

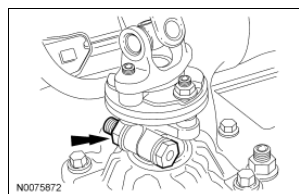
## Steering Column

### Material

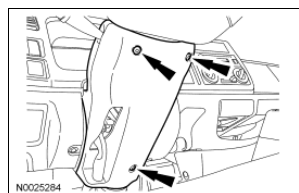
Item	Specification
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

### Removal

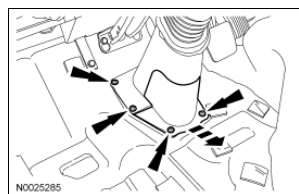
1. Remove the steering wheel. For additional information, refer to [Steering Wheel](#) in this section.
2. Tilt the cab forward.
3. Index-mark the steering shaft to the steering gear, then remove the steering shaft nut and bolt.
  - Disconnect the steering shaft from the steering gear.



4. Lower the cab.
5. Remove the 3 steering column cover screws, then remove the 2 steering column covers.



6. Remove the 6 steering shaft cover screws, then remove the rear half steering shaft cover.

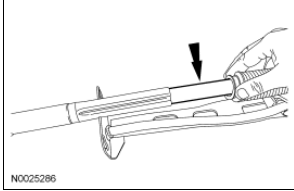


7. Disconnect the following 4 electrical connectors:
  - Ignition switch
  - Key-in-ignition switch
  - Turn signal/head lamp switch
  - Windshield wiper switch
8. Remove the 2 steering column bracket lower bolts.

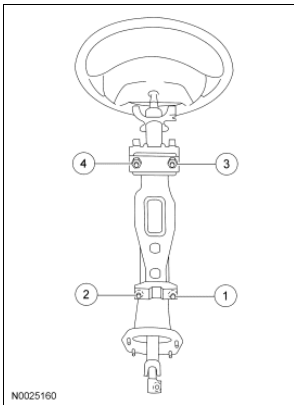
9. Remove the 2 steering column bracket upper nuts.
10. Remove the steering column.

### Installation

1. Lubricate the steering shaft sliding joint with multi-purpose grease.



2. Position the steering column, connecting the steering shaft to the steering gear.
3. Install the 2 steering column bracket bolts and nuts.
  - Do not tighten the fasteners at this time.
4. Tighten the 2 steering column bracket bolts and nuts to 16 Nm (142 lb-in) in the sequence shown.



5. Tilt the cab forward and install the steering column shaft bolt and nut.
    - Tighten to 48 Nm (35 lb-ft).
  6. Lower the cab and connect the 4 electrical connectors.
  7. Position the rear half steering shaft cover and install the 6 screws.
  8. Position the 2 steering column covers and install the 3 screws.
  9. Install the steering wheel. For additional information, refer to [Steering Wheel](#) in this section.
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**Torque Specifications**

Description	Nm	lb-ft	lb-in
Ignition switch mounting bolts <sup>a</sup>	—	—	—

<sup>a</sup> Tighten the bolts until the bolt heads break off.

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## Steering Column Switches

The steering column switches system consists of the following components:

- Multifunction switch
- Ignition switch assembly

The multifunction switch is mounted to the steering column and controls the turn signal, headlamp dimmer/flash-to-pass and windshield wiper/washer.

The ignition switch assembly is mounted below the steering column and is activated by using the ignition key and rotating the ignition switch lock cylinder on the steering column. The ignition switch assembly contains the following items:

- Ignition lock cylinder
  - Ignition switch
  - Key-in-ignition switch
-

**Steering Column Switches**

Refer to Wiring Diagrams Cell 13 for schematic and connector information.



Refer to Wiring Diagrams Cell 20 for schematic and connector information.

Refer to Wiring Diagrams Cell 81 for schematic and connector information.

Refer to Wiring Diagrams Cell 85 for schematic and connector information.

Refer to Wiring Diagrams Cell 90 for schematic and connector information.

**Special Tool(s)**

	73III Automotive Meter 105-R0057 or equivalent
	Flex Probe Kit 105-R025B

**Principles of Operation****Steering Column Switches**

The steering column switches include the ignition switch and the multifunction switch (high beam/low beam, flash-to-pass, turn signal and windshield wiper). The ignition switch is controlled by the ignition lock cylinder with a key. When the ignition lock cylinder is turned using the key, a mechanical connection positions the ignition switch to the selected position and allows the ignition switch to send voltage to specific components. The multifunction switch controls the various components electrically. The headlamp switch sends constant voltage to the headlamps when placed in the ON position, while the flash-to-pass is a momentary switch used to send voltage to the headlamp high beams only. The headlamp high beam/low beam switch sends voltage to the low or high beam headlamps while the headlamps are on. The turn signal switch portion of the multifunction switch operates the left and right turn signals. The windshield wiper switch function uses a ground signal to activate the various wiper modes and the wiper/washer.

**Inspection and Verification**

1. Verify the customer concern by operating the multifunction switch or ignition switch.
2. Visually inspect for obvious signs of mechanical and electrical damage. Refer to the following chart:

**Visual Inspection Chart**

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• Multifunction switch</li> <li>• Ignition switch</li> <li>• Ignition key</li> <li>• Ignition switch lock cylinder</li> <li>• Steering column shrouds</li> </ul>	<ul style="list-style-type: none"> <li>• In-line fuse 1</li> <li>• Battery junction box (BJB) fuse(s):               <ul style="list-style-type: none"> <li>◆ 7 (25A)</li> <li>◆ 12 (20A)</li> <li>◆ 13 (20A)</li> <li>◆ 37 (10A)</li> <li>◆ 42 (10A)</li> <li>◆ 46 (5A)</li> </ul> </li> <li>• Circuitry open/shorted</li> <li>• Disconnected, loose fitting or incorrectly installed electrical connectors and pins</li> </ul>

**NOTE:** For multifunction switch concerns, refer to one of the following sections:

- For exterior lighting, refer to [Section 417-01](#) .
- For wipers and washers, refer to [Section 501-16](#) .

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the concern remains after the inspection, refer to the Symptom Chart.

## Symptom Chart

Symptom Chart

## Pinpoint Tests

### Pinpoint Test A: The Ignition Switch is Inoperative

#### Normal Operation

The battery junction box (BJB) receives fused battery power from the in-line fuse 1. The BJB then provides the ignition switch with fused battery power through fuse 12 (20A) circuit 1050 (LG/VT) and fuse 13 (20A) circuit 1522 (LG). The ignition switch has 3 possible states:

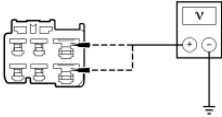
- OFF — No power on any circuit to the BJB
- RUN/START — Power on circuit 298 (VT/OG) to fuse 37 (10A) of the BJB, power on circuit 297 (BK/LG) to fuse 46 (5A) of the BJB, power on circuit 296 (WH/VT) to fuse 42 (10A) of the BJB and power on circuit 32 (RD/LB) to pin 85 of the starter relay.
- RUN/ACC — Power on circuit 298 (VT/OG) to fuse 37 (10A) of the BJB, power on circuit 297 (BK/LG) to fuse 46 (5A) of the BJB and power on circuit 296 (WH/VT) to fuse 42 (10A) of the BJB.

#### Possible causes

- In-line fuse 1
- An open in one or both of the following BJB fuse(s):
  - ◆ 12 (20A)
  - ◆ 13 (20A)

- An open in circuit 1050 (LG/VT) or 1522 (LG)
- Ignition switch

**PINPOINT TEST A: THE IGNITION SWITCH IS INOPERATIVE**

Test Step	Result / Action to Take
<p><b>A1 CHECK THE VOLTAGE TO THE IGNITION SWITCH</b></p>	
<p><b>⚠ CAUTION:</b> Use the Flex Probe Kit for all test connections to prevent damage to the wiring terminals. Do not use standard multimeter probes.</p> <ul style="list-style-type: none"> <li>• Disconnect: Ignition Switch C250.</li> <li>• Measure the voltage between ignition switch C250-6, circuit 1522 (LG) and ground; and between ignition switch C250-3, circuit 1050 (LG/VT) and ground.</li> </ul>  <p><small>N0028411</small></p> <ul style="list-style-type: none"> <li>• Are the voltages greater than 10 volts?</li> </ul>	<p><b>Yes</b> INSTALL a new ignition switch. REFER to <u>Ignition Switch</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> INSPECT in-line fuse 1 and BJB fuses 12 (20A) and 13 (20A) for an open. If OK, REPAIR circuit 1050 (LG/VT) or 1522 (LG) for an open. TEST the system for normal operation.</p>

**Pinpoint Test B: No Power in ACC**

**Normal Operation**

The battery junction box (BJB) receives fused battery power from the in-line fuse 1. The BJB then provides the ignition switch with fused battery power for ACC through fuse 12 (20A) circuit 1050 (LG/VT). When placed in the ACC position, the ignition switch provides voltage to circuit 296 (WH/VT) which is distributed to the power window relay, the reverse lamp relay and BJB fuse 42 (10A). The audio unit receives voltage through BJB fuse 42 (10A).

**Possible causes**

- An open in one or both of the following BJB fuse(s):
  - ◆ 12 (20A)
  - ◆ 42 (10A)
- An open in circuit 296 (WH/VT)
- Ignition switch



## PINPOINT TEST B: NO POWER IN ACC

Test Step	Result / Action to Take
<b>B1 CHECK RADIO OPERATION</b>	
<ul style="list-style-type: none"> <li>• Ignition ON.</li> <li>• Verify the radio operates.</li> <li>• <b>Does the radio operate?</b></li> </ul>	<p><b>Yes</b> INSTALL a new ignition switch. REFER to <u>Ignition Switch</u> in this section. TEST the system for normal operation.</p> <p><b>No</b> GO to <u>Pinpoint Test C</u> .</p>

## Pinpoint Test C: No Power in Run

## Normal Operation

The battery junction box (BJB) receives fused battery power from the in-line fuse 1. The BJB then provides the ignition switch with fused battery power through fuse 12 (20A) circuit 1050 (LG/VT) and fuse 13 (20A) circuit 1522 (LG). When placed in the RUN position, the ignition switch provides voltage to circuits 296 (WH/VT), 297 (BK/LG) and 298 (VT/OG).

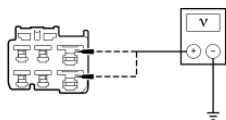
## Possible causes

- An open in one or more of the following BJB fuse(s):
  - ◆ 12 (20A)
  - ◆ 13 (20A)
  - ◆ 37 (10A)
  - ◆ 42 (10A)
  - ◆ 46 (5A)
- An open in one or more of the following circuits:
  - ◆ 1050 (LG/VT)
  - ◆ 1522 (LG)
  - ◆ 296 (WH/VT)
  - ◆ 297 (BK/LG)
  - ◆ 298 (VT/OG)
- Ignition switch

## PINPOINT TEST C: NO POWER IN RUN

Test Step	Result / Action to Take
<b>C1 CHECK THE VOLTAGE SUPPLY TO THE IGNITION SWITCH</b>	
<p><b>⚠ CAUTION: Use the Flex Probe Kit for all test connections to prevent damage to the wiring terminals. Do not use standard multimeter probes.</b></p> <ul style="list-style-type: none"> <li>• Ignition OFF.</li> <li>• Disconnect: Ignition Switch C250 .</li> <li>• Measure the voltage between ignition switch C250-6, circuit 1522 (LG) and ground; and</li> </ul>	<p><b>Yes</b> GO to <u>C2</u> .</p> <p><b>No</b> INSPECT in-line fuse 1 and BJB fuses 12 (20A) and 13 (20A) for an open. If OK, REPAIR circuit 1050 (LG/VT) or 1522 (LG) for an open. TEST the system for normal operation.</p>

between ignition switch C250-3, circuit 1050 (LG/VT) and ground.



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- Are the voltages greater than 10 volts?

**C2 CHECK THE IGNITION SWITCH**

- Carry out the Ignition Switch Continuity Check.

Refer to Wiring Diagrams Cell 149 for component testing.

- Does the ignition switch test OK?

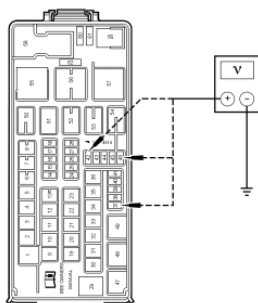
**Yes**  
GO to C3 .

**No**  
INSTALL a new ignition switch. REFER to Ignition Switch in this section. TEST the system for normal operation.

**C3 CHECK THE VOLTAGE SUPPLY TO THE BATTERY JUNCTION BOX**

- Ignition ON.
- Measure the voltage between the battery junction box and ground as follows:

Battery Junction Box	Circuit
Fuse 37 (10A)	298 (VT/OG)
Fuse 42 (10A)	296 (WH/VT)
Fuse 46 (5A)	297 (BK/LG)



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- Are the voltages greater than 10 volts?

**Yes**  
VERIFY the concern. REFER to the Symptom Chart.

**No**  
INSPECT BJB fuses 37 (10A), 42 (10A) and 46 (5A) for an open. If OK, REPAIR the circuits 298 (VT/OG), 296 (WH/VT) or 297 (BK/LG) for an open. TEST the system for normal operation.

**Pinpoint Test D: No Power in Start**

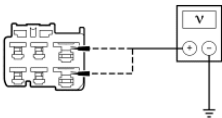
**Normal Operation**

The battery junction box (BJB) receives fused battery power from the in-line fuse 1. The BJB then provides the ignition switch with fused battery power through fuse 12 (20A) circuit 1050 (LG/VT) and fuse 13 (20A) circuit 1522 (LG). When placed in the START position, the ignition switch provides voltage to circuits 32 (RD/LB) and 297 (BK/LG).

**Possible causes**

- An open in one of the following BJB fuse(s):
  - ◆ 12 (20A)
  - ◆ 13 (20A)
  - ◆ 46 (5A)
- An open in one or more of the following circuits:
  - ◆ 1050 (LG/VT)
  - ◆ 1522 (LG)
  - ◆ 32 (RD/LB)
  - ◆ 297 (BK/LG)

**PINPOINT TEST D: NO POWER IN START**

Test Step	Result / Action to Take
<p><b>D1 CHECK THE VOLTAGE SUPPLY TO THE IGNITION SWITCH</b></p> <p><b>⚠ CAUTION: Use the Flex Probe Kit for all test connections to prevent damage to the wiring terminals. Do not use standard multimeter probes.</b></p> <ul style="list-style-type: none"> <li>• Disconnect: Ignition Switch C250.</li> <li>• Measure the voltage between ignition switch C250-6, circuit 1522 (LG) and ground; and between ignition switch C250-3, circuit 1050 (LG/VT) and ground.</li> </ul>  <p><small>N002B411</small></p> <p><b>• Are the voltages greater than 10 volts?</b></p>	<p><b>Yes</b> GO to <u>D2</u> .</p> <p><b>No</b> INSPECT in-line fuse 1 and BJB fuses 12 (20A) and 13 (20A) for an open. If OK, REPAIR circuit 1050 (LG/VT) or 1522 (LG) for an open. TEST the system for normal operation.</p>
<p><b>D2 CHECK CIRCUITS 32 (RD/LB) AND 297 (BK/LG) FOR AN OPEN</b></p> <ul style="list-style-type: none"> <li>• Measure the resistance between ignition switch C250-4, circuit 32 (RD/LB) and starter relay socket pin 85; and between ignition switch C250-1, circuit 297 (BK/LG) and central junction box fuse 46 (5A).</li> </ul>	<p><b>Yes</b> GO to <u>D3</u> .</p> <p><b>No</b> INSPECT BJB fuse 46 (5A) for an open. If OK, REPAIR the circuits 32 (RD/LB) or 297 (BK/LG) for an open. TEST the system for normal</p>