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Steering Column Switches -

Torque Specifications

Description	Nm	lb-ft
Steering column switch Torx screws	1.5	1.0

Part Number

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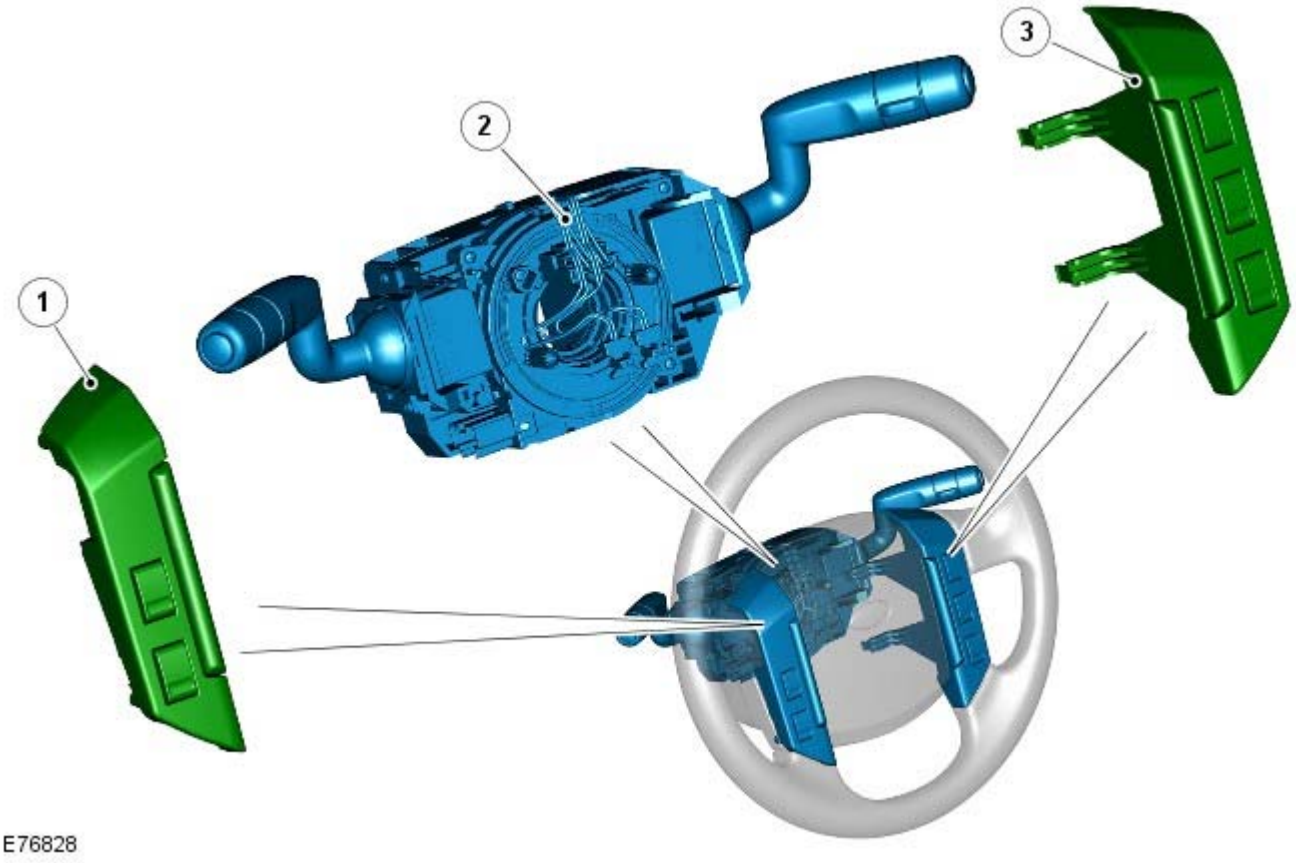
Steering Column Switches - Steering Column Switches

Description and Operation

COMPONENT LOCATION



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Item	Part Number	Description
1	-	Speed control switches
2	-	Steering column case containing the multifunction switches and clockspring
3	-	Audio control switches

OVERVIEW

The windshield wiper switch is located in the right-hand-side of the case and retained with 2 screws. The switch is connected to the main harness via a connector at the back of the switch. The switch controls the following functions:

- Windshield wiper intermittent slow and fast speed
- Windshield wiper flick wipe
- Windshield wash/wipe
- Rear wash/wipe
- Intermittent delay selection.

The turn signal indicator switch is located in the left-hand-side of the case and retained with 2 screws. The switch is connected to the main harness via a connector on the back of the switch. The switch controls the following functions:

- Left / right turn signal operation
- High / low beam operation
- Headlamp flash
- Trip computer function selection (if fitted).

The trip button allows the driver to cycle though an option menu and also reset trip cycle mileage calculations. The trip computer information is displayed in the instrument cluster message center (high line instrument cluster only).

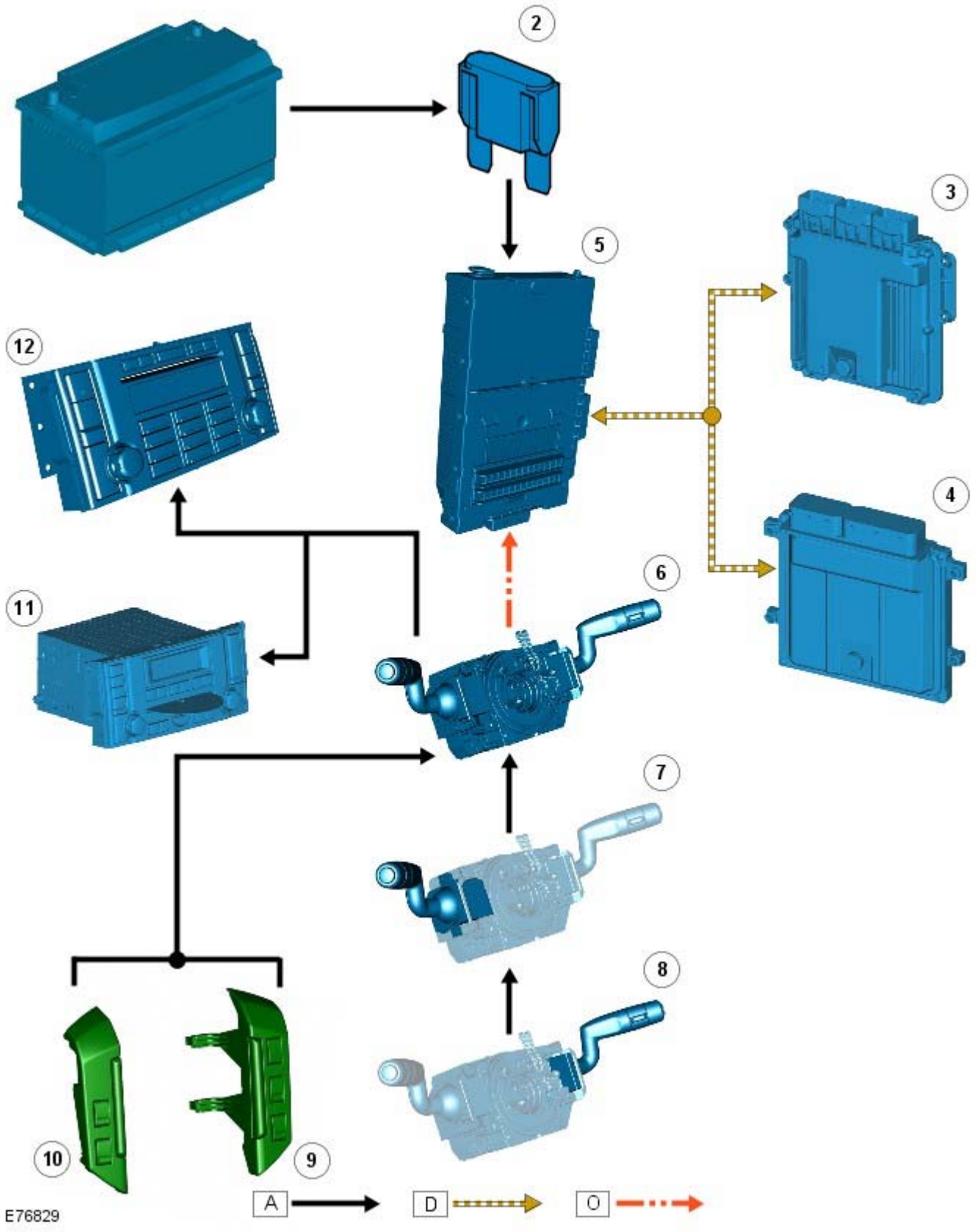
Steering wheel mounted switches on the right-hand-side of the driver's airbag, control the audio and telephone functions. Switches on the left-hand-side of the driver's airbag control the speed control functions.

The clockspring is located in the front of the case and retained with four screws. The clockspring engages in slots in the steering wheel boss and turns with the rotation of the steering wheel. The clockspring incorporates a tang which cancels the turn signal indicators when the steering wheel is rotated.

For additional information, refer to: Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) (501-20B Supplemental Restraint System, Description and Operation).

CONTROL DIAGRAM

NOTE: **A** = Hardwired; **D** = High speed CAN bus, **O** = LIN bus

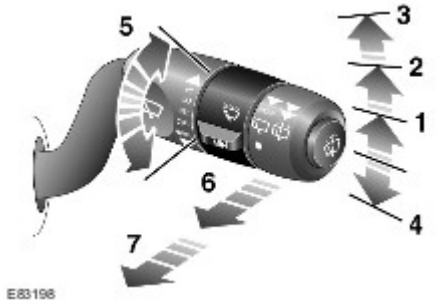


Item		Description
1		Battery
2		Mega fuse 18

3		Engine control module (ECM) (Diesel)
4		Engine control module (ECM) (petrol)
5		Central junction box (CJB)
6		Clockspring
7		Steering column LH multifunction switch
8		Steering column RH multifunction switch
9		RH audio control switches
10		LH speed control switches
11		Integrated audio module
12		Integrated control module

PRINCIPLES OF OPERATION

Windshield Wiper Switch



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Item		Description
1		Intermittent wipe/rain sensor
2		Low speed wipe
3		High speed wipe
4		Single wipe - pull down and release
5		Intermittent wipe delay or rain sensor sensitivity
6		Intermittent operation of the rear wiper
7		Operates the rear washer and wiper

The windshield wiper functions are operated by moving the switch up or down. Flick wipe is selected by pushing the switch down. The switch is non-latching in this position and wiper operation is stopped when the switch is released and it returns to the off position. The flick wipe switch contact is connected on a single wire to the Central junction box (CJB) and ground. This is the same connection to the CJB as the fast speed wipe. When the switch is operated the circuit is completed between the CJB and ground. The CJB detects the completed circuit and operates the wipers for as long as the switch contact is made.

Intermittent is selected by pushing the wiper switch up, to the detent position; the wipers operate at the delay period selected on the rotary switch on the wiper stalk. The wipers remain in the intermittent mode until the wiper switch is moved to the off or slow/fast speed positions. The intermittent switch contact is connected between the CJB and ground. When the switch is moved to the intermittent position the circuit is completed. The CJB detects the completed circuit and operates the wipers in the intermittent delay selected for as long as the switch contact is made.

The intermittent delay period is selected using a rotary control on the wiper switch stalk. The rotary control allows the driver to select six delay periods to suit the prevailing weather conditions. The rotary control is connected on three wires to the CJB and a single wire to ground. The six positions each use a different combination of the three wires. The CJB detects, via the three wires, which selection has been made and operates the wipers with the appropriate delay.

Slow speed operation is selected by pushing the wiper switch up, to the second detent position. The wipers operate at slow speed until the wiper switch is moved to the off, intermittent or fast speed positions. The slow speed switch contact is connected between the CJB and ground. When the switch is moved to the slow speed position the circuit is completed. The CJB detects the completed circuit and operates the wipers at slow speed for as long as the switch contact is made.

Fast speed operation is selected by pushing the wiper switch up, to the third detent position. The wipers operate at fast speed until the wiper switch is moved to the off, intermittent or slow speed positions. The fast speed switch contact is connected between the CJB and ground. When the switch is moved to the fast speed position the circuit is completed. The CJB detects the completed circuit and operates the wipers at fast speed for as long as the switch contact is made.

The windshield washer function button is located on the end of the switch stalk. When the button is pressed a circuit is completed between the CJB and ground. The CJB detects the completed circuit and operates the windshield washer for as long as the button is depressed.

Rear Wash/Wipe Switch

The rear wash/wipe functions are operated by moving the switch rearwards. Rear wipe is selected by moving the wiper switch rearwards to the first detent position. The rear wiper switch is connected between the CJB and ground. When the switch is moved to the rear wiper position the circuit is completed. The CJB detects the completed circuit and operates the rear wiper for as long as the switch contact is made.

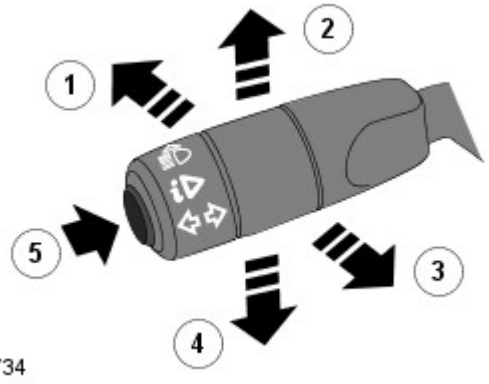
The rear washer is selected by moving the wiper switch rearwards to the second, non-latching position. When the switch is moved to this position a circuit is completed between the CJB and ground. The CJB detects the completed circuit and operates the rear washer for as long as the switch contact is made.

For additional information, refer to: Wipers and Washers (501-16 Wipers and Washers, Description and Operation).

Turn Signal Indicator and Headlamp Switch

The turn signal indicator switch assembly is located in the left hand side of the case and is retained in the case with two screws. The switch is connected to the main harness via a connector on the back of the switch. The switch controls the following functions:

- Left / right turn signal operation
- High / low beam operation
- Headlamp flash
- Computer function selection (if fitted).



Item		Description
1		High beam
2		Right hand indicator
3		Headlamp flash
4		Left hand indicator
5		Computer function button

Turn Signal Indicator

The turn signal indicators are operated by pushing the switch up for right hand indicators and down for left hand indicators. The switch has a detent position which locks the switch in the selected position until it is moved to the central off position. The switch also has a 'lane change' function which allows the switch to be operated, without moving through the detent, for use when changing lane on highways or when overtaking. When released from the 'lane change' position, the switch is automatically returned to the central off position. The left and right hand turn signal indicator switch positions are connected on separate wires to the Central Junction Box (CJB) and the switch. When a switch position selection is made, a circuit is completed from the CJB to ground, via the selected switch position. The CJB detects the completed circuit and operates the selected turn signal indicator until the switch is moved to the central off position. The turn signal indicators can be cancelled either manually by the driver or automatically when the steering wheel is rotated to the straight ahead position.

High/Low Beam and Headlamp Flash

High beam is operated by pushing the switch forwards. The switch is latched in this position and the high beam is active until the switch is manually pulled rearwards. The headlamp flash function is operated by pulling the switch rearwards. The switch contacts complete a circuit and the headlamps are activated for as long as the switch is operated. The switch is non-latching in this position and the headlamp flash is switched off when the switch is released and it returns to its off position. The high beam and headlamp flash positions are connected on separate wires to the CJB and ground. When a switch selection is made, a circuit is completed from the CJB to ground via the switch contacts.

For additional information, refer to: Exterior Lighting (417-01 Exterior Lighting, Description and Operation).

Computer Function Button

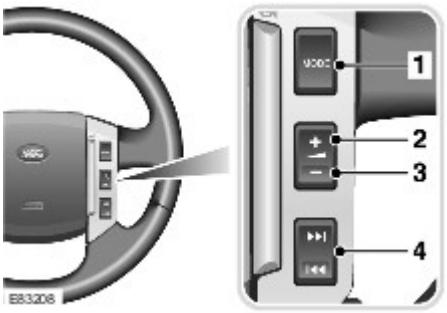
The computer function button is located on the end of the switch stalk. The button is a momentary switch and allows the driver to select the following information in the instrument cluster message center:

- Trip distance

- Distance on fuel remaining in the fuel tank
- Fuel tank remaining quantity
- Average fuel consumption
- Vehicle life fuel consumption
- Average speed
- Instantaneous fuel consumption.

The button is connected to the instrument cluster and ground. When the button is pressed the circuit is completed and the instrument cluster displays the next trip computer information. Repeated presses of the button selects each display in the message center in turn.
For additional information, refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

Audio Control Switches

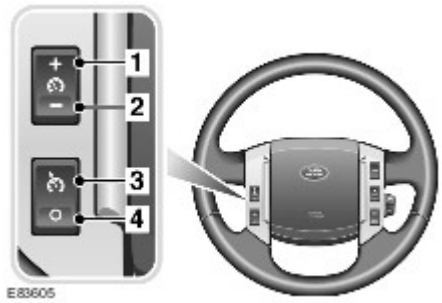


Item		Description
1		Press to switch between radio, CD, or AUX
2		Press to increase volume
3		Press to decrease volume
4		Press and release to scroll through preset radio stations or CD tracks. Press to search up or down for the next or previous radio station/CD track

The audio control switches are resistive ladder switches. These switches connect to the Infotainment Control Module (ICM) or Integrated Audio Module (IAM) (dependant upon the level of audio fitted to the vehicle) via the clockspring.

For additional information, refer to: Audio System (415-01, Description and Operation).

Speed Control Switches



Item		Description
1		Set target speed, or increase speed
2		Set target speed, or decrease speed
3		Resume set speed
4		Cancels speed control operation without erasing memorized speed

The speed control switches are resistive ladder type. The signals from the resistive ladder are fed to the steering column module (located in the clockspring) which then outputs the signals as a local interconnect network (LIN) bus signal to the central junction box (CJB). The CJB transmits speed control signals on the high speed controller area network (CAN) bus to the engine control module (ECM).

For additional information, refer to: Speed Control (310-03A Speed Control - I6 3.2L Petrol, Description and Operation).

For additional information, refer to: Speed Control - 2.2L Diesel (310-03, Description and Operation).

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Steering Column Switches - Steering Column Switches

Diagnosis and Testing

Principles of Operation

For a detailed description of the steering column switches, refer to the relevant Description and Operation section in the workshop manual.
REFER to: Steering Column Switches (211-05 Steering Column Switches, Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

1. Verify the customer concern.
2. Visually inspect for system integrity and obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
• Switches	• Fuse(s) • Electrical connector(s) • Wiring Harness

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 cause is not visually evident, check Central Junction Box (CJB) for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC Index

NOTE: If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

NOTE: Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give extra information read by the manufacturer-approved diagnostic system).

NOTE: When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places and with a current calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE: Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE: If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Cause	Action
B109512	Wiper On/Off Relay - circuit short to power	• Wiper On/Off relay circuit - short to power	Refer to electrical circuit diagrams and check wiper On/Off relay circuit for short to power
B109514	Wiper On/Off Relay - circuit short to ground or open	• Wiper On/Off relay circuit - short to ground, open circuit	Refer to electrical circuit diagrams and check wiper On/Off relay circuit for short to ground, open circuit
B109612	Wiper High/Low Relay - circuit short to power	• Wiper High/Low relay circuit - short to power	Refer to electrical circuit diagrams and check wiper High/Low relay circuit for short to power
B109614	Wiper High/Low Relay - circuit short to ground or open	• Wiper High/Low relay circuit - short to ground, open circuit	Refer to electrical circuit diagrams and check wiper High/Low relay circuit for short to ground, open circuit
B10AC86	Cruise Control Switch - Signal invalid	• Signal invalid	Carry out the pinpoint tests associated to this DTC using the manufacturer approved diagnostic system
B10AC87	Cruise Control Switch - Missing message	• Missing message	Carry out the pinpoint tests associated to this DTC using the manufacturer approved diagnostic system
B10AC95	Cruise Control Switch - Wrong assembly	• Mis-match between Car Configuration File and vehicle	Check/up-date Car Configuration File using the manufacturer approved diagnostic system

DTC	Description	Possible Cause	Action
B112B07	Steering Wheel Module - Mechanical Failures	• Any position or button on wiper stalk active for more than 60 seconds (180 seconds for speed control buttons) • Switch internal failure	Check for stuck wiper or speed control buttons. Install a new switch as required. REFER to: Steering Column Multifunction Switch (211-05 Steering Column Switches, Removal and Installation).
B112B88	Steering Wheel Module - Bus off	• Lost communications with steering wheel module	Carry out diagnostic strategy associated with this DTC using manufacturer approved diagnostic system
C1D2249	Steering Wheel Switch Right Module - Internal failure	• Steering wheel switch right module - internal failure	Install a new wash/wipe switch. REFER to: Steering Column Multifunction Switch (211-05 Steering Column Switches, Removal and Installation).
C200307	Steering Wheel Switch Left Module - Mechanical Failures	• Steering wheel switch left module - mechanical failure	Install a new indicator switch. REFER to: Steering Column Multifunction Switch (211-05 Steering Column Switches, Removal and Installation).
C200349	Steering Wheel Switch Left Module - Internal failure	• Steering wheel switch left module - internal failure	Install a new indicator switch. REFER to: Steering Column Multifunction Switch (211-05 Steering Column Switches, Removal and Installation).
U012600	Lost Communication With Steering Angle Sensor Module	• Lost communication with steering angle sensor	Carry out the associated network test for this DTC using the manufacturer approved diagnostic system

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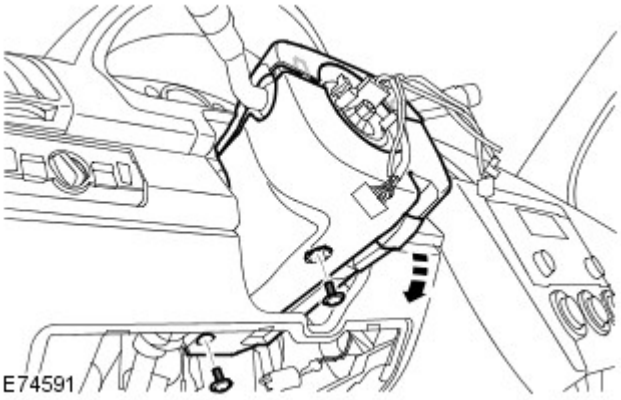
Steering Column Switches - Steering Column Multifunction Switch

Removal and Installation

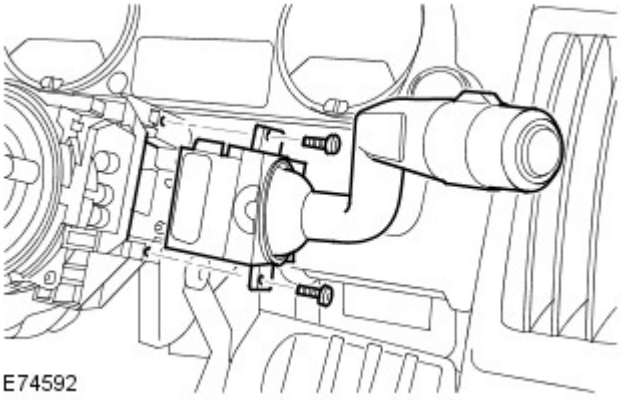
Removal

NOTE: Removal of the windshield wiper switch assembly is identical to this procedure.

1. Release the steering column adjustment lever.
2. Remove the steering column upper cowl.
3. Remove the steering column lower cowl.



4. Remove the steering column multifunction switch.



Installation

1. To install, reverse the removal procedure.

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Steering Column Switches - Ignition Switch

Removal and Installation

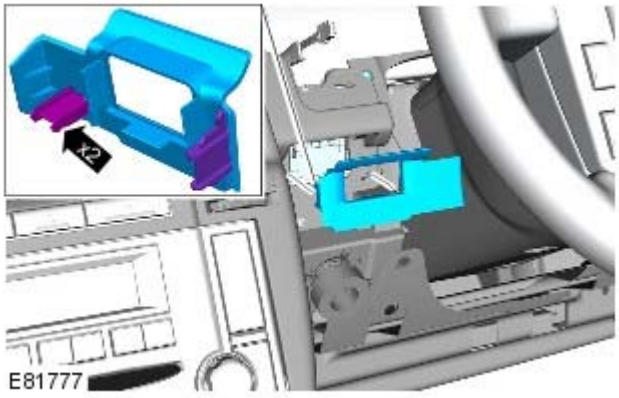
Removal

1. Make the SRS system safe.

   Refer to: Standard Workshop Practices (100-00 General Information, Description and Operation).

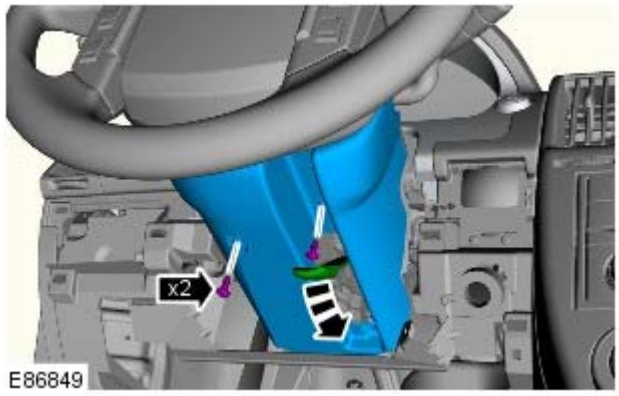
2. Remove the driver lower air bag module.

   Refer to: Driver Lower Air Bag Module (501-20B Supplemental Restraint System, Removal and Installation).



3. NOTE: RHD illustration shown, LHD is similar.

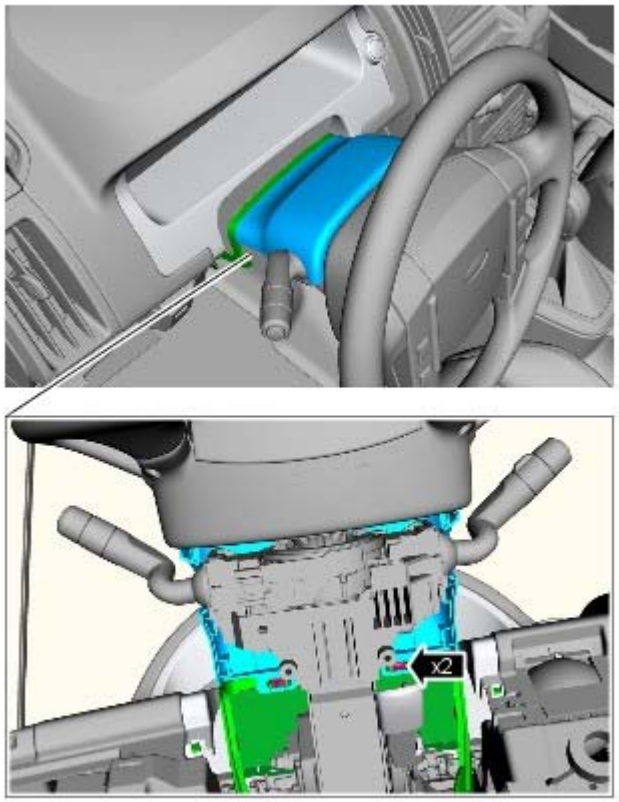
   Remove the keyless start control module trim cover.



4. Remove the steering column lower cowl.

5. Adjust the steering column to its lowest position.

6.



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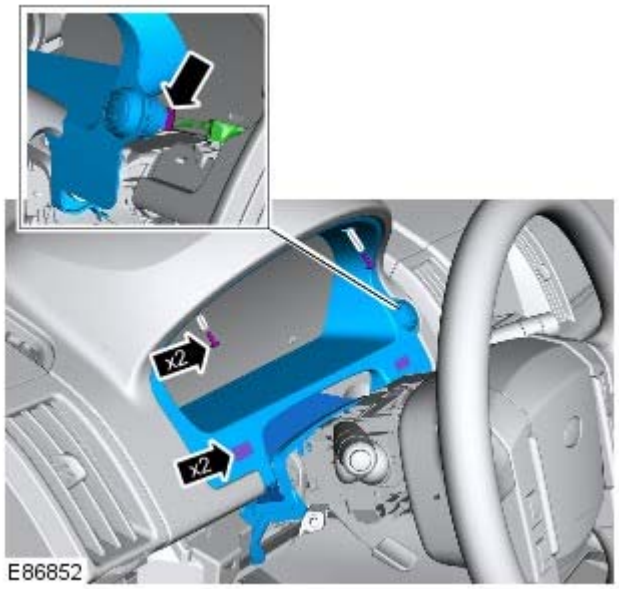
7. NOTE: Take extra care when releasing the clips.

   Remove the instrument cluster surround.



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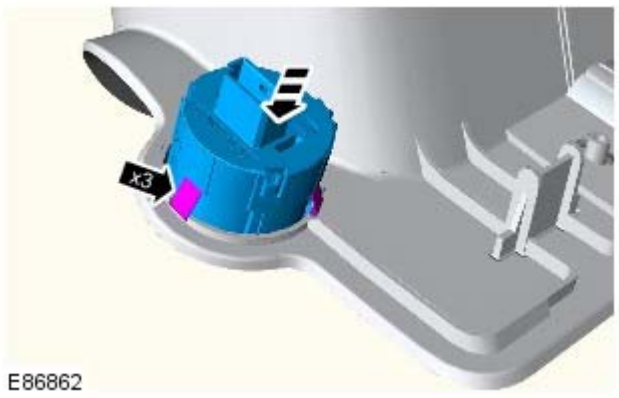

8. Remove the ignition switch.

Installation

1. To install, reverse the removal procedure.

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Steering Column Switches - Steering Column Lock Module

Removal and Installation

Removal

NOTE: On vehicles built from VIN 091770 the steering column lock module may be a non-functional component.

NOTE: The steering column lock module is retained with 2 X 6mm patch locked, tamper proof bolts.

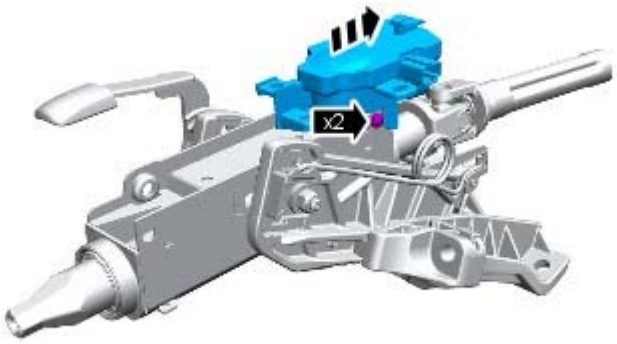
NOTE: Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.

   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

2. Remove the steering column.

   Refer to: Steering Column (211-04 Steering Column, Removal and Installation).



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3. NOTE: Using a suitable stud extraction tool, remove the tamper proof bolts .

Installation

1. CAUTION: Tighten the new tamper proof bolts until the hexagon head shears.

   To install, reverse the removal procedure.

2. Using the Land Rover approved diagnostic system, calibrate a new module.