

## 2004 STEERING

### Steering Wheel and Column - Hummer H2

## SPECIFICATIONS

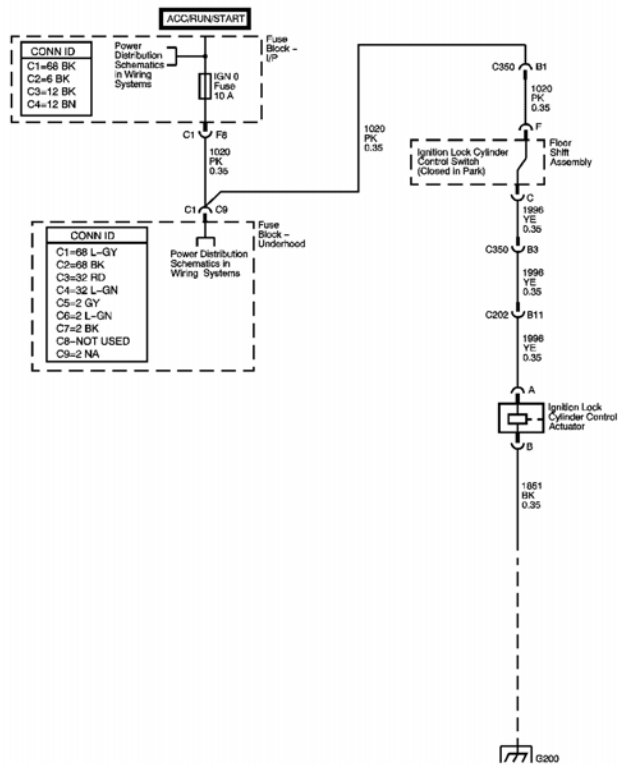
### FASTENER TIGHTENING SPECIFICATIONS

#### Fastener Tightening Specifications

Application	Specification	
	Metric	English
Horn Contact Plate Screws	5.5 N.m	49 lb in
Ignition Lock Cylinder Case Screws	7 N.m	62 lb in
Intermediate Shaft to the Steering Column Pinch Bolt	62 N.m	46 lb ft
Intermediate Shaft to the Steering Gear Pinch Bolt	47 N.m	35 lb ft
Steering Column Electrical Connector Screw	6 N.m	53 lb in
Steering Column Mounting Nuts	27 N.m	20 lb ft
Steering Column Trim Cover Screws Lower	3.5 N.m	31 lb in
Steering Column Trim Cover Screws Upper	1 N.m	9 lb in
Steering Wheel Nut	41 N.m	30 lb ft
Steering Wheel Shroud Retaining Screws	2 N.m	18 lb in
Turn Signal Multifunction Switch Screws Side	7 N.m	62 lb in
Turn Signal Multifunction Switch Screws Top	3 N.m	27 lb in
Upper Intermediate Shaft to Lower Intermediate Shaft Pinch Bolt	50 N.m	37 lb ft

## SCHEMATIC AND ROUTING DIAGRAMS

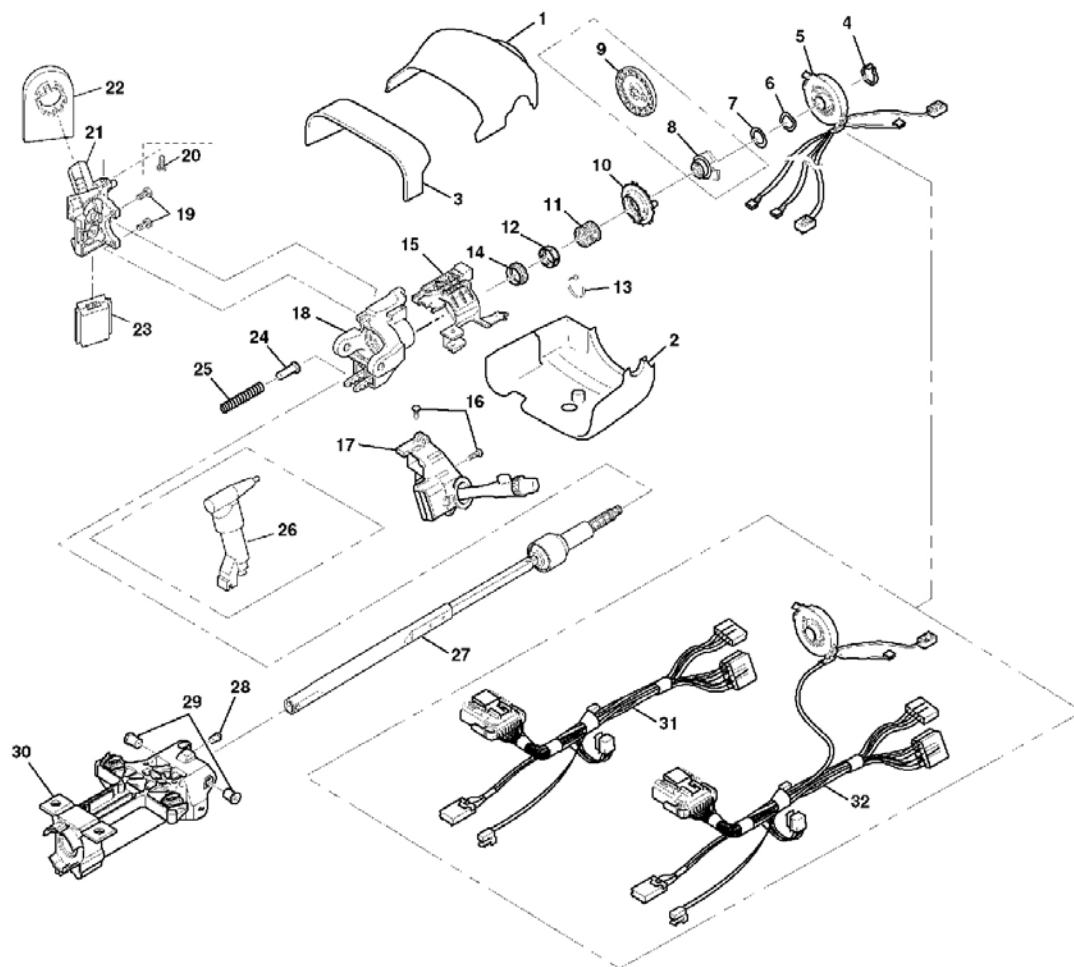
### COLUMN/IGNITION LOCK SCHEMATICS



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

## COMPONENT LOCATOR

### STEERING COLUMN COMPONENT VIEWS



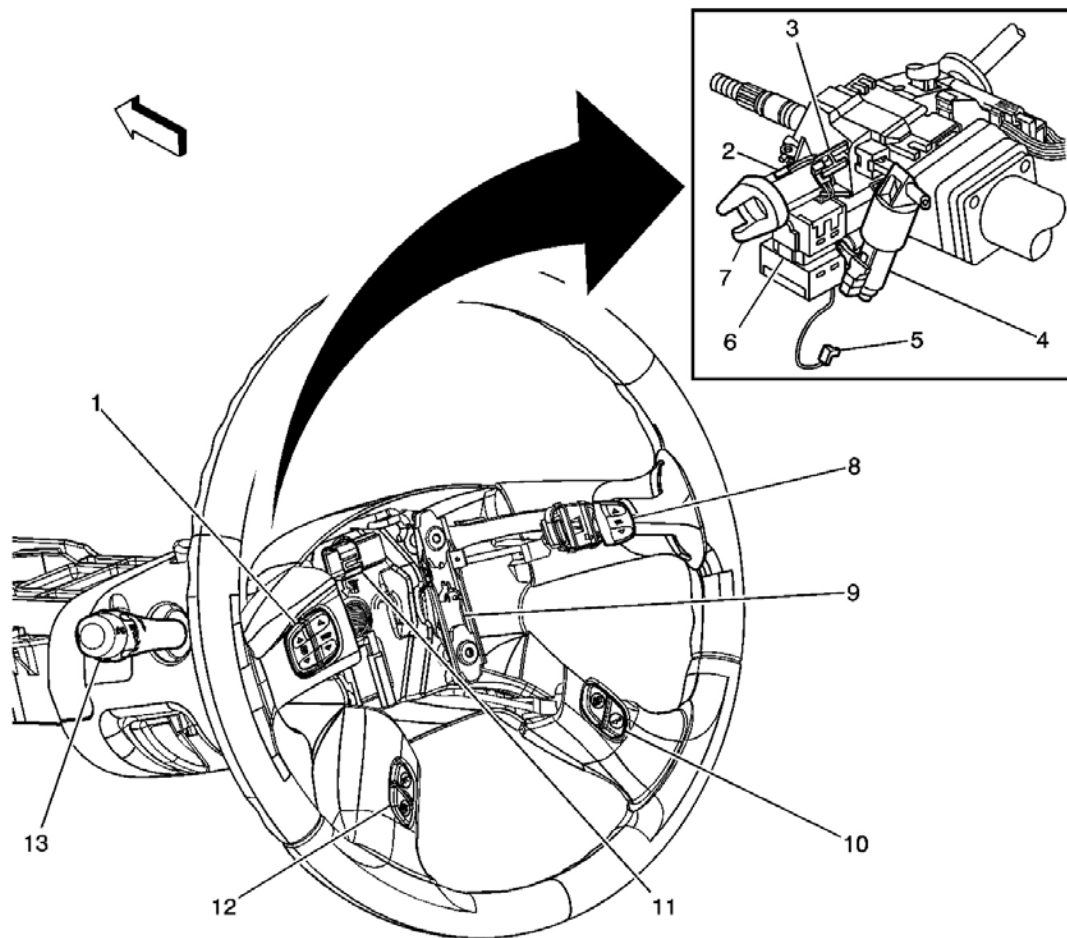
**Fig. 2: Tilt Steering Column Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 2**

Callout	Component Name
1	Upper Trim Cover
2	Lower Trim Cover
3	Steering Column Closeout Trim Cover
4	Retaining Ring
5	SIR Coil
6	Wave Washer
7	Bearing Retainer
8	Cam Orientation Plate
9	Shaft Lock Shield Assembly
10	Turn Signal Cancel Cam Assembly

11	Upper Bearing Spring
12	Upper Bearing Inner Race Seat
13	Wire Harness Strap
14	Inner Race
15	Signal Switch Housing
16	Pan Head Tapping Screws
17	Turn Signal and Multifunction Switch Assembly
18	Steering Column Tilt Head Assembly
19	Pan Head Tapping Screws
20	TORX(R) Head Screw
21	Ignition Lock Cylinder Case
22	Theft Deterrent Control Module
23	Ignition Switch Assembly
24	Spring Guide
25	Tilt Spring
26	Theft Deterrent Control Module Electric Park Lock
27	Steering Shaft Assembly
28	Tilt Bumper
29	Pivot Pins
30	Steering Column Support Assembly
31	Coil Wire Harness Assembly
32	Coil Wire Harness Assembly (Export)

## **STEERING WHEEL AND COLUMN COMPONENT VIEWS**

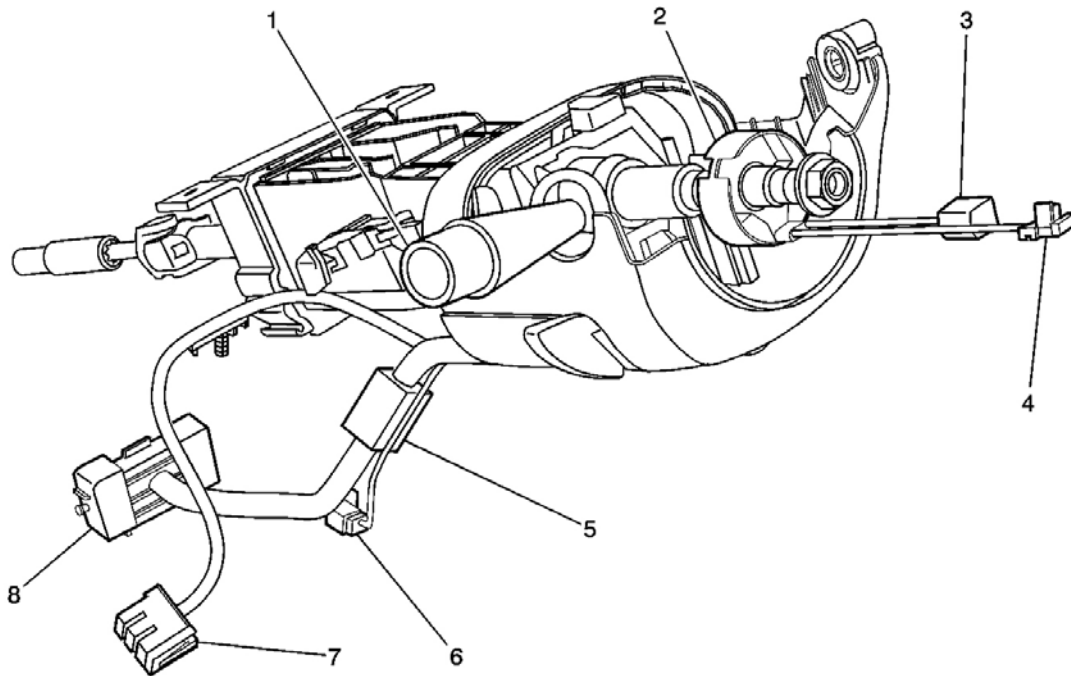


**Fig. 3: Steering Wheel and Column Sub-System Component Views**  
 Courtesy of GENERAL MOTORS CORP.

**Callouts For Fig. 3**

Callout	Component Name
1	Steering Wheel Audio Controls - Left
2	Passlock Sensor Connector
3	Ignition Key Alarm Switch
4	Ignition Lock Cylinder Control Actuator
5	Ignition Lock Cylinder Control Actuator Connector
6	Ignition Switch
7	Ignition Key Cylinder
8	Steering Wheel Audio Controls - Right
9	Horn Switch
10	Steering Wheel Driver Information (DIC) Controls - Right
11	C277

12	Steering Wheel Driver Information Center (DIC) Controls - Left
13	Turn Signal/Multifunction Switch



**Fig. 4: Steering Column Harness Connectors Component Views**  
 Courtesy of GENERAL MOTORS CORP.

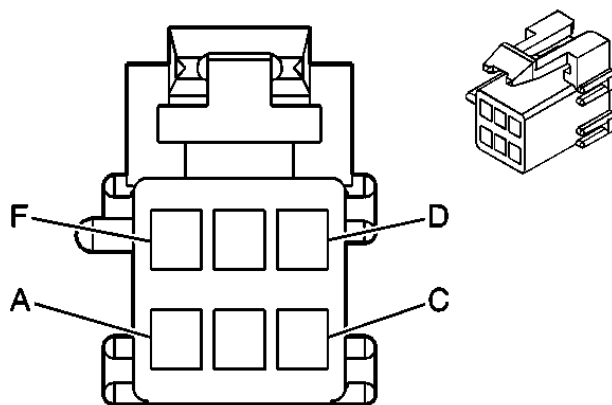
**Callouts For Fig. 4**

Callout	Component Name
1	Multifunction Switch
2	Inflatable Restraint Steering Wheel Module Coil
3	C277 (8 Cavity)
4	Inflatable Restraint Steering Wheel Module Connector
5	Steering Wheel Controls Backlight Fuse
6	C203 (2 Cavity)
7	Fuse Block - I/P C2 (6 Cavity)
8	C202 (52 Cavity)

**STEERING WHEEL AND COLUMN CONNECTOR END VIEWS**

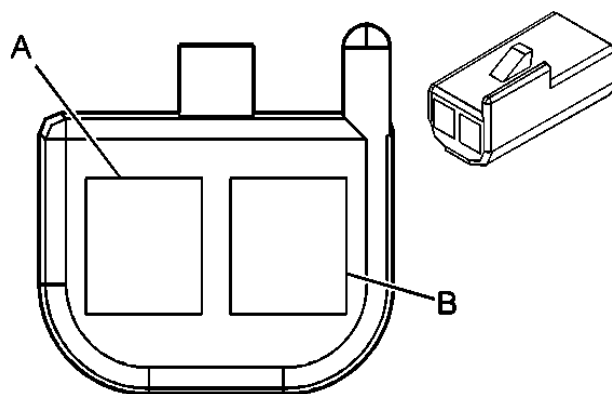
**Floor Shift Terminal Identification Assembly**

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<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12064762</li> <li>• 6-Way F Metri-Pack 150 Series (GY)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	BK	1050	Ground
B	L-GN/BK	584	A/T Shift Lock Control Switch Supply Voltage
C	YE	1996	Remote Shift Selector Signal
D	-	-	Not Used
E	D-GN/WH	1135	A/T Shift Lock Control Solenoid Supply Voltage
F	PK	1020	Off/Run/Crank Voltage

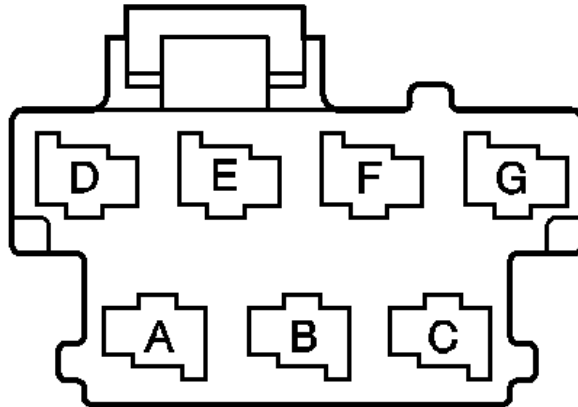
### Ignition Lock Cylinder Control Terminal Identification Actuator



<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12047662</li> <li>• 2-Way F Metri-Pack 150 Series (BK)</li> </ul>	
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Pin	Wire Color	Circuit No.	Function
A	YE	1996	Remote Shift Selector Signal
B	BK	1851	Ground

### Ignition Terminal Identification Switch

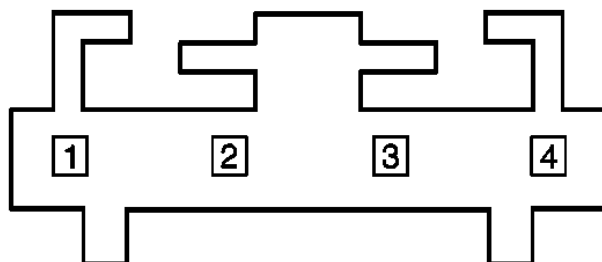


Connector Part Information		<ul style="list-style-type: none"> <li>• 10400853490</li> <li>• 7-Way F Kostal N Series (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	BN	4	Accessory Voltage
B	RD/WH	342	Battery Positive Voltage
C	PK	3	Ignition 1 Voltage
D	YE	5	Crank Voltage
E	WH	1390	Off/Run/Crank Voltage
F	RD	142	Battery Positive Voltage
G	OG	300	Ignition 3 Voltage

### Steering Wheel Controls Terminal Identification - Left Lower (Fuel/Trip)

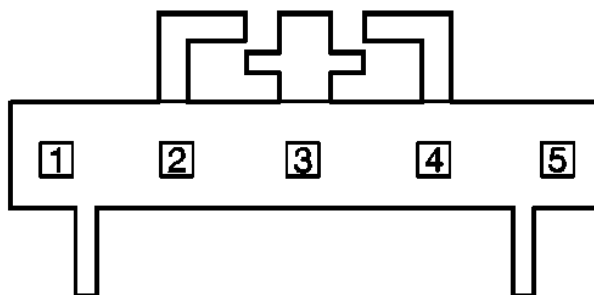
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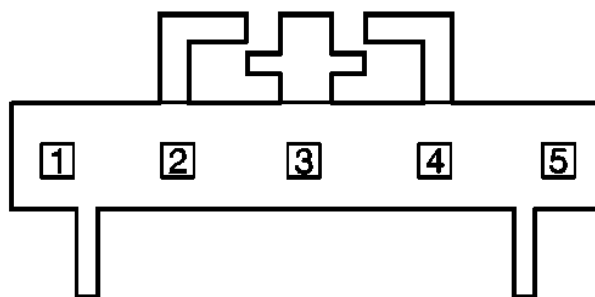
<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 50579404</li> <li>• 4-Way F Molex (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
1	BN	230	Steering Wheel Switch Dimming Control
2	YE	1327	DIC Fuel Signal
3	D-BU	894	DIC Toggle Switch Signal
4	BK	1851	Ground

#### Steering Wheel Controls Terminal Identification - Right Lower (Personalization/Select)



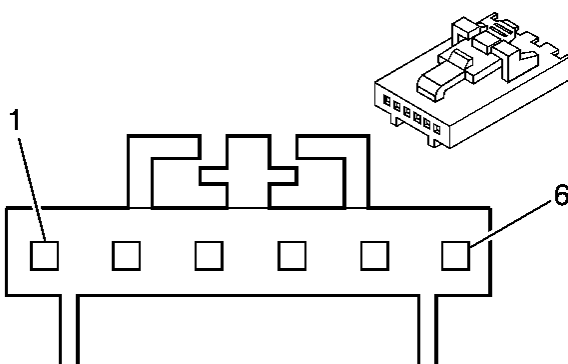
<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 50579405</li> <li>• 5-Way F Molex (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
1	BN	230	Steering Wheel Switch Dimming Control
2	D-GN	1358	DIC Switch Signal
3	OG	1816	DIC Set/Reset Switch Signal
4	BK	1851	Ground
5	-	-	Not Used

### Steering Wheel Controls Terminal Identification - Left Upper (Radio-Program/Source)



<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 50579405</li> <li>• 5-Way F Molex (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
1	L-GN	1011	Remote Radio Control Signal
2	BN	230	Steering Wheel Switch Dimming Control
3	BK	1851	Ground
4	-	-	Not Used
5	L-GN	1011	Remote Radio Control Signal

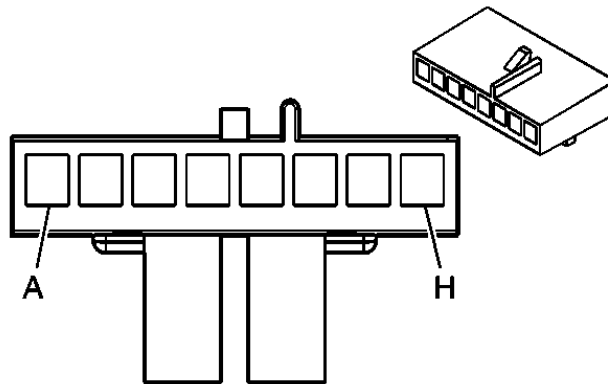
### Steering Wheel Controls Terminal Identification - Right Upper (Radio-Seek/Volume)



<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 50579406</li> <li>• 6-Way F Molex (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
1	WH	2283	12 Volt Reference
2	L-GN	1011	Remote Radio Control Signal

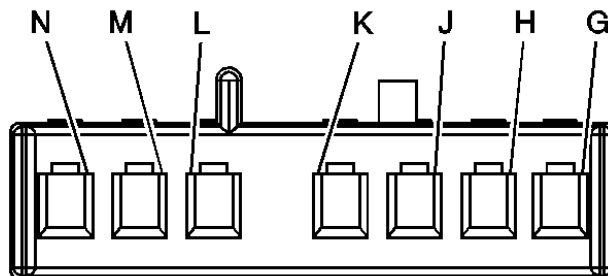
3	BN	230	Steering Wheel Switch Dimming Control
4	-	-	Not Used
5	BK	1851	Ground
6	L-GN	1011	Remote Radio Control Signal

### Turn Signal/Multifunction Terminal Identification Switch - C1



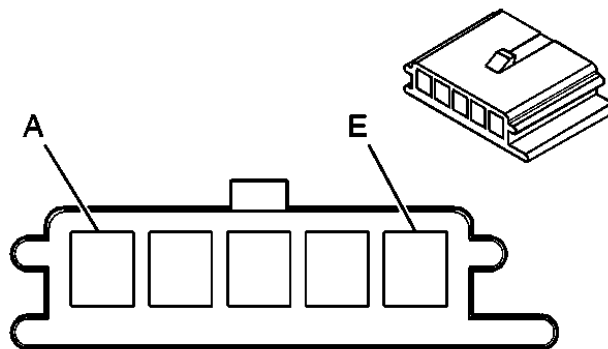
Connector Part Information		<ul style="list-style-type: none"> <li>• 12064862</li> <li>• 8-Way F Metri-Pack 150 Series (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	L-GN	1427	Right Turn Signal Switch Signal
B	PK	639	Ignition 1 Voltage
C	D-GN	1428	Left Turn Signal Switch Signal
D-F	-	-	Not Used
G	BK/YE	28	Horn Relay Control
H	WH	111	Hazard Switch Signal

### Turn Signal/Multifunction Terminal Identification Switch - C2



Connector Part Information		<ul style="list-style-type: none"> <li>• 15339058</li> <li>• 7-Way F Metri-Pack 150 Series (GY)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
G	-	-	Not Used
H	PK	94	Windshield Washer Switch Signal
J	GY	478	Windshield Wiper Switch Supply Voltage
K	D-BU/ WH	477	Windshield Wiper Switch High Signal
L-N	-	-	Not Used

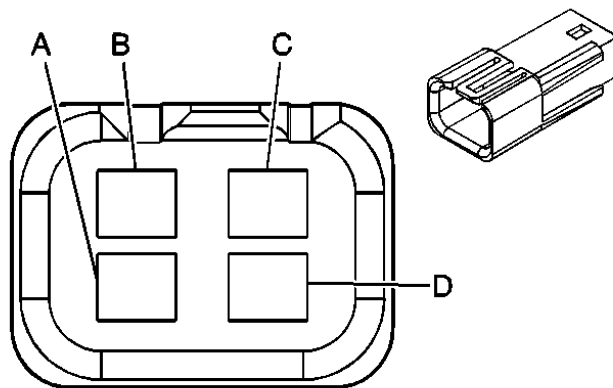
### Turn Signal/Multifunction Terminal Identification Switch - C3



Connector Part Information		<ul style="list-style-type: none"> <li>• 12059800</li> <li>• 5-Way F Metri-Pack 150 Series (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	TN	1851	Ground
B	YE/BK	307	Headlamp Switch Flash to Pass Signal
C	L-GN	11	Headlamp High Beam Supply Voltage
D-E	-	-	Not Used

### Turn Signal/Multifunction Terminal Identification Switch - C4





<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12047786</li> <li>• 4-Way M Metri-Pack 150 Series (BK)</li> </ul>	
<b>Pin</b>	<b>Wire Color</b>	<b>Circuit No.</b>	<b>Function</b>
A	BN	41	Ignition 3 Voltage
B	GY/WH	397	Cruise Control On Switch Signal
C	GY/BK	87	Cruise Control Resume/Accel Switch Signal
D	D-BU	84	Cruise Control Set/Coast Switch Signal

## DIAGNOSTIC INFORMATION AND PROCEDURES

### SYMPTOMS - STEERING WHEEL AND COLUMN

Review the system description and operation in order to familiarize yourself with the system functions. Refer to Steering Wheel and Column Description and Operation .

#### Visual/Physical Inspection

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

#### Symptoms List

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

- Steering Column Tilt Function Inoperative
- Ignition Can/Cannot Be Turned Off with Transmission in Any Gear
- Lock System Does Not Unlock
- Lock System Does Not Lock

- **Lock System Sticks in Start**
- **Key Cannot Be Removed in the Off Lock Position**
- **High Lock Effort**
- **Noise in Steering Column**
- **Looseness in Steering Column**

## STEERING COLUMN TILT FUNCTION INOPERATIVE

### Steering Column Tilt Function Inoperative

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column - Tilt Description and Operation and perform the necessary inspections?	Go to <b>Step 2</b>	Go to <b>Symptoms - Steering Wheel and Column</b>
2	Verify that the steering column tilt function is inoperative. Does the steering column tilt function operate normally?	System OK	Go to <b>Step 3</b>
3	Verify that the shoe is not seized on the pivot pin. Is the shoe seized on the pivot pin?	Go to <b>Step 9</b>	Go to <b>Step 4</b>
4	Inspect the shoe grooves for dirt, burrs, or rust. Are the shoe grooves free of dirt, burrs, and rust?	Go to <b>Step 9</b>	Go to <b>Step 5</b>
5	Inspect weak or broken shoe lock spring. Is the shoe lock spring weak or broken?	Go to <b>Step 9</b>	Go to <b>Step 6</b>
6	Inspect the pivot pins for binding. Are the pivot pins binding?	Go to <b>Step 10</b>	Go to <b>Step 7</b>
7	Inspect for a weak or broken wheel tilt spring. Is the wheel tilt spring weak or broken?	Go to <b>Step 11</b>	Go to <b>Step 8</b>
8	Inspect the steering column wiring harness for tightness. Is the steering column wiring harness too tight?	Go to <b>Step 12</b>	Go to <b>Step 3</b>
9	Replace the tilt head. Refer to <b>Steering Column Tilt Head Housing Replacement</b> . Is the repair complete?	Go to <b>Step 13</b>	-
10	Replace the pivot pins. Refer to <b>Steering Column Tilt Head Housing Replacement</b> . Is the repair complete?	Go to <b>Step 13</b>	-
11	Replace the tilt spring. Refer to <b>Tilt Spring Replacement</b> . Is the repair complete?	Go to <b>Step 13</b>	-
12	Reroute the steering column wiring harness to the correct location. Is the steering column wiring harness routed properly?	Go to <b>Step 13</b>	-
13	Operate the steering column tilt function in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

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

## Circuit Description

If the vehicle is equipped with a floor mounted console gearshift, an ignition lock cylinder control actuator system is used in the steering column. The purpose of the system is to prevent the ignition lock cylinder from being turned to the lock position while the transmission is in gear, this also prevents the steering wheel from being locked. The system consists of an ignition lock cylinder actuator and a park position switch. The actuator contains a pin that is spring loaded out, to prevent the ignition lock cylinder from being turned to the lock position when the gearshift is not in Park. The park position switch is located in the floor mounted gearshift assembly, as part of the automatic transmission shift lock control switch. The switch is closed with the gearshift in PARK, and open in all other positions

## System Operation

When the gearshift is in the PARK position, the park position switch is closed. This applies voltage to the ignition lock cylinder actuator and the pin retracts, allowing the ignition lock cylinder to be turned to the LOCK position. When the gearshift is not in PARK, the park position switch is open. No voltage is applied to the ignition lock cylinder actuator and the spring loaded pin remains in the out position, preventing the ignition lock cylinder from being turned to LOCK. If vehicle power is lost while the ignition lock cylinder is not in the LOCK position, the system will prevent the operator from turning the ignition key to the lock position or removing the key. If the vehicle has lost power, pushing the ignition lock cylinder release button on the underside of the ignition lock cylinder will override the system and allow the key to be removed.

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

Step	Action	Yes	No
<b>Schematic Reference:</b> <u>Column/Ignition Lock Schematics</u> <b>Connector End View Reference:</b> <u>Steering Wheel and Column Connector End Views</u>			
1	Verify the fault is present. Does the system operate normally?	Go to <b>Testing for Intermittent Conditions and Poor Connections</b> in Wiring Systems	Go to <b>Step 2</b>
2	Does the automatic transaxle shift lever operate normally?	Go to <b>Step 3</b>	Go to <b>Diagnostic Starting Point - Automatic Transmission Shift Lock Control</b> in Shift Lock Control
3	1. Push the ignition lock cylinder control actuator release button which is on the underside of the ignition lock cylinder. 2. Turn the key to the LOCK position and remove the key.  Were you able to turn the key to the LOCK position and remove the key?	Go to <b>Step 4</b>	Go to <b>Lock System Does Not Lock</b>
	1. Turn OFF the ignition.		

4	<p>2. Disconnect the ignition lock cylinder control actuator.</p> <p>3. Connect a test lamp between the battery positive voltage and ground circuits of the ignition lock cylinder control actuator.</p> <p>4. Turn ON the ignition, with the engine OFF.</p> <p>5. Cycle the gear shift from Park to Drive.</p> <p>Does the test lamp turn ON and OFF with each cycle?</p>	Go to <b>Step 11</b>	Go to <b>Step 5</b>
5	<p>Does the test lamp remain illuminated with each cycle?</p>	Go to <b>Step 8</b>	Go to <b>Step 6</b>
6	<p>Connect a test lamp between the ground circuit of the ignition lock cylinder control actuator and B+ voltage.</p> <p>Does the test lamp illuminate?</p>	Go to <b>Step 7</b>	Go to <b>Step 9</b>
7	<p>Test the control circuit of the ignition lock cylinder control actuator for an open. Refer to <b>Circuit Testing</b> and to <b>Wiring Repairs</b> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	Go to <b>Step 14</b>	Go to <b>Step 10</b>
8	<p>Test the control circuit of the ignition lock cylinder control actuator for a short to voltage. Refer to <b>Circuit Testing</b> and to <b>Wiring Repairs</b> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	Go to <b>Step 14</b>	Go to <b>Step 10</b>
9	<p>Repair the open in the ground circuit of the ignition lock cylinder control actuator. Refer to <b>Wiring Repairs</b> in Wiring Systems.</p> <p>Did you complete the repair?</p>	Go to <b>Step 14</b>	-
10	<p>Inspect for poor connections at the automatic transmission shift lock actuator. Refer to <b>Testing for Intermittent Conditions and Poor Connections</b> and <b>Connector Repairs</b> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	Go to <b>Step 14</b>	Go to <b>Step 12</b>
11	<p>Inspect for poor connections at the ignition lock cylinder control actuator. Refer to <b>Testing for Intermittent Conditions and Poor Connections</b> and to <b>Connector Repairs</b> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	Go to <b>Step 14</b>	Go to <b>Step 13</b>



12	Replace the automatic transmission shift lock actuator. Refer to <b><u>Automatic Transmission Shift Lock Actuator Replacement</u></b> in Shift Lock Control. Did you complete the replacement?	Go to <b>Step 14</b>	-
13	Replace the ignition lock cylinder control actuator. Refer to <b><u>Steering Wheel Theft Deterrent Lock Replacement</u></b> . Did you complete the replacement?	Go to <b>Step 14</b>	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 2</b>

## LOCK SYSTEM DOES NOT UNLOCK

### Lock System Does Not Unlock

Step	Action	Yes	No
DEFINITION: The lock system does not allow the key to rotate out of the OFF position.			
1	Did you review the Steering Wheel and Column Description and Operation?	Go to <b>Step 2</b>	Go to <b><u>Steering Wheel and Column Description and Operation</u></b>
2	Verify that the lock system does not unlock. Does the lock system operate normally?	System OK	Go to <b>Step 3</b>
3	Inspect for an incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to <b>Step 7</b>	Go to <b>Step 4</b>
4	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to <b>Step 8</b>	Go to <b>Step 5</b>
5	Inspect the ignition lock cylinder case assembly for looseness. Is the ignition lock cylinder case assembly loose?	Go to <b>Step 9</b>	Go to <b>Step 6</b>
6	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to <b>Step 10</b>	Go to <b>Step 3</b>
7	Replace the key. Refer to <b><u>Key and Lock Cylinder Coding</u></b> in General Information. Did you complete the repair?	Go to <b>Step 11</b>	-
8	Replace the lock cylinder. Refer to <b><u>Ignition Lock Cylinder Replacement</u></b> . Did you complete the repair?	Go to <b>Step 11</b>	-
9	Tighten the ignition lock cylinder case assembly. Refer to <b><u>Fastener Tightening Specifications</u></b> . Did you complete the repair?	Go to <b>Step 11</b>	-
10	Replace the ignition switch. Refer to <b><u>Ignition Switch Replacement</u></b> . Did you complete the repair?	Go to <b>Step 11</b>	-

11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>
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## LOCK SYSTEM DOES NOT LOCK

### Lock System Does Not Lock

Step	Action	Yes	No
DEFINITION: The lock system will not allow the key to be turned to the OFF lock position.			
1	Did you review the Steering Wheel and Column Description and Operation?	Go to <b>Step 2</b>	Go to <b>Steering Wheel and Column Description and Operation</b>
2	Verify that the lock system does not lock. Does the lock system operate normally?	System OK	Go to <b>Step 3</b>
3	Inspect for a faulty lock cylinder or release button. Is the lock cylinder or release button damaged?	Go to <b>Step 6</b>	Go to <b>Step 4</b>
4	Inspect the shift cable adjustment. Is the shift cable adjusted incorrectly?	Go to <b>Step 7</b>	Go to <b>Step 5</b>
5	Inspect the ignition switch for damage. Is the ignition switch damaged?	Go to <b>Step 8</b>	Go to <b>Step 6</b>
6	Replace the lock cylinder. Refer to <b>Ignition Lock Cylinder Replacement</b> . Did you complete the repair?	Go to <b>Step 9</b>	-
7	Adjust the shift cable. Refer to <b>Automatic Transmission Range Selector Cable Adjustment</b> in Automatic Transmission - 4L60-E/4L65-E. Did you complete the repair?	Go to <b>Step 9</b>	-
8	Replace the ignition switch. Refer to <b>Ignition Switch Replacement</b> . Did you complete the repair?	Go to <b>Step 9</b>	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

## LOCK SYSTEM STICKS IN START

### Lock System Sticks in Start

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to <b>Step 2</b>	Go to <b>Steering Wheel and Column Description and Operation</b>
2	Verify that the lock system sticks in the START position. Does the lock system operate normally?	System OK	Go to <b>Step 3</b>
3	Inspect the ignition lock cylinder case assembly for damage.	Go to	

	Is the ignition lock cylinder case assembly damaged?	<b>Step 6</b>	Go to <b>Step 4</b>
4	Inspect the lock cylinder for damage. Is the lock cylinder damaged?	Go to <b>Step 7</b>	Go to <b>Step 5</b>
5	Inspect the ignition switch for damage. Is the ignition switch damaged?	Go to <b>Step 8</b>	Go to <b>Step 3</b>
6	Tighten the ignition lock cylinder case assembly mounting bolts. Refer to <b>Fastener Tightening Specifications</b> . Did you complete the repair?	Go to <b>Step 9</b>	-
7	Replace the lock cylinder. Refer to <b>Ignition Lock Cylinder Replacement</b> . Did you complete the repair?	Go to <b>Step 9</b>	-
8	Replace the ignition switch. Refer to <b>Ignition Switch Replacement</b> . Did you complete the repair?	Go to <b>Step 9</b>	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

## KEY CANNOT BE REMOVED IN THE OFF LOCK POSITION

### Key Cannot Be Removed in the Off Lock Position

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to <b>Step 2</b>	Go to <b>Steering Wheel and Column Description and Operation</b>
2	Verify that the key cannot be removed from the lock cylinder in the OFF position. Does the lock system operate normally?	System OK	Go to <b>Step 3</b>
3	Inspect for incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to <b>Step 5</b>	Go to <b>Step 4</b>
4	Inspect for a faulty lock cylinder or release button. Is the lock cylinder or release button damaged?	Go to <b>Step 6</b>	Go to <b>Step 3</b>
5	Replace the key. Refer to <b>Key and Lock Cylinder Coding</b> in General Information. Did you complete the repair?	Go to <b>Step 7</b>	-
6	Replace the lock cylinder. Refer to <b>Ignition Lock Cylinder Replacement</b> . Did you complete the repair?	Go to <b>Step 7</b>	-
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

## HIGH LOCK EFFORT

### High Lock Effort

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Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to <b>Step 2</b>	Go to <b>Steering Wheel and Column Description and Operation</b>
2	Verify that the lock system has a high lock effort. Does the lock system operate normally?	System OK	Go to <b>Step 3</b>
3	Inspect for an incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to <b>Step 7</b>	Go to <b>Step 4</b>
4	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to <b>Step 8</b>	Go to <b>Step 5</b>
5	Inspect the ignition lock cylinder case assembly for damage. Is the ignition lock cylinder case assembly damaged?	Go to <b>Step 9</b>	Go to <b>Step 6</b>
6	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to <b>Step 10</b>	Go to <b>Step 7</b>
7	Replace the key. Refer to <b>Key and Lock Cylinder Coding</b> in General Information. Did you complete the repair?	Go to <b>Step 11</b>	-
8	Replace the lock cylinder. Refer to <b>Ignition Lock Cylinder Replacement</b> . Did you complete the repair?	Go to <b>Step 11</b>	-
9	Tighten the ignition lock cylinder case assembly. Refer to <b>Fastener Tightening Specifications</b> . Did you complete the repair?	Go to <b>Step 11</b>	-
10	Replace the ignition switch. Refer to <b>Ignition Switch Replacement</b> . Did you complete the repair?	Go to <b>Step 11</b>	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

## 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 <b>Step 2</b>	Go to <b>Symptoms - Steering Wheel and Column</b>
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation?	Go to <b>Step 3</b>	System OK
3	Inspect the steering column components for looseness. Is the steering column components loose?	Go to <b>Step 10</b>	Go to <b>Step 4</b>
4	Inspect the SIR coil for noise.	Go to	

	Is the SIR coil noisy?	<b>Step 11</b>	Go to <b>Step 5</b>
5	Inspect the horn contact ring for lubrication. Is the horn contact ring lubricated?	Go to <b>Step 12</b>	Go to <b>Step 6</b>
6	Inspect the lock plate retaining ring for the correct installation. Is the lock plate retaining ring installed properly?	Go to <b>Step 13</b>	Go to <b>Step 7</b>
7	Inspect the shaft bearing for the following conditions: <ul style="list-style-type: none"> <li>• Damage</li> <li>• Lubrication</li> <li>• Wear</li> <li>• Proper seating</li> </ul> Are the bearings in need of repair or replacement?	Go to <b>Step 14</b>	Go to <b>Step 8</b>
8	Inspect the spherical joint for lubrication. Is the spherical joint lubricated?	Go to <b>Step 15</b>	Go to <b>Step 9</b>
9	Inspect the steering column coupling for looseness. Is the steering column coupling loose?	Go to <b>Step 16</b>	Go to <b>Step 3</b>
10	Tighten the steering column components to specifications. Refer to <b>Fastener Tightening Specifications</b> . Did you complete the repair?	Go to <b>Step 17</b>	-
11	Replace the SIR coil. Refer to <b>Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)</b> in SIR. Did you complete the repair?	Go to <b>Step 17</b>	-
12	Lubricate the horn contact ring. Did you complete the repair?	Go to <b>Step 17</b>	-
13	Install the lock plate retaining ring properly. Did you complete the repair?	Go to <b>Step 17</b>	-
14	Repair the shaft bearings as necessary. Refer to <b>Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement</b> and to <b>Steering Column Shaft Replacement</b> . Did you complete the repair?	Go to <b>Step 17</b>	-
15	Lubricate the spherical joints. Did you complete the repair?	Go to <b>Step 17</b>	-
16	Tighten the steering column coupling to specifications. Refer to <b>Fastener Tightening Specifications</b> . Did you complete the repair?	Go to <b>Step 17</b>	-
17	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

## HIGH SHIFT EFFORT

### High Shift Effort

Step	Action	Yes	No
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1	Did you review the Steering Wheel and Column Description and Operation?	Go to <b>Step 2</b>	Go to <b><u>Steering Wheel and Column Description and Operation</u></b>
2	Verify that a high shift effort is required in order to shift out of the PARK position. Does the shifter operate normally?	System OK	Go to <b>Step 3</b>
3	Inspect for worn or damaged shift cable components. Are the shift cable components worn or damaged?	Go to <b>Step 5</b>	Go to <b>Step 4</b>
4	Inspect the shift cable for binding or misadjustment. Is the shift cable binding or misadjusted?	Go to <b>Step 6</b>	Go to <b>Step 7</b>
5	Replace the shift cable. Refer to <b><u>Automatic Transmission Range Selector Cable Replacement</u></b> in Automatic Transmission - 4L60-E/4L65-E. Did you complete the repair?	Go to <b>Step 7</b>	-
6	Adjust the shift cable. Refer to <b><u>Automatic Transmission Range Selector Cable Adjustment</u></b> in Automatic Transmission - 4L60-E/4L65-E. Did you complete the repair?	Go to <b>Step 7</b>	-
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 2</b>

## LOOSENESS IN STEERING COLUMN

### Looseness in Steering Column

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column - Tilt Description and Operation and perform the necessary inspections?	Go to <b>Step 2</b>	Go to <b><u>Symptoms - Steering Wheel and Column</u></b>
2	Verify that the steering column is loose. Is the steering column loose?	Go to <b>Step 3</b>	System OK
3	Inspect the steering column mounting brackets for looseness. Are the steering column mounting brackets loose?	Go to <b>Step 8</b>	Go to <b>Step 4</b>
4	Verify that the steering column bracket capsule is not sheared. Is the steering column bracket capsule sheared?	Go to <b>Step 9</b>	Go to <b>Step 5</b>
5	Inspect the support screws for looseness. Are the support screws loose?	Go to <b>Step 10</b>	Go to <b>Step 6</b>
6	Inspect the intermediate shaft for worn joints or looseness. Is the intermediate joint worn or loose?	Go to <b>Step 11</b>	Go to <b>Step 7</b>
7	Inspect the tilt head, support and pivot pins for looseness. Are there any loose components?	Go to <b>Step 12</b>	Go to <b>Step 2</b>
8	Tighten the brackets to specifications. Refer to <b><u>Fastener Tightening Specifications</u></b> . Did you complete the repair?	Go to <b>Step 13</b>	-
	Replace the jacket assembly. Refer to <b><u>Steering Column Jacket</u></b>		

9	<b>Replacement</b> . Did you complete the replacement?	Go to <b>Step 13</b>	-
10	Tighten the support screws to specifications. Refer to <b>Fastener Tightening Specifications</b> . Did you complete the repair?	Go to <b>Step 13</b>	-
11	Tighten or replace the intermediate shaft as needed. Refer to <b>Intermediate Steering Shaft Replacement - Upper</b> and <b>Intermediate Steering Shaft Replacement - Lower</b> . Did you complete the repair?	Go to <b>Step 13</b>	-
12	Repair or replace the tilt head, support and pivot pins as necessary. Refer to <b>Steering Column Tilt Head Housing Replacement</b> . Did you complete the replacement?	Go to <b>Step 13</b>	-
13	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

## REPAIR INSTRUCTIONS

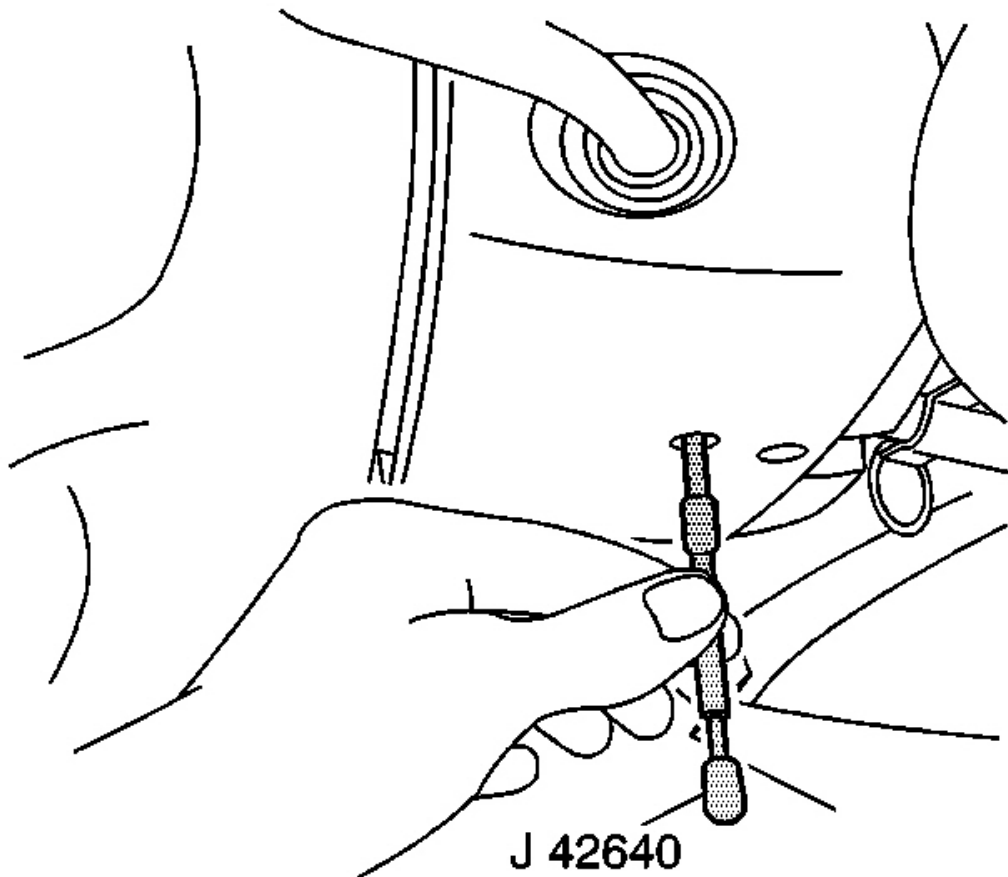
### INTERMEDIATE STEERING SHAFT REPLACEMENT - UPPER

#### Tools Required

J 42640 Steering Column Lock Pin

#### Removal Procedure

**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.

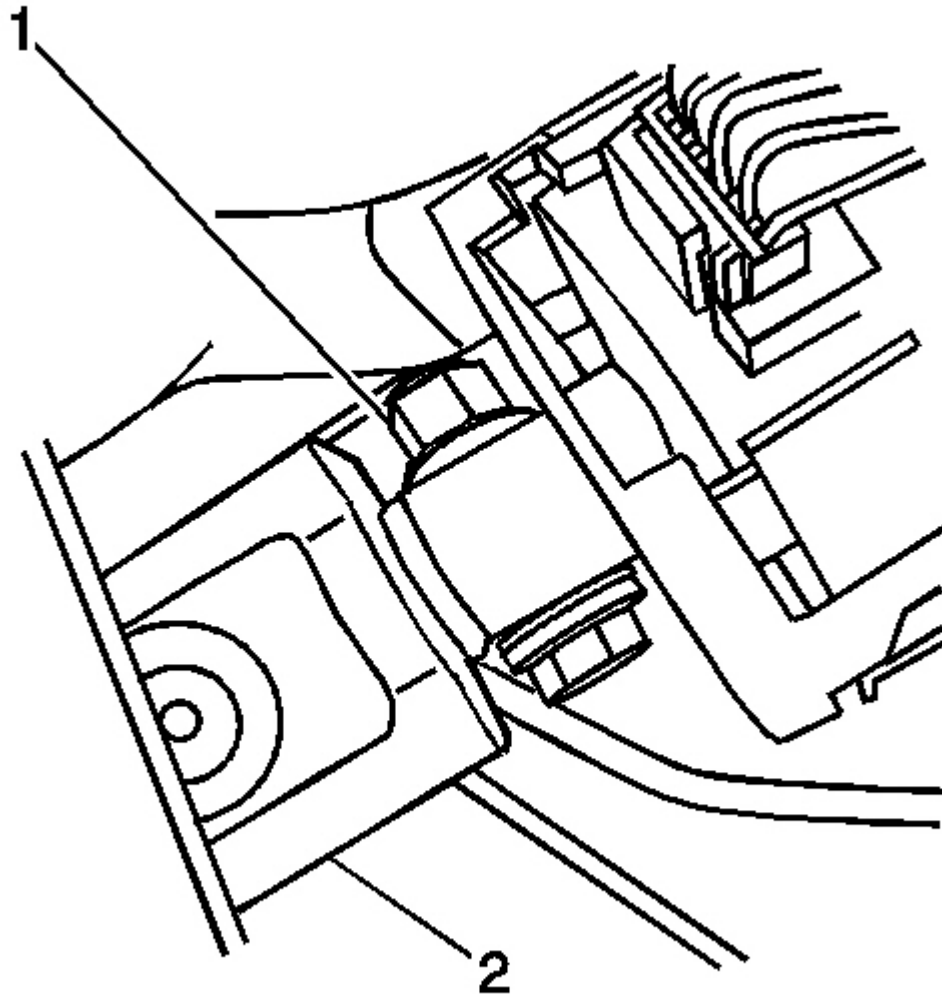


**Fig. 5: Inserting J 42640 To Lock Steering Column**  
Courtesy of GENERAL MOTORS CORP.

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

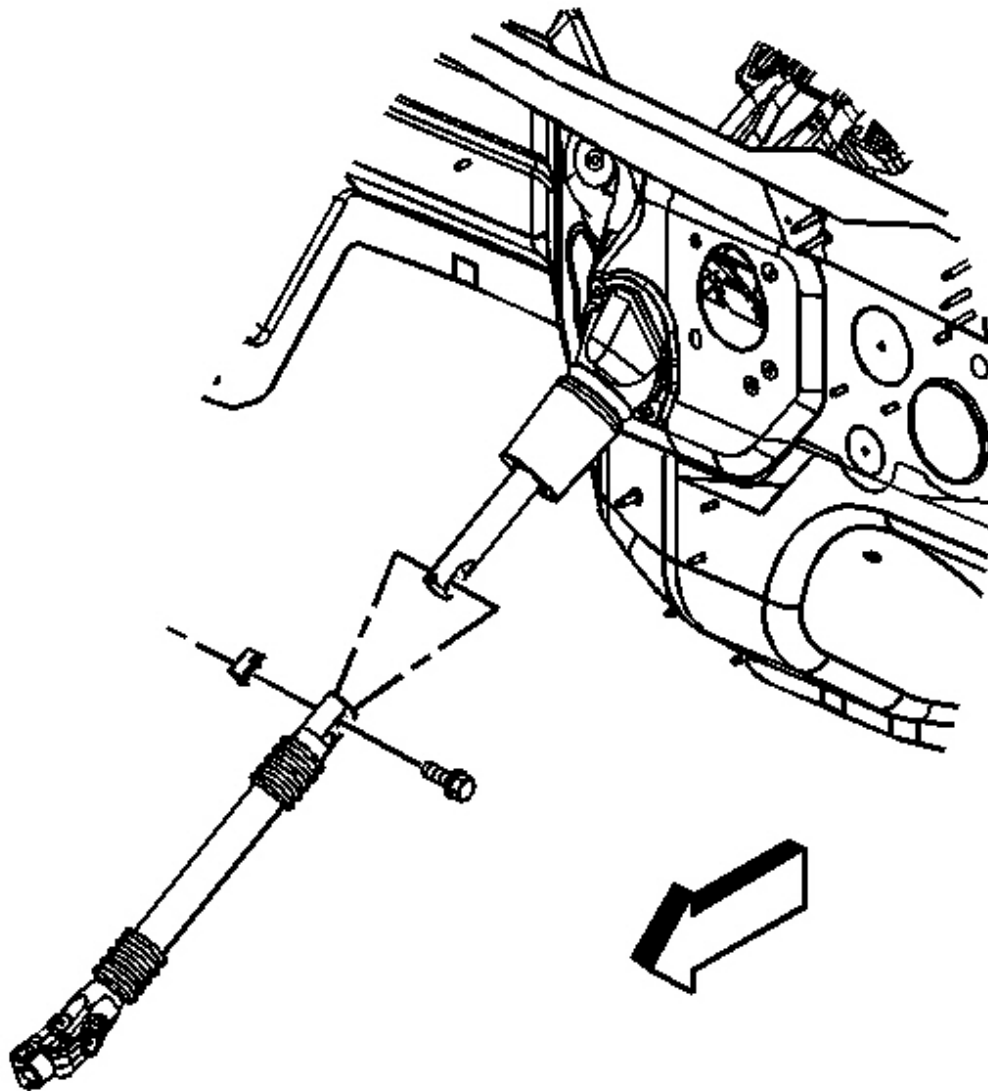
1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition switch to the lock position and remove the key.
3. Lock the steering column through the access hole in the lower steering column trim cover using J 42640 .





**Fig. 6: Nut & Bolt To Upper Shaft To Steering Column**  
Courtesy of GENERAL MOTORS CORP.

4. From inside the vehicle remove the upper intermediate shaft to steering column shaft pinch bolt.

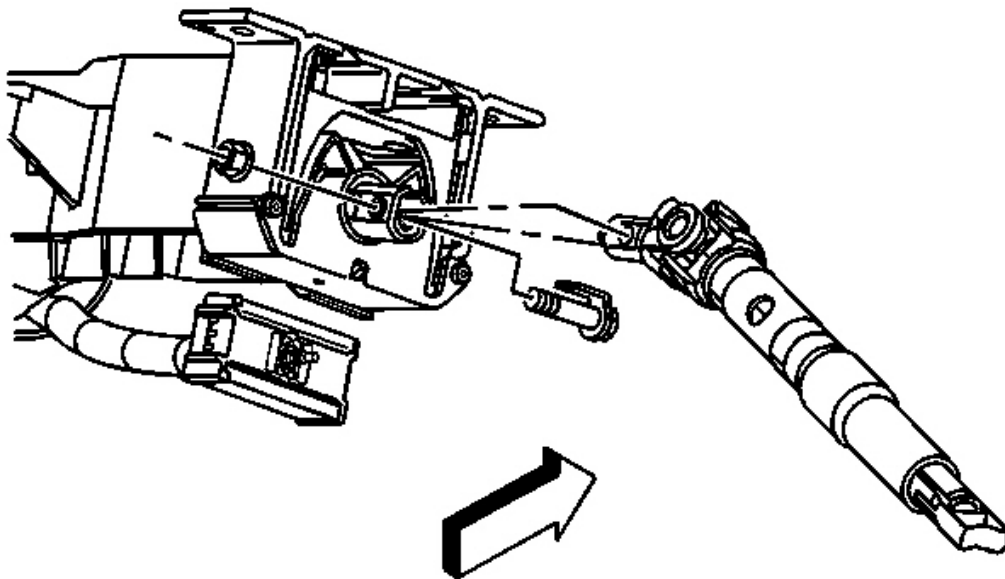


**Fig. 7: Upper Intermediate Shaft & Lower Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Note the direction of upper intermediate shaft to steering column pinch bolt for installation. The bolt must be installed in the same direction it was removed.

5. Remove the upper intermediate shaft to the lower intermediate shaft pinch bolt.

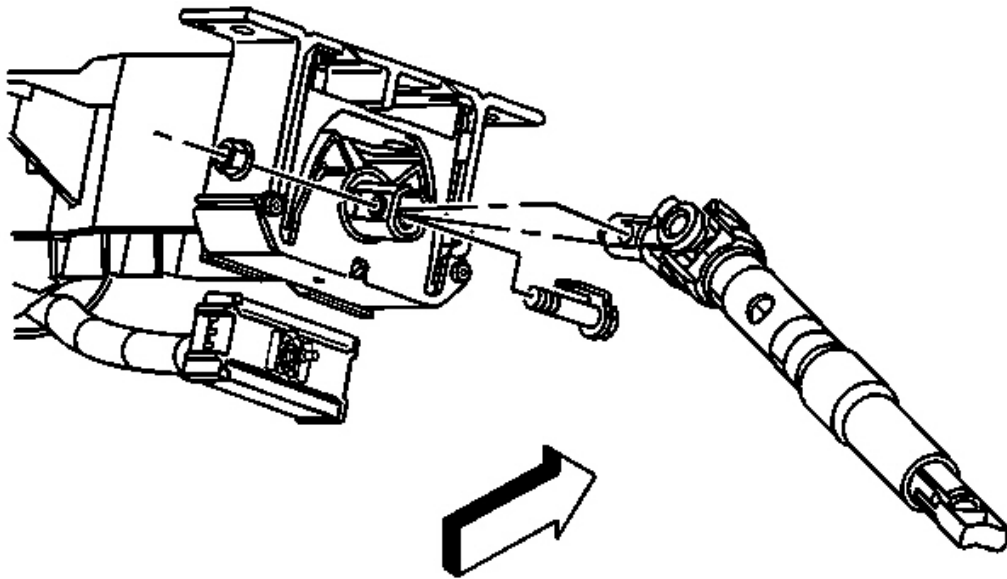
6. Disconnect the upper intermediate shaft from the lower intermediate shaft.



**Fig. 8: Steering Column & Upper Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

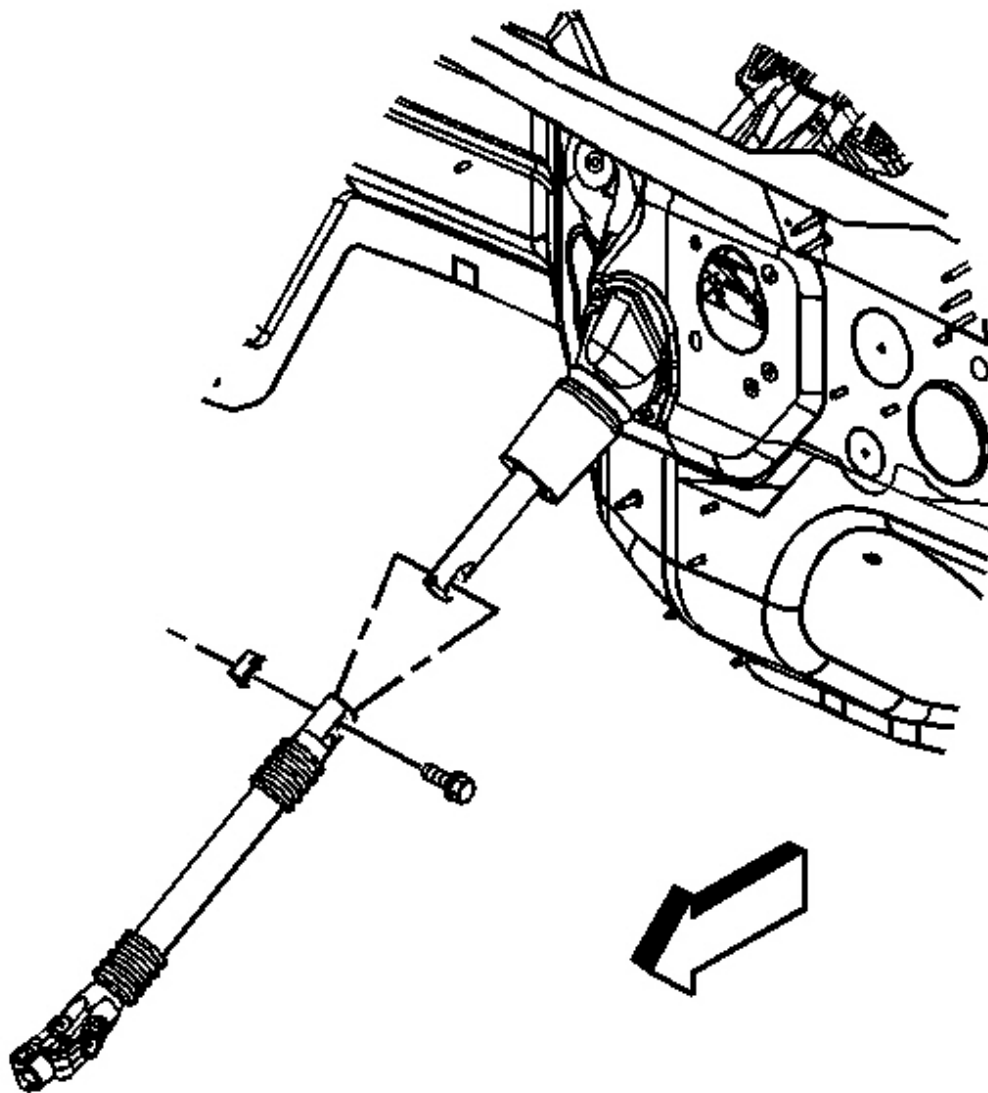
7. Disconnect the upper intermediate shaft from the steering column.
8. Remove the upper intermediate shaft from the vehicle.

#### **Installation Procedure**



**Fig. 9: Steering Column & Upper Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

1. Install the upper intermediate shaft to the vehicle.
2. Connect the upper intermediate shaft to the steering column.



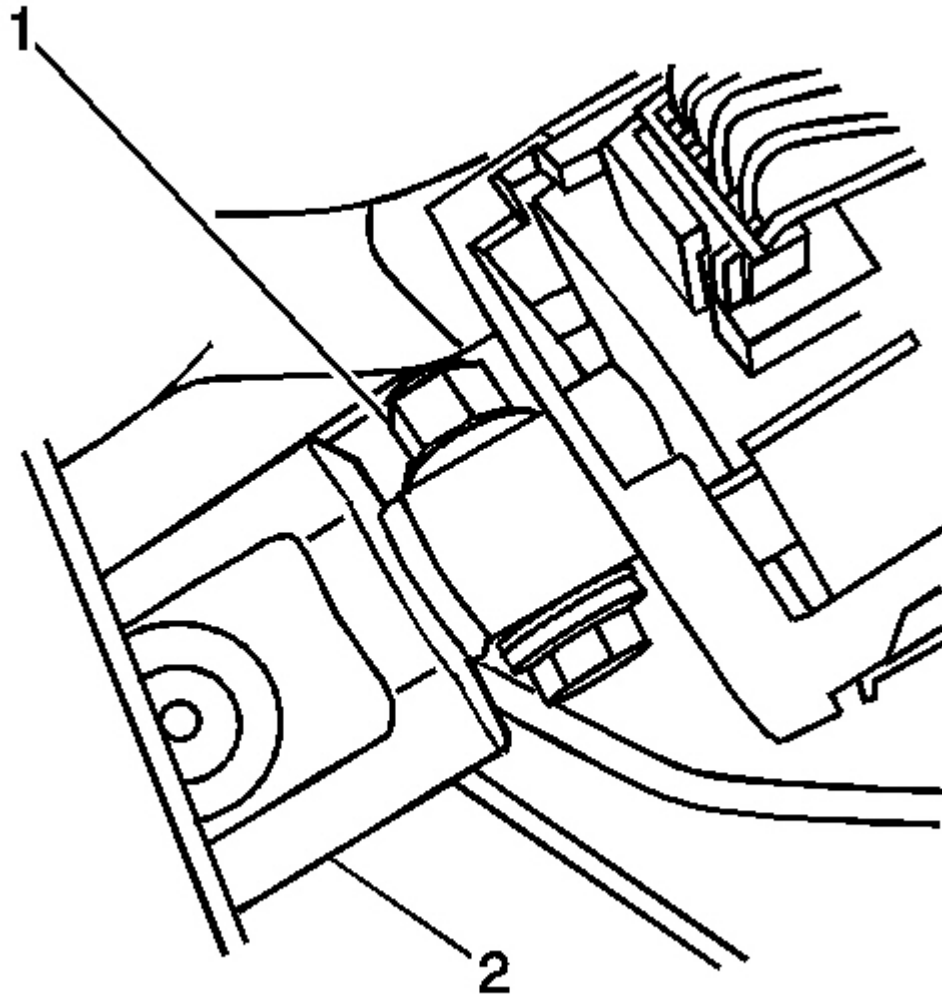
**Fig. 10: Upper Intermediate Shaft & Lower Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

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

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

4. Install the upper intermediate shaft to the lower intermediate shaft pinch bolt.

**Tighten:** Tighten the upper intermediate shaft pinch bolt to 50 N.m (37 lb ft).

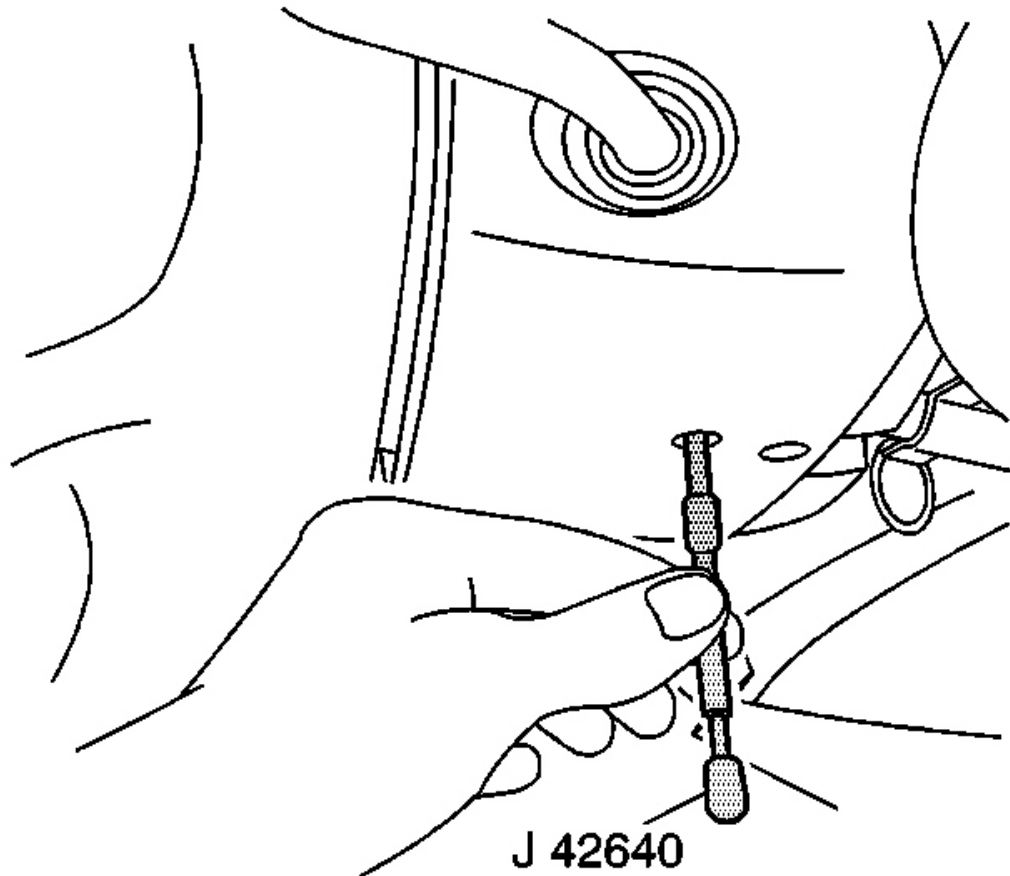


**Fig. 11: Nut & Bolt To Upper Shaft To Steering Column**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** The upper intermediate shaft to the steering column pinch bolt must be installed in the same direction it was removed or the pinch bolt will contact the steering column housing.

5. Install the upper intermediate shaft to the steering column pinch bolt and nut.

**Tighten:** Tighten the upper intermediate shaft to the steering column pinch bolt nut to 62 N.m (46 lb ft).



**Fig. 12: Inserting J 42640 To Lock The Steering Column**  
Courtesy of GENERAL MOTORS CORP.

6. Unlock the steering column by removing J 42640 from the steering column lower trim cover access hole.

## **INTERMEDIATE STEERING SHAFT REPLACEMENT - LOWER**

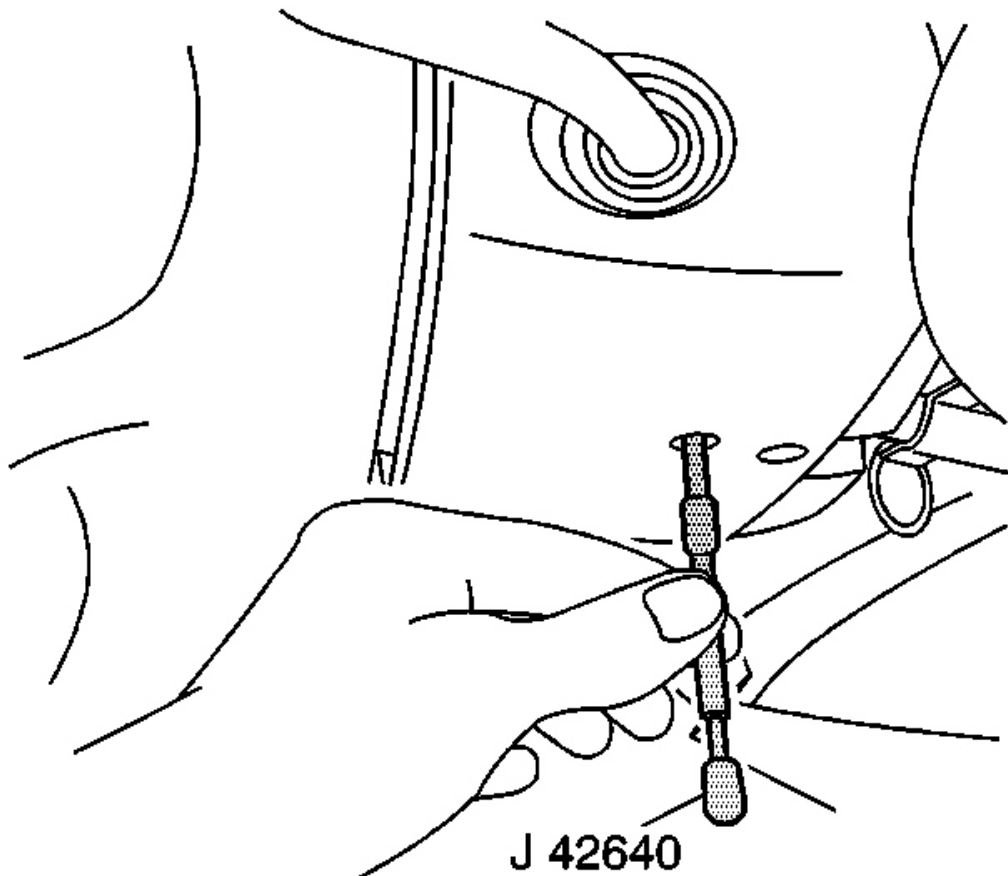
### **Tools Required**

J 42640 Steering Column Lock Pin

### **Removal Procedure**

**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.



**Fig. 13: Inserting J 42640 To Lock Steering Column**  
Courtesy of GENERAL MOTORS CORP.

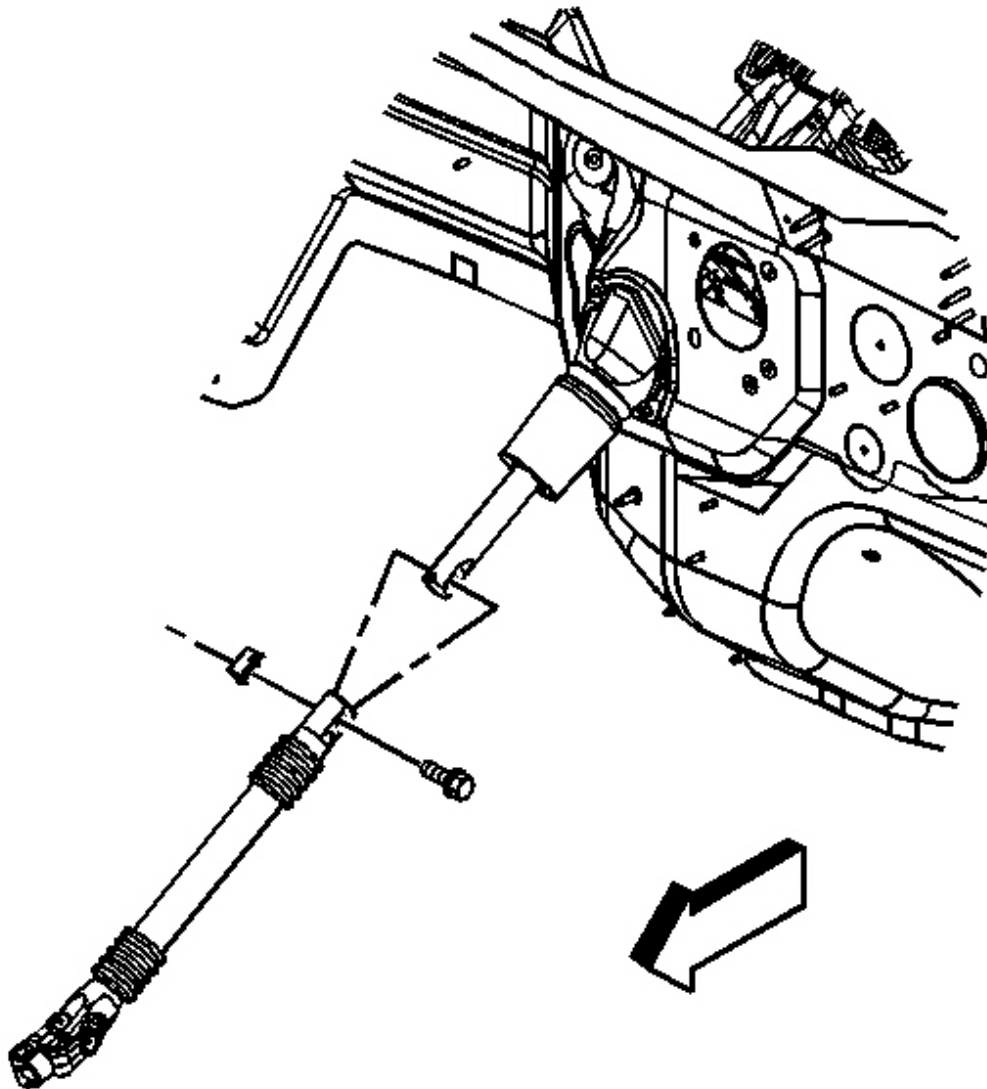
**NOTE:**

The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before



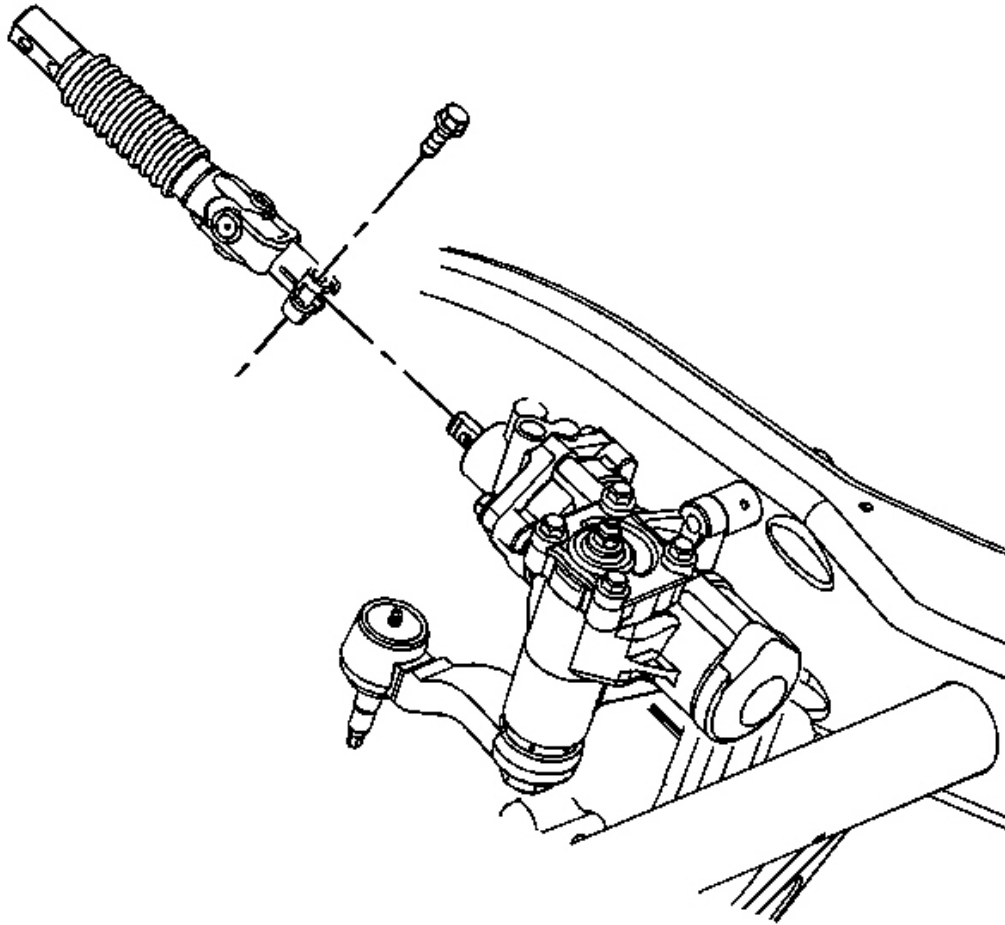
**disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.**

1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition switch to the lock position and remove the key.
3. Lock the steering column through the access hole in the lower steering column trim cover using J 42640 .



**Fig. 14: Upper Intermediate Shaft & Lower Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

4. Remove the upper intermediate shaft to lower intermediate shaft pinch bolt.



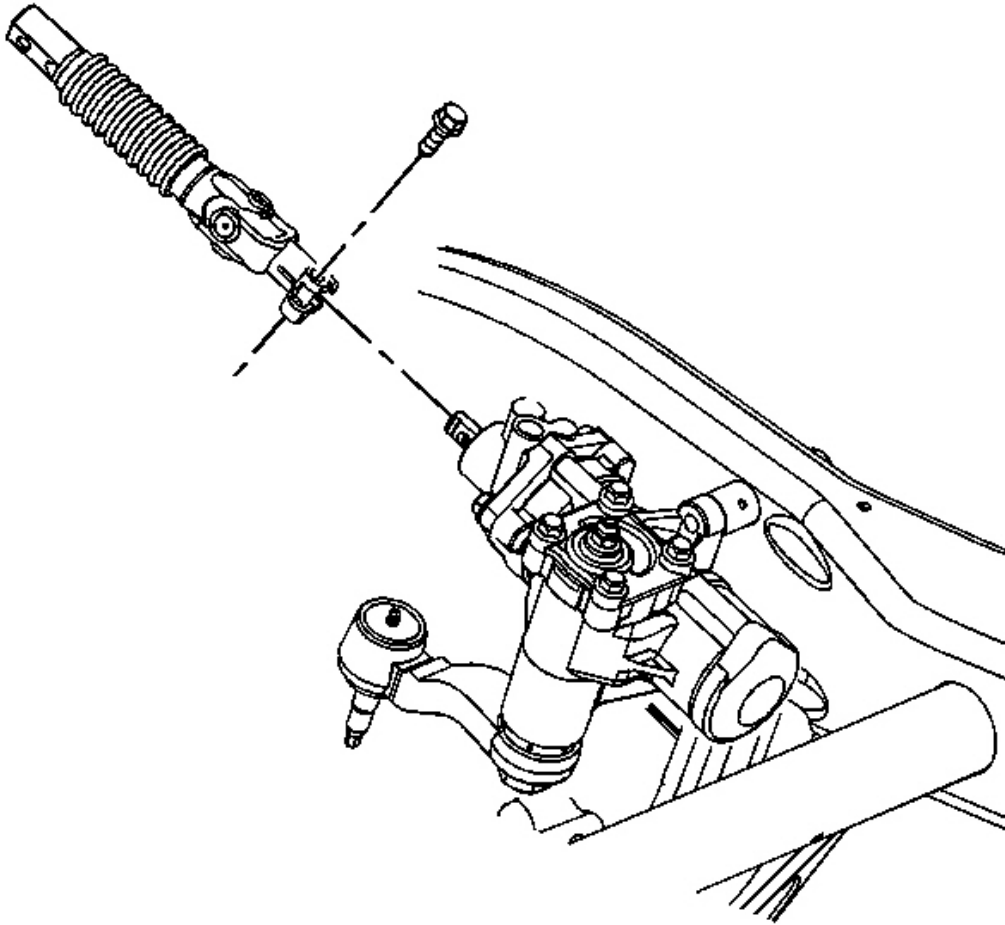
**Fig. 15: Lower Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

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

5. Remove the lower intermediate shaft to the power steering gear input shaft pinch bolt.

6. Disconnect the lower intermediate shaft from the power steering gear.
7. Remove the lower intermediate shaft from the vehicle.

### **Installation Procedure**



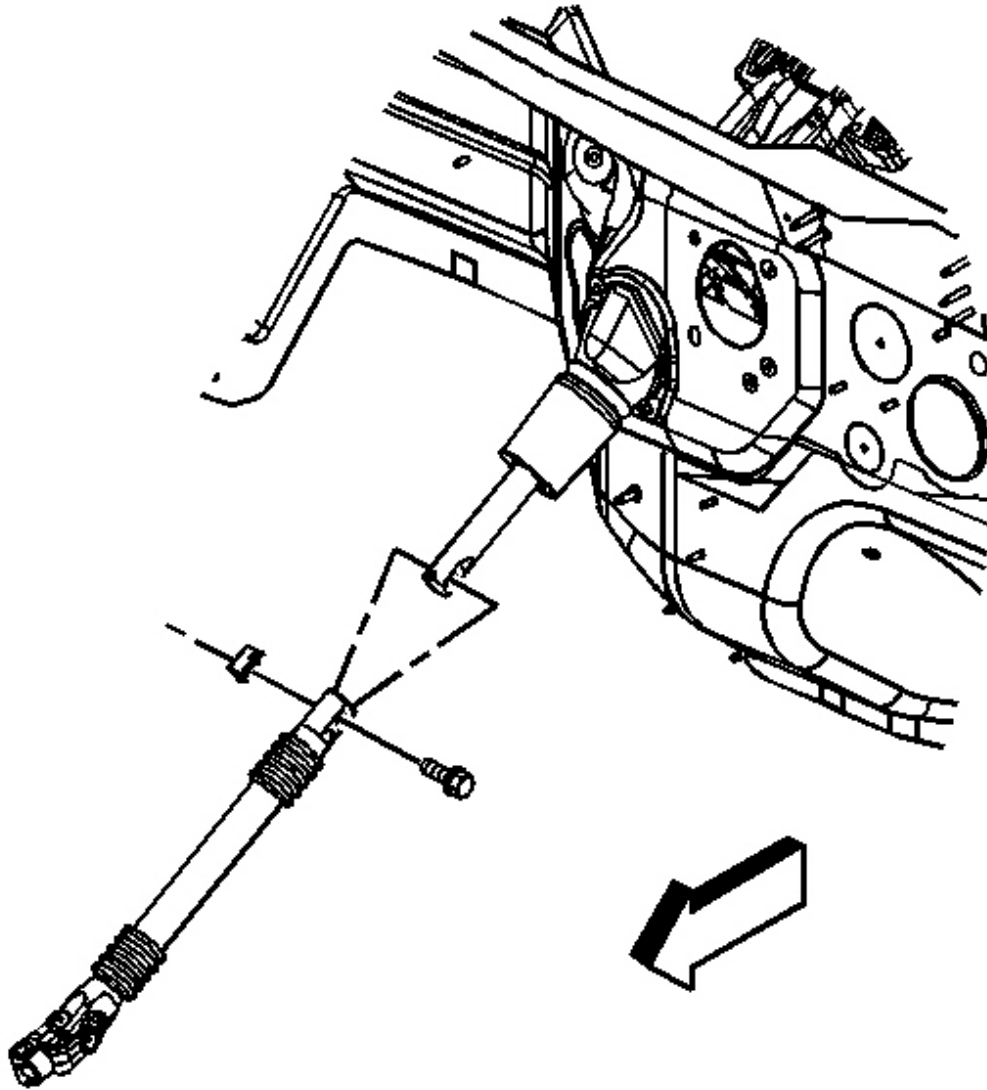
**Fig. 16: Lower Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

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

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

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

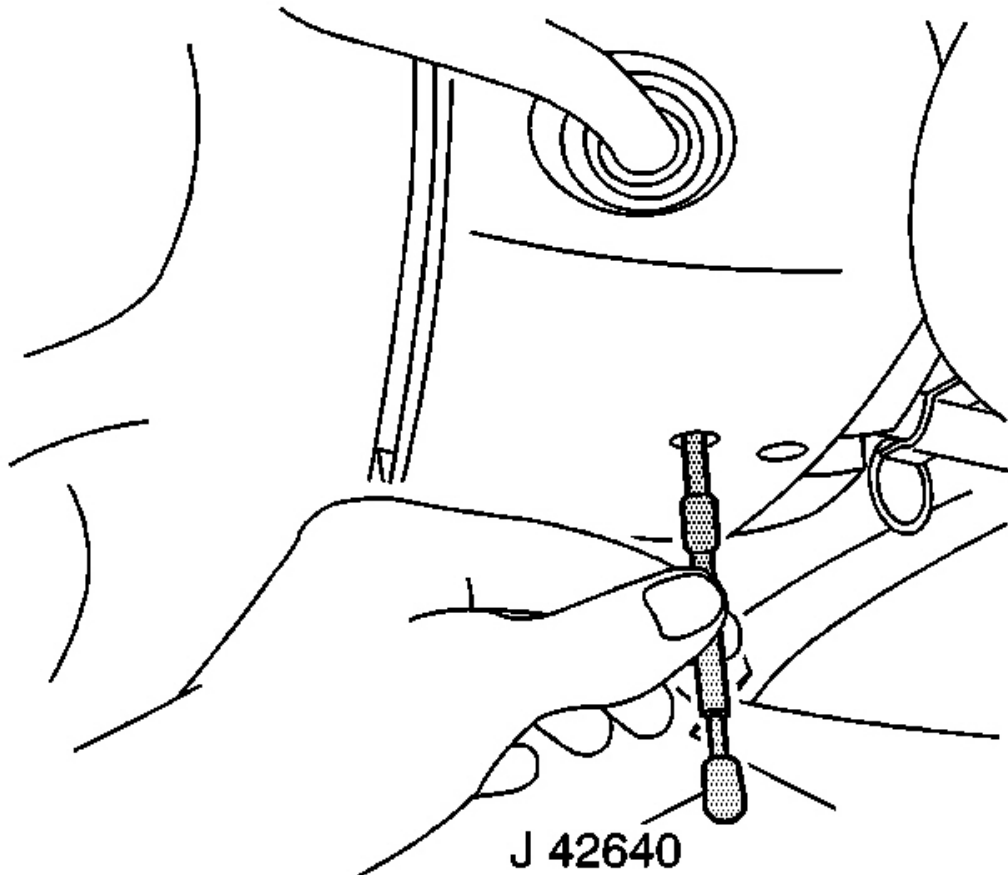
**Tighten:** Tighten the lower intermediate shaft the power steering gear input shaft pinch bolt to 47 N.m (35 lb ft).



**Fig. 17: Upper Intermediate Shaft & Lower Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

4. Connect the lower intermediate shaft to the upper intermediate shaft.
5. Install the lower intermediate shaft to the upper intermediate shaft pinch bolt.

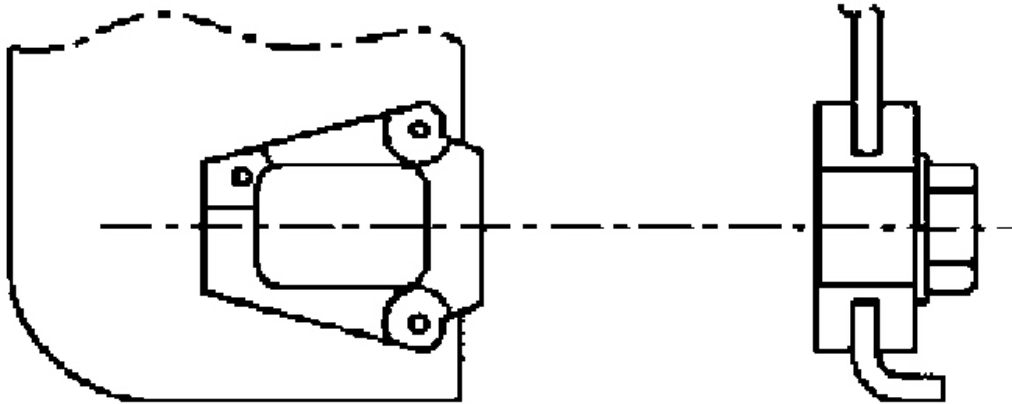
**Tighten:** Tighten the lower intermediate shaft to the upper intermediate shaft pinch bolt to 50 N.m (37 lb ft).



**Fig. 18: Inserting J 42640 To Lock Steering Column**  
Courtesy of GENERAL MOTORS CORP.

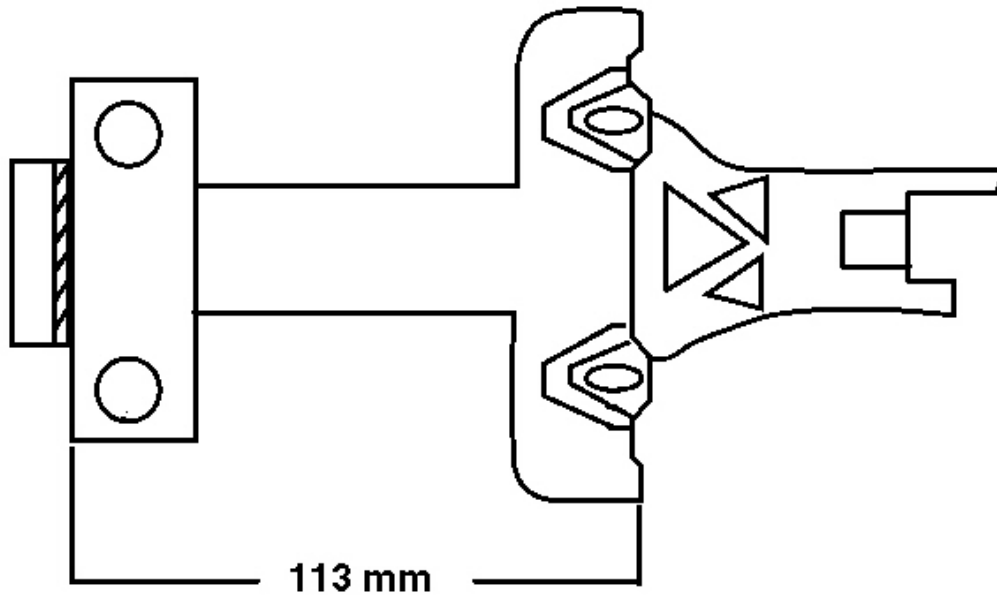
6. Unlock the steering column by removing J 42640 from the steering column lower trim cover access hole.

## STEERING COLUMN ACCIDENT DAMAGE INSPECTION



**Fig. 19: Inspecting Capsule On Steering Column Bracket Assembly**  
Courtesy of GENERAL MOTORS CORP.

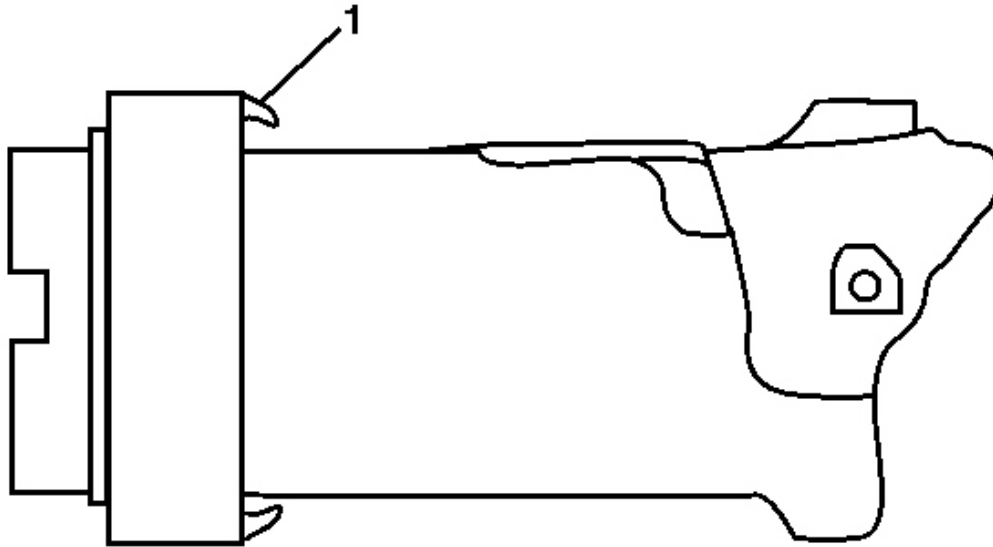
- Vehicles involved in accidents involving the following conditions may also have a damaged or misaligned steering column:
  - Frame damage
  - Major body or sheet metal damage
  - Where the steering column has been impacted
  - Where supplemental inflatable restraint systems deployed
- Inspect the capsules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



**Fig. 20: Measuring Distance From Lower Edge Of Upper Jacket To Defined Point On Lower Jacket**

**Courtesy of GENERAL MOTORS CORP.**

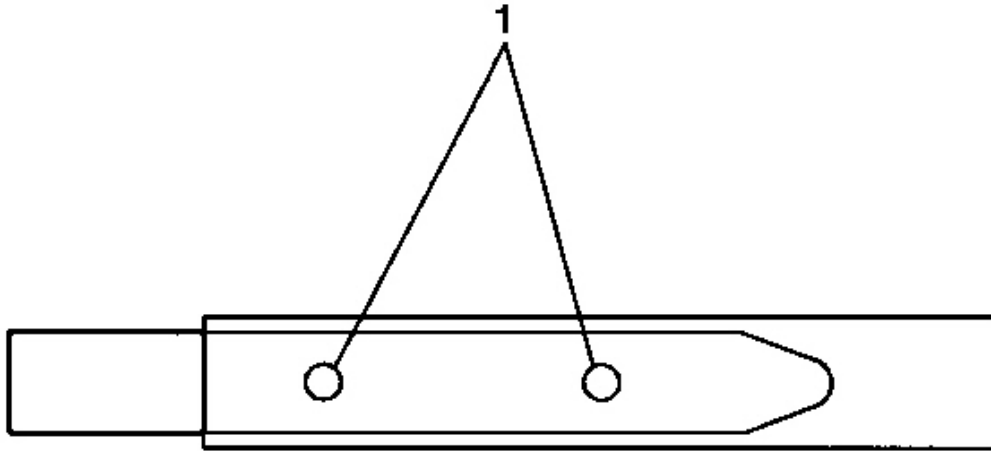
- Inspect for jacket assembly collapse by measuring the distance from the lower edge of the upper jacket to a defined point on the lower jacket. Replace the jacket assembly if the measured dimensions are not within specifications.



**Fig. 21: Inspecting For Tab Breakage On Bearing & Adapter Assembly**  
Courtesy of GENERAL MOTORS CORP.

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



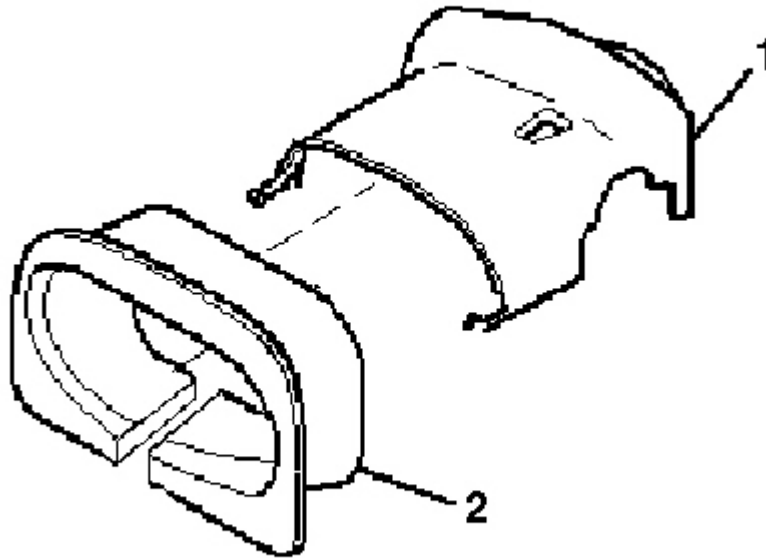


**Fig. 22: Inspecting Steering Shaft For Sheared Injected Plastic**  
Courtesy of GENERAL MOTORS CORP.

- 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**



**Fig. 23: Closeout Trim Cover & Upper Trim Cover**  
Courtesy of GENERAL MOTORS CORP.

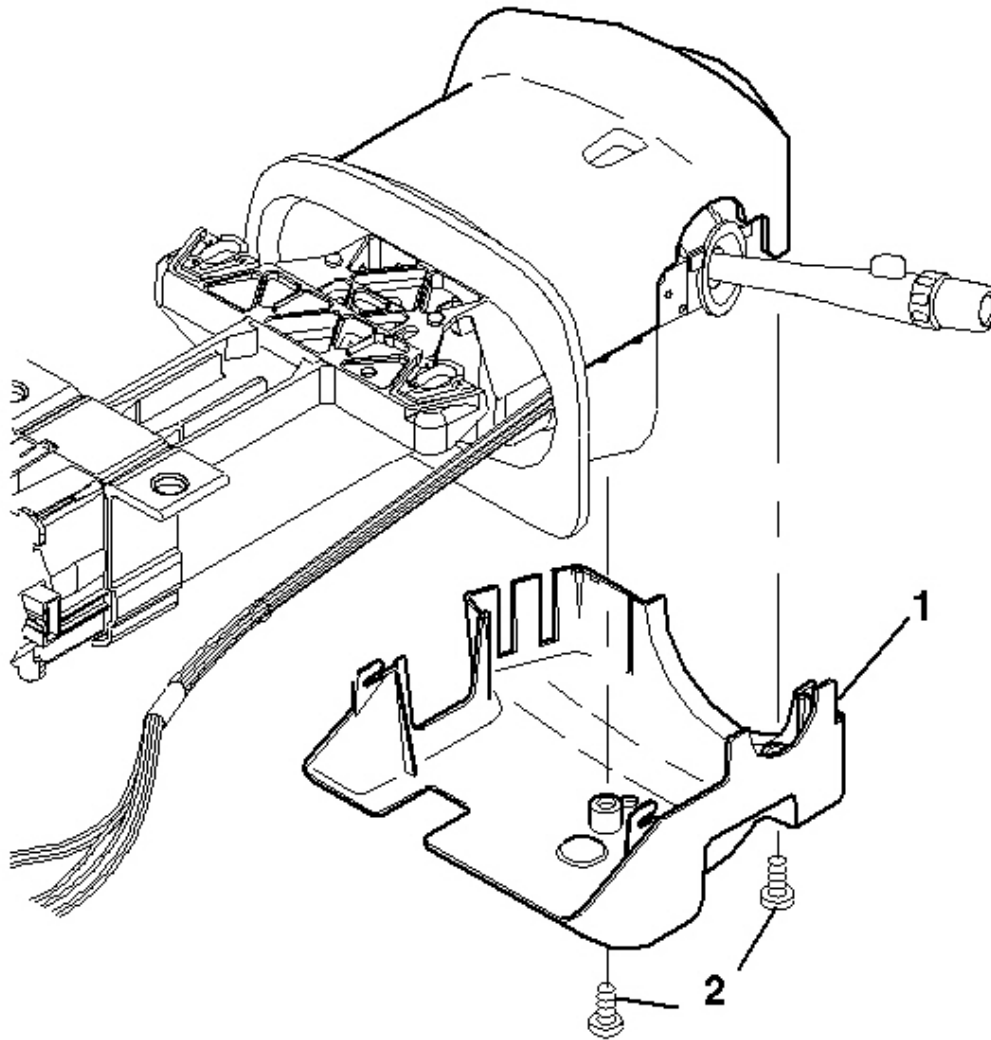
**CAUTION:** Refer to SIR Caution in Cautions and Notices.

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the steering wheel. Refer to Steering Wheel Replacement .
3. Remove the tilt lever. Refer to Tilt Lever Replacement .

**NOTE:** Remove the closeout trim cover following the exact procedure listed below in order not to damage the snaps on the upper trim cover.

4. Disengage the closeout trim cover (2) from the upper trim cover (1) in the following order:
  1. Stand in front of the column from the drivers point of view.
  2. On the left side, gently pull downwards on the left side of the closeout trim cover to loosen 1 snap. Do NOT fully remove the closeout trim cover.
  3. On the right side, gently pull downwards on the right side of the closeout trim cover to loosen 1 snap. Do NOT fully remove the closeout trim cover.
  4. Starting from the left side of the trim covers, gently roll the closeout trim cover to the right to

disengage the remaining 4 snaps.

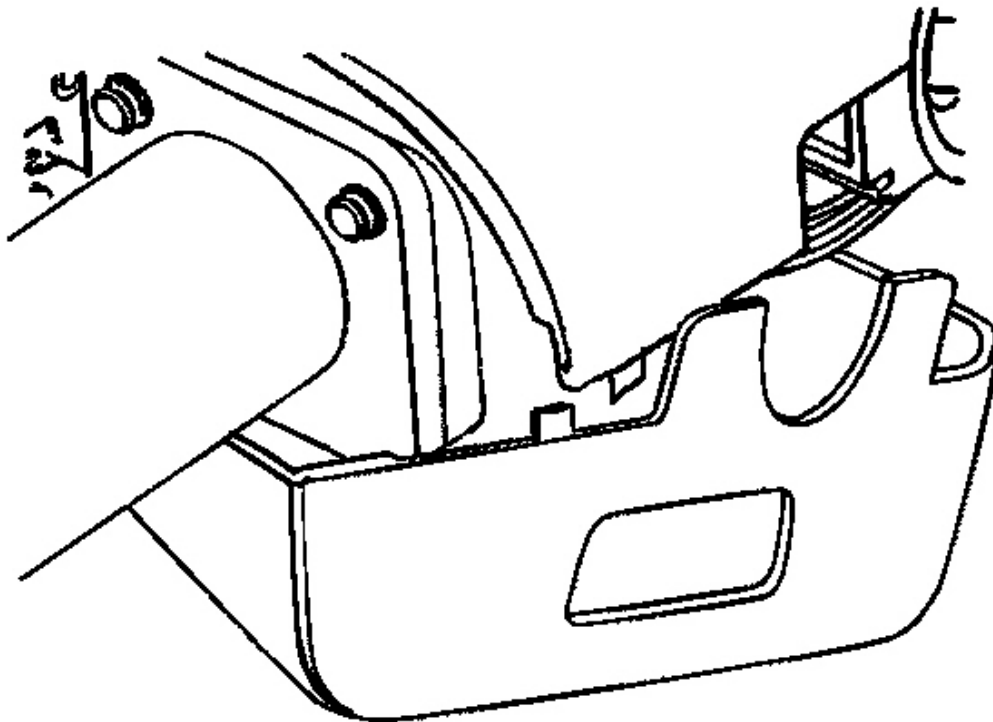


**Fig. 24: Lower Steering Column Cover**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: You must inspect for 2 pan head tapping screws (2) in the lower trim cover (1) before removal.**

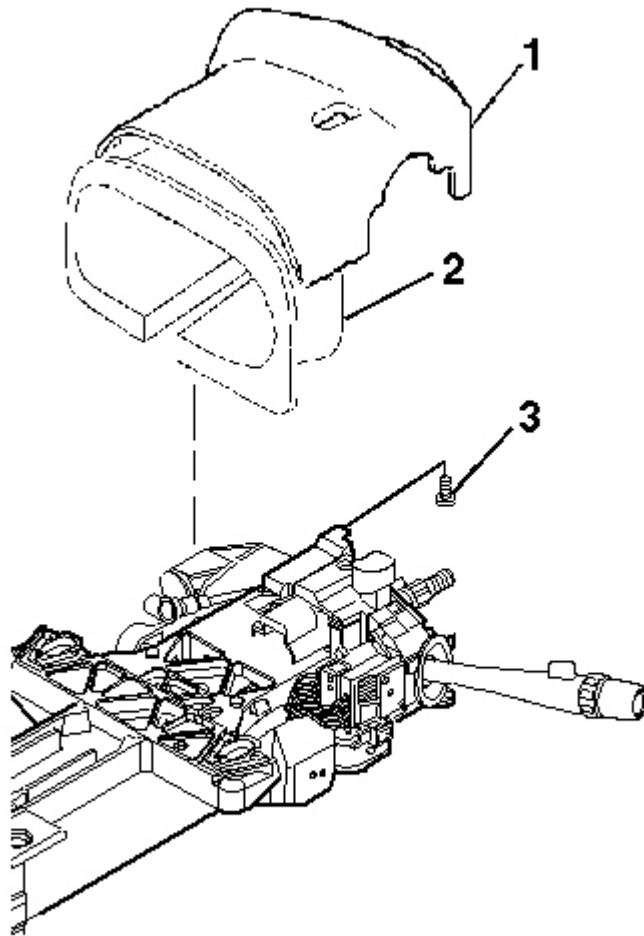
5. If necessary, remove the 2 pan head tapping screws (2) from the lower trim cover (1). Remove the lower trim cover (1).

6. If no screws are present in the lower trim cover, proceed to the next step.



**Fig. 25: Identifying Lower Trim Cover & Upper Trim Cover**  
Courtesy of GENERAL MOTORS CORP.

7. Gently unsnap the lower trim cover from the upper trim cover.

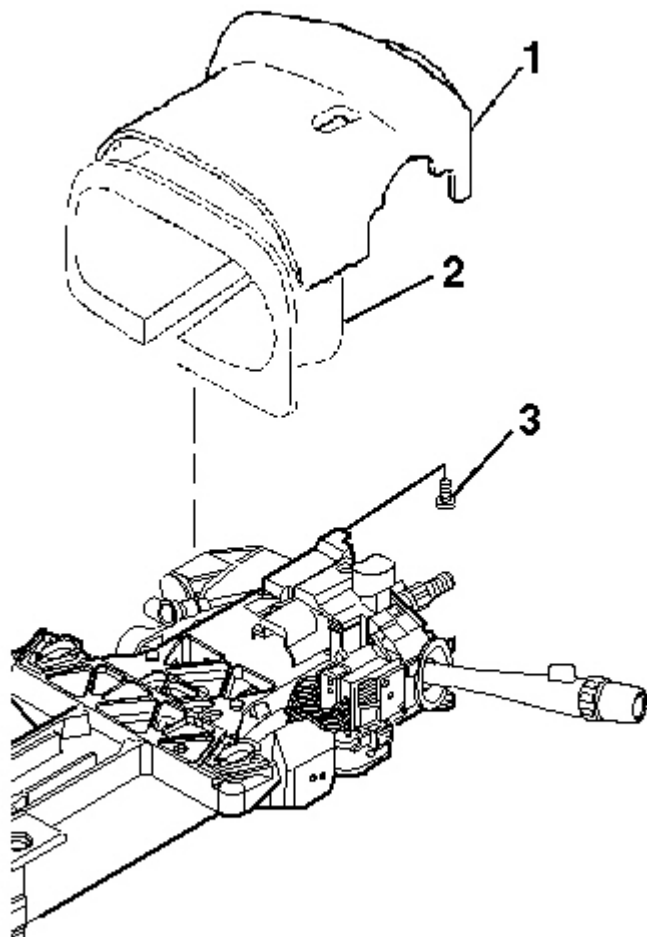


**Fig. 26: Upper Steering Column**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: You must inspect for 1 TORX(R) head screw (3) in the upper trim cover (1) before removal.**

8. If necessary, remove 1 TORX(R) head screw (3) from the upper trim cover (1) and the closeout trim cover (2) for removal.
9. If no screw is present, remove the upper trim cover (1) with the closeout trim cover (2).

#### **Installation Procedure**



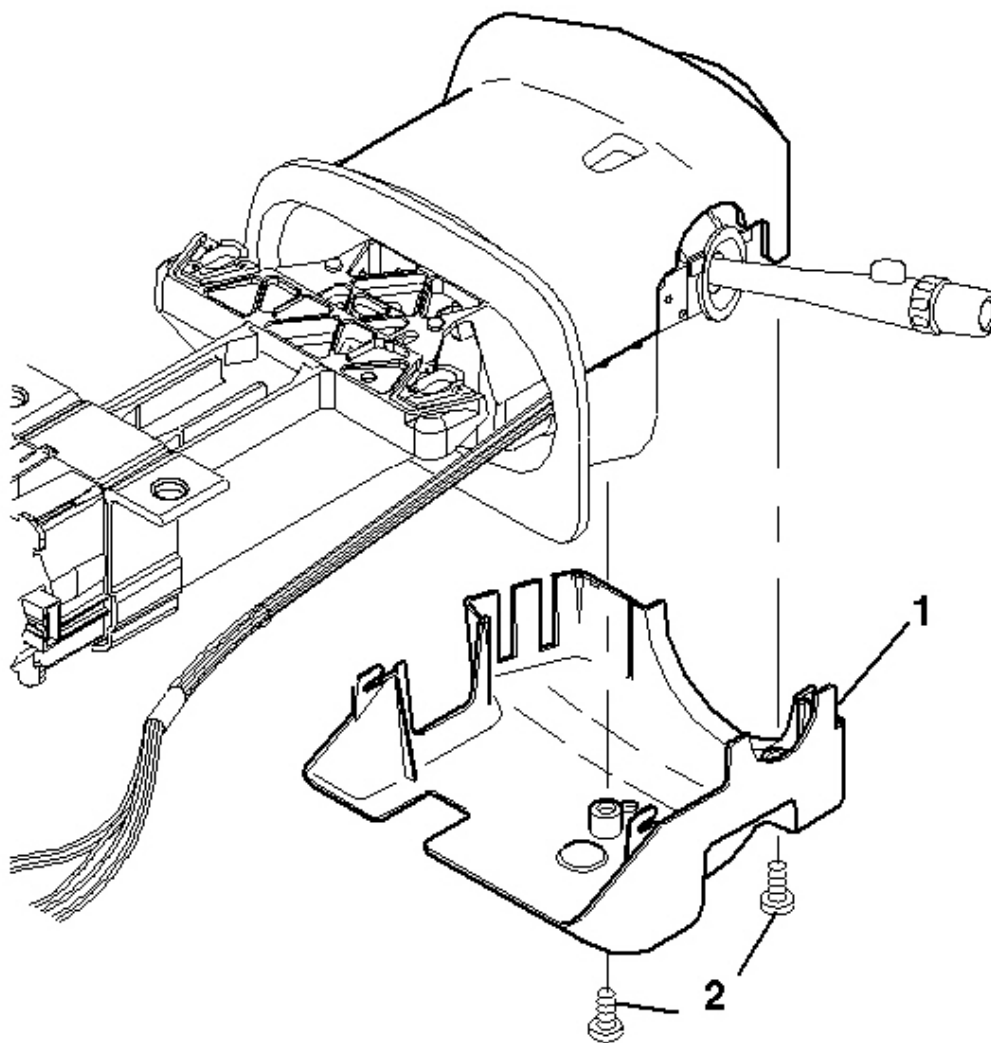
**Fig. 27: Upper Steering Column**  
Courtesy of GENERAL MOTORS CORP.

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

**IMPORTANT:** If the snap on/off feature on the trim covers was damaged during the removal procedure, you must use screws for the installation procedure. If screws were present in the trim covers before the removal procedure, you must use the screws during the installation procedure. If there was not any damage done to the trim covers during the removal procedure and no screws were present, proceed to step 6.

1. Install the upper trim cover (1) with the closeout trim cover (2) and secure by using 1 TORX(R) head screw (3).

**Tighten:** Tighten the screw to 1 N.m (9 lb in).

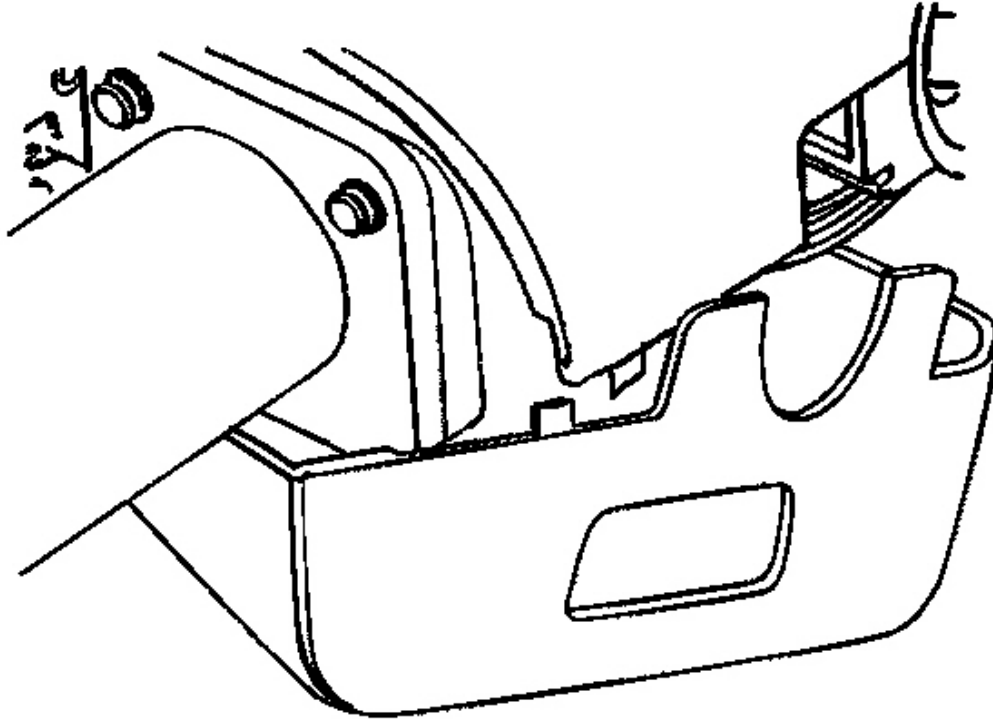


**Fig. 28: Lower Steering Column Cover**  
Courtesy of GENERAL MOTORS CORP.

2. Install the lower trim cover (1).
3. Connect the lower trim cover (1) to the closeout trim cover.

4. Install 2 pan head tapping screws (2).

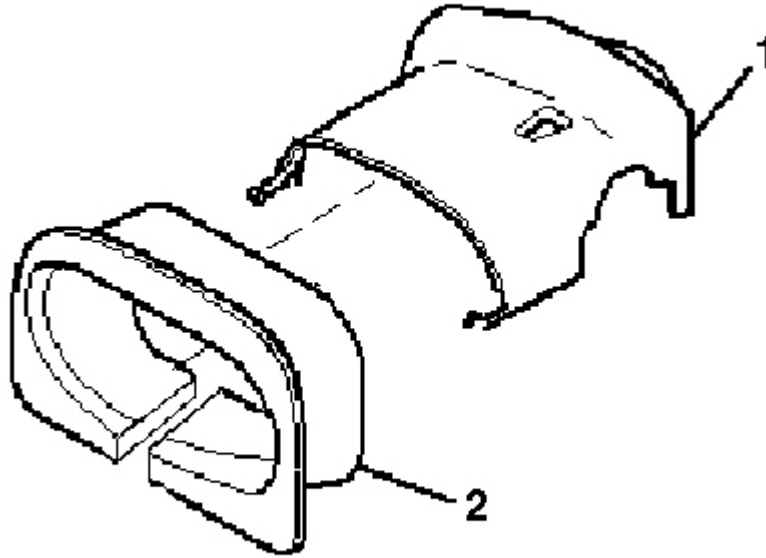
**Tighten:** Tighten the screws to 3.5 N.m (31 lb in).



**Fig. 29: Identifying Lower Trim Cover & Upper Trim Cover**  
Courtesy of GENERAL MOTORS CORP.

5. Install the upper and lower trim covers onto the steering column.
6. Gently snap the upper and lower trim covers together.





**Fig. 30: Closeout Trim Cover & Upper Trim Cover**  
Courtesy of GENERAL MOTORS CORP.

7. Install the closeout trim cover (2) onto the upper trim cover (1).
8. Install the tilt lever. Refer to **Tilt Lever Replacement** .
9. Install the steering wheel. Refer to **Steering Wheel Replacement** .
10. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

## **IGNITION SWITCH REPLACEMENT**

### **Tools Required**

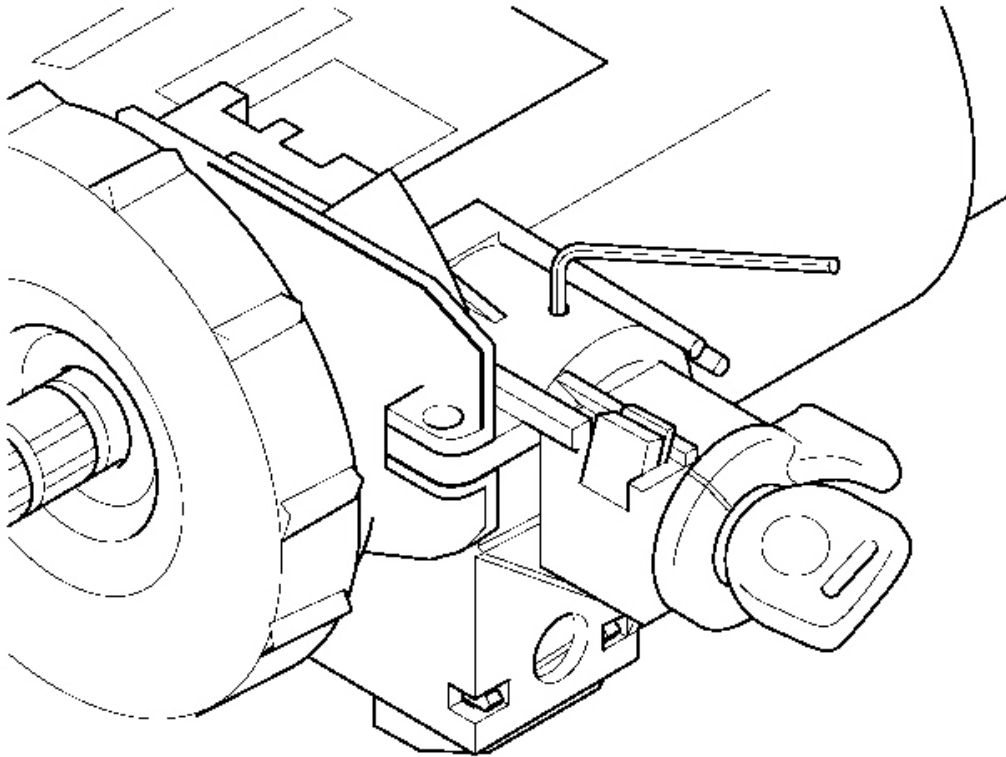
**J 42759** Ignition Switch Connector Release Tool. See **Special Tools and Equipment** .

### **Removal Procedure**

1. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure (Single Battery)** in Engine Electrical.

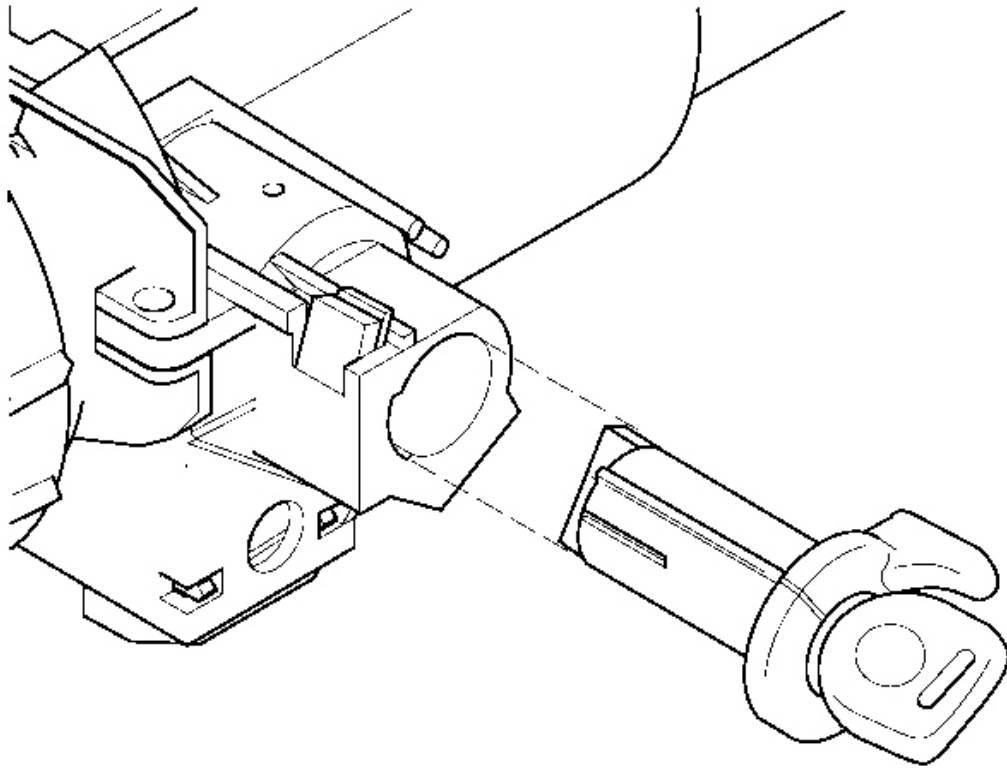
**CAUTION: Refer to SIR Caution in Cautions and Notices.**

2. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
3. Remove the hush and knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gauges, and Console.
4. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement** .
5. With the key installed, turn the key to the RUN position.



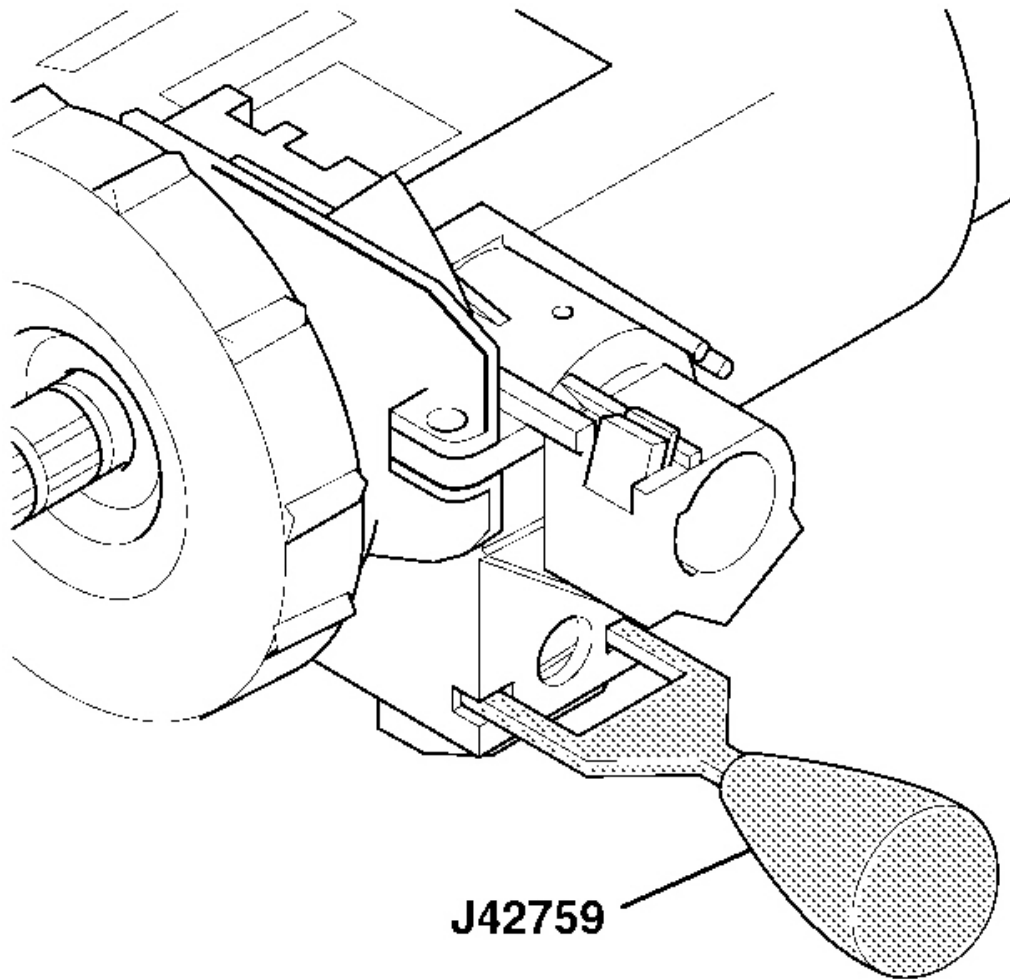
**Fig. 31: Releasing Lock Cylinder**  
Courtesy of GENERAL MOTORS CORP.

6. Install an allen wrench into the hole on top of the lock cylinder housing.
7. Push down on the allen wrench to release the tab on the lock cylinder inside the lock cylinder housing.



**Fig. 32: Aligning Lock Cylinder Into Lock Cylinder Housing**  
Courtesy of GENERAL MOTORS CORP.

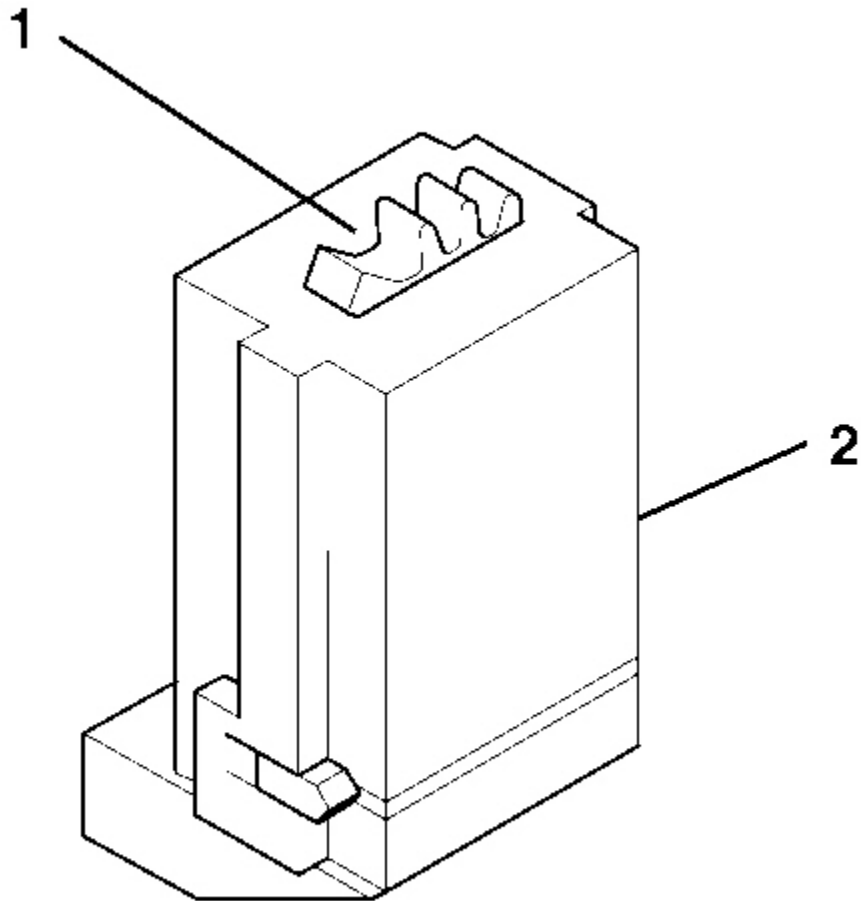
8. Slide the lock cylinder out of the lock cylinder housing.
9. Disconnect the passlock and key buzzer from the lock cylinder housing.



**Fig. 33: Inserting J 42759 Into Lock Cylinder Housing To Release Tabs On Ignition Switch**  
Courtesy of GENERAL MOTORS CORP.

10. Insert **J 42759** into the lock cylinder housing to release the tabs on the ignition switch. See **Special Tools and Equipment** .
11. Pull the ignition switch out of the lock cylinder housing.
12. Disconnect the connector from the ignition switch.

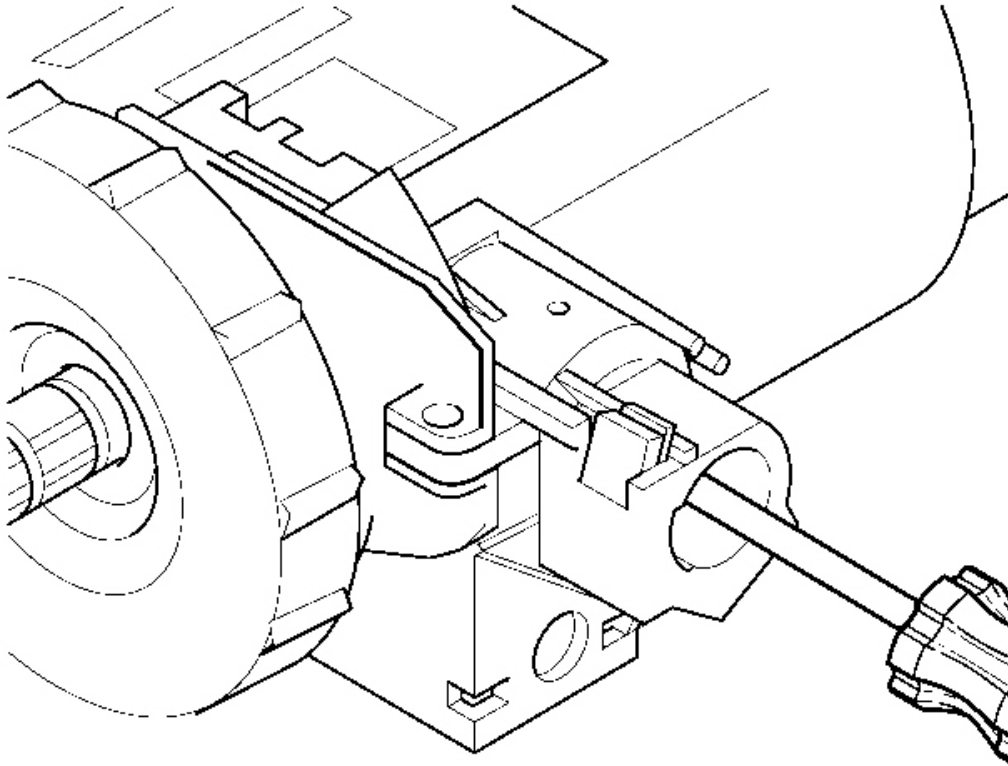
#### **Installation Procedure**



**Fig. 34: Aligning Gear In Ignition Switch**  
Courtesy of GENERAL MOTORS CORP.

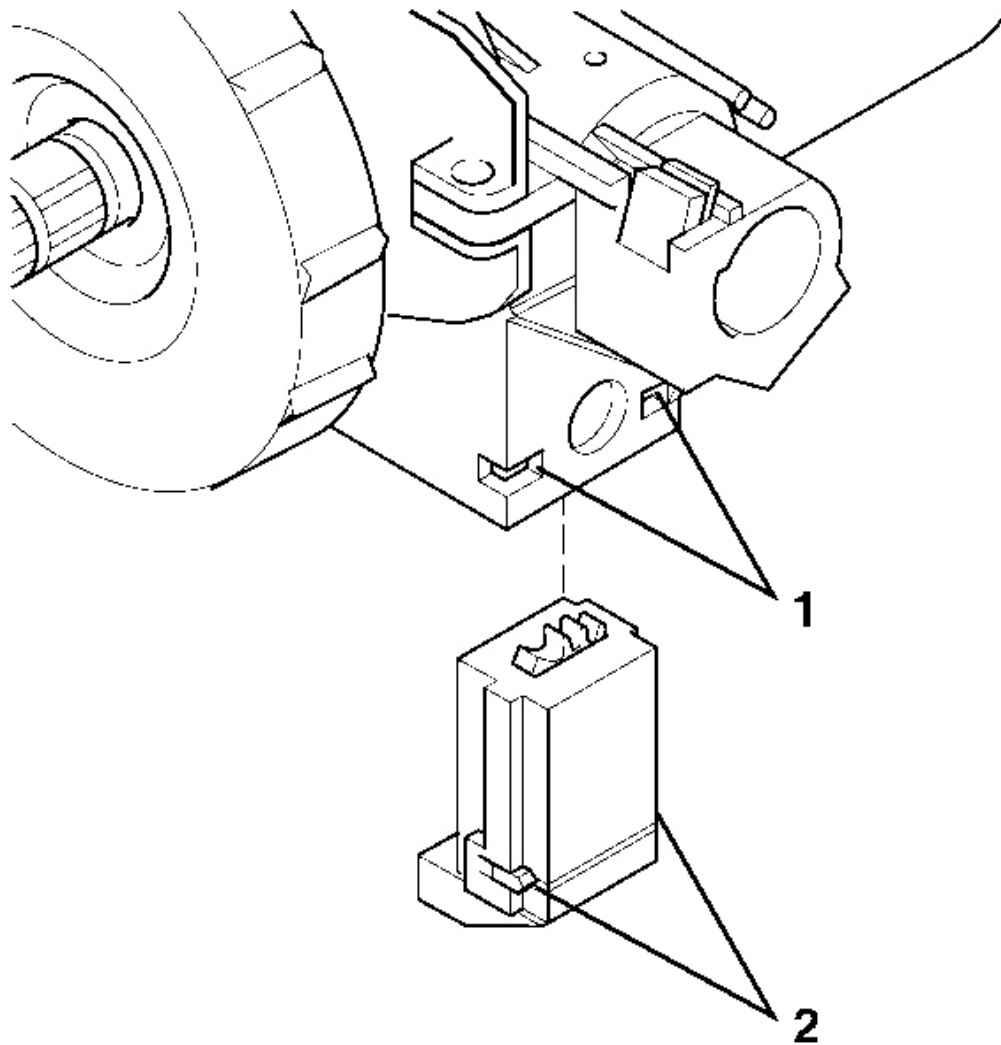
**IMPORTANT:** The gears between the ignition switch and the lock cylinder housing must be in the correct position. Failure to do so will cause a misalignment of the gears in the ignition switch and the lock cylinder housing, which may result in a NO START or BATTERY DRAIN.

1. Verify the alignment of the gear (1) in the ignition switch (2). If gear (1) is not in position shown, turn gear in ignition switch (2) until you reach the correct position.



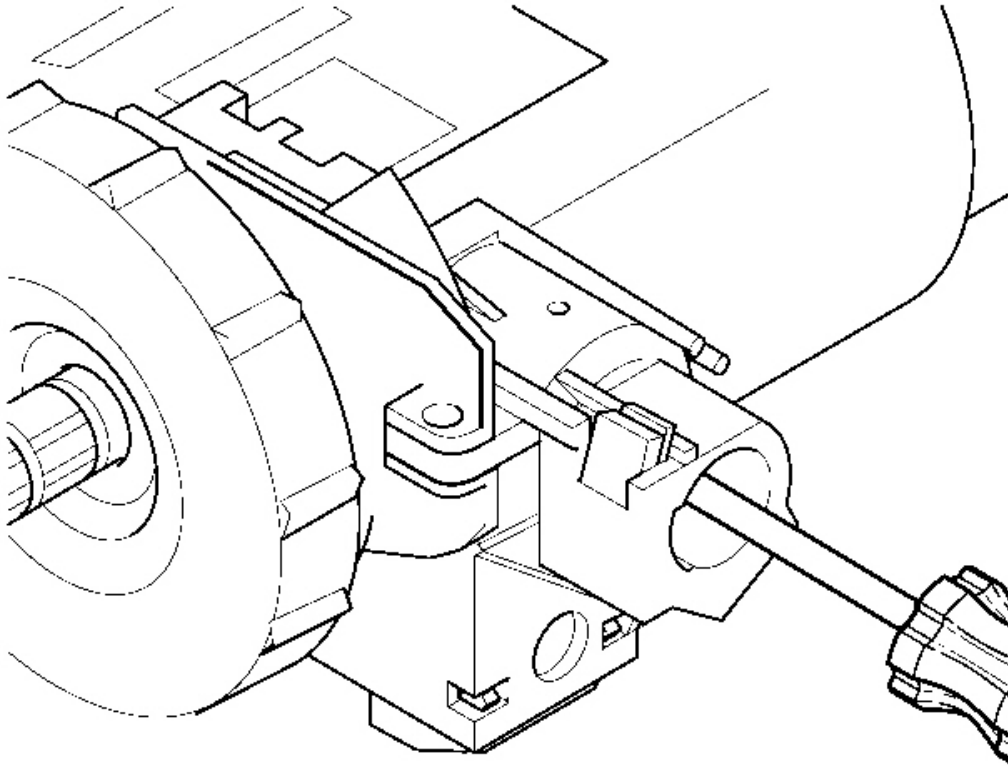
**Fig. 35: Using Screwdriver To Rotate Lock Cylinder Housing Gear**  
Courtesy of GENERAL MOTORS CORP.

2. Use a screwdriver to rotate the lock cylinder housing gear counterclockwise until it hits a stop.
3. Connect the connector to the ignition switch.



**Fig. 36: Inserting Ignition Switch Into Lock Cylinder Housing**  
Courtesy of GENERAL MOTORS CORP.

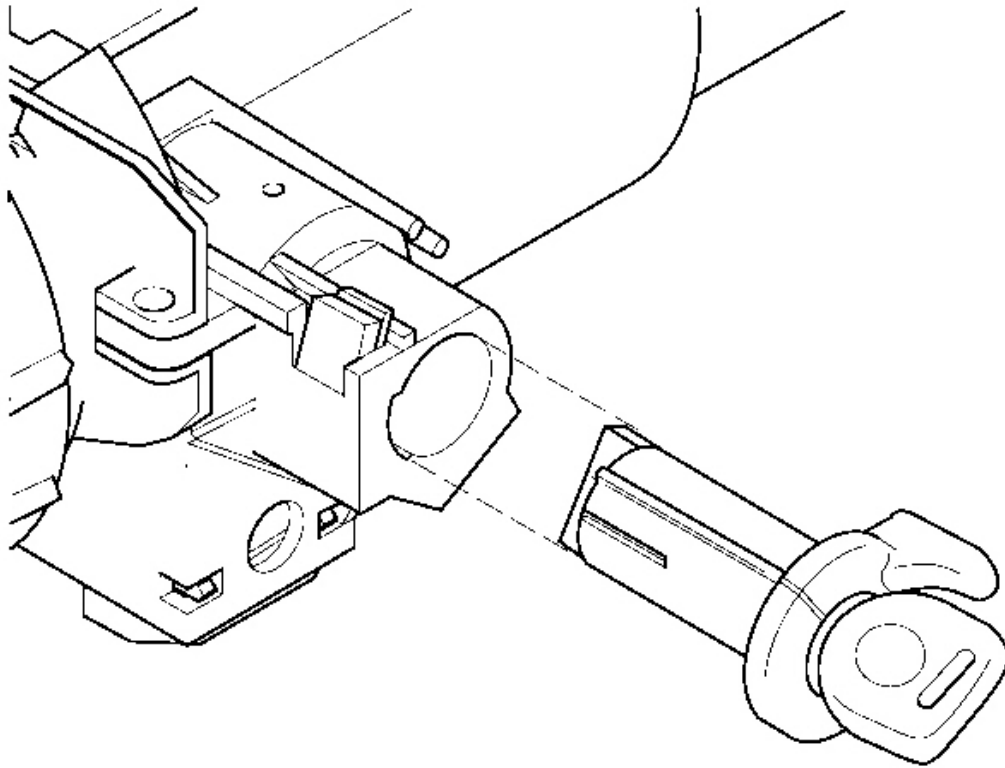
4. Insert the ignition switch into the lock cylinder housing. The tabs (2) on the ignition switch MUST be seated inside the lock cylinder housing (1) for proper installation.



**Fig. 37: Using Screwdriver To Rotate Lock Cylinder Housing Gear Clockwise To START Position**  
Courtesy of GENERAL MOTORS CORP.

5. Use a screwdriver to rotate the lock cylinder housing gear clockwise to the START position, allowing it to spring return into the RUN position.



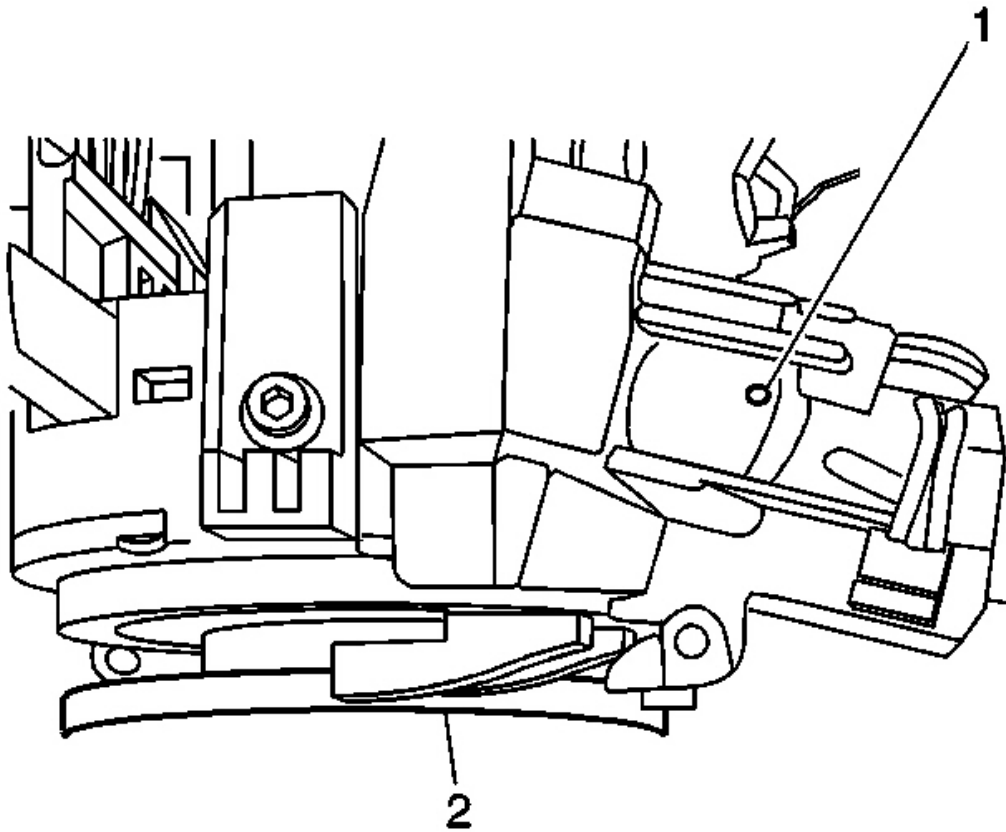


**Fig. 38: Aligning Lock Cylinder Into Lock Cylinder Housing**  
Courtesy of GENERAL MOTORS CORP.

6. Align the lock cylinder and install the lock cylinder into the lock cylinder housing.
7. Connect the passlock and key buzzer into the lock housing.
8. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement** .
9. Install the hush and knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gauges, and Console.
10. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
11. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure (Single Battery)** in Engine Electrical.

## **IGNITION LOCK CYLINDER REPLACEMENT**

### **Removal Procedure**



**Fig. 39: Ignition Lock Cylinder Case**  
Courtesy of GENERAL MOTORS CORP.

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

1. Disconnect the battery negative cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure (Single Battery)** in **Engine Electrical**.

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

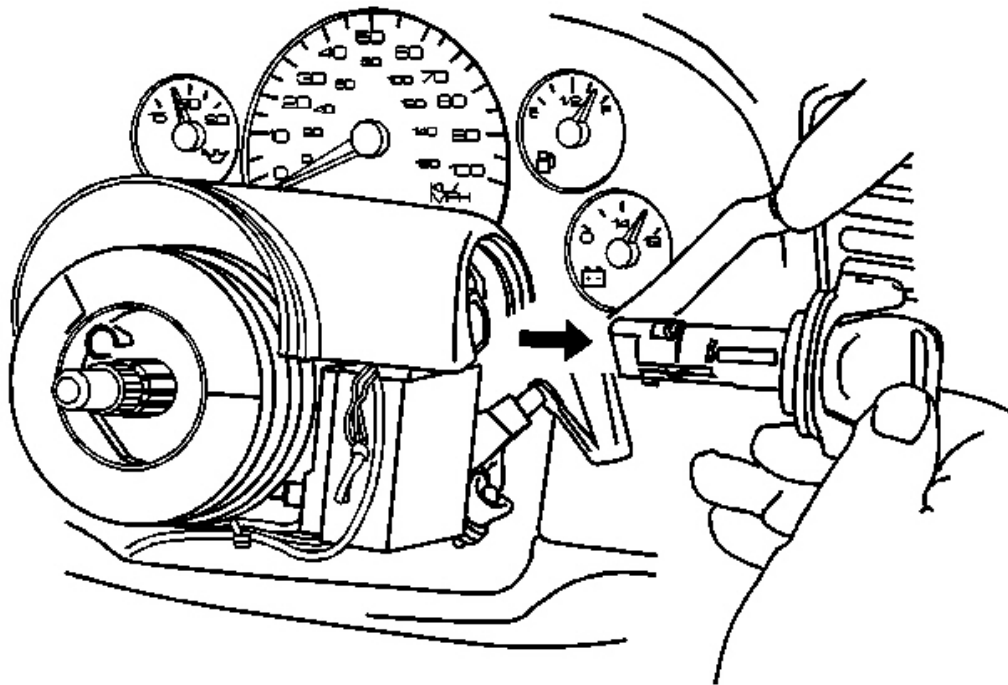
2. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in **SIR**.
3. Turn the ignition lock cylinder to the start position.

**IMPORTANT:** In order to remove the upper trim cover and lock cylinder you will need to release the lock cylinder retaining pin in the access hole of the ignition lock cylinder case.

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

Gently lift the upper trim cover so you may Insert the tip of an awl into the access hole (1) of the ignition lock cylinder case.

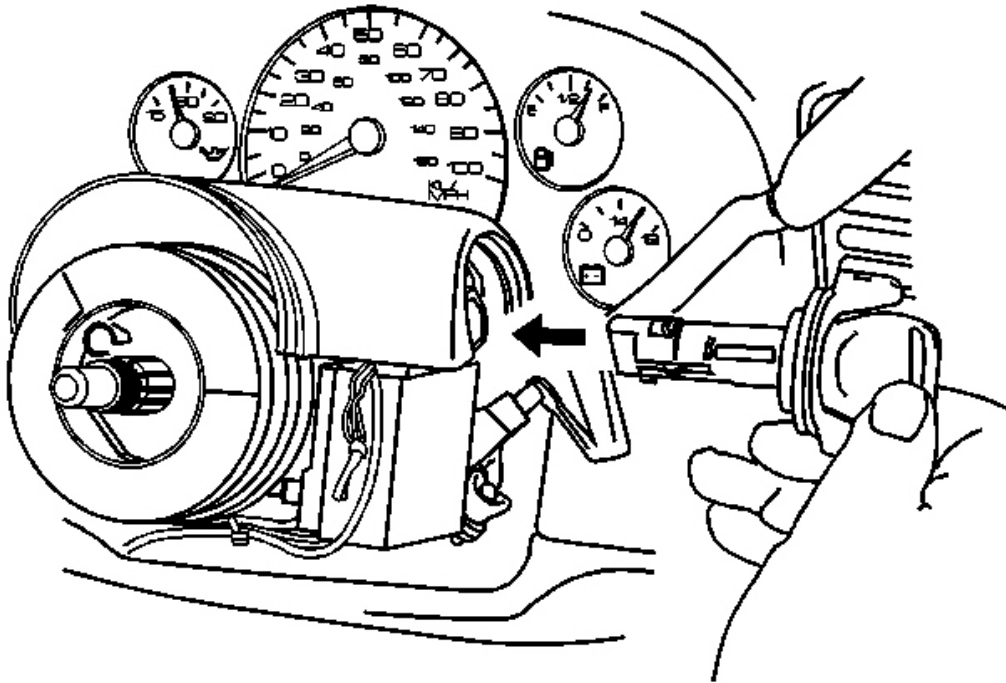
5. Push down and hold the retaining pin of the ignition lock cylinder.
6. Release the ignition lock cylinder to the run position.



**Fig. 40: Ignition Lock Cylinder & Steering Column**  
Courtesy of GENERAL MOTORS CORP.

7. Remove the ignition lock cylinder by pulling the cylinder away from the steering column.

#### **Installation Procedure**



**Fig. 41: Push Lock Cylinder Into Tab Locks In Ignition Lock Cylinder Case**  
Courtesy of GENERAL MOTORS CORP.

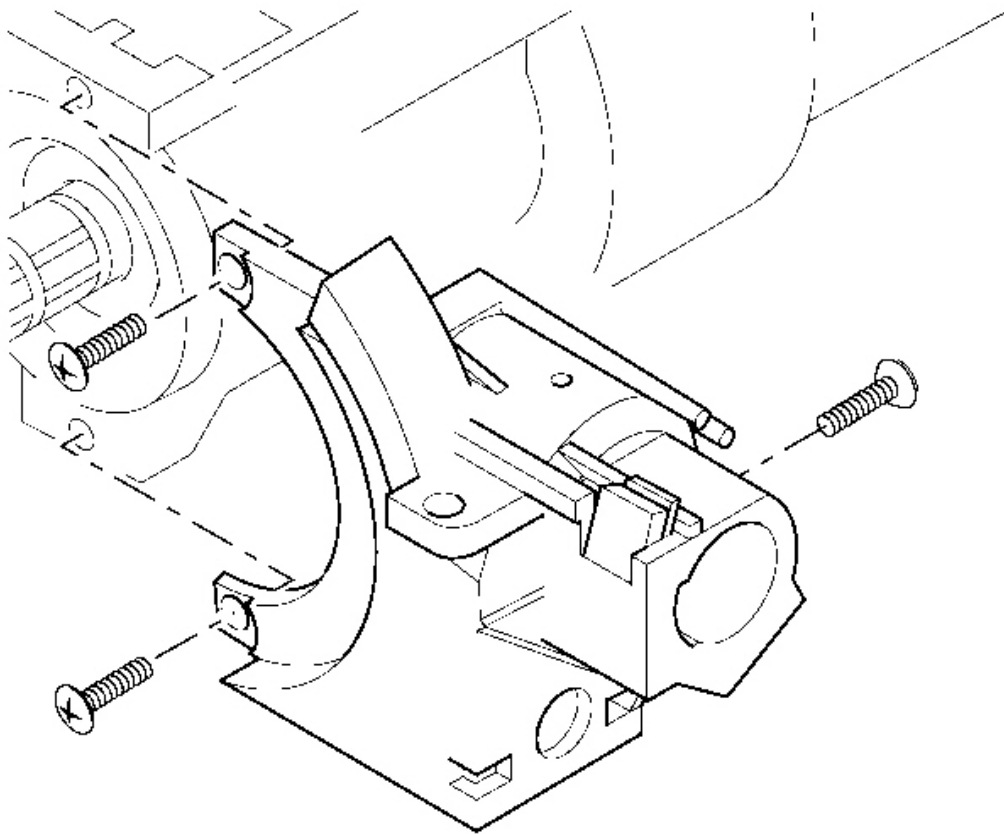
1. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement** .
2. Install the ignition lock cylinder by performing the following procedure:
  1. Align the positioning locking tab slot on the ignition lock cylinder case to the positioning tab on the ignition lock cylinder.
  2. Push the lock cylinder in until the tab locks in the ignition lock cylinder case.
3. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
4. Connect the battery negative cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure (Single Battery)** in Engine Electrical.
5. Perform the Passlock learn procedure. Refer to **Programming Theft Deterrent System Components** in Theft Deterrent.

## IGNITION LOCK CYLINDER CASE REPLACEMENT

### Removal Procedure

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

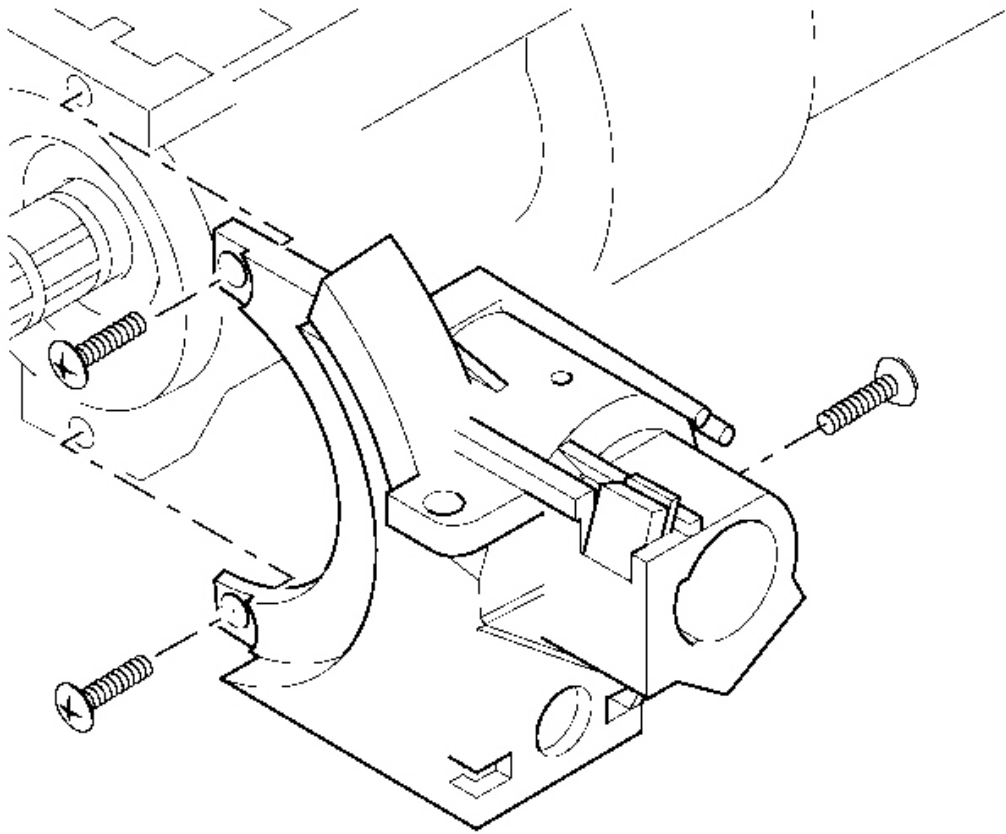
1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the ignition switch. Refer to **Ignition Switch Replacement** .
3. Remove the turn signal cancel cam. Refer to **Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement** .
4. Remove the park lock cable from the lock cylinder housing.



**Fig. 42: Identifying 3 TORX Screws**  
Courtesy of GENERAL MOTORS CORP.

5. Remove 3 TORX(R) screws.
6. Remove the lock cylinder housing from the steering column.

#### **Installation Procedure**



**Fig. 43: Identifying 3 TORX Screws**  
Courtesy of GENERAL MOTORS CORP.

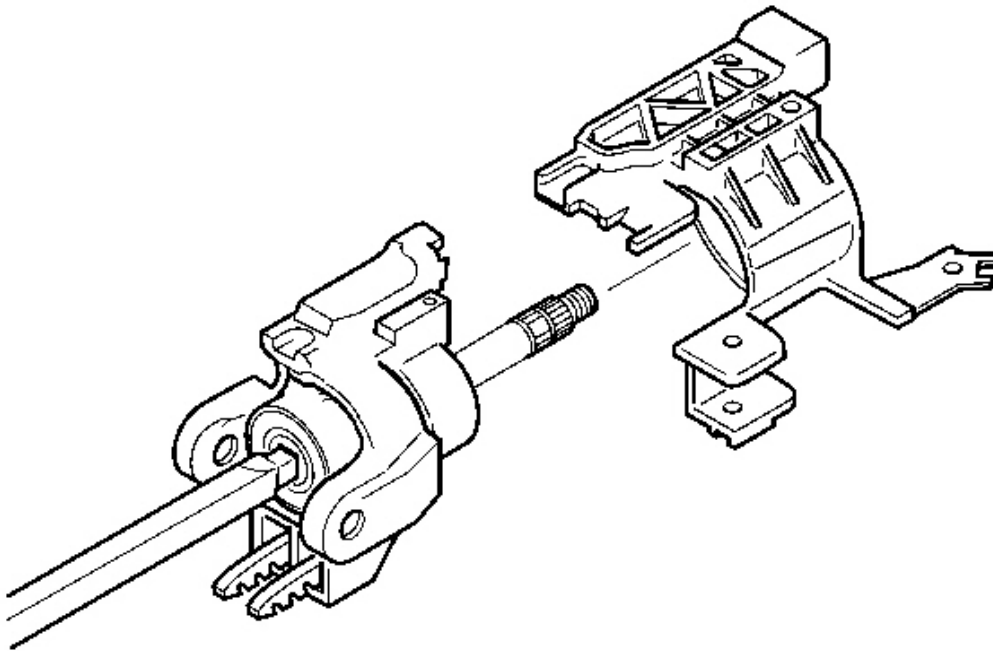
**NOTE:** Refer to Fastener Notice in Cautions and Notices.

1. Install 3 TORX(R) screws into the lock cylinder housing.

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

2. Install the turn signal cancel cam. Refer to Turn Signal Cancel Cam and Steering Shaft Upper Bearing Spring Replacement .
3. Install the park lock cable into the lock cylinder housing.
4. Install the ignition switch. Refer to Ignition Switch Replacement .
5. Enable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.

## Removal Procedure

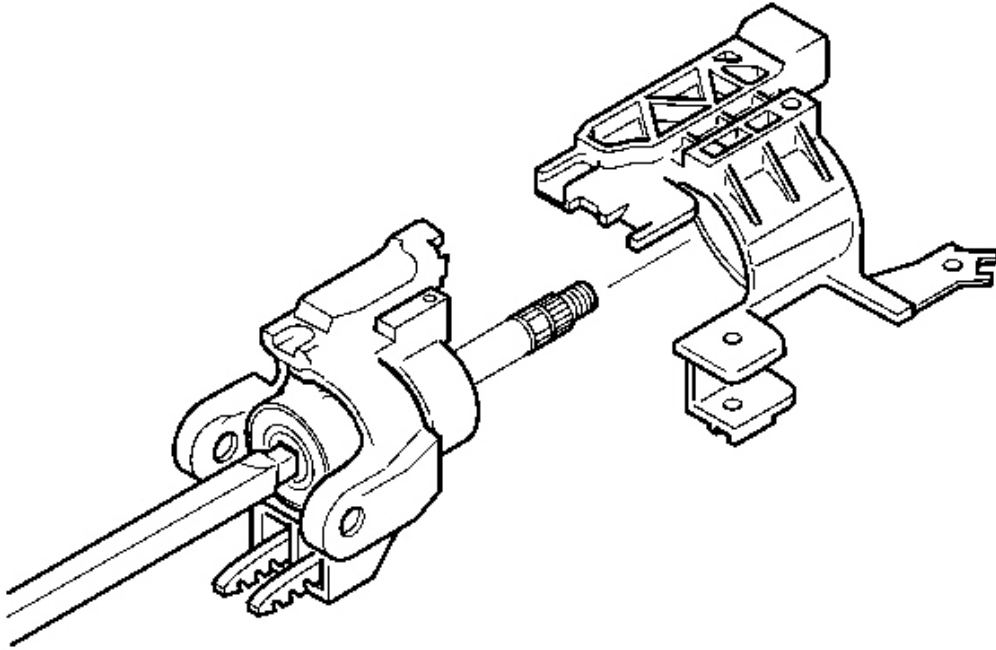


**Fig. 44: Upper Column Components**  
Courtesy of GENERAL MOTORS CORP.

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

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the steering wheel from the column. Refer to **Steering Wheel Replacement** .
3. Remove the ignition lock cylinder case assembly. Refer to **Ignition Lock Cylinder Case Replacement** .
4. Remove the turn signal and multifunction switch assembly. Refer to **Multifunction, Turn Signal Switch Replacement** .
5. Slide the turn signal switch housing off of the steering column shaft assembly.

## Installation Procedure



**Fig. 45: Upper Column Components**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** The turn signal switch housing must be pressed firmly against the steering column tilt head in order for the screws from the turn signal and multifunction switch assembly screws to line up.

1. Slide the turn signal switch housing onto the steering column shaft assembly.
2. Install the turn signal and multifunction switch assembly. Refer to **Multifunction, Turn Signal Switch Replacement** .
3. Install the ignition lock cylinder case. Refer to **Ignition Lock Cylinder Case Replacement** .
4. Install the steering wheel onto the column. Refer to **Steering Wheel Replacement** .
5. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

## **TURN SIGNAL CANCEL CAM AND STEERING SHAFT UPPER BEARING SPRING REPLACEMENT**

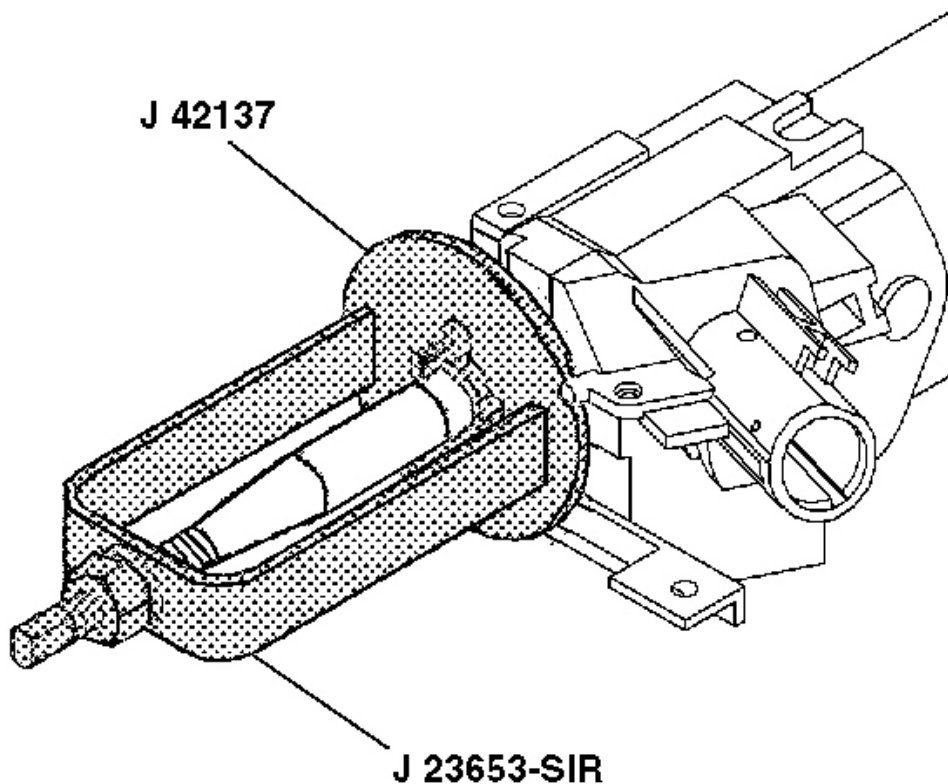
### **Tools Required**

- J 23653-SIR Steering Column Lock Plate Compressor



- **J 42137** Steering Column Lock Plate Compressor Adapter. See **Special Tools and Equipment** .

## Removal Procedure

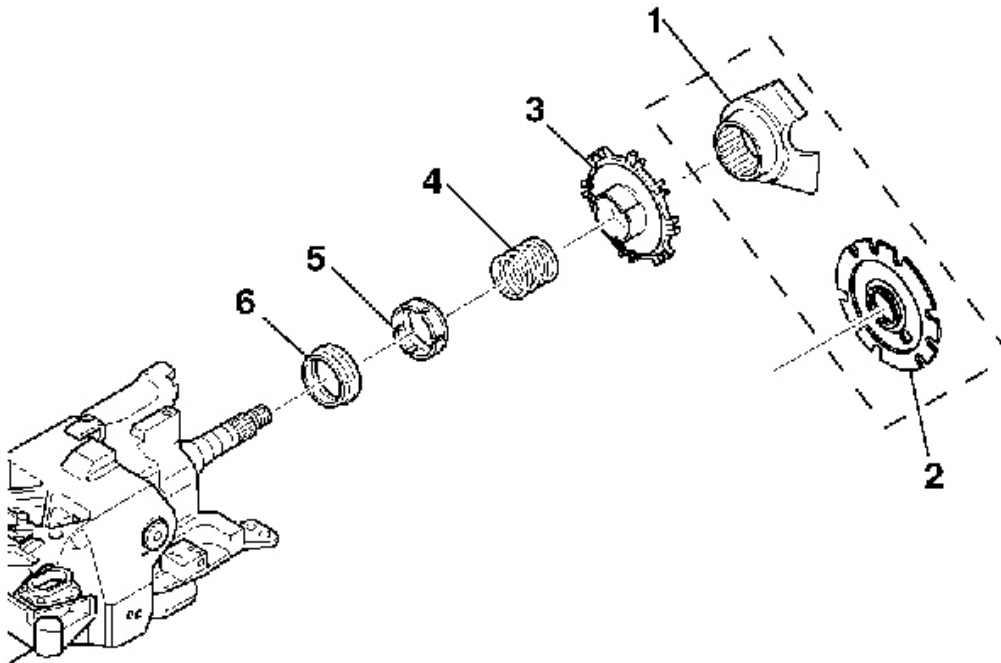


**Fig. 46: Depressing Lock Plate**  
Courtesy of GENERAL MOTORS CORP.

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

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)** in SIR.

3. Remove and discard the bearing retainer using J 23653-SIR and J 42137 . See **Special Tools and Equipment** .
4. Remove J 23653-SIR and J 42137 from the steering shaft. See **Special Tools and Equipment** .



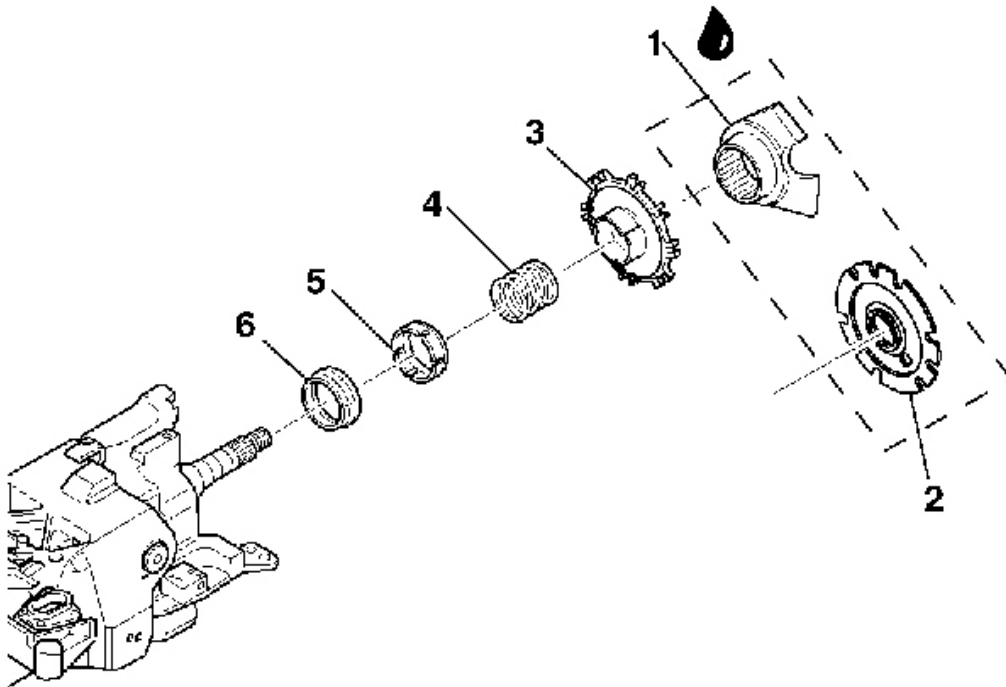
**Fig. 47: Removing Shaft Lock Or Cam Orientation Plate**  
Courtesy of GENERAL MOTORS CORP.

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

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

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

#### **Installation Procedure**



**Fig. 48: Installing Inner Race, Upper Bearing Inner Race Seat & Upper Bearing Spring**  
Courtesy of GENERAL MOTORS CORP.

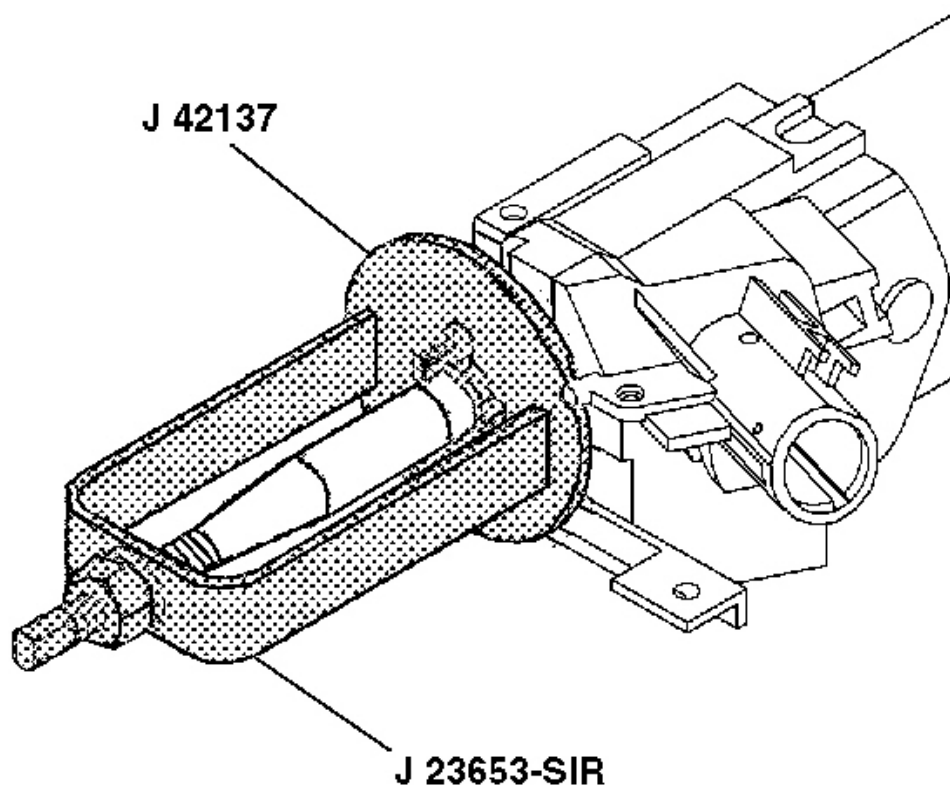
1. Install the inner race (6).
2. Install the upper bearing inner race seat (5).
3. Install the upper bearing spring (4).

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

4. If replacing the turn signal cancel cam (3), lubricate the new turn signal cancel cam with GM P/N 12377900 (Canadian P/N 10953529).

Install the turn signal cancel cam assembly (3).

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



**Fig. 49: Depressing Lock Plate**  
Courtesy of GENERAL MOTORS CORP.

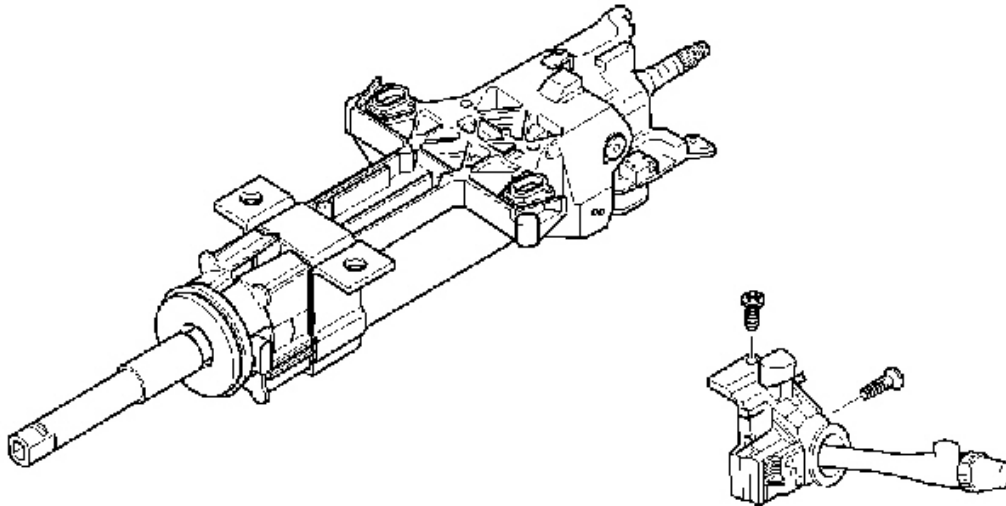
6. Install the new bearing retainer using J 23653-SIR and J 42137 . See Special Tools and Equipment .
7. Remove J 23653-SIR and J 42137 from the steering shaft. See Special Tools and Equipment .

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

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

# MULTIFUNCTION, TURN SIGNAL SWITCH REPLACEMENT

## Removal Procedure

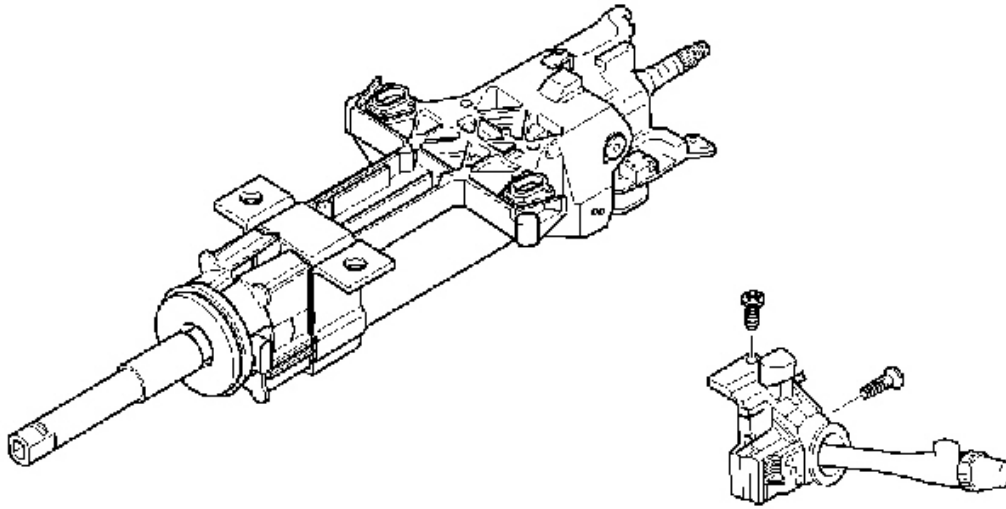


**Fig. 50: Locating Turn Signal Switch Assembly**  
Courtesy of GENERAL MOTORS CORP.

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

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

## Installation Procedure



**Fig. 51: Locating Turn Signal Switch Assembly**  
Courtesy of GENERAL MOTORS CORP.

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

1. Install the turn signal and multifunction switch assembly.

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

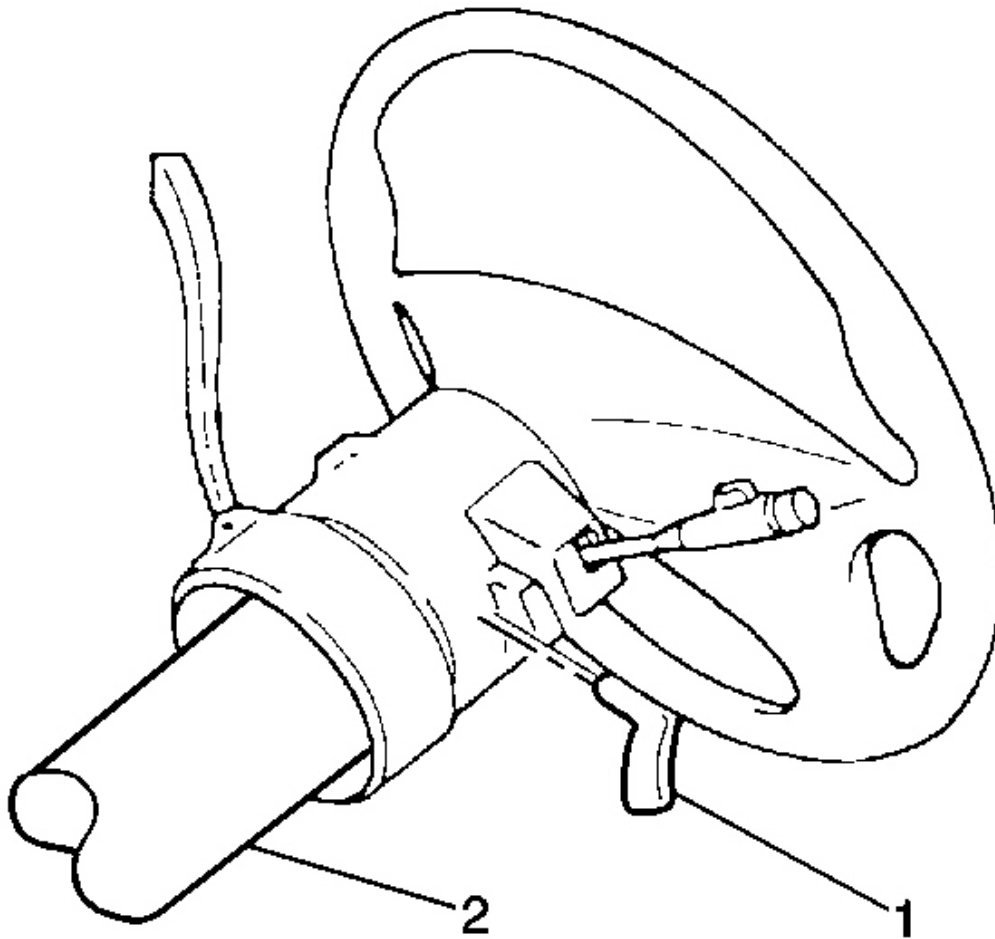
2. Secure by using 2 pan head tapping screws.

**Tighten:**

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

## TILT LEVER REPLACEMENT

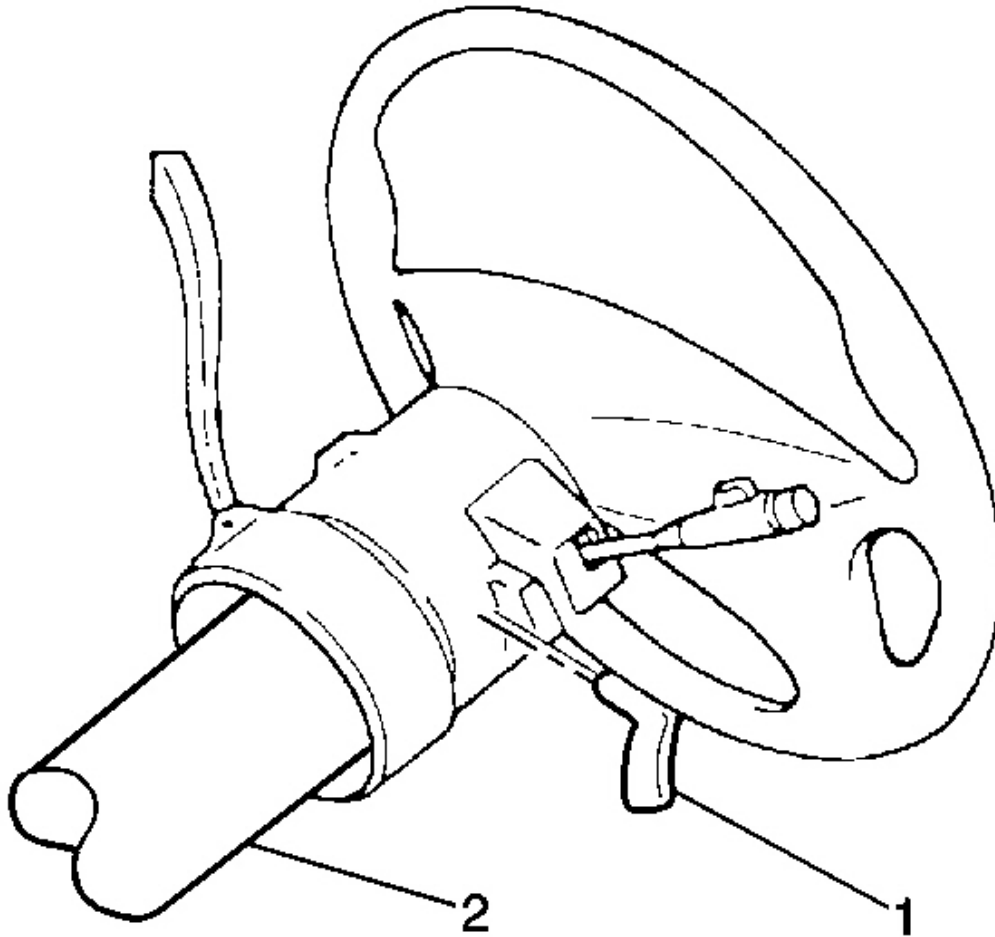
### Removal Procedure



**Fig. 52: Upper Steering Column**  
**Courtesy of GENERAL MOTORS CORP.**

Pull the tilt steering column lever (1) out from the steering column (2).

**Installation Procedure**



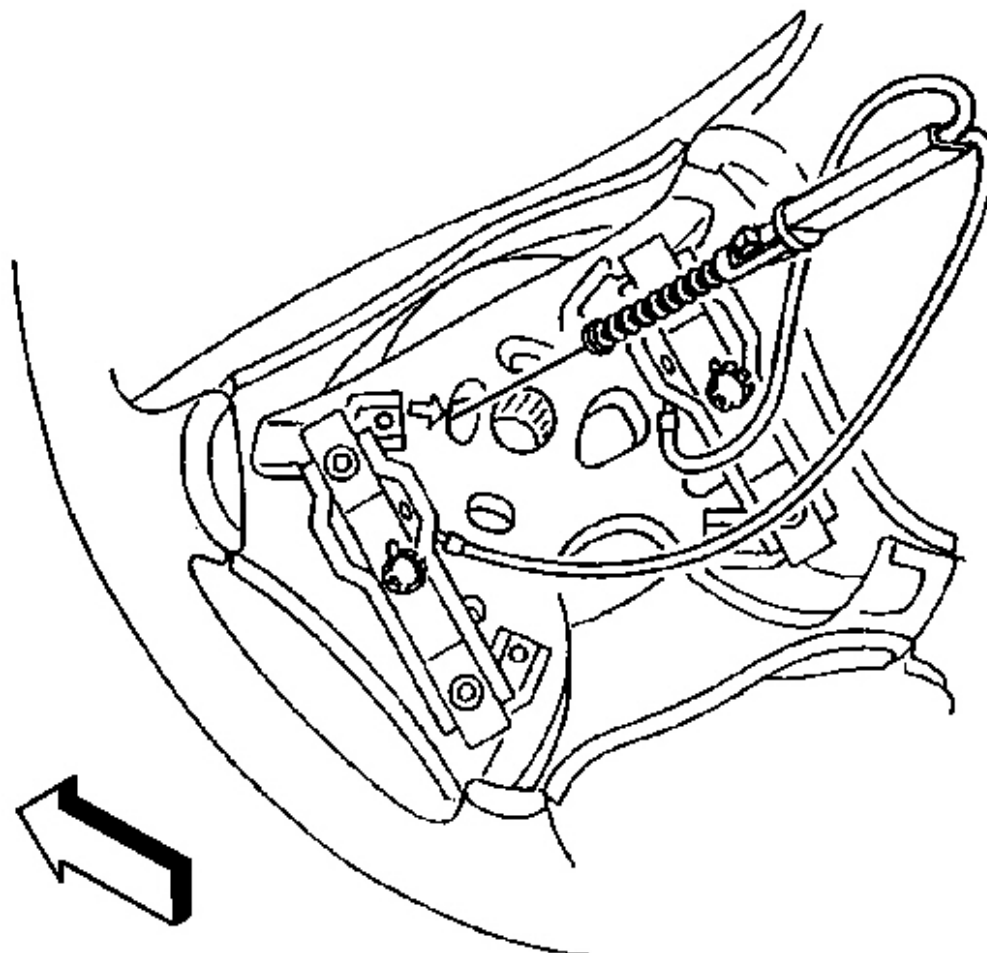
**Fig. 53: Upper Steering Column**  
Courtesy of GENERAL MOTORS CORP.

Align the tilt steering column lever (1) and push the lever into the steering column (2).

## **HORN SWITCH REPLACEMENT**

### **Removal Procedure**

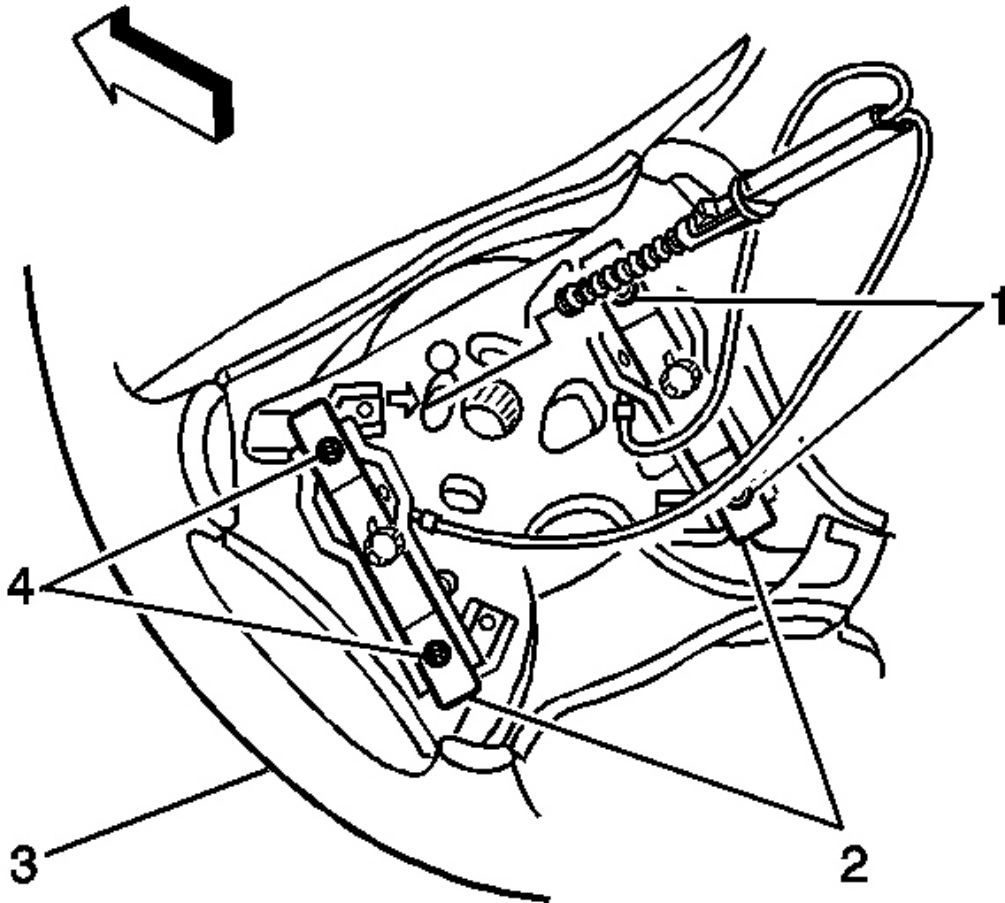




**Fig. 54: View Of Horn Plunger At Steering Column**  
Courtesy of GENERAL MOTORS CORP.

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

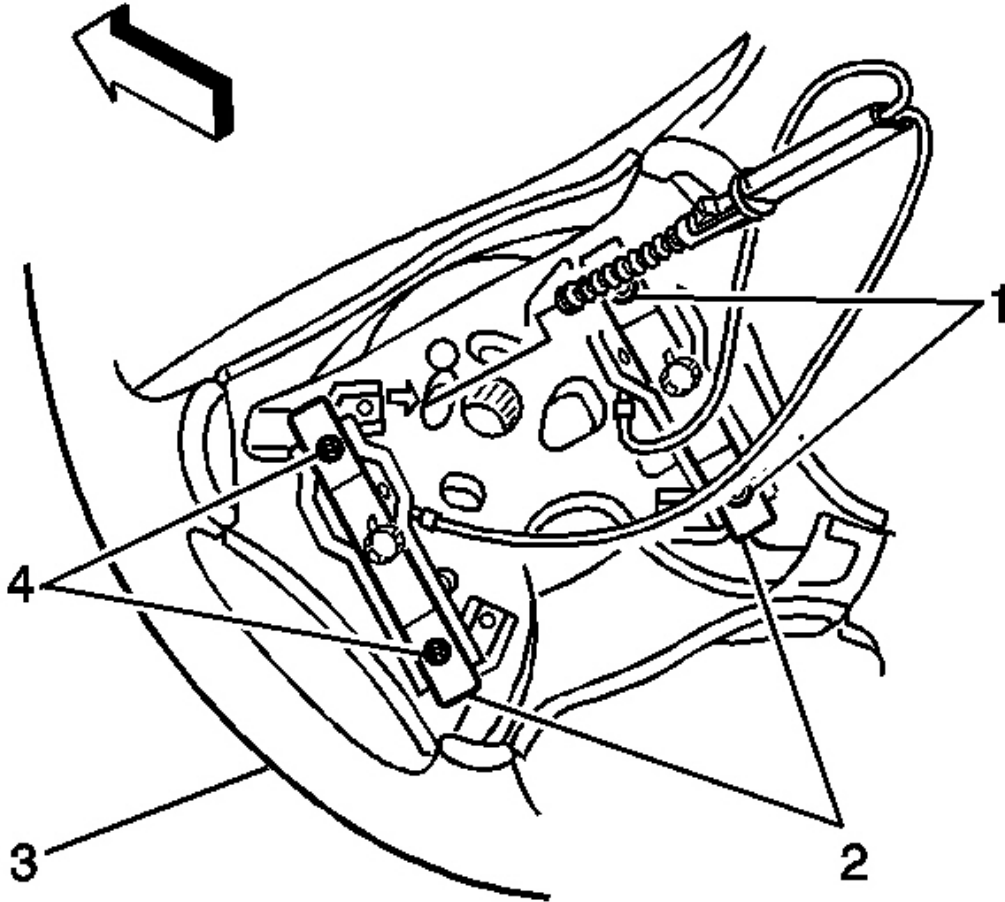
1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the Inflatable Restraint Steering Wheel module. Refer to **Inflatable Restraint Steering Wheel Module Replacement** in SIR.
3. Remove the horn plunger from the steering column by pressing inward to the stop and rotating horn plunger 90 degrees.



**Fig. 55: Horn Contact Plate & Steering Wheel**  
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the horn contact plate (2) captured screws (1,4) from the steering wheel (3).
5. Remove the horn switch (2) from the steering wheel (3).

#### **Installation Procedure**



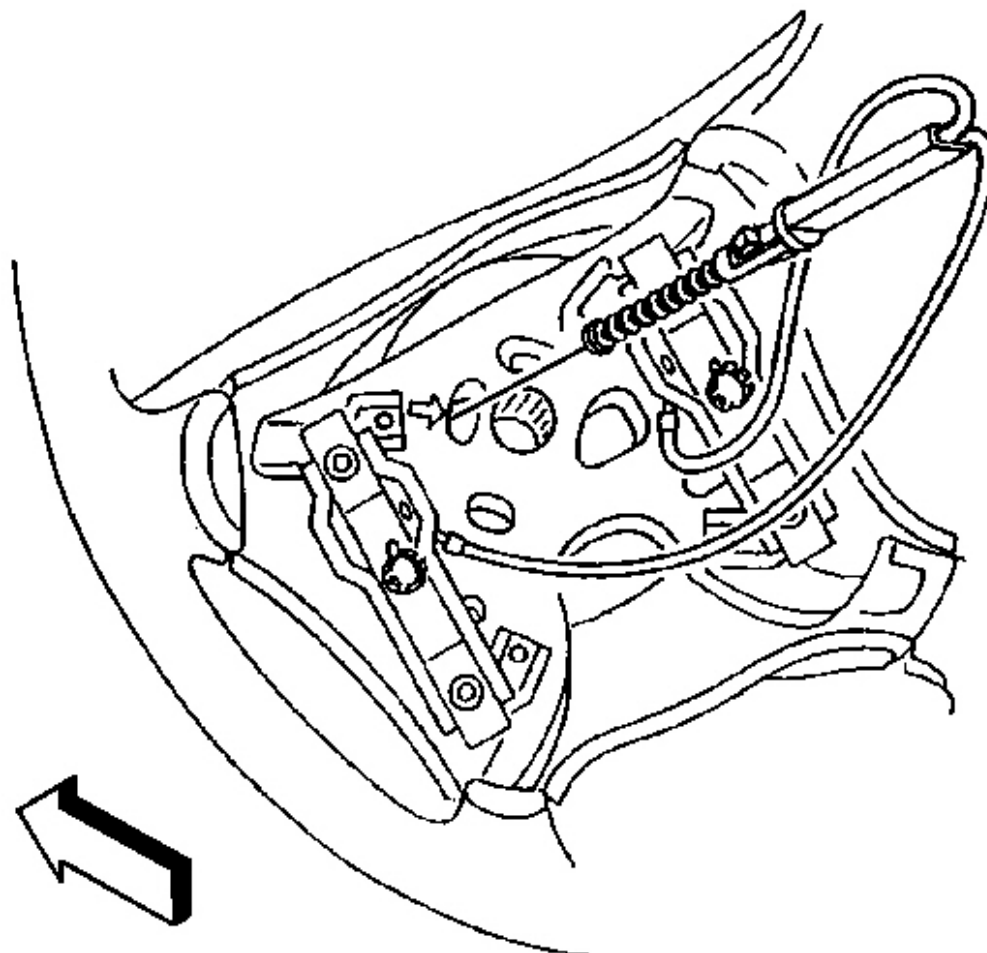
**Fig. 56: Horn Contact Plate & Steering Wheel**  
Courtesy of GENERAL MOTORS CORP.

1. Install the horn switch (2) to the steering wheel (3).

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

2. Connect the horn contact plate (2) captured screws (1,4) to the steering wheel (3).

**Tighten:** Tighten the screws to 5.5 N.m (50 lb in).



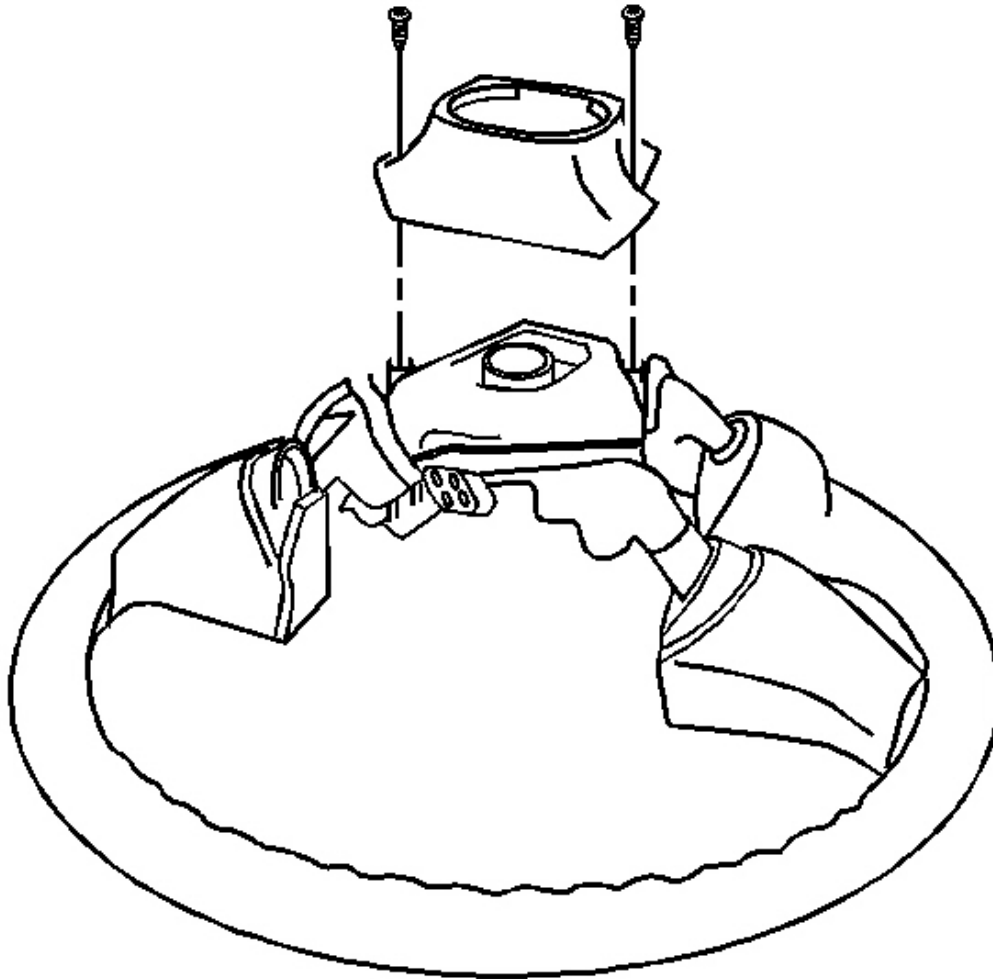
**Fig. 57: View Of Horn Plunger At Steering Column**  
Courtesy of GENERAL MOTORS CORP.

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

## **STEERING WHEEL CONTROL SWITCH ASSEMBLY REPLACEMENT**

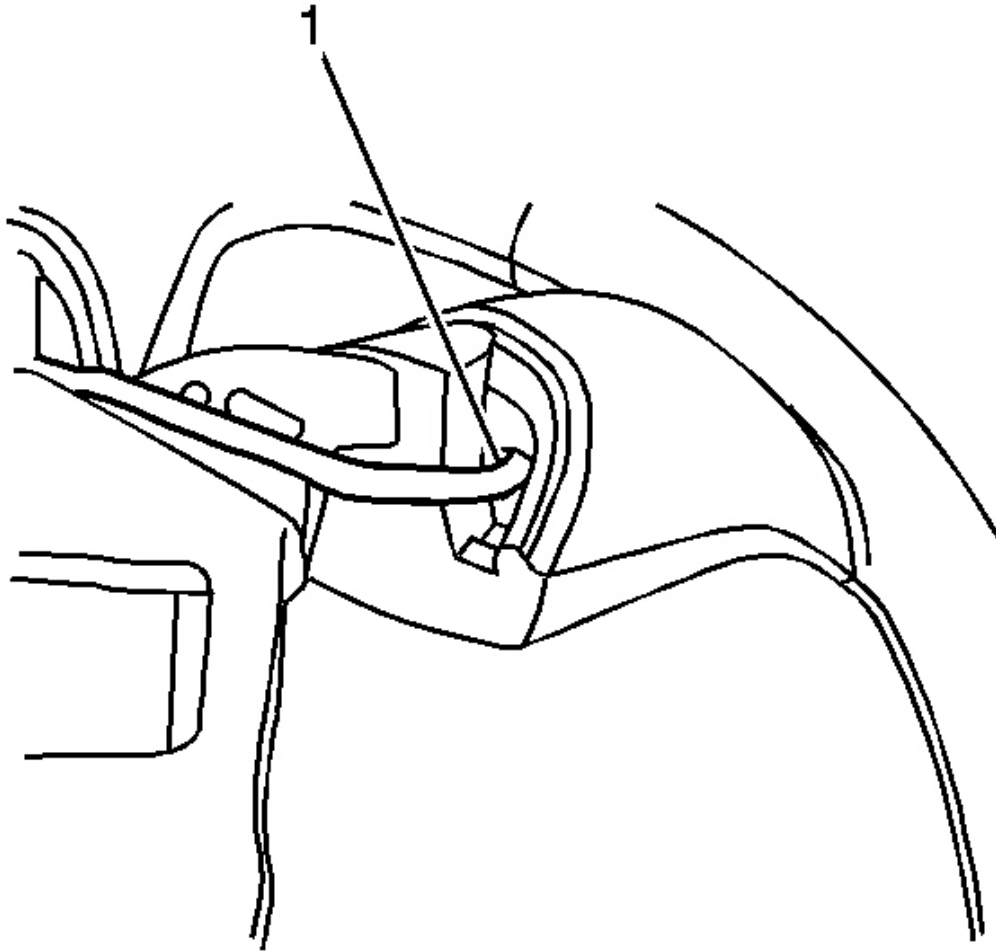
### **Removal Procedure**

1. Remove the steering wheel. Refer to **Steering Wheel Replacement** .



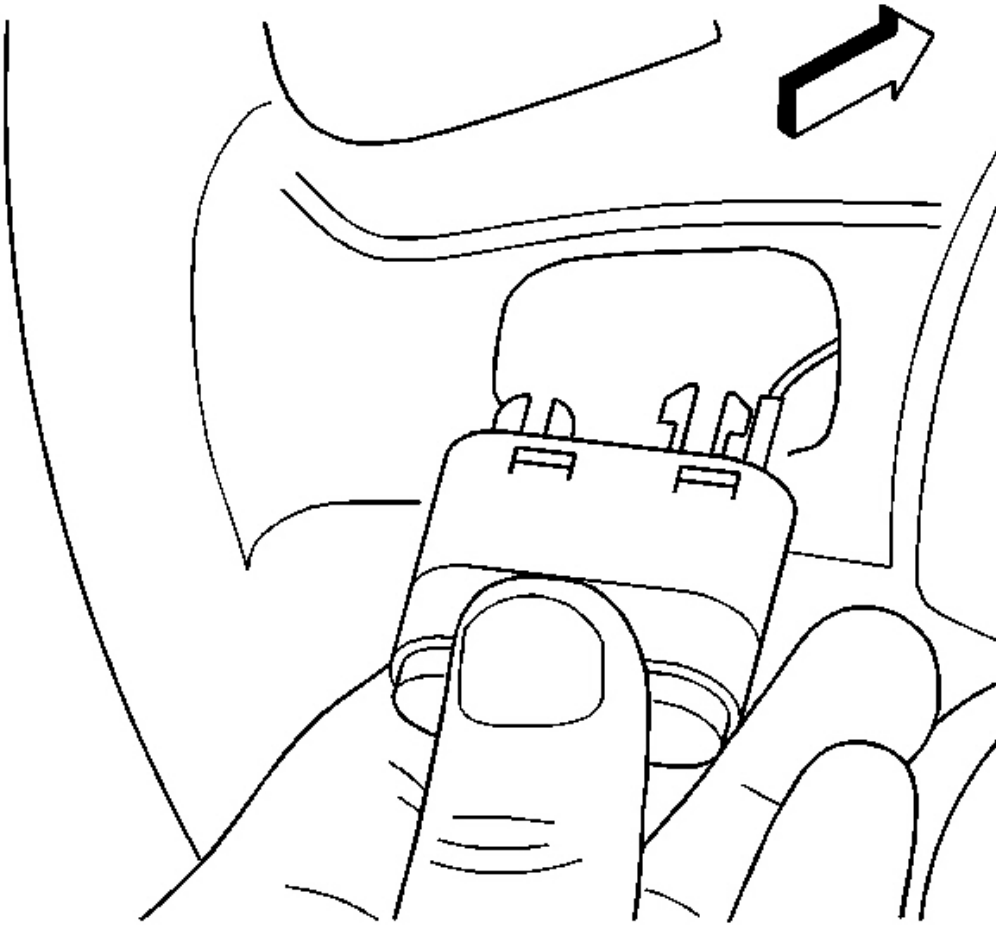
**Fig. 58: Steering Wheel Shroud**  
Courtesy of GENERAL MOTORS CORP.

2. Remove the shroud retaining screws from the back of the steering wheel.
3. Remove the shroud from the steering wheel.



**Fig. 59: Wire Harness Cavity & Steering Wheel Control Switch**  
Courtesy of GENERAL MOTORS CORP.

4. Position a blunt ended tool into the wire harness cavity (1) and apply moderate pressure in order to partially remove the steering wheel control switch from the steering wheel.



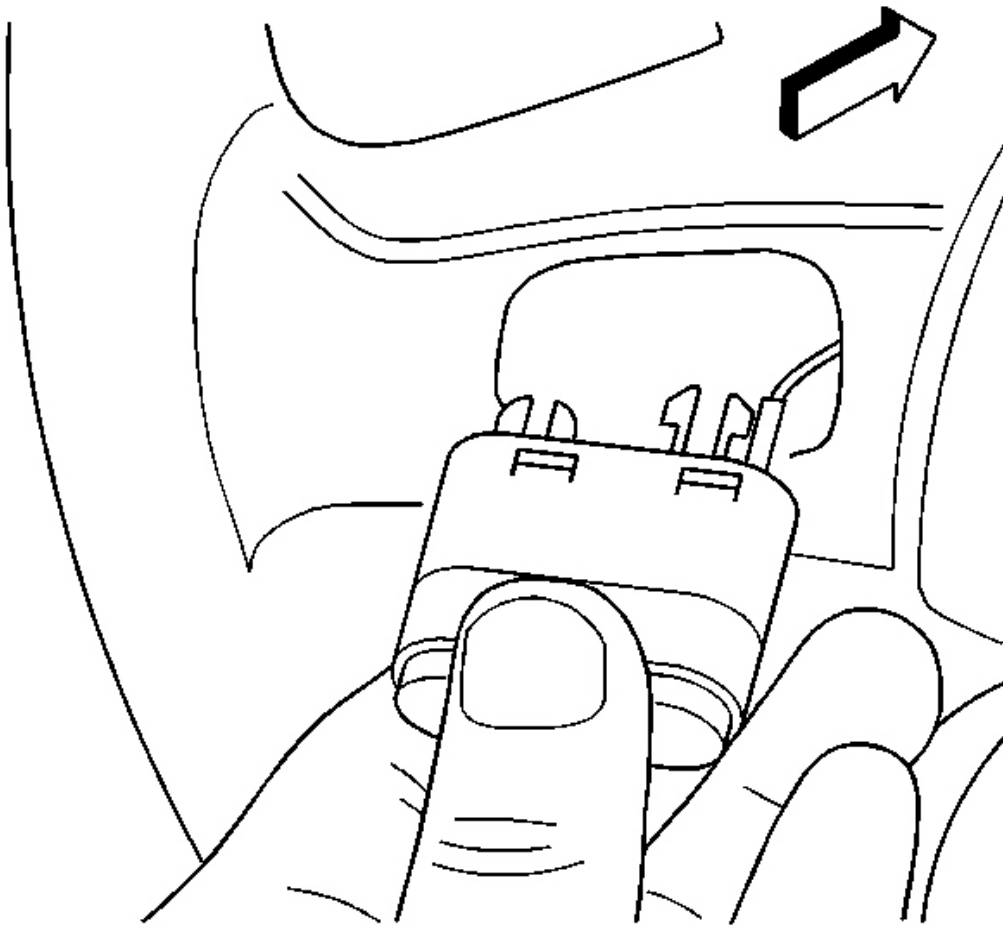
**Fig. 60: Steering Wheel Control Switch Electrical Connector**  
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the steering wheel control switch electrical connector.

**IMPORTANT: The bulbs in the steering wheel control switches are not serviceable. The switches should be replaced only as an assembly.**

6. Remove the steering wheel control switch from the steering wheel.

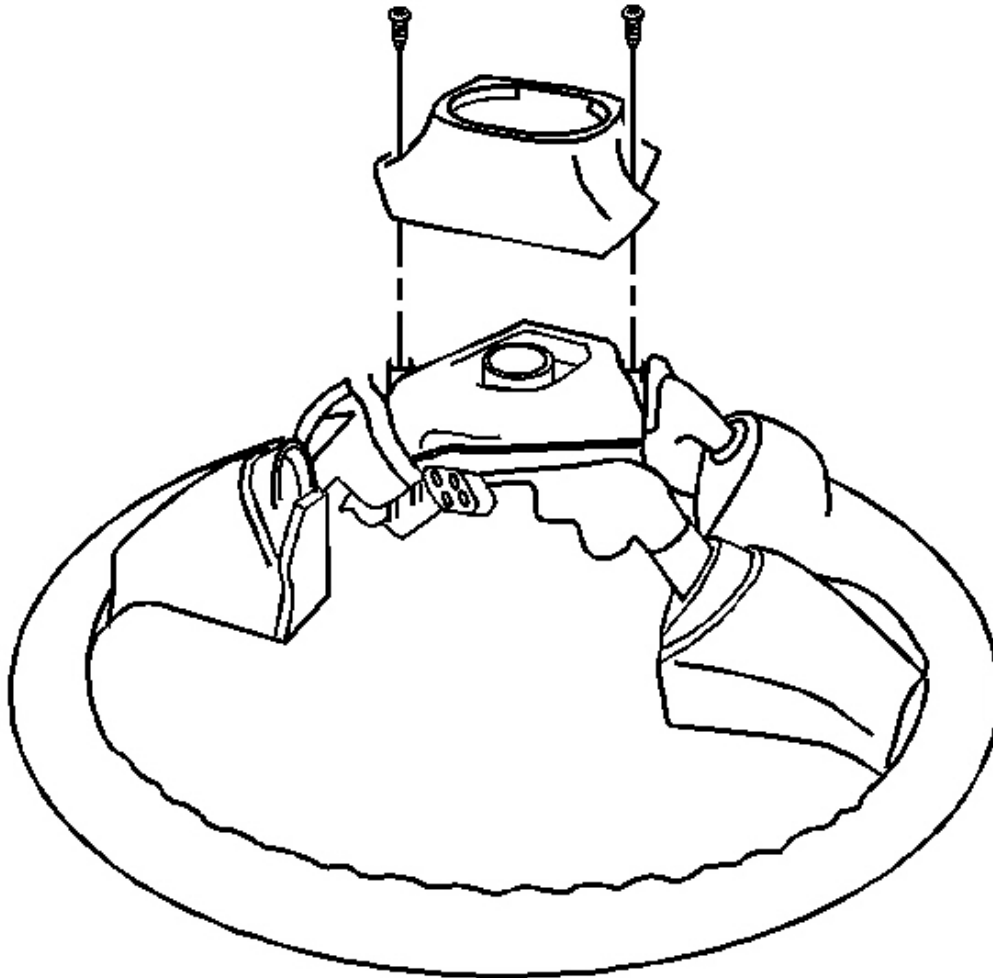
#### **Installation Procedure**



**Fig. 61: Steering Wheel Control Switch Electrical Connector**  
Courtesy of GENERAL MOTORS CORP.

1. Position the steering wheel control switch to the steering wheel.
2. Connect the electrical connector to the steering wheel control switch.
3. Install the steering wheel control switch into the steering wheel, ensuring the retaining tabs are fully seated.





**Fig. 62: Steering Wheel Shroud**  
Courtesy of GENERAL MOTORS CORP.

4. Install the shroud to the steering wheel.

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

5. Install the shroud retaining screws to the steering wheel.

**Tighten:** Tighten the screws to 2 N.m (18 lb in).

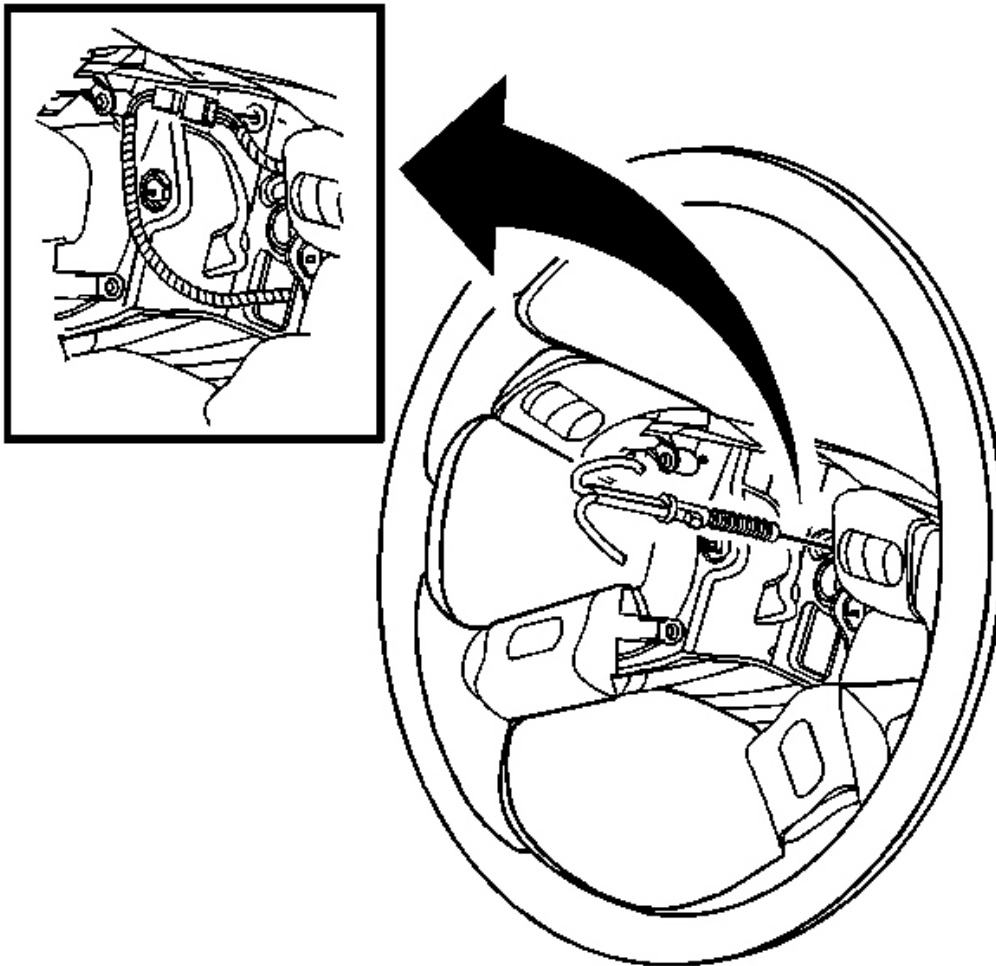
6. Install the steering wheel. Refer to Steering Wheel Replacement.

## STEERING WHEEL REPLACEMENT

### Tools Required

- **J 1859-A** Steering Wheel Puller. See **Special Tools and Equipment** .
- **J-36541-A** Steering Wheel Puller Adapter. See **Special Tools and Equipment** .
- **J 42578** Steering Wheel Puller Legs. See **Special Tools and Equipment** .

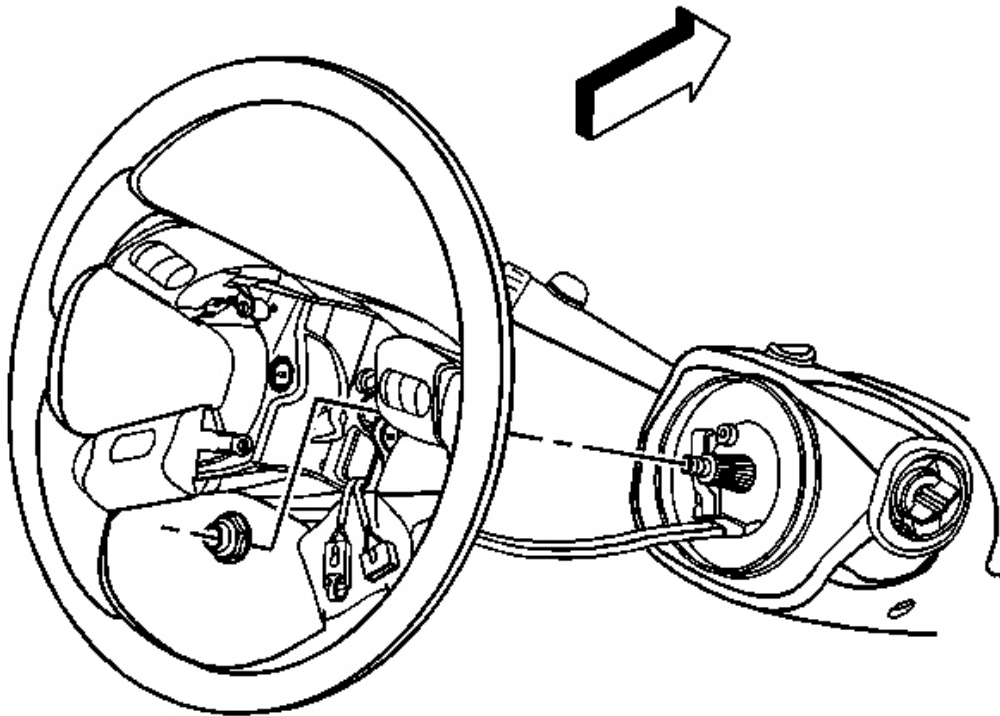
### Removal Procedure



**Fig. 63: Steering Wheel Electrical Connector**  
Courtesy of GENERAL MOTORS CORP.

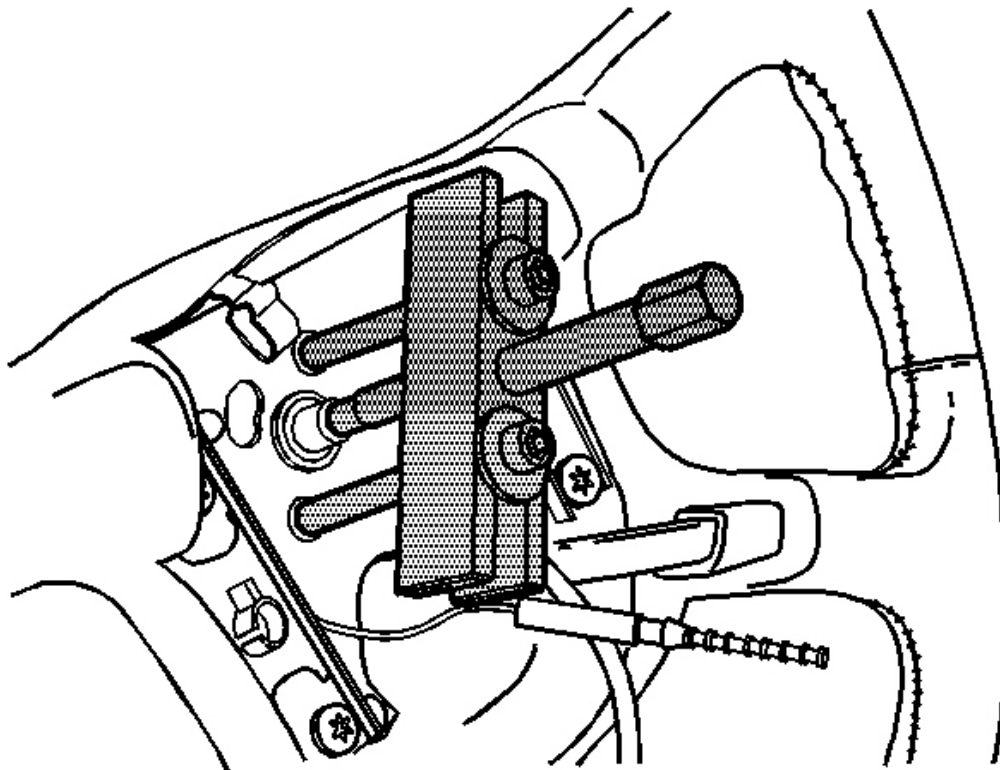
**CAUTION: Refer to Servicing the SIR System Caution in Cautions and Notices.**

1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Remove the inflator module. Refer to **Inflatable Restraint Steering Wheel Module Replacement** in SIR.
3. Remove the horn plunger from the steering column by pressing inward to the stop and rotating horn plunger 90 degrees.
4. Disconnect the steering wheel electrical connector.



**Fig. 64: Steering Wheel & Steering Wheel Shaft**  
Courtesy of GENERAL MOTORS CORP.

5. Remove the retaining nut which secures the steering wheel to the steering wheel shaft.

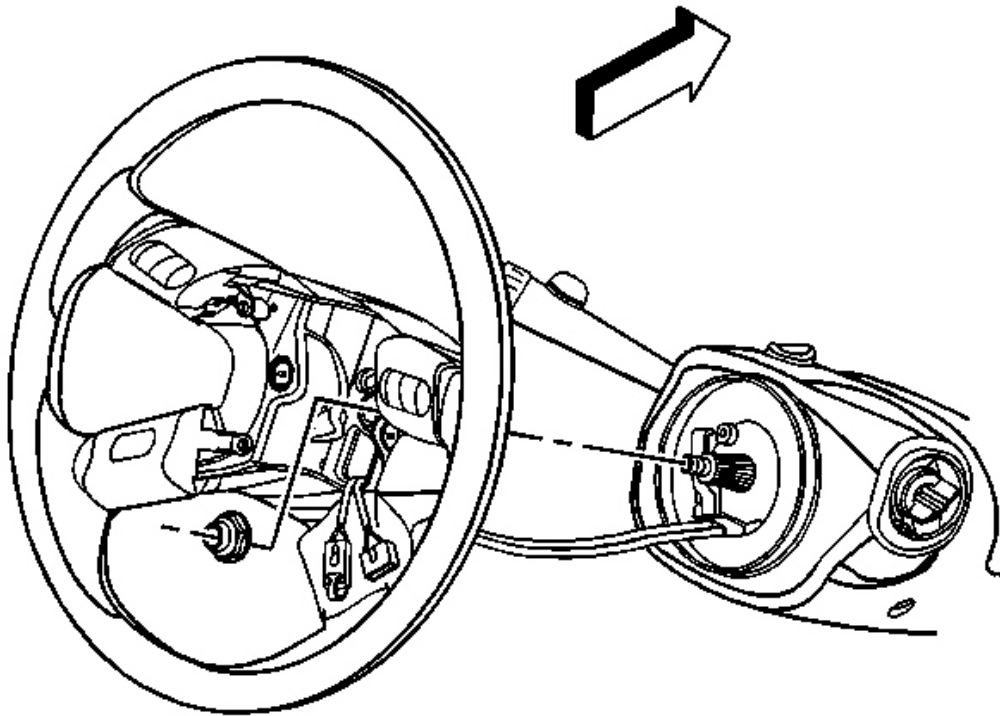


**Fig. 65: Removing Steering Wheel Using J 1859-A With J-36541-A Or J 42578**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** When removing the steering wheel, use only the specified steering wheel puller. Do not hammer on the end of the steering column shaft. Hammering could loosen the plastic injections which maintain the steering column rigidity.

6. Install **J 1859-A** with **J-36541-A** or **J 42578** to the steering wheel. See Special Tools and Equipment .
7. Remove the steering wheel using **J 1859-A** with **J-36541-A** or **J 42578** . See Special Tools and Equipment .

**Installation Procedure**



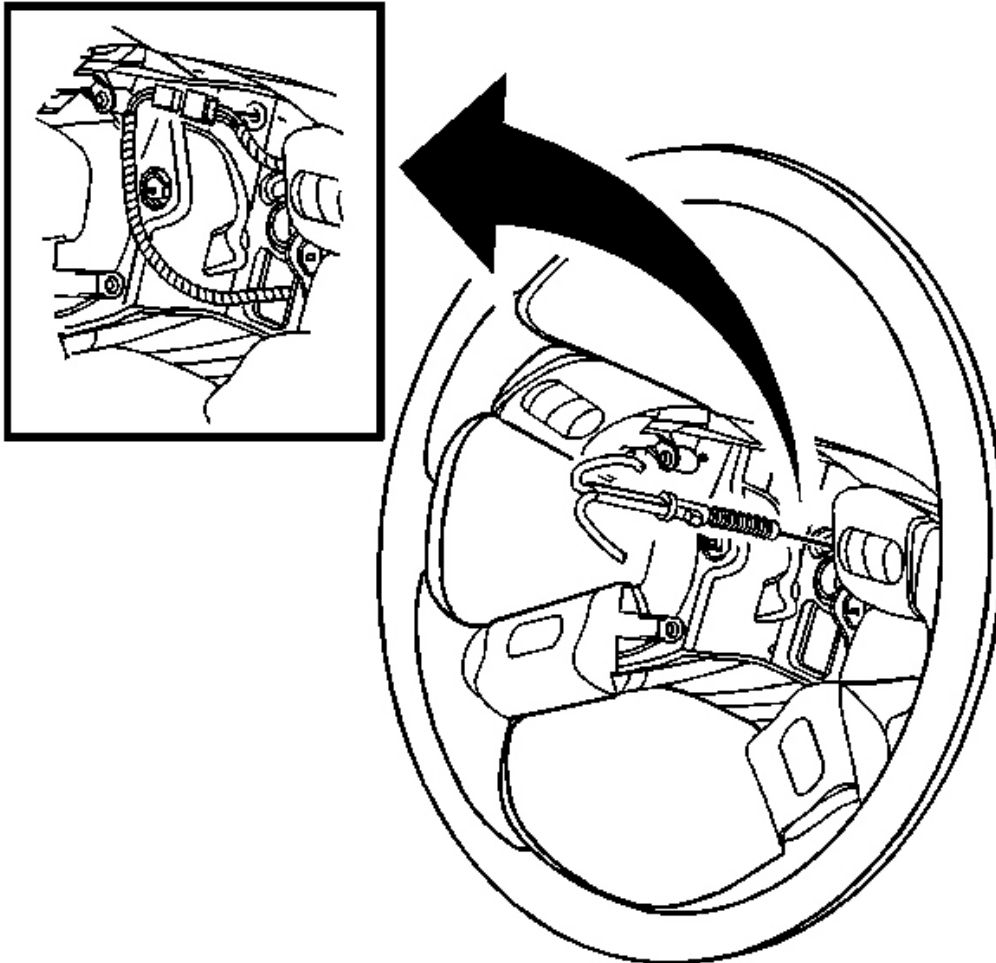
**Fig. 66: Steering Wheel & Steering Wheel Shaft**  
Courtesy of GENERAL MOTORS CORP.

1. Install the steering wheel to the steering wheel shaft.

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

2. Install the retaining nut that secures the steering wheel to the steering wheel shaft.

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

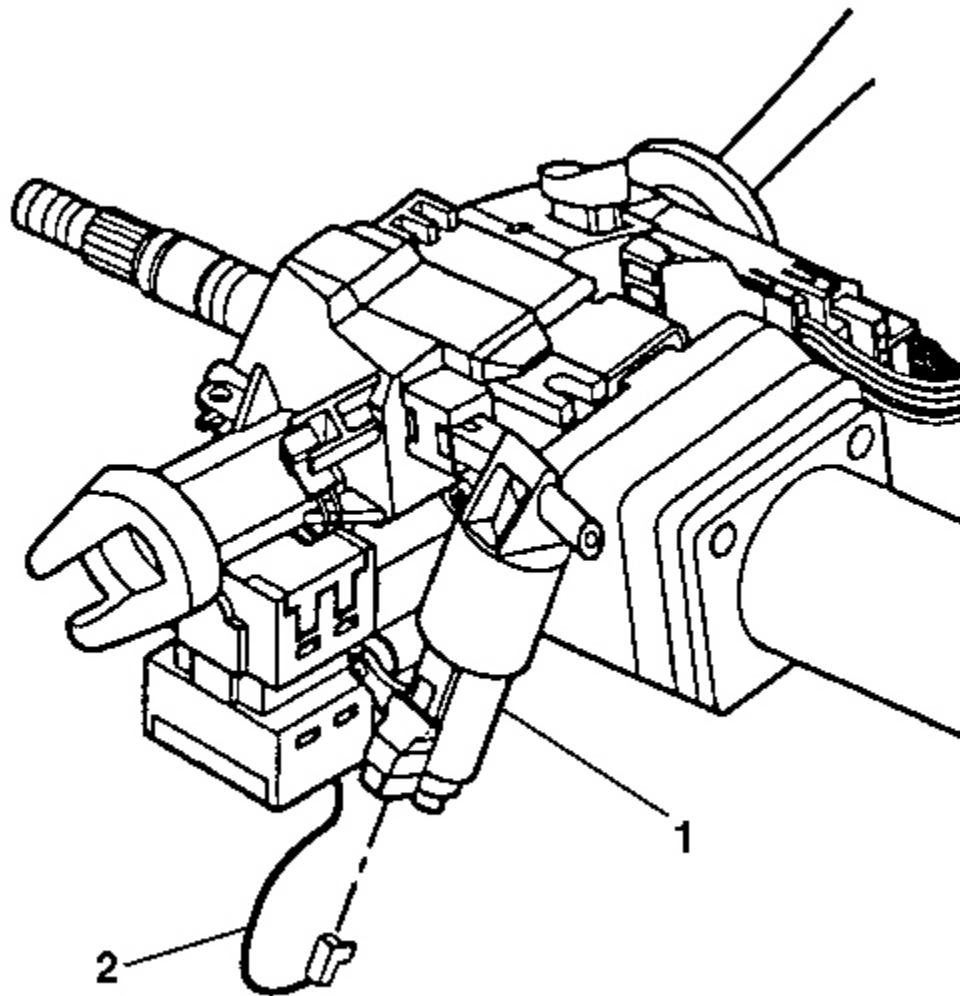


**Fig. 67: Steering Wheel Electrical Connector**  
Courtesy of GENERAL MOTORS CORP.

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

## **STEERING WHEEL THEFT DETERRENT LOCK REPLACEMENT**

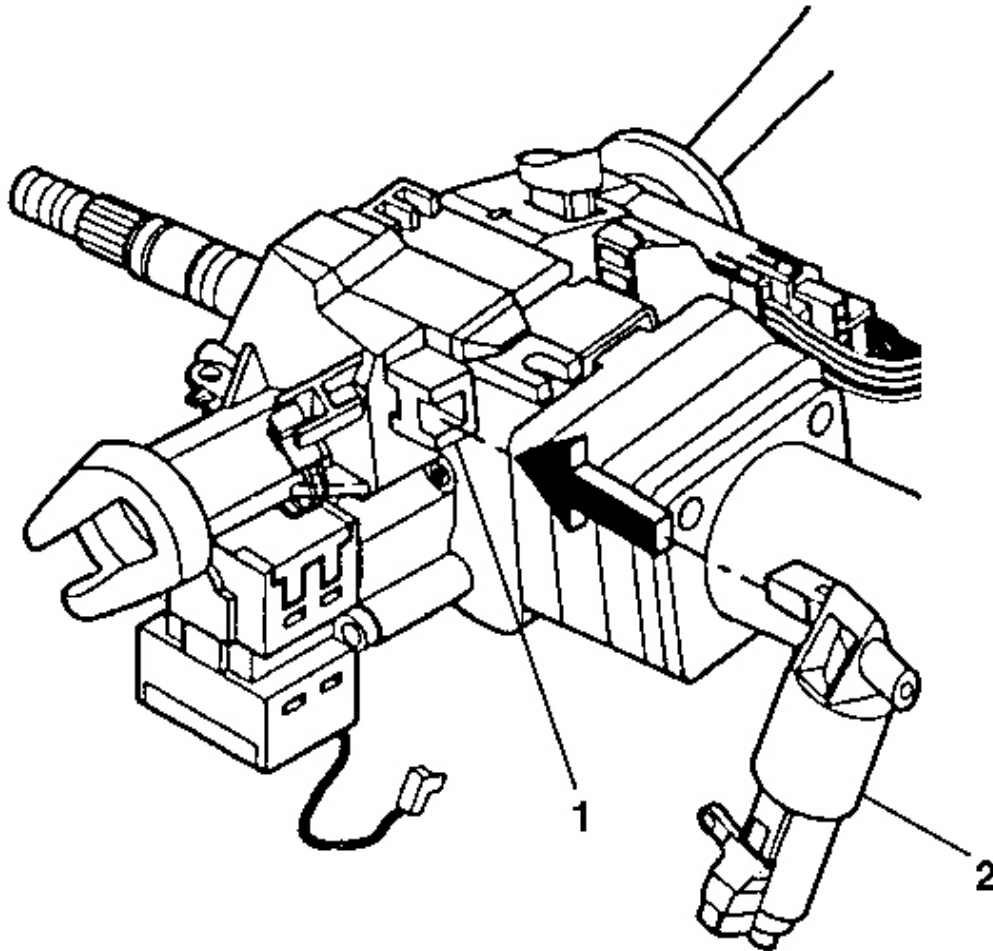
### **Removal Procedure**



**Fig. 68: Connector & Electric Park Lock**  
Courtesy of GENERAL MOTORS CORP.

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

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

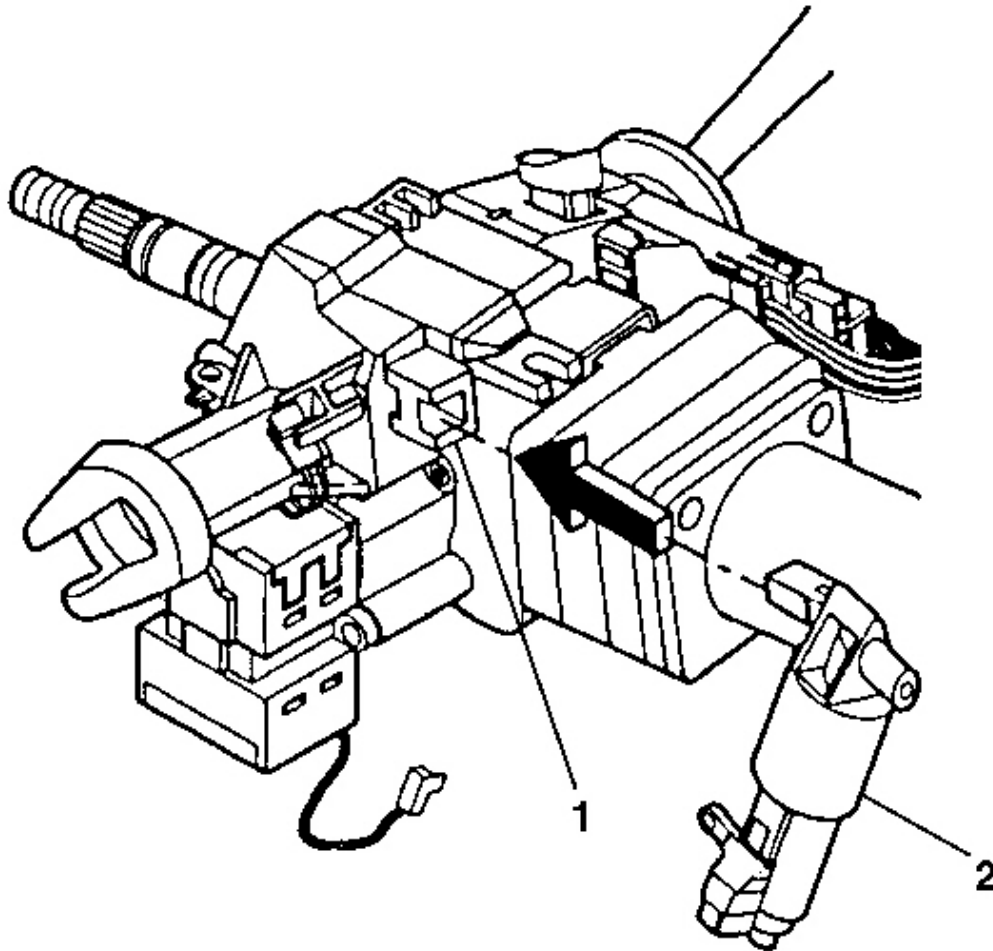


**Fig. 69: Electric Park Lock & Ignition Lock Cylinder Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

4. Pry the electric park lock (2) off of the ignition lock cylinder case assembly (1).

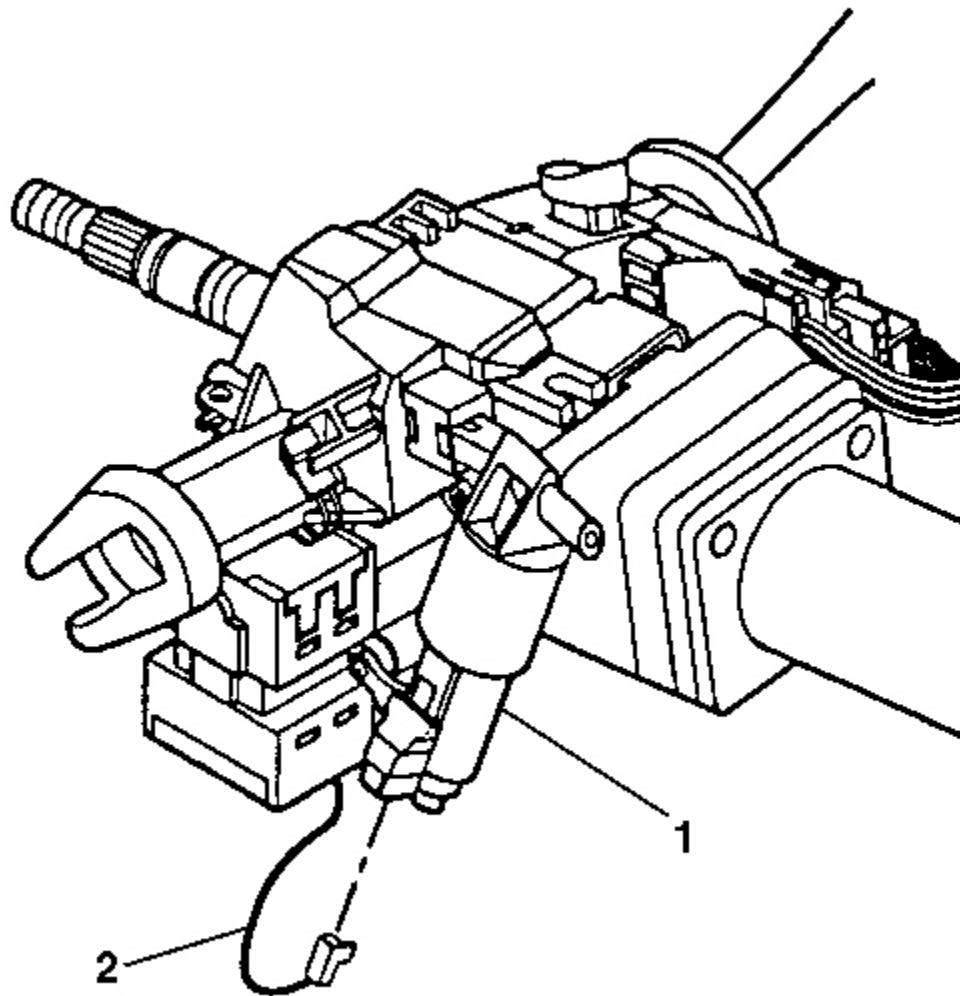
#### **Installation Procedure**





**Fig. 70: Electric Park Lock & Ignition Lock Cylinder Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Snap the electric park lock (2) onto the ignition lock cylinder case assembly (1).



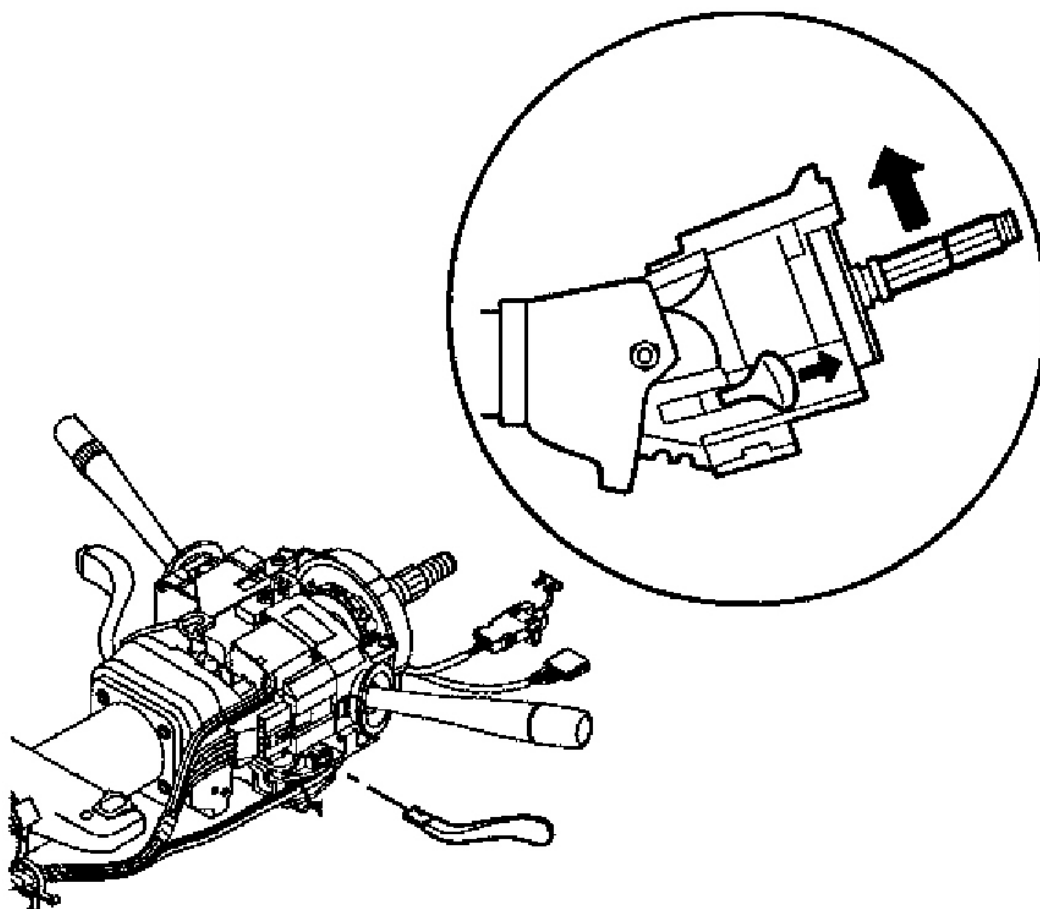
**Fig. 71: Connector & Electric Park Lock**  
Courtesy of GENERAL MOTORS CORP.

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

2. Reconnect the connector (2) to the electric park lock (1).
3. Install the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
4. Enable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

# TILT SPRING REPLACEMENT

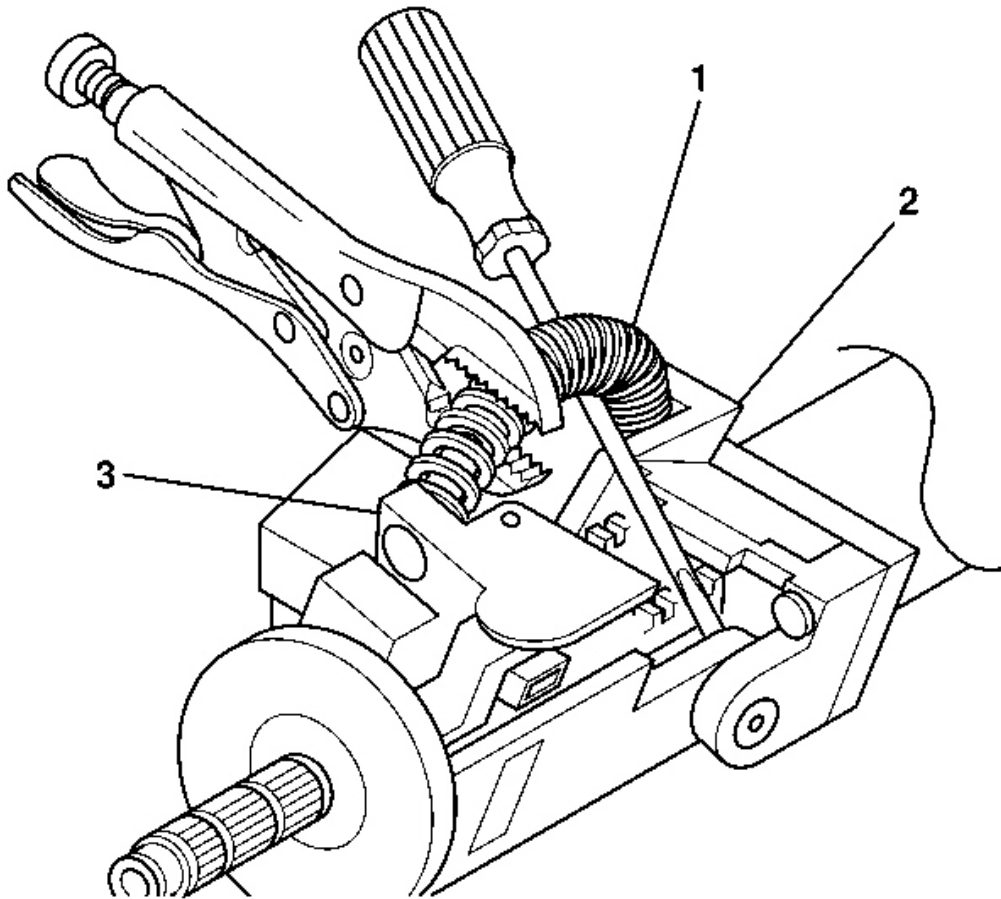
## Removal Procedure



**Fig. 72: Using Tilt Lever To Tilt Column To Up Position**  
Courtesy of GENERAL MOTORS CORP.

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

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

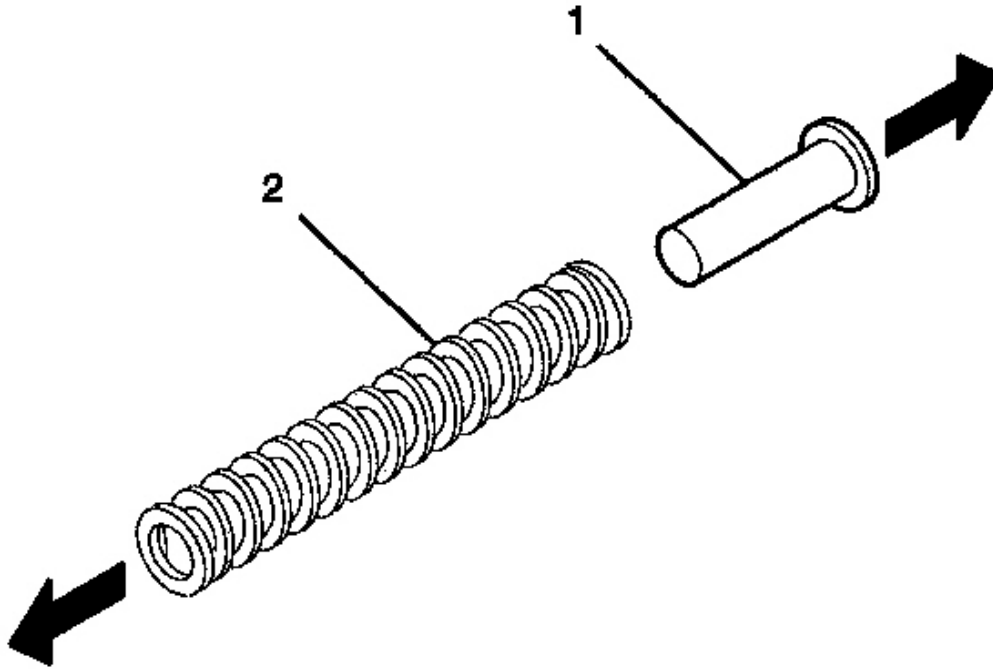


**Fig. 73: Identifying Tilt Spring At Steering Column Support Assembly**  
Courtesy of GENERAL MOTORS CORP.

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

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

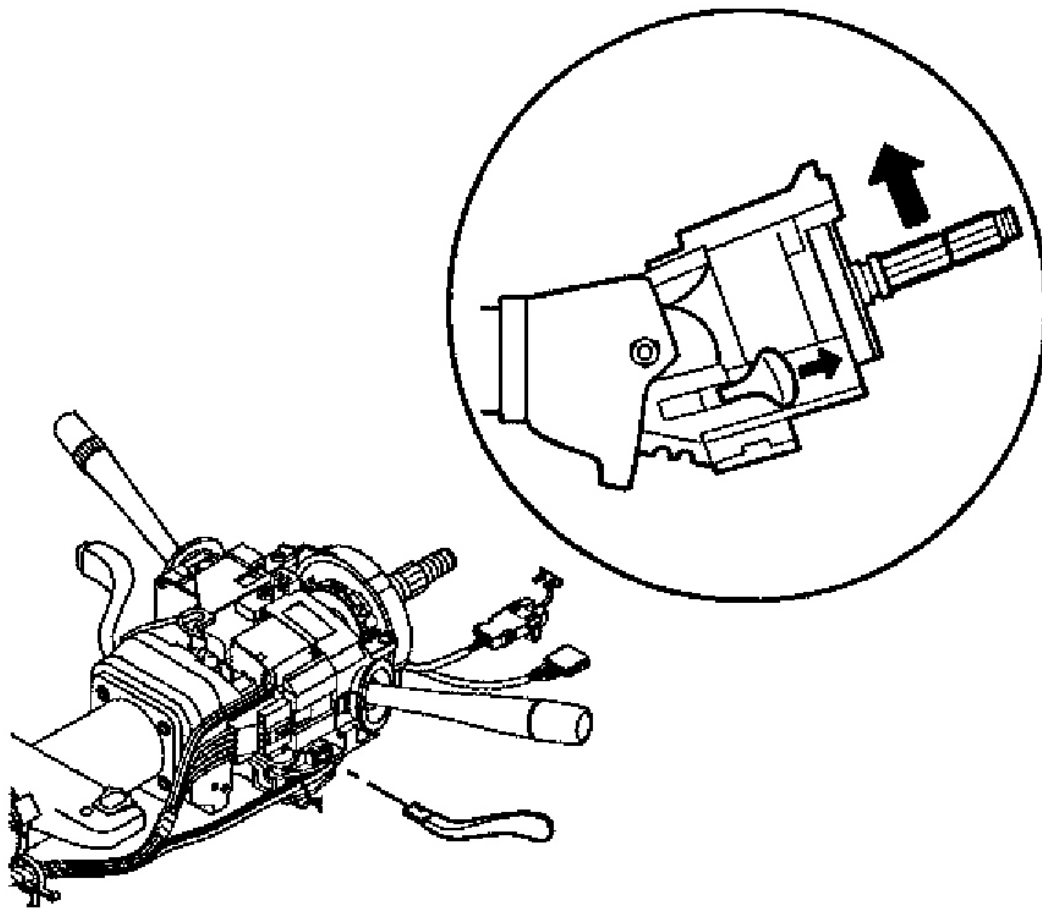
2. Secure the tilt spring (1) with locking pliers.
3. Continue prying up the tilt spring (1) until the tilt spring disengages from the post on the steering column support assembly (2) and from the steering column tilt head assembly (3).



**Fig. 74: Spring Guide & Tilt Spring**  
Courtesy of GENERAL MOTORS CORP.

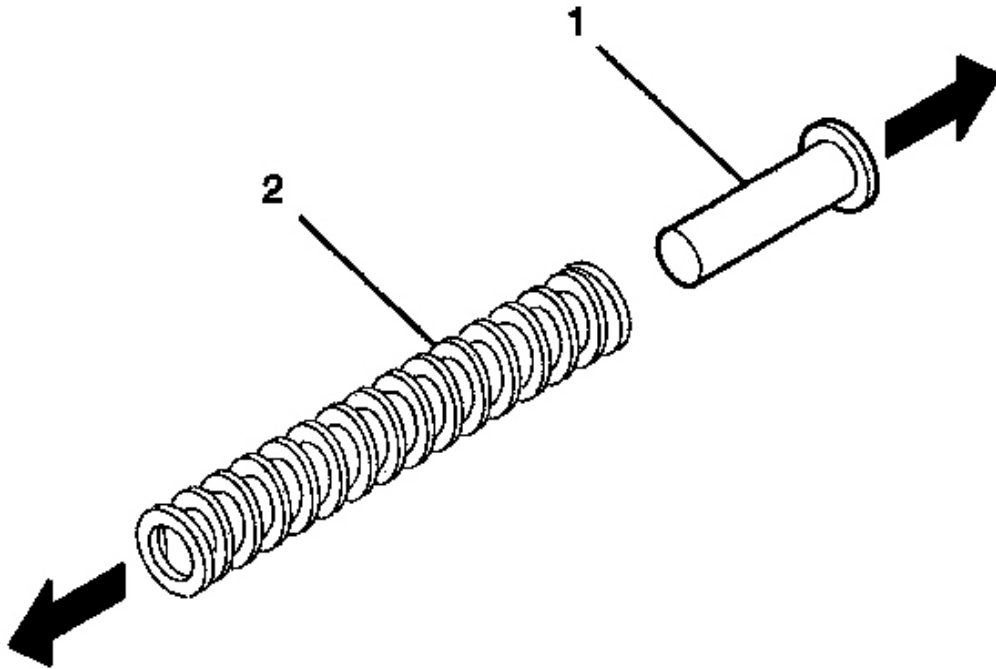
5. Remove the spring guide (1) from the tilt spring (2).

#### **Installation Procedure**



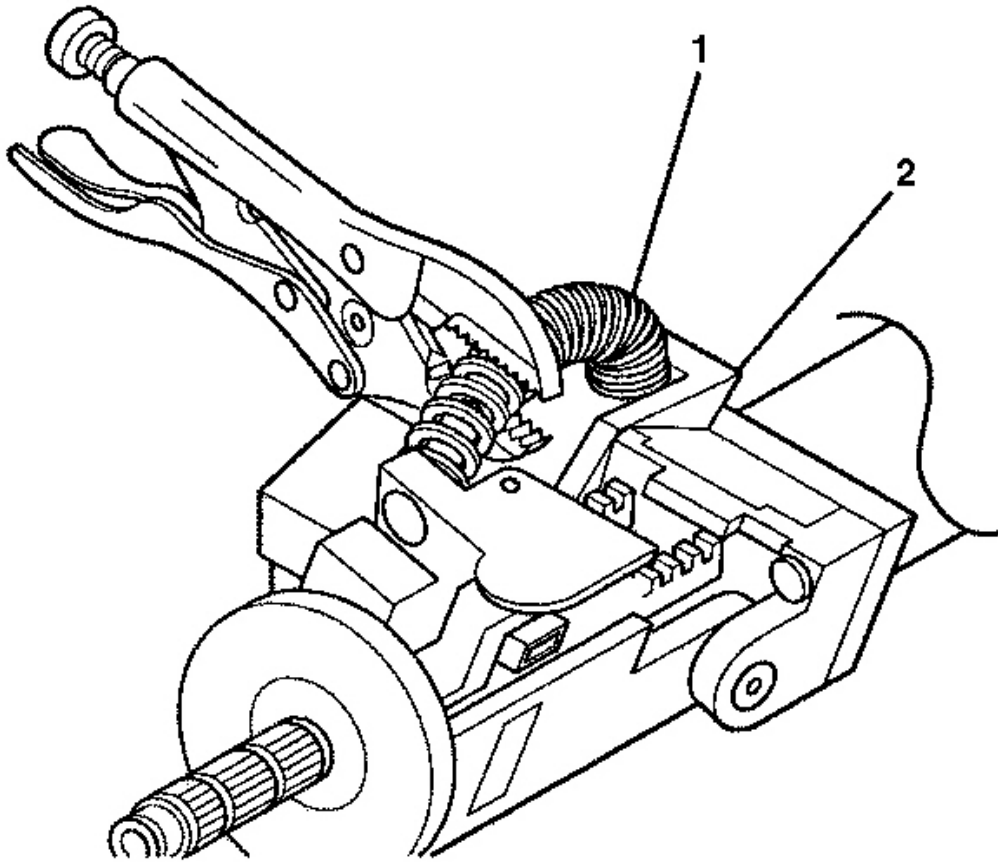
**Fig. 75: Using Tilt Lever To Tilt Column To Up Position**  
Courtesy of GENERAL MOTORS CORP.

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



**Fig. 76: Spring Guide & Tilt Spring**  
Courtesy of GENERAL MOTORS CORP.

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



**Fig. 77: Installing Tilt Spring**  
Courtesy of GENERAL MOTORS CORP.

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

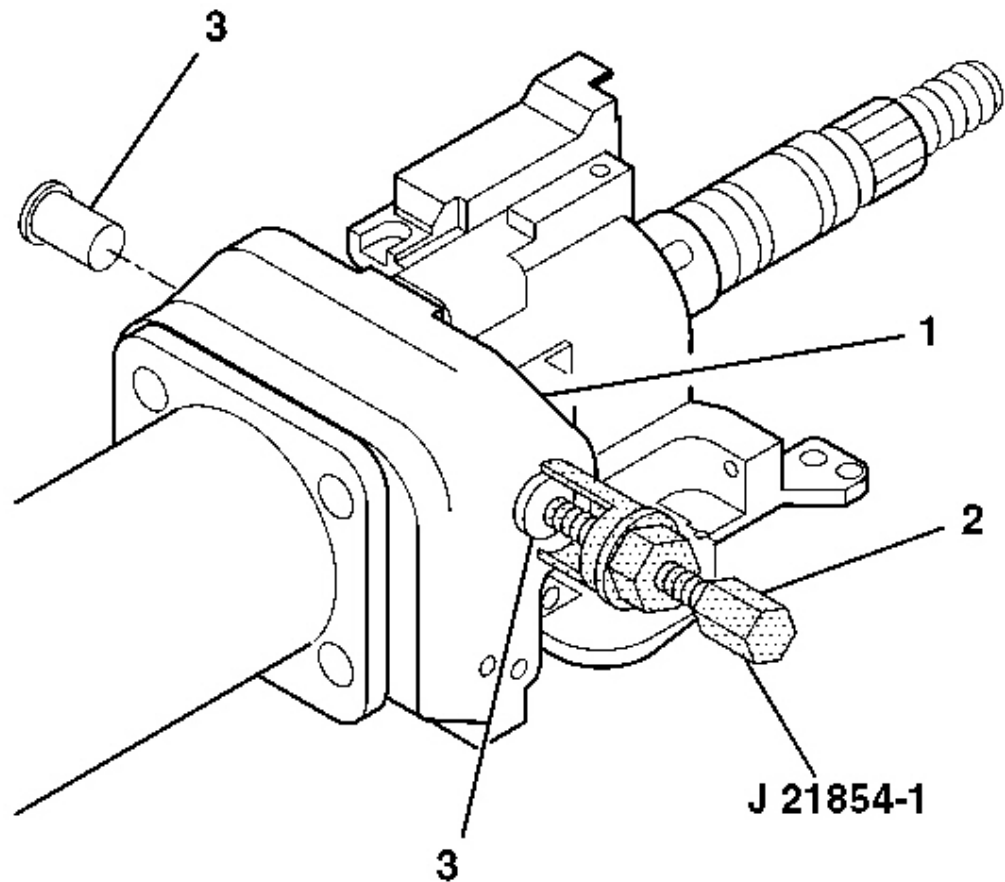
## **STEERING COLUMN TILT HEAD HOUSING REPLACEMENT**

### **Tools Required**

J 21854-01 Pivot Pin Remover



## Removal Procedure

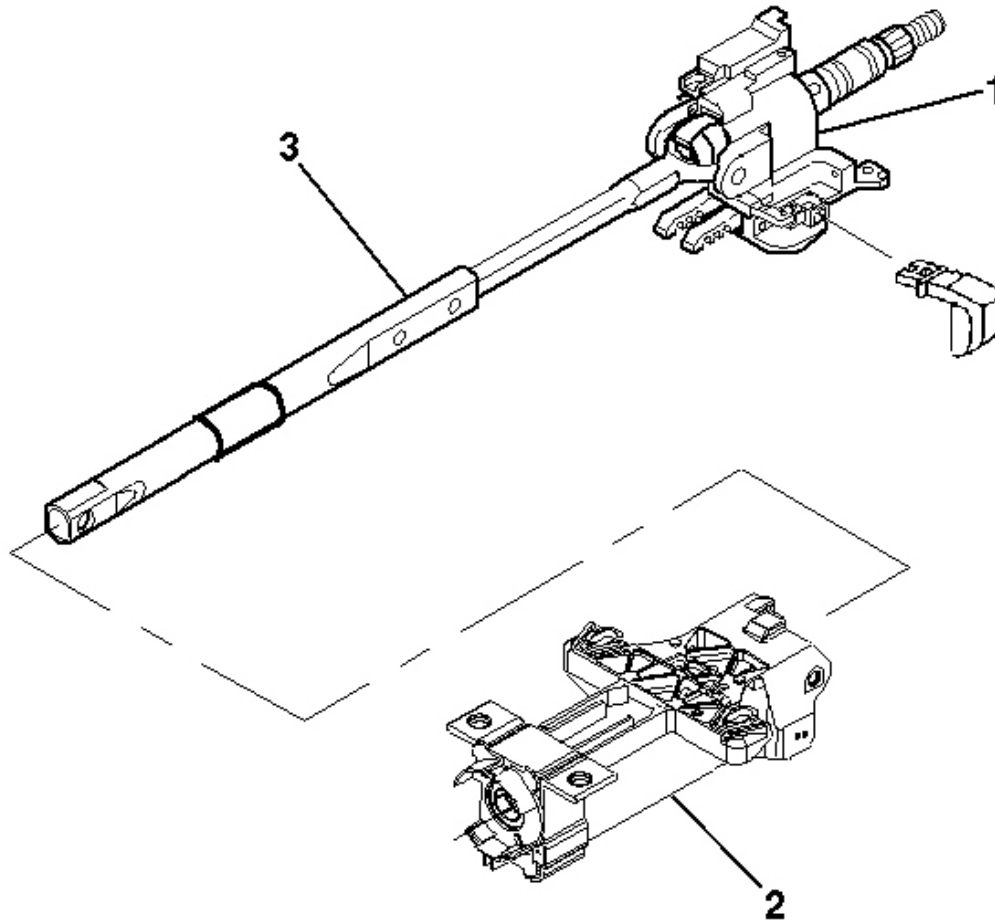


**Fig. 78: Pivot Pins To Steering Column Tilt Head Assembly (Column Shift Lean Shaft)**  
Courtesy of GENERAL MOTORS CORP.

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

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the steering column from the vehicle. Refer to Steering Column Replacement .
3. Remove the ignition lock cylinder case assembly. Refer to Ignition Lock Cylinder Case Replacement .
4. Remove the turn signal and multifunction switch assembly. Refer to Multifunction, Turn Signal Switch Replacement .

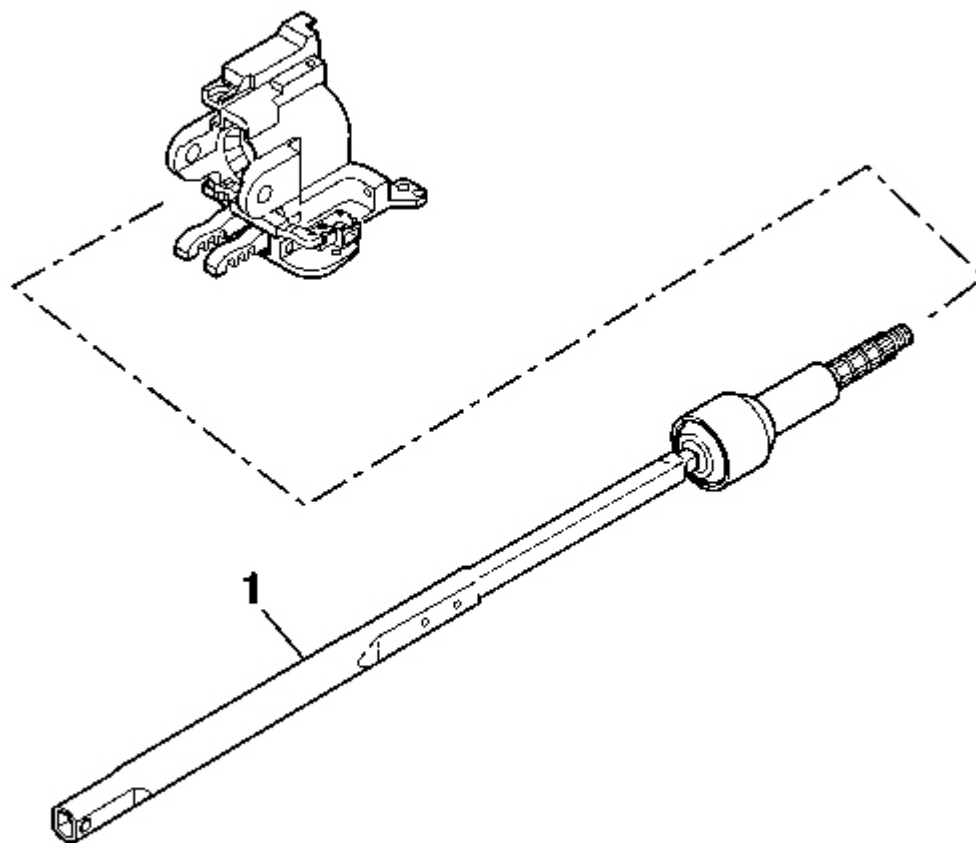
5. Remove the turn signal switch housing.
6. Remove the tilt spring. Refer to **Tilt Spring Replacement** .
7. Remove the 2 pivot pins (3) from the steering column tilt head assembly (1) using J 21854-01 .



**Fig. 79: View Of Upper Steering Column Components**  
Courtesy of GENERAL MOTORS CORP.

8. Install the tilt lever into the steering column tilt head assembly (1).
9. Pull back on the tilt lever and at the same time pull the steering column tilt head assembly (1) down and away from the steering column.
10. Remove the steering column tilt head assembly (1) with the steering shaft assembly (3) from the steering column jacket assembly (2).

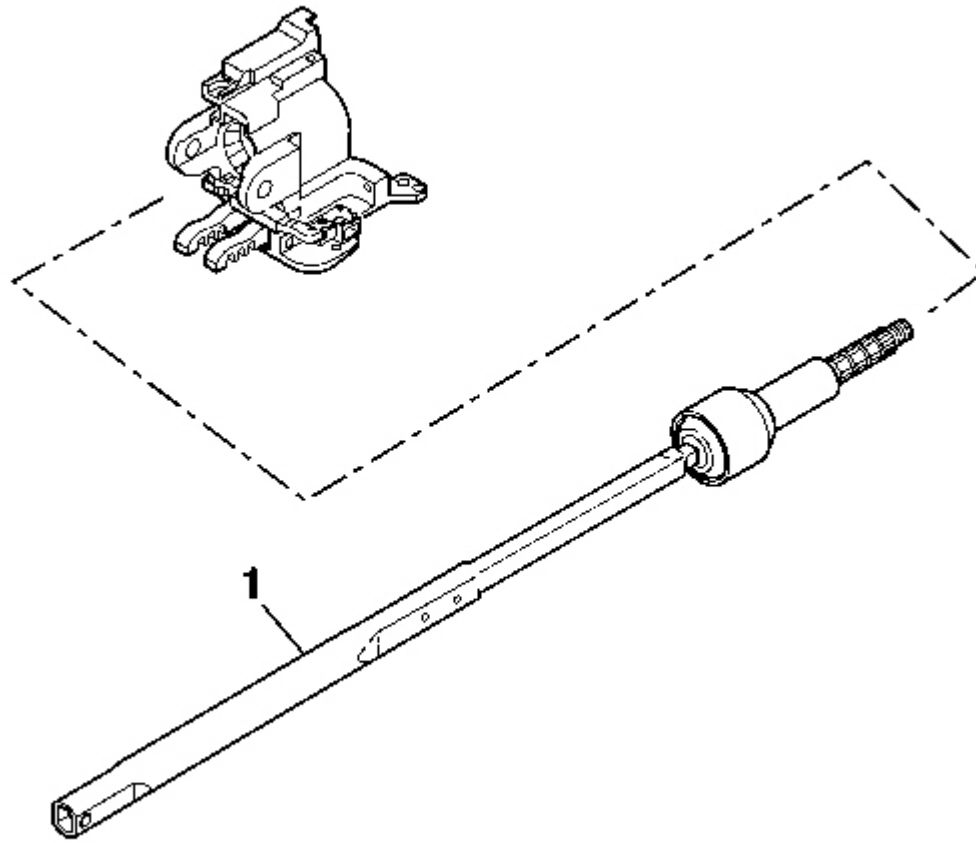
11. Remove the tilt lever.



**Fig. 80: Identifying Steering Shaft**  
Courtesy of GENERAL MOTORS CORP.

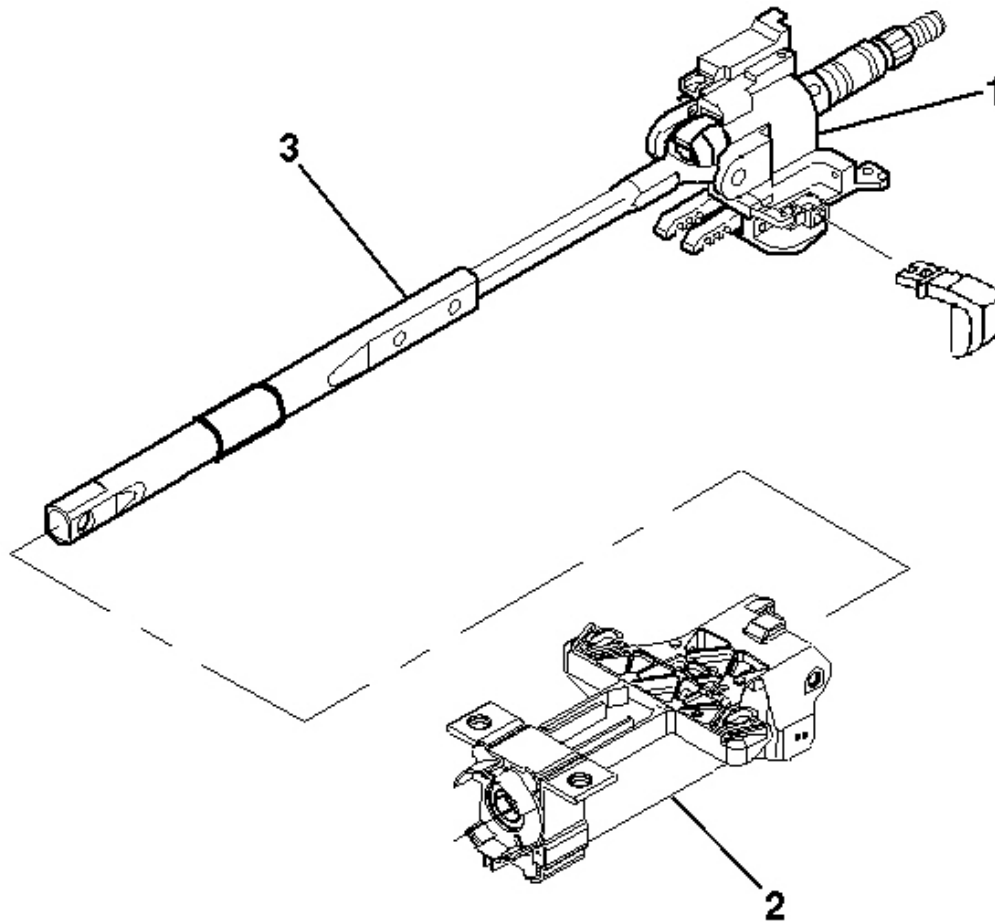
12. Remove the steering shaft (1) from the steering column tilt head assembly.

#### **Installation Procedure**



**Fig. 81: Identifying Steering Shaft**  
Courtesy of GENERAL MOTORS CORP.

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



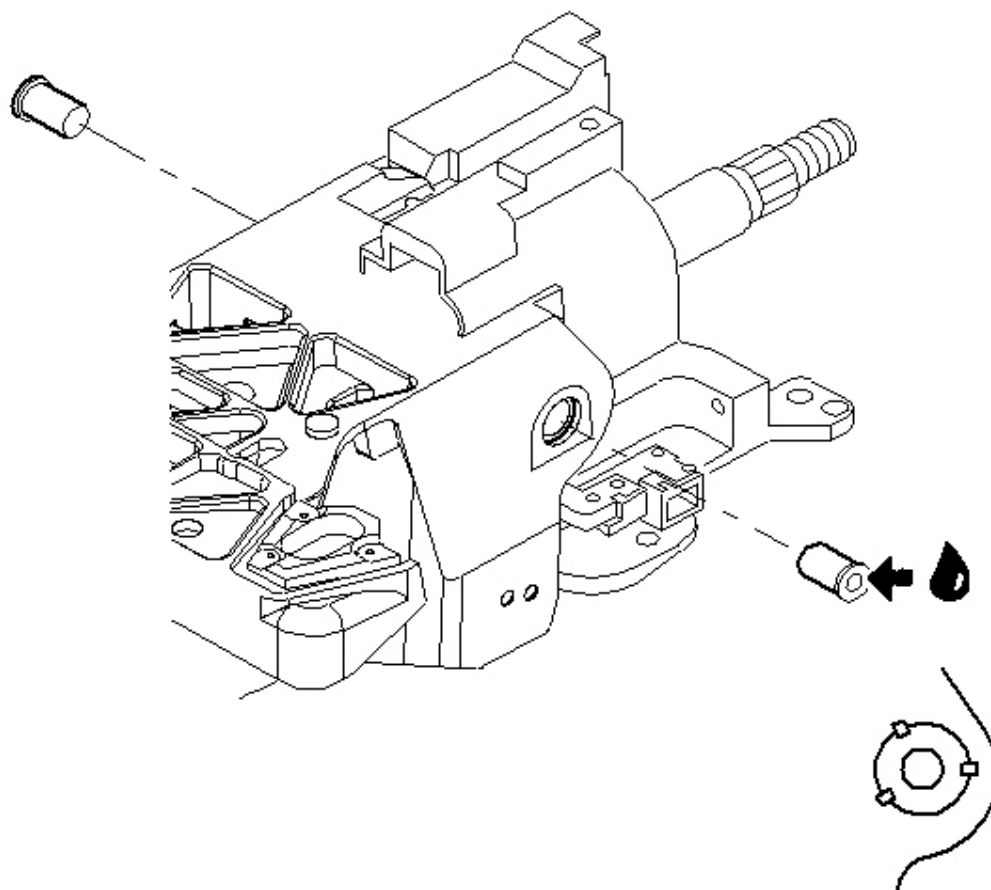
**Fig. 82: View Of Upper Steering Column Components**  
Courtesy of GENERAL MOTORS CORP.

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

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

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

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



**Fig. 83: Pivot Pin Location**  
Courtesy of GENERAL MOTORS CORP.

4. Lubricate the pivot pins with GM P/N 12346293 (Canadian P/N 992723).

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

5. Stake the pins in 3 places.
6. Install the tilt spring assembly only. Refer to **Tilt Spring Replacement** .
7. Install the turn signal switch housing only.
8. Install the turn signal and multifunction switch assembly only. Refer to **Multifunction, Turn Signal Switch Replacement** .
9. Install the ignition lock cylinder case assembly. Refer to **Ignition Lock Cylinder Case Replacement** .

10. Install the steering column to the vehicle. Refer to **Steering Column Replacement** .
11. Enable the inflatable restraint steering wheel module. Refer to **SIR Disabling and Enabling Zone 3** in SIR.

## **STEERING COLUMN REPLACEMENT**

### **Tools Required**

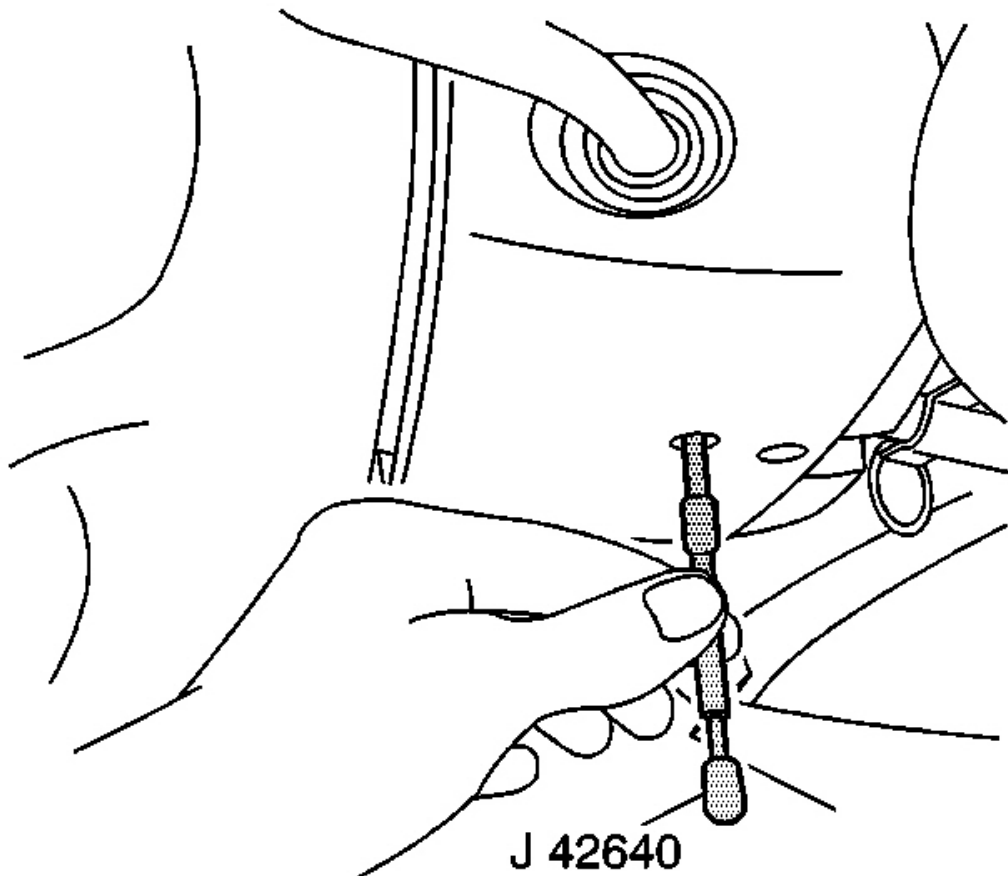
J 42640 Steering Column Lock Pin

### **Removal Procedure**

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

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

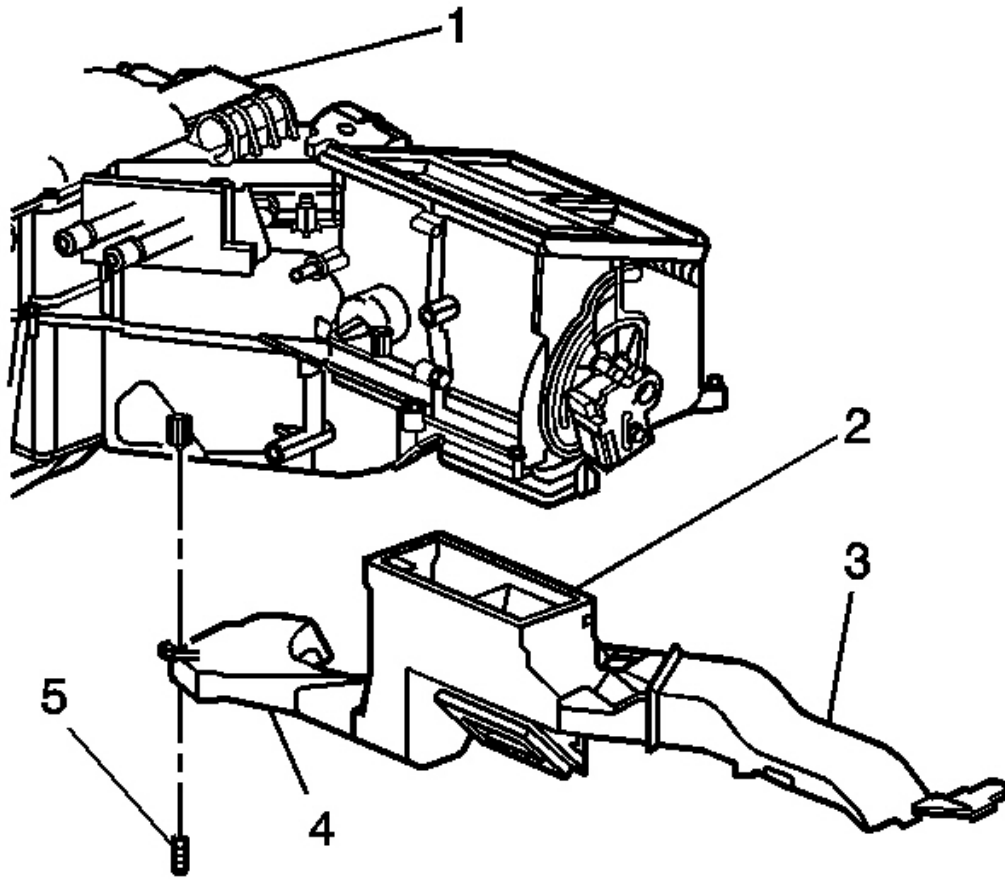
**NOTE:** The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation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



**Fig. 84: Inserting J 42640 To Lock Steering Column**  
Courtesy of GENERAL MOTORS CORP.

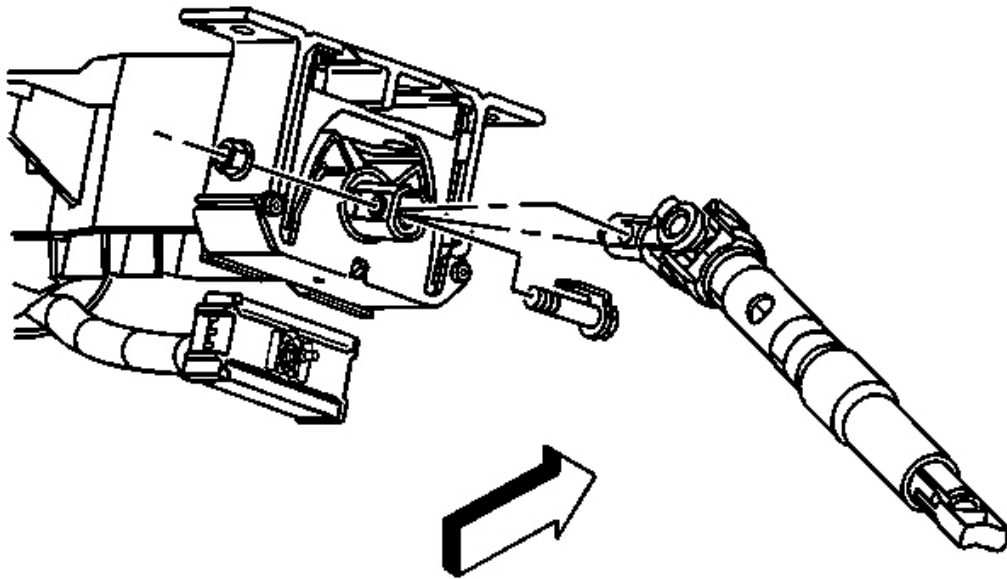
1. Disable the SIR system. Refer to **SIR Disabling and Enabling Zone 3** in SIR.
2. Lock the steering column through the access hole in the lower steering column trim cover using J 42640 .
3. Remove the knee bolster deflector. Refer to **Bracket Replacement - Steering Column** in Instrument Panel, Gauges and Console.
4. Remove the transfer case electronic control module. Refer to **Transfer Case Shift Control Module Replacement** in Transfer Case BW 4484.





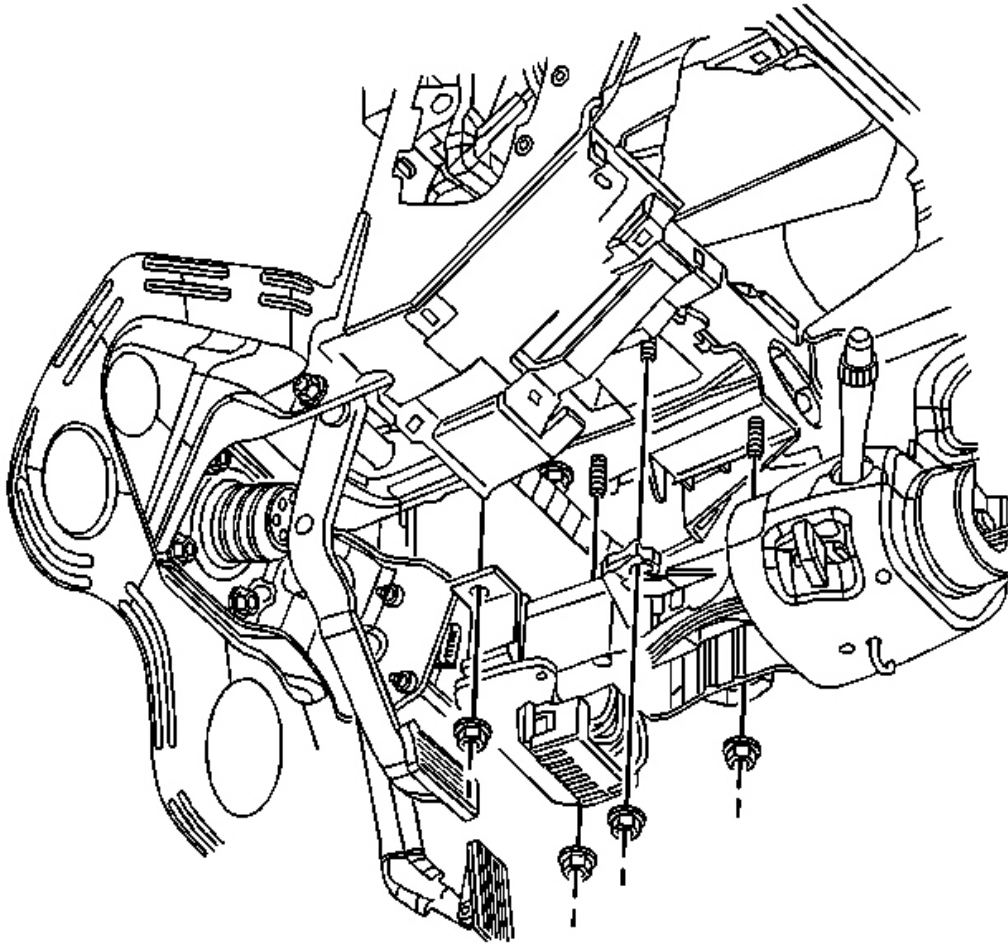
**Fig. 85: Floor Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the heating, ventilation, and air conditioning (HVAC) duct (3) and move out of the way.
6. Remove the transfer case electronic control module bracket bolts and lower bracket out of the way.
7. Disconnect the steering column electrical connector.
8. Disconnect the wiring harness connector from the back of the fuse block.



**Fig. 86: Steering Column & Upper Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

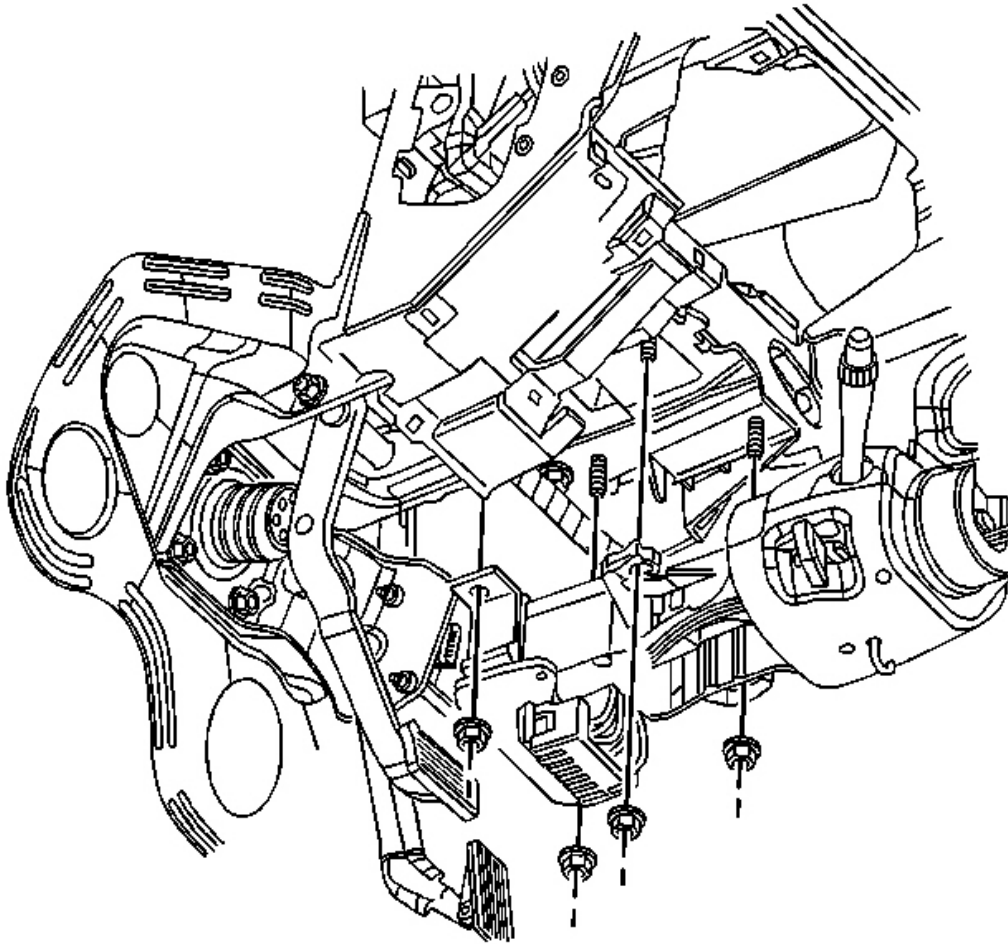
9. Remove the intermediate shaft bolt from the steering column.



**Fig. 87: View Of Steering Column Assembly**  
Courtesy of GENERAL MOTORS CORP.

10. Remove the steering column mounting nuts.
11. Remove the steering column from the vehicle.

#### **Installation Procedure**



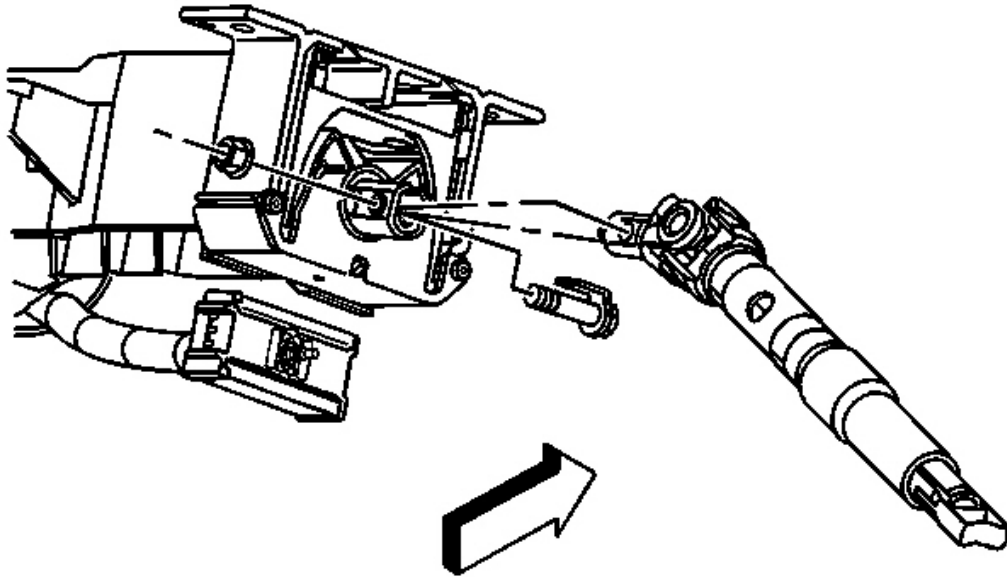
**Fig. 88: View Of Steering Column Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Install the steering column to the vehicle and connect the column to the intermediate shaft.

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

2. Install the steering column mounting nuts.

**Tighten:** Tighten the nuts to 27 N.m (20 lb ft).



**Fig. 89: Steering Column & Upper Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

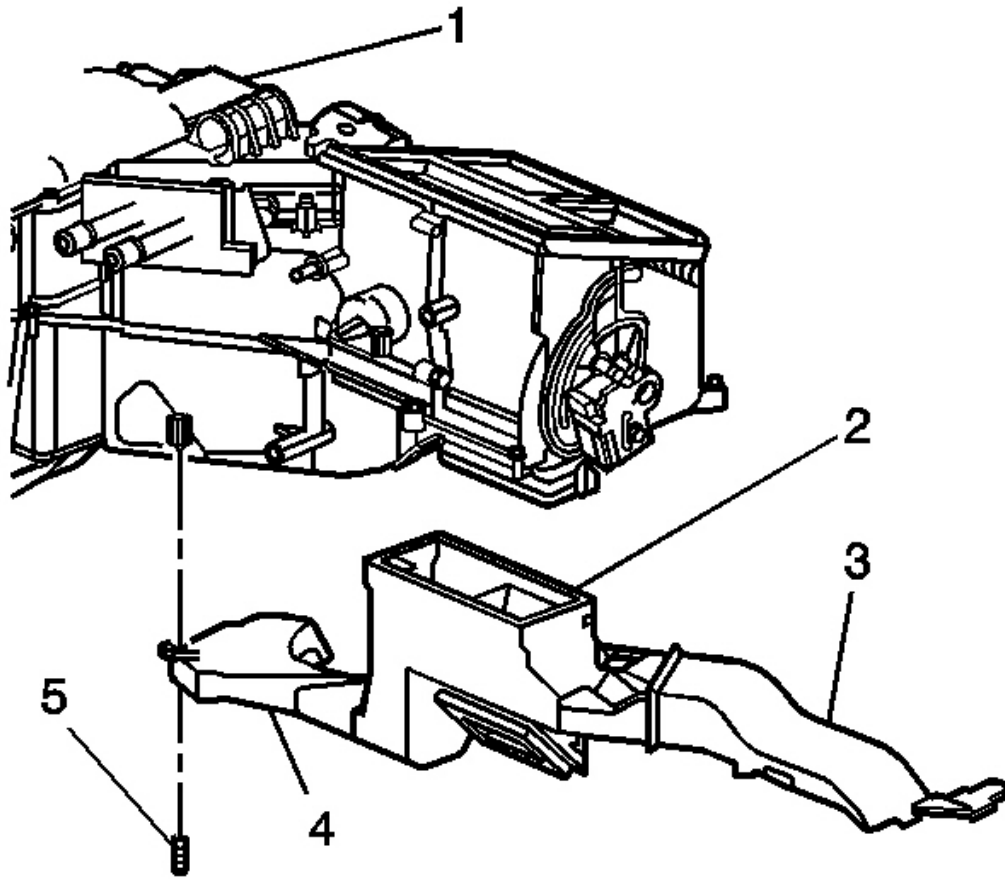
3. Install the intermediate shaft bolt to the steering column.

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

4. Connect the wiring harness connector to the back of the fuse block.
5. Connect the steering column electrical connector to the body wiring harness.
6. Reposition the transfer case electronic control module bracket and install the bolts.

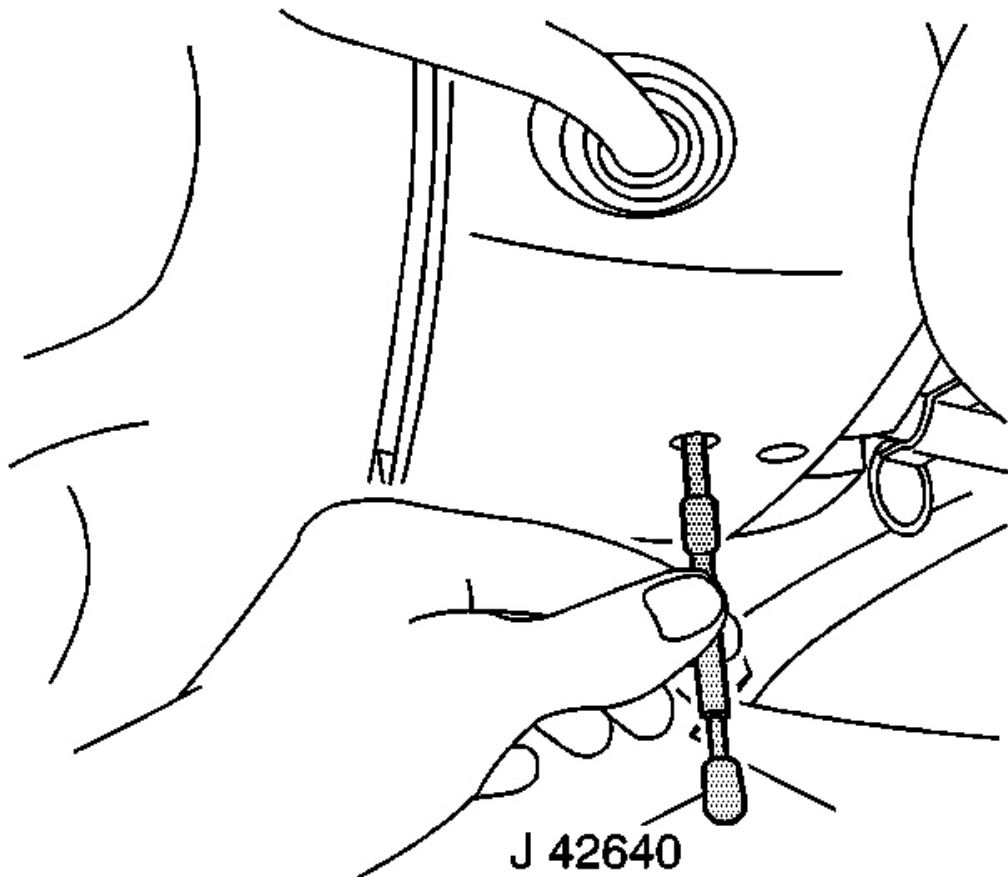
**Tighten:** Tighten the bolts to 2 N.m (18 lb in).

7. Install the transfer case electronic control module. Refer to **Transfer Case Shift Control Module Replacement** in Transfer Case BW 4484.



**Fig. 90: Floor Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

8. Connect the HVAC duct (3).
9. Install the knee bolster deflector. Refer to **Bracket Replacement - Steering Column** in Instrument Panel, Gauges and Console.



**Fig. 91: Inserting J 42640 To Lock Steering Column**  
Courtesy of GENERAL MOTORS CORP.

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

## **STEERING COLUMN SEAL REPLACEMENT**

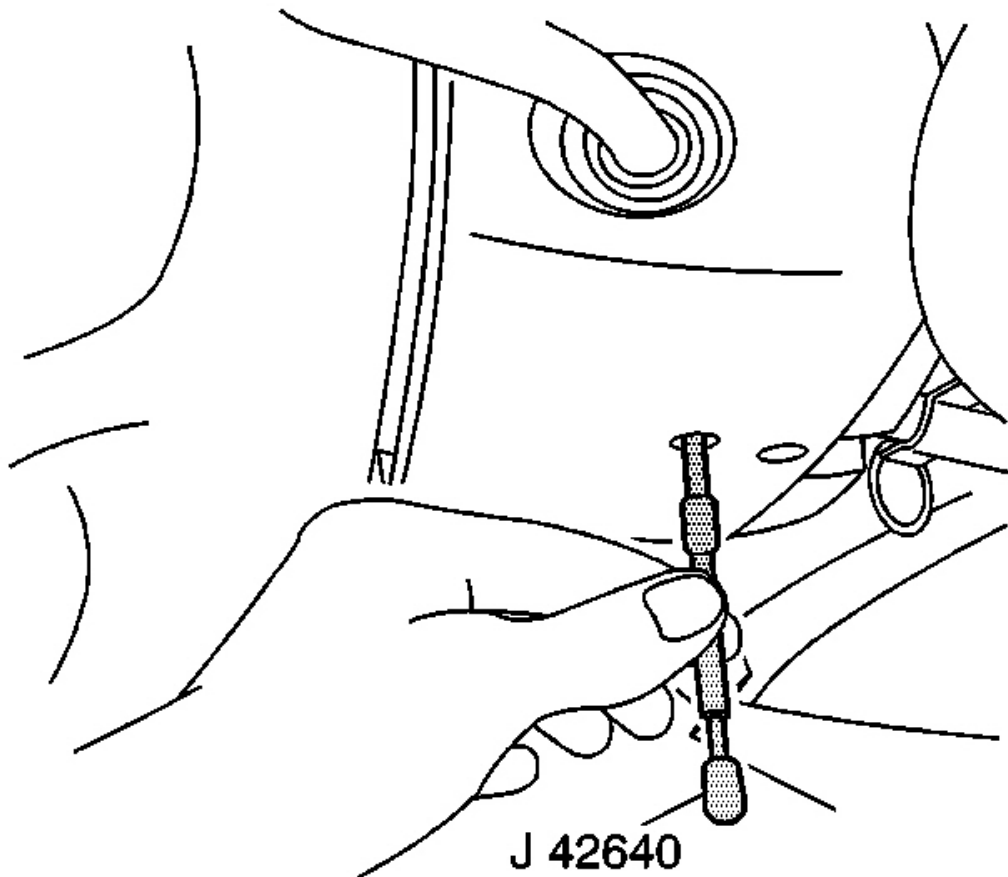
### **Tools Required**

J 42640 Steering Column Lock Pin

### **Removal Procedure**

**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.



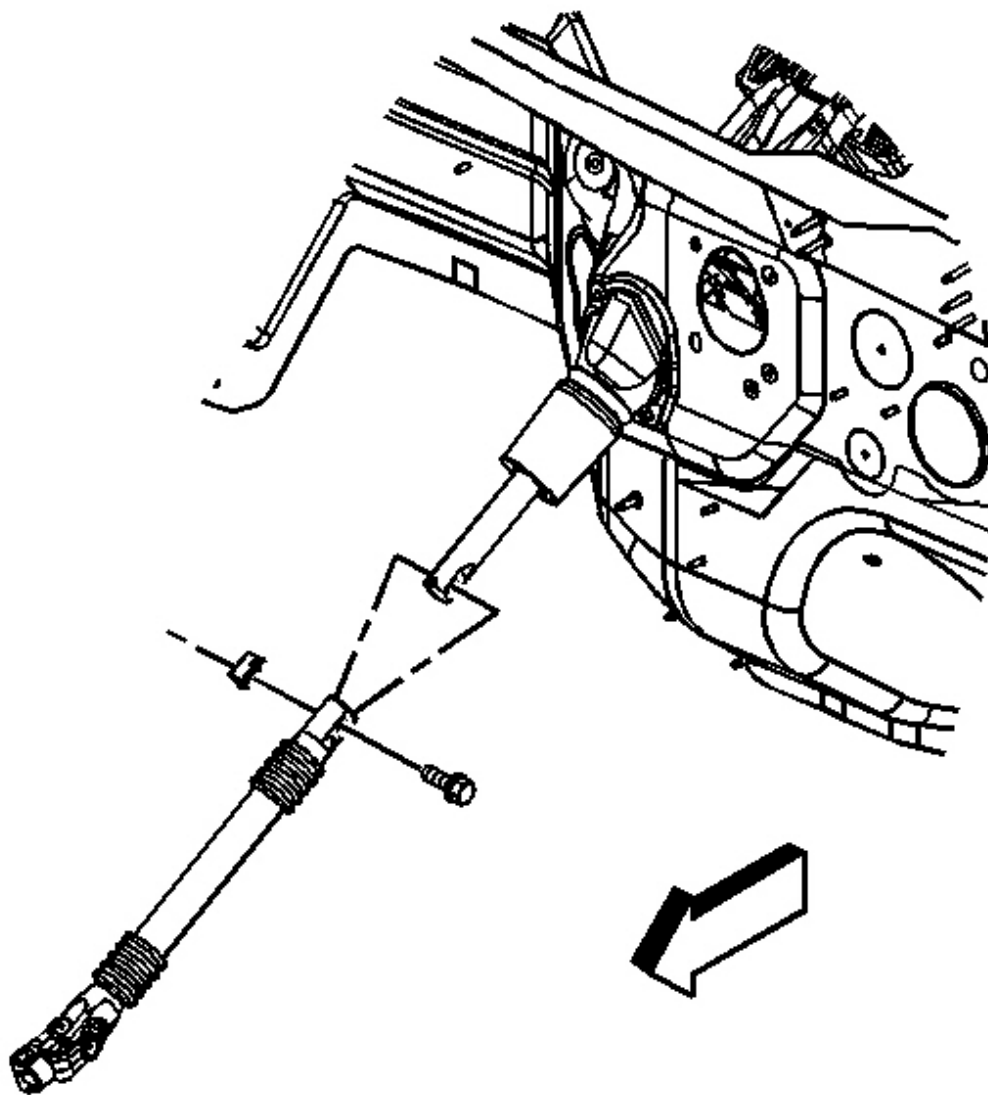
**Fig. 92: Inserting J 42640 To Lock Steering Column**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow



**these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.**

1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition switch to the lock position and remove the key.
3. Lock the steering column through the access hole in the lower steering column trim cover using J 42640 .

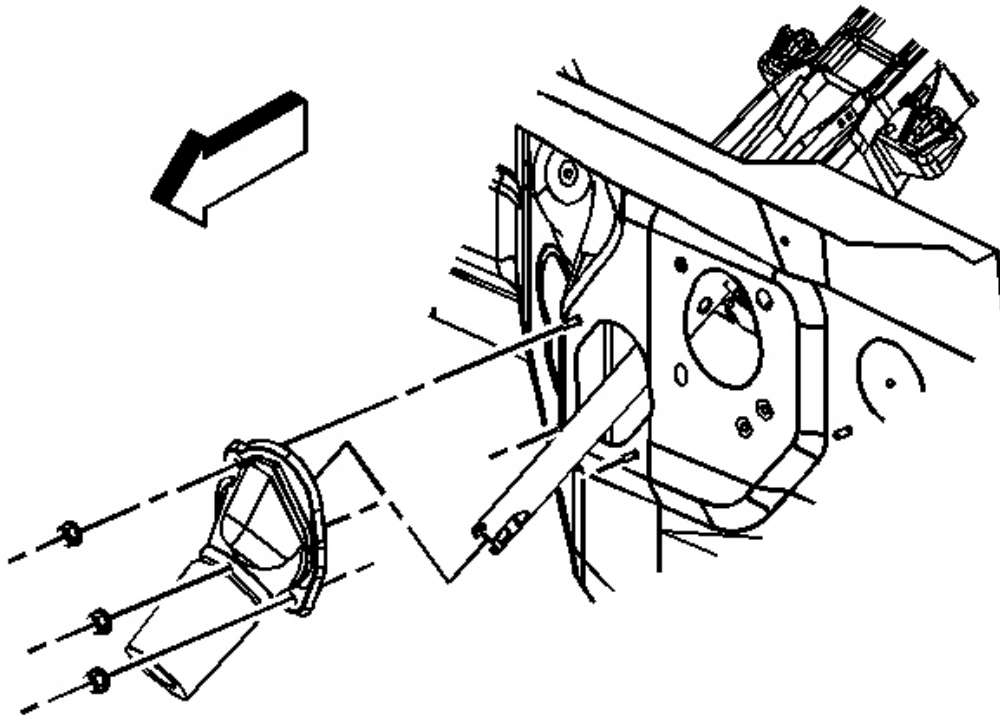


**Fig. 93: Upper Intermediate Shaft & Lower Intermediate Shaft**

Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Note the direction of upper intermediate shaft to steering column pinch bolt for installation. The bolt must be installed in the same direction it was removed.

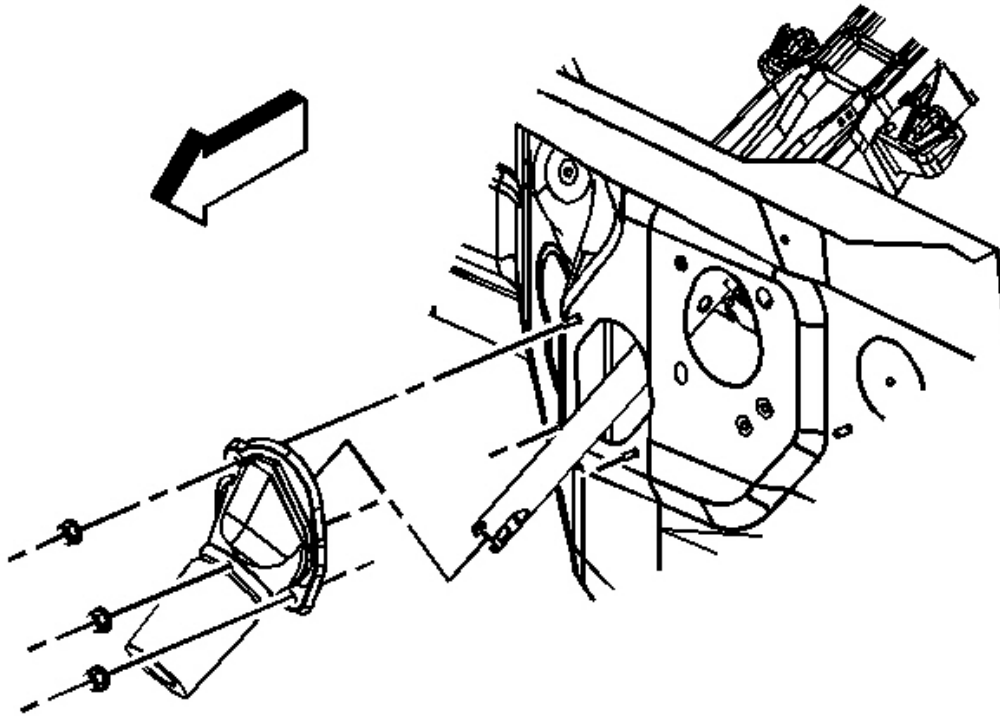
4. Remove the upper intermediate shaft to the lower intermediate shaft pinch bolt.
5. Disconnect the upper intermediate shaft from the lower intermediate shaft.



**Fig. 94: Upper Intermediate Shaft Boot**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the upper intermediate shaft boot.

#### Installation Procedure

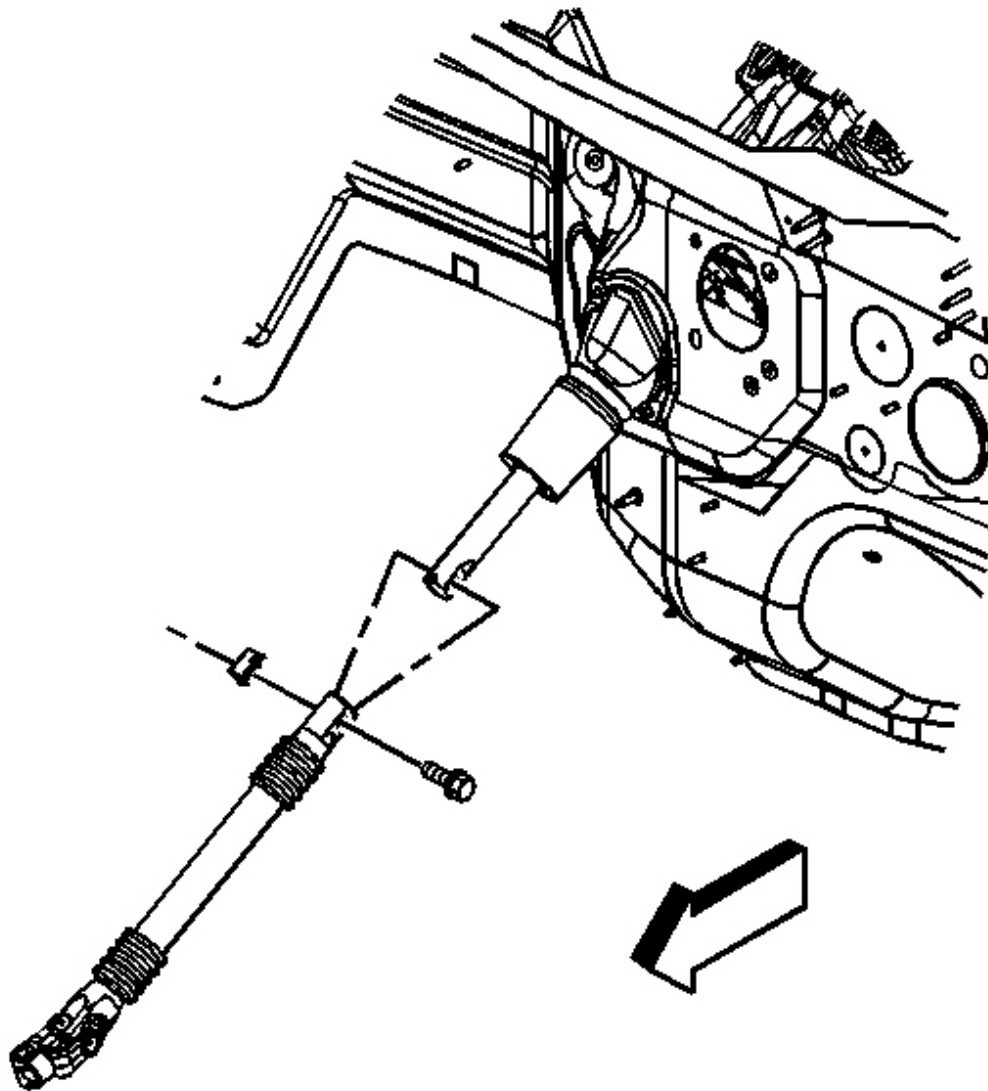


**Fig. 95: Upper Intermediate Shaft Boot**  
Courtesy of GENERAL MOTORS CORP.

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

1. Install the upper intermediate shaft boot.

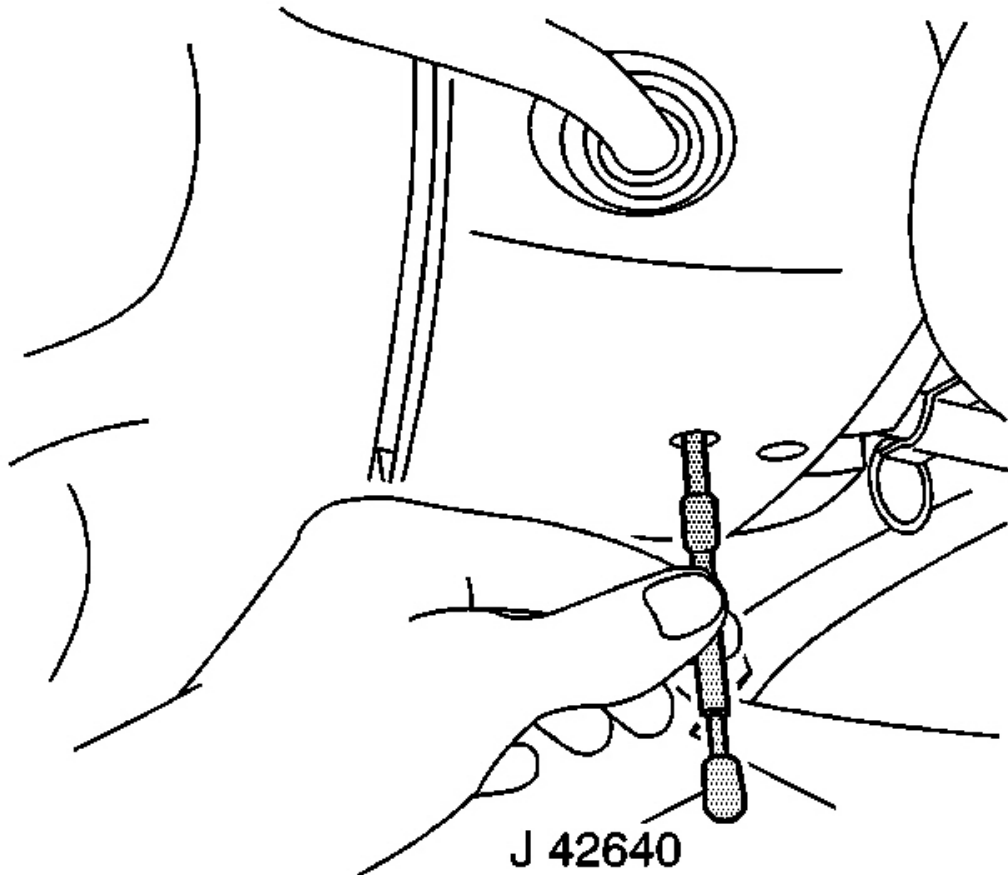
**Tighten:** Tighten the upper intermediate shaft to boot nuts to 50 N.m (37 lb ft).



**Fig. 96: Upper Intermediate Shaft & Lower Intermediate Shaft**  
Courtesy of GENERAL MOTORS CORP.

2. Connect the upper intermediate shaft to the lower intermediate shaft.
3. Install the upper intermediate shaft to the lower intermediate shaft pinch bolt.

**Tighten:** Tighten the upper intermediate shaft pinch bolt to 50 N.m (37 lb ft).

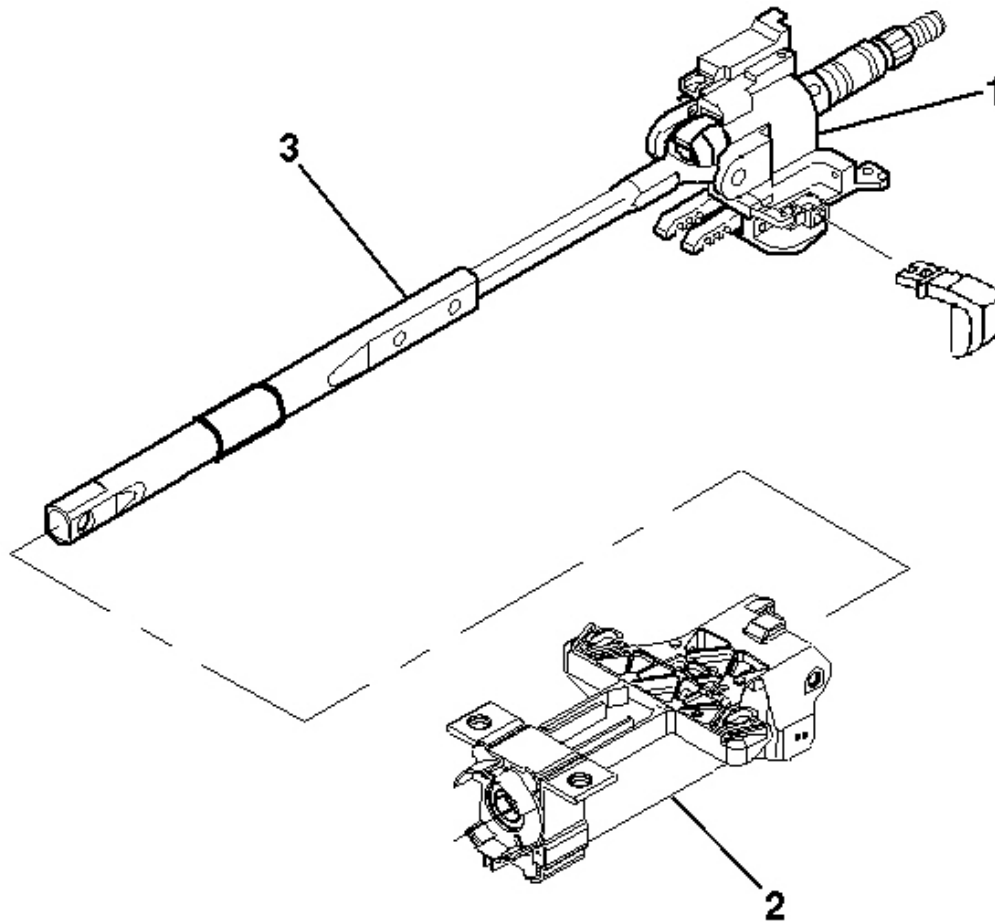


**Fig. 97: Inserting J 42640 To Lock Steering Column**  
Courtesy of GENERAL MOTORS CORP.

4. Unlock the steering column by removing J 42640 from the steering column lower trim cover access hole.

## **STEERING COLUMN JACKET REPLACEMENT**

### **Removal Procedure**

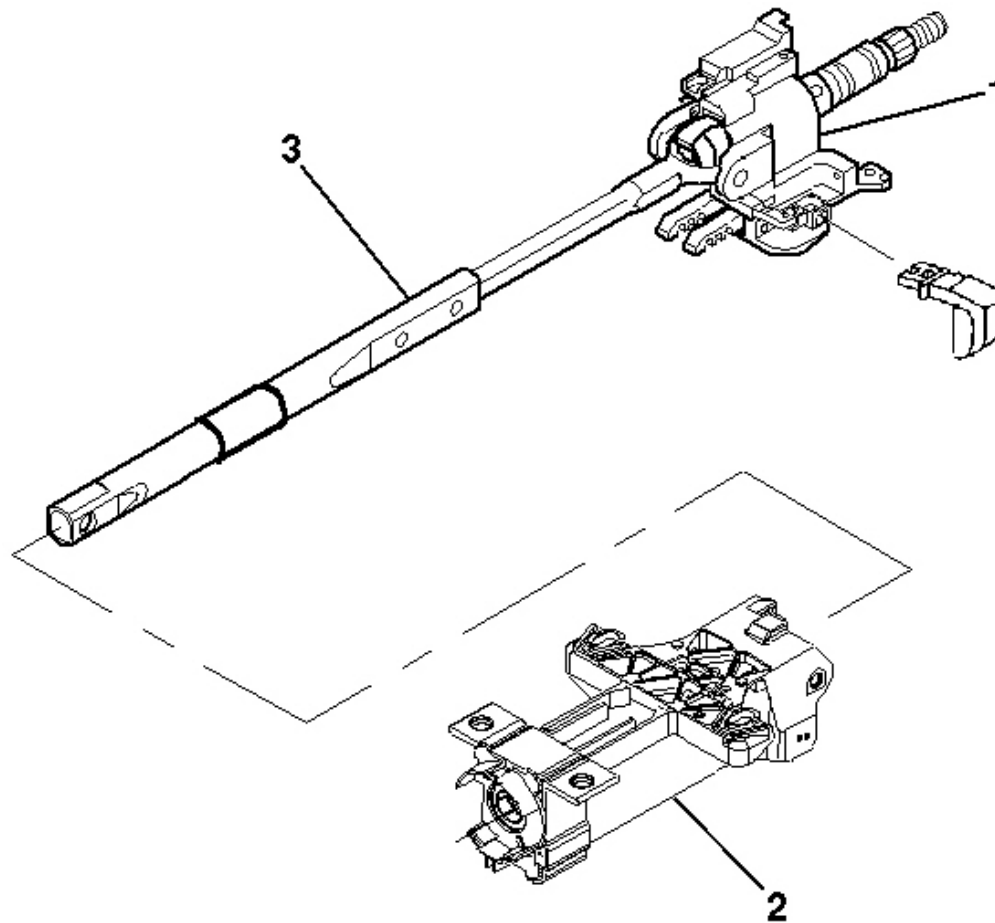


**Fig. 98: View Of Upper Steering Column Components**  
Courtesy of GENERAL MOTORS CORP.

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

1. Disable the SIR system. Refer to SIR Disabling and Enabling Zone 3 in SIR.
2. Remove the steering column from the vehicle. Refer to Steering Column Replacement .
3. Inspect the steering column for accident damage. Refer to Steering Column Accident Damage Inspection .
4. Remove the steering column tilt head. Refer to Steering Column Tilt Head Housing Replacement .
5. Remove the jacket (2).

## Installation Procedure

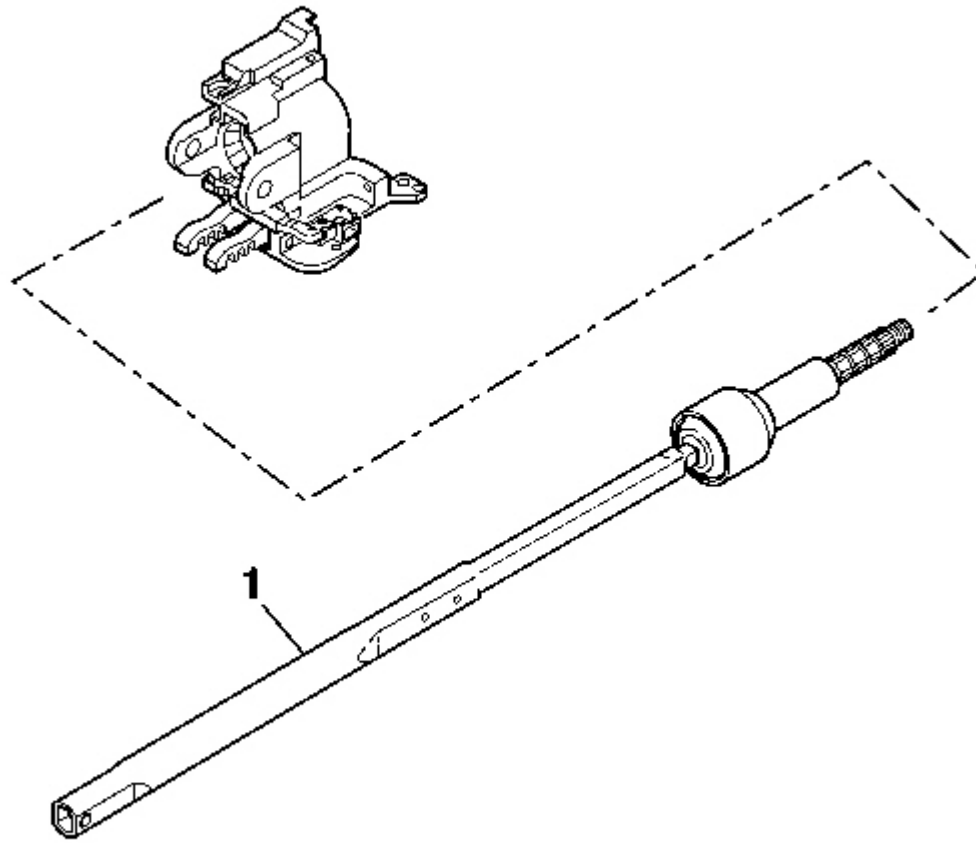


**Fig. 99: View Of Upper Steering Column Components**  
Courtesy of GENERAL MOTORS CORP.

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

## STEERING COLUMN SHAFT REPLACEMENT

### Removal Procedure

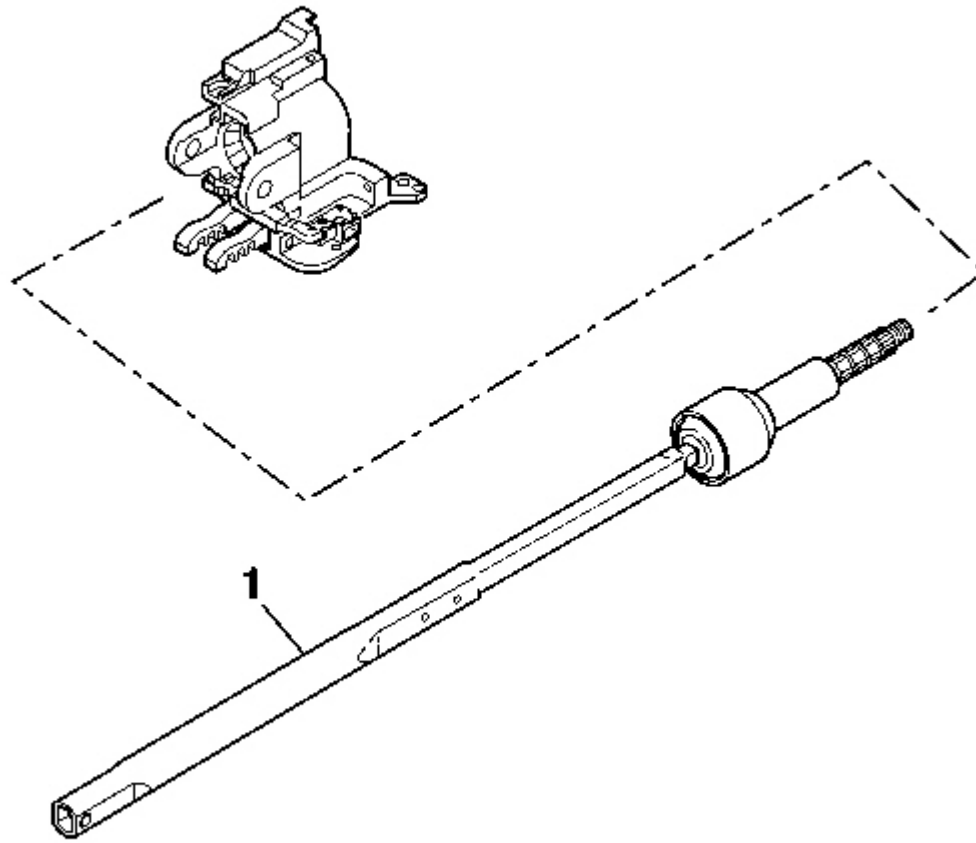


**Fig. 100: Identifying Steering Shaft**  
Courtesy of GENERAL MOTORS CORP.

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

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



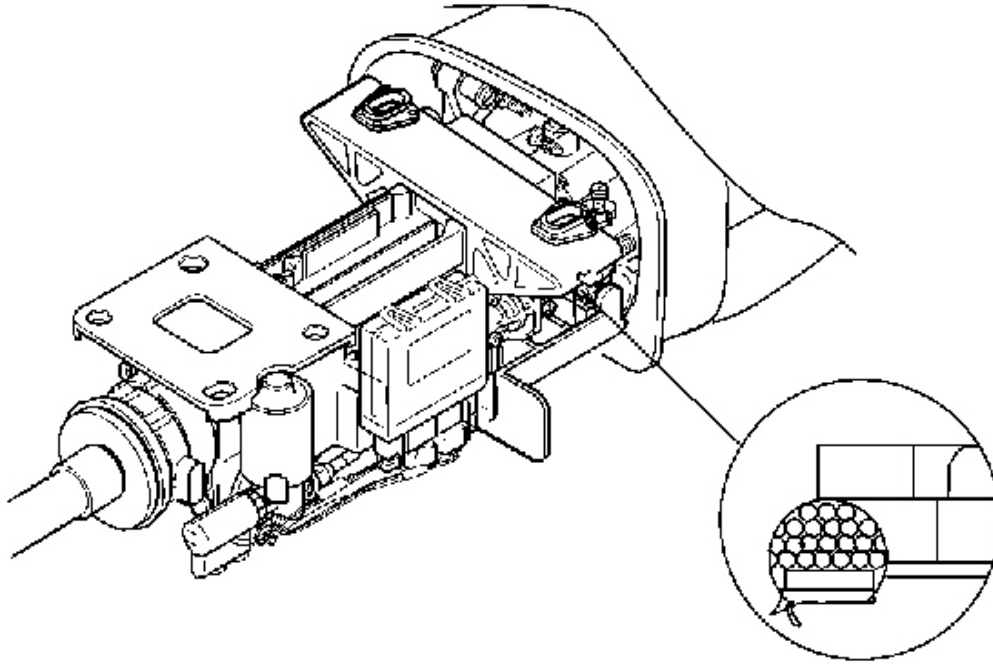


**Fig. 101: Identifying Steering Shaft**  
Courtesy of GENERAL MOTORS CORP.

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

## **STEERING COLUMN WIRE HARNESS ASSEMBLY REPLACEMENT**

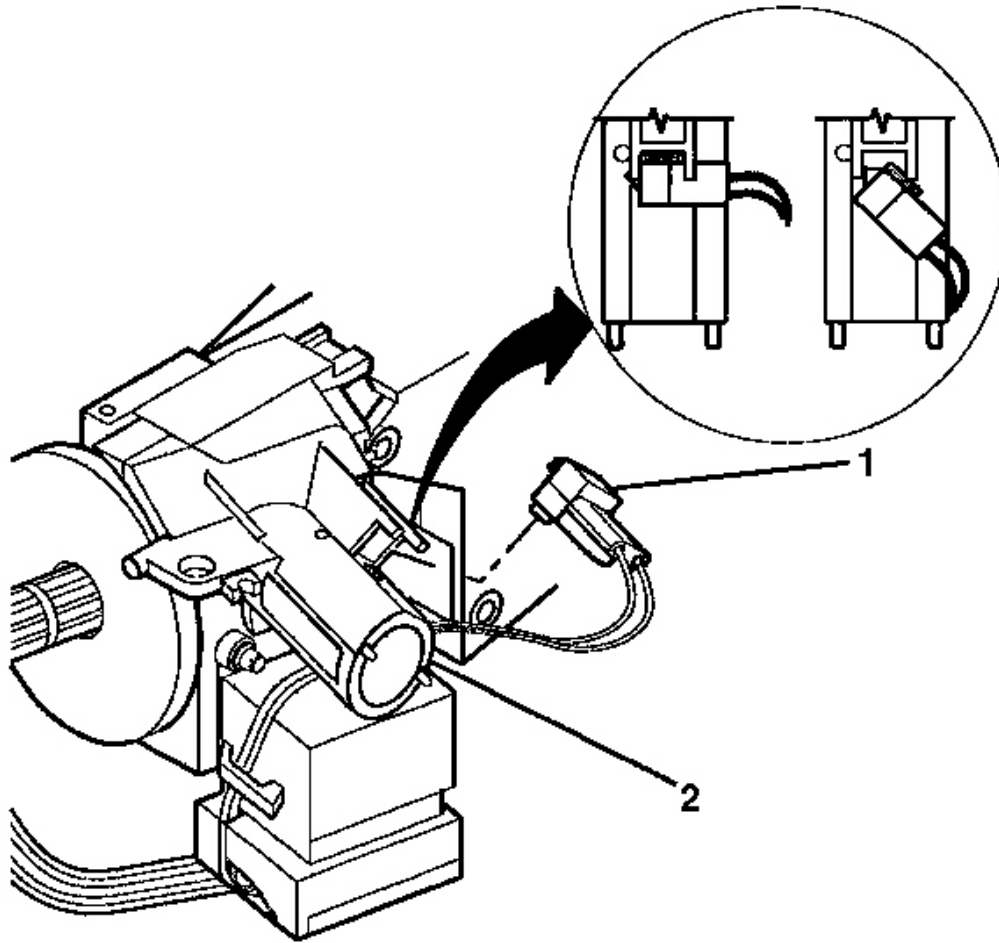
### **Removal Procedure**



**Fig. 102: Plastic Mounted Steering Column Bracket**  
Courtesy of GENERAL MOTORS CORP.

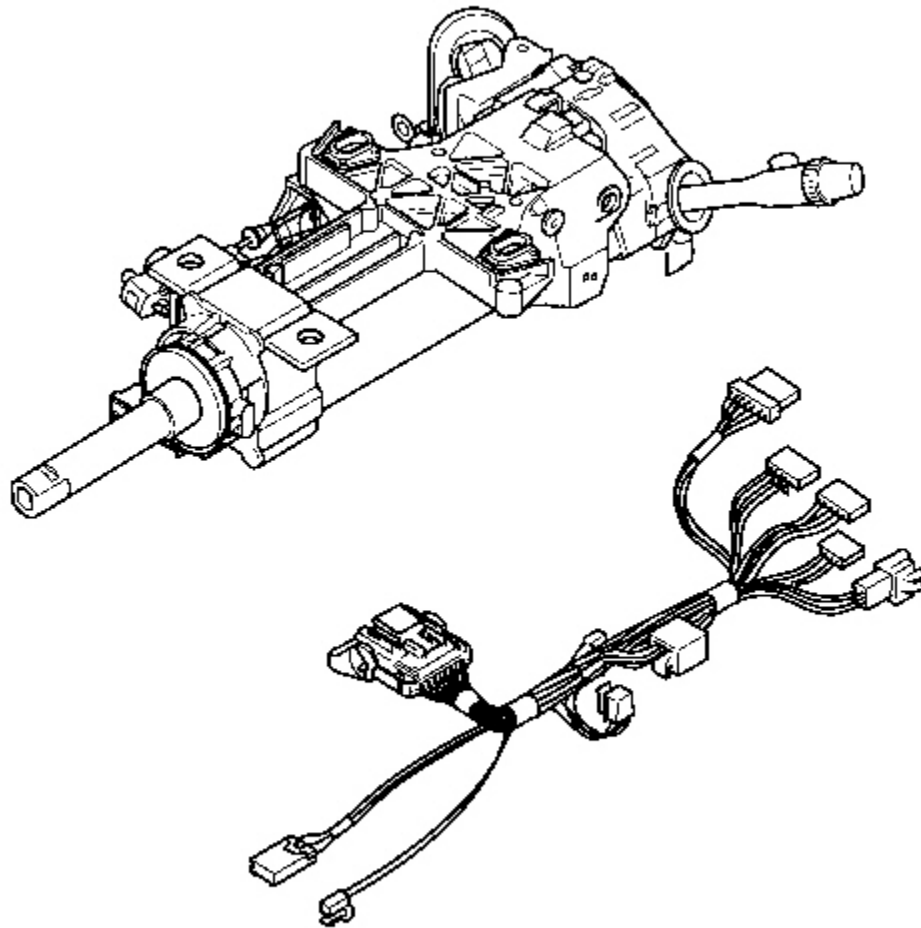
**CAUTION:** Refer to SIR Caution in Cautions and Notices.

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



**Fig. 103: Removing Key Alarm Connector From Ignition Lock Cylinder Case**  
Courtesy of GENERAL MOTORS CORP.

4. Remove the steering wheel theft deterrent lock. Refer to **Steering Wheel Theft Deterrent Lock Replacement** .
5. If equipped, remove the theft deterrent control module.
6. Rotate the key alarm connector (1) 90 degrees.
7. Gently pull the key alarm connector (1) out of the ignition lock cylinder case assembly (2).
8. Disconnect the connector from the ignition switch assembly.
9. Remove the wires encased in the ignition switch clip, which is located on the side of the ignition switch.

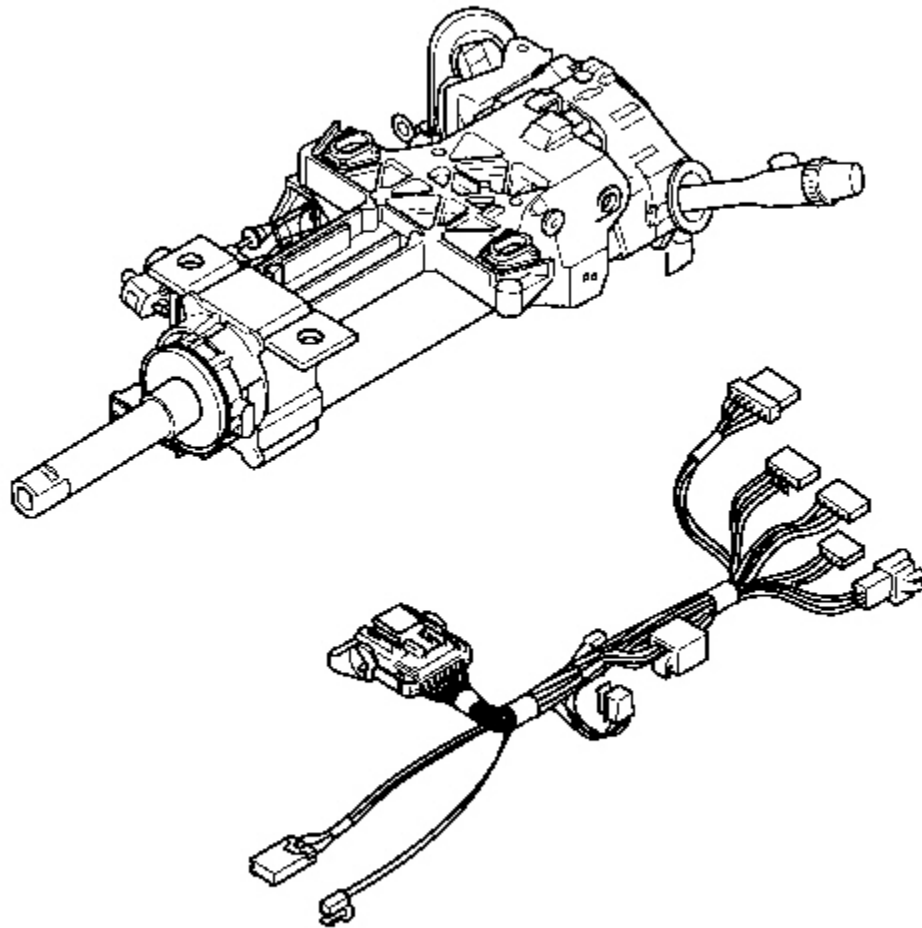


**Fig. 104: Connectors & Wire Harness Assembly**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** If the steering wheel has steering wheel controls, the inflatable restraint steering wheel module coil and the wire harness assembly must come off as one piece. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement (Coil) in SIR.

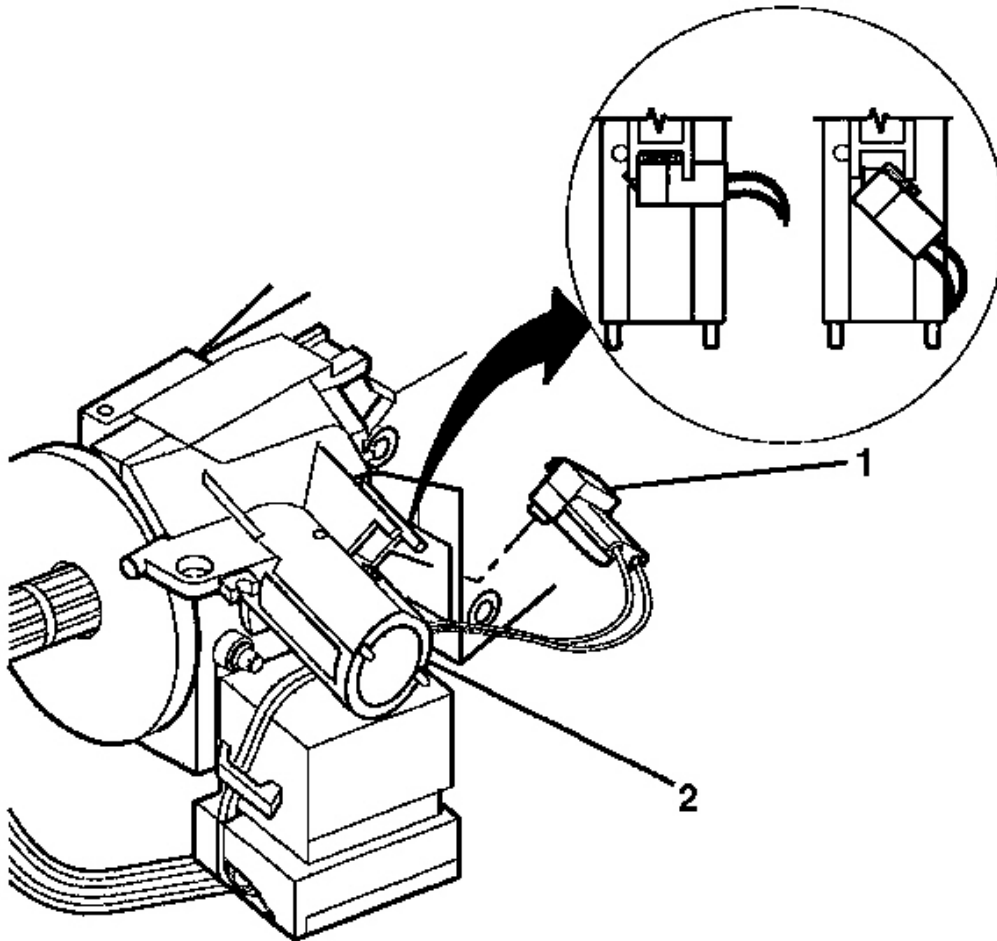
10. Disconnect all connectors attached to the wire harness assembly.

#### Installation Procedure



**Fig. 105: Connectors & Wire Harness Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. If the steering wheel has steering wheel controls, install the SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement (Coil)** in SIR.
2. Connect all of the connectors from the new wire harness assembly.

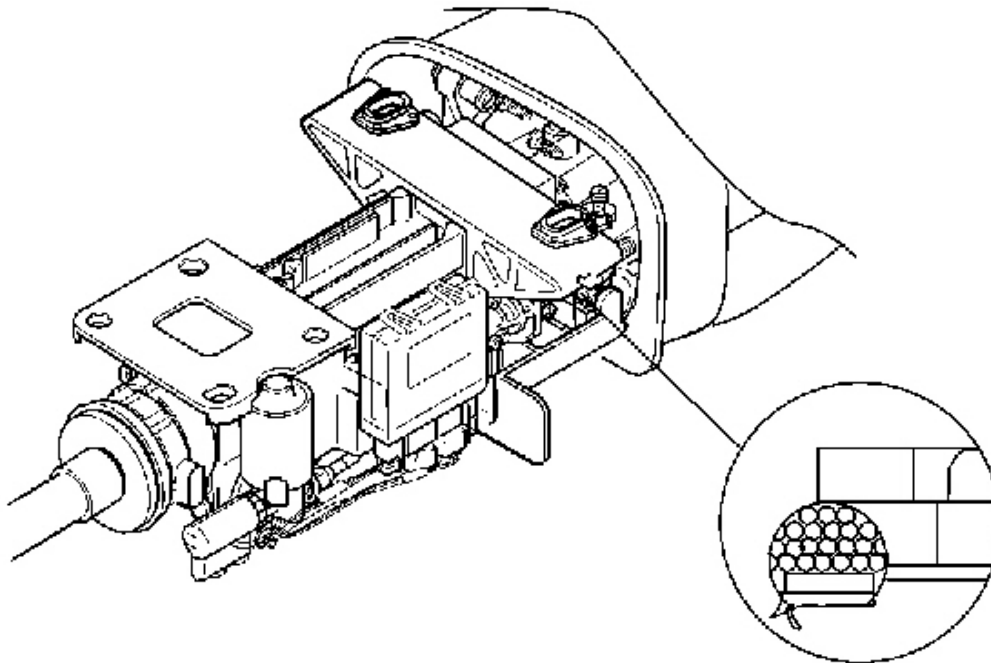


**Fig. 106: Removing Key Alarm Connector From Ignition Lock Cylinder Case**  
Courtesy of GENERAL MOTORS CORP.

3. Push the key alarm connector (1) into the ignition lock cylinder case assembly (2).
4. Rotate the key alarm connector (1) 90 degrees so that the key alarm connector (1) locks into place.
5. Install the steering wheel theft deterrent lock. Refer to **Steering Wheel Theft Deterrent Lock Replacement** .
6. If equipped, install the theft deterrent control module.

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

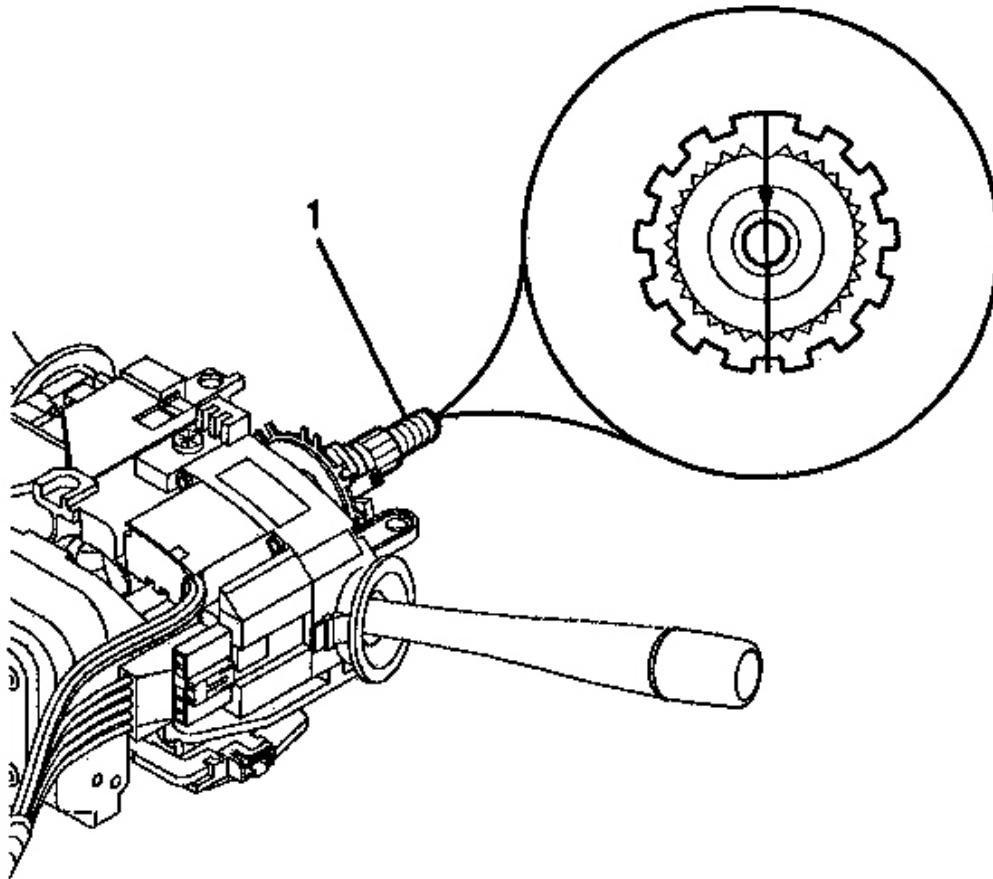
7. Install the wires back into the ignition switch clip, located on the side of the ignition switch.



**Fig. 107: Plastic Mounted Steering Column Bracket**  
Courtesy of GENERAL MOTORS CORP.

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

## **INFLATABLE RESTRAINT STEERING WHEEL MODULE COIL CENTERING**

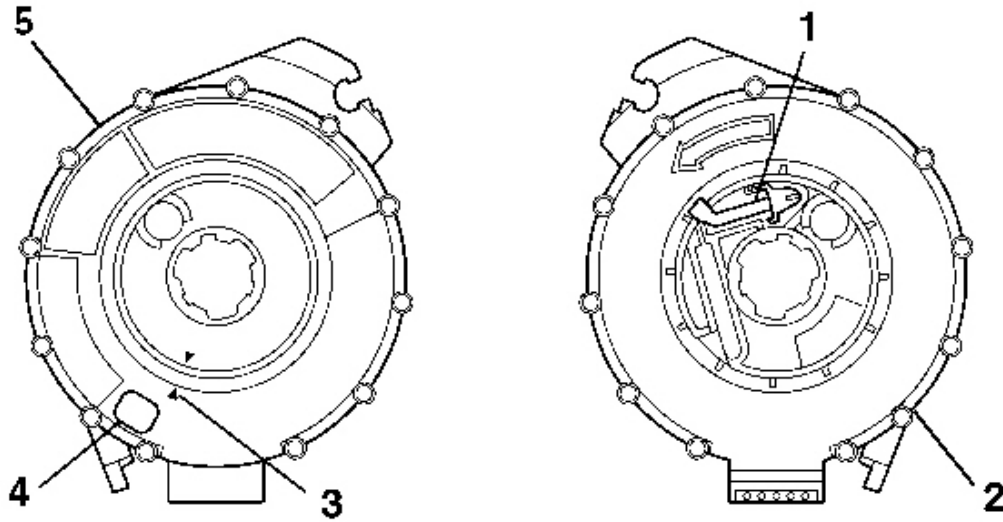


**Fig. 108: Block Tooth Of Steering Shaft Assembly In 12 O'clock Position**  
Courtesy of GENERAL MOTORS CORP.

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

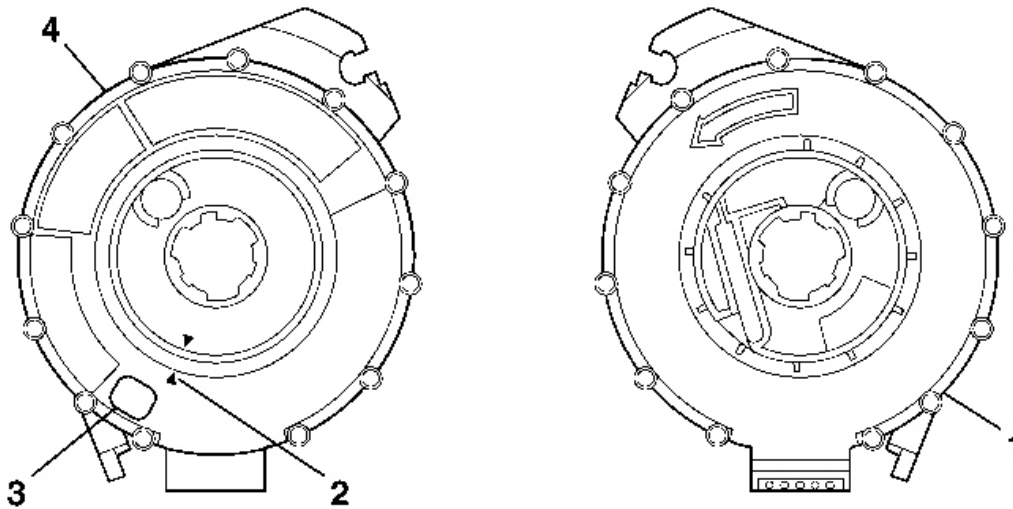
1. Verify the following before centering the inflatable restraint steering wheel module coil:
  - The wheels on the vehicle are straight ahead.
  - The block tooth (1) of the steering shaft assembly is in the 12 o'clock position.
  - The ignition switch is in the LOCK position.





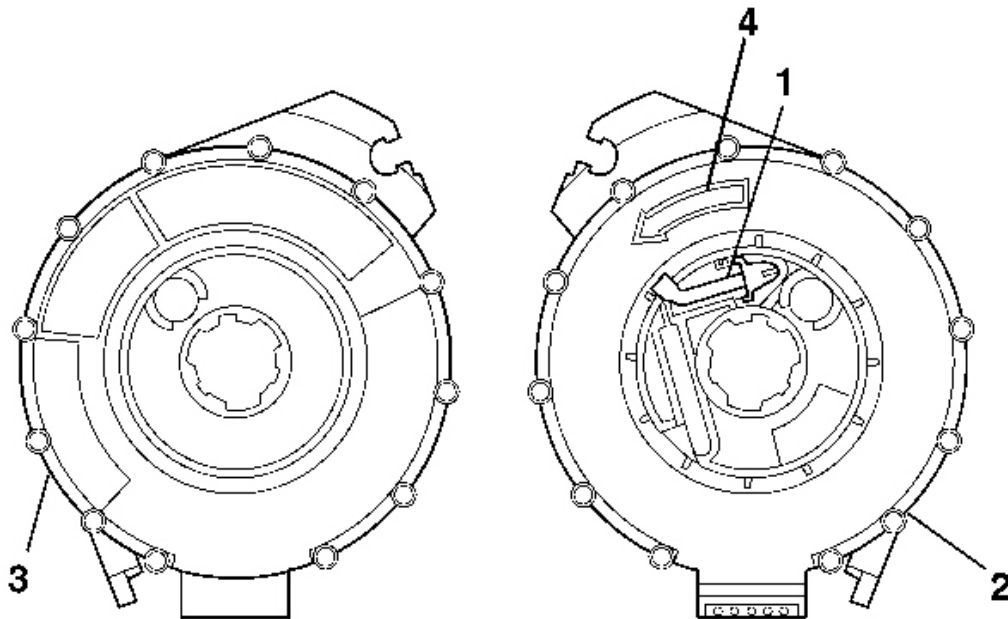
**Fig. 109: Front & Rear Of Inflatable Restraint Steering Wheel Module Coil**  
 Courtesy of GENERAL MOTORS CORP.

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



**Fig. 110: Centering SIR Coil (Without Spring Service Lock)**  
**Courtesy of GENERAL MOTORS CORP.**

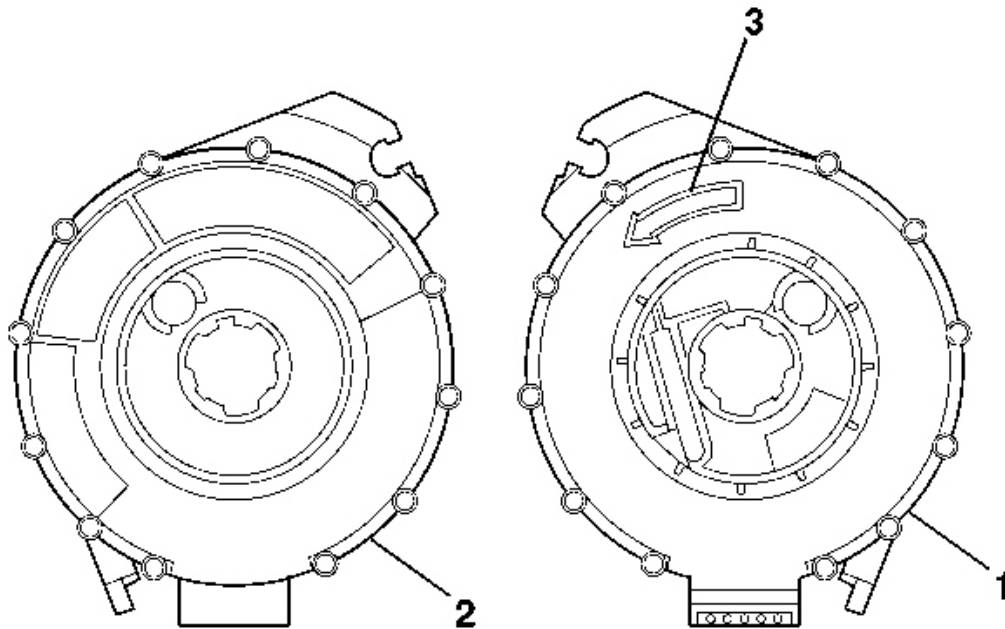
3. If the front (4) of the inflatable restraint steering wheel module coil has a centering window (3) and no spring service lock on the back side (1), perform the following steps:
  1. Hold the inflatable restraint steering wheel module coil with the face up.
  2. Rotate the coil hub clockwise until 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 inflatable restraint steering wheel module coil with the horn tower and slide onto the steering shaft assembly.



**Fig. 111: Inflatable Restraint Steering Wheel Module Coil (Without Centering Window On Front Side)**

**Courtesy of GENERAL MOTORS CORP.**

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



**Fig. 112: SIR Coil (Without Centering Window & Without Spring Service Lock)**  
 Courtesy of GENERAL MOTORS CORP.

5. For no centering window on the front side (2) of the inflatable restraint steering wheel module coil and no spring service lock on the back side (1), perform the following steps:
  1. Hold the inflatable restraint steering wheel module 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 1/2 revolutions. This is the CENTER position.
  4. While maintaining the coil hub in the CENTER position, align the centered inflatable restraint steering wheel module coil with the horn tower and slide onto the steering shaft assembly.

## **DESCRIPTION AND OPERATION**

### **STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION**

The steering wheel and column has 4 primary functions:

- Vehicle steering
- Vehicle security
- Driver convenience

- Driver safety

## **Vehicle Steering**

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

## **Vehicle Security (Some Vehicle Models)**

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

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

## **Driver Convenience**

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

- The turn signal switch
- The hazard switch
- The headlamp dimmer switch
- The wiper/washer switch
- The horn pad/cruise control switch
- The redundant radio/entertainment system controls
- The tilt or tilt/telescoping functions
- The navigation/OnStar(R) features
- The HVAC controls

## **Driver Safety**

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

## **Ignition Lock Cylinder Control Actuator**

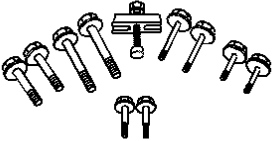
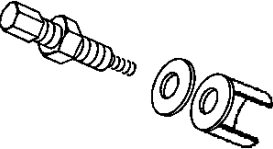
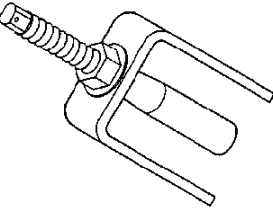
If the vehicle is equipped with a floor mounted console gear shifter, it has a ignition lock cylinder control actuator system in the steering column as an added safety feature. The ignition lock cylinder control actuator's purpose is to prevent the steering wheel from being locked when the transmission is in gear and the vehicle may still be moving. The column ignition lock system consists of a ignition lock cylinder control actuator, and a park

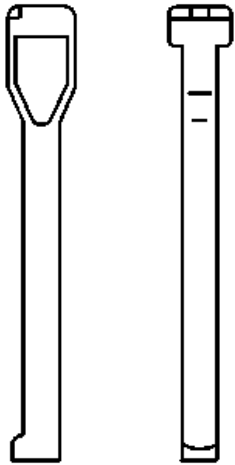
position switch that is located in the A/T shift lock control switch. The ignition lock cylinder control actuator contains a pin that is spring loaded out to mechanically prevent the ignition key cylinder from being turned to the lock position when vehicle transmission is not in the Park position. If vehicle power is lost, and/or the transmission is not in the Park position the operator will not be able to turn the ignition key to the lock position and will not be able to remove the ignition key from the column.

## SPECIAL TOOLS AND EQUIPMENT

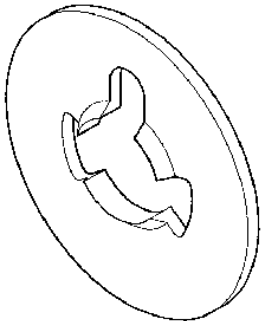
### SPECIAL TOOLS

#### Special Tools

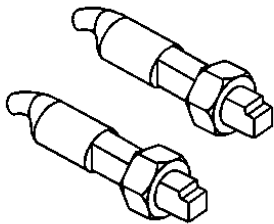
Illustration	Tool Number/Description
	J 1859-A Steering Wheel Puller
	J 21854-01 Pivot Pin Remover
	J 23653-SIR Steering Column Lock Plate Compressor



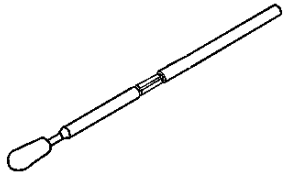
J 36541-A  
Steering Wheel Puller Adapter



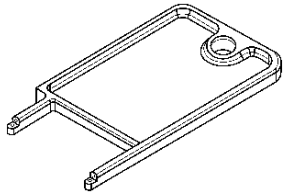
J 42137  
Steering Column Lock Plate Compressor Adapter



J 42578  
Steering Wheel Puller Legs



J 42640  
Steering Column Anti-Rotation Pin



J 42759  
Ignition Switch Connector Release Tool