

2006 Chevrolet Impala LS

2006 STEERING Steering Wheel and Column - Impala

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Steering Wheel and Column - Impala

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Intermediate Shaft to the Steering Column Pinch Bolt	47 N.m	35 lb ft
Intermediate Shaft to the Steering Gear Pinch Bolt	48 N.m	35 lb ft
Linear Shift Assembly Screws	10 N.m	89 lb in
Shift Lever Screw	20 N.m	15 lb ft
Steering Column Mounting Bolts (Tighten in Sequence)	24 N.m	18 lb ft
Turn Signal Multifunction Switch Screws	1 N.m	9 lb in

SCHEMATIC AND ROUTING DIAGRAMS

COLUMN/IGNITION LOCK SCHEMATICS

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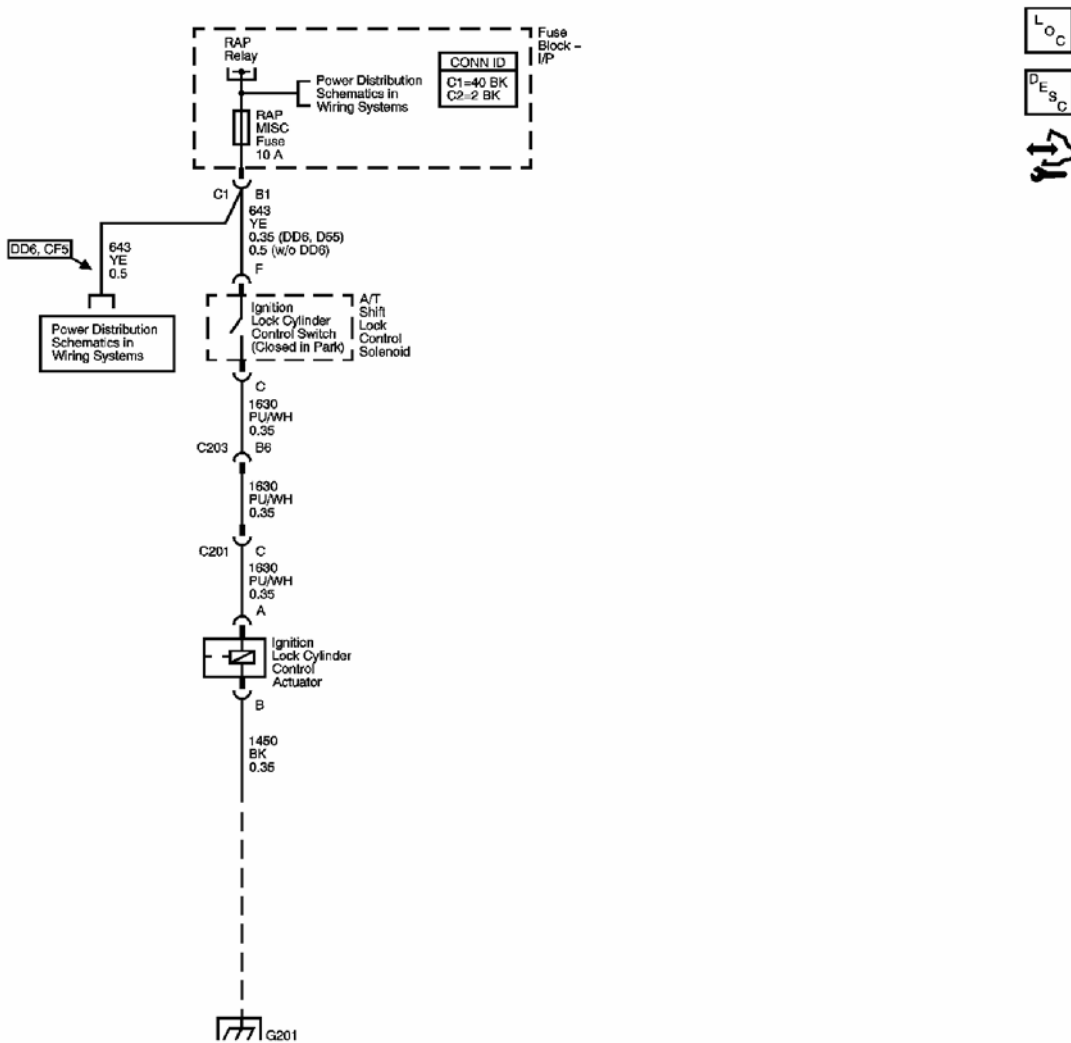


Fig. 1: Column/Ignition Lock Schematics - Wiring Diagram
Courtesy of GENERAL MOTORS CORP.

STEERING WHEEL SCHEMATICS

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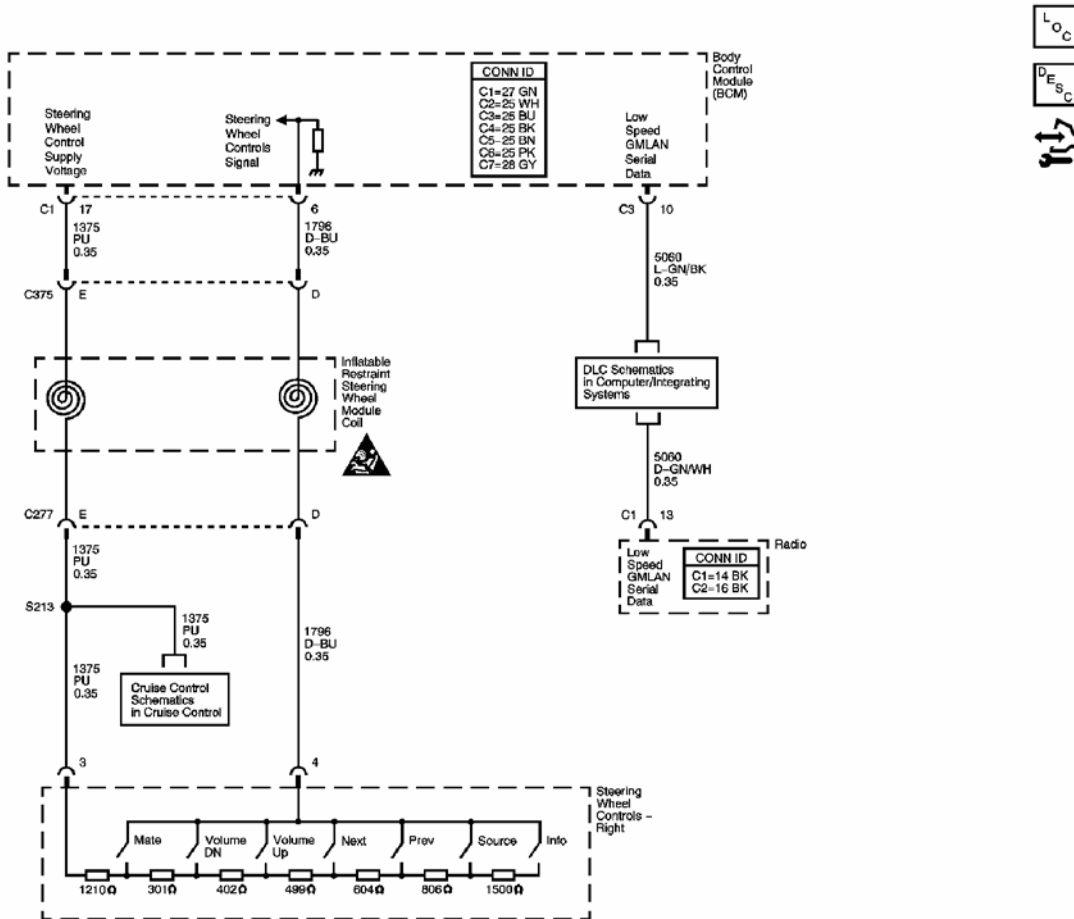


Fig. 2: Steering Wheel Schematics - Wiring Diagram
 Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

STEERING COLUMN DISASSEMBLED VIEW (COLUMN SHIFT)

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

Callouts For Fig. 3

Callout	Component Name
1	Upper Trim Cover
2	Lower Trim Cover
3	Shift Lever Assembly
4	Shift Lever Screw
5	Shift Lever Seal
6	Flanged Prevailing Torque Nut
7	Retaining Ring
8	SIR Coil
9	Wave Washer
10	Bearing Retainer

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11	Shaft Lock Shield Assembly
12	Turn Signal Cancel Cam Assembly
13	Upper Bearing Spring
14	Upper Bearing Inner Race Seat
15	Inner Race
16	Pan Head Tapping Screws
17	TORX® Head Screw
18	Ignition Lock Cylinder Case Assembly
19	Steering Column Lock Cylinder Set
20	Pan Head Tapping Screw
21	Tapping Screws
22	Ignition Switch Assembly
23	Steering Column Tilt Head Housing Assembly
24	Lock Bolt Spring
25	Lock Bolt Assembly
26	Spring Guide
27	Tilt Spring
28	TORX® Head Screw
29	Wire Harness Strap
30	Trim Cover Protector
31	Tilt Knob
32	TORX® Head Screws
33	Pan Head Tapping Screws
34	Turn Signal and Multifunction Switch Assembly
35	Wire Harness Straps
36	Position Assurance Connector
37	Race and Upper Shaft Assembly
38	Joint Preload Spring
39	Centering Sphere
40	Lower Steering Shaft Assembly
41	Linear Shift Assembly
42	Shift Lever Clevis
43	Flat Head 6-Lobed Soc Tap Screws
44	Cable Shift Cam Assembly
45	Ball and Actuator Assembly
46	Cam Bushing
47	Hexagon Flange Head Bolts
48	Gear Shift Lever Assembly Support Bracket

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	Oval Head 6-Lobed Soc Tap Screws
50	Park Lock Cable System
51	TORX® Head Screws
52	Pivot Pins
53	Steering Column Support Assembly
54	Steering Column Jacket Assembly
55	Automatic Transmission Shift Lock Control
56	Adapter and Bearing Assembly
57	Lower Bearing Seat
58	Lower Bearing Spring
59	Lower Spring Retainer
60	Retainer
61	Steering Shaft Seal
62	Intermediate Steering Shaft Assembly
63	Pinch Bolt

STEERING COLUMN DISASSEMBLED VIEW (FLOOR SHIFT)

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Fig. 4: Tilt Steering Column Disassembled View, Floor Shift
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Upper Trim Cover
2	Lower Trim Cover
3	Flanged Prevailing Torque Nut
4	Retaining Ring
5	SIR Coil
6	Wave Washer
7	Bearing Retainer
8	Shaft Lock Shield Assembly
9	Turn Signal Cancel Cam Assembly
10	Upper Bearing Spring

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11	Upper Bearing Inner Race Seat
12	Inner Race
13	Pan Head Tapping Screws
14	TORX® Head Screw
15	Ignition Lock Cylinder Case Assembly
16	Steering Column Lock Cylinder Set
17	Pan Head Tapping Screw
18	Tapping Screws
19	Ignition Switch Assembly
20	Steering Column Tilt Head Assembly
21	Lock Bolt Spring
22	Lock Bolt Assembly
23	Spring Guide
24	Tilt Spring
25	TORX® Head Screw
26	Wire Harness Strap
27	Trim Cover Protector
28	Tilt Knob
29	Pan Head Tapping Screws
30	Pan Head Tapping Screws
31	Turn Signal and Multifunction Switch Assembly
32	Position Assurance Connector
33	Wire Harness Straps
34	Steering Wheel Theft Deterrent Park Lock
35	Race and Upper Shaft Assembly
36	Joint Preload Spring
37	Centering Sphere
38	Lower Shaft Assembly
39	TORX® Head Screws
40	Pivot Pins
41	Steering Column Support Assembly
42	Steering Column Jacket Assembly
43	Adapter and Bearing Assembly
44	Lower Bearing Seat
45	Lower Bearing Spring
46	Lower Spring Retainer
47	Retainer
48	Steering Shaft Seal

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Intermediate Steering Shaft Assembly

50

Pinch Bolt

STEERING WHEEL AND COLUMN COMPONENT VIEWS

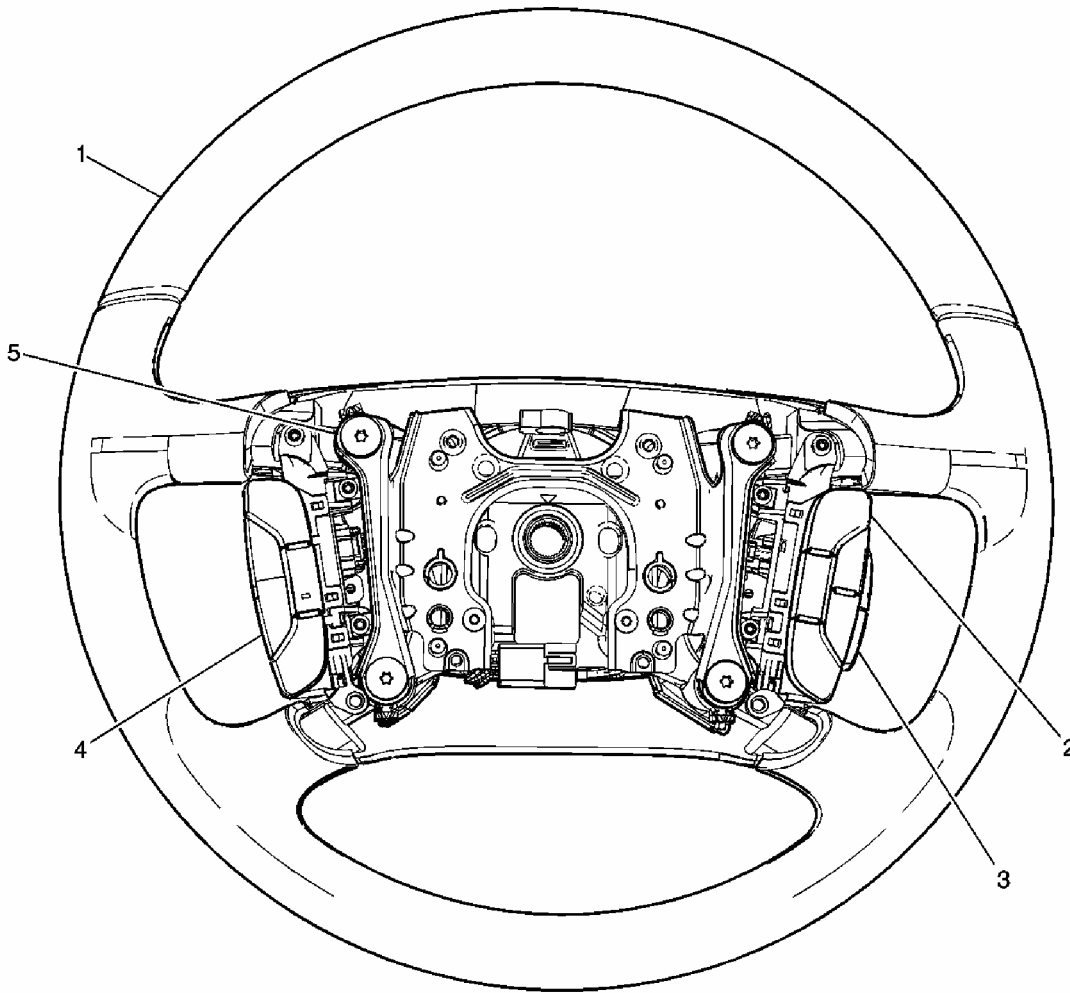


Fig. 5: Steering Wheel Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Steering Wheel
2	Steering Wheel Controls-Right
3	Radio Controls
4	Steering Wheel Control-Right
5	Horn Contact Plate

STEERING WHEEL AND COLUMN CONNECTOR END VIEWS

Ignition Lock Cylinder Control Actuator

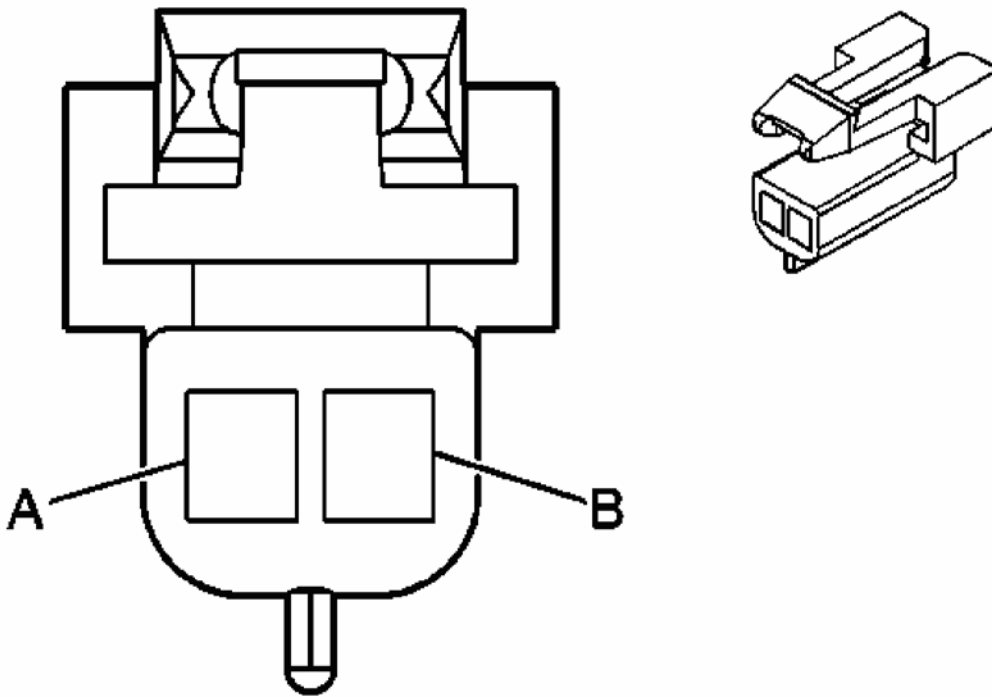


Fig. 6: Connector End Views

Courtesy of GENERAL MOTORS CORP.

Steering Wheel and Column Connector End Views

Connector Part Information

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

Terminal Part Information

- Terminal/Tray: 12064971/5
- Core/Insulation Crimp: E/C
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Ignition Lock Cylinder Control Actuator

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Pin	Wire Color	Circuit No.	Function
A	D-GN/WH	1135	A/T Shift Lock Control Solenoid Supply Voltage
B	BK	1450	Ground
A	PU/WH	1630	Steering Column Key Cylinder Lock Solenoid Control
B	BK	1450	Ground

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - STEERING WHEEL CONTROLS

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

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

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

DTC B3622

DTC Descriptor

DTC B3622 07

Steering Wheel Controls Signal Circuit

Diagnostic Fault Information

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

Circuit/System Description

The body control module (BCM) supplies 12 volts to the audio steering wheel control multiple momentary contact switches and monitors the steering wheel controls signal circuit. Each switch is associated to a set resistance value. When pressed, a specific voltage drop occurs through a series of resistors unique to that switch. The BCM identifies the selection, then sends a serial data message that is received by the component controlled, activating the feature.

Conditions for Running the DTC

Ignition ON

Conditions for Setting the DTC

BCM detects voltage higher than normal

Action Taken When the DTC Sets

BCM will ignore the switch command

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the module ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Diagnostic Aids

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

Reference Information

Schematic Reference

Steering Wheel Schematics

Connector End View Reference

- Steering Wheel and Column Connector End Views
- Computer/Integrating Systems Connector End Views

Electrical Information Reference

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

Circuit/System Testing

**CAUTION: Refer to SIR
Caution .**

1. Ignition OFF, disconnect the harness connector at the audio steering wheel control switch.
2. Ignition ON, connect a test lamp between the steering wheel controls signal circuit and ground at the switch harness connector and verify it does not illuminate.
 - If test lamp illuminates, test the signal circuit for short to voltage. If circuit tests normal, replace the BCM.
3. If circuits tests normal, test or replace the switch.

Component Testing**CAUTION: Refer to SIR
Caution .**

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

Repair Procedures

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

- Steering Wheel Control Switch Assembly Replacement
- Control Module References for BCM replacement, setup, and programming

STEERING WHEEL CONTROLS INOPERATIVE**Diagnostic Fault Information**

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

Circuit/System Description

The body control module (BCM) supplies 12 volts to the audio steering wheel control multiple momentary contact switches and monitors the return signal. Each switch is

associated to a set resistance value, when pressed a specific voltage drop occurs through a series of resistors unique to that switch. The BCM identifies the selection, then sends a serial data message that is received by the component controlled, activating the feature.

Diagnostic Aids

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

Reference Information**Schematic Reference****Steering Wheel Schematics****Connector End View Reference**

- **Steering Wheel and Column Connector End Views**
- **Computer/Integrating Systems Connector End Views**

Electrical Information Reference

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

Circuit/System Testing**CAUTION: Refer to SIR
Caution .**

1. Ignition OFF, disconnect the harness connector at the audio steering wheel control switch.
2. Ignition ON, test for 12 volts between the remote radio control supply voltage circuit and ground at the switch harness connector.
 - If less than 10 volts, test the voltage circuit for a short to ground or an open/high resistance. If circuit test normal, replace the BCM.
3. Ignition ON, connect a test lamp between the signal circuit to the BCM and ground at the switch connector.
 - If test lamp illuminates, test the signal circuit for short to voltage. If circuit test

normal, replace the BCM.

4. Ignition OFF, test for less than 1 ohm of resistance between the signal circuit and ground, at the switch harness connector.
 - o If greater than 1 ohm, test the signal circuit for an open/high resistance. If circuit tests normal, replace the BCM.
5. Ignition OFF, disconnect the harness connector at the BCM and switches.
6. Test for infinite resistance between the signal circuit and ground at the switch harness connector.
 - o If less than infinite resistance, test the signal circuit for a short to ground.
7. If circuit tests normal, test or replace the switch.

Component Testing

CAUTION: Refer to SIR Caution .

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

Repair Procedures

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

- Steering Wheel Control Switch Assembly Replacement
- Control Module References for BCM replacement, setup, and programming

SYMPTOMS - STEERING WHEEL CONTROLS

- IMPORTANT:**
1. **Perform the Diagnostic System Check - Vehicle , before using the Symptom Tables in order to verify that all of the following conditions are true:**
 - There are no DTCs set.
 - The control modules can communicate via the serial

data link.

2. Review the system operation in order to familiarize yourself with the system functions. Refer to **Steering Wheel Controls Description and Operation**.

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

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>Steering Wheel and Column Description and Operation</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
	Inspect the pivot pins for binding.		

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6	Are the pivot pins binding?	Go to Step 10	Go to Step 7
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 Shaft, Lower Bearing, and Jacket Replacement</u> . Is the repair complete?	Go to Step 13	-
10	Replace the pivot pins. Refer to <u>Steering Shaft, Lower Bearing, and 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

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.		

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	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 Key and Lock Cylinder Coding in General Information. Did you complete the repair?	Go to Step 11	-
8	Replace the lock cylinder. Refer to Ignition Lock Cylinder Replacement . Did you complete the repair?	Go to Step 11	-
9	Tighten the ignition lock cylinder case assembly. Refer to Fastener Tightening Specifications . Did you complete the repair?	Go to Step 11	-
10	Replace the ignition switch. Refer to Ignition Switch Replacement . Did you complete the repair?	Go to Step 11	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 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 Steering Wheel and Column Description and Operation
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.		

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	Is the lock cylinder or release button damaged?	Go to Step 7	Go to Step 4
4	Inspect the shift cable 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 steering wheel theft deterrent lock for damage. Is the steering wheel theft deterrent lock damaged?	Go to Step 10	Go to Step 3
7	Replace the lock cylinder. Refer to <u>Ignition Lock Cylinder Replacement</u> . Did you complete the repair?	Go to Step 11	-
8	Adjust the shift cable. Refer to <u>Automatic Transmission Range Selector Cable Adjustment</u> or to <u>Park Lock Cable Adjustment</u> in Automatic Transaxle - 4T65E. Did you complete the repair?	Go to Step 11	-
9	Replace the ignition switch. Refer to <u>Ignition Switch Replacement</u> . Did you complete the repair?	Go to Step 11	-
10	Replace the steering wheel theft deterrent lock. Refer to <u>Steering Wheel Theft Deterrent Lock 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 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

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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 Fastener Tightening Specifications . Did you complete the repair?	Go to Step 9	-
7	Replace the lock cylinder. Refer to Ignition Lock Cylinder Replacement . Did you complete the repair?	Go to Step 9	-
8	Replace the ignition switch. Refer to Ignition Switch Replacement . Did you complete the repair?	Go to Step 9	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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 Steering Wheel and Column Description and Operation
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 for incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to Step 5	Go to Step 4
4	Inspect for a faulty lock cylinder or release button. Is the lock cylinder or release button damaged?	Go to Step 6	Go to Step 3
	Replace the key. Refer to Key and Lock		

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5	Cylinder Coding in General Information. Did you complete the repair?	Go to Step 7	-
6	Replace the lock cylinder. Refer to Ignition Lock Cylinder Replacement . Did you complete the repair?	Go to Step 7	-
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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 Steering Wheel and Column Description and Operation
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 Key and Lock Cylinder Coding in General Information. Did you complete the repair?	Go to Step 11	-
8	Replace the lock cylinder. Refer to Ignition Lock Cylinder Replacement . Did you complete the repair?	Go to Step 11	-
9	Tighten the ignition lock cylinder case assembly. Refer to Fastener Tightening Specifications .		

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	Did you complete the repair?	Go to Step 11	-
10	Replace the ignition switch. Refer to Ignition Switch Replacement . Did you complete the repair?	Go to Step 11	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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 Steering Wheel and Column Description and Operation
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation?	Go to Step 3	System OK
3	Inspect the steering column components for looseness. 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 6	Go to Step 12
6	Inspect the lock plate retaining ring for the correct installation. Is the lock plate retaining ring installed properly?	Go to Step 7	Go to Step 13
7	Inspect the shaft bearing for the following conditions: • Damage • Lubrication • Wear • Proper seating Are the bearings in need of repair or		

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	replacement?	Go to Step 14	Go to Step 8
8	Inspect the spherical joint for lubrication. Is the spherical joint lubricated?	Go to Step 9	Go to Step 15
9	Inspect the steering column coupling for looseness. Is the steering column coupling loose?	Go to Step 16	Go to Step 3
10	NOTE: Refer to <u>Fastener Notice</u> 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 (Coil)</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 Shaft, Lower Bearing, and 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	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 <u>Steering Wheel and Column</u>

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		Go to Step 2	Description and Operation
2	Verify that the steering column is loose. Is the steering column loose?	Go to Step 3	System OK
3	Inspect the steering column mounting brackets for looseness. Are the steering column mounting brackets loose?	Go to Step 8	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 9	Go to Step 5
5	Inspect the support screws for looseness. Are the support screws loose?	Go to Step 10	Go to Step 6
6	Inspect the intermediate shaft for worn joints or looseness. Is the intermediate joint worn or loose?	Go to Step 11	Go to Step 7
7	Inspect the tilt head, support and pivot pins for looseness. Are there any loose components?	Go to Step 12	Go to Step 2
8	NOTE: Refer to <u>Fastener Notice</u> in Cautions and Notices. Tighten the brackets to specifications. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 13	-
9	Replace the jacket assembly. Refer to <u>Steering Shaft, Lower Bearing, and Jacket Replacement</u> . Did you complete the replacement?	Go to Step 13	-
10	Tighten the support screws to specifications. Refer to <u>Fastener Tightening Specifications</u> . Did you complete the repair?	Go to Step 13	-
11	Tighten or replace the intermediate shaft as needed. Refer to <u>Intermediate Steering Shaft Replacement</u> . Did you complete the repair?	Go to Step 13	-
12	Repair or replace the tilt head, support and pivot pins as necessary. Refer to <u>Steering Shaft, Lower Bearing, and Jacket Replacement</u> .		

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	Did you complete the replacement?	Go to Step 13	-
13	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

1. Turn the ignition OFF and remove the key from the ignition lock cylinder in order to lock the steering column.
2. Remove the intermediate shaft seal from the steering column.
3. Disconnect the intermediate shaft from the steering column. Refer to **Intermediate Steering Shaft Replacement**.
4. Push the intermediate shaft down in order to collapse the intermediate shaft.

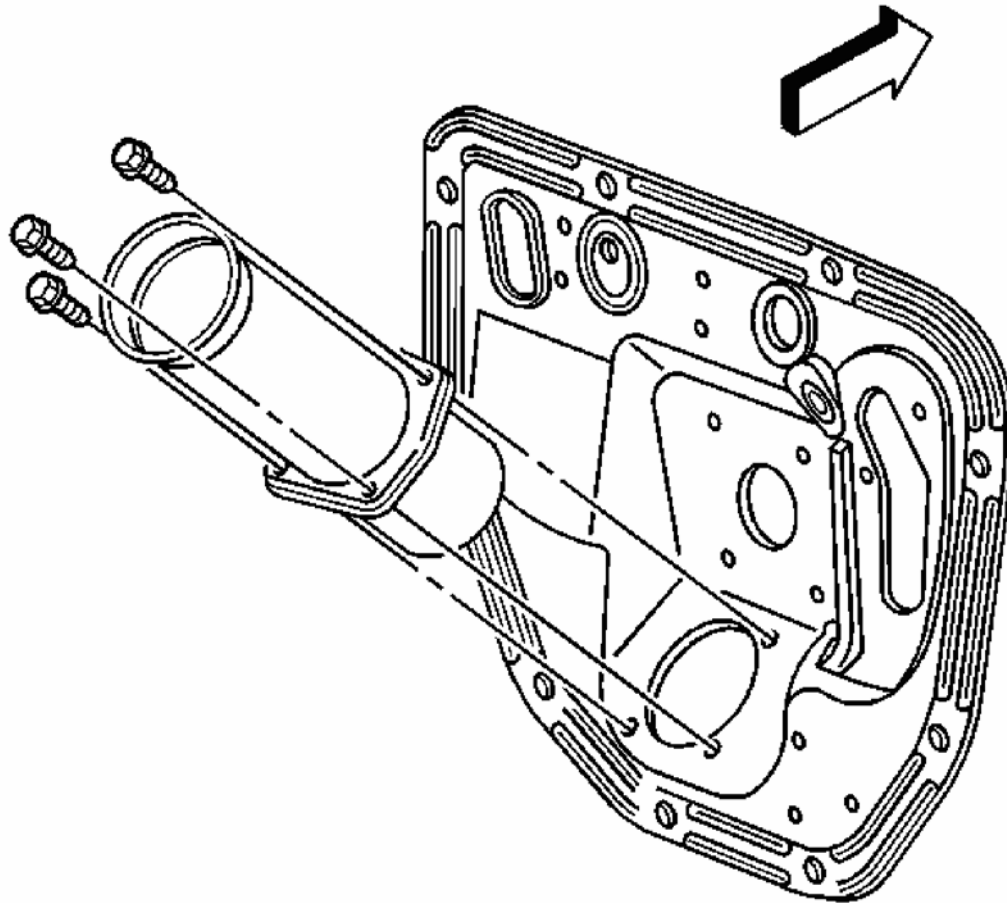


Fig. 7: Locating Intermediate Shaft Seal Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the intermediate shaft seal bolts.

IMPORTANT: It may be necessary to remove the lower portion of the intermediate shaft seal from the steering gear.

6. Remove the intermediate shaft seal.

Installation Procedure

1. Install the intermediate shaft lower seal over the intermediate shaft and to the steering gear.
2. Install the intermediate shaft upper seal over the lower seal and to the instrument panel.
3. Connect the intermediate shaft to the steering column. Refer to **Intermediate Steering**

Shaft Replacement.

4. Install the intermediate shaft seal to the steering column.

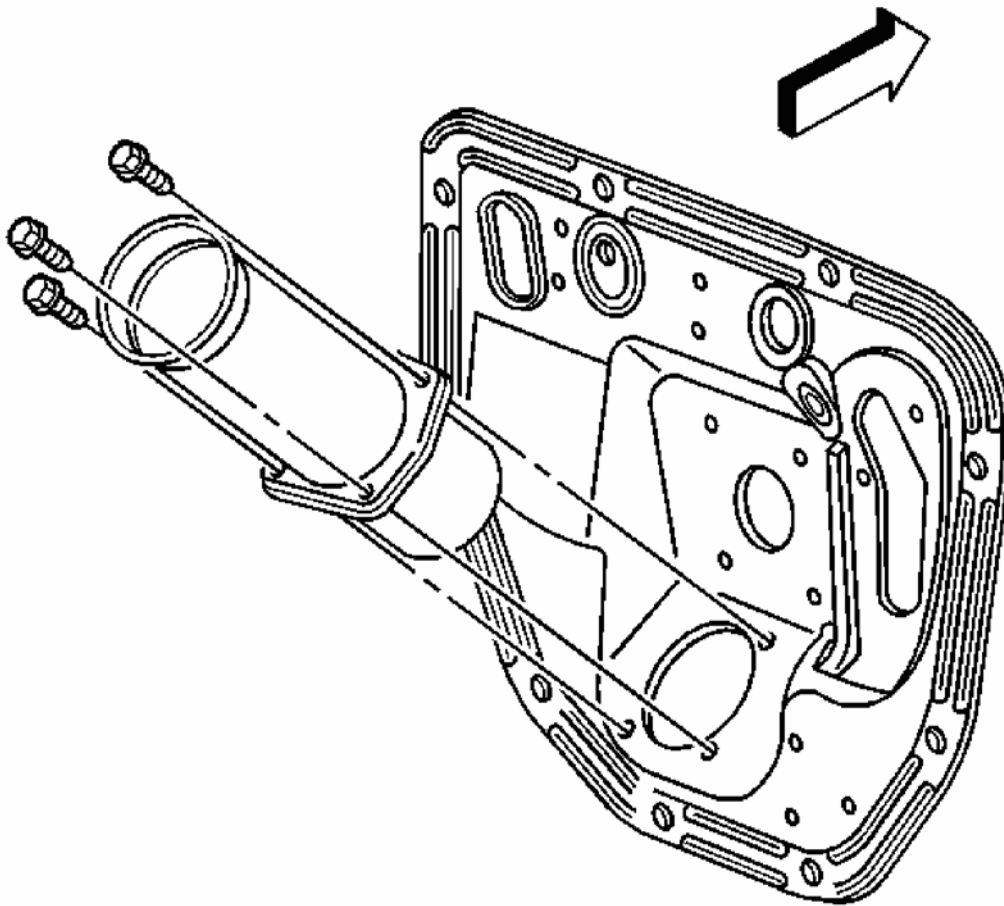


Fig. 8: Locating Intermediate Shaft Seal Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

5. Install the intermediate shaft seal bolts.

Tighten: Tighten the intermediate shaft seal bolts to 3 N.m (27 lb in).

INTERMEDIATE STEERING SHAFT REPLACEMENT

Tools Required

J 42640 Steering Column Anti-Rotation Pin

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
2. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation in Tires and Wheels.

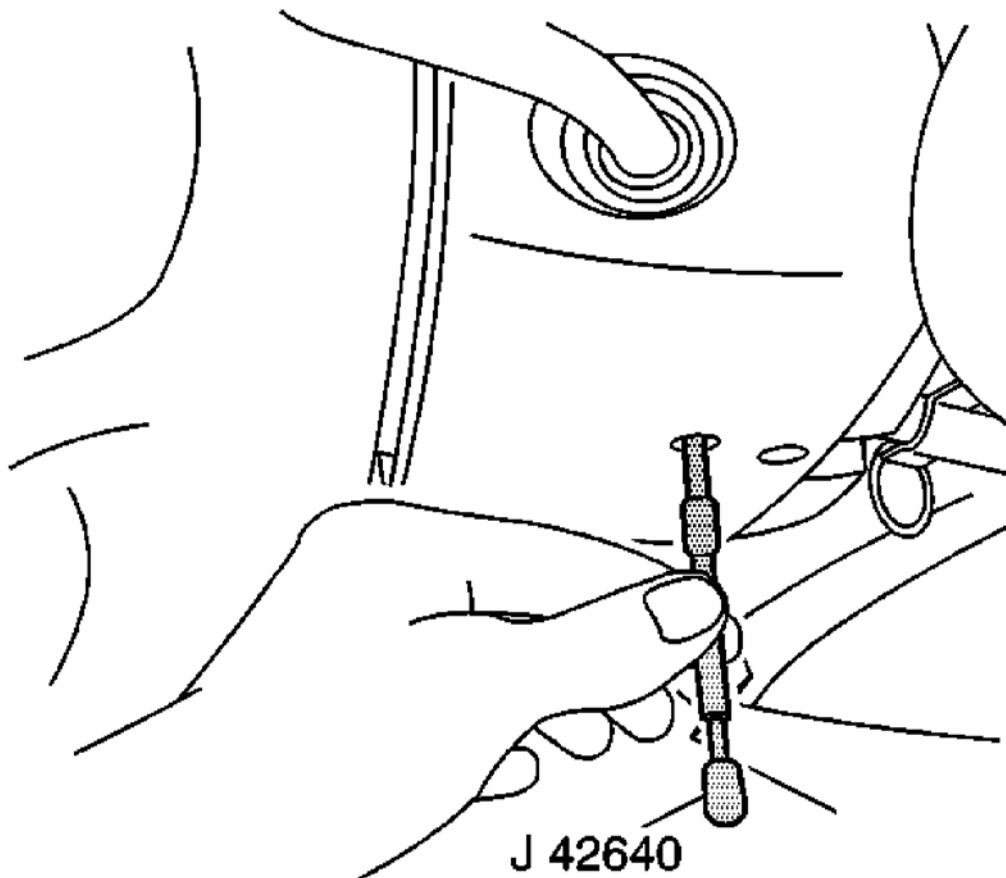


Fig. 9: Identifying J 42640

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.

3. Install **J 42640** into the bottom of the steering column.

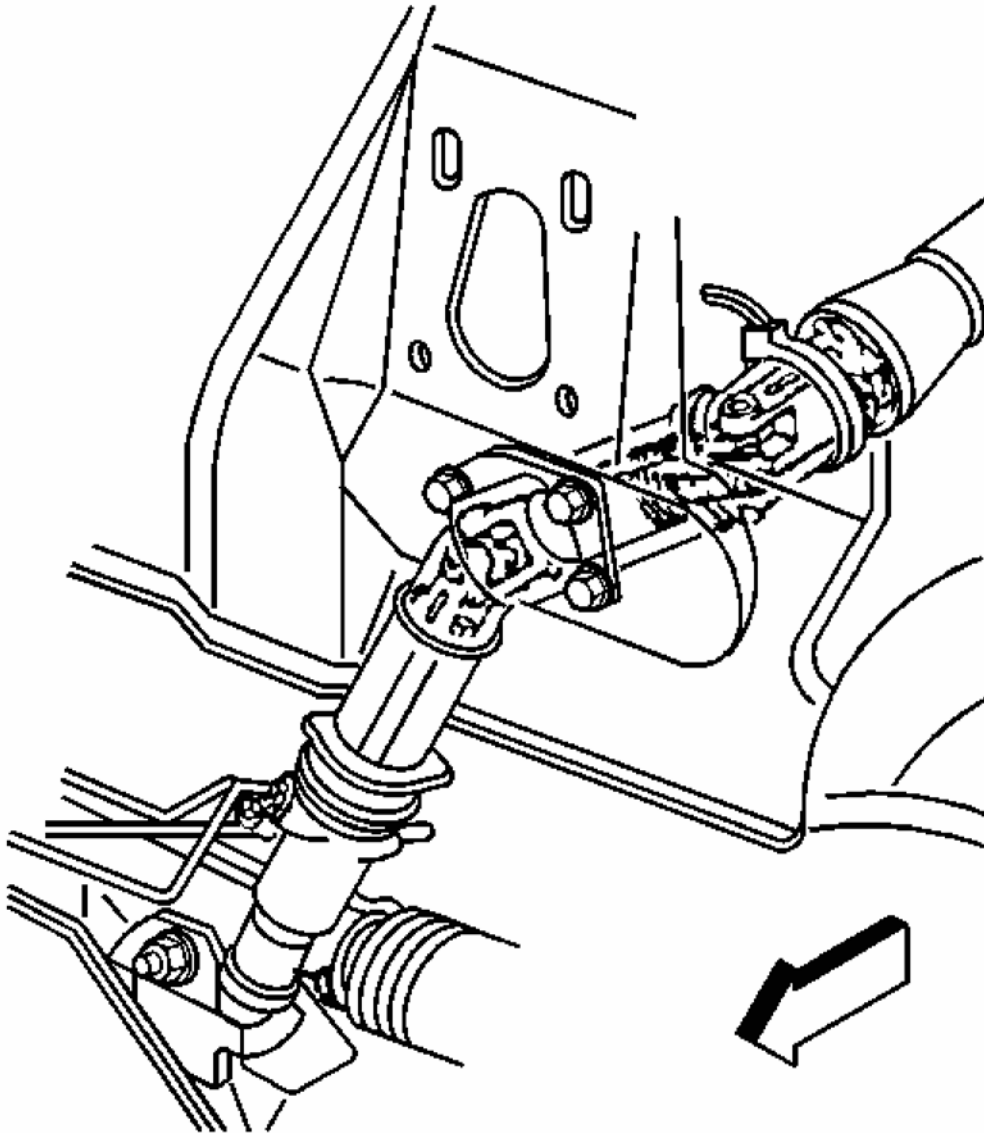


Fig. 10: Providing Access To Intermediate Steering Shaft Lower Pinch Bolt
Courtesy of GENERAL MOTORS CORP.

4. Position the intermediate steering shaft seal in order to provide access to the lower pinch bolt.

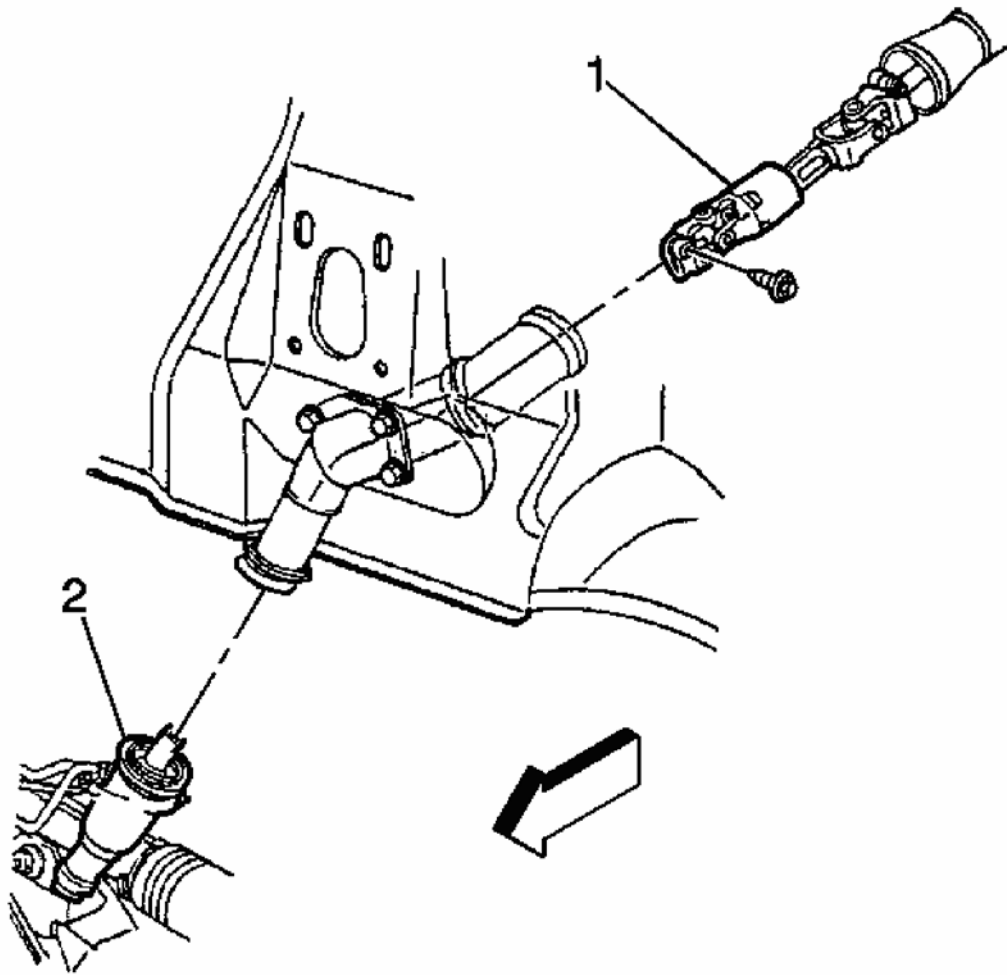


Fig. 11: View Of Intermediate Steering Shaft To Power Steering Gear Stub Shaft
Courtesy of GENERAL MOTORS CORP.

5. Remove the lower pinch bolt from the power steering gear stub shaft (2).
6. Remove the intermediate steering shaft (1) from the power steering gear stub shaft (2).
7. Lower the vehicle.
8. Remove the left instrument panel insulator. Refer to **Closeout/Insulator Panel Replacement - Left** in Instrument Panel, Gages and Console.

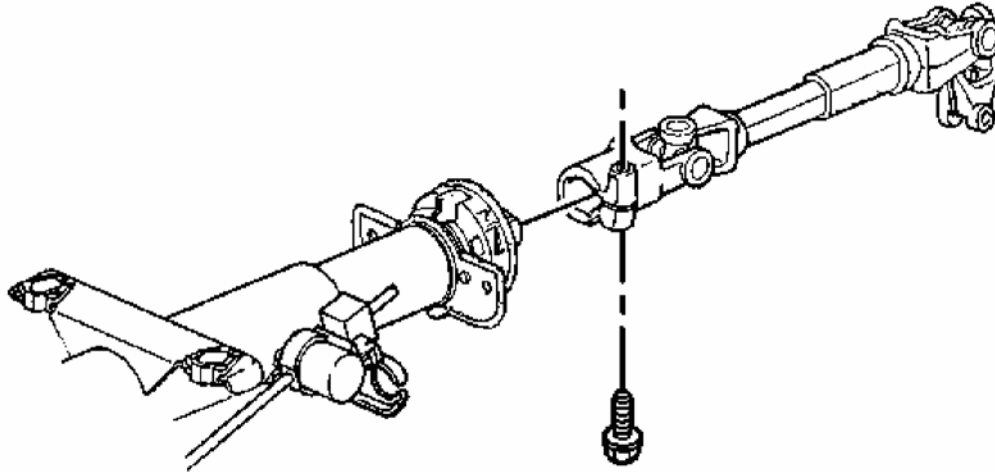


Fig. 12: View Of Upper Pinch Bolt Of Intermediate Steering Shaft
Courtesy of GENERAL MOTORS CORP.

9. Reposition the intermediate steering shaft seal in order to gain access to the upper pinch bolt.
10. Remove the upper pinch bolt from the intermediate steering shaft.
11. Disconnect the intermediate steering shaft from the steering column.
12. Remove the intermediate steering shaft.

Installation Procedure

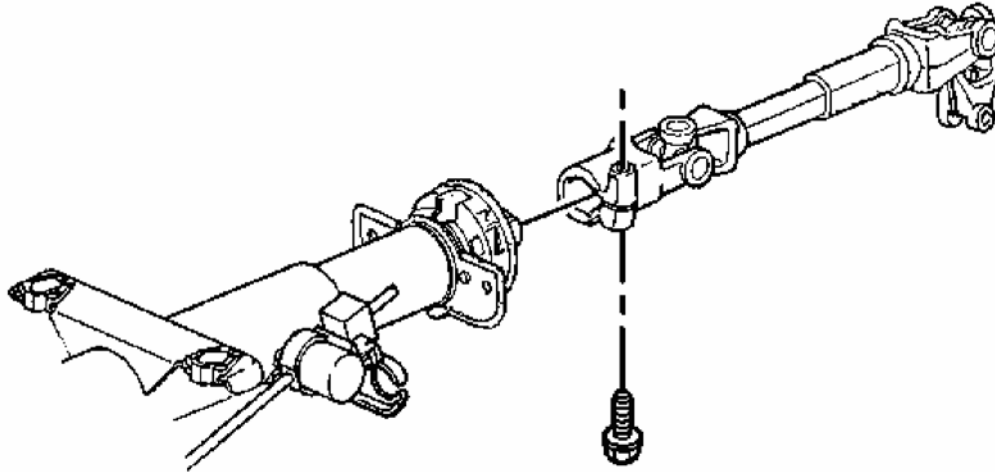


Fig. 13: View Of Upper Pinch Bolt Of Intermediate Steering Shaft
Courtesy of GENERAL MOTORS CORP.

1. Position the intermediate steering shaft into place.

NOTE: Refer to Fastener Notice in Cautions and Notices.

Install the upper pinch bolt which secures the intermediate steering shaft to the steering column.

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

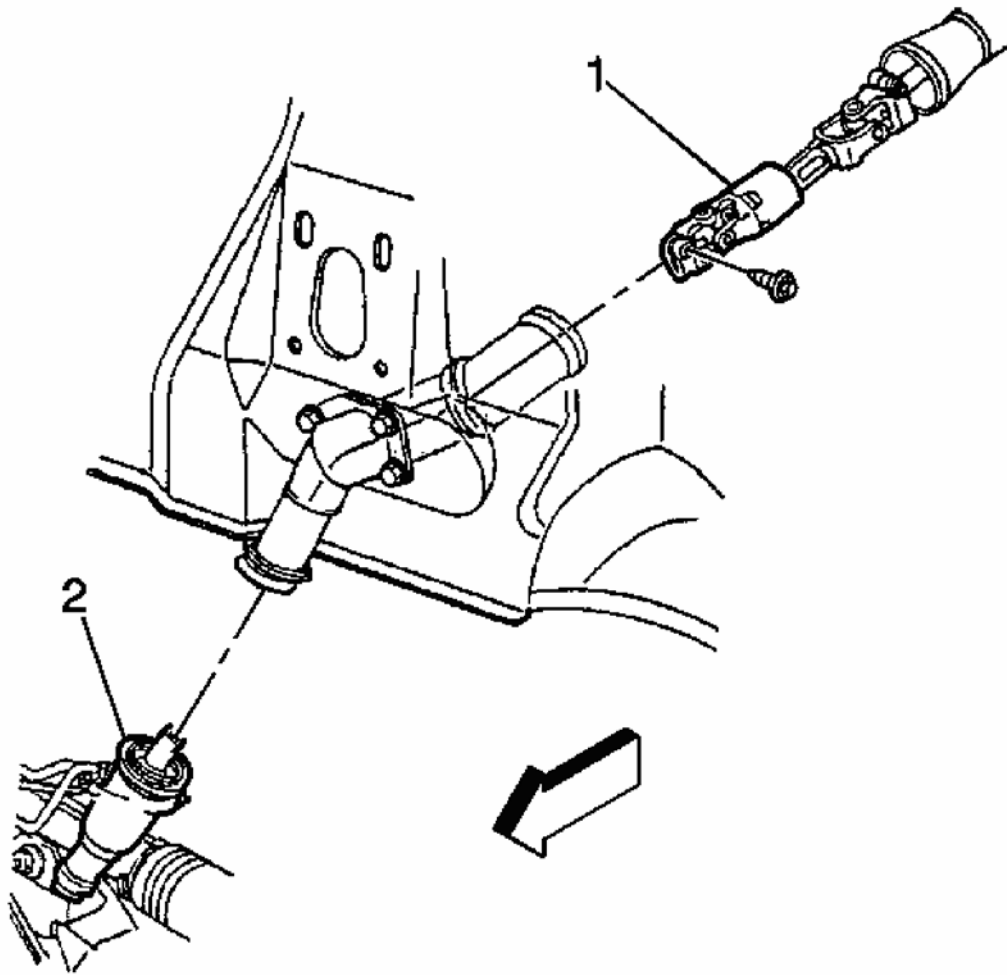


Fig. 14: View Of Intermediate Steering Shaft To Power Steering Gear Stub Shaft
Courtesy of GENERAL MOTORS CORP.

2. Install the intermediate steering shaft seal onto the steering column.
3. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
4. Install the intermediate steering shaft (1) to the power steering gear stub shaft (2).
5. Install the lower pinch bolt which secures the intermediate steering shaft to the power steering gear stub shaft.

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

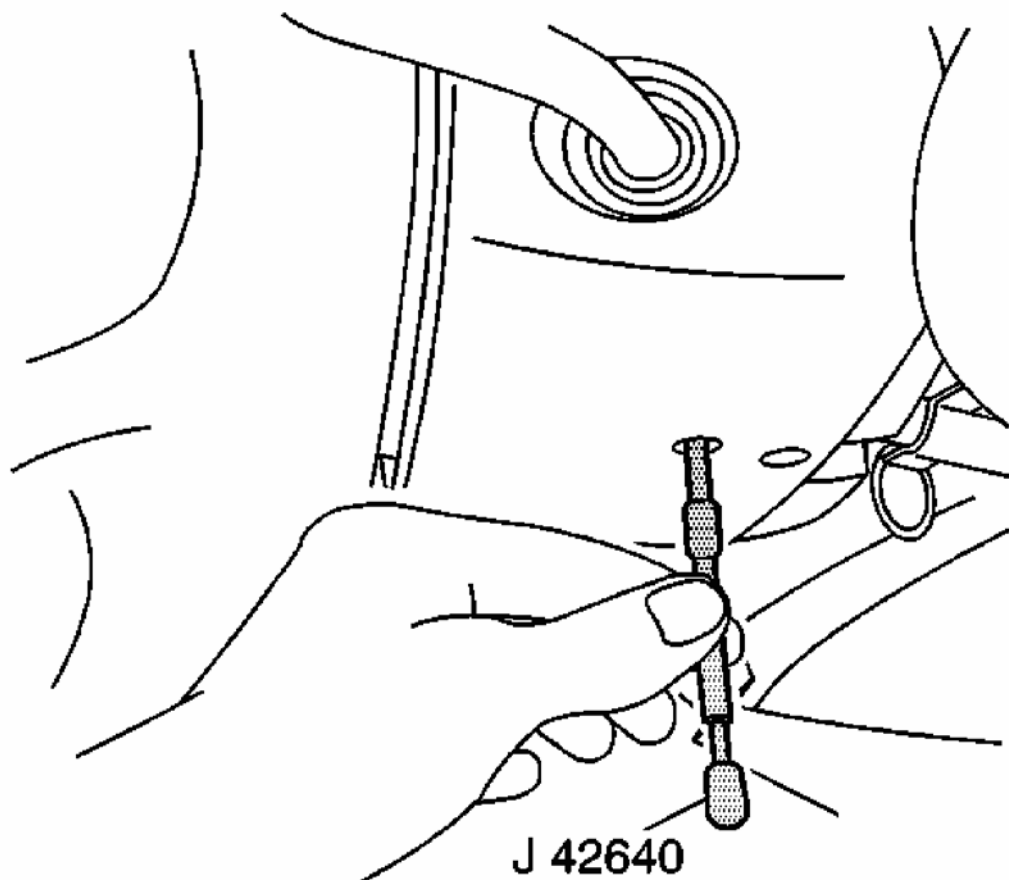


Fig. 15: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

6. Remove the **J 42640** from the steering column.

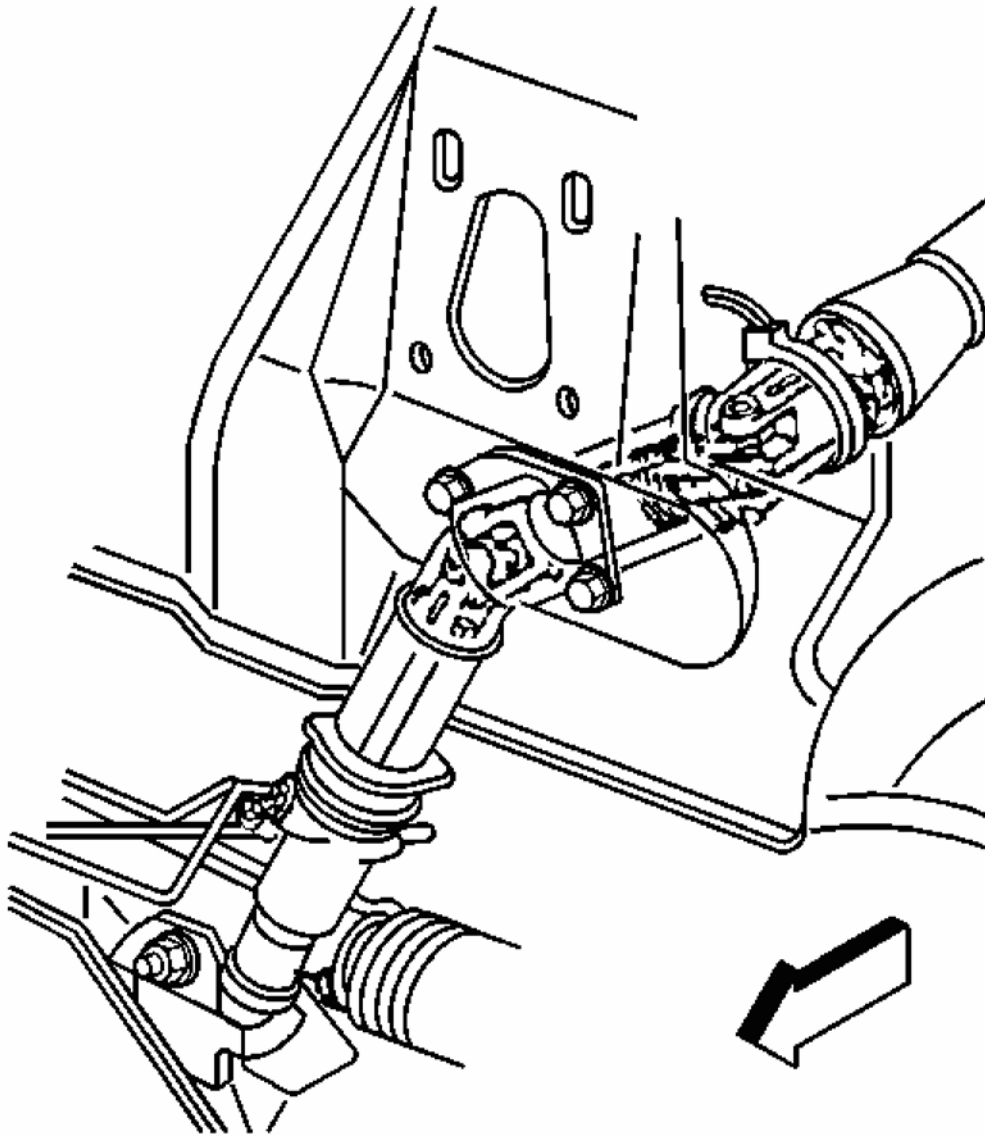


Fig. 16: Providing Access To Intermediate Steering Shaft Lower Pinch Bolt
Courtesy of GENERAL MOTORS CORP.

7. Install the intermediate steering shaft seal onto the power steering gear.
8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
9. Lower the vehicle.
10. Install the left instrument panel insulator. Refer to **Closeout/Insulator Panel Replacement - Left** in Instrument Panel, Gages and Console.

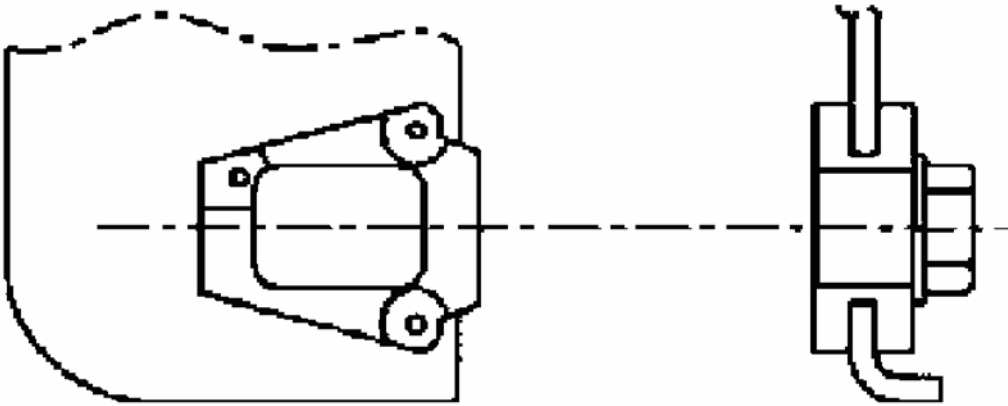
STEERING COLUMN ACCIDENT DAMAGE INSPECTION

Fig. 17: Inspecting Capsules On Steering Column Bracket Assembly
Courtesy of GENERAL MOTORS CORP.

- NOTE:** Vehicles involved in accidents that result in any of the following kinds of damage or situations, may also have a damaged or misaligned steering column:
- **Frame damage**
 - **Major body damage**
 - **Sheet metal damage**
 - **If the steering column has been impacted**
 - **If the supplemental inflatable restraints system was deployed**
- Inspect the capsules on the steering column bracket assembly. All capsules must be securely seated in the bracket slots and inspected 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.

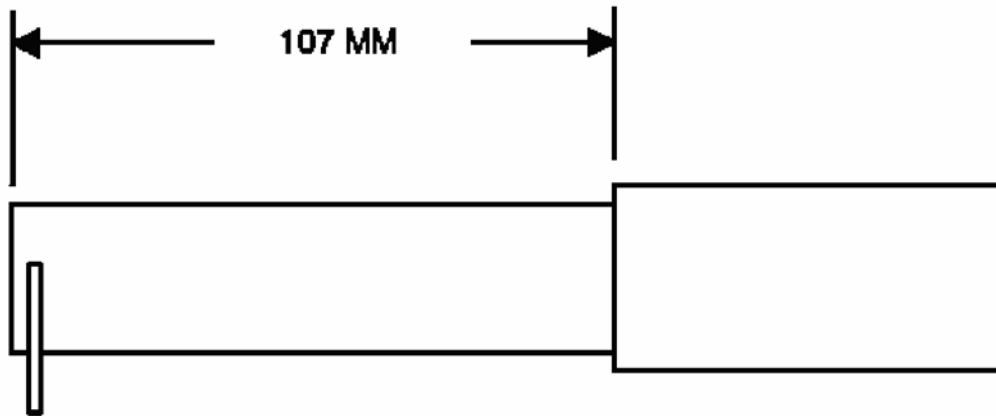


Fig. 18: Measuring Distance From Lower Edge Of Upper Jacket To A Defined Point On Lower Jacket

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.

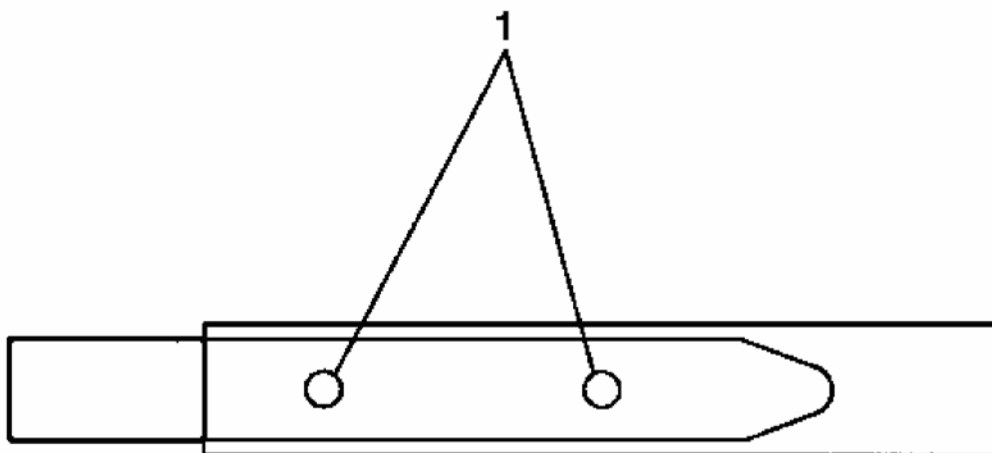


Fig. 19: Inspecting Steering Shaft For Sheared Injected Plastic
Courtesy of GENERAL MOTORS CORP.

- Visually inspect the steering shaft for sheared injected plastic (1). If the steering shaft shows sheared plastic (1), 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 (0.06 in).

STEERING COLUMN TRIM COVERS 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.

CAUTION: Refer to BATTERY DISCONNECT CAUTION in Cautions and Notices.

2. Disconnect the battery negative cable. Refer to Battery Negative Cable Disconnect/Connect Procedure (RPOs LZE/LZ4/LZ9) or Battery Negative Cable Disconnect/Connect Procedure (RPO LS4) in Engine Electrical.
3. Remove the steering wheel. Refer to Steering Wheel Replacement.
4. Remove the steering column filler. Refer to Steering Column Filler Replacement in Instrument Panel, Gages, and Console.

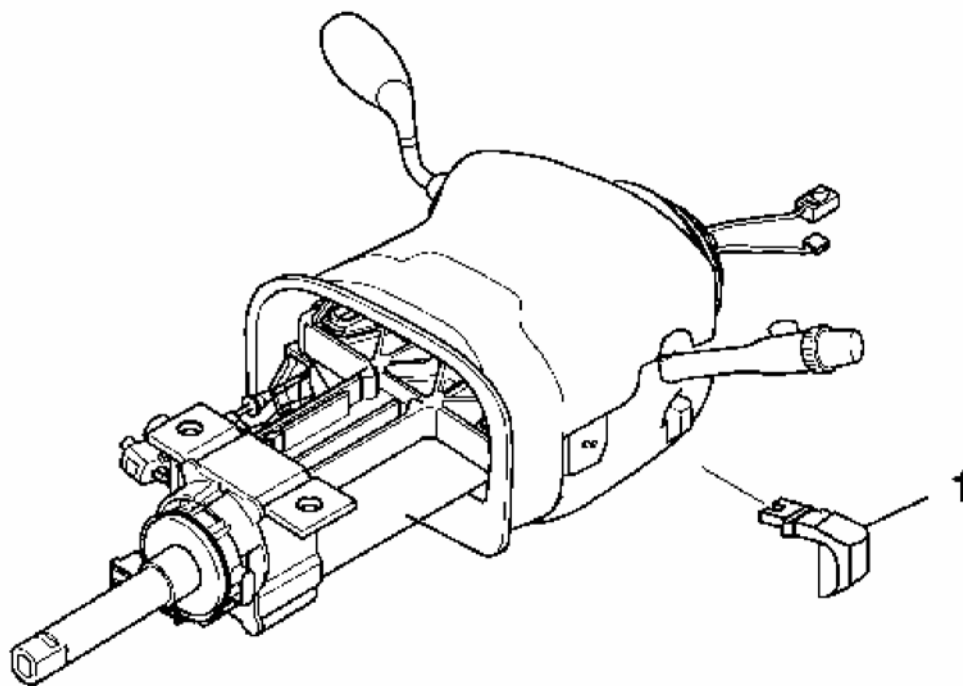


Fig. 20: View Of Tilt Lever
Courtesy of GENERAL MOTORS CORP.

5. Remove the tilt lever (1).

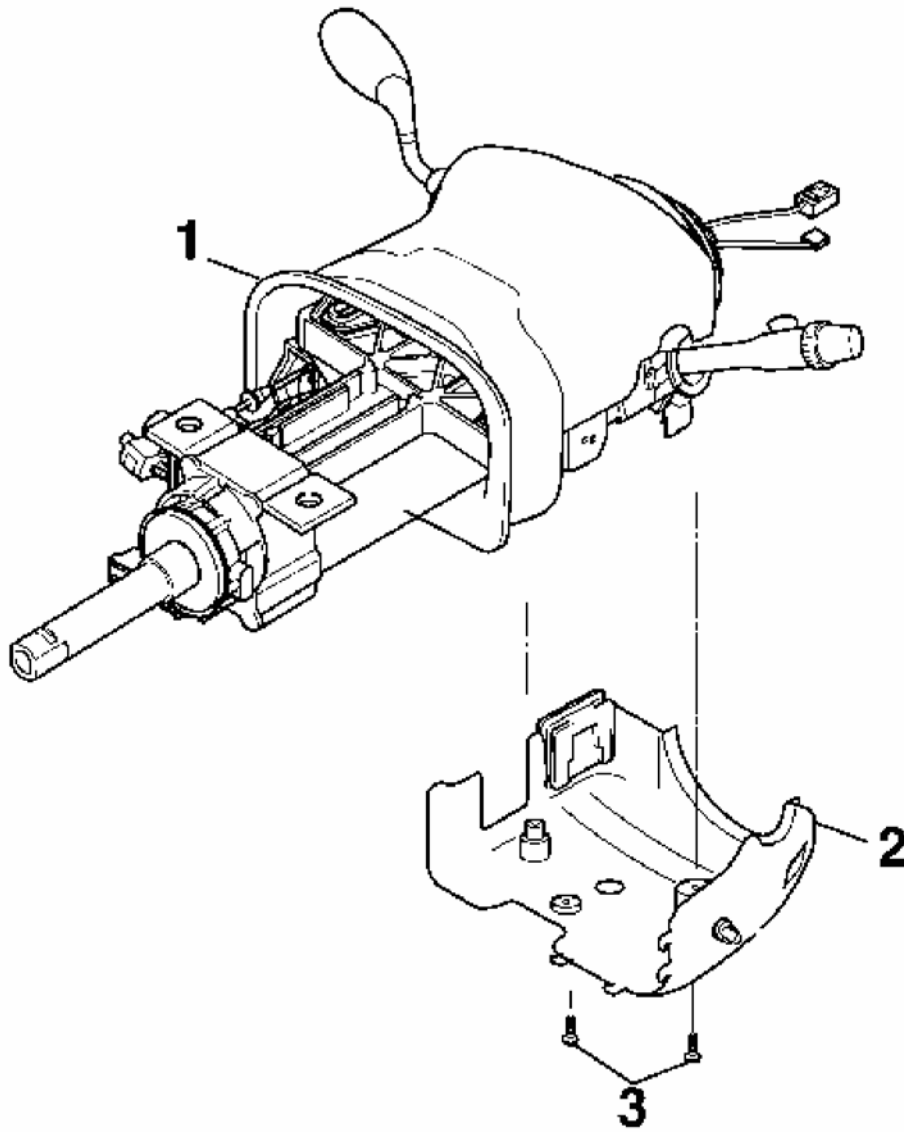


Fig. 21: View Of Lower Steering Column Trim Cover & Screws
Courtesy of GENERAL MOTORS CORP.

6. Remove the retaining screws (3) from the lower steering column trim cover.
7. Disconnect the closeout shroud from the lower steering column trim cover.

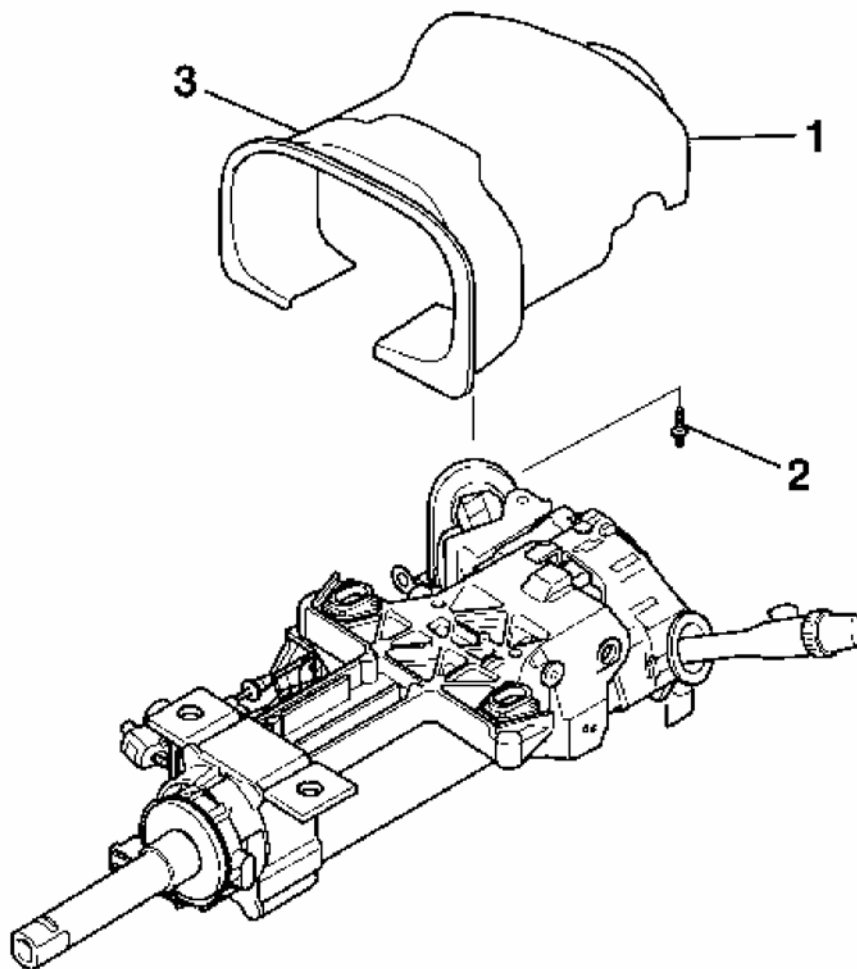


Fig. 22: View Of Upper Steering Column Trim Cover & Screw
Courtesy of GENERAL MOTORS CORP.

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

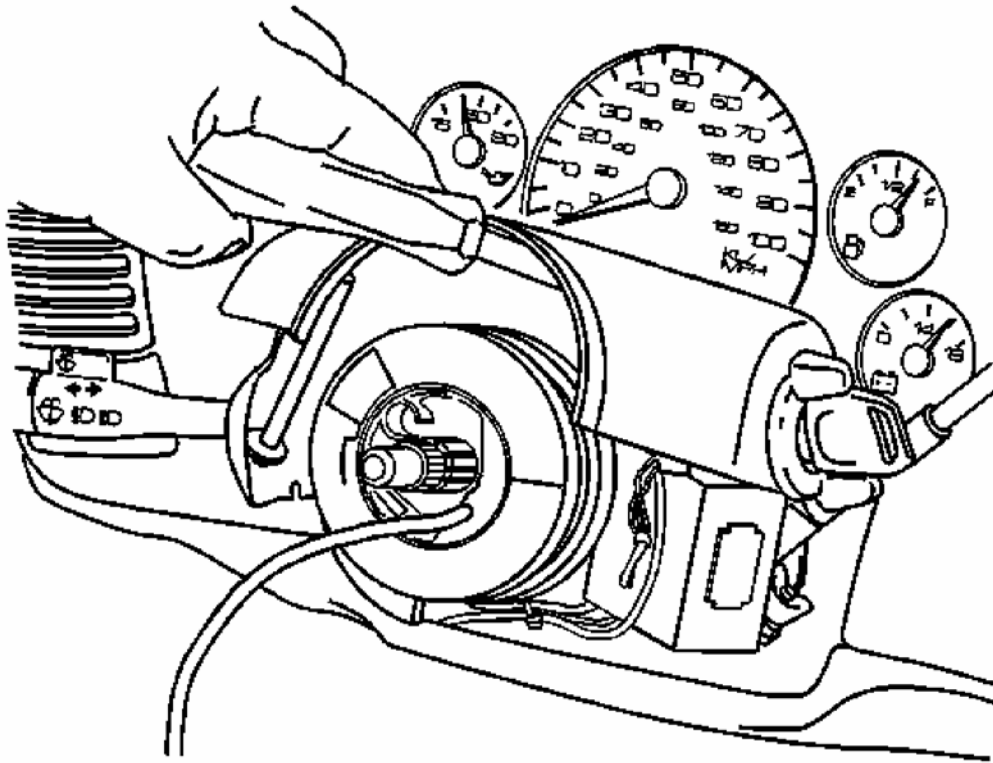


Fig. 23: View of Lock Cylinder Access Hole
Courtesy of GENERAL MOTORS CORP.

9. Lift the upper trim cover to gain access to the lock cylinder access hole.
10. Using a bent tip awl, insert the tip into the access hole in the ignition lock cylinder.

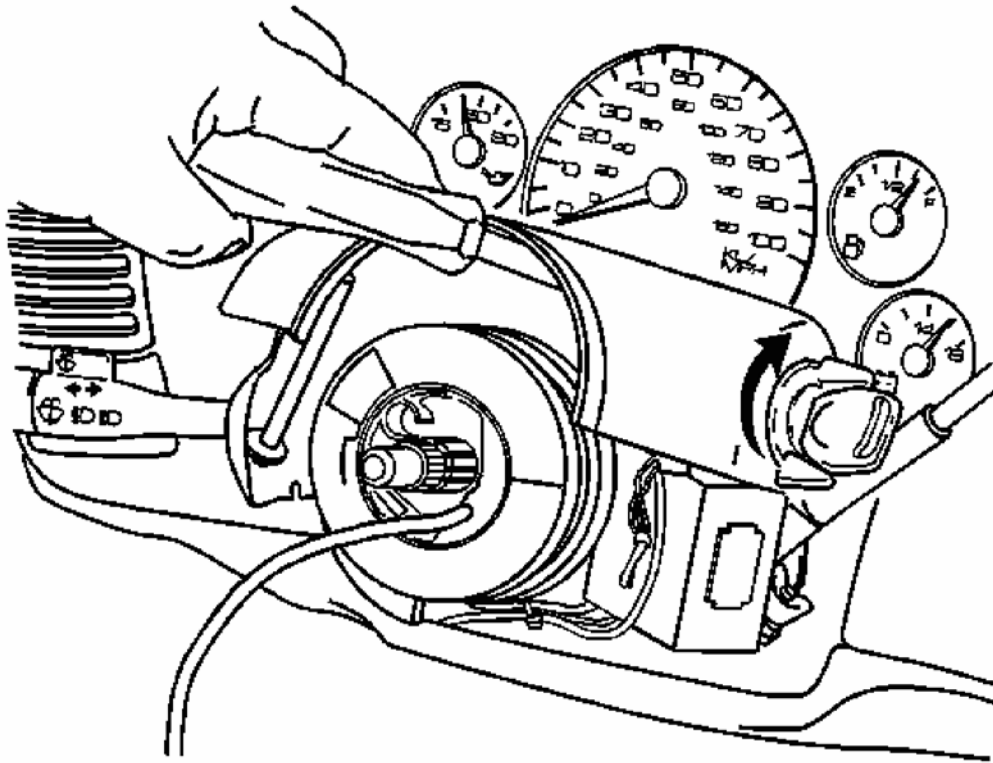


Fig. 24: View of Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

11. Turn the ignition lock cylinder to the START position.
12. Using the bent tip awl push down on the retaining pin of the ignition lock cylinder.
13. Release the ignition lock cylinder to the RUN position and remove the lock cylinder.
14. Remove the upper trim cover.
15. Remove the closeout shroud from the upper trim cover.

Installation Procedure

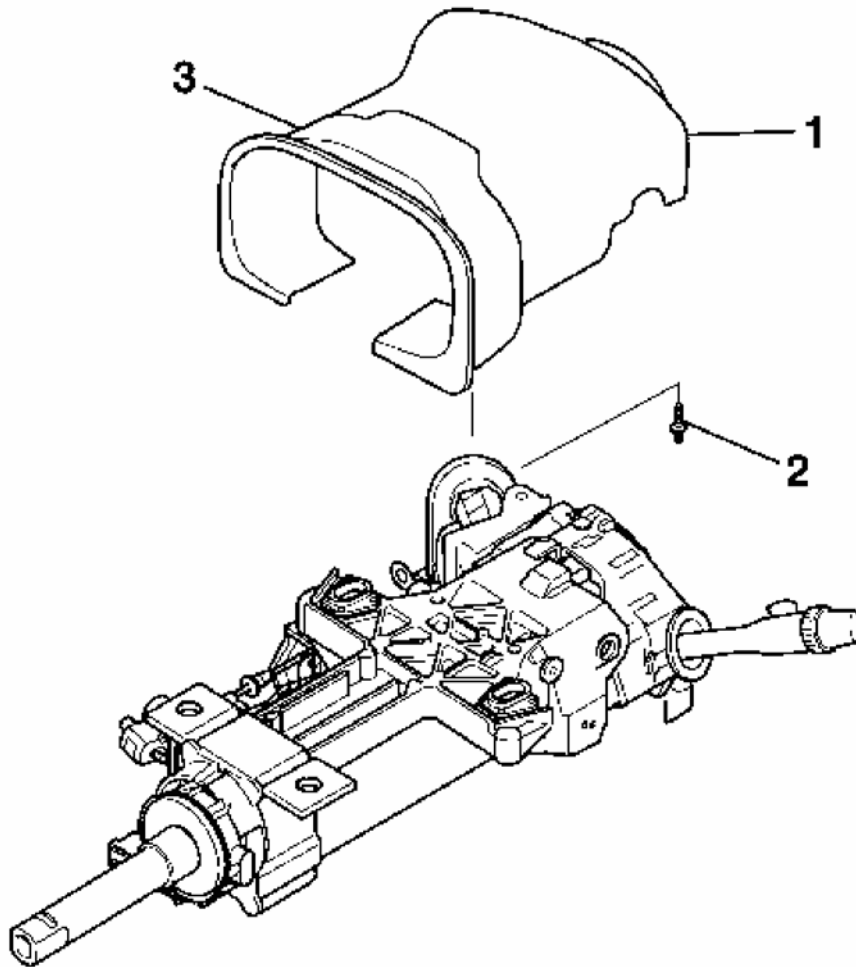


Fig. 25: View Of Upper Steering Column Trim Cover & Screw
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the retaining screw (2) to the upper steering column trim cover.

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

4. Install the Ignition lock cylinder.

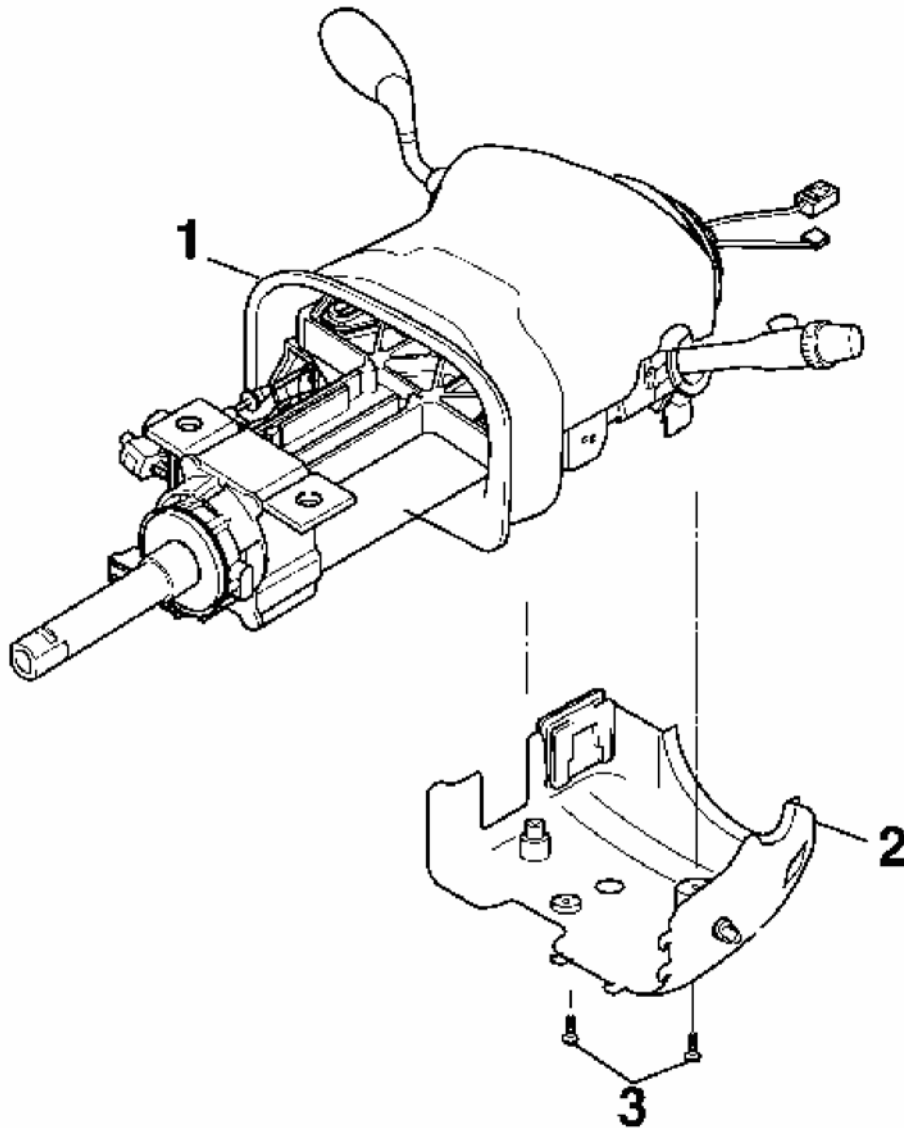


Fig. 26: View Of Lower Steering Column Trim Cover & Screws
Courtesy of GENERAL MOTORS CORP.

5. Install the lower trim cover (2) and ensure that the tabs engage with the tabs on the upper trim cover (1). Snap the tabs together.
6. Connect the lower steering column trim cover to the closeout shroud.
7. Install the retaining screws (3) to the lower steering column trim cover.

Tighten: Tighten the screws to 3 N.m (27 lb in).

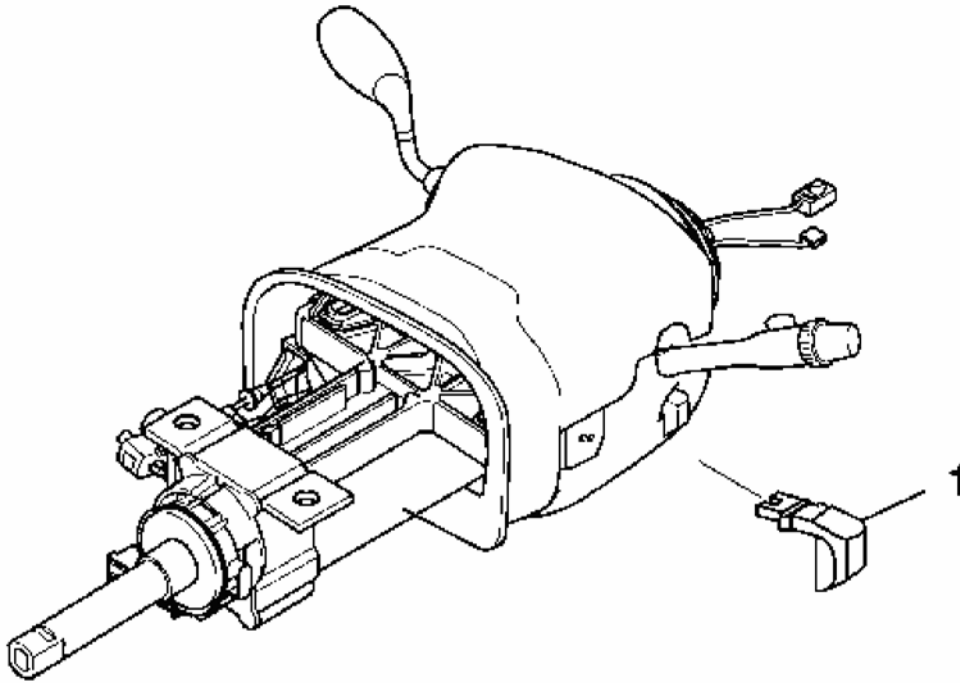


Fig. 27: View Of Tilt Lever
Courtesy of GENERAL MOTORS CORP.

8. Install the tilt lever (1).
9. Install the steering column filler. Refer to Steering Column Filler Replacement in Instrument Panel, Gages, and Console.
10. Install the steering wheel. Refer to Steering Wheel Replacement.
11. Connect the battery negative cable. Refer to Battery Negative Cable Disconnect/Connect Procedure (RPOs LZE/LZ4/LZ9) or Battery Negative Cable Disconnect/Connect Procedure (RPO LS4) in Engine Electrical.
12. 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 **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 ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.

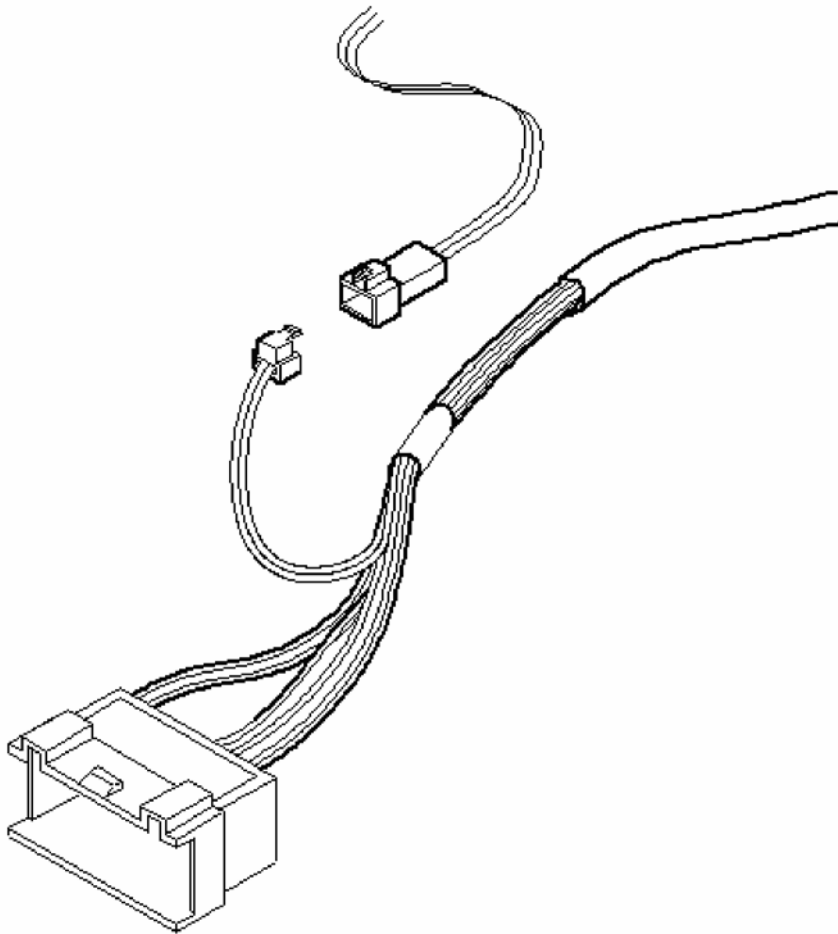


Fig. 28: Disconnecting/Reconnecting Theft Deterrent Control Module Connector
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the theft deterrent control module connector.
5. Disconnect the fused jumper assembly connector.

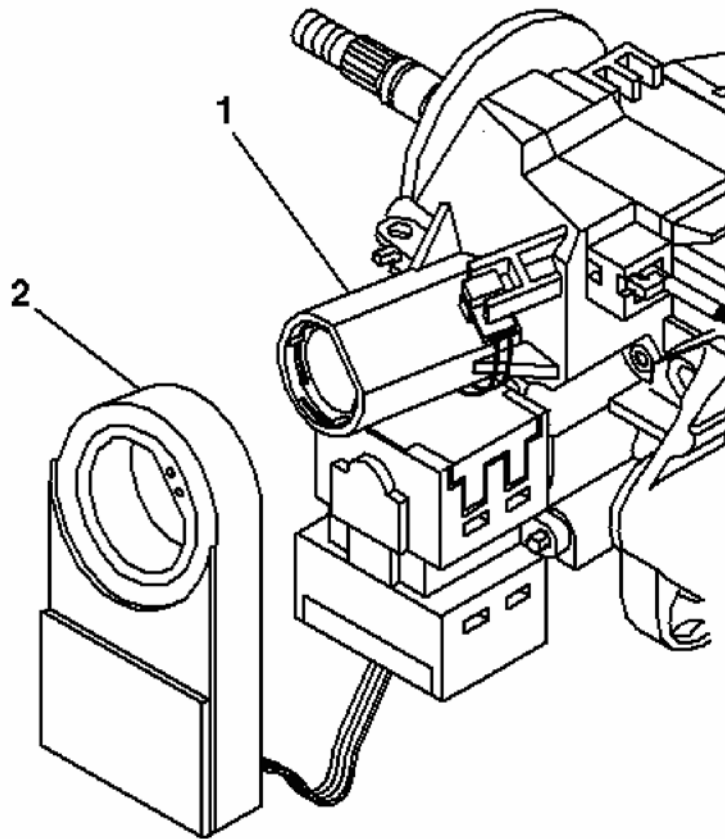


Fig. 29: Locating Theft Deterrent Module & Ignition Lock Cylinder Case Assembly

Courtesy of GENERAL MOTORS CORP.

6. Slide the theft deterrent control module (2) from the ignition lock cylinder case (1).

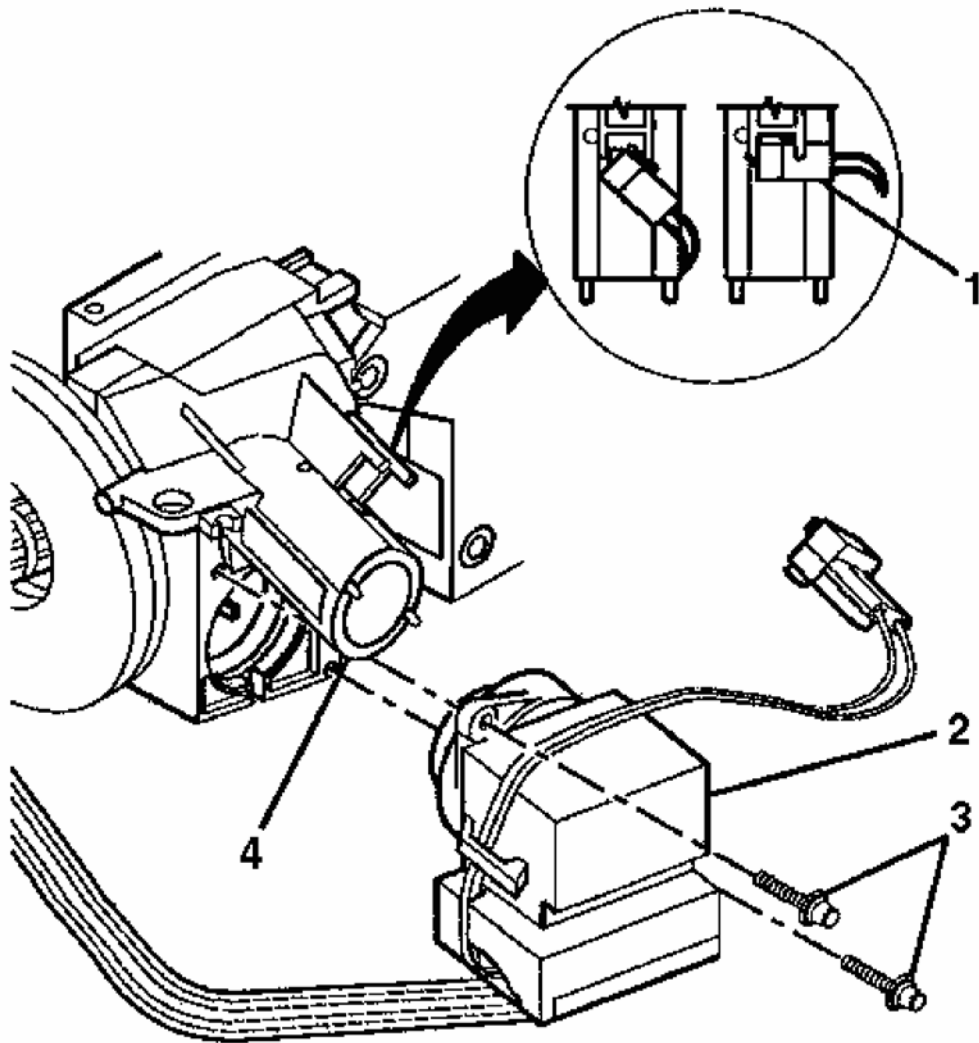


Fig. 30: Removing/Installing Key Alarm Connector To/From Ignition Lock Cylinder Case

Courtesy of GENERAL MOTORS CORP.

7. Remove the key alarm connector (1) from the ignition lock cylinder case (4).
8. Remove the 2 tapping screws (3) from the ignition switch assembly (2).

Installation Procedure

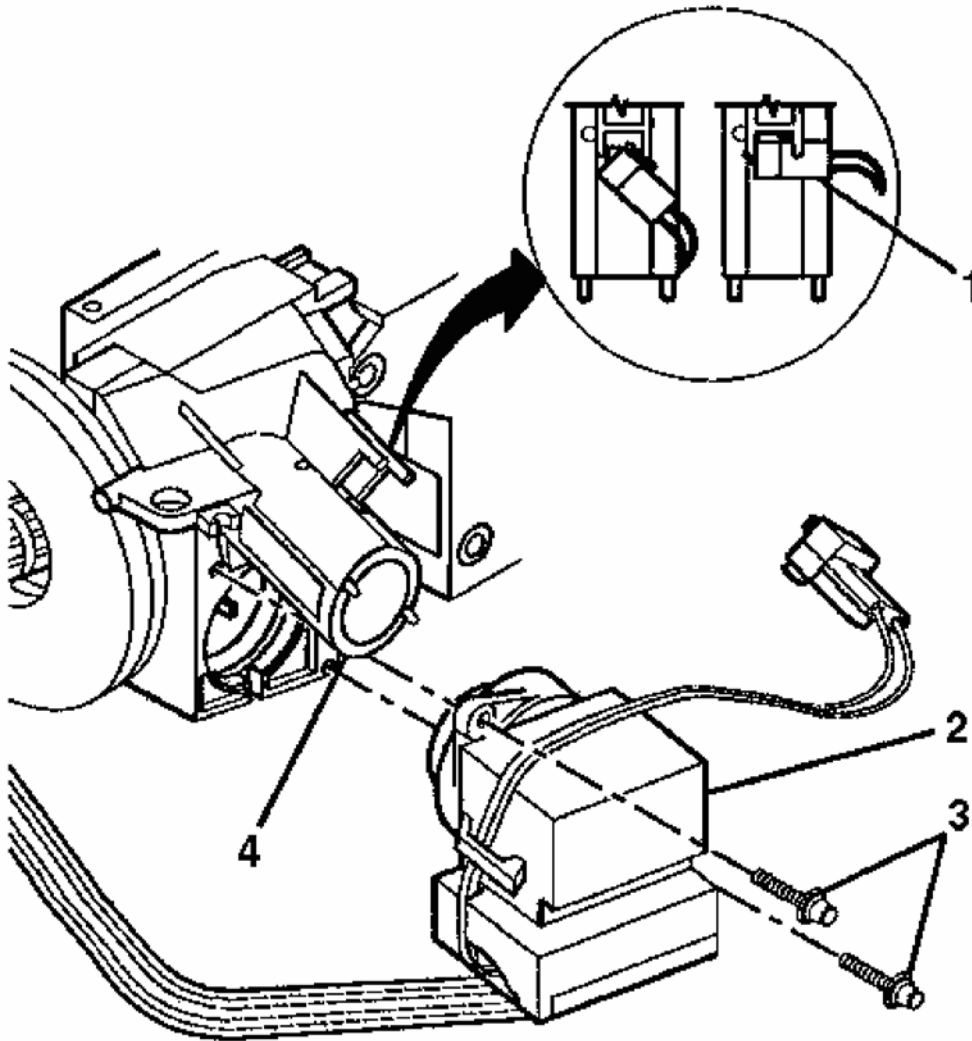


Fig. 31: Removing/Installing Key Alarm Connector To/From Ignition Lock Cylinder Case

Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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

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

2. Install the ignition switch assembly connector (1) onto the ignition lock cylinder case

(4).

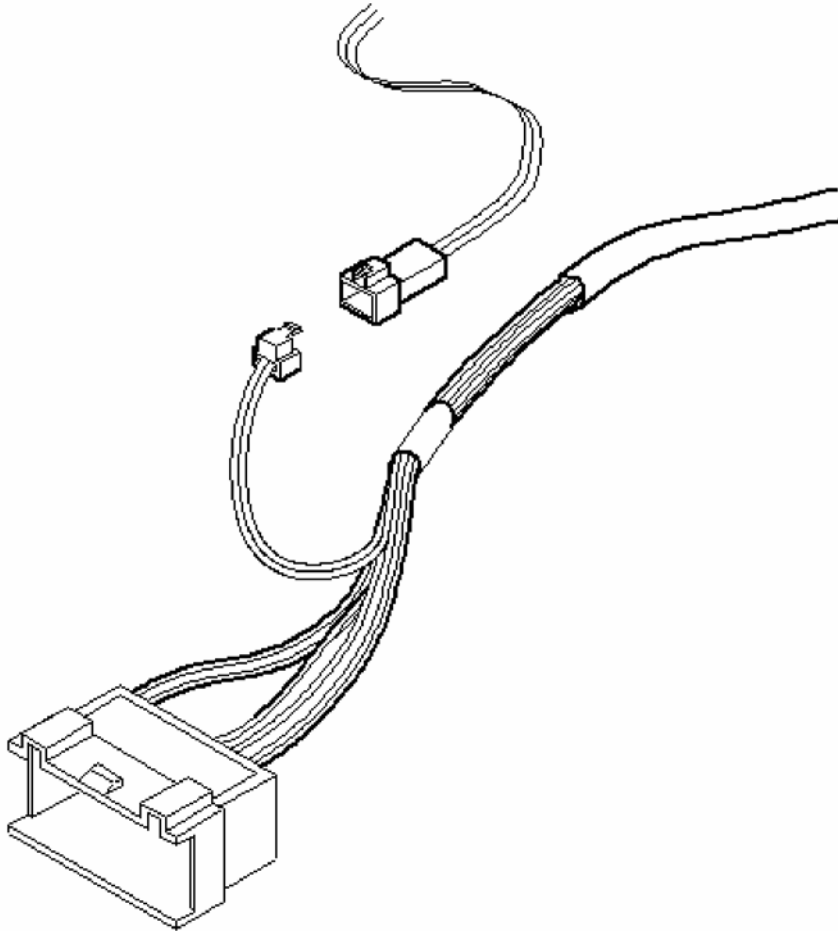


Fig. 32: Disconnecting/Reconnecting Theft Deterrent Control Module Connector
Courtesy of GENERAL MOTORS CORP.

3. Connect the theft deterrent control module connector.
4. Connect the fused jumper assembly connector.

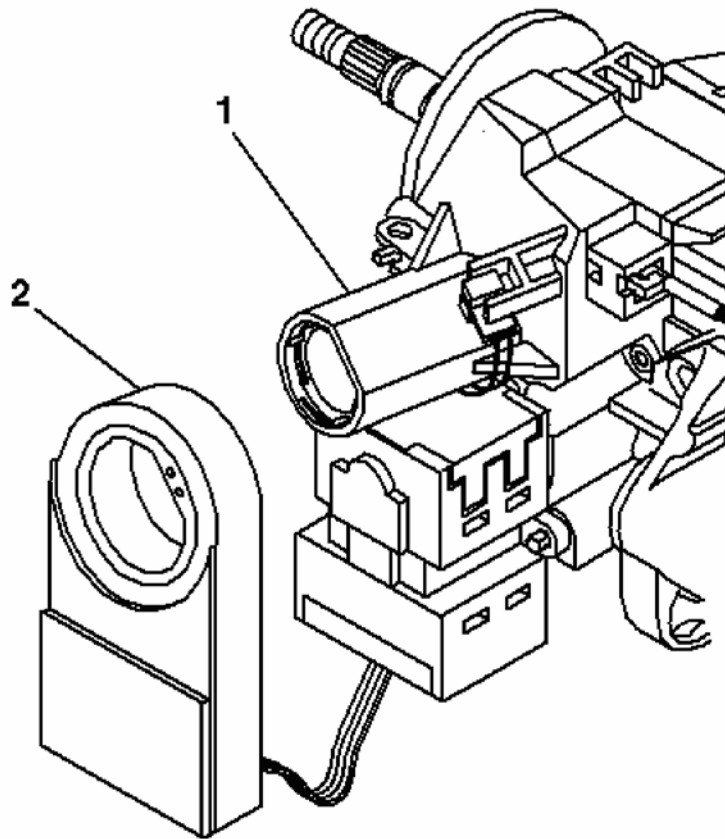


Fig. 33: Locating Theft Deterrent Module & Ignition Lock Cylinder Case Assembly

Courtesy of GENERAL MOTORS CORP.

5. Install the theft deterrent control module (2) onto the ignition lock cylinder case (1).
6. Install the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.
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.

IGNITION LOCK CYLINDER REPLACEMENT

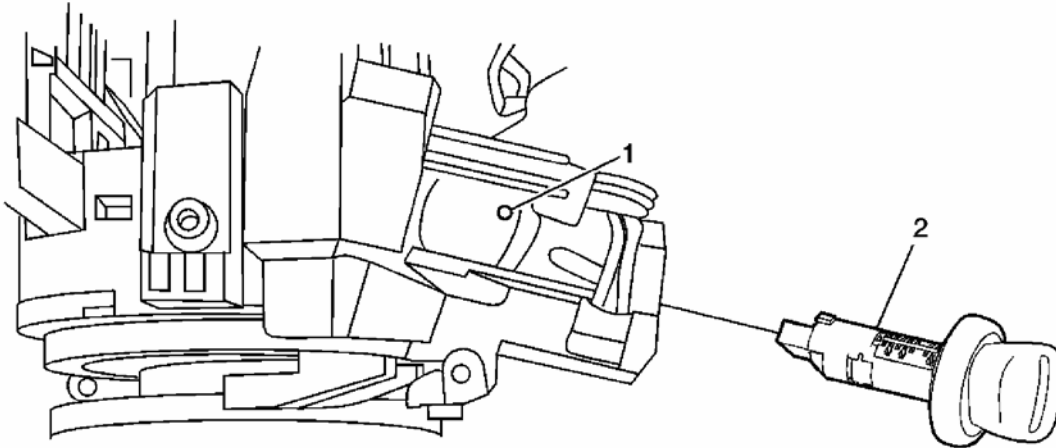


Fig. 34: Replacing Ignition Lock Cylinder
 Courtesy of GENERAL MOTORS CORP.

Ignition Lock Cylinder Replacement

Callout	Component Name
CAUTION: Refer to <u>SIR Caution</u> .	
CAUTION: Refer to <u>Battery Disconnect Caution</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
1. Disconnect the negative battery cable. Refer to <u>Battery Negative Cable Disconnect/Connect Procedure (RPOs LZE/LZ4/LZ9)</u> or <u>Battery Negative Cable Disconnect/Connect Procedure (RPO LS4)</u> .	
2. Disable the SIR system. Refer to <u>SIR Disabling and Enabling Zone 3</u> .	
3. Remove the tilt lever. Refer to <u>Tilt Lever Replacement</u> .	
4. Remove the steering wheel. Refer to <u>Steering Wheel Replacement</u> .	
5. Remove the steering column trim covers. Refer to <u>Steering Column Trim Covers Replacement</u> .	
6. Perform passkey relearn after the ignition lock cylinder has been replaced. Refer to <u>Control Module References</u> .	
	Access Hole, Ignition Lock Cylinder Retaining Pin Tip:

1	1. Rotate the ignition lock cylinder to the crank position. 2. Use a suitable tool to depress the lock cylinder retaining pin through the access hole. 3. Release the lock cylinder the to run position.
2	Cylinder, Ignition Lock Tip: Pull the ignition lock cylinder from the steering column.

IGNITION LOCK CYLINDER CASE REPLACEMENT

Removal Procedure

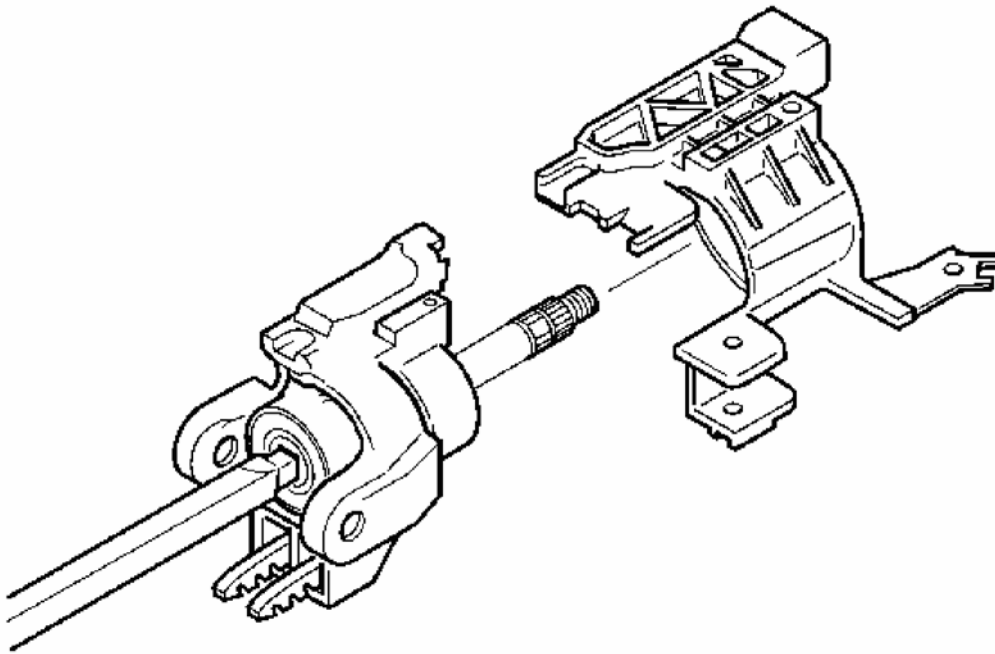


Fig. 35: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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 ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.
3. Remove the ignition switch. Refer to **Ignition Switch Replacement**.

4. Remove the steering column tilt head components. Refer to **Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement**.
5. Remove the turn signal switch housing. Refer to **Turn Signal Switch Housing Replacement**.
6. Remove the turn signal and multifunction switch assembly only. Refer to **Multifunction, Turn Signal Switch Replacement**.

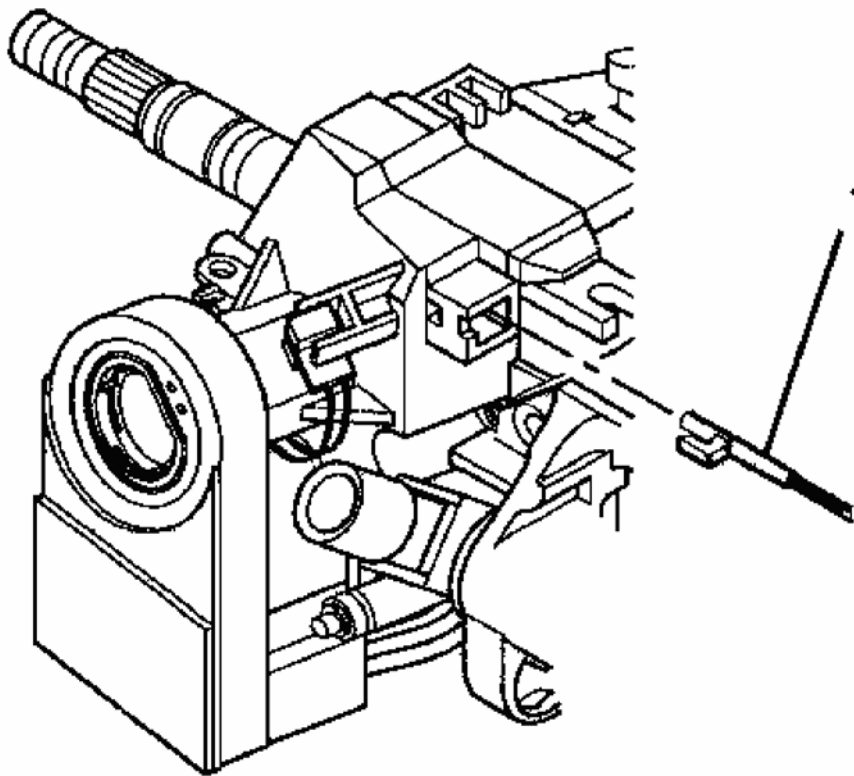


Fig. 36: Identifying Park Lock Cable At Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

7. Remove the park lock cable assembly (1) from the ignition lock cylinder case in the following way:
 1. Use a small blade to push against the locking tab on the end of the park lock cable assembly (1).
 2. Disconnect the park lock cable assembly (1) from the ignition lock cylinder case.

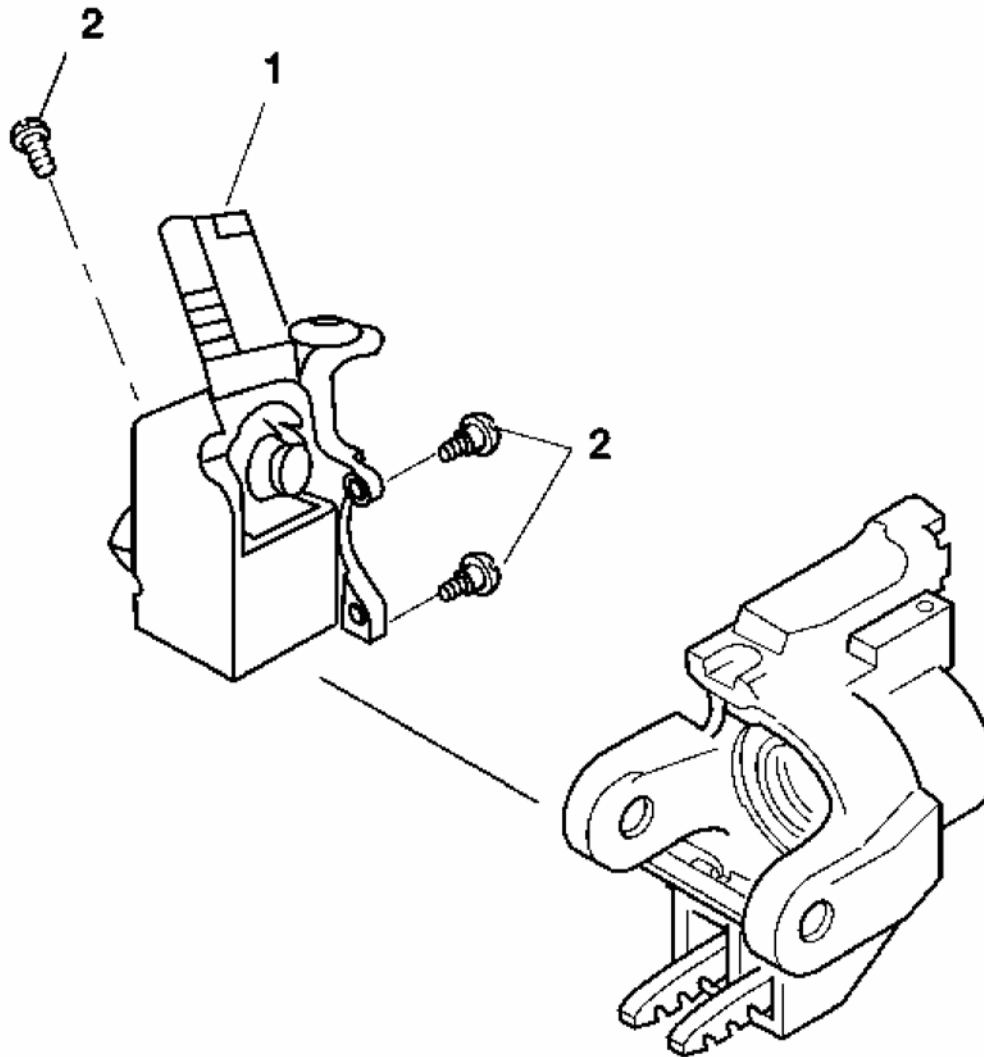


Fig. 37: View Of Ignition Lock Cylinder Case Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

8. Remove the 3 TORX® screws (2) from the ignition lock cylinder case (1).
9. Remove the ignition lock cylinder case (1) from the steering column tilt head assembly.

Installation Procedure

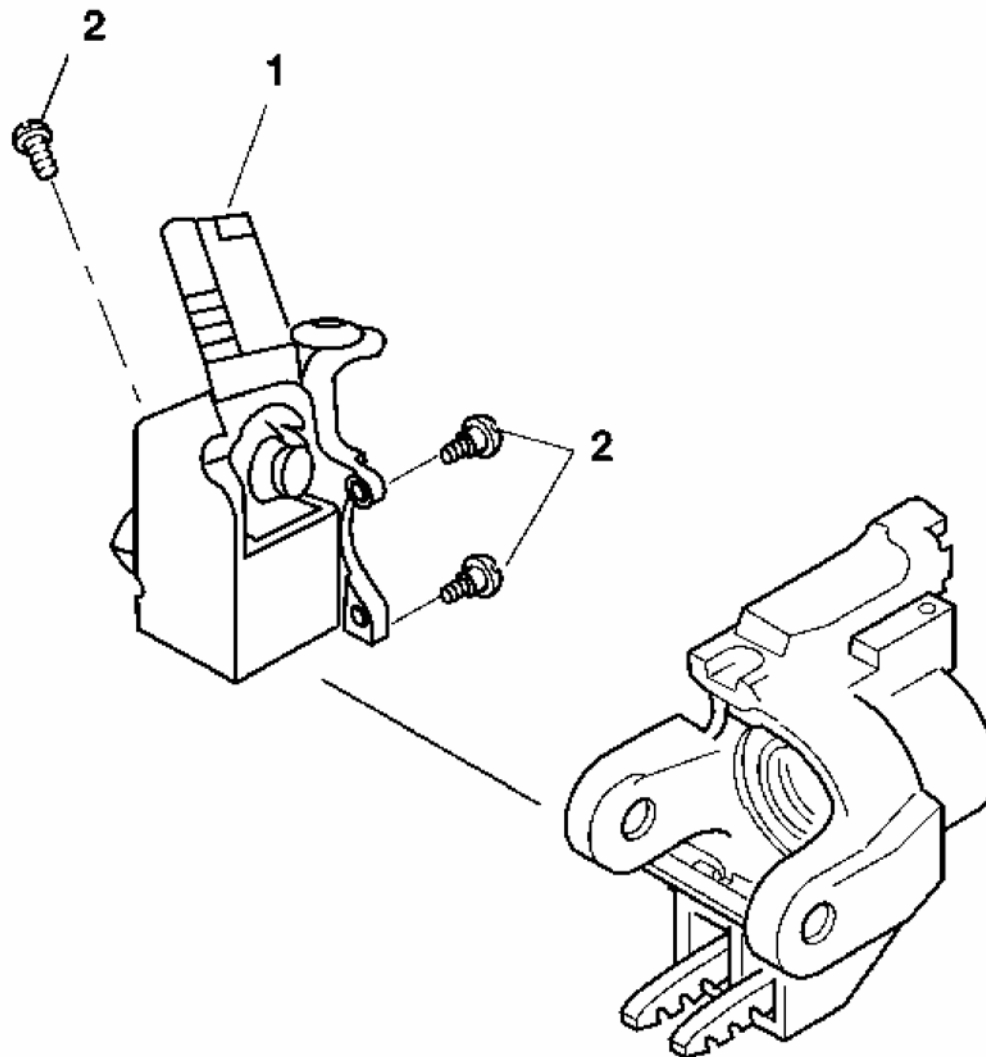


Fig. 38: View Of Ignition Lock Cylinder Case Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Screw the 3 TORX® screws (2) into the ignition lock cylinder case (1).

Tighten: Tighten the 3 TORX® screws to 7 N.m (62 lb in).

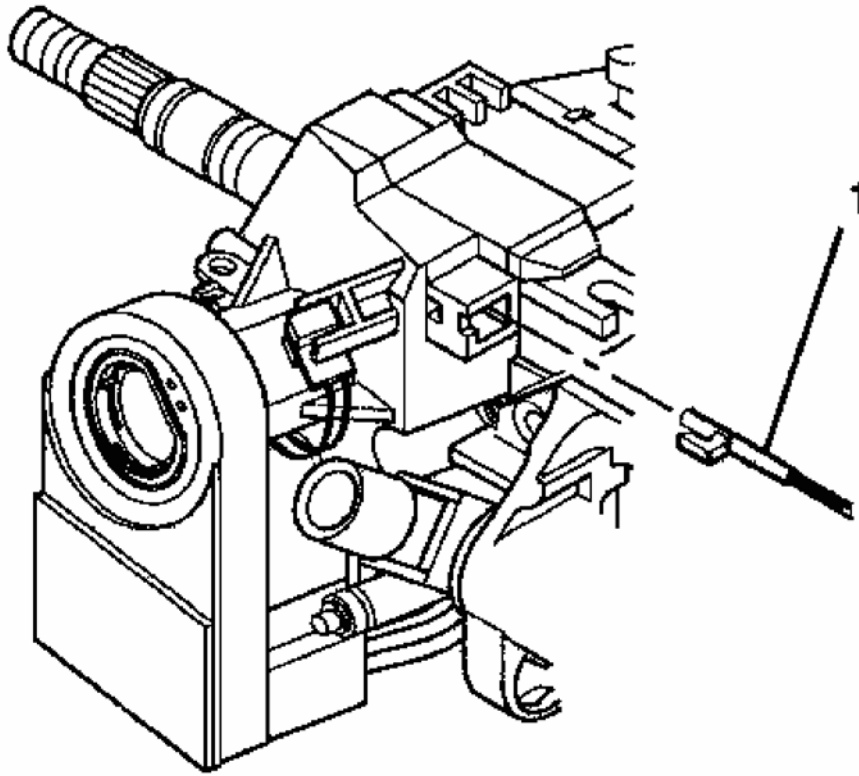


Fig. 39: Identifying Park Lock Cable At Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

3. Press the locking tab on the end of the park lock cable assembly (1) into the slot in the ignition lock cylinder case.

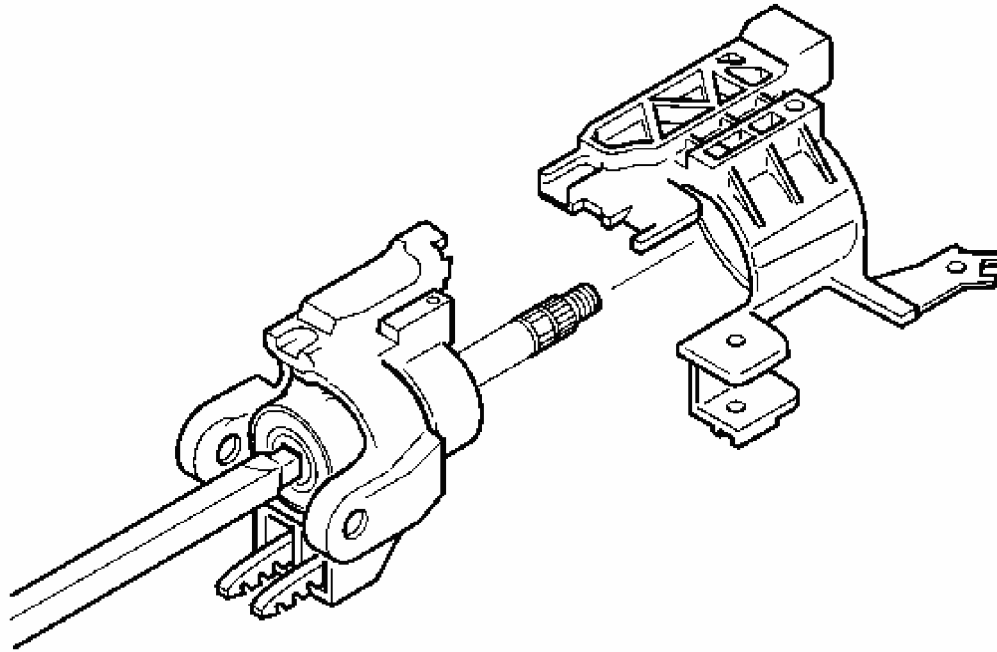


Fig. 40: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Press the turn signal switch housing firmly against the steering column tilt head in order for the screws from the turn signal and multifunction switch assembly to align.

4. Install the turn signal switch housing. Refer to **Turn Signal Switch Housing Replacement**
5. Install the turn signal and multifunction switch assembly only. Refer to **Multifunction, Turn Signal Switch Replacement**.
6. Install the steering column tilt head components. Refer to **Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement**.
7. Install the ignition switch only. Refer to **Ignition Switch Replacement**.
8. Install the ignition lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.
9. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TURN SIGNAL CANCEL CAM AND STEERING SHAFT UPPER BEARING SPRING REPLACEMENT

Tools Required

- **J 23653-SIR** Steering Column Lock Plate Compressor
- **J 42137** Steering Column Lock Plate Compressor Adapter. See **Special Tools**.

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 SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)** in SIR.

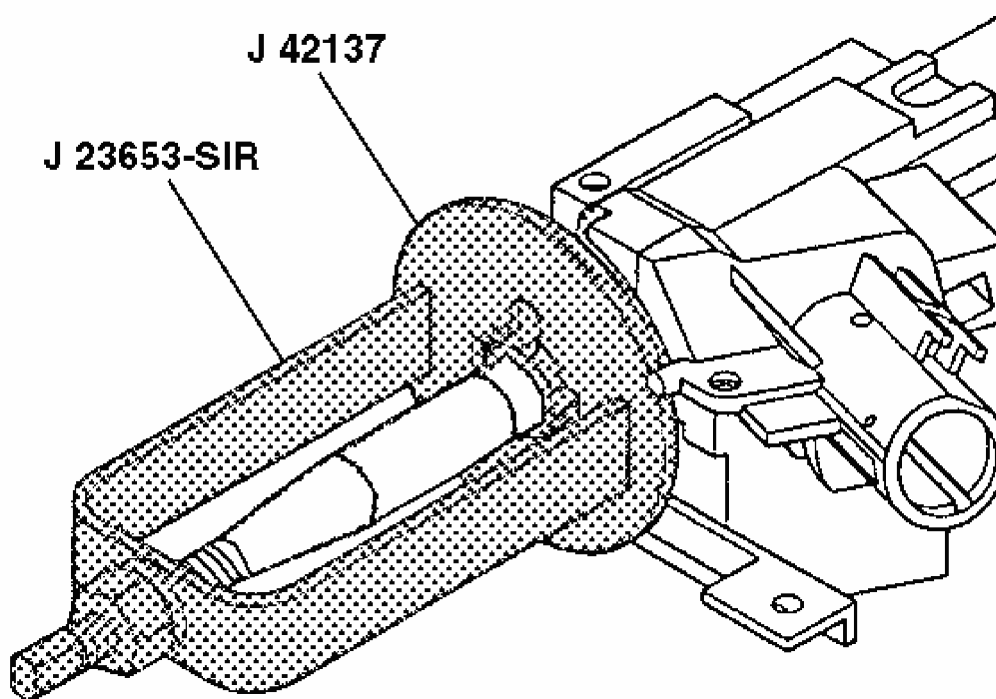


Fig. 41: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

3. Remove the bearing retainer using **J 23653-SIR** and **J 42137** and dispose of it. See

Special Tools.

4. Remove **J 23653-SIR** and **J 42137** from the steering shaft assembly. See **Special Tools.**

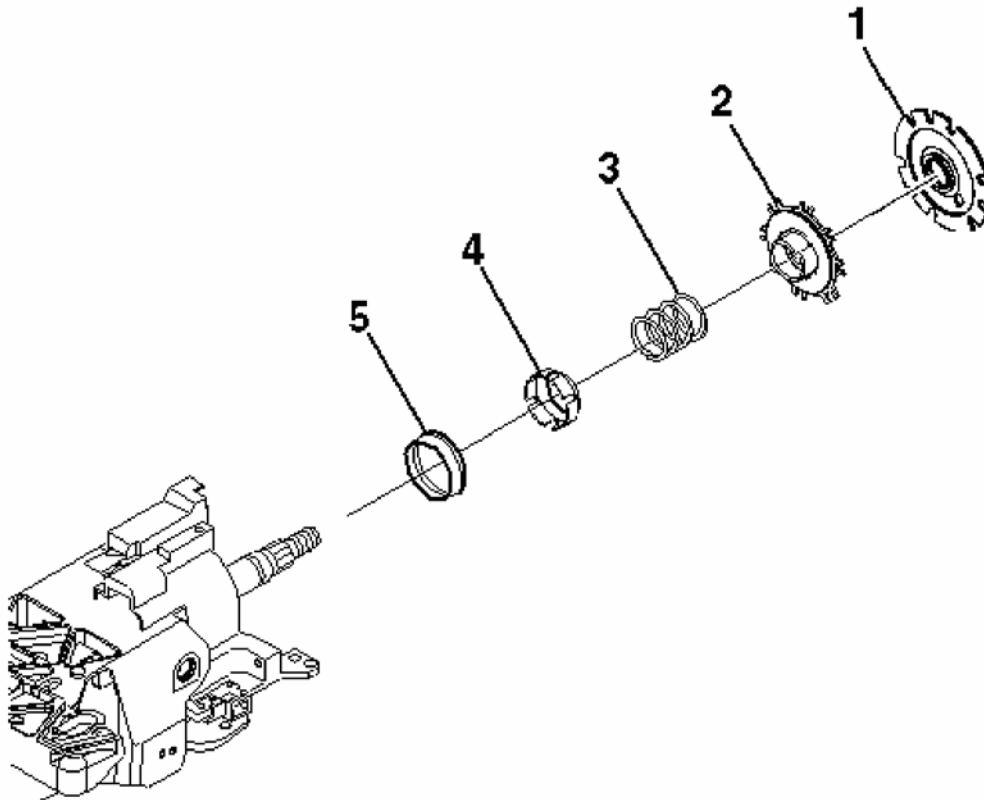


Fig. 42: View of Shaft Lock Shield Assembly, Turn Signal Cancel Cam Assembly, Upper Bearing Spring, Bearing Inner Race Seat and Inner Race
Courtesy of GENERAL MOTORS CORP.

5. Remove the shaft lock shield assembly (1).
6. Remove the turn signal cancel cam assembly (2).
7. Remove the upper bearing spring (3).
8. Remove the upper bearing inner race seat (4).
9. Remove the inner race (5).

Installation Procedure

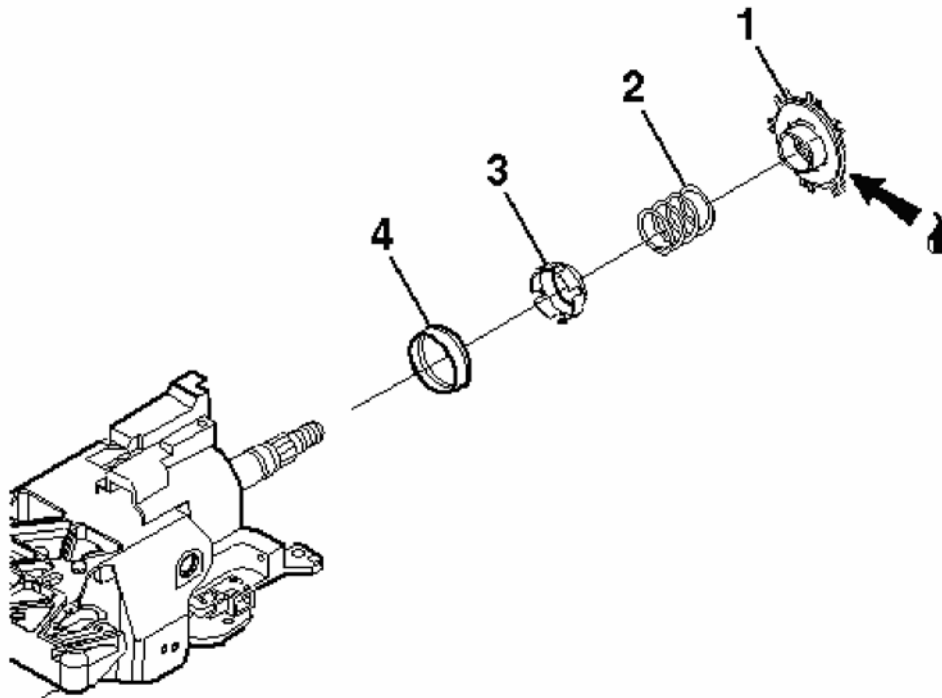


Fig. 43: View of Inner Race, Upper Bearing Inner Race Seat, Upper Bearing Spring, and Turn Signal Cancel Cam Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the inner race (4).
2. Install the upper bearing inner race seat (3).
3. Install the upper bearing spring (2).
4. Lubricate the turn signal cancel cam assembly (1) with GM P/N 12377900 (Canadian P/N 10953529).
5. Install the turn signal cancel cam assembly (1).

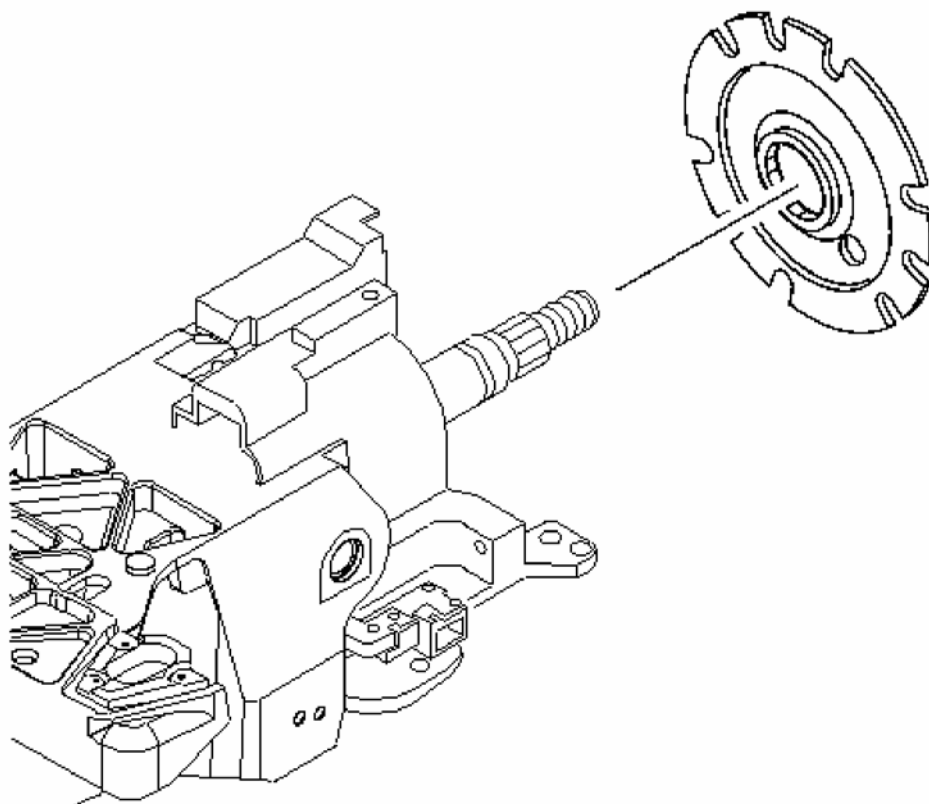


Fig. 44: View of Shaft Lock Shield Assembly
Courtesy of GENERAL MOTORS CORP.

6. Install the shaft lock shield assembly.

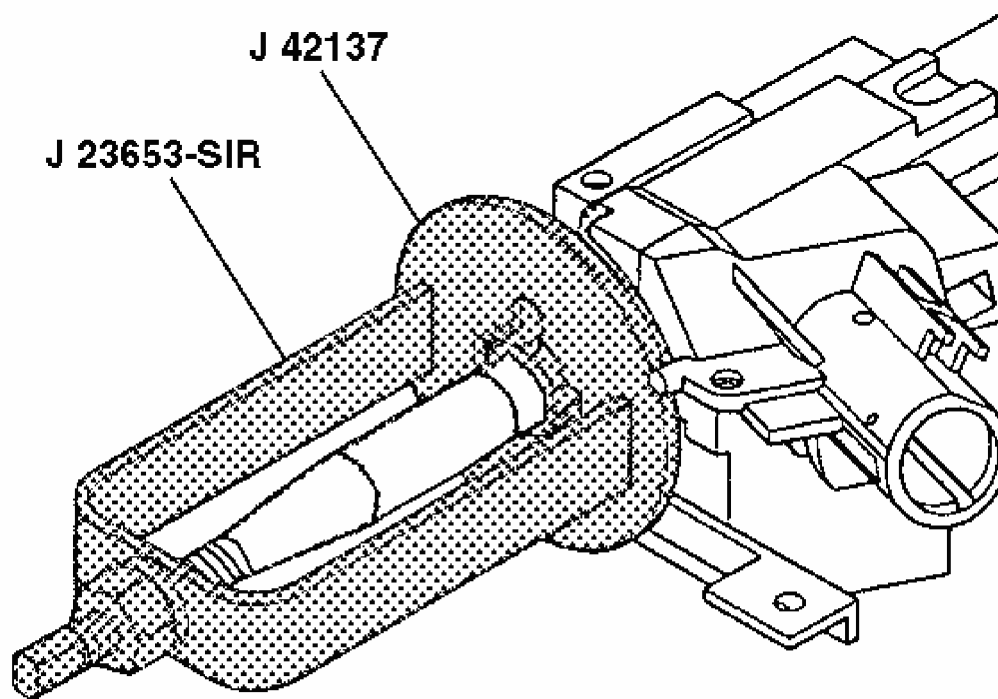


Fig. 45: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

7. Install the new bearing retainer using **J 23653-SIR** and **J 42137** . See **Special Tools**.
8. Remove **J 23653-SIR** and **J 42137** from the steering shaft assembly. See **Special Tools**.
9. Install the SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)** in SIR.
10. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

MULTIFUNCTION, TURN SIGNAL SWITCH REPLACEMENT

Removal Procedure

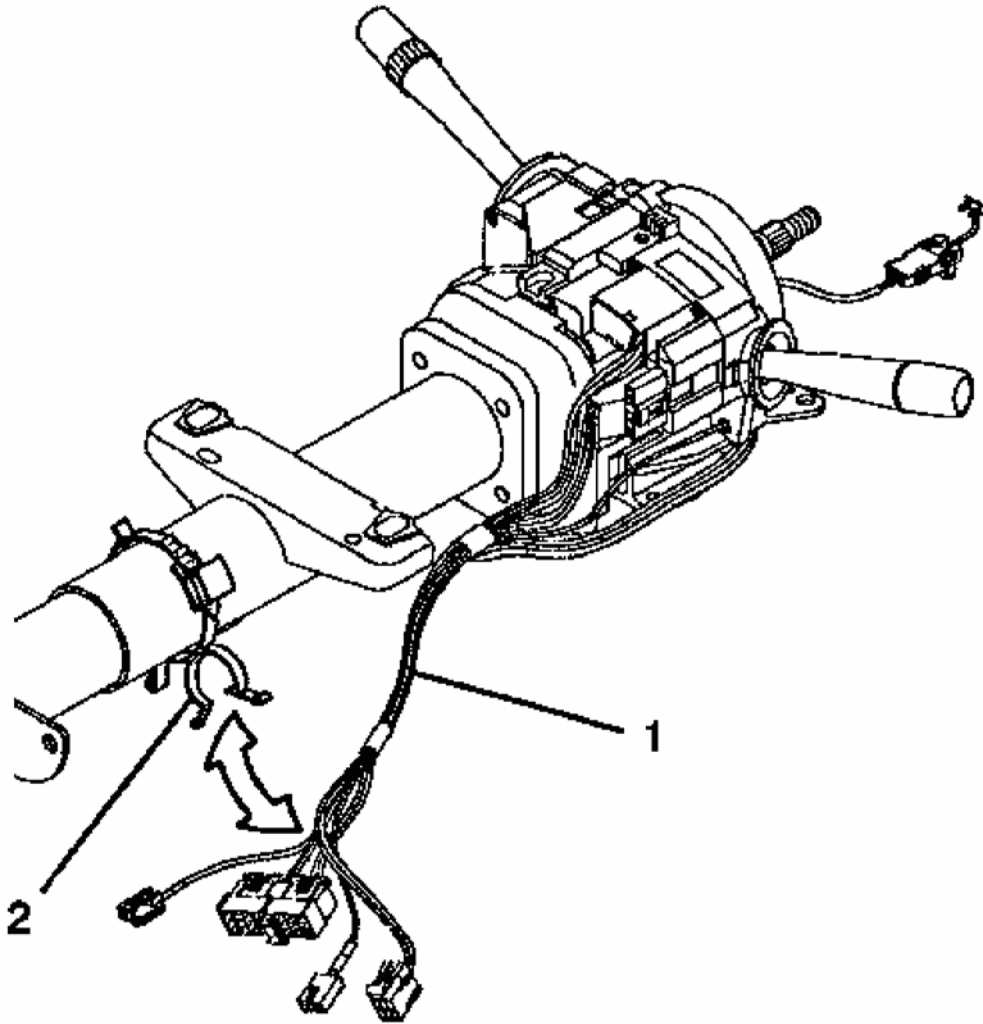


Fig. 46: View Of Steering Column Wire Harness Assembly & Wire Harness Strap
Courtesy of GENERAL MOTORS CORP.

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.

IMPORTANT: The abrasion sleeve located on the steering column wire

harness assembly must be reinstalled. Make note of what connector is coming out of the abrasion sleeve for installation purposes.

3. Remove the wire harness assembly (1) from the wire harness strap (2).
4. Disconnect the turn signal and multifunction switch assembly connector from the SIR system coil connector.

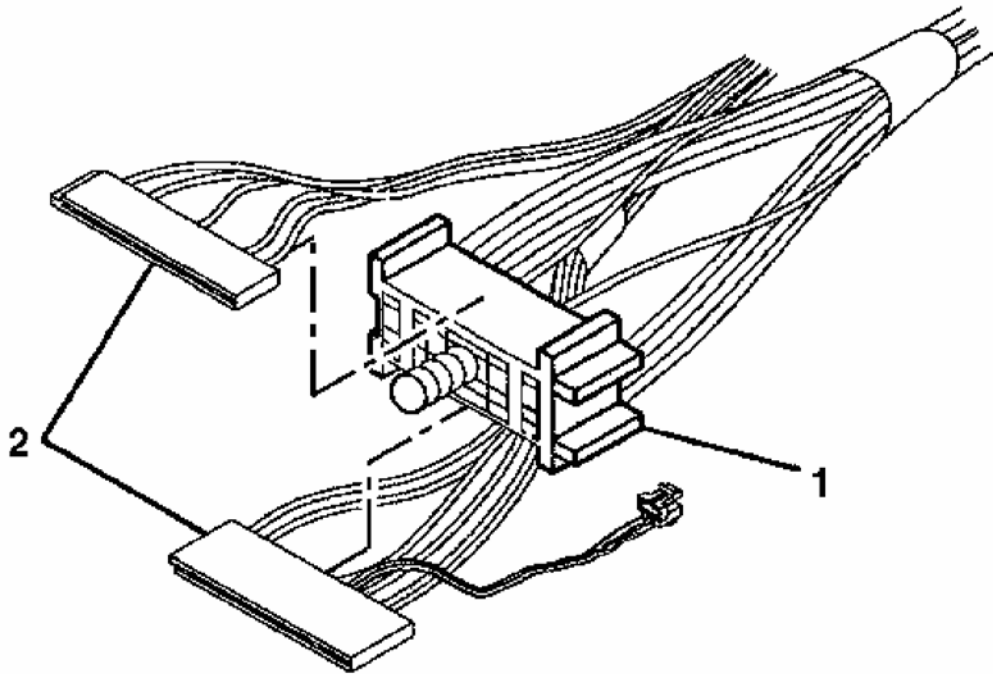


Fig. 47: Turn Signal & Multifunction Switch Assembly Connectors
Courtesy of GENERAL MOTORS CORP.

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

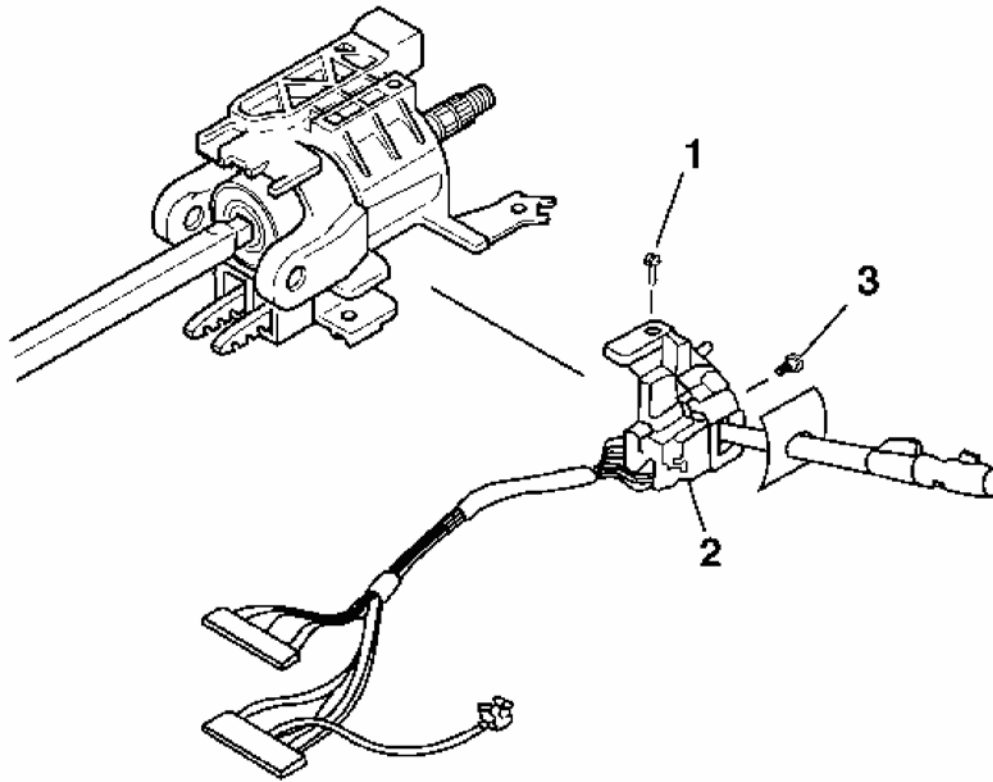


Fig. 48: View Of Turn Signal & Multifunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.

6. Remove the 2 pan head tapping screws (1) and (3) from the turn signal and multifunction switch assembly (2).
7. Remove the turn signal and multifunction switch assembly (2) from the steering column tilt head assembly.

Installation Procedure

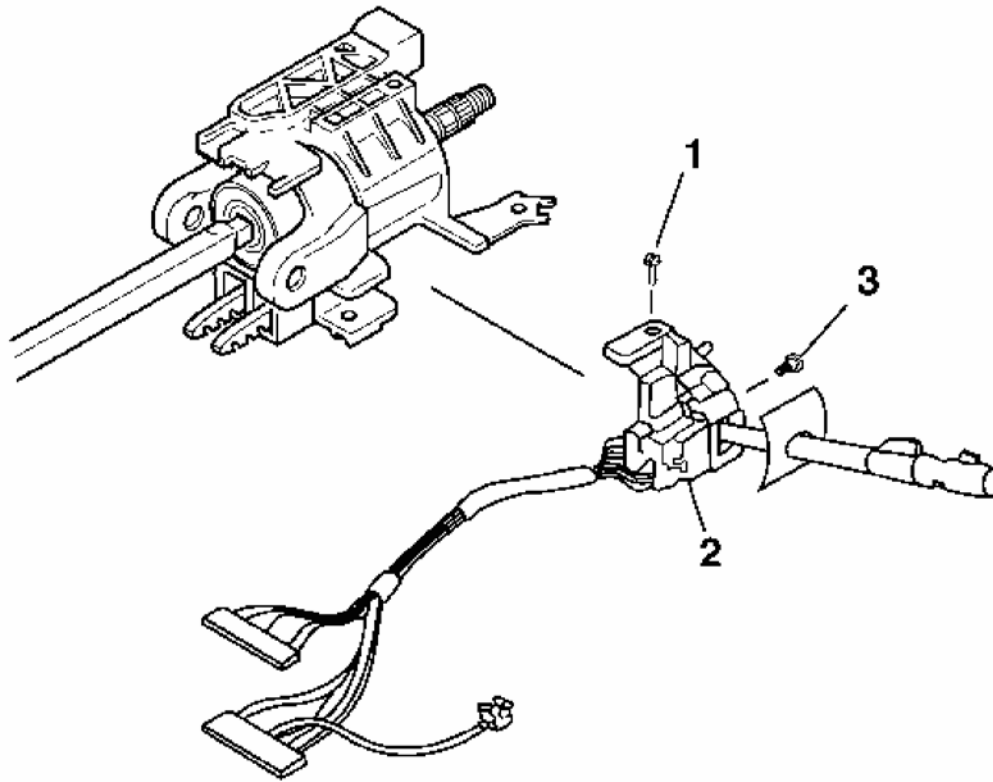


Fig. 49: View Of Turn Signal & Multifunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the turn signal and multifunction switch assembly (2) onto the steering column tilt head assembly.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Be sure that the electrical contact of the turn signal and multifunction switch assembly (2) rests on the turn signal cancel cam assembly.

2. Screw the 2 pan head tapping screws (1) and (3) into the turn signal and multifunction assembly (2).

Tighten: Tighten the pan head tapping screws (1) and (3) to 1 N.m (11 lb in).

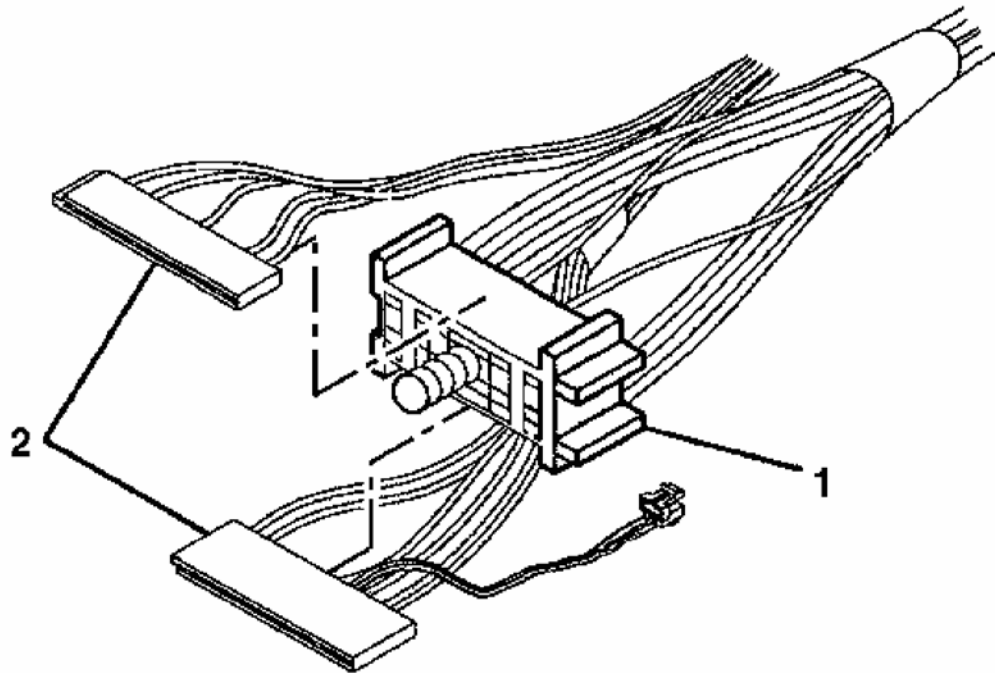


Fig. 50: Turn Signal & Multifunction Switch Assembly Connectors
Courtesy of GENERAL MOTORS CORP.

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

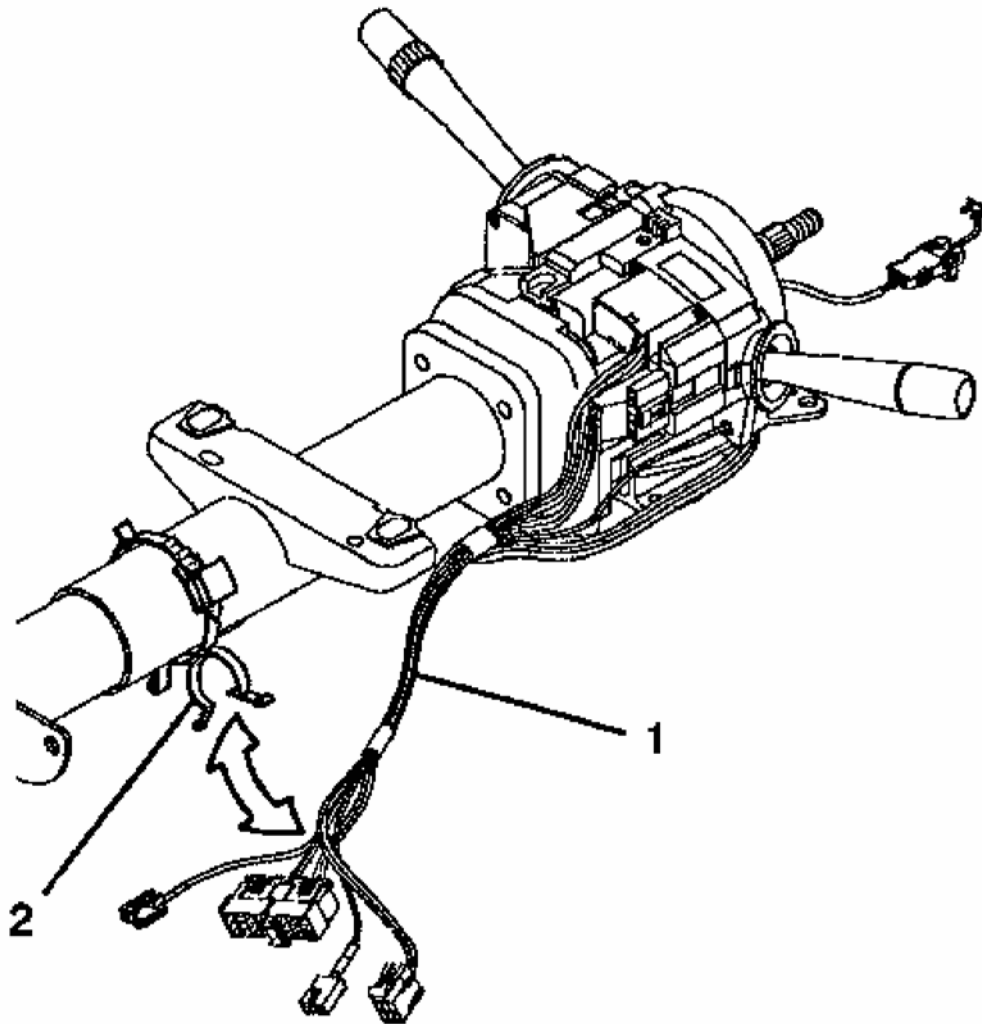


Fig. 51: View Of Steering Column Wire Harness Assembly & Wire Harness Strap
Courtesy of GENERAL MOTORS CORP.

4. Connect the turn signal and multifunction switch assembly connector to the SIR coil connector.

IMPORTANT: The abrasion sleeve must be installed back onto the steering column wire harness assembly. The ignition lock cylinder case wires and connector must be hanging out of the middle of the abrasion sleeve.

5. Install the wire harness assembly (1) into the wire harness strap (2).

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

TURN SIGNAL SWITCH HOUSING REPLACEMENT

Removal Procedure

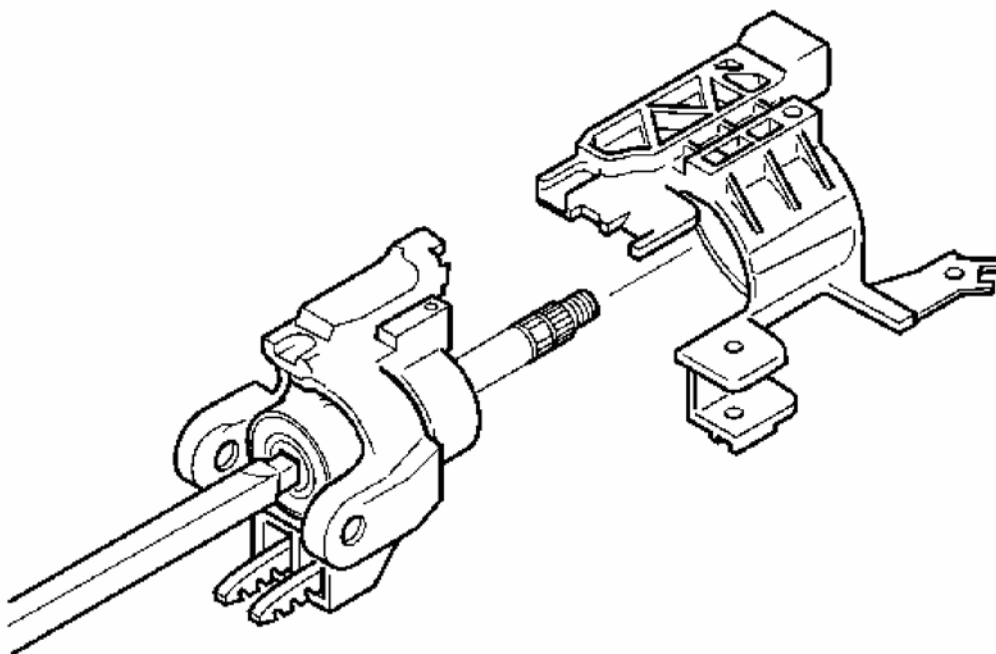


Fig. 52: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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 tilt head components. Refer to **Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement**.
3. Remove the turn signal and multifunction switch assembly only. Refer to **Multifunction, Turn Signal Switch Replacement**.
4. Slide the turn signal switch housing off of the steering column shaft assembly.

Installation Procedure

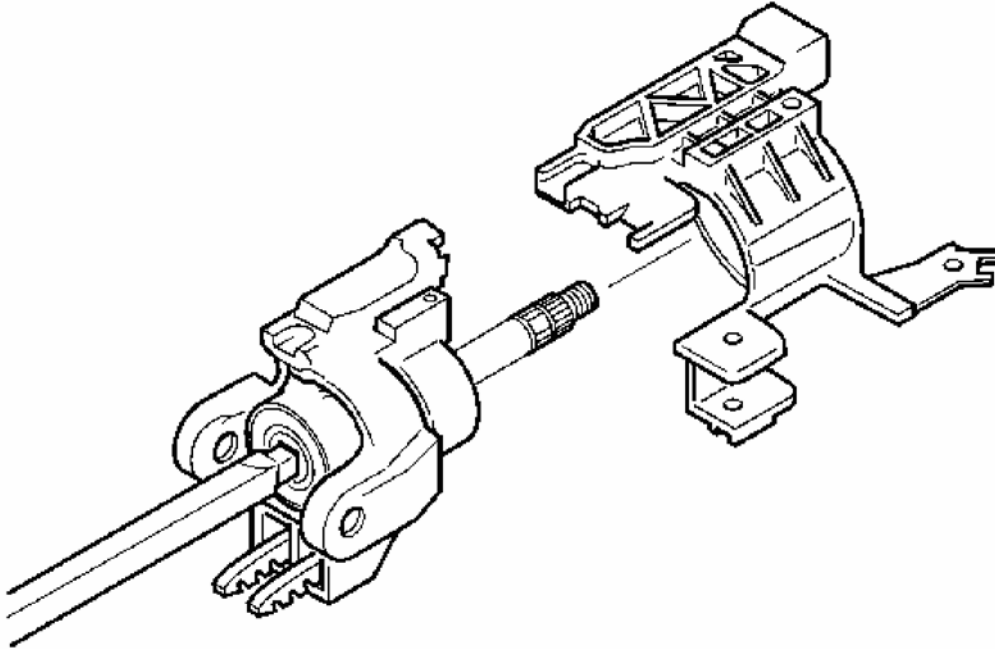


Fig. 53: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The switch mounting bracket must be pressed firmly against the steering column tilt head.

1. Slide the turn signal switch housing onto the steering column shaft assembly.
2. Install the turn signal and multifunction switch assembly only. Refer to **Multifunction, Turn Signal Switch Replacement**.
3. Install the tilt head components. Refer to **Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement**.
4. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

SHIFT LEVER REPLACEMENT

Removal Procedure

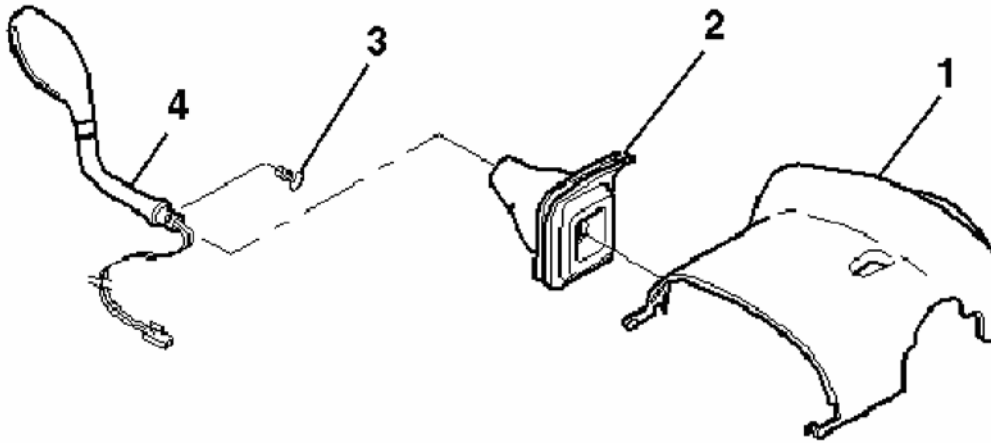


Fig. 54: View Of Shift Lever, Seal (Boot), Screw & Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

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. Slide the shift lever seal (2) up the shift lever (4).
3. If necessary, remove the steering column trim covers. Refer to Steering Column Trim Covers Replacement.
4. Disconnect the shift lever connector at the base of the column.
5. Remove the shift lever screw (3) from the shift lever assembly (4).
6. Remove the shift lever and seal from the linear shift assembly.

IMPORTANT: The shift lever seal must be removed by sliding the shift lever seal towards the narrow section of the shift lever.

7. Remove the shift lever seal (2) from the shift lever (4).

Installation Procedure

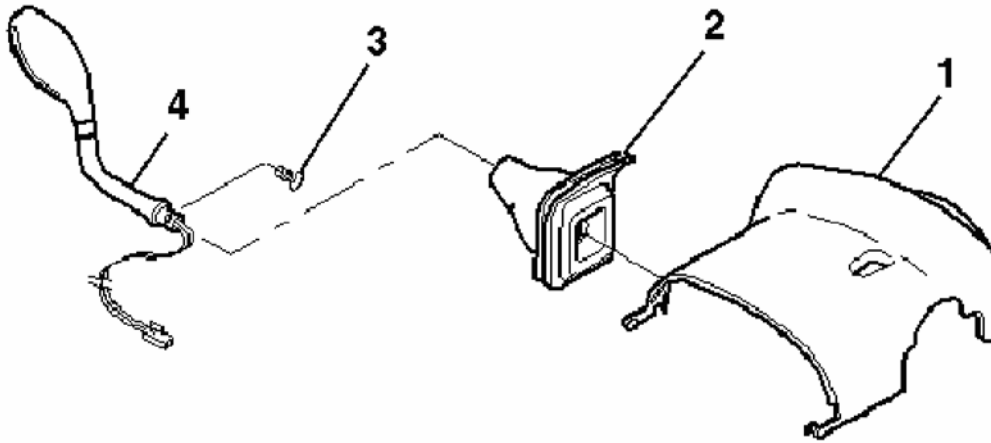


Fig. 55: View Of Shift Lever, Seal (Boot), Screw & Upper Trim Cover
 Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The shift lever seal must be installed to the narrow end of the shift lever.

1. Install the shift lever seal (2) onto the shift lever assembly (4).
2. Install the shift lever assembly (4) to linear shift assembly.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the shift lever screw (3) into the shift lever assembly (4).

Tighten: Tighten the screw to 20 N.m (15 lb ft).

4. Slide the shift lever seal (2) down the shift lever assembly (4).
5. Align the shift lever seal into the steering column trim covers.
6. If necessary, install the steering column trim covers. Refer to Steering Column Trim Covers Replacement.
7. Enable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

LINEAR SHIFT ASSEMBLY REPLACEMENT

Removal Procedure

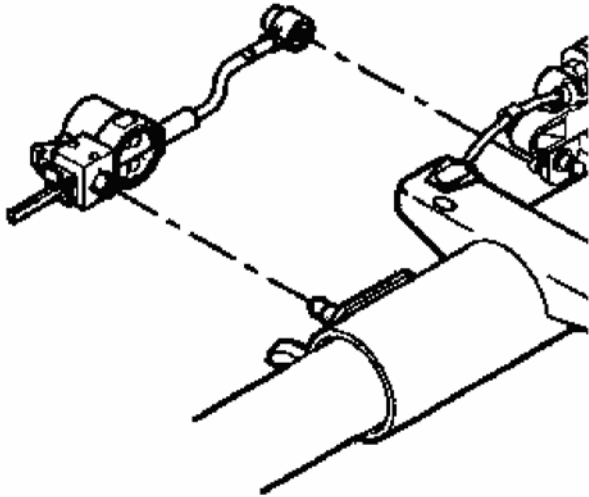


Fig. 56: View Of Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

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 shift lever assembly. Refer to Shift Lever Replacement.
4. With a screwdriver carefully pry the automatic transmission shift lock control away from the steering column jacket.

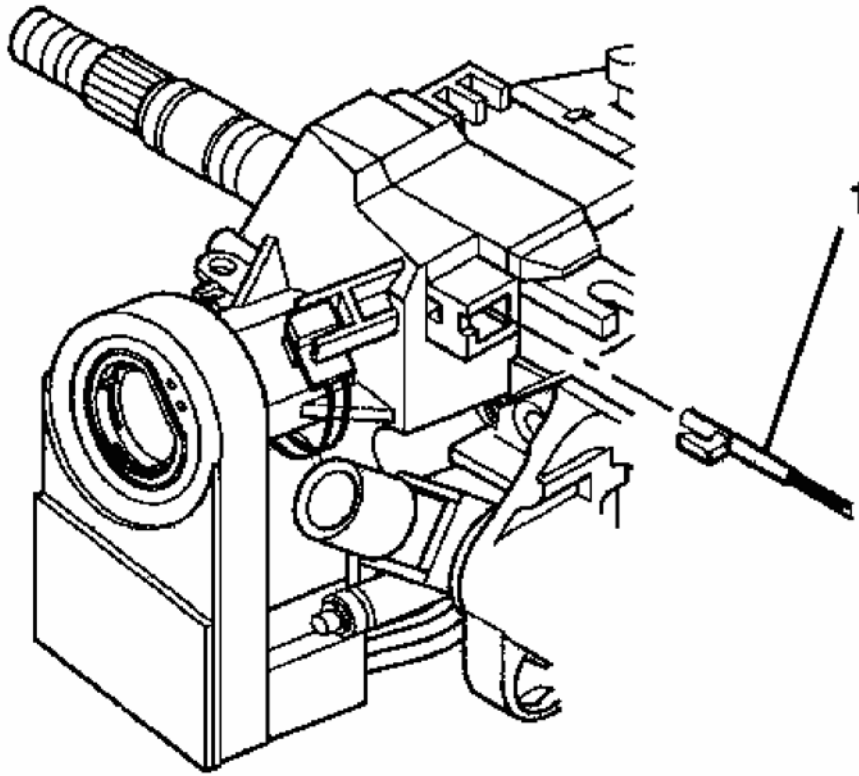


Fig. 57: Identifying Park Lock Cable At Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

5. The lock cylinder should be in the OFF-LOCK position.

IMPORTANT: Do NOT remove the tape on the park lock cable. If the tape is removed from the park lock cable, you **MUST** order a new linear shift assembly.

6. Insert a small screwdriver into the slot on the ignition lock cylinder case and push against the locking tab to remove the park lock cable assembly (1).

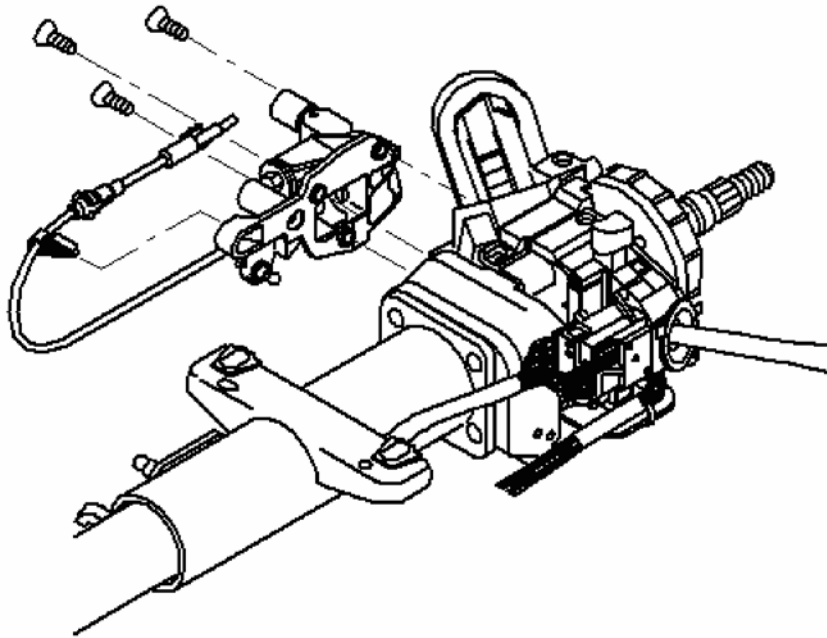


Fig. 58: Flat-Head 6-Lobed Socket Tap Screws & Linear Shift Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the 3 flat-head 6-lobed socket tap screws from the linear shift assembly.
8. Remove the linear shift assembly.

Installation Procedure

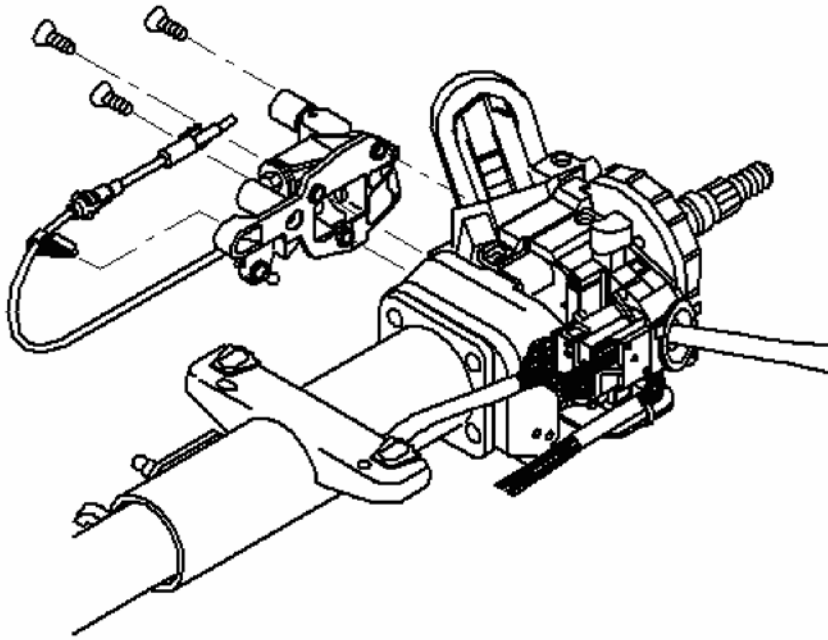


Fig. 59: Flat-Head 6-Lobed Socket Tap Screws & Linear Shift Assembly
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Do NOT remove the tape on the park lock cable. If so, the linear shift assembly **MUST** be replaced.

1. Install the linear shift assembly and secure by using 3 flat-head 6-lobed socket tap screws.

The linear shift assembly must be out of the PARK position to install the lower socket tap screw.

Tighten: Tighten the screws to 10 N.m (89 lb in).

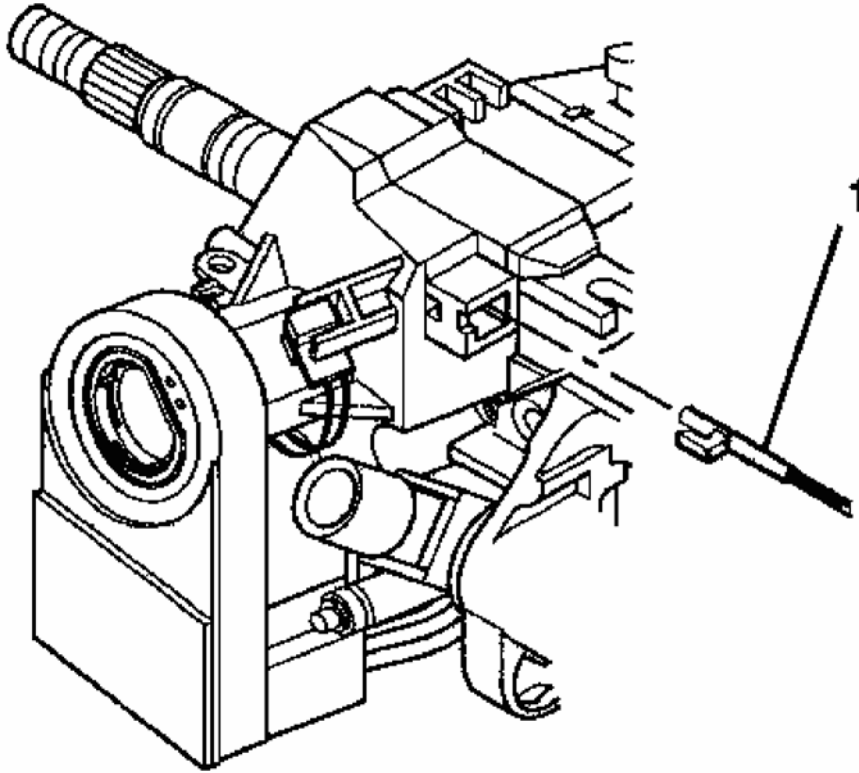


Fig. 60: Identifying Park Lock Cable At Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

2. Connect the park lock cable assembly (1) into the ignition lock cylinder case.
 - The lock cylinder should be in the OFF-LOCK position.
 - The locking tab at the end of the park lock cable assembly (1) must be installed into the ignition lock cylinder case.

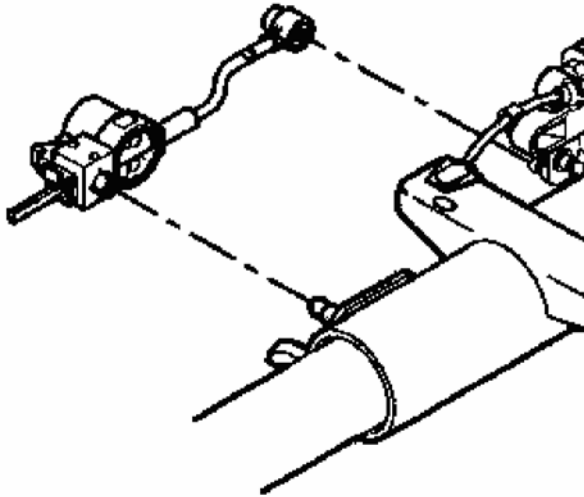


Fig. 61: View Of Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

3. Install the automatic transmission shift lock control.
4. Install the gear shift lever and put the column in the NEUTRAL position.

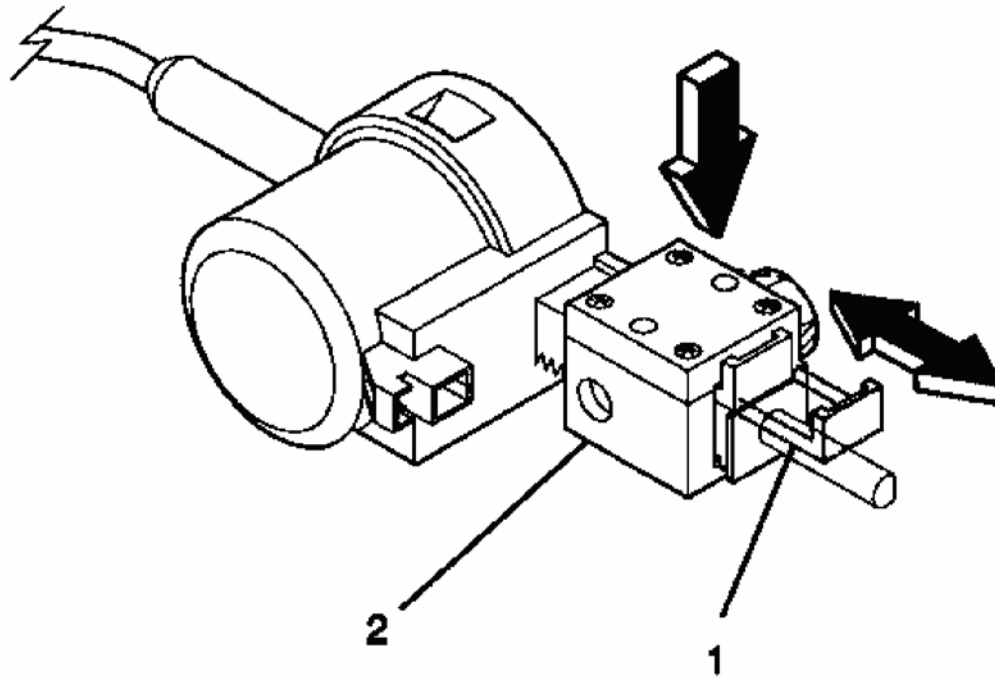


Fig. 62: Adjusting Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

5. Adjust the automatic transmission shift lock control.
 1. Pull the tab (1) out on the block side (2) of the automatic transmission shift lock control.
 2. Press on the adjuster block (2) to compress the internal adjuster spring to disengage the adjuster teeth. Slide the adjuster block as far away from the solenoid as possible.
 3. Lock in place by pushing the tab (1) back in.
6. Inspect the automatic transmission shift lock control.
 1. The automatic transmission shift lock control must lock the gear shift lever when it is put into the PARK position.
 2. When the column is installed in the vehicle you will not be able to shift the gear shift lever out of the PARK position without pressing on the brake pedal. The solenoid will be energized.
 3. Readjust if needed.
7. Install the shift lever assembly. Refer to **Shift Lever Replacement**.
8. Install the upper and lower trim covers. Refer to **Steering Column Trim Covers**

Replacement.

9. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TILT LEVER REPLACEMENT

Removal Procedure

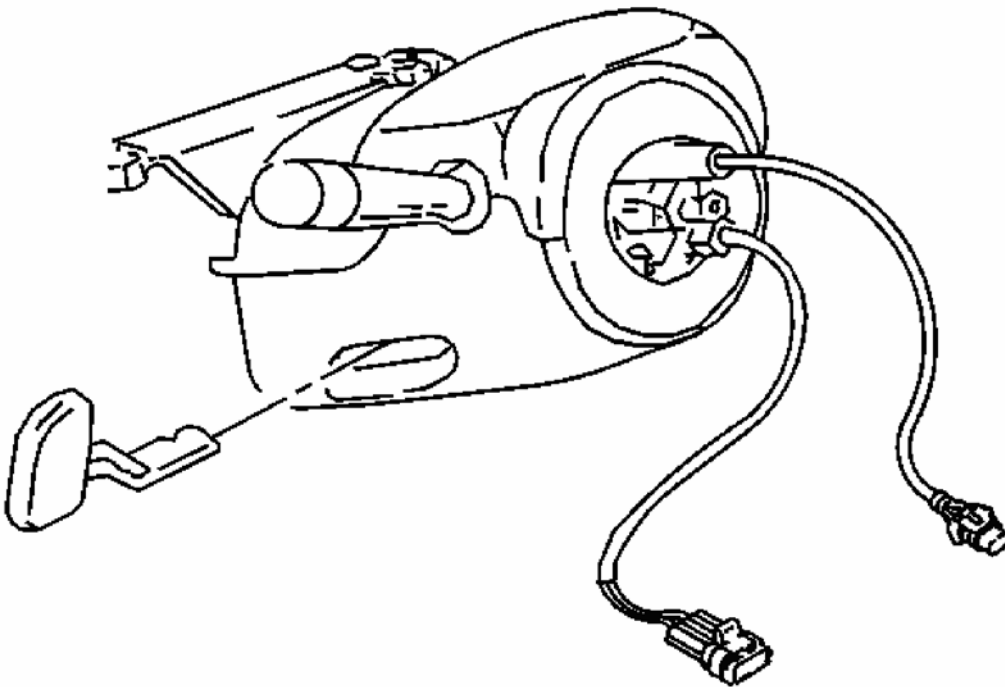


Fig. 63: Identifying Tilt Lever

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. Pull the tilt lever out from the steering column.

Installation Procedure

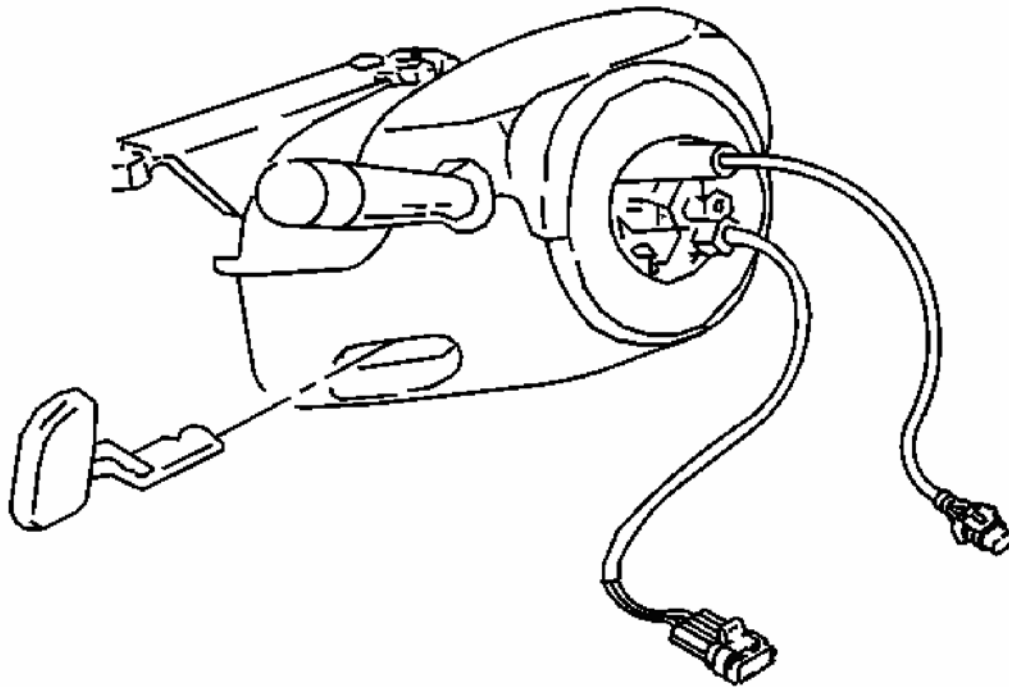


Fig. 64: Identifying Tilt Lever
Courtesy of GENERAL MOTORS CORP.

1. Push the tilt lever into the steering column.
2. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

STEERING WHEEL CONTROL SWITCH ASSEMBLY REPLACEMENT

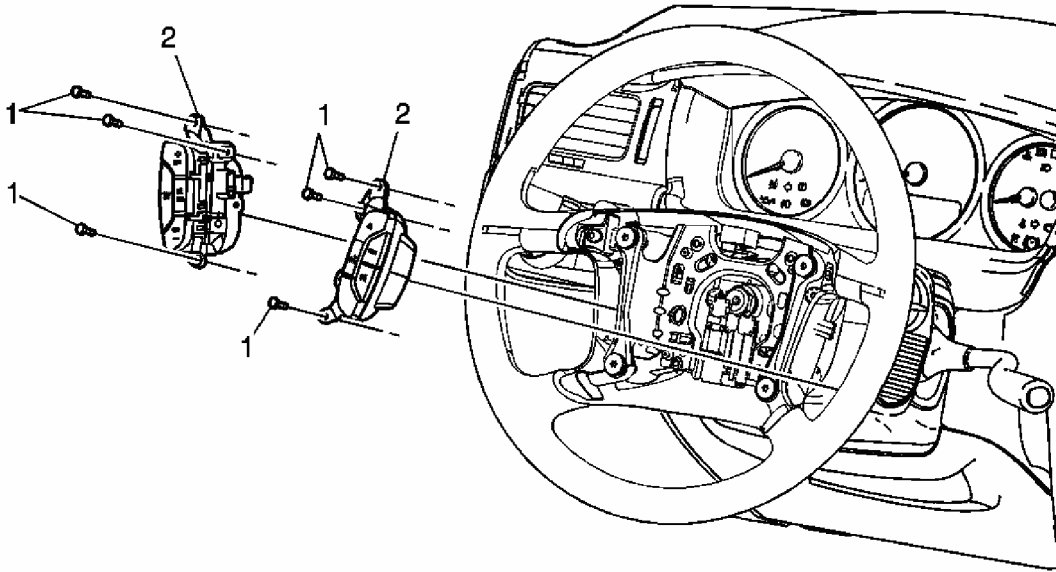


Fig. 65: Replacing Steering Wheel Control Switch Assembly
 Courtesy of GENERAL MOTORS CORP.

Steering Wheel Control Switch Assembly Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice . Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the inflatable restraint steering wheel module. Refer to Inflatable Restraint Steering Wheel Module Replacement .	
1	Bolt/Screw, Steering Wheel Switch Tip: Disconnect the electrical connector. Tighten: 2 N.m (18 lb in)
2	Switch Assembly, Radio, HVAC and Cruise Control Assembly

STEERING WHEEL REPLACEMENT

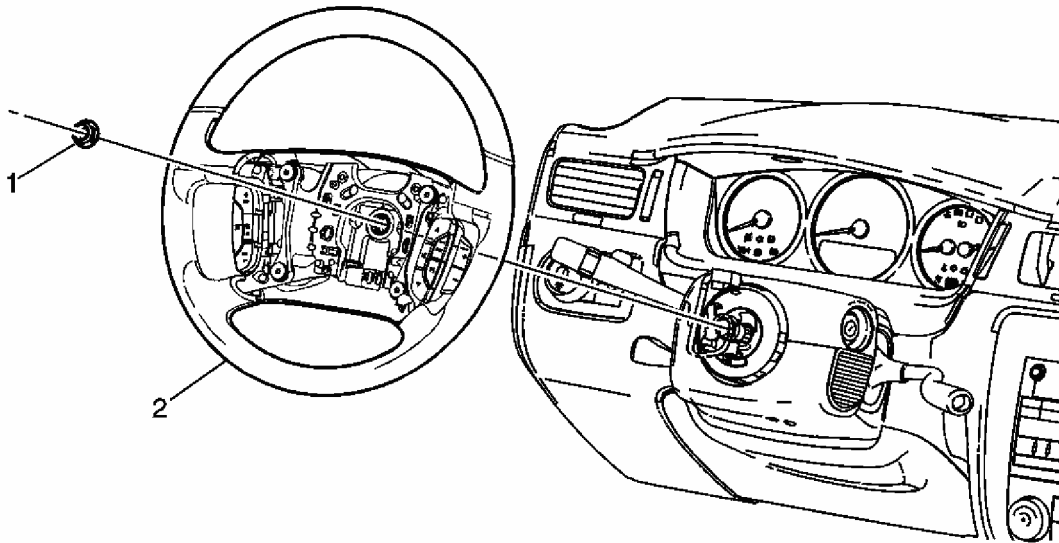


Fig. 66: Replacing Steering Wheel
 Courtesy of GENERAL MOTORS CORP.

Steering Wheel Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Tools Required • J 1859-A Countergear and Steering Wheel Puller. See <u>Special Tools</u>. • J 42578 Steering Wheel Puller Legs. See <u>Special Tools</u>.	
Preliminary Procedure: Remove the inflatable restraint steering wheel module. Refer to <u>Inflatable Restraint Steering Wheel Module Replacement</u> .	
1	Nut, Steering Wheel Assembly Tighten: 41 N.m (30 lb ft)
2	Wheel Assembly, Steering

STEERING WHEEL THEFT DETERRENT LOCK REPLACEMENT

Removal Procedure

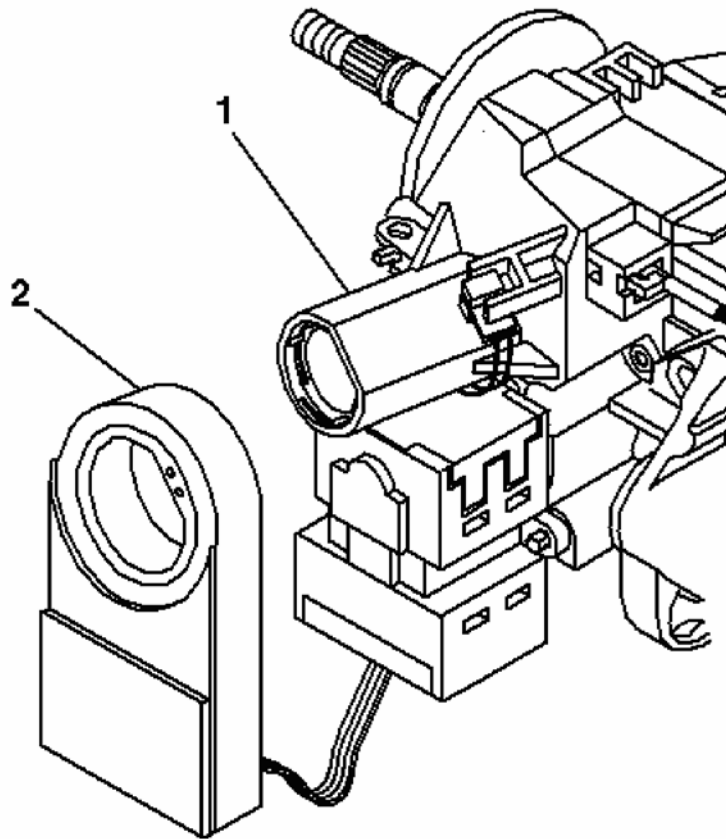


Fig. 67: Locating Theft Deterrent Module & Ignition Lock Cylinder Case Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the inflatable restraint steering wheel module. 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 lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.
4. Disconnect the connector from the theft deterrent control module.
5. If necessary, disconnect the connector from the ignition lock cylinder case (1).

6. Remove the theft deterrent control module (2) from ignition lock cylinder case assembly (1).

Installation Procedure

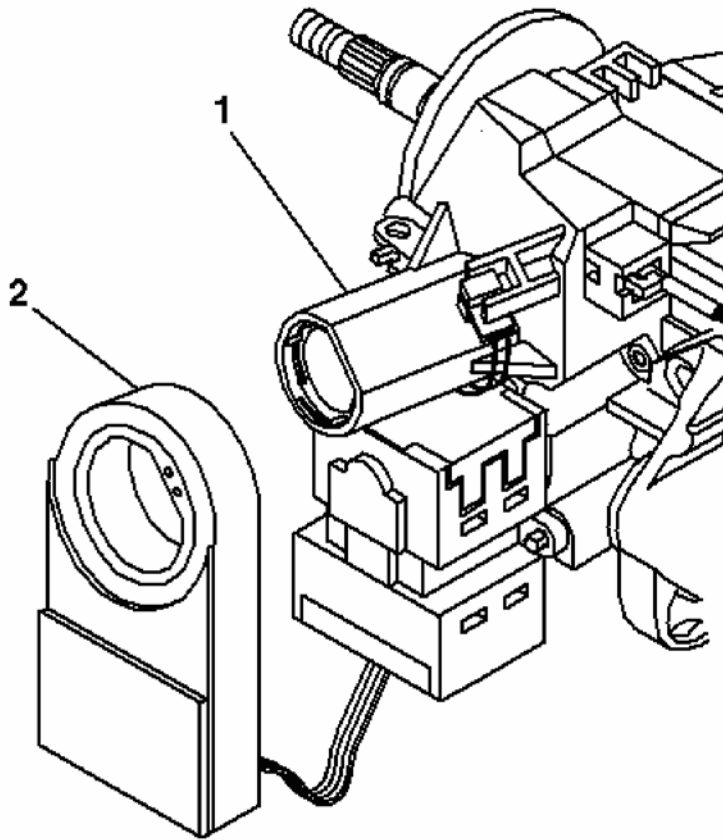


Fig. 68: Locating Theft Deterrent Module & Ignition Lock Cylinder Case Assembly

Courtesy of GENERAL MOTORS CORP.

1. Install the theft deterrent control module (2) onto the ignition lock cylinder case assembly (1).

CAUTION: Refer to SIR INFLATOR MODULE COIL CAUTION in Cautions and Notices.

2. Connect the connector to the theft deterrent control module.
3. If necessary, connect the connector to the ignition lock cylinder case.
4. Install the lock cylinder. Refer to **Ignition Lock Cylinder Replacement**.
5. Install the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
6. Enable the inflatable restraint steering wheel module. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TILT SPRING REPLACEMENT

Removal Procedure

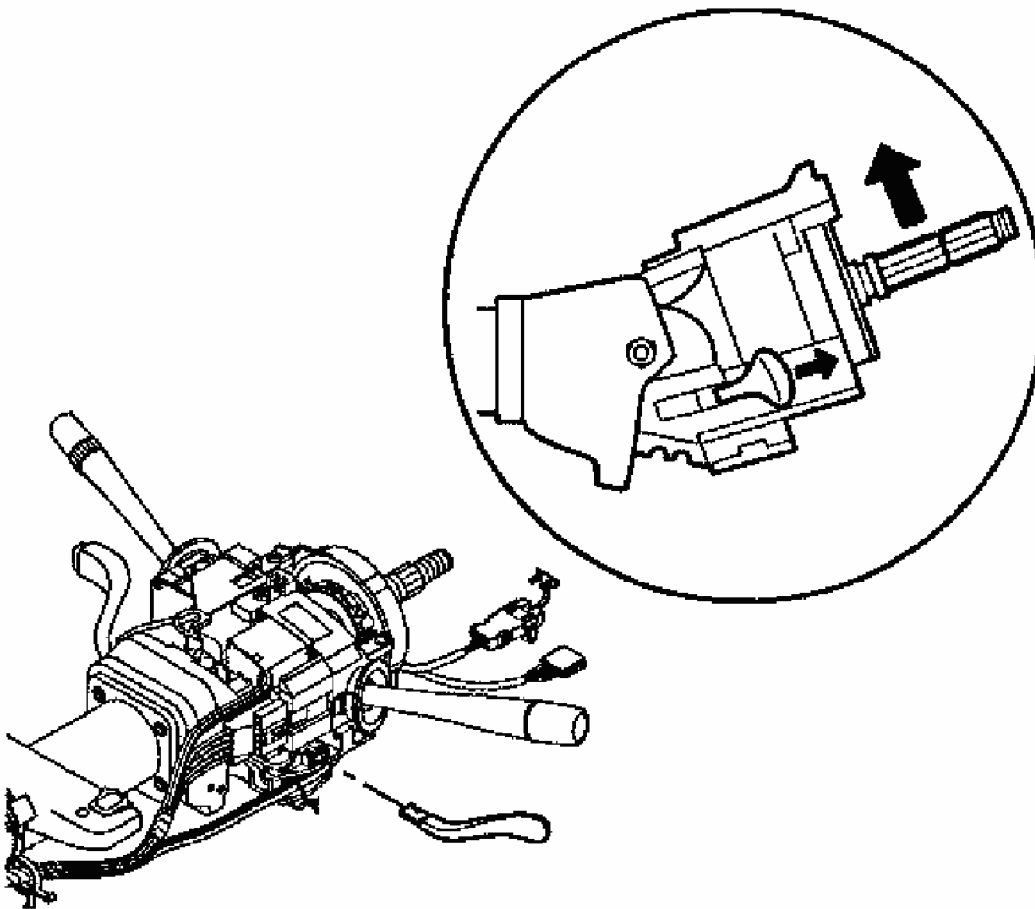


Fig. 69: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

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. Install the tilt lever onto the steering column tilt head assembly.
4. Use the tilt lever to tilt the column to the UP position.

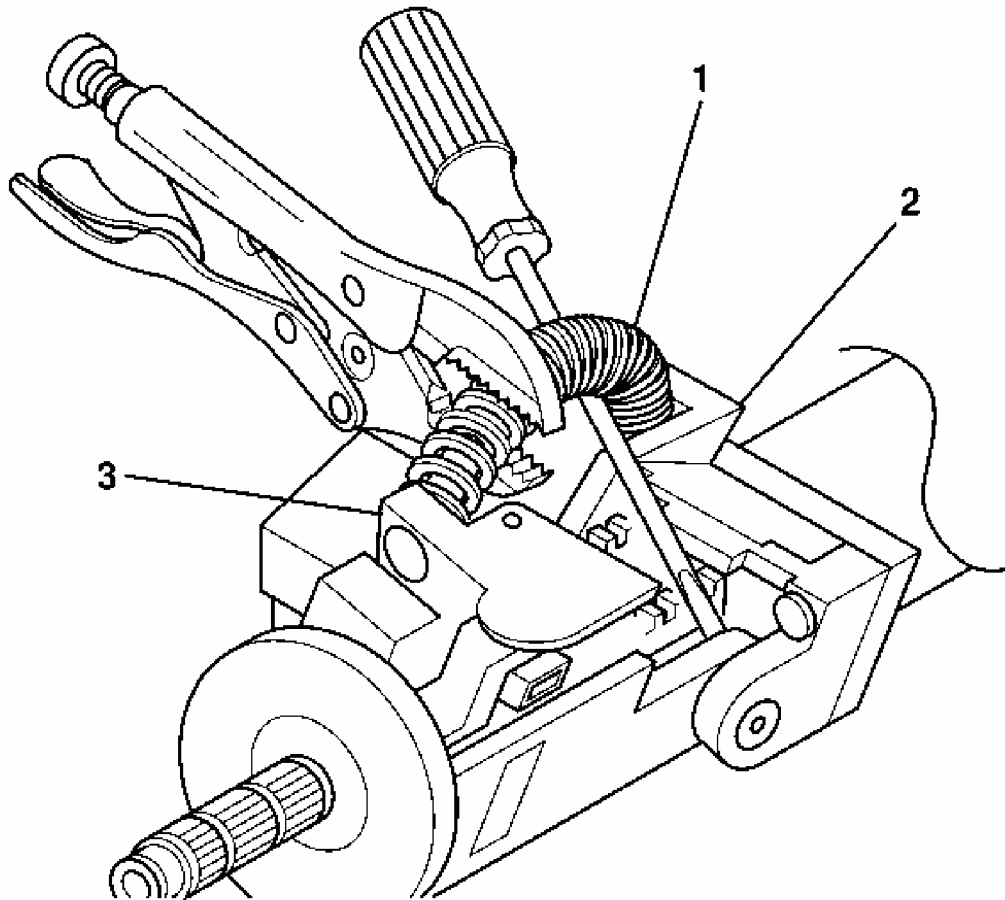


Fig. 70: Removing Tilt Spring From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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.

5. Remove the tilt spring (1) from the steering column support assembly (2) and 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).

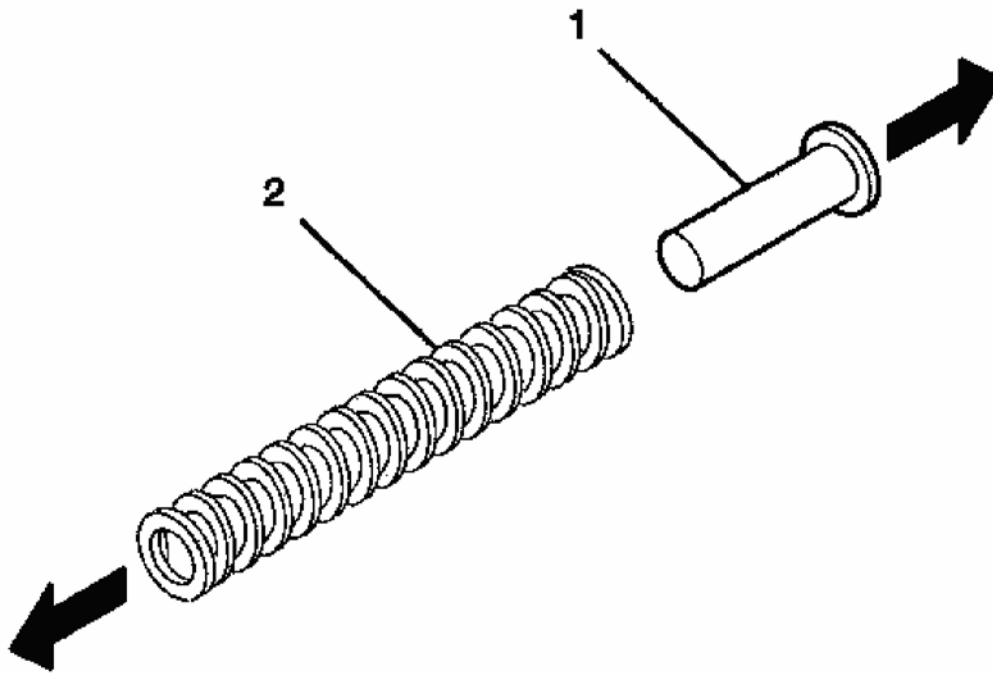


Fig. 71: Identifying Spring Guide Components
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

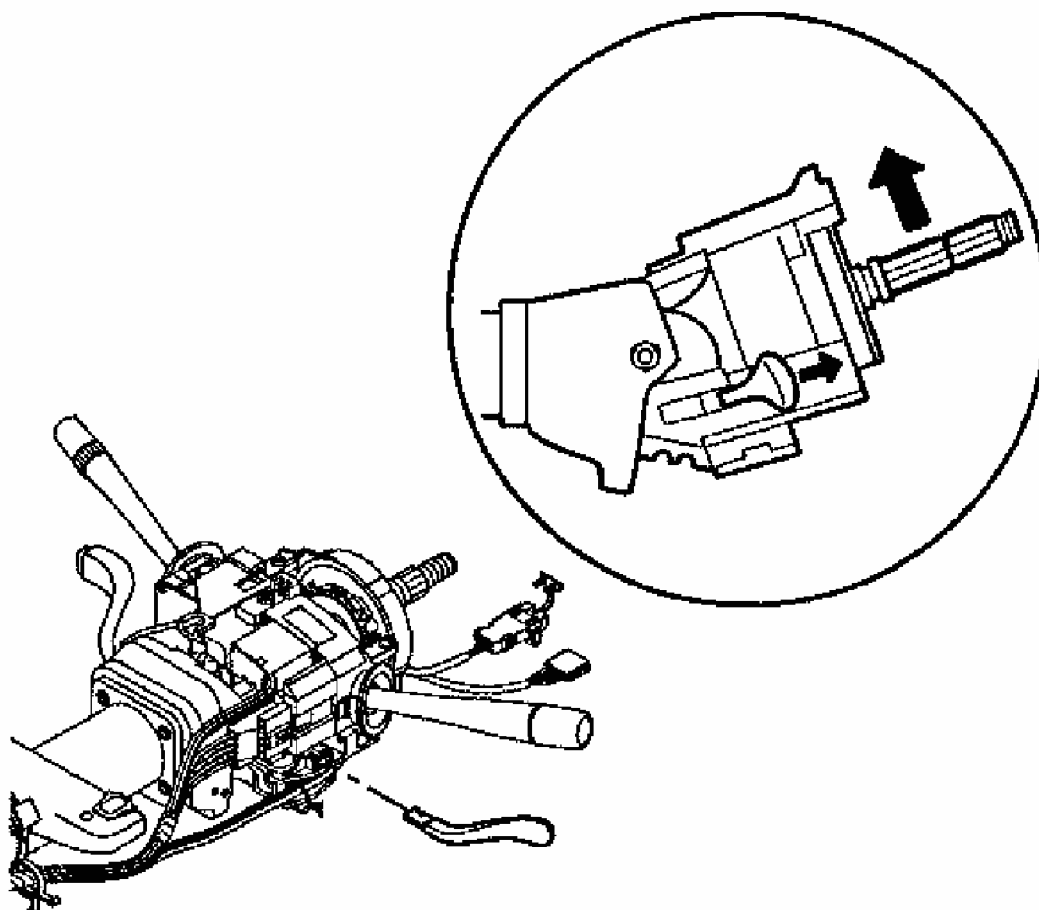


Fig. 72: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

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

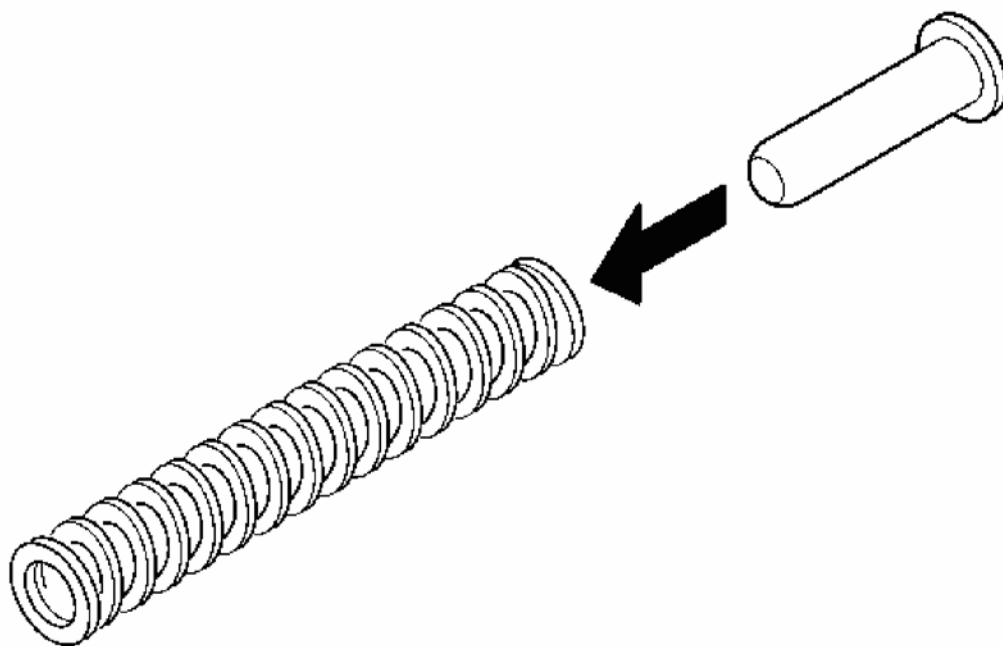


Fig. 73: Spring Guide & Tilt Spring
Courtesy of GENERAL MOTORS CORP.

2. Install the spring guide into the tilt spring.

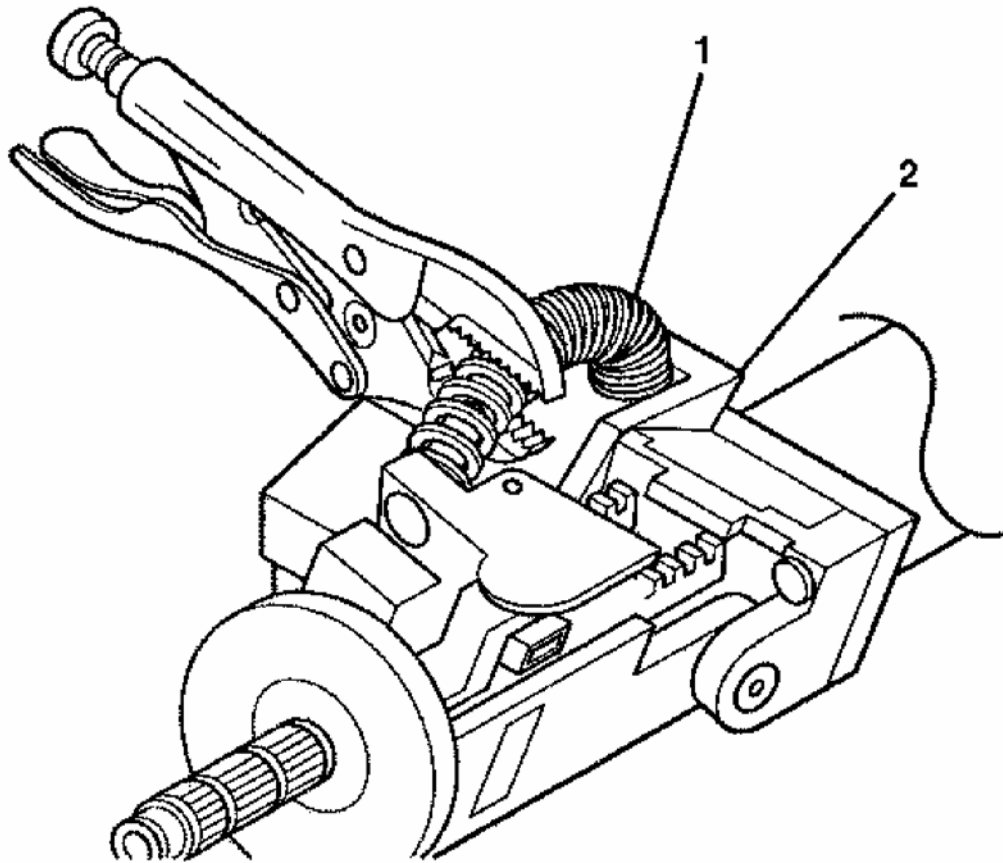


Fig. 74: Installing Tilt Spring Onto The Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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.

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.

STEERING COLUMN TILT HEAD REPLACEMENT

Tools Required

- **J 21854-01** Pivot Pin Remover. See **Special Tools**.
- **J 23653-SIR** Steering Column Lock Plate Compressor
- **J 42137** Cam Orientation Plate Adapter. See **Special Tools**.

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.

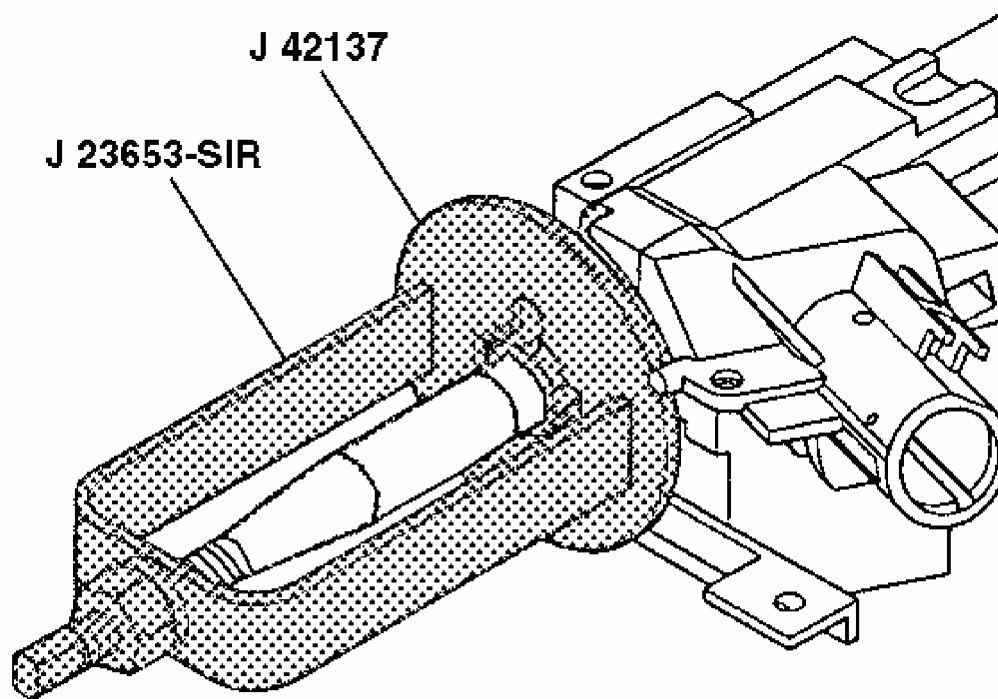


Fig. 75: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

2. Remove the SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)** in SIR.
3. Compress the cam orientation plate using **J 23653-SIR** and **J 42137** . See **Special Tools**.

Remove the bearing retainer from the shaft.

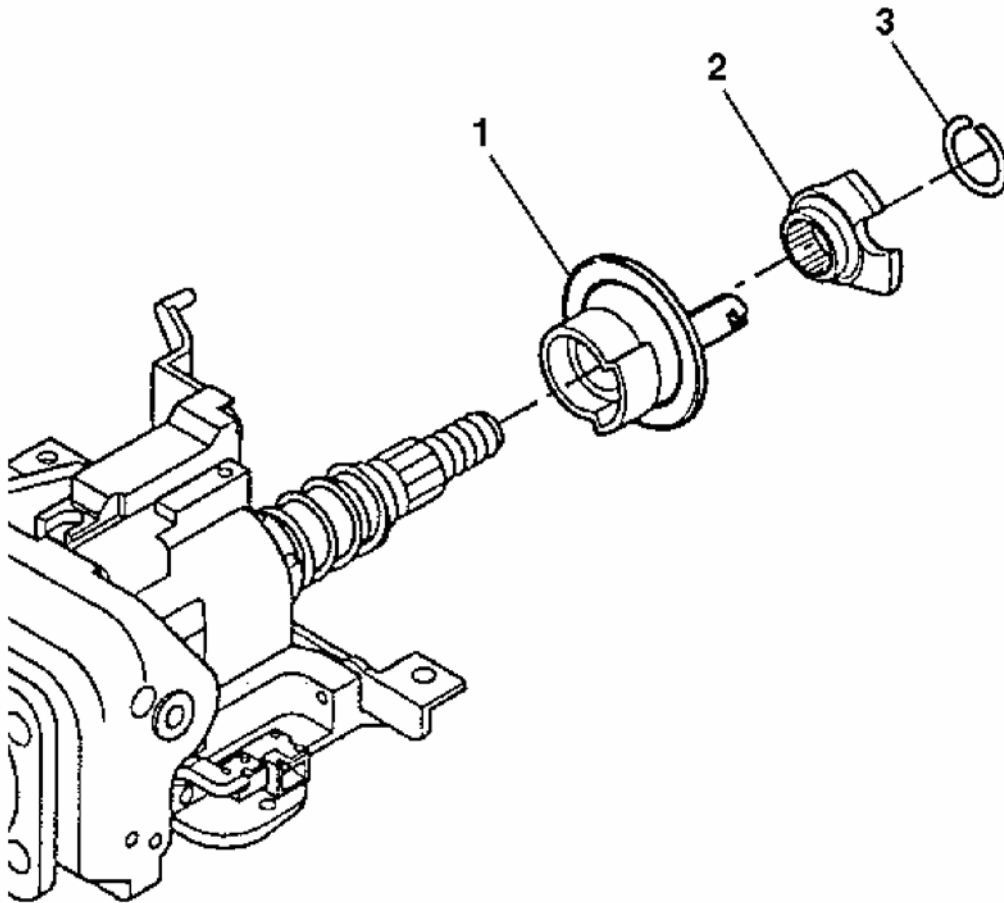


Fig. 76: View Of Turn Signal Cancel Cam Assembly, Cam Orientation Plate & Bearing Retainer

Courtesy of GENERAL MOTORS CORP.

4. Remove **J 23653-SIR** and **J 42137** from the steering column. See **Special Tools**.
5. Remove and dispose the bearing retainer (3).
6. Remove the cam orientation plate (2).
7. Remove the turn signal cancel cam assembly (1).

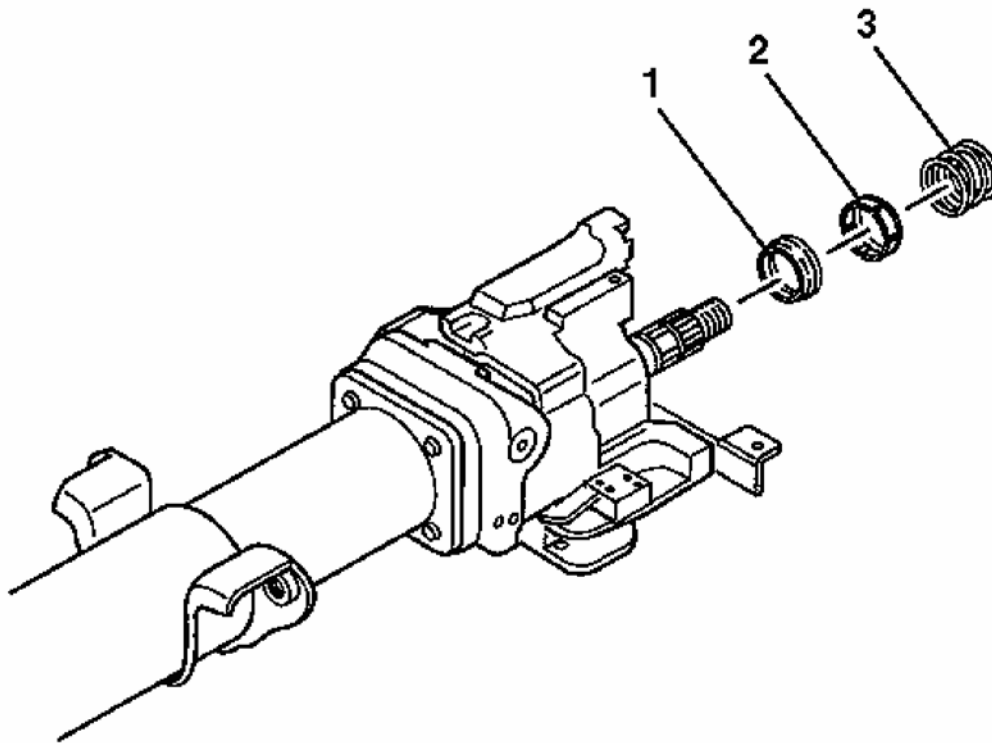


Fig. 77: View Of Upper Bearing Spring, Inner Race Seat & Inner Race
Courtesy of GENERAL MOTORS CORP.

8. Remove the upper bearing spring (3).
9. Remove the upper bearing inner race seat (2).
10. Remove the inner race (1).

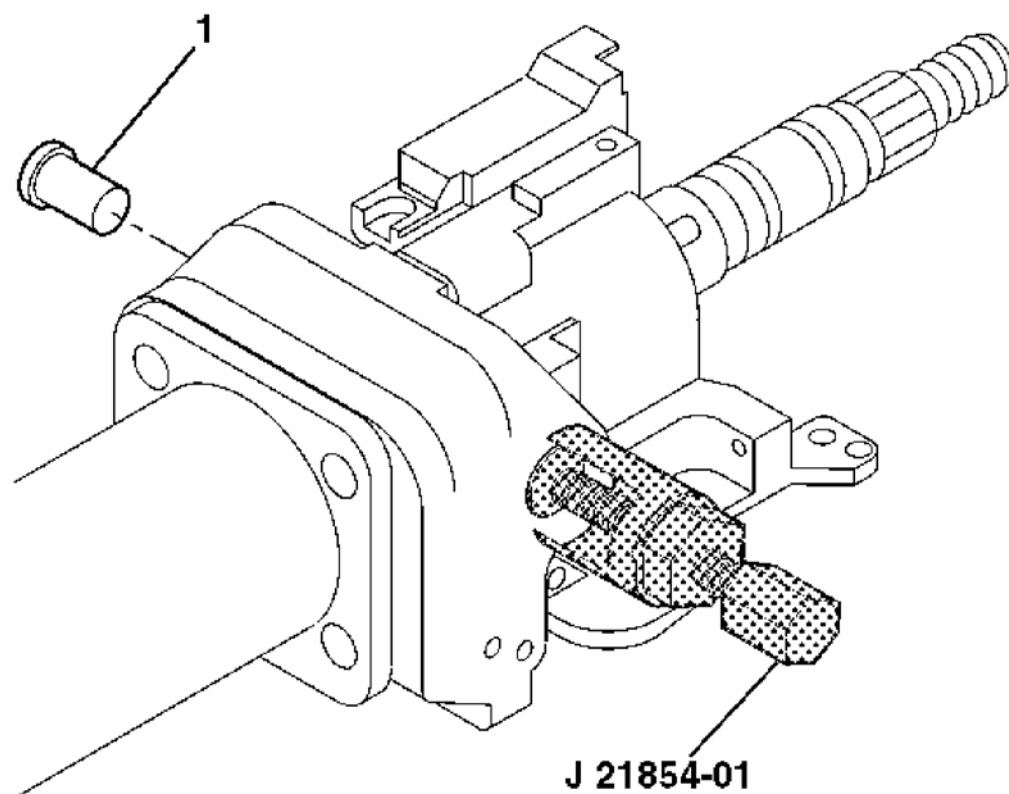


Fig. 78: Identifying J 21854-01
Courtesy of GENERAL MOTORS CORP.

11. Remove the pivot pins (1) using **J 21854-01** . See Special Tools.

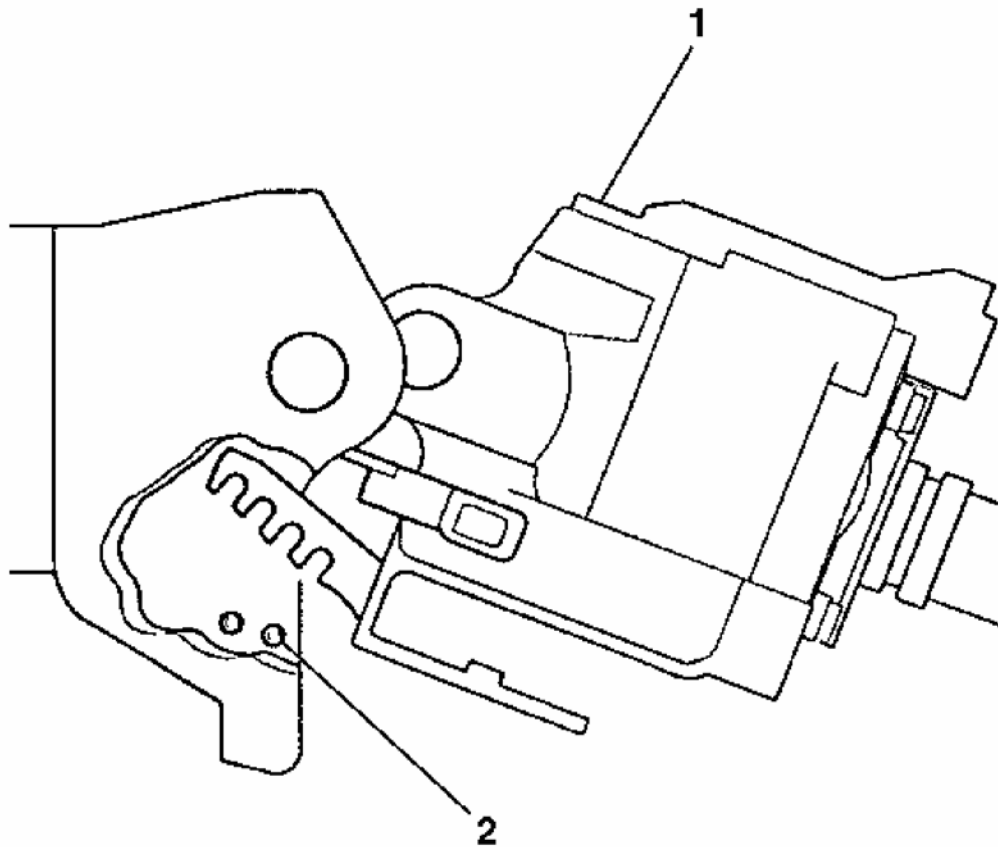


Fig. 79: Disengaging Steering Wheel Lock Shoes From Dowel Pins
Courtesy of GENERAL MOTORS CORP.

12. Pull the tilt arm in order to disengage the steering wheel lock shoes from the dowel pins (2) in the steering column support assembly.

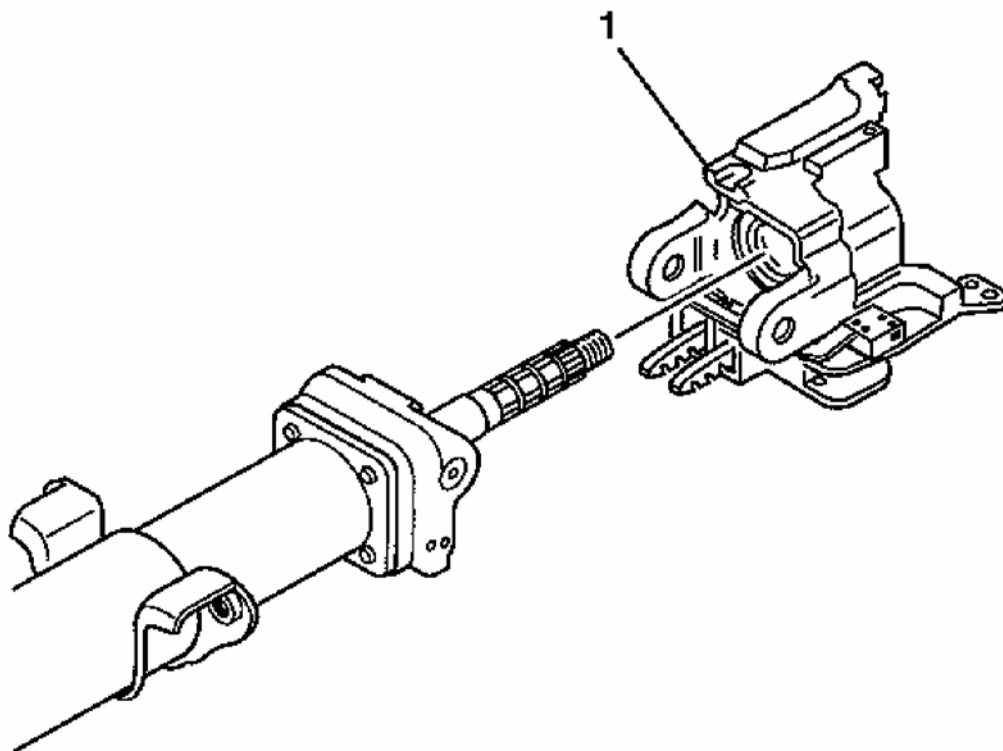


Fig. 80: View Of Steering Column Housing And Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

13. Remove the housing and bearing assembly (1).

Installation Procedure

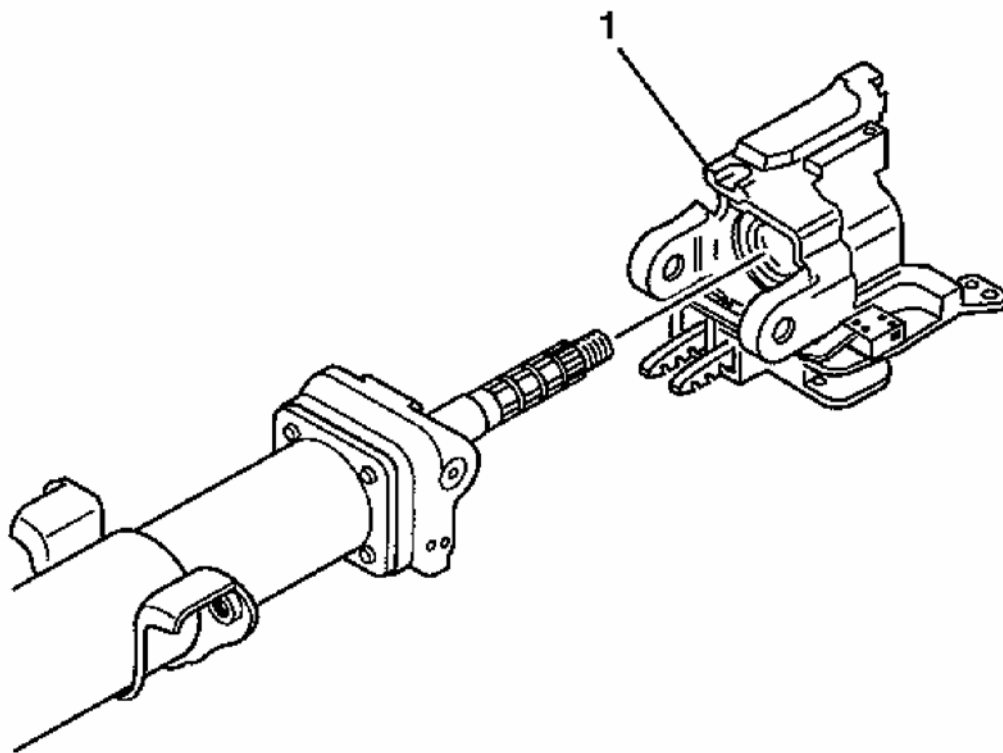


Fig. 81: View Of Steering Column Housing And Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the housing and bearing assembly (1).

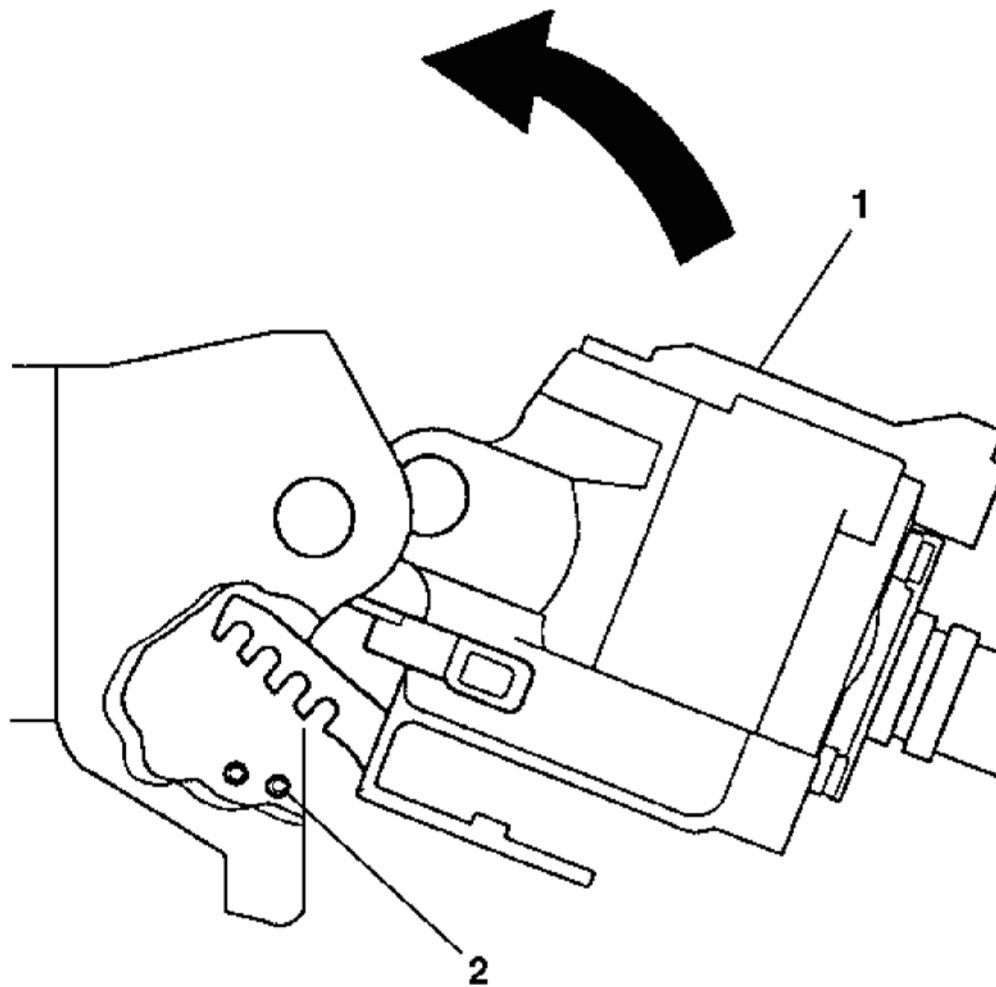


Fig. 82: Locking Shoes To Dowel Pins
Courtesy of GENERAL MOTORS CORP.

2. Using the tilt lever position, lock the shoes to the dowel pins (2).
3. Rotate the tilt head assembly (1) in order to align the holes for the pivot pins.

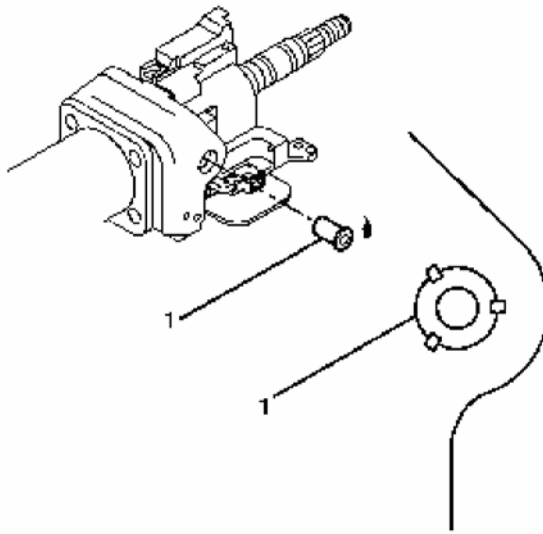


Fig. 83: View Of Pivot Pins At Steering Column Assembly
Courtesy of GENERAL MOTORS CORP.

4. Install the 2 pivot pins by performing the following steps:
 1. Lubricate the pivot pins (1) with, GM P/N 12346293 (Canadian P/N 992723).
 2. Press the pivot pins (1) until the pins are firmly seated.
 3. Stake the pivot pins at three new locations (1).

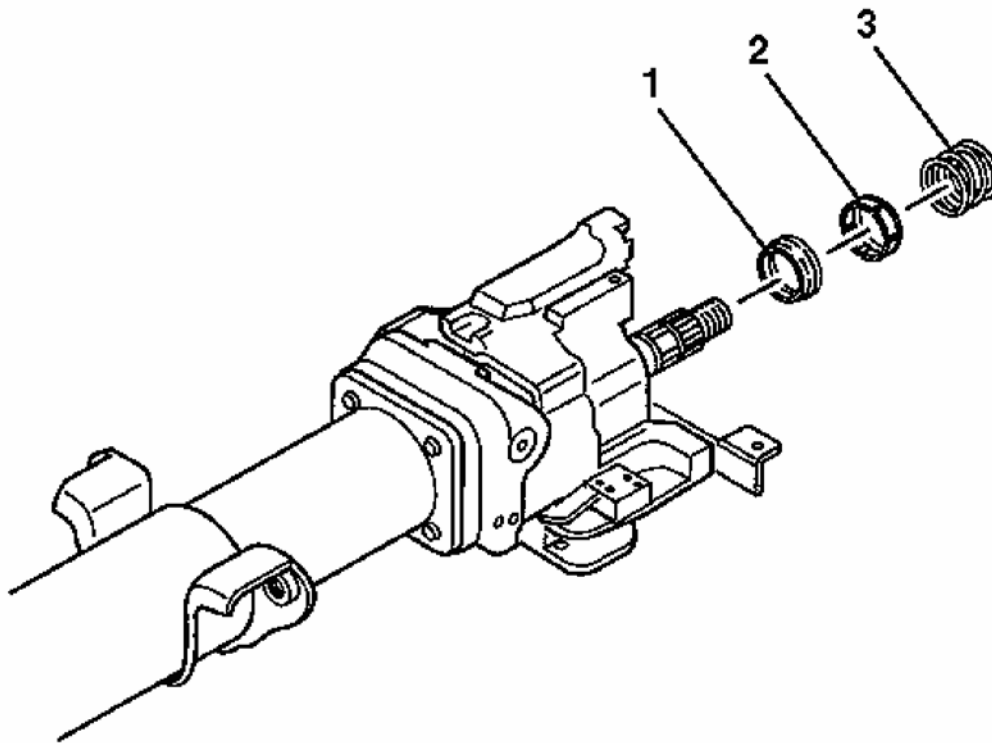


Fig. 84: View Of Upper Bearing Spring, Inner Race Seat & Inner Race
Courtesy of GENERAL MOTORS CORP.

5. Install the inner race (1).
6. Install the upper bearing inner race seat (2).
7. Install the upper bearing spring (3).

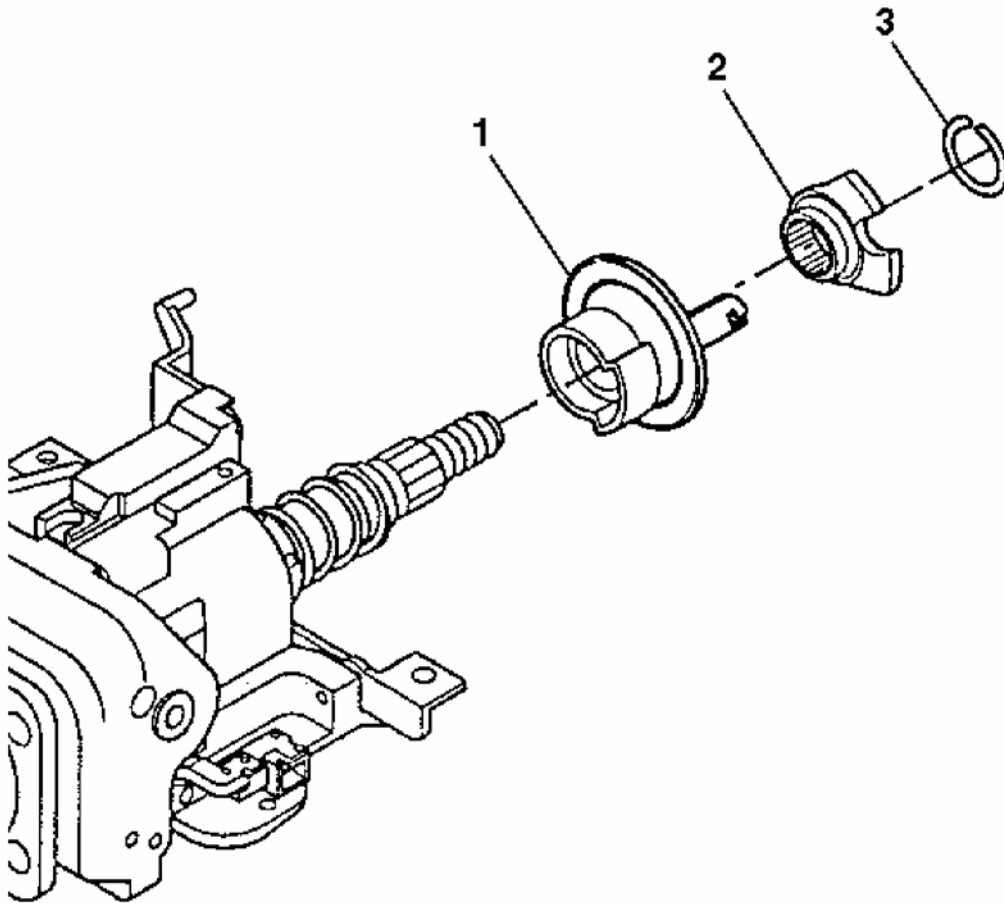


Fig. 85: View Of Turn Signal Cancel Cam Assembly, Cam Orientation Plate & Bearing Retainer

Courtesy of GENERAL MOTORS CORP.

8. Install the turn signal cancel cam assembly (1).
9. Install the cam orientation plate (2).
10. Install the bearing retainer (3).

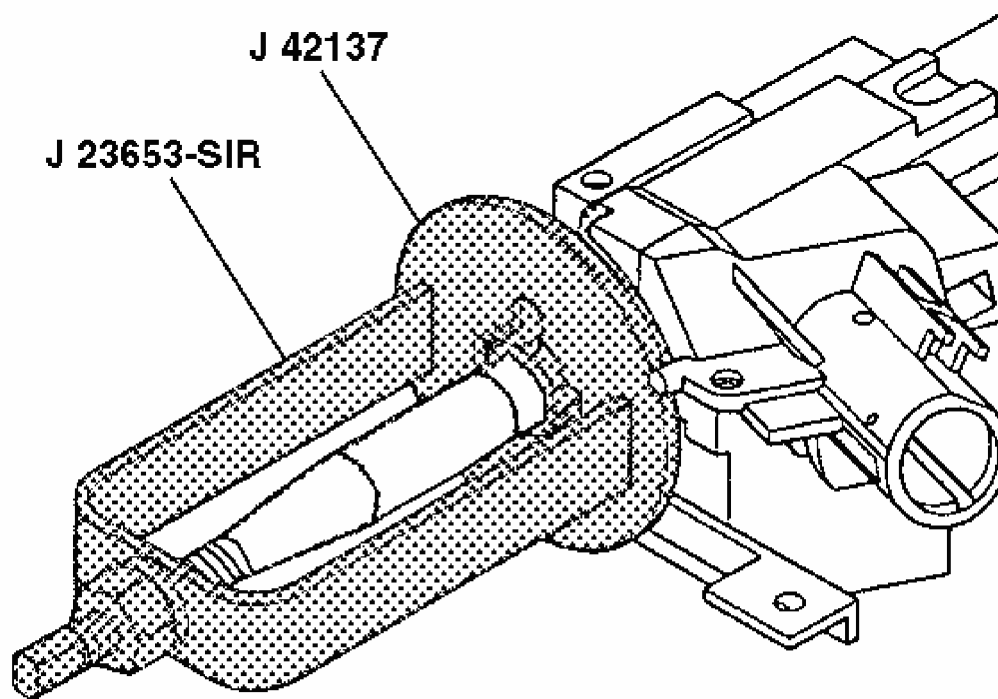


Fig. 86: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

11. Install the bearing retainer ring to the steering shaft.

Compress the cam orientation plate using **J 23653-SIR** and **J 42137** . See **Special Tools**.

12. Remove **J 23653-SIR** and **J 42137** . See **Special Tools**.
13. Install the SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)** in SIR.
14. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

STEERING COLUMN REPLACEMENT

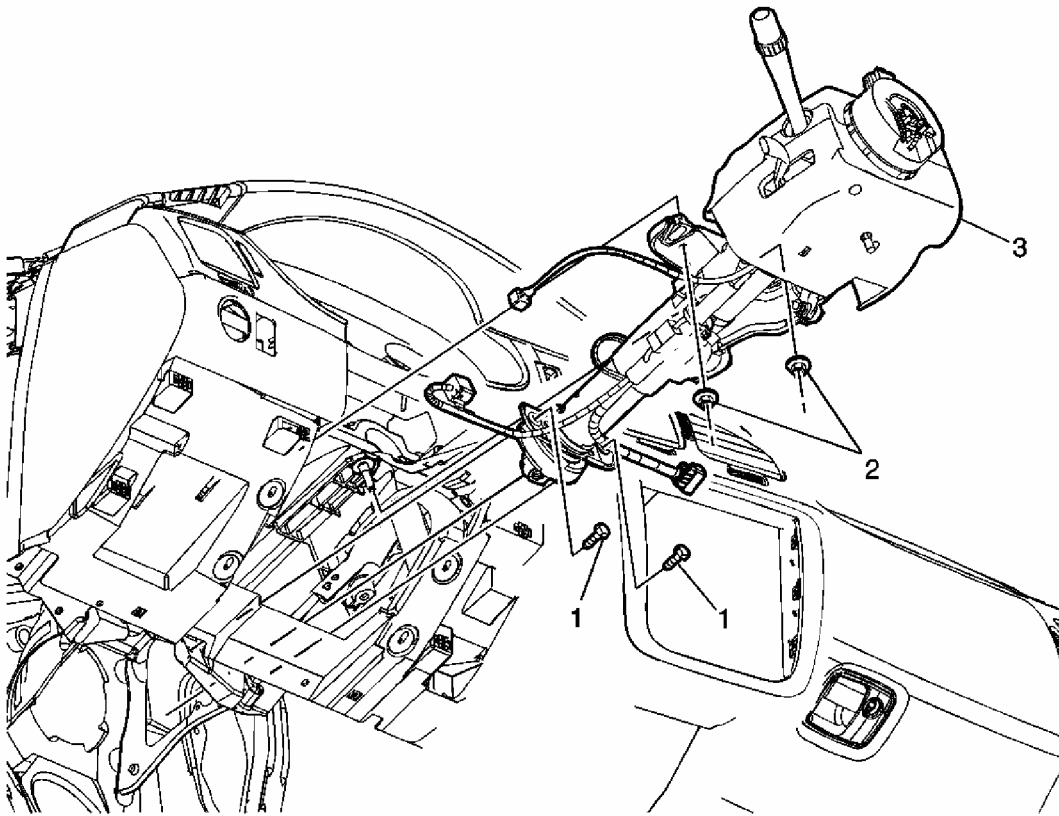


Fig. 87: Replacing Steering Column
Courtesy of GENERAL MOTORS CORP.

Steering Column Replacement

Callout	Component Name
CAUTION: Refer to <u>SIR</u> <u>Caution</u> .	
CAUTION: Refer to <u>Battery Disconnect</u> <u>Caution</u> .	
NOTE: Refer to <u>Fastener</u> <u>Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
1. Disconnect the negative battery cable. Refer to Battery Negative Cable	

Disconnect/Connect Procedure (RPOs LZE/LZ4/LZ9) or Battery Negative Cable Disconnect/Connect Procedure (RPO LS4) .

2. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** .
3. Remove the steering wheel. Refer to **Steering Wheel Replacement**.
4. Remove the left closeout/insulator panel. Refer to **Closeout/Insulator Panel Replacement - Left** .
5. Remove the steering column filler panel. Refer to **Steering Column Filler Replacement** .
6. Remove the knee bolster reinforcement. Refer to **Knee Bolster Reinforcement Replacement (Impala)** or **Knee Bolster Reinforcement Replacement (Monte Carlo)** .
7. Remove the intermediate shaft from the bottom of the steering column. Refer to **Intermediate Steering Shaft Replacement**.
8. Perform passkey relearn after the ignition lock cylinder has been replaced. Refer to **Control Module References** .

1	Bolt, Steering Column (Qty: 2) Tip: Disconnect the steering column electrical connectors. Tighten: 24 N.m (18 lb ft)
2	Nut, Steering Column (Qty: 2) Tip: Tighten the steering column bolts first on installation. Tighten: 24 N.m (18 lb ft)
3	Column, Steering

STEERING WHEEL POSITION SENSOR OR STEERING SHAFT LOWER BEARING REPLACEMENT**Removal Procedure**

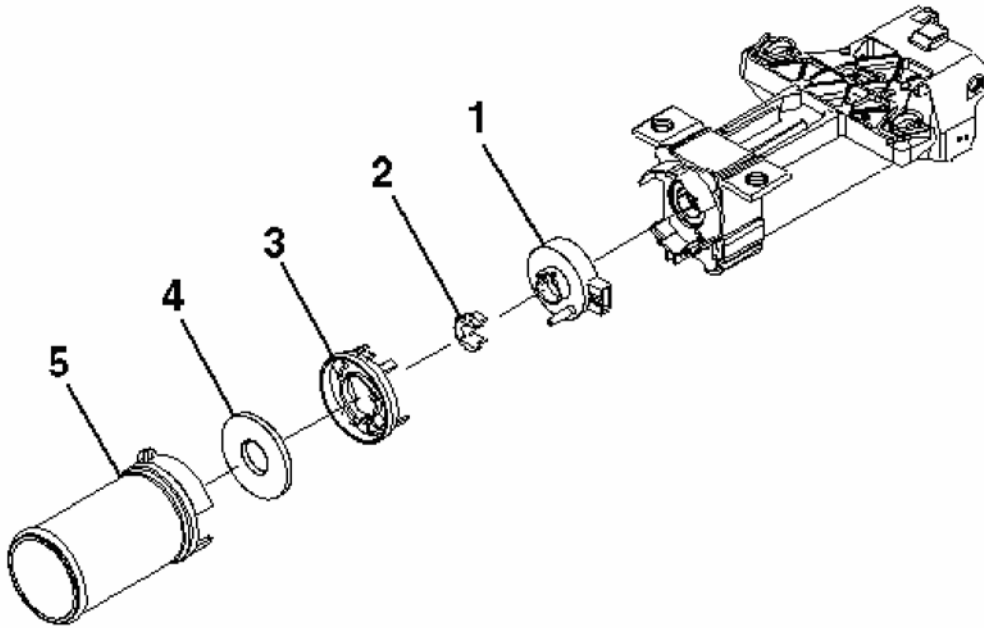


Fig. 88: Identifying Lower Steering Column Components
Courtesy of GENERAL MOTORS CORP.

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 from the vehicle. Refer to Steering Column Replacement.
3. Remove the following from the steering shaft:
 1. The boot seal (5)
 2. The steering shaft seal (4)
 3. The sensor retainer (3)
 4. The sensor locator (2)
4. Remove the steering wheel position sensor (1). Refer to Steering Wheel Position Sensor Centering.

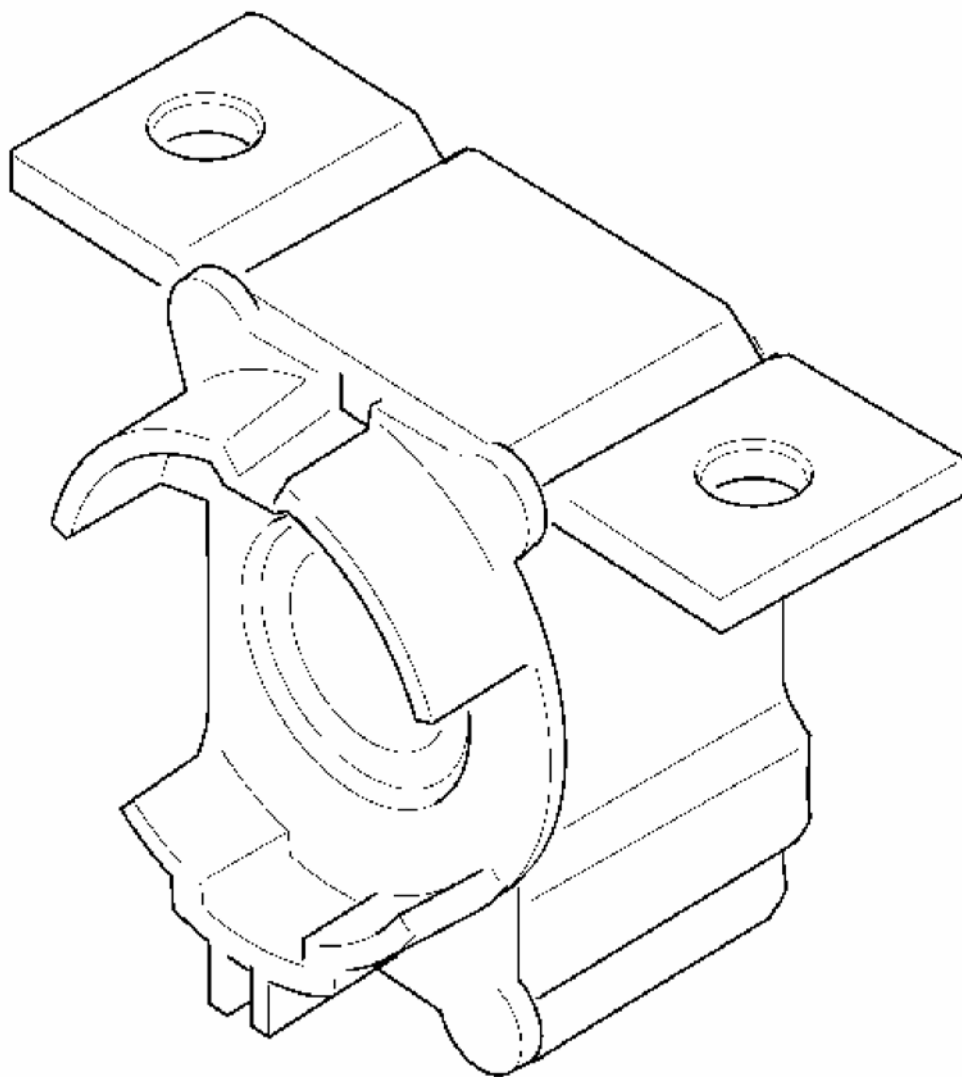


Fig. 89: View Of Lower Bearing Adapter
Courtesy of GENERAL MOTORS CORP.

5. Remove the adapter and bearing assembly from the steering jacket assembly.

Installation Procedure

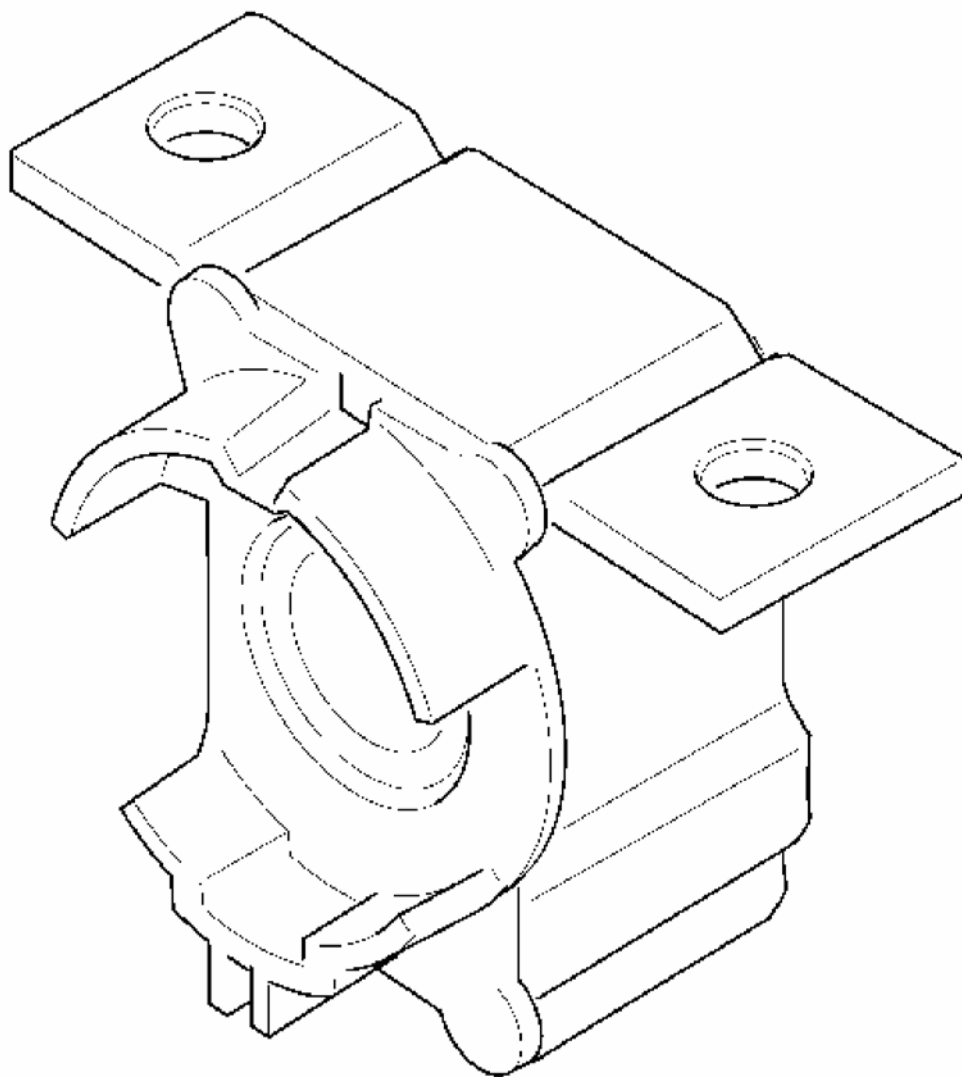


Fig. 90: View Of Lower Bearing Adapter
Courtesy of GENERAL MOTORS CORP.

1. Install the adapter and bearing assembly to the steering jacket assembly.

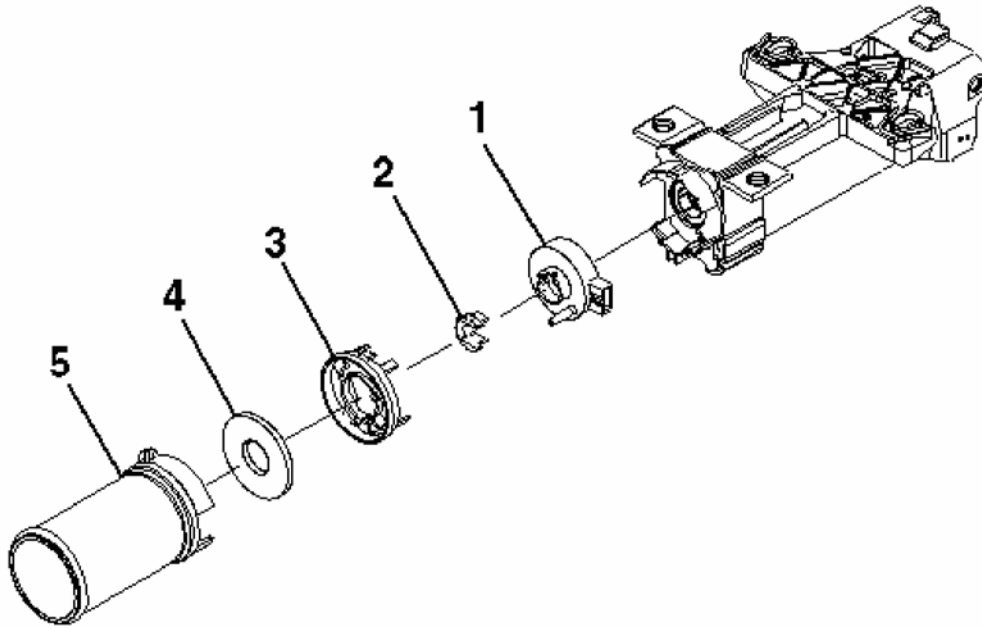


Fig. 91: Identifying Lower Steering Column Components
Courtesy of GENERAL MOTORS CORP.

2. Install the following onto the steering shaft:
 1. The steering wheel position sensor (1) Refer to **Steering Wheel Position Sensor Centering**.
 2. The sensor locator (2)
 3. The sensor retainer (3)
 4. The steering shaft seal (4)
 5. The boot seal (5)
3. Install the steering column into the vehicle. Refer to **Steering Column Replacement**.
4. 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.

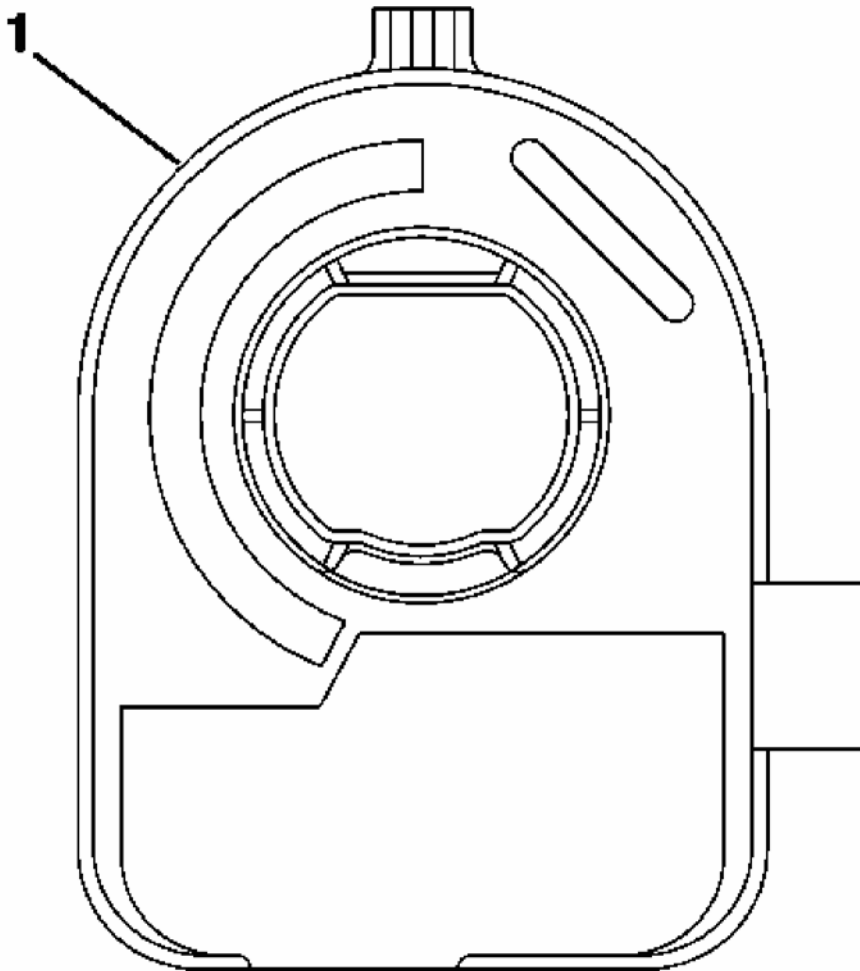


Fig. 92: Front Of The Sensor Connector Will Be On The Right
Courtesy of GENERAL MOTORS CORP.

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.

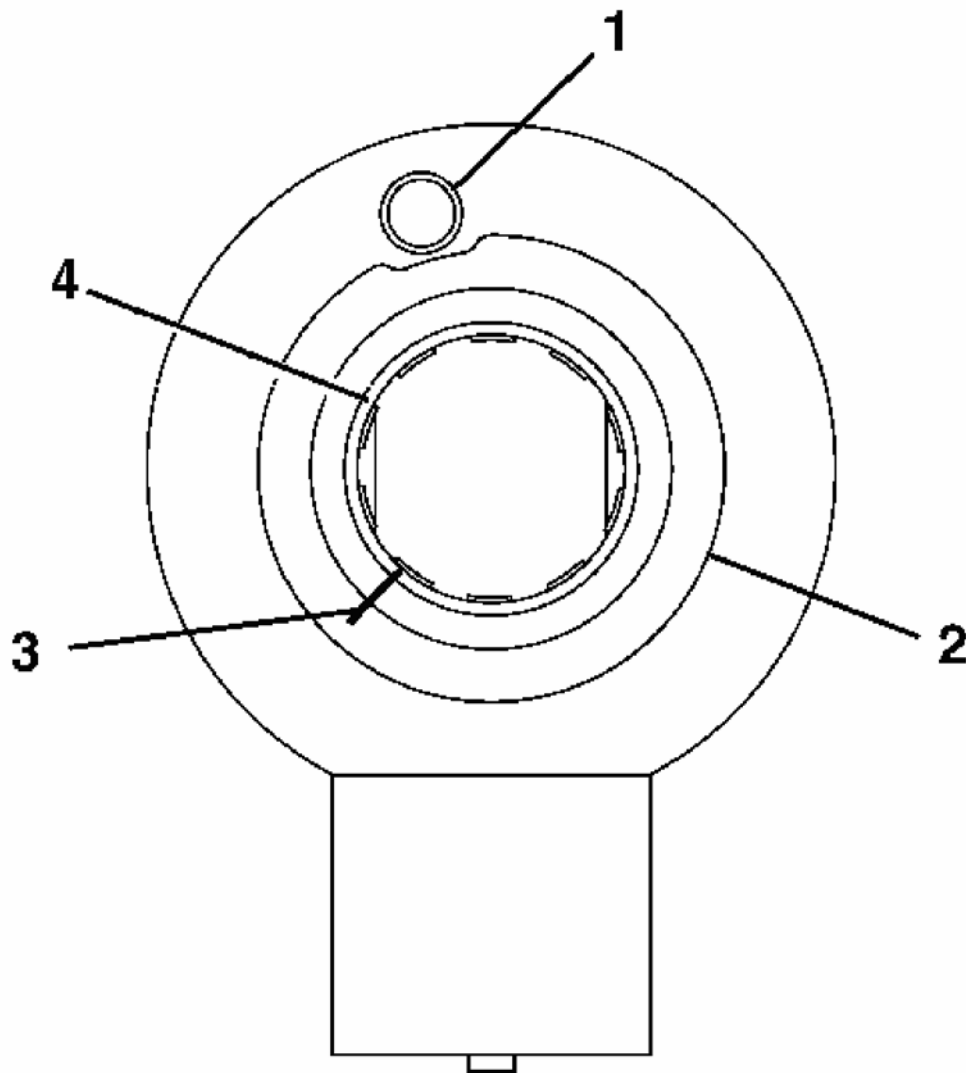


Fig. 93: Steering Wheel Position Sensor Foam Ring, Pin Hole And Rotor Flange Cuff

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.

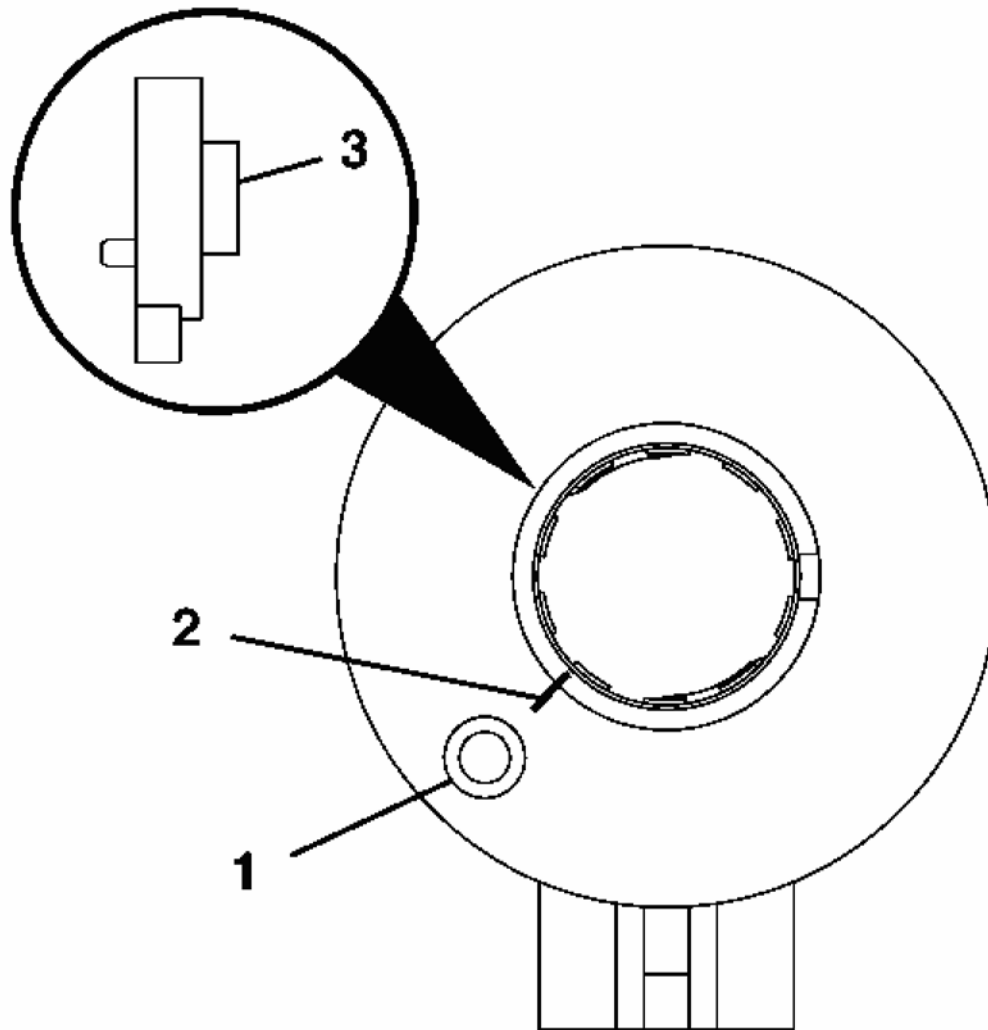


Fig. 94: Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

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.

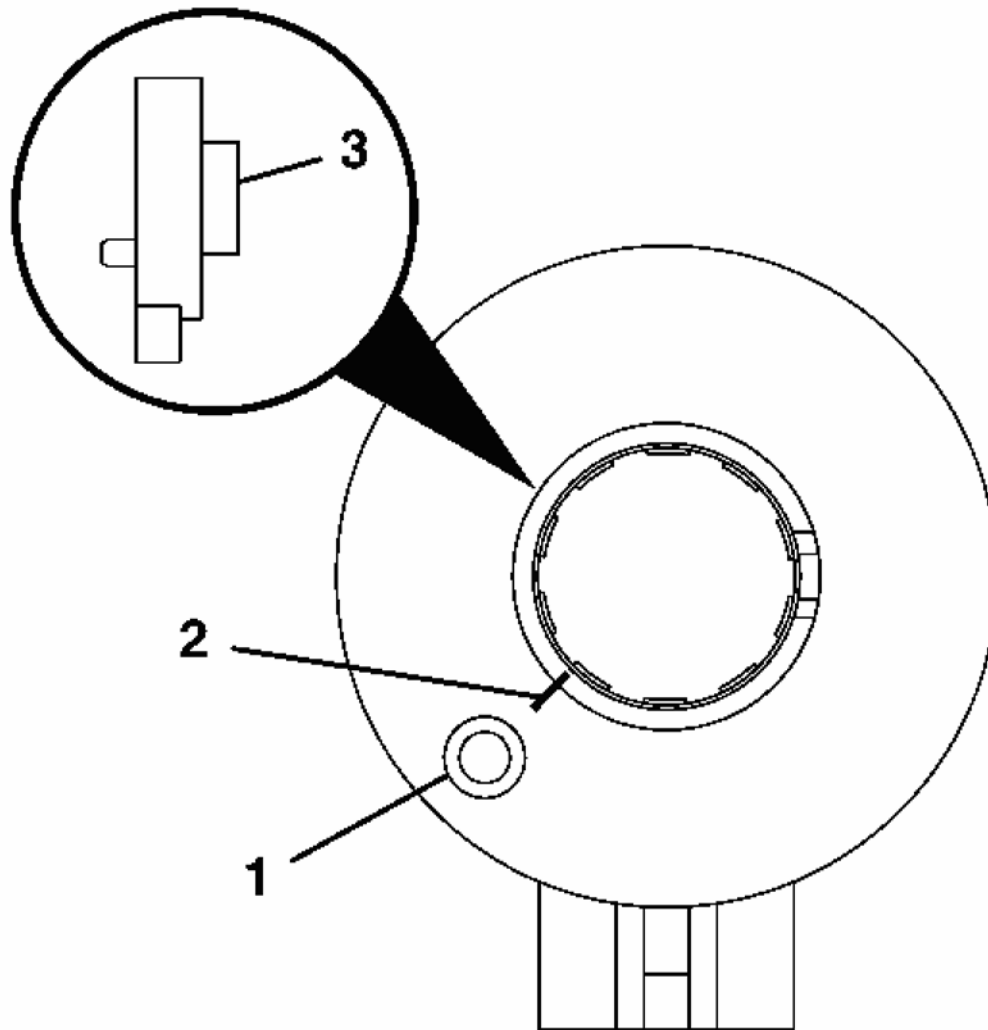


Fig. 95: Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

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.

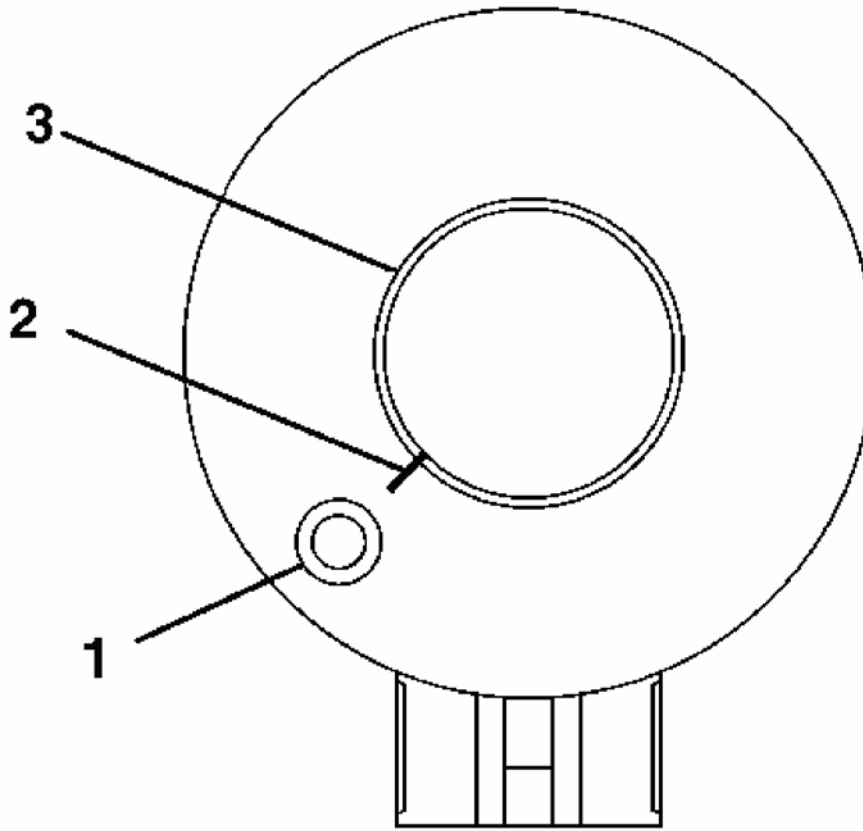


Fig. 96: Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole And Alignment Mark

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.

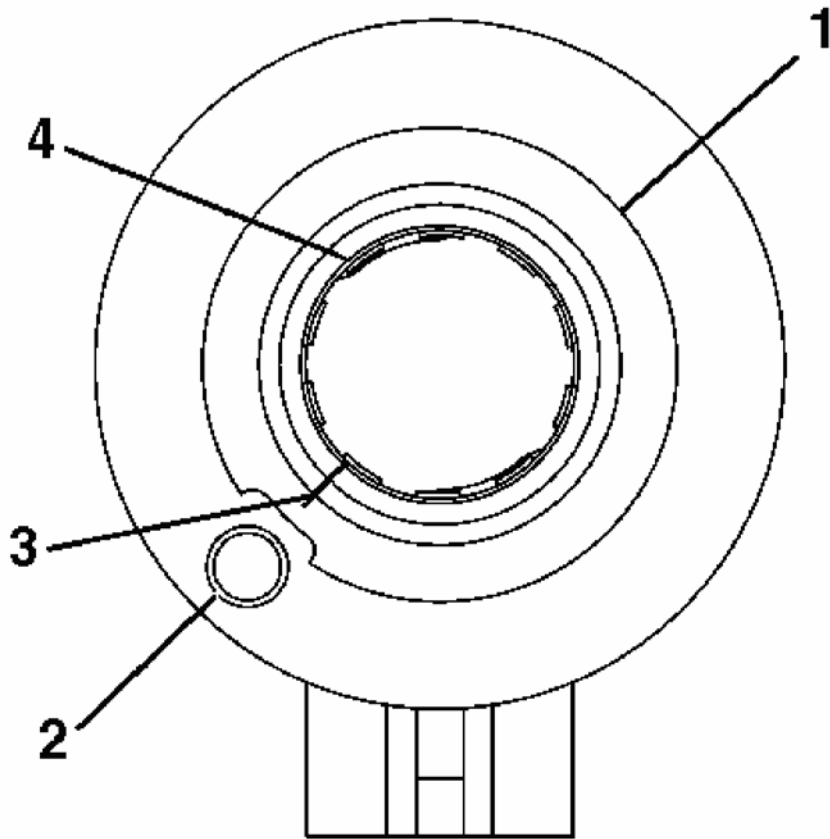


Fig. 97: Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole, Alignment Mark And Foam Ring
 Courtesy of GENERAL MOTORS CORP.

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.

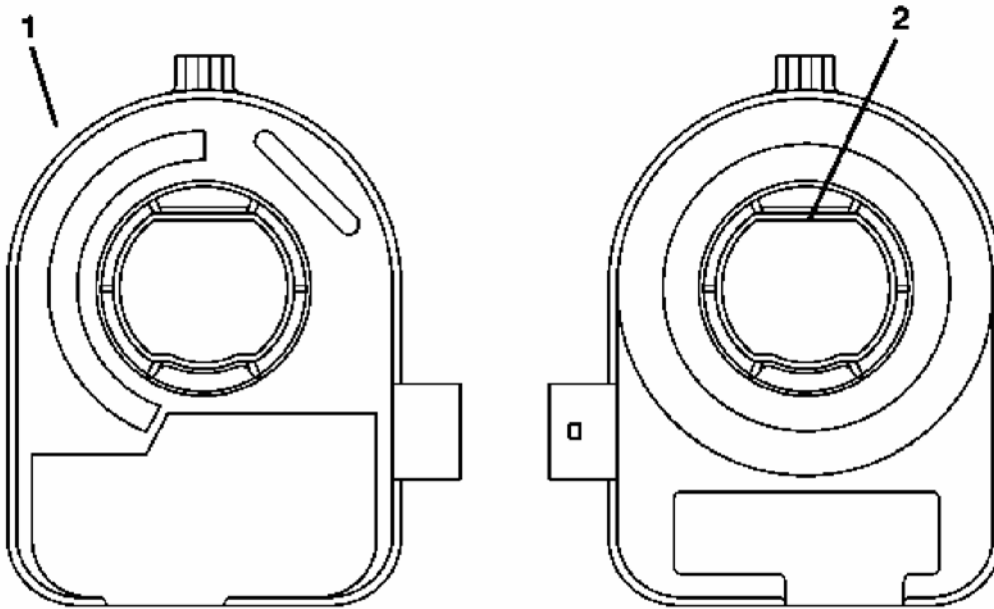


Fig. 98: Front And Back Views Of Steering Wheel Position Sensor
Courtesy of GENERAL MOTORS CORP.

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.

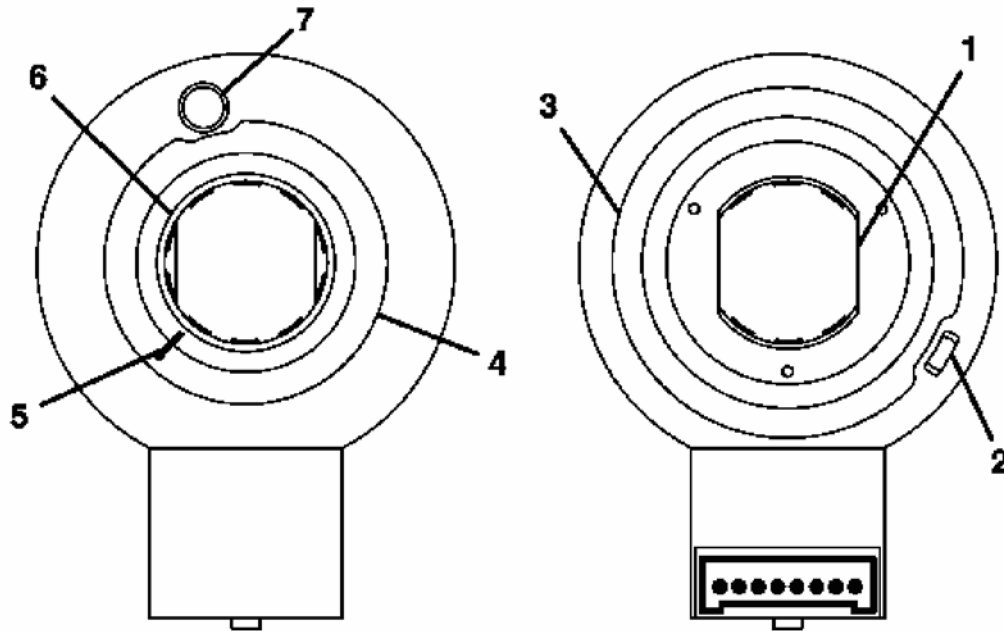


Fig. 99: Steering Wheel Position Sensor Identification Points
Courtesy of GENERAL MOTORS CORP.

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.

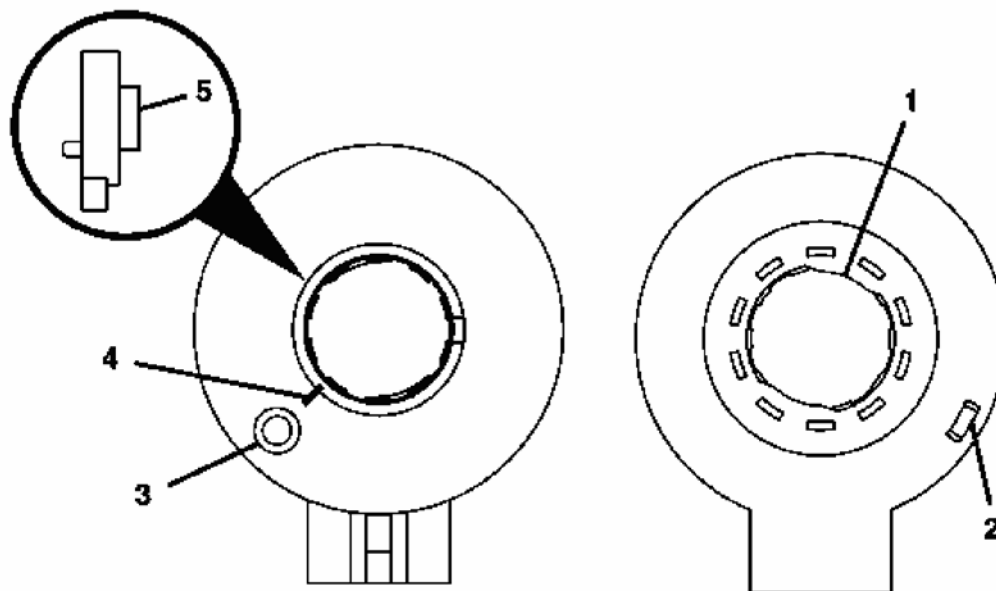


Fig. 100: Steering Wheel Position Sensor Front View
Courtesy of GENERAL MOTORS CORP.

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.

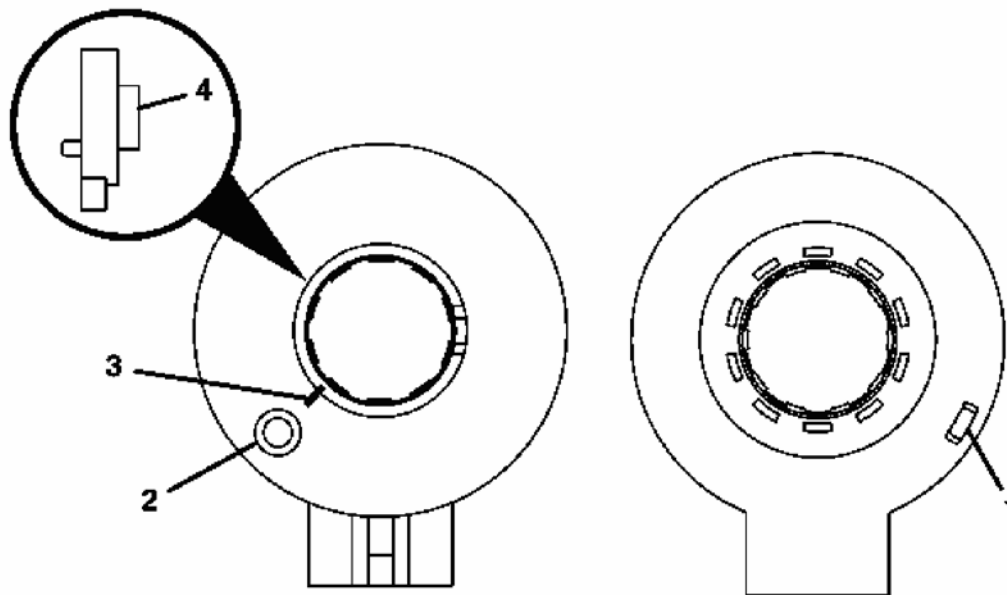


Fig. 101: Steering Wheel Position Sensor Centering Pin Hole, Rotor Flange Cuff And Alignment Mark

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.

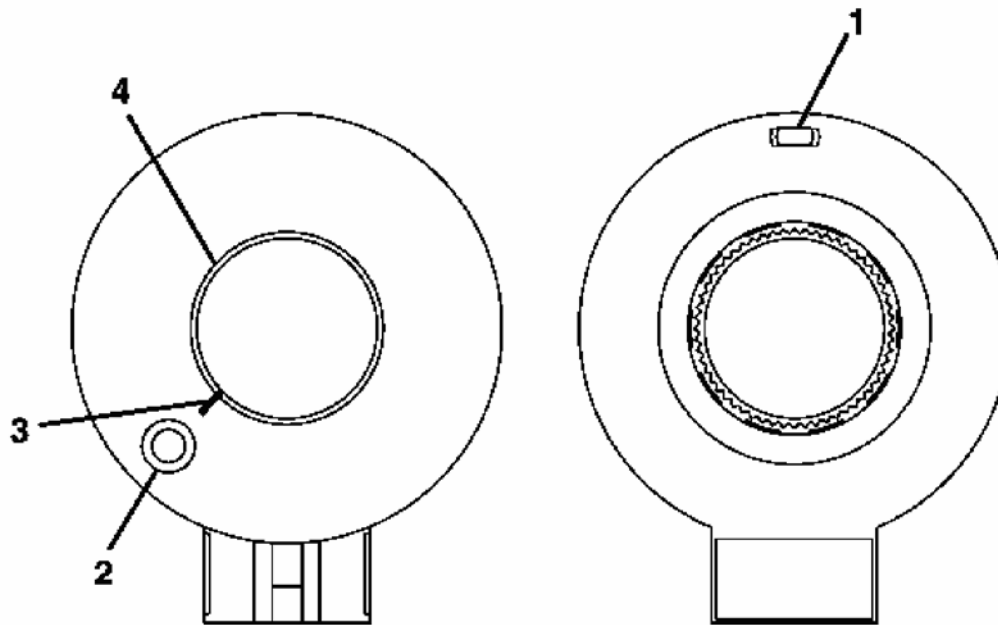


Fig. 102: Steering Wheel Position Sensor Center Pin, Rotor Flange Cuff And Installation Alignment Mark
Courtesy of GENERAL MOTORS CORP.

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.

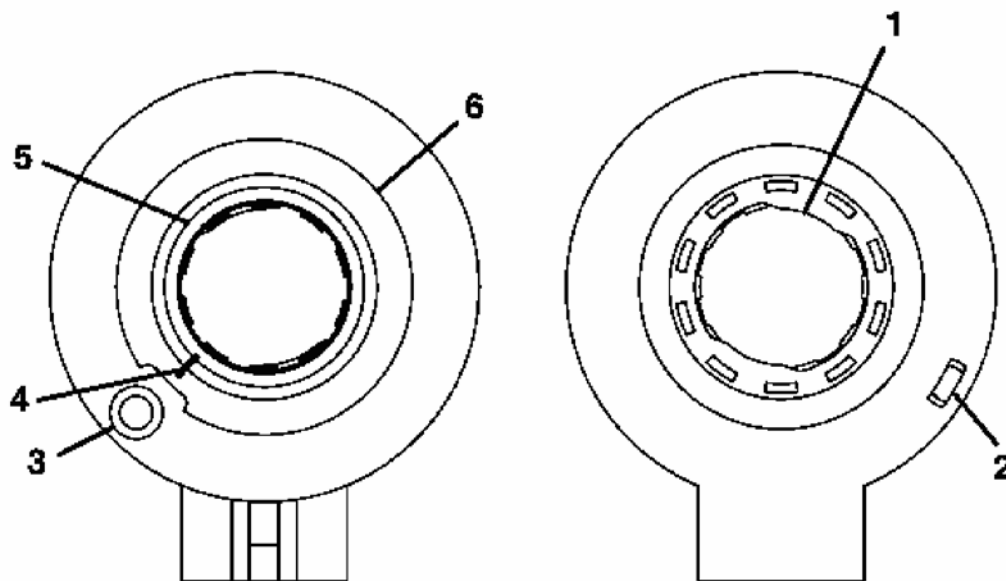


Fig. 103: Steering Wheel Position Sensor Double D Flats
Courtesy of GENERAL MOTORS CORP.

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.

STEERING SHAFT, LOWER BEARING, AND JACKET REPLACEMENT

Tools Required

- **J 21854-01** Pivot Pin Remover. See Special Tools.
- **J 41688** Centering Sphere Installer Tool. See Special Tools.

Removal Procedure

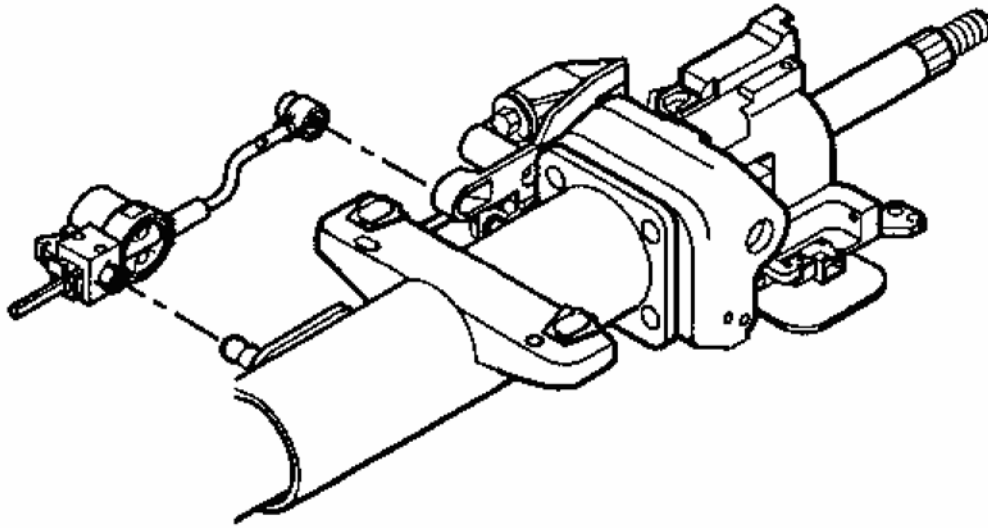


Fig. 104: Automatic Transmission Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

1. Remove the ignition lock cylinder case. Refer to **Ignition Lock Cylinder Case Replacement**.
2. Remove the tilt spring assembly only. Refer to **Tilt Spring Replacement**.
3. Remove the automatic transmission shift lock control.
4. Use a screwdriver to pry the automatic transmission shift lock control from the steering column jacket assembly.

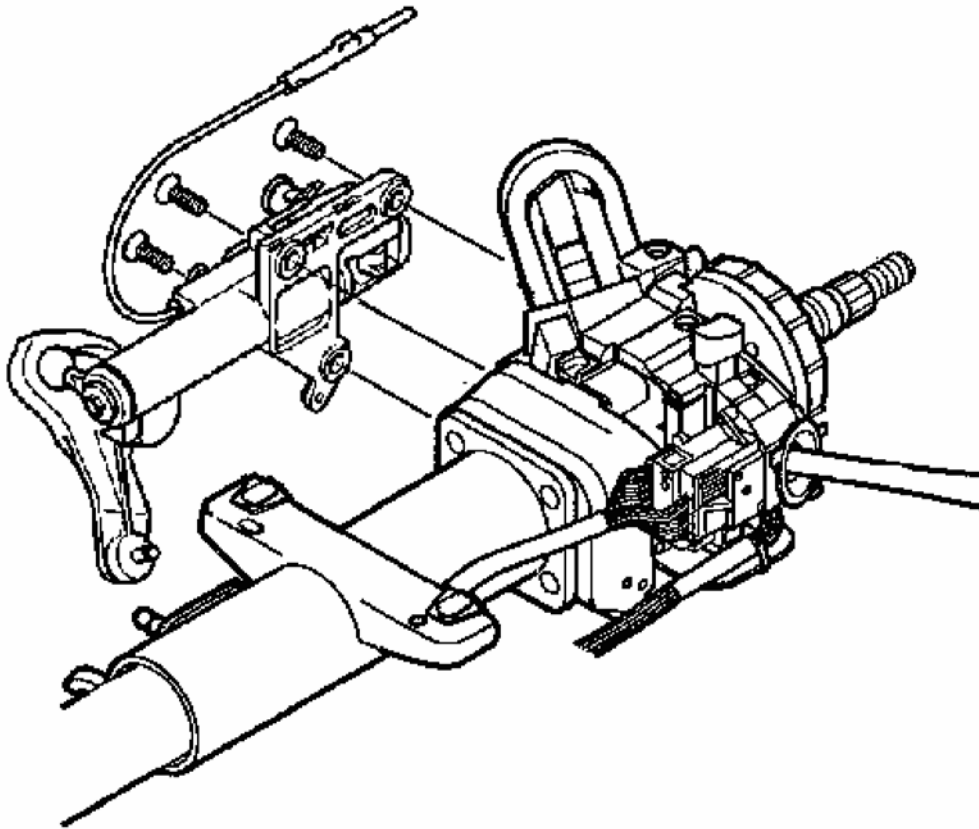


Fig. 105: View Of Linear Shift Assembly And Retaining Screws
Courtesy of GENERAL MOTORS CORP.

5. Remove the 3 flat-head 6-lobed socket tapping screws from the linear shift assembly.
Remove the linear shift assembly.

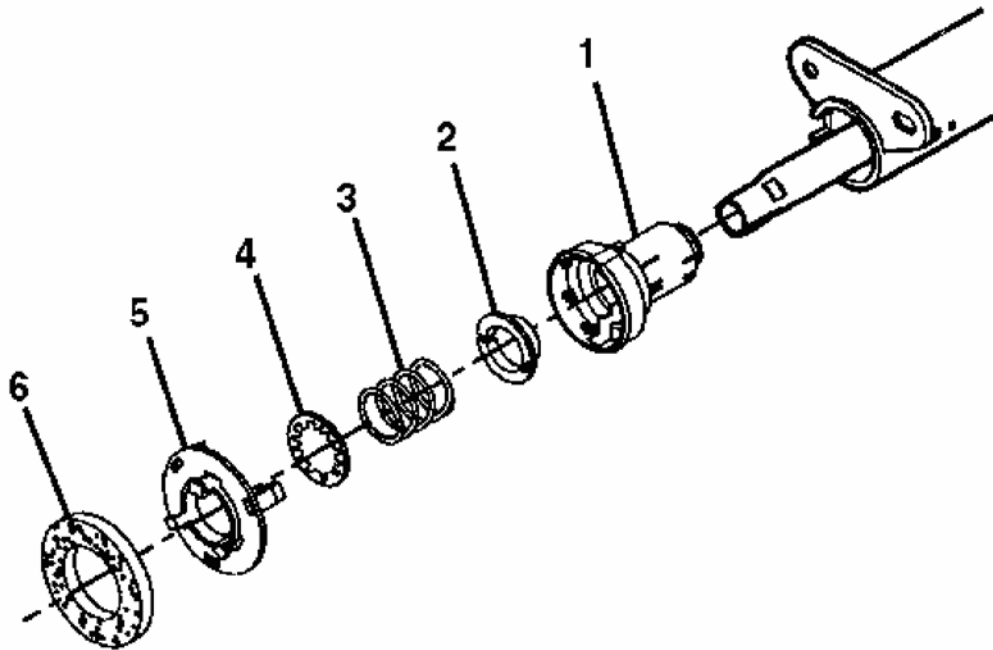


Fig. 106: Locating Steering Shaft Assembly Components
Courtesy of GENERAL MOTORS CORP.

6. Remove the following items from the steering shaft assembly:
 1. The steering shaft seal (6)
 2. The sensor retainer (5)
 3. The lower spring retainer (4)
 4. The lower bearing spring (3)
 5. The lower bearing seat (2)
 6. The adapter and bearing assembly (1)
7. Dispose of the lower spring retainer (4).

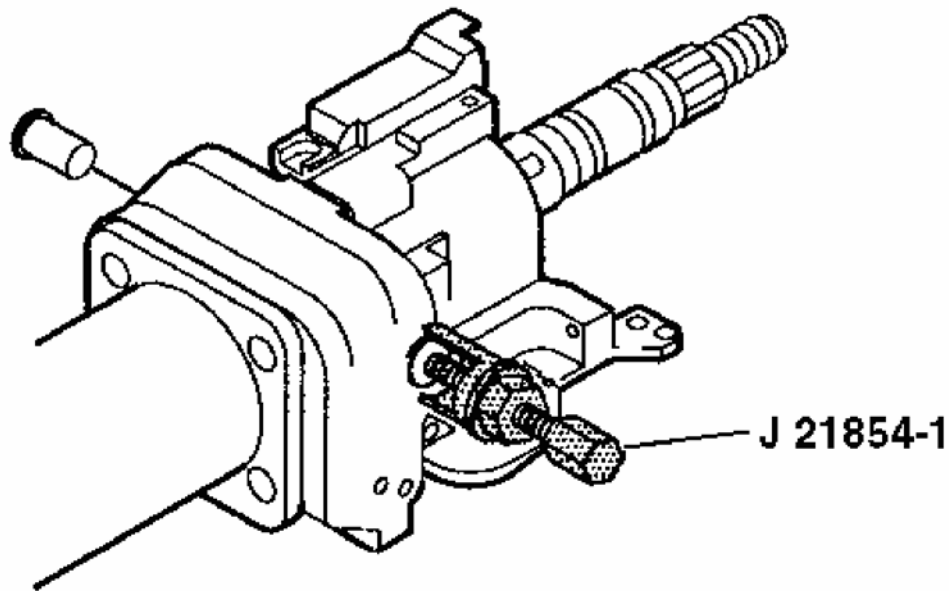


Fig. 107: Removing Pivot Pins From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

8. Remove the 2 pivot pins from the steering column support assembly with **J 21854-01** .
See **Special Tools**.

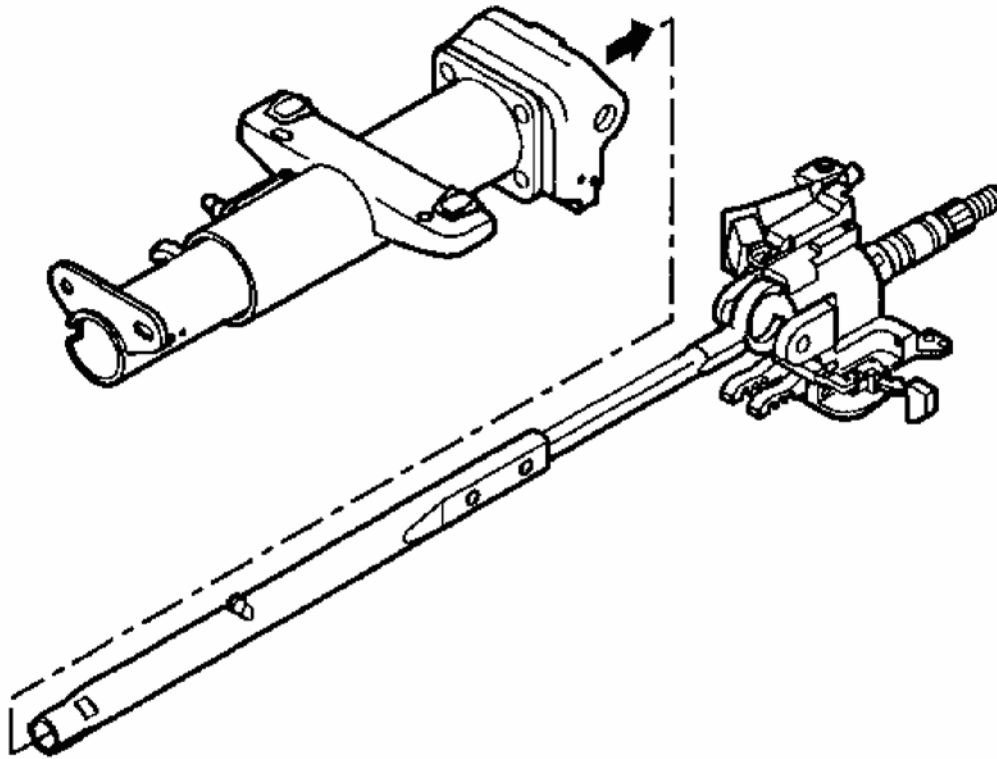


Fig. 108: Removing Upper Tilt Head Assembly With Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

9. Install the tilt knob and tilt the column to the upright position.
10. Remove the upper tilt head assembly with the steering shaft assembly.

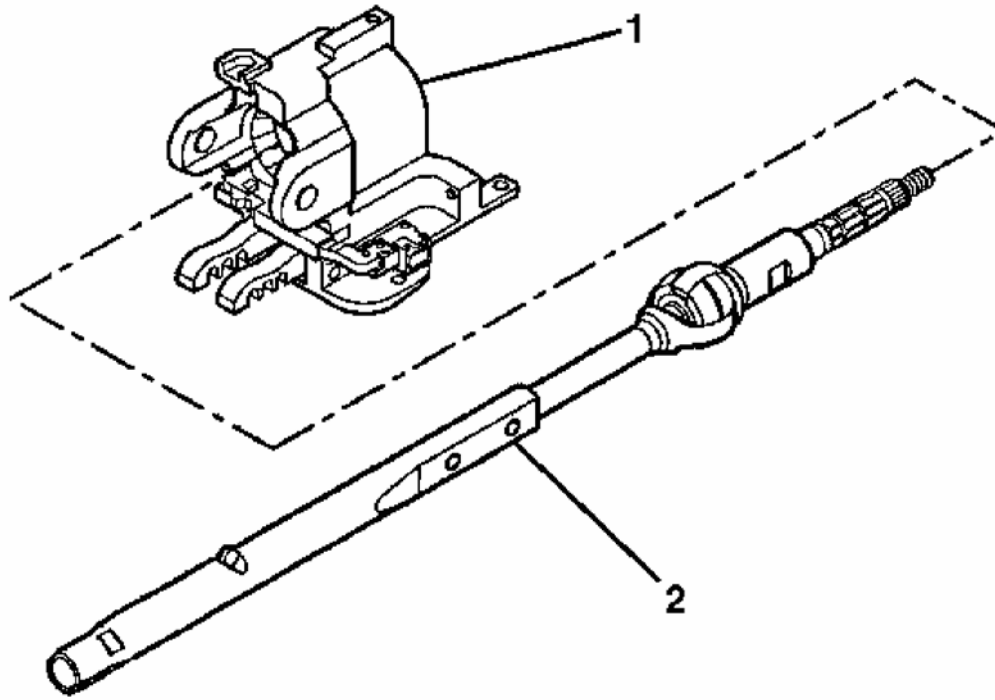


Fig. 109: Steering Shaft Assembly & Steering Column Tilt Head Housing Assembly

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Mark the race and upper shaft assembly and the lower shaft assembly to ensure proper assembly. Failure to assemble properly will cause the steering wheel to be turned 180 degrees.

11. Remove the steering shaft assembly (2) from the steering column tilt head assembly (1).

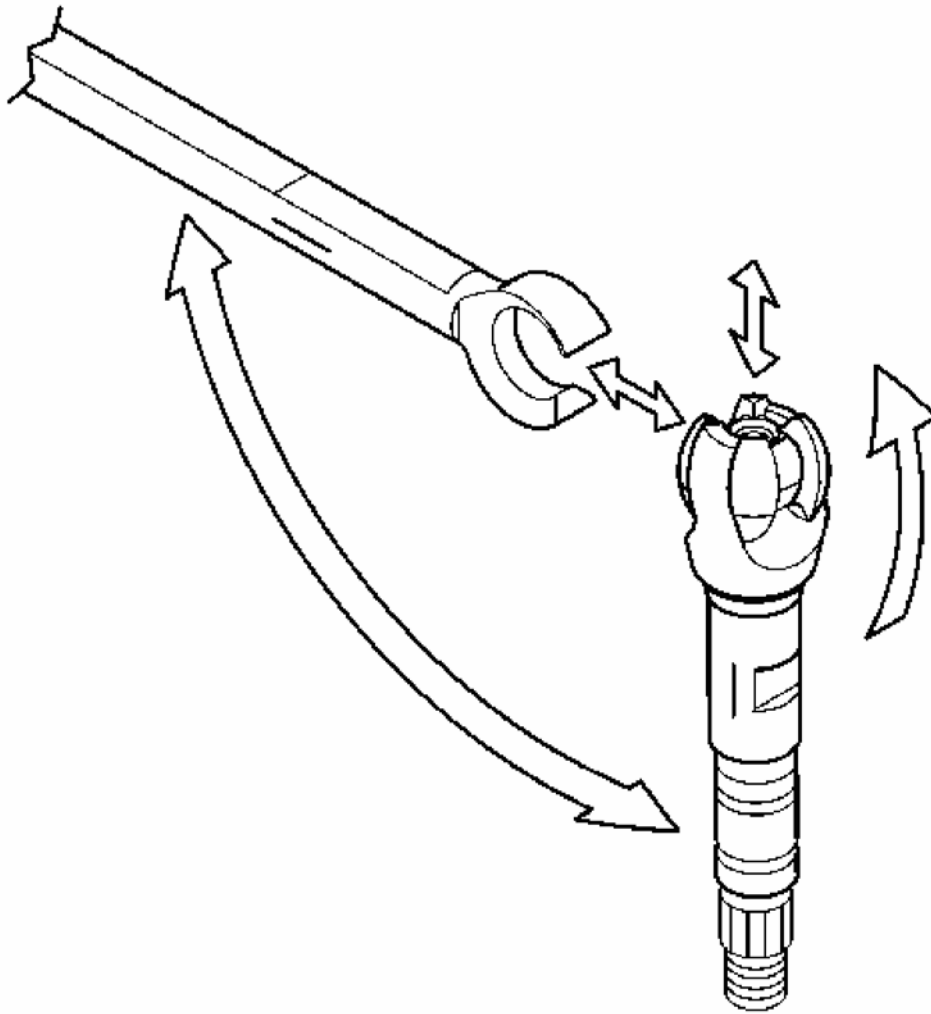


Fig. 110: Disengaging Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

12. Tilt the race and upper shaft assembly 90 degrees to the lower shaft assembly and disengage. If necessary, remove and discard the old centering sphere and spring.

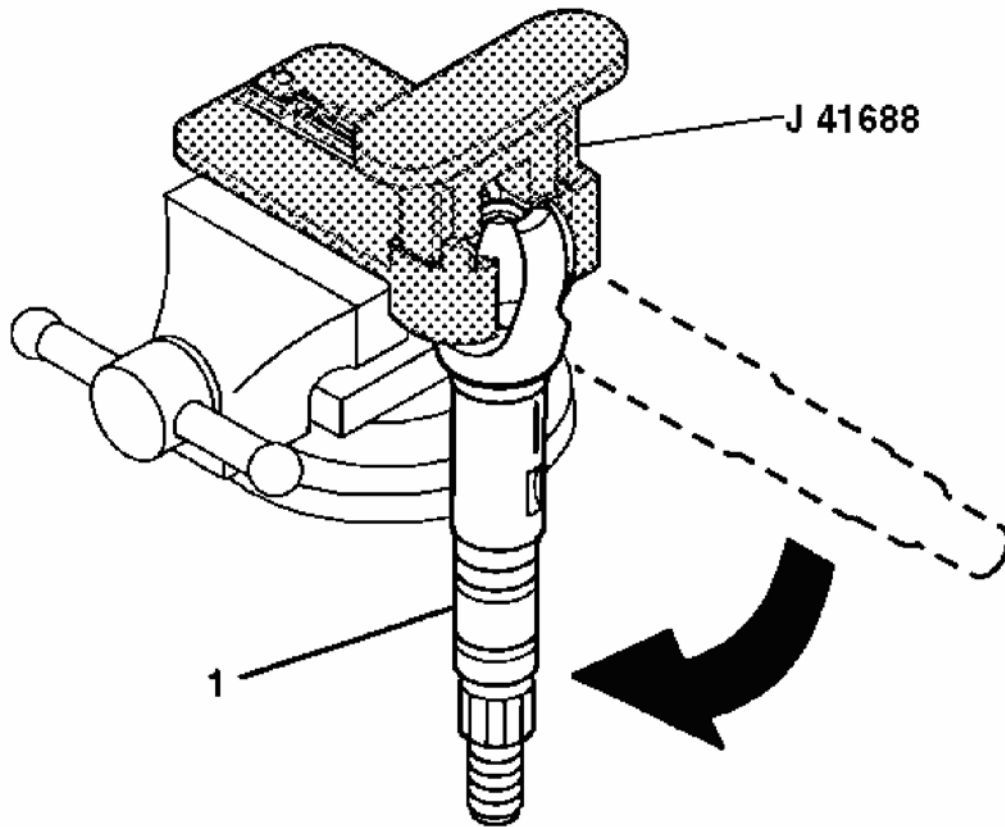


Fig. 111: Rotating Upper Shaft Assembly 90 Degrees
Courtesy of GENERAL MOTORS CORP.

13. Insert the race and upper shaft assembly (1) into **J 41688** . See **Special Tools**.
14. Rotate the driver 90 degrees in the counterclockwise direction in order to disengage the centering sphere.
15. Remove the shaft preload spring and the centering sphere from **J 41688** . See **Special Tools**.
16. If necessary, discard the old centering sphere and the old joint preload spring.

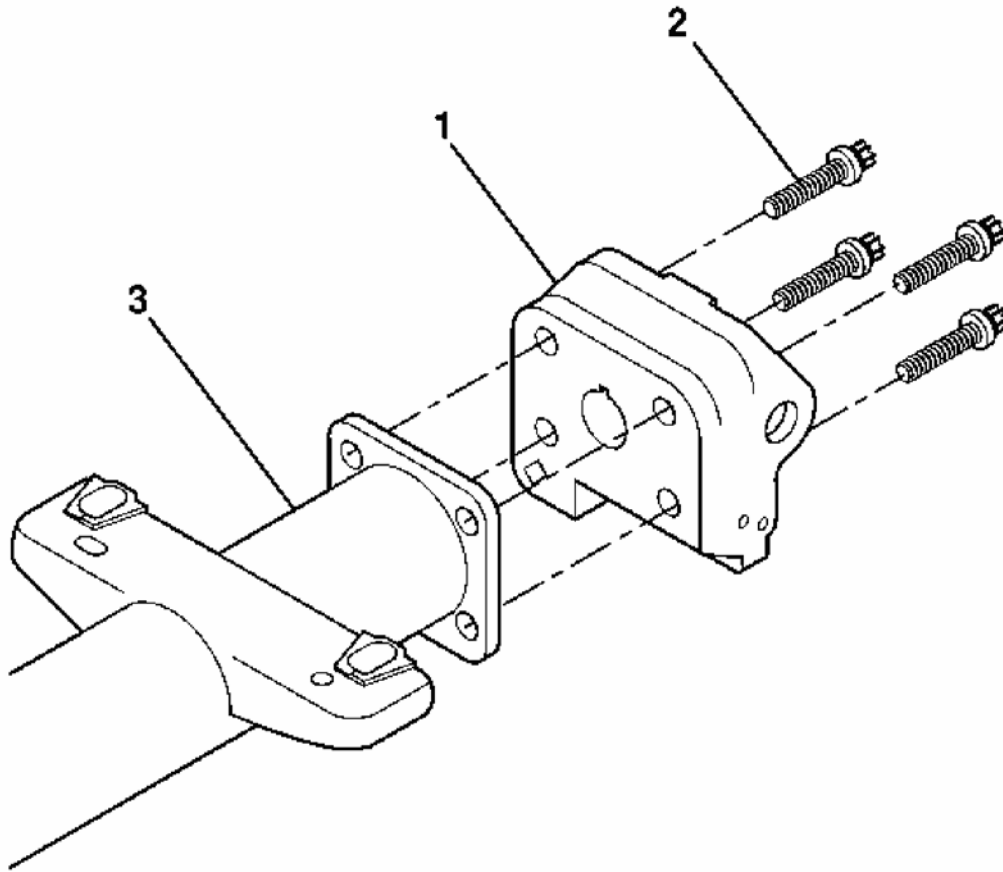


Fig. 112: View Of Steering Column Support Assembly, Steering Column Jacket Assembly & Screws

Courtesy of GENERAL MOTORS CORP.

17. Remove the 4 steering column support TORX® screws from the steering column support assembly (1).
18. Dispose of the 4 steering column support TORX® screws (2).
19. Remove the steering column support assembly (1) from the steering column jacket assembly (3).
20. Inspect the steering column for accident damage. Refer to **Steering Column Accident Damage Inspection**.

Installation Procedure

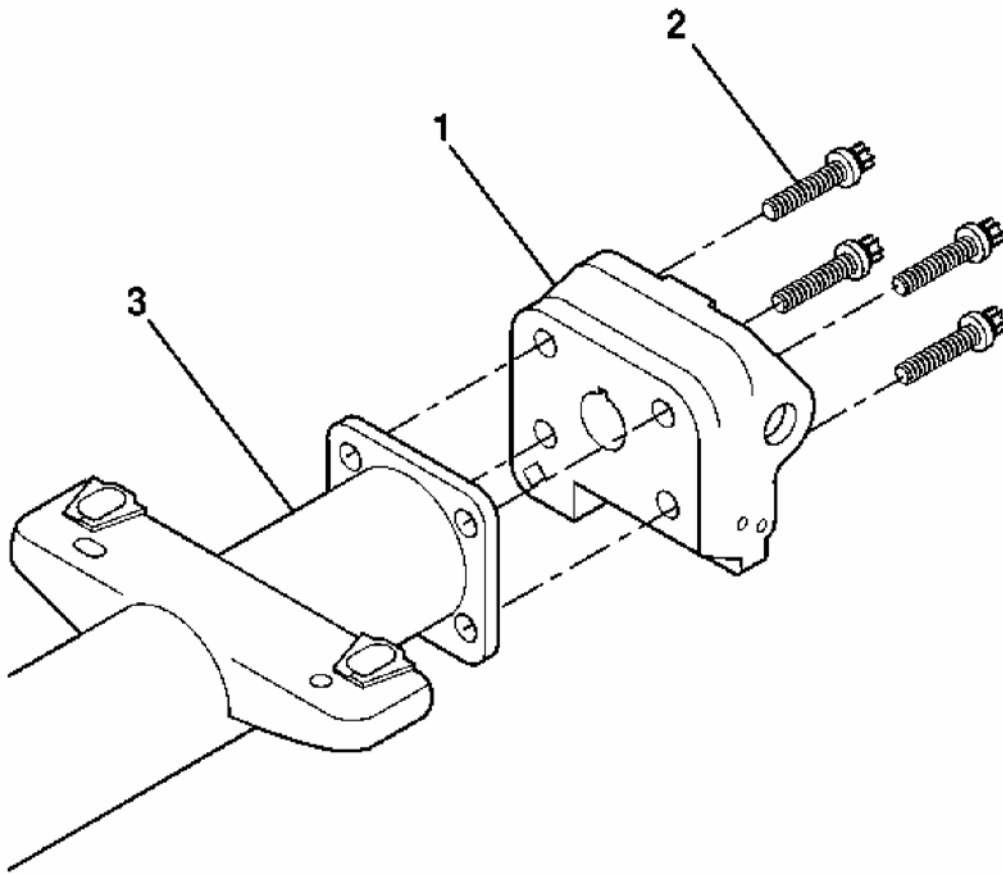


Fig. 113: View Of Steering Column Support Assembly, Steering Column Jacket Assembly & Screws

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Once the steering column support assembly has been staked 3 times, it must be replaced.

1. Install the steering column support assembly (1) to the steering column jacket assembly (3).

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the 4 new steering column support TORX® screws (2).

Tighten: Tighten the 4 steering column support TORX® screws to 17 N.m (13 lb ft).

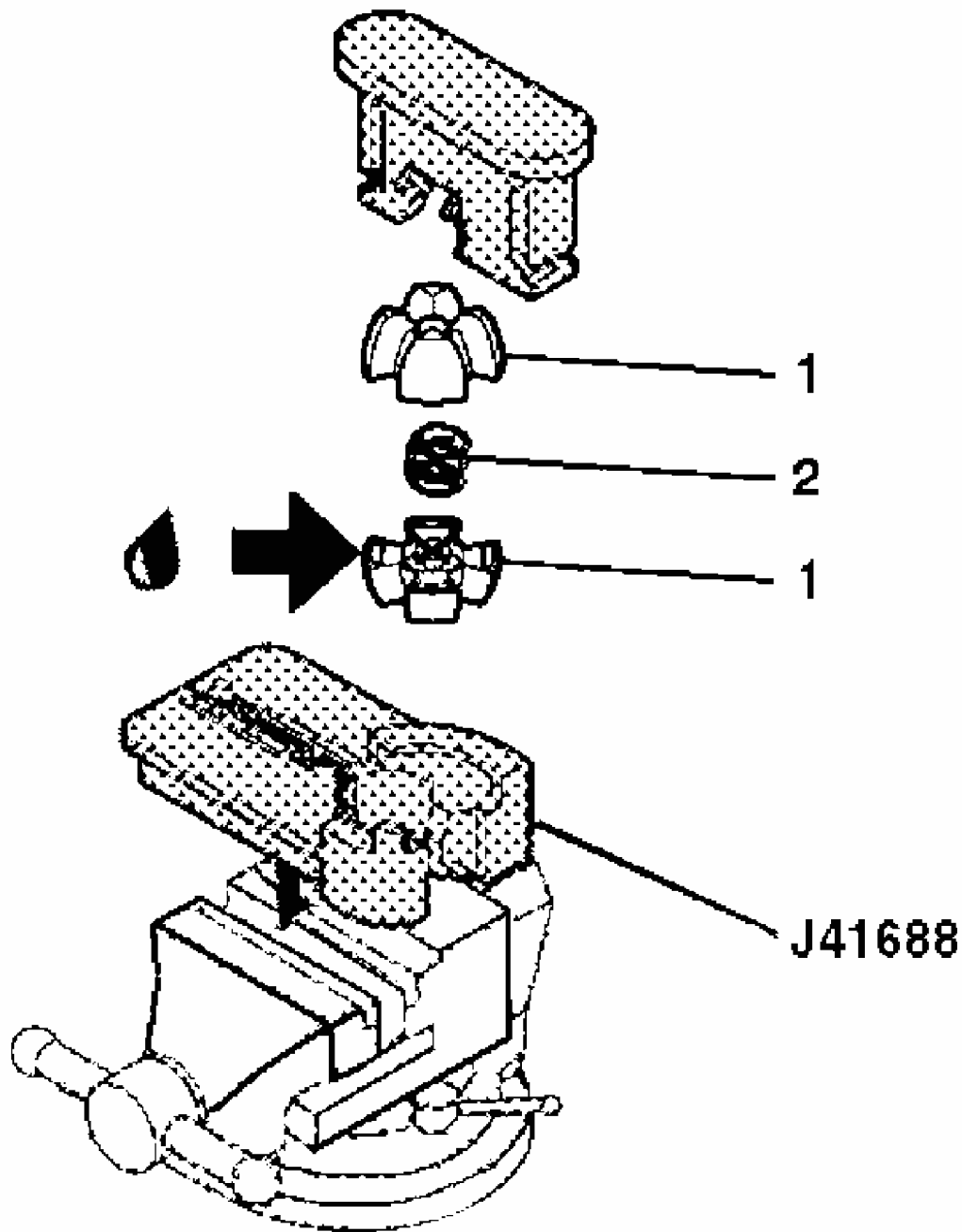


Fig. 114: Lubricating Centering Sphere
Courtesy of GENERAL MOTORS CORP.

3. Lubricate the centering sphere (1) with GM P/N 12345718 (Canadian P/N 10953516).
4. Install the centering sphere (1) and the joint preload spring (2) into **J 41688** . See **Special Tools**.

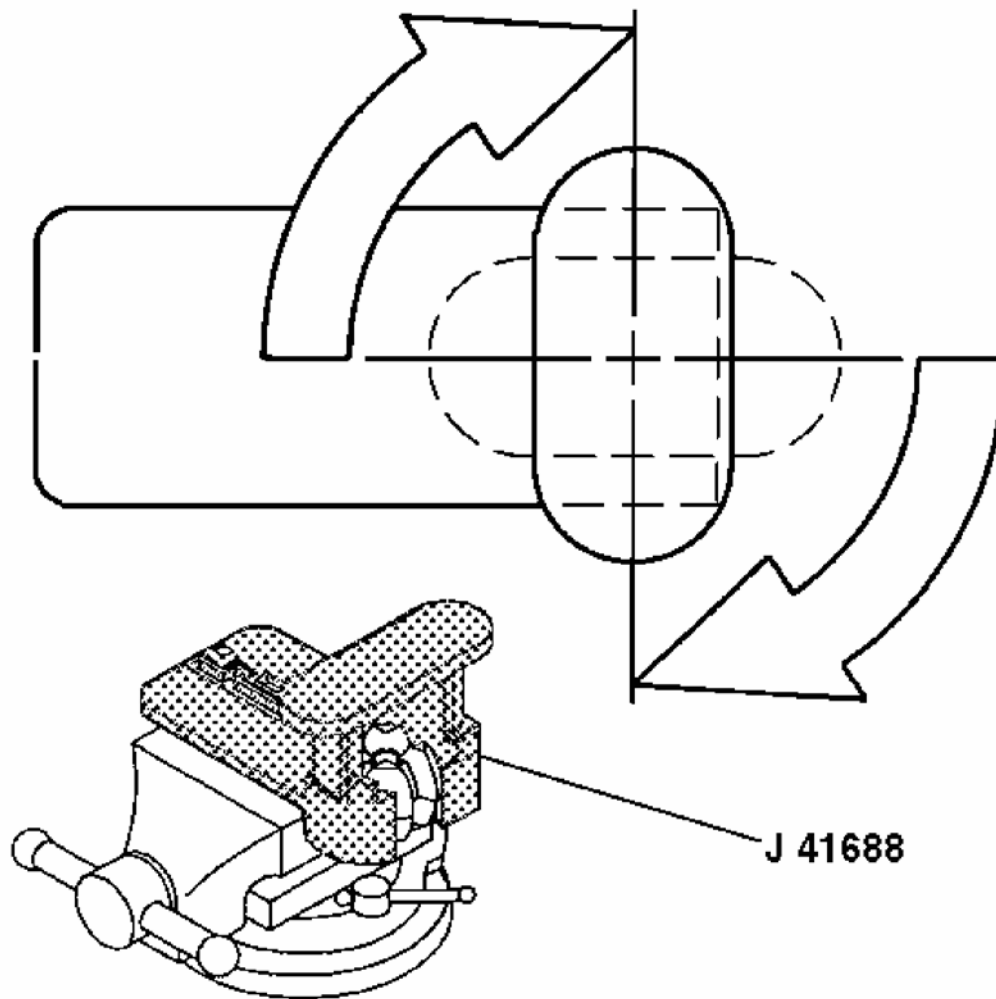


Fig. 115: Centering Sphere

Courtesy of GENERAL MOTORS CORP.

5. Compress the centering sphere and joint preload spring. Rotate the driver 90 degrees in the clockwise direction until the arms lock in place.

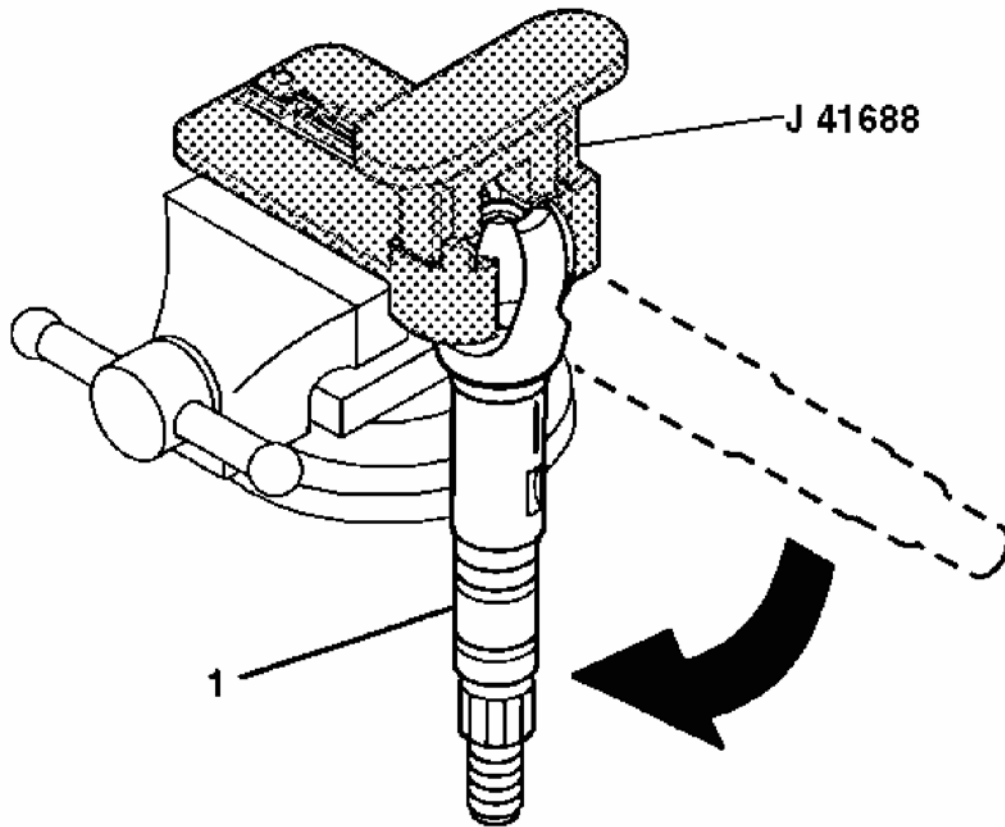


Fig. 116: Rotating Upper Shaft Assembly 90 Degrees
Courtesy of GENERAL MOTORS CORP.

6. Install the race and upper shaft assembly (1) into **J 41688** . See **Special Tools**.
7. Rotate the race and upper shaft assembly (1) 90 degrees.

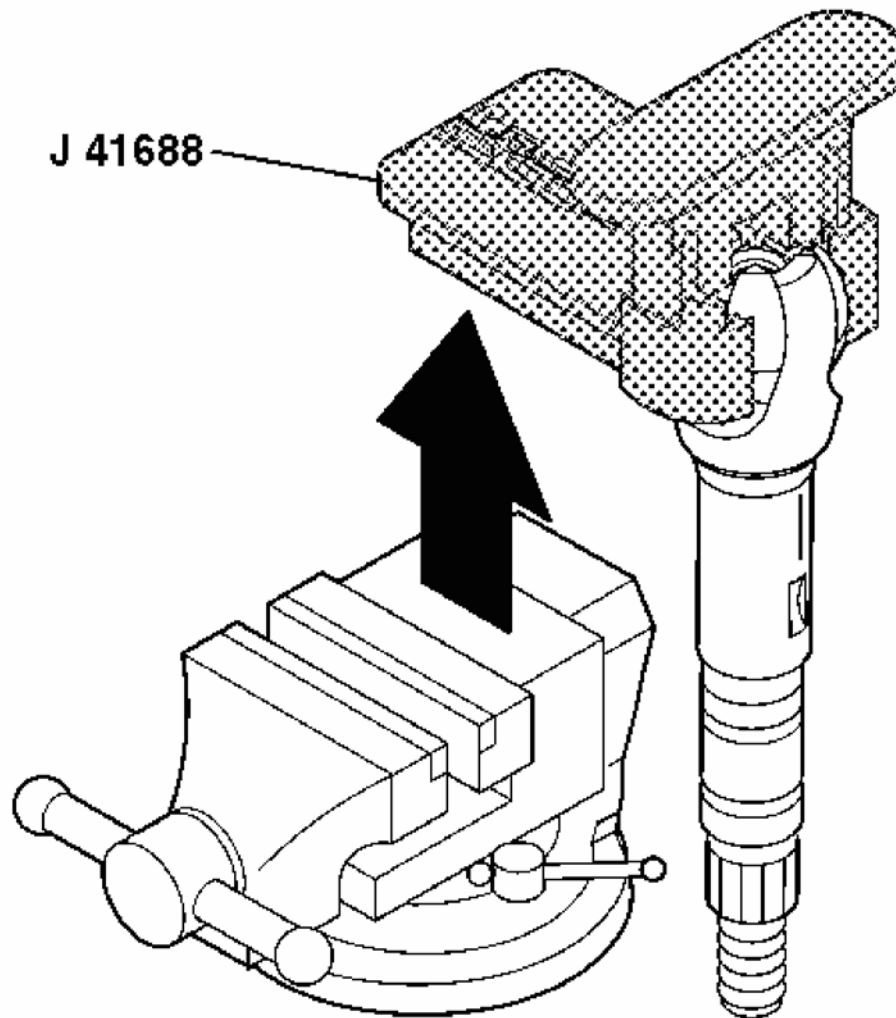


Fig. 117: Removing J 41688 From Vise
Courtesy of GENERAL MOTORS CORP.

8. Remove the race and upper shaft assembly with **J 41688** . See **Special Tools**.
9. Rotate the race and upper shaft assembly 90 degrees from **J 41688** and remove with the race and upper shaft assembly. See **Special Tools**.

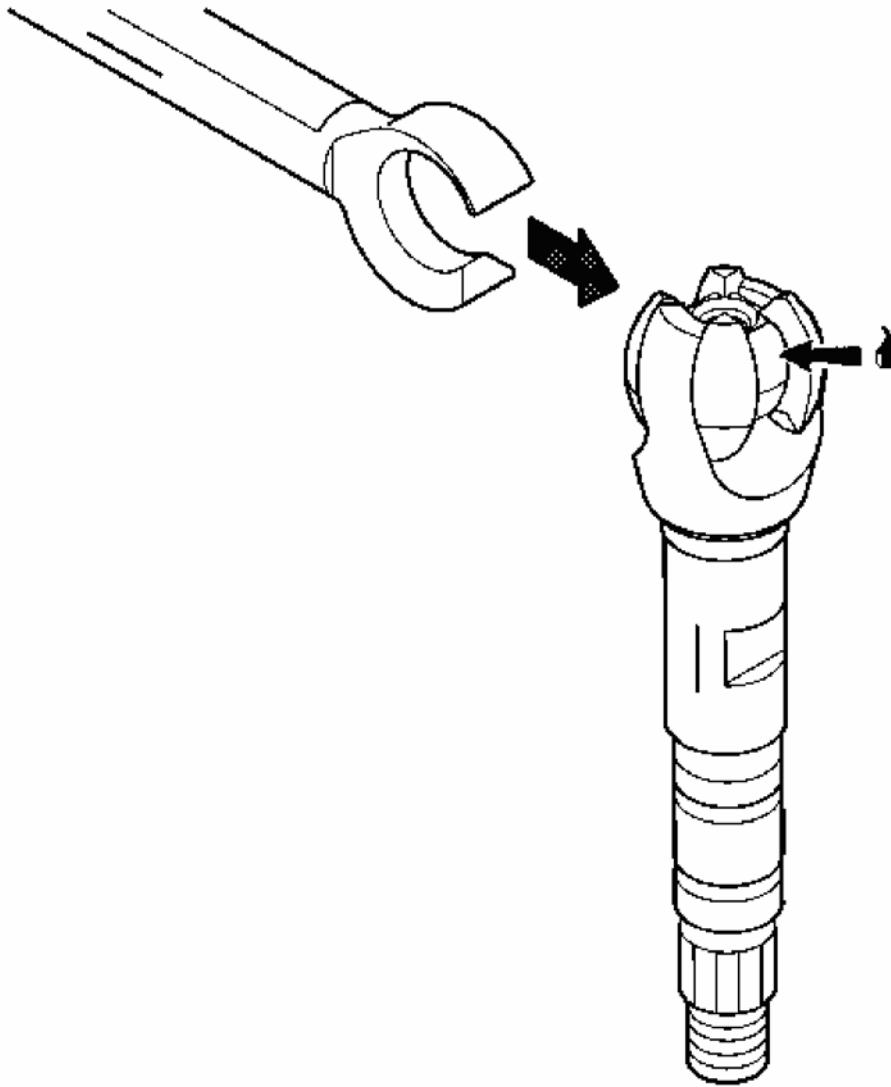


Fig. 118: Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

10. Lubricate the centering sphere with GM P/N 12345718 (Canadian P/N 10953516).
11. Install the lower shaft assembly to the race and upper shaft assembly.

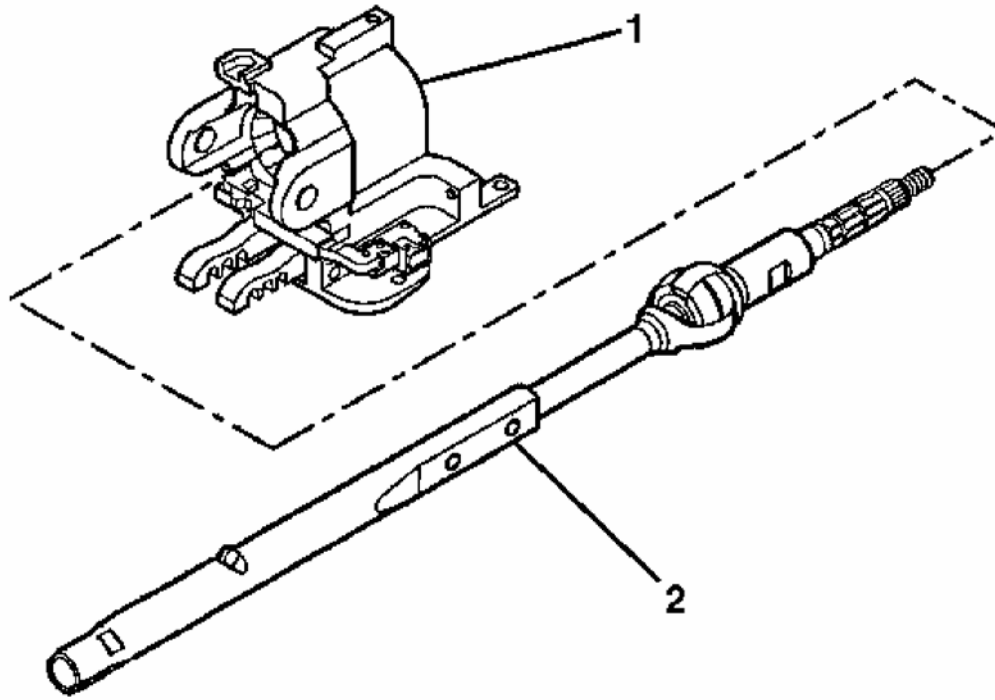


Fig. 119: Steering Shaft Assembly & Steering Column Tilt Head Housing Assembly

Courtesy of GENERAL MOTORS CORP.

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

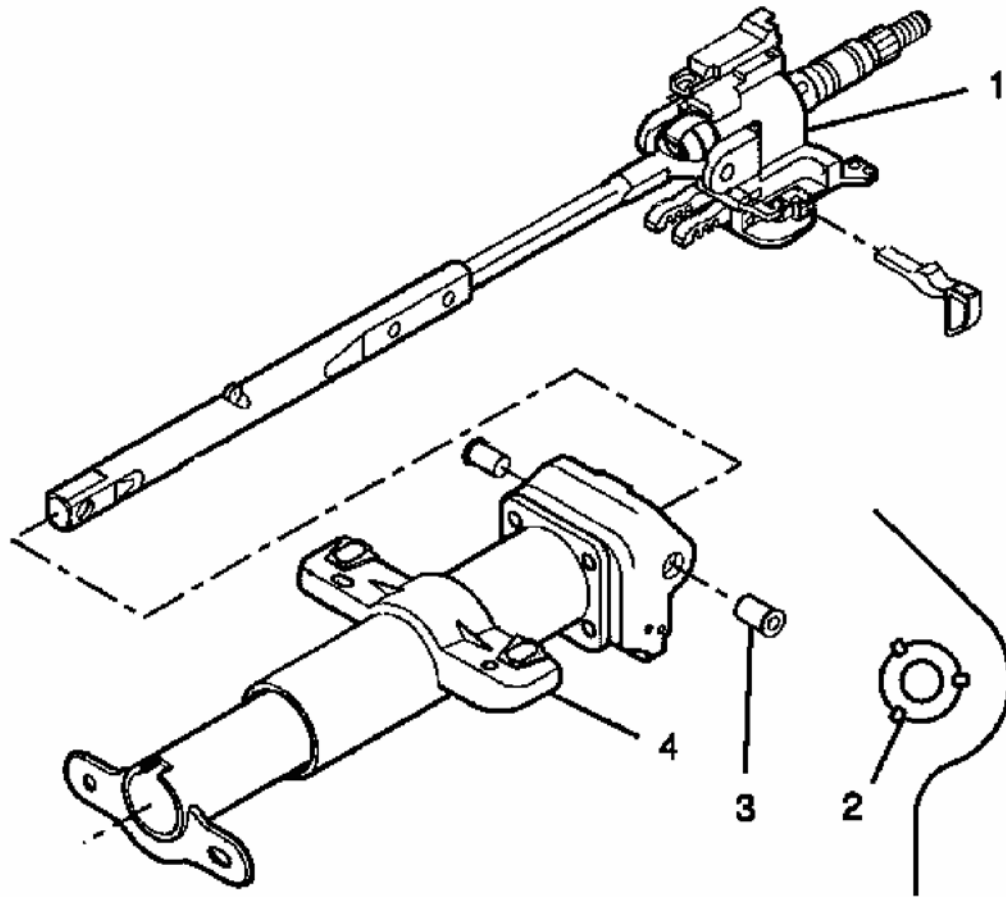


Fig. 120: Assembling Steering Column Lock Shoes Onto Steering Column Support Assembly

Courtesy of GENERAL MOTORS CORP.

13. Install the steering column tilt head assembly (1) to the steering column jacket assembly (4).
14. Install the 2 pivot pins (3).
15. Stake the pivot pins location (2).

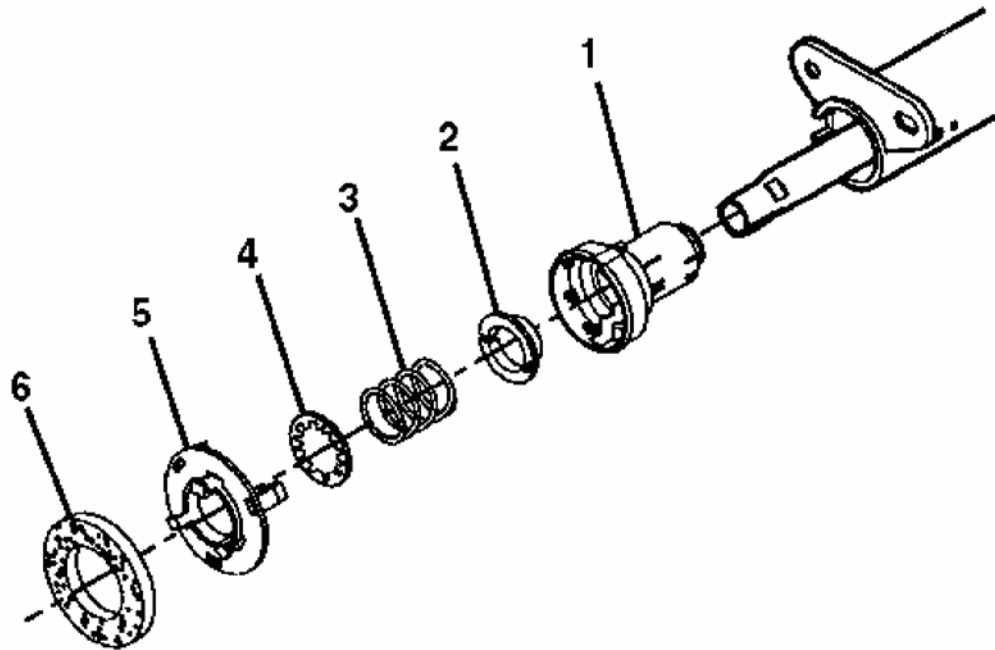


Fig. 121: Locating Steering Shaft Assembly Components
Courtesy of GENERAL MOTORS CORP.

16. Install the following components onto the steering shaft assembly:
1. The adapter and bearing assembly (1)
 2. The lower bearing seat (2)
 3. The lower bearing spring (3)
 4. The lower spring retainer (4)
 5. The sensor retainer (5)
 6. The steering shaft seal (6)

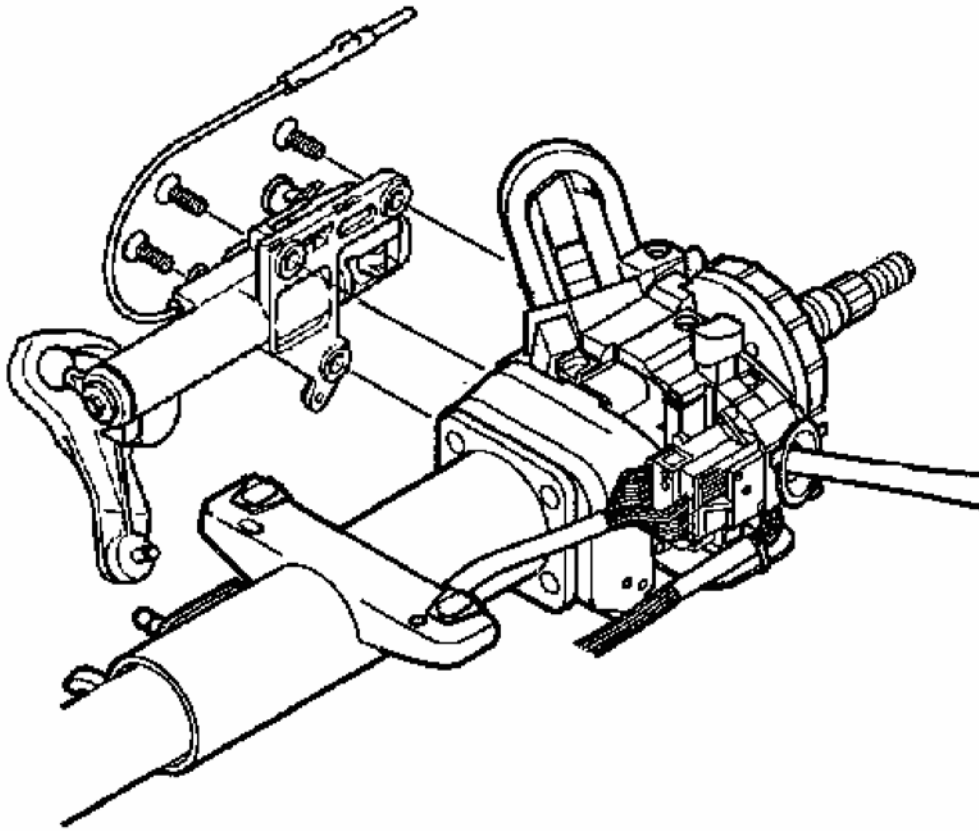


Fig. 122: View Of Linear Shift Assembly And Retaining Screws
Courtesy of GENERAL MOTORS CORP.

17. Install the linear shift assembly.
18. Install the 3 flat-head 6-lobed socket tapping screws

The linear shift assembly must be out of the PARK position to install the lower socket tapping screw.

Tighten: Tighten the 3 flat-head 6-lobed socket tapping screws to 10 N.m (89 lb in).

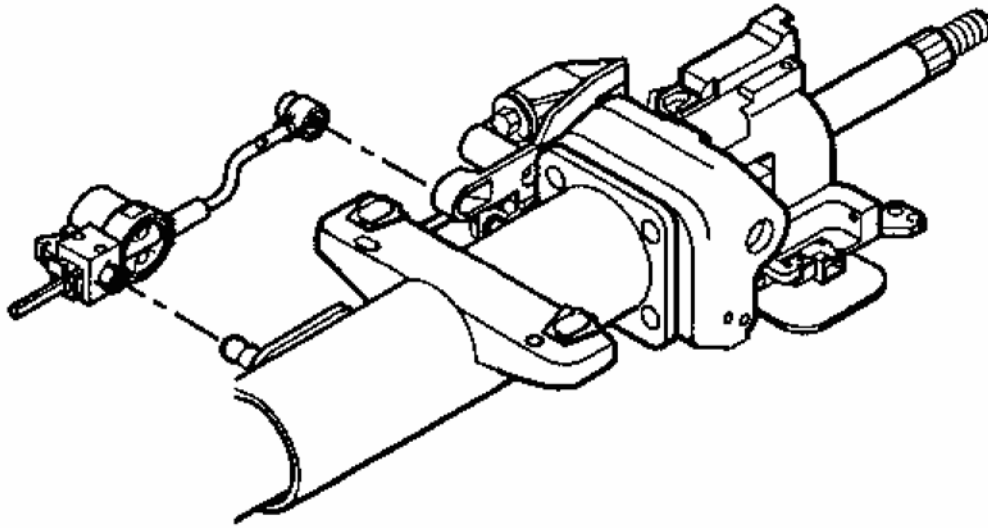


Fig. 123: Automatic Transmission Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

19. Install the automatic transmission shift lock control.
20. Install the gear shift lever and put the column in the NEUTRAL position.

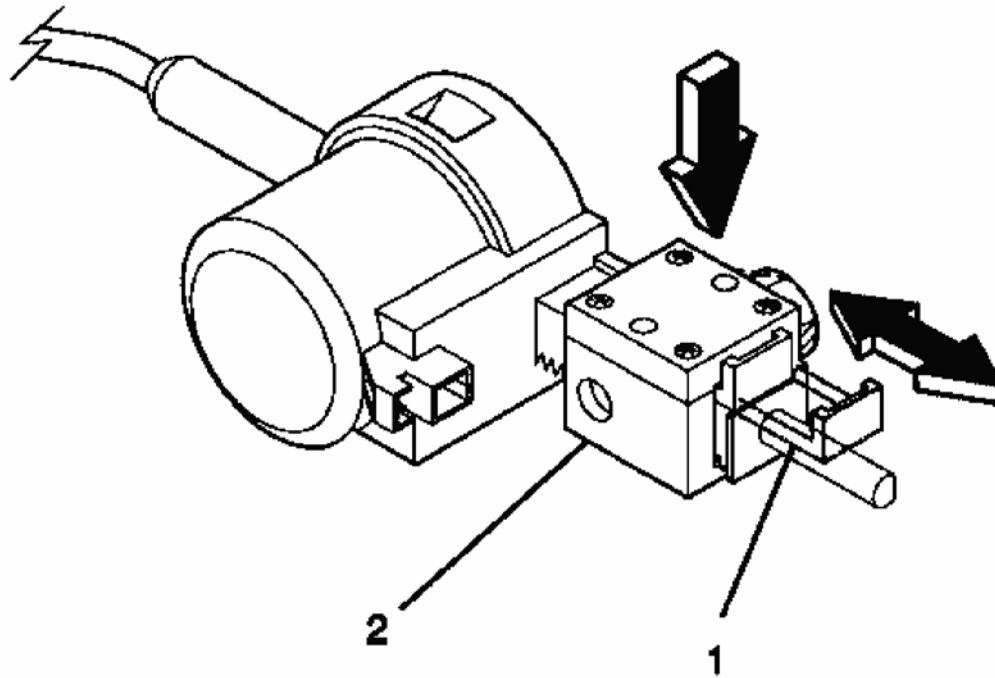


Fig. 124: Adjusting Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

21. Adjust the automatic transmission shift lock control using the following steps:
 1. Pull the tab (1) out on the block side (2) of the automatic transmission shift lock control.
 2. Press on the adjuster block (2) to compress the internal adjuster spring to disengage the adjuster teeth. Slide the adjuster block (2) as far away from the solenoid as possible.
 3. Lock in place by pushing the tab (1) back in.
22. Inspect the automatic transmission shift lock control using the following steps:
 1. The automatic transmission shift lock control must lock the shift lever clevis when it is put into the PARK position.
 2. When the column is installed in the vehicle you will not be able to shift the gear shift lever out of the PARK position without pressing on the brake pedal. The solenoid will be energized.
 3. Readjust if needed.
23. Install the tilt spring assembly only. Refer to **Tilt Spring Replacement**.
24. Install the ignition lock cylinder case. Refer to **Ignition Lock Cylinder Case**

Replacement.

WIRE HARNESS ASSEMBLY REPLACEMENT (MANUAL TILT COLUMN)

Removal Procedure

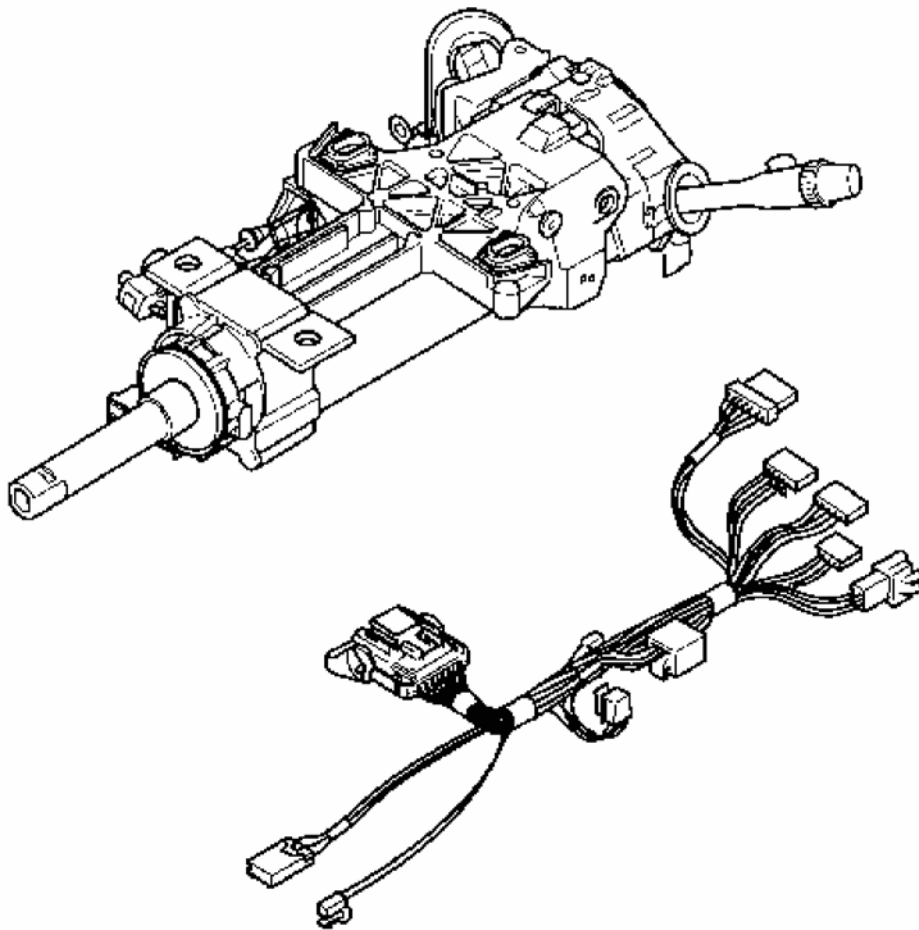


Fig. 125: View Of Steering Column And Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

IMPORTANT: Check the main wiring harness assembly for burned 2 amp fuses before doing this procedure.

1. Disable the SIR coil. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the steering wheel from the column. Refer to **Steering Wheel Replacement**.
3. Remove the steering column from the vehicle. Refer to **Steering Column Replacement**.
4. Inspect the steering column for accident damage. Refer to **Steering Column Accident Damage Inspection**.
5. Remove the upper and lower trim cover. Refer to **Steering Column Trim Covers Replacement**.
6. Disconnect all connectors attached to the wire harness assembly.
7. Remove the bulkhead connector.

Installation Procedure

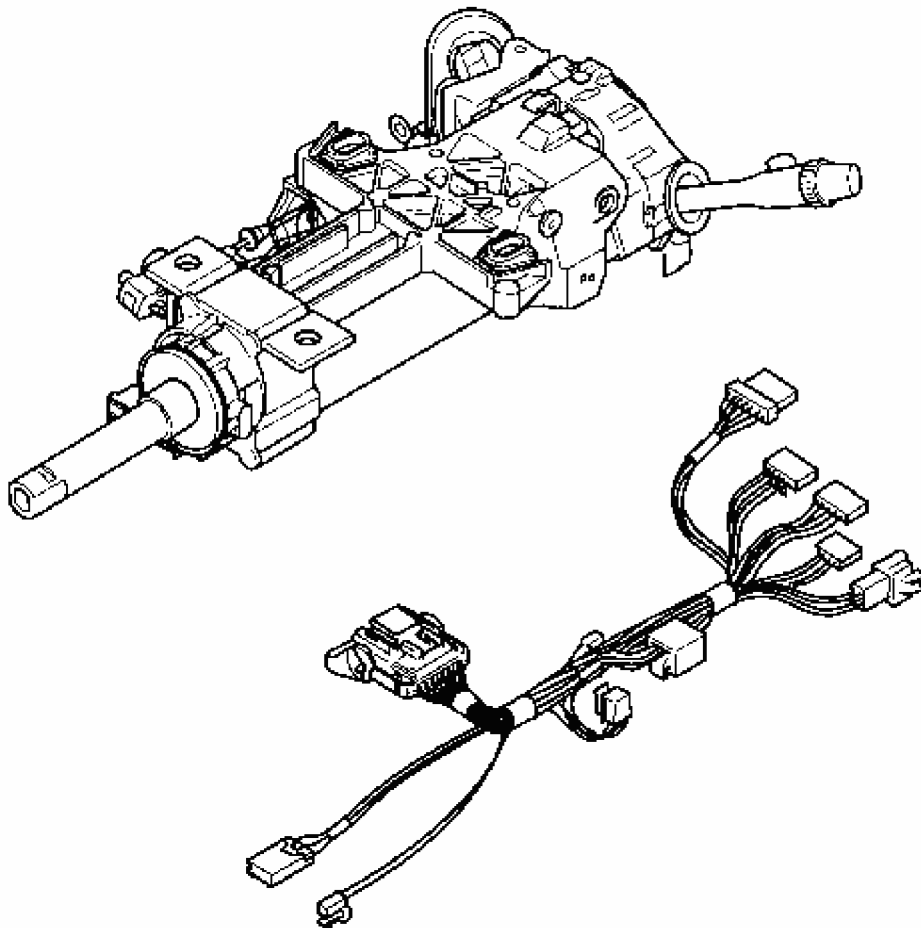


Fig. 126: View Of Steering Column And Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR INFLATOR MODULE COIL CAUTION in Cautions and Notices.

1. Slide the bulkhead connector into the steering column.
2. Connect all of the connectors to the wire harness assembly.
3. Install the upper and lower trim cover. Refer to **Steering Column Trim Covers Replacement**.
4. Install the steering column into the vehicle. Refer to **Steering Column Replacement**.
5. Install the steering wheel onto the steering column. Refer to **Steering Wheel Replacement**.
6. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

INFLATABLE RESTRAINT STEERING WHEEL MODULE COIL CENTERING

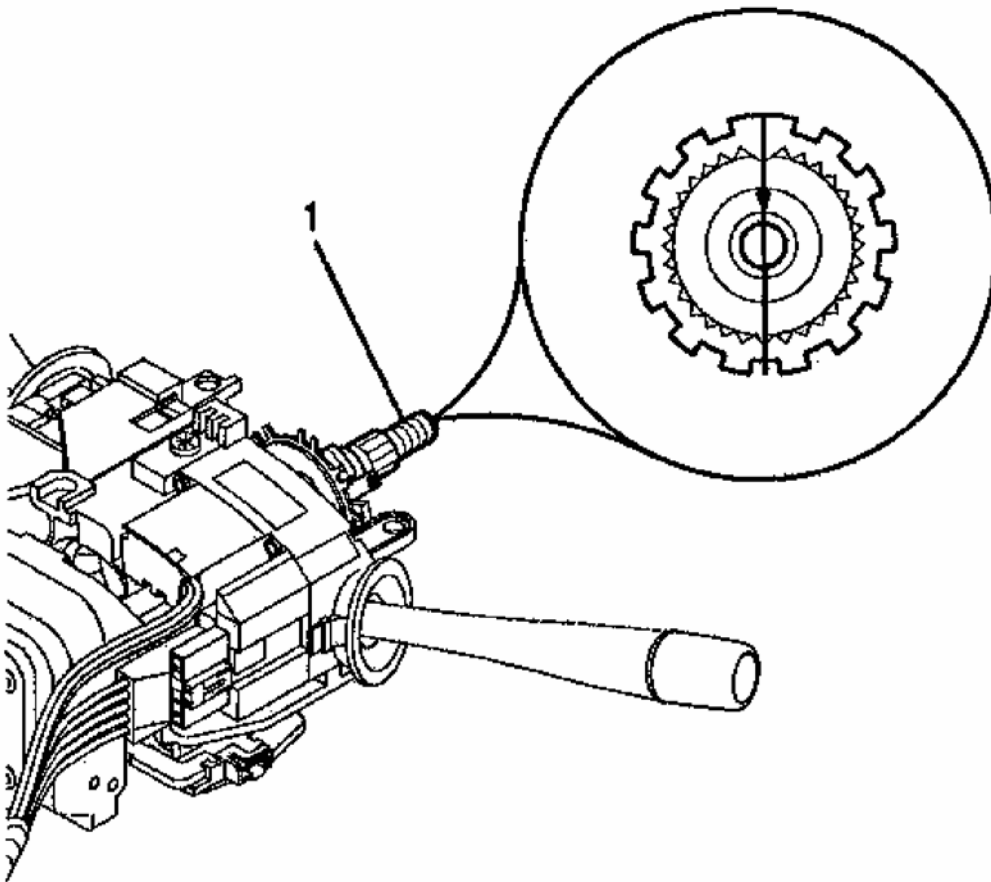


Fig. 127: View Of Block Tooth Of Steering Shaft Assembly In 12 O'clock Position
Courtesy of GENERAL MOTORS CORP.

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.

IMPORTANT: If double wire harness strap is installed onto the wire harness assembly and column, you must reuse the holder for the wire straps during installation.
Remove the wire harness strap(s) where necessary.

1. Verify the following conditions 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.

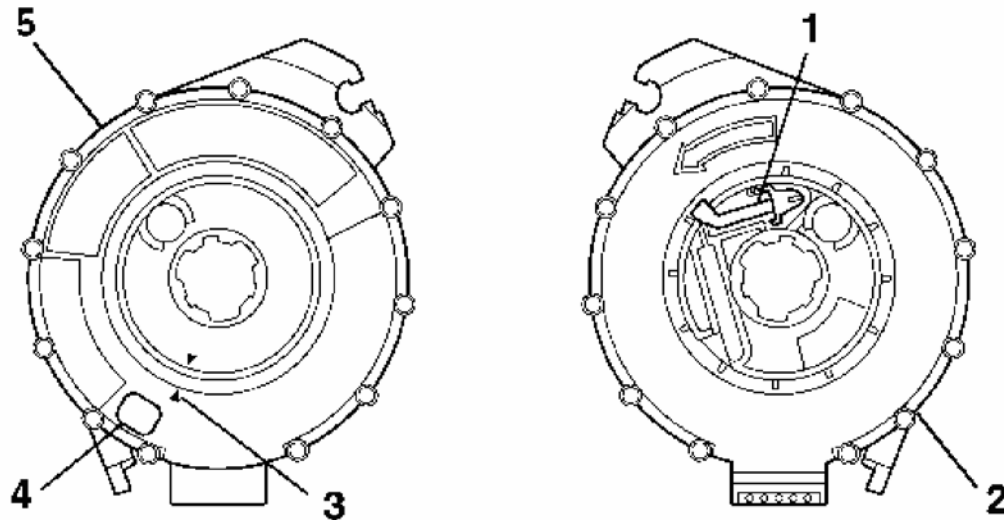


Fig. 128: Centering SIR Coil (With Centering Window & Spring Service Lock)
Courtesy of GENERAL MOTORS CORP.

2. If the front (5) of the SIR coil has a centering window (4), and the back side (2) includes 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.

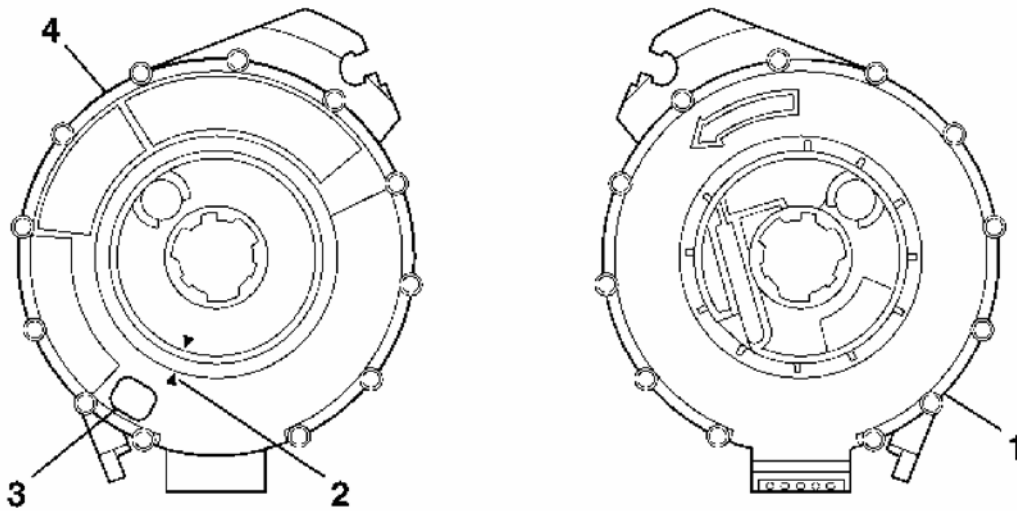


Fig. 129: Centering SIR Coil (With Centering Window, Without Spring Service Lock)

Courtesy of GENERAL MOTORS CORP.

3. If the front (4) of the SIR coil has a centering window (3), and the back side (1) includes NO spring service lock, 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.

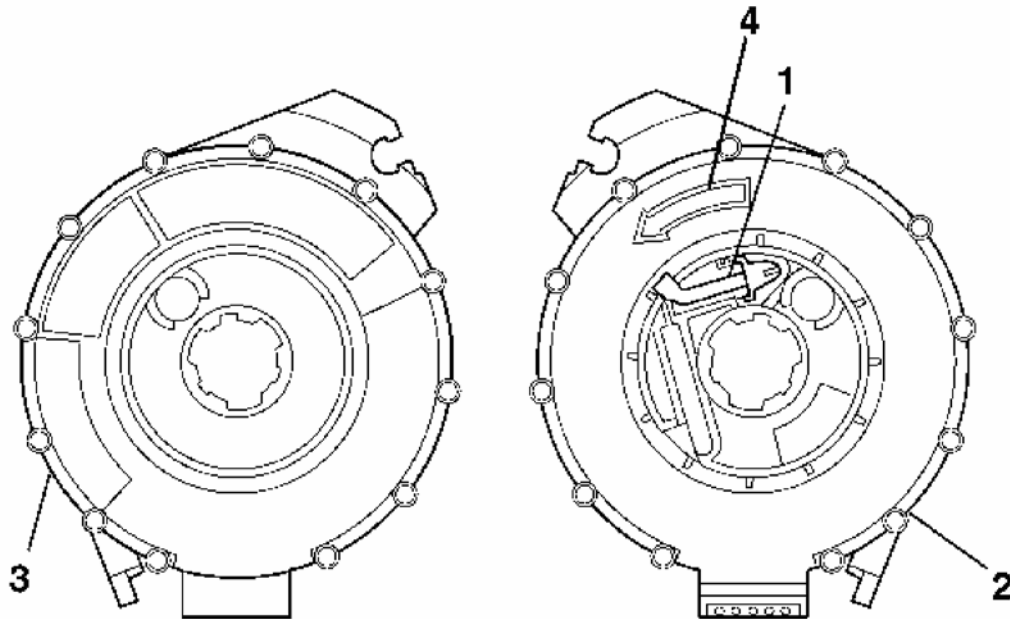


Fig. 130: Centering SIR Coil (No Centering Window, But Back Side Includes A Spring Service Lock)

Courtesy of GENERAL MOTORS CORP.

4. If the front side (3) of the SIR coil has NO centering window, but the back side (2) includes a spring service lock (1), 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 $2\frac{1}{2}$ 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.

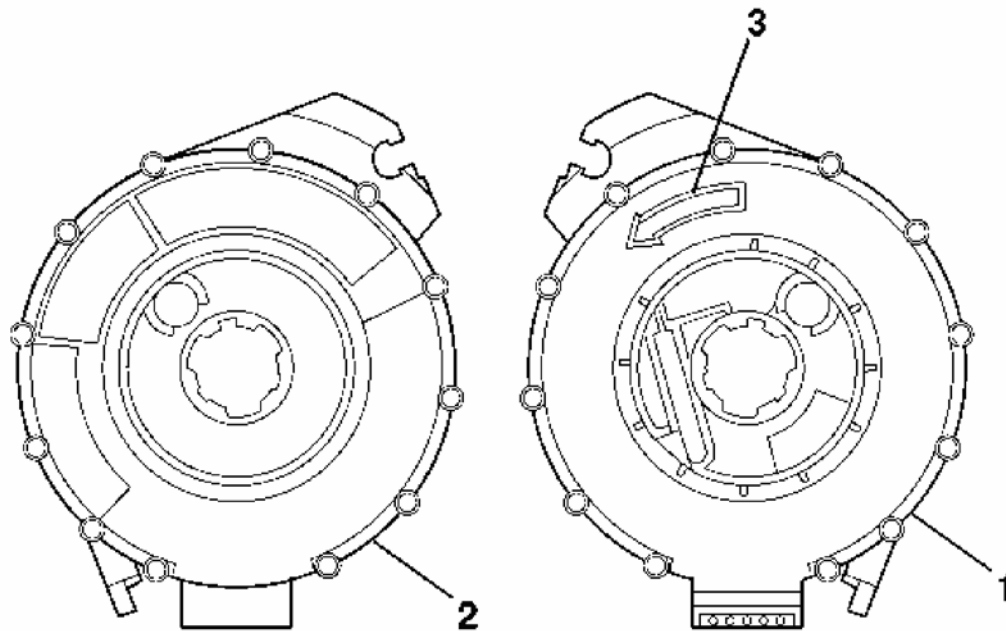


Fig. 131: Centering SIR Coil (Without Centering Window, Without Spring Service Lock)

Courtesy of GENERAL MOTORS CORP.

5. If the front side (2) of the SIR coil has NO centering window, and the back side (1) includes NO spring service lock, perform the following steps:
 1. Hold the SIR coil with the face up.
 2. Rotate the coil hub in the direction of the arrow until the coil ribbon stops.
 3. Rotate the coil hub, slowly, counterclockwise, for $21\frac{1}{2}$ 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.
6. If double wire harness strap is installed onto the wire harness assembly and column, you must route the wires up against the steering column. One wire harness strap will surround one lead from the coil to the steering column. The other wire harness strap will surround all leads to the steering column.

DESCRIPTION AND OPERATION

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION

The steering wheel control switches duplicate the function of the primary controls of the

associated component, through a network of multiple momentary contact switches and a series of resistors. The body control module (BCM) supplies voltage to the switches and monitors the return signal for when a switch is pressed, a specific voltage drop occurs. The BCM identifies the one selected, then sends a serial data message that is received by the component controlled, activating the feature.

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

STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION

The steering wheel and column has 4 primary functions:

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

Vehicle Steering

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

Vehicle Security - Some Vehicle Models

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

- The ignition switch
- The steering column lock
- The ignition cylinder

Driver Convenience

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

- The turn signal switch
- The hazard switch
- The headlamp dimmer switch
- The wiper/washer switch
- The horn pad/cruise control switch

2006 Chevrolet Impala LS

2006 STEERING Steering Wheel and Column - Impala

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

Driver Safety

In the event of a front-end collision the energy-absorbing steering column compresses, 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, an added safety feature is an ignition lock cylinder control actuator system in the steering column. The ignition lock cylinder control actuator system prevents the steering wheel from being locked when the transmission is in gear and the vehicle may be moving. The column ignition lock system consists of a ignition lock cylinder control actuator and a ignition lock cylinder control switch, that is located in the A/T shift lock control switch. The ignition lock cylinder control actuator contains a spring-loaded pin that mechanically prevents the ignition key cylinder from being turned to the Lock position when the transmission is not in the Park position. If vehicle power is lost 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

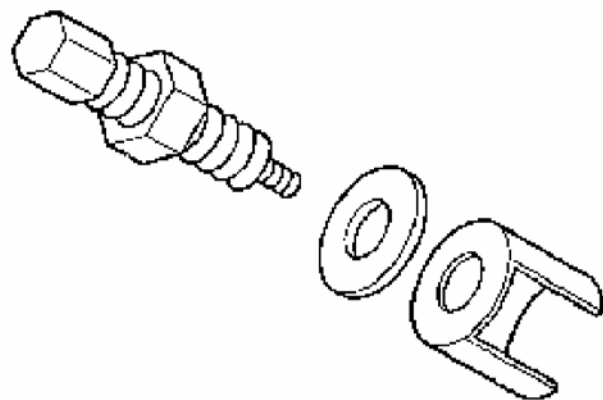
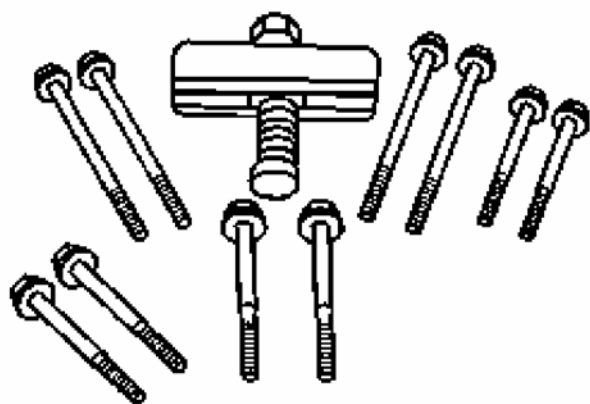
SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 1859-A Countergear and Steering Wheel Puller

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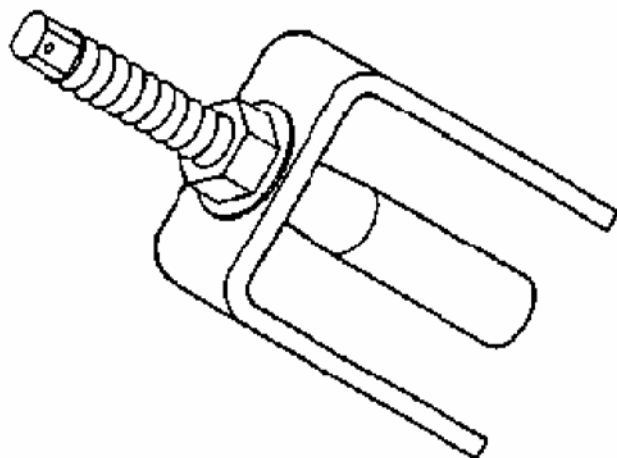
2006 STEERING Steering Wheel and Column - Impala



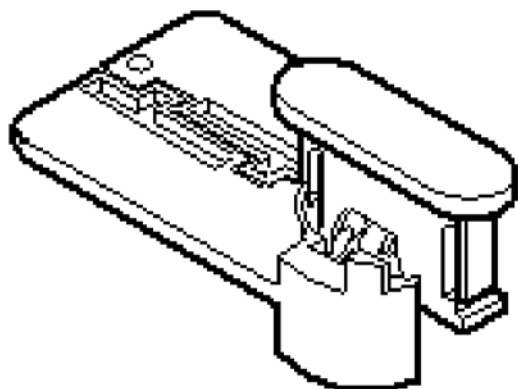
J 21854-01
Pivot Pin Remover

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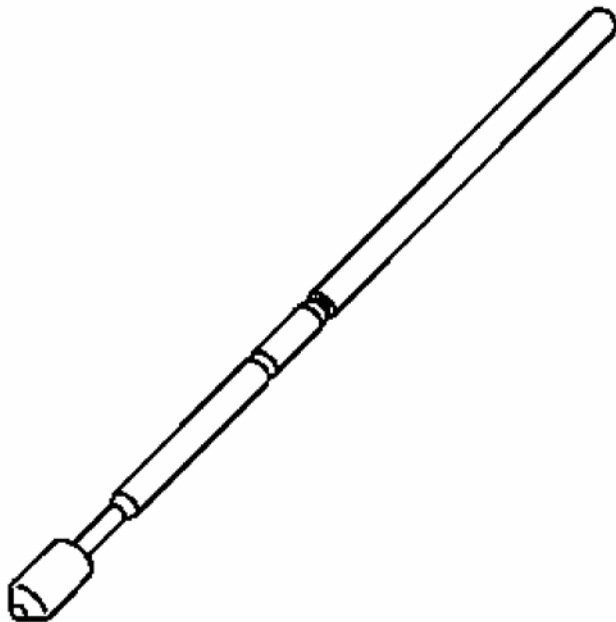
J 23653-SIR
Steering Column Lock Plate
Compressor



J 41688
Centering Sphere Installer - Tilt
Steering Wheel

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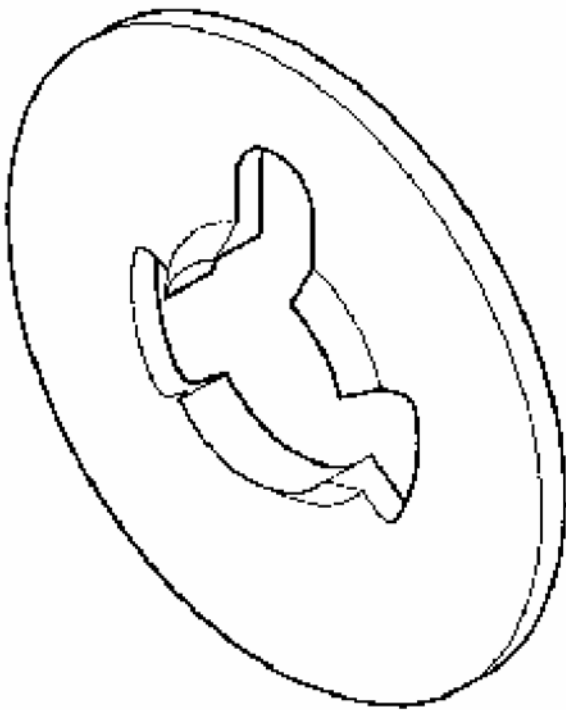


J 42640
Steering Column Anti-Rotation Pin

J 42137
Cam Orientation Plate Adapter

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J 42578
Steering Wheel Puller Legs



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