

Automatic Transmission/Transaxle External Controls -**General Specification**

Item	Specification
Type	Cable shift

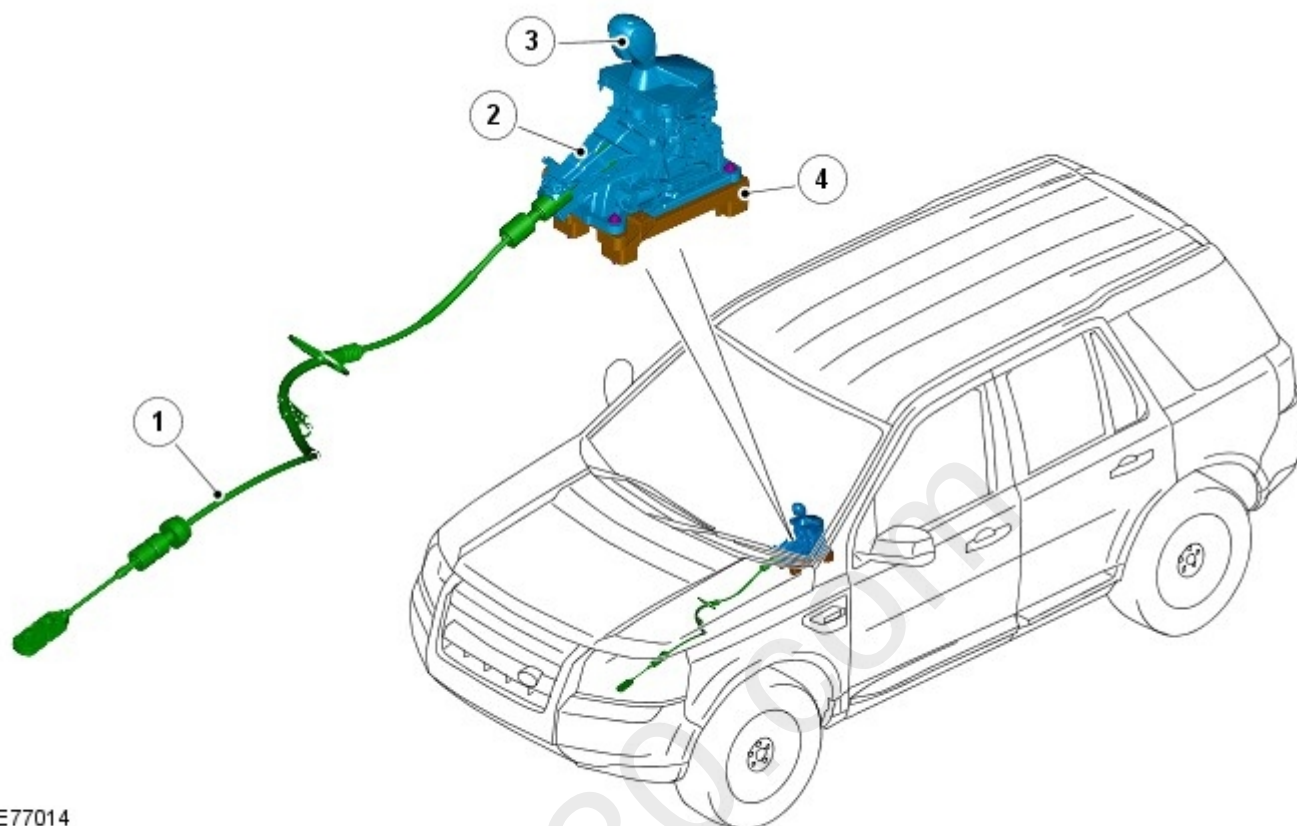
Torque Specifications

Description	Nm	lb-ft
Abutment bracket to gearbox bolt	24	18
Shift assembly to floor	10	7
Shift cable grommet to body bolt	7	5
Shift lever to gearbox	14	10

Automatic Transmission/Transaxle External Controls - External Controls

Description and Operation

COMPONENT LOCATION



E77014

Item	Part Number	Description
1	-	Selector cable
2	-	Selector lever assembly
3	-	Selector knob, gaiter and illumination module
4	-	Selector lever mounting plate

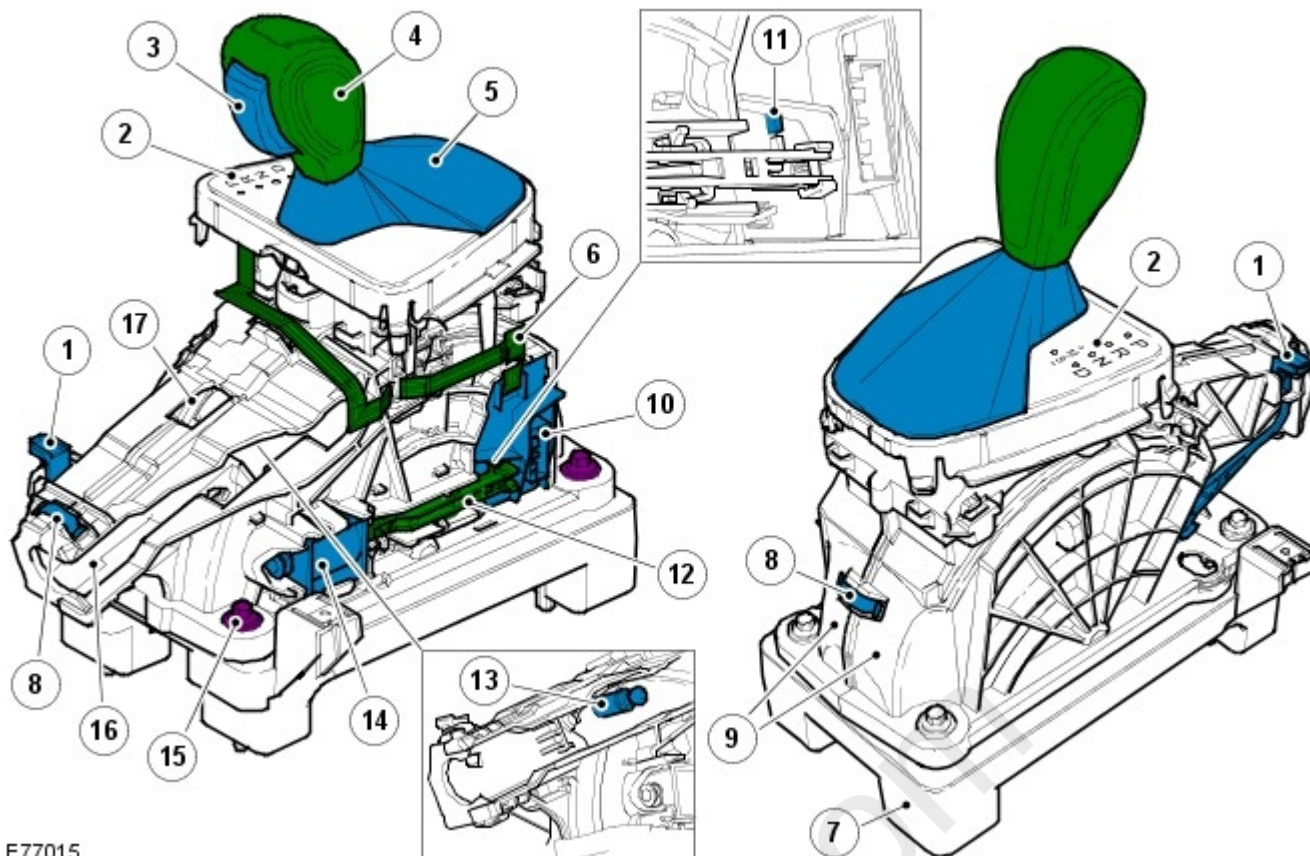
OVERVIEW

The automatic transmission external controls comprise a selector lever assembly and a transmission cable. The selector lever allows the driver to select forward or reverse gears and also to engage sport or manual 'CommandShift™' modes.

Movement of the selector lever is confirmed to the driver by illumination of the applicable position Light Emitting Diode (LED) on the selector lever trim finisher and by an applicable message displayed in the instrument cluster message centre.

SELECTOR LEVER

- NOTE: Right Hand (RH) drive version shown



E77015

Item	Part Number	Description
1	-	Interlock solenoid - Emergency release lever
2	-	Selector position Light Emitting Diodes (LED's)
3	-	Selector lever button
4	-	Knob
5	-	Gaiter
6	-	PCB ribbon cable and connector
7	-	Selector lever mounting plate
8	-	Spring clip
9	-	Shift housing Left Hand (LH) and Right Hand (RH)
10	-	Gear shift module
11	-	Optical sensor alignment mark
12	-	Sensor arm
13	-	Cable attachment ball pin
14	-	Shift interlock solenoid
15	-	Mounting bolt (4 off)
16	-	Cable abutment aperture
17	-	Cable adjustment/setting aperture

The selector lever assembly is located in a central position on the transmission tunnel, between the front driver and passenger seats and is secured to the transmission tunnel with 4 bolts. The selector lever assembly is a non-serviceable electro-mechanical assembly which is used by the driver to select the required transmission mode.

Selections made using the selector lever are passed to the transmission lever arm by a cable. A ball pin is attached to the lever mechanism and provides for the attachment of the cable.

There are five selector lever positions and two additional positions for manual 'CommandShift™' operation:

- **P** (Park) - Prevents the vehicle from moving by locking the transmission
- **R** (Reverse) - Select only when the vehicle is stationary and the engine is at idle
- **N** (Neutral) - No torque transmitted to drive wheels
- **D** (Drive) - This position uses all six forward gears
- **M/S** (Sport Mode) - This position uses all forward gears in 'D' but will upshift at higher engine speeds to improve acceleration and downshift at higher engine speed to give increased engine braking
- **+ and -** Manual ('CommandShift™') mode - Movement of the selector lever in the +/- positions, when the lever is in the M/S position, will operate the transmission in manual (CommandShift™) mode allowing the driver to manually select all six forward gears.

The selector lever position is displayed to the driver on the selector position LED and in the instrument cluster. In 'CommandShift™' mode, if a gear is selected but the Transmission Control module (TCM) logic prevents selection of that gear, the requested gear will be initially displayed. The TCM will engage the next allowed gear and then display that gear.

Sensor Module

A sensor module is located on the LH side of the selector lever. The sensor module is an intelligent unit and controls the selector position LED operation and also the shift interlock solenoid operation. The sensor module comprises a Printed

Circuit Board (PCB) and Hall effect sensors which detect the selected position of the selector lever (M/S and +/-) via a magnet located on the lever mechanism. The signals from the Hall sensors are passed from a connector on the sensor module to the TCM on a Local Interconnect Network (LIN) bus.

The sensor module main connector uses four pins for LIN bus, ground, power and neutral inputs and outputs. A second connector allows for the connection of a ribbon cable from the selector position LED for night illumination and position illumination. A third connector supplies power and ground connections to the shift interlock solenoid.

The sensor module also includes an optical sensor which determines that the selector lever is in the Park (P) position. The sensor is located behind the module housing and is not visible. Alignment marks on the sensor housing and the sensor arm must be aligned when the selector lever is in the Park (P) position. When these 2 marks are aligned the optical sensor/park position is correctly adjusted. This adjustment is set at the point of manufacture and does not require re-setting under normal operating conditions.

Sport/Manual +/- CommandShift™

The sensor module contains the hall effect sensors to activate the sport/manual mode and also the sensors which provide the +/- signals. When the selector lever is moved to the manual/sport position, the magnet located in the selector lever mechanism is moved within proximity of the M/S hall effect sensor on the PCB. This provides the signal which is received by the TCM, which in turn initiates sport mode.

When the lever is moved to the + or - position, the magnet is moved within proximity of one of the hall effect sensors positioned either side of the M/S hall effect sensor. When an input from either the + or - sensors is received, manual CommandShift™ mode will be initiated. In this position a spring will move the selector lever back to the centre position when released. To leave the CommandShift™ mode, return the lever to the 'D' position.

Shift Interlock

The shift interlock solenoid is located on the LH side of the selector lever assembly. The solenoid operates two locking levers which engage with the lever mechanism and lock it in the Park (P) and Neutral (N) positions. When the ignition is off, the solenoid is de-energized, locking the selector lever in the Park (P) position. If the selector lever is in any position other than Park (P), the remote handset cannot be removed from the start control module until the lever is moved to the Park (P) position.

The shift interlock solenoid has a mechanical connection to the sensor module using a sensor arm. Movement of the solenoid is transferred via the sensor arm to the sensor module which detects the movement using an optical sensor. The sensor arm movement provides a confirmation to the sensor module that the solenoid is in its interlocked position. The sensor arm has a ratchet adjustment for alignment of the optical sensor and is factory set and must not be adjusted.

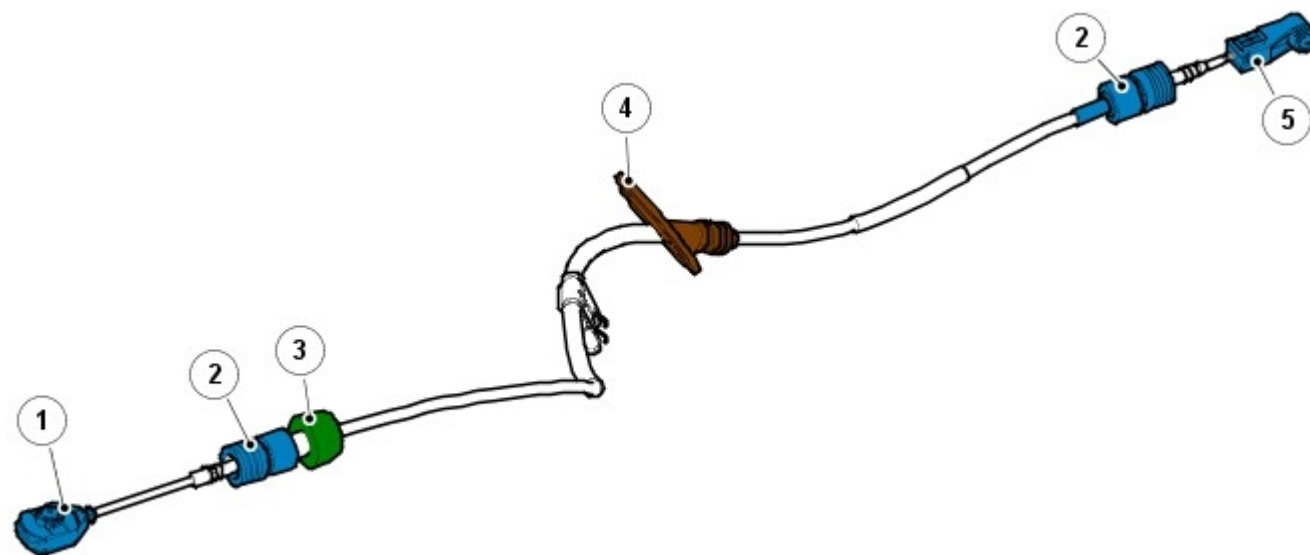
The shift interlock solenoid locks the selector lever in the park position or the neutral position to prevent inadvertent selections on the selector lever. The interlock is released when the ignition is on and the driver presses the brake pedal. A signal from the brake switch is passed on the high speed Controller Area Network (CAN) bus to the TCM and is then passed on the LIN bus to the sensor module. On receipt of this signal the sensor module logic energizes the solenoid if in the Park (P) position or de-energizes the solenoid if in the Neutral (N) position, releasing the interlock mechanism.

If the selector lever is left in the 'N' position for more than 3 seconds, the solenoid will be energized and the selector lever will become locked in the 'N' position. To move the selector lever from the 'N' position in this condition, the footbrake must be applied. This prevents the selector lever from being moved to the 'D' or 'R' position unintentionally and the application of the brakes also prevents the vehicle 'creeping' when the gear is engaged. Movement of the selector lever from the 'P' or 'N' positions is also prevented if the TCM senses the engine speed is above 2500 rev/min, even if the brake pedal is depressed.

If a fault occurs with the shift interlock solenoid, the sensor module, the brake switch or associated wiring, an emergency release lever is provided to disconnect the interlock mechanism. The emergency release lever can be accessed by using a tool to remove the selector lever trim finisher from the floor console. The finisher can be lifted to gain access to the release lever which is located at the front the selector lever assembly and is colored yellow for identification.

• **NOTE:** The selector lever cannot be moved from the 'Park' position if the ignition is switched off unless the emergency release lever is used.

TRANSMISSION CABLE



E77016

Item	Part Number	Description
1	-	Transmission eye end
2	-	Abutment
3	-	Damper weight
4	-	Bulkhead grommet
5	-	Selector lever arm eye end and setting button

The transmission cable assembly is a one-piece, push/pull cable connected between the transmission and the selector lever.

The selector lever end of the cable has an adjustable eye end which locates on a ball pin on the selector lever. An abutment on the cable outer sheath locates in an aperture at the front of the selector lever shift housing.

A fireproof grommet seal is positioned approximately half way along the length of the cable and seals the cable through a hole in the bulkhead.

The transmission end of the cable also has an eye end which locates on a ball pin on the end of the transmission lever arm. An abutment on the outer sheath locates in a bracket attached to the top of the transmission.

Linear movement of the selector lever is transferred, via the inner cable, into movement of the transmission lever arm. The lever arm converts the linear movement of the selector cable into rotary movement of the manual shaft in the transmission.

Cable Setting Procedure

The correct cable adjustment is achieved by use of a yellow button in the selector lever arm eye end. The setting process is to ensure that the transmission is in Park (P) and the selector lever is in its detente park position. This can be checked by selecting the Park (P) position and with the park brake released, rocking the vehicle forward and back to ensure that the transmission parking pawl is engaged.

Once the cable is in the correct position, the yellow setting button can be engaged with the serrated portion of the cable. Access to the setting button is through the aperture in the upper face of the shift housing.

The cable should be reset whenever any part of the transmission shift system has been disturbed or replaced, including the transmission, operating arms, abutment brackets cables or selector lever assembly.

Automatic Transmission/Transaxle External Controls - External Controls

Diagnosis and Testing

Principles of Operation

For a detailed description of the automatic transmission external controls, refer to the relevant Description and Operation section in the workshop manual.

REFER to: [External Controls](#) (307-05 Automatic Transmission/Transaxle External Controls, 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. **1.** Verify the customer concern.
2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
- Check for correct gear selector lever cable adjustment. REFER to: Selector Lever Cable (307-05 Automatic Transmission/Transaxle External Controls, Removal and Installation). - Visibly damaged or worn components - Loose or missing fasteners	- Fuse(s) - Loose or corroded electrical connector(s)

3. **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. **4.** If the cause is not visually evident, check the TCM 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 additional information read by the manufacturer approved diagnostic system).

• **NOTE:** When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date 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:** Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

• **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
P070500	Transmission range sensor A circuit (PRNDL input)	- Incorrect adjustment of the gear selector lever cable - Incorrect adjustment of the gear position sensor - Internal transmission control module (TCM) fault	Check the adjustment of the gear selector lever cable and sensor. REFER to: Selector Lever Cable (307-05 Automatic Transmission/Transaxle External Controls, Removal and Installation). Refer to the warranty policy and procedures manual if a module is suspect.
P070600	Transmission range sensor A circuit range/performance	- Incorrect adjustment of the gear selector lever cable - Incorrect adjustment of the gear position sensor - Internal transmission control module (TCM) fault	Check the adjustment of the gear selector lever cable. REFER to: Selector Lever Cable (307-05 Automatic Transmission/Transaxle External Controls, Removal and Installation). Calibrate the gear position sensor using the approved diagnostic system. Refer to the warranty policy and procedures manual if a module is suspect.
P070900	Transmission range sensor A circuit intermittent	- Incorrect adjustment of the gear selector lever cable - Incorrect adjustment of the gear position sensor - Internal transmission control module (TCM) fault	Check the adjustment of the gear selector lever cable. REFER to: Selector Lever Cable (307-05 Automatic Transmission/Transaxle External Controls, Removal and Installation). Calibrate the gear position sensor using the approved diagnostic system. Refer to the warranty policy and procedures manual if a module is suspect.

DTC	Description	Possible Cause	Action
P085A00	Gear shift module B communication circuit	• LIN circuit fault between the gear selector module (GSM) and transmission control module (TCM)	Check the LIN circuits. Refer to the electrical guides. Rectify as necessary.
P086011	Gear shift module A communication circuit	• LIN circuit fault between the gear selector module (GSM) and transmission control module (TCM)	Check the LIN circuits. Refer to the electrical guides. Rectify as necessary.
P086012	Gear shift module A communication circuit	• LIN circuit fault between the gear selector module (GSM) and transmission control module (TCM)	Check the LIN circuits. Refer to the electrical guides. Rectify as necessary.
P086013	Gear shift module A communication circuit	• LIN circuit fault between the gear selector module (GSM) and transmission control module (TCM)	Check the LIN circuits. Refer to the electrical guides. Rectify as necessary.
P086087	Gear shift module A communication circuit - missing message	• LIN circuit fault between the gear selector module (GSM) and transmission control module (TCM)	Check the LIN circuits. Refer to the electrical guides. Rectify as necessary.
P092800	Gear shift lock solenoid circuit open	• Gear shift lock solenoid circuit: short circuit to ground • Gear shift lock solenoid circuit: open circuit • Gear shift lock solenoid circuit: short circuit to power • Gear shift lock solenoid fault	Check the gear shift lock solenoid and circuits. Refer to the electrical guides. Rectify as necessary.
P092811	Gear shift lock solenoid circuit open	• Gear shift lock solenoid circuit: short circuit to ground • Gear shift lock solenoid fault	Check the gear shift lock solenoid and circuits. Refer to the electrical guides. Rectify as necessary.
P092812	Gear shift lock solenoid circuit open	• Gear shift lock solenoid circuit: short circuit to power • Gear shift lock solenoid fault	Check the gear shift lock solenoid and circuits. Refer to the electrical guides. Rectify as necessary.
P092813	Gear shift lock solenoid circuit open	• Gear shift lock solenoid LIN circuit: open circuit • Gear shift lock solenoid fault	Check the gear shift lock solenoid and LIN circuits. Refer to the electrical guides. Rectify as necessary.
P093000	Gear shift lock solenoid circuit low	• Gear shift lock solenoid circuit: short circuit to ground • Gear shift lock solenoid circuit: open circuit • Gear shift lock solenoid fault	Check the gear shift lock solenoid and circuits. Refer to the electrical guides. Rectify as necessary.
P093100	Gear shift lock solenoid circuit high	• Gear shift lock solenoid circuit: short circuit to power • Gear shift lock solenoid fault	Check the gear shift lock solenoid and circuits. Refer to the electrical guides. Rectify as necessary.
P093111	Gear shift lock solenoid circuit high	• Gear shift lock solenoid LIN circuit: short circuit to ground • Gear shift lock solenoid fault	Check the gear shift lock solenoid and LIN circuits. Refer to the electrical guides. Rectify as necessary.
P093112	Gear shift lock solenoid circuit high	• Gear shift lock solenoid LIN circuit: short circuit to power • Gear shift lock solenoid fault	Check the gear shift lock solenoid and LIN circuits. Refer to the electrical guides. Rectify as necessary.
P173D00	Ignition key lock solenoid circuit open	• Shift lock solenoid circuit: open circuit • Shift lock solenoid fault	Check the shift lock solenoid and circuits (between the gear selector module and the transmission control module). Refer to the electrical guides. Rectify as necessary.
P173E00	Ignition key lock solenoid circuit low	• Shift lock solenoid circuit: short circuit to ground • Shift lock solenoid fault	Check the shift lock solenoid and circuits (between the gear selector module and the transmission control module). Refer to the electrical guides. Rectify as necessary.

DTC	Description	Possible Cause	Action
P173F00	Ignition key lock solenoid circuit high	● Shift lock solenoid circuit: short circuit to power ● Shift lock solenoid fault	Check the shift lock solenoid and circuits (between the gear selector module and the transmission control module). Refer to the electrical guides. Rectify as necessary.
U210511	Switch Pack Signal "A"	● Shift Lock position signal circuit - short to ground, open circuit	Refer to electrical circuit diagrams and check shift lock position signal circuit for short to ground, open circuit
U210512	Switch Pack Signal "A"	● Shift Lock position signal circuit - short to power	Refer to electrical circuit diagrams and check shift lock position signal circuit for short to power

mcx30.com

Automatic Transmission/Transaxle External Controls - Selector Lever Cable Adjustment

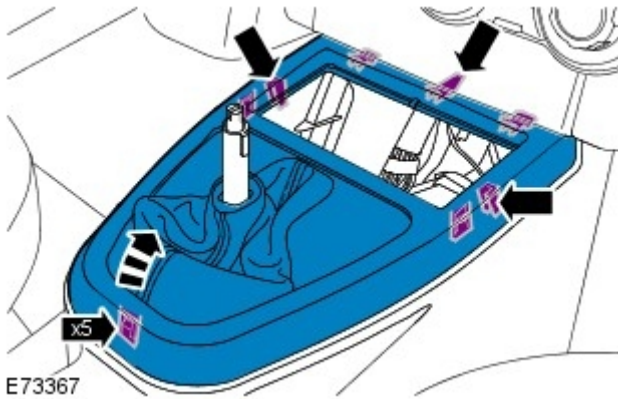
General Procedures

1. Check the operation of the transmission selector lever.

2. Remove the gear selector knob.

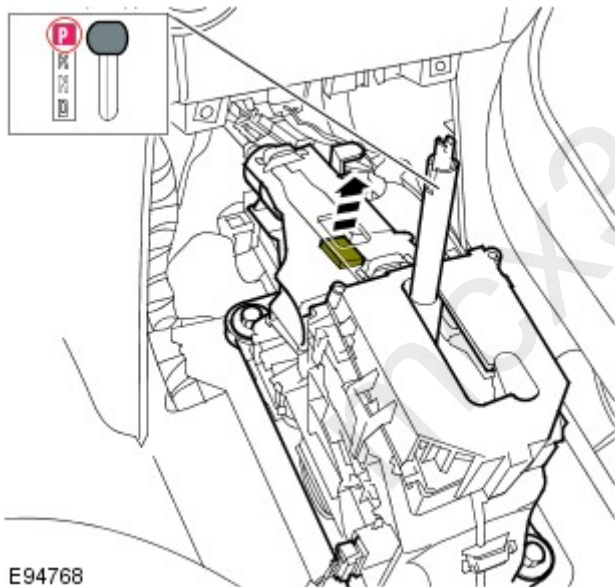
Refer to: Selector Lever Knob (307-05, Removal and Installation).

3.

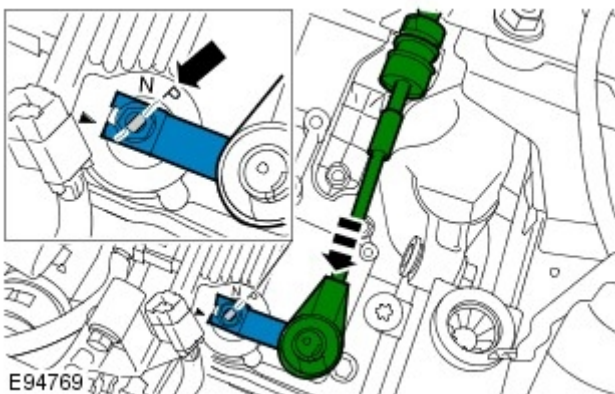


4. **CAUTION:** Make sure that the selector lever and the gearshift mechanism are in the park (P) position.

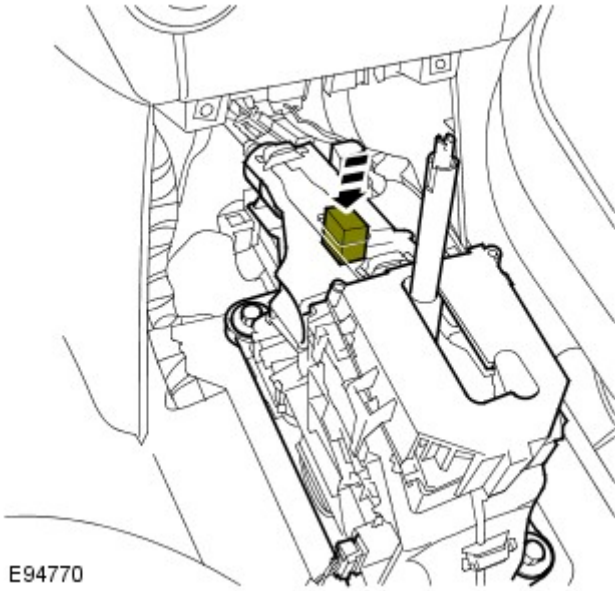
Release the selector cable adjuster.



5. **CAUTION:** Make sure that the selector lever and the gearshift mechanism are in the park (P) position.



6. Lock the selector cable adjuster.



E94770

7. Secure the gear selector cover.

8. Install the gear selector knob.

Refer to: Selector Lever Knob (307-05, Removal and Installation).

Automatic Transmission/Transaxle External Controls - Selector Lever Assembly

Removal and Installation

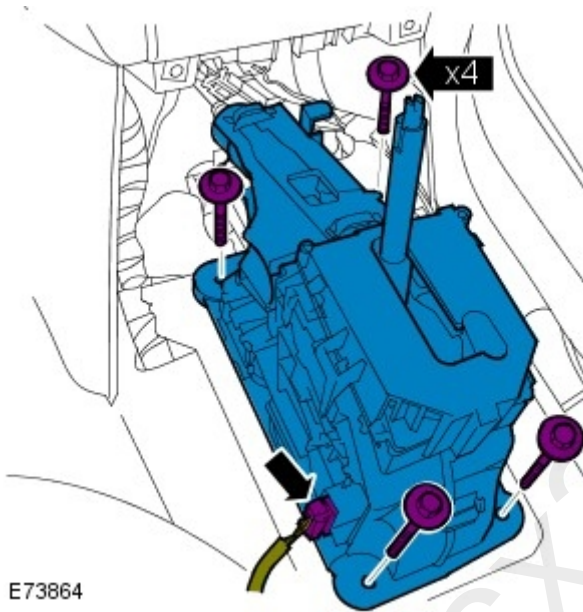
Removal

1. Remove the floor console.

Refer to: [Floor Console](#) (501-12 Instrument Panel and Console, Removal and Installation).

2.
 - Position the transmission selector lever into PARK.
 - Depress and hold the selector cable ball joint release button, using a lever carefully disconnect the cable.
 - Release the cable.

3.
 - Torque: 10 Nm



E73864

Installation

1. To install, reverse the removal procedure.

Automatic Transmission/Transaxle External Controls - Selector Lever Cable

Removal and Installation

Removal



CAUTION: Make sure that the selector lever and the gearshift mechanism are in the park (P) position.

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Remove the driveshaft.

Refer to: [Driveshaft - Vehicles Without: Diesel Particulate Filter \(DPF\)](#) (205-01 Driveshaft, Removal and Installation).

3. Remove the floor console.

Refer to: [Floor Console](#) (501-12 Instrument Panel and Console, Removal and Installation).

4. Remove the air cleaner assembly.

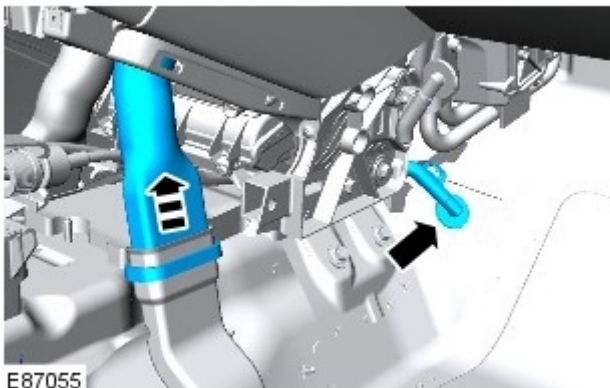
Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - I6 3.2L Petrol, Removal and Installation).

5. Remove the instrument panel, lower trim panels.

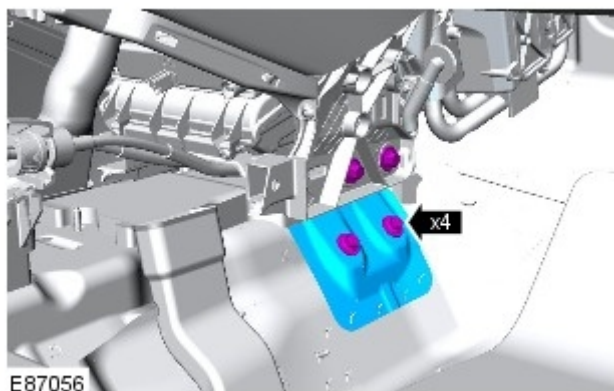


E76716

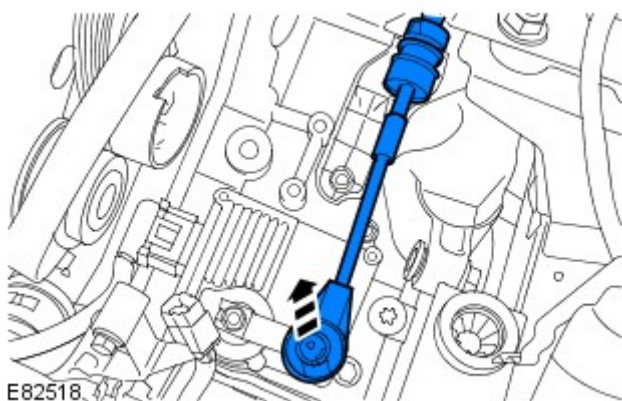
- 6.



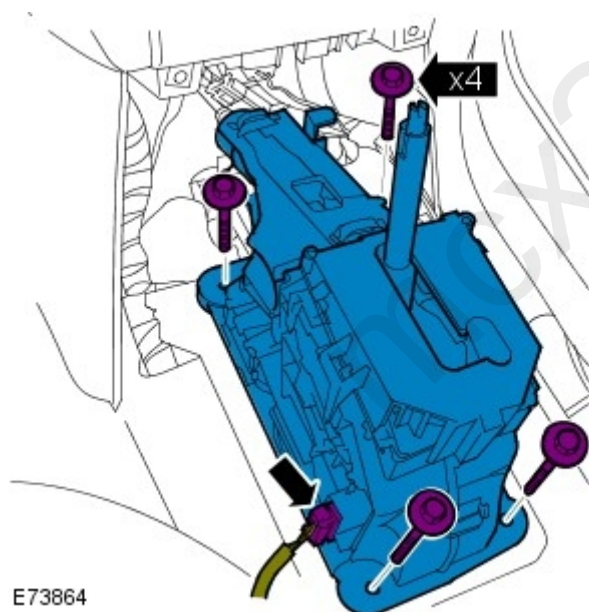
E87055



7. Remove the RH instrument pack lower bracket.

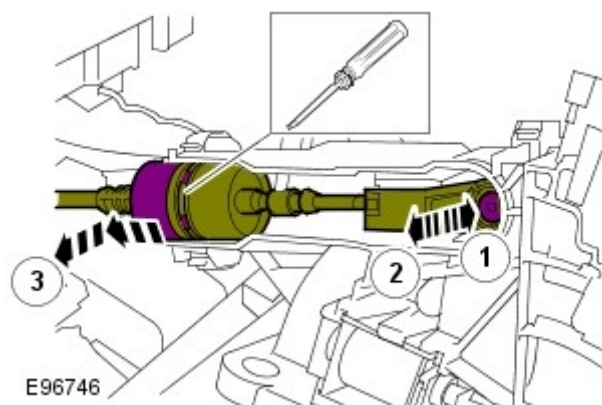


8.



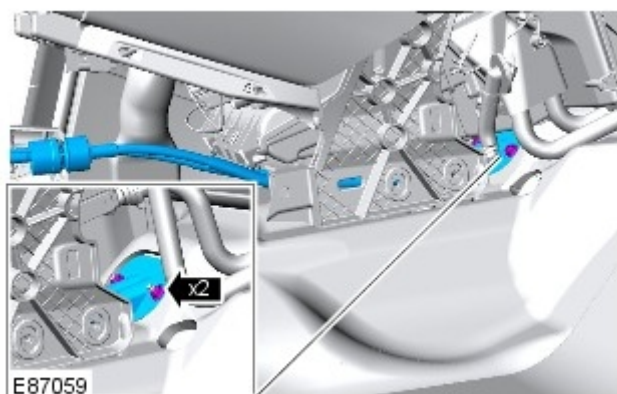
9.

- Position the transmission selector lever into PARK.

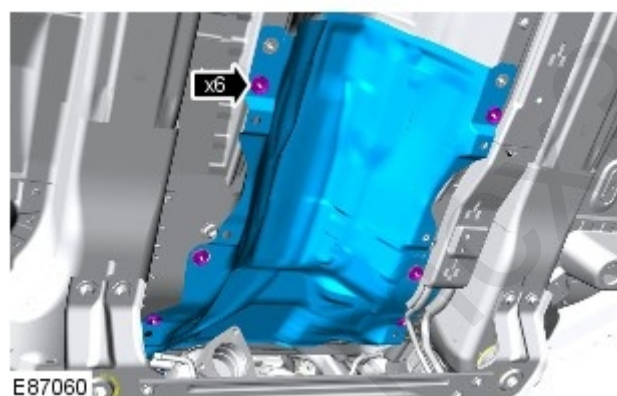


10.

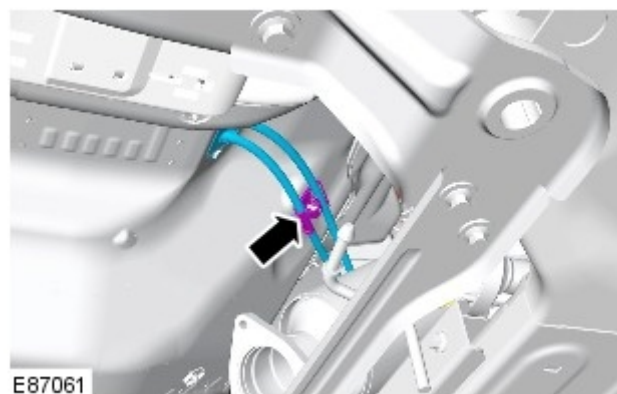
- Depress and hold the selector cable ball joint release button, using a lever carefully disconnect the cable.
- Disconnect and remove the cable.



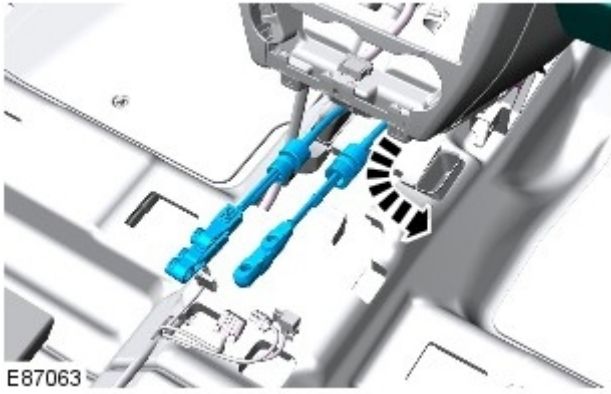
11. Release the cable sealing plate.



12.



13.



14. **14.** NOTE: This step requires the aid of another technician.

Remove the gear selector cable assembly.

Installation

1. **1.** NOTE: This step requires the aid of another technician.

Install the selector cable.

2. Secure the cables in the clips.

3. Install the heat shield.

4. Secure the selector cables.

5. Install the sealing plate.

Torque: 7 Nm

6. Install the gearshift lever.

Torque: 10 Nm

7. Connect the selector cable ball joints.

8. Install the instrument pack bracket.

Torque: 25 Nm

9. Secure the drain tube and heater duct.

10. Install the instrument panel, lower trim panels.

11. Install the air cleaner assembly.

Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - I6 3.2L Petrol, Removal and Installation).

12. Install the floor console.

Refer to: [Floor Console](#) (501-12 Instrument Panel and Console, Removal and Installation).

13. Install the driveshaft.

Refer to: [Driveshaft - Vehicles Without: Diesel Particulate Filter \(DPF\)](#) (205-01 Driveshaft, Removal and Installation).

Automatic Transmission/Transaxle External Controls - Selector Lever Knob, Boot and Bezel

Removal and Installation

Removal

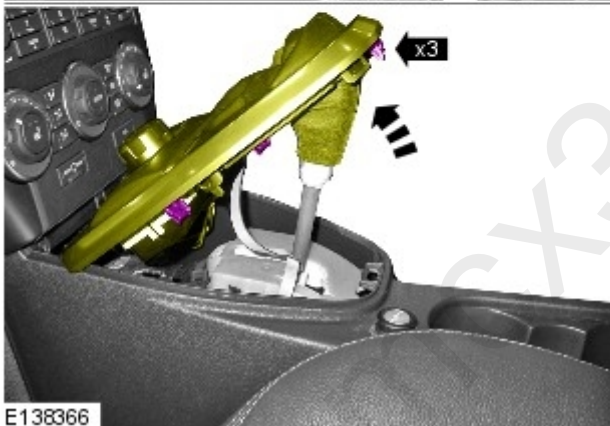
• NOTE: Make sure that the selector lights function correctly. If the ribbon cable is damaged it will be necessary to remove the floor console to access the ribbon cable connector on the selector lever assembly.

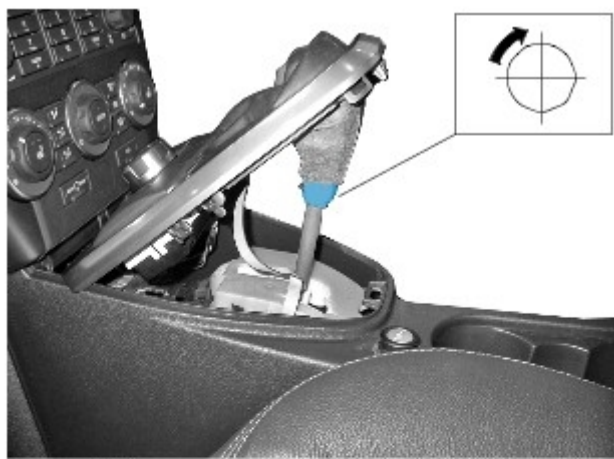
1. Position the gearshift lever in NEUTRAL.

2. Switch the ignition off.

3.

- Release the gear lever surround by pulling upwards firmly at the rear.





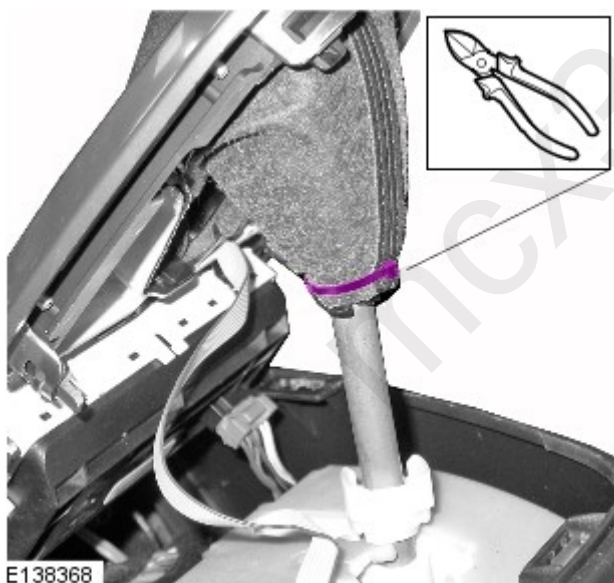
4.

- Release the locking ring.

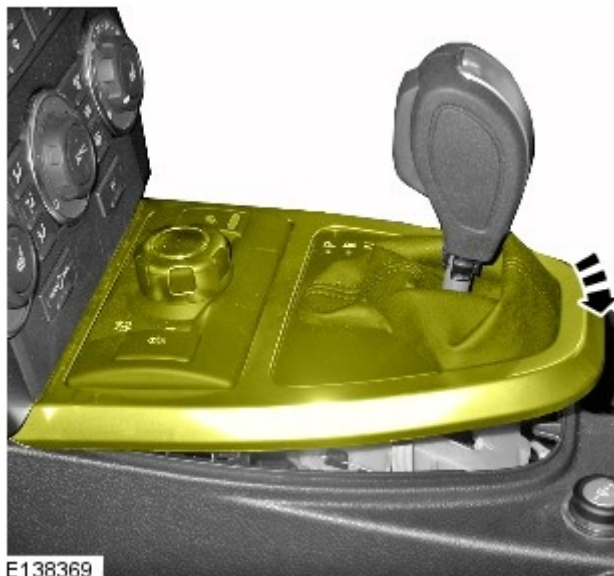


E138367

5.

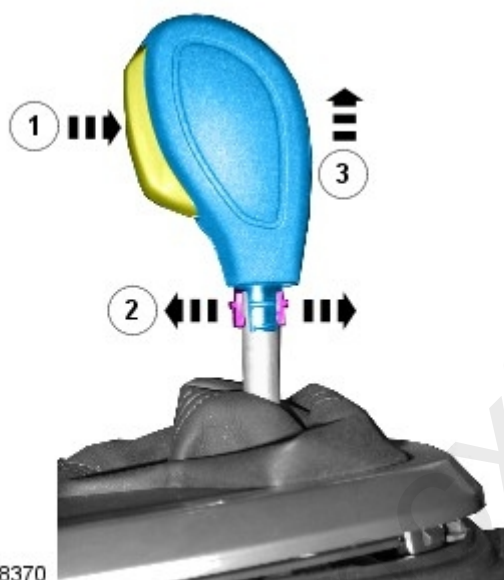


E138368



E138369

6.



E138370

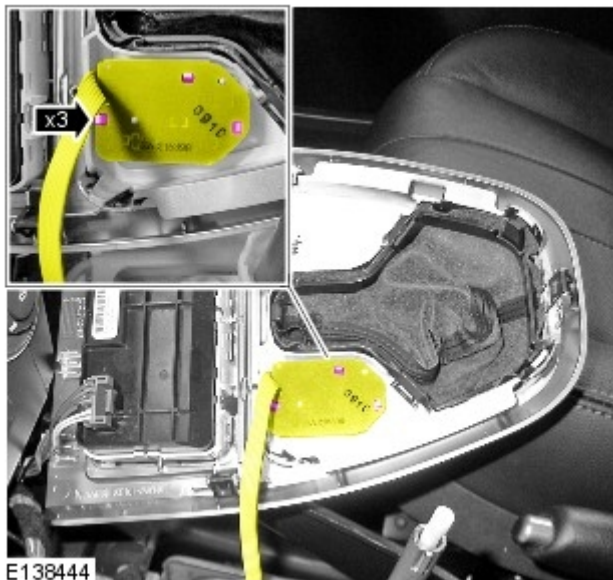
7.  **WARNING:** The selector lever knob will be released suddenly, keep face clear during removal.

 **CAUTION:** Make sure the selector lever button is depressed when removing the selector lever knob. Failure to follow this instruction may result in damage to the selector lever assembly.



E138443

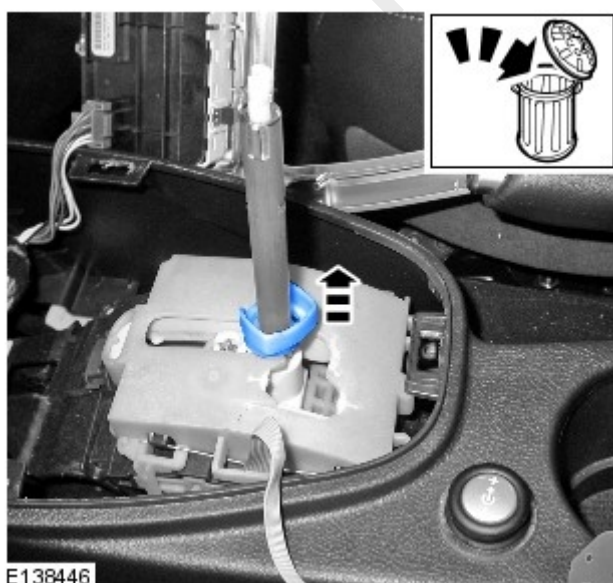
8.



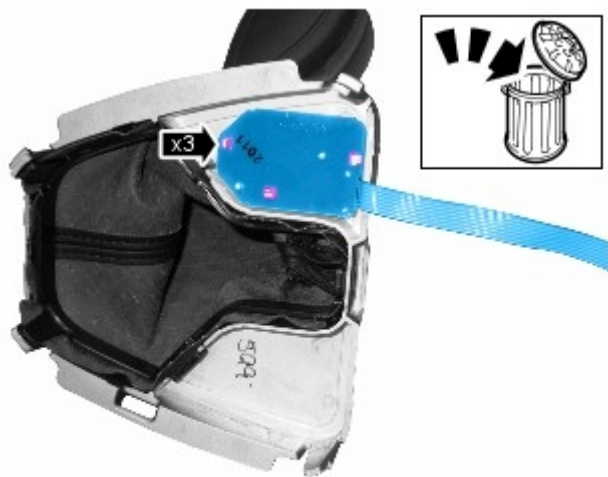
9. **9.**  **CAUTION:** Take care not to touch the printed side of the printed circuit board (PCB).



10. **10.**  **CAUTION:** Discard the component.



11. **11.**  **CAUTION:** Discard the component.

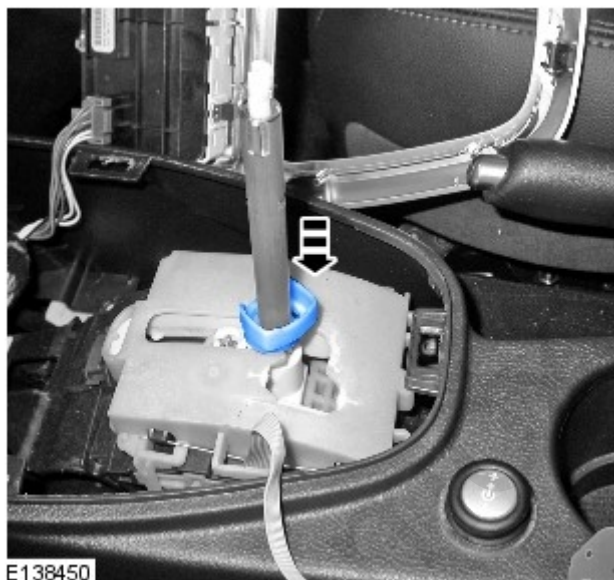


E138447

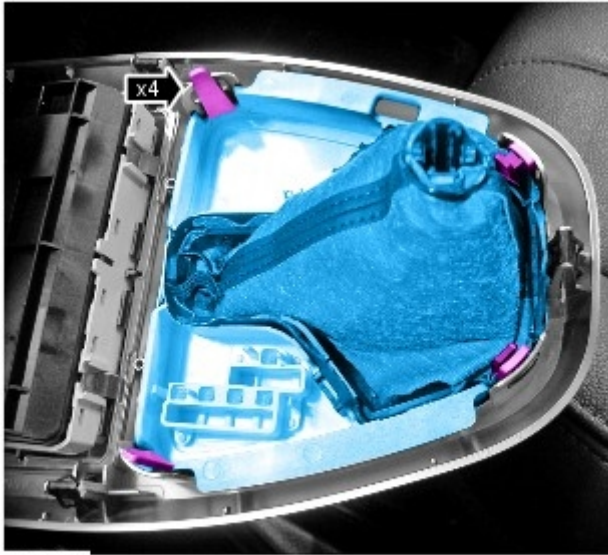
12. **12.**  **CAUTION:** Discard the component.

Remove and discard the selector lever assembly printed circuit board.

Installation

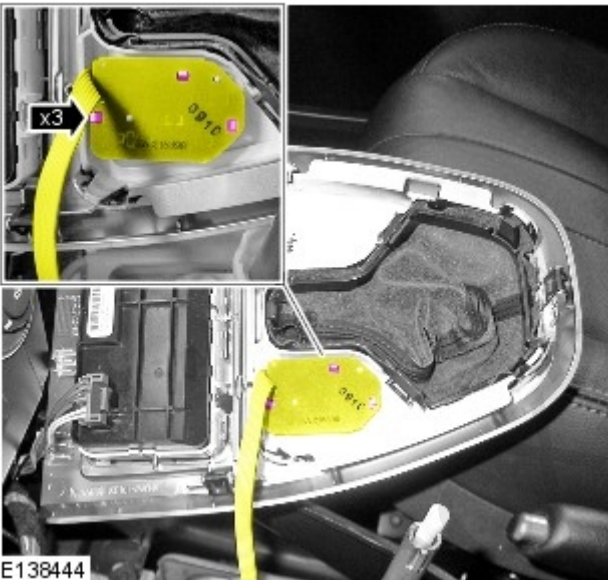


1.



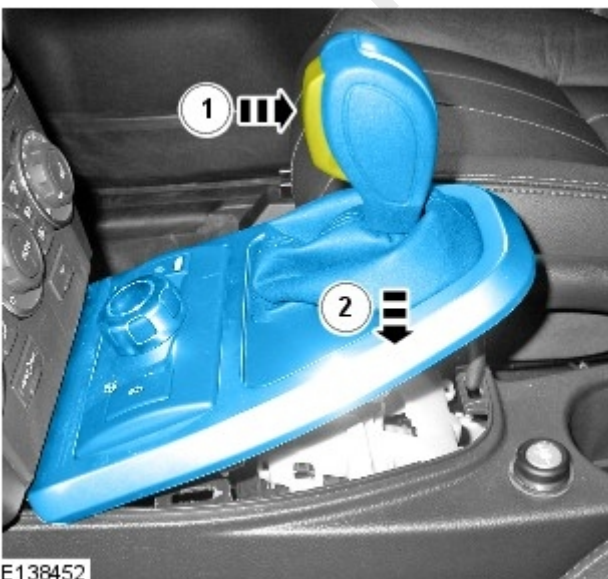
E138451

2.



E138444

3. **3.**  **CAUTION:** Take care not to touch the printed side of the printed circuit board (PCB).

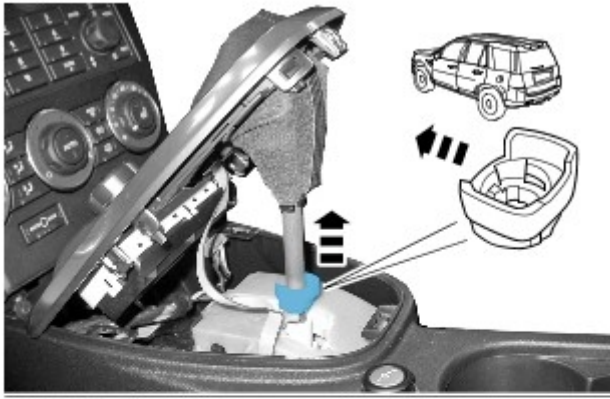


E138452

4. **4. CAUTIONS:**

 Make sure the selector lever button is depressed when installing the selector lever knob. Failure to follow this instruction may result in damage to the selector lever assembly.

 Make sure the ribbon cable is routed in front of the selector shaft.



5. **5. NOTE:** Make sure the cut out on the locking ring faces towards the front of the vehicle.

- Install the locking ring.



E138374



E138376

- 6.

- Secure into the 3 clips.

7. Switch the ignition on.

8. Position the transmission selector lever into PARK.