

2008 Isuzu Ascender LS

2008 STEERING Steering Wheel & Column - Ascender, Envoy & Trailblazer

2008 STEERING

Steering Wheel & Column - Ascender, Envoy & Trailblazer

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Adapter Support Plate	7 N.m	62 lb in
Horn Plate Switch Screws	5.5 N.m	49 lb in
HVAC Floor Duct Mounting Screw	1.9 N.m	17 lb in
Ignition Lock Cylinder Case Screws	7 N.m	62 lb in
Intermediate Shaft to the Steering Column Pinch Bolt	50 N.m	37 lb ft
Intermediate Shaft to the Steering Gear Pinch Bolt	40 N.m	29 lb ft
Steering Column Electrical Connector Screw	6 N.m	53 lb in
Steering Column Mounting Nuts	27 N.m	20 lb ft
Steering Column Trim Cover Screws Lower	3.5 N.m	31 lb in
Steering Column Trim Cover Screws Upper	1 N.m	9 lb in
Steering Wheel Nut	41 N.m	30 lb ft
Steering Wheel Position Wheel Sensor Retainer Screw	10 N.m	89 lb in
Steering Wheel Shroud Screws	2 N.m	18 lb in
Turn Signal Multifunction Switch Screws Side	7 N.m	62 lb in
Turn Signal Multifunction Switch Screws Top	3 N.m	27 lb in
Upper Intermediate Shaft to Lower Intermediate Shaft Pinch Bolt	50 N.m	37 lb ft

COMPONENT LOCATOR

STEERING COLUMN DISASSEMBLED VIEW

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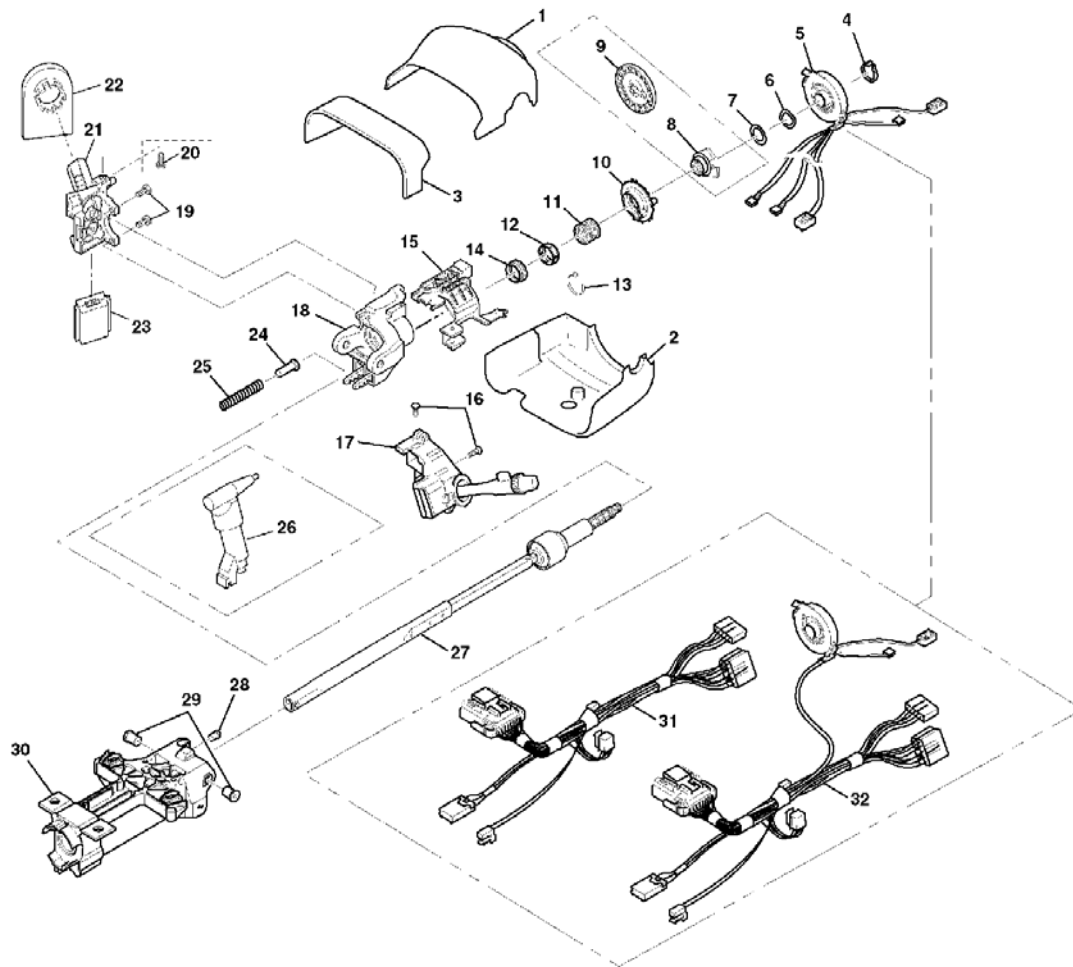


Fig. 1: Tilt Steering Column Component Views
Courtesy of GENERAL MOTORS CORP.

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

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

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.

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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**
- **High Shift Effort**
- **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: <ul style="list-style-type: none">• Tilt pivot pins• 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	-
	If serviceable, replace the pivot pins. If not serviceable		

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8	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: <ul style="list-style-type: none"> 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
6	Inspect the steering column upper and lower bearings for the following conditions: <ul style="list-style-type: none"> Damage Lubrication Wear Proper seating 		

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	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

HIGH SHIFT EFFORT

Step	Action	Yes	No
DEFINITION: Abnormally high shift effort is required to shift the transmission out of the Park (P) position.			
	Did you review the Steering Wheel and Column		Go to Steering

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1	Description and Operation?	Go to Step 2	Wheel and Column Description and Operation
2	Verify that a high column shift effort is required in order to shift out of the PARK position. Does the column shifter operate normally?	System OK	Go to Step 3
3	Inspect for worn or worn or damaged automatic transmission range selector shift cable. Is the transmission range selector shift cable worn or damaged?	Go to Step 6	Go to Step 4
4	Inspect the automatic transmission range selector shift cable for binding or mis-adjustment. Is the automatic transmission range selector shift cable binding or mis-adjusted?	Go to Step 7	Go to Step 5
5	Inspect the column linear shift assembly for damage. Is the column linear shift assembly damaged?	Go to Step 8	Go to Step 9
6	Replace the automatic transmission range selector shift cable. Did you complete the repair?	Go to Step 9	-
7	Adjust the automatic transmission range selector shift cable. Did you complete the repair?	Go to Step 9	-
8	IMPORTANT: If the column linear shift assembly is not serviceable, then the steering column will need to be replaced. Refer to <u>Steering Column Replacement</u>. Replace the column linear shift assembly, if serviceable. Did you complete the replacement?	Go to Step 9	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

LOOSENESS IN STEERING COLUMN

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?	Go to Step 2	Go to Steering Wheel and Column Description and Operation
2	Verify that the steering column is loose. Is the steering column loose?	Go to Step 3	System OK
	Inspect the steering column mounting features for the following conditions. <ul style="list-style-type: none"> Steering column mounting fasteners for 		

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3	looseness <ul style="list-style-type: none">Steering column mounting features are sheared <p>Are the steering column mounting features loose?</p>	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 <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 8	-
6	Replace the steering column. Refer to <u>Steering Column Replacement</u> . 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 <u>Steering Column Replacement</u>. 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

UPPER INTERMEDIATE STEERING SHAFT REPLACEMENT

Tools Required

J 42640 Steering Column Lock Pin

Removal Procedure

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

1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition switch to the lock position and remove the key.

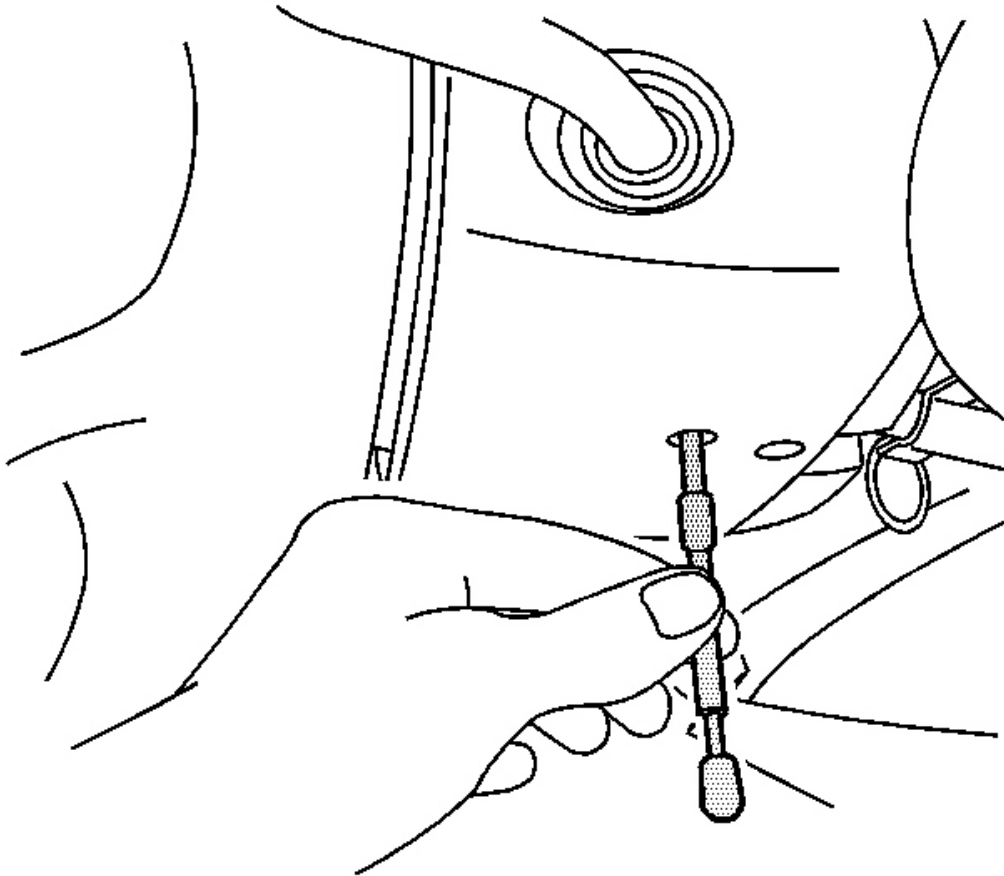


Fig. 2: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

3. Lock the steering column through the access hole in the lower steering column trim cover using the **J 42640**.
4. Remove the air outlet duct. Refer to **Floor Air Outlet Duct Replacement - Left Side (with JF4)** or **Floor Air Outlet Duct Replacement - Left Side (without JF4)**.

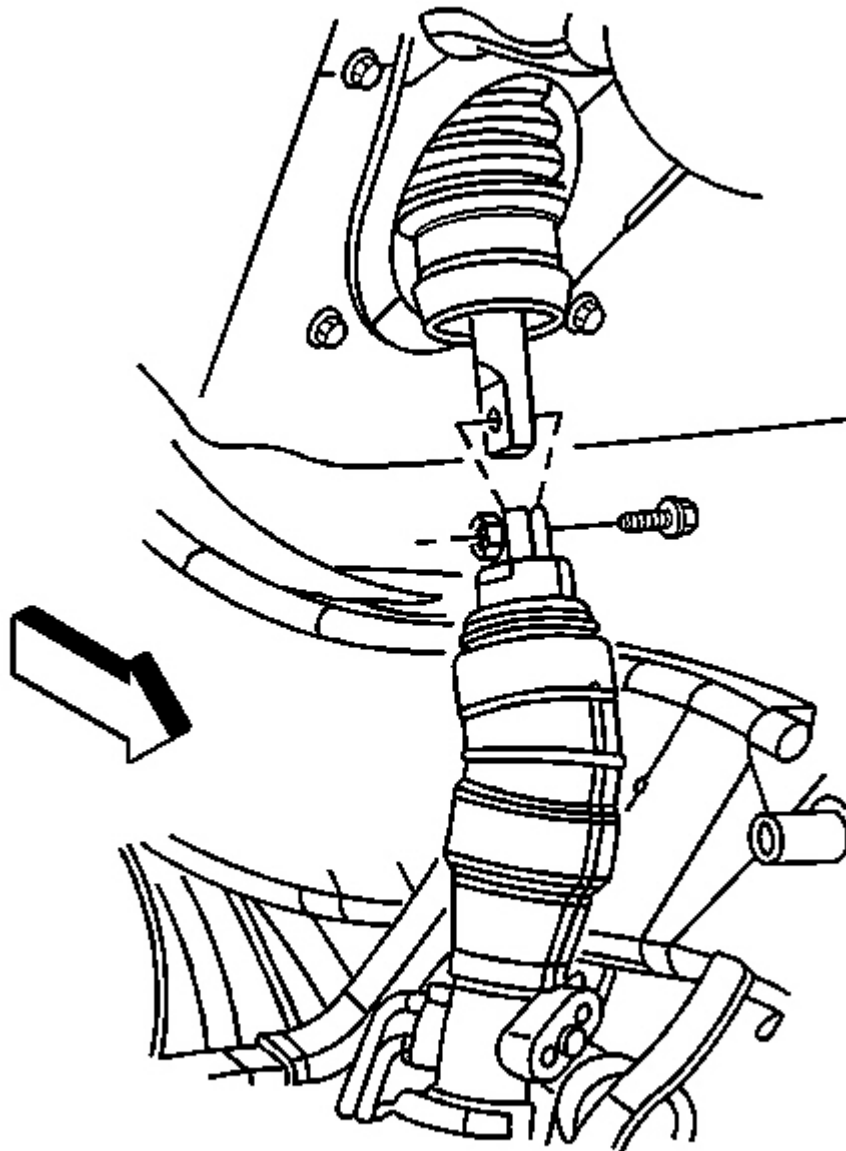


Fig. 3: View Of Steering Column To Steering Gear Connection
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the upper intermediate shaft boot from the lower intermediate shaft boot to gain access to the upper intermediate shaft to lower intermediate pinch bolt.
6. Remove the upper intermediate shaft to lower intermediate shaft pinch bolt.

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

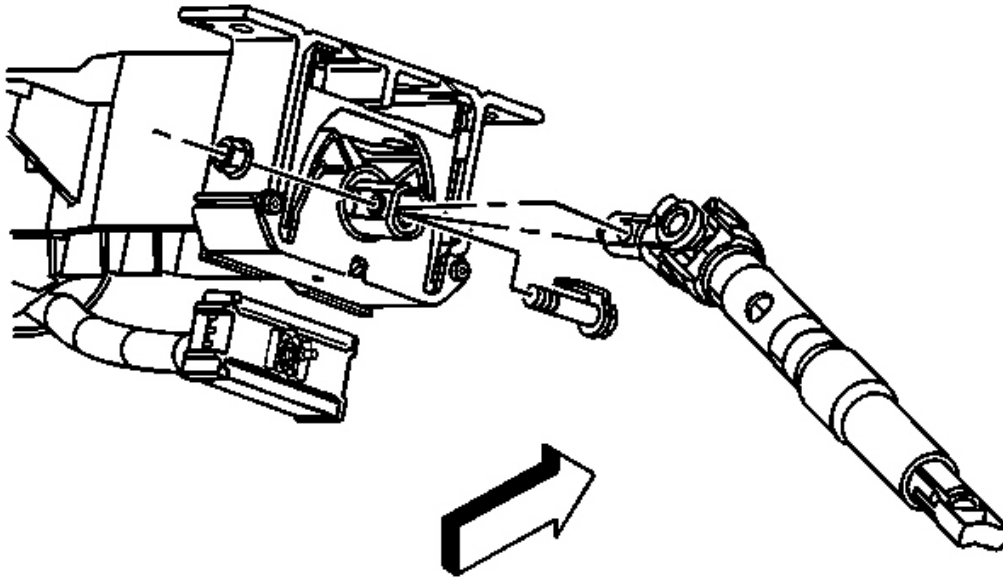


Fig. 4: View Of Steering Column & Upper Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

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

8. Remove the upper intermediate shaft to steering column pinch bolt.
9. Disconnect the upper intermediate shaft from the steering column.
10. Remove the upper intermediate shaft from the vehicle.

Installation Procedure

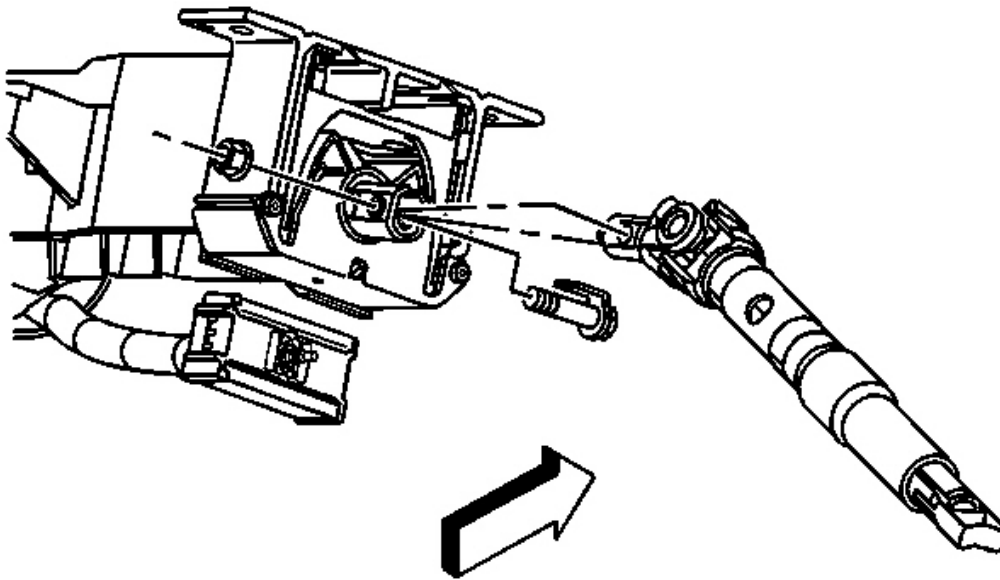


Fig. 5: View Of Steering Column & Upper Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

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

IMPORTANT: Perform the following procedure before installing the bolt.

1. Remove all traces of the original adhesive patch.
2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
3. Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) or LOCTITE™ 222.

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

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

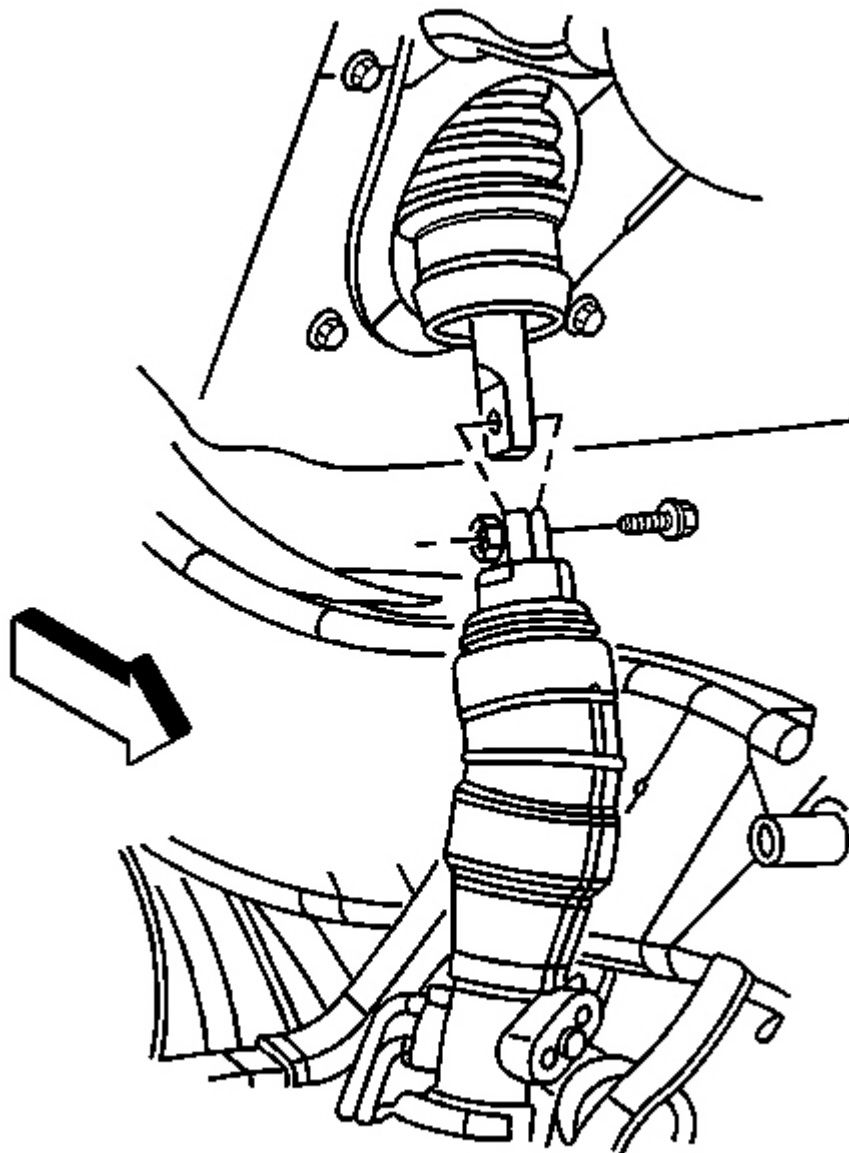


Fig. 6: View Of Steering Column To Steering Gear Connection
Courtesy of GENERAL MOTORS CORP.

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

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IMPORTANT: Perform the following procedure before installing the bolt.

1. Remove all traces of the original adhesive patch.
2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
3. Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) or LOCTITE™ 222.

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

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

IMPORTANT: The upper intermediate shaft boot must completely cover the white insert of the lower intermediate shaft boot to ensure proper sealing.

6. Connect the upper intermediate shaft boot to the lower intermediate shaft boot.
7. Install the air outlet duct. Refer to Floor Air Outlet Duct Replacement - Left Side (with JF4) or Floor Air Outlet Duct Replacement - Left Side (without JF4) .

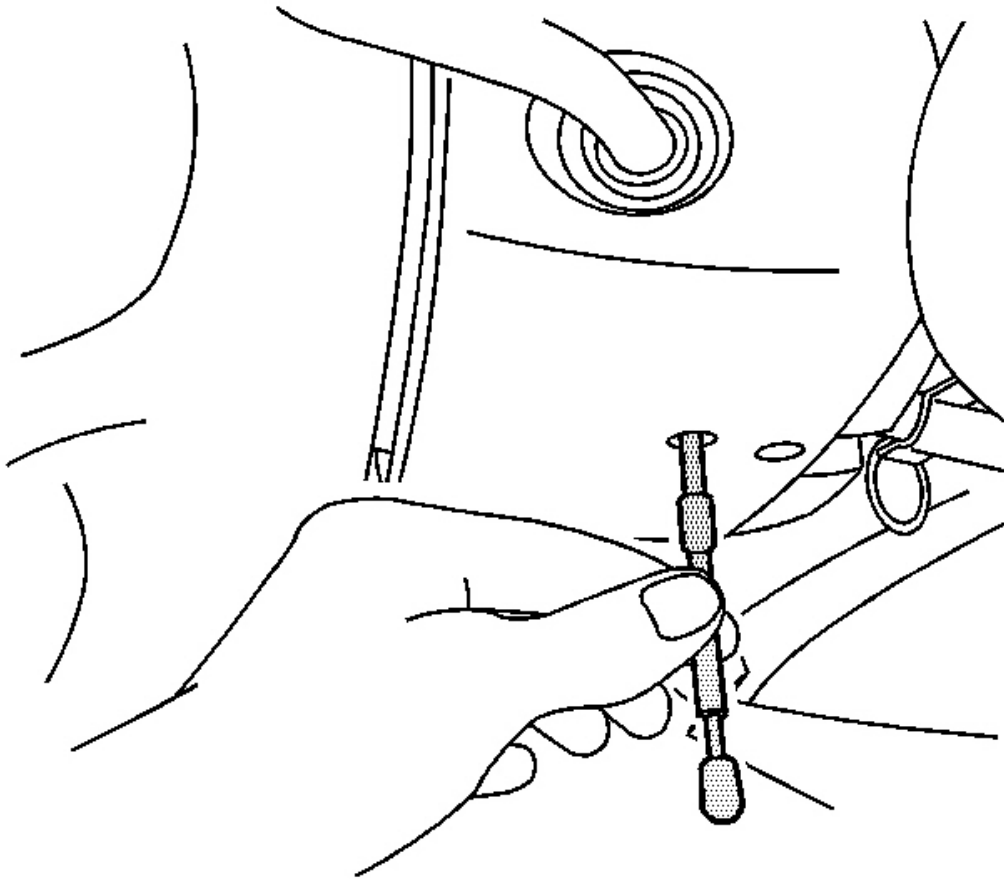


Fig. 7: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

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

LOWER INTERMEDIATE STEERING SHAFT REPLACEMENT

Tools Required

J 42640 Steering Column Lock Pin

Removal Procedure

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

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

1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition switch to the lock position and remove the key.

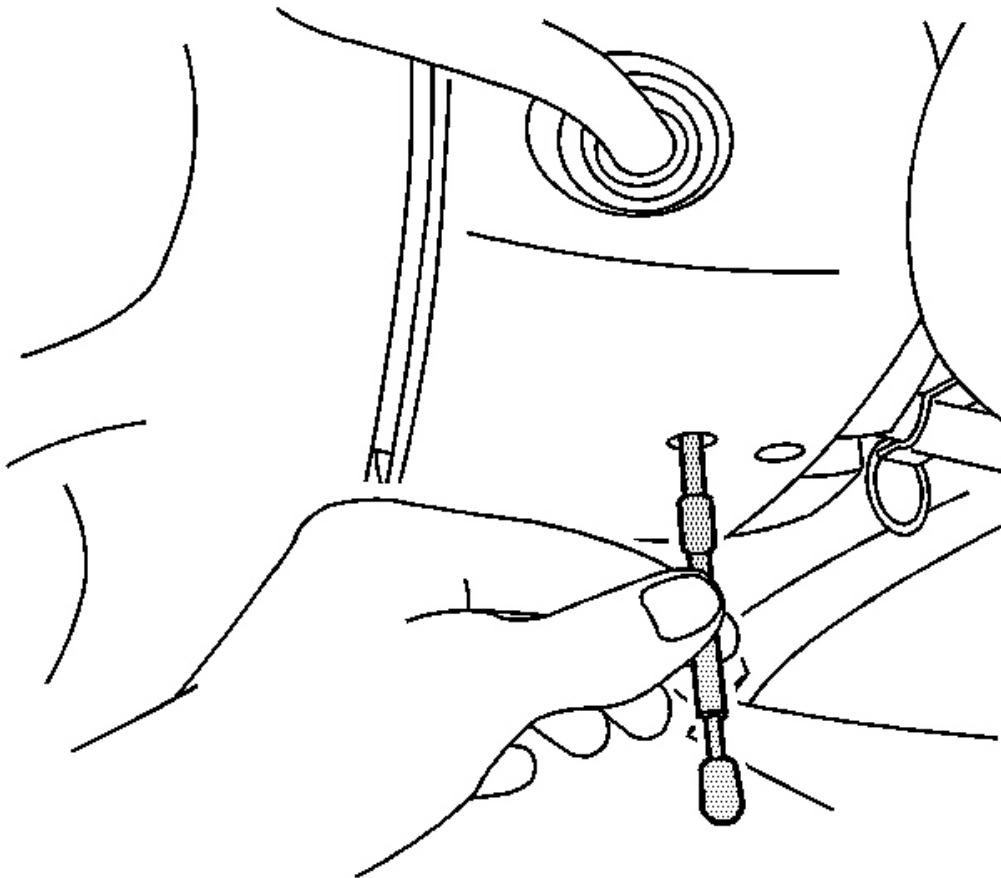


Fig. 8: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

3. Lock the steering column through the access hole in the lower steering column trim cover using **J 42640** .

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

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

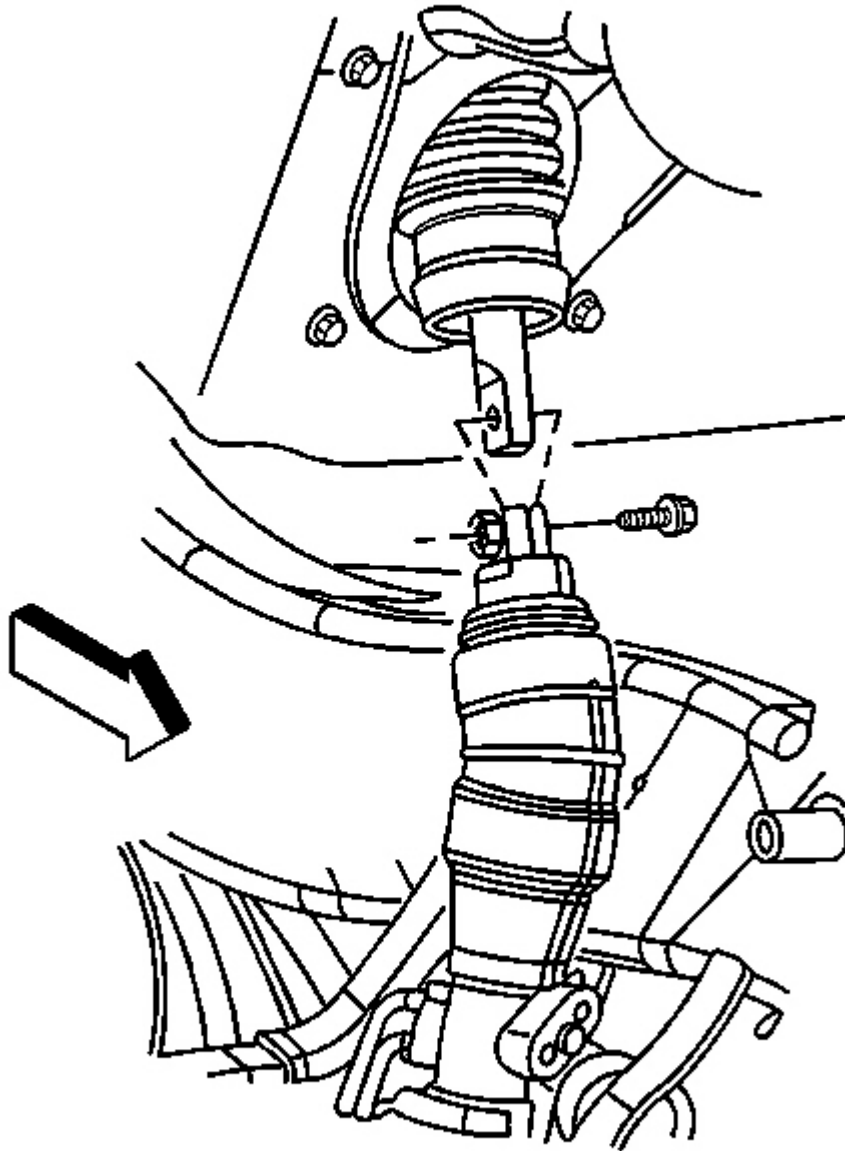


Fig. 9: View Of Steering Column To Steering Gear Connection
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the upper intermediate shaft boot from the lower intermediate shaft boot to gain access to the

upper intermediate shaft to lower intermediate pinch bolt.

6. Remove the lower intermediate shaft to upper intermediate shaft pinch bolt.
7. Disconnect the lower intermediate shaft from the upper intermediate shaft.

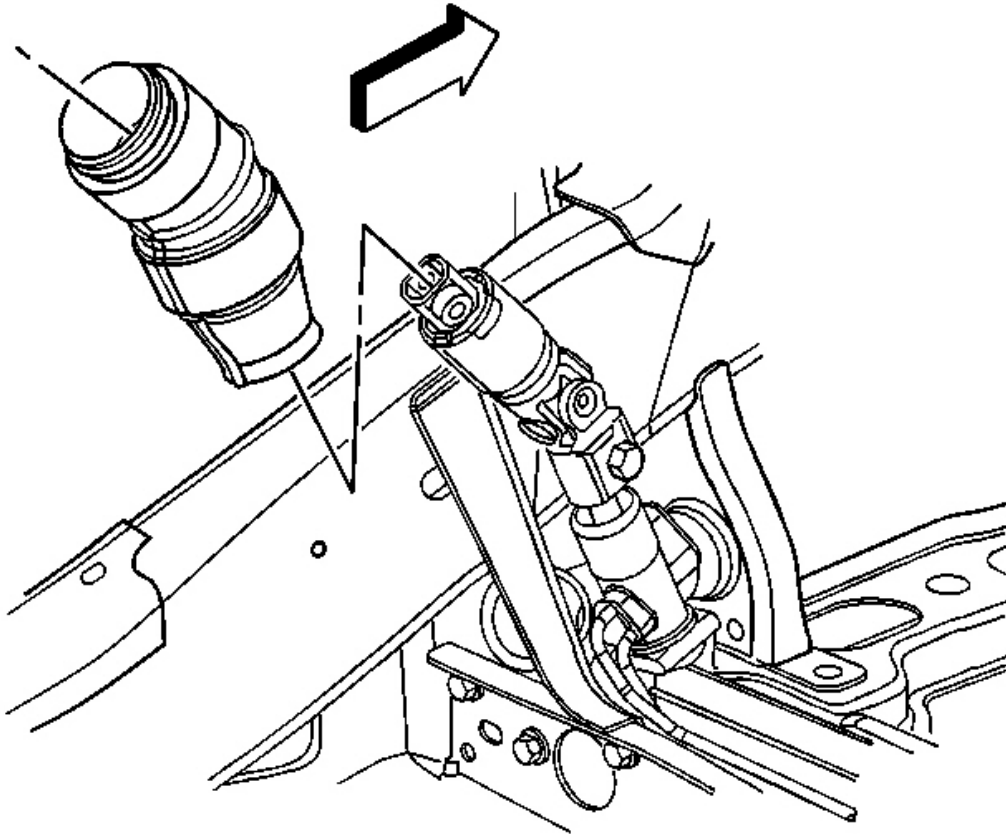


Fig. 10: View Of Intermediate Shaft Boot
Courtesy of GENERAL MOTORS CORP.

8. Disconnect the lower intermediate shaft boot from the power steering gear and remove intermediate shaft boot from the vehicle.

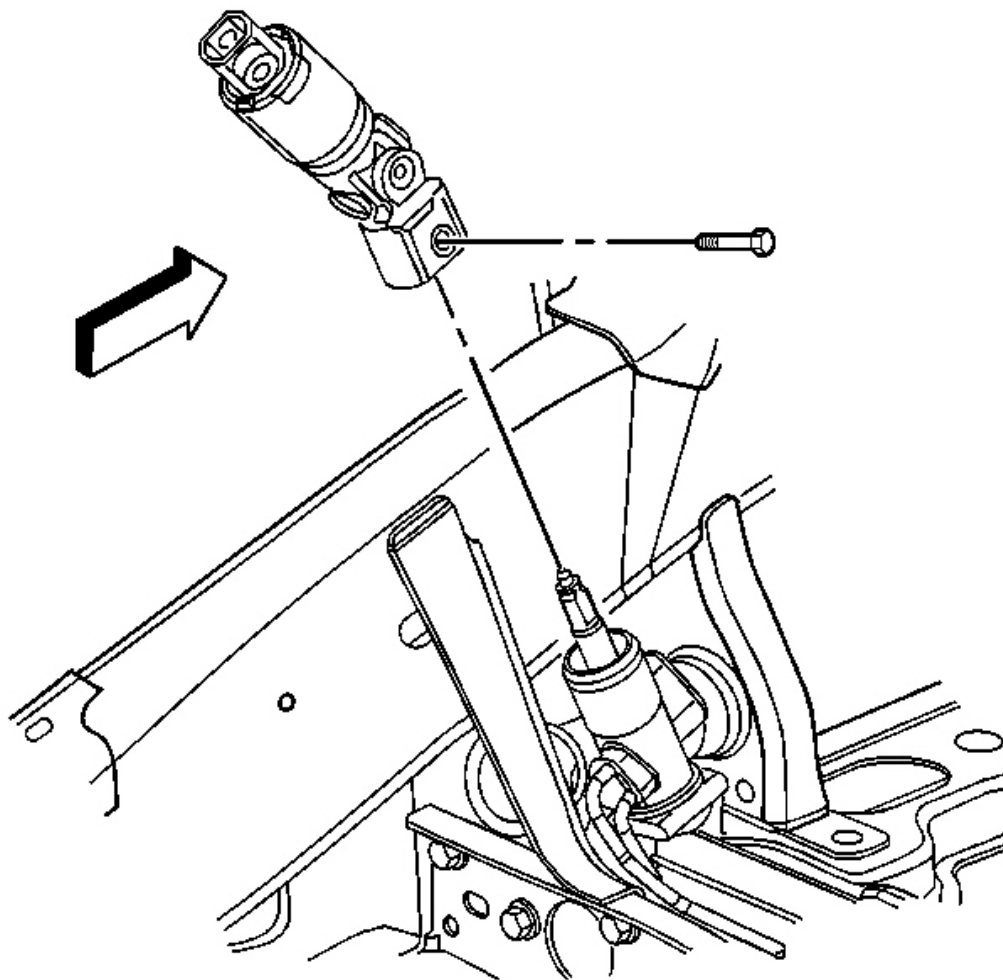


Fig. 11: View Of Lower Intermediate Shaft & Bolt
Courtesy of GENERAL MOTORS CORP.

9. Remove the lower intermediate shaft to the power steering gear input shaft pinch bolt.
10. Disconnect the lower intermediate shaft from the power steering gear.
11. Remove the lower intermediate shaft from the vehicle.

Installation Procedure

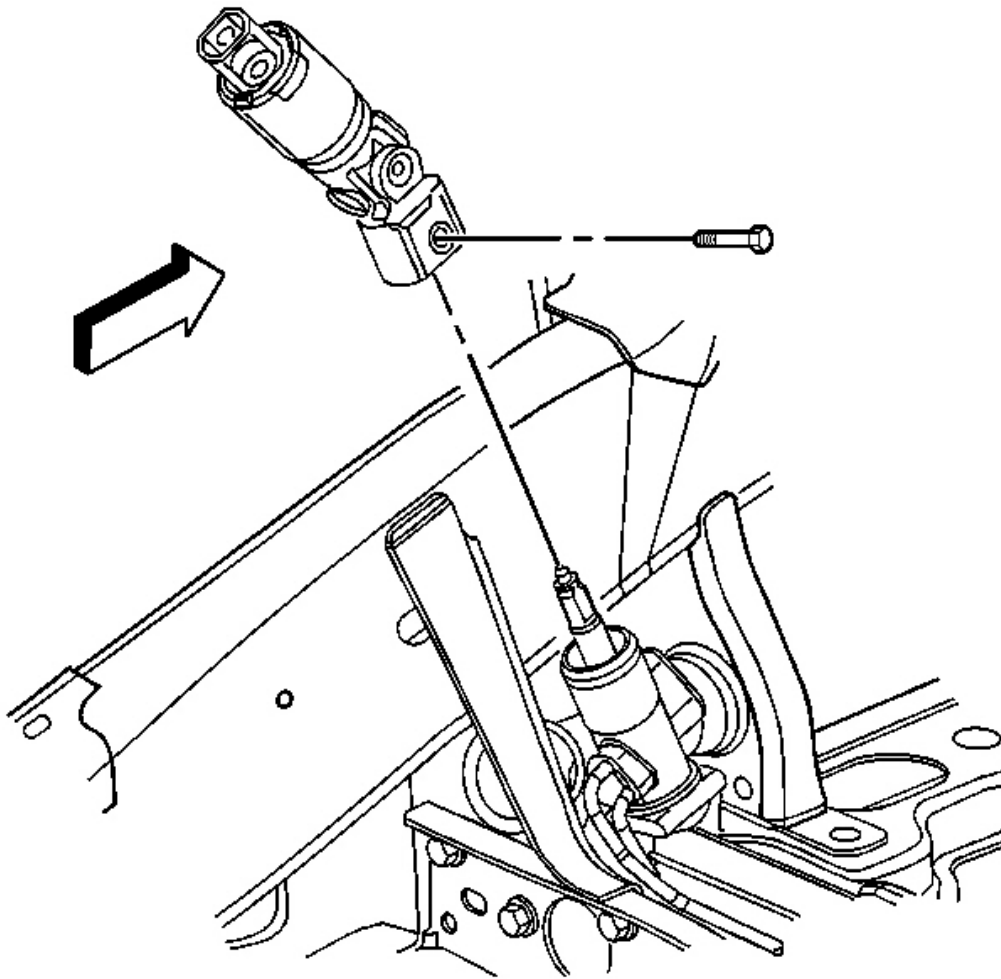


Fig. 12: View Of Lower Intermediate Shaft & Bolt
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

IMPORTANT: Perform the following procedure before installing the bolt.

1. Remove all traces of the original adhesive patch.
2. Clean the threads of the bolt with denatured alcohol or equivalent

and allow to dry.

3. Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) or LOCTITE™ 222.

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

Tighten: Tighten the lower intermediate shaft to the power steering gear input shaft pinch bolt to 40 N.m (29 lb ft).

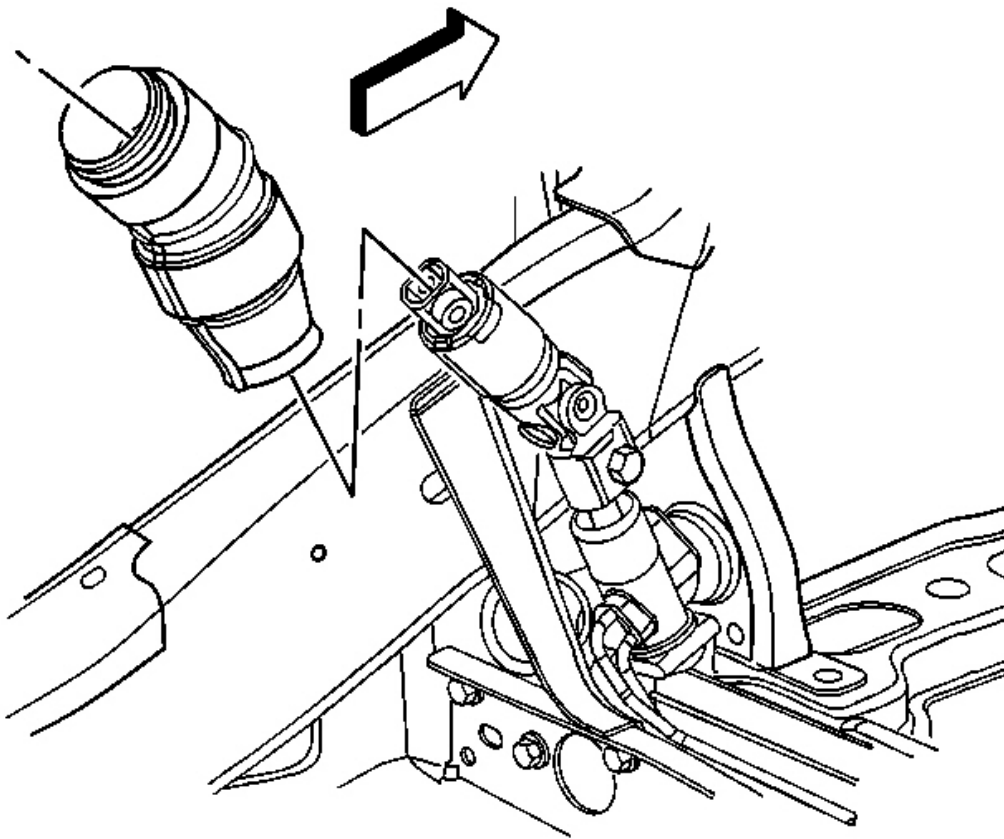


Fig. 13: View Of Intermediate Shaft Boot
Courtesy of GENERAL MOTORS CORP.

4. Install the lower intermediate shaft boot and connect the lower intermediate shaft boot to the power steering gear.

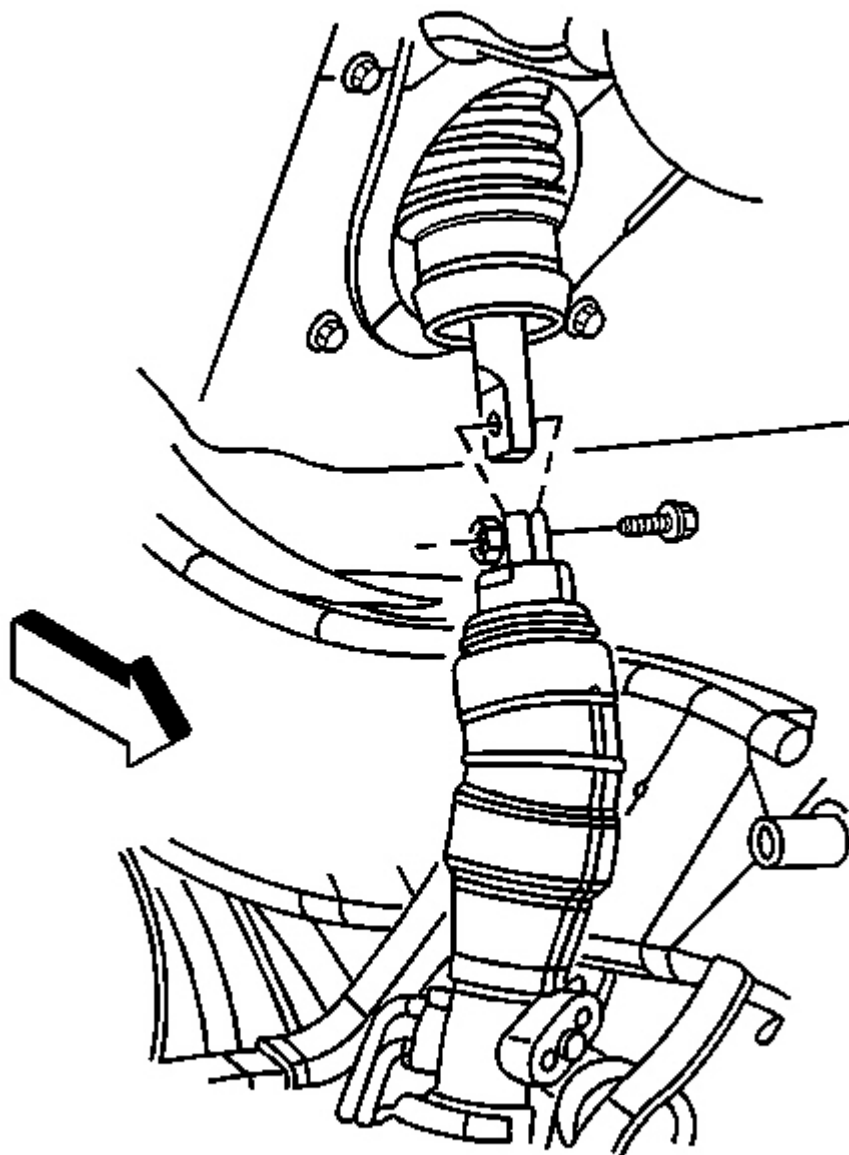


Fig. 14: View Of Steering Column To Steering Gear Connection
Courtesy of GENERAL MOTORS CORP.

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

IMPORTANT: Perform the following procedure before installing the bolt.

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1. Remove all traces of the original adhesive patch.
2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
3. Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) or LOCTITE™ 222.

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

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

IMPORTANT: The upper intermediate shaft boot must completely cover the white insert of the lower intermediate shaft boot to ensure proper sealing.

7. Connect the upper intermediate shaft boot to the lower intermediate shaft boot.
8. Lower the vehicle.

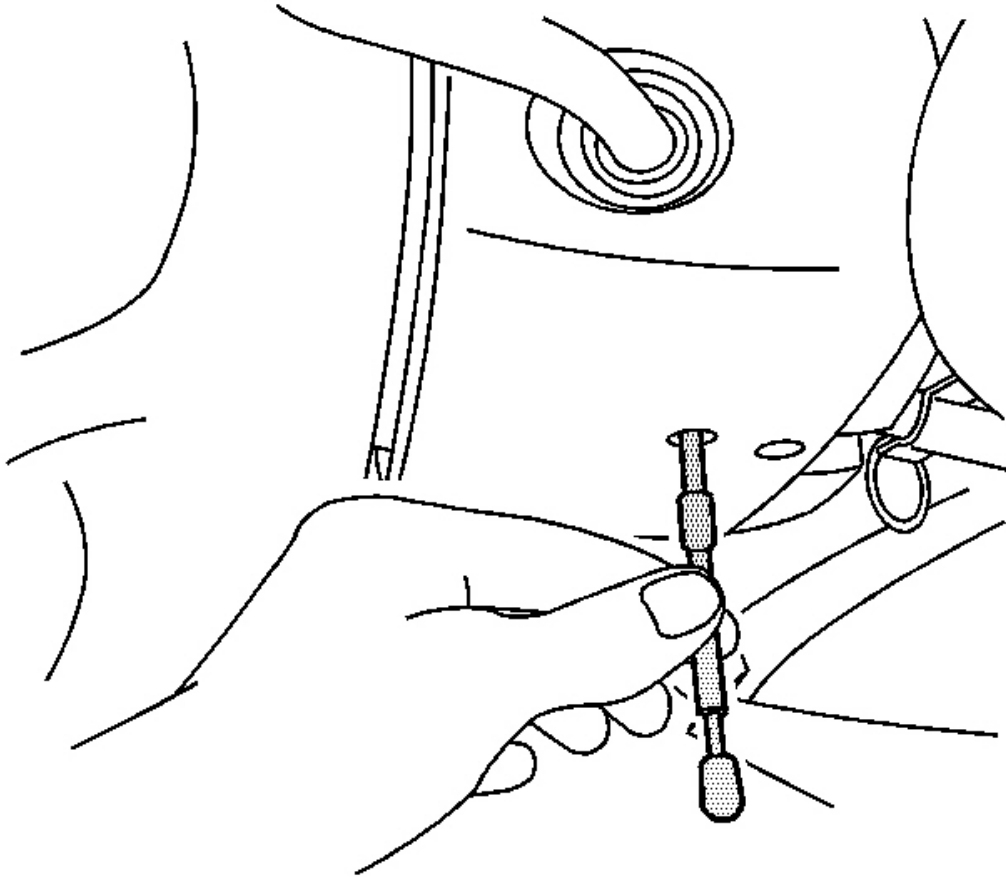


Fig. 15: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

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

STEERING COLUMN ACCIDENT DAMAGE INSPECTION

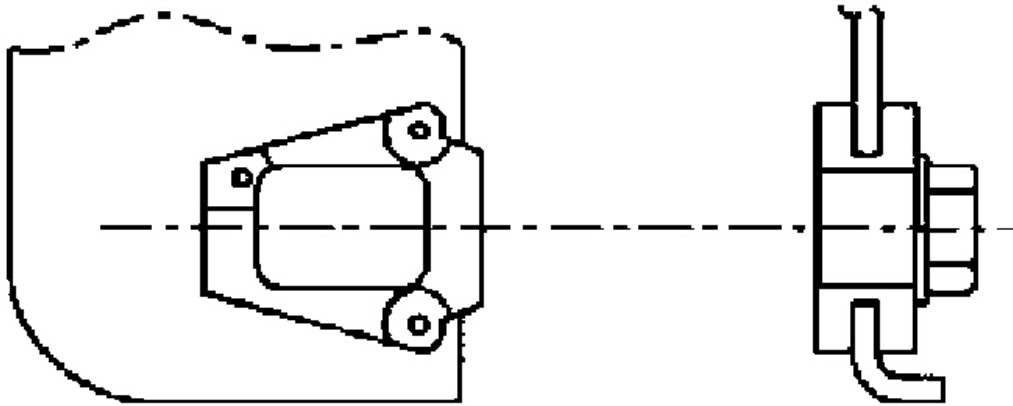


Fig. 16: Inspecting Capsules On Steering Column Bracket Assembly
Courtesy of GENERAL MOTORS CORP.

- Vehicles involved in accidents involving the following conditions may also have a damaged or misaligned steering column:
 - Frame damage
 - Major body or sheet metal damage
 - Where the steering column has been impacted
 - Where supplemental inflatable restraint systems deployed
- Inspect the capsules on the steering column bracket assembly. All capsules must be securely seated in the bracket slots and 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.

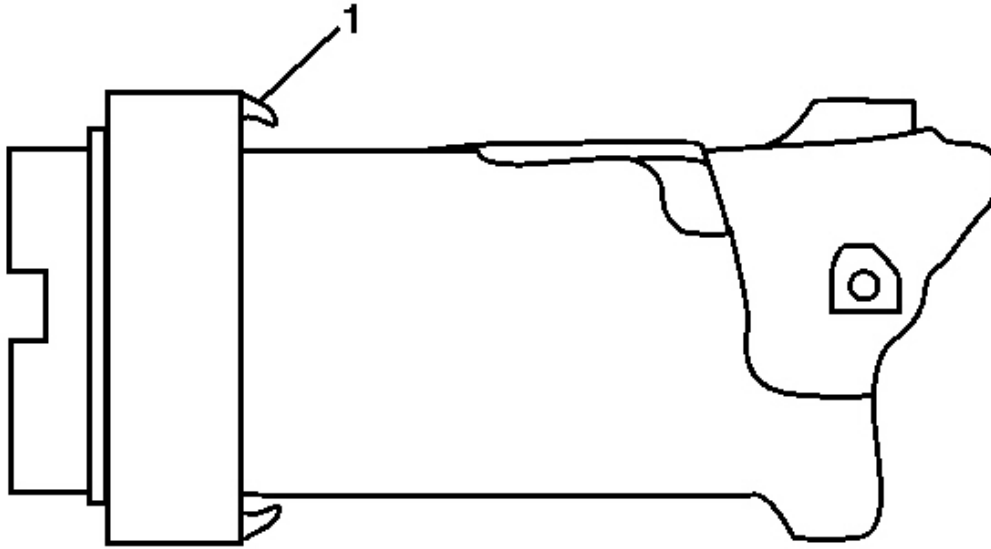


Fig. 17: Inspecting Bearing & Adapter Assembly Tab For Breakage
Courtesy of GENERAL MOTORS CORP.

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

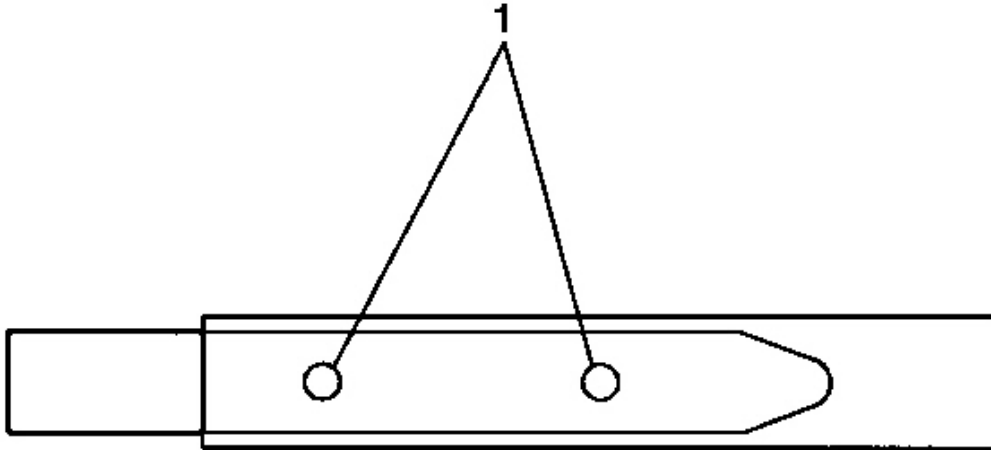


Fig. 18: Inspecting Steering Shaft For Sheared Injected Plastic
Courtesy of GENERAL MOTORS CORP.

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

STEERING COLUMN TRIM COVERS REPLACEMENT

Removal Procedure

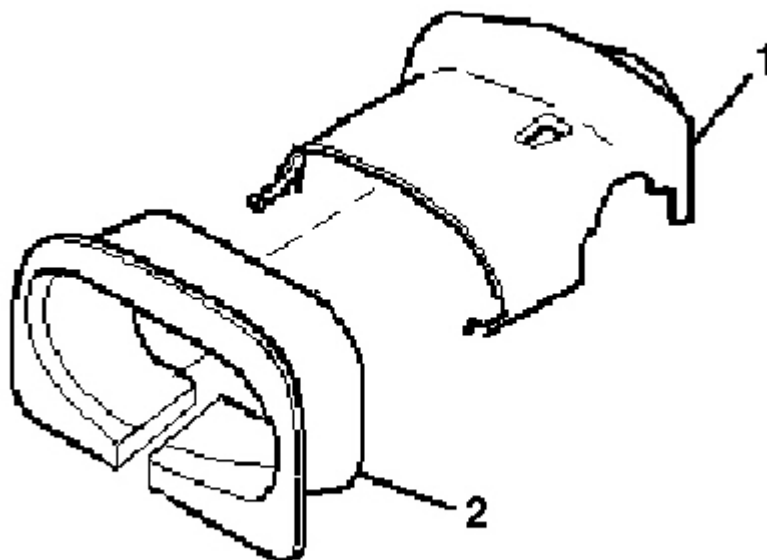


Fig. 19: View Of Closeout Trim Cover & Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Remove the steering wheel. Refer to Steering Wheel Replacement.
3. Remove the tilt lever. Refer to Tilt Lever Replacement.
4. Remove the knee bolster. Refer to Knee Bolster Replacement .

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

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

4. Starting from the left side of the trim covers, gently roll the closeout trim cover to the right to disengage the remaining 4 snaps.

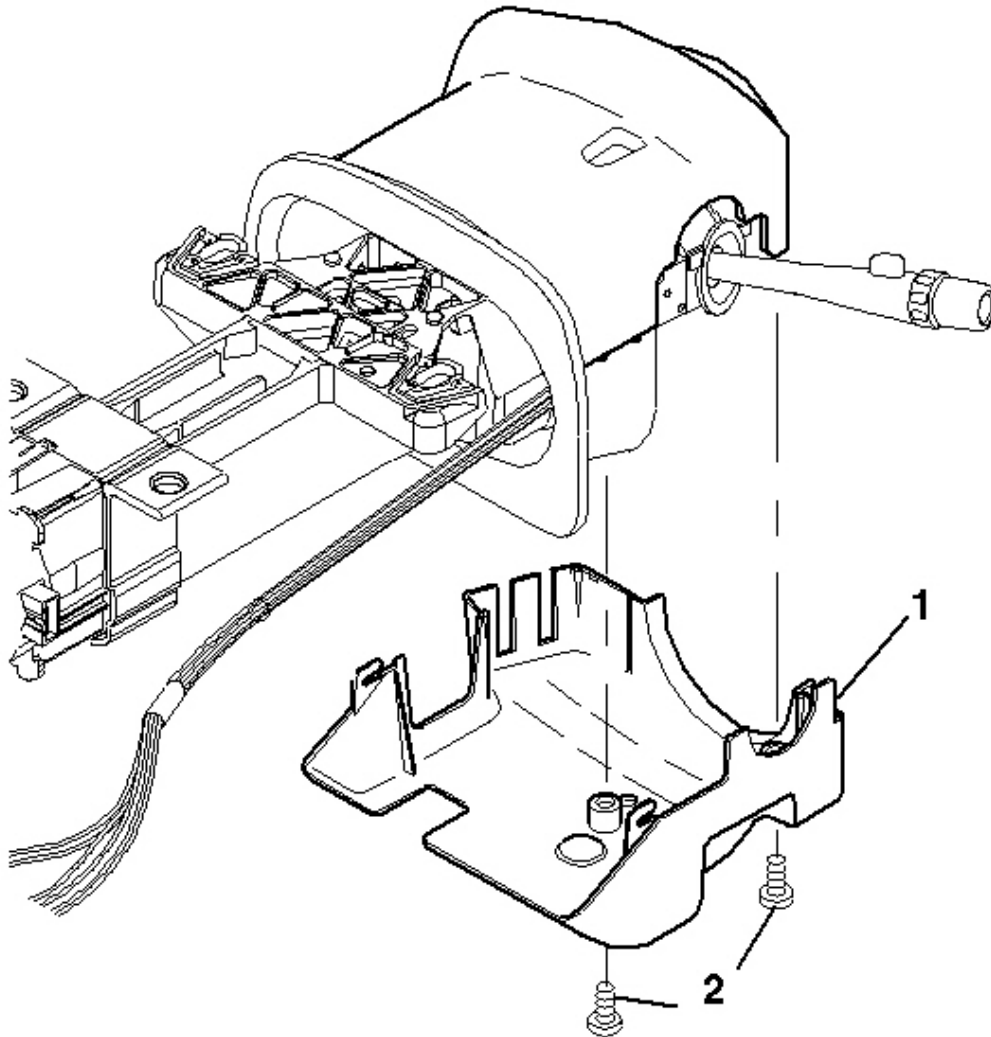


Fig. 20: View Of Lower Steering Column Cover
Courtesy of GENERAL MOTORS CORP.

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

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

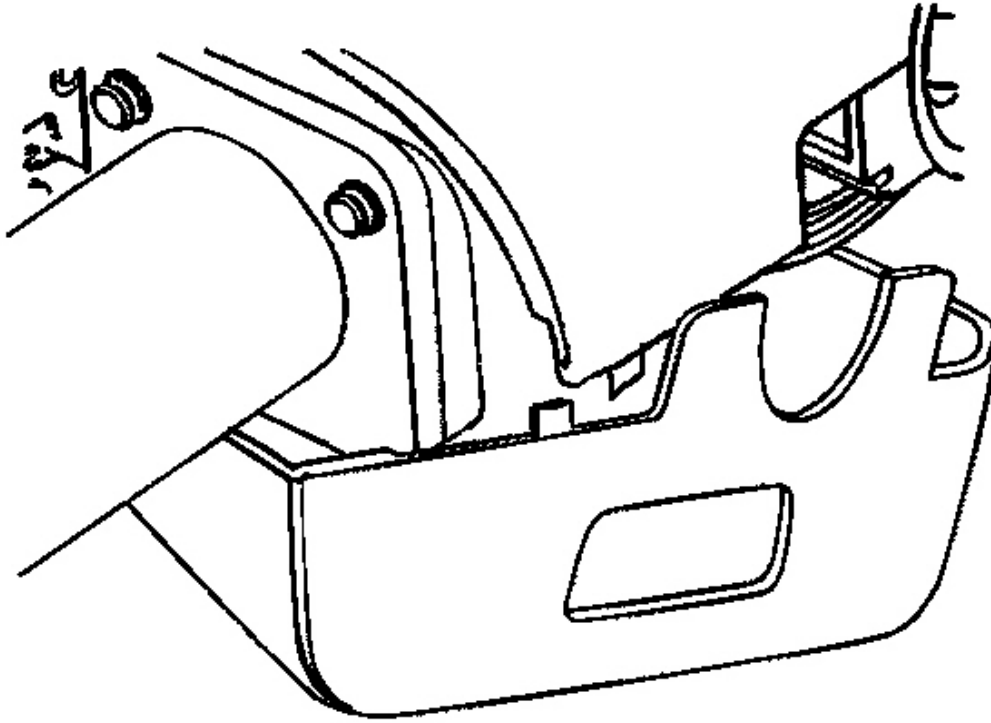


Fig. 21: View Of Lower Trim Cover At Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

7. Gently unsnap the lower trim cover from the upper trim cover.
8. If equipped, disconnect the electrical connector for the power pedal switch.
9. Remove the lower trim cover.
10. Unclip the power pedal switch from the lower cover.

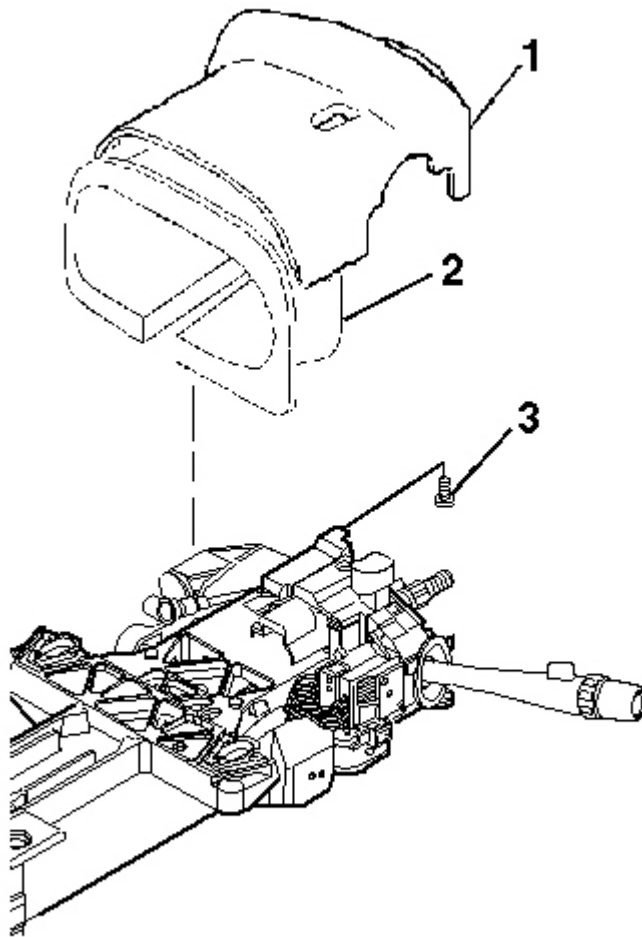


Fig. 22: View Of Upper Steering Column
Courtesy of GENERAL MOTORS CORP.

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

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

Installation Procedure

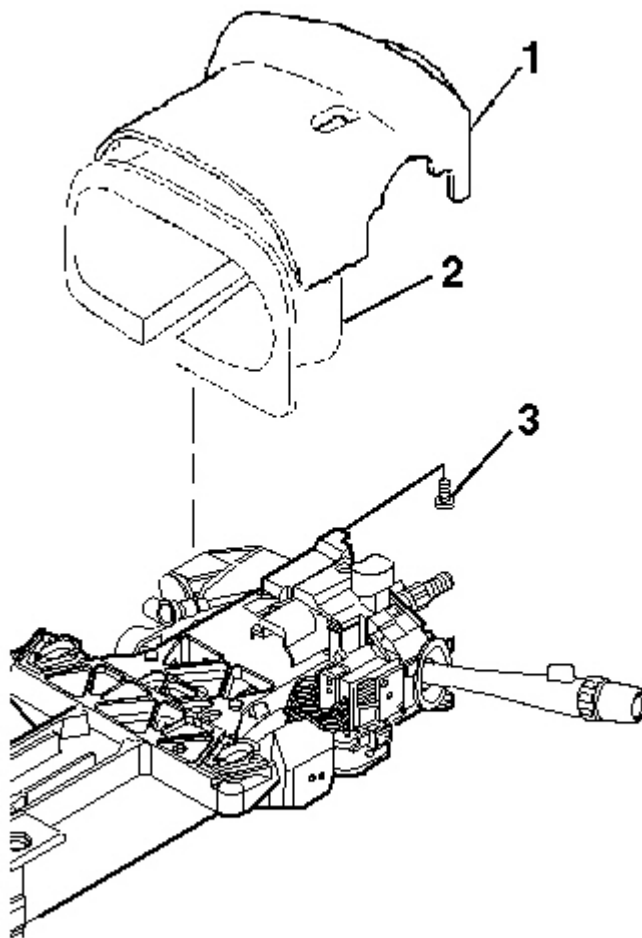


Fig. 23: View Of Upper Steering Column
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

IMPORTANT: If the snap on/off feature on the trim covers was damaged during the removal procedure, you must use screws for the installation procedure. If screws were present in the trim covers before the removal procedure, you must use the screws during the installation procedure. If there was not any damage done to the trim covers during the removal procedure and no screws were present, proceed to step 7.

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

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

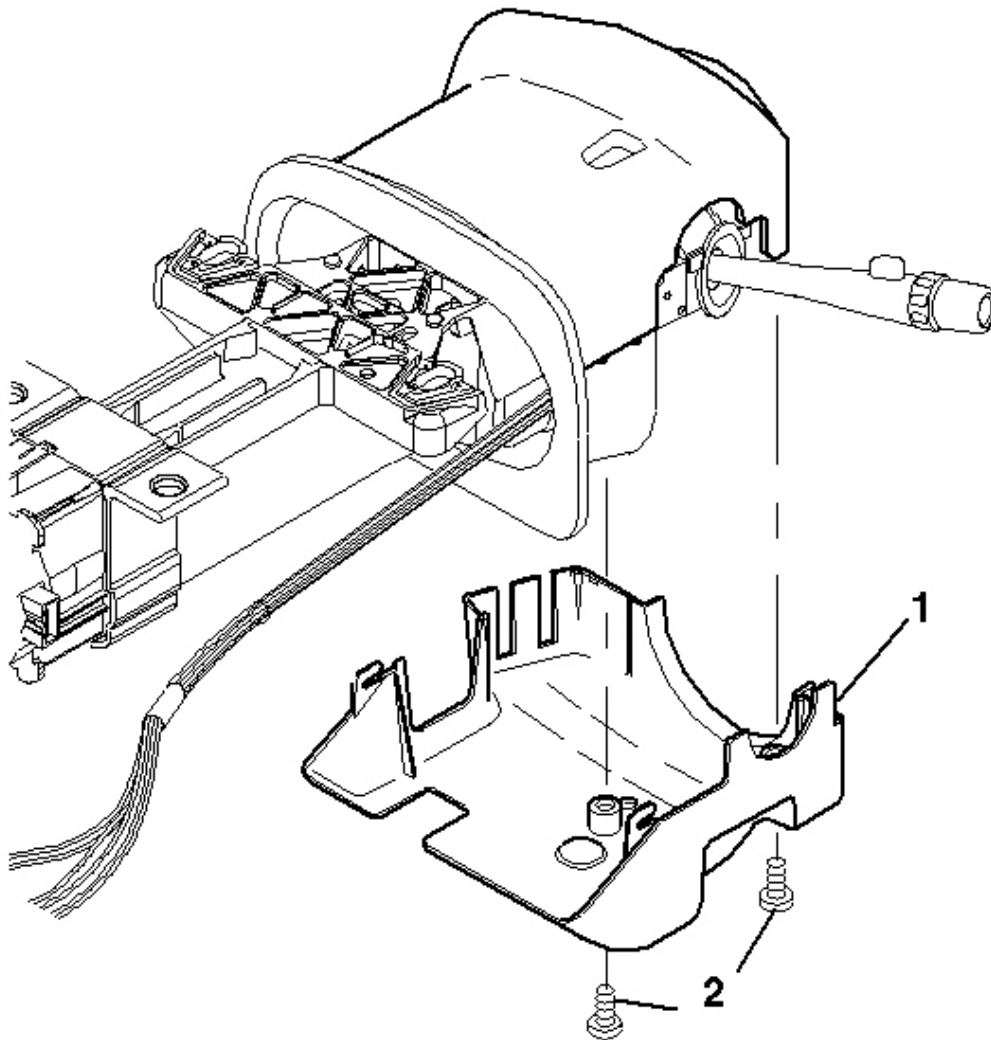


Fig. 24: View Of Lower Steering Column Cover
Courtesy of GENERAL MOTORS CORP.

2. If equipped, install the power pedal switch onto the lower trim cover.
3. Plug in the electrical connector for the power pedal switch.

4. Install the lower trim cover (1).
5. Connect the lower trim cover (1) to the closeout trim cover.
6. Install 2 pan head tapping screws (2).

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

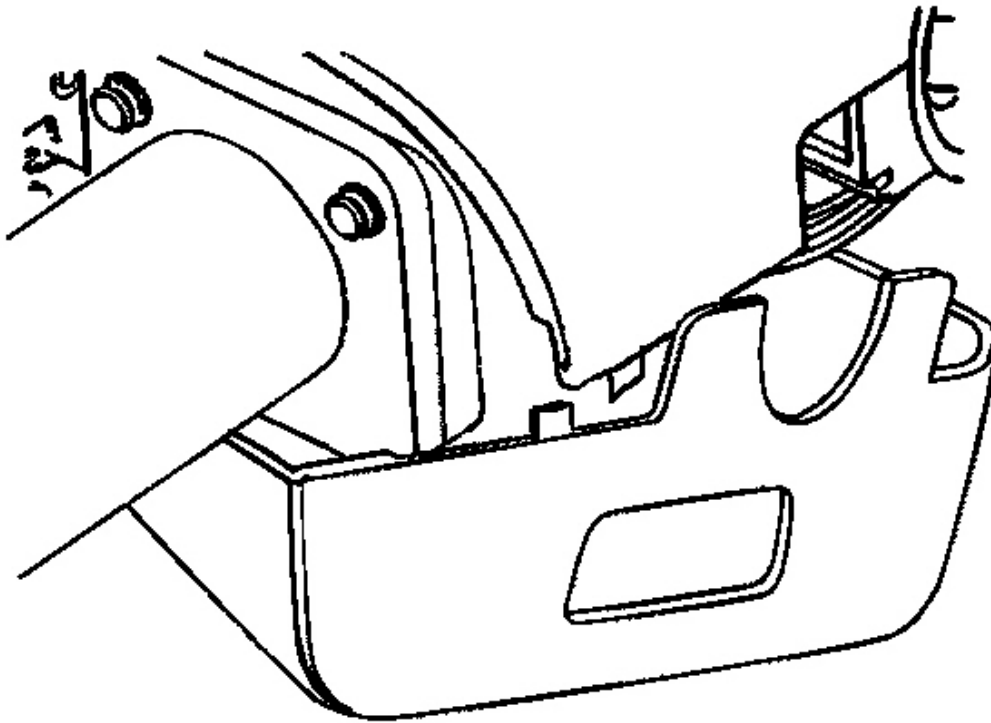


Fig. 25: View Of Lower Trim Cover At Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

7. Install the upper and lower trim covers onto the steering column.
8. Gently snap the upper and lower trim covers together.

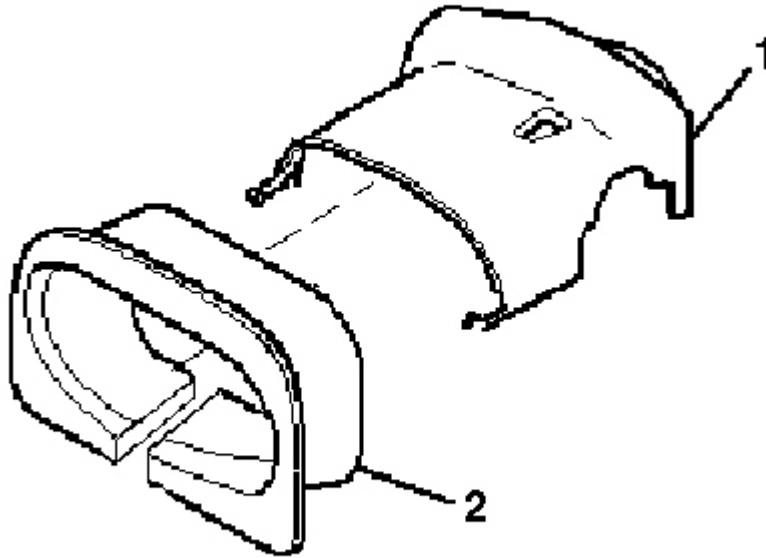


Fig. 26: View Of Closeout Trim Cover & Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

9. Install the closeout trim cover (2) onto the upper trim cover (1).
10. Install the knee bolster. Refer to **Knee Bolster Replacement** .
11. Install the tilt lever. Refer to **Tilt Lever Replacement**.
12. Install the steering wheel. Refer to **Steering Wheel Replacement**.
13. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

MULTIFUNCTION TURN SIGNAL SWITCH HOUSING REPLACEMENT

Removal Procedure

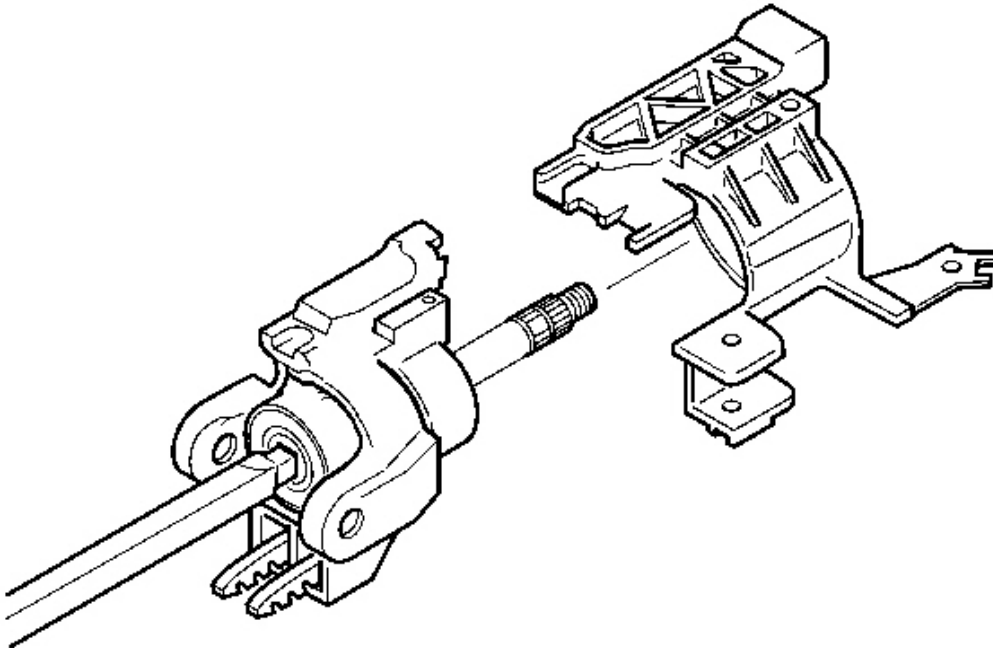


Fig. 27: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

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

Installation Procedure

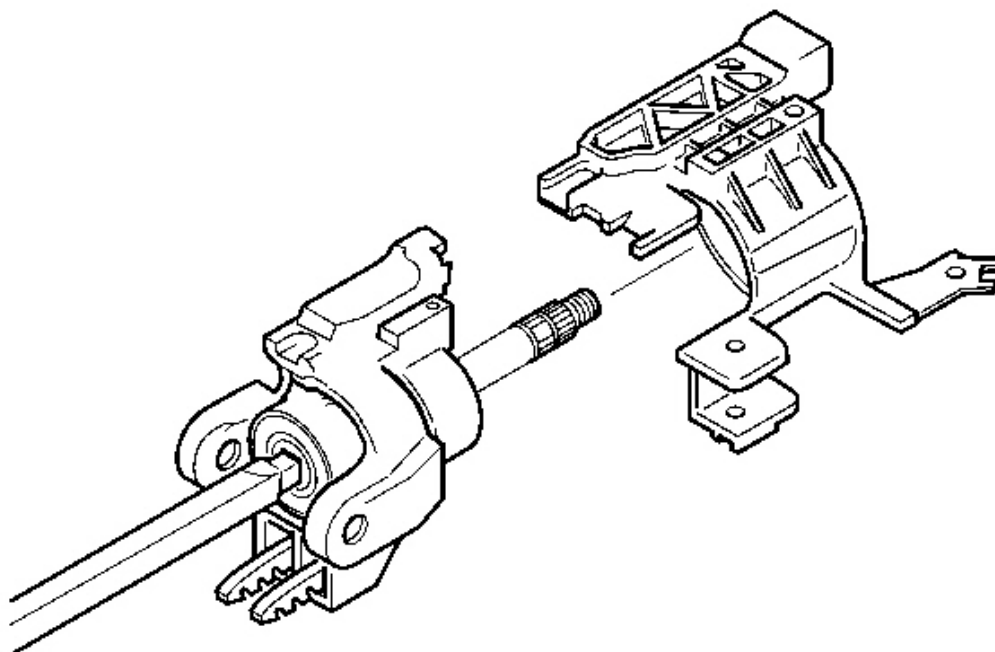


Fig. 28: View Of Turn Signal Switch Housing & Steering Column Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

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

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

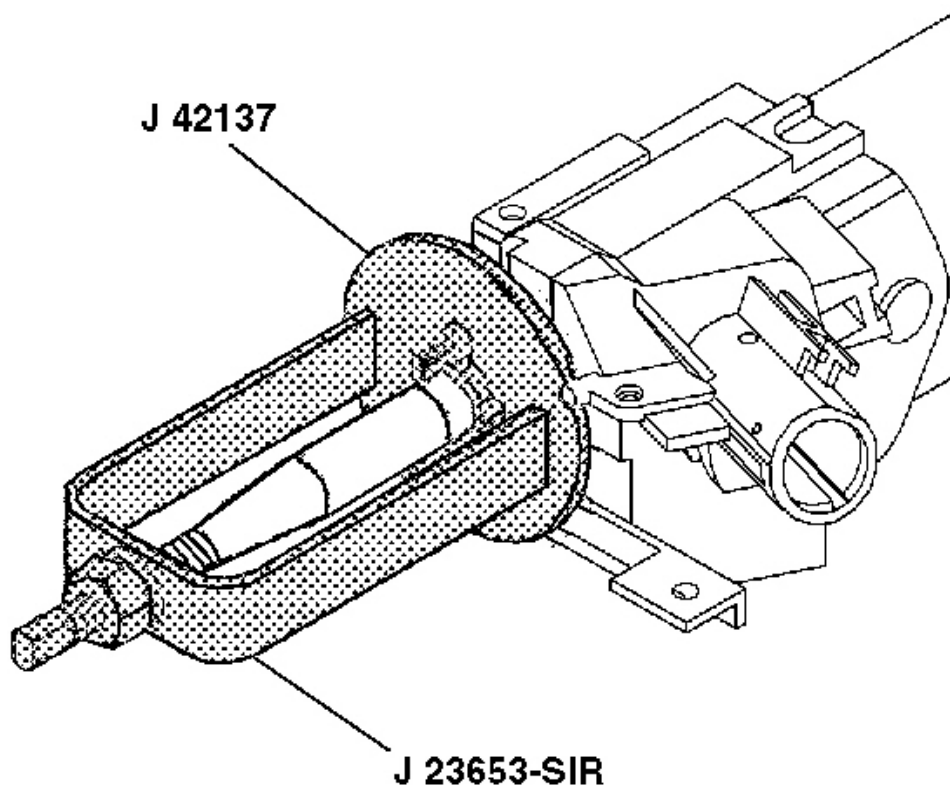


Fig. 29: Depressing Lock Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

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** .
3. Remove and discard the bearing retainer using **J 23653-SIR** and **J 42137** . See **Special Tools**.

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

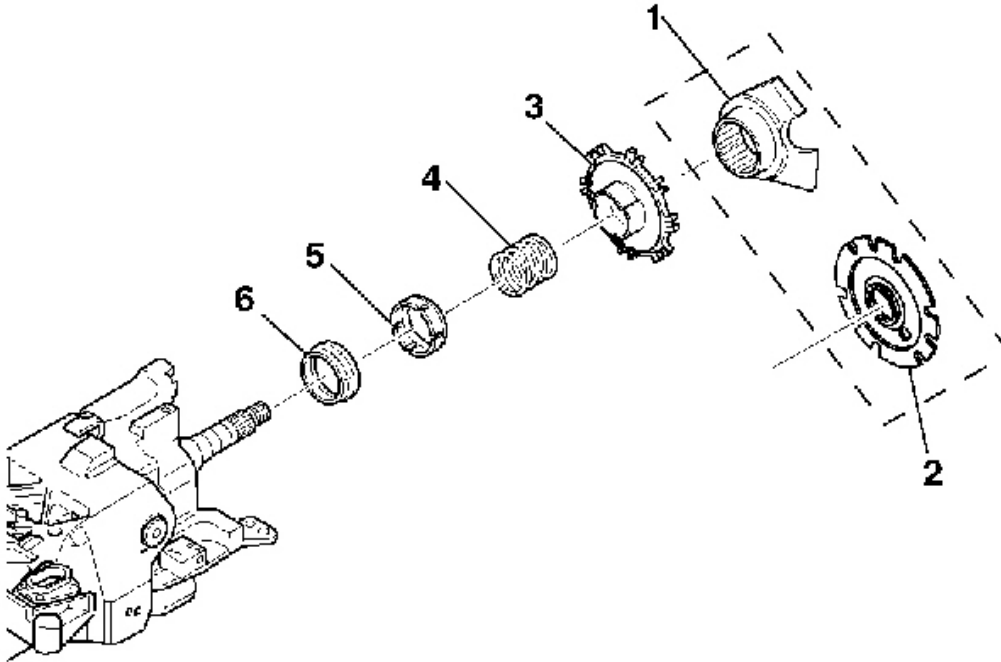


Fig. 30: View Of Turn Signal Cancel Cam, Upper Bearing Inner Race & Components
Courtesy of GENERAL MOTORS CORP.

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

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

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

Installation Procedure

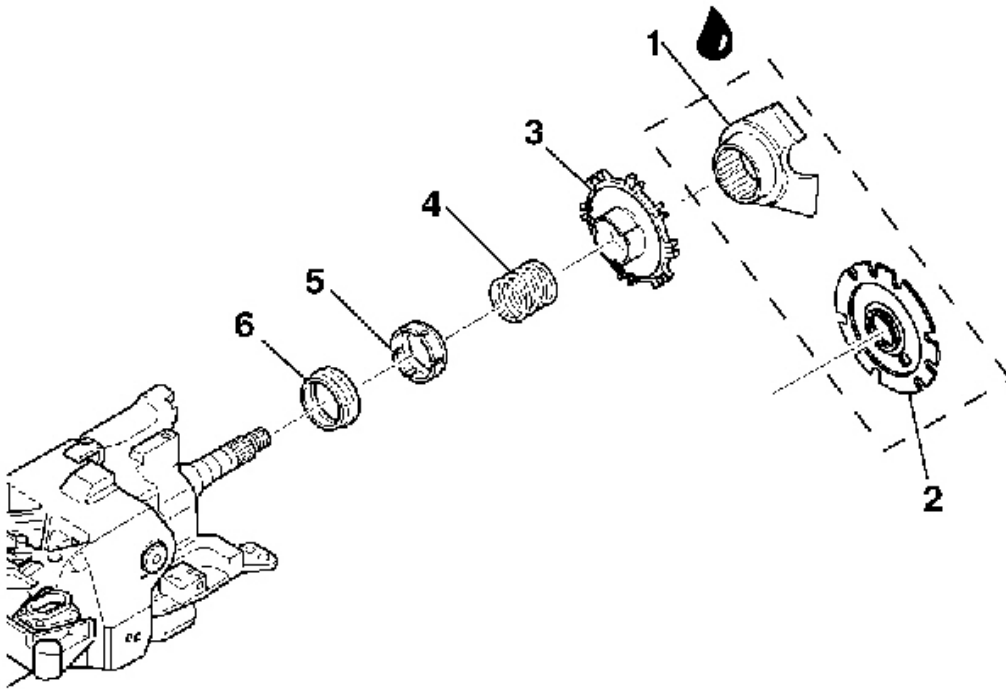


Fig. 31: Installing Inner Race, Upper Bearing Inner Race Seat & Upper Bearing Spring
Courtesy of GENERAL MOTORS CORP.

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

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

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

Install the turn signal cancel cam assembly (3).

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

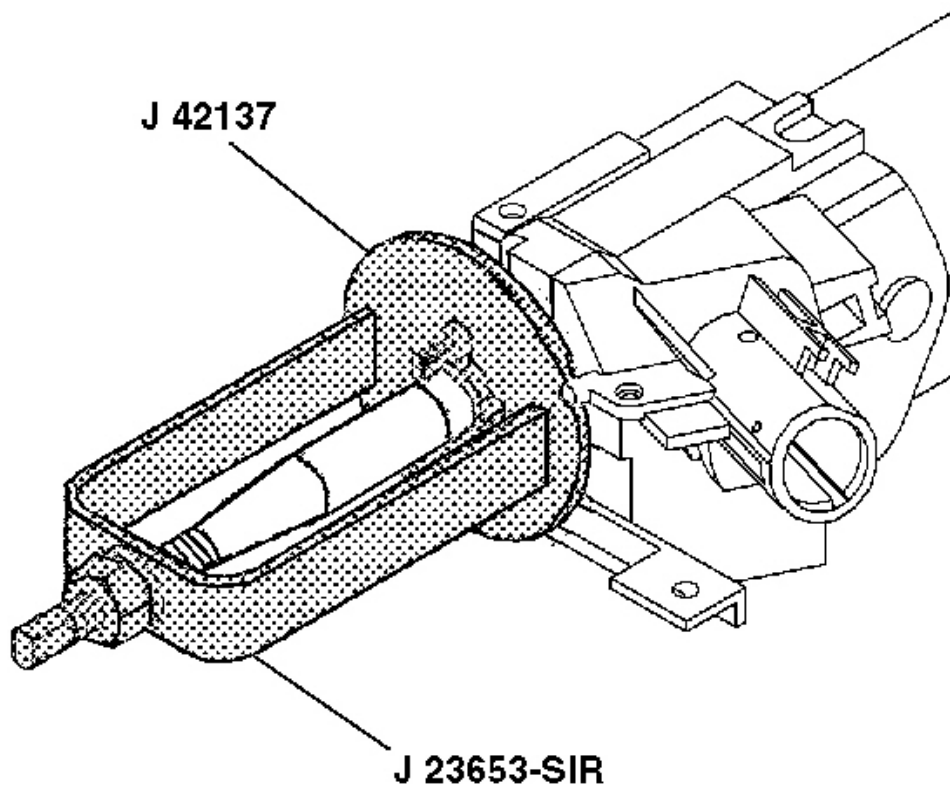


Fig. 32: Depressing Lock Plate Using J 23653-SIR & J 42137
Courtesy of GENERAL MOTORS CORP.

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

CAUTION: Refer to **SIR Inflator Module Coil Caution** .

8. Install the SIR coil. Refer to **Inflatable Restraint Steering Wheel Module Coil Replacement** .
9. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

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Removal Procedure

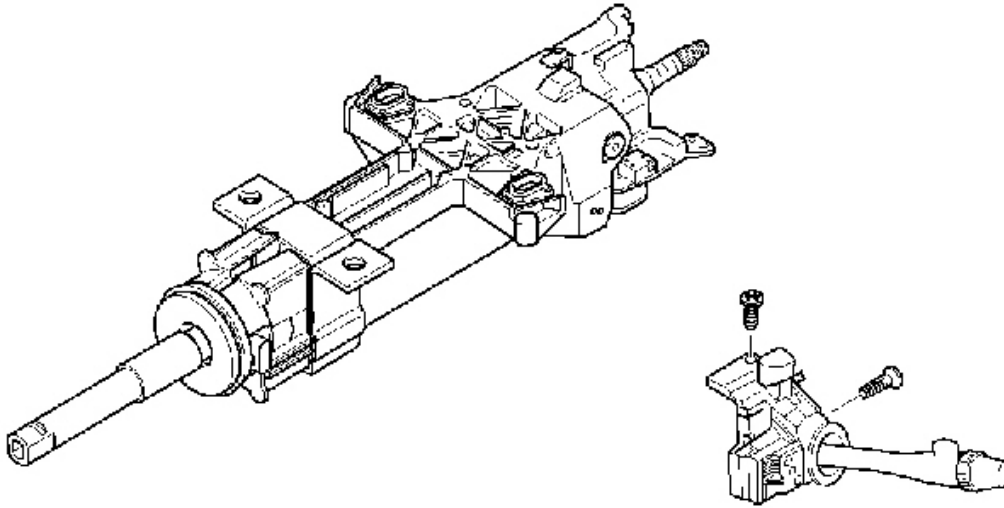


Fig. 33: View Of Turn Signal Switch Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

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

Installation Procedure

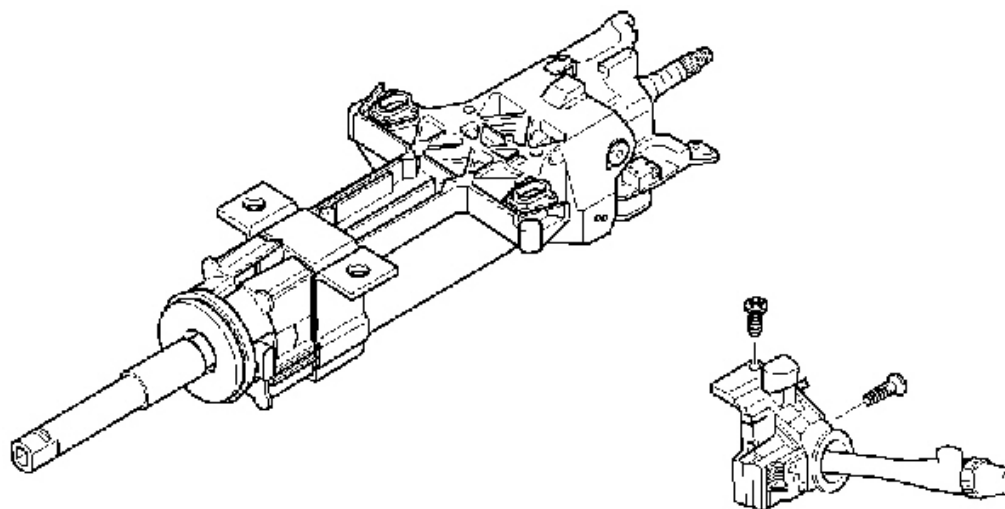


Fig. 34: View Of Turn Signal Switch Assembly
Courtesy of GENERAL MOTORS CORP.

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

1. Install the turn signal and multifunction switch assembly.

NOTE: Refer to Fastener Notice .

2. Secure by using 2 pan head tapping screws.

Tighten:

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

TILT LEVER REPLACEMENT

Removal Procedure

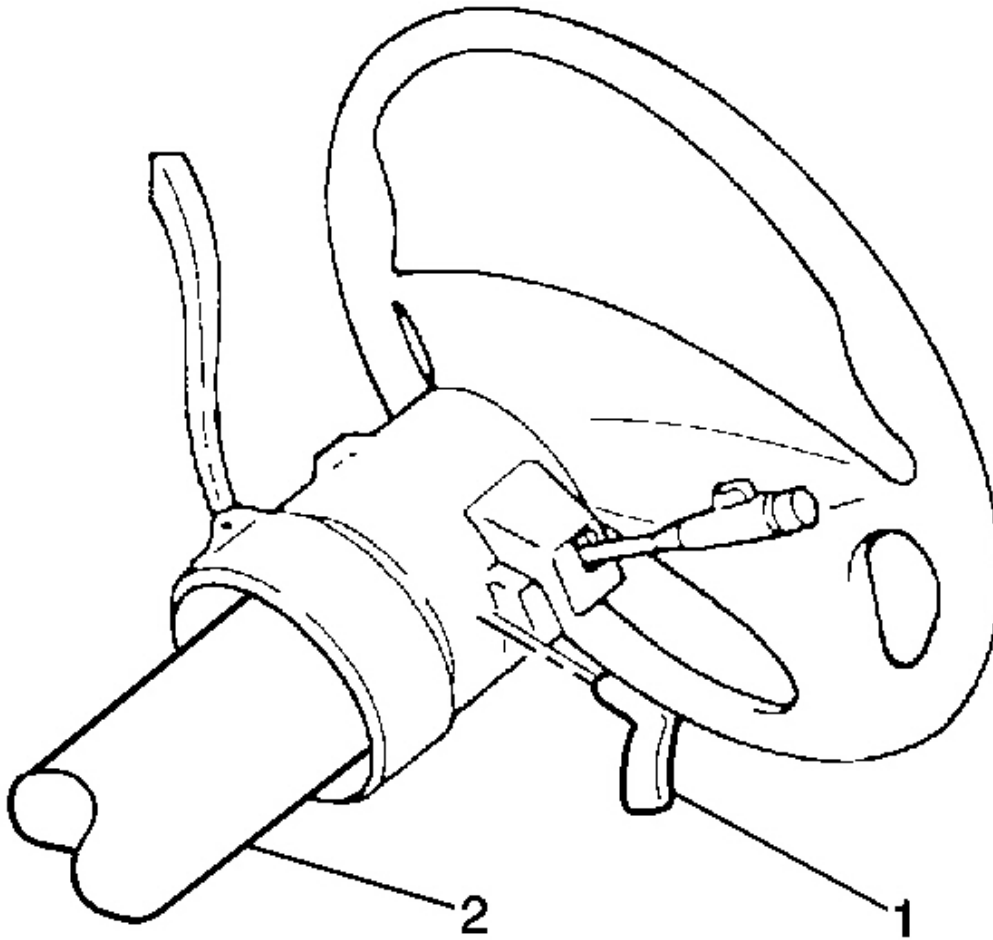


Fig. 35: View Of Upper Steering Column With Tilt Lever
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

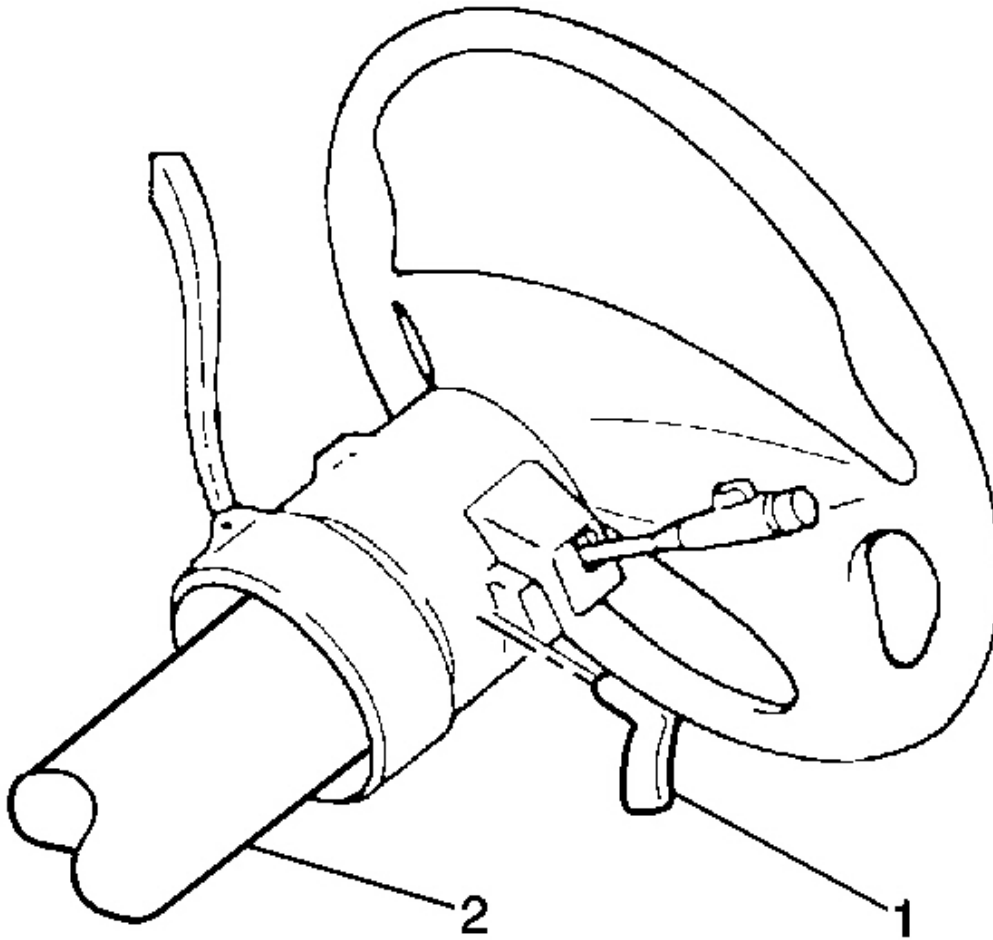


Fig. 36: View Of Upper Steering Column With Tilt Lever
Courtesy of GENERAL MOTORS CORP.

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

STEERING WHEEL REPLACEMENT

Tools Required

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

Removal Procedure

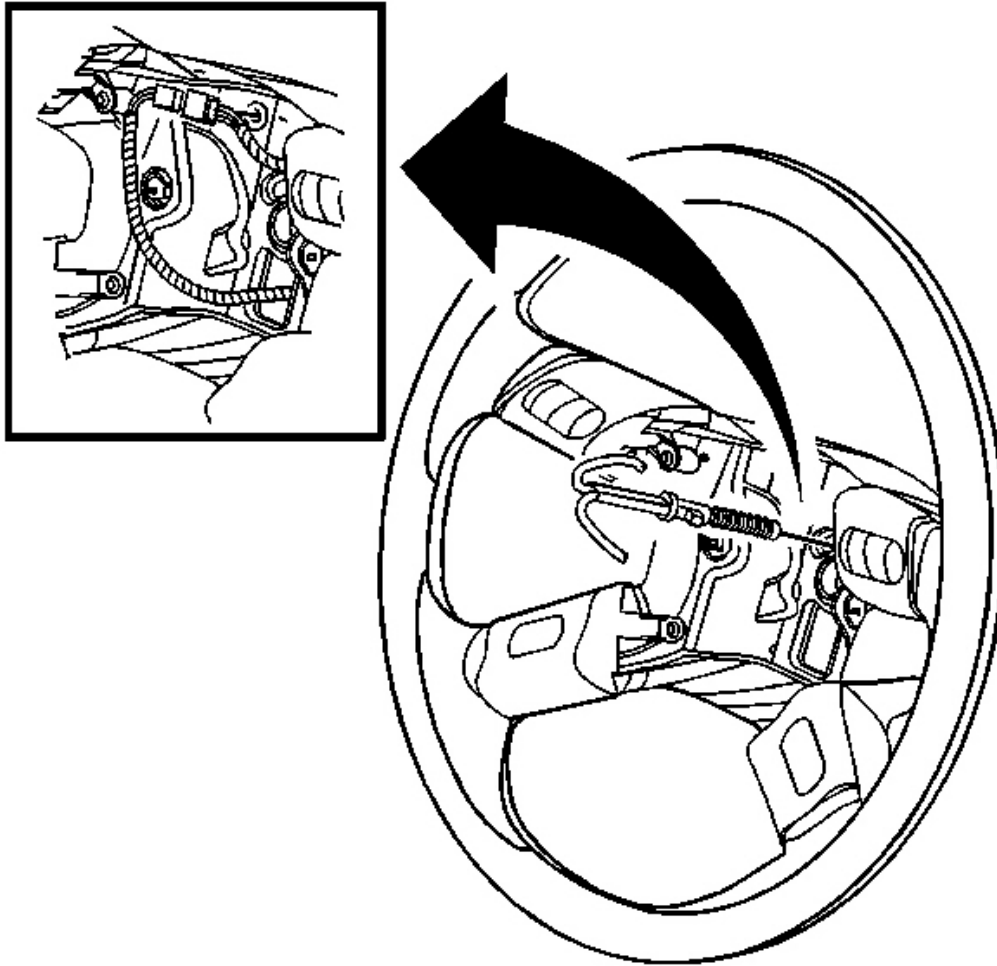


Fig. 37: Steering Wheel Electrical Connector
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to **Servicing the SIR System Caution** .

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

4. Disconnect the steering wheel electrical connector.

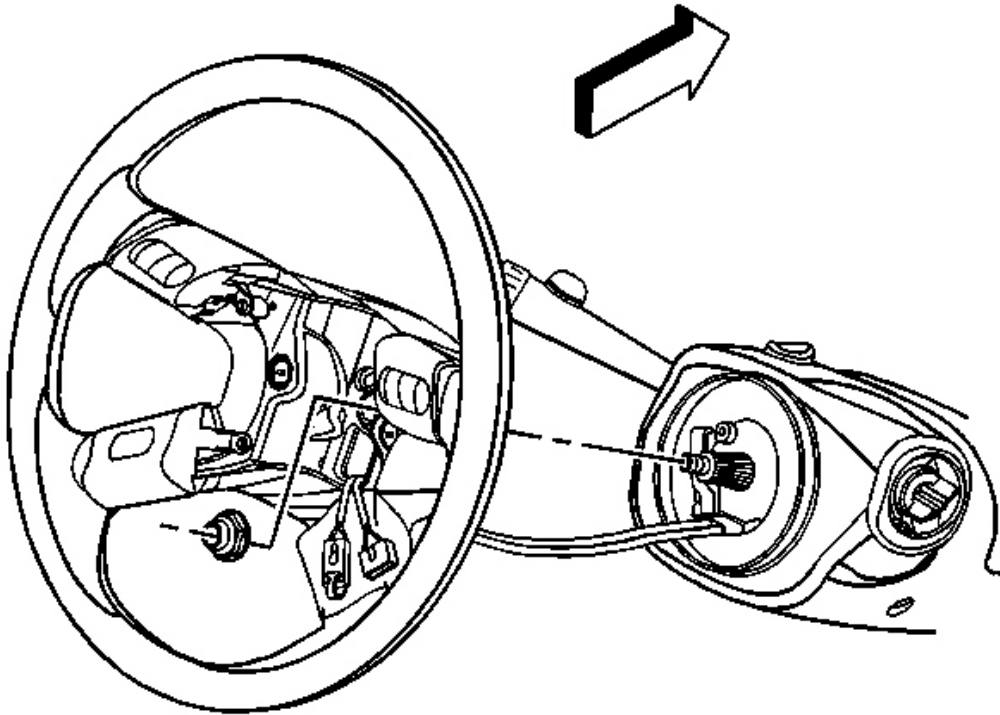


Fig. 38: Steering Wheel & Steering Wheel Shaft
Courtesy of GENERAL MOTORS CORP.

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

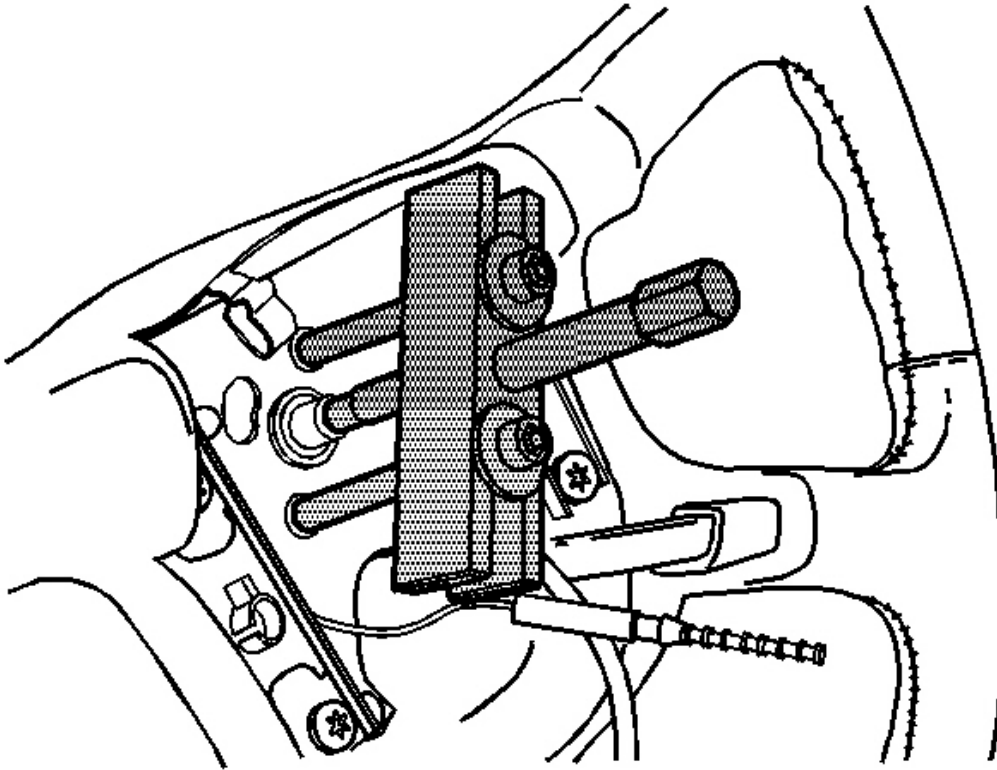


Fig. 39: Removing Steering Wheel Using J 1859-A With J-36541-A Or J 42578
Courtesy of GENERAL MOTORS CORP.

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

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

Installation Procedure

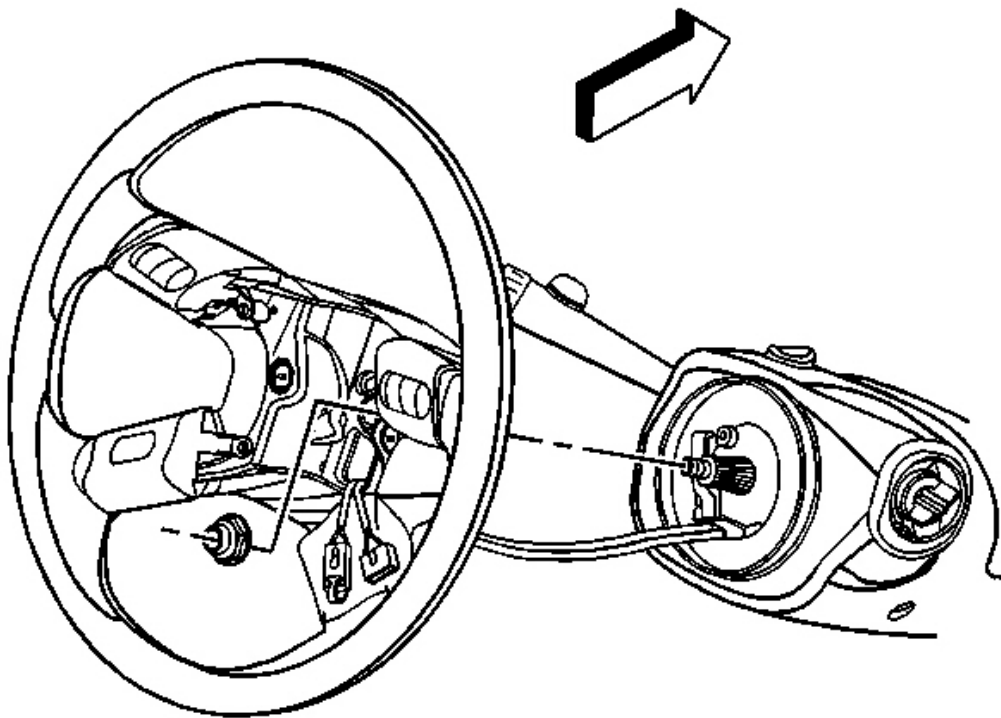


Fig. 40: Steering Wheel & Steering Wheel Shaft
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

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

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

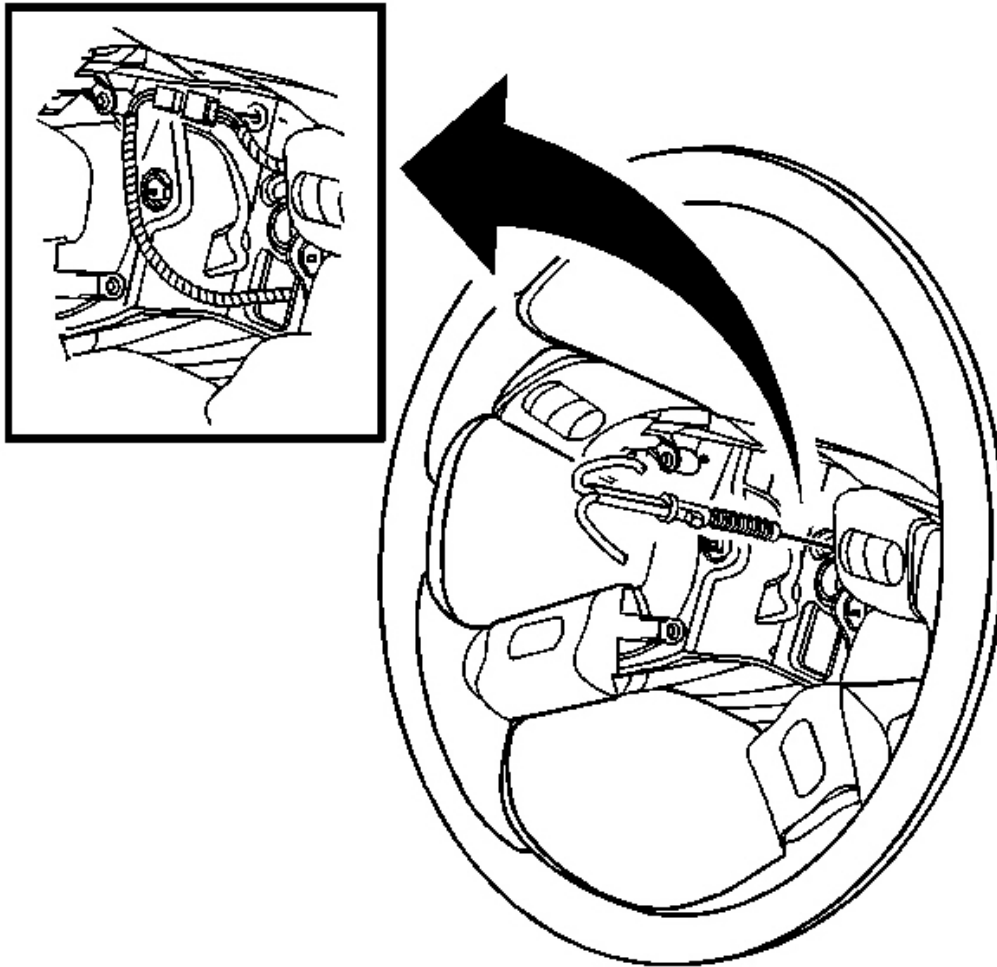


Fig. 41: Steering Wheel Electrical Connector
Courtesy of GENERAL MOTORS CORP.

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

STEERING WHEEL THEFT DETERRENT LOCK REPLACEMENT

Removal Procedure

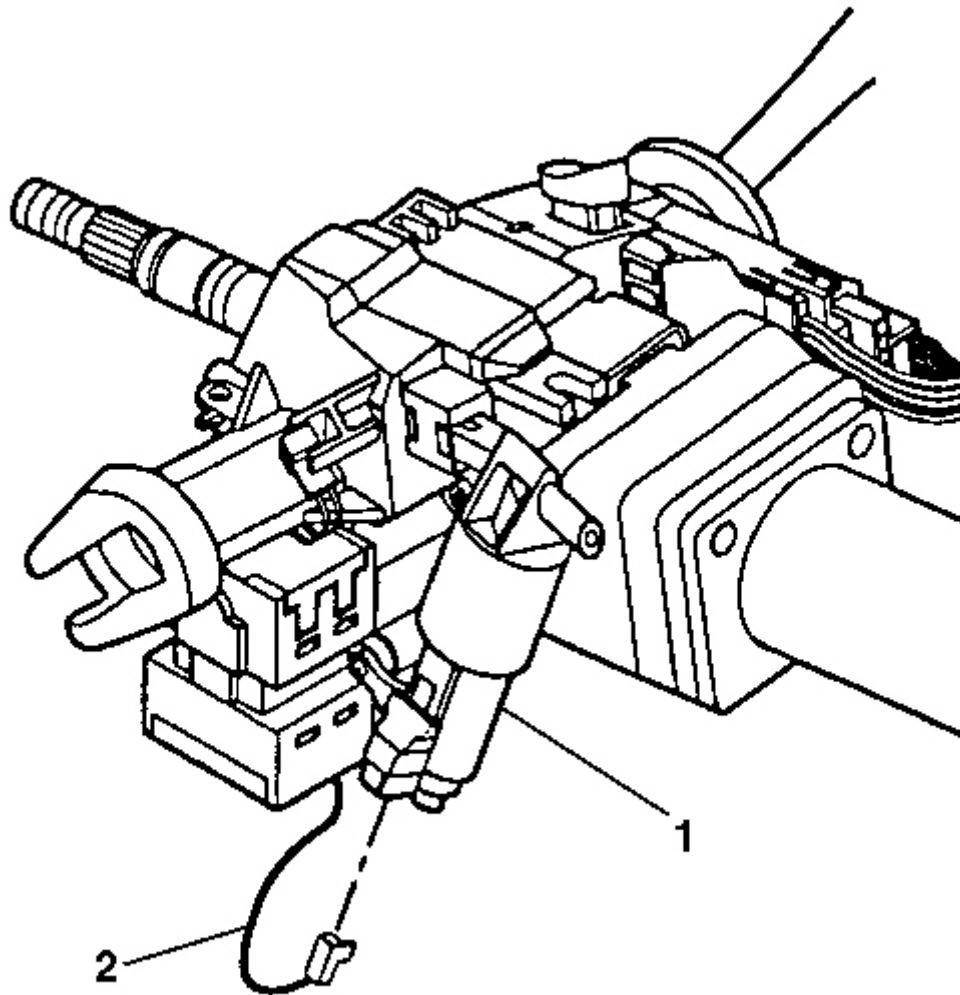


Fig. 42: Electric Park Lock & Connector
Courtesy of GENERAL MOTORS CORP.

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 connector (2) from the lock (1).

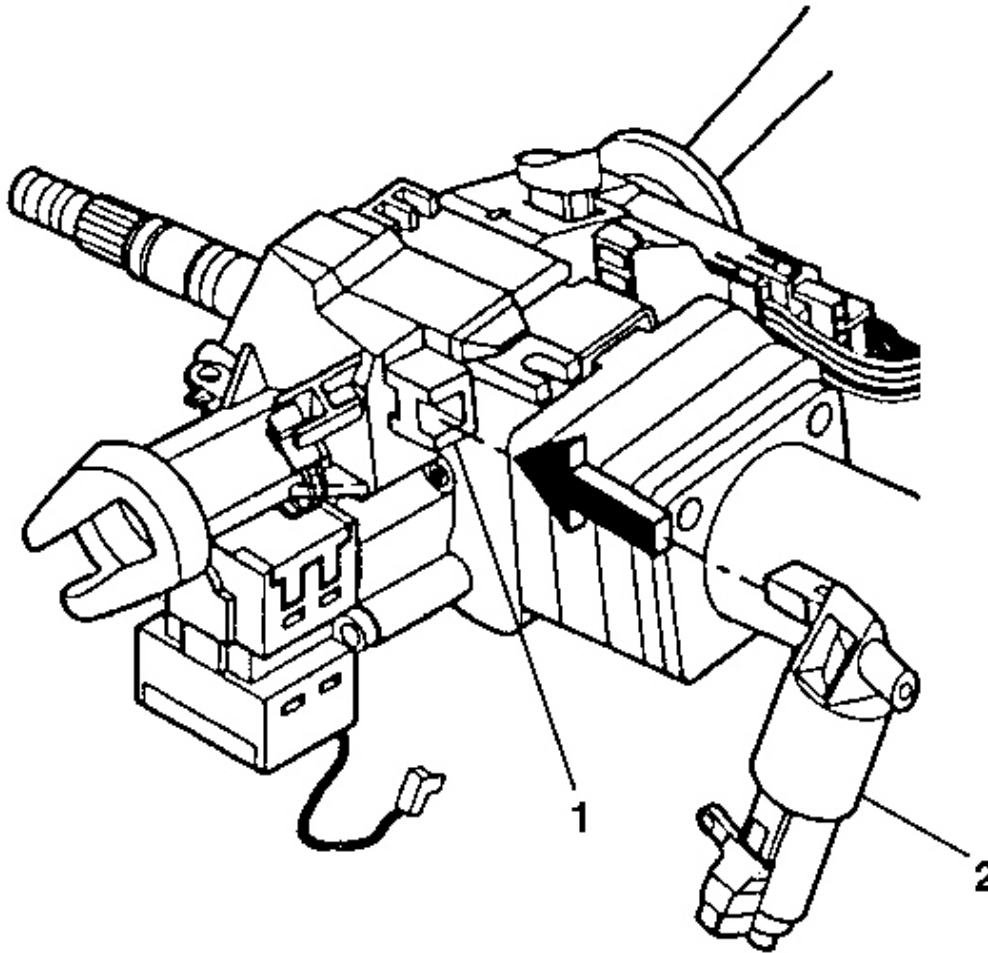


Fig. 43: View Of Electric Park Lock & Ignition Lock Cylinder Case Assembly
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

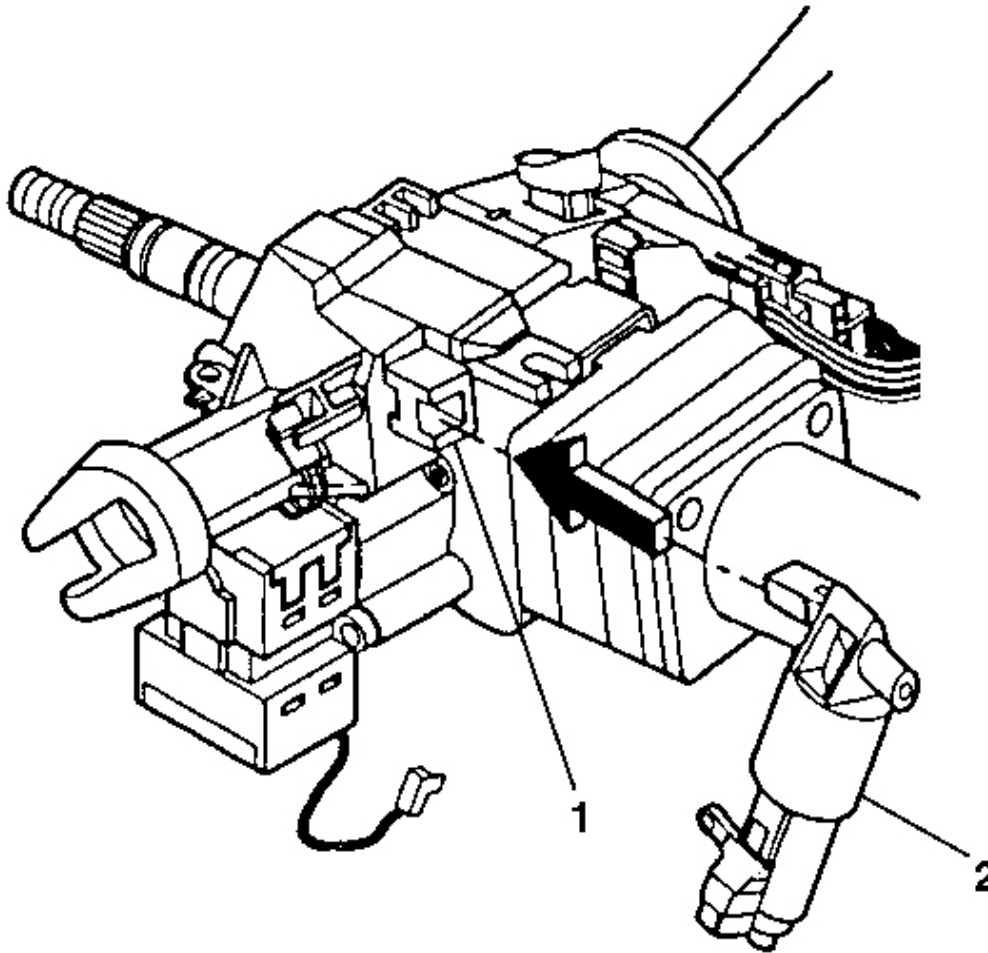


Fig. 44: View Of Electric Park Lock & Ignition Lock Cylinder Case Assembly
Courtesy of GENERAL MOTORS CORP.

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

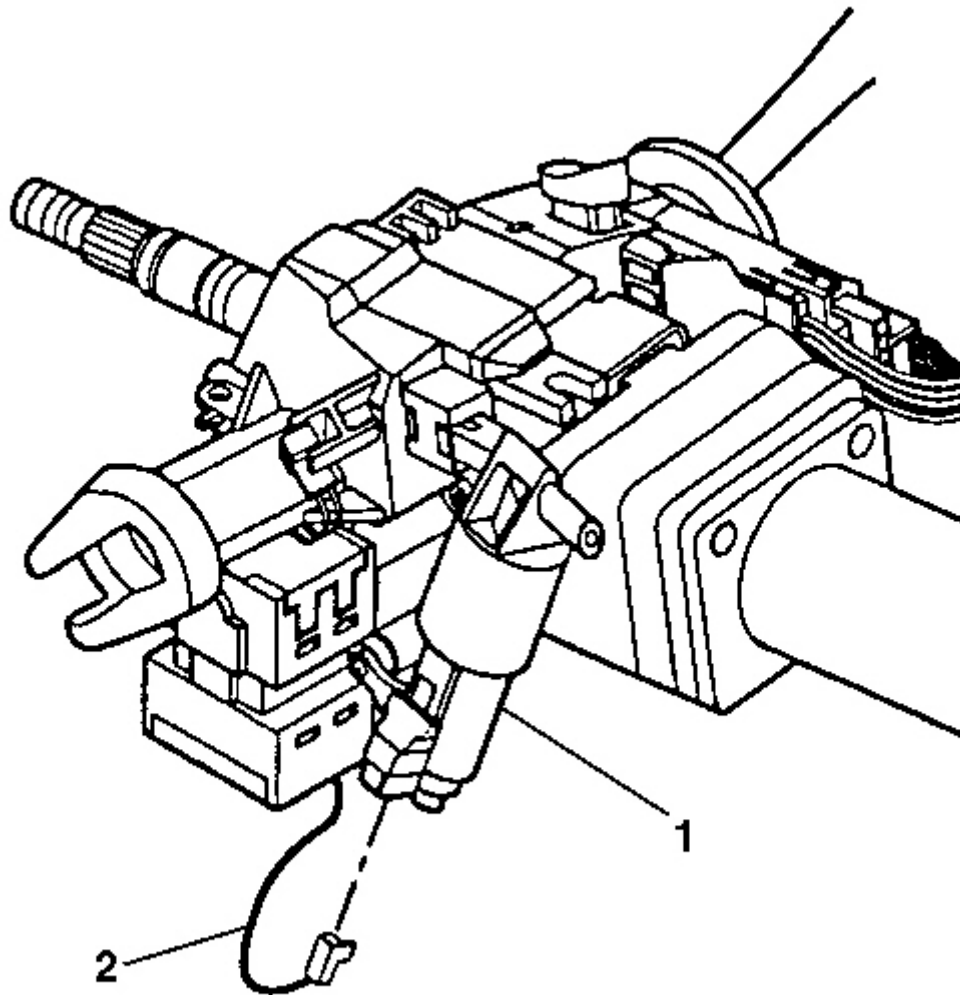


Fig. 45: Electric Park Lock & Connector
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Inflator Module Coil Caution .

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

STEERING COLUMN TILT SPRING REPLACEMENT

Removal Procedure

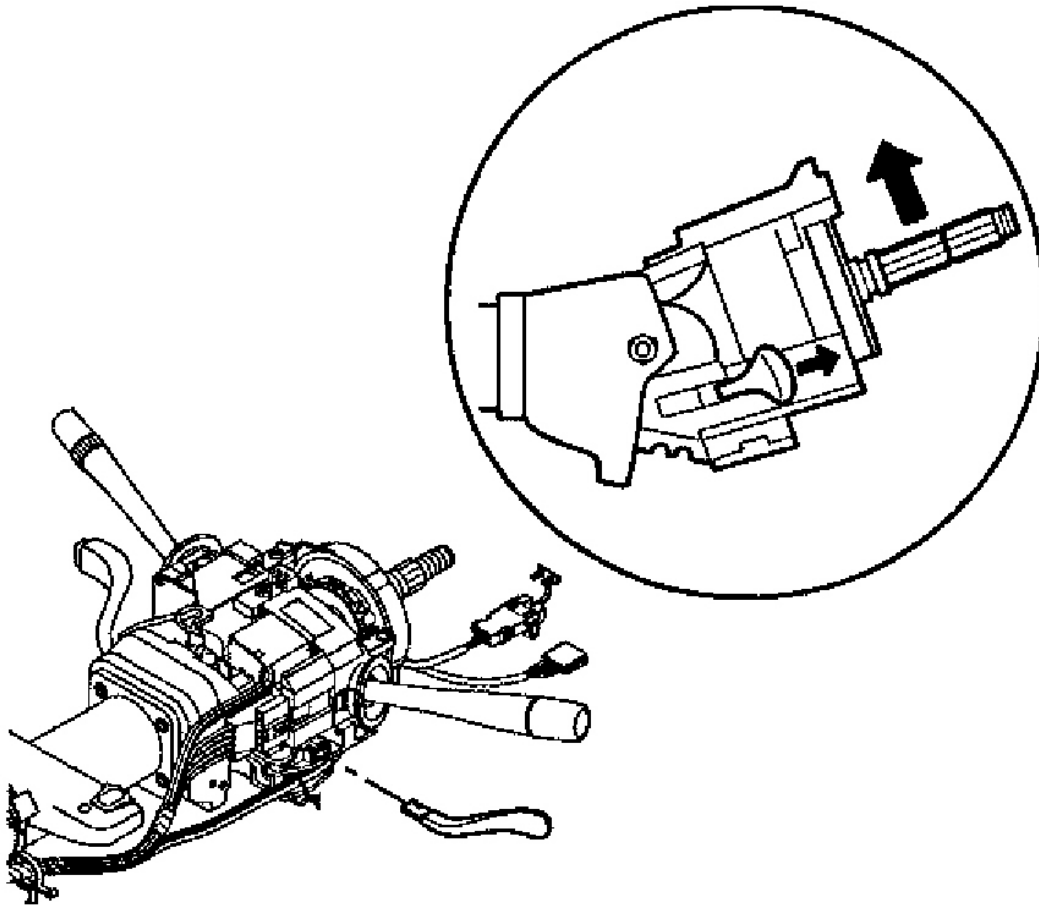


Fig. 46: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

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.

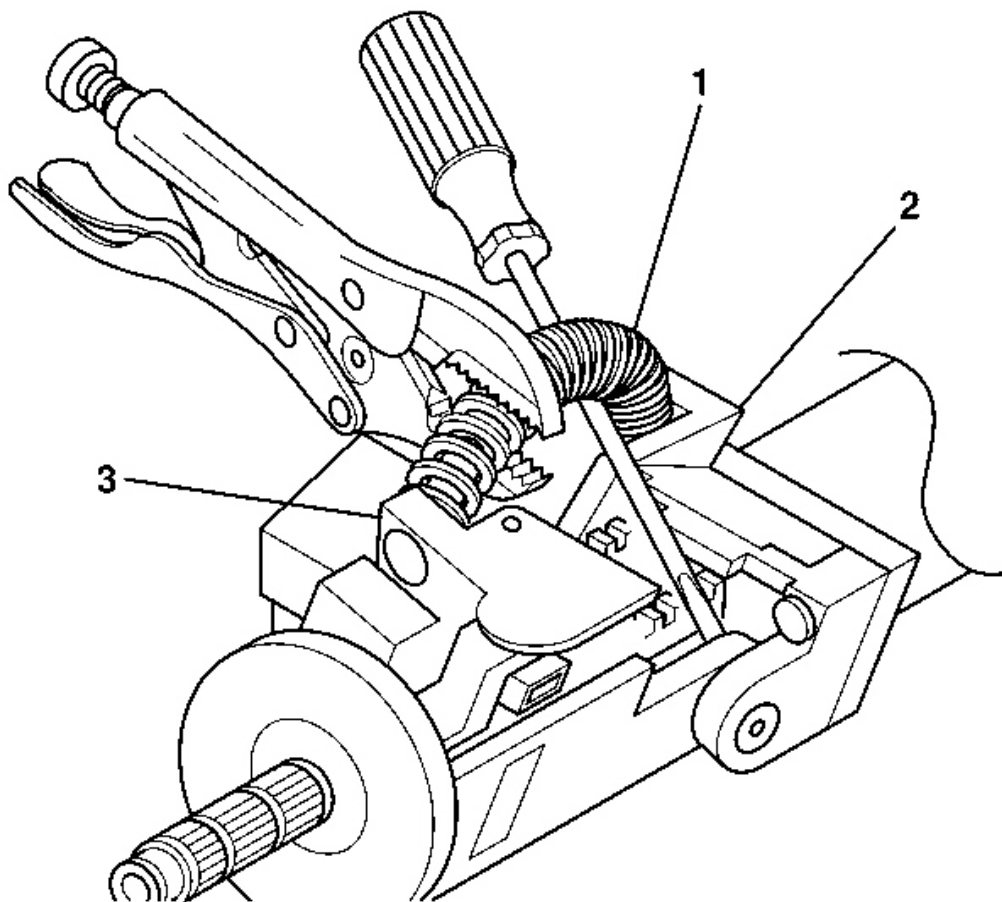


Fig. 47: Removing Tilt Spring From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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).

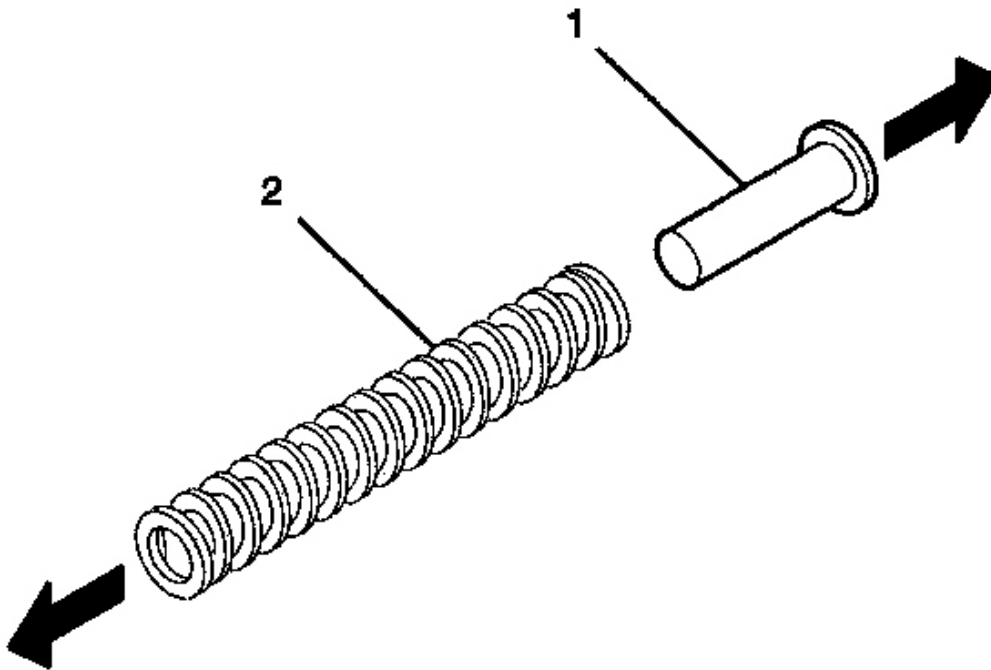


Fig. 48: Identifying Spring Guide Components
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

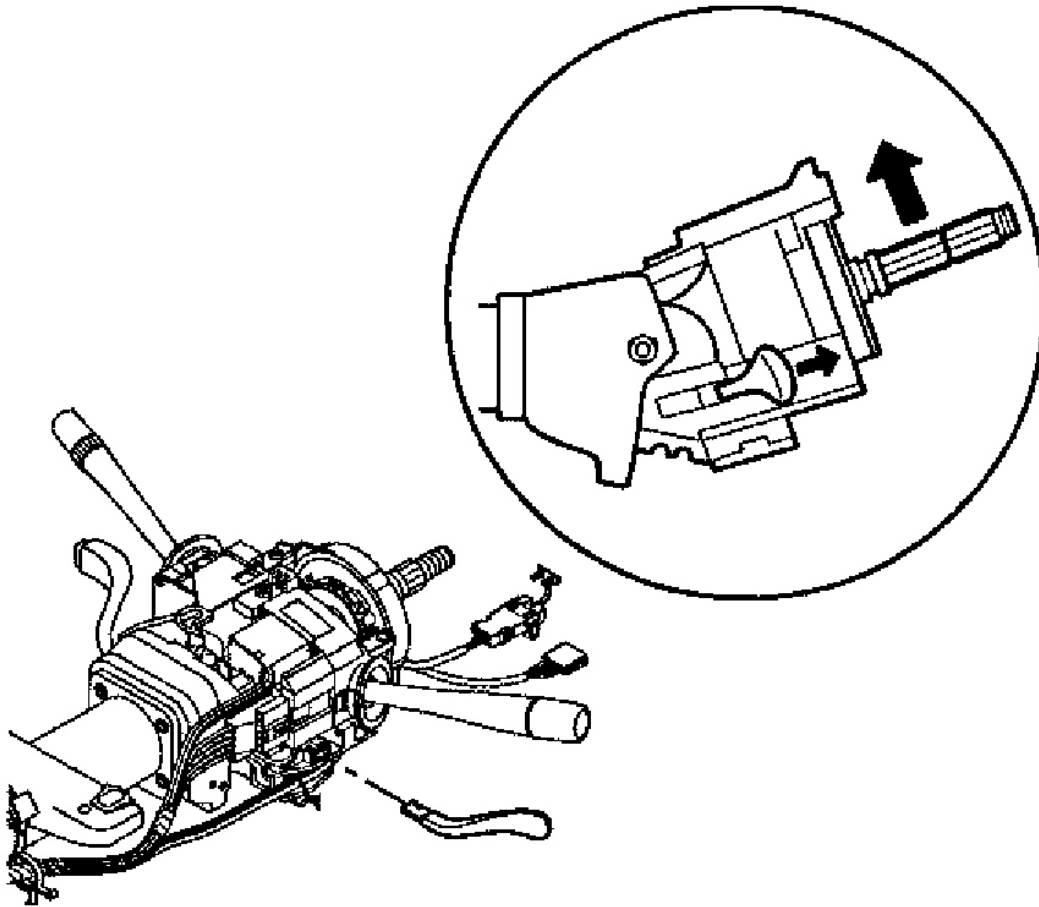


Fig. 49: Tilting Column To Up Position
Courtesy of GENERAL MOTORS CORP.

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

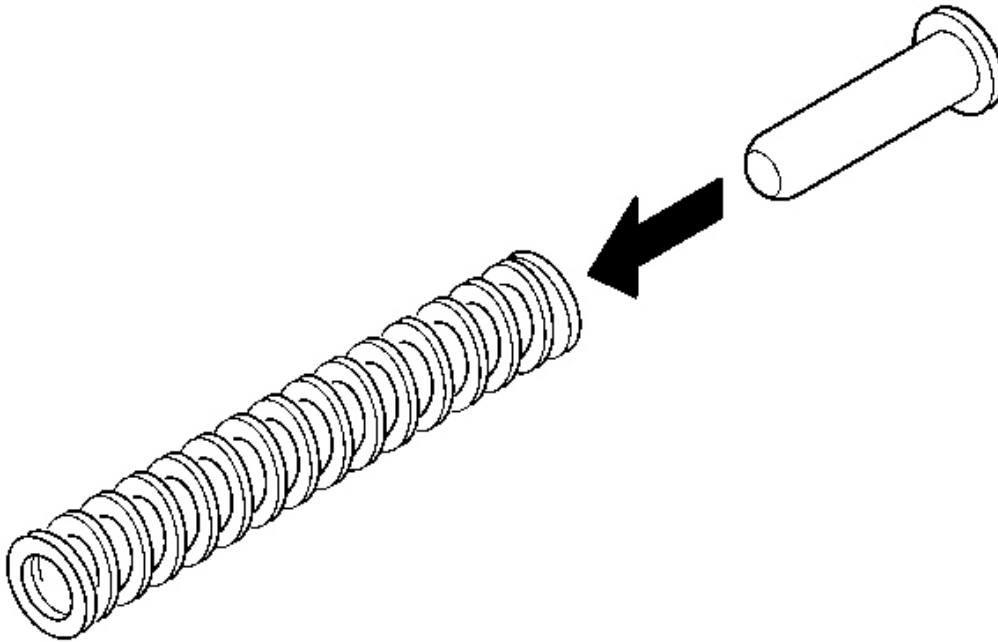


Fig. 50: Spring Guide & Tilt Spring
Courtesy of GENERAL MOTORS CORP.

2. Install the spring guide into the tilt spring.

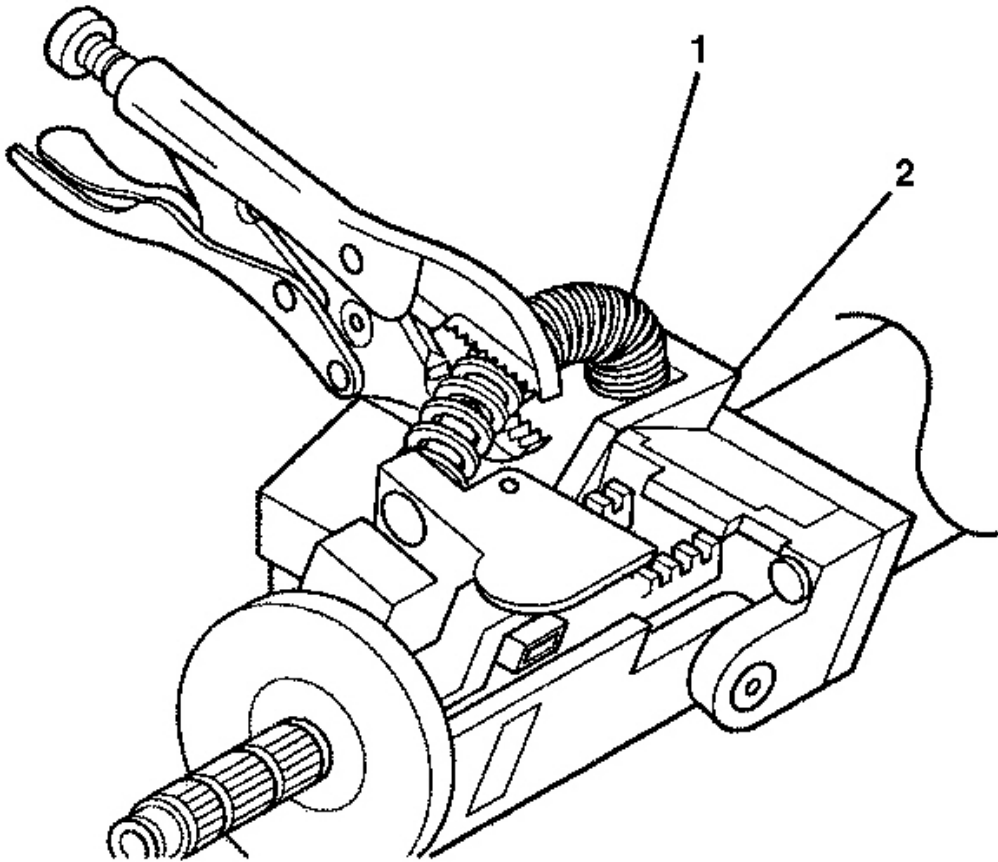


Fig. 51: Installing Tilt Spring Onto The Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

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 HOUSING REPLACEMENT

Tools Required

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

Removal Procedure

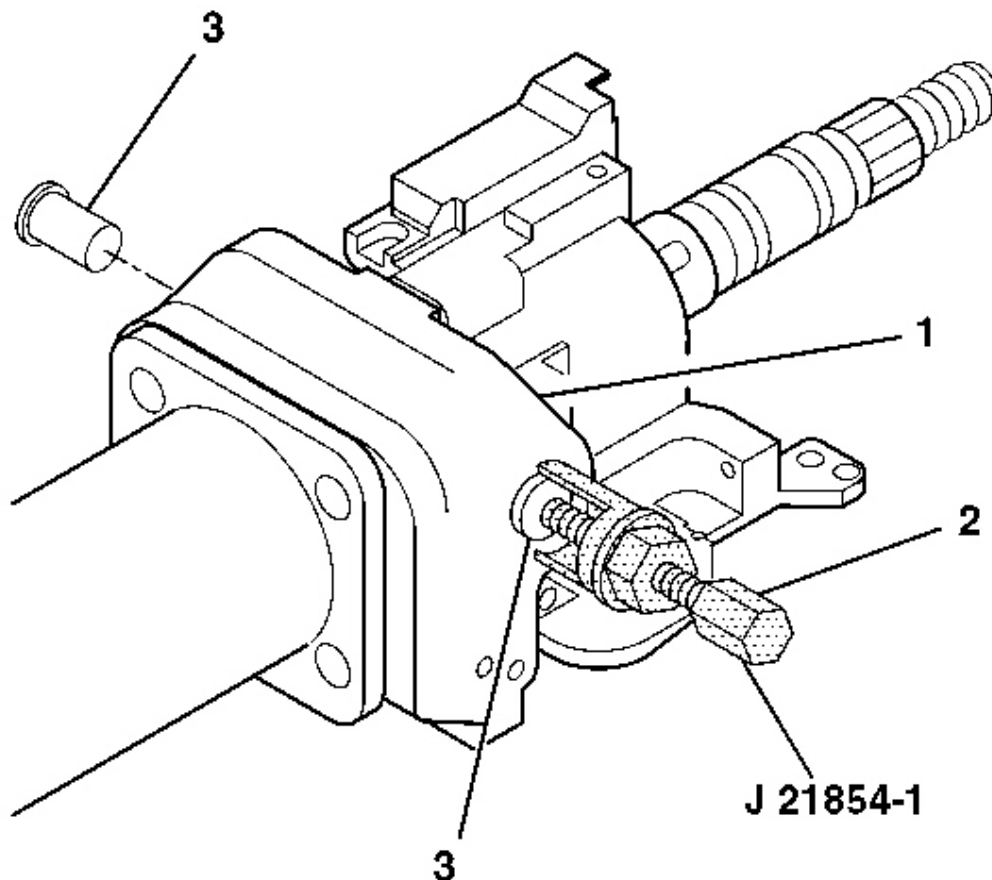


Fig. 52: View Of Pivot Pins To Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

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

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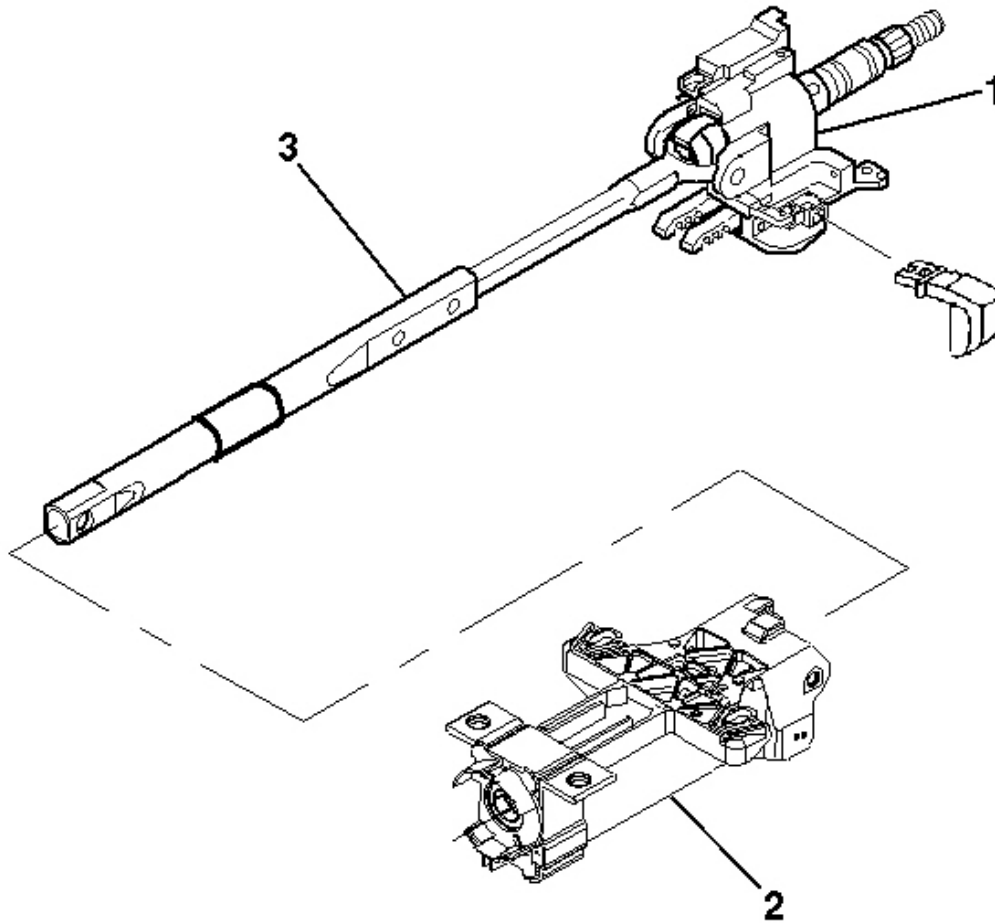


Fig. 53: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

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

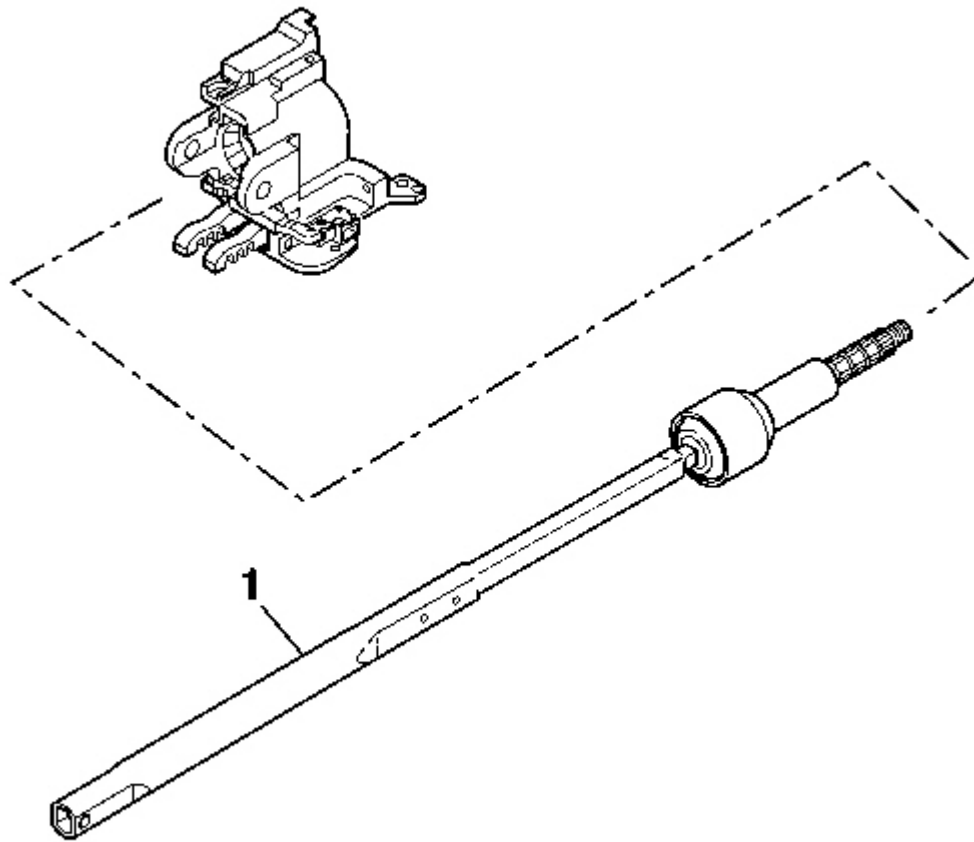


Fig. 54: Identifying Steering Shaft
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

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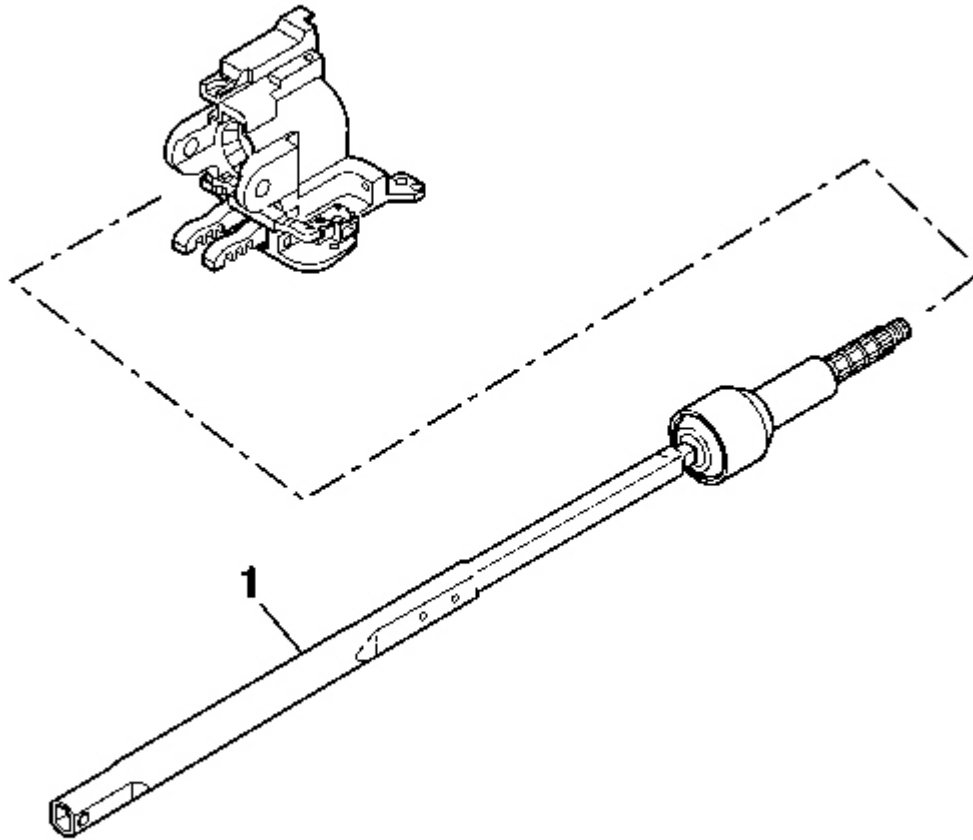


Fig. 55: Identifying Steering Shaft
Courtesy of GENERAL MOTORS CORP.

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

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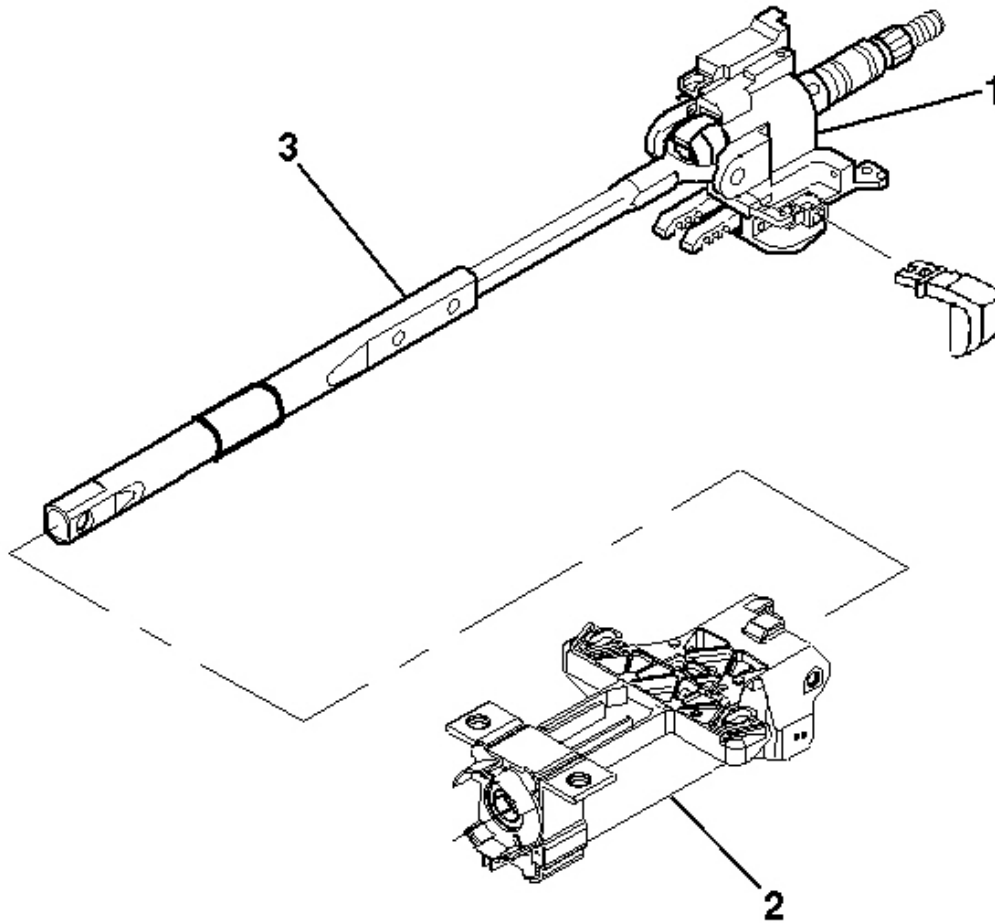


Fig. 56: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

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

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

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

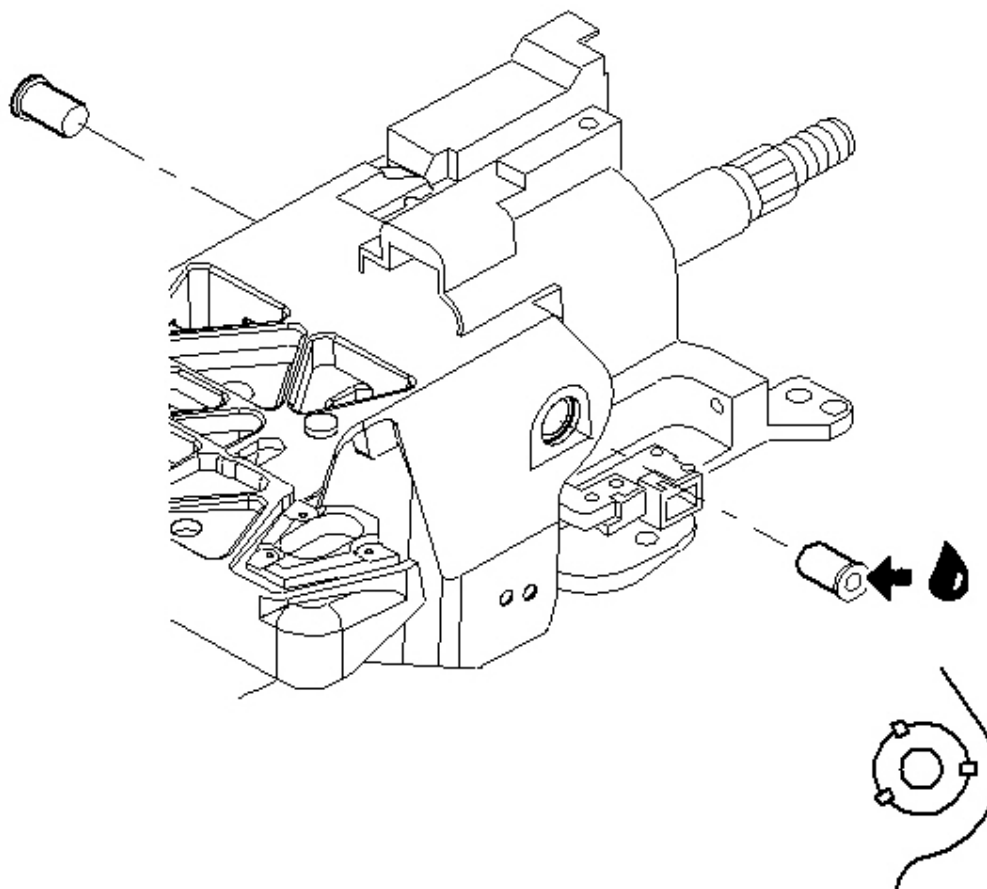


Fig. 57: Identifying Pivot Pin Locations
Courtesy of GENERAL MOTORS CORP.

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

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

6. Stake the pins in 3 places.
7. Install the tilt spring assembly only. Refer to **Steering Column Tilt Spring Replacement**.
8. Install the turn signal switch housing only. Refer to **Multifunction Turn Signal Switch Housing Replacement**.
9. Install the turn signal and multifunction switch assembly only. Refer to **Turn Signal Multifunction Switch Replacement**.

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

STEERING COLUMN REPLACEMENT

Tools Required

J 42640 Steering Column Lock Pin

Removal Procedure

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

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.

CAUTION: Refer to **SIR Caution** .

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

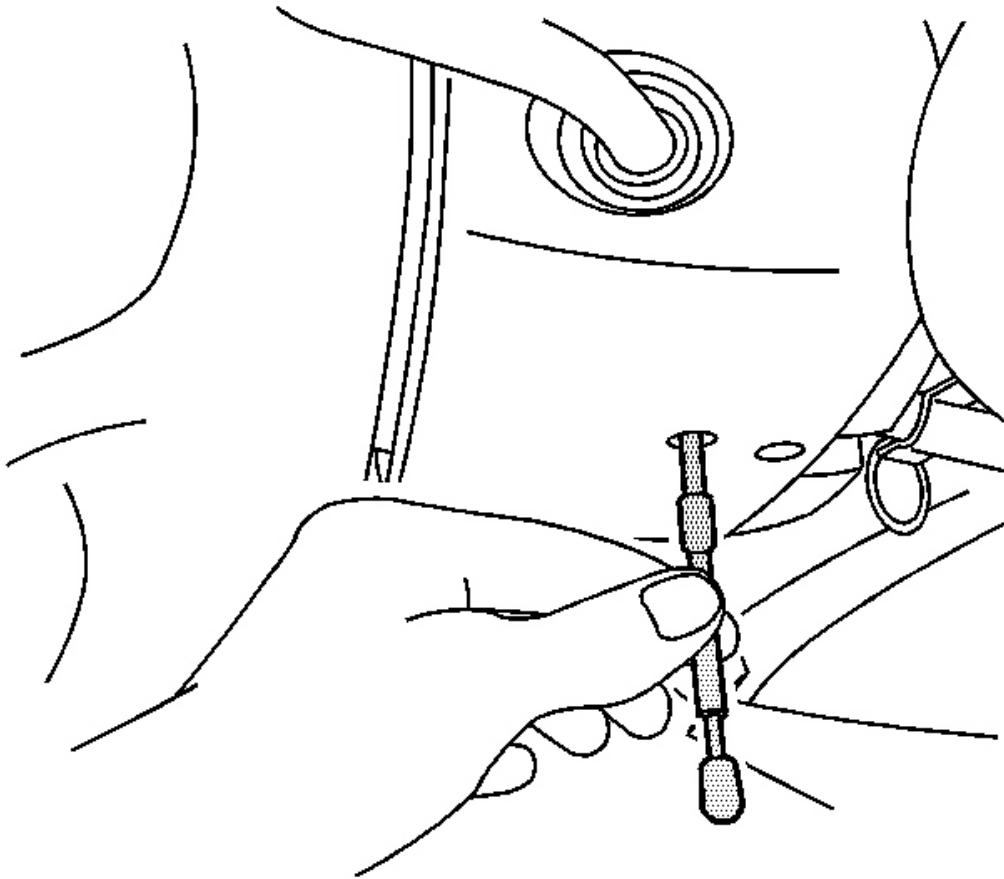


Fig. 58: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

2. Lock the steering column through the access hole in the lower steering column trim cover using **J 42640** .
3. Remove the steering wheel. Refer to **Steering Wheel Replacement**.
4. Remove the knee bolster. Refer to **Knee Bolster Replacement** .

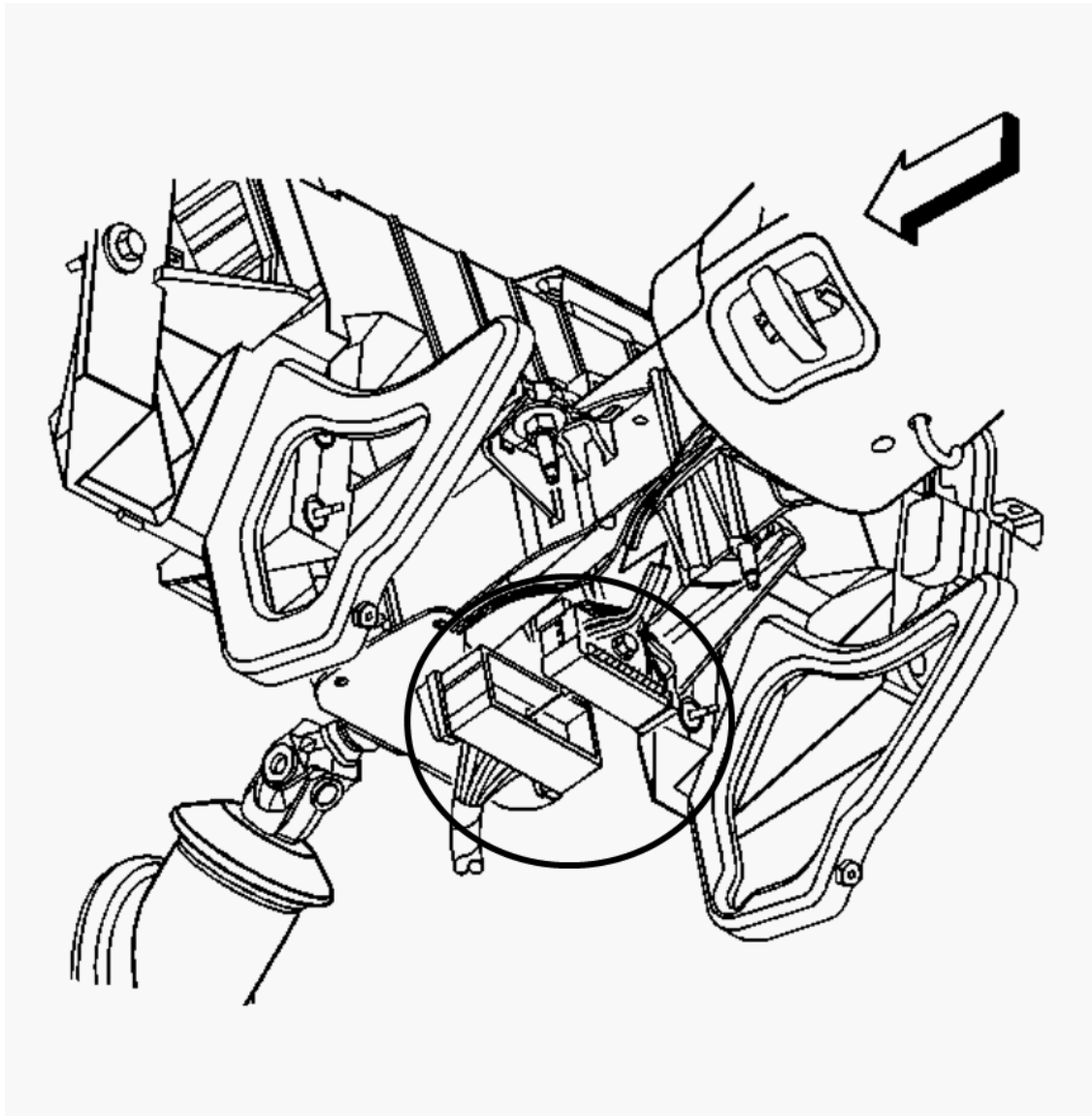


Fig. 59: Locating Steering Column Electrical Connector
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the steering column electrical connector.
6. Disconnect the body wiring harness connector from the steering column lower bracket.

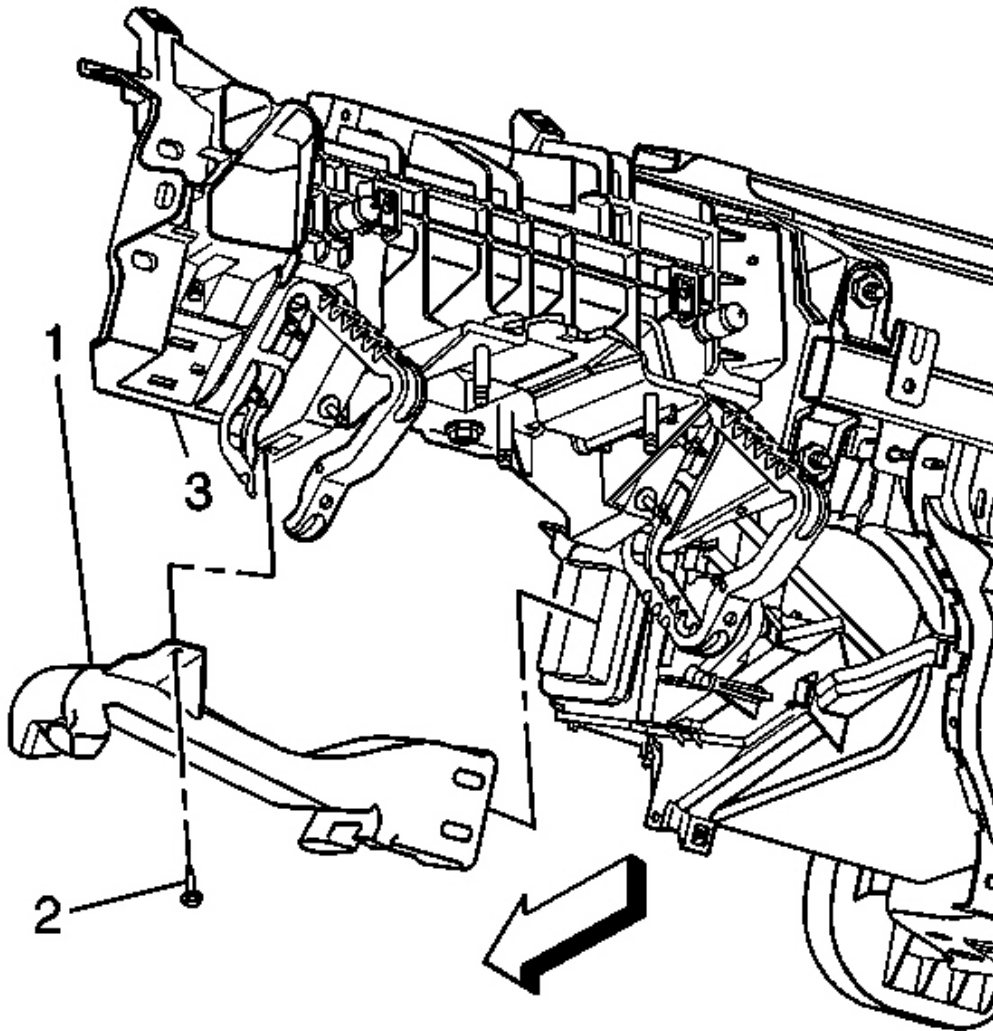


Fig. 60: View Of Left Side HVAC Floor Air Outlet Duct
Courtesy of GENERAL MOTORS CORP.

7. Remove the retaining screw (2) from the left HVAC floor duct (1).
8. Disconnect the left HVAC floor duct temperature sensor and remove the left HVAC floor duct.

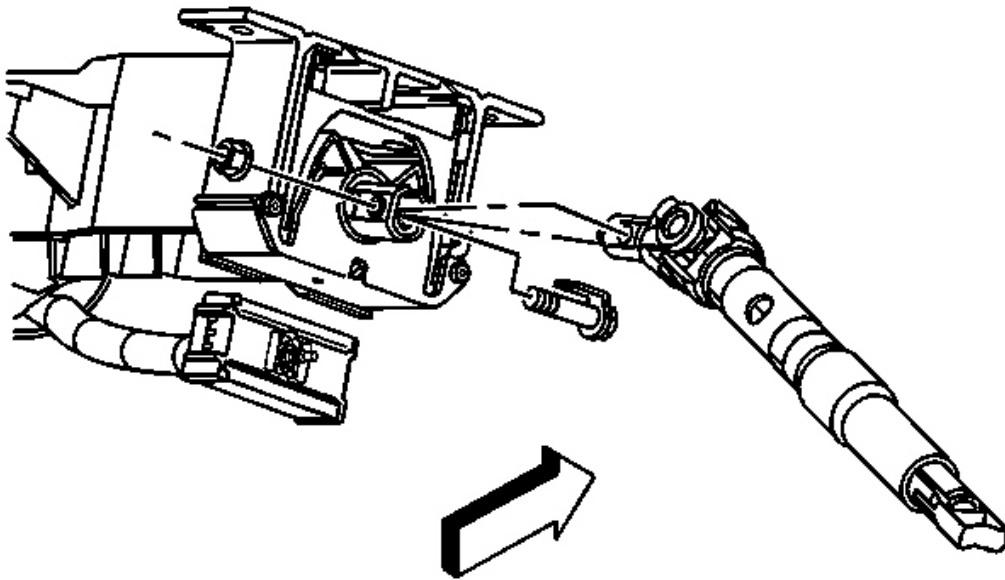


Fig. 61: View Of Steering Column & Upper Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

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

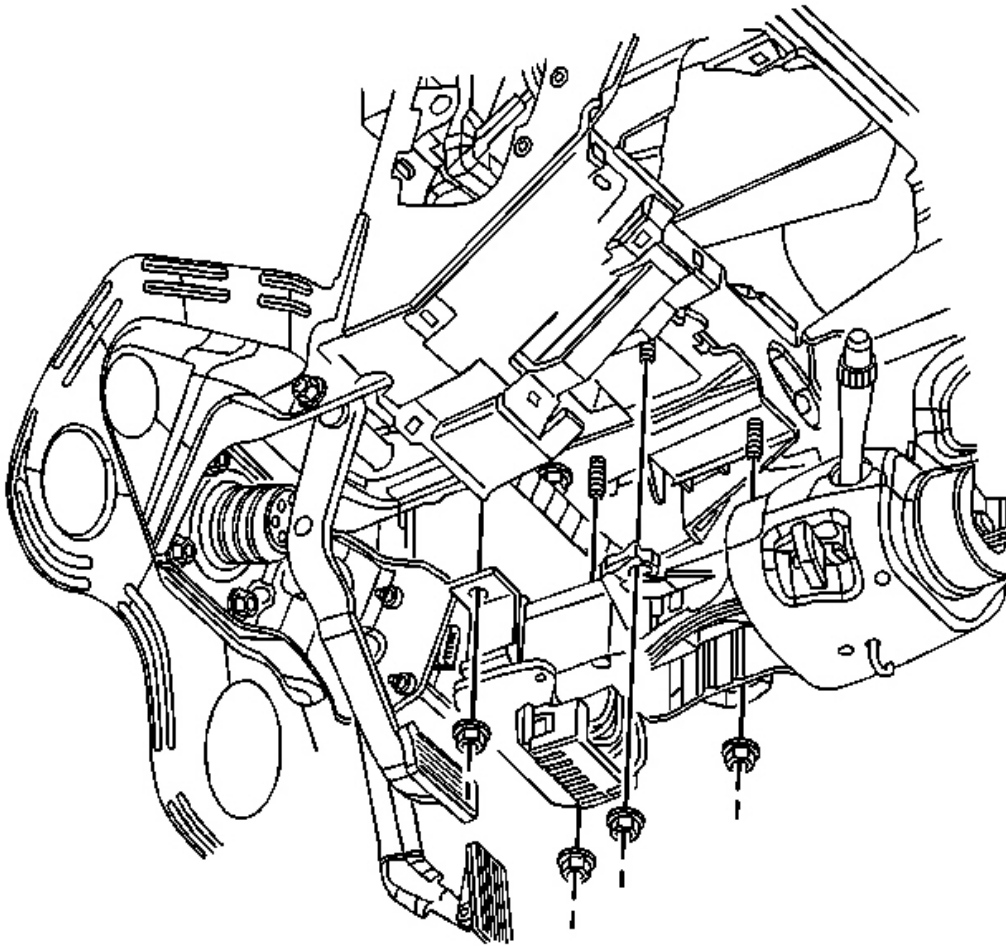


Fig. 62: View Of Steering Column Assembly
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

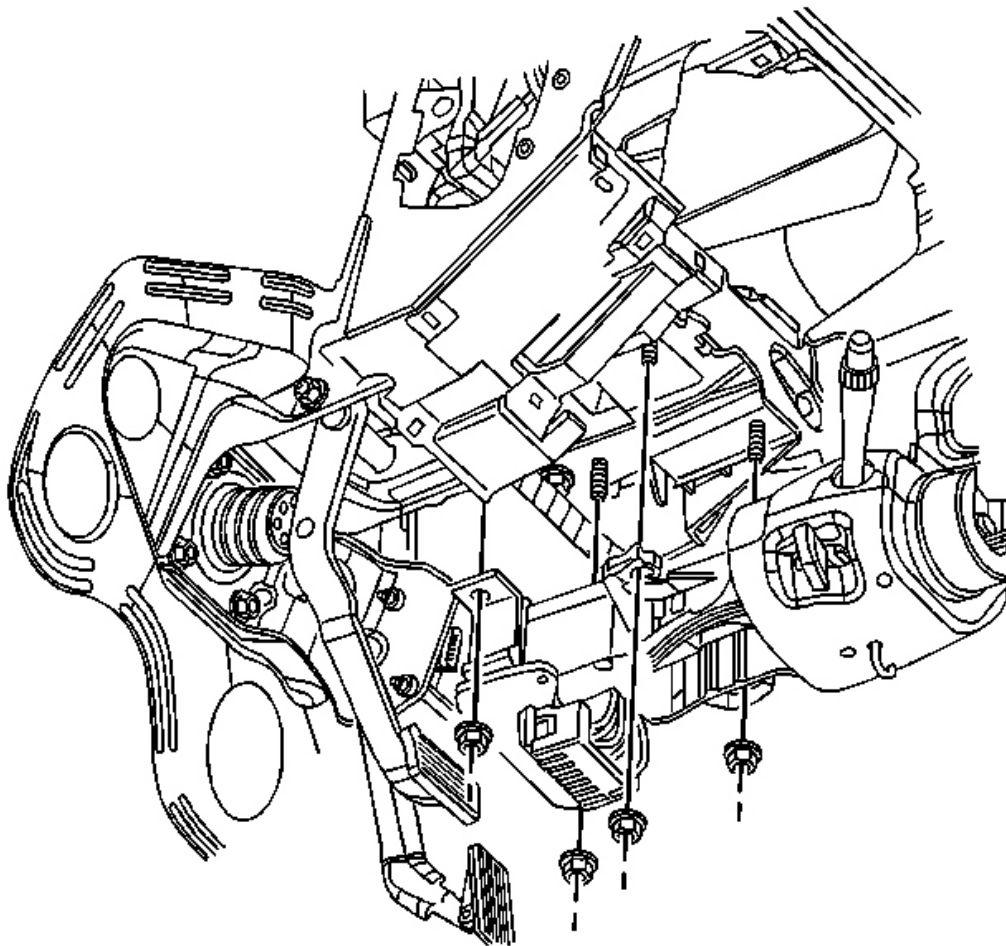


Fig. 63: View Of Steering Column Assembly
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

2. Install the steering column mounting nuts.

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

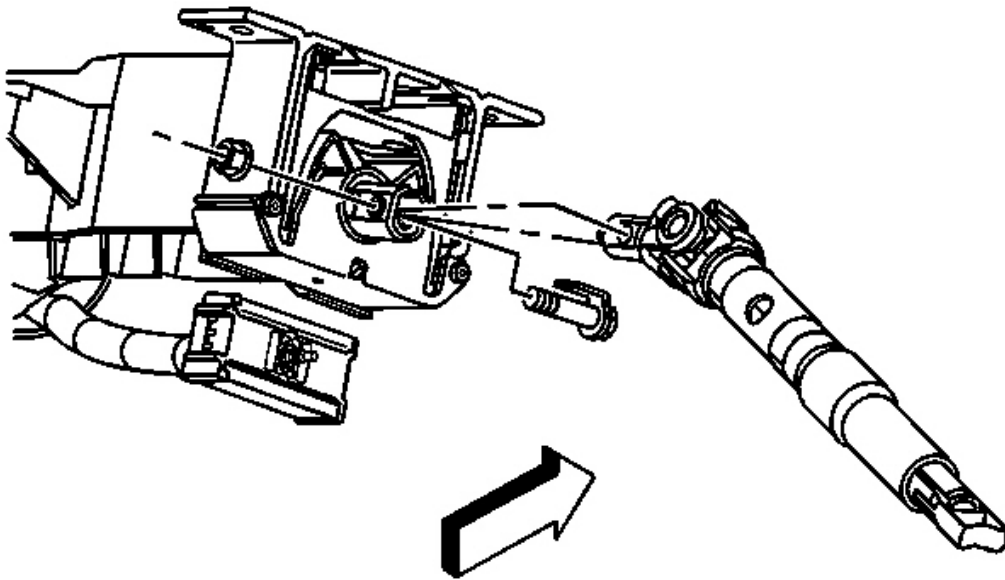


Fig. 64: View Of Steering Column & Upper Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Perform the following procedure before installing the bolt.

1. Remove all traces of the original adhesive patch.
 2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
 3. Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) or LOCTITE™ 222.
3. Install the intermediate shaft bolt to the steering column.

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

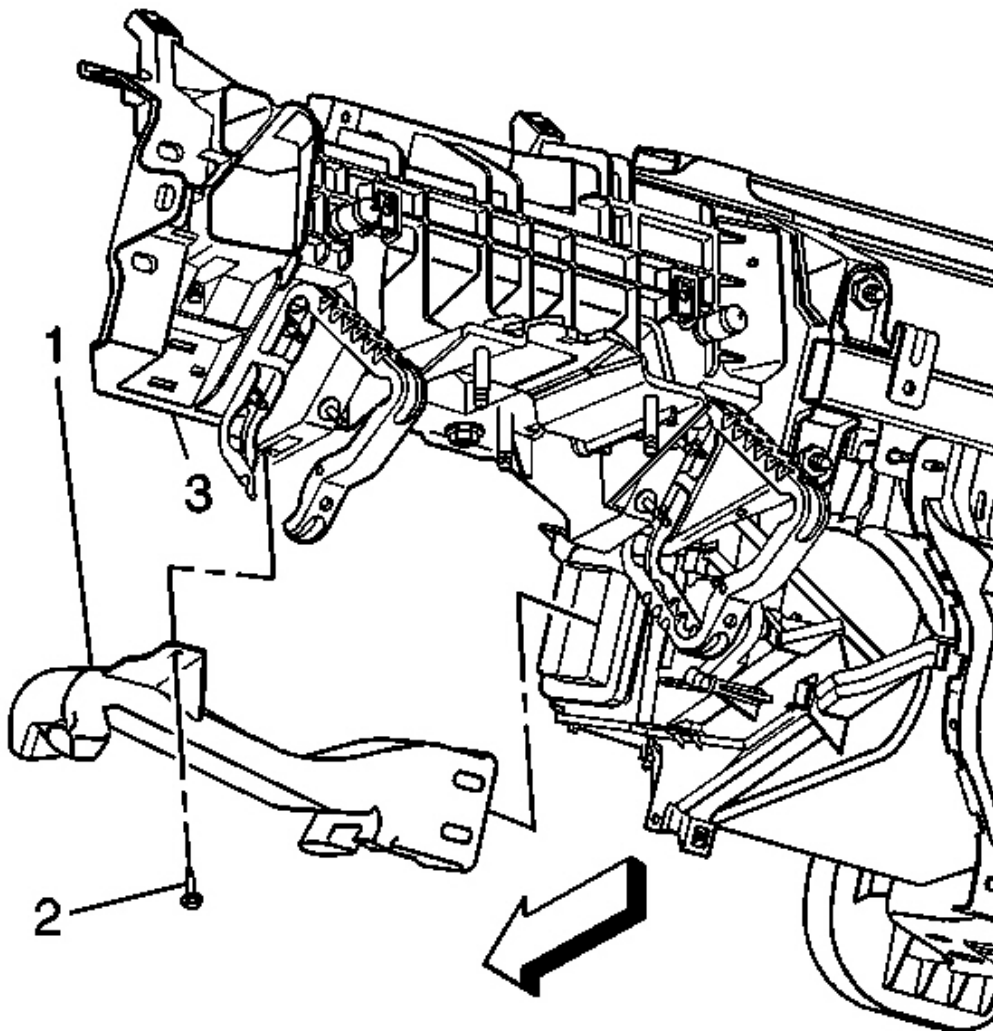


Fig. 65: View Of Left Side HVAC Floor Air Outlet Duct
Courtesy of GENERAL MOTORS CORP.

4. Connect the left HVAC floor duct temperature sensor and install the left HVAC floor duct (1).
5. Install the mounting screw (2) to the left HVAC floor duct.

Tighten: Tighten the screw to 1.9 N.m (17 lb in).

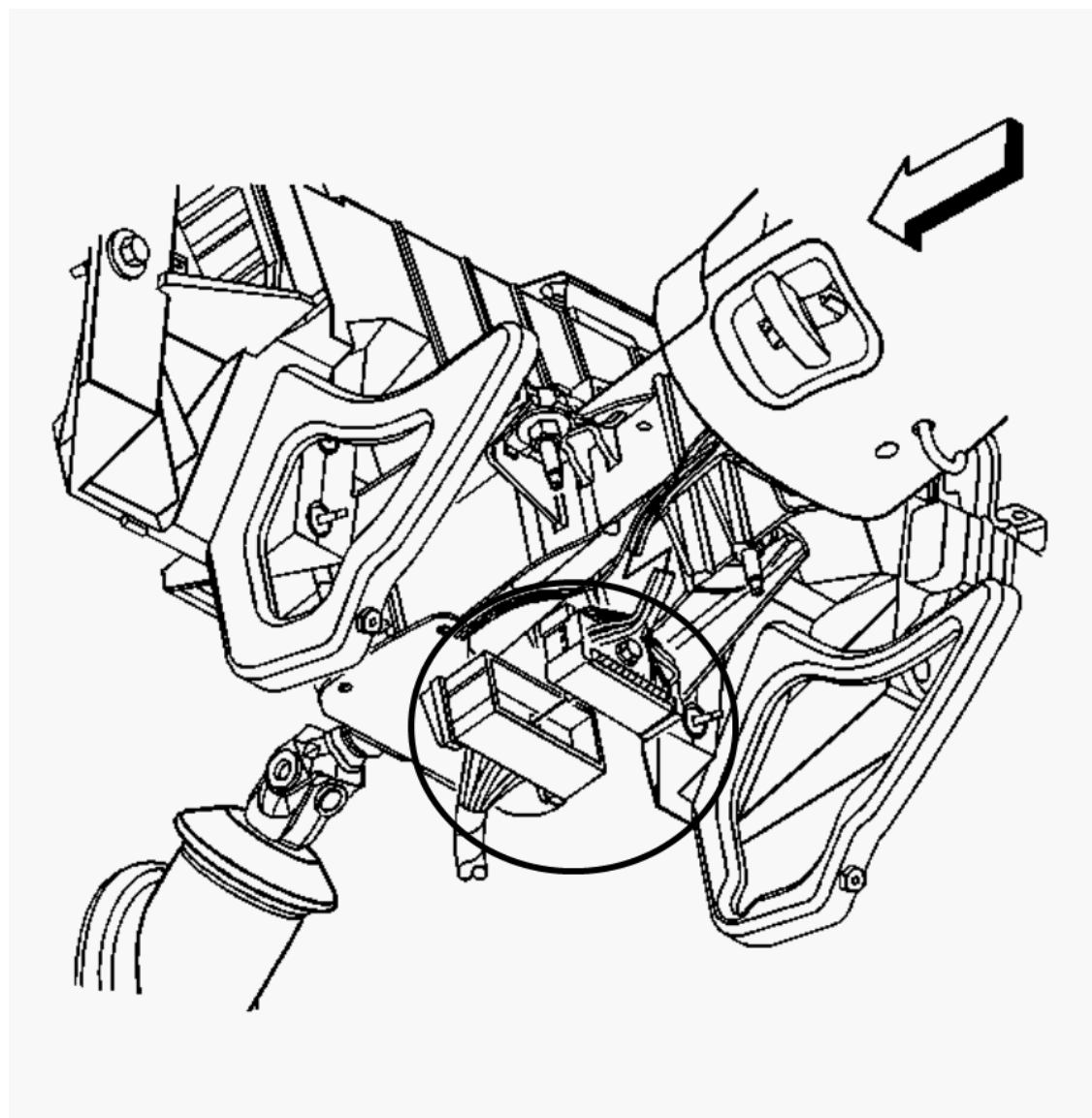


Fig. 66: Locating Steering Column Electrical Connector
Courtesy of GENERAL MOTORS CORP.

6. Connect the body wiring harness connector to the steering column lower bracket.
7. Connect the steering column electrical connector to the vehicle wiring harness.

Tighten: Tighten the screw to 6 N.m (53 lb ft).

8. Install the knee bolster. Refer to **Knee Bolster Replacement** .
9. Install the steering wheel. Refer to **Steering Wheel Replacement** .
10. Unlock the steering column by removing **J 42640** from the lower trim cover access hole.
11. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

Tools Required

J 42640 Steering Column Lock Pin

Removal Procedure

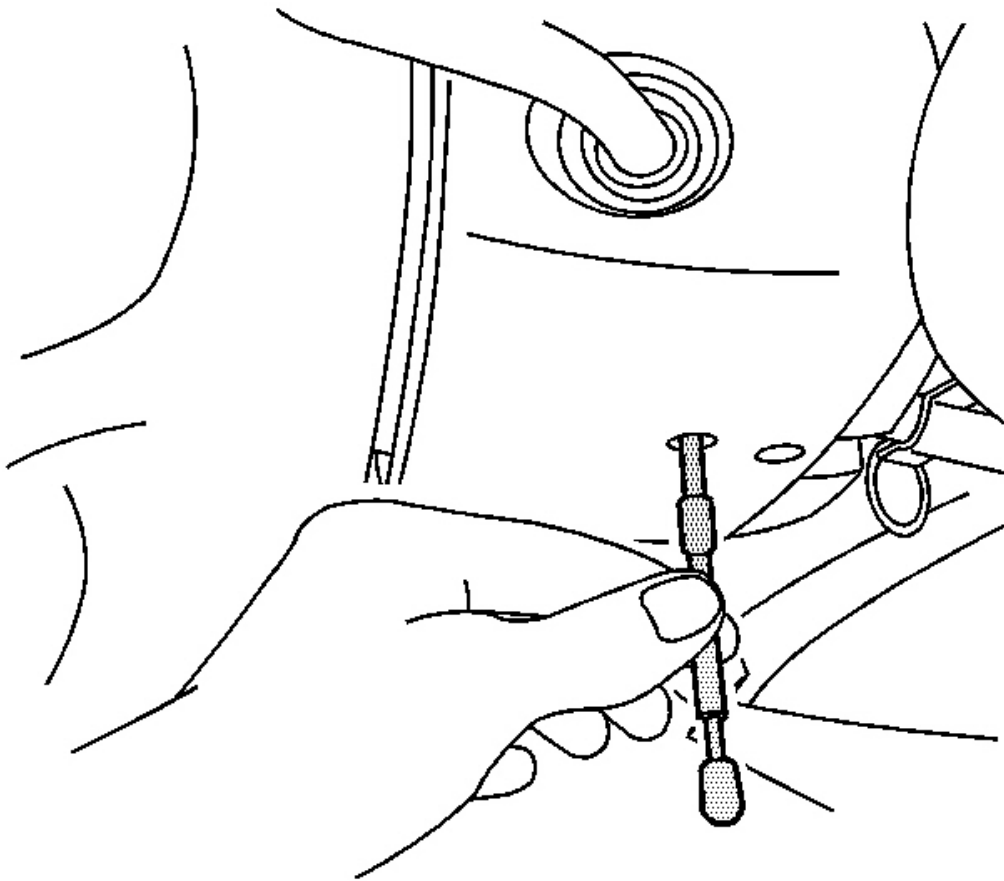


Fig. 67: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

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

1 Turn the steering wheel so that the front wheels are pointing straight ahead

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2. Turn the ignition switch to the lock position and remove the key.
3. Lock the steering column through the access hole in the lower steering column trim cover using **J 42640**.

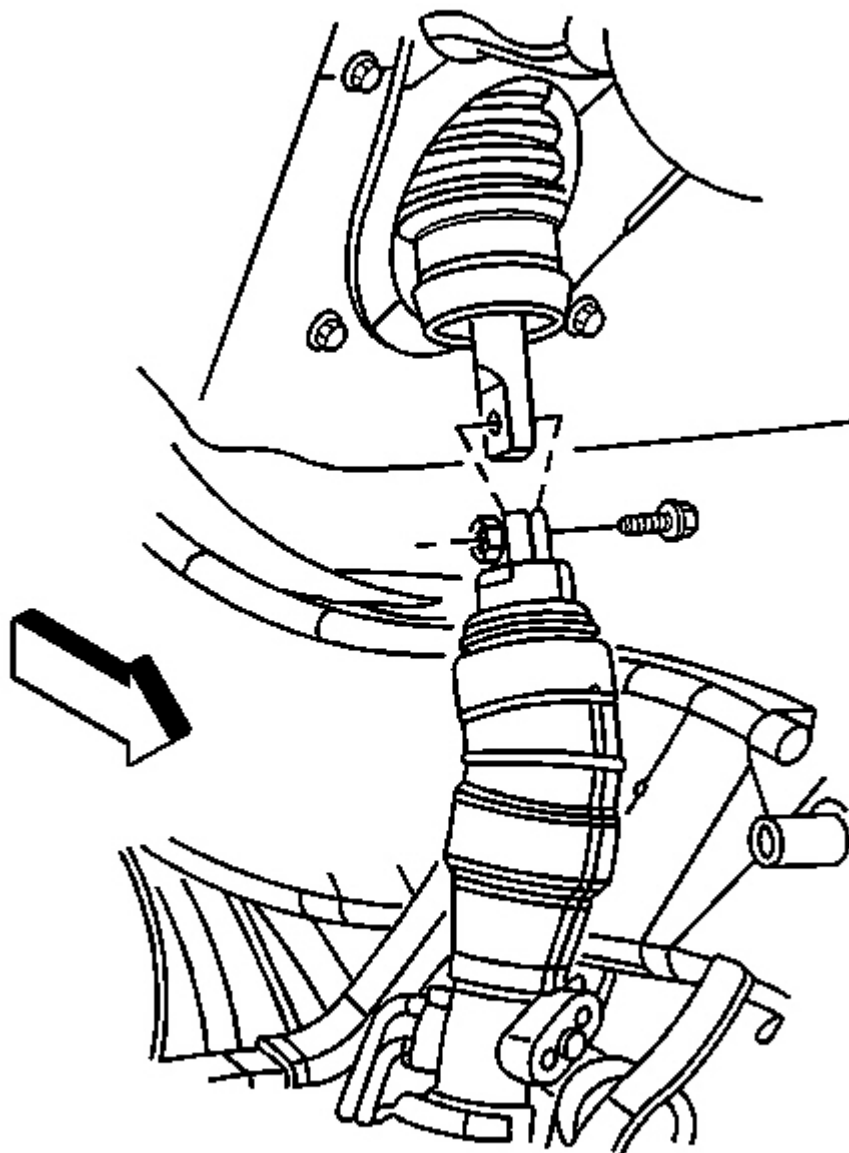


Fig. 68: View Of Steering Column To Steering Gear Connection
Courtesy of GENERAL MOTORS CORP.

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4. Disconnect the upper intermediate shaft boot from the lower intermediate shaft boot to gain access to the upper intermediate shaft to lower intermediate pinch bolt.
5. Remove the lower intermediate shaft to upper intermediate shaft pinch bolt.
6. Disconnect the lower intermediate shaft from the upper intermediate shaft.
7. Remove the steering column seal by rolling lip of seal from inside vehicle pushing it down the upper intermediate shaft.

Installation Procedure

1. Install steering column seal by rolling seal lip to inside vehicle.

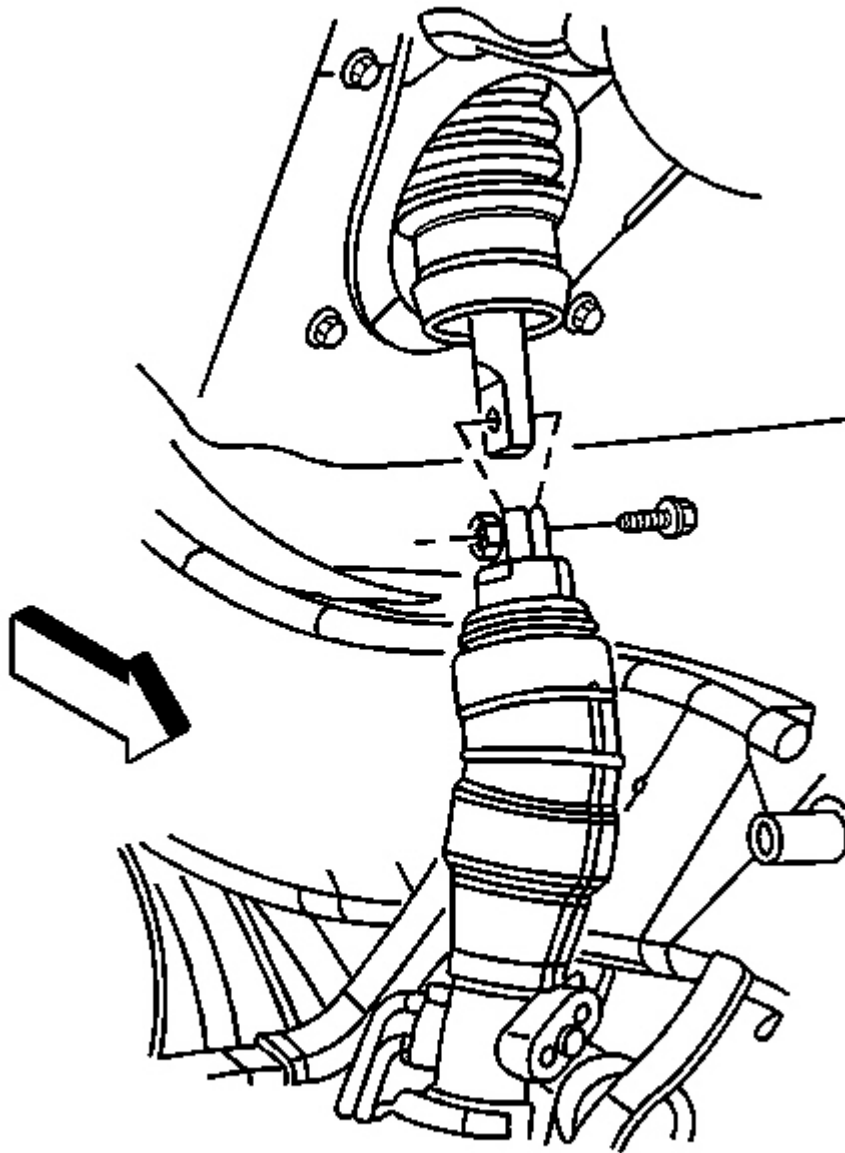


Fig. 69: View Of Steering Column To Steering Gear Connection
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

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IMPORTANT: Perform the following procedure before installing the bolt.

1. Remove all traces of the original adhesive patch.
2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
3. Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) or LOCTITE™ 222.

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

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

IMPORTANT: The upper intermediate shaft boot must completely cover the white insert of the lower intermediate shaft boot to ensure proper sealing.

4. Connect the upper intermediate shaft boot to the lower intermediate shaft boot.

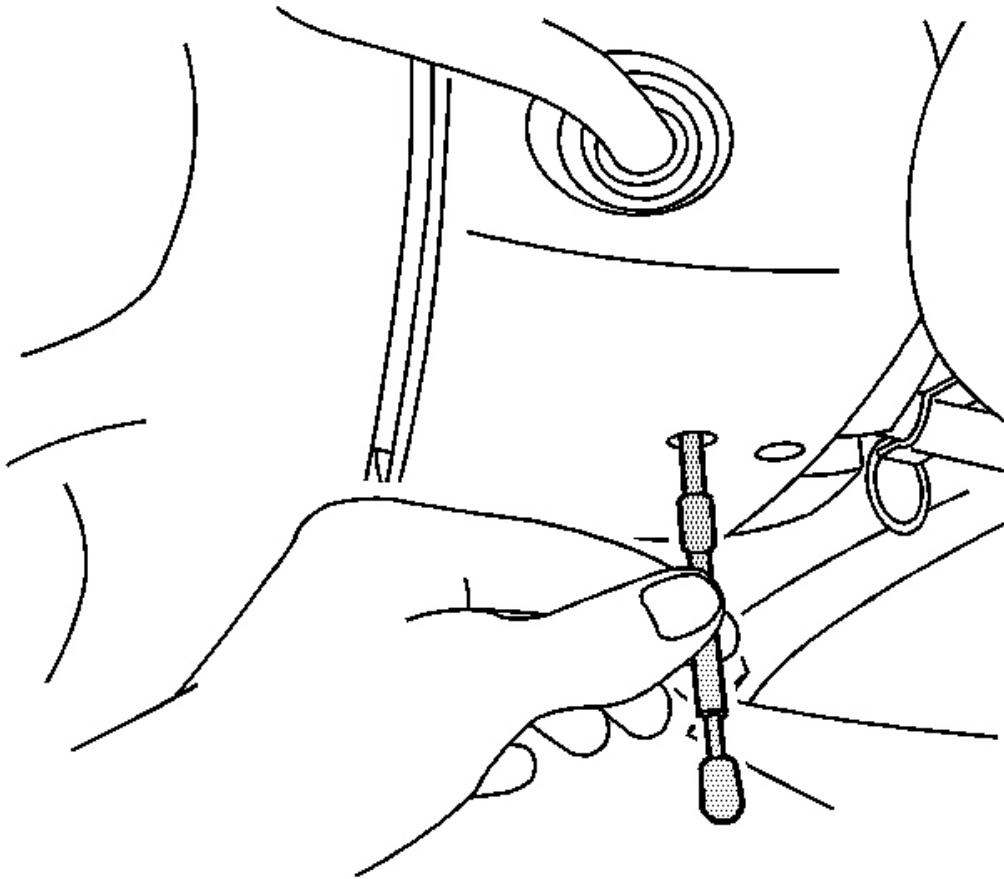


Fig. 70: Identifying J 42640

Courtesy of GENERAL MOTORS CORP.

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

STEERING COLUMN JACKET REPLACEMENT

Removal Procedure

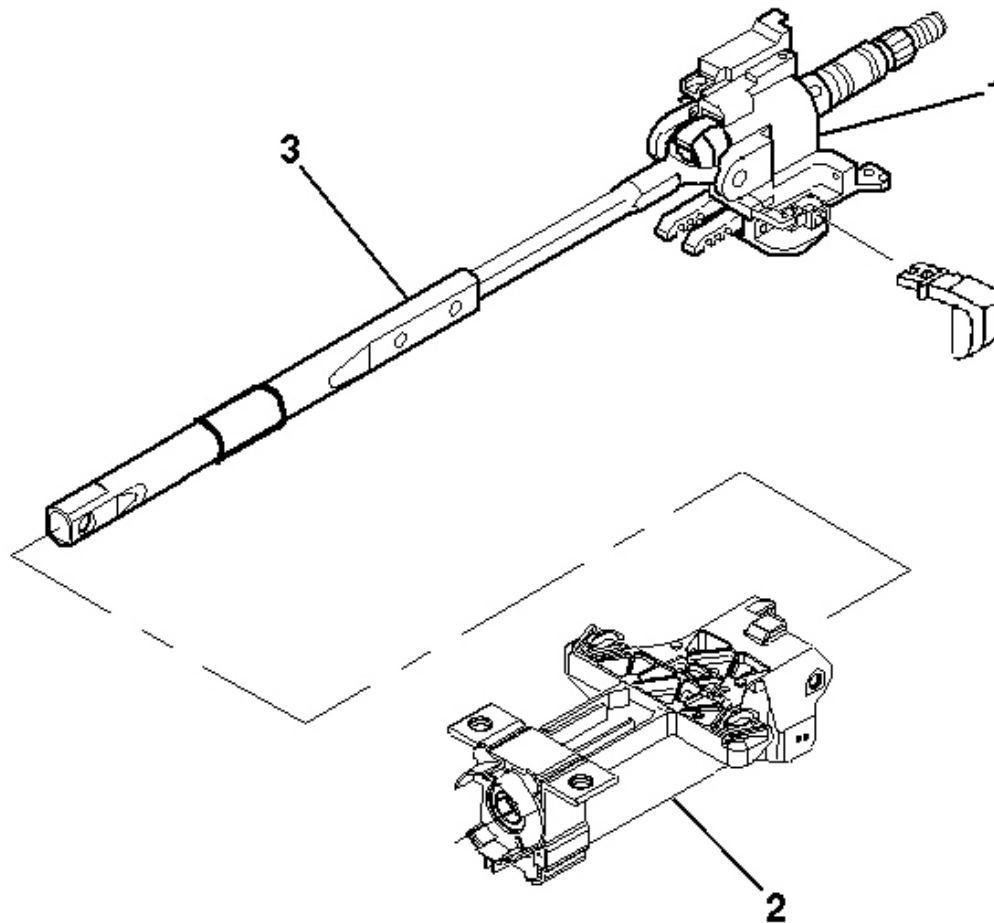


Fig. 71: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

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. Inspect the steering column for accident damage. Refer to Steering Column Accident Damage Inspection.
4. Remove the steering column tilt head. Refer to Steering Column Tilt Head Housing Replacement.
5. Remove the jacket (2).

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Installation Procedure

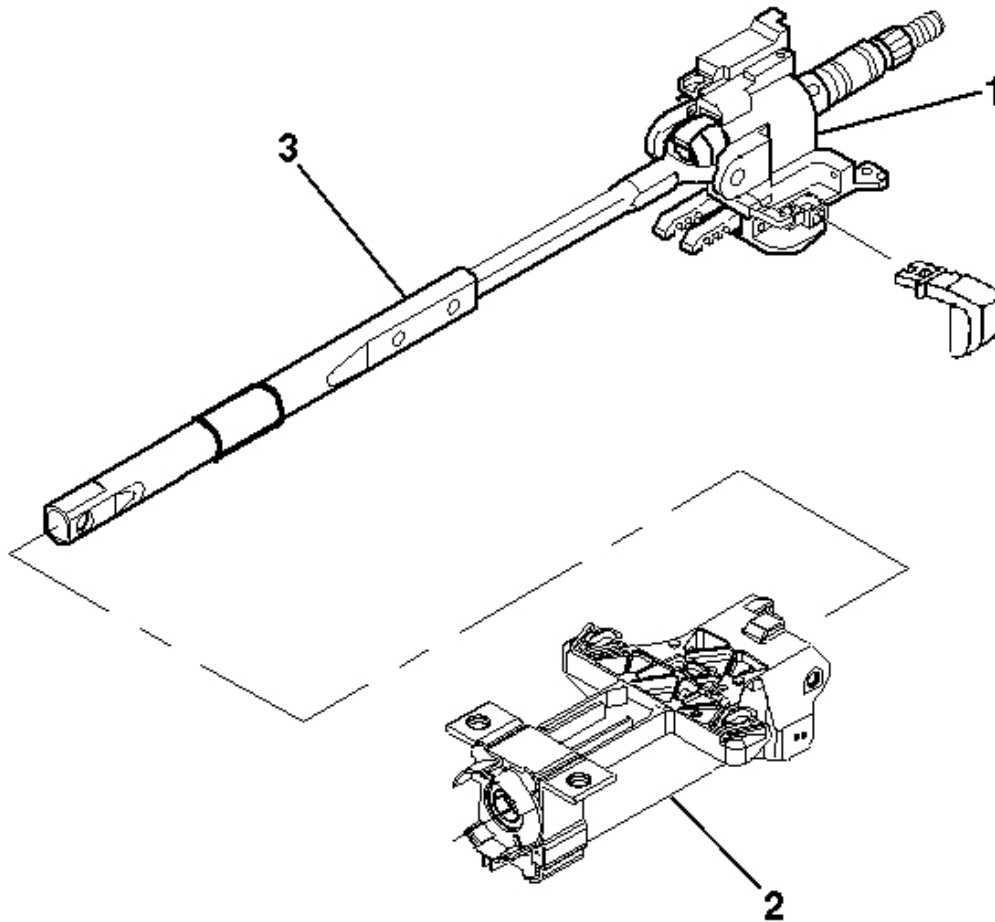


Fig. 72: View Of Upper Steering Column Components
Courtesy of GENERAL MOTORS CORP.

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

STEERING COLUMN SHAFT REPLACEMENT

Removal Procedure

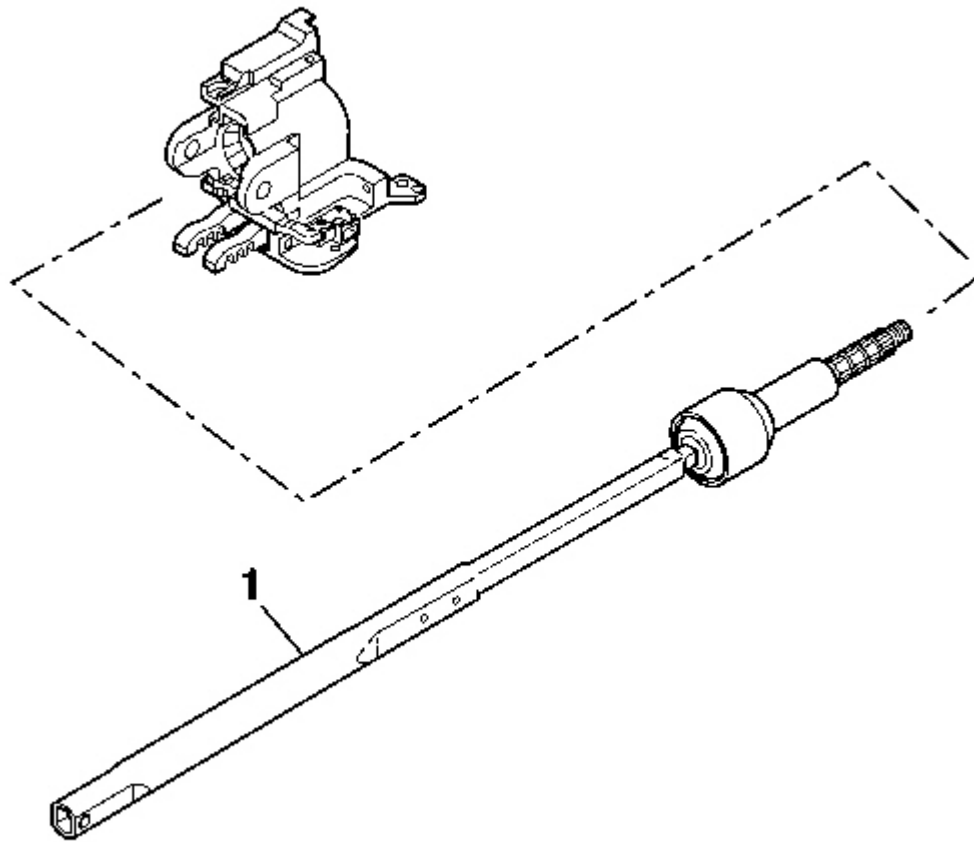


Fig. 73: Identifying Steering Shaft
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

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

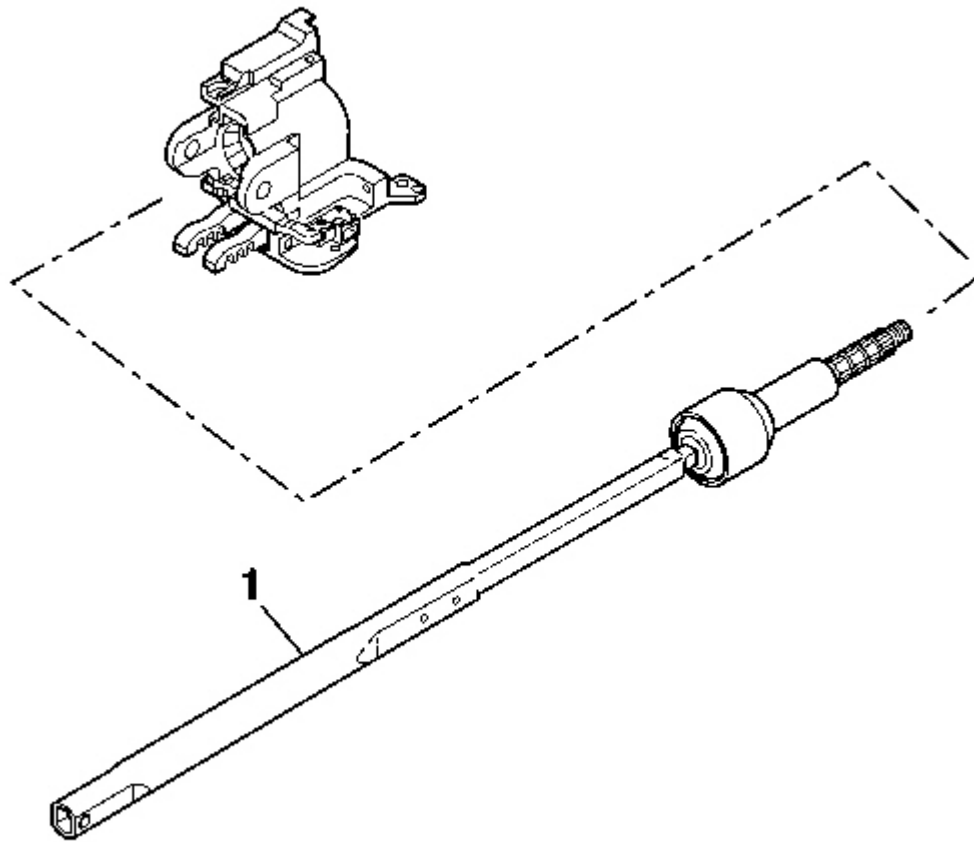


Fig. 74: Identifying Steering Shaft
Courtesy of GENERAL MOTORS CORP.

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

STEERING COLUMN WIRING HARNESS REPLACEMENT

Removal Procedure

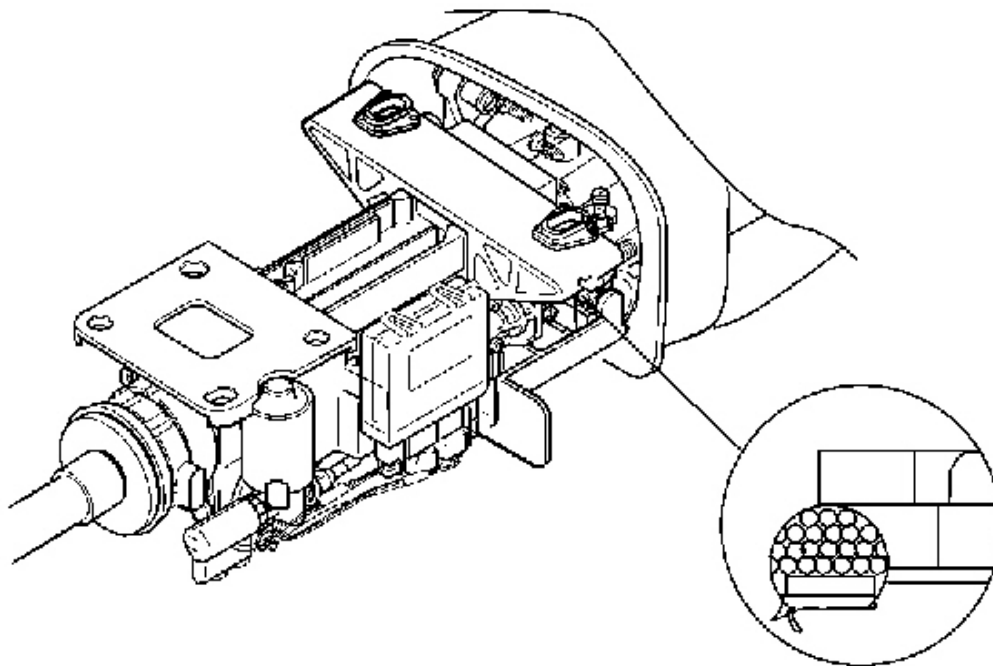


Fig. 75: View Of Plastic Mounted Steering Column Bracket
Courtesy of GENERAL MOTORS CORP.

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 wire harness strap.

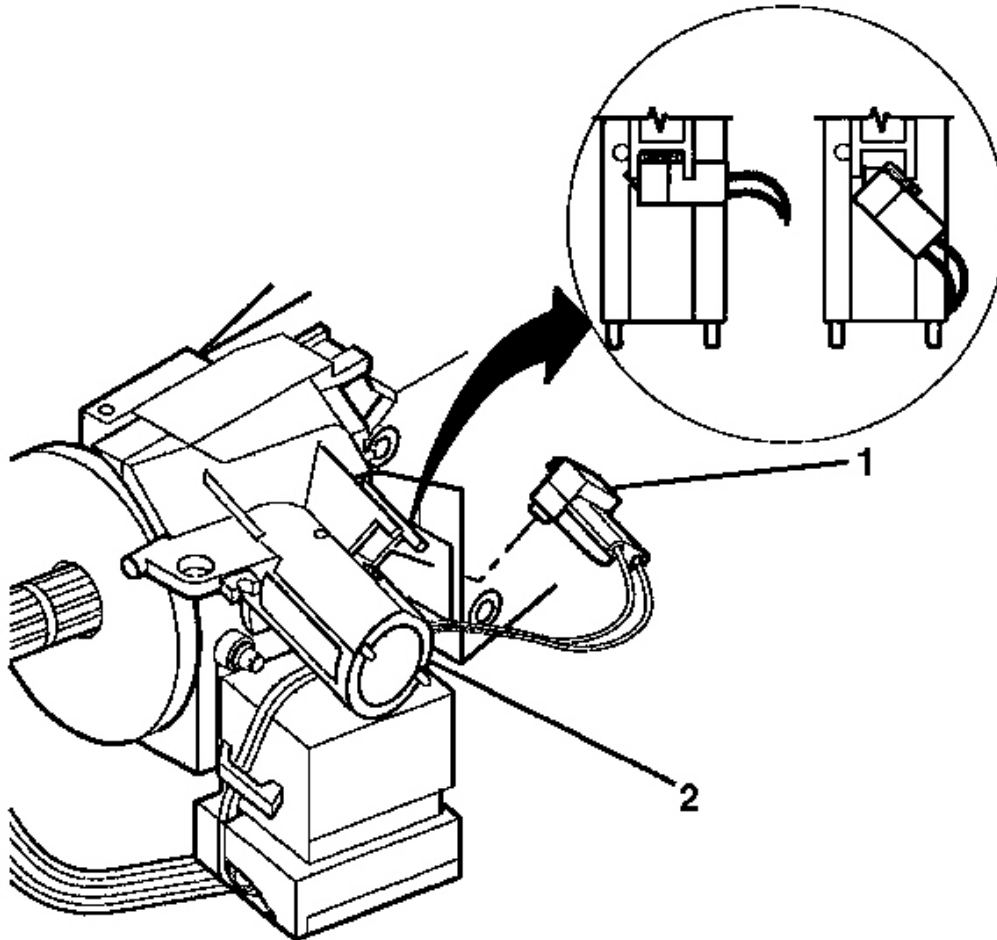


Fig. 76: Identifying Key Alarm Connector At Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

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

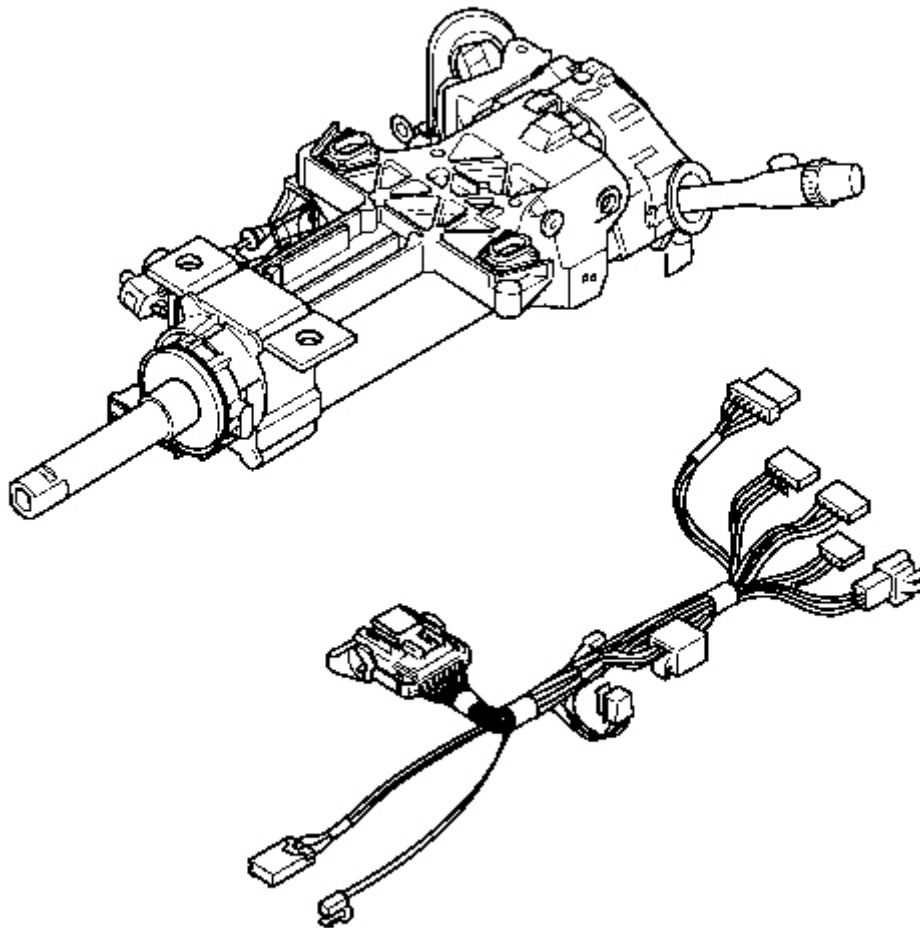


Fig. 77: View Of Steering Column & Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

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

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

Installation Procedure

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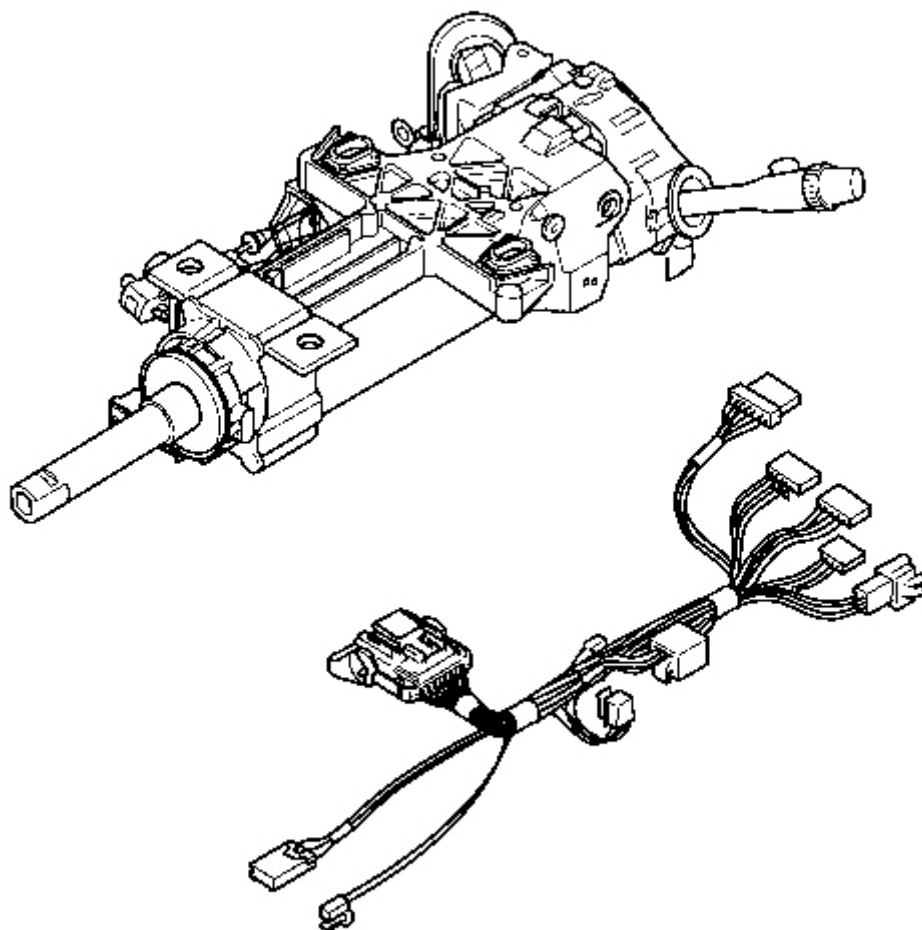


Fig. 78: View Of Steering Column & Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

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

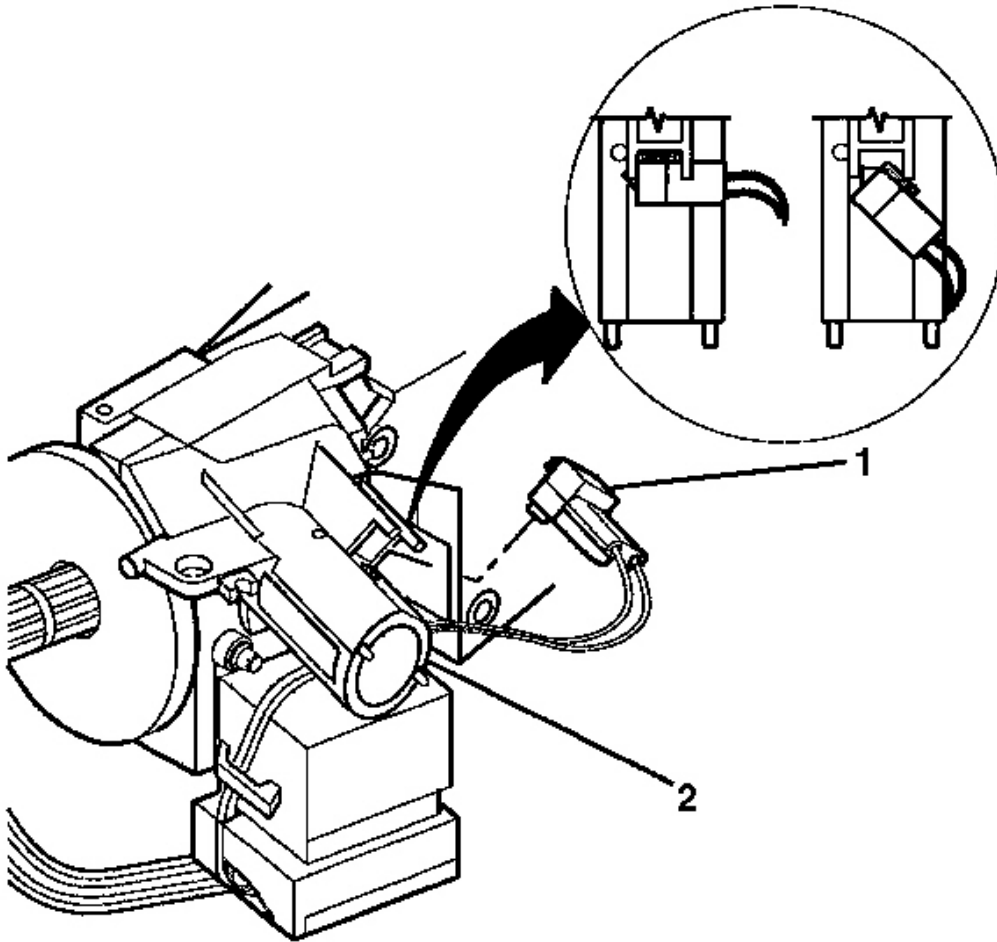


Fig. 79: Identifying Key Alarm Connector At Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

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

CAUTION: Refer to **SIR Inflator Module Coil Caution** .

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

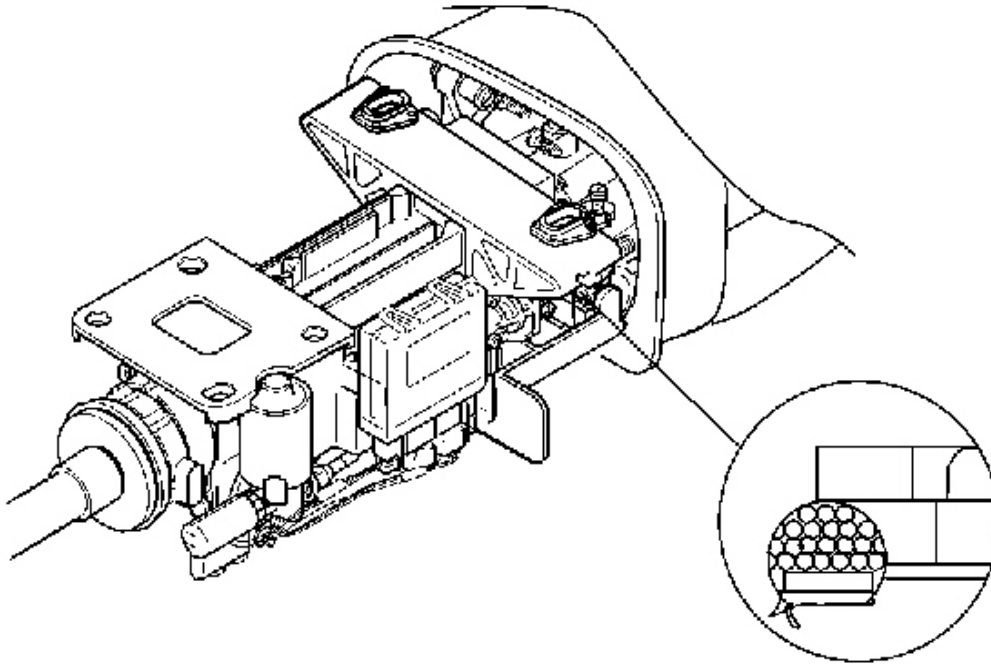


Fig. 80: View Of Plastic Mounted Steering Column Bracket
Courtesy of GENERAL MOTORS CORP.

7. Install the wire harness strap.
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** .

STEERING WHEEL POSITION SENSOR OR STEERING SHAFT LOWER BEARING REPLACEMENT

Removal Procedure

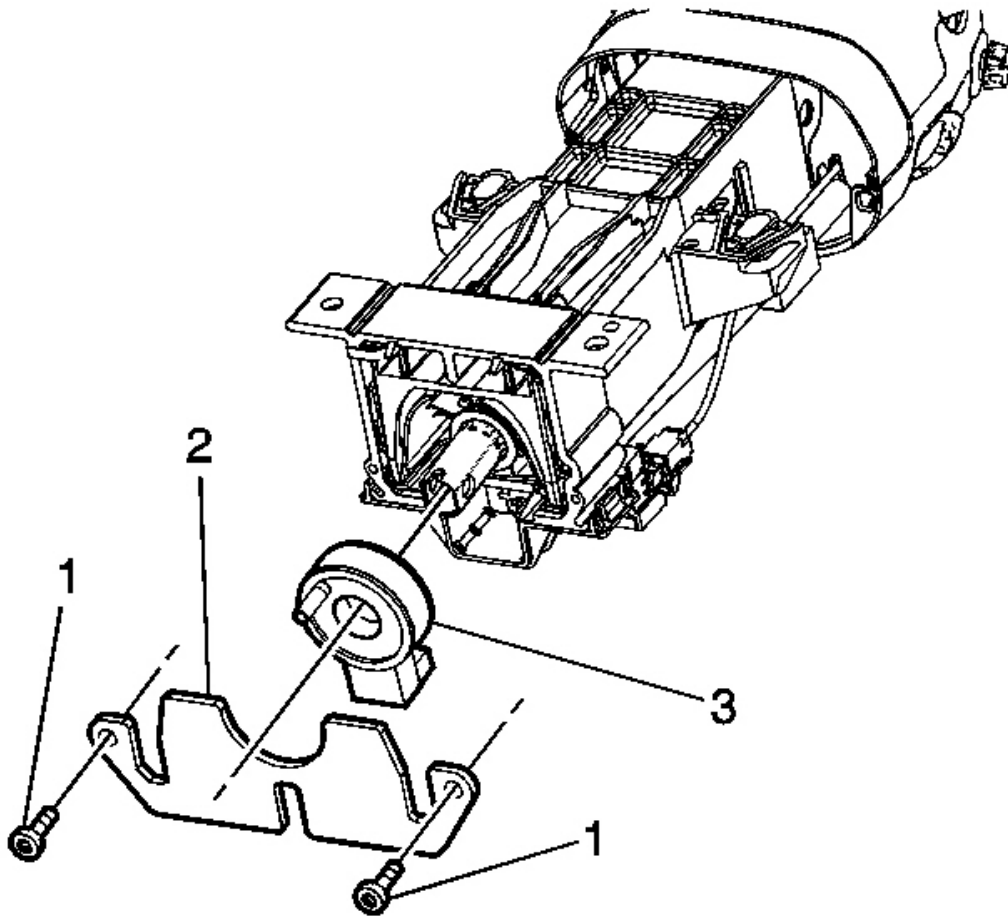


Fig. 81: View Of Steering Wheel Position Sensor & Steering Shaft Lower Bearing
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR Caution .

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

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.

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2. Position the front wheels straight ahead and lock the steering column to prevent rotation of the steering wheel.
3. Remove the intermediate shaft from the steering column. Refer to **Upper Intermediate Steering Shaft Replacement**.
4. Remove the steering wheel position sensor retainer screws (1).
5. Remove the steering wheel position sensor retainer (2) from the base of the steering column.
6. Disconnect the electrical connector from the steering wheel position sensor.
7. Remove the steering wheel position sensor (3) from the steering column.

Installation Procedure

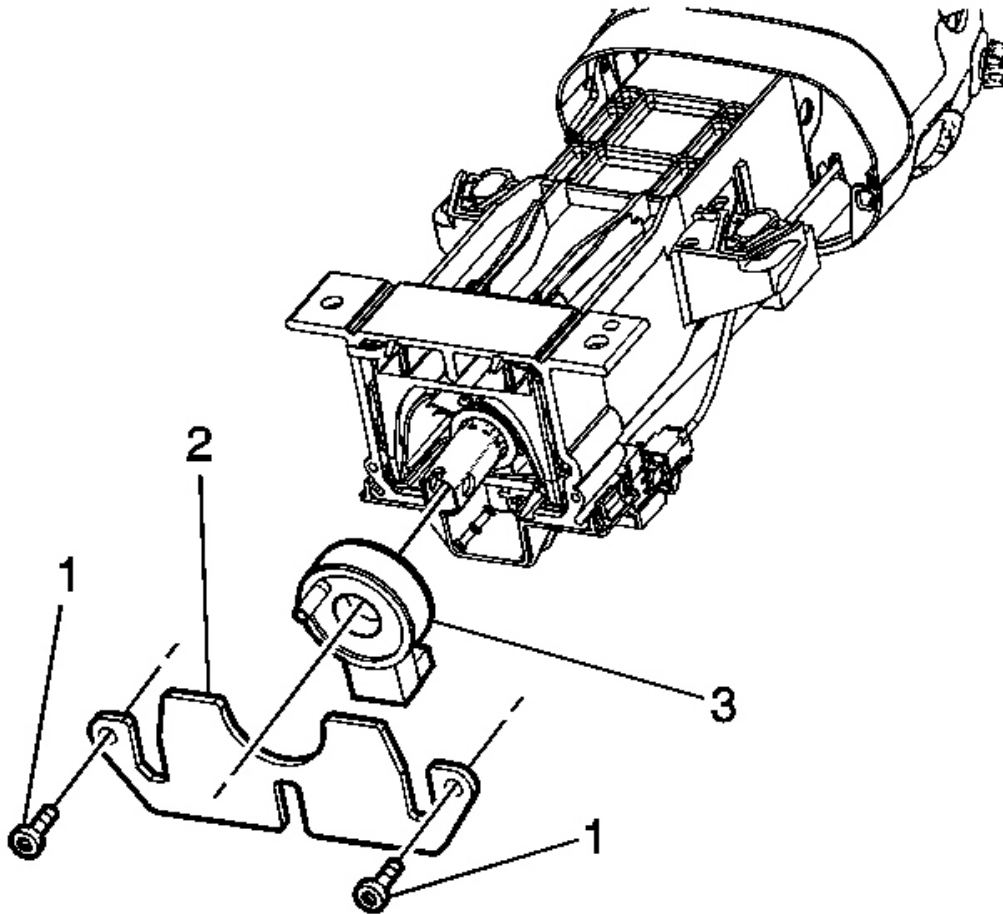


Fig. 82: View Of Steering Wheel Position Sensor & Steering Shaft Lower Bearing
Courtesy of GENERAL MOTORS CORP.

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1. Position the steering wheel sensor (3) to the steering column.
2. Position the steering wheel sensor retainer plate (2) to the steering column.

NOTE: Refer to Fastener Notice .

3. Install the steering wheel position sensor retainer screws (1).

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

4. Remove the steering wheel position sensor anti-rotation pin from the sensor.
5. Connect the electrical connector to the steering wheel position sensor.
6. Install the intermediate shaft to the steering column. Refer to Upper Intermediate Steering Shaft Replacement.
7. 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

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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.

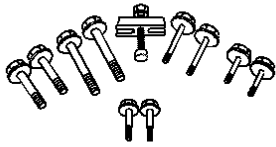
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

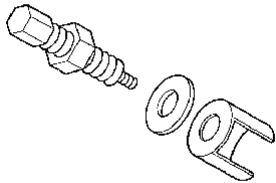
Illustration	Tool Number/Description

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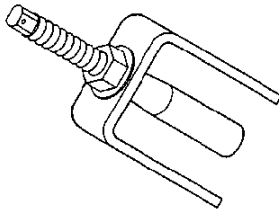
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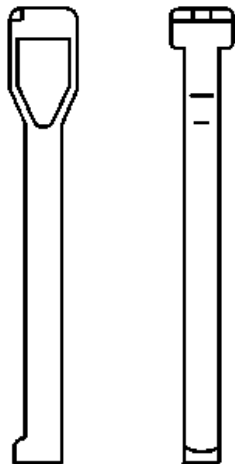
J 1859-A
Steering Wheel Puller



J 21854-01
Pivot Pin Remover



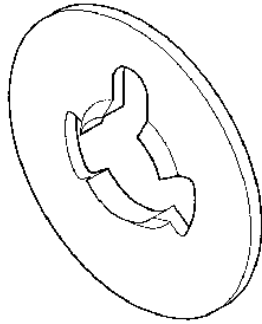
J 23653-SIR
Steering Column Lock Plate Compressor



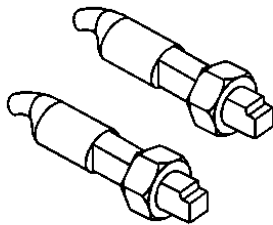
J 36541-A
Steering Wheel Puller Adapter

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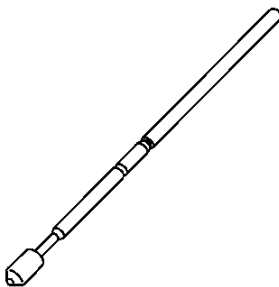
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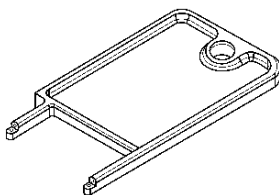
J 42137
Cam Orientation Plate Adapter



J 42578
Steering Wheel Puller Legs



J 42640
Steering Column Anti-Rotation Pin



J 42759
Ignition Switch Connector Release Tool