

2006 Chevrolet HHR LT

2006 STEERING Steering Wheel & Column - HHR

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Steering Wheel & Column - HHR

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Ignition Lock Cylinder Solenoid Screw	2 N.m	18 lb in
Ignition Switch Screws	2 N.m	18 lb in
Intermediate Shaft Pinch Bolt	34 N.m	25 lb ft
Ignition Lock Cylinder Case Shear Bolt	20 N.m	15 lb ft
Steering Column Mid Pivot Bolt	25 N.m	18 lb ft
Steering Column Mounting Bolt	25 N.m	18 lb ft
Steering Column Trim Cover Screws	2 N.m	18 lb in
Steering Column Upper Jacket Bolt	11 N.m	97 lb in
Steering Wheel Control Switch	1.8 N.m	16 lb in
Steering Wheel Horn Switch Bolts	7 N.m	62 lb in
Steering Wheel Nut	41 N.m	31 lb ft

SCHEMATIC AND ROUTING DIAGRAMS

STEERING WHEEL AND COLUMN SCHEMATIC ICONS

Steering Wheel and Column Schematic Icons

Icon	Icon Definition
	CAUTION: When performing service on or near the SIR components or the SIR wiring, the SIR system must be disabled. Refer to SIR Disabling and Enabling Zones. Failure to observe the correct procedure could cause deployment of the SIR components, personal injury, or unnecessary SIR system repairs.

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COLUMN/IGNITION LOCK SCHEMATICS

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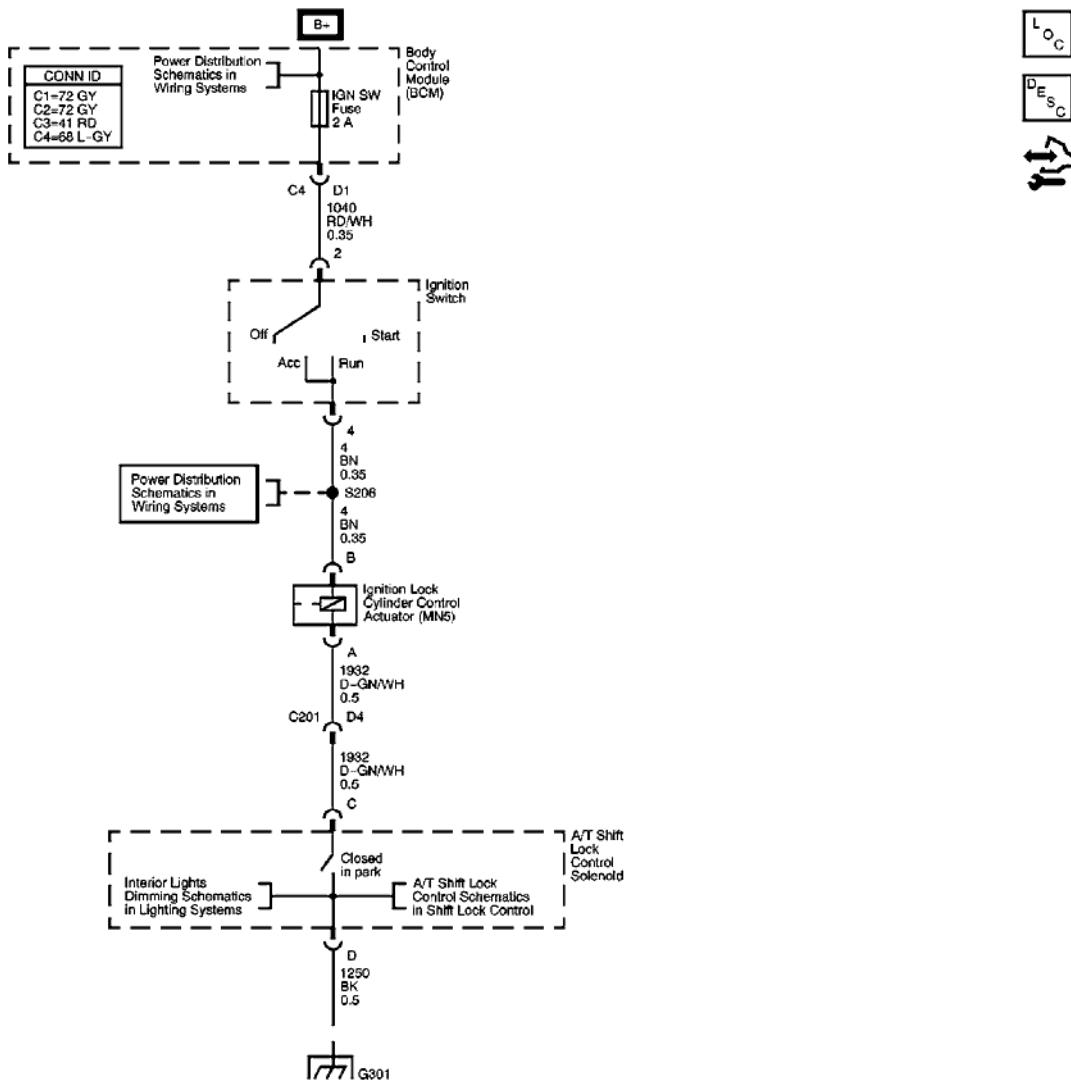


Fig. 1: Column/Ignition Lock Schematic
Courtesy of GENERAL MOTORS CORP.

STEERING WHEEL SCHEMATICS

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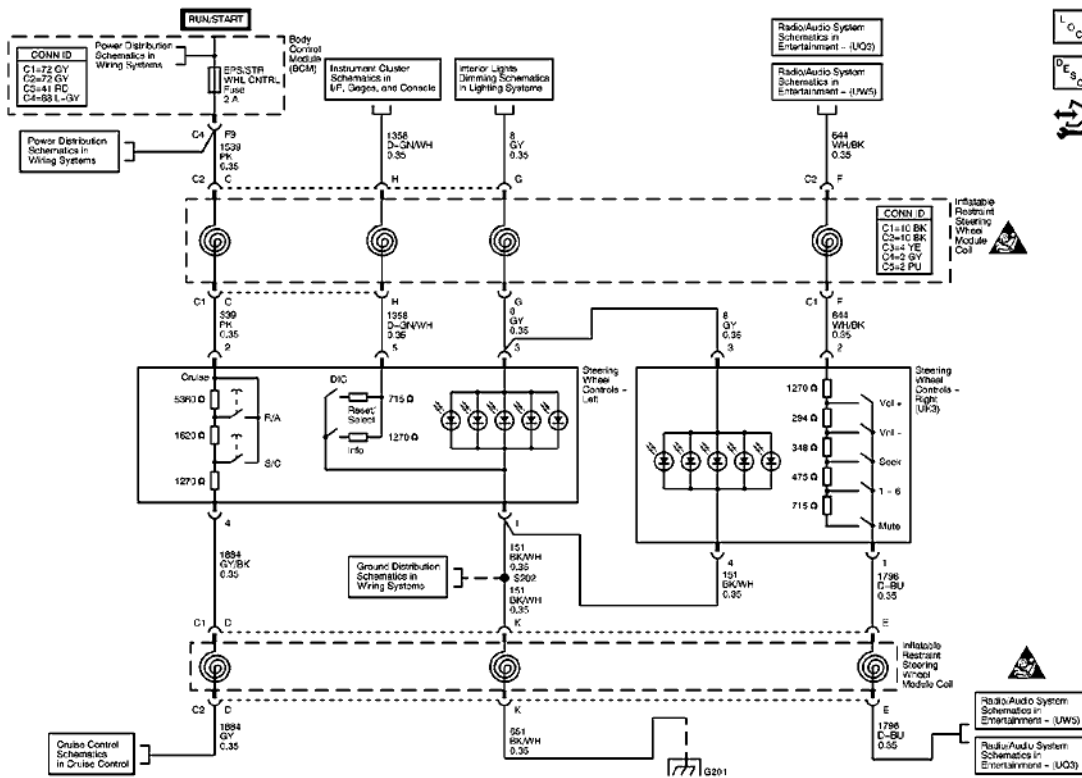


Fig. 2: Redundant Steering Wheel Controls
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

STEERING COLUMN DISASSEMBLED VIEW

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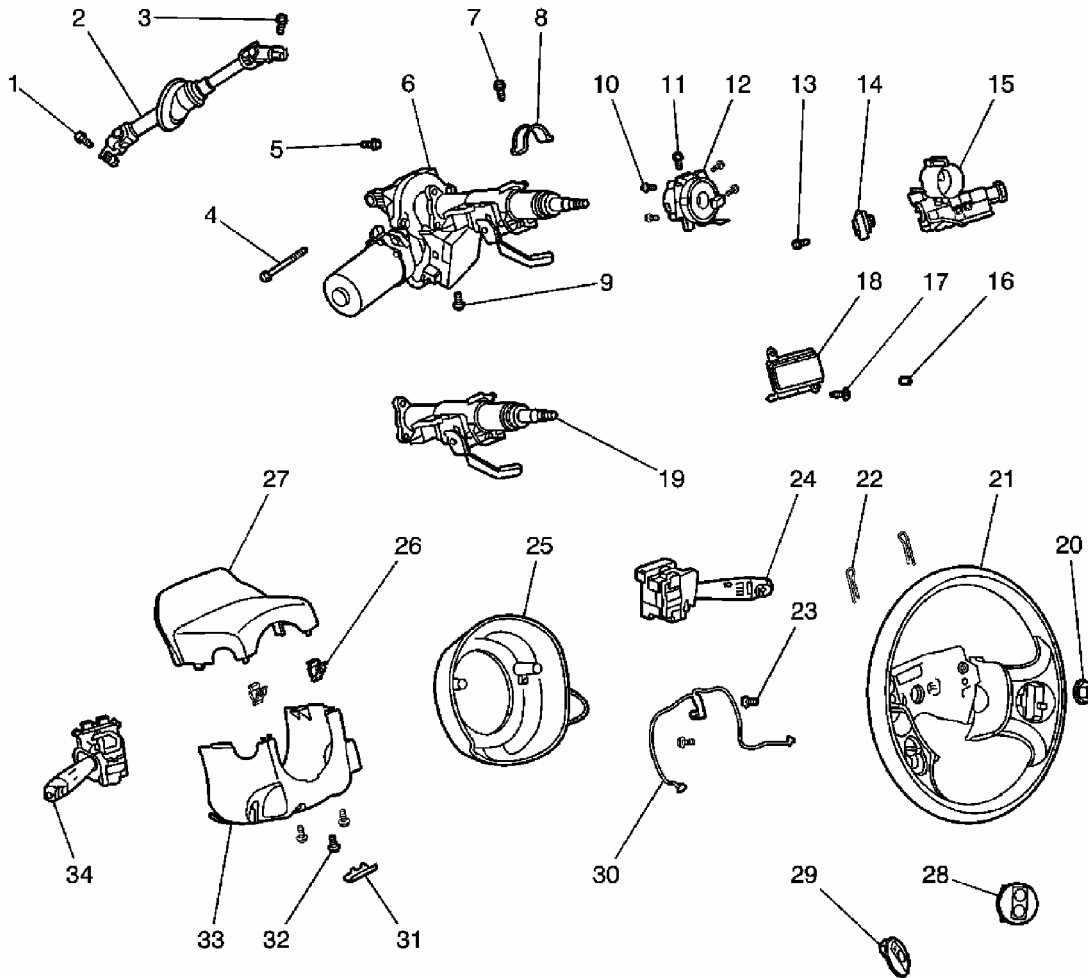


Fig. 3: Steering Column Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Lower Intermediate Steering Shaft Bolt
2	Intermediate Steering Shaft Assembly
3	Upper Intermediate Steering Shaft Bolt
4	Lower Steering Column Support Bracket Bolt
5	Lower Steering Column Jacket Bolt
6	Steering Column Assembly
7	Ignition / Start Switch Clamp Bolt
8	Ignition / Start Switch Clamp
9	Upper Steering Column Support Bracket Bolt
10	Turn Signal Switch Bracket Screw
11	Turn Signal Switch Bracket Screw

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12	Inflatable Restraint Steering Wheel Module Coil Assembly
13	Ignition / Start Switch Screw
14	Ignition / Start Switch Assembly
15	Ignition / Start Switch Housing
16	Spring
17	Ignition Lock Cylinder Control Solenoid Screw
18	Ignition Lock Cylinder Control Solenoid Assembly
19	Steering Column Jacket Assembly
20	Steering Wheel Nut
21	Steering Wheel Assembly
22	Inflatable Restraint Steering Wheel Module Retainer
23	Steering Wheel Shroud Screw
24	Wiper / Washer Switch Assembly
25	Steering Wheel Shroud
26	Lower Trim Cover Clip
27	Upper Trim Cover
28	Cruise Control Resume Switch Assembly
29	Cruise Control Switch Assembly
30	Harness Assembly
31	Lower Trim Cover Plug
32	Lower Trim Cover Screw
33	Lower Trim Cover
34	Headlamp / Dimmer / Park / Turn Signal Switch Assembly

STEERING WHEEL AND COLUMN COMPONENT VIEWS

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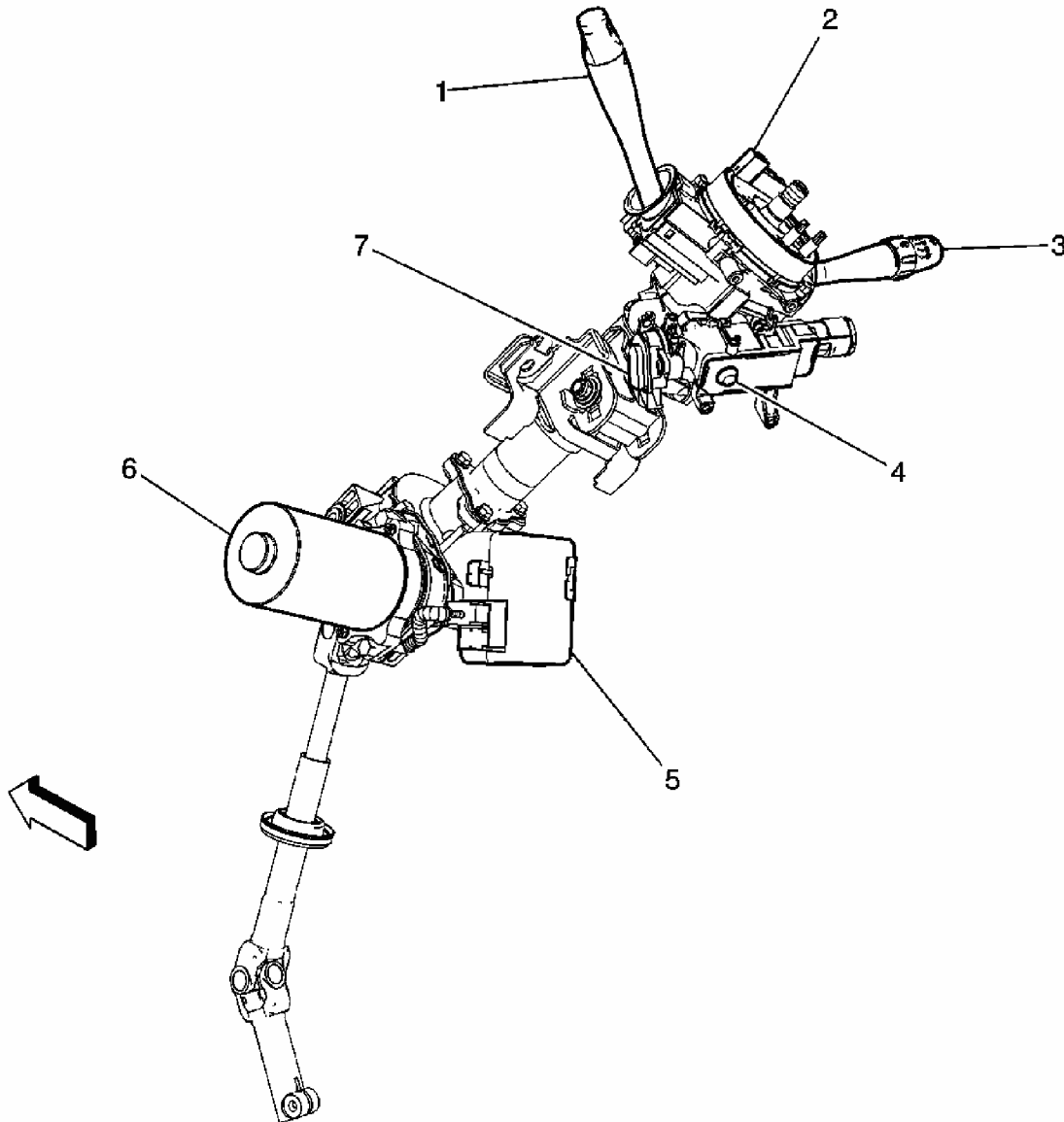


Fig. 4: Steering Column Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Turn Signal / Multifunction Switch
2	Inflatable Restraint Steering Wheel Module Coil
3	Windshield Wiper / Washer Switch
4	Power Steering Control Module (PSCM)
5	Electronic Power Steering (EPS) Motor
6	Ignition Lock Cylinder Control Actuator (MN5)

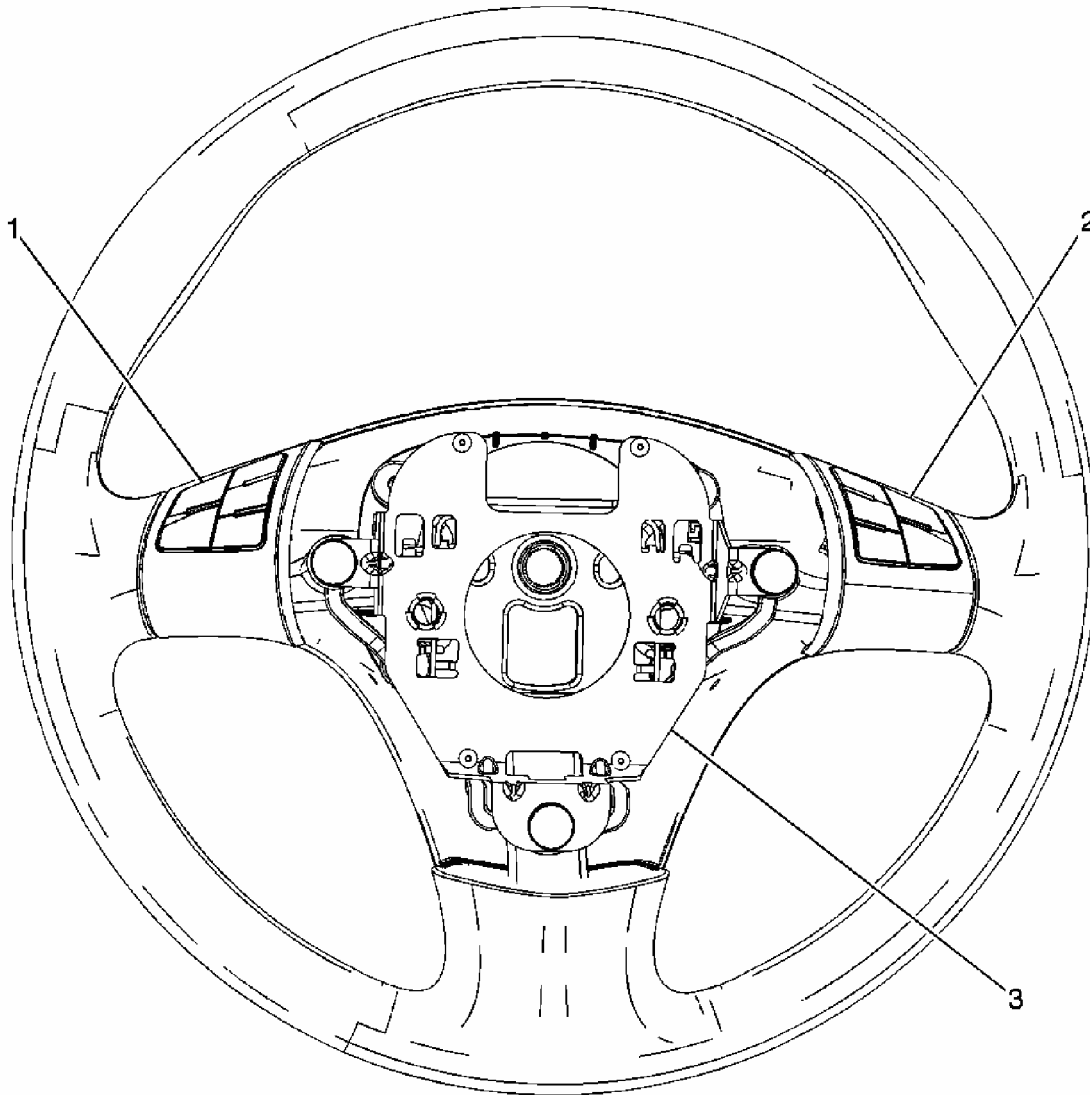


Fig. 5: Steering Wheel Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Steering Wheel Controls - Left
2	Steering Wheel Controls - Right
3	Horn Switch

STEERING WHEEL AND COLUMN CONNECTOR END VIEWS

Ignition Lock Cylinder Control Actuator (MN5)

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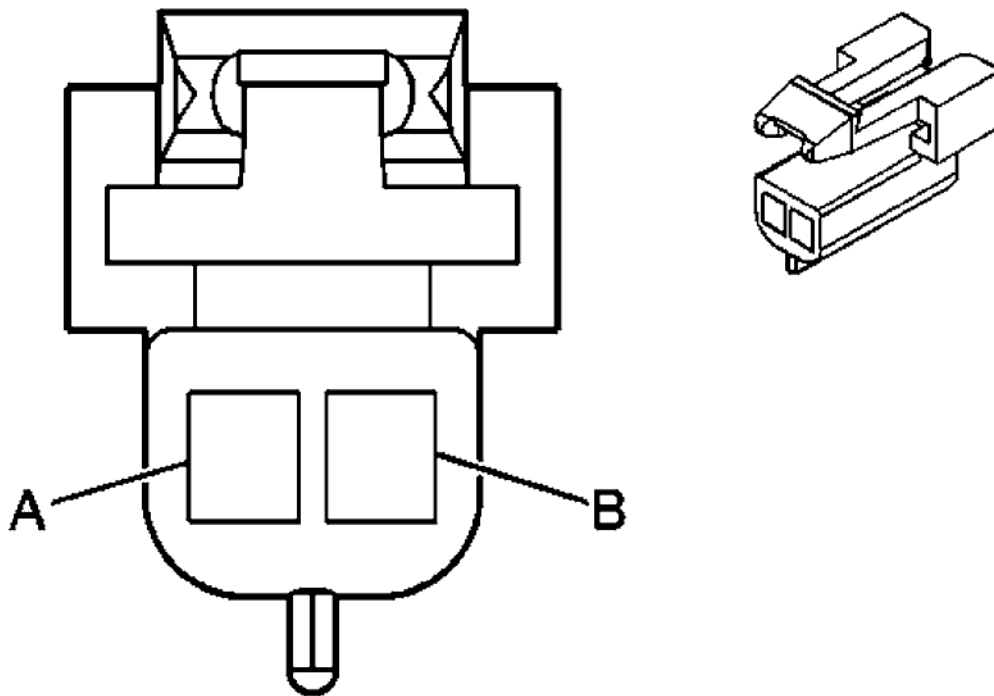


Fig. 6: Ignition Lock Cylinder Control Actuator (MN5) Connector
Courtesy of GENERAL MOTORS CORP.

Steering Wheel and Column Connector End Views

Connector Part Information

- OEM: 12052832
- Service: 12101825
- Description: 2-Way F Metri-Pack 150 Series (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Ignition Lock Cylinder Control Actuator (MN5)

Pin	Wire Color	Circuit No.	Function
			Shift Select Switch Park Signal

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A	D-GN/WH	1932	(MN5)
B	BN	4	Accessory Voltage (MN5)

Steering Wheel Controls - Left

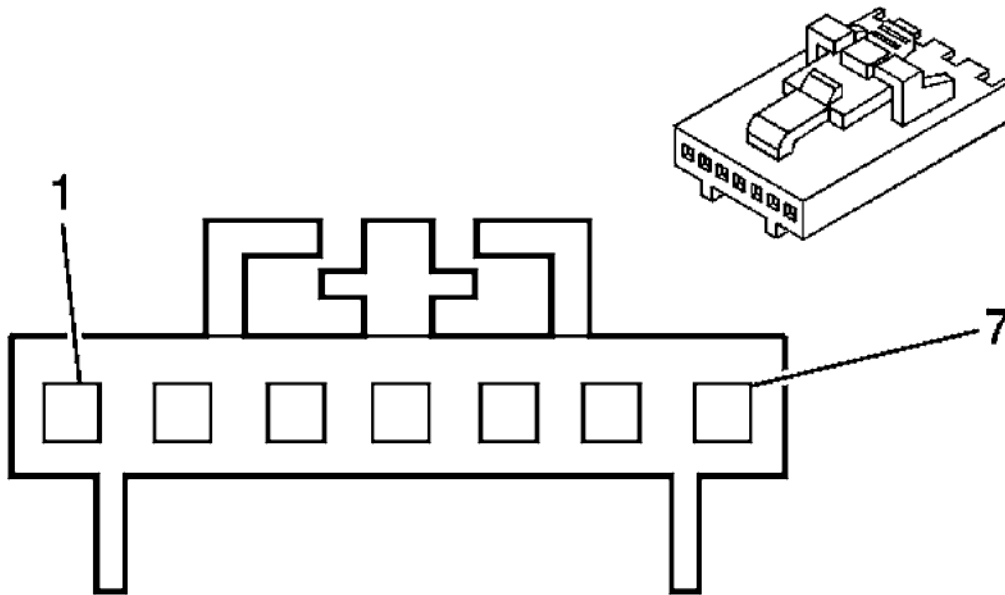


Fig. 7: Steering Wheel Controls - Left Connector
Courtesy of GENERAL MOTORS CORP.

Steering Wheel and Column Connector End Views

Connector Part Information

- OEM: 50-57-9407
- Service: Serviced by Complete Steering Wheel Harness
- Description: 7-Way F (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Steering Wheel Controls - Left

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Pin	Wire Color	Circuit No.	Function
1	BK/WH	151	Signal Ground
	BK/WH	151	Signal Ground (UK3)
2	PK	339	Run/Crank Ignition 1 Voltage
3	GY	8	Instrument Panel Lamp Supply Voltage (1)
	GY	8	Instrument Panel Lamp Supply Voltage (1) (UK3)
4	GY/BK	1884	Cruise Control Set/Coast/Resume/Accelerate Switch Signal
5	D-GN/WH	1358	Driver Information Center Switch Signal
6-7	-	-	Not Used

Steering Wheel Controls - Right (UK3)

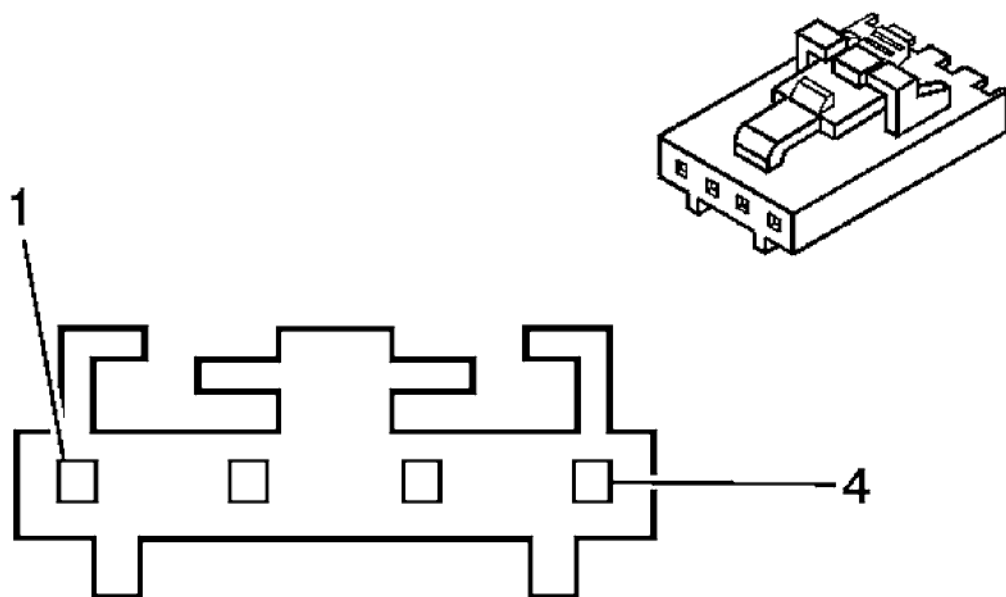


Fig. 8: Steering Wheel Controls - Right (UK3) Connector
Courtesy of GENERAL MOTORS CORP.

Steering Wheel and Column Connector End Views

Connector Part Information

- OEM: 50-57-9404

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- Service: Serviced by Complete Steering Wheel Harness
- Description: 4-Way F (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Steering Wheel Controls - Right (UK3)

Pin	Wire Color	Circuit No.	Function
1	D-BU	1796	Steering Column Radio Control Signal (UK3)
2	WH/BK	644	10 Volt Reference (UK3)
3	GY	8	Instrument Panel Lamp Supply Voltage (1) (UK3)
4	BK/WH	151	Signal Ground (UK3)

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - STEERING WHEEL CONTROLS

Begin the system diagnosis with **Diagnostic System Check - Vehicle** . The Diagnostic System Check - Vehicle will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check - Vehicle will identify the correct procedure for diagnosing the system and where the procedure is located.

STEERING WHEEL CONTROLS INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The radio supplies 10 volts to the audio steering wheel control momentary contact switches, and monitors the return signal. Each switch is associated to a set resistance value, when

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pressed a specific voltage drop occurs through a series of resistors unique to that switch. The radio then identifies the selection to activate the feature, otherwise sends a serial data message received by the controlled component activating the feature.

Diagnostic Aids

- This diagnostic is for the audio steering wheel controls.
- Before diagnosis of the steering wheel controls, ensure the primary controls of the associated component are functioning properly.
- Review schematic when testing switch resistance values.

Reference Information

Schematic Reference

Steering Wheel Schematics

Connector End View Reference

- Entertainment Connector End Views
- Steering Wheel and Column Connector End Views

Electrical Information Reference

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

Circuit/System Testing

CAUTION: Refer to SIR
Caution .

IMPORTANT: It is recommended that **Component Testing** is performed before **Circuit Testing** when diagnosing steering wheel controls.

1. Ignition OFF, disconnect the harness connector at the audio steering wheel control switch.
2. Ignition ON, Radio ON, test for 9.5-10.4 volts between the 10 volt reference circuit and ground at the switch harness connector
 - If less than 9.5 volts, test 10-volt reference circuit for short to ground or open/high resistance. If circuit test normal, replace radio.

- If greater than 10.4 volts, test the 10-volt reference circuit for short to voltage. If circuit test normal, replace radio.
- 3. Ignition ON, Radio ON, connect a test lamp between the signal circuit to the radio and ground at the switch harness connector. Verify lamp does not illuminate.
 - If test lamp illuminates, test the signal circuit for short to voltage. If circuit test normal, replace radio.
- 4. Ignition OFF, test for less than 1.0 ohm of resistance, between the signal circuit and ground at the switch harness connector.
 - If greater than 1.0 ohm, test the signal circuit for open/high resistance. If circuit test normal, replace radio.
- 5. Ignition OFF, disconnect harness connector at the radio and the switch.
- 6. Test for infinite resistance between the signal circuit and ground at the radio harness connector.
 - If less than infinite resistance, test the signal circuit for short to ground.
- 7. If circuit test normal, test or replace switch.

Component Testing

CAUTION: Refer to SIR Caution .

- 1. Ignition OFF, disconnect the harness connector at the audio steering wheel control switch.
- 2. Test for infinite resistance between the 10-volt reference terminal and the signal terminal with the switch in the open position.
 - If less than infinite resistance, replace the switch.
- 3. Test resistance values between the 10-volt reference terminal and the signal terminal with the switch closed in each position and verify readings are approximate to what the schematic reads.
 - If values do not, replace the switch.

Steering Wheel Controls Inoperative

Switch Function	Left Resistance Value Range (ohms)	Right Resistance Value Range (ohms)
Inactive	-	infinite
Vol. Up	-	1270
Vol. Dn.	-	1564
Next	-	1912
Previous	-	2387
Mute/Voice Rec	-	3102

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Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Steering Wheel Control Switch Assembly Replacement
- Control Module References for Radio 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 Steering Wheel and Column Description and Operation.

Visual/Physical Inspection

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

Symptoms List

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

- Ignition Key Cannot Be Removed from the Ignition Lock Cylinder
- Ignition Key Cannot Turn or Sticks in Any Position
- Noise in Steering Column
- Looseness in Steering Column

SYMPTOMS - STEERING WHEEL CONTROLS

- IMPORTANT:**
1. Perform the Diagnostic System Check - Vehicle , before using the Symptom Tables in order to verify that all of the following conditions are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
 2. Review the system operation in order to familiarize yourself with the system functions. Refer to Steering Wheel Controls Description and Operation.

Visual/Physical Inspection

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- Inspect for aftermarket devices which may affect the operation of the Steering Wheel Controls System. Refer to **Checking Aftermarket Accessories** .
- Inspect for easily accessible or visible system components for obvious damage or conditions which may cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

Symptom List

Refer to **Steering Wheel Controls Inoperative** in order to diagnose the symptom.

IGNITION CAN/CANNOT BE TURNED OFF WITH TRANSMISSION IN ANY GEAR

Ignition Can/Cannot Be Turned Off with Transmission in Any Gear

Step	Action	Yes	No
Schematic Reference: <u>Column/Ignition Lock Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Verify the condition is present. Does the system operate normally?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 2
2	1. Remove the small square cover from the lower steering column trim cover. 2. Push the ignition lock cylinder control actuator release button to the left. 3. Turn the key to the OFF position and remove the key. Were you able to turn the key to the OFF position and remove the key?	Go to Step 3	Go to <u>Ignition Key Cannot Be Removed from the Ignition Lock Cylinder</u>
	1. Turn OFF the ignition. 2. Remove the steering column trim covers. Refer to <u>Steering Column Trim Covers Replacement</u> . 3. Disconnect the ignition lock cylinder control actuator. 4. Turn ON the ignition, with the engine		

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3	OFF. 5. Connect a test lamp between the accessory voltage circuit and the shift select switch park signal circuit of the ignition lock cylinder control actuator. 6. Cycle the gear shifter from Park to Drive. Does the test lamp turn ON and OFF with each cycle?	Go to Step 10	Go to Step 4
4	Does the test lamp remain illuminated with each cycle?	Go to Step 6	Go to Step 5
5	1. Put the gear shifter into Park. 2. Connect a test lamp between the shift select switch park signal circuit of the ignition lock cylinder control actuator and B+ voltage. Does the test lamp illuminate?	Go to Step 11	Go to Step 7
6	Test the shift select switch park signal circuit of the ignition lock cylinder control actuator for a short to ground. Did you find and correct the condition?	Go to Step 14	Go to Step 9
7	Test the shift select switch park signal circuit of the ignition lock cylinder control actuator for an open. Did you find and correct the condition?	Go to Step 14	Go to Step 8
8	Test the ground circuit of the ignition lock cylinder control switch for an open. Did you find and correct the condition?	Go to Step 14	Go to Step 9
9	Inspect for poor connections at the shifter assembly. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	Go to Step 14	Go to Step 12
10	Inspect for poor connections at the ignition lock cylinder control actuator. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	Go to Step 14	Go to Step 13
	Repair the accessory voltage circuit of the		

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11	ignition lock cylinder control actuator. Refer to Wiring Repairs . Did you complete the repair?	Go to Step 14	-
12	Replace the shifter assembly. Refer to Floor Shift Control Replacement . Did you complete the replacement?	Go to Step 14	-
13	Replace the ignition lock cylinder control actuator. Refer to Ignition Lock Cylinder Solenoid Replacement . Did you complete the replacement?	Go to Step 14	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

IGNITION LOCK CYLINDER IS STUCK INSIDE LOCK CYLINDER CASE

Ignition Lock Cylinder is Stuck Inside Lock Cylinder Case

Step	Action	Yes	No
DEFINITION: The ignition lock cylinder has been diagnosed as needing replacement but is unable to be removed from the cylinder case using the standard service procedure.			
1	Did you review the Ignition Lock System Description and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Steering Wheel and Column
2	Attempt to rotate the key to the RUN position. Is the lock cylinder in the RUN position?	Go to Step 3	Go to Step 4
3	Replace the lock cylinder. Refer to Ignition Lock Cylinder Replacement . Did you complete the repair?	Go to Step 7	-
4	With the shear bolt and case clamp removed, determine if the lock cylinder case can be removed from the column. Can the lock cylinder case be removed from the column?	Go to Step 6	Go to Step 5
5	The steering wheel lock bolt, if engaged, may prevent removal of the lock cylinder case. DO NOT attempt to remove the lock cylinder by destroying the lock cylinder/housing. Carefully cut away the lock cylinder case from the column. Refer to		

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	step 8 in Ignition Lock Cylinder Case Replacement . Did you complete the repair?	Go to Step 6	-
6	Remove and replace the ignition lock cylinder case. Refer to Ignition Lock Cylinder Case Replacement . Did you complete the repair?	Go to Step 7	-
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 1

IGNITION KEY CANNOT BE REMOVED FROM THE IGNITION LOCK CYLINDER**Ignition Key Cannot Be Removed from the Ignition Lock Cylinder**

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 Steering Wheel and Column Description and Operation
2	Verify the key cannot be removed from the ignition lock cylinder. Is the key stuck in the lock cylinder?	Go to Step 3	System OK
3	Is the vehicle equipped with a manual transmission?	Go to Step 8	Go to Step 4
4	Turn the ignition key to the OFF position. Can the key be turned to the OFF position and be removed?	Go to Step 8	Go to Step 5
5	Verify the adjustment of the automatic transmission shift cable. Refer to Shift Control Cable Adjustment . Can the key be turned to the OFF position and be removed?	System OK	Go to Step 6
6	Inspect the lock cylinder solenoid plunger and spring. Does the plunger or spring exhibit scratches or signs of wear?	Go to Step 10	Go to Step 7
7	Verify the electrical operation of the ignition lock cylinder solenoid. Refer to Ignition Can/Cannot Be Turned Off with Transmission in Any Gear . Can the key be turned to the OFF position		

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	and be removed?	System OK	Go to Step 8
8	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to Step 11	-
9	Inspect the ignition lock cylinder case. Is the case worn, damaged or loose?	Go to Step 12	-
10	Replace the ignition lock cylinder solenoid and spring. Refer to Ignition Lock Cylinder Solenoid Replacement . Did you complete the repair?	Go to Step 13	-
11	Replace the ignition lock cylinder. Refer to Ignition Lock Cylinder Replacement . Did you complete the repair?	Go to Step 13	-
12	Replace the ignition lock cylinder case housing. Refer to Ignition Lock Cylinder Case Replacement . Did you complete the repair?	Go to Step 13	-
13	Operate the system to verify the repair. Did you correct the condition?	System OK	Go to Step 2

IGNITION KEY CANNOT TURN OR STICKS IN ANY POSITION

Ignition Key Cannot Turn or Sticks in Any Position

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column System Description and perform the necessary inspections?	Go to Step 2	Go to Steering Wheel and Column Description and Operation
2	Verify that the key sticks or cannot turn in any position. Is the key functioning correctly?	System OK	Go to Step 3
3	Inspect for an incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to Step 7	Go to Step 4
4	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to Step 8	Go to Step 5
5	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to Step 9	Go to Step 6
6	Inspect the lock cylinder case for looseness. Is the lock cylinder case loose?	Go to Step 10	Go to Step 7
	Replace the key. Refer to Key and Lock		

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7	Cylinder Coding in General Information. Did you complete the repair?	Go to Step 11	-
8	Replace the ignition lock cylinder. Refer to Ignition Lock Cylinder Replacement . Did you complete the repair?	Go to Step 11	-
9	Replace the ignition switch. Refer to Ignition Switch Replacement . Did you complete the repair?	Go to Step 11	-
10	Tighten or replace the ignition lock cylinder case. Refer to Ignition Lock Cylinder Case Replacement . Did you complete the repair?	Go to Step 11	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

NOISE IN STEERING COLUMN**Noise in Steering Column**

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and perform the necessary inspections?	Go to Step 2	Go to Steering Wheel and Column Description and Operation
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 components for looseness. Are the steering column components loose?	Go to Step 6	Go to Step 4
4	Inspect the SIR coil for noise. Is the SIR coil noisy?	Go to Step 7	Go to Step 5
5	Inspect the upper steering column shaft bearing for the following conditions: • Damage • Lubrication • Wear • Proper seating		

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	Are the bearings in need of repair or replacement?	Go to Step 8	Go to Step 9
6	Tighten the steering column components to specifications. Refer to Fastener Tightening Specifications . Did you complete the repair?	Go to Step 9	-
7	Replace the SIR coil. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement in SIR. Did you complete the repair?	Go to Step 9	-
8	Replace the upper jacket assembly. Refer to Steering Column Jacket Replacement . Did you complete the repair?	Go to Step 9	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

LOOSENESS IN STEERING COLUMN

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 Steering Wheel and Column Description and Operation
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 brackets for looseness. Are the steering column mounting brackets loose?	Go to Step 6	Go to Step 4
4	Verify that the steering column bracket capsule is not sheared. Is the steering column bracket capsule sheared?	Go to Step 7	Go to Step 5
5	Inspect the intermediate shaft for worn joints or looseness. Is the intermediate joint worn or loose?	Go to Step 8	Go to Step 9
	NOTE: Refer to Fastener Notice		

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6	Tighten the mounting bolts to specifications. Refer to Fastener Tightening Specifications . Did you complete the repair?	Go to Step 9	-
7	Replace the upper jacket assembly. Refer to Steering Column Jacket Replacement . Did you complete the replacement?	Go to Step 9	-
8	Tighten or replace the intermediate shaft as needed. Refer to Intermediate Steering Shaft Replacement . Did you complete the repair?	Go to Step 9	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

REPAIR INSTRUCTIONS

INTERMEDIATE STEERING SHAFT REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the left front tire. Refer to **Tire and Wheel Removal and Installation** .

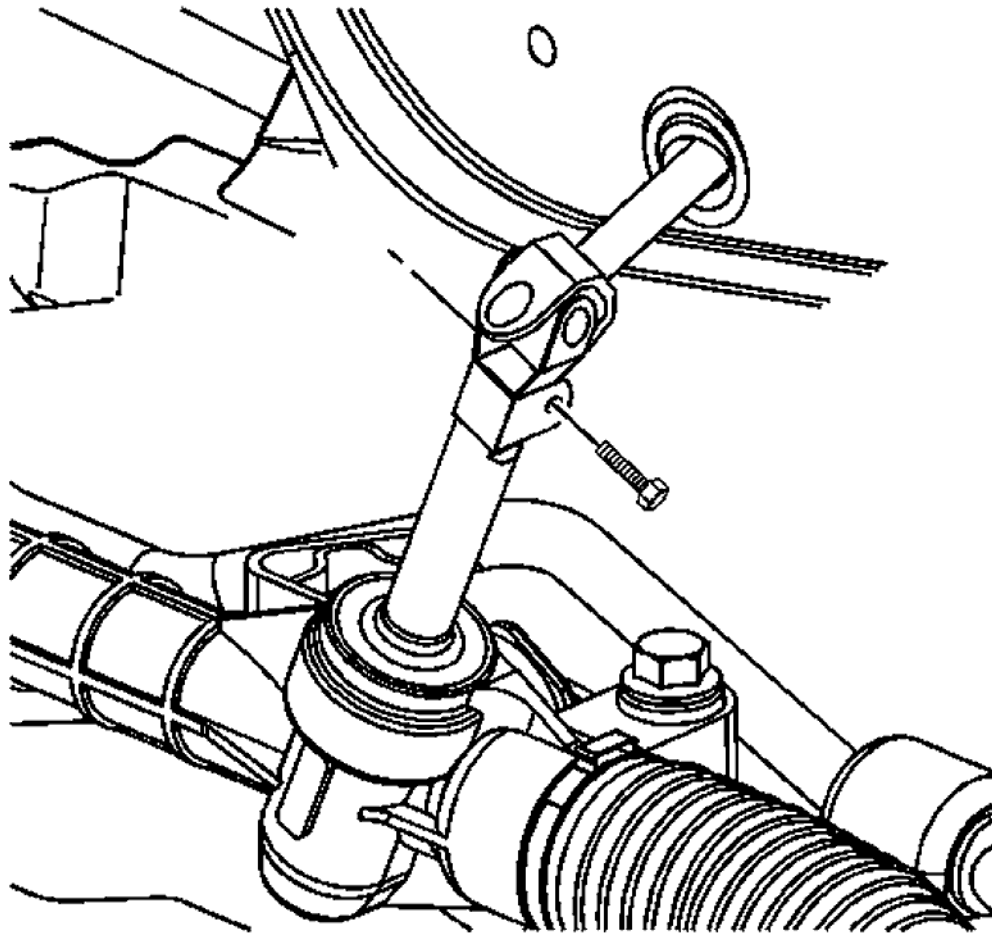


Fig. 9: View Of Intermediate Shaft-To-Steering Gear Pinch Bolt
Courtesy of GENERAL MOTORS CORP.

3. Remove the intermediate shaft to steering gear pinch bolt. Discard the bolt.
4. Disconnect the intermediate shaft from the steering gear.
5. Lower the vehicle.
6. Align the steering wheel into the straight forward position.

IMPORTANT: Locking of the steering column will prevent damage and a possible malfunction of the SIR system.

7. Remove the ignition key and turn the steering wheel clockwise until it locks.

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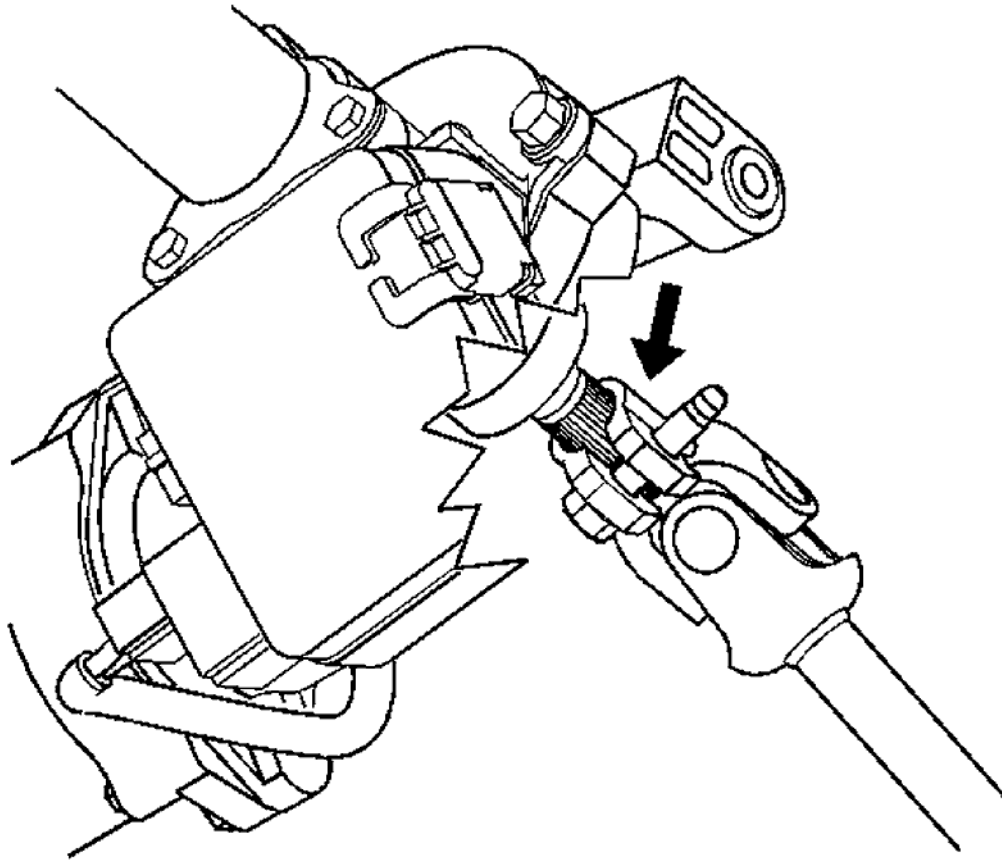


Fig. 10: Scribing Marks On Intermediate Shaft-To-Steering Column Connection
Courtesy of GENERAL MOTORS CORP.

8. Place scribe marks on the intermediate shaft to the steering column connection prior to removal.

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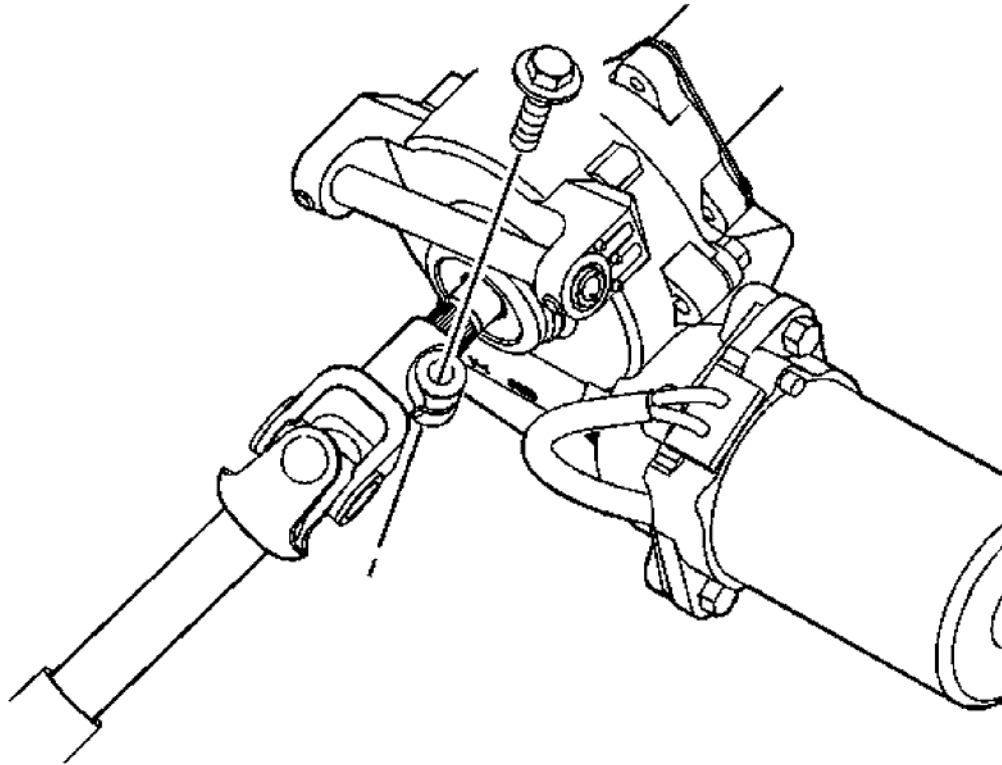


Fig. 11: View Of Upper Intermediate Shaft Pinch Bolt And Column
Courtesy of GENERAL MOTORS CORP.

9. Remove the intermediate shaft pinch bolt at the steering column. Discard the pinch bolt.
10. Slide the intermediate shaft off the steering column shaft.

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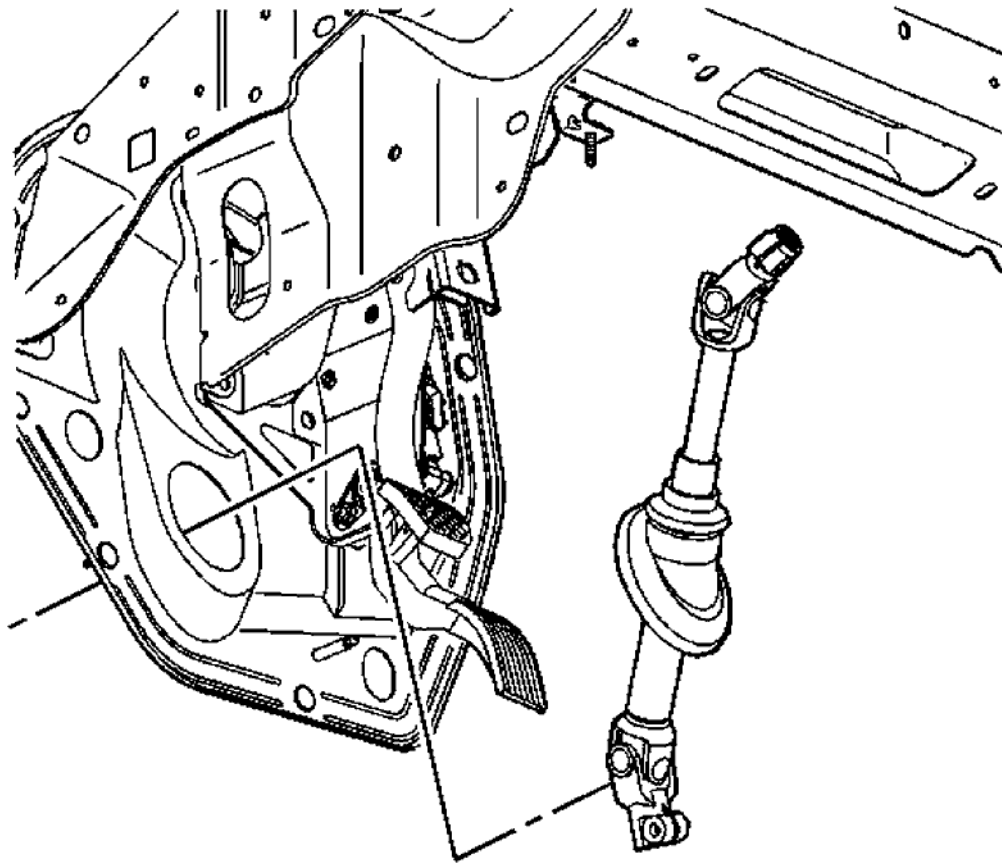


Fig. 12: View Of Intermediate Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

11. Use a pulling, squeezing and twisting motion to unseat the intermediate shaft seal from the dash.
12. Remove the intermediate shaft/seal from the vehicle.

Installation Procedure

IMPORTANT: Failure to transfer the pre-scribed marks may result in an off-center steering wheel.

1. If installing a new intermediate shaft, transfer the pre-scribed alignment marks onto the new part.

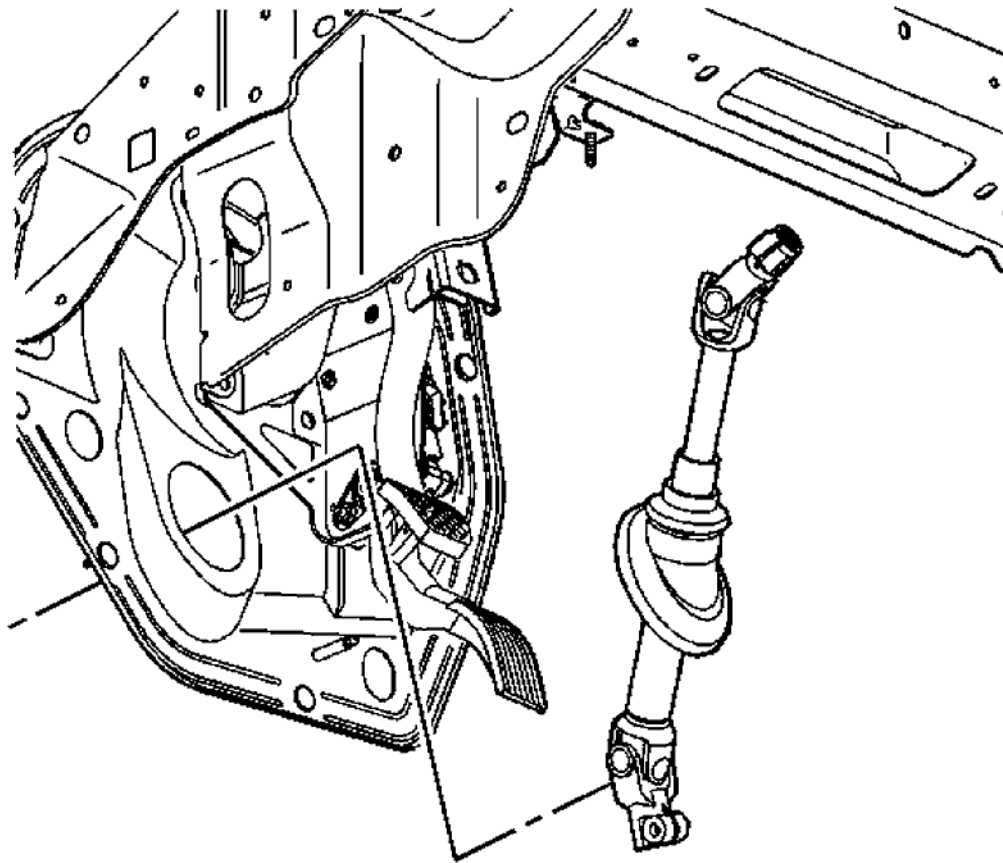


Fig. 13: View Of Intermediate Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the intermediate shaft/seal through the front of dash.

IMPORTANT: To ensure seal is properly seated, inspect the seal from the engine side of the seal.

3. Seat the intermediate shaft seal using a pushing, squeezing and twisting motion until seal is fully seated.
4. Align the pre-scribed mark on the intermediate shaft to the pre-scribed mark on the steering column shaft.
5. Connect the intermediate shaft to the steering column shaft.
6. If the intermediate shaft was removed without the use of a scribed mark, perform the following:
 1. Place the road wheels in the straight ahead position.

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2. Install the intermediate shaft to the steering gear so the intermediate shaft bolt head faces the LH wheel well opening.
3. Place the steering wheel in the straight ahead position.
4. Connect the intermediate shaft to the steering column shaft.

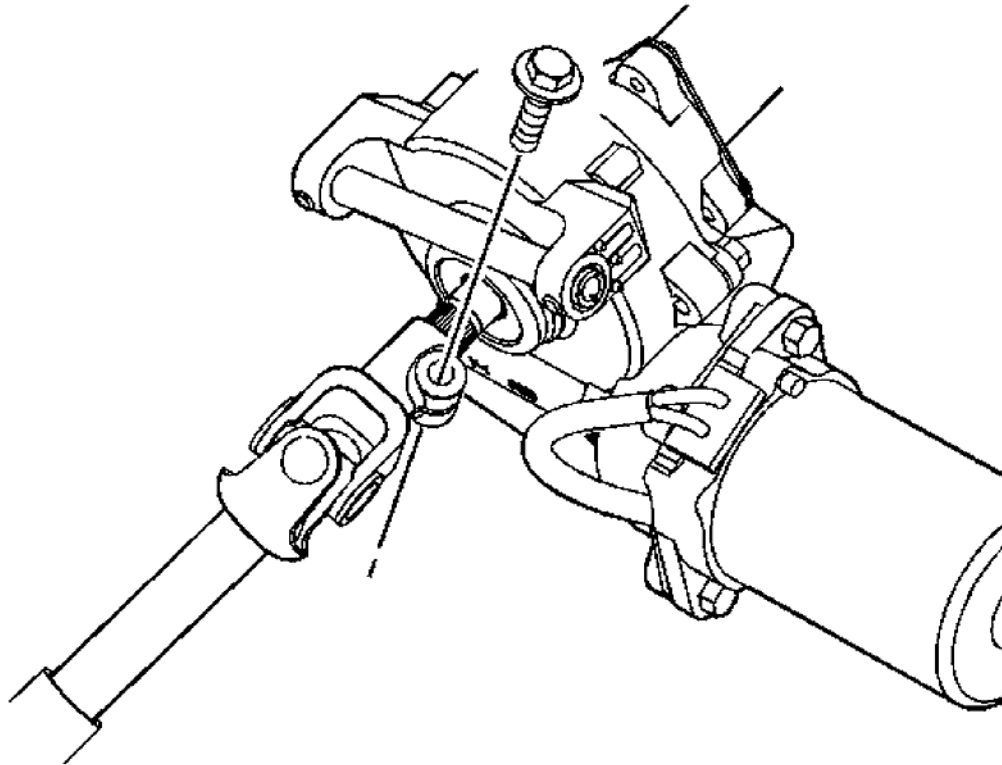


Fig. 14: View Of Upper Intermediate Shaft Pinch Bolt And Column
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

7. Install a new intermediate shaft to steering column pinch bolt.

Tighten: Tighten the bolt to 34 N.m (25 lb ft).

8. Connect the intermediate shaft to the steering gear.

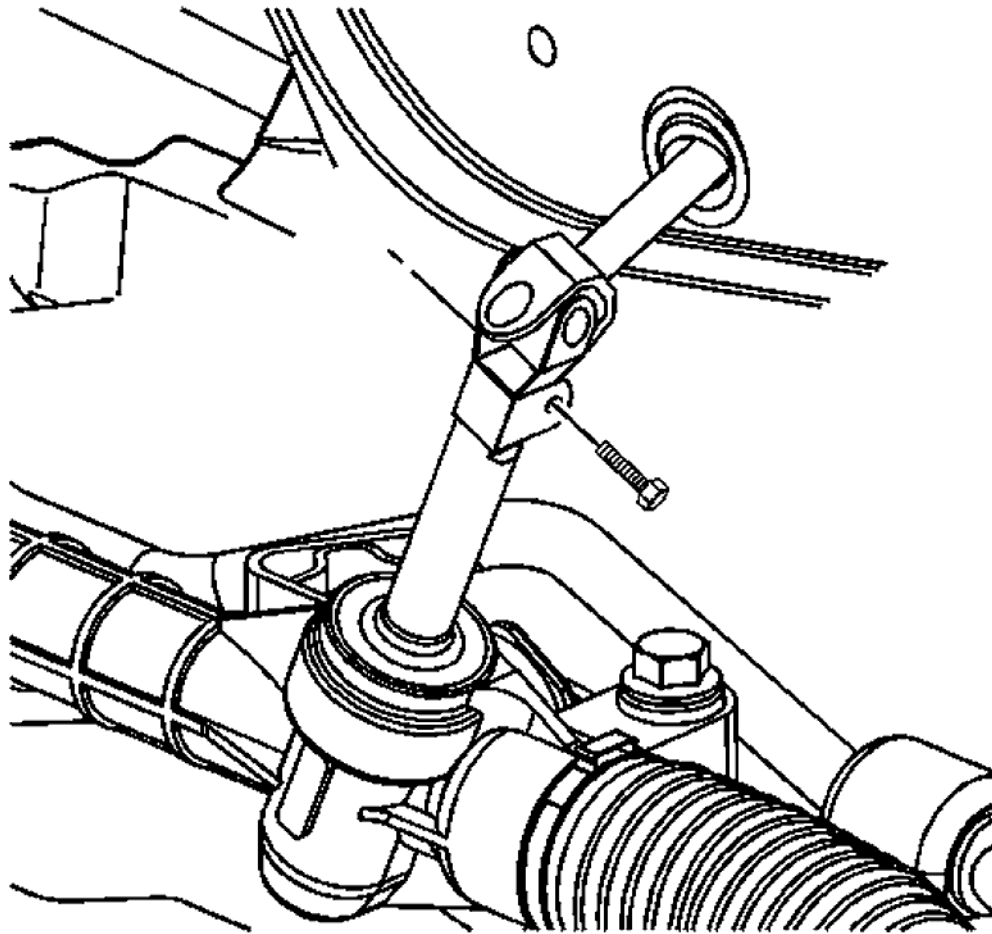


Fig. 15: View Of Intermediate Shaft-To-Steering Gear Pinch Bolt
Courtesy of GENERAL MOTORS CORP.

9. Install a new intermediate shaft to steering gear pinch bolt.

Tighten: Tighten the bolt to 34 N.m (25 lb ft).

10. Install the left front wheel. Refer to **Tire and Wheel Removal and Installation**.
11. Check for proper steering wheel alignment. If steering wheel is out of alignment perform the following:
 1. Remove the intermediate shaft pinch bolt at the steering column.
 2. Disconnect the intermediate shaft in order to rotate and reconnect as needed to straighten the steering alignment.
 3. Install a new intermediate shaft pinch bolt.

Tighten: Tighten the bolt to 34 N.m (25 lb ft).

STEERING COLUMN ACCIDENT DAMAGE INSPECTION

Inspection

This vehicle is equipped with electric power steering (EPS), with the electric motor and torque sensor mounted on the steering column. When involved in an accident resulting in sheet metal damage or driver-side air bag deployment, the steering column must be inspected for both electrical system integrity and steering column collapse. Refer to **Diagnostic System Check - Vehicle** in Vehicle DTC Information.

- If the steering column electrical system integrity is not within specifications, the complete steering column must be replaced. Refer to **Steering Column Replacement**.
- If the steering column collapse mechanism is not within specifications, but the electrical system integrity is within specifications, then the steering column upper jacket must be replaced. Refer to **Steering Column Jacket Replacement**.

Road test the vehicle when ever any steering system repairs or diagnostics have been performed.

Electric Power Steering (EPS) Inspection

1. Install a scan tool.
2. Start the engine.

IMPORTANT: After centering the steering wheel, remove hands and other objects from the steering wheel. Ensure the suspension is relaxed and that no bias, or uneven force is being applied to the steering system.

3. Turn the steering wheel 90 degrees to the left, then 90 degrees to the right, then return the steering wheel to center.
4. Using the scan tool, observe the Torque Sensor Main data parameter in the EPS data list. Correct parameter range for the torque sensor is $<+ \text{ or } - 1 \text{ N.m}$ (0.7 lb ft).
5. If the value is greater than the specified range then replace the steering column assembly. Refer to **Steering Column Replacement**.

Collapse Measurement

A vehicle involved in an accident resulting in sheet metal damage or drivers-side air bag deployment will require an inspection for steering column collapse. If the steering column collapse measurement is greater than 3 mm than the steering column upper jacket must be replaced.

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For steering column collapse measurement, use the following procedure:

1. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.

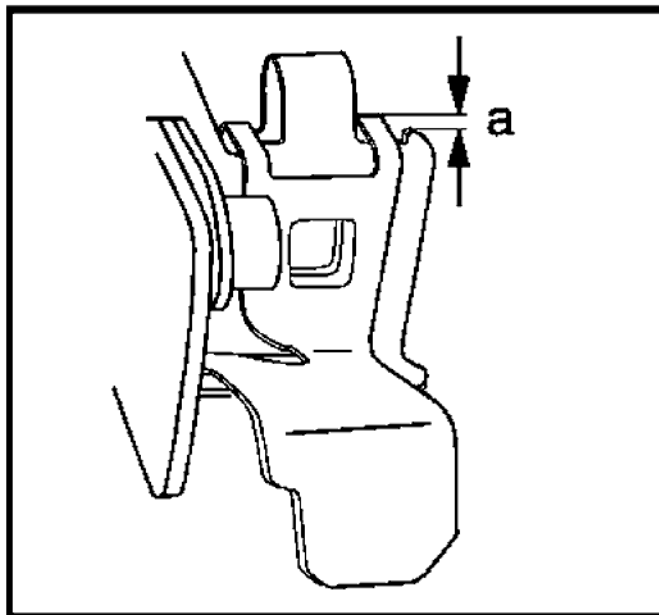
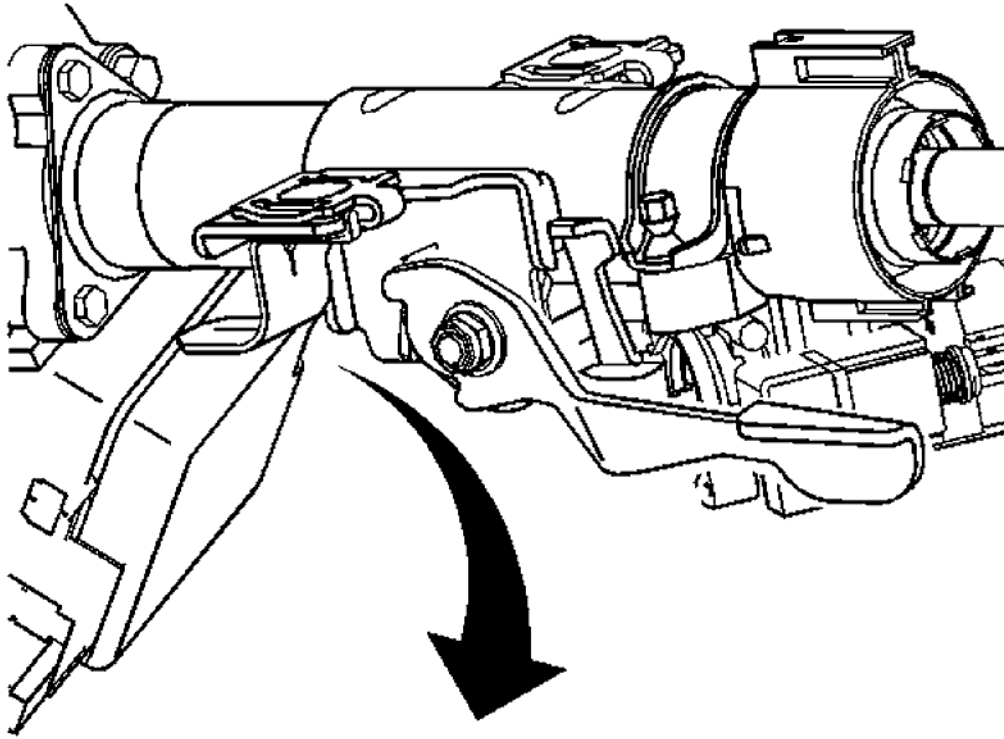


Fig. 16: Inspecting Steering Column Mounting Capsule Nuts For Movement
Courtesy of GENERAL MOTORS CORP.

2. Inspect the upper steering column mounting capsule nuts for movement (a). If the steering column collapse measurement is greater than 3 mm than the steering column upper jacket must be replaced. Refer to **Steering Column Jacket Replacement**.
3. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.

STEERING COLUMN TRIM COVERS REPLACEMENT

Removal Procedure

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Position the steering column in the full downward position.

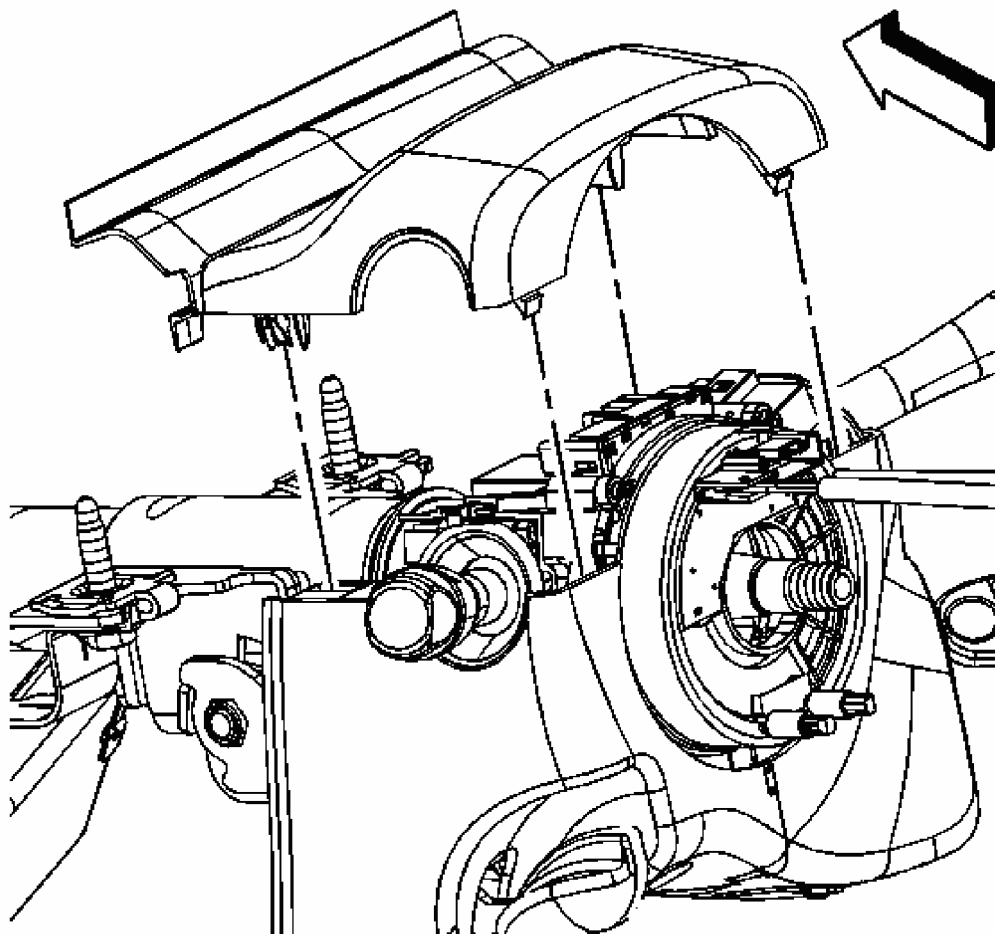


Fig. 17: Upper Steering Column Trim Cover
Courtesy of GENERAL MOTORS CORP.

3. Unsnap and remove the upper steering column cover.

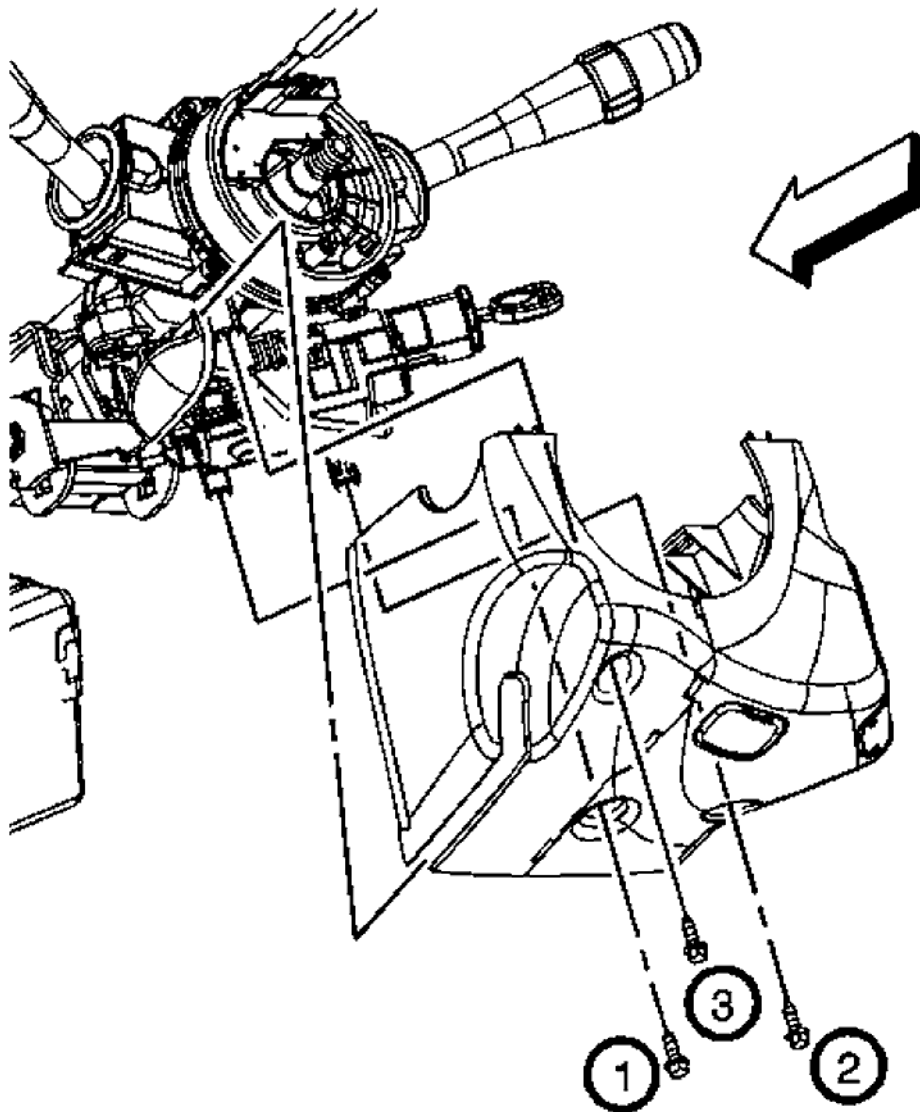


Fig. 18: Lower Steering Column Cover
Courtesy of GENERAL MOTORS CORP.

4. Remove the lower steering column cover screws.
5. Remove the lower steering column trim cover.

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Installation Procedure

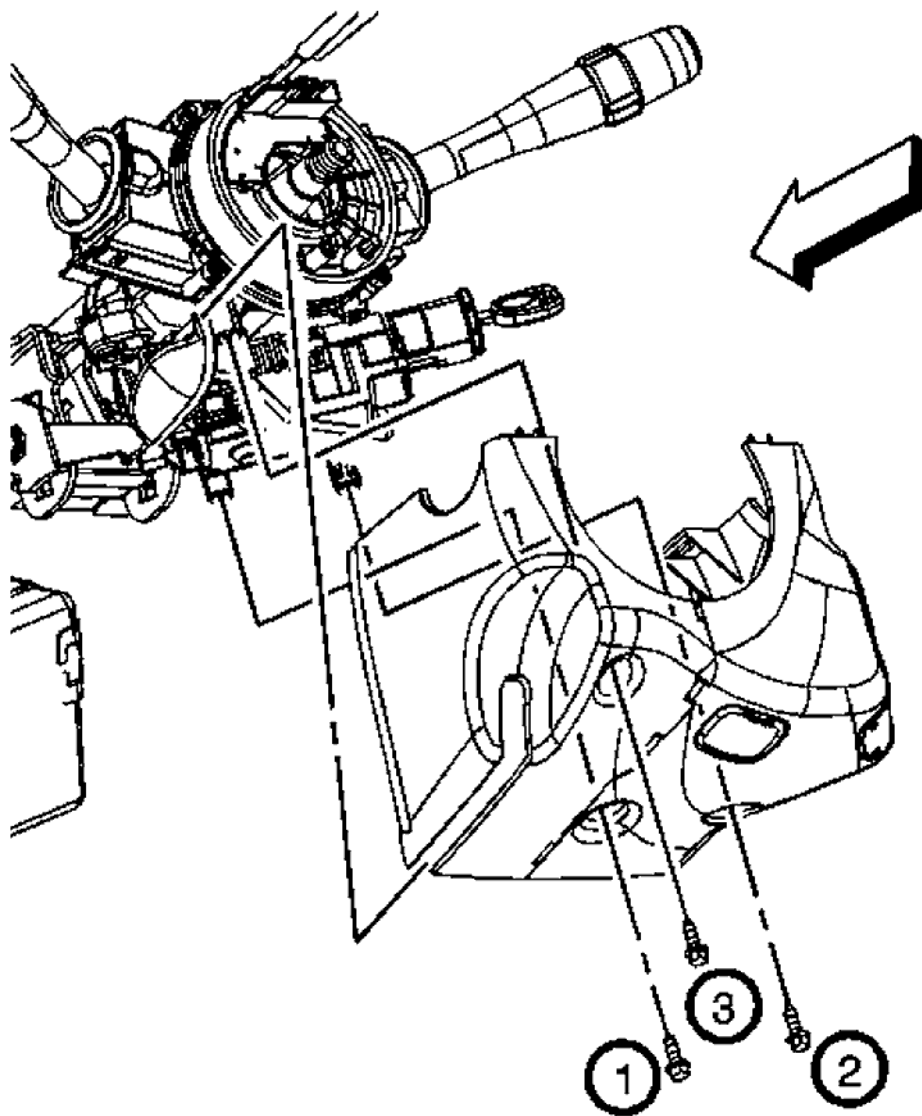


Fig. 19: Lower Steering Column Cover
Courtesy of GENERAL MOTORS CORP.

1. Install the lower steering column cover.

IMPORTANT: Tighten the lower steering column screws in the mandatory torque sequence as shown.

2. Install the lower steering column cover screws.

Tighten: Tighten the lower steering column cover screws to 2 N.m (17 lb in).

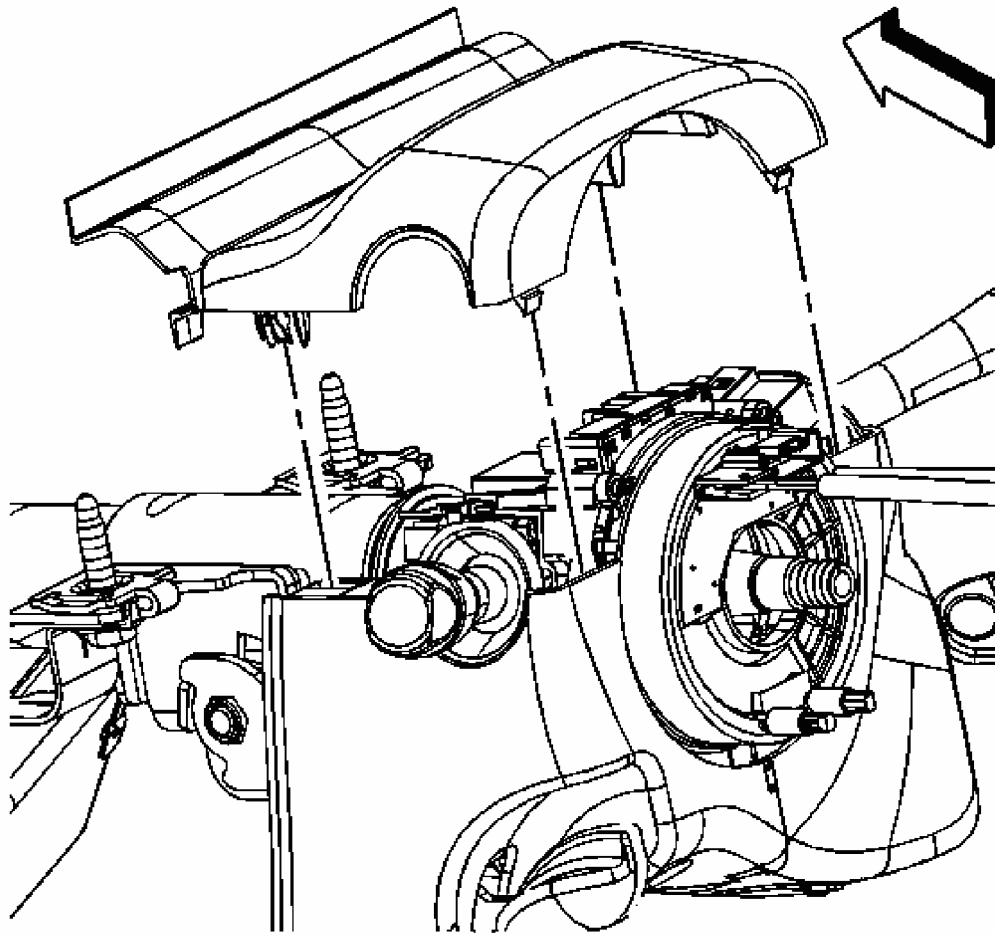


Fig. 20: Upper Steering Column Trim Cover
Courtesy of GENERAL MOTORS CORP.

3. Install the upper steering column trim cover by guiding the soft closeout under the I/P Trim Panel.
4. Push on the upper steering column cover until it snaps into place and is secure.
5. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

IGNITION SWITCH REPLACEMENT

Removal Procedure

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1. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
2. Disconnect the ignition switch harness connector.
3. Turn the ignition switch to the run position.

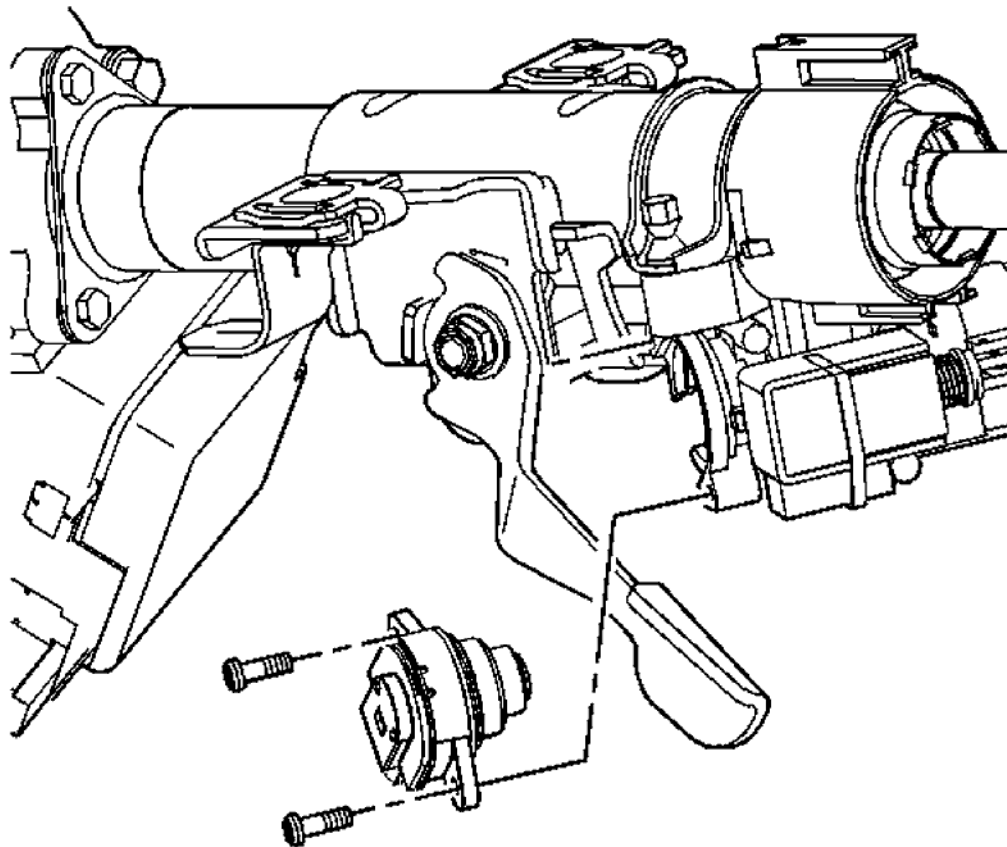


Fig. 21: View Of Ignition Switch
Courtesy of GENERAL MOTORS CORP.

4. Remove the ignition switch screws.

IMPORTANT: The ignition switch must be in the run position during removal in order to avoid damage to the ignition switch.

5. Remove the ignition switch from the steering column.

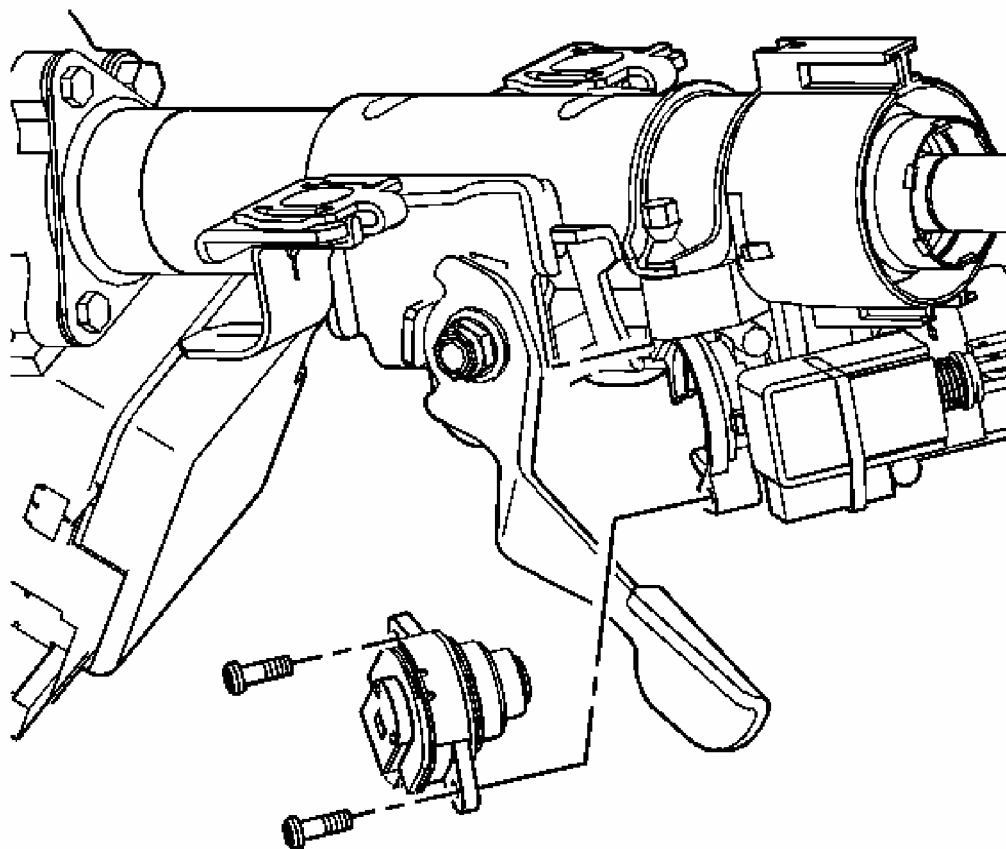


Fig. 22: View Of Ignition Switch
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Install the ignition switch and screws on to the steering column.

Tighten: Tighten the screws to 2 N.m (17 lb in).

2. Connect the ignition switch harness connector.
3. Install the steering column trim covers. Refer to Steering Column Trim Covers Replacement.

IGNITION LOCK CYLINDER REPLACEMENT

Removal Procedure

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1. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure** .
2. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** .
3. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
4. Remove the theft deterrent control module, if equipped. Refer to **Theft Deterrent Control Module Replacement** .

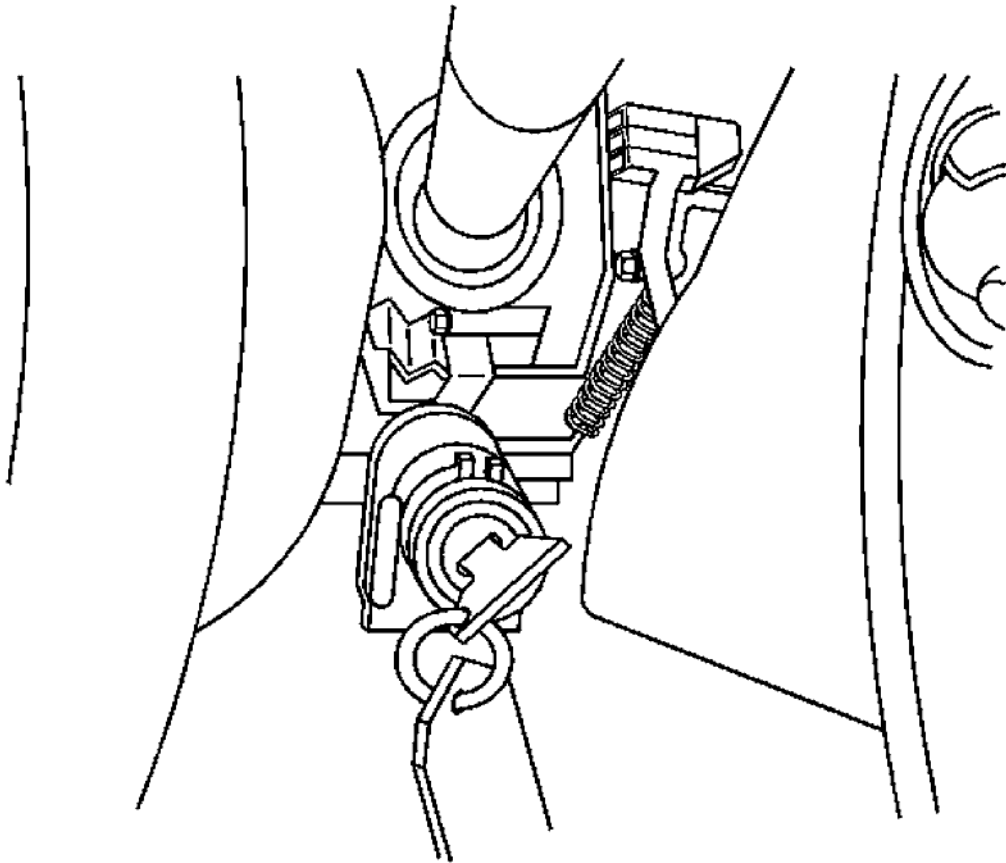


Fig. 23: Turning Ignition Lock Cylinder To RUN Position
Courtesy of GENERAL MOTORS CORP.

5. Turn the ignition lock cylinder to the RUN position.

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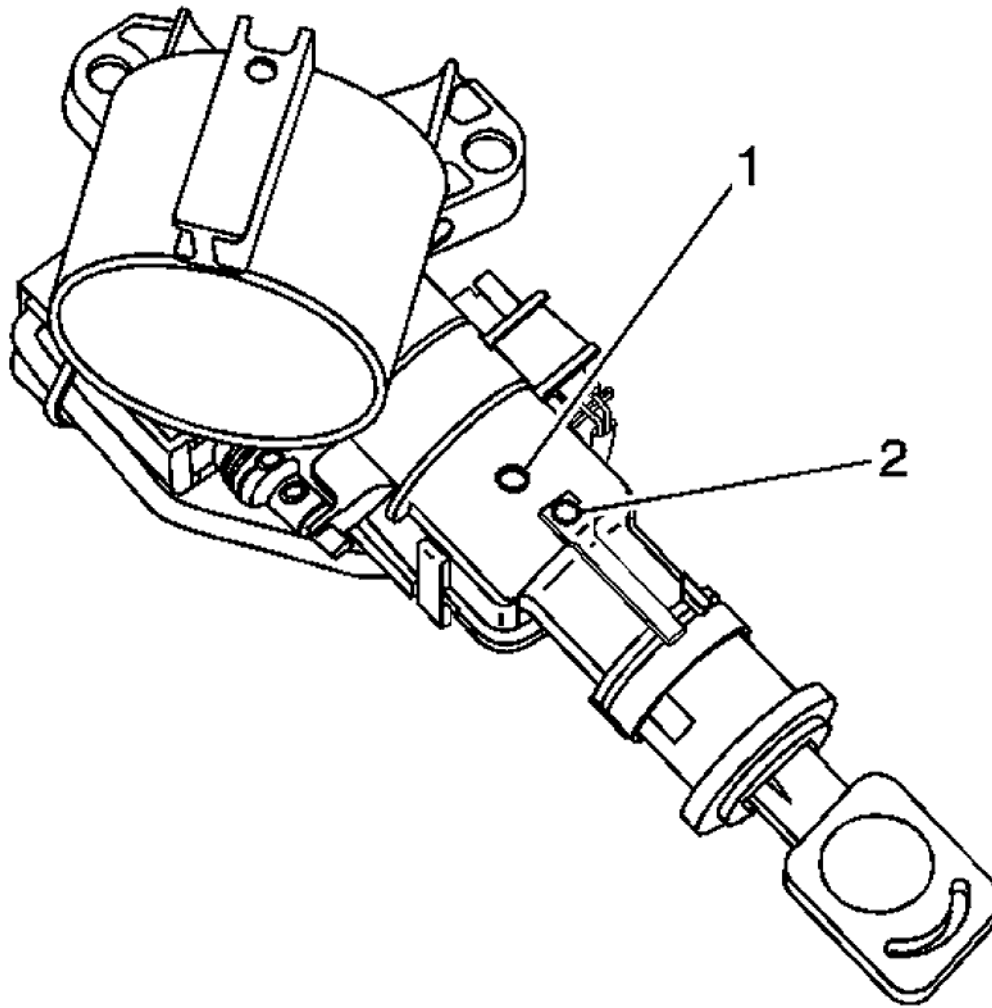


Fig. 24: Locating Lock Housing Access Holes
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: There are two retainers on the ignition lock cylinder.
Depress both retainers to remove the lock cylinder from
the housing.

6. Depress the first retainer through the lock housing access hole (2) with a small Allen wrench or similar pick-type tool. The lock cylinder will back out slightly.
7. Depress the second retainer through the lock housing access hole (1). The lock cylinder will back out slightly again.
8. Pull the lock cylinder out enough to locate the second retainer to the lock housing

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access hole (2).

9. Depress the retainer through the access hole (2) a second time. The ignition cylinder should release from the housing. If not, the ignition cylinder may need to be moved in and out several times to locate the retainer correctly in the hole.
10. Remove the lock cylinder from the lock housing.

Installation Procedure

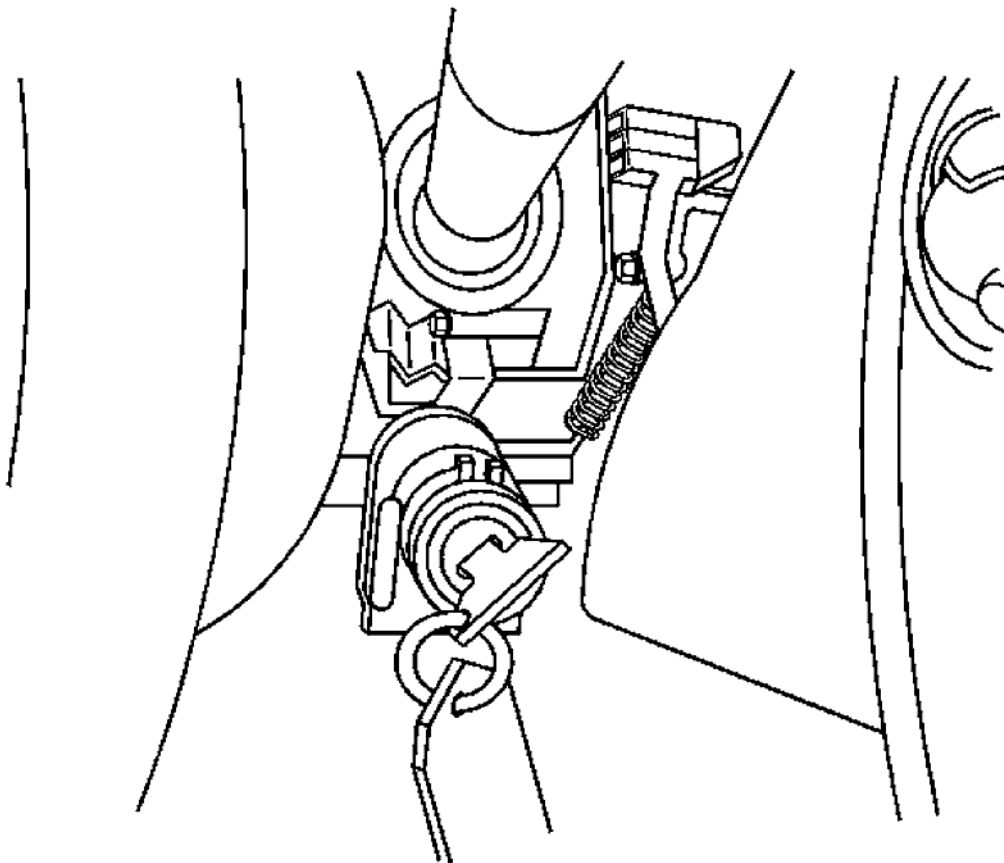


Fig. 25: Turning Ignition Lock Cylinder To RUN Position
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If you are installing a new lock cylinder, refer to Key and Lock Cylinder Coding .

1. Position the lock cylinder in the run position. Insert the cylinder into the lock housing.
2. Rotate the lock cylinder in the housing. Verify proper rotation.

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3. Install the theft deterrent control module, if equipped. Refer to **Theft Deterrent Control Module Replacement** .
4. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
5. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** .
6. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure** .
7. Program the theft deterrent control module, if equipped. Refer to **Control Module References**

IGNITION LOCK CYLINDER CASE REPLACEMENT

Removal Procedure

1. Remove the steering wheel. Refer to **Steering Wheel Replacement**.
2. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
3. Remove the theft deterrent control module, if equipped. Refer to **Theft Deterrent Control Module Replacement** .

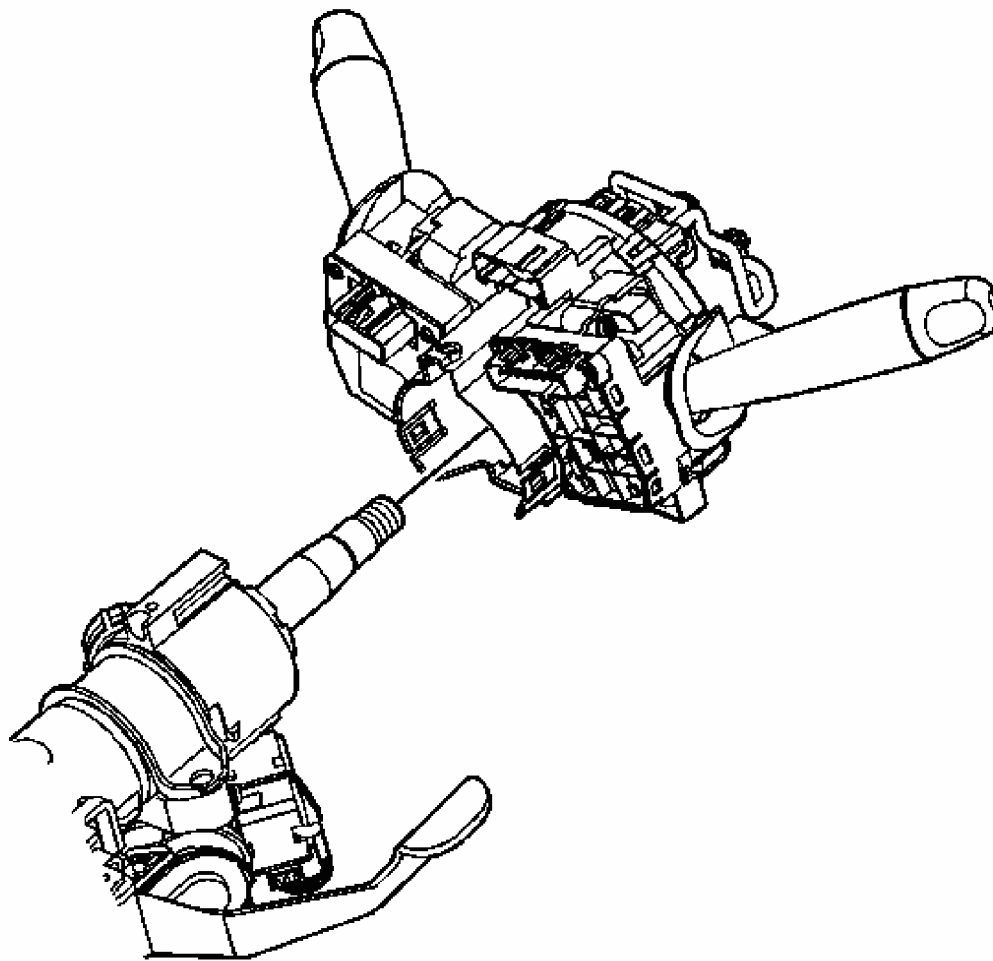


Fig. 26: Steering Wheel Module
Courtesy of GENERAL MOTORS CORP.

4. Remove the inflatable restraint steering wheel module coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement** .

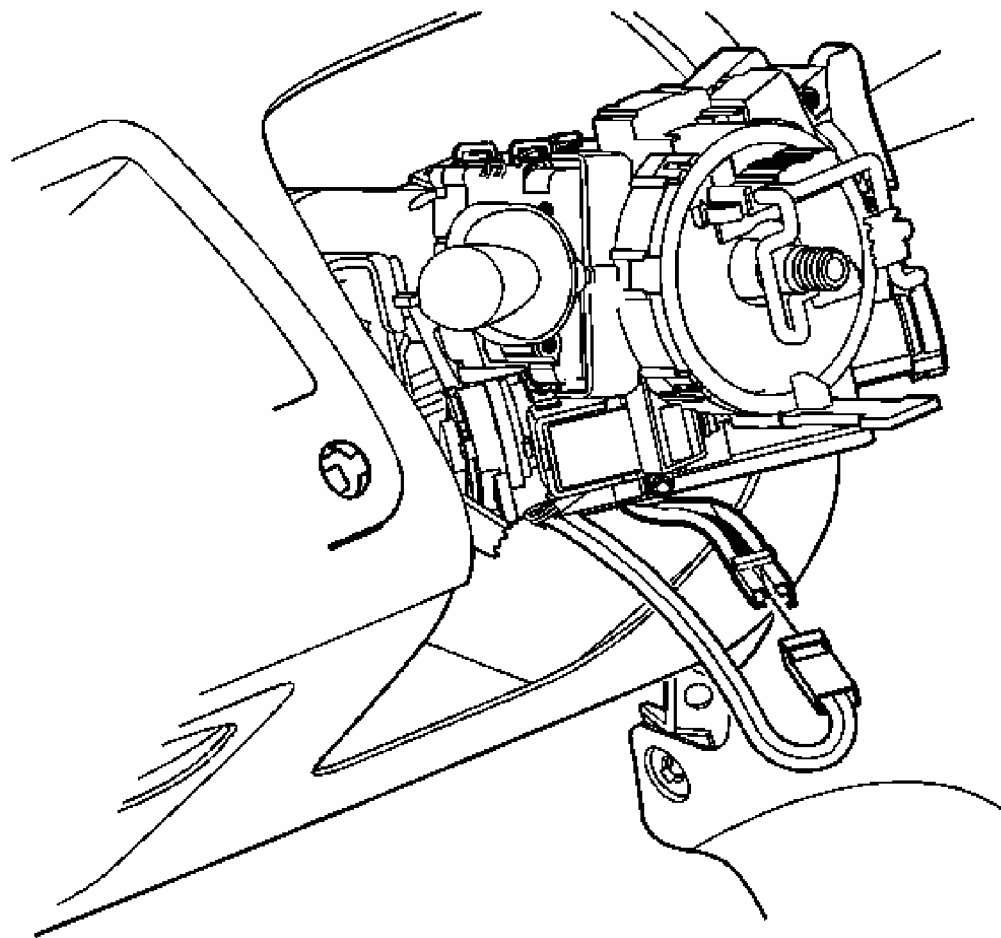


Fig. 27: View Of Ignition Switch Harness Connector
Courtesy of GENERAL MOTORS CORP.

5. If applicable, disconnect the ignition lock cylinder solenoid harness connector.
6. Disconnect the ignition switch harness connector.

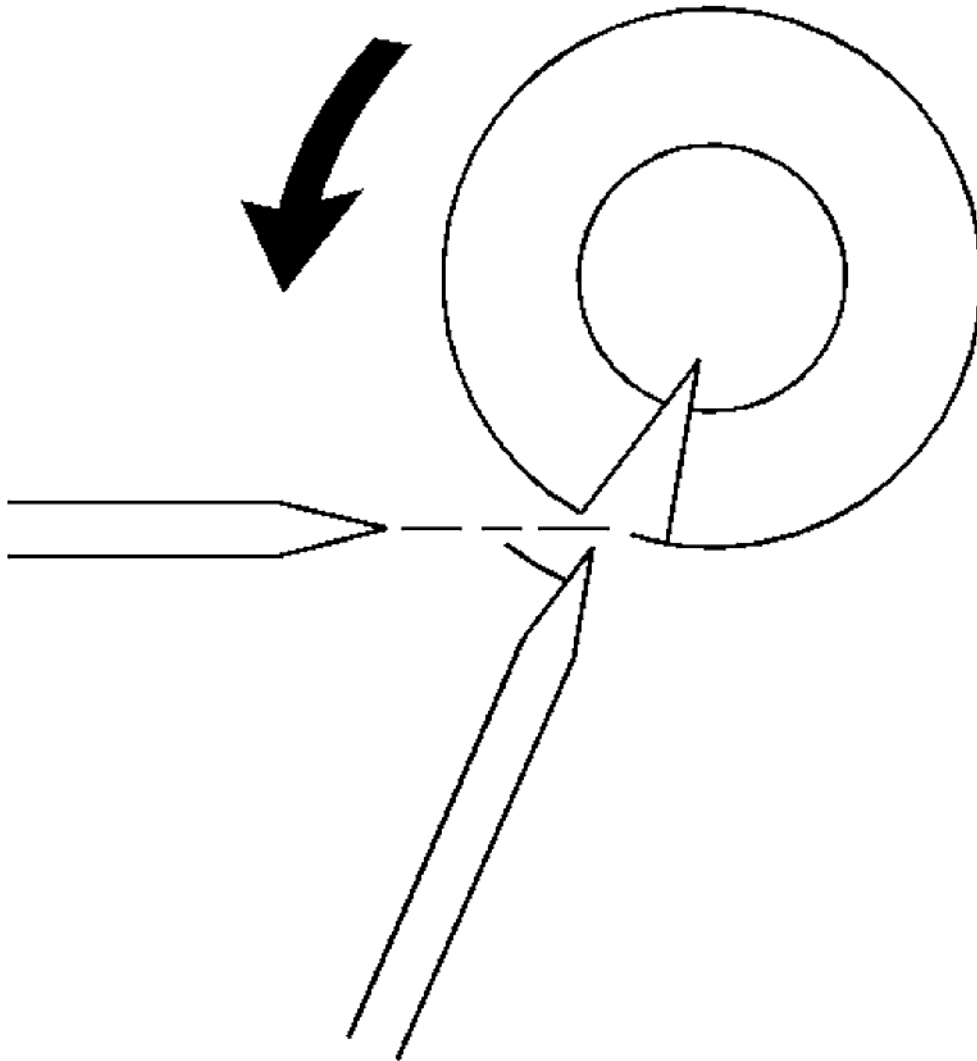


Fig. 28: Biting Into Shear Bolt
Courtesy of GENERAL MOTORS CORP.

7. Using the following procedure, remove the ignition lock cylinder case shear bolt:
 1. Use a hammer and chisel to bite into the shear bolt at a position offset from center.
 2. Tap the chisel to rotate the bolt in order to loosen it. Repeat as necessary until bolt is loose enough to remove.

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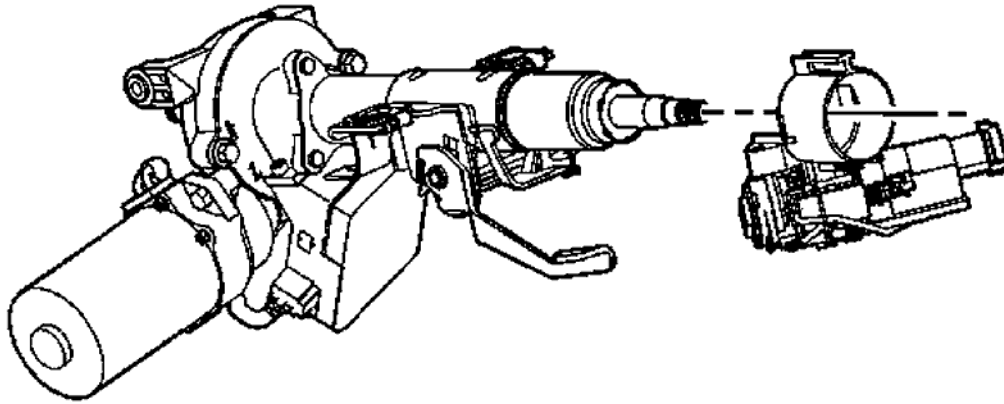


Fig. 29: View Of Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The lock cylinder must be in the RUN position for the lock cylinder case removal. If the lock cylinder is stuck in the OFF position with the lock bolt engaged then proceed to step 8 for cutting off the lock cylinder housing collar.

8. With the ignition in the run position, remove the ignition lock cylinder case housing from the steering column.

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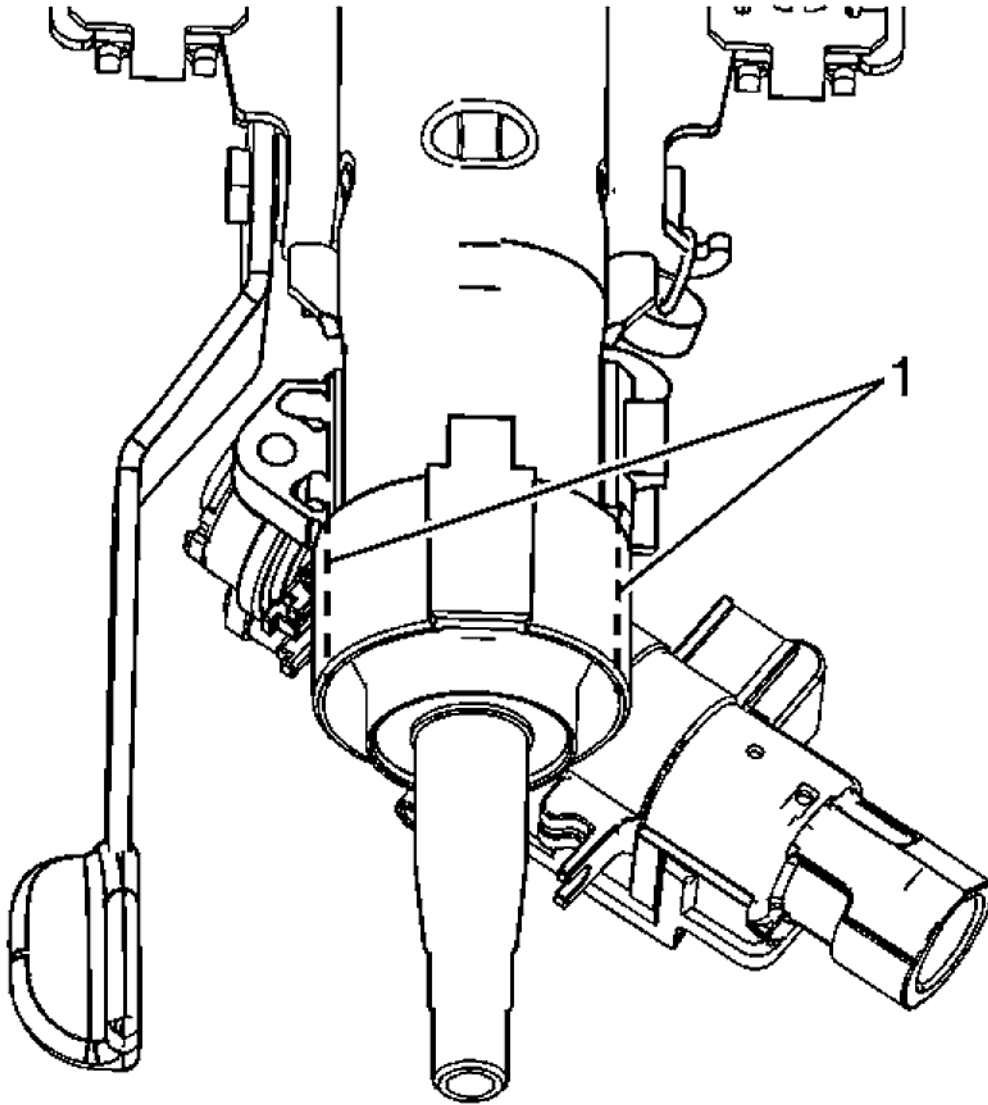


Fig. 30: Lock Cylinder Case Housing Collar
Courtesy of GENERAL MOTORS CORP.

9. The steering wheel lock bolt, if engaged, may prevent removal of the lock cylinder case. If necessary, cut the lock cylinder case housing collar at the locations (1).

Installation Procedure

1. Install the ignition lock cylinder into the lock cylinder housing. Refer to **Ignition Lock Cylinder Replacement**.

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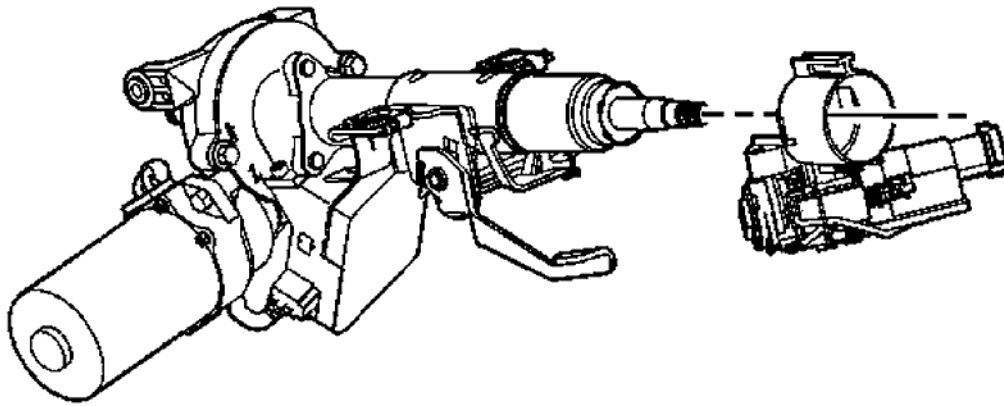


Fig. 31: View Of Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

2. Install the lock cylinder case housing to the steering column.

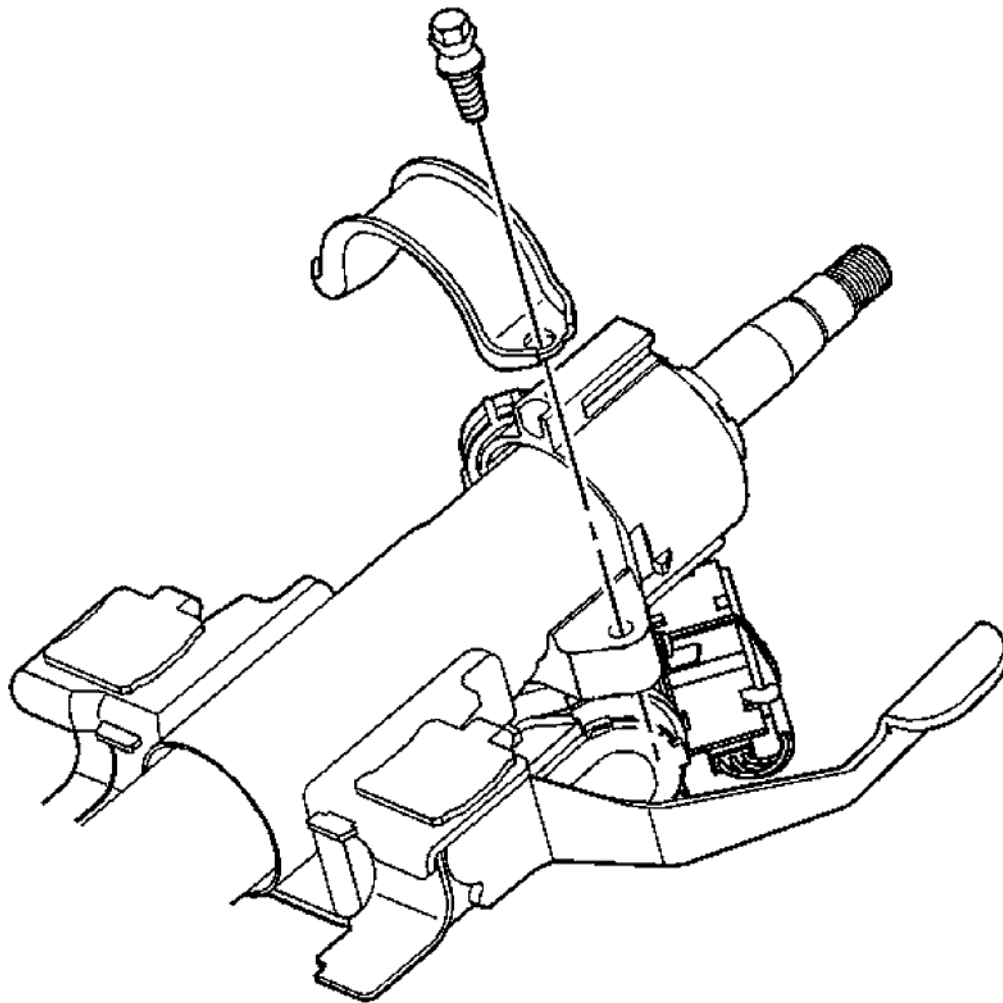


Fig. 32: View Of Shear Bolt
Courtesy of GENERAL MOTORS CORP.

3. Install the lock cylinder case housing clamp and a new shear bolt. Ensure the tab is correctly positioned.

IMPORTANT: Ensure the lock cylinder case mounting clamp tab is properly installed. Rock the lock cylinder case back and forth to ensure it is seated into the lock bolt cutout.

4. Tighten the shear bolt until the head breaks off.

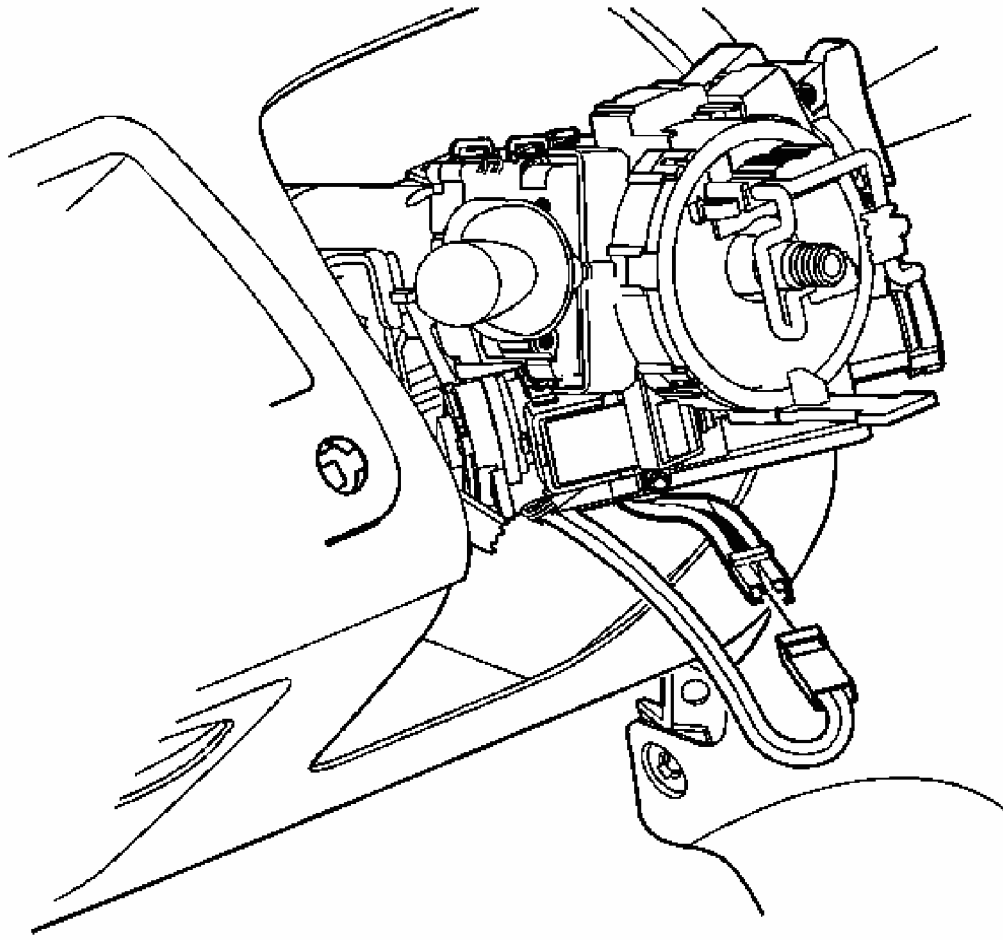


Fig. 33: View Of Ignition Switch Harness Connector
Courtesy of GENERAL MOTORS CORP.

5. If applicable, connect the ignition lock cylinder solenoid harness connector.
6. Connect the ignition switch harness connector to the lock module.

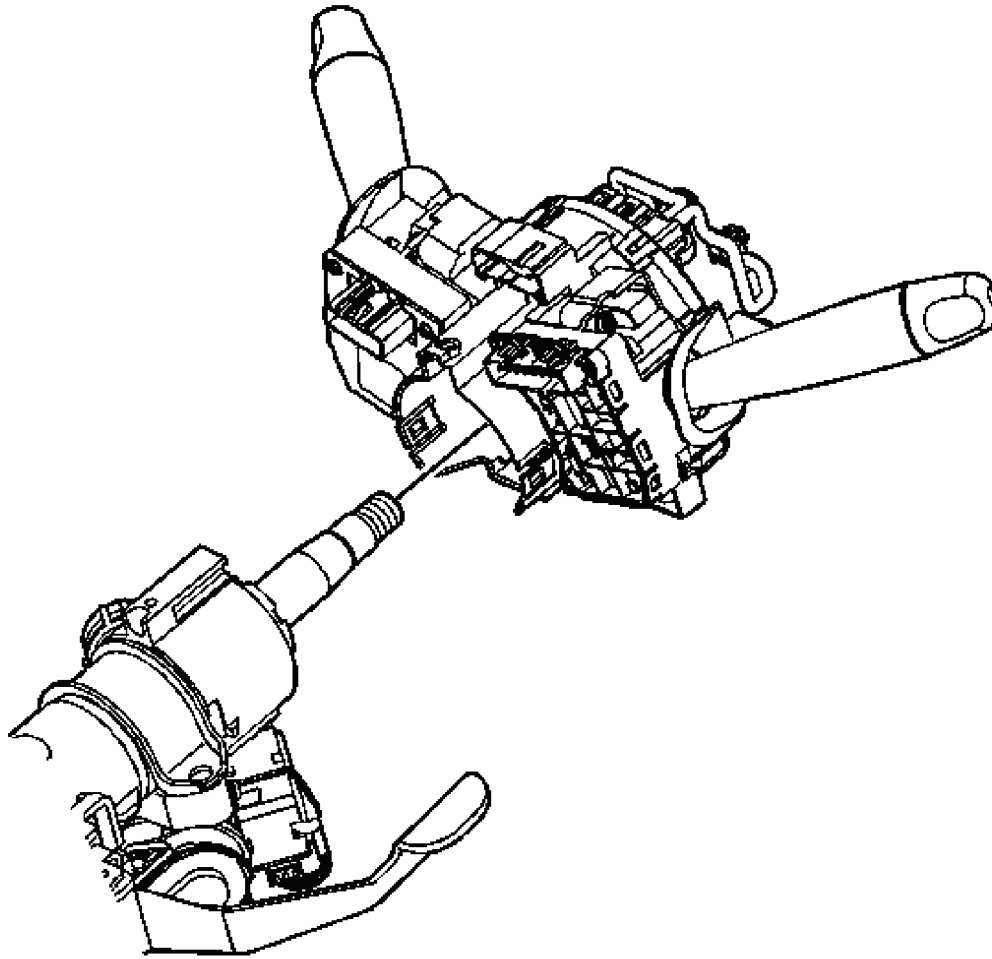


Fig. 34: Steering Wheel Module
Courtesy of GENERAL MOTORS CORP.

7. Install the inflatable restraint steering wheel module coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement** .
8. Install the theft deterrent control module, if equipped. Refer to **Theft Deterrent Control Module Replacement** .
9. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
10. Install the steering wheel. Refer to **Steering Wheel Replacement**.
11. Program the theft deterrent control module, if equipped. Refer to **Control Module References**

Removal Procedure

1. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.

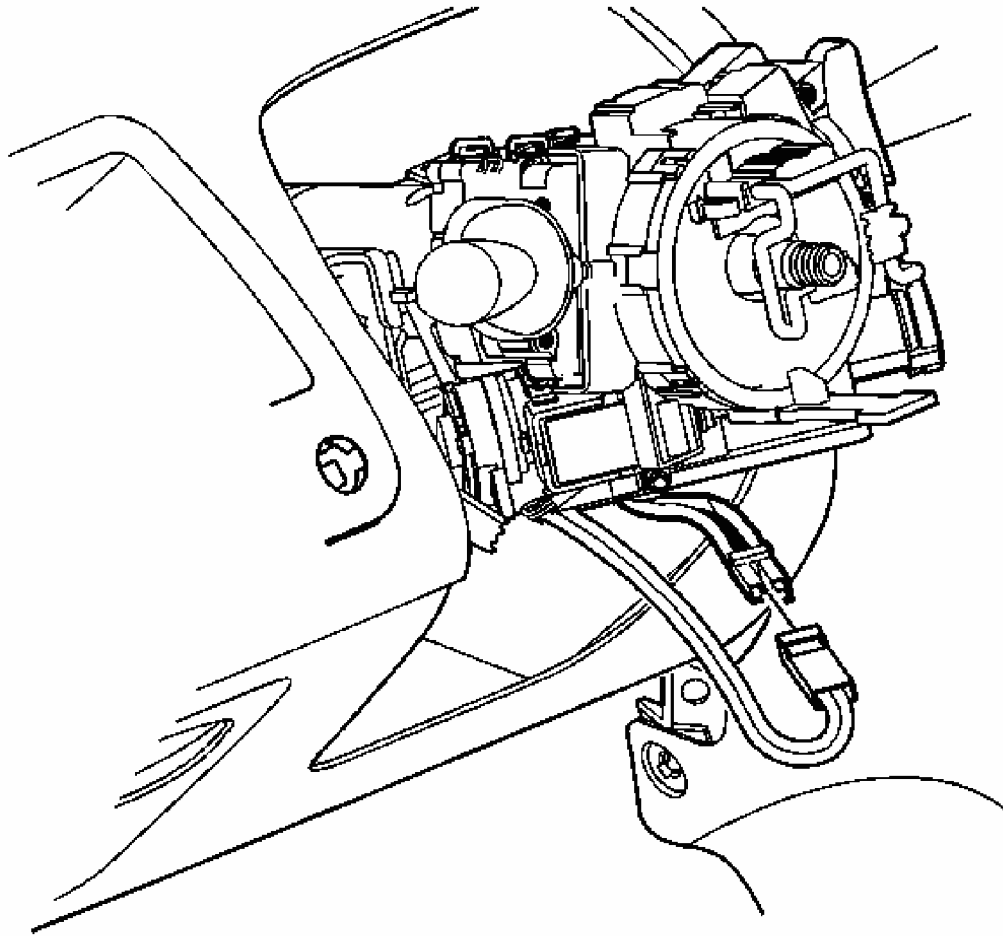


Fig. 35: View Of Ignition Switch Harness Connector
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the Ignition lock cylinder solenoid harness connector.

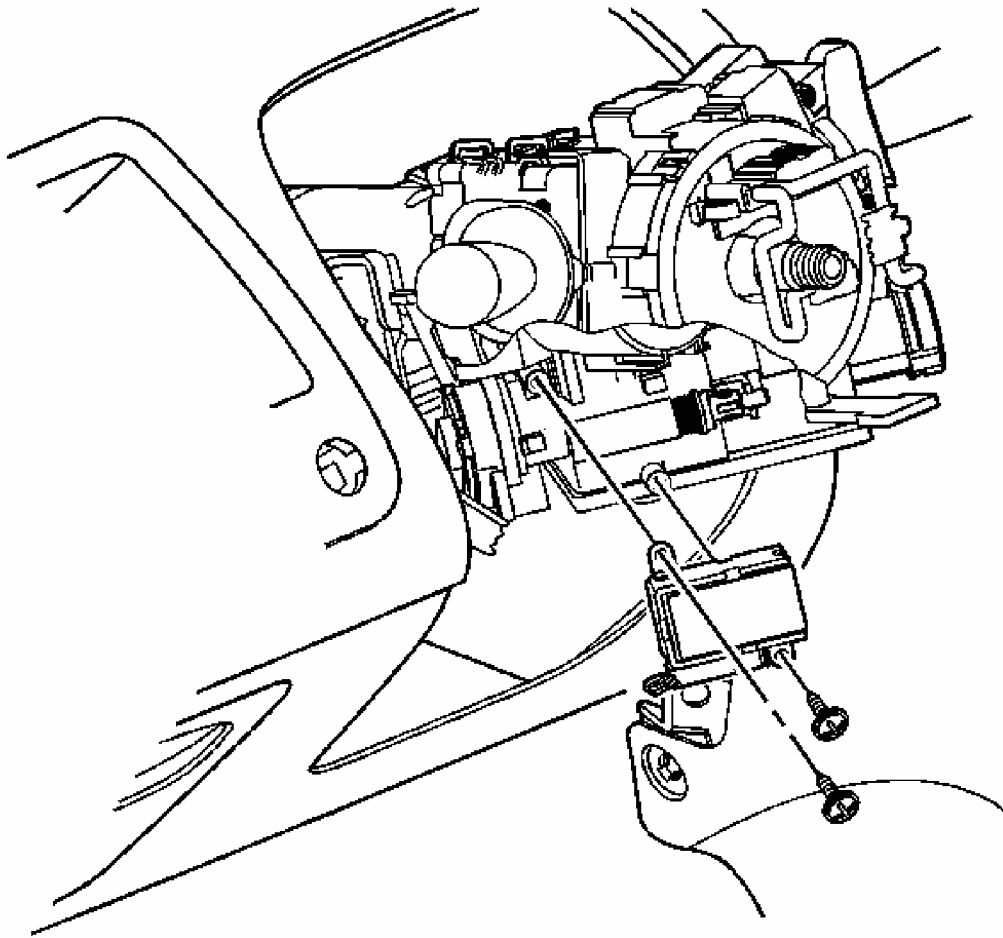


Fig. 36: View Of Ignition Lock Cylinder Solenoid
Courtesy of GENERAL MOTORS CORP.

3. Remove the Ignition lock cylinder solenoid screws.

IMPORTANT: Do not attempt to remove any roll pins retaining the plunger mechanism. The ignition lock cylinder solenoid replacement part consists of only the solenoid and spring. If the plunger mechanism exhibits any signs of damage or wear then replacement of the ignition lock cylinder case will be necessary.

4. Remove the Ignition lock cylinder solenoid from the lock cylinder case housing.

IMPORTANT: Clean the solenoid and plunger with a lint free cloth prior to installation. Oil or debris may cause ignition lock cylinder solenoid malfunction.

1. Install a new spring over the ignition lock cylinder solenoid plunger.
2. Carefully install the new ignition lock cylinder solenoid over the plunger.

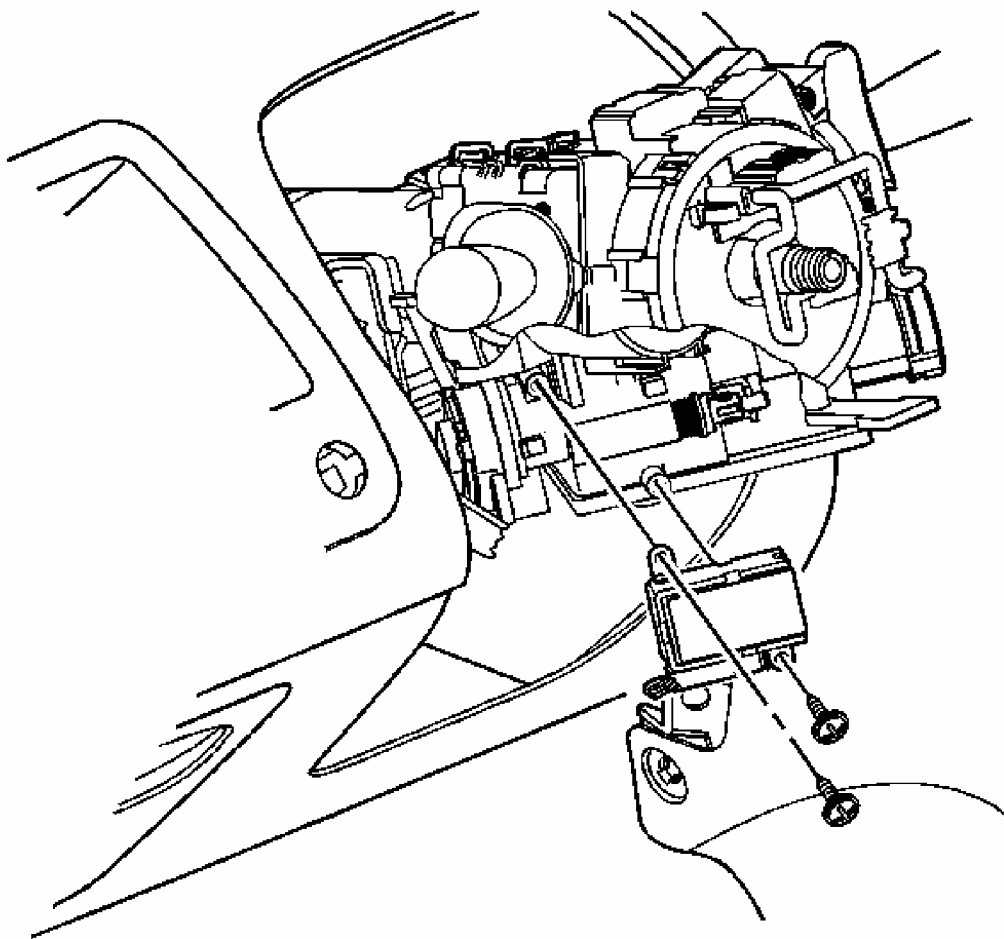


Fig. 37: View Of Ignition Lock Cylinder Solenoid
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Seat the ignition lock cylinder solenoid on the lock cylinder case housing and install the screws.

Tighten: Tighten the screws to 2 N.m (17 lb in).

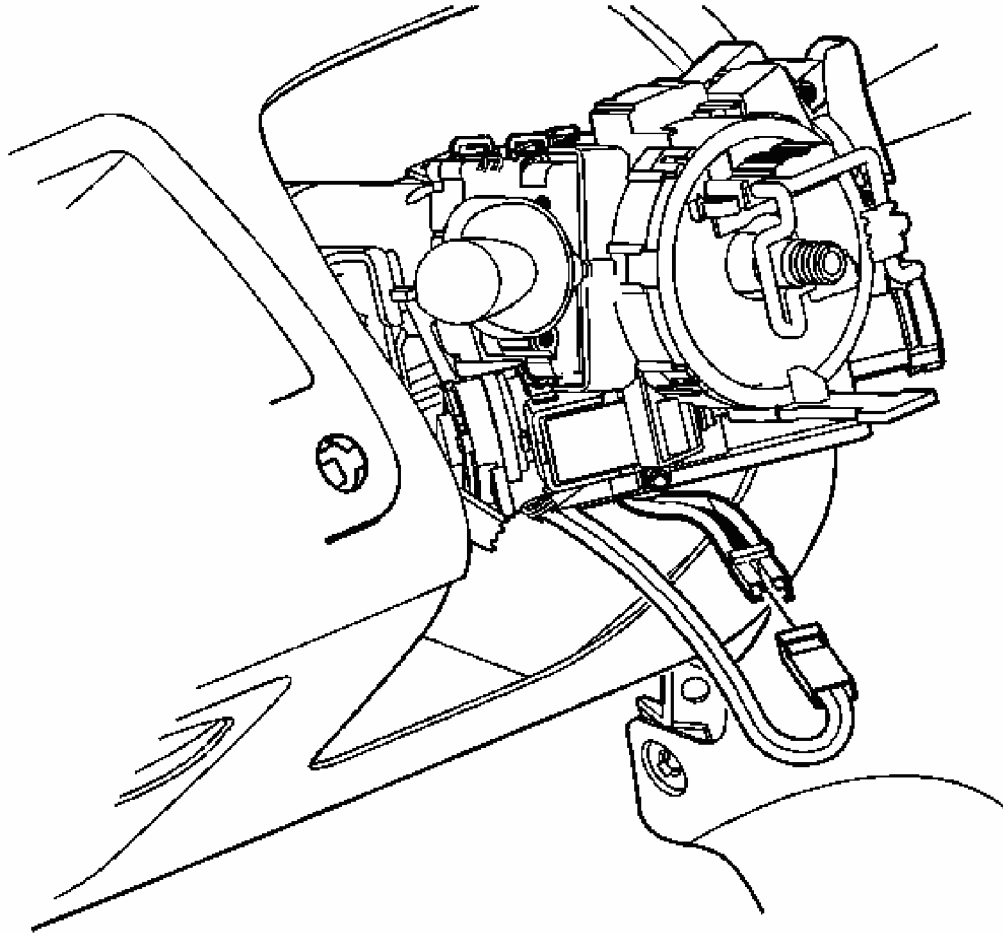


Fig. 38: View Of Ignition Switch Harness Connector
Courtesy of GENERAL MOTORS CORP.

4. Connect the lock cylinder solenoid harness connector.
5. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
6. Check the operation of the ignition lock cylinder solenoid.

MULTIFUNCTION, TURN SIGNAL SWITCH REPLACEMENT

Removal Procedure

1. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.

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2. Disconnect the multifunction turn signal switch harness connector.

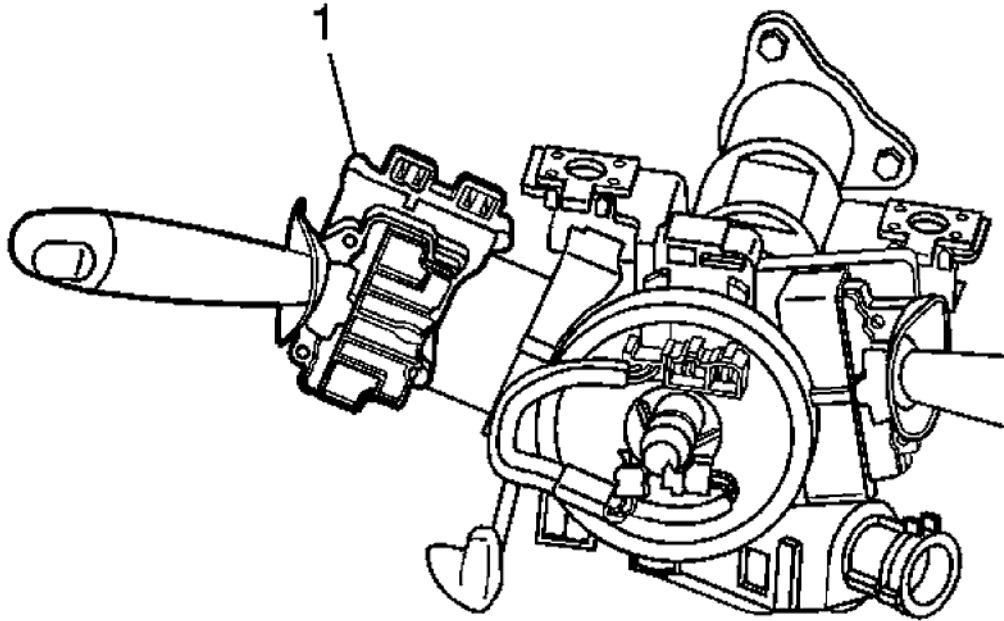


Fig. 39: Headlamp/Turn Signal Switch
Courtesy of GENERAL MOTORS CORP.

3. Depress the locking tabs and remove the multifunction turn signal switch from the steering column.

Installation Procedure

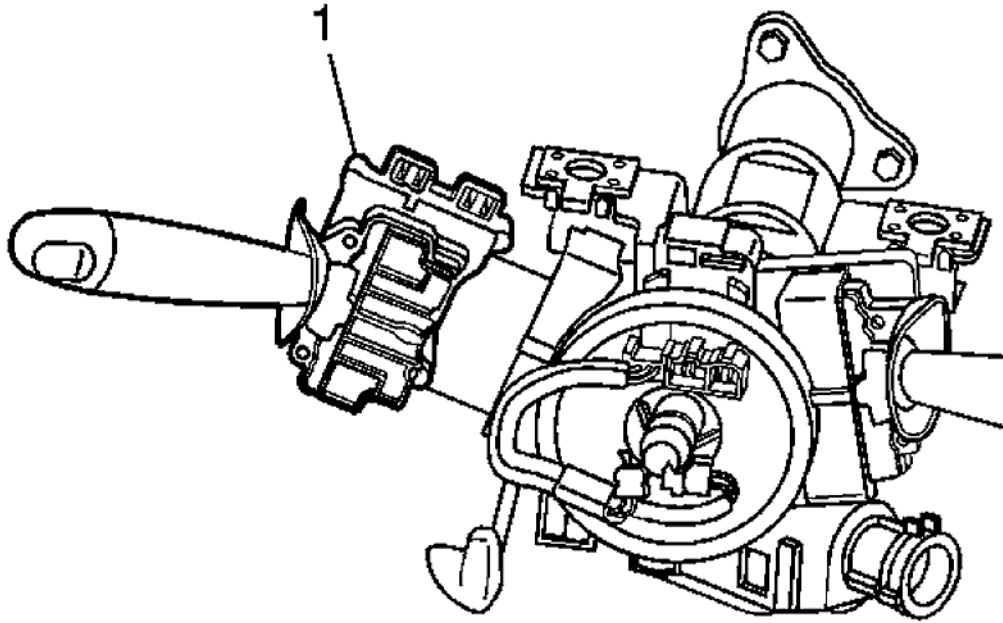
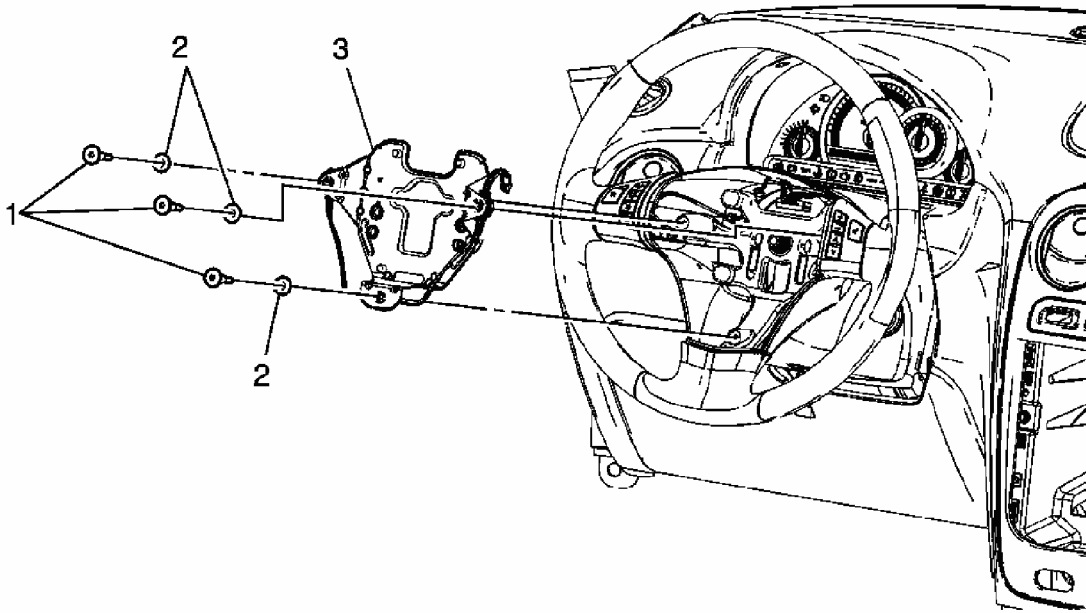


Fig. 40: Headlamp/Turn Signal Switch
Courtesy of GENERAL MOTORS CORP.

1. Install the multifunction turn signal switch to the steering column. Ensure the locking tabs are snapped into place.
2. Connect the multifunction turn signal switch harness connector.
3. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.

HORN SWITCH REPLACEMENT

**Fig. 41: Horn Switch**

Courtesy of GENERAL MOTORS CORP.

Horn Switch Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u>	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Remove the inflatable restraint steering wheel module. Refer to <u>Inflatable Restraint Steering Wheel Module Replacement</u> .	
1	Bolt, Steering Wheel Horn Switch (Qty: 3) Tighten: 7 N.m (62 lb in)
2	Washers, Steering Wheel Horn Switch (Qty: 3)
3	Steering Wheel Horn Switch Assembly

STEERING WHEEL CONTROL SWITCH ASSEMBLY REPLACEMENT

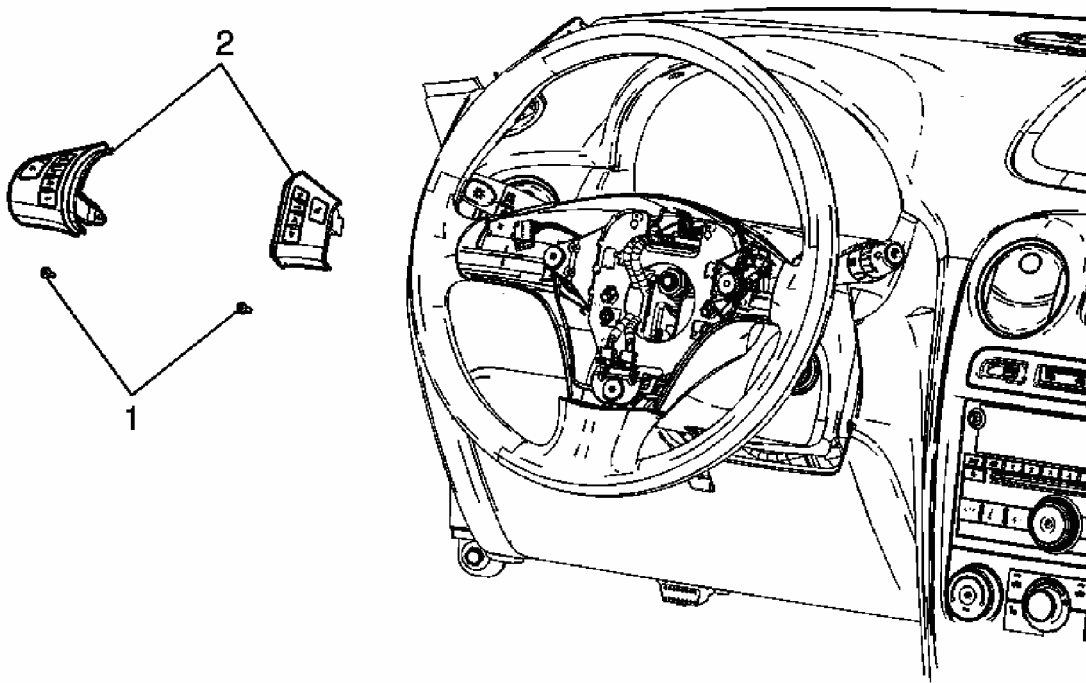


Fig. 42: Steering Wheel Control Switch Assembly
Courtesy of GENERAL MOTORS CORP.

Steering Wheel Control Switch Assembly Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u>	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Remove the inflatable restraint steering wheel module. Refer to <u>Inflatable Restraint Steering Wheel Module Replacement</u> .	
1	Bolt/Screw, Steering Wheel Switch Tip: Disconnect the Electrical Connector Tighten: 1.8 N.m (16 lb in)
2	Switch Assembly, Radio, HVAC and Cruise Control Assembly

STEERING WHEEL REPLACEMENT

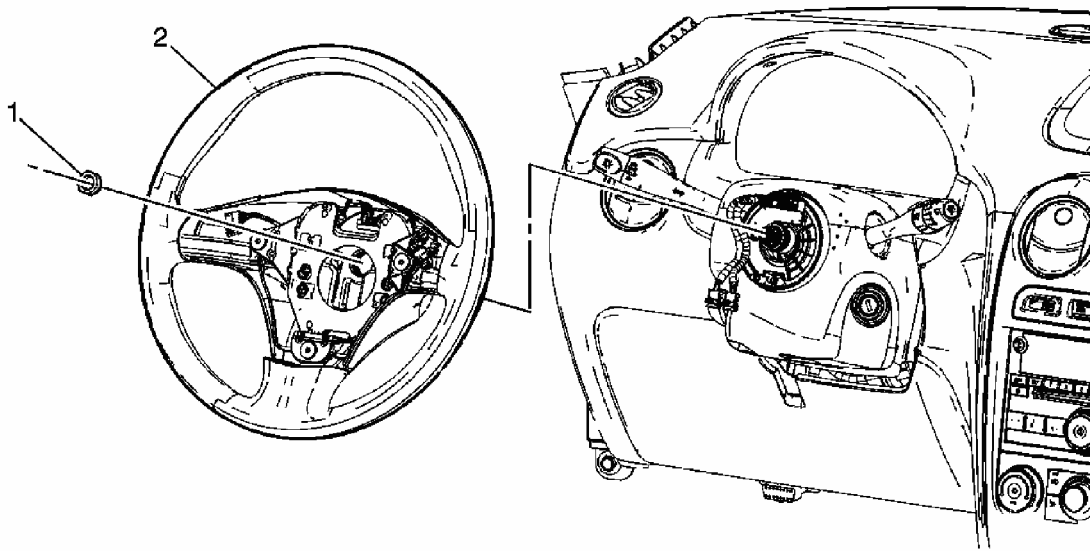


Fig. 43: Steering Wheel Replacement
 Courtesy of GENERAL MOTORS CORP.

Steering Wheel Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u>. Tools Required • J 1859-A Countergear and Steering Wheel Puller • J 36541-A Steering Wheel Puller Legs Preliminary Procedure: Remove the inflatable restraint steering wheel module. Refer to <u>Inflatable Restraint Steering Wheel Module Replacement</u> .	
1	Nut, Steering Wheel Assembly Tighten: 41 N.m (30 lb ft)
2	Wheel Assembly, Steering

STEERING COLUMN REPLACEMENT

Removal Procedure

1. Place the steering wheel in the straight forward position.
2. Remove the knee bolster. Refer to Knee Bolster Replacement .

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3. Remove the knee bolster reinforcement. Refer to **Knee Bolster Reinforcement Replacement**.
4. Remove the steering wheel. Refer to **Steering Wheel Replacement**.

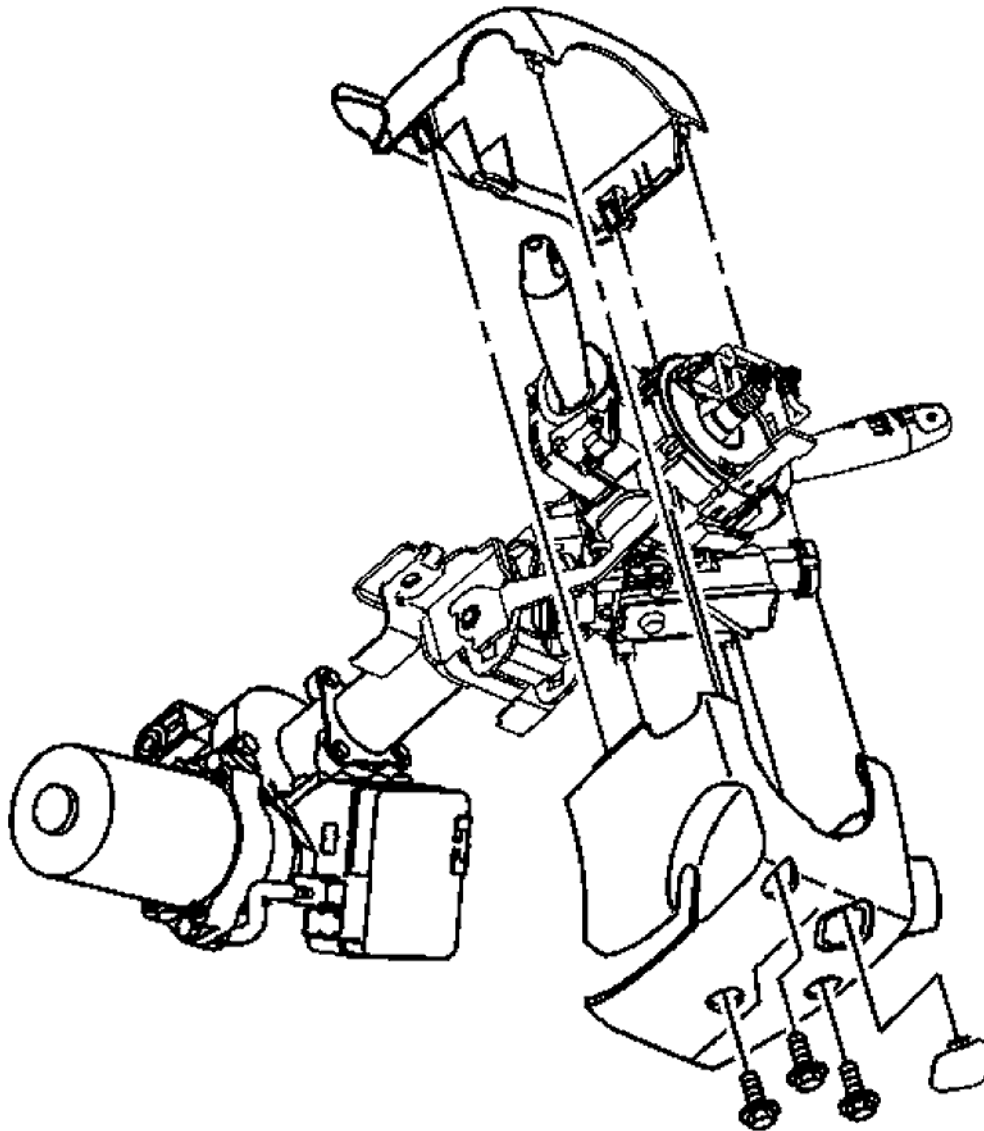


Fig. 44: View Of Steering Column Trim Covers
Courtesy of GENERAL MOTORS CORP.

5. Remove the column trim covers. Refer to **Steering Column Trim Covers Replacement**.

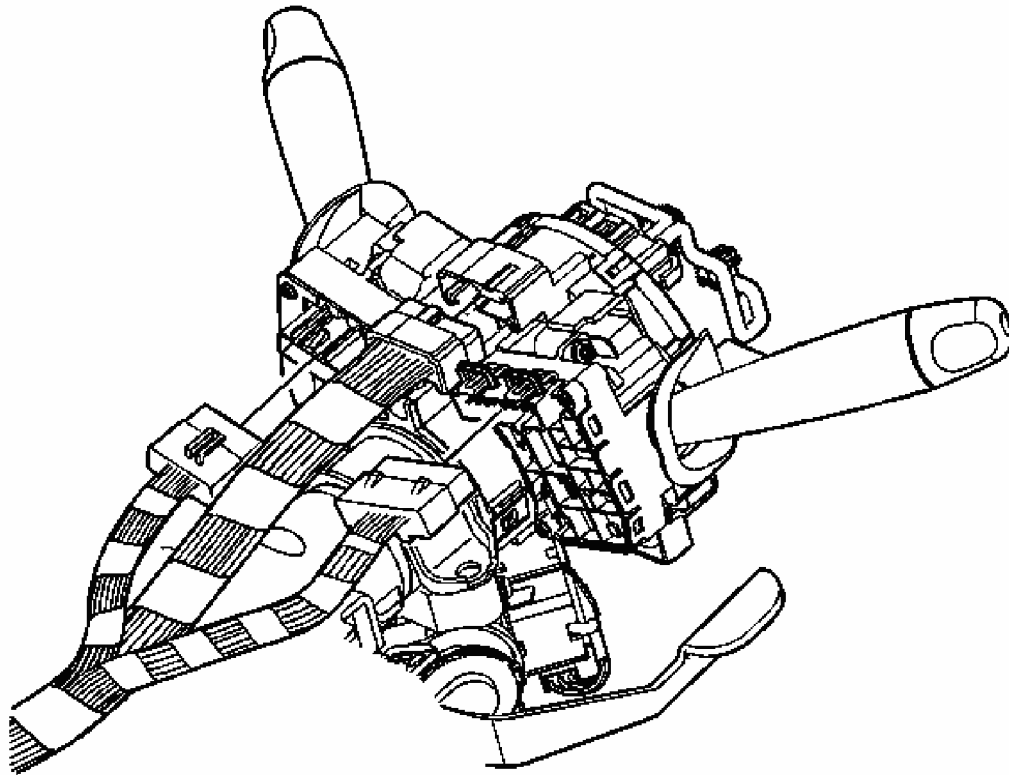


Fig. 45: View Of SIR Coil Module Assembly Harness Connectors
Courtesy of GENERAL MOTORS CORP.

6. Disconnect the head lamp/turn signal harness connector from the SIR coil module assembly.
7. Disconnect the wiper/washer harness connector from the SIR coil module assembly.
8. Disconnect the SIR coil harness connector from the SIR coil module assembly.
9. Remove the SIR coil module assembly. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement** .

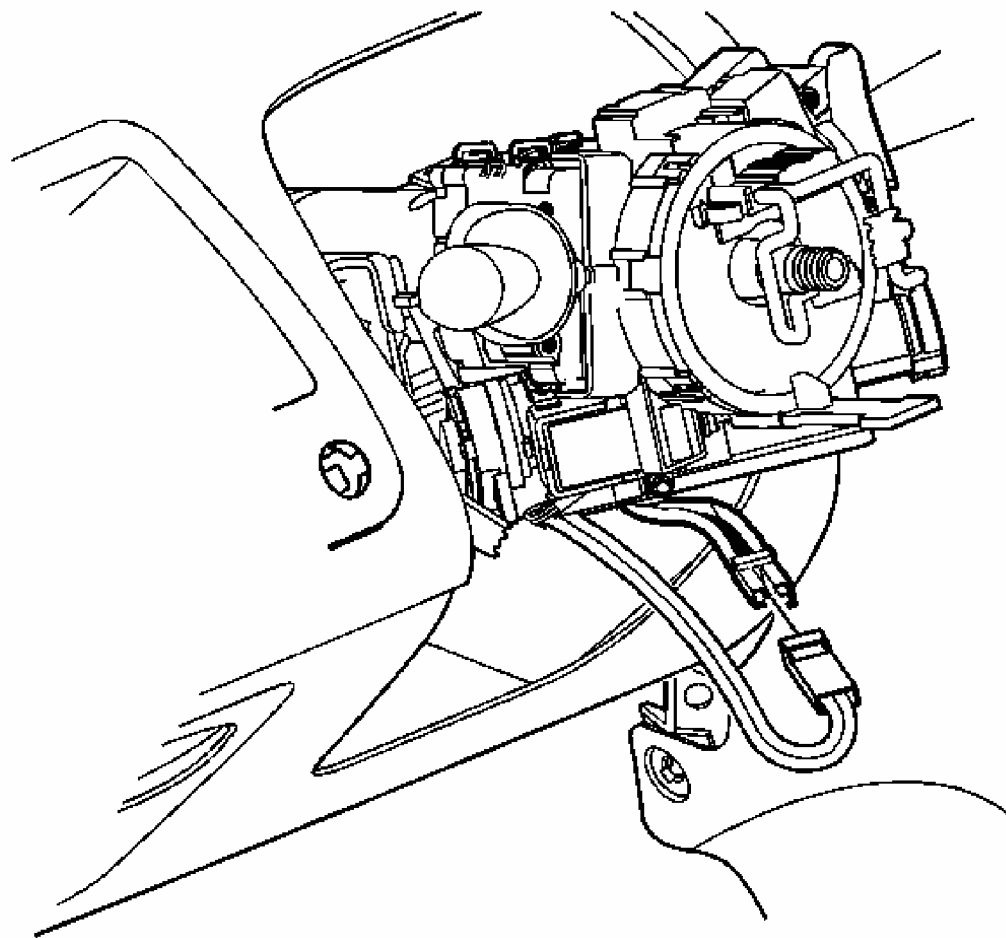


Fig. 46: View Of Ignition Switch Harness Connector
Courtesy of GENERAL MOTORS CORP.

10. Disconnect the ignition lock cylinder harness connector.
11. Disconnect the ignition switch harness connector.

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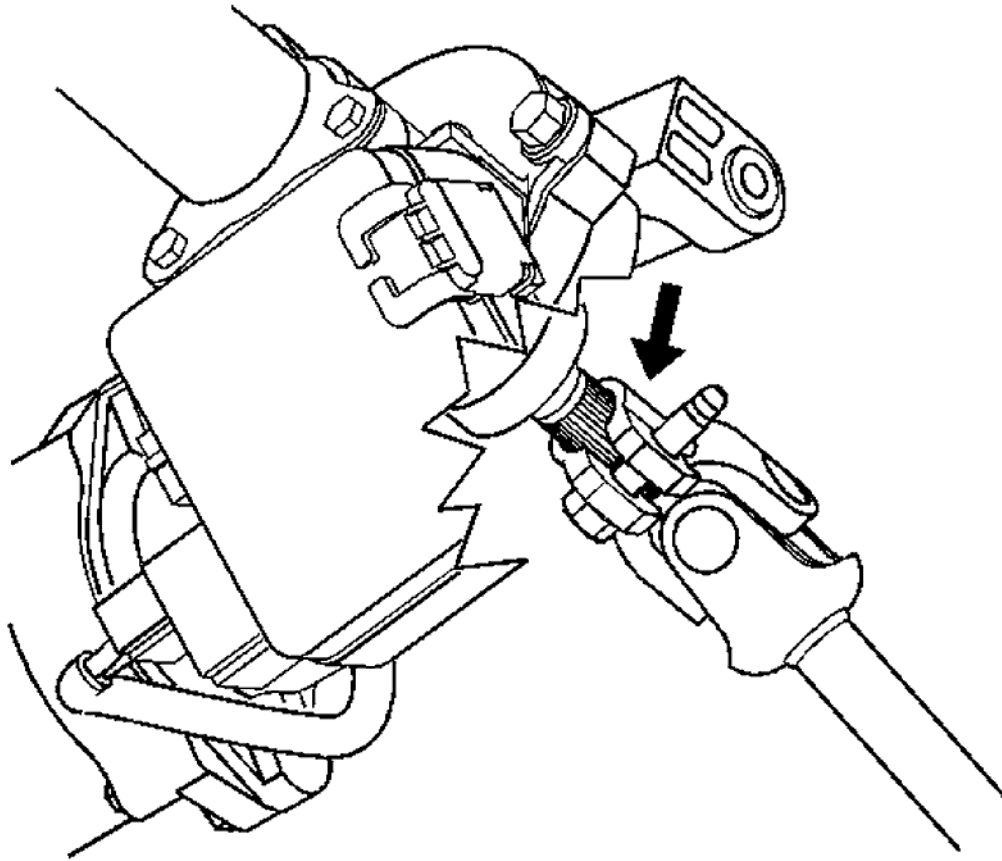


Fig. 47: Scribing Marks On Intermediate Shaft-To-Steering Column Connection
Courtesy of GENERAL MOTORS CORP.

12. Place scribe marks on the intermediate shaft to steering column, for use during assembly.

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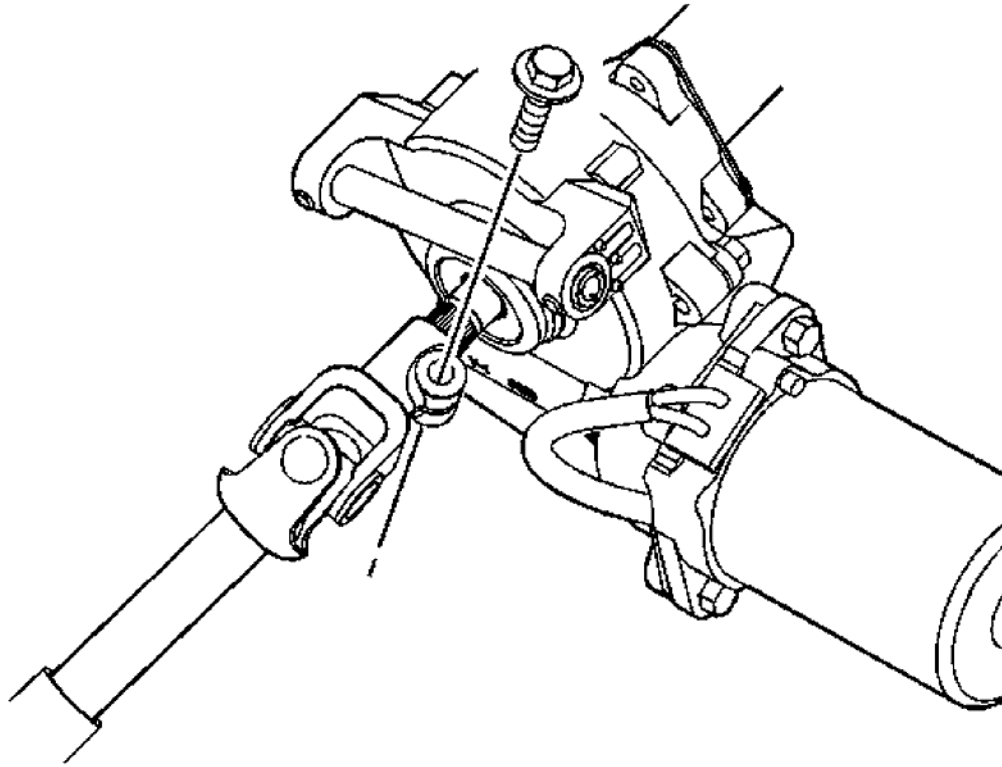


Fig. 48: View Of Upper Intermediate Shaft Pinch Bolt And Column
Courtesy of GENERAL MOTORS CORP.

13. Remove the intermediate shaft pinch bolt at the steering column and discard.
14. Slide the intermediate shaft off the steering column.

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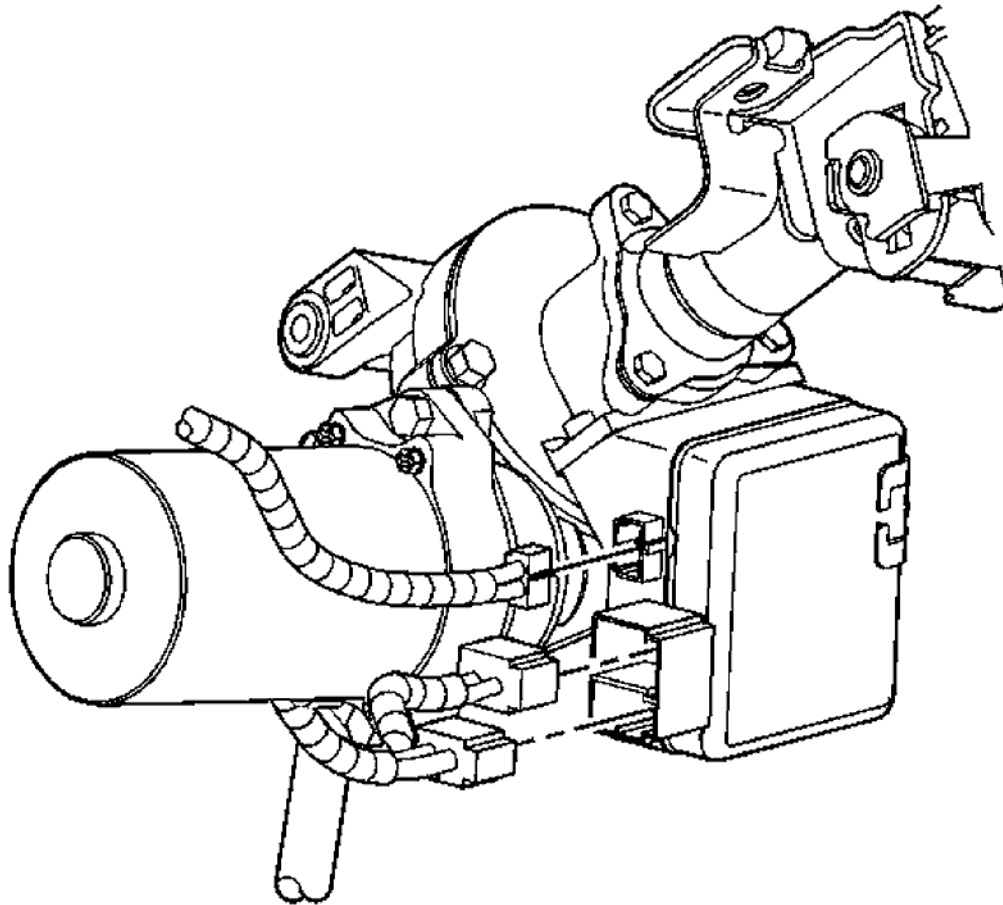


Fig. 49: View Of EPS Control Module Harness Connectors
Courtesy of GENERAL MOTORS CORP.

15. Disconnect the EPS control module power feed harness connector.
16. Disconnect the EPS control module small harness connector.

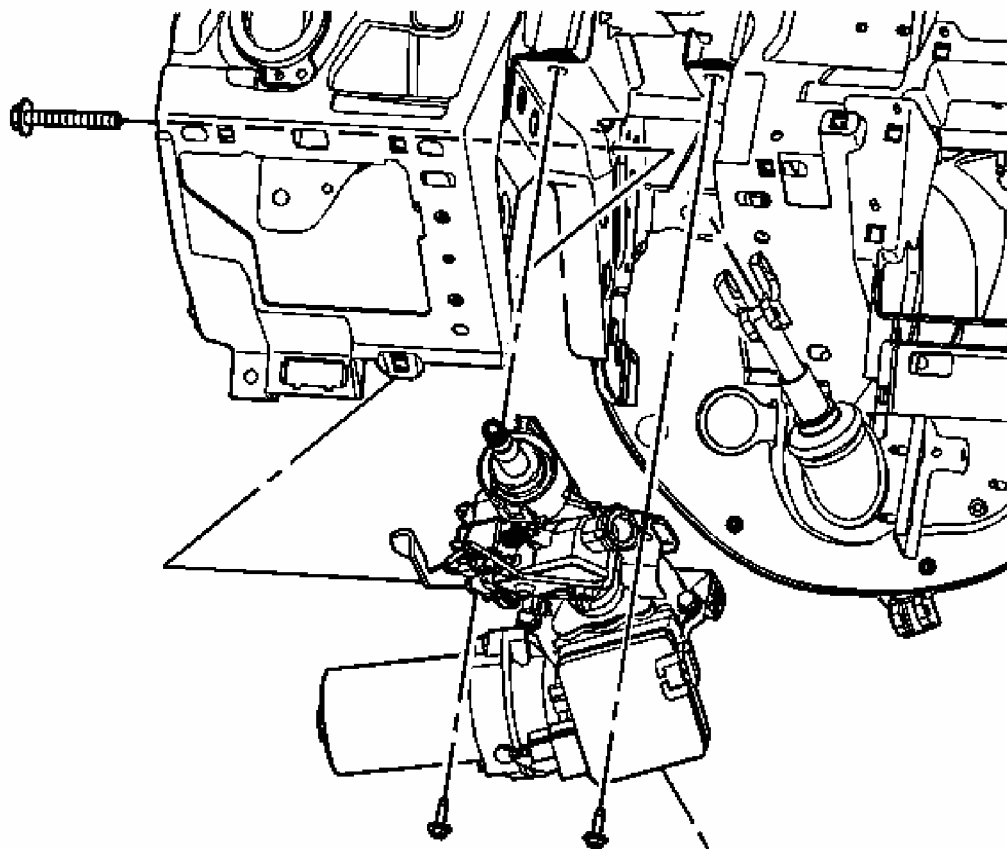


Fig. 50: View Of Steering Column
Courtesy of GENERAL MOTORS CORP.

17. Remove the steering column pivot Bolt.
18. Remove the steering column mounting bolts.
19. Remove the column from the vehicle and place on a bench.

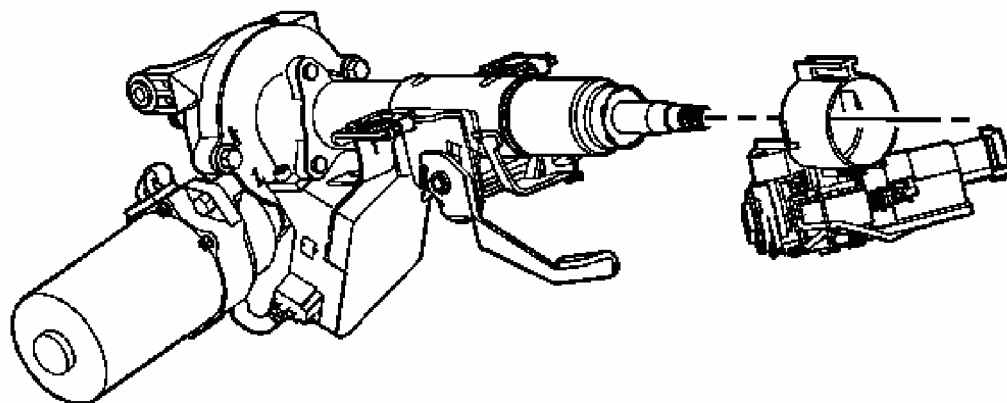


Fig. 51: View Of Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

20. Remove the ignition lock cylinder case from the steering column. Refer to **Ignition Lock Cylinder Case Replacement**.

Installation Procedure

1. If replacing the steering column duplicate the scribed mark placed on the old column.

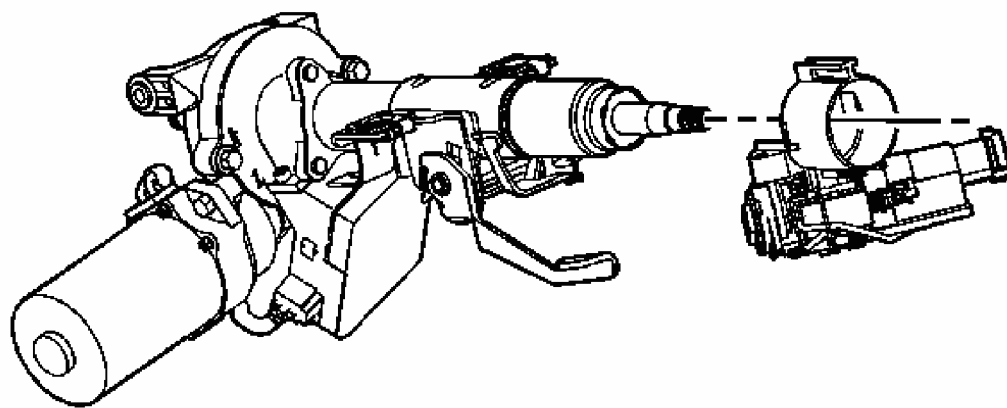


Fig. 52: View Of Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

2. Install the ignition lock cylinder case to the steering column. Refer to **Ignition Lock Cylinder Case Replacement**.

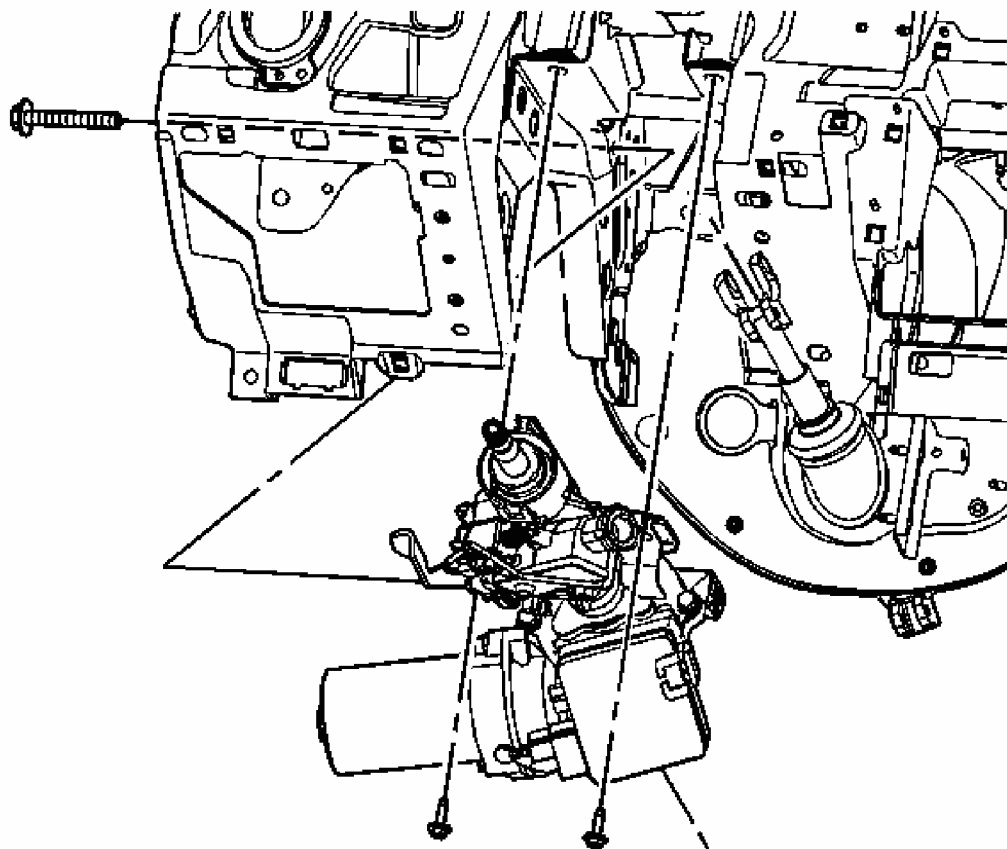


Fig. 53: View Of Steering Column
Courtesy of GENERAL MOTORS CORP.

3. Position the steering column in the vehicle.
4. Hand start the steering column mid-pivot bolt.
5. Hand start the steering column mounting bolts.

NOTE: Refer to **Fastener Notice** .

6. Tighten the column bolts using the following order:

Tighten:

1. Tighten the mid-pivot bolt to 25 N.m (18 lb ft).

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2. Tighten the RH column mounting bolt to 25 N.m (18 lb ft).
3. Tighten the LH column mounting bolt to 25 N.m (18 lb ft).

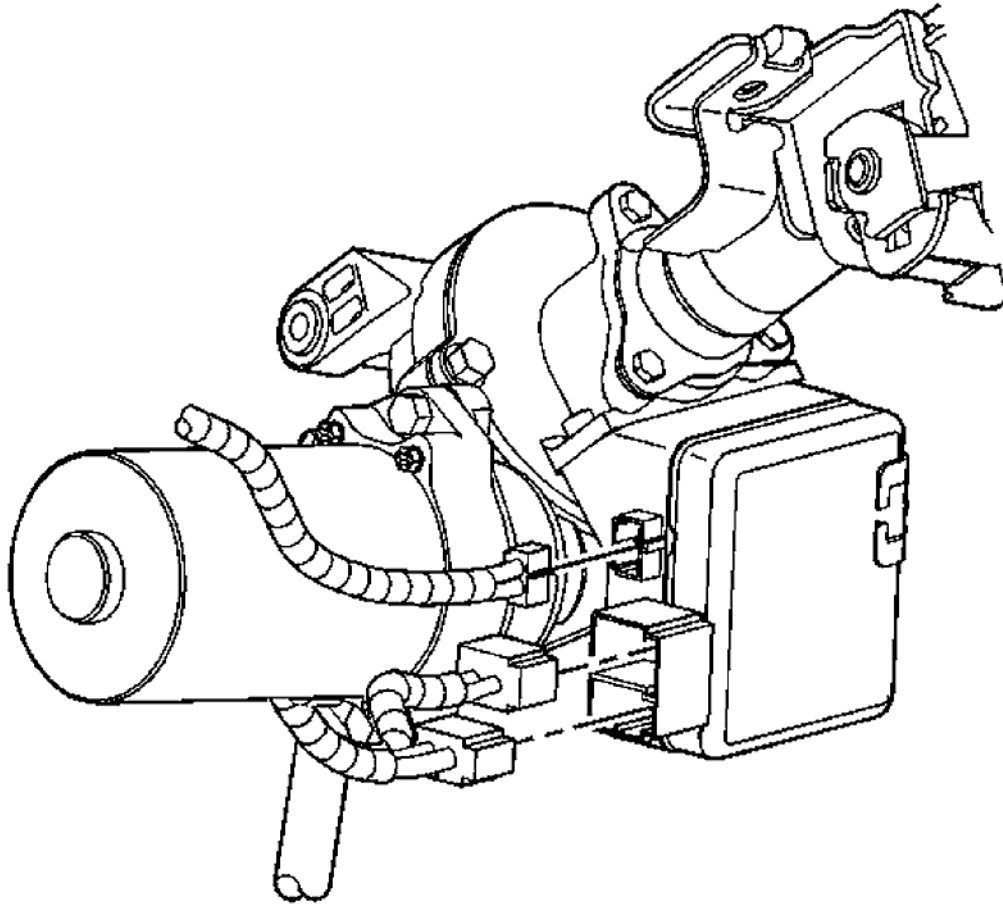


Fig. 54: View Of EPS Control Module Harness Connectors
Courtesy of GENERAL MOTORS CORP.

7. Connect the EPS control module power feed harness connector.
8. Connect the EPS control module small harness connector.

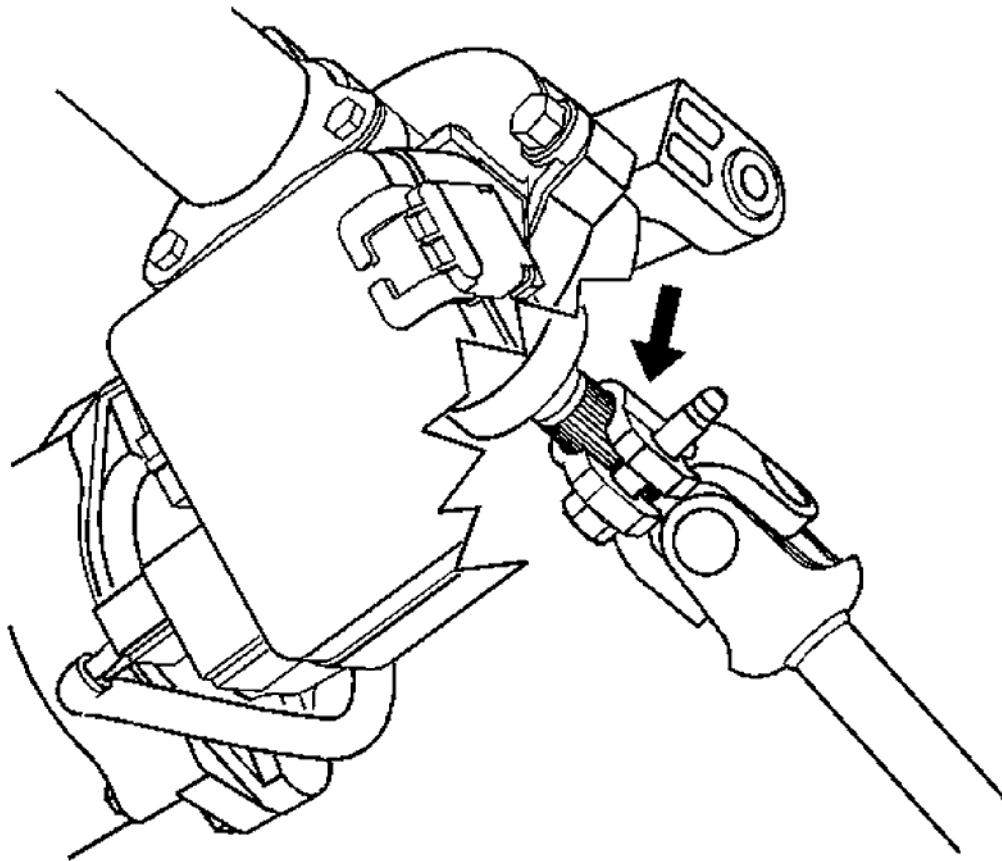


Fig. 55: Scribing Marks On Intermediate Shaft-To-Steering Column Connection
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: For proper realignment of the steering column to intermediate shaft, use the previously scribed marks.

9. Slide the intermediate shaft onto the steering column while aligning the previously scribed marks.
10. If the steering column to intermediate shaft was not previously scribed. Refer to **Intermediate Steering Shaft Replacement**.

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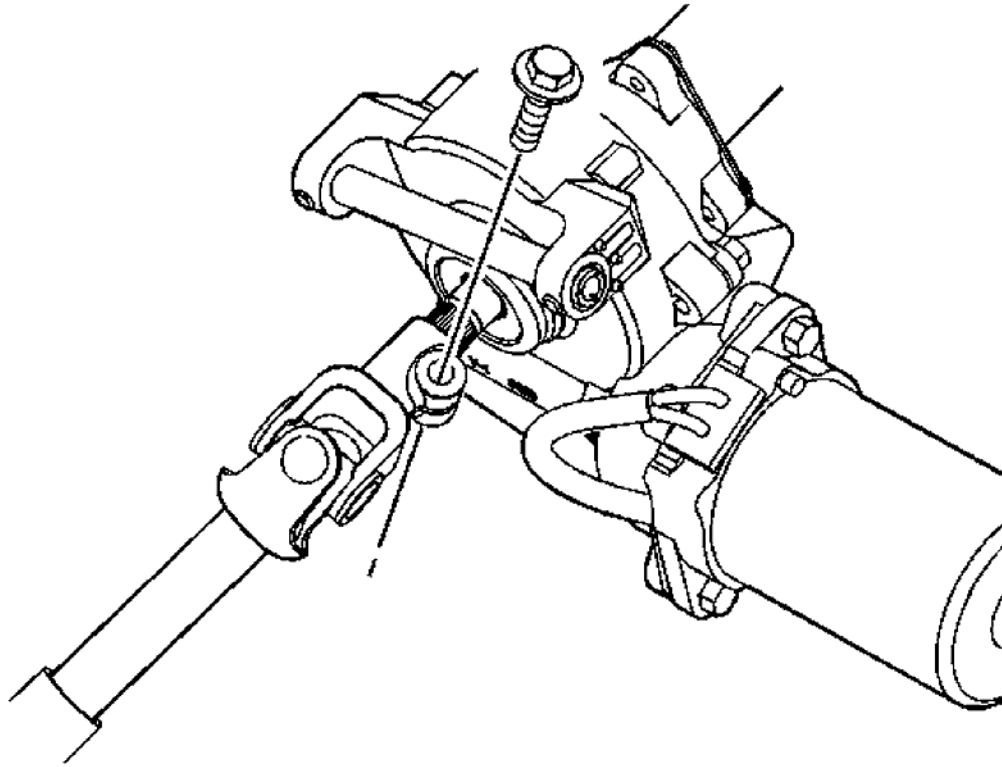


Fig. 56: View Of Upper Intermediate Shaft Pinch Bolt And Column
Courtesy of GENERAL MOTORS CORP.

11. Install a new intermediate shaft pinch bolt.

Tighten: Tighten bolt to 34 N.m (25 lb ft).

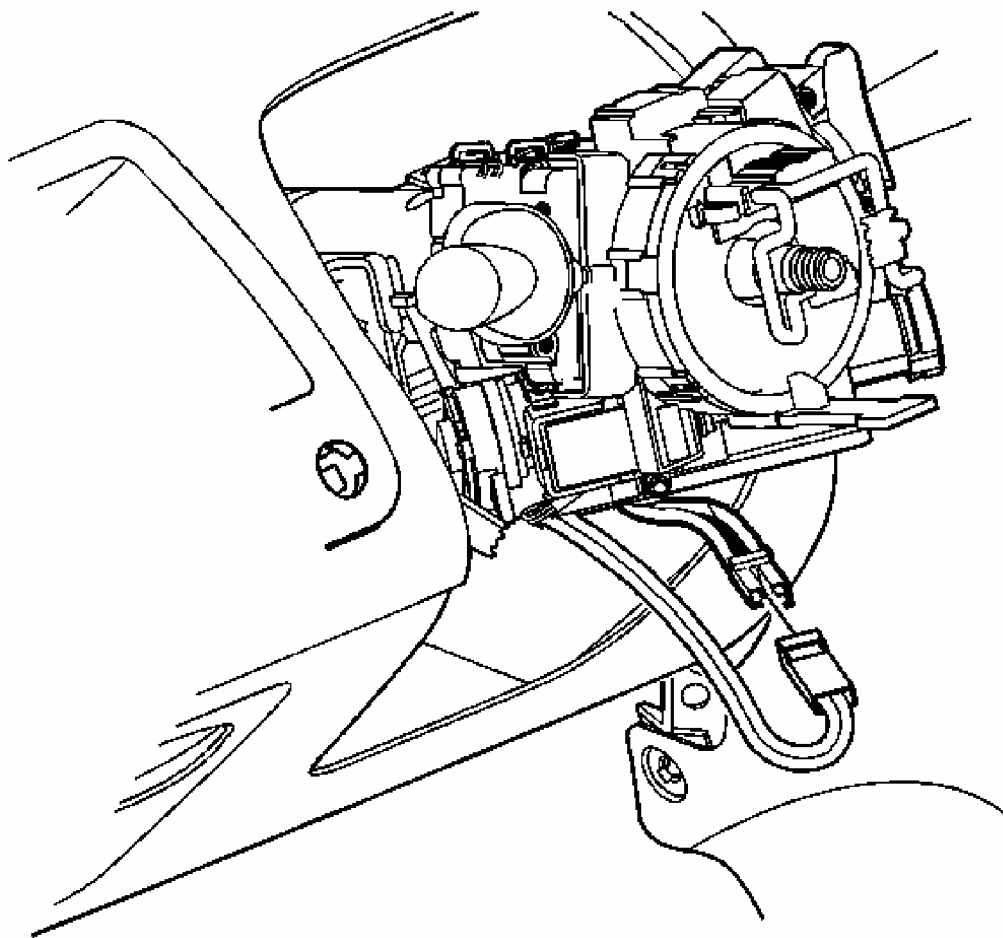


Fig. 57: View Of Ignition Switch Harness Connector
Courtesy of GENERAL MOTORS CORP.

12. Connect the ignition lock cylinder harness connector.
13. Connect the ignition switch harness connector.
14. Install the SIR coil module assembly. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement** .

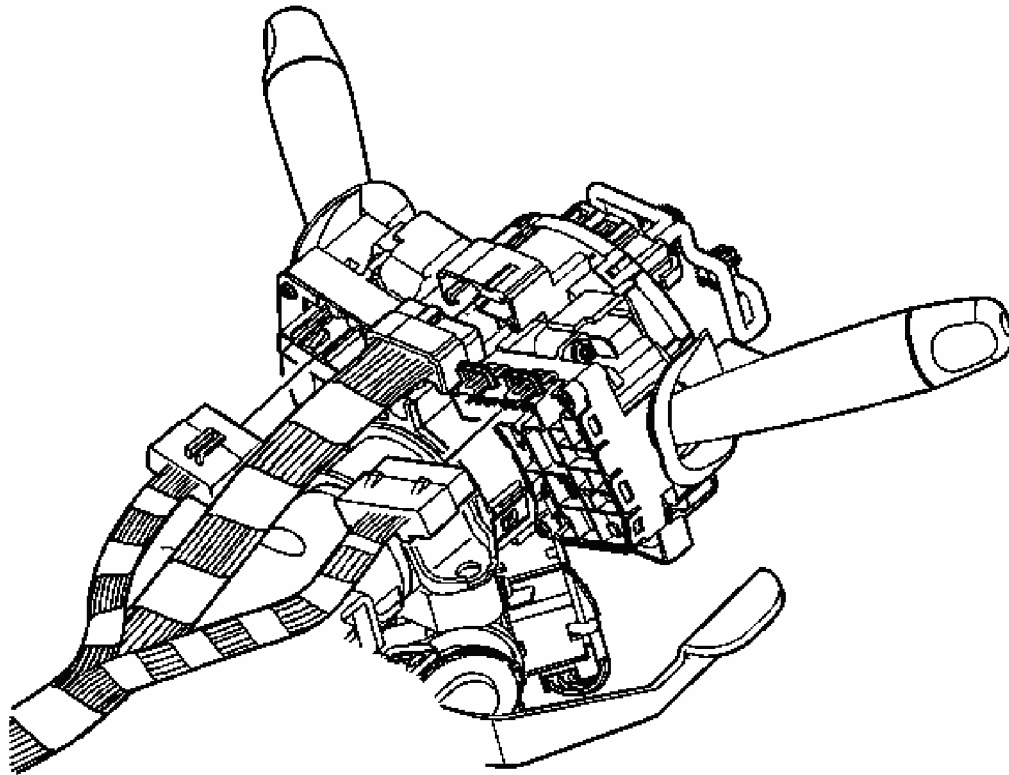


Fig. 58: View Of SIR Coil Module Assembly Harness Connectors
Courtesy of GENERAL MOTORS CORP.

15. Connect the SIR coil harness connector to the SIR coil module assembly.
16. Connect the wiper/washer harness connector to the SIR coil module assembly.
17. Connect the head lamp/turn signal harness connector to the SIR coil module assembly.
18. Install the column trim covers. Refer to **Steering Column Trim Covers Replacement**.
19. Install the knee bolster reinforcement. Refer to **Knee Bolster Reinforcement Replacement**.
20. Install the knee bolster. Refer to **Knee Bolster Replacement**.
21. Install the steering wheel. Refer to **Steering Wheel Replacement**.

STEERING COLUMN JACKET REPLACEMENT

Removal Procedure

1. Place the steering wheel in the straight forward position.
2. Remove the steering wheel. Refer to **Steering Wheel Replacement**.

3. Remove the column trim covers. Refer to Steering Column Trim Covers Replacement.

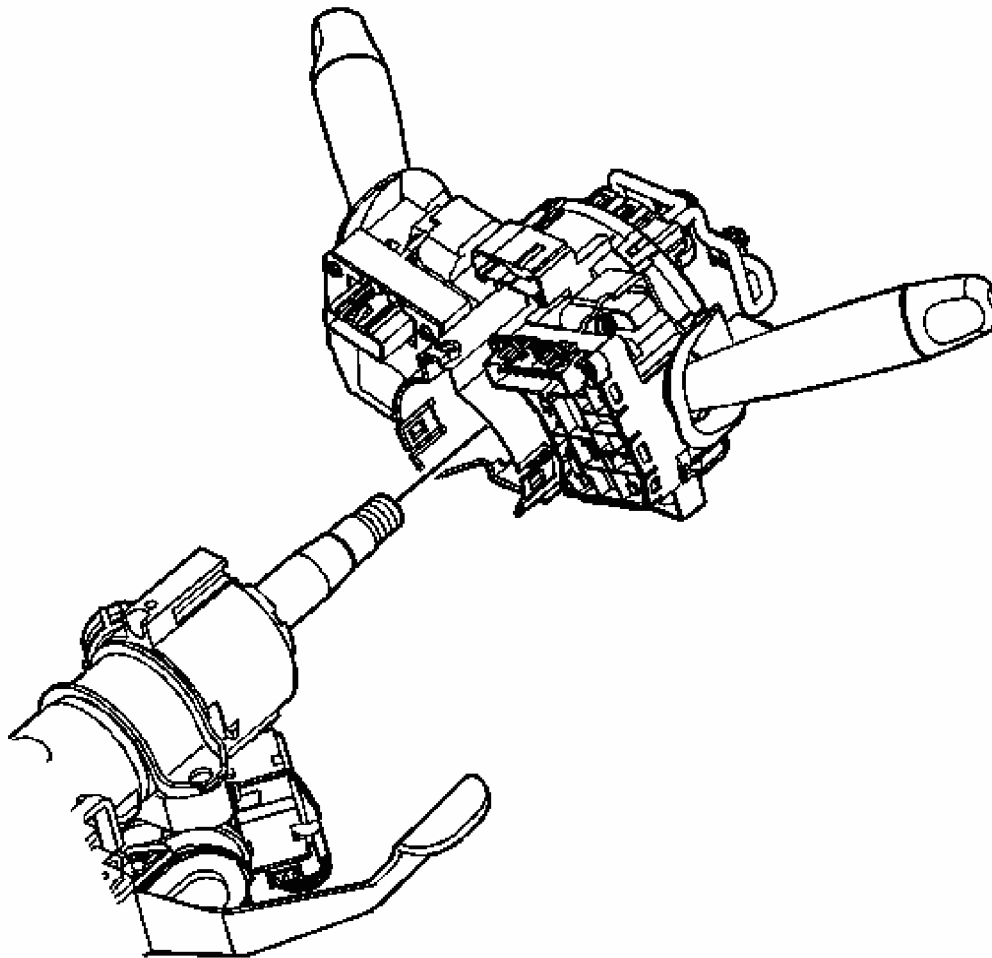


Fig. 59: Steering Wheel Module
Courtesy of GENERAL MOTORS CORP.

4. Remove the SIR coil module assembly. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement in SIR.

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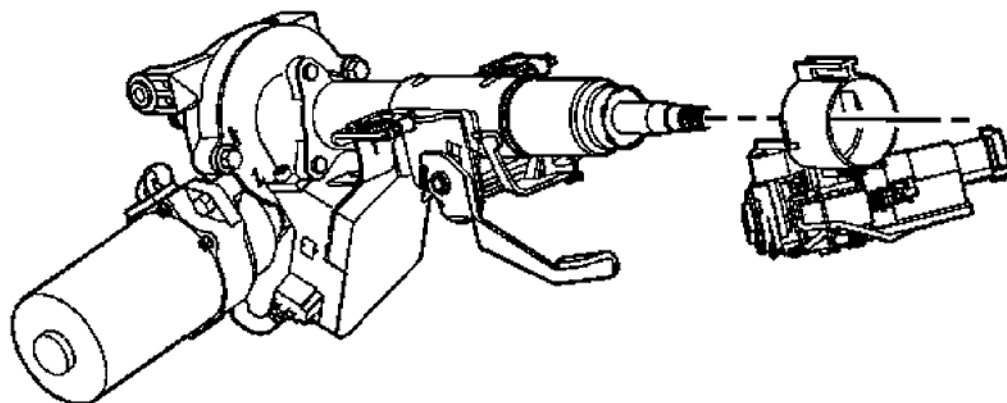


Fig. 60: View Of Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

5. Remove the ignition lock cylinder case. Refer to **Ignition Lock Cylinder Case Replacement**.

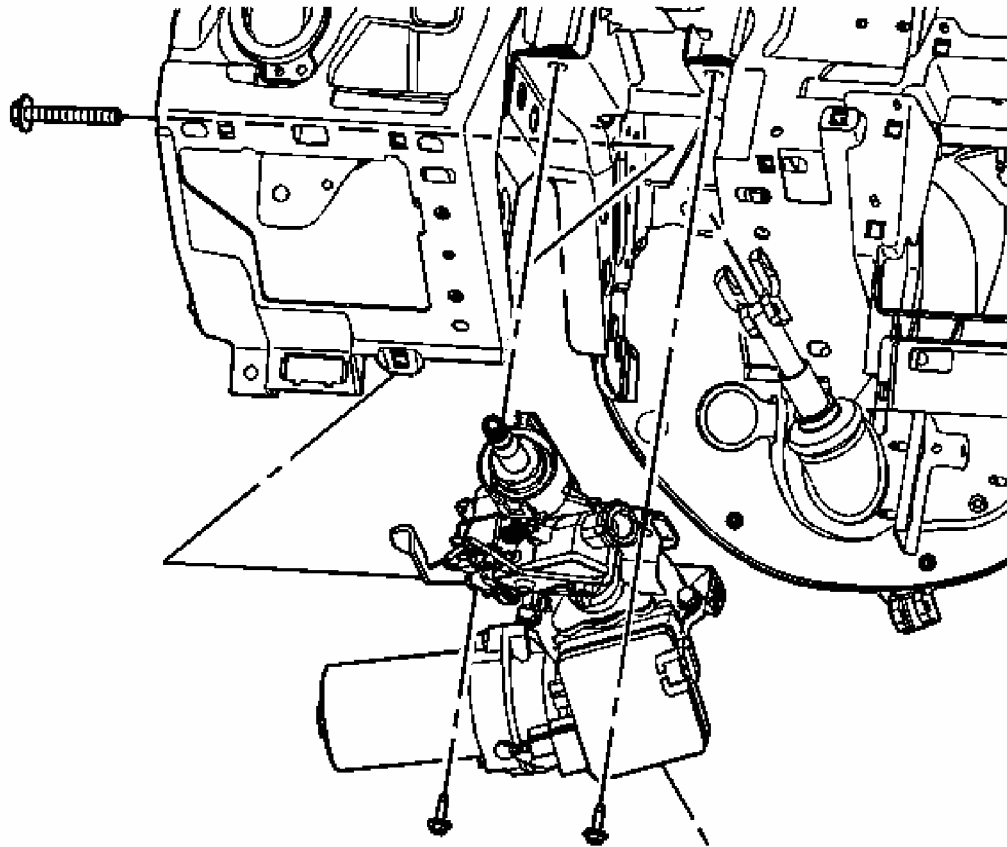


Fig. 61: View Of Steering Column
Courtesy of GENERAL MOTORS CORP.

6. Remove the steering column mounting bolts.
7. Support the lower column as necessary.

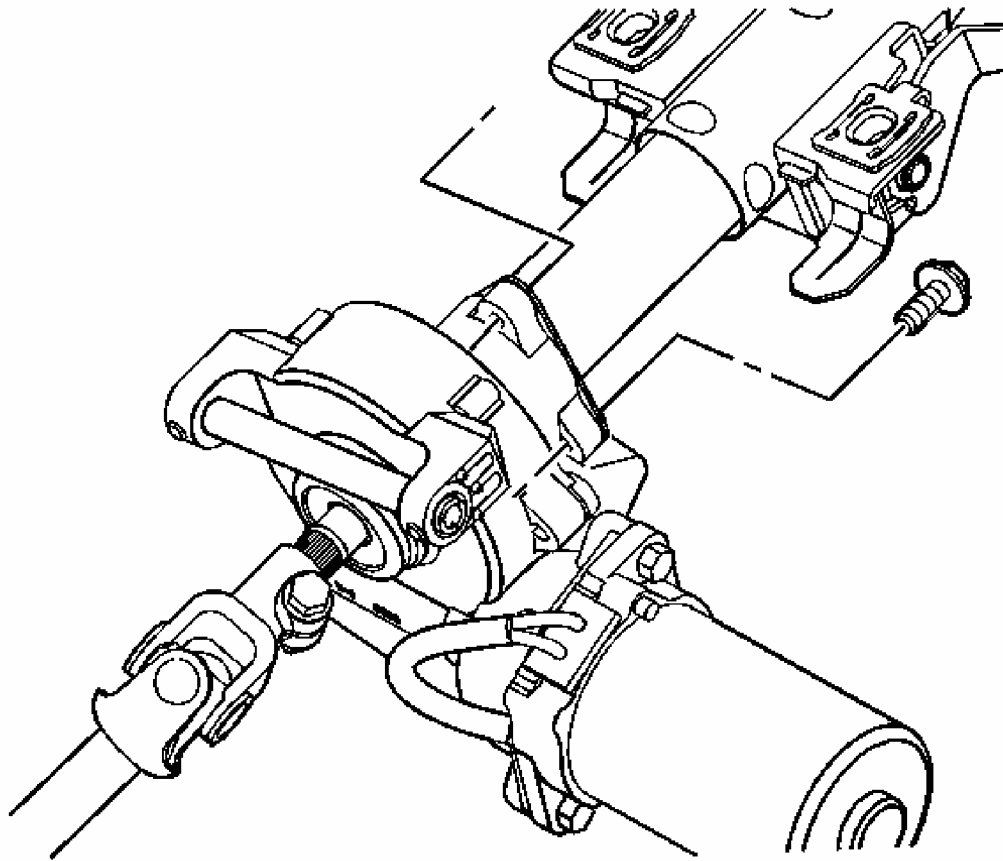


Fig. 62: View Of Jacket Attaching Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the jacket attaching bolts.

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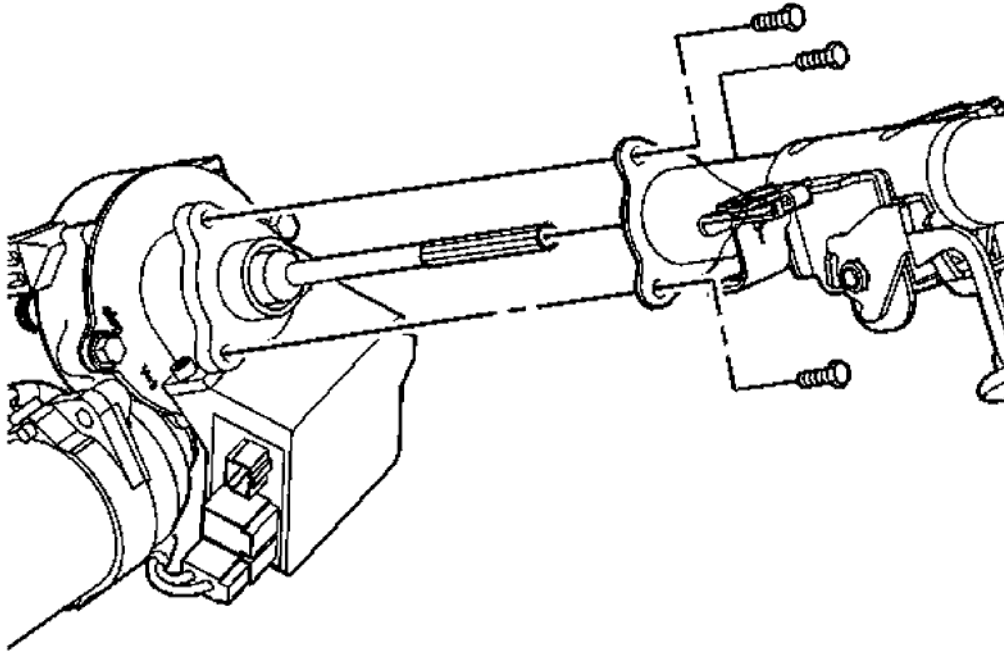


Fig. 63: View Of Upper Jacket
Courtesy of GENERAL MOTORS CORP.

9. Remove the upper jacket from the steering column.

Installation Procedure

IMPORTANT: The column shaft splines must be free of dirt and debris.

1. Clean the column shaft splines
2. Use the supplied grease to apply 2 grams (0.07 oz) of grease to the column shaft splines.

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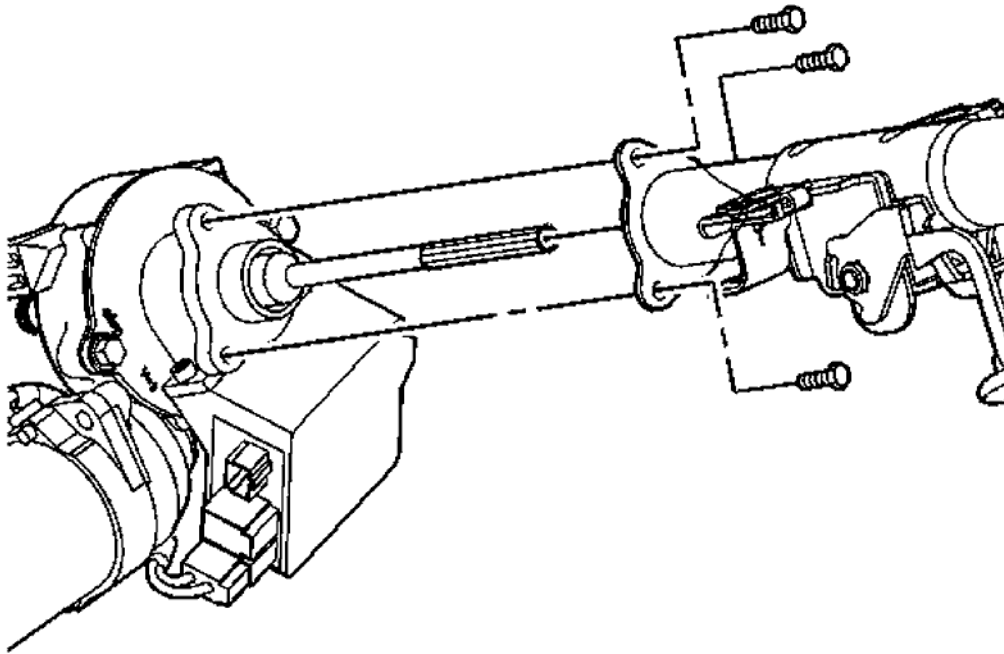


Fig. 64: View Of Upper Jacket
Courtesy of GENERAL MOTORS CORP.

3. Install the new jacket on the steering column.

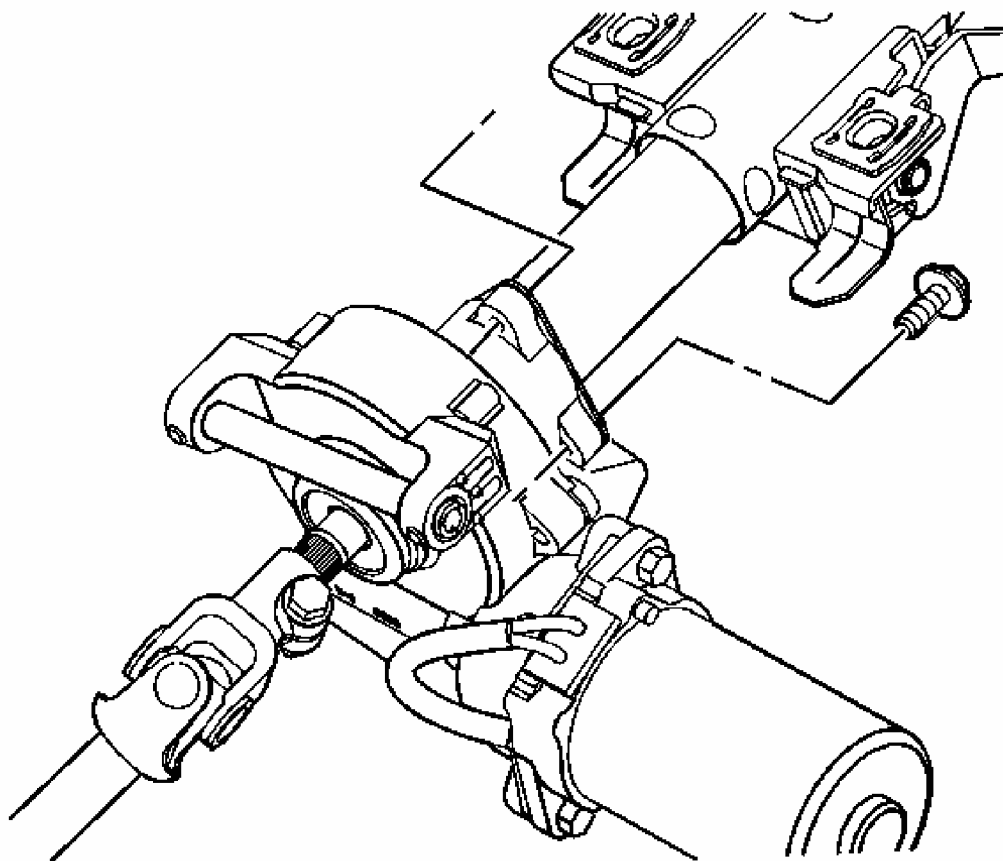


Fig. 65: View Of Jacket Attaching Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the jacket attaching bolts.

Tighten: Tighten the bolts to 11 N.m (97 lb in).

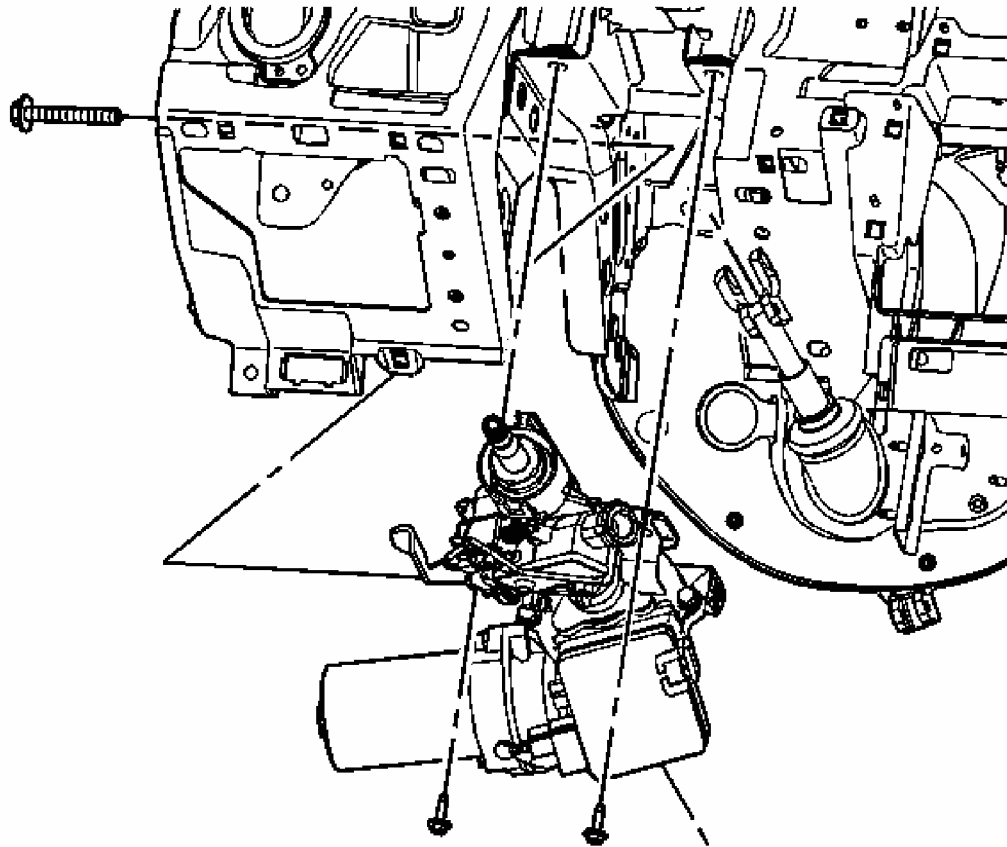


Fig. 66: View Of Steering Column
Courtesy of GENERAL MOTORS CORP.

5. Install the steering column mounting bolts.

Tighten:

1. Tighten the RH bolt to 25 N.m (18 lb ft).
2. Tighten the LH bolt to 25 N.m (18 lb ft).

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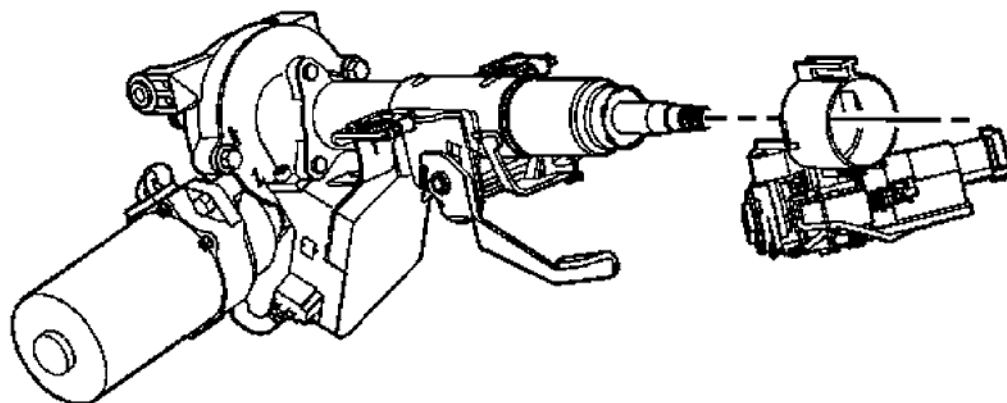


Fig. 67: View Of Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

6. Install the ignition lock cylinder case. Refer to **Ignition Lock Cylinder Case Replacement**.

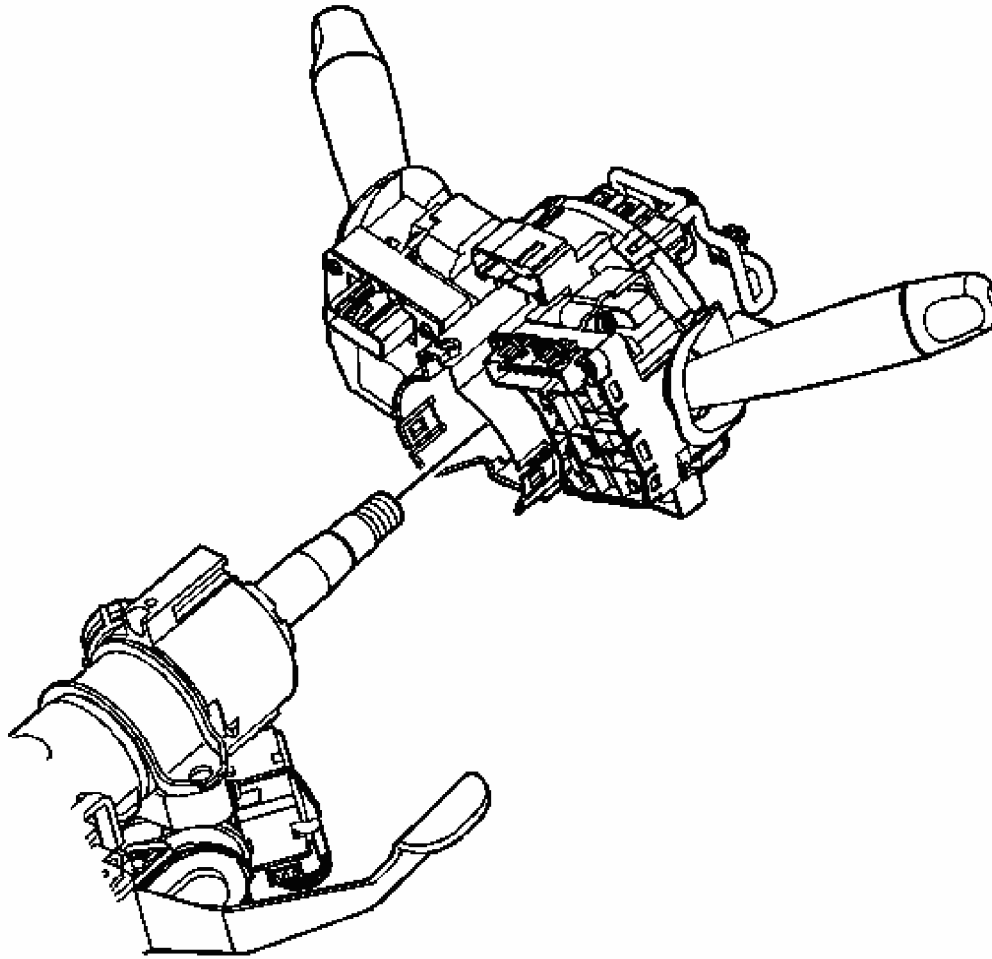


Fig. 68: Steering Wheel Module
Courtesy of GENERAL MOTORS CORP.

7. Install the SIR coil module assembly. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement** in SIR.
8. Install the column trim covers. Refer to **Steering Column Trim Covers Replacement**.
9. Install the steering wheel. Refer to **Steering Wheel Replacement**.

INFLATABLE RESTRAINT STEERING WHEEL MODULE COIL CENTERING

Alignment Procedure

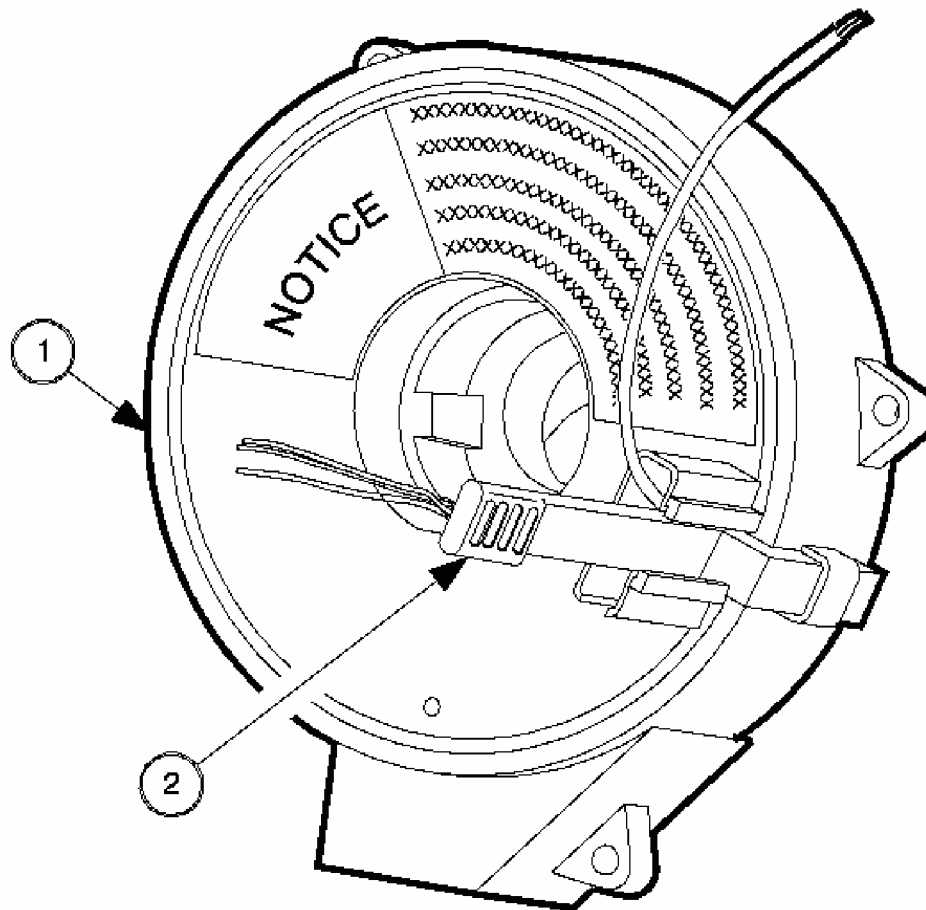


Fig. 69: Locating Coil Hub & Yellow Tab
Courtesy of GENERAL MOTORS CORP.

NOTE: The new SIR coil assembly will be centered. Improper alignment of the SIR coil assembly may damage the unit, causing an inflatable restraint malfunction.

1. If available remove the yellow tab (2) and save for reassembly.
2. Gently rotate the coil hub (1) clockwise until a slight tension is present.
3. Count the number of revolutions, while gently rotating the coil hub (1) counter clockwise until a slight tension is present.
4. Gently rotate the coil hub (1) clockwise one half of the previously counted revolutions.
5. Rotate the coil hub as required to align the yellow tab (2).

6. Install the yellow tab (2) into the coil hub. Use tape if the tab is unavailable.

DESCRIPTION AND OPERATION

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION

The audio steering wheel control switches duplicate the function of the primary controls of the associated component, through a network of multiple momentary contact switches and a series of resistors. The radio supplies voltage to the switches and monitors the return signal for a specific voltage drop to occur unique to the one pressed. The radio then identifies the switch selected to activate the feature, otherwise sends a serial data message that is received by the component controlled, activating the feature.

This section is intended to diagnosis the circuits between the radio and the audio steering wheel control switches. If the primary control for the device is inoperative, refer to the appropriate section for the component the steering wheel control switch is functioning.

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 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.

SPECIAL TOOLS AND EQUIPMENT

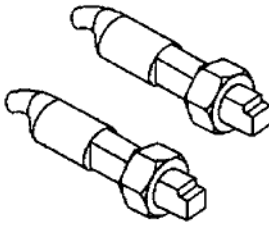
SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 1859A Steering Wheel Puller

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J 42578
Steering Wheel Puller Legs