

Rear View Mirrors -**Torque Specifications**

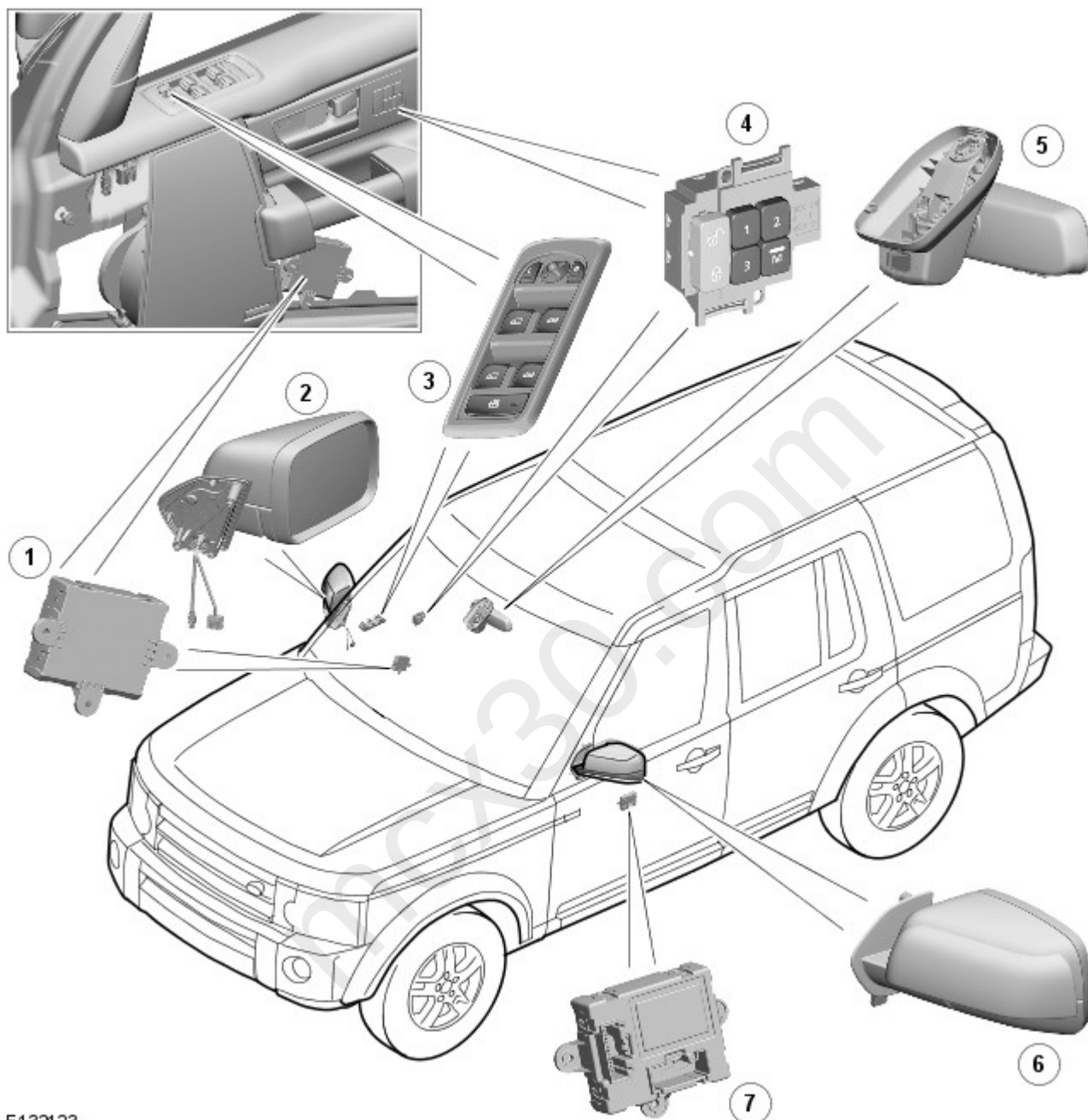
Description	Nm	lb-ft
Exterior mirror bolts	6	4

Rear View Mirrors - Rear View Mirrors

Description and Operation

COMPONENT LOCATION

- NOTE: RHD (right-hand drive) installation shown, LHD (left-hand drive) installation similar.



E132123

Item	Part Number	Description
1	-	DDM (driver door module)
2	-	Driver exterior mirror
3	-	Exterior mirror switches
4	-	Memory switches
5	-	Interior mirror (automatic dimming version shown)
6	-	Passenger exterior mirror
7	-	PDM (passenger door module)

GENERAL

Rear view mirrors consist of an interior mirror on the windshield and an exterior mirror on each front door cheater.

The interior mirror incorporates either manual dimming or automatic dimming. Depending on vehicle model and market, the automatic dimming interior mirror may also incorporate:

- A HomeLink® universal transmitter. NOTE: HomeLink is a registered trademark owned by Johnson Controls Inc.
- The automatic high beam function.

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

The exterior mirrors on all models incorporate electrical heating and adjustment. Depending on vehicle model and market, the exterior mirrors may also incorporate:

- Memory recall.
- Reverse dipping.
- Mirror foldback.
- Approach lamps and proximity cameras. For additional information, refer to:
[Interior Lighting](#) (417-02 Interior Lighting, Description and Operation),
[Parking Aid](#) (413-13 Parking Aid, Description and Operation).

The door modules operate the exterior mirror functions under the control of the [CJB \(central junction box\)](#) and switches in the driver door switchpack.

INTERIOR MIRROR

Interior mirrors consist of mirror glass in a housing that is connected to a mounting stem by a ball joint. The mounting stem is attached to a pad bonded onto the windscreen.

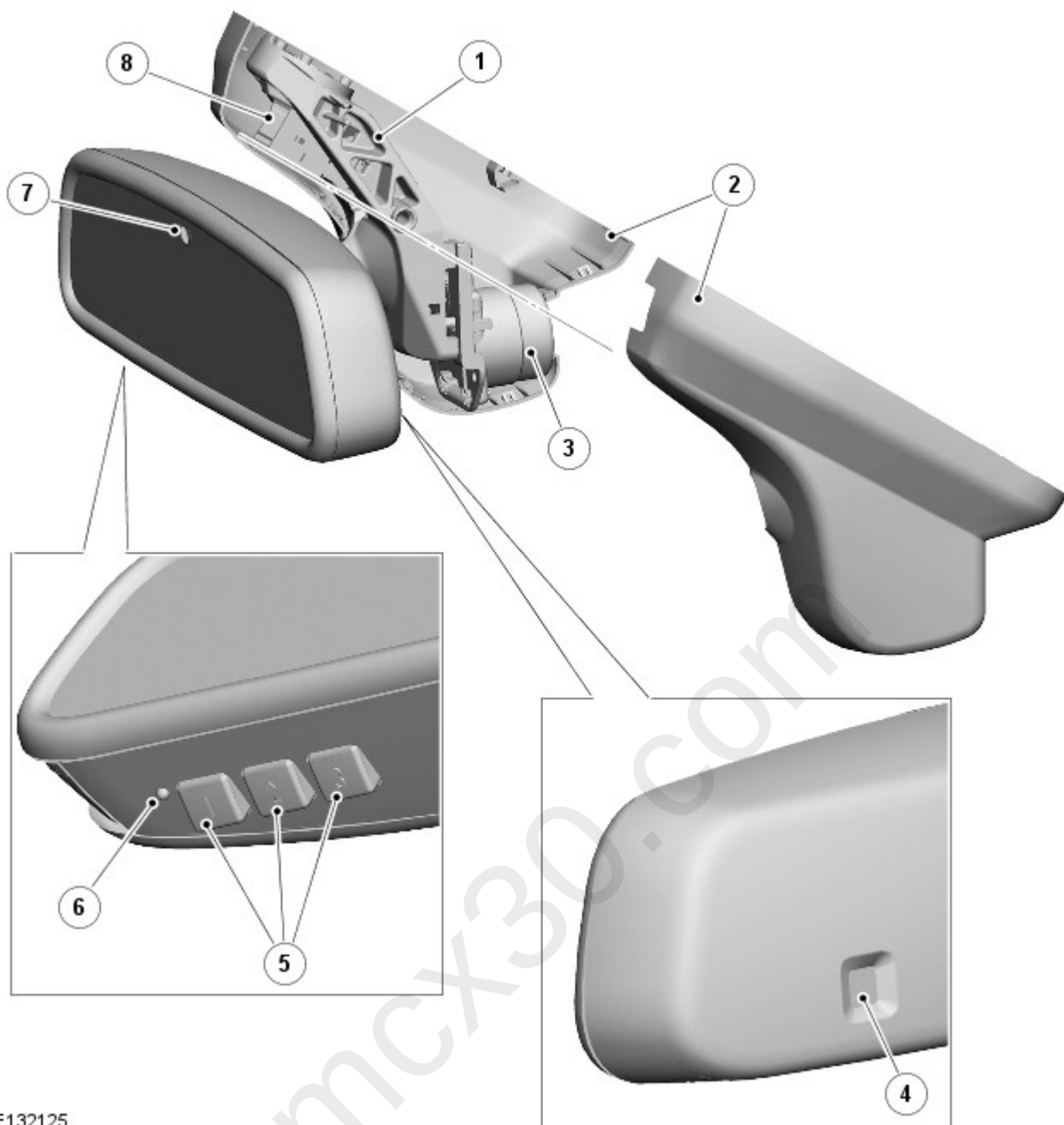
Manual Dimming Mirror



E132124

Manual dimming is performed with a lever on the underside of the mirror body.

Automatic Dimming Mirror



E132125

Item	Part Number	Description
1	-	Mounting stem
2	-	Covers
3	-	Auto high beam control module and sensor (where fitted)
4	-	Front light sensor
5	-	Universal transmitter channel buttons
6	-	Universal transmitter status indicator
7	-	Rear light sensor
8	-	Electrical connector

Automatic dimming is performed by electrochromic mirror glass that automatically dims to reduce glare from the headlights of following vehicles in dark or low light conditions.

Light sensors on the front and rear of the interior mirror provide light level inputs for the automatic dimming function.

Automatic dimming interior mirrors are connected to the vehicle wiring by an electrical connector concealed by covers installed over the mounting stem. On vehicles with the automatic high beam function, the covers also contain the auto high beam control module.

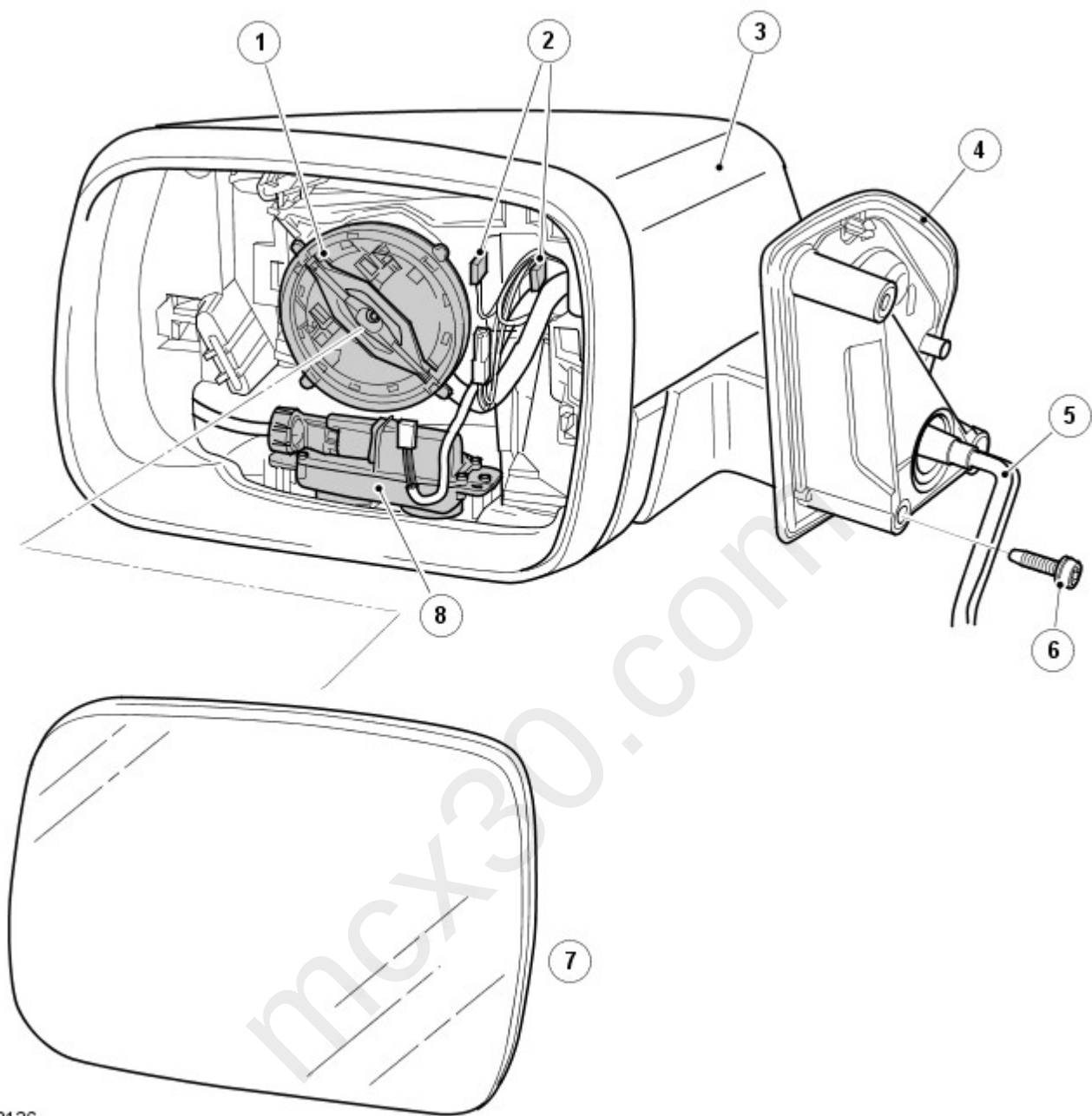
Interior mirrors which incorporate a HomeLink® universal transmitter have operating buttons on the lower face. They also have a red **LED (light emitting diode)** status indicator, next to the buttons, which illuminates when the universal transmitter is transmitting.

The universal transmitter can operate up to three home or office remotely operated systems (e.g. garage door/gate openers, lighting and security systems), replacing the individual hand held transmitters required for each system. Universal transmitter operating frequencies vary across markets.

Power for the feature(s) in the automatic dimming interior mirror is provided by an ignition feed from the **EJB (engine**

junction box).

EXTERIOR MIRRORS



E132126

Item	Part Number	Description
1	-	Actuator
2	-	Heating element connectors
3	-	Cover
4	-	Body assembly
5	-	Fly leads
6	-	Screw (3 off)
7	-	Mirror glass
8	-	Combined approach lamp and proximity camera (where fitted)

The exterior mirrors are attached to the front door structure and connected to the door harness.

The door mirrors fold forwards or rearwards on impact. On vehicles without the mirror foldback option, the mirrors can be folded into a park position by pushing the mirror housing towards the side window.

Exterior mirror heating is provided by heater elements bonded to the back of the mirror glass. The power supply to the heater elements is controlled by the respective door modules, in response to signals from the [CJB](#).

The exterior mirrors each incorporate an actuator which contains two adjustment motors for the mirror glass. One for horizontal (left/right) adjustment and one for vertical (up/down) adjustment. Power to the motors is controlled by the respective door modules in response to signals from the driver door switchpack. On vehicles with memory recall, the exterior mirrors incorporate horizontal and vertical plane position sensors.

Exterior mirrors with the foldback feature incorporate a foldback motor in the hinge. Operation of the foldback motor is

controlled by the respective door modules in response to signals from the driver door switchpack.

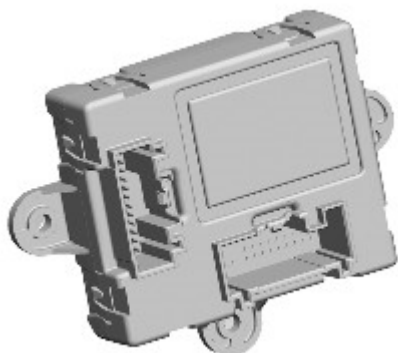
EXTERIOR MIRROR SWITCHES



E 132127

Left and right select switches and an adjustment switch for the exterior mirrors are incorporated into the driver door switchpack in the top of the door casing. The switchpack is connected to the door harness and powered by a permanent battery feed from the [CJB](#).

FRONT DOOR MODULES



E 132128

Each front door module is attached to the inside of the related door casing and connected to the door harness.

The two front door modules interpret the signals from the [CJB](#), the driver door switchpack and the interior mirror into appropriate outputs for the related exterior mirrors. For operation of the various exterior mirror functions each door module is powered by a permanent battery feed from the [CJB](#). The live feed to the mirror foldback motors goes off 5 minutes after the ignition is switched off.

OPERATION

Automatic Dimming Interior Mirror

Power for the feature(s) in the automatic dimming interior mirror is provided in power mode 6 (ignition).

Automatic Dimming

The light sensor in the front of the mirror monitors ambient light at the front of the vehicle and the light sensor in the rear of the mirror monitors the light coming from behind the vehicle. When the light from behind the vehicle exceeds the ambient light level, the automatic dimming circuits darken the interior mirror.

Automatic dimming is inhibited when reverse gear is selected, to provide the driver with maximum vision. The reverse gear signal is provided by a battery voltage signal from the reverse relay in the central junction box (CJB).

Universal Transmitter



WARNING: The universal transmitter must not be used with any garage door that lacks a safety stop and reverse feature, as required by federal safety standards (this includes any garage or door opener model manufactured before April 1 1982). A garage door opener which cannot detect an object in the path of a closing door, and then automatically stop and reverse the door, does not meet current federal safety standards. Using a garage door opener without these features increases the risk of serious injury or death.

The universal transmitter has three channels, with separate operating buttons for each channel. When one of the buttons is pressed the universal transmitter outputs the radio signal programmed for the related channel (if any) and illuminates the status indicator to confirm transmission.

Hand held transmitters are programmed into the universal transmitter as follows:

- Turn the ignition on.

-  **WARNING:** When programming the universal transmitter in the vicinity of the affected system, the system will operate. If the system controls garage doors or gates, ensure they are clear of people and objects to prevent personal injury or damage to equipment.

Press and hold the outer two buttons of the universal transmitter until the status indicator begins to flash, then release the buttons. This initializes the universal transmitter and erases previous settings from all three channels.

- Place the signal emitting end of the hand held transmitter against the underside of the interior mirror.
- Simultaneously press and hold the activation button on the hand held transmitter and the chosen button of the universal transmitter. When the status indicator flashes rapidly, indicating the channel has been programmed, release the buttons (the status indicator flashes slowly at first and can take up to a minute before it flashes rapidly).
- To program another channel on the universal transmitter, repeat steps C. and D.
- Turn the ignition off.

The radio signals used to operate some home/office systems incorporate a code protection feature. After a channel has been programmed from the hand held transmitter, these systems will need to be trained to accept the signal from the universal transmitter. To check if a system is code protected, press the appropriate universal transmitter button. If the status indicator flashes rapidly for 1 to 2 seconds, before illuminating permanently, the system has a code protection feature.

The system is trained to the universal transmitter, as follows:

- Locate the training button on the receiver system (refer to the system's literature for details).
- Press the training button for 1 to 2 seconds, then perform step C. within 30 seconds.
- On the vehicle, press and release the appropriate universal transmitter button, twice. The receiver system should now be trained to the universal transmitter.
- If the system does not operate, repeat the procedure, but in step C. press and release the universal transmitter button three times.

Additional information on the universal transmitter can be found on: www.homelink.com

Exterior Mirrors

Heating

The [CJB](#) receives the ambient air temperature value from the [ECM \(engine control module\)](#) on the high speed [CAN \(controller area network\)](#) bus. The [CJB](#) converts the ambient air temperature value to an on-time percentage and transmits it on the medium speed [CAN](#) bus to the two door modules, which then energize the exterior mirror heating elements accordingly. The on-time percentage is increased while the windshield wipers are on.

Exterior Mirror Heating Percentage On-times

On-times	Ambient Air Temperature, °C (°F)			
	<8 (<46)	8 to 15 (46 to 59)	>15 to 25 (>59 to 77)	>25 (>77)
Wipers Off	50%	33%	0%	0%
Wipers On	50%	33%	25%	0%

On vehicles with the parked heating function, exterior mirror heating may also operate when the parked heating function is active, depending on the ambient air temperature.

For additional information, refer to: [Auxiliary Heater](#) (412-02B Auxiliary Heating, Description and Operation).

Adjustment

Adjustment is enabled while the ignition is on and, provided the driver door is not opened, for up to five minutes after the ignition is switched off.

When the L or R select switch is pressed, the tell-tale [LED](#) in the switch illuminates and the adjustment switch can be used to move the mirror glass of the related exterior mirror. The driver door switchpack interprets adjustment switch movement and transmits it to the [DDM](#) on a [LIN \(local interconnect network\)](#) bus. Adjustment signals for the passenger door exterior mirror are transmitted from the [DDM](#) to the [PDM](#) on the medium speed [CAN](#) bus. On receipt of an adjustment signal, the appropriate door module connects a power supply and ground to the relevant adjustment motor to produce the required movement of the mirror glass. When the adjustment switch is tilted in the opposite direction, the door module reverses the polarity of the adjustment motor, to move the mirror glass in the opposite direction.

Memory recall

The vehicle can memorize up to three different positions for the exterior mirrors, the driver seat and the steering column. This enables three different drivers to achieve their optimum driving position at the touch of a button. The memory store and memory pre-set switches are located on the driver door casing.

The memory function is incorporated into the [CJB](#).

Memory Switches



E 132129

The memory switches form a resistive ladder in hardwired connections with the driver seat switchpack. When a position is stored or recalled for channels 1 to 3, the driver seat switchpack transmits the information on a [LIN](#) bus to the seat memory module, which relays it to the [CJB](#) on the medium speed [CAN](#) bus. It is then relayed to the door modules. Each door module evaluates the recall or storage command and performs the necessary adjustments to the exterior mirrors. If a manual mirror adjustment is selected while a memory recall is operating, it will over-ride the memory recall movement.

For mirror memory to operate, the mirror adjustment potentiometers must deliver a voltage value in the range of 80 mV - 4.8 V. Should a voltage applied be outside of this range the mirror will not operate when memory is selected.

Reverse dipping

Reverse dipping can be enabled and disabled in the vehicle set-up section of the vehicle information and settings menu. If reverse dipping is enabled, both of the exterior mirrors automatically dip, to provide a better view of the kerb, when the ignition is on and reverse gear is engaged. The mirrors return to their original position immediately reverse gear is disengaged, or if the vehicle speed in reverse exceeds 12 km/h (7.5 mph).

The dipped positions of the exterior mirrors are stored in the [CJB](#), which signals the front door modules on the medium speed [CAN](#) to move the mirror glass into and out of the dipped positions. Reverse gear engagement and disengagement is signaled to the [CJB](#) on the high speed [CAN](#) bus by the [TCM \(transmission control module\)](#) (automatic transmission) or the transfer box control module (manual transmission).

The dipped mirror position can be adjusted using the mirror switches while reverse gear is selected and the ignition is on.

On vehicles with an automatic transmission, reverse gear must be selected for approximately 0.5 second before the exterior mirrors move to the dipped position. The time delay prevents nuisance movement of the exterior mirrors when the transmission selection moves between Park and Drive.

Mirror foldback

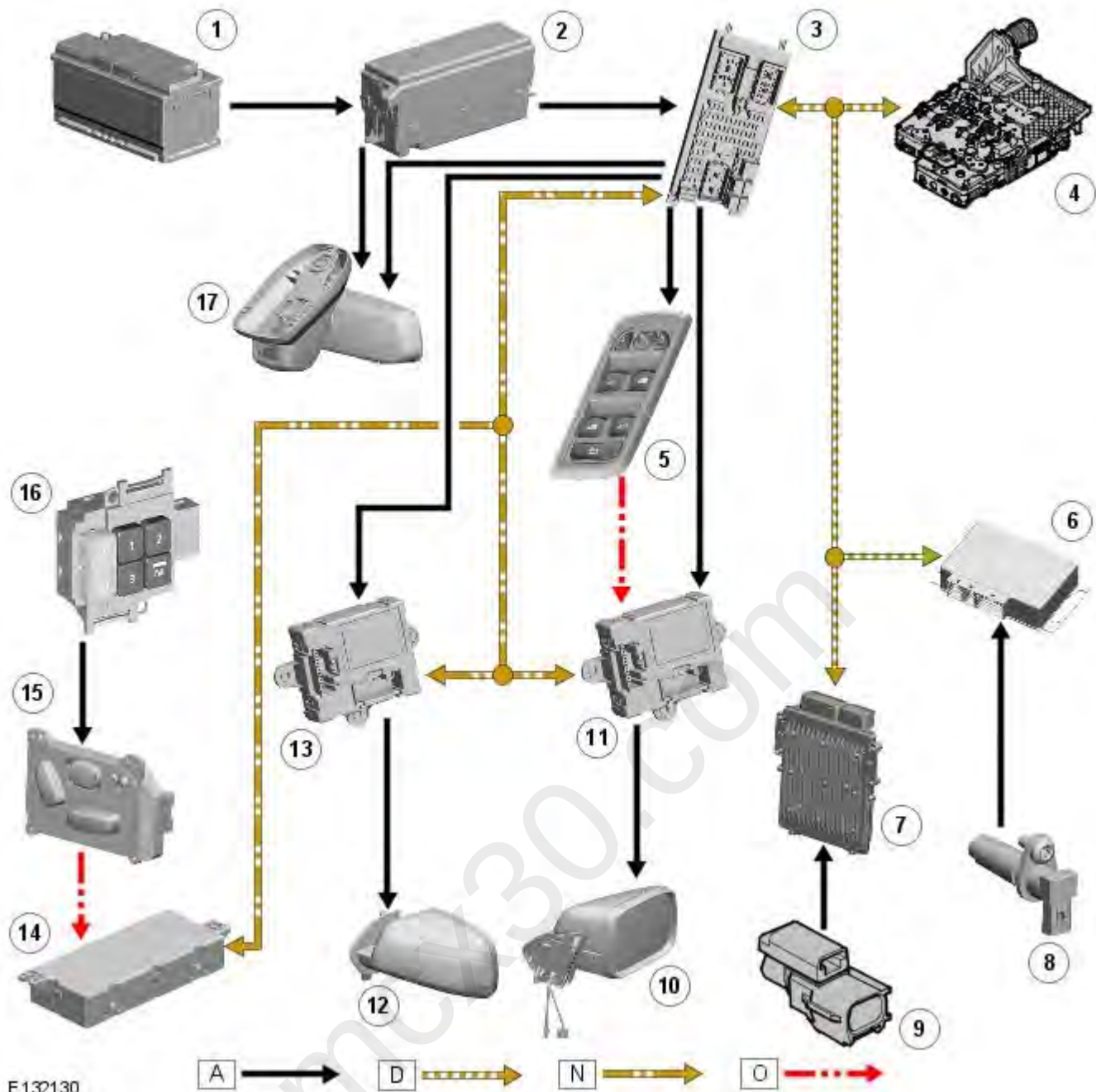
If mirror foldback is incorporated, pressing the L and R mirror select switches at the same time folds the exterior mirrors. Pressing both of the switches again unfolds the mirrors. Operation of mirror foldback is inhibited at speeds over 110 km/h (70 mph). If the mirrors are accidentally knocked out of synchronization (i.e. with one mirror folded and the other in the normal position), pressing both of the switches again re-synchronizes them.

On vehicles with mirror foldback, automatic operation can be enabled and disabled using Land Rover approved diagnostic equipment. When automatic operation is enabled, the exterior mirrors automatically fold and unfold when the vehicle is locked and unlocked using the smart key. However, if the mirrors are folded using the mirror switches, they will not automatically unfold when the vehicle is unlocked.

To prevent the foldback motors from overheating, the foldback function is disabled for 3 minutes if the mirror foldback function is selected ten times within 60 seconds. On the tenth selection within 60 seconds, the exterior mirrors will only unfold; if the selection is for the exterior mirrors to fold, the selection is ignored.

CONTROL DIAGRAM

• NOTE: A = Hardwired connection; D = High speed [CAN](#); N = Medium speed controller area network (CAN) bus; O = [LIN](#) bus.



Item	Part Number	Description
1	-	Battery
2	-	EJB
3	-	CJB
4	-	TCM (automatic transmission vehicles)
5	-	Driver door switchpack
6	-	Transfer box module (manual transmission vehicles)
7	-	ECM
8	-	Reverse gear switch (manual transmission vehicles)
9	-	Ambient temperature sensor
10	-	Driver door mirror
11	-	DDM
12	-	Passenger door mirror
13	-	PDM
14	-	Driver seat module
15	-	Driver seat switchpack
16	-	Memory switches
17	-	Interior mirror

Rear View Mirrors - Rear View Mirrors

Diagnosis and Testing

Principle of Operation

For a detailed description of the rear view mirror systems and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Rear View Mirrors](#) (501-09 Rear View Mirrors, 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 checked and/or the donor vehicle.

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

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

Visual Inspection

Mechanical	Electrical
• Door mirror switch condition and installation • Door mirror condition and installation	• Battery condition and state of charge • Fuses • Harnesses and connectors • Washer jet and mirror heater relay • Memory control module(s) • Door mirror switch(s) • Door mirror motor(s) • Ignition switch • Battery Junction Box (BJB) • Central Junction Box (CJB) • Automatic Temperature Control (ATCM) module • Local Interconnect Network (LIN) circuit

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, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Mirrors do not defrost/washer jets freeze	• Fuse fault • Washer jet and mirror heater relay fault • Circuit fault: high resistance • Circuit fault: short circuit to ground • Automatic temperature control module fault	Check the fuses. Check the operation of the washer jet and mirror heater relay. Check the washer jet and mirror heater circuits. Refer to the electrical guides. Refer to the warranty policy and procedures manual if a module is suspect.
Mirrors inoperative in one or more directions	• Mechanical fault • Switch fault • Motor fault • Circuit fault: high resistance • Circuit fault: short circuit to ground	Operate the mirror switch and listen for the motor(s). If the motor(s) can be heard, check the mechanical condition of the mirror and linkages. Rectify as necessary. Check for DTCs indicating a switch, motor or circuit fault.
Memorized mirror position is not resumed	• Battery voltage below 10.5 volts • Position not stored • Switch operated during "one-touch" memory recall • EEPROM fault	Before condemning a memory component, check the function from the switch and refer to the symptoms above. Make sure the battery voltage is adequate. Make sure that the desired position is correctly stored. Make sure that the memory store/recall procedure is being followed. Refer to the relevant section of the workshop manual.
'Lazy entry' function inoperative	• Remote transmitter fault (battery, transmitter programming, etc) • Battery voltage below 10.5 volts • Position not stored • Switch operated during "one-touch" memory	Check that the remote transmitter operates the central locking, etc. If it does, the fault is not with the transmitter. Make sure the battery voltage is adequate. Make sure that the desired position is correctly stored. Make sure that the memory store/recall procedure is being followed. Refer to the relevant section of the workshop manual.

Symptom	Possible Causes	Action
	recall ● EEPROM fault	

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.
REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation) /
[Diagnostic Trouble Code \(DTC\) Index - DTC: Driver/Passenger Door Module \(DDM/PDM\)](#) (100-00 General Information, Description and Operation).

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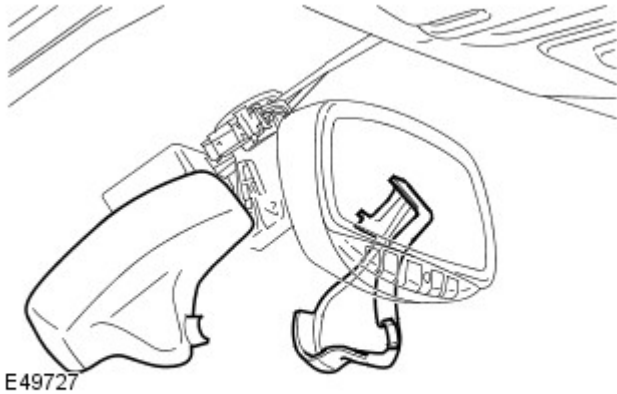
Rear View Mirrors - Interior Mirror

Removal and Installation

Removal

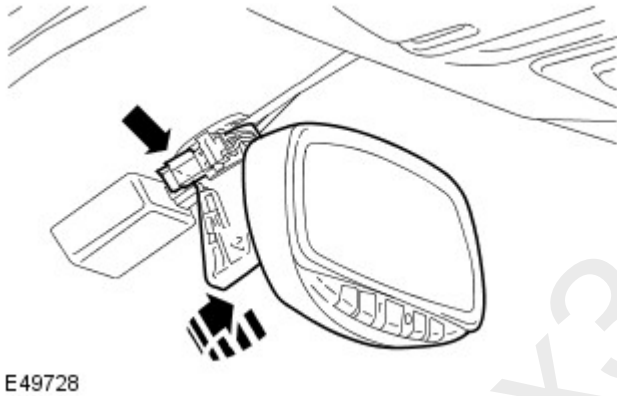
1. If installed, remove the interior mirror upper and lower covers.

- Release the 2 clips.



2. Vehicles with an auto-dimming interior mirror, remove the interior mirror.

- Disconnect the electrical connector.
- Rotate the mirror stem at its base to release from the windshield.



3. Vehicles without an auto-dimming interior mirror, remove the interior mirror.

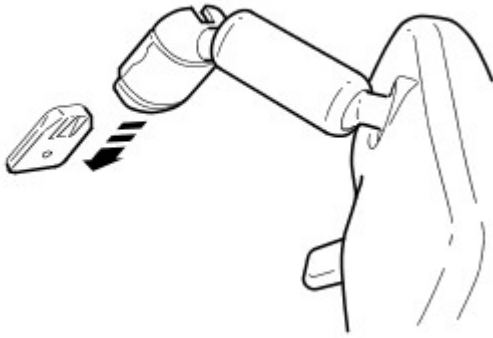
- Pull the mirror away from the windshield to release the clip.



Installation

1. Vehicles without an auto-dimming interior mirror, install the interior mirror.

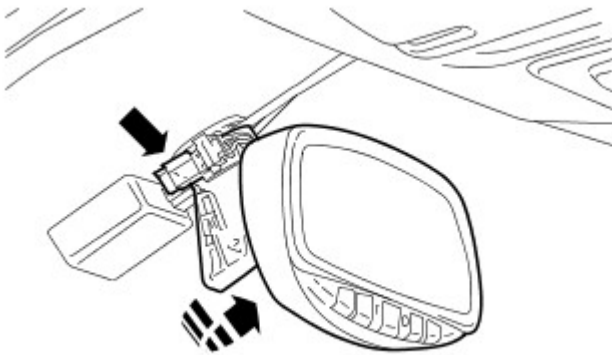
- Slide the mirror onto the boss from above to engage the clip.



E49730

2. Vehicles with an auto-dimming interior mirror, install the interior mirror.

- Rotate the mirror stem at its base to secure to the windshield.
- Connect the electrical connector.



E49731

3. Install the interior mirror covers.

- Secure with the clips.

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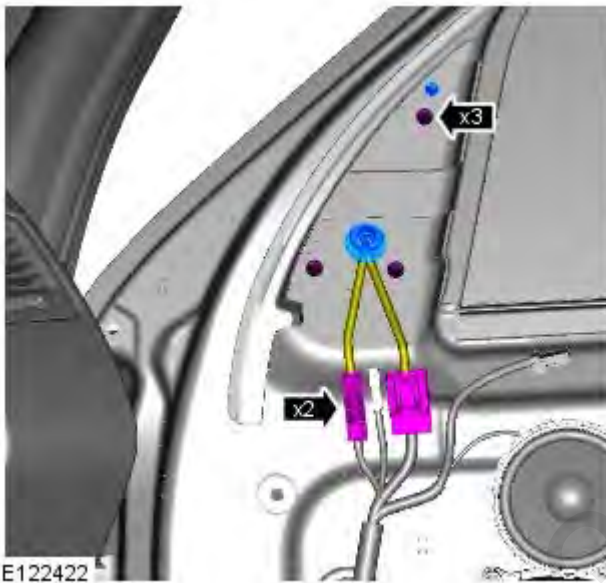
Rear View Mirrors - Exterior Mirror Vehicles With: Parking Aid Camera

Removal and Installation

Removal

- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: RH illustration shown, LH is similar.
- NOTE: The ignition must be switched off.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Front Door Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



2.  CAUTION: Take extra care not to damage the wiring harnesses.

- NOTE: Support as necessary.

Torque: 6 Nm

- 3.



Installation

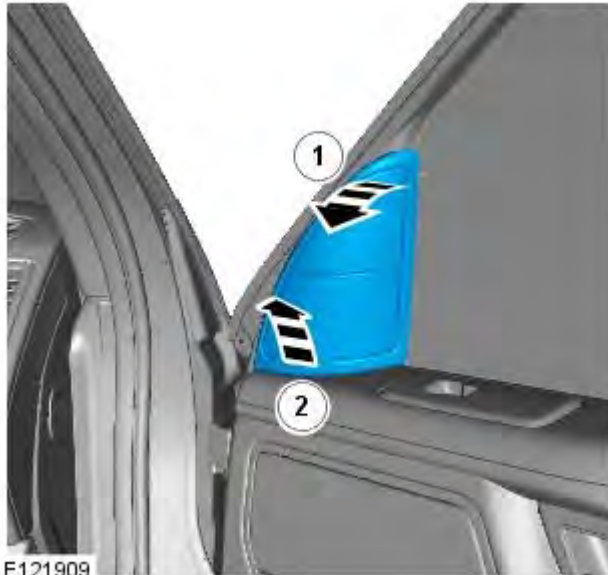
1. To install, reverse the removal procedure.

Rear View Mirrors - Exterior Mirror Vehicles Without: Parking Aid Camera

Removal and Installation

Removal

- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: RH illustration shown, LH is similar.
- NOTE: The ignition must be switched off.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



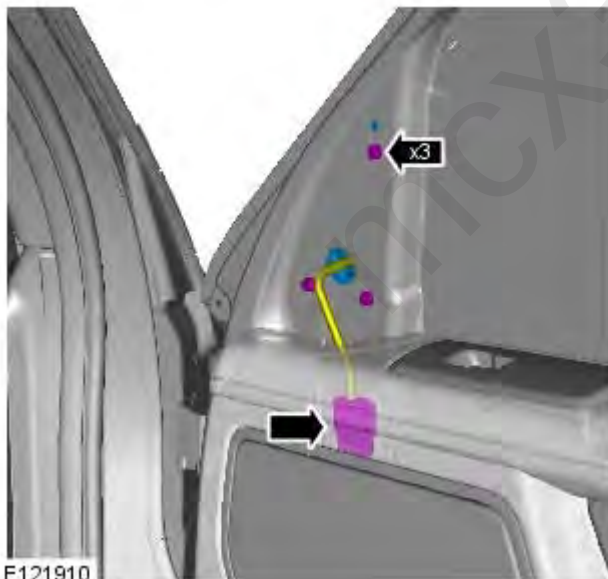
1. 1. CAUTIONS:



Take extra care not to damage the component.



Make sure that the clips are correctly located.



2. 2. CAUTIONS:



Take extra care not to damage the wiring harnesses.

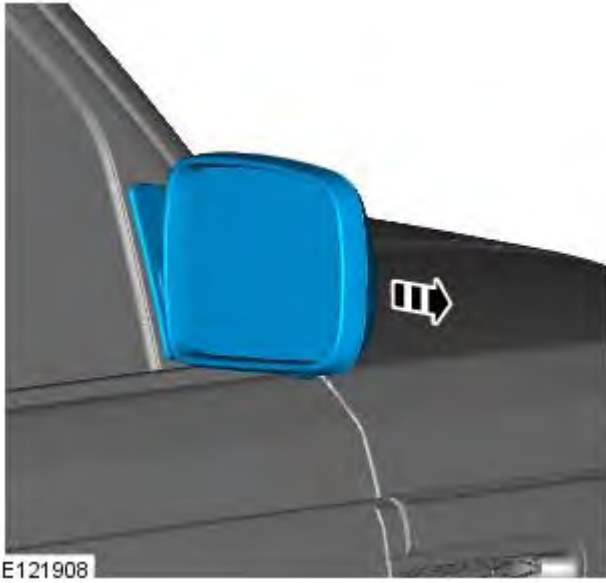


Make sure the electrical connector is securely in the service position, before disconnection. If the connector springs back after disconnection the internal door trim panel will have to be removed for access.

- NOTE: Support as necessary.

Torque: 6 Nm

3.



Installation

1. To install, reverse the removal procedure.

Rear View Mirrors - Exterior Mirror Glass

Removal and Installation

Removal

- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



1.  CAUTION: Take extra care not to damage the clips.



Installation

1. To install, reverse the removal procedure.

Rear View Mirrors - Exterior Mirror Cover

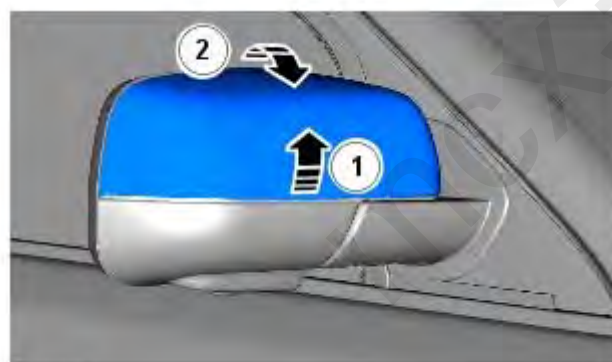
Removal and Installation

Removal

- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Exterior Mirror Glass](#) (501-09 Rear View Mirrors, Removal and Installation).

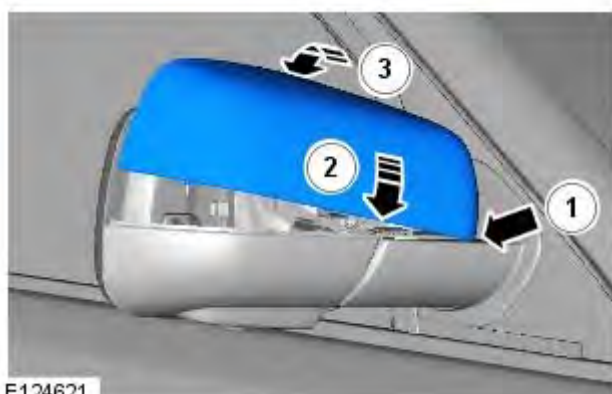
2.



3. **CAUTIONS:**

- ⚠ Take extra care not to damage the clips.
- ⚠ Protect the surrounding trim to avoid damage.
- ⚠ Protect the surrounding paintwork to avoid damage.

Installation



1. **CAUTIONS:**

- ⚠ Take extra care not to damage the clips.
- ⚠ Protect the surrounding trim to avoid damage.
- ⚠ Protect the surrounding paintwork to avoid damage.

To install, reverse the removal procedure.

Rear View Mirrors - Exterior Mirror Motor

Removal and Installation

Removal

- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: The ignition must be switched off.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Exterior Mirror Glass](#) (501-09 Rear View Mirrors, Removal and Installation).

2.  CAUTION: Make sure the locating tangs are aligned. Failure to follow this instruction may result in damage to the vehicle.

Torque: 1.2 Nm



E123679

Installation

1. To install, reverse the removal procedure.