

2010 Cadillac SRX

2010 STEERING Steering Wheel and Column - SRX

2010 STEERING

Steering Wheel and Column SRX

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Intermediate Steering Shaft Lower Bolt	36 N.m	27 lb ft
Intermediate Steering Shaft Upper Bolt	34 N.m	25 lb ft
Steering Column Trim Cover Fastener	1.5 N.m	13 lb in
Steering Column Nut	25 N.m	18 lb ft
Steering Wheel Bolt	50 N.m	37 lb ft

SCHEMATIC AND ROUTING DIAGRAMS

COLUMN LOCK SCHEMATICS

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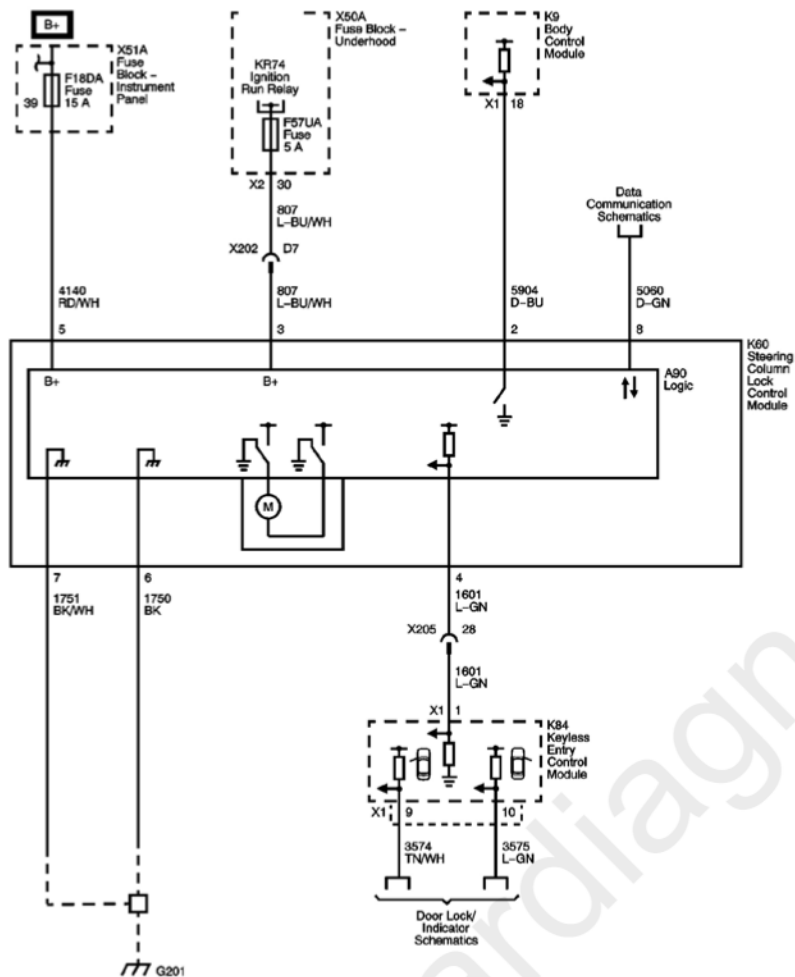


Fig. 1: Column Lock Circuit Schematic
Courtesy of GENERAL MOTORS CORP.

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DIAGNOSTIC CODE INDE

DIAGNOSTIC CODE INDE

DTC	Description
DTC 1023	B1023 00: Integral Switch Malfunction
DTC 144C	B144C 01: Inverted Run/Start Power Relay Circuit Short to Battery B144C 06: Inverted Run/Start Power Relay Circuit Low Voltage/Open
DTC 2515	B2515 5A: Steering Column Lock Motor Feedback Circuit Not Plausible
DTC 2897	B2897 02: Steering Column Lock Motor Lock Circuit Short to Ground B2897 05: Steering Column Lock Motor Lock Circuit High Voltage/Open
DTC 2910	B2910 00: Steering Column Lock Password Incorrect

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DTC 305A

B305A 00: No Response From Steering Column Lock Received

DTC 1023

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.

DTC Descriptor

DTC 1023 00

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 control 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.

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

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.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference**Column Lock Schematics****Connector End View Reference****Component Connector End Views****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**

Scan Tool Reference**Control Module References** for scan tool information**Circuit/System Verification**

Clear all DTCs and operate the integral switch at the steering column lock within the conditions for running the DTC. The DTC should not set.

- If the DTC sets, replace the K60 Steering Column Lock Control Module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Steering Column Lock Control Module Replacement ULS**
- **Control Module References** for steering column lock control module replacement, setup and programming

DTC 144C**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.

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DTC Descriptors

DTC 144C 01

Inverted Run/Start Power Relay Circuit Short to Battery

DTC 144C 06

Inverted Run/Start Power Relay Circuit Low Voltage/Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Run Crank Relay B+	B144C 06	B144C 06	-	-
Off/Accessory Voltage	B144C 06	B144C 06	B144C 01	-

Circuit/System Description

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering column electrically. The steering column lock control 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.

Conditions for Running the DTC

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

Conditions for Setting the DTC

144C 01

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

144C 06

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

Action Taken When the DTC Sets

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

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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 Aids

Verify that DTC B144B is not set prior to performing extensive electrical diagnostics.

Reference Information

Schematic Reference

- Column Lock Schematics
- Power Moding Schematics

Connector End View Reference

Component Connector End Views

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the KR73 RUN/CRNK relay.
2. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal 87A and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage. If the circuit tests normal, replace the K60 Steering Column Lock Control Module.
3. Verify that a test lamp illuminates between the B+ circuit terminal 30 and ground.

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- If the test lamp does not illuminate, test the B+ circuit for an open/high resistance.
- 4. Ignition OFF, disconnect the harness connector at the K60 steering column lock control module.
- 5. Connect a test lamp between the voltage circuit terminal 3 and ground.
- 6. Ignition ON, connect a 5 A fused jumper wire between the B+ circuit terminal 30 and the control circuit terminal 87A. Verify the test lamp is illuminated.
 - If the test lamp is not illuminated and the control circuit fuse is good, test the control circuit for an open/high resistance.
 - If the test lamp is not illuminated and the control circuit fuse is open, test the control circuit for a short to ground. If the circuit tests normal, replace the K60 steering column lock control module.
- 7. If all circuits test normal, test or replace the KR73 RUN/CRNK relay.

Component Testing

Relay Test

1. Ignition OFF, disconnect the KR73 RUN/CRNK relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If not within the specified range, replace the KR73 RUN/CRNK relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - If not the specified value, replace the KR73 RUN/CRNK relay.
4. Test for less than 2 ohms between terminals 30 and 87A.
 - If greater than the specified range, replace the KR73 RUN/CRNK relay.
5. Install a 3 A fused jumper wire between the relay terminal 85 and 12 V. Install a jumper wire between the relay terminal 86 and ground. Test for less than 2 ohms between terminals 30 and 87.
 - If greater than specified range, replace the KR73 RUN/CRNK relay.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Relay Replacement Attached to Wire Harness** or **Relay Replacement Within an Electrical Center**
- **Control Module References** for the steering column lock control module replacement, setup and programming

DTC 2515

Diagnostic Instructions

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- 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.

DTC Descriptor

DTC B2515 5A

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 control 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.

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

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.

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 control module.

Reference Information

Schematic Reference

Column Lock Schematics

Connector End View Reference

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Component Connector End Views

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Clear all DTCs and operate the steering column lock control module within the conditions for running the DTC. The DTC should not set.

- If the DTC sets, replace the K60 Steering Column Lock Control Module or the K9 Body Control Module.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Steering Column Lock Control Module Replacement ULS
- Body Control Module Replacement
- Control Module References for steering column lock control module and BCM replacement, setup and programming

DTC 2897

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.

DTC Descriptors

DTC 2897 02

Steering Column Lock Motor Lock Circuit Short to Ground

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Steering Column Lock Motor Lock Circuit High Voltage/Open

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 05	-

Circuit/System Description

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering electrically. The steering column lock control 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.

Conditions for Running the DTC

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

Conditions for Setting the DTC

2897 02

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

2897 05

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference**Column Lock Schematics****Connector End View Reference****Component Connector End Views****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**

Scan Tool Reference**Control Module References** for scan tool information**Circuit/System Testing**

1. Ignition OFF, disconnect the harness connector at the K60 Steering Column Lock Control Module.
2. Test for less than 5 ohms between the ground circuit terminals 6 and 7 and ground.
 - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Test for greater than 11 V between the B+ circuit terminal 5 and ground.
 - If less than the specified value, test the open circuit on the steering column unlock circuit.
4. Ignition ON, test for greater than 11 V on the control circuit terminal 3.
 - If less than the specified value, test the open circuit on the control circuit.
5. Test for less than 0.3 V of resistance between the control circuit terminal 4 and ground.
 - If greater than the specified value, test the control circuit for a short to voltage.
6. Disconnect the connector at the K77 Remote Control Door Lock Receiver.
7. Test for less than 5 ohms between the K60 Steering Column Lock Control Module circuit terminal 4 and the K77 Remote Control Door Lock Receiver circuit terminal 1.
 - If greater than the specified range, test the control circuit for a open circuit.
8. If all circuits test normal, test or replace the K60 Steering Column Lock Control Module or the K77 Remote Control Door Lock Receiver.

Component Testing**Static Test**

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1. Ignition OFF, disconnect the connector at the K60 Steering Column Lock Control Module.
2. Ignition ON, command the K77 Remote Control Door Lock Receiver to unlock the K60 Steering Column Lock Control Module. Test for less than 5 ohms between the K60 Steering Column Lock Control Module circuit terminal 4 and ground.
 - If not the specified value, replace the K77 Remote Control Door Lock Receiver.
3. Test for infinite resistance between the steering column lock circuit terminal 4 and ground.
 - If less than the specified range, replace the K60 Steering Column Lock Control Module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Steering Column Lock Control Module Replacement ULS**
- **Control Module References** for steering column lock control module/remote control door lock receiver replacement, setup and programming

DTC 2910

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.

DTC Descriptor

DTC 2910 00

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 control 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.

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

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Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Column Lock Schematics

Connector End View Reference

Component Connector End Views

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Clear all DTCs and operate the steering column lock control module within the conditions for running the DTC.

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The DTC should not set.

- If the DTC sets, reprogram the K60 Steering Column Lock Control Module. If the DTC resets, replace the K60 Steering Column Lock Control Module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Steering Column Lock Control Module Replacement ULS**
- **Control Module References** for steering column lock control module replacement, setup and programming

DTC 305A

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.

DTC Descriptor

DTC 305A 00

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 control 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.

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

- DTC B305A is stored in the BCM memory.
- The driver information center displays the service column lock system warning message.

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- The steering column lock indicator is ON.

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 control module.

Reference Information

Schematic Reference

Column Lock Schematics

Connector End View Reference

Component Connector End Views

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Clear all DTCs and operate the steering column lock within the conditions for running the DTC. The DTC should not set.

- If the DTC sets, replace the K60 Steering Column Lock Control Module or the K9 Body Control Module.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Steering Column Lock Control Module Replacement ULS
- Body Control Module Replacement
- Control Module References for steering column lock control module/body control module replacement,

setup and programming

SYMPTOMS - STEERING WHEEL AND COLUMN

Review the system description and operation in order to familiarize yourself with the system functions. Refer to **Power Steering System Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the steering wheel and column.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Symptoms List

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

- **Noise in Steering Column**
- **Looseness in Steering Column**

STEERING COLUMN TILT FUNCTION INOPERATIVE

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections	Go to Step 2	Go to 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		

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	correctly	o to Step 11	o to Step 10
7	Replace the steering column. Refer to <u>Steering Column Replacement</u> . Did you complete the repair	o to Step 11	
	If serviceable, replace the pivot pins. If not serviceable replace the steering column. Refer to <u>Steering Column Replacement</u> . Did you complete the repair	o to Step 11	
	If serviceable, replace the tilt spring. Did you complete the repair	o to Step 11	
10	Route the steering column wiring harness to the correct location. Did you correctly route the wiring harness	o to Step 11	
11	Operate the steering column tilt function in order to verify the repair. Did you correct the condition	System OK	o to Step 3

HIGH TELESCOPING EFFORT

Checks	Action
The steering shaft assembly is bent or damaged.	If necessary, replace the steering column. Refer to <u>Steering Column Replacement</u> .

NOISE WHILE DRIVER ADJUSTING COLUMN

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

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	o to Step 2	o to <u>Symptoms - Steering Wheel and Column</u>
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation	o to Step 3	System OK
	Inspect the steering column mounting features for the following conditions: The steering column mounting fasteners are		

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3	loose. The steering column mounting features are sheared.		
	Are the steering column mounting features loose	o to Step 9	o to Step 4
4	Inspect the SIR SRS coil for noise. Is the SIR SRS coil noisy	o to Step 10	o to Step 5
5	If e uipped, inspect the lock plate retaining ring for correct installation. Is the lock plate retaining ring installed incorrectly	o to Step 11	o to Step 6
6	Inspect the steering column upper and lower bearings for the following conditions: - Damage - Lubrication - Wear - Proper seating Are the bearings in need of repair or replacement	o to Step 12	o to Step 7
7	Does the tilt oint need to be lubricated	o to Step 13	o to Step 8
	NOTE: Inspect the intermediate shaft for noise while driving the vehicle, turning the steering wheel, and applying the brakes. Inspect the intermediate shaft for noise. Is the intermediate shaft noisy	o to Step 14	o to Step 15
	NOTE: If the steering column mounting feature is damaged or sheared, replace the steering column. Refer to <u>Steering Column Replacement</u>. Tighten the steering column mounting fastener to specifications. Refer to <u>Fastener Tightening Specifications</u>. Did you complete the repair	o to Step 15	
10	Replace the SIR SRS coil. Refer to <u>Steering Wheel Inflatable Restraint Module Coil Replacement</u> . Did you complete the repair	o to Step 15	
11	Install the lock plate retaining ring correctly. Did you complete the repair	o to Step 15	
	NOTE:		

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12	If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to <u>Steering Column Replacement</u> . Replace the upper and or lower bearings, if serviceable. Did you complete the replacement	o to Step 15	
13	Lubricate the tilt joint. Did you complete the repair	o to Step 15	
14	Replace the appropriate steering intermediate shaft component. Did you complete the repair	o to Step 15	
15	Operate the system in order to verify the repair. Did you correct the condition	System OK	o to Step 3

LOOSENESS IN STEERING COLUMN

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections	o to Step 2	o to <u>Symptoms - Steering Wheel and Column</u>
2	Verify that the steering column is loose. Is the steering column loose	o 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	o to Step 5	o to Step 4
4	Inspect the upper and or lower bearings for looseness. Are any of the bearings worn or loose	o to Step 6	o to Step 7
5	NOTE: If the steering column mounting feature is damaged or sheared, replace the steering column. Refer to <u>Steering Column Replacement</u> . Tighten the steering column mounting fastener to specifications. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair	o to Step 7	
	NOTE:		

6	If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to <u>Steering Column Replacement</u>. Replace the upper and or lower bearings, if serviceable.Did you complete the repair	o to Step 7	
7	Operate the steering column in order to verify the repair. Did you correct the condition	System OK	o to Step 3

REPAIR INSTRUCTIONS

INTERMEDIATE STEERING SHAFT UPPER SEAL REPLACEMENT

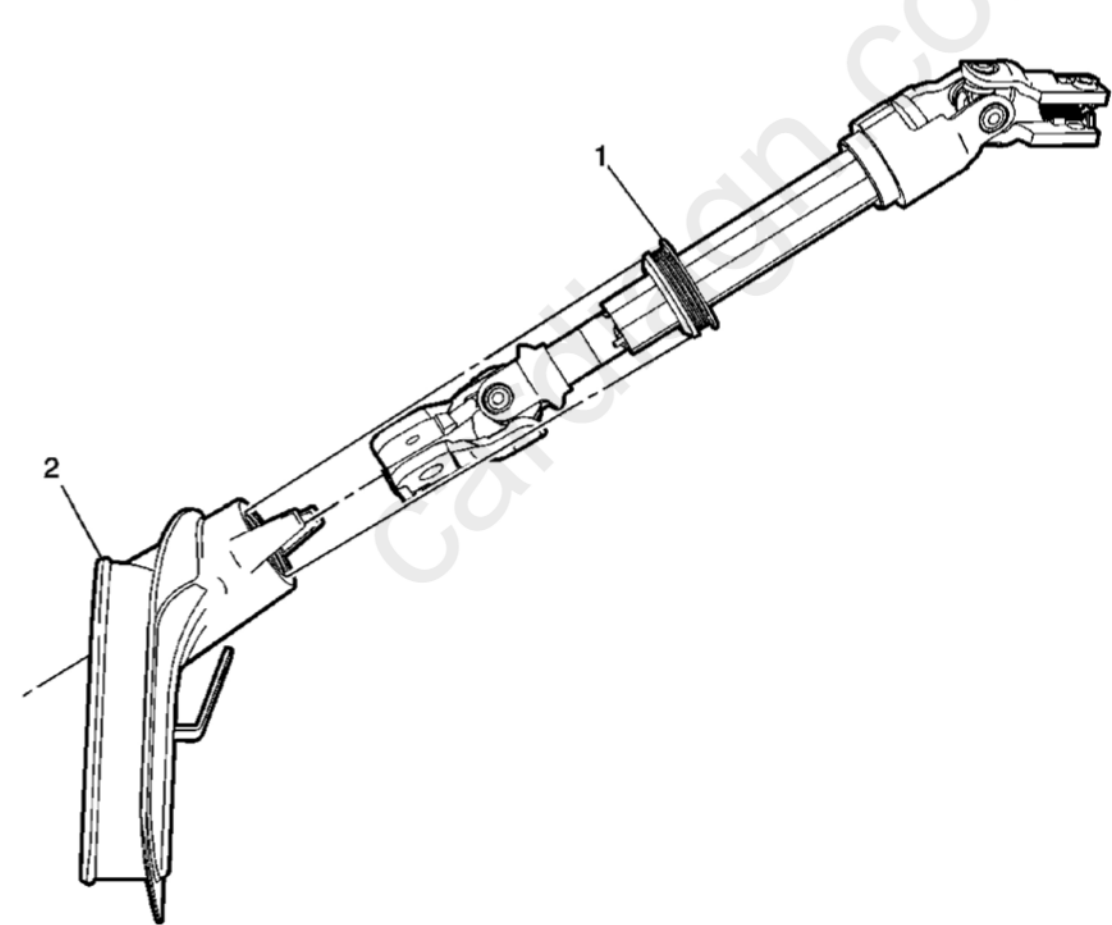


Fig. 2: View Of Intermediate Steering Shaft Upper Seal
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure:	

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Remove the intermediate steering shaft. Refer to **Intermediate Steering Shaft Replacement**.

1	Intermediate Steering Shaft Upper Seal Collar Procedure: Disengage the collar from the intermediate steering shaft upper seal.
2	Intermediate Steering Shaft Upper Seal

INTERMEDIATE STEERING SHAFT REPLACEMENT

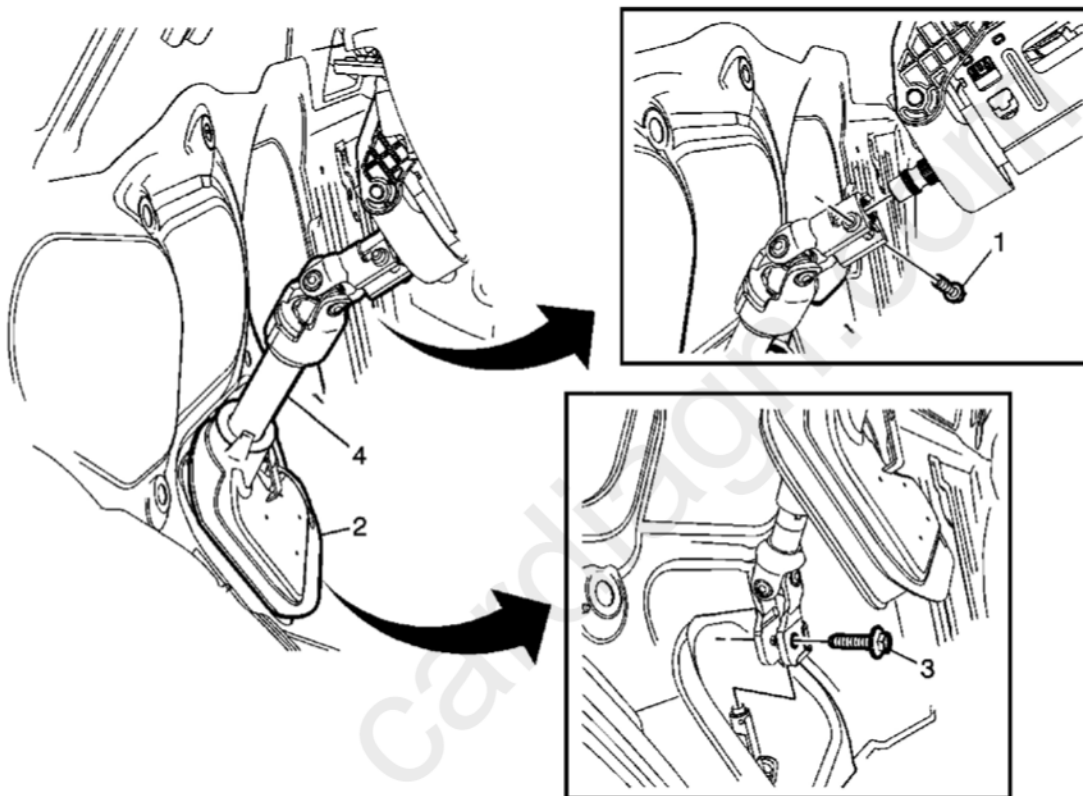


Fig. : Identifying Intermediate Steering Shaft
Courtesy of GENERAL MOTORS CORP.

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

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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.

Preliminary Procedure

1. LOCK the steering column in the straight ahead position.
2. Remove the left side instrument panel insulator panel. Refer to **Instrument Panel Insulator Panel Replacement - Left Side**.
3. Use paint in order to place match marks on the intermediate steering shaft and on the steering gear pinion shaft.
4. Use paint in order to place match marks on the steering column shaft and on the intermediate steering shaft.

Intermediate Steering Shaft Upper Bolt

CAUTION:

Refer to **Fastener Caution**.

Procedure

1. Remove and discard the intermediate steering shaft upper bolt.
2. Install a NEW intermediate steering shaft upper bolt.

Tip: A NEW intermediate steering shaft upper bolt has a thread locking adhesive patch on the threads.

Tighten: 34 N.m (25 lb ft)

Intermediate Steering Shaft Seal

Procedure

2. Remove the push in retainer from the seal.
2. Disengage the seal from the floor.
3. Slide the seal up the intermediate steering shaft.

Intermediate Steering Shaft Lower Bolt

Procedure

3. Remove and discard the intermediate steering shaft lower bolt with the plastic sleeve retainer.
2. Install a NEW intermediate steering shaft lower bolt.

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Tip: A NEW intermediate steering shaft lower bolt has a plastic sleeve retainer on the shank and a thread locking adhesive patch on the threads.

Tighten: 36 N.m (27 lb ft)

Intermediate Steering Shaft

Procedure

4

1. Pull the intermediate steering shaft off of the steering column shaft.
2. Pull the intermediate steering shaft off of the steering gear pinion shaft in an axial direction.
3. If you are replacing the intermediate steering shaft, copy the match marks from the old intermediate steering shaft to the new intermediate steering shaft.
4. Align the match marks and install the intermediate steering shaft to the steering gear pinion shaft in an axial direction.
5. Align the match marks and the block tooth on the intermediate steering shaft with the match marks and the notch on the steering column shaft. Install the intermediate steering shaft to the steering column shaft.
6. Push the intermediate steering shaft in an axial direction onto the steering gear pinion shaft shoulder.
7. After installation, center the steering angle sensor. Refer to **Steering Angle Sensor Centering**.

STEERING COLUMN SHROUD REPLACEMENT

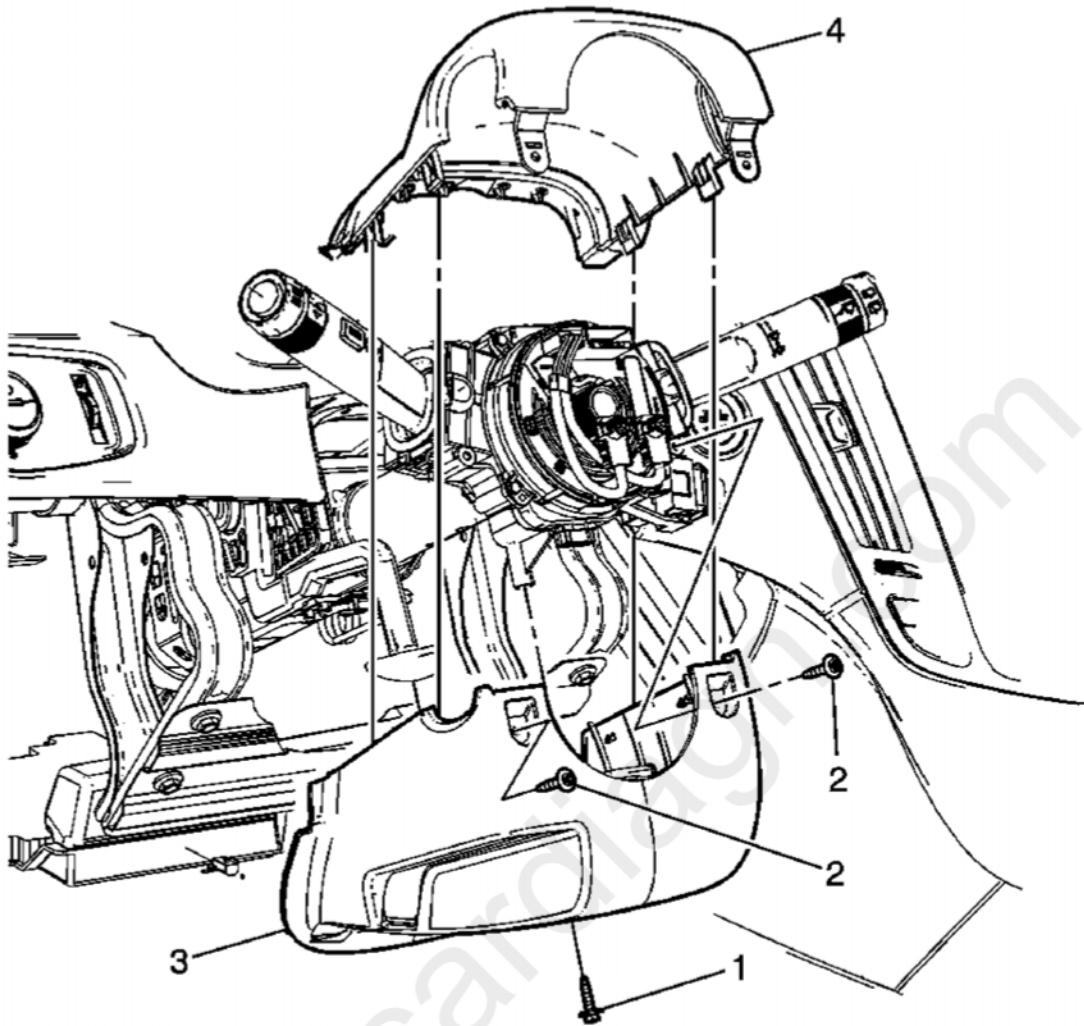


Fig. : View Of Steering Column Shroud
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Telescope the steering column to the maximum rearward position. Tilt the steering column to the lowest position.	
2. Remove the left knee bolster. Refer to <u>Dri er Knee Bolster Panel Replacement</u>	
	Steering Column Trim Cover Fastener CAUTION: Refer to <u>Fastener Caution</u> .

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1	Tip: Snap the steering column upper shroud and the steering column lower shroud together before installing the fasteners. Tighten: 1.5 N.m (13 lb in)
2	Steering Column Trim Cover Fastener (Qty: 2) Procedure: Turn the steering wheel in order to access the fasteners. Tighten: 1.5 N.m (13 lb in)
3	Steering Column Lower Shroud
4	Steering Column Upper Shroud Procedure: Disconnect the steering column upper shroud from the steering column seal.

STEERING COLUMN LOCK CONTROL MODULE REPLACEMENT ULS

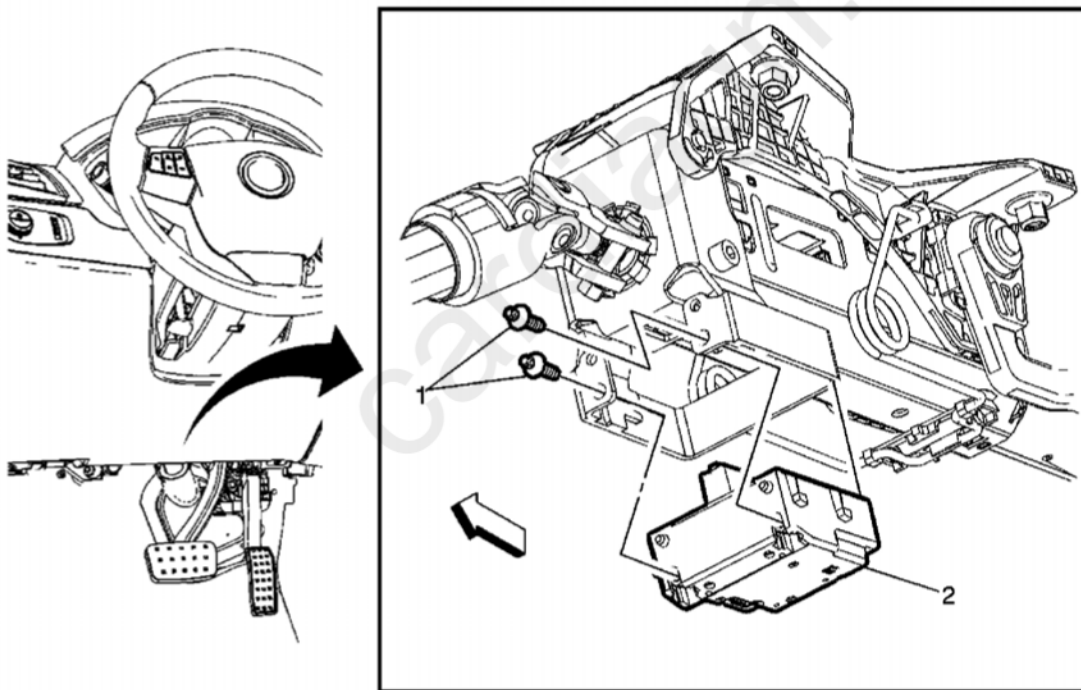


Fig. : Identifying Steering Column Lock Control Module ULS
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1.	Ensure the steering wheel and the front wheels are in the straight ahead position.

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2. Remove the left side instrument panel insulator panel. Refer to **Instrument Panel Insulator Panel Replacement - Left Side**.
3. With your foot off of 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 (ACC) mode and unlock the steering column for 5 minutes.
4. Turn the steering wheel in order to verify the steering column is not locked.
5. Disconnect any electrical connectors as necessary.
6. With your foot off of 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. With the electrical connector disconnected, the steering column lock module will remain in the unlocked position.

Steering Column Lock Control Module Bolt (Qty: 2)

CAUTION:
Refer to **Fastener Caution**.

Procedure

1. Use any of the following common tools in order to remove the bolts:
 - An angle grinder and a screwdriver
 - A hammer and a chisel
 - A screw extractor
 - A center punch
2. Discard the old bolts.
3. Install 2 NEW bolts and tighten until the bolt heads break off.

Tip: The steering column lock control module bolts are shear bolts.

Steering Column Lock Control Module

Procedure

2. 1. Disconnect any electrical connectors as necessary.
2. After the installation is complete, program and setup the steering column lock control module. Refer to **Control Module References**.

TURN SIGNAL SWITCH BRACKET REPLACEMENT

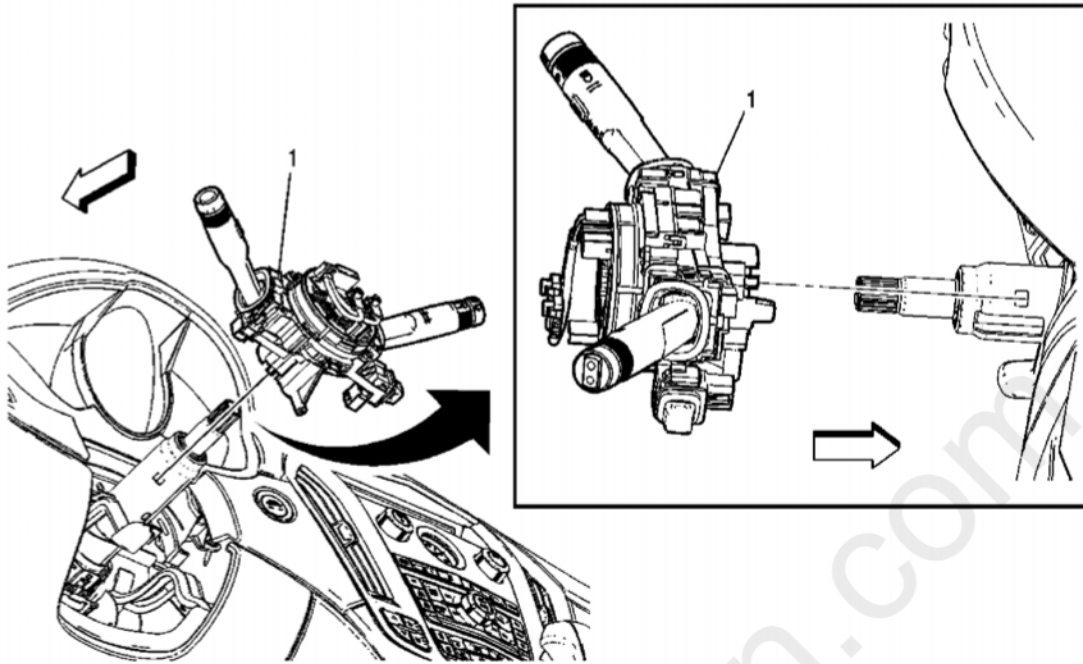


Fig. 6: Identifying Turn Signal Switch Bracket
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Remove the steering wheel. Refer to <u>Steering Wheel Replacement</u>. 2. Remove the steering column shroud. Refer to <u>Steering Column Shroud Replacement</u>.	
1	Turn Signal Switch Bracket Procedure 1. Disconnect any electrical connectors as necessary. 2. Release the 2 tabs in order to release the turn signal switch bracket from the steering column. 3. Transfer any parts as necessary. Refer to the following procedures: • <u>Turn Signal Multifunction Switch Replacement</u> • <u>Windshield Wiper and Washer Switch Replacement</u> • <u>Steering Wheel Inflatable Restraint Module Coil Replacement</u> • <u>Steering Angle Sensor Replacement</u> • <u>Brake and Accelerator Pedal Adjuster Switch Replacement</u>

TURN SIGNAL MULTIFUNCTION SWITCH REPLACEMENT

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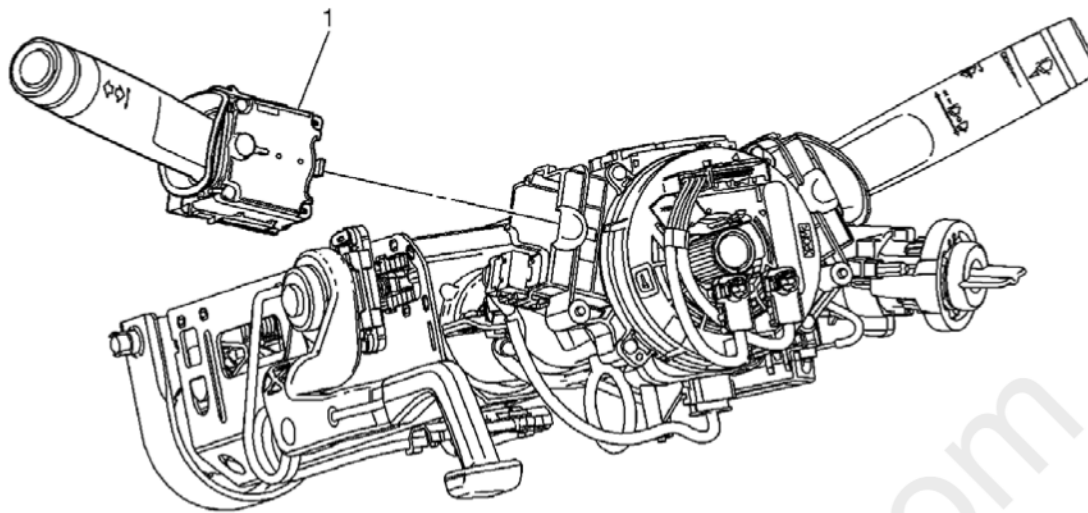


Fig. 7: Identifying Turn Signal Multifunction Switch
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the steering column shroud. Refer to <u>Steering Column Shroud Replacement</u> .	
1	Turn Signal Multifunction Switch Procedure 1. Disconnect any electrical connectors. 2. Depress the locking tabs to remove the turn signal multifunction switch.

STEERING WHEEL PAD ACCESSORY WIRING HARNESS REPLACEMENT

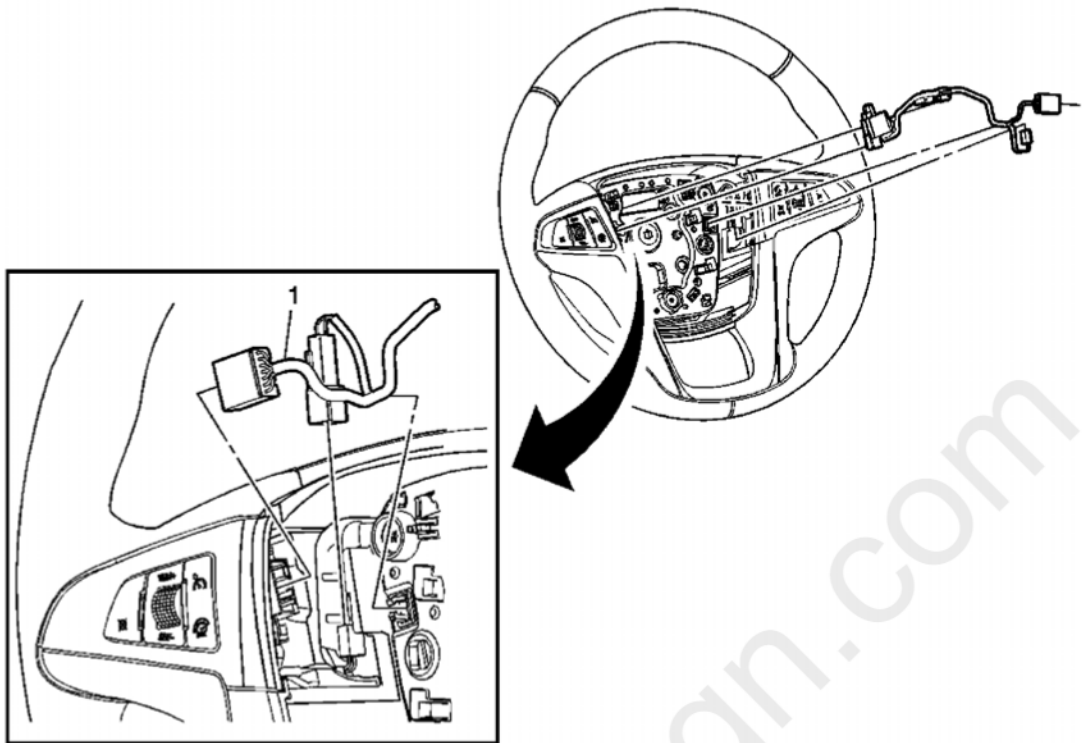


Fig. 8: View Of Steering Wheel Pad Accessory Wiring Harness
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1. Remove the steering wheel inflatable restraint module. Refer to <u>Steering Wheel Inflatable Restraint Module Replacement</u> 2. Remove the steering wheel horn contact. Refer to <u>Steering Wheel Horn Contact Replacement</u> 3. Remove the cruise control switch. Refer to <u>Cruise Control Switch Replacement</u> 4. Remove the radio control switch. Refer to <u>Radio Control Switch Replacement - Steering Wheel</u>	
1	Steering Wheel Pad Accessory Wiring Harness Procedure 1. Note the harness routing prior to removal and follow the same routing. 2. Disconnect the electrical connectors.

STEERING WHEEL REPLACEMENT

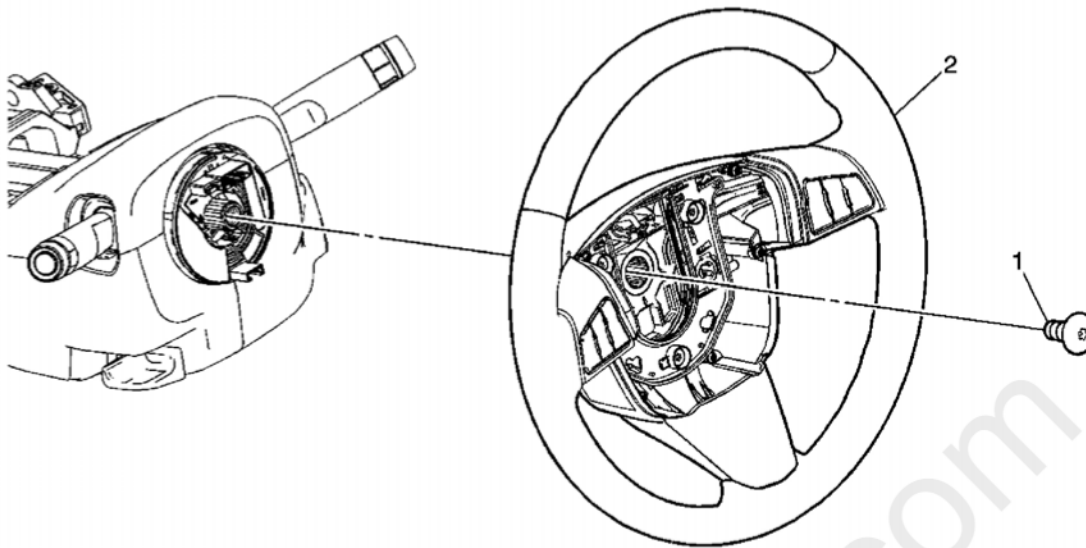


Fig. 9: Identifying Steering Wheel
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1. Remove the inflatable restraint steering wheel module. Refer to <u>Steering Wheel Inflatable Restraint Module Replacement</u>. 2. Use paint in order to place match marks on the steering wheel and on the steering column shaft.	
1	Steering Wheel Bolt CAUTION: Refer to <u>Fastener Caution</u>. Tighten: 50 N.m (37 lb ft)
2	Steering Wheel Procedure 1. Disconnect all electrical connectors as necessary. 2. Loosen the steering wheel bolt until 2 to 3 threads are left engaged. 3. Wiggle the steering wheel until the steering wheel disengages completely. 4. Remove the steering wheel bolt. 5. Remove the steering wheel. 6. Copy the match marks from the old steering wheel to the new steering wheel. 7. Transfer any parts as necessary.

STEERING COLUMN REPLACEMENT

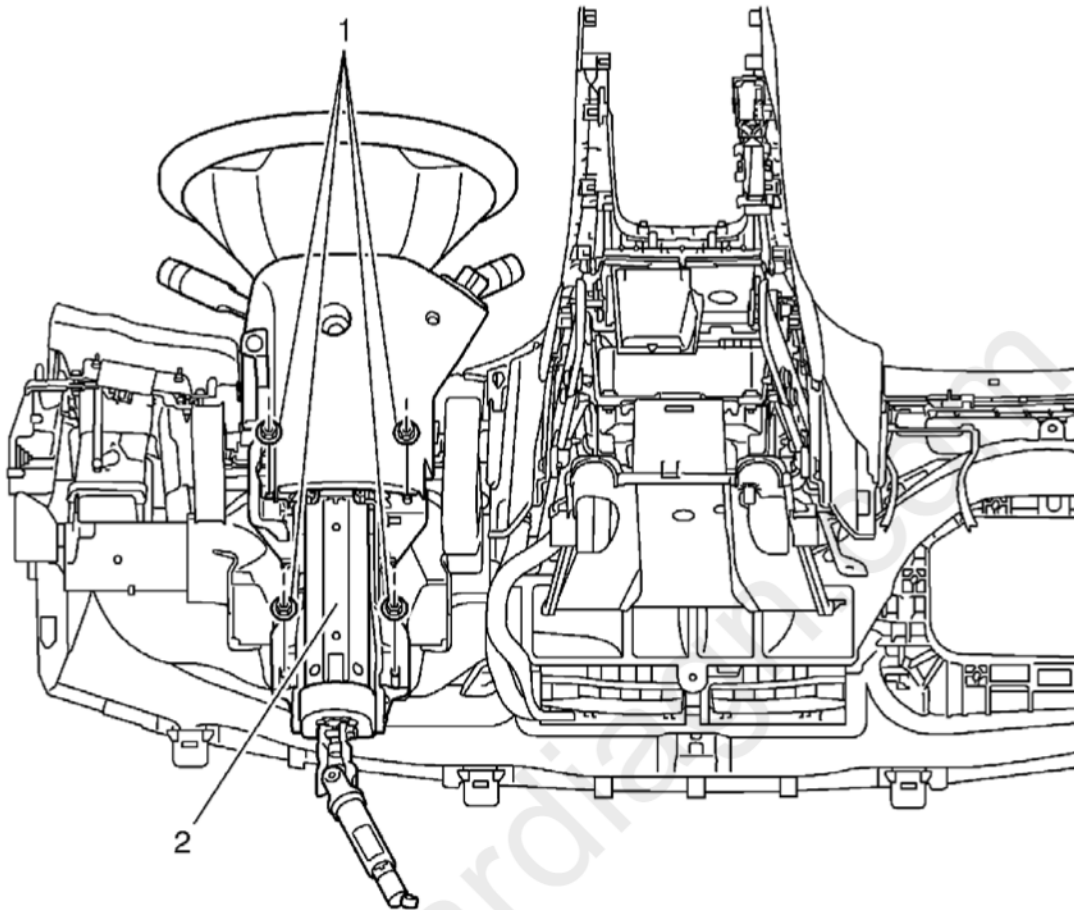


Fig. 10: Identifying Steering Column
Courtesy of GENERAL MOTORS CORP.

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

Preliminary Procedure

1. LOCK the steering column and verify the front wheels are in the straight ahead position.
2. Disable the supplemental inflatable restraint system. Refer to **SIR Disabling and Enabling** .
3. Remove the left instrument panel insulator panel. Refer to **Instrument Panel Insulator Panel Replacement - Left Side** .
4. Remove the driver knee bolster reinforcement. Refer to **Driver Knee Bolster Reinforcement Replacement** .
5. Remove the steering column shroud. Refer to **Steering Column Shroud Replacement**.
6. Use paint in order to place match marks on the steering column shaft and on the intermediate steering shaft.
7. Disconnect the intermediate steering shaft from the steering column. Refer to **Intermediate Steering Shaft Replacement**.

1	Steering Column Nut (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 25 N.m (18 lb ft)
2	Steering Column 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 <u>Steering Wheel Replacement</u> procedure in this section. Procedure 1. Disconnect any electrical connectors as necessary. 2. Transfer any parts as necessary. 3. If you are replacing the steering column, copy the match marks from the old steering column to the new steering column. 4. After installation, center the steering angle sensor. Refer to <u>Steering Angle Sensor Centering</u> .

STEERING ANGLE SENSOR REPLACEMENT

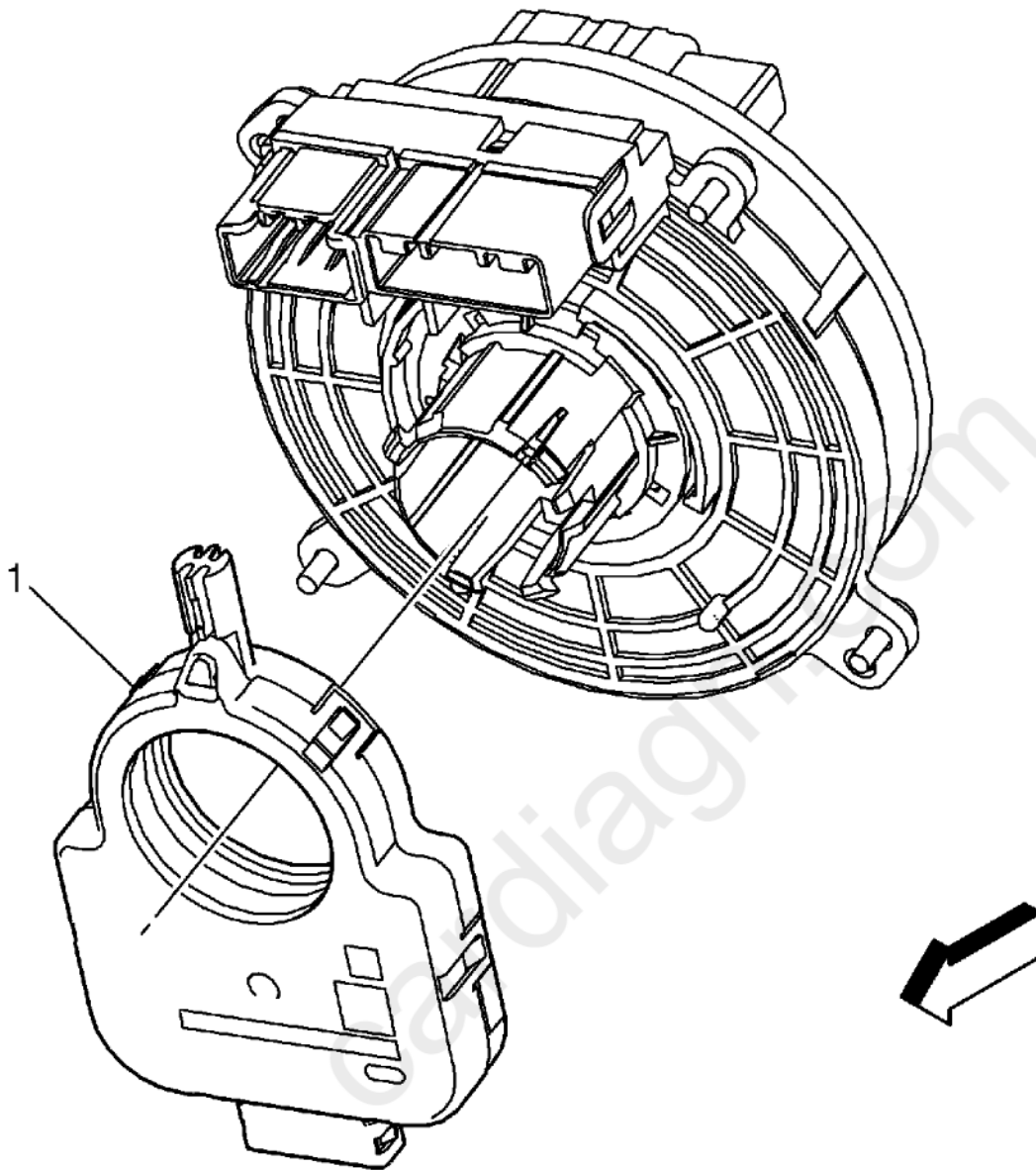


Fig. 11: View Of Steering Angle Sensor
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the steering wheel inflatable restraint module coil. Refer to <u>Steering Wheel Inflatable Restraint Module Coil Replacement</u> .	
1	Steering Angle Sensor Procedure 1. Press in the clip on the steering wheel inflatable restraint module coil in order to remove the sensor.

- | |
|---|
| 2. After installation, center the steering angle sensor. Refer to <u>Steering Angle Sensor Centering</u> . |
|---|

DESCRIPTION AND OPERATION

STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION

The steering wheel and column has 4 primary functions:

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

Vehicle Steering

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

The steering column can be adjusted vertically and longitudinally.

Vehicle Security

Theft deterrent components are mounted and designed into the steering column. The following components allow the column to be locked in order to minimize theft:

- The ignition switch
- The steering column lock
- The ignition cylinder
- The theft deterrent immobilizer module, if equipped

Driver Convenience

The steering wheel and column may also have driver controls attached for convenience and comfort. The following controls may be mounted on the steering wheel or column.

- The turn signal switch
- The headlamp dimmer switch
- The wiper/washer switch
- The horn pad
- The redundant radio/entertainment system controls
- The tilt functions
- The telephone system controls

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- The driver information center controls
- The cruise control functions
- The automatic transmission manual setting function

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.

SIR Coil and Module

For additional information on the operation of the SIR coil and module, refer to **SIR System Description and Operation**.

Electronic Park Lock/Ignition Lock Cylinder Control Actuator

If the vehicle is equipped with automatic transmission and a floor mounted console gear shift, it has an ignition lock cylinder control actuator system in the steering column. The ignition lock cylinder control actuator purpose is to prevent the ignition key from being turned to the OFF position when the transmission is in any position other than PARK and the vehicle may still be moving. The column ignition lock system consists of an ignition lock cylinder control actuator, and a park position switch that is located in the automatic transmission shift lock control switch. The ignition lock cylinder control actuator contains a pin that is spring loaded to mechanically prevent the ignition key cylinder from being turned to the lock position when the vehicle transmission is not in the PARK position. If vehicle power is lost, and/or the transmission is not in the PARK position the operator will not be able to turn the ignition key to the lock position and will not be able to remove the ignition key from the column. Depending on the implementation, logic might be inverted: Key can be removed by power off.

Steering Wheel Angle Sensor

The steering wheel angle sensor is located somewhere along the steering shaft assembly. The sensor measures the position of the steering wheel and the speed at which it is rotated. A signal representing this measurement is provided to the vehicle stability enhancement system in the ABS module and to the variable effort steering system.

The Theft Deterrent Immobilizer Module

The immobilizer module is mounted in the steering column lock on cars without Passive Entry Passive Start system. Refer to **Content Theft Deterrent (CTD) Description and Operation**.

