

2010 STEERING

Steering Wheel and Column - Equinox & Terrain

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Intermediate Steering Shaft Bolt	36 N.m	27 lb ft
Steering Column Lower Trim Cover Fastener	2.5 N.m	22 lb in
Steering Column Nut	22 N.m	16 lb ft
Steering Wheel Bolt	50 N.m	37 lb ft

SCHEMATIC AND ROUTING DIAGRAMS

COLUMN LOCK SCHEMATICS

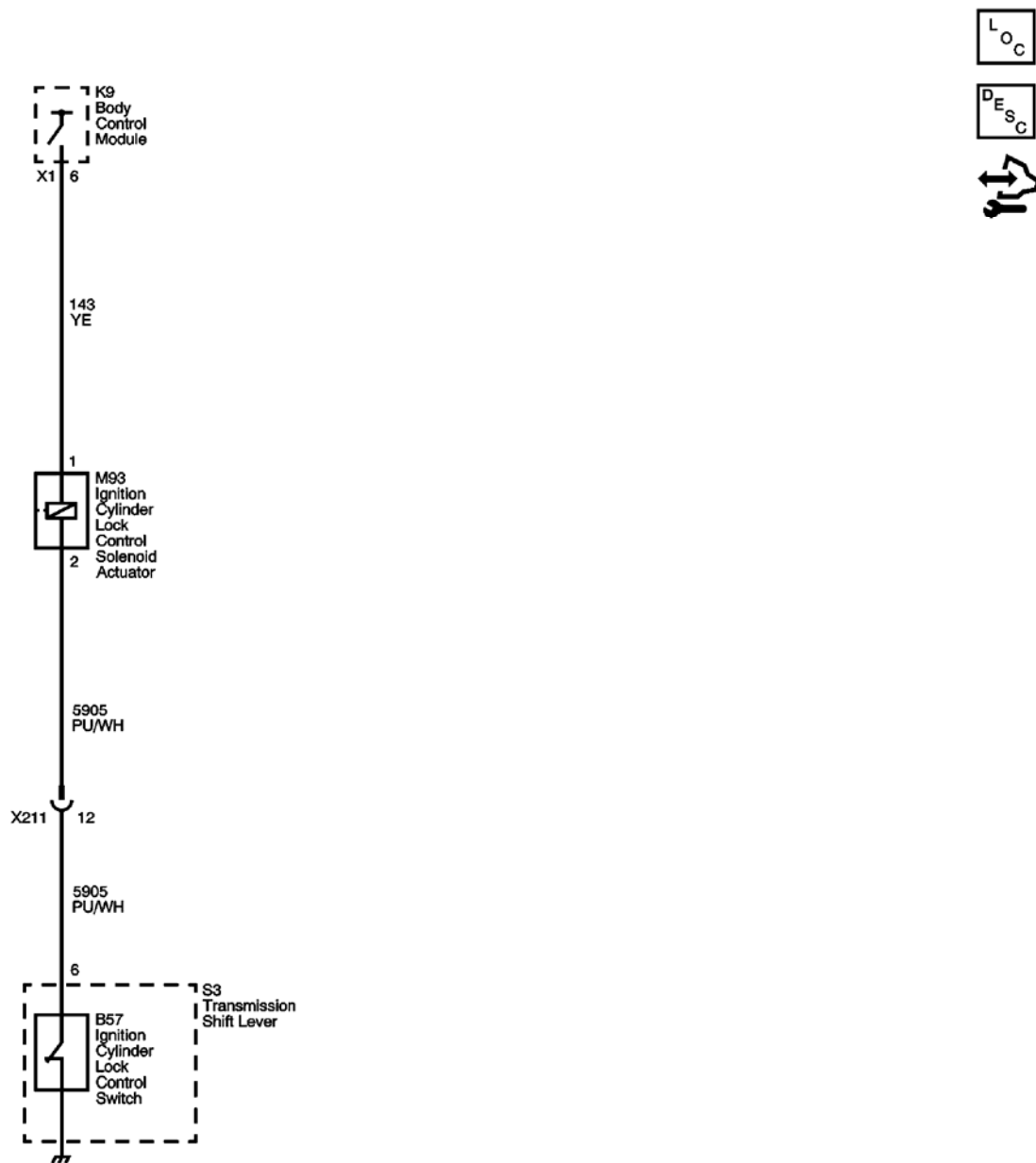


Fig. 1: Column Lock

DIAGNOSTIC INFORMATION AND PROCEDURES

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

Visual/Physical Inspection

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

Symptoms List

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

- **Steering Column Tilt Function Inoperative**
- **High Effort While Tilting Column**
- **Noise While Driver Adjusting Column**
- **Noise in Steering Column**
- **Looseness in Steering Column**

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 <u>Symptoms - Steering Wheel and Column</u>
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 <u>Steering Column Replacement</u> .		

	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 <u>Steering Column Replacement</u> . Did you complete the repair?	Go to Step 11	-
9	If serviceable, replace the tilt spring. Did you complete the repair?	Go to Step 11	-
10	Route the steering column wiring harness to the correct location. Did you correctly route the wiring harness?	Go to Step 11	-
11	Operate the steering column tilt function in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

HIGH EFFORT WHILE TILTING COLUMN

Condition	Action
The pivot bolt is damaged or misaligned.	Replace the steering column. Refer to <u>Steering Column Replacement</u> .
The tilt lever assembly or the tilt teeth are damaged.	If necessary, replace the steering column. Refer to <u>Steering Column Replacement</u> .

NOISE WHILE DRIVER ADJUSTING COLUMN

Condition	Action
Interference occurs in the column assembly pivot path.	Inspect the column jacket for wear patterns. Ensure that the mounting and the pivot bolts are properly installed and that the column is properly aligned in the vehicle.
The tilt lever assembly is damaged.	Replace the steering column. Refer to <u>Steering Column Replacement</u> .

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 <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?	Go to Step 3	System OK
	Inspect the steering column mounting features for the following conditions:		

3	• The steering column mounting fasteners are loose. • The steering column mounting features are sheared. Are the steering column mounting features loose?	Go to Step 9	Go to Step 4
4	Inspect the SIR/SRS coil for noise. Is the SIR/SRS coil noisy?	Go to Step 10	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 11	Go to Step 6
6	Inspect the steering column upper and lower bearings for the following conditions: • Damage • Lubrication • Wear • Proper seating Are the bearings in need of repair or replacement?	Go to Step 12	Go to Step 7
7	Does the tilt joint need to be lubricated?	Go to Step 13	Go to Step 8
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?	Go to Step 14	Go to Step 15
9	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?	Go 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?	Go to Step 15	-
11	Install the lock plate retaining ring correctly. Did you complete the repair?	Go to Step 15	-
	NOTE:		

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?	Go to Step 15	-
13	Lubricate the tilt joint. Did you complete the repair?	Go to Step 15	-
14	Replace the appropriate steering intermediate shaft component. Did you complete the repair?	Go to Step 15	-
15	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

LOOSENESS IN STEERING COLUMN

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?	Go to Step 2	Go to <u>Symptoms - Steering Wheel and Column</u>
2	Verify that the steering column is loose. Is the steering column loose?	Go to Step 3	System OK
3	Inspect the steering column mounting features for the following conditions. • The steering column mounting fasteners are loose. • The steering column mounting features are sheared. Are the steering column mounting features loose?	Go to Step 5	Go to Step 4
4	Inspect the upper and/or lower bearings for looseness. Are any of the bearings worn or loose?	Go to Step 6	Go to Step 7
5	NOTE: If the steering column mounting 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?	Go to Step 7	-
	NOTE: If the steering column upper and/or lower bearings are not serviceable, replace the steering column.		

	Refer to <u>Steering Column Replacement</u> .		
6	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

INTERMEDIATE STEERING SHAFT REPLACEMENT

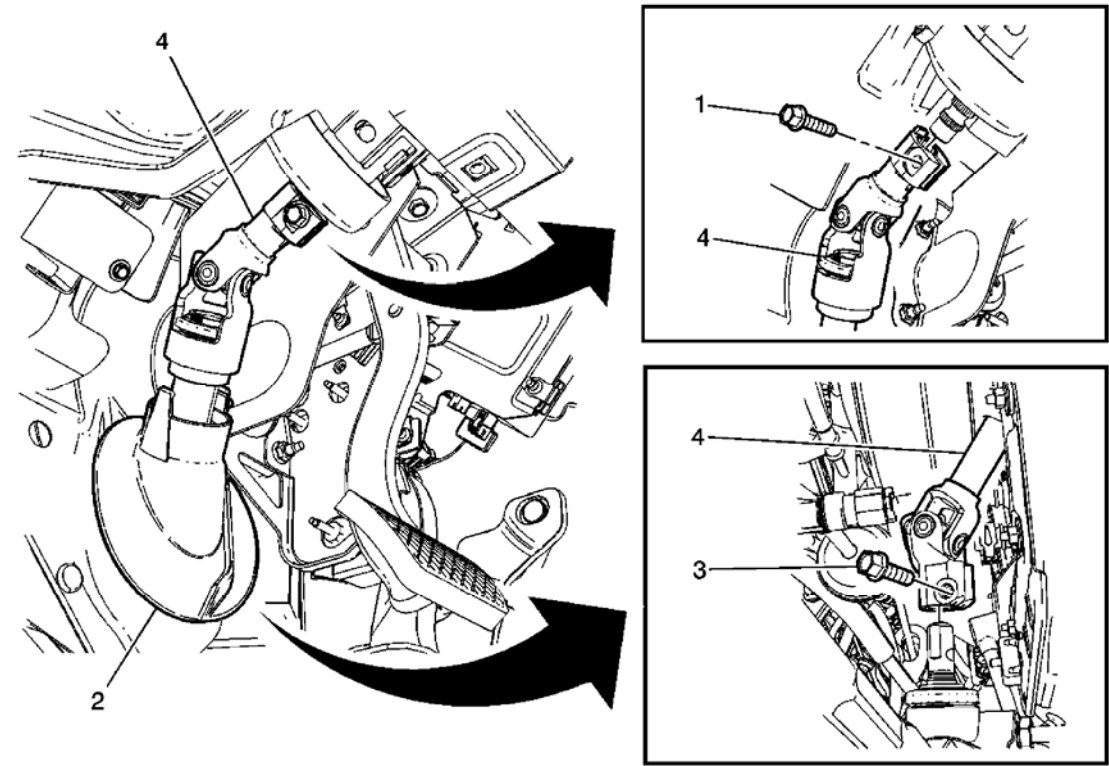


Fig. 2: Intermediate Steering Shaft
Courtesy of GENERAL MOTORS CORP.

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

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. With the front wheels in the straight ahead position, turn the ignition switch to the OFF position and remove the key from the ignition lock cylinder.
2. Rotate the steering wheel in order to lock the steering column.
3. Remove the left side instrument panel insulator panel. Refer to **Instrument Panel Insulator Panel Replacement - Left Side (Equinox)** or **Instrument Panel Insulator Panel Replacement - Left Side (Terrain)** .
4. Use paint in order to place match marks on the steering column shaft and on the intermediate steering shaft.
5. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
6. Use paint in order to place match marks on the intermediate steering shaft and on the steering gear pinion shaft.

1	Intermediate Steering Shaft Upper Bolt CAUTION: Refer to <u>Fastener Caution</u> . Procedure 1. Remove the intermediate steering shaft upper bolt. - Discard the 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: 36 N.m (27 lb ft)
2	Intermediate Steering Shaft Seal Procedure: If you are replacing the intermediate steering shaft, disengage the seal from the floor and slide the seal up the intermediate steering shaft. Tip: The intermediate steering shaft seal is for a single use only. If you are NOT replacing

	the intermediate steering shaft, DO NOT disengage the seal from the floor.
3	Intermediate Steering Shaft Lower Bolt Procedure 1. From the left front wheelhouse opening, remove the intermediate steering shaft lower bolt. - Discard the bolt. 2. Install a NEW intermediate steering shaft lower bolt. Tip: A NEW intermediate steering shaft lower bolt has a thread locking adhesive patch on the threads. Tighten: 36 N.m (27 lb ft)
4	Intermediate Steering Shaft Procedure 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 connect the intermediate steering shaft to the steering gear pinion shaft in an axial direction. 5. Align the match marks and connect 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 <u>Steering Angle Sensor Centering</u>.

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:

- Frame damage
- Major body damage
- Sheet metal damage
- If the steering column has been impacted
- 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.

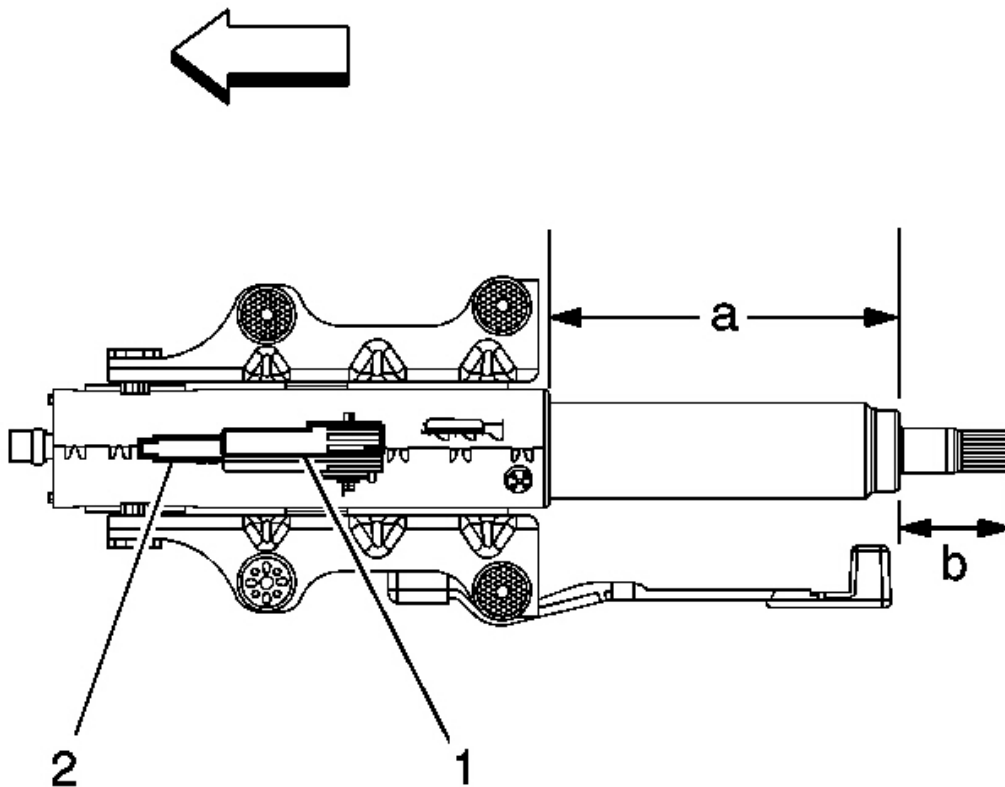


Fig. 3: Steering Column Components
 Courtesy of GENERAL MOTORS CORP.

4. Verify the E/A strap retainer (1) is firmly seated on the jacket.
5. Verify there is no visual damage to the E/A strap (2).
6. 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 not be less than 61 mm (2.4 in).

- 7. Measure the length of the upper jacket assembly (a). The length of the upper jacket assembly must not be less than 160 mm (6.3 in).
- 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. If the steering column meets the specifications, install the steering column. Refer to **Steering Column Replacement**.
- 9. Install the turn signal switch bracket. Refer to **Turn Signal Switch Bracket Replacement**.

STEERING COLUMN SHROUD REPLACEMENT

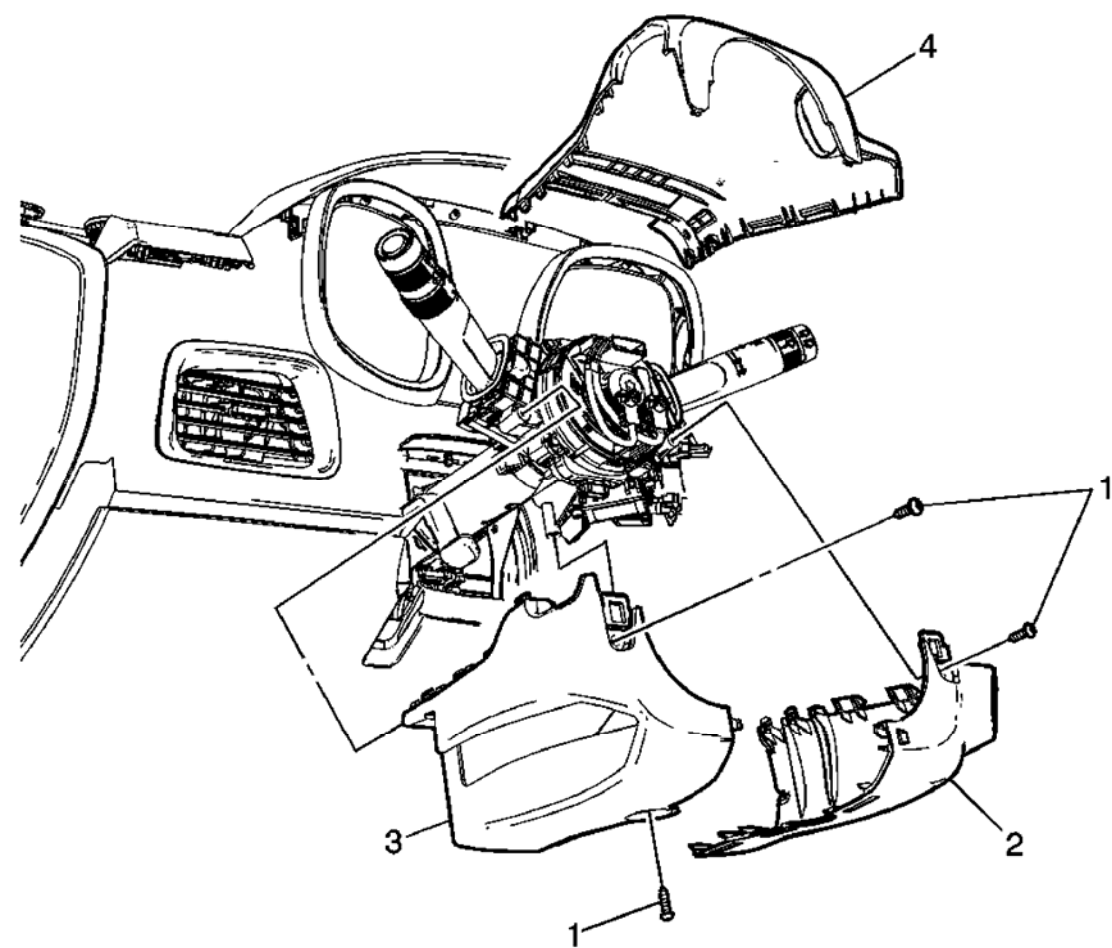


Fig. 4: Steering Column Shroud
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1.	Telescope the steering column to the maximum rearward position.
2.	Tilt the steering column to the lowest position.

	Steering Column Lower Trim Cover Fastener (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Procedure 1 1. Turn the ignition key to the ON position. 2. Turn the steering wheel in order to access the fasteners. 3. Snap the upper shroud, the lower left shroud, and the lower right shroud together before installing the fasteners. Tighten: 2.5 N.m (22 lb in)
2	Steering Column Lower Right Shroud
3	Steering Column Lower Left Shroud
4	Steering Column Upper Shroud Procedure: Disconnect the upper shroud from the steering column seal.

TURN SIGNAL SWITCH BRACKET REPLACEMENT

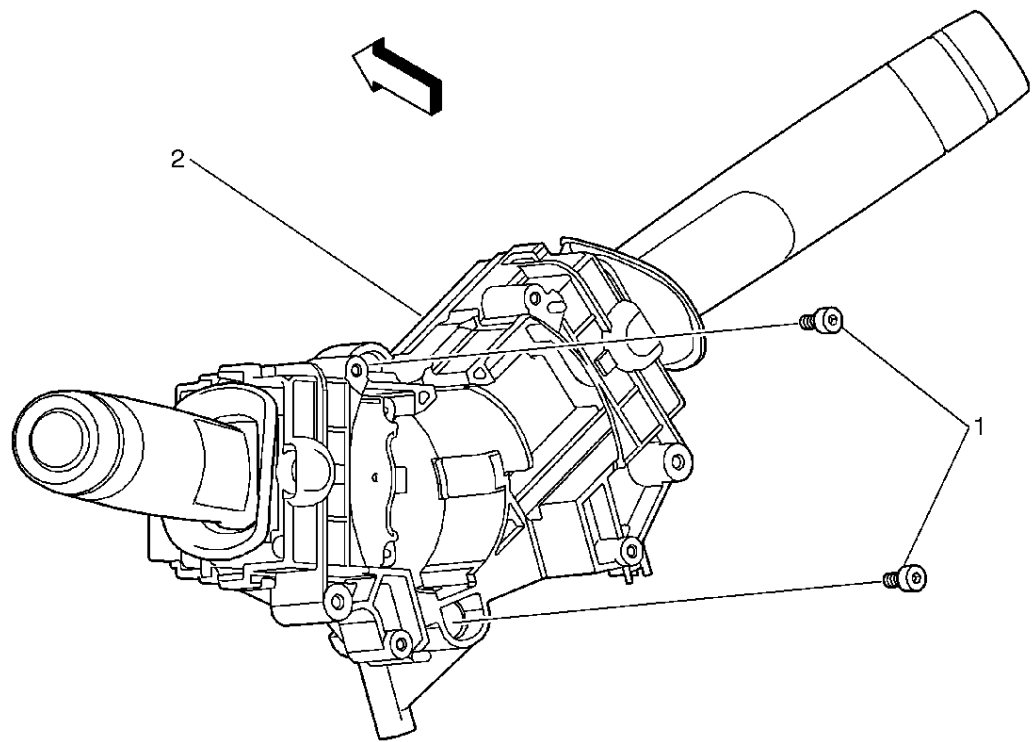


Fig. 5: Turn Signal Switch Bracket
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the inflatable restraint steering wheel module coil. Refer to <u>Steering Wheel Inflatable Restraint Module Coil Replacement</u> .	
1	Turn Signal Switch Bracket Fastener (Qty: 2)
2	Turn Signal Switch Bracket Procedure 1. Disconnect any electrical connectors as needed. 2. Transfer any parts as needed.

TURN SIGNAL MULTIFUNCTION SWITCH REPLACEMENT

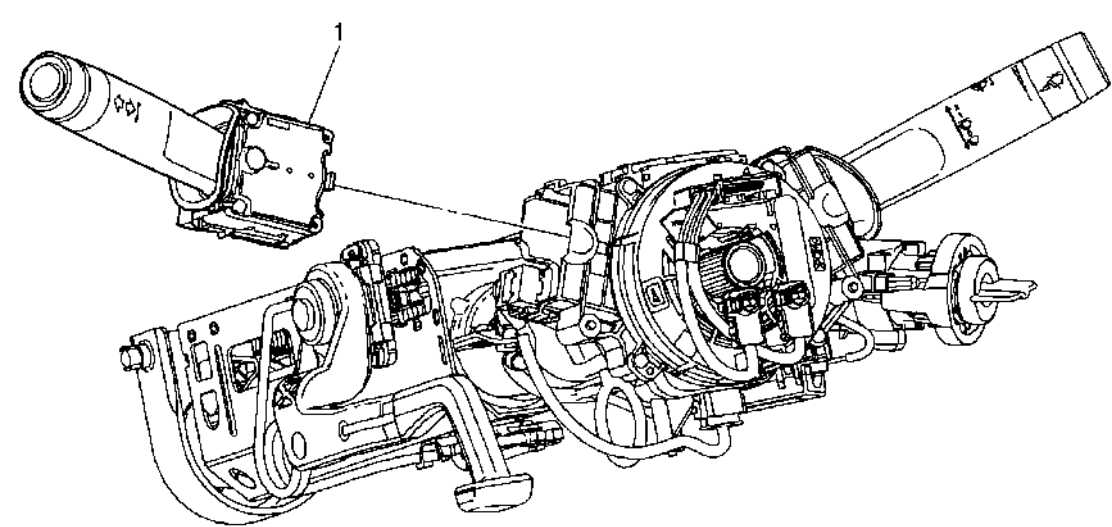


Fig. 6: Turn Signal Multifunction Switch
Courtesy of GENERAL MOTORS CORP.

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 REPLACEMENT

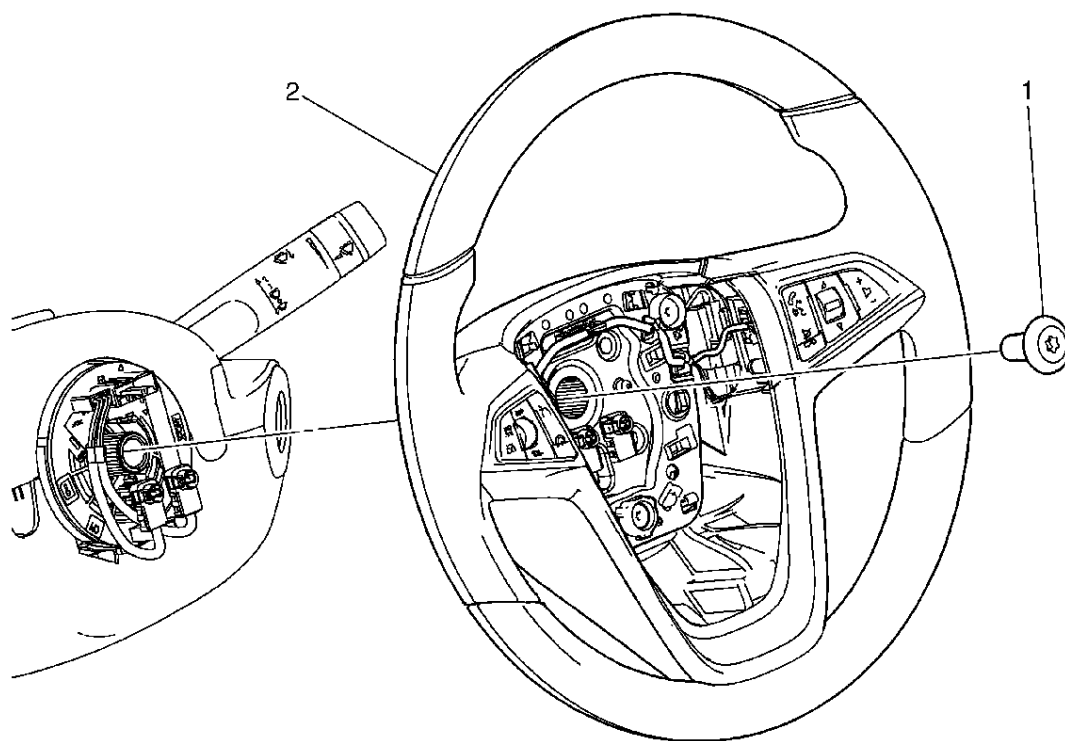


Fig. 7: Steering Wheel
 Courtesy of GENERAL MOTORS CORP.

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

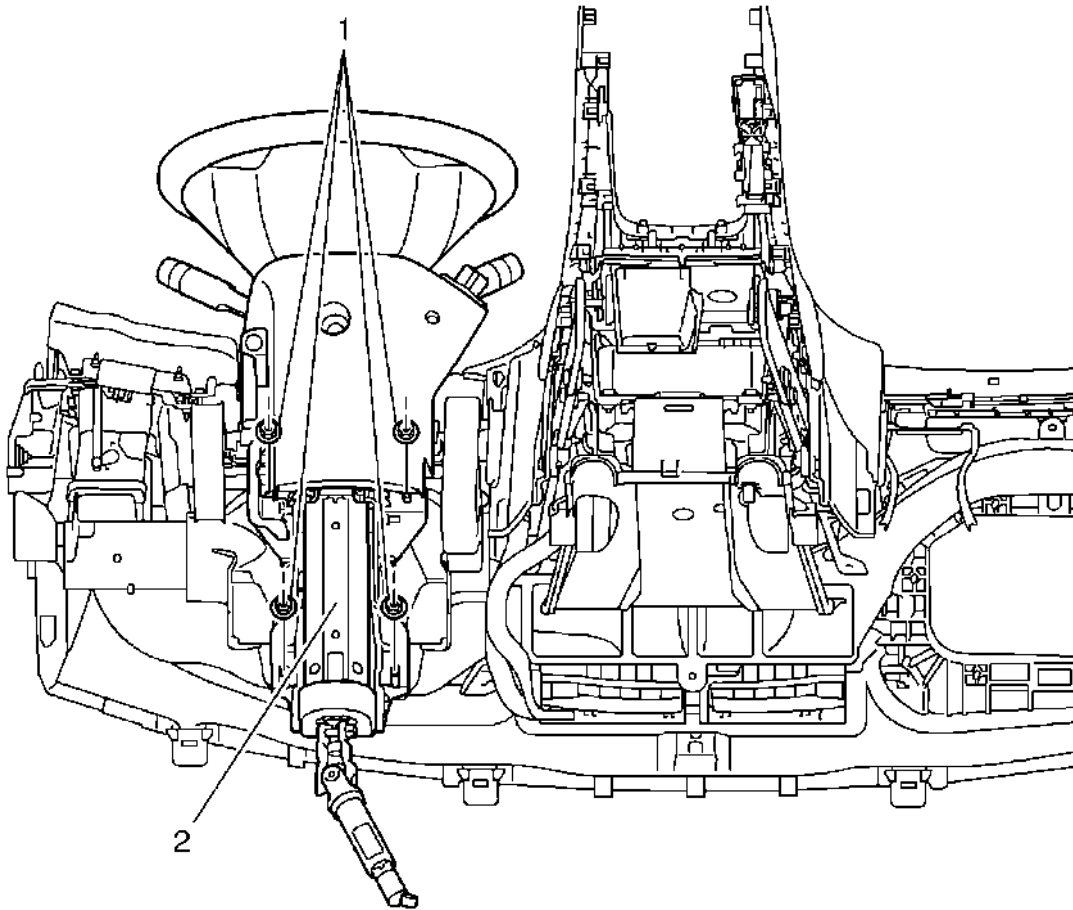


Fig. 8: Steering Column

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. Disable the supplemental inflatable restraint system. Refer to SIR Disabling and Enabling .
- 2. Remove the steering column shroud. Refer to Steering Column Shroud Replacement.
- 3. With the front wheels in the straight ahead position, turn the ignition switch to the OFF position and remove the key from the ignition lock cylinder.
- 4. Rotate the steering wheel in order to lock the steering column.
- 5. Remove the left instrument panel insulator panel. Refer to Instrument Panel Insulator Panel Replacement - Left Side (Equinox) or Instrument Panel Insulator Panel Replacement - Left Side (Terrain) .
- 6. Remove the driver knee bolster reinforcement. Refer to Driver Knee Bolster Reinforcement Replacement (Equinox) or Driver Knee Bolster Reinforcement Replacement (Terrain) .
- 7. Use paint in order to place match marks on the steering column shaft and on the intermediate steering shaft.
- 8. 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: 22 N.m (16 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 Steering Wheel Replacement 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 **Steering Angle Sensor Centering**.

STEERING ANGLE SENSOR REPLACEMENT

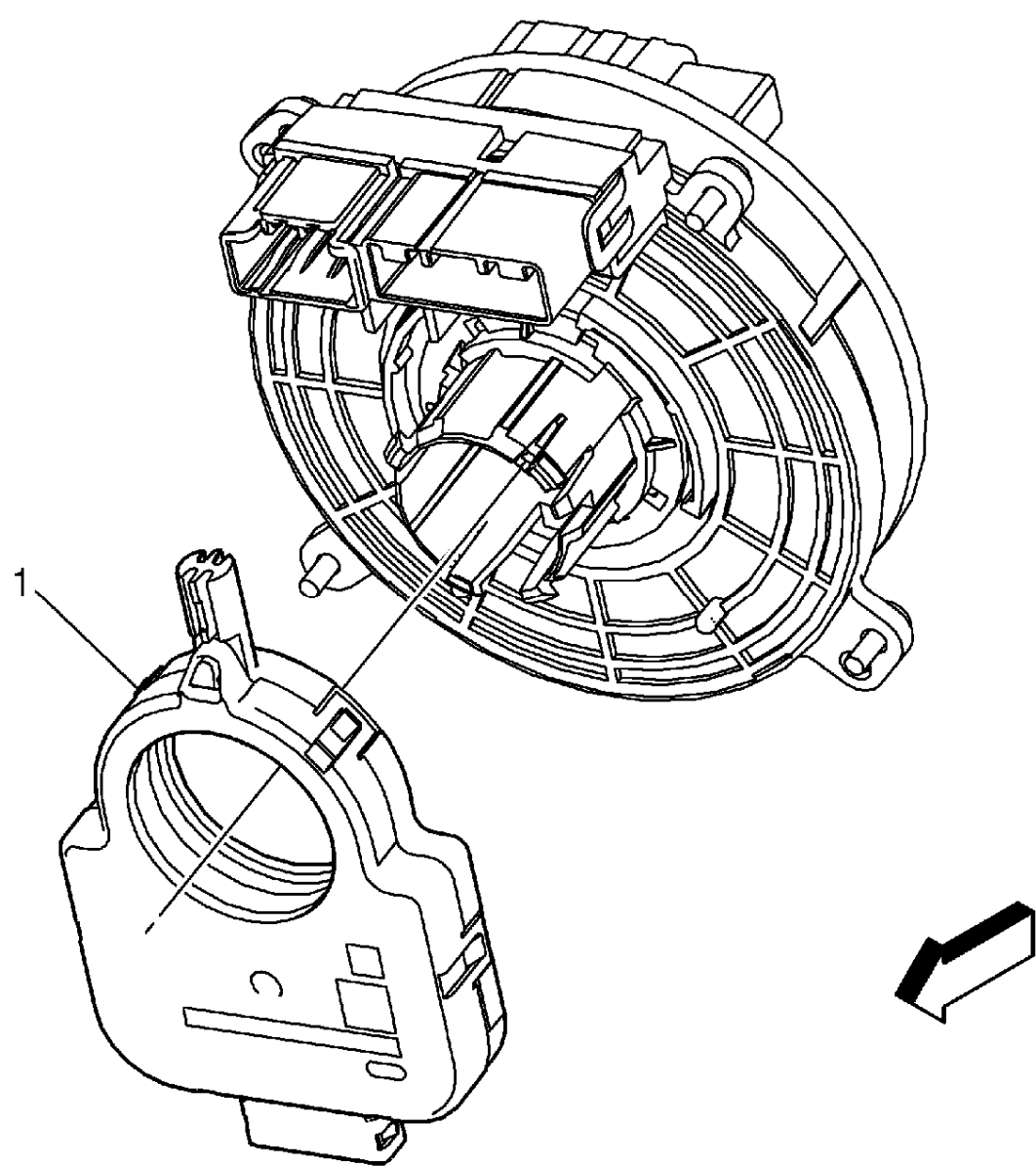


Fig. 9: Steering Angle Sensor
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the steering wheel inflatable restraint module coil. Refer to <u>Steering Wheel Inflatable</u>	

Restraint Module Coil Replacement

	Steering Angle Sensor
1	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.

Vehicle Security - Some Vehicle Models

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

Driver Convenience

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

- The turn signal switch
- The hazard switch
- The headlamp dimmer switch
- The wiper/washer switch

- The horn pad/cruise control switch
- The tilt or tilt/telescoping functions

Driver Safety

The energy-absorbing steering column compresses in the event of a front-end collision, which reduces the chance of injury to the driver. The mounting capsules break away from the mounting bracket in the event of an accident.

Ignition Lock Cylinder Control Actuator

If the vehicle is equipped with a floor mounted console gear shifter, it has a ignition lock cylinder control actuator system in the steering column. The ignition lock cylinder control actuator's purpose is to prevent the ignition key from being turned to the OFF position when the transmission is in gear and the vehicle may still be moving. The column ignition lock system consists of a ignition lock cylinder control actuator, and a Park position switch that is located in the automatic transmission (A/T) shift lock control switch. The ignition lock cylinder control actuator contains a pin that is spring loaded out to mechanically prevent the ignition key cylinder from being turned to the Lock position when 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.