

2008 STEERING

Steering Wheel and Column - LaCrosse

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Intermediate Shaft Seal Bolt	3 N.m	27 lb in
Linear Shift Assembly Screw	10 N.m	89 lb in
Lower Intermediate Shaft Pinch Bolt	48 N.m	35 lb ft
Shift Lever Screw	20 N.m	15 lb ft
Steering Column Bolt	25 N.m	18 lb ft
Steering Wheel Nut	41 N.m	30 lb ft
Turn Signal Multifunction Switch Screw	1 N.m	9 lb in
Upper Intermediate Shaft Pinch Bolt	48 N.m	35 lb ft

COMPONENT LOCATOR

STEERING COLUMN DISASSEMBLED VIEW (FLOOR SHIFT)

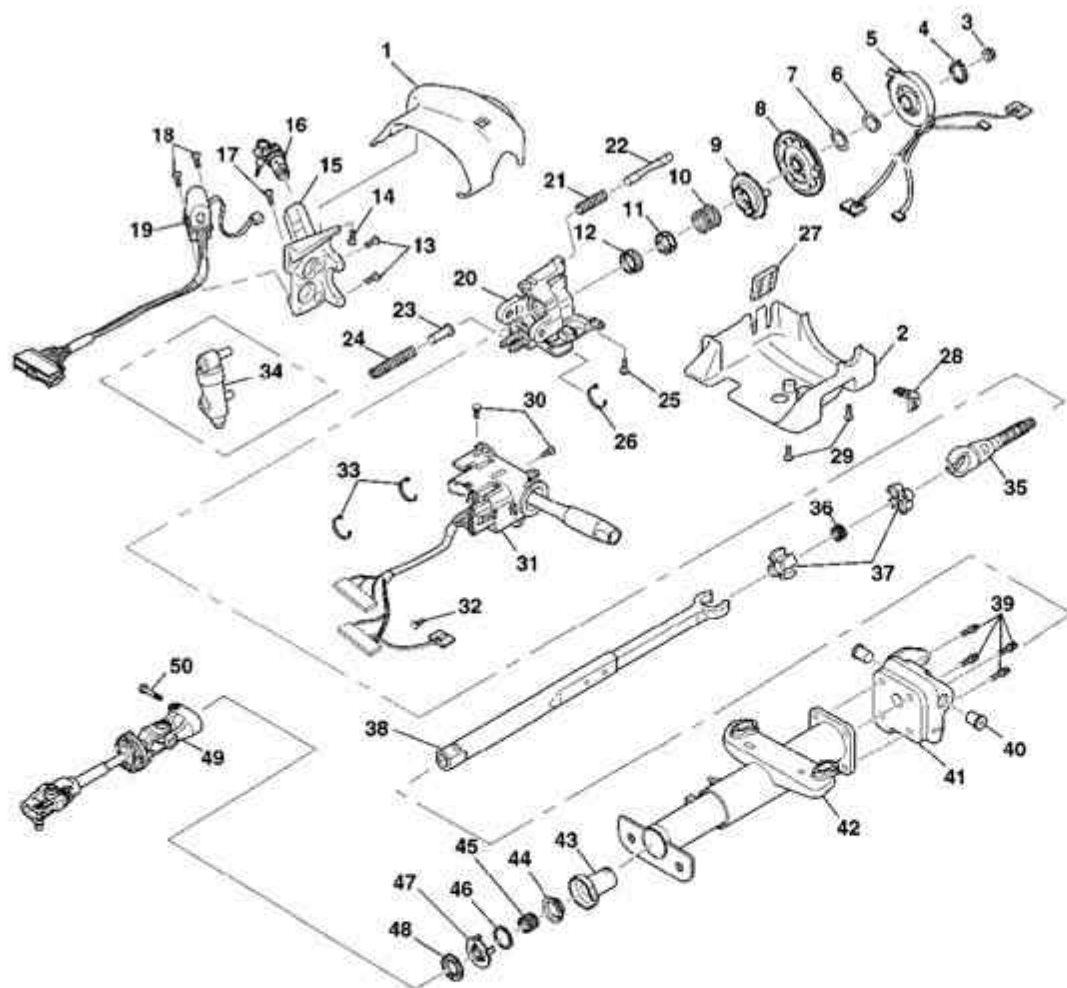


Fig. 1: Tilt Steering Column Disassembled View, Floor Shift
 Courtesy of GENERAL MOTORS CORP.

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Callout	Component Name
1	Upper Trim Cover
2	Lower Trim Cover
3	Flanged Prevailing Torque Nut
4	Retaining Ring
5	SIR Coil
6	Wave Washer
7	Bearing Retainer
8	Shaft Lock Shield Assembly
9	Turn Signal Cancel Cam Assembly
10	Upper Bearing Spring
11	Upper Bearing Inner Race Seat
12	Inner Race
13	Pan Head Tapping Screws
14	TORX® Head Screw
15	Ignition Lock Cylinder Case Assembly
16	Steering Column Lock Cylinder Set
17	Pan Head Tapping Screw
18	Tapping Screws
19	Ignition Switch Assembly
20	Steering Column Tilt Head Assembly
21	Lock Bolt Spring
22	Lock Bolt Assembly
23	Spring Guide
24	Tilt Spring
25	TORX® Head Screw
26	Wire Harness Strap
27	Trim Cover Protector
28	Tilt Knob
29	Pan Head Tapping Screws
30	Pan Head Tapping Screws
31	Turn Signal and Multifunction Switch Assembly
32	Position Assurance Connector
33	Wire Harness Straps
34	Steering Wheel Theft Deterrent Park Lock
35	Race and Upper Shaft Assembly
36	Joint Preload Spring
37	Centering Sphere
38	Lower Shaft Assembly
39	TORX® Head Screws
40	Pivot Pins
41	Steering Column Support Assembly
42	Steering Column Jacket Assembly
43	Adapter and Bearing Assembly
44	Lower Bearing Seat
45	Lower Bearing Spring
46	Lower Spring Retainer

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9	Turn Signal Cancel Cam Assembly
148	Upper Bearing Spring
149	Upper Bearing Steering Shaft Assembly
150	Inner Pin Bolt

STEERING COLUMN DISASSEMBLED VIEW (COLUMN SHIFT)

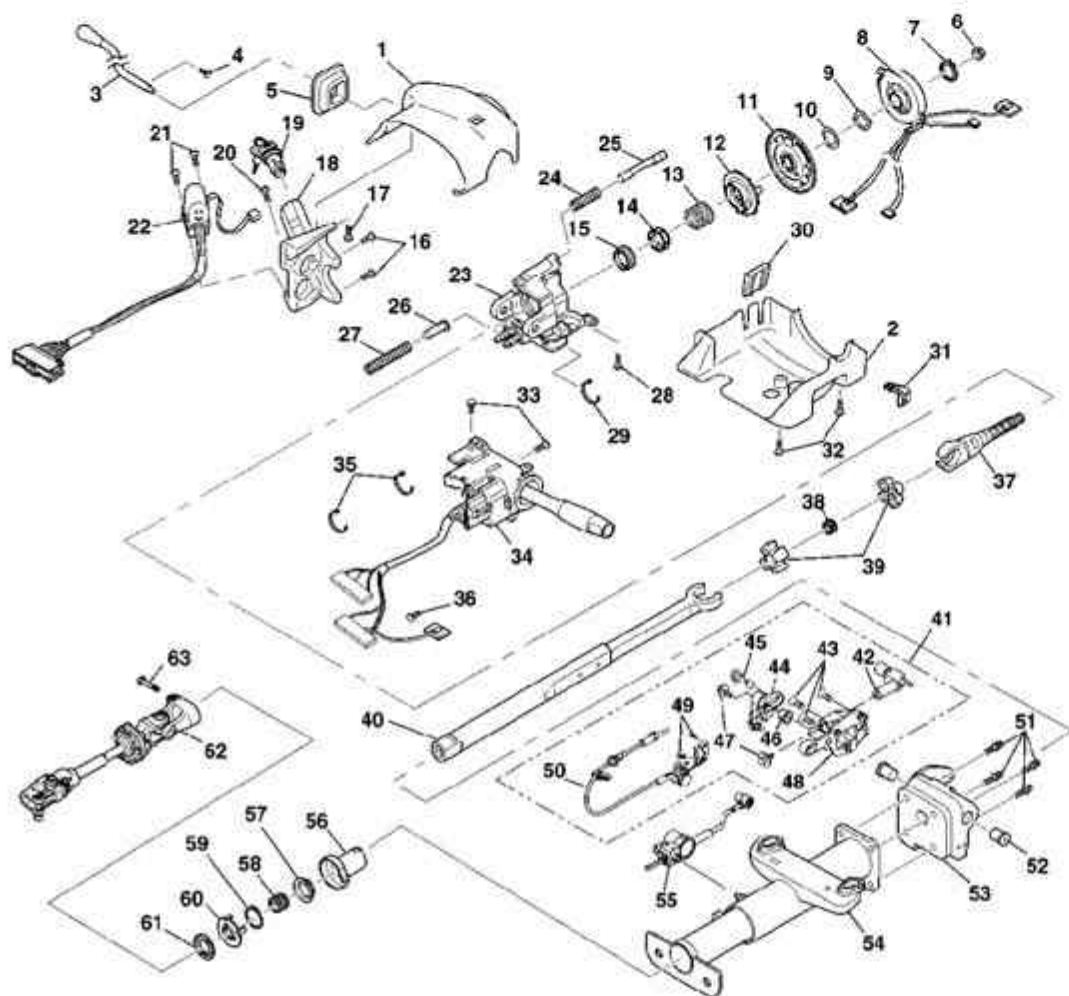


Fig. 2: Tilt Steering Column Disassembled View, Column Shift
Courtesy of GENERAL MOTORS CORP.

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

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14	Upper Bearing Inner Race Seat
15	Inner Race
16	Pan Head Tapping Screws
17	TORX® Head Screw
18	Ignition Lock Cylinder Case Assembly
19	Steering Column Lock Cylinder Set
20	Pan Head Tapping Screw
21	Tapping Screws
22	Ignition Switch Assembly
23	Steering Column Tilt Head Housing Assembly
24	Lock Bolt Spring
25	Lock Bolt Assembly
26	Spring Guide
27	Tilt Spring
28	TORX® Head Screw
29	Wire Harness Strap
30	Trim Cover Protector
31	Tilt Knob
32	TORX® Head Screws
33	Pan Head Tapping Screws
34	Turn Signal and Multifunction Switch Assembly
35	Wire Harness Straps
36	Position Assurance Connector
37	Race and Upper Shaft Assembly
38	Joint Preload Spring
39	Centering Sphere
40	Lower Steering Shaft Assembly
41	Linear Shift Assembly
42	Shift Lever Clevis
43	Flat Head 6-Lobed Soc Tap Screws
44	Cable Shift Cam Assembly
45	Ball and Actuator Assembly
46	Cam Bushing
47	Hexagon Flange Head Bolts
48	Gear Shift Lever Assembly Support Bracket
49	Oval Head 6-Lobed Soc Tap Screws
50	Park Lock Cable System
51	TORX® Head Screws
52	Pivot Pins
53	Steering Column Support Assembly
54	Steering Column Jacket Assembly
55	Automatic Transmission Shift Lock Control
56	Adapter and Bearing Assembly
57	Lower Bearing Seat
58	Lower Bearing Spring
59	Lower Spring Retainer
60	Retainer

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Callout	Steering Shaft Seal	Component Name
162	Upper Tie Rod End	Steering Shaft Assembly
263	Lower Tie Rod End	Pinch Bolt Cover

DIAGNOSTIC INFORMATION AND PROCEDURES**DIAGNOSTIC STARTING POINT - STEERING COLUMN**

Begin the system diagnosis by reviewing the system Description and Operation. Refer to **Steering Wheel and Column Description and Operation**. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Steering Wheel and Column** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - STEERING WHEEL AND COLUMN

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

Visual/Physical Inspection

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

Symptoms List

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

- **Ignition Key Cannot Be Removed from the Ignition Lock Cylinder**
- **Ignition Key Cannot Turn or Sticks in Any Position**
- **Noise in Steering Column**
- **Looseness in Steering Column**
- **Steering Column Tilt Function Inoperative**
- **Ignition Can/Cannot Be Turned Off with Transmission in Any Gear**

STEERING COLUMN TILT FUNCTION INOPERATIVE

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that the steering column tilt function is inoperative. Does the steering column tilt function operate normally?	System OK	Go to Step 3
3	Verify that the following components are not seized or corroded: • Tilt pivot pins		

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	Tilt head lock shoes		
	Are the components seized or corroded?	Go to Step 7	Go to Step 4
4	Inspect the tilt pivot pins for binding. Are the tilt pivot pins binding?	Go to Step 8	Go to Step 5
5	Inspect for a weak or broken steering column tilt spring. Is the steering column tilt spring weak or broken?	Go to Step 9	Go to Step 6
6	Inspect the steering column wiring harness routing for tightness. Was the steering column wiring harness routed correctly?	Go to Step 11	Go to Step 10
7	Replace the steering column. Refer to <u>Steering Column Replacement</u> . Did you complete the repair?	Go to Step 11	-
8	If serviceable, replace the pivot pins. If not serviceable replace the steering column. Refer to <u>Steering Column Replacement</u> . Did you complete the repair?	Go to Step 11	-
9	Replace the tilt spring. Did you complete the repair?	Go to Step 11	-
10	Route the steering column wiring harness to the correct location. Did you correctly rout the wiring harness?	Go to Step 11	-
11	Operate the steering column tilt function in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

NOISE IN STEERING COLUMN

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and perform the necessary inspections?	Go to Step 2	Go to <u>Steering Wheel and Column Description and Operation</u>
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation?	Go to Step 3	System OK
3	Inspect the steering column mounting features for the following conditions: - Steering column mounting fasteners for looseness - Steering column mounting features are sheared Are the steering column mounting features loose?	Go to Step 9	Go to Step 4
4	Inspect the SIR/SRS coil for noise. Is the SIR/SRS coil noisy?	Go to Step 10	Go to Step 5
5	Inspect the lock plate retaining ring for correct installation. Is the lock plate retaining ring installed incorrectly?	Go to Step 11	Go to Step 6

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6	Inspect the steering column upper and lower bearings for the following conditions: • Damage • Lubrication • Wear • Proper seating Are the bearings in need of repair or replacement?	Go to Step 12	Go to Step 7
7	Inspect the tilt joint for lubrication, if equipped. Is the tilt joint lubricated?	Go to Step 13	Go to Step 8
8	IMPORTANT: This is best evaluated while driving the vehicle, turning the steering and applying the brake pedal. Inspect the steering column intermediate shaft for noise. Is the steering column intermediate shaft noisy?	Go to Step 14	Go to Step 15
9	IMPORTANT: If the steering column mounting feature is damaged or sheared, the steering column will need to be replaced. Refer to <u>Steering Column Replacement</u>. Tighten the steering column mounting fastener to specifications. Refer to <u>Fastener Tightening Specifications</u>. Did you complete the repair?	Go to Step 15	-
10	Replace the SIR/SRS coil. Refer to <u>Inflatable Restraint Steering Wheel Module Replacement</u>. Did you complete the repair?	Go to Step 15	-
11	Install the lock plate retaining ring correctly. Did you complete the repair?	Go to Step 15	-
12	IMPORTANT: If the steering column upper and/or lower bearings are not serviceable, the steering column will need to be replaced. Refer to <u>Steering Column Replacement</u>. Replace the upper and/or lower bearings, if serviceable. Did you complete the replacement?	Go to Step 15	-
13	Lubricate the tilt joint. Did you complete the repair?	Go to Step 15	-
14	Replace the appropriate steering intermediate shaft component. Did you complete the repair?	Go to Step 15	-
15	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

LOOSENESS IN STEERING COLUMN

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?		Go to <u>Steering Wheel and Column</u>

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		Go to Step 2	Description and Operation
2	Verify that the steering column is loose. Is the steering column loose?	Go to Step 3	System OK
3	Inspect the steering column mounting features for the following conditions. - Steering column mounting fasteners for looseness - Steering column mounting features are sheared Are the steering column mounting features loose?	Go to Step 5	Go to Step 4
4	Inspect the upper and/or lower bearings for looseness. Are any of the bearings worn or loose?	Go to Step 7	Go to Step 8
5	IMPORTANT: If the steering column mounting feature is damaged or sheared, the steering column will need to be replaced. Refer to Steering Column Replacement . Tighten the steering column mounting fastener to specifications. Refer to Fastener Tightening Specifications . Did you complete the repair?	Go to Step 8	-
6	Replace the steering column. Refer to Steering Column Replacement . Did you complete the replacement?	Go to Step 8	-
7	IMPORTANT: If the steering column upper and/or lower bearings are not serviceable, the steering column will need to be replaced. Refer to Steering Column Replacement . Replace the upper and/or lower bearings, if serviceable. Did you complete the repair?	Go to Step 8	-
8	Operate the steering column in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

REPAIR INSTRUCTIONS

INTERMEDIATE STEERING SHAFT SEAL REPLACEMENT

Removal Procedure

- Turn the ignition OFF and remove the key from the ignition lock cylinder in order to lock the steering column.
- Pull the intermediate shaft seal from the steering column.

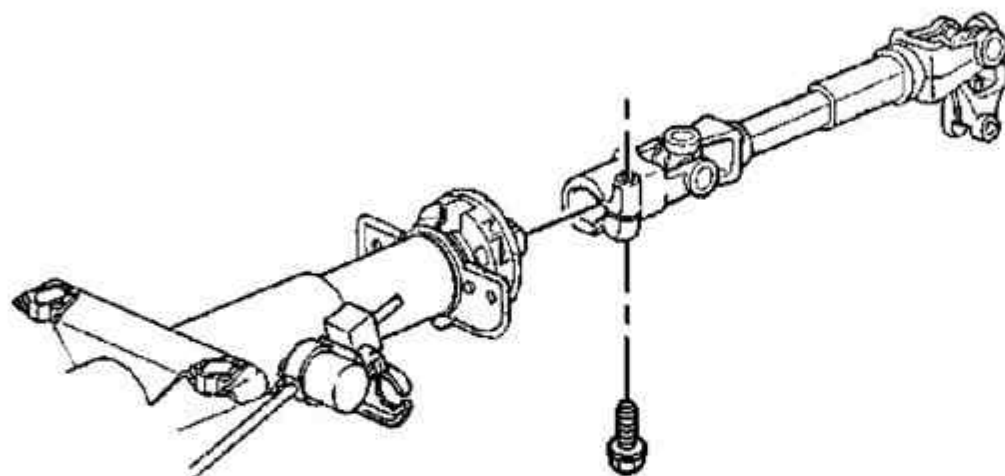


Fig. 3: View Of Upper Pinch Bolt Of Intermediate Steering Shaft
Courtesy of GENERAL MOTORS CORP.

3. Remove the Intermediate shaft pinch bolt from the intermediate shaft.
4. Disconnect the intermediate shaft from the steering column. Note the alignment for assembly.
5. Carefully lower the intermediate shaft.
6. Collapse the intermediate shaft in order to gain clearance.

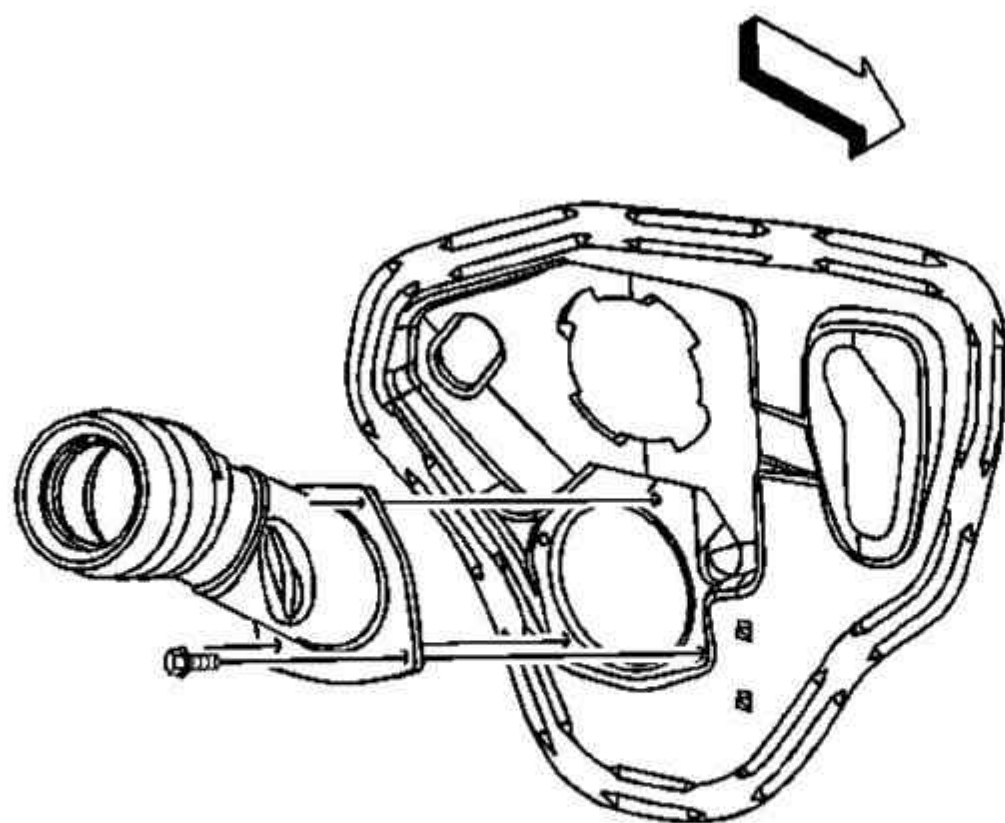


Fig. 4: View Of Intermediate Shaft Seal

Courtesy of **GENERAL MOTORS CORP.**

7. Cut back the insulation around the inner intermediate shaft seal in order to access the seal bolts.
8. Remove the intermediate shaft seal bolts.

IMPORTANT: The intermediate shaft does not need to be removed from the vehicle.

9. Remove the intermediate shaft seal from the inside of vehicle.

Installation Procedure

1. Install the intermediate shaft seal over the intermediate shaft from inside the vehicle.
2. Connect the intermediate shaft to the steering column as noted during removal.

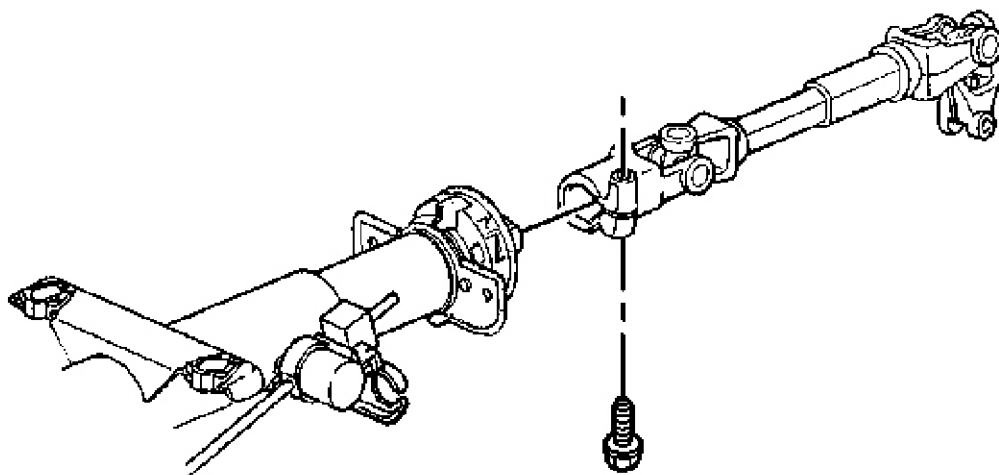


Fig. 5: View Of Upper Pinch Bolt Of Intermediate Steering Shaft
Courtesy of **GENERAL MOTORS CORP.**

NOTE: Refer to Fastener Notice .

3. Install the upper intermediate shaft pinch bolt.

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

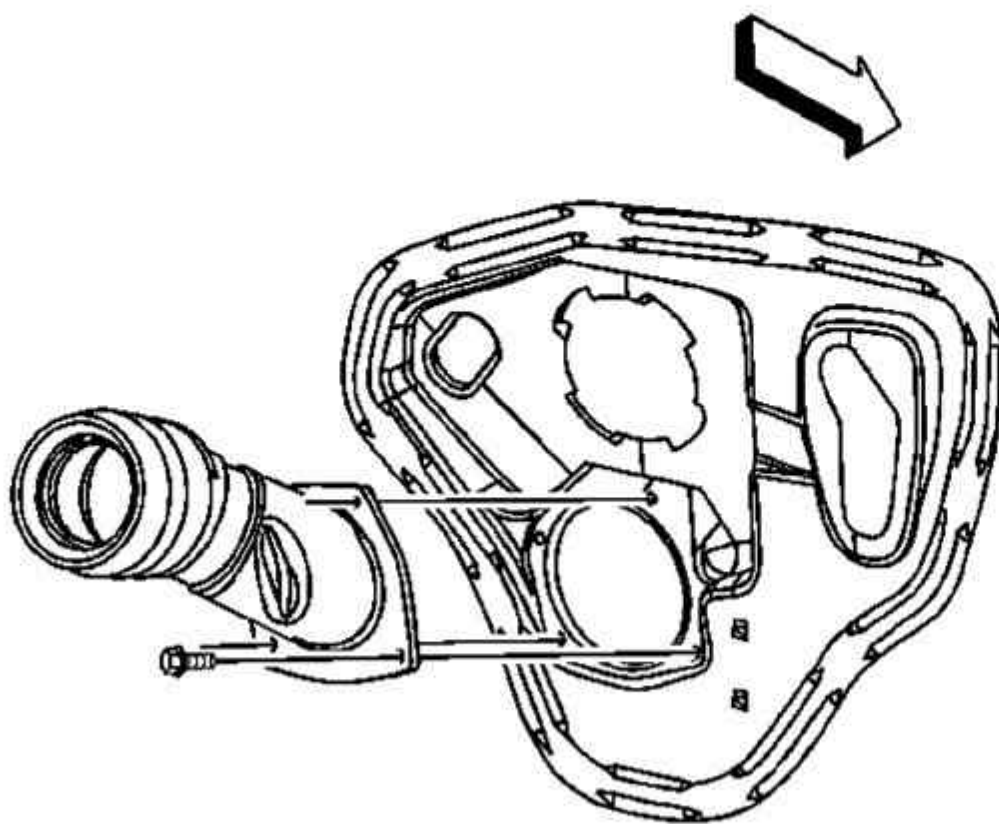


Fig. 6: View Of Intermediate Shaft Seal
Courtesy of GENERAL MOTORS CORP.

4. Install the intermediate shaft seal bolts.

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

5. Connect the intermediate shaft seal to the steering column.

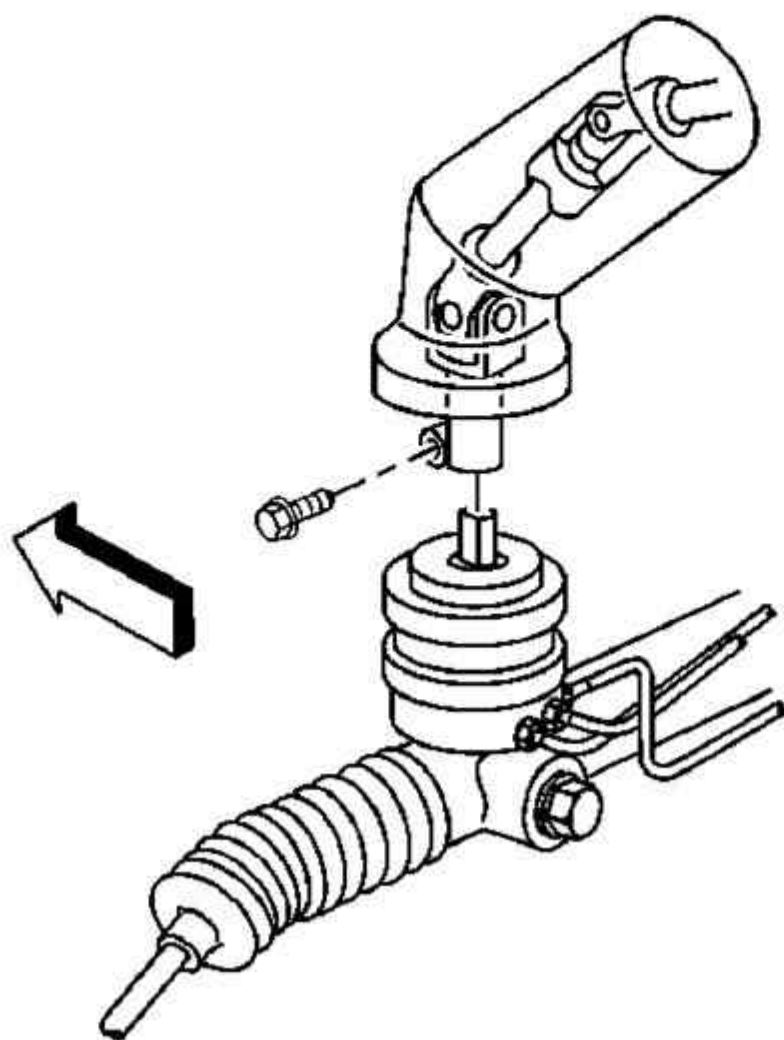


Fig. 7: View Of Lower Intermediate Shaft Seal To Steering Gear
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Rotate the lower seal in order to obtain proper shaft to seal clearance.

6. Connect the lower intermediate shaft seal to the steering gear.

INTERMEDIATE STEERING SHAFT REPLACEMENT

Tools Required

J 42640 Steering Column Lock Pin

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .

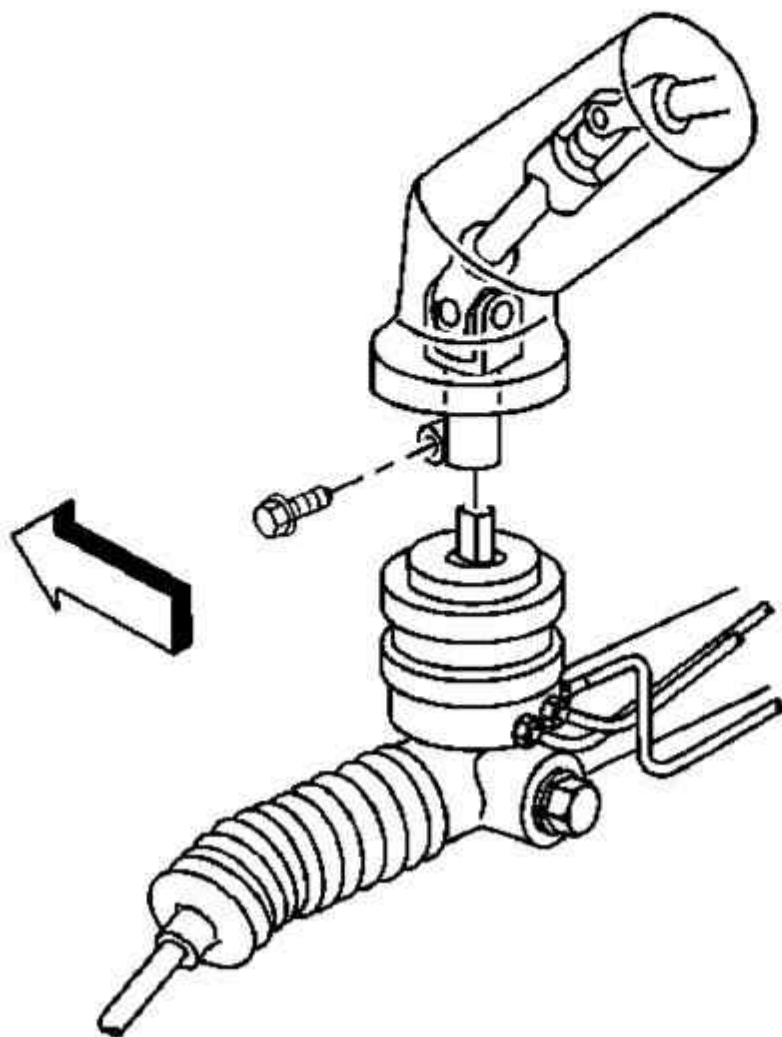


Fig. 8: View Of Lower Intermediate Shaft Seal To Steering Gear
Courtesy of GENERAL MOTORS CORP.

2. Position the seal in order to provide access to the lower pinch bolt on the intermediate steering shaft.
3. Remove the lower pinch bolt from the power steering gear stub shaft.

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.

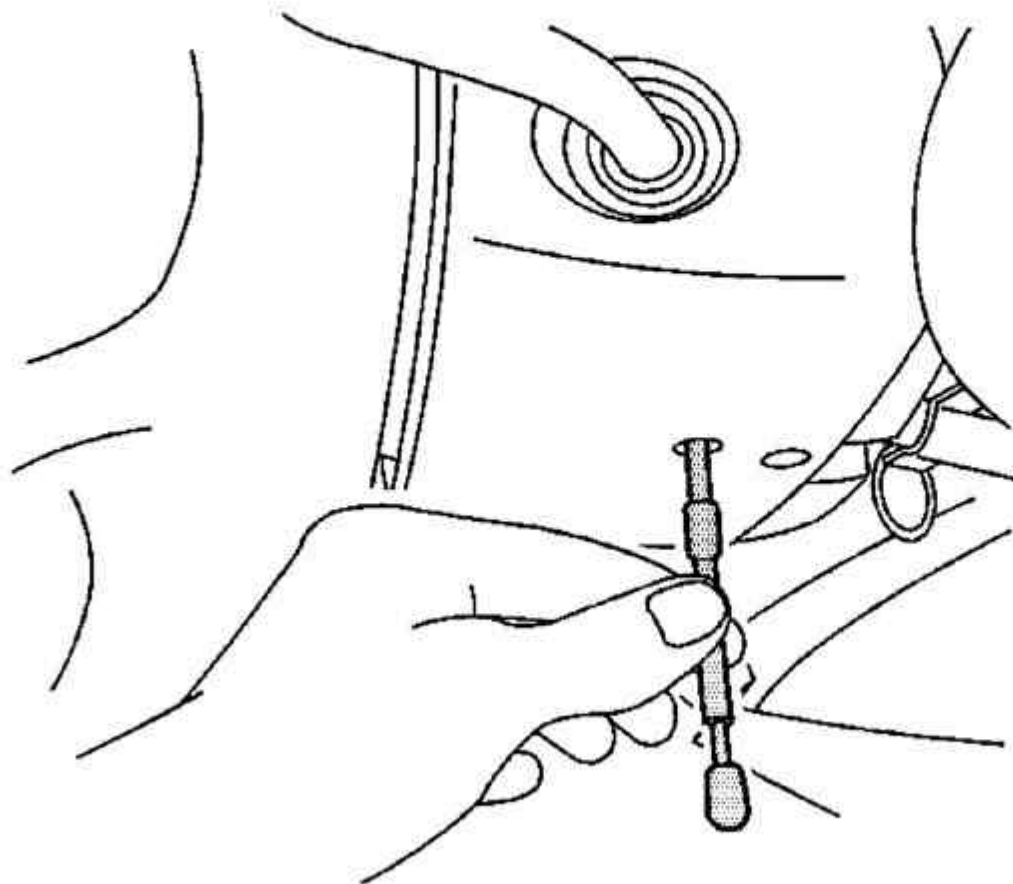


Fig. 9: Identifying Special Tool - J 42640
Courtesy of GENERAL MOTORS CORP.

4. Insert **J 42640** into the steering column access hole in order to lock the steering column. This will maintain the orientation.
5. Disconnect the intermediate steering shaft from the power steering gear stub shaft. Note the shaft to gear alignment for installation.
6. Lower the vehicle.

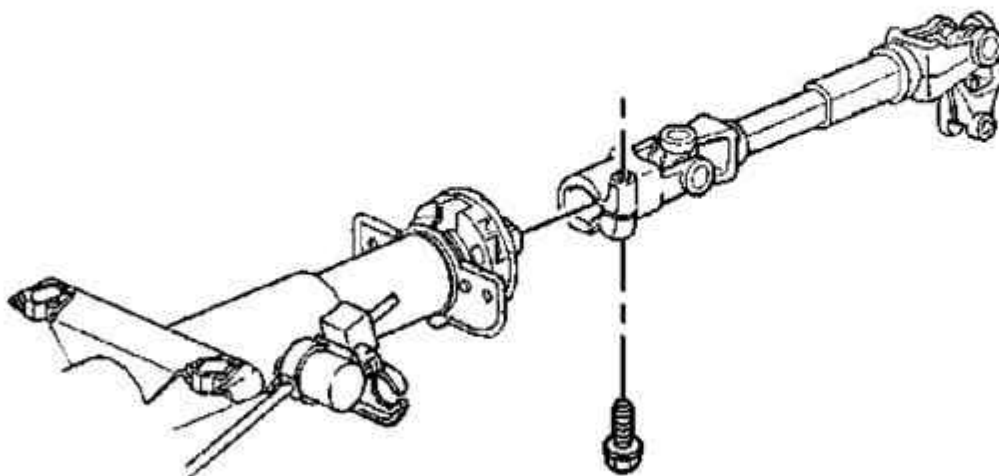


Fig. 10: View Of Upper Pinch Bolt Of Intermediate Steering Shaft
Courtesy of GENERAL MOTORS CORP.

7. Remove the upper pinch bolt from the intermediate steering shaft.
8. Disconnect the intermediate steering shaft from the steering column. Note the shaft to column alignment for installation.
9. Remove the intermediate steering shaft from the vehicle.

Installation Procedure

1. Position the intermediate steering shaft into the seal.

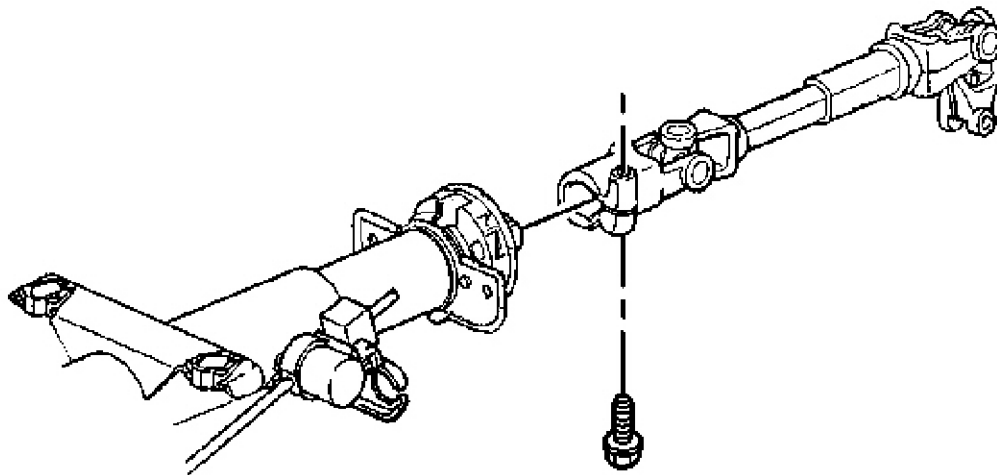


Fig. 11: View Of Upper Pinch Bolt Of Intermediate Steering Shaft
Courtesy of GENERAL MOTORS CORP.

2. Connect the intermediate shaft to the steering column as noted during removal.
3. Install the upper boot to the ridge around the intermediate shaft pass-through.

NOTE: Refer to Fastener Notice .

4. Install the upper intermediate steering shaft pinch bolt.

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

5. Connect the intermediate steering shaft seal onto the steering column.
6. Raise the vehicle.

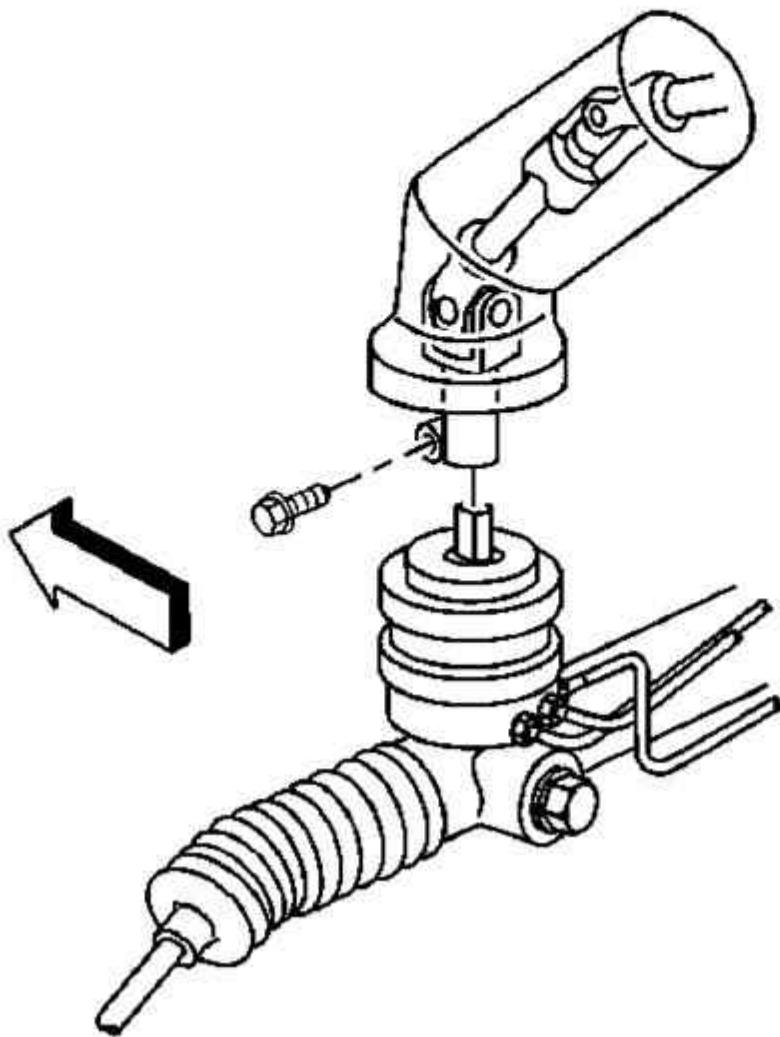


Fig. 12: View Of Lower Intermediate Shaft Seal To Steering Gear
Courtesy of GENERAL MOTORS CORP.

7. Connect the intermediate steering shaft to the power steering gear stub shaft as noted during removal.
8. Install the lower intermediate steering shaft pinch bolt.

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

9. Connect the intermediate steering shaft seal onto the power steering gear. Rotate the lower seal as necessary to gain maximum clearance.
10. Lower the vehicle.

STEERING COLUMN ACCIDENT DAMAGE INSPECTION

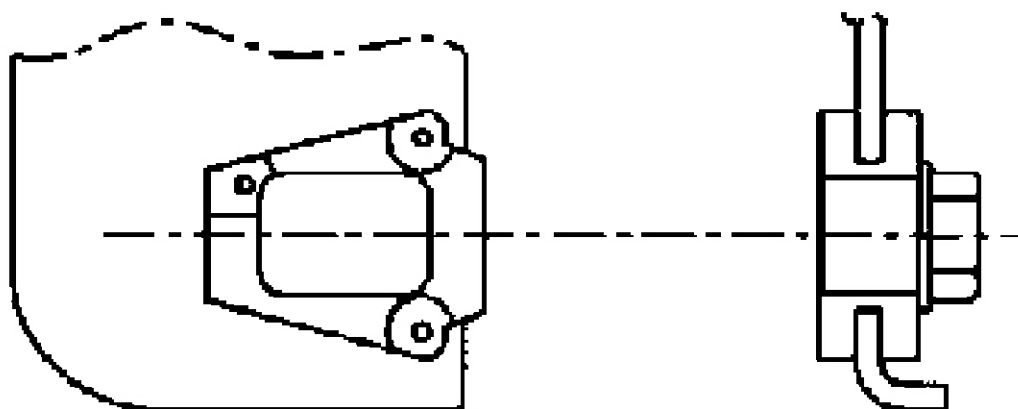


Fig. 13: Inspecting Capsules On Steering Column Bracket Assembly
 Courtesy of GENERAL MOTORS CORP.

NOTE: Vehicles involved in accidents that result in any of the following kinds of damage or situations, may also have a damaged or misaligned steering column:

- Frame damage
 - Major body damage
 - Sheet metal damage
 - If the steering column has been impacted
 - If the supplemental inflatable restraints system was deployed
- Inspect the capsules on the steering column bracket assembly. All capsules must be securely seated in the bracket slots and inspected for any loose conditions when pushed or pulled by hand.
 - Observe how the bracket is attached to the jacket assembly.
 - If the capsules are not securely seated and the bracket is bolted to the jacket assembly, replace only the bracket.
 - If the capsules are not securely seated and the bracket is welded to the jacket assembly, replace only the jacket assembly.

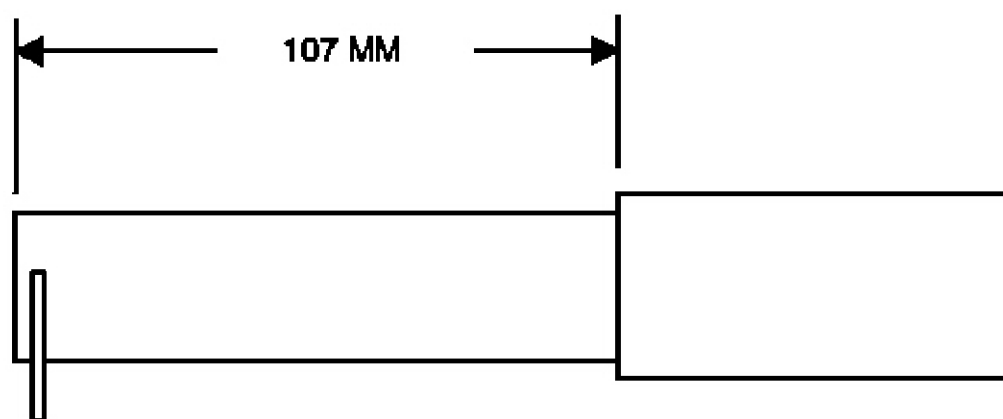


Fig. 14: Measuring Distance From Lower Edge Of Upper Jacket To A Defined Point On Lower Jacket

Courtesy of GENERAL MOTORS CORP.

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

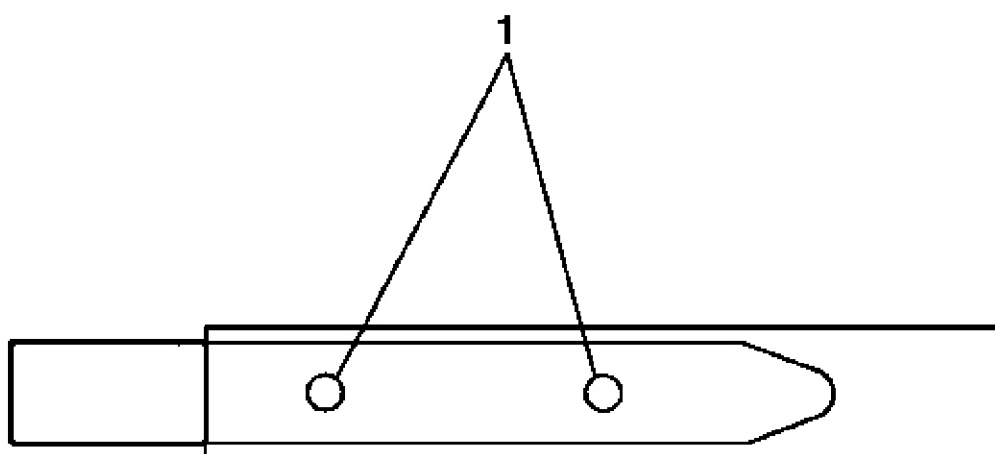


Fig. 15: Inspecting Steering Shaft For Sheared Injected Plastic
Courtesy of GENERAL MOTORS CORP.

- Visually inspect the steering shaft for sheared injected plastic (1). If the steering shaft shows sheared plastic (1), replace the steering shaft.
- Any frame damage that could cause a bent steering shaft must have the steering shaft runout checked. Using a dial indicator at the lower end of the steering shaft, rotate the steering wheel. The runout must not exceed 1.60 mm (0.06 in).

STEERING COLUMN TRIM COVERS REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR Caution .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .

CAUTION: Refer to BATTERY DISCONNECT CAUTION .

2. Disconnect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection (L26) or Battery Negative Cable Disconnection and Connection (LY7) or Battery Negative Cable Disconnection and Connection (LS4) .
3. Remove the steering wheel. Refer to Steering Wheel Replacement .
4. Remove the knee bolster. Refer to Driver Knee Bolster Replacement .
5. Remove the gap hider. Refer to Instrument Cluster Replacement .

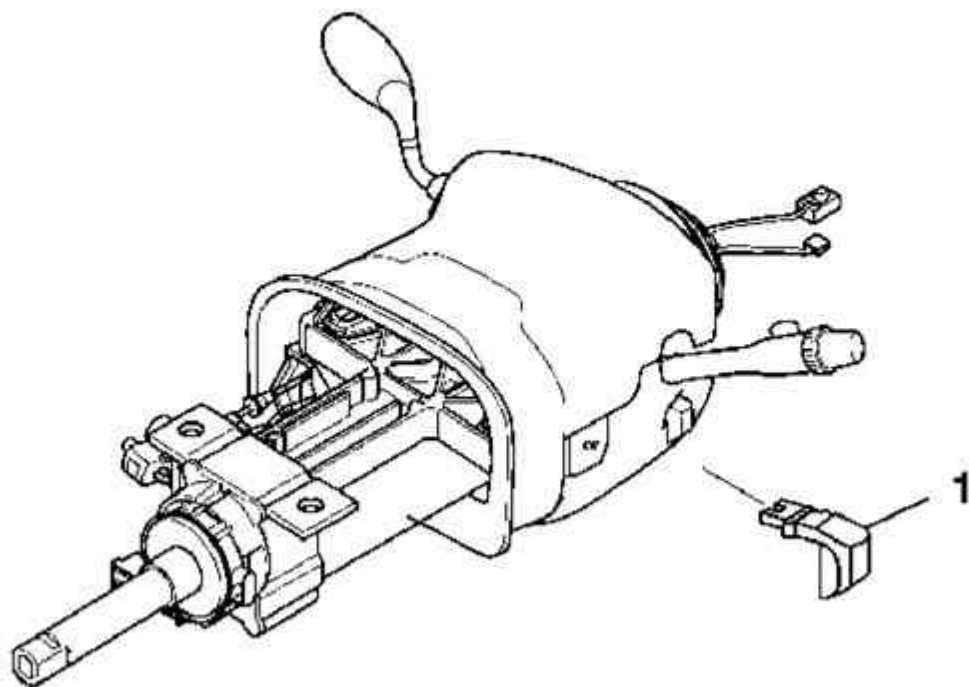


Fig. 16: View Of Tilt Lever

Courtesy of GENERAL MOTORS CORP.

6. Remove the tilt lever (1).

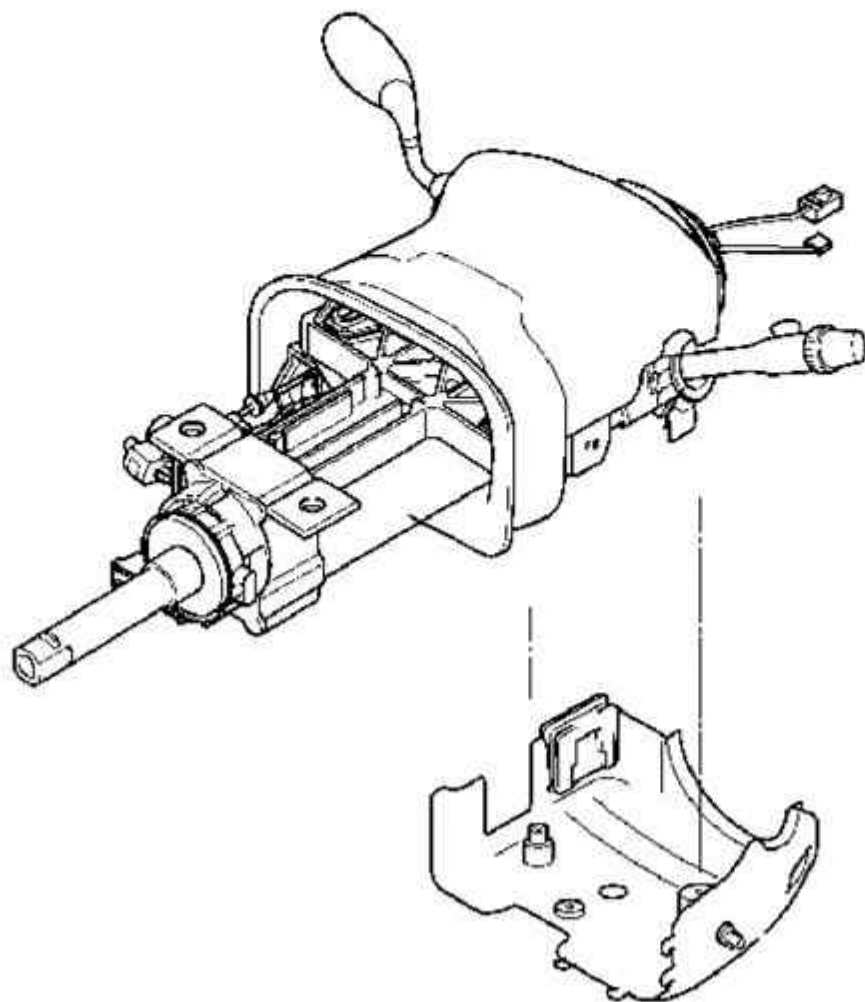


Fig. 17: View Of Lower Trim Cover
Courtesy of GENERAL MOTORS CORP.

7. Disconnect the closeout trim cover from the lower steering column trim cover.
8. Gently unsnap the lower trim cover from the upper trim cover.

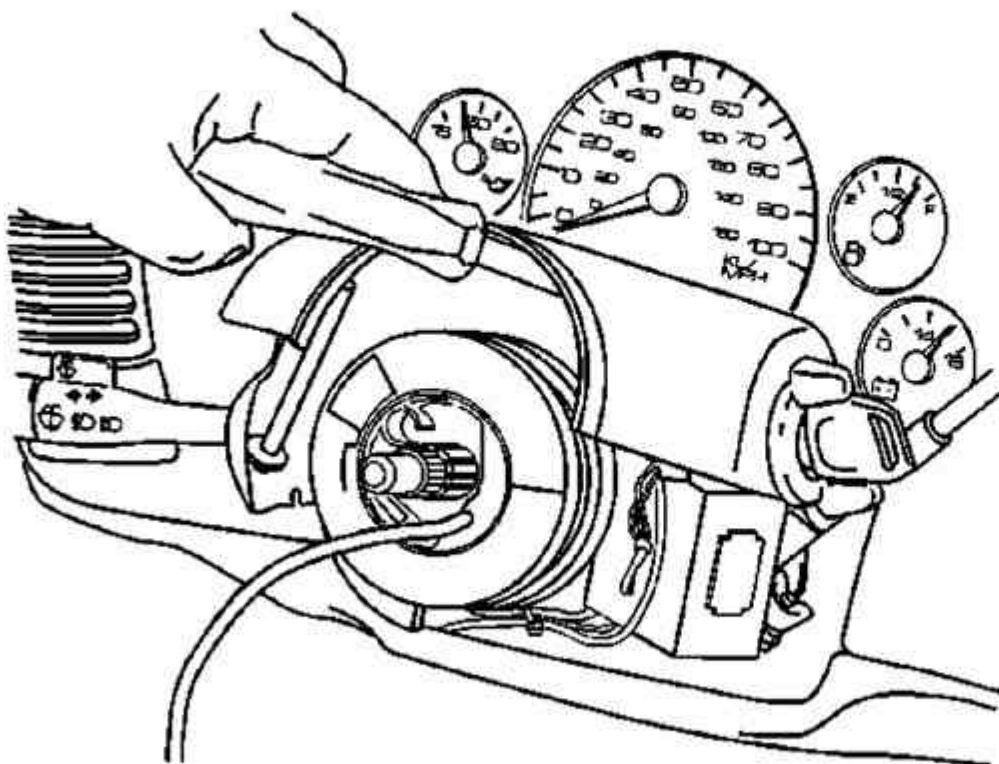


Fig. 18: View of Lock Cylinder Access Hole
Courtesy of GENERAL MOTORS CORP.

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

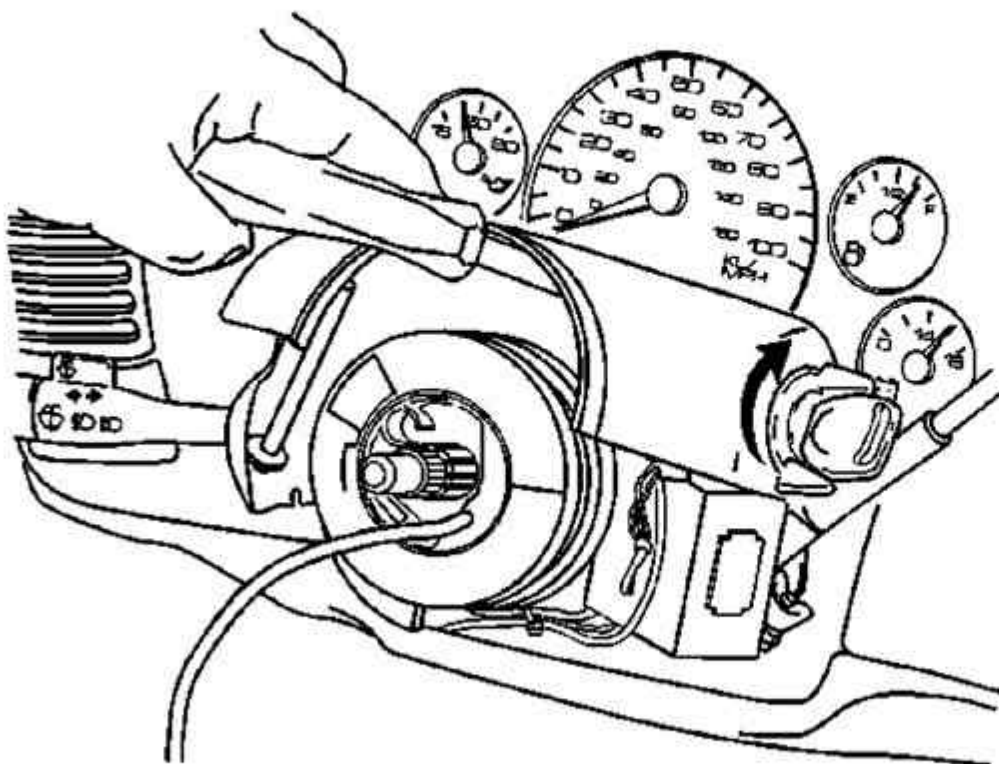


Fig. 19: View of Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

11. Turn the ignition lock cylinder to the START position.
12. Using the bent tip awl push down on the retaining pin of the ignition lock cylinder.
13. Release the ignition lock cylinder to the RUN position and remove the lock cylinder.

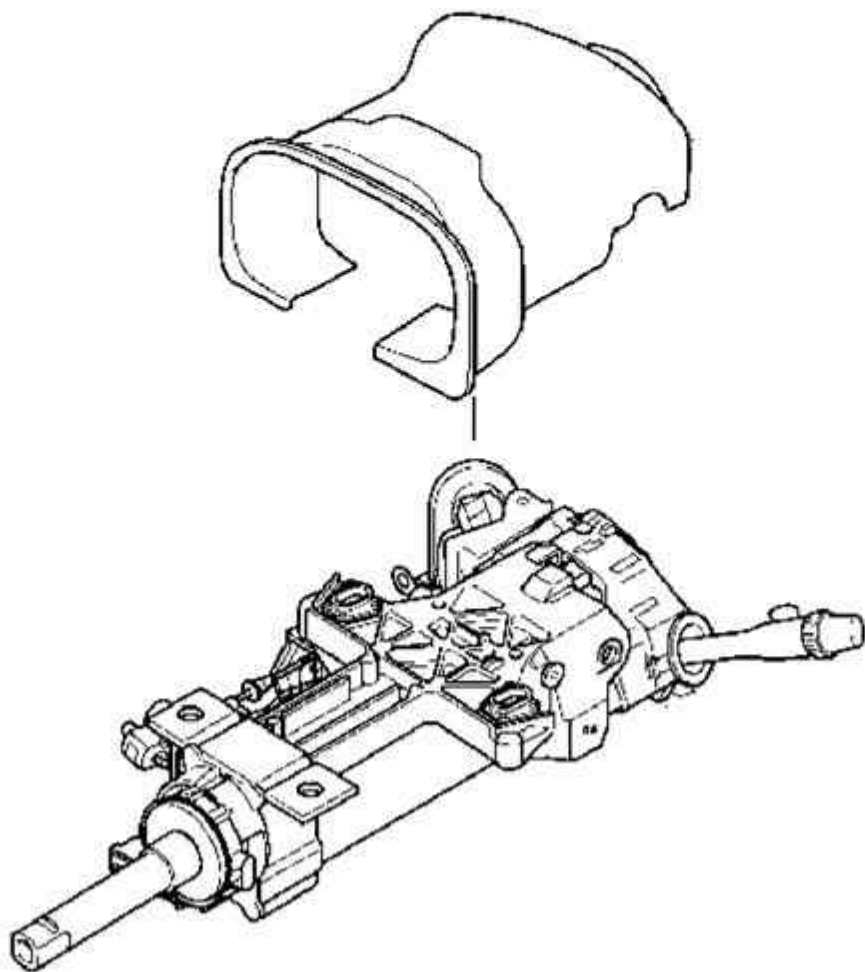


Fig. 20: View Of Upper Steering Column Trim Cover
Courtesy of GENERAL MOTORS CORP.

14. Remove the upper steering column trim cover.
15. If necessary, remove the closeout trim cover from the upper trim cover.

Installation Procedure

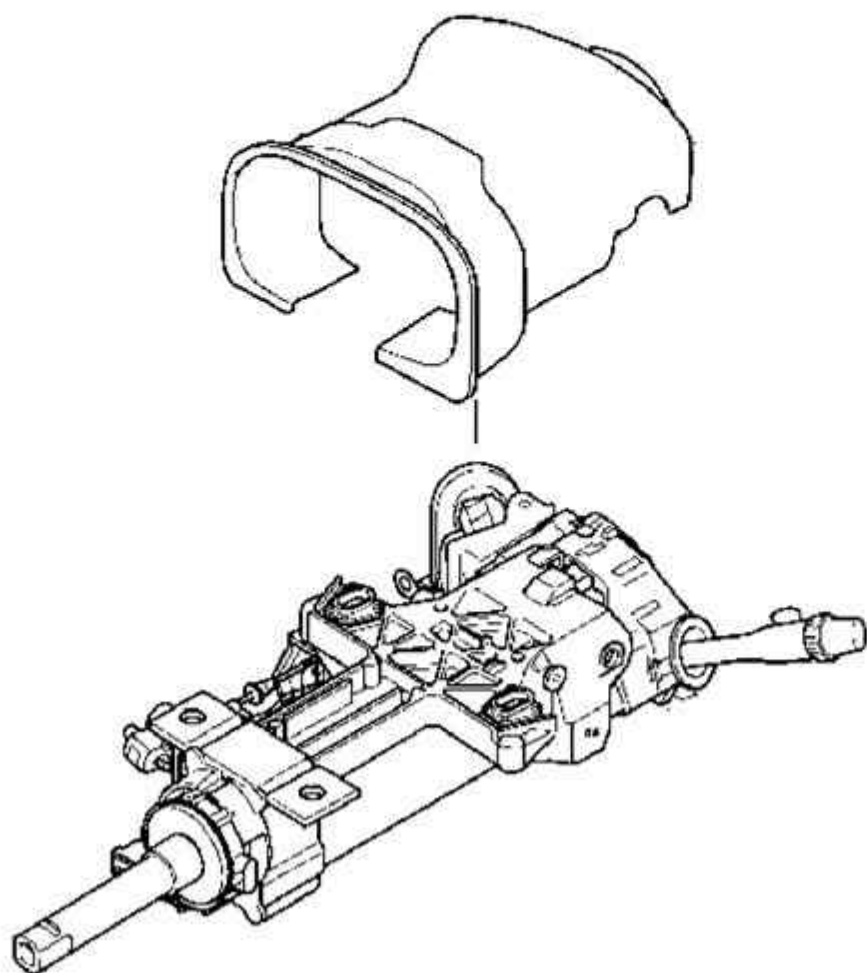


Fig. 21: View Of Upper Steering Column Trim Cover
Courtesy of GENERAL MOTORS CORP.

1. If necessary, install the upper steering column trim cover to the closeout trim cover.
2. Install the upper trim cover to the steering column.
3. Install the ignition lock cylinder.

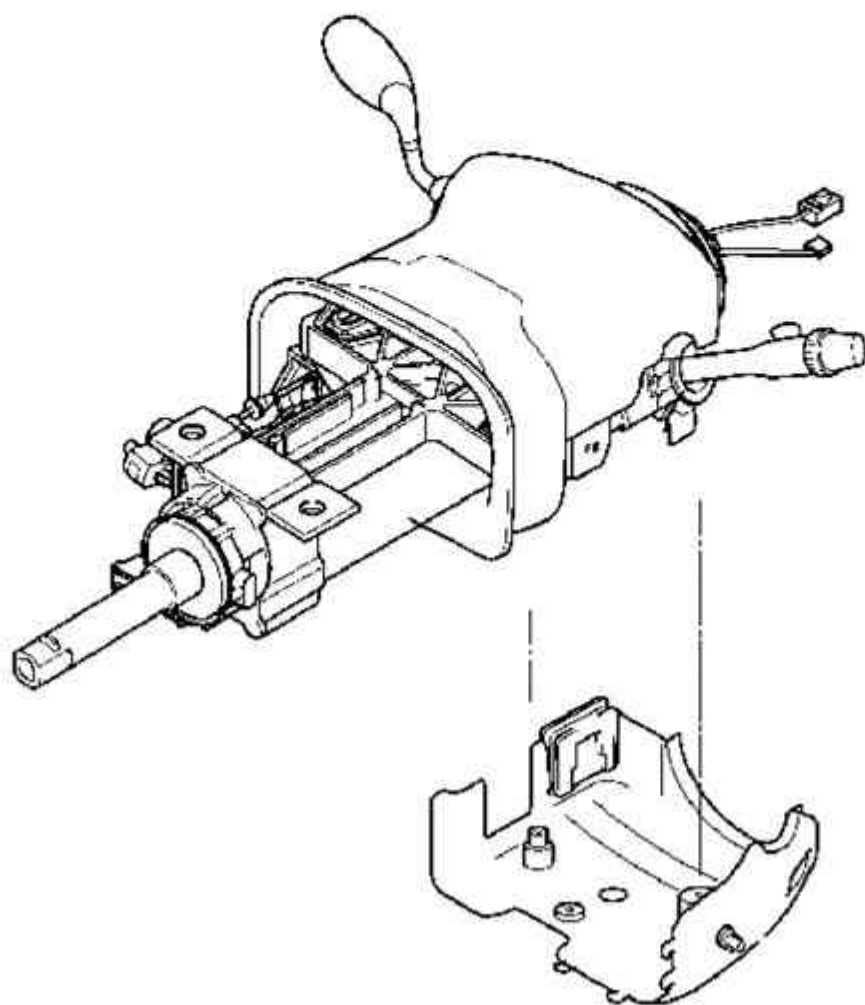


Fig. 22: View Of Lower Trim Cover
Courtesy of GENERAL MOTORS CORP.

4. Install the lower trim cover and ensure that the tabs engage with the tabs on the upper trim cover.
Snap the tabs together.
5. Connect the lower steering column trim cover to the closeout trim cover.

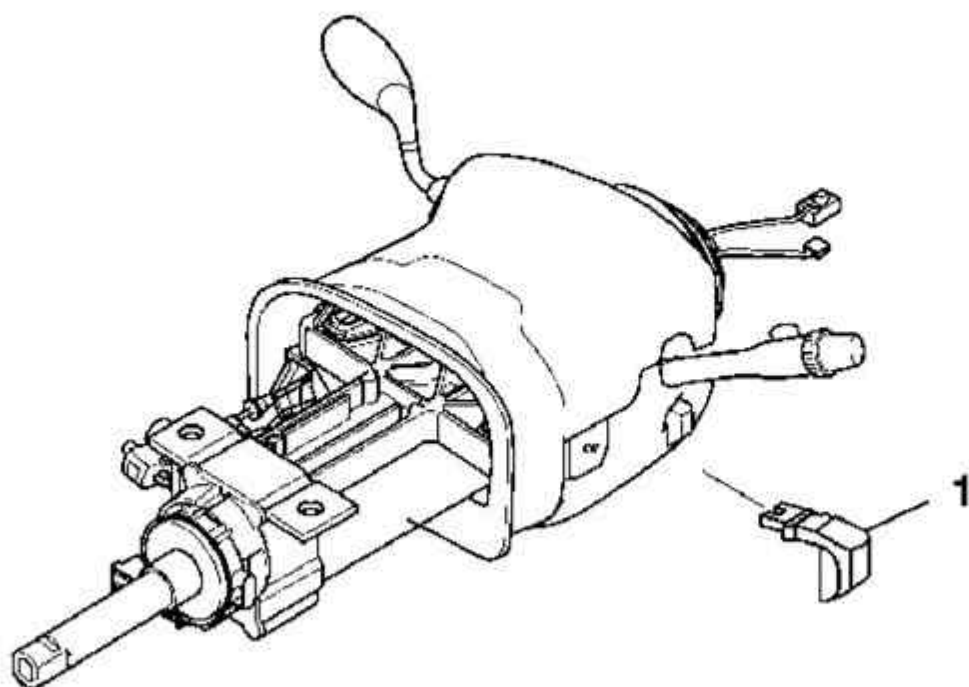


Fig. 23: View Of Tilt Lever

Courtesy of GENERAL MOTORS CORP.

6. Install the tilt lever (1).
7. Install the gap hider. Refer to Instrument Cluster Replacement.
8. Install the knee bolster. Refer to Driver Knee Bolster Replacement.
9. Install the steering wheel. Refer to Steering Wheel Replacement.
10. Connect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection (L26) or Battery Negative Cable Disconnection and Connection (LY7) or Battery Negative Cable Disconnection and Connection (LS4).
11. Enable the SIR system. Refer to SIR Disabling and Enabling.

TURN SIGNAL CANCEL CAM AND STEERING SHAFT UPPER BEARING SPRING REPLACEMENT

Tools Required

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

Removal Procedure

CAUTION: Refer to SIR Caution.

1. Disable the SIR system. Refer to SIR Disabling and Enabling.
2. Remove the SIR coil. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement.

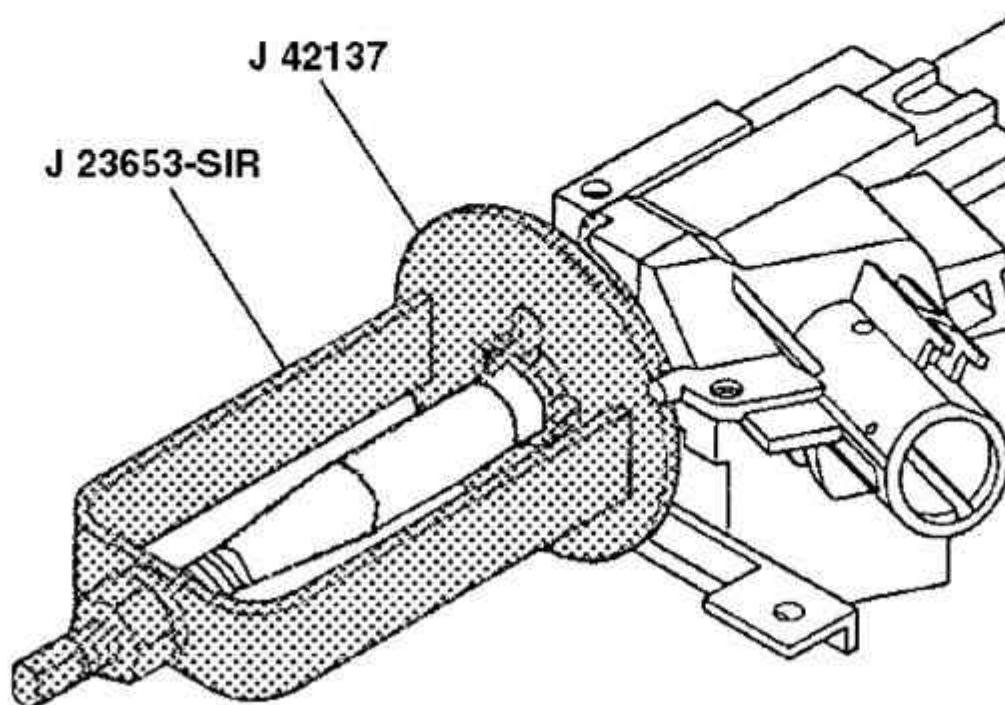


Fig. 24: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

3. Remove the bearing retainer using **J 23653-SIR** and **J 42137** and dispose of it. See **Special Tools**.
4. Remove **J 23653-SIR** and **J 42137** from the steering shaft assembly. See **Special Tools**.

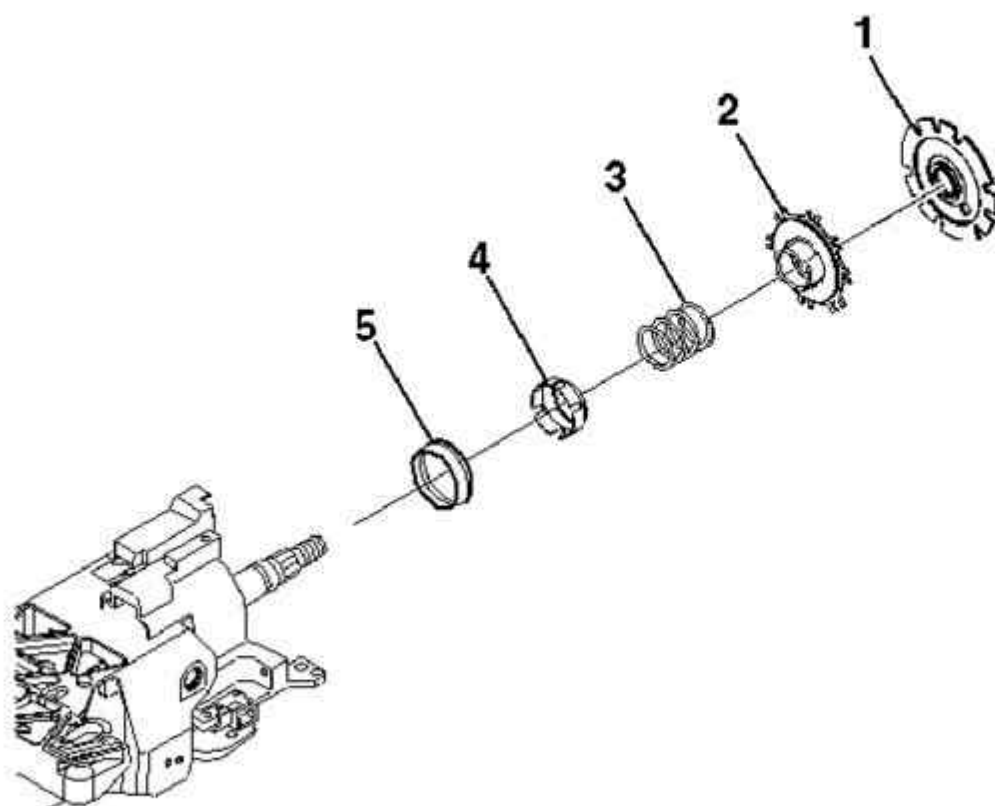


Fig. 25: View of Shaft Lock Shield Assembly, Turn Signal Cancel Cam Assembly, Upper Bearing Spring, Bearing Inner Race Seat and Inner Race
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

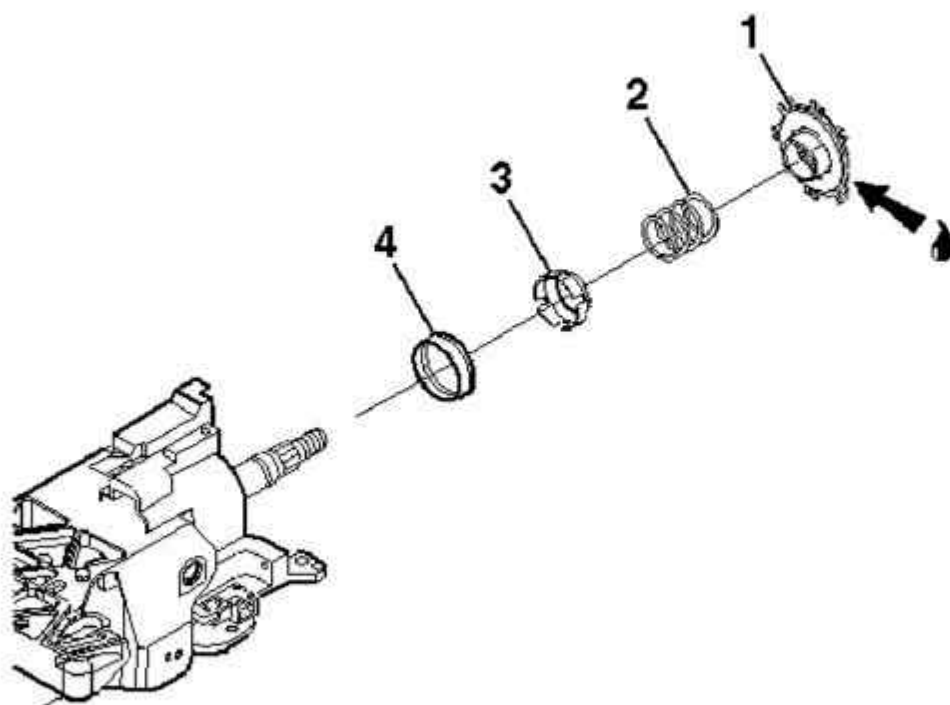


Fig. 26: View of Inner Race, Upper Bearing Inner Race Seat, Upper Bearing Spring, and Turn Signal Cancel Cam Assembly
Courtesy of GENERAL MOTORS CORP.

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

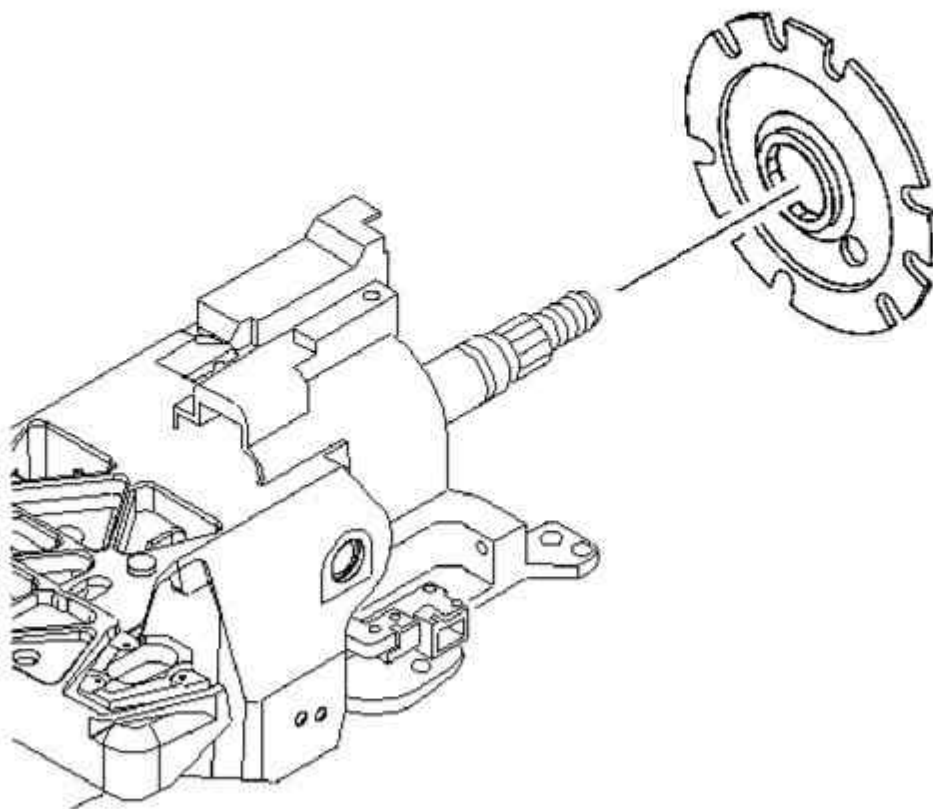


Fig. 27: View of Shaft Lock Shield Assembly
Courtesy of GENERAL MOTORS CORP.

6. Install the shaft lock shield assembly.

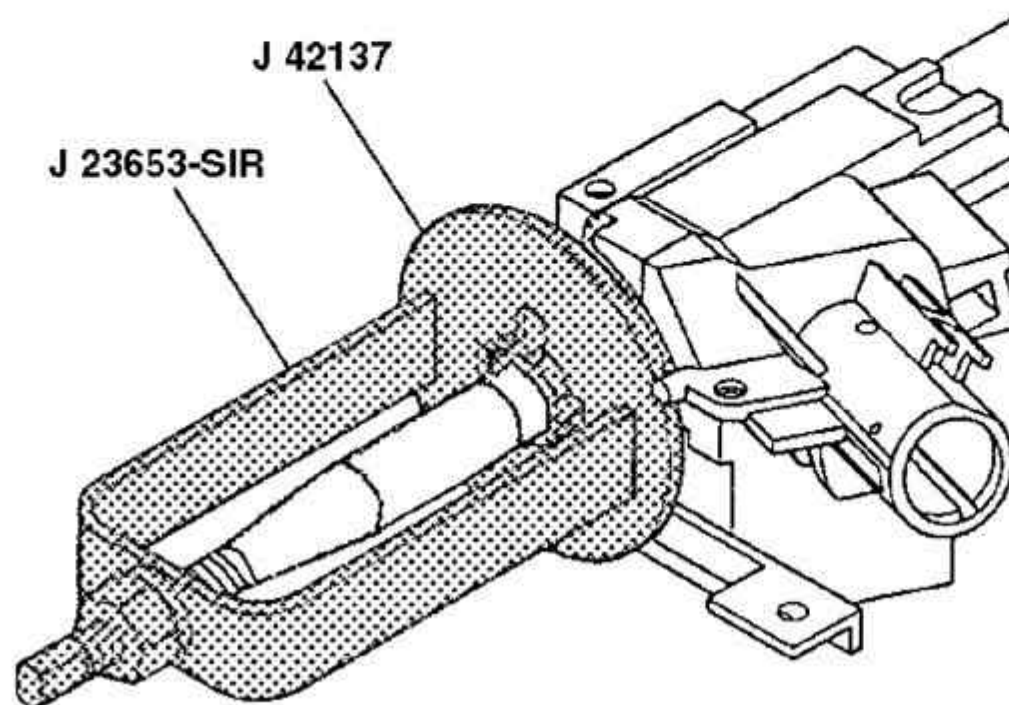


Fig. 28: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

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

TURN SIGNAL MULTIFUNCTION SWITCH REPLACEMENT

Removal Procedure

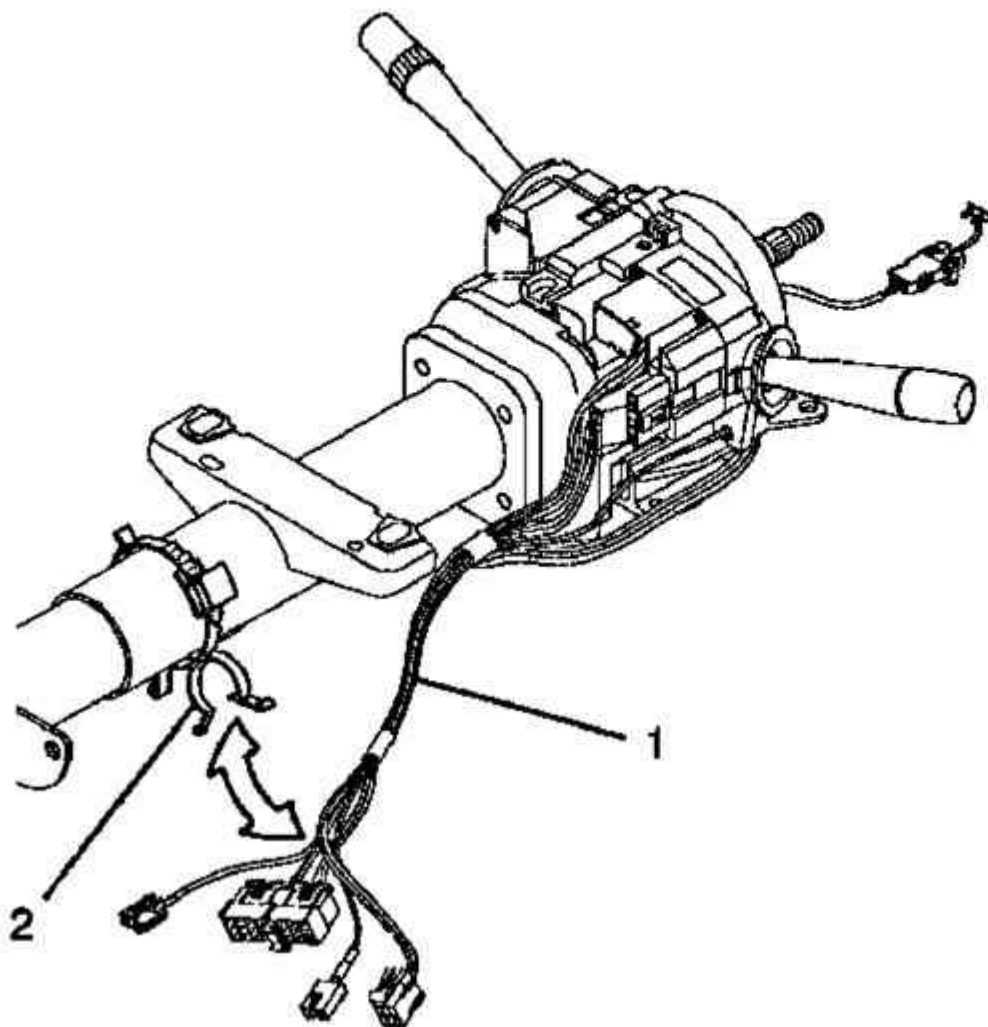


Fig. 29: View Of Steering Column Wire Harness Assembly & Wire Harness Strap
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

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

IMPORTANT: The abrasion sleeve located on the steering column wire harness assembly must be reinstalled. Make note of what connector is coming out of the abrasion sleeve for installation purposes.

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

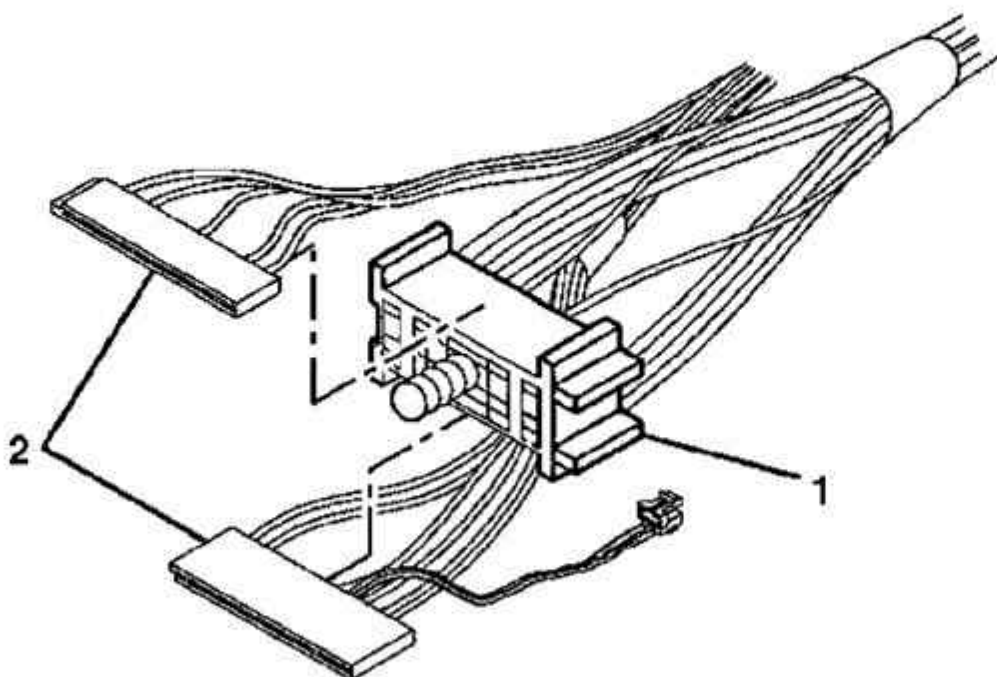


Fig. 30: View Of Turn Signal & Multifunction Switch Assembly Connectors
Courtesy of GENERAL MOTORS CORP.

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

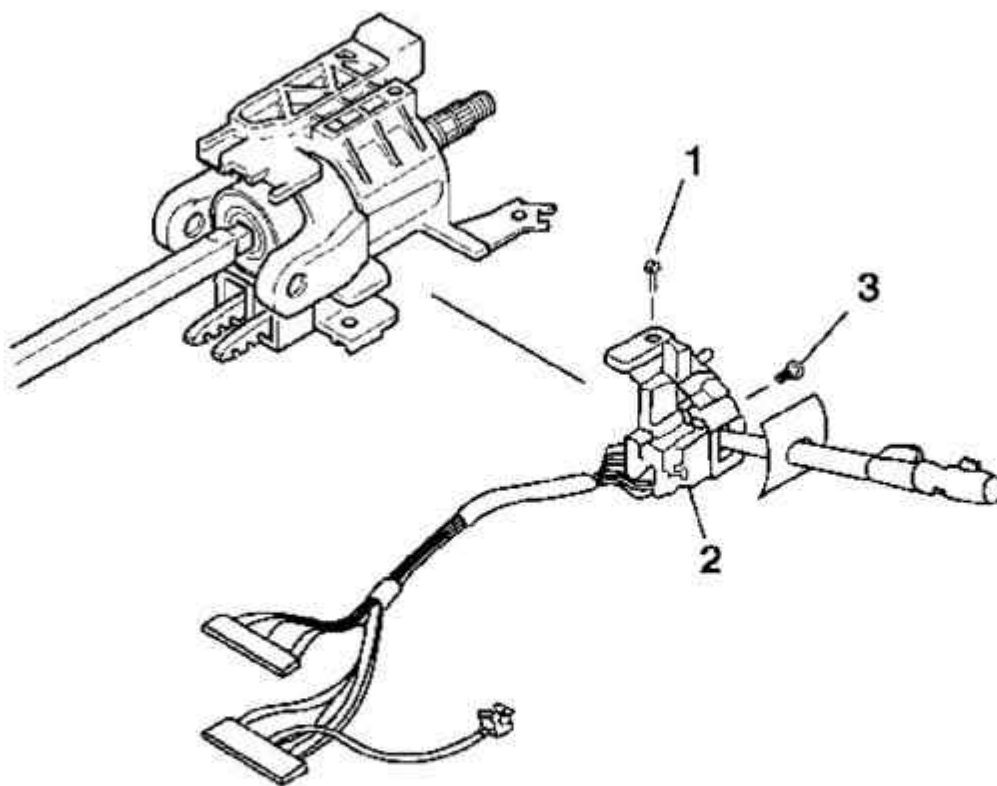


Fig. 31: View Of Turn Signal & Multifunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

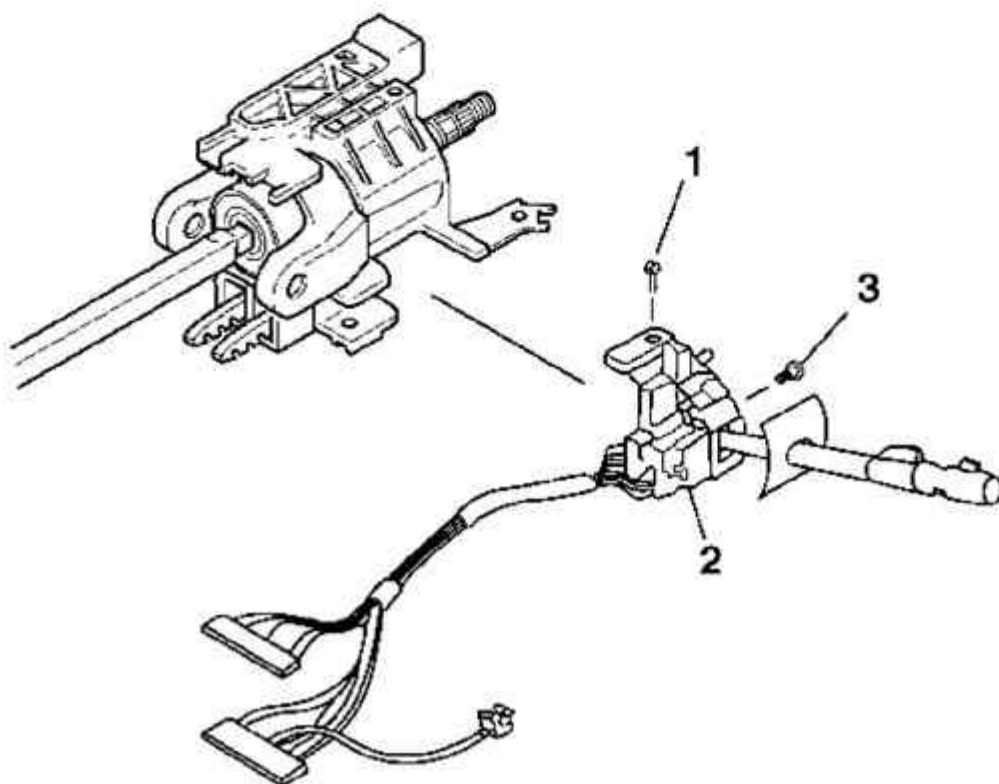


Fig. 32: View Of Turn Signal & Multifunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

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

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

Tighten: Tighten the pan head tapping screws to 1 N.m (9 lb in).

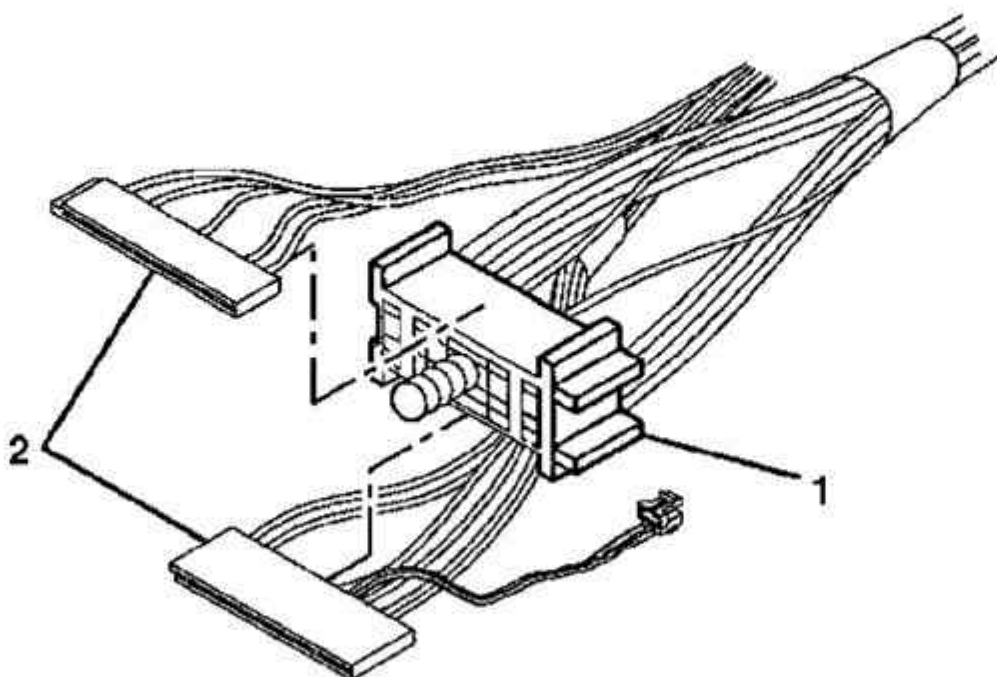


Fig. 33: View Of Turn Signal & Multifunction Switch Assembly Connectors
Courtesy of GENERAL MOTORS CORP.

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

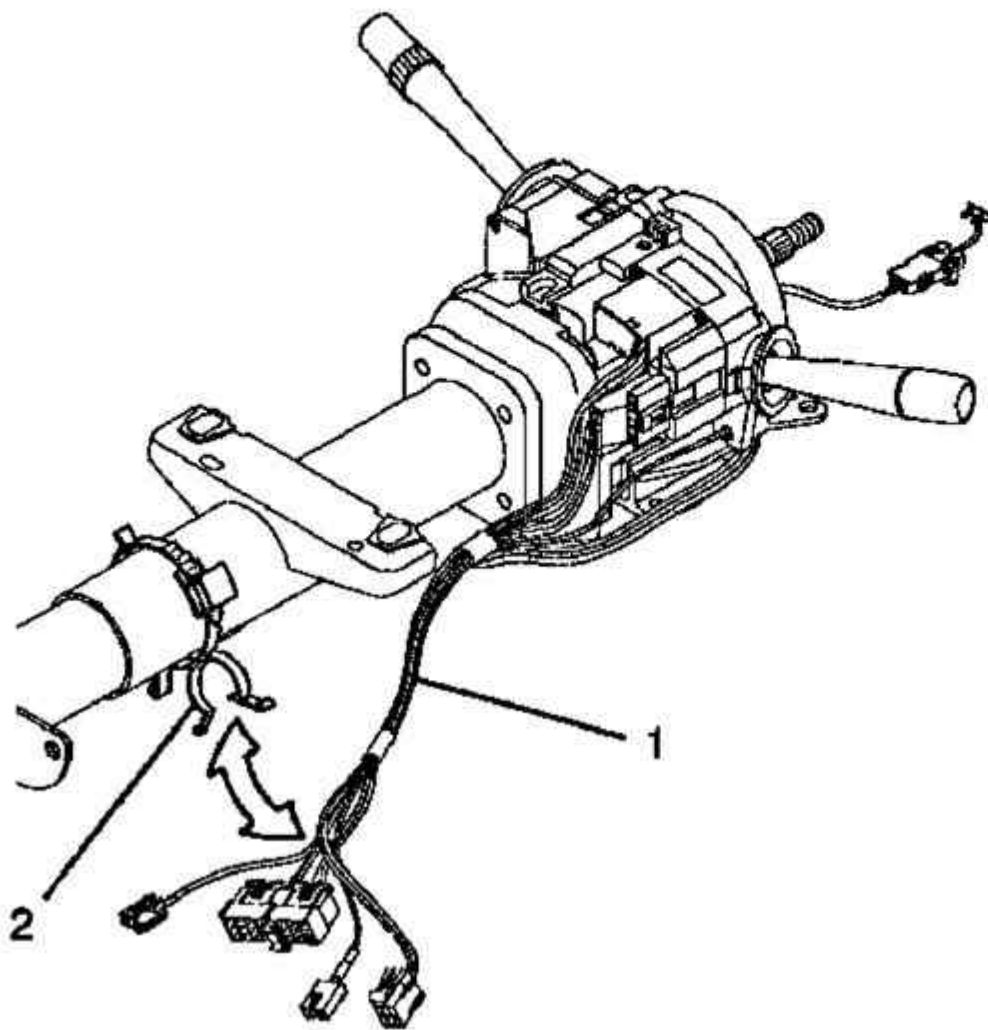


Fig. 34: View Of Steering Column Wire Harness Assembly & Wire Harness Strap
Courtesy of GENERAL MOTORS CORP.

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

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

5. Install the wire harness assembly (1) into the wire harness strap (2).
6. Install the upper and lower trim covers. Refer to Steering Column Trim Covers Replacement.
7. Enable the SIR system. Refer to SIR Disabling and Enabling.

TURN SIGNAL SWITCH HOUSING REPLACEMENT

Removal Procedure

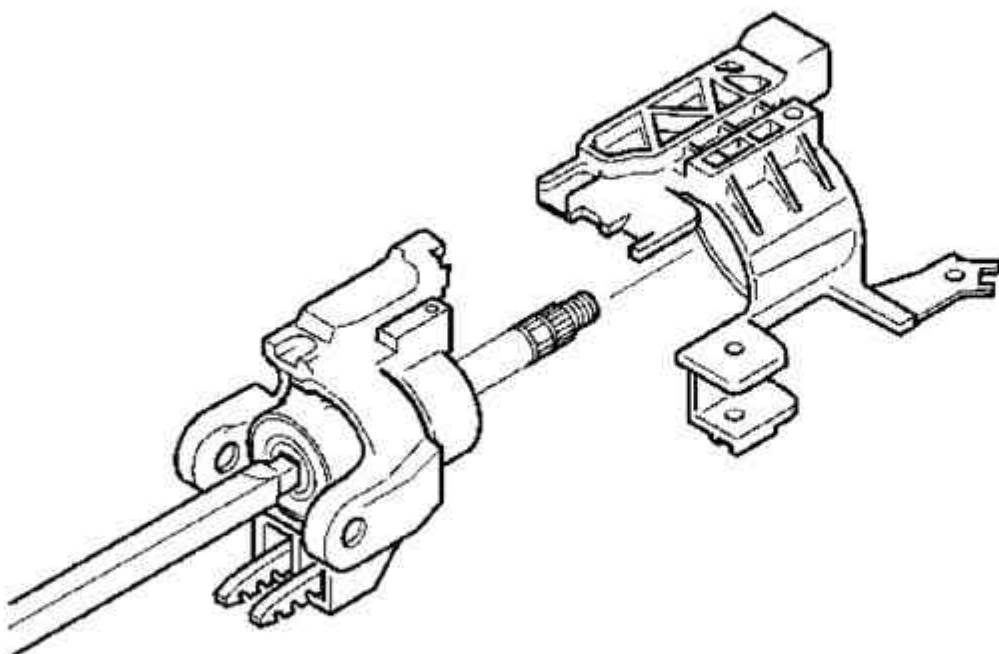


Fig. 35: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

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

Installation Procedure

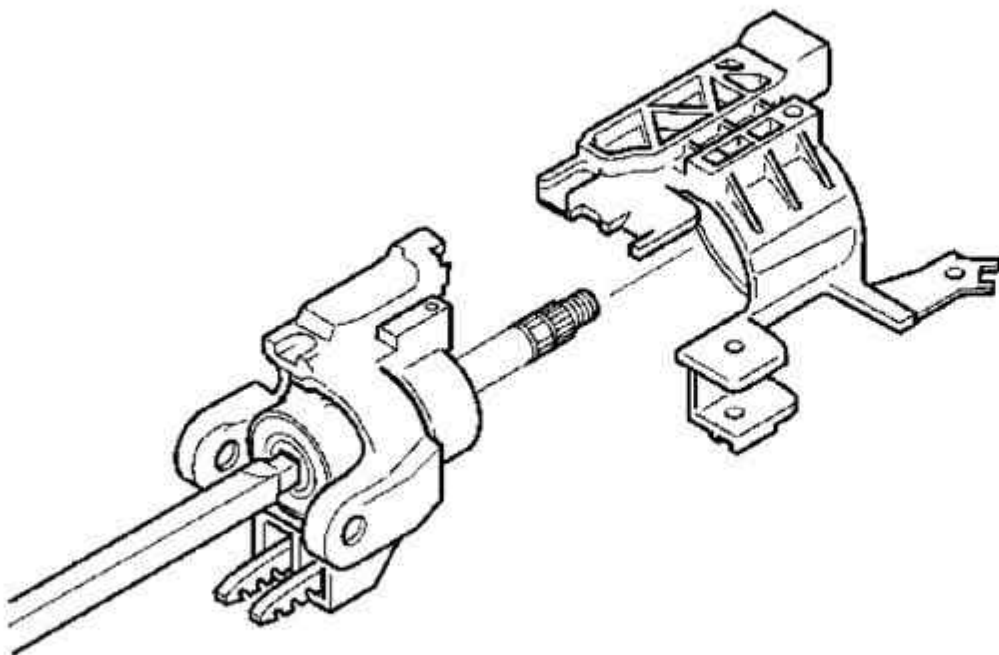


Fig. 36: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

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

SHIFT LEVER REPLACEMENT

Removal Procedure

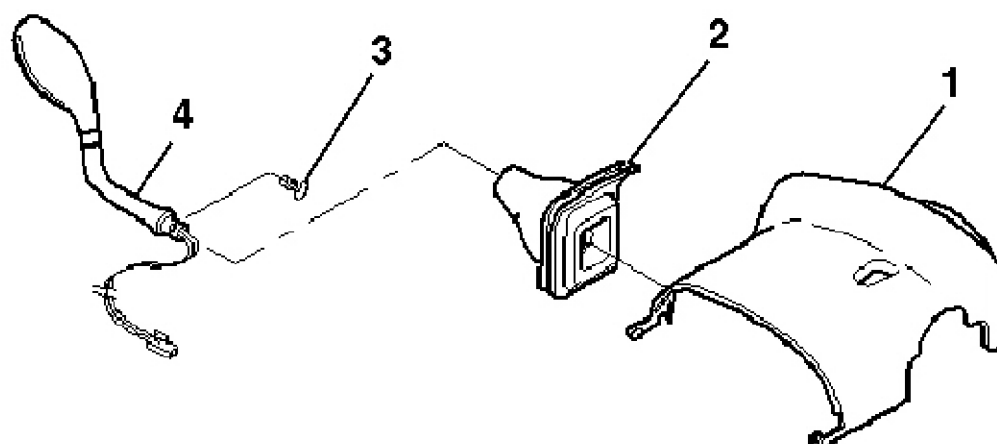


Fig. 37: View Of Shift Lever, Seal (Boot), Screw & Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

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

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

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

Installation Procedure

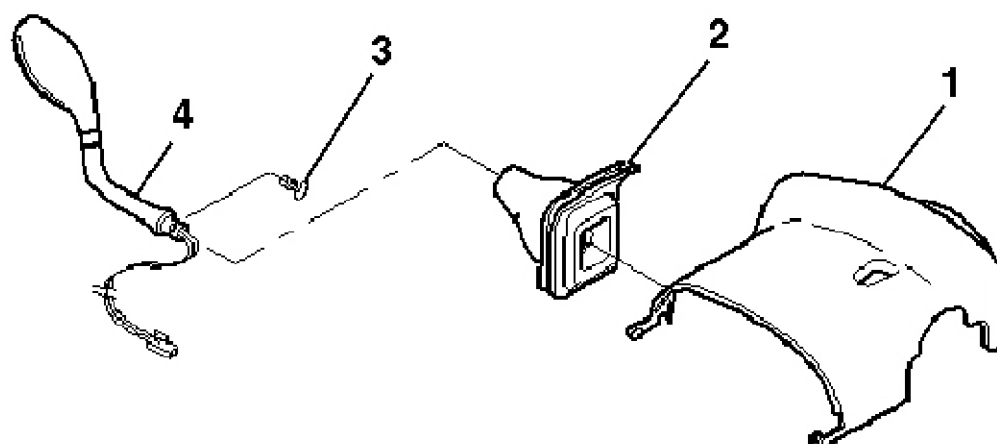


Fig. 38: View Of Shift Lever, Seal (Boot), Screw & Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

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

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

NOTE: Refer to Fastener Notice .

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

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

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

LINEAR SHIFT ASSEMBLY REPLACEMENT

Removal Procedure

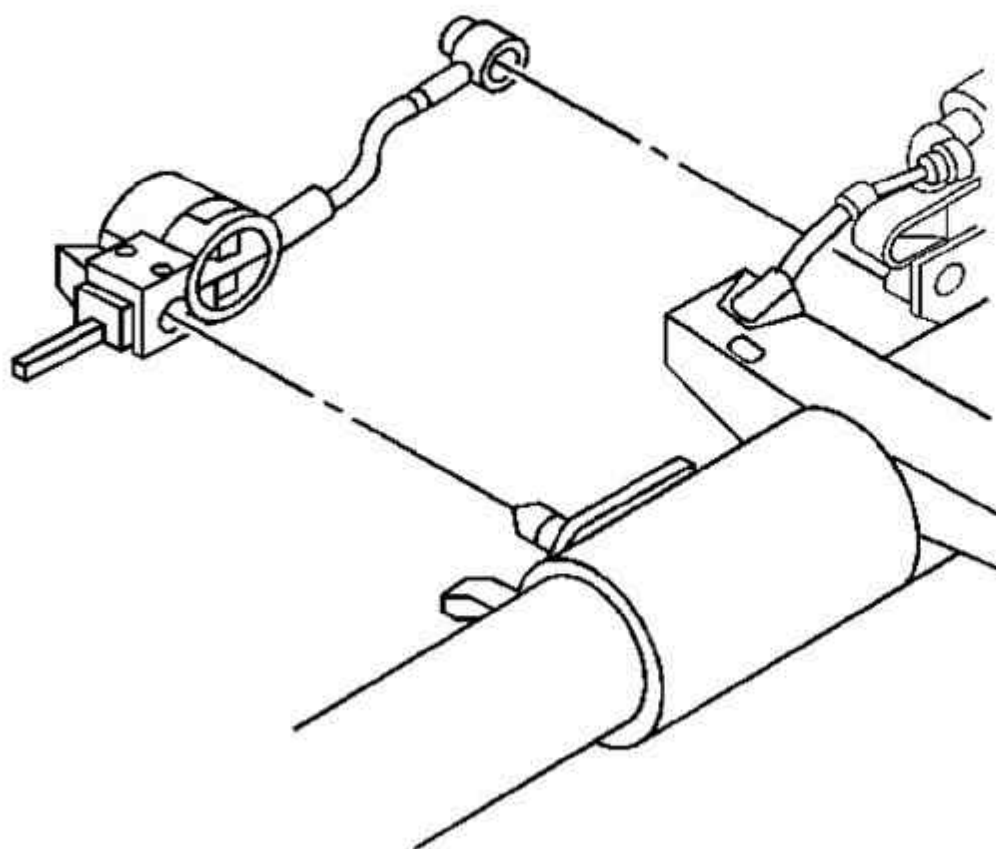


Fig. 39: View Of Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

1. Disable the SIR system. Refer to **SIR Disabling and Enabling** .
2. Remove the upper and lower trim covers. Refer to **Steering Column Trim Covers Replacement**.
3. Remove the shift lever assembly. Refer to **Shift Lever Replacement**.
4. With a screwdriver carefully pry the automatic transmission shift lock control away from the steering column jacket.

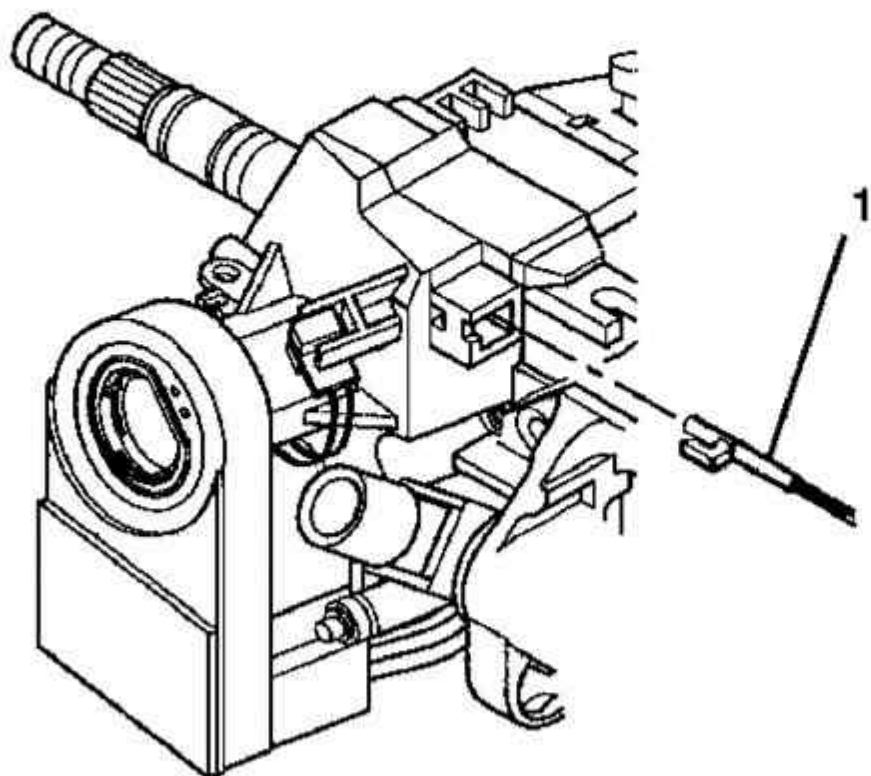


Fig. 40: Identifying Park Lock Cable At Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

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

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

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

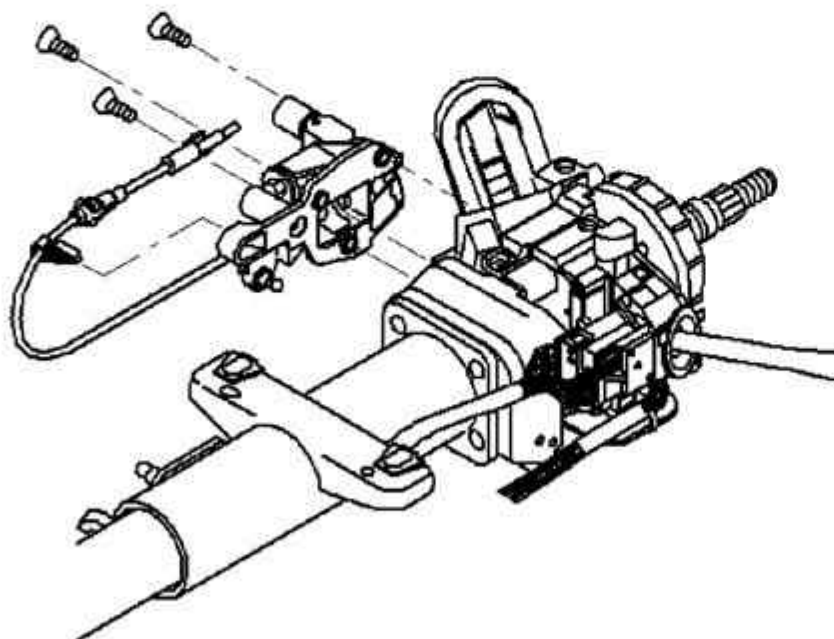


Fig. 41: Identifying Flat-Head 6-Lobed Socket Tap Screws & Linear Shift Assembly
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

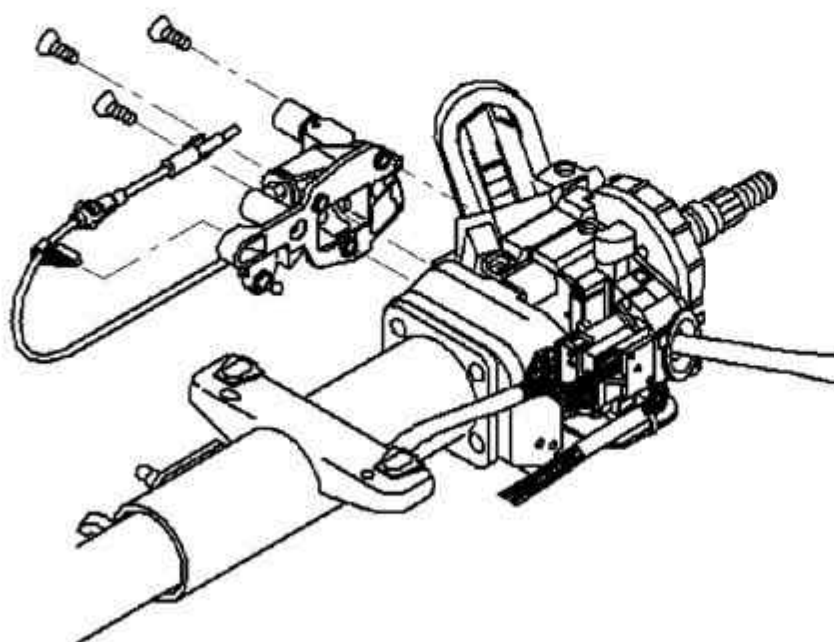


Fig. 42: Identifying Flat-Head 6-Lobed Socket Tap Screws & Linear Shift Assembly
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

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

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

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

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

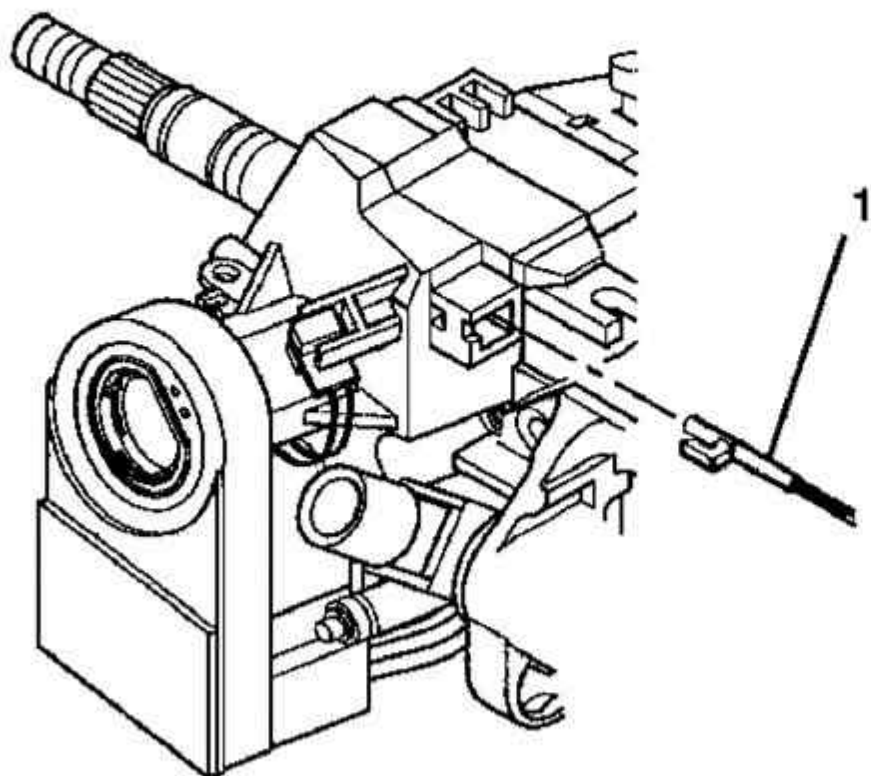


Fig. 43: Identifying Park Lock Cable At Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

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

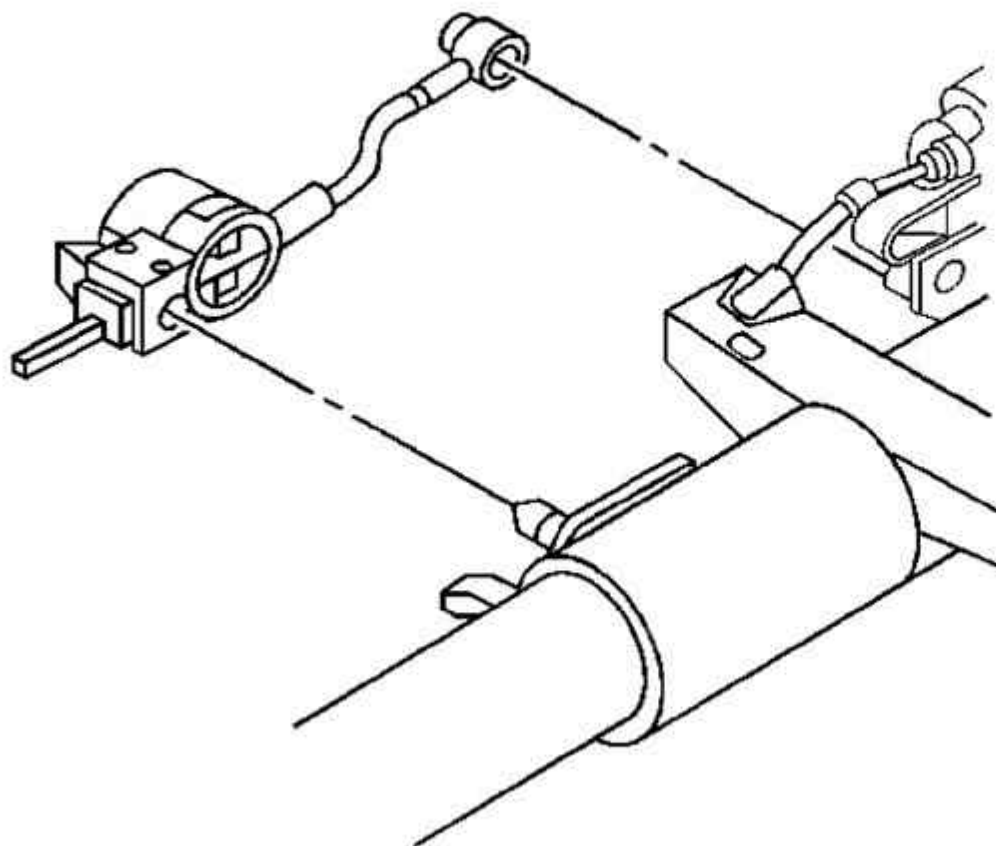


Fig. 44: View Of Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

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

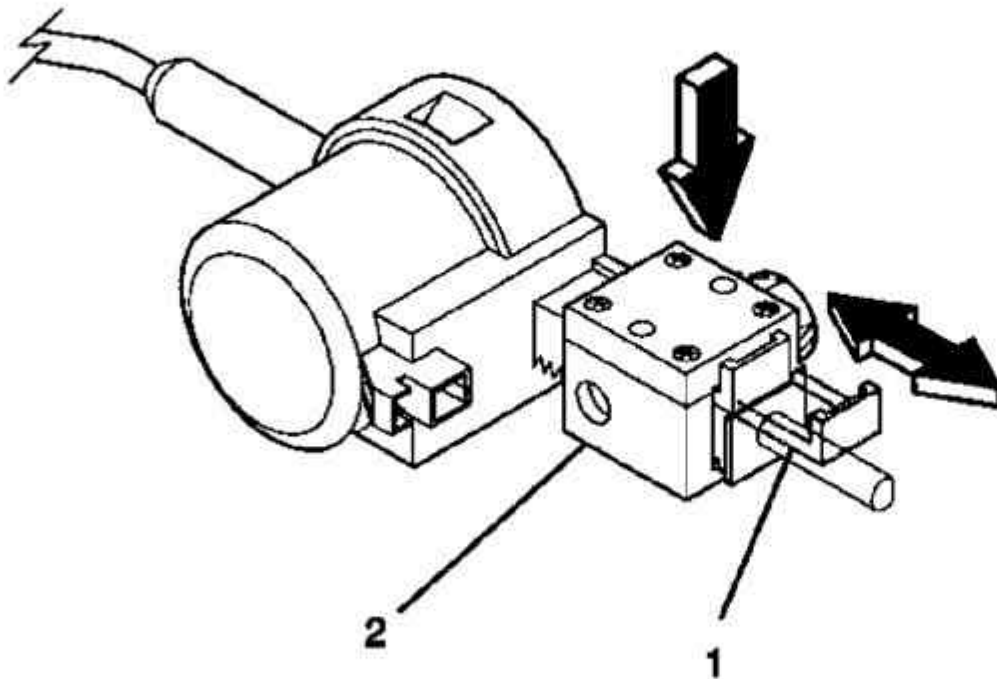


Fig. 45: Adjusting Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

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

TILT LEVER REPLACEMENT

Removal Procedure

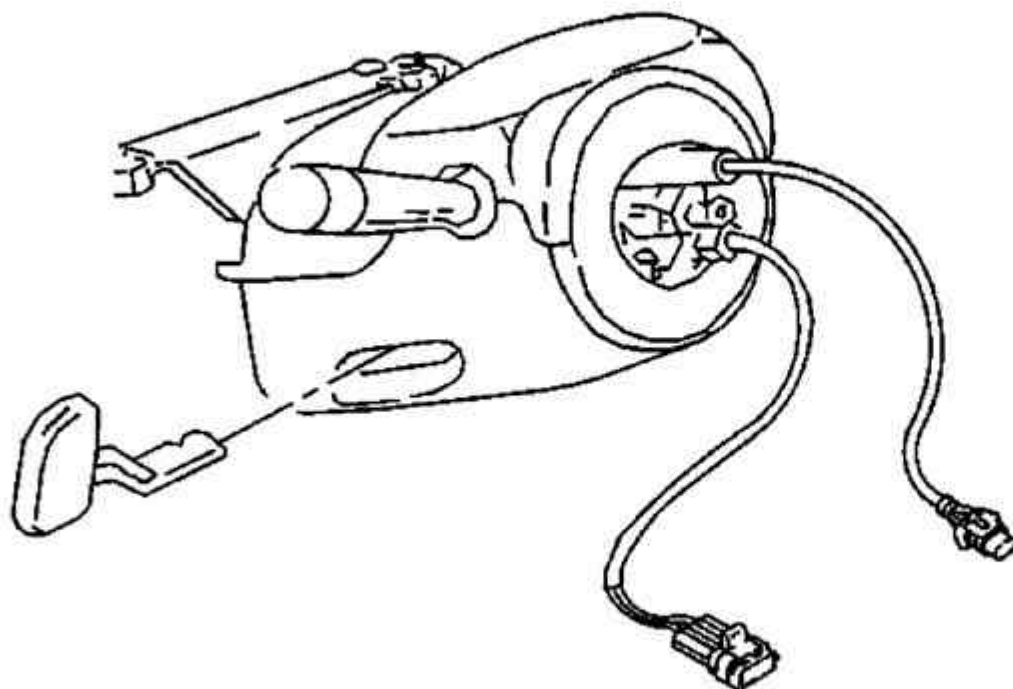


Fig. 46: Identifying Tilt Lever

Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Pull the tilt lever out from the steering column.

Installation Procedure

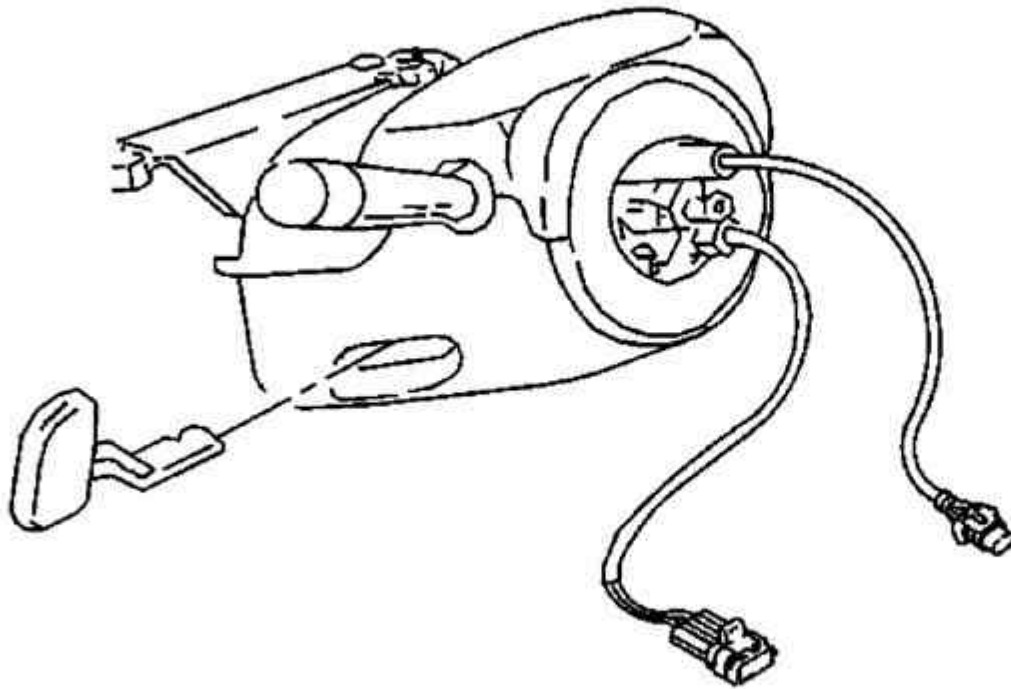


Fig. 47: Identifying Tilt Lever

Courtesy of GENERAL MOTORS CORP.

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

STEERING WHEEL REPLACEMENT

Tools Required

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

Removal Procedure

1. Disable the SIR system. Refer to **SIR Disabling and Enabling**.
2. Turn OFF the ignition.
3. Remove the Inflatable restraint steering wheel module. Refer to **Inflatable Restraint Steering Wheel Module Replacement**.
4. Scribe an alignment mark on the steering wheel hub. Align the mark with the slash mark on the steering shaft.

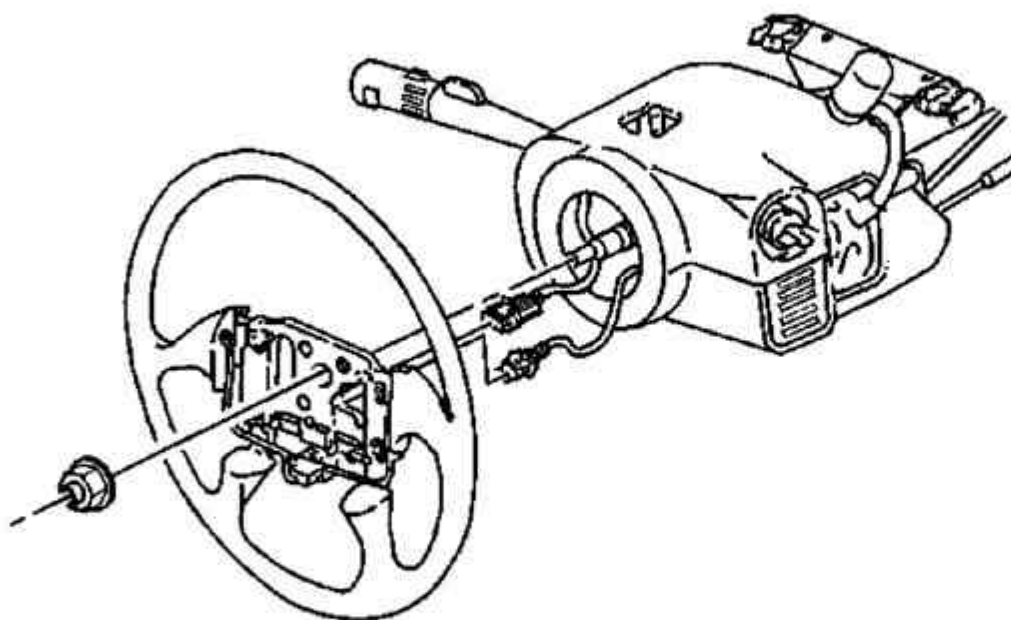


Fig. 48: View Of Steering Wheel, Shaft & Nut
Courtesy of GENERAL MOTORS CORP.

5. Loosen the steering wheel nut.
6. Position the steering wheel nut flush with the end of the steering shaft.

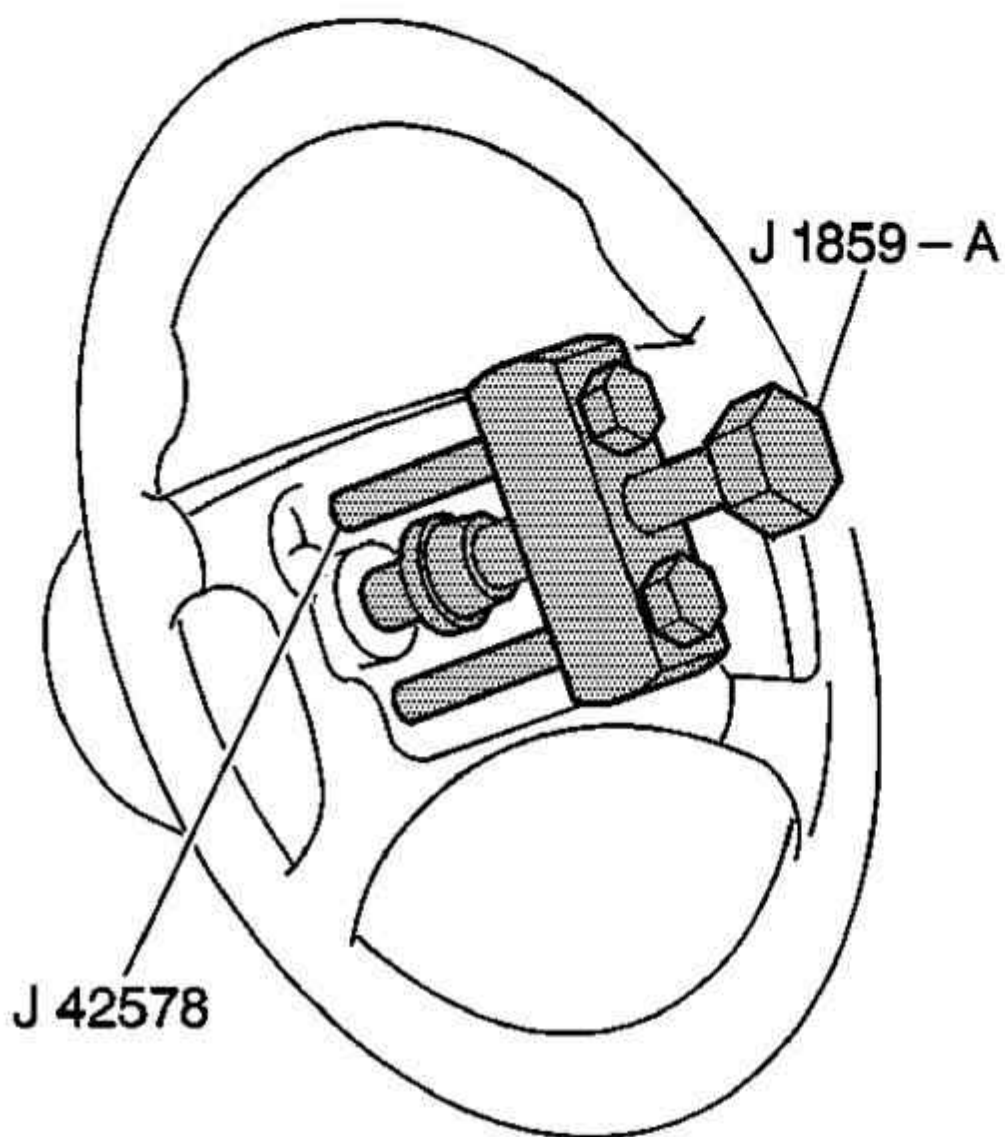


Fig. 49: Identifying Steering Wheel, J 1859-A & J 42578
Courtesy of GENERAL MOTORS CORP.

7. Assemble J 1859-A with J 42578 on the steering wheel. See **Special Tools**.
8. Use J 1859-A with J 42578 in order to unseat the steering wheel from the steering shaft. See **Special Tools**.
9. Remove J 1859-A and J 42578 from the steering wheel. See **Special Tools**.
10. Remove the steering shaft nut.
11. Remove the steering wheel from the steering shaft.
12. Remove the SIR connector from the steering wheel.

Installation Procedure

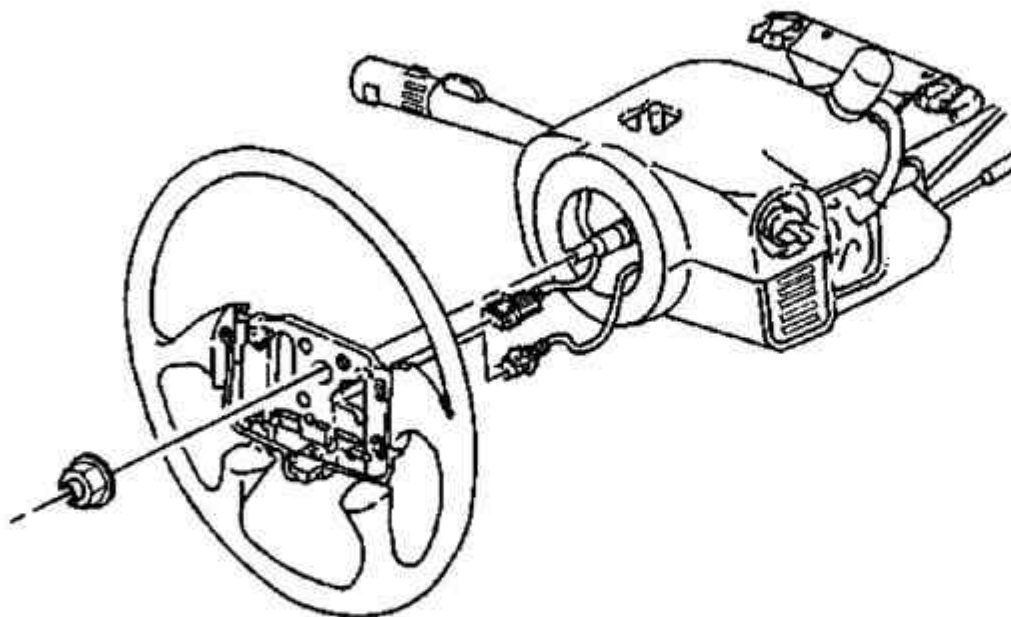


Fig. 50: View Of Steering Wheel, Shaft & Nut
Courtesy of GENERAL MOTORS CORP.

1. Route the SIR connector through the steering wheel.
2. Align the scribe mark on the steering wheel with the slash mark on the steering shaft.
3. Install the steering wheel.

NOTE: Refer to Fastener Notice .

4. Install the steering shaft nut.

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

5. Install the Inflatable restraint steering wheel module. Refer to Inflatable Restraint Steering Wheel Module Replacement .
6. Enable the SIR system. Refer to SIR Disabling and Enabling .
7. Inspect the operation of the following components:
 - The horn
 - The steering wheel
 - The steering wheel controls

STEERING COLUMN TILT SPRING REPLACEMENT

Removal Procedure

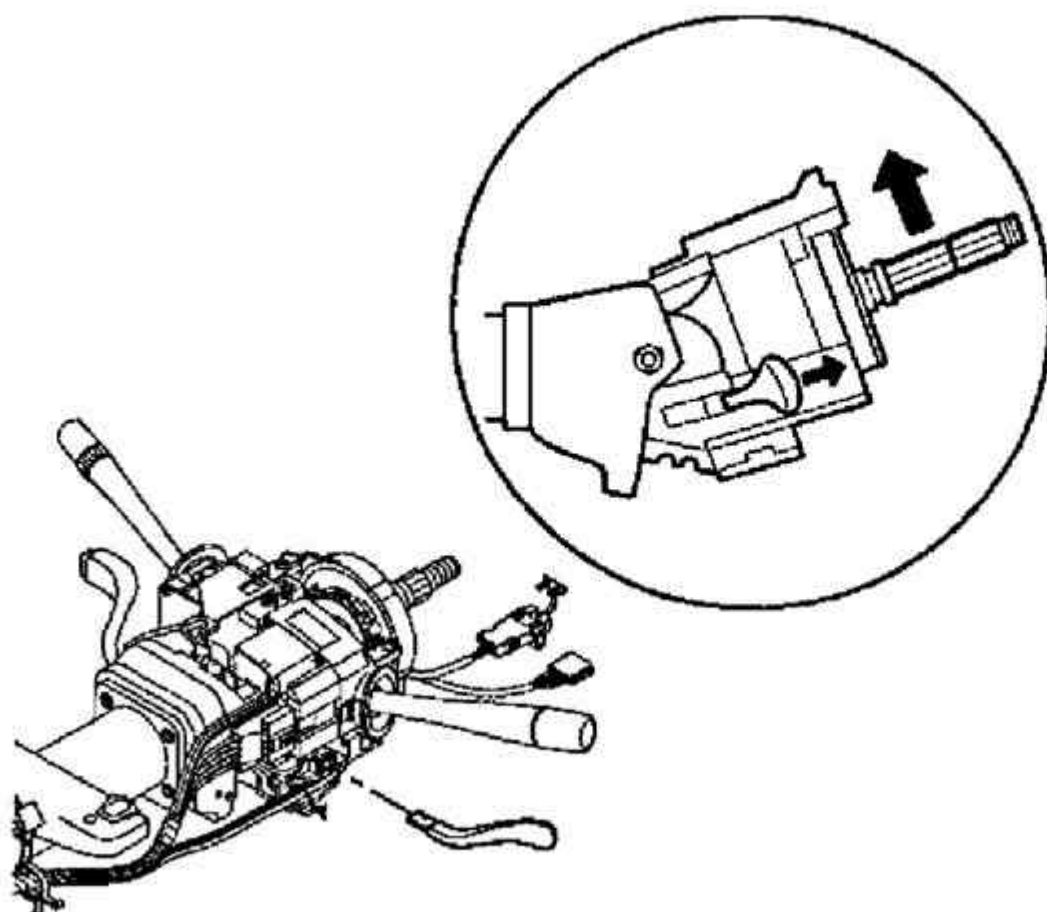


Fig. 51: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Remove the upper and lower trim covers. Refer to Steering Column Trim Covers Replacement.
3. Install the tilt lever onto the steering column tilt head assembly.
4. Use the tilt lever to tilt the column to the UP position.

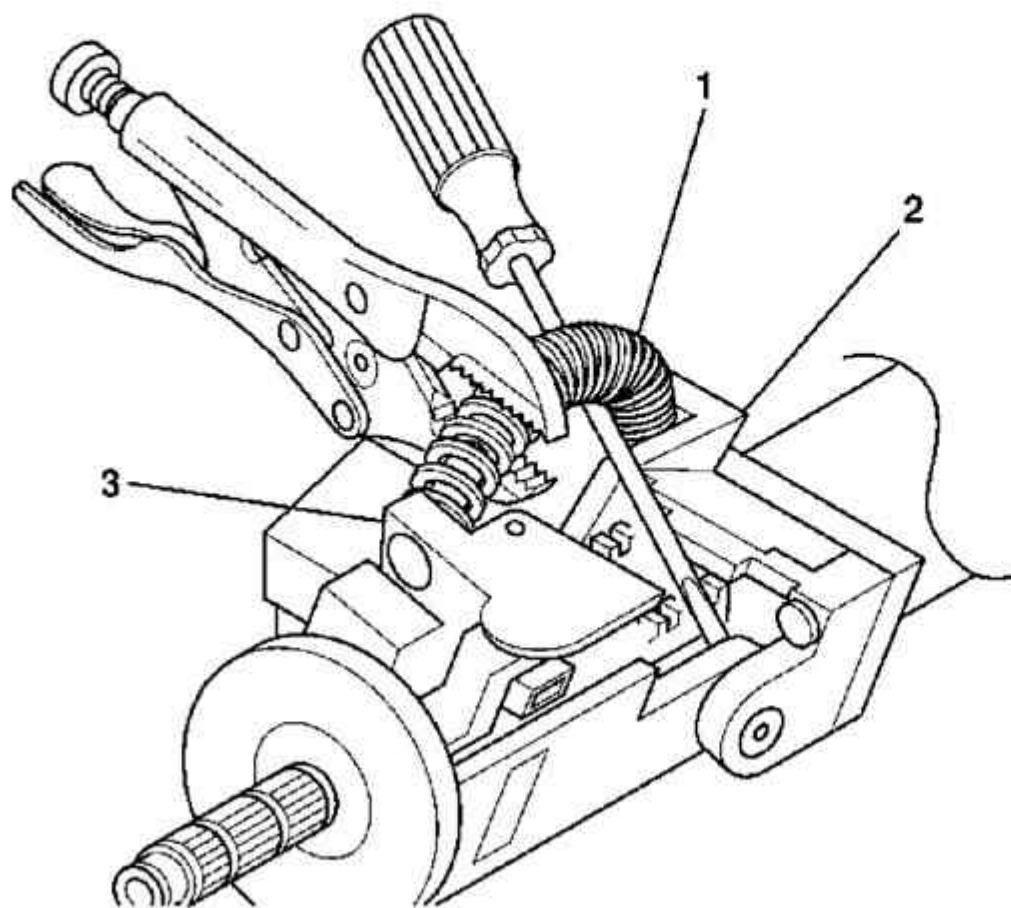


Fig. 52: Removing Tilt Spring From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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

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

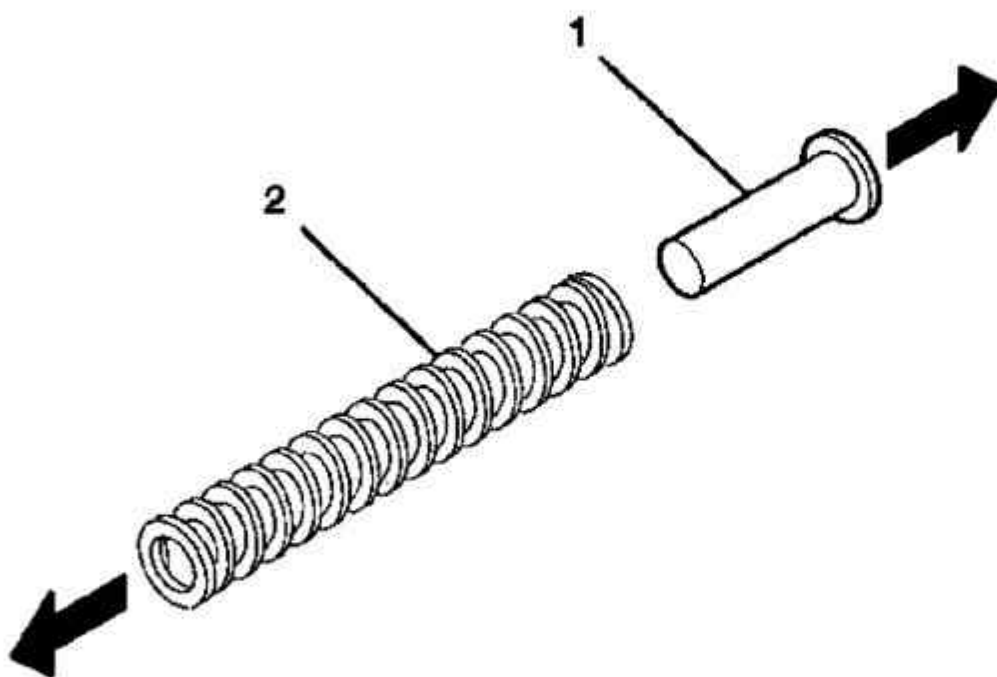


Fig. 53: Identifying Spring Guide Components
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

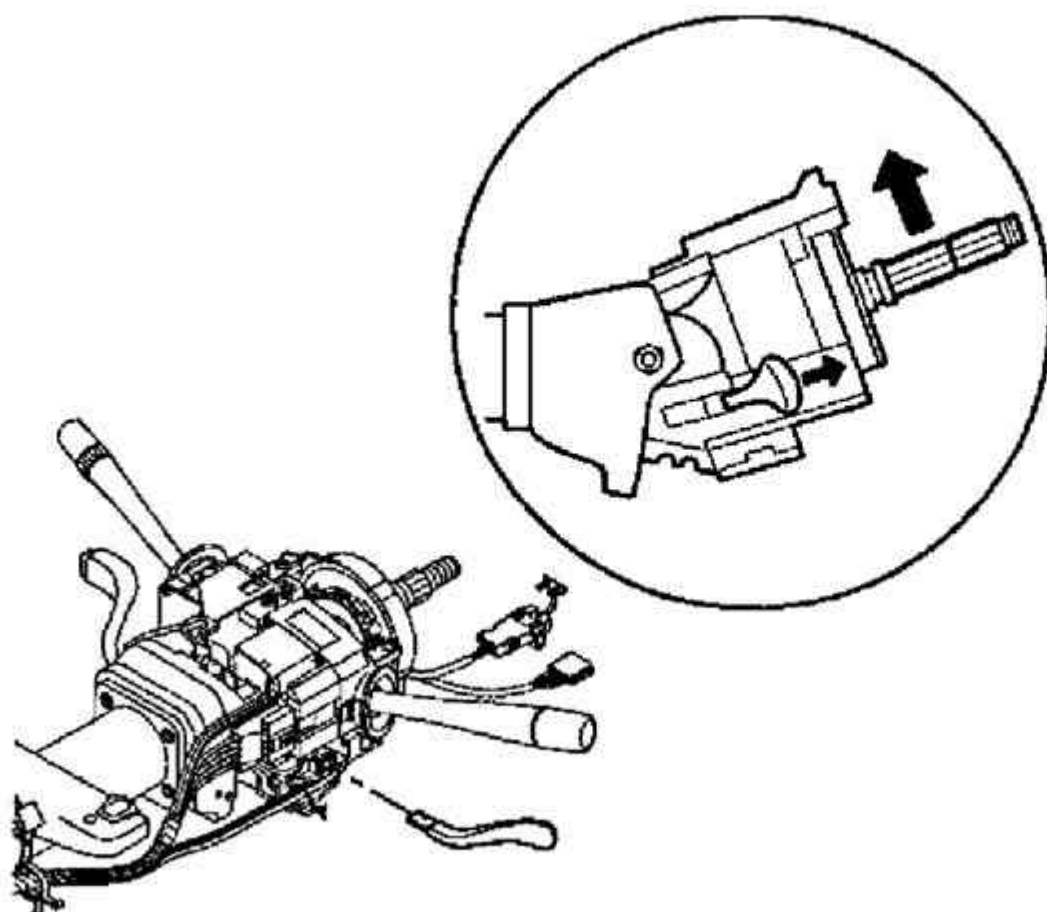


Fig. 54: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

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

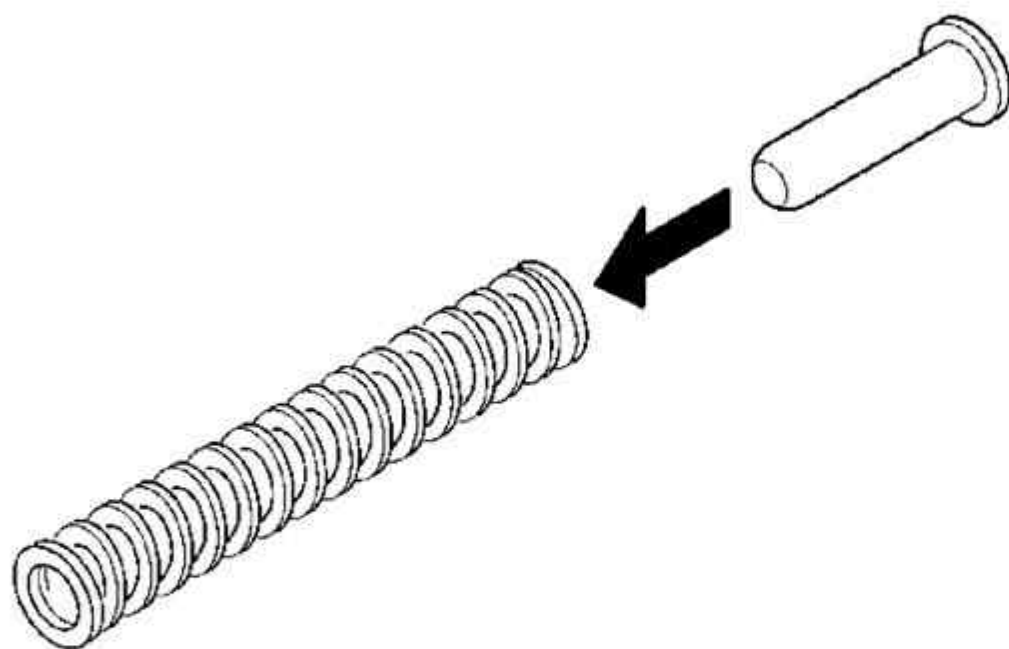


Fig. 55: View Of Spring Guide & Tilt Spring

Courtesy of GENERAL MOTORS CORP.

2. Install the spring guide into the tilt spring.

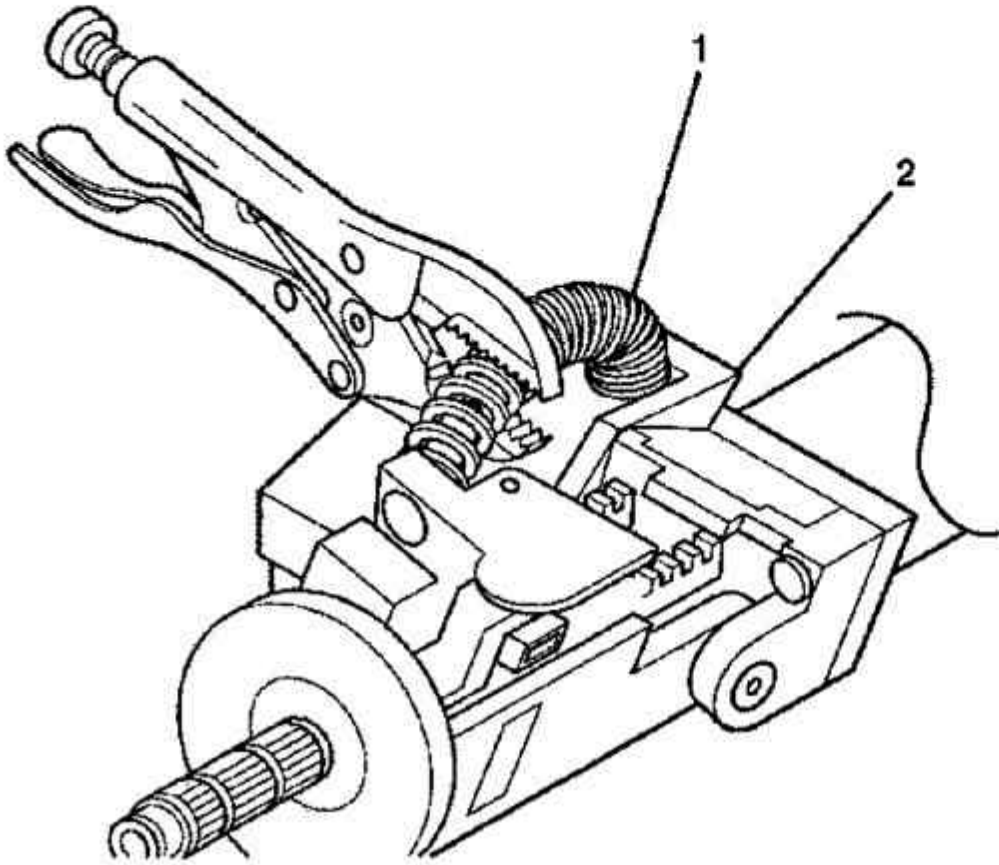


Fig. 56: Installing Tilt Spring Onto The Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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

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

STEERING COLUMN TILT HEAD REPLACEMENT

Tools Required

- J 21854-01 Pivot Pin Remover. See Special Tools.

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

Removal Procedure

CAUTION: Refer to SIR Caution .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .

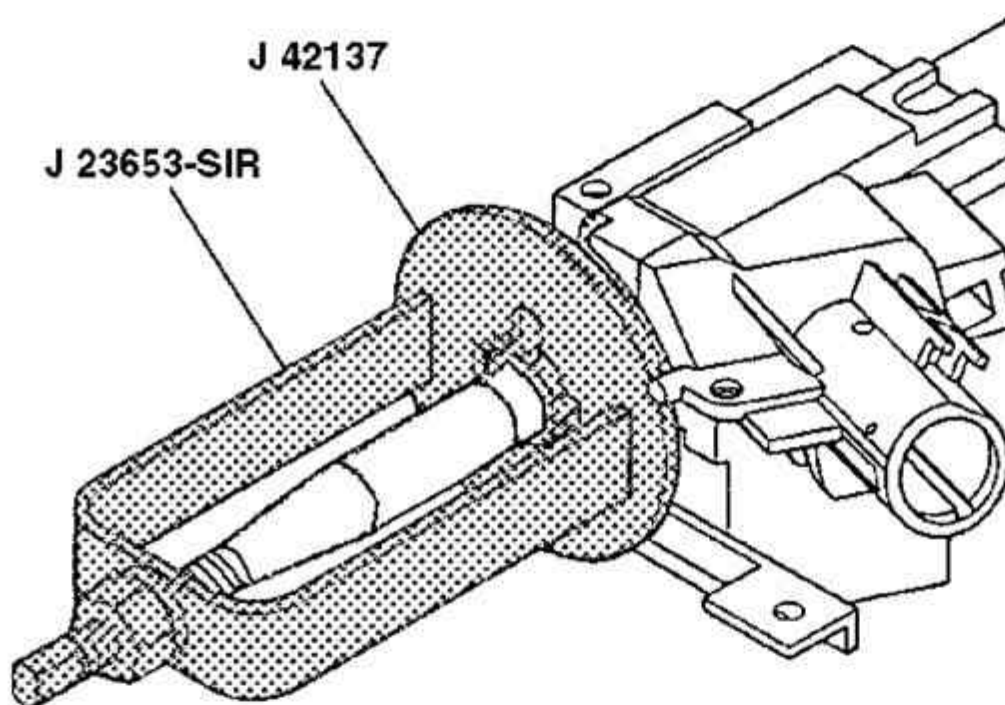


Fig. 57: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

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

Remove the bearing retainer from the shaft.

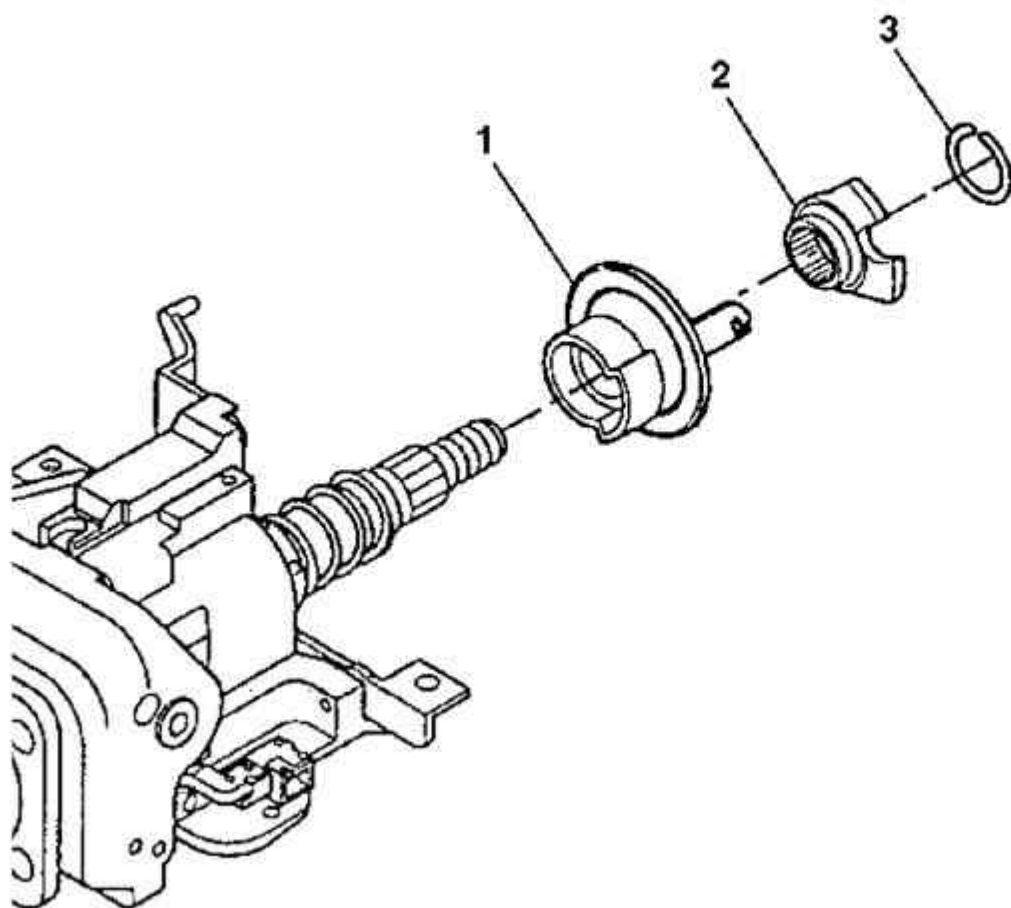


Fig. 58: View Of Turn Signal Cancel Cam Assembly, Cam Orientation Plate & Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

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

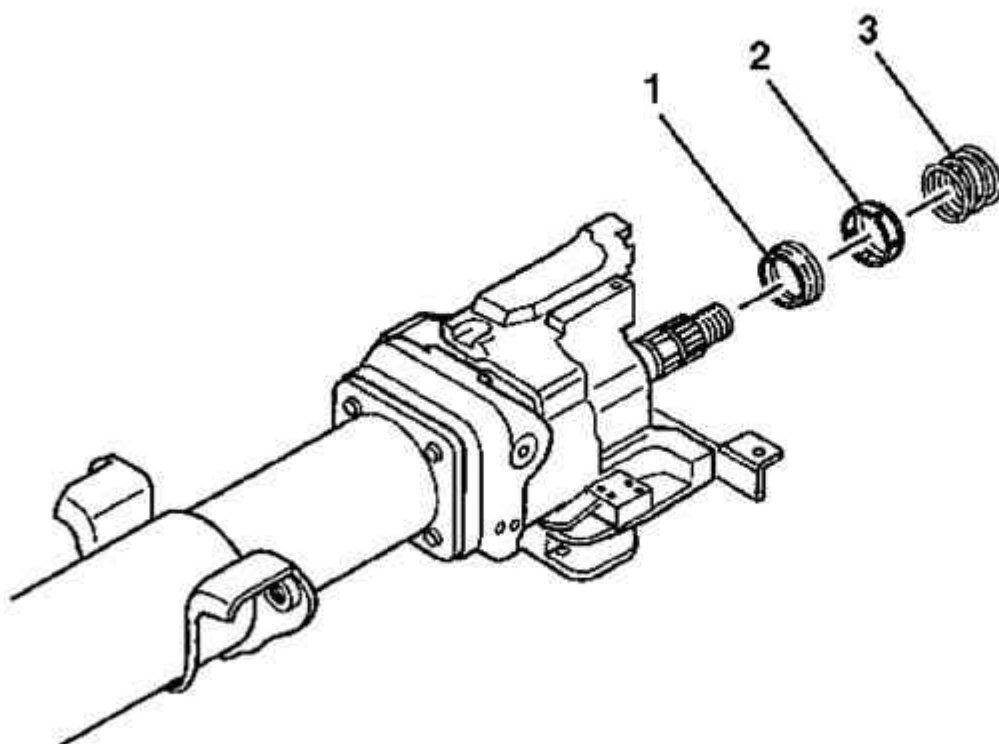


Fig. 59: View Of Upper Bearing Spring, Inner Race Seat & Inner Race
Courtesy of GENERAL MOTORS CORP.

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

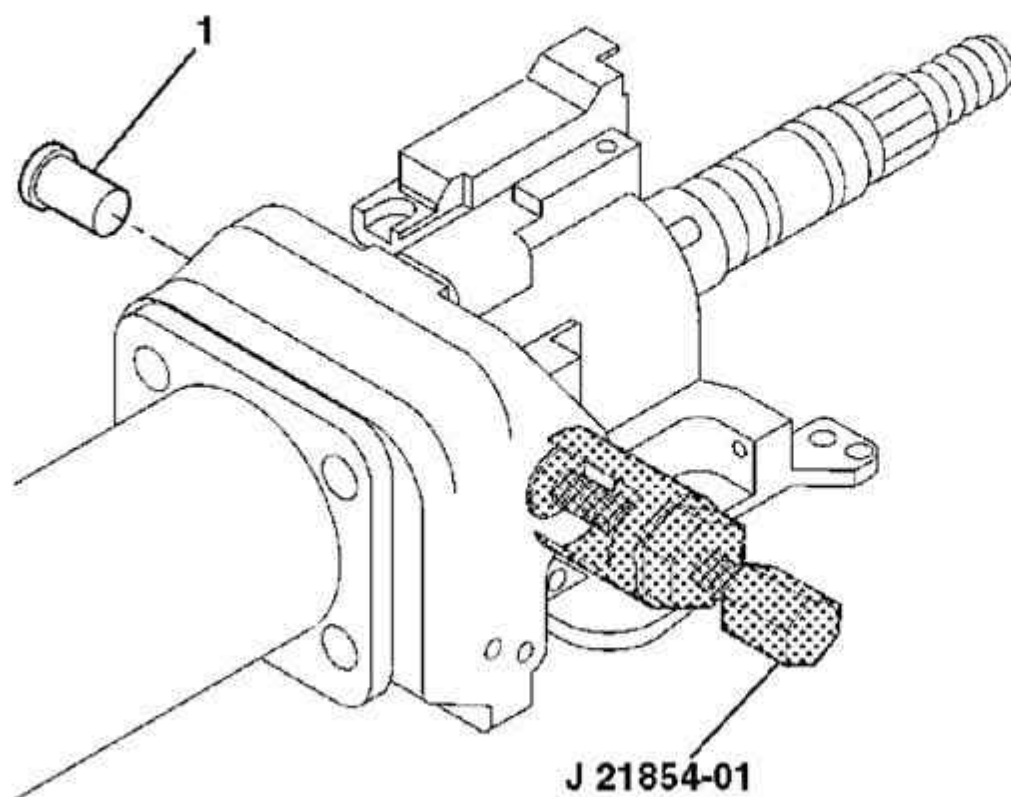


Fig. 60: Identifying J 21854-01 & Pivot Pins
Courtesy of GENERAL MOTORS CORP.

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

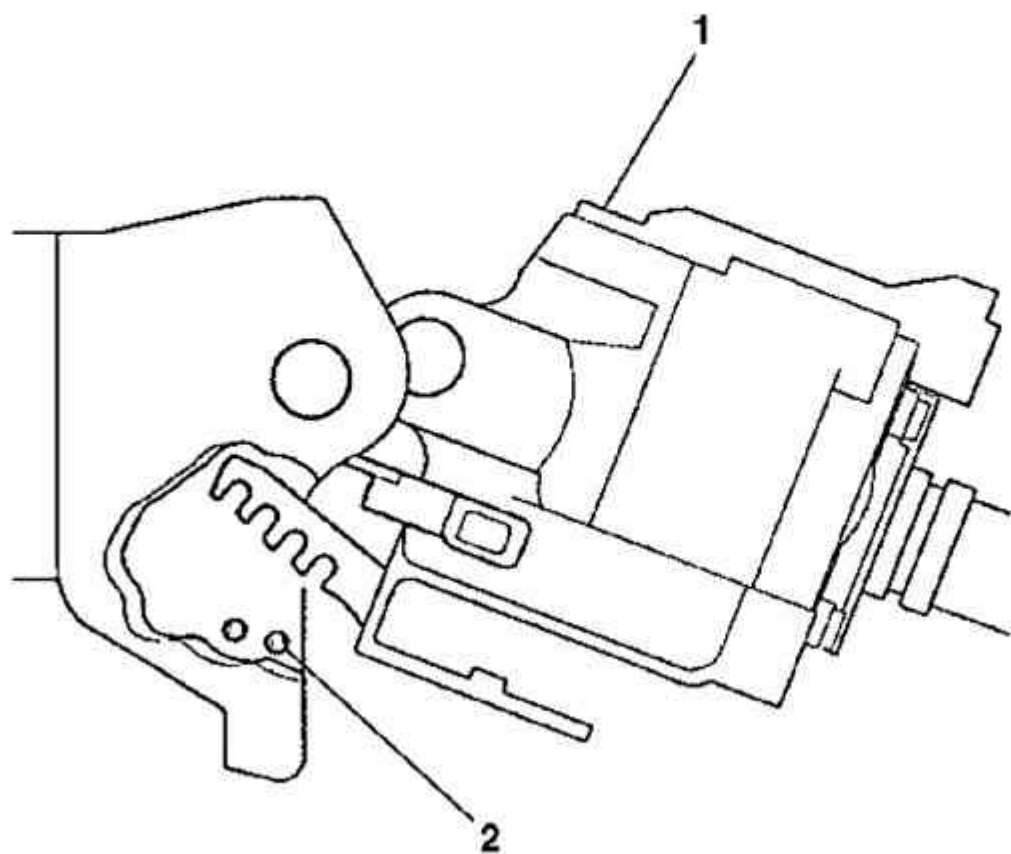


Fig. 61: Identifying Dowel Pins
Courtesy of GENERAL MOTORS CORP.

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

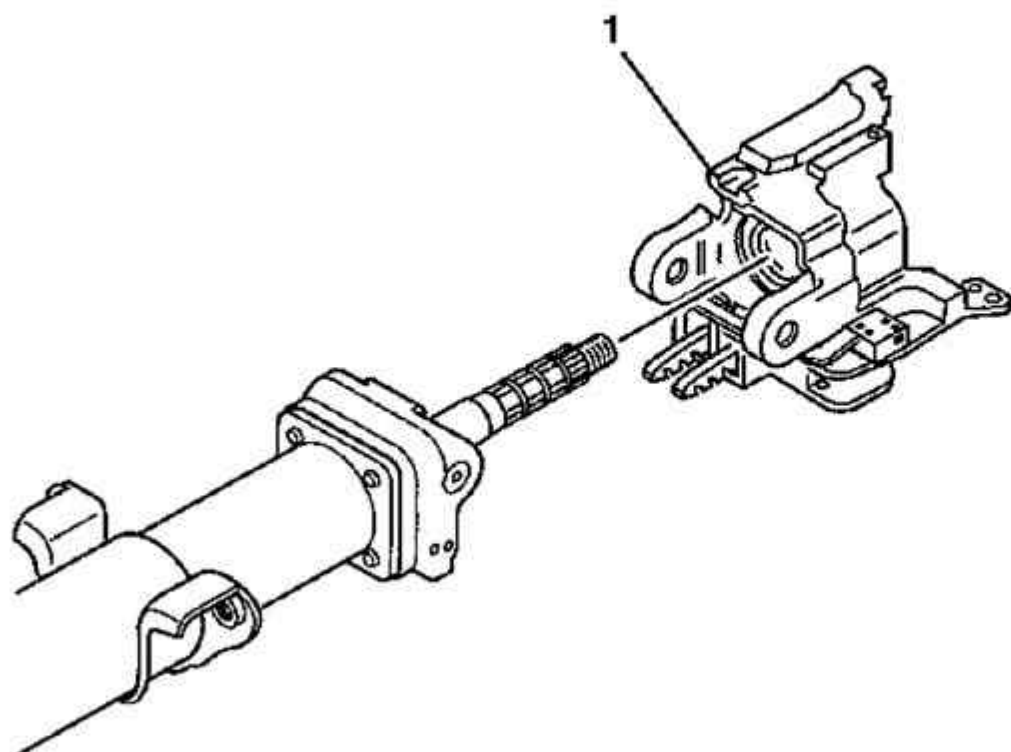


Fig. 62: View Of Steering Column Housing And Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

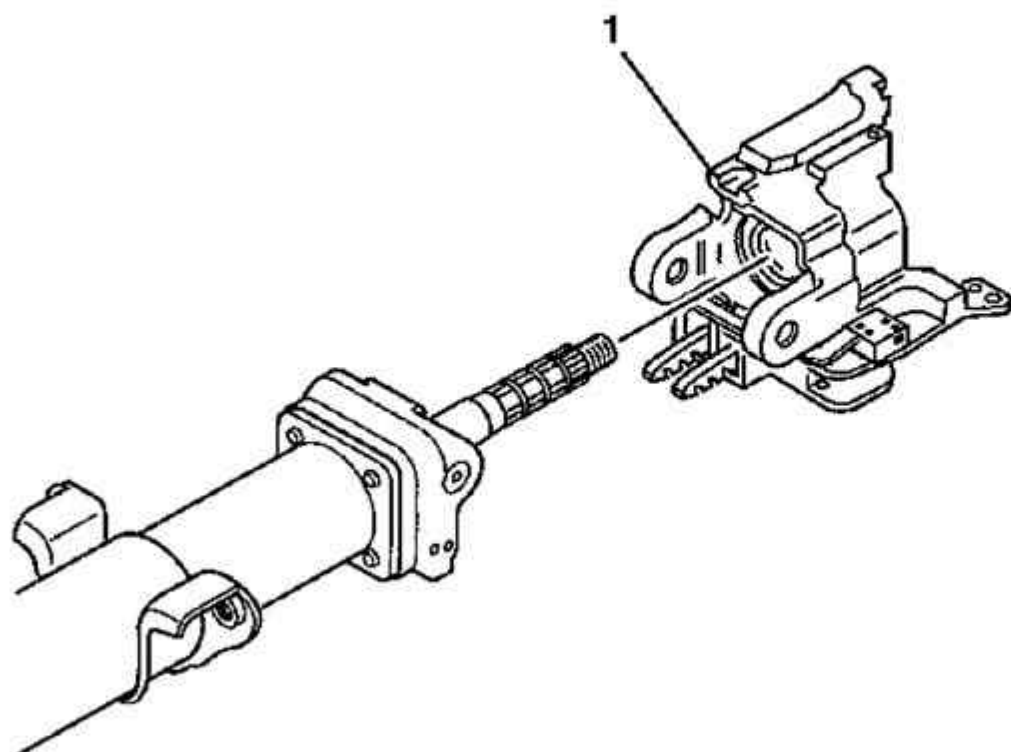


Fig. 63: View Of Steering Column Housing And Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

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

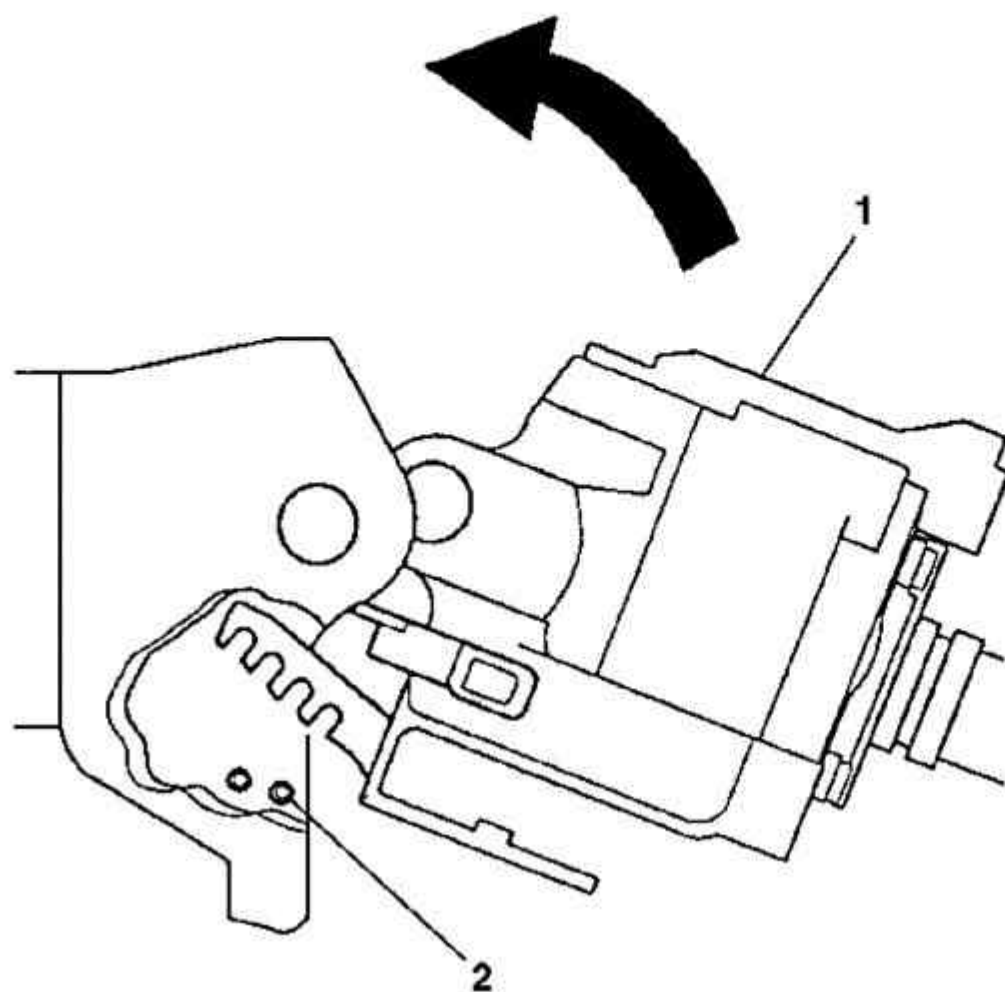


Fig. 64: Locking Shoes To Dowel Pins
Courtesy of GENERAL MOTORS CORP.

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

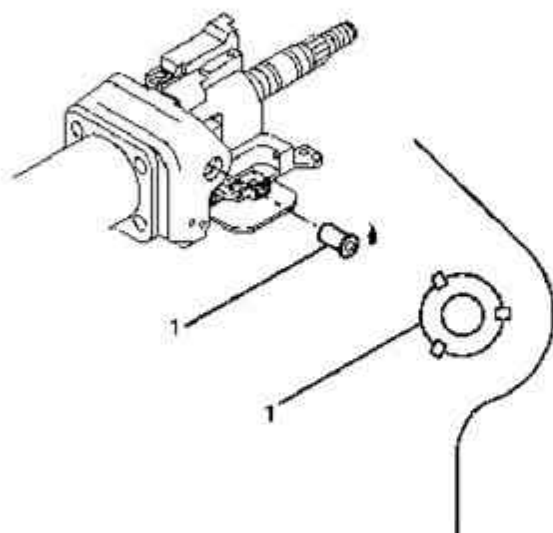


Fig. 65: View Of Pivot Pins At Steering Column Assembly
Courtesy of GENERAL MOTORS CORP.

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

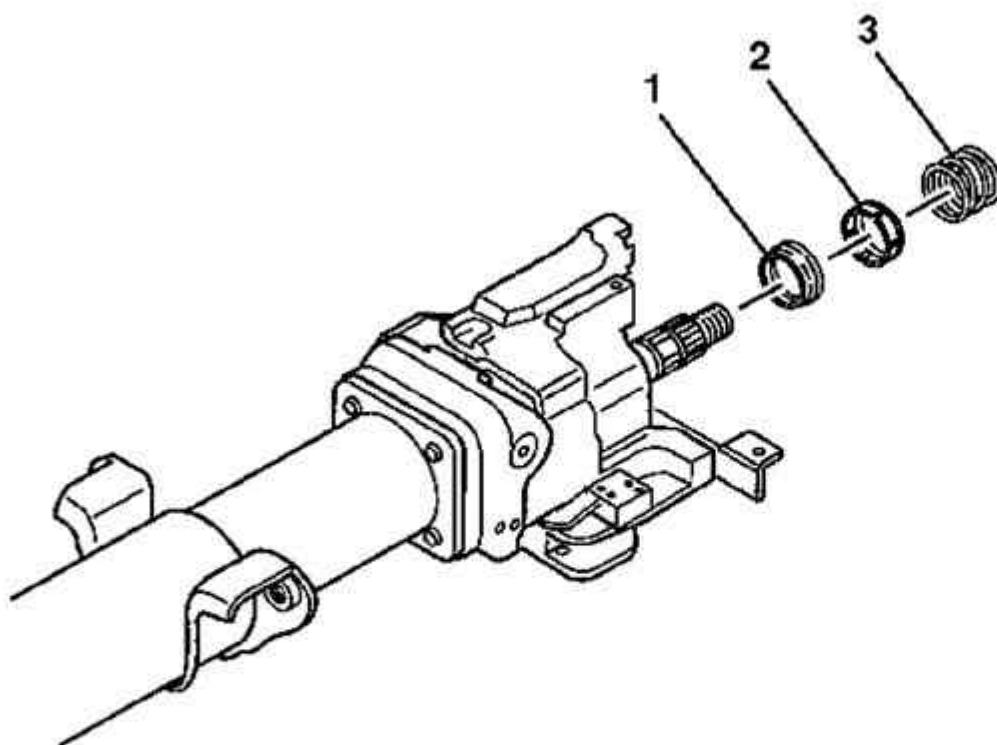


Fig. 66: View Of Upper Bearing Spring, Inner Race Seat & Inner Race

Courtesy of GENERAL MOTORS CORP.

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

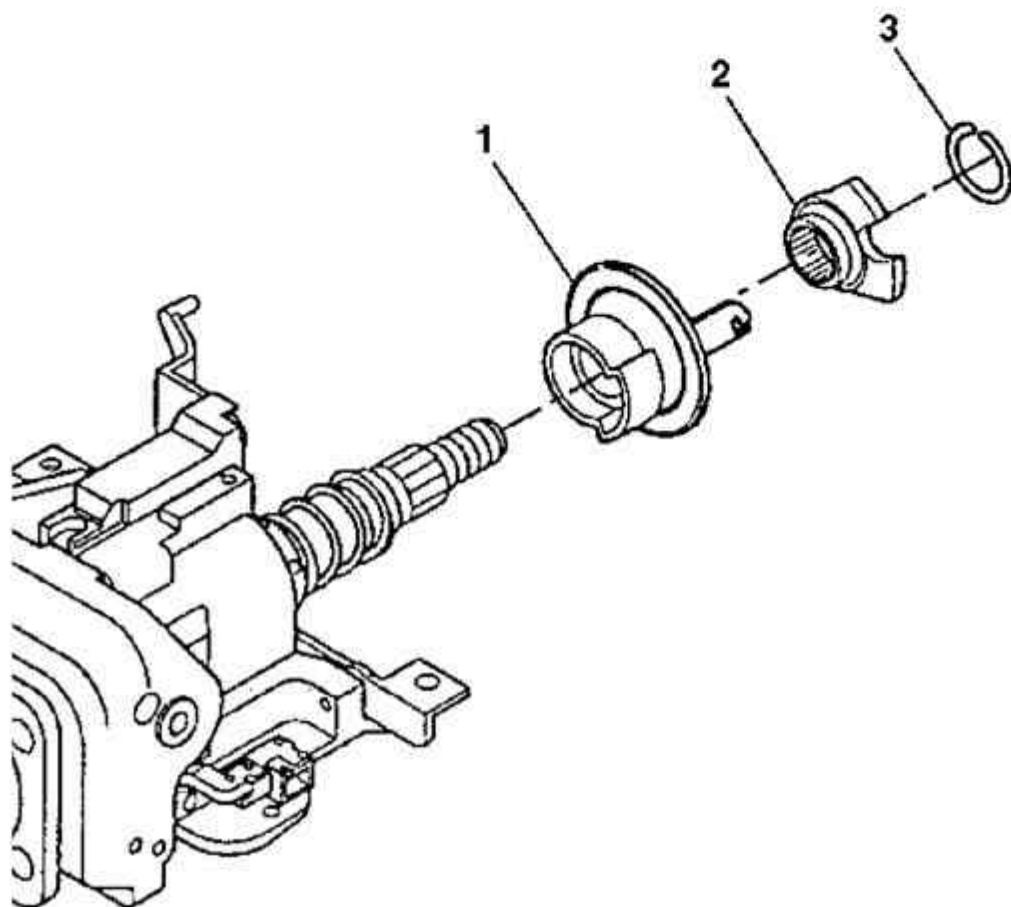


Fig. 67: View Of Turn Signal Cancel Cam Assembly, Cam Orientation Plate & Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

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

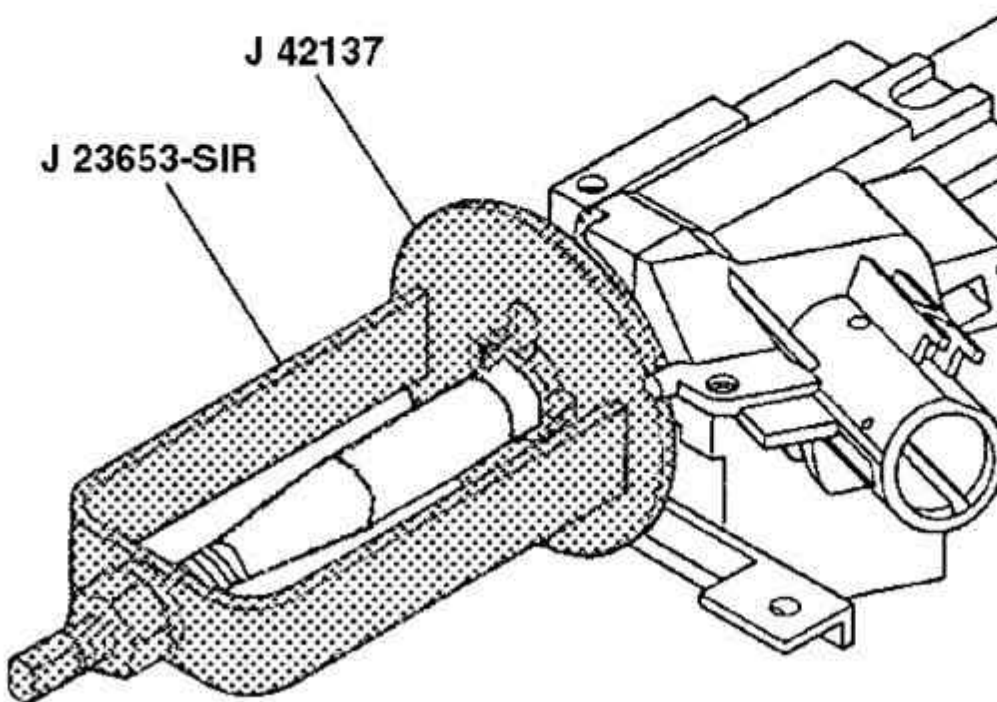


Fig. 68: Compressing Cam Orientation Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

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

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

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

STEERING COLUMN REPLACEMENT

Tools Required

- **J 41352** Modular Column Holding Fixture. See Special Tools.
- **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 Steering Wheel Replacement procedure in this section.

NOTE: Do not support the steering column by only the lower or upper support bracket. Damage to the column lower bearing adapter could result.

IMPORTANT: In the event of a deployment, inspect the coil wire for any of the following signs of damage due to excessive heat:

- Scorching
- Melting
- Other damage

Replace the coil, if necessary.

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

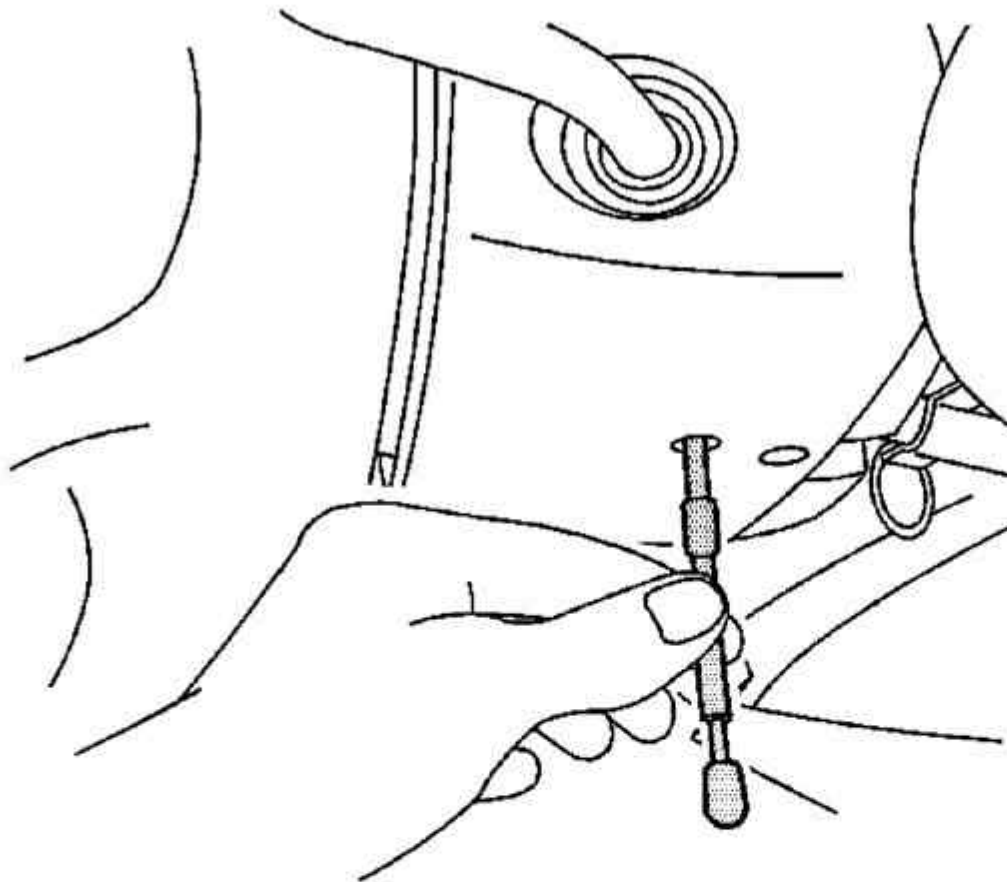


Fig. 69: Identifying Special Tool - J 42640
Courtesy of GENERAL MOTORS CORP.

1. Insert **J 42640** into the steering column access hole in order to lock the steering column. This will maintain the correct orientation.
2. Disable the SIR system. Refer to **SIR Disabling and Enabling**.
3. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection (L26)** or **Battery Negative Cable Disconnection and Connection (LY7)** or **Battery Negative Cable Disconnection and Connection (LS4)**.
4. Remove the inflatable restraint steering wheel module. Refer to **Inflatable Restraint Steering Wheel Module Replacement**.
5. Remove the steering wheel. Refer to **Steering Wheel Replacement**.
6. Remove the left instrument panel insulator. Refer to **Instrument Panel Insulator Panel Replacement - Left Side**.
7. Remove the trim panel below the steering column. Refer to **Steering Column Opening Filler Replacement**.
8. Remove the knee bolster. Refer to **Driver Knee Bolster Replacement**.
9. Remove the intermediate steering shaft from the steering column. Refer to **Intermediate Steering Shaft Replacement**.

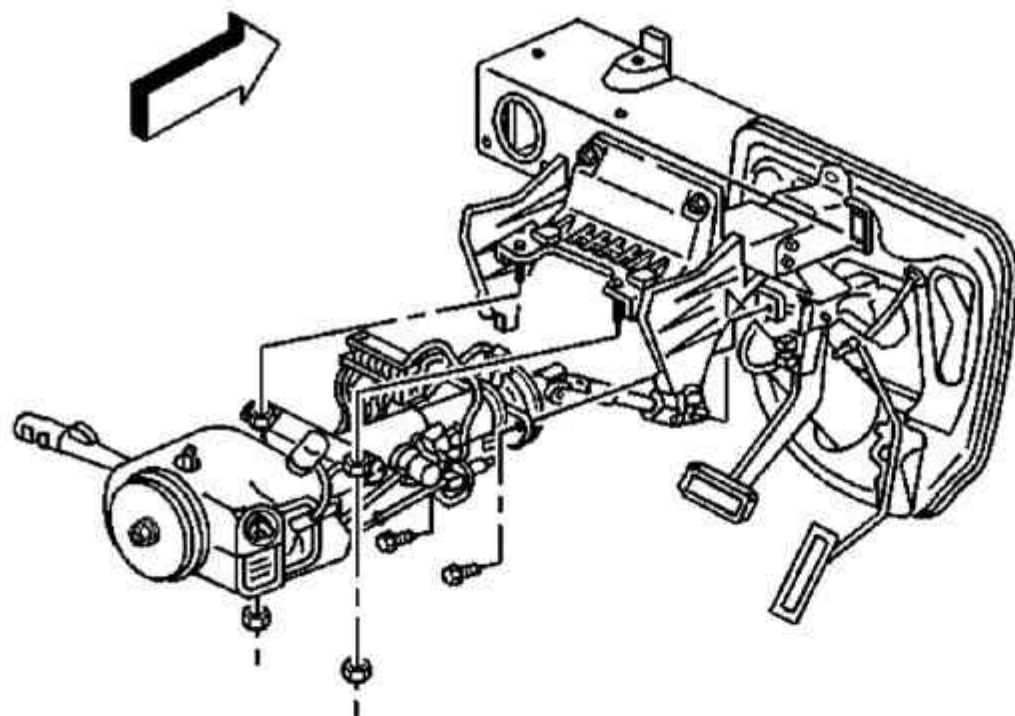


Fig. 70: View Of Upper Steering Column & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

10. Remove the mounting bolts from the lower steering column.
11. Remove the mounting bolts from the upper steering column.
12. Disconnect the steering column electrical connectors.
13. Loosen the bolt from the steering column electrical connector.
14. Separate the two halves of the steering column electrical connector.

IMPORTANT: You may have to spread the coupling clamp with a flat bladed tool in order

to withdraw the steering shaft.

15. Remove the steering column.

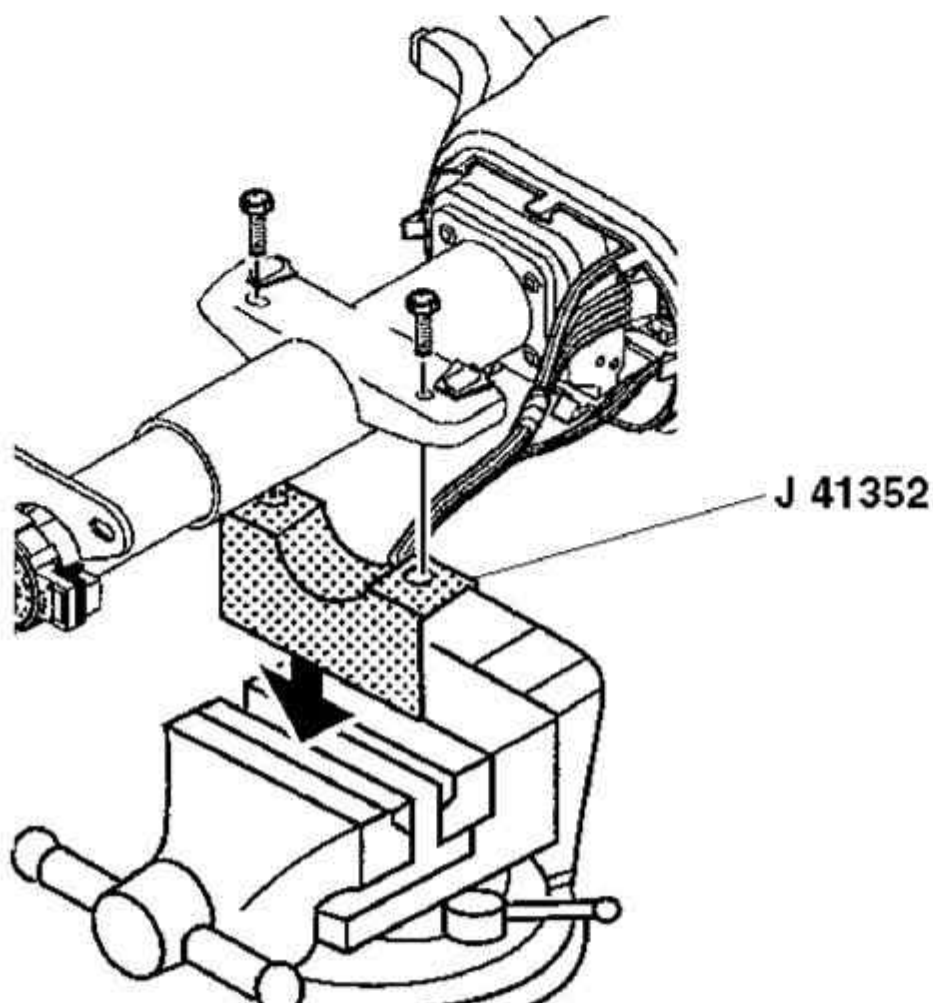


Fig. 71: Removing/Installing Steering Column On/Off J 41352
Courtesy of GENERAL MOTORS CORP.

16. Install the steering column onto J 41352 . See Special Tools.

Installation Procedure

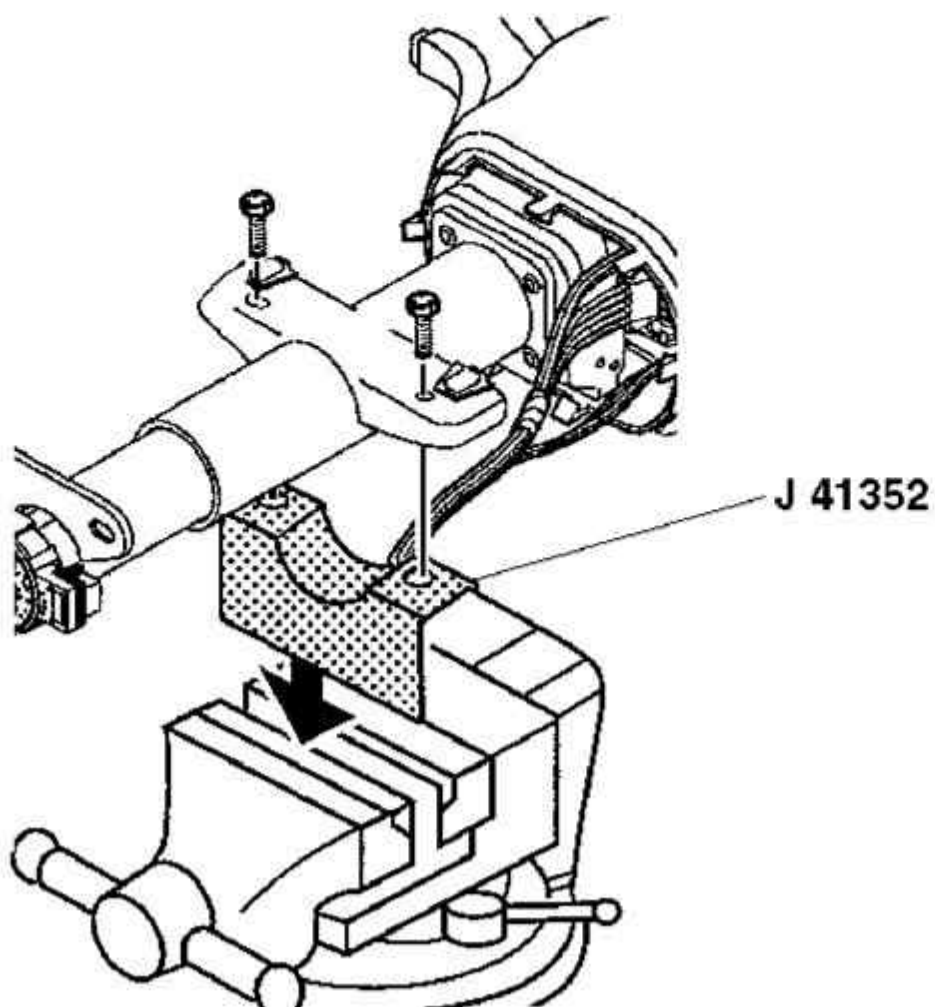


Fig. 72: Removing/Installing Steering Column On/Off J 41352
Courtesy of GENERAL MOTORS CORP.

1. Remove the steering column from J 41352 . See Special Tools.

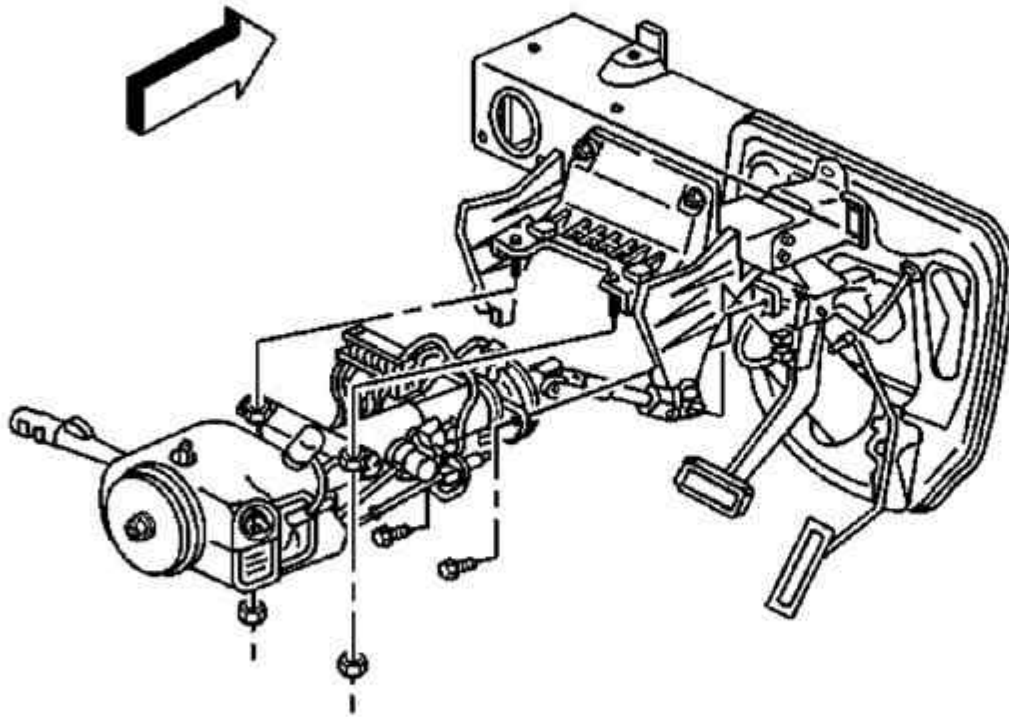


Fig. 73: View Of Upper Steering Column & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

2. Position the steering column.
3. Insert the lower end of the steering column shaft into the intermediate steering shaft coupling.
4. Connect the steering column electrical connectors.
5. Tighten the electrical connector bolt in order to draw the 2 halves of the electrical connectors together.

CAUTION: When installing the steering column to the intermediate shaft, make sure that the shaft is seated prior to pinch bolt installation. If the bolt is inserted into the coupling before shaft installation, the two mating shafts may disengage.

CAUTION: In order to ensure the intended function of the steering column in a vehicle during a crash and in order to avoid personal injury to the driver, perform the following:

- Tighten the steering column lower fasteners before you tighten the steering column upper fasteners. Failure to do this can damage the steering column.
- Tighten the steering column fasteners to the specified torque. Overtightening the upper steering column fasteners could affect the steering column collapse.

NOTE: Refer to Fastener Notice .

6. Loosely install the bolts to the upper and the lower steering column.

Tighten:

1. Tighten the right side lower bolt to 24 N.m (18 lb ft).
2. Tighten the left side lower bolt to 24 N.m (18 lb ft).
3. Tighten the left side upper bolt to 24 N.m (18 lb ft).
4. Tighten the right side upper bolt to 24 N.m (18 lb ft).
7. Install the intermediate steering shaft to the steering column. Refer to **Intermediate Steering Shaft Replacement**.
8. Pull the intermediate steering shaft seal up over the lower column in order to lock the seal into place.
9. Install the knee bolster. Refer to **Driver Knee Bolster Replacement**.
10. Install the trim panel below the steering column. Refer to **Steering Column Opening Filler Replacement**.
11. Install the left instrument panel insulator. Refer to **Instrument Panel Insulator Panel Replacement - Left Side**.
12. Install the steering wheel. Refer to **Steering Wheel Replacement**.
13. Install the inflatable restraint steering wheel module. Refer to **Inflatable Restraint Steering Wheel Module Replacement**.
14. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection (L26)** or **Battery Negative Cable Disconnection and Connection (LY7)** or **Battery Negative Cable Disconnection and Connection (LS4)**.
15. Enable the SIR system. Refer to **SIR Disabling and Enabling**.
16. Inspect all of the column components for the correct operation.

STEERING WHEEL POSITION SENSOR OR STEERING SHAFT LOWER BEARING REPLACEMENT

Removal Procedure

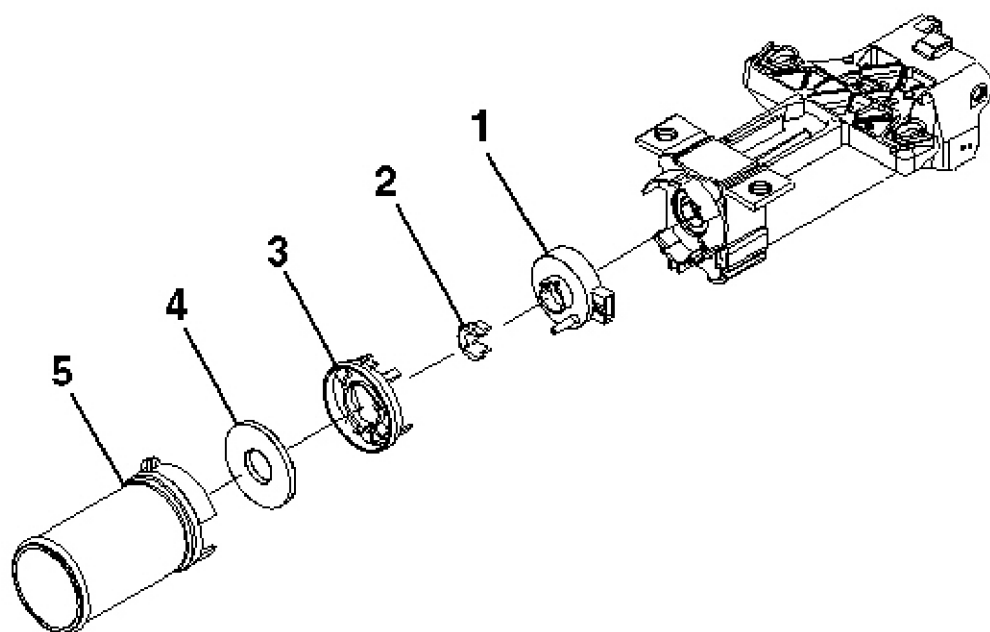


Fig. 74: Identifying Lower Steering Column Components
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to **SIR Caution**.

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

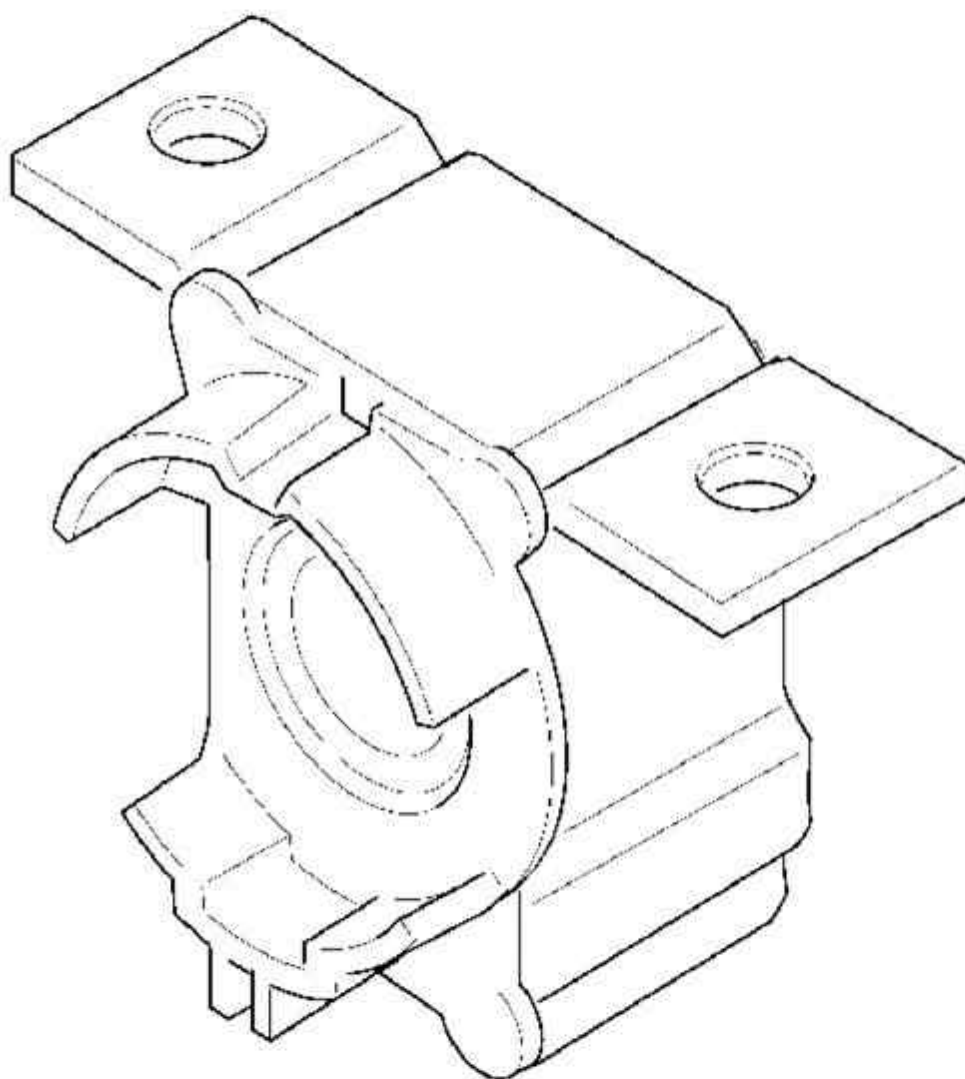


Fig. 75: View Of Lower Bearing Adapter
Courtesy of GENERAL MOTORS CORP.

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

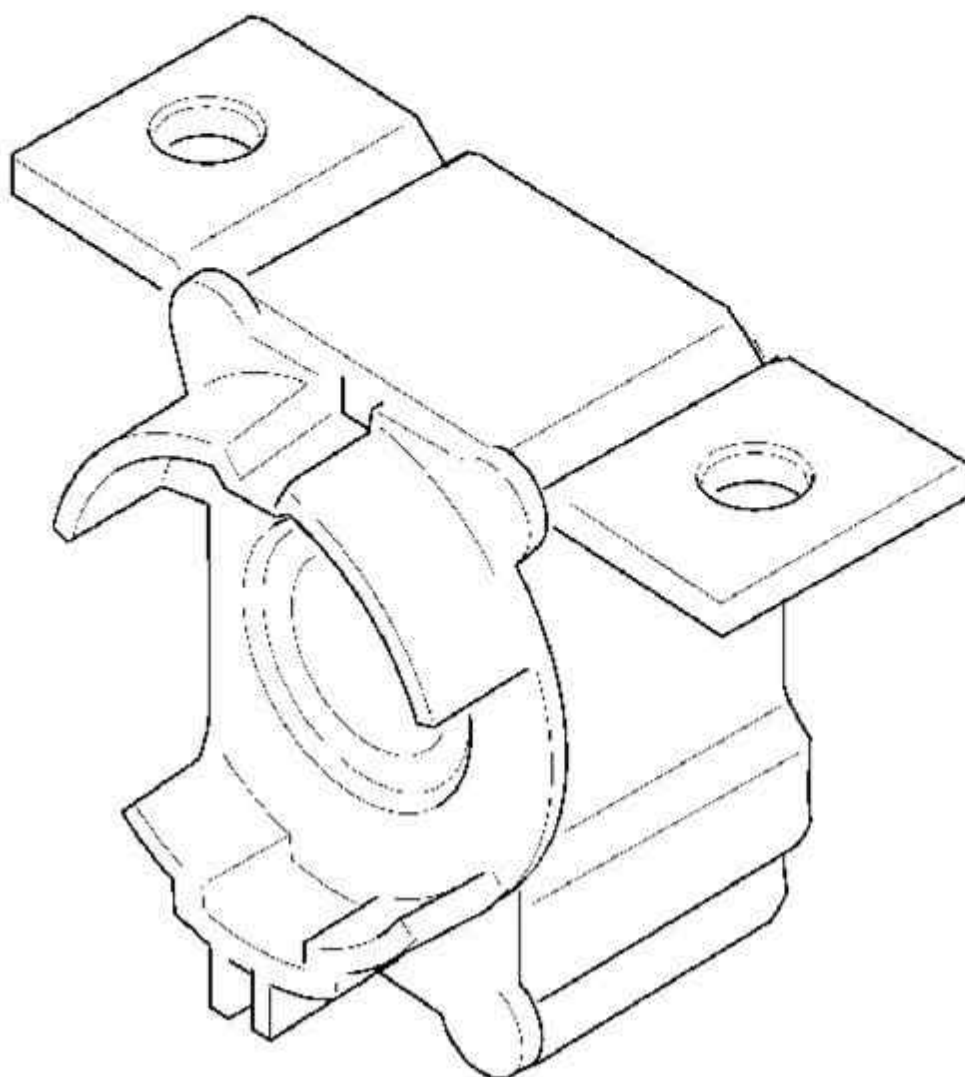


Fig. 76: View Of Lower Bearing Adapter
Courtesy of GENERAL MOTORS CORP.

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

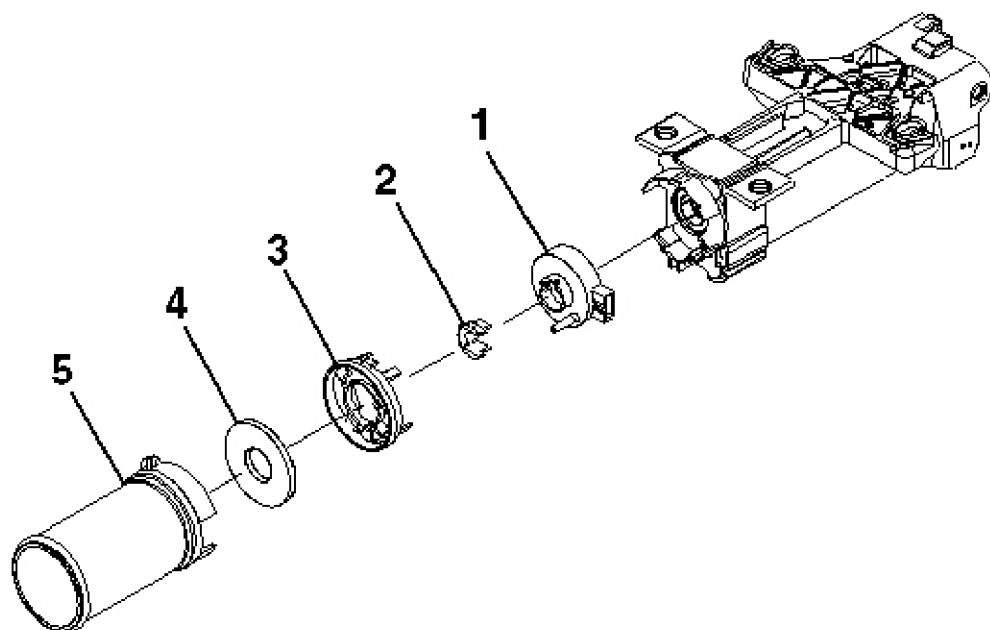


Fig. 77: Identifying Lower Steering Column Components
Courtesy of GENERAL MOTORS CORP.

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

STEERING WHEEL POSITION SENSOR CENTERING

Removal Procedure

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

1. Verify the type of steering wheel position sensor.

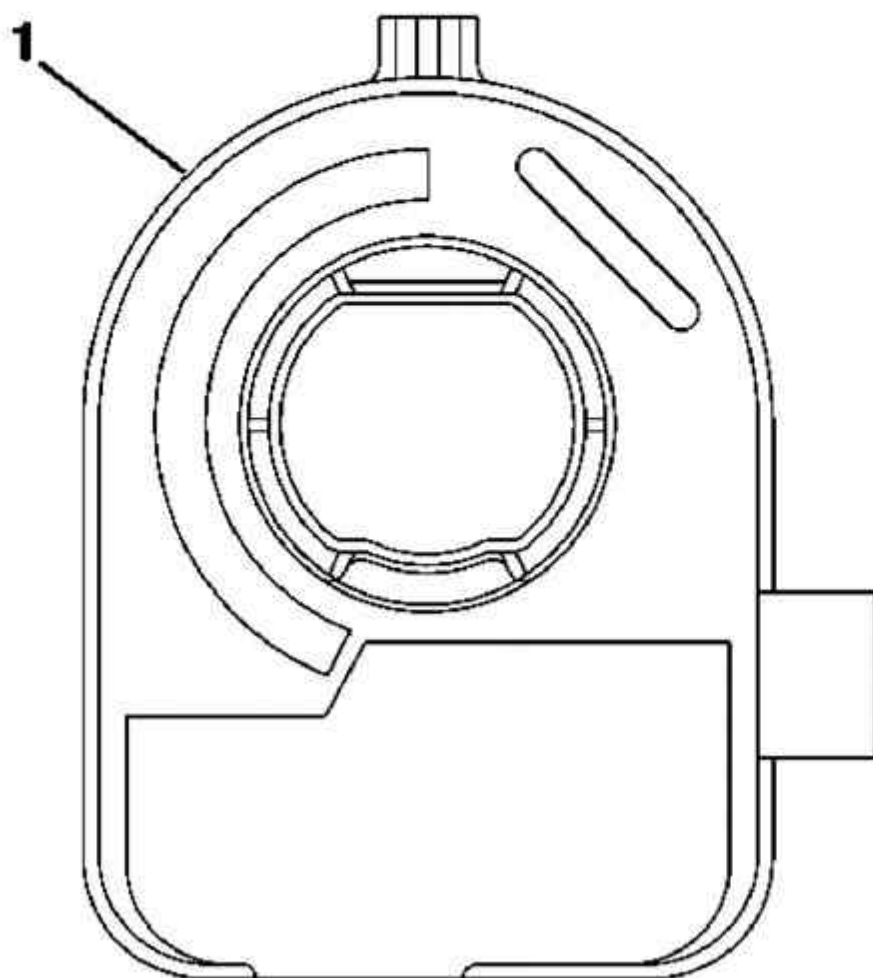


Fig. 78: Identifying Front Of Sensor Connector
Courtesy of GENERAL MOTORS CORP.

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

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

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

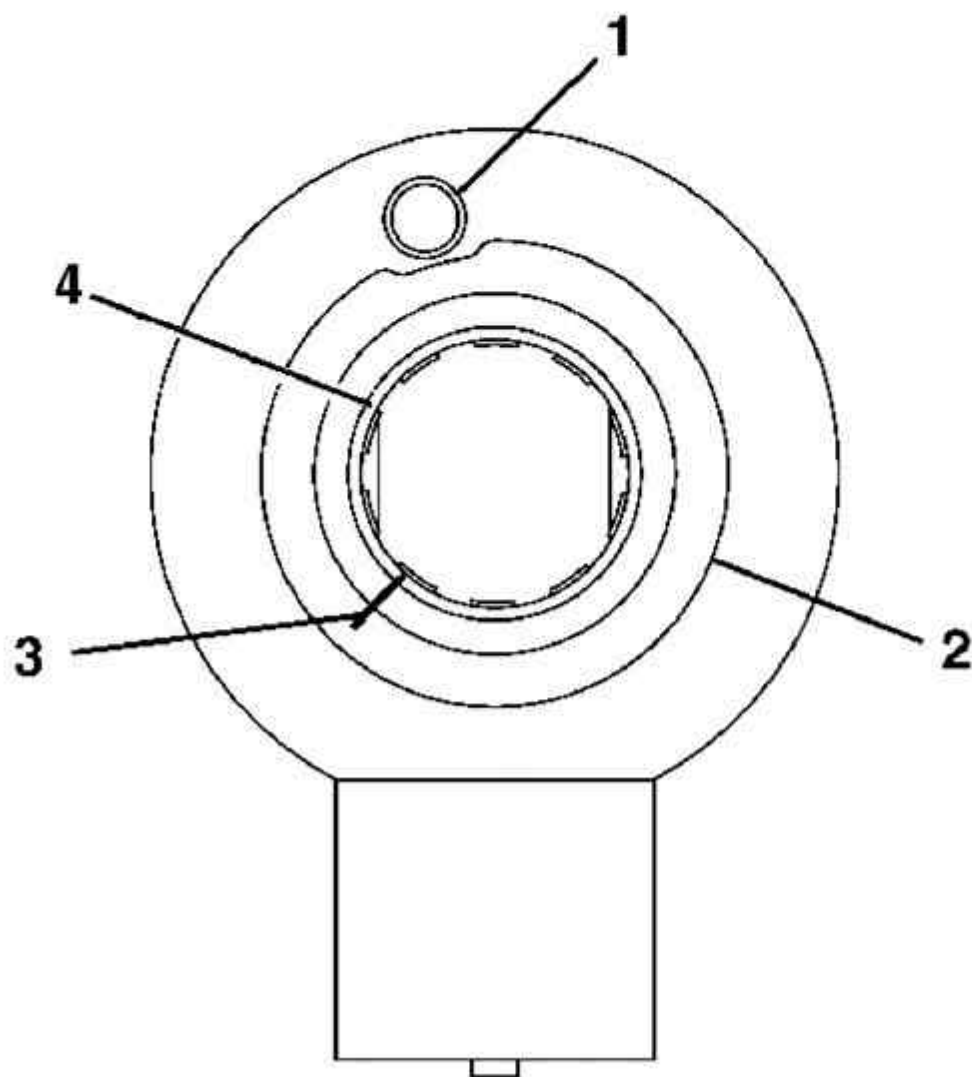


Fig. 79: View Of Steering Wheel Position Sensor Foam Ring, Pin Hole & Rotor Flange Cuff
Courtesy of GENERAL MOTORS CORP.

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

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

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

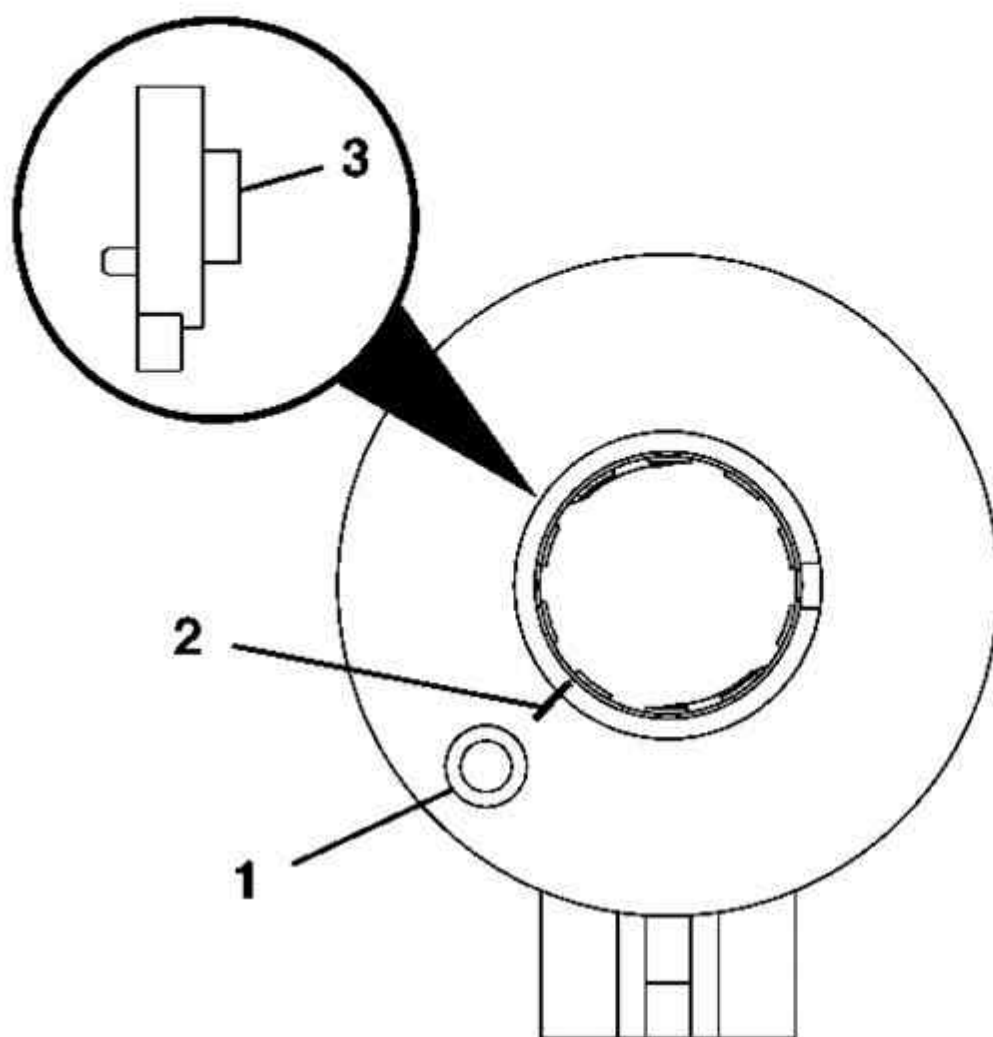


Fig. 80: Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

11. From the technicians point of view, the FRONT of the sensor will have:
 - A raised rotor flange cuff (3)
 - An alignment mark (2) on the rotor flange cuff (3) for installation
 - A pin hole (1) for the centering pin-Note the location of the pin hole.
12. Remove the connector from the sensor.
13. Remove the sensor from the adapter and bearing assembly.
14. To install the sensor, proceed to step 9 in the installation procedure.

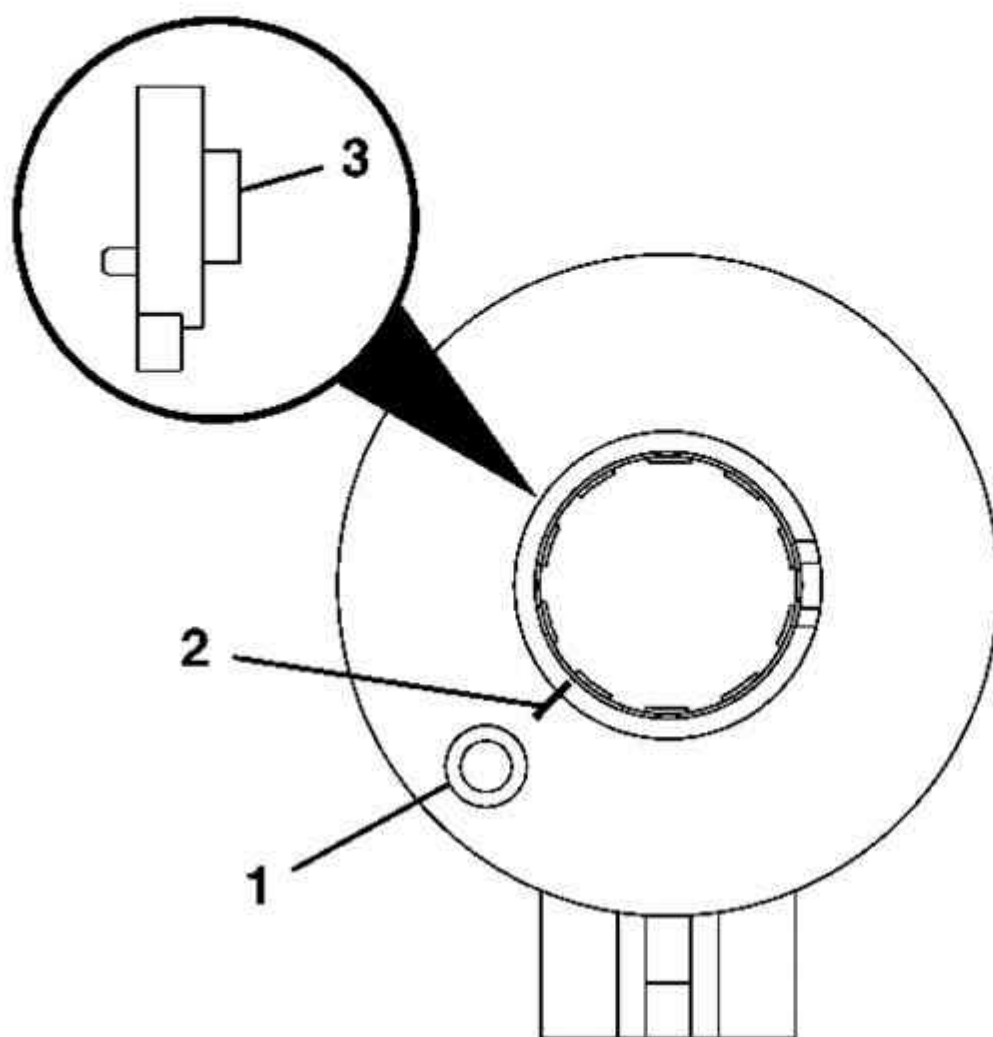


Fig. 81: Identifying Steering Wheel Position Sensor Alignment Mark
Courtesy of GENERAL MOTORS CORP.

15. From the technicians point of view, the FRONT of the sensor will have:
 - A raised rotor flange cuff (3)
 - An alignment mark (2) on the rotor flange cuff (3) for installation
 - A pin hole (1) for the centering pin-Note location of the pin hole.
 - A sensor clip in FRONT of the sensor
16. Remove the connector from the sensor.
17. Remove the sensor clip from the sensor.
18. Remove the sensor from the adapter and bearing assembly.
19. To install the sensor, proceed to step 13 in the installation procedure.

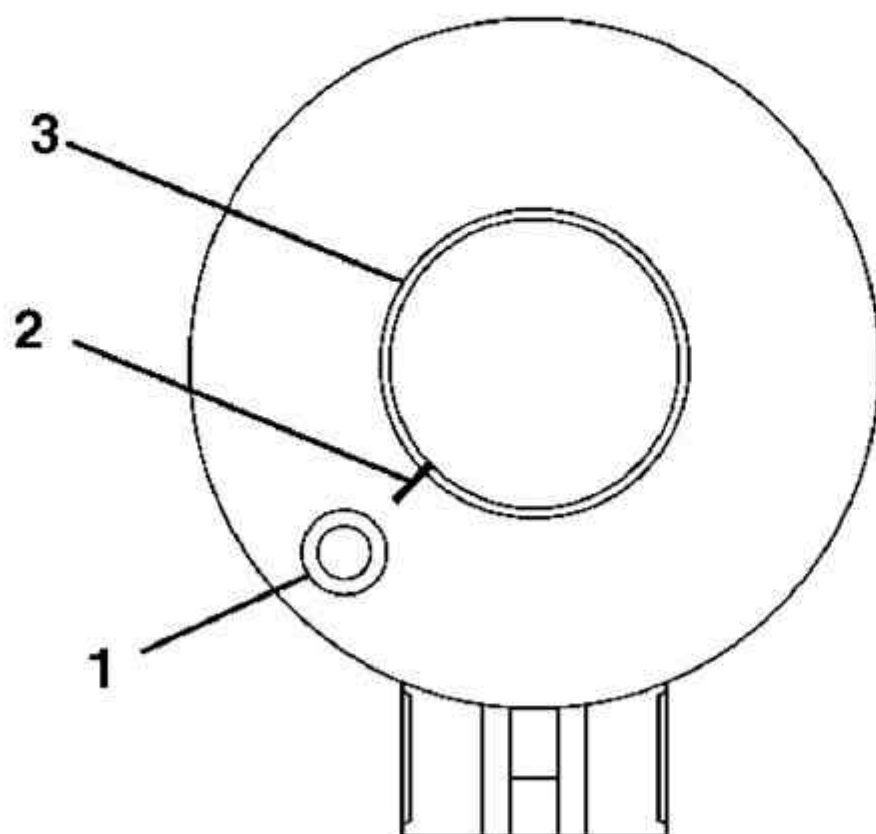


Fig. 82: Identifying Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole & Alignment Mark

Courtesy of GENERAL MOTORS CORP.

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

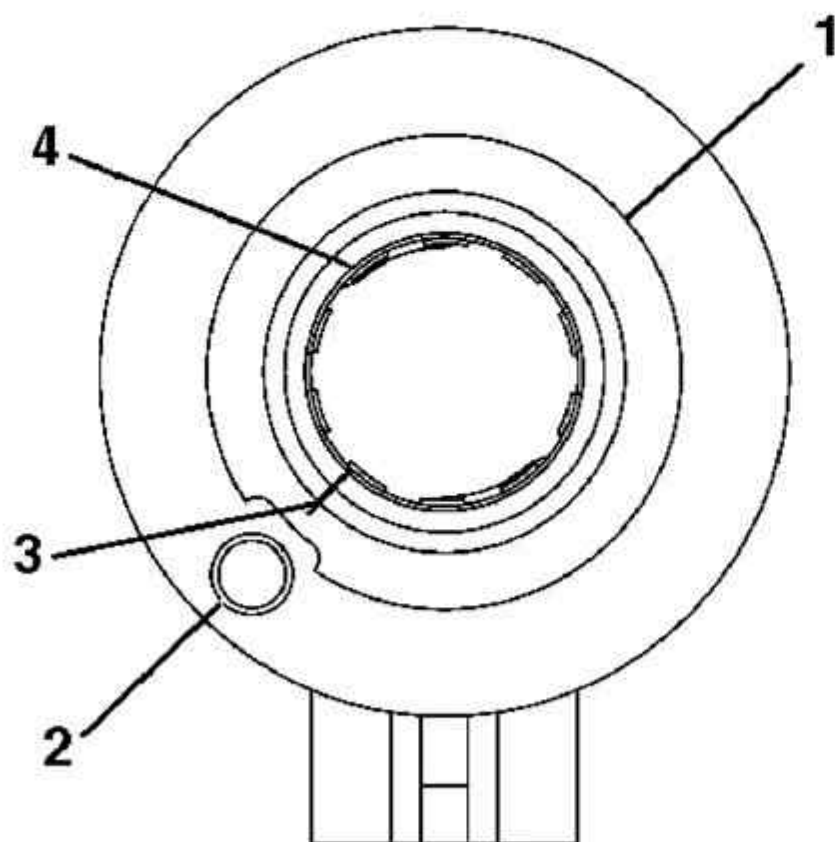


Fig. 83: Identifying Steering Wheel Position Sensor Rotor Flange Cuff, Centering Pin Hole, Alignment Mark & Foam Ring
Courtesy of GENERAL MOTORS CORP.

24. From the technicians point of view, the FRONT of the sensor will have:
 - A flush rotor flange cuff (4)
 - A pin hole (2) for the centering pin-Note the location of the pin hole.
 - An alignment mark (3) on the flush rotor flange cuff (4) for installation
 - A foam ring (1)
25. Remove the connector from the sensor.
26. Remove the sensor from the adapter and bearing assembly.
27. To install the sensor, proceed to step 21 in the installation procedure.

Installation Procedure

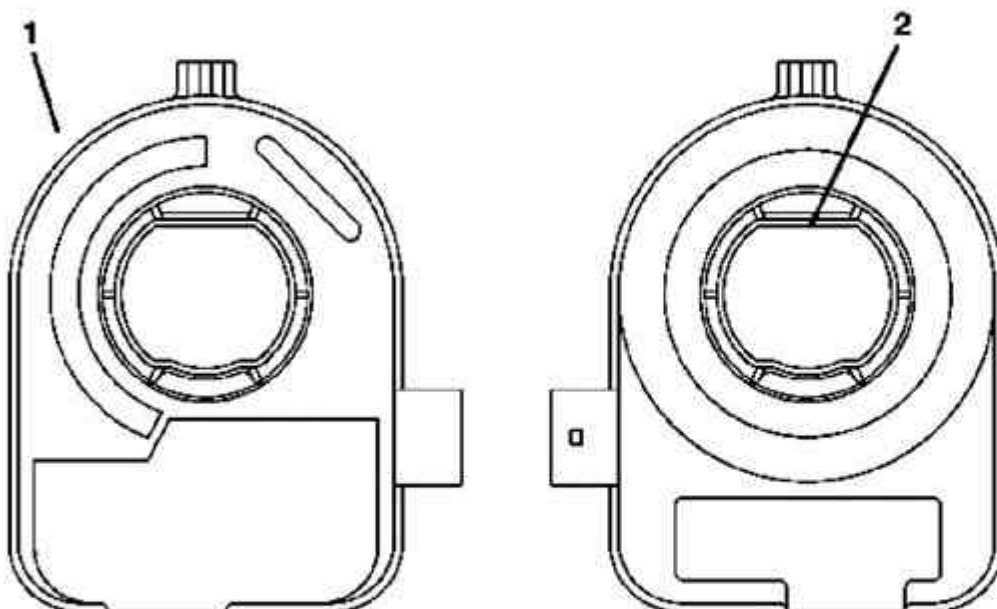


Fig. 84: Identifying Front & Back Views Of Steering Wheel Position Sensor
Courtesy of GENERAL MOTORS CORP.

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

1. If installing a new sensor, it will come with a pin installed in the sensor. Do not remove the pin until the sensor is seated.
2. From the technicians point of view, the FRONT of the sensor (1) connector will be on your right.

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

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

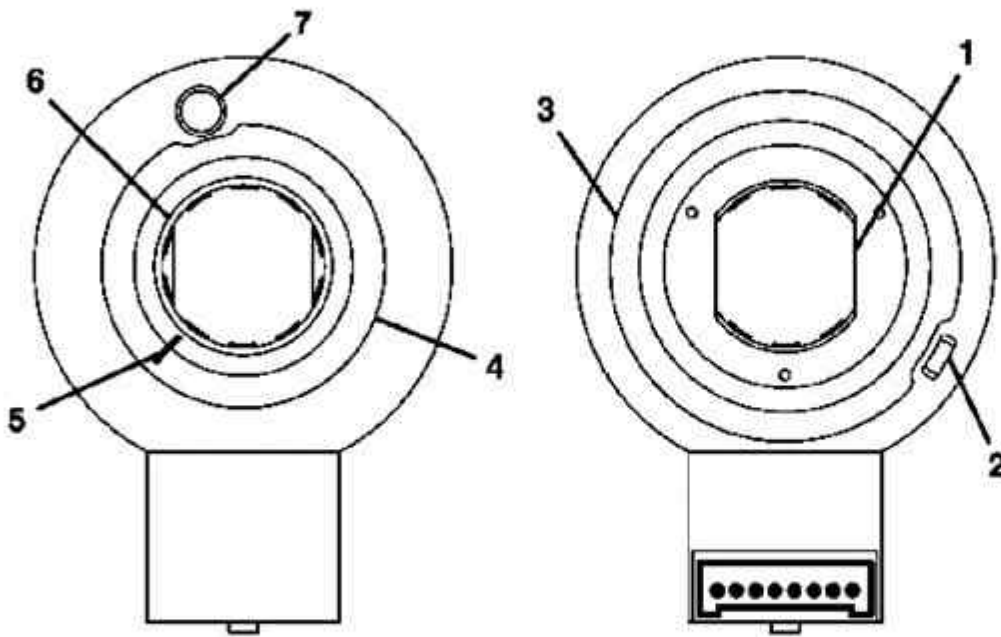


Fig. 85: View Of Steering Wheel Position Sensor Identification Points
Courtesy of GENERAL MOTORS CORP.

5. From the technicians point of view, the FRONT of the sensor will have:
 - A foam ring (4)
 - A pin hole (7) for the centering pin-Note the location of the pin hole.
 - A flushed rotor flange cuff (6)
 - An alignment mark (5) for installation
6. From the technicians point of view, the BACK of the sensor will have:
 - Double D flats (1)
 - A foam ring (3)
 - An alignment tab (2) for installing into the adapter and bearing assembly
 - A view of the inside of the connector

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

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

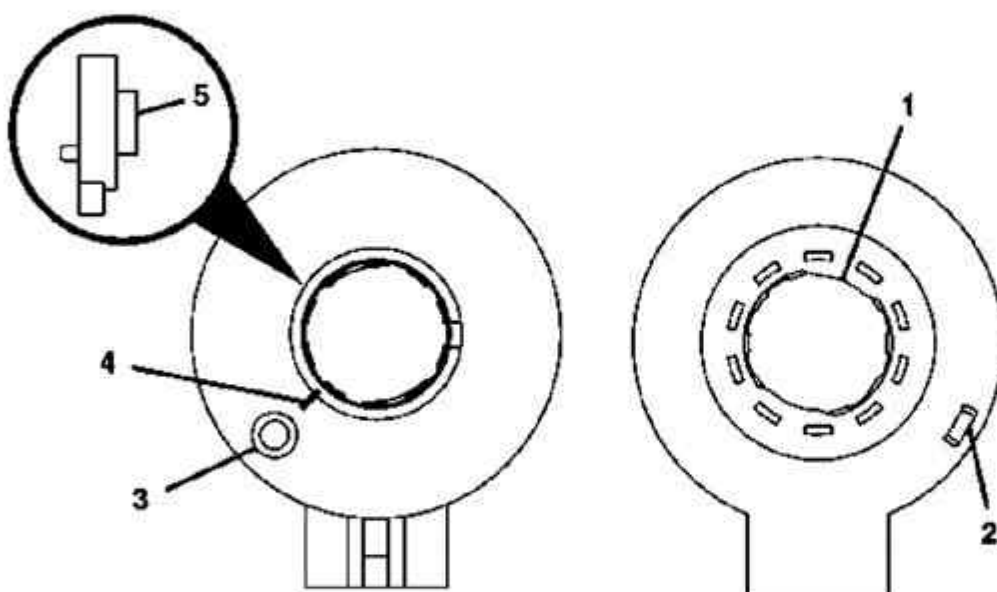


Fig. 86: Front View Of Steering Wheel Position Sensor
Courtesy of GENERAL MOTORS CORP.

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

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

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

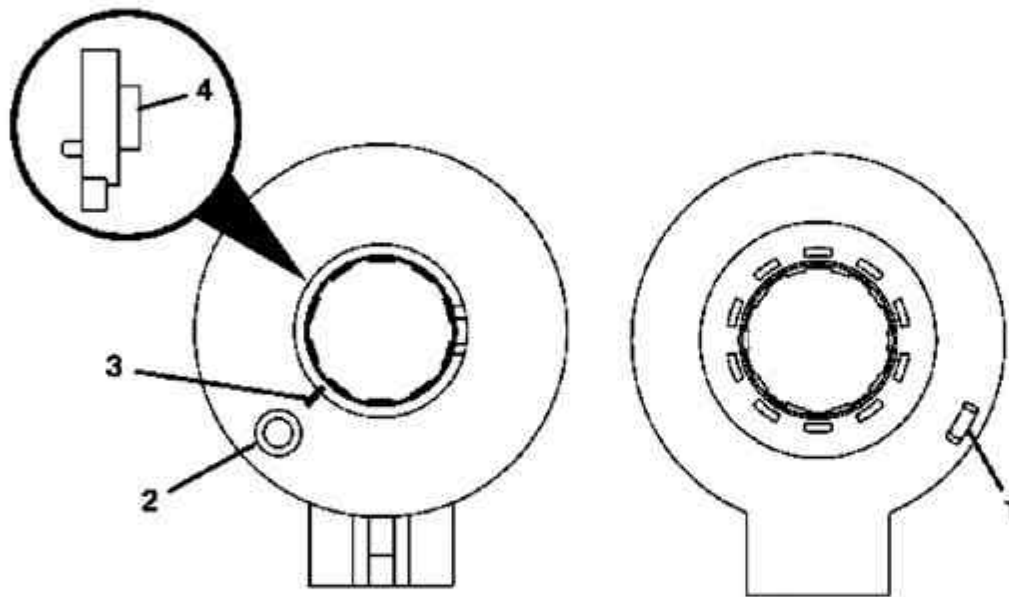


Fig. 87: Identifying Steering Wheel Position Sensor Centering Pin Hole, Rotor Flange Cuff & Alignment Mark

Courtesy of GENERAL MOTORS CORP.

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

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

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

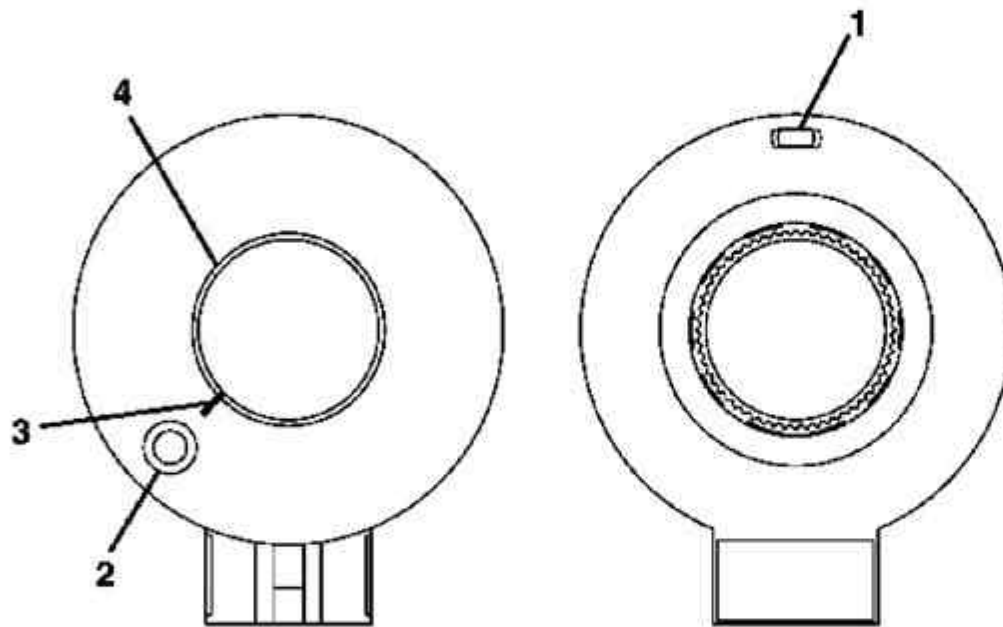


Fig. 88: Identifying Steering Wheel Position Sensor Center Pin, Rotor Flange Cuff & Installation Alignment Mark

Courtesy of GENERAL MOTORS CORP.

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

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

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

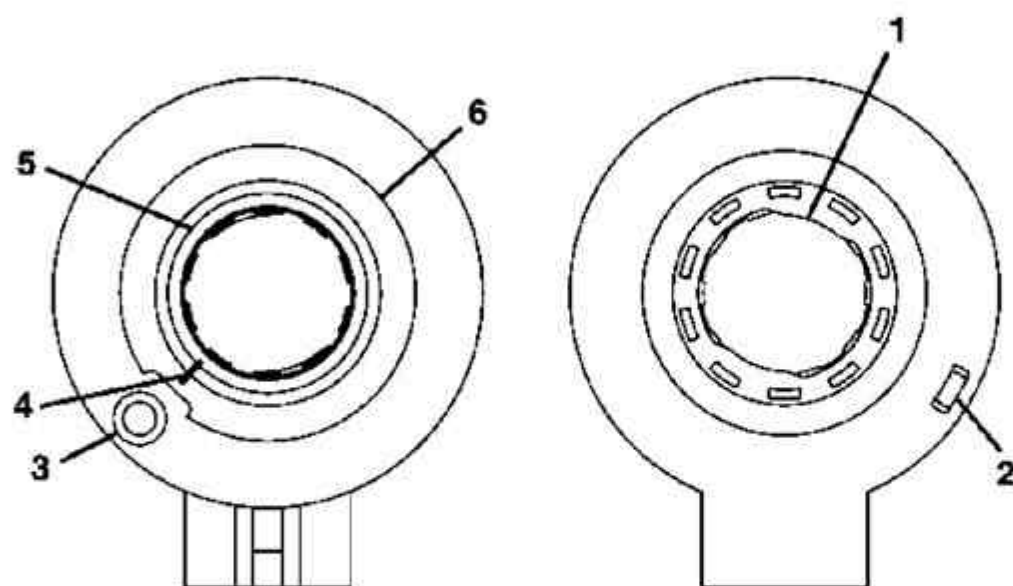


Fig. 89: Identifying Steering Wheel Position Sensor Double D Flats
 Courtesy of GENERAL MOTORS CORP.

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

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

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

STEERING SHAFT, LOWER BEARING, AND JACKET REPLACEMENT

Tools Required

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

Removal Procedure

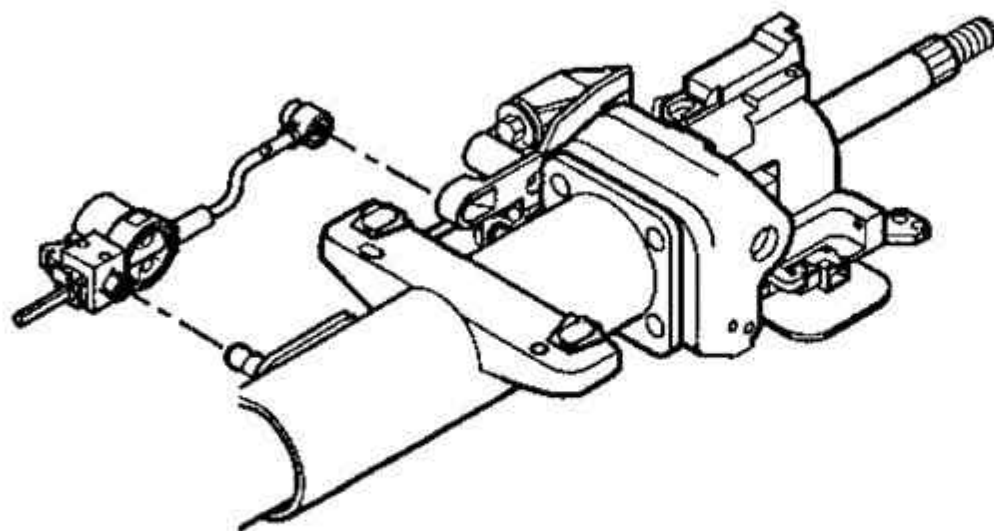


Fig. 90: View Of Automatic Transmission Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

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

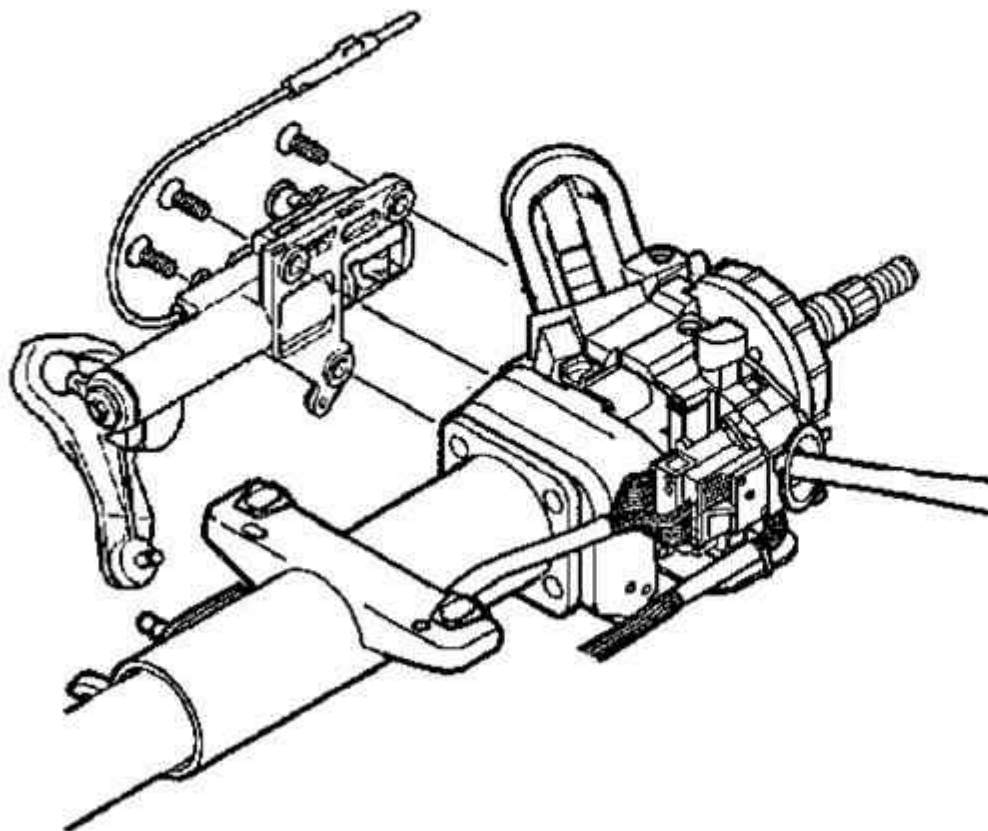


Fig. 91: View Of Linear Shift Assembly & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

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

Remove the linear shift assembly.

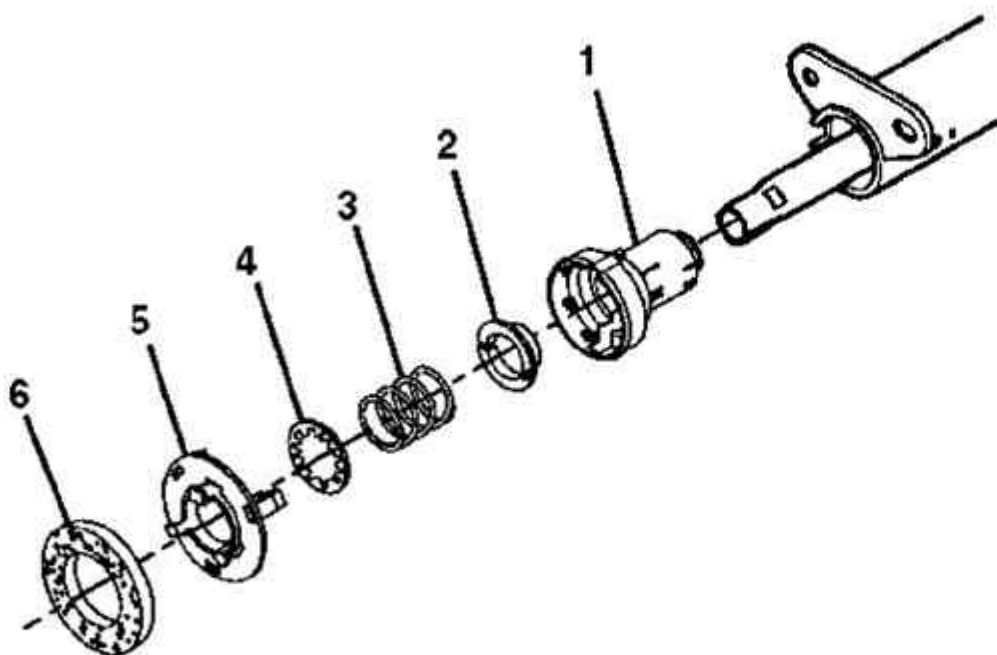


Fig. 92: Locating Steering Shaft Assembly Components
Courtesy of GENERAL MOTORS CORP.

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

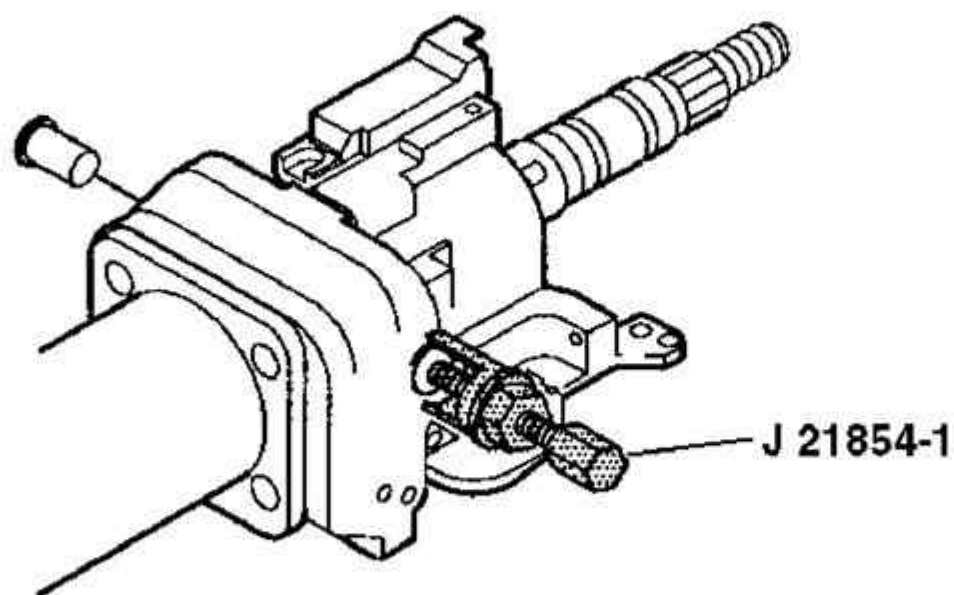


Fig. 93: Removing 2 Pivot Pins From Steering Column Support Assembly With J 21854-01
Courtesy of GENERAL MOTORS CORP.

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

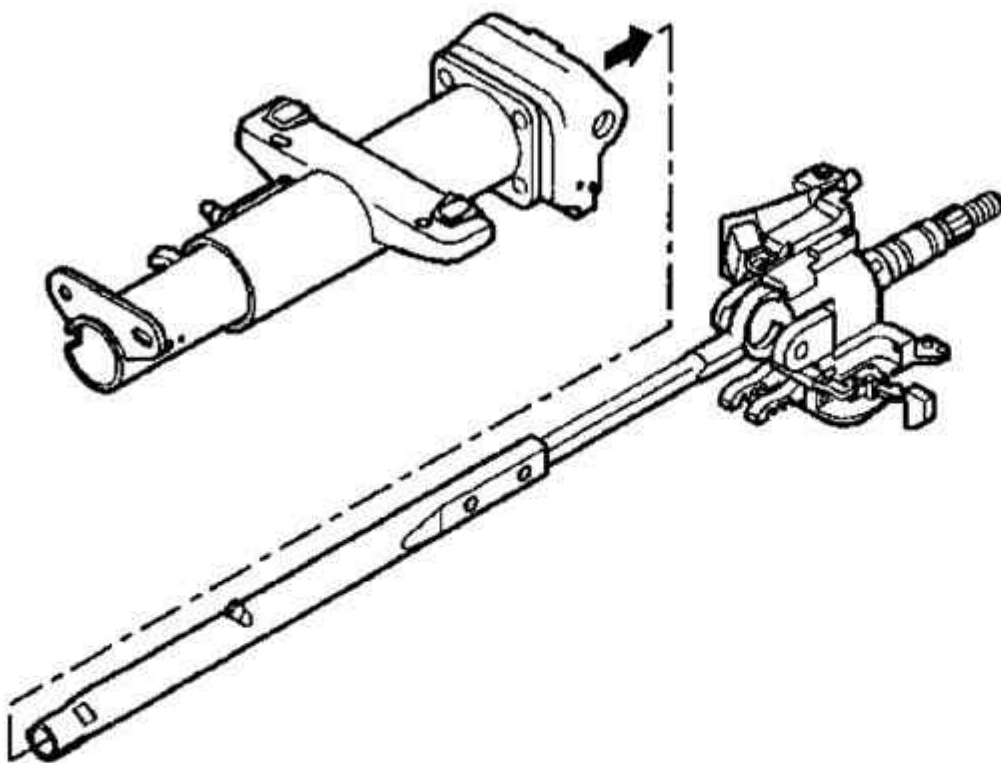


Fig. 94: Removing Upper Tilt Head Assembly With Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

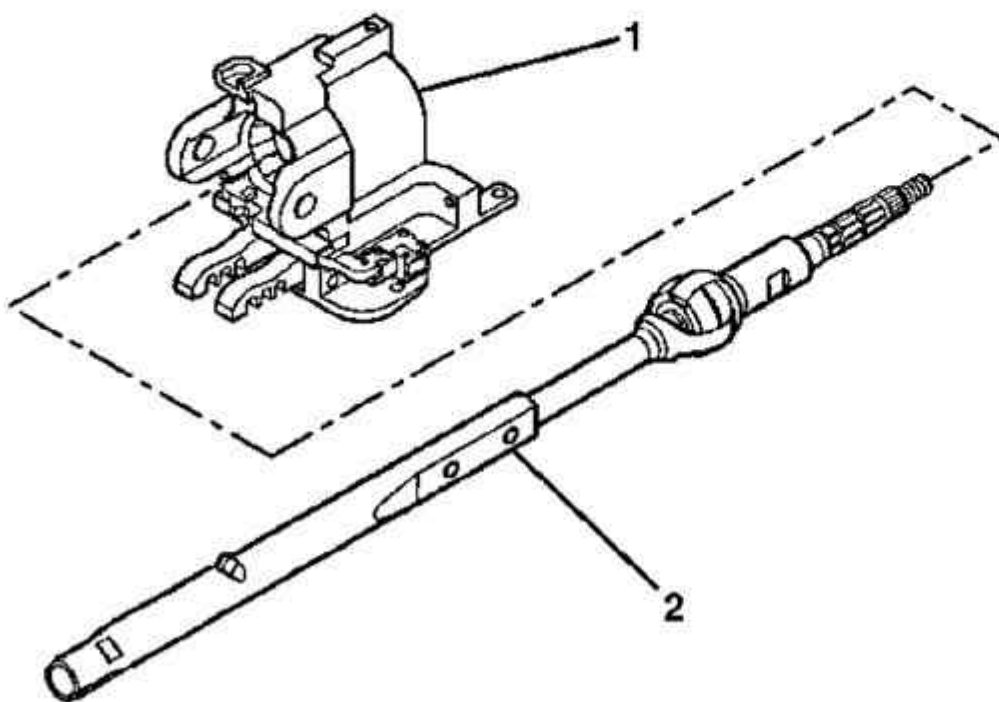


Fig. 95: Identifying Steering Shaft Assembly & Steering Column Tilt Head Housing Assembly
Courtesy of GENERAL MOTORS CORP.

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

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

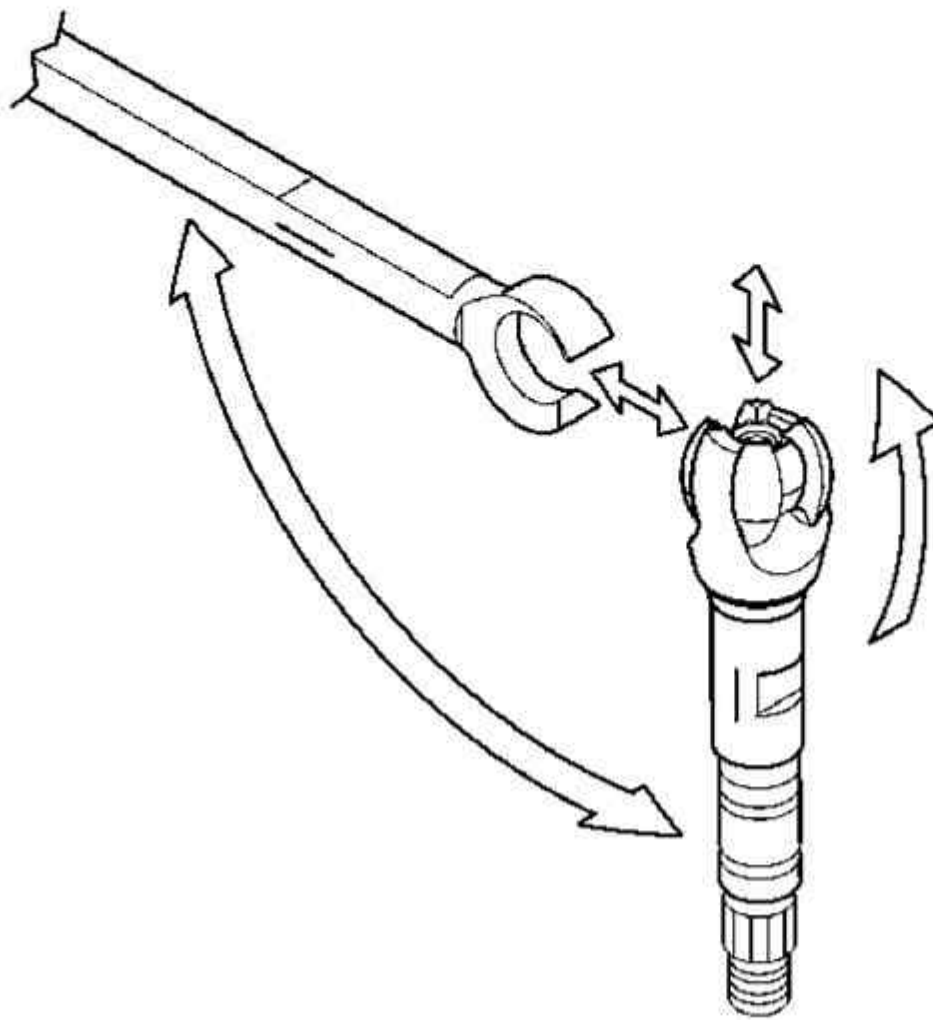


Fig. 96: Identifying Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

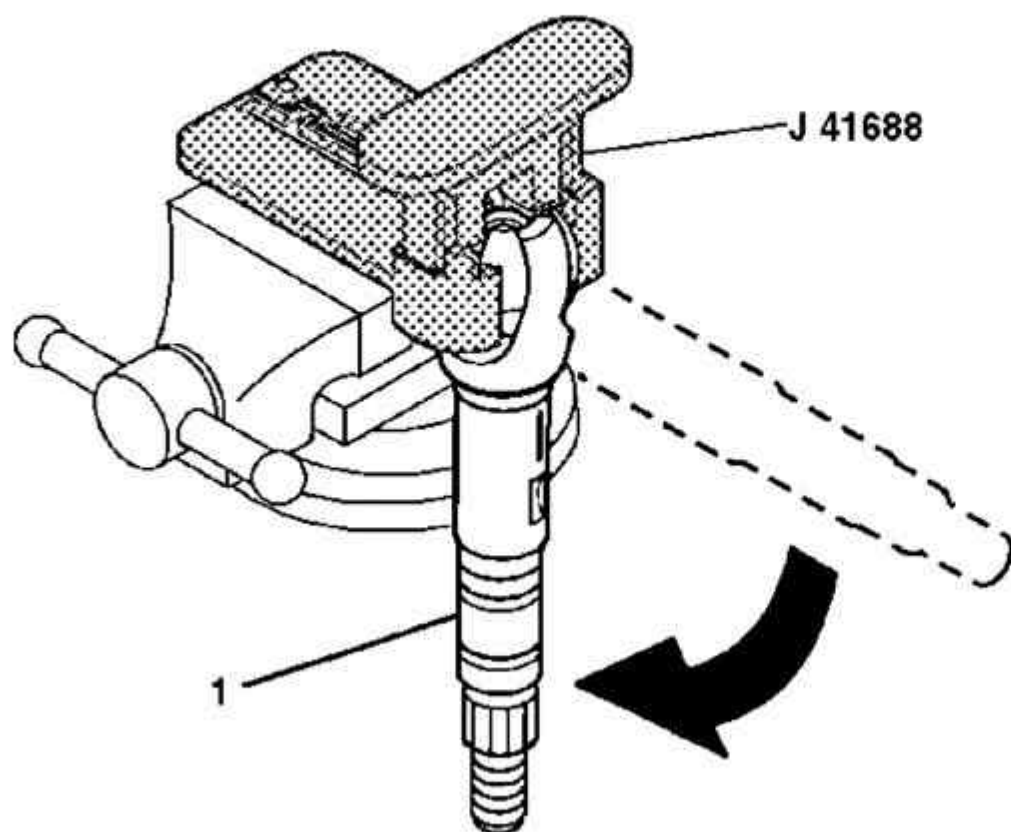


Fig. 97: Rotating Upper Shaft Assembly 90 Degrees
Courtesy of GENERAL MOTORS CORP.

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

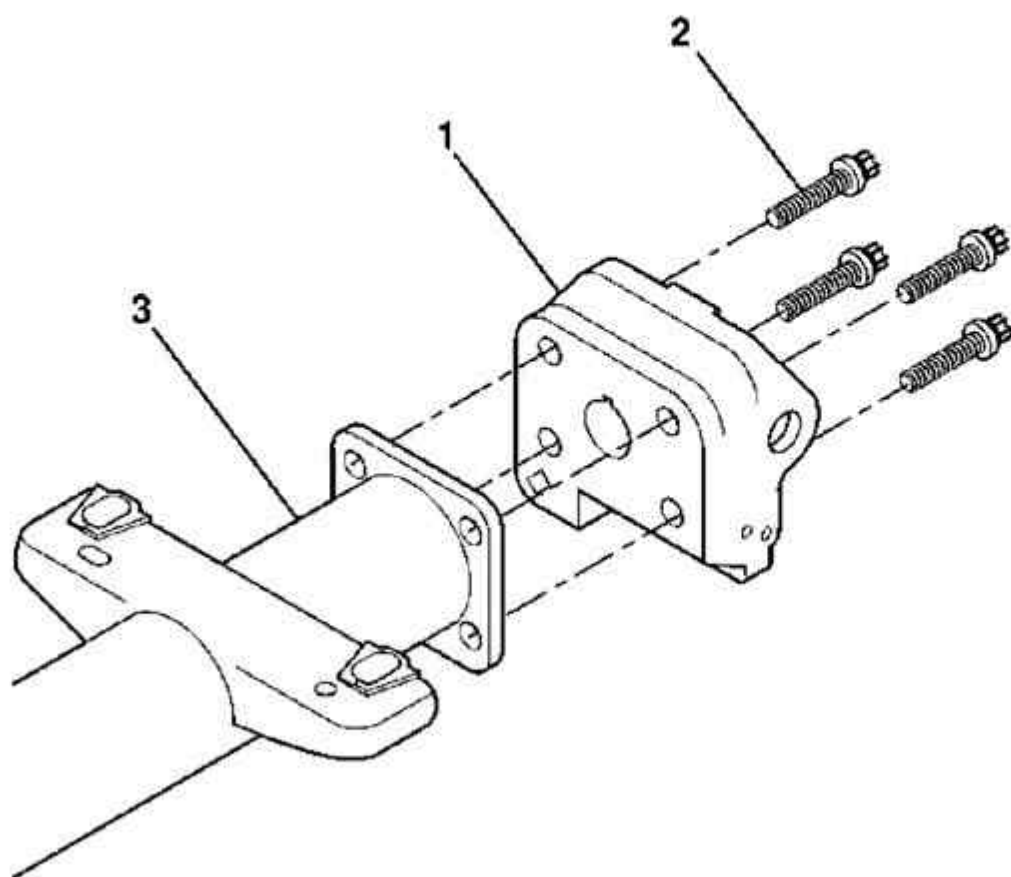


Fig. 98: View Of Steering Column Support Assembly, Steering Column Jacket Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

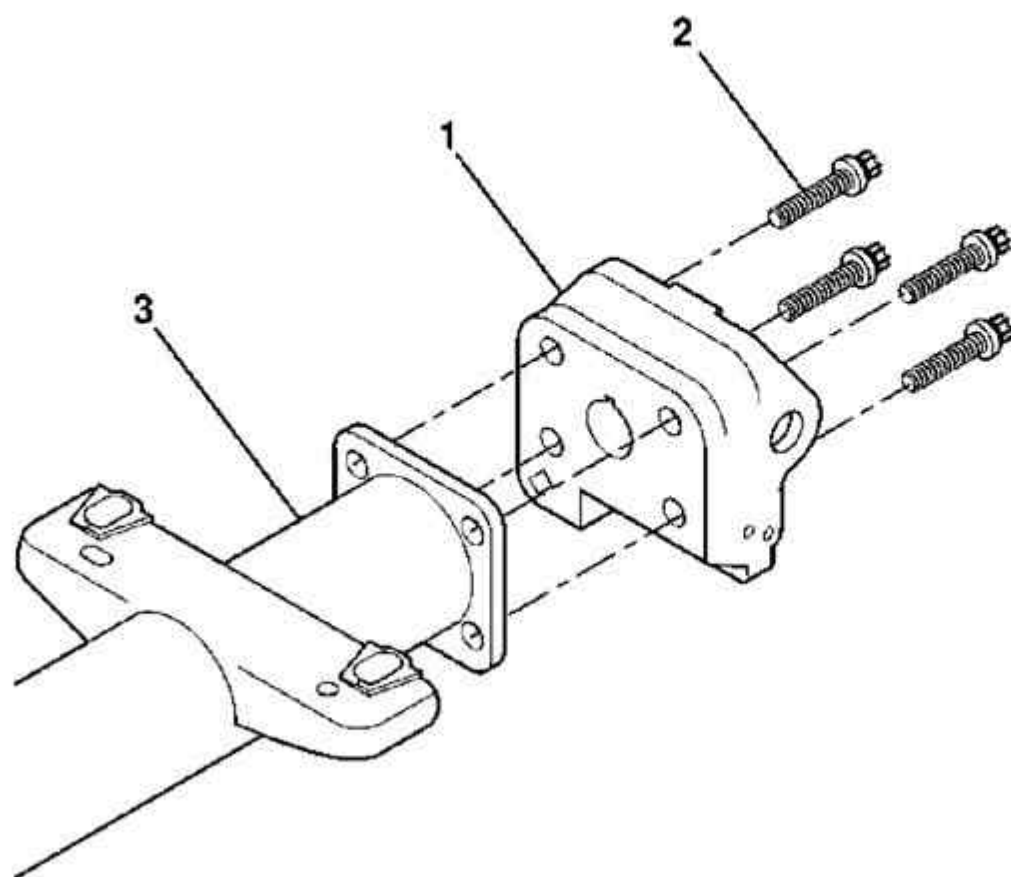


Fig. 99: View Of Steering Column Support Assembly, Steering Column Jacket Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

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

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

NOTE: Refer to Fastener Notice .

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

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

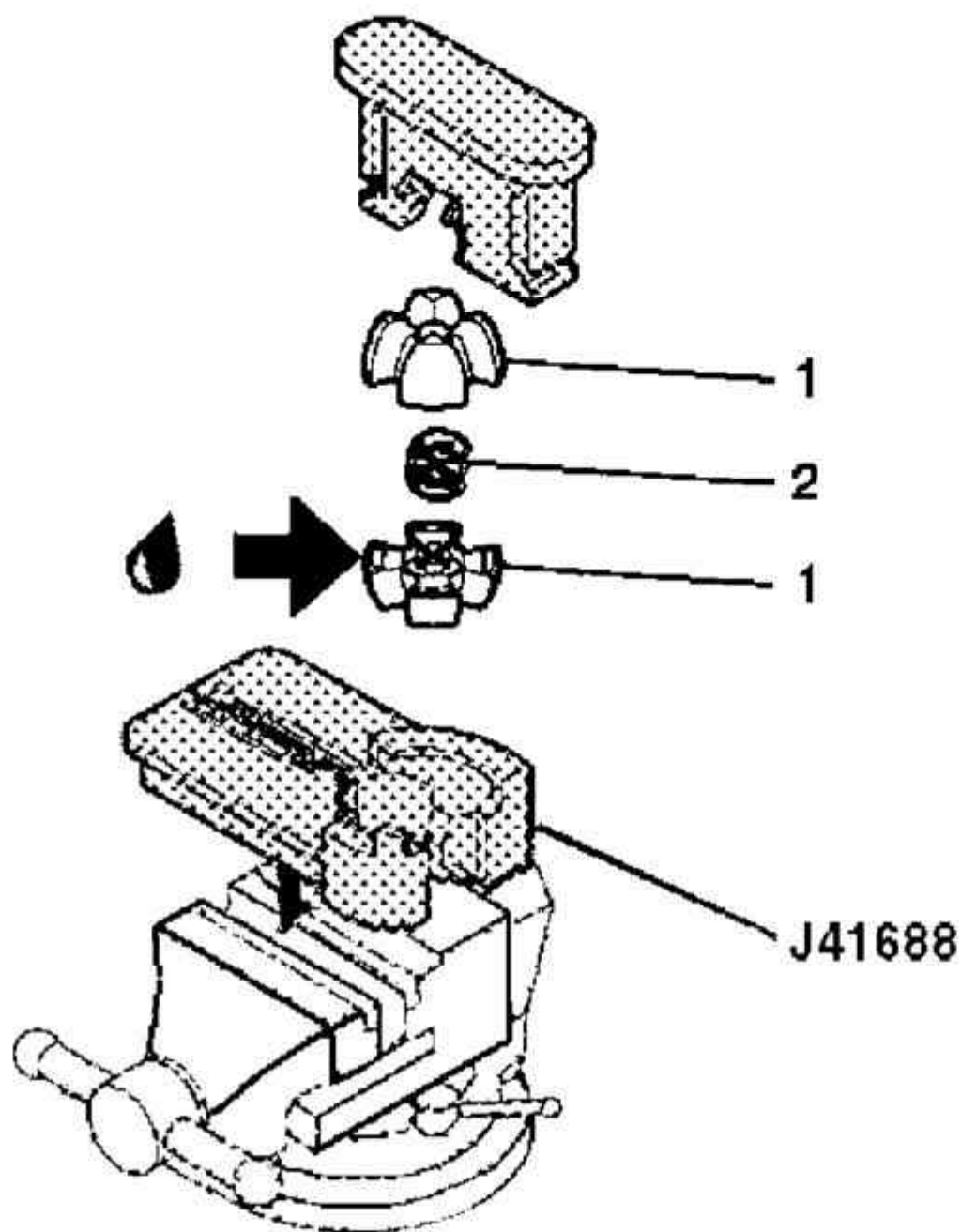


Fig. 100: Lubricating Centering Sphere
Courtesy of GENERAL MOTORS CORP.

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

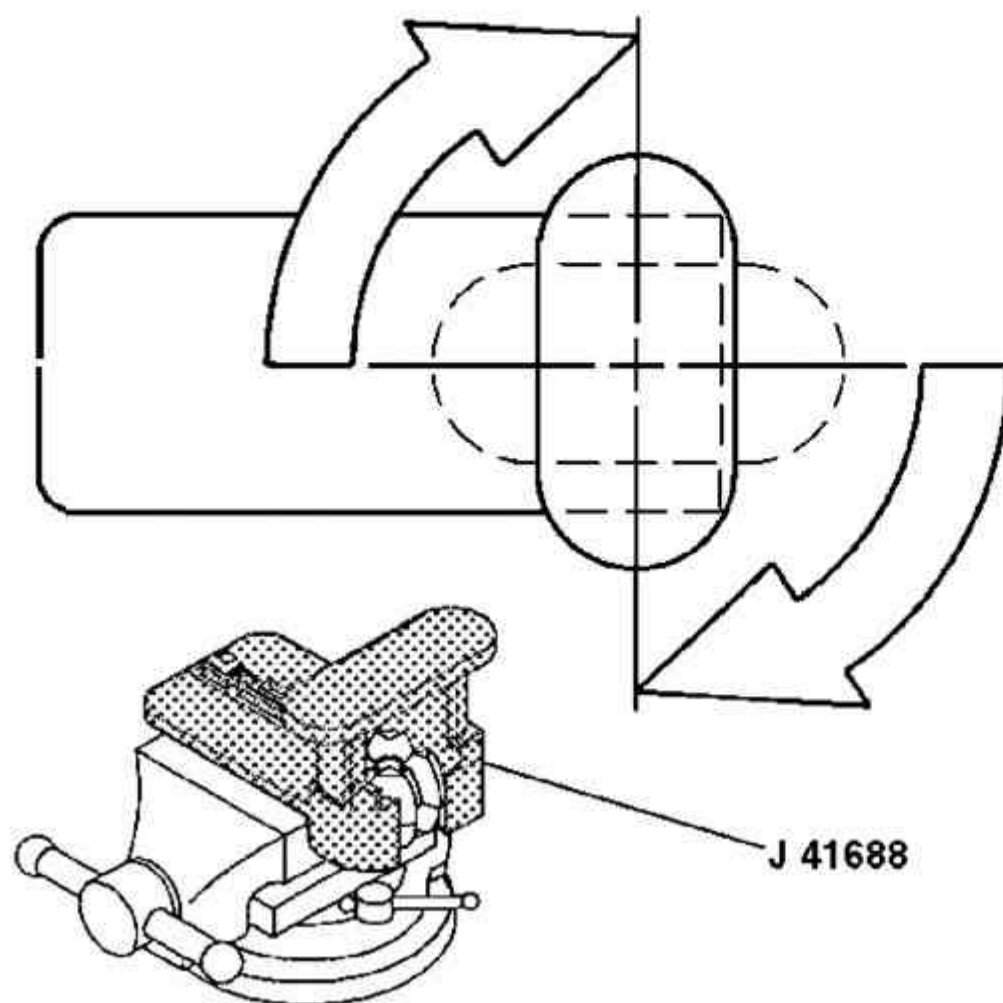


Fig. 101: Centering Sphere
Courtesy of GENERAL MOTORS CORP.

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

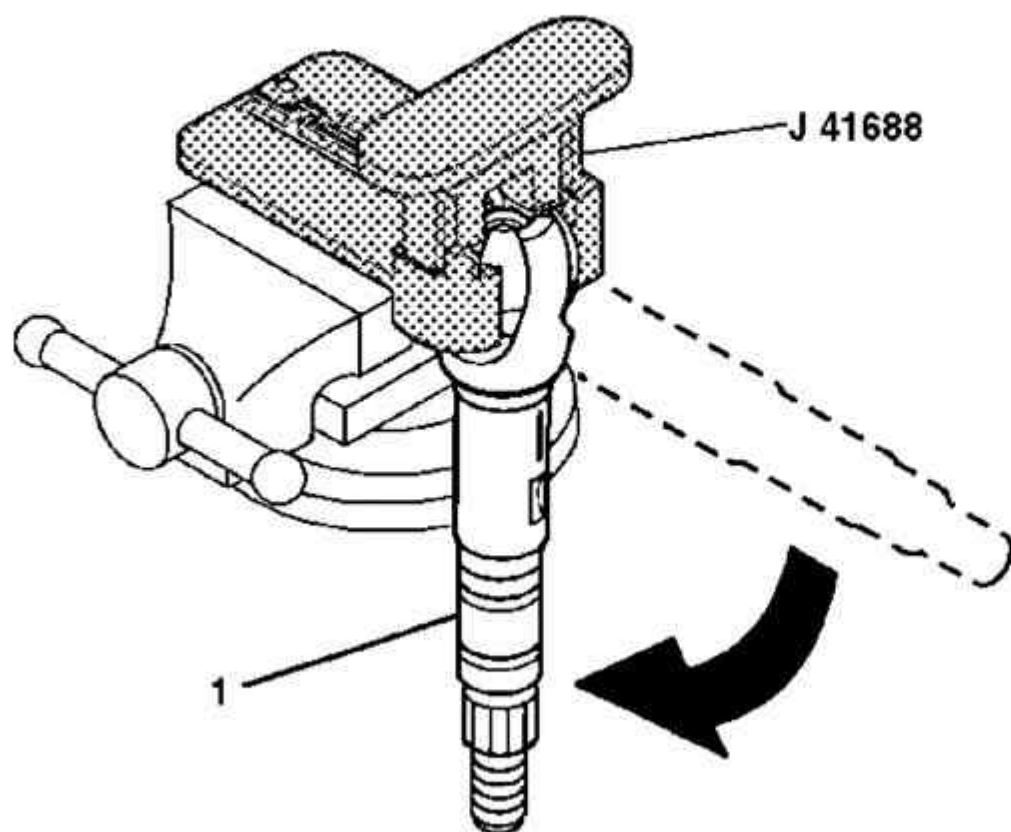


Fig. 102: Rotating Upper Shaft Assembly 90 Degrees
Courtesy of GENERAL MOTORS CORP.

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

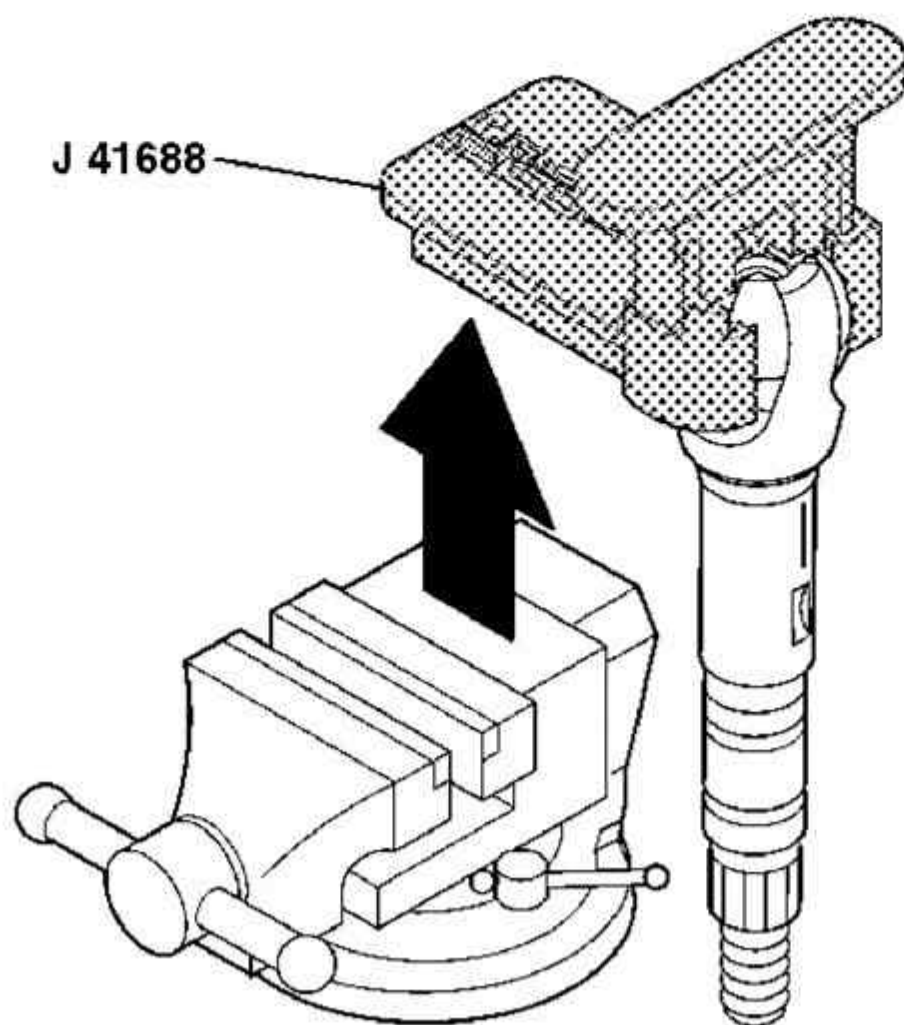


Fig. 103: Identifying Upper Shaft Assembly & Special Tool
Courtesy of GENERAL MOTORS CORP.

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

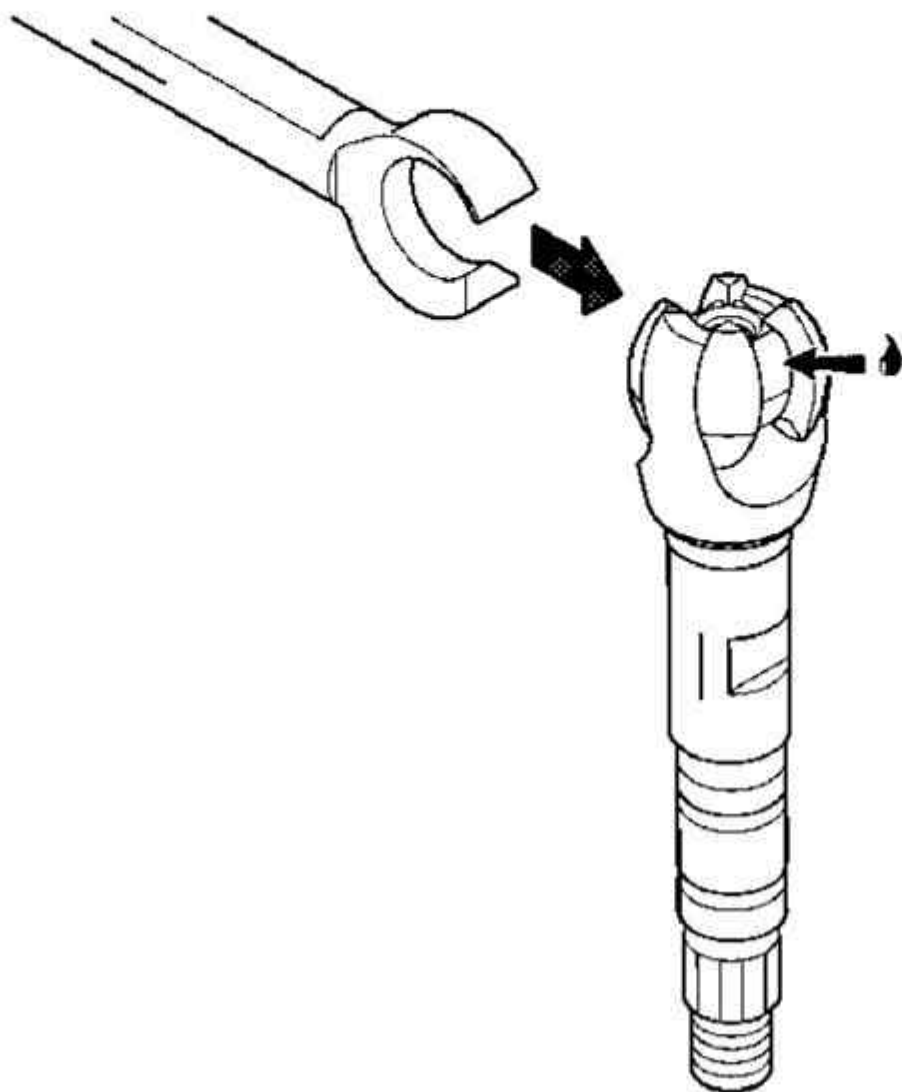


Fig. 104: Identifying Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

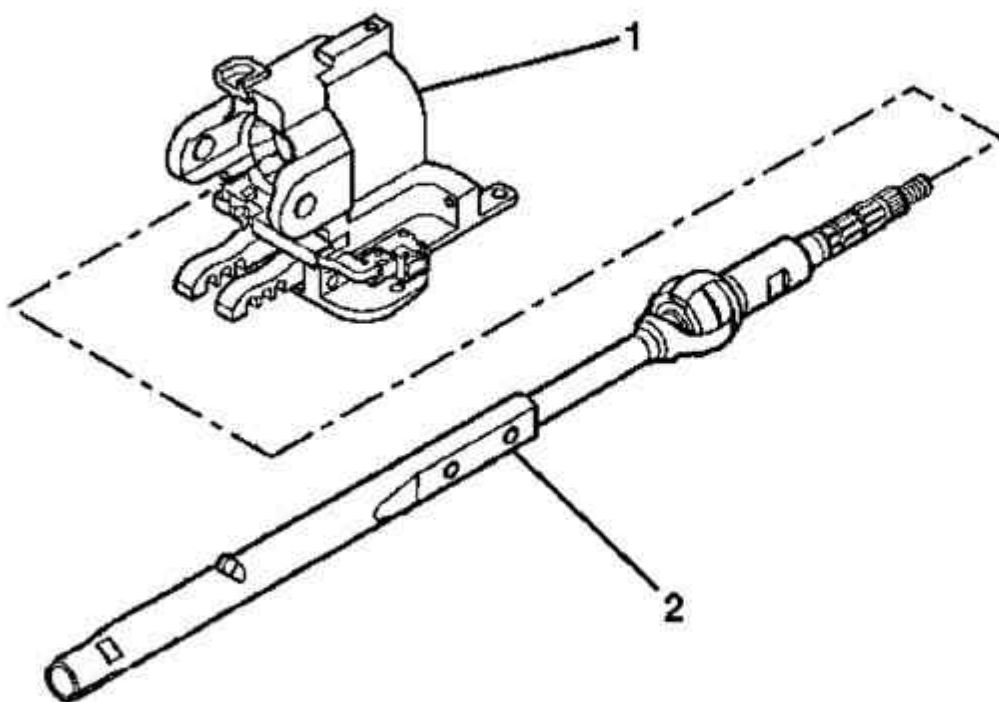


Fig. 105: Identifying Steering Shaft Assembly & Steering Column Tilt Head Housing Assembly
Courtesy of GENERAL MOTORS CORP.

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

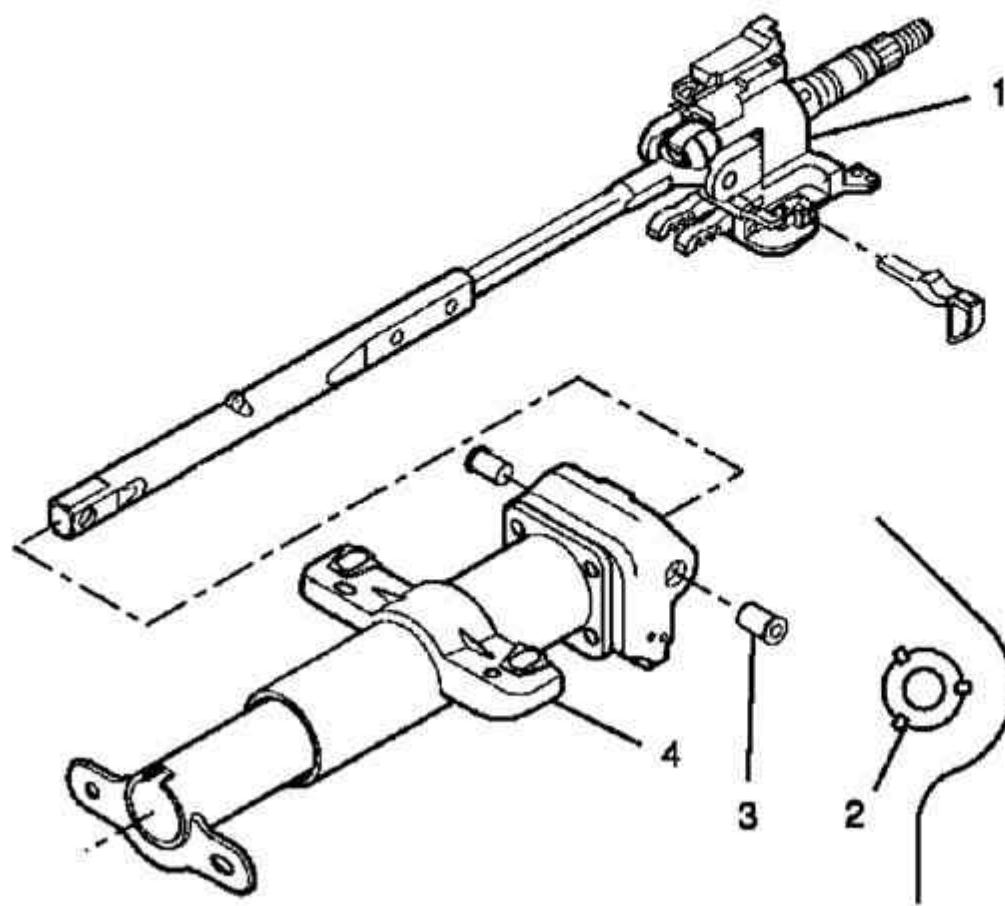


Fig. 106: Assembling Steering Column Lock Shoes Onto Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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

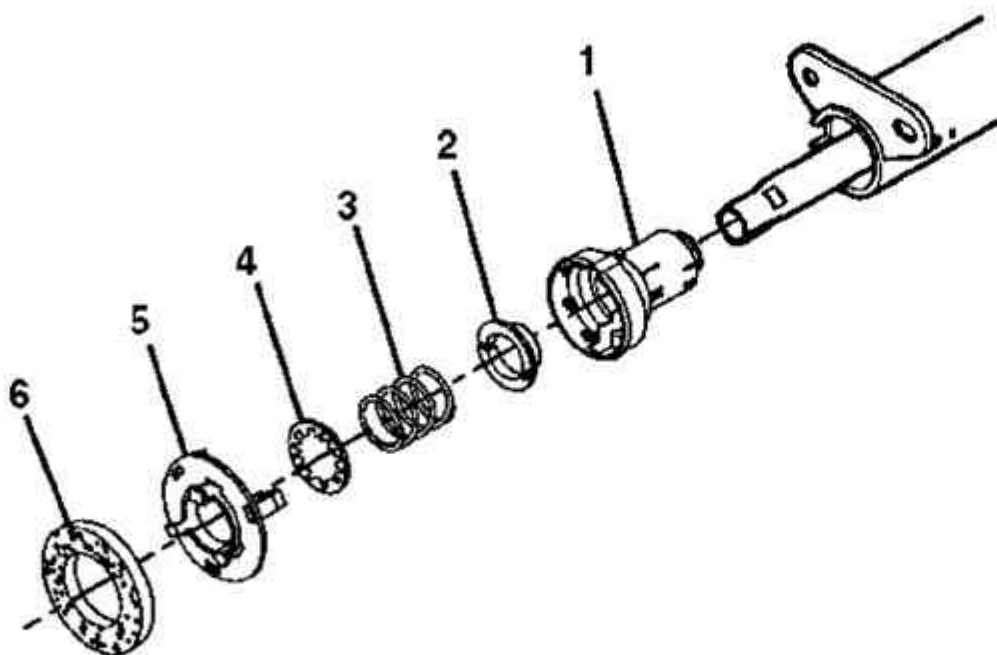


Fig. 107: Locating Steering Shaft Assembly Components
Courtesy of GENERAL MOTORS CORP.

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

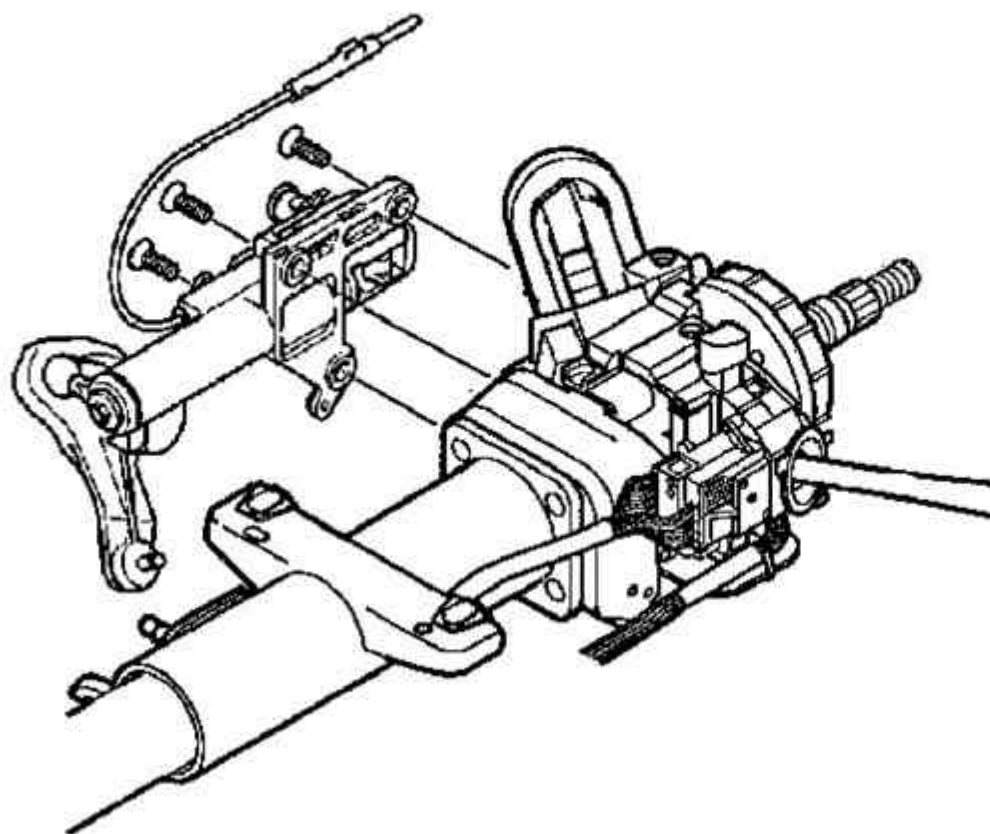


Fig. 108: View Of Linear Shift Assembly & Retaining Screws
Courtesy of GENERAL MOTORS CORP.

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

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

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

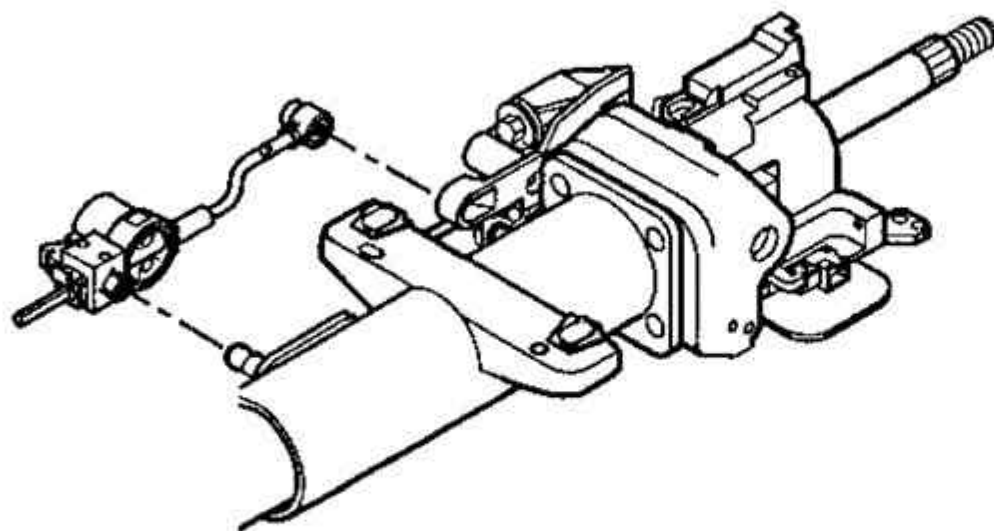


Fig. 109: View Of Automatic Transmission Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

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

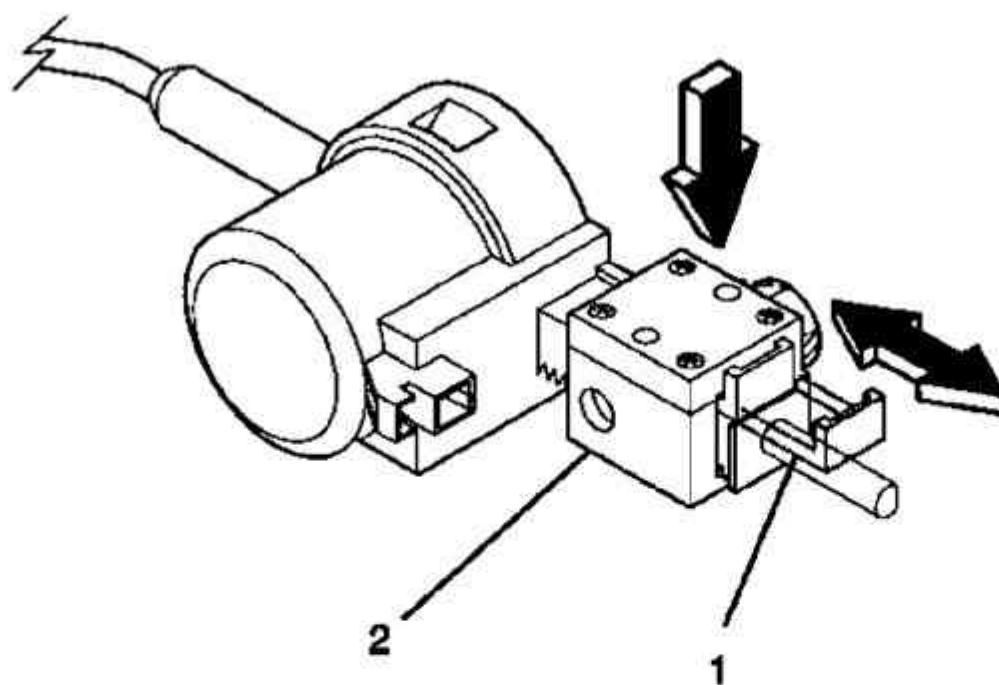


Fig. 110: Adjusting Automatic Transmission Shift Lock Control Actuator
Courtesy of GENERAL MOTORS CORP.

21. Adjust the automatic transmission shift lock control using the following steps:
 1. Pull the tab (1) out on the block side (2) of the automatic transmission shift lock control.

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

STEERING COLUMN WIRING HARNESS ASSEMBLY REPLACEMENT

Removal Procedure

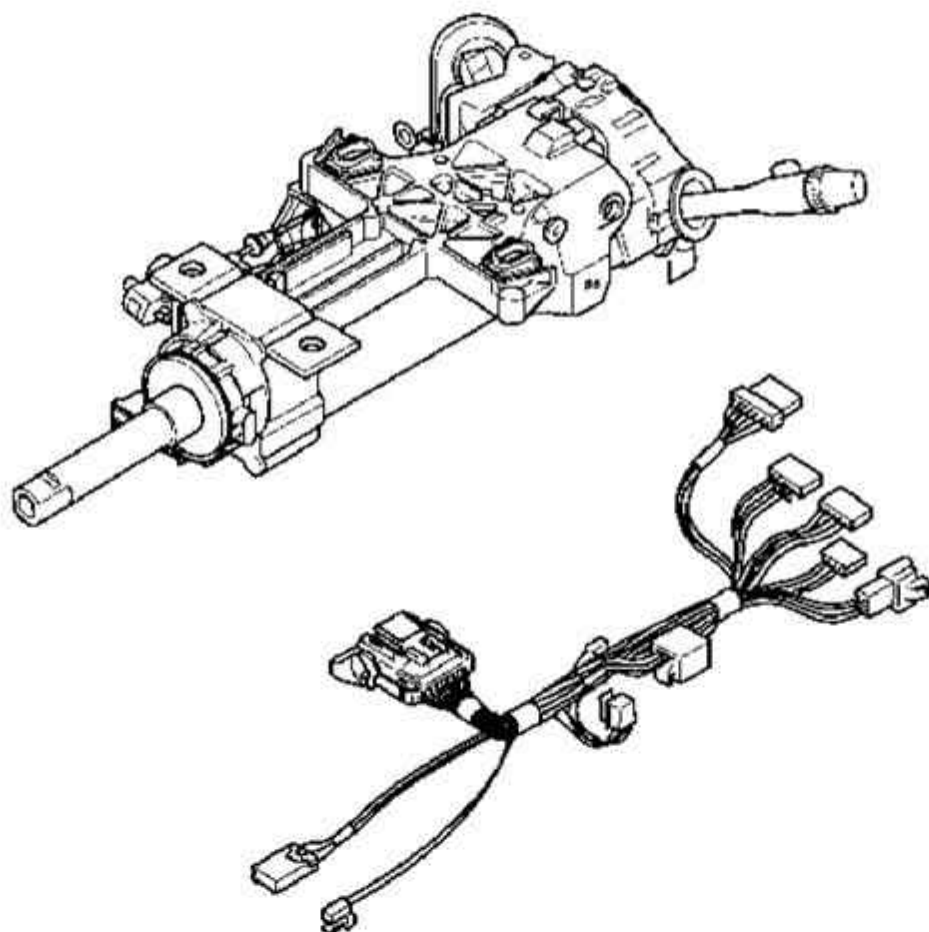


Fig. 111: View Of Steering Column And Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to **SIR Caution** .

IMPORTANT: Check the main wiring harness assembly for burned 2 amp fuses before

doing this procedure.

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

Installation Procedure

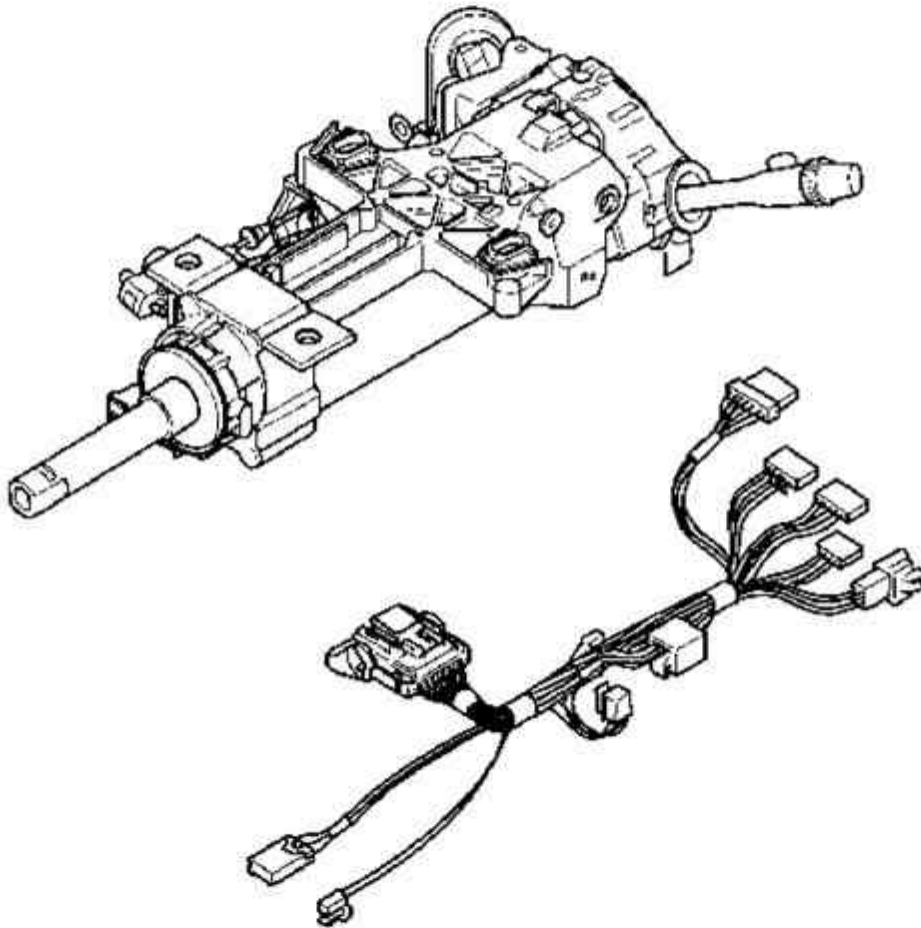


Fig. 112: View Of Steering Column And Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to **SIR INFLATOR MODULE COIL CAUTION**.

1. Slide the bulkhead connector into the steering column.
2. Connect all of the connectors to the wire harness assembly.
3. Install the upper and lower trim cover. Refer to **Steering Column Trim Covers Replacement**.
4. Install the steering column into the vehicle. Refer to **Steering Column Replacement**.

5. Install the steering wheel onto the steering column. Refer to **Steering Wheel Replacement**.
6. Enable the SIR system. Refer to **SIR Disabling and Enabling**.

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, Found on 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-location varies
- The steering column lock-content varies
- The ignition cylinder-location varies
- The theft deterrent module-location varies

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 manual/power tilt or tilt/telescoping functions
- The power pedal adjustment control switch
- The navigation/OnStar® features
- The HVAC controls

Driver Safety

The steering wheel and column has safety features to protect the driver. The following components may be mounted on or near the steering column:

Energy-Absorbing Steering Column

The energy-absorbing steering column compresses in the event of a front-end collision, which reduces the chance of injury to the driver. The energy-absorbing feature, collapsible steering shaft, and break away mounting features help reduce the injury in the event of an accident. In addition to these features, the following driver safety features may be on the steering column. To inspect the steering column for damage, refer to **Steering Column Accident Damage Inspection**.

Electronic Park Lock (EPL)/Ignition Lock Cylinder Control Actuator

If the vehicle is equipped with automatic transmission and a floor mounted console gear shift, it has an ignition lock cylinder control actuator system in the steering column. The ignition lock cylinder control actuator purpose is to prevent the ignition key from being turned to the OFF position when the transmission is in any position other than PARK and the vehicle may still be moving. The column ignition lock system consists of an ignition lock cylinder control actuator, and a park position switch that is located in the automatic transmission shift lock control switch. The ignition lock cylinder control actuator contains a pin that is spring loaded to mechanically prevent the ignition key cylinder from being turned to the lock position when the 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.

Linear Shift Assembly

If the vehicle is equipped with a column mounted gear shift, it has a linear shift assembly on the steering column. The linear shift assembly has a cable that runs from the linear shift assembly to the ignition lock cylinder case. The purpose of this cable is to prevent the ignition key from being turned to the OFF position when the transmission is in gear and the vehicle may still be moving. The linear shift assembly cable contains a pin that is spring loaded to mechanically prevent the ignition key cylinder from being turned to the lock position when the 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.

SIR Coil and Module

For additional information on the operation of the SIR coil and module, refer to **SIR System Description and Operation**.

Automatic Transmission Shift Lock Actuator

The automatic transmission shift lock control system is a safety device that prevents an inadvertent shift out of PARK when the engine is running. The driver must press the brake pedal before moving the shift lever out of the PARK position. The system consists of the following components: the automatic transmission shift lock control solenoid, the automatic transmission shift lock control switch, the body control module (BCM), the powertrain control module (PCM)/engine control module (ECM). With the ignition in the ON position, voltage is supplied to automatic transmission shift lock control switch. Voltage flows through the normally closed contacts of the automatic transmission shift lock control switch to the automatic transmission shift lock control solenoid. When the BCM receives a class 2 message from the PCM/ECM indicating the transmission is in the park position the BCM then grounds the automatic transmission shift lock solenoid control circuit. This energizes the automatic transmission shift lock control solenoid causing the transmission shift lever to be physically locked in the PARK position. When the brake pedal is pressed the contacts in the automatic transmission shift lock control switch open, de-energizing the automatic transmission shift lock control solenoid. This allows the shift lever to be move out of the PARK position.

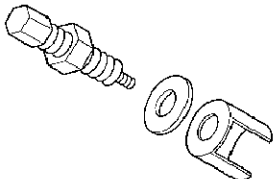
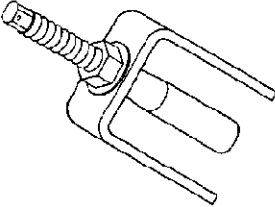
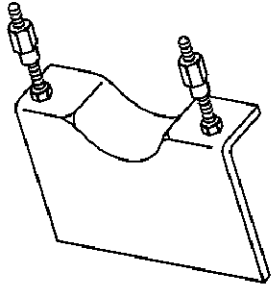
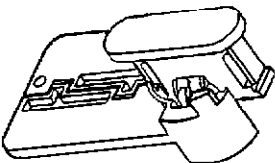
Steering Wheel Angle Sensor or Steering Wheel Position Sensor

The steering wheel position sensor is located somewhere along the steering shaft assembly. The sensor

measures the position of the steering wheel and the speed at which it is rotated. A signal representing this measurement is provided to the vehicle stability enhancement system (VSES) module. The VSES module uses this signal, along with several others representing different vehicle conditions, to monitor the driving behavior of the vehicle and ensure that it stays in control. If the VSES module determines that the vehicle is out of control it provides signals to the powertrain control module (PCM) and the ABS module. These output signals are used to modulate the transmission torque and brake pressure of each of the vehicles wheels in order to regain control of the vehicle.

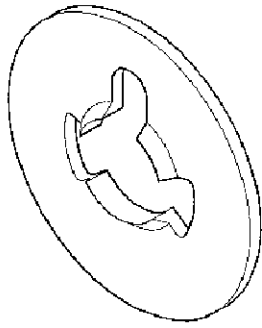
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

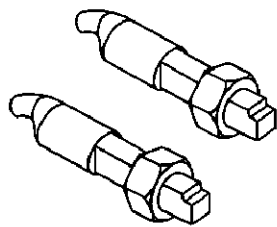
Illustration	Tool Number/Description
	J 1859-A Steering Wheel Puller
	J 21854-01 Pivot Pin Remover
	J 23653-SIR Steering Column Lock Plate Compressor
	J 41352 Steering Column holding Fixture
	J 41688 Centering Sphere Installer - Tilt Steering Wheel

2008 Buick LaCrosse CXL

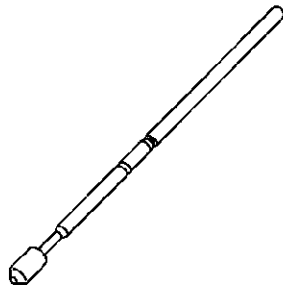
2008 STEERING Steering Wheel and Column - LaCrosse



J 42137
Cam Orientation Plate Adapter



J 42578
Steering Wheel Puller Legs



J 42640
Steering Column Anti-Rotation Pin

2008 Buick LaCrosse CXL
2008 STEERING Steering Wheel and Column - LaCrosse

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