# Component Procedures: Steering Column

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## Parts and Labor (itype_189)

### Parts

| Qualifier | Part # | Name | Price | Note |
|---|---|---|---|---|
| Steering Column | 92199281 | 1 - Steering Column | 376.63 | |

### Labor

| Operation | Qualifier Path | Skill | Std Hrs | Wty Hrs |
|---|---|---|---|---|
| Remove & Replace | Steering Column > Intermediate Shaft, R&R | B | 1.5 | 0.0 |
| Remove & Replace | Steering Column > Lower Shroud, R&R | C | 0.4 | 0.3 |
| Remove & Replace | Steering Column > Position Sensor, R&R | B | 0.8 | 0.6 |
| Remove & Replace | Steering Column > Steering Column, R&R | B | 1.3 | 1.0 |
| Remove & Replace | Steering Column > Upper Shroud, R&R | C | 0.4 | 0.3 |
| Remove & Replace | Steering Wheel > Steering Wheel, R&R | B | 0.5 | 0.3 |

## Steering Wheel and Column (Article 13485)

The steering wheel and column has 4 primary functions:
- Heated Steering Wheel
- Vehicle steering
- Vehicle security
- Driver convenience
- Driver safety

Heated Steering Wheel

The heated steering wheel control module controls the heated steering wheel and the heated steering wheel ON indicator based on an input from the heated steering wheel switch. When the heated steering wheel switch is pressed, the switch signal circuit is pulled to ground. This indicates to the heating steering wheel control module that steering wheel heat is requested. When the request is seen, the heated steering wheel control module supplies ground to the indicator lamp and supplies voltage to the heating elements, which are internal to the steering wheel. The heated steering wheel temperature is monitored through an internal temperature sensor. When the steering wheel reaches operating temperature the module will cycle the voltage on and off to maintain the operating temperature.

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:
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 .
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.
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.
For additional information on the operation of the SIR coil and module, refer to Supplemental Inflatable Restraint System Description and Operation .
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.
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.

## Steering Column Accident Damage Inspection (Article 13495)

Inspection Procedure
- Remove the turn signal switch bracket. Refer to Turn Signal Switch Bracket Replacement .
- Remove the steering column from the vehicle. Refer to Steering Column Replacement .
- Inspect the steering column shear pin (1). If the shear pin is damaged, broken, or missing, replace the steering column. Click for full-size image
- Rotate the steering column shaft . Verify the shaft turns freely and without interference.
- Verify the E/A strap retainer (1) is firmly seated on the jacket. Click for full-size image
- Verify there is no visual damage to the E/A strap (2).
- Measure the length of the upper shaft (b) from the end of the upper jacket to the tip. The length of the upper shaft must not be less than 57 mm (2.2 in) .

- Measure the length of the upper and lower jacket assembly (a). The length of the upper and lower jacket assembly must not be less than 441 mm (17.4 in) .
- If the steering column does not meet the specifications, the steering column is damaged. Discard the damaged steering column. Install a NEW steering column. If the steering column meets the specifications, install the steering column. Refer to Steering Column Replacement .
- Install the turn signal switch bracket. Refer to Turn Signal Switch Bracket Replacement .

## Turn Signal Switch Bracket Replacement (Article 13503)

Callout Component Name
Preliminary Procedure Remove the steering wheel airbag coil. Refer to Steering Wheel Airbag Coil Replacement .
Preliminary Procedure
Remove the steering wheel airbag coil. Refer to Steering Wheel Airbag Coil Replacement .
1 Turn Signal Switch Bracket Fastener (Qty: 2)
2 Turn Signal Switch Bracket Procedure Disconnect any electrical connectors as necessary. Transfer any parts as necessary. Refer to Turn Signal Multifunction Switch Replacement and to Windshield Wiper and Windshield Washer Switch Replacement .
Procedure
- Disconnect any electrical connectors as necessary.
- Transfer any parts as necessary. Refer to Turn Signal Multifunction Switch Replacement and to Windshield Wiper and Windshield Washer Switch Replacement .

## Steering Column Replacement (Article 13496)

Removal Procedure
- The steering column
- The intermediate shaft (s)
- The steering gear
- LOCK the steering column and verify the front wheels are in the straight ahead position.
- Remove the steering column shroud . Refer to Steering Column Shroud Replacement .
- Ensure the tilt and telescope lever is in the locked position with the steering column tilted to the highest position and telescoped to the maximum rearward position.
- Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
- Disconnect any electrical connectors as necessary.
- Working under the instrument panel, use paint in order to place match marks (4) on the steering column shaft (3) and on the intermediate steering shaft (1). Click for full-size image
- Remove the upper intermediate steering shaft bolt (2).
- Insert a piece of scrap steel (1) into the slot in the intermediate steering shaft yoke (2) near the steering column shaft. Click for full-size image
- Insert the upper intermediate steering shaft bolt (3) backwards into the intermediate steering shaft yoke until the bolt contacts the steel.
- Tighten the bolt 1.5 turns.
- Remove the bolt and the steel.
- Remove the thread locking patch and clean the threads on the upper intermediate shaft bolt.
- Separate the upper intermediate steering shaft from the steering column. Do not pull the intermediate steering shaft lower seal (4).
- Support the steering column.
- Remove the 4 steering column bolts (1, 2, 3, 4). Click for full-size image
- Remove the steering column from the vehicle.
- Transfer components as necessary.

Installation Procedure
- If you are replacing the steering column, copy the match marks from the old column to the new column.
- Position the steering column in the vehicle.
- Support the steering column and install, but DO NOT tighten, the 4 steering column bolts (1, 2, 3, 4). Click for full-size image
- Tighten the steering column bolts in sequence to 22 Nm (16 lb ft) .
- Working under the instrument panel, align the match marks (4) and connect the intermediate steering shaft (1) to the steering column shaft (3). Click for full-size image
- Ensure the intermediate steering shaft upper seal is seated correctly.
- Apply thread locking adhesive to the upper intermediate steering shaft bolt (2). Refer to Adhesives, Fluids, Lubricants, and Sealers .

- Install the upper intermediate steering shaft bolt and tighten to 36 Nm (26.5 lb ft) .
- Connect all electrical connectors as necessary.
- Install the steering column shroud . Refer to Steering Column Shroud Replacement .
- Connect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .

## Steering Wheel and Column - Fastener Specifications (Article 13509)

Note: All fasteners listed in this table can be reused after removal.
Application Specification
Metric (English)
Steering Column Bolts 22 Nm (16 lb ft)
Steering Column Shroud Bolts 2.5 Nm (22 lb in)
Steering Gear Pinion Bolt 50 Nm (37 lb ft)
Steering Wheel Bolt 30 Nm (22 lb ft)
Upper Intermediate Steering Shaft Bolt 36 Nm (27 lb ft)

## Steering Wheel and Column - Adhesives, Fluids, Lubricants, and Sealers (Article 13507)

Application Type of Material GM Part Number
United States Canada Brazil
Steering Gear Pinion Bolt Thread Locking Adhesive 12345382 10953489 Refer to Electronic Parts Catalog.
Steering Wheel Bolt Thread Locking Adhesive 12345382 10953489
Upper Intermediate Steering Shaft Bolt Thread Locking Adhesive 12345382 10953489

## Symptoms - Steering Wheel and Column (Article 13490)

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

Visual/Physical Inspection

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

Symptoms List

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

- Steering Column Tilt Function Inoperative
- Noise in Steering Column
- Looseness in Steering Column

## Steering Column Tilt Function Inoperative (Article 13489)

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 Symptoms - Steering Wheel and Column
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 If equipped, verify that the following components are not seized or corroded: Tilt pivot pins Tilt head lock shoes Are the components seized or corroded? Go to Step 7 Go to Step 4
- Tilt pivot pins
- Tilt head lock shoes

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 Steering Column Replacement . Did you complete the repair? Go toStep 11 —
8 If serviceable, replace the pivot pins. If not serviceable replace the steering column. Refer to Steering Column Replacement . Did you complete the repair? Go to Step 11 —
9 If serviceable, 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 route 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 (Article 13488)

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 Symptoms - Steering Wheel and Column
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: The steering column mounting fasteners are loose. The steering column mounting features are sheared. Are the steering column mounting features loose or sheared? Go to Step 10 Go to Step 4
- The steering column mounting fasteners are loose.
- The steering column mounting features are sheared.
4 Inspect the SIR/SRS coil for noise. Is the SIR/SRS coil noisy? Go to Step 11 Go to Step 5
5 If equipped, inspect the lock plate retaining ring for correct installation. Is the lock plate retaining ring installed incorrectly? Go to Step 12 Go to Step 6
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 13 Go to Step 7
- Damage
- Lubrication
- Wear
- Proper seating
7 Does the steering column tilt joint need to be lubricated? Go to Step 14 Go to Step 8
8 Note: Inspect the intermediate steering shaft for noise while driving the vehicle, turning the steering wheel , and applying the brakes. Inspect the intermediate steering shaft for noise. Is the intermediate steering shaft noisy? Go to Step 15 Go to Step 9
9 Note: For vehicles equipped with a telescoping steering column, perform this step. If not equipped, go to next step. Inspect the steering column for noise while telescoping the column. Is the steering column noisy while telescoping? Go to Step 16 Go to Step 17
10 Note: If the steering column mounting features are damaged or sheared, replace the steering column. Steering Column Replacement Tighten the steering column mounting fasteners to specification. Fastener Specifications Did you complete the repair? Go to Step 17 —
11 Replace the SIR/SRS coil. Steering Wheel Airbag Coil Replacement Did you complete the repair? Go to Step 17 —
12 Install the lock plate retaining ring correctly. Did you complete the repair? Go to Step 17 —
13 Note: If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Steering Column Replacement Replace the steering column upper and/or lower bearings, if serviceable. Did you complete the replacement? Go to Step 17 —
14 Lubricate the steering column tilt joint. Did you complete the repair? Go to Step 17 —
15 Replace the appropriate intermediate steering shaft component. Did you complete the repair? Go to Step 17 —
16 Redistribute or add lubricant to the steering column lower jacket with the column telescoped to its end of outward travel. Did you complete the repair? Go to Step 17 —
17 Operate the system in order to verify the repair. Did you correct the condition? System OK Go to Step 3

## Looseness in Steering Column (Article 13487)

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 Symptoms - Steering Wheel and Column
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. The steering column mounting fasteners are loose. The steering column mounting features are sheared. Are the steering column mounting features loose or sheared? Go to Step 5 Go to Step 4
- The steering column mounting fasteners are loose.
- The steering column mounting features are sheared.
4 Inspect the upper and/or lower bearings for looseness. Are any of the bearings worn or loose? Go to Step 6 Go to Step 7
5 Note: If the steering column mounting features are damaged or sheared, replace the steering column. Steering Column Replacement Tighten the steering column mounting fasteners to specification. Fastener Specifications Did you complete the repair? Go to Step 7 —
6 Note: If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Steering Column Replacement Replace the upper and/or lower bearings, if serviceable. Did you complete the

repair? Go to Step 7 —
7 Operate the steering column in order to verify the repair. Did you correct the condition? System OK Go to Step 3