

Roof Opening Panel -

Torque Specifications

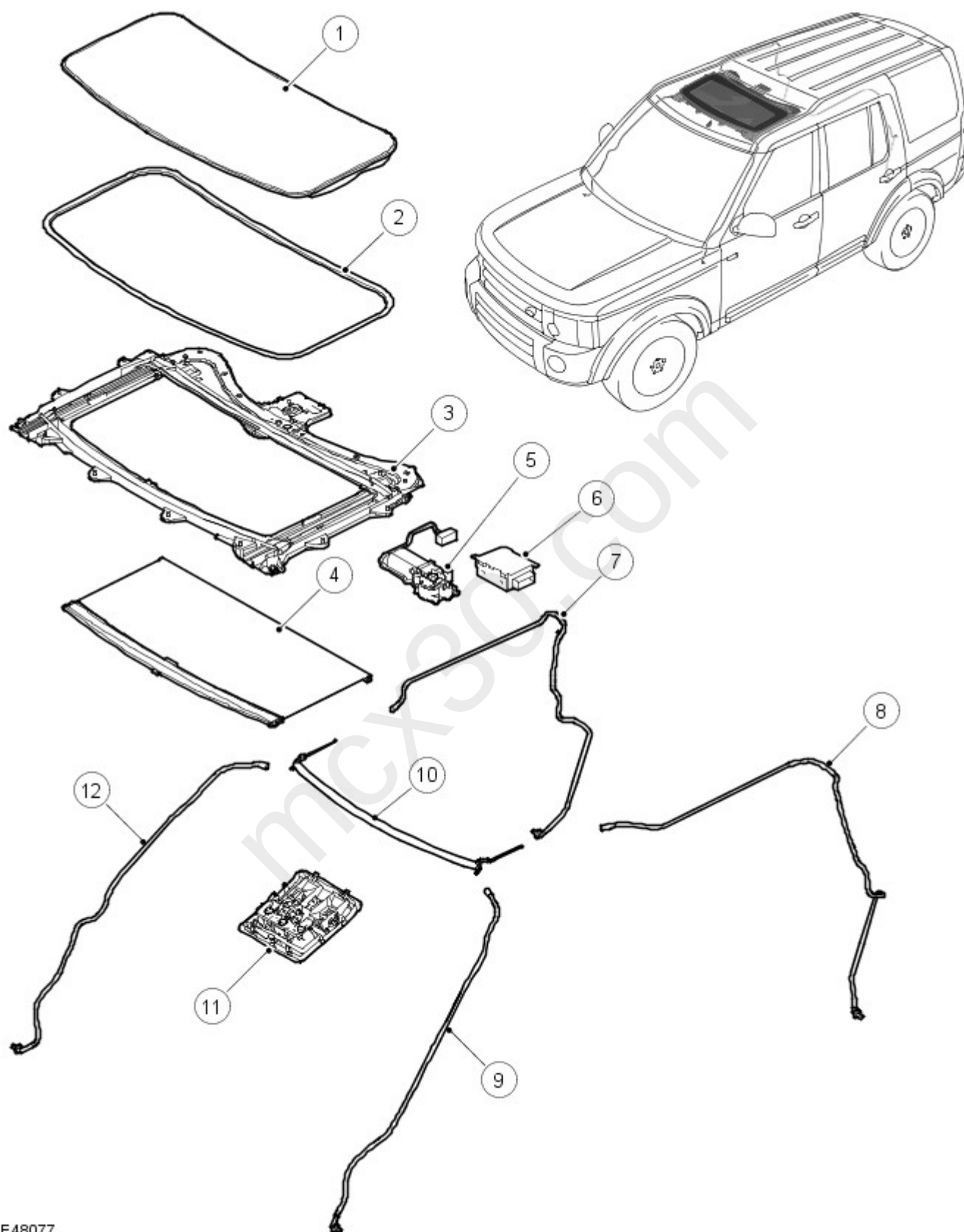
Description	Nm	lb-ft
Roof opening panel motor Torx screws	4	3
Roof opening panel bolts	10	7
Roof opening panel alignment Torx screws	6	4

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Roof Opening Panel - Roof Opening Panel

Description and Operation

Roof Opening Panel Components

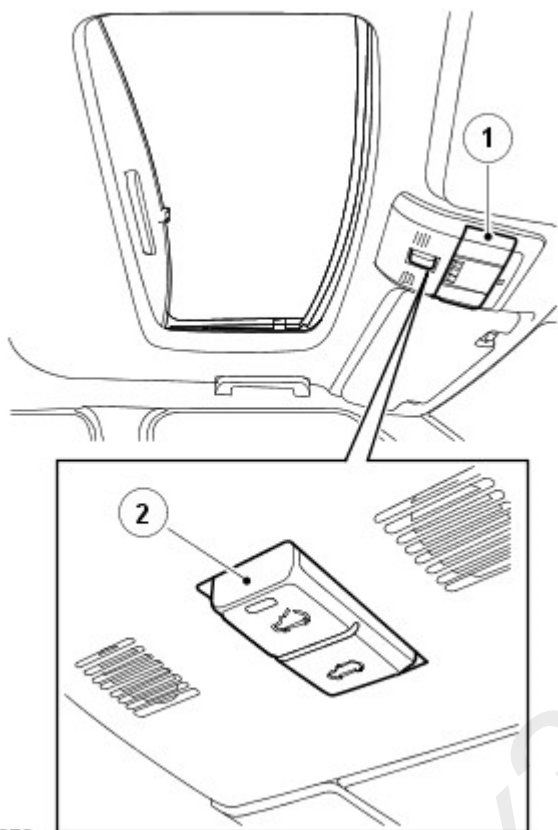


E48077

Item	Part Number	Description
1	-	Glass panel assembly
2	-	Glass panel seal
3	-	Frame assembly
4	-	Sunblind

5	-	Motor
6	-	Control module
7	-	RH rear drain tube
8	-	LH rear drain tube
9	-	LH front drain tube
10	-	Deflector
11	-	Access panel
12	-	RH front drain tube

GENERAL



E48078

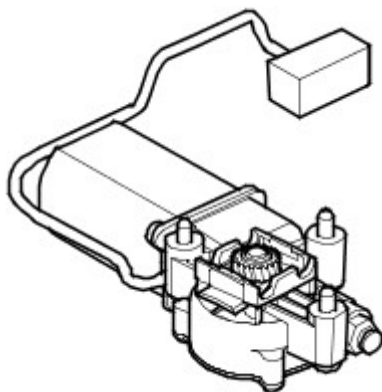
Item	Part Number	Description
1	-	Access panel
2	-	Switch

The sunroof is electrically operated through a two-way rocker switch located on the roof mounted centre console. An electric motor, attached to the sunroof frame, drives the glass sunroof panel to the tilt or open positions. The glass panel is operated by two cables, which are driven by the motor.

The sunroof frame is bolted to eleven mounting points on the roof panel. The frame is a large injection moulding and supports all of the sunroof components. Two aluminium guides held in the frame, on each side. The sunroof motor attaches to the rear of this frame. The motor is supported on the frame with three screws.

The sunroof glass panel is attached to the guide at the extreme front and rear. The tilt and slide positions are achieved by driving the attachment points on the panel over two fixed curves, one in the guide and one fixed to the panel.

Sunroof Motor



E48079

The sunroof motor has a worm drive, which drives a gear in a cast housing attached to the end of the motor. The gear has

a small pinion gear attached to the outer part of its spindle. The pinion engages with the helixed cables to form a rack and pinion drive. Rotation of the motor turns the pinion, which in turn drives the cables in the required direction.

Sunroof Motor Pin Out Information

Pin	Description	Input / Output
1	Hall sensor Ground	-
2	Hall sensor Supply	Input
3	Hall sensor Speed	Output
4	Hall sensor Direction	Output
5	Motor A	Input
6	Motor B	Input

The two cables are attached either side of the pinion. One end of each cable is attached to the guide. The opposite end is trapped in its position on the pinion by a metal insert in the frame. The cables run in channels in the frame to the guides. As the sunroof panel is closed, the cables are pushed through channels in the rear of the frame. The displaced cable is guided into a further two channels in the frame, which protect the cable and prevent the cable snagging creating noise. The cables are made from rigid spring steel and therefore can pull as well as push the sunroof along the guides.

A sun blind is also located in the guides integrated into the frame. The sunblind is operated manually, independently of the glass panels position. To move to the closed position the sunblind handle is pushed forward until it latches into the frame. To move the sunblind to the open position the sunblind handle is pushed up, to unlatch and either released or retracted to the open position. The sunblind can only be in either the fully open or fully closed positions.

Drain hoses are connected to the front and rear corners of the frame. The drain hoses are located inside of the cabin on the 'A' and 'C' post pillars to allow water, which has collected in the frame to escape. A one-way valve is fitted to the end of each drain hose to prevent the ingress of dirt and moisture.

SUNROOF CONTROL MODULE

The sunroof control module is mounted on the rear of the frame, and is connected to the motor at one end as described above, and to the vehicle electrical system at the other. It takes the inputs from the vehicle, such as LIN (Local Interconnect Network) bus signals and switch signals, and controls motor movement appropriately. It also contains the algorithm for the anti-trap system.

Sunroof Control Module Pin Out Information

Pin	Description	Input / Output
1	Switch Ground	-
2	Switch Open	Input
3	Switch Close	Input
4	Not used	-
5	Not used	-
6	Emergency (see note below)	Input
7	ECU Ground	-
8	Battery	Input
9	Not used	-
10	Not used	-
11	Not used	-
12	LIN	Input

• NOTE: Pin 6 is for use in an emergency only in the event of the vehicle LIN bus not being functional. It is not connected on the vehicle harness or in the connector.

• NOTE: Putting pin 6 to ground will enable the sunroof control module but without one touch operation or anti trap. The sunroof will not require re-calibrating unless the battery has been disconnected.

• NOTE: The sunroof control module will remain awake and enabled until pin 6 is disconnected again. Under no circumstances is this pin to be left grounded for long periods.

• NOTE: There is no emergency key access in the headlining for manual sunroof operation should the motor fail for any reason.

OPERATION

The sunroof can be operated with the ignition in power modes 4 accessory or 6 on. The sunroof can also be operated for up to 40 seconds after the ignition power mode 0 'off' provided the driver's or passenger's door is not opened. During the 40 second period the one touch function is inoperative.

The motor contains a micro-switch and a Hall effect sensor. Two gears, driven by the motor at one end of the pinion drive spindle, trip the micro-switch every thirteen revolutions of the spindle. When the micro-switch is tripped, the sunroof control module senses an open circuit signal. The sunroof control module, to calculate the exact position of the sunroof, uses the signal from the micro-switch combined with signals received from the Hall effect sensor. The Hall effect sensor is also responsible for the operation of the anti-trap function.

If the anti-trap feature is activated while the sunroof is closing, the roof panel is reversed for 200mm or as far as possible. The Hall sensor, located in the sunroof motor, monitors the speed of the motor and if the speed decreases below a set threshold, indicating an obstruction, the power feed to the motor is reversed so the sunroof goes back. In an emergency the anti-trap function can be overridden by holding the sunroof switch in the closed position.

Tilt

With the sunroof panel closed, pushing the upper part of the rocker switch operates the sunroof motor to 'tilt' the rear of the sunroof upwards. The motor operates for as long as the switch is operated until the glass is tilted to its full extent. If the switch is released before the full tilt position is reached, the sunroof panel stops at the chosen position. A single press (between 0.5 and 1 second) of the switch operates the motor so that the panel automatically retracts to the fully tilted position.

When the tilt function is requested, the cables pull the guide rearward, forcing the panel attachment up a curve, which raises the sunroof panel to the tilt position.

With the sunroof panel in the tilted position, pushing the lower part of the rocker switch operates the sunroof motor to lower the sunroof panel. The motor operates to lower the panel for as long as the switch is operated until the panel is fully lowered. If the switch is released before the fully lowered position is reached, the sunroof panel stops at the chosen position.

Open (slide)

With the sunroof panel tilted, pushing the upper part of the rocker switch operates the sunroof motor to raise the sunroof panel and retract it backwards. A single press (between 0.5 and 1 second) of the switch operates the motor so that the panel automatically retracts to the fully open position. When the panel retracts, a wind deflector automatically raises at the front of the sunroof aperture, which serves to reduce wind noise.

When the open function is requested, the cables pull in a rearward direction, driving the glass panel attachments to slide the panel over the exterior roof skin.

With the sunroof panel half or fully open, pushing the lower part of the switch operates the motor to close the sunroof panel. A single press (between 0.5 and 1 second) of the switch operates the motor so that the panel automatically closes to the fully tilted position.

If only partial opening or closing is desired, pressing the switch momentarily (less than 0.5 seconds) in either direction will stop the sunroof panel movement. When movement is desired in either direction, pressing the switch will operate the motor to move the panel.

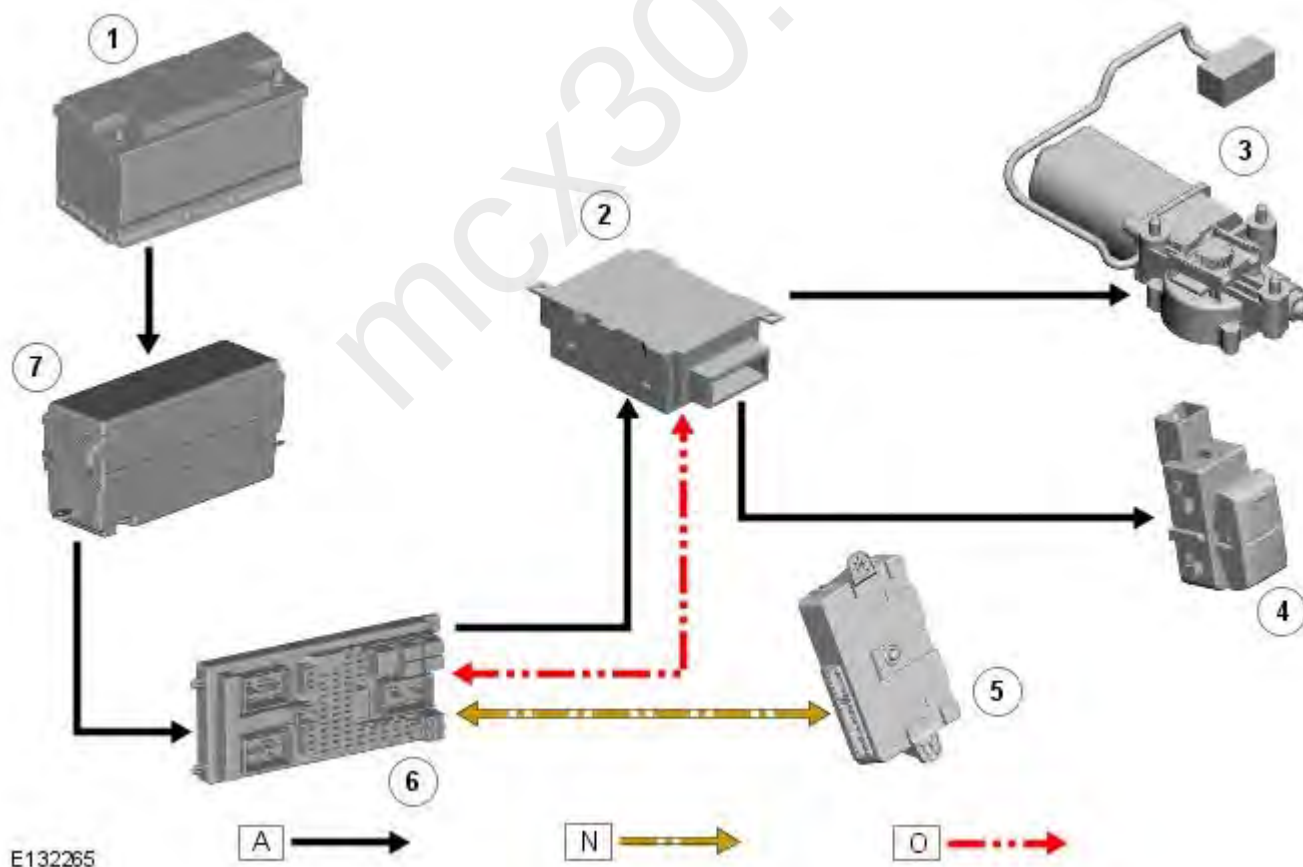
The sunroof has an 'anti-trap' function which prevents the sunroof panel from closing if an obstruction is sensed. When an obstruction is sensed, the motor will automatically retract the panel by 200mm or as far as possible. When the obstruction is removed, the panel can be closed by the normal method.

Battery Disconnection

If the battery has been disconnected, the one touch and anti-trap function will become inoperative. Pressing the lower part of the sunroof switch for 20 seconds will start the sunroof's calibration routine. The sunroof will complete a full cycle in order to re-learn the parameters required for one-touch open and close and the anti-trap function. The sunroof will still have manual movement available until the sunroof is re-calibrated.

SUNROOF CONTROL DIAGRAM

• NOTE: **A** = Hardwired; **N** = Medium speed CAN bus; **P** = Local Interconnect Network (LIN) bus



Item	Part Number	Description
1	-	Battery
2	-	Sunroof control module
3	-	Sunroof motor
4	-	Sunroof switch
5	-	Keyless Vehicle Module (KVM)

6	-	Central Junction Box (CJB)
7	-	Engine Junction Box (EJB)

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Roof Opening Panel - Roof Opening Panel

Diagnosis and Testing

Principle of Operation

For a detailed description of the roof opening panel system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Roof Opening Panel](#) (501-17 Roof Opening Panel, 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
• Glass panel assembly • Glass panel seal • Frame assembly • Sunblind • Deflector • Access panel • Roof opening panel cables • Drain tube(s)	• Fuses • Battery Junction Box (BJB) • Central Junction Box (CJB) • Wiring harness • Loose or corroded connector(s) • Roof opening panel motor and control module • Roof opening panel switch

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
Roof opening panel inoperative	• Fuse(s) blown • Circuit fault • Switch fault • Motor fault	Check the fuse(s). Check the roof opening panel circuits. Check the switch and motor function. Refer to the electrical guides.
Roof opening panel sticking	• Debris in the channels/guides • Cable(s) sticking/damaged • Roof opening panel not correctly aligned • Switch fault • Motor fault	Check for general debris. Inspect, clean and lubricate the cable(s) and guides. Check the roof opening panel alignment. Refer to the relevant section of the workshop manual. Check the switch and motor function. Refer to the electrical guides.
Roof opening panel juddering	• Debris in the channels/guides • Cable(s) sticking/damaged • Roof opening panel not correctly aligned • Motor fault	Check for general debris. Inspect, clean and lubricate the cable(s) and guides. Check the roof opening panel alignment. Refer to the relevant section of the workshop manual. Check the motor function.
Water ingress from roof opening panel	• Debris in the channels/guides • Drain tube(s) blocked • Damage to the glass panel seal • Roof opening panel not correctly aligned	Check for general debris and blocked drain tube(s). Inspect, clean and lubricate the cable(s) and guides. Check the glass panel seal. Check the roof opening panel alignment. Refer to the relevant section of the workshop manual.
Wind noise	• Damage to the glass panel seal • Cable(s) sticking/damaged • Roof opening panel not correctly aligned	Check the glass panel seal. Inspect, clean and lubricate the cable(s) and guides. Check the roof opening panel alignment. Refer to the relevant section of the workshop manual.

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).

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Roof Opening Panel - Roof Opening Panel Alignment

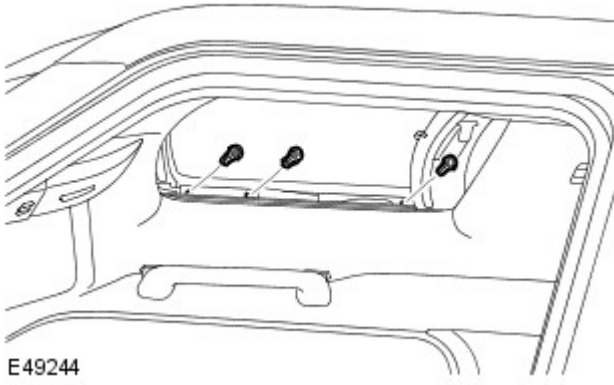
General Procedures

1. With the roof opening panel closed, check the alignment of the glass to the roof panel. The glass should be central in its aperture. Profile of sunroof to body:

1. Front edge, set flush or up to 1.0 mm (0.040") low.
1. Rear edge, set flush or up to 1.0 mm (0.040") high.

2. Open the roof opening panel blind.

3. Loosen the 6 roof opening panel Torx bolts.



E49244

4. Align the roof opening panel.

- Tighten the Torx screws to 6 Nm (4 lb.ft).

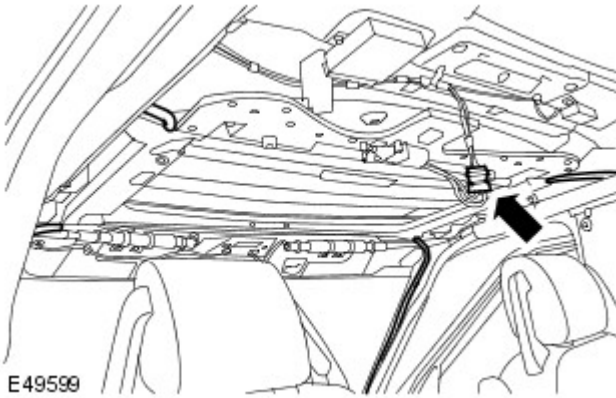
5. Close the roof opening panel blind.

Roof Opening Panel - Roof Opening Panel

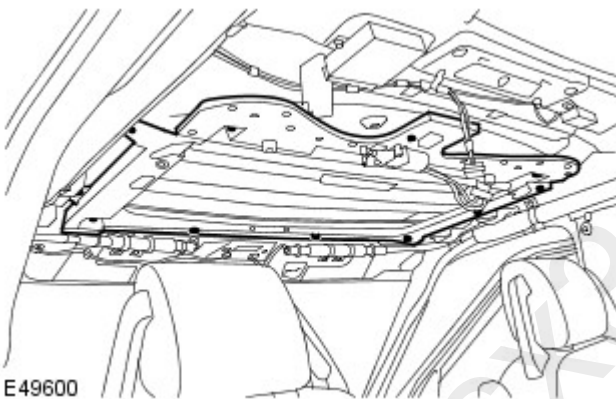
Removal and Installation

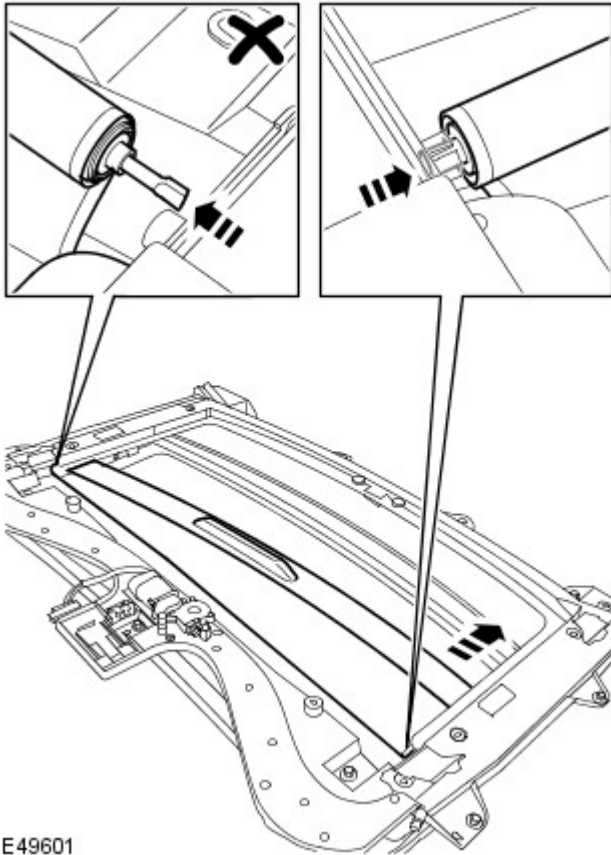
Removal

1. Remove the headliner.
For additional information, refer to: [Headliner](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
2. Release the 4 drain hoses from the roof opening panel.
3. Disconnect the roof opening panel motor electrical connector.



4. With assistance, remove the roof opening panel assembly.
 - Remove the 11 bolts.





E49601

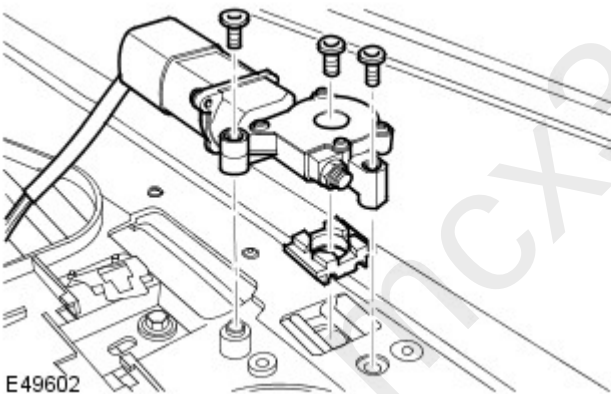
5.  **CAUTION:** Do not depress the RH plunger to remove the blind.

• **NOTE:** Do not disassemble further if the component is removed for access only.

• **NOTE:** Note the fitted position.

Remove the roof opening panel blind.

- Twist to release the handle.
- Depress the LH plunger.



E49602

6. Remove the roof opening panel motor.

- Remove the 3 Torx screws.
- Remove the spacer.

Installation

1. Install the roof opening panel motor.

- Install the spacer.
- Tighten the Torx screws to 4 Nm (3 lb.ft).

2. **NOTE:** Align to the position noted on removal.

Install the roof opening panel blind.

- Secure in the guides.
- Locate the tensioner peg.
- Depress the LH plunger.

3. With assistance, install the roof opening panel assembly.

- Clean the component mating faces.
- Tighten the bolts to 10 Nm (7 lb.ft).

4. Connect the roof opening panel motor electrical connector.

5. Connect the drain hoses.

- Make sure the drain hoses are clear prior to connection.

6. Install the headliner.

For additional information, refer to: [Headliner](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

7. Using T4, configure a new roof opening panel.

- 8.** If the battery has been disconnected, the one touch and anti-trap function will become inoperative. Close the roof opening panel and continue to hold the switch for a further 20 seconds to allow the sunroof to complete a full cycle. This will complete the roof opening panels calibration routine and reset these functions.

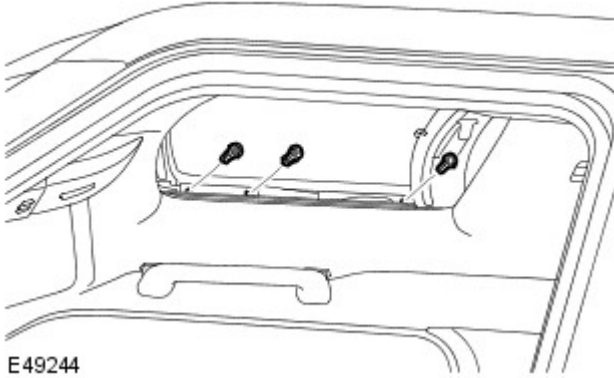
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Roof Opening Panel - Roof Opening Panel Glass

Removal and Installation

Removal

1. Open the roof opening panel blind.
2. Open the roof opening panel to the tilt position.
3. Remove the roof opening panel glass.
 - Remove the 3 Torx screws.
 - Repeat the above procedure for the other side.



Installation

1. Install the roof opening panel glass.
 - Install the Torx bolts, but do not tighten fully at this stage.
2. Align the roof opening panel glass.

For additional information, refer to: [Roof Opening Panel Alignment](#) (501-17 Roof Opening Panel, General Procedures).

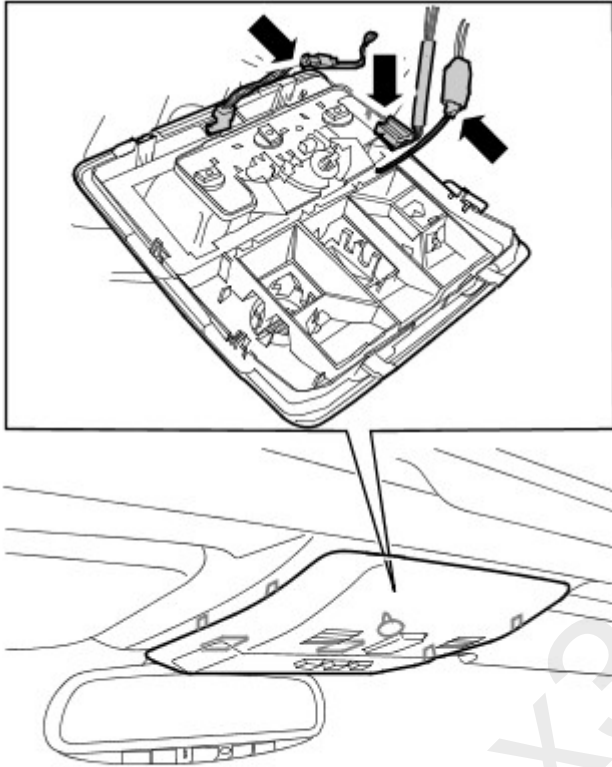
Roof Opening Panel - Roof Opening Panel Motor

Removal and Installation

Removal

1. Remove both A-pillar upper trim panels.
For additional information, refer to: [A-Pillar Trim Panel](#) (501-05 Interior Trim and Oramentation, Removal and Installation).
2. Remove both B-pillar upper trim panels.
For additional information, refer to: [B-Pillar Upper Trim Panel](#) (501-05 Interior Trim and Oramentation, Removal and Installation).
3. Remove the front overhead console.

- Carefully release the 7 clips.
- Disconnect the electrical connector.



E50142

4. Remove the sun visor.

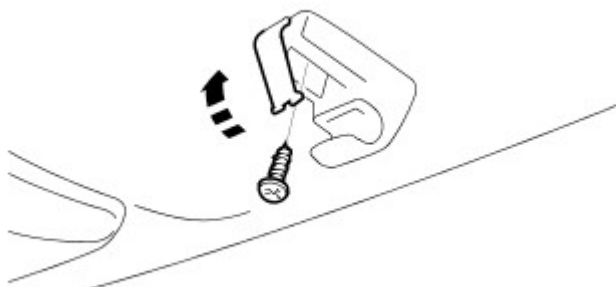
- Remove the cover.
- Remove the 2 screws.
- Release from the clip.
- Disconnect the electrical connector.
- Repeat the above procedure for the other side.



E49687

5. Remove the sun visor retaining clip.

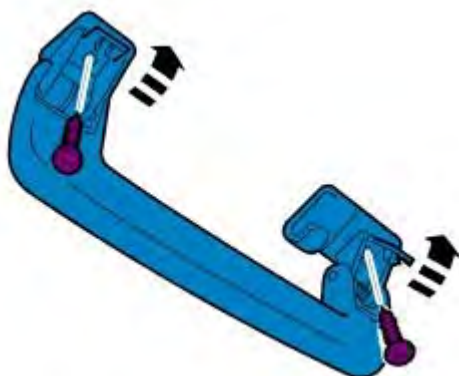
- Release the screw cover.
- Remove the screw.
- Repeat the above procedure for the other side.



E49688

6. Remove the passenger assist handle.

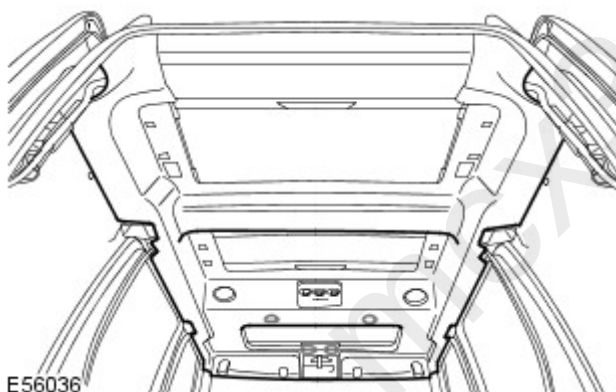
- Release the 2 screw covers.
- Remove the 2 screws.
- Repeat the above procedure for the other side.



E49689

7. Lower the headliner for access.

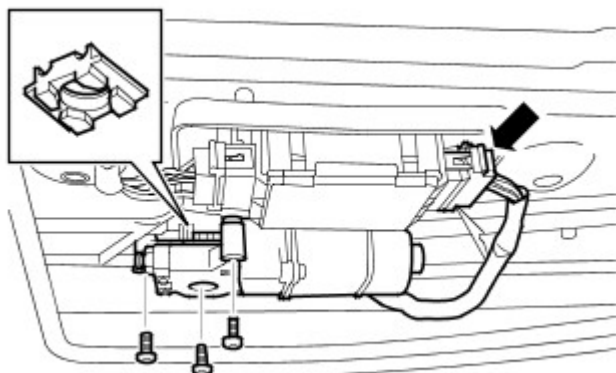
- Release the 4 clips.



E56036

8. Remove the roof opening panel motor.

- Disconnect the electrical connector.
- Remove the 3 Torx screws.
- Remove the spacer.



E55446

Installation

1. Install the roof opening panel motor.

- Install the spacer.

- Tighten the Torx screws to 4 Nm (3 lb.ft).
 - Connect the electrical connector.
- 2.** Position the headliner.
- Secure with the clips.
- 3.** Install the passenger assist handles.
- Install the screws.
 - Secure the screw covers.
- 4.** Install the sun visors.
- Install the clips.
 - Install the screws.
 - Install the screw covers.
 - Connect the electrical connectors.
- 5.** Install the front overhead console.
- Connect the electrical connector.
 - Carefully secure the clips.
- 6.** Install both B-pillar upper trim panels.
For additional information, refer to: [B-Pillar Upper Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 7.** Install both A-pillar upper trim panels.
For additional information, refer to: [A-Pillar Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 8.** Using T4, configure a new roof opening panel motor.
- 9.** If the battery has been disconnected, the one touch and anti-trap function will become inoperative. Close the roof opening panel and continue to hold the switch for a further 20 seconds to allow the sunroof to complete a full cycle. This will complete the roof opening panel calibration routine and reset these functions.

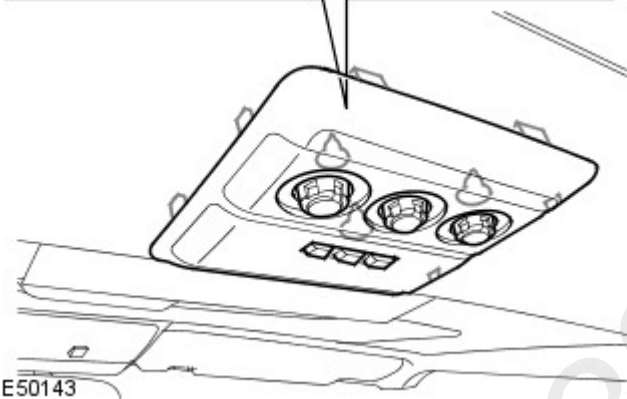
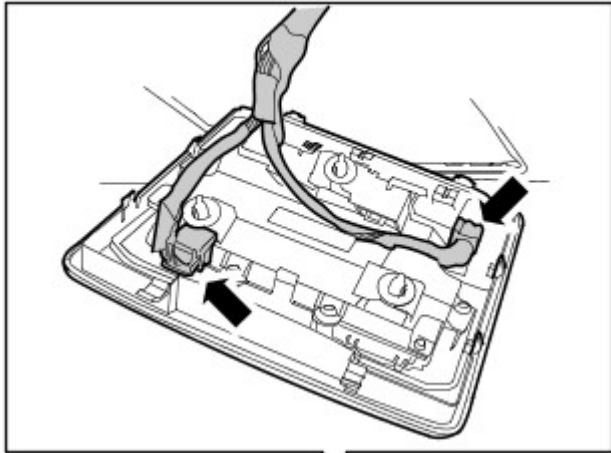
Roof Opening Panel - Roof Opening Panel Module

Removal and Installation

Removal

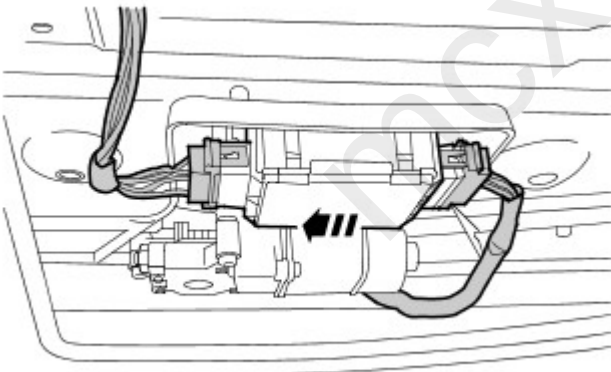
1. Remove the rear overhead console.

- Carefully release the 9 clips.
- Disconnect the 2 electrical connectors.



2. Remove the roof opening panel module.

- Slide the module to the LH side to release it from the bracket.
- Disconnect the 2 electrical connectors.



Installation

1. Install the roof opening panel module.

- Connect the electrical connectors.
- Secure the module to the bracket.

2. Install the rear overhead console.

- Connect the electrical connectors.
- Carefully secure the clips.

3. Using T4, configure a new roof opening panel module.

4. If the battery has been disconnected, the one touch and anti-trap function will become inoperative. Close the roof

opening panel and continue to hold the switch for a further 20 seconds to allow the sunroof to complete a full cycle. This will complete the roof opening panels calibration routine and reset these functions.

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