

2004 Cadillac CTS

2004 STEERING Steering Wheel and Column - CTS

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Steering Wheel and Column - CTS

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Ignition Lock Cylinder Case Screws	7 N.m	62 lb in
Intermediate Shaft Bolts	30 N.m	22 lb ft
Intermediate Shaft to the Steering Column Pinch Bolt	48 N.m	35 lb ft
Intermediate Shaft to the Steering Gear Pinch Bolt	50 N.m	37 lb ft
Steering Column Mounting Nuts	25 N.m	18 lb ft
Steering Column Trim Cover Screws Lower	3.5 N.m	31 lb in
Steering Column Trim Cover Screws Upper	1.5 N.m	13 lb in
Steering Wheel Control Harness Retainer Screws	2.3 N.m	20 lb in
Steering Wheel Control Switch Screws	2.3 N.m	20 lb in
Steering Wheel Nut	41 N.m	30 lb ft
Turn Signal Multifunction Switch Screw Side	7 N.m	62 lb in
Turn Signal Multifunction Switch Screw Top	3 N.m	27 lb in
Upper Intermediate Shaft to Lower Intermediate Shaft Pinch Bolt	30 N.m	22 lb ft

SCHEMATIC AND ROUTING DIAGRAMS

COLUMN/IGNITION LOCK SCHEMATICS

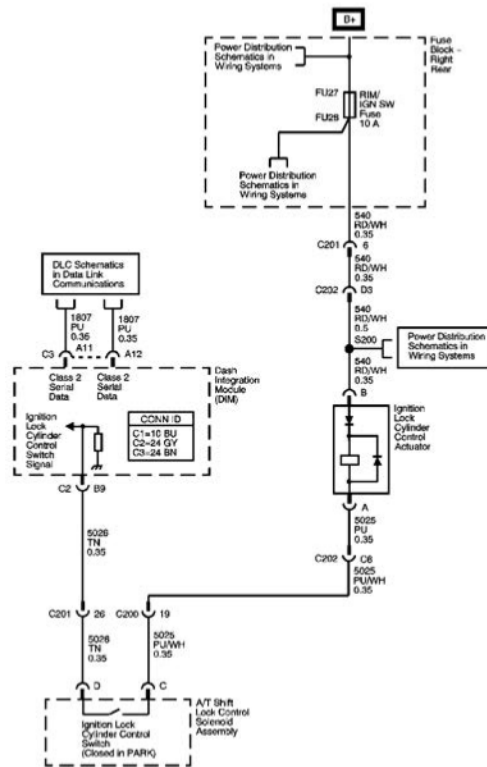


Fig. 1: Column/Ignition Lock Schematics
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

STEERING COLUMN DISASSEMBLED VIEW

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Fig. 2: Steering Column Disassembled View
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Callouts For Fig. 2

Callout	Component Name
1	Upper Trim Cover
2	Lower Trim Cover
3	Steering Column Closeout Trim
4	Flange Prevail Torque Nut

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5	Retaining Ring
6	SIR Coil
7	Wave Washer
8	Bearing Retainer
9	Cam Orientation Plate
10	Turn Signal Cancel Cam
11	Upper Bearing Spring
12	Upper Bearing Inner Race
13	Inner Race
14	Switch Mounting Bracket
15	Turn Signal and Multifunction Switch Assembly
16	Steering Column Tilt Head Assembly
17	Wire Strap
18	Spring Guide
19	Tilt Spring
20	Release Lever Pin
21	Pan Head Tapping Screws
22	Wire Straps
23	Pan Head Tapping Screws
24	Window Washer and Wiper Switch Assembly
25	Wire Straps
26	Theft Deterrent
27	Ignition Lock Cylinder Case
28	Race and Upper Shaft
29	Centering Sphere
30	Joint Preload Spring
31	Lower Steering Shaft
32	Pivot Pins
33	Wire Strap
34	Steering Column Jacket Assembly
35	Steering Column Position Sensor
36	Sensor Clip
37	Sensor Seal
38	Boot
39	Bolt Retainer

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	Pinch Bolt
41	Intermediate Shaft Assembly

STEERING WHEEL AND COLUMN COMPONENT VIEWS

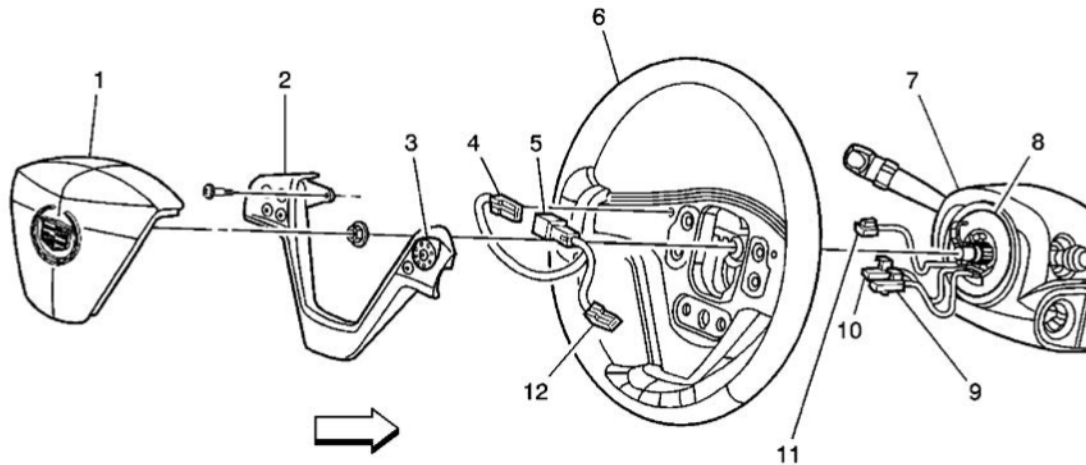


Fig. 3: Steering Wheel Components

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Inflatable Restraint Steering Wheel Module
2	Steering Wheel Controls - Left (V6 shown, V8 Similar)
3	Steering Wheel Controls - Right (V6 shown, V8 Similar)
4	Steering Wheel Controls - Left Connector
5	C208
6	Steering Wheel
7	Steering Column
8	Inflatable Restraint Steering Wheel Module Coil
9	Inflatable Restraint Steering Wheel Module Connector C1
10	Inflatable Restraint Steering Wheel Module Connector C2
11	C208
12	Steering Wheel Controls - Right Connector

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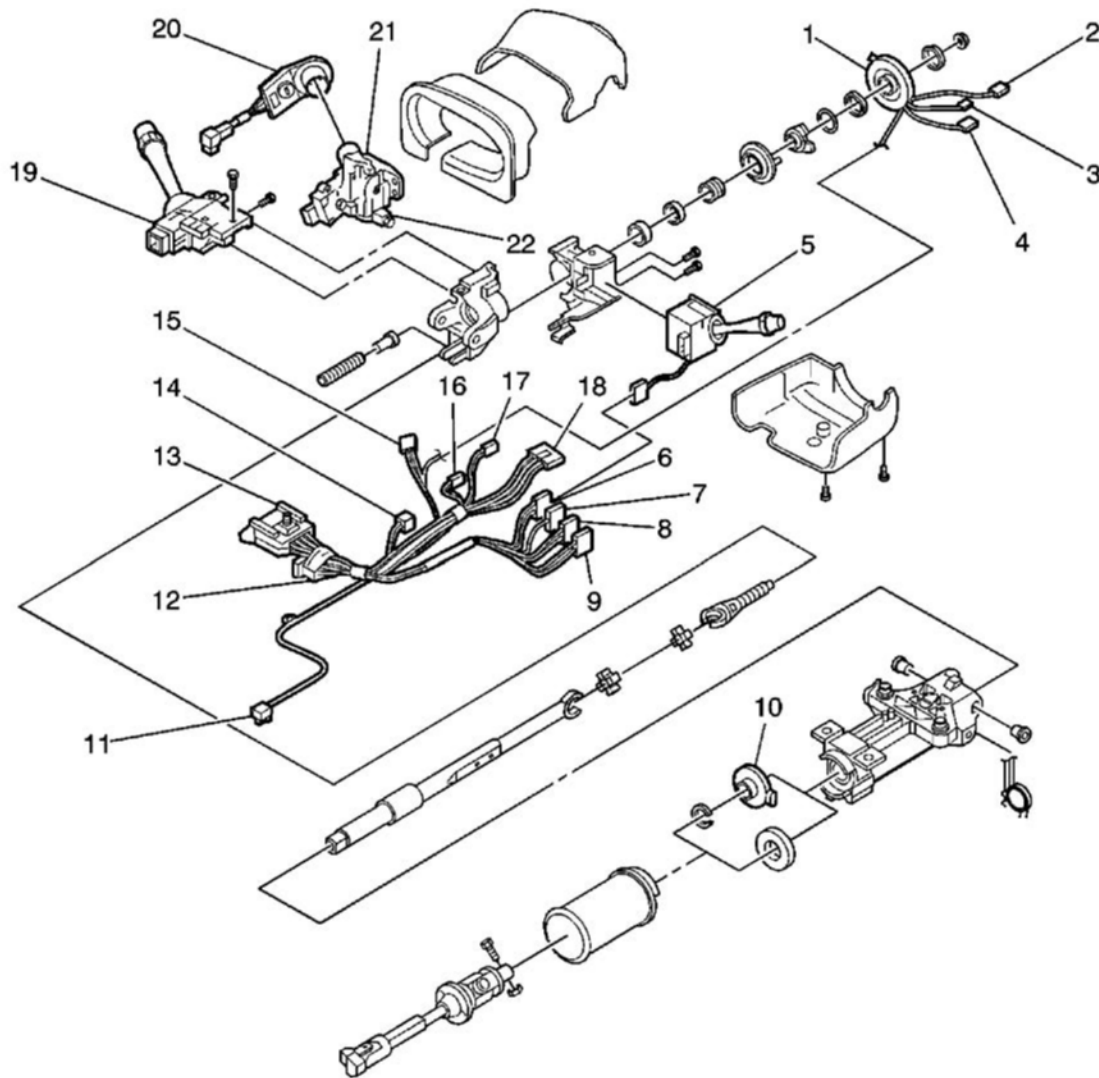


Fig. 4: Steering Column Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Inflatable Restraint Steering Wheel Module Coil
2	C208
3	Inflatable Restraint Steering Wheel Module Connector C1
4	Inflatable Restraint Steering Wheel Module Connector C2
5	Turn Signal/Multifunction Switch
6	Turn Signal/Multifunction Switch Connector C4 (LY9/LA3/LY7)

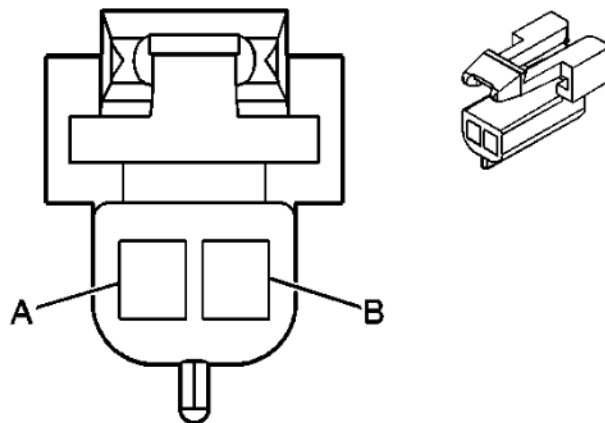
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7	Turn Signal/Multifunction Switch Connector C3
8	Turn Signal/Multifunction Switch Connector C2
9	Turn Signal/Multifunction Switch Connector C1
10	Steering Wheel Position Sensor
11	C203
12	Fuse Block - Steering Column
13	C202
14	Theft Deterrent Control Module Connector
15	Ignition Lock Cylinder Control Actuator Connector
16	Ignition Switch Connector
17	Ignition Key Alarm Switch (Part of steering column harness)
18	Windshield Wiper/Washer Switch Connector
19	Windshield Wiper/Washer Switch
20	Theft Deterrent Control Module
21	Ignition Switch (Hidden) and Ignition Lock Cylinder Case
22	Ignition Lock Cylinder Control Actuator

STEERING WHEEL AND COLUMN CONNECTOR END VIEWS

Steering Wheel and Column Connector End Views - Ignition Lock Cylinder Control Actuator (A/T) (-LS6)



Connector Part Information

- 12052832
- 2-Way F Metri-Pack 150 Series (BK)

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Pin	Wire Color	Circuit No.	Function
A	PU	5025	Ignition Lock Cylinder Control Actuator Supply Voltage
B	RD/WH	540	Battery Positive Voltage

DIAGNOSTIC INFORMATION AND PROCEDURES

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
Dash Inergration Module	Park Key Lock Relay	The DIM can be commanded by using the scan tool to actuate the park key lock transistor On or Off.

SCAN TOOL DATA LIST

Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Park Key Lock Switch	DIM Outputs	On/Off	On

SCAN TOOL DATA DEFINITIONS

Park Key Lock Switch

The scan tool displays On or Off. The scan tool displays the On when the vehicle is in Park and the ignition lock cylinder control switch is closed. The scan tool displays the Off when the vehicle is out of Park and the ignition lock cylinder control switch is open.

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:

- **Lock System Does Not Unlock**
- **Lock System Does Not Lock**
- **Lock System Sticks in Start**
- **Key Cannot Be Removed in the Off Lock Position**
- **High Lock Effort**
- **Noise in Steering Column**
- **Looseness in Steering Column**
- **Steering Column Tilt Function Inoperative**
- **Ignition Can/Cannot Be Turned Off with Transmission in Any Gear**

STEERING COLUMN TILT FUNCTION INOPERATIVE

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	Verify that the shoe is not seized on the pivot pin. Is the shoe seized on the pivot pin?	Go to Step 9	Go to Step 4
4	Inspect the shoe grooves for dirt, burrs, or rust. Are the shoe grooves free of dirt, burrs, and rust?	Go to Step 9	Go to Step 5
5	Inspect weak or broken shoe lock spring. Is the shoe lock spring weak or broken?	Go to Step 9	Go to Step 6
6	Inspect the pivot pins for binding. Are the pivot pins binding?	Go to Step 10	Go to Step 7

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7	Inspect for a weak or broken wheel tilt spring. Is the wheel tilt spring weak or broken?	Go to Step 11	Go to Step 8
8	Inspect the steering column wiring harness for tightness. Is the steering column wiring harness too tight?	Go to Step 12	Go to Step 3
9	Replace the tilt head. Refer to <u>Steering Column Jacket Replacement</u> . Is the repair complete?	Go to Step 13	-
10	Replace the pivot pins. Refer to <u>Steering Column Jacket Replacement</u> . Is the repair complete?	Go to Step 13	-
11	Replace the tilt spring. Refer to <u>Tilt Spring Replacement</u> . Is the repair complete?	Go to Step 13	-
12	Reroute the steering column wiring harness to the correct location. Is the steering column wiring harness routed properly?	Go to Step 13	-
13	Operate the steering column tilt function in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: Tests for voltage at the coil side of the lock cylinder relay.

4: Verifies that the DIM is providing ground to the lock cylinder relay.

5: Tests if ground is constantly being applied to the ignition lock cylinder control actuator.

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>			
	Verify the fault is present. Does the system operate normally?	Go to <u>Testing</u> for	

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1		<u>Intermittent Conditions and Poor Connections</u>	Go to Step 2
2	1. Push the ignition lock cylinder control actuator release button which is on the underside of the ignition key cylinder. 2. 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>Lock System Does Not Lock</u>
3	1. Turn OFF the ignition. 2. Disconnect the ignition lock cylinder control actuator. 3. Turn ON the ignition, with the engine OFF. 4. Probe the battery positive voltage and voltage supply circuits of the ignition lock cylinder control actuator with a test lamp. Does the test lamp illuminate?	Go to Step 8	Go to Step 4
4	Connect a test lamp between the battery positive voltage circuit of the ignition lock cylinder control actuator and a good ground. Does the test lamp illuminate?	Go to Step 5	Go to Step 12
5	1. Turn OFF the ignition. 2. Reconnect the ignition lock cylinder control actuator connector. 3. Disconnect the automatic transmission shift lock actuator connector. 4. Turn ON the ignition, with the engine OFF. 5. Connect a test lamp between the ignition lock cylinder control switch voltage supply and signal circuit. Does the test lamp illuminate?	Go to Step 10	Go to Step 6
	Connect a test lamp ignition lock cylinder control		

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6	switch between the signal circuit and battery positive voltage. Does the test lamp illuminate?	Go to Step 13	Go to Step 7
7	Test the signal circuit of the ignition lock cylinder control actuator for an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 17	Go to Step 11
8	Test the voltage supply circuit of the ignition lock cylinder control actuator for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 17	Go to Step 9
9	Inspect for poor connections at the ignition lock cylinder control actuator. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 17	Go to Step 14
10	Inspect for poor connections at the automatic transmission shift lock actuator. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 17	Go to Step 15
11	Inspect for poor connections at the harness connector of the DIM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 17	Go to Step 16
12	Repair the battery positive voltage circuit of the ignition lock cylinder control actuator. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	Go to Step 17	-
13	Repair the voltage supply circuit of the ignition lock cylinder control switch. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	Go to Step 17	-
14	Replace the ignition lock cylinder control actuator. Did you complete the replacement?	Go to Step 17	-

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15	Replace the automatic transmission shift lock actuator. Refer to <u>Automatic Transmission Shift Lock Actuator Replacement</u> . Did you complete the replacement?	Go to Step 17	-
16	IMPORTANT: Perform the set up procedure for the DIM. Replace the DIM. Refer to <u>Dash Integration Module Replacement</u> .Did you complete the replacement?	Go to Step 17	-
17	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

LOCK SYSTEM DOES NOT UNLOCK

Lock System Does Not Unlock

Step	Action	Yes	No
DEFINITION: The lock system does not allow the key to rotate out of the OFF position.			
1	Did you review the Steering Wheel and Column Description and Operation?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that the lock system does not unlock. Does the lock system operate normally?	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 lock cylinder case assembly for looseness. Is the ignition lock cylinder case assembly loose?	Go to Step 9	Go to Step 6
6	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to Step 10	Go to Step 3
7	Replace the key. Refer to <u>Key and Lock Cylinder Coding</u> in General Information.		

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	Did you complete the repair?	Go to Step 11	-
8	Replace the lock cylinder. Refer to <u>Ignition Lock Cylinder Replacement</u> . Did you complete the repair?	Go to Step 11	-
9	Tighten the ignition lock cylinder case assembly. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 11	-
10	Replace the ignition switch. Refer to <u>Ignition Switch Replacement</u> . 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 3

LOCK SYSTEM DOES NOT LOCK

Lock System Does Not Lock

Step	Action	Yes	No
DEFINITION: The lock system will not allow the key to be turned to the OFF lock position.			
1	Did you review the Steering Wheel and Column Description and Operation?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that the lock system does not lock. Does the lock system operate normally?	System OK	Go to Step 3
3	Inspect for a faulty lock cylinder or release button. Is the lock cylinder or release button damaged?	Go to Step 7	Go to Step 4
4	Inspect the shift linkage adjustment. Is the shift linkage adjusted incorrectly?	Go to Step 8	Go to Step 5
5	Inspect the ignition switch for damage. Is the ignition switch damaged?	Go to Step 9	Go to Step 6
6	Inspect the park lock for damage. Is the park lock damaged?	Go to Step 10	Go to Step 3
7	Replace the lock cylinder. Refer to <u>Ignition Lock Cylinder Replacement</u> .		

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	Did you complete the repair?	Go to Step 10	-
8	Adjust the shift linkage. Did you complete the repair?	Go to Step 10	-
9	Replace the ignition switch. Refer to <u>Ignition Switch Replacement</u> . Did you complete the repair?	Go to Step 10	-
10	Replace the park lock. 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 3

LOCK SYSTEM STICKS IN START

Lock System Sticks in Start

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that the lock system sticks in the START position. Does the lock system operate normally?	System OK	Go to Step 3
3	Inspect the ignition lock cylinder case assembly for damage. Is the ignition lock cylinder case assembly damaged?	Go to Step 6	Go to Step 4
4	Inspect the lock cylinder for damage. Is the lock cylinder damaged?	Go to Step 7	Go to Step 5
5	Inspect the ignition switch for damage. Is the ignition switch damaged?	Go to Step 8	Go to Step 3
6	Tighten the ignition lock cylinder case assembly mounting bolts. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 9	-
7	Replace the lock cylinder. Refer to <u>Ignition Lock Cylinder Replacement</u> . Did you complete the repair?	Go to Step 9	-

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8	Replace the ignition switch. Refer to <u>Ignition Switch Replacement</u> . 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

KEY CANNOT BE REMOVED IN THE OFF LOCK POSITION

Key Cannot Be Removed in the Off Lock Position

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that the key cannot be removed from the lock cylinder in the OFF position. Does the lock system operate normally?	System OK	Go to Step 3
3	Inspect the automatic transmission shift linkage. Is the adjustment correct?	Go to Step 5	Go to Step 4
4	Adjust the shift linkage. Refer to <u>Shift Control Linkage Adjustment</u> in Automatic Transmission - 5L40-E. Did you correct the condition?	System OK	Go to Step 5
5	Inspect for incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to Step 7	Go to Step 6
6	Inspect for a faulty lock cylinder or release button. Is the lock cylinder or release button damaged?	Go to Step 8	Go to Step 5
7	Replace the key. Refer to <u>Key and Lock Cylinder Coding</u> in General Information. Did you complete the repair?	Go to Step 9	-
8	Replace the lock cylinder. Refer to <u>Ignition Lock Cylinder Replacement</u> . 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

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HIGH LOCK EFFORT

High Lock Effort

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that the lock system has a high lock effort. Does the lock system operate normally?	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 lock cylinder case assembly for damage. Is the ignition lock cylinder case assembly damaged?	Go to Step 9	Go to Step 6
6	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to Step 10	Go to Step 7
7	Replace the key. Refer to <u>Key and Lock Cylinder Coding</u> in General Information. Did you complete the repair?	Go to Step 11	-
8	Replace the lock cylinder. Refer to <u>Ignition Lock Cylinder Replacement</u> . Did you complete the repair?	Go to Step 11	-
9	Tighten the ignition lock cylinder case assembly. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 11	-
10	Replace the ignition switch. Refer to <u>Ignition Switch Replacement</u> . 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 3

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NOISE IN STEERING COLUMN

Noise in Steering Column

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Steering Wheel and Column
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation?	Go to Step 3	System OK
3	Inspect the steering column components for looseness. Is the steering column components loose?	Go to Step 10	Go to Step 4
4	Inspect the SIR coil for noise. Is the SIR coil noisy?	Go to Step 11	Go to Step 5
5	Inspect the horn contact ring for lubrication. Is the horn contact ring lubricated?	Go to Step 12	Go to Step 6
6	Inspect the lock plate retaining ring for the correct installation. Is the lock plate retaining ring installed properly?	Go to Step 13	Go to Step 7
7	Inspect the shaft bearing for the following conditions: • Damage • Lubrication • Wear • Proper seating Are the bearings in need of repair or replacement?	Go to Step 14	Go to Step 8
8	Inspect the spherical joint for lubrication. Is the spherical joint lubricated?	Go to Step 15	Go to Step 9
9	Inspect the steering column coupling for looseness.		

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	Is the steering column coupling loose?	Go to Step 16	Go to Step 3
10	NOTE: Refer to Fastener Notice in Cautions and Notices. Tighten the steering column components to specifications. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 17	-
11	Replace the SIR coil. Refer to <u>Inflatable Restraint Steering Wheel Module Coil Replacement</u> in SIR. Did you complete the repair?	Go to Step 17	-
12	Lubricate the horn contact ring. Did you complete the repair?	Go to Step 17	-
13	Install the lock plate retaining ring properly. Did you complete the repair?	Go to Step 17	-
14	Repair the shaft bearings as necessary. Refer to <u>Steering Column Jacket Replacement</u> . Did you complete the repair?	Go to Step 17	-
15	Lubricate the spherical joints. Did you complete the repair?	Go to Step 17	-
16	NOTE: Refer to Fastener Notice in Cautions and Notices. Tighten the steering column coupling to specifications. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 17	-
17	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

LOOSENESS IN STEERING COLUMN

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.		

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	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 7	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 8	Go to Step 5
5	Inspect the upper and lower tilt head screws for looseness. Are the support screws loose?	Go to Step 9	Go to Step 6
6	Inspect the intermediate shaft for worn joints or looseness. Is the intermediate joint worn or loose?	Go to Step 10	Go to Step 2
7	Tighten the brackets to specifications. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 11	-
8	Replace the jacket assembly. Refer to <u>Steering Column Jacket Replacement</u> . Did you complete the replacement?	Go to Step 11	-
9	Tighten the upper and lower tilt head screws to specifications. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 11	-
10	Tighten or replace the intermediate shaft as needed. Refer to • <u>Intermediate Steering Shaft Replacement - Upper</u> • <u>Intermediate Steering Shaft Replacement - Lower</u> 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 3

REPAIR INSTRUCTIONS

SEAL REPLACEMENT - INTERMEDIATE STEERING SHAFT

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

IMPORTANT: The steering column is removed with the upper intermediate shaft attached.

1. Remove the steering column. Refer to Steering Column Replacement.

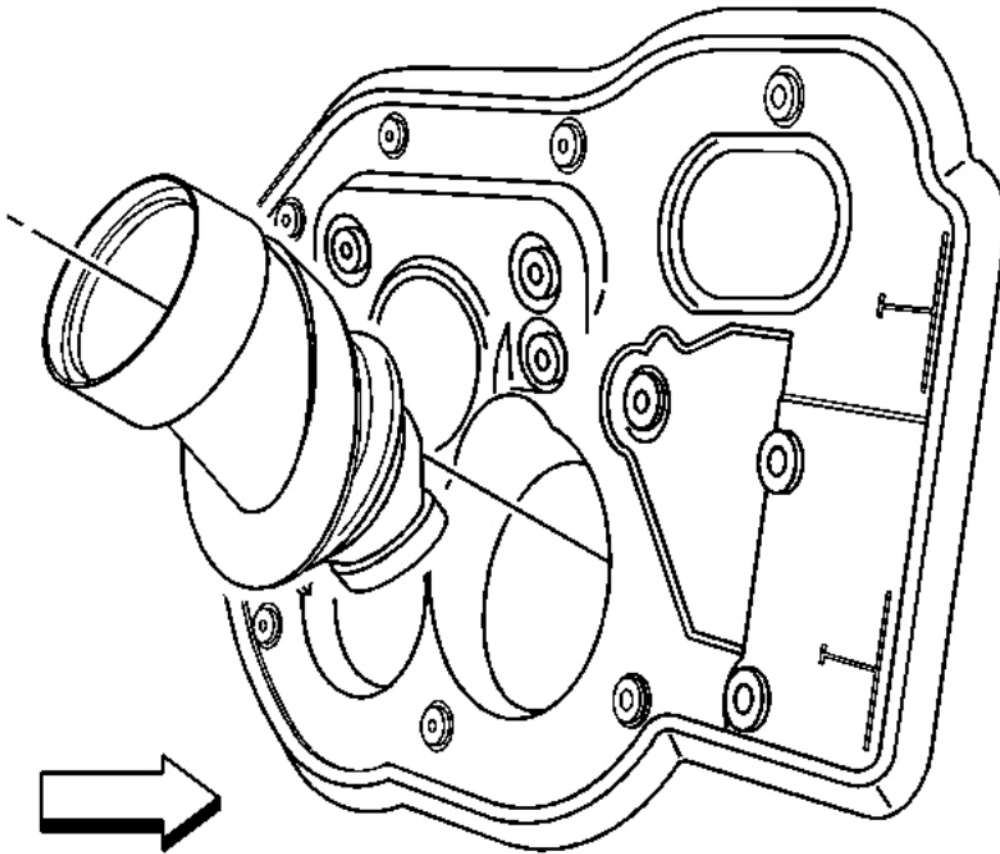


Fig. 5: Removing Intermediate Shaft Seal From Mod Plate
Courtesy of GENERAL MOTORS CORP.

2. Remove the intermediate shaft seal from the mod plate.

Installation Procedure

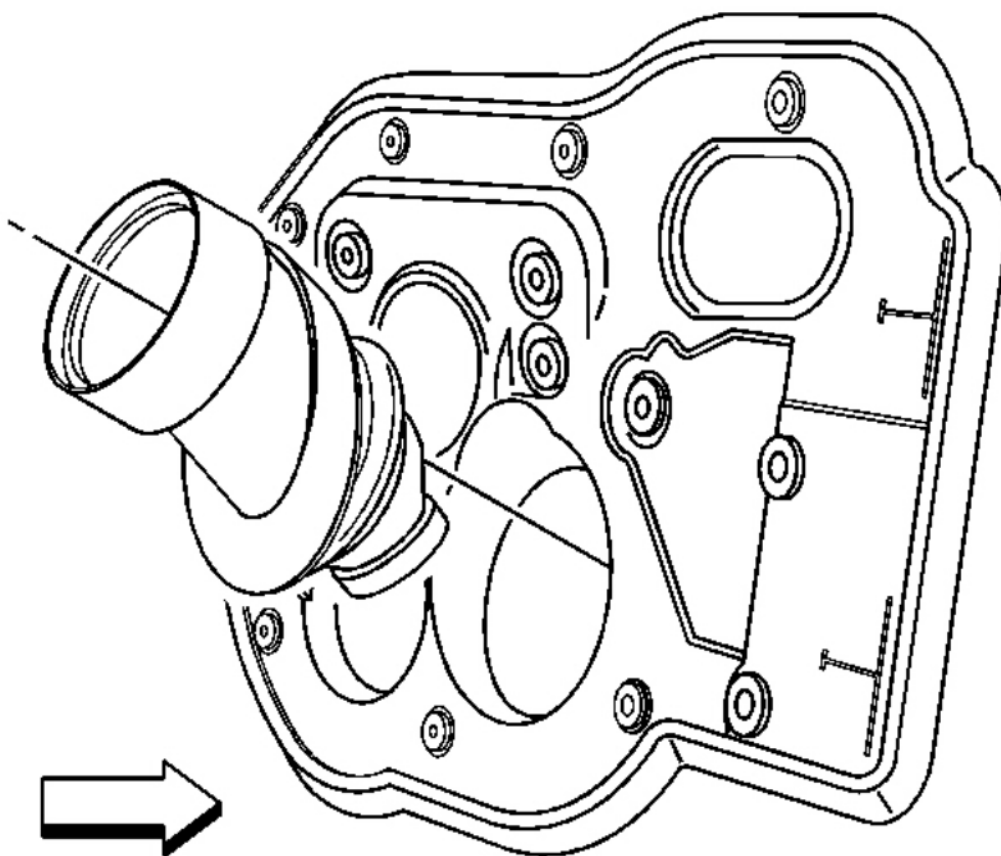


Fig. 6: Installing Intermediate Shaft Seal To Mod Plate
Courtesy of GENERAL MOTORS CORP.

1. Install the intermediate shaft seal to the mod plate, ensuring the seal between the intermediate shaft seal and mod plate.
2. Install the steering column. Refer to **Steering Column Replacement**.
3. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

NOTE: The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

IMPORTANT: The steering column is removed with the upper intermediate shaft attached.

2. Remove the steering column. Refer to Steering Column Replacement.

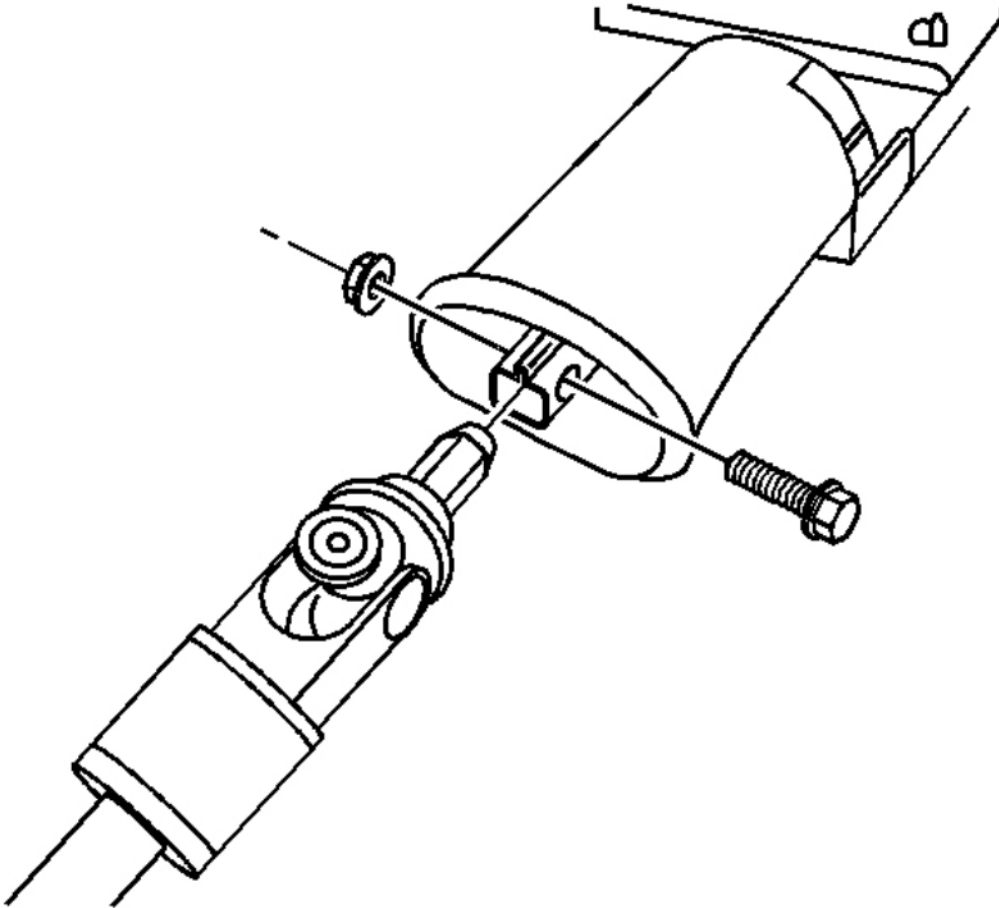


Fig. 7: Removing Upper Intermediate Shaft To Steering Column Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Note the relationship of the upper intermediate shaft to the steering column in order to ensure proper installation.

3. Remove the upper intermediate shaft to steering column retaining bolt.
4. Remove the upper intermediate shaft from the steering column.

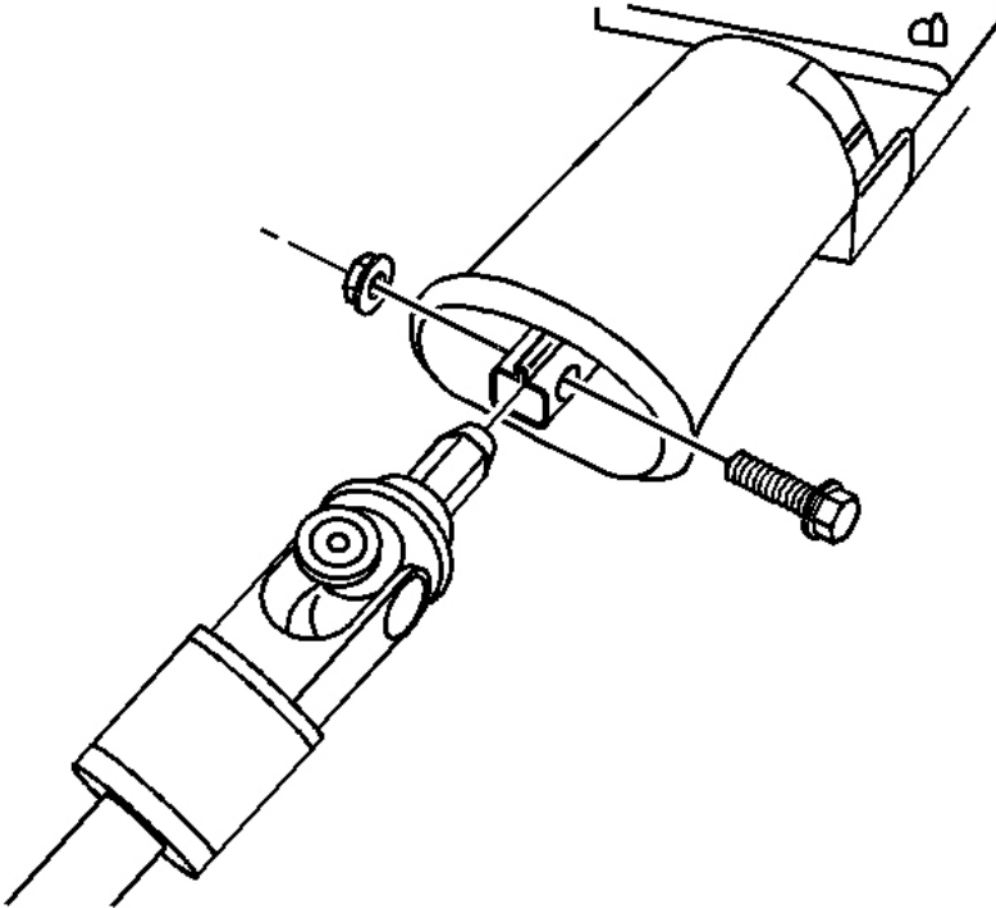


Fig. 8: Installing Upper Intermediate Shaft To Steering Column As Noted During Removal

Courtesy of GENERAL MOTORS CORP.

1. Install the upper intermediate shaft to the steering column as noted during removal.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the upper intermediate shaft to the steering column retaining bolt.

Tighten: Tighten the bolt to 48 N.m (35 lb ft).

IMPORTANT: The steering column is installed with the upper intermediate steering shaft attached.

3. Install the steering column. Refer to Steering Column Replacement.
4. Enable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

INTERMEDIATE STEERING SHAFT REPLACEMENT - CENTER

Tools Required

J 42640 Steering Column Anti-Rotation Pin

Removal Procedure

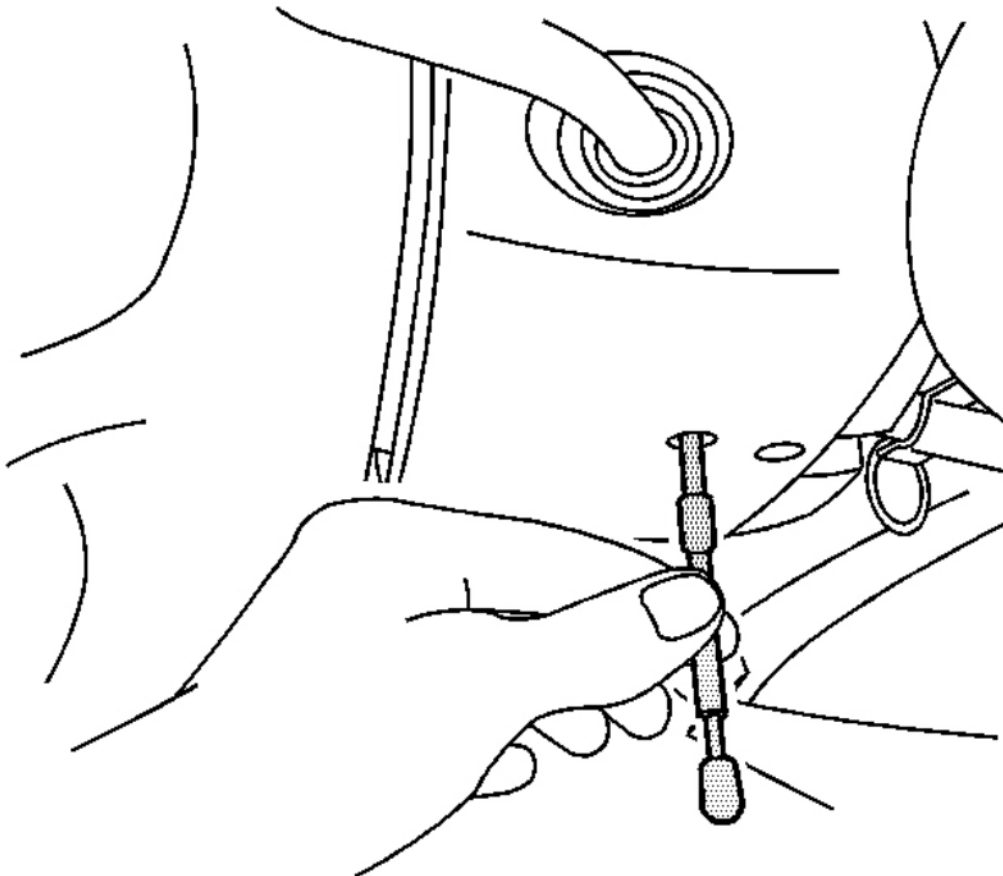


Fig. 9: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

NOTE: The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.

1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition lock cylinder to the lock position and remove the key.
3. Install the **J 42640** through the access hole in the lower steering column trim cover in order to lock the steering column.
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

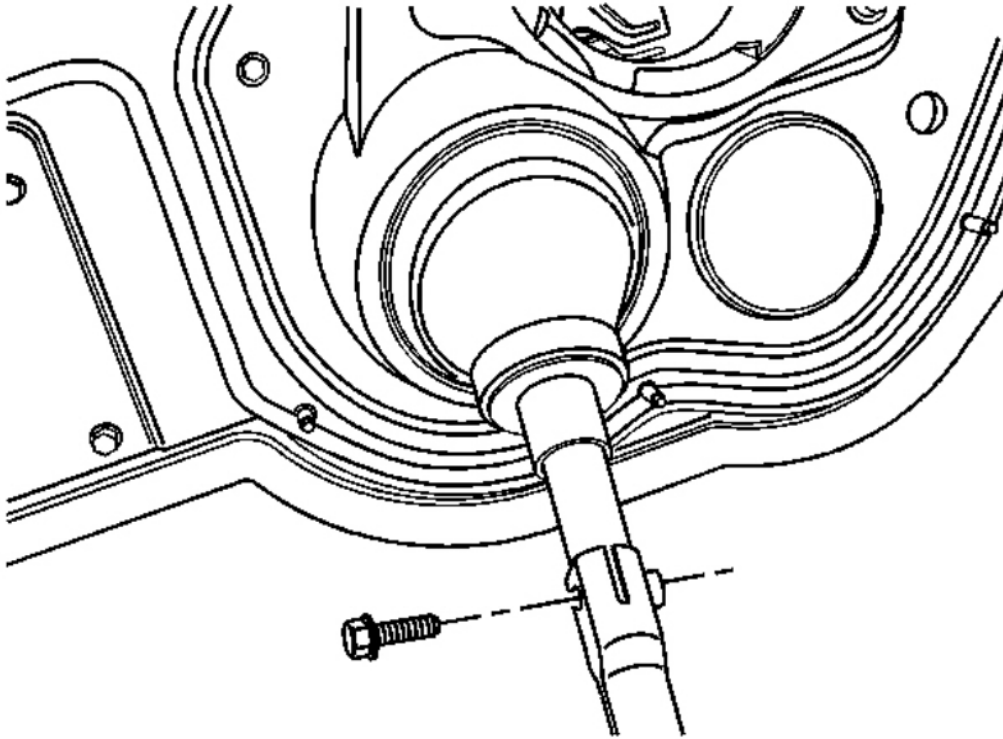


Fig. 10: Removing Upper To Center Intermediate Shaft Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

5. Remove the upper to center intermediate shaft retaining bolt.

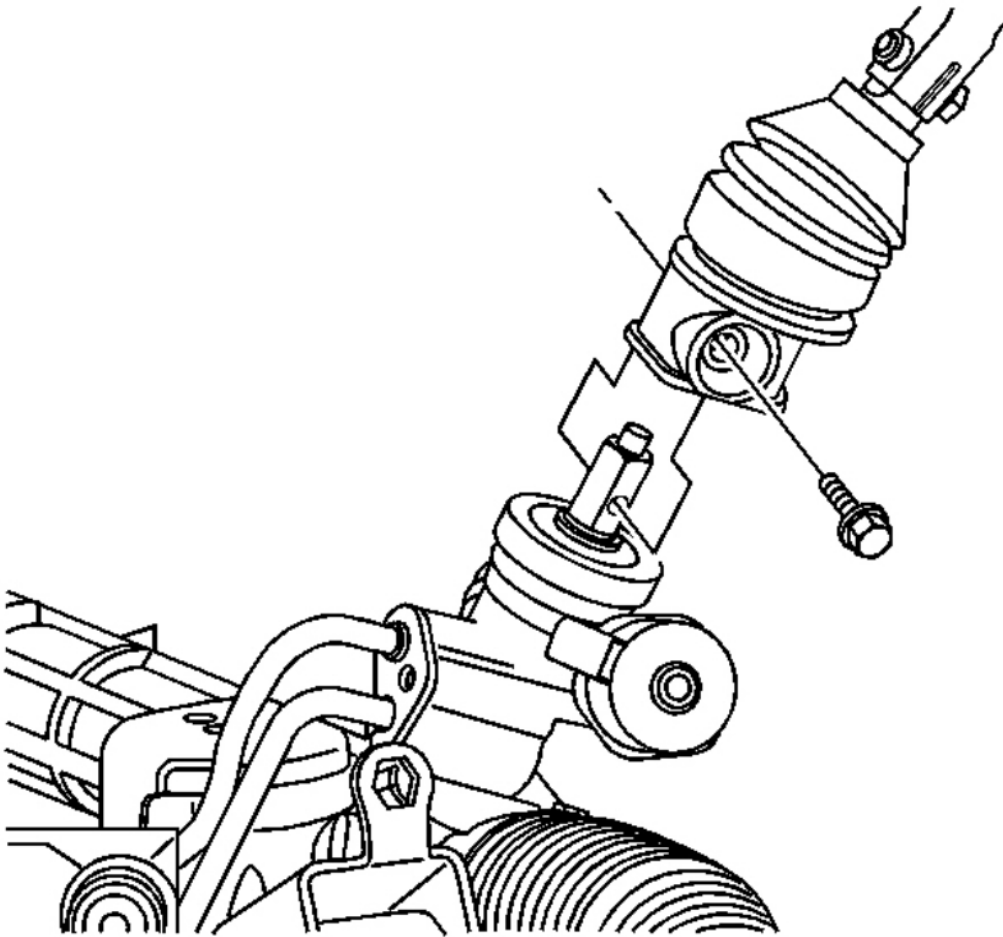


Fig. 11: Removing Lower Intermediate Shaft To The Power Steering Gear Retaining Bolt

Courtesy of GENERAL MOTORS CORP.

6. Remove the lower intermediate shaft to the power steering gear retaining bolt.
7. Disconnect the lower intermediate shaft from the power steering gear.

IMPORTANT: Note the relationship of the center intermediate shaft to upper intermediate shaft in order to ensure proper installation.

8. Disconnect the center intermediate shaft from the upper intermediate shaft

9. Remove the center intermediate shaft with the lower intermediate shaft attached.

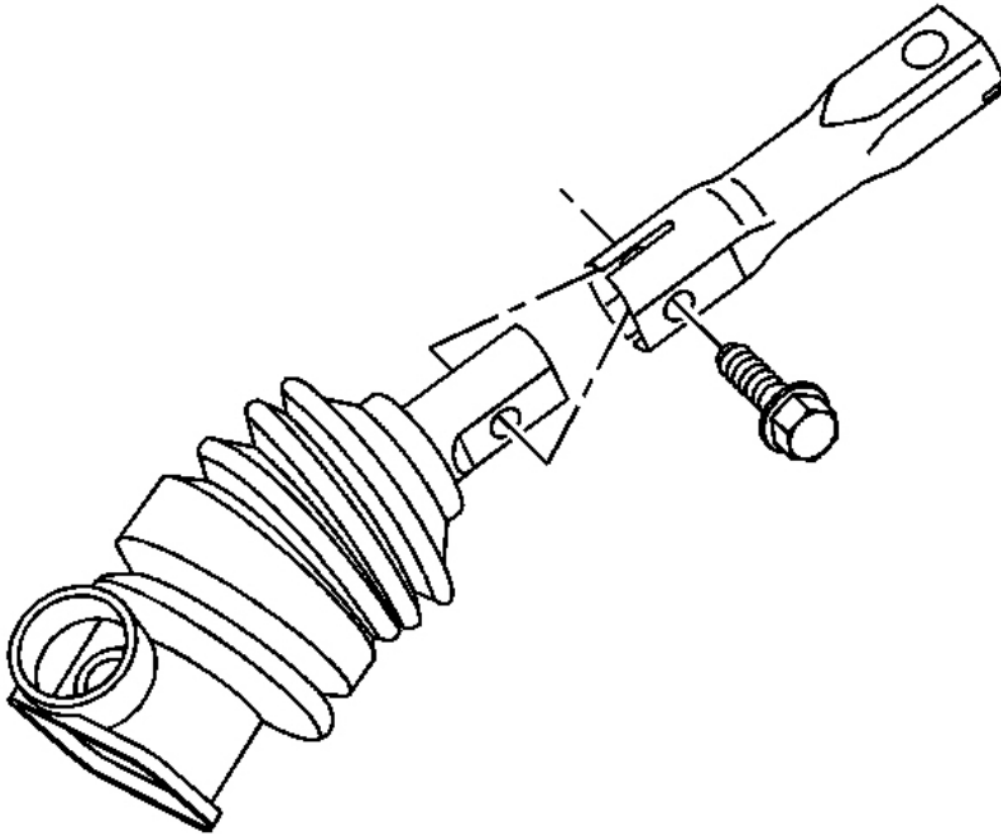


Fig. 12: Removing Lower To Center Intermediate Shaft Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

10. Remove the lower to center intermediate shaft retaining bolt.

IMPORTANT: Note the relationship of the center intermediate shaft to lower intermediate shaft in order to ensure proper installation.

11. Remove the center intermediate shaft from the lower intermediate shaft.

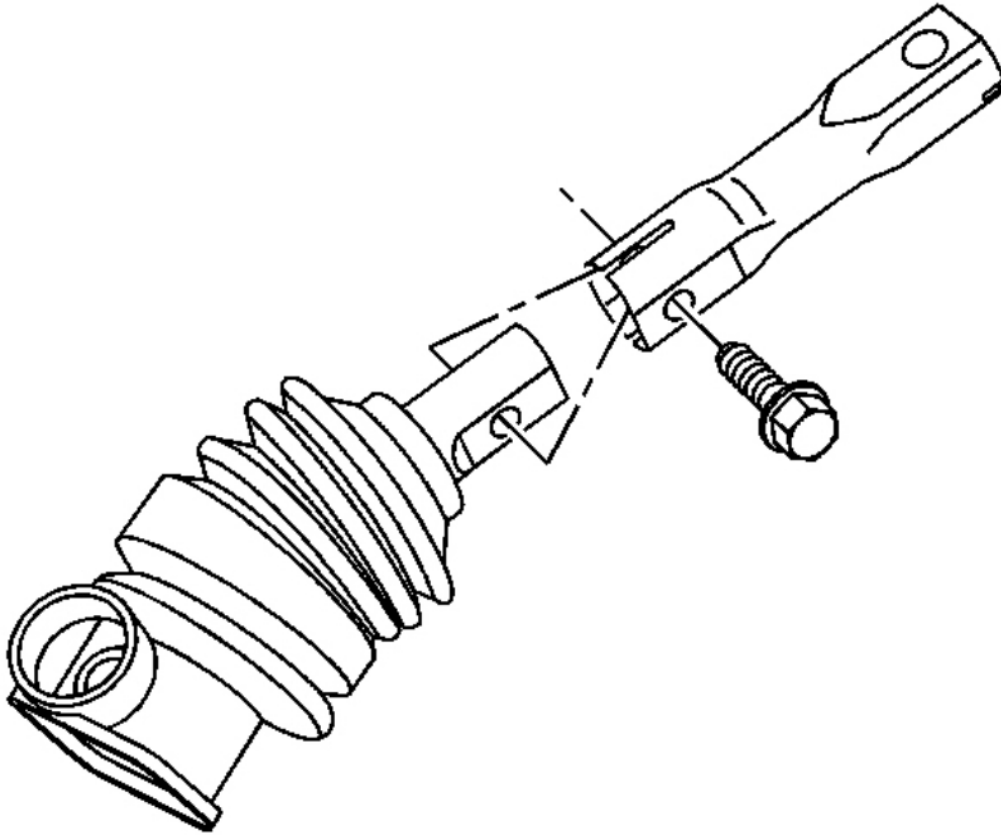


Fig. 13: Installing Lower Intermediate Shaft To Upper Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

1. Install the lower intermediate shaft to the upper intermediate shaft.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the lower to center intermediate shaft retaining bolt.

Tighten: Tighten the bolt to 30 N.m (23 lb ft).

IMPORTANT: Ensure the orientation of the intermediate shafts as noted during removal.

3. Connect the center intermediate shaft to the upper intermediate shaft.

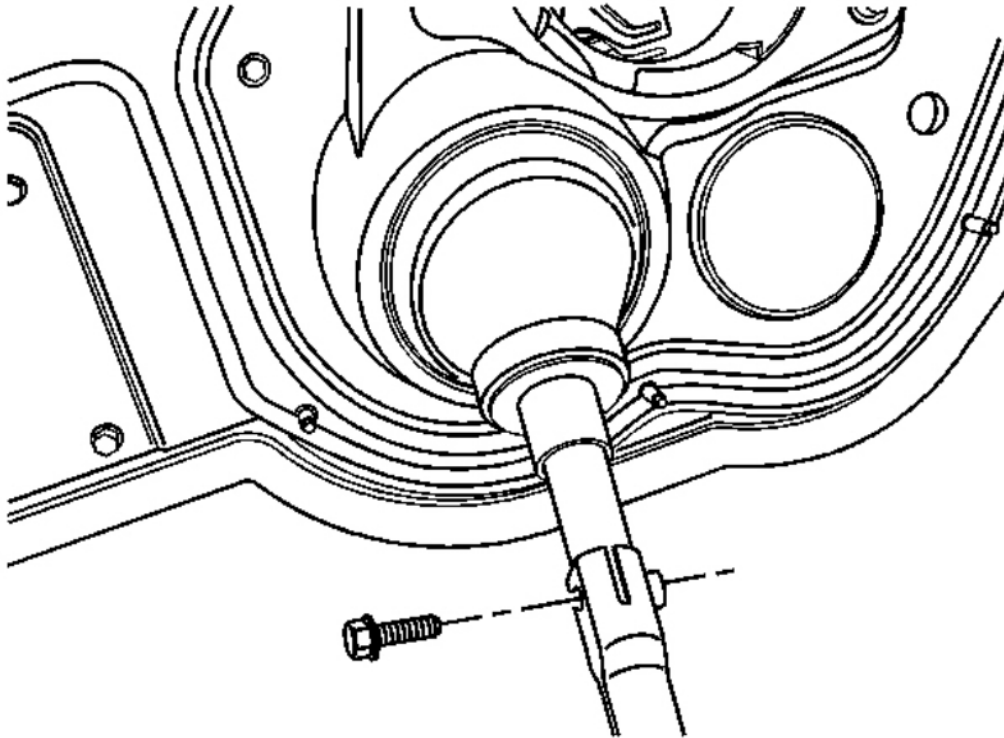


Fig. 14: Installing Center To Upper Intermediate Shaft Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

4. Install the center to upper intermediate shaft retaining bolt.

Tighten: Tighten the bolt to 30 N.m (23 lb ft).

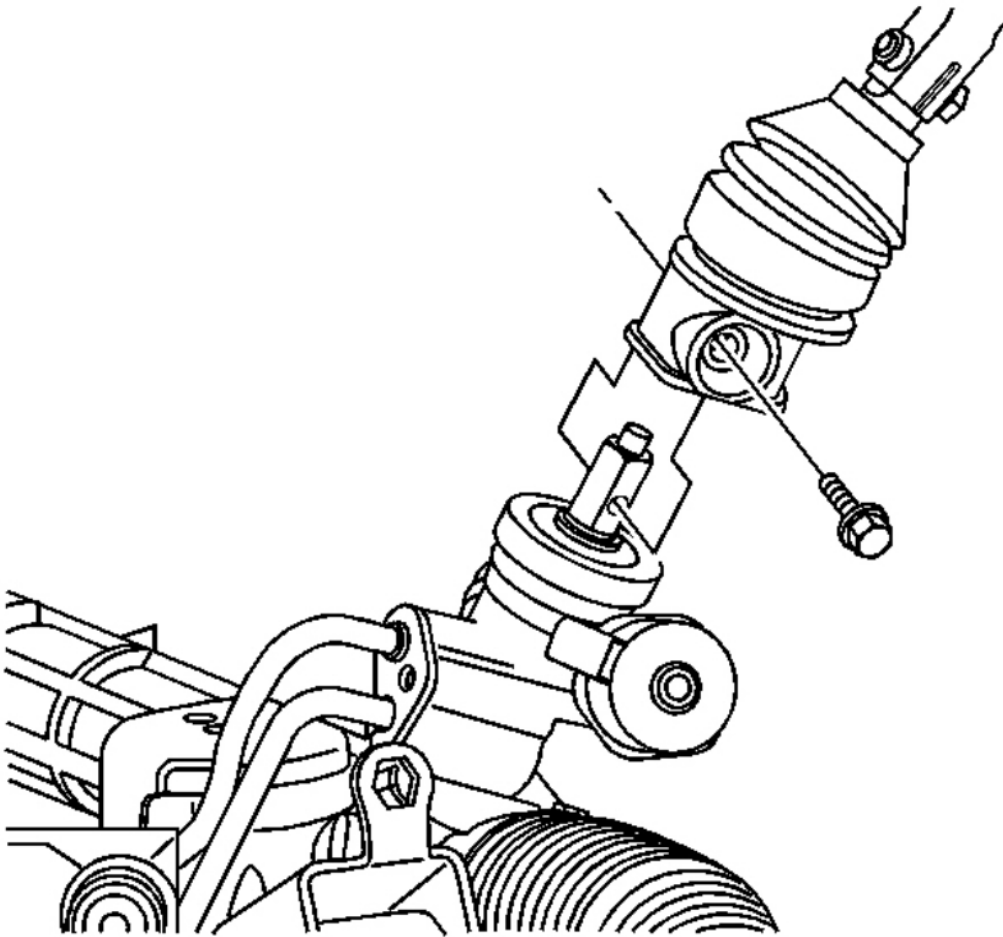


Fig. 15: Installing Lower Intermediate Shaft To Power Steering Gear Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

5. Connect the lower intermediate shaft to the power steering gear.
6. Install the lower intermediate shaft to power steering gear retaining bolt.

Tighten: Tighten the bolt to 50 N.m (37 lb ft).

7. Lower the vehicle.

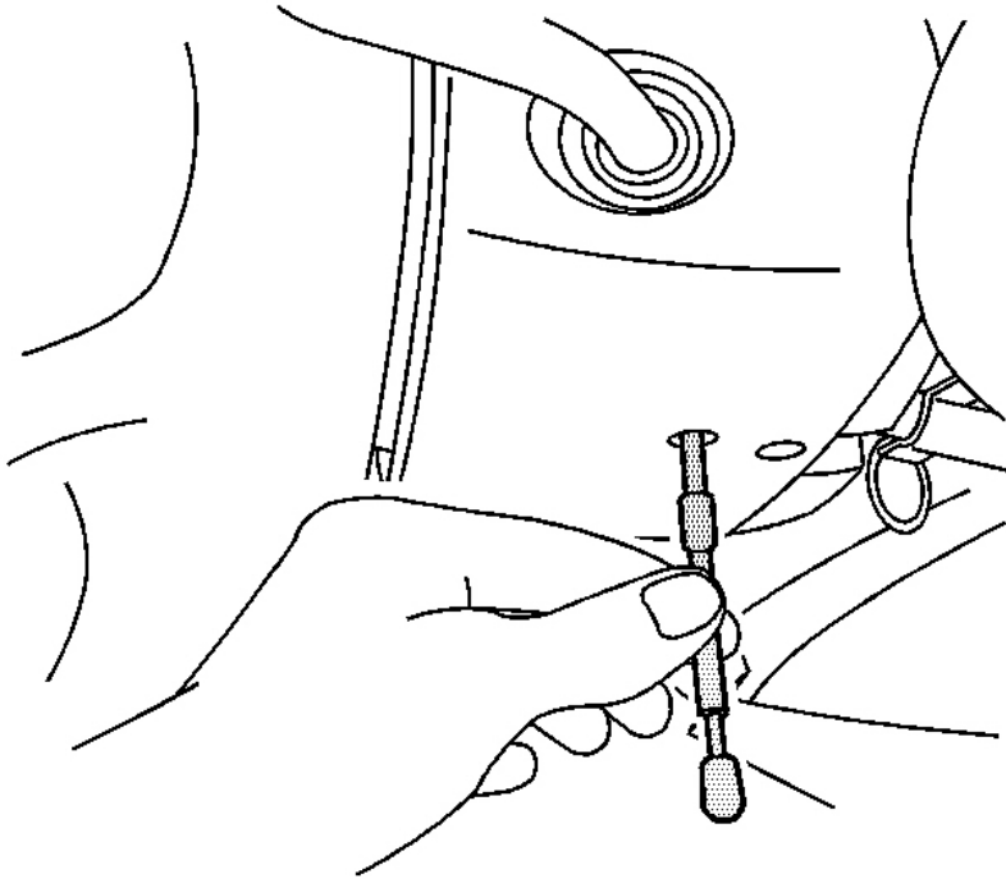


Fig. 16: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

8. Remove **J 42640** from the steering column lower trim cover access hole.

INTERMEDIATE STEERING SHAFT REPLACEMENT - LOWER

Tools Required

J 42640 Steering Column Anti-Rotation Pin

Removal Procedure

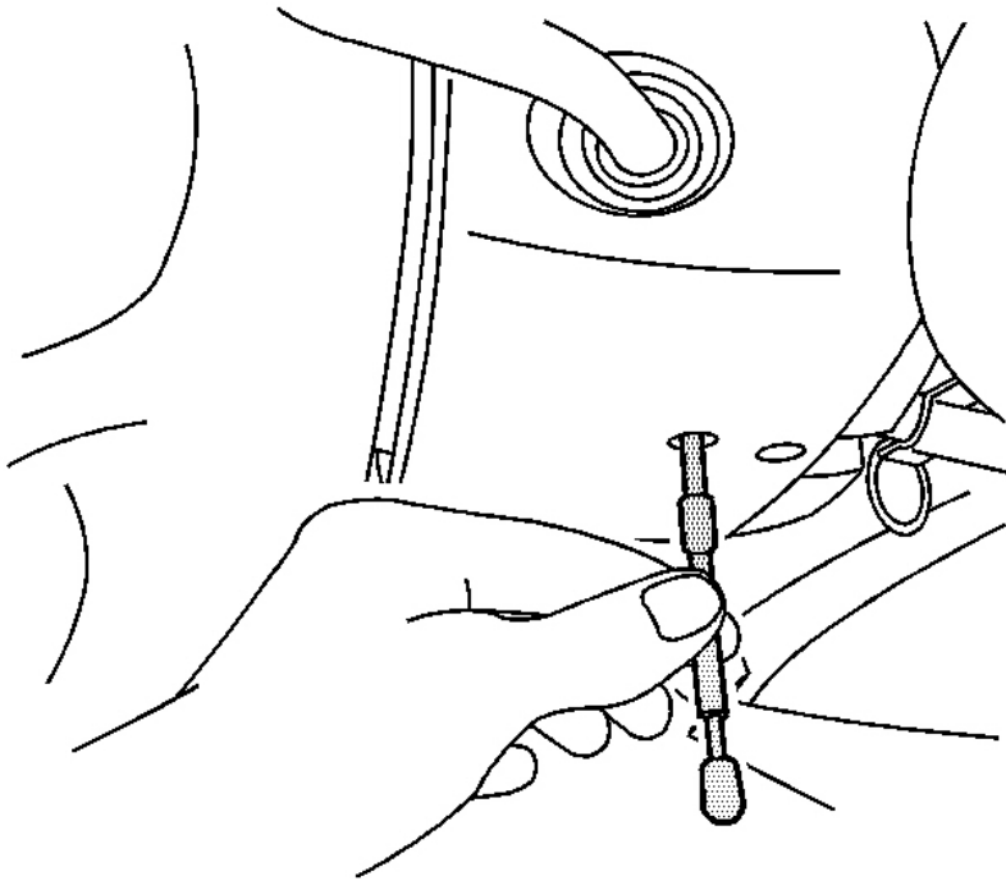


Fig. 17: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

NOTE: The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.

1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition lock cylinder to the lock position and remove the key.
3. Lock the steering column through the access hole in the lower steering column trim cover

using the **J 42640** .

4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

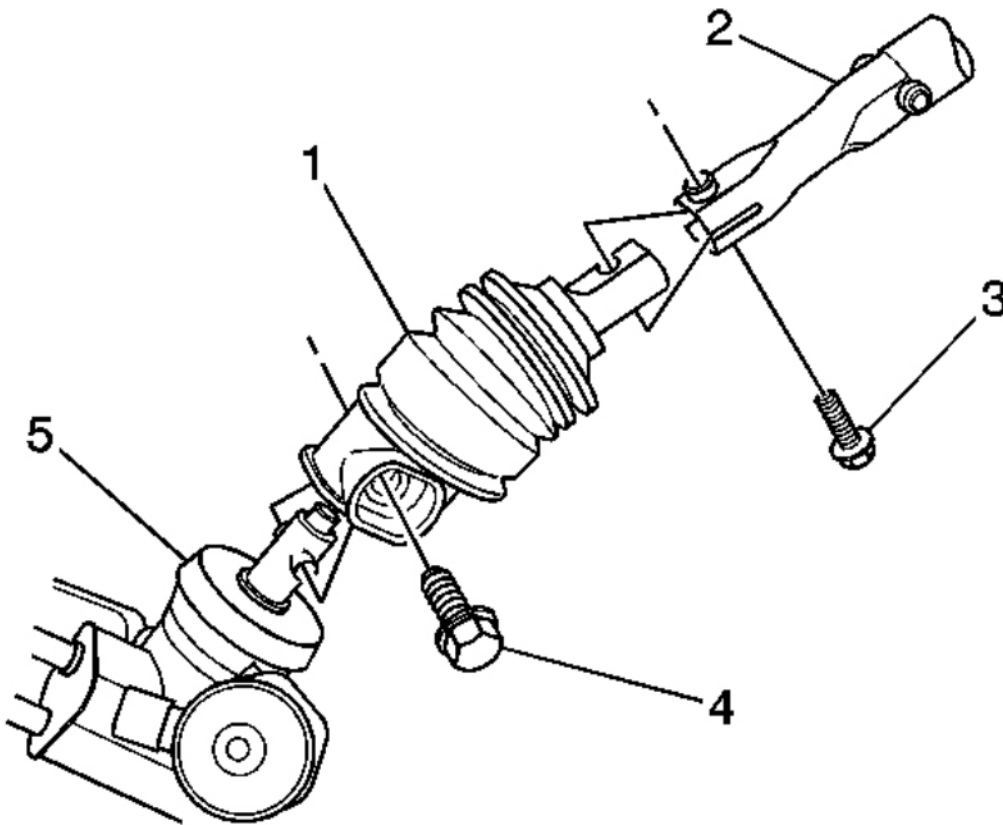


Fig. 18: Removing Center Intermediate Shaft To Lower Intermediate Shaft Retaining Bolt

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Note the relationship of the center intermediate shaft to the lower intermediate shaft in order to ensure proper installation.

5. Remove the center intermediate shaft to the lower intermediate shaft retaining bolt (3).
6. Remove the lower intermediate shaft to the power steering gear retaining bolt (4).

IMPORTANT: Note the relationship of the lower intermediate shaft to the power steering gear in order to ensure proper installation.

7. Disconnect the lower intermediate shaft from the power steering gear.
8. Remove the lower intermediate shaft from the center intermediate shaft.

Installation Procedure

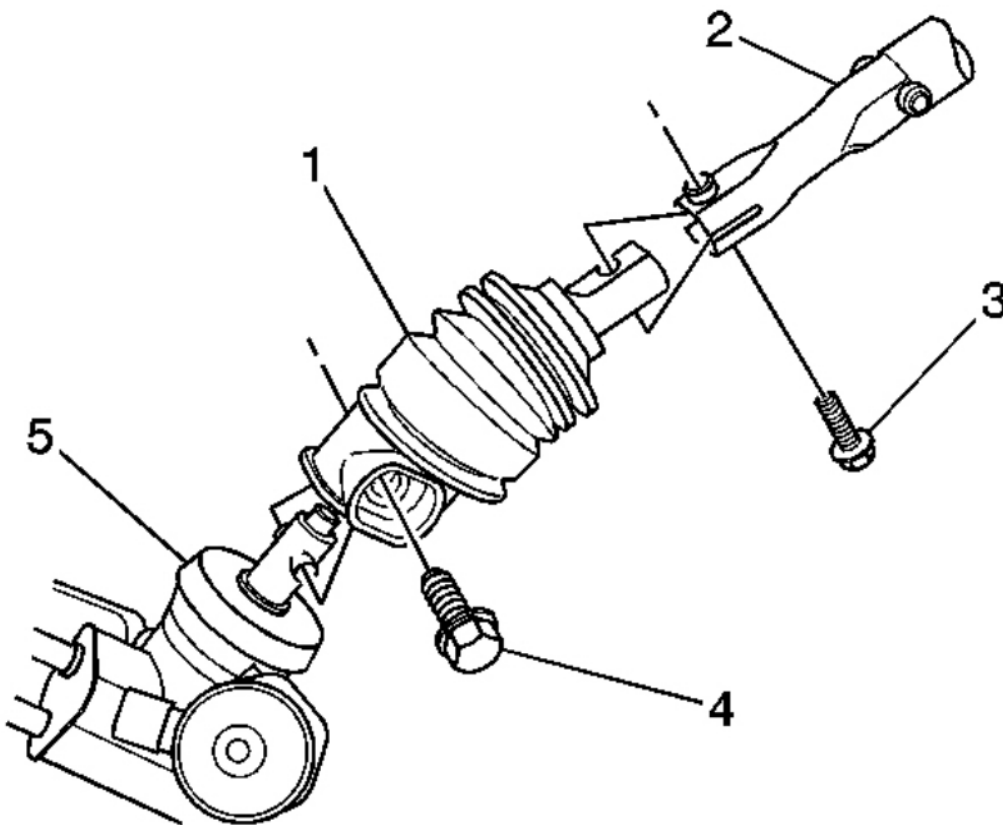


Fig. 19: Connecting Lower Intermediate Shaft To Center Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

1. Connect the lower intermediate shaft to the center intermediate shaft.
2. Connect the lower intermediate shaft to the power steering gear.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the lower intermediate shaft to the power steering gear retaining bolt.

Tighten: Tighten the bolt to 50 N.m (37 lb ft).

4. Install the center intermediate shaft to the lower intermediate shaft retaining bolt (3).

Tighten: Tighten the bolt to 30 N.m (23 lb ft).

5. Lower the vehicle.

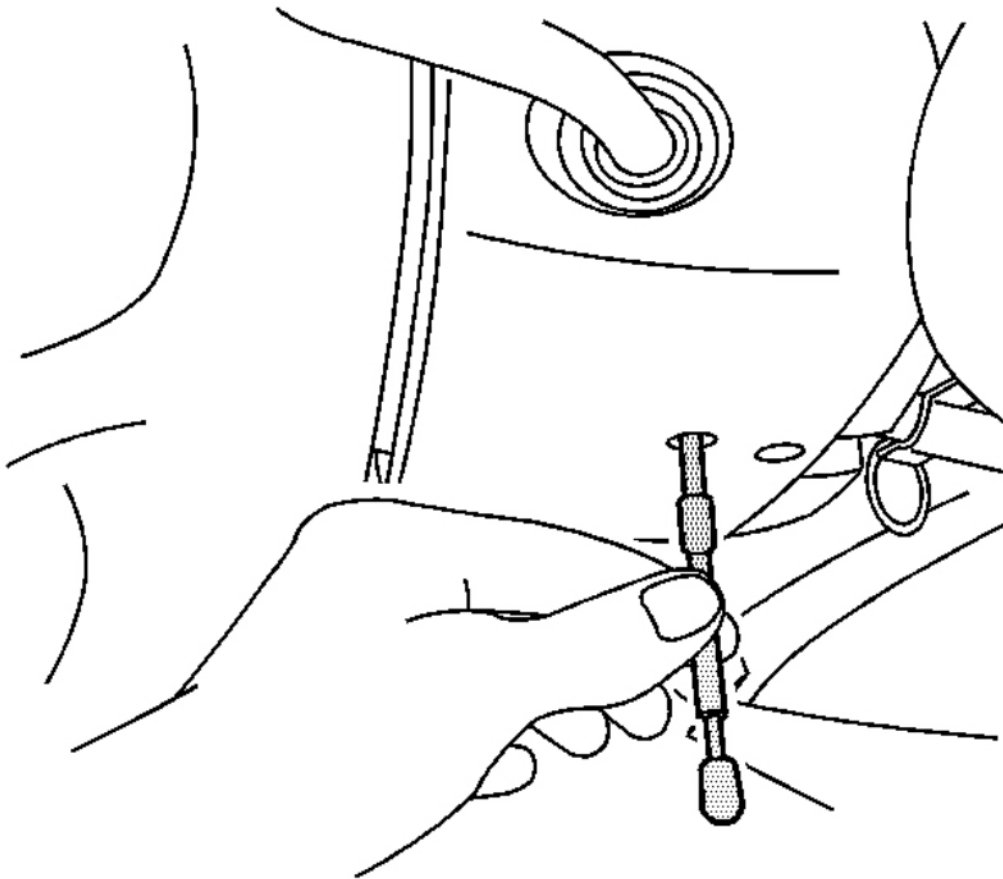


Fig. 20: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

6. Remove the **J 42640** from the steering column lower trim cover access hole.

STEERING COLUMN ACCIDENT DAMAGE INSPECTION

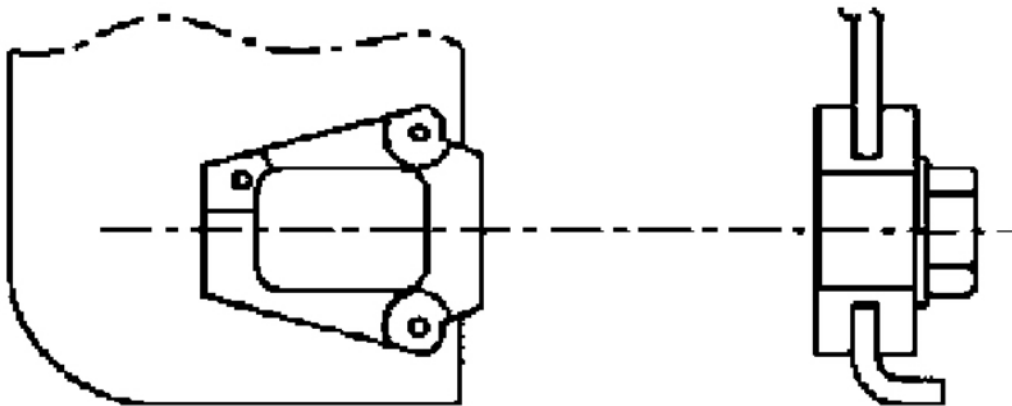


Fig. 21: Inspecting Capsules On Steering Column Bracket Assembly
Courtesy of GENERAL MOTORS CORP.

- Vehicles involved in accidents resulting in frame damage, major body or sheet metal damage, or where the steering column has been impacted, or where supplemental inflatable restraint systems deployed may also have a damaged or misaligned steering column.
- Inspect the capsules on the steering column bracket assembly. All capsules must be securely seated in the bracket slots and checked for any loose conditions when pushed or pulled by hand.
- Observe how the bracket is attached to the jacket assembly.
 - If the capsules are not securely seated and the bracket is bolted to the jacket assembly, replace only the bracket.
 - If the capsules are not securely seated and the bracket is welded to the jacket assembly, replace only the jacket assembly.

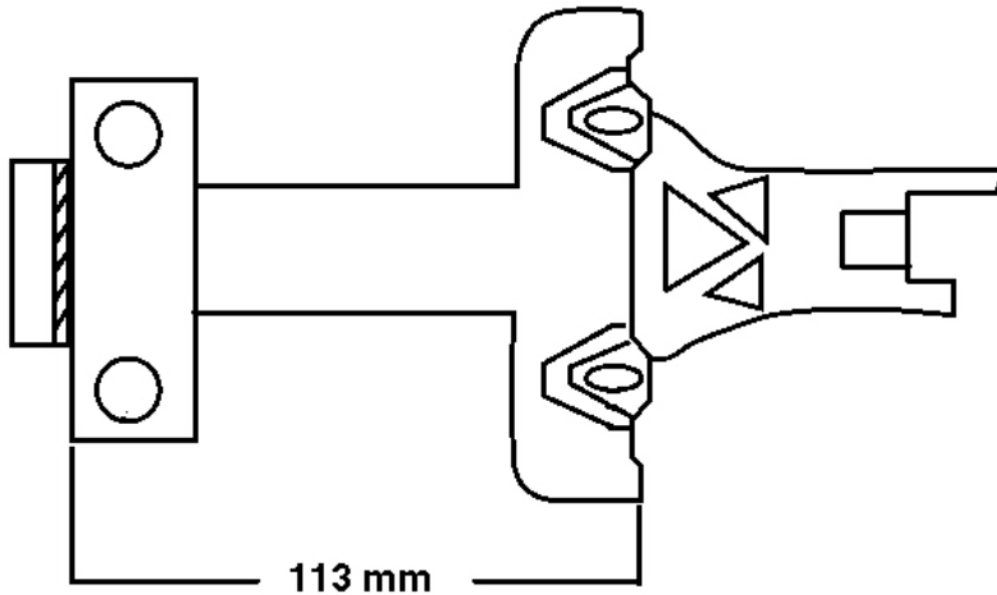


Fig. 22: Replacing Jacket Assembly If Measured Dimensions
Courtesy of GENERAL MOTORS CORP.

- Inspect for jacket assembly collapse by measuring the distance from the lower edge of the upper jacket to a defined point on the lower jacket. Replace the jacket assembly if the measured dimensions are not within specifications.

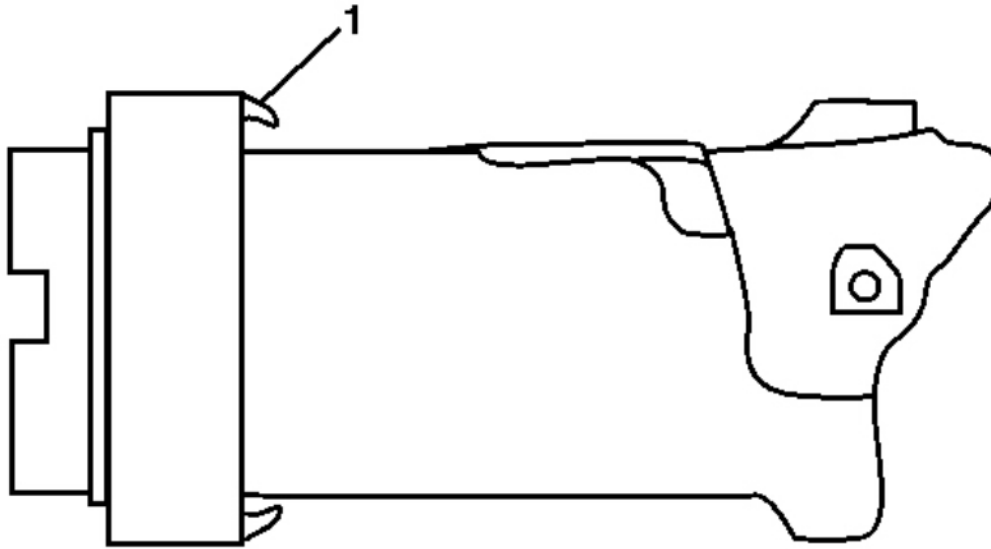


Fig. 23: Inspecting Bearing & Adapter Assembly Tab For Breakage
Courtesy of GENERAL MOTORS CORP.

- Inspect for tab (1) breakage on the bearing and adapter assembly.

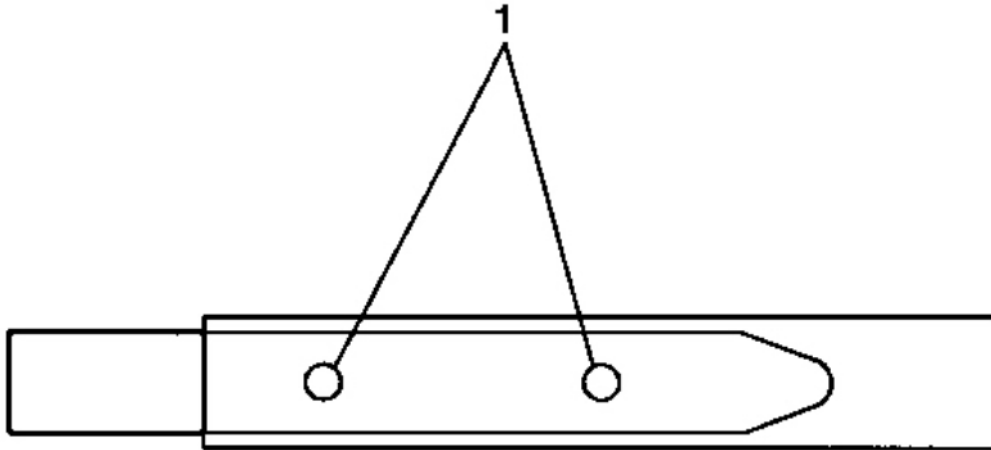


Fig. 24: Inspecting Steering Shaft For Sheared Injected Plastic
Courtesy of GENERAL MOTORS CORP.

- Visually inspect the steering shaft for sheared injected plastic (1). If the steering shaft shows sheared plastic, replace the steering shaft.
- Any frame damage that could cause a bent steering shaft must have the steering shaft runout checked. Using a dial indicator at the lower end of the steering shaft, rotate the steering wheel. The runout must not exceed 1.60 mm (0.0625 in).

STEERING COLUMN TRIM COVERS REPLACEMENT

Removal Procedure

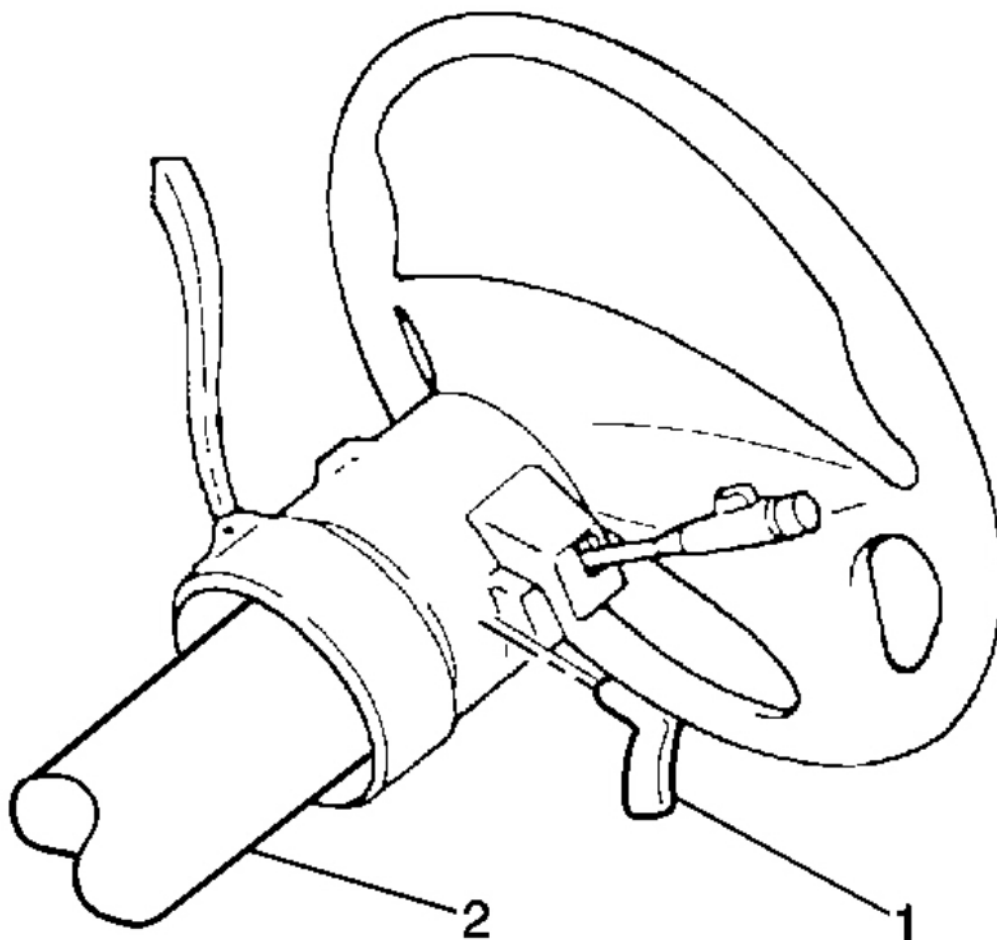


Fig. 25: View Of Upper Steering Column With Tilt Lever
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the steering wheel. Refer to **Steering Wheel Replacement**.
3. Remove the tilt steering column lever (1) from steering column (2).
4. Remove the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.

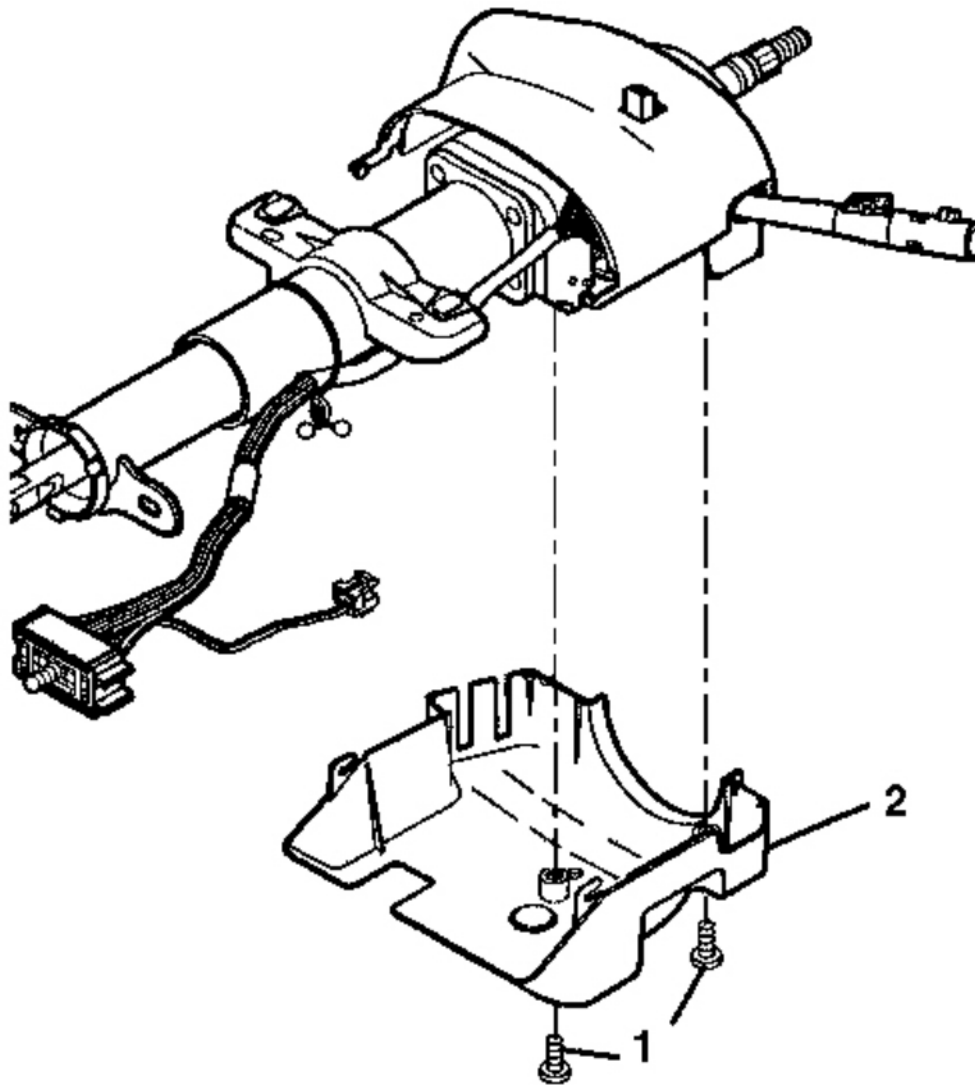


Fig. 26: Removing Retaining Screws That Secure Lower Trim Cover To Steering Column

Courtesy of GENERAL MOTORS CORP.

5. Remove the retaining screws (1) that secure the lower trim cover (2) to the steering column.

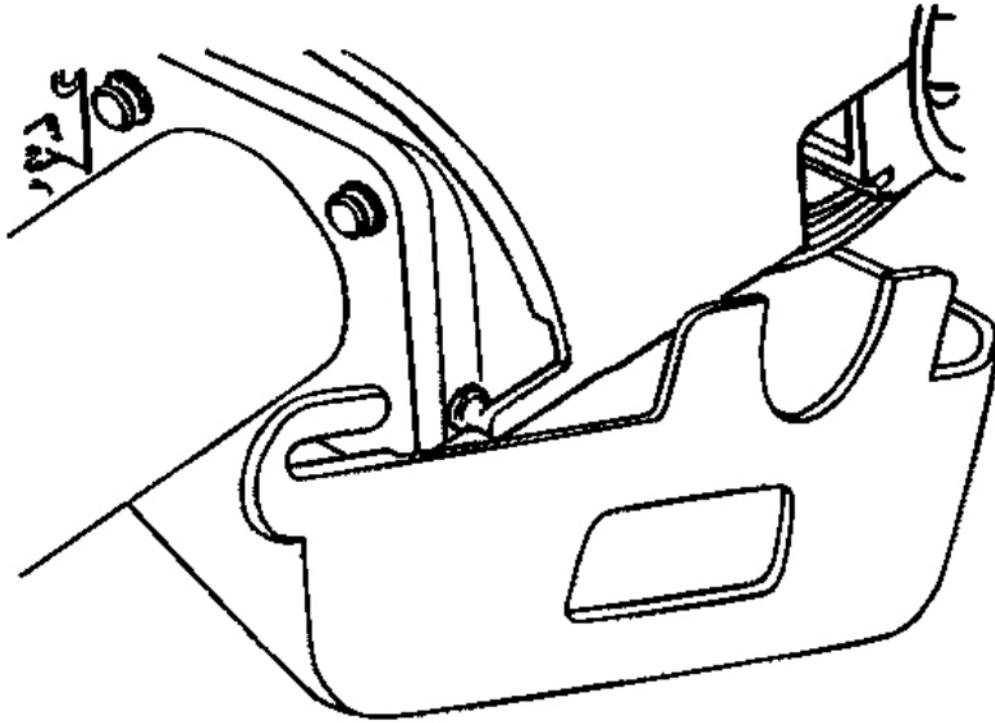


Fig. 27: View Of Lower And Upper Steering Column Covers
Courtesy of GENERAL MOTORS CORP.

6. Remove the lower trim cover by tilting the cover down and sliding the cover back in order to disengage the locking tabs.

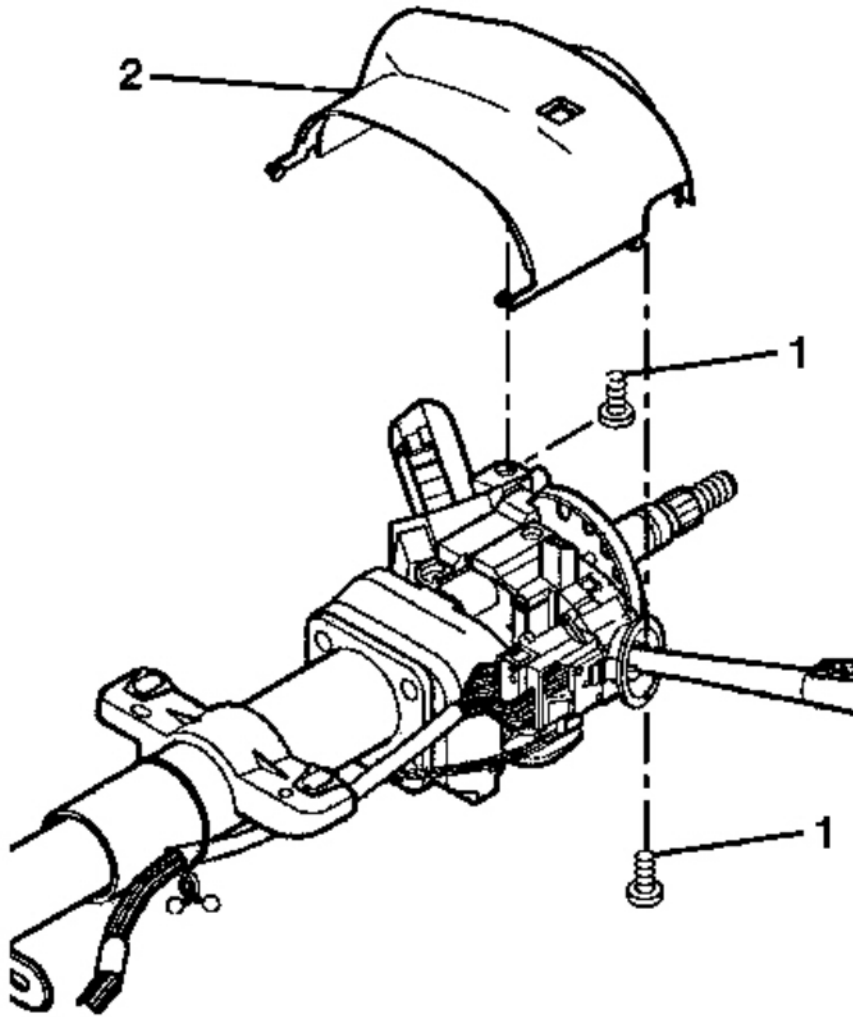


Fig. 28: Removing Retaining Screws From Upper Steering Column Trim Cover
Courtesy of GENERAL MOTORS CORP.

7. Remove the retaining screws (1) from the upper steering column trim cover (2).
8. Remove the upper steering column trim cover (2).

Installation Procedure

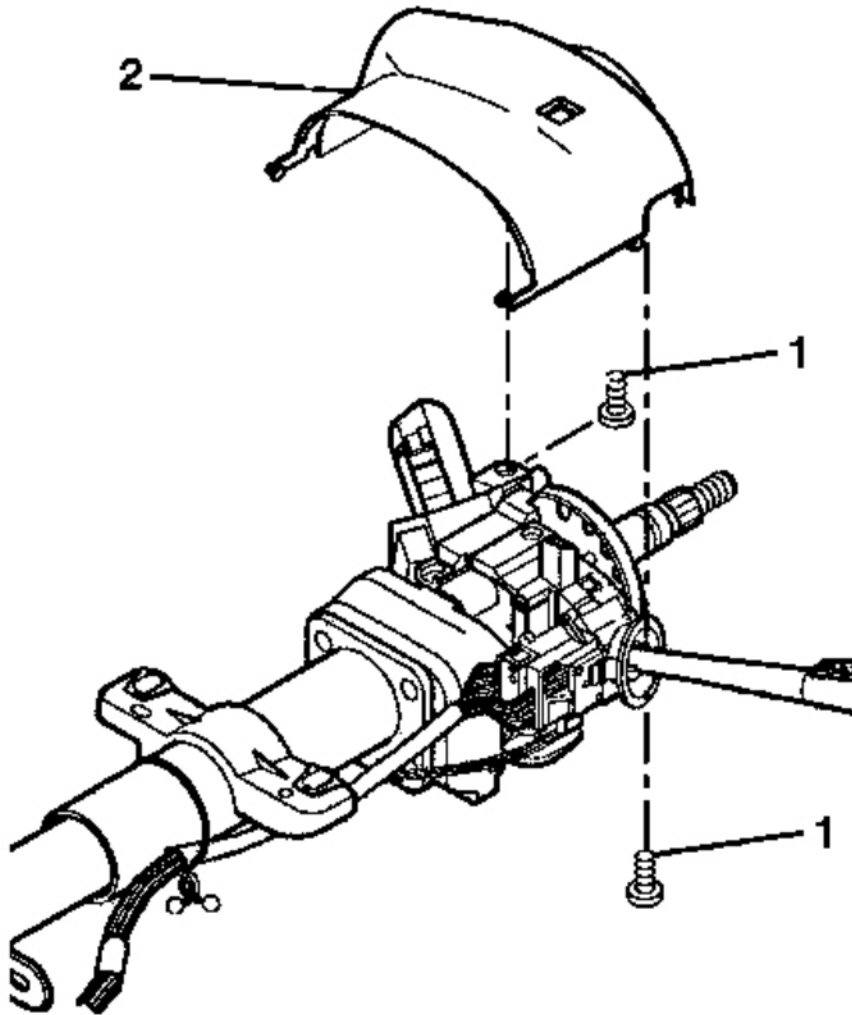


Fig. 29: Installing Upper Steering Column Trim Cover
Courtesy of GENERAL MOTORS CORP.

1. Install the upper steering column trim cover (2).

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the retaining screws (1) to the upper steering column trim cover (2).

Tighten: Tighten the screw to 1.5 N.m (13 lb in).

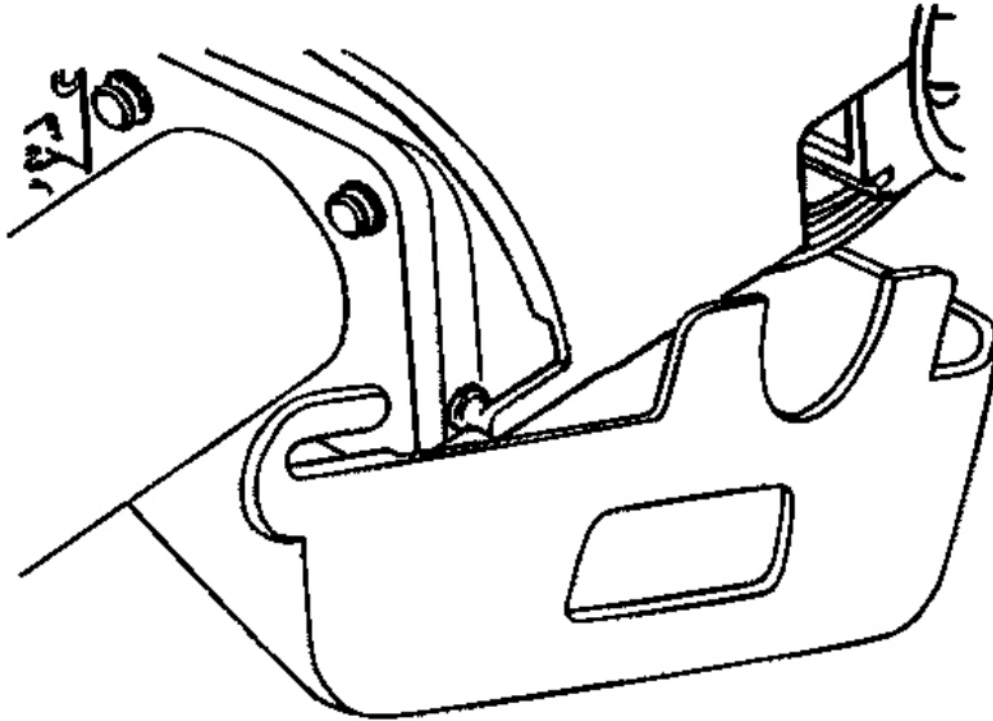


Fig. 30: View Of Lower And Upper Steering Column Covers
Courtesy of GENERAL MOTORS CORP.

3. Install the lower steering column trim cover by matching the tabs slots on the trim cover with the locking tabs on the upper trim cover and tilting the lower trim cover up.

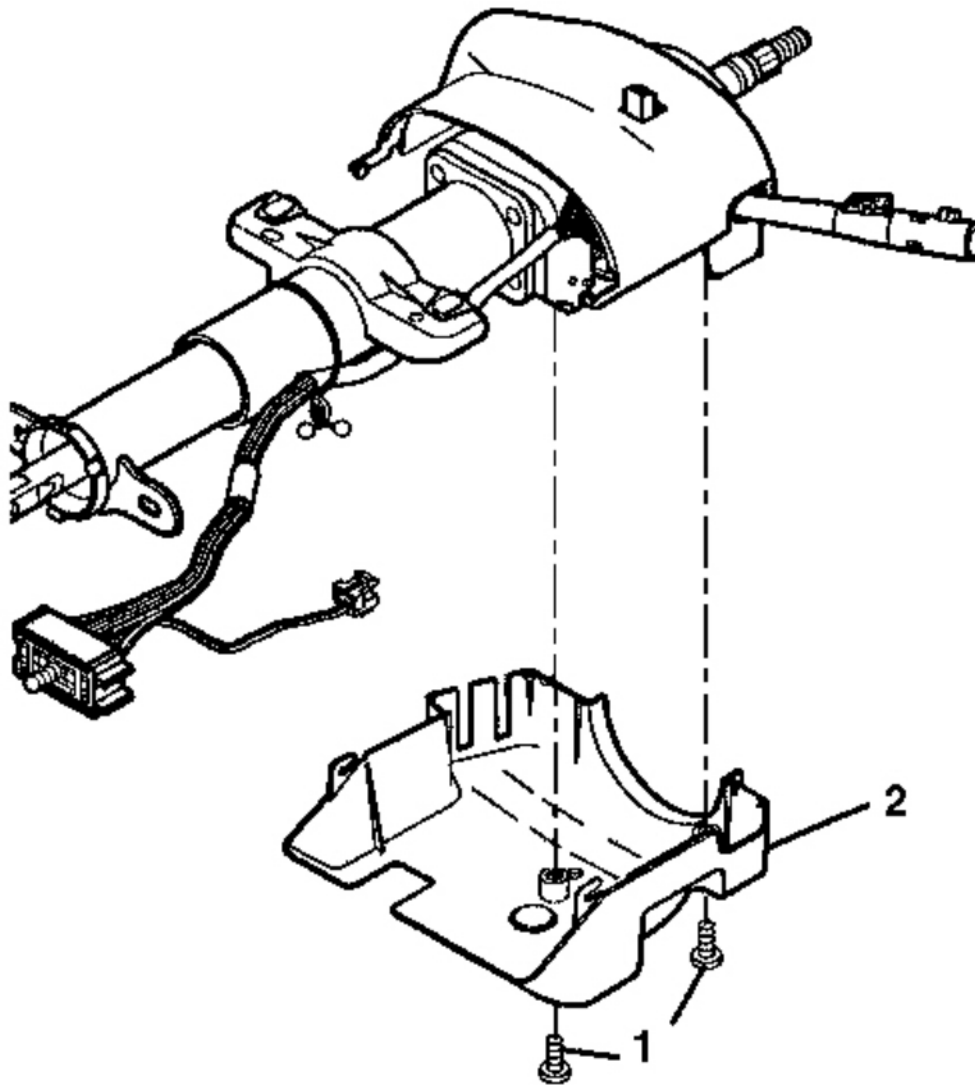


Fig. 31: Installing Retaining Screws To Lower Steering Column Trim Cover
Courtesy of GENERAL MOTORS CORP.

4. Install the retaining screws (1) to the lower steering column trim cover (2).

Tighten: Tighten the screws to 3.5 N.m (31 lb in).

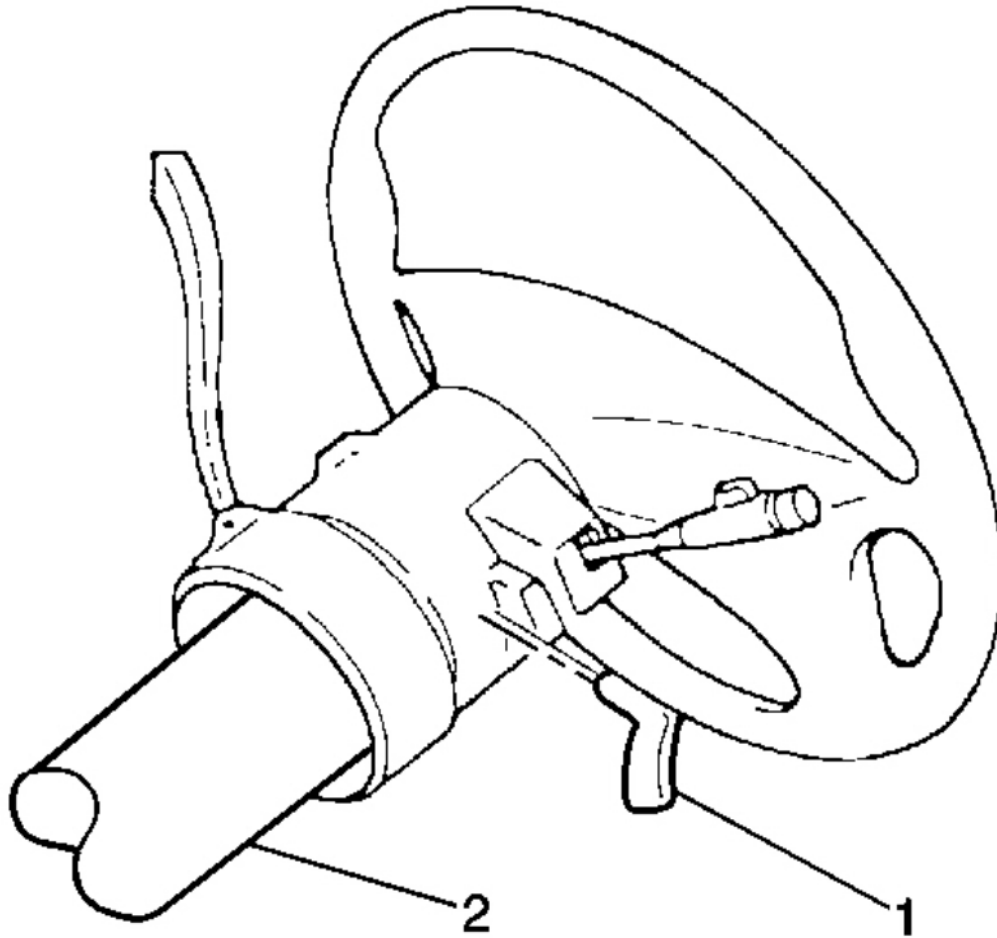


Fig. 32: View Of Upper Steering Column With Tilt Lever
Courtesy of GENERAL MOTORS CORP.

5. Install the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.
6. Install the tilt steering column lever (1) to the steering column (2).
7. Install the steering wheel. Refer to **Steering Wheel Replacement**.
8. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

IGNITION SWITCH REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.

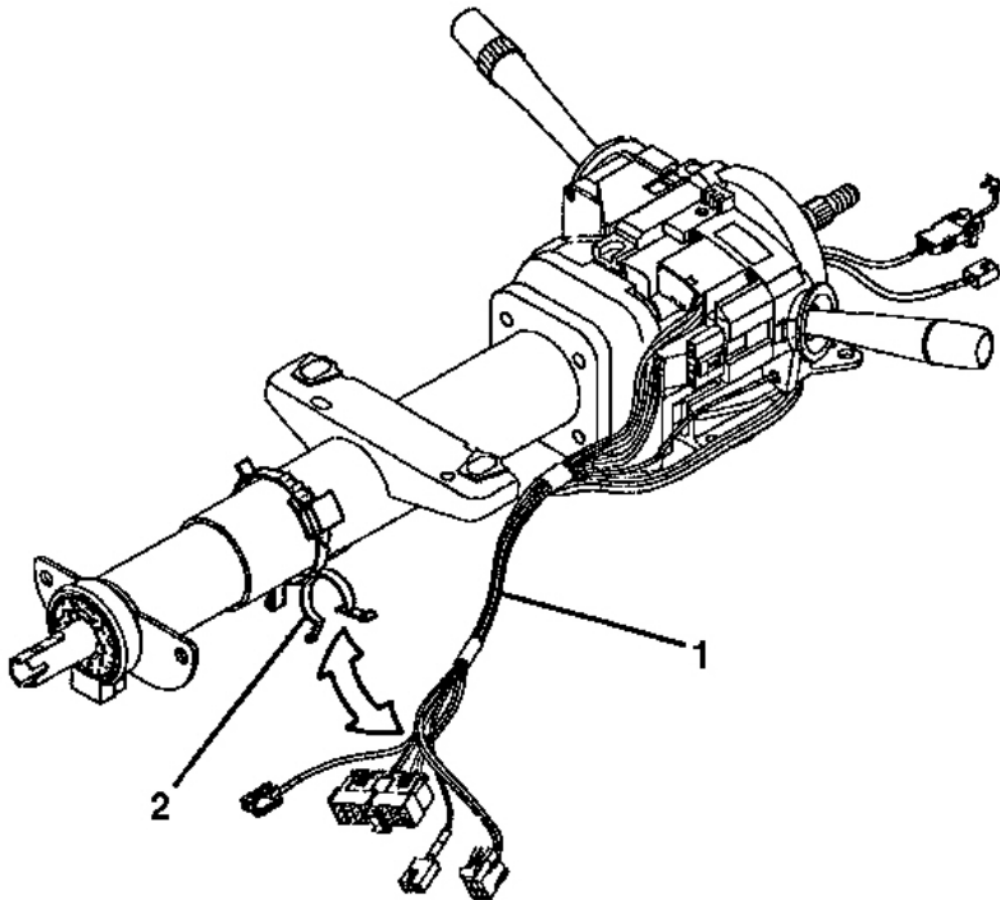


Fig. 33: View Of Wiring Harness In Steering Column Harness Strap
Courtesy of GENERAL MOTORS CORP.

3. Remove the wire harness assembly (1) from the wire harness strap (2).
4. Remove and dispose of the smaller wire harness straps.

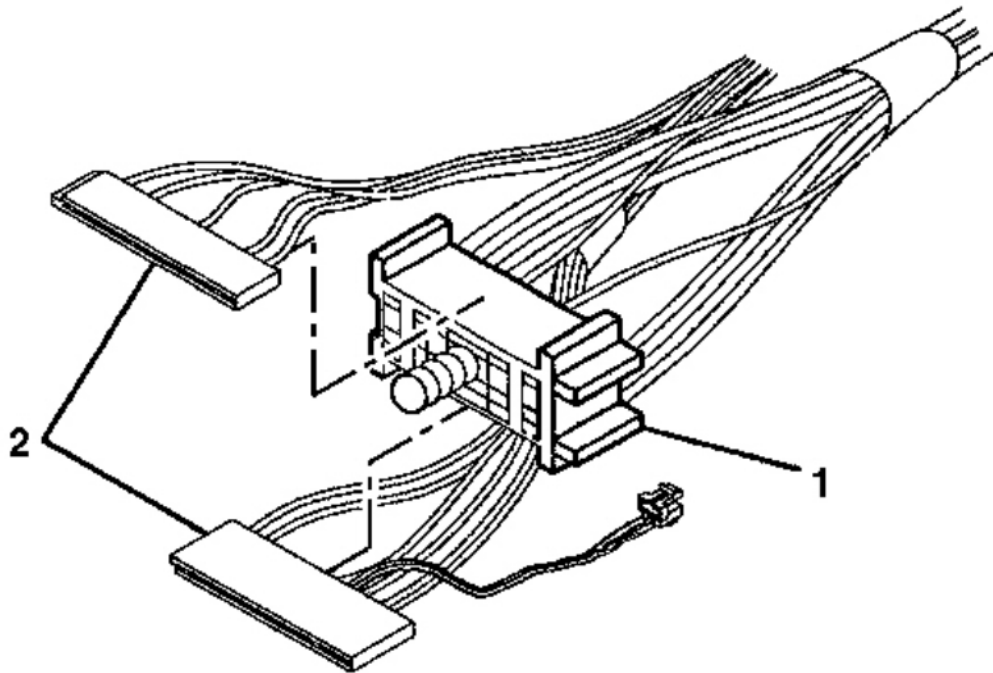


Fig. 34: Turn Signal & Multifunction Switch Assembly Connectors
Courtesy of GENERAL MOTORS CORP.

5. Slide the 2 connectors (2) of the turn signal and multifunction switch assembly out of the bulkhead connector (1).

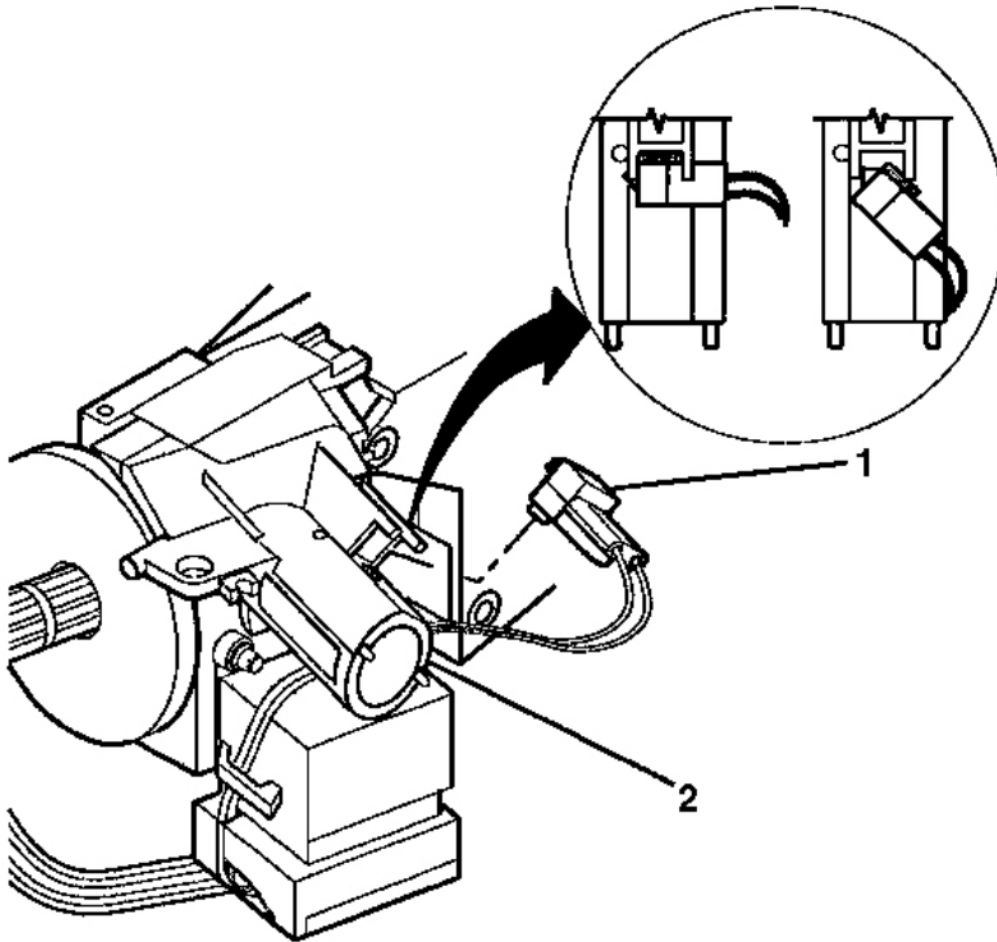


Fig. 35: Identifying Key Alarm Connector At Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

6. Remove the key alarm connector (1) from the ignition lock cylinder case (2).
 1. Rotate the key alarm connector (1) 90 degrees.
 2. Pull the key alarm connector (1) out of the ignition lock cylinder case (2).

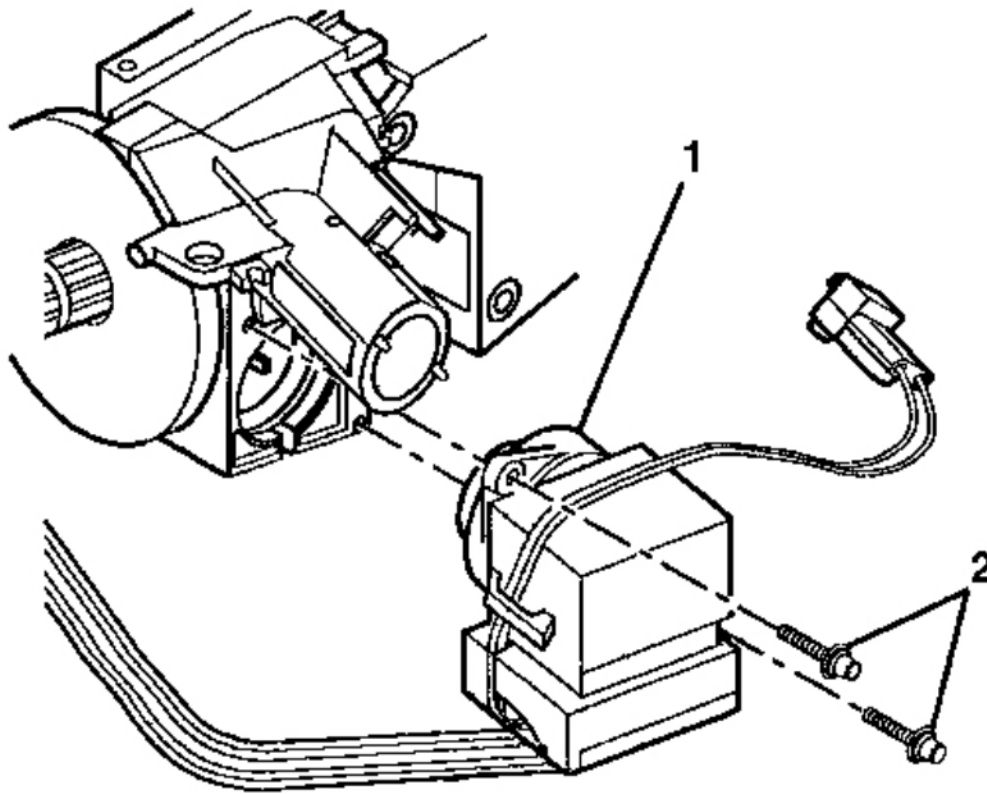


Fig. 36: Removing 2 Tapping Screws From Ignition Switch Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the 2 tapping screws (2) from the ignition switch assembly (1).
8. Remove the ignition switch replacement (1) from the ignition lock cylinder case.

Installation Procedure

NOTE: Refer to Fastener Notice in Cautions and Notices.

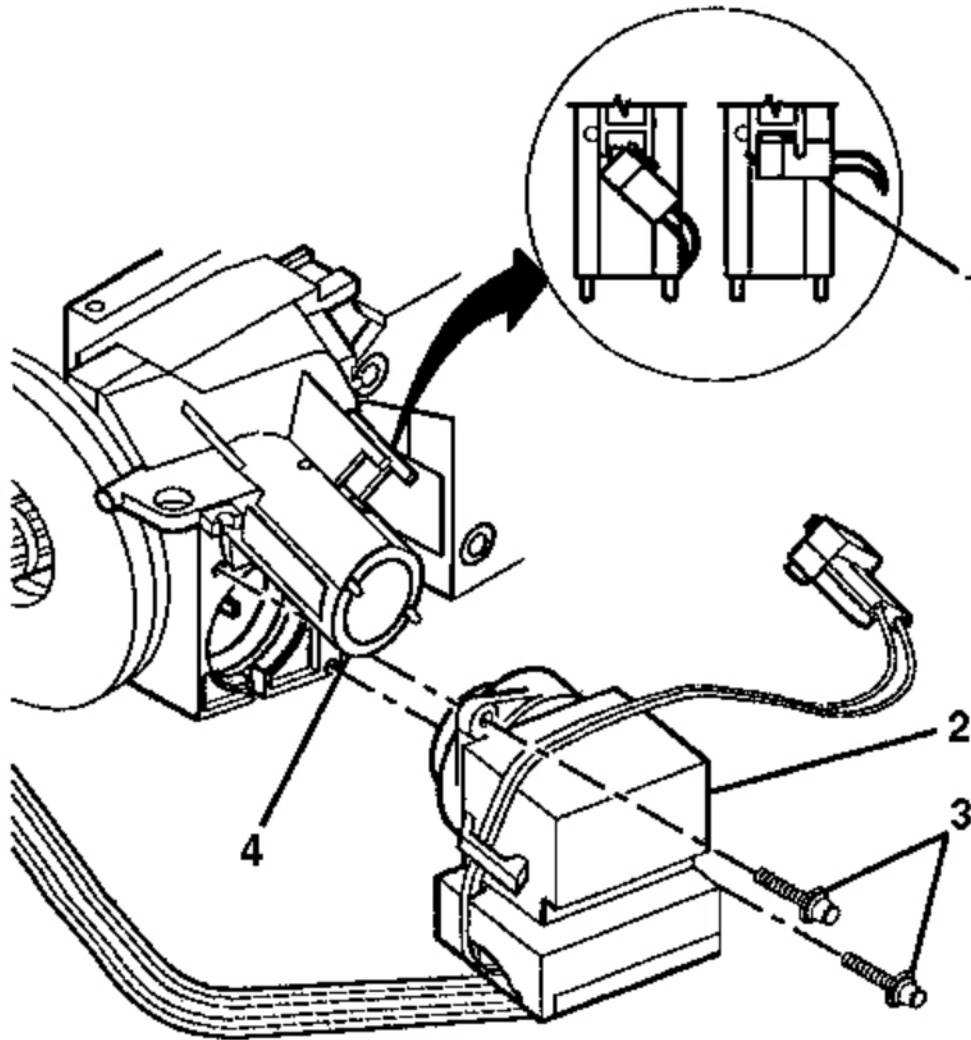


Fig. 37: Installing Ignition Switch Replacement And Securing By Using 2 Tapping Screws

Courtesy of GENERAL MOTORS CORP.

1. Install the ignition switch replacement (2) and secure by using the 2 tapping screws (3).

Tighten: Tighten the screws to 7 N.m (62 lb in).

2. Push the key alarm connector (1) into the ignition lock cylinder case (4).

3. Rotate the key alarm connector (1) 90 degrees so that the key alarm connector (1) locks into place.

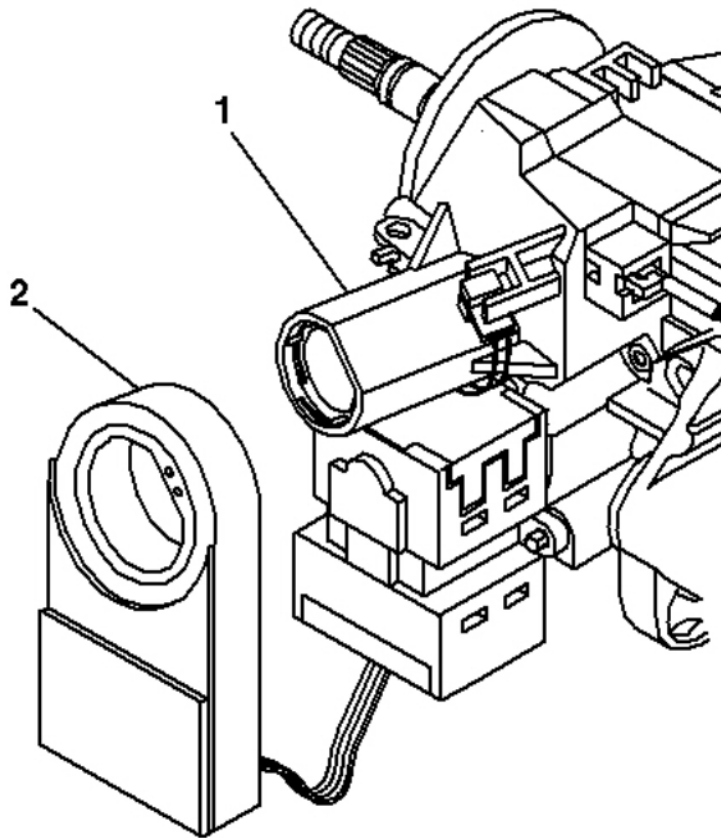


Fig. 38: Locating Theft Deterrent Module & Ignition Lock Cylinder Case Assembly
Courtesy of GENERAL MOTORS CORP.

4. Install the coded key controller (2) onto the ignition lock cylinder case (1).

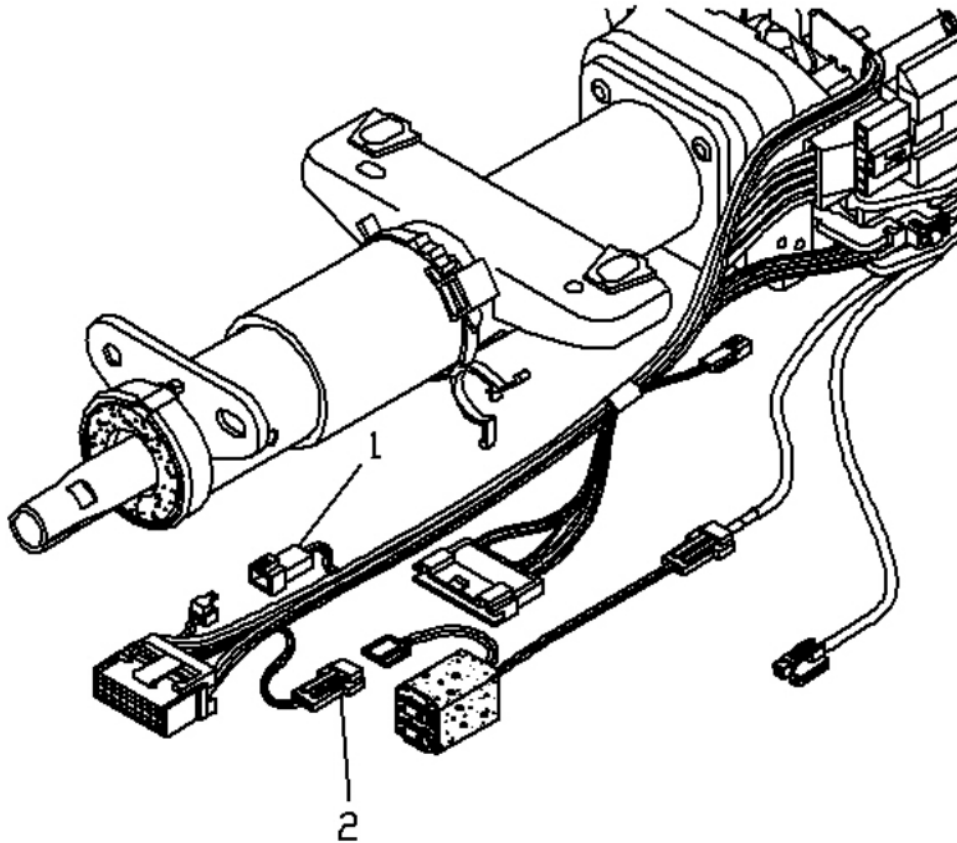


Fig. 39: Connecting Connectors And Of Ignition Switch Replacement
Courtesy of GENERAL MOTORS CORP.

5. Connect the connectors (1) and (2) of the ignition switch replacement.

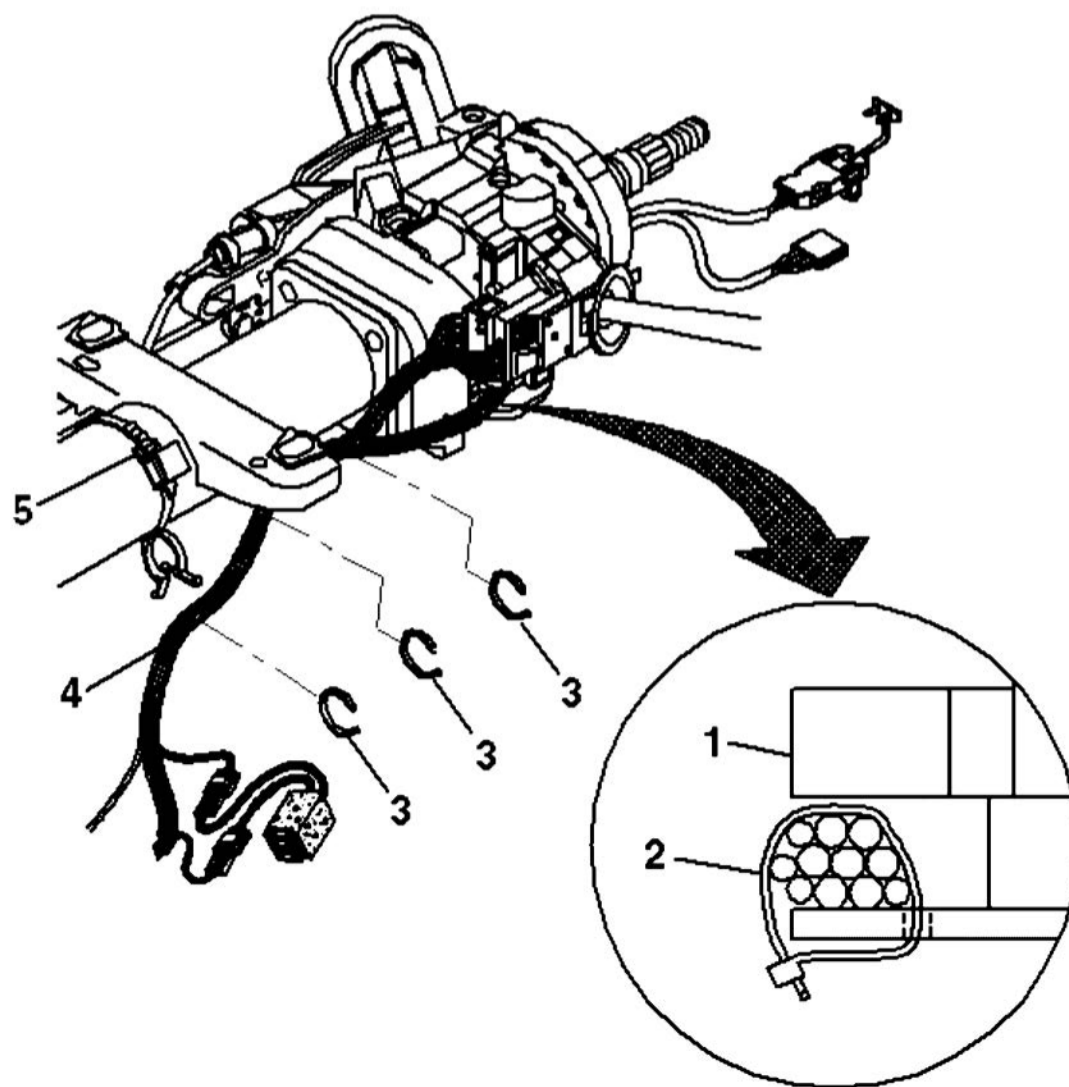


Fig. 40: Installing Wire Harness Strap Onto Upper Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

6. Install the wire harness strap (2) onto the upper tilt head assembly (1).
7. Install the 3 wire harness straps (3) onto the wire harness assembly (4).
8. Install the wire harness assembly (4) into the wire harness strap (5).
9. Install the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
10. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

IGNITION LOCK CYLINDER REPLACEMENT

Removal Procedure

CAUTION: Refer to **Battery Disconnect Caution** in **Cautions and Notices**.

1. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure** in Engine Electrical.
2. Turn the ignition switch to the START position.

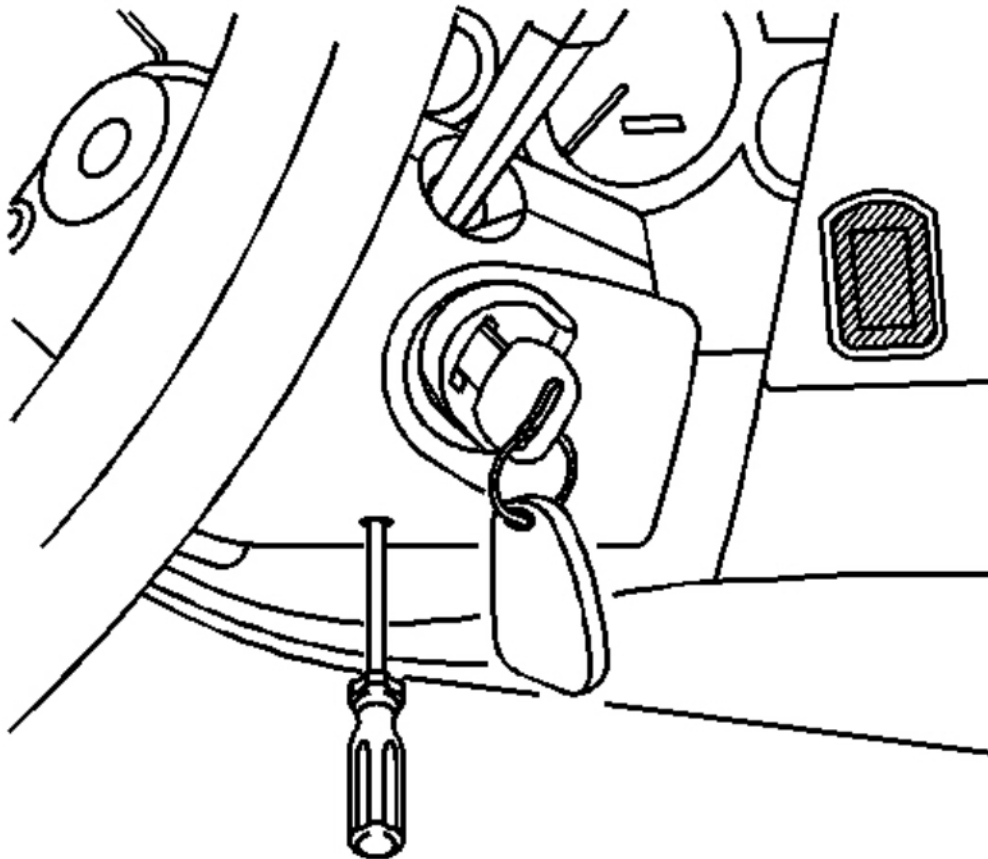


Fig. 41: Inserting Awl Into Lower Steering Column Trim Cover Access Hole
Courtesy of GENERAL MOTORS CORP.

3. Insert the awl into the lower steering column trim cover access hole.
4. Press in the release button using the awl.

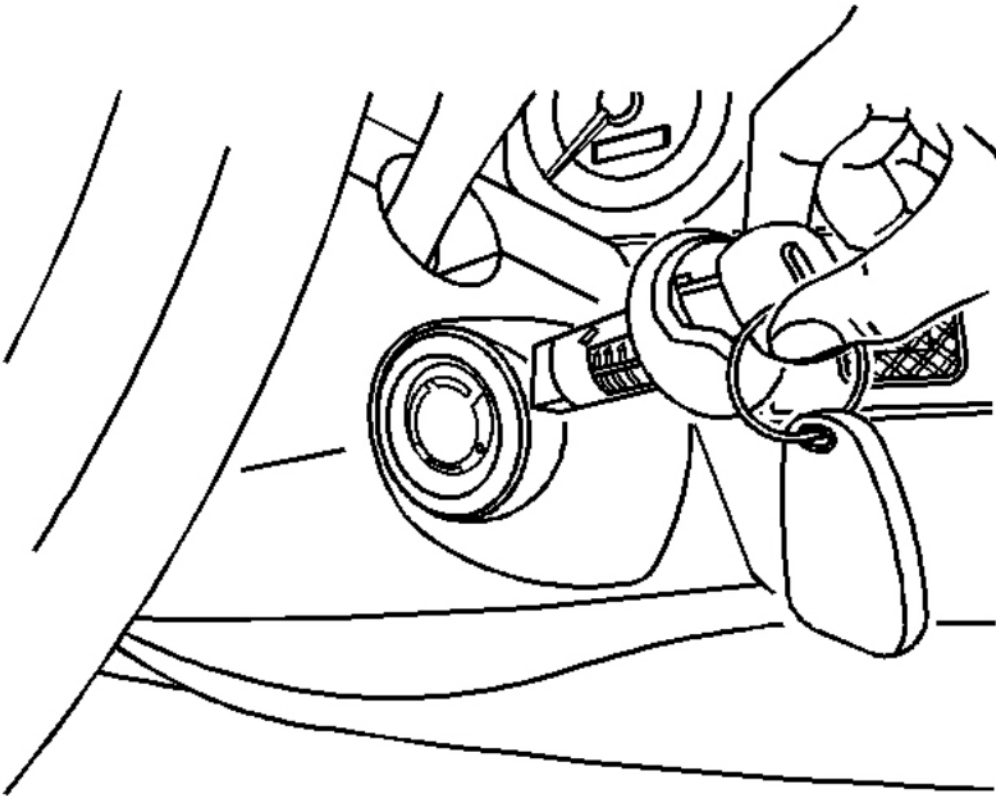


Fig. 42: Removing Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

5. Release the ignition switch to the RUN position.
6. Remove the ignition lock cylinder.

Installation Procedure

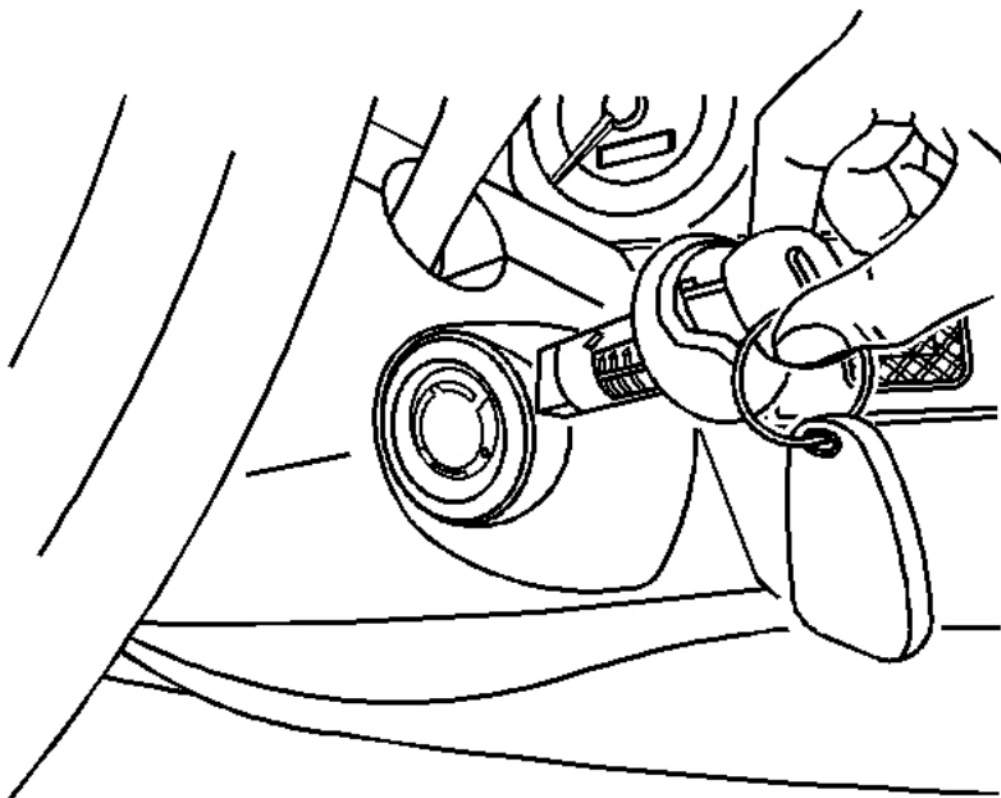


Fig. 43: Installing Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

1. Install the ignition lock cylinder by doing the following procedure:
 - Align the positioning locking tab slot on the lock module to the positioning tab on the ignition lock cylinder.
 - Push the lock cylinder in until the locking tab locks in the lock module.
2. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure** in Engine Electrical.

IGNITION LOCK CYLINDER CASE REPLACEMENT

Removal Procedure

CAUTION: Refer to **SIR Caution** in Cautions and Notices.

2004 Cadillac CTS

2004 STEERING Steering Wheel and Column - CTS

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the turn signal cancel cam and upper bearing. Refer to **Turn Signal Cancel Cam and Upper Bearing Inner Race Replacement**.
3. Remove the theft deterrent control module. Refer to **Theft Deterrent Control Module Replacement** in Theft Deterrent.
4. Remove the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**
5. Remove the ignition switch assembly. Refer to **Ignition Switch Replacement**.

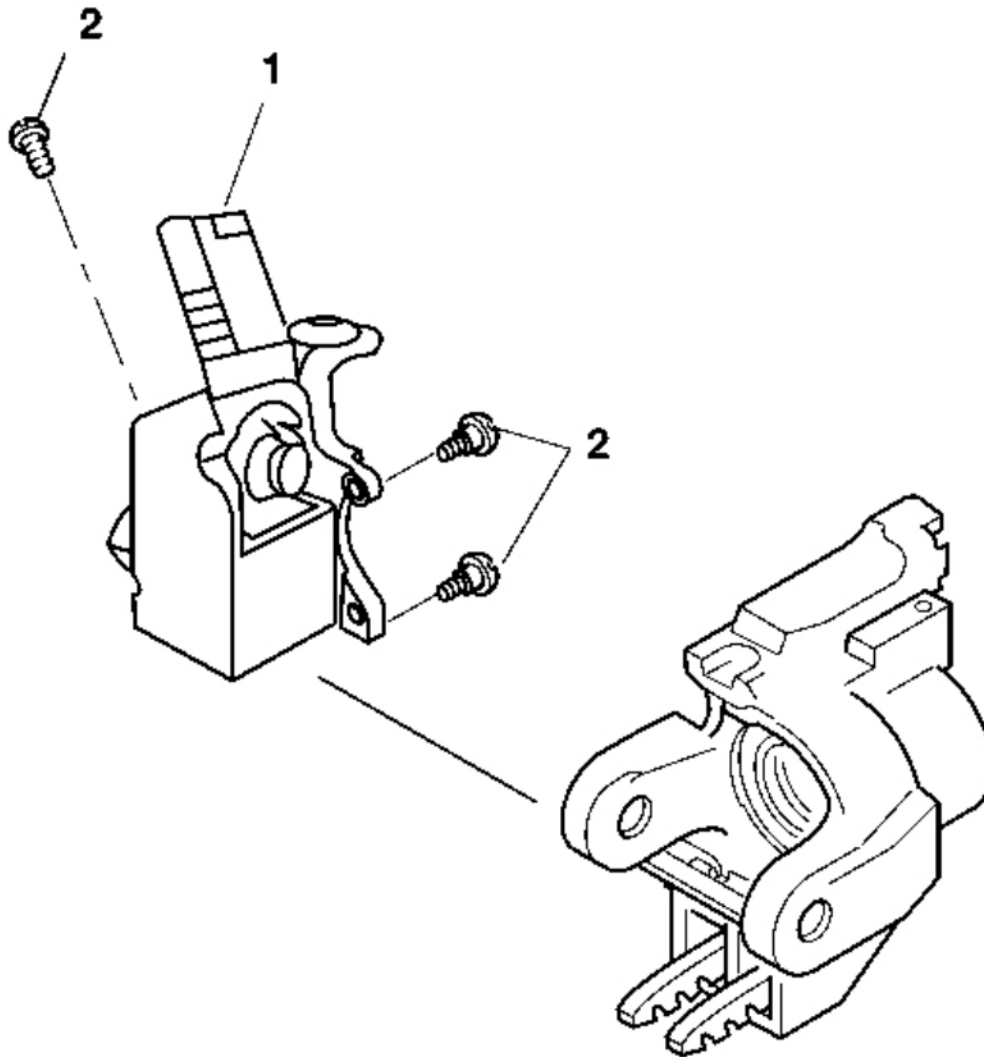


Fig. 44: View Of Ignition Lock Cylinder Case Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

6. Remove 3 pan head tapping screws (2) from the ignition lock cylinder case assembly (1).

Remove the ignition lock cylinder case from the steering column.

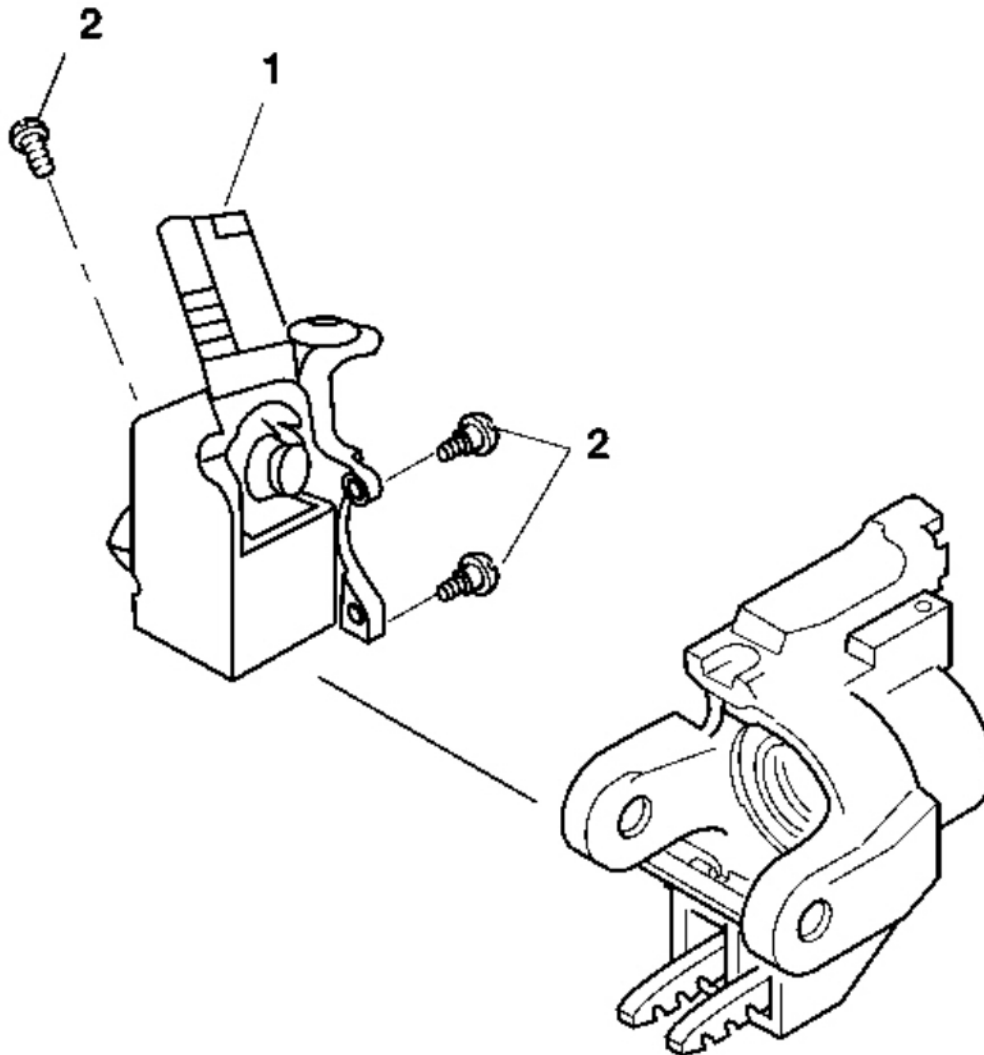


Fig. 45: View Of Ignition Lock Cylinder Case Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

1. Align the ignition lock cylinder case assembly (1) with the steering column tilt head assembly.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Secure the ignition lock cylinder case assembly (1) to the steering column using 3 pan head tapping screws (2).

Tighten: Tighten the screws to 7 N.m (62 lb in).

3. Install the ignition switch assembly. Refer to **Ignition Switch Replacement**.
4. Install the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.
5. Install the theft deterrent control module. Refer to **Theft Deterrent Control Module Replacement** in Theft Deterrent.
6. Install the turn signal cancel cam and upper bearing. Refer to **Turn Signal Cancel Cam and Upper Bearing Inner Race Replacement**.
7. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

MULTIFUNCTION, TURN SIGNAL SWITCH REPLACEMENT

Removal Procedure

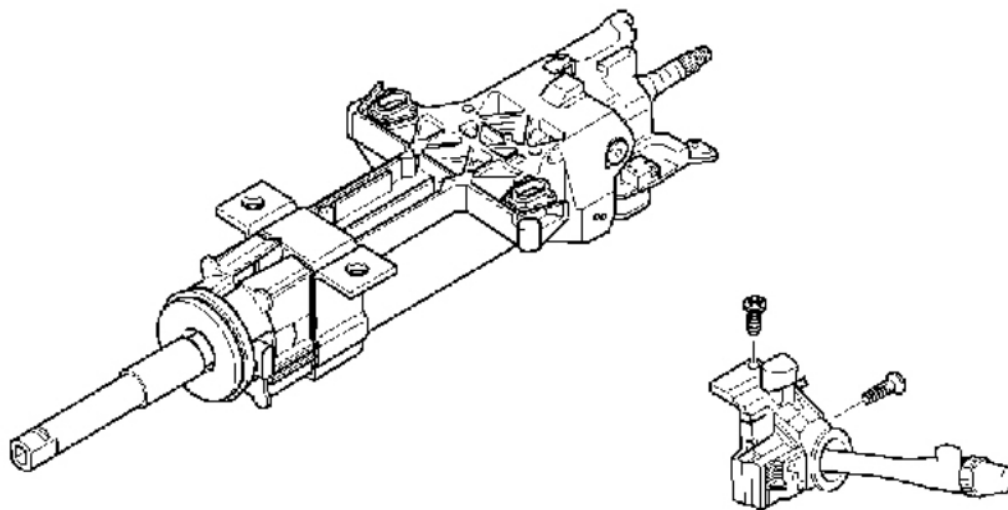


Fig. 46: Removing/Installing Turn Signal Switch Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to **SIR Caution** in Cautions and Notices.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
3. Tilt the column to the CENTER position.
4. Disconnect the connectors from the turn signal and multifunction switch assembly.

Remove 2 pan head tapping screws from the turn signal and multifunction switch assembly.

5. Remove the turn signal and multifunction switch assembly.

Installation Procedure

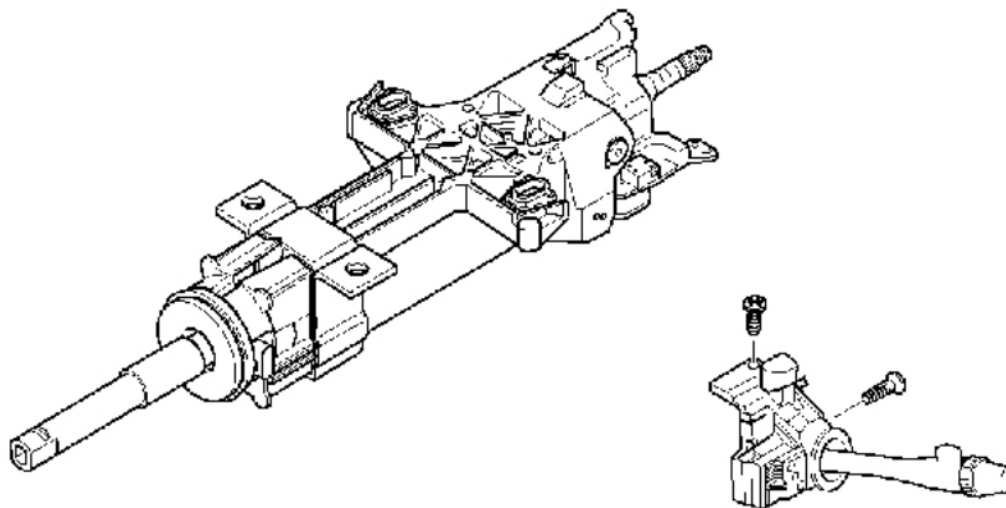


Fig. 47: Removing/Installing Turn Signal Switch Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The electrical contact on the turn signal and multifunction switch assembly must rest on the turn signal cancel cam assembly.

1. Install the turn signal and multifunction switch assembly.

NOTE: Refer to **Fastener Notice** in Cautions and Notices.

2. Secure by using 2 pan head tapping screws.

Tighten

- Tighten the screw on the top of the column to 3 N.m (27 lb in).
 - Tighten the screw in the front to 7 N.m (62 lb in).
3. Connect the connectors to the turn signal and multifunction switch assembly.
 4. Install the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
 5. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TILT LEVER REPLACEMENT

Removal Procedure

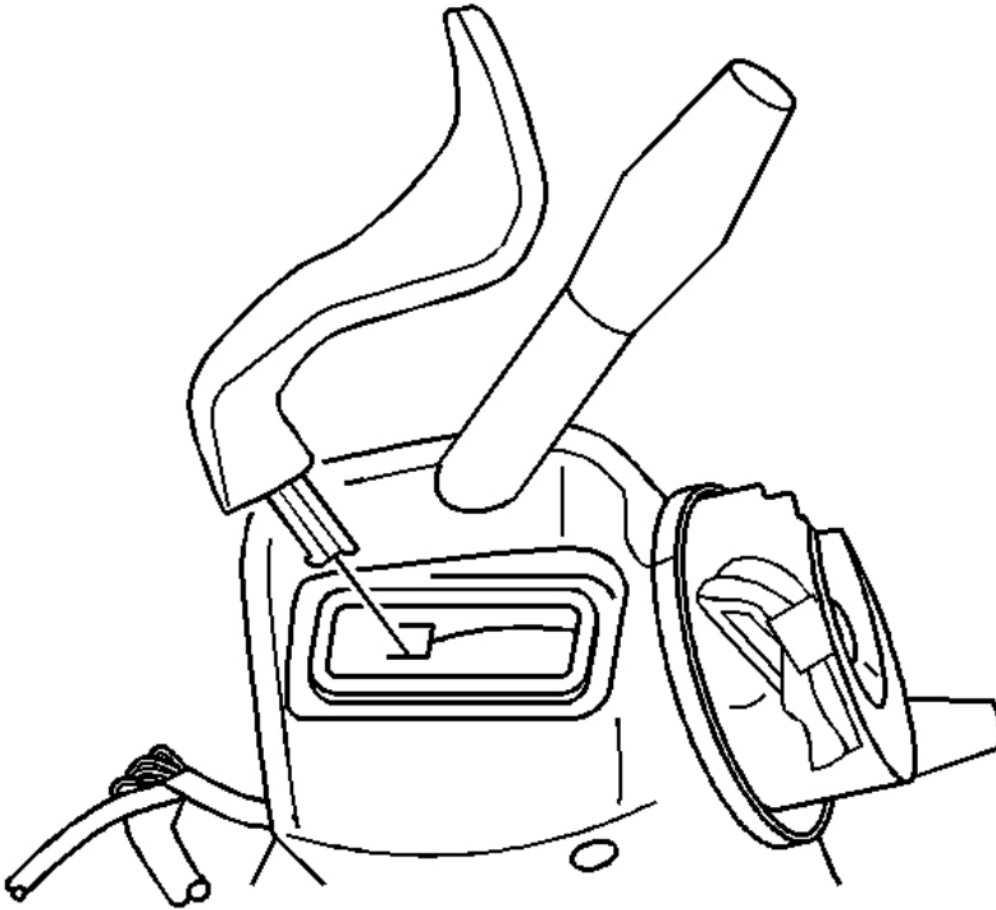


Fig. 48: Pulling Tilt Lever Straight Out From Steering Column
Courtesy of GENERAL MOTORS CORP.

1. Grasp the tilt lever.
2. Pull the tilt lever straight out from steering column.

Installation Procedure

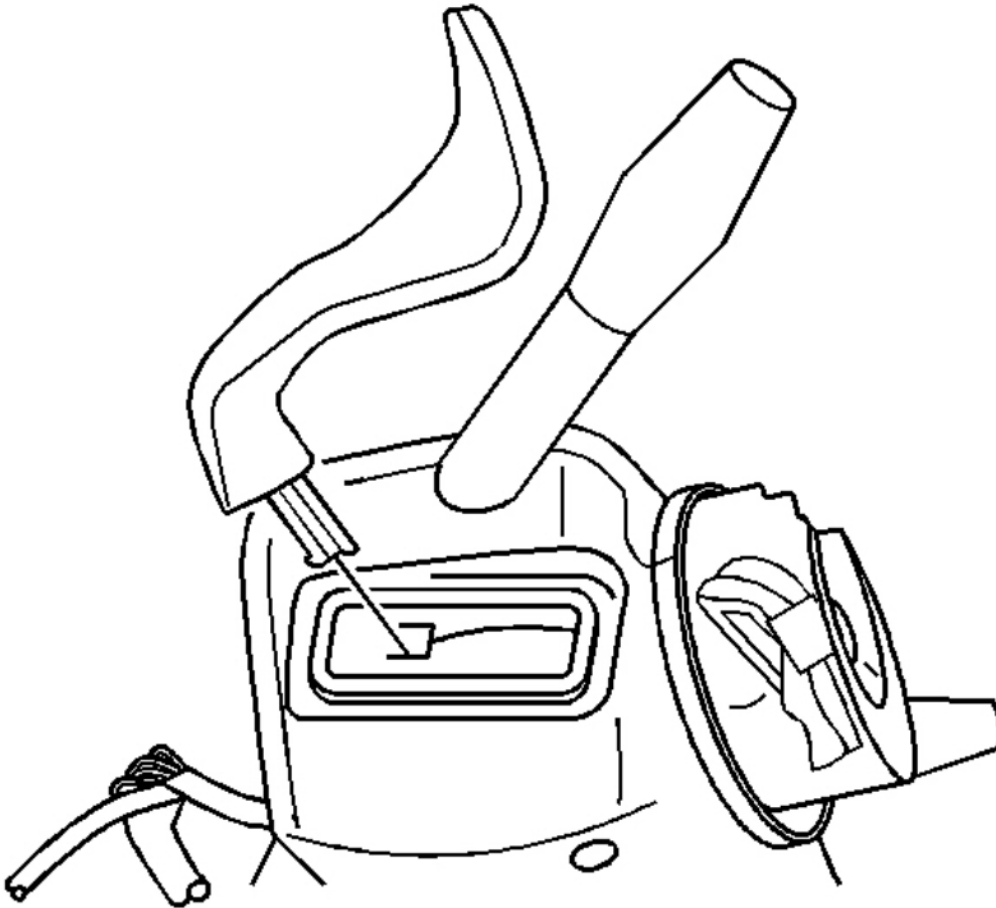


Fig. 49: Sliding Tilt Lever Handle Into Steering Column Until It Locks Into Position
Courtesy of GENERAL MOTORS CORP.

1. Align the tilt lever into the steering column.
2. Slide the tilt lever handle into the steering column until it locks into position.

STEERING WHEEL CONTROL SWITCH ASSEMBLY REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the steering wheel inflatable restraint module. Refer to **Inflatable Restraint Steering Wheel Module Replacement** in SIR.

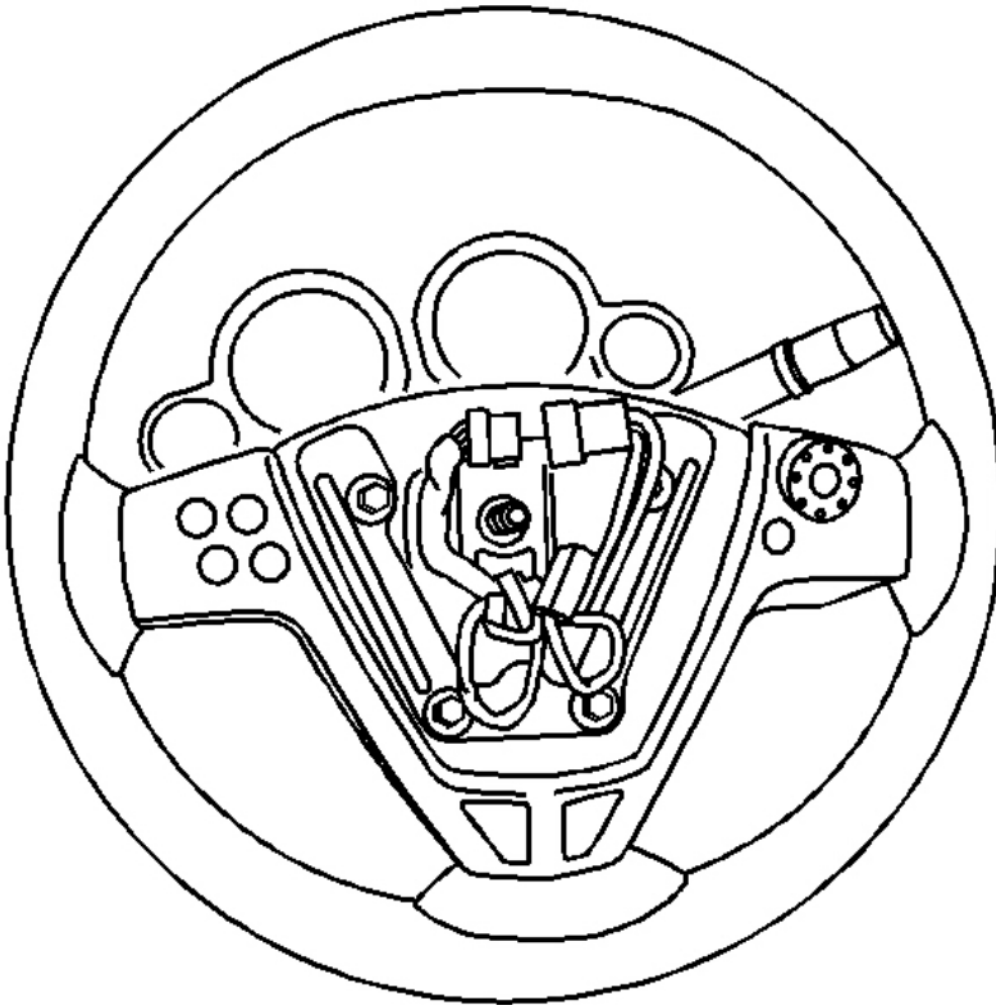


Fig. 50: Disconnecting Electrical Connectors For Steering Wheel Control Switch
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electrical connectors for the steering wheel control switch.

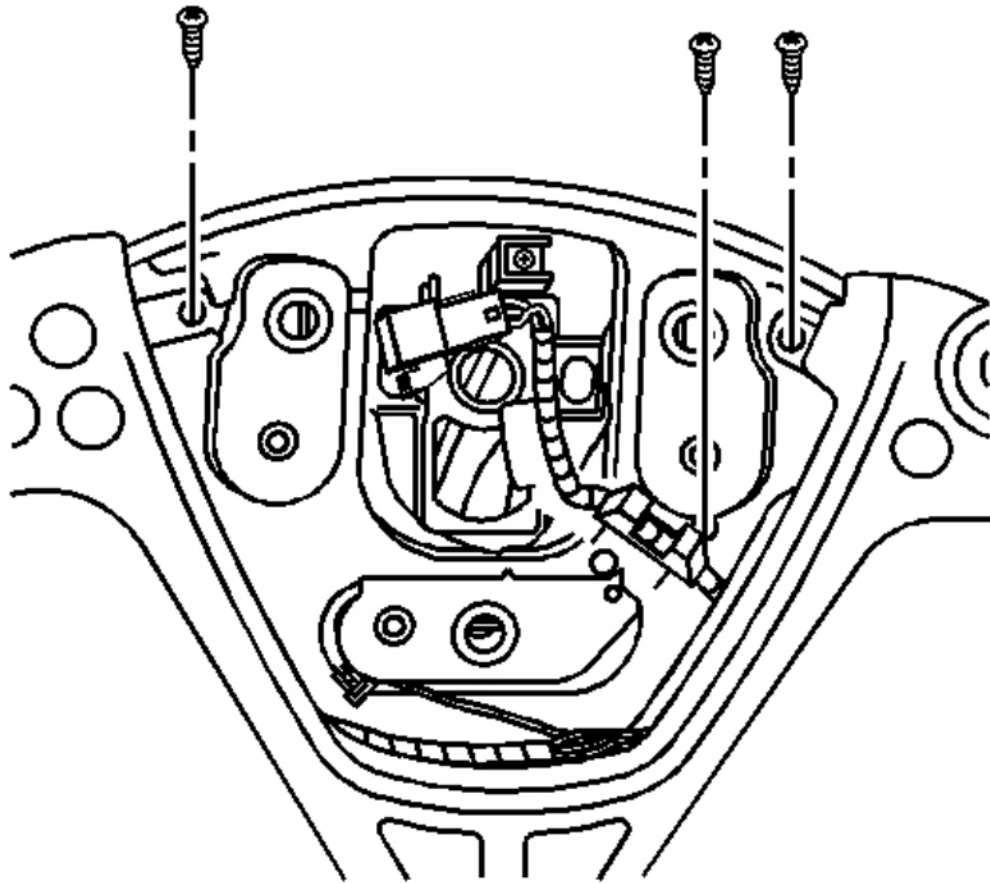


Fig. 51: Removing Retaining Screws From Steering Wheel Control Switch
Courtesy of GENERAL MOTORS CORP.

4. Remove the retaining screws from the steering wheel control switch.
5. Remove the retainer and screw from the steering wheel control harness.
6. Carefully pull the control switch assembly away from the steering wheel.
7. Remove the control switch assembly from the steering wheel.
8. Remove the wire harness from the control switch assembly.

Installation Procedure

1. Install the wire harness to the steering wheel control switch assembly.

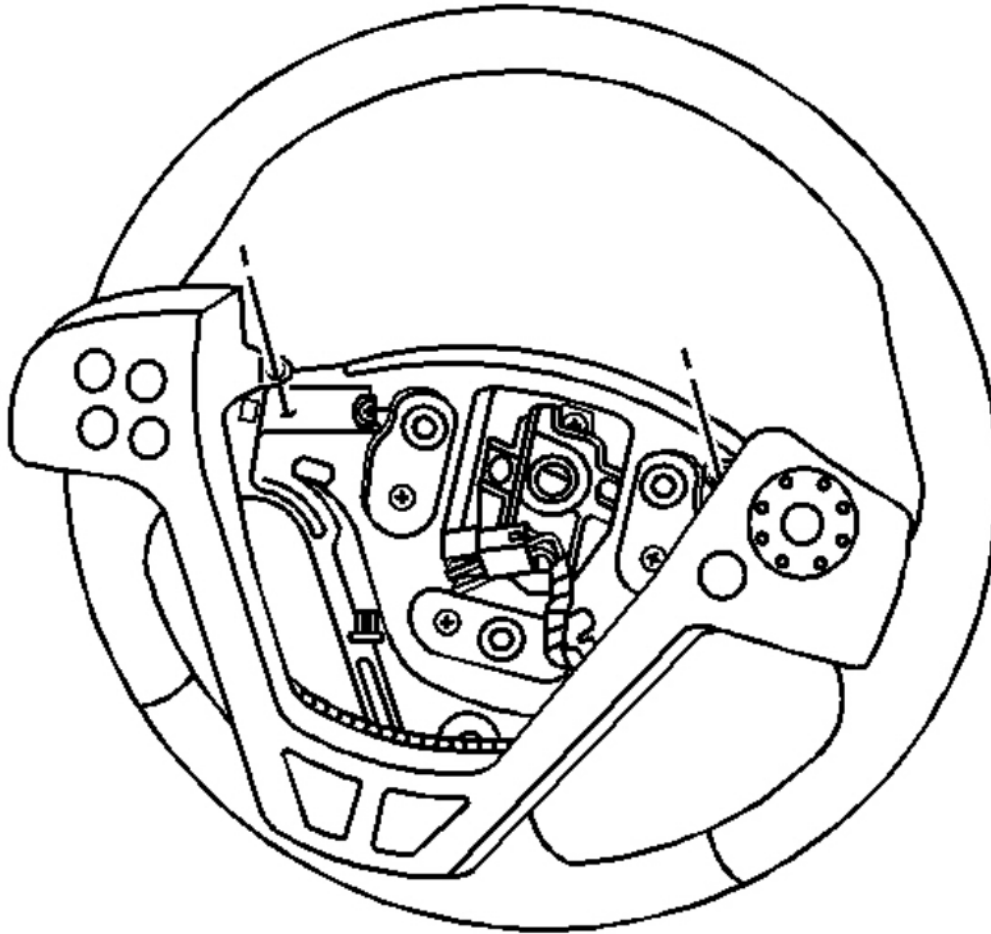


Fig. 52: Aligning Control Switch Assembly Engagement Tabs To Steering Wheel
Courtesy of GENERAL MOTORS CORP.

2. Align the control switch assembly engagement tabs to the steering wheel.

Push in on the control switch assembly in order to secure the assembly to the steering wheel.

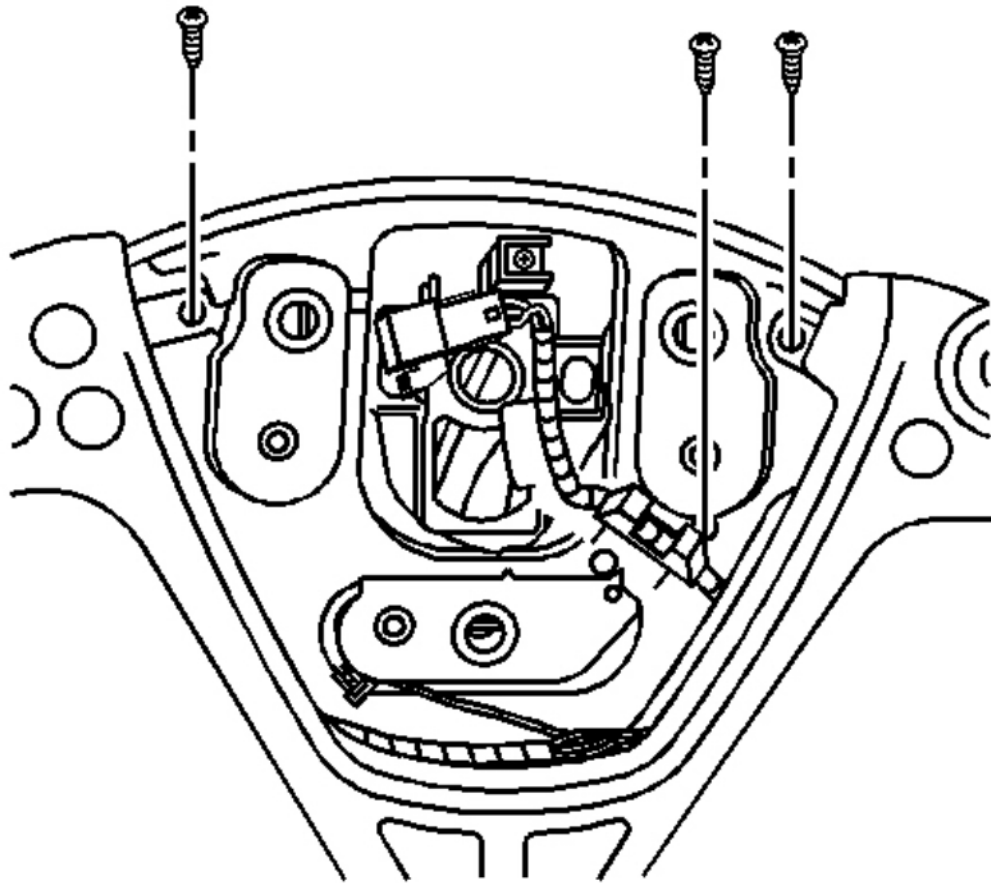


Fig. 53: Installing Control Harness Retainer And Screw
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the control harness retainer and screw.

Tighten: Tighten the screw to 2.3 N.m (20 lb in).

4. Install the control switch assembly screws

Tighten: Tighten the screws to 2.3 N.m (20 lb in).

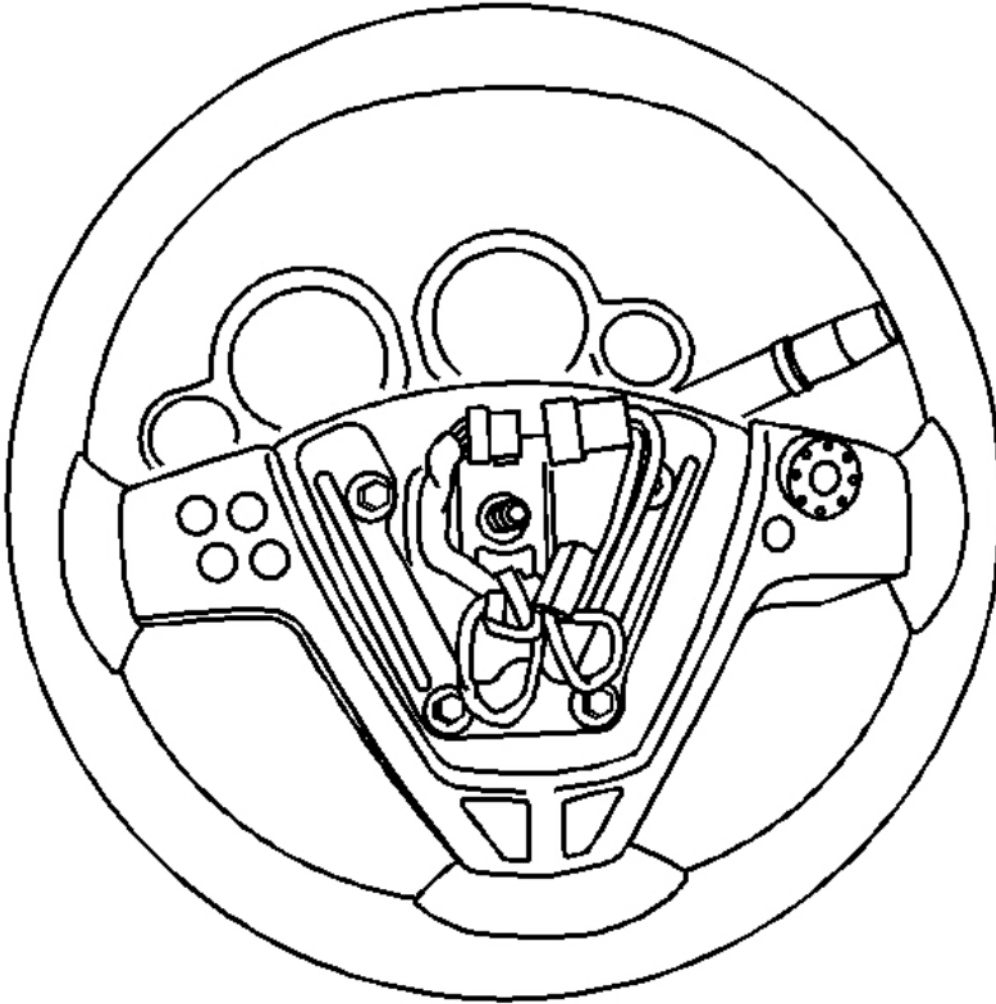


Fig. 54: Connecting Electrical Connector To Steering Wheel Control
Courtesy of GENERAL MOTORS CORP.

5. Connect the electrical connector to the steering wheel control.
6. Secure the connector to the retaining clip.
7. Install the inflatable restraint module. Refer to **Inflatable Restraint Steering Wheel Module Replacement** in SIR.
8. Enable the SIR. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

STEERING WHEEL REPLACEMENT

Tools Required

- **J 1859-A** Steering Wheel Puller. See Special Tools and Equipment.
- **J 42578** Steering Wheel Puller Legs. See Special Tools and Equipment.

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the inflatable restraint steering wheel module. Refer to Inflatable Restraint Steering Wheel Module Replacement in SIR.

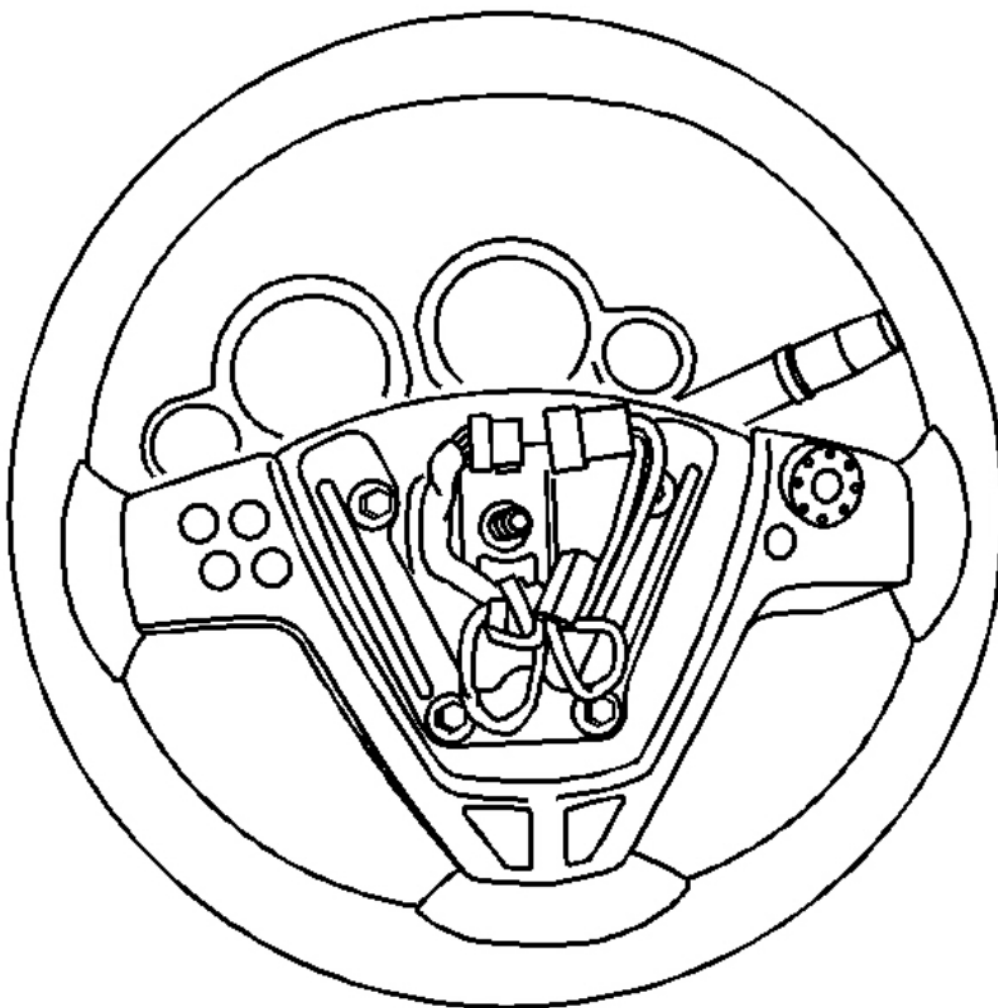


Fig. 55: Disconnecting Steering Column Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the steering column electrical connector.

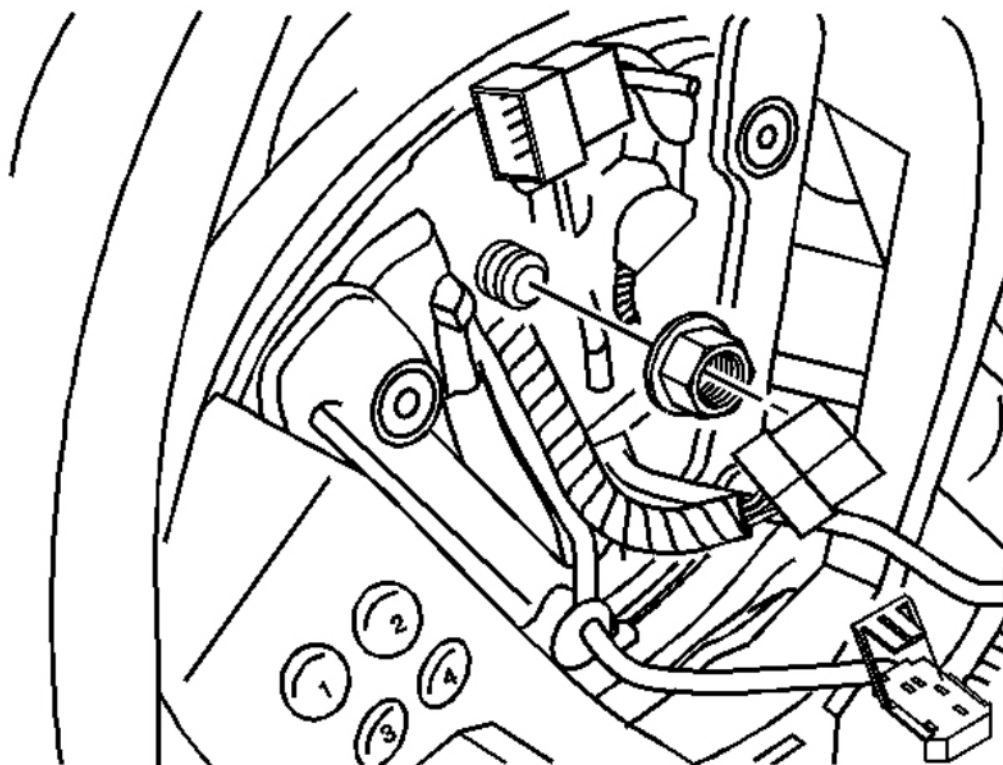


Fig. 56: Removing Steering Wheel Retaining Nut
Courtesy of GENERAL MOTORS CORP.

4. Remove the steering wheel retaining nut.

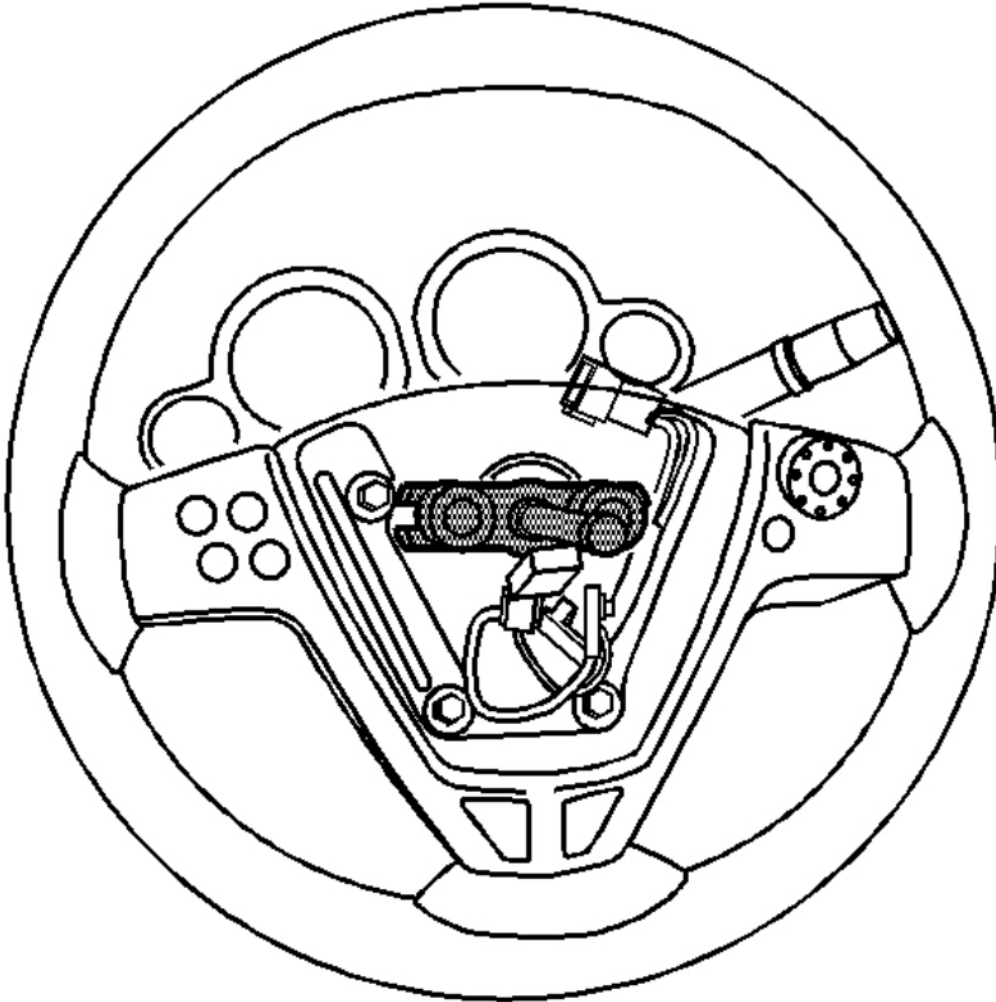


Fig. 57: Installing J 42578

Courtesy of GENERAL MOTORS CORP.

5. Install **J 42578** and **J 1859-A** to the steering wheel. See **Special Tools and Equipment**.
6. Using **J 42578** and **J 1859-A** , remove the steering wheel. See **Special Tools and Equipment**.

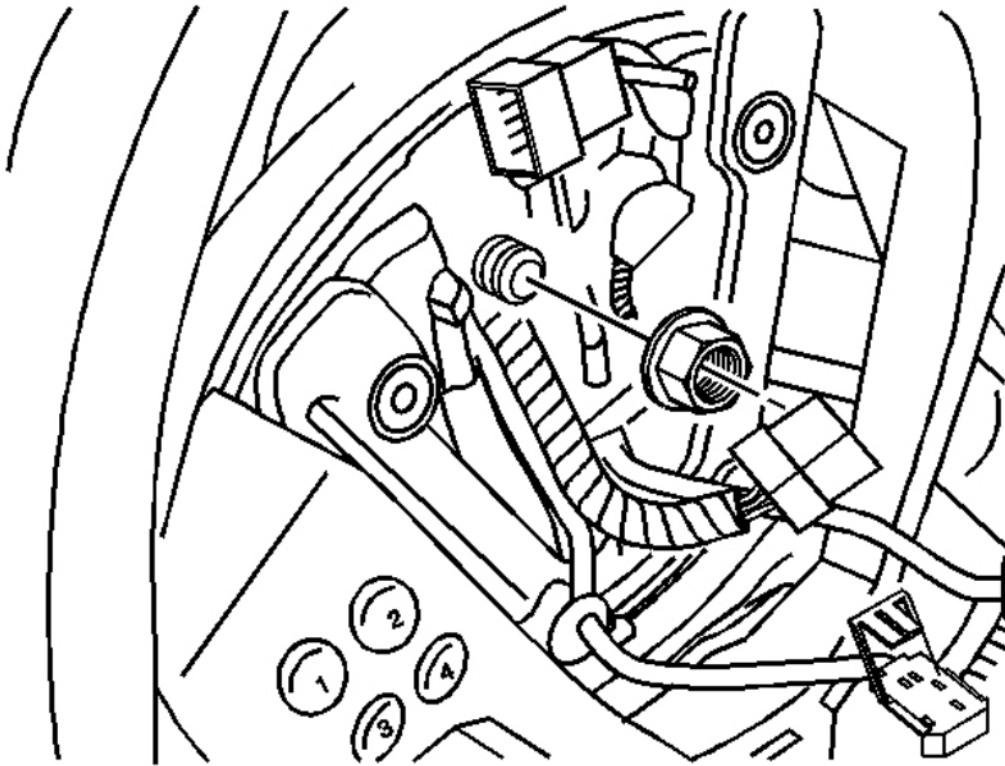


Fig. 58: Installing Steering Wheel
Courtesy of GENERAL MOTORS CORP.

1. Install the steering wheel.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the steering wheel retaining nut.

Tighten: Tighten the nut to 41 N.m (30 lb ft).

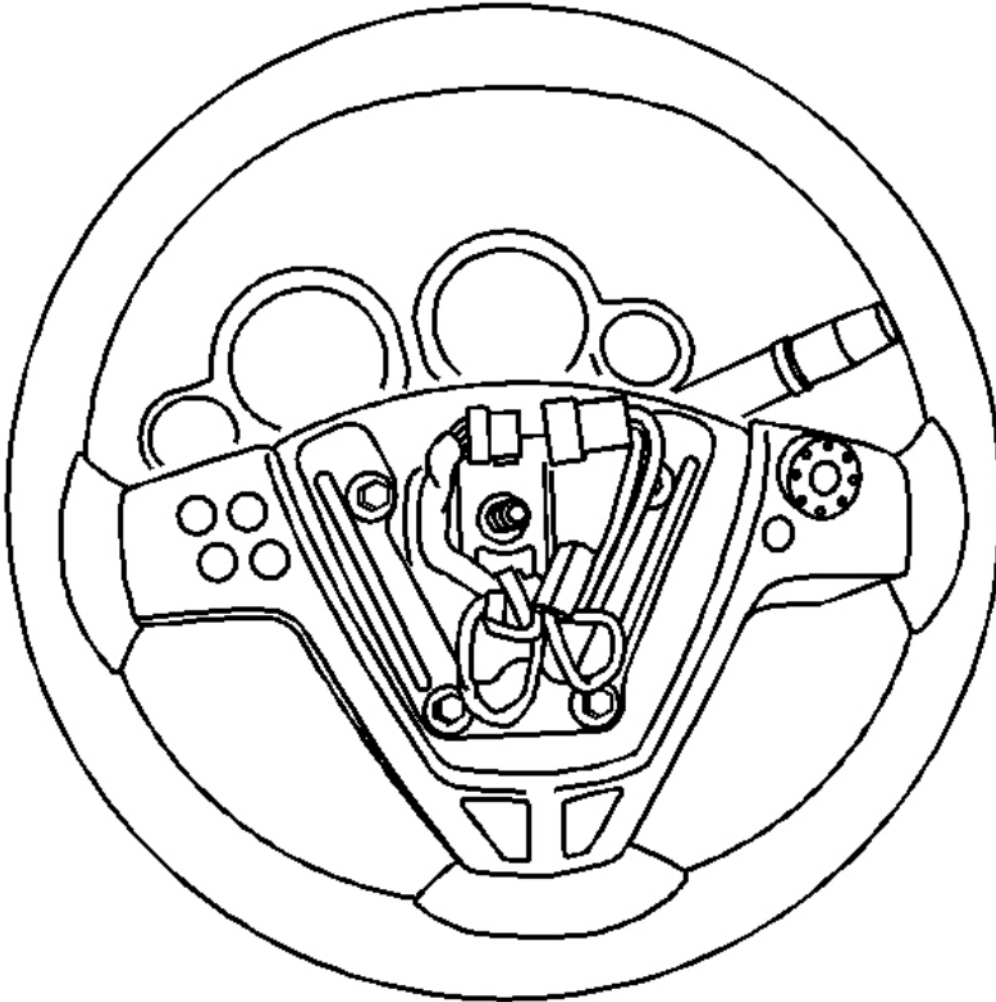


Fig. 59: Connecting Steering Column Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Connect the steering column electrical connector.
4. Install the inflator module. Refer to **Inflatable Restraint Steering Wheel Module Replacement** in SIR.
5. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

2004 Cadillac CTS

2004 STEERING Steering Wheel and Column - CTS

Repair Procedure

1. Remove the steering wheel. Refer to **Steering Wheel Replacement**.
2. Wash the wood section of the wheel with wax and grease remover.
3. Mask off the non-wood area of the steering wheel.

IMPORTANT: Do NOT sand through the clear.

4. Sand with 400 grit sand paper first. Finish sanding with 600 grit.
5. Wash the wood section of the wheel again with wax and grease remover.
6. Clear coat the steering wheel. Refer to the 2003 GM Approved Refinish Materials Booklet, GM 4901 M-D-2003 (English) or M-D-F2003 (French).
7. Install the steering wheel. Refer to **Steering Wheel Replacement**.

TILT SPRING REPLACEMENT

Removal Procedure

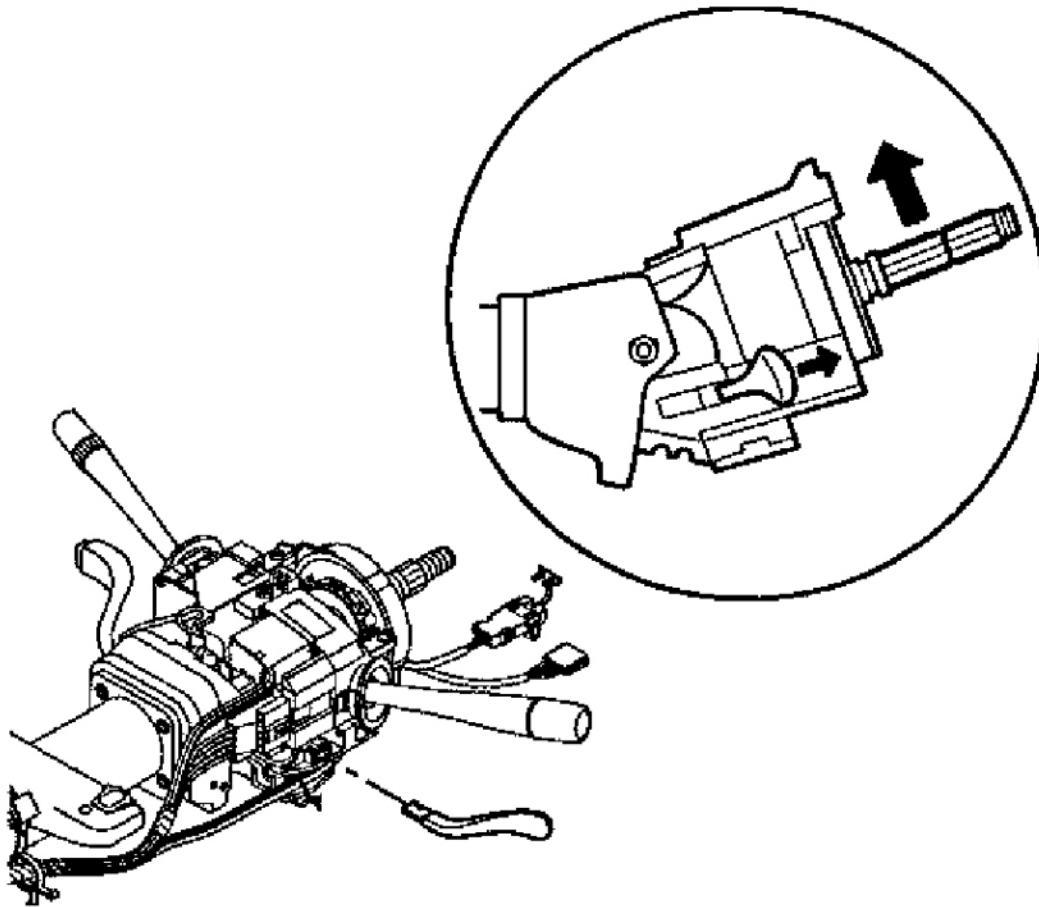


Fig. 60: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the upper and lower trim covers. Refer to Steering Column Trim Covers Replacement.
3. Use the tilt lever to tilt the column to the UP position.

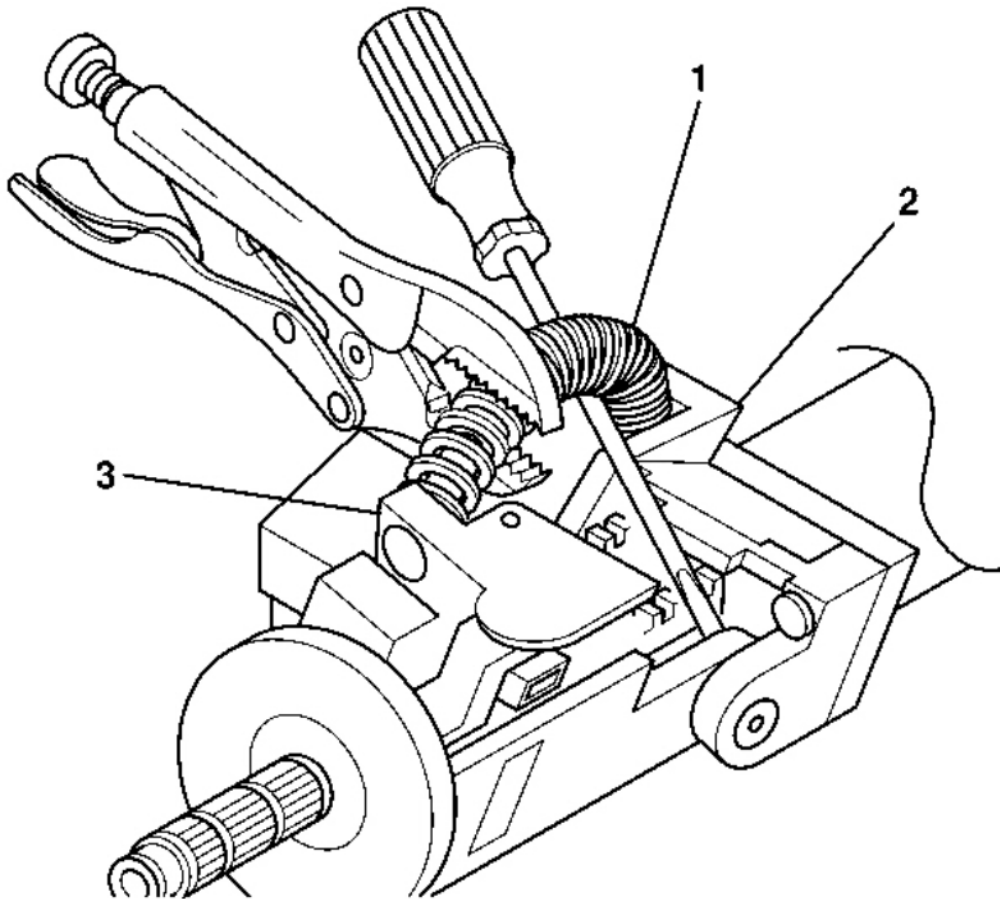


Fig. 61: Removing Tilt Spring From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: The tilt spring and the spring guide are under pressure. The tilt spring and the spring guide may become a projectile. Secure the spring with locking pliers during removal. Secure the spring with locking pliers during installation. Bodily injury may result during removal and installation of the tilt spring and the spring guide. Always use caution during removal and installation of the tilt spring and the spring guide.

4. Remove one end of the tilt spring (1) from the steering column support assembly (2) and the other end from the steering column tilt head assembly (3) by using the following procedure:
 1. Pry up the tilt spring (1) until a bulge occurs and most of the tilt spring tension is removed.
 2. Secure the tilt spring (1) with locking pliers.
 3. Continue prying up the tilt spring (1) until the tilt spring disengages from the post on the steering column support assembly (2) and from the steering column tilt head assembly (3).

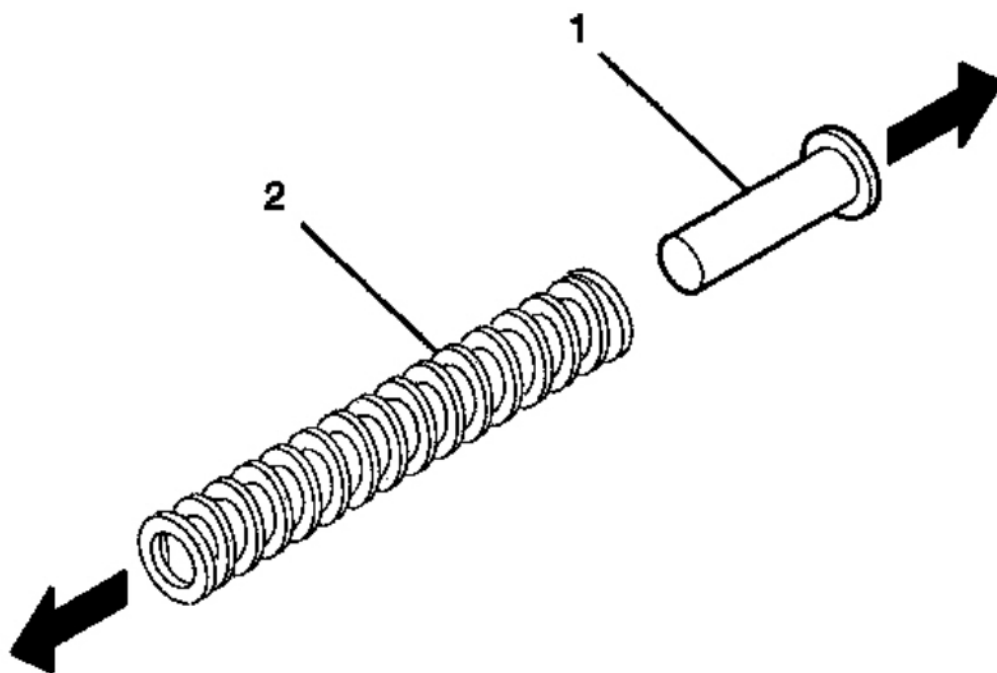


Fig. 62: Identifying Spring Guide Components
Courtesy of GENERAL MOTORS CORP.

5. Remove the spring guide (1) from the tilt spring (2).

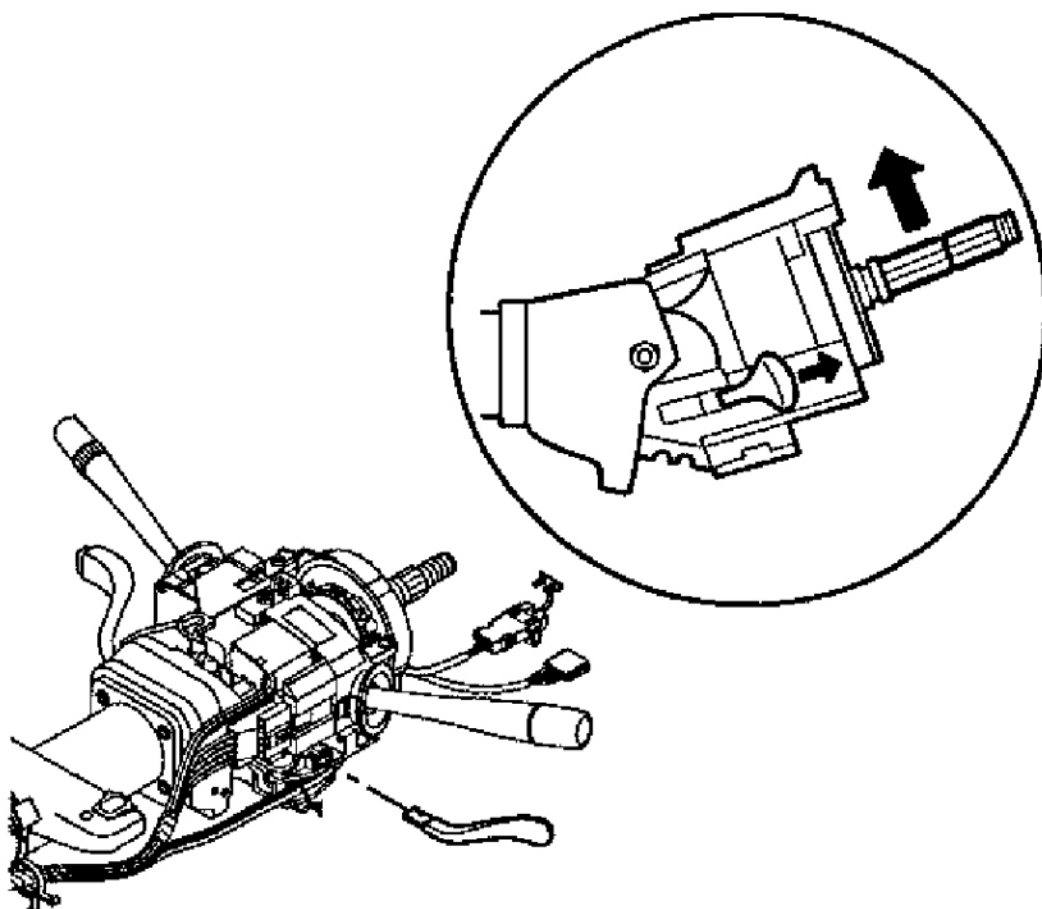


Fig. 63: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

1. Use the tilt lever to tilt the column to the UP position.

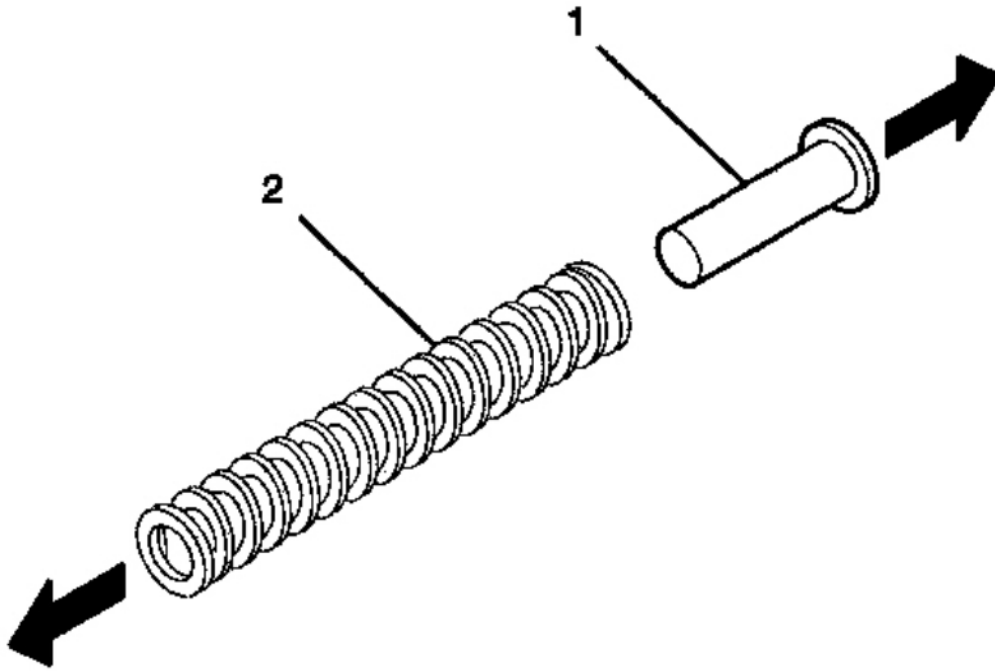


Fig. 64: Identifying Spring Guide Components
Courtesy of GENERAL MOTORS CORP.

2. Install the spring guide (1) into the tilt spring (2).

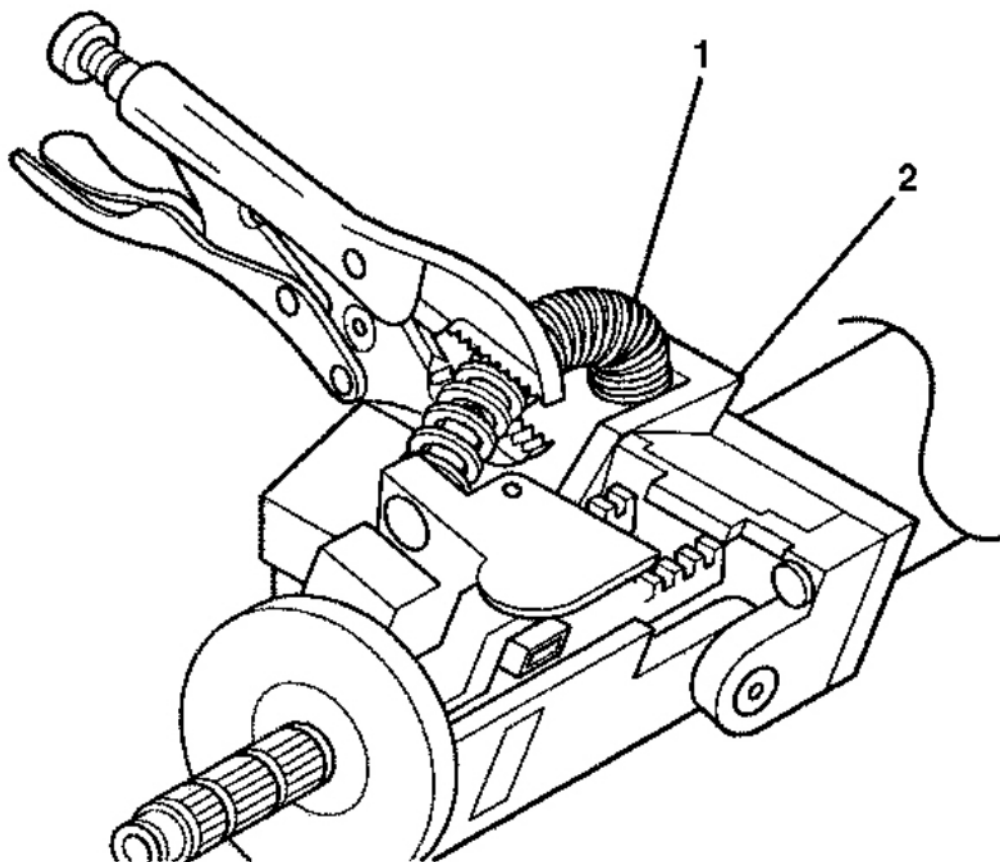


Fig. 65: Installing Tilt Spring Onto The Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the tilt spring (1) onto the steering column support assembly (2) and onto the steering column tilt head assembly by using the following procedure:
 1. Install the tilt spring (1) onto the steering column tilt head assembly.
 2. Install the tilt spring (1) onto the post on the steering column support assembly (2).
4. Install the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
5. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

Tools Required

J 21854-01 Pivot Pin Remover

Removal Procedure

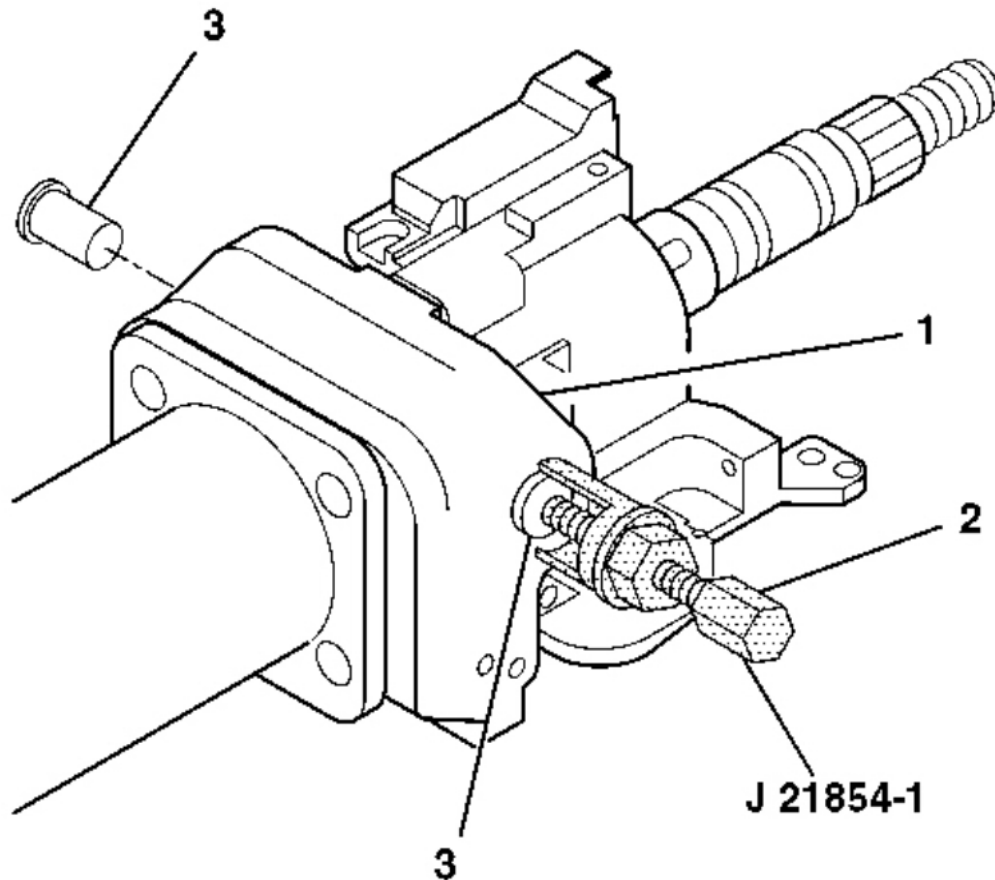


Fig. 66: View Of Pivot Pins To Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

2. Remove the steering column from the vehicle. Refer to **Steering Column Replacement**.
3. Remove the ignition lock cylinder case. Refer to **Ignition Lock Cylinder Case Replacement**.
4. Remove the turn signal and multifunction switch assembly. Refer to **Multifunction, Turn Signal Switch Replacement**.
5. Remove the tilt spring. Refer to **Tilt Spring Replacement**.
6. Remove the 2 pivot pins (3) from the steering column tilt head assembly (1) using J 21854-01 .

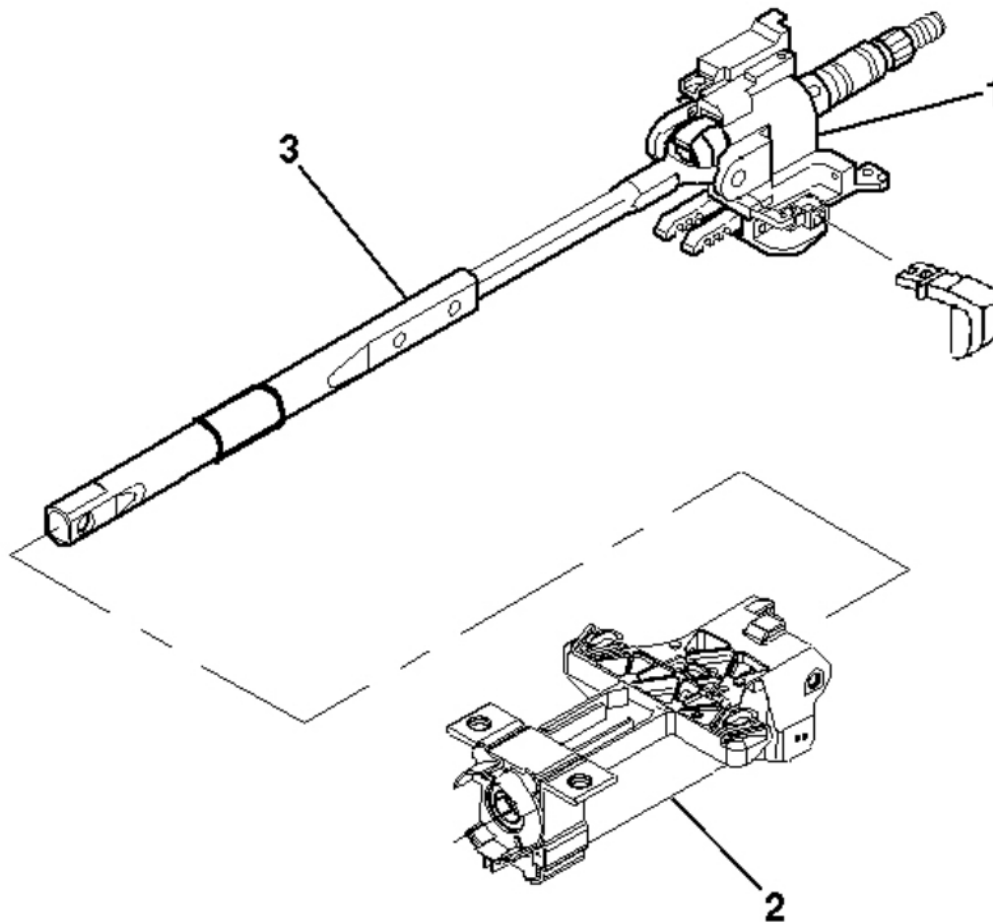


Fig. 67: View Of Upper Steering Column Components

Courtesy of GENERAL MOTORS CORP.

7. Install the tilt lever into the steering column tilt head assembly (1).
8. Pull back on the tilt lever and at the same time pull the steering column tilt head assembly (1) down and away from the steering column.
9. Remove the steering column tilt head assembly (1) with the steering shaft assembly (3) from the steering column jacket assembly (2).
10. Remove the tilt lever.
11. Remove the lower bearing and sensor. Refer to **Steering Wheel Position Sensor or Steering Shaft Lower Bearing Replacement**.

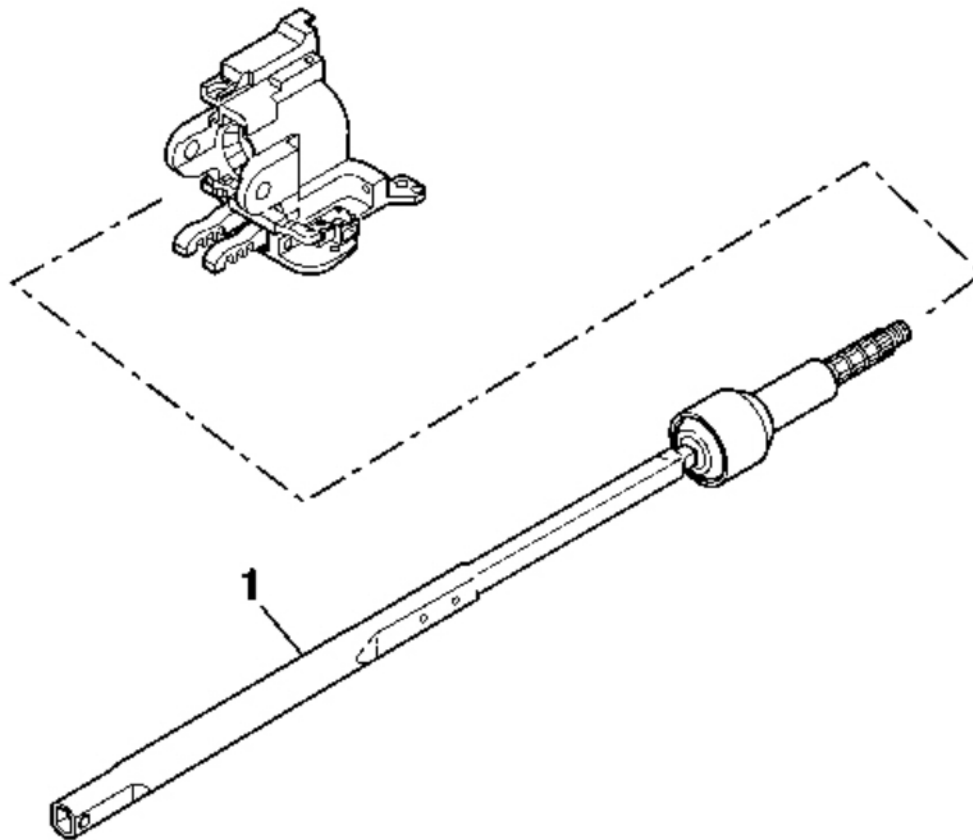


Fig. 68: Identifying Steering Shaft

Courtesy of GENERAL MOTORS CORP.

12. Remove the steering shaft (1) from the steering column tilt head assembly.

Installation Procedure

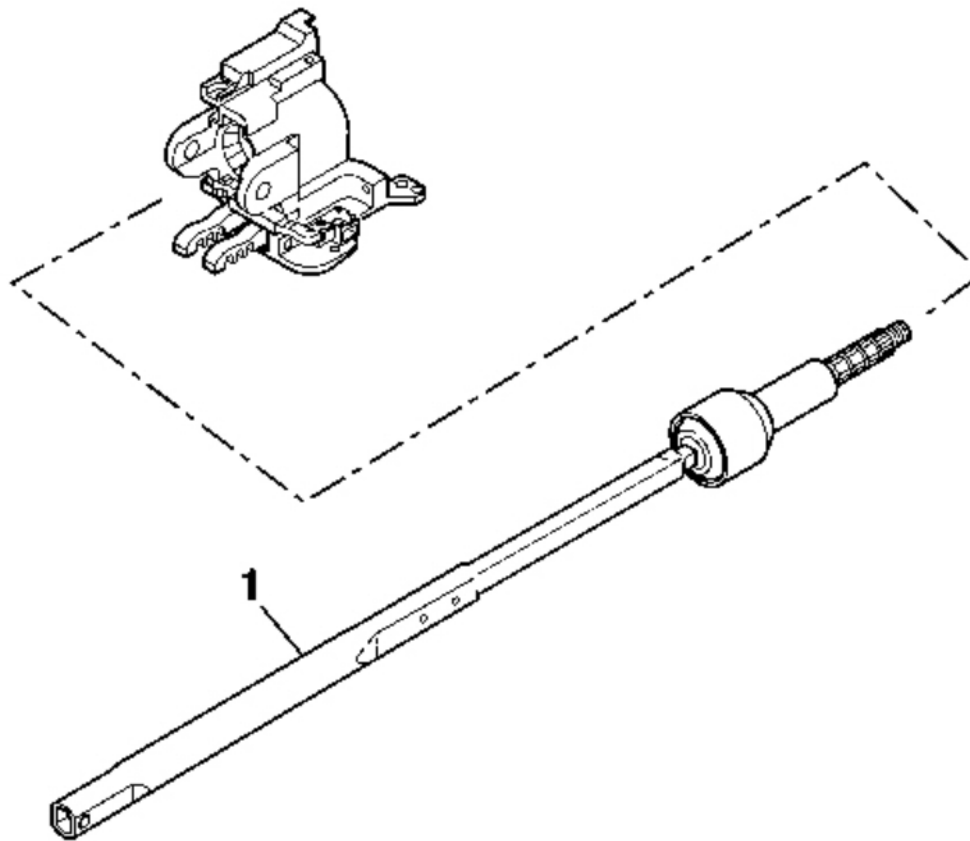


Fig. 69: Identifying Steering Shaft
Courtesy of GENERAL MOTORS CORP.

1. Install the steering shaft (1) into the steering column tilt head assembly.
2. Install the lower bearing and sensor. Refer to **Steering Wheel Position Sensor or Steering Shaft Lower Bearing Replacement**.

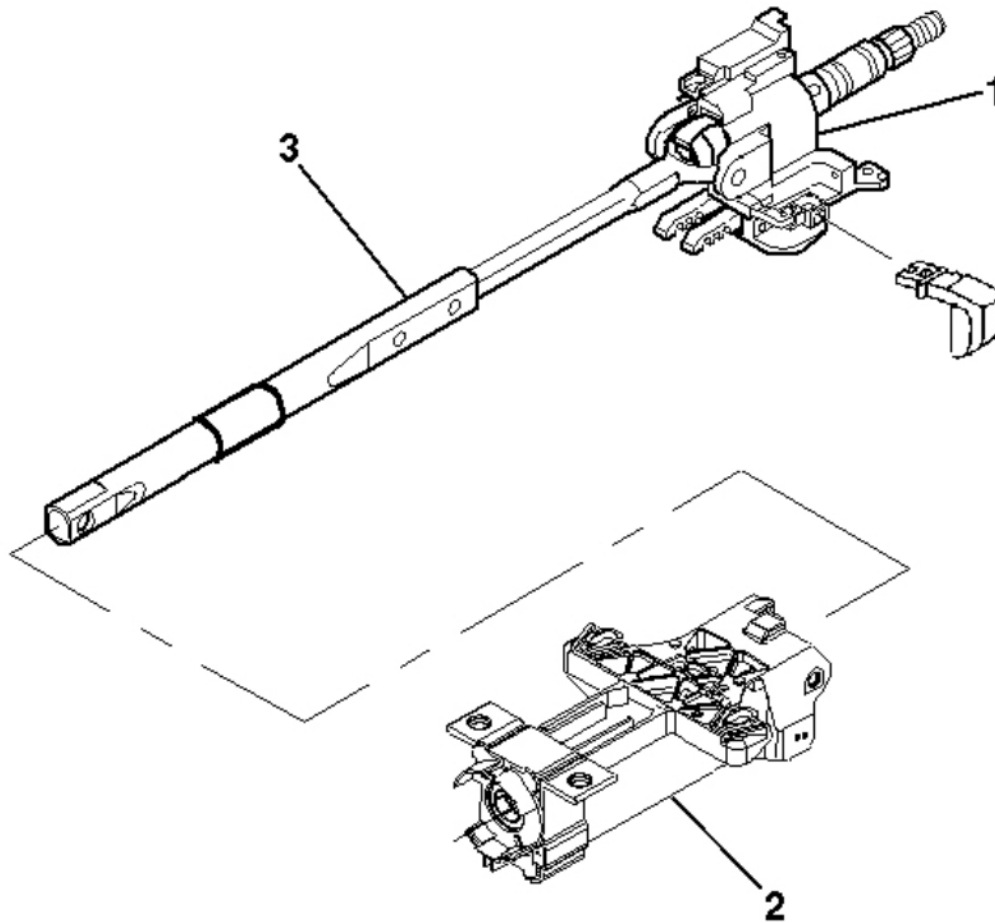


Fig. 70: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

3. Install the steering shaft (3) into the steering column tilt head assembly (1).

Install the tilt head assembly (1) and the steering shaft (3) into the steering column jacket assembly (2).

IMPORTANT: The steering wheel lock shoes must be resting on the bar in the steering column jacket assembly.

4. Align the steering column tilt head assembly with the pivot pin holes on the steering column

jacket assembly.

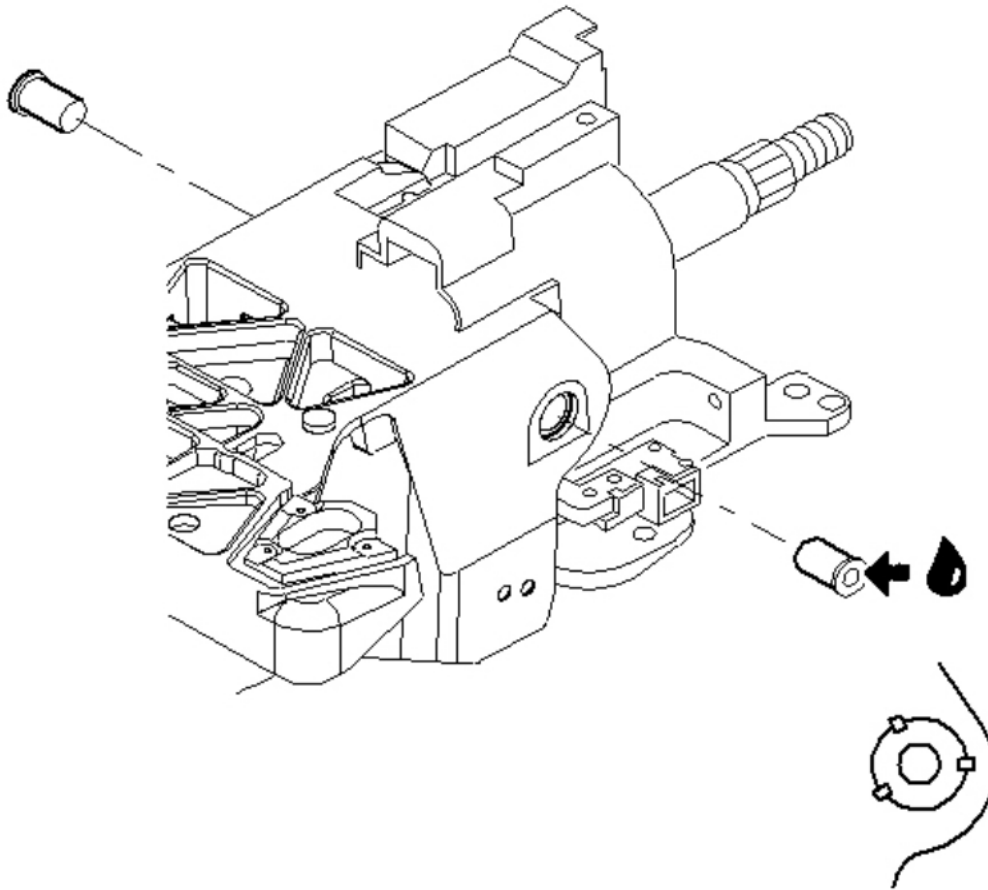


Fig. 71: Identifying Pivot Pin Locations
Courtesy of GENERAL MOTORS CORP.

5. Lubricate the pivot pins with GM P/N 12346293 (Canadian P/N 99723).

Install the 2 pivot pins into the steering column support assembly.

6. Stake the pins in 3 places.
7. Install the tilt spring assembly only. Refer to **Tilt Spring Replacement**.
8. Install the turn signal and multifunction switch assembly only. Refer to **Multifunction**.

Turn Signal Switch Replacement.

9. Install the ignition lock cylinder case assembly. Refer to **Ignition Lock Cylinder Case Replacement.**
10. Install the steering column to the vehicle. Refer to **Steering Column Replacement.**
11. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TURN SIGNAL CANCEL CAM AND UPPER BEARING INNER RACE REPLACEMENT

Tools Required

- J 23653-SIR Lock Plate Compressor
- **J 42137** Cam Orientation Plate Adapter. See **Special Tools and Equipment.**

Removal Procedure

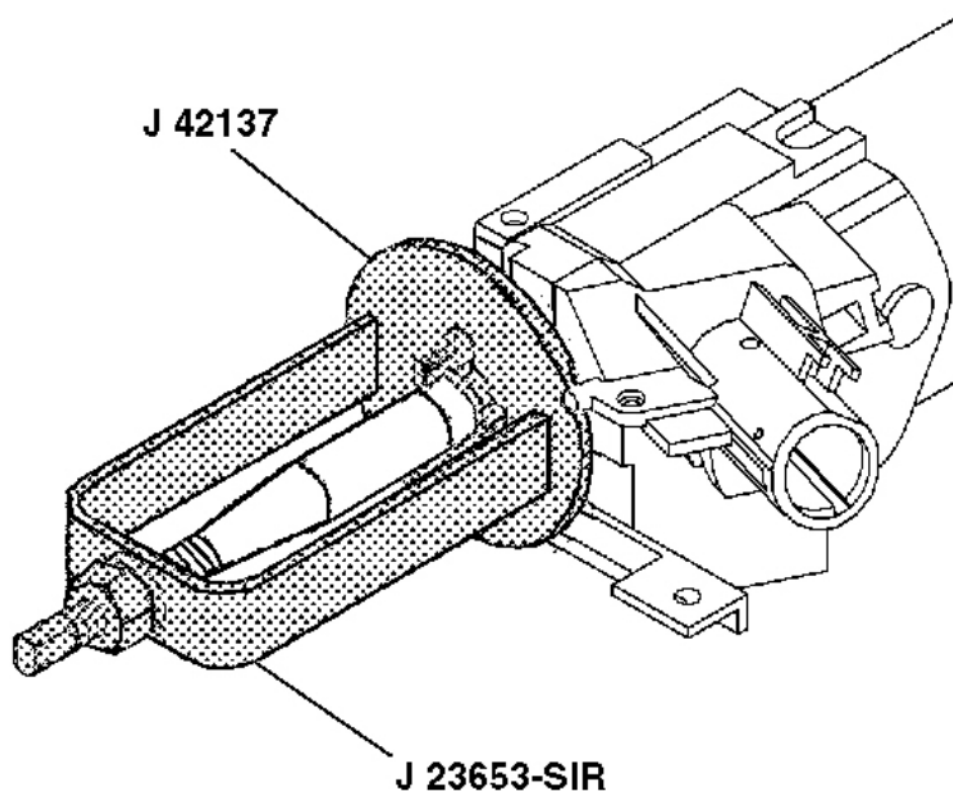


Fig. 72: Depressing Lock Plate Using J 23653-SIR And J 42137
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the SIR coil. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement in SIR.
3. Remove and discard the bearing retainer using J 23653-SIR and J 42137 . See Special Tools and Equipment.

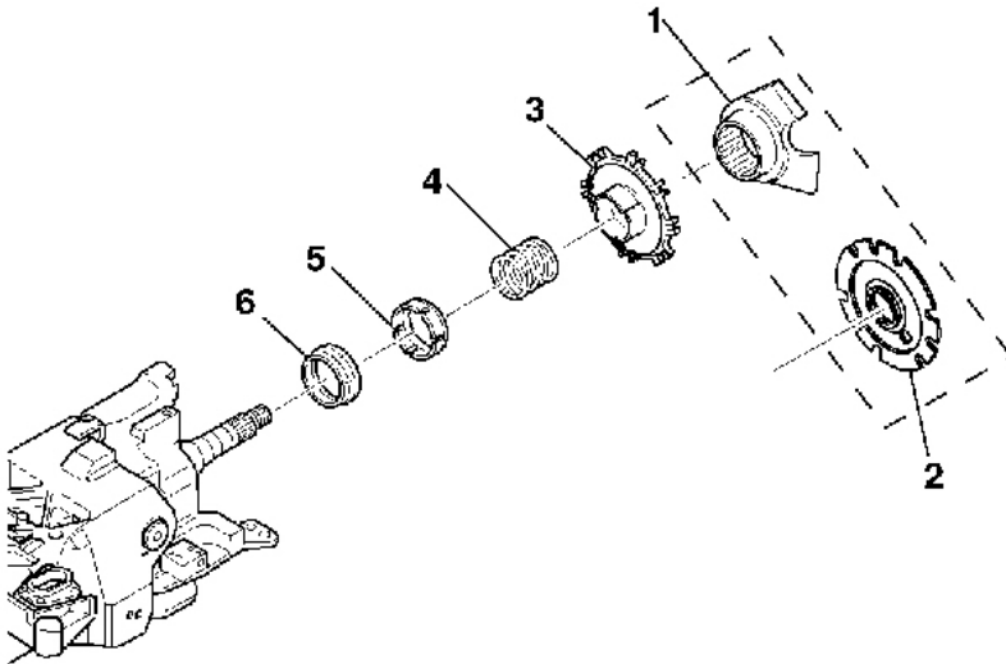


Fig. 73: Removing Shaft Lock Or Cam Orientation Plate
Courtesy of GENERAL MOTORS CORP.

4. Remove the shaft lock (2) or the cam orientation plate (1).

IMPORTANT: Do not wipe the lubricant off the turn signal cancel cam assembly.

5. Remove the turn signal cancel cam assembly (3).
6. Remove the upper bearing spring (4).
7. Remove the upper bearing inner race seat (5).
8. Remove the inner race (6).

Installation Procedure

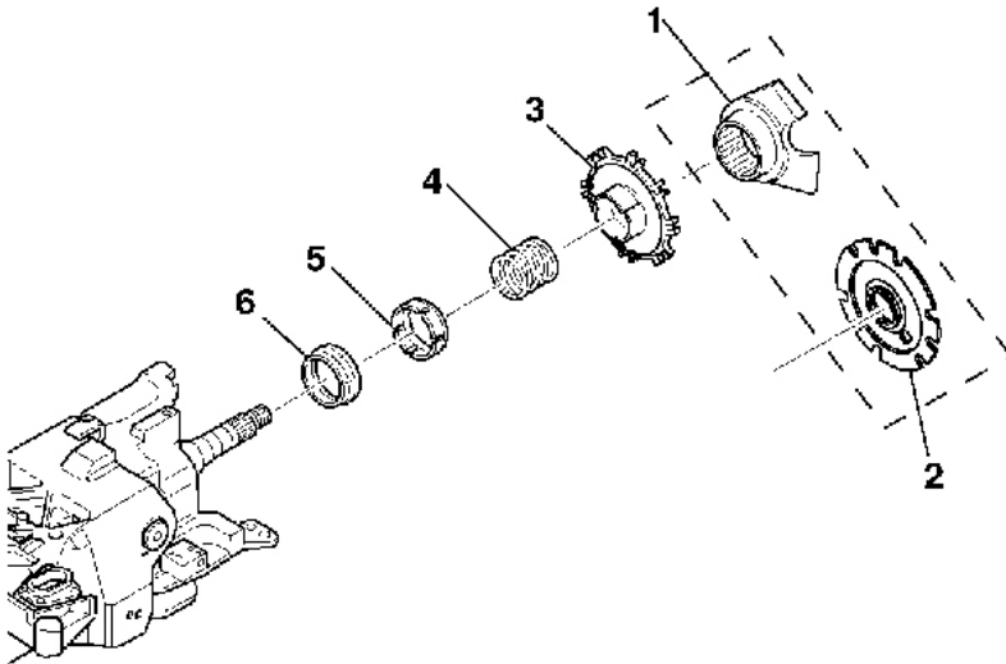


Fig. 74: Installing Inner Race
 Courtesy of GENERAL MOTORS CORP.

1. Install the inner race (6).
2. Install the upper bearing inner race seat (5).
3. Install the upper bearing spring (4).
4. Install the turn signal cancel cam (3).

IMPORTANT: The electrical contact of the turn signal and multifunction switch assembly must rest on the turn signal cancel cam assembly.

5. Install the shaft lock (2) or the cam orientation plate (1).

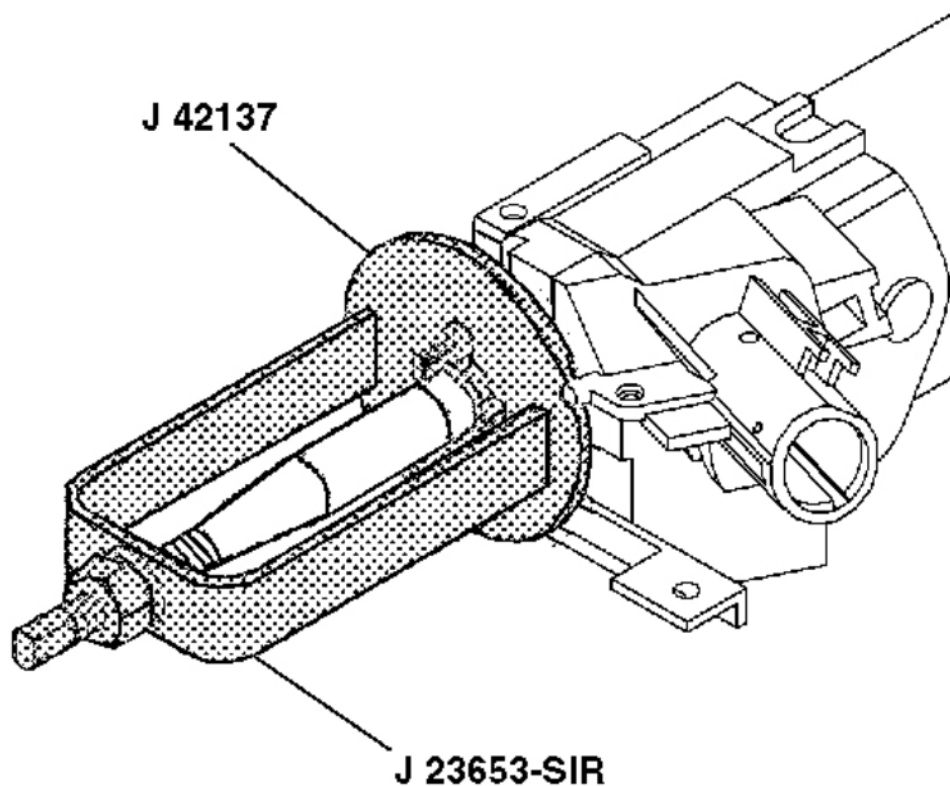


Fig. 75: Depressing Lock Plate Using J 23653-SIR And J 42137
Courtesy of GENERAL MOTORS CORP.

6. Install the new bearing retainer using J 23653-SIR and J 42137 . See Special Tools and Equipment.

CAUTION: Refer to SIR Inflator Module Coil Caution in Cautions and Notices.

7. Install the SIR coil. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement .
8. Enable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

STEERING COLUMN REPLACEMENT

Tools Required

J 42640 Steering Column Anti Rotation Pin

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

NOTE: 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.

NOTE: The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

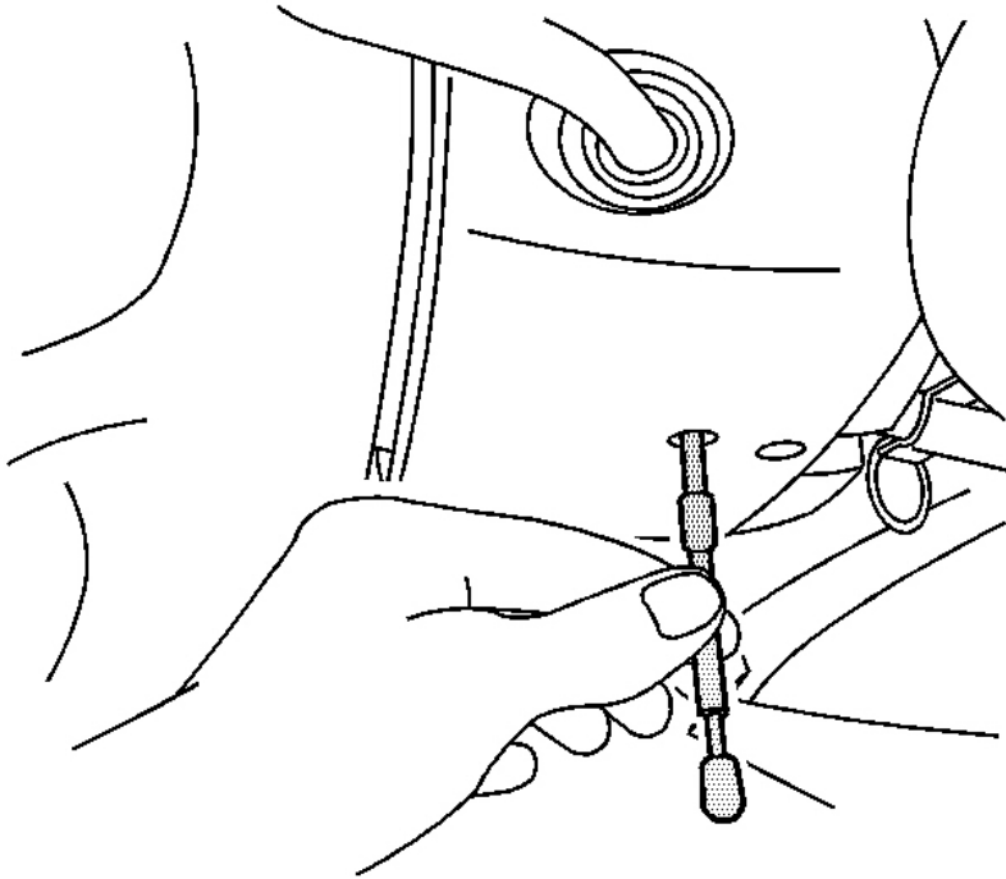


Fig. 76: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

2. Turn the steering wheel so that the front wheels are pointing straight ahead.
3. Turn the ignition lock cylinder to the lock position and remove the key.
4. Insert **J 42640** into the steering column access hole in order to lock the steering column. This will maintain the correct orientation.
5. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

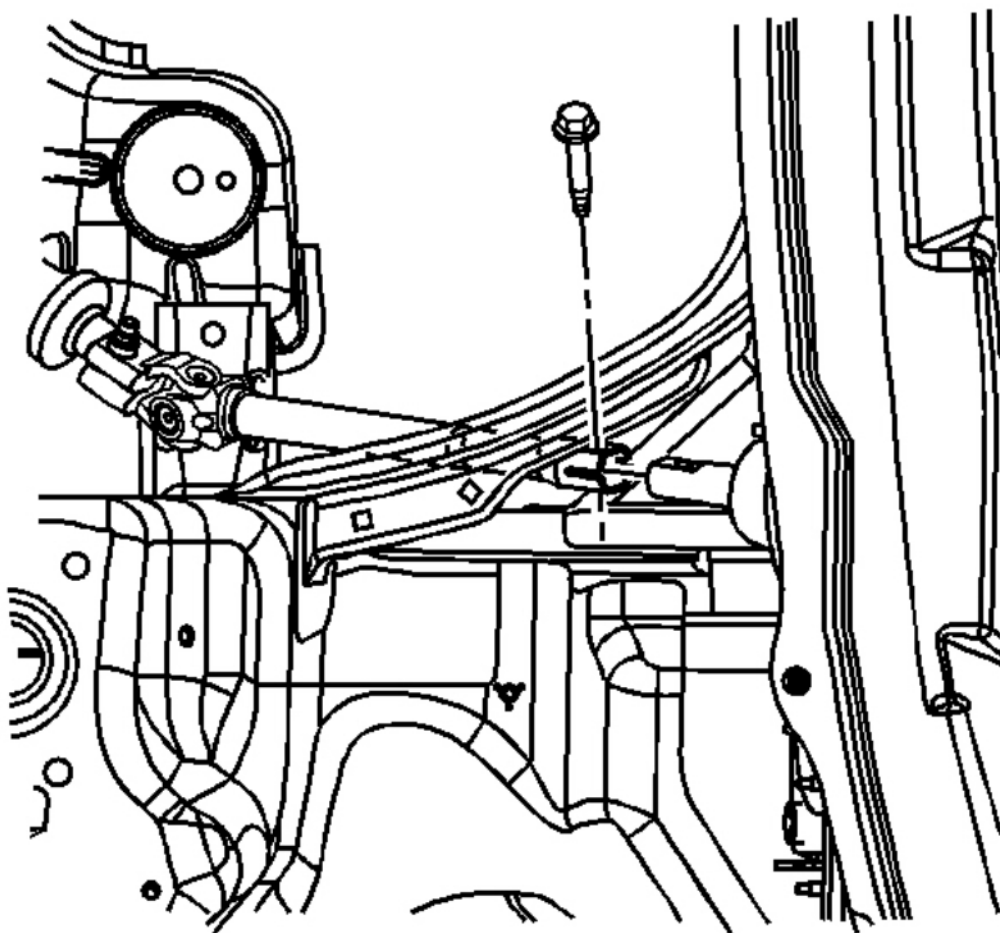


Fig. 77: Removing Retaining Bolt That Secures Upper Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

6. Remove the retaining bolt that secures the upper intermediate shaft to the lower intermediate shaft.
7. Lower the vehicle.
8. Remove the knee bolster. Refer to **Knee Bolster Replacement** in Instrument Panel, Gages and Console.
9. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
10. Disconnect the steering column electrical connectors.

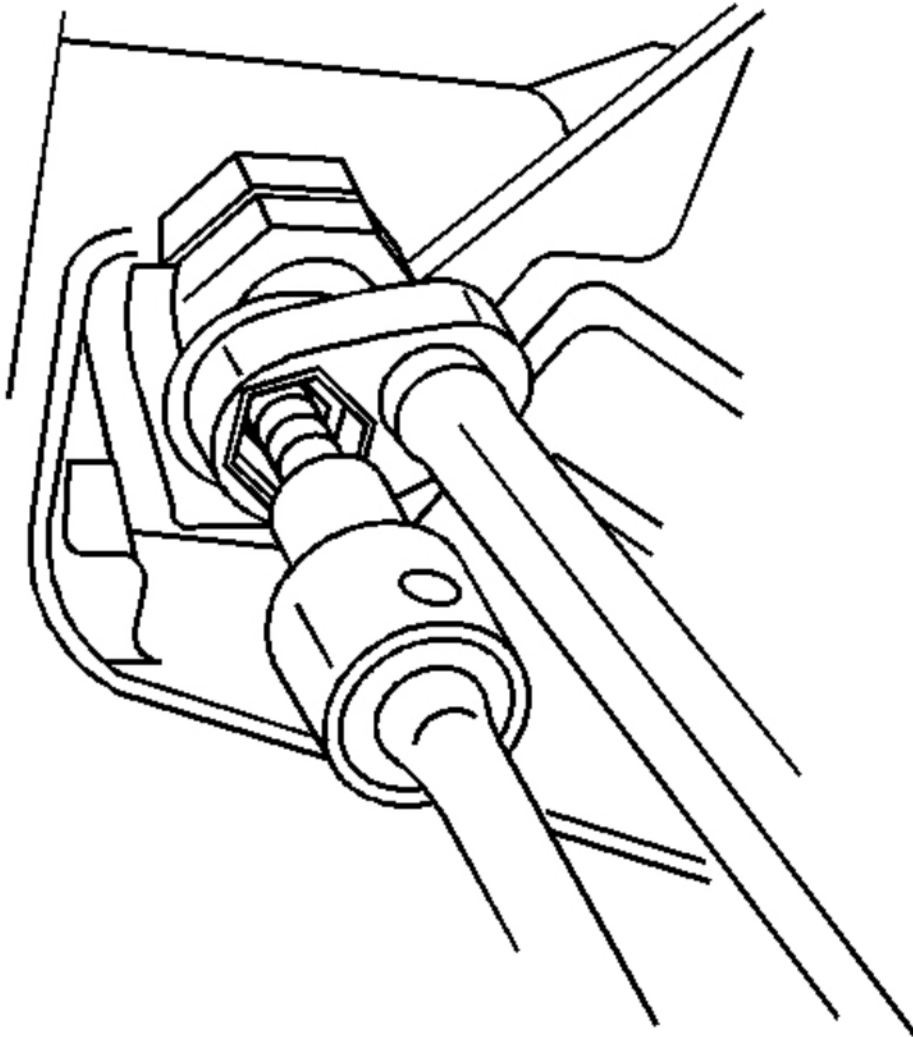


Fig. 78: Supporting Steering Column
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Stabilize the studs in order to remove the nuts securing the steering column to the instrument panel.

11. Support the steering column.

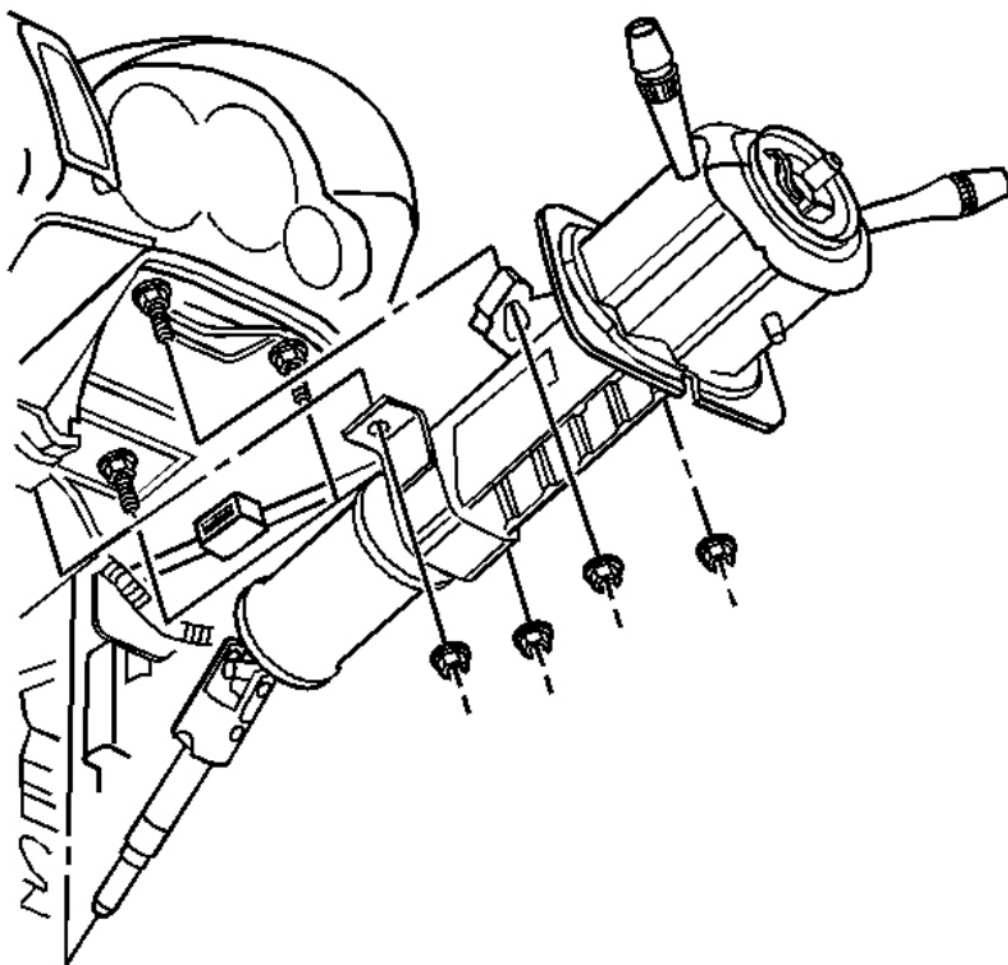


Fig. 79: Removing Steering Column Mounting Nuts
Courtesy of GENERAL MOTORS CORP.

12. Remove the steering column mounting nuts.
13. Remove the steering column.

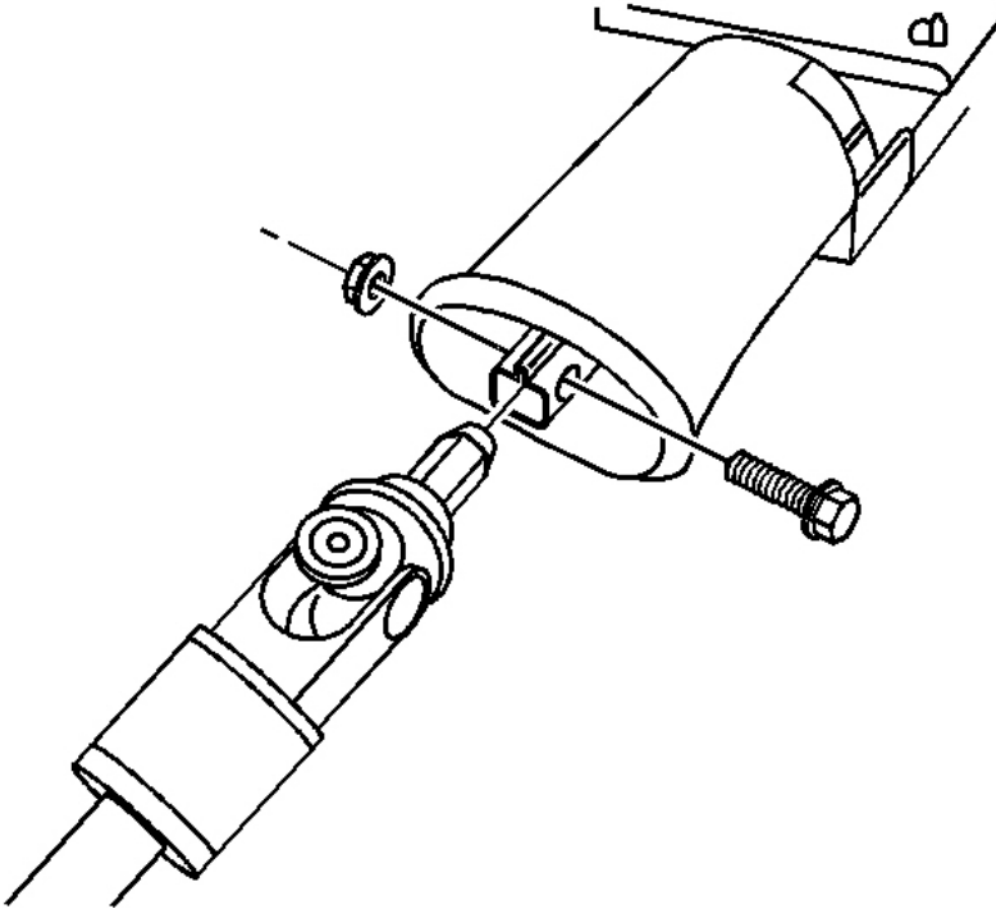


Fig. 80: Removing Retaining Bolt That Securing Upper Intermediate Shaft To Steering Column

Courtesy of GENERAL MOTORS CORP.

14. Remove the retaining bolt that secures the upper intermediate shaft to the steering column.
15. Remove the upper intermediate shaft from the steering column.

Installation Procedure

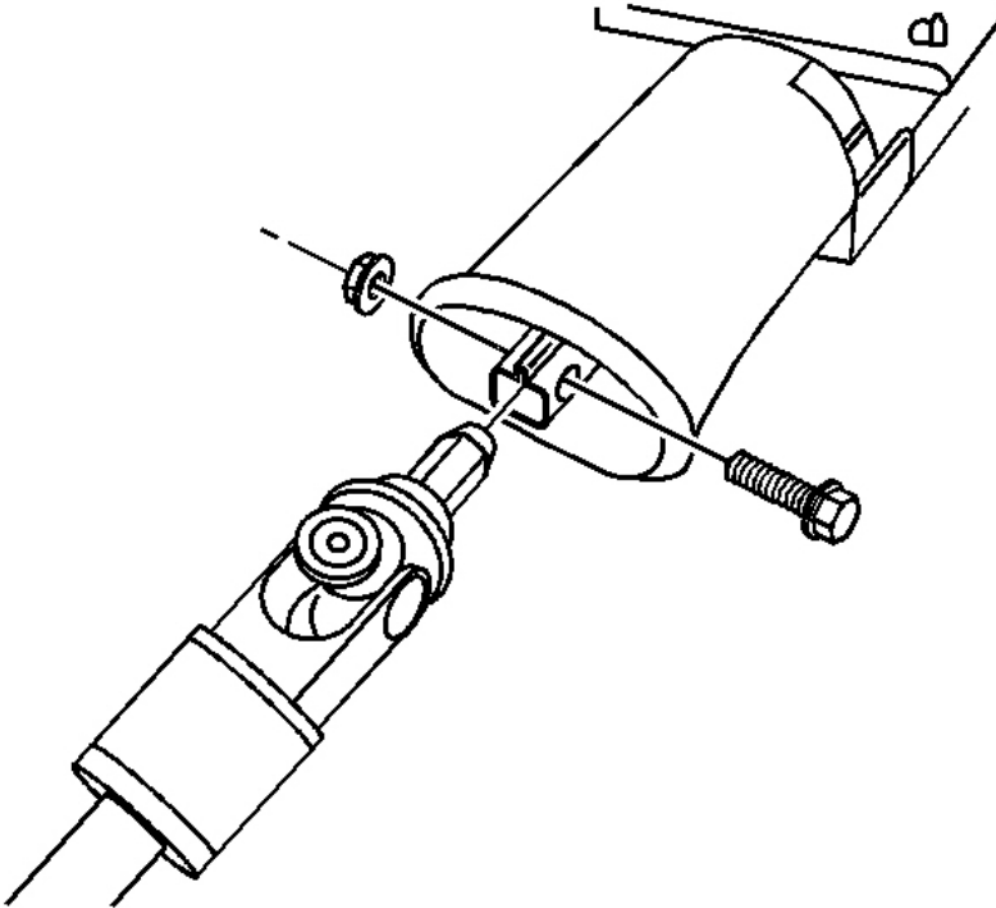


Fig. 81: Installing Upper Intermediate Shaft To Steering Column
Courtesy of GENERAL MOTORS CORP.

1. Install the upper intermediate shaft to the steering column.

NOTE: Refer to **Fastener Notice** in Cautions and Notices.

2. Install the retaining bolt that secures the upper intermediate shaft to the steering column.

Tighten: Tighten the bolt to 48 N.m (35 lb ft).

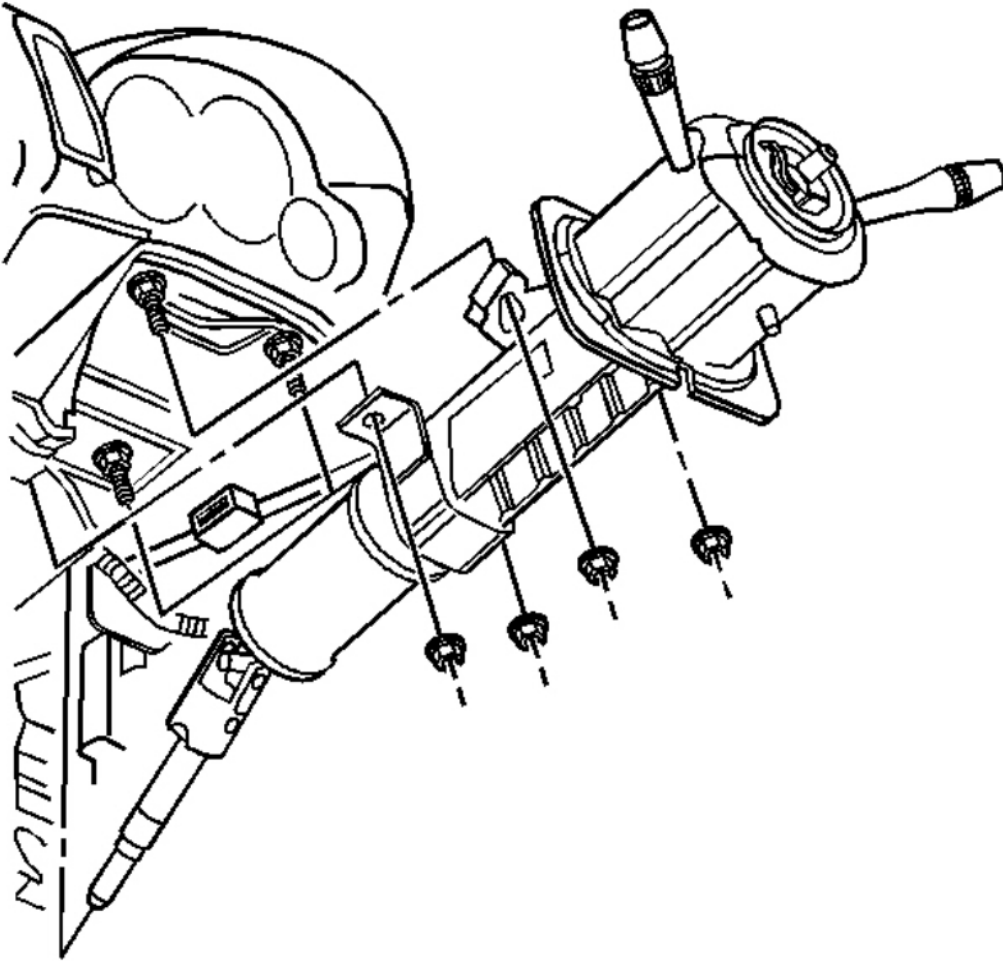


Fig. 82: Installing Steering Column
Courtesy of GENERAL MOTORS CORP.

3. Install the steering column.
4. Install the steering column mounting nuts.

Tighten: Tighten the nuts to 25 N.m (18 lb ft).

5. Connect the steering column electrical connectors.
6. Install the knee bolster. Refer to **Knee Bolster Replacement** in Instrument Panel, Gages and Console.

7. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
8. Raise the vehicle.
9. Install the upper intermediate shaft to the lower intermediate shaft.
10. Install the retaining bolt that secures the upper intermediate shaft to the lower intermediate shaft.

Tighten: Tighten the bolt to 48 N.m (35 lb ft).

11. Lower the vehicle.

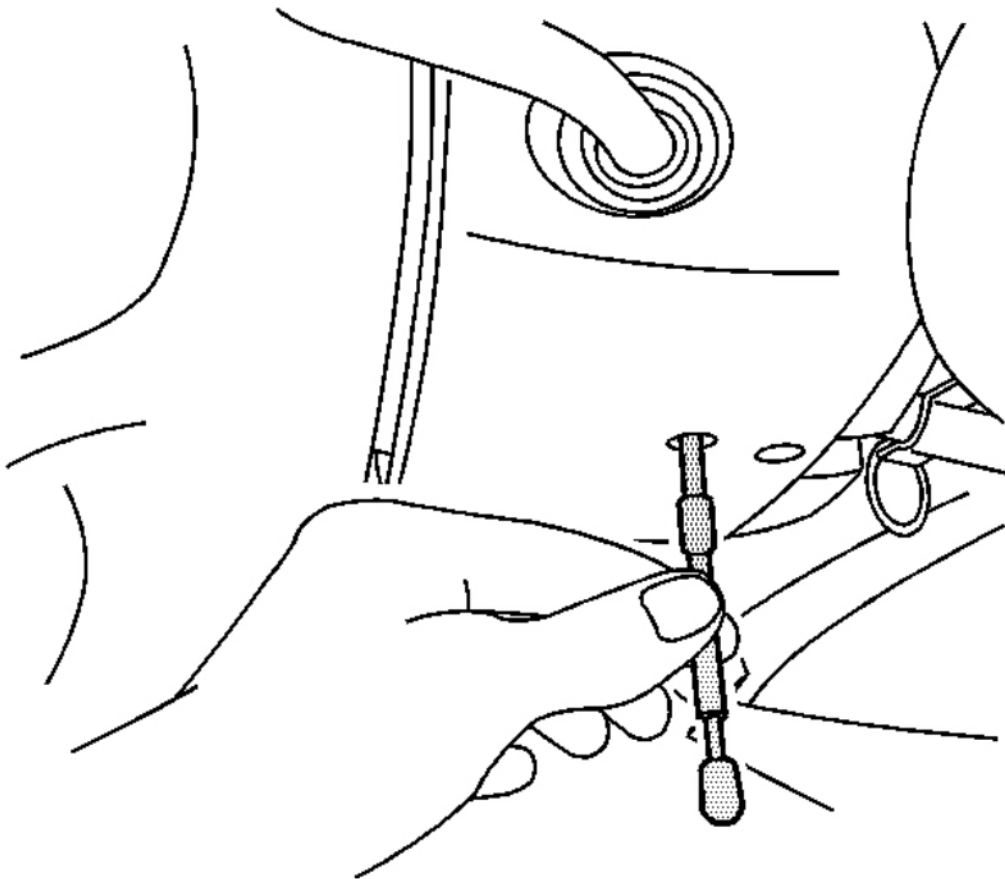


Fig. 83: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

12. Unlock the steering column by removing **J 42640** from the steering column lower trim cover access hole.
13. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

STEERING COLUMN JACKET REPLACEMENT

Removal Procedure

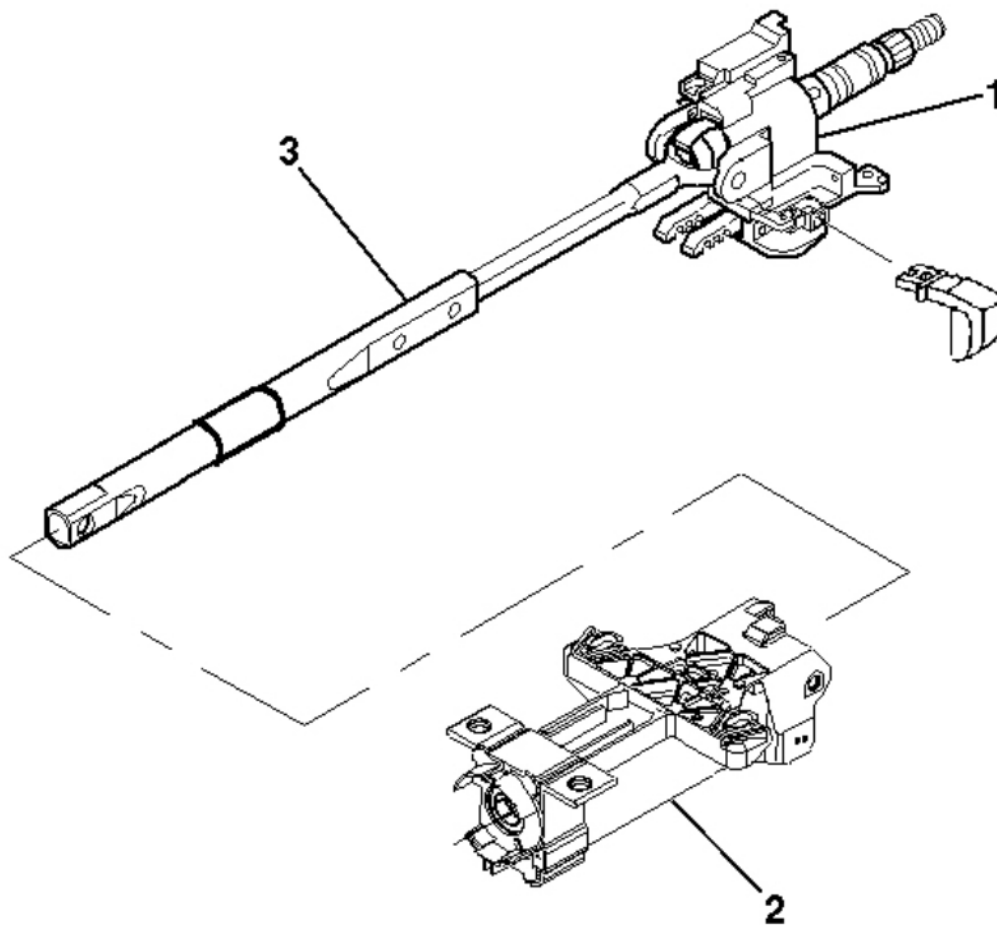


Fig. 84: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to **SIR Caution** in Cautions and Notices.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the steering column tilt head (1). Refer to **Steering Column Tilt Head Replacement**.
3. Check the steering column for accident damage. Refer to **Steering Column Accident Damage Inspection**.

Installation Procedure

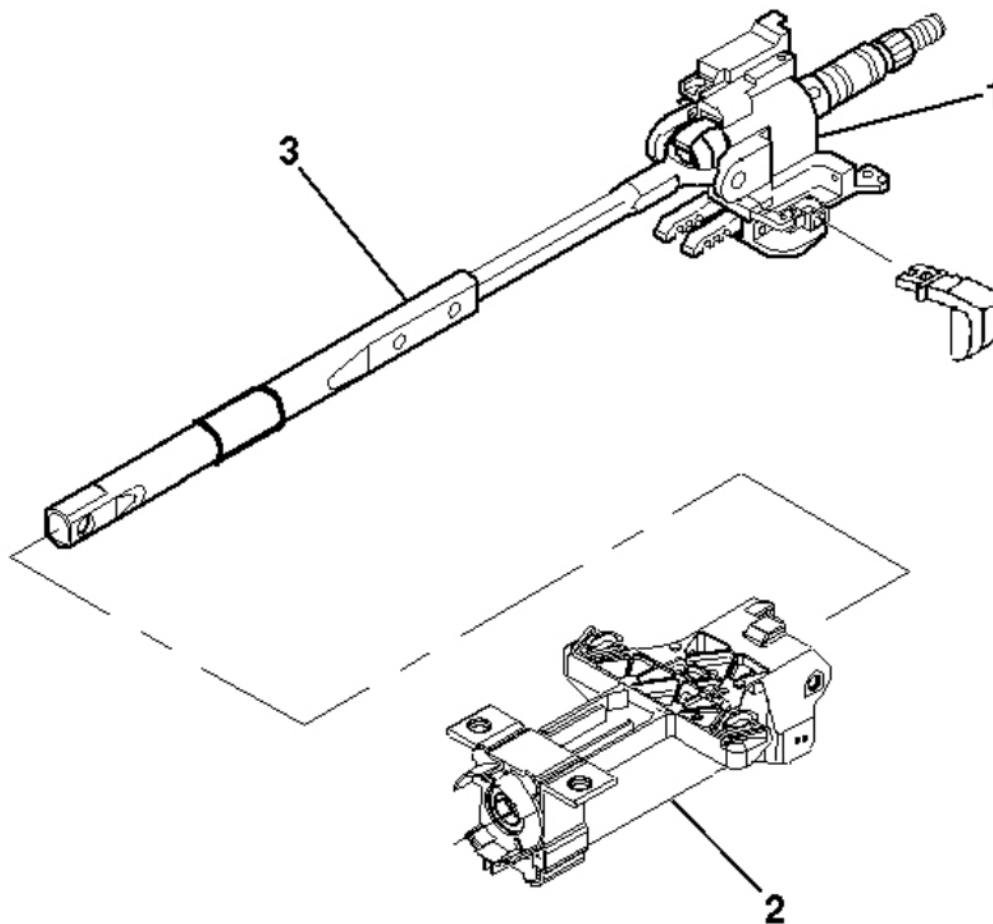


Fig. 85: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

1. Install the steering column tilt head (1). Refer to Steering Column Tilt Head Replacement.
2. Enable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

STEERING COLUMN WIRE HARNESS ASSEMBLY REPLACEMENT

Removal Procedure

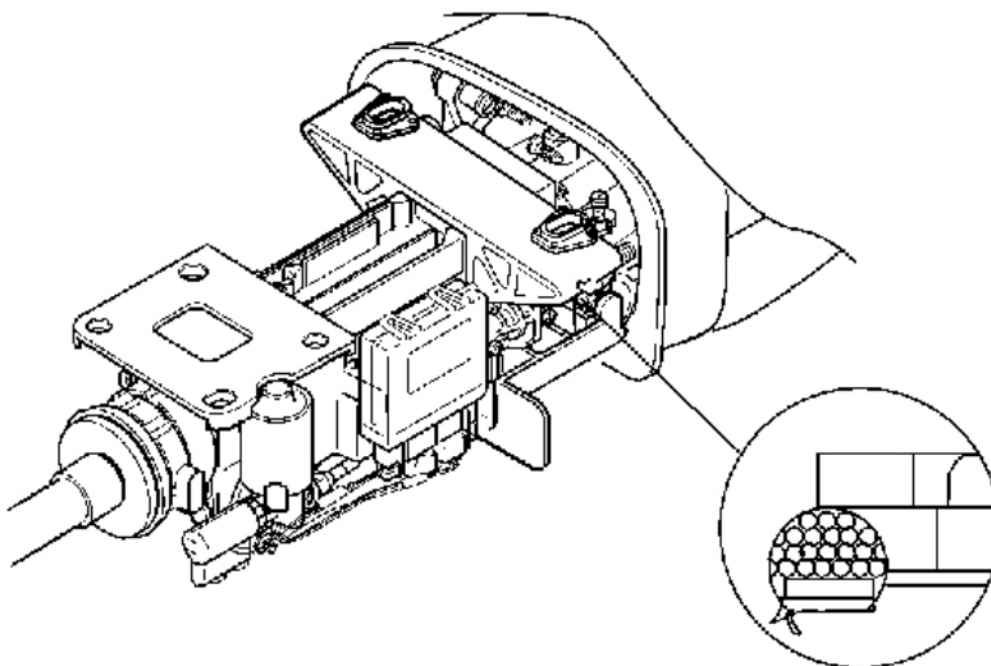


Fig. 86: Removing/Installing Plastic Mounted Steering Column Bracket
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the upper and lower trim covers. Refer to Steering Column Trim Covers Replacement

3. Remove the wire harness strap.

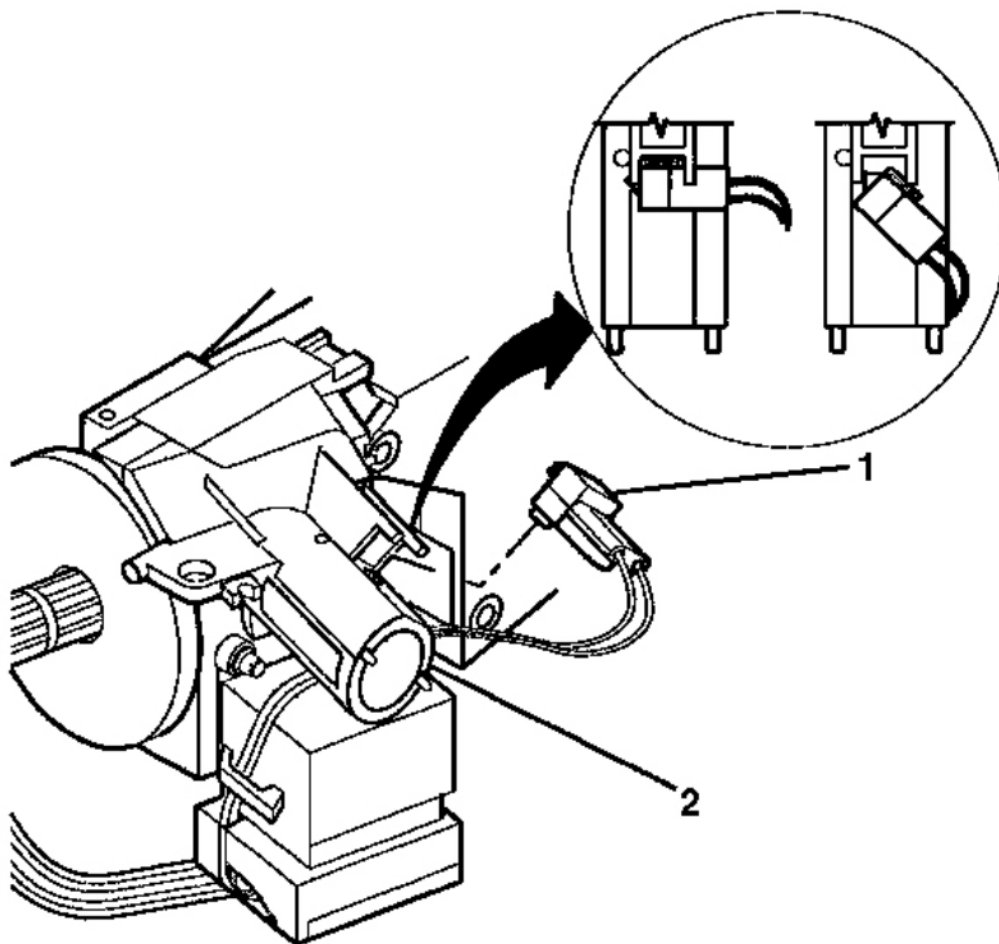


Fig. 87: Identifying Key Alarm Connector At Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

4. Remove the theft deterrent control module. Refer to **Theft Deterrent Control Module Replacement** in Theft Deterrent.
5. Rotate the key alarm connector (1) 90 degrees.
6. Gently pull the key alarm connector (1) out of the ignition lock cylinder case assembly (2).
7. Disconnect the connector from the ignition switch assembly.

8. Remove the wires encased in the ignition switch clip located on the side of the ignition switch.

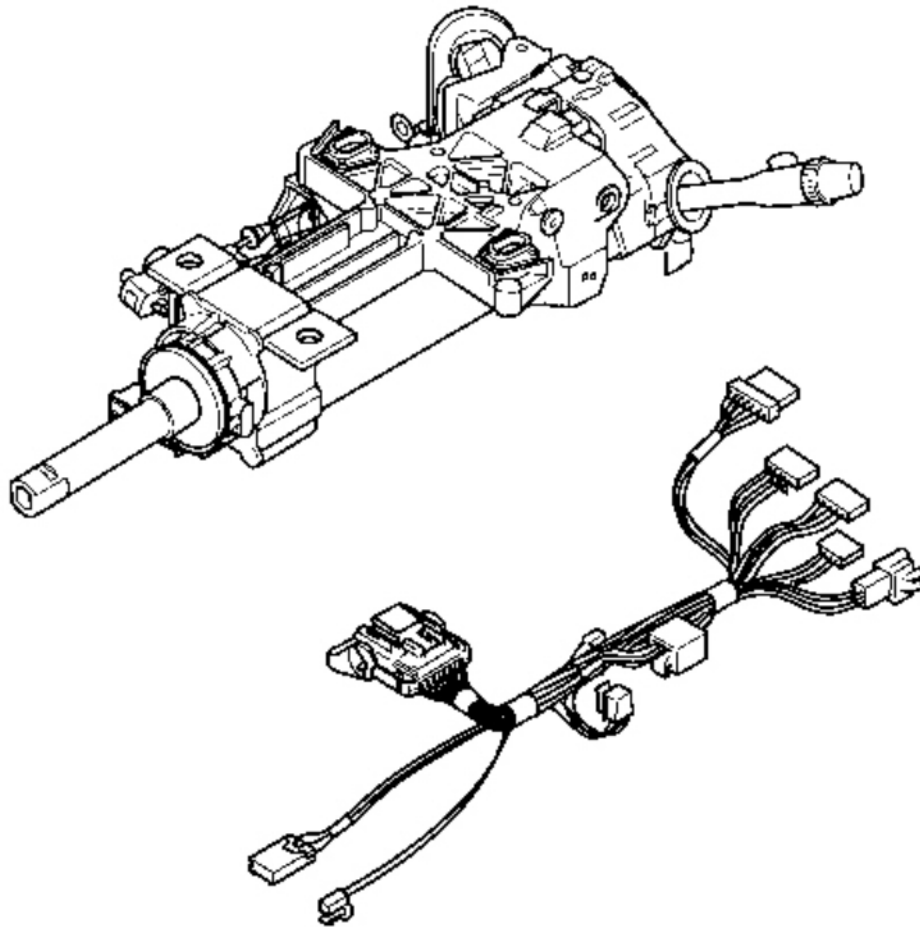


Fig. 88: View Of Steering Column And Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

9. Disconnect all connectors attached to the wire harness assembly.

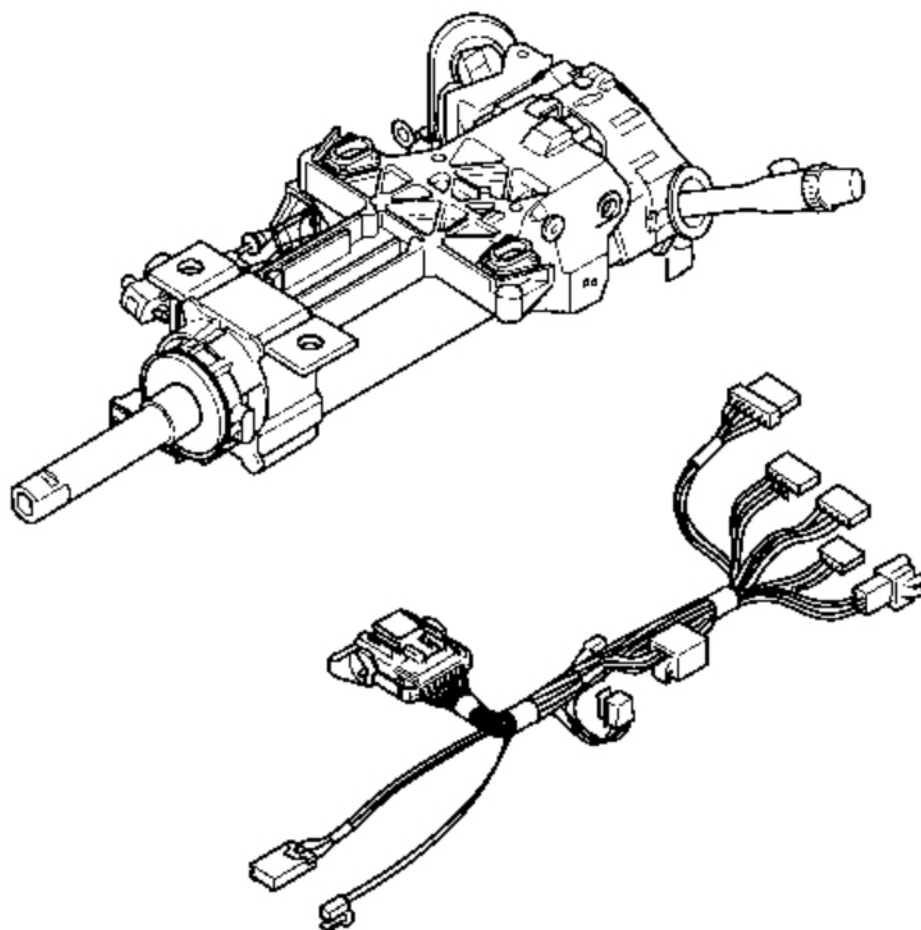


Fig. 89: View Of Steering Column And Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

1. Connect all of the connectors from the new wire harness assembly.

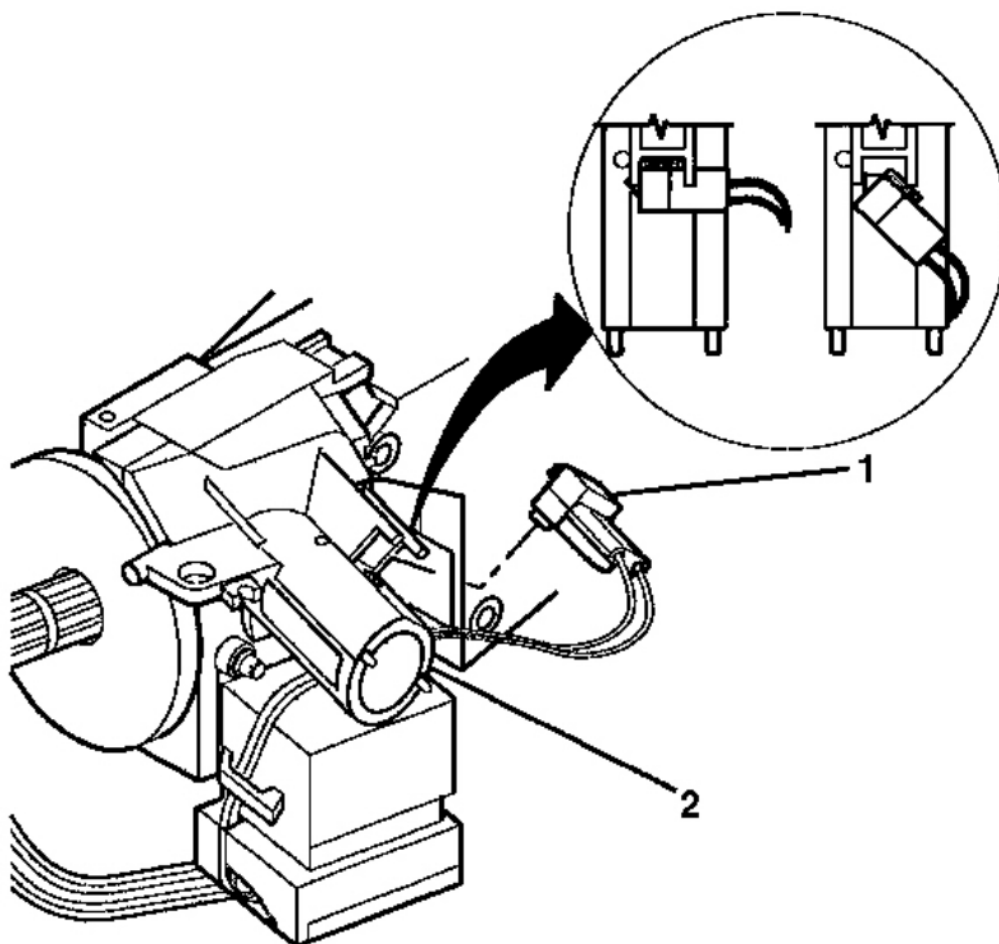


Fig. 90: Identifying Key Alarm Connector At Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

2. Push the key alarm connector (1) into the ignition lock cylinder case assembly (2).
3. Rotate the key alarm connector (1) 90 degrees so that the key alarm connector (1) locks into place.
4. Install the theft deterrent control module. Refer to **Theft Deterrent Control Module Replacement** in Theft Deterrent.

CAUTION: Refer to SIR Inflator Module Coil Caution in Cautions and Notices.

5. Install the wires back into the ignition switch clip located on the side of the ignition switch.

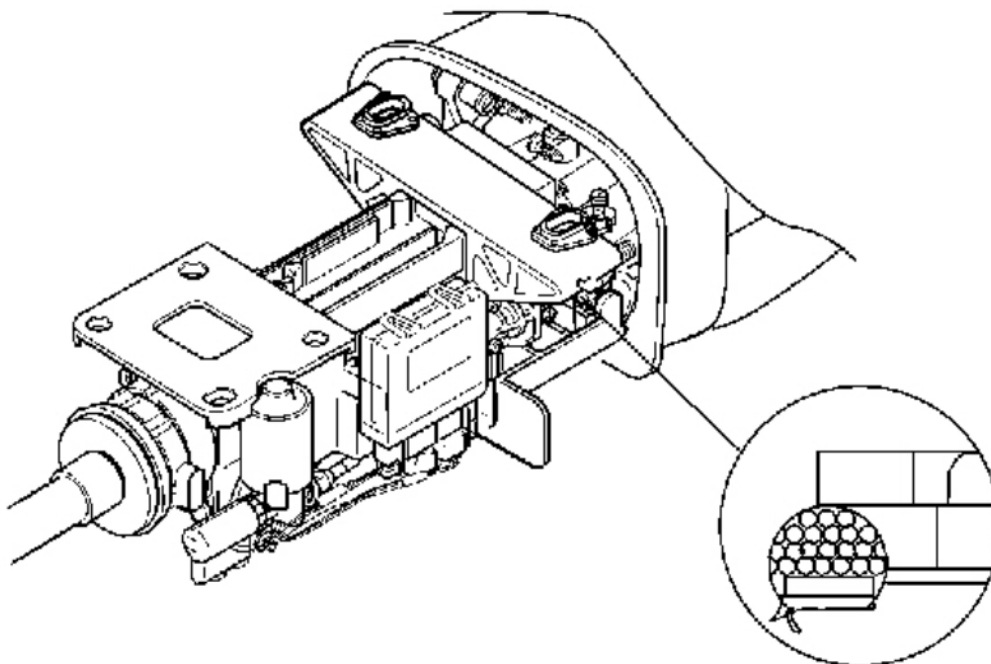


Fig. 91: Removing/Installing Plastic Mounted Steering Column Bracket
Courtesy of GENERAL MOTORS CORP.

6. Install the wire harness strap.
7. Install the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
8. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

STEERING WHEEL POSITION SENSOR OR STEERING SHAFT LOWER BEARING REPLACEMENT

Tools Required

J 21854-01 Pivot Pin Remover

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the steering column from the vehicle. Refer to Steering Column Replacement.
3. Remove the turn signal switch housing. Refer to Steering Column Tilt Head Replacement.
4. Remove the tilt spring only. Refer to Tilt Spring Replacement.

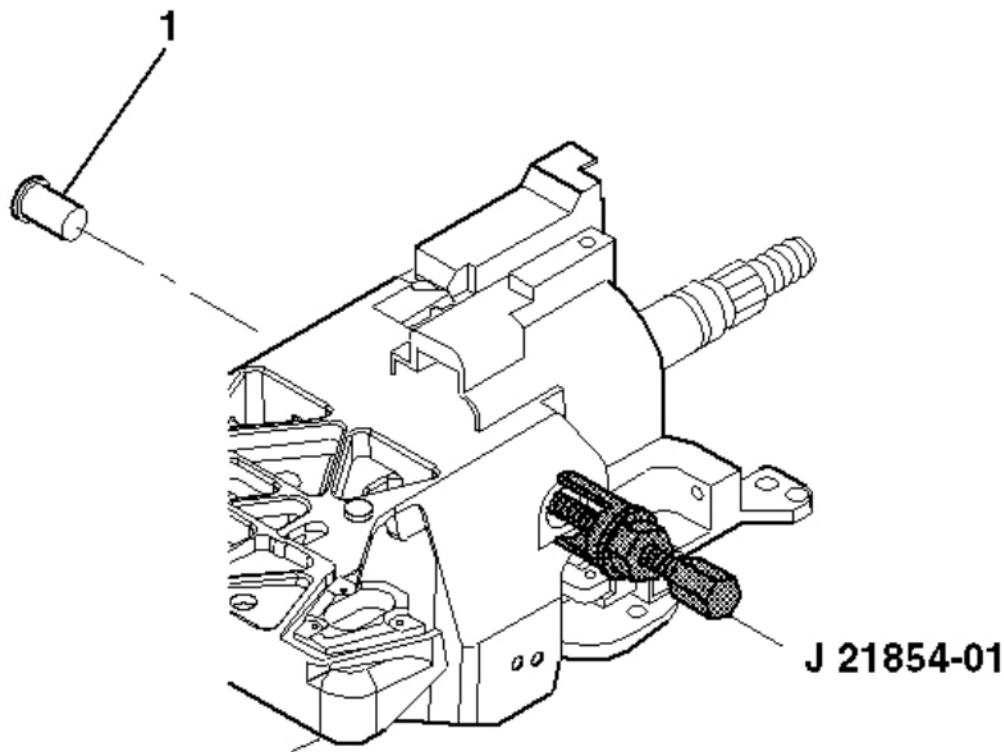


Fig. 92: Removing 2 Pivot Pins From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

5. Remove 2 pivot pins (1) from the steering column support assembly using J 21854-01 .

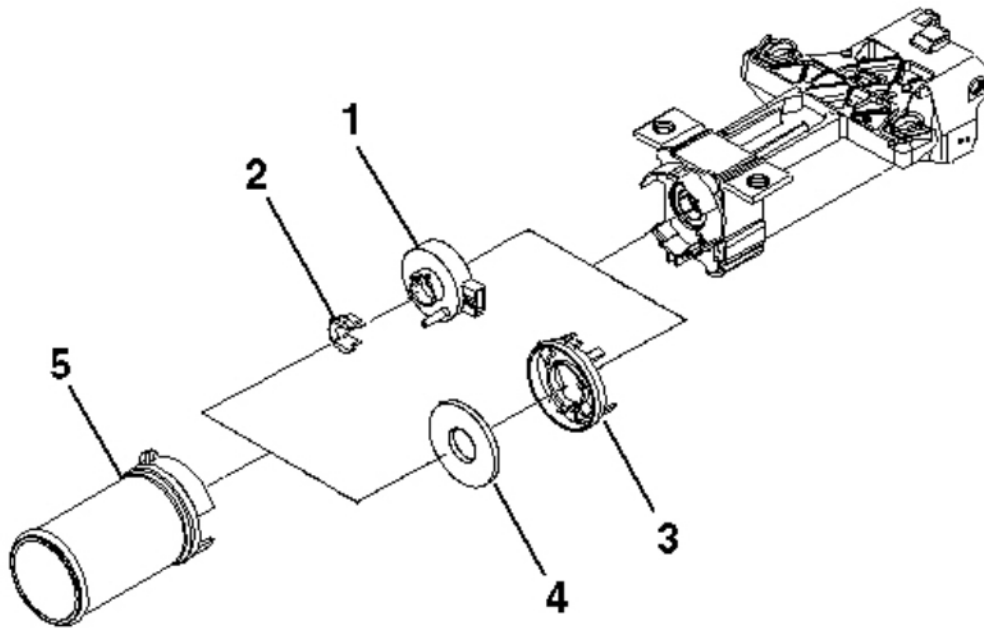


Fig. 93: Removing Boot Seal
Courtesy of GENERAL MOTORS CORP.

6. Remove the boot seal (5).
7. If sensor is not present, remove the following:
 1. The steering shaft seal (4)
 2. The sensor retainer (3)
8. If sensor is present, remove the following:
 1. The sensor locator (2)
 2. The sensor assembly (1)

Installation Procedure

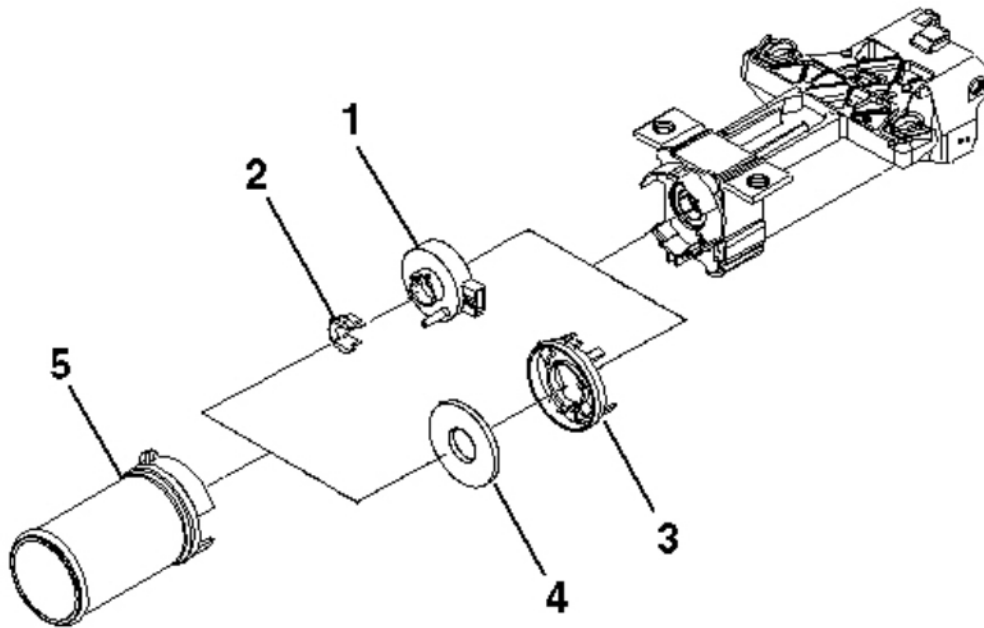


Fig. 94: Installing Sensor Retainer And Steering Shaft Seal
Courtesy of GENERAL MOTORS CORP.

1. If sensor is not present, install the following:
 1. The sensor retainer (3)
 2. The steering shaft seal (4)
2. If sensor is present, install the following
 1. The sensor assembly (1)

The sensor assembly must be aligned to the 9 o'clock position.

2. The sensor locator (2)
3. Install the boot seal (5)

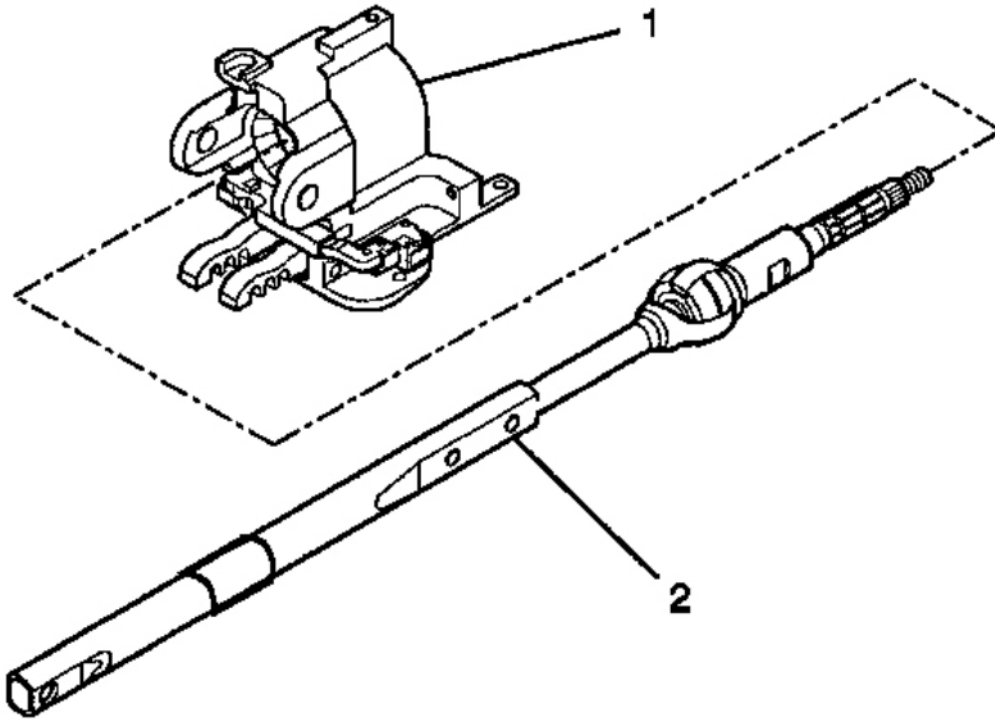


Fig. 95: Installing Steering Shaft Assembly Into Steering Column Tilt Head Assembly

Courtesy of GENERAL MOTORS CORP.

4. Install the steering shaft assembly (2) into the steering column tilt head assembly (1).

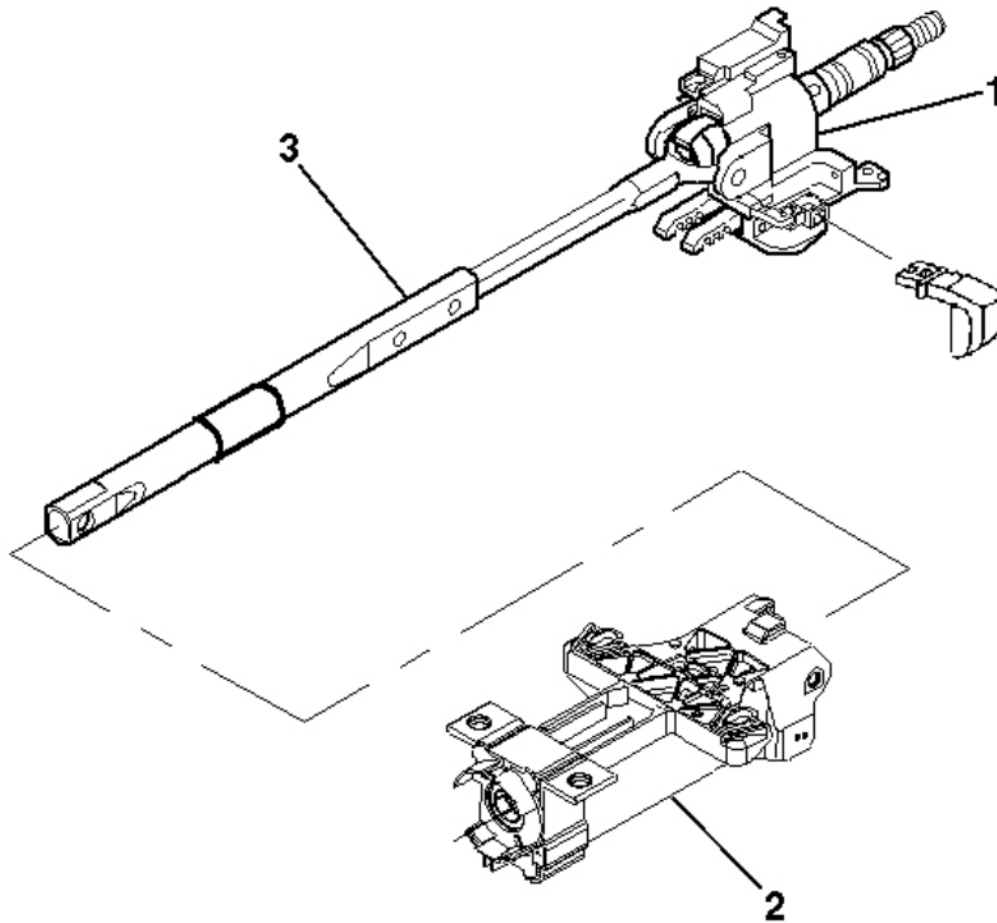


Fig. 96: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

5. Install the tilt head assembly (1) and the steering shaft (3) into the steering column jacket assembly (2).

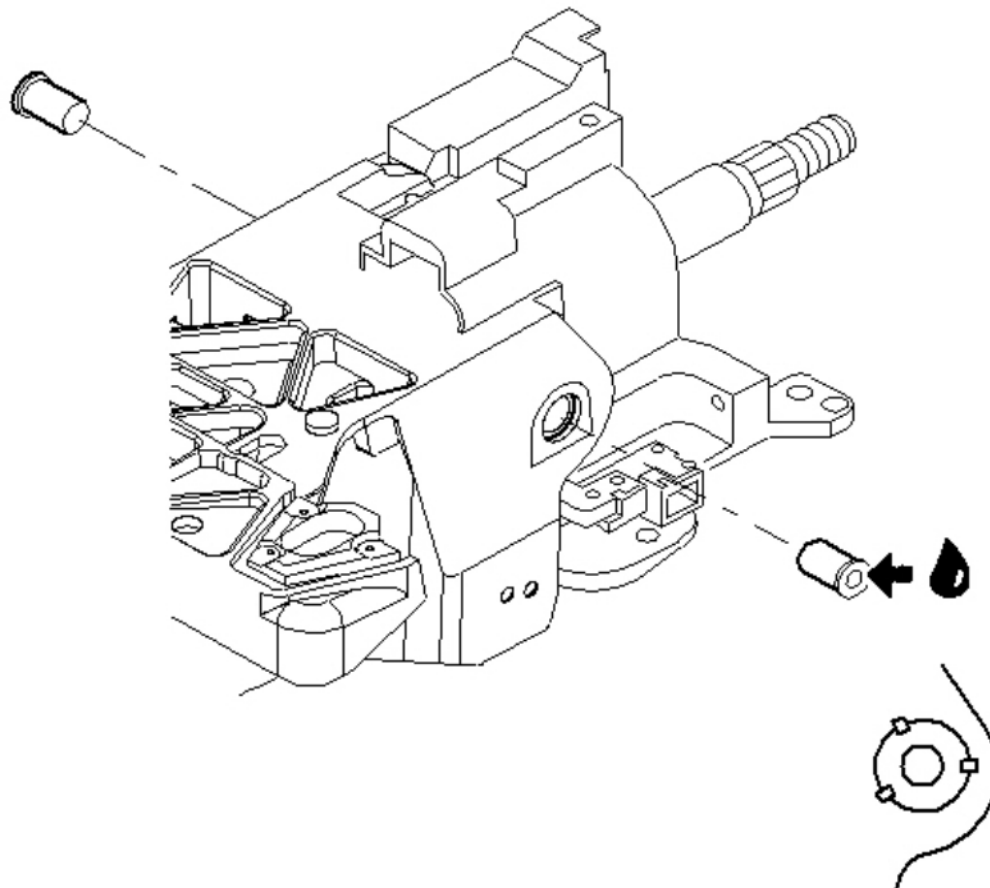


Fig. 97: Identifying Pivot Pin Locations
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Replace the steering column support assembly if the steering column support assembly has been staked 3 times.

6. Lubricate the pivot pins with GM P/N 12346293 (Canadian P/N 992723). Install the 2 pivot pins onto the steering column support assembly. Stake the pins in 3 places.
7. Install the tilt spring assembly only. Refer to **Tilt Spring Replacement**.

CAUTION: Refer to SIR Inflator Module Coil Caution in Cautions and Notices.

2004 Cadillac CTS

2004 STEERING Steering Wheel and Column - CTS

8. Install the turn signal switch housing. Refer to **Steering Column Tilt Head Replacement**.
9. Install the steering column to the vehicle. Refer to **Steering Column Replacement**.
10. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

STEERING WHEEL POSITION SENSOR CENTERING

Removal Procedure

IMPORTANT: Identify the type of steering wheel position sensor from the illustrations shown **BEFORE** removing the sensor from the steering column. Once you have identified the steering wheel position sensor, follow the instructions listed in the removal procedure.

1. Verify the type of steering wheel position sensor.

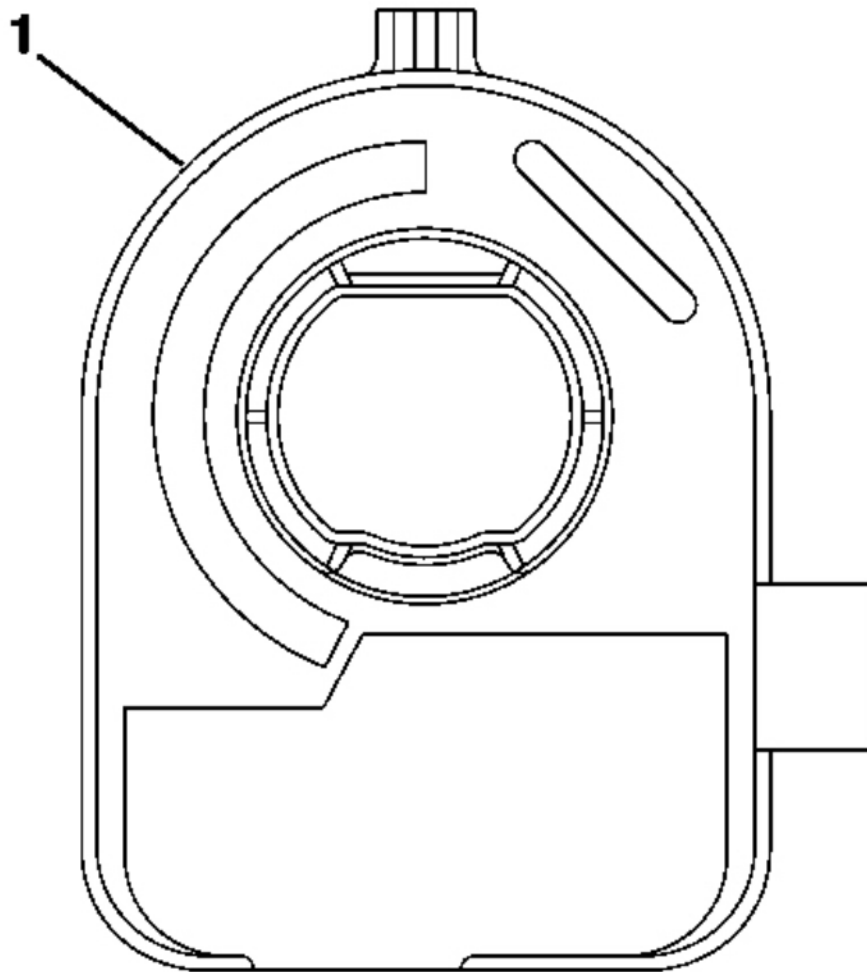


Fig. 98: FRONT Of The Sensor Connector Is On The Right
Courtesy of GENERAL MOTORS CORP.

2. From the technicians point of view, the FRONT of the sensor (1) connector will be on the right.

IMPORTANT: If reusing the existing sensor, you do not have to align the sensor before removal. Centering is not required when it is time to reinstall.

3. Remove the connector from the sensor.
4. Remove the sensor (1) from the adapter and bearing assembly.
5. To install the sensor, proceed to step 1 in the installation section.

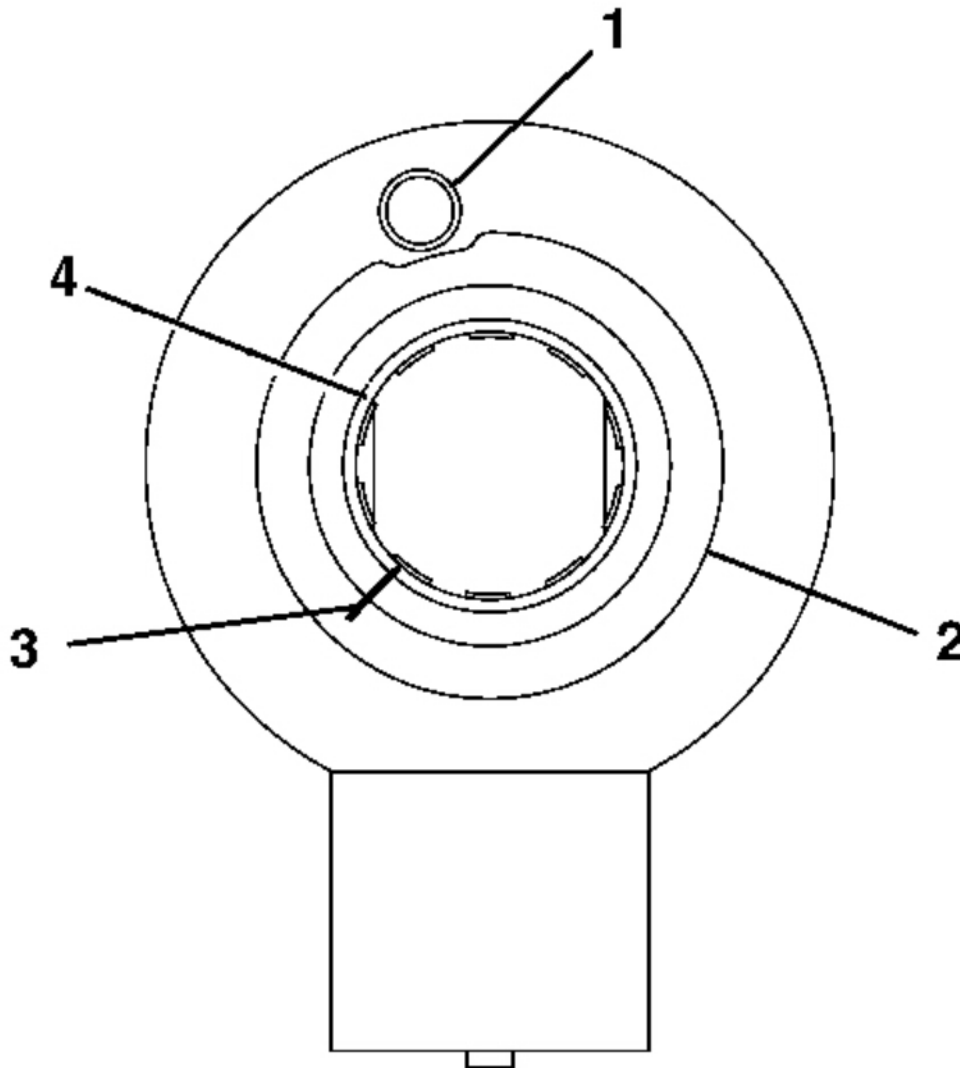


Fig. 99: Steering Wheel Position Sensor Foam Ring, Pin Hole And Rotor Flange Cuff

Courtesy of GENERAL MOTORS CORP.

6. From the technicians point of view, the FRONT of the sensor will have:
 - A foam ring (2)
 - A pin hole (1) for centering the pin. Note the location of the pin hole.
 - A flush rotor flange cuff (4)

IMPORTANT: If reusing the existing sensor, you must make an alignment mark on the rotor flange cuff (3) before removing the sensor. Failure to do so will cause misalignment when installing the sensor. A new sensor will be required if misaligned.

7. Make an alignment mark on the flush rotor flange cuff (3).
8. Remove the connector from the sensor.
9. Remove the sensor from the adapter and bearing assembly.
10. To install the sensor, proceed to step 5 in the installation procedure.

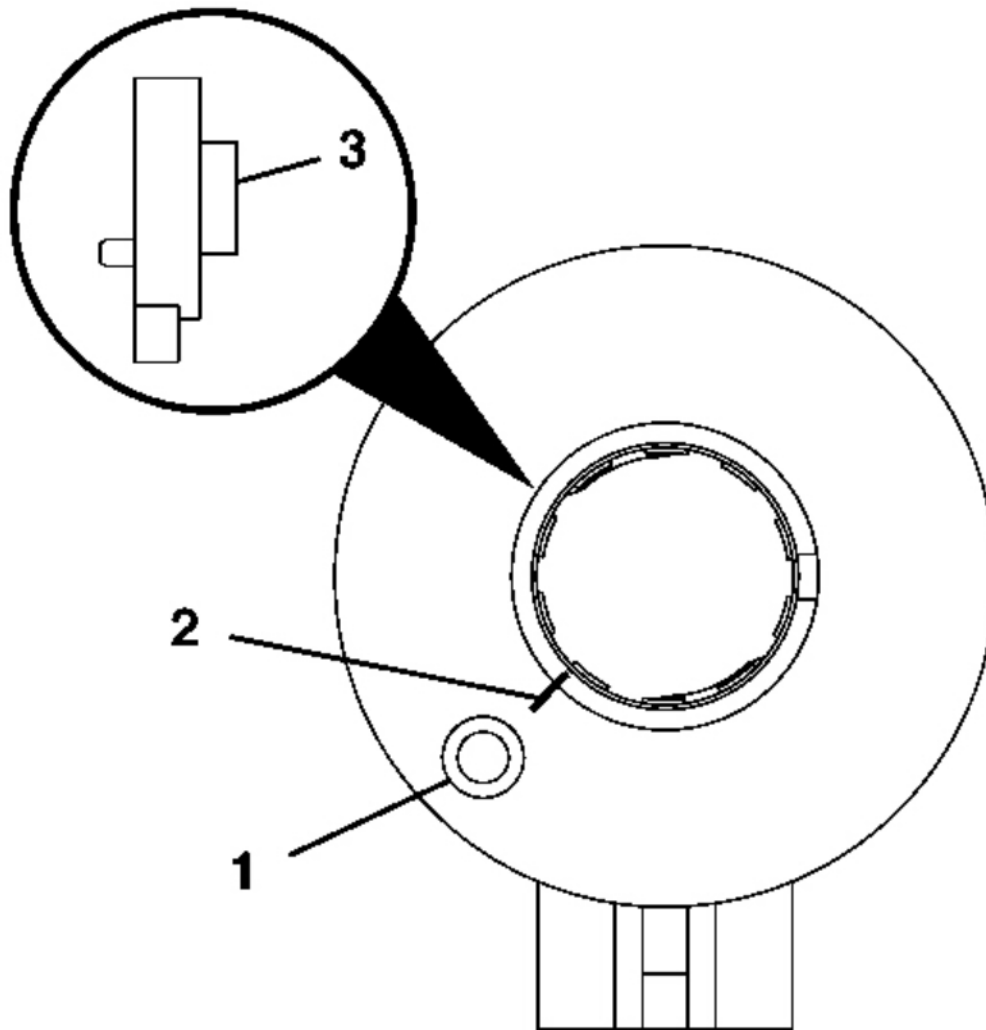


Fig. 100: Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

11. From the technicians point of view, the FRONT of the sensor will have:
 - A raised rotor flange cuff (3)
 - An alignment mark (2) on the rotor flange cuff (3) for installation
 - A pin hole (1) for the centering pin. Note the location of the pin hole.
12. Remove the connector from the sensor.

13. Remove the sensor from the adapter and bearing assembly.
14. To install the sensor, proceed to step 9 in the installation procedure.

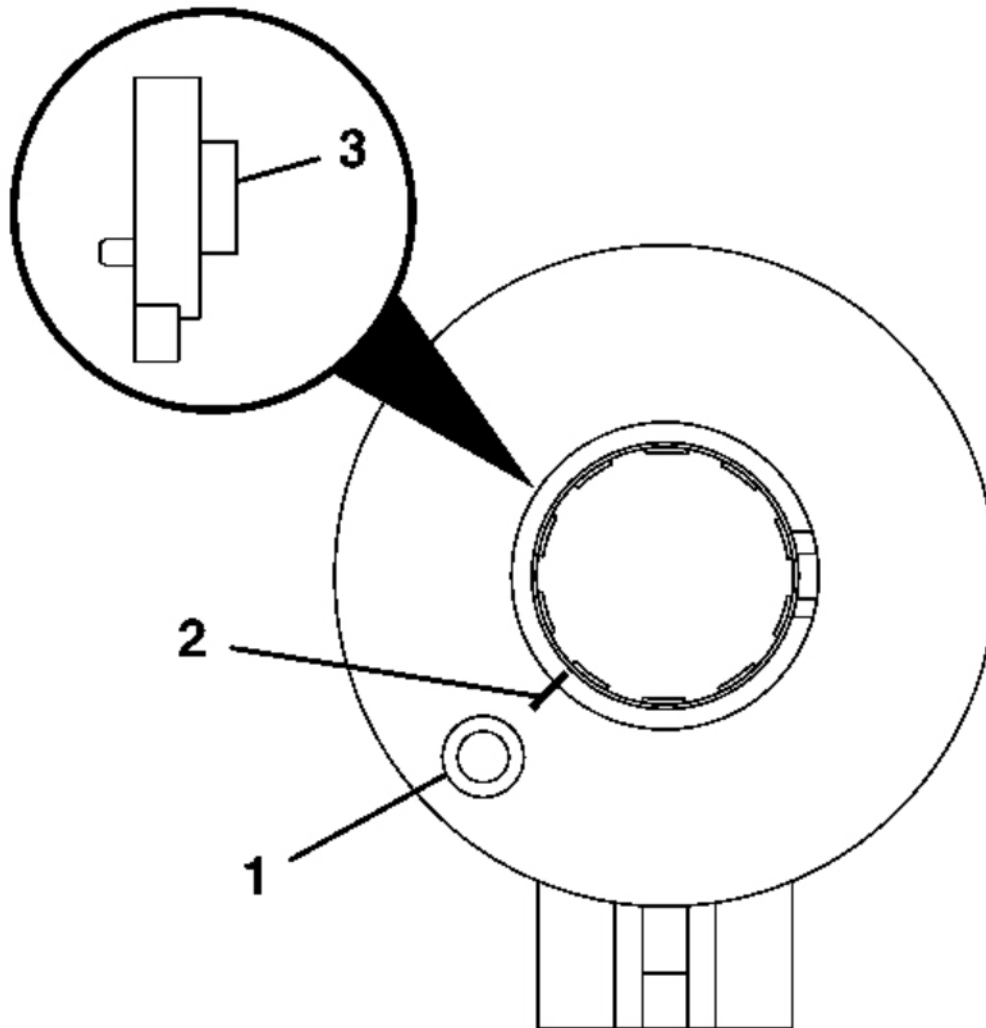


Fig. 101: Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

15. From the technicians point of view, the FRONT of the sensor will have:
 - A raised rotor flange cuff (3)

- An alignment mark (2) on the rotor flange cuff (3) for installation
- A pin hole (1) for the centering pin. Note location of the pin hole.
- A sensor clip in FRONT of the sensor

16. Remove the connector from the sensor.
17. Remove the sensor clip from the sensor.
18. Remove the sensor from the adapter and bearing assembly.
19. To install the sensor, proceed to step 13 in the installation procedure.

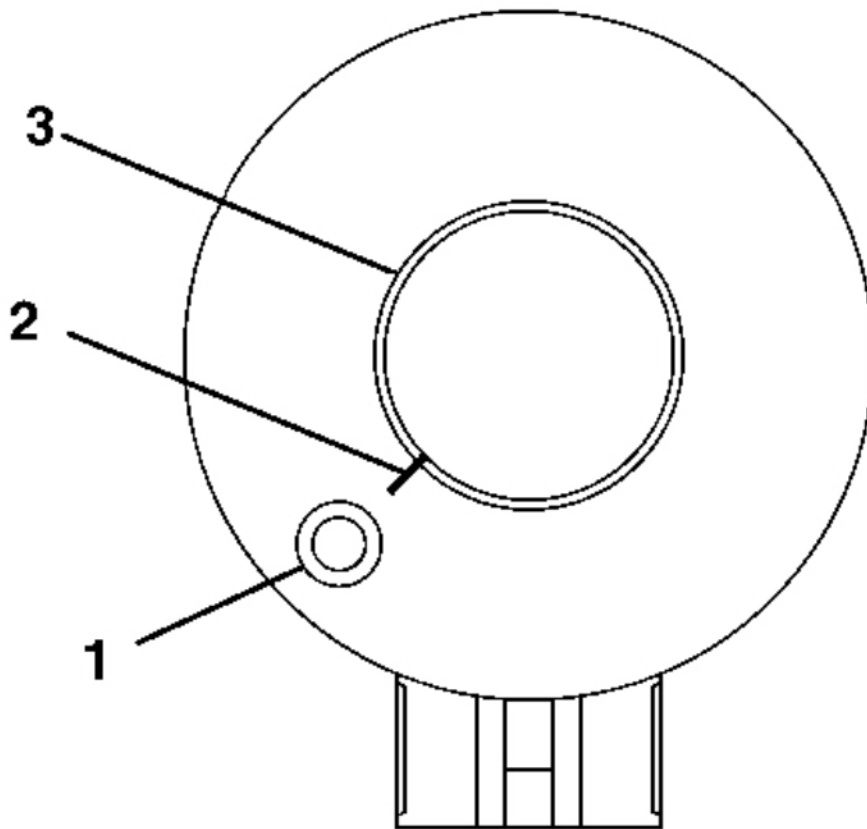


Fig. 102: Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole And Alignment Mark

Courtesy of GENERAL MOTORS CORP.

20. From the technicians point of view, the FRONT of the sensor will have:
- A flush rotor flange cuff (3)
 - A pin hole (1) for the centering pin. Note the location of the pin hole.
 - An alignment mark (2) on the flush rotor flange cuff (3) for installation
21. Remove the connector from the sensor.
22. Remove the sensor from the adapter and bearing assembly.
23. To install the sensor, proceed to step 17 in the installation procedure.

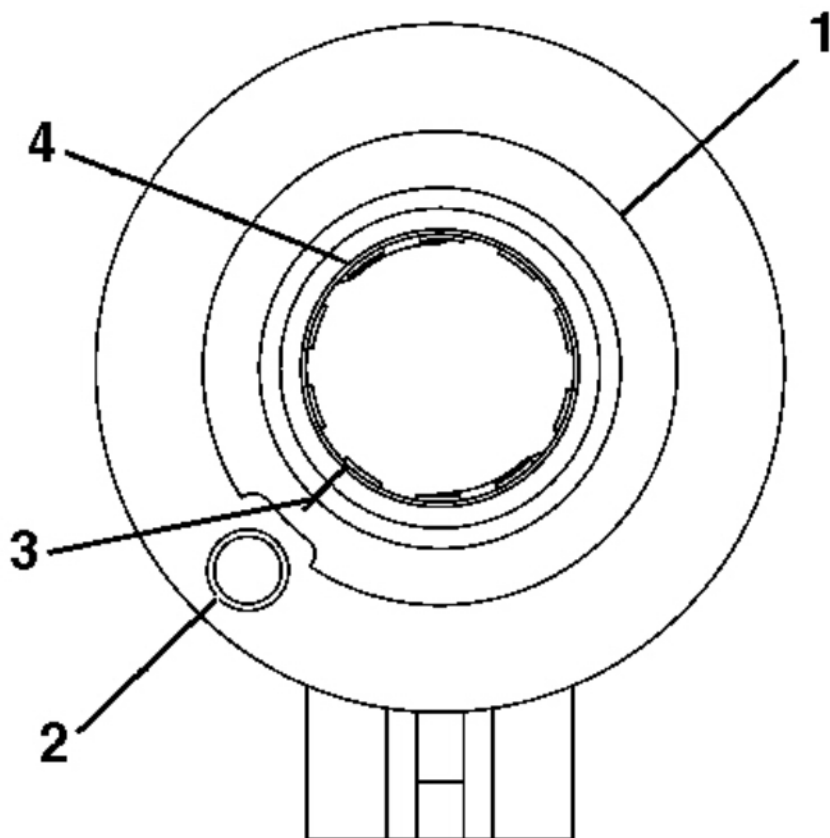


Fig. 103: Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole, Alignment Mark And Foam Ring
Courtesy of GENERAL MOTORS CORP.

24. From the technicians point of view, the FRONT of the sensor will have:

- A flush rotor flange cuff (4)
- A pin hole (2) for the centering pin- Note the location of the pin hole.
- An alignment mark (3) on the flush rotor flange cuff (4) for installation
- A foam ring (1)

25. Remove the connector from the sensor.

26. Remove the sensor from the adapter and bearing assembly.

27. To install the sensor, proceed to step 21 in the installation procedure.

Installation Procedure

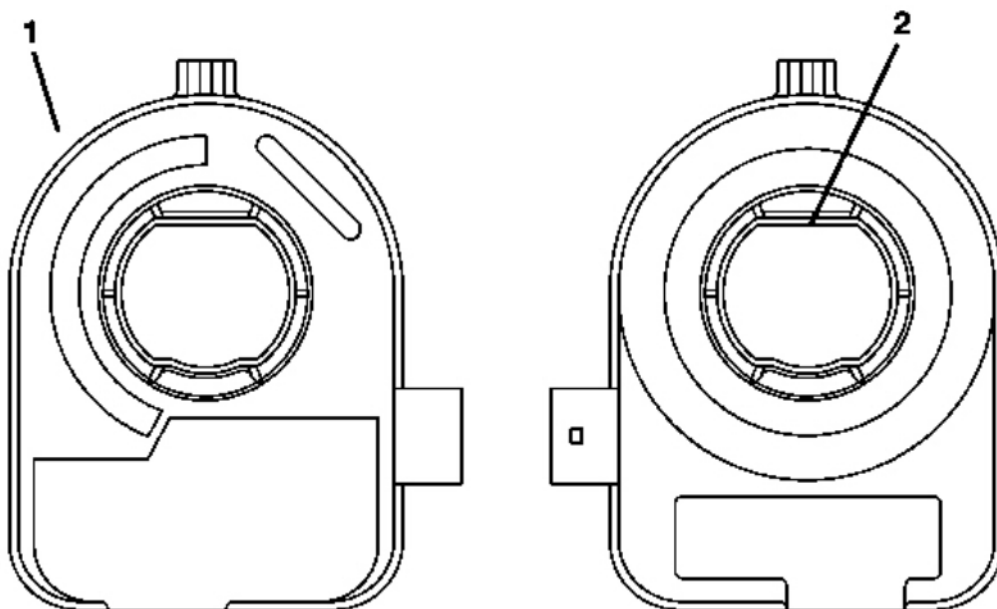


Fig. 104: Front And Back Views Of Steering Wheel Position Sensor
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If reusing the existing sensor, no centering of the sensor is required.

1. If installing a new sensor, it will come with a pin installed in the sensor. Do not remove the

pin until the sensor is seated.

2. From the technicians point of view, the FRONT of the sensor (1) connector will be on your right.

From the technicians point of view, the BACK of the sensor (2) connector will be on your left.

3. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install into the adapter and bearing assembly.
4. Install the connector to the sensor.

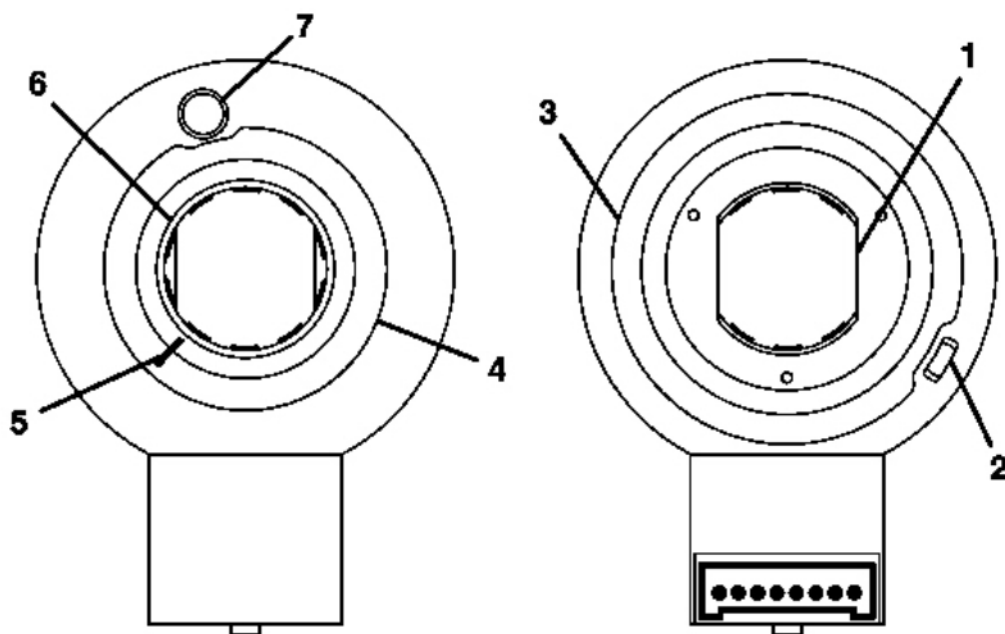


Fig. 105: Steering Wheel Position Sensor Identification Points
Courtesy of GENERAL MOTORS CORP.

5. From the technicians point of view, the FRONT of the sensor will have:
 - A foam ring (4)
 - A pin hole (7) for the centering pin- Note the location of the pin hole.
 - A flushed rotor flange cuff (6)

- An alignment mark (5) for installation
6. From the technicians point of view, the BACK of the sensor will have:
 - Double D flats (1)
 - A foam ring (3)
 - An alignment tab (2) for installing into the adapter and bearing assembly
 - A view of the inside of the connector

IMPORTANT: If reusing the existing sensor, you must align the marks on the flush rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

If installing a new sensor, it will come with a pin installed in the sensor. Do not remove the pin until the sensor is seated. If the new sensor did not come with a pin installed, you must reorder a new sensor.

7. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install into the adapter and bearing assembly.
8. Install the connector to the sensor.

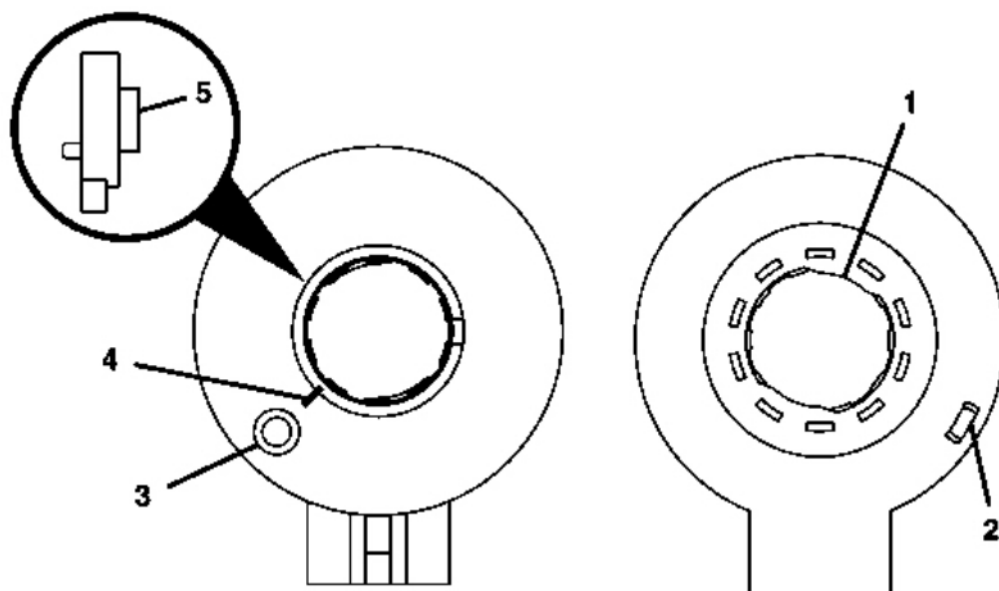


Fig. 106: Steering Wheel Position Sensor Front View
Courtesy of GENERAL MOTORS CORP.

9. From the technicians point of view, the FRONT of the sensor will have:
 - A pin hole (3) for the centering pin- Note location of the pin hole.
 - A raised rotor flange cuff (5)
 - An alignment mark (4) for installation
10. From the technicians point of view, the BACK of the sensor will have:
 - Double D flats (1)
 - An alignment tab (2) for installing into the adapter and bearing assembly

IMPORTANT: If reusing the existing sensor, you must align the marks on the raised rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

If installing a new sensor, it will come with a pin installed in the sensor. Do not remove the pin until the sensor is seated. If the new sensor did not come with a pin installed, you must

reorder a new sensor.

11. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install into the adapter and bearing assembly.
12. Install the connector to the sensor.

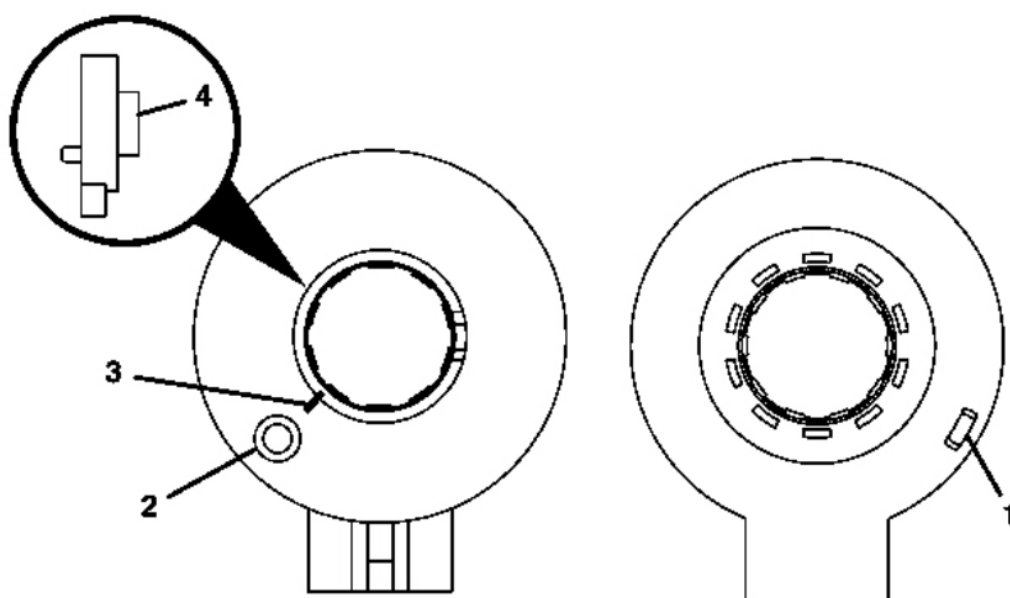


Fig. 107: Steering Wheel Position Sensor Centering Pin Hole, Rotor Flange Cuff And Alignment Mark

Courtesy of GENERAL MOTORS CORP.

13. From the technicians point of view, the FRONT of the sensor will have:
 - A pin hole (2) for the centering pin- Note the location of the pin hole.
 - A raised rotor flange cuff (4)
 - An alignment mark (3) for installation
14. From the technicians point of view, the BACK of the sensor will have an alignment tab (1) for installation. This sensor does not have double D flats.

IMPORTANT: If reusing the existing sensor, you must align the marks on the raised rotor flange cuff before installation. The alignment

mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

If installing a new sensor, it will come with a pin installed in the sensor. Do not remove the pin until the sensor is seated. If the new sensor did not come with a pin installed, you must reorder a new sensor.

15. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install into the adapter and bearing assembly.
16. Install the connector to the sensor.

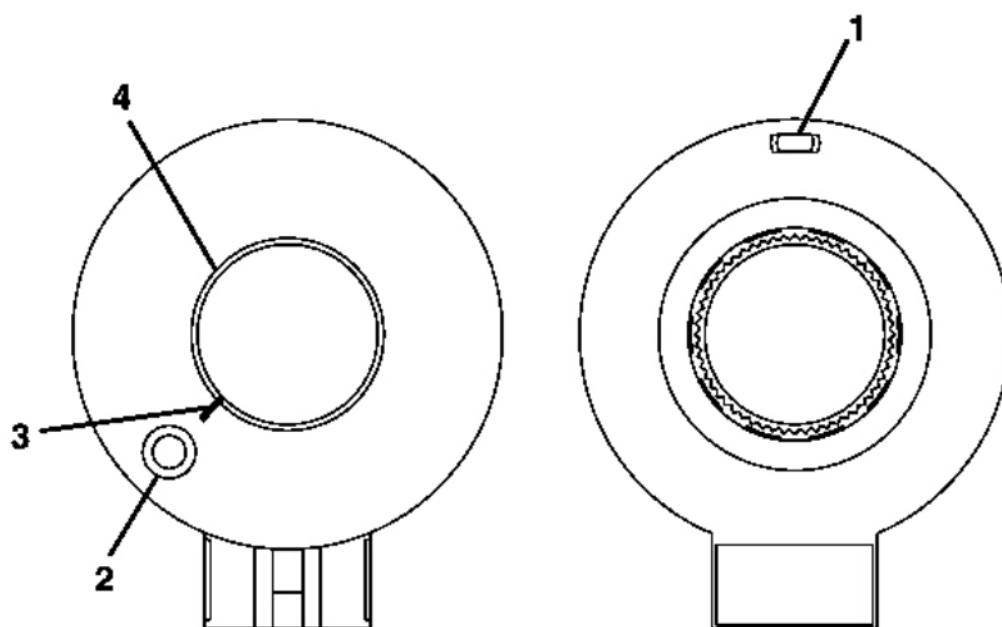


Fig. 108: Steering Wheel Position Sensor Center Pin, Rotor Flange Cuff And Installation Alignment Mark

Courtesy of GENERAL MOTORS CORP.

17. From the technicians point of view, the FRONT of the sensor will have:
 - A pin hole (2) for the centering pin- Note the location of the pin hole.
 - A flush rotor flange cuff (4)

- An alignment mark (3) for installation

18. From the technicians point of view, the BACK of the sensor will have an alignment tab (1) for installation. This sensor does not have double D flats.

IMPORTANT: If reusing the existing sensor, you must align the marks on the flush rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.
If installing a new sensor, it will come with a pin installed in the sensor. Do not remove the pin until the sensor is seated. If the new sensor did not come with a pin installed, you must reorder a new sensor.

19. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install into the adapter and bearing assembly.
20. Install the connector to the sensor.

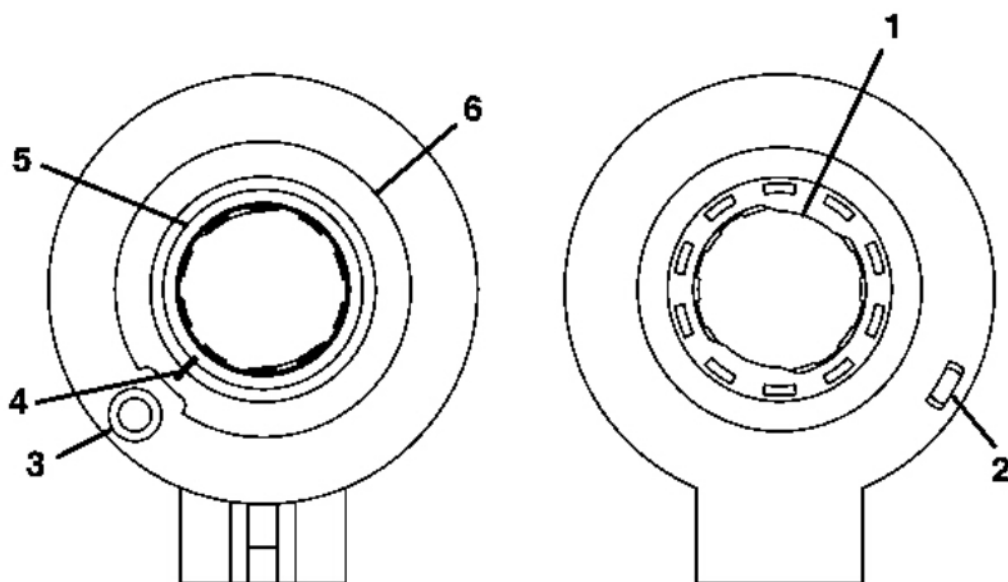


Fig. 109: Steering Wheel Position Sensor Double D Flats
Courtesy of GENERAL MOTORS CORP.

21. From the technicians point of view, the FRONT of the sensor will have:
 - A pin hole (3) for the centering pin- Note location of the pin hole.
 - A flush rotor flange cuff (5)
 - An alignment mark (4) for installation
 - A foam ring (6)
22. From the technicians point of view, the BACK of the sensor will have:
 - Double D flats (1)
 - An alignment tab (2) for installing into the adapter and bearing assembly

IMPORTANT: If reusing the existing sensor, you must align the marks on the flush rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

If installing a new sensor, it will come with a pin installed in the sensor. Do not remove the pin until the sensor is seated. If the new sensor did not come with a pin installed, you must reorder a new sensor.

23. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install into the adapter and bearing assembly.
24. Install the connector to the sensor.

INFLATABLE RESTRAINT STEERING WHEEL MODULE COIL CENTERING

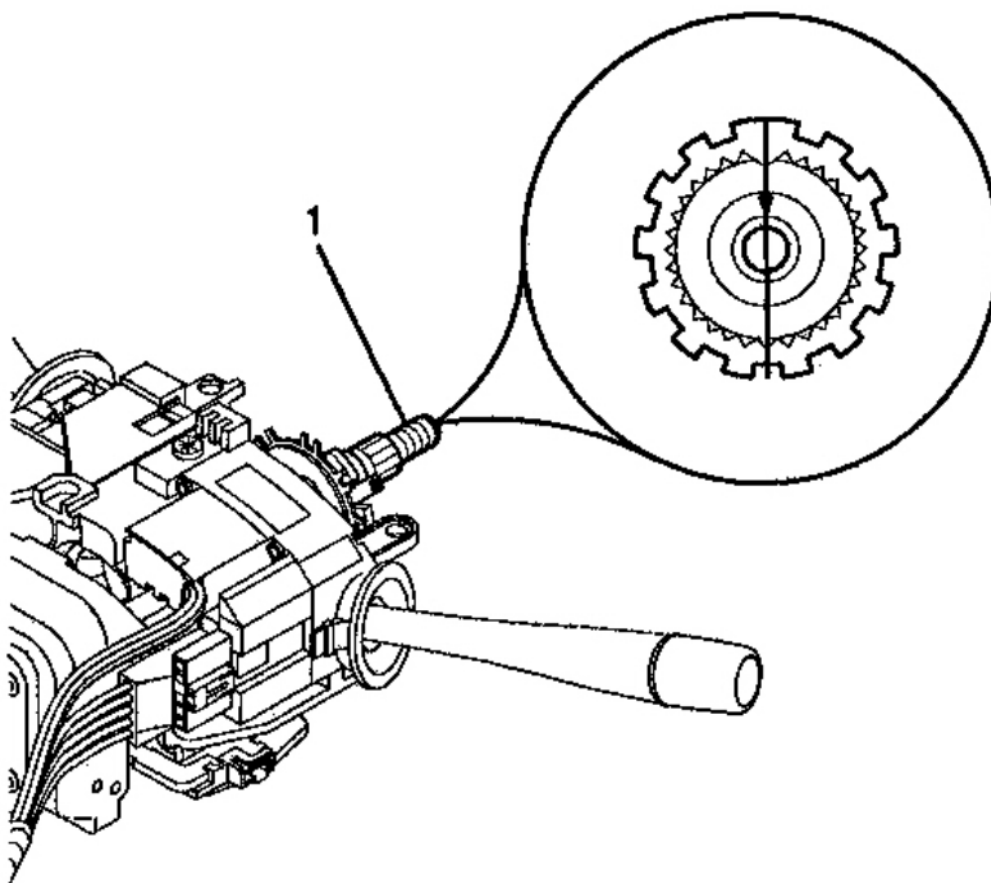


Fig. 110: View Of Block Tooth Of Steering Shaft Assembly In 12 O'clock Position
Courtesy of GENERAL MOTORS CORP.

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. Verify the following before centering the SIR coil:
 - The wheels on the vehicle are straight ahead.
 - The block tooth (1) of the steering shaft assembly is in the 12 o'clock position.
 - The ignition switch is in the LOCK position.

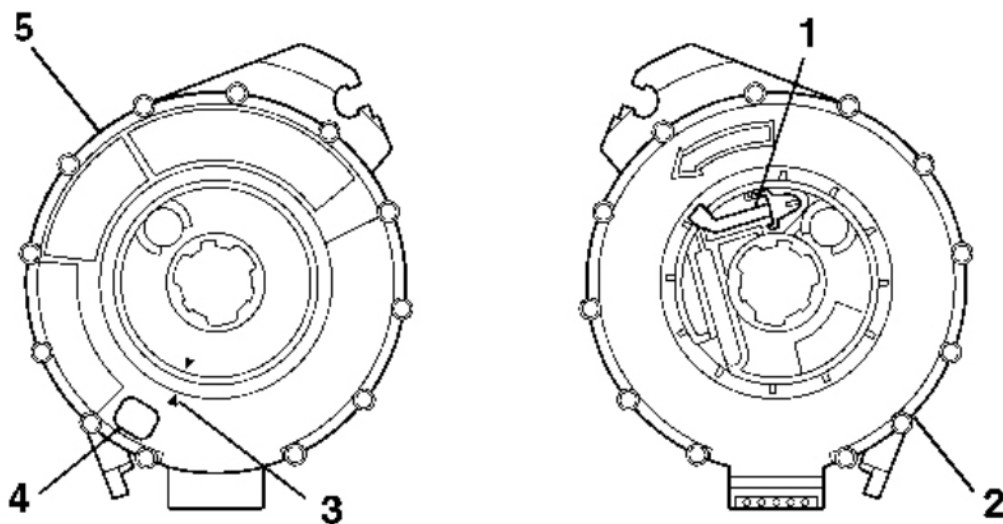


Fig. 111: Centering SIR Coil (With Centering Window & Spring Service Lock)
Courtesy of GENERAL MOTORS CORP.

2. If the front (5) of the SIR coil has a centering window (4), and on the back side (2) a spring service lock (1), perform the following steps:
 1. Hold the SIR coil with the face up.
 2. While depressing the spring service lock, rotate the coil hub clockwise until the coil ribbon stops.
 3. Rotate the coil hub slowly, counterclockwise, until the centering window appears yellow and both arrows (3) line up.
 4. Release spring service lock between the locking tab. The SIR coil is now centered.
 5. Align the centered SIR coil with the horn tower and slide onto the steering shaft assembly.

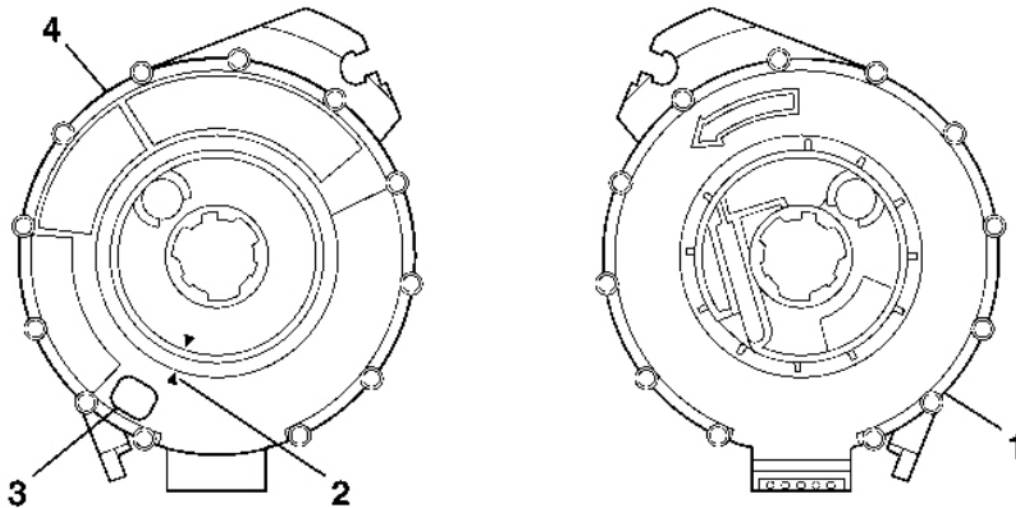


Fig. 112: Centering SIR Coil (With Centering Window, Without Spring Service Lock)

Courtesy of GENERAL MOTORS CORP.

3. If the front (4) of the SIR coil has a centering window (3) and no spring service lock on the back side (1), perform the following steps:
 1. Hold the SIR coil with the face up.
 2. Rotate the coil hub clockwise until the coil ribbon stops.
 3. Rotate the coil hub slowly, counterclockwise until the centering window appears yellow and both arrows (2) line up. This is the CENTER position.
 4. While holding the coil hub in the CENTER position, align the SIR coil with the horn tower and slide onto the steering shaft assembly.

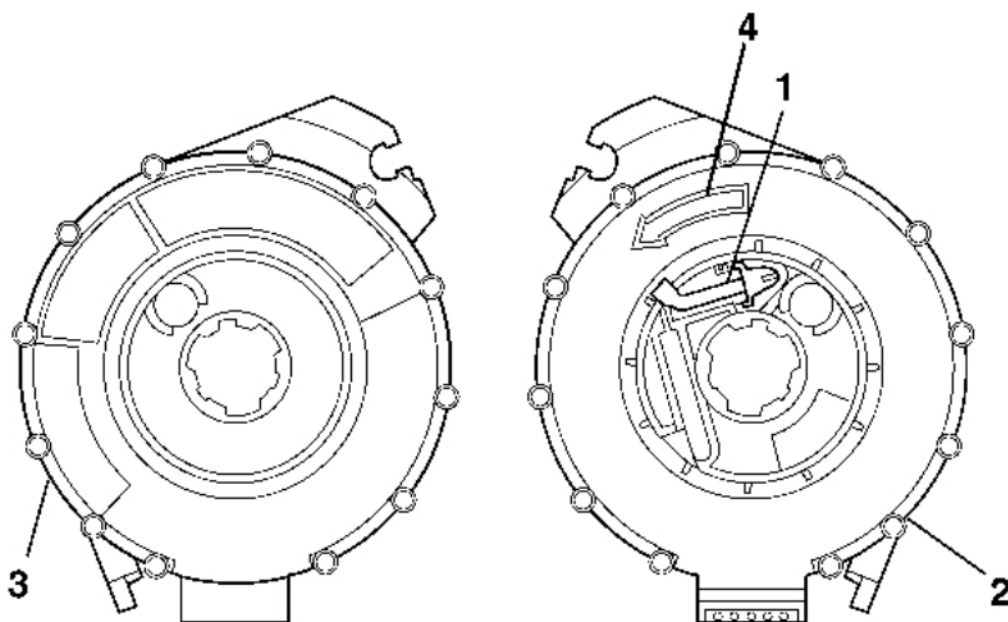


Fig. 113: Centering SIR Coil (No Centering Window, But Back Side Includes A Spring Service Lock)

Courtesy of GENERAL MOTORS CORP.

4. If no centering window is present on the front side (3) of the SIR coil, but a spring service lock (1) is on the back side (2), perform the following steps:
 1. Hold the SIR coil with the back side up.
 2. While depressing the spring service lock, rotate the coil hub in the direction of the arrow (4) until the coil ribbon stops.
 3. Still pressing the spring service lock, rotate the coil hub in the opposite direction 2 1/2 revolutions.
 4. Release the spring service lock between locking tabs. The SIR coil is now centered.
 5. Align the centered SIR coil with the horn tower and slide onto the steering shaft assembly.

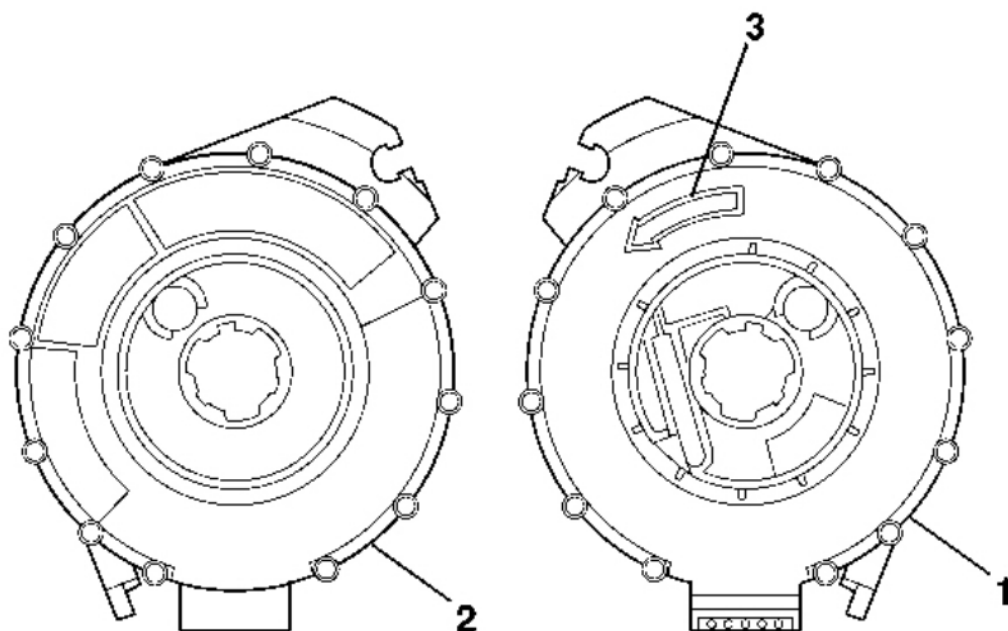


Fig. 114: Centering SIR Coil (Without Centering Window, Without Spring Service Lock)

Courtesy of GENERAL MOTORS CORP.

5. For no centering window on the front side (2) of the SIR coil and no spring service lock on the back side (1), perform the following steps:
 1. Hold the SIR coil with the face up.
 2. Rotate the coil hub in the direction of the arrow (3) until the coil ribbon stops.
 3. Rotate the coil hub, slowly, counterclockwise, for 2 1/2 revolutions. This is the CENTER position.
 4. While maintaining the coil hub in the CENTER position, align the centered SIR coil with the horn tower and slide onto the steering shaft assembly.

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 redundant radio/entertainment system controls
- The tilt or tilt/telescoping functions
- The navigation/OnStar® features
- The HVAC controls

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.

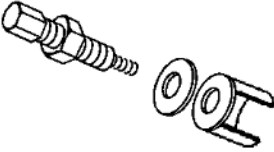
Ignition Lock Cylinder Control Actuator

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

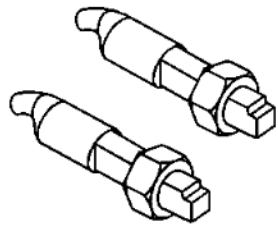
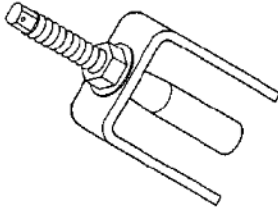
SPECIAL TOOLS

Special Tools

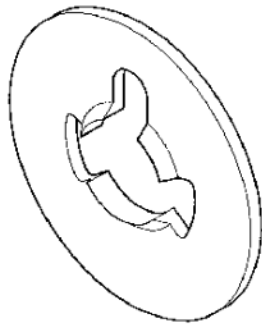
Illustration	Tool Number/ Description
	J 1859-A Steering Wheel Puller
	J 21854-01 Pivot Pin Remover
	J 23653-SIR Lock Plate Compressor

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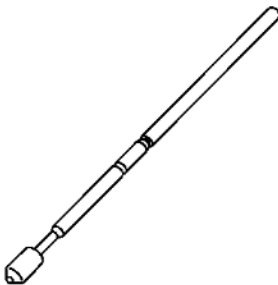
2004 STEERING Steering Wheel and Column - CTS



J 36541-A
Steering Wheel Puller Legs



J 42137
Cam Orientation Plate Adapter



J 42640
Steering Column Anti Rotation Pin