

2005 Cadillac XLR

2005 STEERING Steering Wheel and Column - XLR

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Steering Wheel and Column - XLR

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Column Support Bracket Nuts	24 N.m	17 lb ft
Dampener Screws	1.5 N.m	13 lb in
Intermediate Shaft to the Steering Column Pinch Bolt	48 N.m	35 lb ft
Intermediate Shaft to the Steering Gear Pinch Bolt	34 N.m	25 lb ft
Intermediate Shaft to the Steering Gear Pinch Bolt Shield Screw	3.5 N.m	31 lb in
Steering Column Bottom Bracket Screw	3 N.m	27 lb in
Steering Column Support Screws	17 N.m	13 lb ft
Steering Column Trim Cover Screws Lower	3 N.m	27 lb in
Steering Column Trim Cover Screw Upper	1.5 N.m	13 lb in
Steering Wheel Control Harness Retainer And Screw	2.3 N.m	20 lb in
Steering Wheel Control Switch Assembly Screws	2.3 N.m	20 lb in
Steering Wheel and Column Lower To Upper Intermediate Shaft Retaining Bolts	48 N.m	35 lb ft
Steering Wheel Nut	41 N.m	30 lb ft
Telescope Actuator Assembly Screws	5 N.m	44 lb in
Tilt Actuator Assembly Retainer Screws	1.5 N.m	13 lb in
Turn Signal Multifunction Switch Screws	7 N.m	62 lb in

SCHEMATIC AND ROUTING DIAGRAMS

COLUMN/IGNITION LOCK SCHEMATICS

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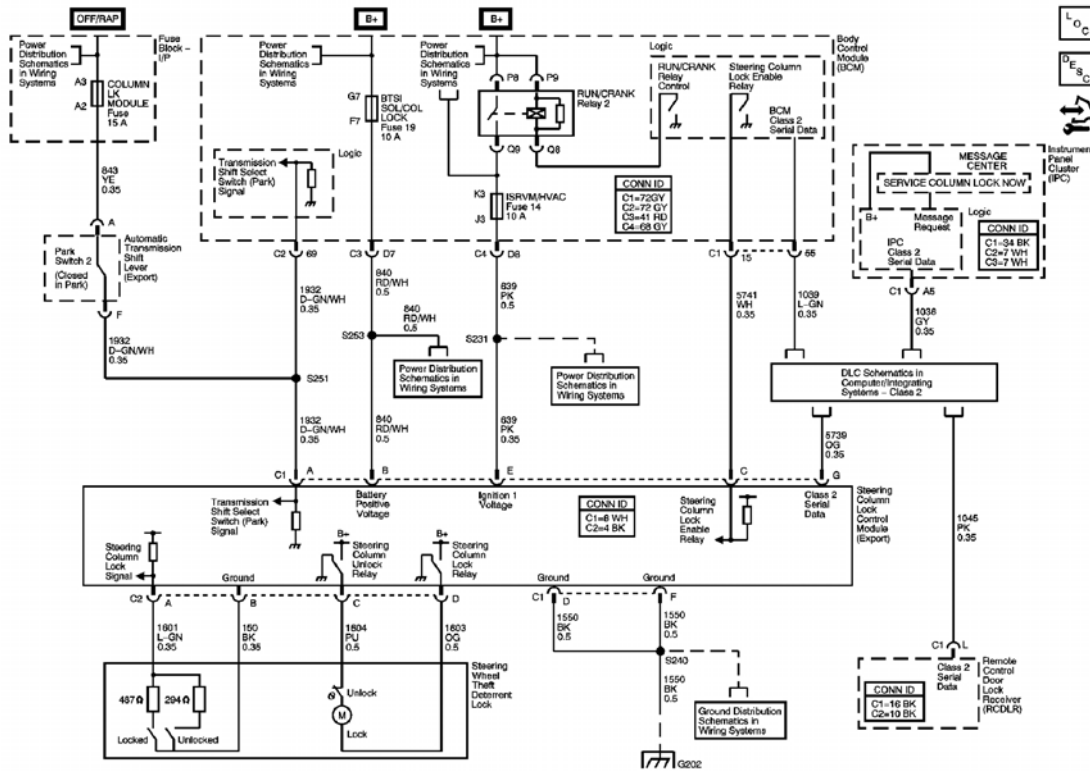
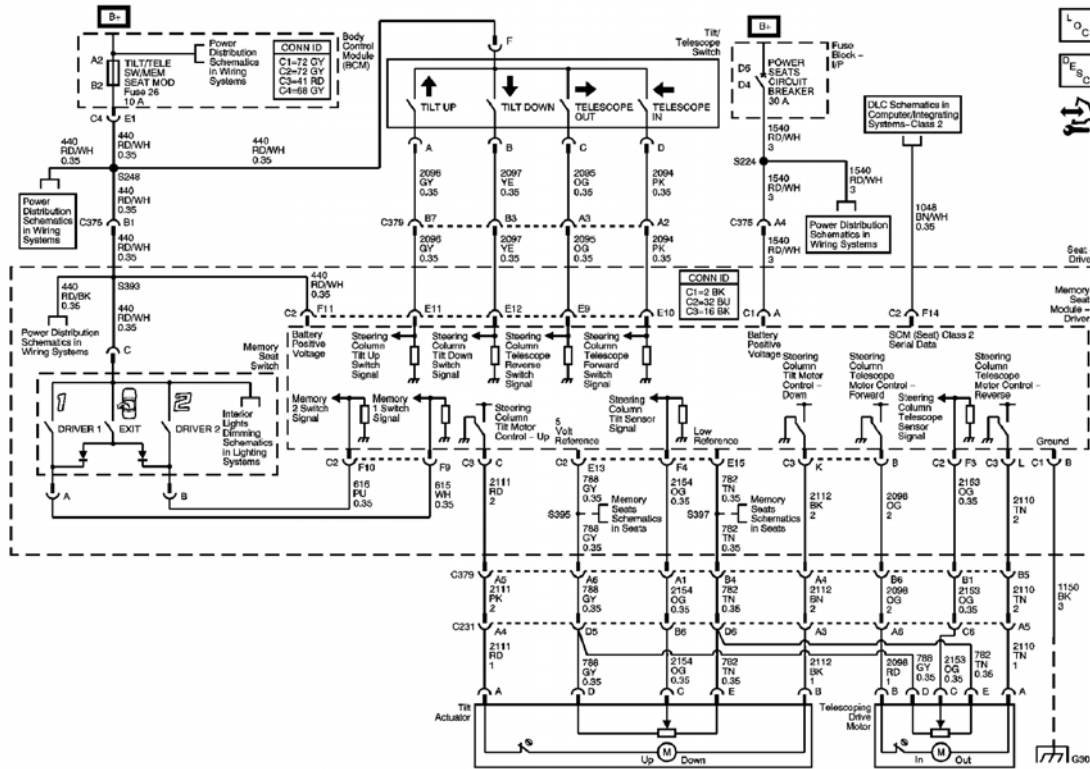


Fig. 1: Column/Ignition Lock Schematics
 Courtesy of GENERAL MOTORS CORP.

TILT/TELESCOPING STEERING COLUMN SCHEMATICS

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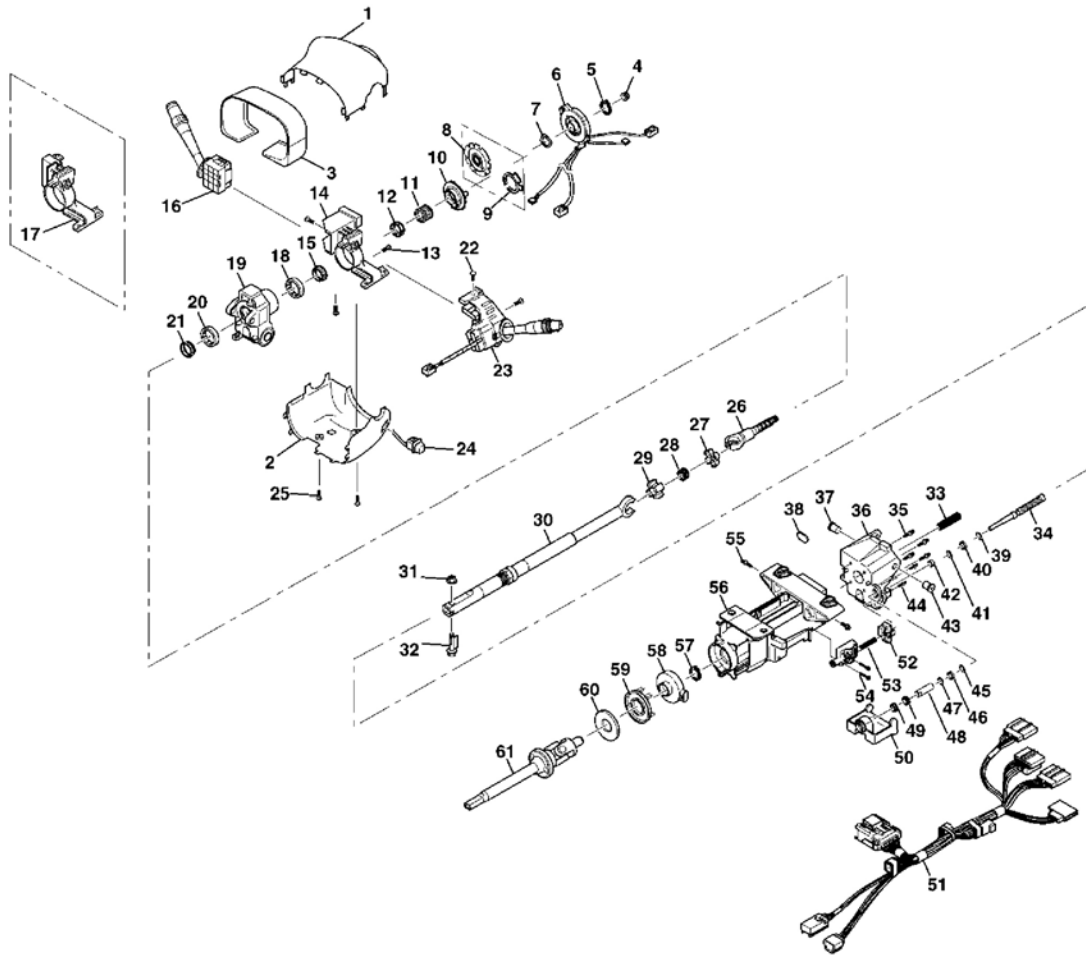


Fig. 3: Steering Column Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Upper Trim Cover (Kit)
2	Lower Trim Cover (Kit)
3	Steering Column Closeout Shroud
4	Flanged Prevailing Torque Nut
5	Retaining Ring
6	SIR Coil
7	Wave Washer
8	Shaft Lock Shield Assembly (Export)
9	Cam Orientation Plate
10	Turn Signal Cancel Cam Assembly
11	Upper Bearing Spring

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12	Upper Bearing Inner Race Seat
13	Pan Head Tapping Screw
14	Switch Mounting Bracket
15	Inner Race
16	Washer Wiper Switch Assembly
17	Switch Mounting Bracket
18	Bearing Assembly
19	Steering Column Tilt Head Assembly
20	Bearing Assembly
21	Inner Race
22	Pan Head Tapping Screw
23	Turn Signal and Multifunction Switch Assembly
24	Power TNT Toggle Switch Assembly
25	Pan Head Tapping Screws
26	Race and Upper Shaft Assembly
27	Centering Sphere (Kit)
28	Joint Preload Spring (Kit)
29	Centering Sphere (Kit)
30	Lower Steering Shaft Assembly
31	Bolt and Retainer Assembly
32	Pinch Bolt
33	Tilt Spring
34	Lead Screw
35	TORX Head Screw
36	Tilt Support Assembly
37	Pivot Pin
38	Tilt Bumper
39	Thrust Washer
40	Thrust Bearing
41	Thrust Washer
42	Bearing Roller
43	Pivot Pin
44	TORX Head Screw
45	Thrust Washer
46	Thrust Bearing
47	Thrust Washer
48	Tilt Dampener Spacer
49	Tilt Dampener Seal
50	Lower Shield Assembly
51	Steering Column Wiring Assembly
52	Jacket Screw LH Telescoping Nut

53	Jacket Screw Telescoping Actuator Assembly
54	Pan Head Tapping Screw
55	Pan Head Tapping Screw
56	Telescoping Jacket Assembly
57	Retaining Ring
58	Steering Wheel Position Sensor
59	Sensor Retainer
60	Steering Shaft Seal
61	Intermediate Steering Shaft Assembly

STEERING WHEEL AND COLUMN COMPONENT VIEWS

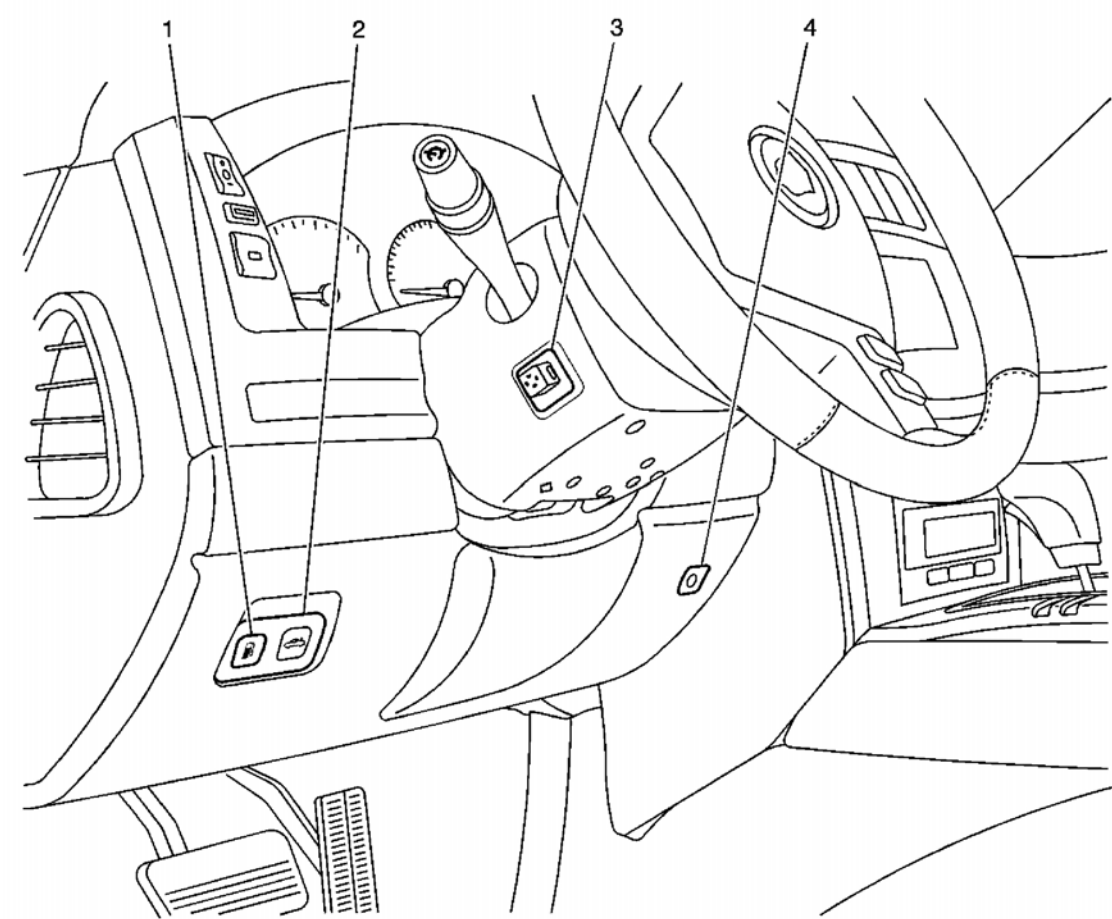


Fig. 4: Lower Left of the I/P Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name

1	Fuel Door Release Switch
2	Rear Compartment Lid Release Switch - Inside
3	Tilt/Telescope Switch
4	Noise Compensation Microphone

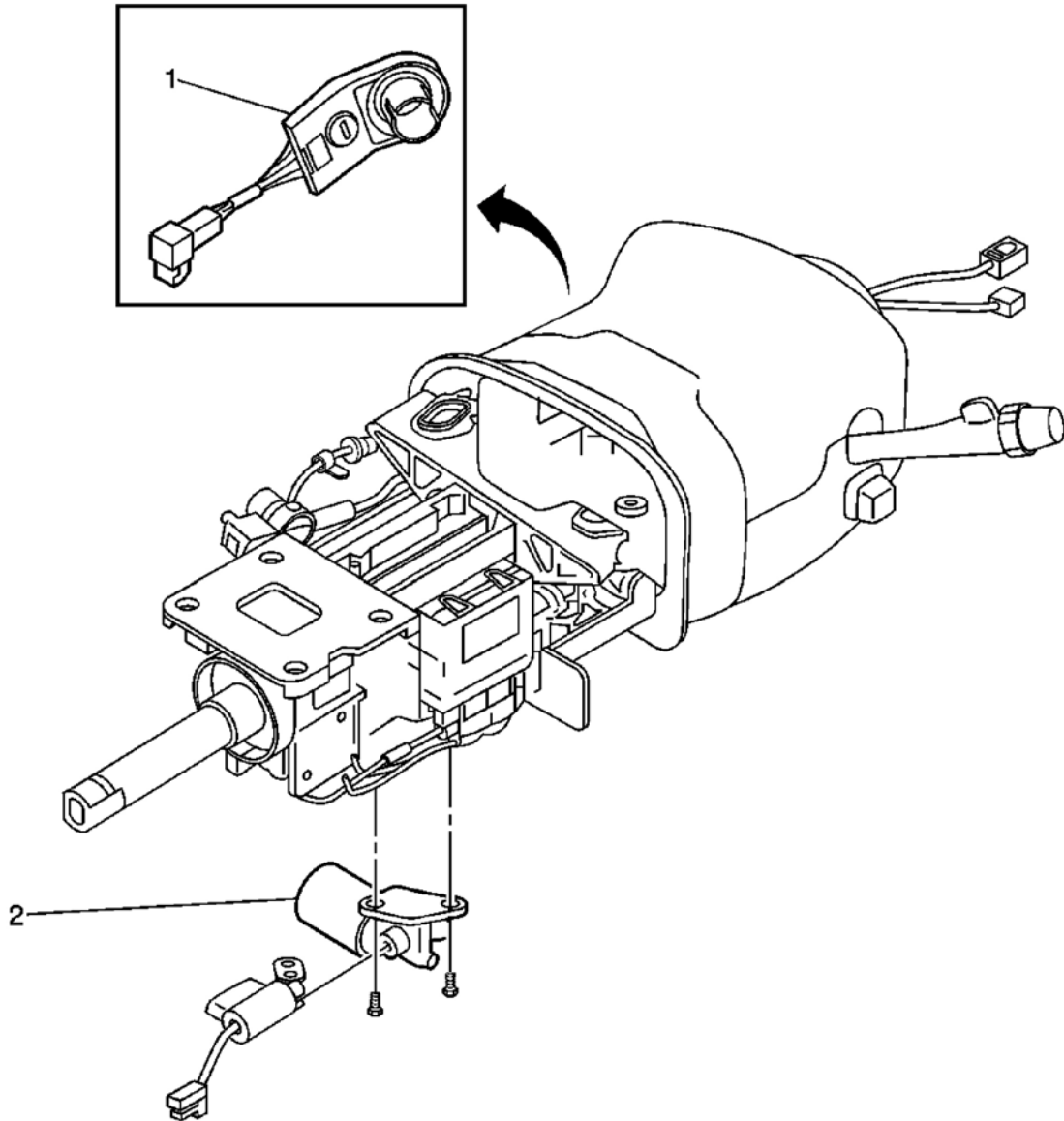


Fig. 5: Identifying Steering Wheel Theft Deterrent Lock & Tilt Actuator At LR of Steering Column
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Steering Wheel Theft Deterrent Lock (Export)

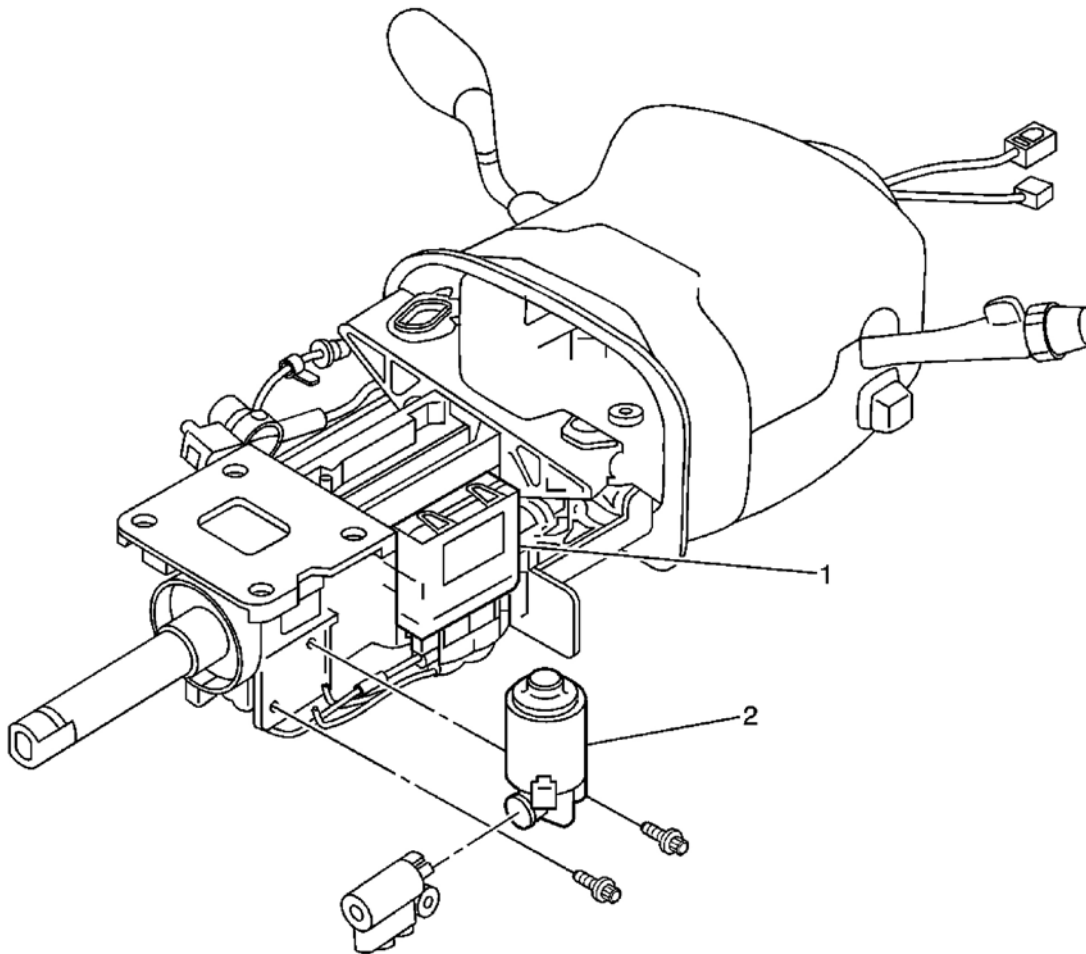


Fig. 6: Steering Column Lock Control Module & Telescoping Drive Motor
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Steering Column Lock Control Module (Export)
2	Telescoping Drive Motor

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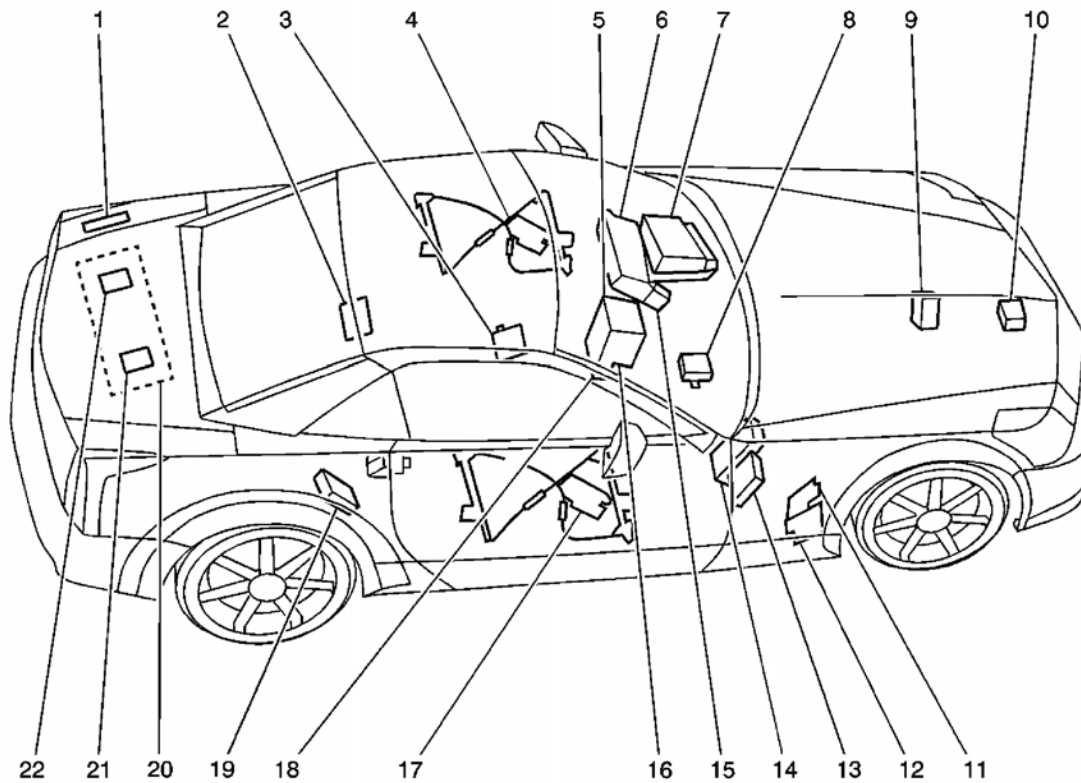


Fig. 7: Modules Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Folding Top Module
2	Rear Object Sensor Control Module
3	Memory Seat Module
4	Driver Door Module (DDM)
5	Radio
6	Instrument Panel Cluster (IPC)
7	Head-Up Display (HUD)
8	Remote Control Door Lock Receiver (RCDLR)
9	EBCM - BPMV
10	Distance Sensing Control Module
11	Transmission Control Module (TCM)
12	Engine Control Module (ECM)
13	Body Control Module (BCM)

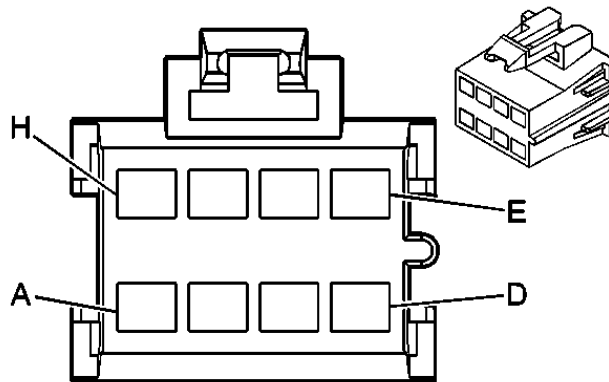
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14	Audio Amplifier
15	Steering Column Lock Control Module (Export)
16	Inflatable Restraint Sensing and Diagnostic Module (SDM)
17	Front Passenger Door Module (FPDM)
18	HVAC Control Module
19	Vehicle Communication Interface Module (VCIM)
20	Antenna Ground Plane
21	Antenna Module - Right
22	Antenna Module - Left

STEERING WHEEL AND COLUMN CONNECTOR END VIEWS

Steering Column Lock Control Module C1 (Export) Connector End View

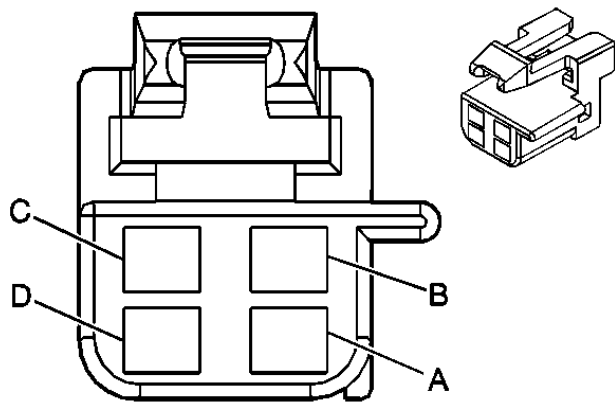


Connector Part Information		<ul style="list-style-type: none">• OEM: 173850• Service: NS• 8-Way F Metri-Pack 280 Series (WH)	
Pin	Wire Color	Circuit No.	Function
A	D-GN/WH	1932	Transmission Shift Select Switch (Park) Signal
B	RD/WH	840	Battery Positive Voltage
C	WH	5741	Steering Lock Control
D	BK	1550	Ground
E	PK	639	Ignition 1 Voltage
F	BK	1550	Ground
G	OG	5739	Class 2 Serial Data
H	-	-	Not Used

Steering Column Lock Control Module C2 (Export) Connector End View

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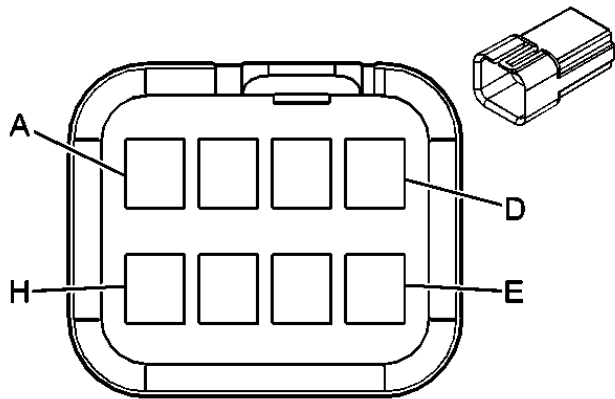


Connector Part Information

- OEM: 12064760
- Service: 12085208
- 4-Way F Metri-Pack 150 Series (BK)

Pin	Wire Color	Circuit No.	Function
A	L-GN	1601	Steering Column Lock Signal
B	BK	150	Ground
C	PU	1604	Steering Column Unlock
D	OG	1603	Steering Column Lock

Telescoping Drive Motor Connector End View



Connector Part Information

- OEM: 12045688
- Service: 12101827
- 8-Way M Metri-Pack 150 Series (BK)

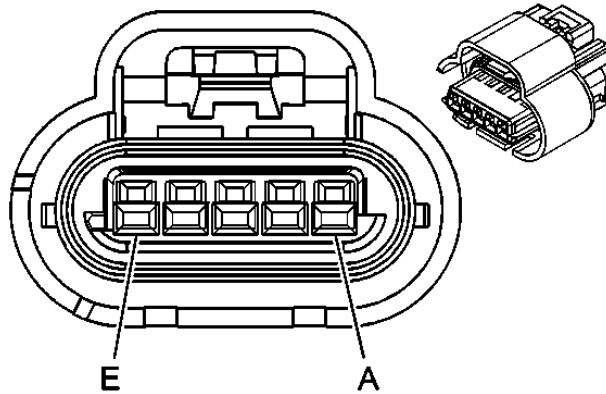
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Pin	Wire Color	Circuit No.	Function
A	TN	2110	Steering Column Telescope Motor Control - Reverse
B	RD	2098	Steering Column Telescope Motor Control - Forward
C	OG	2153	Steering Column Telescope Sensor Signal
D	GY	788	5-Volt Reference
E	TN	782	Low Reference
F-H	-	-	Not Used

Tilt Actuator Connector End View



Connector Part Information

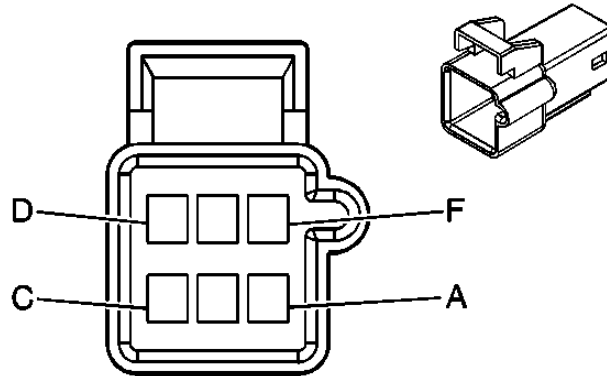
- OEM: 15332138
- Service: NS
- 5-Way F Metri-Pack 280 Series (BK)

Pin	Wire Color	Circuit No.	Function
A	RD	2111	Steering Column Tilt Motor Control - Up
B	BK	2112	Steering Column Tilt Motor Control - Down
C	OG	2154	Steering Column Tilt Sensor Signal
D	GY	788	5-Volt Reference
E	TN	782	Low Reference

Tilt/Telescope Switch Connector End View

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Connector Part Information

- **OEM: 12064763**
- **Service: 12101876**
- **6-Way M Metri-Pack 150 Series (GY)**

Pin	Wire Color	Circuit No.	Function
A	GY	2096	Steering Column Tilt Up Switch Signal
B	YE	2097	Steering Column Tilt Down Switch Signal
C	OG	2095	Steering Column Tilt and Telescope Reverse Switch Signal
D	PK	2094	Steering Column Tilt and Telescope Forward Switch Signal
E	-	-	Not Used
F	RD/WH	440	Battery Positive Voltage

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - STEERING COLUMN

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

- The identification of the control module which commands the system
- The ability of the control module 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 will identify the correct procedure for diagnosing the system and where the procedure is located.

SCAN TOOL OUTPUT CONTROLS

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Scan Tool Output Control	Additional Menu Selections	Description
Column Calibration	Calibrate	The DPM can be commanded by using the scan tool to calibrate the tilt/telescope steering wheel. This must be done every time the DPM or the tilt/telescope actuators are replaced.
Column Lock Relay	On/Off	The BCM can be commanded by using the scan tool to energize the column lock enable circuit.
Default Position	Recall/Cancel	The DPM can be commanded by using the scan tool to command the tilt/telescope steering wheel to the default position.
Memory 1 Exit Position	Recall/Cancel	The DPM can be commanded by using the scan tool to command the tilt/telescope steering wheel to the number 1 exit position in the DPM memory.
Memory 1 Position	Recall/Cancel	The DPM can be commanded by using the scan tool to command the tilt/telescope steering wheel to the number 1 position in the DPM memory.
Memory 2 Exit Position	Recall/Cancel	The DPM can be commanded by using the scan tool to command the tilt/telescope steering wheel to the number 2 exit position in the DPM memory.
Memory 2 Position	Recall/Cancel	The DPM can be commanded by using the scan tool to command the tilt/telescope steering wheel to the number 2 position in the DPM memory.
SCLCM Setup	-	The SCLCM can be commanded by the scan tool to be programmed to the installed vehicle. The module will then only work on the vehicle that it was programmed. This procedure is only necessary when installing a new module.
Telescope Motor	Forward/Rearward	The DPM can be commanded by using the scan tool to command the tilt/telescope steering wheel forward or rearward.
Tilt Motor	Up/Down	The DPM can be commanded by using the scan tool to command the tilt/telescope steering wheel up or down.

SCAN TOOL DATA LIST**SCLCM Scan Tool Data List**

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Turn the Ignition ON, with the Engine OFF			
Battery Voltage Signal	SCLCM	Volts	12.6 V
Column Feedback Signal	SCLCM	Volts	11.9 V
Column Lock Enable Signal	SCLCM	Enabled/Disabled	Enabled
Column Lock Module Status	SCLCM	Enabled/Disabled	Enabled
Column Lock Motor Command	SCLCM	Lock/Unlock/Idle/Invalid	Unlock

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Column Lock Motor Status	SCLCM	Lock/Unlock/Idle/Invalid	Idle
Column Lock Status	SCLCM	Varies	Unlocked
Ignition Voltage Signal	SCLCM	On/Off	On
Park Switch	SCLCM	On/Off	On
Password Status	SCLCM	Valid/Invalid/Not Programmed	Valid

DPM Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Default Telescope Exit Position	DPM	Volts	3.76 V
Default Tilt Exit Position	DPM	Volts	3.76 V
Memory 1 Telescope Exit Position	DPM	Volts	Varies
Memory 1 Telescope Position	DPM	Volts	Varies
Memory 1 Tilt Exit Position	DPM	Volts	Varies
Memory 1 Tilt Position	DPM	Volts	Varies
Memory 2 Telescope Exit Position	DPM	Volts	Varies
Memory 2 Telescope Position	DPM	Volts	Varies
Memory 2 Tilt Exit Position	DPM	Volts	Varies
Memory 2 Tilt Position	DPM	Volts	Varies
Telescope Forward Command	DPM	On/Off	Off
Telescope Forward Switch	DPM	Active/Inactive	Inactive
Telescope Rearward Command	DPM	On/Off	Off
Telescope Rearward Switch	DPM	Active/Inactive	Inactive
Telescope Sensor	DPM	Volts	Varies
Tilt Down Command	DPM	On/Off	Off
Tilt Down Switch	DPM	Active/Inactive	Inactive
Tilt Sensor	DPM	Volts	Varies
Tilt Up Command	DPM	On/Off	Off
Tilt Up Switch	DPM	Active/Inactive	Inactive

BCM Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Column Lock Relay Command	BCM	On/Off	On
Column Lock Relay Signal	BCM	On/Off	On

SCAN TOOL DATA DEFINITIONS

SCLCM Scan Tool Data Definitions

The steering column lock control module (SCLCM) Scan Tool Data Definitions contains a brief description of all steering column related SCLCM parameters available on the scan tool.

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Battery Voltage Signal

The scan tool displays 0-20 volts. The scan tool displays the voltage as received on the battery positive voltage circuit of the module.

Column Feedback Signal

The scan tool displays 0-5 volts. This data represents the signal received on the column lock motor signal circuit.

Column Lock Enable Signal

The scan tool displays Enabled or Disabled. This signal determines whether or not the body control module (BCM) is allowing the SCLCM to function.

Column Lock Module Status

The scan tool displays Enabled or Disabled, whether or not the SCLCM is functioning.

Column Lock Motor Command

The scan tool displays Lock, Unlock, or No Action. This data shows what the SCLCM is commanding the column lock motor.

Column Lock Motor Status

The scan tool displays Lock, Unlock, No Action, or Undefined. This data shows what the column lock motor is doing.

Column Lock Status

The scan tool displays the current column lock state. This data represents what column lock functional mode the SCLCM is in. The SCLCM enters different column lock states based upon information received from various inputs associated with the column lock system.

Ignition Voltage Signal

The scan tool displays ON or OFF. When the SCLCM detects ignition is present, the scan tool will display On. When the SCLCM does not detect ignition, the scan tool will display OFF. This ignition switch information is hard wired into the SCLCM.

Park Switch

The scan tool displays On or Off. When the transmission is placed in PARK the scan tool displays On and when the transmission is out of PARK the scan tool displays Off.

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Password Status

The scan tool displays Valid, Invalid, or Not Programmed. The SCLCM compares the password it has to the password in the remote control door lock receiver (RCDLR) via class 2. When the password is the same then the scan tool displays Valid and when the password is different then the scan tool displays Invalid. When the SCLCM is has not been programmed the seed and key procedure to program the module has not been performed.

DPM Scan Tool Data Definitions

The driver position module (DPM) Scan Tool Data Definitions contains a brief description of all steering column related DPM parameters available on the scan tool.

Default Telescope Exit Position

The scan tool displays the default voltage value for the telescope operation in the exit position.

Default Tilt Exit Position

The scan tool displays the default voltage value for the tilt operation in the exit position.

Memory 1 Telescope Exit Position

The scan tool displays 0-5 volts. The value displayed is the telescope sensor voltage stored by the DPM and is used to recall the telescope exit position for driver 1.

Memory 1 Telescope Position

The scan tool displays 0-5 volts. The value displayed is the telescope sensor voltage stored by the DPM and is used to recall the telescope position for driver 1.

Memory 1 Tilt Exit Position

The scan tool display 0-5 volts. The value displayed is the tilt sensor voltage stored by the DPM and is used to recall the tilt exit position for driver 1.

Memory 1 Tilt Position

The scan tool displays 0-5 volts. The value displayed is the tilt sensor voltage stored by the DPM and is used to recall the tilt position for driver 1.

Memory 2 Telescope Exit Position

The scan tool displays 0-5 volts. The value displayed is the telescope sensor voltage stored by the DPM and is used to recall the telescope exit position for driver 2.

Memory 2 Telescope Position

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The scan tool displays 0-5 volts. The value displayed is the telescope sensor voltage stored by the DPM and is used to recall the telescope position for driver 2.

Memory 2 Tilt Exit Position

The scan tool display 0-5 volts. The value displayed is the tilt sensor voltage stored by the DPM and is used to recall the tilt exit position for driver 2.

Memory 2 Tilt Position

The scan tool displays 0-5 volts. The value displayed is the tilt sensor voltage stored by the DPM and is used to recall the tilt position for driver 2.

Telescope Forward Command

The scan displays On or Off. The scan tool displays On when the DPM commands the telescope actuator forward.

Telescope Forward Switch

The scan tool displays Active or Inactive. When the switch is pressed to the forward position the scan tool displays Active. When the switch is not depressed forward the scan tool displays Inactive.

Telescope Rearward Command

The scan displays On or Off. The scan tool displays On when the DPM commands the telescope actuator rearward.

Telescope Rearward Switch

The scan tool displays Active or Inactive. When the switch is pressed to the rearward position the scan tool displays Active. When the switch is not depressed rearward the scan tool displays Inactive.

Telescope Sensor

The scan tool displays 0-5 volts. The value displayed is the telescope sensor signal voltage. This voltage varies when the steering column is moved forward or rearward and is used by the DPM to determine the steering column position when memory settings are stored and recalled.

Tilt Down Command

The scan displays On or Off. The scan tool displays On when the DPM commands the tilt actuator down.

Tilt Down Switch

The scan tool displays Active or Inactive. When the switch is pressed to the down position the scan tool

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displays Active. When the switch is not depressed down the scan tool displays Inactive.

Tilt Sensor

The scan tool displays 0-5 volts. The value displayed is the tilt sensor signal voltage. This voltage varies when the steering column is moved up or down and is used by the DPM to determine the steering column position when memory settings are stored and recalled.

Tilt Up Switch

The scan tool displays Active or Inactive. When the switch is pressed to the up position the scan tool displays Active. When the switch is not depressed up the scan tool displays Inactive.

BCM Scan Tool Data Definitions

The Body control module (BCM) Scan Tool Data Definitions contains a brief description of all steering column related BCM parameters available on the scan tool.

Column Lock Relay Command

The scan tool displays On/Off. The state displayed is the command state of the lock enable relay. This function is controlled by the BCM with data from the remote control door lock receiver (RCDLR).

Column Lock Relay Signal

The scan tool displays On/Off. The state displayed is the actual state of the lock enable relay. This function is controlled by the BCM with data from the RCDLR.

DTC B0005

Circuit Description

The steering column lock control module (SCLCM) receives a discrete input from the automatic transmission shift lever and a serial data input from the body control module (BCM). When the shift lever is in the park position, the switch internal to the automatic transmission shift lever closes sending a high input to the SCLCM. The SCLCM compares the serial data input to the discrete input. If the SCLCM receives a column lock enable command from the BCM and the transmission shift select switch park signal circuit is low, DTC B0005 will set.

DTC Descriptor

This diagnostic supports the following DTC:

DTC B0005 In Park Switch

Conditions for Running the DTC

- DTCs B1327 or B1328 are not set as current.

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- The condition must be present for 300 ms.
- The condition must be present for 5 consecutive ignition cycles.

Conditions for Setting the DTC

- DTC B0005 will set when the SCLCM receives a column lock enable command from the BCM and the transmission shift select switch park signal circuit is low.
- There is a short to ground, or an open in the transmission shift select switch park signal circuit.

Action Taken When the DTC Sets

- DTC B0005 is stored in the SCLCM memory.
- The SCLCM will command the driver information center (DIC) to display the Service Column Lock Now message.

Conditions for Clearing the MIL/DTC

- The SCLCM no longer detects a malfunction in the transmission shift select park signal circuit.
- A history DTC will clear after 50 consecutive ignition cycles if the condition for the malfunction is no longer present.

DTC B0005

Step	Action	Yes	No
Schematic Reference: Column/Ignition Lock Schematics			
Connector End View Reference: Steering Wheel and Column Connector End Views			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	1. Turn ON the ignition, with the engine OFF. 2. Observe the Park Switch parameter in the SCLCM data list with a scan tool. Does the scan tool display OFF?	Go to Step 3	System OK
3	Test the transmission shift select switch park signal circuit for an open or short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 6	Go to Step 4
4	Inspect for poor connections at the harness connector of the steering column lock control module (SCLCM). Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 6	Go to Step 5

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5	IMPORTANT: Perform the setup procedure for the SCLCM. 1. Replace the SCLCM. Refer to <u>Steering Column Lock Control Module Replacement</u> . 2. Perform the setup procedure for the SCLCM. Refer to <u>Control Module Setup (SCLCM Setup)</u> .		
	Did you complete the replacement?	Go to Step 6	-
6	1. Clear the DTCs with the scan tool. 2. Operate the vehicle within the Conditions for Running the DTC.		
	Does DTC B0005 reset?	Go to Step 2	System OK

DTC B2510

Circuit Description

The steering column lock control module (SCLCM) controls the column lock motor using an internal lock relay, an internal unlock relay, and an internal lock enable relay. The lock and unlock relays provide a low input to the column lock motor. When the column needs to be locked, the lock enable relay will energize the lock relay, which provides a high input to the lock side of the motor, energizing the motor to lock the steering column.

When the SCLCM receives the low input from the body control module (BCM) the internal lock enable relay is energized and provides a high input to the lock side of the column lock motor. The unlock side of the column lock motor is grounded through the internal unlock relay within the SCLCM.

DTC Descriptor

This diagnostic supports the following DTC:

DTC B2510 Steering Column Lock Solenoid/Motor Unlock Circuit

Conditions for Running the DTC

- DTCs B1327 or B1328 are not set as current.
- The condition must be present for 300 ms.

Conditions for Setting the DTC

This DTC will set if there is an open, short to ground, or short to voltage on the SCLCM unlock relay circuit.

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Action Taken When the DTC Sets

- Stores a DTC B2510 in the SCLCM memory.
- The SCLCM will command driver information center (DIC) to display the Service Column Lock Now message.

Conditions for Clearing the MIL/DTC

- The SCLCM no longer detects a malfunction in the unlock relay circuit.
- A history DTC will clear after 50 consecutive ignition cycles if the condition for the malfunction is no longer present.

DTC B2510

Step	Action	Values	Yes	No
Schematic Reference: Column/Ignition Lock Schematics				
Connector End View Reference: Steering Wheel and Column Connector End Views				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Turn OFF the ignition. 2. Disconnect the steering column lock control module (SCLCM) connector C2. 3. Test the SCLCM unlock relay circuit for an open, a short to ground, and a short to battery positive. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find any of these conditions?	-	Go to Step 4	Go to Step 3
3	Inspect for poor connections at the harness connector of the SCLCM. Refer to Testing for Intermittent Conditions and Poor Connections in Wiring Systems. Did you find and correct the condition?	-	Go to Step 6	Go to Step 5
4	Replace the steering wheel theft deterrent lock. Refer to Steering Column Electronic Lock Replacement . Did you complete the replacement?	-	Go to Step 6	-
	IMPORTANT: Always perform the setup procedure for the SCLCM. 1. Replace the SCLCM. Refer to Steering			

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5	<u>Column Lock Control Module Replacement.</u> 2. Perform the setup procedure for the SCLCM. Refer to <u>Control Module Setup (SCLCM Setup)</u> .	-		
	Did you complete the replacement?			
6	1. Clear the DTCs with a scan tool. 2. Operate the vehicle within the Conditions for Running the DTC.	-		
	Does DTC B2510 reset?			
			Go to Step 6	-
			Go to Step 2	System OK

DTC B2515

Circuit Description

The steering column lock control module (SCLCM) controls the column lock motor using an internal lock relay, an internal unlock relay, and an internal lock enable relay. The lock and unlock relays provide a low input to the column lock motor. When the column needs to be locked the lock enable relay will energize the lock relay, which provides a high input to the lock side of the motor, energizing the motor to lock the steering column.

When the SCLCM receives the low input from the body control module (BCM) the internal lock enable relay is energized and provides a high input to the lock side of the column lock motor. The unlock side of the column lock motor is grounded through the internal unlock relay within the SCLCM. The column lock motor will send an input back to the SCLCM indicating the motor is energized for the locked position. This results in the locking of the steering column.

DTC Descriptor

This diagnostic supports the following DTC:

DTC B2515 Steering Column Lock Solenoid/Motor Feedback Circuit

Conditions for Running the DTC

- DTCs B0005, B1000, B1327, B1328, or B2907 are not set as current.
- The condition must be present for 300 ms.

Conditions for Setting the DTC

- This DTC will set when the SCLCM checks for a valid feedback signal, but the feedback is not what was expected. This indicates a failure in the motor feedback switch/motor circuit.
- The condition must occur 5 consecutive times for this DTC to set.

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Action Taken When the DTC Sets

- Stores a DTC B2515 in the SCLCM memory.
- The SCLCM will command the driver information center (DIC) to display the Service Column Lock Now message.

Conditions for Clearing the MIL/DTC

- The SCLCM no longer detects a malfunction in the motor feedback switch/motor circuit.
- A history DTC will clear after 50 consecutive ignition cycles if the condition for the malfunction is no longer present.

Test Description

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

2: During the steering column electronic lock operation, listen for an audible click. Repeat the commands as necessary.

3: This test determines if the steering column electronic lock feedback circuit is operating properly.

DTC B2515

Step	Action	Values	Yes	No
Schematic Reference: <u>Column/Ignition Lock Schematics</u>				
Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	1. Vehicle in Park. 2. Operate the column lock system by cycling the ignition. Does the column lock with each cycle of the ignition?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Measure the resistance between the steering column lock signal and ground circuits. Does the resistance measure within the specification?	492-482 ohms	Go to Step 5	Go to Step 4
	Test the steering column lock signal circuit for			

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4	an open, a short to ground, or short to voltage. Refer to <u>Circuit Testing</u> in Wiring Systems. Did you find the condition?	-	Go to Step 8	Go to Step 6
5	Inspect for poor connections at the harness connector of the steering column lock control module (SCLCM). Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 8	Go to Step 7
6	Replace the steering wheel theft deterrent lock. Refer to <u>Steering Column Electronic Lock Replacement</u> . Did you complete the replacement?	-	Go to Step 8	-
7	IMPORTANT: Perform the setup procedure for the SCLCM. 1. Replace the SCLCM. 2. Perform the setup procedure for the SCLCM. Refer to <u>Control Module Setup (SCLCM Setup)</u> . Did you complete the replacement?	-	Go to Step 8	-
8	1. Clear the DTCs with a scan tool. 2. Operate the vehicle within the Conditions for Running the DTC. Does DTC 2515 reset?	-	Go to Step 2	System OK

DTC B2853, B2858, B2873, OR B2878**Circuit Description**

The steering column module receives ground inputs from contacts inside the tilt/telescoping switch. The steering column module then supplies battery voltage to the tilt motor up or down circuit or the telescope motor in or out circuit depending on which direction of movement is requested. Both motors are reversible and the circuits are simply reversed to accomplish movement in opposite directions.

DTC Descriptors

This diagnostic supports the following DTCs:

- DTC 2853 Telescope Forward Switch Circuit High
- DTC 2858 Telescope Rearward Switch Circuit High
- DTC 2873 Tilt Up Switch Circuit High

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- DTC 2878 Tilt Down Switch Circuit High

Conditions for Running the DTC

The steering column module is ON.

Conditions for Setting the DTC

The steering column module detects a switch input for more than 30 consecutive seconds after movement of the motor in the requested direction has stopped.

Action Taken When the DTC Sets

- The motor that is being driven by the failed switch will be deactivated.
- Memory recall functions will be disabled.

Conditions for Clearing the DTC

- A current DTC will clear when the failed switch input is no longer active.
- A history DTC will clear after 100 ignition cycles.

Diagnostic Aids

An intermittently stuck switch can cause this DTC to set. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

DTC B2853, B2858, B2873, or B2878

Step	Action	Yes	No
Schematic Reference: <u>Tilt/Telescoping Steering Column Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Turn ON the ignition, with the engine OFF. 2. Retrieve DTCs with a scan tool. Is DTC B2853, B2858, B2873 or B2878 displayed as current?	Go to Step 3	Go to Diagnostic Aids
3	1. Turn OFF the ignition. 2. Disconnect the tilt/telescoping switch harness connector. 3. Turn ON the ignition, with the engine OFF. 4. Retrieve DTCs with the scan tool.		

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	Is DTC B2853, B2858, B2873 or B2878 displayed as current?	Go to Step 4	Go to Step 5
4	Inspect for poor connections at the harness connector of the tilt/telescoping steering column switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 7	Go to Step 6
5	Replace the tilt/telescoping steering column switch. Refer to <u>Telescope Actuator Switch Replacement</u> . Did you complete the replacement?	Go to Step 7	-
6	IMPORTANT: Perform the set up procedure for the steering column module. Replace the steering column module. Refer to <u>Steering Column Lock Control Module Replacement</u> . Did you complete the replacement?	Go to Step 7	-
7	Perform the steering column control module programming. Refer to <u>Telescoping Steering Column Calibration</u> . Did you complete the action?	Go to Step 8	-
8	<ol style="list-style-type: none">1. Clear the DTCs with the scan tool.2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	Go to Step 2	System OK

DTC B2860**Circuit Description**

The memory seat and telescoping steering column position settings are stored in the left hand seat control module (SCM). The SCM measures and stores the steering column position by using a position sensor, which is an internal part of the telescoping actuator. The SCM provides the position sensor with a 5-volt reference and ground. The SCM monitors the position sensor signal voltage, which ranges from 0.1-4.78 volts depending on the steering column position. The steering column position sensor becomes active only when the SCM detects a steering column switch input.

DTC Descriptor

This diagnostic supports the following DTC:

DTC B2860 Telescope Position Sensor

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Conditions for Setting the DTC

The steering column position sensor signal, to the SCM, is less than 0.1 volt or greater than 4.78 volts for 2 seconds or more.

Action Taken When the DTC Sets

- A history DTC B2860 is stored in the SCM memory.
- This DTC can only be set as a history code even if the malfunction is current.
- No driver warning message will be displayed for this DTC.
- The memory operation/function of the faulted position sensor is disabled.

Conditions for Clearing the DTC

- The steering column position sensor input, to the SCM, is within 0.1-4.78 volts for 2 seconds or more.
- A scan tool can clear this DTC.

Diagnostic Aids

- If the DTC does not reset after the code is cleared the problem may be intermittent. Perform the tests shown while moving related wiring and connectors. This can often cause the malfunction to occur. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.
- The following conditions may also cause an intermittent malfunction:
 - There is an intermittent open, short to ground, or short to voltage in steering column telescope motor signal circuit.
 - The steering column position sensor is open or shorted internally.
- If the SCM is unable to determine the correct steering column position, limited manual operation of the telescoping steering column will be functional, but the SCM will be unable to recall the correct memory settings.
- Using a scan tool, select SCM data display and monitor the Column Position Feedback data. Operate the steering column in both directions while monitoring the position sensor data. The voltage should range from 0.1-4.78 volts depending on the steering column position.

Test Description

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

3: This step tests for the proper operation of the circuit in the high voltage range.

4: This step tests for the proper operation of the circuit in the low voltage range. If the fuse in the jumper opens when you perform this test, the signal circuit is shorted to voltage.

5: This step tests for a short to ground in the 5-volt reference circuit.

DTC B2860

Step	Action	Value(s)	Yes	No
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Schematic Reference: Tilt/Telescoping Steering Column Schematics

Connector End View Reference: Steering Wheel and Column Connector End Views

1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	<ol style="list-style-type: none"> 1. Turn ON the ignition, with the engine OFF. 2. Observe the Column Position Feedback data parameter in the Seat Control Module Column Info list with a scan tool. <p>Does the scan tool indicate that the Column Position Feedback data parameter is within the specified range?</p>	0.1-4.78 V	Go to Diagnostic Aids	Go to Step 3
3	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Disconnect the telescoping sensor. 3. Turn ON the ignition, with the engine OFF. 4. Observe the Column Position Feedback data parameter with the scan tool. <p>Does the scan tool indicate that the Column Position Feedback data parameter is greater than the specified value?</p>	4.78 V	Go to Step 4	Go to Step 8
4	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the signal circuit of the telescoping sensor and the low reference circuit of the telescoping sensor. 3. Turn ON the ignition, with the engine OFF. 4. Observe the Column Position Feedback data parameter with the scan tool. <p>Does the scan tool indicate that the Column Position Feedback data parameter is less than the specified value?</p>	0.1 V	Go to Step 5	Go to Step 9
	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Disconnect the fused jumper wire. 3. Connect a 3-amp fused jumper wire 			

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5	<p>between the 5-volt reference circuit of the telescoping sensor and the signal circuit of the telescoping sensor.</p> <p>4. Turn ON the ignition, with the engine OFF.</p> <p>5. Observe the Column Position Feedback data parameter with the scan tool.</p> <p>Does the scan tool indicate that the Column Position Feedback data parameter is greater than the specified value?</p>	4.78 V	Go to Step 7	Go to Step 6
6	<p>Test the 5-volt reference circuit of the telescoping sensor for a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 15	Go to Step 12
7	<p>Test the 5-volt reference circuit of the telescoping sensor for a short to voltage, a high resistance, or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 15	Go to Step 11
8	<p>Test the signal circuit of the telescoping sensor for a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 15	Go to Step 12
9	<p>Test the signal circuit of the telescoping sensor for a short to voltage, a high resistance, or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 15	Go to Step 10
10	<p>Test the low reference circuit of the telescoping sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 15	Go to Step 12
11	<p>Inspect for poor connections at the harness connector of the telescoping sensor. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 15	Go to Step 13
12	<p>Inspect for poor connections at the harness connector of the seat control module (SCM). Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems.</p>	-		

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	Did you find and correct the condition?		Go to Step 15	Go to Step 14
13	Replace the telescoping sensor. Refer to Telescope Actuator Assembly Replacement . Did you complete the replacement?	-	Go to Step 15	-
14	Replace and calibrate the SCM. Refer to Memory Seat Control Module Replacement in Seats and Telescoping Steering Column Calibration . Did you complete the replacement and the calibration?	-	Go to Step 15	-
15	1. Clear the DTCs with the scan tool. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does DTC B2860 reset?	-	Go to Step 2	System OK

DTC B2880

Circuit Description

The steering column module determines the position of the steering column based on inputs received from position sensor located in the tilt actuator. The steering column module supplies a 5-volt reference and a ground to the sensor and monitors the column position via a steering column tilt sensor signal circuit.

DTC Descriptor

This diagnostic supports the following DTC:

DTC B2880 Tilt Position Sensor

Conditions for Running the DTC

DTC B1327 is not set as current.

Conditions for Setting the DTC

This DTC will set as current when the voltage is greater than 4.8 volts for 2 seconds on the steering column tilt sensor signal circuit.

Action Taken When the DTC Sets

The steering column module will not allow the affected motor to work during memory recall and/or easy exit operations. However, the motor will still operate for manual switch positioning.

Conditions for Clearing the DTC

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This DTC will clear from current status when the voltage is less than 4.8 volts for 2 seconds.

Test Description

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

3: This step tests for the proper operation of the circuit in the low voltage range.

4: This step tests for the proper operation of the circuit in the high voltage range. If the fuse in the jumper opens if you perform this test, the signal circuit is short to ground.

5: This step tests for a short to voltage in the 5-volt reference circuit.

6: This step tests for a high resistance or for an open in the low reference circuit.

DTC B2880

Step	Action	Values	Yes	No
Schematic Reference: <u>Tilt/Telescoping Steering Column Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	1. Turn ON the ignition, with the engine OFF. 2. Observe the tilt sensor parameter in the data list for the driver position module (DPM) with a scan tool. Is the tilt sensor parameter within the specified range?	4.80-0.12 V	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring System	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the tilt sensor. 3. Turn ON the ignition, with the engine OFF. 4. Observe the tilt sensor parameter with the scan tool. Is the tilt sensor parameter less than the specified value?	0.12 V	Go to Step 4	Go to Step 10
	1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the 5-volt reference circuit of the tilt sensor and the signal circuit of the tilt			

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4	<p>sensor.</p> <ol style="list-style-type: none"> Turn ON the ignition, with the engine OFF. Observe the tilt sensor data parameter with the scan tool. <p>Is the tilt sensor data parameter greater than the specified value?</p>	4.80 V	Go to Step 5	Go to Step 8
5	<ol style="list-style-type: none"> Disconnect the fused jumper wire. Measure the voltage between the 5-volt reference circuit of the tilt sensor and the low reference circuit of the tilt sensor. <p>Is the voltage less than the specified value?</p>	5 V	Go to Step 6	Go to Step 7
6	<ol style="list-style-type: none"> Turn OFF the ignition. Disconnect the negative battery cable. Measure the resistance from the low reference circuit of the tilt sensor to a good ground. <p>Is the resistance less than the specified value?</p>	5 ohms	Go to Step 12	Go to Step 11
7	<p>Test the 5-volt reference circuit of the tilt sensor for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 17	Go to Step 13
8	<p>Test the 5-volt reference circuit of the tilt sensor for one of the following conditions:</p> <ul style="list-style-type: none"> A short to ground A high resistance An open <p>Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 17	Go to Step 9
9	<p>Test the signal circuit of the tilt sensor for one of the following conditions:</p> <ul style="list-style-type: none"> A short to ground A high resistance An open 	-		

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	Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?		Go to Step 17	Go to Step 13
10	Test the signal circuit of the tilt sensor for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 17	Go to Step 13
11	1. Disconnect the DPM. 2. Test the low reference circuit of the tilt sensor for a high resistance or for an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 17	Go to Step 13
12	Inspect for poor connections at the harness connector of the tilt sensor. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 17	Go to Step 14
13	Inspect for poor connections at the harness connector of the DPM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 17	Go to Step 15
14	Replace the tilt sensor. Refer to Telescope Actuator Assembly Replacement . Did you complete the replacement?	-	Go to Step 17	-
15	Replace the DPM. Refer to Memory Seat Control Module Replacement in Seats. Did you complete the replacement?	-	Go to Step 17	-
16	Perform the Steering Column Control Module Programming. Refer to Telescoping Steering Column Calibration . Did you complete the action?	-	Go to Step 17	-
17	1. Clear the DTCs with the scan tool. 2. Operate the vehicle within the Conditions for Running the DTC. Does DTC B2880 reset?	-	Go to Step 2	System OK

Circuit Description

The steering column lock control module (SCLCM) controls the column lock motor using an internal lock relay, an internal unlock relay, and an internal lock enable relay. The lock and unlock relays provide a low input to the column lock motor. When the column needs to be locked the lock enable relay will energize the lock relay, which provides a high input to the lock side of the motor, energizing the motor to lock the steering column.

When the SCLCM receives the low input from the body control module (BCM) the internal lock enable relay is energized and provides a high input to the lock side of the column lock motor. The unlock side of the column lock motor is grounded through the internal unlock relay within the SCLCM.

DTC Descriptor

This diagnostic supports the following DTC:

DTC B2897 Steering Column Lock Solenoid/Motor Lock Circuit

Conditions for Running the DTC

- DTCs B1327 or B1328 are not set as current.
- The condition must be present for 300 ms.

Conditions for Setting the DTC

This DTC will set if the SCLCM lock relay circuit has an open, short to ground, or short to voltage.

Action Taken When the DTC Sets

- Stores a DTC B2897 in the SCLCM memory.
- The SCLCM will command the Service Column Lock Now to turn ON in the driver information center (DIC).

Conditions for Clearing the MIL/DTC

- The SCLCM no longer detects a malfunction in the SCLCM lock relay circuit.
- A history DTC will clear after 50 consecutive ignition cycles if the condition for the malfunction is no longer present.

DTC B2897

Step	Action	Values	Yes	No
Schematic Reference: <u>Column/Ignition Lock Schematics</u>				
Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>				
	Did you perform the Diagnostic System Check - Vehicle?			Go to <u>Diagnostic System Check</u>

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1		-	Go to Step 2	- Vehicle in Vehicle DTC Information
2	Test the steering column electronic lock relay circuit for an open, short to ground, or short to voltage. Refer to Circuit Testing in Wiring Systems. Did you find the condition?	-	Go to Step 4	Go to Step 3
3	Inspect for poor connections at the harness connector of the steering column lock control module (SCLCM). Refer to Testing for Intermittent Conditions and Poor Connections in Wiring Systems. Did you find the condition?	-	Go to Step 6	Go to Step 5
4	Replace the steering wheel theft deterrent lock. Refer to Steering Column Electronic Lock Replacement . Did you complete the replacement?	-	Go to Step 6	-
5	IMPORTANT: Perform the setup procedure for the SCLCM. 1. Replace the SCLCM. Refer to Steering Column Lock Control Module Replacement . 2. Perform the setup procedure for the SCLCM. Refer to Control Module Setup (SCLCM Setup) . Did you complete the replacement?	-	Go to Step 6	-
6	1. Clear the DTCs with a scan tool. 2. Operate the vehicle within the Conditions for Running the DTC. Does DTC B2897 reset?	-	Go to Step 2	System OK

DTC B2907

Circuit Description

The steering column lock control module (SCLCM) receives an input from the body control module (BCM) enable relay. When the BCM goes to the off power mode then a low input is sent to the SCLCM.

DTC Descriptor

This diagnostic supports the following DTC:

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DTC B2907 Steering Column Lock Solenoid/Motor Enable Relay Circuit

Conditions for Running the DTC

- DTCs B1327 or B1328 are not set as current.
- The condition must be present for 300 ms.

Conditions for Setting the DTC

When the SCLCM is locking the column but no input has been received on the steering column lock enable relay circuit from the BCM.

Action Taken When the DTC Sets

- Stores a DTC B2907 in the SCLCM memory.
- Stores a DTC B2907.01 in the BCM memory for a short to battery in the steering column lock enable relay circuit.
- Stores a DTC B2907.06 in the BCM memory for an open or a short to ground in the steering column lock enable relay circuit.
- The SCLCM will command the Service Column Lock Now to turn ON in the driver information center (DIC).

Conditions for Clearing the MIL/DTC

- When the SCLCM is locking the column and ground has been received on the steering column lock enable relay circuit for 300 ms.
- A history DTC will clear after 50 consecutive ignition cycles if the condition for the malfunction is no longer present.
- Use a scan tool.

DTC B2907

Step	Action	Yes	No
Schematic Reference: <u>Column/Ignition Lock Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	<ol style="list-style-type: none">1. Place the transmission in the park position.2. Turn ON the ignition, with the engine OFF.3. Observe the Column Lock Enable Signal parameter in the data list for the steering column lock control module (SCLCM) with a scan tool.		

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	Does the scan tool display Disabled?	Go to Step 5	Go to Step 3
3	Observe the Column Lock Relay Signal parameter in the data list for the body control module (BCM) with the scan tool. Does the scan tool display Off?	Go to Step 6	Go to Step 4
4	Inspect for poor connections at the harness connector of the BCM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 7
5	Inspect for poor connections at the harness connector of the SCLCM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 8
6	Repair an open, a short to ground, or a short to battery in the steering column lock enable relay circuit. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	Go to Step 9	-
7	Replace the BCM. Refer to <u>Body Control Module Replacement</u> . Did you complete the replacement?	Go to Step 9	-
8	IMPORTANT: Perform the setup procedure for the SCLCM. 1. Replace the SCLCM. Refer to <u>Steering Column Lock Control Module Replacement</u> . 2. Perform the setup procedure for the SCLCM. Refer to <u>Control Module Setup (SCLCM Setup)</u> . Did you complete the replacement?	Go to Step 9	-
9	1. Clear the DTCs with the scan tool. 2. Operate the vehicle within the Conditions for Running the DTC. Does DTC B2907 reset?	Go to Step 2	System OK

DTC B2910

Circuit Description

The steering column lock control module (SCLCM) will unlock the steering column if the power mode is on and the SCLCM and remote control door lock receiver (RCDLR) passwords match. If the SCLCM and RCDLR passwords do not match, the DTC B2910 will set.

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DTC Descriptor

This diagnostic supports the following DTC:

DTC B2910 Steering Column Lock Password Incorrect

Conditions for Running the DTC

- DTCs B1327 or B1328 are not set as current.
- The condition must be present for 300 ms.

Conditions for Setting the DTC

This DTC will set if the SCLCM password does not match RCDLR password.

Action Taken When the DTC Sets

- The SCLCM stores a DTC B2910 in memory.
- The SCLCM will command the driver information center (DIC) to display the Service Column Lock Now message.

Conditions for Clearing the MIL/DTC

- The stored SCLCM password matches the password from the RCDLR.
- Use a scan tool.

DTC B2910

Step	Action	Yes	No
Schematic Reference: <u>Column/Ignition Lock Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Perform the steering column lock control module (SCLCM) setup. Refer to <u>Control Module Setup (SCLCM Setup)</u> . 2. Clear the DTCs with a scan tool. 3. Turn ON the ignition, with the engine OFF. 4. Retrieve DTCs from the SCLCM with the scan tool. Does DTC 2910 reset?	Go to Step 3	Go to Step 4
	IMPORTANT:		

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3	Perform the setup procedure for the SCLCM. 1. Replace the SCLCM. Refer to <u>Steering Column Lock Control Module Replacement</u> . 2. Perform the setup procedure for the SCLCM. Refer to <u>Control Module Setup (SCLCM Setup)</u> .		
	Did you complete the replacement?	Go to Step 4	-
4	1. Clear the DTCs with the scan tool. 2. Operate the vehicle within the Conditions for Running the DTC.		
	Does DTC 2910 reset?	System OK	-

SYMPTOMS - STEERING WHEEL AND COLUMN

IMPORTANT: The following steps must be completed before using the symptom tables:

- Refer to **Diagnostic Starting Point - Vehicle** in Vehicle DTC Information
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
- Review the system operation in order to familiarize yourself with the system functions. Refer to **Steering Wheel and Column Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the tilt/telescoping steering column or the steering wheel theft deterrent lock system. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could 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** in Wiring Systems.

Symptom List

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

- **Steering Column Tilt/Telescoping Inoperative**
- **Steering Column Does Not Tilt Up/Down**

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- Steering Column Does Not Telescope In/Out
- Service Column Lock Indicator Always On
- Service Column Lock Indicator Inoperative
- Noise in Steering Column
- Looseness in Steering Column

STEERING COLUMN TILT/TELESCOPING INOPERATIVE

Test Description

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

4: If the tilt or telescope actuator is actuated all the way forward, rearward, up, or down, to its soft limits, then the scan tool will show the switch inputs but the DPM will not allow any actuator movement in that direction that the actuator is actuated to but will function normally in the opposite direction.

Steering Column Tilt/Telescoping Inoperative

Step	Action	Yes	No
Schematic Reference: <u>Tilt/Telescoping Steering Column Schematics</u>			
Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Did you perform the Vehicle Diagnostic System Check?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	Verify the fault is present. Does the system operate normally?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Using the scan tool, observe the Telescope Forward Switch, Telescope Rearward Switch, Tilt Up Switch, and Tilt Down Switch Data parameters. 4. Actuate the tilt/telescope switch in all directions. Does the Telescope Forward Switch, Telescope Rearward Switch, Tilt Up Switch, and Tilt Down Switch Data parameters change with each switch actuation?	Go to Step 4	Go to Step 6
	1. Using the scan tool, observe the Telescope Up Command and Telescope Down Command Data		

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	parameters.		
	2. Actuate the tilt/telescope switch in all directions.		
4	Do the Telescope Forward Command, Telescope Rearward Command, Tilt Up Command, and Tilt Down Command Data parameters change state with each switch actuation?	Go to Step 5	Go to Step 9
5	Test the tilt/telescope actuator circuits for a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 8
6	Test the tilt/telescope switch battery power circuit for an open or short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 7
7	Inspect for poor connections at the harness connector of the tilt/telescoping actuator switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 10
8	Inspect for poor connections at the harness connector of the telescope actuator. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 11
9	Inspect for poor connections at the harness connector of the DPM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 12
10	Replace the tilt/telescoping actuator switch. Refer to <u>Telescope Actuator Switch Replacement</u> . Did you complete the replacement?	Go to Step 14	-
11	Replace the tilt and telescope actuators. Refer to <u>Tilt Actuator Assembly Replacement</u> and <u>Telescope Actuator Assembly Replacement</u> . Did you complete the replacement?	Go to Step 13	-
12	Replace the DPM. Refer to <u>Memory Seat Control Module Replacement</u> . Did you complete the replacement?	Go to Step 13	-
13	Perform the telescope steering column calibration. Refer to <u>Control Module Setup (SCLCM Setup)</u> . Did you complete the action?	Go to Step 14	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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STEERING COLUMN DOES NOT TILT UP/DOWN**Test Description**

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

4: If the tilt actuator is actuated all the way up or all the way down, to its soft limits, then the scan tool will show the switch input but the DPM will not allow any actuator movement in that direction but will function normally in the opposite direction.

Steering Column Does Not Tilt Up/Down

Step	Action	Yes	No
Schematic Reference: <u>Tilt/Telescoping Steering Column Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Did you perform the Vehicle Diagnostic System Check?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	Verify the fault is present. Does the system operate normally?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Using the scan tool, observe the Tilt Up Switch and Tilt Down Switch Data parameters. 4. Actuate the tilt up switch and tilt down switch. Does the Tilt Up Switch and Tilt Down Switch Data parameters change with each switch actuation?	Go to Step 4	Go to Step 6
4	1. Using the scan tool, observe the Tilt Up Command and Tilt Down Command Data parameters. 2. Actuate the tilt up switch and the tilt down switch. Do the Tilt Up Command and Tilt Down Command Data parameters change state with each switch actuation?	Go to Step 5	Go to Step 9
5	Test the tilt actuator circuits for an open or short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 8

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6	Test the tilt switch circuits for an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 7
7	Inspect for poor connections at the harness connector of the tilt/telescoping actuator switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 10
8	Inspect for poor connections at the harness connector of the tilt actuator. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 11
9	Inspect for poor connections at the harness connector of the DPM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 12
10	Replace the tilt/telescoping actuator switch. Refer to <u>Telescope Actuator Switch Replacement</u> . Did you complete the replacement?	Go to Step 14	-
11	Replace the tilt actuator. Refer to <u>Tilt Actuator Assembly Replacement</u> . Did you complete the replacement?	Go to Step 13	-
12	Replace the DPM. Refer to <u>Memory Seat Control Module Replacement</u> . Did you complete the replacement?	Go to Step 13	-
13	Perform the telescope steering column calibration. Refer to <u>Control Module Setup (SCLCM Setup)</u> . Did you complete the action?	Go to Step 14	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

STEERING COLUMN DOES NOT TELESCOPE IN/OUT**Test Description**

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

4: If the telescope actuator is actuated all the way forward or all the way rearward, to its soft limits, then the scan tool will show the switch input but the DPM will not allow any actuator movement in that direction but will function normally in the opposite direction.

Steering Column Does Not Telescope In/Out

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Step	Action	Yes	No
Schematic Reference: <u>Tilt/Telescoping Steering Column Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Did you perform the Vehicle Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	Verify the fault is present. Does the system operate normally?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Using the scan tool, observe the Telescope In Switch and Telescope Out Switch Data parameters. 4. Actuate the telescope in switch and telescope out switch. Does the Telescope In Switch and Telescope Out Switch Data parameters change with each switch actuation?	Go to Step 4	Go to Step 6
4	1. Using the scan tool, observe the Telescope In Command and Telescope Out Command Data parameters. 2. Actuate the telescope in switch and the telescope out switch. Do the Telescope In Command and Telescope Out Command Data parameters change state with each switch actuation?	Go to Step 5	Go to Step 9
5	Test the telescope actuator circuits for an open or short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 8
6	Test the telescope switch circuits for an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 7
7	Inspect for poor connections at the harness connector of the tilt/telescoping actuator switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems.		

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	Did you find and correct the condition?	Go to Step 14	Go to Step 10
8	Inspect for poor connections at the harness connector of the telescope actuator. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 11
9	Inspect for poor connections at the harness connector of the DPM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 12
10	Replace the tilt/telescoping actuator switch. Refer to <u>Telescope Actuator Switch Replacement</u> . Did you complete the replacement?	Go to Step 14	-
11	Replace the telescope actuator. Refer to <u>Tilt Actuator Assembly Replacement</u> . Did you complete the replacement?	Go to Step 13	-
12	Replace the DPM. Refer to <u>Memory Seat Control Module Replacement</u> . Did you complete the replacement?	Go to Step 13	-
13	Perform the telescope steering column calibration. Refer to <u>Control Module Setup (SCLCM Setup)</u> . Did you complete the action?	Go to Step 14	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

SERVICE COLUMN LOCK INDICATOR ALWAYS ON

Service Column Lock Indicator Always On

Step	Action	Yes	No
Schematic Reference: <u>Column/Ignition Lock Schematics</u> Connector End View Reference: <u>Steering Wheel and Column Connector End Views</u>			
1	Did you perform the Vehicle Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	IMPORTANT: Always perform the setup procedure for the SCLCM. Refer to <u>Control Module Setup (SCLCM Setup)</u>. 1. Replace the steering column lock control module. Refer to <u>Steering Column Lock Control Module Replacement</u> . 2. Perform the setup procedure for the steering column lock control module.		

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	Did you complete the replacement?	Go to Step 3	-
3	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

SERVICE COLUMN LOCK INDICATOR INOPERATIVE**Service Column Lock Indicator Inoperative**

Step	Action	Yes	No
1	Did you perform the Vehicle Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	1. Turn OFF the ignition. 2. Disconnect the steering column electronic lock. 3. Turn ON the ignition Is the Service Column Lock message displayed?	System OK	Go to Step 3
3	IMPORTANT: Always perform the setup procedure for the SCLCM. Refer to <u>Control Module Setup (SCLCM Setup)</u>. 1. Replace the steering column lock control module. Refer to <u>Steering Column Lock Control Module Replacement</u> . 2. Perform the setup procedure for the steering column lock control module. Did you complete the replacement?	System OK	-

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

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and perform the necessary inspections?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation?	Go to Step 3	System OK
3	Inspect the steering column components for looseness. Is the steering column components loose?	Go to Step 10	Go to Step 4

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4	Inspect the SIR/SRS coil for noise. Is the SIR/SRS coil noisy?	Go to Step 11	Go to Step 5
5	Inspect the horn contact ring for lubrication. Is the horn contact ring lubricated?	Go to Step 12	Go to Step 6
6	Inspect the lock plate retaining ring for the correct installation. Is the lock plate retaining ring installed properly?	Go to Step 13	Go to Step 7
7	Inspect the shaft bearing for the following conditions: <ul style="list-style-type: none"> • Damage • Lubrication • Wear • Proper seating Are the bearings in need of repair or replacement?	Go to Step 14	Go to Step 8
8	Inspect the spherical joint for lubrication. Is the spherical joint lubricated?	Go to Step 15	Go to Step 9
9	Inspect the steering column coupling for looseness. 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>Lower Bearing and Steering Column Jacket Replacement</u> . Did you complete the repair?	Go to Step 17	-
15	Lubricate the spherical joints. Did you complete the repair?	Go to Step 17	-
16	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

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LOOSENESS IN STEERING COLUMN

Looseness in Steering Column

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?	Go to Step 2	Go to Steering Wheel and Column Description and Operation
2	Verify that the steering column is loose. Is the steering column loose?	Go to Step 3	System OK
3	Inspect the steering column mounting brackets for looseness. Are the steering column mounting brackets loose?	Go to Step 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>Lower Bearing and Steering Column 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>Lower Bearing and Steering Column Jacket Replacement</u> . 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

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REPAIR INSTRUCTIONS

INTERMEDIATE STEERING SHAFT REPLACEMENT

Tools Required

J 42640 Steering Column Lock Pin. See **Special Tools**.

Removal Procedure

1. Turn the steering wheel far enough to the left to gain access to the upper to lower intermediate shaft bolts.

NOTE: **The wheels of the vehicle must be straight ahead and the steering column in the LOCK position before disconnecting the steering column or intermediate shaft from the steering gear. Failure to do so will cause the SIR coil assembly to become uncentered, which may cause damage to the coil assembly.**

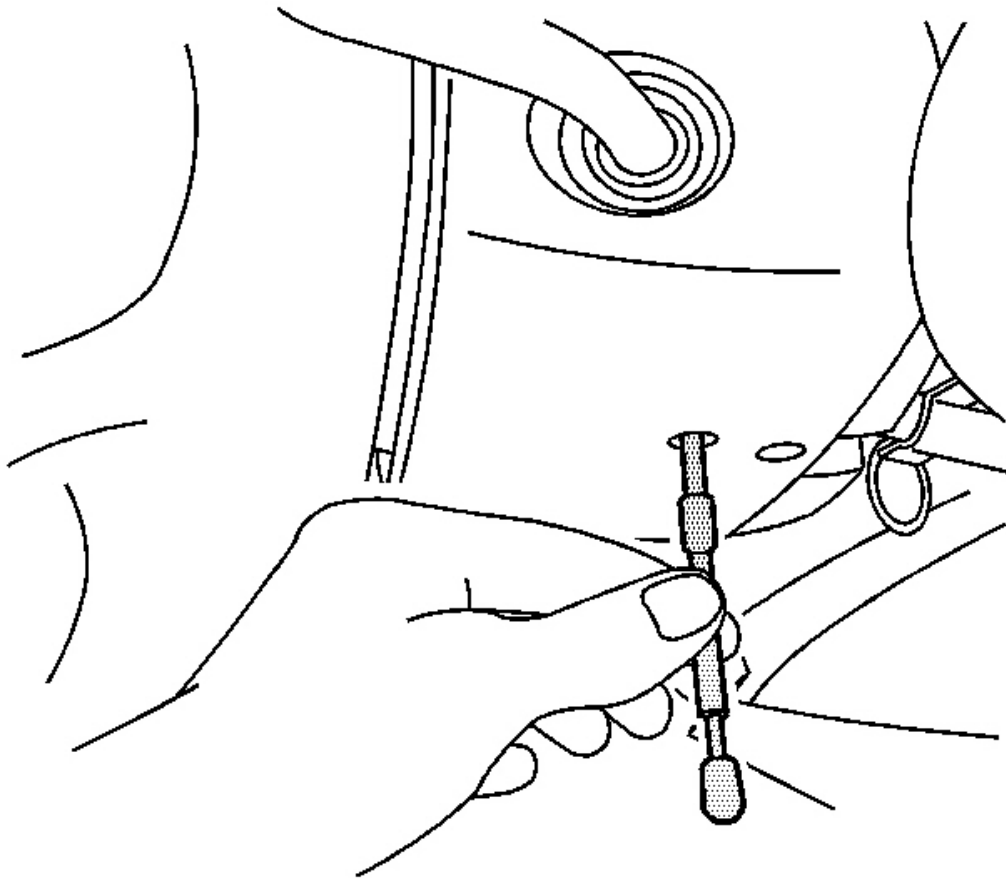


Fig. 8: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

2. Insert **J 42640** into the steering column access hole in order to lock the steering column. See **Special Tools**. This will maintain the correct orientation.

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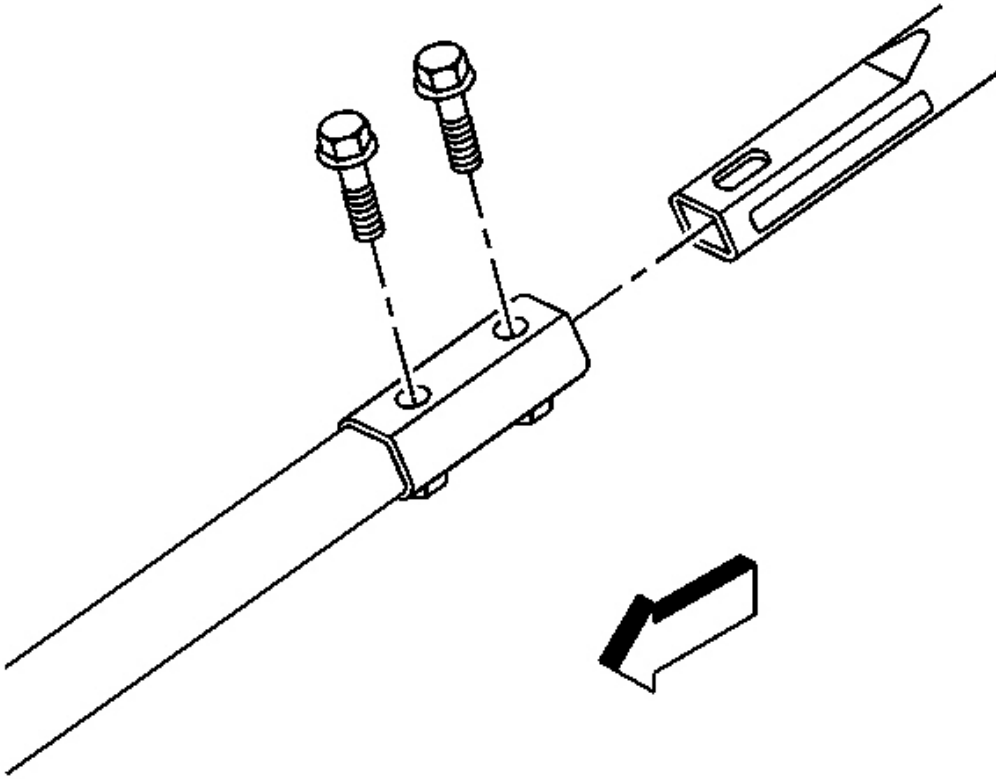


Fig. 9: View Of Steering Shaft & Bolts
Courtesy of GENERAL MOTORS CORP.

3. Remove the upper to lower intermediate shaft bolts.
4. Remove the lower coupling shield.

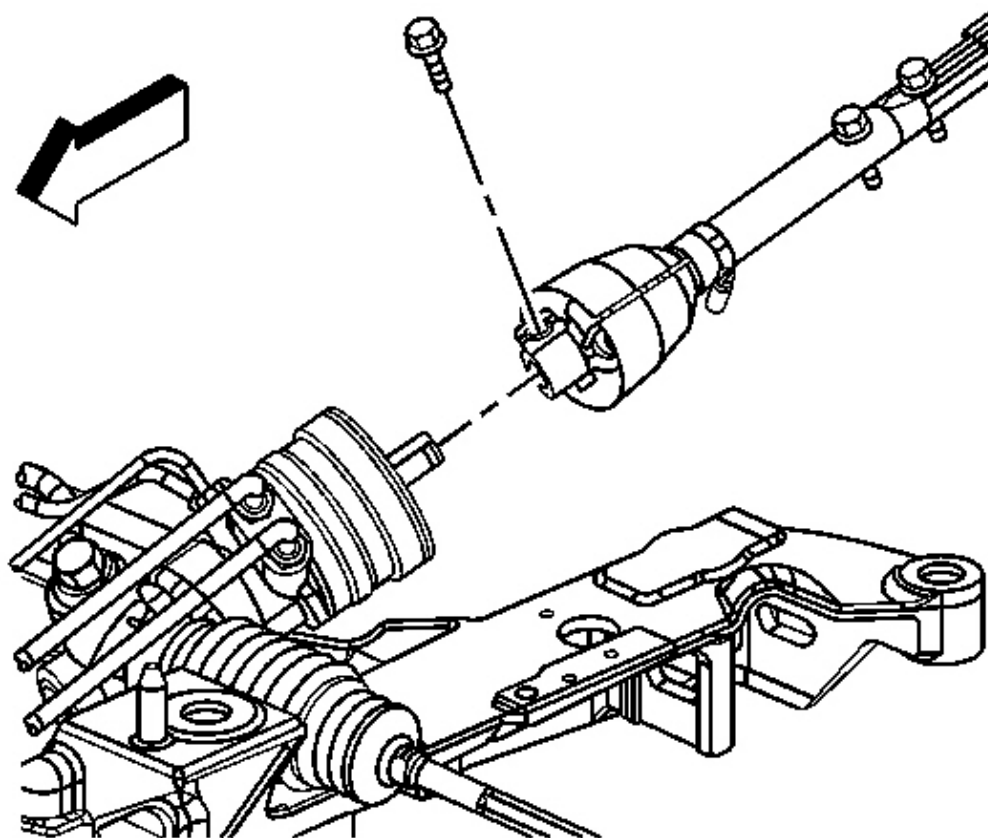


Fig. 10: Lower Coupling Pinch Bolt At Steering Gear
Courtesy of GENERAL MOTORS CORP.

5. Remove the lower coupling pinch bolt.
6. Remove the lower coupling from the steering gear.
7. Slide the lower intermediate shaft from the upper intermediate shaft.
8. Remove the lower intermediate shaft from the vehicle.

Installation Procedure

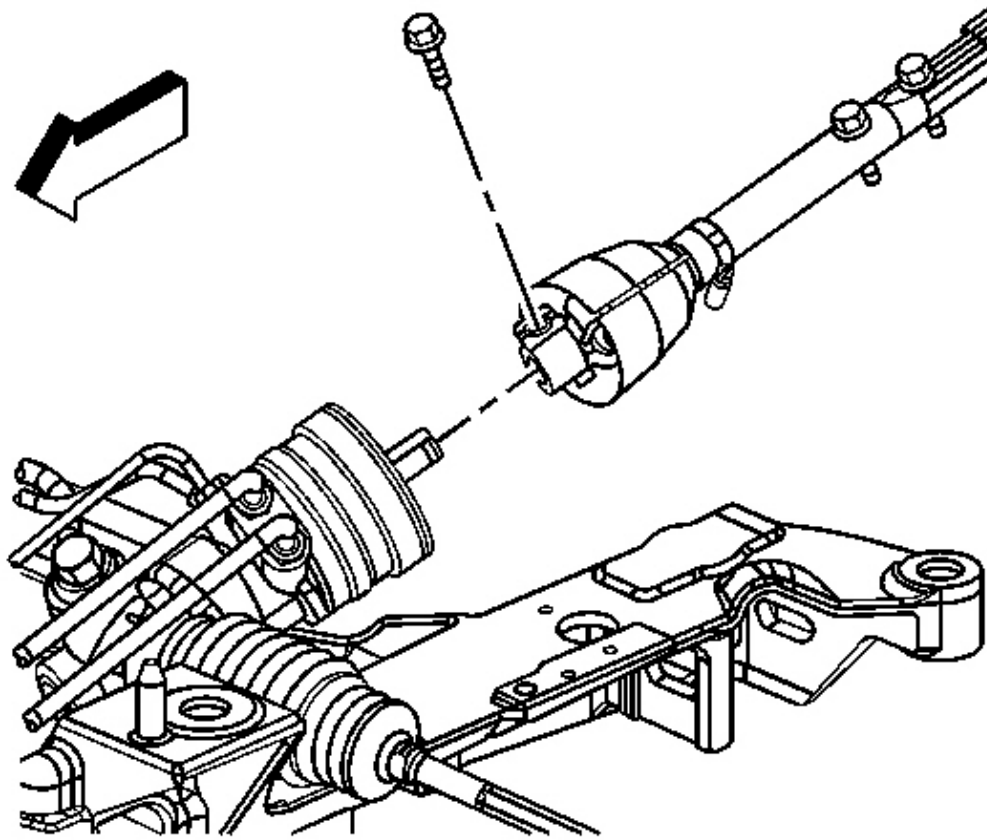


Fig. 11: Lower Coupling Pinch Bolt At Steering Gear
Courtesy of GENERAL MOTORS CORP.

1. Slide the lower intermediate shaft over the upper intermediate shaft.
2. Connect the lower intermediate shaft coupler to the steering gear.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the lower coupling pinch bolt into the lower coupling.

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

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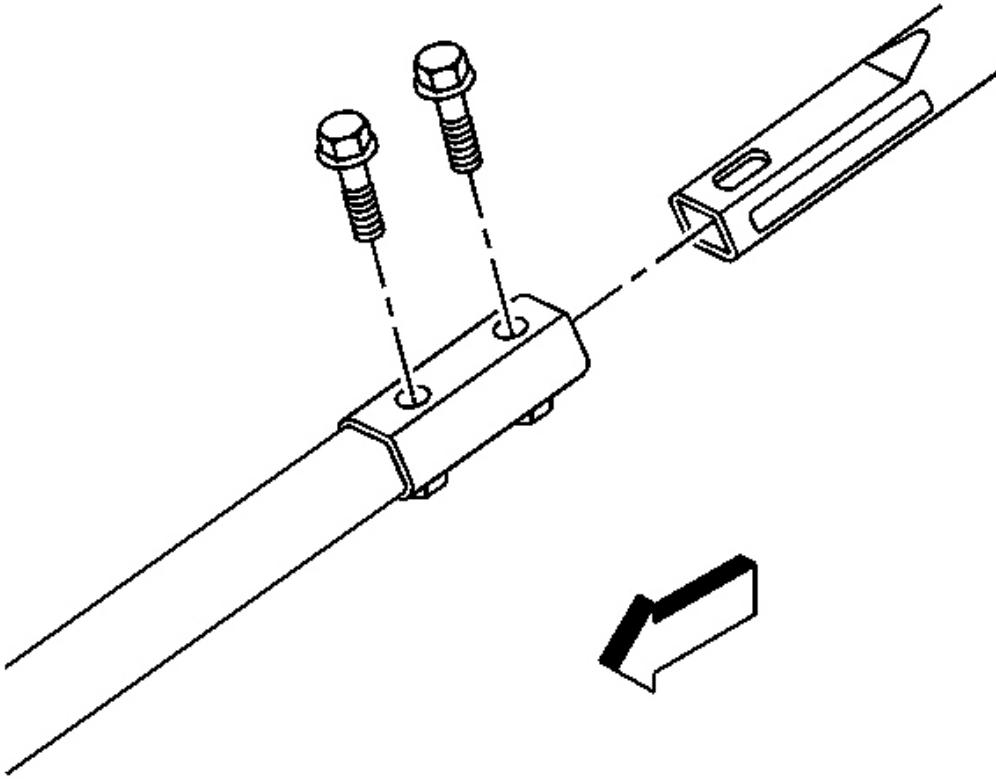


Fig. 12: View Of Steering Shaft & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Install the lower to upper intermediate shafts retaining bolts.

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

5. Install the lower steering coupling shield.

Tighten: Tighten the lower steering coupling shield screw to 3.5 N.m (31 lb in).

STEERING COLUMN ACCIDENT DAMAGE INSPECTION

Inspection Procedure

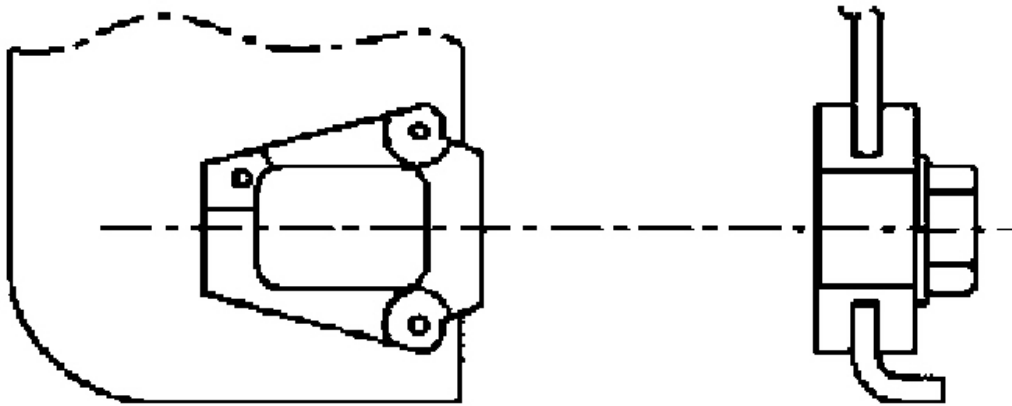


Fig. 13: Inspecting Capsules On Steering Column Bracket Assembly
Courtesy of GENERAL MOTORS CORP.

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

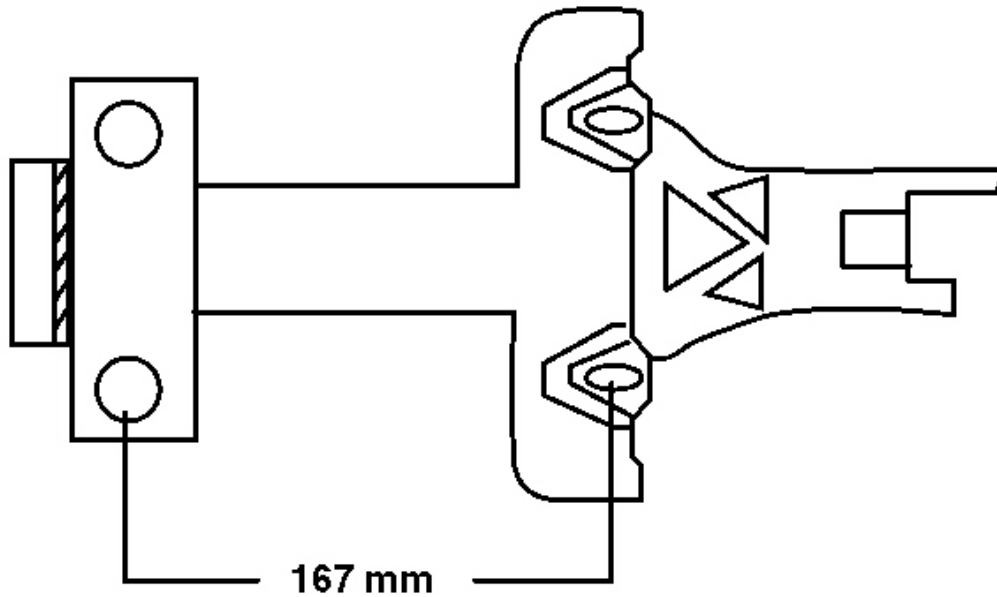


Fig. 14: Checking For Jacket Assembly Collapse
Courtesy of GENERAL MOTORS CORP.

- Inspect for jacket assembly collapse by measuring the distance as shown in the graphic. Replace the jacket assembly if the measured dimensions are not within specifications.

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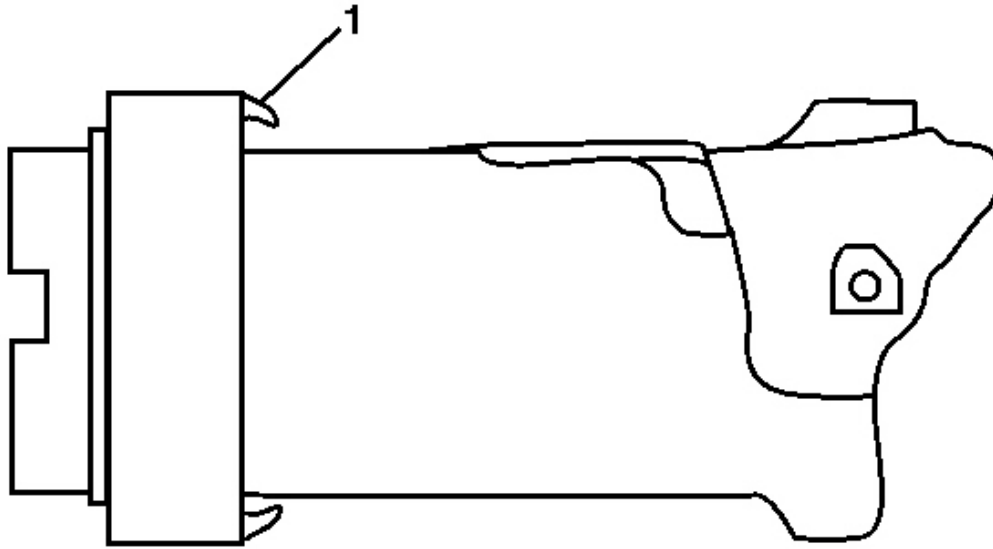


Fig. 15: Inspecting Bearing & Adapter Assembly Tab For Breakage
Courtesy of GENERAL MOTORS CORP.

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

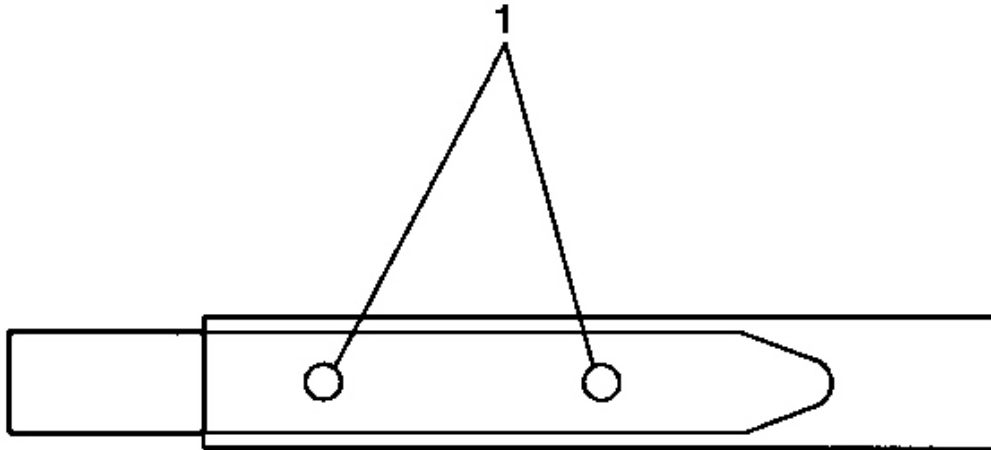


Fig. 16: Inspecting Steering Shaft For Sheared Injected Plastic
Courtesy of GENERAL MOTORS CORP.

- Visually inspect the steering shaft for sheared injected plastic (1). If the steering shaft shows sheared plastic, replace the steering shaft.
- Any frame damage that could cause a bent steering shaft must have the steering shaft runout checked. Using a dial indicator at the lower end of the steering shaft, rotate the steering wheel. The runout must not exceed 1.60 mm (0.06 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 in Engine Electrical.
3. Remove the steering wheel. Refer to Steering Wheel Replacement.
4. Remove the knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages.

and Console.

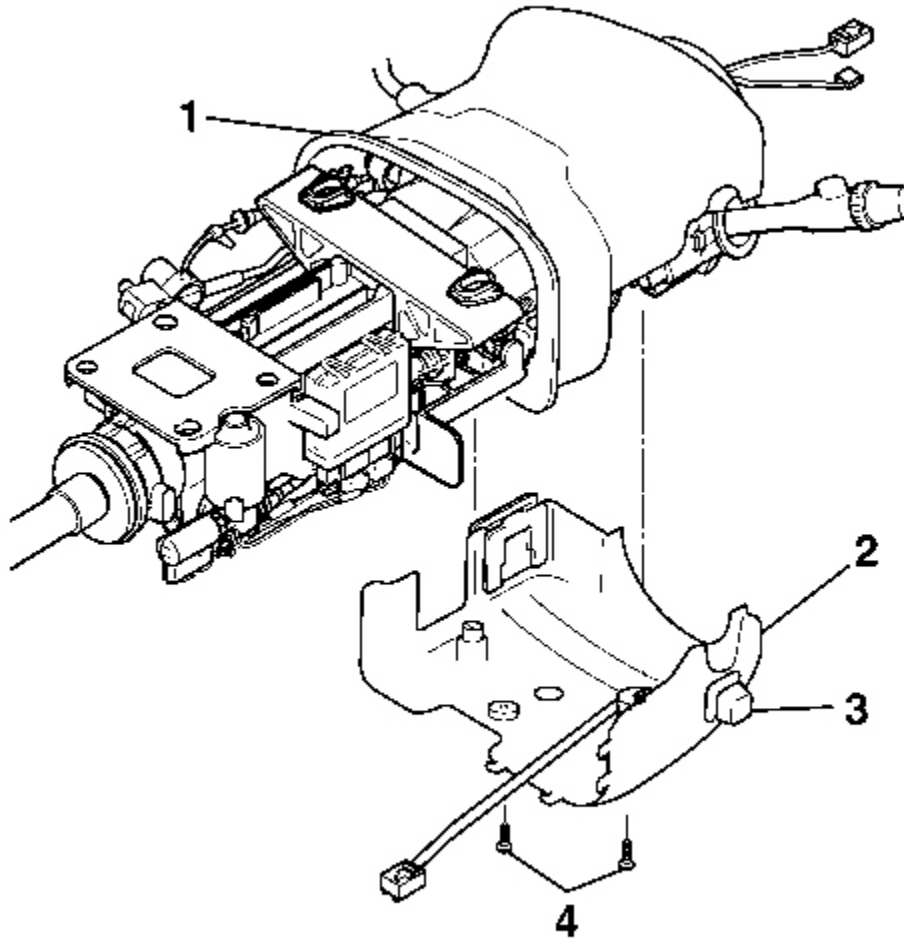


Fig. 17: View Of Closeout Shroud, Lower Steering Column Trim Cover & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

5. Remove the retaining screws (4) from the lower steering column trim cover.
6. Disconnect the closeout shroud from the lower trim cover.

NOTE: Avoid damaging the steering column electronic lock harness by gently removing the plugs installed in the I/P beam. Do NOT twist, pull, bend, cut, or incorrectly route the harness. Damage to the harness will require replacement of the entire electronic lock.

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7. Disconnect the electrical connector for the power tilt and telescopic switch.
8. Remove the electrical connector for the telescopic switch from the lower trim cover.

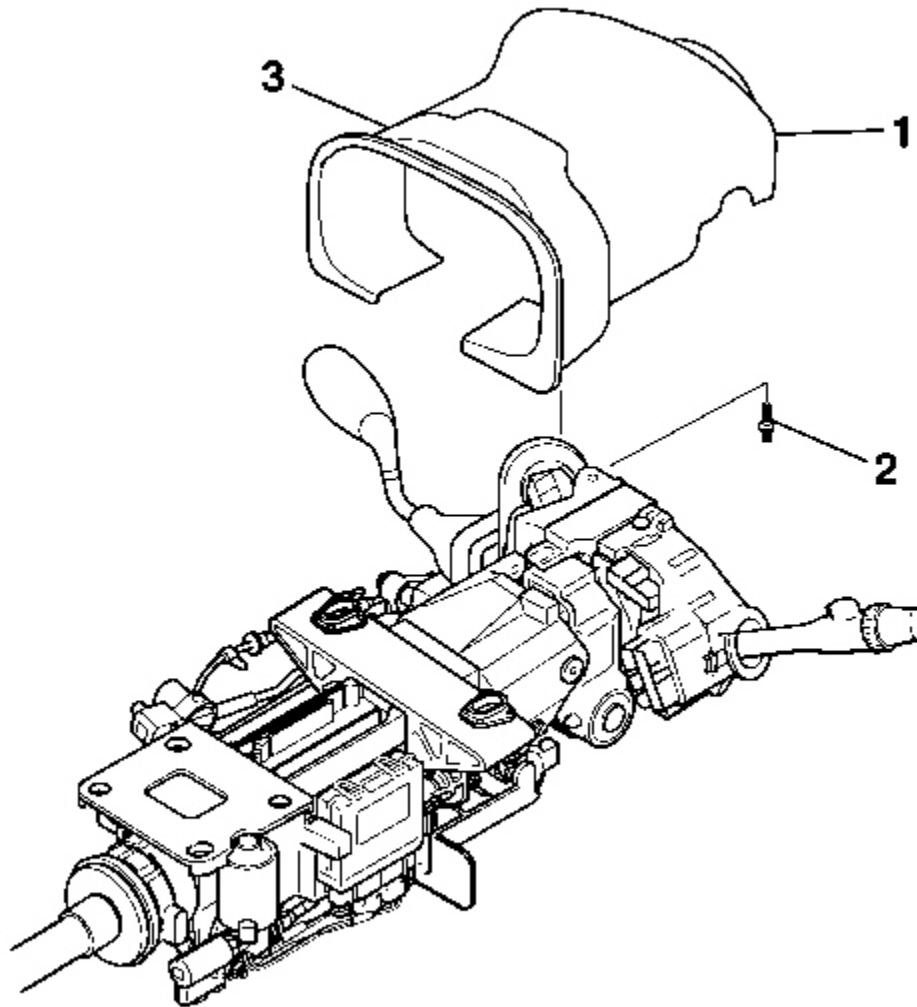


Fig. 18: View Of Upper Steering Column Trim Cover & Screws
Courtesy of GENERAL MOTORS CORP.

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

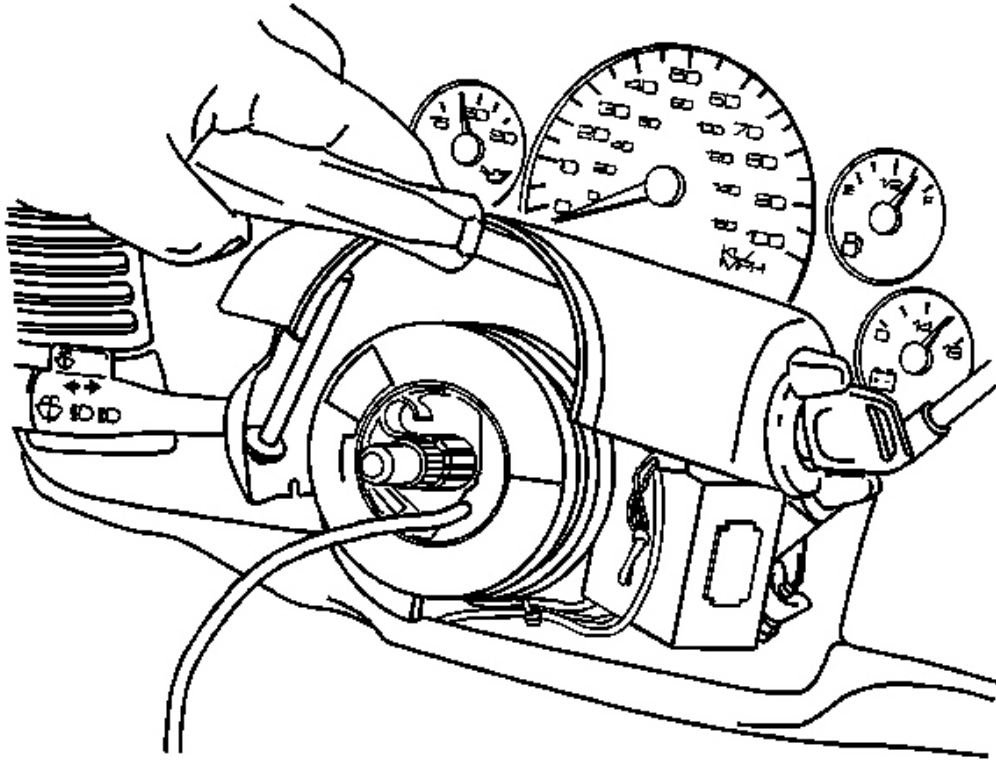


Fig. 19: View of Lock Cylinder Access Hole
Courtesy of GENERAL MOTORS CORP.

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

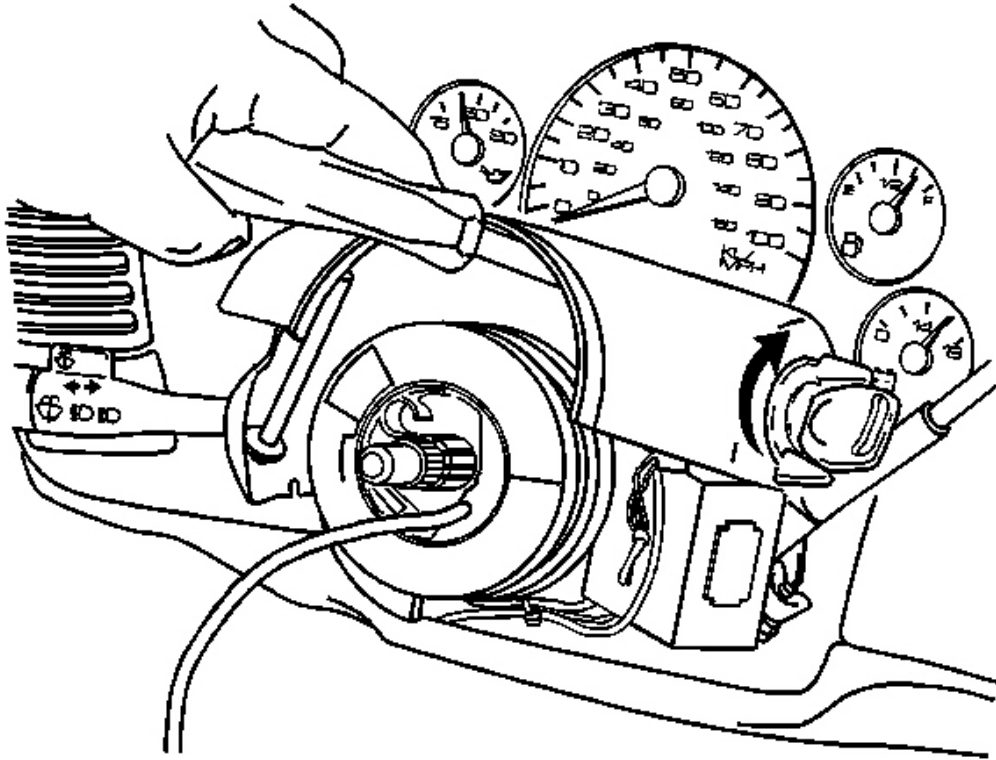


Fig. 20: View of Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

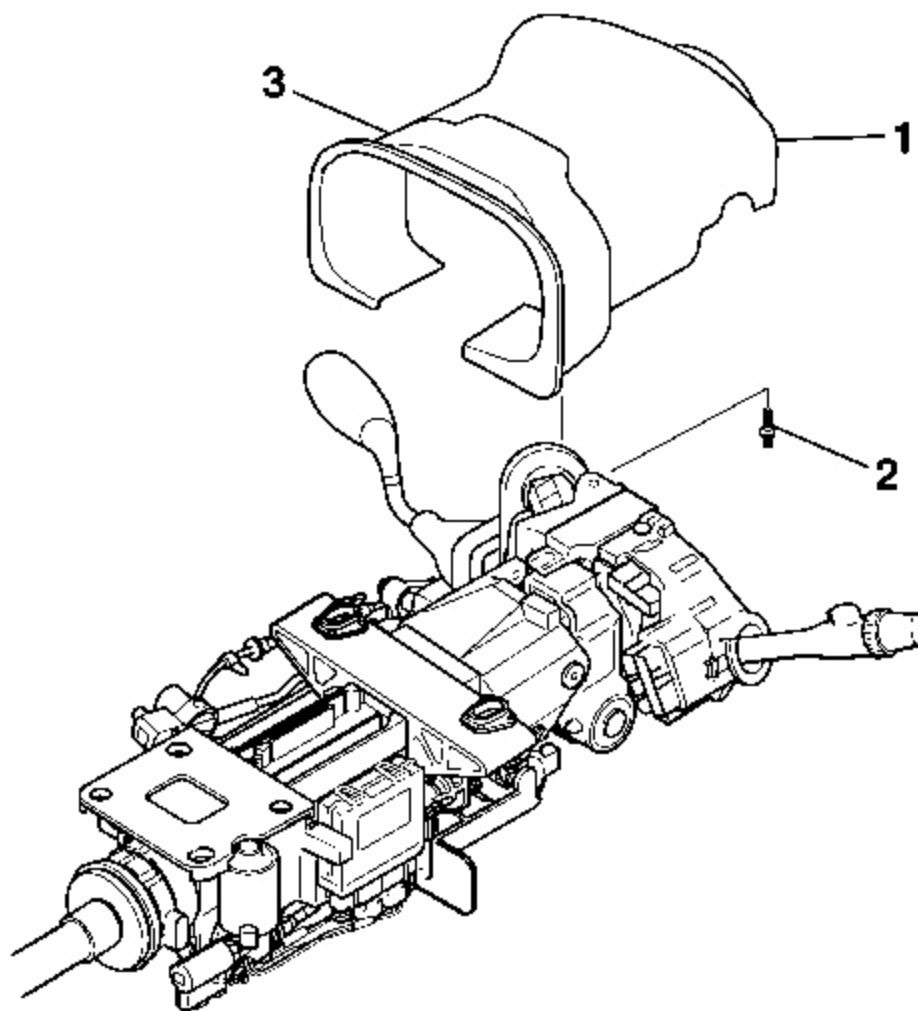


Fig. 21: View Of Upper Steering Column Trim Cover & Screws
Courtesy of GENERAL MOTORS CORP.

1. Install the upper steering column trim cover (1) to the closeout shroud (3).
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 to the upper trim cover.

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

4. Install the Ignition lock cylinder.

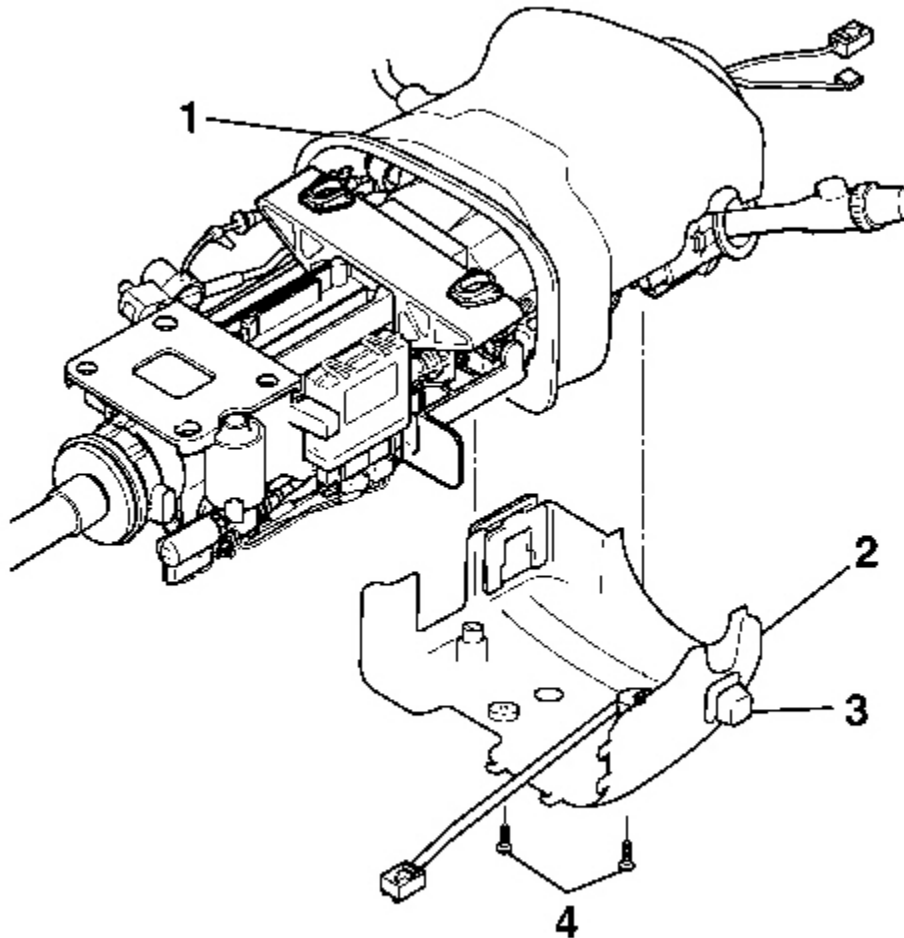


Fig. 22: View Of Closeout Shroud, Lower Steering Column Trim Cover & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

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

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

NOTE: **Avoid damaging the steering column electronic lock harness by gently removing the plugs installed in the I/P beam. Do NOT twist, pull, bend, cut, or incorrectly route the harness. Damage to the harness will require replacement of the entire electronic lock.**

8. Install the knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages, and Console.
9. Install the steering wheel. Refer to **Steering Wheel Replacement**.
10. Connect the battery negative cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure** in Engine Electrical.
11. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

STEERING COLUMN LOCK CONTROL MODULE REPLACEMENT

Removal Procedure

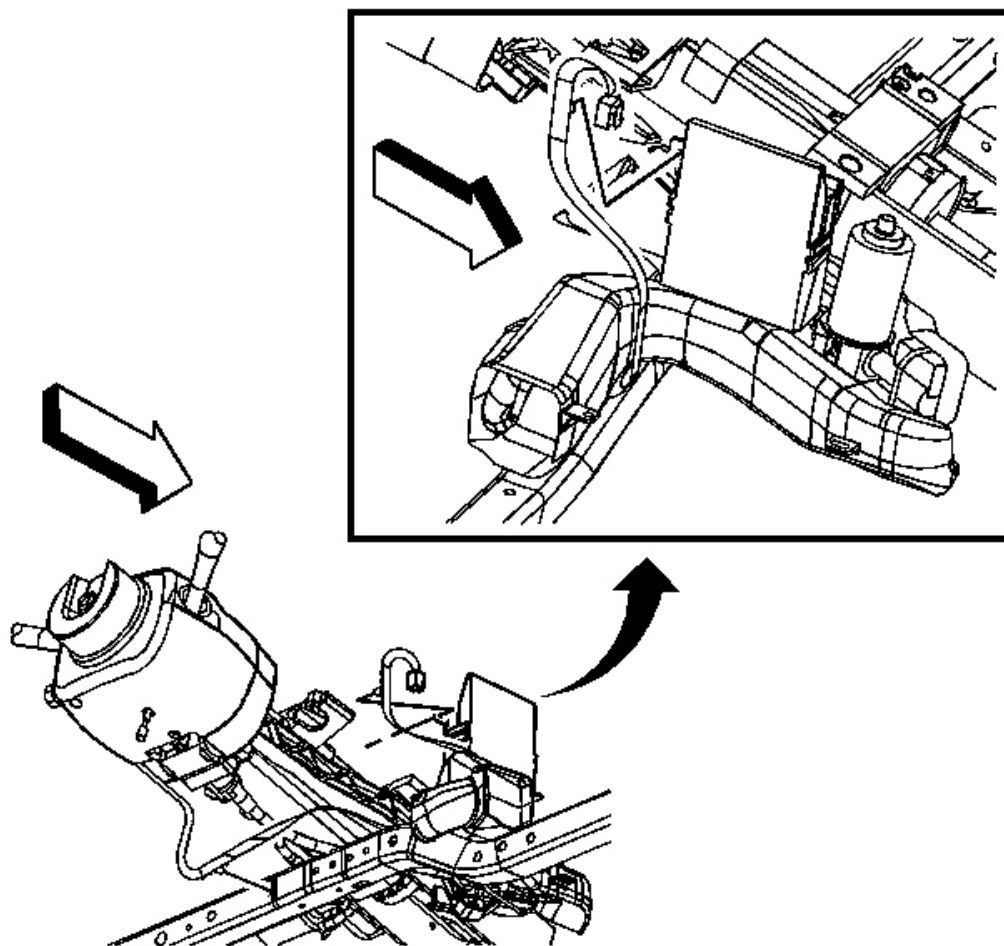


Fig. 23: Identifying Steering Column Electronic Lock Harness
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to the following procedures:

- SIR Disabling and Enabling Zone 3
- SIR Disabling and Enabling Zone 4
- SIR Disabling and Enabling Zone 5

NOTE: Avoid damaging the steering column electronic lock harness by gently

removing the plugs installed in the I/P beam. Do NOT twist, pull, bend, cut, or incorrectly route the harness. Damage to the harness will require replacement of the entire electronic lock.

2. Remove the I/P carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages, and Console.
3. Disconnect the electrical connectors at the lock module.

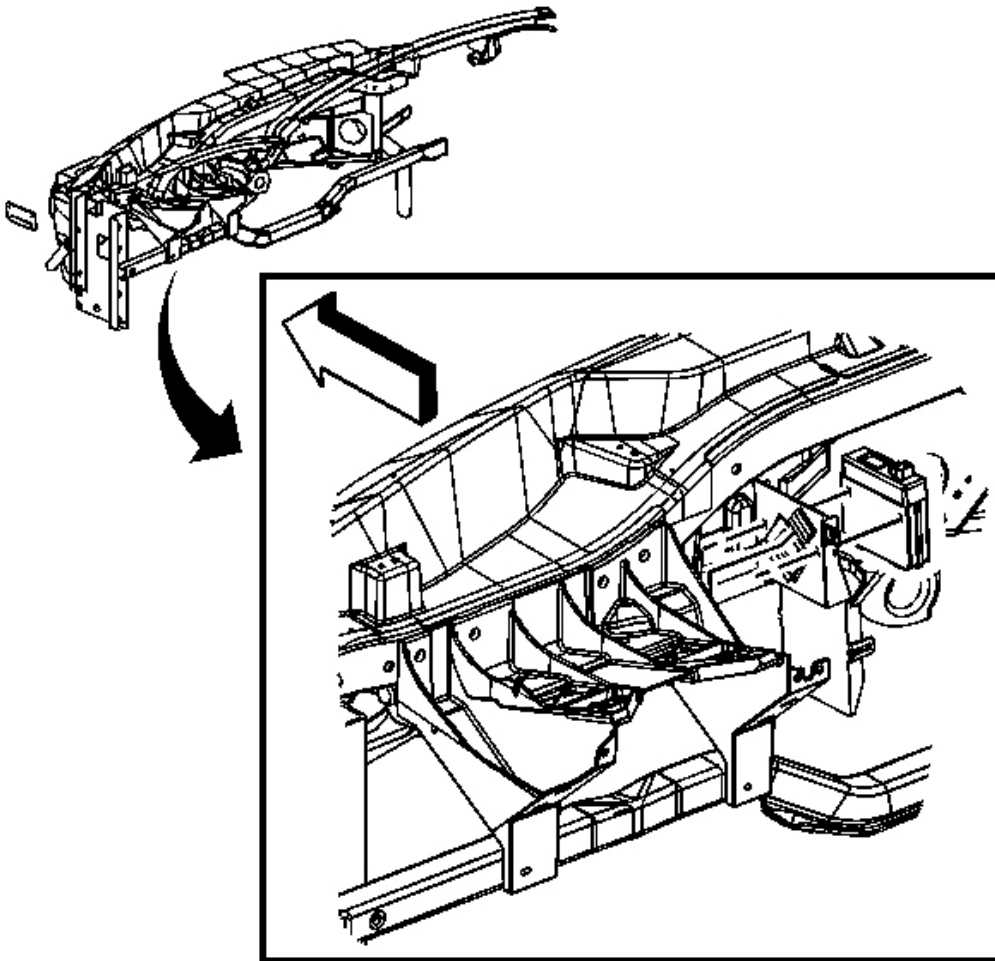


Fig. 24: Identifying The Lock Module In The I/P Carrier
Courtesy of GENERAL MOTORS CORP.

4. Remove the lock module by pulling the module up to release the retaining clips and sliding the module

upward.

Installation Procedure

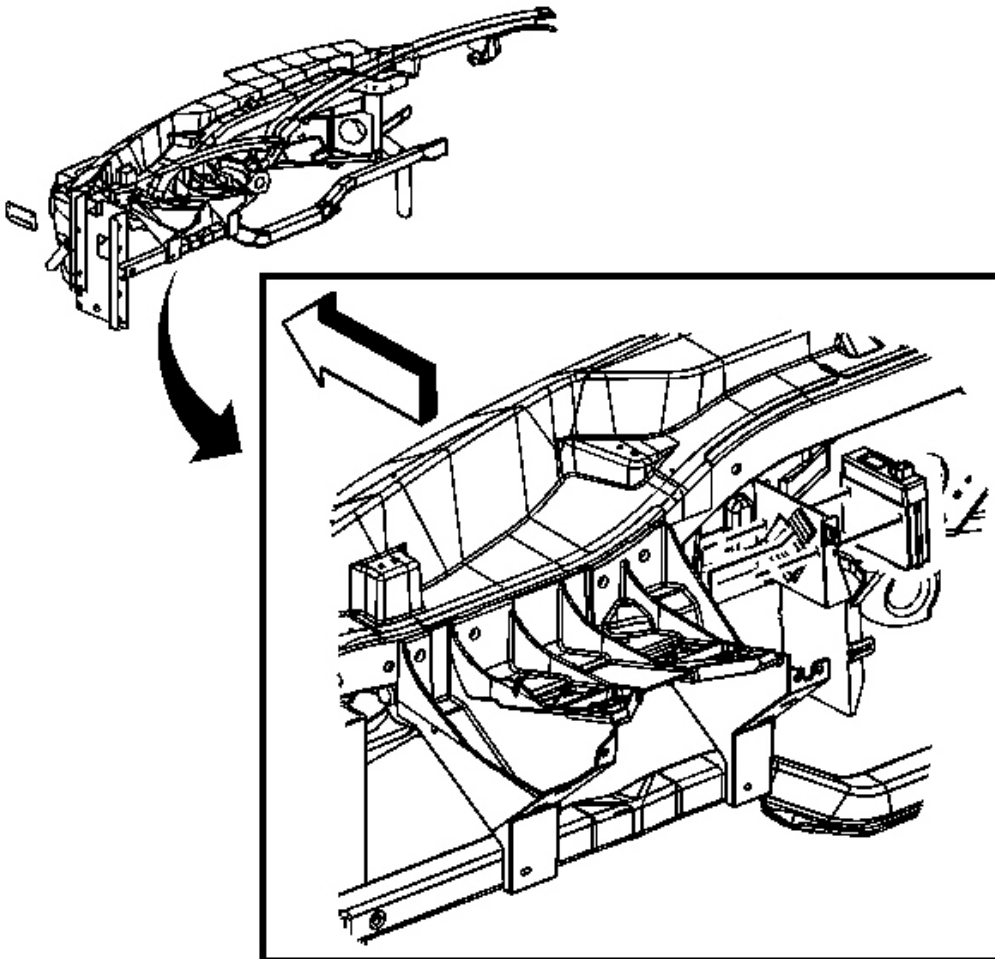


Fig. 25: Identifying The Lock Module In The I/P Carrier
Courtesy of GENERAL MOTORS CORP.

1. Install the control module to the retaining bracket on the steering column.
2. Connect the electrical connector to the lock module.

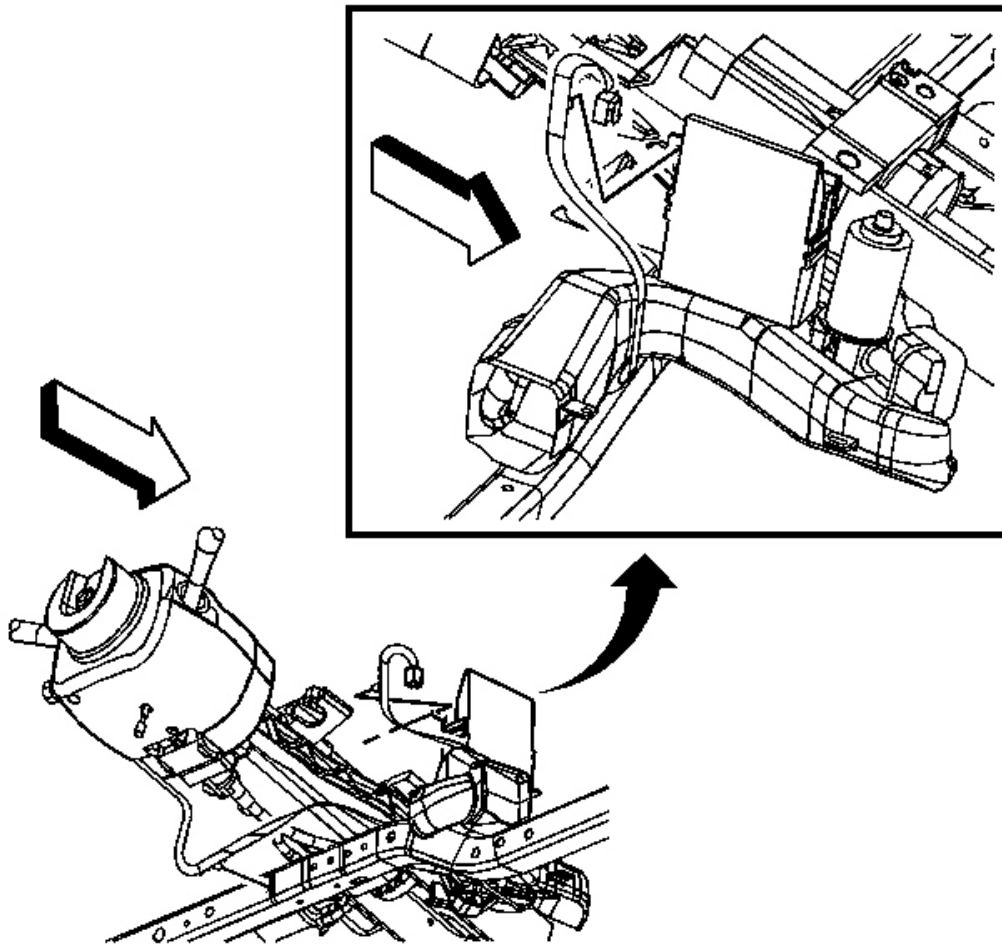


Fig. 26: Identifying Steering Column Electronic Lock Harness
Courtesy of GENERAL MOTORS CORP.

3. Install the I/P carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages, and Console.
4. Enable the SIR system. Refer to the following procedures:
 - **SIR Disabling and Enabling Zone 3**
 - **SIR Disabling and Enabling Zone 4**
 - **SIR Disabling and Enabling Zone 5**
5. Program the lock control module. Refer to **Control Module Setup (SCLCM Setup)**.

Tilt/Telescoping Soft Stops

After replacement of the driver position module (DPM), it is necessary to program the tilt/telescoping soft stops. Each soft stop is a programmable end of travel that is set approximately 1.3 cm (0.5 in) from the mechanical end of travel. The steering column has a soft stop set at each end of the telescoping in/out and tilt up/down movement. The system uses soft stops to prevent wear on the system by ensuring that the steering column movement stops before it reaches its mechanical end of travel in any direction. The soft stops are initially programmed at the factory. The stop positions may be reprogrammed, which is necessary any time the DPM, the tilt actuator or telescope actuators replaced, as described in the following procedure.

Tilt/Telescoping Soft Stop Programming Procedure

1. Turn ON the ignition, with the engine OFF.
2. Connect a scan tool to the vehicle.
3. Select Vehicle Control Systems.
4. Select Computer/Integrating Systems.
5. Select Module Replacement/Setup.
6. Select DPM.
7. Select Column Calibration.
8. Follow the scan tool on-screen instructions.

CONTROL MODULE SETUP (SCLCM SETUP)**IMPORTANT:**

- When replacing a steering column lock control module (SCLCM) with a GM SPO Replacement Part, insure the procedure to setup a new SCLCM is performed.
- When replacing an SCLCM with a GM SPO Replacement Part, the new SCLCM will learn the incoming fuel continue password of the remote control door lock receiver (RCDLR) immediately upon the next ignition switch from OFF to CRANK. A SCLCM which had been installed in another vehicle will have learned the fuel continue password of the other vehicles RCDLR. Perform the SCLCM procedure to learn the fuel continue password of the current vehicles RCDLR.

Set Up Steering Column Lock Control Module

1. Turn ON the ignition, with the engine OFF.
2. Connect a scan tool to the vehicle.
3. With a scan tool, select Vehicle Control Systems.
4. Select Computer/Integrating Systems.
5. Select Module Replacement/Setup.
6. Select SCLCM Setup (Export Only).
7. Select SCLCM Setup.

8. Follow the scan tool on-screen instructions.

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

Removal Procedure

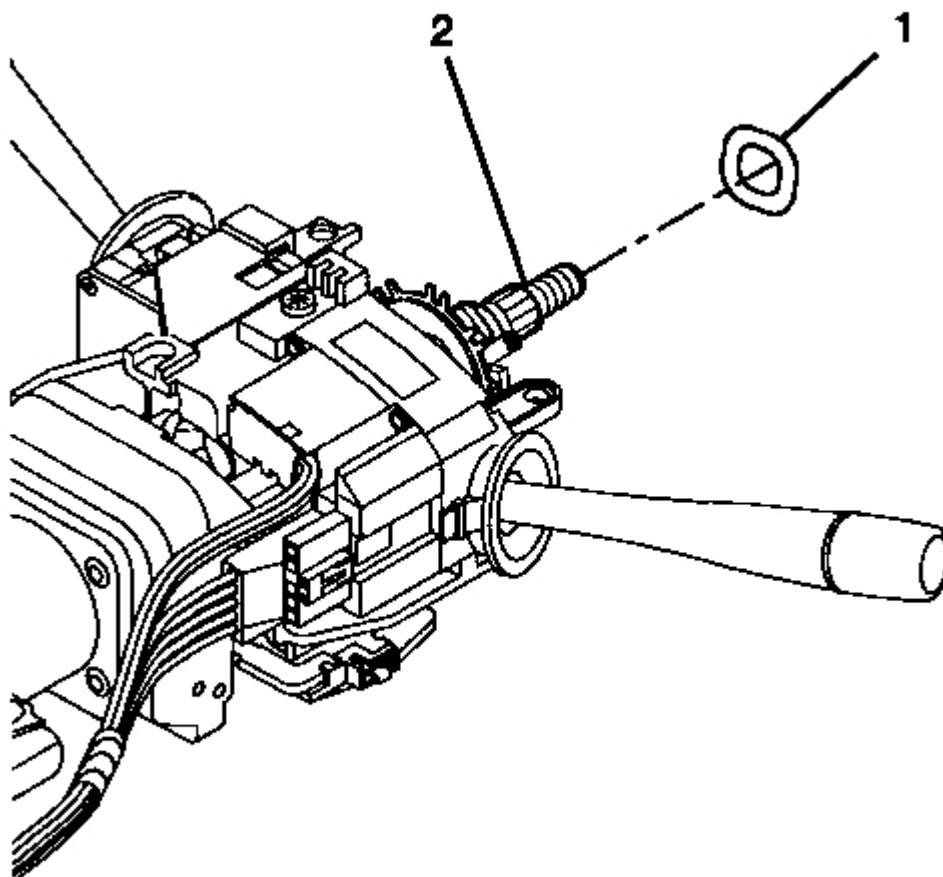


Fig. 27: Wave Washer & Steering Shaft
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

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

IMPORTANT: Let the SIR coil hang freely after removal.

2. Remove the SIR coil from the steering column. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement (Coil) in SIR.
3. Remove the wave washer (1) from the steering shaft assembly (2).

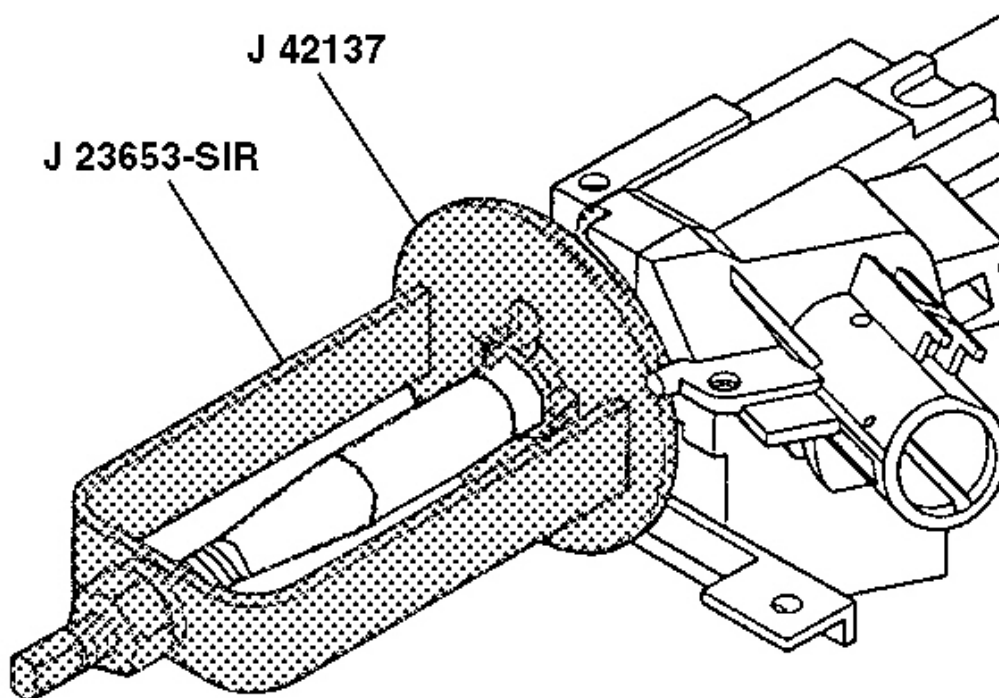


Fig. 28: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

4. Compress the cam orientation plate using J 23653-SIR and J 42137 .
5. Remove the bearing retainer from the steering shaft assembly.
6. Remove J 23653-SIR and J 42137 .
7. Dispose of the bearing retainer.

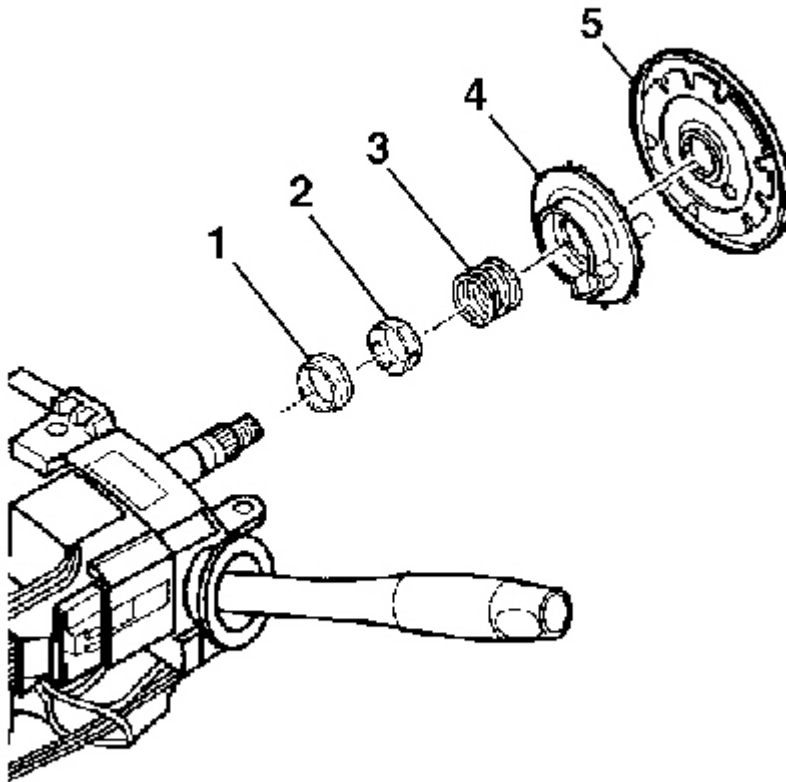


Fig. 29: Removing Turn Signal Cancel Cam & Inner Race
Courtesy of GENERAL MOTORS CORP.

8. Remove the following from the steering shaft:
 1. Shaft lock shield (5)
 2. Turn signal cancel cam assembly (4)
 3. Upper bearing spring (3)
 4. Upper bearing inner race seat (2)
 5. Inner race (1)

Installation Procedure

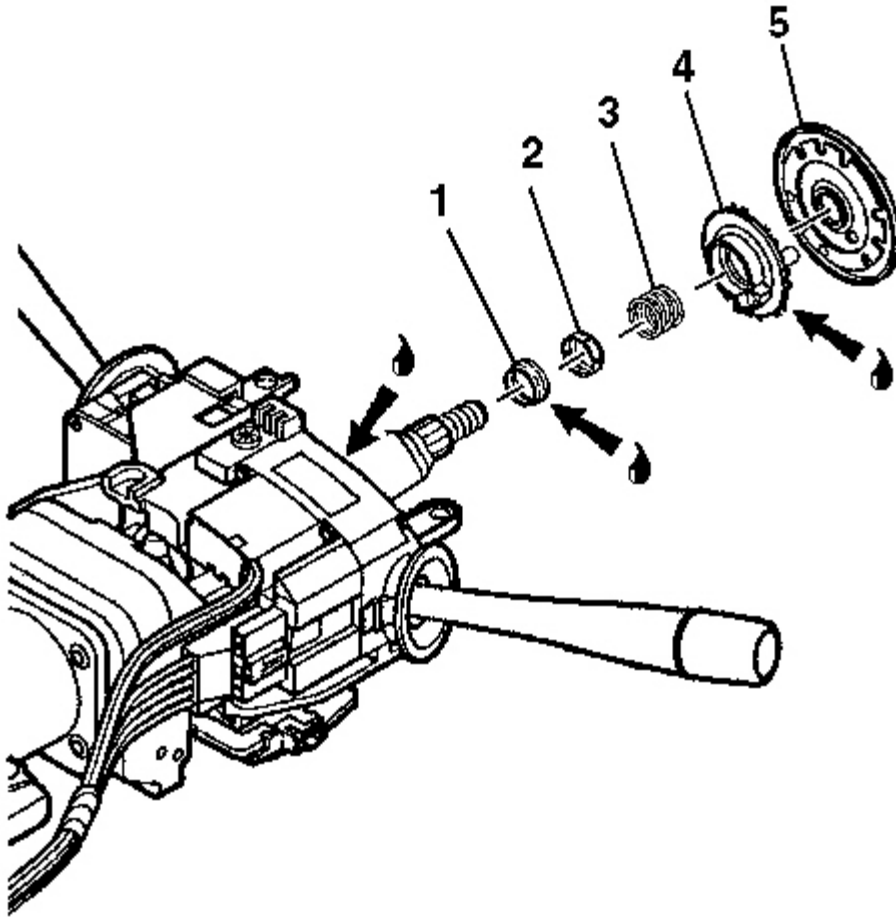


Fig. 30: Installing Turn Signal Cancel Cam & Inner Race
Courtesy of GENERAL MOTORS CORP.

1. Install the following to the steering shaft:
 1. Inner race (1)
 2. Upper bearing inner race seat (2)
 3. Upper bearing spring (3)
 4. Turn signal cancel cam assembly (4)
 5. Shaft lock shield (5)

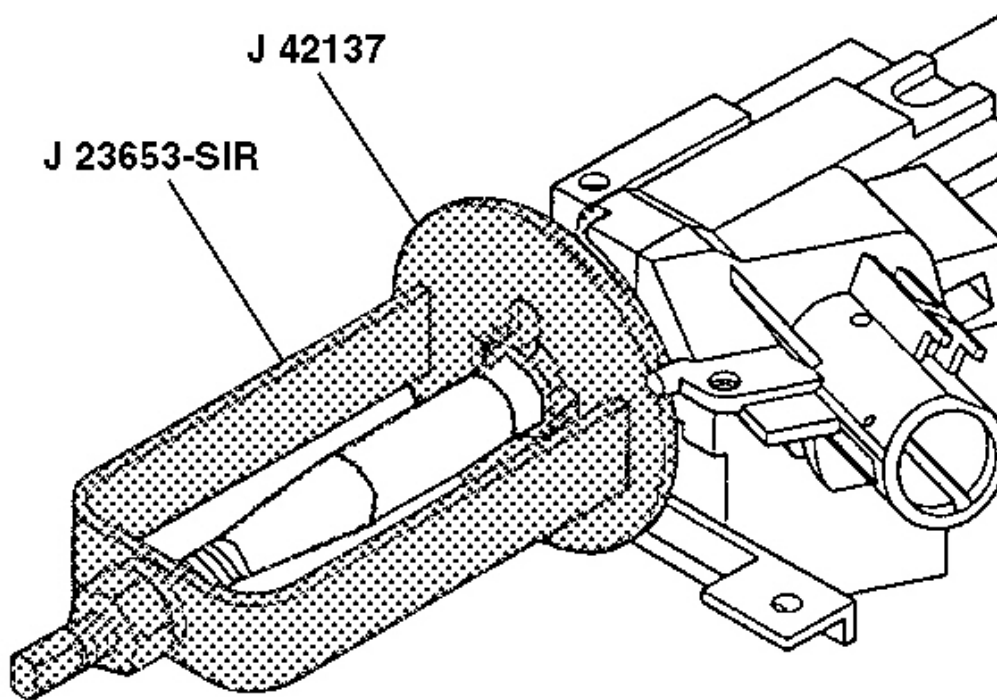


Fig. 31: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

2. Install a new bearing retainer onto the steering shaft assembly.
3. Compress the cam orientation plate using J 23653-SIR and J 42137 to install the bearing retainer.
4. Remove J 23653-SIR and J 42137 from the steering shaft assembly.

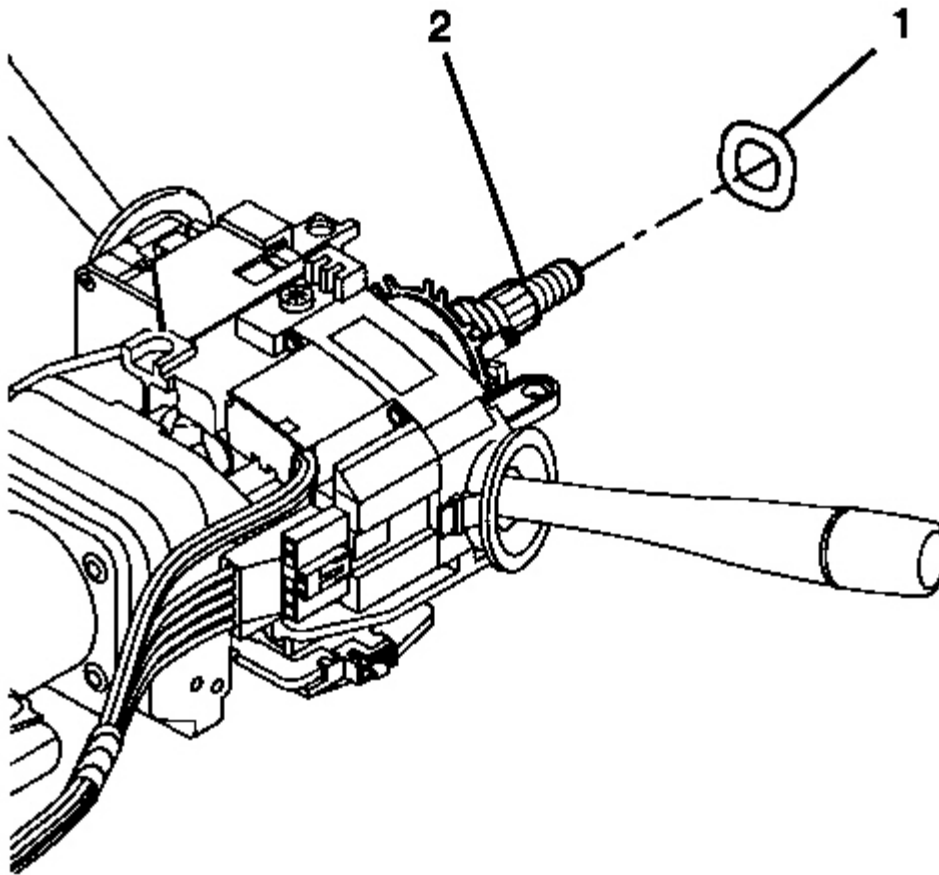


Fig. 32: Wave Washer & Steering Shaft
Courtesy of GENERAL MOTORS CORP.

5. Install the wave washer (1) onto the steering shaft assembly (2).
6. Install the SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)** in SIR.
7. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

MULTIFUNCTION, TURN SIGNAL SWITCH REPLACEMENT

Removal Procedure

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

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

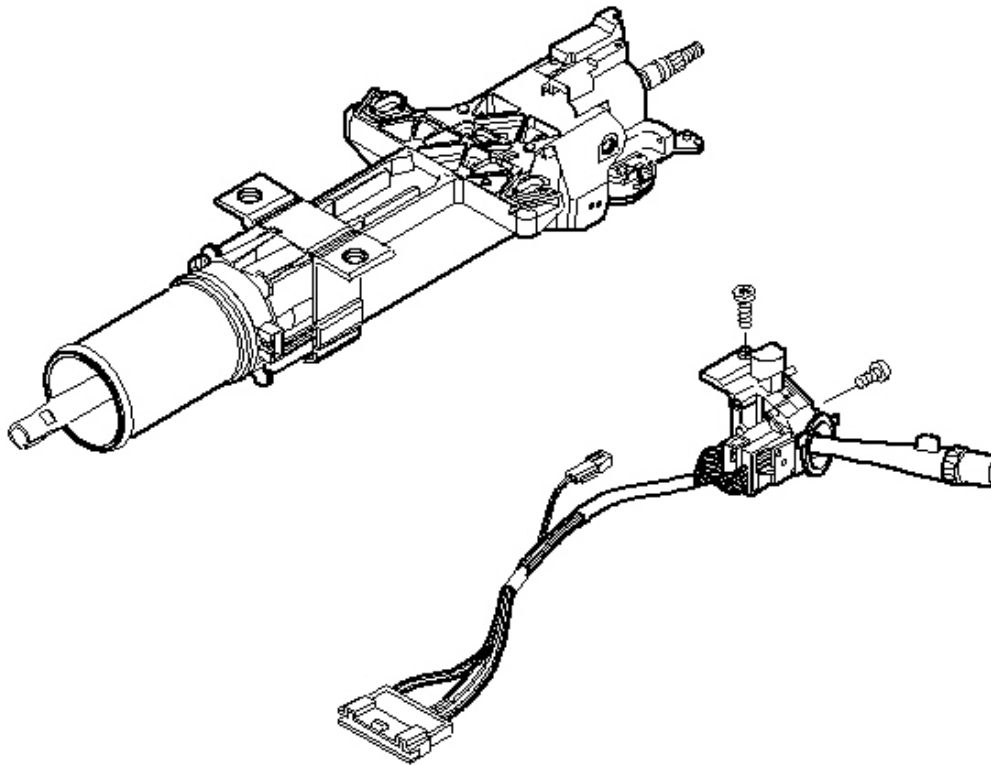


Fig. 33: View Of Multifunction Switch & Screws
Courtesy of GENERAL MOTORS CORP.

3. Remove the retaining screws from the multifunction switch.
4. Disconnect the multifunction switch electrical connections.
5. Remove the multifunction switch.

Installation Procedure

1. Connect the multifunction switch electrical connectors.
2. Install the multifunction switch to the steering column.

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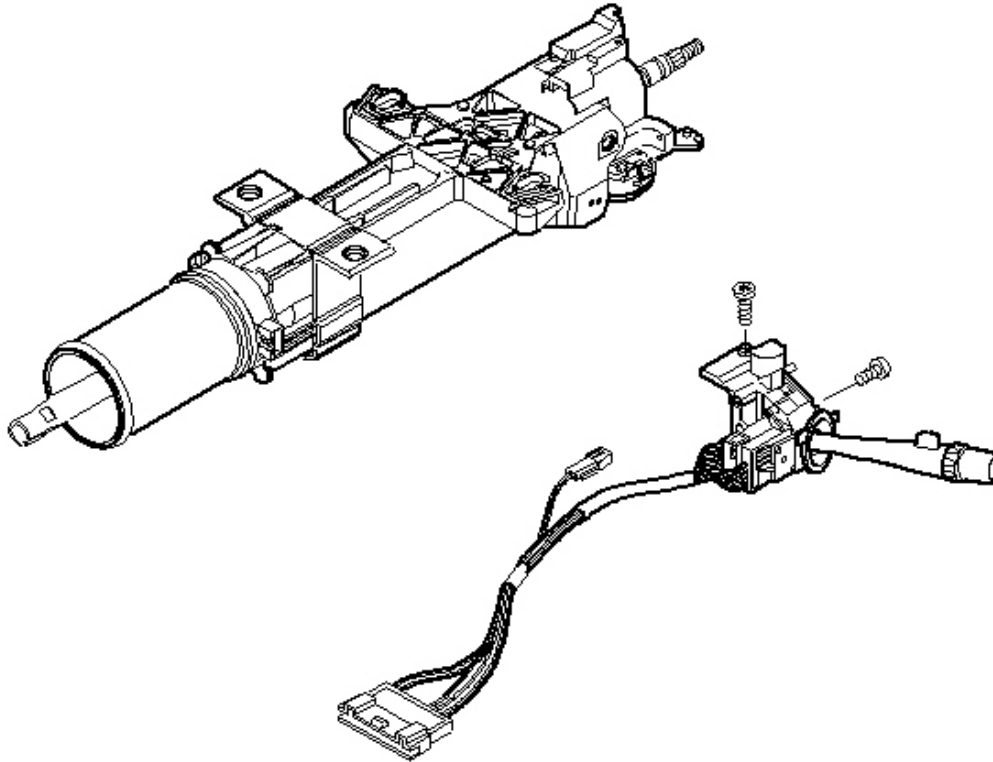


Fig. 34: View Of Multifunction Switch & Screws
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the retaining screws to the multifunction switch.

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

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

STEERING WHEEL CONTROL SWITCH ASSEMBLY REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

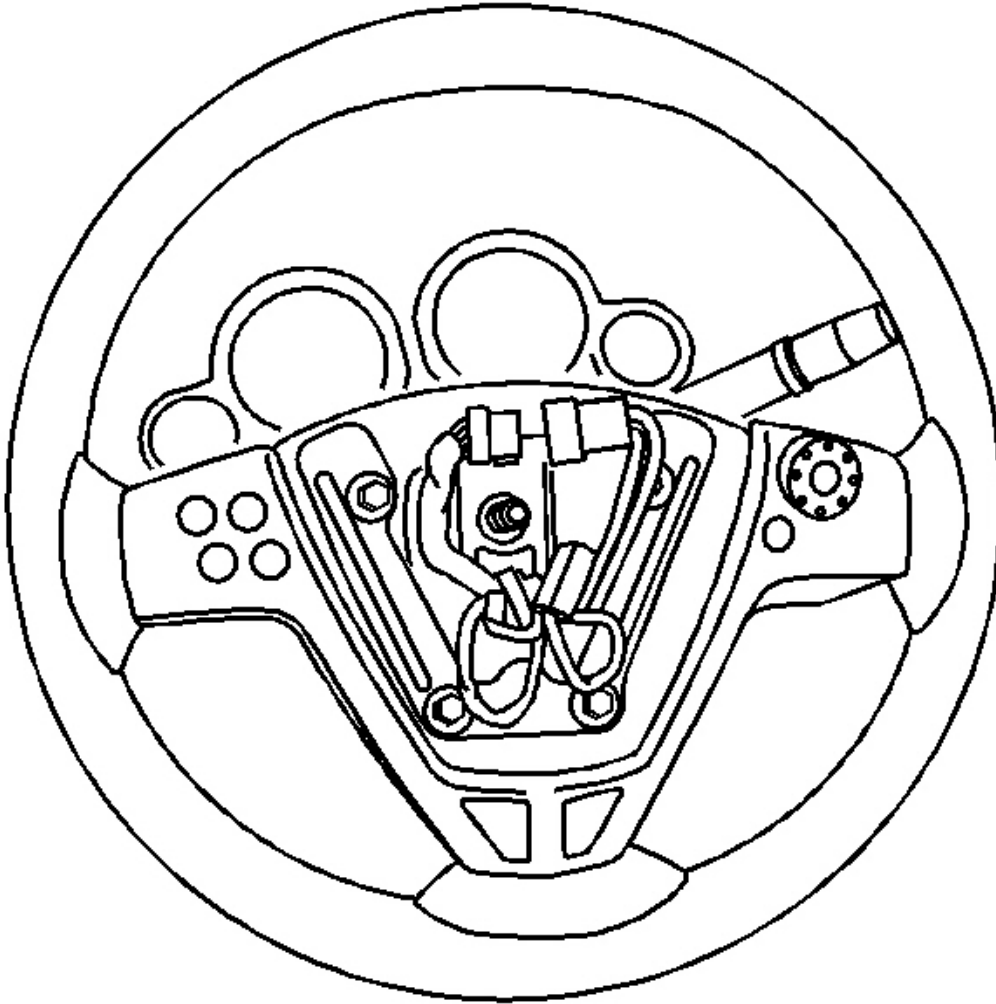


Fig. 35: View Of Steering Wheel Control Switch Electrical Connector
Courtesy of GENERAL MOTORS CORP.

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

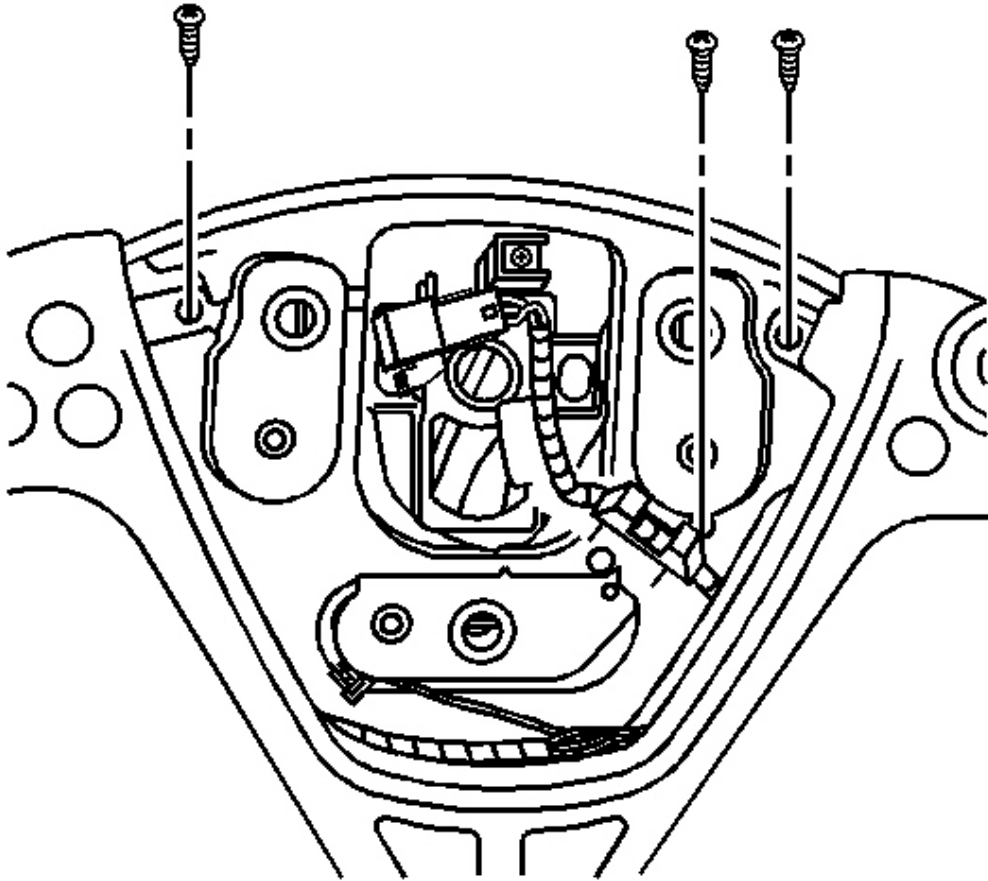


Fig. 36: View Of Steering Wheel Control Switch Retaining Screws
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

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

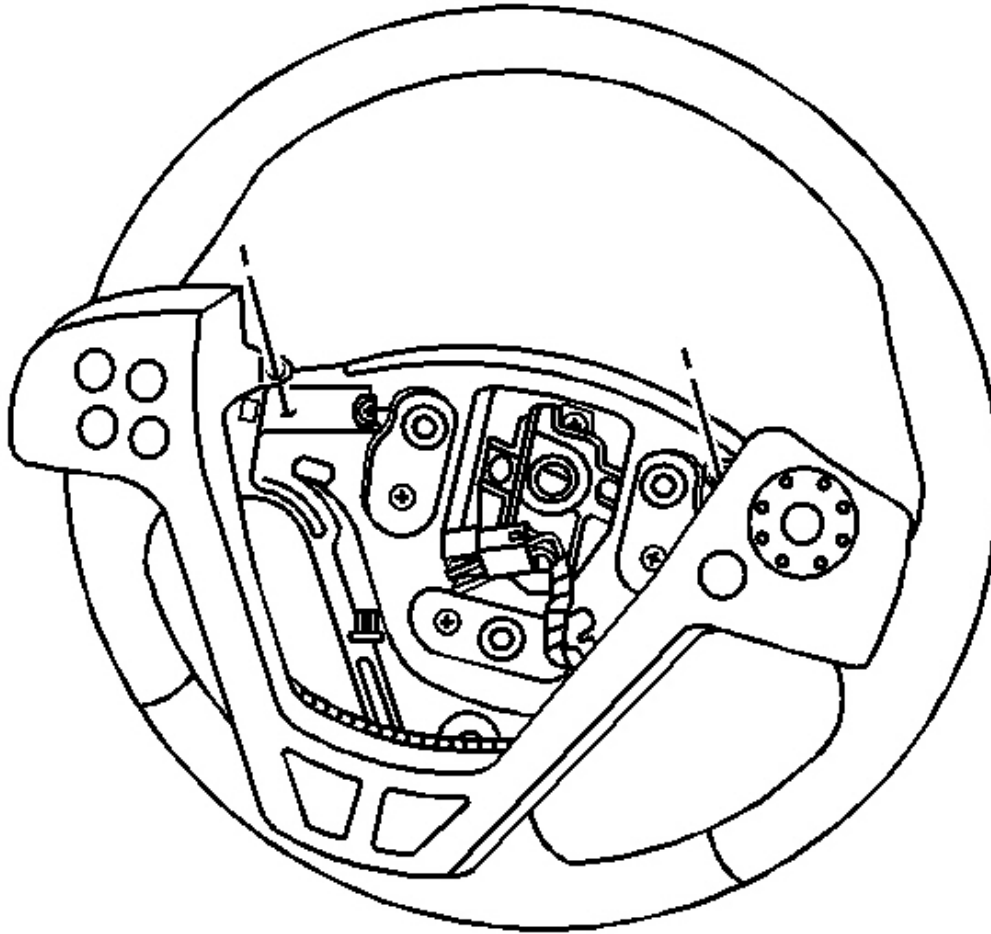


Fig. 37: Securing Control Switch Assembly To Steering Wheel
Courtesy of GENERAL MOTORS CORP.

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

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

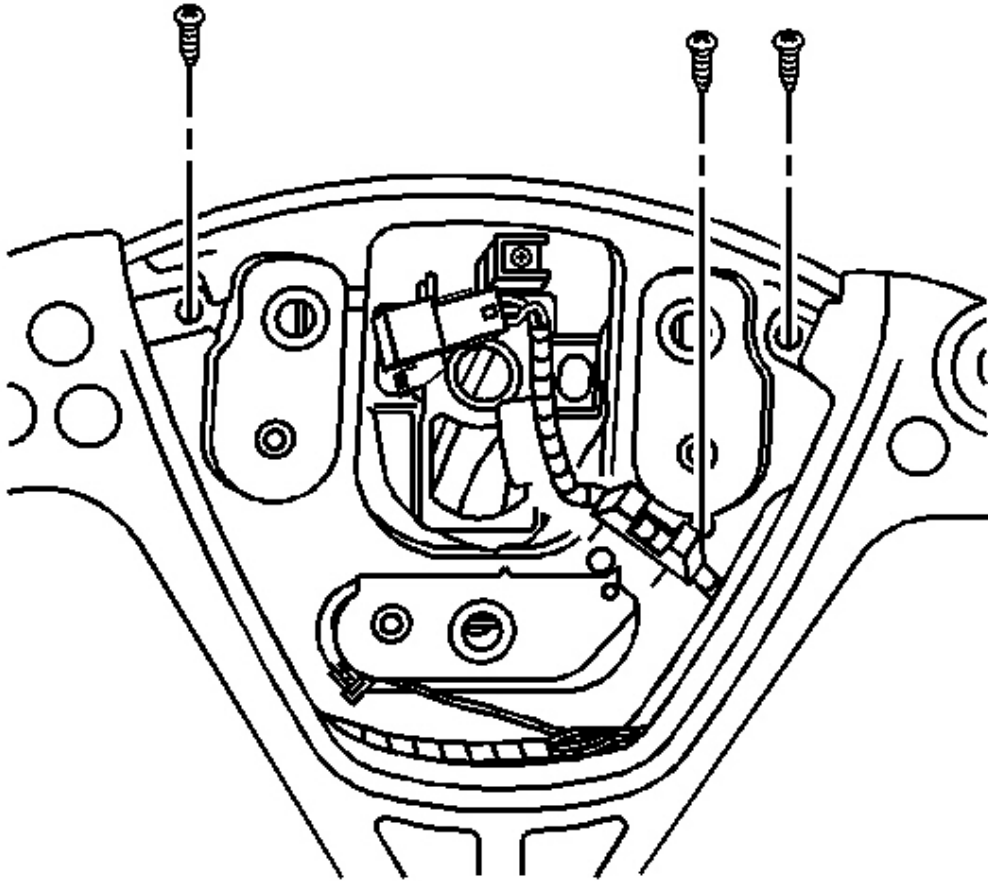


Fig. 38: View Of Steering Wheel Control Switch Retaining Screws
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the steering wheel control harness retainer and screw.

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

4. Install the steering wheel control switch assembly screws.

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

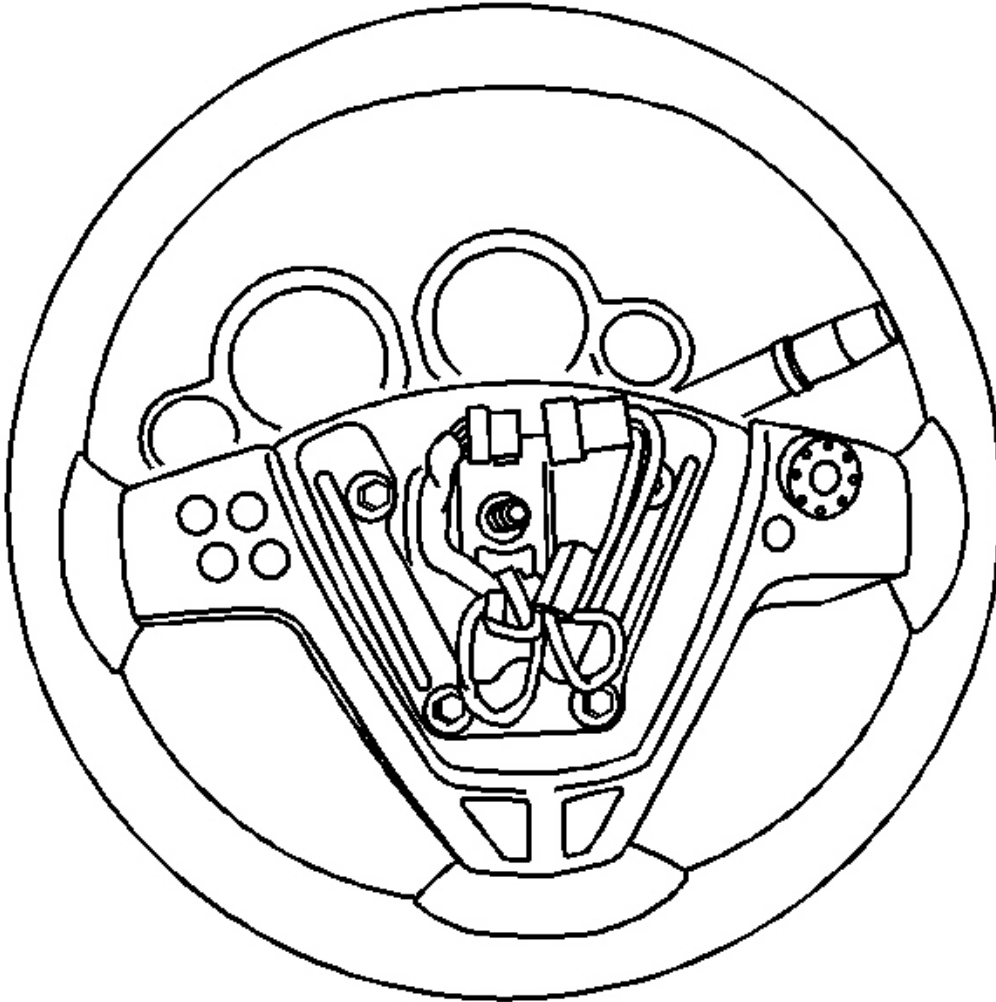


Fig. 39: View Of Steering Wheel Control Switch Electrical Connector
Courtesy of GENERAL MOTORS CORP.

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

STEERING WHEEL REPLACEMENT

Tools Required

- **J 36541-A** Steering Wheel Puller Legs. See **Special Tools**.
- **J 1859-A** Steering Wheel Puller. See **Special Tools**.
- **J 42640** Steering Column Lock Pin. See **Special Tools**.

Removal Procedure

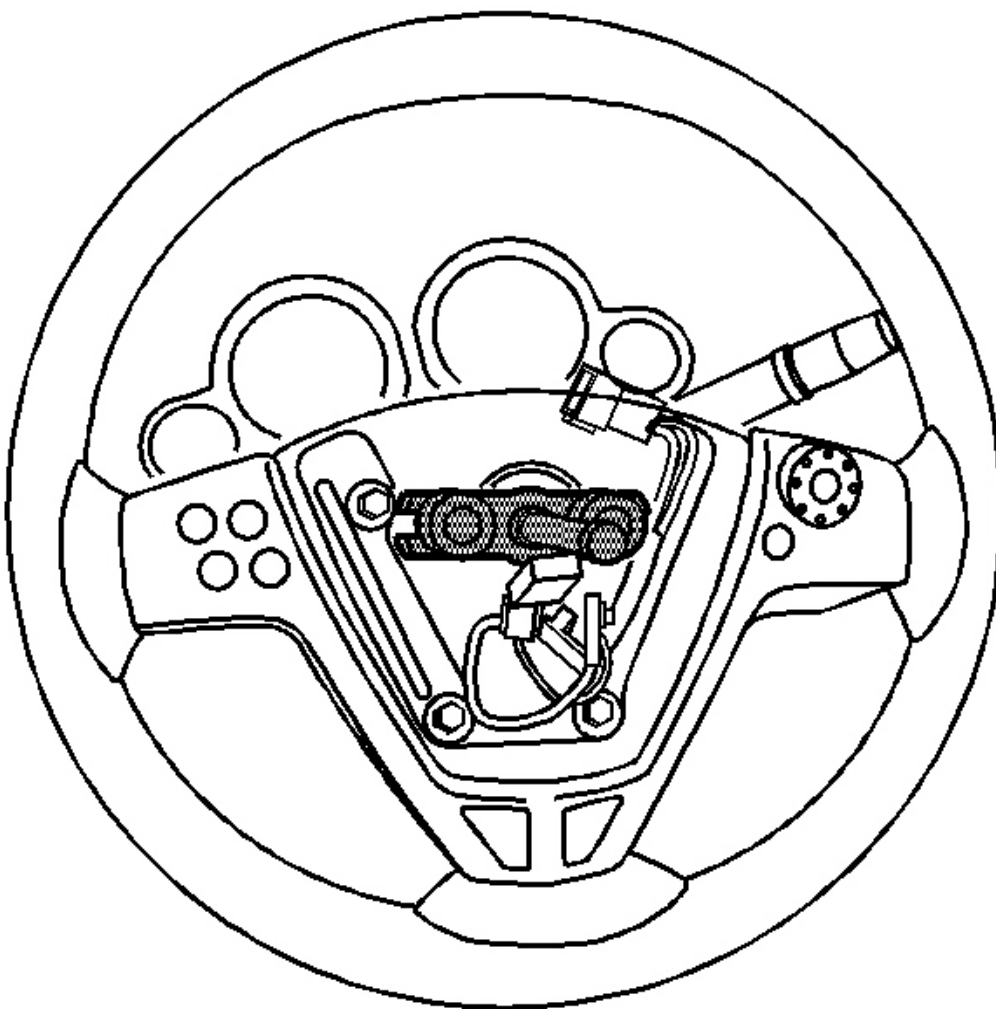


Fig. 40: Installing J 42578
Courtesy of GENERAL MOTORS CORP.

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1. Remove the steering wheel inflator module. Refer to **Inflatable Restraint Steering Wheel Module Replacement** in SIR.
2. Remove the horn electrical connector.
3. Install **J 42640** to the steering column. See **Special Tools**.
4. Remove the steering wheel set nut.
5. Discard the steering wheel set nut.
6. Install **J 36541-A** and . See **Special Tools**.**J 1859-A** to the steering wheel. See **Special Tools**.
7. Tighten the puller center screw against steering column shaft until the steering wheel slides off the steering column shaft.
8. Remove **J 36541-A** and . See **Special Tools**.**J 1859-A** from the steering wheel. See **Special Tools**.

Installation Procedure

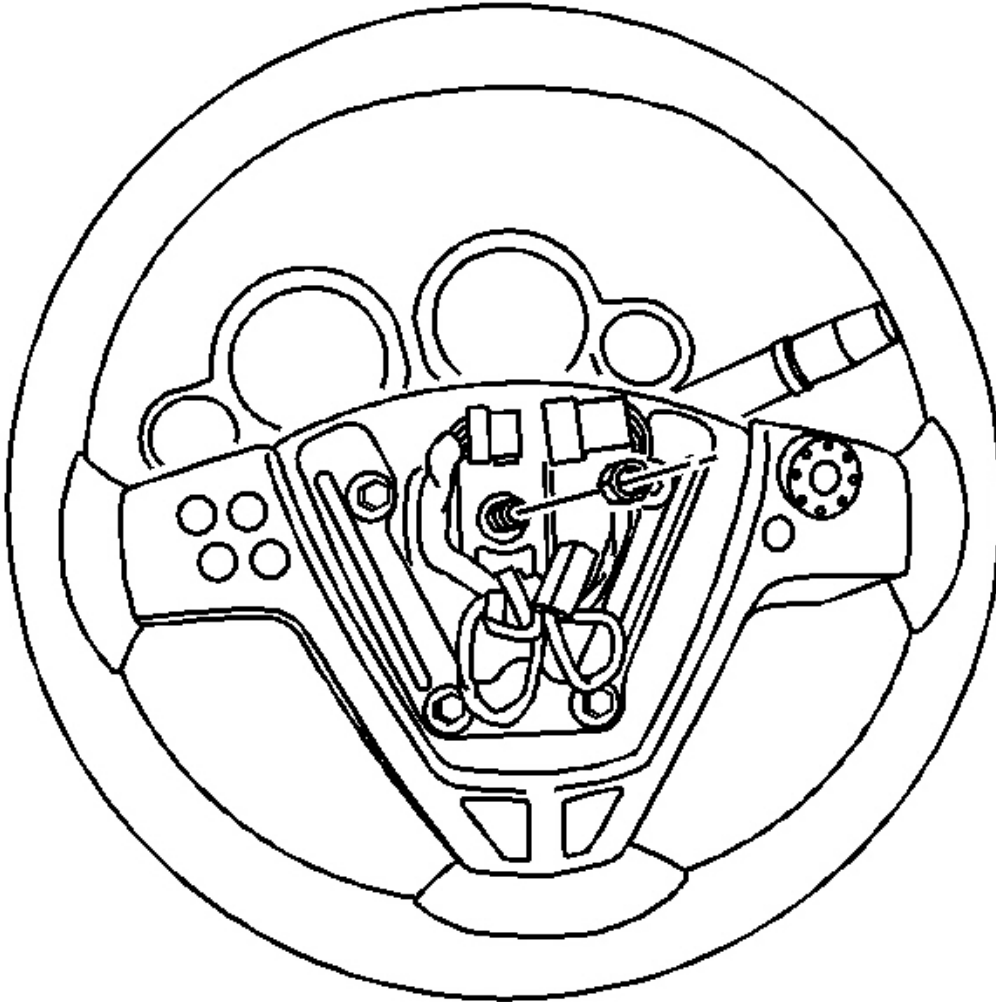


Fig. 41: Connecting/Disconnecting Steering Wheel To Steering Column
Courtesy of GENERAL MOTORS CORP.

1. Install the steering wheel to the steering column, observing the alignment marks.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install a new steering wheel set nut.

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

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3. Remove **J 42640** from the steering column. See **Special Tools**.
4. Connect the horn electrical connector.
5. Install the steering wheel inflator module. Refer to **Inflatable Restraint Steering Wheel Module Replacement** in SIR.

REPAIRING SCRATCHED WOOD STEERING WHEELS

Repair Procedure

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

IMPORTANT: Do NOT sand through the clear.

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

TILT ACTUATOR ASSEMBLY REPLACEMENT

Removal Procedure

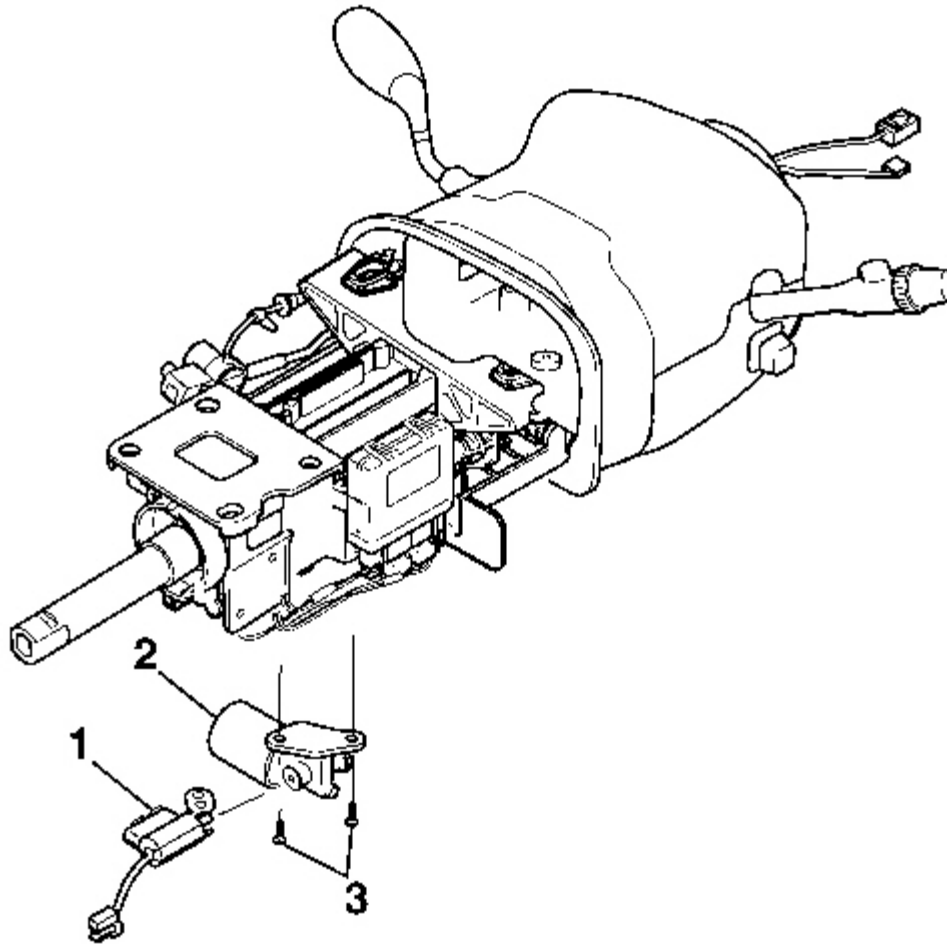


Fig. 42: View Of Potentiometer Housing, Tilt Actuator Assembly & Fasteners
Courtesy of GENERAL MOTORS CORP.

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 knee bolster. Refer to Trim Panel Replacement - Knee Bolster in Instrument Panel, Gages, and Console.
3. Remove the lower trim cover. Refer to Steering Column Trim Covers Replacement.
4. Disconnect the electrical connector from the tilt actuator assembly.

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5. Remove the fasteners (3) from the tilt actuator assembly.
6. Remove the tilt actuator assembly (2) from the steering column.
7. Remove the potentiometer housing (1) from the tilt actuator assembly.

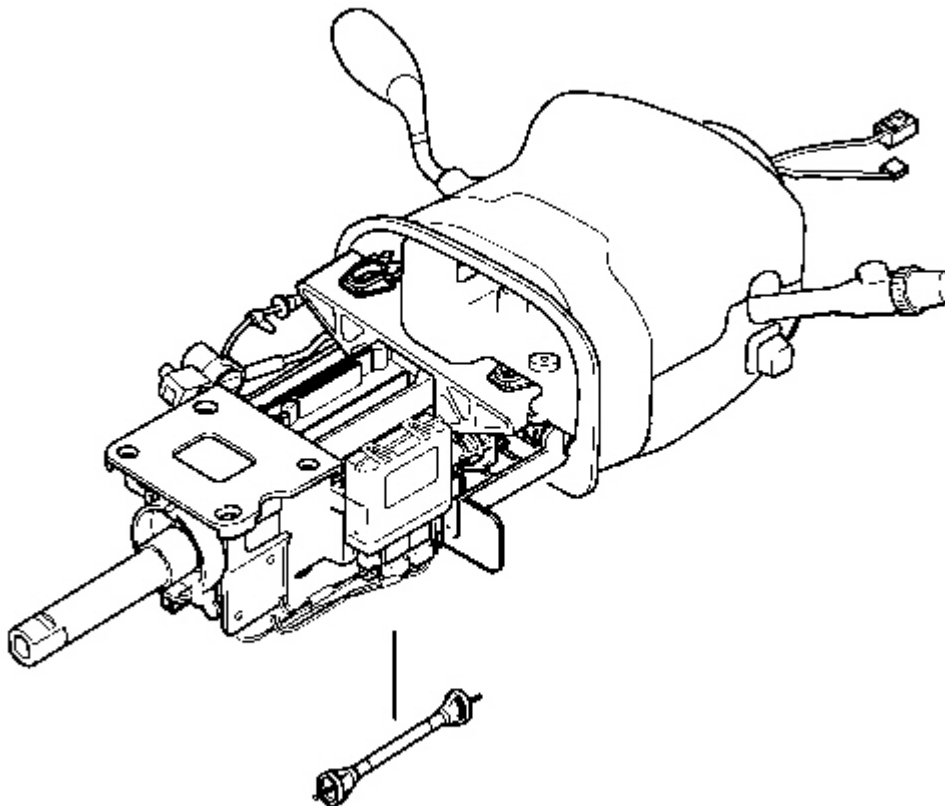


Fig. 43: View Of Tilt Cable & Tilt Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

8. Disconnect the tilt cable from the tilt actuator assembly.

Installation Procedure

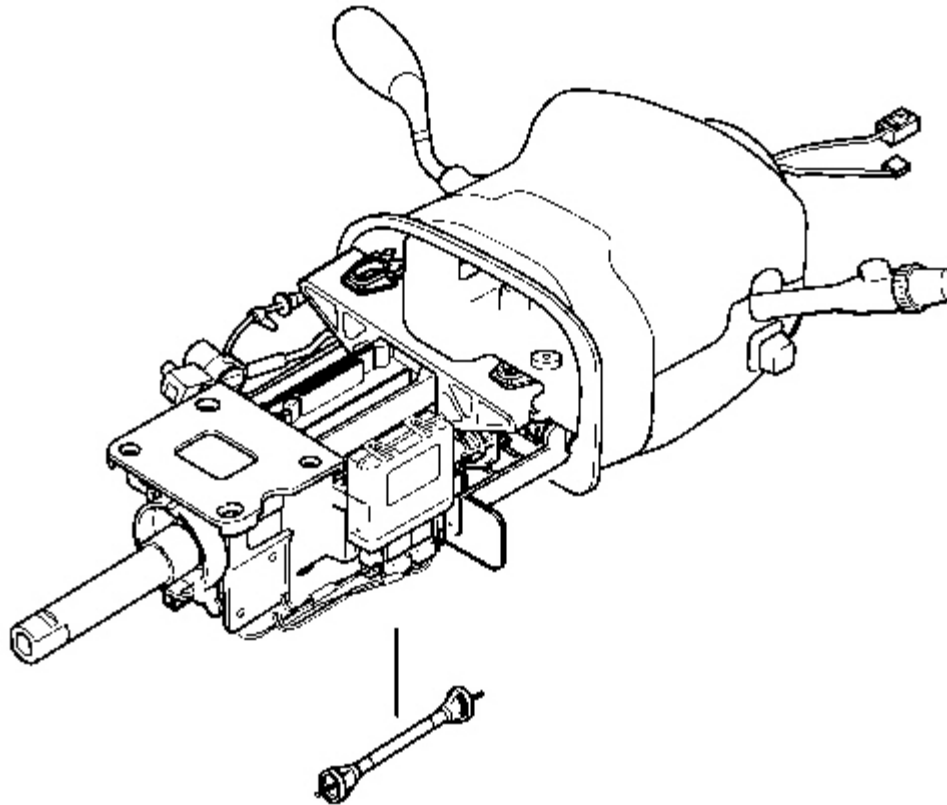


Fig. 44: View Of Tilt Cable & Tilt Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the black end of the tilt actuator cable assembly to the steering column.

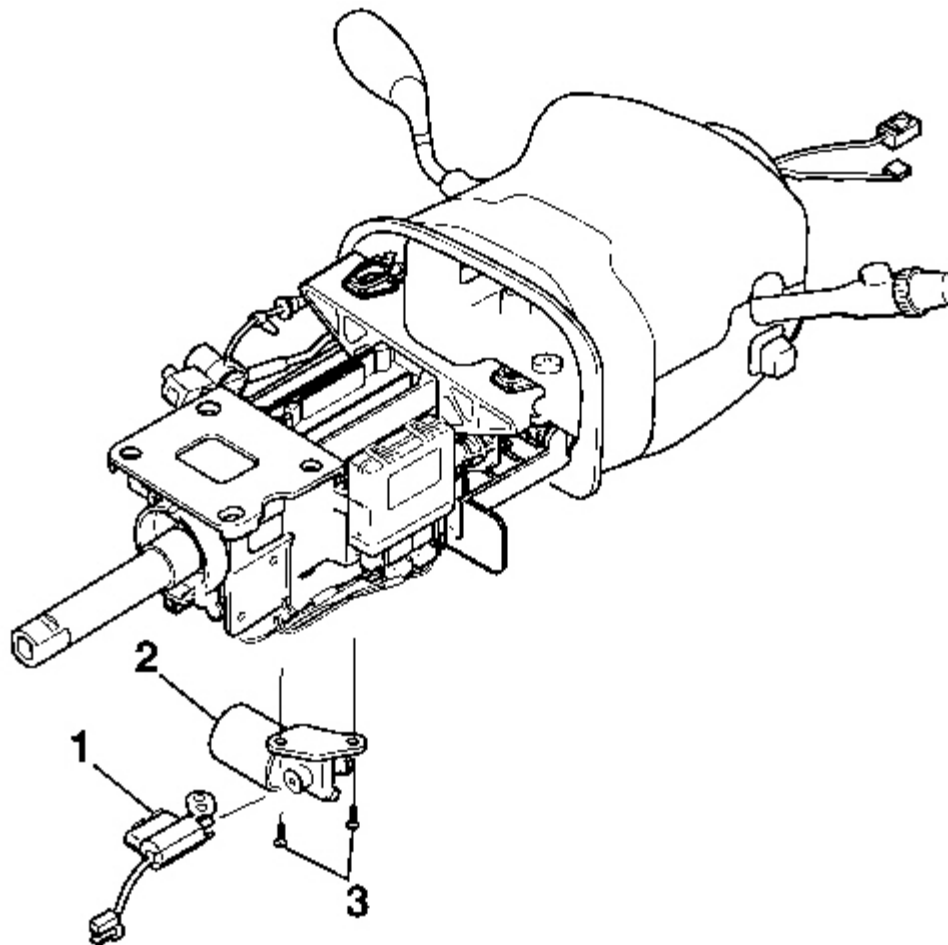


Fig. 45: View Of Potentiometer Housing, Tilt Actuator Assembly & Fasteners
Courtesy of GENERAL MOTORS CORP.

2. Install the potentiometer housing (1) to the tilt actuator assembly (2).
3. Install the white end of the tilt actuator cable to the tilt actuator assembly.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the tilt actuator assembly and the retaining screws.

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

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5. Connect the electrical connector to the tilt actuator.
6. Install the lower trim cover. Refer to **Steering Column Trim Covers Replacement**.
7. Install the knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages, and Console.
8. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TELESCOPE ACTUATOR SWITCH REPLACEMENT

Removal Procedure

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

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages, and Console.

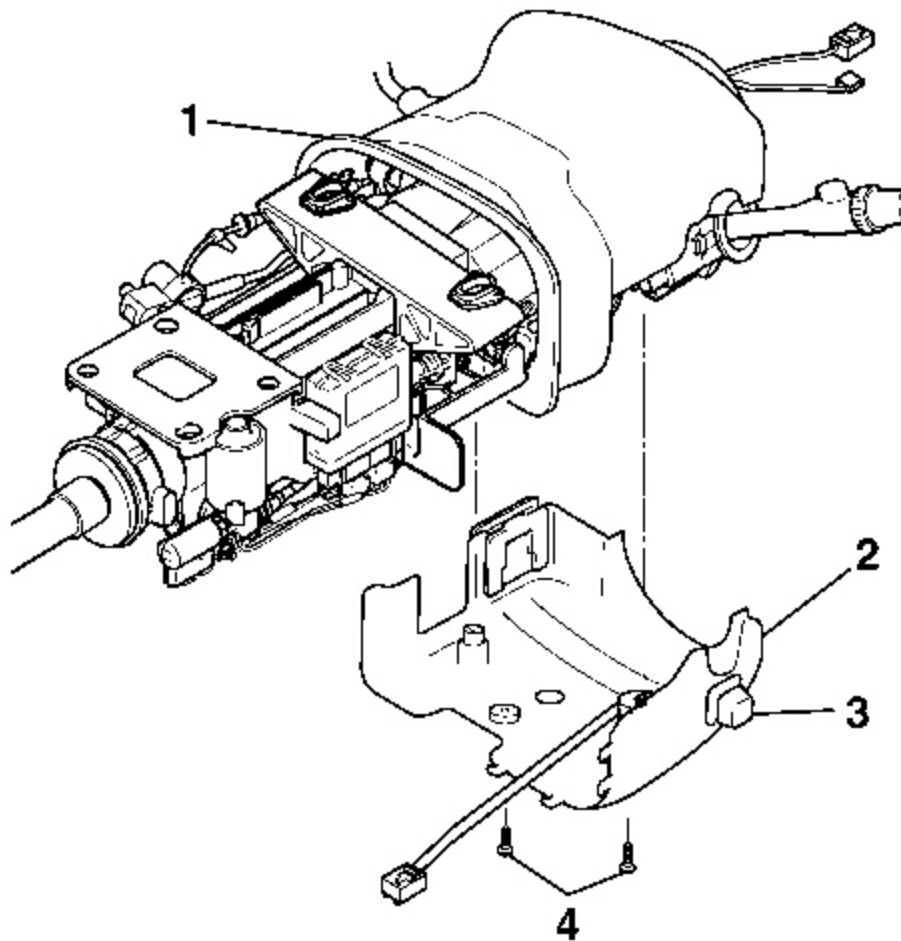


Fig. 46: View Of Closeout Shroud, Lower Steering Column Trim Cover & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

3. Remove the retaining screws (4) from the lower steering column trim cover.
4. Disconnect the lower trim cover from the closeout shroud.
5. Disconnect the telescope actuator switch electrical connector.
6. Remove the telescope actuator switch from the lower trim cover.

Installation Procedure

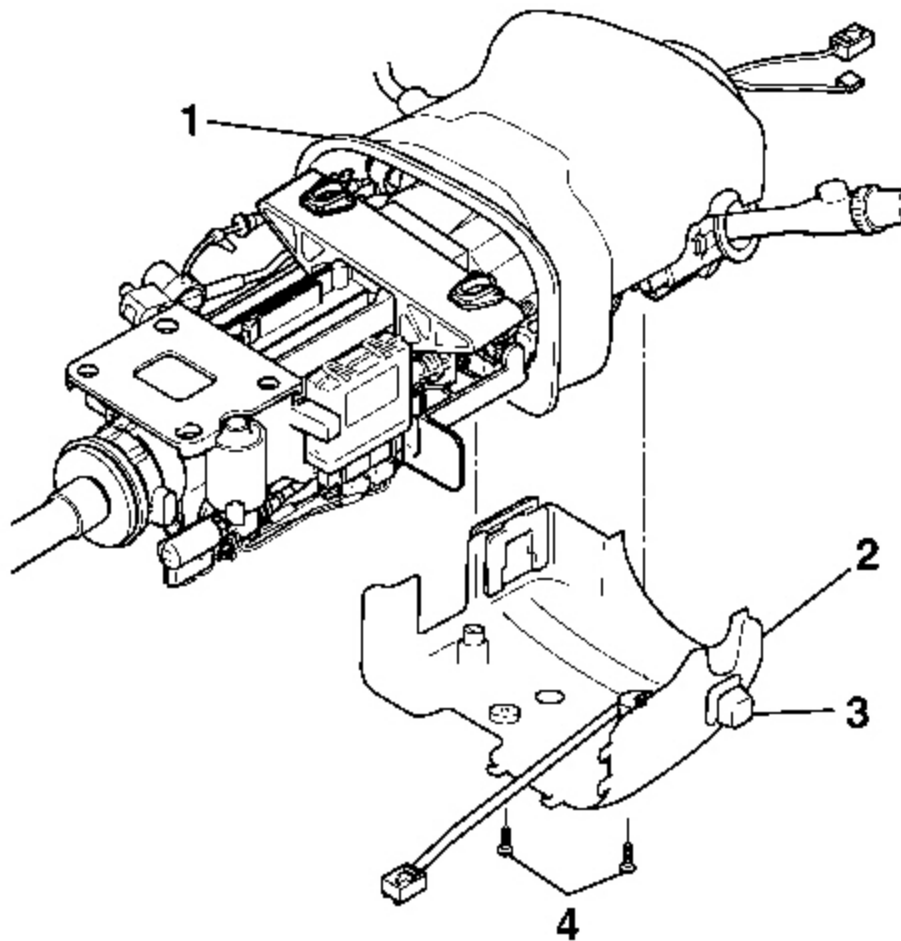


Fig. 47: View Of Closeout Shroud, Lower Steering Column Trim Cover & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

1. Install the telescope actuator switch to the lower steering column trim cover.
2. Connect the telescope actuator switch electrical connector to the steering column control module.
3. Connect the lower trim cover to the closeout shroud.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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

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

5. Install the knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages, and Console.
6. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TELESCOPE ACTUATOR ASSEMBLY REPLACEMENT

Removal Procedure

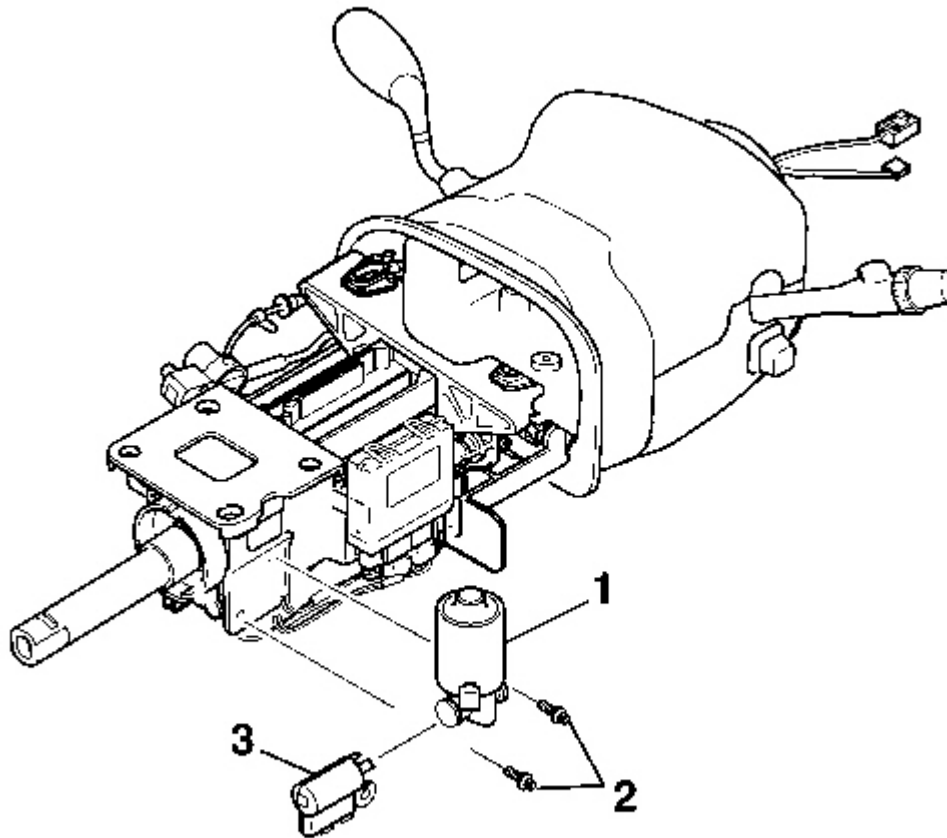


Fig. 48: View Of Potentiometer Housing, Telescope Actuator Assembly & Fasteners
Courtesy of GENERAL MOTORS CORP.

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

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1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages, and Console.
3. Disconnect the electrical connector from the telescope actuator assembly.
4. Remove the fasteners (2) from the telescope actuator assembly.
5. Remove the telescope actuator assembly (1) from the steering column.
6. Remove the potentiometer housing (3) from the telescope actuator assembly.

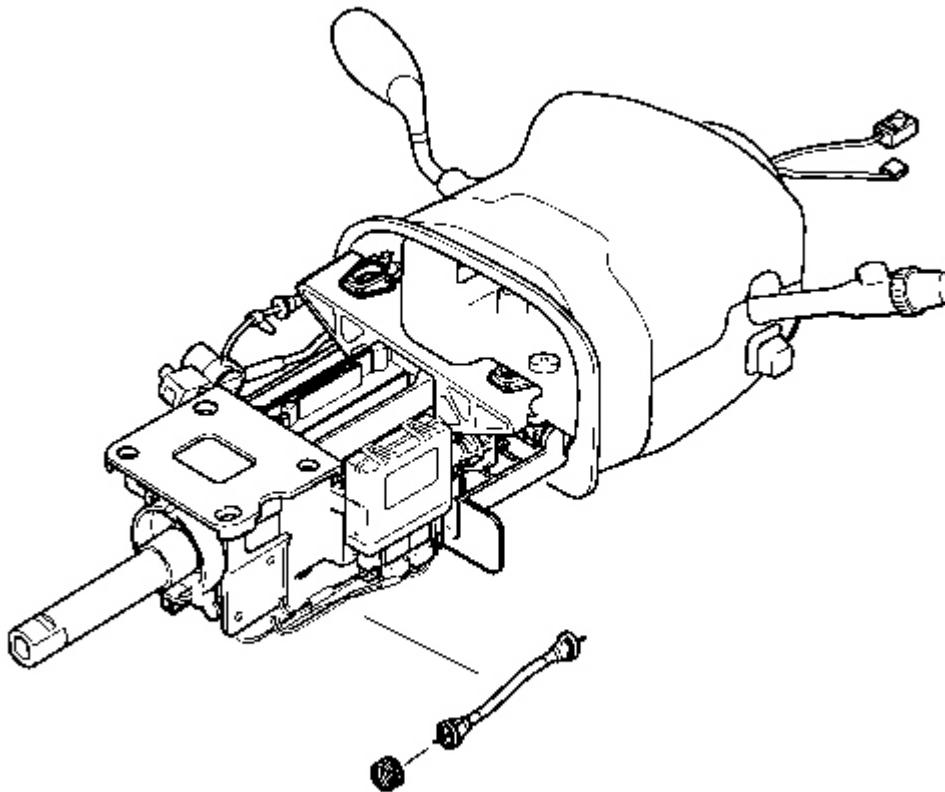


Fig. 49: View Of Telescope Cable & Telescope Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

7. Disconnect the telescope cable from the telescope actuator assembly.

Installation Procedure

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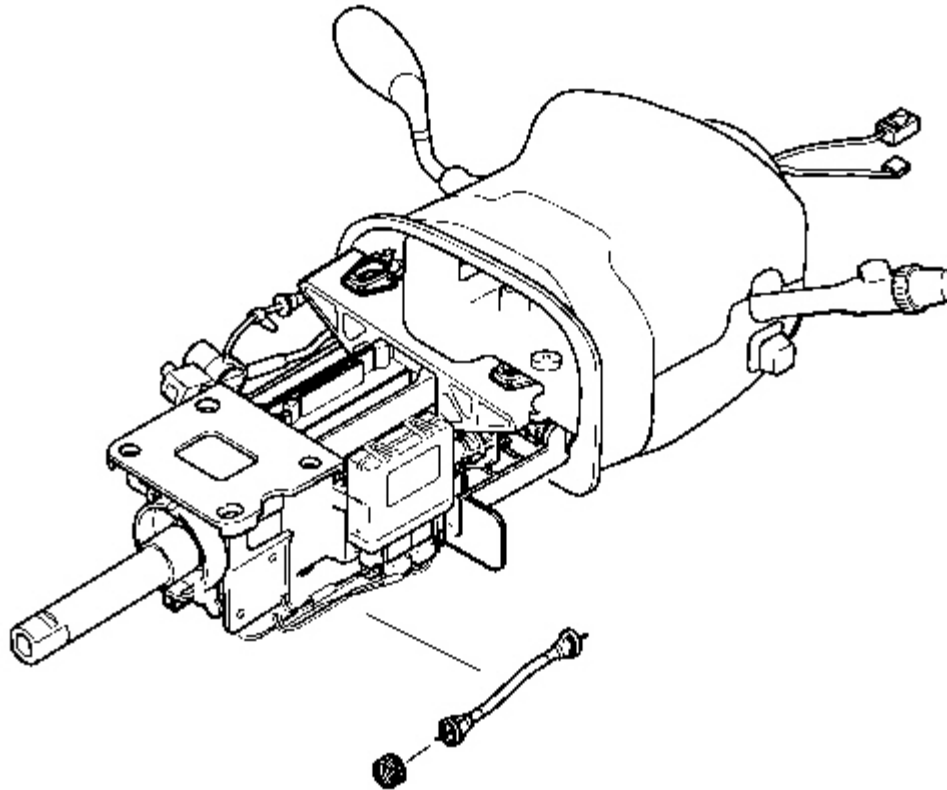


Fig. 50: View Of Telescope Cable & Telescope Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the white end of the telescope actuator cable assembly to the steering column.
2. Install the black end of the telescope actuator cable to the telescope actuator assembly.

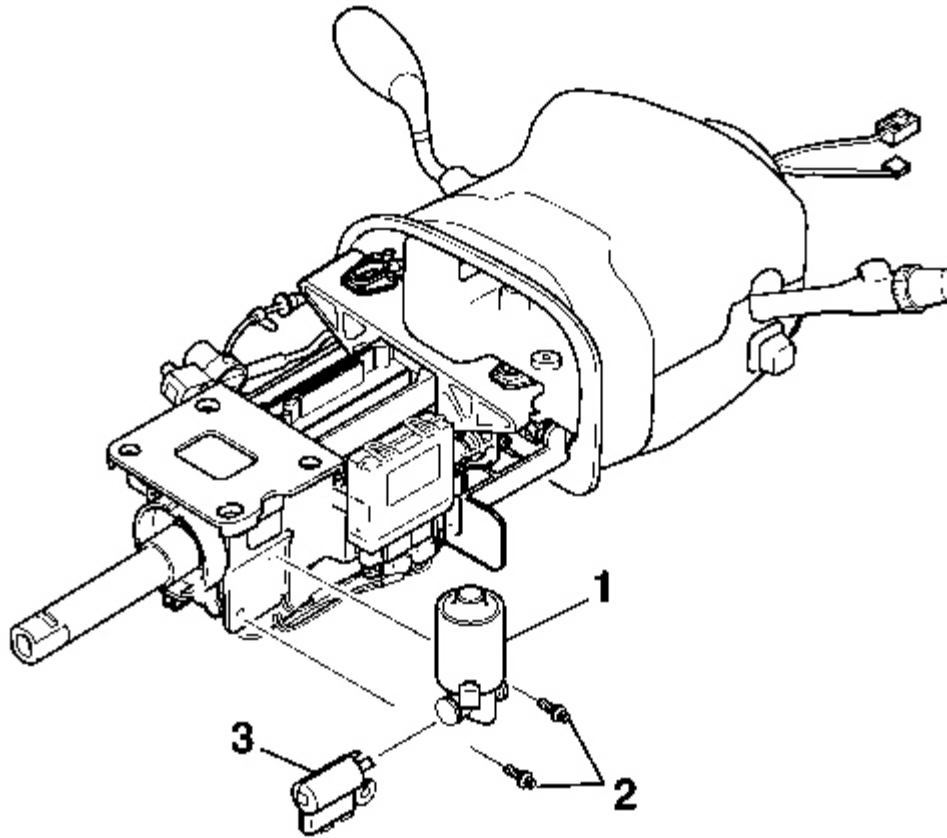


Fig. 51: View Of Potentiometer Housing, Telescope Actuator Assembly & Fasteners
Courtesy of GENERAL MOTORS CORP.

3. Install the potentiometer housing (3) to the telescope actuator assembly (1).
4. Install the telescope actuator assembly.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Install the retaining screws to the telescope actuator assembly.

Tighten: Tighten the screws to 5 N.m (44 lb in).

6. Connect the electrical connector to the telescope assembly actuator.
7. Install the knee bolster. Refer to Trim Panel Replacement - Knee Bolster in Instrument Panel, Gages,

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and Console.

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

STEERING COLUMN ELECTRONIC LOCK REPLACEMENT

Removal Procedure

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

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the steering column from the vehicle. Refer to **Steering Column Replacement**.
3. Remove the turn signal cancel cam. Refer to **Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement** in Wipers/Washer Systems.
4. Remove the windshield wiper wash and switch assembly. Refer to **Wipers/Washer Switch Replacement**.
5. Remove the multifunction switch assembly. Refer to **Multifunction, Turn Signal Switch Replacement**.

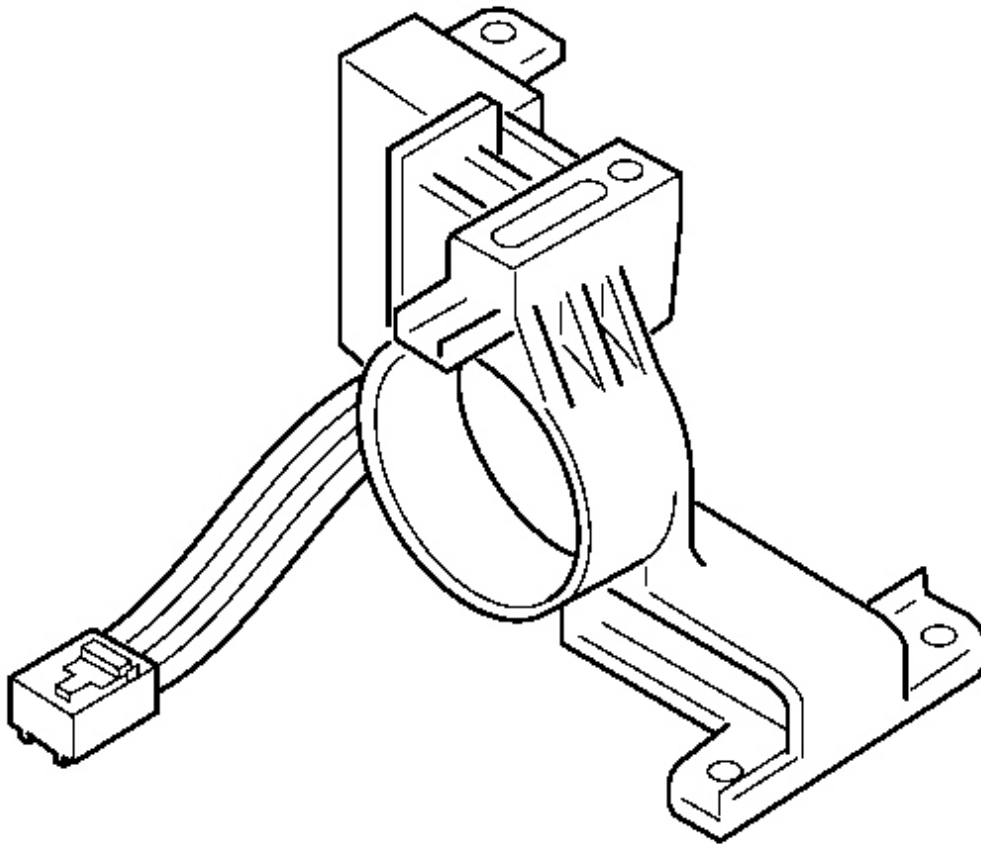


Fig. 52: Steering Column Electronic Lock Harness
Courtesy of GENERAL MOTORS CORP.

NOTE: Avoid damaging the steering column electronic lock harness by gently removing the plugs installed in the I/P beam. Do NOT twist, pull, bend, cut, or incorrectly route the harness. Damage to the harness will require replacement of the entire electronic lock.

6. Remove the wire harness straps from the wire harness.
7. Remove the electronic lock module lead from the wire harness assembly.
8. Remove the electronic lock module from the steering column.

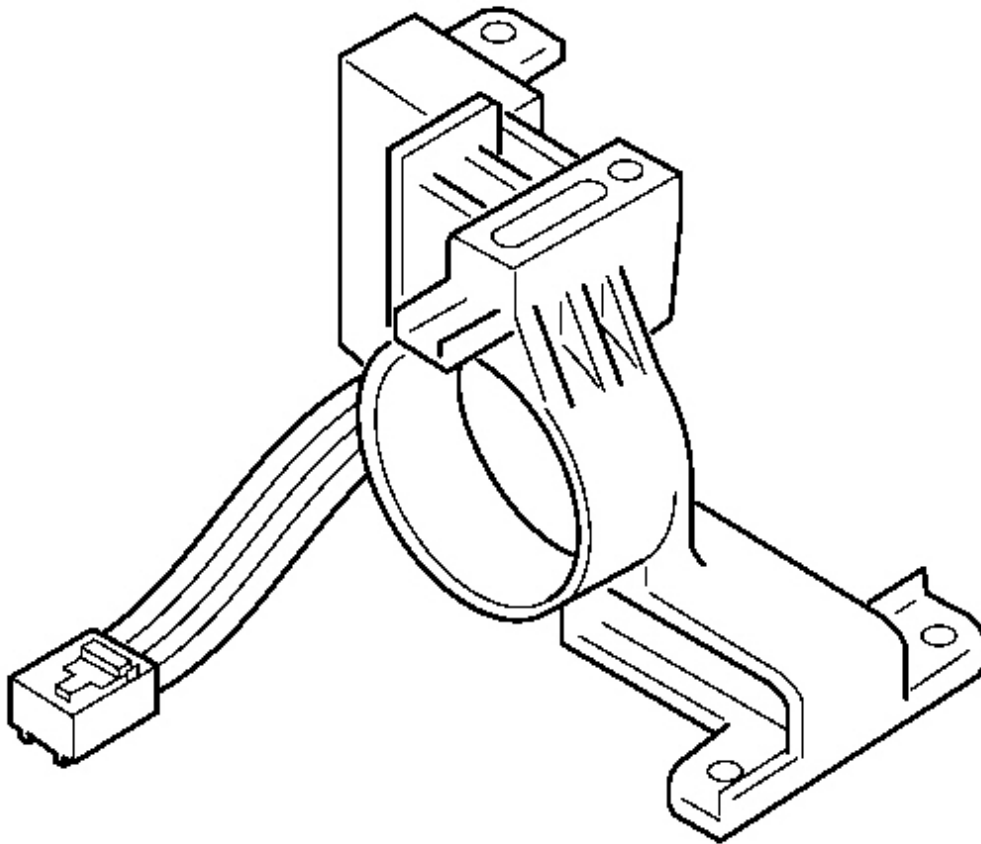


Fig. 53: Steering Column Electronic Lock Harness
Courtesy of GENERAL MOTORS CORP.

1. Install the electronic lock module onto the steering column.

NOTE: **Avoid damaging the steering column electronic lock harness by gently removing the plugs installed in the I/P beam. Do NOT twist, pull, bend, cut, or incorrectly route the harness. Damage to the harness will require replacement of the entire electronic lock.**

2. Feed the electronic column lock lead into the wire harness assembly.
3. Install new wire harness straps.
4. Install the turn signal cancel cam. Refer to **Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement**.

5. Install the windshield wiper wash and switch assembly. Refer to **Wipers/Washer Switch Replacement** in Wipers/Washer Systems.
6. Install the multifunction switch assembly. Refer to **Multifunction, Turn Signal Switch Replacement**.
7. Install the steering column into the vehicle. Refer to **Steering Column Replacement**.
8. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

TILT SPRING REPLACEMENT

Removal Procedure

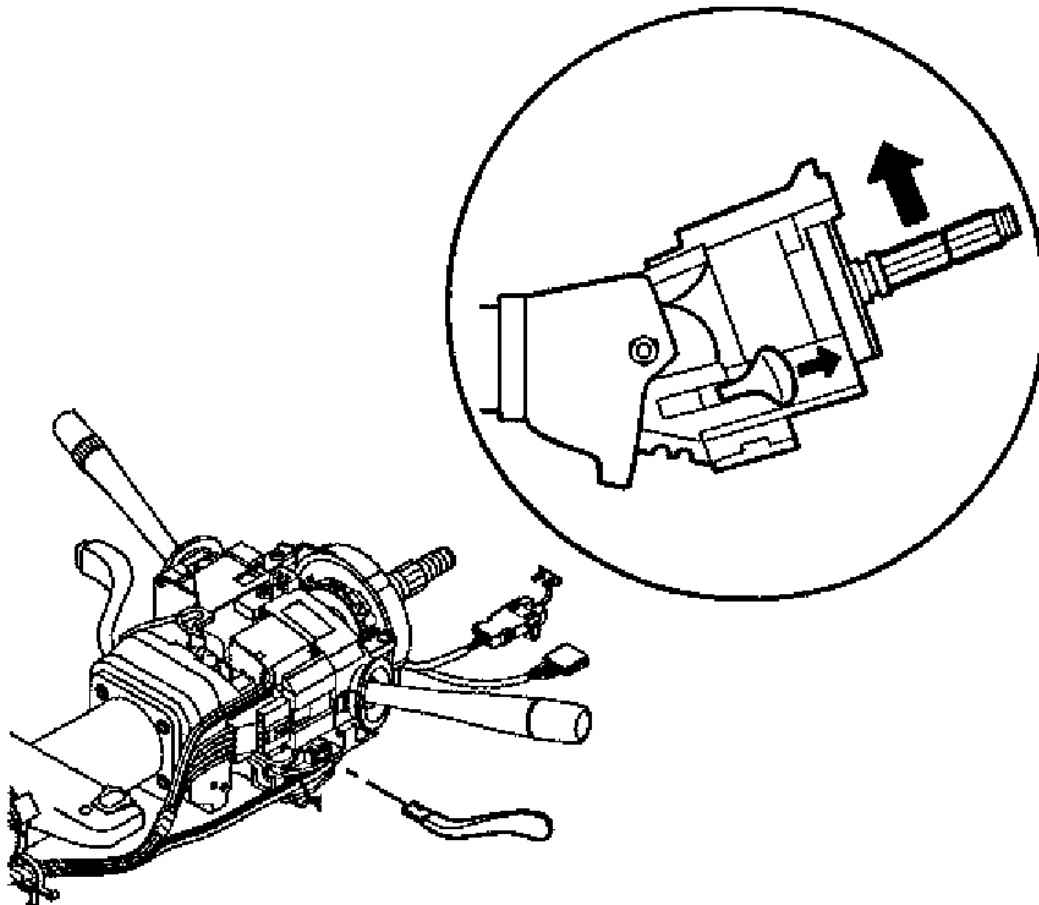


Fig. 54: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

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.

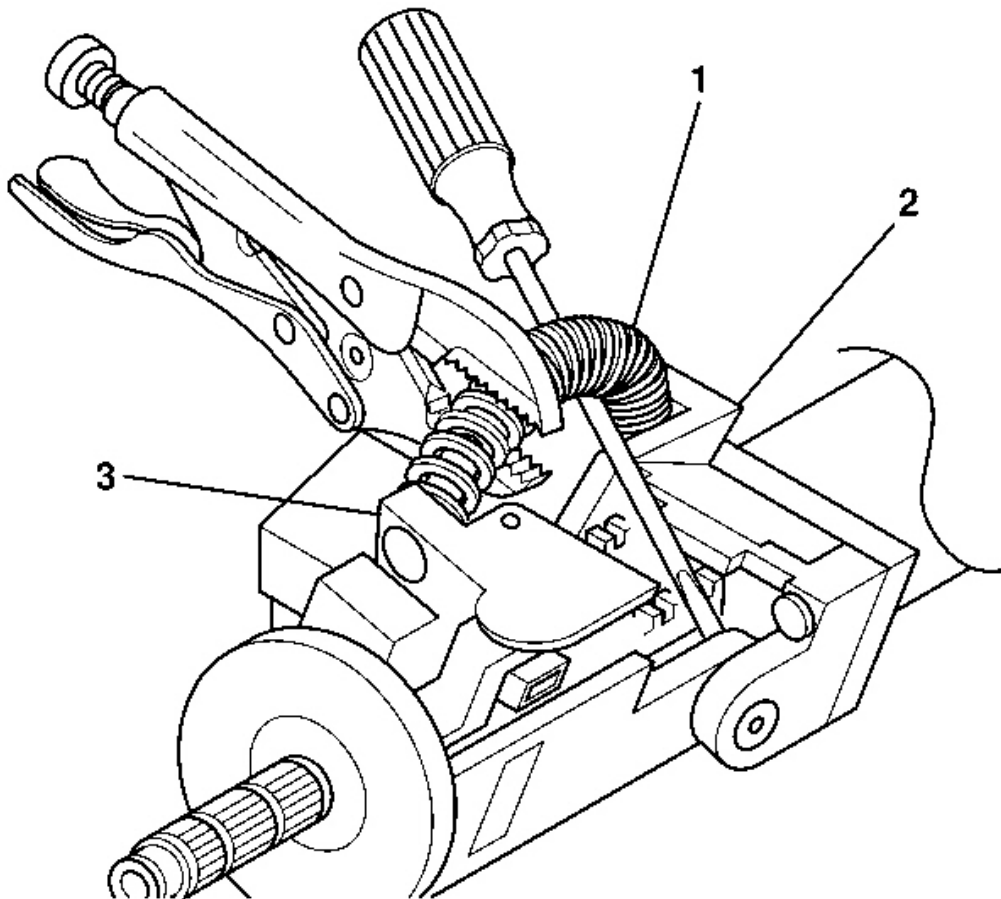


Fig. 55: Removing Tilt Spring From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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).

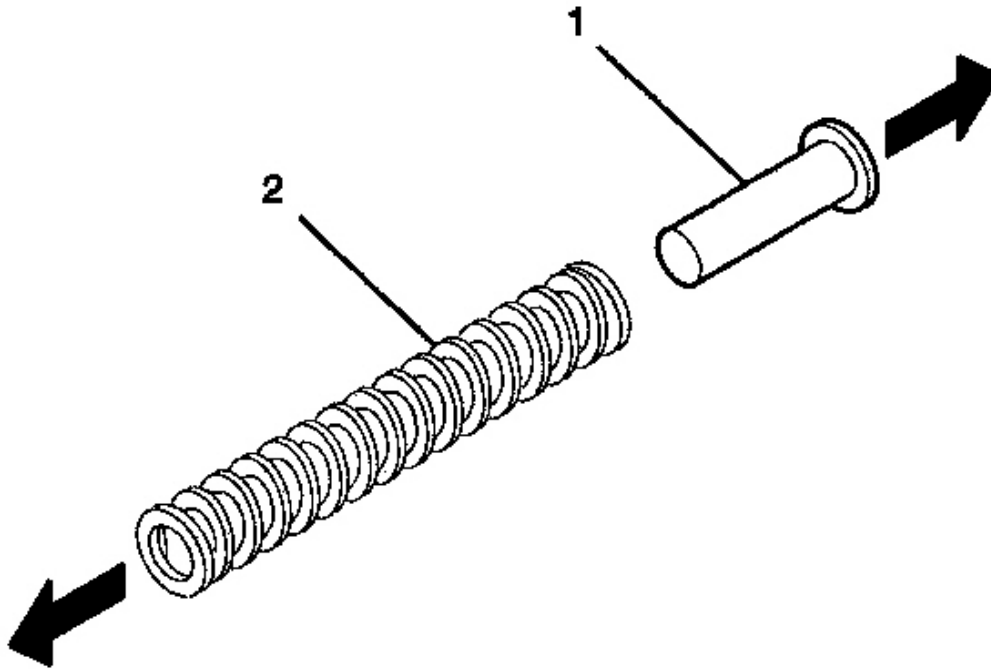


Fig. 56: Identifying Spring Guide Components
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

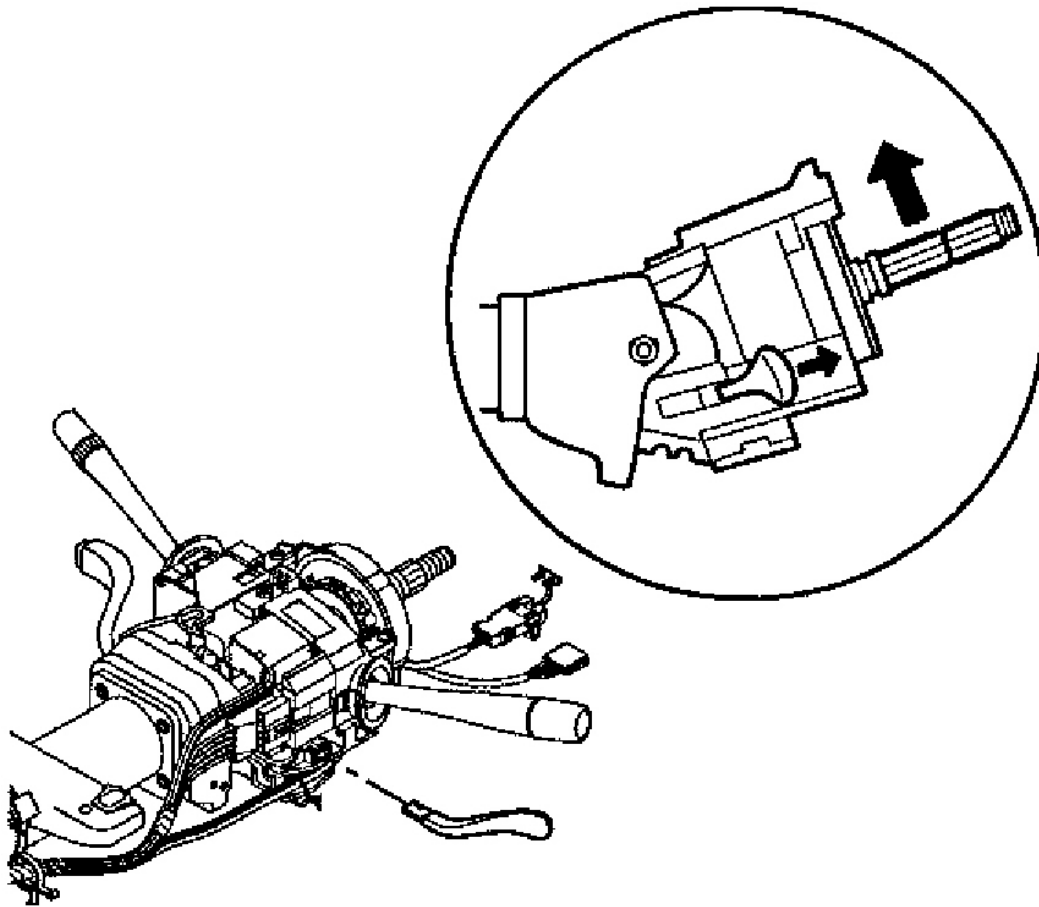


Fig. 57: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

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

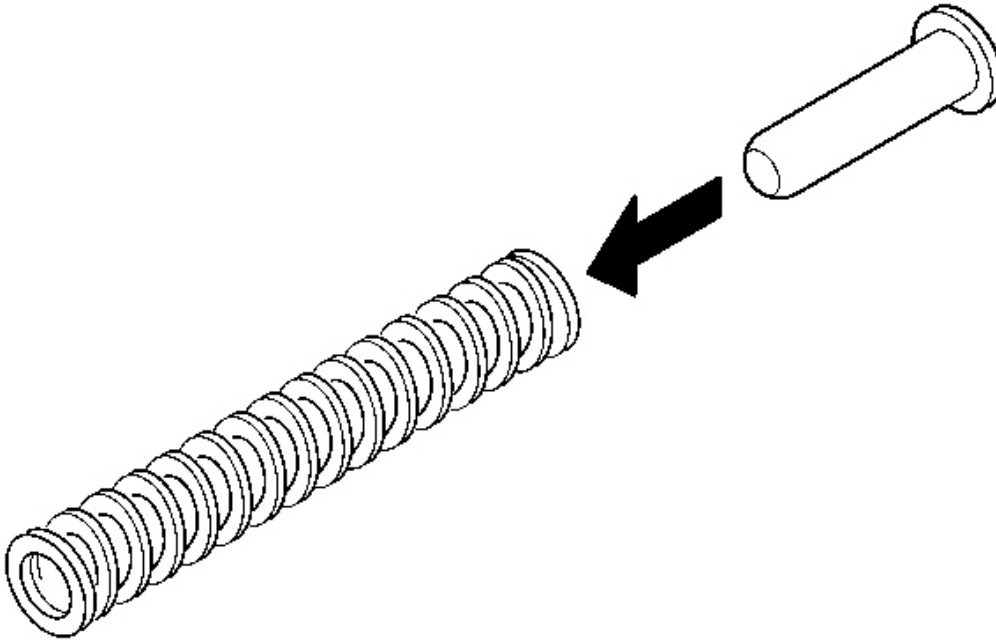


Fig. 58: Spring Guide & Tilt Spring
Courtesy of GENERAL MOTORS CORP.

2. Install the spring guide into the tilt spring.

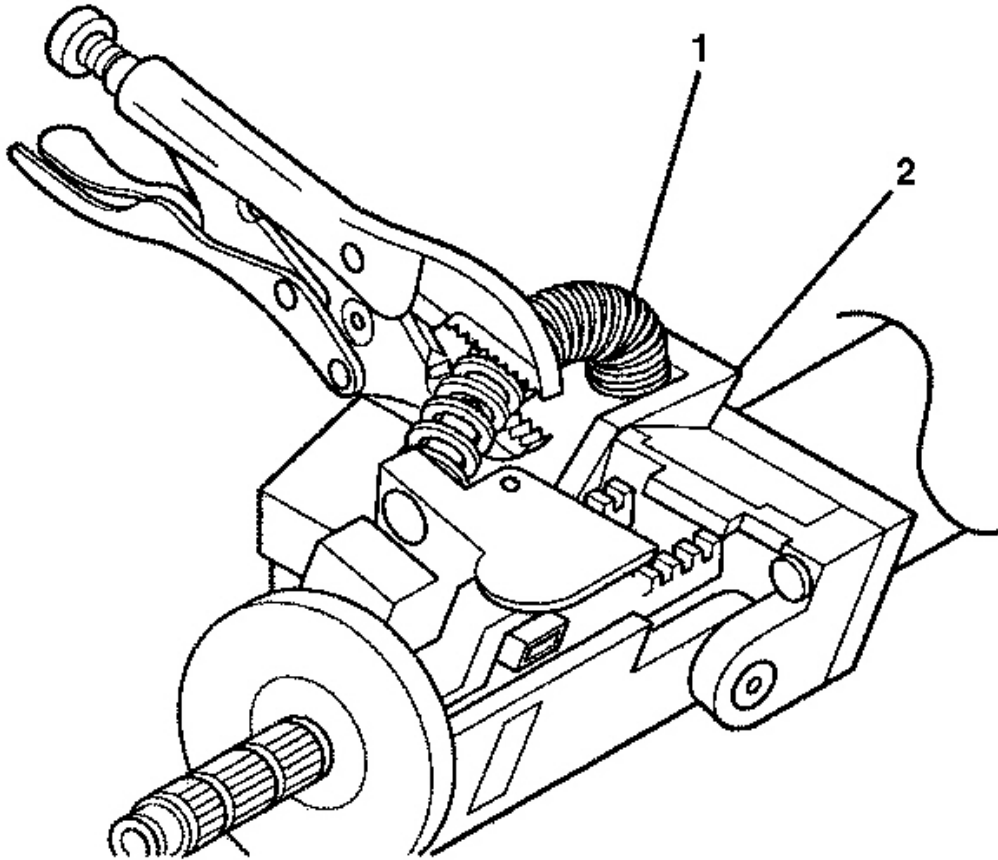


Fig. 59: Installing Tilt Spring Onto The Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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 REPLACEMENT

Tools Required

J 42640 Steering Column Lock Pin. See **Special Tools**.

Removal Procedure

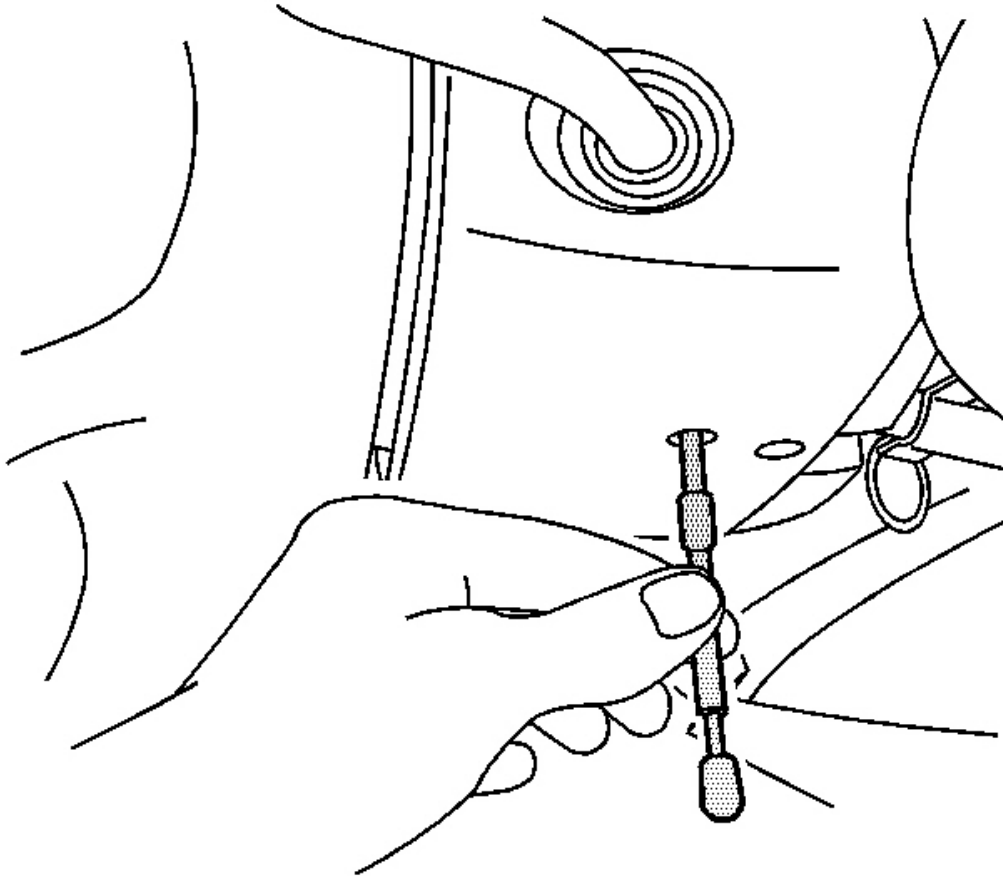


Fig. 60: Identifying J 42640
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the steering column connectors are disconnected with the ignition in

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the ON position, the BCM will enter a fail enable mode and prevent steering column lock operations. The PCM will also inhibit vehicle motion by disabling fuel. To clear the BCM fail enable mode, disconnect the BCM #25 for 15 seconds.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3**
2. Disconnect the battery. Refer to **Battery Negative Cable Disconnect/Connect Procedure**

NOTE: The wheels of the vehicle must be straight ahead and the steering column in the LOCK position before disconnecting the steering column or intermediate shaft from the steering gear. Failure to do so will cause the SIR coil assembly to become uncentered, which may cause damage to the coil assembly.

3. Insert the **J 42640** . See **Special Tools**.

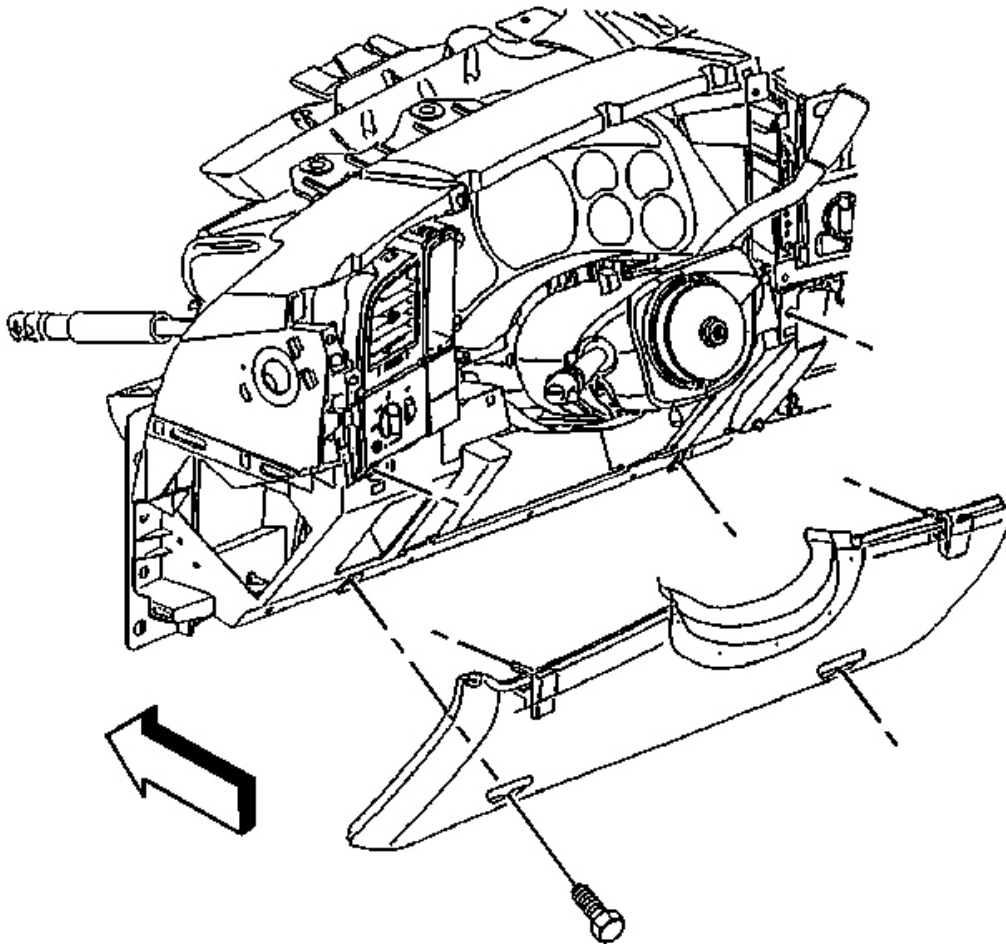


Fig. 61: Knee Bolster & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the knee bolster panel. Refer to **Knee Bolster Bracket Replacement - Left**

NOTE: Avoid damaging the steering column electronic lock harness by gently removing the plugs installed in the I/P beam. Do NOT twist, pull, bend, cut, or incorrectly route the harness. Damage to the harness will require replacement of the entire electronic lock.

5. Disconnect the steering column electrical connectors.

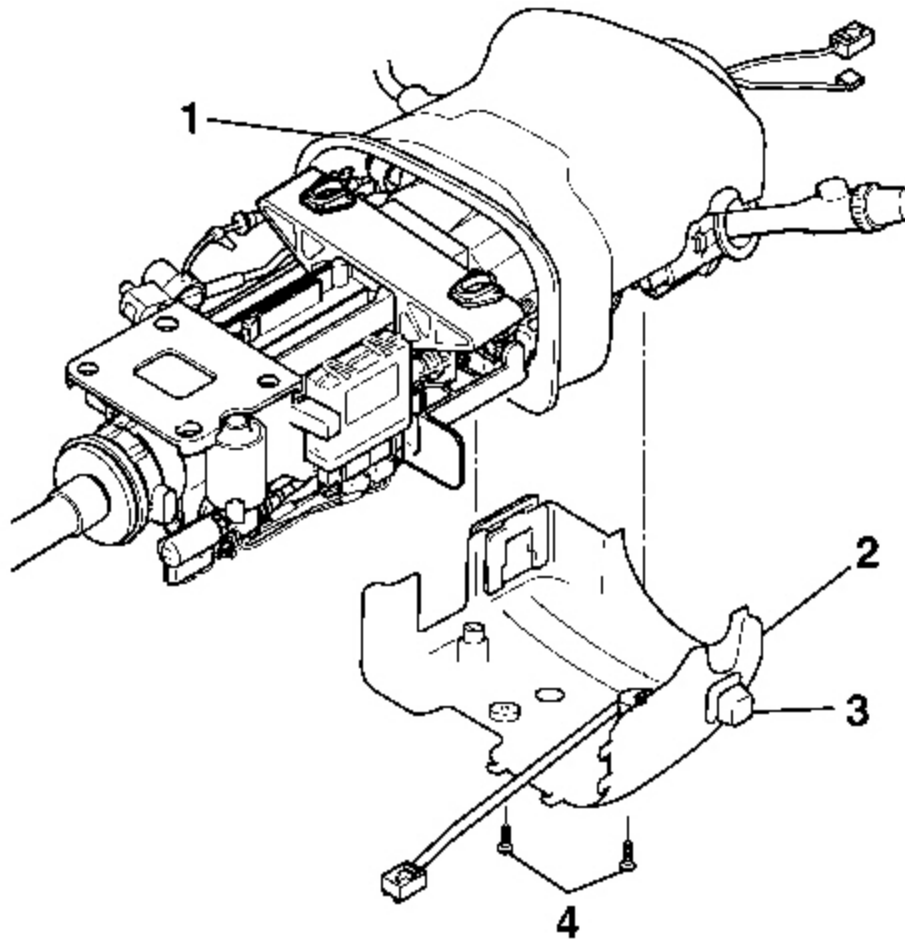


Fig. 62: View Of Closeout Shroud, Lower Steering Column Trim Cover & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

6. Remove the lower steering column shroud. Refer to **Steering Column Trim Covers Replacement**
7. Remove the heater duct.
8. Remove the telescoping motor. Refer to **Telescope Actuator Assembly Replacement**
9. Remove the tilt motor and bracket assembly. Refer to **Tilt Actuator Assembly Replacement**
10. Remove the intermediate shaft to column through bolt.

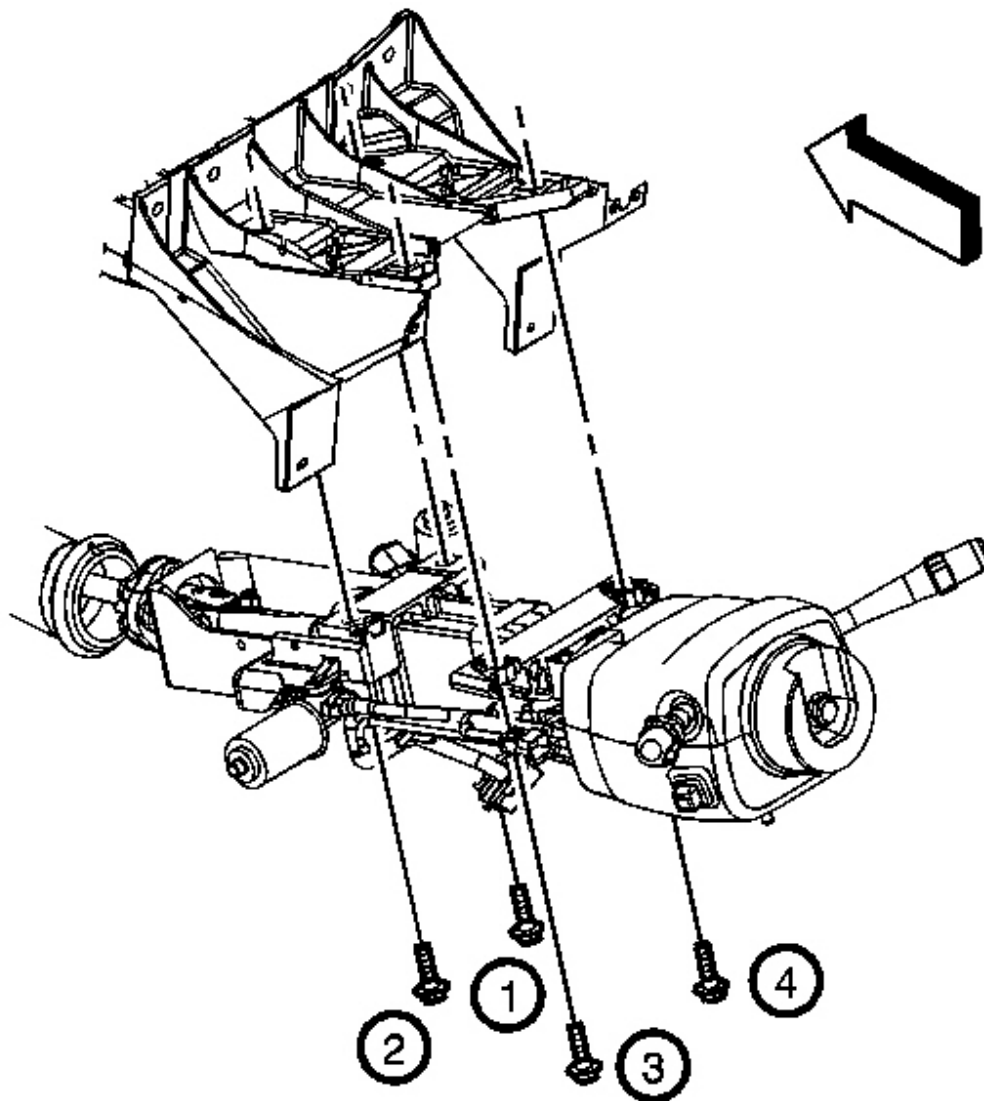


Fig. 63: Identifying Mounting Bolts Of Steering Column
Courtesy of GENERAL MOTORS CORP.

11. Remove the mounting bolts, 1, 2, 3, 4 from the steering column.

NOTE: Once the steering column is removed from the vehicle, the column is extremely susceptible to damage. Dropping the column assembly on the end could collapse the steering shaft or loosen the plastic injections,

which maintain column rigidity. Leaning on the column assembly could cause the jacket to bend or deform. Any of the above damage could impair the columns collapsible design. Do NOT hammer on the end of the shaft, because hammering could loosen the plastic injections, which maintain column rigidity. If you need to remove the steering wheel, refer to the Steering Wheel Replacement procedure in this section.

12. With the aid of an assistant, remove the steering column.

Installation Procedure

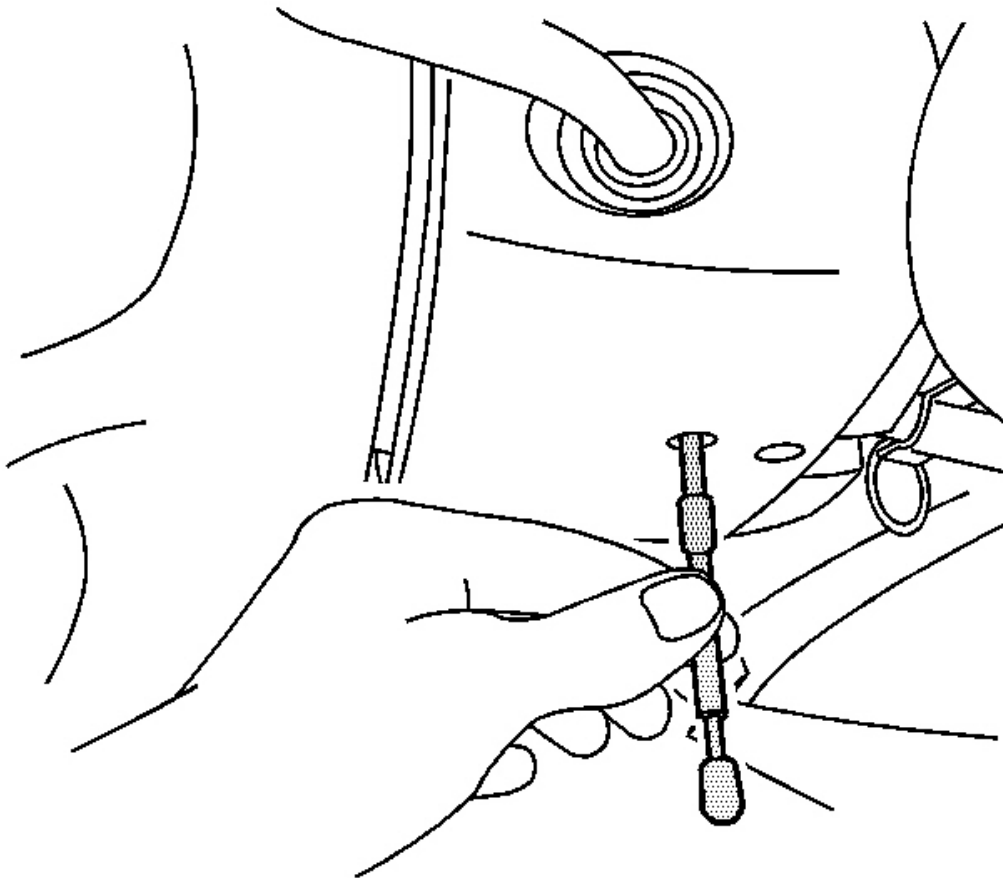


Fig. 64: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

1. With the aid of an assistant, install the steering column.

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2. Install the 2 of the steering column mounting bolts.
3. Install the pinch bolt for the intermediate shaft to steering column. Finger tighten the bolt only.

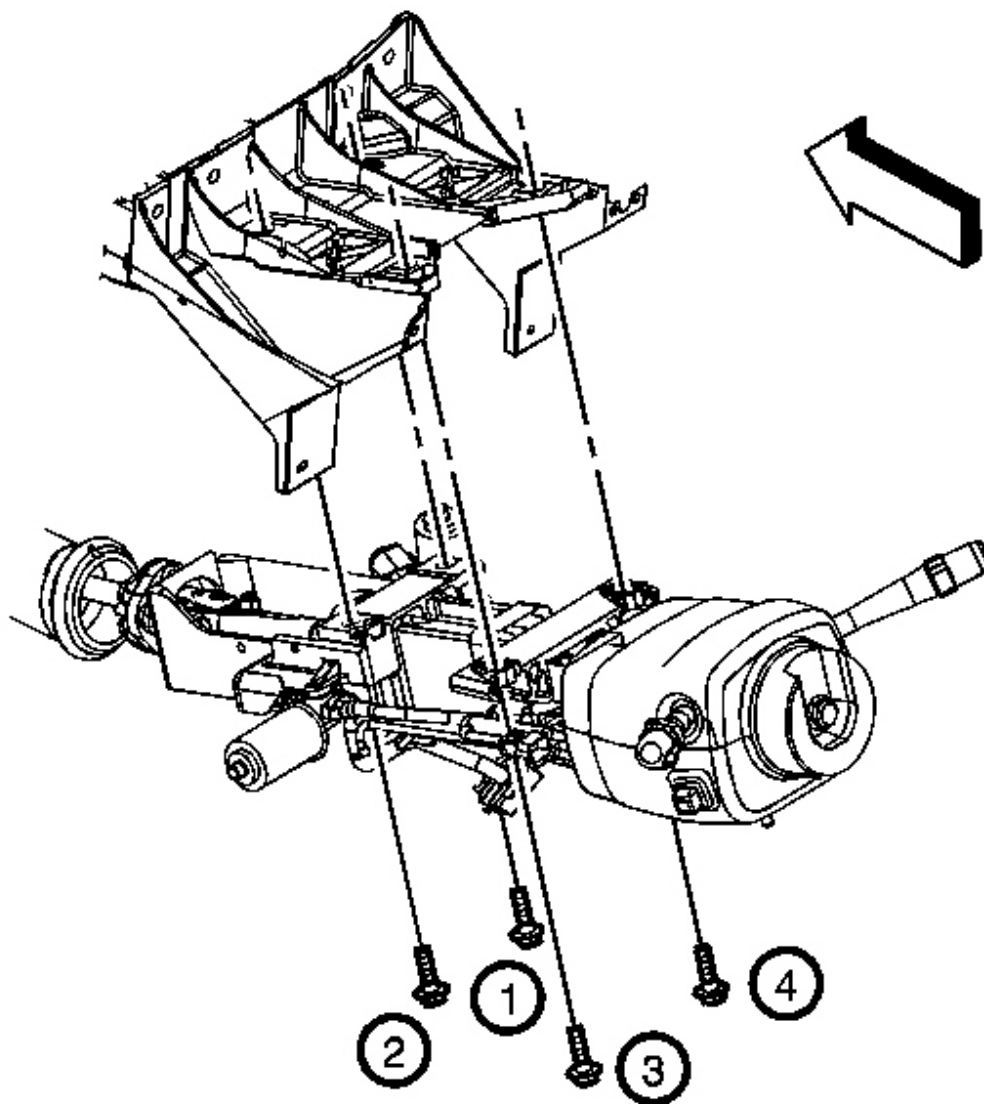


Fig. 65: Identifying Mounting Bolts Of Steering Column
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice

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4. Install the reminding steering column bolts and tighten in sequence.

Tighten: Tighten the mounting bolts to 24 N.m (18 lb ft).

5. Tighten the pinch bolt to specifications.

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

6. Install the tilt motor and bracket assembly. Refer to **Tilt Actuator Assembly Replacement**
7. Install the telescoping motor. Refer to **Telescope Actuator Assembly Replacement**
8. Reconnect the steering column electrical connectors.
9. Install the heater duct.

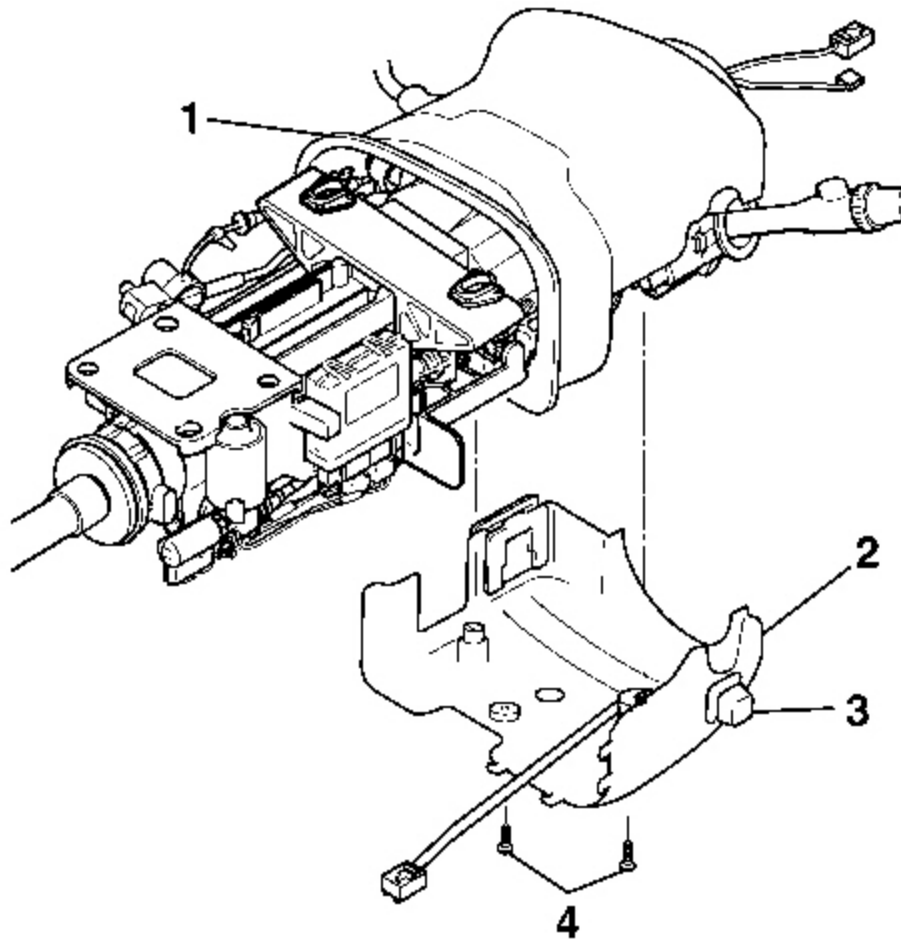


Fig. 66: View Of Closeout Shroud, Lower Steering Column Trim Cover & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

10. Install the lower steering column shroud. Refer to **Steering Column Trim Covers Replacement**

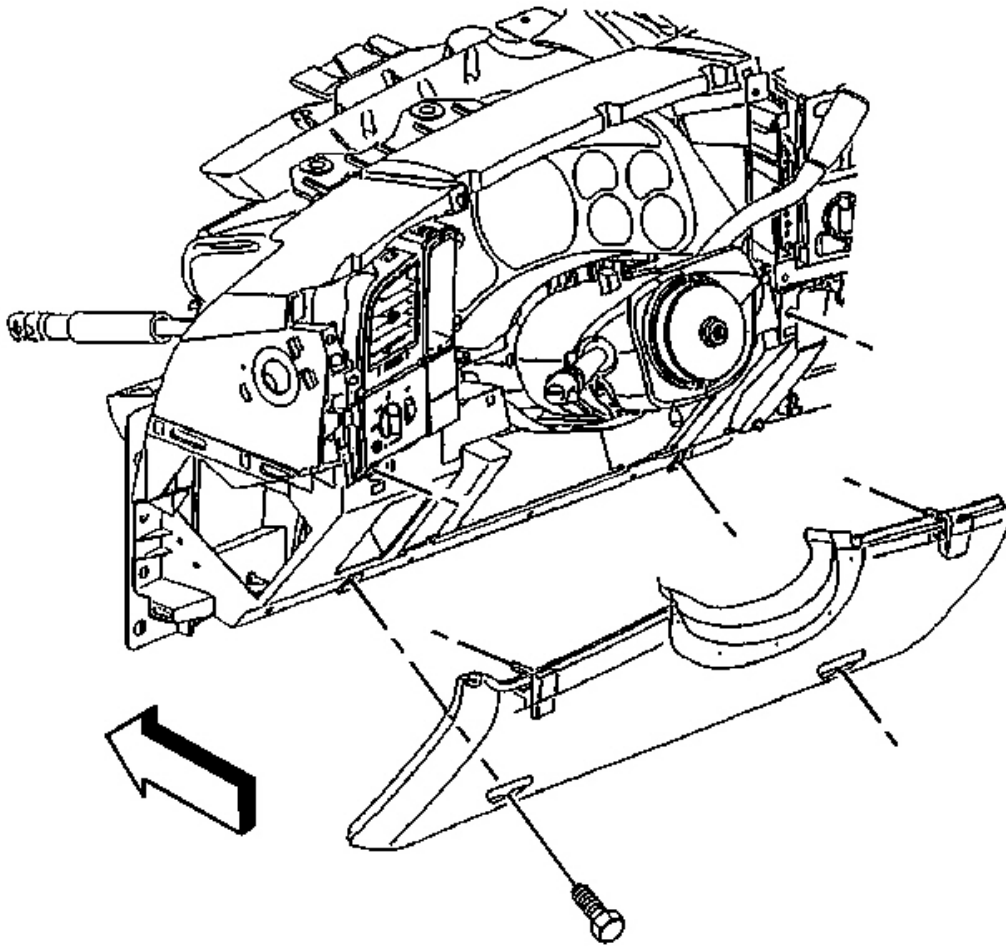


Fig. 67: Knee Bolster & Bolts
Courtesy of GENERAL MOTORS CORP.

11. Install the knee bolster panel. Refer to **Knee Bolster Bracket Replacement - Left**
12. Remove the **J 42640** . See **Special Tools**.
13. Reconnect the battery. Refer to **Battery Negative Cable Disconnect/Connect Procedure**
14. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3**

LOWER BEARING AND STEERING COLUMN JACKET REPLACEMENT

Tools Required

J 21854-01 Pivot Pin Remover

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Removal Procedure

CAUTION: Refer to SIR Caution in Cautions and Notices.

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. Remove the turn signal and multifunction switch assembly only. Refer to **Multifunction, Turn Signal Switch Replacement**.
5. Remove the wire harness assembly only. Refer to **Wire Harness Assembly Replacement (Power Tilt and Telescope)**.
6. Remove the telescope drive motor assembly and cable only. Refer to **Telescope Actuator Assembly Replacement**.
7. Remove the tilt drive motor assembly and cable only. Refer to **Tilt Motor Replacement**.

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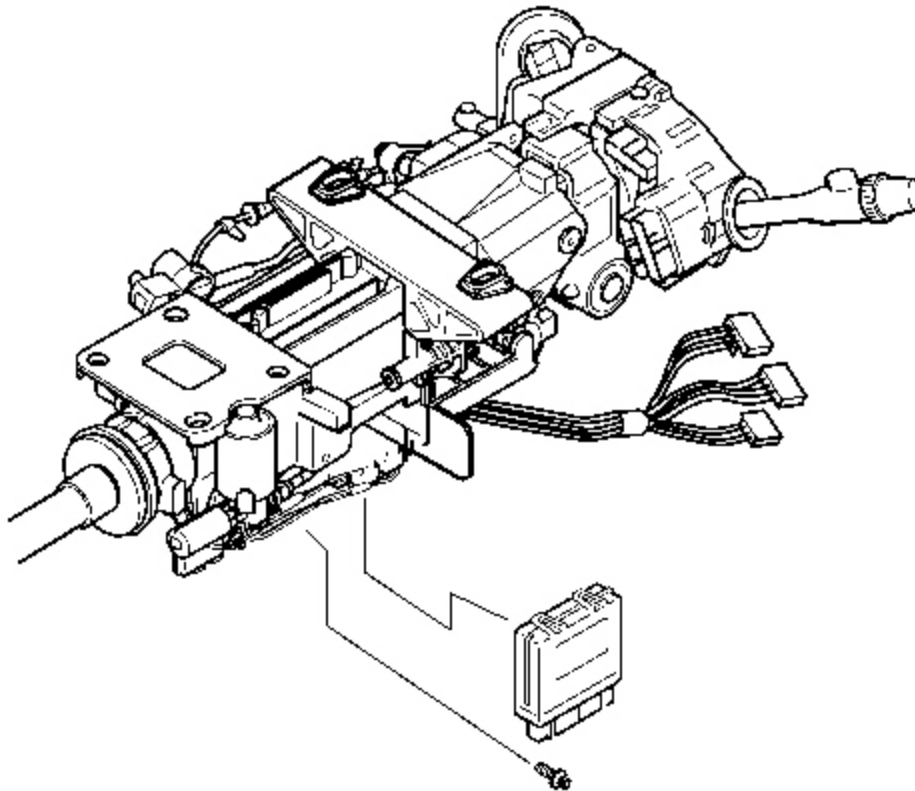


Fig. 68: View Of Control Module & Screw (Power Tilt/Telescope, Floor Shift)
Courtesy of GENERAL MOTORS CORP.

8. Remove 1 TORX® head screw from the control module.
9. Slide the control module out from the steering column.

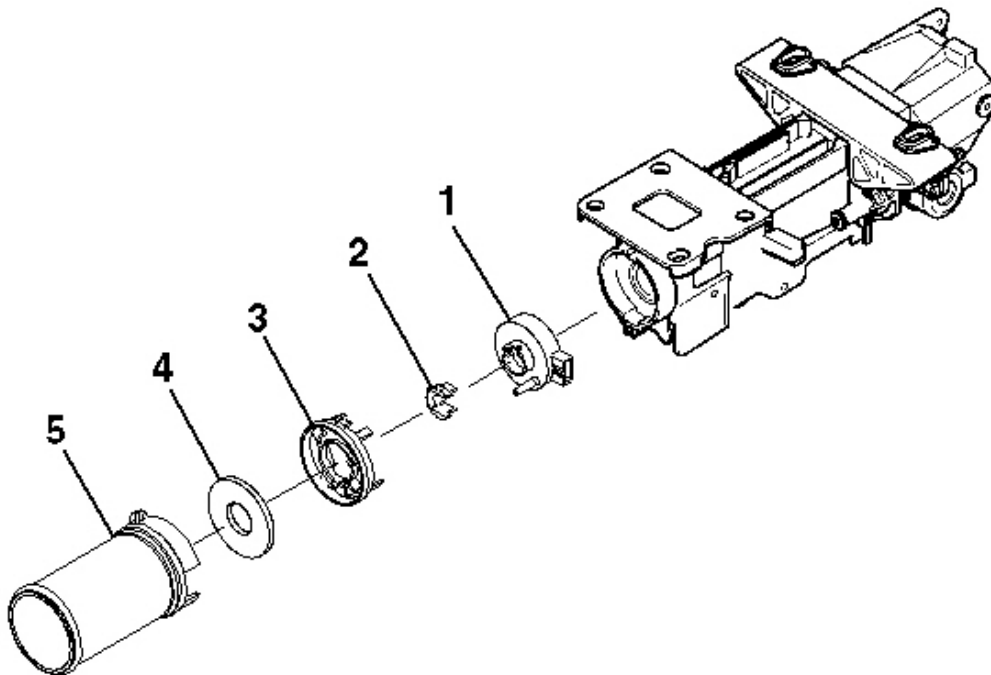


Fig. 69: View Of Lower Steering Column Components (Power Tilt\Telescope, Floor Shift)
Courtesy of GENERAL MOTORS CORP.

10. Remove the following components:
 1. The boot seal (5)
 2. The steering shaft seal (4)
 3. The sensor retainer (3)
 4. The sensor locator (2)
11. The steering wheel position sensor (1). Refer to **Steering Wheel Position Sensor Centering**.

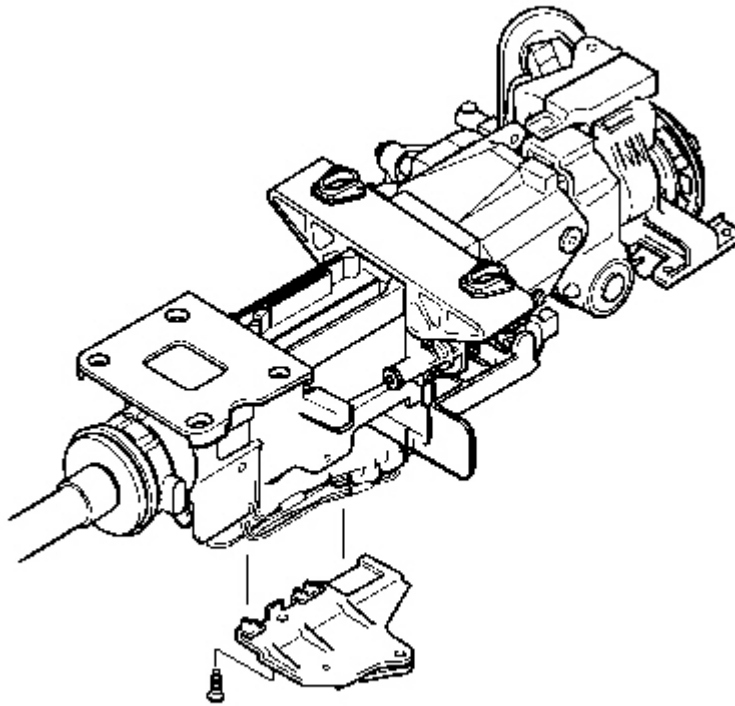


Fig. 70: View Of Gearshift & Tilt Motor Bracket & Screw (Power Tilt/Telescope, Floor Shift)
Courtesy of GENERAL MOTORS CORP.

12. Remove 1 TORX® head screw from the bottom of the gearshift and tilt motor bracket.
13. Remove the bracket.

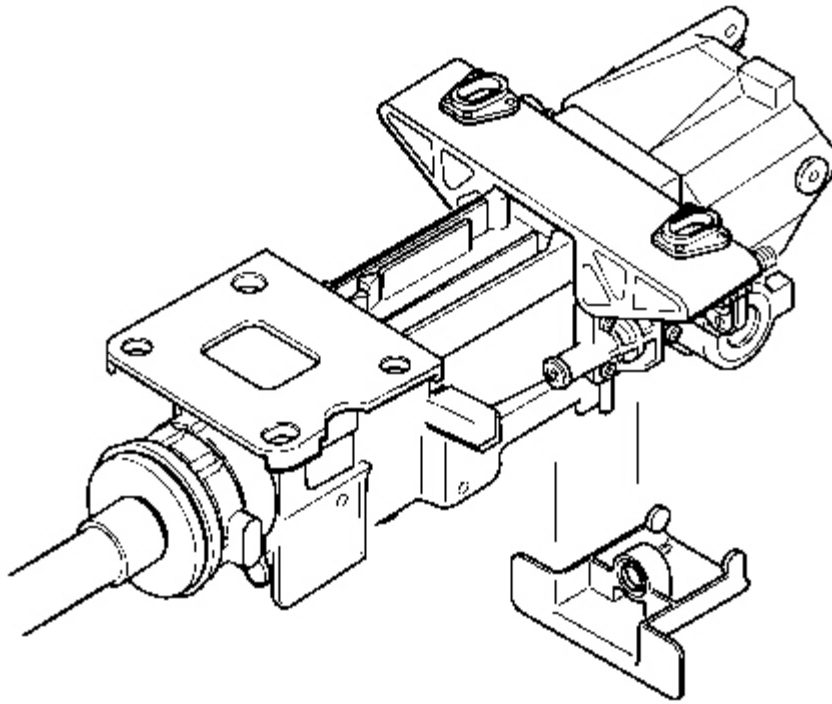


Fig. 71: View Of Lower Shield Assembly
Courtesy of GENERAL MOTORS CORP.

14. Gently pry the lower shield assembly off of the steering column.

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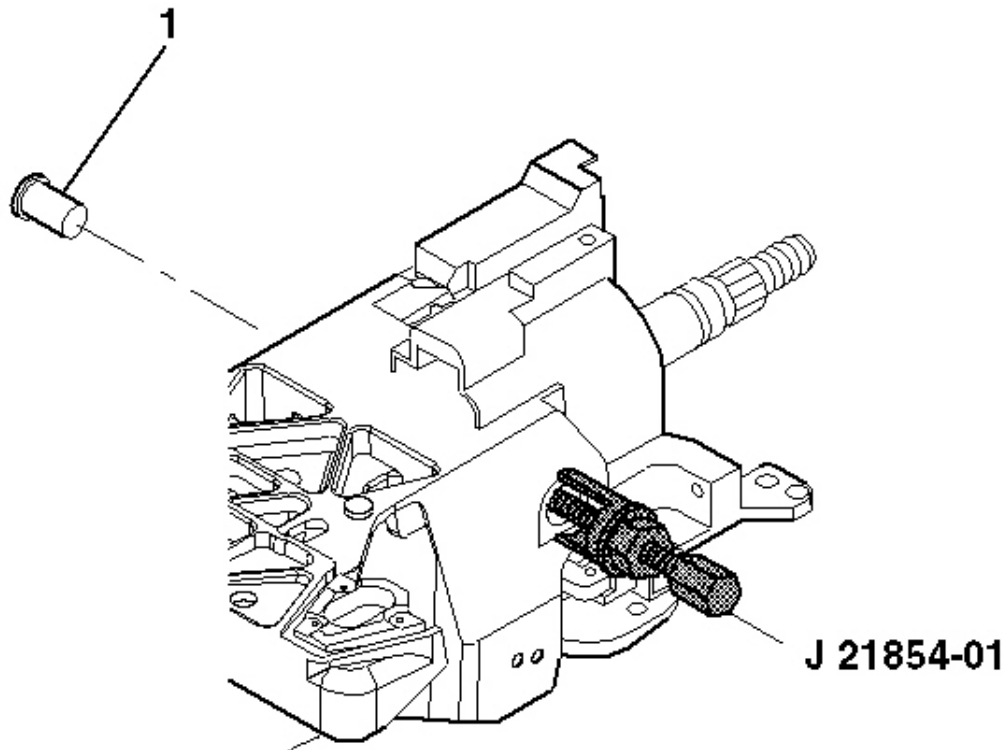


Fig. 72: View Of Pivot Pins & J 21854-01
Courtesy of GENERAL MOTORS CORP.

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

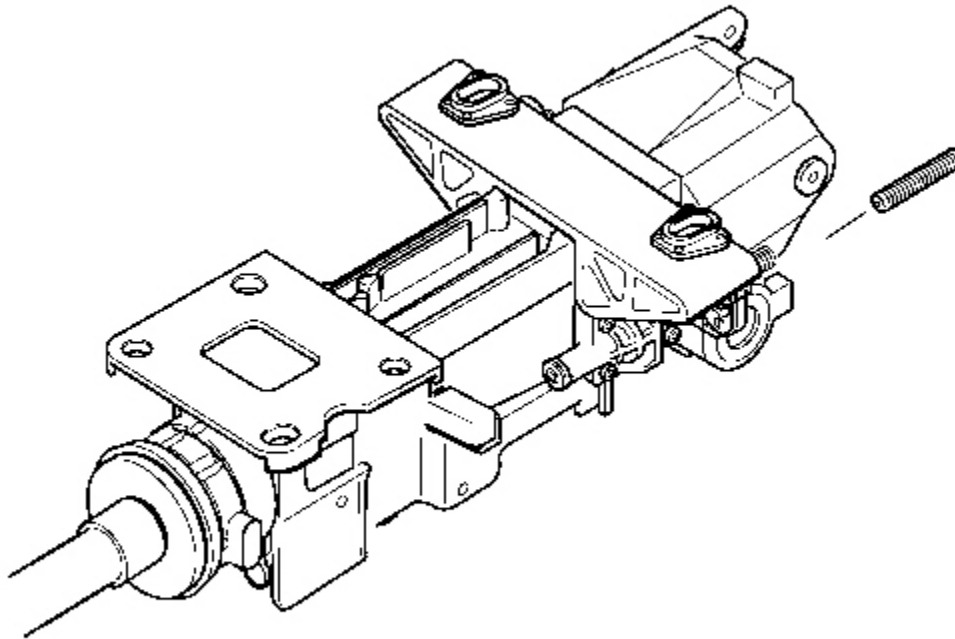


Fig. 73: View Of Lead Screw
Courtesy of GENERAL MOTORS CORP.

16. Unscrew the lead screw.

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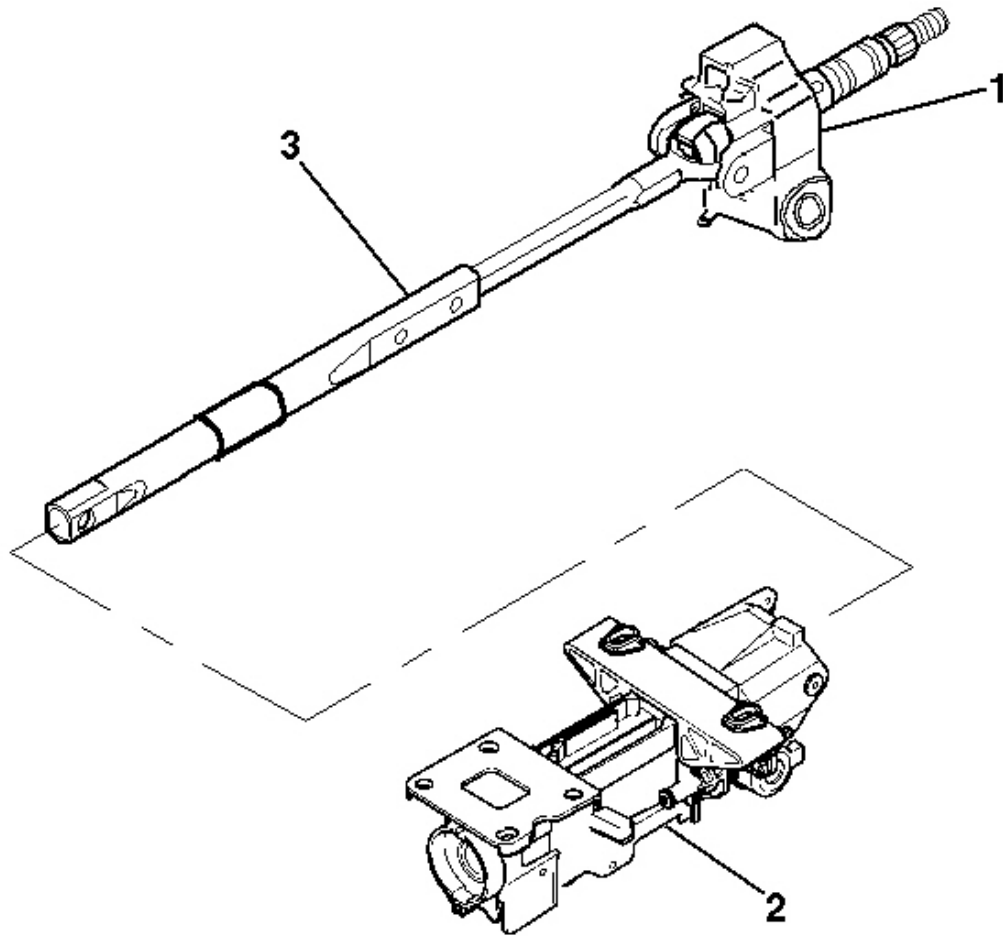


Fig. 74: View Of Tilt Head Assembly, Steering Column Support Assembly & Steering Shaft (Power Tilt\Telescope, Floor Shift)

Courtesy of GENERAL MOTORS CORP.

17. Remove the tilt head assembly (1) from the steering column support assembly (2) with the steering shaft (3) still attached.

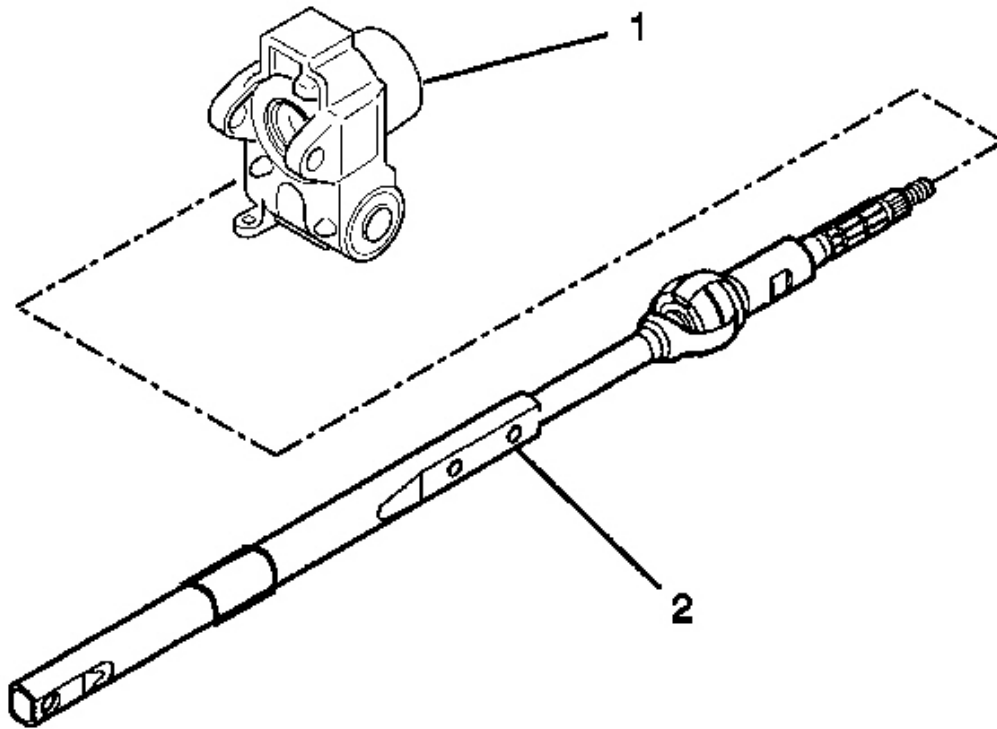


Fig. 75: View Of Tilt Head Assembly & Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

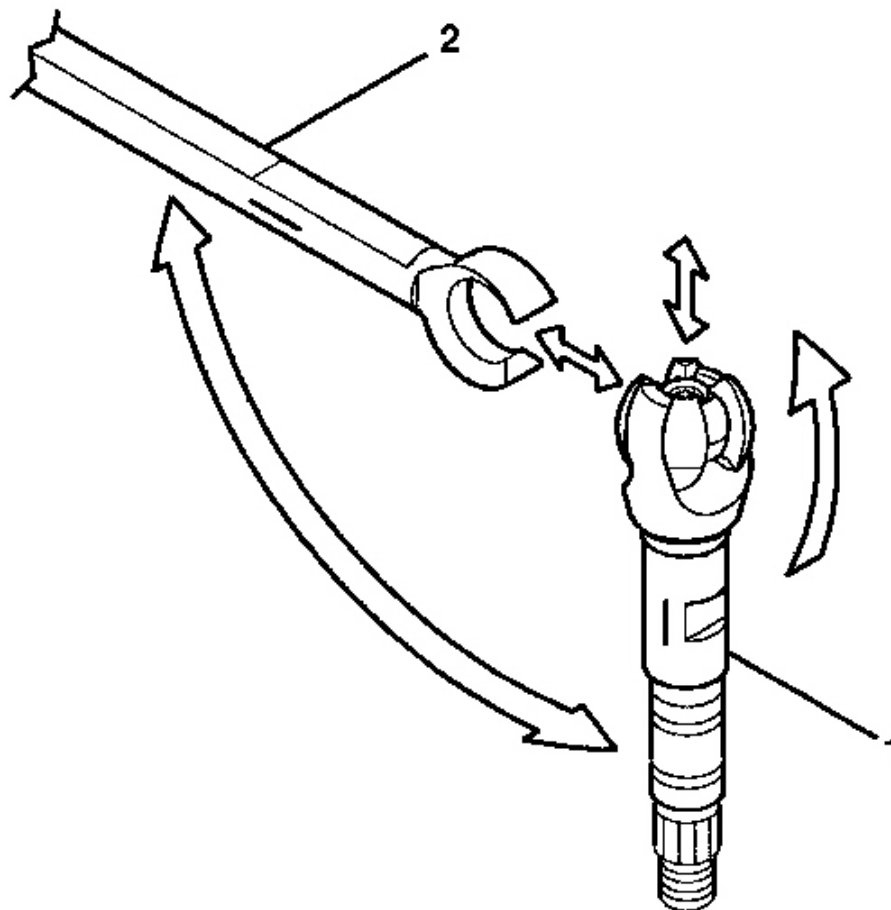


Fig. 76: Tilting Upper Shaft Assembly 90 Degrees
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Mark the race and upper shaft (1) and the lower steering shaft (2) to ensure proper assembly. Failure to assemble properly will cause the steering wheel to be turned 180 degrees.

19. Tilt the upper shaft assembly 90 degrees to the steering shaft assembly and disengage.

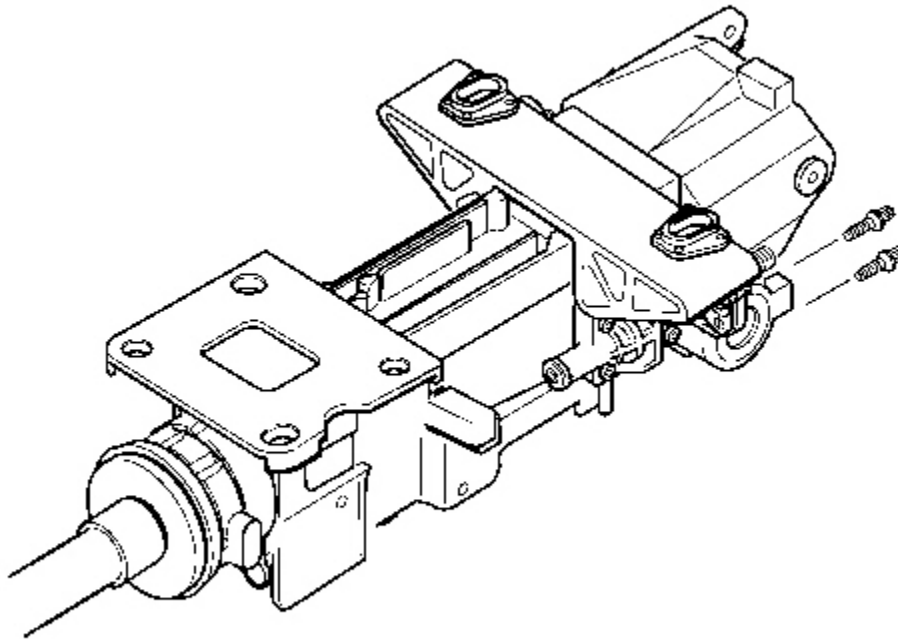


Fig. 77: View Of Dampener Screws
Courtesy of GENERAL MOTORS CORP.

20. Remove 2 TORX® screws from the dampener.

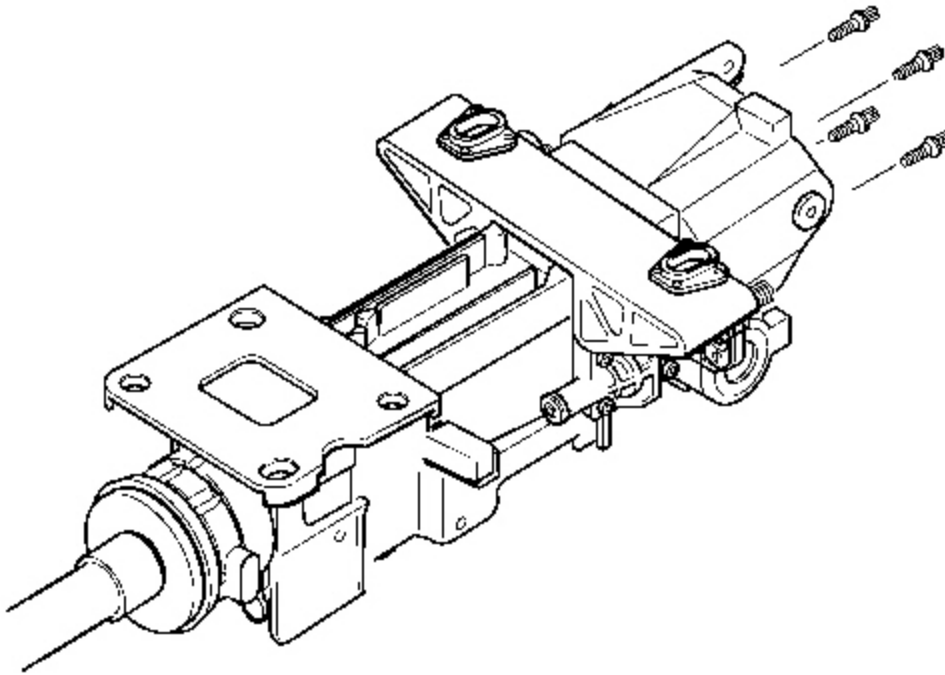


Fig. 78: View Of Steering Column Support Screws
Courtesy of GENERAL MOTORS CORP.

21. Remove and discard 4 support screws from the steering column support.
22. Remove the steering column support.
23. Inspect the steering column for accident damage.

Installation Procedure

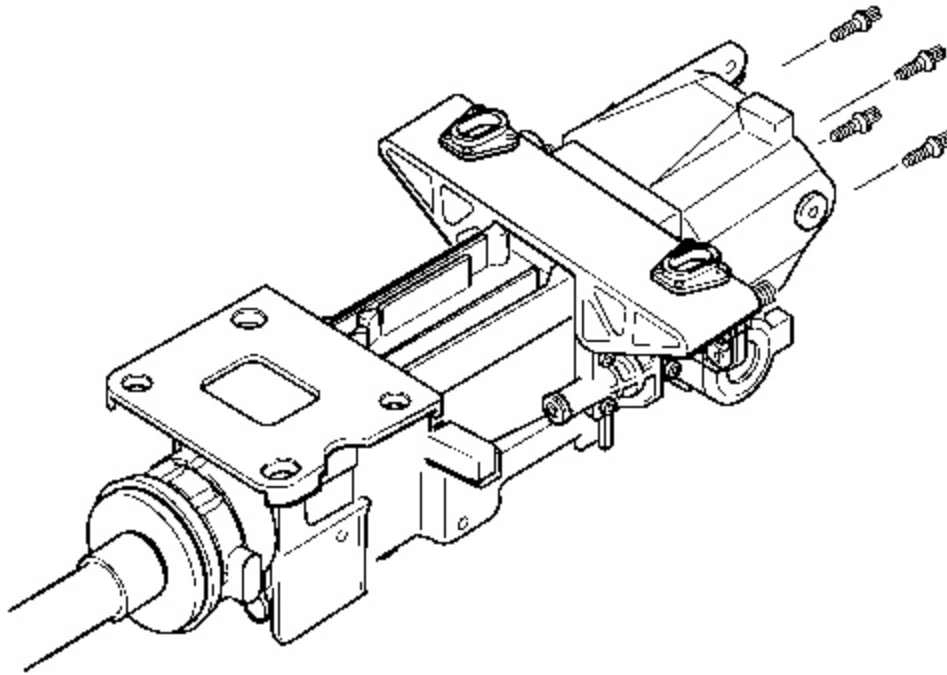


Fig. 79: View Of Steering Column Support Screws
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the steering column support and secure the support using 4 support screws.

Tighten: Tighten the screws to 17 N.m (13 lb ft).

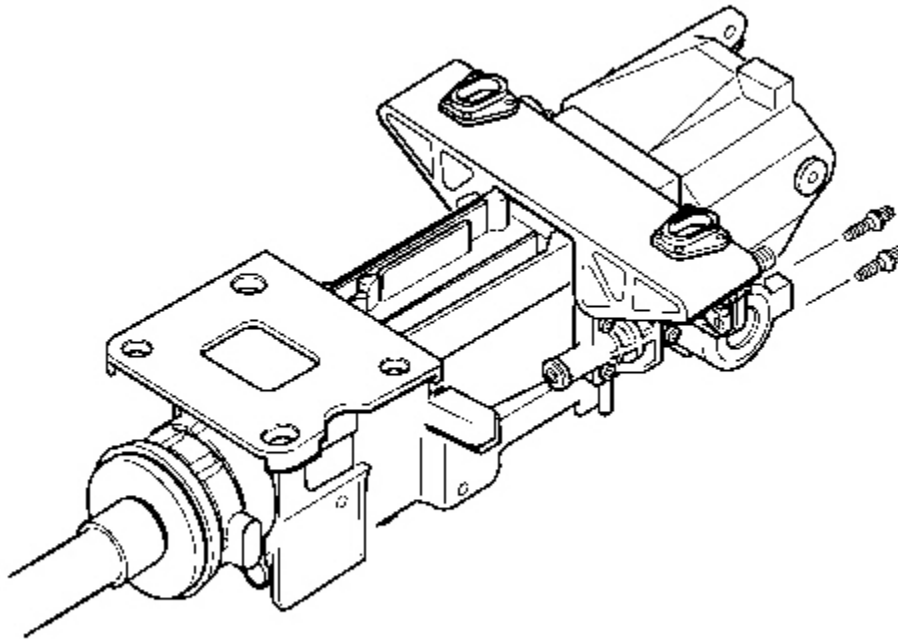


Fig. 80: View Of Dampener Screws
Courtesy of GENERAL MOTORS CORP.

2. Install 2 TORX® screws into the dampener.

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

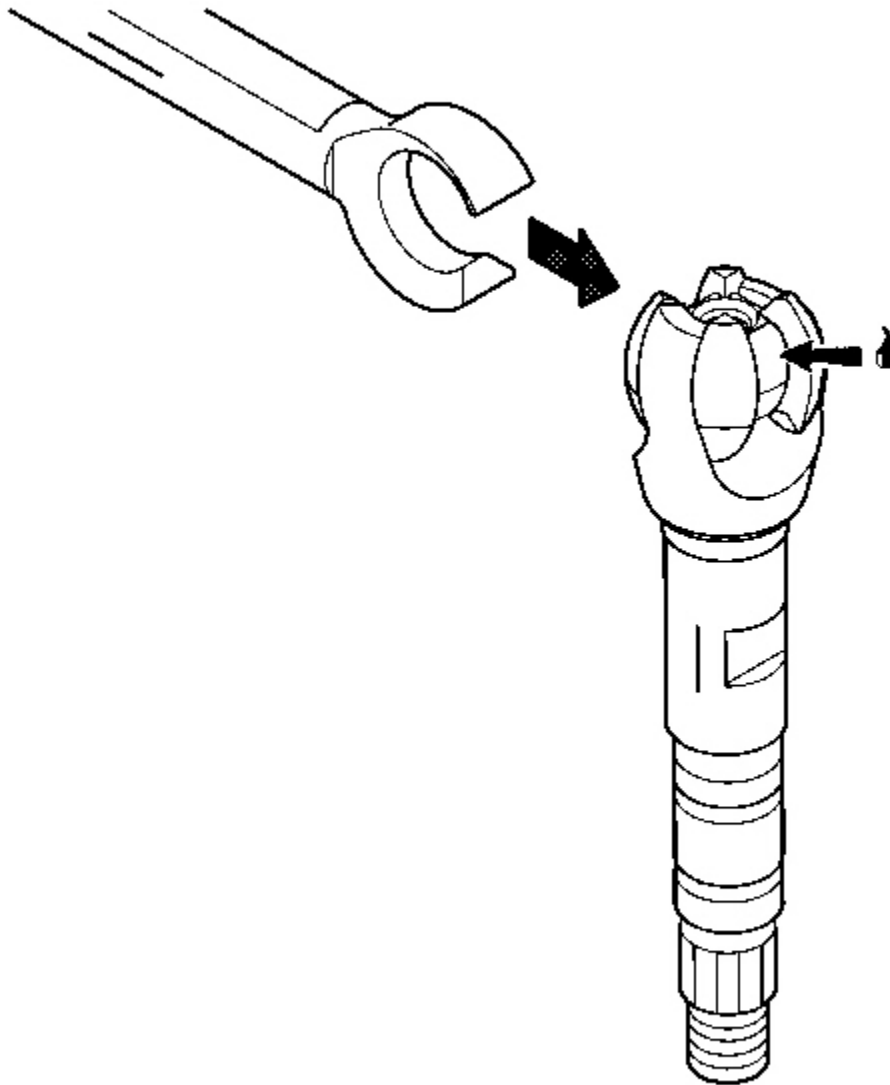


Fig. 81: Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Use the alignment marks from the disassemble procedure. Failure to assemble properly will cause the steering wheel to be turned 180 degrees.

3. Apply GM P/N 12345718 (Canadian P/N 10953516) to the race and upper shaft assembly.
4. Align the marks on the race and upper shaft assembly with the lower shaft assembly.

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5. Install the lower shaft assembly to the race and upper shaft assembly.

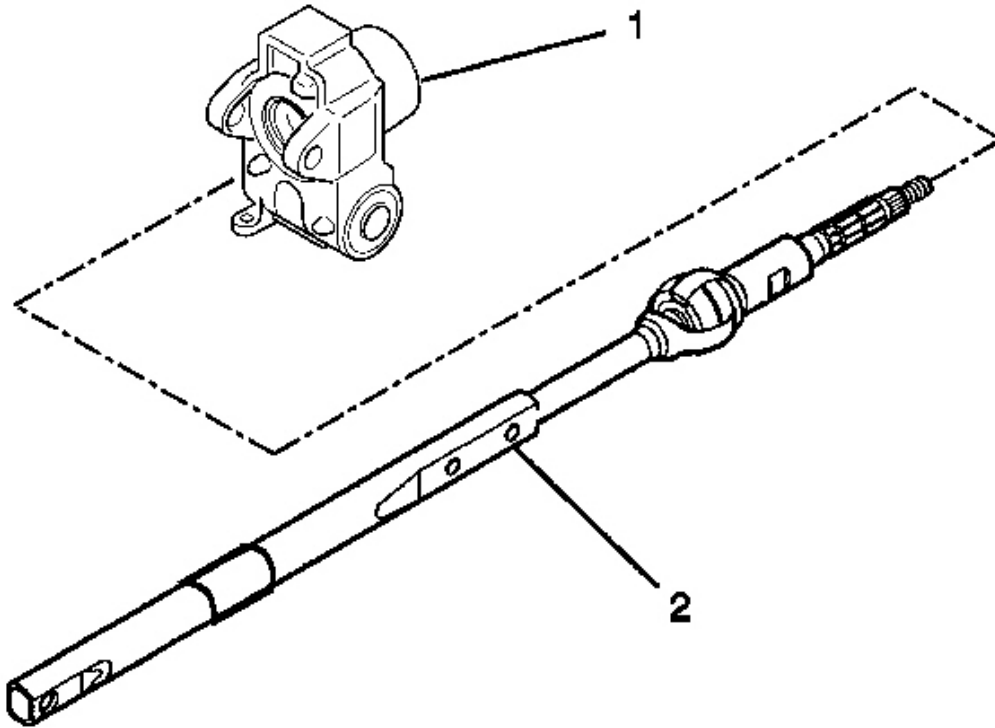


Fig. 82: View Of Tilt Head Assembly & Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

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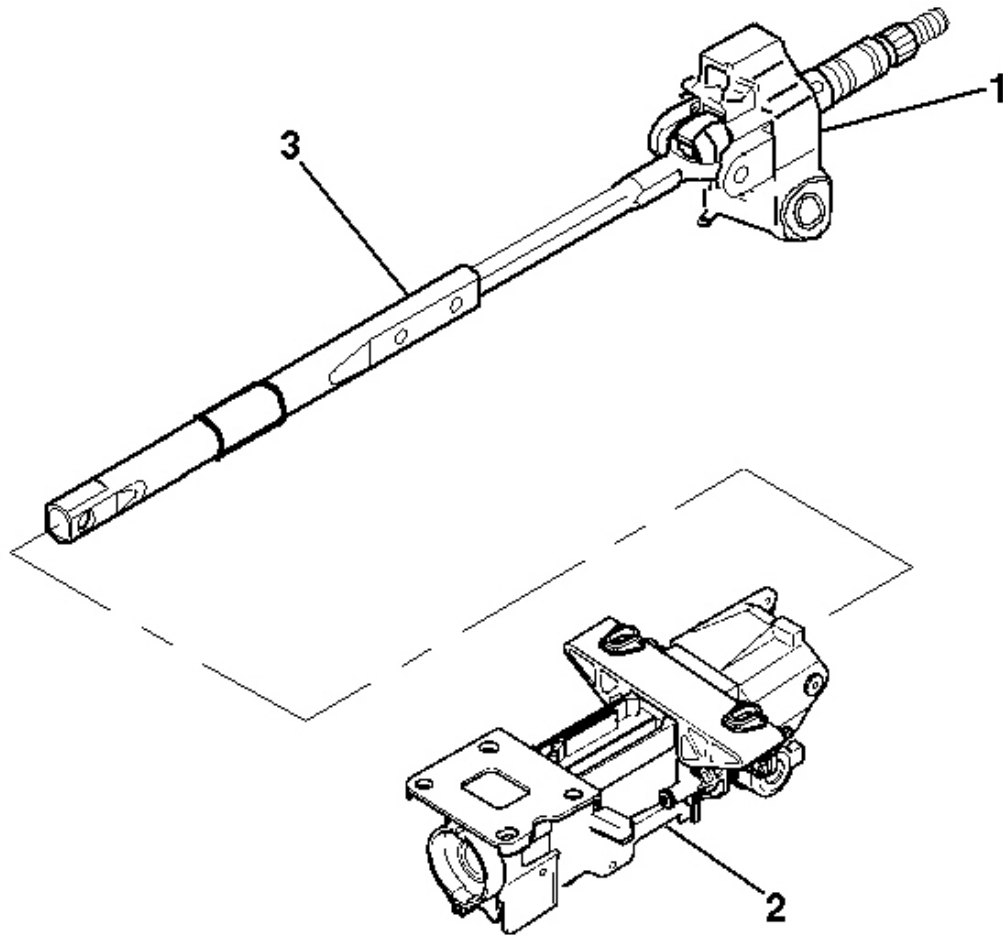


Fig. 83: View Of Tilt Head Assembly, Steering Column Support Assembly & Steering Shaft (Power Tilt/Telescope, Floor Shift)

Courtesy of GENERAL MOTORS CORP.

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

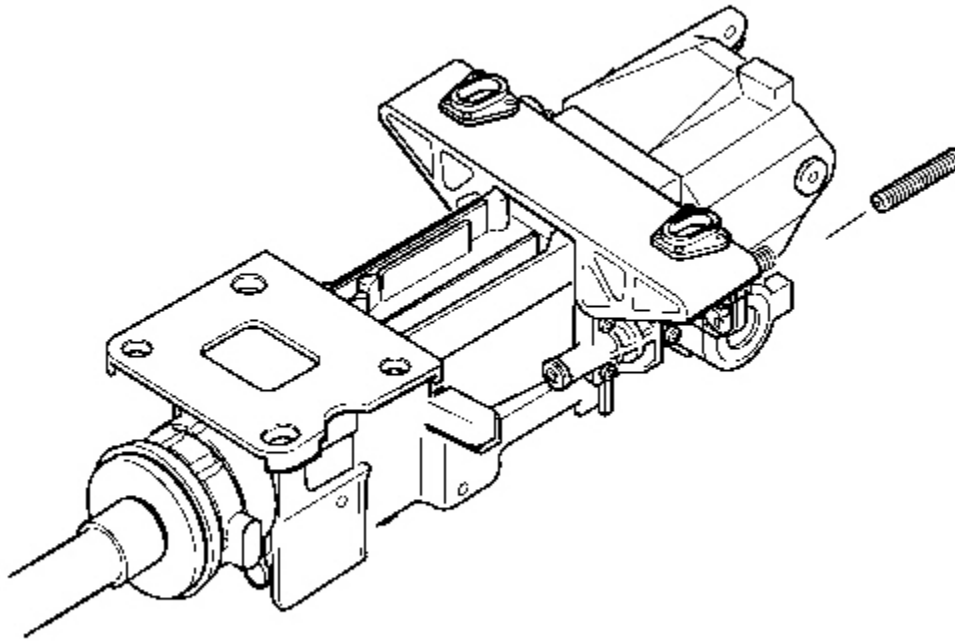


Fig. 84: View Of Lead Screw
Courtesy of GENERAL MOTORS CORP.

8. Install the lead screw.

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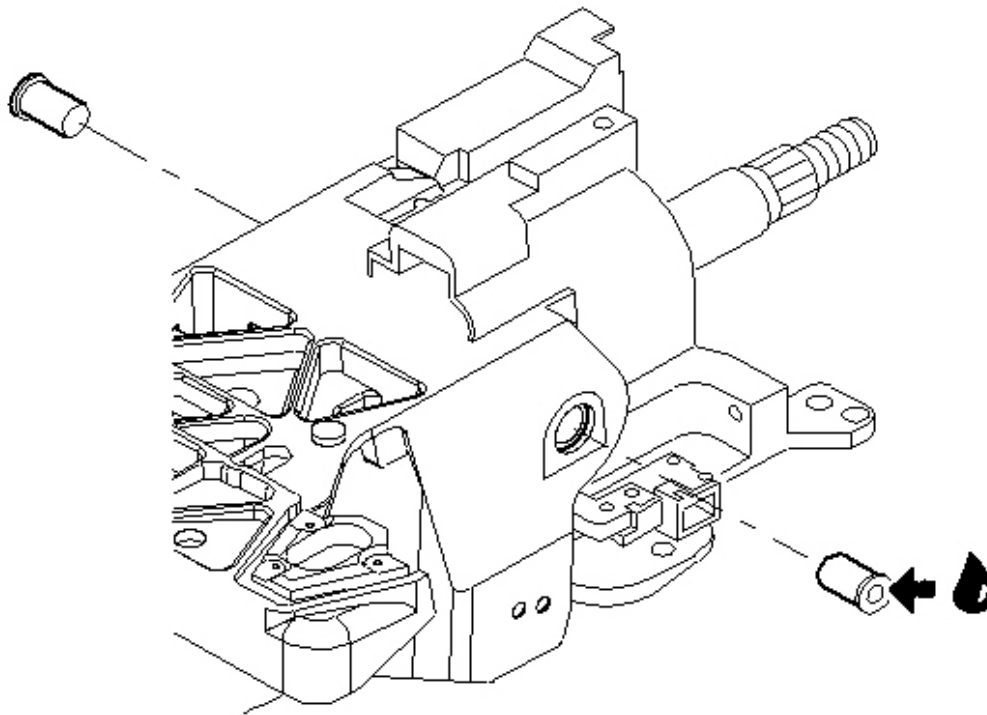


Fig. 85: View Of Pivot Pins (Power Tilt/Telescope, Floor Shift)
Courtesy of GENERAL MOTORS CORP.

9. Lubricate the pivot pins with GM P/N 12345718 (Canadian P/N 10953516).

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

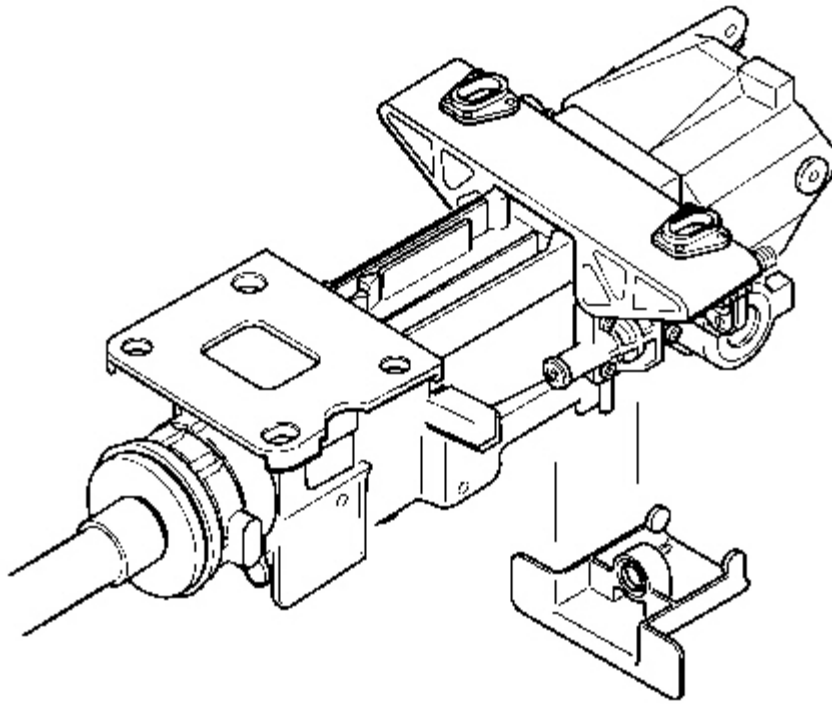


Fig. 86: View Of Lower Shield Assembly
Courtesy of GENERAL MOTORS CORP.

10. Align and snap the lower shield assembly onto the steering column.

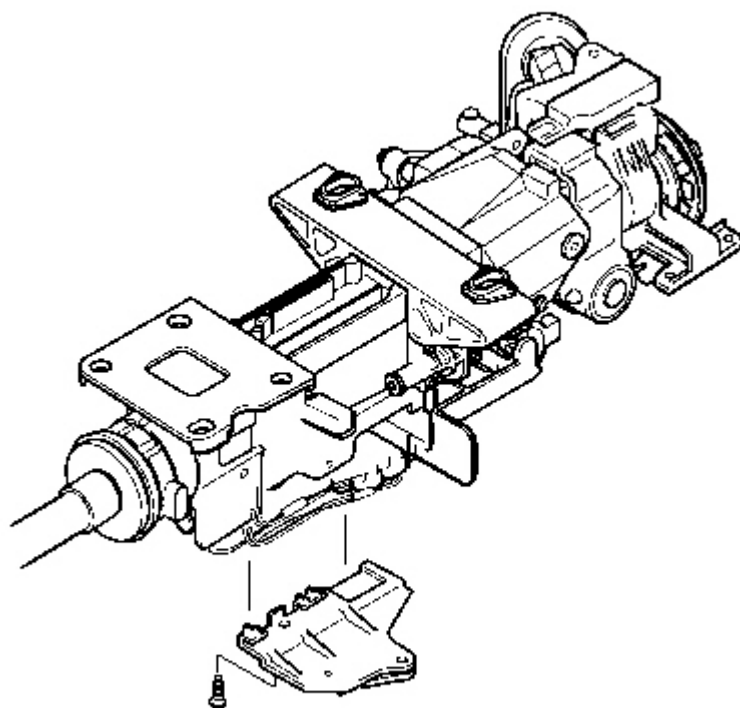


Fig. 87: View Of Gearshift & Tilt Motor Bracket & Screw (Power Tilt/Telescope, Floor Shift)
Courtesy of GENERAL MOTORS CORP.

11. Install the bracket.
12. Install 1 TORX® head screw to the bottom of the gearshift and tilt motor bracket.

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

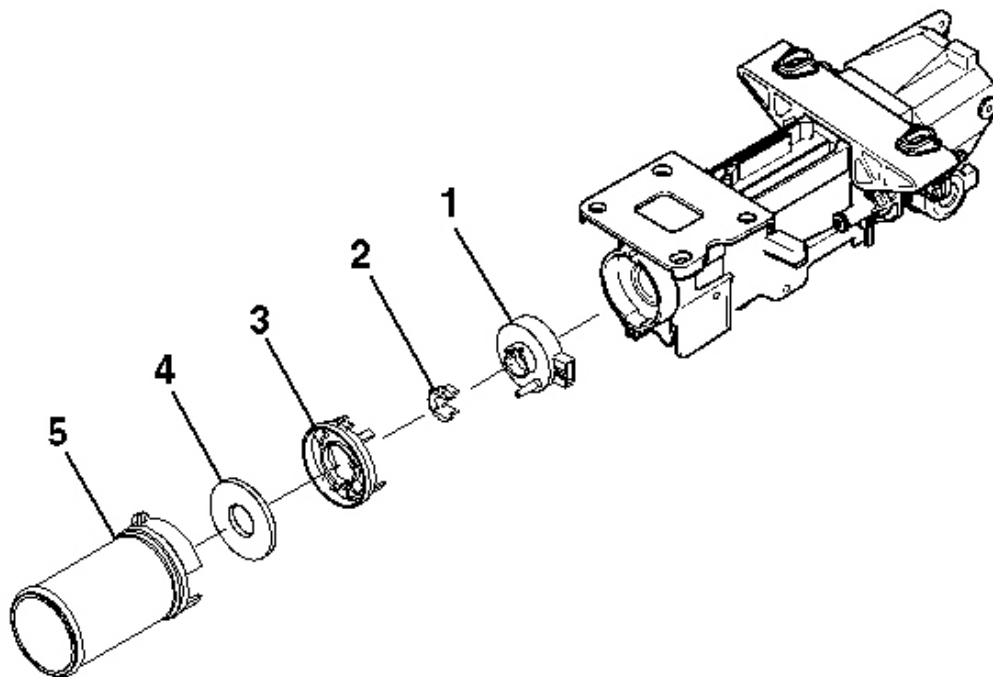


Fig. 88: View Of Lower Steering Column Components (Power Tilt\Telescope, Floor Shift)
Courtesy of GENERAL MOTORS CORP.

13. Install the following components:
 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)

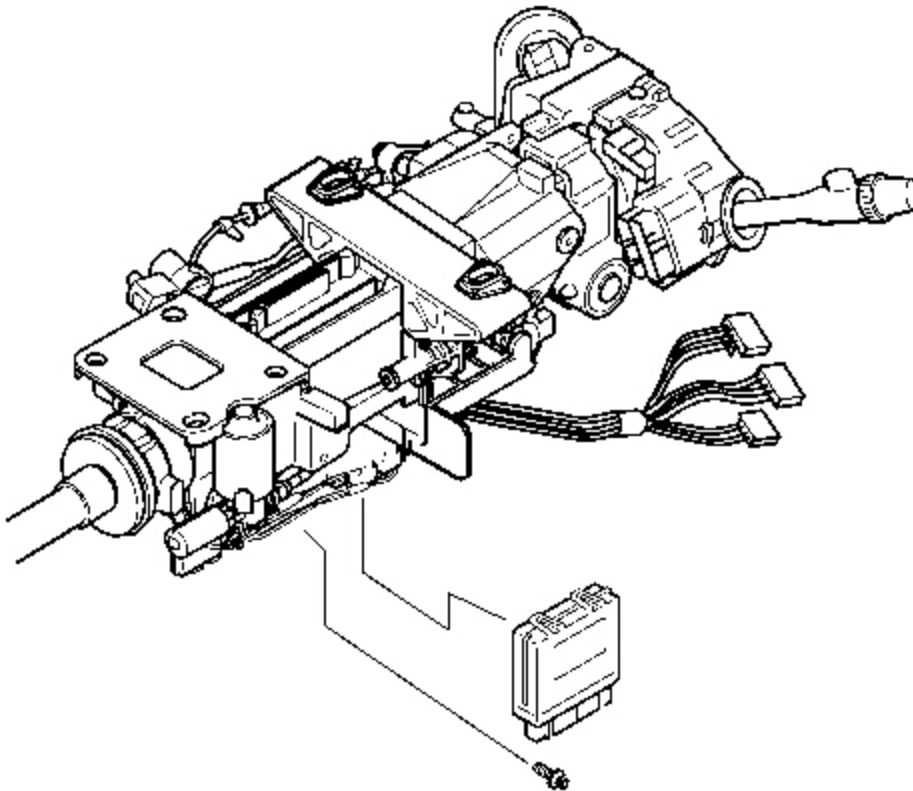


Fig. 89: View Of Control Module & Screw (Power Tilt/Telescope, Floor Shift)
Courtesy of GENERAL MOTORS CORP.

14. Slide the control module into position.
15. Install 1 retaining screw.

Tighten: Tighten the screw to 5 N.m (44 lb in).

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

16. Install the tilt drive motor assembly and cable only. Refer to **Tilt Motor Replacement**.
17. Install the telescope drive motor assembly and cable only. Refer to **Telescope Actuator Assembly Replacement**.
18. Install the turn signal and multifunction switch assembly only. Refer to **Multifunction, Turn Signal**

Switch Replacement.

19. Install the wire harness assembly only. Refer to **Wire Harness Assembly Replacement (Power Tilt and Telescope)**.
20. Install the steering column into the vehicle. Refer to **Steering Column Replacement**.
21. Install the steering wheel onto the steering column. Refer to **Steering Wheel Replacement**.
22. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

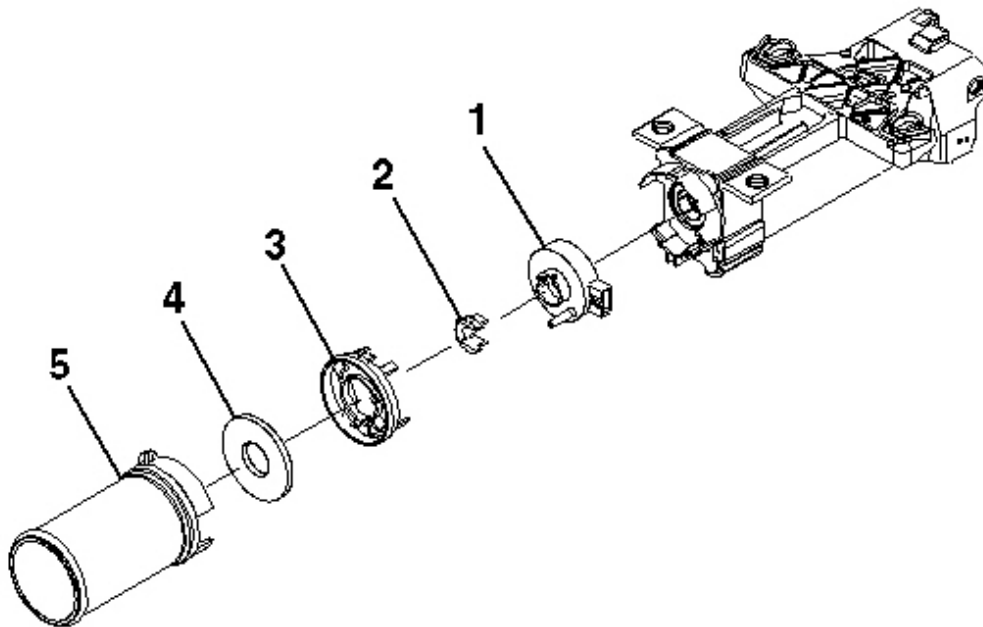
STEERING WHEEL POSITION SENSOR OR STEERING SHAFT LOWER BEARING REPLACEMENT**Removal Procedure**

Fig. 90: 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.

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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**.

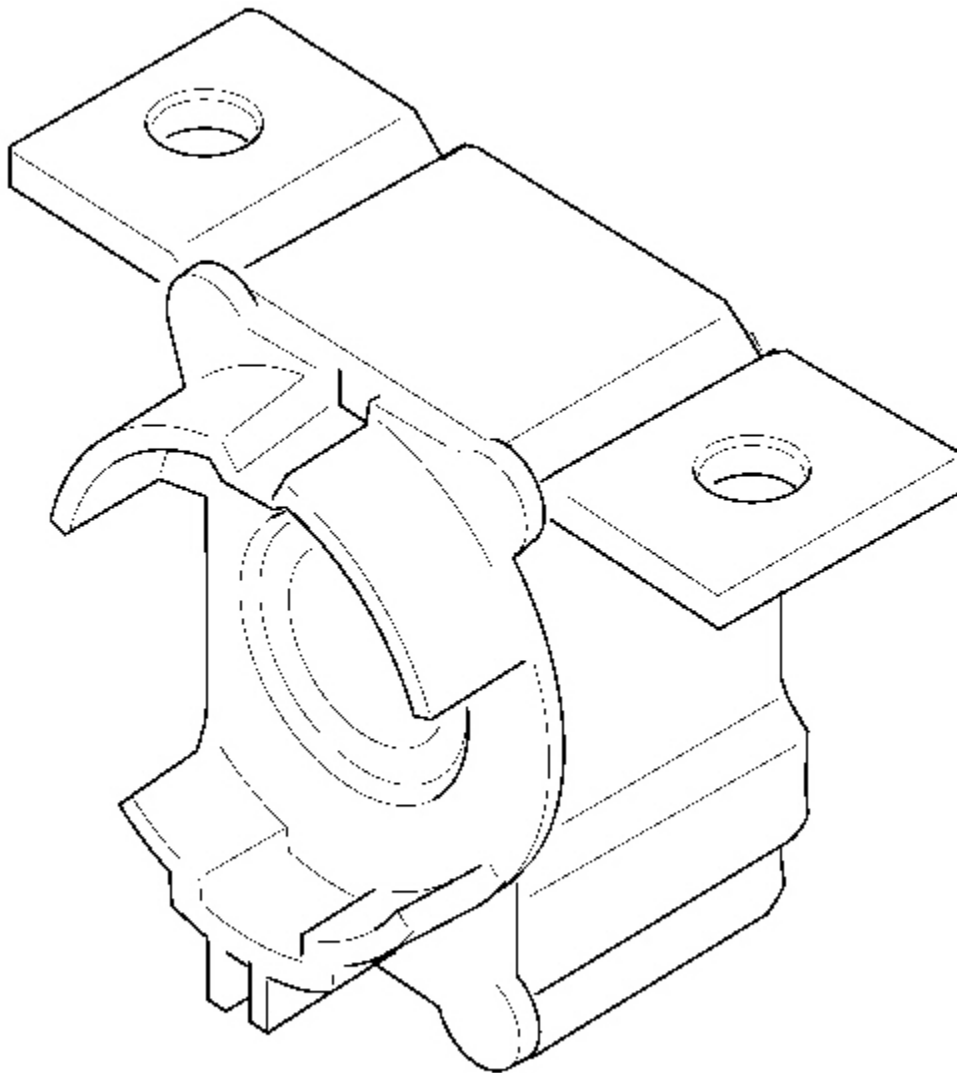


Fig. 91: View Of Lower Bearing Adapter
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

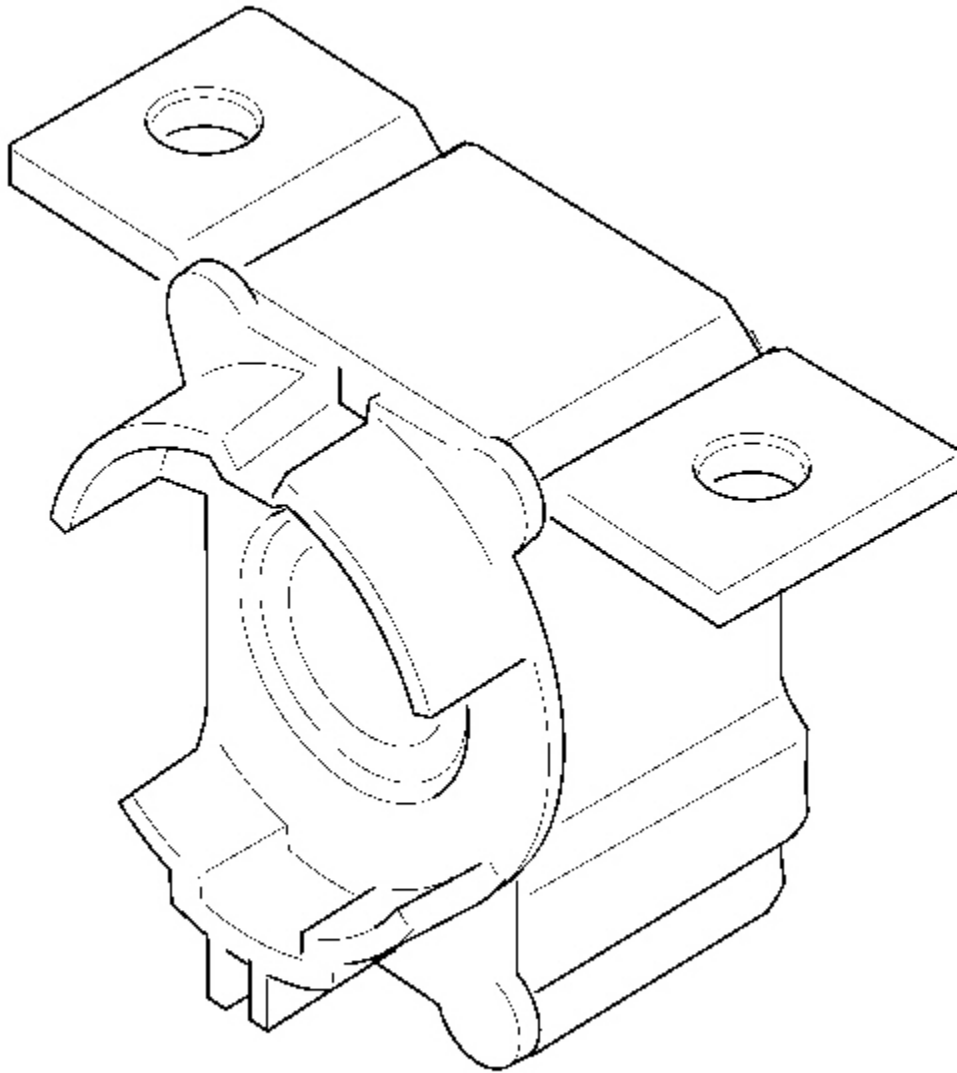


Fig. 92: View Of Lower Bearing Adapter
Courtesy of GENERAL MOTORS CORP.

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

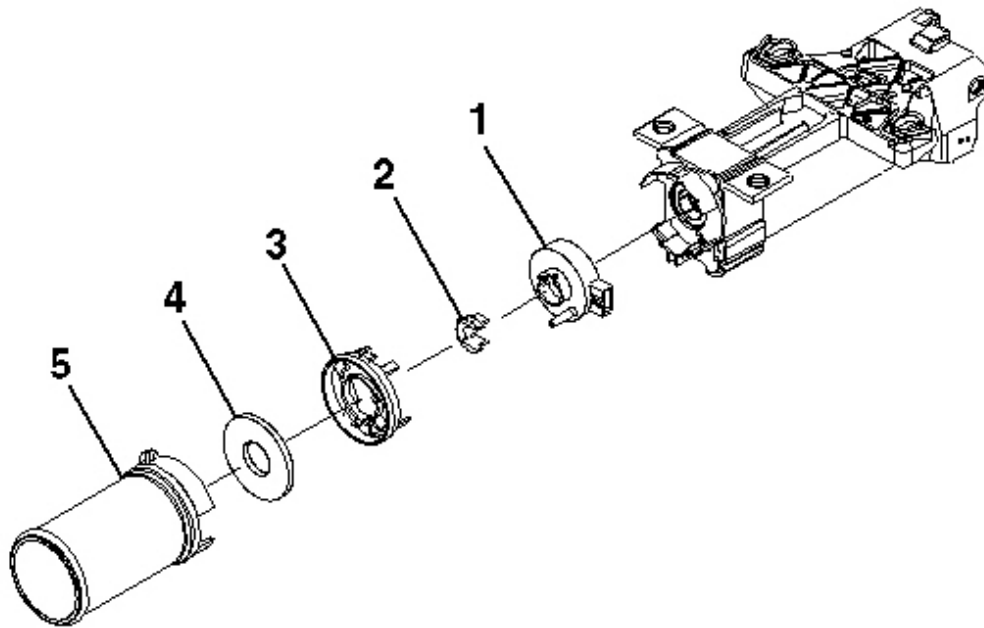


Fig. 93: Identifying Lower Steering Column Components
Courtesy of GENERAL MOTORS CORP.

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.

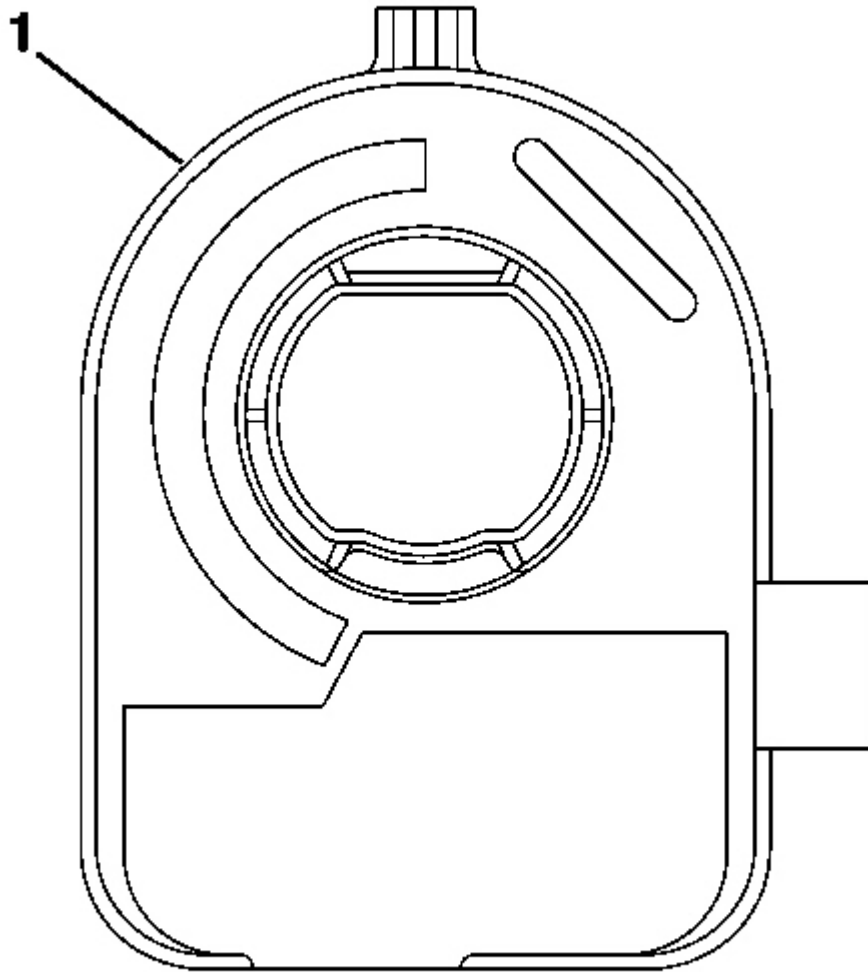


Fig. 94: Front Of The Sensor Connector Will Be On The Right
Courtesy of GENERAL MOTORS CORP.

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.

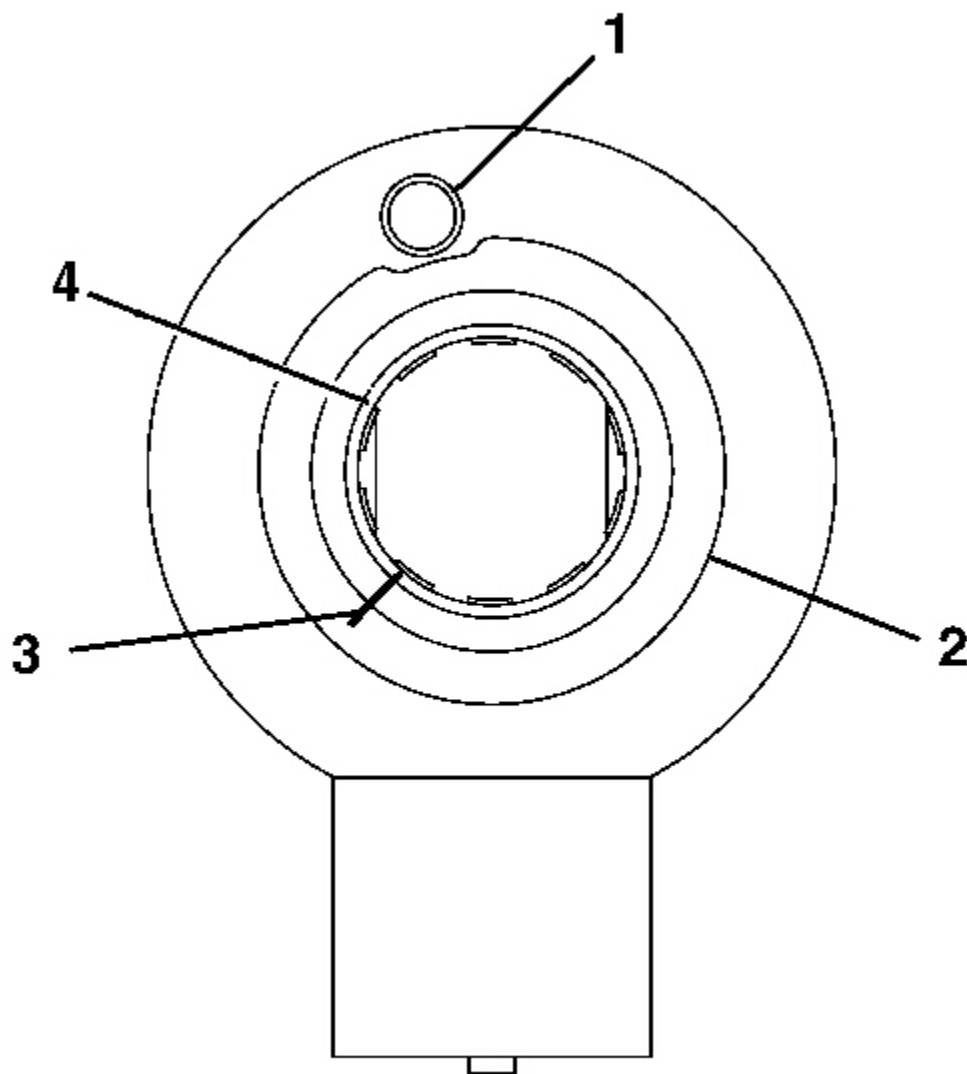


Fig. 95: Steering Wheel Position Sensor Foam Ring, Pin Hole And Rotor Flange Cuff
Courtesy of GENERAL MOTORS CORP.

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

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- 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.

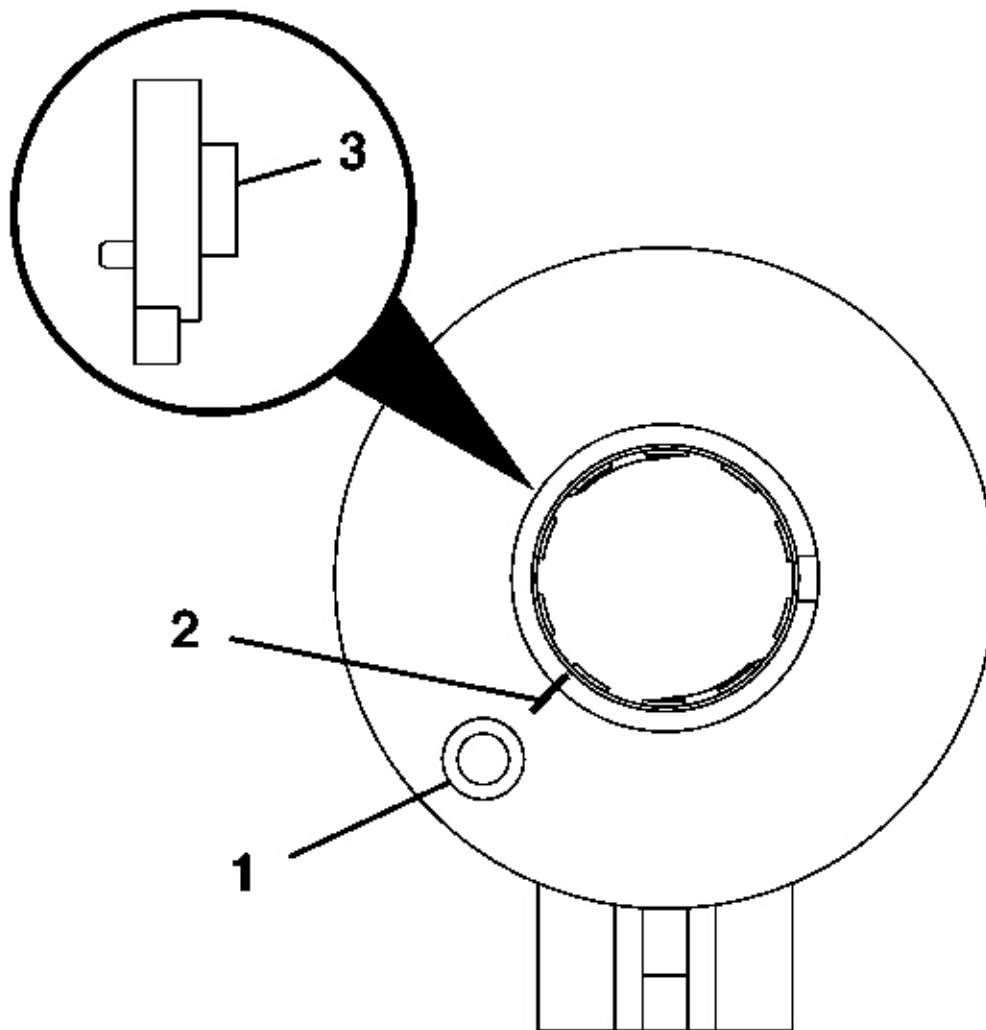


Fig. 96: Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

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.

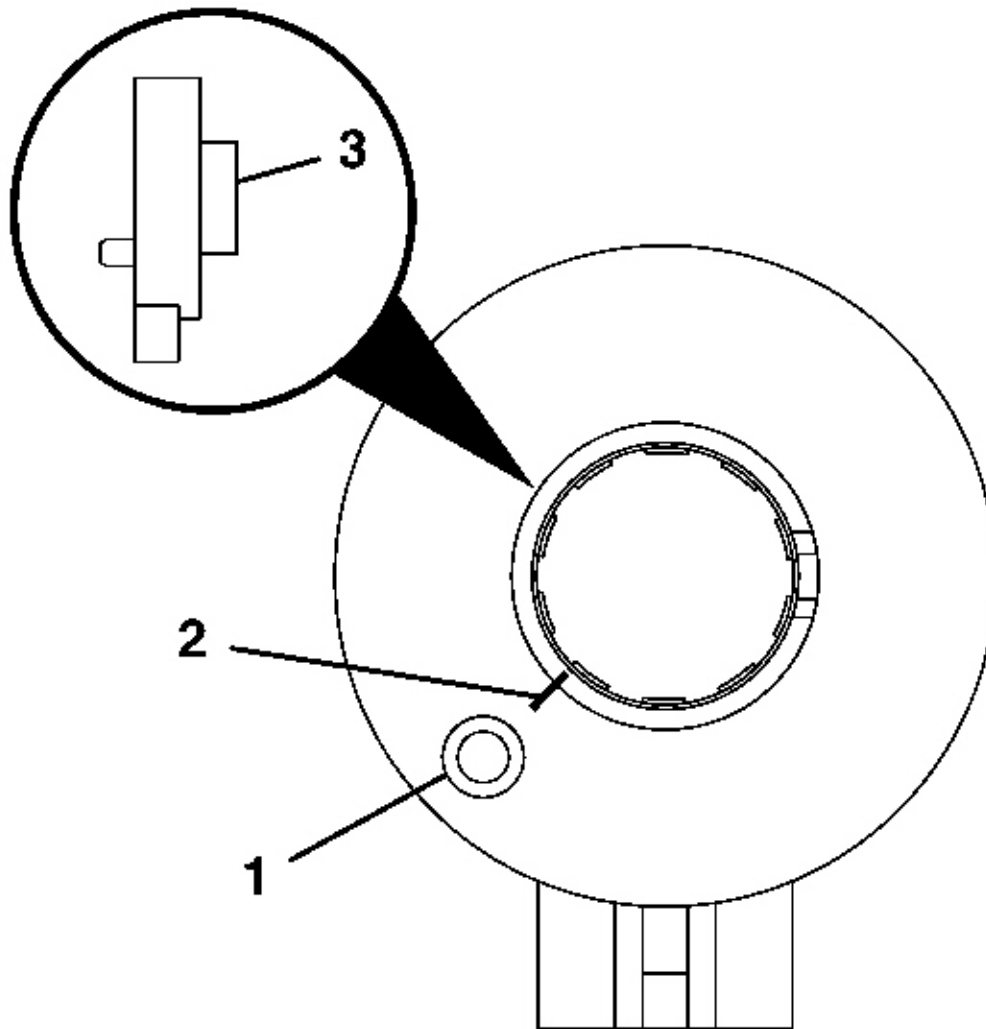


Fig. 97: Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

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.

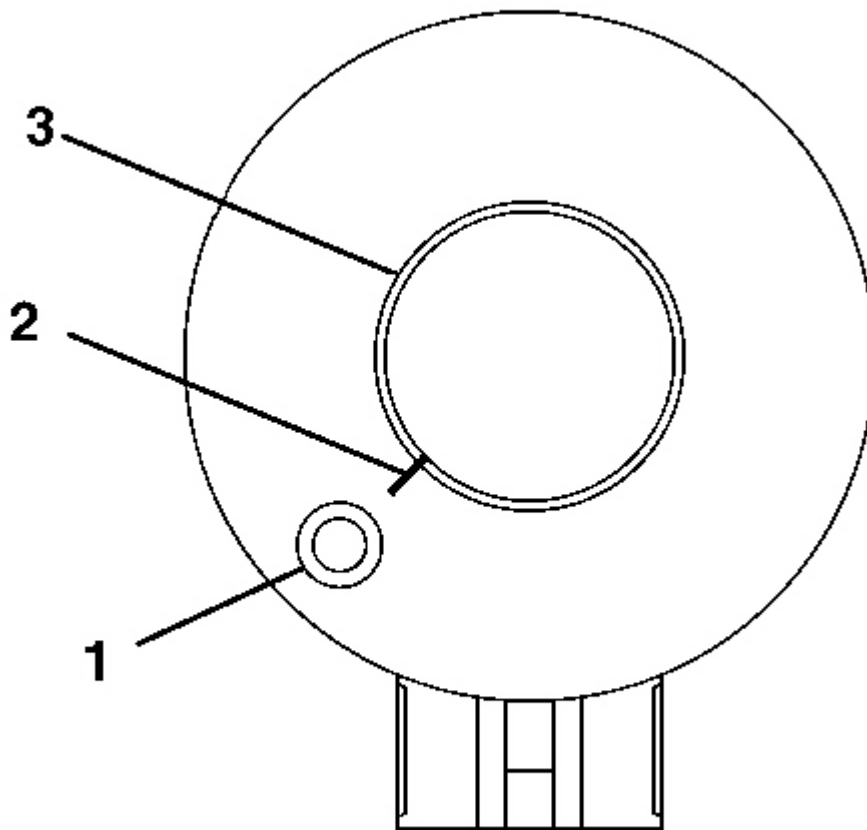


Fig. 98: Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole And Alignment Mark

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.

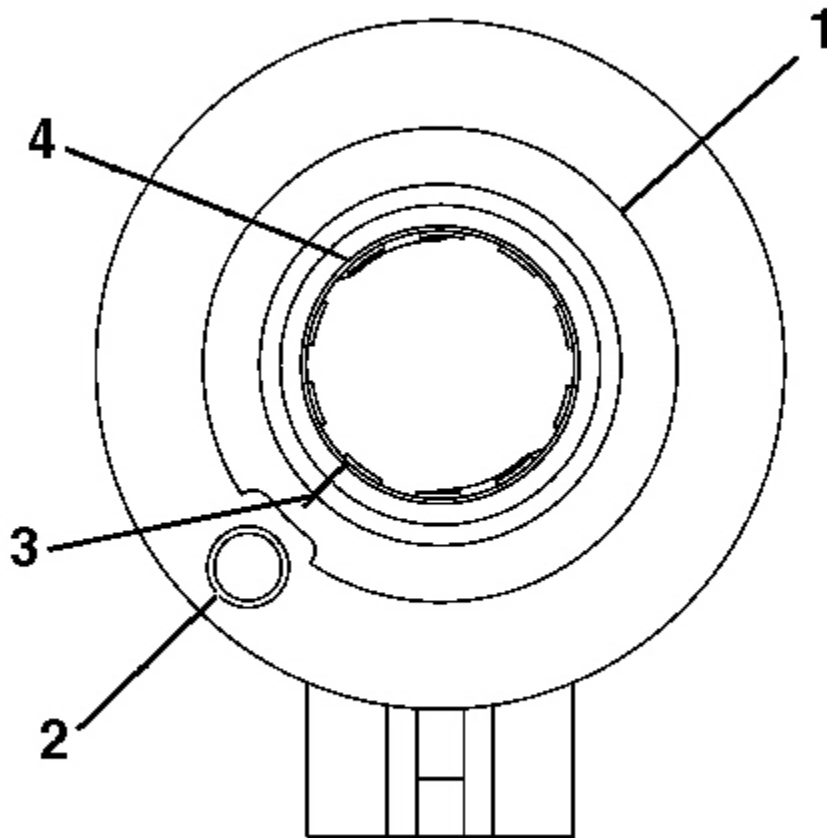


Fig. 99: Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole, Alignment Mark And Foam Ring
Courtesy of GENERAL MOTORS CORP.

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

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- A foam ring (1)
25. Remove the connector from the sensor.
 26. Remove the sensor from the adapter and bearing assembly.
 27. To install the sensor, proceed to step 21 in the installation procedure.

Installation Procedure

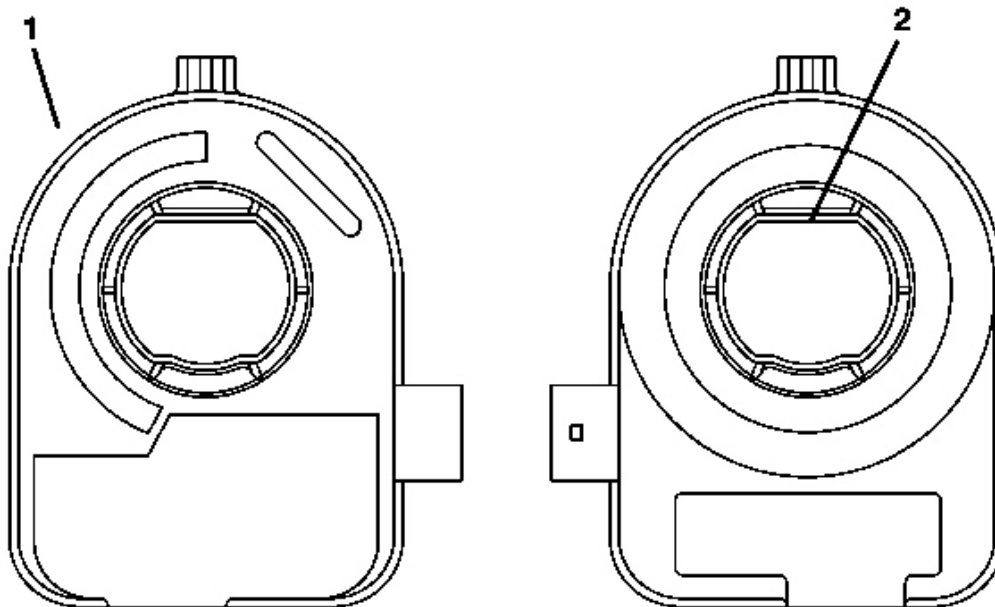


Fig. 100: Front And Back Views Of Steering Wheel Position Sensor
Courtesy of GENERAL MOTORS CORP.

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.

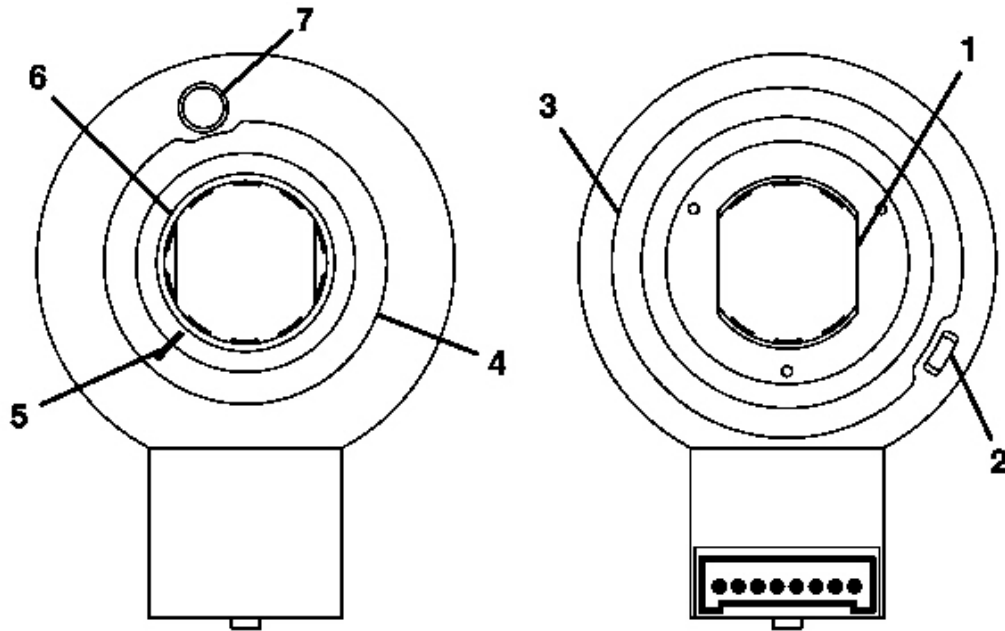


Fig. 101: Steering Wheel Position Sensor Identification Points
 Courtesy of GENERAL MOTORS CORP.

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.

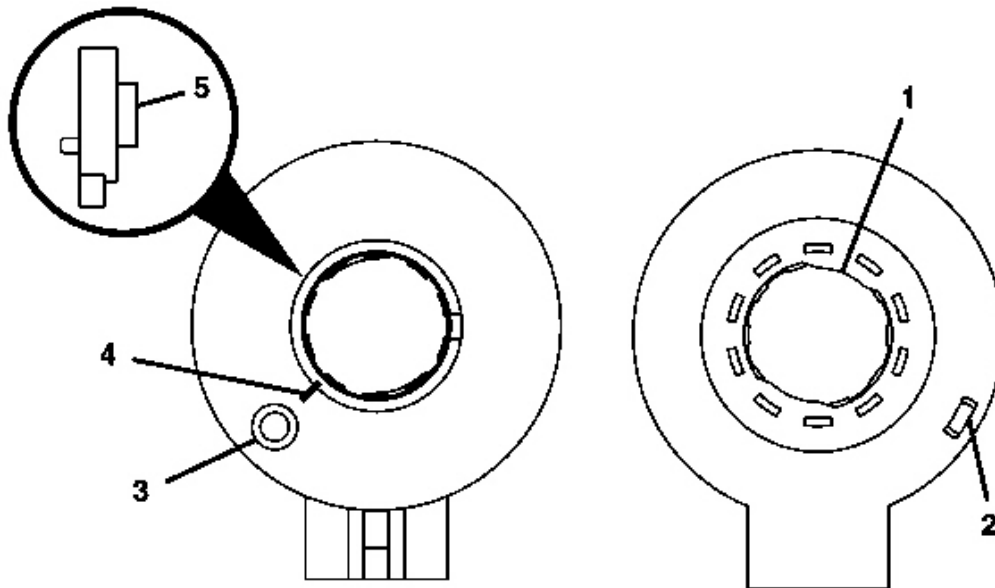


Fig. 102: Steering Wheel Position Sensor Front View
Courtesy of GENERAL MOTORS CORP.

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.

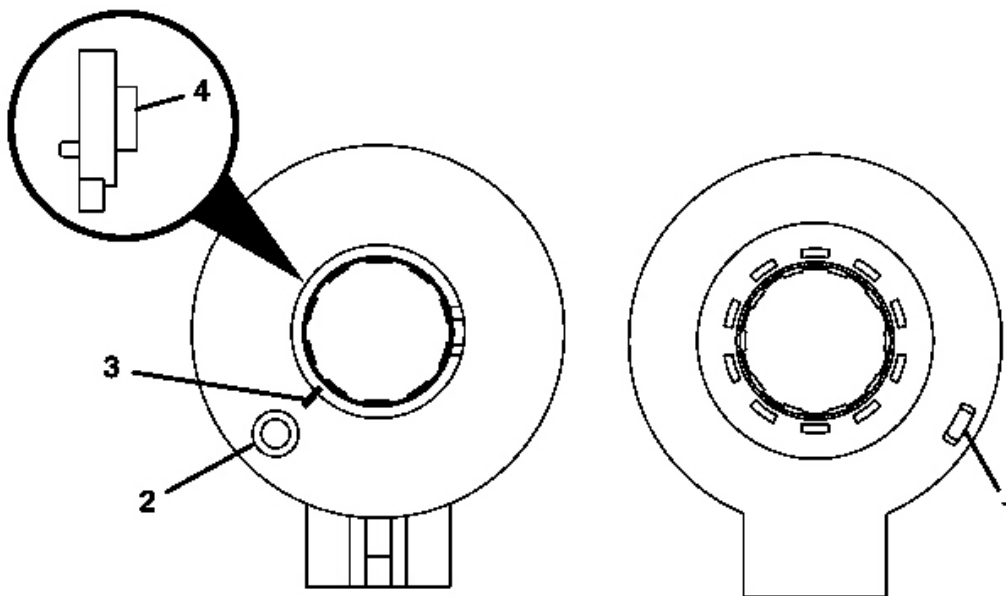


Fig. 103: Steering Wheel Position Sensor Centering Pin Hole, Rotor Flange Cuff And Alignment Mark

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.

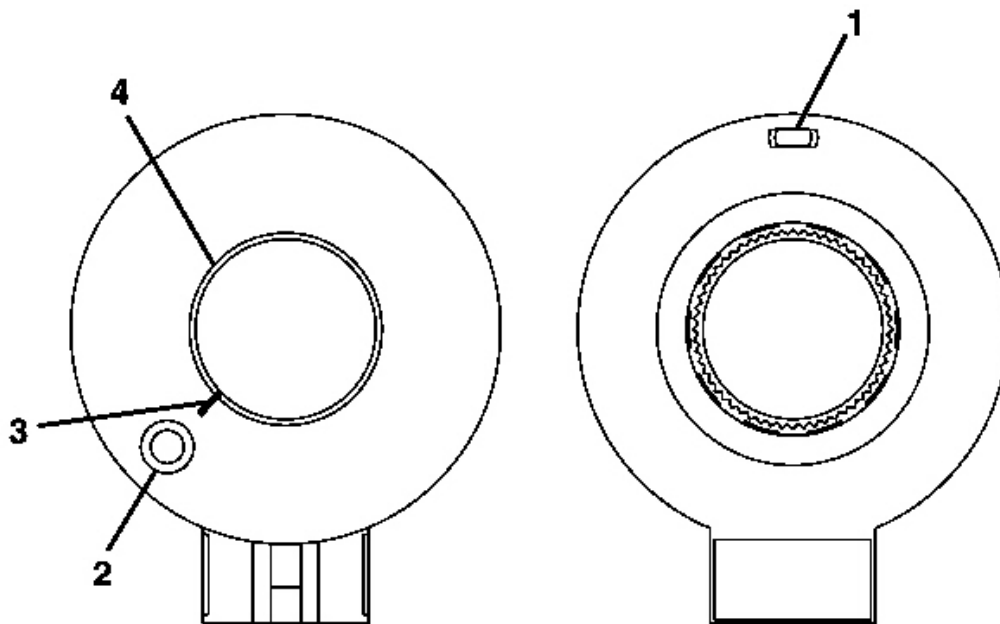


Fig. 104: Steering Wheel Position Sensor Center Pin, Rotor Flange Cuff And Installation Alignment Mark
Courtesy of GENERAL MOTORS CORP.

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.

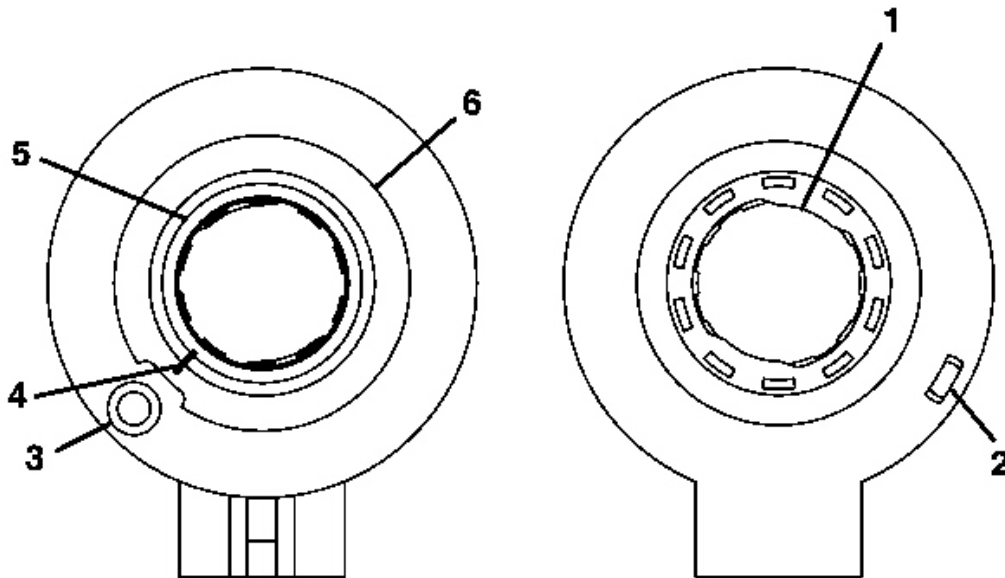


Fig. 105: Steering Wheel Position Sensor Double D Flats
Courtesy of GENERAL MOTORS CORP.

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

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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.

TILT MOTOR REPLACEMENT

Removal Procedure

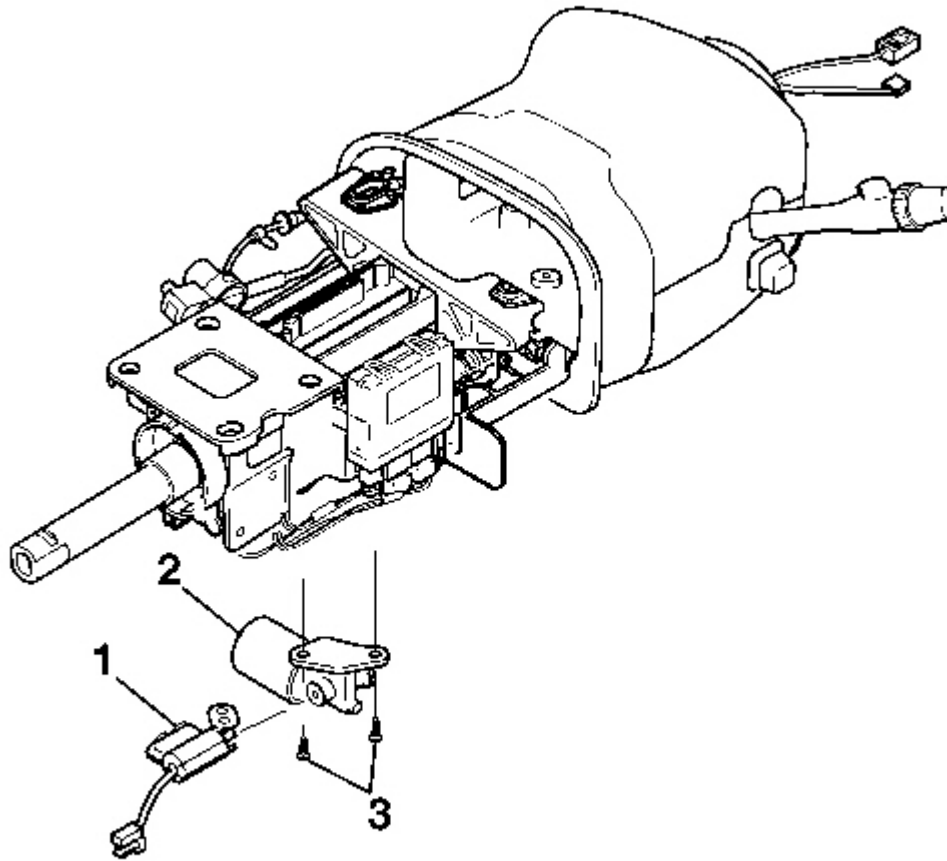


Fig. 106: View Of Potentiometer Housing, Tilt Drive Motor Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution in Cautions and Notices.

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. To remove the tilt drive motor assembly (2) perform the following procedure:
 1. Disconnect the connectors of the tilt drive motor assembly (2).

2. Remove the 2 TORX® head screws (3).
3. Remove the tilt drive motor assembly (2).
4. Pull off the potentiometer housing (1).

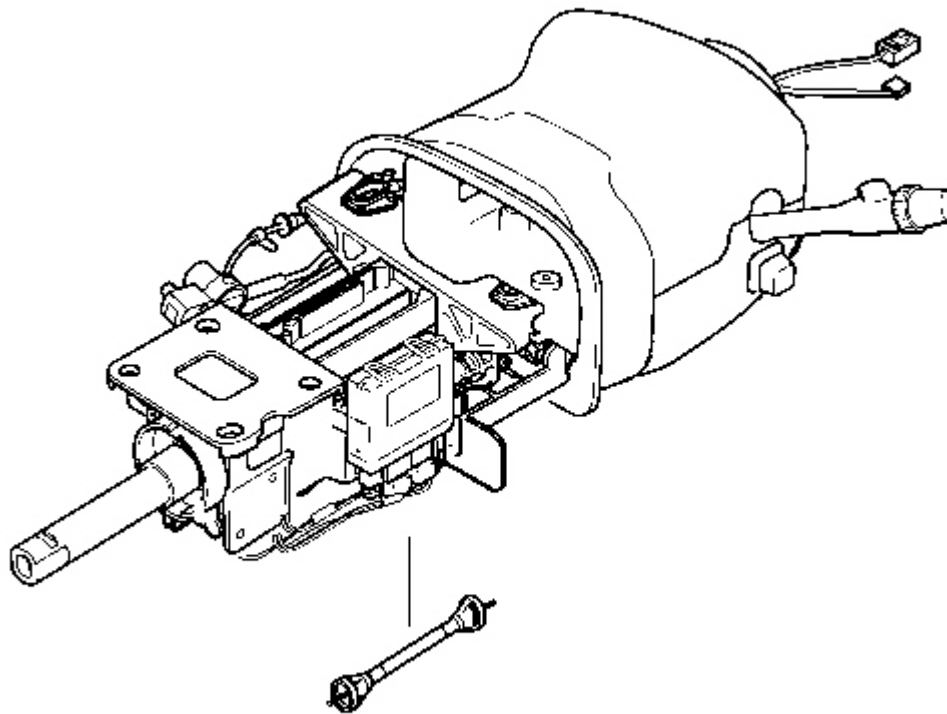


Fig. 107: View Of Tilt Cable Assembly
Courtesy of GENERAL MOTORS CORP.

6. To remove the tilt cable assembly perform the following procedure:
 1. With locking pliers squeeze the white end of the tilt cable assembly to remove from the tilt drive motor assembly.
 2. Pull the black end to separate the tilt cable assembly from the steering column.

Installation Procedure

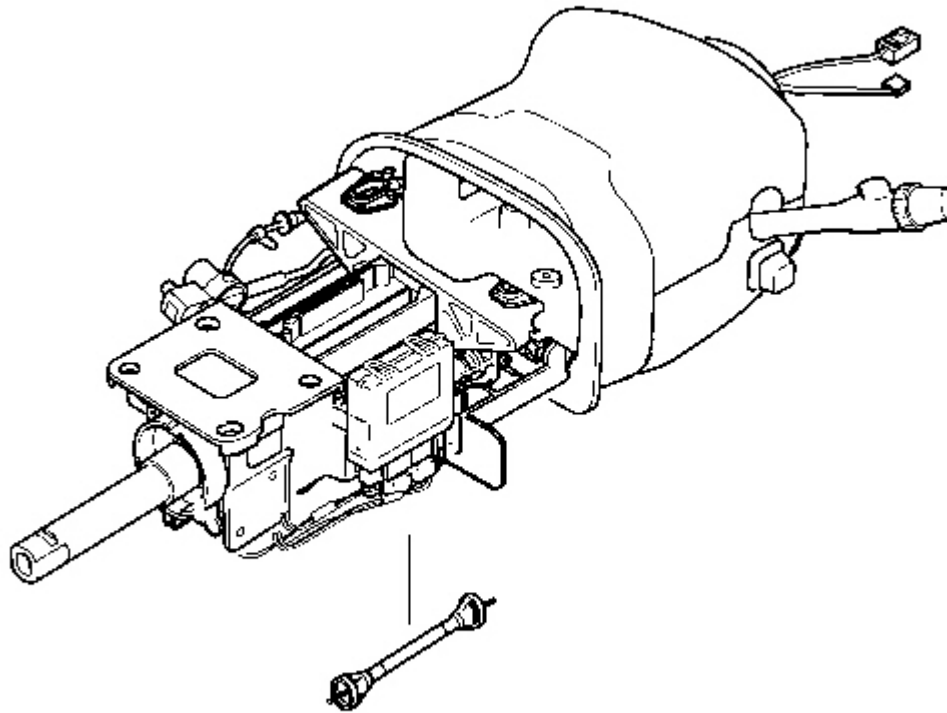


Fig. 108: View Of Tilt Cable Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the black end of the tilt cable assembly to the steering column.
2. Install the white end of the tilt cable assembly to the tilt drive motor assembly.

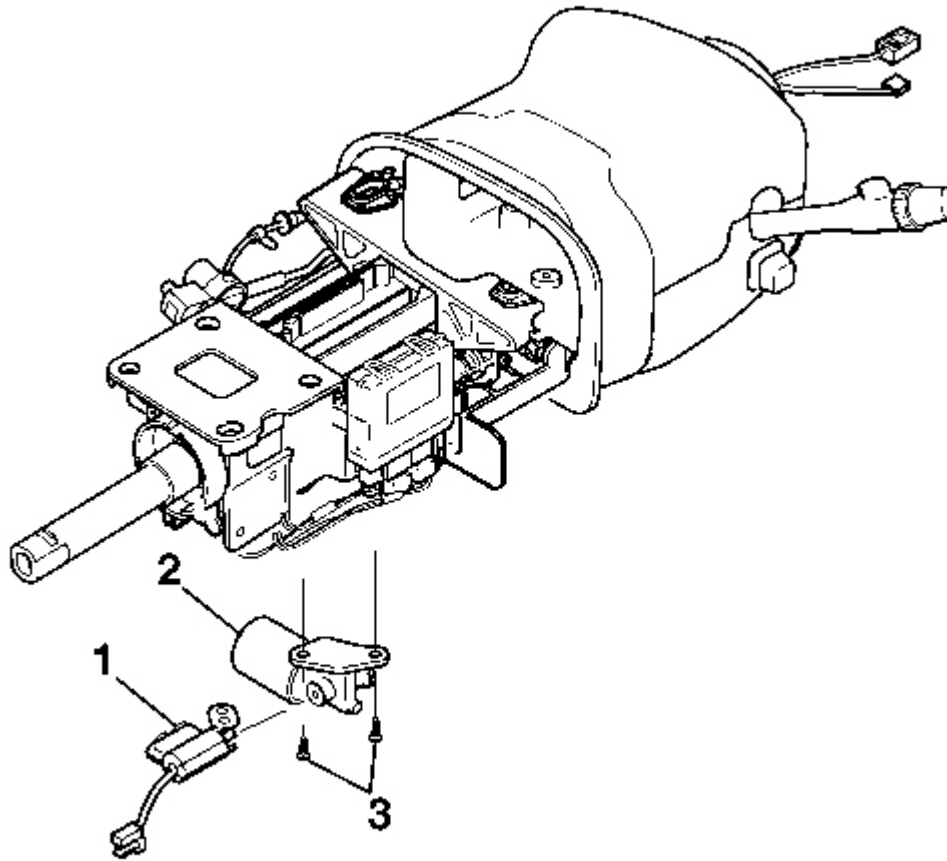


Fig. 109: View Of Potentiometer Housing, Tilt Drive Motor Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

3. Snap on the potentiometer housing. (1).
4. Install the tilt drive motor assembly (2) to the steering column.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Install 2 TORX® head screws (3).

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

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

6. Connect the connectors of the tilt drive motor assembly (2).
7. Install the steering column into the vehicle. Refer to **Steering Column Replacement**.
8. Install the steering wheel onto the steering column. Refer to **Steering Wheel Replacement**.
9. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

WIRE HARNESS ASSEMBLY REPLACEMENT (POWER TILT AND TELESCOPE)

Removal Procedure

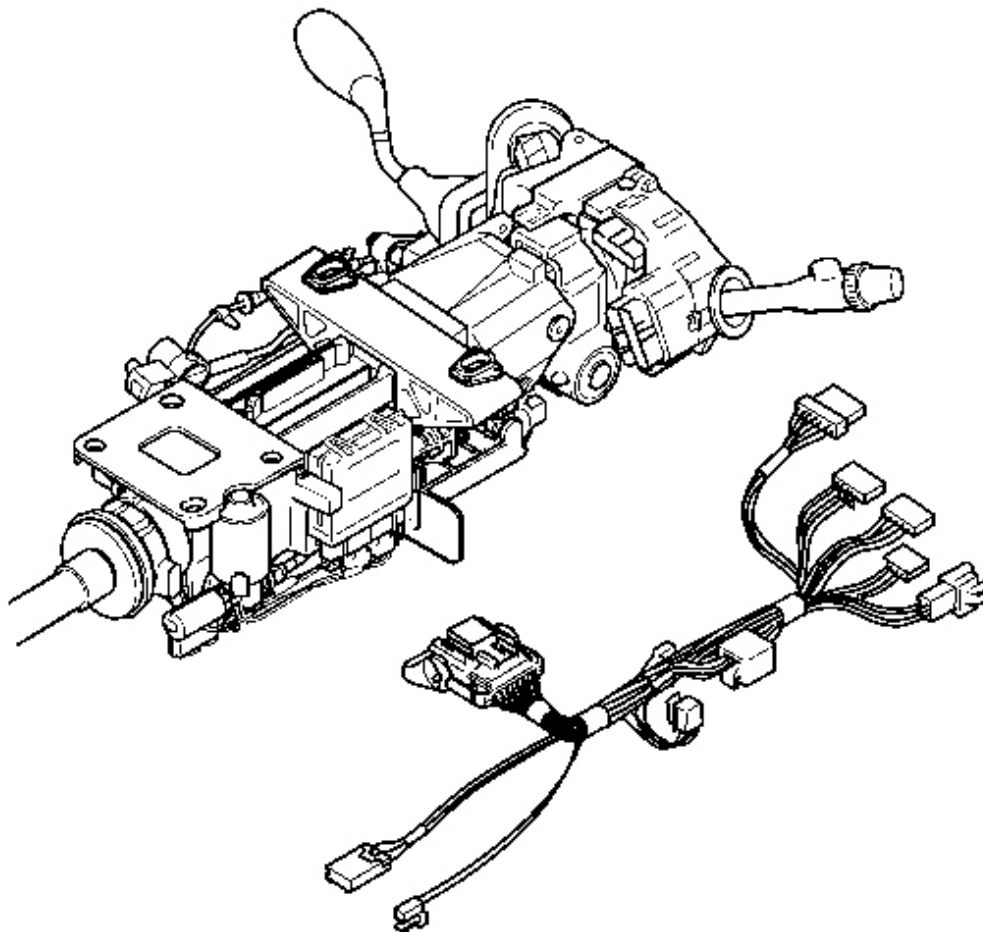


Fig. 110: View Of Bulkhead Connector (Power Tilt and Telescope)
Courtesy of GENERAL MOTORS CORP.

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CAUTION: Refer to SIR Caution in Cautions and Notices.

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. Slide the bulkhead connector out from the column shift and tilt motor bracket assembly.

Installation Procedure

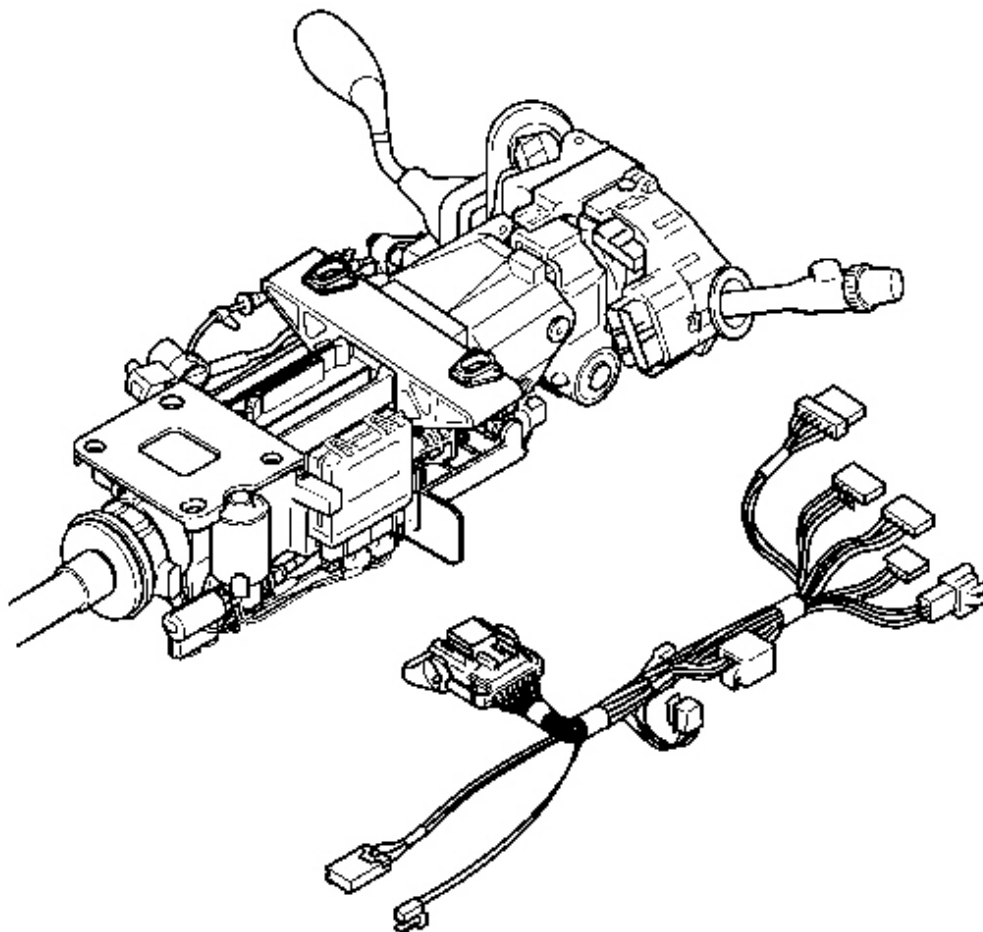


Fig. 111: View Of Bulkhead Connector (Power Tilt and Telescope)
Courtesy of GENERAL MOTORS CORP.

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

1. Slide the bulkhead connector into the column shift and tilt motor bracket assembly.
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

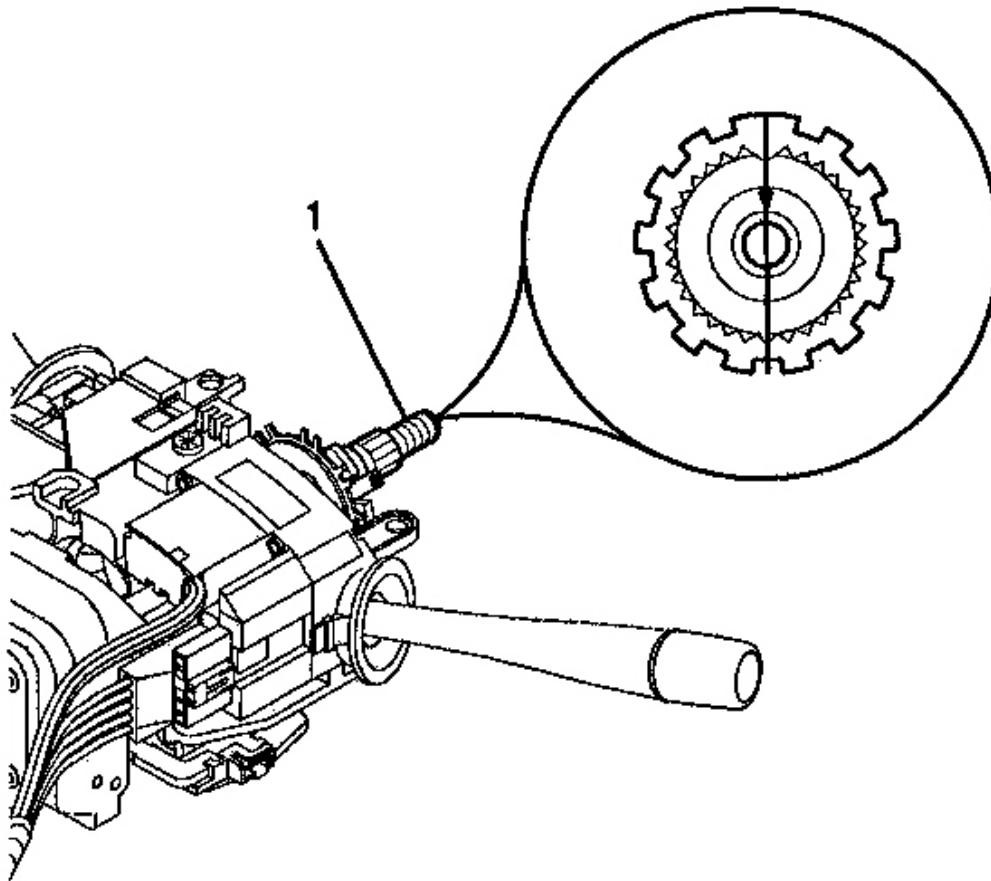


Fig. 112: View Of Block Tooth Of Steering Shaft Assembly In 12 O'clock Position
Courtesy of GENERAL MOTORS CORP.

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

1. Verify the following 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 assembly is in the LOCK position.

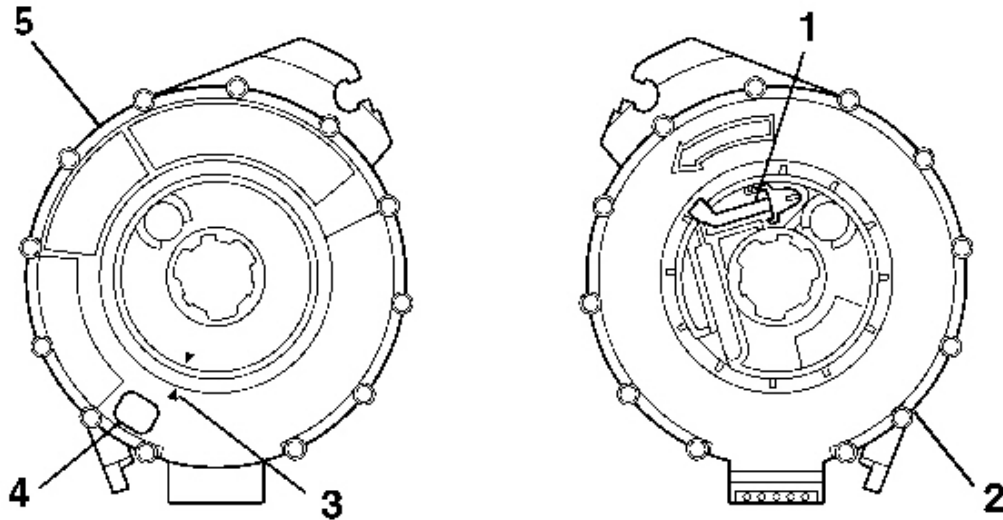


Fig. 113: Centering SIR Coil (With Centering Window & Spring Service Lock)
Courtesy of GENERAL MOTORS CORP.

2. If the front (5) of the SIR coil has a centering window (4), and the back side (2) has a spring service lock (1), perform the following steps:
 1. Hold the 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 the 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.

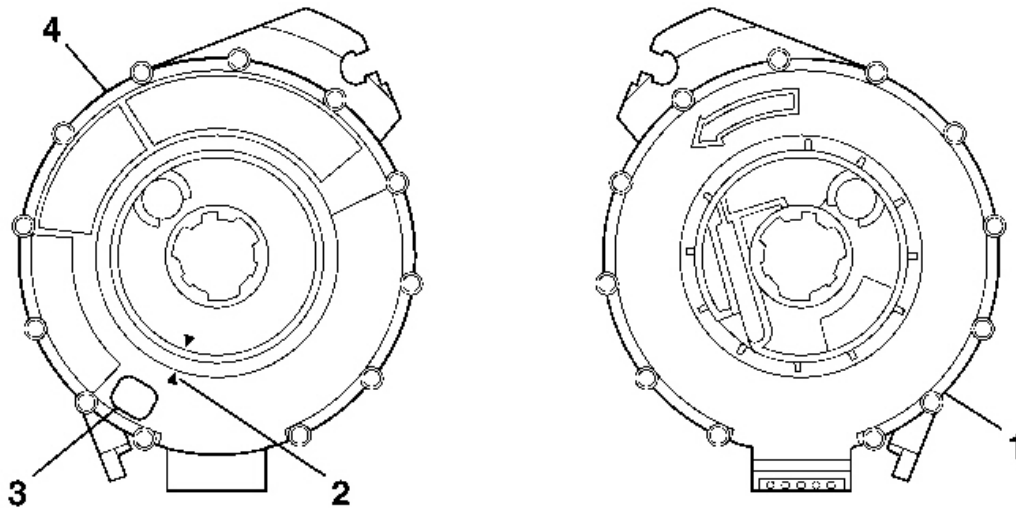


Fig. 114: Centering SIR Coil (With Centering Window, Without Spring Service Lock)
Courtesy of GENERAL MOTORS CORP.

3. If the front (4) of the SIR coil has a centering window (3) and the back side (1) has NO spring service lock, perform the following steps:
 1. Hold the 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 coil with the horn tower and slide the coil onto the steering shaft assembly.

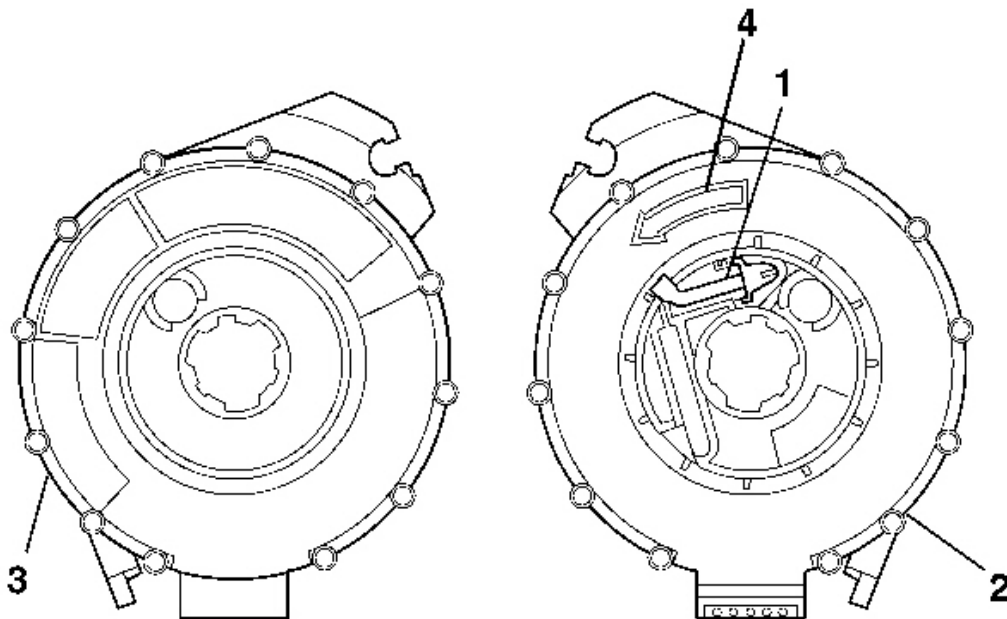


Fig. 115: Centering SIR Coil (No Centering Window, But Back Side Includes A Spring Service Lock)

Courtesy of GENERAL MOTORS CORP.

4. If no centering window is present on the front side (3) of the SIR coil, but a spring service lock (1) is on the back side (2), perform the following steps:
 1. Hold the 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 the locking tabs. The SIR coil is now centered.
 5. Align the centered coil with the horn tower and slide the coil onto the steering shaft assembly.

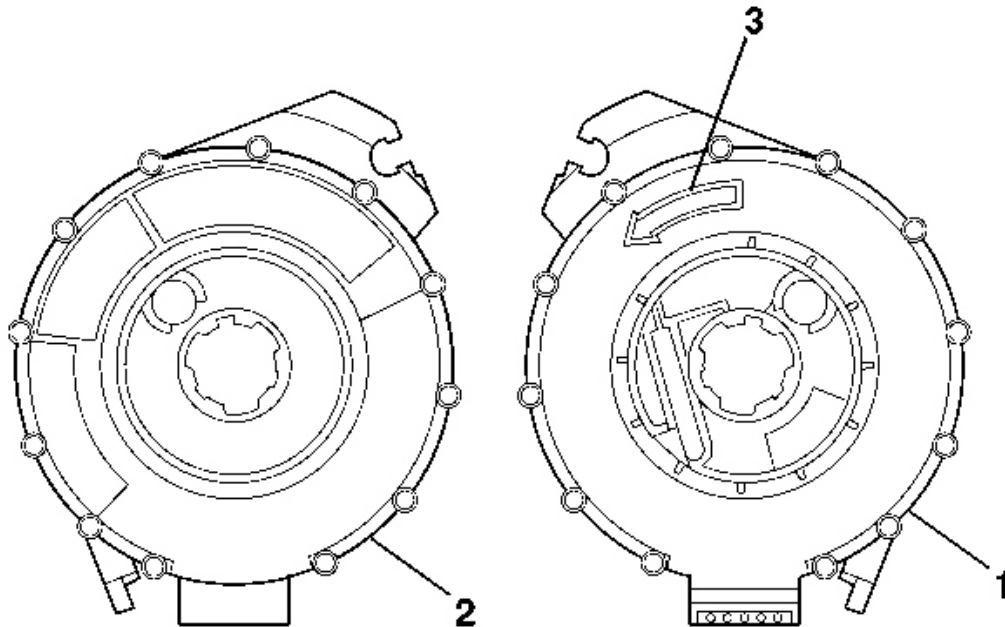


Fig. 116: Centering SIR Coil (Without Centering Window, Without Spring Service Lock)
Courtesy of GENERAL MOTORS CORP.

5. If no centering window appears on the front side (2) of the SIR coil and no spring service lock exists on the back side (1), perform the following steps:
 1. Hold the 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 $2\frac{1}{2}$ revolutions. This is the CENTER position.
 4. While maintaining the coil hub in the CENTER position, align the centered coil with the horn tower and slide the coil onto the steering shaft assembly.

DESCRIPTION AND OPERATION

STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION

Tilt/Telescoping Description

The tilt/telescoping function of this column consists of the tilt/telescoping drive motors, the tilt/telescoping motor position sensors and the tilt/telescoping switch. The tilt/telescoping motor position sensors are an internal part of the tilt/telescoping steering motor. The tilt/telescoping switch operates the inward, outward, upward, or downward movement of the steering wheel.

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The energy absorbing and locking steering column includes three important features in addition to the steering function.

1. The steering column is energy absorbing and is designed to compress in a front-end collision which will lessen the chance of injury to the driver.
2. The steering column has a tilt/telescoping control system that consists of an electronic control module capable of class 2 serial data communication, a steering column power assembly with positioning motor and sensor, and a steering column control switch.
3. The multi-function lever provides for the control of the headlamp high beams, and the windshield washer and wiper.

The steering column may be removed, disassembled and reassembled with relative ease. It is important to use only the specified screws, bolts and nuts and to tighten them to the specified torque in order to ensure the proper energy absorbing functions. When the steering column assembly is removed from the vehicle, special care must be taken in handling it. Avoid the use of a steering wheel puller other than the special one recommended in this manual. Sharply striking the end of the steering shaft, leaning on the assembly or dropping the assembly could shear off or loosen the plastic fasteners which maintain the steering column rigidity.

Tilt/Telescoping Operation

The tilt/telescoping steering column in/out/up/down switch is an input to the driver position module (DPM). The tilt/telescoping drive motor is an output function of the DPM.

Steering column memory settings are stored in the DPM. The steering column position sensor is an internal part of the tilt/telescoping motor assemblies, and is an input to the DPM. The DPM uses the position sensor input when storing and recalling memory settings.

Memory steering column, and the easy enter/exit operations are performed by the DPM. Commands for memory operations are sent to the DPM as class 2 messages by the driver door switch module (DDS).

Steering Wheel Theft Deterrent Lock Operation

The steering column lock control module (SCLCM) controls the steering wheel theft deterrent lock function, which allows the column to be electronically locked. The SCLCM controls the column lock motor using an internal lock relay, an internal unlock relay, and an internal lock enable relay. The lock and unlock relays provide a low input to the column lock motor. When the column needs to be locked the lock enable relay will energize the lock relay, which provides a high input to the lock side of the motor, energizing the motor to lock the steering column.

In order for the steering column to be locked the SCLCM has to see 3 inputs. The first input the module needs to see is the vehicle in the park position (automatic transmission shift lever). When the shift lever is in the park position, the switch internal to the automatic transmission shift lever closes sending a high input to the SCLCM and the body control module (BCM). When this occurs the lock relay (internal to the SCLCM) is energized closing the lock relay switch.

The second input to the SCLCM is the ignition state. The remote control door lock receiver (RCDLR) and the BCM look at the power mode. When the ignition 1 input is in the off state or RAP mode, the RCDLR sends a

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class 2 message to the SCLCM indicating this state which will lock the column.

The third input the SCLCM receives comes from the BCM enable relay. When the BCM goes to the off power mode then the low input is sent to the SCLCM.

When the SCLCM receives this low input from the BCM the internal lock enable relay is energized and provides a high input to the lock side of the column lock motor. The unlock side of the column lock motor is grounded through the internal unlock relay within the SCLCM. The column lock motor will send an input back to the SCLCM indicating the motor is energized for the locked position. This results in the locking of the steering column.

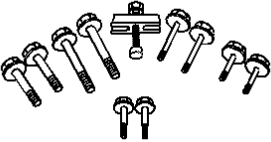
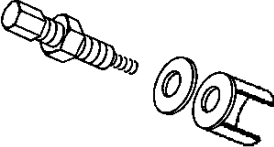
The SCLCM will unlock the steering column if the power mode is on and the SCLCM and RCDLR passwords match.

The SCLCM monitors the column lock system and will set DTC codes when the module detects malfunctions within the system. When a malfunction occurs the driver information center (DIC) will display the Service Column Lock Now message indicating DTC codes are set within the SCLCM.

SPECIAL TOOLS AND EQUIPMENT

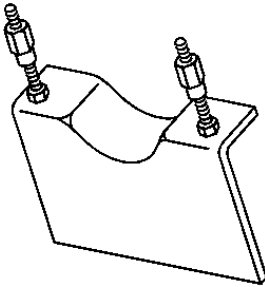
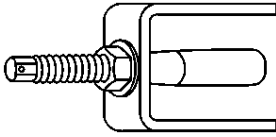
SPECIAL TOOLS

Special Tools

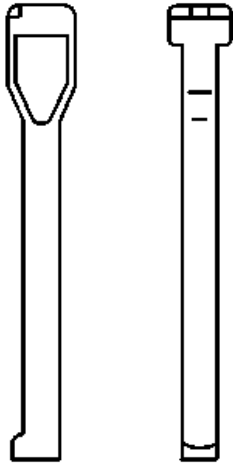
Illustration	Tool Number/ Description
	J 1859-A Steering Wheel Puller
	J 21854-01 Pivot Pin Remover
	J 23653-SIR Lock Plate Compressor

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J 41352
Modular Column Holding Fixture



J 42120
Steering Wheel Puller Legs

J 42640
Steering Column Lock Pin

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