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Front End Body Panels -

Torque Specifications

Description	Nm	lb-ft
Engine undershield bolts	62	46
Front fender bolts	10	7
Front fender nut	10	7

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Front End Body Panels - Fender Splash Shield

Removal and Installation

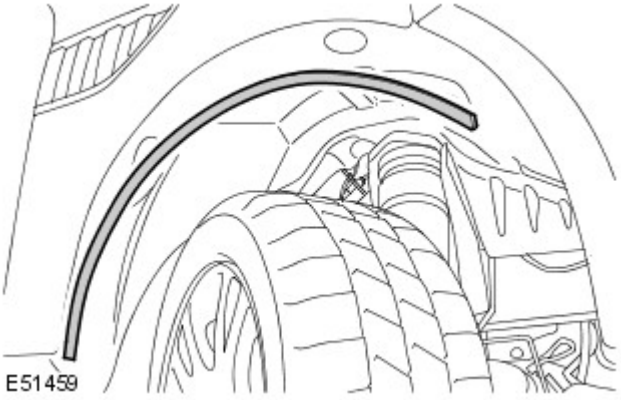
Removal

All vehicles

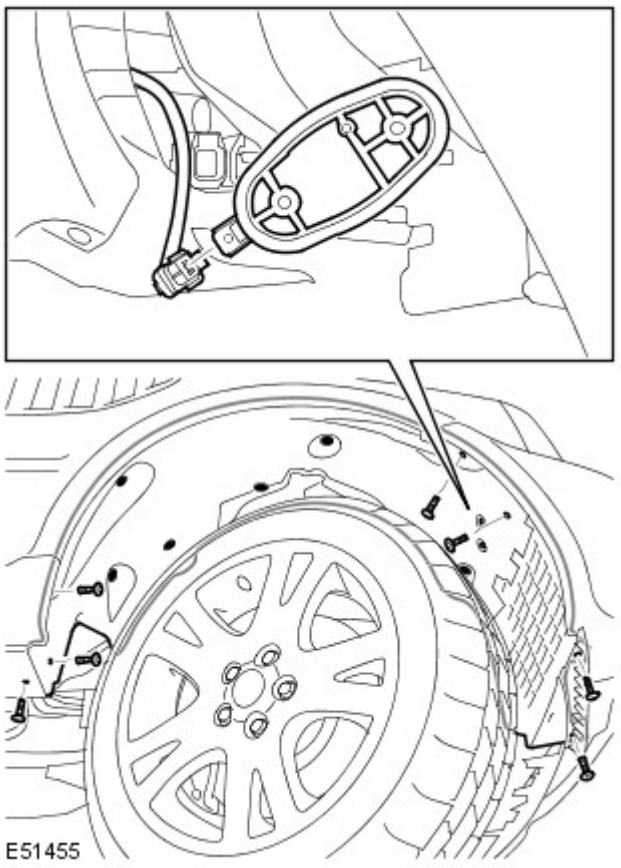
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the fender seal

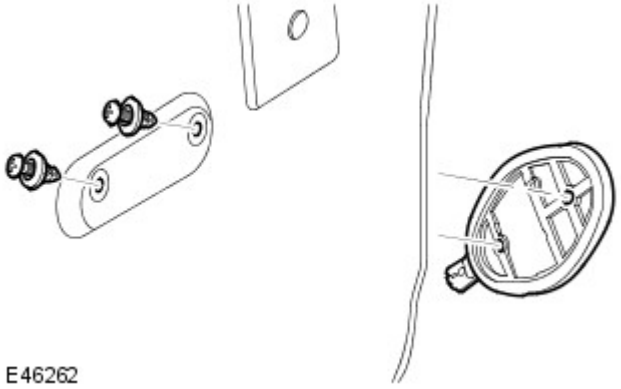


3. Remove the fender splash shield.
   - Release the 6 clips.
   - Remove the 7 screws.
   - Disconnect the electrical connector.

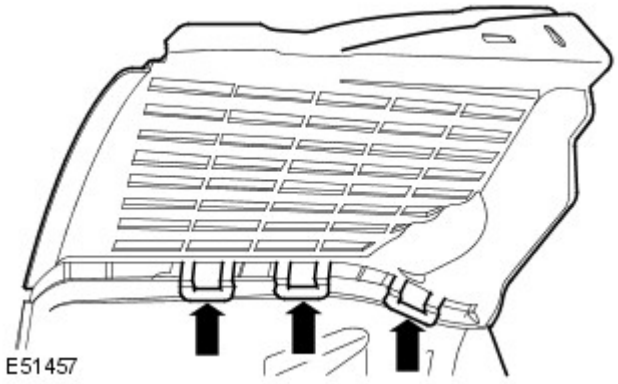


4. NOTE: Do not disassemble further if the component is removed for access only.

   Remove the tire pressure antenna.
   - Release the 2 clips.



Vehicles with supercharger



5. NOTE: Right-hand shown, left-hand similar.

   Remove fender splash shield grille.
   - Release the 3 clips and remove the cover.

Installation

Vehicles with supercharger

1. Install the fender splash shield grille.
   - Secure with the clips.

All vehicles

2. Install the tire pressure antenna.

3. Install the fender splash shield.
   - Tighten the screws.
   - Install the clips.
   - Connect the electrical connector.

4. Install the fender seal.

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Front End Body Panels - Fender

Removal and Installation

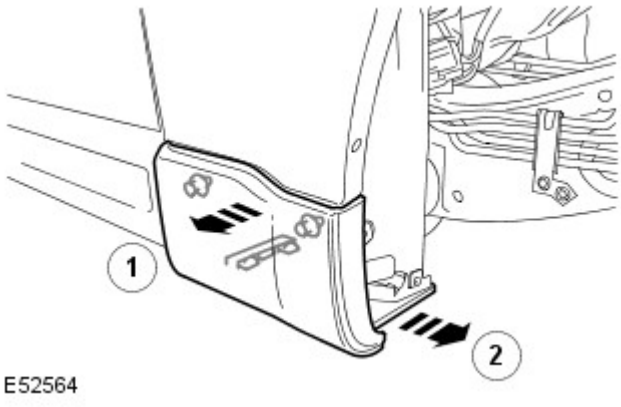
Removal

1. Remove the plenum chamber panel.
   For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).

2. Remove the front bumper cover.
   For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).

3. Remove the fender splash shield.
   For additional information, refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).

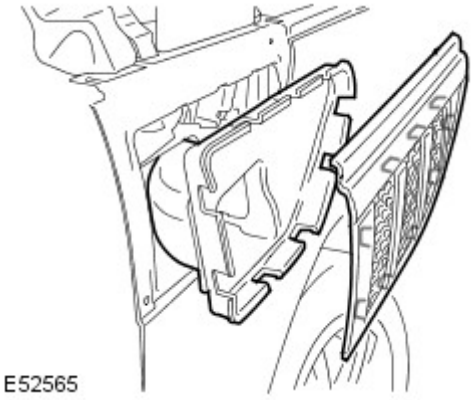
4. Remove the fender moulding.
   - Release the 4 clips.



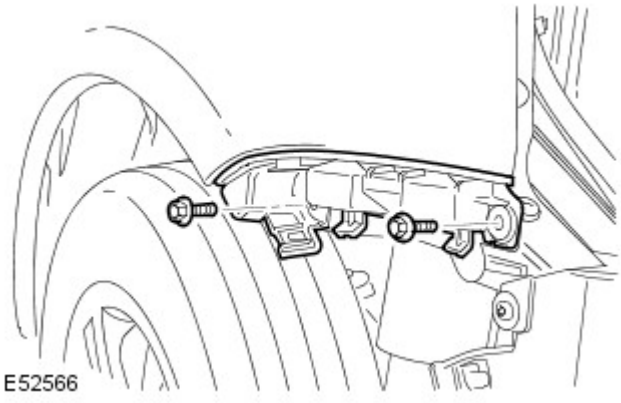
E52564

5. NOTE: Right-hand shown, left-hand similar.

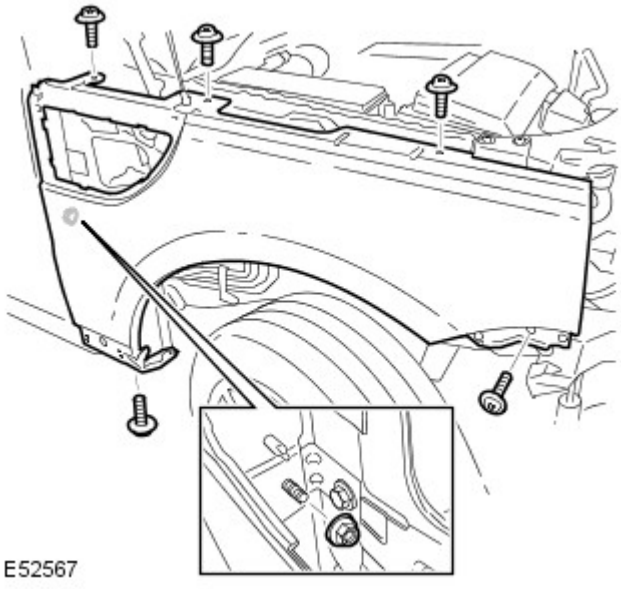
   Remove the fender air intake grille.
   - Release the 9 clips.
   - Remove the air ducting.


E52565

6. Remove the bumper cover clip.
   - Remove the 2 bolts.


E52566

7. Remove the front fender.
   - Remove the 5 Torx bolts.
   - Remove the nut.





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

   Remove the fender rear trim.
   - Remove the 3 clips.

Installation

1. Install the fender rear trim.
   - Secure in the 3 clips.
2. Install the front fender.
   - Install the bolts and tighten to 10 Nm (7 lb.ft).
   - Install the nut and tighten to 10 Nm (7 lb.ft).
3. Install the front bumper clip.
   - Install the bolts and tighten to 6 Nm (4 lb.ft).
4. Install the fender air intake grille.
   - Install the air ducting.
5. Install the fender moulding.
   - Secure in the clips.
6. Install the fender splash shield.
   For additional information, refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).
7. Install the front bumper cover.
   For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).
8. Install the plenum chamber panel.
   For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).

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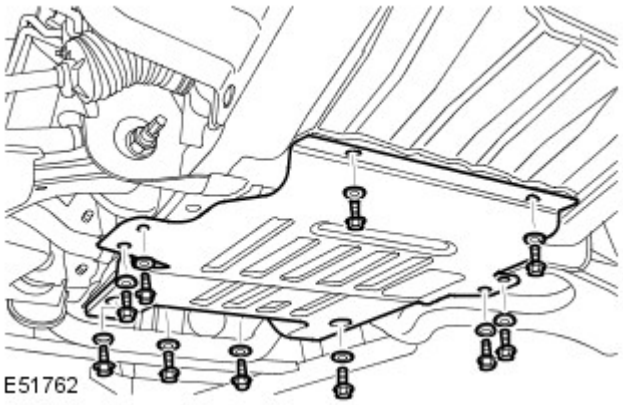
Front End Body Panels - Engine Undershield

Removal and Installation

Removal

1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.



2. CAUTION: Note the special washer.

   Remove the engine undershield.
   - Remove the 10 bolts.

Installation

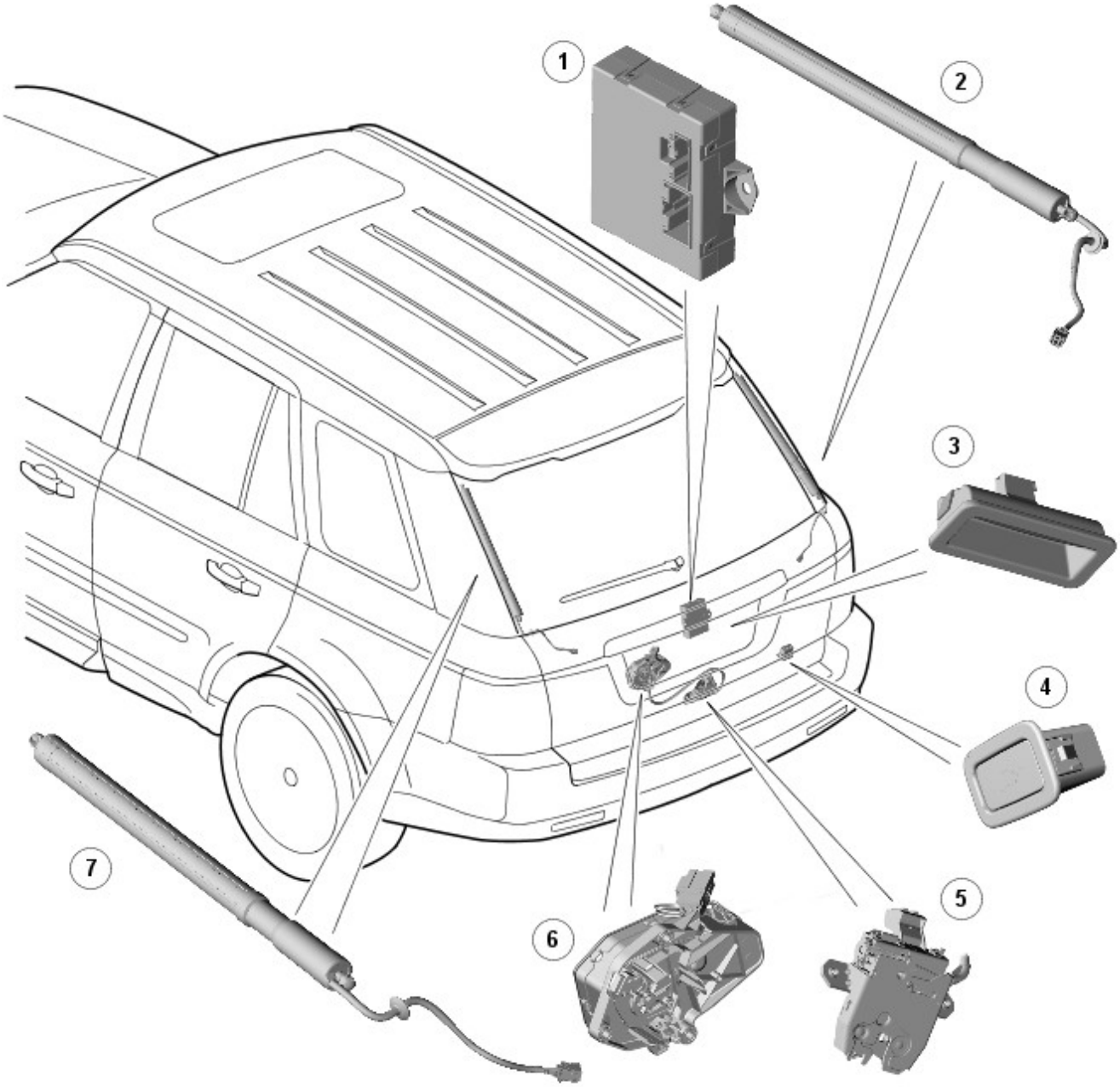
1. To install, reverse the removal procedure.
   - Tighten the bolts to 62 Nm (46 lb.ft).

Published: 27-Oct-2011

Body Closures - Body Closures - Component Location

Description and Operation

Power Tailgate - Component Location



E139824

Item	Description
1	Tailgate module
2	Powered strut
3	Tailgate open button
4	Tailgate close button
5	Latch assembly
6	Powered cinch motor
7	Powered strut

Published: 27-Oct-2011

Body Closures - Body Closures - Overview

Description and Operation

Tailgate

Overview

The single piece tailgate is manufactured from aluminum and depending on vehicle specification is offered with either:

- manual opening and closing, or with a
- powered opening and closing function.

Powered opening and closing of the tailgate is provided by an electrically driven spindles housed in each of the struts.

In addition to the powered movement of the tailgate, the closing mechanism of the tailgate has a soft-close power cinching unit. The cinching unit pulls the latch closed at the end of the tailgate's travel. The latch and power-cinch unit are both housed within the tailgate.

Published: 01-Feb-2012

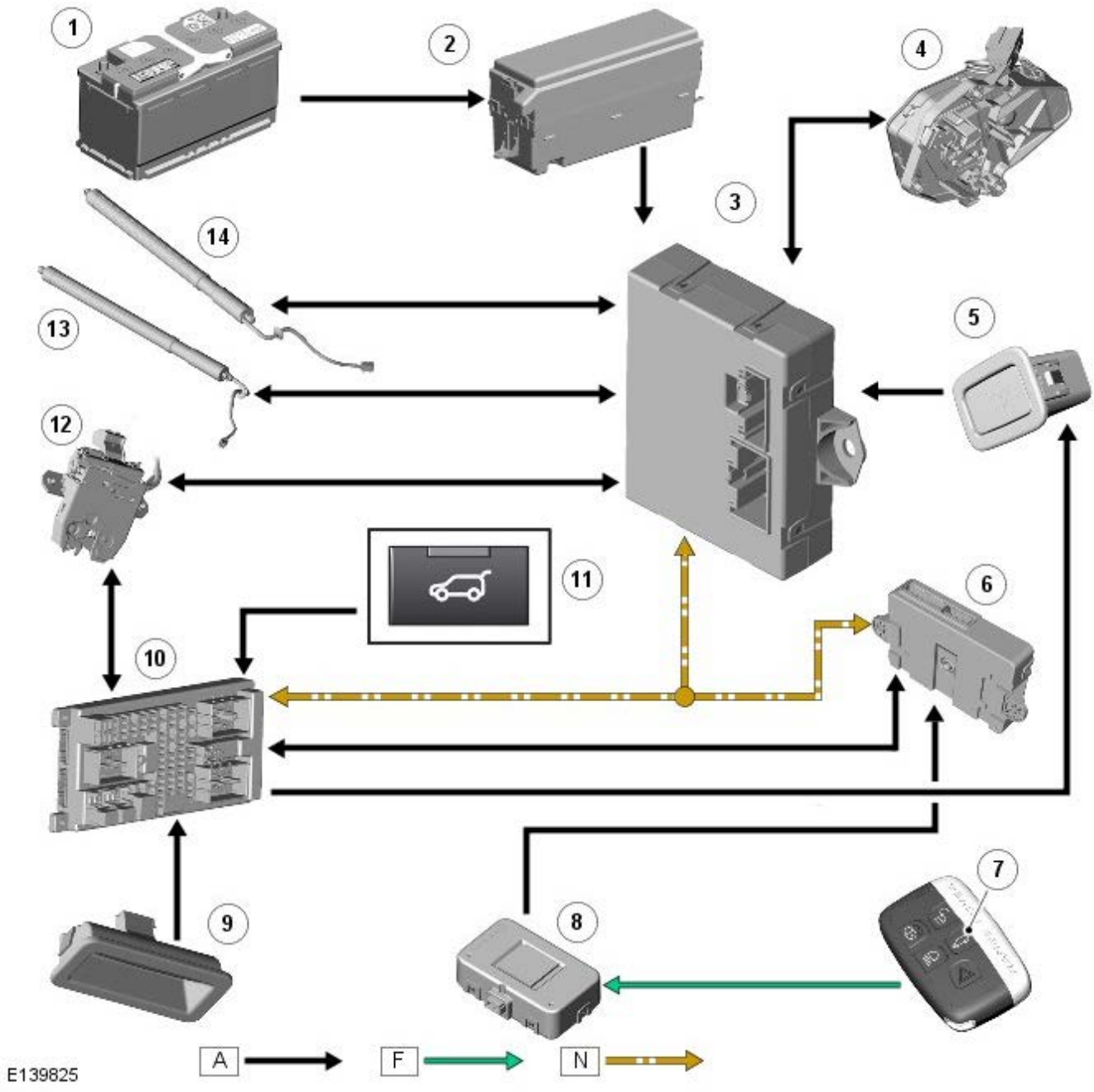
Body Closures - Body Closures - System Operation and Component Description

Description and Operation

Control Diagram

NOTE: **A** = Hardwired; **F** = RF Transmission; **N** = Medium Speed CAN

Tailgate



Item	Description
1	Battery
2	EJB (engine junction box)
3	Tailgate module
4	Powered cinch motor
5	Close switch – tailgate close edge
6	KVM (keyless vehicle module)
7	Release button - Smart Key
8	Radio frequency receiver
9	Release switch - numberplate plinth
10	CJB (central junction box) incorporating the BCM (body control module)
11	Release switch – vehicle interior

12 Latch assembly
13 Powered strut
14 Powered strut

System Operation

Powered Tailgate

The powered opening and closing actions are controlled by the tailgate module. The module receives a permanent battery power supply from the RJB (rear junction box).

To initiate the tailgate opening sequence a 'tailgate release-request' is received by the CJB from one of the following:

- KVM (keyless vehicle module) - signal originates from the Smart Key tailgate release button.
- Instrument panel, tailgate switch.
- Rear numberplate plinth mounted, tailgate switch.

The CJB responds with the following simultaneous actions:

- A hardwire power release to the latch actuator mechanism.
- A powered opening request-signal transmitted to the tailgate module via the medium speed CAN bus.

The processing of the opening signal by the CJB is influenced by a number of factors:

- Source of 'opening signal'.
- Vehicle status: locked or unlocked.
- Vehicle equipped with or without passive entry.

Once the latch is released the tailgate module actuates the motor located in the powered struts to raise the tailgate to its fully open or pre-set position. When the tailgate is in its opening cycle the automatic stop-position of the tailgate is functioned by a hall-sensor located in the motor. The hall-sensor signal transmitted to the tailgate module is synchronized with the pre-set memory indicating the stop position of the tailgate.

To close the tailgate a hardwired signal is transmitted directly to the tailgate module when the switch located on tailgate's closing edge is pressed and then released. The module operates the spindle motors in the opposite direction to close the tailgate to the latch position.

When the latch engages with the striker plate a signal transmitted from the latches' secondary switch, located in the actuator mechanism, to the tailgate module confirms the latch is engaged. The module de-activates the spindle-drive and activates the power cinch-motor to pull the latch closed through the last 6mm of travel. This is the latches primary fully-closed position. The power cinch motor then reverses to allow the latch to be opened upon the next release request. A mechanical Bowden cable connection between the motor and latch assembly is used to complete the closing process of claw contraction and then reverse.

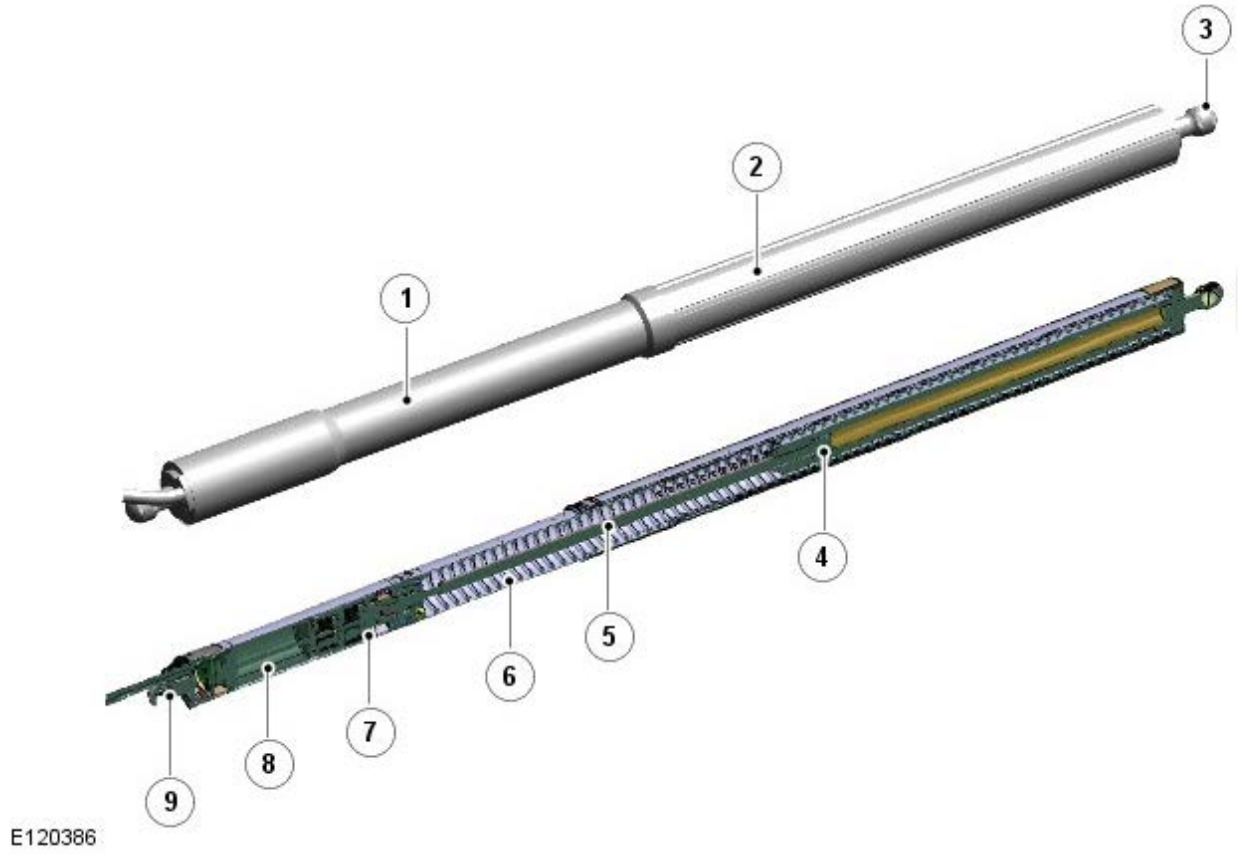
If the battery is disconnected when the tailgate is closed, the stored and calibrated tailgate opening heights will remain stored when the battery is reconnected. However if power supply to the tailgate module is disconnected when the tailgate is open the system will not recognize the tailgate's position and subsequently will not function to any switch commands when power is reinstated. To reset the system, the tailgate must be moved manually to the closed position where it will perform a soft-close and reset the hall-sensor counters to zero.

 NOTE: If required the tailgate can be opened and closed manually.

 CAUTION: DO NOT CLOSE THE TAILGATE IF THE VEHICLE BATTERY IS DISCONNECTED. It is advisable to close the latch claw when working on a vehicle with the battery disconnected to prevent accidental closure.

Powered Strut

Powered strut components



Item	Description
1	Inner tube
2	Outer tube
3	Ball joint
4	Outer tube spindle nut
5	Spindle
6	Springs
7	Gear
8	Motor
9	Ball joint

The powered struts opens and close the tailgate using an electrically driven spindle located in the struts internal electric motor. Ball-joints positioned at each end of the strut allow it to articulate between a fixed mount on the vehicle and the moveable tailgate. The tailgate opening operation is also aided by spring assistance.

The spindle drive comprises an inner and outer tube where the motor and gears in the inner tube drive a threaded spindle which runs on a threaded nut fixed to the inside of the outer tube.

The spindle drive incorporates an object detection function controlled by the tailgate module. The function is similar to the anti-trap function of a closing electric window but operates in both directions. If the object detection feature is activated while the tailgate is closing, the spindle motor stopped and then reversed for a preset period. If the object detection feature is activated while the tailgate is opening, the spindle motor is stopped and held at that position.

A hall sensor, located in the spindle motor, monitors the speed of the motor. If the speed decreases below a set threshold, indicating an obstruction and increasing the motor current draw, the power feed to the motor is reversed causing the tailgate to move in the opposite direction of travel.

The amount of travel in the opposite direction, before stopping, is determined by the hall sensor count. An exception to the object detection reverse travel function occurs when the tailgate is opening through its first few degrees of travel from the latched position. In these circumstances if an obstacle is detected the tailgate stops in the position of the obstruction and no travel in the opposite direction occurs.

Component Description

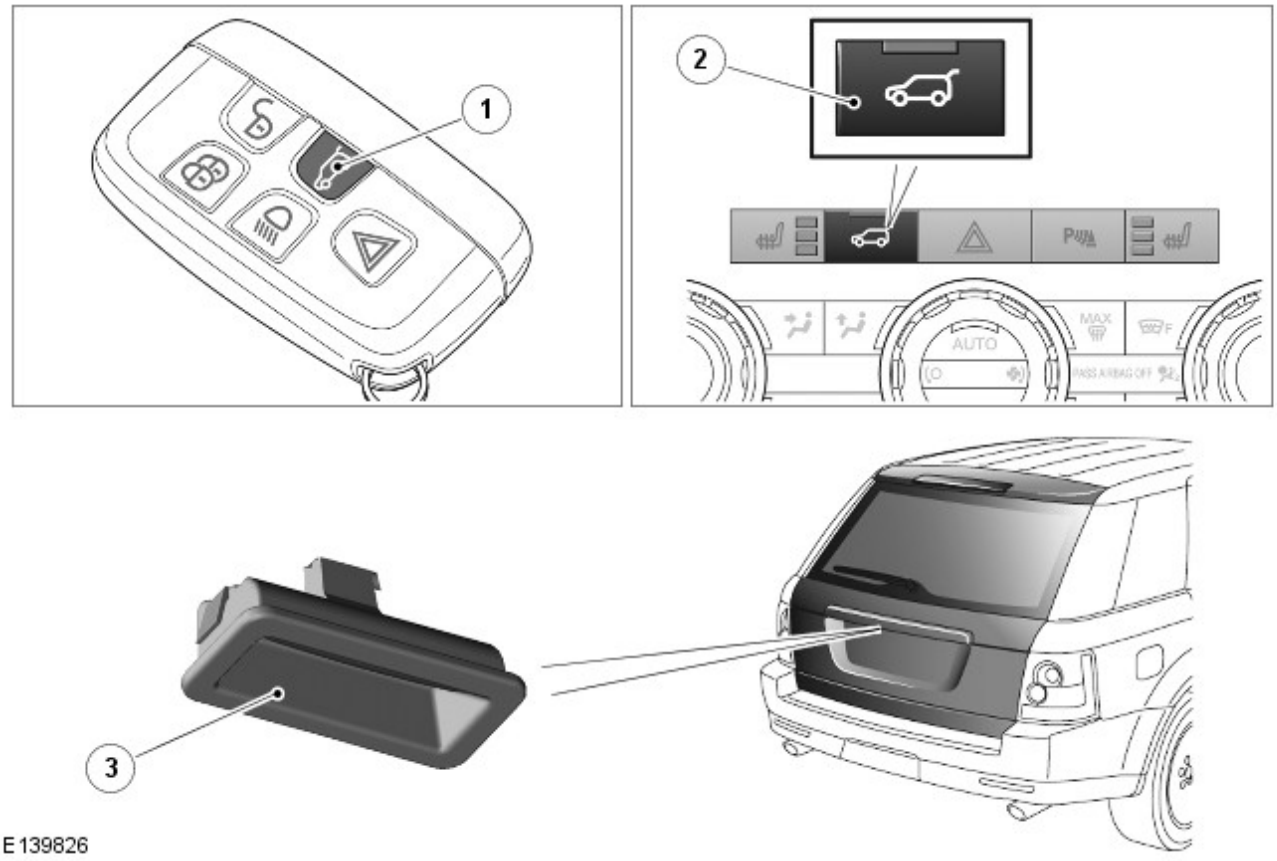
Tailgate

The tailgate can be opened using the following:

- The release button on the Smart Key.
- The exterior release switch, providing the doors are unlocked and the gear selector is in Park (P).
- The interior release switch, providing:
  - the vehicle is not locked or alarmed;
  - the vehicle speed is not at 5 kilometer/hour (3 mile/hour) or above.

These switches will also de-latch the manual tailgate.

Tailgate – release switches



Item Description

1 Smart Key - release button
2 Vehicle interior - release switch
3 Vehicle exterior - release switch

The tailgate close switch is located on the tailgate closing edge.

The powered tailgate can also be manually closed, to either the latches' secondary or primary position, without causing any damage to the power mechanism.

Tailgate – close switch



Item Description

1 Close switch

The tailgate can be stopped at any time during the open or close cycle by a single press on any of the tailgate control switches. Thereafter:

- Pressing any ‘release’ control switch will authorize the tailgate to continue or start opening.
- Pressing the ‘close’ control switch will authorize the tailgate to continue or start closing.

For further information, see chart below.

The tailgate has a 'Garage Position' setting, where it is possible to set the maximum height to which the tailgate will open.

To set the required height:

- Open the tailgate to the position of the required height and ensure the tailgate is stationary for at least three seconds.
- Press and hold, the tailgate close switch for a period of 10 seconds.
- Successful height programming will be indicated by the tailgate remaining stationary on the release of the close switch.
- Close the tailgate manually, or via the close switch, then open again to check that it opens to the programmed height.

The maximum opening height is now set. To reset the maximum opening height to full, repeat the process, but fully open the tailgate before pressing and holding the close switch.

NOTE: If the Smart Key is left inside the luggage compartment and the vehicle is locked and the alarm set, an audible warning will sound and the tailgate will re-open after three seconds.

The opening and closing control strategies are listed in the following chart:

Strategy	Opening	Closing	Stop	Start from stopped position after opening	Start from stopped position after closing	Garage position - set/reset
Smart Key	One push	No function	One push	One push for opening	One push for opening	X
Interior tailgate release	One push	No function	One push	One push for opening	One push for opening	X
Exterior tailgate release	One push	No function	One push	One push for opening	One push for opening	X
Closing edge switch	X	One push	One push	One push for closing	One push for closing	One push for 10 seconds

If any object is detected, that would interfere with the closing of the tailgate; movement will stop and reverse a short

distance. Any obstructions must be removed before pressing the close switch again.

The powered tailgate may lose its position memory if:

- there are multiple object detections,
- there are inadvertent loads on the tailgate while it is moving; for example a person leaning against the tailgate,
- the battery voltage is low.

The above may also inhibit the powered operation of the tailgate.

To reset the tailgate:

1. Manually close the tailgate.
2. Press a tailgate release switch.
3. Allow the tailgate to power fully open or to the previously set position.
4. Press and release the close switch.
5. Allow the tailgate to power close fully.

The tailgate programmed position memory will now be restored.

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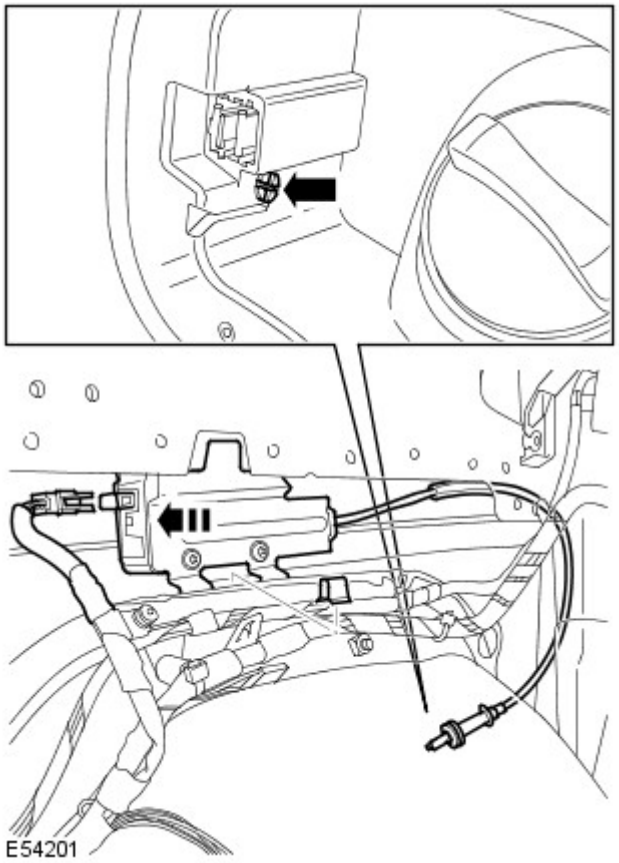
Body Closures - Fuel Filler Interlock Catch

Removal and Installation

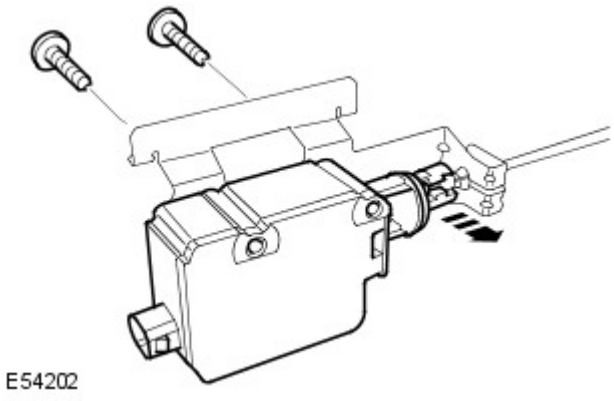
Removal

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Remove the LH lower rear quarter trim panel.
   For additional information, refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).



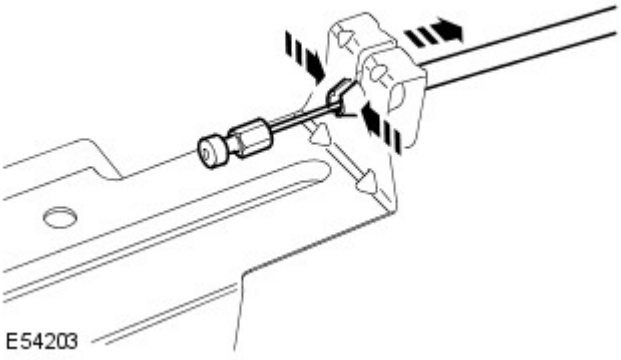
3. Remove the fuel filler interlock catch assembly.
   - Remove the clip.
   - Release the cable.
   - Disconnect the electrical connector.



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

   Remove the solenoid.
   - Remove the 2 Torx screws.
   - Release the cable.

5. Release and remove the cable.
   - Release the clip.



Installation

1. Install the cable.
    - Secure the clip.

2. Install the solenoid.
    - Attach the cable.
    - Install the Torx screws.

3. Install the fuel filler flap latch assembly.
    - Connect and secure the electrical connector.
    - Carefully secure the clips.

4. Install the rear quarter trim panel.
   For additional information, refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).

5. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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Body Closures - Fuel Filler Door Assembly

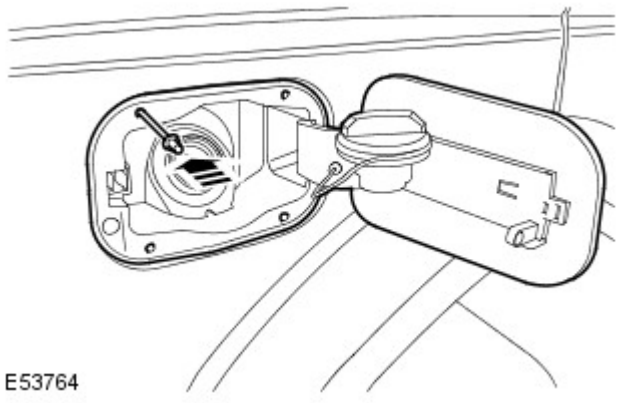
Removal and Installation

Removal

CAUTION: Always protect paintwork and glass when removing exterior components.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Remove the fuel filler interlock catch assembly.
   For additional information, refer to: Fuel Filler Interlock Catch (501-03, Removal and Installation).



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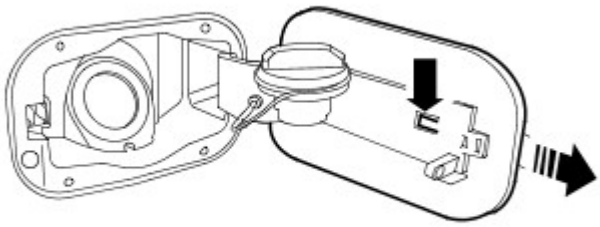
3. WARNINGS:

   Place the vehicle in a well ventilated, quarantined area and arrange ' No Smoking/Petrol Fumes' signs about the vehicle.

   Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

   Remove the fuel filler door and inner assembly.
   - Open the fuel filler door and remove the cap.
   - Using a 2 mm metal rod, pierce the inner assembly and release the 4 clips.
   - Release from the filler neck.
   - Replace the filler cap.

4. Remove the fuel filler door.
   - Release the clip.



E55132

5. Remove the drain tube.

Installation

1. Install the drain tube.

2. Install the filler door.

3. Install the fuel filler door assembly.
   - Clean the component mating faces.
   - Install the filler cap.
   - Close the fuel filler door.

4. Install the fuel filler interlock catch assembly.
   For additional information, refer to: Fuel Filler Interlock Catch (501-03, Removal and Installation).

5. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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Body Closures - Liftgate

Removal and Installation

General Equipment

Rigid Foam

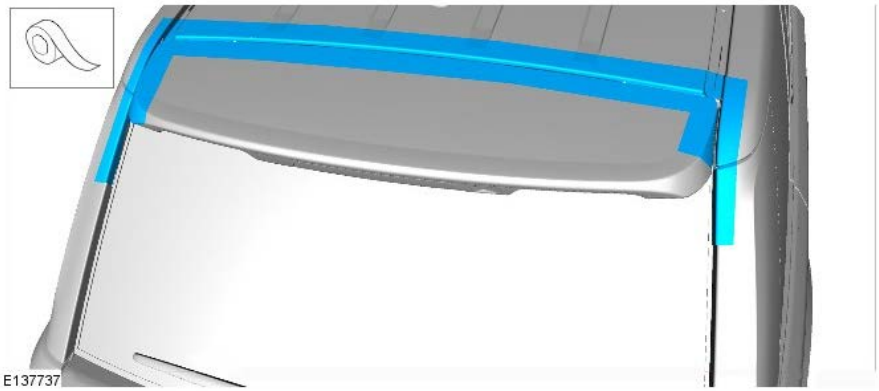
Removal

NOTES:

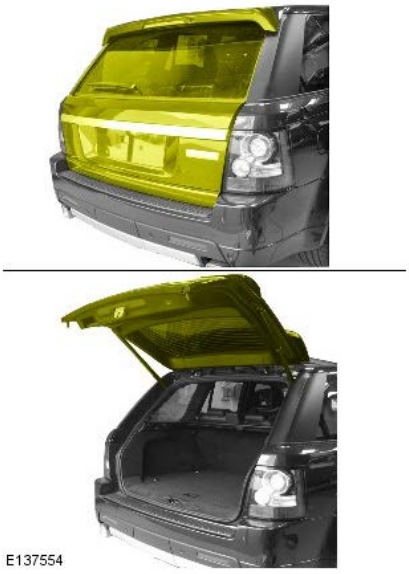
Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

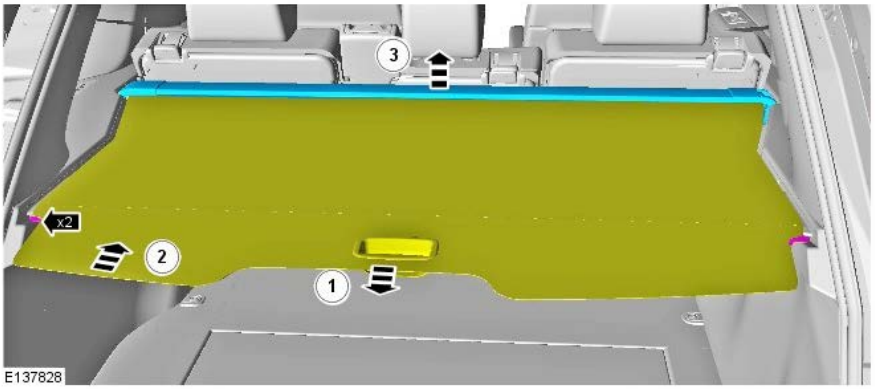
1. CAUTION: Protect the surrounding paintwork to avoid damage.



2.



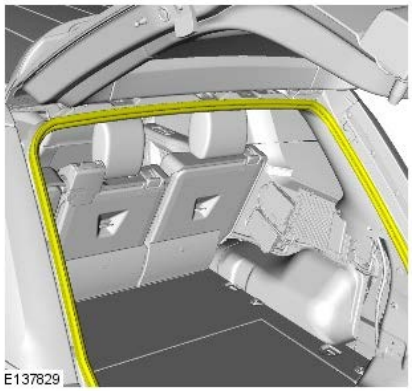
3. NOTE: If equipped.



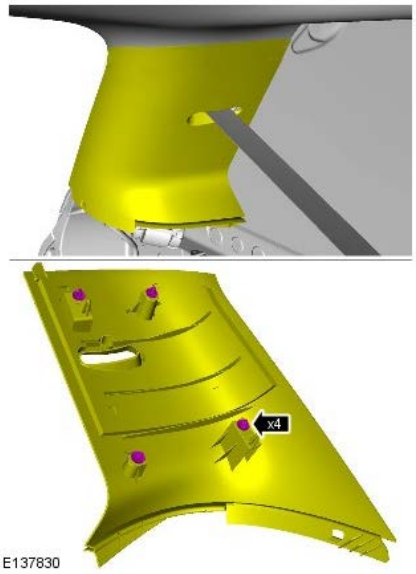
4. NOTE: Repeat to the other side.

Refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).

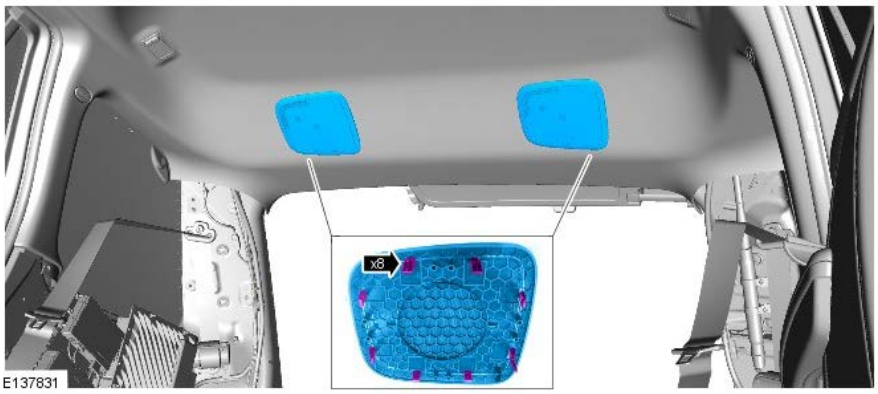
5.



6. NOTE: Repeat to the other side.



7.



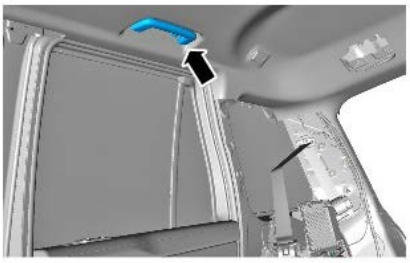
8. NOTE: Repeat to the other side.

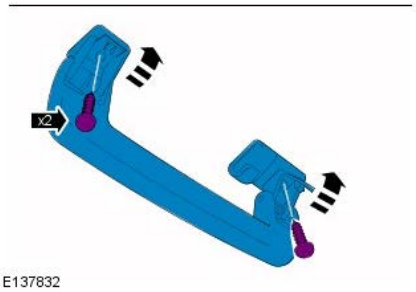
Refer to: C-Pillar Upper Trim Panel (501-05, Removal and Installation).

9. NOTE: Repeat to the other side.



10. NOTE: Repeat to the other side.

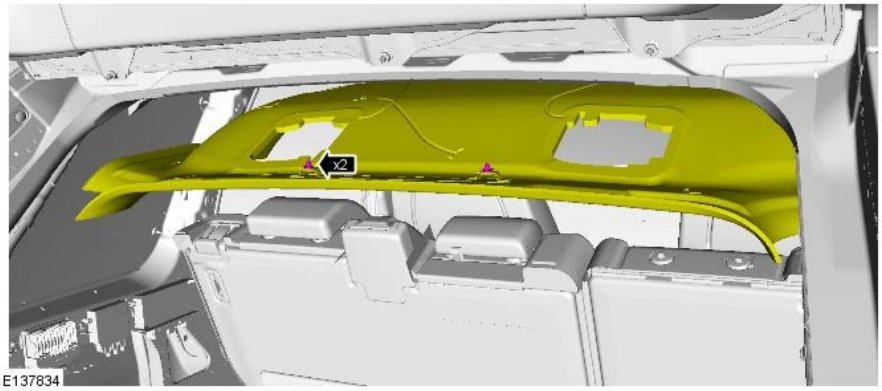




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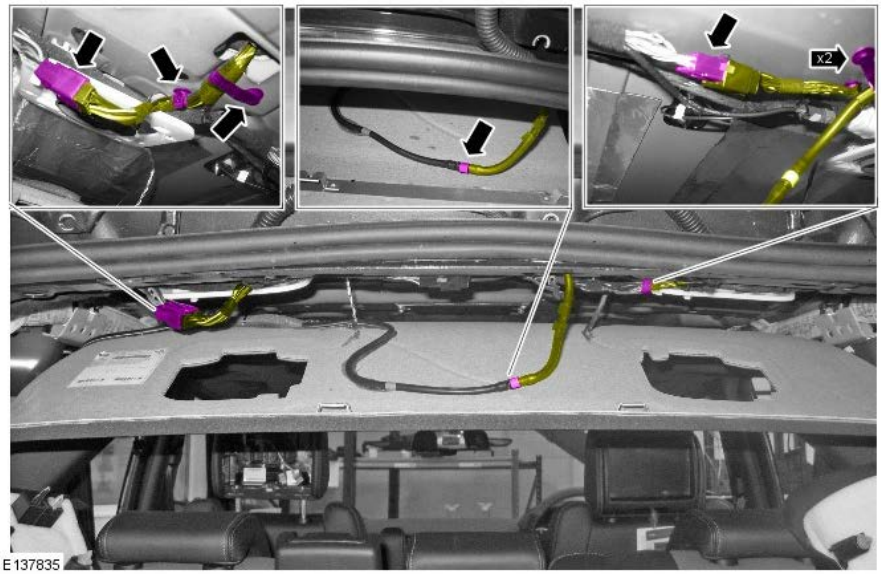
11. CAUTION: Make sure damage is not caused to the headliner.

NOTE: Lower and reposition the headliner to aid access.



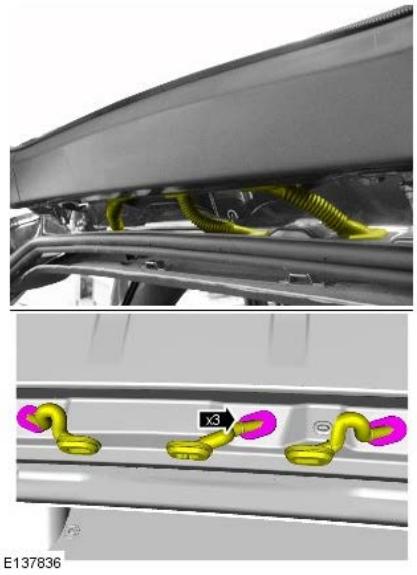
E137834

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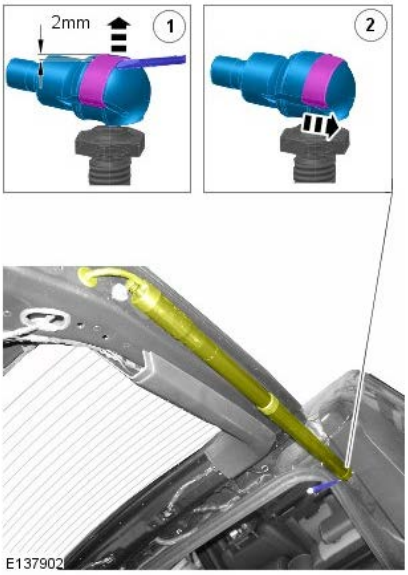
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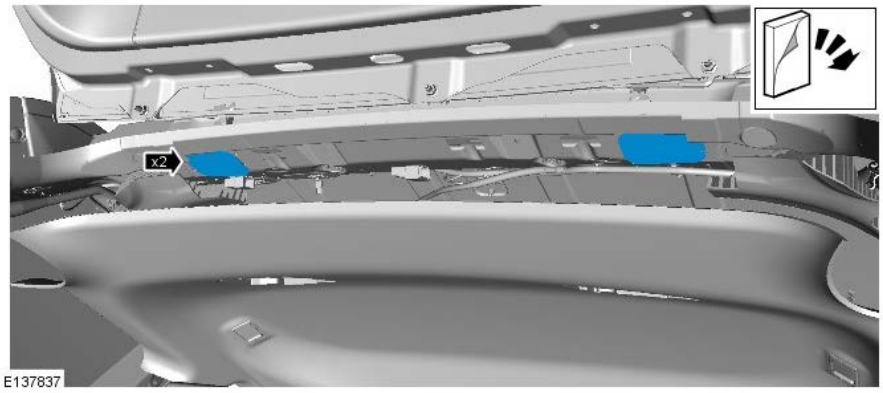


14. WARNING: Make sure the liftgate is supported.

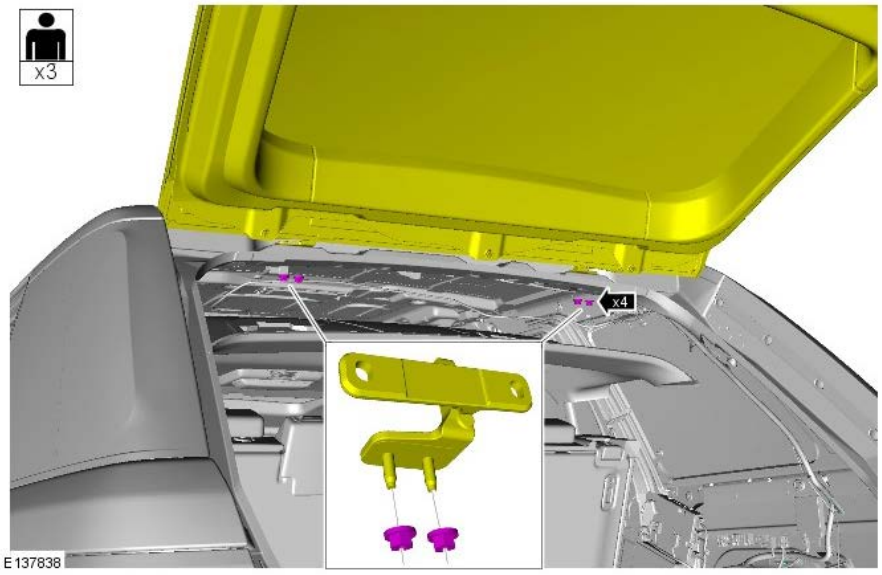
NOTE: Repeat to the other side.



15.



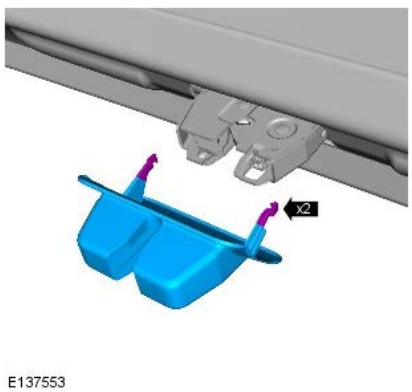
16. *Torque:* 25 Nm



17. *General Equipment:* Rigid Foam



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



19.



20. *Torque:* 12 Nm



E137556

21.

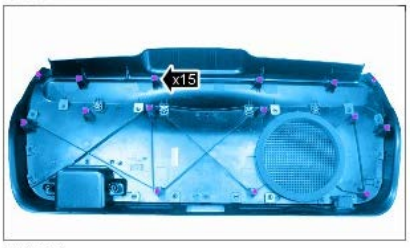




E137558

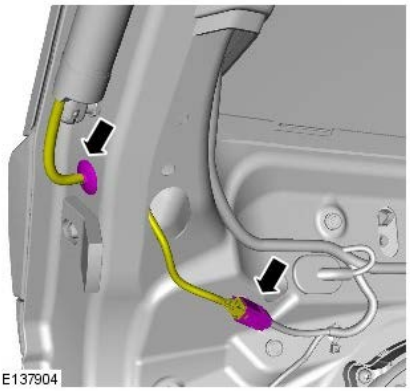
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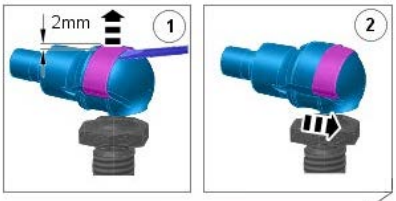
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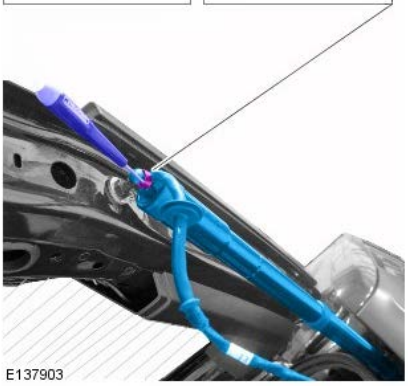
23. NOTE: Repeat to the other side.



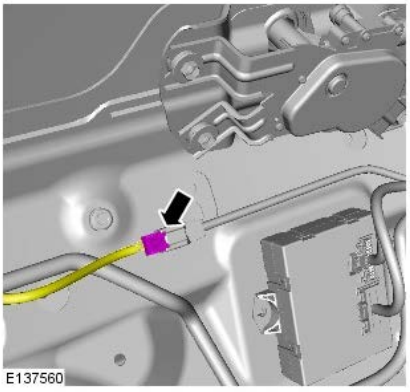
E137904

24. NOTE: Repeat to the other side.

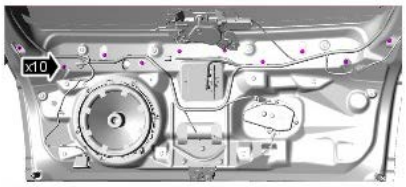


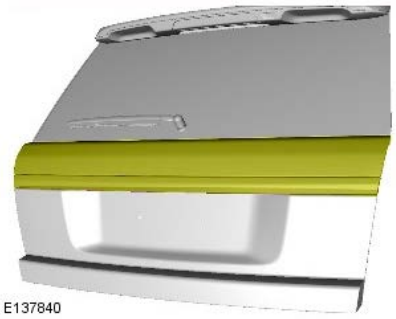


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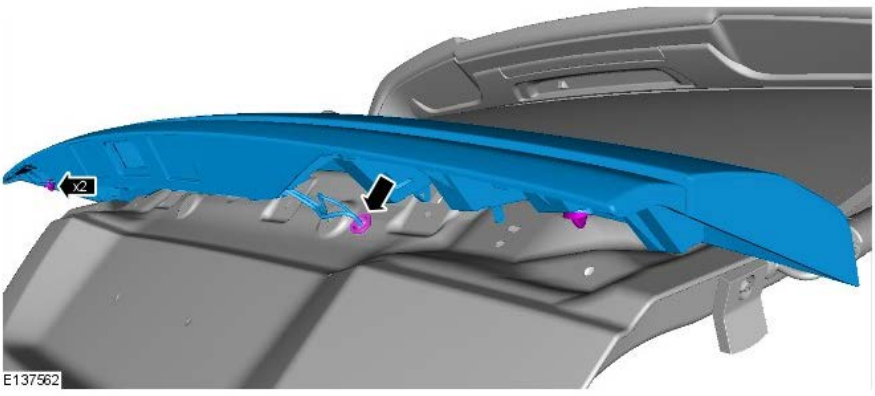


26. *Torque:* 8 Nm



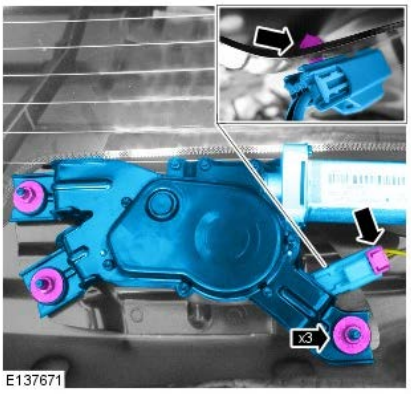


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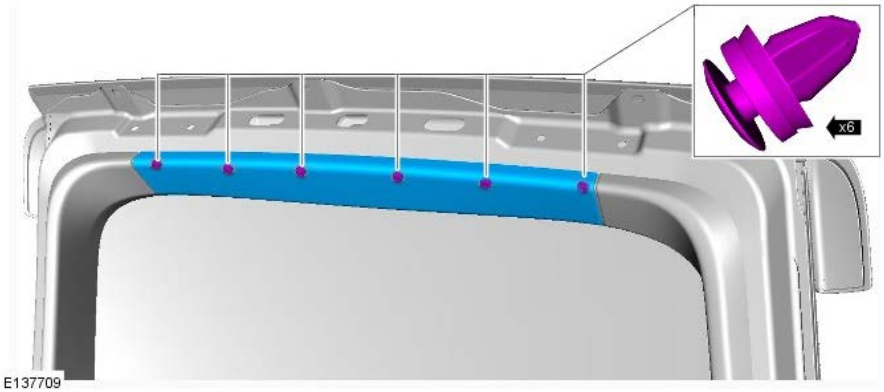


28. Refer to: Rear Wiper Pivot Arm (501-16, Removal and Installation).

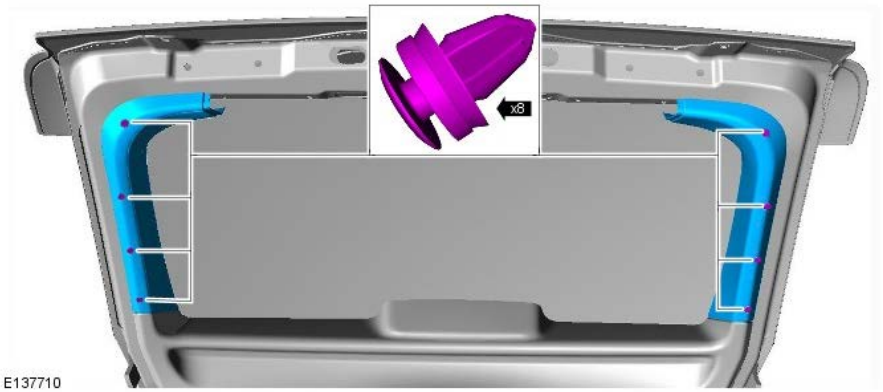
29. *Torque:* 10 Nm



30.

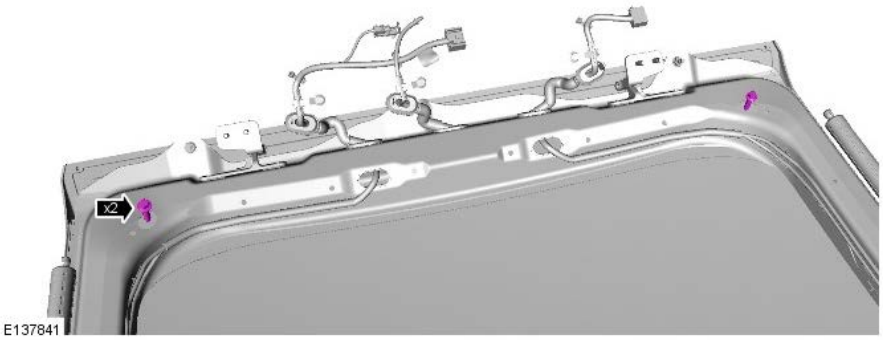


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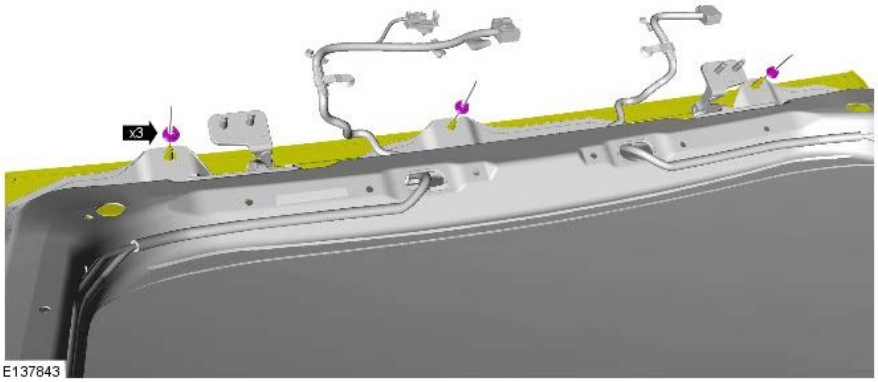


32. CAUTION: Make sure that new bolts are installed.

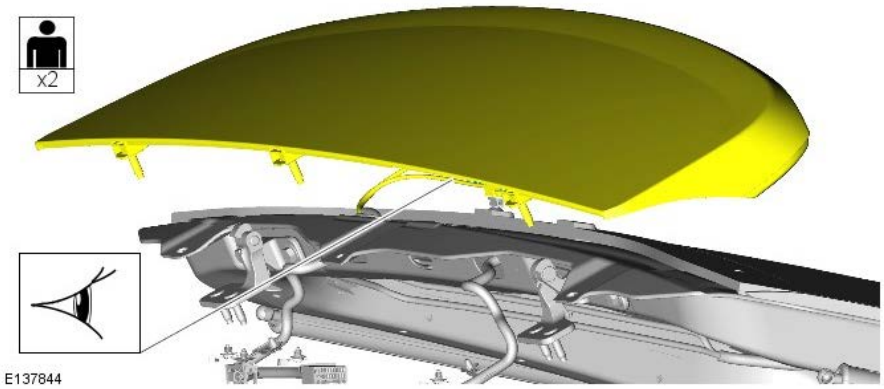
Torque: 6 Nm



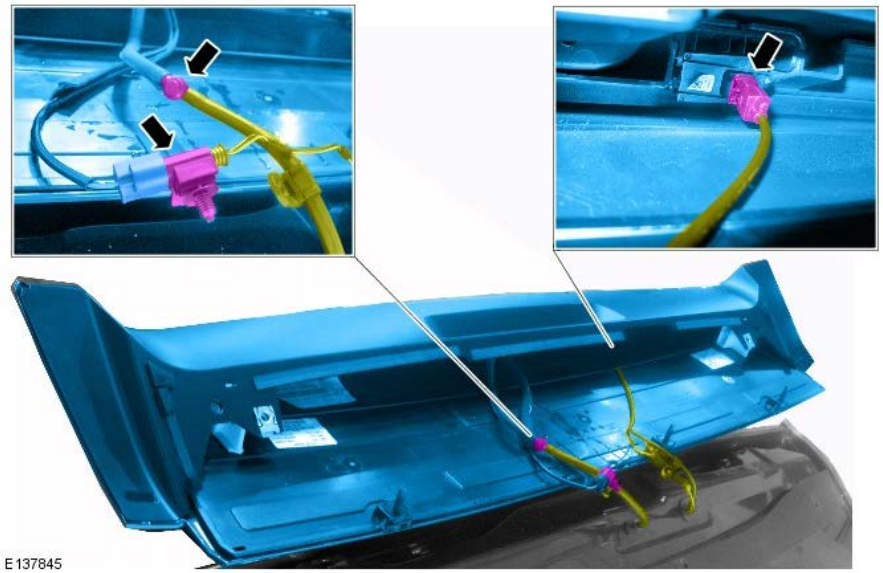
33. *Torque:* 8 Nm



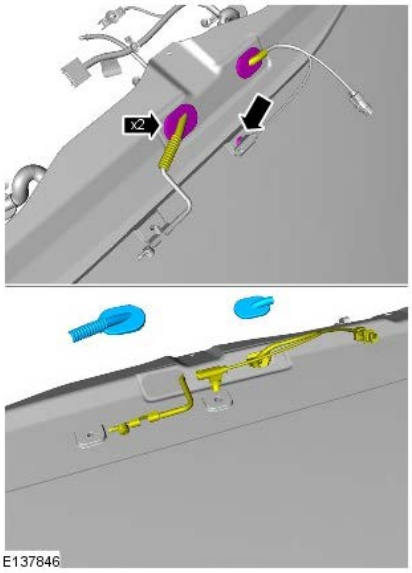
34. CAUTION: Make sure the wiring harness and electrical connectors are not damaged during this operation.



35.

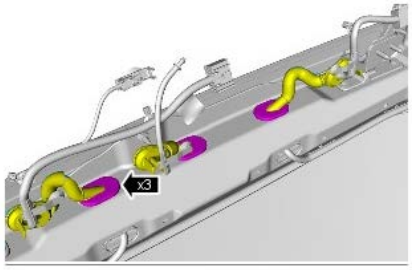


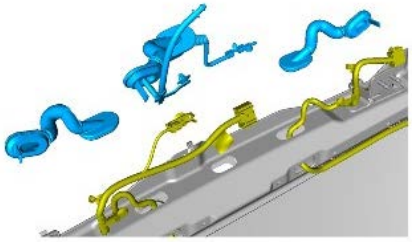
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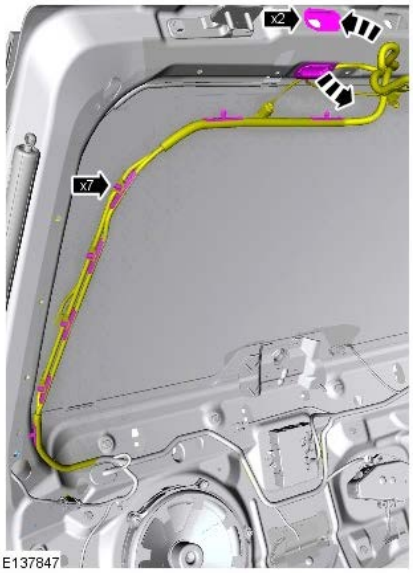
E137846

37.



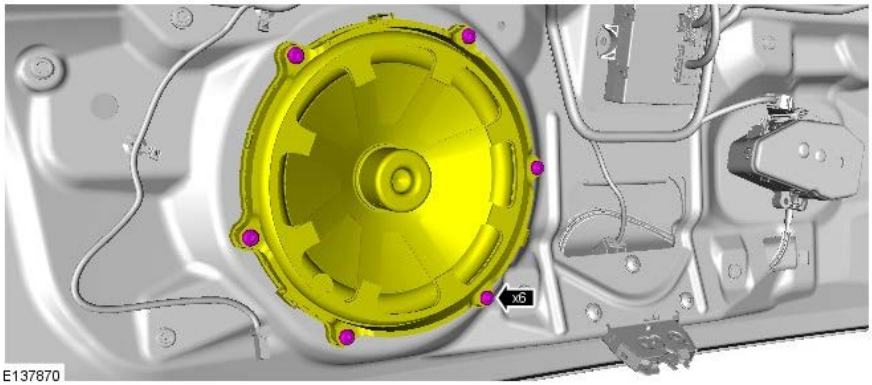

E137842

38. NOTE: Repeat to the other side.



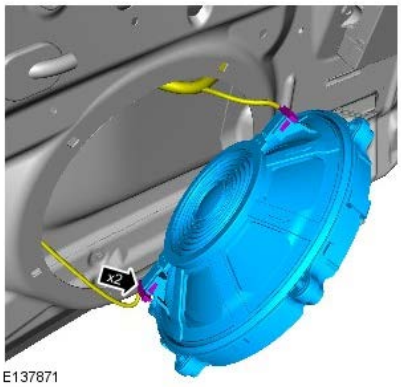
E137847

39. *Torque:* 10 Nm



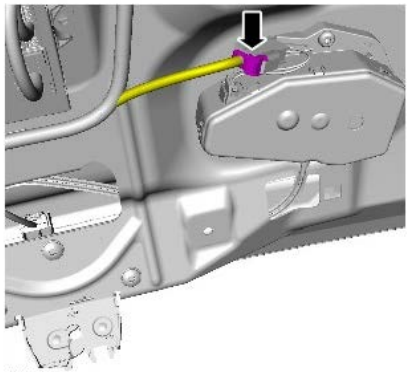
E137870

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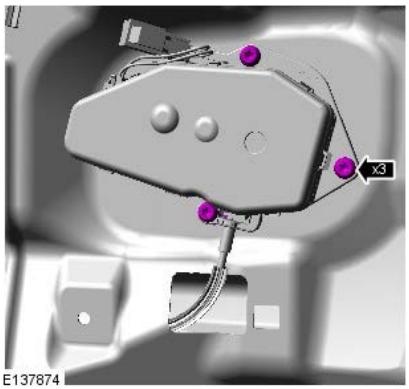


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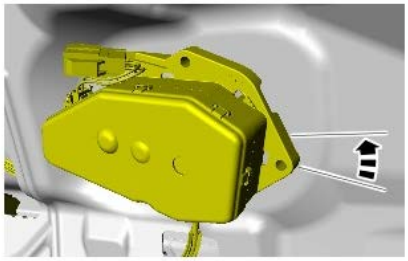

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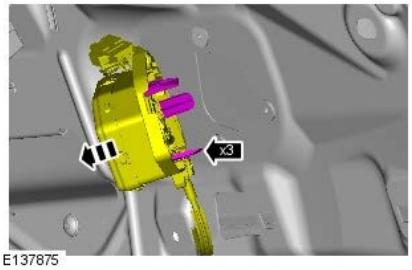
42. *Torque:* 10 Nm



E137874

43.

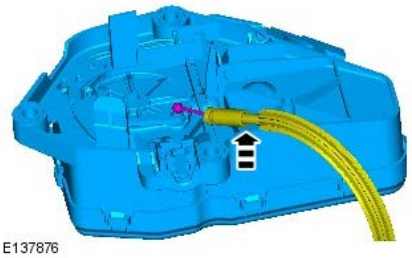




E137875

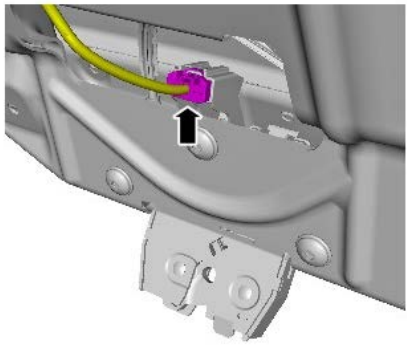
44.





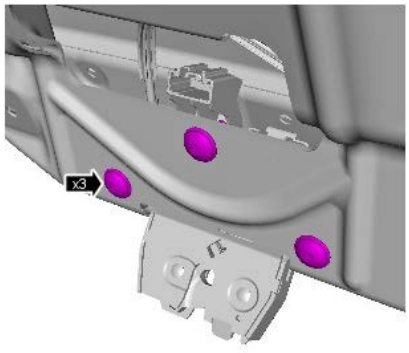
E137876

45.



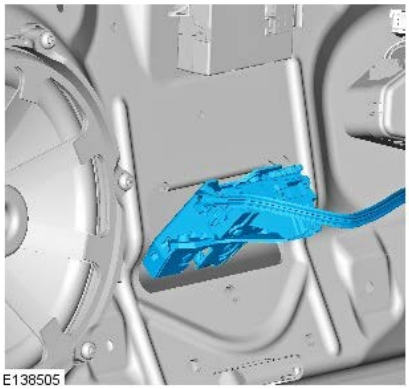
E137866

46. *Torque:* 22 Nm

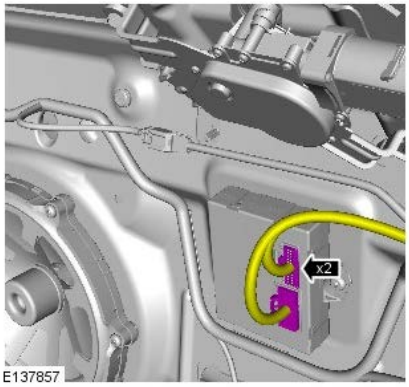


E137867

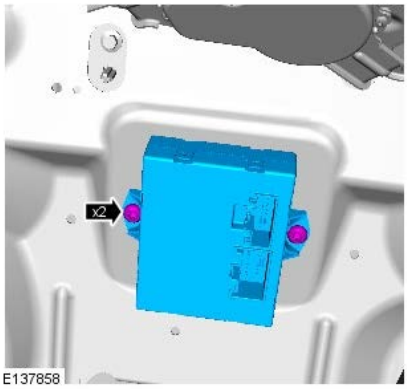
47.



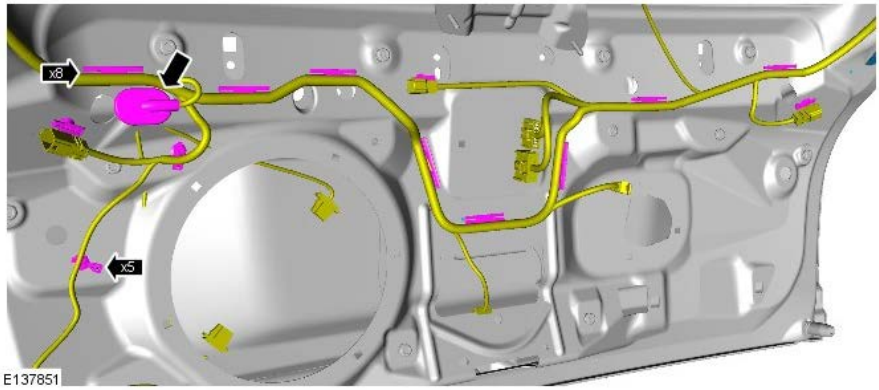
48.



49. *Torque:* 10 Nm



50.

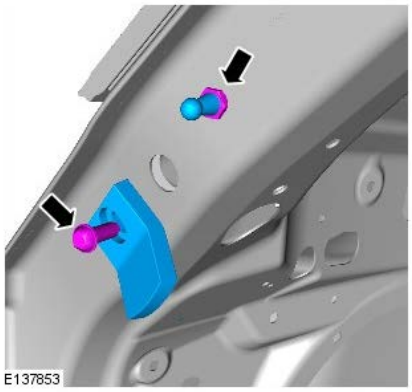


51.



E137852

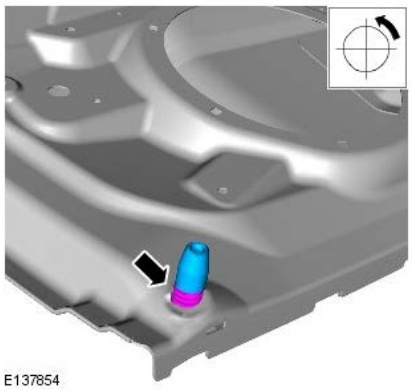
52. Refer to: Liftgate Moulding (501-08, Removal and Installation).



E137853

53. NOTE: Repeat to the other side.

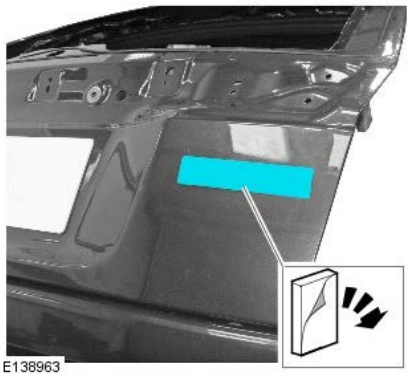
Torque:
Torx Bolt 12 Nm
Ball stud 24 Nm



E137854

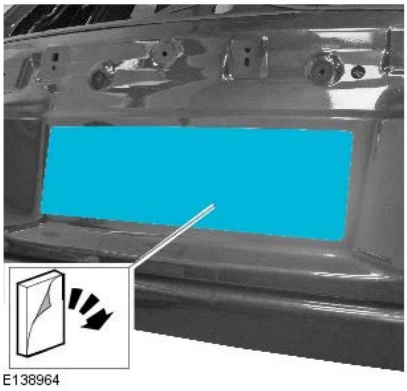
54. NOTE: Repeat to the other side.

55.



E138963

56.


E138964

57. Refer to: Liftgate Window Glass (501-11, Removal and Installation).

Installation

1. To install, reverse the removal procedure.

Published: 30-Sep-2011

Body Closures - Power Liftgate Module

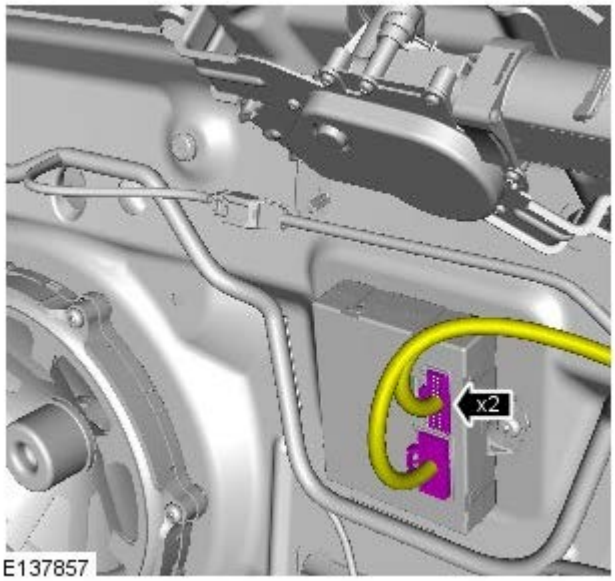
Removal and Installation

Removal

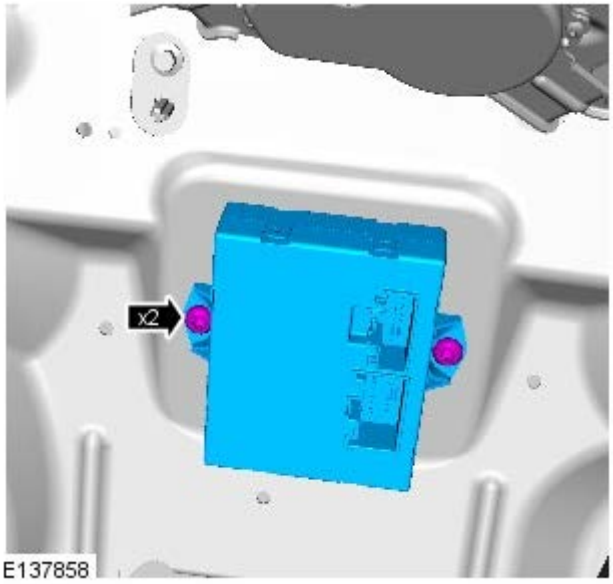
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Liftgate Trim Panel (501-05, Removal and Installation).

2.



3. *Torque:* 10 Nm



Installation

1. To install, reverse the removal procedure.

2. NOTE: This step is only necessary when installing a new component.

   Using the diagnostic tool, calibrate the component.

Published: 03-Dec-2011

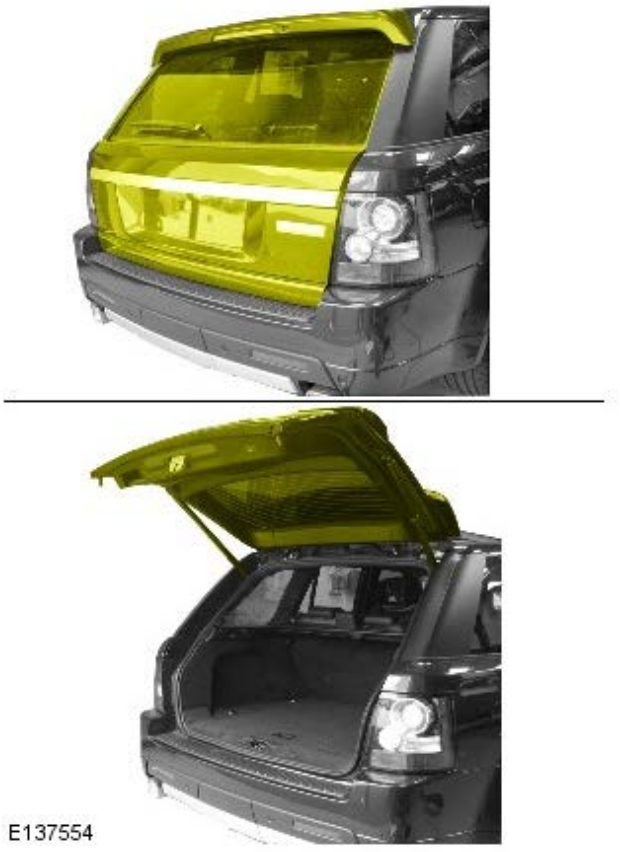
Body Closures - Power Liftgate Switch

Removal and Installation

Removal

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

1.



2.



3.



Installation

1. To install, reverse the removal procedure.

This section contains no data

This section contains no data

Published: 11-May-2011

Interior Trim and Ornamentation -

Torque Specifications

Description	Nm	lb-ft
Front safety belt lower anchorage to seat Torx bolt	40	30
C-pillar lower trim panel Torx screw	8	6
C-pillar upper trim panel Torx screw	6	4
* A-pillar trim panel Torx screw	3	2
* Rear safety belt lower anchorage Torx bolt	45	33
Foot rest trim panel bolt	5	4
Rear seat assembly retaining Torx bolts	40	30
Engine cover retaining nuts - supercharged vehicles	5	4
Loadspace anchor point retaining bolts	25	18

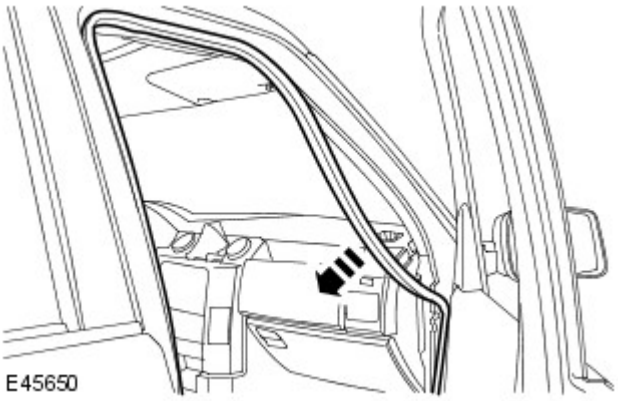
*** New bolt must be installed**

Published: 11-May-2011

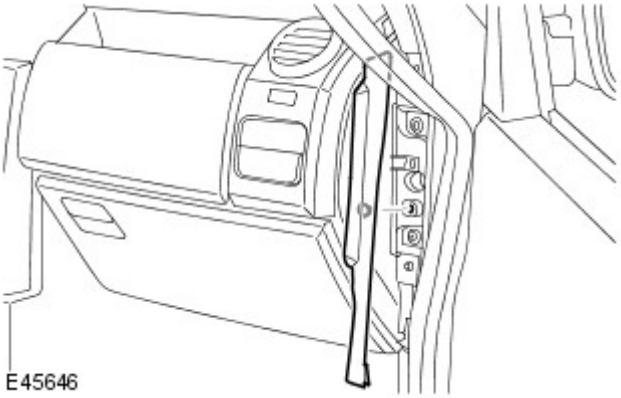
Interior Trim and Ornamentation - A-Pillar Trim Panel

Removal and Installation

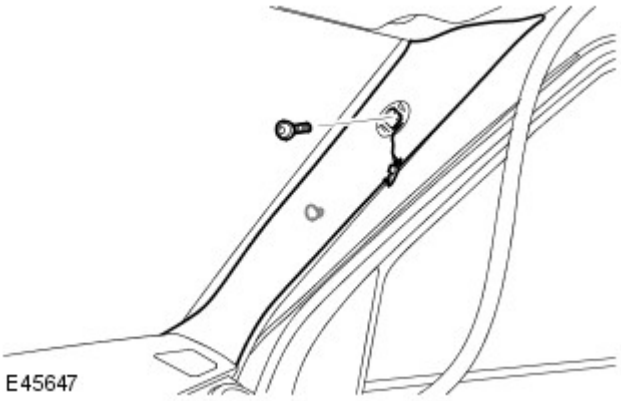
Removal



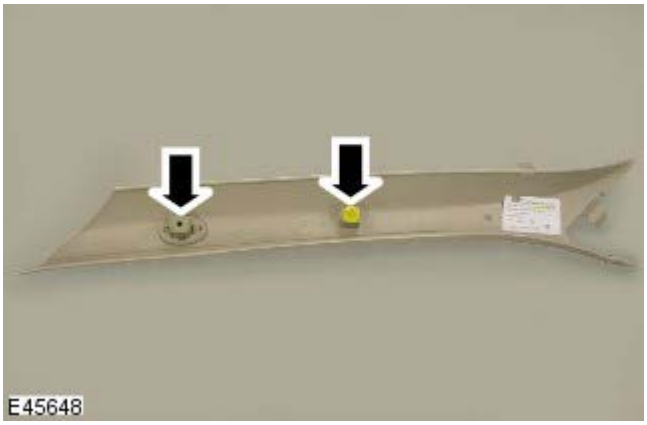
1. Release the door weatherstrip to access the A-pillar upper trim panel and instrument panel end panel.



2. Remove the instrument panel end panel.
   - Release the clip.



3. Remove the A-pillar upper trim panel.
   - Release the screw cover.
   - Remove and discard the Torx screw.
   - Release the clip.



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

   Remove the screw retainer and clip from the A-pillar upper trim panel.

Installation

1. Install the screw retainer and clip to the A-pillar upper trim panel.

2. Install the A-pillar upper trim panel.
    - Secure with the clip.
    - Install a new Torx screw and tighten to 3 Nm (2 lb.ft).
    - Install the screw cover.

3. Install the instrument panel end panel.
    - Secure with the clip.

4. Attach the door weatherstrip.

Published: 11-May-2011

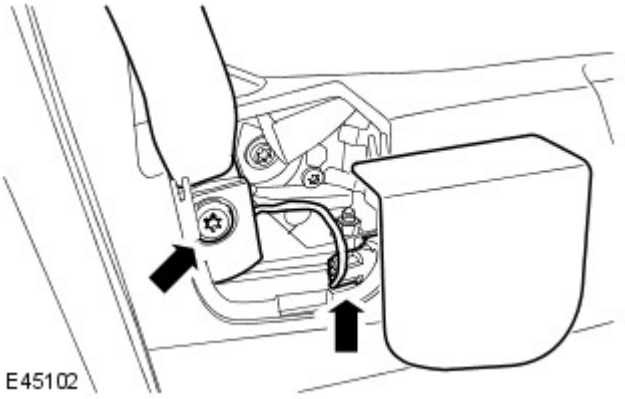
Interior Trim and Ornamentation - B-Pillar Upper Trim Panel

Removal and Installation

Removal

1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

2. Remove the B-pillar lower trim panel.
   For additional information, refer to: B-Pillar Lower Trim Panel (501-05, Removal and Installation).



3. Release the safety belt lower anchor from the seat.
   - Remove the bolt cover.
   - Passenger side, disconnect the electrical connector.
   - Remove the Torx bolt.



4. NOTE: Make sure the seat belt height adjuster is at its lowest point prior to removal of the B-pillar upper trim panel.

   Remove the B-pillar upper trim panel.
   - Release the front and rear door weatherstrips for access.
   - Release the 2 lower clips, then the remaining upper clip.
   - Release the safety belt.

Installation

1. Install the B-pillar upper trim panel.
   - Secure with the clips.
   - Attach the safety belt.
   - Attach the door weatherstrips.

2. Attach the safety belt lower anchor to the seat.
   - Tighten the Torx bolt to 40 Nm (30 lb.ft).
   - Passenger side, connect the electrical connector.
   - Install the bolt cover.

3. Install the B-pillar lower trim panel.
   For additional information, refer to: B-Pillar Lower Trim Panel (501-05, Removal and Installation).

Published: 11-May-2011

Interior Trim and Ornamentation - B-Pillar Lower Trim Panel

Removal and Installation

Removal



E43145

1. Remove the B-pillar lower trim panel.
   - Release weatherstrip from both sides of the B-pillar lower trim panel.
   - Release the 4 clips.



E43146

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

   Remove 4 clips from the B-pillar lower trim panel.

Installation

1. To install, reverse the removal procedure.

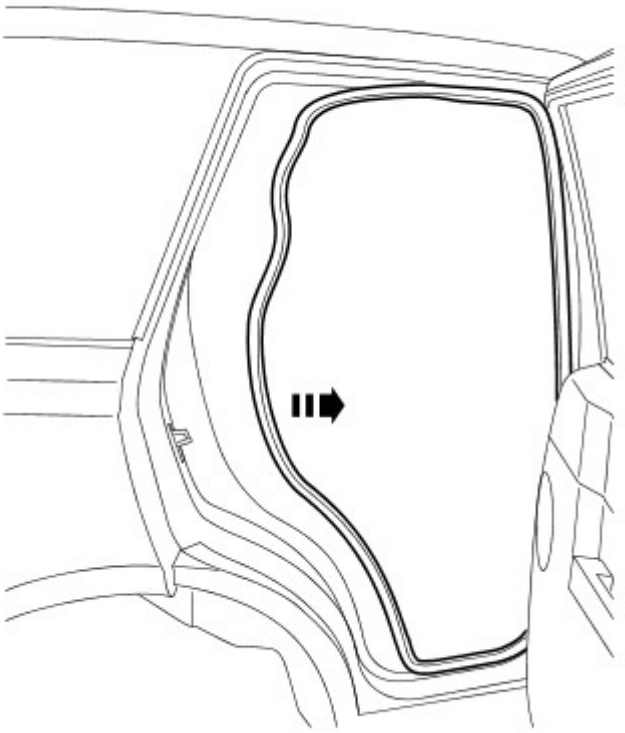
Published: 11-May-2011

Interior Trim and Ornamentation - C-Pillar Upper Trim Panel

Removal and Installation

Removal

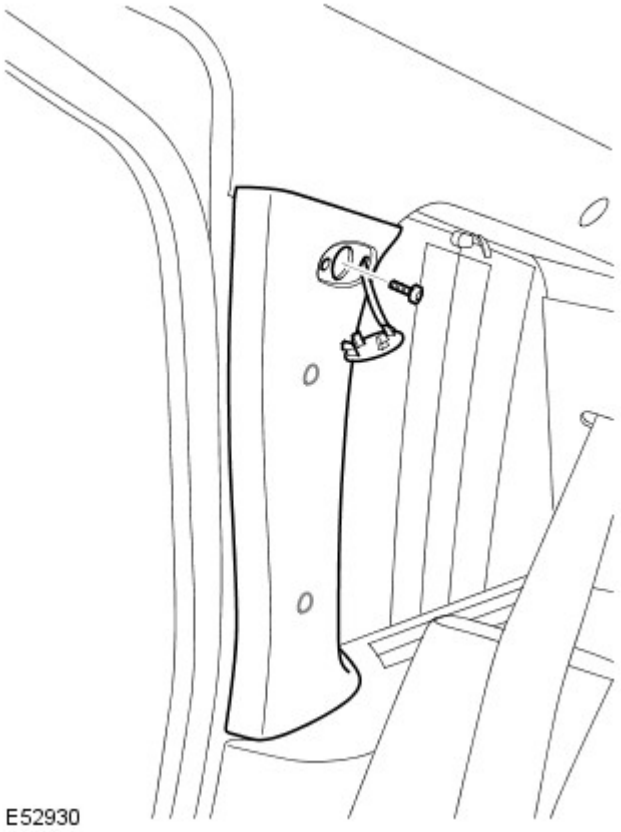
1. Release the door aperture weatherstrip.



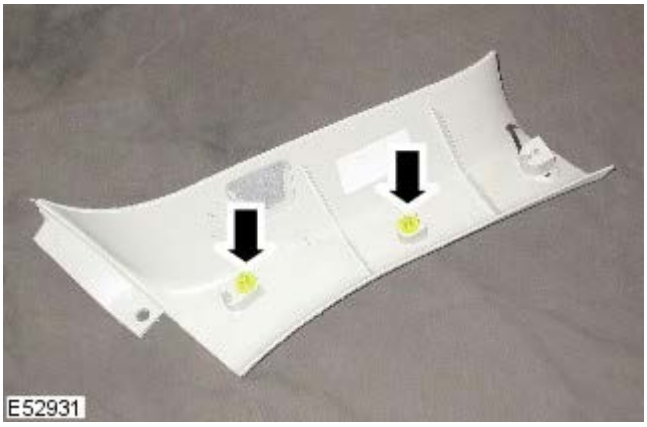
E52929

2. Release the font edge of the lower quarter trim panel.
3. Release the upper trim access cover.
4. NOTE: Do not disassemble further if the component is removed for access only.

   Remove the C-pillar upper trim panel.
   - Remove the Torx screw.
   - Release the 2 clips.



5. Remove the 2 C-pillar retaining clips.



Installation

1. Install the clips to the C-pillar upper trim panel.

2. Install the C-pillar upper trim panel.
   - Attach the safety belt.
   - Secure with the clips.
   - Tighten the Torx screw to 6 Nm (4 lb.ft).

3. Install the lower quarter trim panel
   - Carefully secure the clips.

4. Install the upper trim access cover.

5. Install the door aperture weatherstrip.

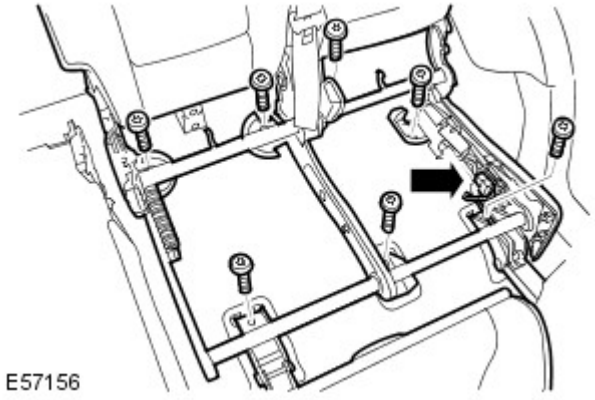
Published: 11-May-2011

Interior Trim and Ornamentation - D-Pillar Trim Panel

Removal and Installation

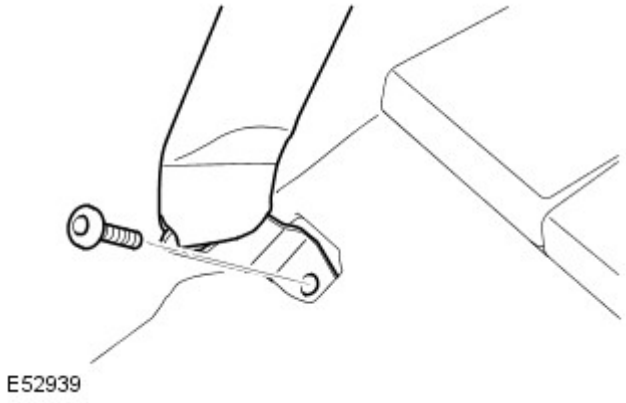
Removal

1. Remove the lower quarter trim panel.
   For additional information, refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).

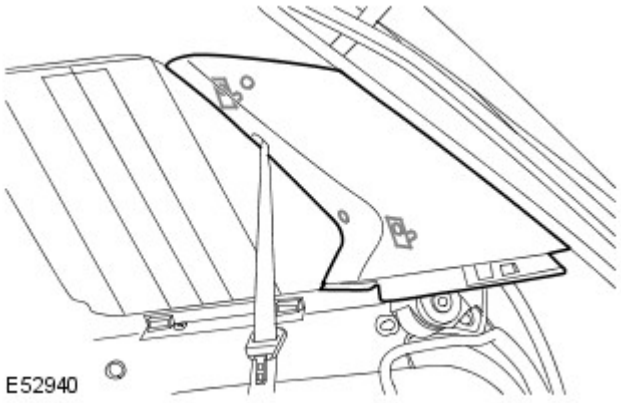


2. NOTE: Left-hand shown, right-hand similar.

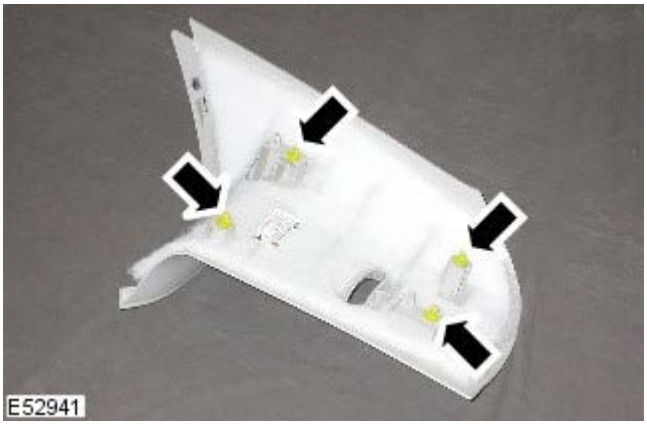
   With assistance, remove the rear seat assembly.
   - Remove and discard the 7 Torx bolts.
   - Disconnect the electrical connector.



3. Remove the safety belt lower anchor.
   - Remove and discard the Torx bolt.



4. Remove the D-pillar trim panel.
   - Release the 4 clips.
   - Release the safety belt from the trim panel.



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

   Remove the 4 clips from the D-pillar upper trim panel.

Installation

1. Install the clips to the D-pillar upper trim panel.

2. Install the D-pillar upper trim panel.
   - Position the safety belt through the trim panel.
   - Secure the clips.

3. Install the safety belt lower anchor.
   - Tighten the Torx bolt to 45 Nm (33 lb.ft).

4. With assistance, install the rear seat assembly.
   - Position the locating pegs.
   - Connect and secure the electrical connector.
   - Tighten the Torx bolts to 40 Nm (30 lb.ft).

5. Install the lower quarter trim panel
   For additional information, refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).

Published: 11-May-2011

Interior Trim and Ornamentation - Front Door Trim Panel

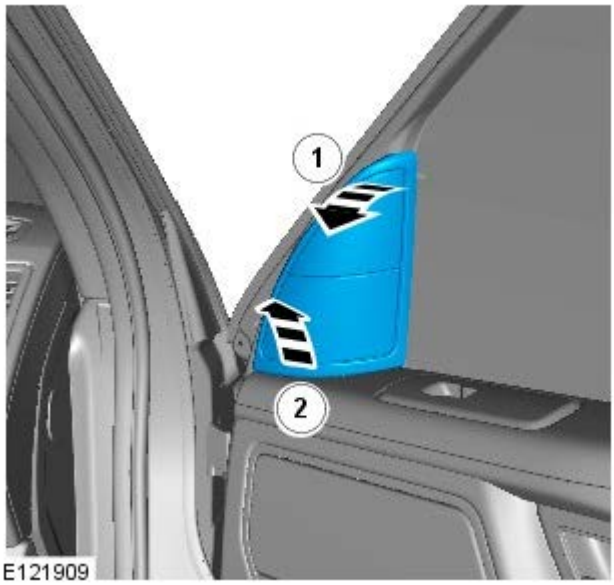
Removal and Installation

Removal

NOTES:

Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

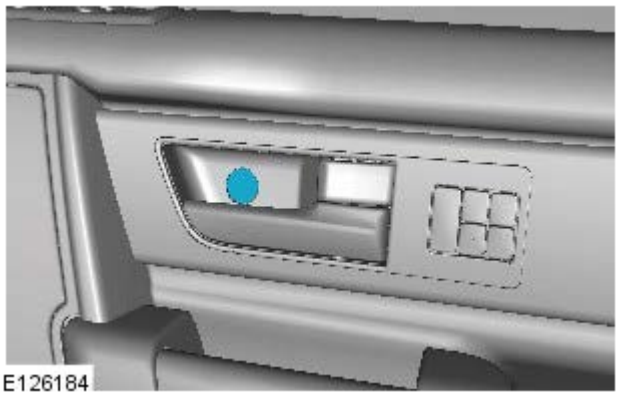


1. CAUTIONS:

   Take extra care not to damage the component.

   Make sure that the clips are correctly located.

   Disconnect the tweeter speaker electrical connector.



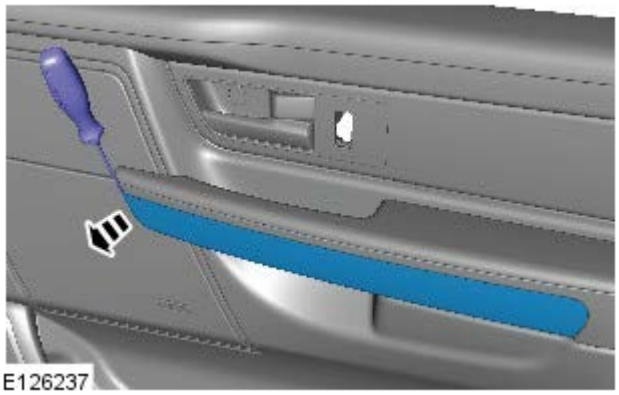
2.



3.

4. CAUTIONS:

   Take extra care not to damage the component. Apply masking tape to the end of the

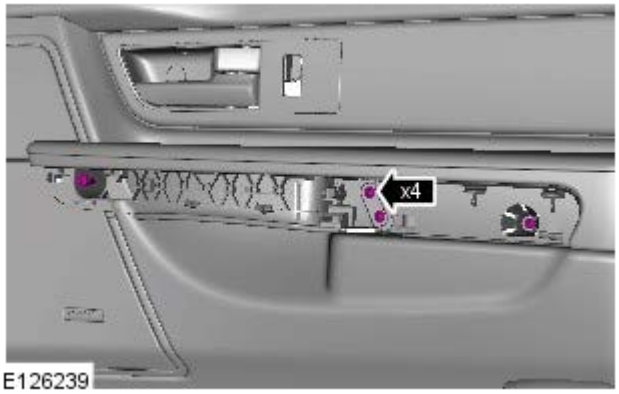


screwdriver.

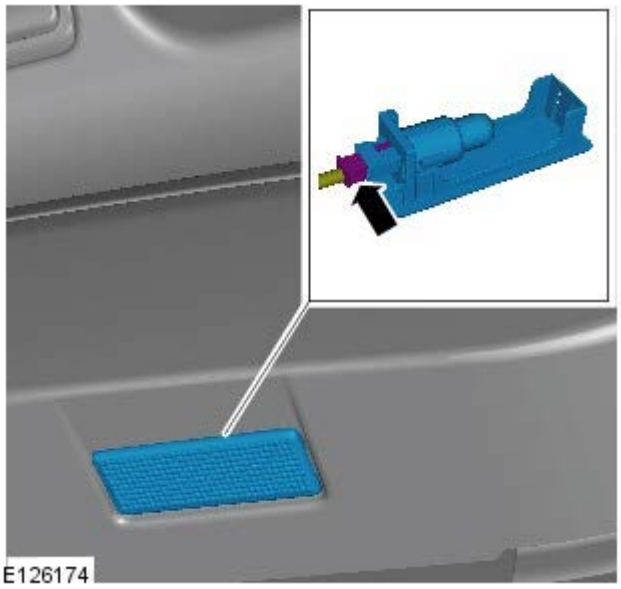
When removing the chrome finisher from the trim panel, make sure the components are not damaged. If necessary protect the surrounding areas using masking tape.

Make sure that the clips are correctly located.

5.



6.



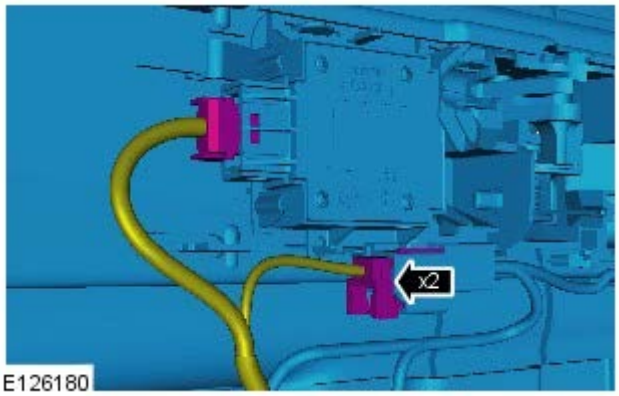
7. CAUTION: Take extra care not to damage the wiring harnesses.

Detach the front door trim panel.



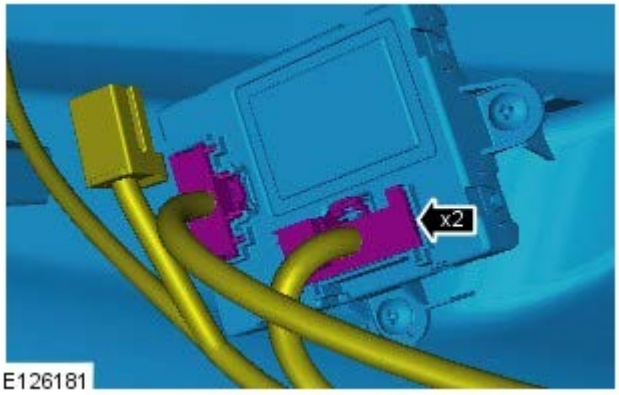
E126244

8.



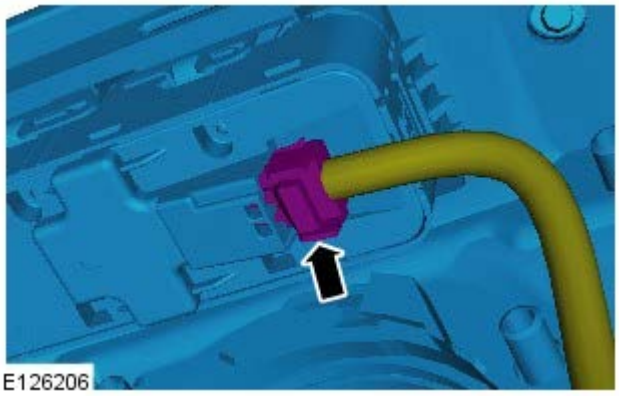
E126180

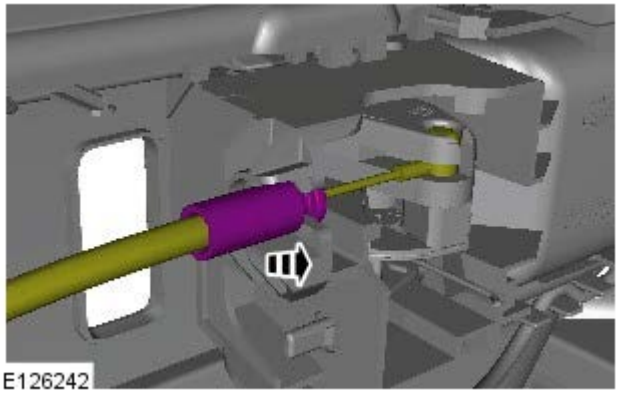
9.



E126181

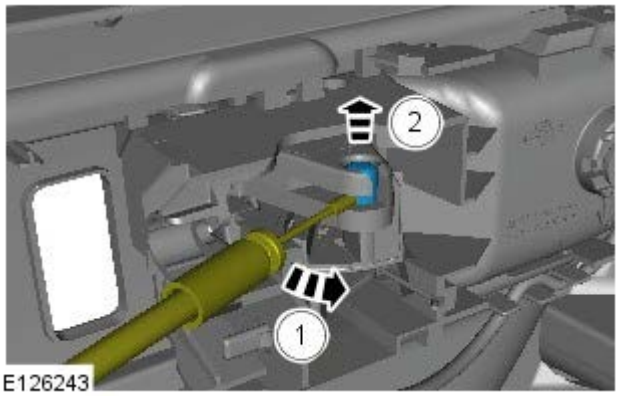
10.


E126206


E126242

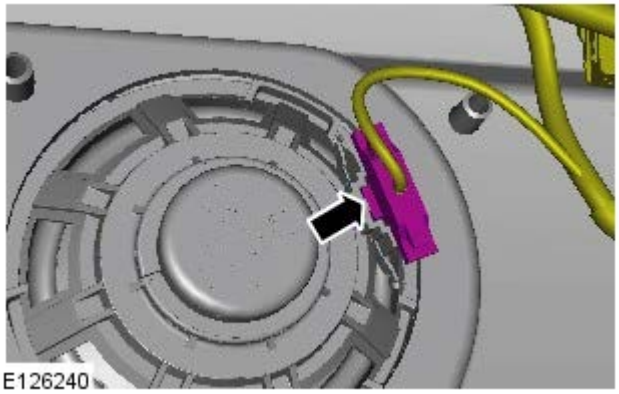
11. CAUTION: Make sure that the release cable is removed from the door trim panel using the plastic fixing and not using the cable.

12.



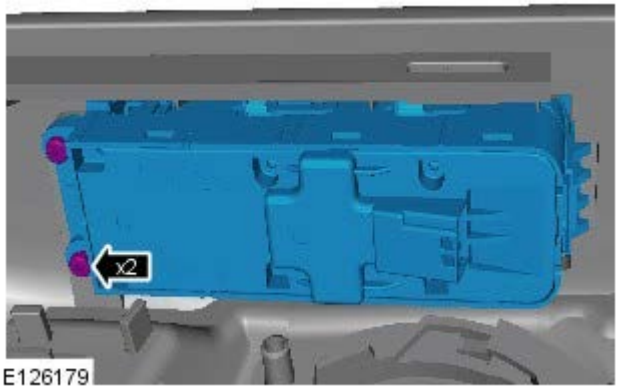
E126243

13. Remove the front door trim panel.


E126240

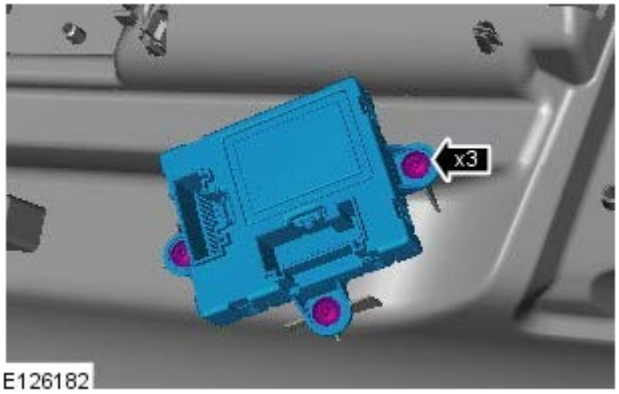
14. NOTE: Do not disassemble further if the component is removed for access only.

15.



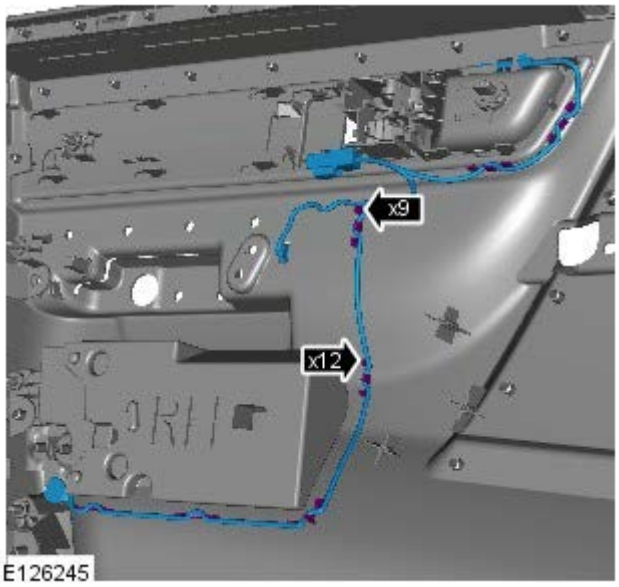
E126179

16.



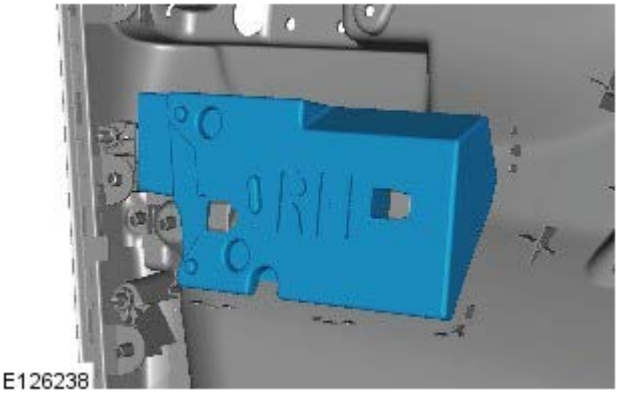
E126182

17.

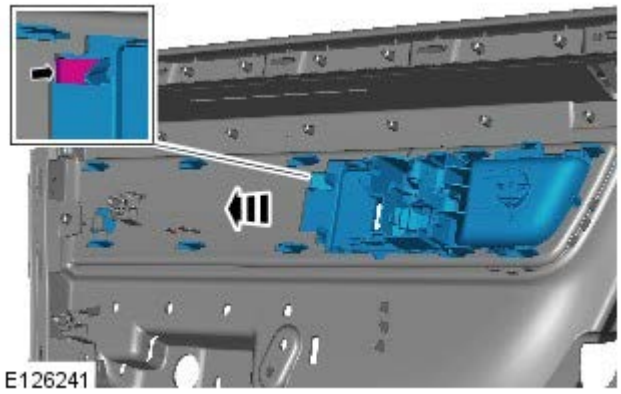


E126245

18.


E126238

19. Release the retaining tang.


E126241

20.



E126246

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Interior Trim and Ornamentation - Rear Door Trim Panel

Removal and Installation

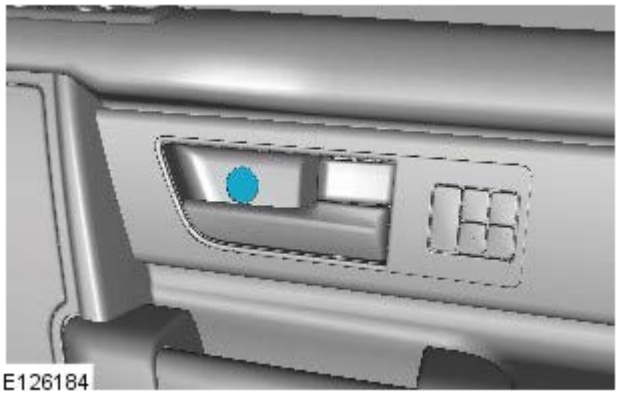
Removal

NOTES:

Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

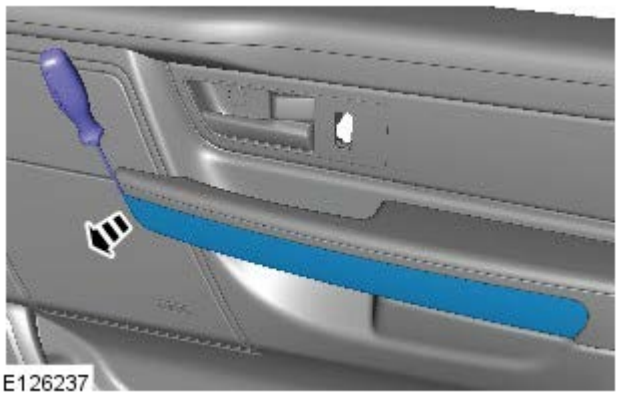
1.


E126184

2.


E126207

3. CAUTIONS:


E126237

Take extra care not to damage the component. Apply masking tape to the end of the screwdriver.

When removing the chrome finisher from the trim panel, make sure the components are not damaged. If necessary protect the surrounding areas using masking tape.

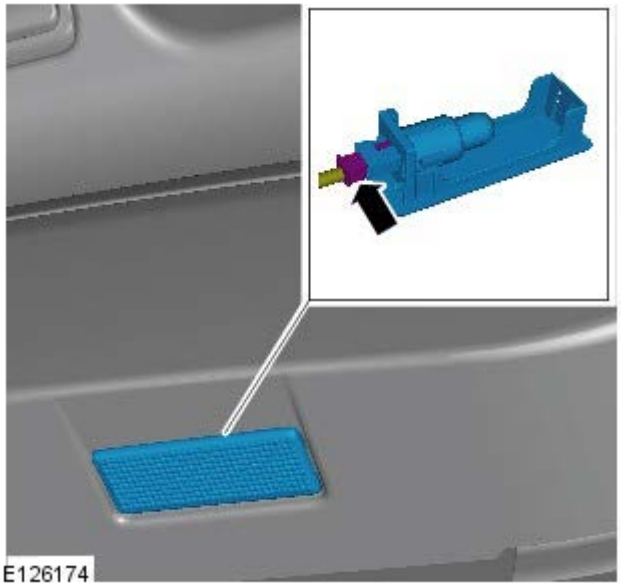
Make sure that the clips are correctly located.

4.



E126250

5.


E126174

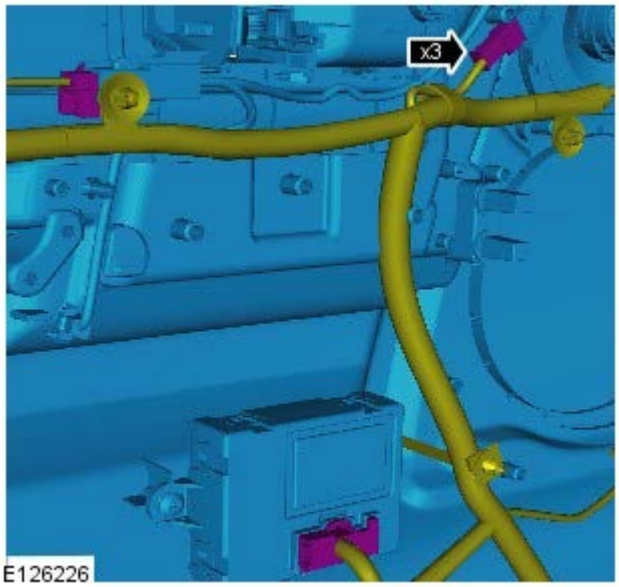
6. CAUTION: Take extra care not to damage the wiring harnesses.

Detach the rear door trim panel.

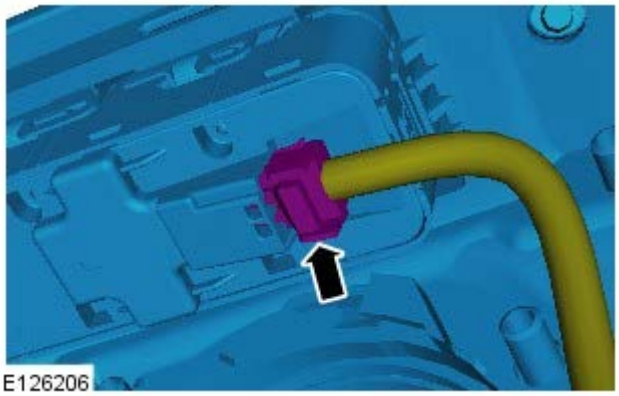


E126247

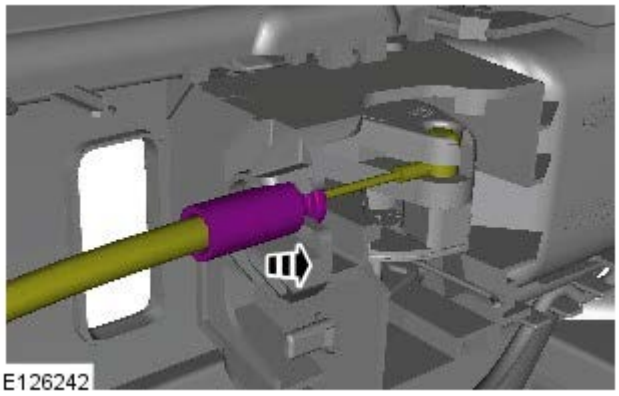
7.



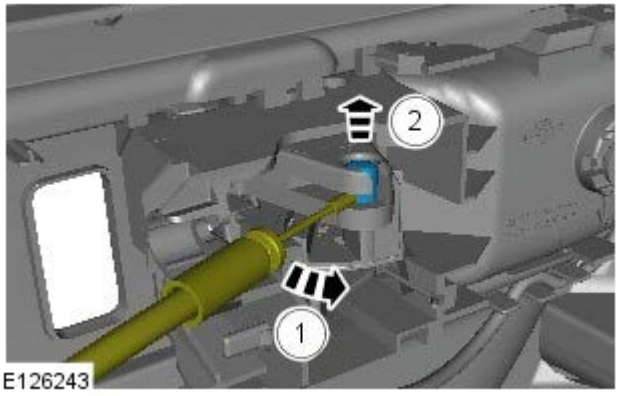
8.



9. CAUTION: Make sure that the release cable is removed from the door trim panel using the plastic fixing and not using the cable.



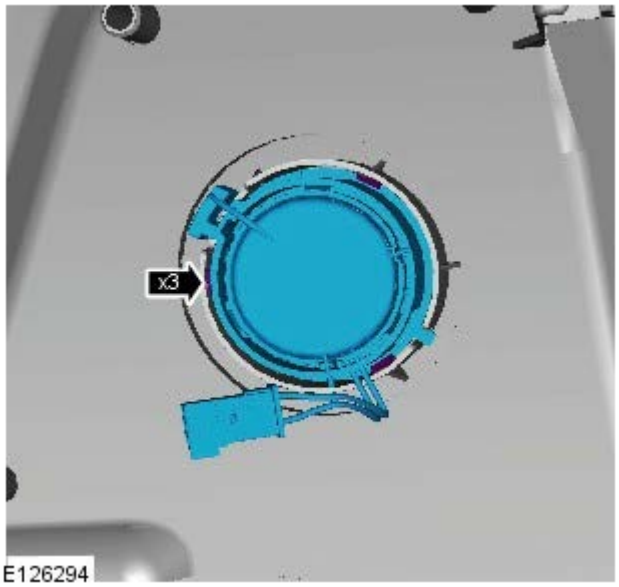
10.



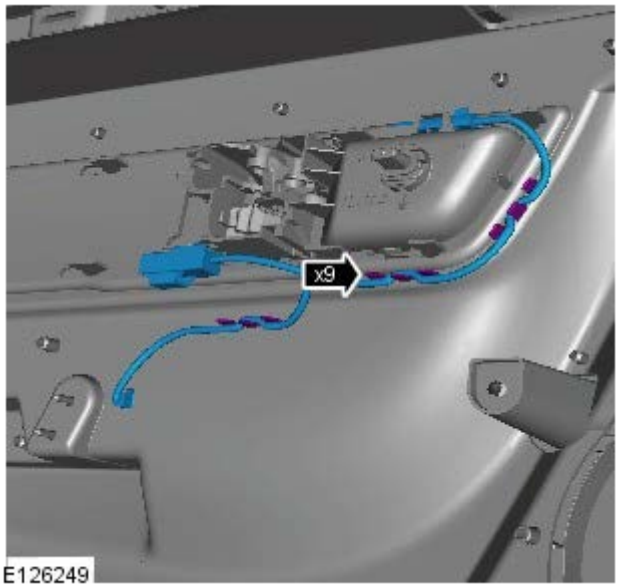
11. Remove the rear door trim panel.

12. NOTE: Do not disassemble further if the

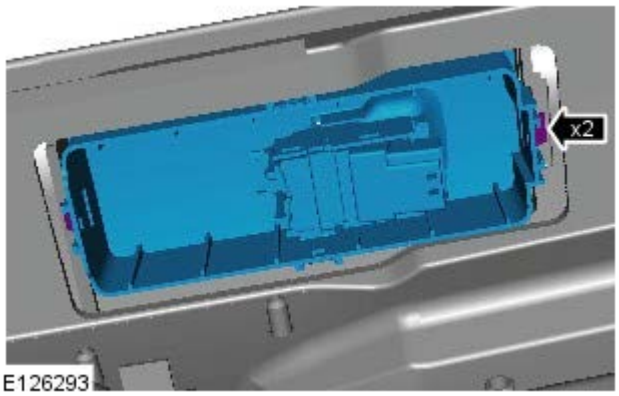
component is removed for access only.



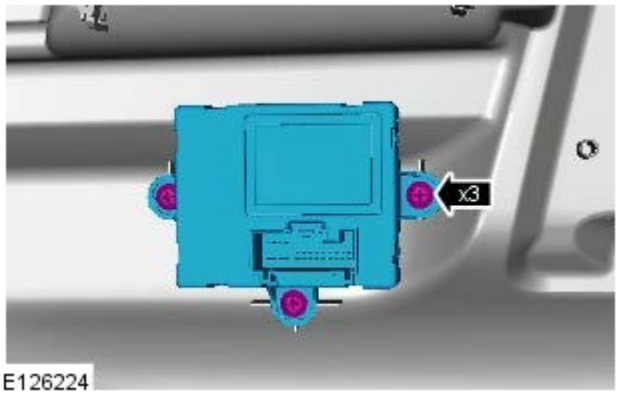
13.



14.

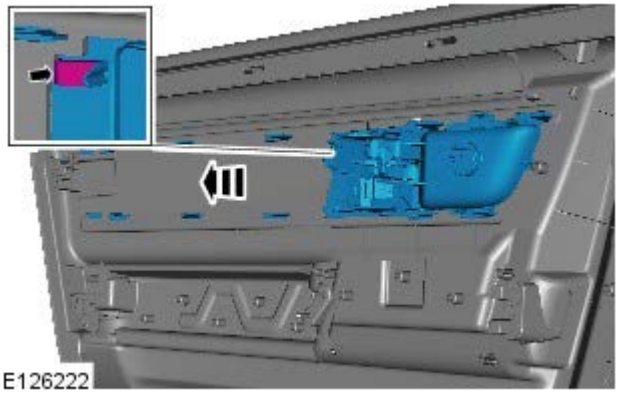


15.



E126224

16. Release the retaining tang.


E126222

17.



E126248

Installation

1. To install, reverse the removal procedure.

Published: 19-Dec-2012

Interior Trim and Ornamentation - Scuff Plate Trim Panel

Removal and Installation

Removal

NOTES:

Some components shown removed for clarity.

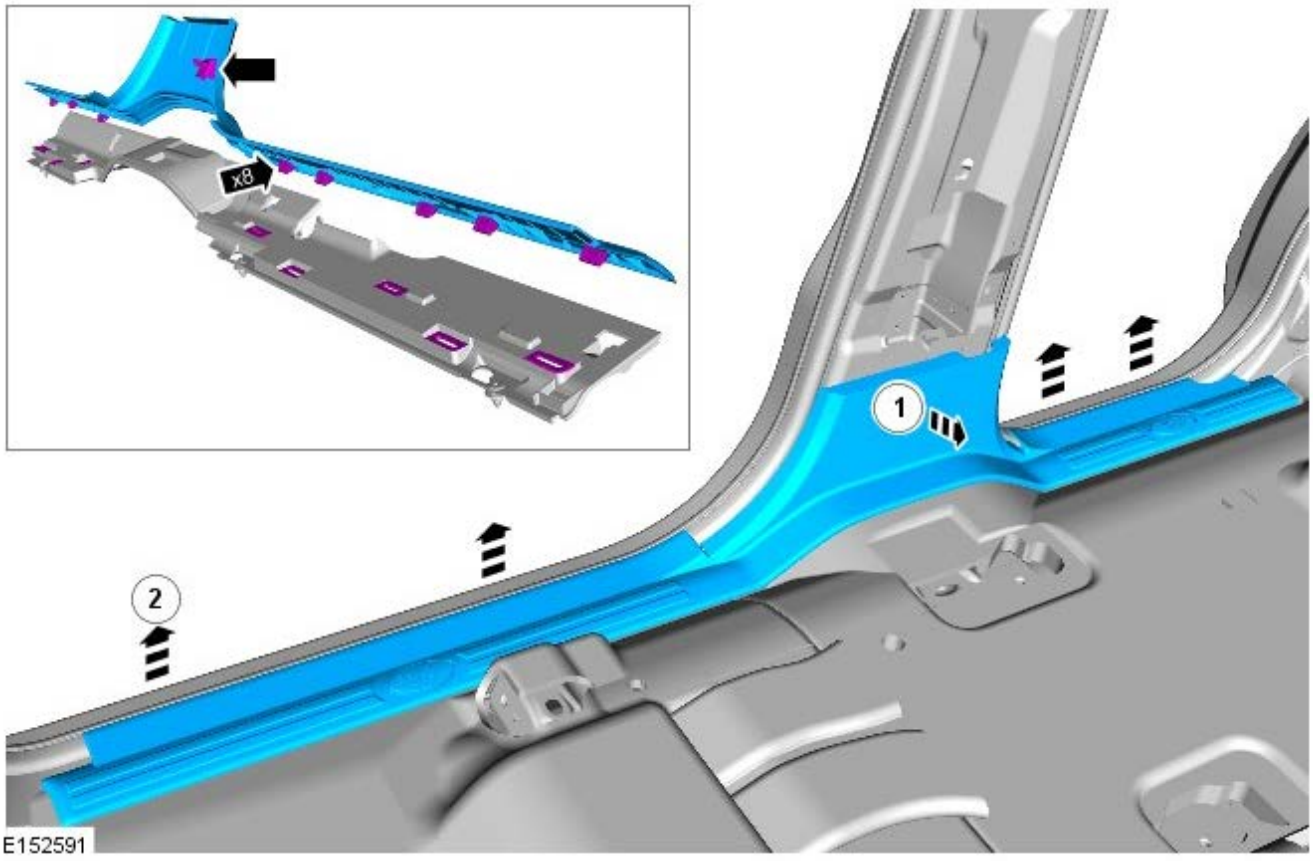
Some variation in the illustrations may occur, but the essential information is always correct.

Removal steps in this procedure may contain installation details.

RH shown, LH similar.

1. Remove the B-pillar lower trim panel.
   For additional information, refer to: B-Pillar Lower Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. CAUTION: Care must be taken when releasing the trim panel from the retaining clips.



Installation

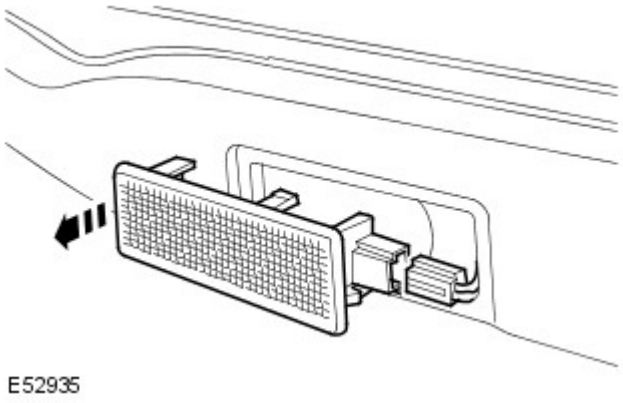
1. To install, reverse the removal procedure.

Published: 16-Nov-2011

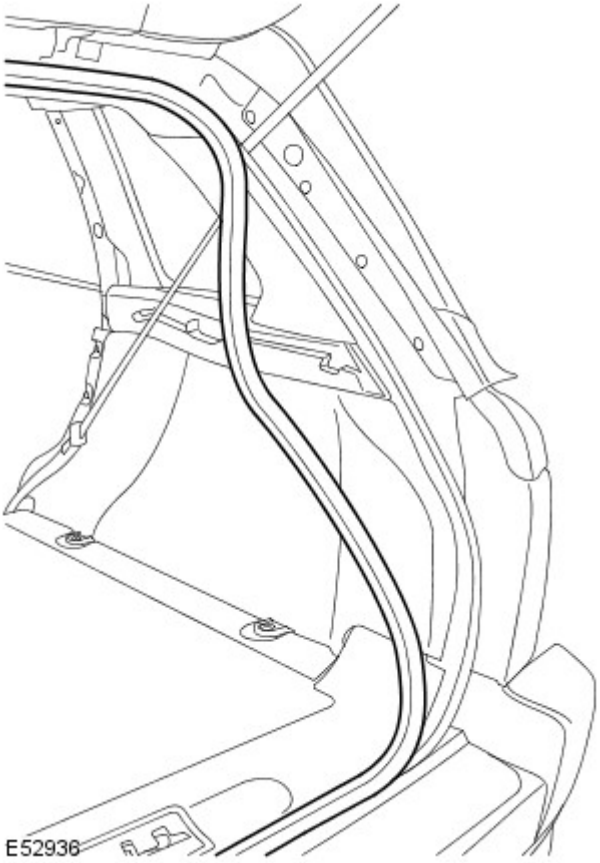
Interior Trim and Ornamentation - Rear Quarter Trim Panel

Removal and Installation

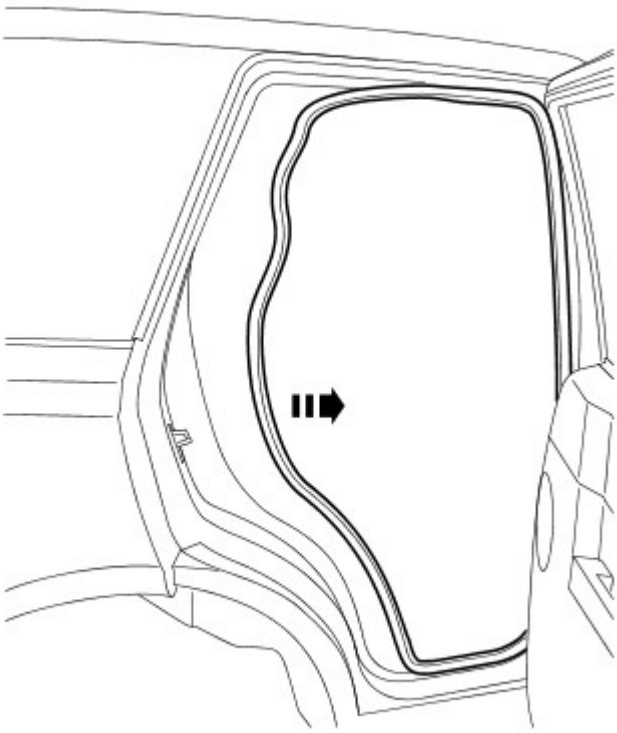
Removal



1. If installed, remove the loadspace lamp unit.
   - Carefully release the lamp.
   - Disconnect the electrical connector.
2. Release the liftgate seal.

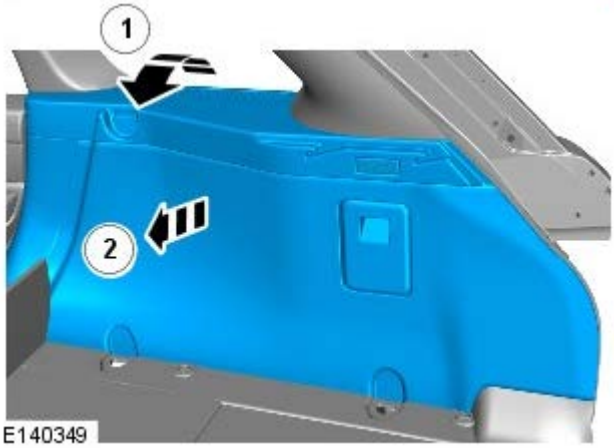


3. Fold the seat assembly forwards.
4. Remove the door frame seal.



E52929





E140349

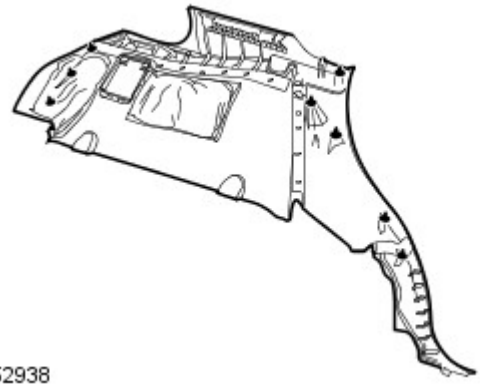
5. CAUTION: Do not remove clips by pulling on carpeted section of the quarter trim panel.

   NOTE: Note the fitted position.

   Remove the lower quarter trim panel.
   1. Release the 2 window clips using a firm grip on the vent grilles.
   2. Release remaining 8 clips using a suitable tool.

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

   Remove the 8 clips.



E52938

Installation

1. Install the clips.

2. Install the load space lamp unit.
   - Connect the electrical connector.

3. NOTE: Align to the position noted on removal.

   Install the lower quarter trim panel
   - Secure the clips.
   - Install the access cover.

4. Install the liftgate seal.

5. Install the door seal.

6. Fold seat assembly rearwards.

Published: 30-Sep-2011

Interior Trim and Ornamentation - Headliner

Removal and Installation

Removal

NOTES:

Some variation in the illustrations may occur, but the essential information is always correct.

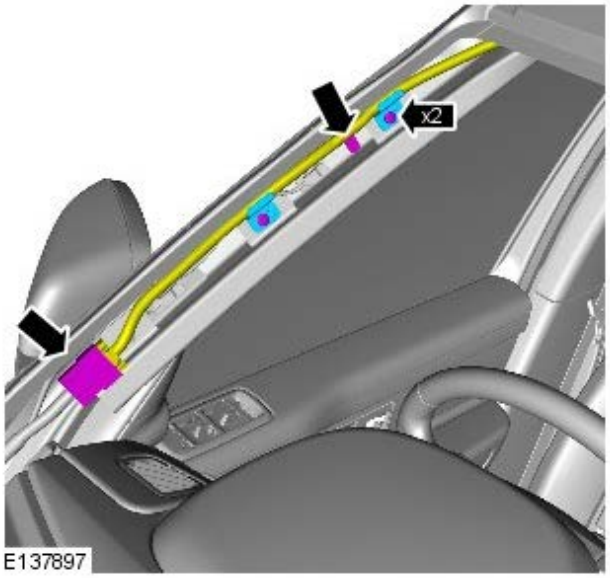
Removal steps in this procedure may contain installation details.

All vehicles

1. NOTE: Repeat the procedure for the other side.

   Refer to: A-Pillar Trim Panel (501-05, Removal and Installation).

2. *Torque:* 9 Nm



3. NOTE: Repeat the procedure for the other side.

   Refer to: B-Pillar Lower Trim Panel (501-05, Removal and Installation).

4. NOTE: Repeat the procedure for the other side.

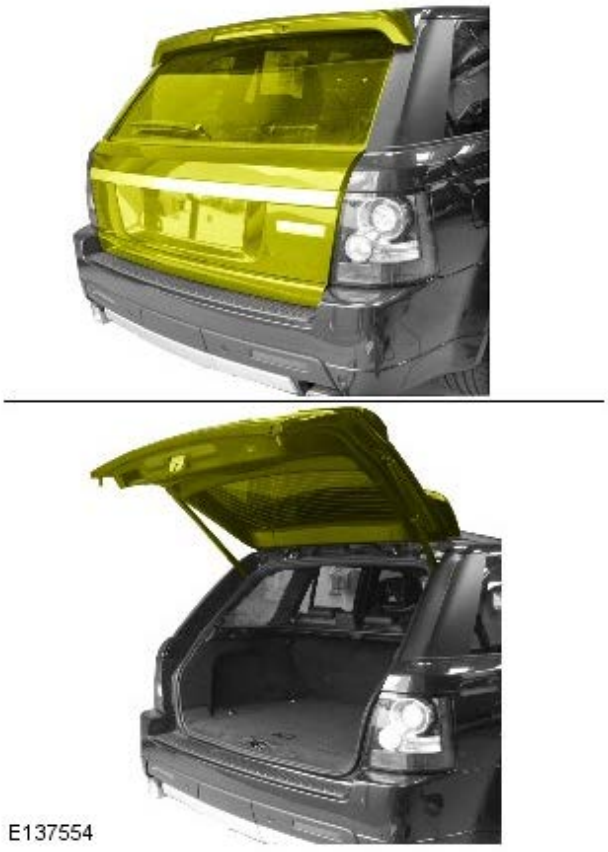


E138875

5. NOTE: Repeat the procedure for the other side.

   Refer to: C-Pillar Upper Trim Panel (501-05, Removal and Installation).

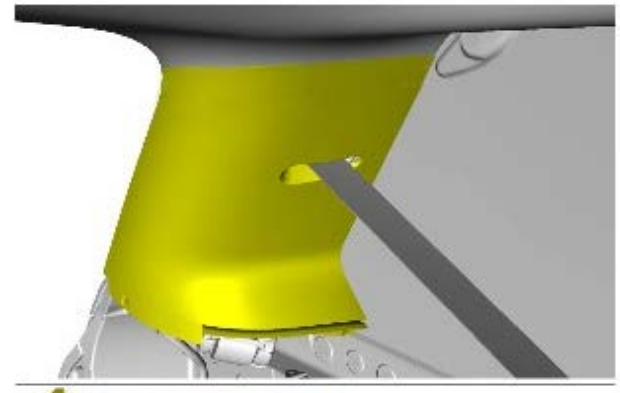
6.

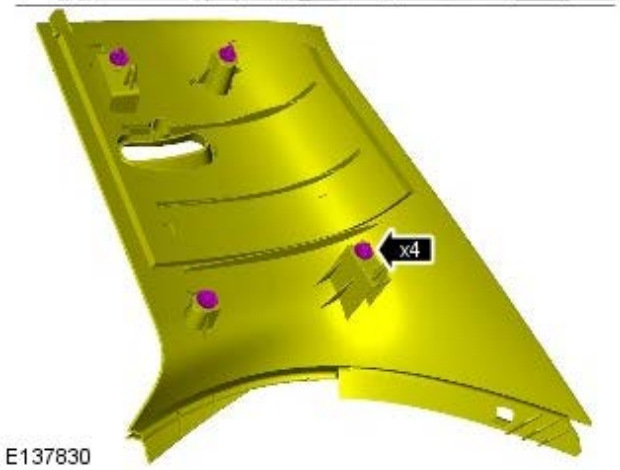


E137554

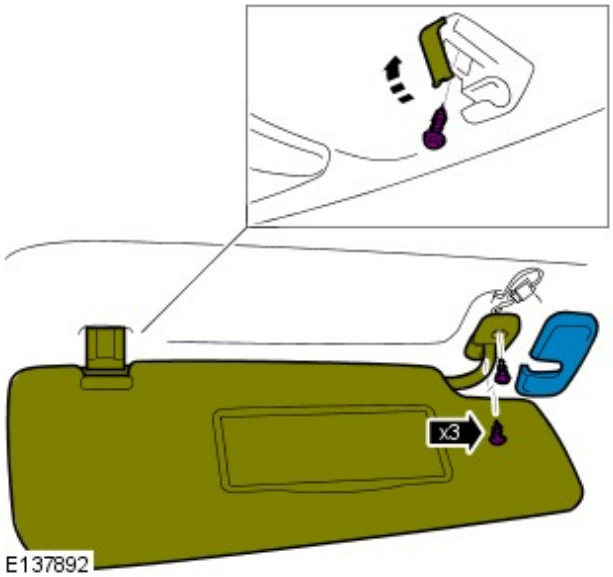
7. NOTE: Repeat the procedure for the other side.

   Refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).





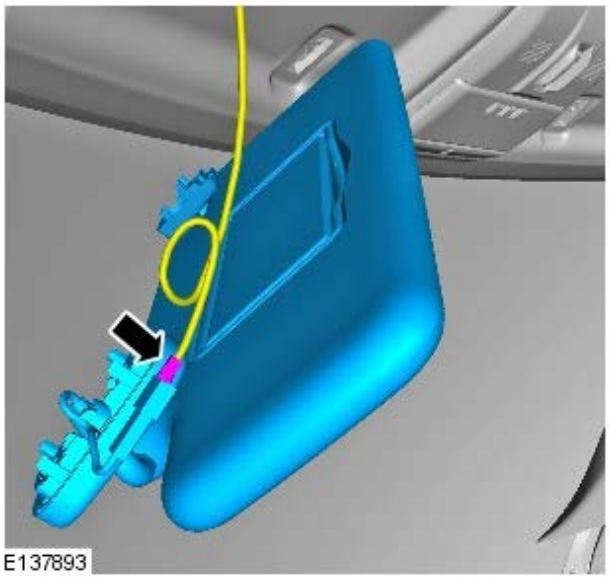
8. NOTE: Repeat the procedure for the other side.



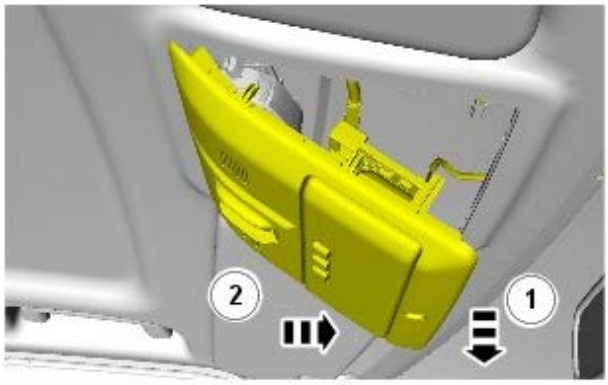
9. NOTE: Repeat the procedure for the other side.

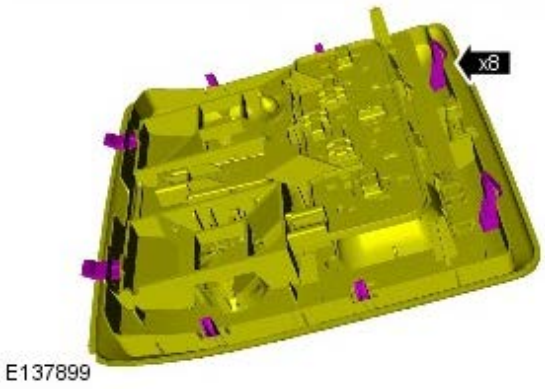
Torque: 5 Nm

10. NOTE: Repeat the procedure for the other side.

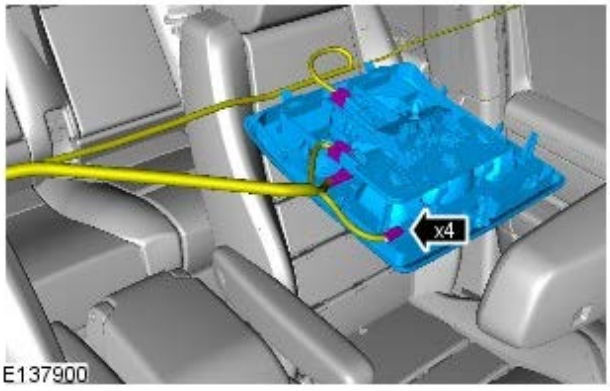


11.

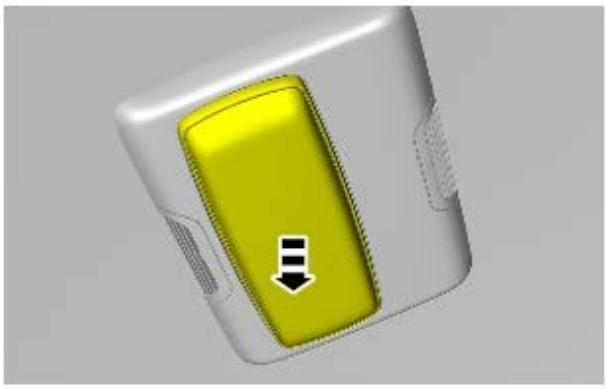




12.

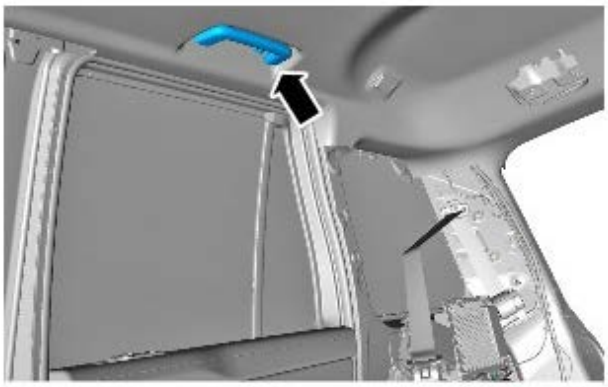


13.



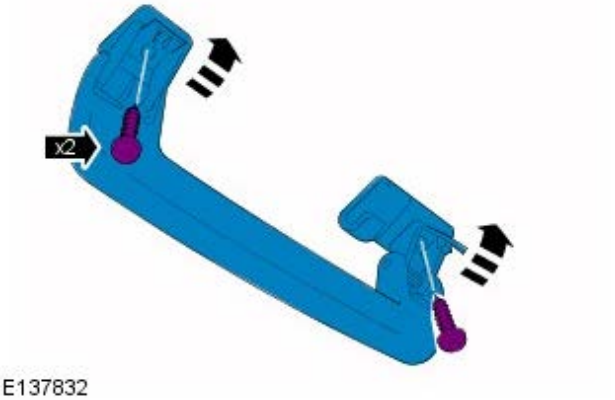


E138884



14. NOTE: Repeat the procedure for the other side.

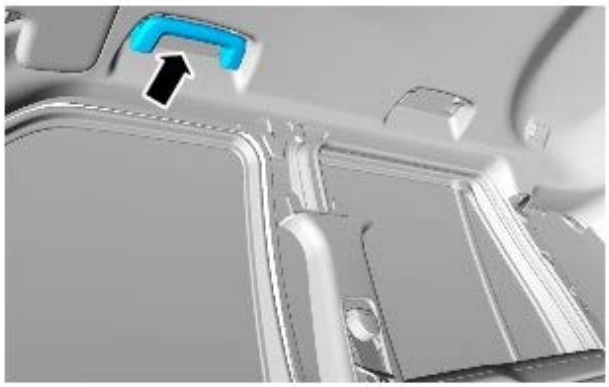
Torque: 3 Nm

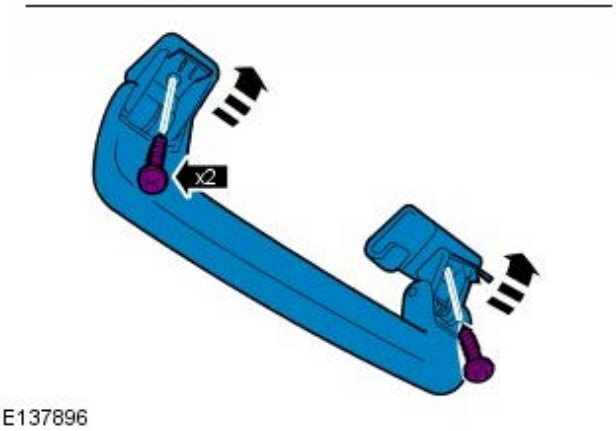


E137832

15. NOTE: Repeat the procedure for the other side.

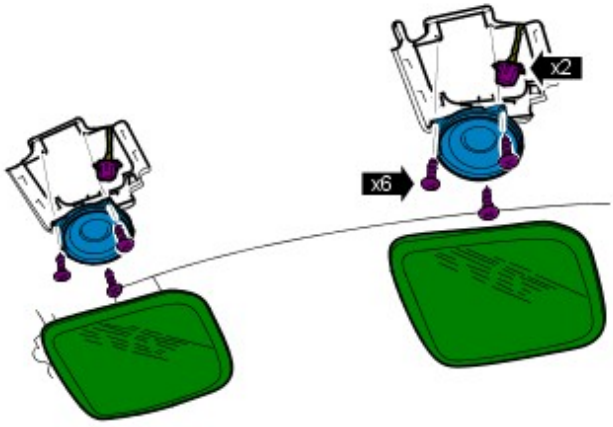
Torque: 3 Nm





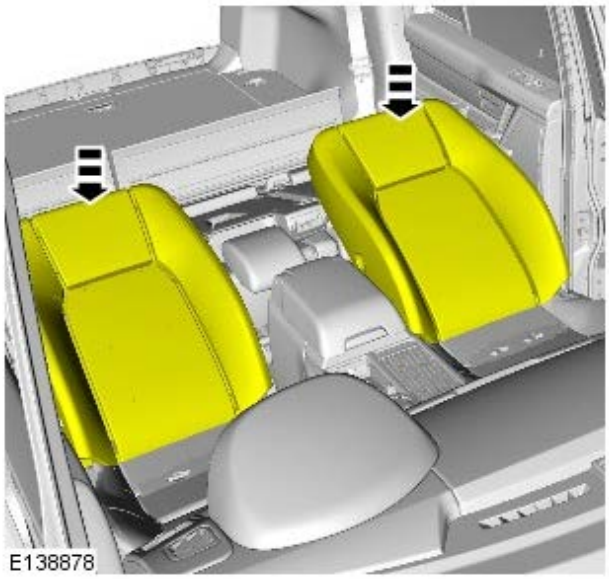
E137896

16.



E138877

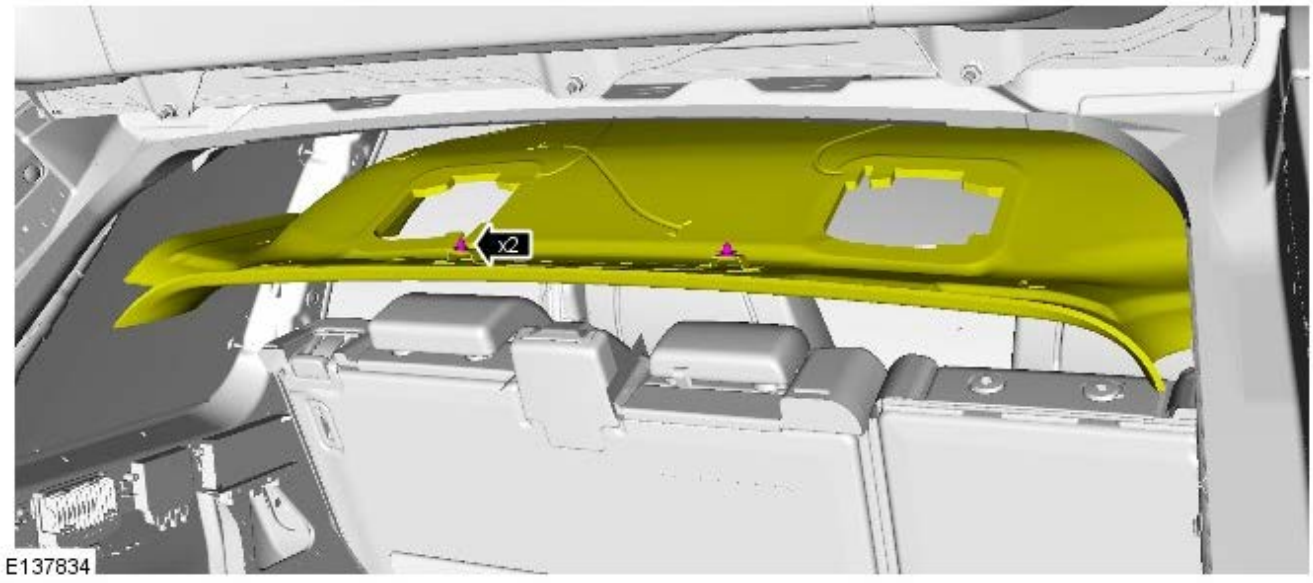
17.



18. WARNING: This step requires the aid of another technician.

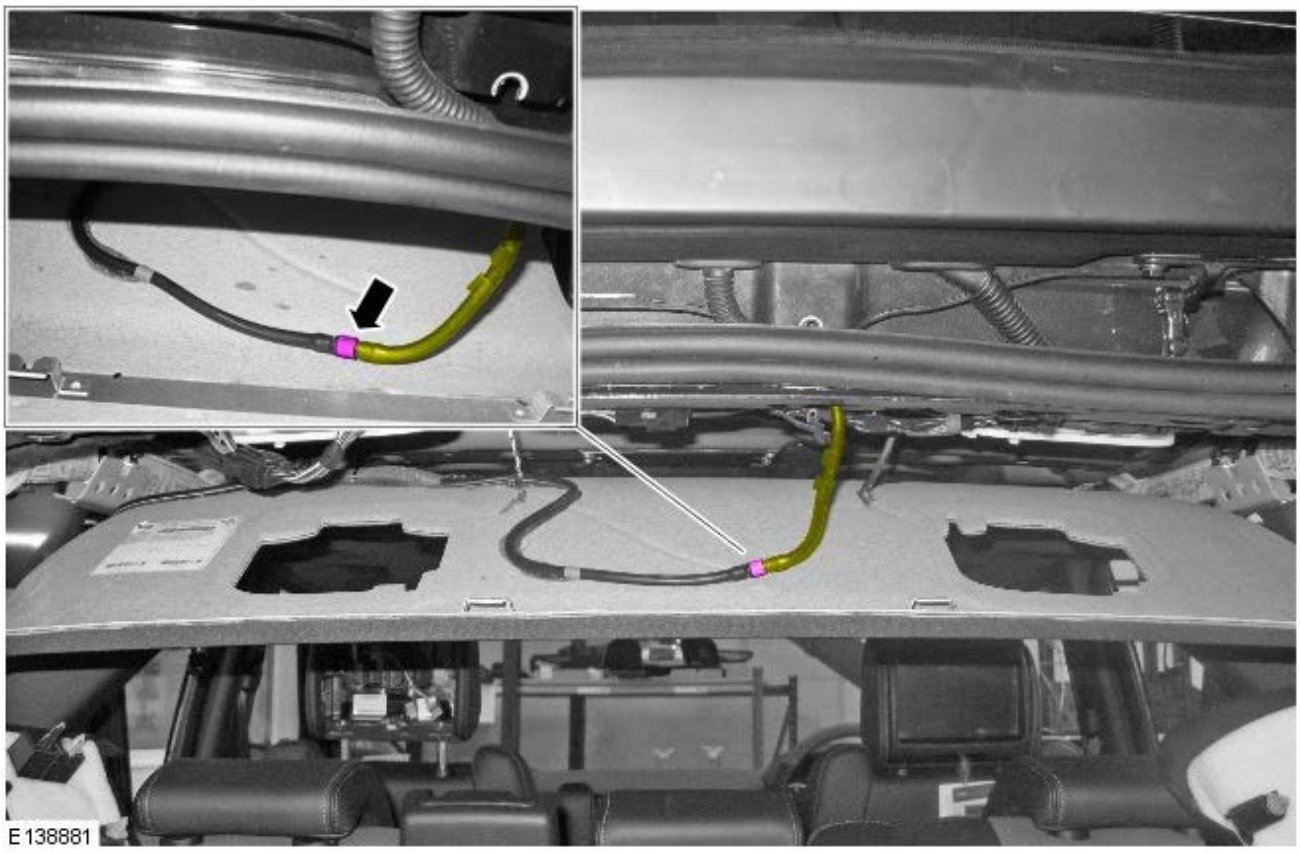
CAUTION: Make sure damage is not caused to the headliner.

NOTE: Support as necessary.



19. CAUTION: Make sure damage is not caused to the headliner.

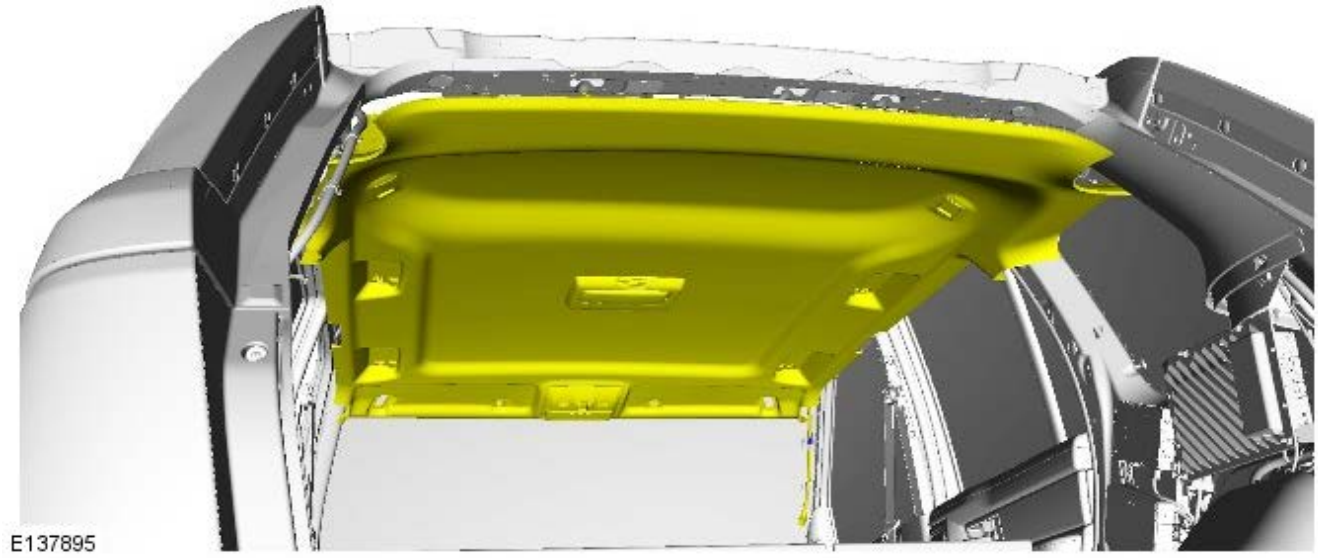
NOTE: Lower and reposition the headliner to aid access.



Vehicles without roof opening panel

20. CAUTION: Make sure damage is not caused to the headliner.

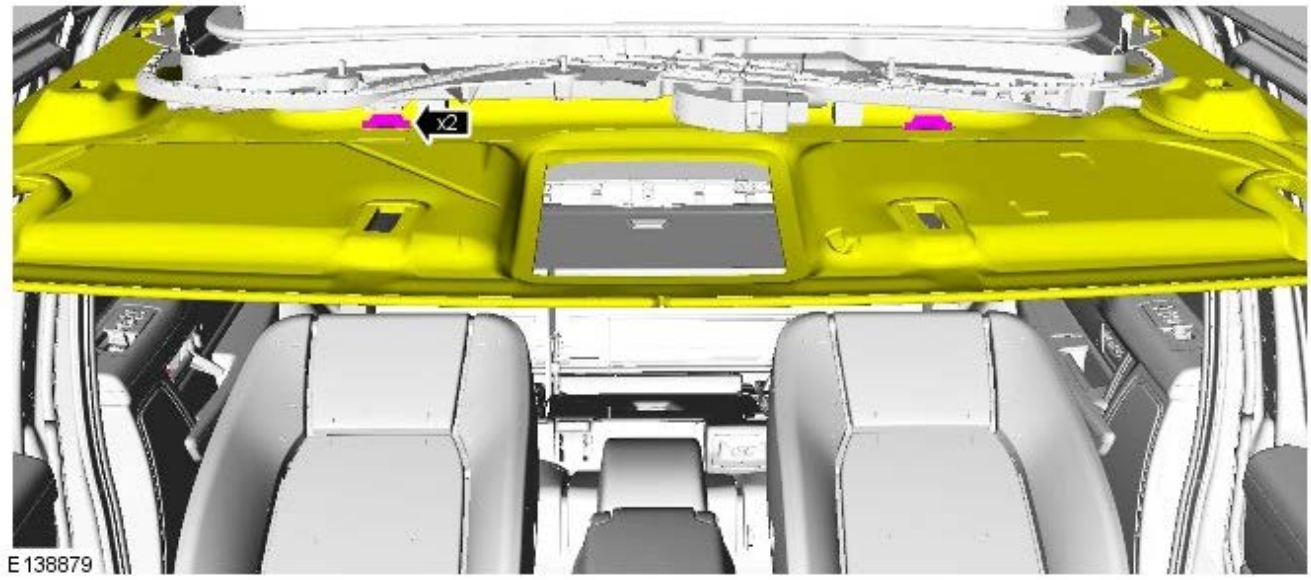
NOTE: This step requires the aid of another technician.



Vehicles with roof opening panel

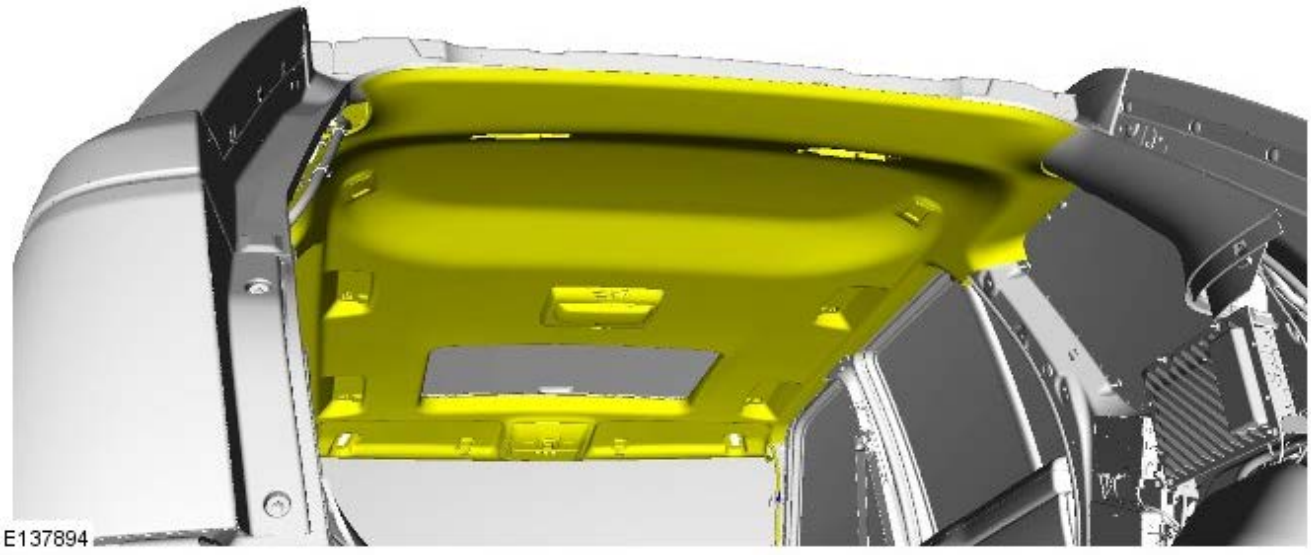
21. WARNING: This step requires the aid of another technician.

NOTE: Support as necessary.



22. WARNING: This step requires the aid of another technician.

CAUTION: Make sure damage is not caused to the headliner.

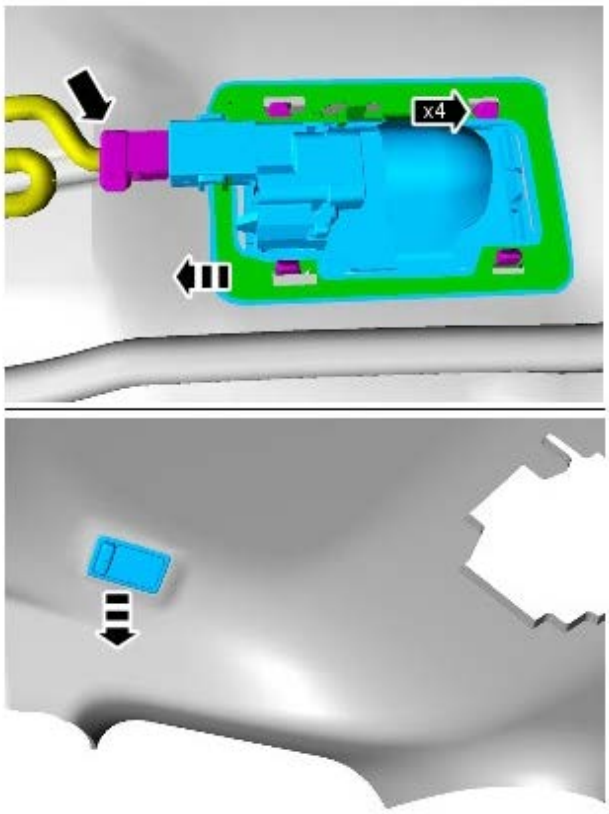


All vehicles

23. NOTES:

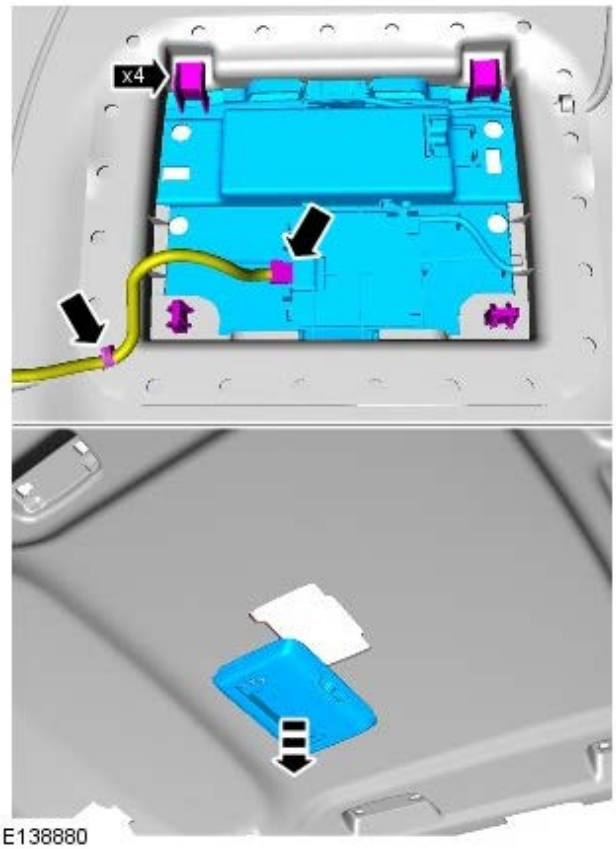
Do not disassemble further if the component is removed for access only.

Repeat the procedure for the other side.



E138876

24.

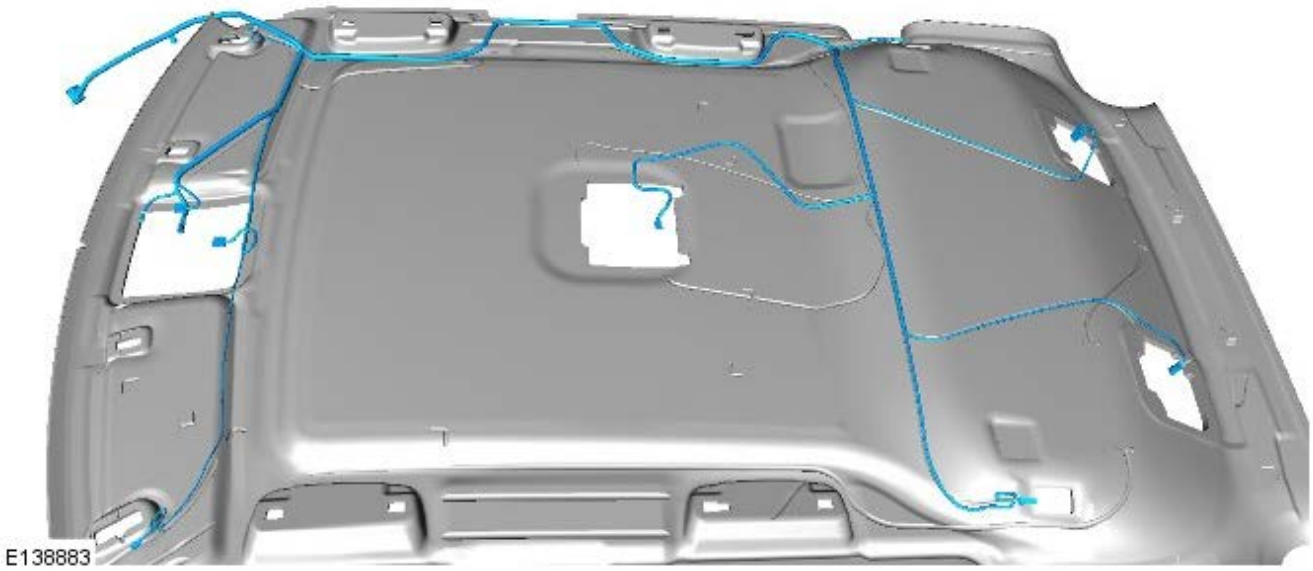


E138880

25. CAUTION: Make sure damage is not caused to the headliner.



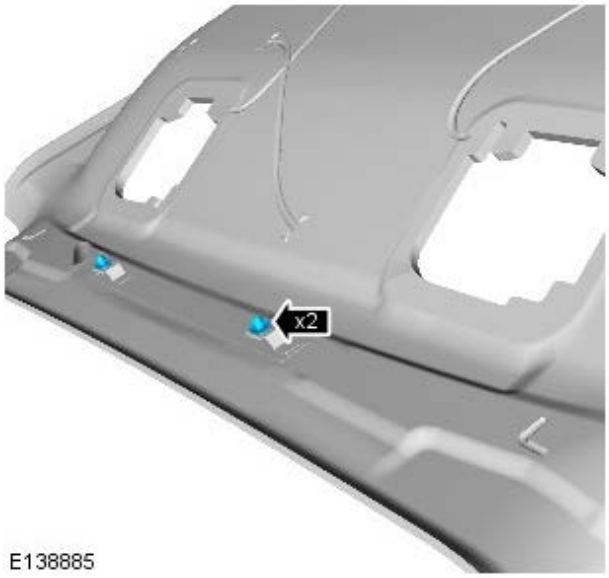
26. CAUTION: Make sure damage is not caused to the headliner.



27. CAUTION: Make sure damage is not caused to the headliner.



28.



Installation

1. To install, reverse the removal procedure.

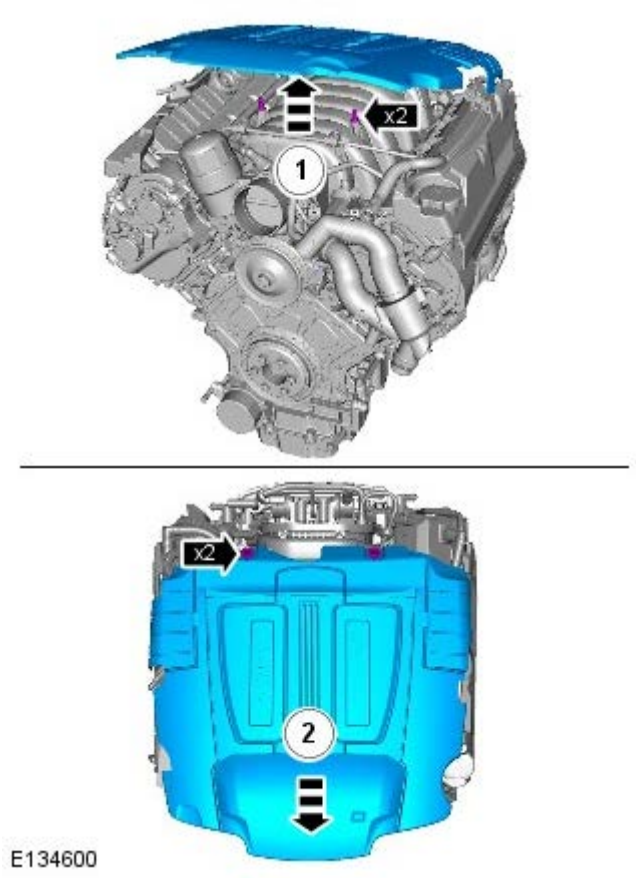
Published: 11-May-2011

Interior Trim and Ornamentation - Engine Cover V8 5.0L Petrol/V8 S/C 5.0L Petrol

Removal and Installation

Removal

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



1. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Installation

1. To install, reverse the removal procedure.

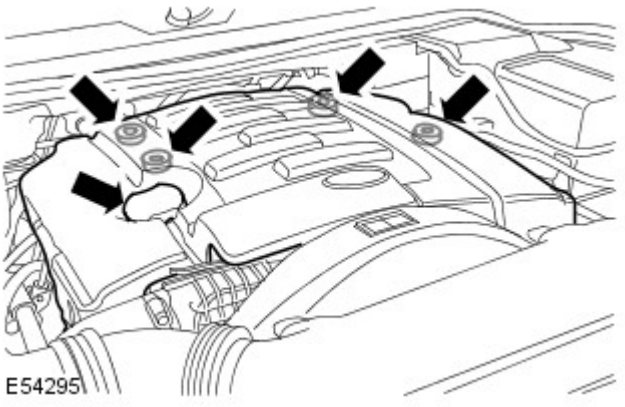
Published: 11-May-2011

Interior Trim and Ornamentation - Engine Cover TDV6 3.0L Diesel

Removal and Installation

Removal

NOTE: Some variation in the illustrations may occur, but the essential information is always correct.



1.
- Remove the oil filler cap.
- Release the 4 clips.

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Interior Trim and Ornamentation - Cowl Side Trim Panel

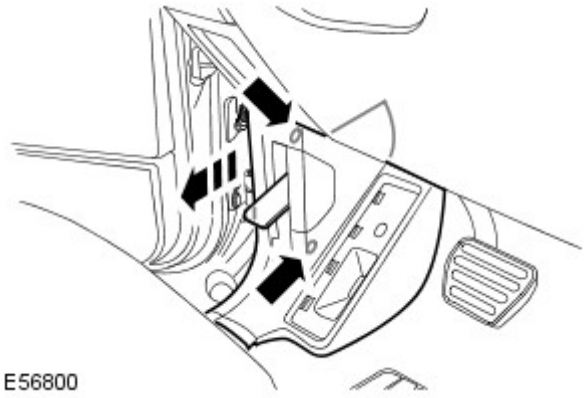
Removal and Installation

Removal

1. Remove the front scuff plate trim panel.
   For additional information, refer to: Cowl Side Trim Panel (501-05, Removal and Installation).



2. Driver side: Remove the footrest trim panel bolt.
   - Remove the cover.



3. Remove the cowl side trim panel.
   - Driver side: Release the hood release lever.
   - Release from the 2 clips.

Installation

1. Install the cowl side trim panel.
   - Align the hood release lever.
   - Secure with the clips.

2. Driver side: Tighten the footrest trim panel bolt to 5 Nm (4 lb.ft).
   - Install the cover.

3. Install the front scuff plate trim panel.
   For additional information, refer to: Cowl Side Trim Panel (501-05, Removal and Installation).

Published: 11-May-2011

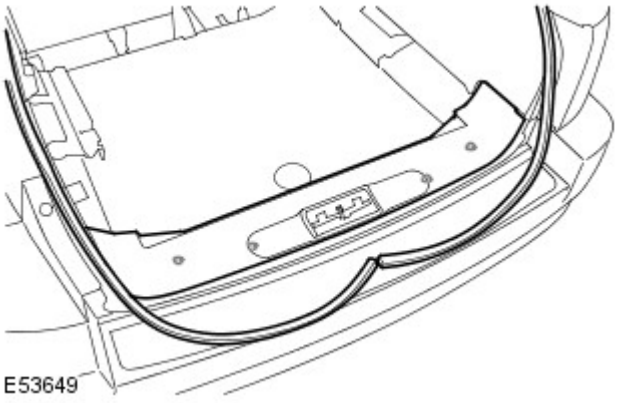
Interior Trim and Ornamentation - Loadspace Scuff Plate Trim Panel

Removal and Installation

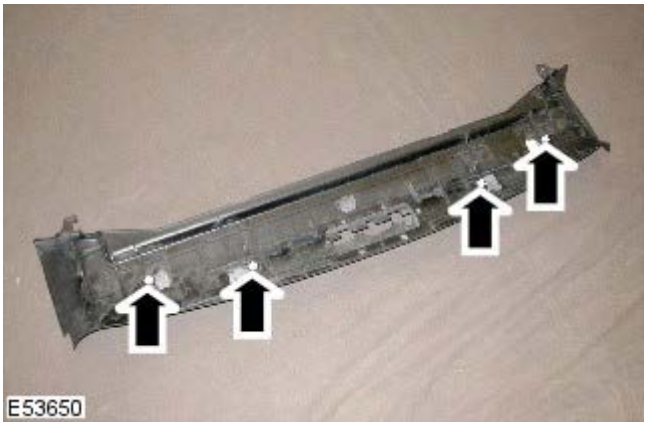
Removal

1. Remove the LH loadspace trim panel.
   For additional information, refer to: Loadspace Trim Panel LH (501-05, Removal and Installation).

2. Remove the RH loadspace trim panel.
   For additional information, refer to: Loadspace Trim Panel RH (501-05, Removal and Installation).



3. Remove the loadspace scuff plate .
   - Release the liftgate seal.
   - Release the 4 clips.



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

   Remove the retaining clips.

Installation

1. Install the clips.

2. Install the loadspace scuff plate.
   - Position the locating pegs.
   - Secure the clips.
   - Install the liftgate seal.

3. Install the LH loadspace trim panel.
   For additional information, refer to: Loadspace Trim Panel LH (501-05, Removal and Installation).

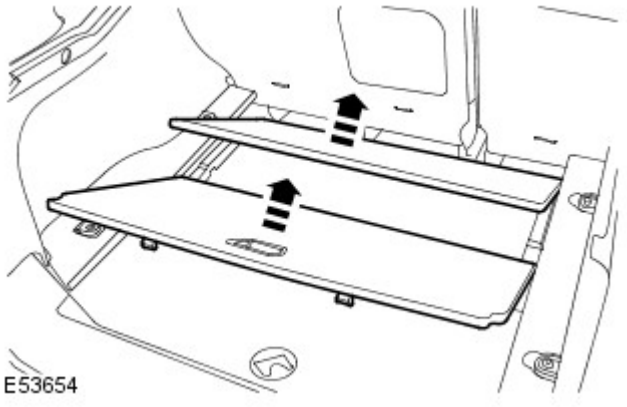
4. Install the RH loadspace trim panel.
   For additional information, refer to: Loadspace Trim Panel RH (501-05, Removal and Installation).

Published: 11-May-2011

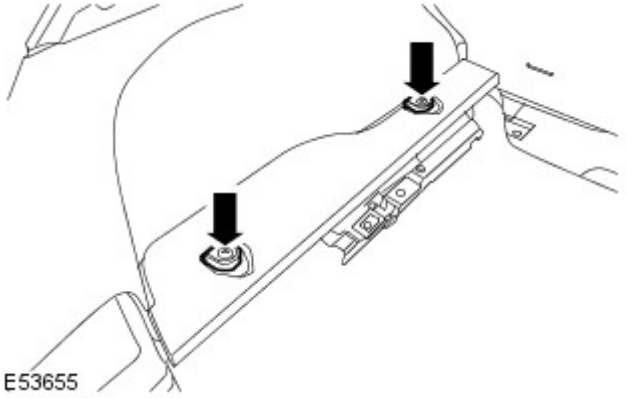
Interior Trim and Ornamentation - Loadspace Trim Panel LH

Removal and Installation

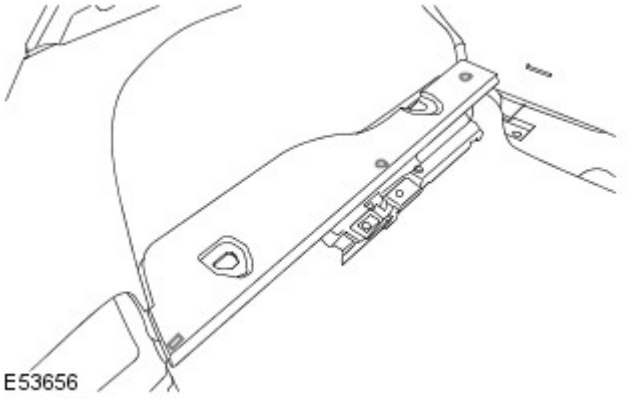
Removal



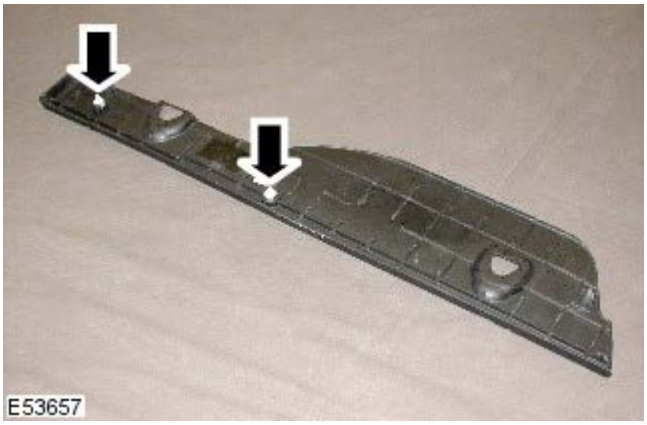
1. Remove the loadspace floor panels.
    - Lift and remove the front panel.
    - Lift and remove the rear panel.



2. Remove the loadspace compartment anchors.
    - Remove the bolt.
    - Repeat the above procedure for the other anchor.



3. Remove the loadspace trim panel.
    - Release the 3 clips.



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

   Remove the 2 clips.

Installation

1. Install the clips.

2. Install the loadspace trim panel.
    - Secure the clips.
    - Position the locating pegs.

3. Install the loadspace compartment anchors.
    - Position the locating peg.
    - Tighten the bolt to 25 Nm (18 lb.ft).
    - Repeat the above procedure for the other anchor.

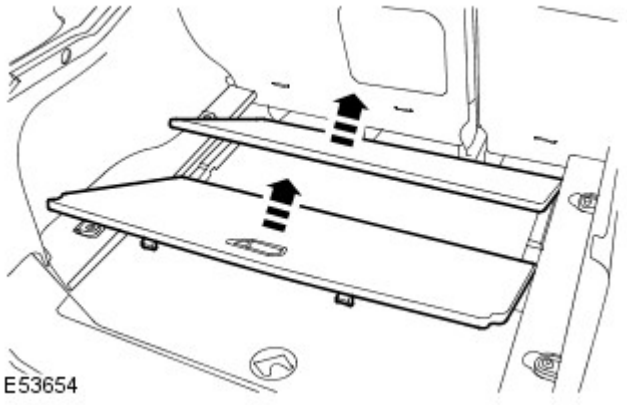
4. Install the loadspace floor panels.

Published: 11-May-2011

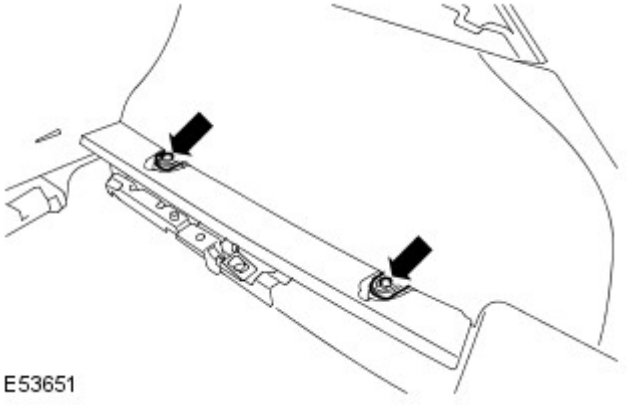
Interior Trim and Ornamentation - Loadspace Trim Panel RH

Removal and Installation

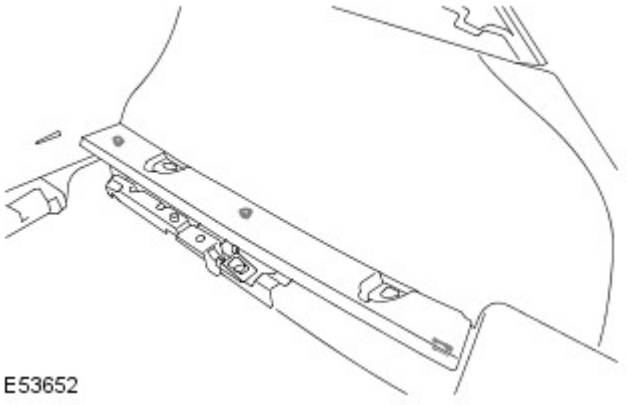
Removal



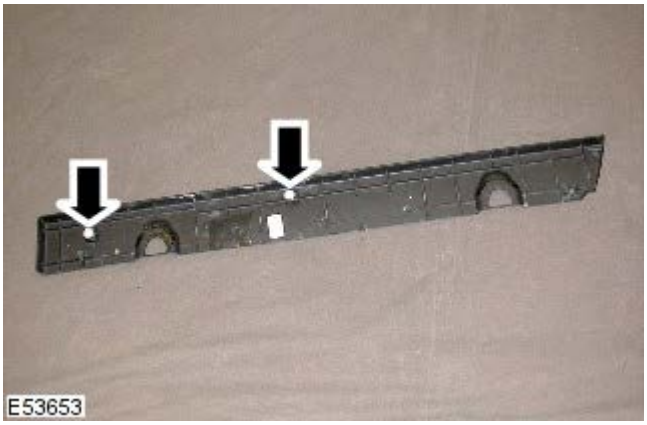
1. Remove the loadspace floor panels.
    - Lift and remove the front panel.
    - Lift and remove the rear panel.



2. Remove the loadspace compartment anchors.
    - Remove the bolt.
    - Repeat the above procedure for the other anchor.



3. Remove the loadspace trim panel.
    - Release the 3 clips.



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

   Remove the 2 clips.

Installation

1. Install the clips.

2. Install the loadspace trim panel.
    - Secure the clips.
    - Position the locating pegs.

3. Install the loadspace compartment anchors.
    - Position the locating peg.
    - Tighten the bolt to 25 Nm (18 lb.ft).
    - Repeat the above procedure for the other anchor.

4. Install the loadspace floor panels.

Published: 15-Jul-2013

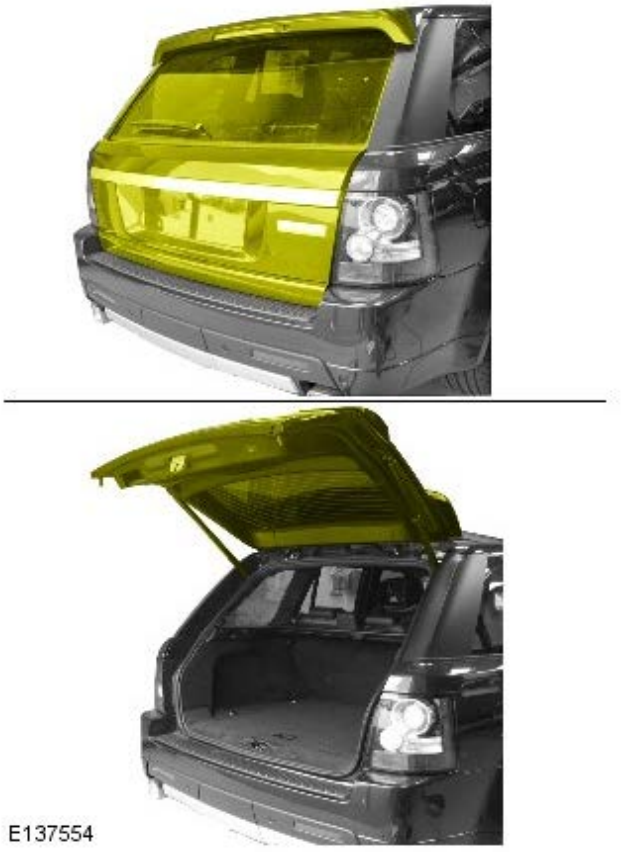
Interior Trim and Ornamentation - Liftgate Trim Panel

Removal and Installation

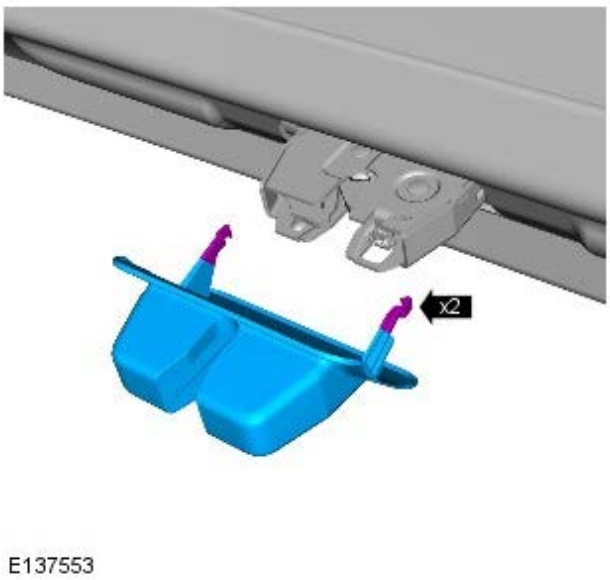
Removal

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

1.



2.



3.



E137555

4. *Torque:* 12 Nm



E137556

5.

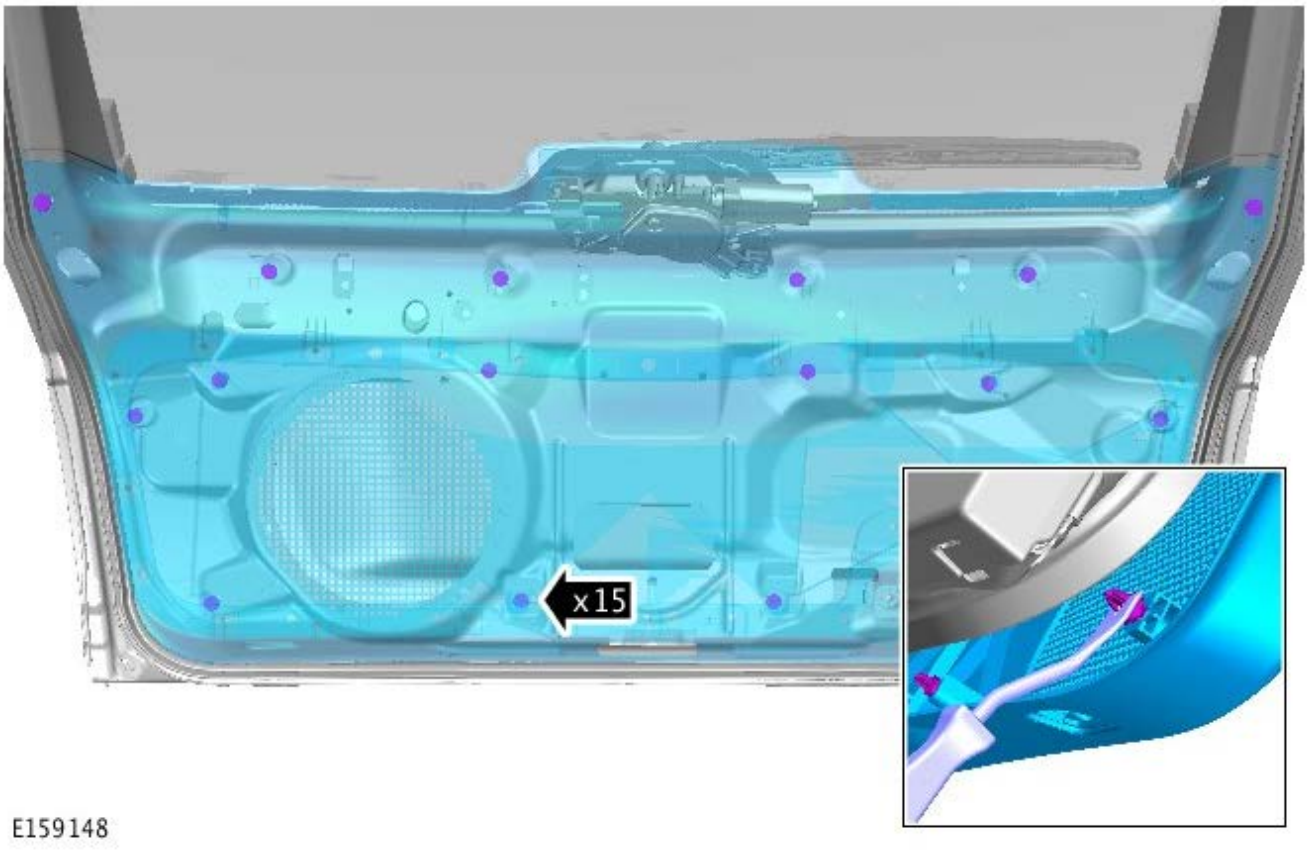


6. CAUTIONS:

   Care must be taken when releasing the trim panel from the retaining clips.

   Make sure the clips are correctly located.

   Using a suitable trim tool, release the trim from the lower edge first.



E159148

Installation

1. To install, reverse the removal procedure.

Published: 16-Jan-2013

Interior Trim and Ornamentation - Front Door Trim Veneer

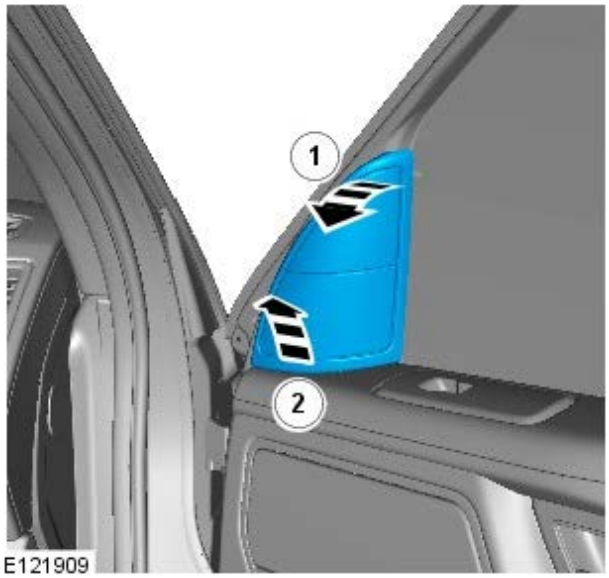
Removal and Installation

Removal

NOTES:

Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

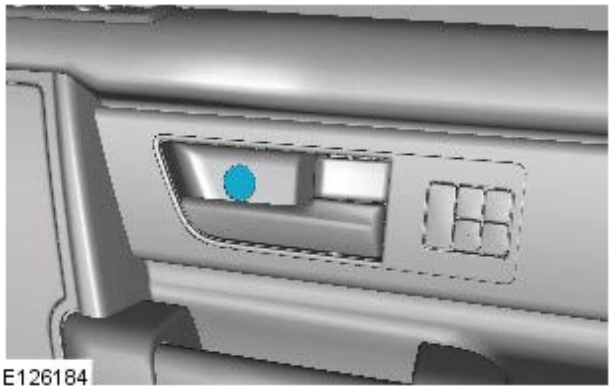


1. CAUTIONS:

   Take extra care not to damage the component.

   Make sure that the clips are correctly located.

   Disconnect the tweeter speaker electrical connector.



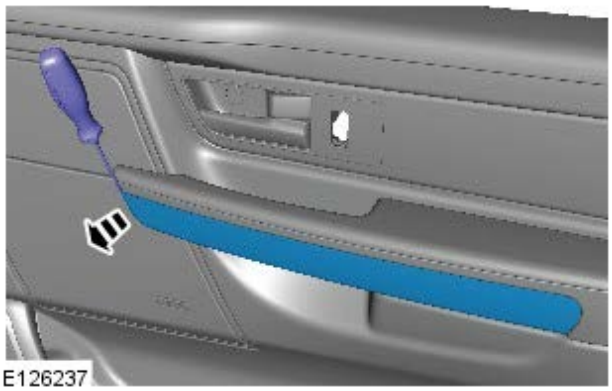
2.



3.

4. CAUTIONS:

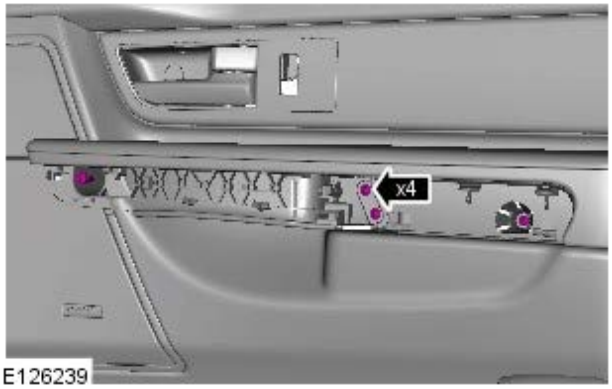
   Take extra care not to damage the component.
   Apply masking tape to the end of the screwdriver.


E126237

When removing the chrome finisher from the trim panel, make sure the components are not damaged. If necessary protect the surrounding areas using masking tape.

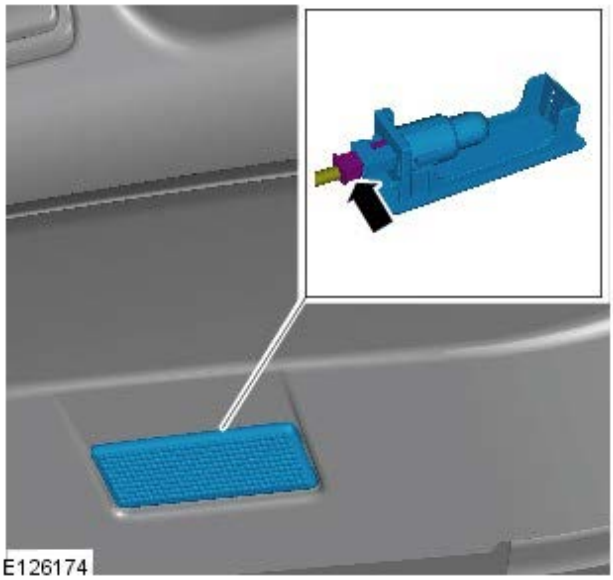
Make sure that the clips are correctly located.

5.



E126239

6.


E126174

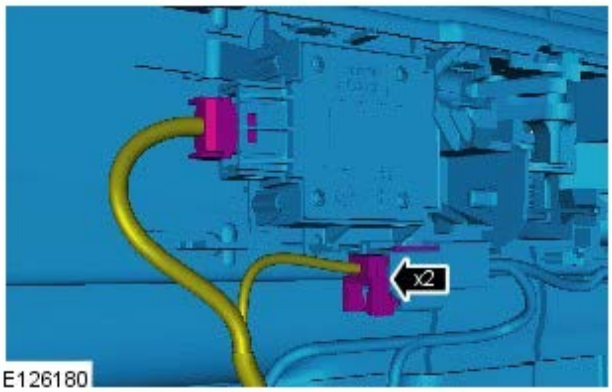
7. CAUTION: Take extra care not to damage the wiring harnesses.

Detach the front door trim panel.



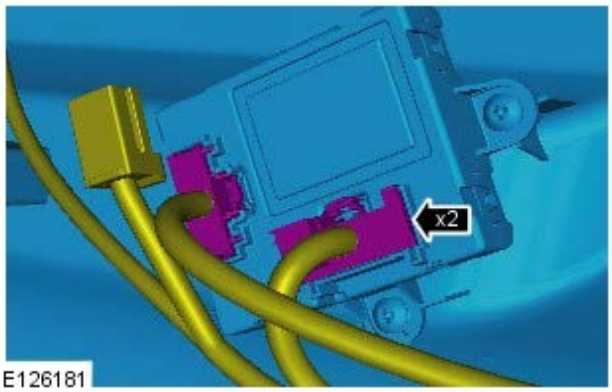
E126244

8.



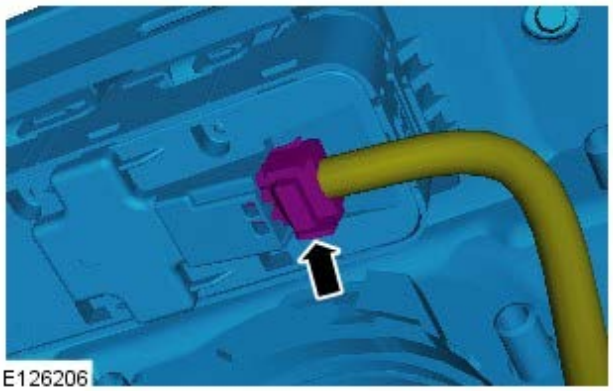
E126180

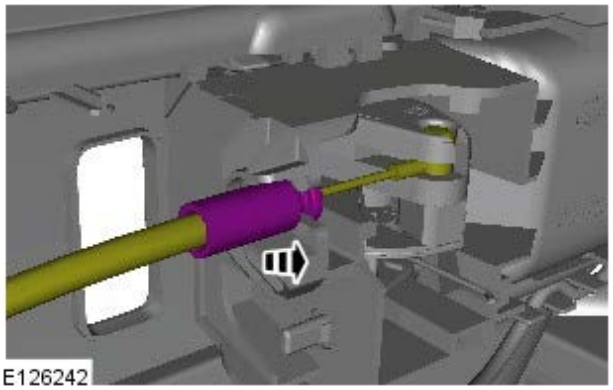
9.



E126181

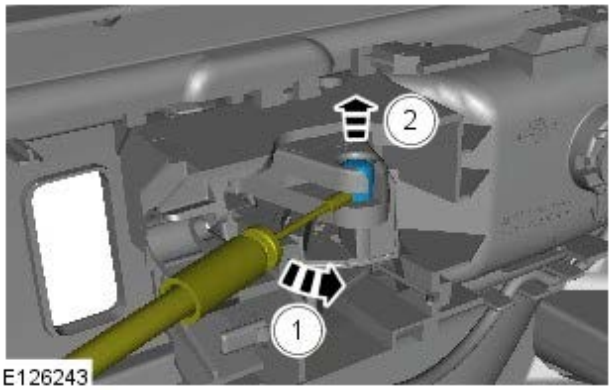
10.


E126206


E126242

11. CAUTION: Make sure that the release cable is removed from the door trim panel using the plastic fixing and not using the cable.

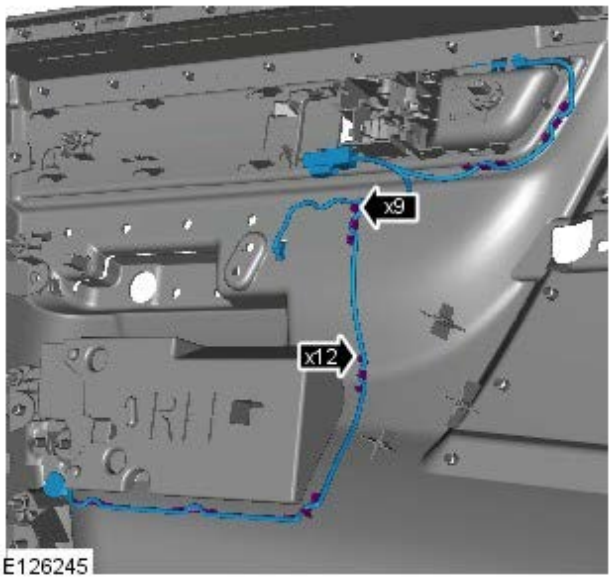
12.



E126243

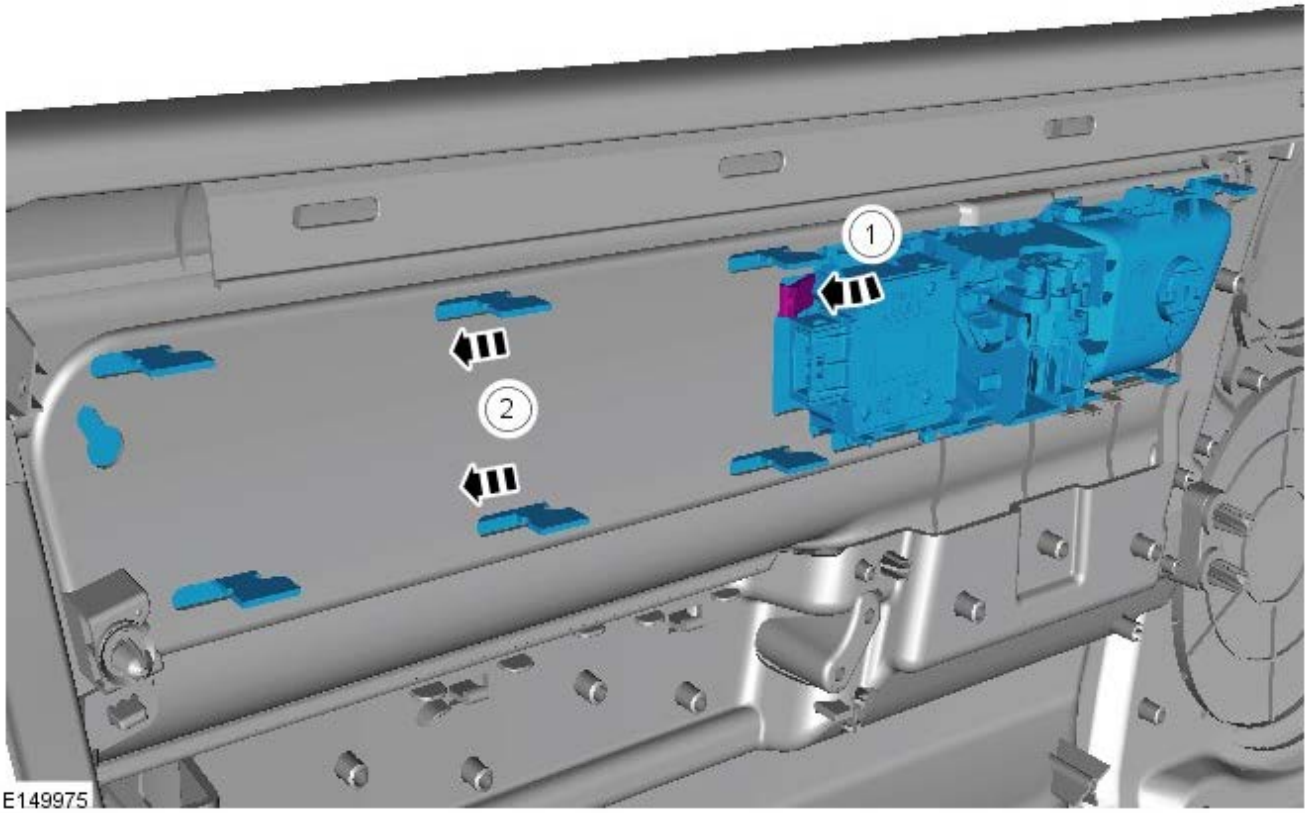
13. Remove the front door trim panel.

14.

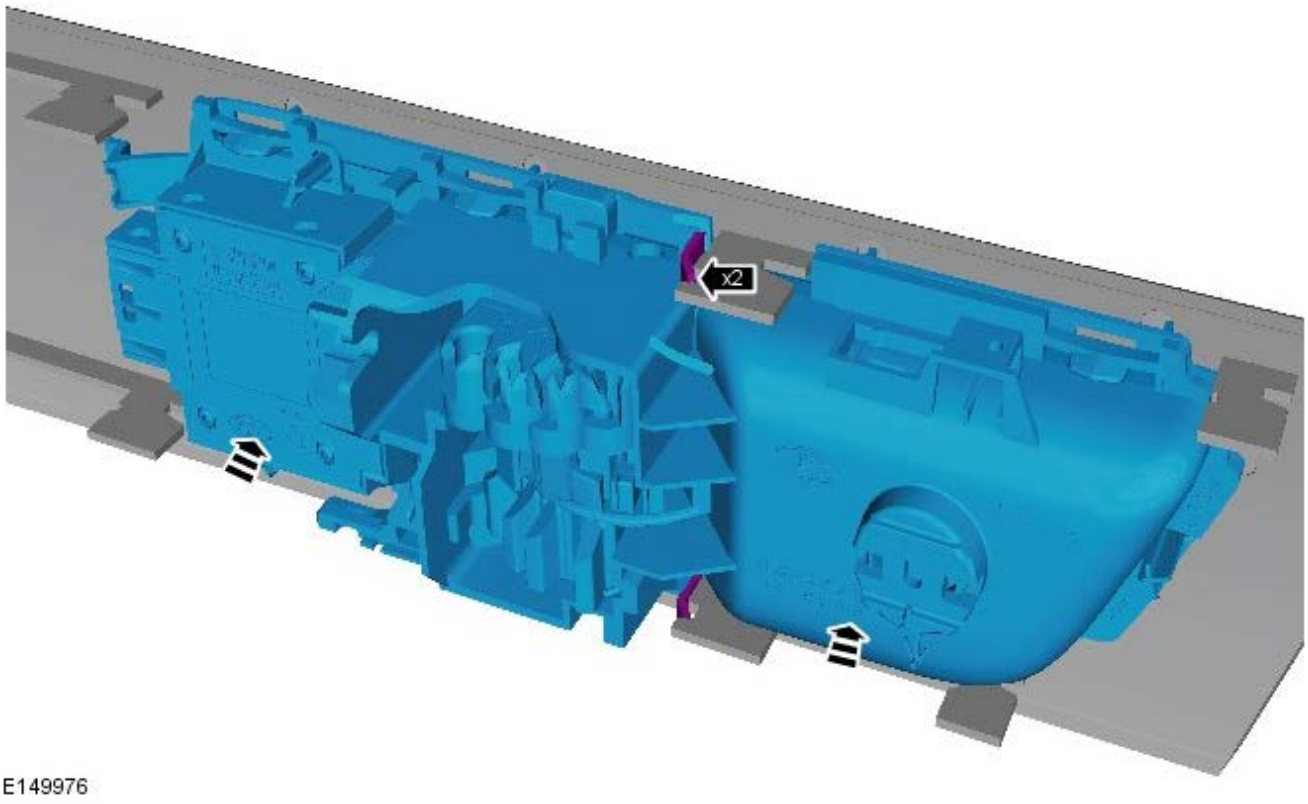


E126245

15. Release the retaining tang and remove the veneer.



16. Release the retaining tangs.



Installation

1. To install, reverse the removal procedure.

Published: 16-Jan-2013

Interior Trim and Ornamentation - Rear Door Trim Veneer

Removal and Installation

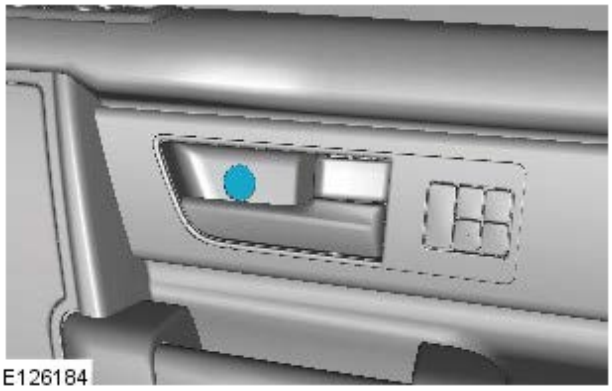
Removal

NOTES:

Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

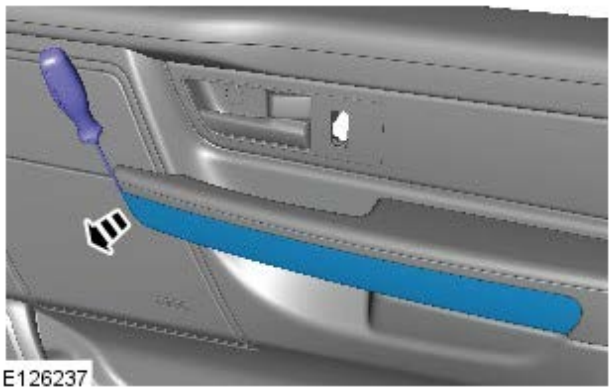
1.



2.



3. CAUTIONS:



Take extra care not to damage the component. Apply masking tape to the end of the screwdriver.

When removing the chrome finisher from the trim panel, make sure the components are not damaged. If necessary protect the surrounding areas using masking tape.

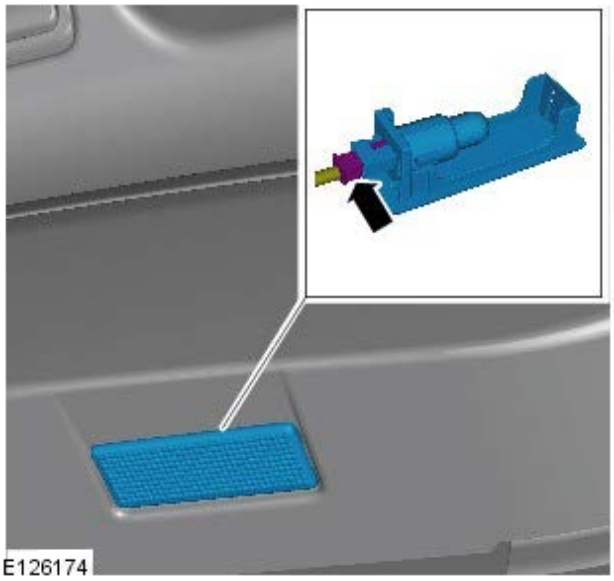
Make sure that the clips are correctly located.

4.



E126250

5.


E126174

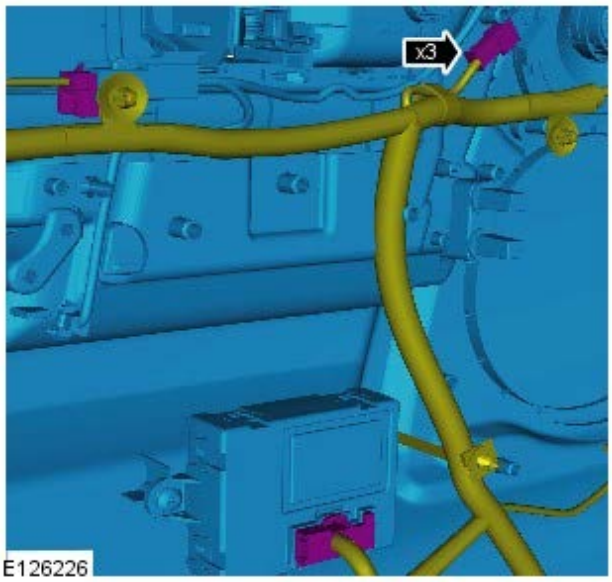
6. CAUTION: Take extra care not to damage the wiring harnesses.

Detach the rear door trim panel.

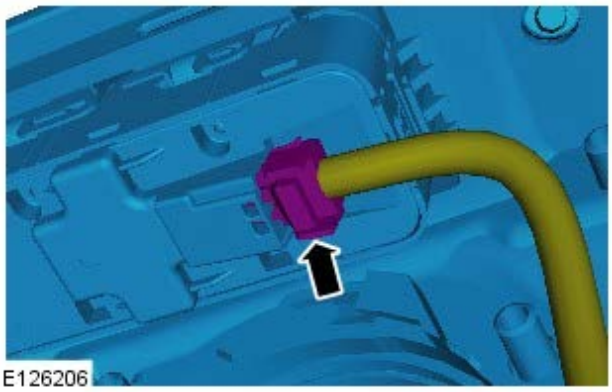


E126247

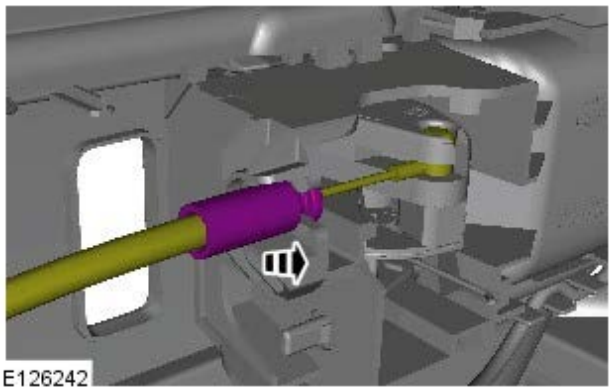
7.



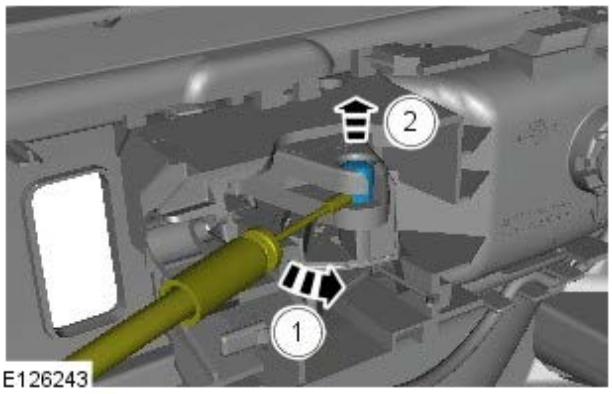
8.



9. CAUTION: Make sure that the release cable is removed from the door trim panel using the plastic fixing and not using the cable.

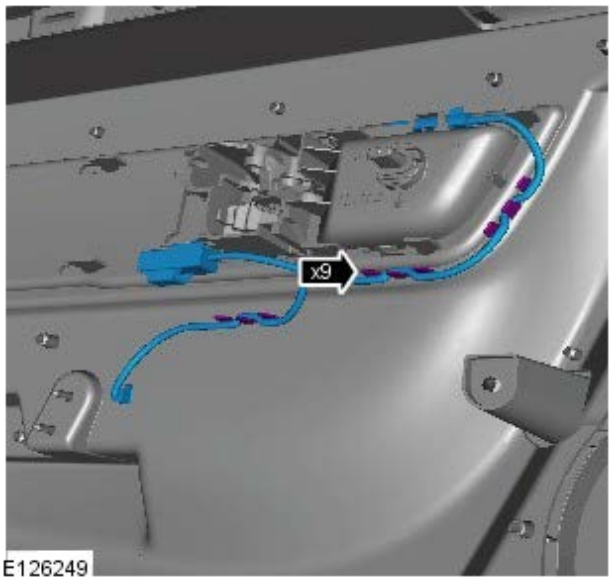


10.



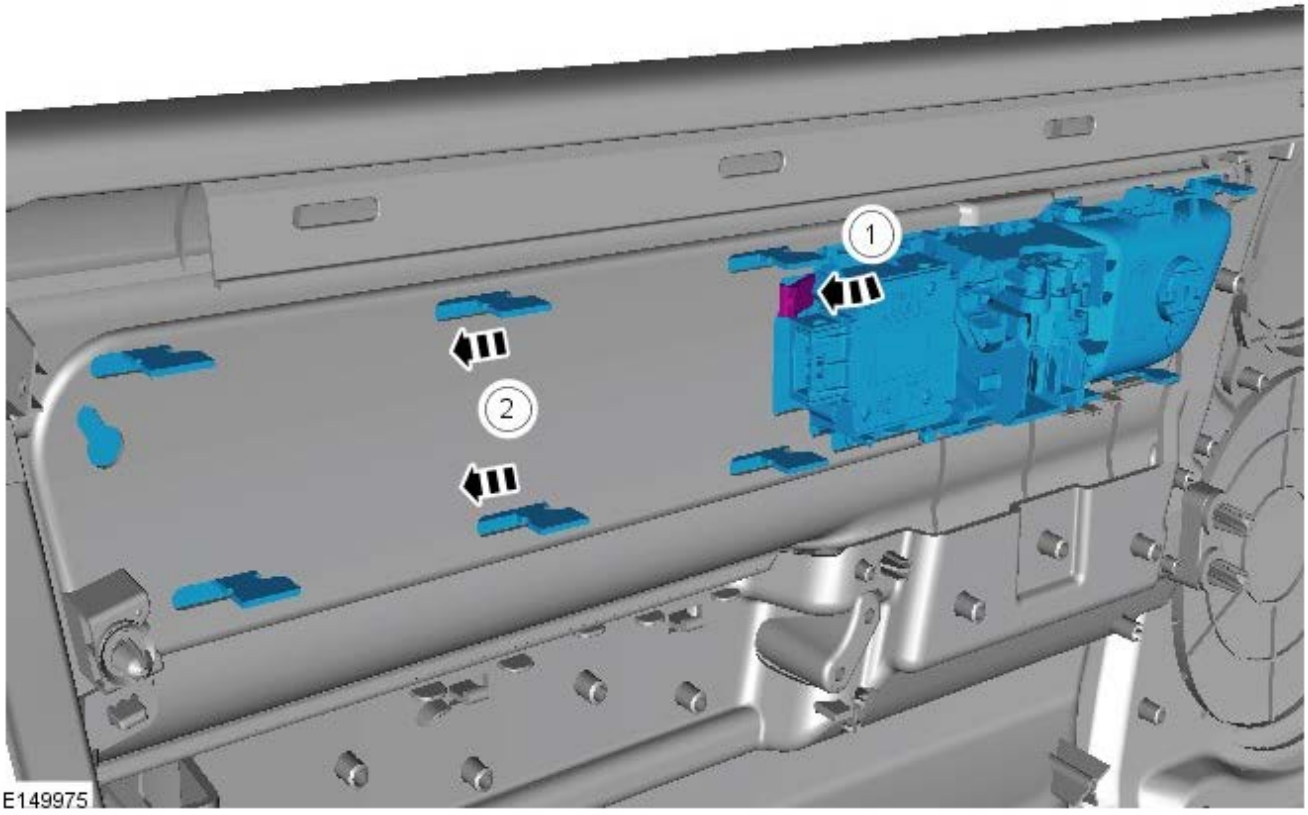
11. Remove the rear door trim panel.

12.



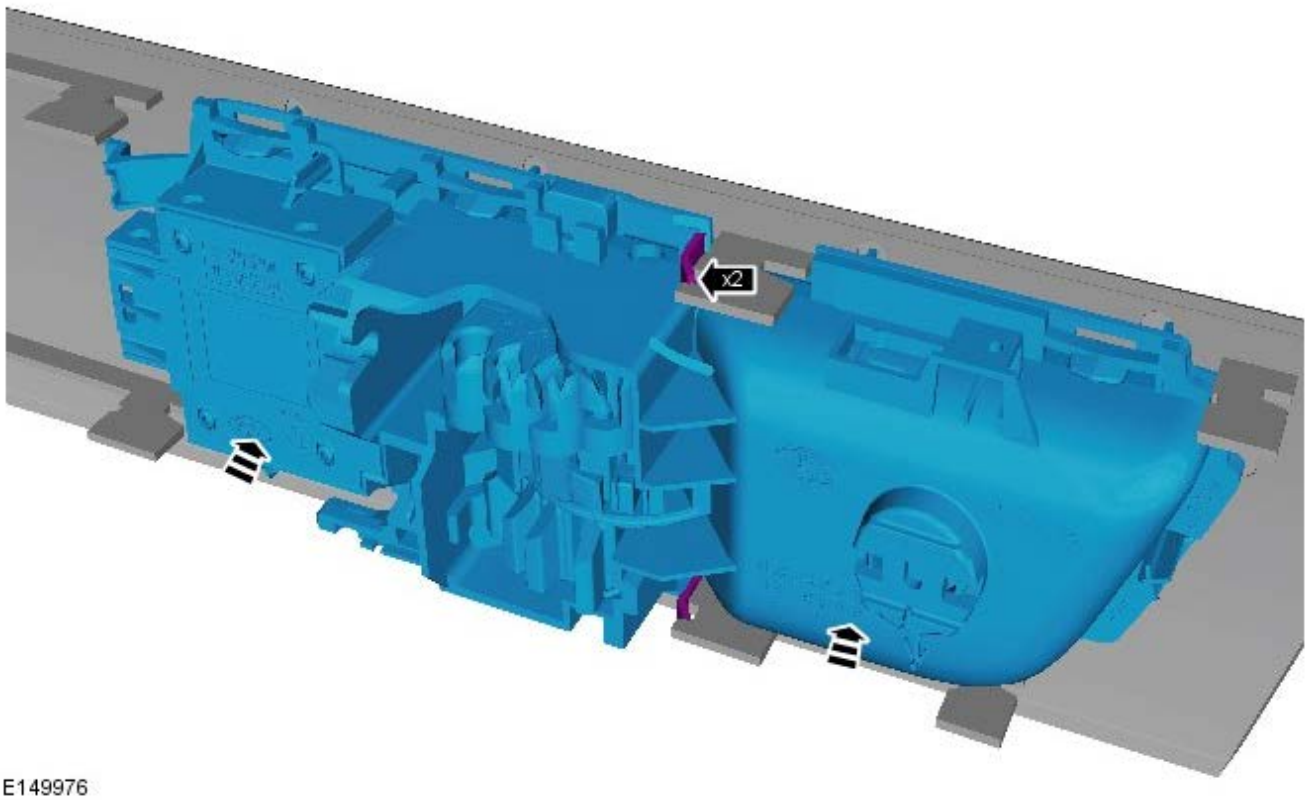
13. NOTE: **Some variation in the illustrations may occur, but the essential information is always correct.**

    Release the retaining tang and remove the veneer.



14. NOTE: **Some variation in the illustrations may occur, but the essential information is always correct.**

    Release the retaining tangs.



E149976

Installation

1. To install, reverse the removal procedure.

Published: 30-Sep-2011

Exterior Trim and Ornamentation -

Torque Specifications

Description	Nm	lb-ft
Rear spoiler securing nuts	8	6
Rear spoiler securing Torx bolts	6.5	5
Liftgate window glass trim panel bolts	8	6

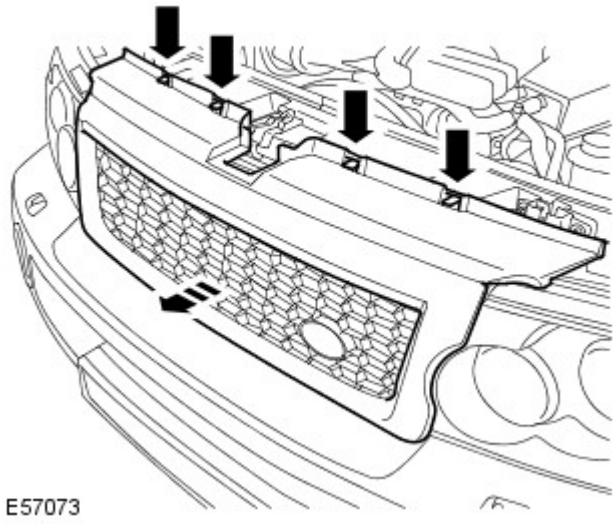
Published: 11-May-2011

Exterior Trim and Ornamentation - Radiator Grille

Removal and Installation

Removal

1. Remove the radiator grille.
    - Open the hood.
    - Carefully release the 4 clips.



Installation

1. Install the radiator grille.
    - Position the locating pegs.
    - Carefully secure the clips.

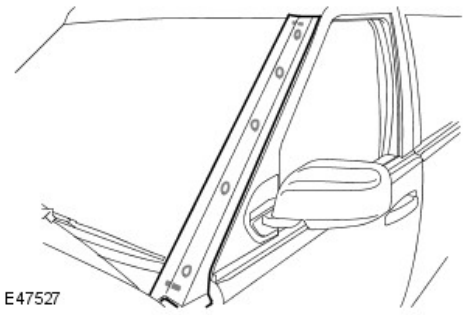
Published: 11-May-2011

Exterior Trim and Ornamentation - A-Pillar Moulding LH

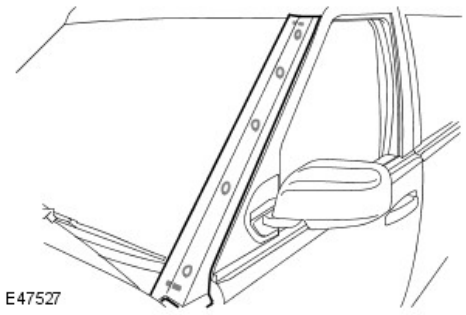
Removal and Installation

Removal

NOTE: This procedure is also applicable for the RH moulding.



1. Open the bonnet.



2. Remove the A-pillar moulding.
   - Release and discard the 5 clips.

Installation

1. NOTE: The lower clip is unique to the others and must only be installed to the lowest position on the moulding.

To install, reverse the removal procedure.

1. New clips must be used.

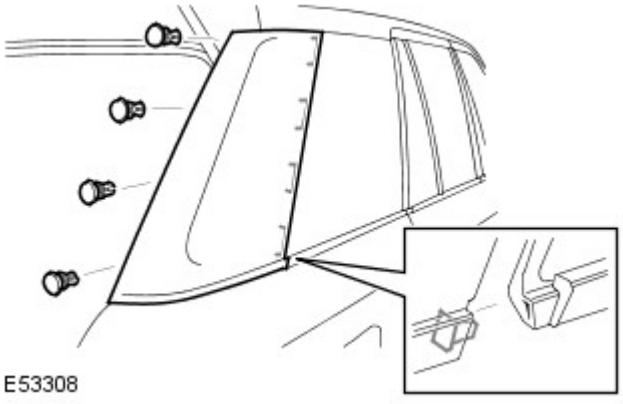
Published: 11-May-2011

Exterior Trim and Ornamentation - Rear Quarter Window Moulding

Removal and Installation

Removal

1. Open the liftgate.



2. Remove the rear quarter window moulding.
   - Remove the 4 clips.
   - Release the locating peg.

Installation

1. Install the rear quarter window moulding.
   - Position the locating peg.
   - Secure the clips.

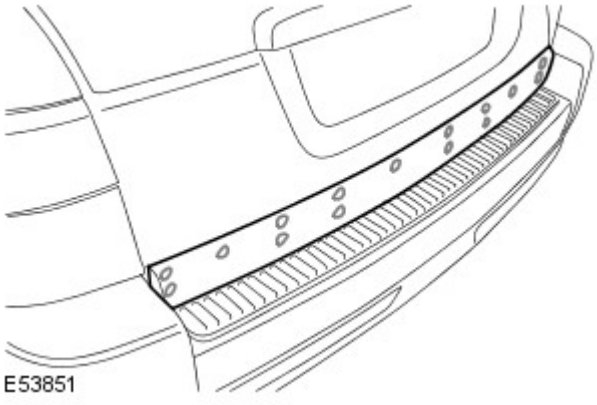
Published: 11-May-2011

Exterior Trim and Ornamentation - Liftgate Moulding

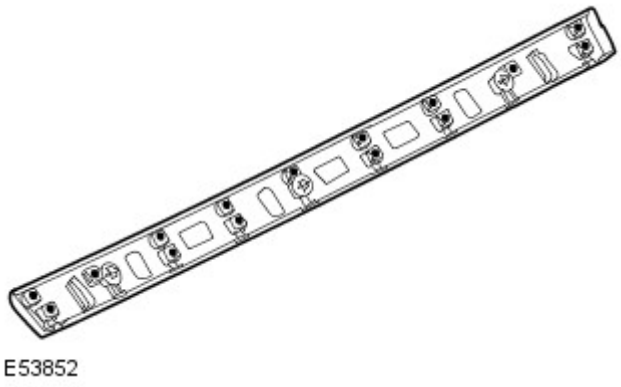
Removal and Installation

Removal

CAUTION: Always protect paintwork and glass when removing exterior components.


E53851

1. Remove the liftgate lower trim panel.
   - Release the 15 clips.


E53852

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

   Remove the 15 clips.

Installation

1. Install the clips.

2. Install the liftgate lower trim panel.
   - Position and secure the clips.

Published: 30-Sep-2011

Exterior Trim and Ornamentation - Rear Spoiler

Removal and Installation

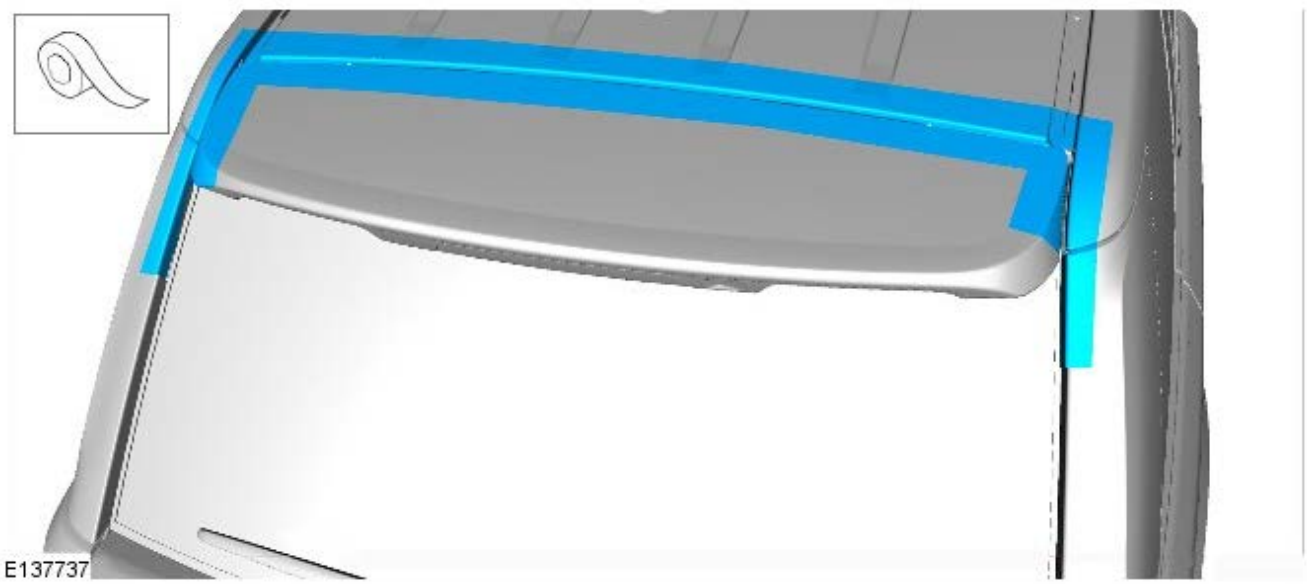
Removal

NOTES:

Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

1. CAUTION: Protect the surrounding paintwork to avoid damage.

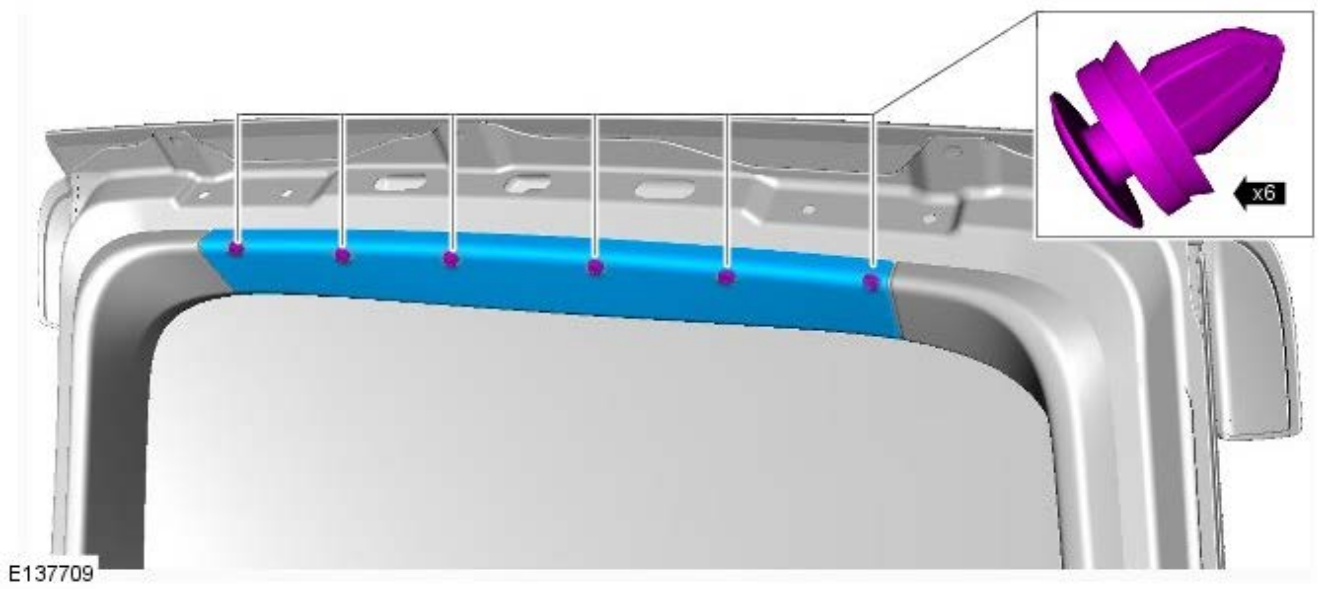


2.

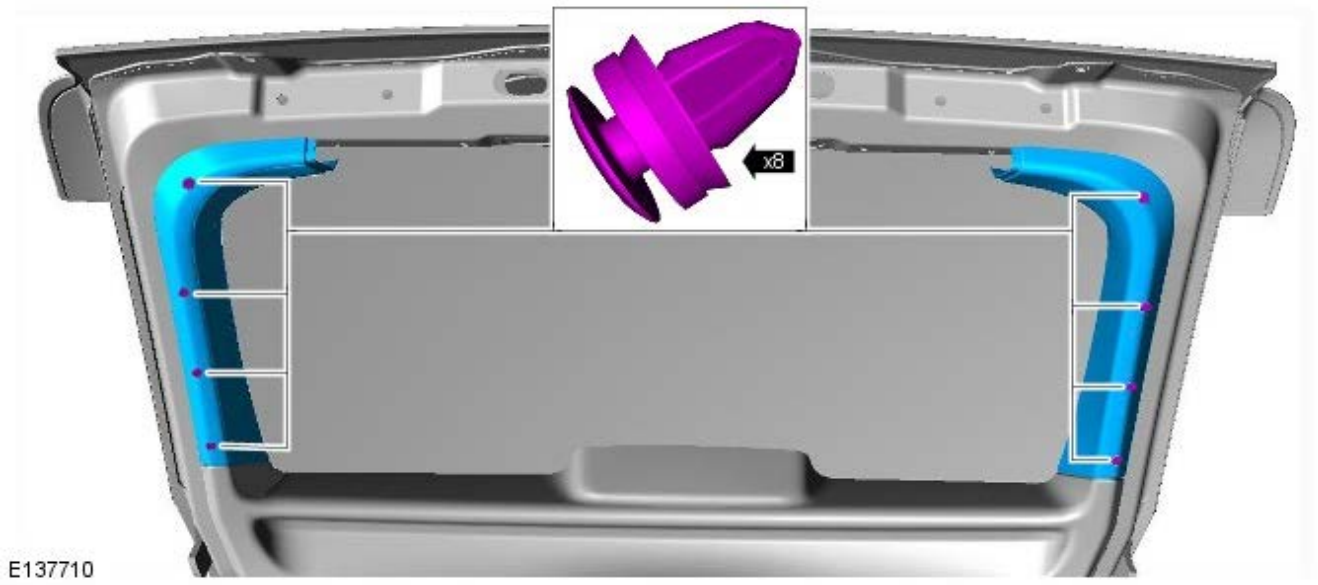


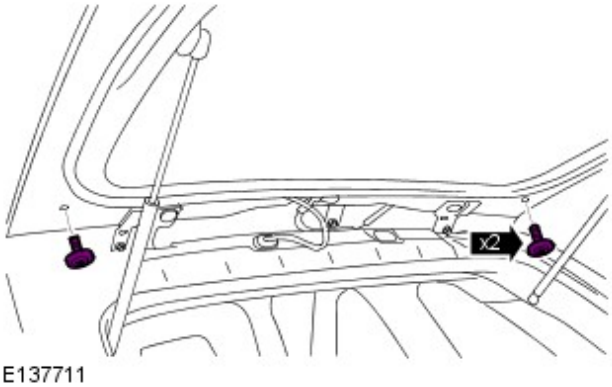


3.



4.

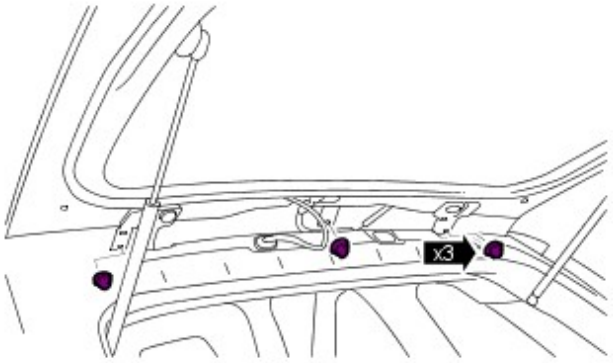




5. CAUTION: Make sure that new bolts are installed.

Torque: 6.5 Nm

6. *Torque:* 8 Nm



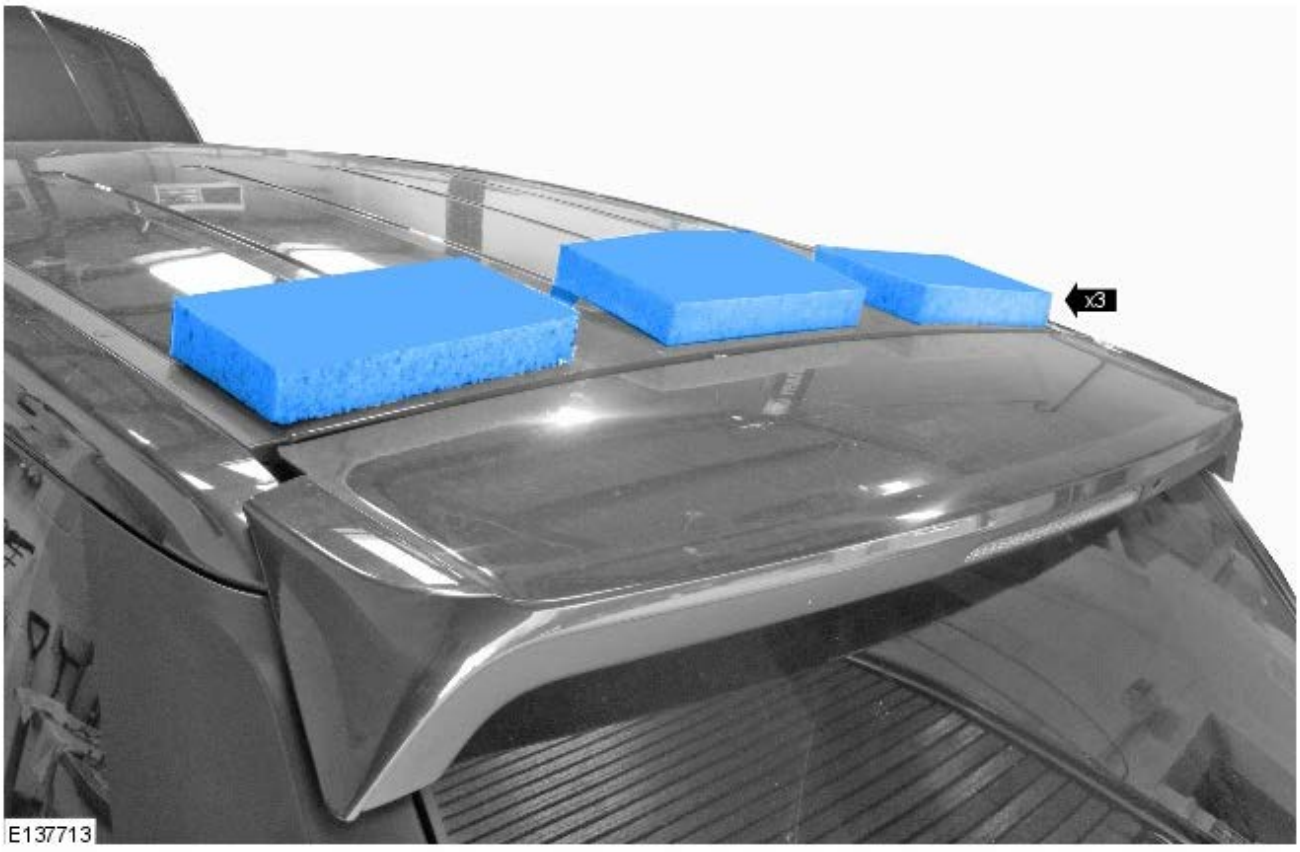
E137712

7.

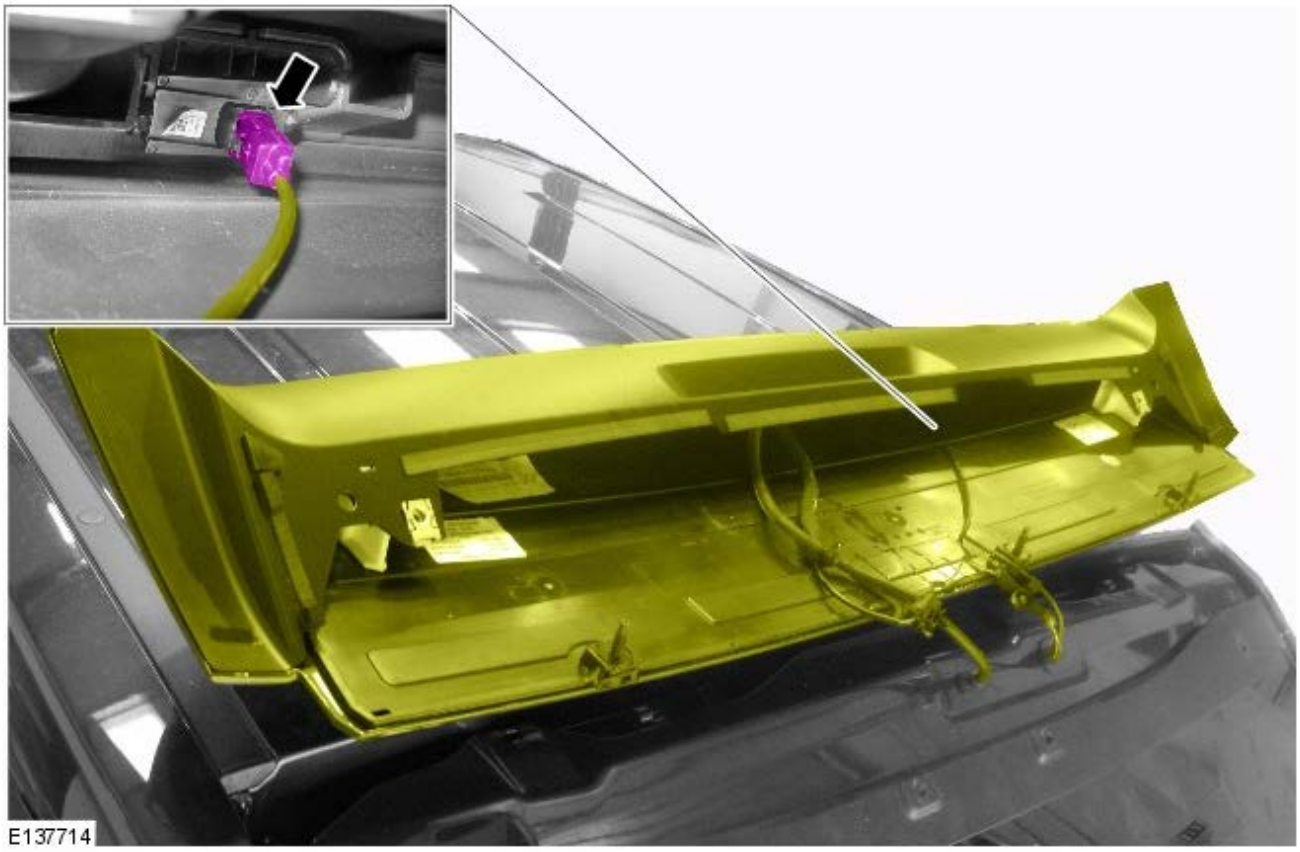


E137578

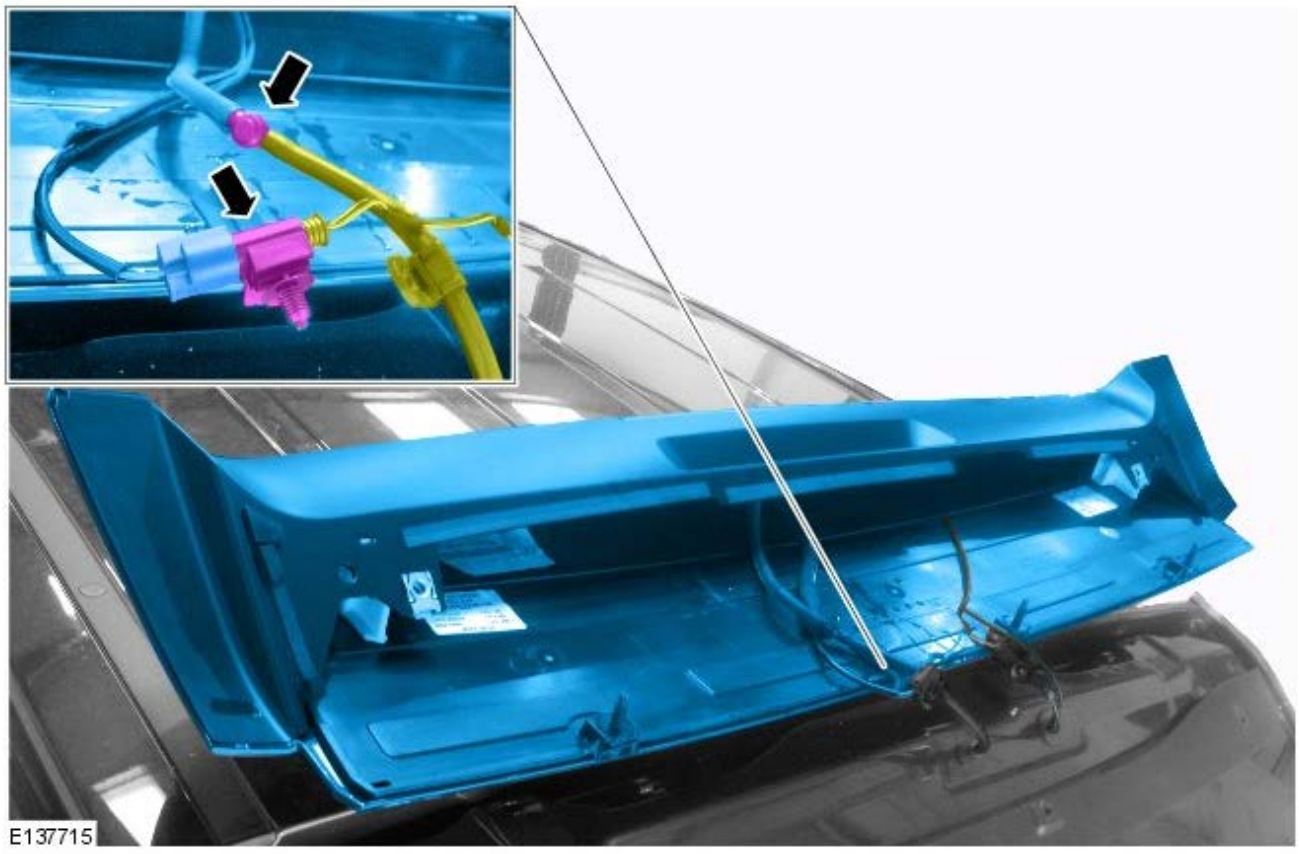
8. CAUTION: Protect the surrounding paintwork to avoid damage.

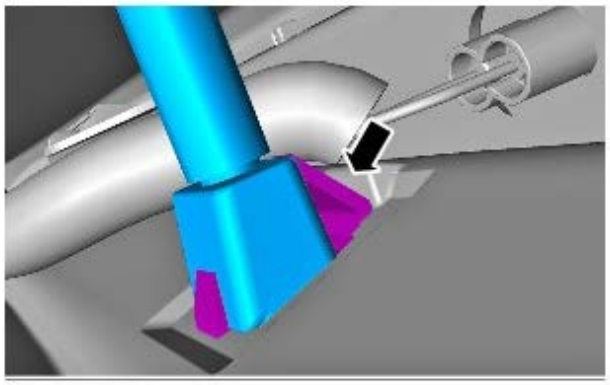


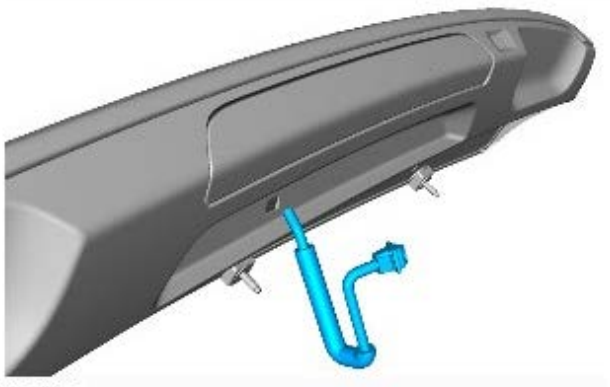
9.



10.

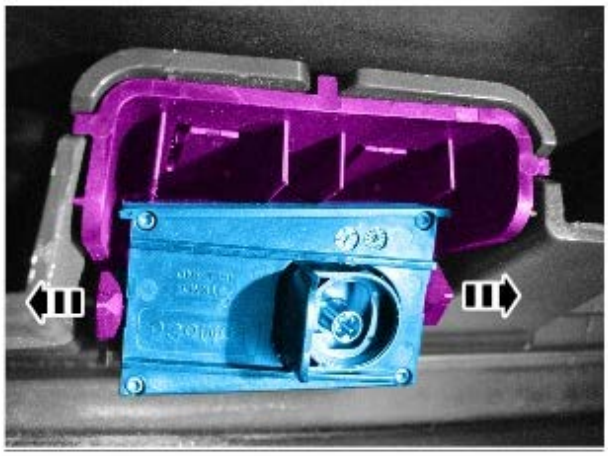

E137715

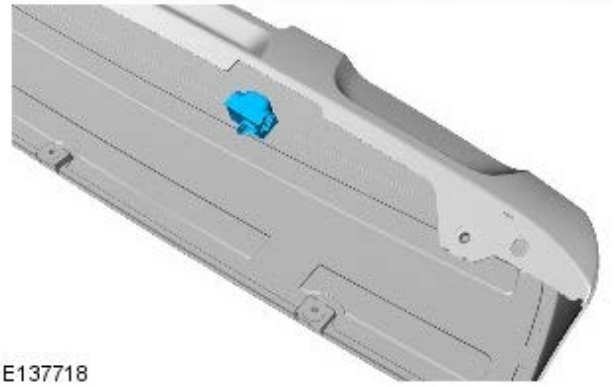



E137716

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

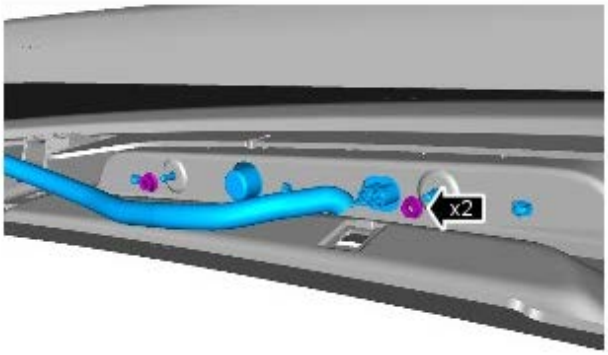
12.





E137718

13. *Torque:* 8 Nm





E137717

Installation

1. CAUTION: Make sure that the gap is even between the rear spoiler and the rear quarter panel moulding and the rear spoiler is flush with the roof panel (use a suitable plastic straight edge).

   To install, reverse the removal procedure.

Published: 30-Sep-2011

Exterior Trim and Ornamentation - Liftgate Window Glass Trim Panel

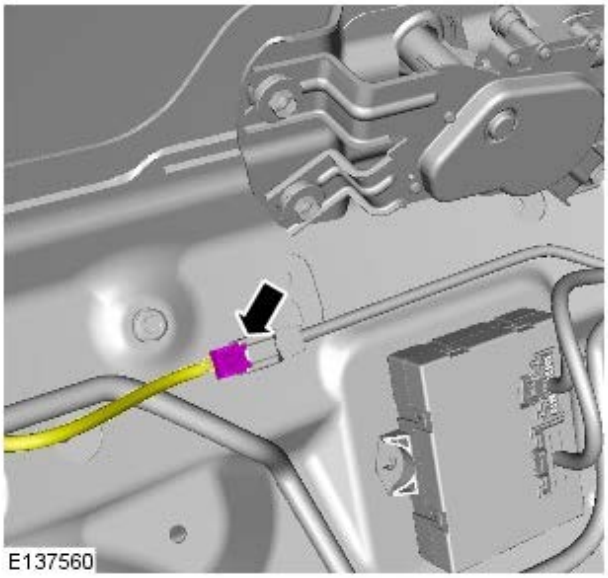
Removal and Installation

Removal

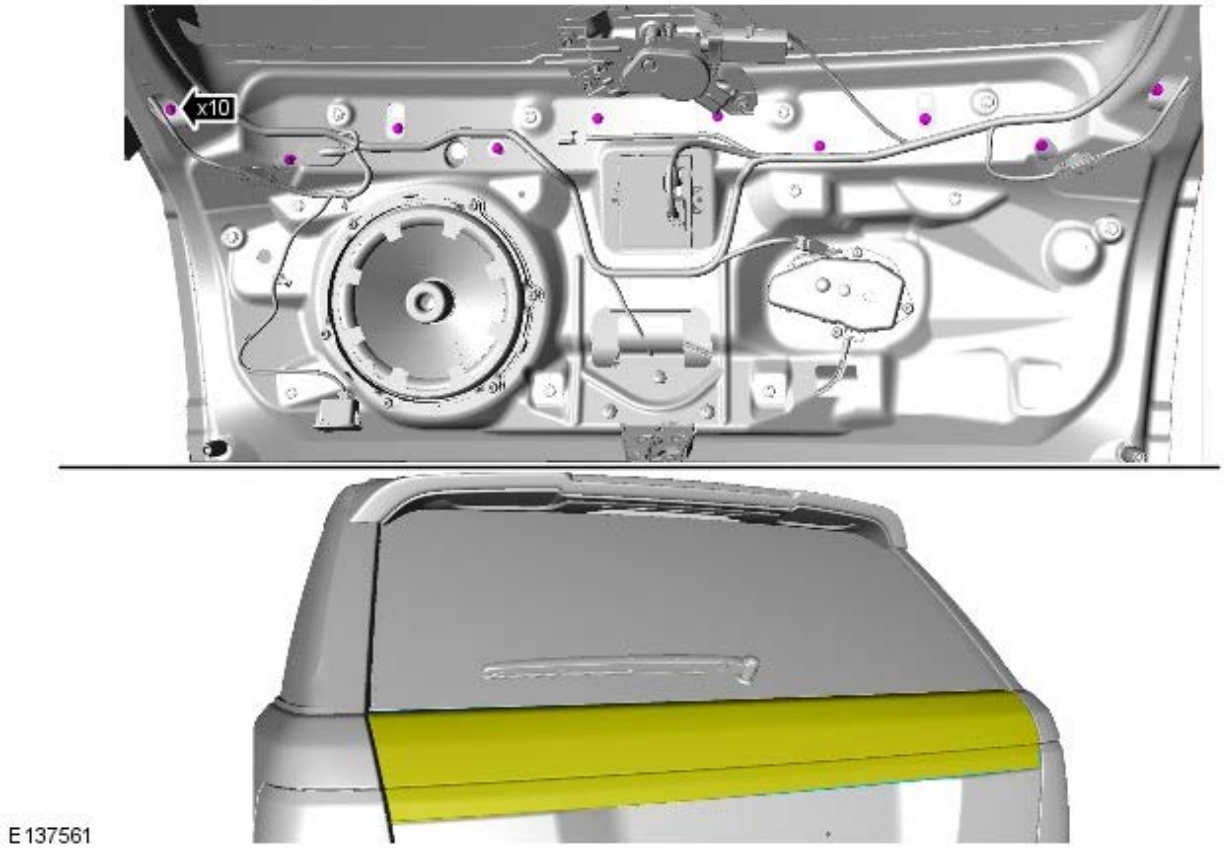
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Liftgate Trim Panel (501-05, Removal and Installation).

2.



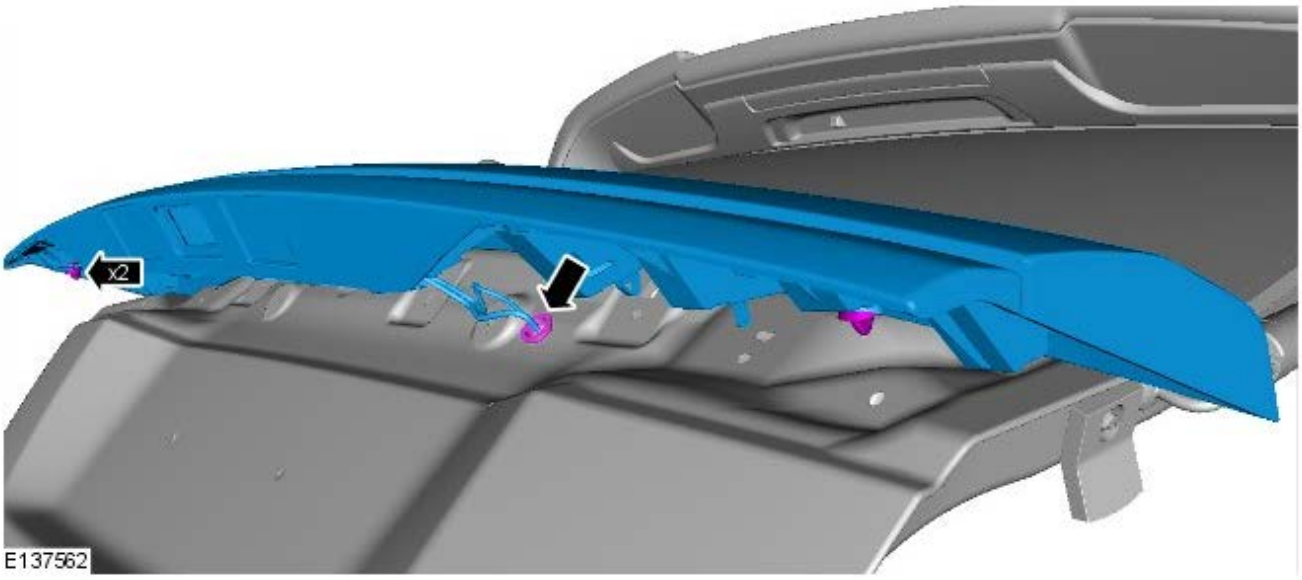
3. *Torque:* 8 Nm



4.



5.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Rear View Mirrors -

Torque Specifications

Description	Nm	lb-ft
Exterior mirror bolts	6	4

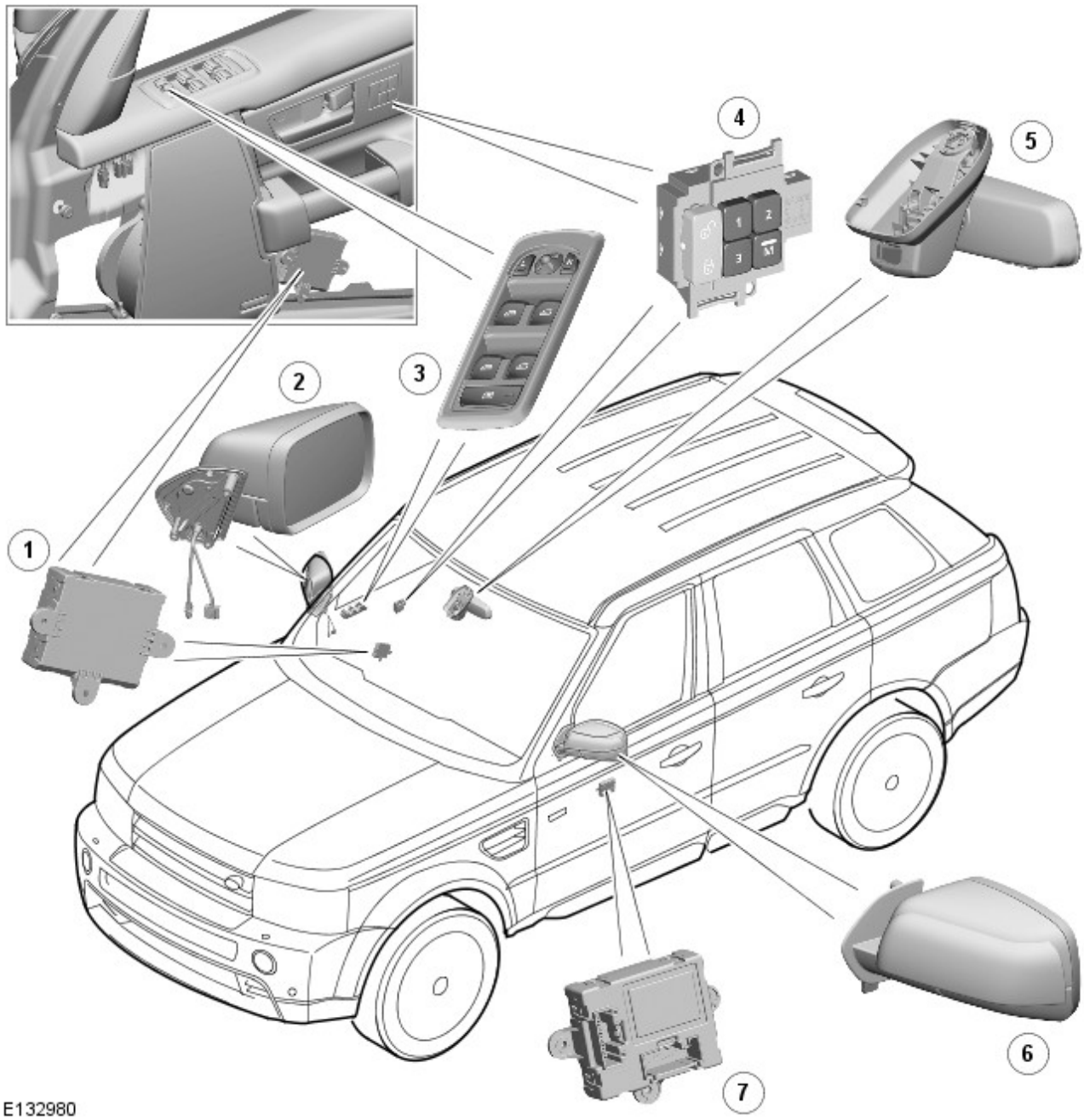
Published: 11-May-2011

Rear View Mirrors - Rear View Mirrors

Description and Operation

COMPONENT LOCATION

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



Item	Part Number	Description
1	-	DDM (driver door module)
2	-	Driver exterior mirror
3	-	Exterior mirror switches
4	-	Memory switches
5	-	Interior mirror
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 automatic dimming. Depending on vehicle model and market, the interior mirror may also incorporate:

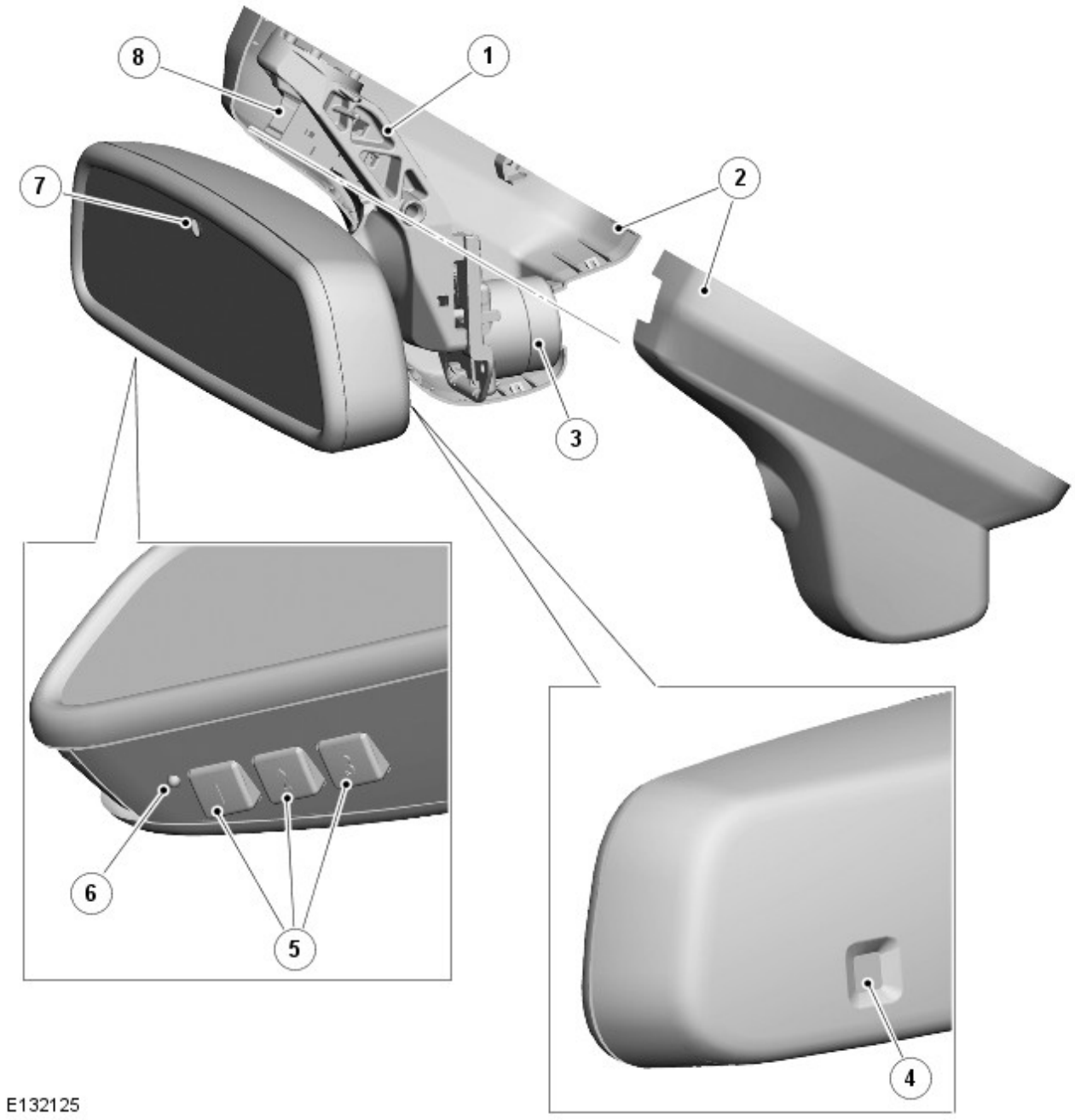
A HomeLink® universal transmitter. NOTE: HomeLink is a registered trademark owned by Johnson Controls Inc.
- The automatic high beam function.

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.
- Approach lamps and proximity cameras. For additional information, refer to:
  Interior Lighting (417-02, Description and Operation),
  Parking Aid (413-13, 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



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

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.

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.

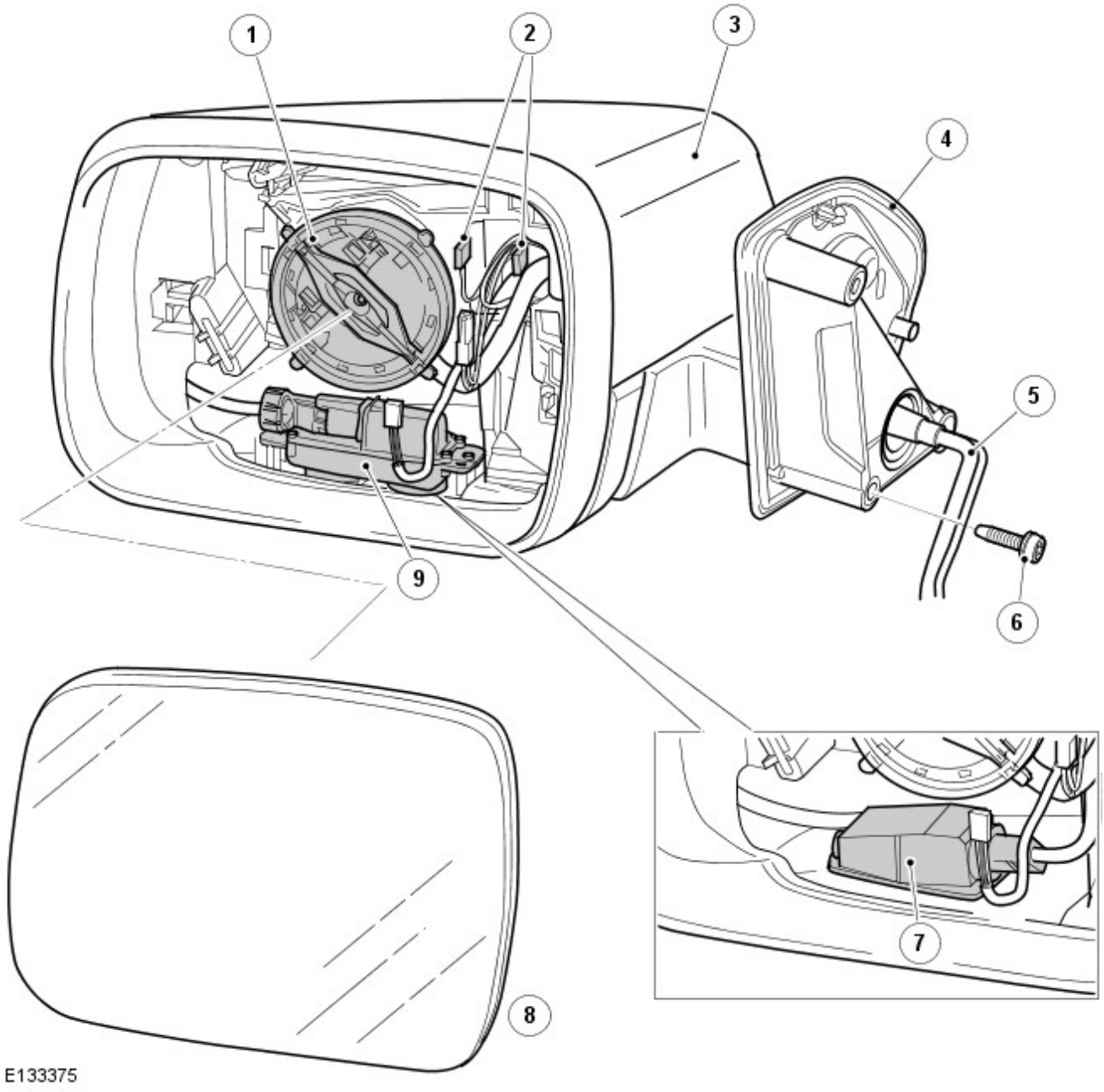
Automatic dimming interior mirrors are connected to the vehicle wiring by an electrical connector concealed by covers installed over the mounting stem. On vehicles with the automatic high beam function, the covers also contain the auto high beam control module.

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



Item	Part Number	Description
1	-	Actuator
2	-	Heating element connectors
3	-	Cover
4	-	Body assembly
5	-	Fly leads
6	-	Screw (3 off)
7	-	Approach lamp (SC (supercharger) models only)
8	-	Mirror glass
9	-	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.

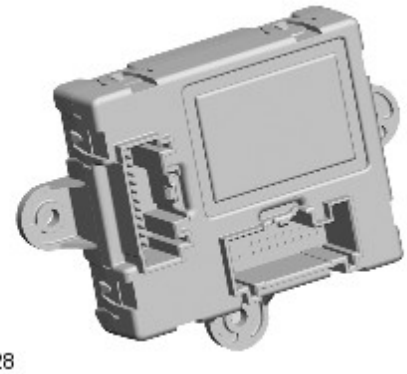
EXTERIOR MIRROR SWITCHES



E132127

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


E132128

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

Interior Mirror

Power for the feature(s) in the 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. The automatic dimming circuits also send messages to the door modules on the medium speed CAN (controller area network) bus.

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:

A. Turn the ignition on.
B. 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.
C. Place the signal emitting end of the hand held transmitter against the underside of the interior mirror.
D. 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).
E. To program another channel on the universal transmitter, repeat steps C. and D.
F. 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:

A. Locate the training button on the receiver system (refer to the system's literature for details).
B. Press the training button for 1 to 2 seconds, then perform step C. within 30 seconds.
C. On the vehicle, press and release the appropriate universal transmitter button, twice. The receiver system should now be trained to the universal transmitter.
D. 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 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.

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



E132129

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).

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

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

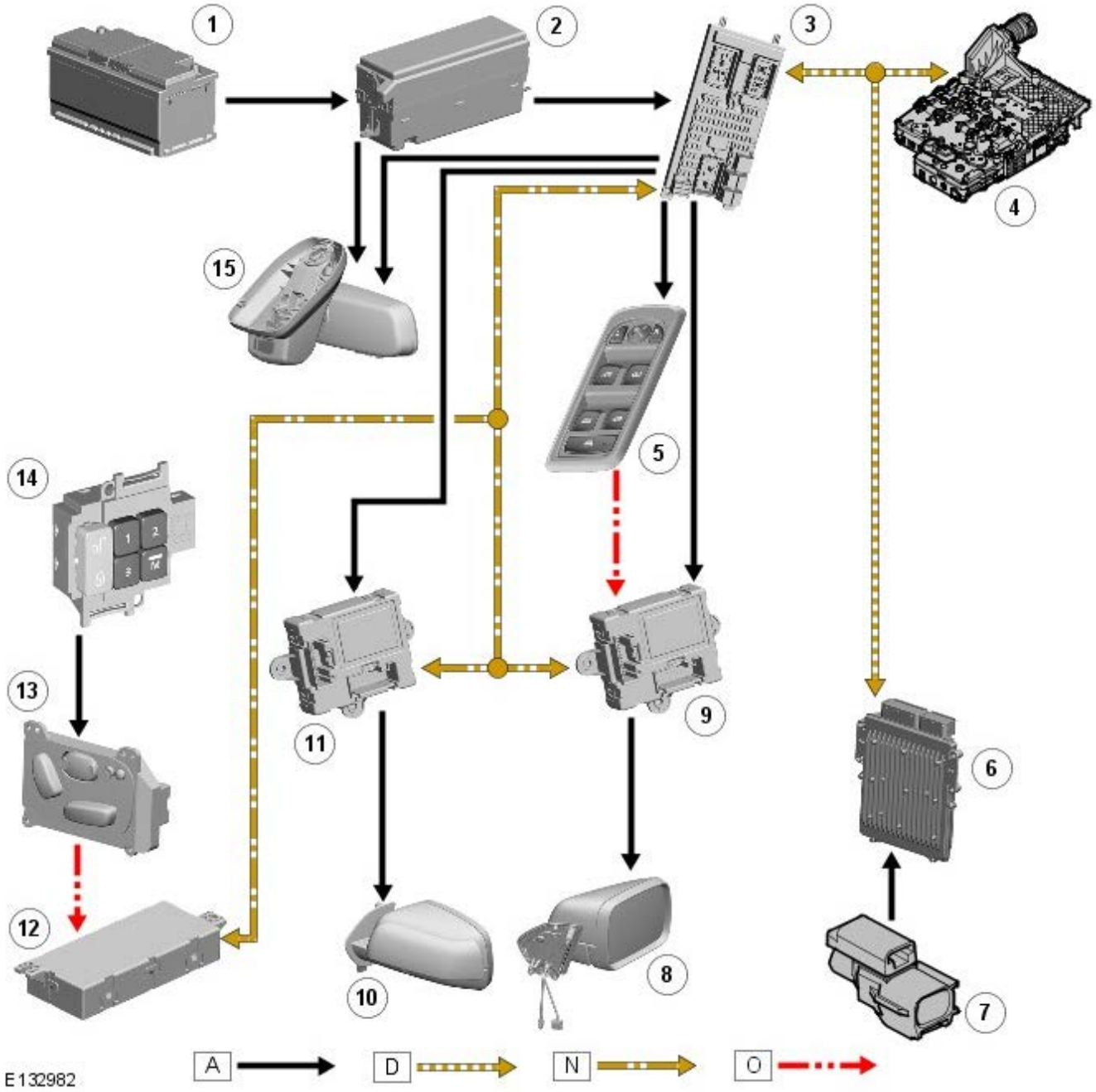
If mirror foldback is incorporated, pressing the L and R mirror select switches at the same time folds the exterior mirrors. Pressing both of the switches again unfolds the mirrors. Operation of mirror foldback is inhibited at speeds over 110 km/h (70 mph). If the mirrors are accidentally knocked out 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
5	-	Driver door switchpack
6	-	ECM
7	-	Ambient temperature sensor
8	-	Driver door mirror
9	-	DDM
10	-	Passenger door mirror
11	-	PDM
12	-	Driver seat module
13	-	Driver seat switchpack
14	-	Memory switches
15	-	Interior mirror

Published: 20-Aug-2012

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 Module (ATC) • Driver/Passenger Door Module (DDM/PDM) • 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 • Heated washer jets / heated mirrors circuit short circuit to ground, open circuit, high resistance • Automatic Temperature Control Module (ATC) fault	• Check the fuses • Refer to the electrical circuit diagrams and test the heated washer jets / heated mirrors circuit for short circuit to ground, open circuit, high resistance • Using the manufacturer approved diagnostic system, check the Automatic Temperature Control Module (ATC) for related DTCs and refer to the relevant DTC index
Mirrors inoperative in one or more directions	• Door mirror mechanical failure • Door mirror circuit short circuit to ground, short circuit to power, open circuit, high resistance • Driver/Passenger Door Module (DDM/PDM) fault	• Operate the mirror switch and listen for the motor(s). If each motor operation is audible, check the mechanical condition of the mirror and linkages • Refer to the electrical circuit diagrams and test the door mirror circuit for short circuit to ground, short circuit to power, open circuit, high resistance • Using the manufacturer approved diagnostic system, check the Driver/Passenger Door Module (DDM/PDM) for related DTCs and refer to the relevant DTC index
Memorized mirror position is not resumed	• Battery voltage below 10.5V • Position not stored • Switch operated during "one-touch" memory recall	• Refer to the relevant section of the workshop manual and test the battery • Make sure that the desired position is correctly stored • Make sure that the memory store/recall procedure is being followed
'Lazy entry' function inoperative	• Remote transmitter fault (battery, transmitter programming, etc) • Battery voltage below 10.5V	• Check that the remote transmitter operates the central locking • Refer to the relevant section of the workshop manual and test the battery

	• Position not stored • Switch operated during "one-touch" memory recall	• Make sure that the desired position is correctly stored • Make sure that the memory store/recall procedure is being followed

DTC Index

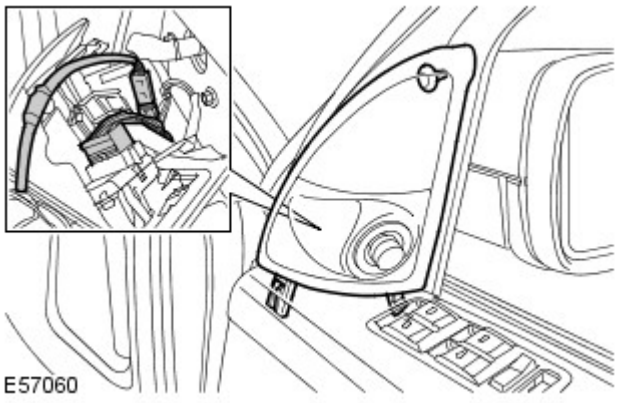
For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Central Junction Box (CJB) (100-00 General Information, Description and Operation).

Published: 11-May-2011

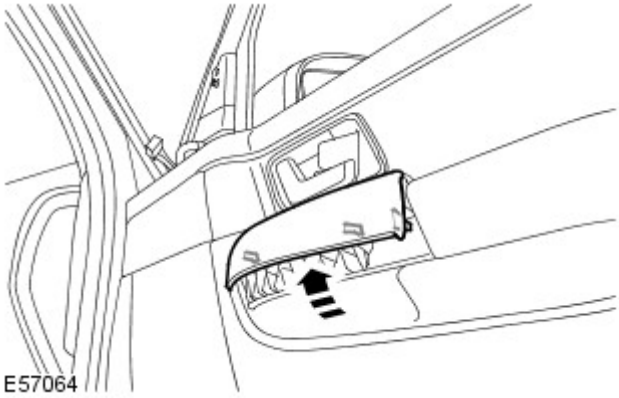
Rear View Mirrors - Exterior Mirror

Removal and Installation

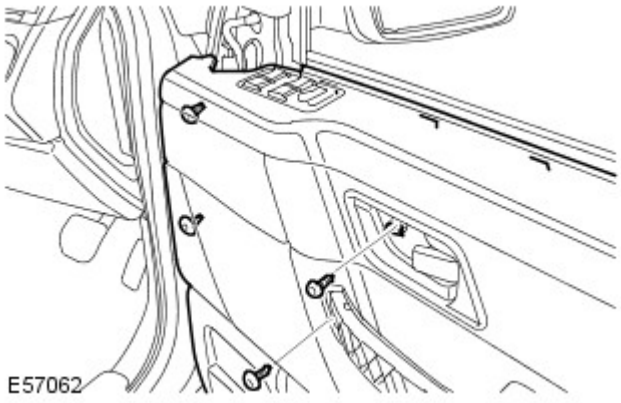
Removal



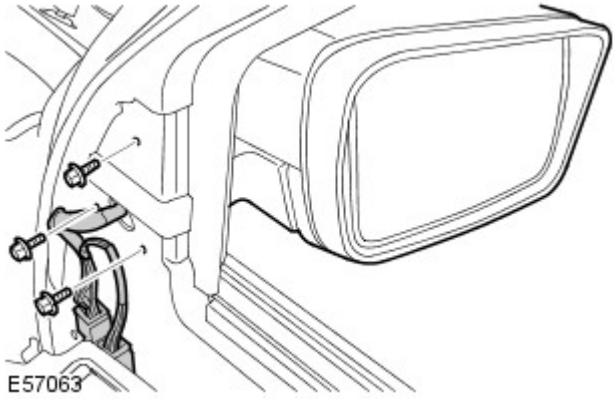
1. Remove the cheater panel.
    - Carefully release the 3 clips.
    - Disconnect the 2 electrical connectors.



2. Starting at the lower edge, carefully remove the grab handle cover.
    - Release the 2 clips.



3. Release the forward upper corner of the front door trim panel.
    - Release the screw cover.
    - Remove the 2 screws.
    - Release the 5 clips.



4. Remove the exterior rear view mirror.
    - Disconnect the electrical connectors.
    - Remove the 3 bolts.

Installation

1. Install the exterior rear view mirror.
    - Tighten the bolts to 6 Nm (4 lb.ft).

- Connect the electrical connectors.

2. Secure the front door trim panel.
    - Secure the clips.
    - Install the screws.
    - Install the screw cover.
    - Install the grab handle cover.

3. Install the grab handle cover.

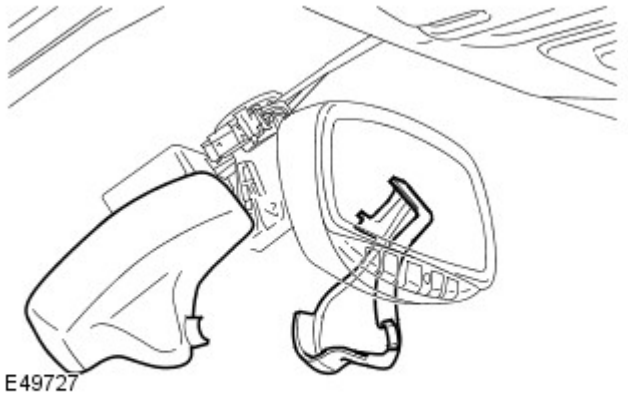
4. Install the cheater panel.
    - Connect the electrical connectors.
    - Secure the clips.

Published: 11-May-2011

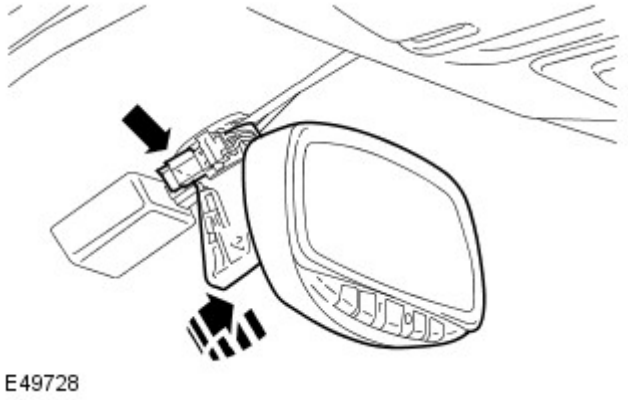
Rear View Mirrors - Interior Mirror

Removal and Installation

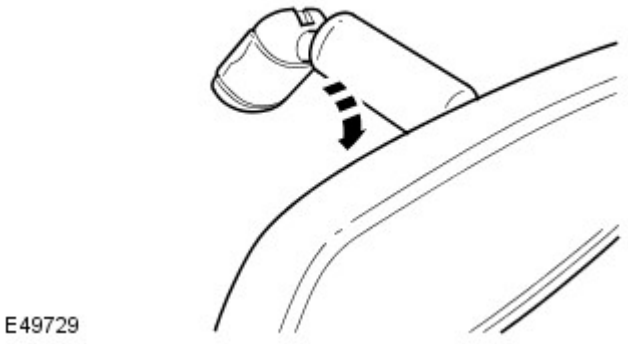
Removal



1. If installed, remove the interior mirror upper and lower covers.
    - Release the 2 clips.



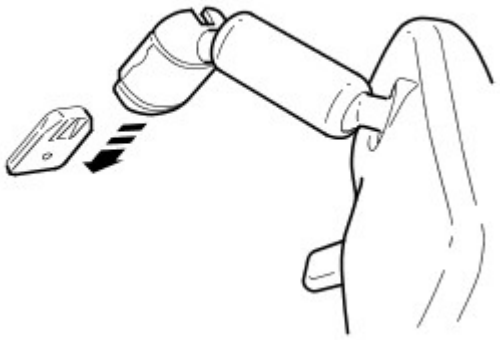
2. Vehicles with an auto-dimming interior mirror, remove the interior mirror.
    - Disconnect the electrical connector.
    - Rotate the mirror stem at its base to release from the windshield.



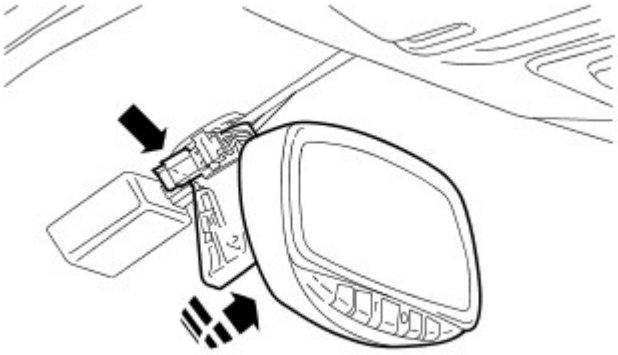
3. Vehicles without an auto-dimming interior mirror, remove the interior mirror.
    - Pull the mirror away from the windshield to release the clip.

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



E49731

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.

3. Install the interior mirror covers.
    - Secure with the clips.

Published: 11-May-2011

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

Removal and Installation

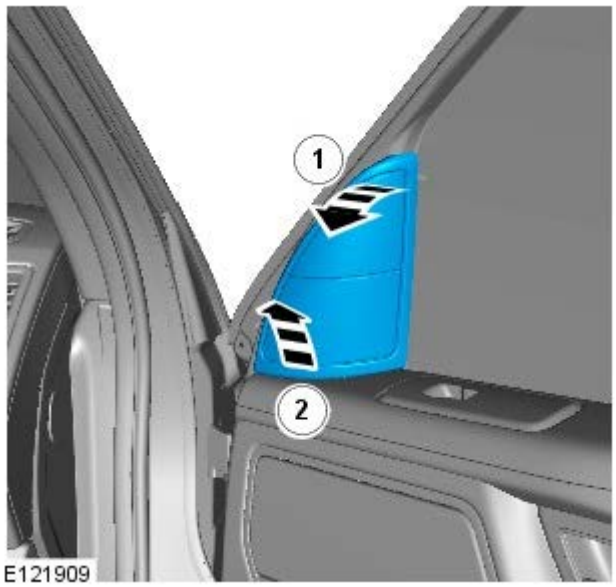
Removal

NOTES:

Removal steps in this procedure may contain installation details.

RH illustration shown, LH is similar.

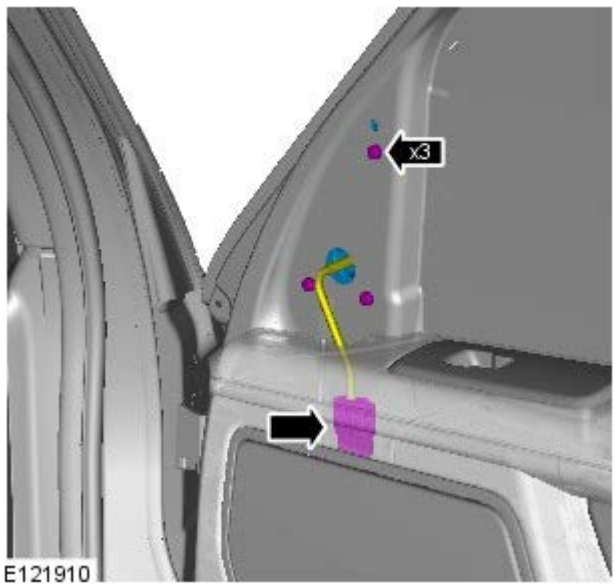
The ignition must be switched off.



1. CAUTIONS:

   Take extra care not to damage the component.

   Make sure that the clips are correctly located.



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.

Published: 11-May-2011

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

Removal and Installation

Removal

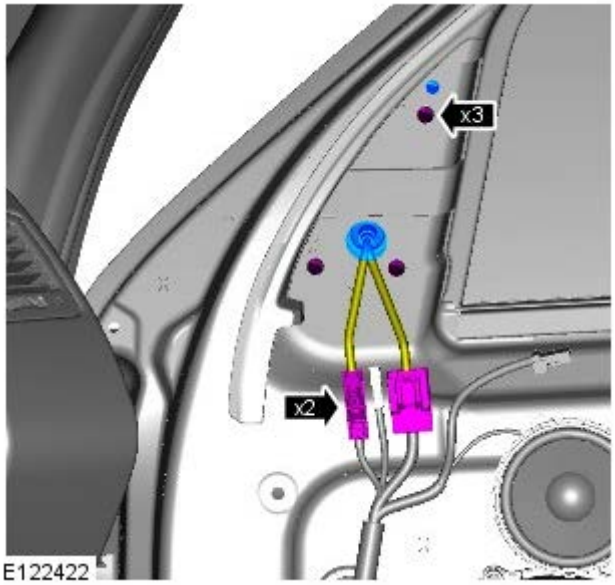
NOTES:

Removal steps in this procedure may contain installation details.

RH illustration shown, LH is similar.

The ignition must be switched off.

1. Refer to: Front Door Trim Panel (501-05, Removal and Installation).



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

   Torque: 6 Nm

3.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Rear View Mirrors - Exterior Mirror Cover

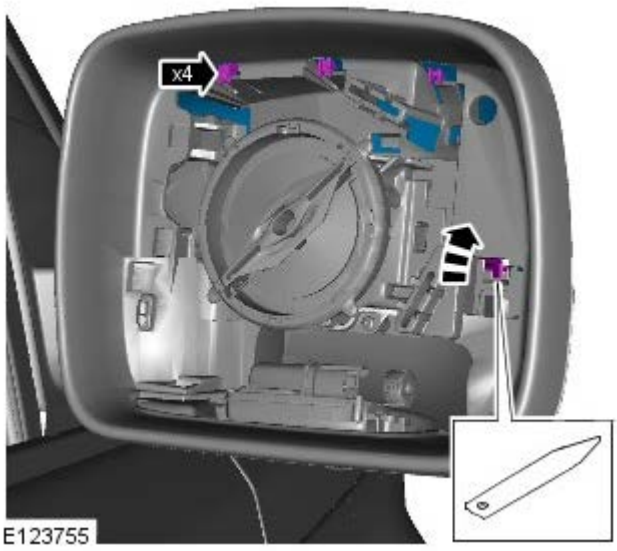
Removal and Installation

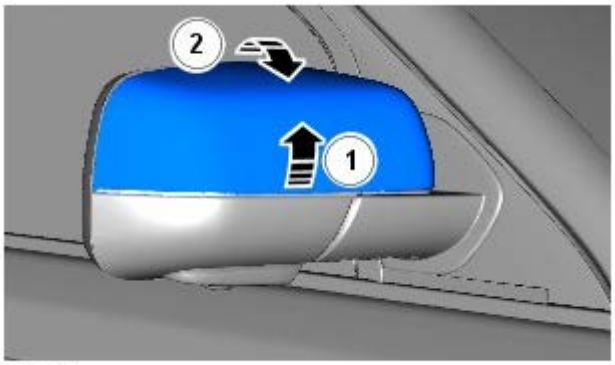
Removal

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

1. Refer to: Exterior Mirror Glass (501-09, Removal and Installation).

2.





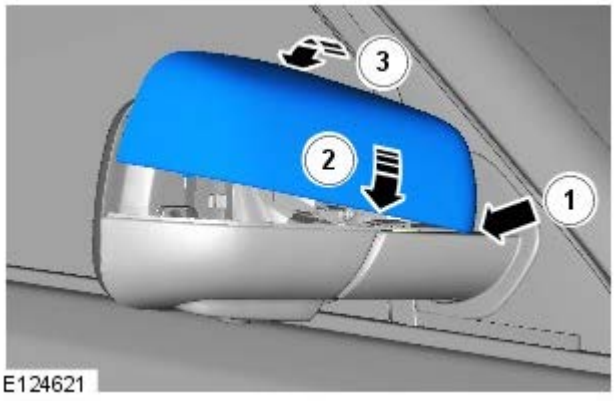
3. CAUTIONS:

   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.

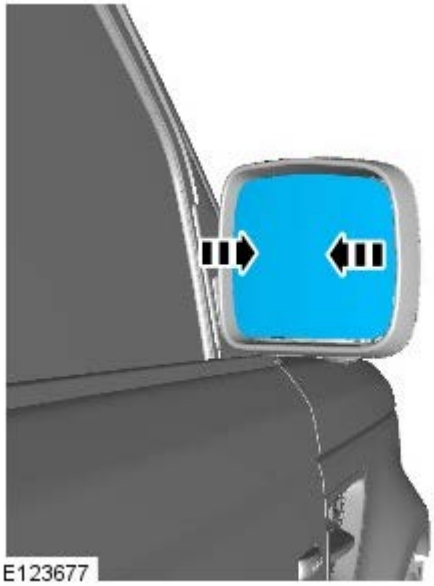
Published: 11-May-2011

Rear View Mirrors - Exterior Mirror Glass

Removal and Installation

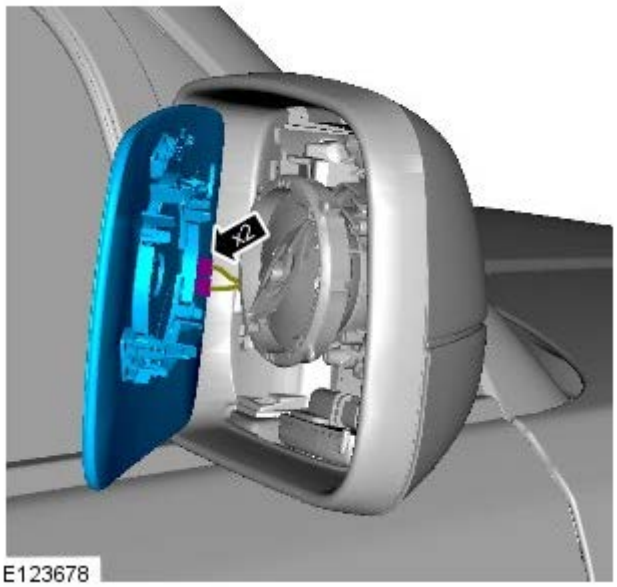
Removal

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



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

2.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Rear View Mirrors - Exterior Mirror Motor

Removal and Installation

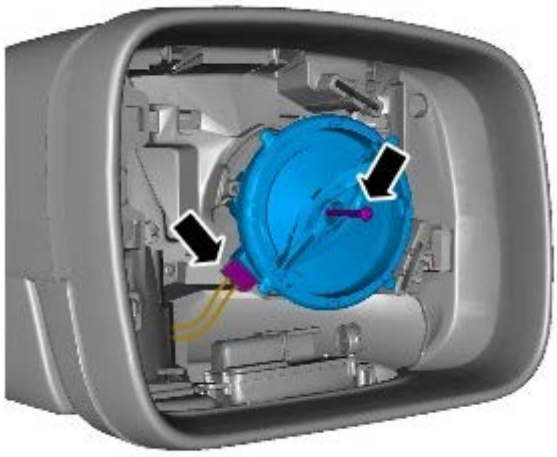
Removal

NOTES:

Removal steps in this procedure may contain installation details.

The ignition must be switched off.

1. Refer to: Exterior Mirror Glass (501-09, Removal and Installation).



E123679

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

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Seating -

Torque Specifications

Description	Nm	lb-ft
Front safety belt lower anchorage to seat Torx bolt	40	30
Front safety belt buckle to front seat Torx bolt	40	30
Front seat Torx bolts	40	30
Front seat armrest Torx bolt	10	7
Front seat grab handle Torx bolts	25	18
Front seat height adjustment motor nuts	25	18
Front seat position sensor nuts	4	3
Front seat tilt motor Torx bolts	10	7
Front seat backrest assembly Torx bolts	25	18
Front seat recliner motor Torx bolt	10	7
Seat module bracket Torx bolts	10	7
Front seat track motor nuts	25	18
Front seat base nuts	25	18
Rear seat Torx bolts	40	30
Rear seat backrest assembly Torx bolts	45	33

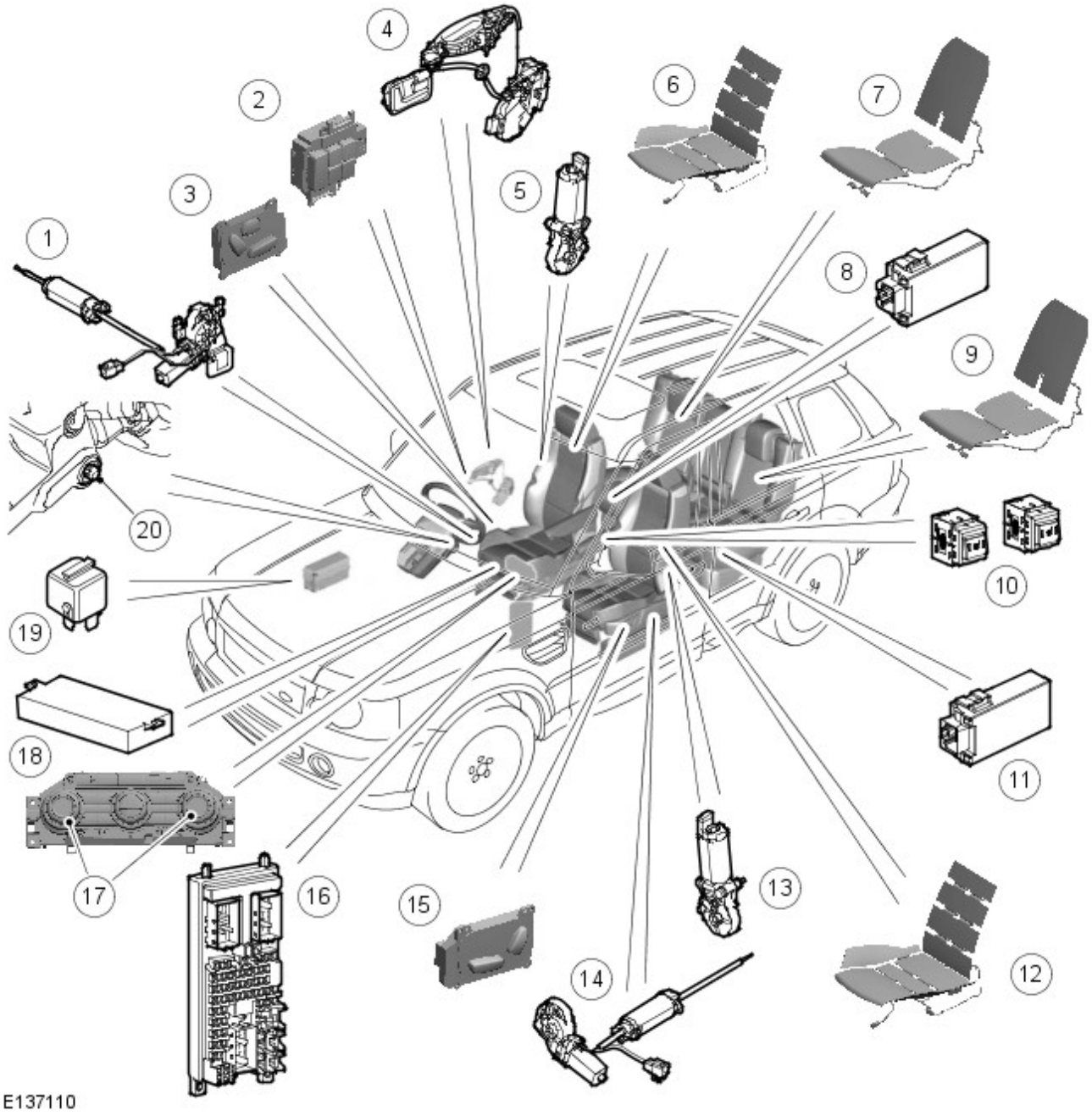
Published: 20-Nov-2013

Seating - Seats

Description and Operation

Component Location

NOTE: RH drive shown, LH drive similar.



Item	Part Number	Description
1	-	Driver's seat cushion adjustment motor assembly
2	-	Driver's seat memory switch pack
3	-	Driver's seat non-memory switch pack
4	-	Driver's door ajar switch
5	-	Driver's seat squab motor
6	-	Driver's seat heating element
7	-	Second row RH (right-hand) seat heating element
8	-	Second row RH seat heating module
9	-	Second row LH (left-hand) seat heating element
10	-	Second row heated seat switches
11	-	Second row LH seat heating module
12	-	Front passenger seat heating element
13	-	Front passenger seat squab motor

14	-	Front passenger seat cushion adjustment motor assembly
15	-	Front passenger seat switch pack
16	-	CJB (central junction box)
17	-	Front heated seat switch pack (climate control system)
18	-	Memory control module
19	-	Front passenger seat power relay
20	-	Steering rake and reach adjustment

OVERVIEW

LEATHER SEAT COVERS

Leather is a natural product, therefore it bears natural characteristics, such as grain variations, growth & bush marks. These non-weakening marks show the true nature of the hide and are the hallmarks of Leather. In order to maintain the beauty of the vehicles natural Leather upholstery it requires regular cleaning, which if neglected, may cause deterioration. Where dust and dirt are allowed to accumulate and become ingrained in the surface of the Leather, the upholstery may become permanently damaged.

Light coloured upholstery can be particularly susceptible to soiling and staining and care should be taken to ensure that where there is evidence of any soiling or staining on the upholstery then this should be cleaned immediately using the Jaguar/Land Rover approved products, failure to do this could lead to the stain becoming permanent, this applies to all leather upholstery and is not colour specific.

Leather trimmed seats will naturally exhibit areas of creasing and wrinkling over a period of time and is a normal characteristic as the Leather ages.

Particular care should be taken where there is evidence of soiling or staining on the leather, this should be cleaned immediately. Failure to do this could lead to the stain becoming permanent.

Particular care should be taken to prevent damage from studs, zips and buckles.

NOTES:

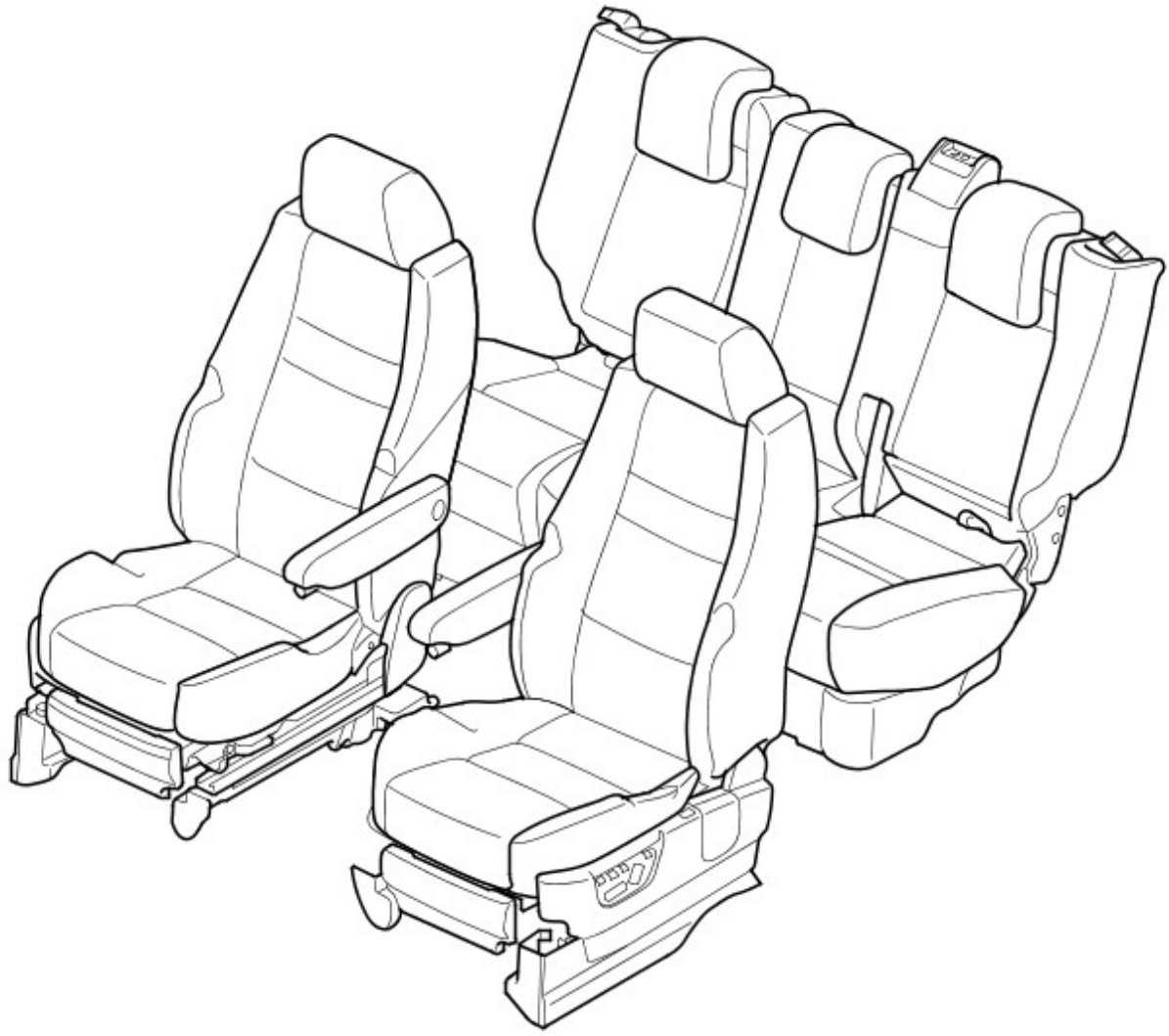
 Please refer to Leather care label attached to seats for more information.

 Creasing and wrinkling does not represent a manufacturing defect.

 Damage from studs, zips and buckles do not represent manufacturing defects.

 Use only Jaguar/Land Rover approved products in accordance with the instructions for use.

SEAT CONFIGURATION



E57128

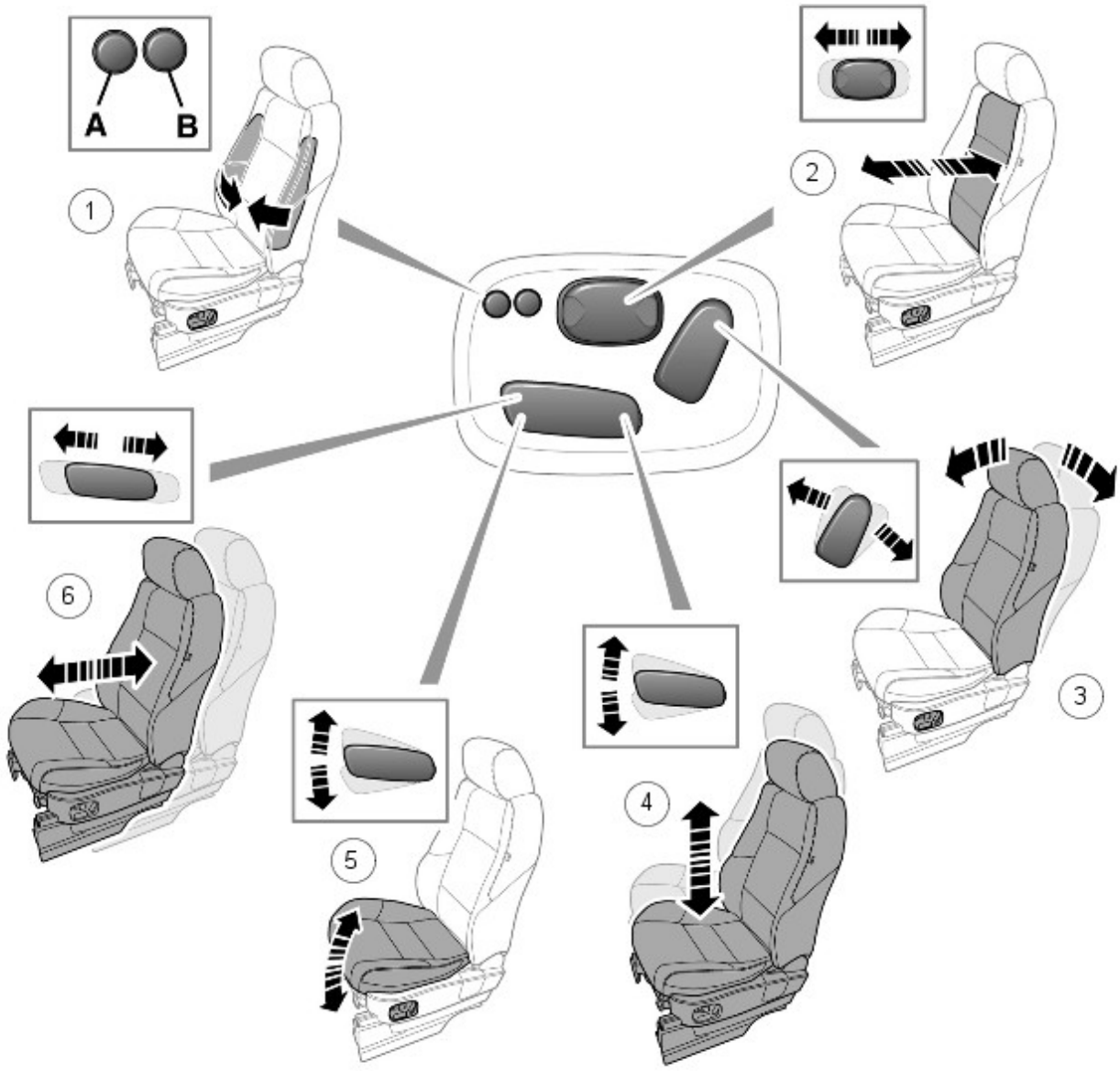
The driver's seat has the option of an 8-way power adjustment, with or without memory functionality, or a 6-way manual adjustment. The front passenger seat has the option of a 6 way power adjustment or a 4-way, non-height, manual adjustment. On vehicles from 2008MY, the passenger seat is also available with an 8-way power adjustment.

The second row of seats are designed as a 60/40 split, flip and fold configuration.

All seats are available in a fabric, duragrain or leather finish depending on model specification.

POWER OPERATED FRONT SEATS (NON-MEMORY)

NOTE: 8-way memory switch pack shown.



E137620

Item	Part Number	Description
1	-	Bolster adjustment: A - Bolster inflate; B - Bolster deflate
2	-	Lumbar support adjustment
3	-	Backrest adjustment
4	-	Height adjustment
5	-	Cushion tilt adjustment
6	-	Fore and aft adjustment

Forward/Backward adjustment

Push and hold the switch forwards or backwards to move the seat to the desired position.

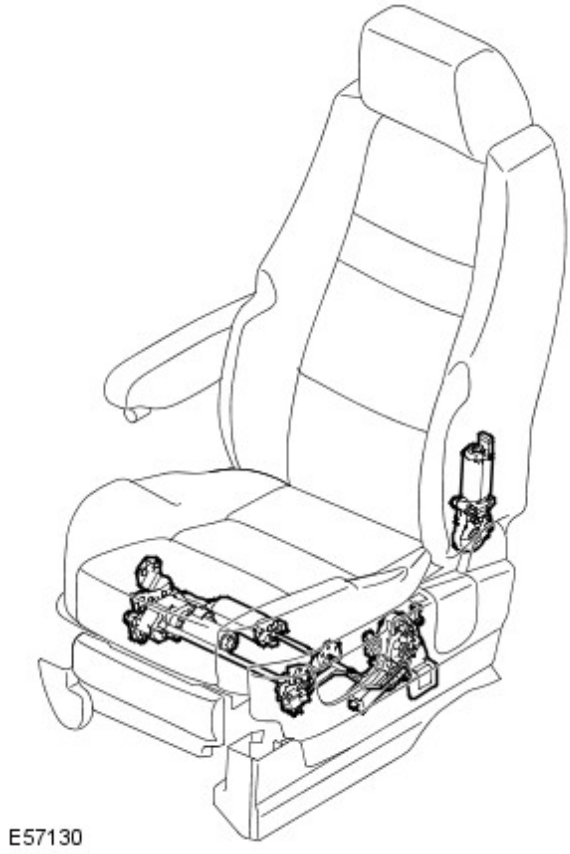
Seat back adjustment

Twist the switch forwards or backwards until the desired seat back angle is achieved.

Seat cushion height adjustment

Push the switch up or down to raise or lower the cushion.

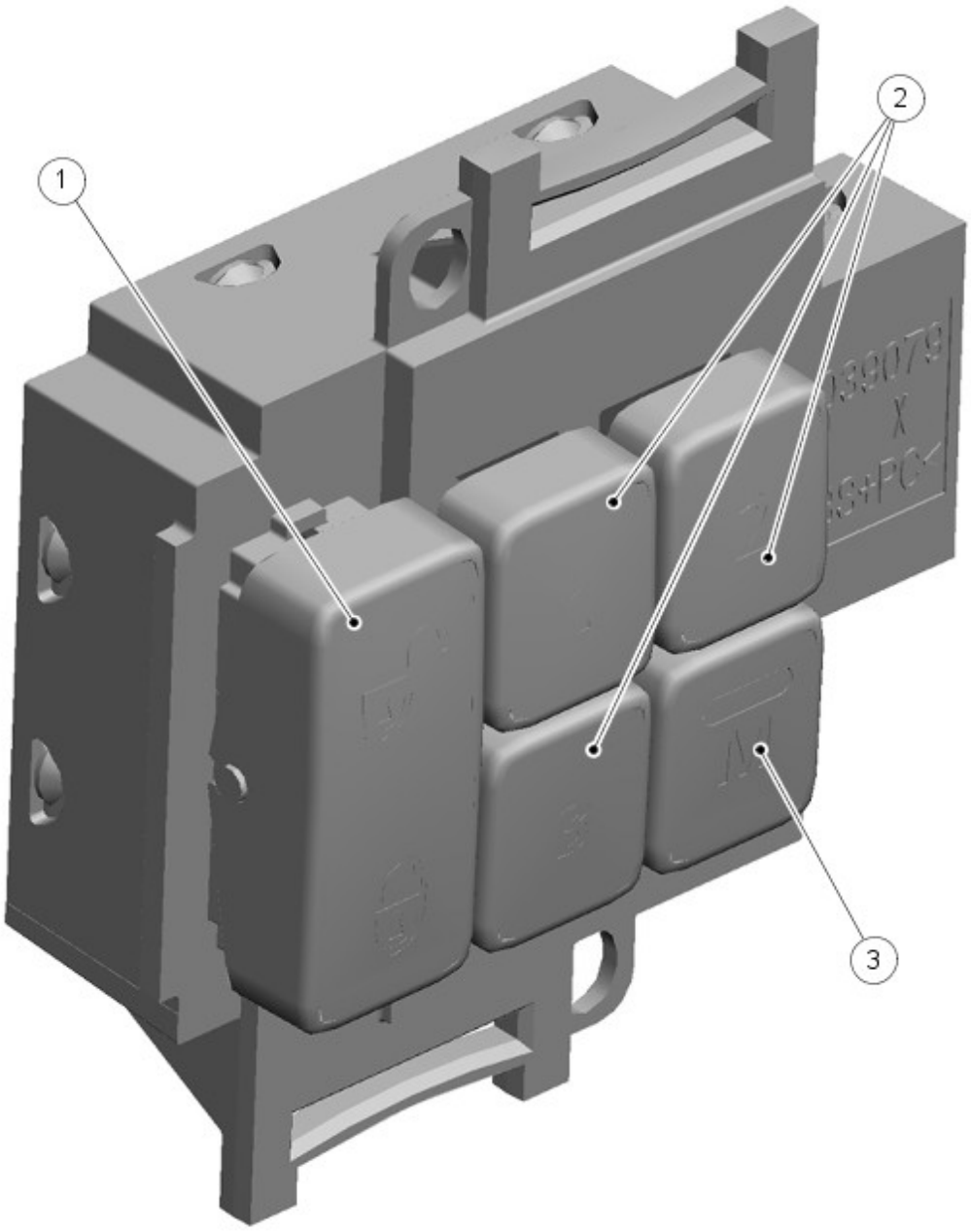
Front Seat Motors



Item	Part Number	Description
1	-	Seat back adjustment motor
2	-	Seat cushion height and tilt adjustment motor
3	-	Seat slide adjustment motor

The seat motors are a permanent magnet motor type coupled to a rack and pinion assembly. Should the motor seize or stick, an internal thermal cut-out switch will trip to remove voltage from the motor. Two pins within each of the seat switch packs control the seat motors. Both pins are connected to ground. Operating the switch applies voltage to one of the pins while the other pin remains connected to ground. Operating the switch in the opposite direction reverses power and ground path to the motor allowing the motor to run in the opposite direction.

Driver's MEMORY SEAT



E137100

Item	Part Number	Description
1	-	Lock/unlock button
2	-	Memory preset buttons
3	-	Memory store button

Once the power operated driver's seat, steering column and exterior mirrors are adjusted, the vehicle can memorize these settings for future use.

1. Press the memory store (M) button to activate the memory function. The switch indicator will illuminate.

2. Press one of the preset buttons within 5 seconds to memorize the current settings. MEMORY (1, 2 or 3) SETTINGS SAVED will be displayed on the message center, accompanied by an audible chime to confirm the settings have been memorized.

3. To recall a stored position press the relevant preset button. MEMORY (1, 2 OR 3) RECALLED will be displayed in the message center.

NOTES:

A seat position will only be memorized during the 5 second active period. Any existing settings will be over-written when programming a memory position.

If the driver's seat or steering column are adjusted during entry or exit operation, automatic movement will stop.

Memory Recall

Memory recall has three memory positions stored for the seats, exterior mirrors and electric steering column (where fitted). The switches for this function are located on driver's seat outer side trim panel. Pressing the appropriate numbered memory switch allows the seat to start moving to the position appropriate to that memory.

The following procedure will store a memory position:

Ensure reverse gear is not engaged
Manually adjust the seat to the desired position, using the seat switches
Press and release the 'memory store' switch
Press and release the desired numbered memory switch within 5 seconds

When a memory recall is initiated, to limit the overall current consumption, only two-seat axis will move towards their intended position at any one time. To minimize current load as the motors start, the initiation of each axis is phased with a 100ms delay between each motor starting.

If any of the seat adjustment or memory switches are activated during a 'one touch' memory recall, the recall will be overridden and the seat will begin to move in the direction corresponding to the switch that has been pressed.

Both mirrors move simultaneously about the vertical axis first (left/right), and then, once all vertical axis movements are complete, about the horizontal axis (up/down). To minimize the number of mirror drives required, a method of sharing is implemented, which dictates that all movement about one axis is complete before movement about the other axis commences.

Mirror movement coincides with the following switch request table (the table below shows module pins of connector C2383):

Action	Control Module Pin 14	Control Module Pin 7	Control Module Pin 13	Control Module Pin 8
Driver Mirror Up	Battery	-	-	-
Driver Mirror Down	Ground	-	-	-
Driver Mirror Left	-	Ground	-	-
Driver Mirror Right	-	Battery	-	-
Passenger Mirror Up	-	-	Battery	-
Passenger Mirror Down	-	-	Ground	-
Passenger Mirror Left	-	-	-	Ground
Passenger Mirror Right	-	-	-	Battery

Lazy Entry

Pressing the unlock button on the remote transmitter will initiate a memory recall. This feature is known as 'lazy entry'. If the seat movement, memory switch or the lock button on the remote transmitter is pressed, then the 'lazy entry' feature will stop immediately.

The memory settings are stored within EEPROM (electrically erasable programmable read only memory) of the memory control module. These are the positional values that a lazy entry request uses when the remote unlock button for that particular key is next pressed.

The lazy entry feature can be activated or deactivated via the setting menu of the high line instrument cluster. This provides the driver with the option to enable or disable lazy entry as required.
For additional information, refer to: Information and Message Center (413-08, Description and Operation).

Immediate Adjustment

Pressing one of the manual adjustment switches will initiate the corresponding motor for that axis until the switch is released.

Only two seat motors can be driven at any one time. However, due to the sharing of relays, there are certain combinations of motors that cannot be driven together. The following table indicates which axis can and cannot be operated at the same time:

	Recline Up	Recline Down	Tilt Up	Tilt Down	Height Up	Height Down	Slide Forward	Slide Backward
Recline Up	-	No	Yes	Yes	Yes	Yes	Yes	Yes
Recline Down	No	-	Yes	Yes	Yes	Yes	Yes	Yes
Tilt Up	Yes	Yes	-	No	Yes	Yes	No*	No*
Tilt Down	Yes	Yes	No	-	Yes	Yes	No*	No*
Height Up	Yes	Yes	Yes	Yes	-	No	No*	No*
Height Down	Yes	Yes	Yes	Yes	No	-	No*	No*
Slide Forward	Yes	Yes	No*	No*	No*	No*	-	No
Slide Backward	Yes	Yes	No*	No*	No*	No*	No	-

Key:

- - = Not applicable
- Yes = Can be activated together
- No = Cannot be activated together (Physically impossible)
- No* = Cannot be activated together (Relay sharing restriction)

If two axis are being driven and a third axis is requested to move, the third switch request is ignored until either of

the two axis switches, already active, are released. The third axis movement may only be initiated providing the switch has been released and re-selected.

Seat adjustment can be initiated simultaneously with any mirror movement.

REVERSE GEAR MIRROR POSITION

To give the driver a clear view of the kerbs when reversing, the exterior door mirrors can be dipped when reverse gear is selected. The level of mirror dipping is set to a predetermined amount when the vehicle leaves the factory but has the ability to be customer programmed.

The following procedure will store a reverse gear mirror position:

Perform a memory recall procedure
Ensure reverse gear is engaged
Manually adjust the mirrors to the desired position
Press and release the 'memory store' switch
Press and release the desired numbered memory switch
Reverse gear mirror dip setting will be stored for that particular memory setting.

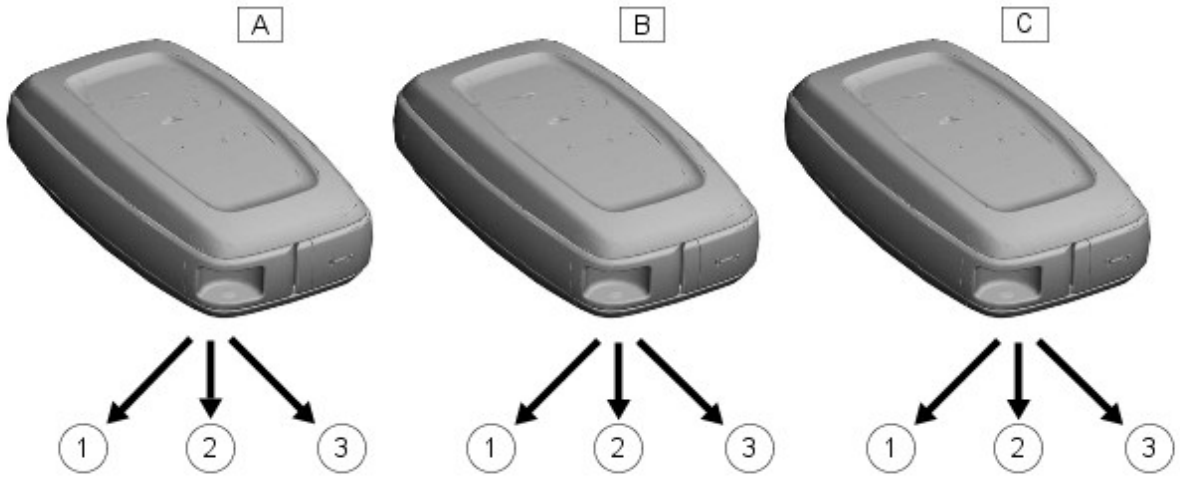
A single chime will be emitted from the instrument cluster to indicate that the store operation has been successful and 'Mirror Dip Stored' message will be displayed in the message center.

Once this sequence has been completed, the stored mirror position will be the position that the mirrors move to when reverse gear is next selected.

Storing a memory position with reverse gear selected only affects reverse gear mirror positions, the remainder of the memory positions remain unchanged.

To protect against an accidental setting, the mirror position will only be stored if a mirror adjustment has been made since reverse gear was selected. If there is no reverse gear mirror position stored, then a default setting, stored in the memory control module, is adopted.

There are three memory settings per key. For each of these settings there is a reverse gear mirror position store. This equates to a possible nine reverse gear mirror position settings. Personalization memory setting relates to the 3 most recent ignition keys.



E137622

Item	Part Number	Description
A	-	Most recent ignition key
B	-	Second most recent ignition key
C	-	Third most recent ignition key
1	-	First reverse gear mirror position store
2	-	Second reverse gear mirror position store
3	-	Third reverse gear mirror position store

The reverse gear mirror position feature can be activated or deactivated via the customer Personalization feature of the high line instrument cluster. This provides the driver with the option to enable or disable reverse gear mirror position as required.
For additional information, refer to: Information and Message Center (413-08, Description and Operation).
Information regarding the reverse gear mirror status, for both manual and automatic transmissions, is transmitted as a message on the LIN (local interconnect network) bus.

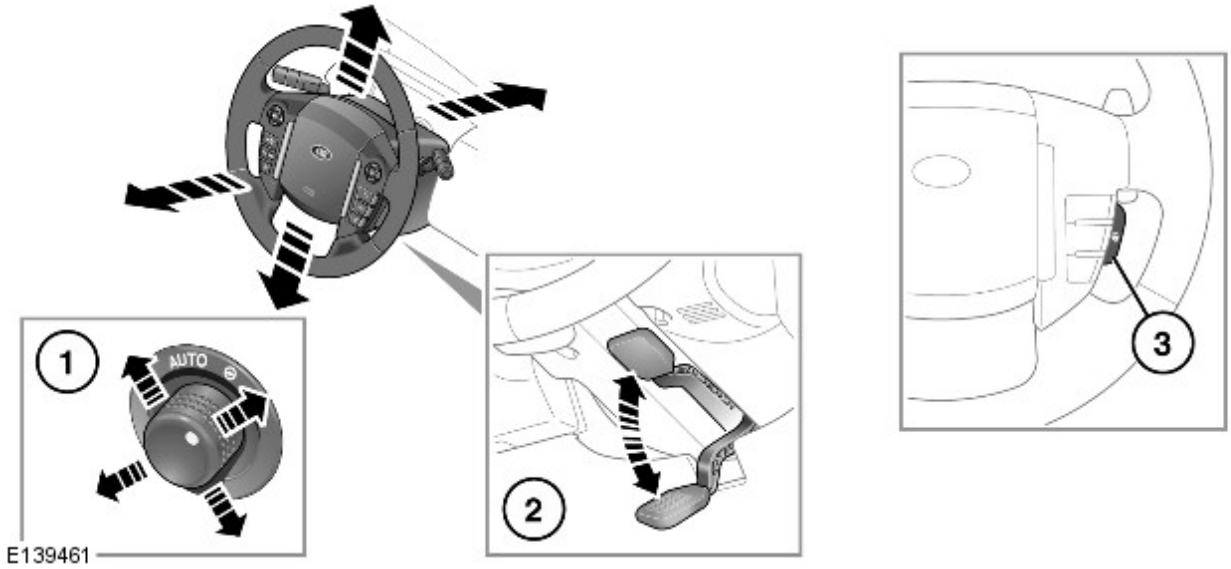
When the reverse gear mirror position feature is toggled 'OFF', all 3-memory settings associated with that Personalization memory will return to the default reverse gear mirror settings.

When reverse gear is de-selected, the mirror position immediately prior to reverse selection will be resumed, unless a memory recall has been requested whilst reverse has been selected, in which case the mirrors will move to the requested memory position when reverse is de-selected.

On vehicles fitted with the ZF automatic transmission there is a delay of 0.5 second following the selection of reverse gear, prior to the reverse mirror position being recalled. This is to prevent any movement of the mirrors as the gear selector is moved through the reverse position on the way to, and from, the park position.

STEERING COLUMN ADJUST (where fitted)

The memory control module controls the electric adjustable steering column in a rake (up and down) and reach (in and out). The steering column can be adjusted for rake and reach by operating the rotary joystick control switch on the LH side of the steering column.



Item	Part Number	Description
1	-	Electric adjustment
2	-	Manual adjustment
3	-	Heated steering wheel

Entry/Exit Mode

Entry/Exit mode provides automatic movement of the steering column and driver's seat to allow easier entry to or exit from the vehicle.

Entry/Exit mode is selected by setting the steering column adjustment switch to the 'AUTO' position.

NOTES:

If the adjustment switch is moved away from 'AUTO' whilst the steering column is tilted away, the steering column will move back to its memorized position. Entry/Exit mode will then be cancelled.

If the adjustment switch is moved during entry/exit operation, steering column movement will stop.

Exit

When the door is opened, the steering column will move to the uppermost rake and innermost reach positions and the driver's seat will move slightly rearwards and lower.

Entry

When the ignition is switched to power mode 6 the steering column and seat will return to their previous positions. If, however, the memorized driver position has been changed (using the seat memory switches or another key transmitter), the steering wheel and seat will move to the new position.

Steering Column Control

Adjustment of the steering column is achieved by a single DC (direct current) motor. Each adjustment movement is transmitted through a solenoid actuated clutch; one clutch for reach movement and one for rake movement.

When engaged, a clutch can be released only if the system is unstressed. As the clutches are mounted on the same motor spindle, the sequence for position adjustment is as follows:

- Engage the selected clutch by powering the appropriate solenoid
- After a time period (approximately 0.1 of a second), the motor is powered in the desired direction
- When the motor reaches the stop position the solenoid and motor is released/unpowered. The clutch remains engaged under stress
- After a time period (approximately 0.1 of a second), the motor is powered in the opposite direction to enable the clutch to disengage when the stress is released.

Motor Rotation Direction	Clockwise	Counter Clockwise
Reach movement	IN	OUT
Rake movement	UP	DOWN

Simultaneous rake and reach movements are not possible since the motor must reverse direction as soon as the first axis has reached its required position.

Steering column rake and reach is controlled via potentiometer feedback.

AUDIBLE AND VISUAL CONFIRMATIONS

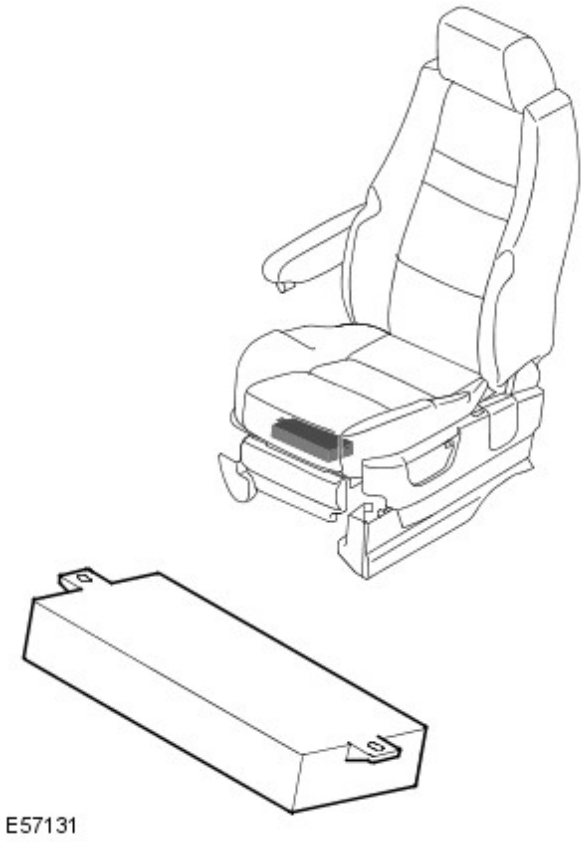
An audible confirmation is generated by the instrument cluster to provide confirmation to the driver that the requested operation has been successfully completed. The following operations support an audible confirmation:

Operation	Audible Confirmation	Conditions
Memory Store	Single Chime	Successful store operation completed
Memory Recall	Double Chime	Only issued if all axis of movement successfully reach the intended position
Reverse Gear Mirror Position Store	Single Chime	Successful store operation for reverse mirror position completed

In addition to audible confirmation there is also a visual confirmation via the instrument cluster message center. For additional information, refer to: Information and Message Center (413-08, Description and Operation).

MEMORY CONTROL MODULE

NOTE: Memory control module location (LHD shown, RHD similar)



The memory control module, located under the driver's seat, relies upon a number of inputs to control various outputs. As with all electronic control modules, the unit needs information regarding the current operating conditions of the engine and other related systems before it can make calculations, which determine the appropriate outputs.

All memory values are stored in the non-volatile memory, EEPROM. The current motor positions, which are monitored by the control modules integral Hall sensors, are stored in the EEPROM. If a loss of power occurs, upon power reconnection the current motor position are recalled from the memory and adopted as the current positions. This will allow the relative memory positions to be retained without any need to re-calibrate. The memory control module checks the integrity of all data stored in the EEPROM each time it exit's stand-by mode. In the event that the data is corrupt, the control module adopts the default values for all of the programming options. All memory positions are deemed as invalid and the software will perform as if there are no memory positions stored. Following the procedure for storing a memory position again will reset the relevant memory and allow full functionality.

Stall Detection

Seat, steering column (where fitted) and mirror motors are deemed to have stalled if there is no change in the inputs that are received from the corresponding feedback sensors for 200ms (seat), 1000ms (mirror & steering column)

while that axis is being driven.

If a stall condition is detected then the drive to that axis is cancelled for the remainder of that memory operation (memory recall) or until the switch is re-selected (manual movement).

If the motor movement has stopped due to loss of sensor feedback, either stall or sensor failure, then that axis may be activated again, to move past the stall position, by re-selecting the appropriate switch. This allows control of the motor to be maintained if sensor feedback is lost.

Upon re-selection of movement, if sensor pulses are detected then the motor will continue to be driven until the switch is released or another stall condition is detected. If sensor feedback is not detected then the motor is only driven for 0.5 second and then stops until the switch is released and then pressed again, when a further 0.5 second of activation is permitted, and so on.

For all seat motor and steering column manual movements, whenever a motor is driven and a stall occurs, the memory control module records the position at which the stall occurred. If movement occurs beyond a stall position, then that position is erased from the control modules memory. This will always allow movement past a previously recorded stall position once movement has been registered beyond that position. This is the case for both manual and memory movement.

Initialization

When a replacement memory control module is fitted to a seat it should be initialized so that the control module can learn the seats and steering column maximum and minimum adjustment values. This is achieved by:

- adjusting all seat movement axis from one end of travel to the other; slide, recline, height and tilt
- adjusting all steering column movement from one end of travel to the other; rake and reach.

Battery Monitor

If the battery voltage drops below 10.5 Volts, then the memory control module ignores all requests for a memory recall, including lazy entry, or easy entry/exit until the battery voltage has reached 11.5 Volts. This will conserve as much power in the vehicle battery as possible to enable engine cranking.

Stand-by Mode

The memory control module supports a stand-by mode to keep power consumption to a minimum.

The control module will enter stand-by mode upon receipt of a LIN bus 'SLEEP' message from the CJB. Alternatively, a time period of 3 seconds after the LIN bus network has remained quiet provided there are no motors being driven at that time and there are no valid switch requests.

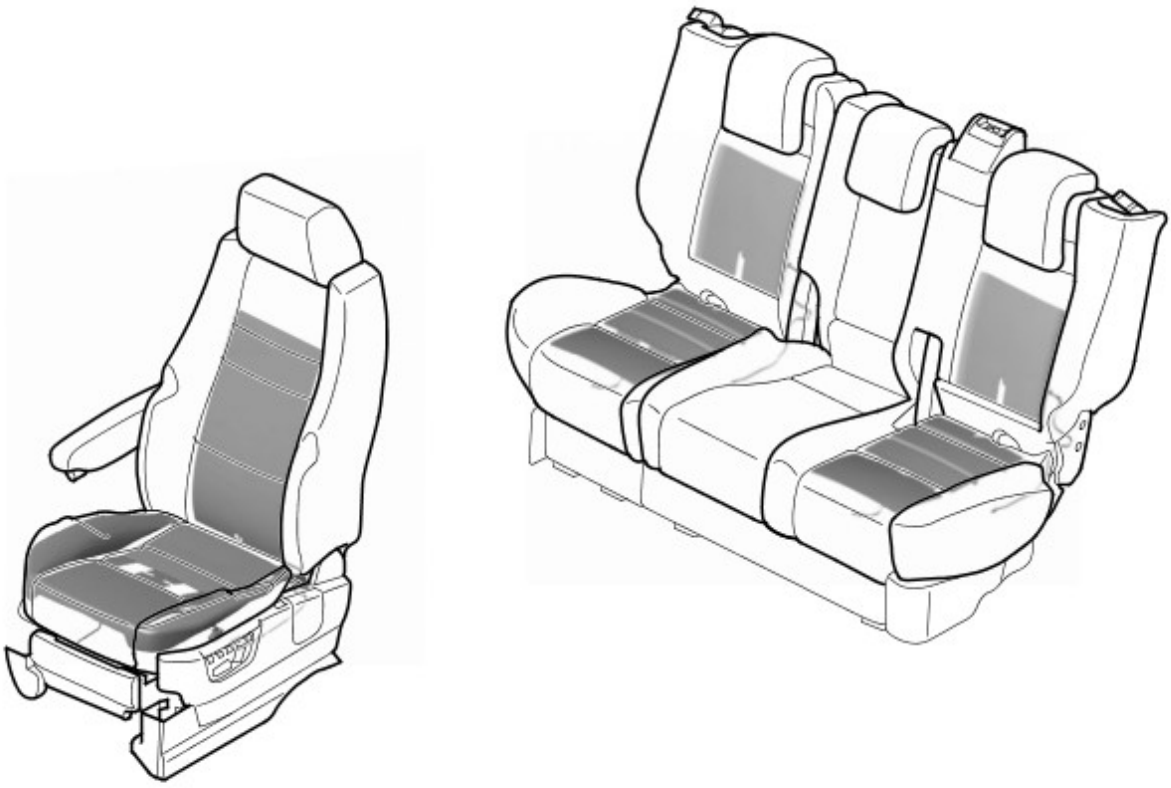
If there is a failure with the LIN bus network then the seat will be operational in 'inch mode' only.

If the control module is being prevented from entering stand-by mode due to motor movement, memory recall or switch operation, then it will enter stand-by mode when the current function has terminated.

 NOTE: In the case of a memory recall, all memory recall operations should be carried out before entering stand-by mode, not just the current motor movement.

The control module will exit stand-by mode if there is any LIN bus activity. When the control module exits stand-by mode it must verify the 'System Enable Status' in order to recognize when it should respond to a switch request.

SEAT HEATING



E57132

Front Seats

Front Seat Heater Switches



E138151

Item	Part Number	Description
1	-	LH front seat heater switch
2	-	RH front seat heater switch

The heated front seat system is available on both manual and electric seats and is controlled by the ATC (automatic temperature control) module .

When the front seat heater switch is operated, power is supplied to the heater elements in the seat, causing the seat to heat up. The ATC module senses seat temperature via the sensor in the cushion and regulates voltage to the seat heater elements to maintain a constant temperature.
For additional information, refer to: Control Components (412-04 Control Components, Description and Operation).

Rear Seat Heaters

Rear Seat Heater Switches



E57134

The RH and LH rear seats support three integral heating elements, squab, backrest and bolster. The optional rear child booster seat also supports an integral seat-heating element.

NOTE: The rear center seat is not available with seat heating.

The rear seat heaters are enabled when the ignition switch is in position II, and operate at one of two temperature settings. With the first press of a rear seat heater switch the relative rear seat heat control module (RH or LH) adopts the higher temperature setting, supplies a power feed to the related rear seat heater elements and illuminates two amber LED (light emitting diode)'s in the switch. At the second press of the switch the control module adopts the lower temperature setting and extinguishes one of the LED's. At the third press of the switch the control module de-energizes the heater elements and extinguishes the second LED. The seat heaters remain on until selected off or the ignition is turned off.

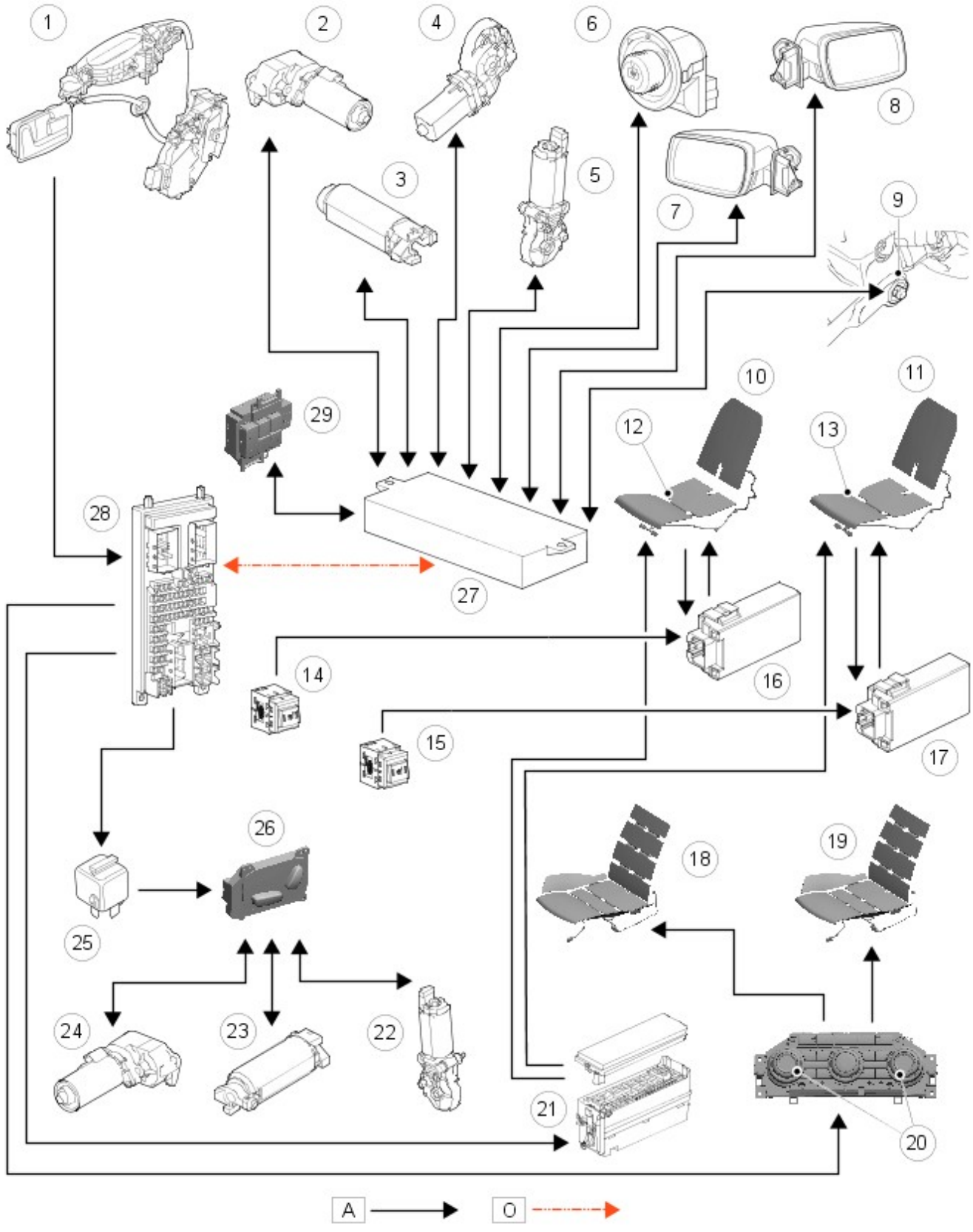
The rear seat heat control modules receive an input from a temperature sensor in RH and LH rear seats, and regulate the power feed to the heater elements to control the seat temperature at the appropriate temperature setting between 35 and 45 °C (95 and 113 °F). The actual temperature settings vary with the type of seat covering, to allow for the differing heat conduction properties of the different seat covering materials.

DIAGNOSTICS

The exchange of information between a Land Rover approved diagnostic system and the memory control module is via the CJB, which are interconnected via the hi-speed CAN (controller area network) bus and LIN bus. There is a non-volatile memory (EEPROM) for saving detected errors. Its contents are not lost when the power supply is disconnected. Only a Land Rover approved diagnostic system can erase the error memory.

CONTROL DIAGRAM

NOTE: **A** = Hardwired; **O** = LIN bus



E137111

Item	Part Number	Description
1	-	Driver's door ajar switch
2	-	Driver's seat tilt motor
3	-	Driver's seat slide motor
4	-	Driver's seat height motor
5	-	Driver's seat recline motor
6	-	Mirror adjustment switch
7	-	LH mirror motor
8	-	RH mirror motor

9	-	Steering reach and rake adjustment
10	-	RH rear seat heater
11	-	LH rear seat heater
12	-	RH rear seat heater cut-off switch
13	-	LH rear seat heater cut-off switch
14	-	RH rear seat heater switch
15	-	LH rear seat heater switch
16	-	RH rear seat heater control module
17	-	LH rear seat heater control module
18	-	RH front seat heater
19	-	LH front seat heater
20	-	Front seat heater switches
21	-	BJB (battery junction box)
22	-	Front passenger seat recline motor
23	-	Front passenger seat slide motor
24	-	Front passenger seat height motor
25	-	Front passenger seat power relay
26	-	Front passenger seat switch pack
27	-	Memory control module
28	-	CJB
29	-	Driver's seat memory switch pack

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Seating - Seats

Diagnosis and Testing

Principle of Operation

For a detailed description of the seating systems and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: Seats (501-10 Seating, 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
• Seat runners • Seat frames • Seat movement switch condition and installation • Seat heater switch condition and installation • Seat motor(s) condition and installation • Steering column switch condition and installation • Steering column condition and installation • Door mirror switch condition and installation • Door mirror condition and installation	• Battery condition and state of charge • Fuses • Harnesses and connectors • Seat movement switch(s) • Seat heater switch(s) • Seat heater elements • Seat motor(s) • Seat module(s) • Memory control module(s) • Steering column switch • Steering column motor • Door mirror switch(s) • Door mirror motor(s) • Ignition switch • Battery Junction Box (BJB) • Central Junction Box (CJB) • 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
Seat does not move when the switch is operated (forward, backward, tilt, etc)	• Runner or mechanism jammed • Seat circuit short circuit to ground, short circuit to power, open circuit, high resistance • Thermal cut-out engaged • Driver/Passenger Seat Module (DSM/PSM) fault	• Check for obstructions at the seat runners or mechanisms • Refer to the electrical circuit diagrams and test the relevant seat circuit for short circuit to ground, short circuit to power, open circuit, high resistance • The thermal cut-out may engage if there is a motor or mechanism fault • Using the manufacturer approved diagnostic system, check the Driver/Passenger Seat Module (DSM/PSM) for related DTCs and refer to the relevant DTC index
Steering column does not move when the switch is operated	• Steering column adjustment circuit short circuit to ground, short circuit to power, open circuit, high resistance • Central Junction Box (CJB) fault	• Refer to the electrical circuit diagrams and test the steering column adjustment circuit for short circuit to ground, short circuit to power, open circuit, high resistance • Using the manufacturer approved diagnostic system, check the Central Junction Box (CJB) for related DTCs and refer to the relevant DTC index
Mirrors do not move when the switch is operated	• Door mirror internal failure • Door mirror circuit short circuit to ground, short circuit to power, open circuit, high resistance	• For door mirror tests, refer to the relevant section of the workshop manual • Refer to the electrical circuit diagrams and test the door mirror circuits for short circuit to ground, short circuit to power, open circuit, high resistance

Memorized seat / steering column / mirror position is not resumed	• Battery voltage below 10.5V • Position not stored • Switch operated during "one-touch" memory recall	• Refer to the relevant section of the workshop manual and test the battery • Make sure that the desired position is correctly stored • Make sure that the memory store/recall procedure is being followed
"Lazy entry" function inoperative	• Remote transmitter fault (battery, transmitter programming, etc) • Battery voltage below 10.5V • Position not stored • Switch operated during "one-touch" memory recall	• Check that the remote transmitter operates the central locking • Refer to the relevant section of the workshop manual and test the battery • Make sure that the desired position is correctly stored • Make sure that the memory store/recall procedure is being followed
Entry/exit mode inoperative	• Switch not in **AUTO** mode • Driver/Passenger Seat Module (DSM/PSM) fault	• Make sure the function is enabled and that the switch is correctly set • Using the manufacturer approved diagnostic system, check the Driver/Passenger Seat Module (DSM/PSM) for related DTCs and refer to the relevant DTC index
Seat does not get warm	• Switch fault • Heated seat circuit short circuit to ground, short circuit to power, open circuit, high resistance • Temperature sensor • Battery voltage is greater than 16.5 volts	• Check the LEDs at the switches as a quick check of the switch function. If the LEDs illuminate when the switches are operated, there is power to the switches and the switches are operating at least one level • Refer to the electrical circuit diagrams and test the heated seat circuit for short circuit to ground, short circuit to power, open circuit, high resistance • Test the operation of the temperature sensor • If the battery voltage is higher than 16.5 volts for more than 5 seconds, seat heating is suspended
Part of the seat does not get warm	• Heated seat element fault	• Refer to the electrical circuit diagrams and test the heated seat circuit for short circuit to ground, short circuit to power, open circuit, high resistance

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: Driver/Passenger Seat Module (DSM/PSM) (100-00 General Information, Description and Operation) / Diagnostic Trouble Code (DTC) Index - DTC: Central Junction Box (CJB) (100-00 General Information, Description and Operation).

Published: 11-May-2011

Seating - Rear Seat

Removal and Installation

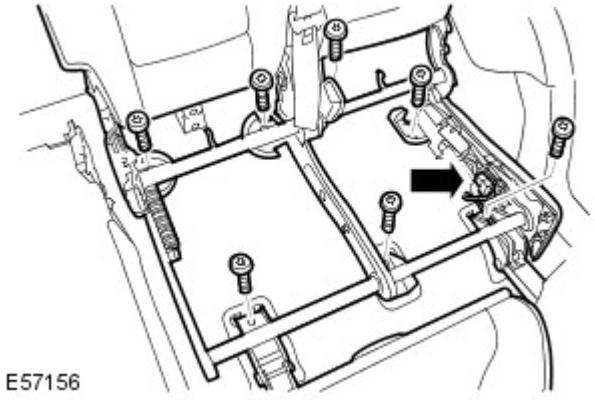
Removal

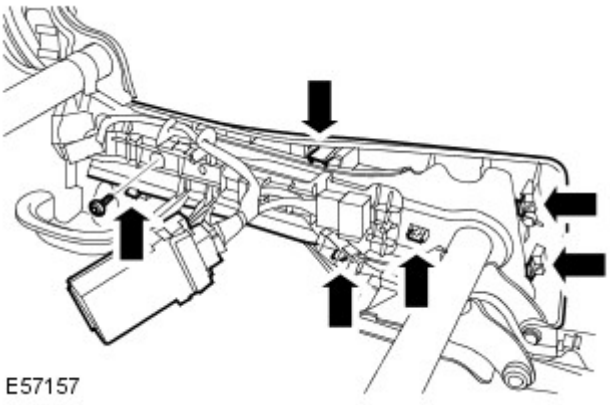
NOTES:

Left-hand shown, right-hand similar.

The Torx bolts can be re-used.

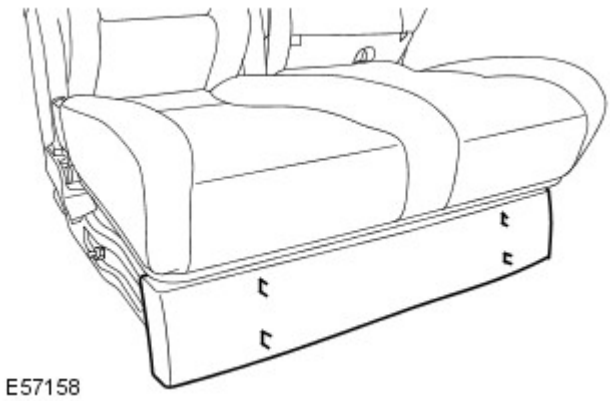
1. Release the rear seat.
   - Fold the LH seat cushion forward.
   - Remove the 7 Torx bolts.
   - Fold down the rear seat backrest.
   - Disconnect the electrical connector.
2. With assistance, remove the rear seat assembly.





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

   Remove the rear seat cushion side trim.
   - Release the seat heater control module.
   - Remove the Torx screw.
   - Release the 6 clips.



4. Remove the seat frame trim.
   - Release the 4 clips.

Installation

1. Install the seat frame trim.
   - Carefully secure the clips.
2. Install the rear seat cushion side trim.
   - Carefully secure the clips.

- Fit and tighten the Torx screw.
- Install the seat heater control module.

3. With assistance, install the rear seat assembly.
    - Position the seat on the dowels.

4. Secure the rear seat.
    - Return the seat backrest to the upright position.
    - Tighten the Torx bolts to 40 Nm (30 lb.ft).
    - Fold the seat cushion rearwards.
    - Connect and secure the electrical connector.

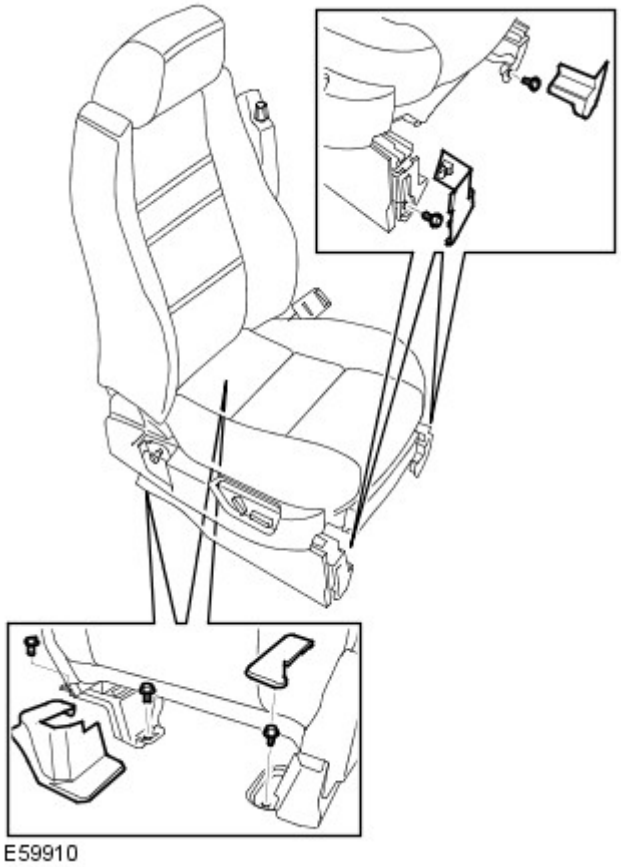
Published: 11-May-2011

Seating - Front Seat

Removal and Installation

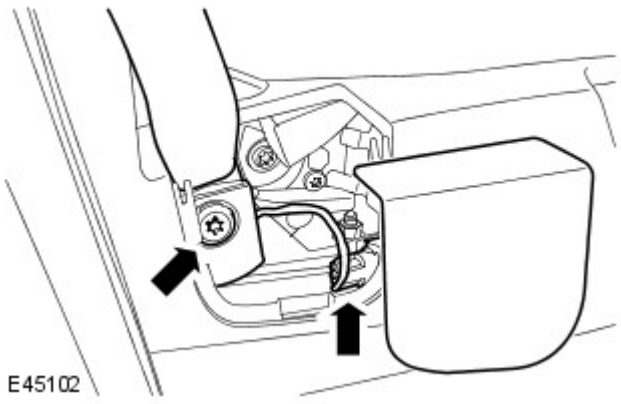
Removal

1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00 General Information, Description and Operation).



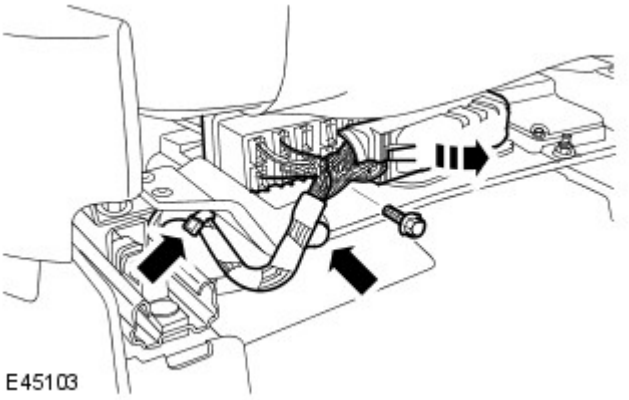
2. NOTE: The Torx bolts can be re-used.

   Release the front seat.
   - Remove the bolt covers.
   - Remove the 5 Torx bolts.



3. Release the safety belt lower anchor from the seat.
   - Remove the bolt cover.
   - Passenger side, disconnect the electrical connector.
   - Remove and discard the Torx bolt.

4. With assistance, remove the front seat.
   - Protect the rocker panel.
   - Remove the bolt.
   - Disconnect the 2 electrical connectors.
   - Release the 2 wiring harness clips.



Installation

1. With assistance, install the front seat.
    - Connect the electrical connectors.
    - Secure the wiring harness clips.

2. Attach the safety belt lower anchor to the seat.
    - Tighten the new Torx bolt to 40 Nm (30 lb.ft).
    - Passenger side, connect the electrical connector.
    - Install the bolt cover.

3. Secure the front seat.
    - Tighten the Torx bolts to 40 Nm (30 lb.ft).
    - Install the bolt covers.

4. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

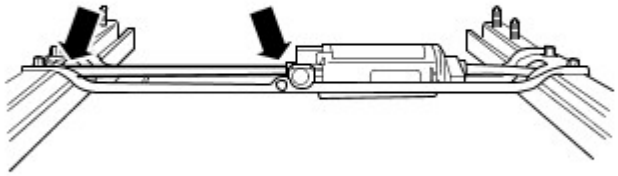
Published: 11-May-2011

Seating - Front Seat Track Motor

Removal and Installation

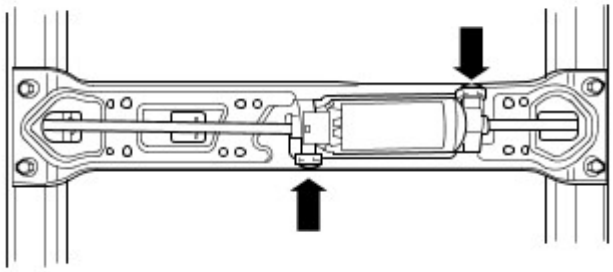
Removal

1. Raise the seat base for access.
2. Remove the drive cable.
   - Disconnect the seat motor electrical connector.



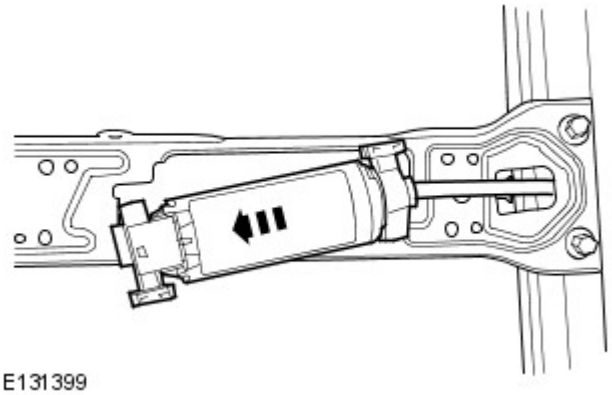
E131397

3. Remove the 2 clips.



E131398

4. Remove the front seat track motor.



E131399

Installation

1. Install the front seat track motor.
   - Install the drive cable.
   - Install the 2 clips.
2. Install the drive cable.
   - Connect the seat motor electrical connector.

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Seating - Front Seat Recliner Motor

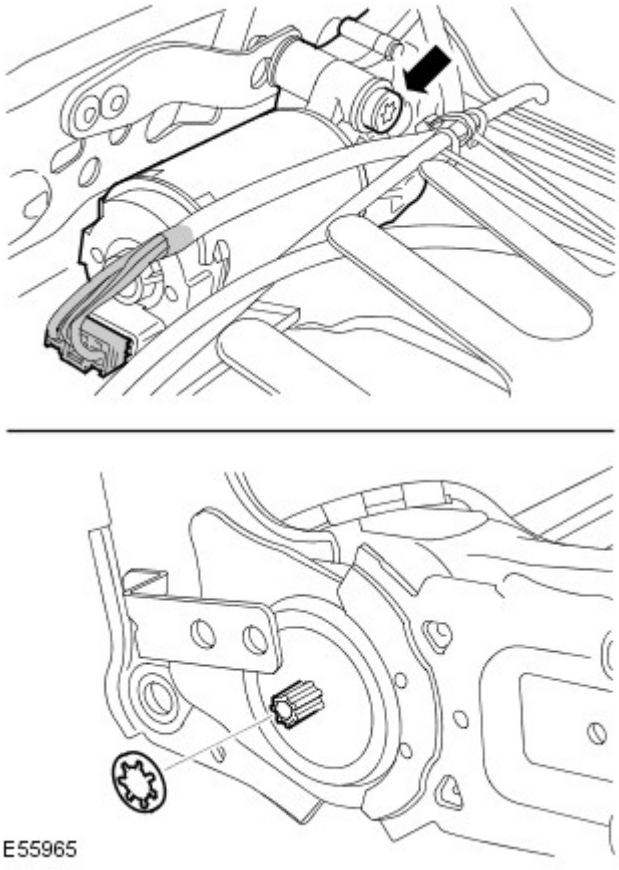
Removal and Installation

Removal

1. Remove the front seat backrest cover.
   For additional information, refer to: Front Seat Backrest Cover (501-10, Removal and Installation).

2. Remove the front seat backrest pad.

3. Remove the front seat recliner motor.
   - Disconnect the electrical connector.
   - Remove the Torx bolt.
   - Remove the front seat backrest shaft clip.
   - Remove the front seat backrest shaft.



Installation

1. Install the front seat recliner motor.
   - Install the front seat backrest shaft.
   - Install the front seat backrest shaft clip.
   - Tighten the Torx bolt to 10 Nm (7 lb.ft).
   - Connect the electrical connector.

2. Install the front seat backrest pad.

3. Install the front seat backrest cover.
   For additional information, refer to: Front Seat Backrest Cover (501-10, Removal and Installation).

Published: 11-May-2011

Seating - Front Seat Cushion Cover

Removal and Installation

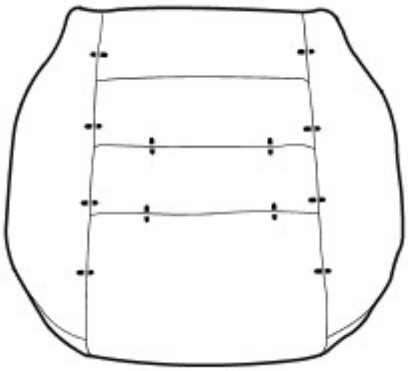
Removal

1. Remove the front seat cushion assembly.
   For additional information, refer to: Front Seat Cushion (501-10, Removal and Installation).



E55966

2. Release the front seat cushion cover.
   - Release the 13 clips.



E56020

3. Remove the front seat cushion cover.
   - Remove the 12 hog rings.

Installation

1. Install the front seat cushion cover.
   - Install the hog rings.
   - Attach the cover and secure with the clips.

2. Install the front seat cushion assembly.
   For additional information, refer to: Front Seat Cushion (501-10, Removal and Installation).

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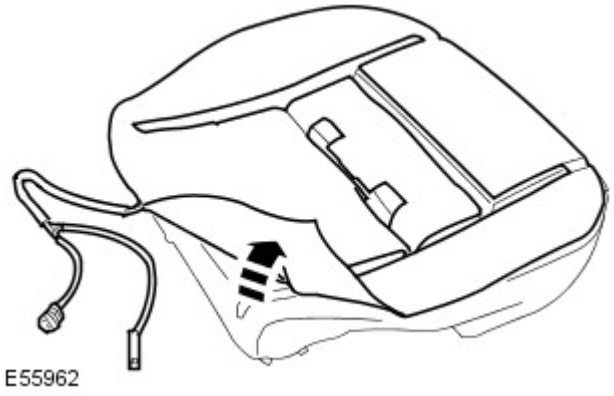
Seating - Front Seat Cushion Heater Mat

Removal and Installation

Removal

1. Remove the front seat cushion cover.
   For additional information, refer to: Front Seat Cushion Cover (501-10, Removal and Installation).

2. Remove the front seat cushion heater mat.



Installation

1. Install the front seat cushion heater mat.

2. Install the front seat cushion cover.
   For additional information, refer to: Front Seat Cushion Cover (501-10, Removal and Installation).

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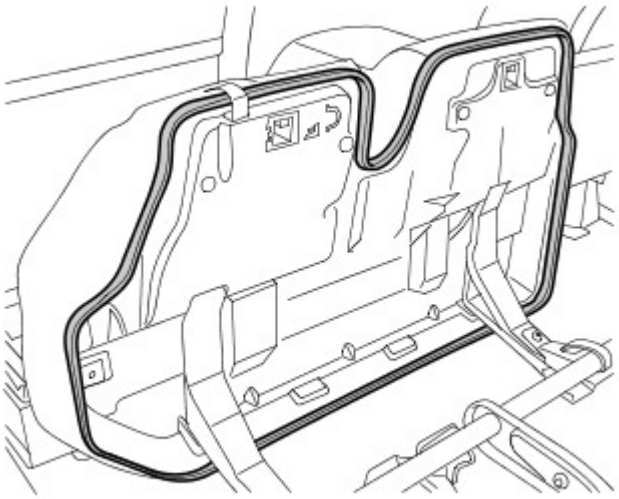
Seating - Rear Seat Cushion Cover

Removal and Installation

Removal

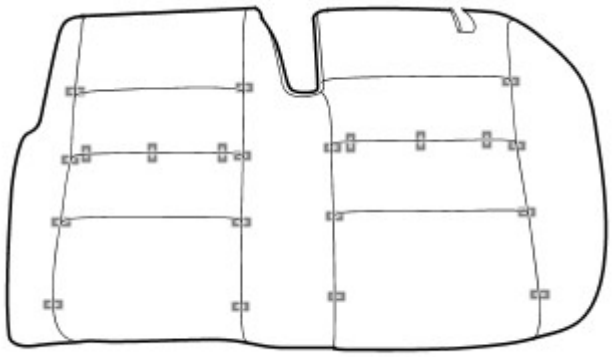
NOTE: This procedure shows the removal and installation of both the LH and the RH covers.

1. Fold the seat cushion forward.
2. Release the rear LH seat cushion cover.
   - Release the clip.



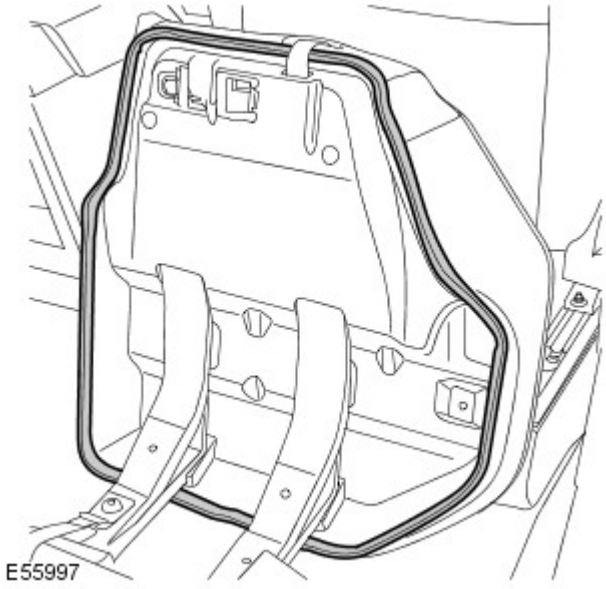
E55996

3. Remove the rear LH seat cushion cover.
   - Remove the 21 hog rings.



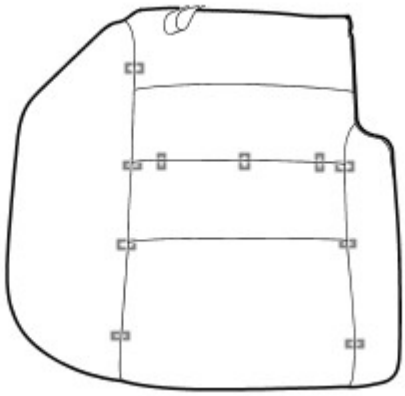
E56015

4. Release the rear RH seat cushion cover.
   - Release the clip.



E55997

5. Remove the rear RH seat cushion cover.



E56016

- Remove the 10 hog rings.

Installation

1. Install the rear seat cushion cover.
    - Install the hog rings.
    - Attach the retaining clip.

2. Fold the seat cushion rearwards.

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Seating - Front Seat Height Adjustment Motor

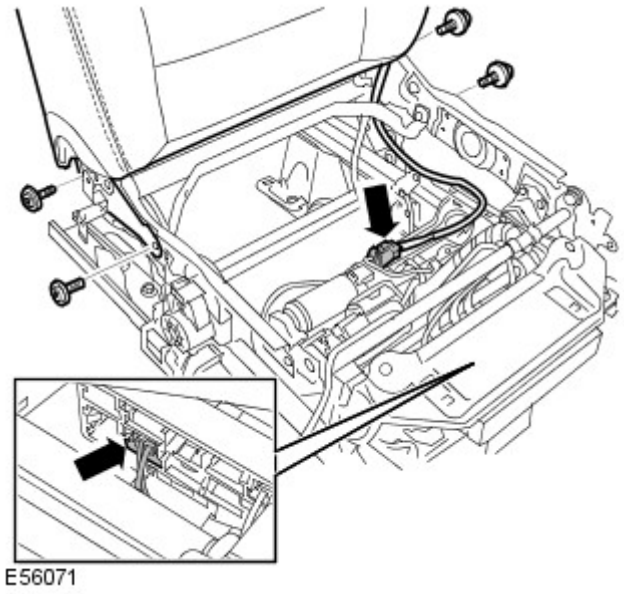
Removal and Installation

Removal

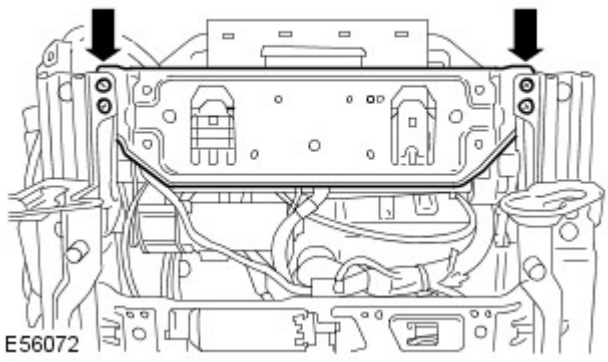
NOTE: Front seat height adjustment motor is supplied as part of the front seat frame assembly.

1. Remove the front safety belt buckle.
   For additional information, refer to: Front Safety Belt Buckle (501-20A, Removal and Installation).

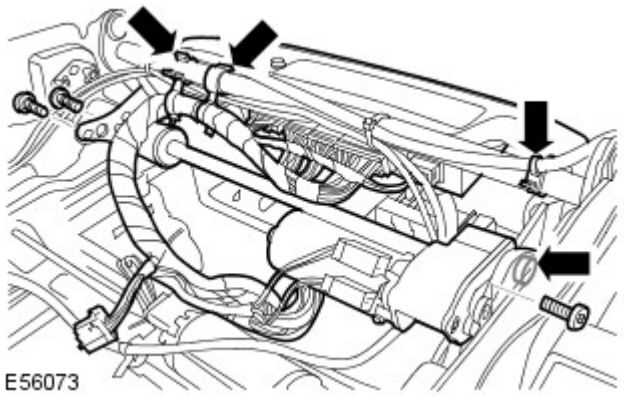
2. Remove the front seat cushion assembly.
   For additional information, refer to: Front Seat Cushion (501-10, Removal and Installation).


E56071

3. Remove the front seat backrest assembly.
   - Release and disconnect the 2 electrical connectors.
   - Remove the 4 Torx bolts.

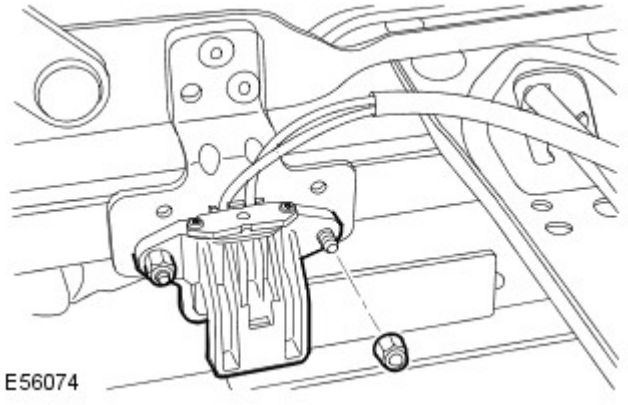

E56072

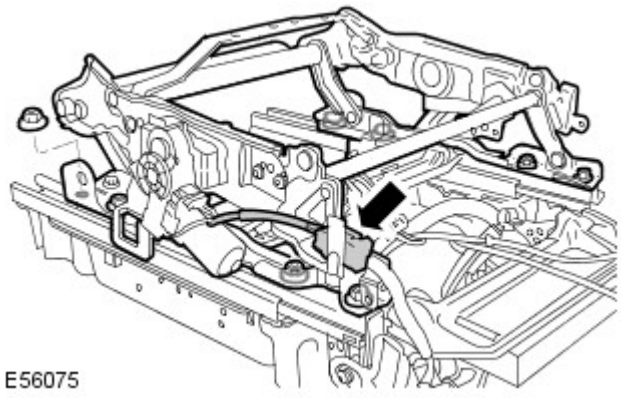
4. Remove the front seat electrical connector bracket.
   - Remove the 4 screws.


E56073

5. Remove the front seat tilt motor.
   - Release the 3 wiring harness clips.
   - Remove the 4 Torx bolts.

6. Remove the front seat position sensor.
   - Remove the 2 nuts.





7. Remove the front seat height adjustment motor.
    - Disconnect the electrical connector.
    - Remove the 8 nuts.

Installation

1. Install the front seat height adjustment motor.
    - Tighten the nuts to 25 Nm (18 lb.ft).
    - Connect the electrical connector.

2. Install the front seat position sensor.
    - Tighten the nuts to 4 Nm (3 lb.ft).

3. Install the front seat tilt motor.
    - Tighten the Torx bolts to 10 Nm (7 lb.ft).
    - Attach the wiring harness.

4. Install the front seat electrical connector bracket.
    - Tighten the screws.

5. Install the front seat backrest assembly.
    - Tighten the Torx bolts to 25 Nm (18 lb.ft).
    - Connect and secure the electrical connectors.

6. Install the front seat cushion assembly.
   For additional information, refer to: Front Seat Cushion (501-10, Removal and Installation).

7. Install the front safety belt buckle.
   For additional information, refer to: Front Safety Belt Buckle (501-20A, Removal and Installation).

Published: 11-May-2011

Seating - Front Seat Backrest Cover

Removal and Installation

Removal

WARNINGS:

To avoid accidental deployment, the restraints control module backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the supplemental restraint system (SRS), or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.

Always wear safety glasses when working on an air bag equipped vehicle and when handling an air bag module. Failure to follow this instruction may result in personal injury.

To minimize the possibility of premature deployment, do not use radio key code savers when working on the supplemental restraint system. Failure to follow this instruction may result in personal injury.

To minimize the possibility of injury in the event of premature deployment, always carry a live air bag module with the bag and trim cover pointed away from the body. Failure to follow this instruction may result in personal injury.

To minimize the possibility of premature deployment, live air bag modules must only be placed on work benches which have been ground bonded and with the trim cover facing up. Failure to follow these instructions may result in personal injury.

Never probe the electrical connectors of air bag modules or any other supplemental restraint system component. Failure to follow this instruction may result in personal injury.

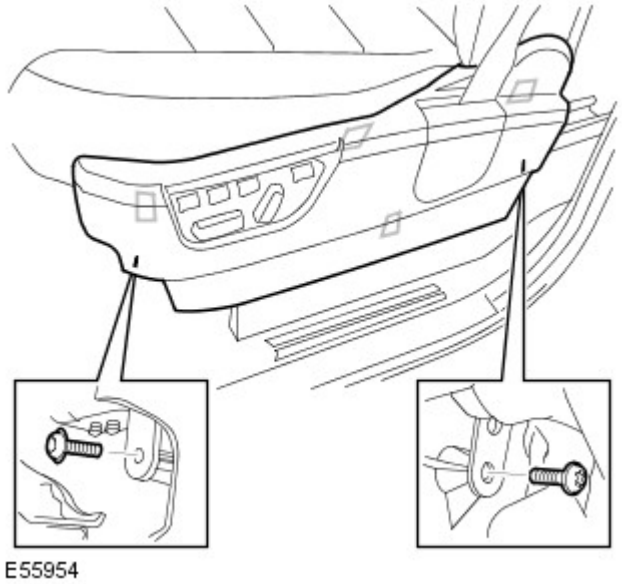
Painting over the driver air bag module trim cover or instrument panel could lead to deterioration of the trim cover and air bags. Do not for any reason attempt to paint discolored or damaged air bag module trim covers or instrument panel. Install a new component. Failure to follow this instruction may result in personal injury.

Make sure that sufficient time has elapsed after disconnecting the battery ground cable(s), before commencing work on the supplemental restraint system (SRS). Failure to follow these instructions may result in personal injury.

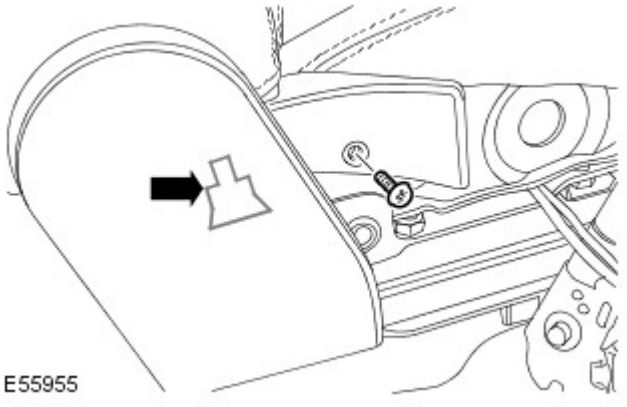
1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

2. Remove the front safety belt buckle.
   For additional information, refer to: Front Safety Belt Buckle (501-20, Removal and Installation).

3. Remove the front seat cushion side trim.
   - Remove the 2 screws.
   - Release from the 3 clips.

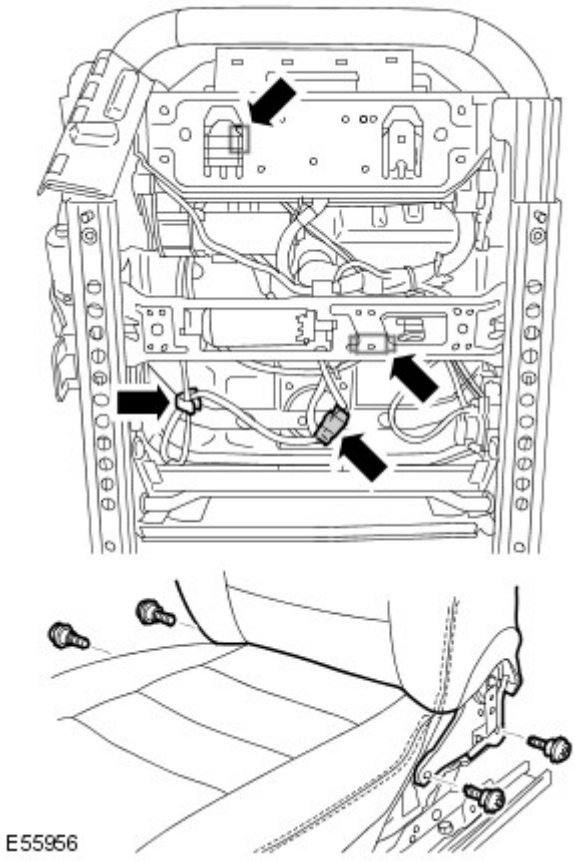

E55954

4. Remove the front seat backrest hinge cover.

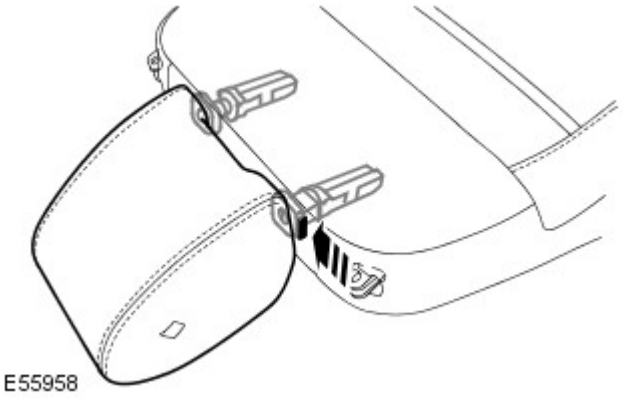


Remove the 2 screws.
- Release from the clip.

5. Remove the front seat backrest assembly.
   - Release the retaining clips and disconnect the three electrical connectors.
   - Remove the 4 Torx bolts.



6. Remove the front seat head restraint.
   - Release the front seat head restraint latch.



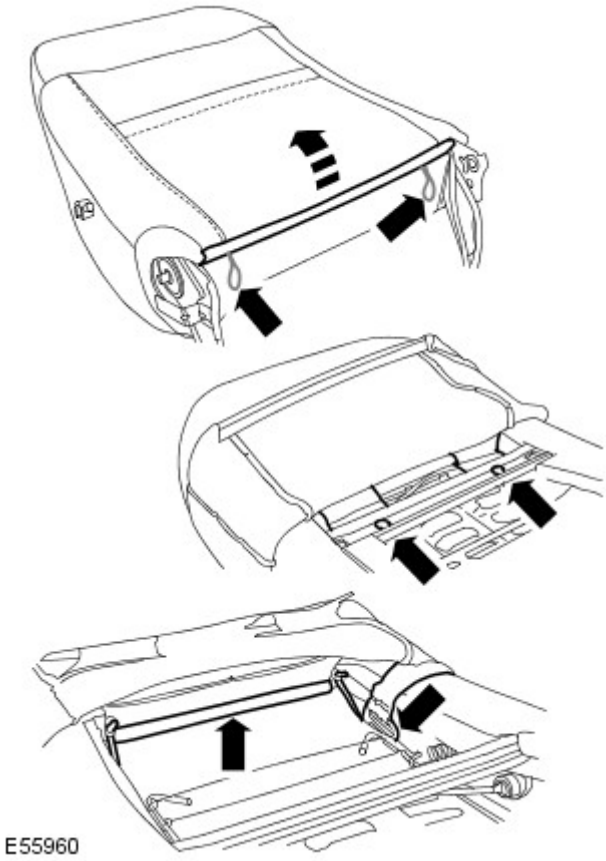
7. Remove the seat armrest.
   For additional information, refer to: Front Seat Armrest (501-10, Removal and Installation).

8. Remove the front seat lumbar adjustment knob.
   - Pull sharply to release from lumbar mechanism.



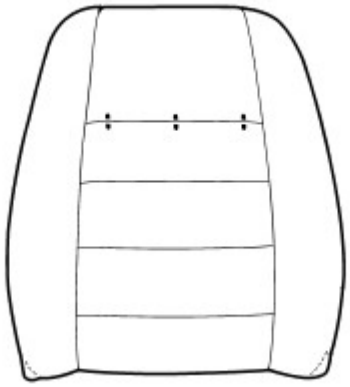
E67102

9. Release the front seat backrest cover.
    - Release the 5 clips.
    - Release the tension straps.



E55960

10. Remove the front seat backrest cushion and cover from the front seat frame.
    - Remove the 3 hog rings.



E56021

Installation

1. Install the front sear backrest cover.
    - Install the hog rings.
    - Install the clips.
    - Attach the tension straps.

2. Install the front seat lumbar adjustment knob.
    - Push firmly to secure to the lumbar mechanism.

3. Install the seat armrest.
    - Tighten the Torx bolt to 10 Nm (7 lb.ft).
    - Install the bolt cover.

4. Install the front seat head restraint.
   For additional information, refer to: Front Seat Armrest (501-10, Removal and Installation).

5. Install the front seat backrest assembly.
    - Tighten the Torx bolts to 25 Nm (18 lb.ft).
    - Connect and secure the electrical connectors.

6. Install the front seat backrest hinge cover.
    - Tighten the screws.
    - Fit the clip.

7. Install the front seat cushion side trim.
    - Position and secure in the clips.
    - Install the screws.

8. Install the front safety belt buckle.
   For additional information, refer to: Front Safety Belt Buckle (501-20, Removal and Installation).

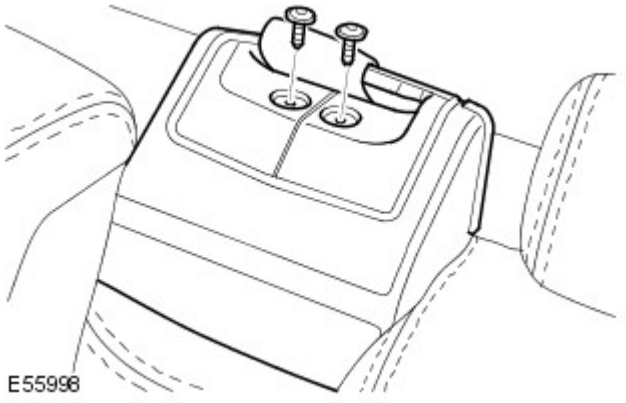
Published: 11-May-2011

Seating - Rear Seat Backrest Cover

Removal and Installation

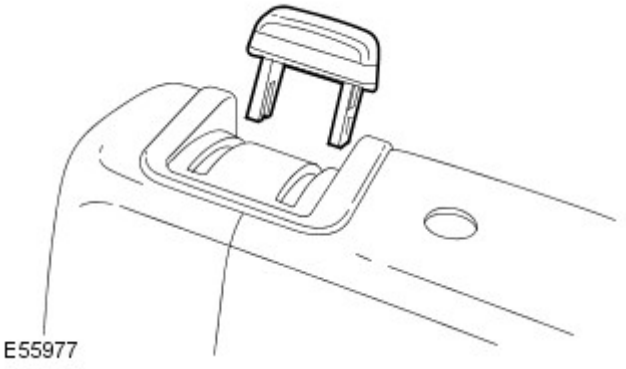
Removal

NOTE: This procedure shows the removal of both the LH and RH covers.

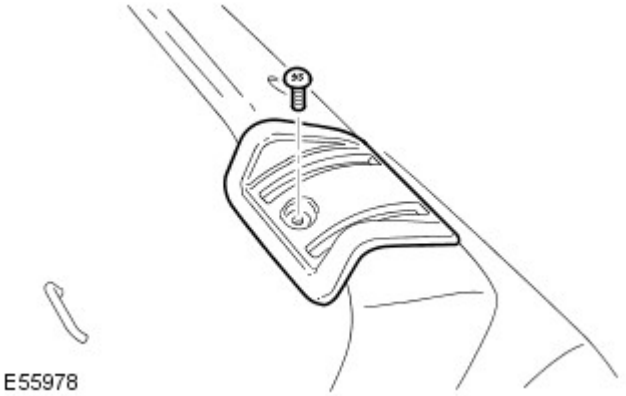


1. LH seat only: Remove the safety belt retractor cover and guide.
    - Remove the 2 screws.

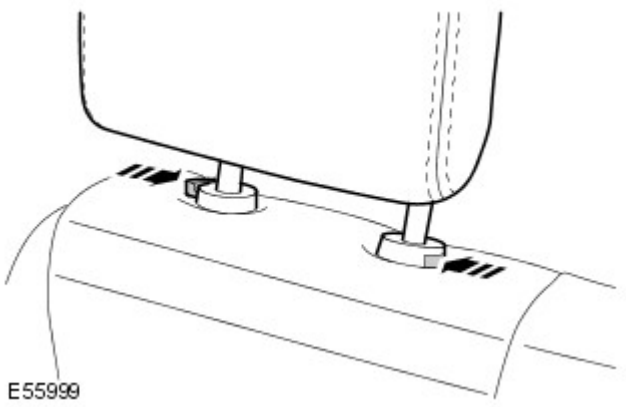
2. Remove the rear seat release handle.



3. Remove the rear seat release handle finisher.
    - Remove the screw.

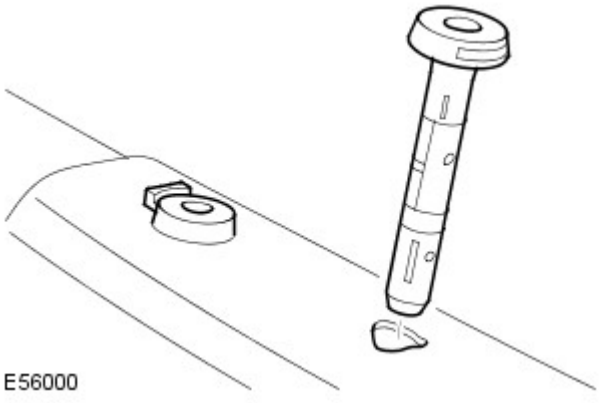


4. Remove the rear seat head restraint.
    - Depress the 2 retaining clips.

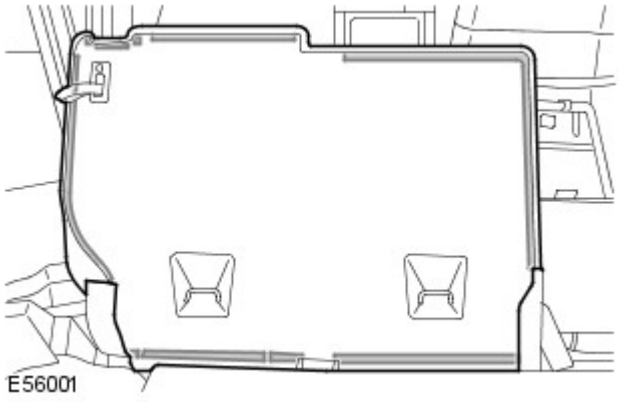


5. Remove the rear seat head restraint retaining

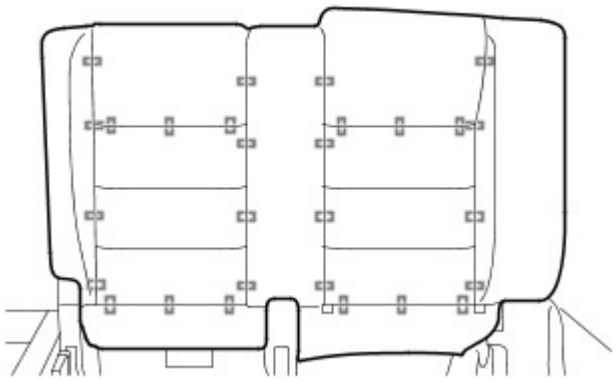
clips.

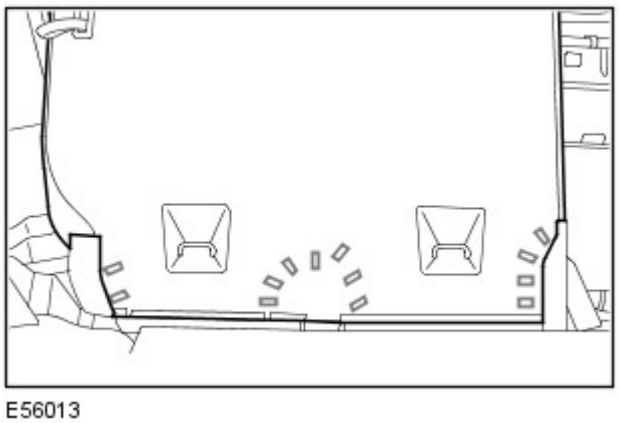

E56000

6. Release the rear LH seat backrest cover.
    - Release the 10 clips.

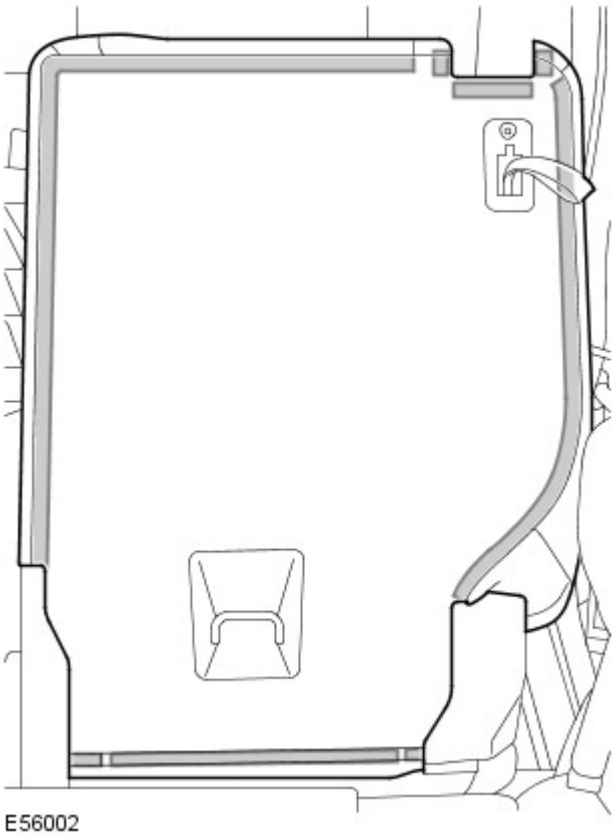

E56001

7. Remove the rear LH seat backrest cover.
    - Remove the 41 hog rings.



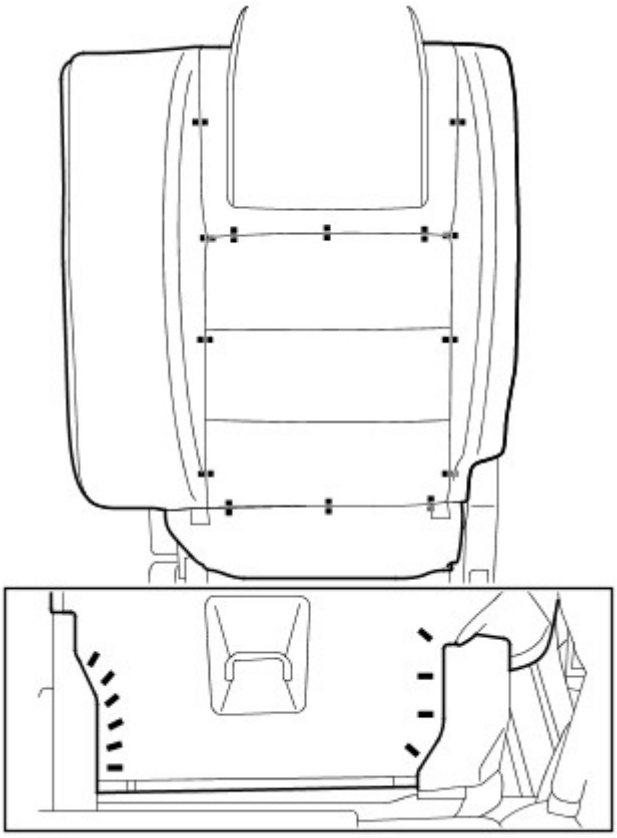

E56013

8. Release the rear RH seat backrest cover.
    - Release the 9 clips.



E56002

9. Remove the rear RH seat backrest cover.
    - Remove the 24 hog rings.



E56014

Installation

1. Install the rear seat backrest cover.
    - Install the hog rings.
    - Attach the clips.
2. Install the rear seat head restraint retaining clips.
3. Install the rear seat head restraint.

4. Install the rear seat release handle finisher.
    - Tighten the screw.

5. Install the rear seat release handle.

6. Install the safety belt guide and retractor cover.
    - Attach the safety belt guide and retractor cover.
    - Tighten the screws.

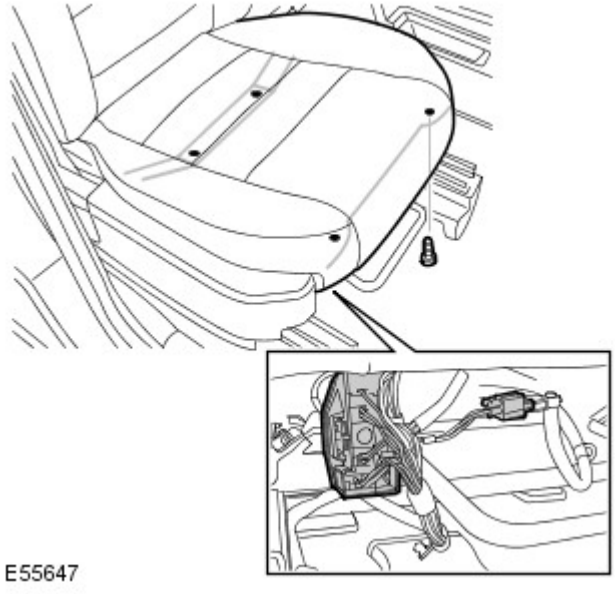
Published: 11-May-2011

Seating - Front Seat Cushion

Removal and Installation

Removal

NOTE: In this procedure the cushion is removed as an assembly. There is a separate procedure showing removal of the cushion cover.



1. Remove the front seat cushion assembly.
    - Release and disconnect the 2 electrical connectors.
    - Remove the 4 Torx bolts.

Installation

1. Install the front seat cushion assembly.
    - Tighten the Torx bolts to 25 Nm (18 lb.ft).
    - Connect and secure the electrical connectors.

Published: 11-May-2011

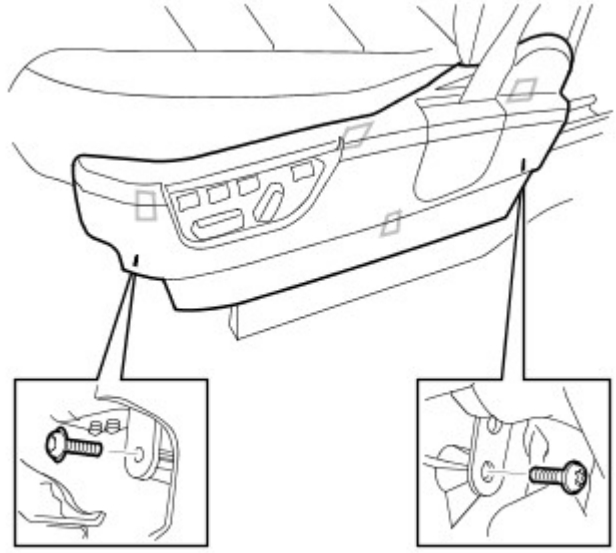
Seating - Seat Track Vehicles With: Power Seats

Removal and Installation

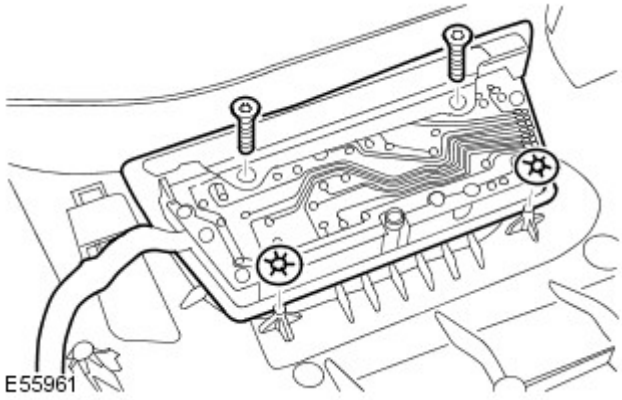
Removal

NOTE: The front seat track motor is supplied as part of the front seat lower frame assembly.

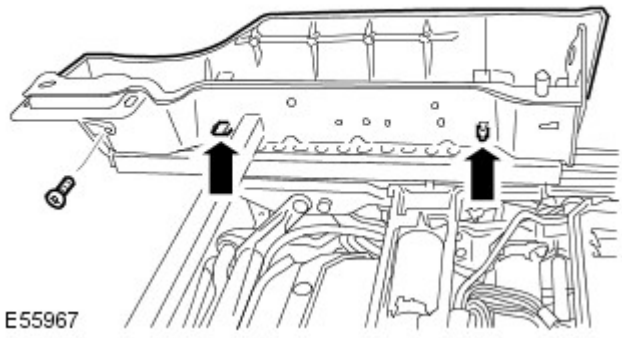
1. Remove the front seat.
   For additional information, refer to: Front Seat (501-10, Removal and Installation).


E56089

2. Remove the front seat cushion side trim.
   - Remove the 2 Torx screws.
   - Release from the 4 clips.

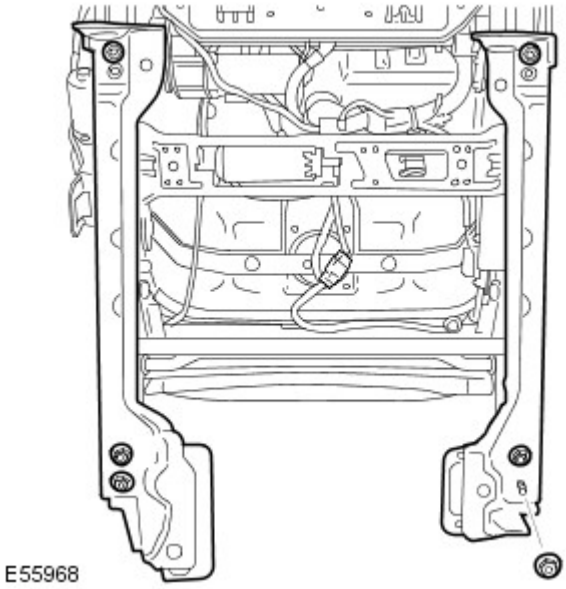

E55961

3. Release the seat control switch.
   - Remove the 2 screws.
   - Remove the 2 clips.

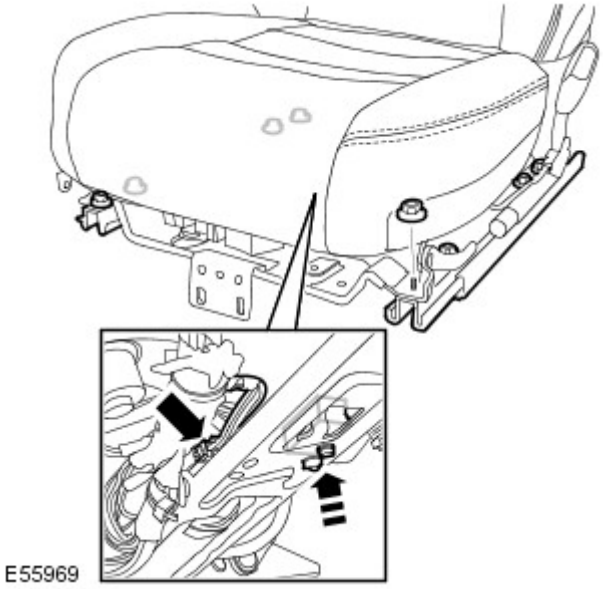

E55967

4. Remove the front seat base trim.
   - Remove the screw.
   - Release the 2 clips.

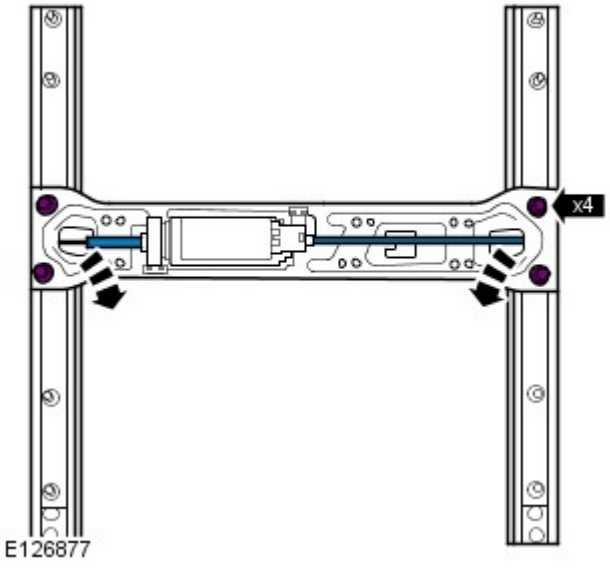
5. Remove the front seat base.
   - Remove the 6 nuts.



6. Remove the front seat track motor.
    - Disconnect the electrical connector.
    - Release the electrical connector.
    - Remove the 8 nuts.

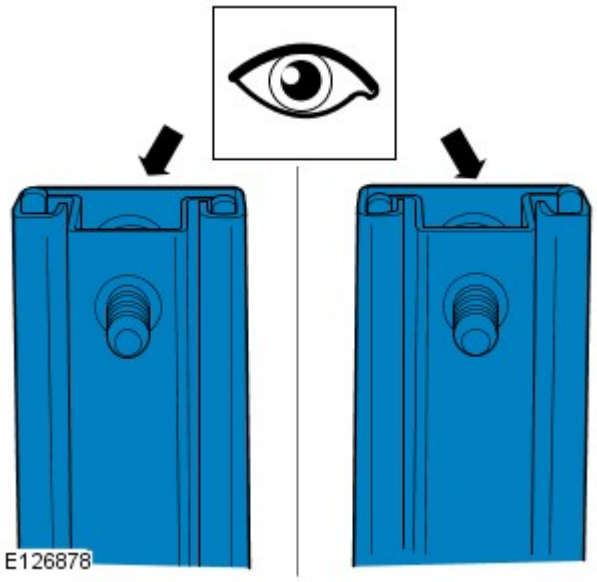


7. Remove the front seat track motor assembly from the seat rails.
    - Remove the 4 bolts.
    - Release the flexi drive from the seat rails.



Installation

1. Make sure the seat rails are installed as a matched pair as supplied.
    - Make sure the seat rails are correctly aligned.



2. Install the front seat track motor assembly to the seat rails.
    - Install the 4 bolts.
    - Tighten the nuts to 10 Nm (7 lb.ft).

3. Install the front seat track motor.
    - Tighten the nuts to 22 Nm (16 lb.ft).
    - Connect the electrical connector.
    - Secure the electrical connector.

4. Install the front seat base.
    - Tighten the nuts to 22 Nm (16 lb.ft).

5. Install the front seat base trim.
    - Secure in the clips.
    - Tighten the screw.

6. Install the front seat cushion side trim.
    - Secure in the clips.
    - Tighten the screws.

7. Install the seat control switch.
    - Secure in the clips.
    - Tighten the screws.

8. Install the front seat.
   For additional information, refer to: Front Seat (501-10, Removal and Installation).

Published: 11-May-2011

Seating - Front Seat Manual Height Adjustment Lever

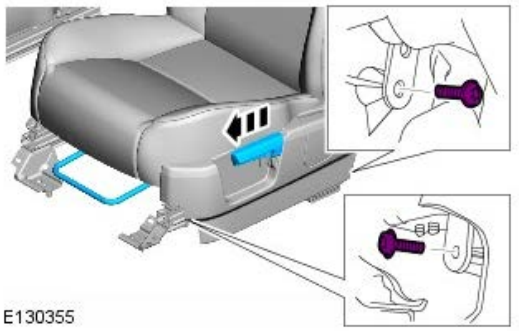
Removal and Installation

Removal

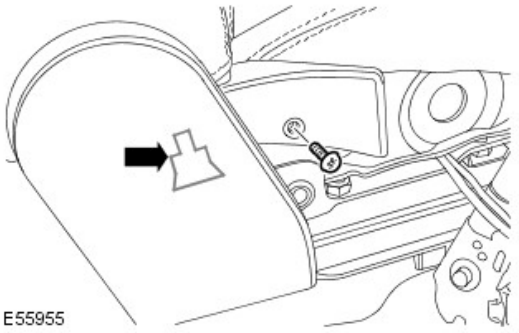
1. Remove the drivers side seat slides.
   For additional information, refer to: Seat Track - Vehicles With: Power Seats (501-10, Removal and Installation).

2. Remove the front seat cushion base.
   For additional information, refer to: Front Seat Cushion (501-10, Removal and Installation).

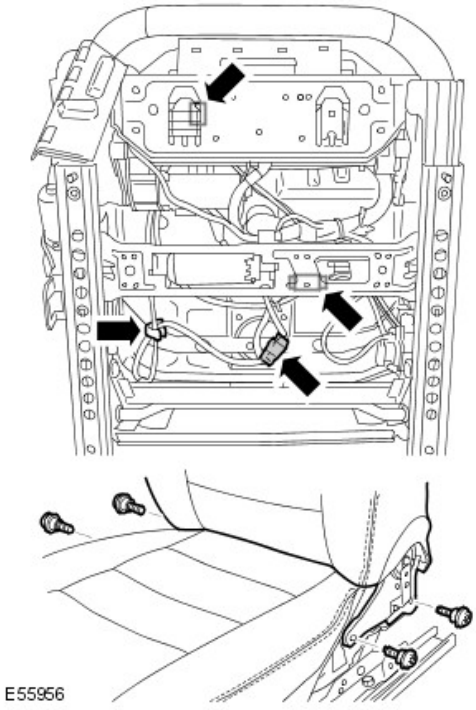
3.



4.

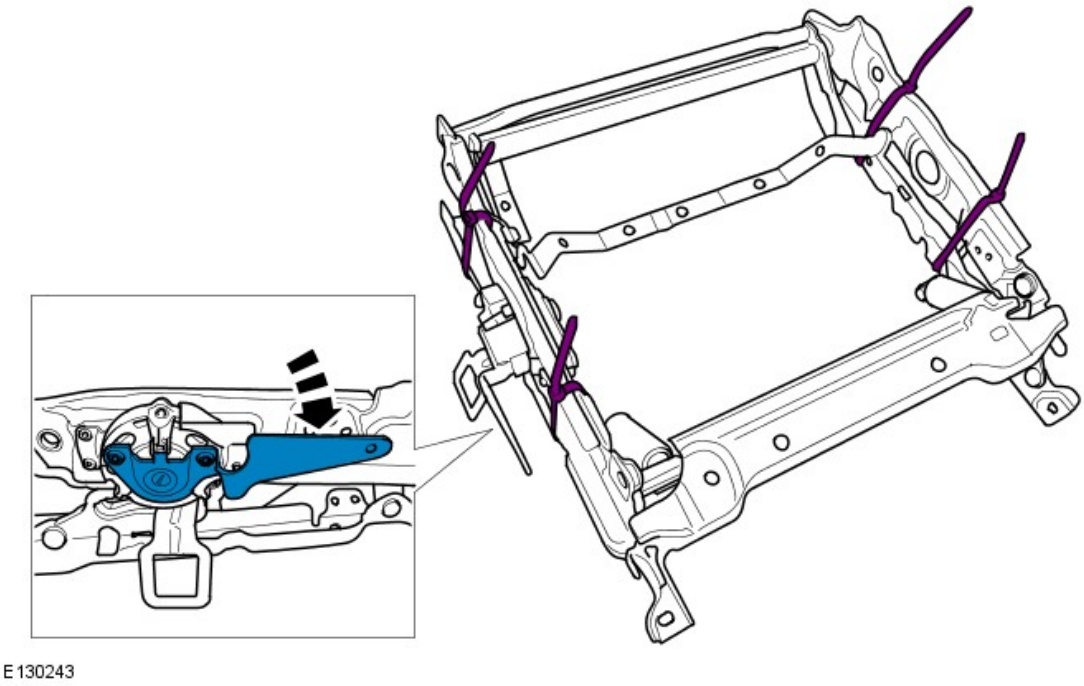


5. TORQUE: 25 Nm



6. CAUTIONS:

Tie straps must be fitted, failure to follow this instruction may result in personal injury.



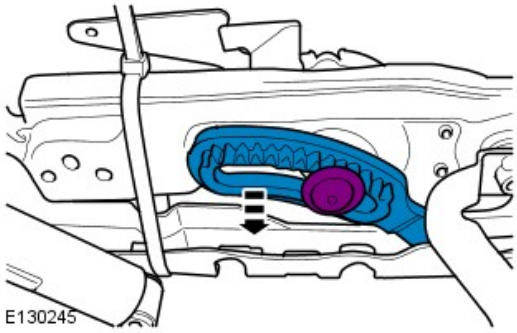
E130243

Failure to follow this instruction may cause damage to the vehicle.

Secure the seat base using the 4 tie straps supplied, as shown.

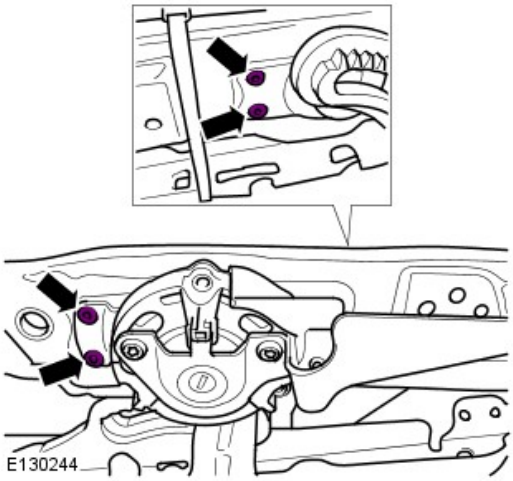
- Using the seat height adjuster, lower the seat base to its lowest position.

7. Release the arm from the height adjuster.
   - Remove the Torx bolt.



E130245

8. Drill out the 4 rivets.



E130244

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Seating - Front Seat Armrest

Removal and Installation

Removal

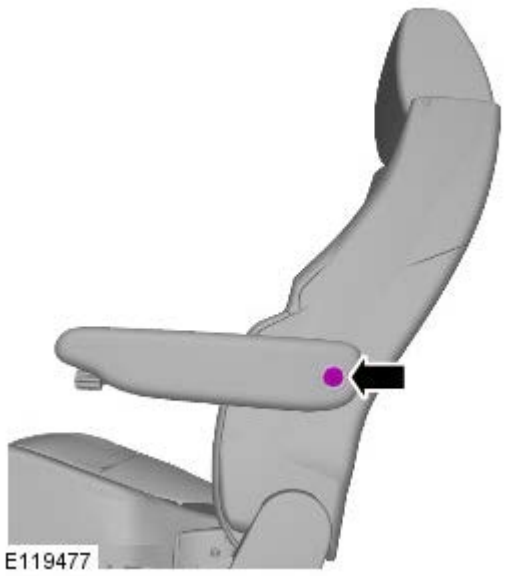
1. Raise the seat base for access.

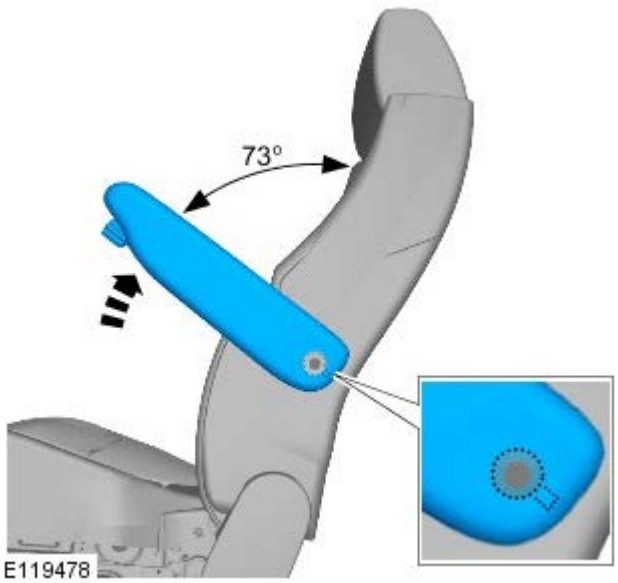

E119475

2. Remove the cover.


E119476

3. Remove the Torx bolt.

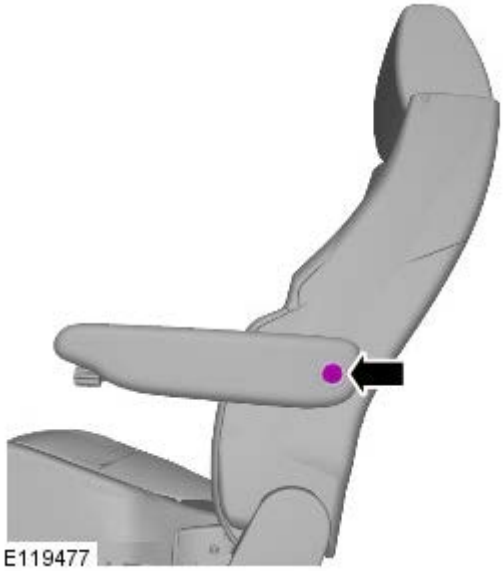

E119477



4. CAUTION: Make sure that the seat armrest slot is correctly aligned before removing the seat armrest. Failure to follow this instruction may result in damage to the vehicle.

   Remove the seat armrest.
   - Raise the seat armrest to the position shown.
   - Slide the seat armrest towards the centre of the vehicle.

Installation



1. To install, reverse the removal procedure.
   - Tighten the Torx bolt to 10 Nm (7 lb.ft).

Published: 11-May-2011

Glass, Frames and Mechanisms -

Sealants

Application	Land Rover Sealant kit Part No.
Windshield	CES 500020
Liftgate glass	CES 500020
Glass roof panel	CES 500020
Rear quarter window glass	CES 500020

Torque Specifications

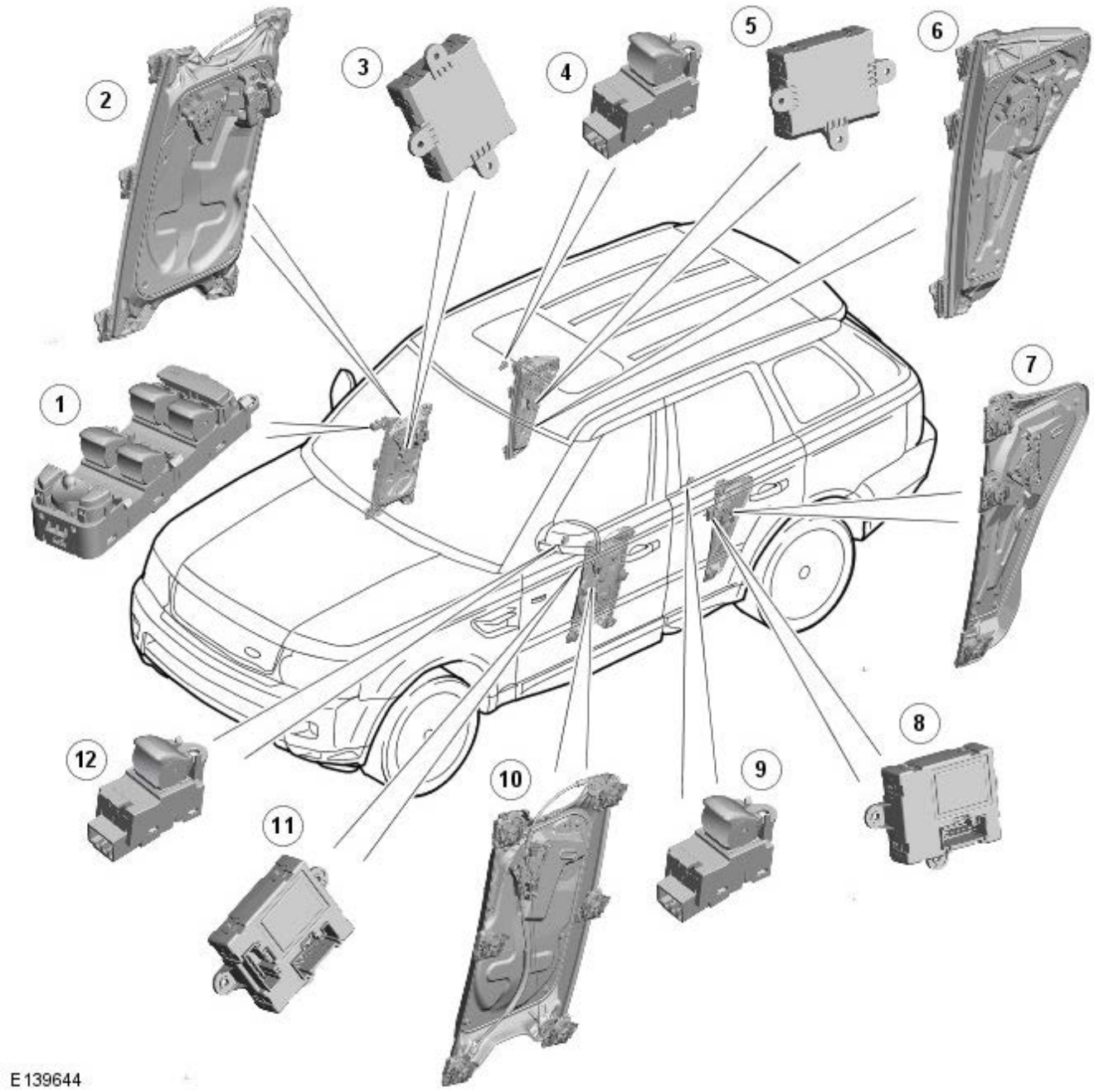
Description	Nm	lb-ft
Rear door window fixed glass Torx screw	10	7
Rear door window motor and regulator to door nuts and bolts	10	7
Front door window regulator and motor nuts and bolts	10	7
Front door window glass guide channel bolt	10	7
Liftgate glass retaining nuts	25	18

Published: 29-Mar-2012

Glass, Frames and Mechanisms - Glass, Frames and Mechanisms

Description and Operation

Windows Component Location

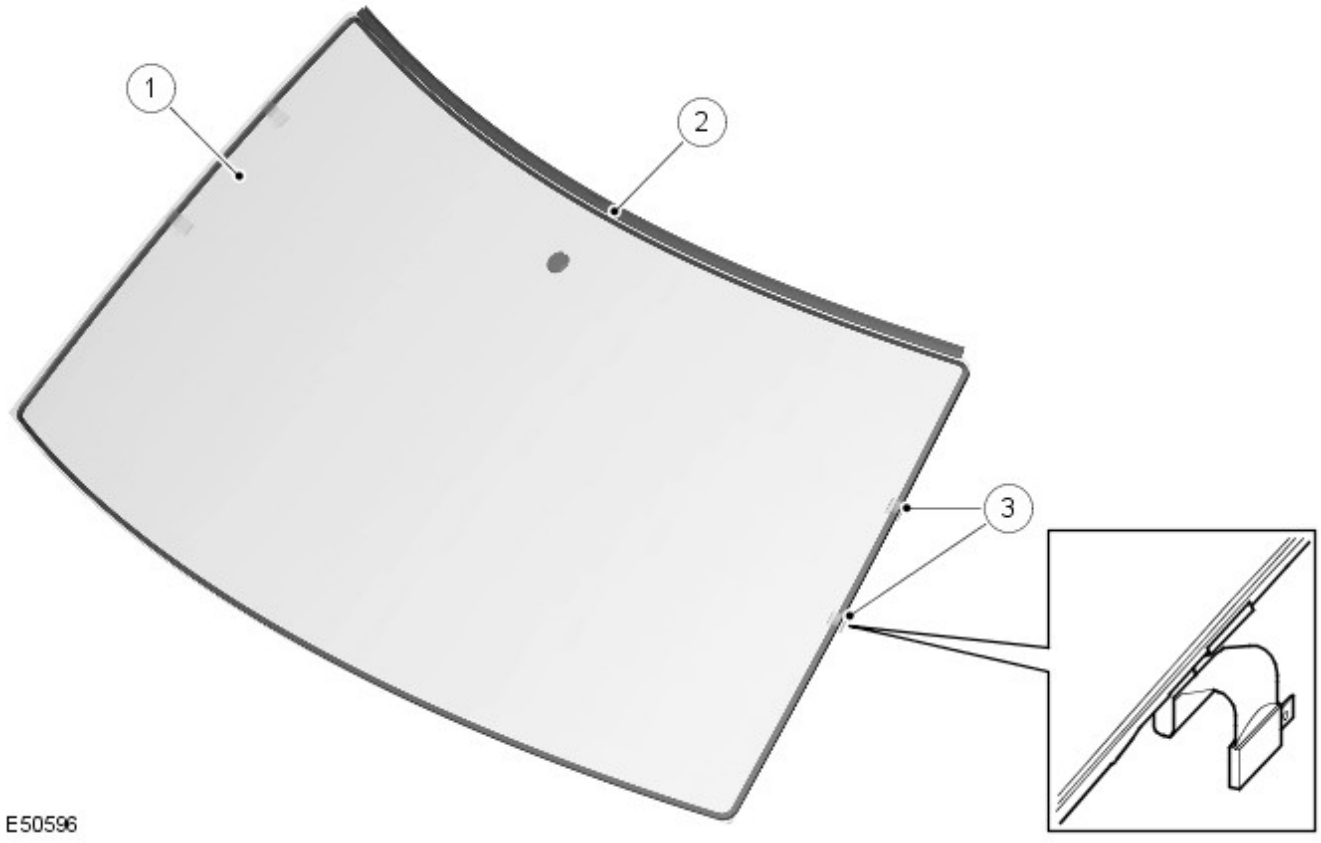


Item	Part Number	Description
1	-	Driver door, switch pack
2	-	Driver door, glass regulator and motor
3	-	Driver door module
4	-	RH rear window switch
5	-	RH rear door module
6	-	RH rear, glass regulator and motor
7	-	LH rear, glass regulator and motor
8	-	LH rear door module
9	-	LH rear window switch
10	-	LH front, glass regulator and motor
11	-	LH front door module
12	-	LH front window switch

COMPONENT DESCRIPTION

Windshield

Windshield Components



Item	Part Number	Description
1.	-	Windshield
2.	-	Finisher
3	-	Heated windshield connectors

The laminated windshield is bonded, and sealed, to the body aperture using PU sealant.

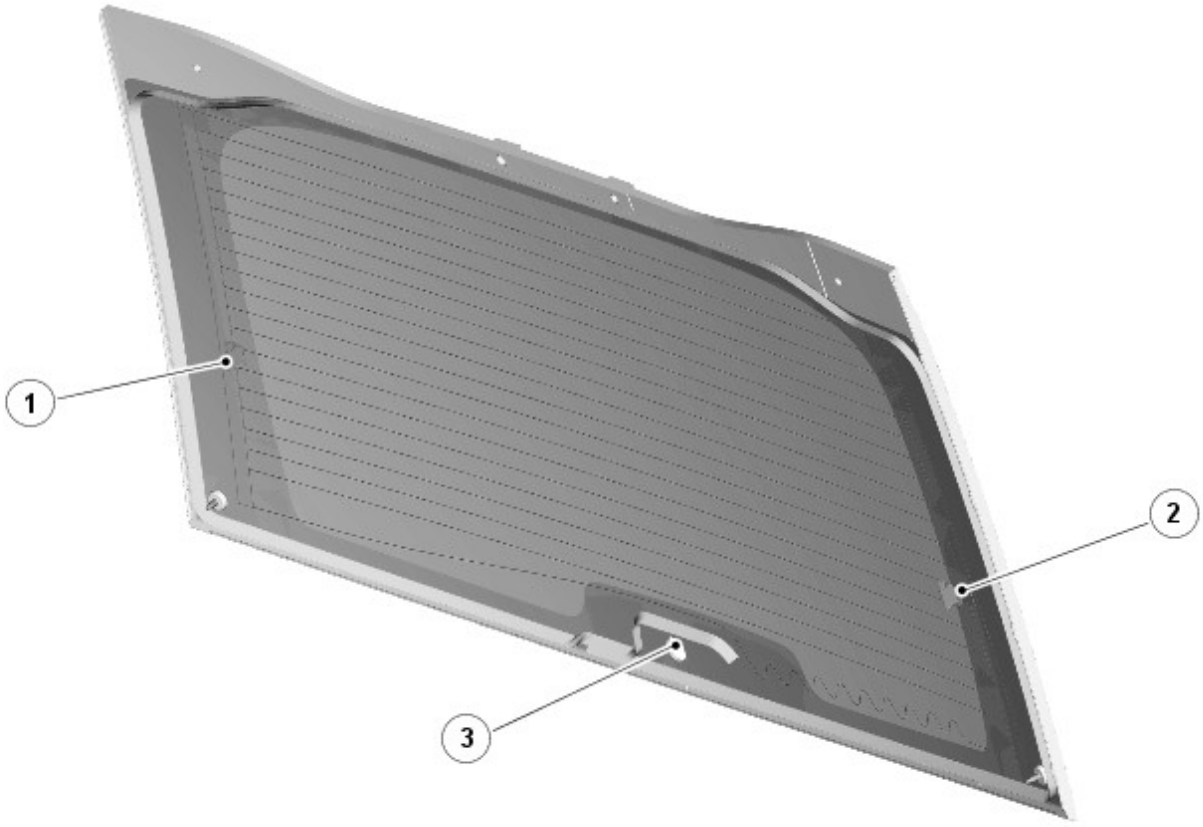
Both the optical unit for the rain sensor and the interior mirror-mounting boss are heat bonded to the inner surface of the windshield.

Vertical fine-wire multi-strand elements are fitted between the glass laminations to de-ice and demist the windshield. At the bottom of the screen six horizontal heating elements bonded to the interior glass surface prevent the wiper blades freezing to the screen during adverse weather conditions. .

The windshield is supplied with the heating element flat foil connectors fitted to a moulded sealed terminal block. This terminal block is wired to a connector for connecting to the vehicle harness.

Rear Window

Rear Window Components



E139643

Item	Part Number	Description
1.	-	Heating element terminal
2.	-	Heating element terminal
3	-	Rear wiper motor, location

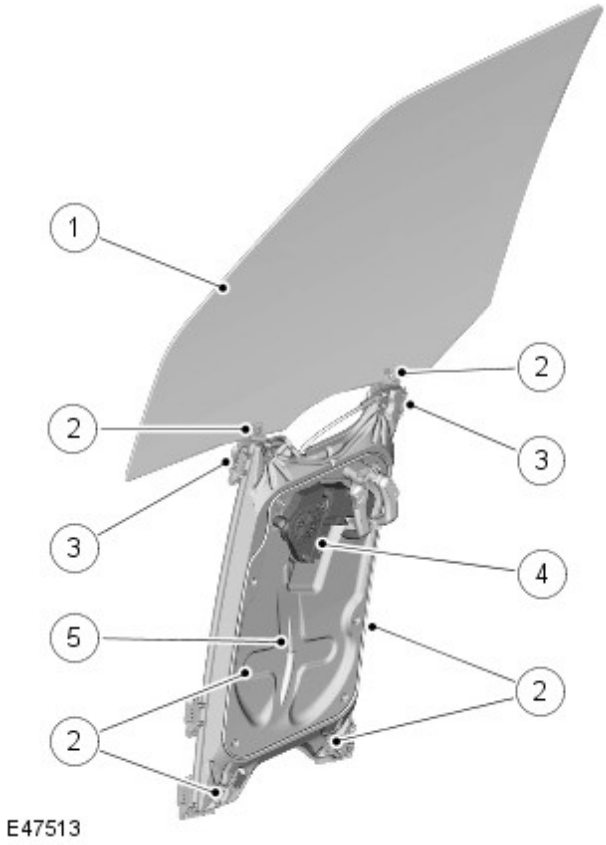
The rear window is made from green tinted, tempered glass and is bonded to the door frame using PU sealant. The heating element, connected by two lucar terminals, is fitted to the inner surface of the rear window.

Door Windows

The door windows are manufactured from green-tinted toughened glass. The driver and passenger windows are electrically operated, and are raised and lowered by a cable mechanism; the rear glass sections in the rear doors are fixed units.

All windows can be operated individually, or by the driver's window control switch. The operation of the windows is proportional to the switch activation. The driver window can be controlled by 'one touch' in an upward or downward direction. When the 'one touch' operation is activated in the upwards direction an anti-trap sensor is automatically checked prior to the window closing. If the anti-trap sensor is inoperative the window will not close. When the anti-trap sensor detects an obstacle in the window's path, the upward travel of the window will automatically cease. Downward travel of the window will begin and then stop when a preset time has elapsed.

Front Window Regulators



Item	Part Number	Description
1	-	Window Glass
2	-	Fixing points
3	-	Glass carrier
4	-	Window motor
5	-	Mounting frame

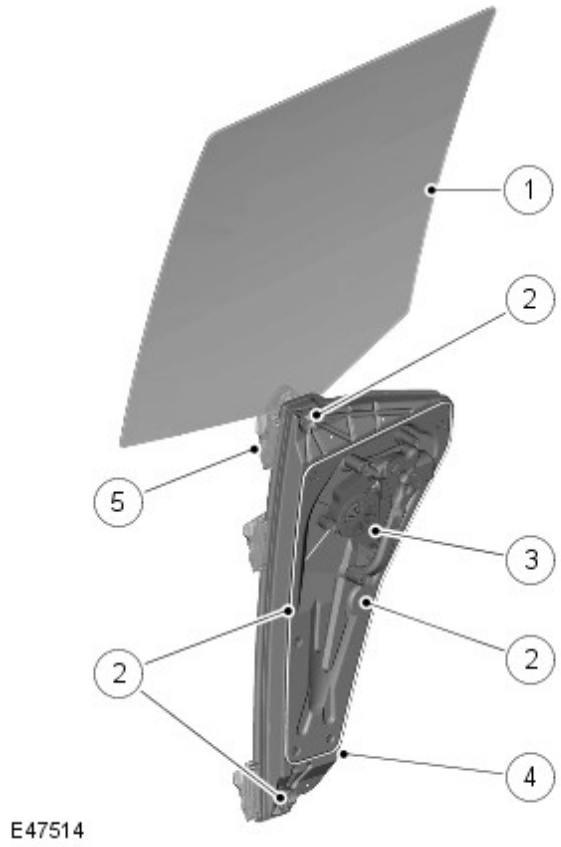
Cable operated window regulators powered by an electric motor are installed in each of the doors.

The front window regulator and motor is supplied as an assembly and is handed. Each assembly comprises a front and rear runner, a continuous cable and a motor.

The door glass is located in two carriers, which are located in tracks in the runners. The glass is retained in friction pads in each carrier and secured with clamp screws.

Each carrier is attached to the cable, which, in turn, is attached to a drum driven by the motor. When the motor is operated the drum pulls the cable in the required direction to raise or lower the glass.

Rear Window Regulators



Item	Part Number	Description
1	-	Window Glass
2	-	Fixing points
3	-	Window motor
4	-	Mounting frame
5	-	Glass carrier

Cable operated window regulators powered by an electric motor are installed in each of the doors.

The rear window regulator and motor is supplied as an assembly and is handed. Each assembly comprises a runner, a continuous cable and a motor.

The door glass is located in a carrier located in a track in the runner. The glass is retained in friction pads in the carrier and secured with a clamp screw.

The carrier is attached to the cable, which, in turn, is attached to a drum driven by the motor. When the motor is operated, the drum pulls the cable in the required direction to raise or lower the glass.

SYSTEM OPERATION

Door Windows

All windows can be operated individually, or by the driver's window control switch. The operation of the windows is proportional to the switch activation. The driver window can be controlled by 'one touch' in an upward or downward direction. When the 'one touch' operation is activated in the upwards direction an anti-trap sensor is automatically checked prior to the window closing. If the anti-trap sensor is active the window will not close. When the anti-trap sensor detects an obstacle in the window's path, the upward travel of the window will automatically cease. Downward travel of the window will begin and then stop when a preset time has elapsed.

Electric window operation is enabled while the ignition is in power mode 4 and 6. When the switches in the driver's door are used to operate the passenger windows, the driver's door module outputs a related message on the LIN (local interconnect network) bus and medium speed CAN (controller area network) bus. The passenger door module responds to the message by operating the appropriate window. When the child lock is engaged, the rear door modules ignore inputs from the rear window switches.

End of travel shut off

End of travel shut-off for the window motors is determined by monitoring the current draw of the motors. Each time it switches on a window motor, the door module measures the window motor current for a preset time. The maximum value measured within that time is stored as the switch-on current. When the window motor current next exceeds the switch-on current, the door module assumes the window has reached the end of its travel and switches off the power supply to the window motor even if a window switch is still being activated.

Anti-trap

The anti-trap function is enabled for window closing in both the inching and one-shot modes. If the anti-trap feature is activated while a window is closing, the window motor is reversed for a preset period.

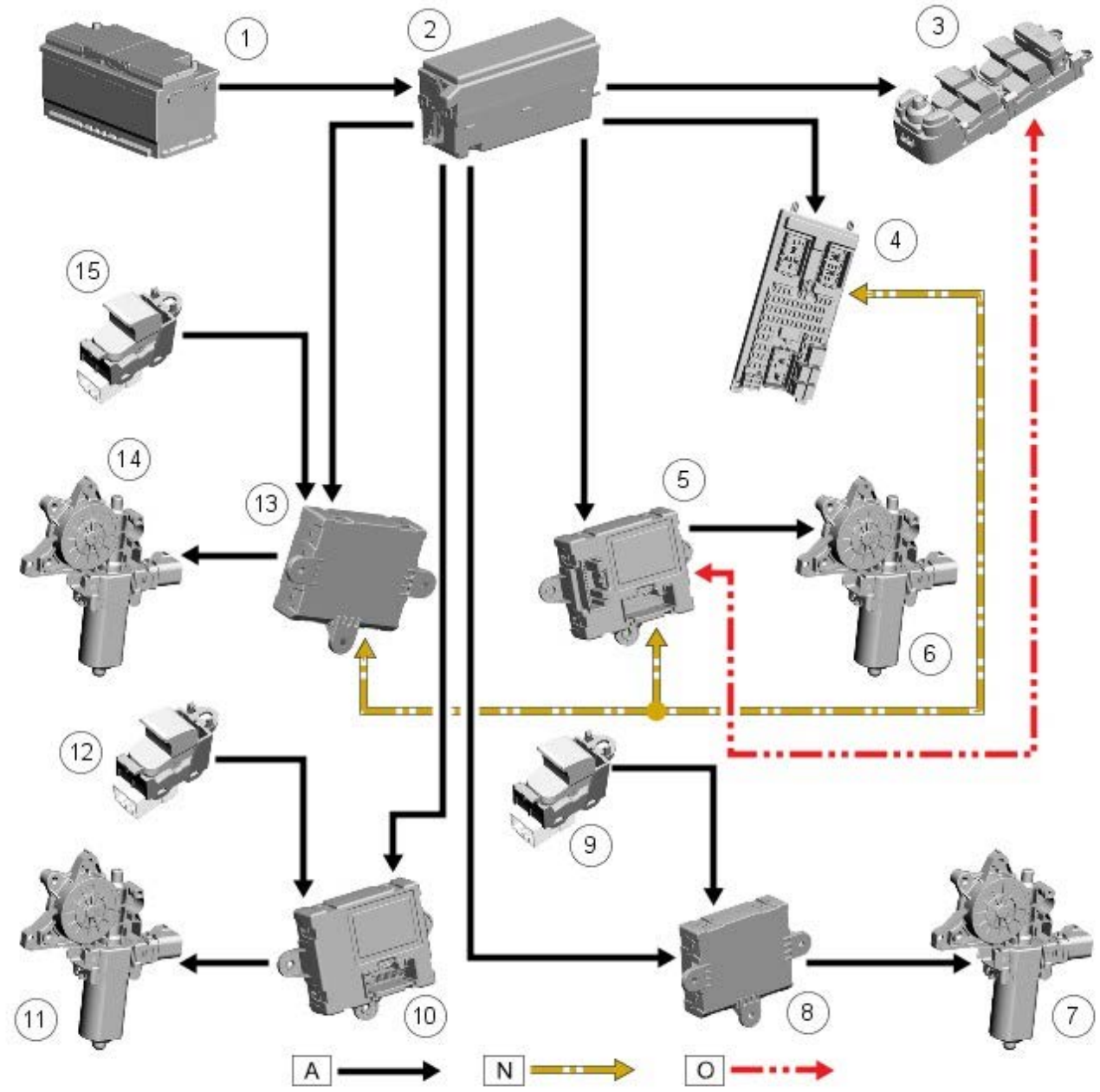
A Hall sensor, located in the window regulator motor, monitors the speed of the motor and if the speed decreases below a set threshold, indicating an obstruction, the power feed to the motor is reversed so the window goes back down for preset time.

In an emergency the anti-trap function can be overridden by holding the window switch in the one-shot closed position.

After the battery has been disconnected it is necessary to initialize the door window motors to be able to operate the one-shot up function.

WINDOW CONTROL DIAGRAM

NOTE: **A** = Hardwired, **N** = Medium speed CAN (controller area network) bus; **O** = LIN (local interconnect network) bus.



E142901

Item	Part Number	Description
1	-	Battery
2	-	EJB (engine junction box)
3	-	Driver window switches
4	-	CJB (central junction box)
5	-	DDM (driver door module)
6	-	Driver window motor
7	-	Driver side rear window motor
8	-	Driver side RDM (rear door module)

9	-	Driver side rear window switch
10	-	Passenger side RDM
11	-	Passenger side rear window motor
12	-	Passenger side rear window switch
13	-	PDM (passenger door module)
14	-	Passenger window motor
15	-	Passenger window switch

Published: 20-Aug-2012

Glass, Frames and Mechanisms - Glass, Frames and Mechanisms

Diagnosis and Testing

Principle of Operation

For a detailed description of the glass, frames and mechanisms and operation, refer to the relevant Description and Operation section of the workshop manual.
REFER to: Glass, Frames and Mechanisms (501-11 Glass, Frames and Mechanisms, 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
• Window control switches condition and installation • Window motors/regulators • Window channels/runners • Window cables	• Fuses • Harnesses and connectors • Window control switches • Window motors

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
Window(s) inoperative	• Fuse(s) • Switch fault • Front switch isolator fault • Motor/regulator fault • Channel/runner fault • Cable fault • Window circuit short circuit to ground, short circuit to power, open circuit, high resistance	• Check the fuses • Check the suspect window operation from the individual door switch and from the driver door master switch (it is unlikely that both switches would fail at the same time, so if the window is inoperative from either switch, suspect a fault other than a switch) • If the inoperative window is a rear unit, check the function of the isolator at the master switch. • If the concern persists and a noise cannot be heard when operating the door window glass, GO to Pinpoint Test B. • Refer to the electrical circuit diagrams and test the window circuit for short circuit to ground, short circuit to power, open circuit, high resistance
Window(s) 'one-shot' function inoperative	• Window motor initialization required	NOTE: Do not install a new door window regulator motor for this concern. • If the battery has been disconnected, carry out the initialization procedure
Heated rear window does not defrost	• Heated rear window circuit short circuit to ground, open circuit, high resistance	• Refer to the electrical circuit diagrams and test the heated rear window circuit for short circuit to ground, open circuit, high resistance
Window(s) noisy during operation	• Channel/runner fault • Cable fault • Motor/regulator fault	NOTE: Door window glass retaining bracket adjustment procedure GO to Pinpoint Test A.
Slow or partial window operation	• Fuse • Switch fault • Relay fault • Element fault • Circuit fault	GO to Pinpoint Test C.
Rear door window	• Window motor initialization required	NOTE: Do not install a new door window regulator motor for this

glass bounce back	(using the manufacturers approve diagnostic system)	concern. Using the manufacturer approved diagnostic system, perform window initialization
Front door window glass bounce back	• Window motor initialization required • Channel/runner fault	NOTE: Do not install a new door window regulator motor for this concern. GO to Pinpoint Test D.

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: (100-00 General Information)

Diagnostic Trouble Code (DTC) Index - DTC: Central Junction Box (CJB) (Description and Operation),
Diagnostic Trouble Code (DTC) Index - DTC: Driver/Passenger Door Module (DDM/PDM) (Description and Operation).

Pinpoint Test

PINPOINT TEST A : WINDOW(S) NOISY DURING OPERATION	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: CHECK THE DOOR WINDOW GLASS IS SECURE	
	1 Remove the door window glass outer waist seal.
	2 Check if the door glass installed correctly and secured to the door window regulator motor.
	Is the door window glass correctly installed and secure? **Yes** GO to A2. **No** Install a new door window glass as necessary. REFER to: Front Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation) / Rear Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).
A2: CHECK THE OPERATION OF THE DOOR WINDOW REGULATOR MOTOR	
	1 Remove the door window glass as necessary. REFER to: Front Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation) / Rear Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).
	2 Operate the door window regulator four times.
	Does the door window regulator operate correctly (without noise)? **Yes** Ensure that an anti-rattle pad (available from the parts department) is installed to the door window glass retaining bracket and installed correctly. REFER to: Front Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation). Test the system for normal operation. If the concern persists, GO to A3. **No** Install a new door window regulator motor as necessary. REFER to: Front Door Window Regulator and Motor (501-11 Glass, Frames and Mechanisms, Removal and Installation) / Rear Door Window Regulator and Motor (501-11 Glass, Frames and Mechanisms, Removal and Installation).
A3: CHECK THAT THE DOOR WINDOW GLASS SEAL IS FREE FROM FOREIGN MATERIAL	
	1 Check for any foreign material or obstruction in the door window glass seal.
	Is the door window glass seal free from foreign material? **Yes** GO to A4. **No** Remove any foreign material from door window glass seal and lubricate the seal. Test the system for normal operation.
A4: CHECK THAT THE DOOR WINDOW GLASS SEAL IS INSTALLED CORRECTLY	
	1 Check that the door window glass seal is installed correctly.
	Is the door window glass seal installed correctly? **Yes** GO to A5. **No** Install the door window glass seal correctly. Test the system for normal operation.
A5: CHECK THAT THE DOOR WINDOW GLASS SEAL IS NOT WORN IN THE CHANNELS	
	1 Visually check that the door window glass seal is not worn in the door channels.
	Is the door window glass seal worn in the channels? **Yes** Install a new door window glass seal as necessary. Test the system for normal operation. **No** Install the door window glass and adjust the door window glass. Test the system for normal

	operation.

PINPOINT TEST B : WINDOW(S) INOPERATIVE (MOTOR NOISE CANNOT BE HEARD)	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: CHECK FOR DOOR WINDOW REGULATOR MOTOR NOISE	
	1 Operate the door window regulator motor as necessary.
	Is there a noise from the door window regulator motor when operated? **Yes** GO to B2. **No** Install a new door window regulator motor as necessary. REFER to: Front Door Window Regulator and Motor (501-11 Glass, Frames and Mechanisms, Removal and Installation) / Rear Door Window Regulator and Motor (501-11 Glass, Frames and Mechanisms, Removal and Installation).
B2: CHECK THAT THE DOOR WINDOW GLASS SEAL IS FREE FROM FOREIGN MATERIAL	
	1 Check for any foreign material or obstruction in the door window glass seal.
	Is the door window glass seal free from foreign material? **Yes** GO to B3. **No** Remove any foreign material from door window glass seal and lubricate the seal. Test the system for normal operation.
B3: CHECK THAT THE DOOR WINDOW GLASS SEAL IS INSTALLED CORRECTLY	
	1 Check that the door window glass seal is installed correctly.
	Is the door window glass seal installed correctly? **Yes** GO to B4. **No** Install the door window glass seal correctly. Test the system for normal operation.
B4: CHECK THAT THE DOOR WINDOW GLASS SEAL IS NOT WORN IN THE CHANNELS	
	1 Visually check that the door window glass seal is not worn in the door channels.
	Is the door window glass seal worn in the channels? **Yes** Install a new door window glass seal as necessary. Test the system for normal operation. **No** Install the door window glass. Adjust the door window glass referring to the **door window glass retaining bracket procedure** at the end of this section (see below). Test the system for normal operation. If the concern persists, Test the system for normal operation.

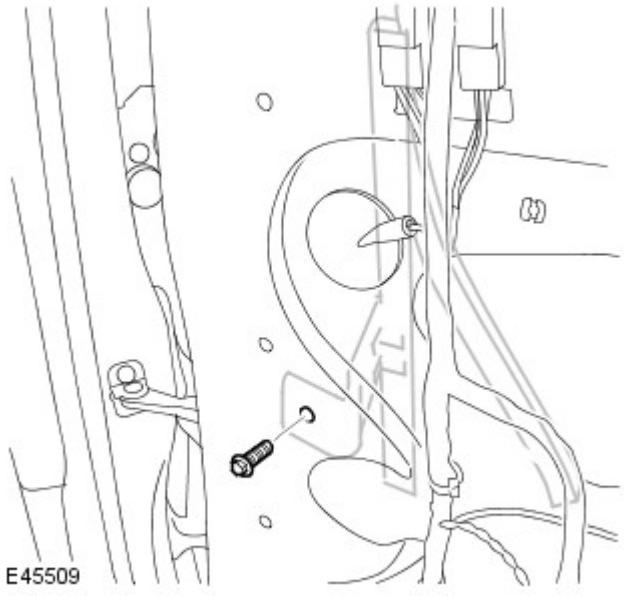
PINPOINT TEST C : SLOW OR PARTIAL WINDOW OPERATION	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
C1: CHECK THE OPERATION OF THE DOOR WINDOW REGULATOR MOTOR	
	1 Remove the door window glass as necessary. REFER to: Front Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation) / Rear Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).
	2 Operate the door window regulator as necessary.
	Does the door window regulator operate correctly? **Yes** GO to C2. **No** GO to C5.
C2: CHECK THAT THE DOOR WINDOW GLASS SEAL IS FREE FROM FOREIGN MATERIAL	
	1 Check for any foreign material or obstruction in the door window glass seal.
	Is the door window glass seal free from foreign material? **Yes** GO to C3. **No** Remove any foreign material from door window glass seal and lubricate the seal. Test the system for normal operation.
C3: CHECK THAT THE DOOR WINDOW GLASS SEAL IS INSTALLED CORRECTLY	
	1 Check that the door window glass seal is installed correctly.
	Is the door window glass seal installed correctly? **Yes** GO to C4. **No** Install the door window glass seal correctly. Test the system for normal operation.
C4: CHECK THAT THE DOOR WINDOW GLASS SEAL IS NOT WORN IN THE CHANNELS	
	1 Visually check that the door window glass seal is not worn in the door channels.
	Is the door window glass seal worn in the channels? **Yes** Install a new door window glass seal as necessary. Test the system for normal operation. **No**

	Adjust the door window glass referring to the **door window glass retaining bracket procedure** at the end of this section (see below). Test the system for normal operation.
C5: CHECK THE VOLTAGE TO THE DOOR WINDOW REGULATOR MOTOR	
NOTE: **The door window regulator motor can be removed from the regulator. Install a new door window regulator motor not the complete assembly for this concern.**	
	1 Using a multimeter, check the voltage to the door window regulator motor.
	Is the voltage greater than 10 volts? **Yes** Install a new door window regulator motor as necessary. **No** Repair the wiring harness. Test the system for normal operation. If the concern continues, install a new door window regulator motor as necessary.

PINPOINT TEST D : FRONT DOOR WINDOW GLASS BOUNCE BACK	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
D1: CHECK WINDOW MOTOR INITIALIZATION	
	1 Initialize the door window motor. REFER to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).
	Did the initialization work? **Yes** Test the system for normal operation. **No** GO to D2.
D2: CHECK THAT THE DOOR WINDOW GLASS SEAL IS FREE FROM FOREIGN MATERIAL	
	1 Check for any foreign material or obstruction in the door window glass seal.
	Is the door window glass seal free from foreign material? **Yes** GO to D3. **No** Remove any foreign material from door window glass seal and lubricate the seal. Test the system for normal operation.
D3: CHECK THAT THE DOOR WINDOW GLASS SEAL IS INSTALLED CORRECTLY	
	1 Check that the door window glass seal is installed correctly.
	Is the door window glass seal installed correctly? **Yes** GO to D4. **No** Install the door window glass seal correctly. Test the system for normal operation.
D4: CHECK THAT THE DOOR WINDOW GLASS SEAL IS NOT WORN IN THE CHANNELS	
	1 Visually check that the door window glass seal is not worn in the door channels.
	Is the door window glass seal worn in the channels? **Yes** Install a new door window glass seal as necessary. Test the system for normal operation. **No** GO to D5.
D5: CHECK THE DOOR WINDOW GLASS IS SECURE	
	1 Remove the door window glass outer waist seal.
	2 Check if the door glass installed correctly and secured to the door window regulator.
	Is the door window glass correctly installed and secure? **Yes** Test the system for normal operation. **No** Adjust the door window glass referring to the door glass channel setting procedure in this procedure. Test the system for normal operation. If the concern persists, install a new door window regulator motor as necessary. REFER to: Front Door Window Regulator and Motor (501-11 Glass, Frames and Mechanisms, Removal and Installation).

Door glass channel setting procedure

1. Remove the door trim panel as necessary.
   REFER to: Front Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation) / Rear Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. NOTE: Do not remove the door window glass channel.

   Release the door window glass channel retaining bolt.

3. Push the door window glass to the seal of the door glass channel and door window regulator motor to make sure correct installation in to the door window glass.
4. Lower the door window glass.
5. Tighten the door window glass channel retaining bolt.
6. Check the system for normal operation.

Published: 26-Jun-2012

Glass, Frames and Mechanisms - Fixed Window Glass

Diagnosis and Testing

Principles of Operation

For a detailed description of the Glass, Frames and Mechanisms and operation, refer to the relevant Description and Operation section of the workshop manual.

Inspection and Verification

NOTES:

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

Refer to Section 100-00 General Information for window glass health and safety precautions.

1. Verify the customer concern.
2. Visually inspect for obvious mechanical faults.

Visual Inspection

Mechanical
Physical damage to the windshield

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.

Warranty Repairs

NOTES:

The warranty period for the windshield is twelve months with the exception of delamination and electrical faults.

Warranty repairs should be completed using genuine parts, in accordance with the Warranty Policy and Procedures Manual.

1. Draw a line around the windshield damage using a marker pen.
2. Photograph the entire windshield. If the damage extends behind any trim, remove the trim and take further photographs.
3. Photograph the trademark logo and code to validate the windshield as factory fitment.

Symptom Chart

Symptom	Possible Cause	Action
Scratches	• Debris trapped under a wiper blade • Foreign object damage • Fouling by trim	GO to Pinpoint Test A.
Chips	• Foreign object damage	GO to Pinpoint Test B.
Cracks	• Foreign object damage • Impact damage during assembly	GO to Pinpoint Test C.
Delamination	• Manufacturing defect	GO to Pinpoint Test D.

PINPOINT TEST A : SCRATCH TEST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: IDENTIFY SCRATCH	
NOTE: A scratch will usually be regular in shape, following the line of the object that caused it.	
	1 Probe using the tip of a pencil to identify a groove in the windshield surface.
	Is there a groove? **Yes** Windshield scratched. GO to A2. **No** Defect not valid.
A2: CAUSE OF SCRATCH	

	1 Check for trim, body panels, or foreign objects that may have caused the scratch.
	Was the scratch caused by a foreign object? **Yes** The damage is not due to a defect or an assembly error. **No** Rectify as appropriate.

PINPOINT TEST B : CHIP TEST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: CHIP TEST	
NOTE: Impact damage may cause a crack to form.	
	1 Assess the damage by probing with the tip of a pencil.
	Is the damaged area rough (indicating a breach of the windshield surface)? **Yes** Damage caused by the impact of a foreign object. Not a manufacturing defect. **No** Install a new windshield.

PINPOINT TEST C : CRACK TEST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
C1: IDENTIFY CRACK	
	NOTE: A crack will be detectable as a step in the glass. **1** Confirm the presence of a crack by probing with the tip of a pencil.
	Is the windshield cracked? **Yes** Windshield cracked. GO to C2. **No** Windshield not cracked. GO to Pinpoint Test A.
C2: CAUSE OF CRACK	
NOTE: Multiple cracks will radiate out from the source.	
	1 Assess the source of the crack by probing with the tip of a pencil.
	Is there evidence of impact damage being the source of the crack? **Yes** GO to Pinpoint Test B. **No** Install a new windshield.

PINPOINT TEST D : DELAMINATION TEST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
D1: DELAMINATION TEST	
 E129727	**1** Visually assess the windshield for delamination.
	Have the glass laminates separated? **Yes** Install a new windshield. **No** No further action.

DTC Index

For a complete list of all Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.

Published: 11-May-2011

Glass, Frames and Mechanisms - Door Window Motor Initialization

General Procedures

1. NOTES:

   After the battery has been disconnected it is necessary to initialize each door window motor separately to operate the "one-touch" up function.

   Make sure a minimum of 2 minutes from initial disconnect of battery has elapse prior to reconnecting the battery. The initialising of the window glass motor must be conducted with the engine running.

   Operate the window control switch until the door window glass is in the fully closed position, continue to operate the window control switch for a further two seconds.

2. Release the window control switch.

3. Operate the window control switch in the closed position and continue to operate the window control switch for a further two seconds.

4. Operate the window control switch until the door window glass is in the fully open position ("one-touch" down).

5. NOTES:

   If the door window motor initialization has been completed correctly, when the window control switch is operated, the door window glass should move to the fully closed position ("one-touch" up) automatically.

   If the door window glass does not fully close automatically ("one-touch" up), repeat the complete procedure.

   Operate the window control switch once to the close position.

6. Repeat the door window motor initialization for each door window motor.

Published: 11-May-2011

Glass, Frames and Mechanisms - Rear Door Window Glass

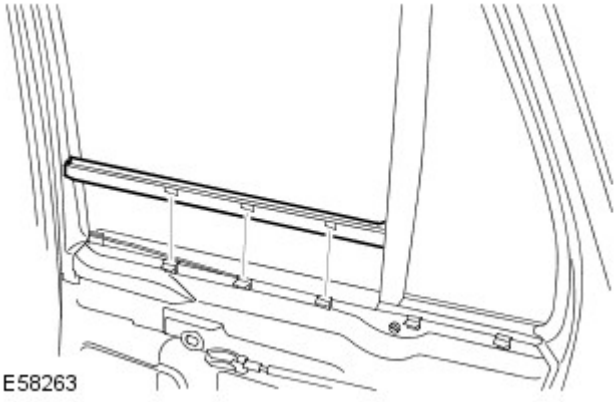
Removal and Installation

Removal

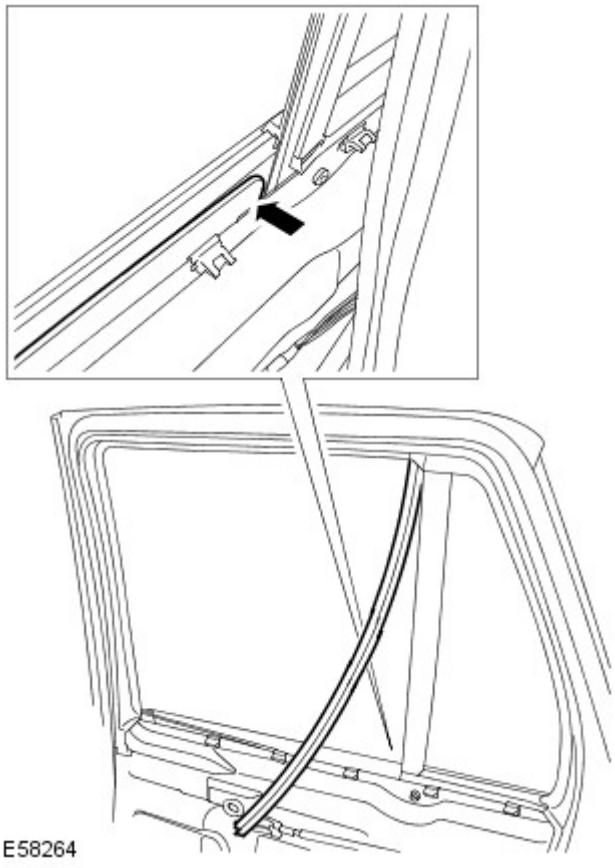
1. Remove the rear door window motor and regulator assembly. For additional information, refer to: Rear Door Window Regulator and Motor (501-11, Removal and Installation).

2. Lower the rear door glass to the bottom of the door.
   - Remove the wedge.

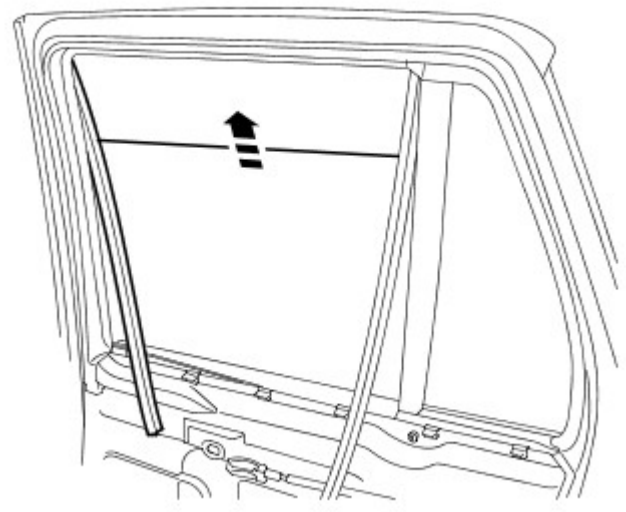
3. Carefully remove the inner waist seal.
   - Release it from 3 clips.


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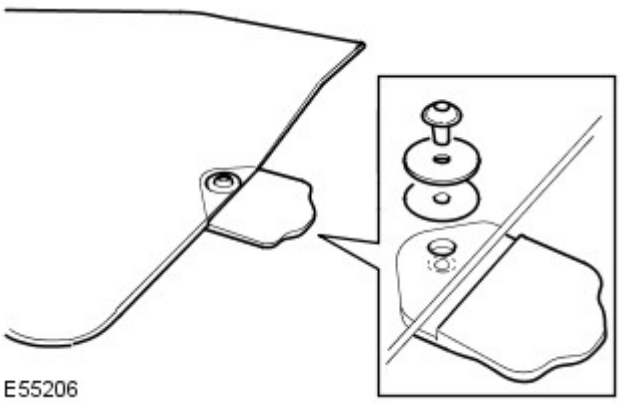
4. Position the rear edge of the glass, forward of the glass guide channel.
   - Release the lining from the glass rear guide channel.


E58264

5. Remove the rear door window glass.
   - Release the lining from the glass front guide channel.



E58265



E55206

6. NOTES:

   Do not disassemble further if the component is removed for access only.

   Note the fitted position.

   Remove the glass retaining clip.
   - Remove the Torx bolt.
   - Remove the spacer washer.
   - Remove the flat washer.

Installation

1. Install the glass retaining clip.
   - Install the spacer.
   - Install the washer.
   - Tighten the Torx screws to 8 Nm (6 lb.ft).
2. Install the rear door window glass.
3. Install the guide channel lining.
4. Install the inner waist seal.
5. NOTE: Wedge the glass in this position.

   Raise the rear door glass fully.
6. Install the rear door window motor and regulator assembly. For additional information, refer to: Rear Door Window Regulator and Motor (501-11, Removal and Installation).

Published: 11-May-2011

Glass, Frames and Mechanisms - Rear Door Fixed Window Glass

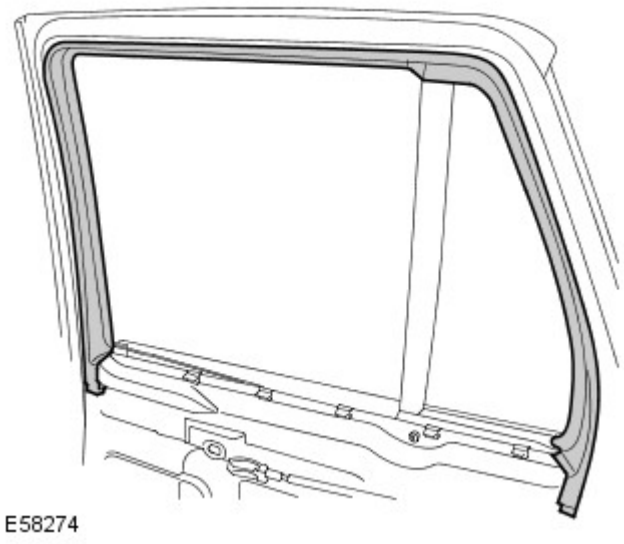
Removal and Installation

Removal

1. Remove the rear door window motor and regulator assembly. For additional information, refer to: Rear Door Window Regulator and Motor (501-11, Removal and Installation).

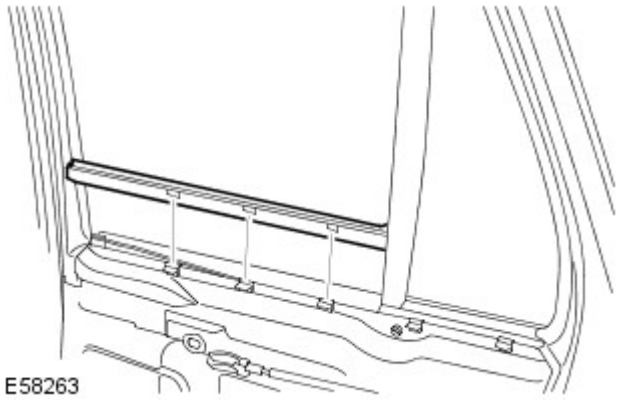
2. Lower the rear door glass to the bottom of the door.
   - Remove the wedge.

3. Remove the rear door frame trim.
   - Carefully release the adhesive strip.



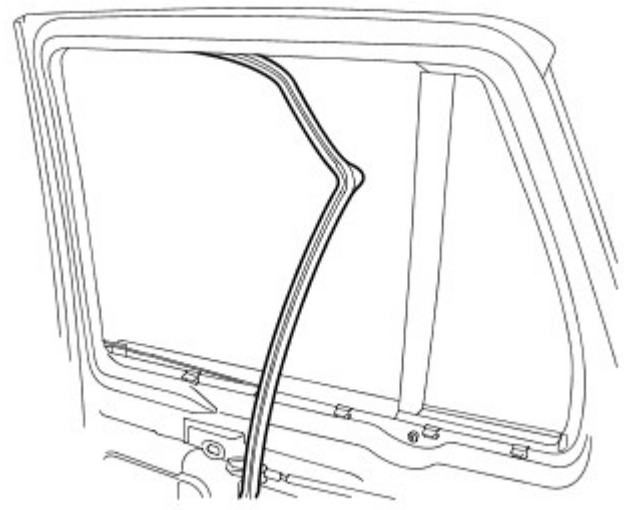
E58274

4. Carefully remove the inner waist seal.

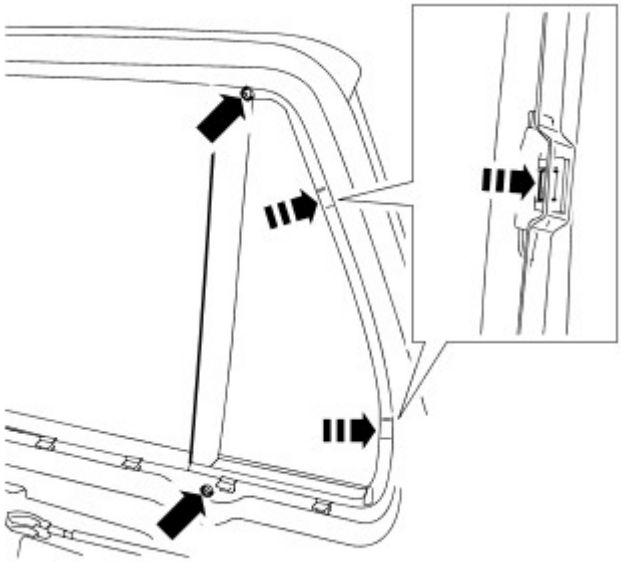


E58263

5. Release the lining from the glass rear guide channel.



E58275



E58276

6. Remove the rear door window fixed glass.
    - Remove the 2 Torx screws.
    - Release the 2 clips.

Installation

1. Install the rear door window fixed glass.
    - Clean the component mating faces.
    - Secure the 2 clips.
    - Tighten the Torx screws to 10 Nm (7 lb.ft).
2. Install the guide channel lining.
3. Install the inner waist seal.
4. Install the door frame trim.
    - Clean the component mating faces.
    - Remove backing tape from adhesive strip.
5. NOTE: Wedge the glass in this position.

    Raise the rear door glass fully.
    - Engage the door glass with the channel.
6. Install the rear door window motor and regulator assembly. For additional information, refer to: Rear Door Window Regulator and Motor (501-11, Removal and Installation).

Published: 04-Sep-2013

Glass, Frames and Mechanisms - Rear Quarter Window Glass

Removal and Installation

Removal

CAUTIONS:

Always protect paintwork and glass when removing exterior components.

Always protect the interior components when removing body glass.

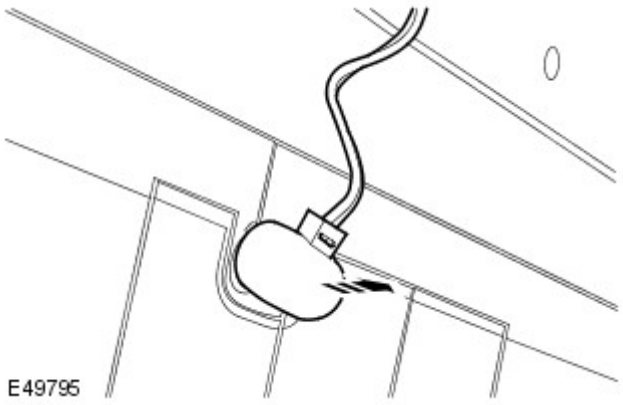
Lay the glass on felt covered supports. Do not stand on edge as this can cause chips which subsequently develop into cracks.

NOTE: The following equipment is required: l Cutting wire and handles l Kent knife l Glazing knife l Glass replacement kit l Sealant applicator gun l Suction cups l A felt covered table or stand to support glass

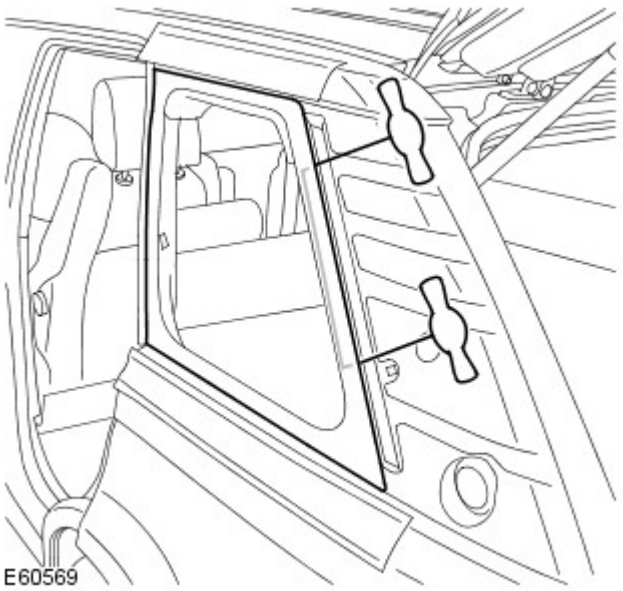
1. Remove the D-pillar upper trim panel.
   For additional information, refer to: D-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Remove the C-pillar upper trim panel.
   For additional information, refer to: C-Pillar Upper Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

3. Disconnect the rear quarter window glass antenna connector.



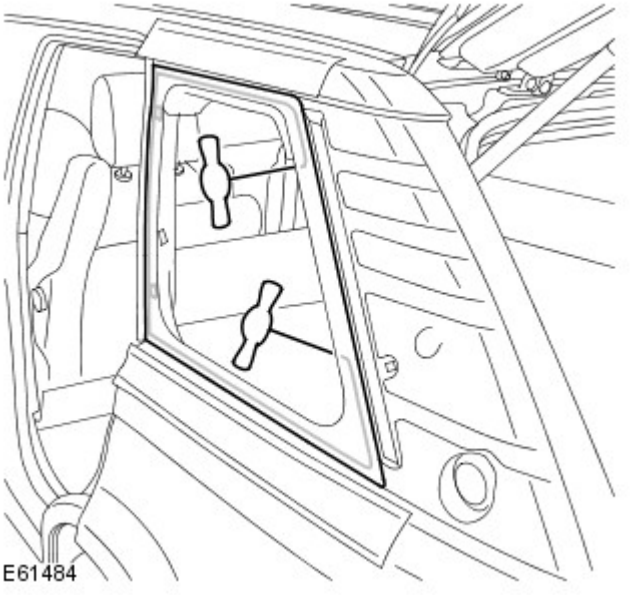
4. Remove the rear quarter window moulding.
   For additional information, refer to: Rear Quarter Window Moulding (501-08 Exterior Trim and Ornamentation, Removal and Installation).



5. WARNING: Eye protection must be worn.

   CAUTION: Care must be taken not to damage the air bag curtain module when cutting through the sealant.

   Release the rear edge of the rear quarter window glass.
   - Carefully cut through the sealant using a glazing knife or cutting wire.



6. WARNING: Eye protection must be worn.

   CAUTION: Care must be taken not to damage the air bag curtain module when cutting through the sealant.

   With assistance, remove the rear quarter window glass.
   - Carefully cut through the sealant using a glazing knife or cutting wire.
   - Attach the suction cups.
   - Noting fitted position, remove the 2 spacers.

Installation

1. Carefully remove the sealant from the body to leave a smooth surface.

2. Apply etch primer to any bare metal.

3. CAUTION: Correct preparation of body apertures “post painting” to ensure satisfactory glass adhesion, must be carried out in line with industry practise.

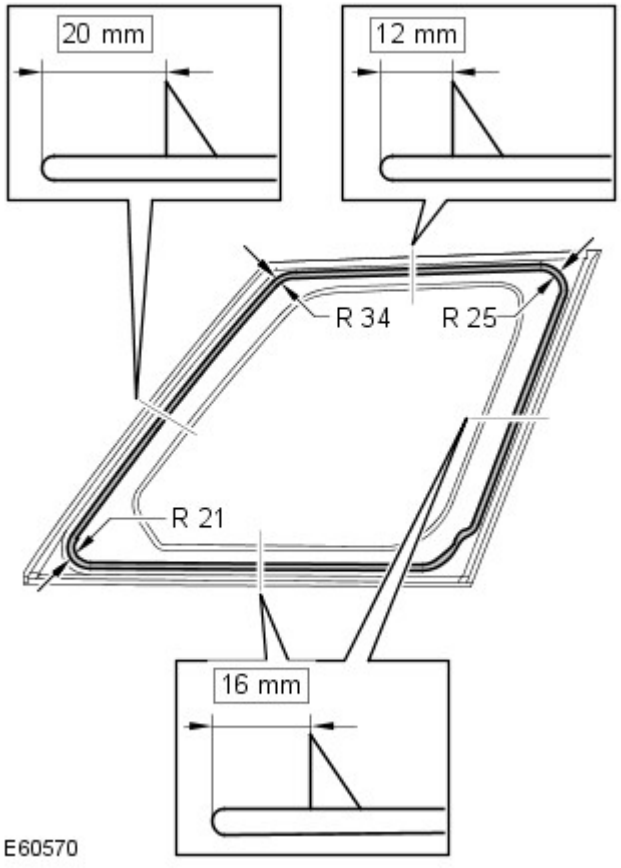
   Apply primer over the etch primer.

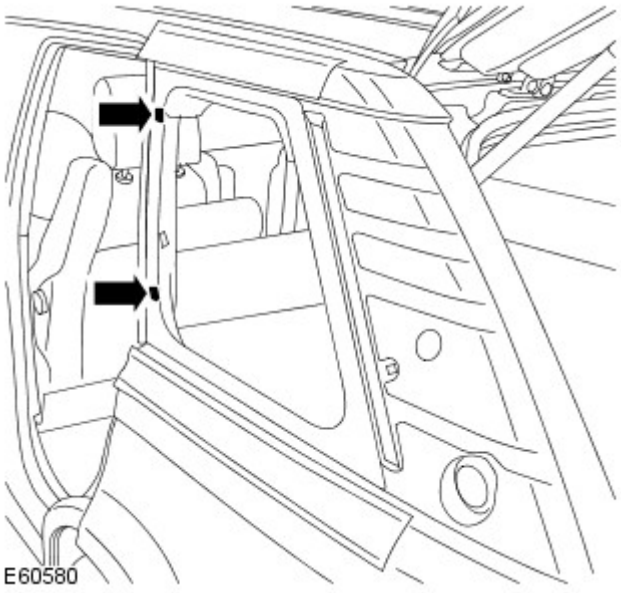
4. Apply glass primer to the sealant face on the rear quarter window glass and allow to cure.

5. Apply activator over the old sealant on the rear quarter window glass and allow to cure.

6. Fit a pre-cut nozzle to the sealer cartridge, remove the lid, shake out the crystals and fit the cartridge to the applicator gun.
   - Modify the nozzle to achieve a bead section in the shape of a right angle triangle with a base of 8 mm and a vertical height of 12 mm.

7. Apply a continuous bead of sealant to the rear quarter window glass as shown.





8. With assistance, install and align the rear quarter window glass.
    - Install the spacers equally as shown.
    - Lightly press the window glass to seat the sealer.
9. Test the sealer for leaks, apply additional sealer if necessary. If water is used, allow sealer to dry before testing. Spray water around the glass and check for leaks. Mark any area that leaks. Dry the glass and sealer then apply additional sealer.
10. Install the rear quarter window moulding.
    For additional information, refer to: Rear Quarter Window Moulding (501-08 Exterior Trim and Ornamentation, Removal and Installation).
11. Connect the rear quarter window glass antenna connector.
    - Clean the component mating faces.
12. Install the rear quarter window glass panel.
    - Secure with the clips.
13. Install the D-pillar upper trim panel.
    For additional information, refer to: D-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

14. Install the C-pillar upper trim panel.
    For additional information, refer to: C-Pillar Upper Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

Published: 11-May-2011

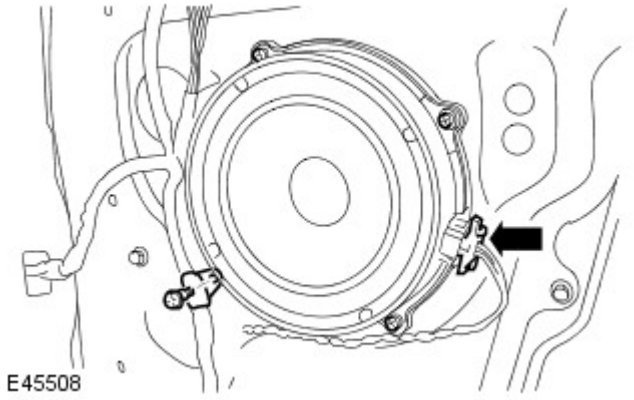
Glass, Frames and Mechanisms - Front Door Window Regulator and Motor

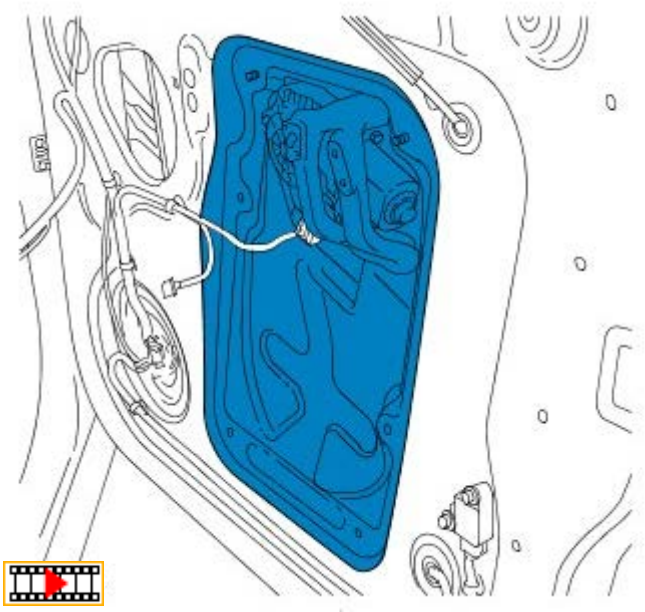
Removal and Installation

Removal

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

1. Refer to: Front Door Trim Panel (501-05, Removal and Installation).
2. Refer to: Front Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).
3.





4. *Torque:*
   Front door window regulator and motor retaining bolts 10 Nm
   Front door window regulator and motor retaining nuts 10 Nm
   Door window glass guide channel retaining bolt 10 Nm

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Glass, Frames and Mechanisms - Rear Door Window Regulator and Motor

Removal and Installation

Special Tool(s)

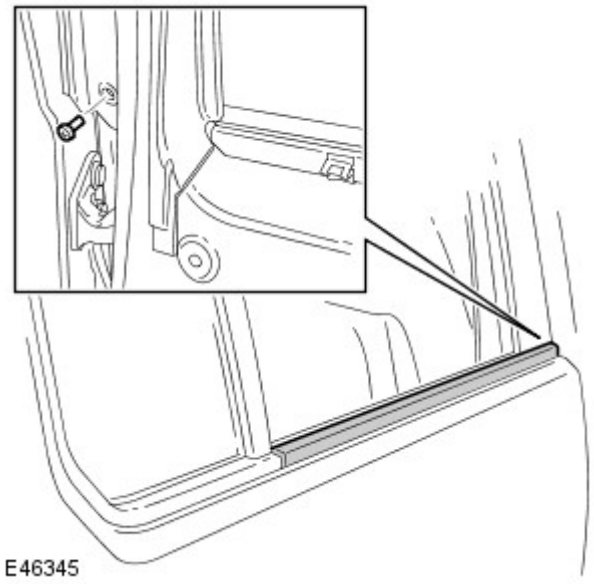
 E54200	Door glass release lever 501-114

Removal

NOTE: The door glass should be lowered by approximately one third.

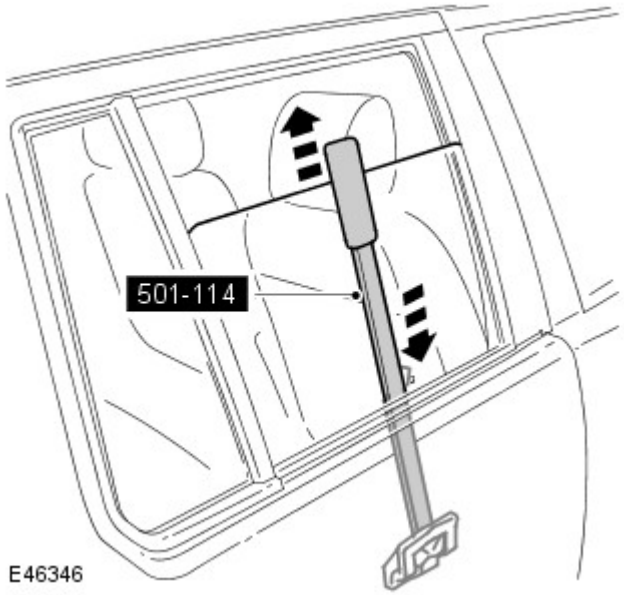
1. Remove the rear door speaker.
   For additional information, refer to: Rear Door Speaker (415-03, Removal and Installation).

2. Carefully remove the outer waist seal.
   - Remove the screw.

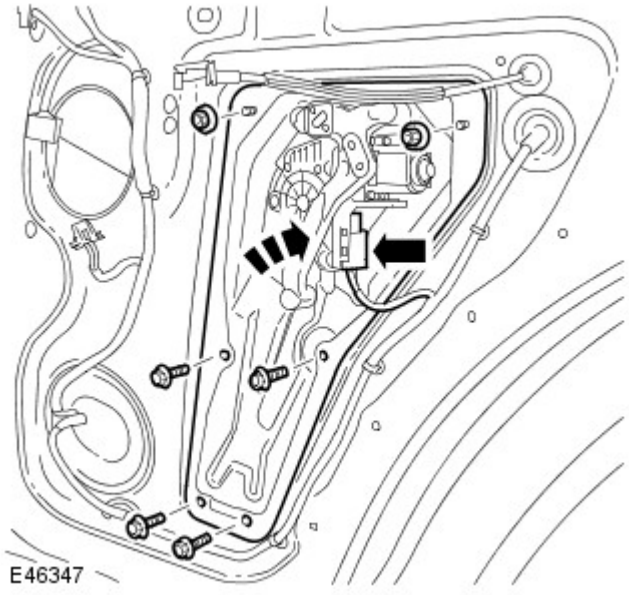


3. NOTE: Wedge the glass in this position.

   Using the special tool, release the clip and lift the glass to the top of the door frame.



4. Remove the window motor and regulator assembly.
   - Disconnect the electrical connector.



- Remove the 4 bolts.
- Remove the 2 nuts.
- Rotate the assembly by approximately 45 degrees, to remove the assembly from the rear side of the aperture first.

Installation

1. Install the window motor and regulator assembly.
    - Tighten the bolts and nuts to 10 Nm (7 lb.ft).
    - Connect the electrical connector.

2. Secure the glass to the glass regulator.
    - Remove the wedge.
    - Lower the glass.

3. Install the outer waist seal.
    - Tighten the Torx screw.

4. Install the rear door speaker.
   For additional information, refer to: Rear Door Speaker (415-03, Removal and Installation).

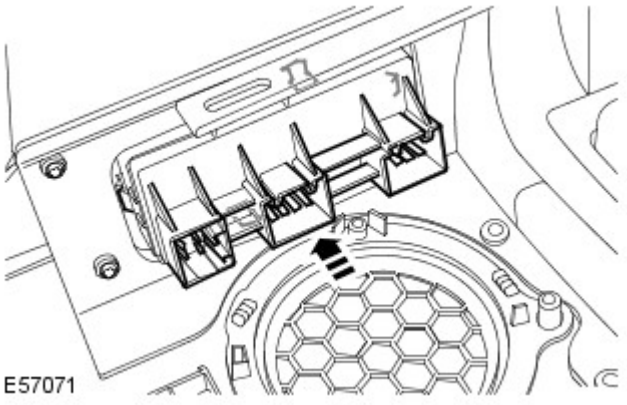
Published: 11-May-2011

Glass, Frames and Mechanisms - Front Door Window Control Switch

Removal and Installation

Removal

1. Remove the front door trim panel.
   For additional information, refer to: Front Door Trim Panel (501-05, Removal and Installation).



2. Remove the window control switch.
   - Carefully release the 4 clips.

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

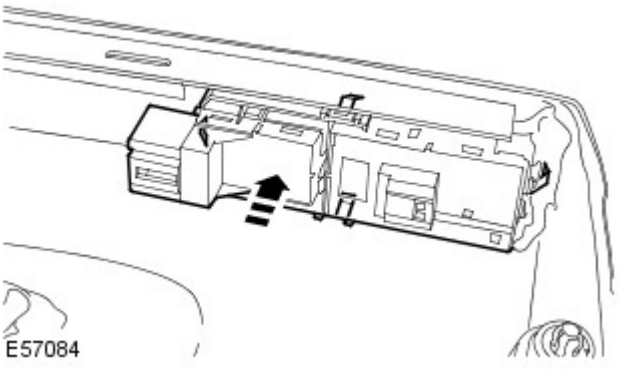
Glass, Frames and Mechanisms - Rear Door Window Control Switch

Removal and Installation

Removal

1. Remove the rear door trim panel.
   For additional information, refer to: Rear Door Trim Panel (501-05, Removal and Installation).

2. Remove the window control switch.
   - Carefully release the 4 clips.



Installation

1. To install, reverse the removal procedure.

Published: 04-Sep-2013

Glass, Frames and Mechanisms - Liftgate Window Glass

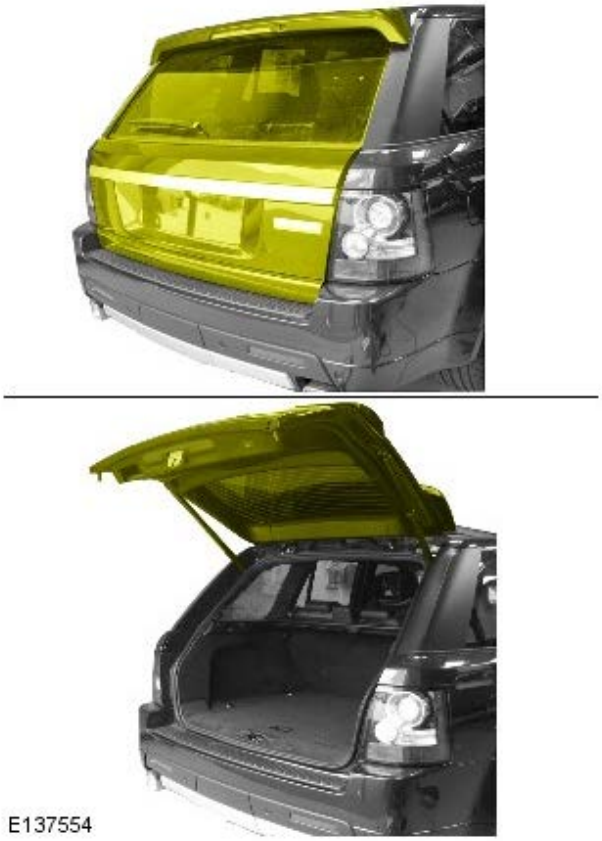
Removal and Installation

General Equipment

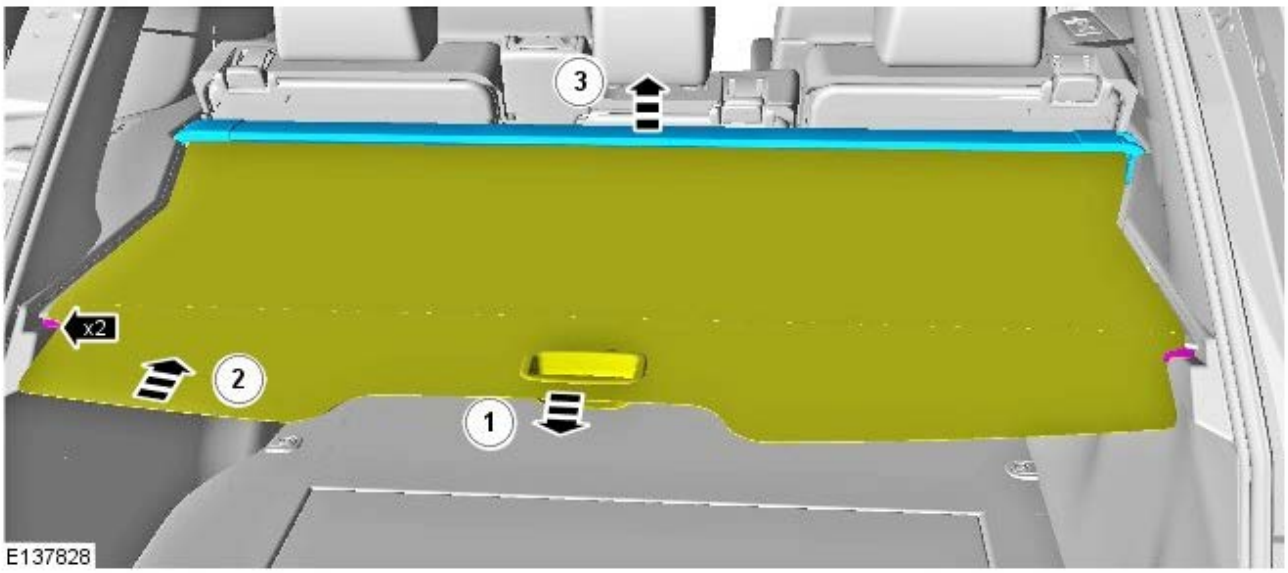
Direct glazing removal/replacement equipment

Removal

1.



2. If equipped.

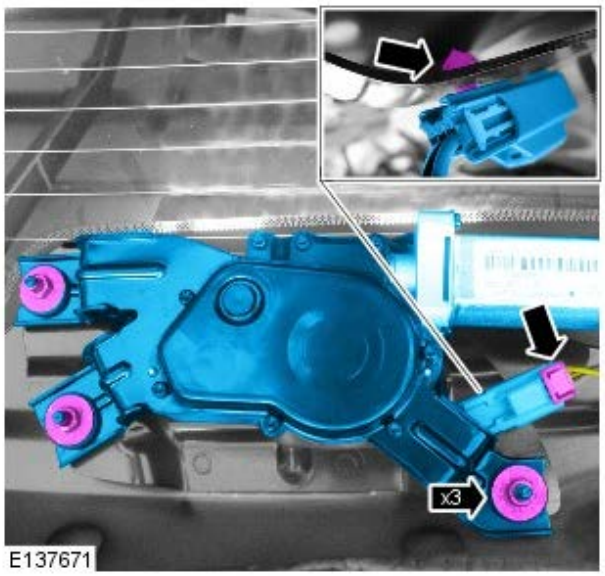


3. Refer to: Liftgate Window Glass Trim Panel (501-08 Exterior Trim and Ornamentation, Removal and Installation).

4. Refer to: Rear Spoiler (501-08 Exterior Trim and Ornamentation, Removal and Installation).

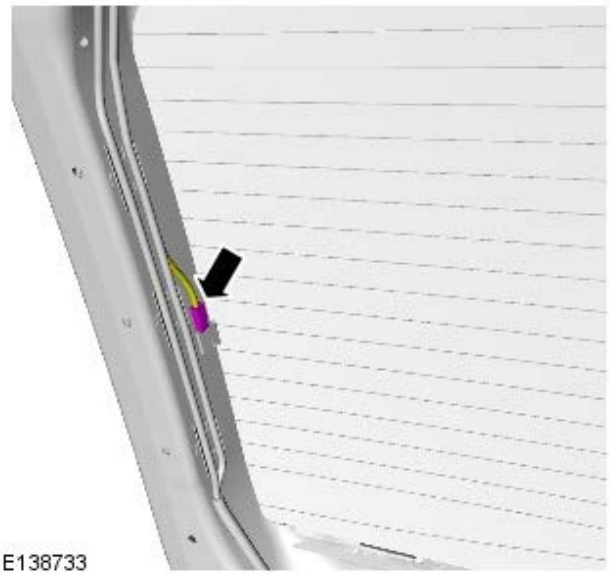
5. Refer to: Rear Wiper Pivot Arm (501-16 Wipers and Washers, Removal and Installation).

6.



E137671

7. Repeat to the other side.


E138733

8.


E138723

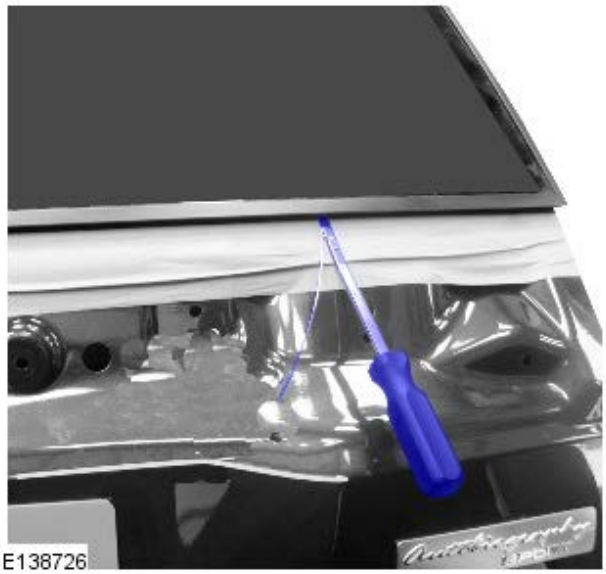
9. *General Equipment:* Direct glazing removal/replacement equipment



10. Feed the glazing cutting wire around the whole perimeter of the glass.

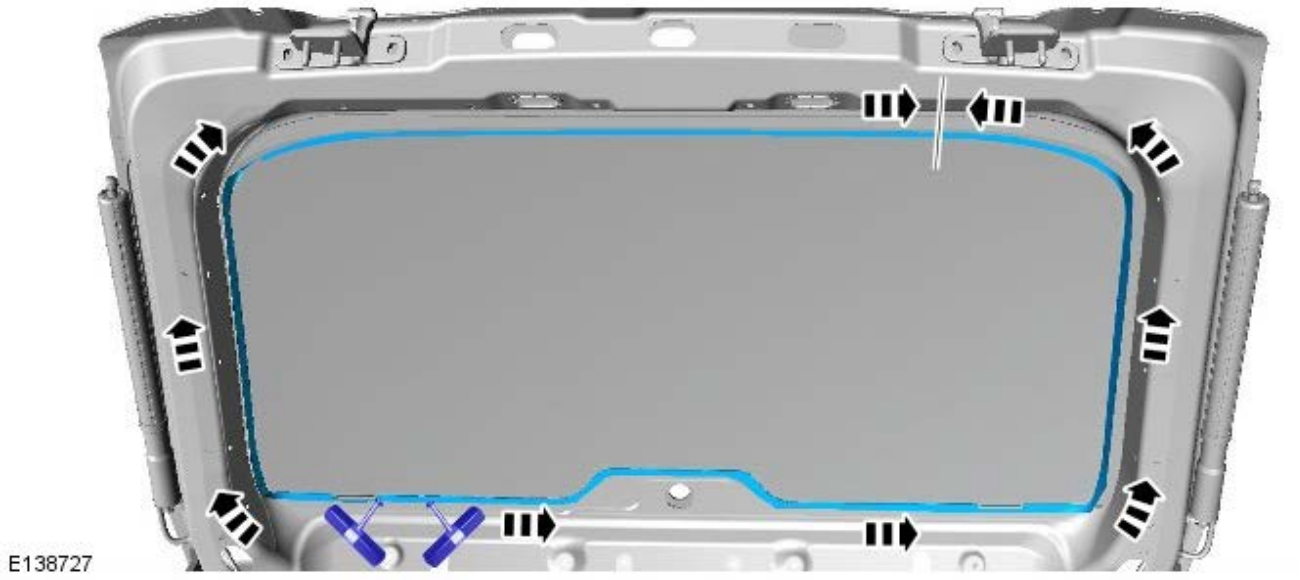


11. *General Equipment:* Direct glazing removal/replacement equipment



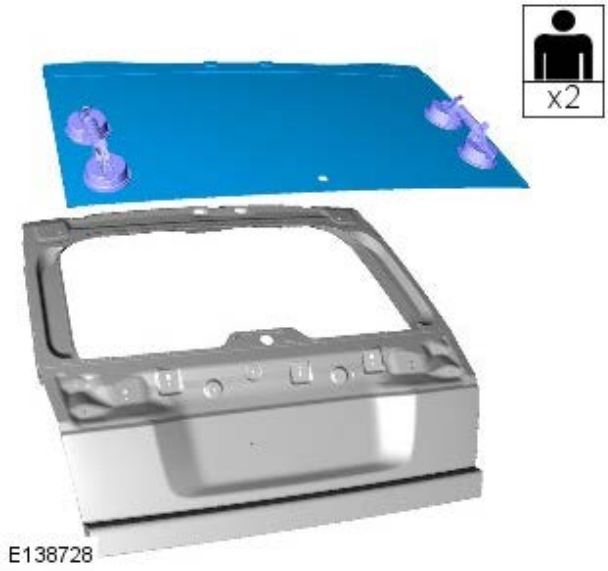
12. WARNING: Eye protection must be worn.

General Equipment: Direct glazing removal/replacement equipment

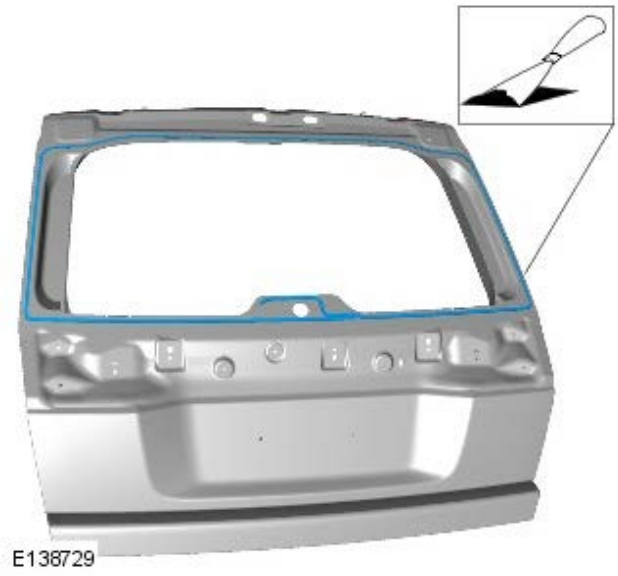


13. Remove the liftgate window glass.

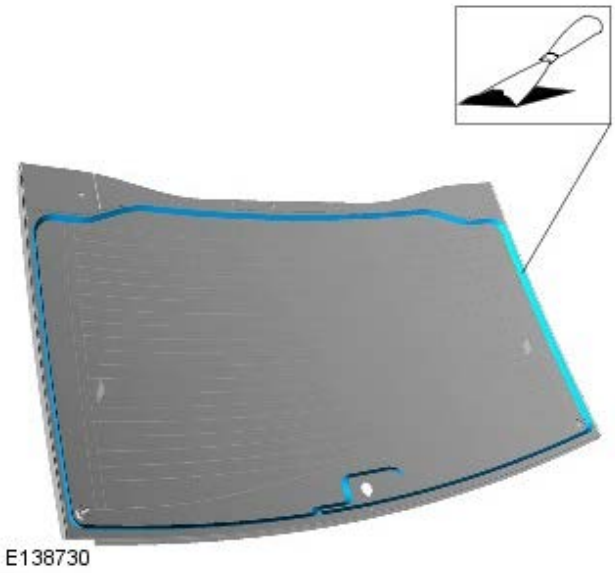
    General Equipment: Direct glazing removal/replacement equipment

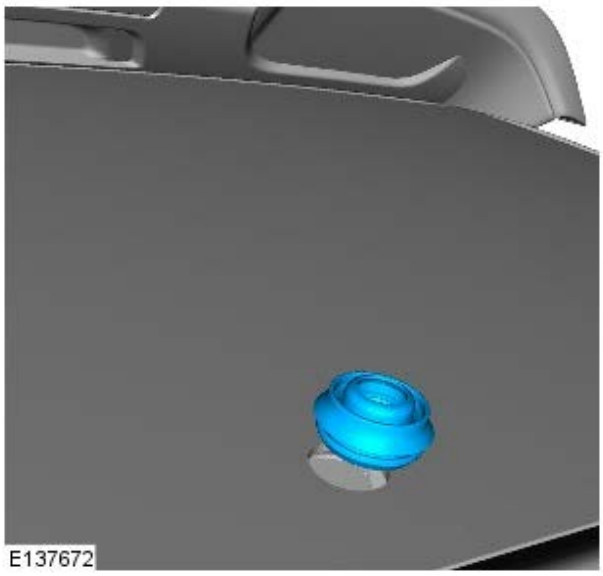


14. Carefully remove the sealant from the liftgate mating face to leave a smooth surface.



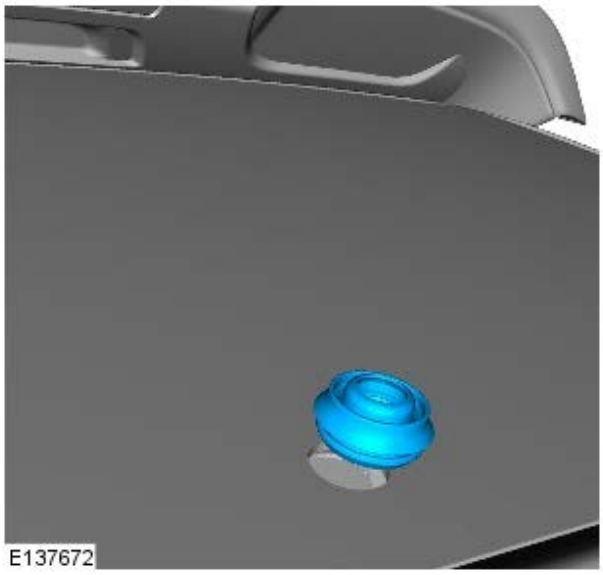
15. NOTE: This step is only required if a new liftgate glass is not installed.


E138730


E137672

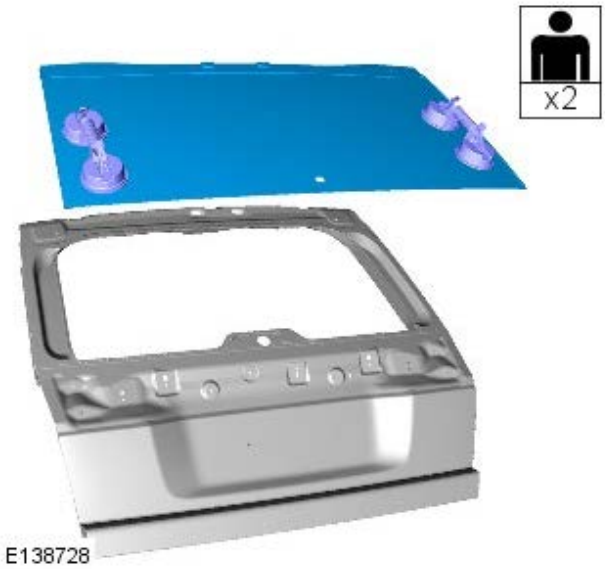
16. NOTE: Do not disassemble further if the component is removed for access only.

Installation


E137672

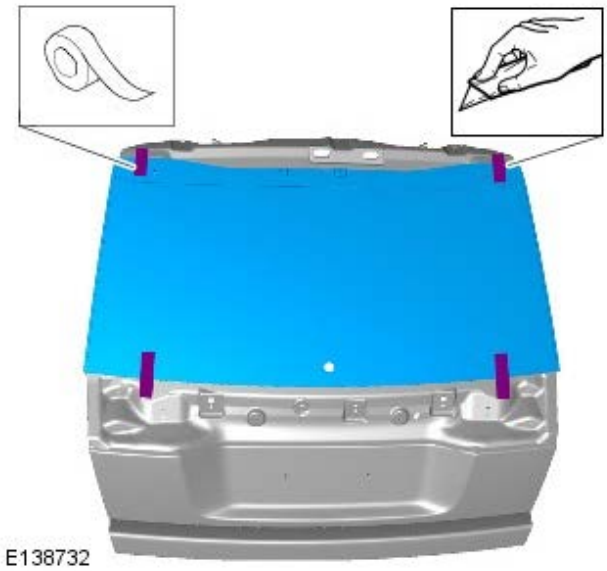
1. NOTE: This step is only required if a new component is installed.

2. Temporarily install the liftgate glass.

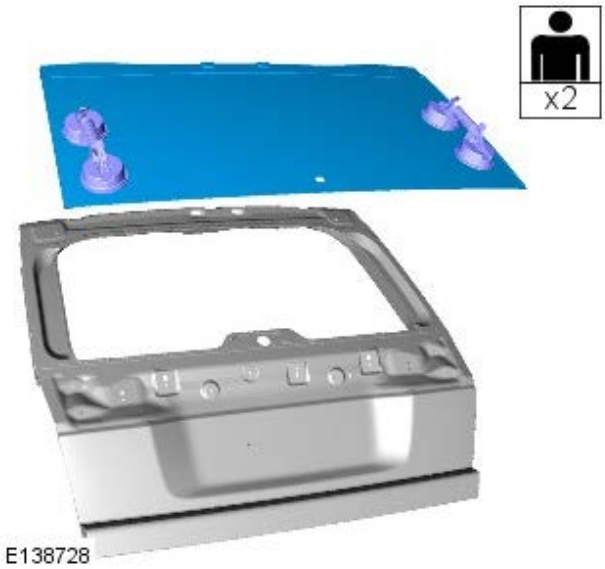


E138728

3. Use masking tape to establish reference marks as an alignment aid.


E138732

4. Remove the liftgate glass.



E138728

5. CAUTION: Correct preparation of body apertures “post painting” to ensure satisfactory glass adhesion, must be carried out in line with industry practise.

- Apply etch primer to any liftgate bare metal.
- Apply glass primer over the previously applied etch primer.
- Apply activator over the old sealant on the liftgate and

allow to cure.

- Apply glass primer to the sealant face on the liftgate window glass and allow to cure.

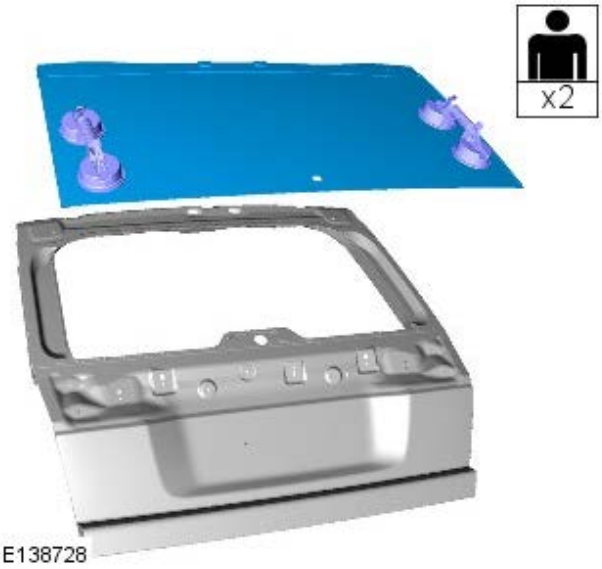
6.

- Apply a continuous bead of sealant to the liftgate window glass as shown.
- Modify the nozzle to achieve a bead section in the shape of a right angle triangle with a base of 8 mm and a vertical height of 12 mm.



E138731

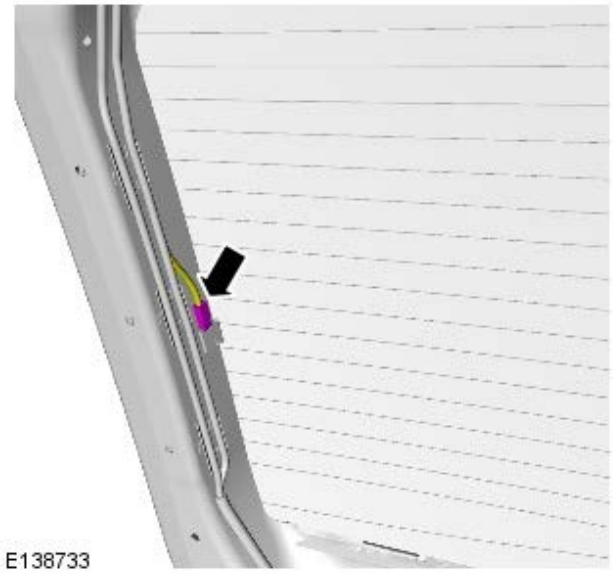
7. Install the liftgate window glass and lightly press around to whole perimeter to seat the sealer.



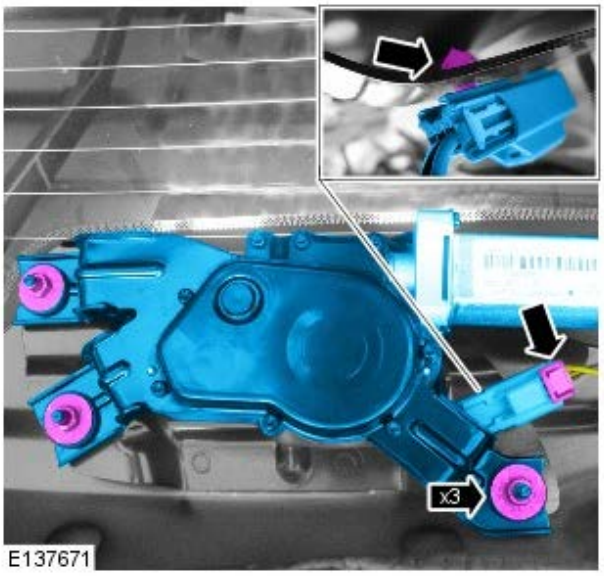
E138728

8. Test the sealer for leaks, apply additional sealer if necessary. If water is used, allow sealer to dry before testing. Spray water around the glass and check for leaks. Mark any area that leaks. Dry the glass and sealer then apply additional sealer.

9. Repeat to the other side.



10. *Torque:* 10 Nm

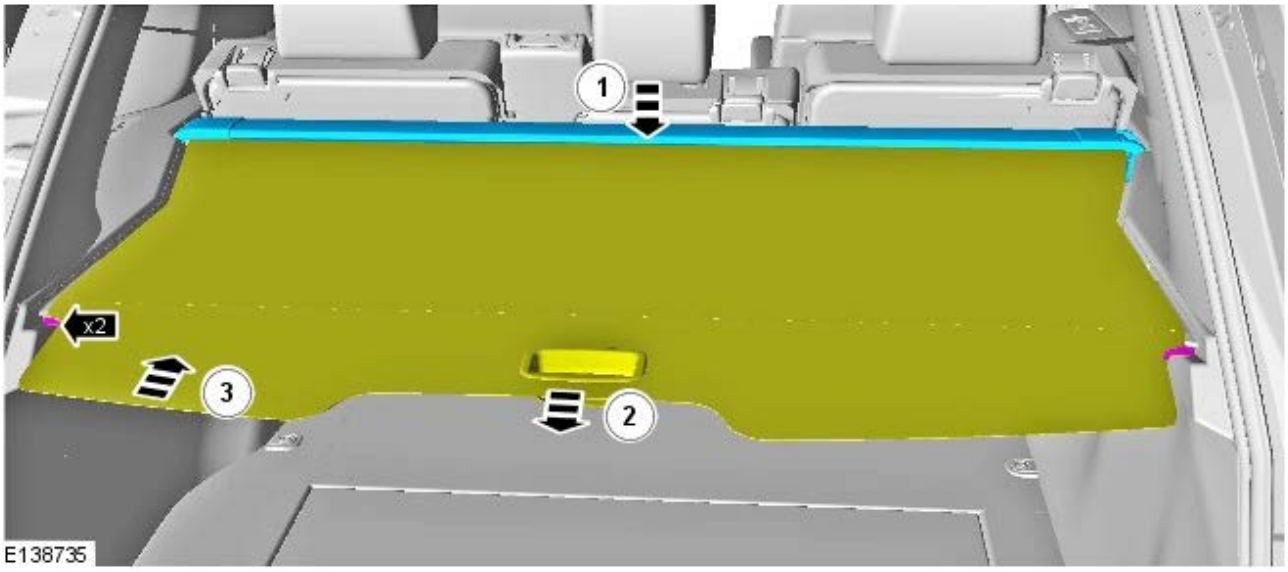


11. Refer to: Rear Wiper Pivot Arm (501-16 Wipers and Washers, Removal and Installation).

12. Refer to: Rear Spoiler (501-08 Exterior Trim and Ornamentation, Removal and Installation).

13. Refer to: Liftgate Window Glass Trim Panel (501-08 Exterior Trim and Ornamentation, Removal and Installation).

14. If equipped.



15.





Published: 04-Sep-2013

Glass, Frames and Mechanisms - Windshield Glass

Removal and Installation

Removal

CAUTIONS:

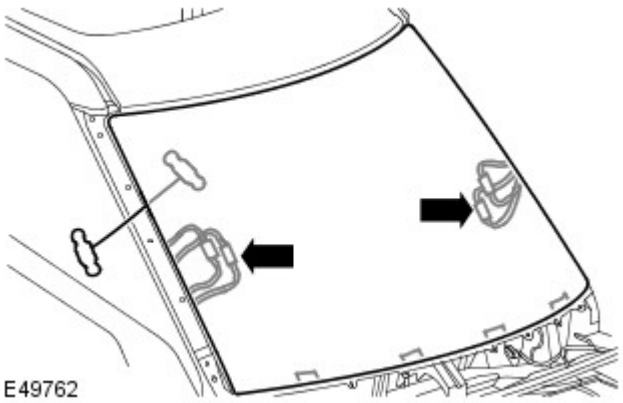
Always protect paintwork and glass when removing exterior components.

Always protect the interior components when removing body glass.

Lay the glass on felt covered supports. Do not stand on edge as this can cause chips which subsequently develop into cracks.

NOTE: The following equipment is required: l Cutting wire and handles l Kent knife l Glazing knife l Windshield replacement kit l Sealant applicator gun l Suction cups l A felt covered table or stand to support glass

1. Remove the plenum chamber panel.
   For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).
2. Remove both A-pillar upper trim panels.
   For additional information, refer to: A-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
3. Remove the rain sensor.
   For additional information, refer to: Rain Sensor (501-16 Wipers and Washers, Removal and Installation).
4. Remove the roof moulding.
   - Release the 6 clips.
   - Repeat the above procedure for the other side.

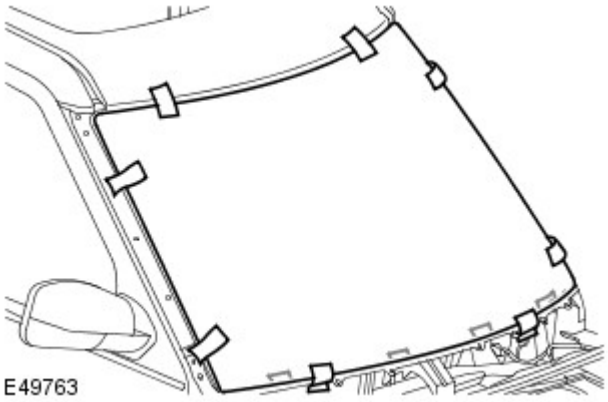


5. WARNING: Eye protection must be worn.

   With assistance, remove the windshield glass.
   - If installed, disconnect the 4 electrical connectors.
   - Carefully cut through the sealant using a glazing knife or cutting wire.
   - Attach the suction cups.
   - Noting fitted position, remove the 4 spacers.

Installation

1. Carefully remove the sealant from the body to leave a smooth surface.



2. Install the windshield glass.
   - Install the spacers equally as shown.
   - Use masking tape to establish reference marks as an alignment aid.

3. Remove the windshield glass.
    - Clean the component mating faces.

4. CAUTION: Correct preparation of body apertures “post painting” to ensure satisfactory glass adhesion, must be carried out in line with industry practise.

   Apply etch primer to any bare metal.

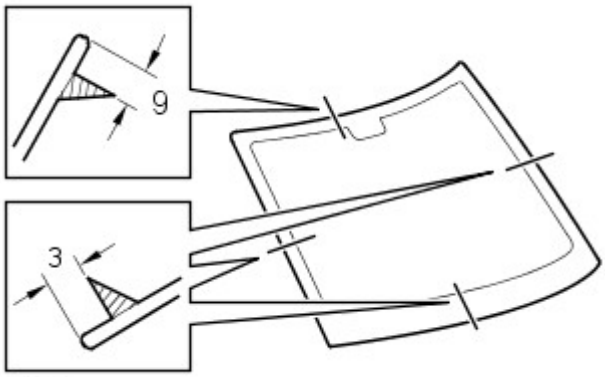
5. Apply primer over the etch primer.

6. Apply glass primer to the sealant face on the windshield glass and allow to cure.

7. Apply activator over the old sealant on the windshield glass and allow to cure.

8. Fit a pre-cut nozzle to the sealer cartridge, remove the lid, shake out the crystals and fit the cartridge to the applicator gun.
    - Modify the nozzle to achieve a bead section in the shape of a right angle triangle with a base of 8 mm and a vertical height of 12 mm.

9. Apply a continuous bead of sealant to the windshield glass as shown.



E49764

10. With assistance, install the window glass.
    - Lightly press the window glass to seat the sealer.
    - Connect the electrical connectors.

11. Test the sealer for leaks, apply additional sealer if necessary. If water is used, allow sealer to dry before testing. Spray water around the glass and check for leaks. Mark any area that leaks. Dry the glass and sealer then apply additional sealer.

12. Install the roof mouldings.
    - Secure with the clips.

13. Install the rain sensor.
    For additional information, refer to: Rain Sensor (501-16 Wipers and Washers, Removal and Installation).

14. 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).

15. Install the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).

Published: 02-Nov-2011

Glass, Frames and Mechanisms - Front Door Window Glass

Removal and Installation

Special Tool(s)

	501-114 Release Lever, Door Glass

Removal

1. *Special Tool(s):* 501-114



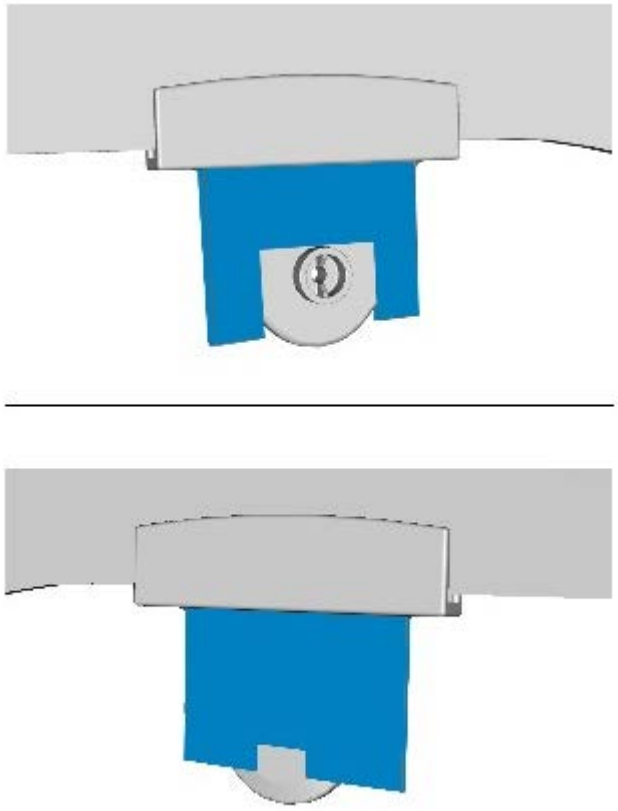
Installation

1. CAUTIONS:

   Make sure that any grease or lubricant is removed from the retaining brackets prior to installation of the anti-rattle pads.

   Make sure that the anti-rattle pad is installed in the orientation illustrated.

   NOTE: This operation must be done for both retaining brackets.



E140282

2. To install, reverse the removal procedure.

Published: 11-May-2011

Instrument Panel and Console -

Torque Specifications

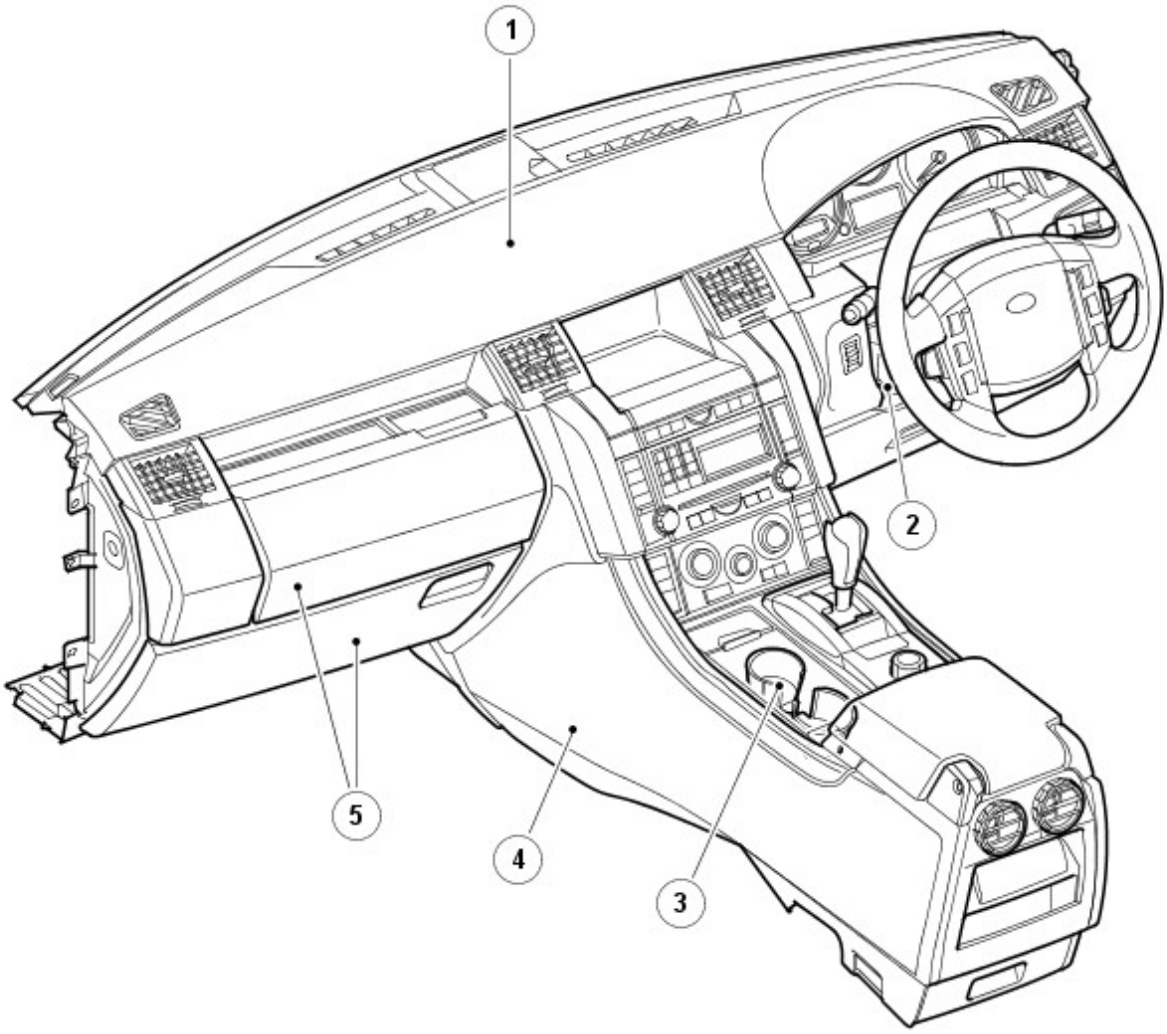
Description	Nm	lb-ft
Floor console lid Torx bolts	3	2
Floor console Torx bolts	10	7
Passenger air bag module nuts	10	7
Passenger air bag module bracket Torx screws	25	18
Instrument panel Torx bolts	25	18
Heater housing to bulkhead Torx bolts	6	4
Ground cables to passenger/driver side lower A-pillar nuts	10	7
Adaptor panel(s) nuts	10	7
A/C lines to bulkhead bolt	10	7
A/C lines to body nuts	10	7
EGR coolant crossover pipe bolts	10	7
Instrument panel carrier to bulkhead Torx bolt	25	18
Instrument panel upper section to body bolt	10	7
Instrument panel center bracket Torx bolts	25	18
* Steering column intermediate shaft nut	22	16
Transmission selector lever bolts	10	7
Front door bolts	10	7
Door check strap to A-pillar bolts	10	7
Steering column switch assembly Torx bolts	3	2
Transmission selector lever mount bracket bolts	10	7

*** New nut must be installed**

Published: 11-May-2011

Instrument Panel and Console - Instrument Panel

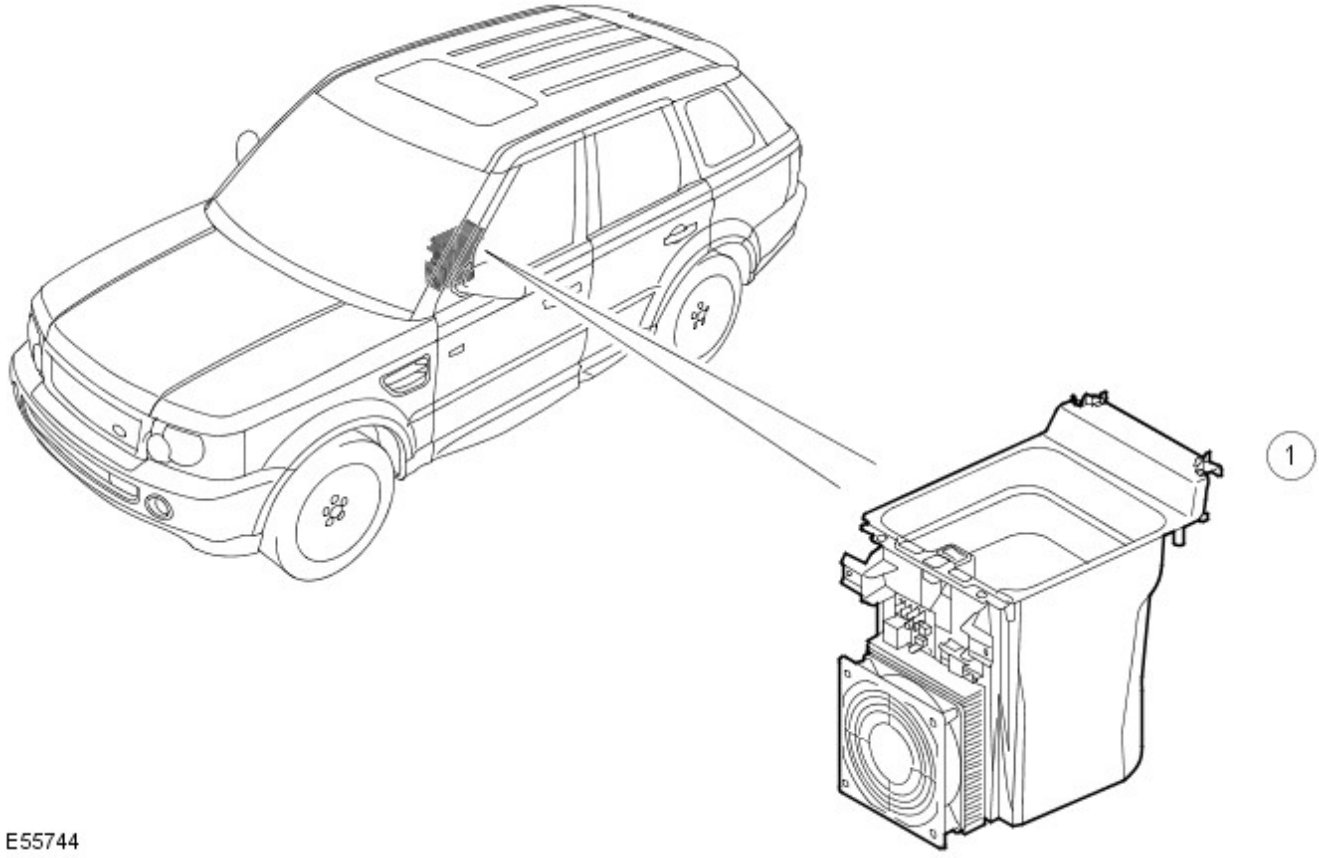
Description and Operation



E56707

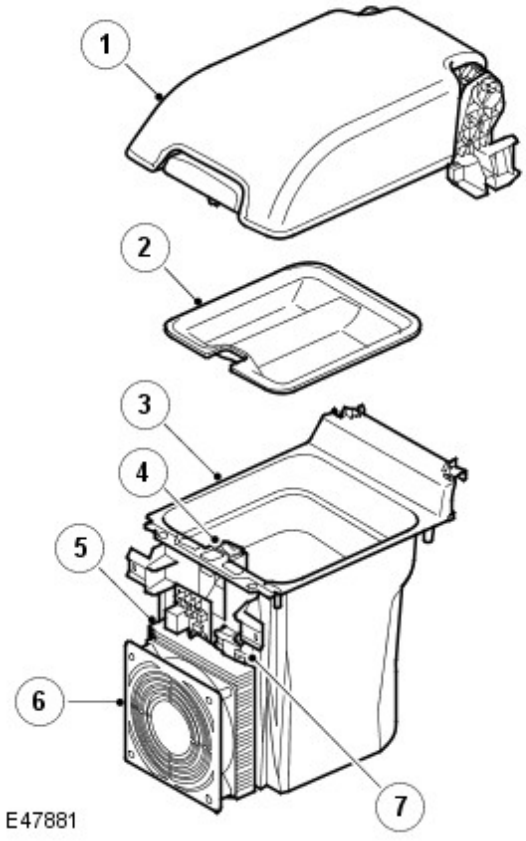
Item	Part Number	Description
1	-	Instrument Panel
2	-	Steering column cover
3	-	Cup holders
4	-	Center console
5	-	Glove compartment

COOL BOX



Item	Part Number	Description
1	-	Coolbox

On some vehicles, a cool box is incorporated in the tunnel console between the two front seats.



Item	Part Number	Description
1	-	Cubby box lid
2	-	Cubby box tray
3	-	Container
4	-	On/Off switch

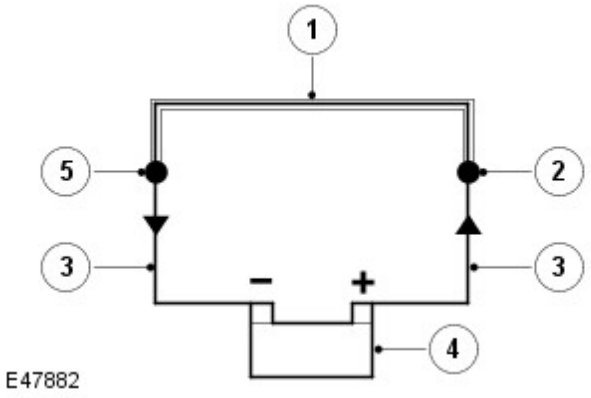
5	-	Thermoelectric cooler heatsink
6	-	Fan
7	-	Electrical connector

The cool box is an open topped container with an aluminum liner and an insulating outer layer. A thermoelectric cooler is installed in the front of the container. The top of the container is covered by the cubby box tray and the cubby box lid. An electrical connector on the front of the cool box connects the cool box to the console harness.

Operation of the thermoelectric cooler is controlled by an on/off switch on the top front edge of the container. A permanent battery feed is supplied to the on/off switch from the central junction box (CJB). A light emitting diode (LED) in the on/off switch is illuminated while the cool box is selected on.

The thermoelectric cooler is a solid state heat pump that uses the Peltier Effect to cool the inside of the cool box. The Peltier Effect occurs when a direct current is passed through a circuit of two dissimilar conductors, which are connected together at two junctions; this causes one junction to become cold and one junction to become hot. The potential difference between the two conductors creates an electric field at each junction; when a current is then applied to the circuit the charge flows against the direction of the electric field at one junction, causing it to absorb heat, and with the direction of the electric field at the other junction, causing it to release heat. In thermoelectric coolers, a number of these circuits (known as couples) are connected together, in series, and sandwiched between ceramic plates, then connected to a heatsink and fan. On the cool box, the cold side of the thermoelectric cooler is attached to the aluminum liner and the heatsink and fan are installed on the insulating outer layer.

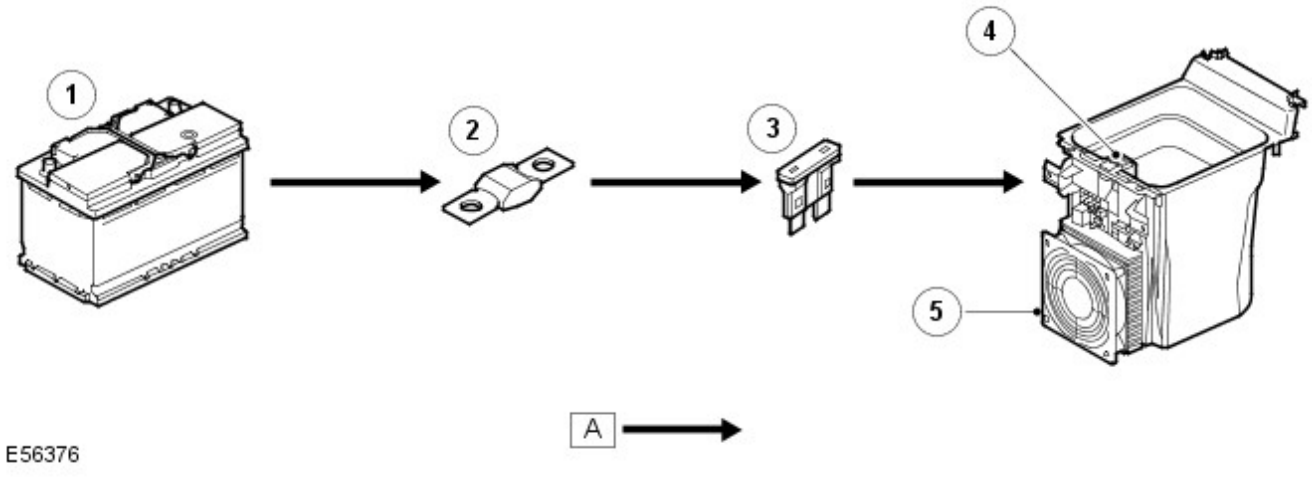
Peltier Effect Circuit



Item	Part Number	Description
1	-	Conductor material A
2	-	Hot junction
3	-	Conductor material B
4	-	Battery
5	-	Cold junction

When the on/off switch is selected on, the LED in the switch illuminates and power is supplied to the thermoelectric cooler. The couples in the thermoelectric cooler then transfer heat from the liner of the cool box to the heatsink, and the fan runs to cool the heatsink.

COOL BOX CONTROL DIAGRAM



Item	Part Number	Description
1	-	Battery

2	-	Fusible link 18E, battery junction box (BJB)
3	-	Fuse 59P, CJB
4	-	Cool box on/off switch
5	-	Thermoelectric cooler

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Instrument Panel and Console - Floor Console

Description and Operation

For additional information, refer to: Instrument Panel (501-12, Description and Operation).

Published: 11-May-2011

Instrument Panel and Console - Overhead Console

Description and Operation

For additional information, refer to: Interior Lighting (417-02, Description and Operation).

Published: 11-May-2011

Instrument Panel and Console - Cool Box

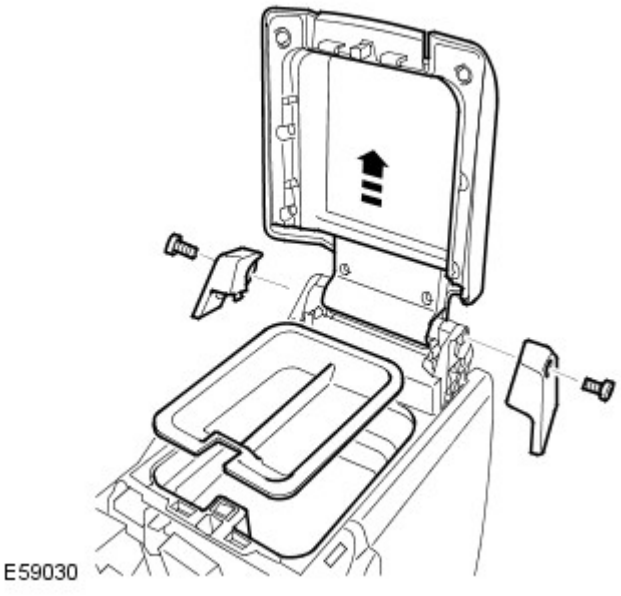
Removal and Installation

Removal

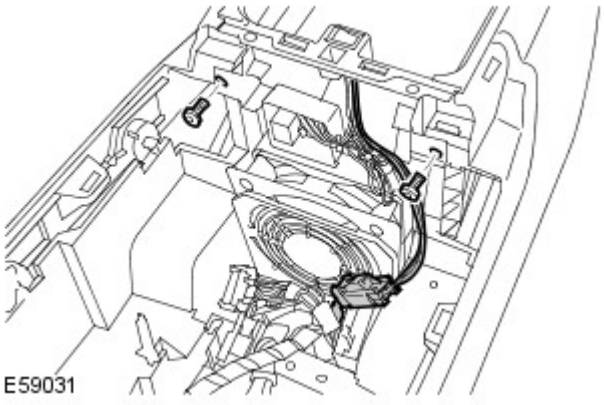
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Remove the floor console upper panel.
   For additional information, refer to: Floor Console Upper Panel (501-12, Removal and Installation).

3. Remove the floor console lid.
   - Open the lid.
   - Remove the 2 Torx bolts.
   - Remove the 2 covers.



4. Remove the floor console cool box.
   - Remove the 2 Torx screws.
   - Disconnect the electrical connector.



Installation

1. Install the floor console cool box.
   - Connect the electrical connector.
   - Tighten the screws.

2. Install the floor console lid.
   - Install the covers.
   - Tighten the Torx bolts to 3 Nm (2 lb.ft).

3. Install the floor console upper panel.
   For additional information, refer to: Floor Console Upper Panel (501-12, Removal and Installation).

4. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

Published: 11-May-2011

Instrument Panel and Console - Floor Console

Removal and Installation

Removal

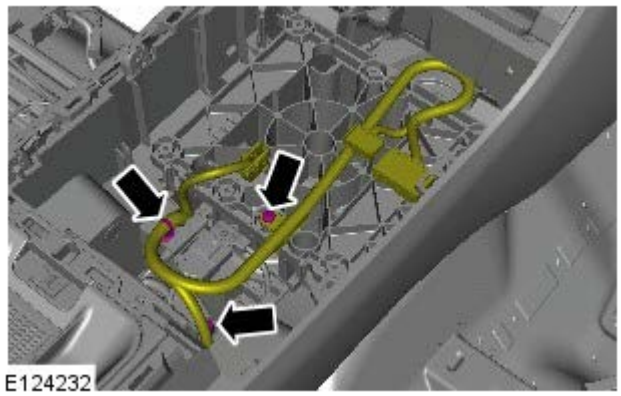
NOTES:

Removal steps in this procedure may contain installation details.

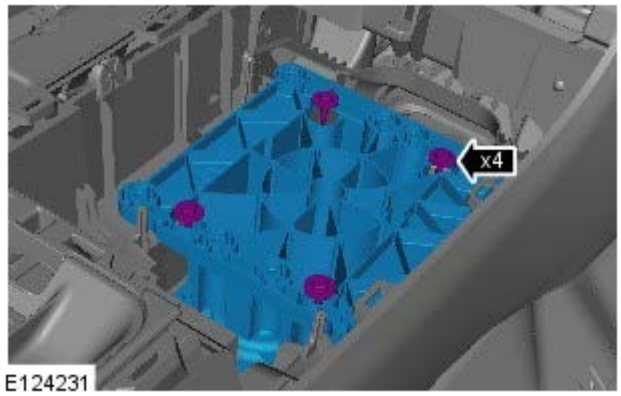
Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: Selector Lever Assembly (307-05B, Removal and Installation).

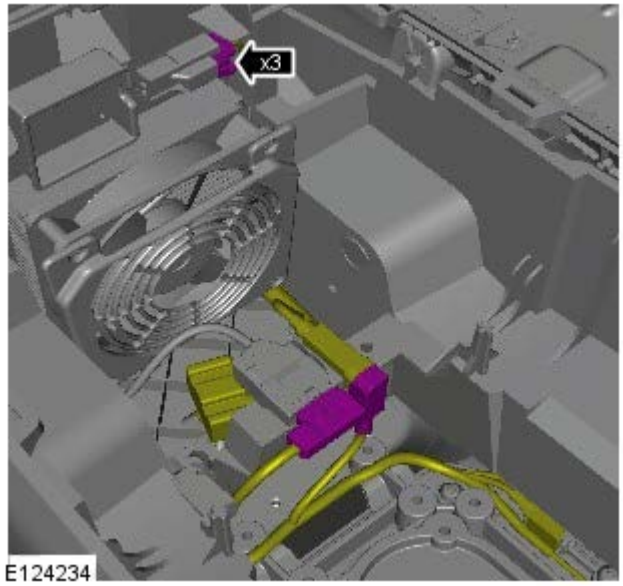
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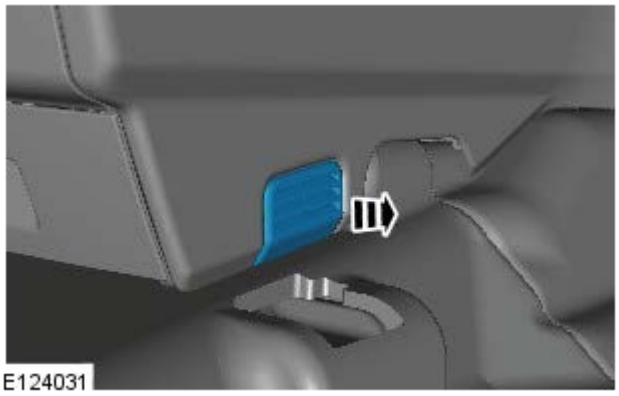
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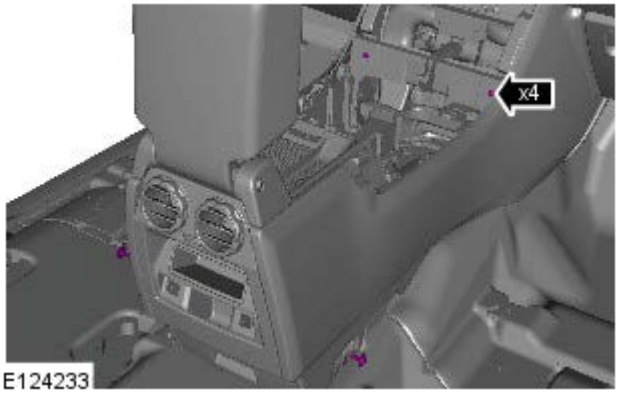
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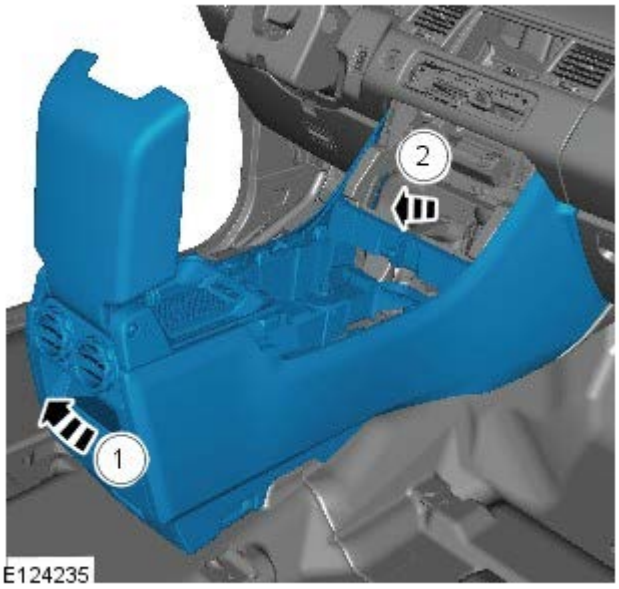
5. NOTE: Right-hand shown, left-hand similar.



6.



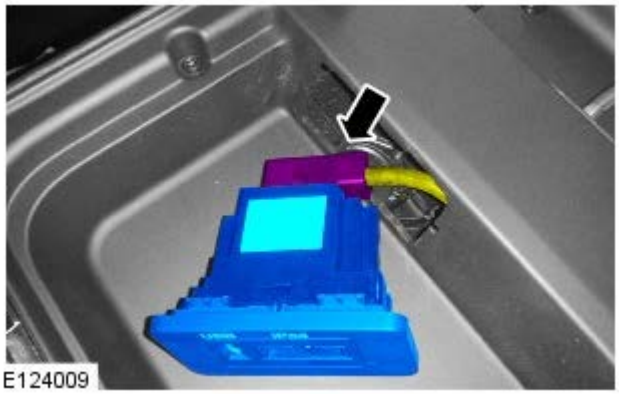
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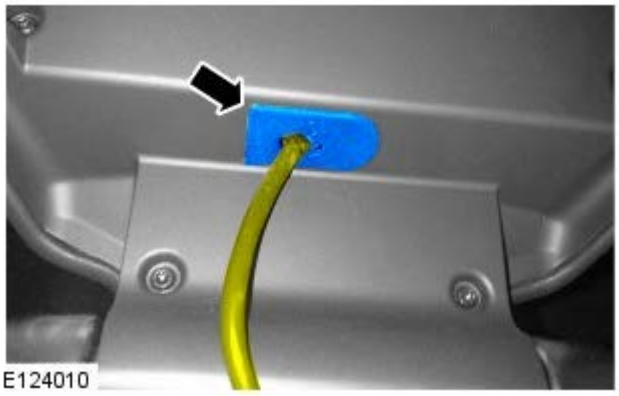
8. NOTE: Do not disassemble further if the component is removed for access only.



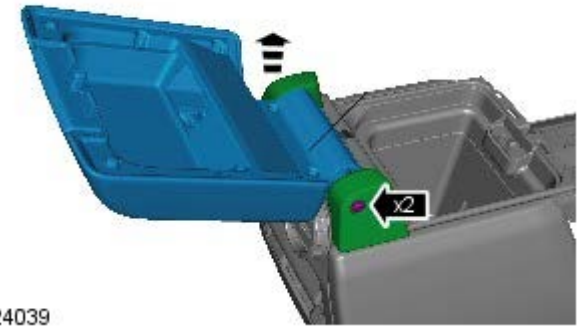
9.


E124009

10.

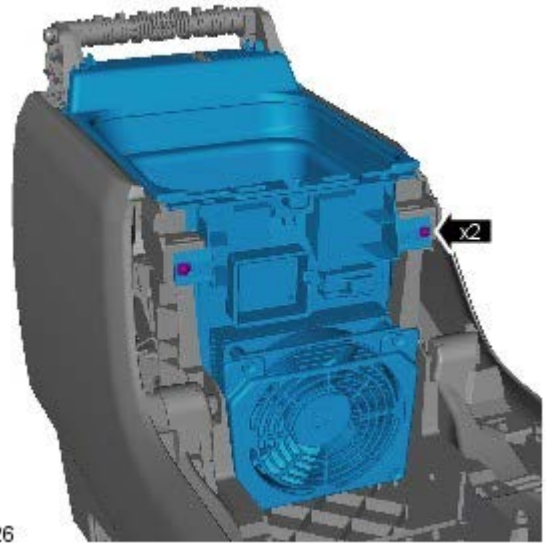

E124010

11.



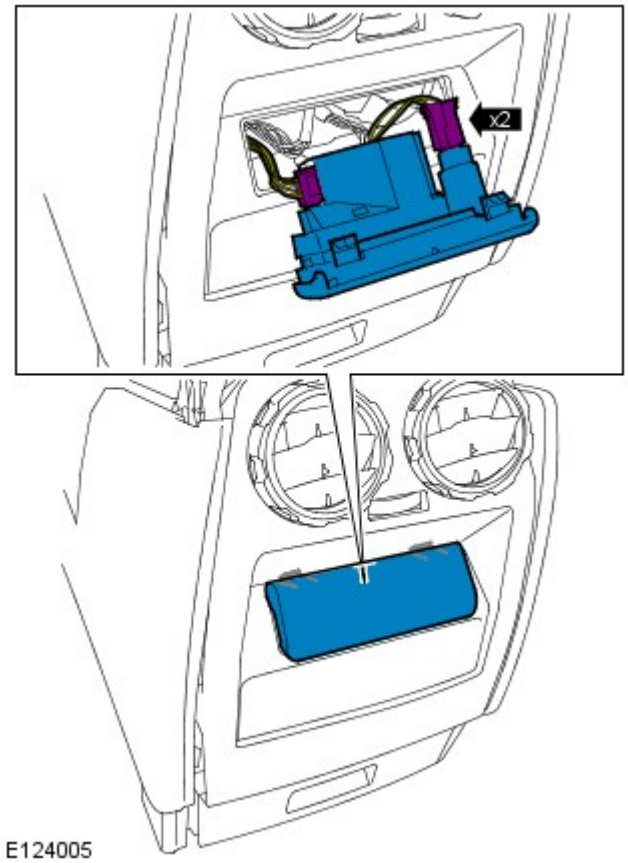
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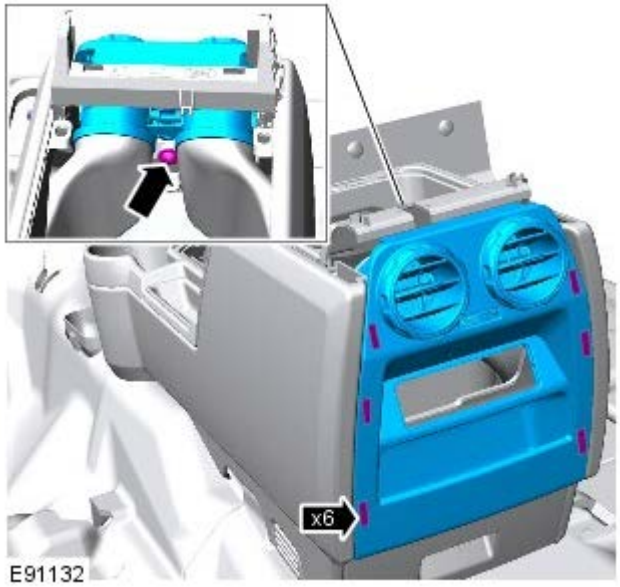


E124026

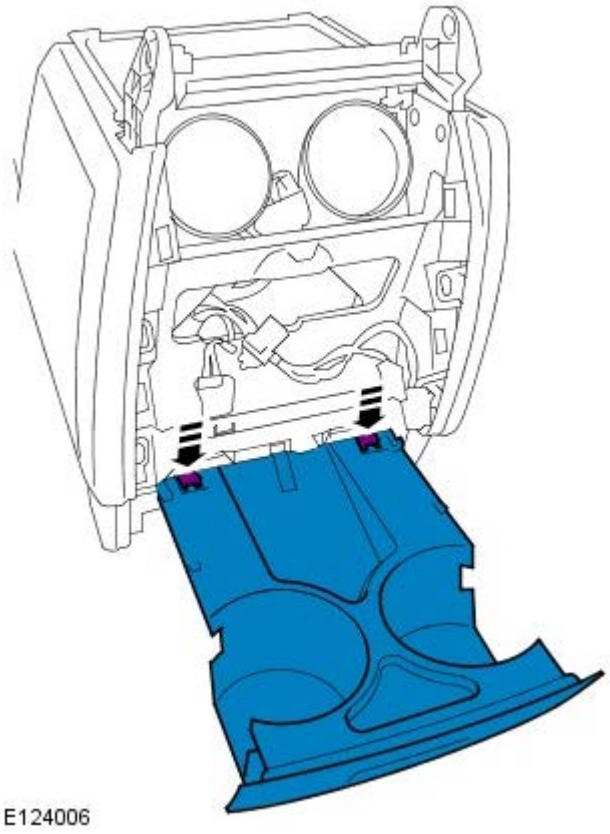
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14.

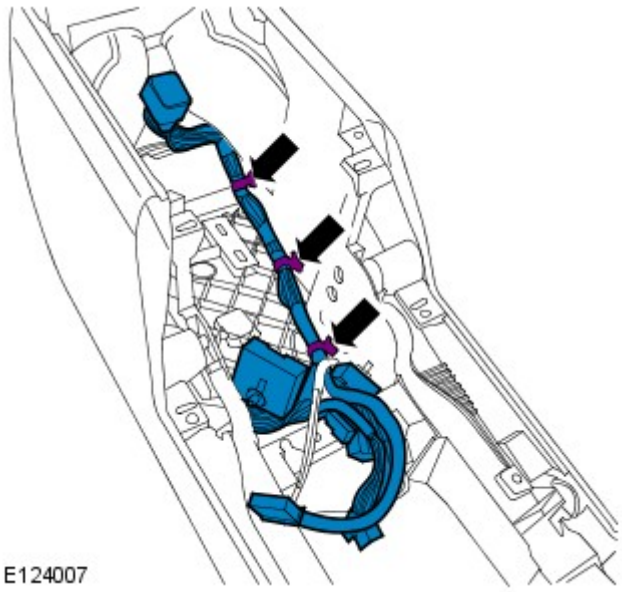


15.



E124006

16.



E124007

Installation

1. To install, reverse the removal procedure.

Published: 30-Sep-2011

Instrument Panel and Console - Floor Console Upper Section

Removal and Installation

Removal

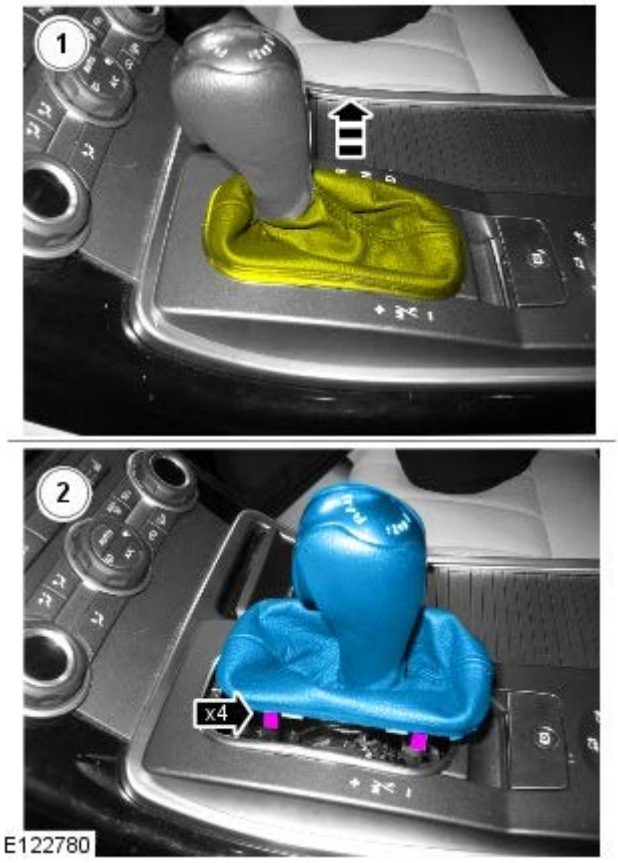
NOTES:

Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

Vehicles with 6 speed automatic transmission

1.



All vehicles

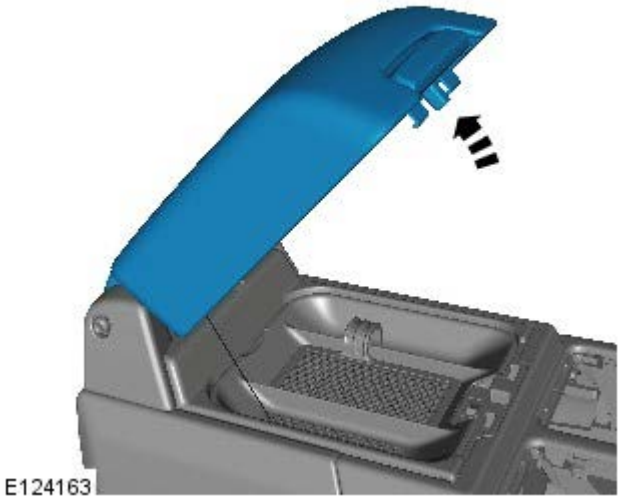
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3.

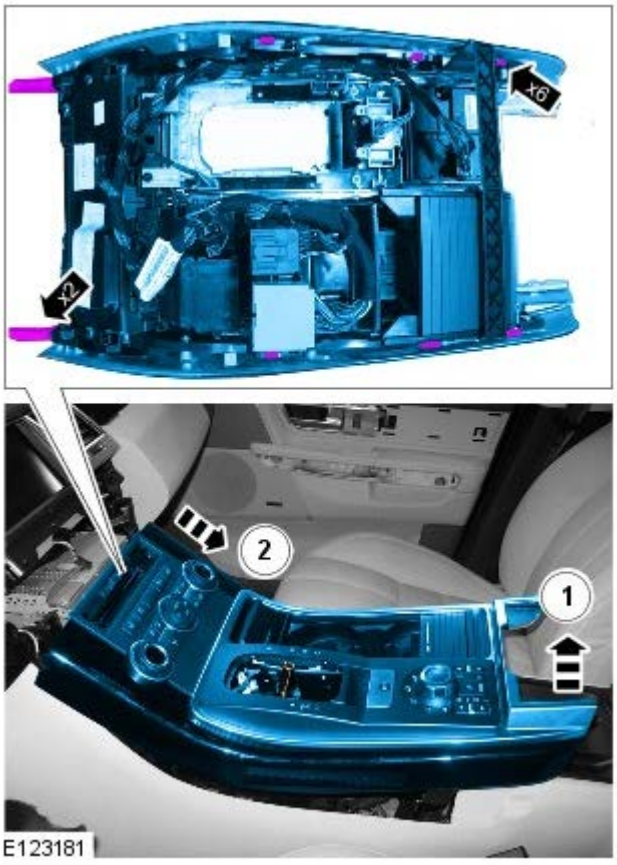


4.



Vehicles with 6 speed automatic transmission

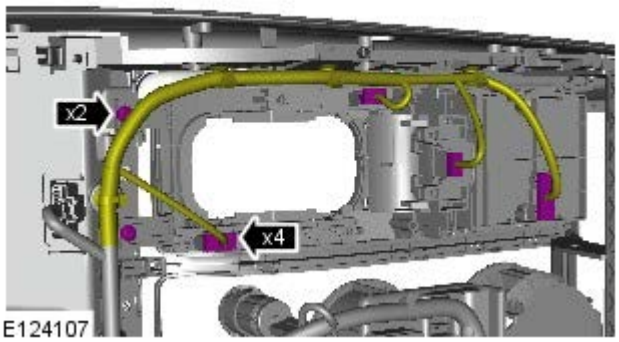
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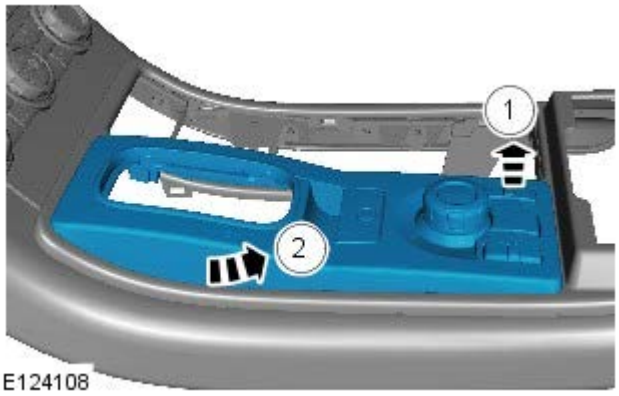
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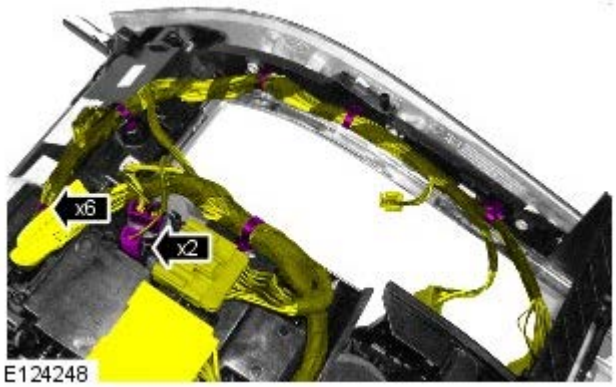
7. NOTE: Do not disassemble further if the component is removed for access only.



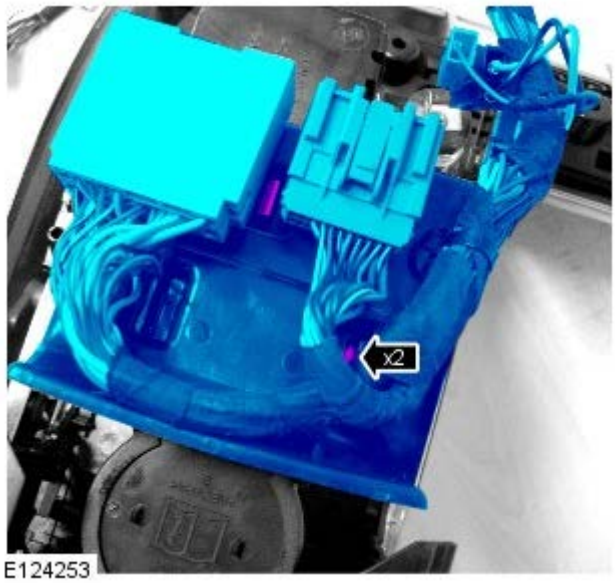
8.



9.

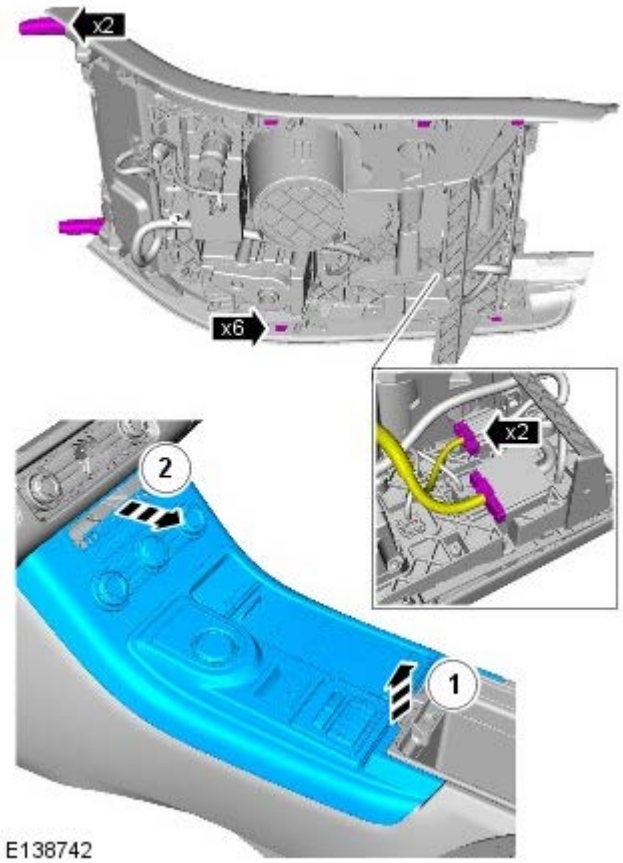


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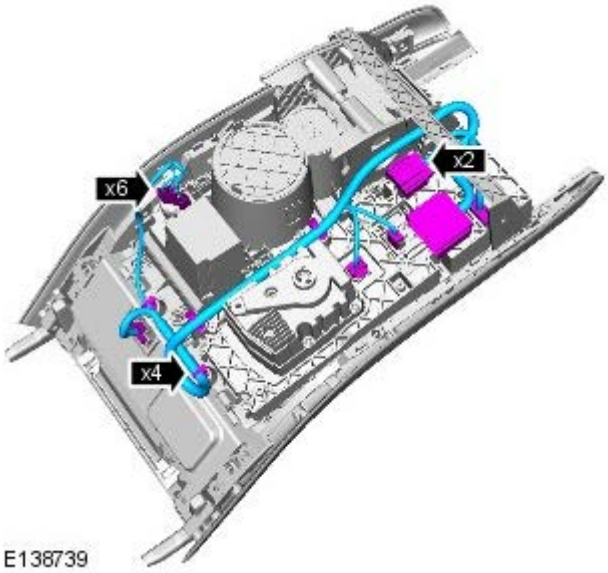
Vehicles with 8 speed automatic transmission

11.



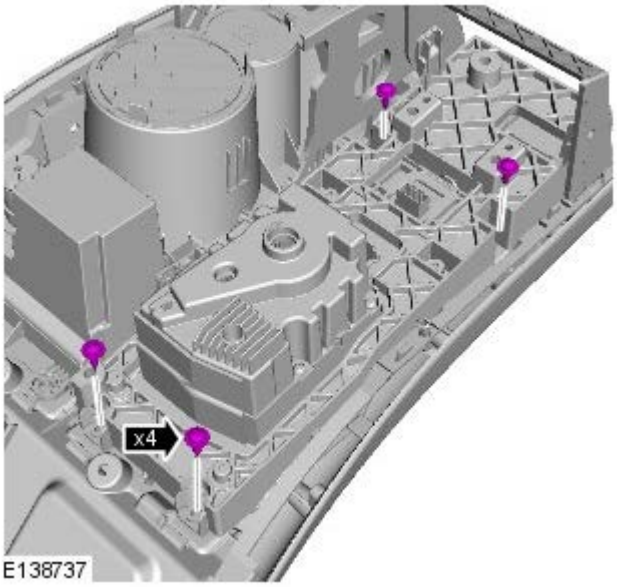
E138742

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

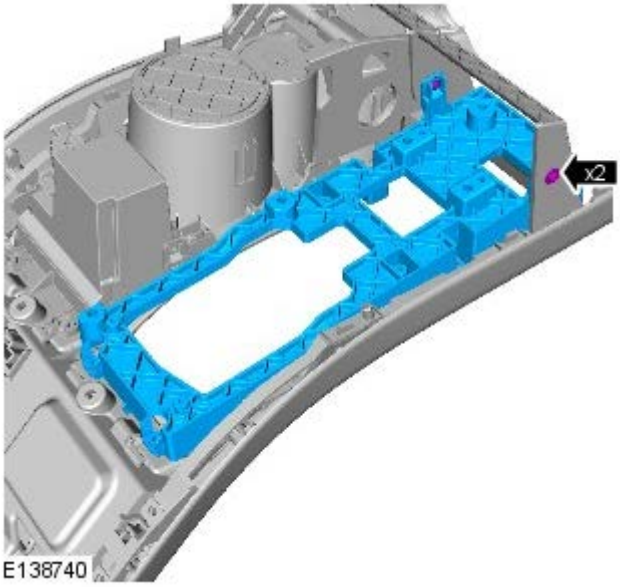


E138739

13.



14. NOTE: Transmission Control Switch (TCS) shown removed for clarity.



15.

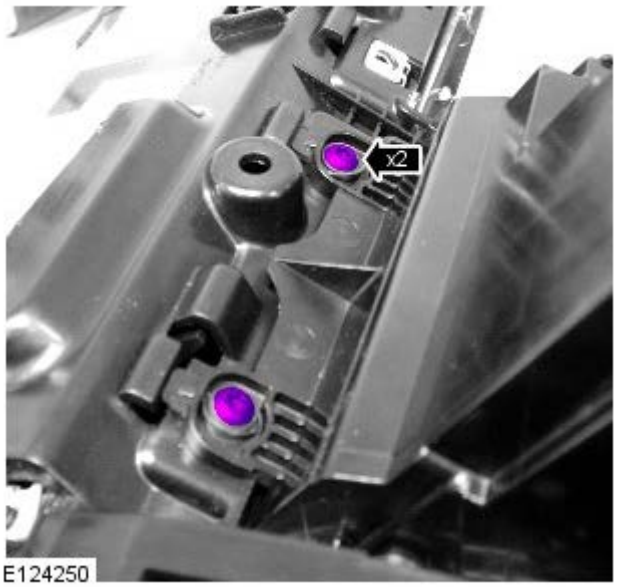


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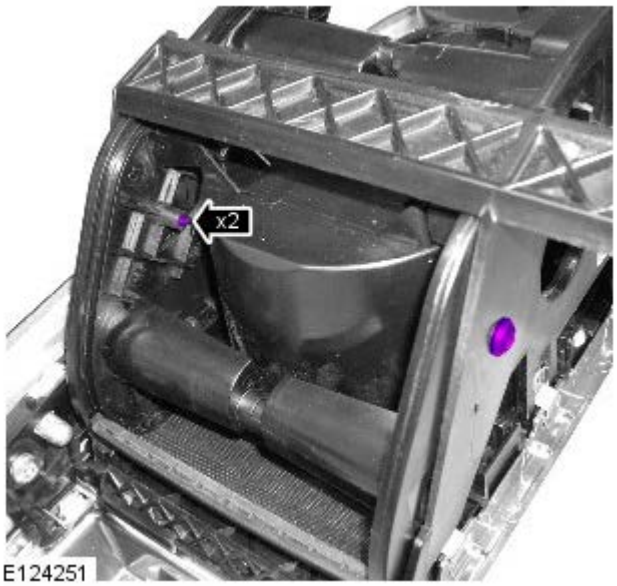


All vehicles

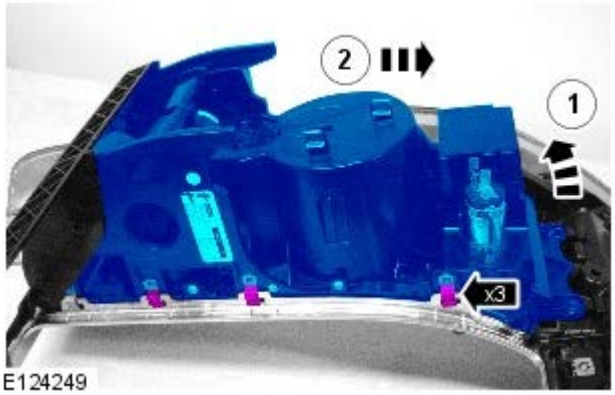
17.



18.

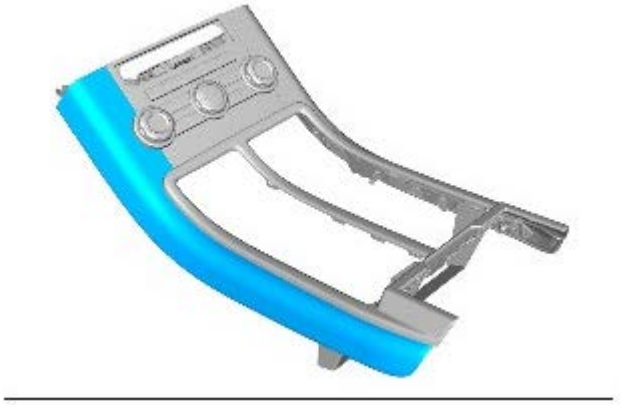


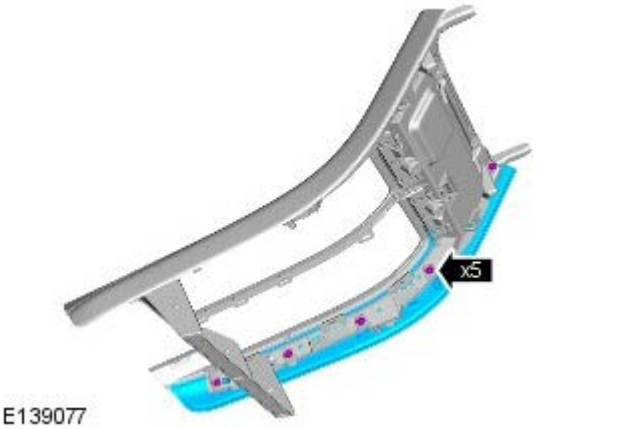
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E124249

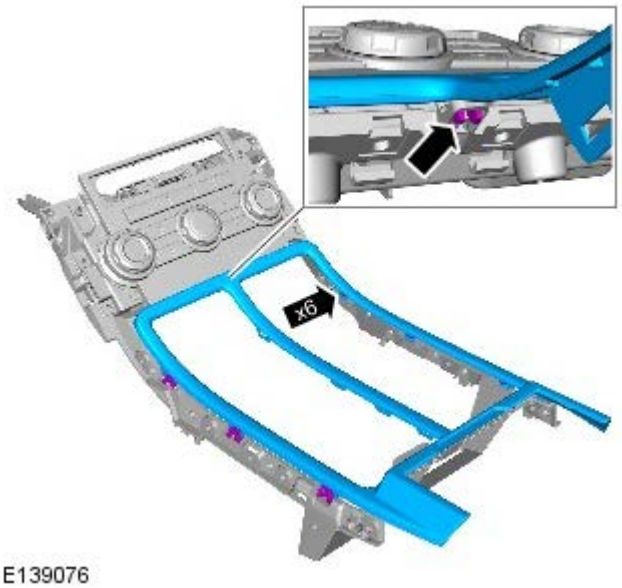
20. NOTE: Left-hand shown, right-hand similar.





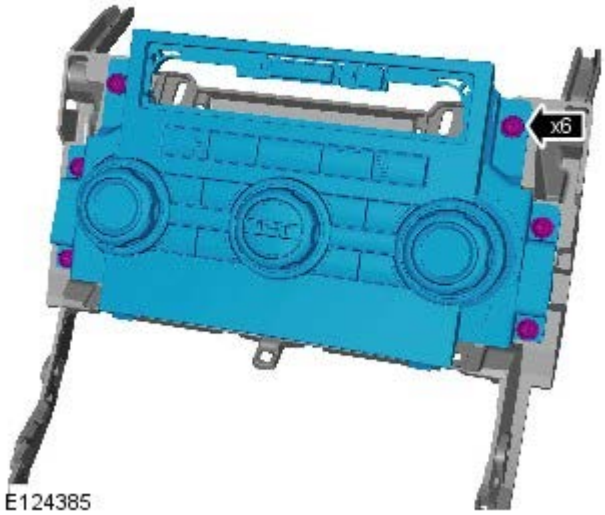
E139077

21.



E139076

22.



Installation

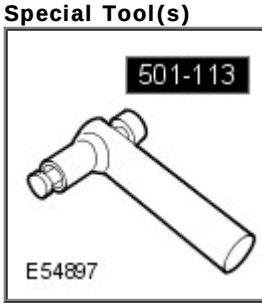
1. To install, reverse the removal procedure.

Published: 11-May-2011

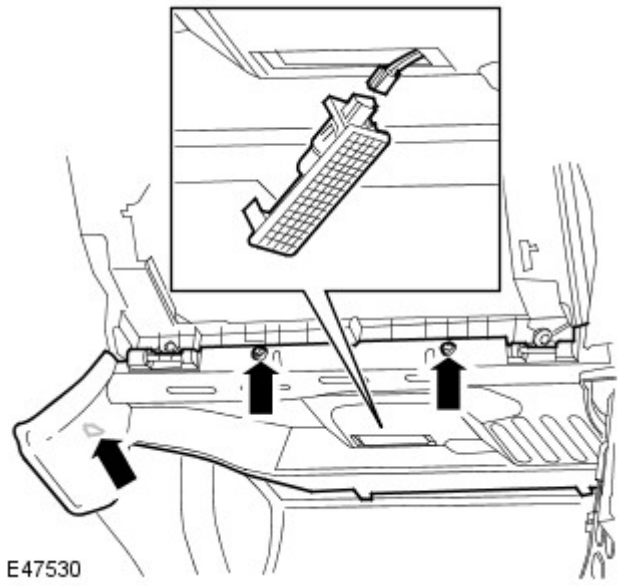
Instrument Panel and Console - Glove Compartment

Removal and Installation

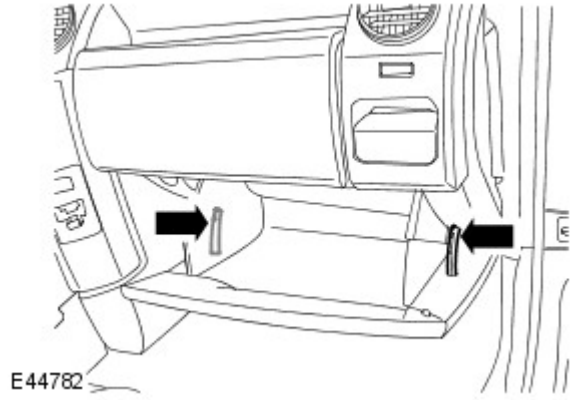
Special Tool(s)

	Glove compartment hinge pin remover 501-113

Removal



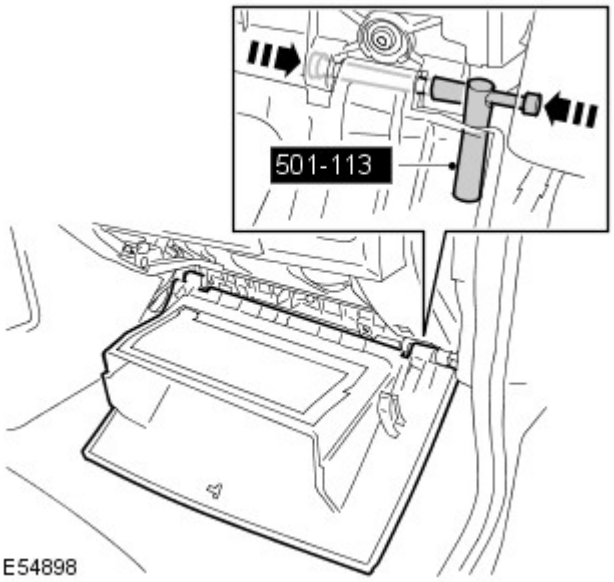
1. Remove the closing trim panel.
   - Release the clip.
   - Remove the 2 screws.
   - Disconnect the electrical connector.



2. Open the glove compartment to the service condition.
   - Release the glove compartment latch stops.

3. CAUTION: If the hinge pin will not release, rotate the pin through 90 degrees to aid removal.

   Using the special tool, remove the glove compartment.
   - Apply pressure to the head of the hinge pin and install the special tool. Remove the hinge pin.
   - Repeat the above procedure for the remaining hinge pin.



Installation

1. Install the glove compartment.
    - Install the hinge pins.

2. Close the glove compartment.
    - Secure the latch stops.

3. Install the closing trim panel.
    - Connect the electrical connector.
    - Secure the clip.
    - Tighten the screws.

Published: 21-Nov-2013

Instrument Panel and Console - Instrument Panel

Removal and Installation

Removal

NOTE: **Some variation in the illustrations may occur, but the essential information is always correct.**

1. Remove the engine cover.
   For additional information, refer to: Engine Cover - V6 4.0L Petrol (501-05 Interior Trim and Ornamentation, Removal and Installation) /
   Engine Cover - V8 5.0L Petrol (501-05 Interior Trim and Ornamentation, Removal and Installation) /
   Engine Cover - 2.7L V6 - TdV6 (501-05 Interior Trim and Ornamentation, Removal and Installation) /
   Engine Cover - TDV6 3.0L Diesel (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Evacuate the air conditioning (A/C) system.
   For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

3. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

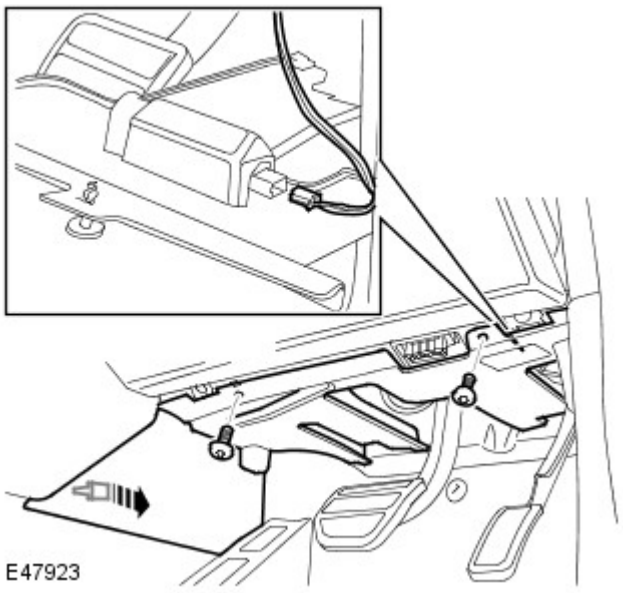
   Raise and support the vehicle.

4. Drain the cooling system.
   For additional information, refer to: Cooling System Draining, Filling and Bleeding (303-03 Engine Cooling - TDV6 2.7L Diesel, General Procedures) /
   Cooling System Draining, Filling and Bleeding (303-03 Engine Cooling - TDV6 3.0L Diesel, General Procedures) /
   Cooling System Draining, Filling and Bleeding (303-03C, General Procedures) /
   Cooling System Partial Draining, Filling and Bleeding (303-03B, General Procedures).

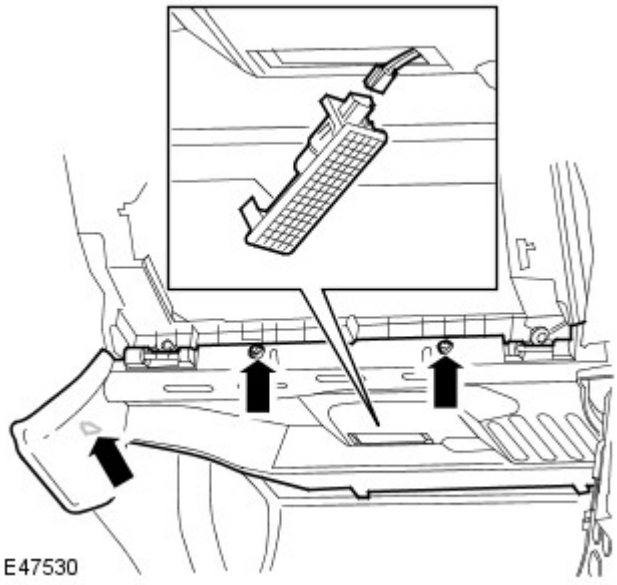
5. Remove the floor console.
   For additional information, refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).

6. Remove both cowl side trim panels.
   For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

7. Remove the driver side closing trim panel.
   - Release the clip.
   - Remove the 2 screws.
   - Disconnect the electrical connector.

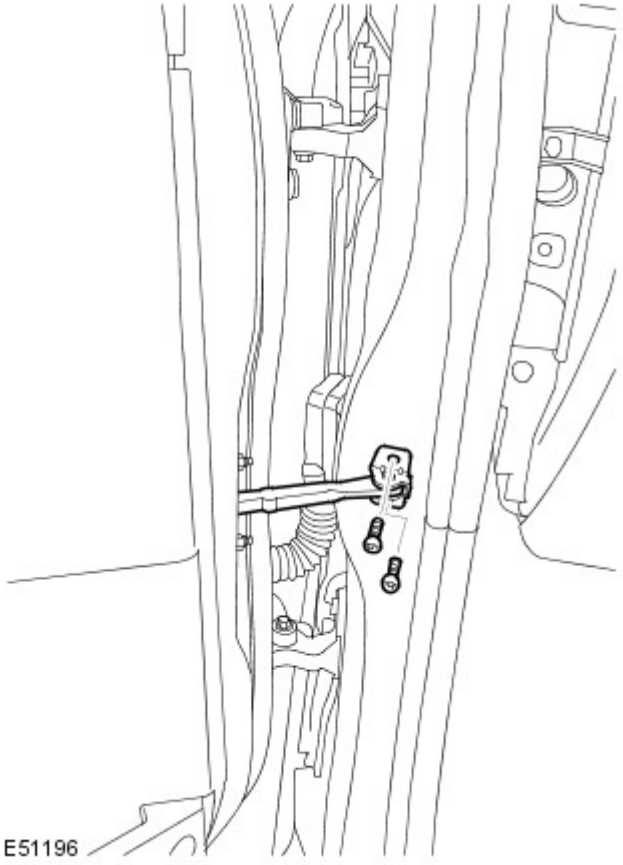


8. Remove the passenger side closing trim panel.
   - Release the clip.
   - Remove the 2 screws.



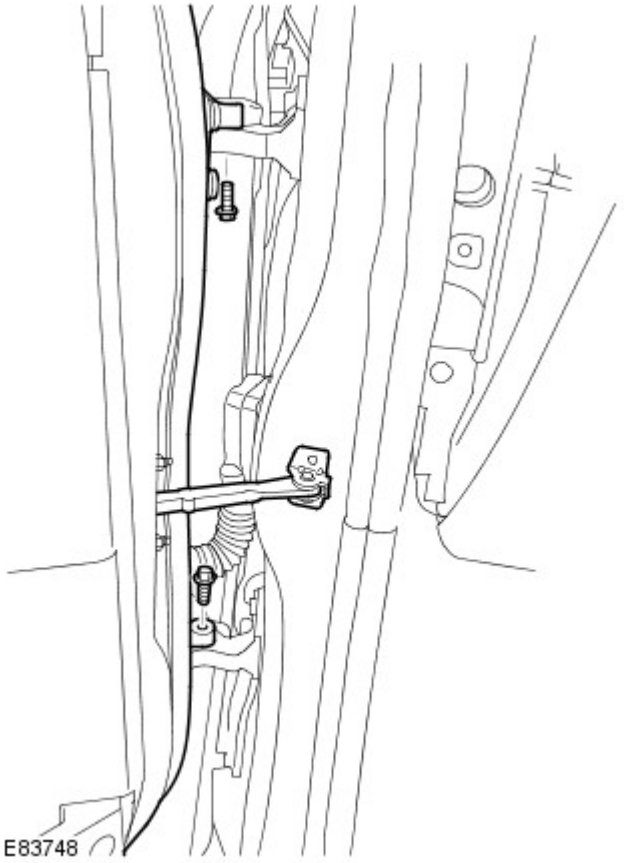
- Disconnect the electrical connector.

9. Release the door check strap from the A-pillar.
   - Remove the 2 Torx bolts.

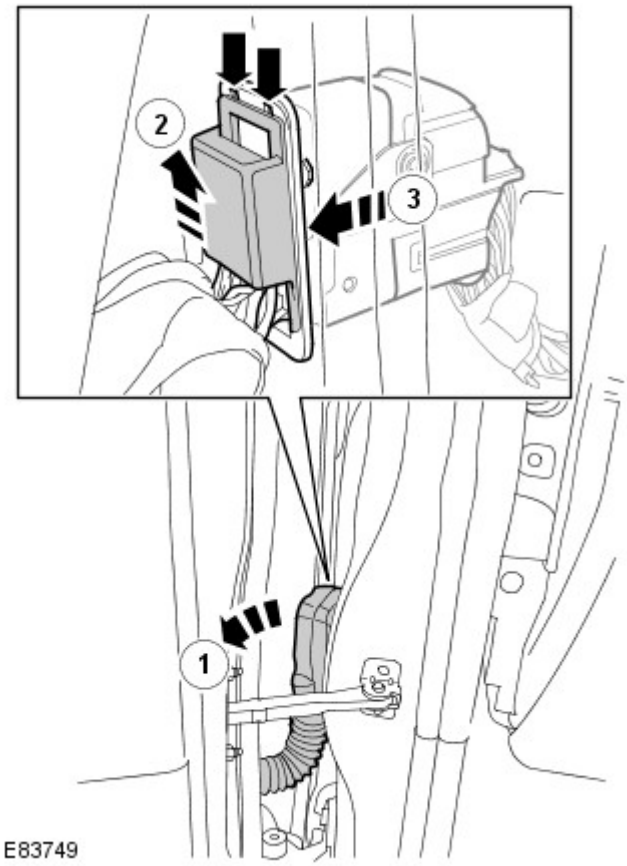


10. NOTE: The door is still attached by its harness at this stage.

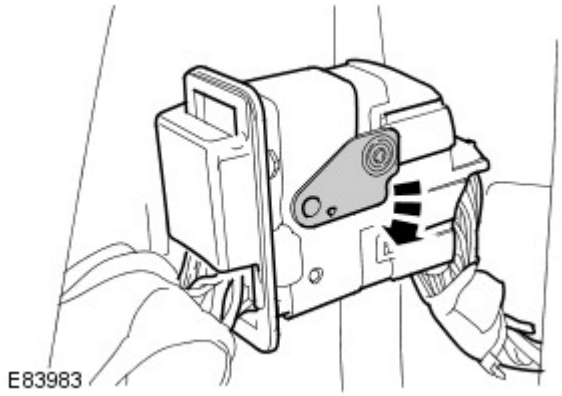
    With assistance, release and support the door assembly.
    - Remove the 2 bolts.



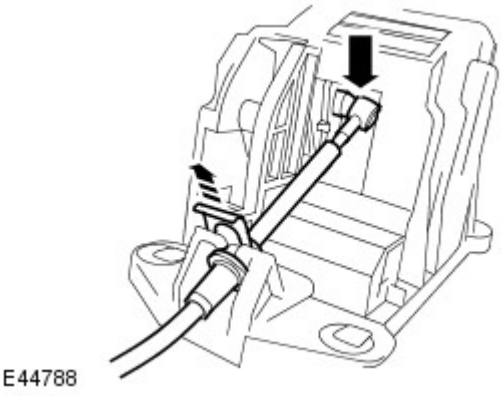
11. Release the electrical connector from the A-Pillar.
    - Release the grommet.
    - Carefully release, then slide the latch to locate in the indents, arrowed.



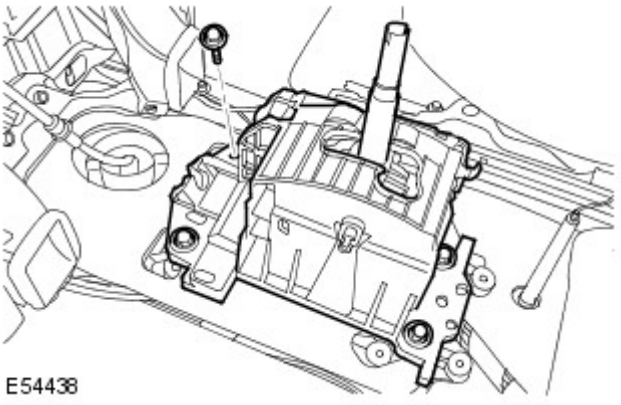
12. Remove the door.
    - Disconnect the electrical connector.



13. Remove the front seats.
    For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).



14. Release the transmission selector lever cable.
    - Remove the clip.
    - Release the cable.

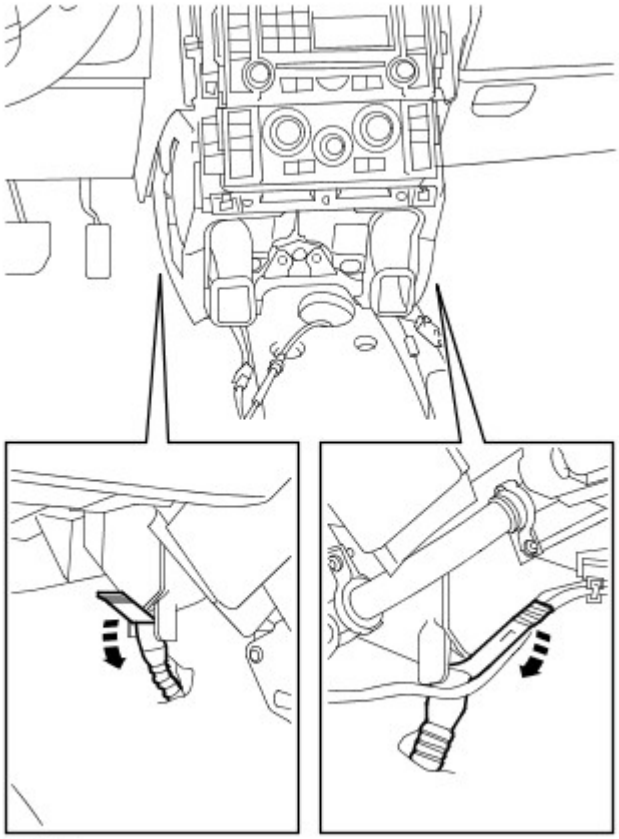


15. Remove the transmission selector lever.
    - Remove the 4 bolts.

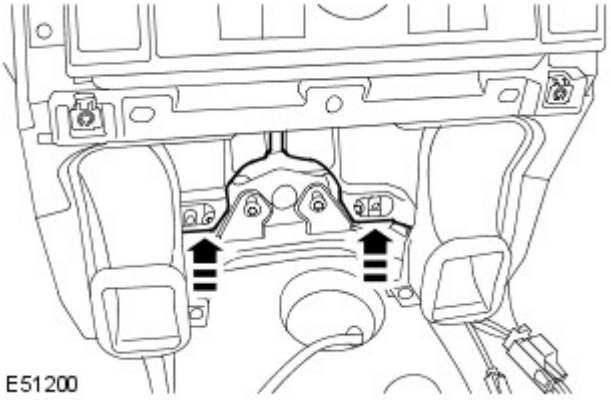


16. Disconnect the steering column intermediate shaft from the steering column.
    - Note the fitted position.
    - Remove the special bolt and discard the nut.

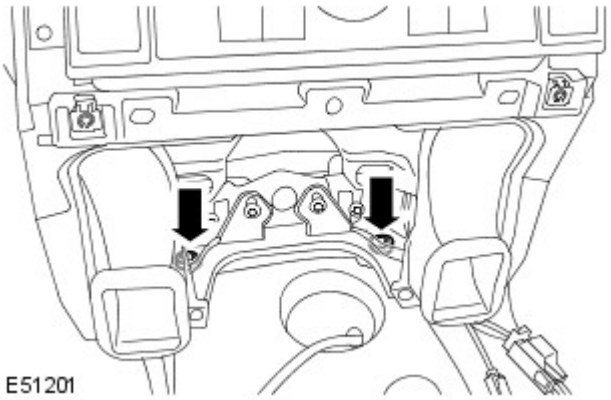
17. Disconnect 2 drain tubes from the heater housing.


E51199

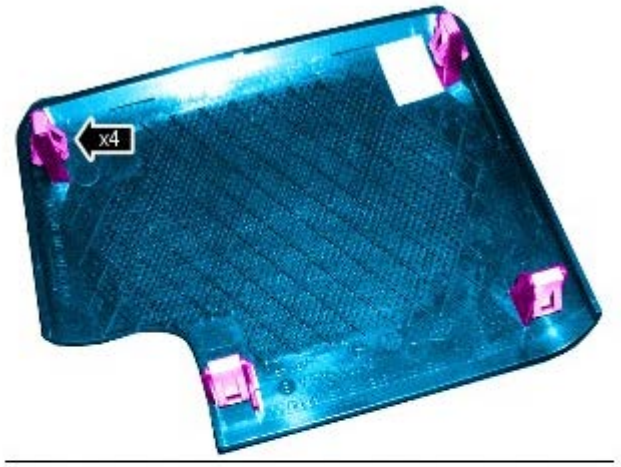
18. Position the heater housing center ducts aside for access.

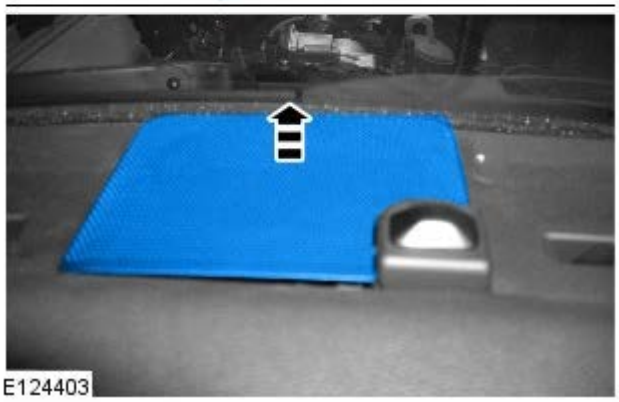

E51200

19. Remove 2 Torx bolts from the instrument panel center bracket.

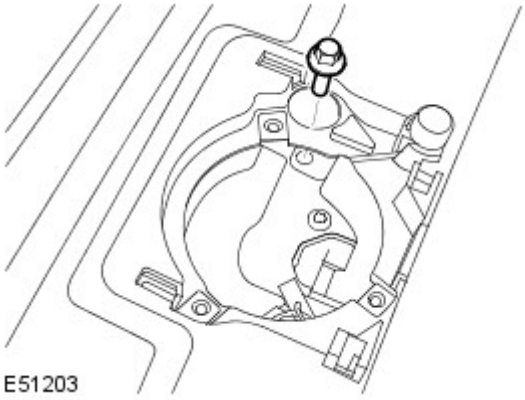

E51201

20. Remove the instrument panel center speaker grille.
    - Release the 4 clips.



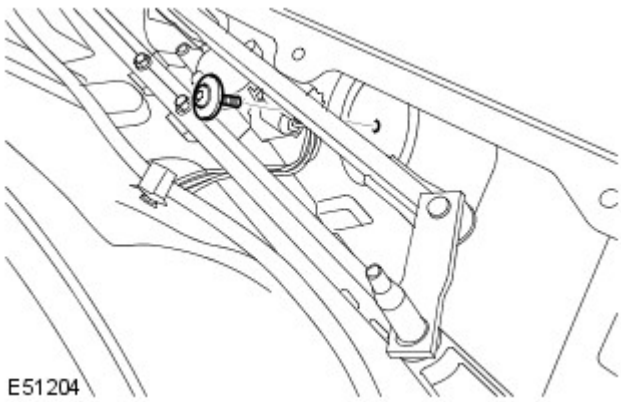


21. Remove the instrument panel upper section to body bolt.



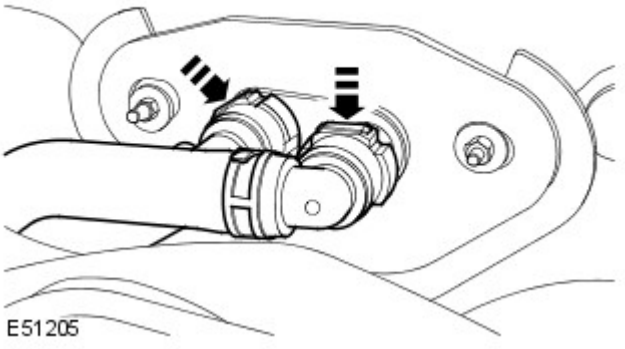
22. Remove the plenum chamber panel.
For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).

23. Remove the instrument panel carrier to bulkhead Torx bolt.



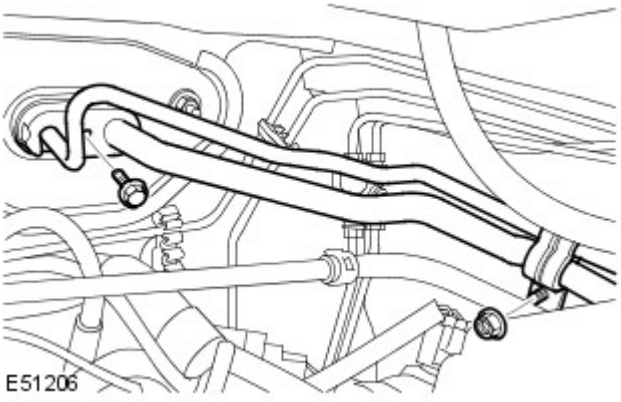
24. CAUTION: Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

Disconnect 2 heater hoses from the bulkhead.



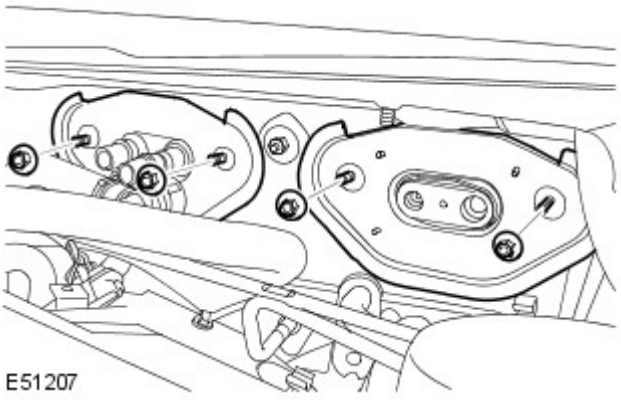
- Release the 2 clips.

25. Release 2 A/C lines from the body.
    - Remove the nut.

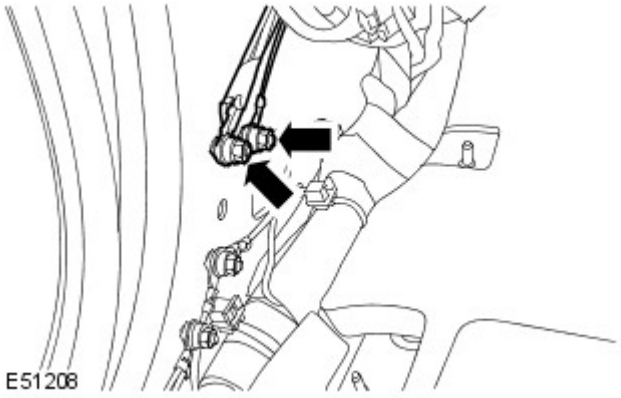


26. CAUTION: Immediately cap all refrigerant lines to prevent ingress of dirt and moisture.

    Release 2 A/C lines from the bulkhead.
    - Remove the bolt.
    - Remove and discard the O-ring seals.

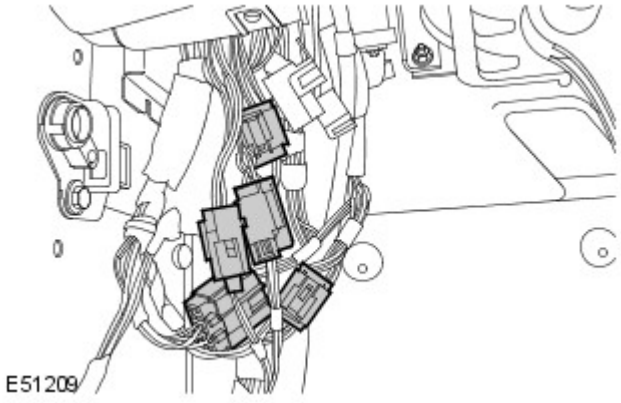


27. Remove the 2 adapter panels.
    - Remove the 4 nuts.

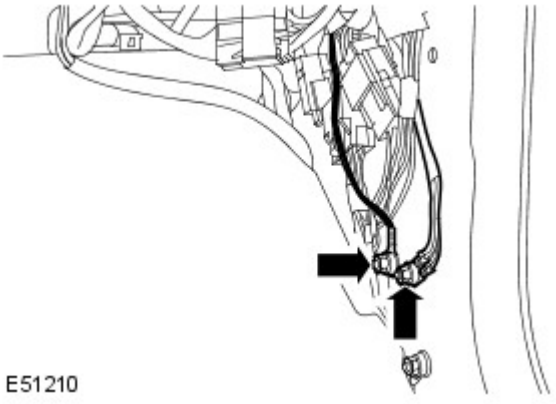


28. Release the 3 ground cables from the driver side lower A-pillar.
    - Remove the 2 nuts.

29. Disconnect the 5 electrical connectors from the driver side lower A-pillar.

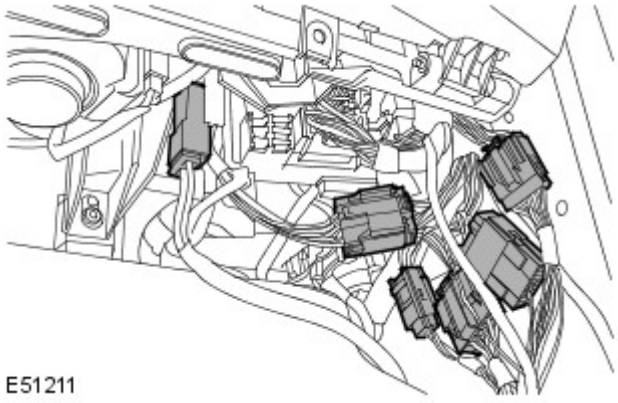

E51209

30. Release the 3 ground cables from the passenger side lower A-pillar.
    - Remove the 2 nuts.

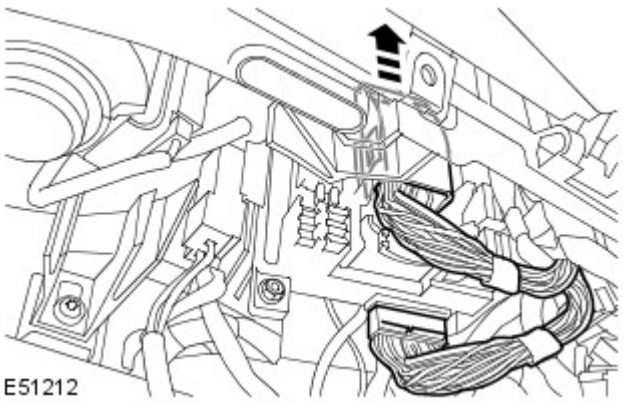

E51210

31. Disconnect the 5 electrical connectors from the passenger side lower A-pillar.

32. Disconnect the heater motor electrical connector.


E51211

33. Disconnect 2 central junction box (CJB) electrical connectors.


E51212

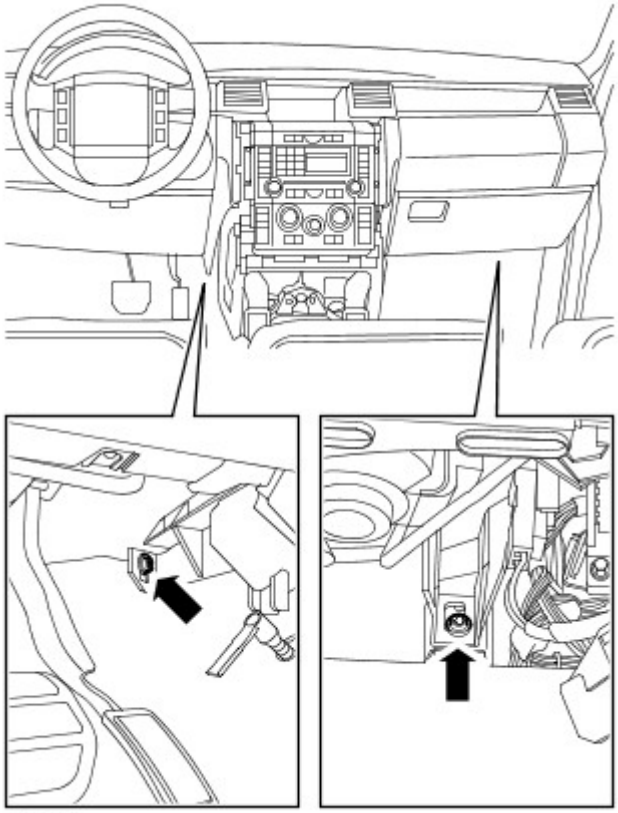
34. Disconnect 2 electrical connectors from the instrument panel center reinforcement.

35. If installed, disconnect the instrument panel center reinforcement fibre optic cables.
    - Disconnect the electrical connector.

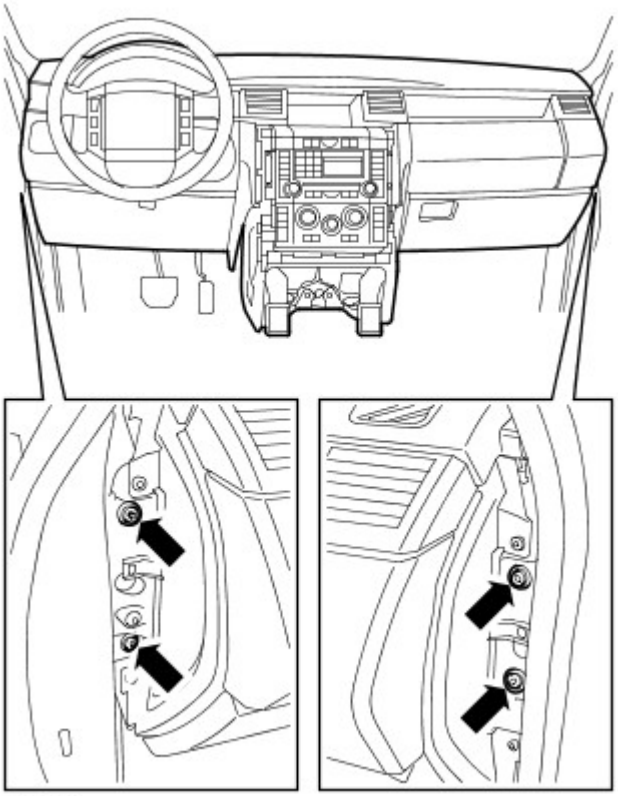


36. Driver side: Remove the heater housing to bulkhead Torx bolt.

37. Passenger side: Remove the heater housing to bulkhead Torx bolt.



38. With assistance, remove the instrument panel.
    - Remove the 4 Torx bolts.


E51215

Installation

1. With assistance, install the instrument panel.
    - Tighten the Torx bolts to 25 Nm (18 lb.ft).
2. Passenger side: Install the heater housing to bulkhead Torx bolt and tighten to 6 Nm (4 lb.ft).
3. Driver side: Install the heater housing to bulkhead Torx bolt and tighten to 6 Nm (4 lb.ft).
4. Connect the instrument panel center reinforcement fibre optic cables.
5. Connect the instrument panel center reinforcement electrical connectors.
6. Connect the CJB electrical connectors.
7. Connect the heater motor electrical connector.
8. Connect the electrical connectors to the passenger side lower A-pillar.
9. Connect the ground cables to the passenger side lower A-pillar.
    - Tighten the nuts to 10 Nm (7 lb.ft).
10. Connect the electrical connectors to the driver side lower A-pillar.
11. Connect the ground cables to the driver side lower A-pillar.
    - Tighten the nuts to 10 Nm (7 lb.ft).
12. Install the adapter panels.
    - Tighten the nuts to 10 Nm (7 lb.ft).
13. Secure the A/C lines to the bulkhead.
    - Clean the components.
    - Install new O-ring seals.
    - Tighten the bolt to 10 Nm (7 lb.ft).
14. Secure the A/C lines to the body.

Tighten the nuts to 10 Nm (7 lb.ft).

15. Connect the bulkhead heater hoses.

16. Install the instrument panel carrier to bulkhead Torx bolt and tighten to 25 Nm (18 lb.ft).

17. Install the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).

18. Install the instrument panel upper section to body bolt and tighten to 10 Nm (7 lb.ft).

19. Install the speaker grille.
    - Secure with the clips.

20. Install the instrument panel center bracket Torx bolts and tighten to 25 Nm (18 lb.ft).

21. Attach the heater housing center ducts.

22. Connect the drain tubes to the heater housing.

23. Connect the steering column intermediate shaft.
    - Install the special bolt and tighten the new nut to 22 Nm (16 lb.ft).

24. Install the transmission selector lever.
    - Tighten the bolts to 10 Nm (7 lb.ft).

25. Attach the transmission selector lever cable.
    - Install the clip.

26. Install the front seats.
    For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).

27. With assistance, install the door assembly.
    - Connect the electrical connector.
    - Secure the electrical connector.
    - Secure the grommet.
    - Tighten the bolts to 10 Nm (7 lb.ft).

28. Attach the door check strap to the A pillar.
    - Tighten the Torx bolts to 10 Nm (7 lb.ft).

29. Install the driver side closing trim panel.
    - Connect the electrical connector.
    - Secure the clip.
    - Tighten the screws.

30. Install the passenger side closing trim panel.
    - Connect the electrical connector.
    - Secure the clip.
    - Tighten the screws.

31. Install the cowl side trim panels.
    For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

32. Install the floor console.
    For additional information, refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).

33. Refill the cooling system.
    For additional information, refer to: Cooling System Draining, Filling and Bleeding (303-03 Engine Cooling - TDV6 2.7L Diesel, General Procedures) /
    Cooling System Draining, Filling and Bleeding (303-03 Engine Cooling - TDV6 3.0L Diesel, General Procedures) /
    Cooling System Draining, Filling and Bleeding (303-03C, General Procedures) /
    Cooling System Partial Draining, Filling and Bleeding (303-03B, General Procedures).

34. Recharge the A/C system.
    For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

35. Install the engine cover.
    For additional information, refer to: Engine Cover - V6 4.0L Petrol (501-05 Interior Trim and Ornamentation, Removal and Installation) /
    Engine Cover - V8 5.0L Petrol (501-05 Interior Trim and Ornamentation, Removal and Installation) /
    Engine Cover - 2.7L V6 - TdV6 (501-05 Interior Trim and Ornamentation, Removal and Installation) /
    Engine Cover - TDV6 3.0L Diesel (501-05 Interior Trim and Ornamentation, Removal and Installation).

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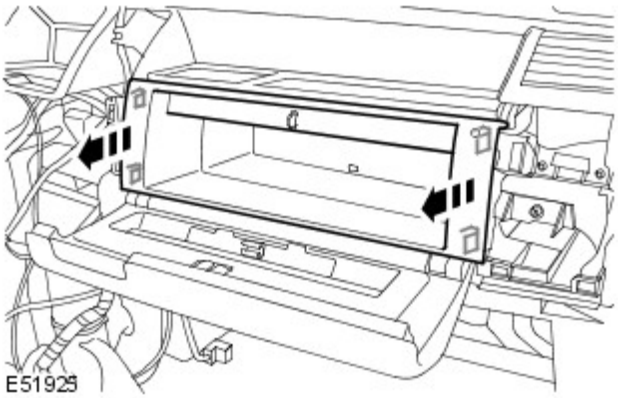
Instrument Panel and Console - Instrument Panel Upper Section

Removal and Installation

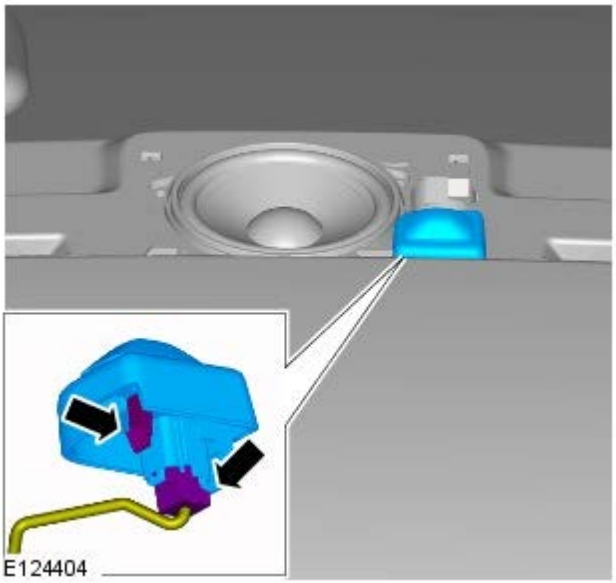
Removal

NOTE: **Some variation in the illustrations may occur, but the essential information is always correct.**

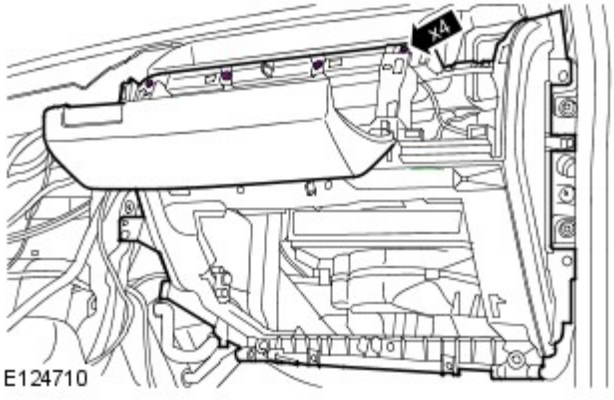
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00 General Information, Description and Operation).
3. Remove the instrument panel driver side reinforcement.
   For additional information, refer to: Instrument Panel Driver Side Reinforcement (501-12, Removal and Installation).
4. Remove the passenger side register trim panel.
   For additional information, refer to: Passenger Side Register Trim Panel (412-01, Removal and Installation).
5. Remove the stowage compartment tray.
   - Release the 4 clips.


E51925

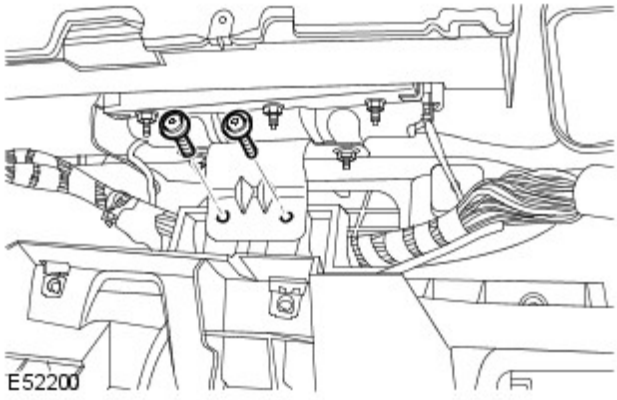
6. Remove the instrument panel speaker.
   For additional information, refer to: Instrument Panel Speaker (415-03 Speakers, Removal and Installation).
7. Remove both A-pillar upper trim panels.
   For additional information, refer to: A-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
8. Remove the sunload sensor.
   - Release the clips.
   - Disconnect the electrical connector.


E124404

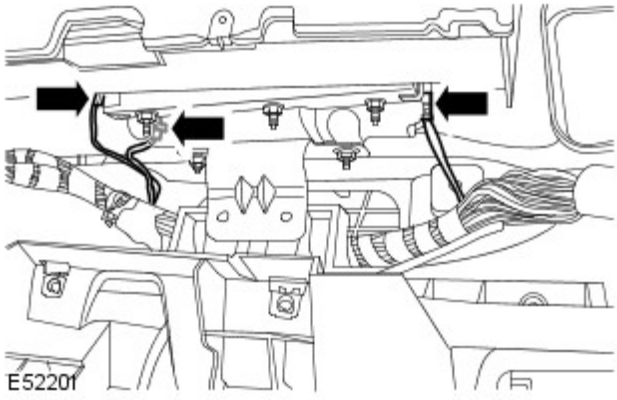
9. Remove the instrument panel passenger side reinforcement upper retaining screws.



10. Release the passenger air bag module bracket.
    - Remove the 2 Torx screws.

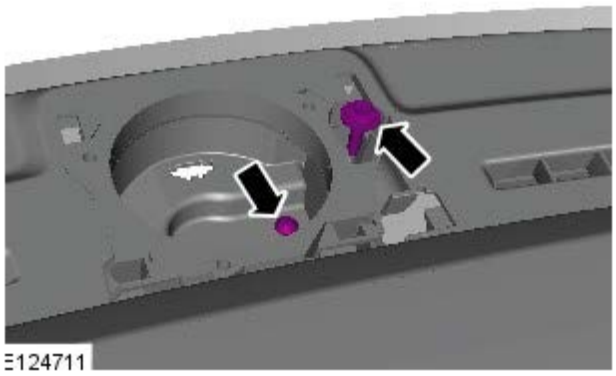


11. Disconnect the 3 electrical connectors from the passenger air bag module.

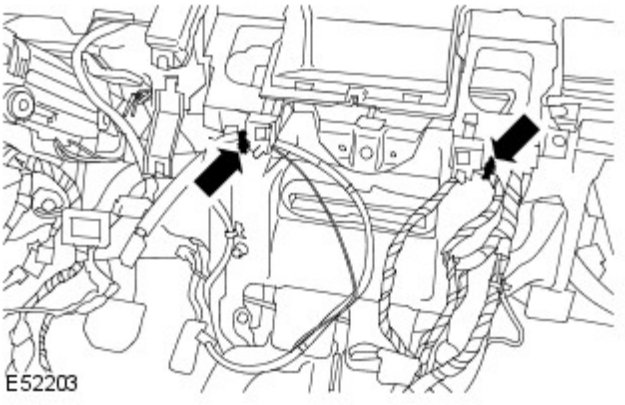


12. NOTE: Avoid dropping the screw inside the instrument panel.

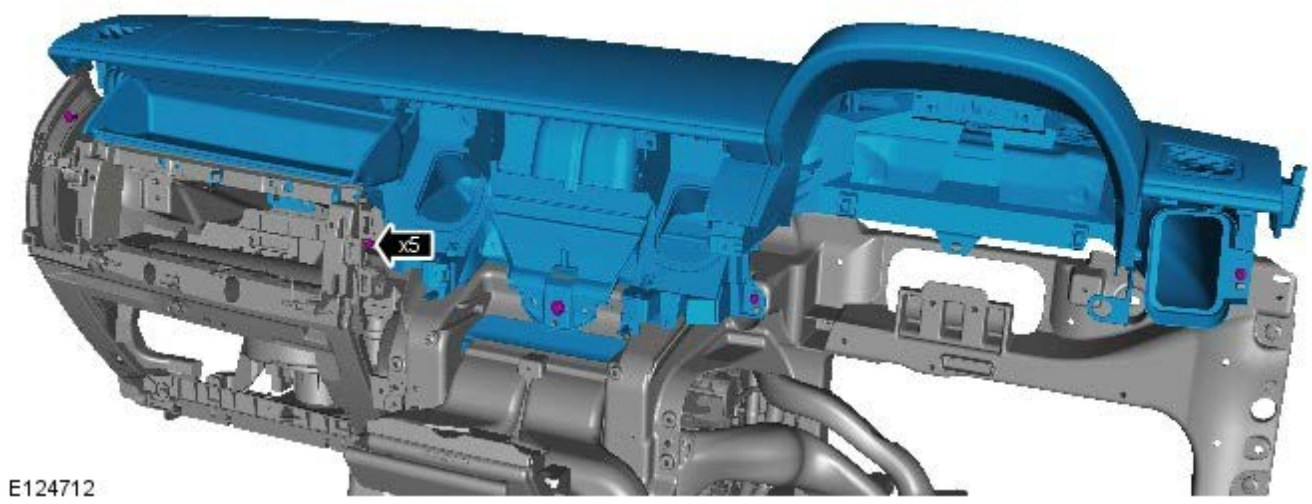
    Remove 1 Torx screw and 1 bolt, from the instrument panel upper section speaker aperture.

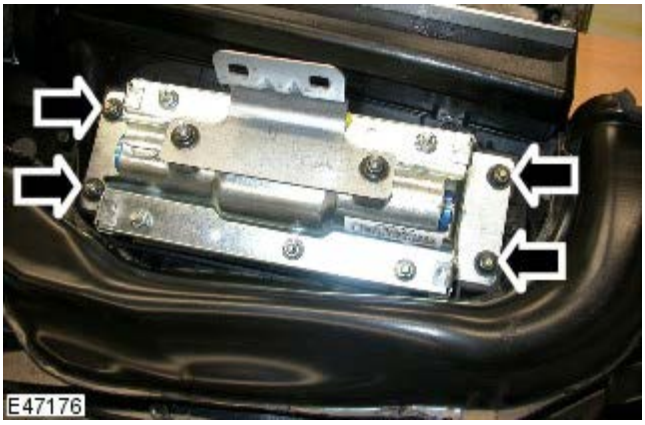


13. Release the instrument panel wiring harness.
    - Release the 2 clips.



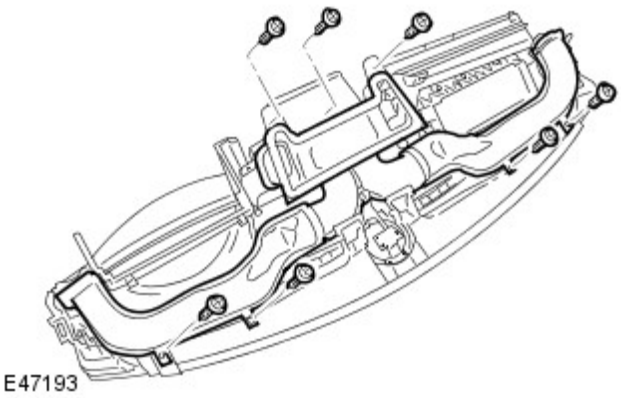
14. With assistance, remove the instrument panel upper section.
    - Remove the 5 Torx screws.





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

    Remove the passenger air bag module.
    - Remove the 4 nuts.



16. Remove the windshield defroster duct.
    - Remove the 7 screws.

Installation

1. Install the windshield defroster duct.
    - Tighten the screws.
2. Install the passenger air bag module.
    - Tighten the nuts to 10 Nm (7 lb.ft).
3. With assistance, install the instrument panel upper section.
    - Tighten the screws.
    - Attach the wiring harness.
4. Tighten the instrument panel upper section speaker aperture bolt to 10 Nm (7 lb.ft).
5. Secure the passenger air bag module bracket.
    - Tighten the Torx screws to 25 Nm (18 lb.ft).
6. Connect the passenger air bag module electrical connectors.
7. Install the instrument panel passenger side reinforcement upper retaining screws.
8. Install the sunload sensor.
    - Connect the electrical connector.
    - Secure with the clips.
9. Install the A-pillar trim panels.
   For additional information, refer to: A-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
10. Install the speaker
    For additional information, refer to: Instrument Panel Speaker (415-03 Speakers, Removal and Installation).
11. Install the stowage compartment tray.
    - Secure the 4 clips.
12. Install the passenger side register trim panel.
    For additional information, refer to: Passenger Side Register Trim Panel (412-01, Removal and Installation).
13. Install the instrument panel driver side reinforcement.
    For additional information, refer to: Instrument Panel Driver Side Reinforcement (501-12, Removal and Installation).
14. Connect the battery ground cable.
    For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

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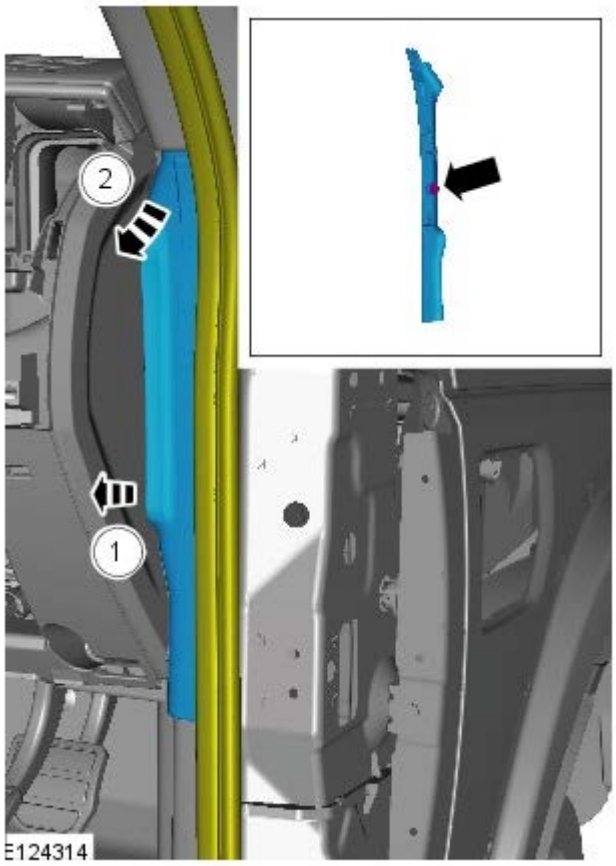
Instrument Panel and Console - Instrument Panel Driver Side Reinforcement

Removal and Installation

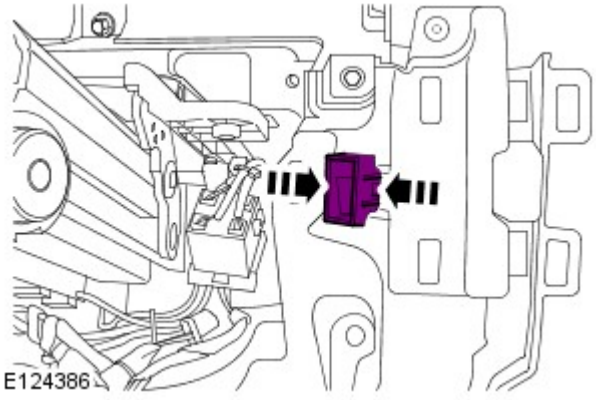
Removal

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

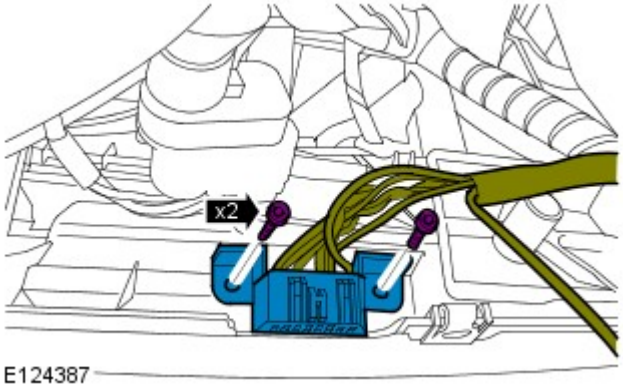
1. Fully extend the steering column for access.
2. Refer to: Steering Wheel (211-04, Removal and Installation).
3. Refer to: Instrument Panel Center Reinforcement (501-12, Removal and Installation).
4. Refer to: Instrument Cluster (413-01, Removal and Installation).
5.

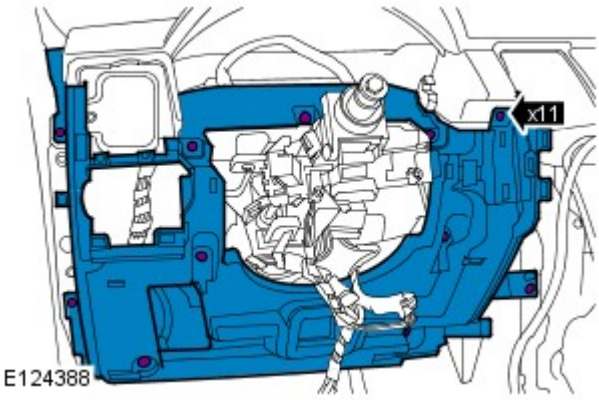


6.



7.





8. NOTE: Left-hand drive shown, right-hand drive similar.

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Instrument Panel and Console - Instrument Panel Passenger Side Reinforcement

Removal and Installation

Removal

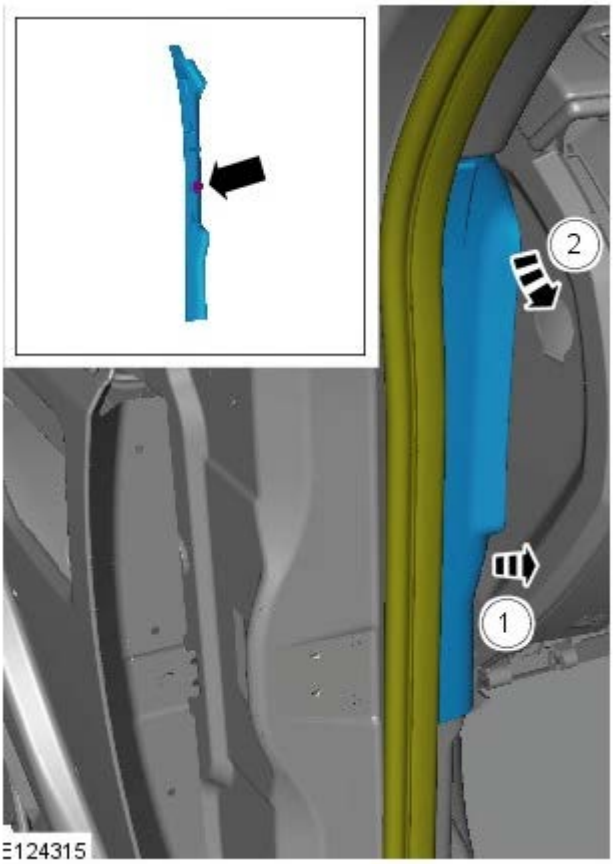
NOTE: **Some variation in the illustrations may occur, but the essential information is always correct.**

1. Remove the PAD switch.
   For additional information, refer to: Passenger Air Bag Deactivation (PAD) Switch (501-20 Supplemental Restraint System, Removal and Installation).

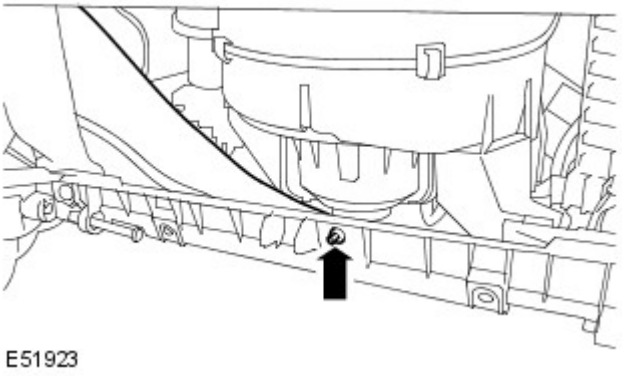
2. Remove the instrument panel center reinforcement.
   For additional information, refer to: Instrument Panel Center Reinforcement (501-12, Removal and Installation).

3. Remove the glove compartment.
   For additional information, refer to: Glove Compartment (501-12 Instrument Panel and Console, Removal and Installation).

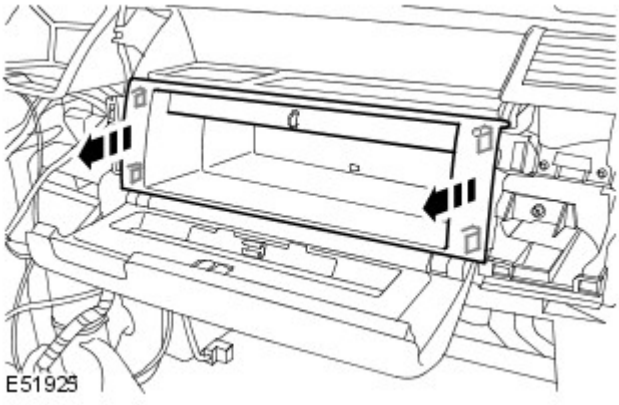
4. Detach the door weatherstrip and remove the side trim panel.
   1. Release the trim panel retaining clip.
   2. Remove the trim panel.



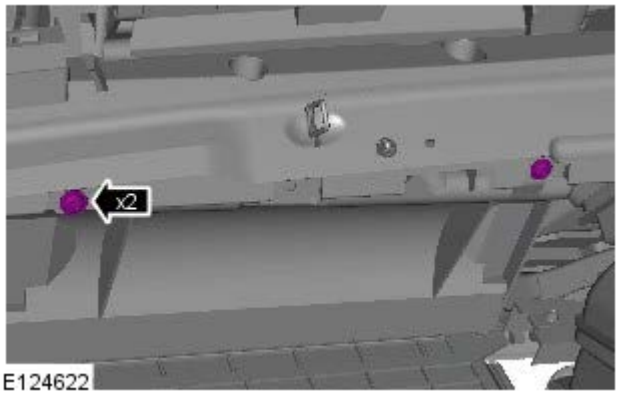
5. Remove the passenger side footwell duct.
   - Remove the clip.



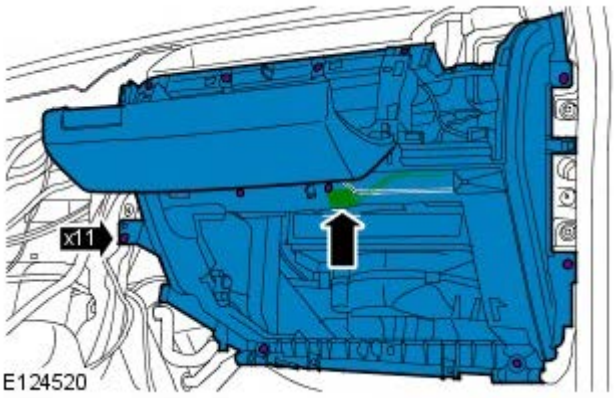
6. Remove the stowage compartment tray.
   - Release the 4 clips.



7. Remove the passenger side support bracket lower retaining screws.

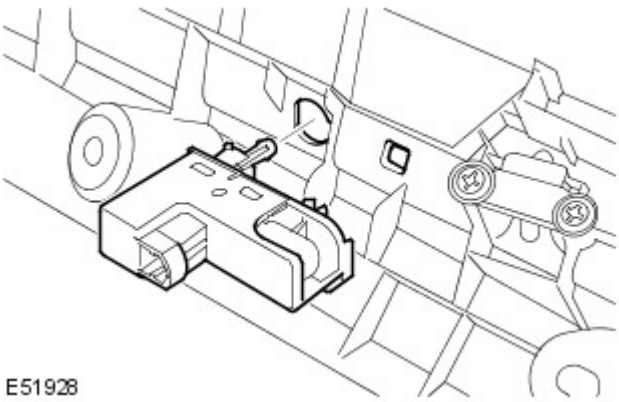


8. Remove the instrument panel passenger side reinforcement.
   - Remove the 11 Torx screws.
   - Disconnect the electrical connector.

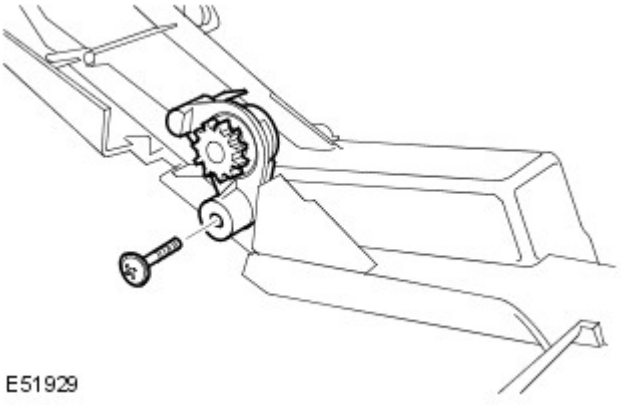


9. NOTE: Do not disassemble further if the component is removed for access only.

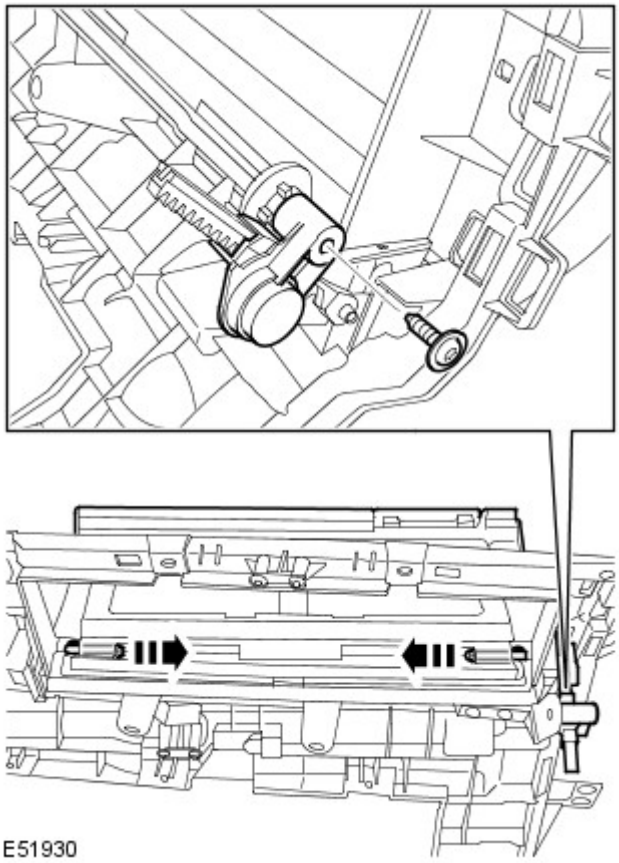
   Remove the glove compartment lamp.



10. Remove the glove compartment damper.
    - Remove the Torx screw.



E51929

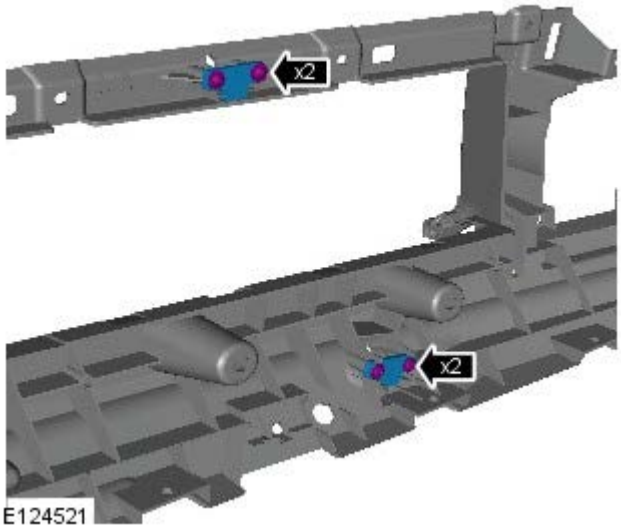


E51930

11. NOTE: Note the position of the hinge pin and spring prior to removal.

    Remove the stowage compartment lid.
    - Remove the 2 hinge pins.
    - Release the 2 hinge springs.
    - Remove the Torx screw and remove the damper.

12. Remove the glove and stowage compartment strikers.
    - Remove the 4 Torx screws.



E124521

Installation

1. Install the glove compartment damper.

Tighten the Torx screw.

2. Install the stowage compartment lid.
    - Install the damper and tighten the Torx screw.
    - Attach the hinge springs.
    - Install the hinge springs.

3. Install the glove and stowage compartment strikers.
    - Tighten the screws.

4. Install the glove compartment lamp.

5. Install the instrument panel passenger side reinforcement.
    - Connect the electrical connector.
    - Tighten the Torx screws.

6. Install the passenger side support bracket lower retaining screws.

7. Install the passenger side footwell duct.
    - Install the clip.

8. Install the stowage compartment tray.
    - Secure the clips.

9. Install the side trim panel and attach the door weatherstrip.

10. Install the glove compartment.
    For additional information, refer to: Glove Compartment (501-12 Instrument Panel and Console, Removal and Installation).

11. Install the instrument panel center reinforcement.
    For additional information, refer to: Instrument Panel Center Reinforcement (501-12, Removal and Installation).

12. Install the PAD switch.
    For additional information, refer to: Passenger Air Bag Deactivation (PAD) Switch (501-20 Supplemental Restraint System, Removal and Installation).

Published: 11-May-2011

Instrument Panel and Console - Instrument Panel Center Reinforcement

Removal and Installation

Removal

NOTES:

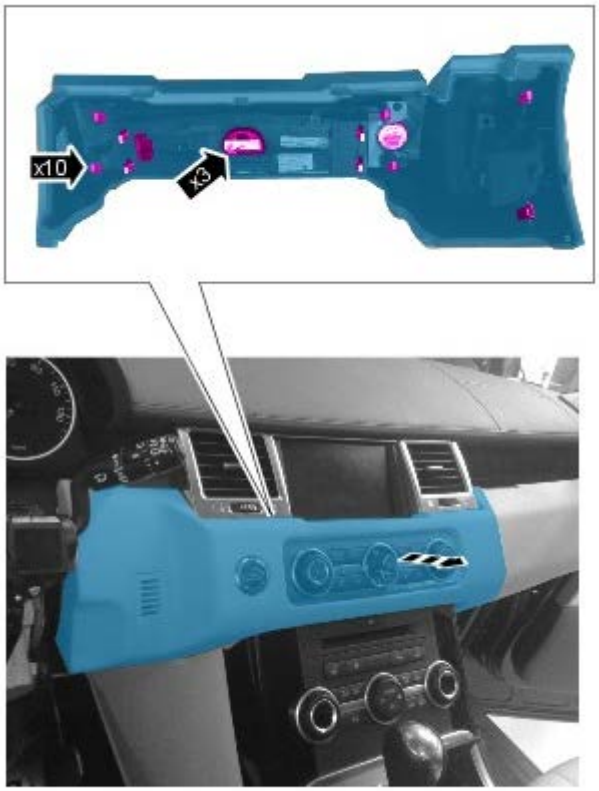
Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

Make sure that the gear selector lever is in position N before removing any components.

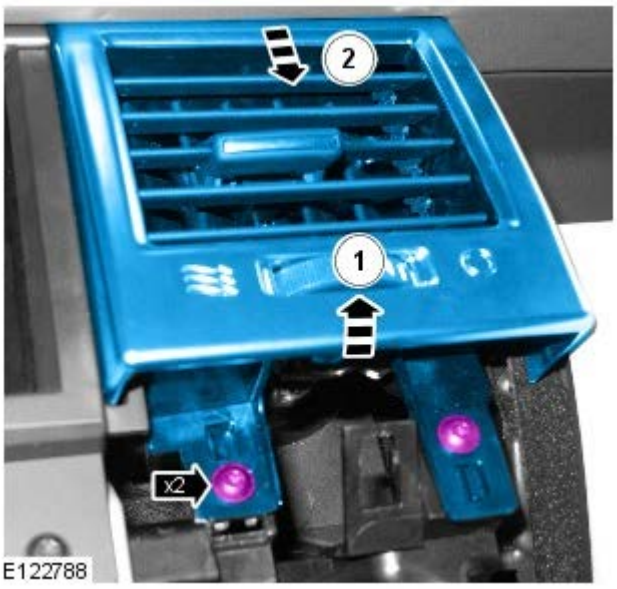
1. Refer to: Floor Console (501-12, Removal and Installation).

2.



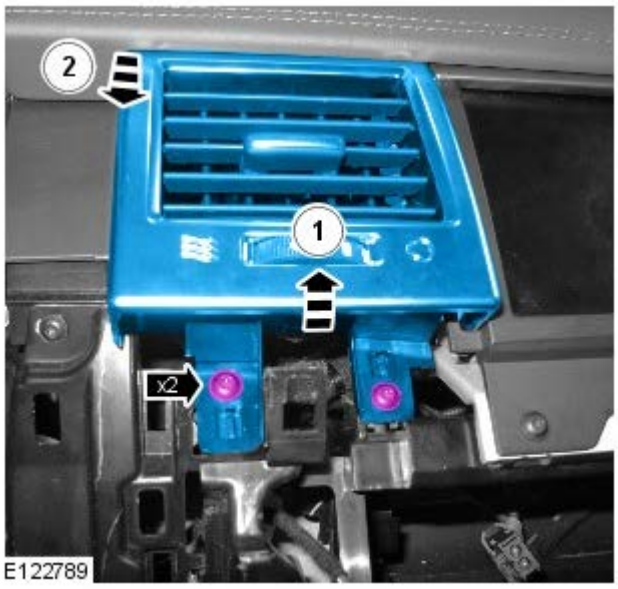
E122692

3.



E122788

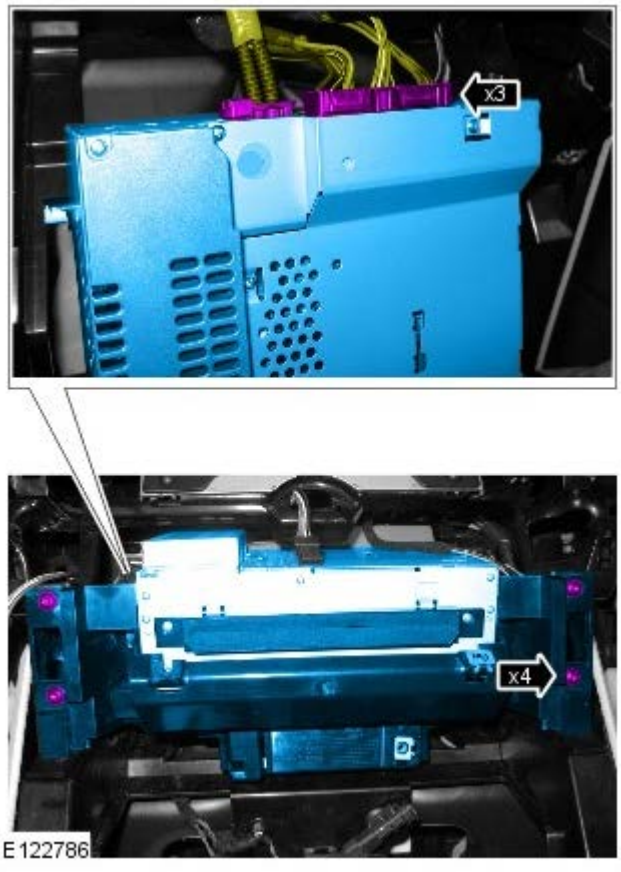
4.



5.



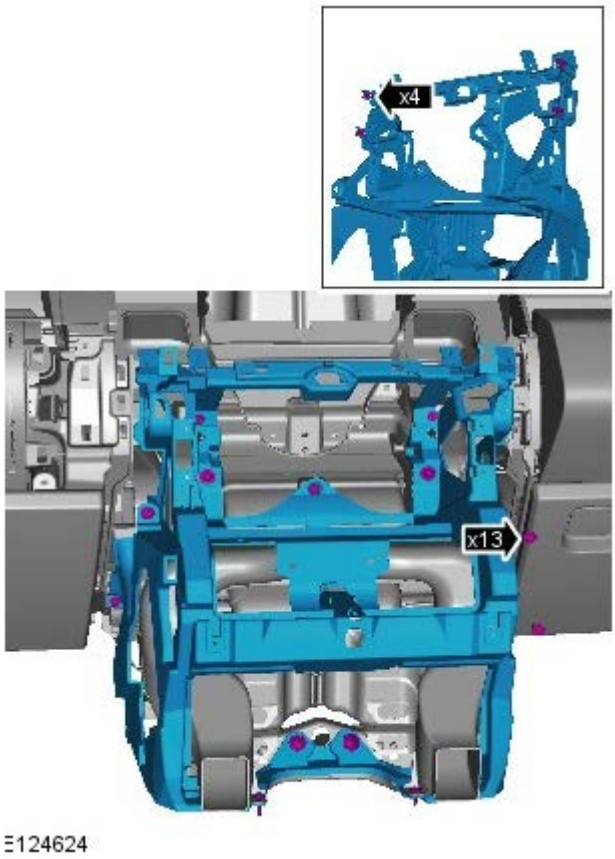
6.



7.



8.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Instrument Panel and Console - Instrument Panel Console Switch Assembly

Removal and Installation

Removal

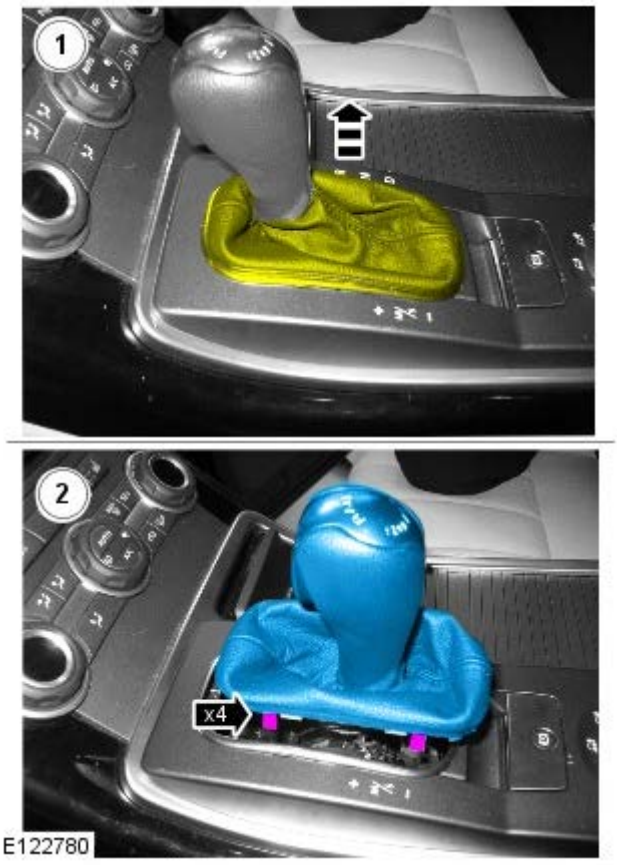
NOTES:

Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

Make sure that the gear selector lever is in position N before removing any components.

1.



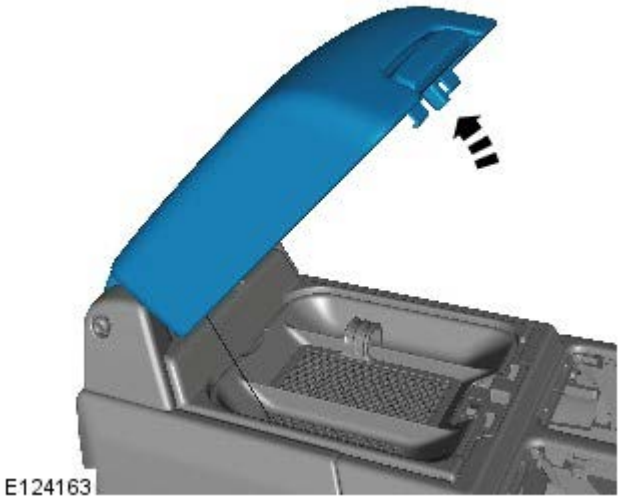
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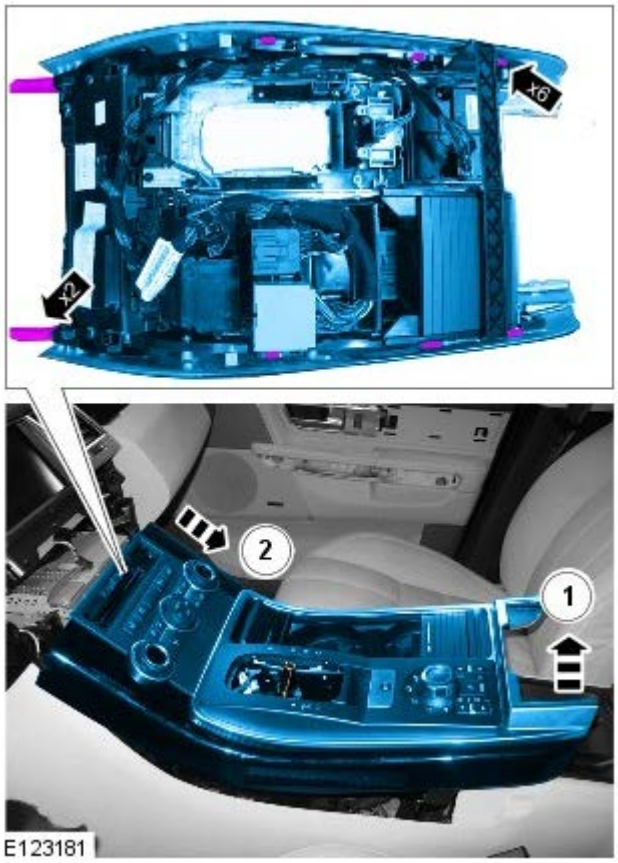
3.



4.



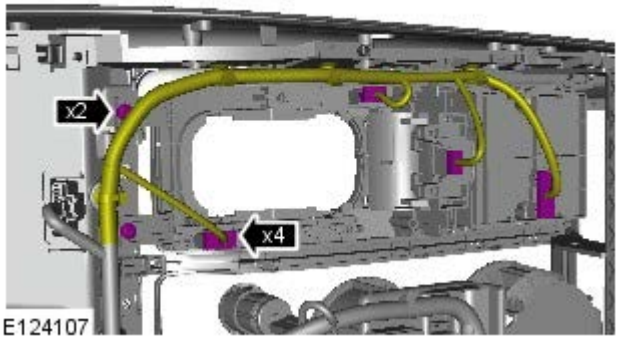
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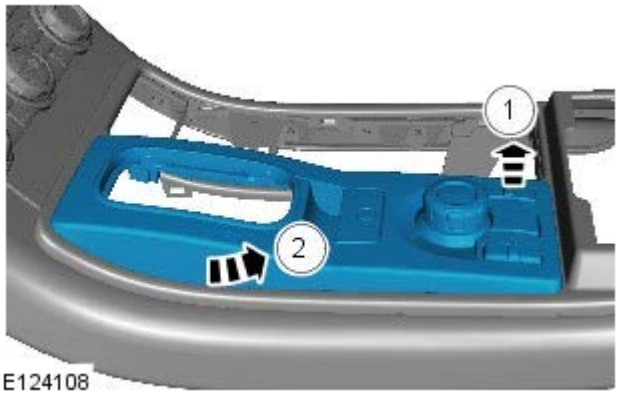
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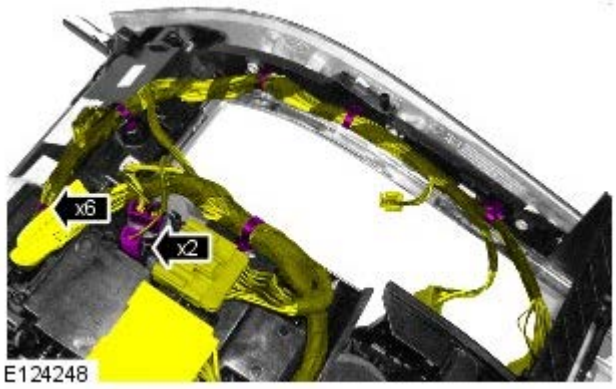
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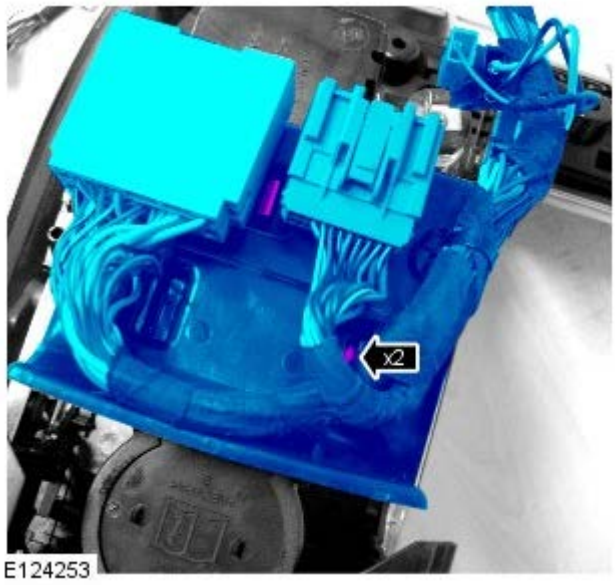
8.



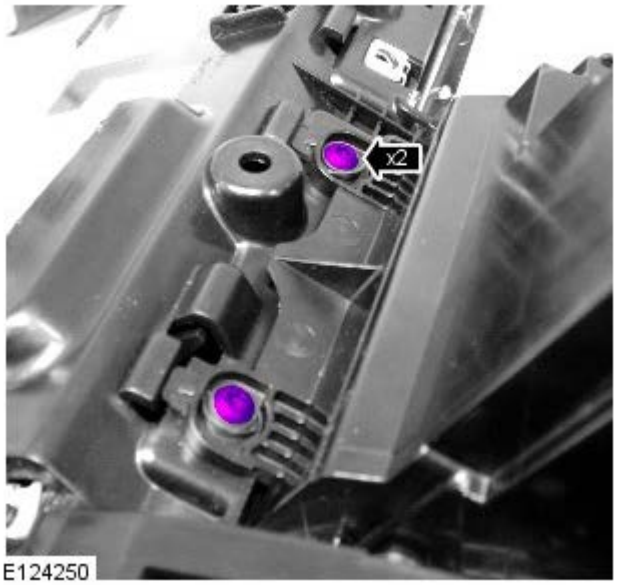
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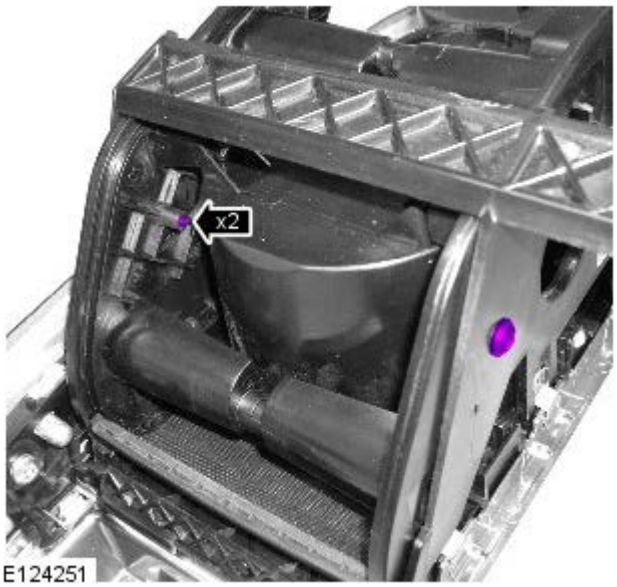
10.



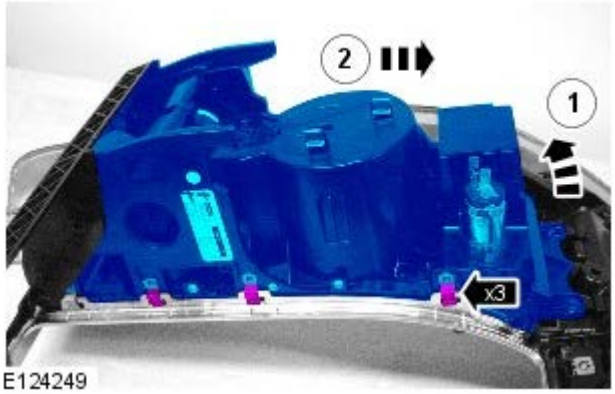
11.



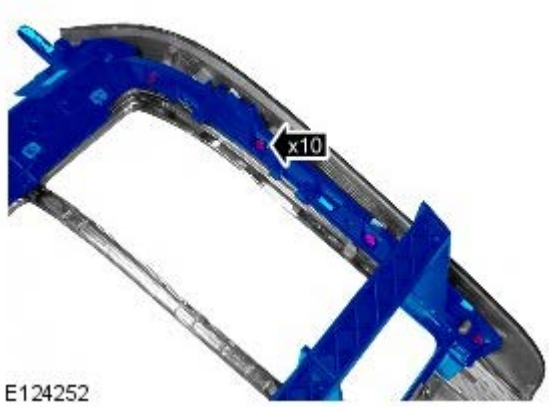
12.



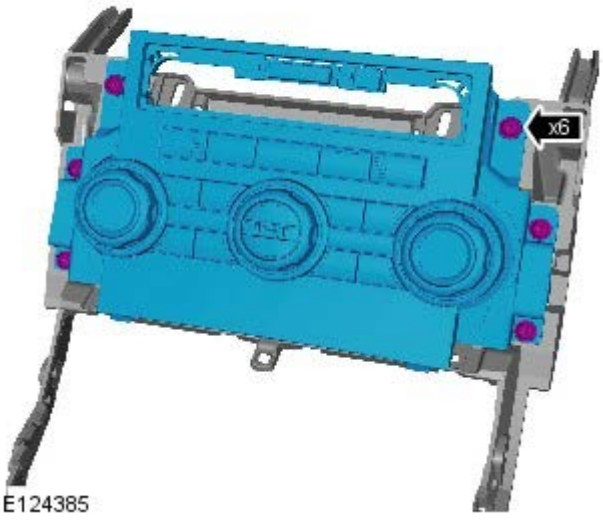
13.



14. NOTE: Left-hand shown, right-hand similar.



15.



Installation

1. To install, reverse the removal procedure.

Published: 30-Sep-2011

Handles, Locks, Latches and Entry Systems -

Torque Specifications

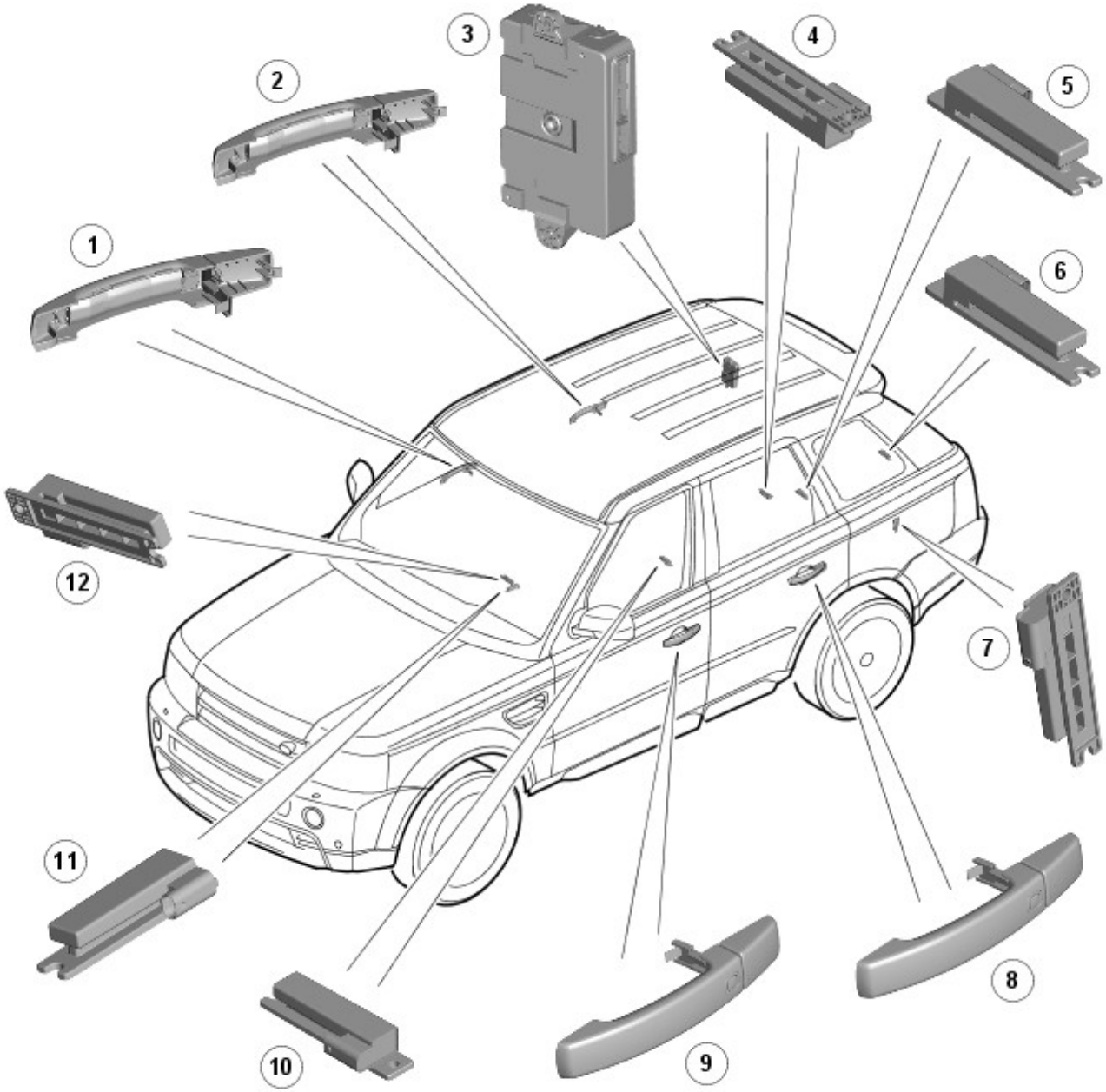
Description	Nm	lb-ft
Liftgate latch actuator bolts	10	7
Liftgate latch Torx screws	22	16
Liftgate striker bolts	25	18
Front door latch Torx screws	10	7
Rear door latch Torx screws	10	7

Published: 31-Oct-2011

Handles, Locks, Latches and Entry Systems - Handles, Locks, Latches and Entry Systems

Description and Operation

Passive Entry - Antenna and Keyless Vehicle Module Location



E117995

Item	Part Number	Description
1	-	Door Antenna - right-hand-front
2	-	Door Antenna - right-hand-rear
3	-	Keyless Vehicle Module
4	-	Interior Antenna – rear of cabin
5	-	Interior Antenna – luggage compartment
6	-	Bumper Antenna – rear bumper
7	-	Interior Antenna – luggage compartment
8	-	Door Antenna - left-hand-rear
9	-	Door Antenna - left-hand-front
10	-	Interior Antenna - front of cabin
11	-	Interior Antenna – front compartment (passive start only)
12	-	Interior Antenna – front compartment

OVERVIEW

The hinged panels are secured with latches and strikers. A remotely operated central locking system controls the locking and unlocking of the door and tailgate latches.

A radio frequency Smart Key allows the vehicle to be locked and unlocked by pressing the appropriate handset buttons. Two levels of central locking system are available:

- Remote central locking, and an
- optional passive entry.

The passive entry and associated passive start system allows the driver to unlock and start the vehicle without using a vehicle key in a door-lock or ignition switch. The passive entry system is an optional fitment while the passive start system is a standard fitment on all vehicles. The passive start system is combined with the passive anti-theft immobilization system.
For additional information, refer to: Anti-Theft - Passive (419-01B, Description and Operation).

Emergency access to the vehicle is provided by a concealed key barrel located in the front left-hand door handle. The key barrel is concealed by a plastic cover which can be removed by inserting the blade of the emergency key into a slot in the cover. The removable emergency key blade is located in the Smart Key.

Operation of the key barrel unlocks the vehicle but does not disarm the alarm system. Locking and unlocking conditions using the emergency key in the door key barrel are:

- If the alarm is not armed the vehicle can be centrally unlocked.
- If the alarm is armed the door only can be opened and the alarm will be triggered.
- The vehicle cannot be double locked or the alarm system armed using the emergency key.

The vehicle can be centrally locked and unlocked from inside using the interior handle release levers on the front doors only. The driver can select locking options, single point entry or drive away locking for example, from a menu available on the touch screen.

Central Locking – Radio Frequency Remote System

The radio frequency central locking system provides locking and unlocking from inside the vehicle and outside within a 20 meter range. The system is operated using buttons on the Smart Key, which transmits radio frequency signals to the radio frequency receiver.

Additional buttons on the Smart Key provide for the convenience operation of the headlamp delay, panic alarm and tailgate release.

Depending on vehicle market, functions offered by the Smart Key include:

- Double locking the doors from outside the vehicle if the lock button on the Smart Key is pressed twice within 3 seconds.
- Drive-away locking - switched on or off by the customer using the vehicle security settings menu available on the touch screen.
- Single or two stage unlocking - single-stage unlocking unlocks all doors with a single press; two-stage unlocking unlocks the driver's door only with a single press and all other doors with a second press.

Changing the unlocking mode between single stage and two-stage also affects the unlocking mode for passive entry (see below). The single or two-stage unlocking function can be switched on or off, as can remote global open or close for the electric windows using the vehicle security settings menu available on the touch screen.

The fuel filler flap is locked by the global locking function. It is not locked by drive-away locking, or if doors are locked from inside the vehicle using the handles.

Actuated from the front door levers only, the doors can be locked from inside the vehicle by pressing the interior door release levers inwards and unlocked by pulling the levers. The touch-screen incorporates a valet mode feature which inhibits access to the glove box while also limiting the use of the touch-screen.

On leaving the vehicle with passive entry the user must press an external button on the door handle once to centrally lock the vehicle or twice within 3 seconds to double lock. The user has a further 3 seconds to pull the door handle to check the vehicle is locked without the Smart Key proximity function unlocking the door again. Pulling the handle after the 3 seconds has lapsed will unlock the door as normal.

If any aperture is not fully closed when the locking process is initiated, either passively or by the Smart Key transmitter, the locking function will be inhibited and an audible error indication will be given. If the ignition is left on an audible warning will be given if the user exits the vehicle, if the user attempts to lock the vehicle (ignition on), another audible indication will be given, and the locking function will be inhibited.

If the door is closed without locking and no key left in the car the ignition will be switched off immediately. If the ignition is left on at any time without starting the vehicle it will switch off automatically after 60 minutes.

If the door is opened by the mechanical key, the full alarm system will sound until the user enters the vehicle and presses either:

- the start/stop button, or
- Smart Key unlock button.

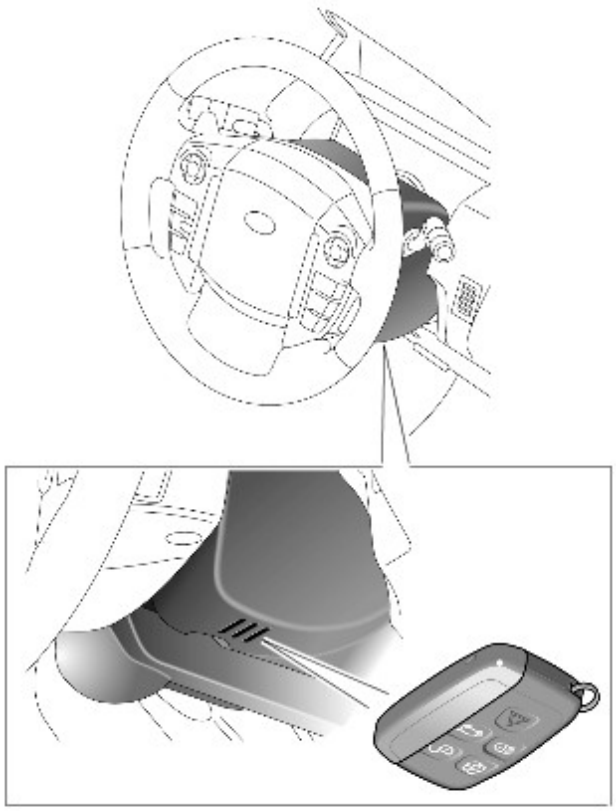
 NOTE: If the KVM (keyless vehicle module) fails to locate the Smart Key, a message 'SMART KEY NOT FOUND REFER TO HANDBOOK' will appear in the instrument cluster message center and the keyless start back-up process will have to be used to mobilize and start the vehicle.

Keyless Start Backup

If the vehicle has been unlocked using the emergency key blade or the Smart Key is not detected by the vehicle, it will be necessary to use the keyless start backup to disarm the alarm and start the engine. The following process must be followed in this event:

- Position the Smart Key against the underside of the fascia, on the outboard side of the steering column, with the buttons facing downwards. This is the location of the IAU (immobilizer antenna unit).
- Holding the Smart Key in position and the brake / clutch pedal depressed, press the start/stop button to start the engine.

Smart Key positioned next to immobilizer antenna unit



E140079

This process bypasses the data exchange between the KVM and the CJB (central junction box); this is an inductive process and will operate if the battery in the Smart Key is discharged. A transponder within the Smart Key is detected by the IAU. The IAU confirms the code output from the transponder and communicates this code confirmation with the CJB via a LIN (local interconnect network) bus connection. The CJB then initiates the vehicle start process in the normal manner.

PASSIVE ENTRY SYSTEM

The passive entry system is controlled by the KVM and low frequency antennas in each door handle and one in the rear bumper; antennas are also strategically situated within the vehicle. When inside the vehicle, the antennas ensure the Smart Key is always within the active transmission zone of the antennas no matter where the Smart Key is placed inside the vehicle. For this reason the orientation and positioning of the antennas is critical to the correct functioning of the system.

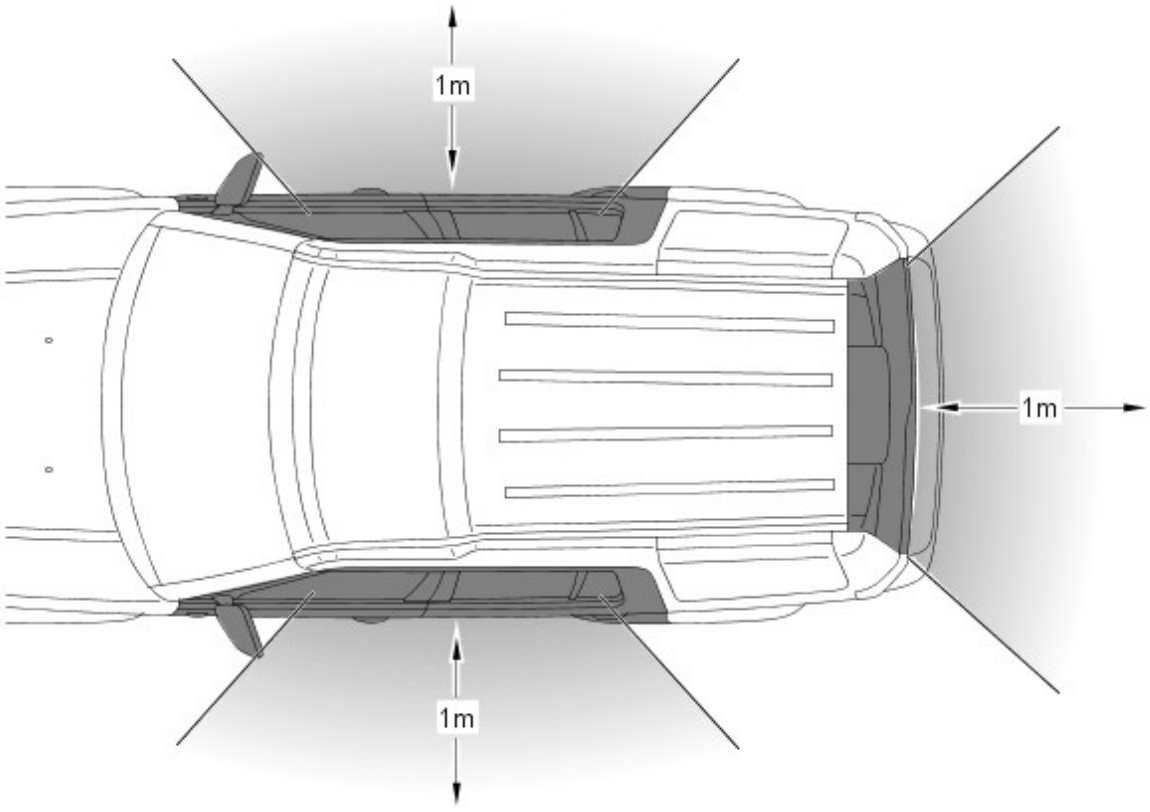
The vehicle can be unlocked without the use of a key-blade or buttons on the Smart Key.

When an external door handle is grasped and the Smart Key is within one meter (3.3ft.) of the handle; the Smart Key receives a low-frequency signal transmitted from the handle.

The Smart Key responds with a radio frequency transmission of its authorization code. The radio frequency signal is received by the Radio-Frequency receiver and passed to the keyless vehicle module which checks and approves the code as valid.

The KVM then drives the fast latch directly to allow the door to be opened. The keyless vehicle module also transmits an unlock request to the CJB. The CJB then passes an unlock request to the door modules.

Door-handle antenna operating area



E117707

Locking of the vehicle is performed by pressing one of the buttons located on each exterior door handle, with the Smart Key within a one meter range of the vehicle. When the door handle button is pressed, the KVM transmits a low-frequency signal via the handle antenna to the Smart Key. The Smart Key transmits a radio frequency signal which is verified by the KVM and allows the doors to be locked or double locked and the alarm system to be armed.

To double lock the vehicle, the button on the exterior door handle must be pressed twice within three seconds, with the Smart Key within one meter range of the vehicle. If a door, hood or the tailgate door is ajar when an attempt to lock the vehicle is made, an error tone is emitted and no locking action will occur.
For additional information, refer to: Anti-Theft - Active (419-01A, Description and Operation).

When unlocking the vehicle using passive entry with single stage unlocking selected and a valid Smart key present, grasping the door handle will centrally unlock the vehicle. When the vehicle is configured for two stage unlocking and the drivers door handle is grasped with a valid Smart Key present only the drivers door will unlock, however if a passenger door handle is grasped with a valid Smart Key present the vehicle will centrally unlock.

NOTES:

Placing the key in a metallic container, a metal briefcase for example, may hinder its operation.

Passive locking will only activate if the key is outside the vehicle. If no key is present, two audible error warnings will sound.

To globally close the vehicle pressing and holding the button on the door handle locks the vehicle, arms the alarm and closes all open windows, not the sunroof. The windows will stop closing when the button is released.

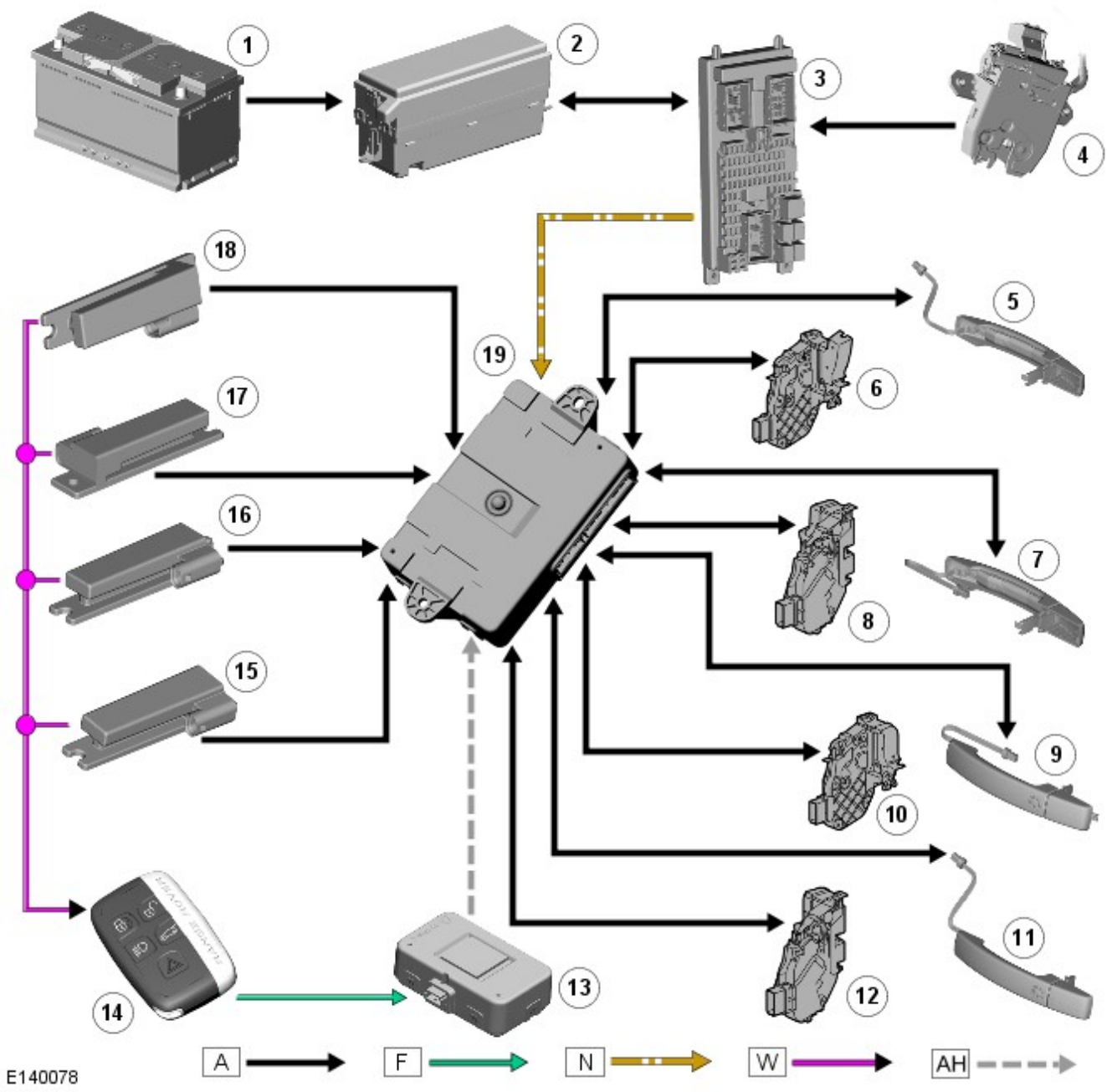
Capacitive Door Handle

The new exterior door operates using the following principle. A capacitive plate is molded internally within the handle, the vehicle exterior body acts as a second capacitive plate; air between the two acts as an insulator. The control electronics within the door handle evaluate the capacitance of the circuit, when a hand interrupts the space between the electrical field is altered and thus the capacitance of the capacitor. This signal is used to trigger the KVM to initiate the unlock process. This signal is calibrated so as not to detect false activations, for example, rain water or soiling.

NOTE: Extreme water levels can trigger an unlock signal, for example, when washing a locked vehicle with a hose or high powered jet nozzle, providing the key is in the detection zone.

CONTROL DIAGRAM

NOTE: **A** = Hardwired; **F** = RF transmission; **N** = Medium Speed CAN; **W** = LF transmission; **AH** = Serial Communication Link



Item	Part Number	Description
1	-	Battery
2	-	EJB (engine junction box)
3	-	CJB
4	-	Tailgate release switch
5	-	Door handle, lock/unlock switch and antenna – right-hand-front
6	-	Door latch and fast latch - right-hand-front
7	-	Door handle, lock/unlock switch and antenna – left-hand-front
8	-	Door latch and fast latch - left-hand-front
9	-	Door handle, lock/unlock switch and antenna – right-hand-rear
10	-	Door latch and fast latch - right-hand-rear
11	-	Door handle, lock/unlock switch and antenna – left-hand-rear
12	-	Door latch and fast latch - left-hand-rear
13	-	Radio frequency receiver
14	-	Smart Key
15	-	Interior Antenna
16	-	Interior Antenna
17	-	Interior Antenna
18	-	Interior Antenna
19	-	Keyless Vehicle Module

PRINCIPLES OF OPERATION

Passive Entry - Locking / Unlocking Process

The vehicle unlocking procedure is carried out in the following way.

With the key within one meter of the approached door and the handle grasped a signal is sent to the KVM which responds with the following simultaneous actions:

- The KVM energizes the low frequency antenna in the door handle which transmits a 125 KHz signal to the key.
- On receipt of the low frequency signal the Smart Key transmits a radio frequency signal '433.92 MHz Europe' '315 MHz NAS / ROW' containing its authorization code to the RF (radio frequency) receiver.
- The RF receiver relays the code, via a serial communication line, to the KVM which checks and approves the code as valid.
    - The KVM will only respond if the radio frequency signal produced is from a valid key for the vehicle.
- The KVM transmits the unlock request to the CJB via the medium-speed CAN (controller area network) bus.
- The CJB confirms and sends the request, via the medium speed CAN bus, to the front door modules.
- The front door modules respond with the following simultaneous actions:
    - Drive the motors to unlock the front doors.
    - Transmit the door unlock request via a LIN (local interconnect network) data signal to the rear door modules.
- The rear door modules drive the motors to unlock the rear doors.
- When the door handle reaches 80 percent of its travel the handle clutch switch is closed and grounded sending a hardwired switched signal to the KVM.
- The KVM drives the fast latch release motors in the door latch assemblies releasing the door latches as the approached door handle is pulled through its full travel, the door can be opened.

Published: 26-Oct-2012

Handles, Locks, Latches and Entry Systems - Locks, Latches and Entry Systems

Diagnosis and Testing

Principle of Operation

For a detailed description of the locks, latches and entry systems and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: Handles, Locks, Latches and Entry Systems (501-14 Handles, Locks, Latches and Entry Systems, 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, to be sure the correct issue is investigated
2. Visually inspect for obvious signs of mechanical or electrical damage

Visual Inspection

Mechanical	Electrical
• Incorrectly aligned door(s), hood or tailgate • Fuel filler door lock actuator • Hood release handle • Hood release cables • Hood latch(es) • Exterior door handle(s) • Interior door handle(s) • Cable(s) • Tailgate release switch • Rear window release switch	• Fuses • Wiring harness • Wiring connector(s) • Door lock actuator(s) • Remote transmitter (key-fob or smart key) • Central locking switches • Controller Area Network (CAN) circuits • Radio frequency (RF) receiver • Central junction box (CJB) • Loose or corroded connections

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

NOTE: **Complete the diagnostic steps below to confirm any concern prior to replacing any component**

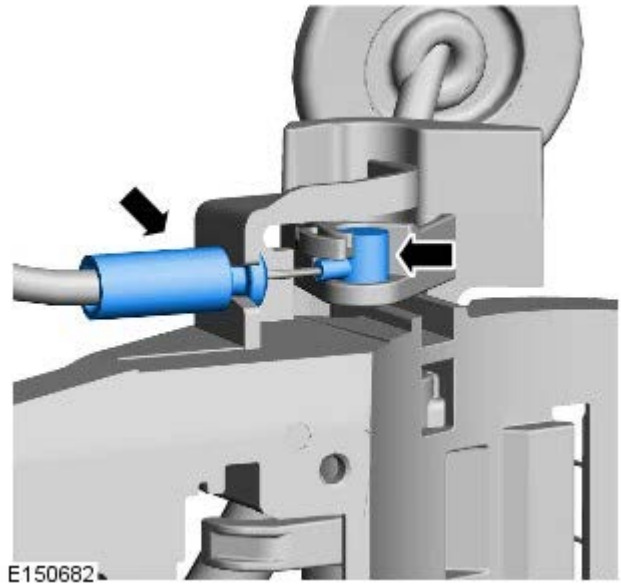
Symptom	Possible causes	Action
The message center indicates that the hood, the tailgate is open when it appears to be closed Vehicle indicates a miss-lock when the hood, tailgate appear to be closed	• Incorrect striker alignment/adjustment • Ajar switch circuit short circuit to ground • Ajar switch failure	• Check/adjust the strikers as necessary • Check for DTCs indicating an ajar switch fault. Refer to the DTC index
Fuel flap does not lock/unlock	• Fuel flap cable detached from body • Fuel flap actuator detached from mounting bracket • Fuel flap actuator disconnected • Fuel flap actuator failure	• Check the condition and installation of the fuel flap cable • Check the security of the fuel flap actuator and bracket • Check the security of the actuator electrical connector • Check for DTCs indicating a fuel flap actuator fault. Refer to the DTC index
Door(s) will not unlatch/open when using outside door handle	• Exterior door handle condition/installation • Exterior release cable disconnected from exterior door handle or door latch	• Check the exterior door handle condition and installation • Check the condition and security of the exterior release cable • **Single door will not open from the outside (but opens from the inside)** GO to Pinpoint Test A.
Door(s) will not unlatch/open when using inside door handle	• Child lock(s) engaged • Interior door handle condition/installation	• Check that the child locks are disengaged • Check the interior door handle

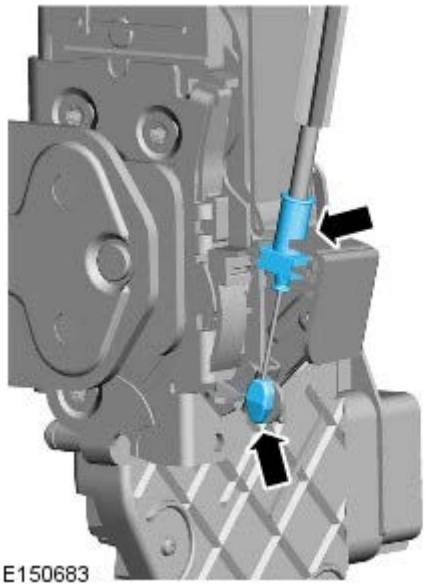
	• Interior release cable disconnected from interior door handle or door latch	condition and installation • Check the condition and security of the interior release cable • **Single Door Will Not Open From The Inside (but opens from the outside)** GO to Pinpoint Test B.
Door(s) will not lock/unlock from key fob, key or internal lock switch	• Wiring harness/connectors • Central junction box (CJB) • Door lock switch • Cable fault	• Check for relevant stored DTCs • Once any DTC related faults have been rectified continue with the diagnostic steps below • **No lock / unlock function from key-fob** GO to Pinpoint Test C.
Door ajar or miss lock signal at message centre when door(s) are closed or alarm triggering	• Wiring harness • Instrument cluster • Incorrect striker alignment/adjustment • Ajar switch circuit short circuit to ground • Ajar switch failure	• **Latch Mounted Door Ajar Switch Test** GO to Pinpoint Test D.

DTC Index

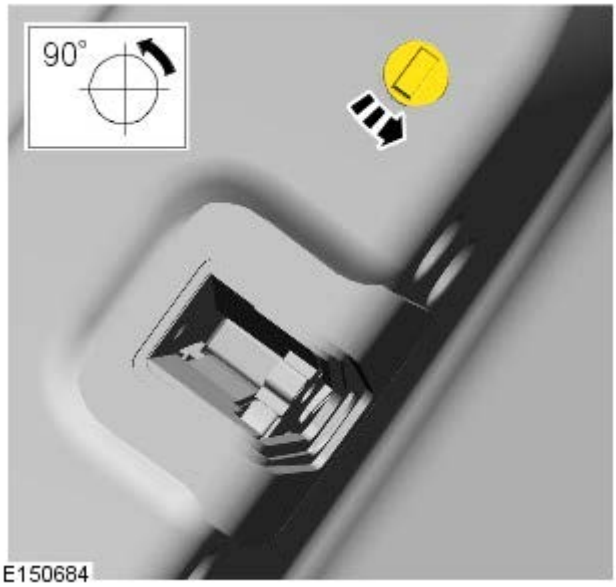
For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.
REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Remote Function Actuator (RFA) (100-00 General Information, Description and Operation) /
Diagnostic Trouble Code (DTC) Index - DTC: Luggage Compartment Powered Lid Module (RGTM) (100-00 General Information, Description and Operation) /
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).

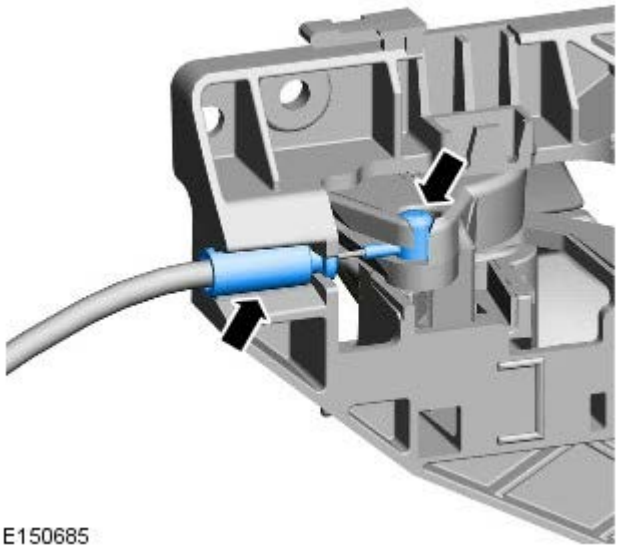
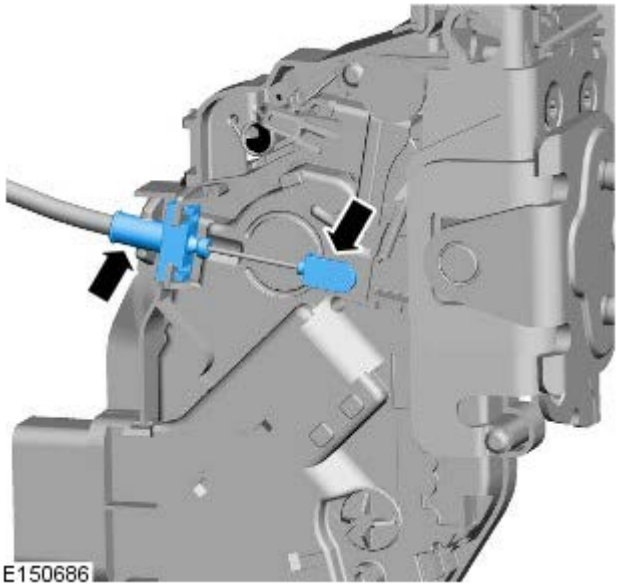
Pinpoint Test

PINPOINT TEST A : SINGLE DOOR WILL NOT OPEN FROM THE OUTSIDE (BUT OPENS FROM THE INSIDE)	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: CHECK THE EXTERIOR DOOR RELEASE CABLE TO EXTERIOR DOOR HANDLE IS INSTALLED CORRECTLY	
	**1** Remove the door trim panel as necessary REFER to: Front Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation) / Rear Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
	2 Confirm the exterior door release cable is correctly installed to the exterior door handle
	Is the cable correctly installed? **Yes** GO to A2. **No** Connect the door release cable correctly. **If the cable is damaged, install a new door release cable**. Test the system for normal operation
A2: CHECK THE EXTERIOR DOOR HANDLE RELEASE CONNECTION TO THE DOOR LATCH	
	1 Confirm the exterior door handle release connection to the door latch is installed correctly

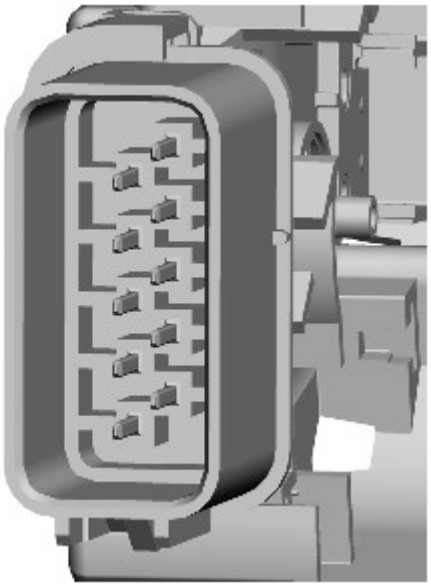
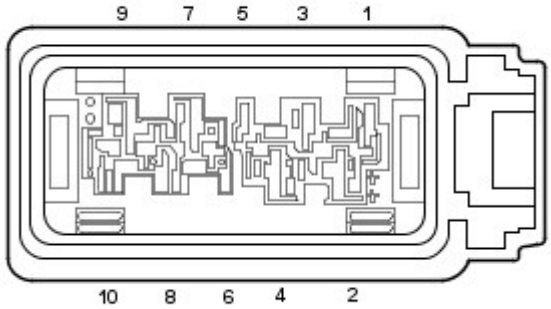


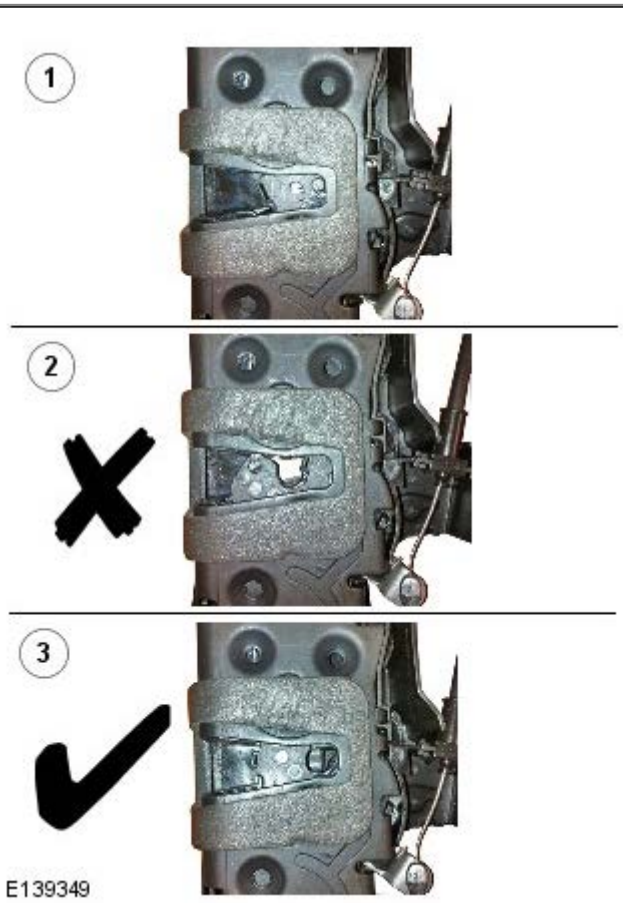
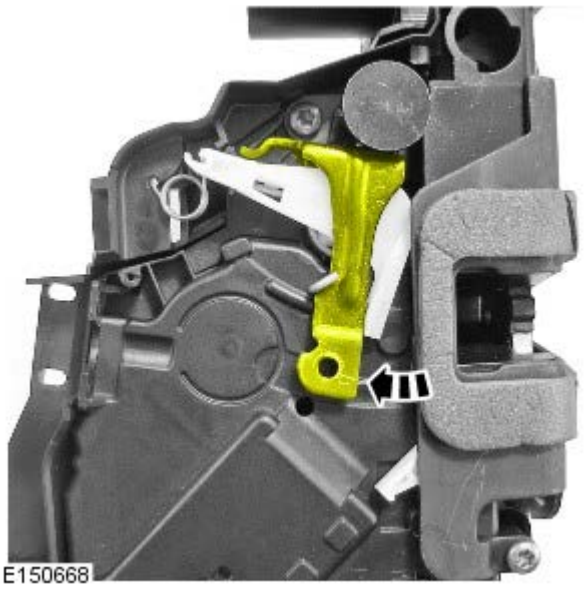
	Is the exterior door handle release cable installed correctly? **Yes** GO to Pinpoint Test C. **No** Connect the door release cable correctly. **If the cable is damaged, install a new door release cable**. Test the system for normal operation

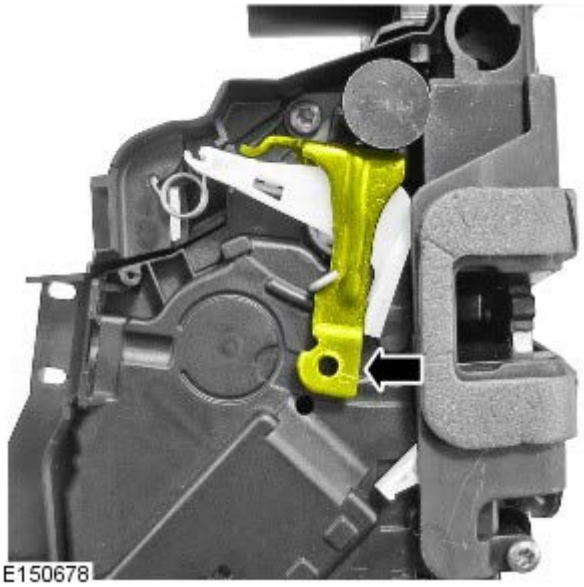
PINPOINT TEST B : SINGLE DOOR WILL NOT OPEN FROM THE INSIDE (BUT OPENS FROM THE OUTSIDE)	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: CHECK THE INTERIOR DOOR RELEASE CABLE TO INTERIOR DOOR HANDLE IS INSTALLED CORRECTLY	
	NOTE: Figure A - Child lock off position shown **1** Make sure the child lock is disengaged (rear door only)
	2 Remove the door trim panel as necessary REFER to: Front Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation) / Rear Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

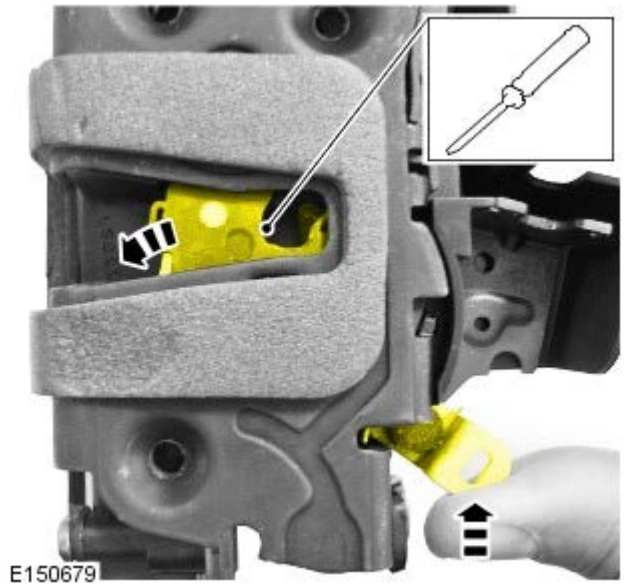
 E150685	
	3 Confirm the interior door release cable is correctly installed to the interior door handle
	Is the cable correctly installed? **Yes** GO to B2. **No** Connect the door release cable correctly. **If the cable is damaged, install a new door release cable**. Test the system for normal operation
B2: CHECK THE INTERIOR DOOR HANDLE RELEASE CONNECTION TO THE DOOR LATCH	
 E150686	**1** Confirm the interior door handle release connection to the door latch is installed correctly
	Is the interior door handle release cable installed correctly? **Yes** GO to Pinpoint Test C. **No** Connect the door release cable correctly. **If the cable is damaged, install a new door release cable**. Test the system for normal operation

PINPOINT TEST C : DOOR LATCHING AND LOCKING FUNCTION TEST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
C1: HARNESS CONNECTION	
NOTE: Test as a single component to ensure that the door latch is not replaced unnecessarily, when another component may be at fault	
	1 Remove the door trim panel as necessary REFER to: Front Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation) / Rear Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
	2 Disconnect harness from latch, check for corrosion or damage to both connectors at socket points and pins.

 E150687	Re-connect harness ensuring robust assembly when all parts confirmed to be in good order. If harness or latch connectors are damaged, install new harness/latch as necessary. Test the system for normal operation
	Check for normal operation, does latch function correctly? **Yes** Re-assemble door trim and test for normal operation **No** GO to C2.
C2: LOCK COMMAND SIGNAL FROM VEHICLE HARNESS	
 9 7 5 3 1 10 8 6 4 2 E139357	**1** Close all vehicle doors apart from door being investigated, please note which door, left side or right side is under investigation
	2 Disconnect harness from latch to enable access to socket points to carry-out conductivity testing as detailed
	3 Monitor the circuit for momentary power when locking the vehicle via the key-fob or smart key between terminals **1 and 10 left side** or **8 and 10 right side**
	Is there momentary power (for approx 8 seconds) between terminals **1 and 10 left side** or **8 and 10 right side** when locking the vehicle via the key-fob or smart key **Yes** The vehicle electrical system is locking correctly, providing the signal to the latch GO to C3. **No** Refer to the electrical circuit diagrams and investigate why vehicle electrical system is not providing signals to the latch. Using the manufacturer approved diagnostic system check for logged DTCs to localize the fault
C3: UNLOCK COMMAND SIGNAL FROM VEHICLE HARNESS	
	1 Monitor the circuit for momentary power when unlocking the vehicle via the key-fob or smart key between terminals **1 and 9 left side** or **8 and 9 right side**
	Is there momentary power (for approx 8 seconds) between terminals **1 and 9 left side** and **8 and 9 right side** when unlocking the vehicle via the key-fob or smart key? **Yes** The vehicle electrical system is unlocking correctly, providing the signal to the latch GO to C4. **No**

	Refer to the electrical circuit diagrams and investigate why vehicle electrical system is not providing signals to the latch. Using the manufacturer approved diagnostic system check for logged DTCs to localize the fault
C4: PHYSICAL TEST 1	
	1 Remove latch module from door REFER to: Front Door Latch (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Rear Door Latch (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).
	2 Inspect latch module for any visual damage
	3 With the latch in hand, connect the electrical connector(s) to connect door latch to door harness
	NOTE: THE LATCH IS NOW READY TO TEST **4** Close all vehicle doors except the door being investigated
	NOTES: Figure 1 - Unlatched position shown Figure 2 - First safety latched position shown Figure 3 - Fully latched position shown Test will not work if latch is only in first safety latch position **5** Rotate latch claw (using a small screw driver or similar), to the fully latched position (figure 3)
	NOTE: Unlocked position shown **6** Confirm that the latch interior release lever is in the unlocked position as shown

 E150677	NOTE: Locked position shown **7** Press the **lock** button on the key-fob or smart key
	Does the latch interior release lever move from the unlocked position to the locked position? **Yes** GO to C5. **No** If this is a repeat test and the vehicle electrical test section has been completed and confirmed that vehicle is working correctly, then replace the door latch. If replacing latch as part of a warranty claim, please quote reference code **LKINOP** in the technician comments section of the warranty claim
C5: PHYSICAL TEST 2	
 E150678	NOTE: Unlocked position shown **1** With the latch in the locked state (i.e. the latch interior release lever is in the locked position), press the key-fob or smart key **unlock** button
	Does the latch interior release lever move from the locked position to the unlocked position? **Yes** GO to C6. **No** If this is a repeat test and the vehicle electrical test section has been completed and confirmed that vehicle is working correctly, then replace the door latch. If replacing latch as part of a warranty claim, please quote reference code **LKINOP** in the technician comments section of the warranty claim
C6: PHYSICAL TEST 3	
	NOTE: Fully latched position shown **1** With the latch in its unlocked state, push the latch exterior release lever against its return spring, whilst simultaneously applying a light pressure to release the latch claw using a small screw driver or similar



Does the latch claw release?

Yes

GO to C7.

No

Repeat tests **C5** and **C6** to confirm the fault GO to C5. If the repeat test has confirmed that the exterior release lever will not release the claw on an unlocked latch replace the door latch. If replacing latch as part of a warranty claim, please quote reference code **EXTINOP** in the technician comments section of the warranty claim

C7: PHYSICAL TEST 4

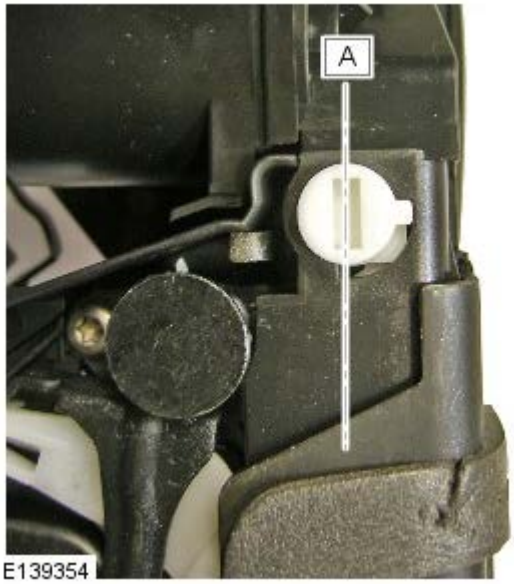


NOTE: Fully latched position shown

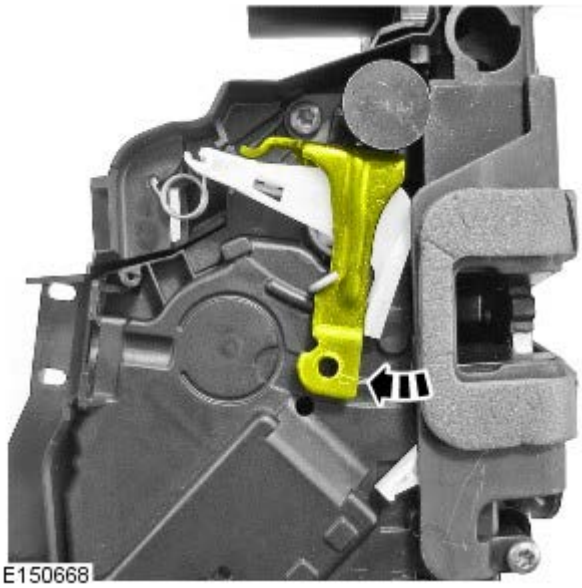
1 Using a small screw driver or similar, rotate latch claw to the second fully latched position

NOTE: Figure A - Child lock off position shown

2 If testing a rear door latch, ensure that the child lock is turned to the off position



E139354


E150668

NOTE: Unlocked position shown

3 Confirm that the latch interior release lever is in the unlocked position as shown


E139355

4 Whilst the latch is still in its unlocked state, push the latch interior release lever against its return spring, whilst simultaneously applying a light pressure to release the latch claw using a small screw driver or similar

Does the latch claw release?

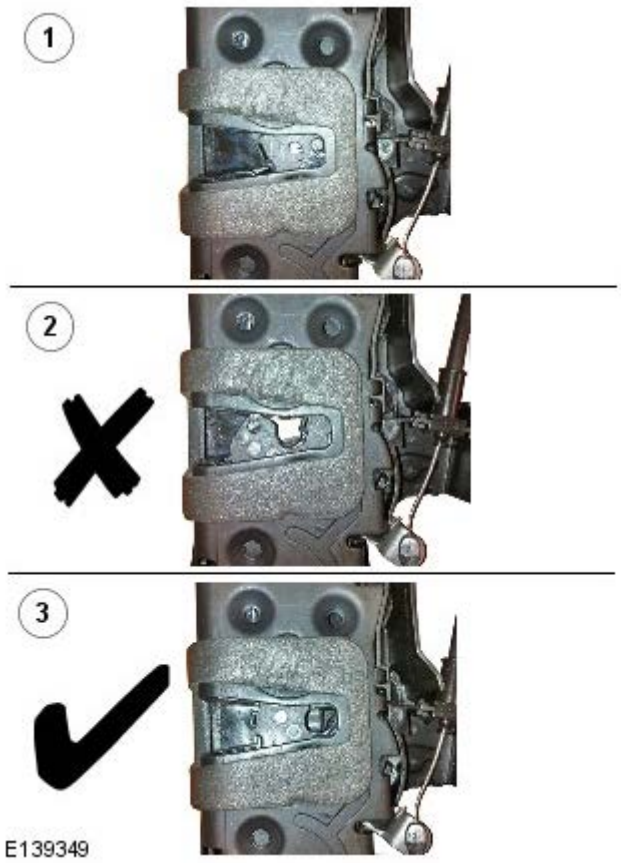
Yes

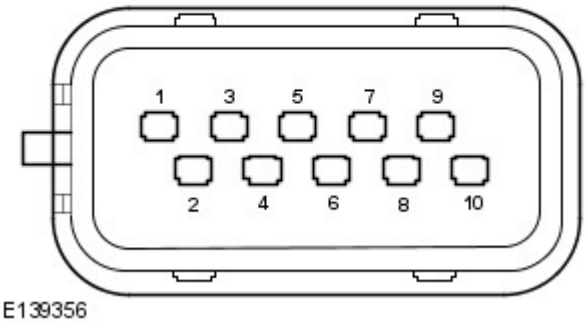
Latch has passed all tests to confirm its correct function. **DO NOT REPLACE LATCH** as part of any attempts to resolve any locking functionality issues

No

Repeat test GO to C7. If repeat test has confirmed that the interior release lever will not release the claw

	when the latch is in the unlocked state, then replace the latch. If replacing latch as part of a warranty claim, please quote reference code **INTINOP** in the technician comments section of the warranty claim

PINPOINT TEST D : LATCH MOUNTED DOOR AJAR SWITCH TEST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
D1: TEST 4 DOOR LATCH	
NOTES: If a customer is complaining of issues relating to a door ajar signal e.g. door latch won't lock, or alarm system triggering (indicated via DTC's), there may be several components that generate the fault, including • Body wiring harness / connectors • Door wiring harness / connectors • Alarm control module • Central junction box (CJB) • Door Latch ajar switch	
To investigate the functioning of the door ajar switch contained within the door latch, to prove or eliminate the door latch mounted door ajar switch as the root cause, follow the process below. This will prevent the unnecessary replacement of a correctly functioning door latch	
	1 Remove door trim from door REFER to: Front Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation) / Rear Door Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
	2 Disconnect door harness from latch for access to connector pins for latch electrical testing
	3 Inspect latch module for any visual damage
	NOTES: Figure 1 - Unlatched position shown Figure 2 - First safety latched position shown Figure 3 - Fully latched position shown **Test will not work if latch is only in first safety latch position** **4** Using a small screw driver or similar, rotate latch claw to the second fully latched position (figure 3)
	5 Carry out continuity test between terminals **1 and 4 (left side)** or **8 and 4 (right side)** with claw closed

 E139356	
	Does the continuity test pass? **Yes** The latch ajar switch is working correctly. **Do not replace latch**. Investigate for fault elsewhere in vehicle system **No** Release latch claw and repeat test from step 4 to confirm result. If this is a repeat test and you are sure that the ajar switch does not provide continuity when fully latched. Replace the latch. If replacing latch as part of a warranty claim, please quote reference code **AJARINOP** in the technician comments section of the warranty claim

Published: 11-May-2011

Handles, Locks, Latches and Entry Systems - Liftgate Striker Adjustment

General Procedures



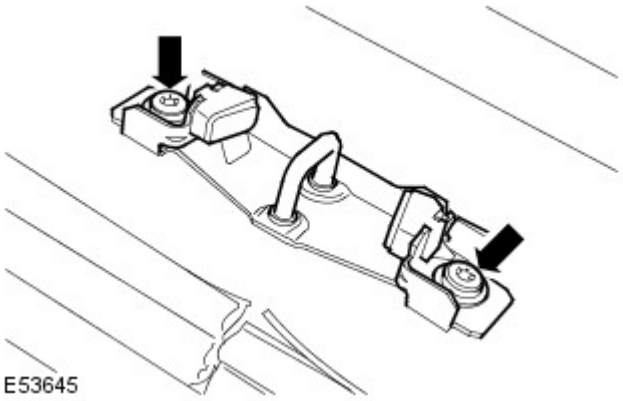
E53644

1. Check for an equal gap and alignment to the adjacent panels. If incorrect, follow the adjust procedure below.



E56976

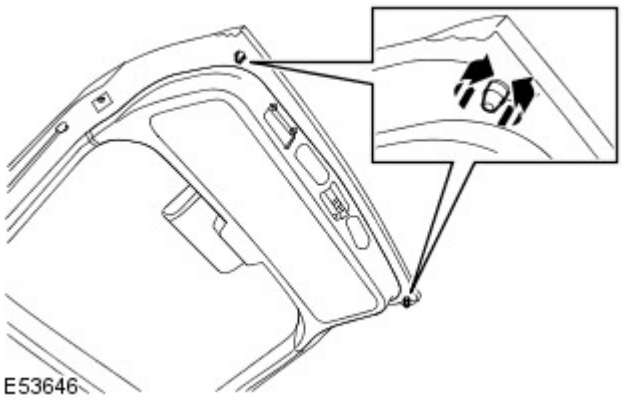
2. Remove the liftgate striker cover.
   - Release the 2 clips.



E53645

3. Loosen the 2 liftgate striker bolts.

4. Close the liftgate and check for an equal gap and alignment to the adjacent panels.



E53646

5. Adjust the bump stops if required.

6. Open the liftgate and tighten the liftgate striker bolts to 25 Nm

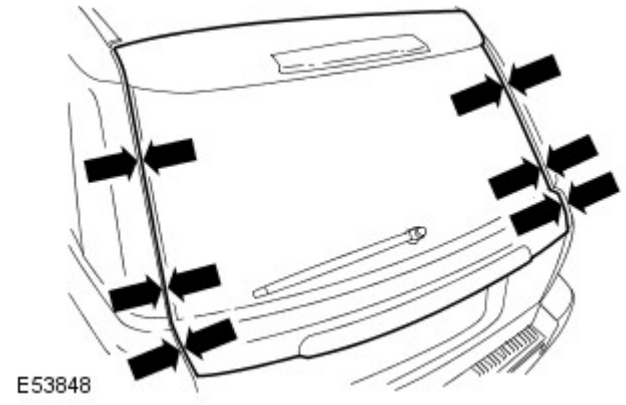
(18 lb.ft).

7. Install the liftgate striker cover.

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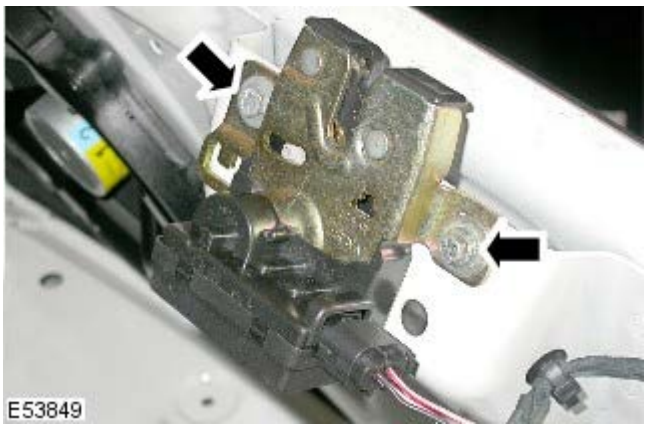
Handles, Locks, Latches and Entry Systems - Liftgate Window Latch Adjustment

General Procedures



1. Check for an equal gap and alignment to the adjacent panels. If incorrect, follow the adjust procedure below.

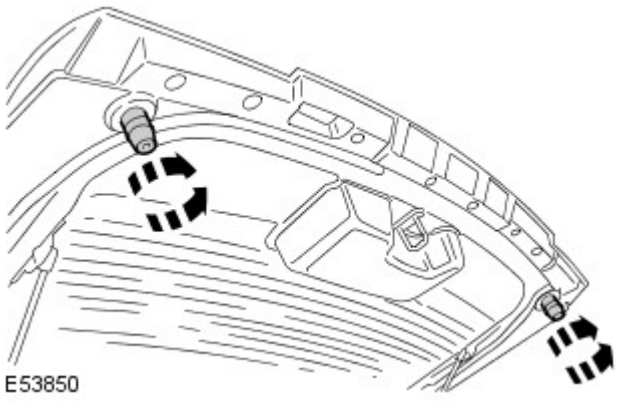
2. Remove the liftgate lower trim panel.
   For additional information, refer to: Liftgate Trim Panel (501-05, Removal and Installation).



3. Loosen the 2 liftgate glass latch retaining bolts.

4. Close the liftgate glass and check the alignment to adjacent panels.

5. Adjust the bump stops if required.



6. Open the liftgate glass and tigten the latch retaining bolts to 10 Nm (7 lb.ft).

7. Install the liftgate lower trim panel.
   For additional information, refer to: Liftgate Trim Panel (501-05, Removal and Installation).

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Handles, Locks, Latches and Entry Systems - Front Door Latch

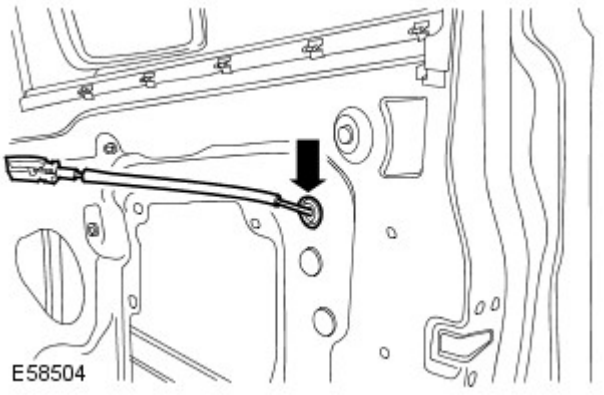
Removal and Installation

Removal

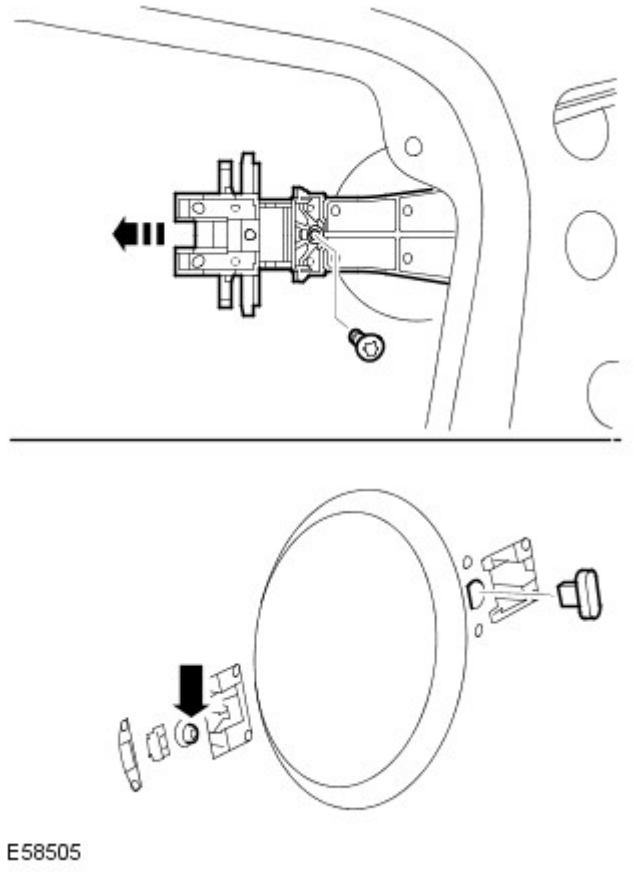
1. Remove the window motor and regulator assembly.
   For additional information, refer to: Front Door Window Regulator and Motor (501-11, Removal and Installation).

2. Remove the front door exterior handle.
   For additional information, refer to: Exterior Front Door Handle (501-14, Removal and Installation).

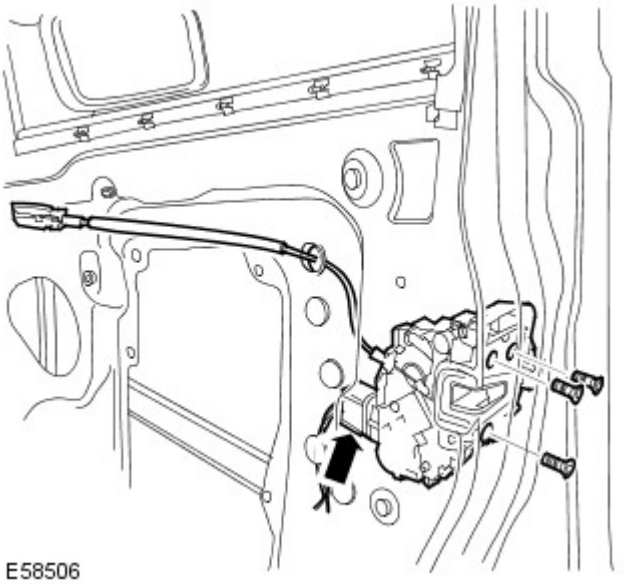
3. Release the remote control cable.
   - Release the grommet.



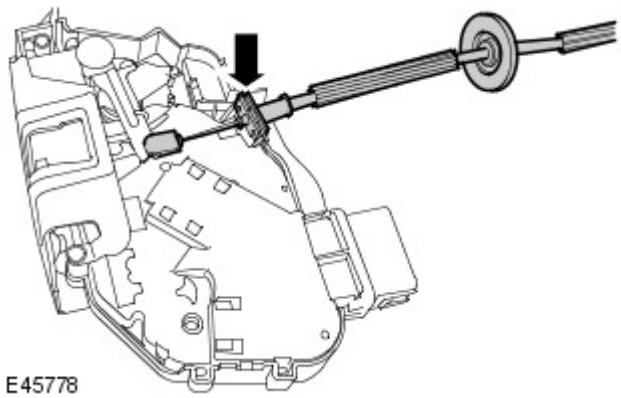
4. Release the door exterior handle mechanism.
   - Remove the 2 Torx screws.
   - Remove the locking pin.



5. Remove the front door latch assembly.
   - Disconnect the electrical connector.
   - Remove the 3 Torx screws.



E58506



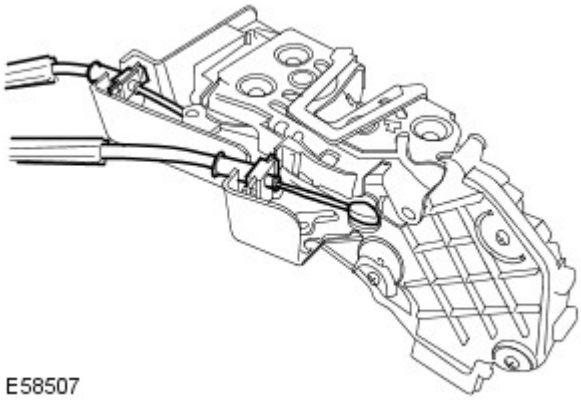
E45778

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

   Remove the door latch remote control cable.
   - Release the cable from the abutment bracket.
   - Remove the cable from the lever.

7. Release the exterior door handle mechanism cable from the door latch.
   - Release the cable from the abutment bracket.
   - Remove the cable from the lever.

8. LH side: Release the door lock cylinder cable from the door latch.
   - Release the cable from the abutment bracket.
   - Remove the cable from the lever.



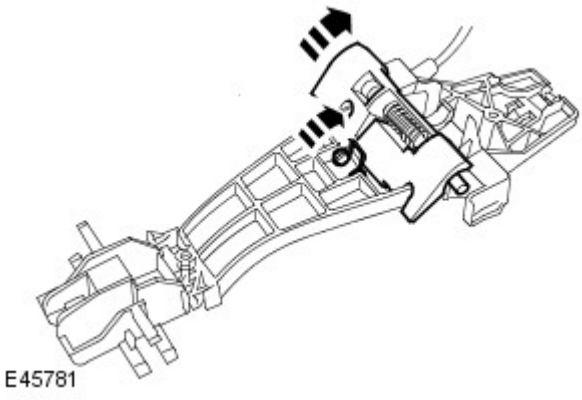
E58507

Installation

1. LH side: Connect the door lock cylinder cable to the door latch.
   - Connect the cable to the lever.
   - Secure the cable to the abutment bracket.

2. Connect the door exterior handle mechanism cable to the door latch.
   - Connect the cable to the lever.
   - Secure the cable to the abutment bracket.

3. Install the remote control cable to the door latch.
   - Connect the cable to the lever.
   - Secure the cable to the abutment bracket.



4. Set the exterior handle mechanism.
    - Rotate the lever.
    - Engage the retaining tang.

5. Install the front door latch assembly.
    - Tighten the Torx screws to 10 Nm (7 lb.ft).
    - Connect the electrical connector.

6. Install the door exterior handle mechanism.
    - Position the mechanism to the door.
    - Fit the locking pin.
    - Fit and tighten the Torx screws.

7. LH side: Position the control cables into the retainers.

8. Position the remote control cable to the door.
    - Install the grommet.

9. Install the front door exterior handle.
   For additional information, refer to: Exterior Front Door Handle (501-14, Removal and Installation).

10. Install the window motor and regulator assembly.
    For additional information, refer to: Front Door Window Regulator and Motor (501-11, Removal and Installation).

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Handles, Locks, Latches and Entry Systems - Rear Door Latch

Removal and Installation

Removal

1. Remove the rear door window motor and regulator assembly. For additional information, refer to: Rear Door Window Regulator and Motor (501-11, Removal and Installation).

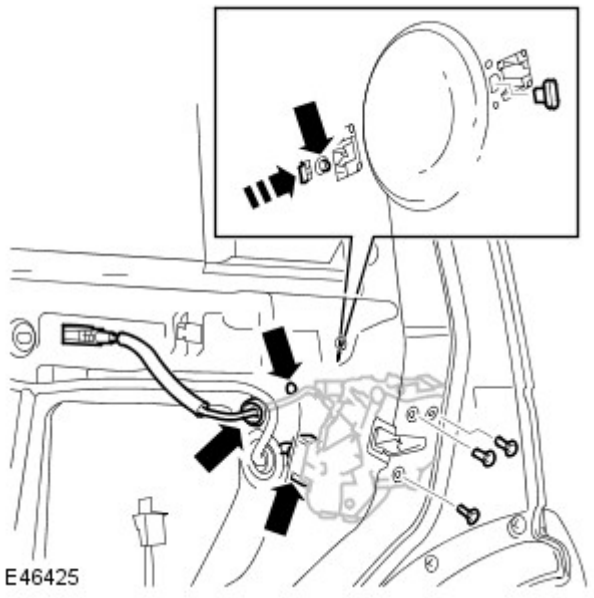
2. CAUTION: Release the exterior door handle and screw cover clips from inside the door.

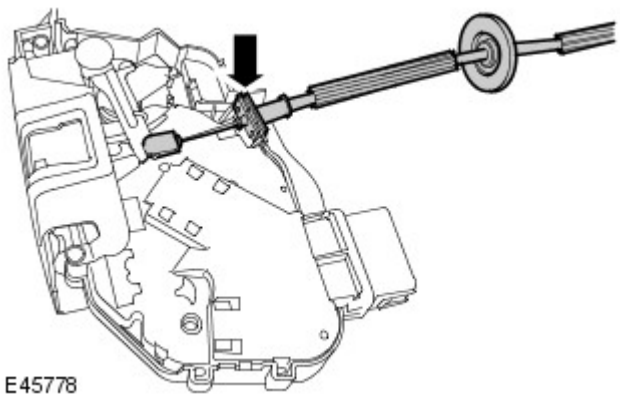
   Remove the rear door exterior handle.
   For additional information, refer to: Exterior Rear Door Handle (501-14, Removal and Installation).

3. Release the remote control cable.
   - Release the grommet.

4. Release the door exterior handle mechanism.
   - Remove the 2 Torx screws.
   - Remove the locking pin.

5. Remove the rear door latch assembly.
   - Disconnect the electrical connector.
   - Remove the 3 Torx screws.

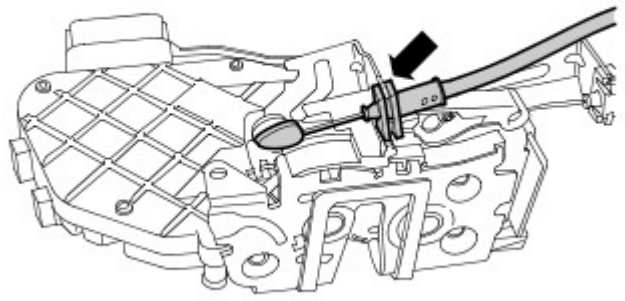




6. NOTE: Do not disassemble further if the component is removed for access only.

   Remove the door latch remote control cable.
   - Release the cable from the abutment bracket.
   - Remove the cable from the lever.

7. Release the exterior door handle mechanism cable from the door latch.
   - Release the cable from the abutment bracket.
   - Remove the cable from the lever.



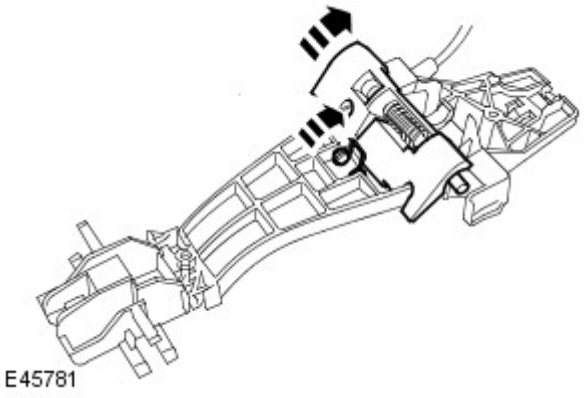
E45779

Installation

1. Connect the door exterior handle mechanism cable to the door latch.
    - Connect the cable to the lever.
    - Secure the cable to the abutment bracket.

2. Install the remote control cable to the door latch.
    - Connect the cable to the lever.
    - Secure the cable to the abutment bracket.

3. Set the exterior handle mechanism.
    - Rotate the lever.
    - Engage the retaining tang.



E45781

4. Install the rear door latch assembly.
    - Tighten the Torx screws to 10 Nm (7 lb.ft).
    - Connect the electrical connector.

5. Install the door exterior handle mechanism.
    - Position the mechanism to the door.
    - Fit the locking pin.
    - Install and tighten the Torx screws.

6. Position the remote control cable to the door.
    - Install the grommet.

7. Install the rear door exterior handle.
   For additional information, refer to: Exterior Rear Door Handle (501-14, Removal and Installation).

8. Install the rear door window motor and regulator assembly.
   For additional information, refer to: Rear Door Window Regulator and Motor (501-11, Removal and Installation).

Published: 30-Sep-2011

Handles, Locks, Latches and Entry Systems - Liftgate Latch

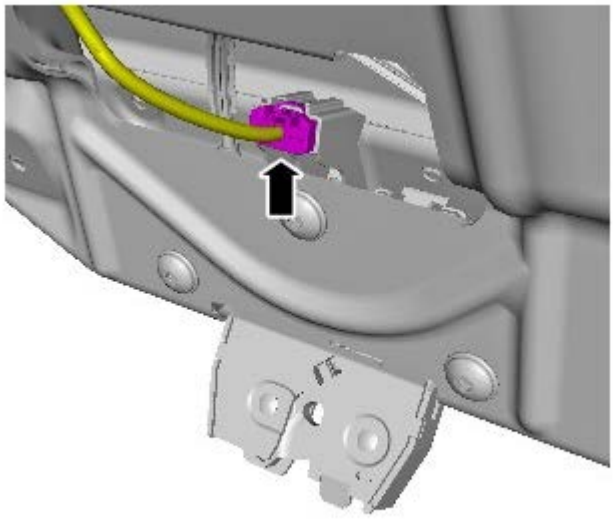
Removal and Installation

Removal

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

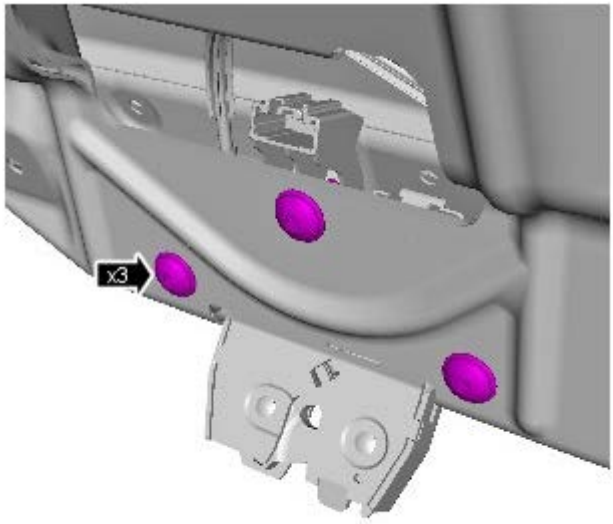
1. Refer to: Liftgate Trim Panel (501-05, Removal and Installation).

2.



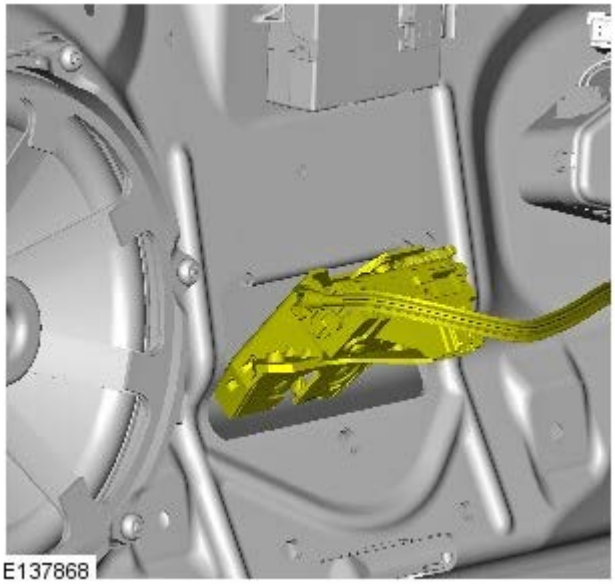
E137866

3. *Torque:* 22 Nm

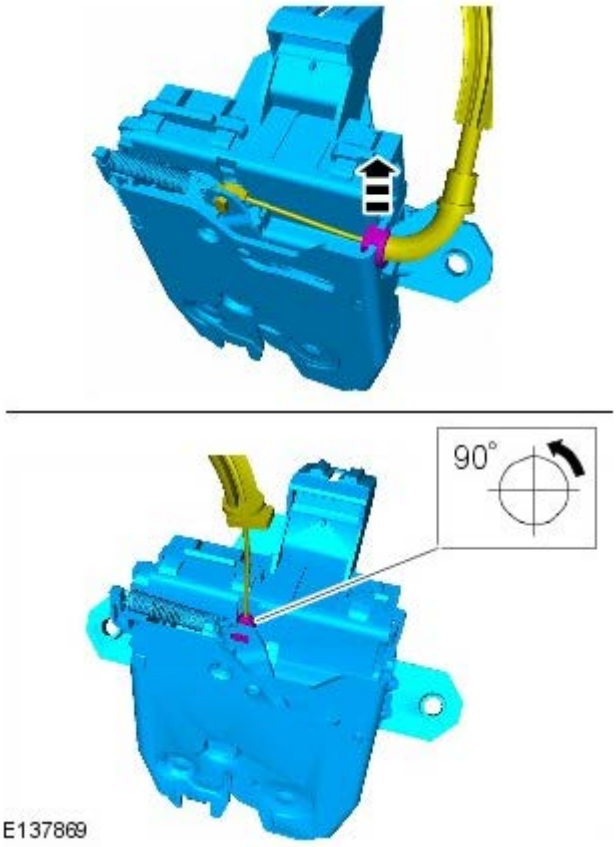


E137867

4.



5.



Installation

1. To install, reverse the removal procedure.

Published: 30-Sep-2011

Handles, Locks, Latches and Entry Systems - Exterior Liftgate Release Switch

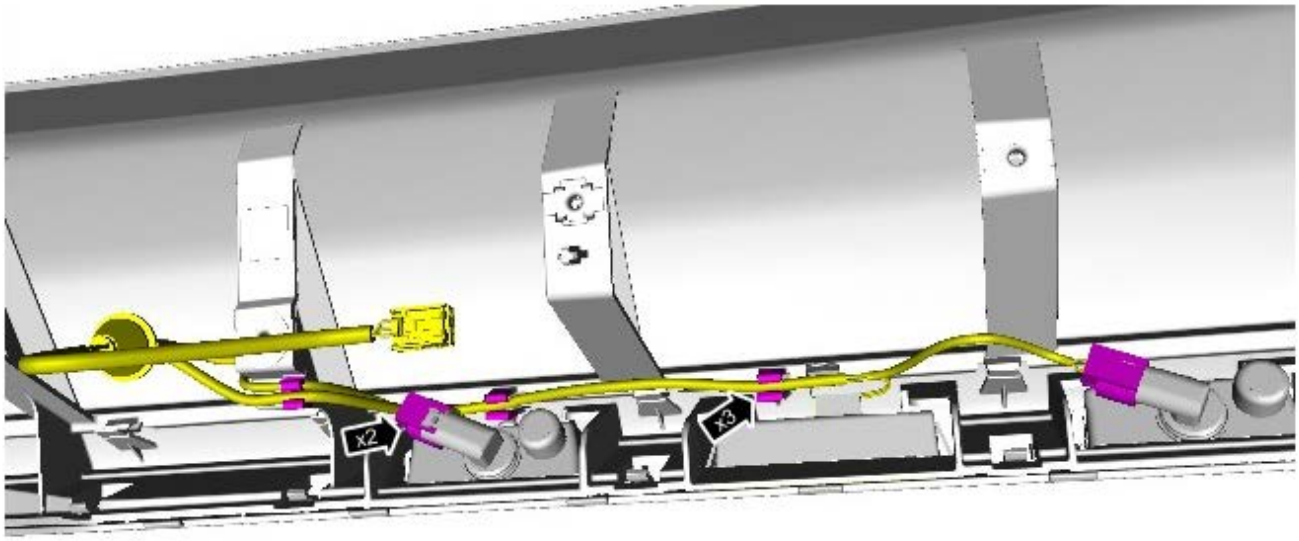
Removal and Installation

Removal

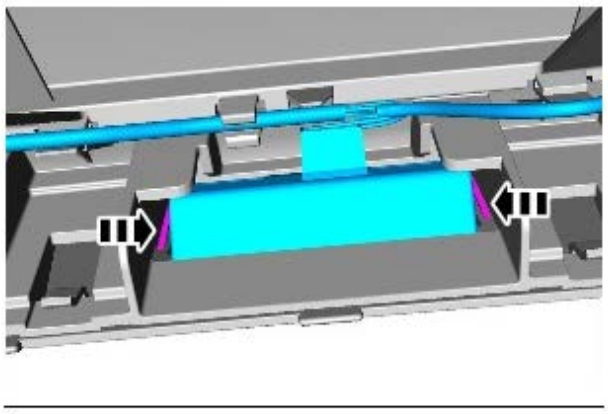
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Liftgate Window Glass Trim Panel (501-08, Removal and Installation).

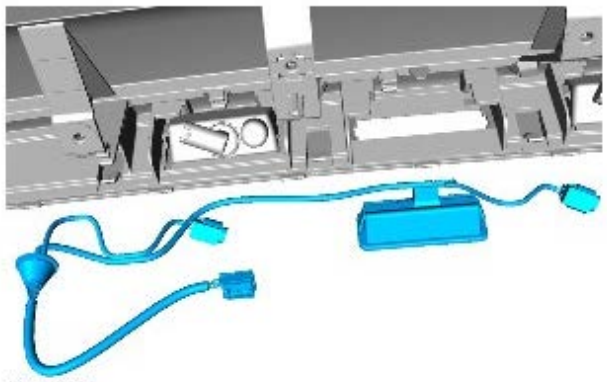
2.



E139416



3. CAUTION: Protect the surrounding trim from damage when changing the component.



E139417

Installation

1. To install, reverse the removal procedure.

Published: 30-Sep-2011

Handles, Locks, Latches and Entry Systems - Interior Liftgate Release Switch

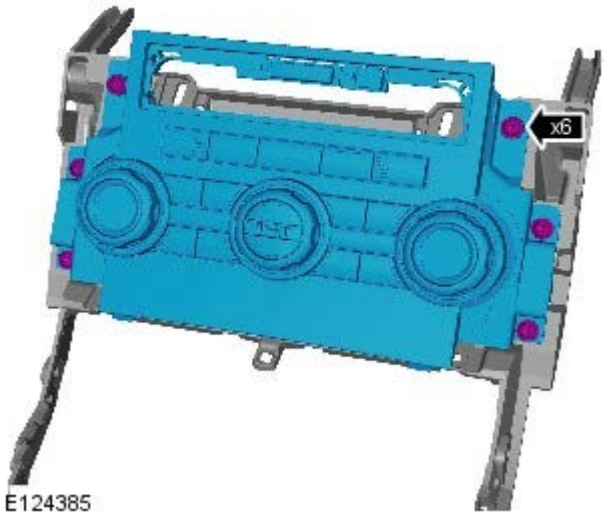
Removal and Installation

Removal

NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: Floor Console Upper Section (501-12, Removal and Installation).

2.



Installation

1. To install, reverse the removal procedure.

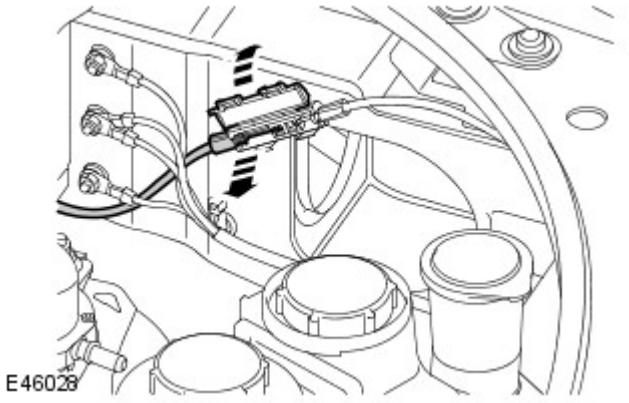
Published: 11-May-2011

Handles, Locks, Latches and Entry Systems - Hood Latch Release Handle

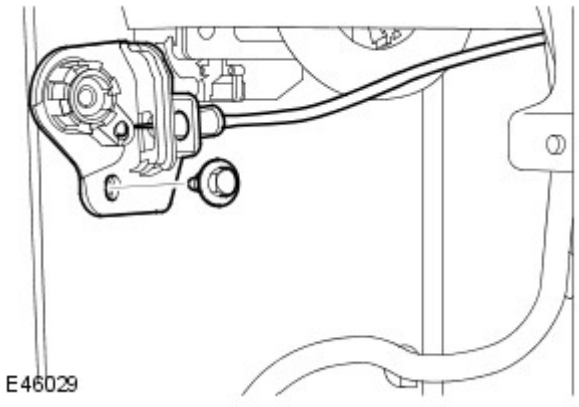
Removal and Installation

Removal

1. Remove the cowl side trim panel.
   For additional information, refer to: Cowl Side Trim Panel (501-05, Removal and Installation).



2. Disconnect the hood release cable from the connecting box.
   - Open the connecting box cover.



3. Remove the hood release lever housing.
   - Remove the bolt.
   - Disconnect the hood release cable.

Installation

1. Install the hood release lever housing.
   - Connect the hood release cable.
   - Tighten the bolt to 5 Nm (3.7 lb.ft).

2. Attach the hood release cable to the connecting box.
   - Close the connecting box cover.

3. Install the cowl side trim panel.
   For additional information, refer to: Cowl Side Trim Panel (501-05, Removal and Installation).

Published: 06-Aug-2013

Handles, Locks, Latches and Entry Systems - Exterior Rear Door Handle

Removal and Installation

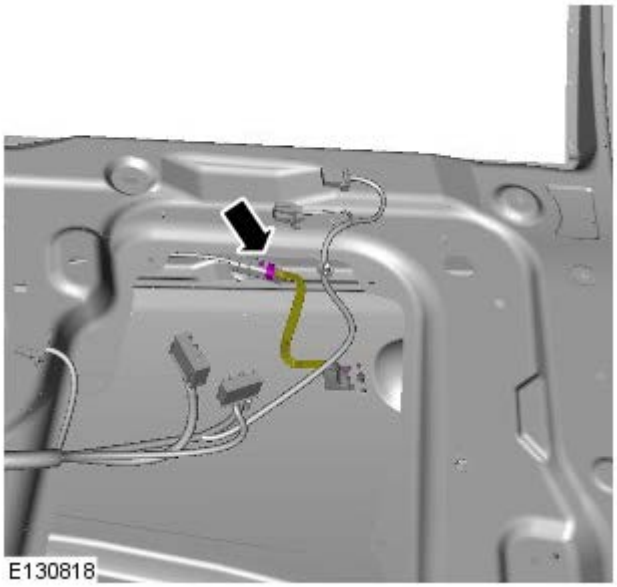
Removal

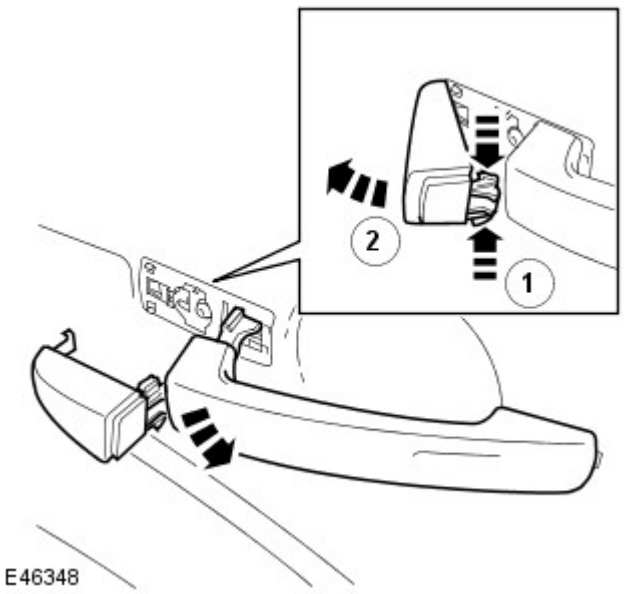
NOTE: If the exterior handle is to be removed in conjunction with additional door internal items, then it is recommended that the exterior handle and screw cover be released from the inside of the door, after removal of the door trim pad, regulator and motor.

1. NOTE: Vehicles with passive entry system.

   For additional information, refer to: Rear Door Window Regulator and Motor (501-11, Removal and Installation).

2. Disconnect the electrical connector.





3. NOTES:

   All vehicles.

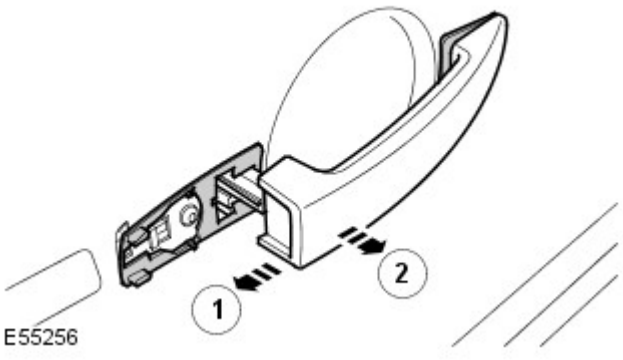
   Removal of the screw cover may break the retaining clips.

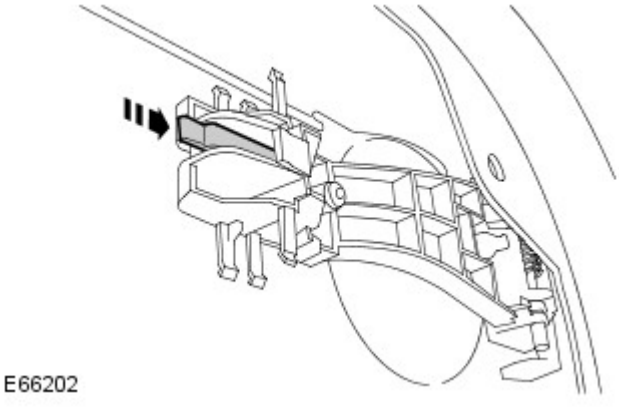
   If the screw cover is to be removed in conjunction with additional door internal items, then it is recommended that the screw cover be released from the inside of the door, after removal of the door trim pad, regulator and motor.

   Remove the screw cover.
   - Release the 2 clips.

4. NOTE: Vehicles without passive entry system.

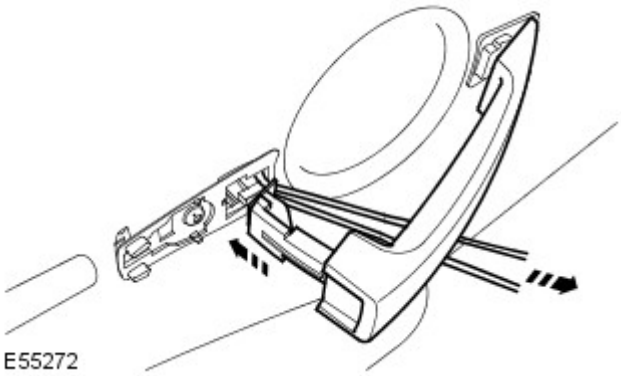
   To remove the exterior rear door handle, without removal of the door trim pad.
   - Slide the handle firmly rearward, then pivot the handle away from the door to remove it.
   - Remove the 2 gaskets.





5. To remove the exterior rear door handle, after removal of the door trim pad and regulator.
    - Using a nylon mallet, carefully release the clip.
    - Remove the 2 gaskets.

Installation



1. NOTE: Use a length of cord to hold the lock lever against spring pressure while engaging the outside handle.

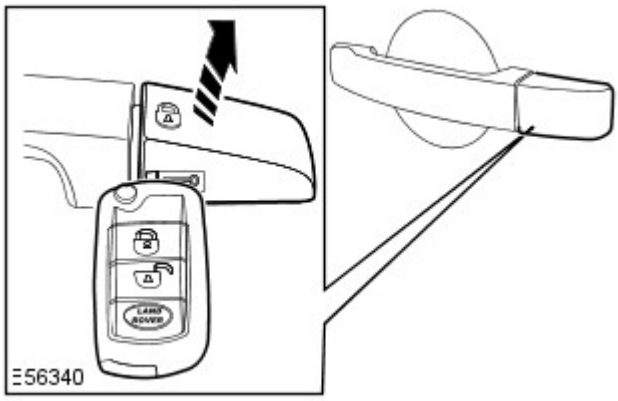
   To install, reverse the removal procedure.

Published: 11-May-2011

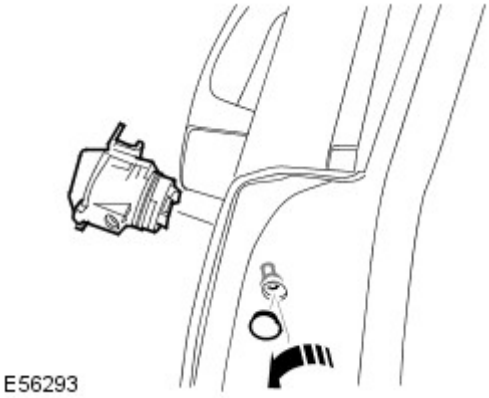
Handles, Locks, Latches and Entry Systems - Door Lock Cylinder

Removal and Installation

Removal



1. Remove the front door lock cylinder cover.
   - Use the ignition key.



2. NOTE: The Torx screw remains in the door lock housing.

   Remove the front door lock cylinder.
   - Open the door.
   - Remove the access plug.
   - Loosen the Torx screw to release the lock.

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Handles, Locks, Latches and Entry Systems - Exterior Front Door Handle

Removal and Installation

Removal

NOTES:

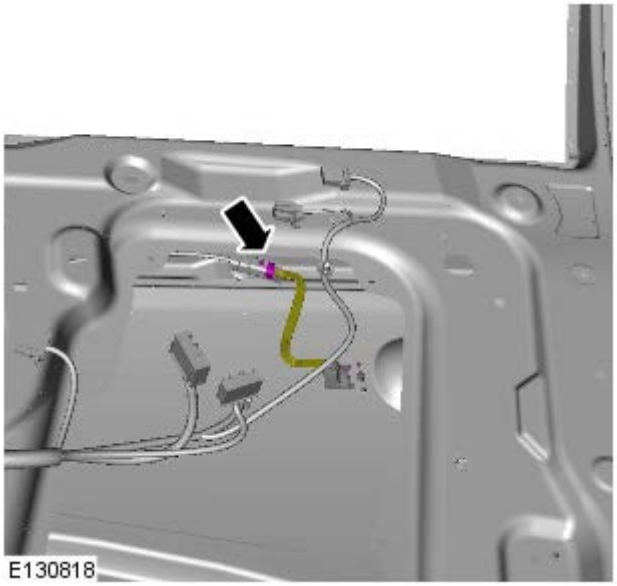
This procedure details removal and installation of both the LH and RH exterior front door handles.

If the exterior handle is to be removed in conjunction with additional door internal items, then it is recommended that the exterior handle and screw cover be released from the inside of the door, after removal of the door trim pad, regulator and motor.

1. NOTE: Vehicles with passive entry system.

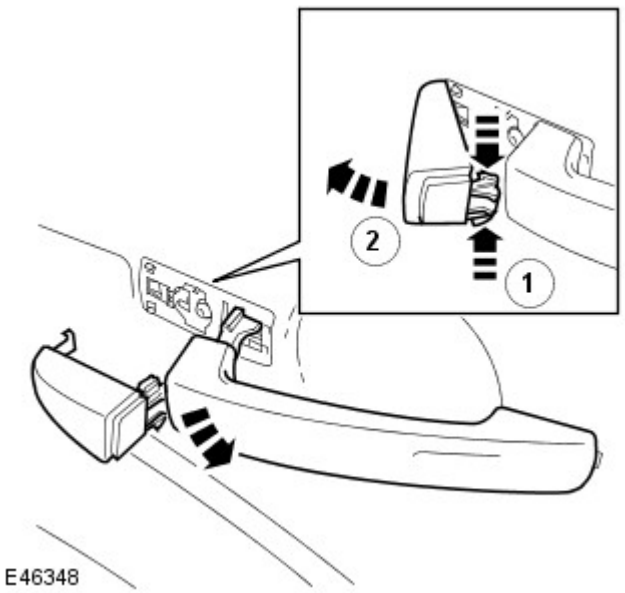
   Remove the window regulator assembly.
   For additional information, refer to: Front Door Window Regulator and Motor (501-11, Removal and Installation).

2. Disconnect the electrical connector.



3. NOTE: All vehicles.

   LH side: Remove the private lock.
   For additional information, refer to: Door Lock Cylinder (501-14, Removal and Installation).

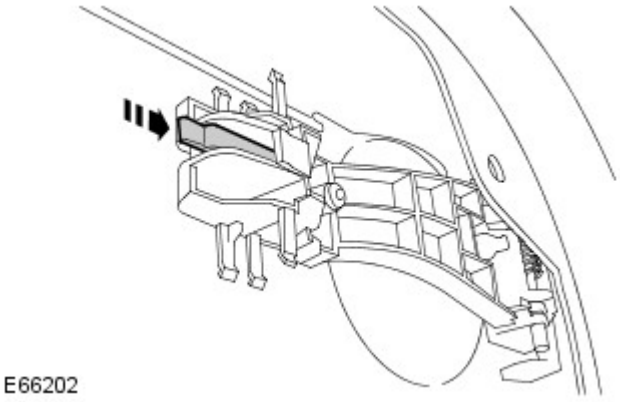


4. NOTES:

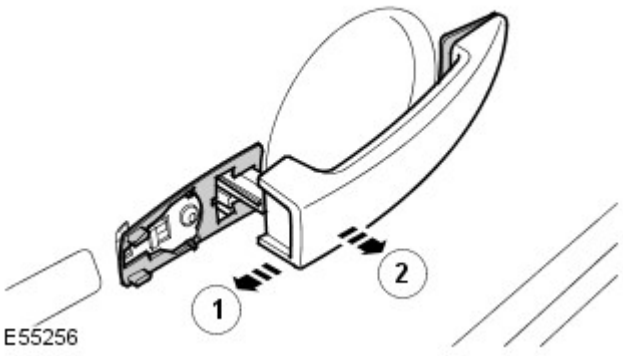
   Removal of the screw cover may break the retaining clips.

   If the screw cover is to be removed in conjunction with additional door internal items, then it is recommended that the screw cover be released from the inside of the door, after removal of the door trim pad, regulator and motor.

   RH side: Remove the screw cover.
   - Release the 2 clips.



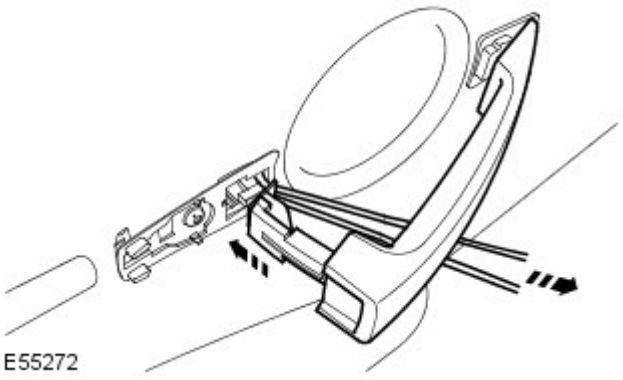
5. To remove the exterior front door handle, after removal of the door trim pad and regulator.
    - Using a nylon mallet, carefully release the clip.
    - Remove the 2 gaskets.



6. NOTE: Vehicles without passive entry system.

    To remove the exterior front door handle, without removal of the door trim pad.
    - Slide the handle firmly rearward, then pivot the handle away from the door to remove it.
    - Remove the 2 gaskets.

Installation



1. NOTE: Use a length of cord to hold the lock lever against spring pressure while engaging the outside handle.

    To install, reverse the removal procedure.

Published: 11-May-2011

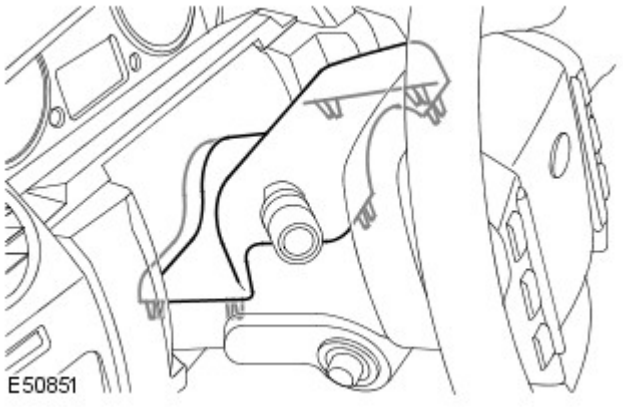
Handles, Locks, Latches and Entry Systems - Ignition Lock Cylinder

Removal and Installation

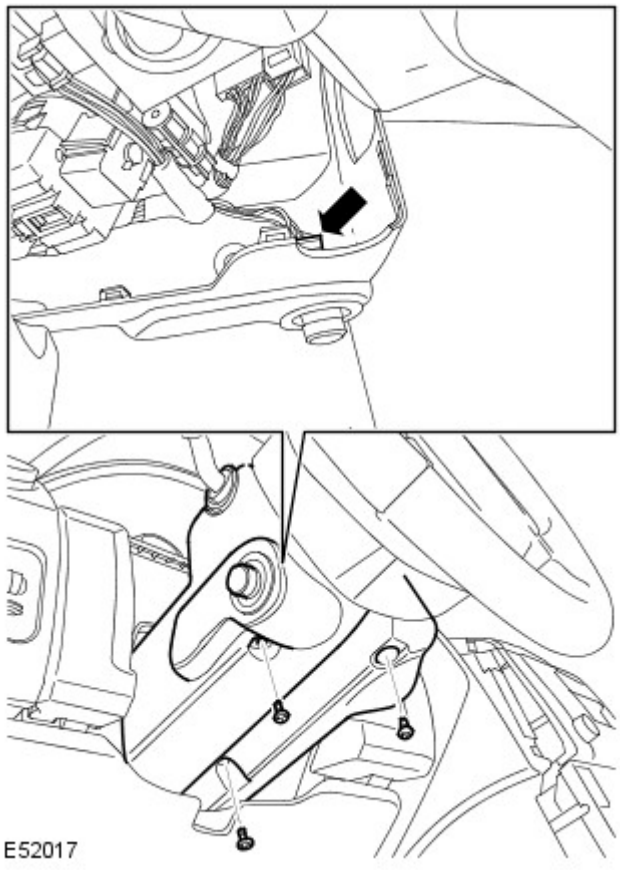
Removal

NOTE: This procedure is for removal and installation of the ignition lock cylinder. The ignition lock and door lock cylinders are replaced in sets.

1. Fully extend the steering column for access.

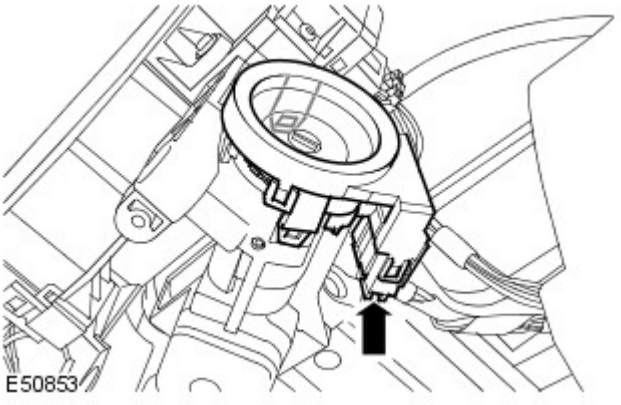


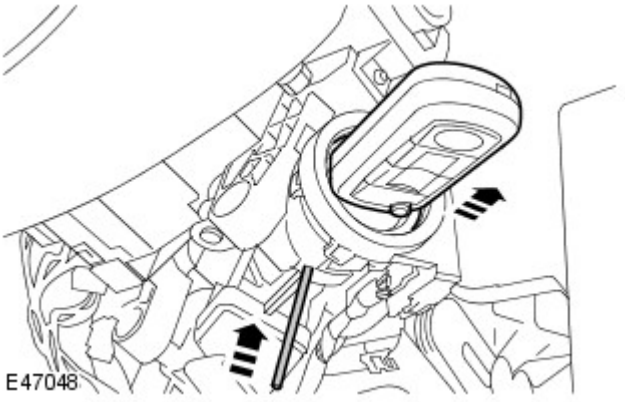
2. Remove the steering column upper shroud.
   - Release the 6 clips.



3. Remove the steering column lower shroud.
   - Remove the 3 Torx screws.
   - Disconnect the electrical connector.

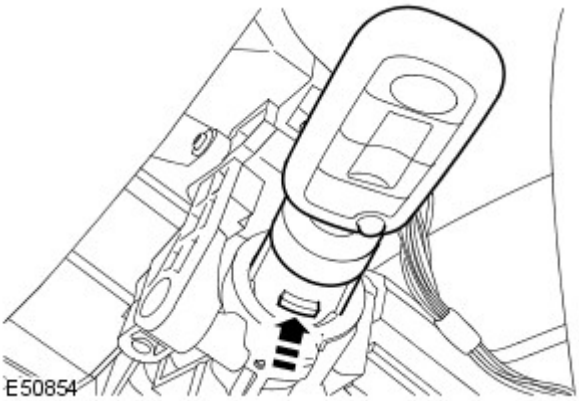
4. Remove the passive coil.
   - Disconnect the electrical connector.
   - Release the 2 clips.





5. Remove the ignition lock cylinder.
    - Turn the ignition key to position 1.
    - Insert a pin, not exceeding 2 mm diameter, through the access hole in the ignition lock cylinder housing to depress the plunger, and release the ignition lock cylinder.

Installation



1. Install the ignition lock cylinder.
    - Turn the ignition key to position 1.
    - Locate into guides and depress the plunger.
2. Install the passive coil.
    - Secure the clips.
    - Connect the electrical connector.
3. Install the steering column shrouds.
    - Connect the electrical connector.
    - Tighten the Torx screws.
    - Secure the clips.

Published: 30-Sep-2011

Handles, Locks, Latches and Entry Systems - Liftgate Latch Actuator

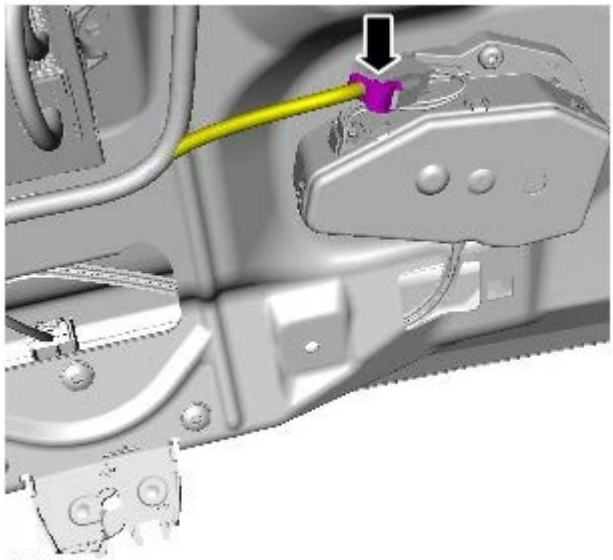
Removal and Installation

Removal

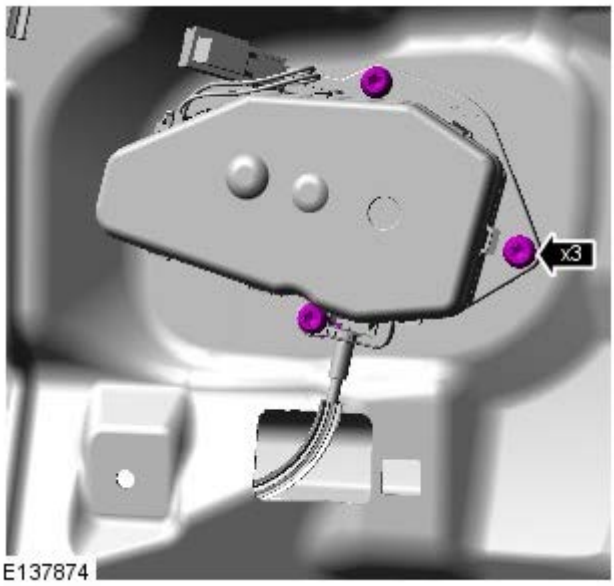
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Liftgate Trim Panel (501-05, Removal and Installation).

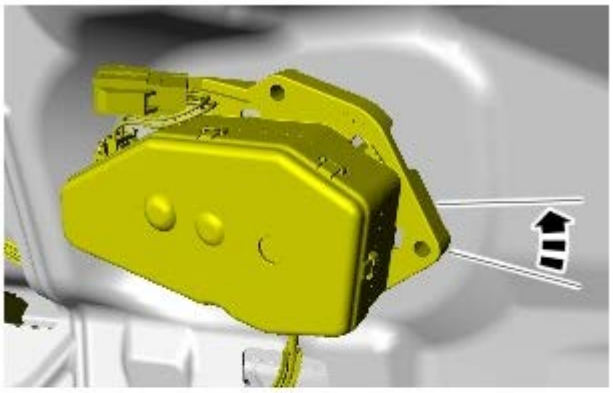
2.

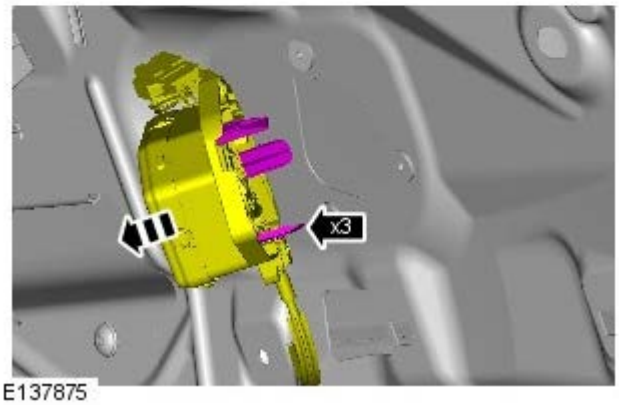


3. *Torque:* 10 Nm



4.

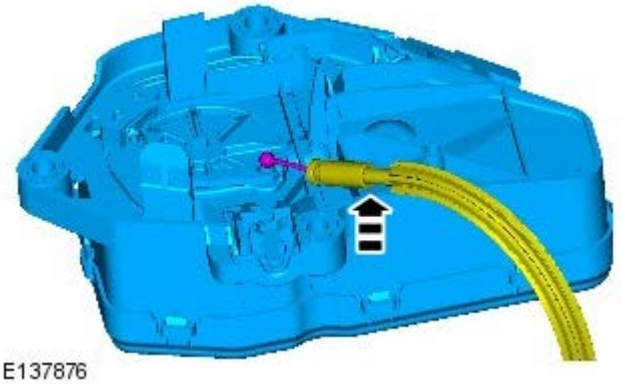




E137875

5.





E137876

Installation

1. To install, reverse the removal procedure.

Published: 26-Sep-2011

Handles, Locks, Latches and Entry Systems - Remote Keyless Entry (RKE) Module

Removal and Installation

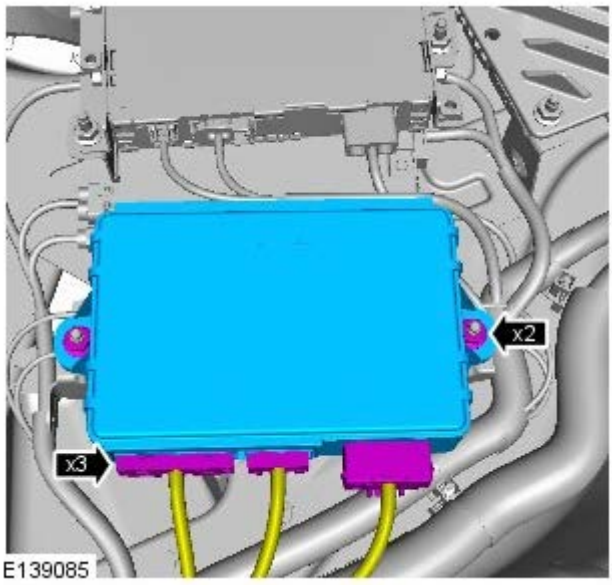
Removal

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

1. NOTE: RH side only.

   Refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).

2. *Torque:* 9 Nm



Installation

1. To install reverse the removal procedure.
2. Using the diagnostic tool, calibrate the component.

Published: 11-May-2011

Wipers and Washers -

Capacities

Item	Description
Windshield washer reservoir	6.3 litres (11.0 pints) (6.6 US quarts)

Torque Specifications

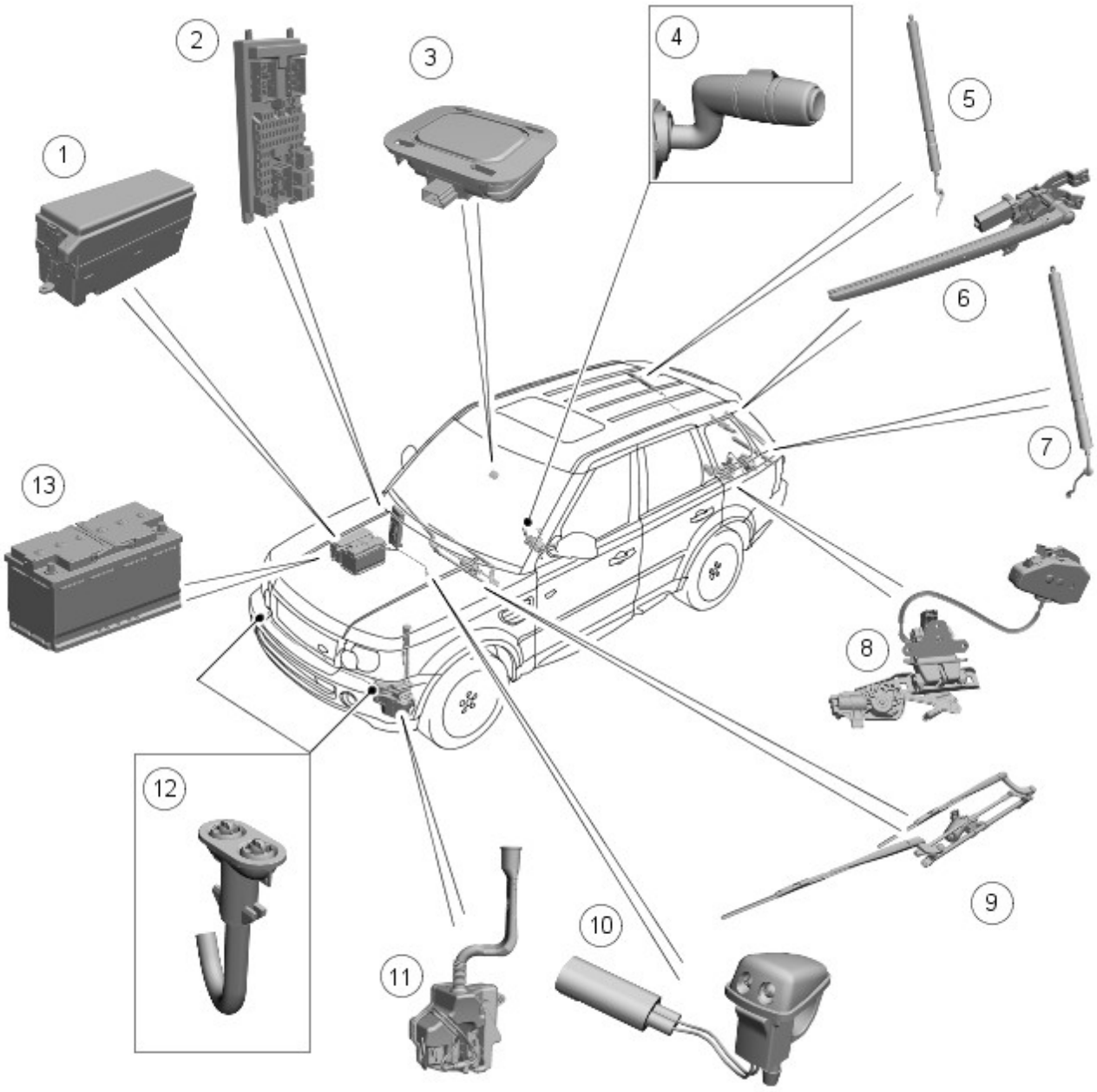
Description	Nm	lb-ft
Front wiper arms to linkage nut	18	13
Rear window wiper motor nuts	10	7
Rear wiper arm to motor nut	15	11
Wiper linkage to front wiper motor:		
Nut	25	18
Bolts	10	7
Wiper linkage to body bolts	6	4
Washer reservoir and pump assembly to body bolts	10	7
Rear wiper motor trim retaining plate nuts	6	4

Published: 28-Mar-2012

Wipers and Washers - Wipers and Washers

Description and Operation

Wiper and Washer System Component Location



E139810

Item	Part Number	Description
1	-	BJB (battery junction box)
2	-	CJB (central junction box)
3	-	Rain/Light sensor
4	-	Wiper control switch
5	-	RH (right-hand) tailgate strut
6	-	Rear wiper linkage and motor assembly
7	-	LH (left-hand) tailgate strut
8	-	Tailgate latch assembly
9	-	Front wiper linkage and motor assembly, including wiper arms and blades
10	-	Front washer jets
11	-	Washer reservoir and pumps
12	-	Headlamp washer jets
13	-	Battery

GENERAL

The wiper and washer system is controlled by the CJB on receipt of requests made by the driver or the rain/light sensor unit (if fitted). All wiper functions for the front and rear wipers are controlled from a multi-function wash/wipe switch assembly located on the right hand side of the steering column.

The wiper and washer system comprises:

- Front and rear wiper motors
- A front wiper linkage
- Two front and one rear wiper arms and blades
- Two front washer jets and one rear washer jet
- A washer reservoir and pump
- A wash/wipe control column switch.

The following optional items can be added to enhance the wiper system:

- A rain/light sensor for automatic wiper control
- Heated front washer jets
- Headlamp washers
- Low fluid level sensor (fitted to vehicles with headlamp washers).

The wiper system can be optionally equipped with a rain/light sensor. The sensor, located below the interior rear view mirror, detects raindrops on the windshield and automatically controls the operating speed of the front wipers. The column stalk switch must be in the intermittent position for rain/light sensor controlled wiper operation.

The front wiper system has five stages of operation and six intermittent delay periods.

The five wiper stages are as follows:

1. Flick wipe
2. Off
3. Intermittent
4. Normal (slow) speed continuous
5. Fast speed continuous.

Speed Control Intermittent Mode

The intermittent mode is affected by road speed, providing the speed control intermittent wipe mode has been configured. The intermittent wiper delay periods change with the road speed and wiper sensitivity positions, with the delay decreasing as the road speed increases.

Speed Dependent Wipe Mode

When the speed dependent wipe mode has been configured, the normal continuous operation changes to intermittent operation when the vehicle has been driven above 2 mph (3km/h) and then drops below 2 mph (3km/h). The fast speed operation changes to normal operation when the vehicle has been driven above 2 mph (3km/h) and then drops below 2 mph (3km/h).

The wiper and washers operate with the ignition switch in position II. Wiper functions are suspended during engine cranking to reduce battery power consumption under high load conditions.

Diagnostic information for the wiper system is available and can be retrieved using T4.

CENTRAL JUNCTION BOX (CJB)

The CJB is an integrated unit located behind the instrument panel on the passenger side of the bulkhead. The CJB contains fuses, relays and a number of microprocessors, which control the power supply and functionality of the wash/wipe system and other vehicle systems.

Inputs and Outputs

The CJB receives and sends the following wiper and washer system inputs and outputs:

Inputs

- Intermittent front wipe switch
- Rear wipe park switch
- Rain/light sensor, if fitted
- Normal (slow) speed continuous switch
- Fast speed continuous switch
- Flick wipe switch
- Front shield wash switch
- Rear shield wash switch
- Ignition switch
- Lighting switch
- Low level reservoir status, via CAN
- Vehicle speed, via CAN
- Front wiper motor park switch
- Reverse switch, via CAN
- Tail gate open switch
- Ambient temperature, via CAN

Outputs

- Front wiper motor (normal)
- Front wiper motor (fast)

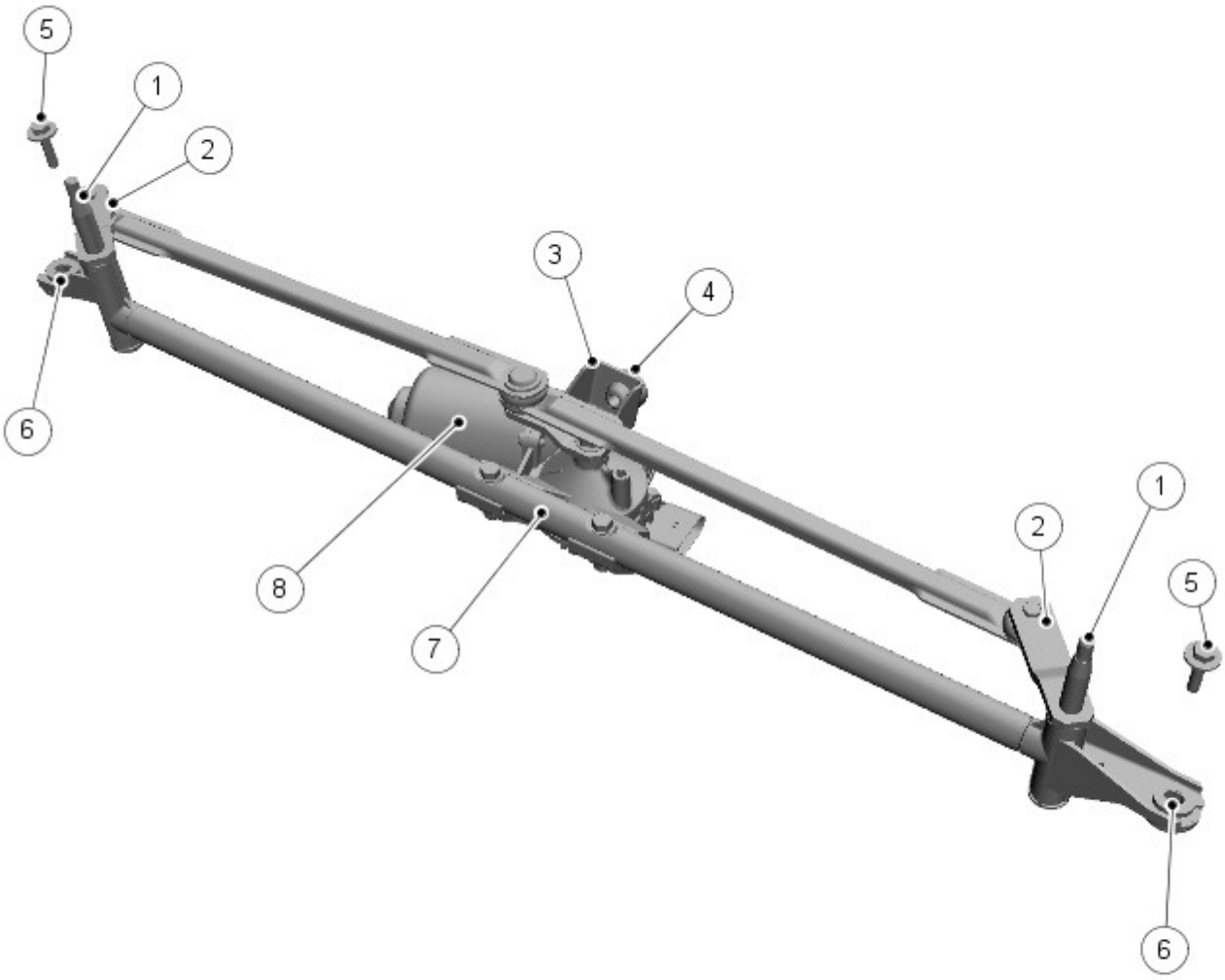
- Washer motors
- Heated washer jets (if fitted)
- Rear wiper motor relay
- Headlamp power wash motor

FRONT WIPER ASSEMBLY

The front wiper assembly comprises:

- Wiper motor and linkage assembly
- Wiper arms and blades
- Washer reservoir, pumps and jets.

Wiper Linkage



E139777

Item	Part Number	Description
1	-	RH pivot housing assembly
2	-	Link rod
3	-	Bracket
4	-	Bush
5	-	Bolt
6	-	Bush
7	-	Link rod
8	-	Motor assembly

The wiper linkage and motor assembly are available as separate components. The wiper linkage and motor differs between LH and RH drive models.

The assembly is located below the plenum grill in the engine compartment and is secured with bushes, sleeves and bolts. The rubber bushes isolate the assembly from the body mountings.

The linkage assembly comprises a main tube, with a pivot housing at each end. The motor is attached directly to the tube. A motor crank is positively attached to the motor output shaft. Two link rods then attach to the motor crank, which transfers power directly to each pivot crank.

The motor crank converts rotary motion from the motor output shaft into linear movement of the link rods. The cranks, connected between the each link rod and pivot housing, convert the linear motion to reciprocating motion at the pivot housing. This reciprocating motion is passed to the wiper arms and blades causing the blades to wipe an arc across the windshield.

Wiper Motor

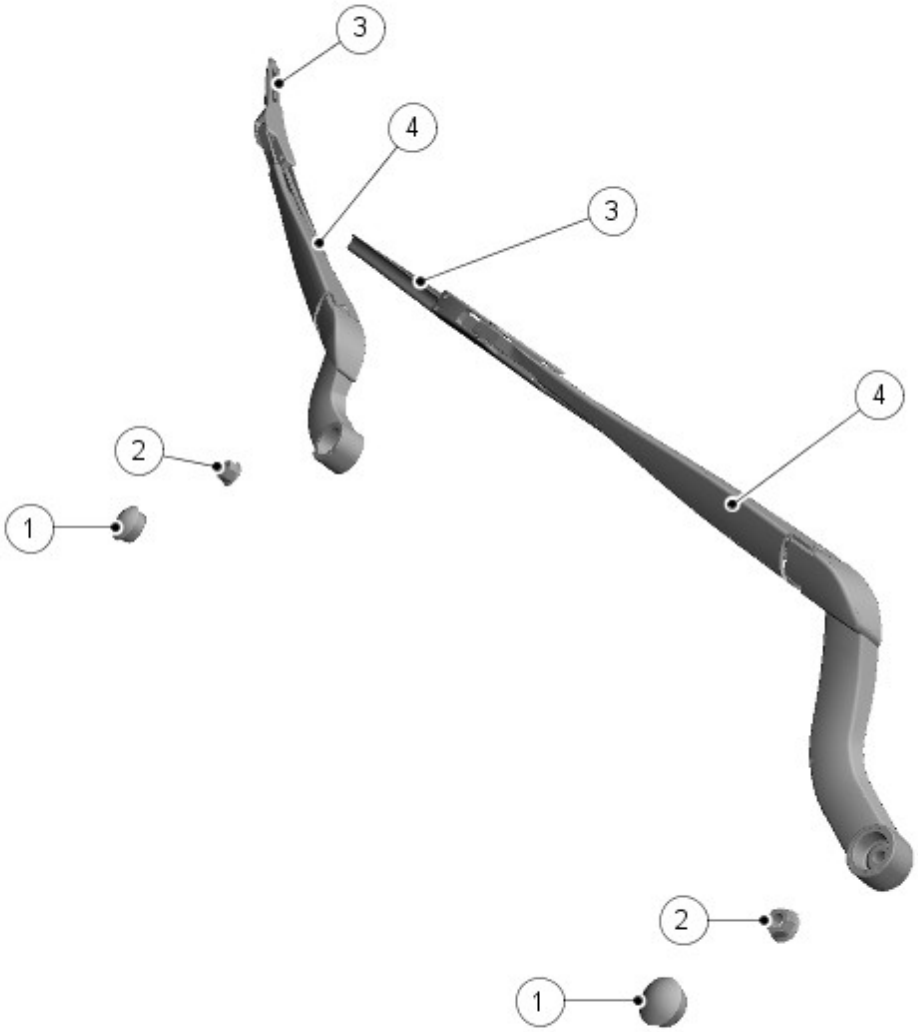
The motor assembly comprises a DC (direct current) motor, which drives a gear wheel via a worm drive attached to the motor spindle. The gear wheel has a central spigot, which provides the attachment point for the motor crank.

A five-pin connector connects the motor electrically. The connector supplies two battery voltage feeds to the motor (when switched). The motor has three sets of brushes with one brush connected to ground. One feed is direct to the motor brush opposite the ground brush and operates the motor at normal (slow) speed. The second feed is connected to a motor brush, which is offset from the ground brush and operates the motor at fast speed. With the power supplied through this brush, the current flows through fewer coil windings. This results in a lower resistance to the current flow to the ground brush and gives a higher motor rotational speed.

Output control of the wiper motor is through a double contact relay. The relay is located in the BJB.

The motor has an internal track switch, which signals the CJB when the wipers have reached the park position. The park signal is closed circuit when the wipers are in the park position. When the wipers are switched off and the CJB receives the park position signal from the motor, the CJB shorts the motor via a relay bridge circuit. This short circuit has the effect of applying a brake to the motor, giving precise positioning of the wiper blades in the park position.

Wiper Arms



E139778

Item	Part Number	Description
1	-	Spindle caps
2	-	Securing nuts
3	-	Wiper blades
4	-	Wiper arms

The wiper arms are positively located on tapered splines on the wiper linkage spindles.

The wiper arm has a pivot point, midway between the spindle attachment and the blade. A tension spring is connected to the wiper arm on each side of the pivot point and applies pressure to maintain the wiper blade in contact with the windshield.

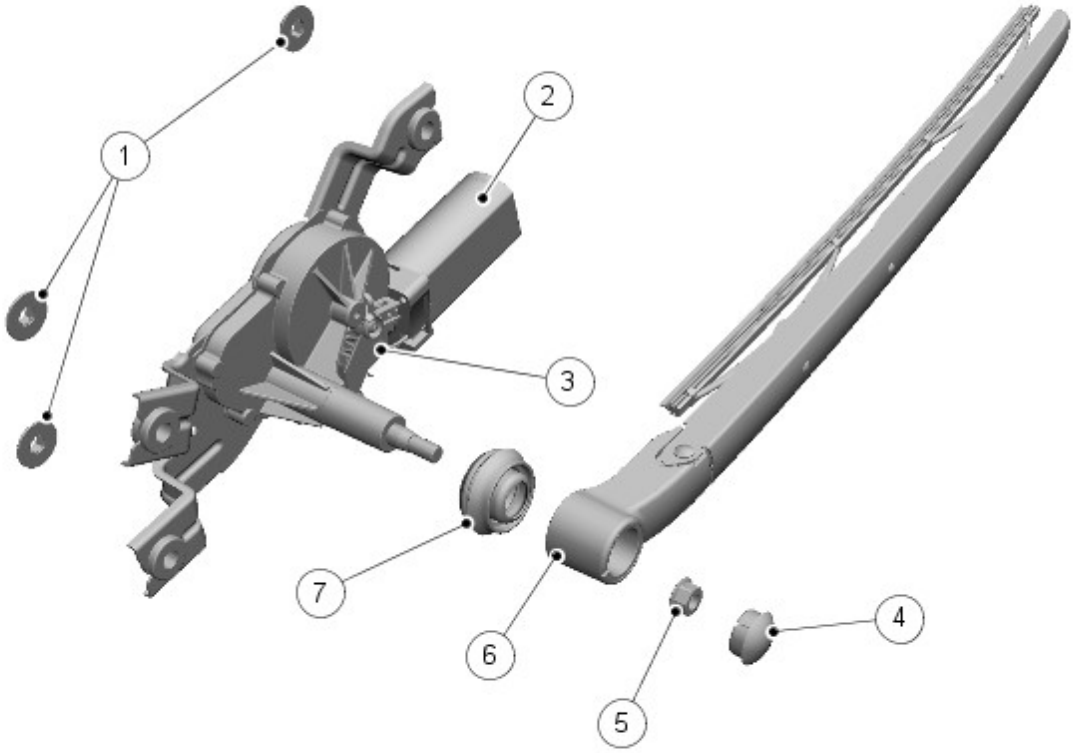
The wiper blades are attached to the wiper arms with clips that allow the blade to pivot. The wiper blades comprise a sprung steel curved backbone which applies pressure evenly to the windshield, to which is applied the wiping lip to the bottom surface and an aero foil section to the top which presses the blades onto the windshield at high vehicle speeds.

REAR WIPER ASSEMBLY

The rear wiper assembly comprises:

- Wiper motor
- Rear washer pump
- Rear washer jet
- Wiper arm and blade
- Glass sealing grommet.

Wiper Motor



E139811

Item	Part Number	Description
1	-	Washers and nuts
2	-	Motor assembly
3	-	Harness connector
4	-	Spindle cap
5	-	Securing nut
6	-	Wiper arm
7	-	Pivot housing connection

Rear wiper and washer operation is controlled by the CJB, via the rear wiper relay, which is located in the LH 'D' post.

The rear wiper motor is located in the upper tailgate, behind a trim panel. The assembly is secured to the body of the upper tailgate with three M6 nuts. Bushes isolate the motor assembly from the body, which help reduce the transmission of motor operating noise to the tailgate.

The motor is located on a worm drive gearbox mechanism, which converts the rotary motion of the motor output spindle into the required arc for the rear wiper blade.

The feed hose, for the separate rear washer jet, is located at the rear of the motor spindle. The hose is connected to a 90 degrees connector allowing the washer fluid to flow through the center of the motor spindle. A Non-Return Valve (NRV) is located in the hose, near the motor, and prevents fluid returning to the reservoir.

The motor spindle is a conventional design with a taper spline location for the wiper arm and a threaded shank to secure the arm to the spindle.

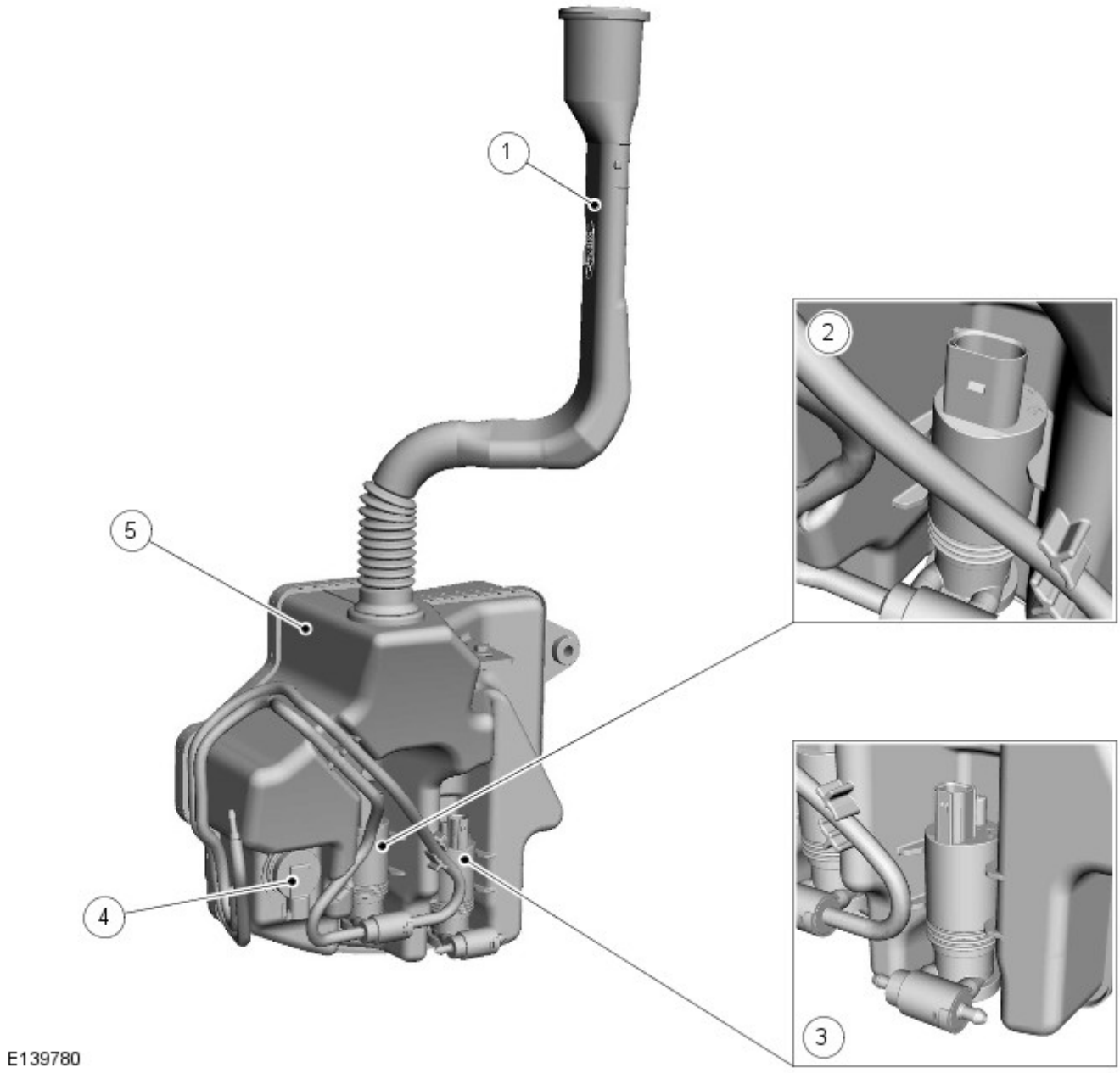
Wiper Arm

The wiper arm is similar in design to the front wiper arms. The arm attachment hole has tapered splines, which mate with the splines on the wiper spindle. The arm is secured to the wiper motor spindle with a nut. The wiper arm has a pivot point, close to the spindle attachment. A tension spring is connected to the wiper arm on each side of the pivot point and applies pressure to maintain the wiper blade in contact with the windshield.

The wiper blade is attached to the wiper arm with a clip that allows the blade to pivot. The blade comprises a number of levers and yokes to, which the rubber wiper blade is attached. The levers and yokes ensure that the pressure applied by the arm tension spring is distributed evenly along the full length of the blade and also allow the blade to adjust to the curvature and contour of the windshield.

A plastic cap located on the arm pivot point, covers the spindle attachment nut.

WASHER RESERVOIR AND PUMPS



E139780

Item	Part Number	Description
1	-	Filler tube and cap
2	-	Headlamp washer pump
3	-	Front and rear screen washer pump
4	-	Fluid level sensor
5	-	Reservoir

The windshield washer system comprises:

Vehicles without headlamp washers:

- A reservoir and filler neck
- A washer pump
- Two washer jets

- A rear washer jet
- Hoses

Vehicles with headlamp washers:

- A reservoir and filler neck
- Two washer pumps
- A level sensor
- Four washer jets - two windshield and two headlamp washers
- A rear washer jet
- Hoses

The plastic, molded reservoir is located in the LH wheel arch, behind the liner and has a capacity of 11.08 pints (6.3 liters). It is secured to the body and front panel with bolts. A boss on the reservoir locates in a slot in the front panel and provides additional support.

The reservoir has two recessed holes on its rear face, which provide location for the combined front pump, rear pump and headlamp washer pumps. The pumps are push fitted into grommets, which seal the pumps in their locations. A hole in the top of the reservoir allows for the fitment of a flexible filler neck. The front and rear wash hoses are integrated into the harness and so follow it's routing. The headlamp washer hose comes from the bumper around the bottle to attach to the headlamp washer pump.

A hole with a grommet in the side of the reservoir provides the location for the fluid level sensor.

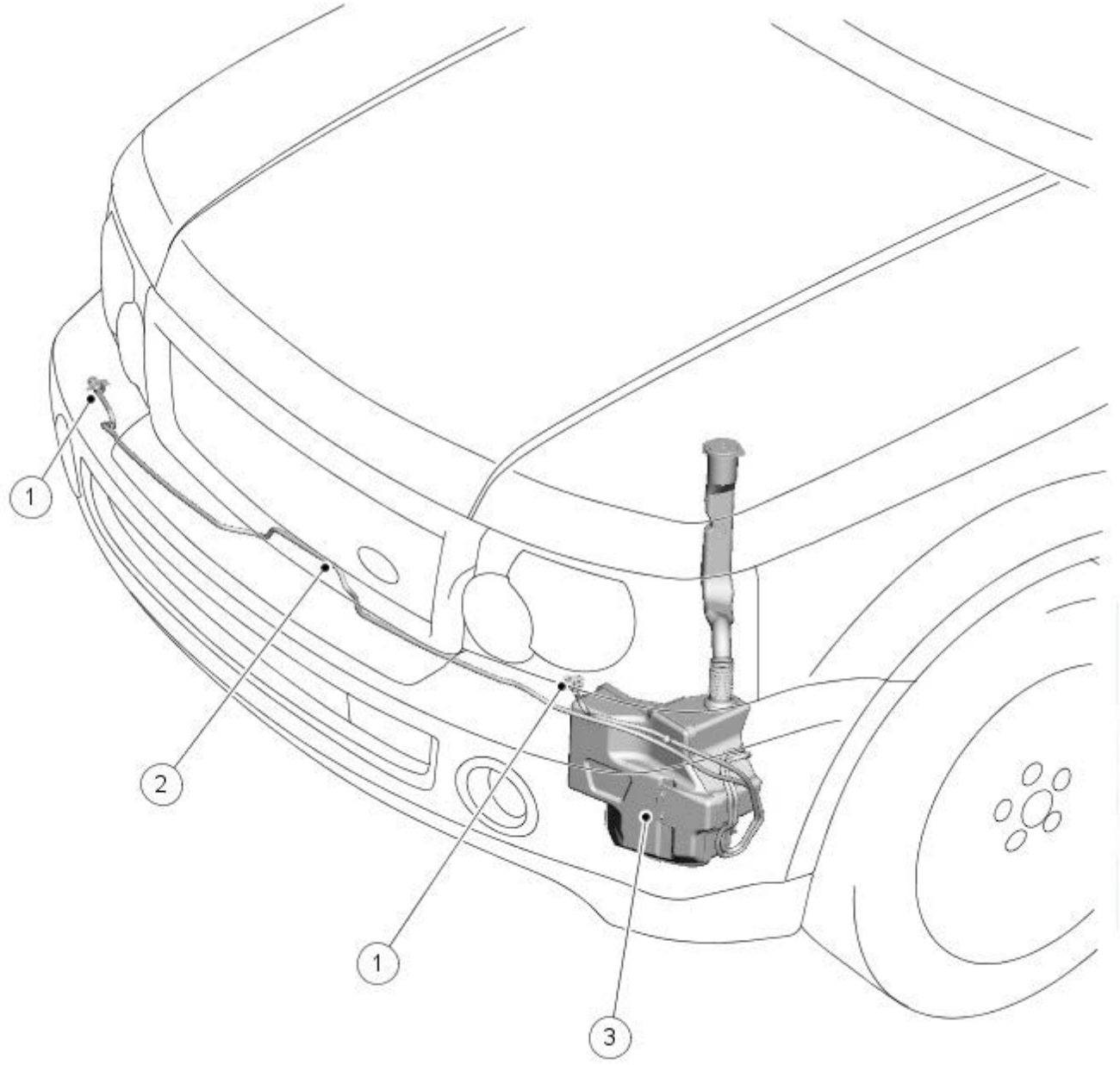
The low level sensor has a float, with integral magnet. The sensor has a contact, which is normally closed when the reservoir is full. When the fluid level reduces to approximately 1 liter, the magnetic float pivots down, which causes the switch contact to open. This open circuit is sensed by the CJB and transmits the low fluid level message on the CAN (controller area network) bus.

The sensor cannot determine the precise amount of fluid in the reservoir, but can detect when the fluid level has fallen below a certain point. When the fluid level is low, the magnetic float opens the sensor contacts, breaking a circuit through the sensor. This broken circuit is sensed by the CJB, to which the sensor is directly connected.

The instrument cluster monitors the fluid level sensor continuously. The instrument cluster checks the fluid level sensor when the ignition is switched on to give the driver an early warning of the low fluid level. The instrument cluster then monitors the sensor value over a 25 second period when the ignition is on to prevent invalid messages due to fluid 'sloshing' in the reservoir.

When a low fluid level signal is transmitted to the high line instrument cluster, a 'WASHER FLUID LOW' message is displayed in the instrument cluster's message center. On the low line instrument cluster a low fluid level indicator is illuminated. The first display of this message, or illumination of the indicator, is accompanied by a 'chime' sound to alert the driver to the low fluid level.

HEADLAMP WASHERS



E139812

Item	Part Number	Description
1	-	Headlamp washer jets
2	-	Washer fluid tube
3	-	Reservoir

The headlamp washer assembly is located below each headlamp.

The headlamp washer operation is controlled by the CJB via a headlamp washer relay. The relay is located in the BJB.

Head Lamp Wash Only (No Wipe Function)

The headlamp washers are only active when the headlamps and ignition are switched on. If the washer reservoir fluid level becomes low, the CJB sends a message, via the CAN bus, to the instrument cluster. The CJB then suspends headlamp wash operation to preserve washer fluid in the reservoir.

With the ignition and lights on, headlamp wash is activated on the first operation of the wiper column control switch in the wash/wipe position.

The CJB monitors the operation of the wash/wipe switch and maintains a counter to restrict headlamp washer operation to every fourth operation of the wash/wipe switch in conjunction with a 10-minute timer. The timer prevents a second operation of the headlamp washers within a 10-minute period. Should the washer switch be activated for more than four programmed wipe requests during the 10-minute period, the headlamp washer will remain disabled. Only the next consecutive programmed wipe request, after the 10-minute timer has expired, will the headlamp washers be enabled. The counter and timer are reset when the ignition is switched to OFF or lights have been switched back on from off.

When headlamp wash is active, the CJB energizes the washer pump twice per cycle. The headlamp washer pump is powered for a 0.5 second period.

RAIN/LIGHT SENSOR



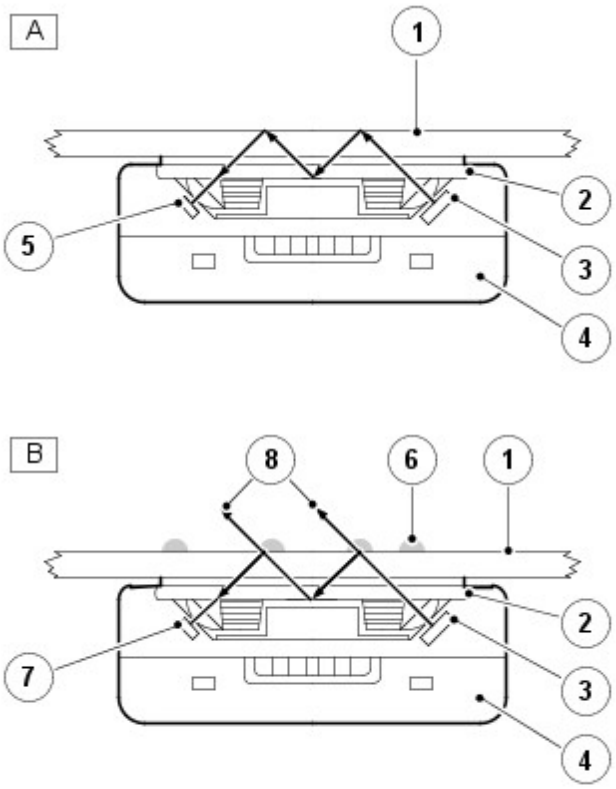
E133992

The rain/light sensor is located at the upper edge of the windscreen, behind the interior rear view mirror. The sensor is mounted on a mounting bracket, which is heat bonded to the inner surface of the windscreen during manufacture. Thus, if damage occurs to the optical unit, the windscreen will not have to be changed.

The rain sensor must be re-authorized to a new windscreen, if fitted, or if transferred to another vehicle, the new rain sensor assembly will automatically re-initialize when powered-up for the first time. In order for this to occur successfully, it must be fitted and connected to the windscreen bracket.

The sensor provides information to the CJB for the optimum wiper operation for the prevailing conditions to maintain the screen in a clear condition at all times. The rain/light sensor is an optical unit, which operates on an infrared waveband. The sensor uses the principle of the laws of reflection on interfacing surfaces between materials with differing refraction properties.

Rain Sensor Functionality



E43326

Item	Part Number	Description
A	-	Clean and dry windshield
B	-	Wet and dirty windshield

1	-	Windshield - Outside surface
2	-	Optical element
3	-	Transmitter diodes (100% light transmitted)
4	-	Rain/Light sensor assembly
5	-	Receiver diodes (100% received)
6	-	Water droplets/film
7	-	Receiver diodes (less than 100% light received)
8	-	Lost light

The rain/light sensor contains transmitter and receiver diodes, which transmit and receive infrared light. This is directed onto the windshield via an optical element. The light is directed at an angle so that light is reflected 100% on the outside surface of the shield and is transmitted back into the optical unit. To receive a 100% reflection, the outer shield surface must be clean and dry.

The rain/light sensor is active when the wiper column control switch is in the intermittent position. The rain/light sensor suspends wiper operation when the area of the windshield for the rain/light sensor is dry and operates the wipers continuously when the windshield is subject to heavy rainfall.

By using the intermittent rotary switch on the wiper stalk the driver can adjust the sensitivity of the rain/light sensor. Six sensitivity levels of the sensor can be selected, which has the effect of increasing or decreasing the wiper delay period, allowing driver adjustment for the prevailing conditions. When several continuous wipe cycles have taken place, the sensor will maintain the continuous operation to avoid switching back to intermittent from a continuous wipe and back again.

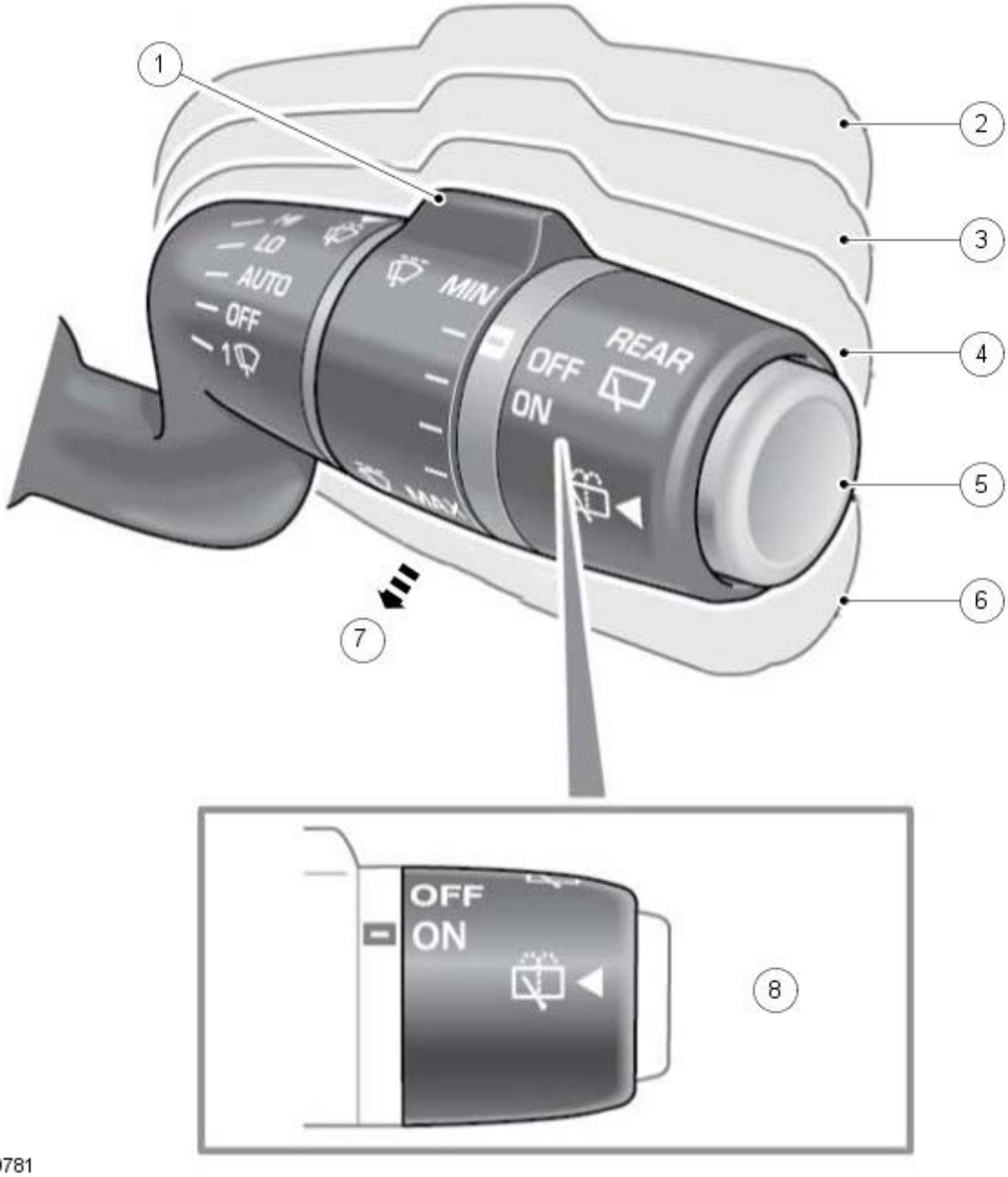
The rain/light sensor receives vehicle speed information from the ABS (anti-lock brake system) module on the LIN (local interconnect network) bus via the CJB. The sensor increases the sensitivity as the speed increases to optimize wiper operation. When the vehicle speed is reduced to less than 5 mph (8 km/h), the sensitivity is automatically reduced. Below this speed the wipers will only operate continuously in very heavy rain.

Automatic Headlamp Operation

A light sensor is incorporated in the housing of the rain/light sensor to control the operation of the automatic headlamps.

The rain/light sensor receives vehicle speed information from the ABS module on the LIN bus via the CJB. The speed information is used only for automatic headlamp operation.

WIPER CONTROL COLUMN SWITCH



E139781

Item	Part Number	Description
1	-	Intermittent wipe delay
2	-	High speed wipe
3	-	Low speed wipe
4	-	AUTO or intermittent wipe
5	-	Rear window wash/wipe
6	-	Single wipe of windscreen
7	-	Windscreen wash/wipe
8	-	Rear wiper

The wiper control column switch is located on the right hand side of the steering column and controls all front and rear wiper functions.

The switch comprises 7 switch positions and the intermittent rotary control. The switch positions each complete a combination of ground paths to connections on the CJB. The CJB interprets the selected combination of switches and operates the respective function accordingly.

Flick Wipe

Moving the switch down selects the front wiper flick function. The front wipers will operate at fast speed for as long as the flick wipe switch position is operated. Once the switch is released the front wiper motor will revert to a normal (slow) speed operation until the park position has been detected.

Intermittent

Moving the switch up one position from 'OFF', selects intermittent front wiper operation. The rotary potentiometer on the stalk selects one of six delay periods. The delay period is also influenced by vehicle speed (should speed control

intermittent wipe mode be configured), using a signal value derived from the ABS control module. The selected delay period decreases with an increase in road speed. When a rain/light sensor is incorporated into the system, the intermittent position also initiates wiper operation controlled by the rain/light sensor. The sensitivity of the rain/light sensor is also adjusted by moving the rotary switch to one of six positions.

The rotary switch selects differing output values for each position. The switch is wired to three data input terminals of the CJB.

Rotary Switch Position	Output Data 1	Output Data 2	Output Data 3
1	Yes	-	-
2	Yes	Yes	-
3	-	Yes	-
4	-	Yes	Yes
5	Yes	Yes	Yes
6	Yes	-	Yes

The speed control intermittent wipe mode has 6 sensitivity settings; position 1 being the most sensitive. There are 6 defined speed classes; 0 to 5, as shown in the following table:

Class	Speed Increase - MPH (KPH)	Speed Decrease - MPH (KPH)
0	Vehicle speed <5 (8), remain in class 0 Vehicle speed >5 (8), increment to class 1	- -
1	Vehicle speed >5 (8) and <20 (32), remain in class 1 Vehicle speed >20 (32), increment to class 2	Vehicle speed = 0, Revert to class 0 Vehicle speed > 0 and <20 (32), remain in class 1
2	Vehicle speed >20 (32) and <40 (64), remain in class 2 Vehicle speed >40 (64), increment to class 3	Vehicle speed <10 (16), revert to class 1 Vehicle speed >10 (16) and <40 (64), remain in class 2
3	Vehicle speed >40 (64) and <60 (96), remain in class 3 Vehicle speed >60 (96), increment to class 4	Vehicle speed <30 (48), revert to class 2 Vehicle speed >30 (48) and <60 (96), remain in class 3
4	Vehicle speed >60 (96) and <80 (128), remain in class 4 Vehicle speed >80 (128), increment to class 5	Vehicle speed <50 (80), revert to class 3 Vehicle speed >50 (80) and <80 (128), remain in class 4
5	Vehicle speed >80 (128), remain in class 5 -	Vehicle speed <70 (112), revert to class 4 -

Key:

- < = Less than
- > = Greater than.

Rear Wiper Speed Class Matrix (Delay value in Seconds)

Rotary Position	Speed Class					
	0	1	2	3	4	5
Position 1	6	5	4	3	2	0
Position 2	10	8	6	4	2	1
Position 3	14	11	8	5	3	1
Position 4	18	15	11	8	5	2
Position 5	22	18	13	9	6	3
Position 6	26	21	16	11	7	4

Front Wiper Speed Class Matrix (Delay value in Seconds)

Rotary Position	Speed Class					
	0	1	2	3	4	5
Position 1	3.5	3	2.5	2	1.5	1
Position 2	5	4	3.5	3	2.5	2
Position 3	7	6.5	6	5	4	3
Position 4	9	8	7	6	5	4
Position 5	11	9.5	8	7	6	5
Position 6	13	11	9	8	7	6

The rotary switch positions also influence the operation of the rain/light sensor (when fitted) by adjusting its sensitivity. Refer to the Rain/Light Sensor section for details.

Normal (Slow) Speed

The normal (slow) speed continuous wiper operation is selected by moving the switch vertically to the second detente position from 'OFF'. The wipers will operate continuously when the vehicle is moving. When the vehicle is stationary, or less than 5 mph (8 km/h), the CJB operates the wipers in the intermittent mode (if speed dependent wipe mode is configured), using a 3 second intermittent delay period.

Fast Speed

Fast speed continuous wiper operation is selected by moving the switch vertically to the third detente position. The wipers will operate continuously at fast speed when the vehicle is moving. When the vehicle is stationary, or less than 5 mph (8 km/h), the CJB operates the wipers in normal (slow) speed mode (if speed dependent wipe mode is configured).

Wash/Wipe

When the non-latching wiper stalk button is pushed the front shield washer is operated. If the wipers are off and the button is pressed for less than 0.5 seconds, only the washer will operate. If the button is pressed for more than 0.5 seconds, the wipers will come on and perform two wipes. If the switch is operated for more than 10 seconds, the pump will be disabled. When headlamp washers are fitted, the headlamp washers will operate if the front windshield washer is operated and the headlamps are on – refer to headlamp wash section for detail of operation. The CJB monitors the wash/wipe switch operation and after the switch is released, if a programmed wipe is enabled, the CJB allows two further wipe cycles to be completed.

Rear Wash/wipe

Moving the switch rearwards, towards the driver, selects the intermittent rear wash/wipe function. The intermittent delay period will vary according to the sensitivity settings and vehicle speed.

When the switch is moved rearwards to the second position and held, the washer pump will operate. If the switch is operated for more than 10 seconds, the pump will be disabled. When the switch is released, the rear wiper will complete a further two full wipe cycles and then operate on an intermittent function until selected off.

The rear wiper will operate continuously if the 'continuous rear wipe' function is enabled.

The intermittent delay period (below) depends on speed dependent wipe mode being enabled or disabled.

HEATED WINDSHIELD WASHER JETS

Two windshield washer jets are located on the hood outer surface. The washer fluid feed hose from the front shield pump is connected to a 'Y' piece connector located between the two jets. Two short lengths of hose connect the jets to the 'Y' piece. Each jet contains a NRV to prevent washer fluid draining back to the reservoir and also to limit the amount of washer fluid, which can be forced by gravity from the jet during cornering.

Each washer jet has two ball nozzles, which can rotate in their housing's to obtain the optimum fluid application onto the windshield. Each washer jet contains a heater element, which prevents the fluid freezing in the nozzles in very cold conditions and a PTC (positive temperature coefficient), which regulates the temperature. The jet heater elements are controlled by the ATC (automatic temperature control) module and a heated washer jet relay in the BJB.
For additional information, refer to: Control Components (412-04 Control Components, Description and Operation).

REVERSE GEAR INPUT

The rear wiper also operates if reverse gear is selected and the front wipers are on. If the front wipers are operating continuously when reverse is selected, the rear wiper will also operate continuously as long as reverse gear is engaged. If the front wipers are operating intermittently when reverse is engaged, the rear wiper will complete one wipe cycle then wipe intermittently.

On vehicles fitted with rain/light sensor, when reverse gear is selected while the front wipers are in intermittent mode but the rain/light sensor indicates that the front wipers are off, the rear wiper will not operate. If the rain/light sensor subsequently calls for a single wipe, the rear wiper will operate a single wipe cycle. If the rain/light sensor calls for a slow or fast wipe, the rear wiper will operate continuously.

The CJB will operate the rear wiper (providing the front wipers are on) upon receipt of a reverse gear signal from the TCM (transmission control module) on the CAN bus, via the instrument cluster.

'TAILGATE OPEN' DISABLE

If the rear wiper is switched on or is already running and the tailgate is opened, the rear wiper should not start to run, or should immediately become disabled during a wipe cycle. If the tailgate is subsequently closed, the wiper will resume its normal operation after a delay of three seconds. Should the vehicle speed input be more than 2 mph (3km/h), then the tailgate switch will be deemed as closed.

The CJB receives the 'tailgate open' signal directly from the upper tailgate central locking motor.

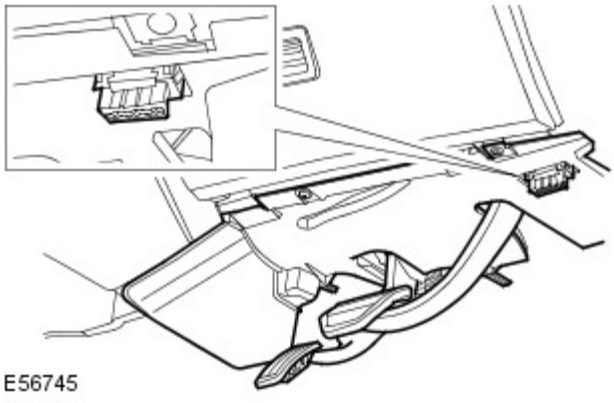
FRONT AND REAR WIPER MOTOR BLOCKING PROTECTION

The wiper park signal is also used by the CJB for blocking protection of the front wiper motor. This feature protects the motor in the event of the wiper operation being obstructed.

If the CJB does not receive a wiper park signal status change for a period of 6 seconds, when the wiper motor is active, the CJB removes the power supply to the motor. The motor will remain disabled until either an alternative motor mode has been selected, or the ignition has been moved to position 0 and back to position II. Should a stall condition be achieved 3 times during a single ignition position II status, then the wiper relay will remain disabled, regardless of wiper switch positions, for 180 seconds. The CJB will not automatically switch the motor on, to prevent the risk of injury. The wiper switch must be moved off and then on to reactivate the wiper motor. The blocking protection is active in all wiper switch positions and can only be reset by turning the ignition off.

The rear wiper algorithm contains the same logic as mentioned above.

DIAGNOSTICS



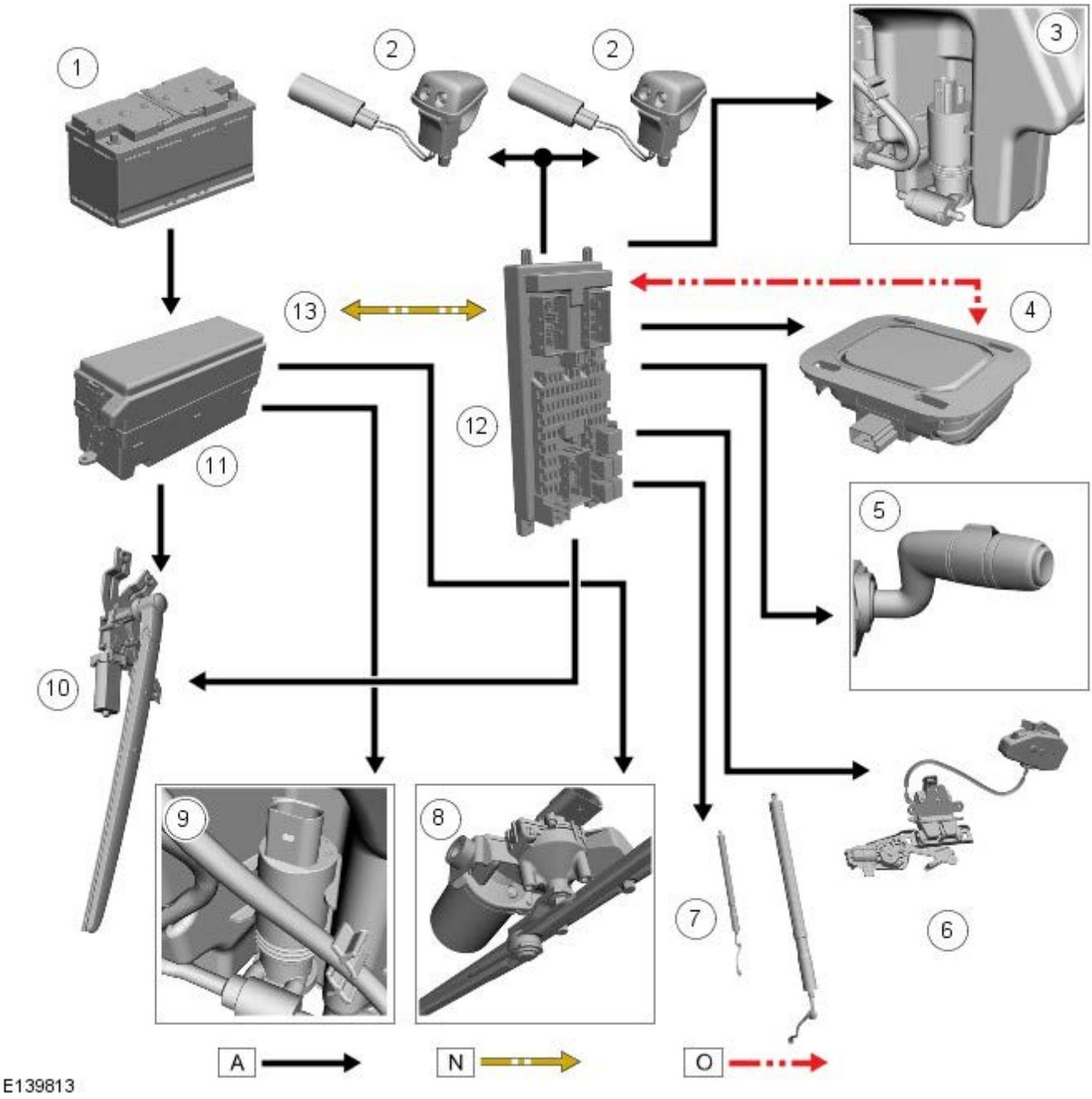
The diagnostic socket allows the transfer of information between the CJB, the rain/light sensor and T4. The diagnostic socket is located in the lower instrument panel, on the driver's side, below the steering column.

The rain/light sensor performs an internal self-test in the first 50ms from the ignition being switched to position I and can store fault codes, which can be used to diagnose, faults or non-function of the rain/light sensor. The faults are stored in a non-volatile memory which retains the logged fault codes even when the power supply is disconnected. If a rain/light sensor fault prevents the sensor from operating, the CJB will control wiper operation as if a rain/light sensor is not installed in the system.

The CJB monitors all inputs and outputs relative to the wiper system and other CJB controlled functions on the LIN bus. If a fault is detected, a code applicable to that fault is stored in a fault log. Two fault logs are provided within the CJB for internal and external faults.

CONTROL DIAGRAM

NOTE: **A** = Hardwired; **N** = Medium speed CAN; **O** = LIN bus.



Item	Part Number	Description
1	-	Battery
2	-	Heated windshield washer jets
3	-	Front and rear screen washer pump
4	-	Rain/Light sensor
5	-	Wiper control switch
6	-	Tailgate latch assembly
7	-	Tailgate struts
8	-	Front wiper motor assembly
9	-	Headlamp washer pump
10	-	Rear wiper motor assembly
11	-	BJB
12	-	CJB
13	-	CAN connection to other systems

Published: 20-Aug-2012

Wipers and Washers - Wipers and Washers

Diagnosis and Testing

Principle of Operation

For a detailed description of the wipers and washers systems and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: Wipers and Washers (501-16 Wipers and Washers, 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
• Windshield and rear window for damage or contamination e.g. road film or general residue deposits • Wiper blades, arms and linkage for wear, security, damage and freedom of movement • Windshield / rear window / headlamp washer fluid level • Washer hoses and jets for leaks, restrictions and damage	• Battery condition and state of charge • Fusible links • Fuses • Relays • Electrical connections • Front and rear wiper motors • Wiper switch • Washer pumps • Rain/light sensor • Heated front washer jets • Light switch • Ambient air temperature sensor • Central Junction Box (CJB) • Battery Junction Box (BJB) • Anti-lock Brake System (ABS) control module • Automatic Temperature Control Module (ATC) • Instrument Cluster (IC) module • Controller Area Network (CAN) circuits

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
Wiper blade(s) drag/judder across the windshield / rear window	• Contamination of the windshield / rear window • Wiper arm(s) incorrectly installed • Wiper arm(s) incorrectly aligned to the screen • Wiper arm(s) spring tension inadequate	• Clean the windshield / rear window • Check the wiper arm installation • Check the wiper arm alignment • Check the wiper arm tension
Very slow operation of the wiper(s) across the windshield / rear window	• Low battery voltage • Front wiper linkage seized or fouling • Wiper circuit short circuit to ground, short circuit to power, open circuit, high resistance	• Refer to the relevant section of the workshop manual and test the battery • Check the wiper linkage for seizure and fouling • Refer to the electrical circuit diagrams and test the wiper circuit for short circuit to ground, short circuit to power, open circuit, high resistance
Wiper(s) inoperative		
Noisy operation of wiper(s)	• Wiper motor/linkage fault	• Lift the wiper arm(s) from the windshield / rear window and recheck the noise level during the

		wiper sweep operation
Noisy operation of washers	• Washer motor(s) faulty • Washer system blocked or partially blocked	• Listen for washer motor operation. Check and top up washer fluid level. Check and rectify blocked washer circuit • Using the manufacturer approved diagnostic system, check the Central Junction Box (CJB) for related DTCs and refer to the relevant DTC index
Washers do not operate	• Fluid level low • Washer circuit blocked • Washer circuit faulty	

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).

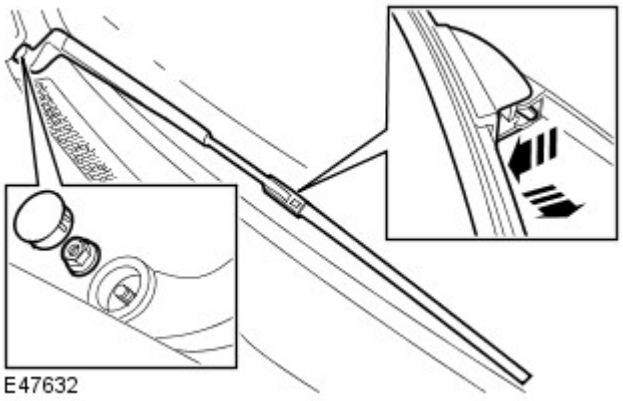
Published: 16-May-2013

Wipers and Washers - Front Wiper Pivot Arm

Removal and Installation

Removal

1. Noting the fitted position, remove the front wiper pivot arm.
    - Remove the nut cover.
    - Remove the nut.



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

   Remove the wiper blade.
    - Release the clip.

Installation

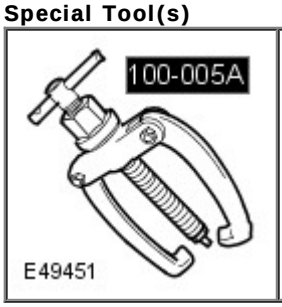
1. To install, reverse the removal procedure.
    - Tighten the nut to 24 Nm (18 lb.ft).

Published: 11-May-2011

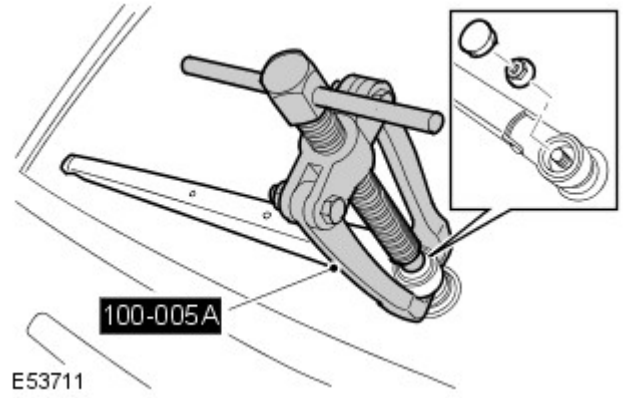
Wipers and Washers - Rear Wiper Pivot Arm

Removal and Installation

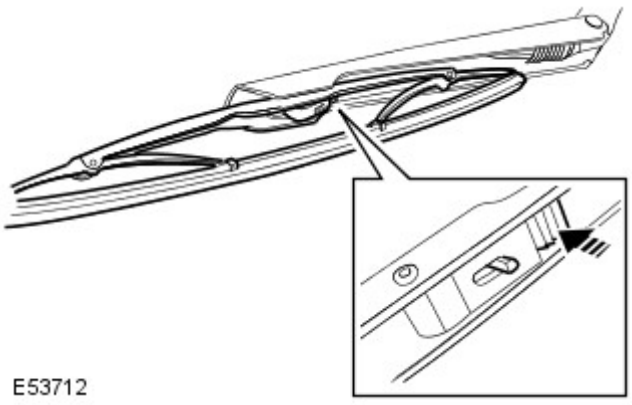
Special Tool(s)

	General purpose puller 100-005A (LRT-99-500A)

Removal



1. Noting the fitted position and using the special tool, remove the rear wiper pivot arm.
   - Remove the nut cover.
   - Remove the nut.



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

   Remove the wiper blade.
   - Release the clip.

Installation

1. To install, reverse the removal procedure.
   - Tighten the nut to 15 Nm (11 lb.ft).

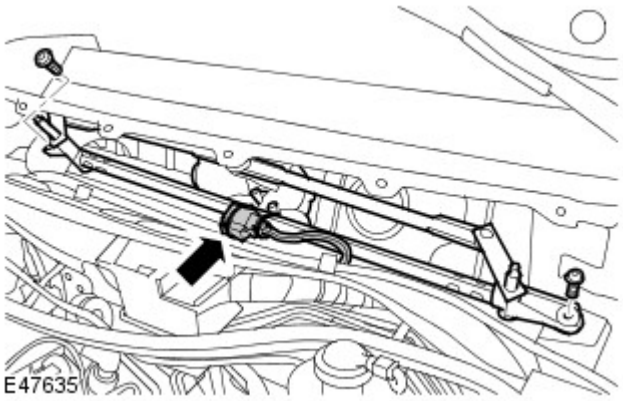
Published: 11-May-2011

Wipers and Washers - Windshield Wiper Motor

Removal and Installation

Removal

1. Remove the plenum chamber panel.
   For additional information, refer to: Plenum Chamber (412-01, Removal and Installation).



2. Remove the windshield wiper motor and linkage.
   - Remove the 2 bolts.
   - Remove the 2 clips.
   - Disconnect the electrical connector.



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

   Noting the fitted position, remove the wiper linkage.
   - Remove the 2 bolts.
   - Remove the nut.

Installation

1. Install the wiper linkage.
   - Tighten the bolts to 10 Nm (7 lb.ft).
   - Tighten the nut to 25 Nm (18 lb.ft).

2. CAUTION: Make sure the windshield wiper motor is located on its stud prior to installing the bolts.

   Install the windshield wiper motor and linkage.
   - Tighten the bolts to 6 Nm (4 lb.ft).
   - Connect the electrical connector.
   - Install the clips.

3. Install the plenum chamber panel.
   For additional information, refer to: Plenum Chamber (412-01, Removal and Installation).

Published: 30-Sep-2011

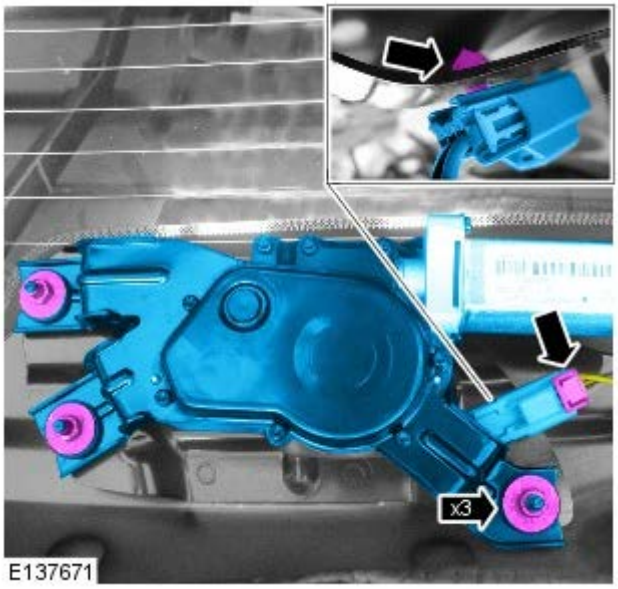
Wipers and Washers - Rear Window Wiper Motor

Removal and Installation

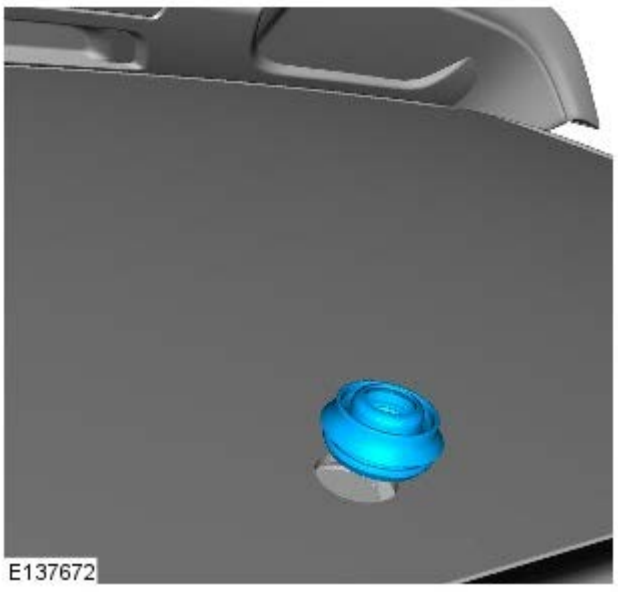
Removal

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

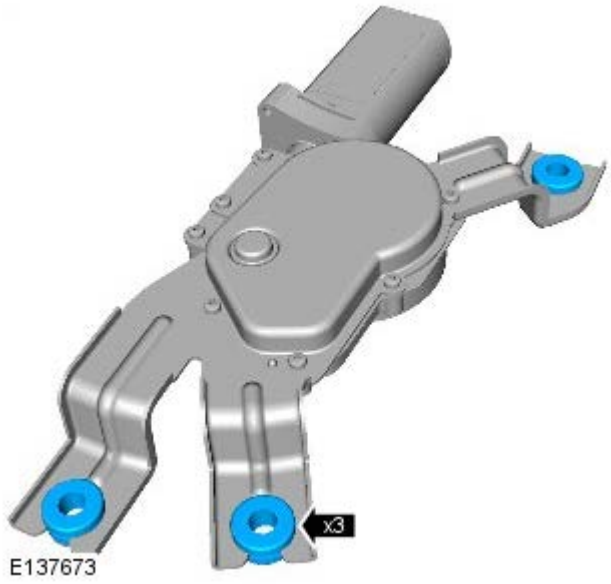
1. Refer to: Rear Wiper Pivot Arm (501-16, Removal and Installation).
2. Refer to: Liftgate Trim Panel (501-05, Removal and Installation).
3. *Torque:* 10 Nm



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



5.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Wipers and Washers - Windshield Washer Pump

Removal and Installation

Removal

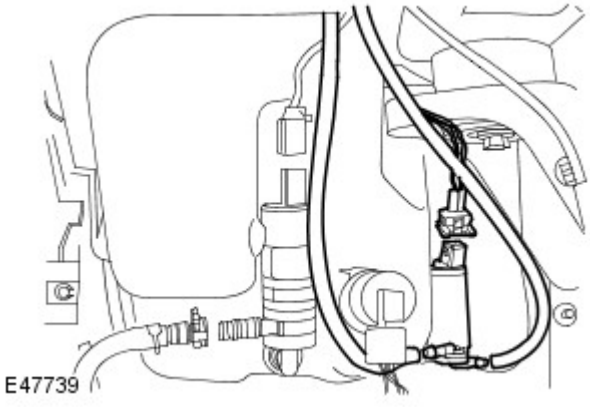
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the LH fender splash shield.
   For additional information, refer to: Fender Splash Shield (501-02, Removal and Installation).

3. Release the windshield washer pump hoses.
   - Drain the washer reservoir fluid.

4. Disconnect the windshield washer pump electrical connector.



5. Remove the windshield washer pump.
   - Discard the O-ring seal.

Installation

1. Install the windshield washer pump.
   - Install a new O-ring seal.

2. Connect the windshield washer pump electrical connector.

3. Connect the windshield washer pump hoses.

4. Install the fender splash shield.
   For additional information, refer to: Fender Splash Shield (501-02, Removal and Installation).

5. Lower the vehicle.

6. Top-up the windshield washer reservoir.

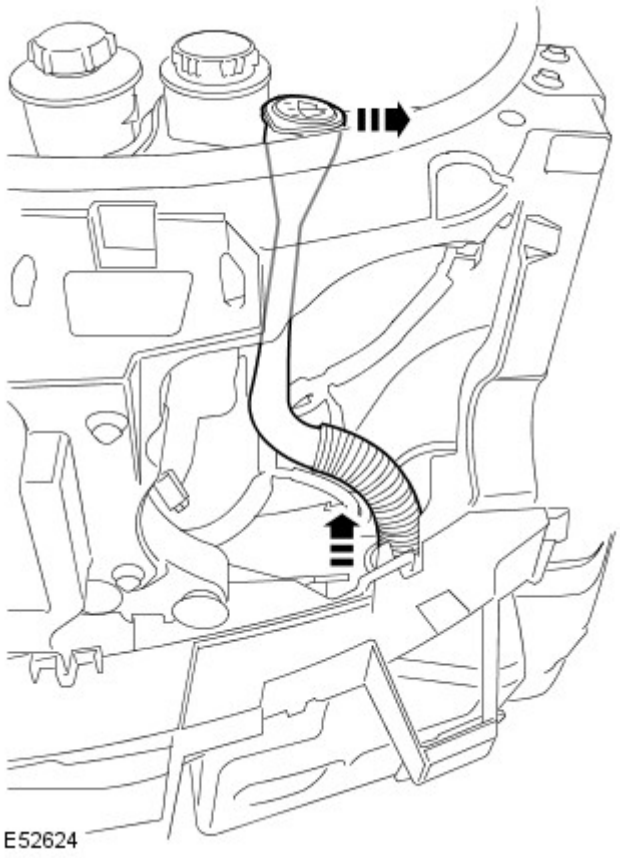
Published: 11-May-2011

Wipers and Washers - Windshield Washer Reservoir

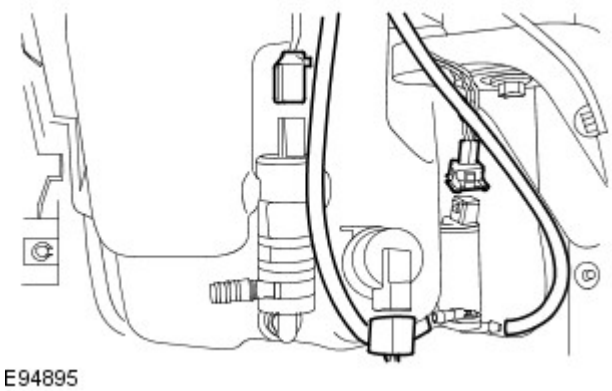
Removal and Installation

Removal

1. Remove the front bumper cover.
   For additional information, refer to: Front Bumper Cover (501-19, Removal and Installation).

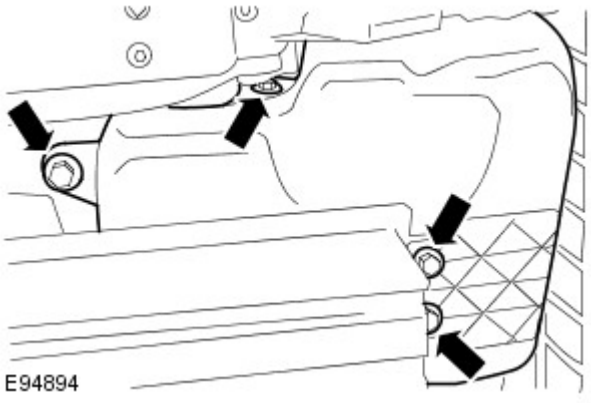

E52624

2. Remove the windshield washer reservoir filler neck.
   - Release the windshield washer reservoir filler neck from the coolant expansion tank.
   - Remove and if necessary, discard the seal.


E94895

3. NOTE: Some fluid spillage is inevitable during this operation.

   Disconnect the 2 hoses from the windshield washer reservoir pumps.
   - Drain the washer reservoir fluid.
   - Disconnect the 3 electrical connectors.

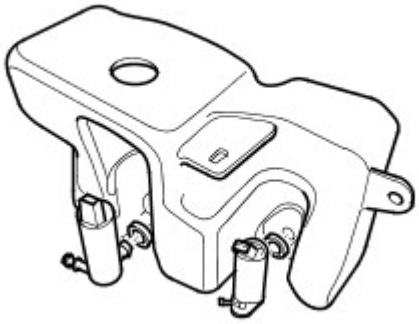

E94894

4. Remove the windshield washer reservoir.
   - Remove the 4 bolts.

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

   Remove the windshield washer pump.
   - Remove and if necessary, discard the seal.

6. Remove the headlamp washer pump.
   - Remove and if necessary, discard the seal.



E47738

Installation

1. Install the windshield washer pump.
   - If necessary, install a new seal.

2. Install the headlamp washer pump.
   - If necessary, install a new seal.

3. Install the windshield washer reservoir.
   - Tighten the M6 bolts to 6 Nm (4 lb.ft).
   - Tighten the M8 bolt to 25 Nm (18 lb.ft).

4. Connect the 2 hoses to the windshield washer reservoir pumps.
   - Connect the electrical connectors.

5. Install the windshield washer reservoir filler neck.
   - If necessary, install a new seal.
   - Lubricate the seal.
   - Secure in the clip.

6. Install the front bumper cover.
   For additional information, refer to: Front Bumper Cover (501-19, Removal and Installation).

Published: 11-May-2011

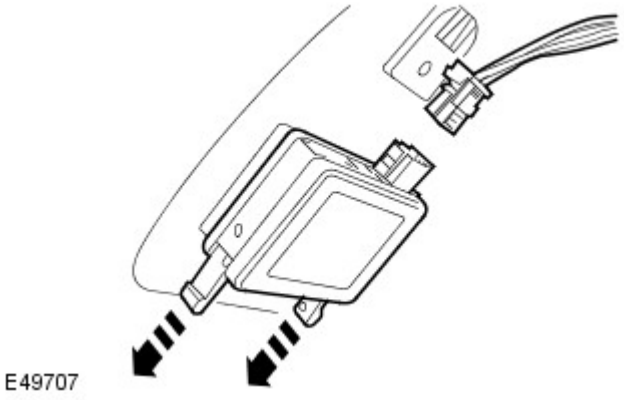
Wipers and Washers - Rain Sensor

Removal and Installation

Removal

1. Remove the interior mirror.
   For additional information, refer to: Interior Mirror (501-09 Rear View Mirrors, Removal and Installation).

2. Remove the rain sensor.
   - Release the 2 clips.
   - Disconnect the electrical connector.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Wipers and Washers - Headlamp Washer Pump

Removal and Installation

Removal

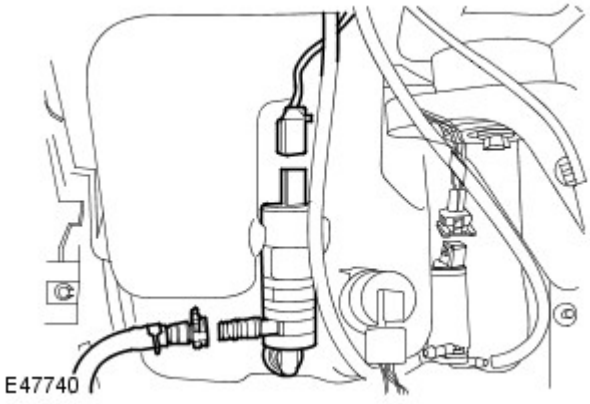
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the LH fender splash shield.
   For additional information, refer to: Fender Splash Shield (501-02, Removal and Installation).

3. Release the headlamp washer pump hose.
   - Drain the washer reservoir fluid.

4. Disconnect the headlamp washer pump electrical connector.



5. Remove the headlamp washer pump.
   - Discard the O-ring seal.

Installation

1. Install the headlamp washer pump.
   - Install a new O-ring seal.

2. Connect the headlamp washer pump electrical connector.

3. Connect the headlamp washer pump hose.

4. Install the fender splash shield.
   For additional information, refer to: Fender Splash Shield (501-02, Removal and Installation).

5. Lower the vehicle.

6. Top-up the windshield washer reservoir.

Published: 11-May-2011

Wipers and Washers - Headlamp Washer Jet

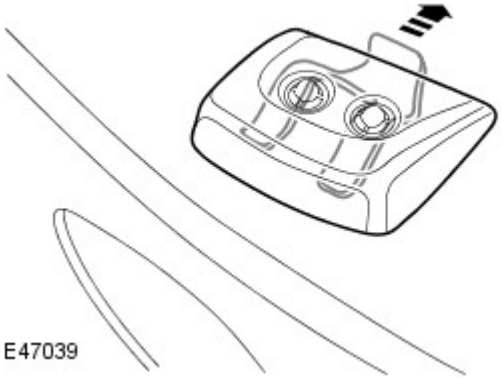
Removal and Installation

Removal

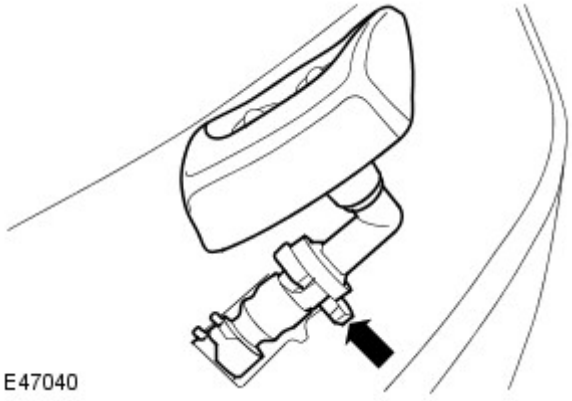
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Remove the front fog lamp.
   For additional information, refer to: Front Fog Lamp (417-01, Description and Operation).

3. Release the washer jet assembly.
   - Release the clip.



4. Remove the washer jet.
   - Release the hose clip and disconnect the hose.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Roof Opening Panel -

Torque Specifications

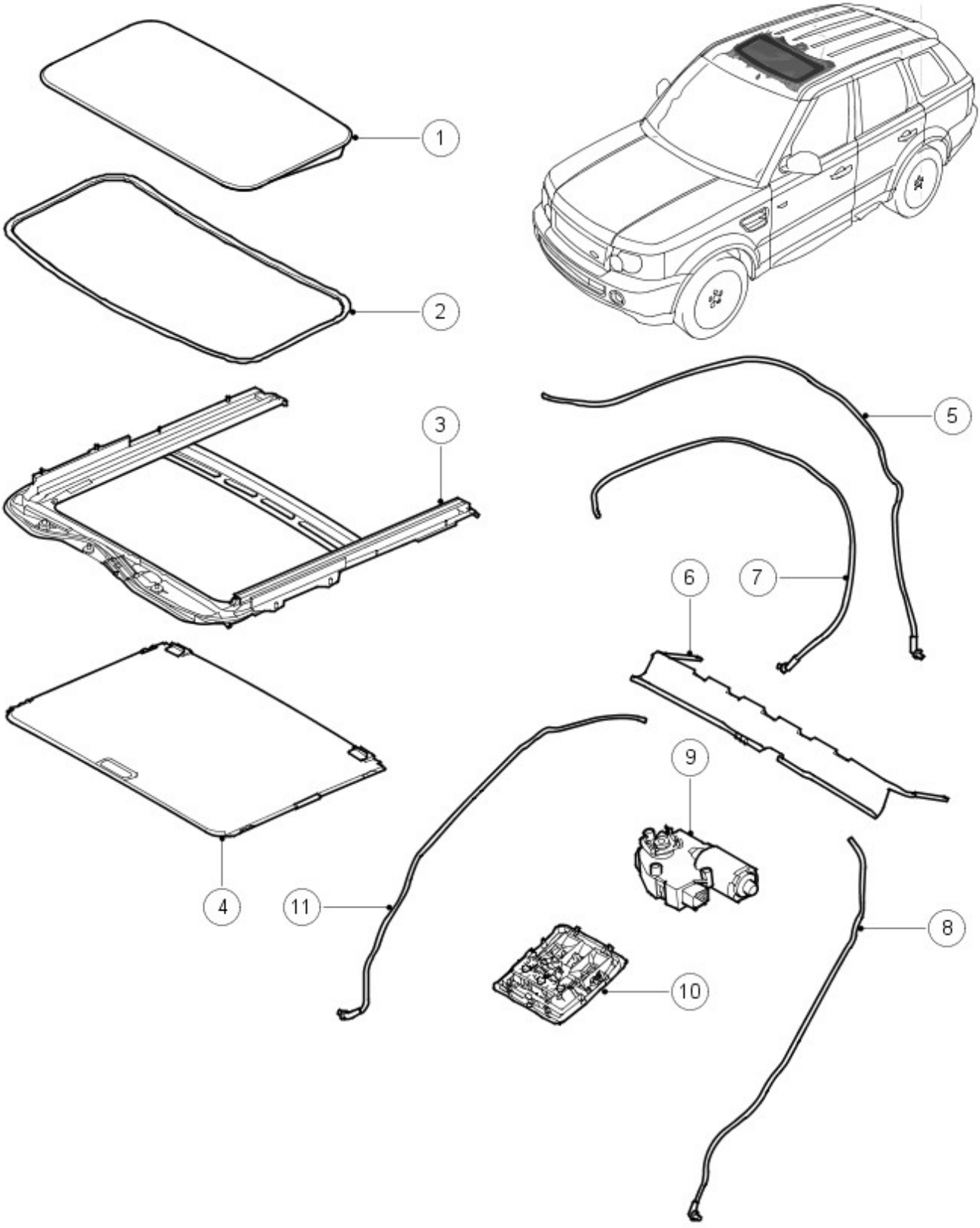
Description	Nm	lb-ft
Roof opening panel motor Torx screws	4	3
Roof opening panel bolts	10	7
Roof opening panel alignment Torx screws	6	4

Published: 17-Jan-2013

Roof Opening Panel - Roof Opening Panel

Description and Operation

Roof Opening Panel Components

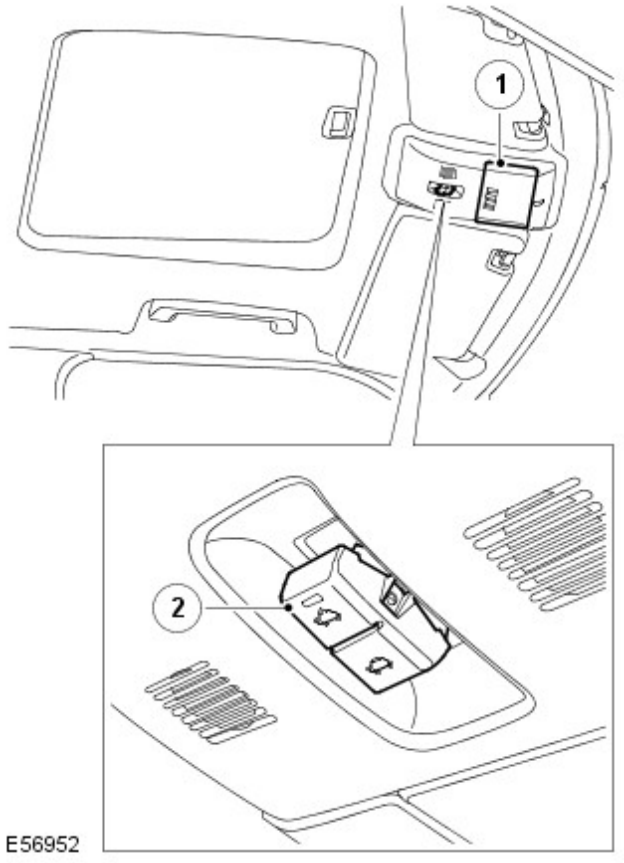


E56951

Item	Part Number	Description
1	-	Glass panel assembly
2	-	Glass panel seal
3	-	Frame assembly
4	-	Sunblind
5	-	RH rear drain tube

6	-	Deflector
7	-	LH rear drain tube
8	-	LH front drain tube
9	-	Motor with integral control module
10	-	Access panel
11	-	RH front drain tube

GENERAL

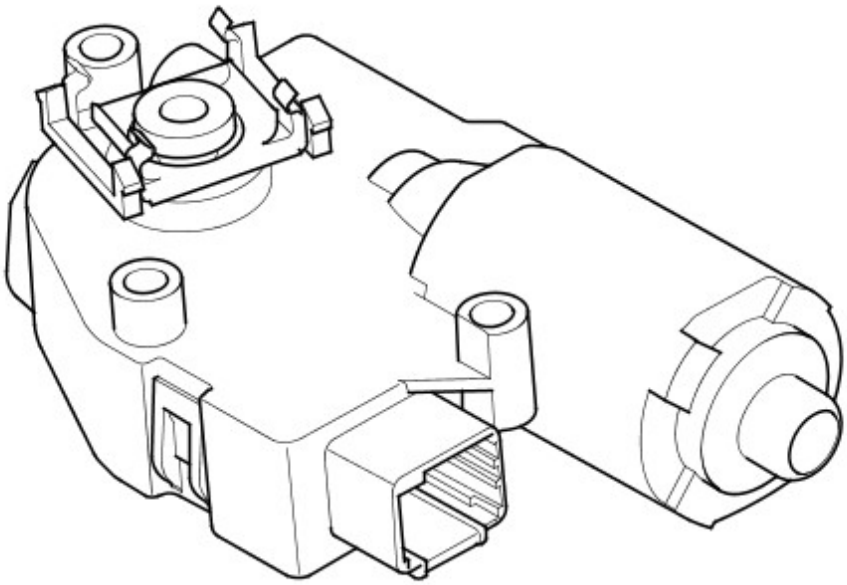


Item	Part Number	Description
1	-	Access panel
2	-	Switch

The roof opening panel is electrically operated through a 2-way rocker switch located on the roof-mounted console. An electric motor, attached to the roof opening panel frame, drives the glass panel to the tilt or open positions. The glass panel is operated by a mechanism via 2 cables, which are driven by the motor.

The frame is bolted to 11 mounting points on the roof panel. The modular frame consists of injection mouldings, aluminium side extrusions and pressings and supports all of the roof opening panel components. The glass panel is fixed to the mechanism via 4 screws. The motor is supported on the frame with 3 screws.

Roof Opening Panel Motor



E56953

The roof opening panel 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.

The 2 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 panel is closed, the cables are pushed through channels in the front of the frame. The displaced cable is guided into a further 2 channels in the frame, which protect the cable and prevent it from snagging. The cables are made from rigid spring steel and can pull as well as push the panel along the guides.

A sunblind, also located in the guides, is integrated into the frame. The sunblind is operated manually, independent of the panel when closed. When the panel opens (slides rearwards) the sunblind automatically slides rearwards and cannot be pulled forward until the panel is driven forward.

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 'D' 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.

ROOF OPENING PANEL CONTROL MODULE

The roof opening panel control module is integrated within the motor. 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.

Roof Opening Panel Control Module Pin Out Information

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

NOTES:

Pin 4 is for emergency use only, in the event of the vehicle LIN bus not being functional. It is not connected on the vehicle harness or in the connector.

Grounding pin 4 will enable the control module, but without one touch operation or anti trap. The panel will not require re-calibrating unless the battery has been disconnected (the control module will remain awake and enabled

until pin 4 is disconnected again).

Under no circumstances is this pin to be left connected to ground for long periods.

 There is no emergency key access in the roof-mounted console for manual operation should the motor fail for any reason.

OPERATION

The roof opening panel can be operated with the ignition state in accessory power mode 4 or ignition power mode 6. The panel can also be operated for up to 40 seconds after the ignition is off power mode 0 provided the driver or passenger 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 control module senses an open circuit signal. To calculate the exact position of the roof opening panel, the control module 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 roof opening panel is closing, the panel is reversed for 200mm or as far as possible. The Hall sensor, located in the 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 panel goes back. In an emergency the anti-trap function can be overridden by holding the switch in the closed position.

The roof opening panel can also be closed using the window global close feature. A signal from the Keyless Vehicle module (KVM) is sent via the medium speed CAN (controller area network) bus to the CJB (central junction box) which activates the roof opening panel control module to close the roof opening panel.

Tilt

With the roof opening panel closed, pushing the forward part of the rocker switch operates the motor to 'tilt' the rear of the panel upwards. The motor operates for as long as the switch is operated until the panel is tilted to its full extent. If the switch is released before the full tilt position is reached, the 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 opens to the fully tilted position.

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

With the roof opening panel in the tilted position, pushing the forward part of the rocker switch again operates the motor to lower the panel to the fully closed position. 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 panel stops at the chosen position.

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

Open (slide)

With the roof opening panel closed, pushing the rearward part of the rocker switch operates the motor to retract the panel backwards. A single press (between 0.5 and 1 second) of the switch operates the motor so that the panel automatically retracts to a 'comfort' position. The 'comfort' position reduces the effects of wind buffeting. When the panel retracts, a wind deflector automatically raises at the front of the aperture, which serves to reduce wind noise. Pressing the rear of the switch again will retract the panel further to the fully open position.

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

With the panel half or fully open, pushing the forward part of the switch operates the motor to close the 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 closed position.

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

The 'anti-trap' function will automatically retract the panel by 200mm or as far as possible if an obstruction is sensed. 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.

Initializing the roof opening panel allows the control module to learn the end positions of the motors travel. Hall sensors in the motor provide pulses for motor spindle rotation. The control module counts the pulses and determines where the panel is by memorizing the stored pulses.

If the system is not initialized, the roof opening panel will only operate in the tilt up and slide closed positions.

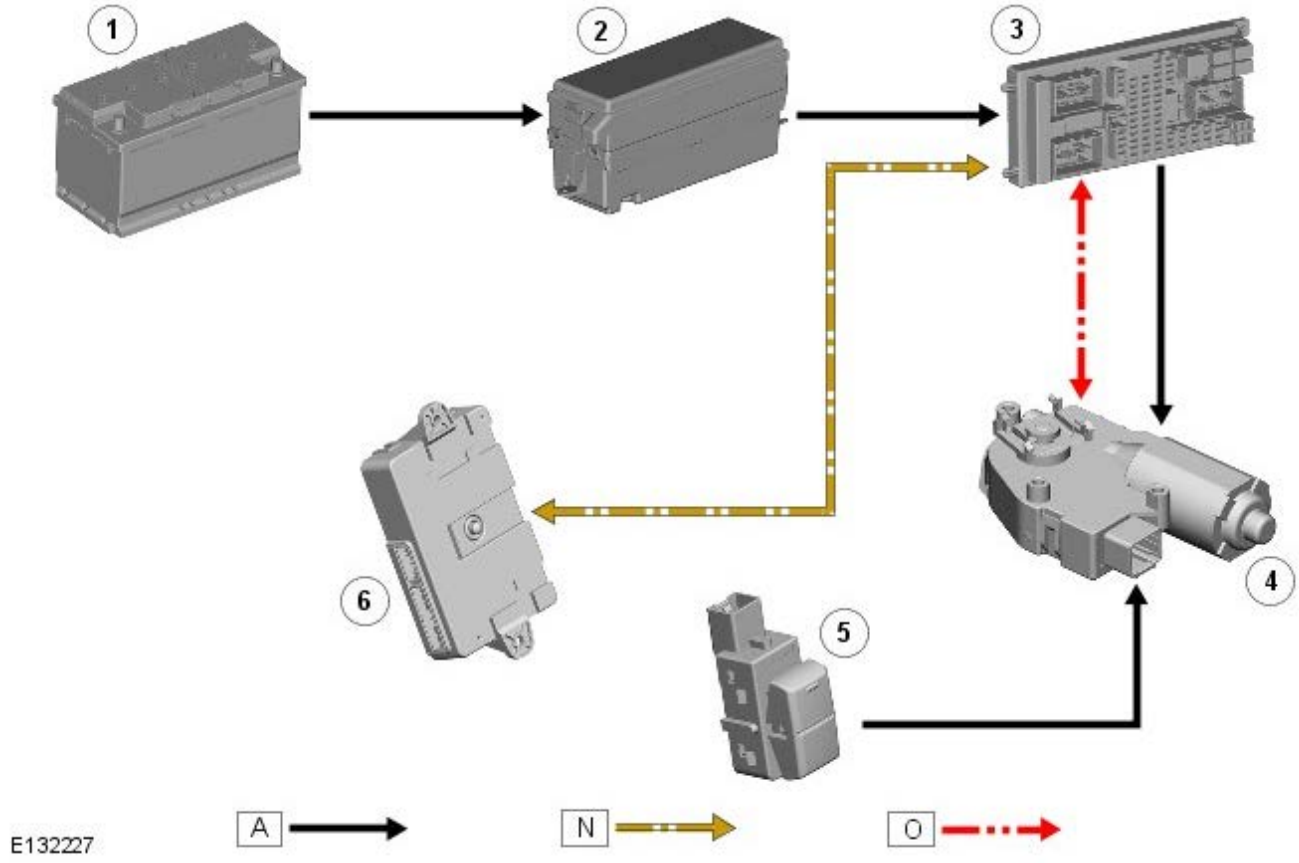
The roof opening panel initialization procedure is as follows:

- Start the engine
- Ensure the blind is fully closed

- Press and hold the roof opening panel tilt switch, when the roof is in the tilt position release the switch
- Press the tilt switch again and hold for 20 seconds
- The roof and blind will then open, ensure the switch is kept pressed until the roof has completed its opening and closing cycle.
- Once the roof opening and closing cycle is complete the roof opening panel has been initialized.

ROOF OPENING PANEL CONTROL DIAGRAM

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



Item	Part Number	Description
1	-	Battery
2	-	Engine Junction Box (EJB)
3	-	Central Junction Box (CJB)
4	-	Roof opening panel motor and control module
5	-	Roof opening panel switch
6	-	Keyless Vehicle Module (KVM)

Published: 06-Feb-2013

Roof Opening Panel - Roof Opening Panel

Diagnosis and Testing

Overview

For information on the description and operation of the system, refer to the relevant section of the workshop manual. REFER to: Roof Opening Panel (501-17 Roof Opening Panel, Description and Operation).

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious mechanical or electrical faults.

Visual Inspection Chart

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) - link 11E - BJB - link 15E - Central junction box (CJB) - Fuse 20P • 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. Use the approved diagnostic system or a scan tool to retrieve any diagnostic trouble codes (DTCs) before moving onto the symptom chart or DTC index.
   - Make sure that all DTCs are cleared following rectification

Symptom Chart

Symptom	Possible causes	Action
Roof opening panel inoperative	• Fuse(s) blown • Circuit fault • Switch fault • Motor fault	• Refer to the electrical guides • Check the fuse(s) (see visual inspection) • Check the roof opening panel circuits • Check the switch and motor function • For further diagnostic information GO to Pinpoint Test B.
Roof opening panel sticking/jamming	• 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: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures). • Refer to the electrical guides • Check the switch and motor function • For further diagnostic information GO to Pinpoint Test C.
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: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures). • 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 • Check for blocked drain tube(s) • Check the glass panel seal • Check the roof opening panel alignment REFER to: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures). • For further diagnostic information GO to Pinpoint Test A.
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: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures).

Water Leak Diagnostic Procedure

Introduction

This procedure has been developed to aid diagnosis and rectification of water ingress on vehicles with the aim of providing a **right first time fix**.

The procedure provides suggested points of water ingress and guidelines for a recommended fix.

Prerequisites

It is assumed the technician working on the vehicle will be at least **level 3 trained** and normal vehicle service protection equipment will be used where appropriate i.e. seat covers, wing covers etc.

Water Leak Diagnosis

There are certain basic tools required for effective water leak detection the following are a few recommendations.

Basic tools
Hosepipe
Water supply
Pressure Washer
Watering Can
Torch
Mirror (telescopic type)
Air supply
Boning tool (Nylon shaped block for trim removal)

There are several adaptations of tools that can be used, for example a watering can rose attached to a hosepipe to create a spray, or a new sealant tube nozzle attached to a hosepipe can be very effective to direct water into awkward corners, there are also several ready made hosepipe nozzles available from DIY stores which can be switched through several different water patterns, and finally not forgetting a normal car wash. With the exception of a car wash initial diagnosis is more accurate if carried out by **two people**, one inside and one outside the vehicle, the person outside can direct the water onto the areas where the leak is suspected to be entering, and the person inside can inspect with a 12 volt hand lamp to confirm the entry point.

It is worth bearing in mind that the location that the water appears in the interior of the vehicle, may not be the leak source, **for example water lying in the passenger footwell could be entering on the drivers side and running across, behind the fascia**. In order to find the water entry point, trim or components may have to be removed.

Staining

Often when water has been entering over a period of time, the water entry point can be located visually by following the stains or tracks left by the leak.

Sealing Water Leaks

There are different substances that can be used to seal water leaks, putty type sealant and wet/paste sealant. Examples of these are bostic (dum-dum) "303 glasticon" and "betafill 10210" which is a white paste and "terostat 33" which is clear.

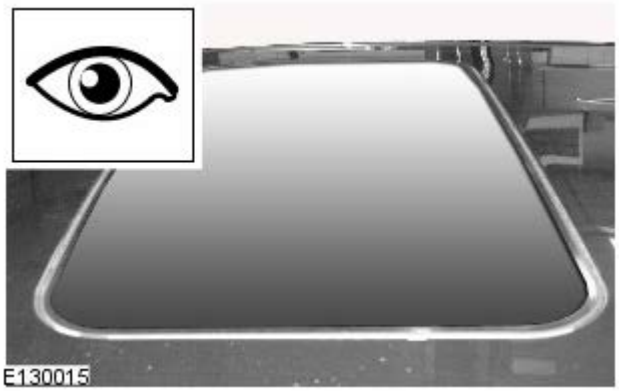
 NOTE: Do not use silicon based sealers as these will cause problems if any subsequent paint operations are required.

Careful consideration needs be given as to the substance used to seal a water leak, for example an external seam on a white vehicle would require white or clear sealant, dum-dum is best used in concealed places to fill larger gaps. The sealant should be applied in a manner that it does not look unsightly when finished, if used in a box section or under a carpet, applying and smoothing over should be ok, but on the external panels or visible areas the sealant should be "wiped" into the gap and any excess removed with a suitable spirit that will not harm the vehicles paintwork

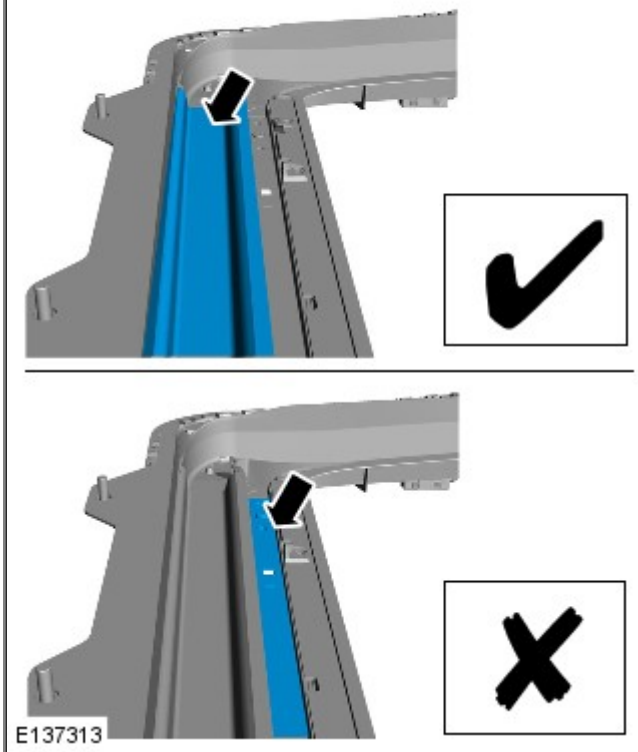
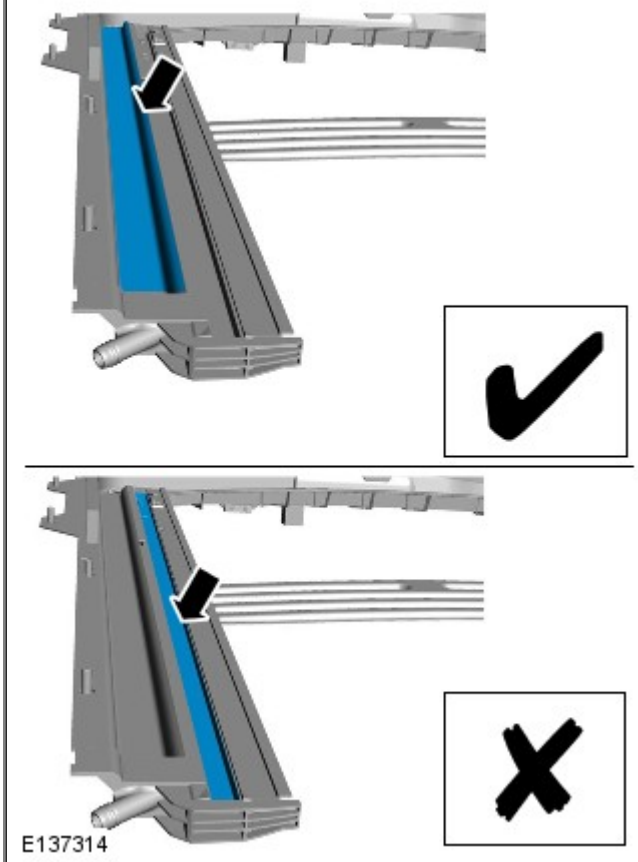
Once the water entry point has been confirmed, the suspect area must be sufficiently dried prior to the application of any sealing compound the use of a compressed air will assist

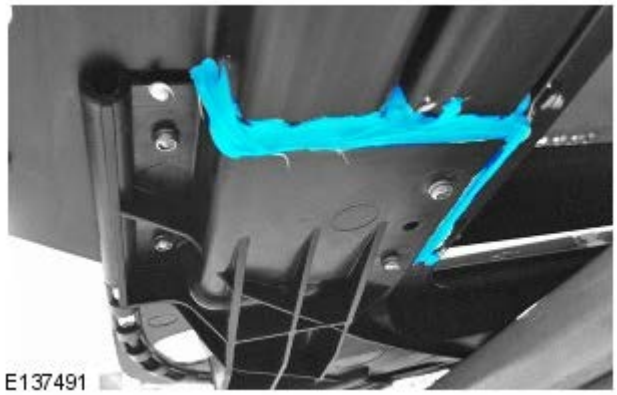
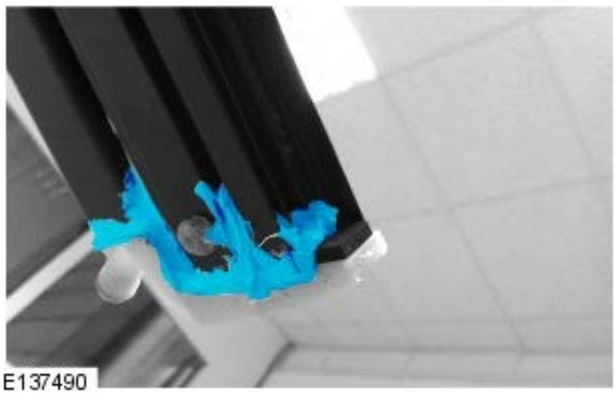
Pinpoint Test

PINPOINT TEST A : ROOF OPENING PANEL WATER INGRESS	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: WATER LEAK TEST	
	1 Carry out a water leak test of the roof opening panel
	Is the water ingress via the roof opening panel? **Yes** GO to A2. **No** The water ingress is not from the roof opening panel or aperture. Investigate water ingress from other areas
A2: GLASS SEAL LOCATION	

 E130015	**1** Visually inspect the roof opening panel glass seal
	Is the roof opening panel glass seal installed correctly? **Yes** GO to A6. **No** GO to A3.
A3: GLASS SEAL CONDITION	
	1 Visually inspect the roof opening panel glass seal for damage
	Is the roof opening panel glass seal damaged? **Yes** Install a new the roof opening panel glass seal REFER to: Roof Opening Panel Weatherstrip (501-17 Roof Opening Panel, Removal and Installation). GO to A4. **No** Correctly install the roof opening panel glass seal REFER to: Roof Opening Panel Weatherstrip (501-17 Roof Opening Panel, Removal and Installation). GO to A4.
A4: GLASS SEAL GAP	
	1 Visually inspect the gap surrounding the roof opening panel glass seal for consistency (Central in aperture)
	Is the roof opening panel glass seal central in the aperture? **Yes** GO to A5. **No** Re-align / re-profile the glass panel REFER to: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures). GO to A5.
A5: WATER LEAK TEST	
	1 Carry out a water leak test of the roof opening panel
	Is the water ingress via the roof opening panel? **Yes** GO to A7. **No** No further action required
A6: GLASS SEAL GAP	
	1 Visually inspect the gap surrounding the roof opening panel glass seal for consistency (Central in aperture)
	Is the roof opening panel glass seal central in the aperture? **Yes** GO to A7. **No** Re-align / re-profile the glass panel REFER to: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures). GO to A5.
A7: DRAIN TUBES ACCESS FROM ABOVE	
NOTES: The sliding roof/tilting roof is installed in a water trap. The water drains off via the water trap, water drain holes and drain tubes. The drain tubes lead downwards on both sides via the A-pillar and C-pillar	
The drain holes or drain tubes can become clogged with leaves, dirt or underbody protection	
	1 Check the water trap for leaks
	2 Check the drain tubes for leaks and for correct

	connection to the water trap
	3 Check the drainage system for unhindered flow, and blow out with compressed air if necessary
	Are drain tubes free from obstruction & working correctly? **Yes** GO to A8. **No** GO to A8.
A8: DRAIN TUBES CONNECTION AND ROUTING	
	1 Gain access to the drain tubes at the roof opening panel REFER to: Headliner (501-05 Interior Trim and Ornamentation, Removal and Installation).
	2 Confirm that the drain tubes are correctly attached to the roof opening panel
	3 Confirm that the drain tubes are not kinked or twisted
 E118136	**4** Gain access to the drain tubes where they exit the vehicle
 E118137	**5** Confirm that the drain tubes correctly exit the vehicle
	Are the drain tubes attached at the roof opening panel and correctly routed within the vehicle? **Yes** GO to A9. **No** Correctly install the water drain tubes, confirm that there are no kinks or twistsGO to A9.
A9: WATER LEAK TEST	
	1 Carry out a water leak test of the roof opening panel
	Is the water ingress via the roof opening panel? **Yes** GO to A10. **No** The water ingress is not from the roof opening panel

	or aperture. Investigate water ingress from other areas
A10: ROOF OPENING PANEL FRAME JOINT LEAK TEST	
	1 Detach all 4 drain tubes and block the ends with butyl (to keep water in the sunroof channels)
	2 Raise the front wheels of the vehicle by 15cm
	NOTE: Pour into water management channel only, **do not pour water into dry channel** **3** Pour 30ml of water into both of the outboard channels to the fill rear end caps
	4 Lower the front vehicle
	5 Pour water over joint between the guide rail and front cross member
	**6** Adjust the angle by raising the rear of the vehicle to ensure water covers the joints (shown). Leave in this condition for 15 minutes

	7 Inspect the rail joints for water ingress
	Is the water ingress via the roof opening panel frame through the rail joints with plastic components? **Yes** GO to A11. **No** Contact dealer technical support
A11: RAIL JOINT REPAIR	
 E137491	**1** Rail Joint Repair
 E137490	**2** Thoroughly clean and degrease the areas to be sealed, dry the area using compressed air
	NOTE: Use sealant 'Betafill 10210' or equivalent **not silicone sealant** **3** Apply the sealant to cover the entire joint, repeat for each failed joint
	4 Allow 24 hours for sealer to cure
	5 Carry out a water leak test of the roof opening panel
	Is the water ingress via the roof opening panel? **Yes** Contact dealer technical support **No** No further action required

Pinpoint Test

PINPOINT TEST B : ROOF OPENING PANEL INOPERATIVE	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: OPERATION	
	1 Operate the roof opening panel using the overhead console mounted switch
	Does the roof opening panel move or attempt to move? **Yes** Refer to symptom chart above - Roof opening panel sticking/jamming **No** GO to B2.
B2: CALIBRATION ROUTINE AND RESET	
	1 Complete the roof opening panel calibration routine and reset the functions. • Start the engine • Ensure blind is fully closed • Press and hold the tilt switch. When the roof is in the full tilt position, release the switch • Press and hold the tilt switch again for 20 seconds

	• The roof and blind will then open. **Ensure the switch remains pressed throughout the full opening and closing movement, until the roof is fully closed** • Once the roof is in the fully closed position, the routine is complete
	2 Operate the roof opening panel using the overhead console mounted switch
	Does the roof opening panel operate correctly? **Yes** No further action required **No** GO to B3.
B3: SWITCH - CIRCUIT CHECK 1	
NOTE: The roof opening panel motor gives a voltage out on the open and close circuits which is grounded when the switch is operated, this voltage should be greater than **7volts (switch inactive)** and less than **1volt (switch active)** with the ignition state switched to on	
	1 Refer to the electrical circuit diagrams and locate the **open and close** circuits between the roof opening panel motor and the roof opening panel switch, monitor the voltage on each circuit as the switch is operated
	Do both **open and close** switch circuit voltages change from greater than **7volts** to less than **1volt** when the roof opening panel **open or close** switches are operated? **Yes** GO to B7. **No** GO to B4.
B4: SWITCH - CIRCUIT CHECK 2	
NOTES: During the previous check, if the voltage remained high **(greater than 7volts)**, refer to the electrical circuit diagrams and check the switch circuit for fault.	
During the previous check, if the voltage remained low **(less than 1volt)**, refer to the electrical circuit diagrams and check the roof opening panel motor circuit for fault.	
	1 Refer to notes above
	Did the voltage remain low **(less than 1volt)**? **Yes** GO to B5. **No** GO to B7.
B5: POWER SUPPLY	
	1 Refer to the electrical circuit diagrams and check the voltage between the power **- VBATT -** and ground **- GND -** circuits to the roof opening panel motor for battery supply voltage **(approx. 12volts)**
	Do the **(VBATT)** and **(GND)** circuits to the roof opening panel motor receive battery supply voltage? **Yes** GO to B6. **No** Refer to the electrical circuit diagrams, investigate and rectify the loss of power to the roof opening panel
B6: LIN BUS CIRCUIT	
NOTE: The authorization signal is transmitted via the LIN Bus circuit when the ignition status is set to on	
	1 Refer to the electrical circuit diagrams and check the **(LIN Bus)** circuit between the central junction and the roof opening panel control module for continuity
	Did the (LIN Bus) circuit pass the continuity test? **Yes** GO to B7. **No** Refer to the electrical circuit diagrams, investigate and rectify the circuit fault
B7: ROOF OPENING PANEL MOTOR	
	1 Install a new roof opening panel motor REFER to: Roof Opening Panel Motor (501-17 Roof Opening Panel, Removal and Installation).
	2 Complete the roof opening panel calibration routine and reset the functions. • Start the engine • Ensure blind is fully closed • Press and hold the tilt switch. When the roof is in the full tilt position, release the switch • Press and hold the tilt switch again for 20 seconds • The roof and blind will then open. **Ensure the switch remains pressed throughout the full opening and closing movement, until the roof is fully closed** • Once the roof is in the fully closed position, the routine is complete

	Does the roof opening panel operate correctly? **Yes** No further action required **No** If customer concern is still evident contact dealer technical support

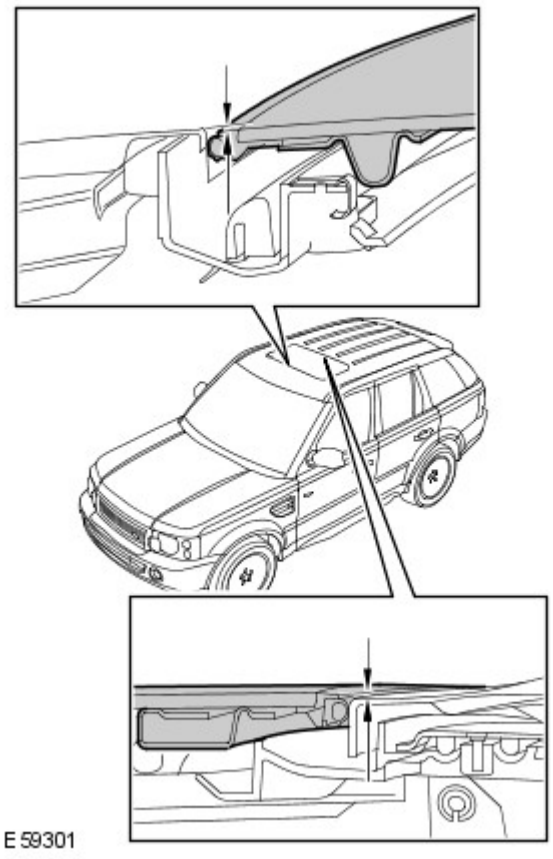
Pinpoint Test

PINPOINT TEST C : ROOF OPENING PANEL STICKING / JAMMING	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
C1: SIDE COVER / CONCERTINA JAMMING	
	1 Operate the roof opening panel using the overhead console mounted switch
	Is the side cover/concertina jamming? **Yes** GO to C2. **No** GO to C3.
C2: SIDE COVER / CONCERTINA DAMAGE	
	1 Visually inspect the side cover/concertina for damage
	Is the side cover/concertina damaged? **Yes** Replace the side cover/concertina. Check for correct roof opening panel operation **No** Correctly install the side cover/concertina. Check for correct roof opening panel operation
C3: GLASS SEAL GAP	
	1 Visually inspect the gap surrounding the roof opening panel glass seal for consistency (Central in aperture)
	Is the roof opening panel glass seal central in the aperture? **Yes** GO to C4. **No** Re-align / re-profile the glass panel REFER to: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures). Check for correct roof opening panel operation. If customer concern is still evident contact dealer technical support
C4: RAIL DAMAGE	
	1 Visually inspect the roof opening panel rails for damage
	Are the roof opening panel rails for damaged? **Yes** Replace roof opening panel frame assembly **(not the complete roof opening panel)** REFER to: Roof Opening Panel (501-17 Roof Opening Panel, Removal and Installation). . **No** Clean and lubricate the roof opening panel rails using lubricant **Klubersynth LF 44-22**. Check for correct roof opening panel operation. If customer concern is still evident contact dealer technical support

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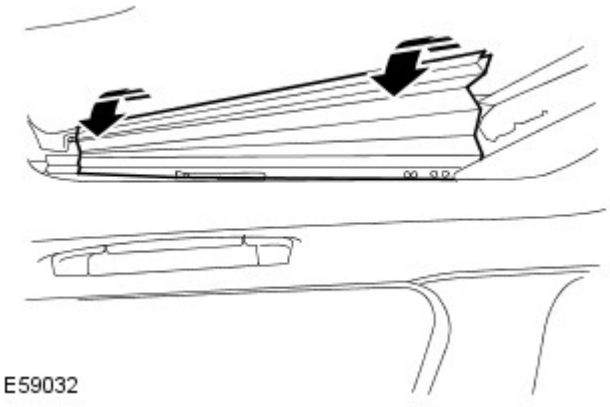
Roof Opening Panel - Roof Opening Panel Alignment

General Procedures

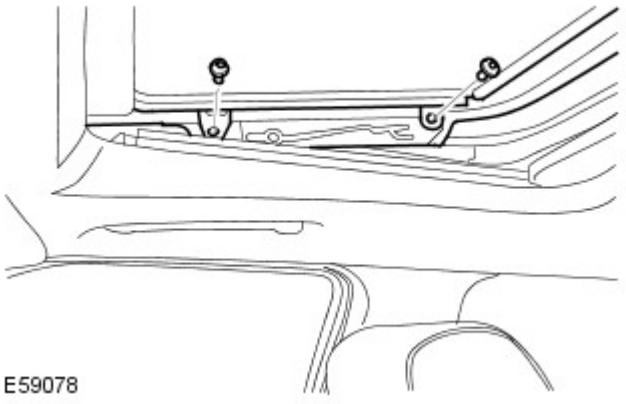


1. With the roof opening panel closed, check the alignment of the glass to the roof panel. The glass should be central in its aperture. Profile of sunroof to body: front edge, set flush or up to 1.0 mm (0.040") low; rear edge, set flush or up to 1.0 mm (0.040") high.

2. Open the roof opening panel blind.



3. Remove the cover.
   - Repeat the above procedure for the other side.



4. Loosen the 4 roof opening panel Torx screws.

5. Align the roof opening panel.
   - Tighten the Torx screws to 6 Nm (4 lb.ft).

6. Install the cover.
    - Repeat the above procedure for the other side.

7. Close the roof opening panel blind.

Published: 05-Aug-2011

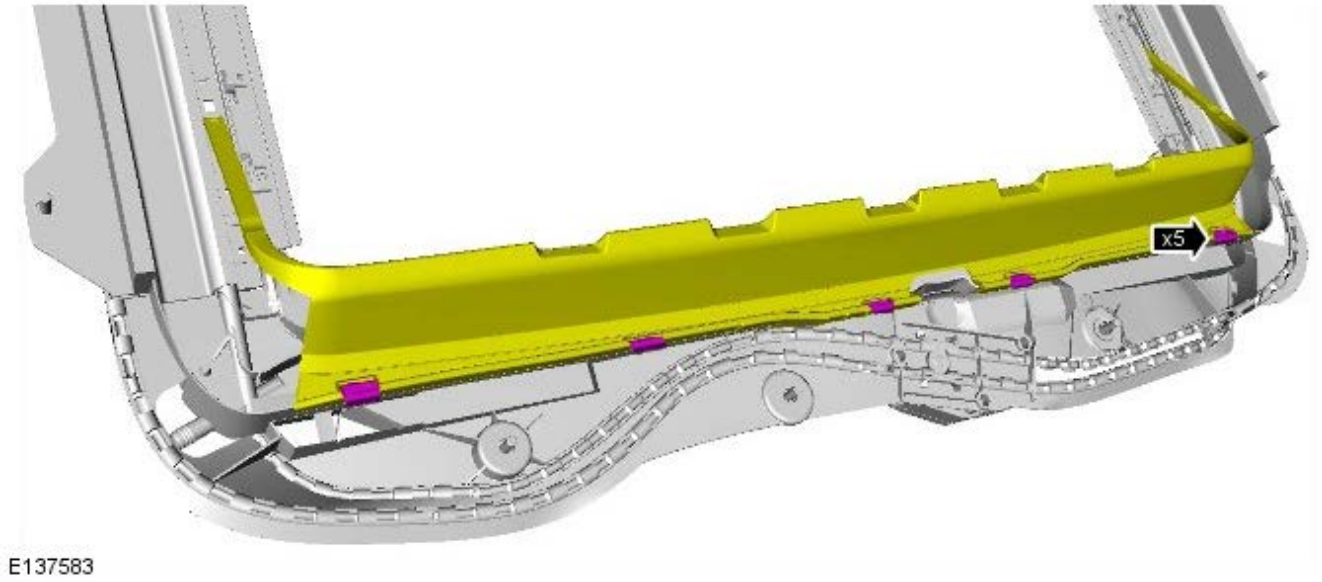
Roof Opening Panel - Air Deflector

Removal and Installation

Removal

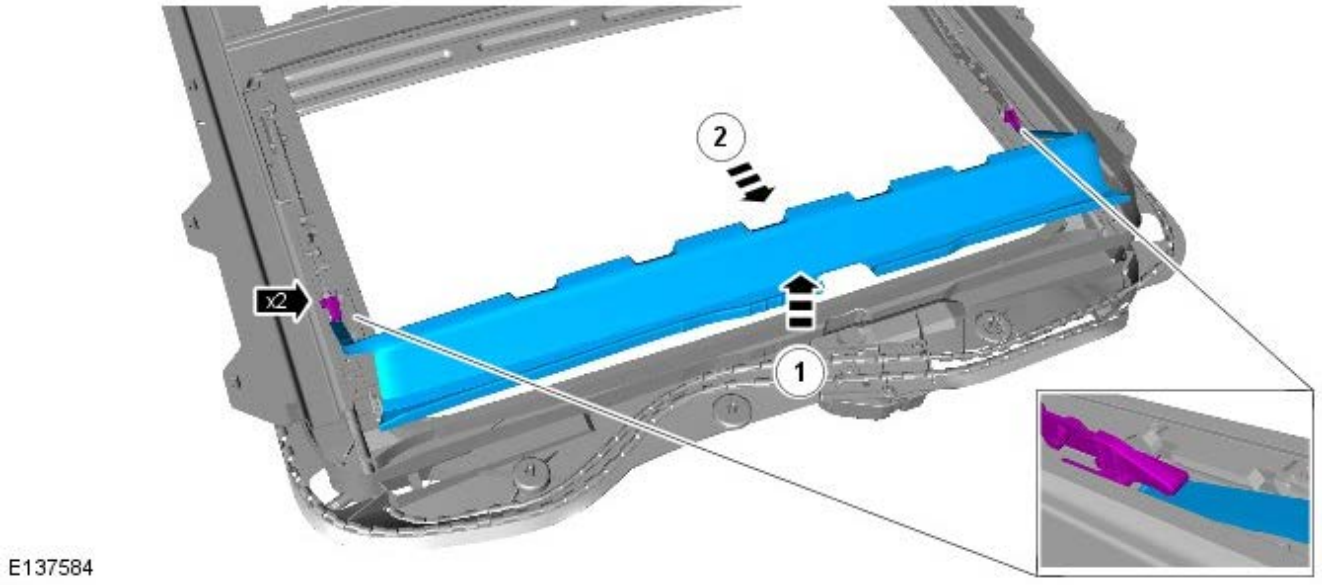
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Roof Opening Panel (501-17, Removal and Installation).
2.



E137583

3.



E137584

Installation

1. To install, reverse the removal procedure.

Published: 09-Mar-2011

Roof Opening Panel - Driver Side Roof Opening Panel Front Drain Hose

Removal and Installation

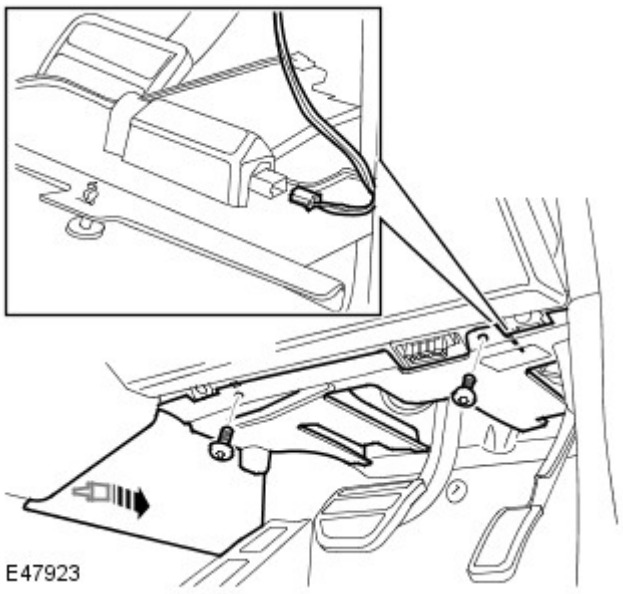
Removal

NOTES:

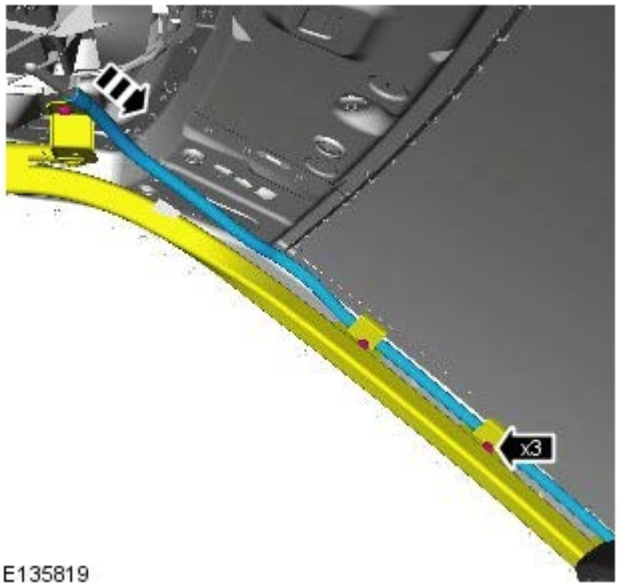
Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: Headliner (501-05, Removal and Installation).
2. Remove the driver side closing trim panel.



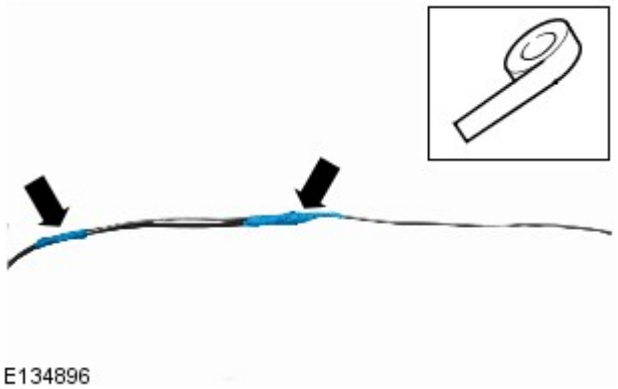
3. Release the side air bag curtain and detach the drain hose from the opening roof panel.



4. Detach the drain hose from the body panel.



5. Using suitable tape, secure the drain hose to a suitable rod to aid removal from the A-pillar area.



6. Remove the drain hose.



Installation

1. To install, reverse the removal procedure.

Published: 09-Mar-2011

Roof Opening Panel - Passenger Side Roof Opening Panel Front Drain Hose

Removal and Installation

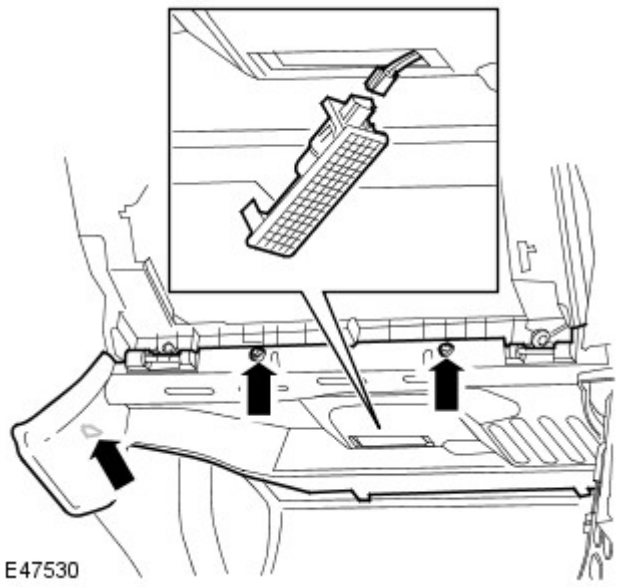
Removal

NOTES:

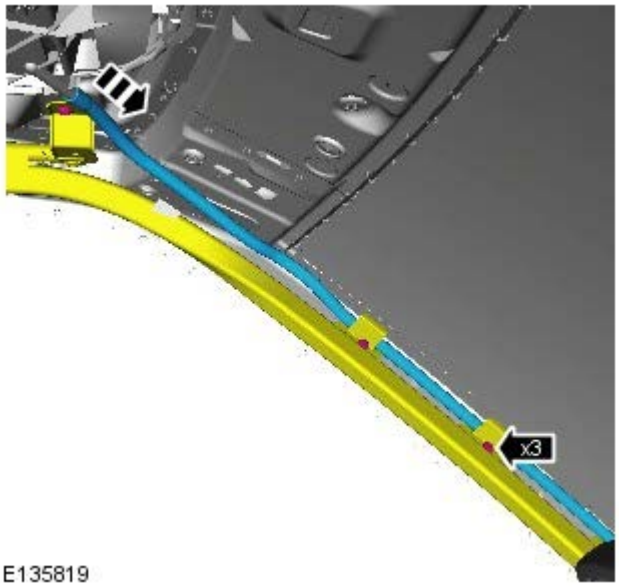
Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: Headliner (501-05, Removal and Installation).
2. Remove the passenger side closing trim panel.



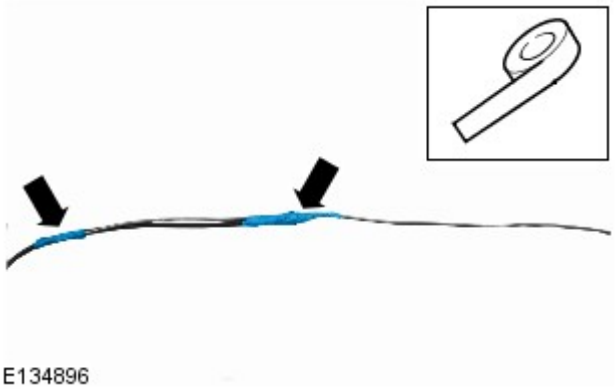
3. Release the side air bag curtain and detach the drain hose from the opening roof panel.



4. Detach the drain hose from the body panel.



5. Using suitable tape, secure the drain hose to a suitable rod to aid removal from the A-pillar area.



6. Remove the drain hose.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

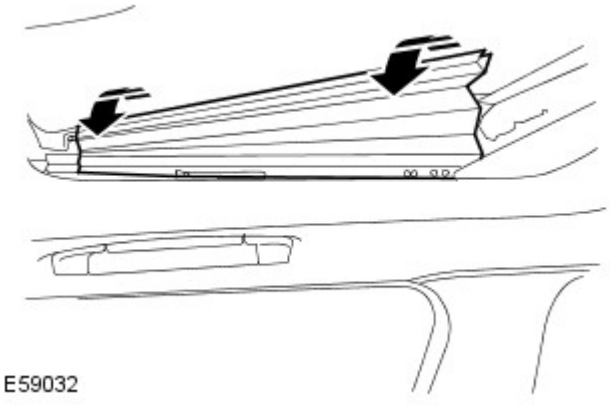
Roof Opening Panel - Roof Opening Panel Glass

Removal and Installation

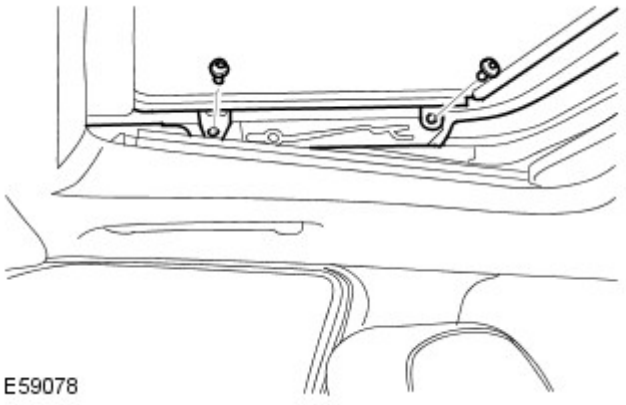
Removal

1. Open the roof opening panel blind.

2. Open the roof opening panel to the tilt position.



3. Remove the cover.
   - Repeat the above procedure for the other side.



4. Remove the roof opening panel glass.
   - Remove the 2 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, General Procedures).

Published: 11-May-2011

Roof Opening Panel - Roof Opening Panel Motor

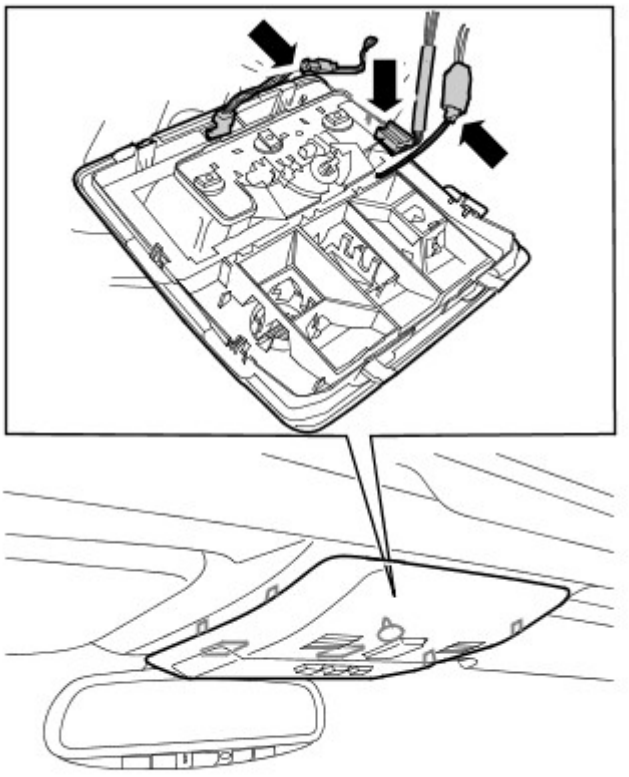
Removal and Installation

Removal

WARNING: If the roof opening panel motor is being replaced, 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.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-01, Specifications).

2. Remove the front overhead console.
   - Carefully release the clips.
   - Disconnect the 4 electrical connectors.

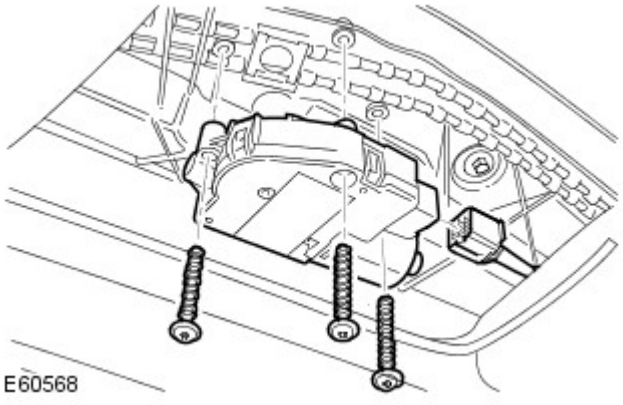


E50142

3. Remove the overhead console support bracket.
   - Remove the 3 bolts.



4. Remove the roof opening panel motor.
   - Remove the 3 Torx screws.
   - Disconnect the electrical connector.



Installation

1. Install the motor.
    - Connect and secure the electrical connector.
    - Tighten the Torx screws to 4 Nm (3 lb.ft).

2. Install the support bracket.
    - Tighten the bolts to 25 Nm (18 lb.ft).

3. Install the front overhead console.
    - Connect the electrical connector.
    - Carefully secure the clips.

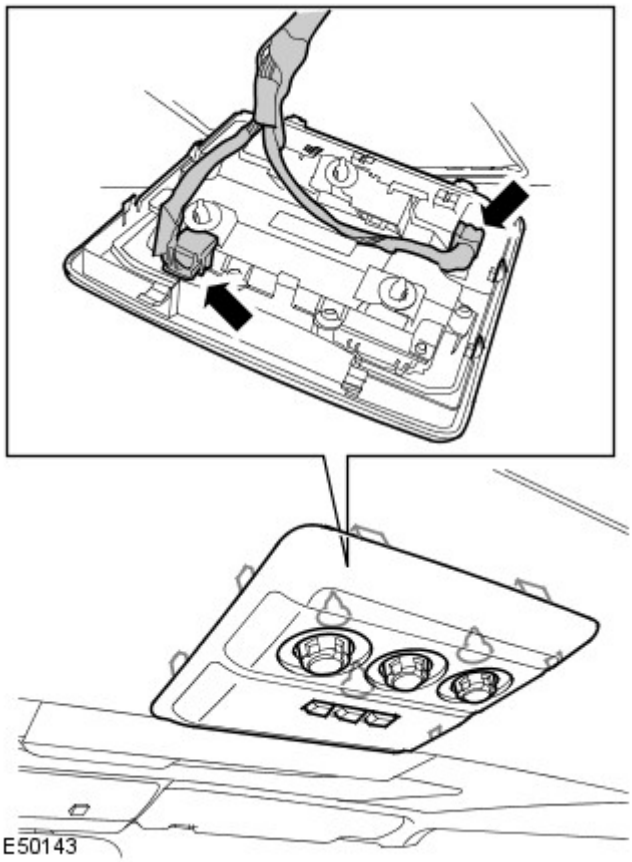
4. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-01, Specifications).

Published: 11-May-2011

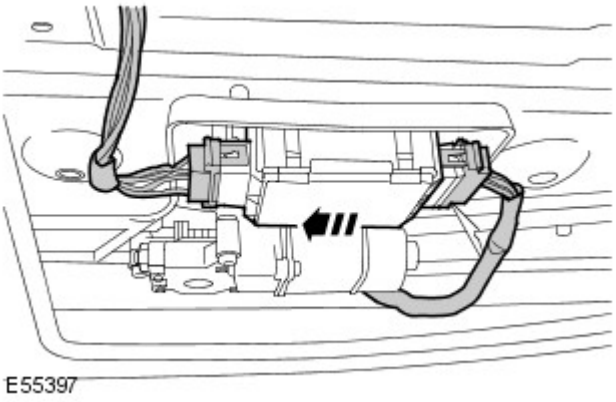
Roof Opening Panel - Roof Opening Panel Module

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.

Published: 22-Jun-2011

Roof Opening Panel - Roof Opening Panel

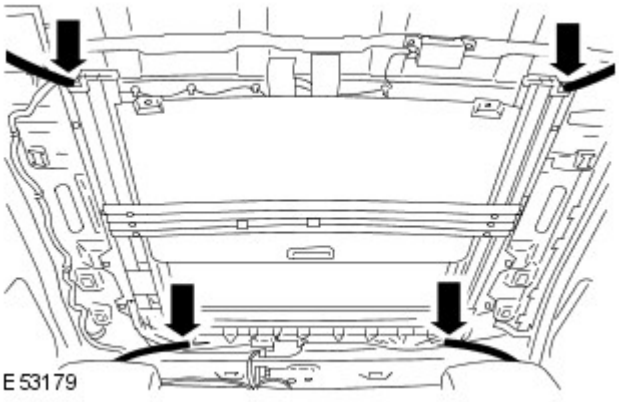
Removal and Installation

Removal

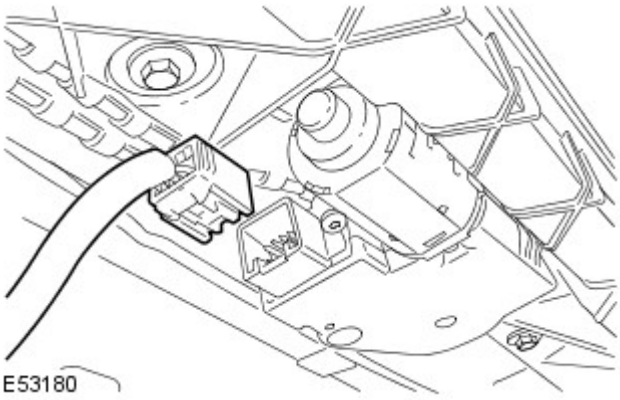
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the roof opening panel glass.
   For additional information, refer to: Roof Opening Panel Glass (501-17, Removal and Installation).

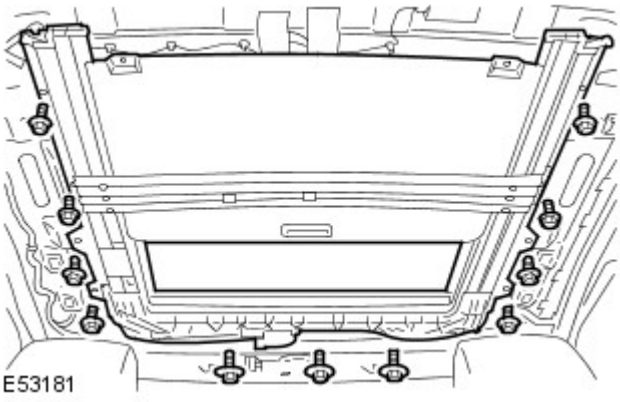
3. Remove the headliner.
   For additional information, refer to: Headliner (501-05 Interior Trim and Ornamentation, Removal and Installation).



4. Release the 4 drain hoses from the roof opening panel.
   - Release the 4 clips.



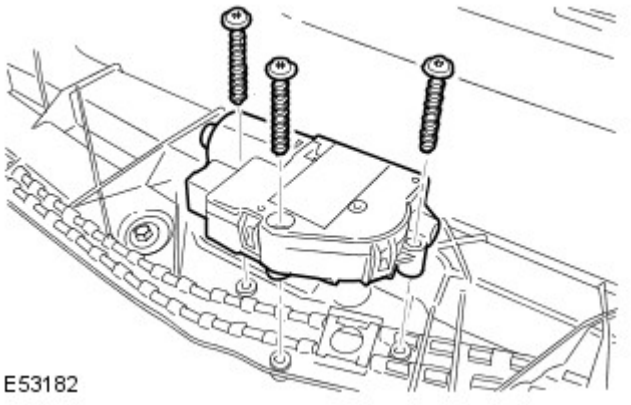
5. Disconnect the roof opening panel motor electrical connector.



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

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

   Remove the roof opening panel motor.
   - Remove the 3 Torx screws.



Installation

1. WARNING: If the roof opening panel motor is being replaced, 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.

   Install the motor.
   - Tighten the Torx screws to 3 Nm.

2. With assistance, install the roof opening panel assembly.
   - Clean the component mating faces.
   - Tighten the bolts to 11 Nm.

3. Connect the roof opening panel motor electrical connector.

4. Connect the drain hoses.
   - Make sure the drain hoses are clear prior to connection.
   - Secure with the clips.

5. Install the headliner.
   For additional information, refer to: Headliner (501-05 Interior Trim and Ornamentation, Removal and Installation).

6. Install the roof opening panel glass.
   For additional information, refer to: Roof Opening Panel Glass (501-17, Removal and Installation).

7. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

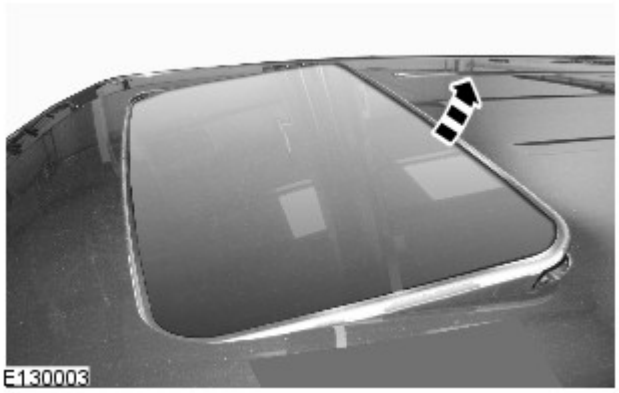
8. Using the Land Rover approved diagnostic system, configure a new roof opening panel motor.

Published: 11-May-2011

Roof Opening Panel - Roof Opening Panel Weatherstrip

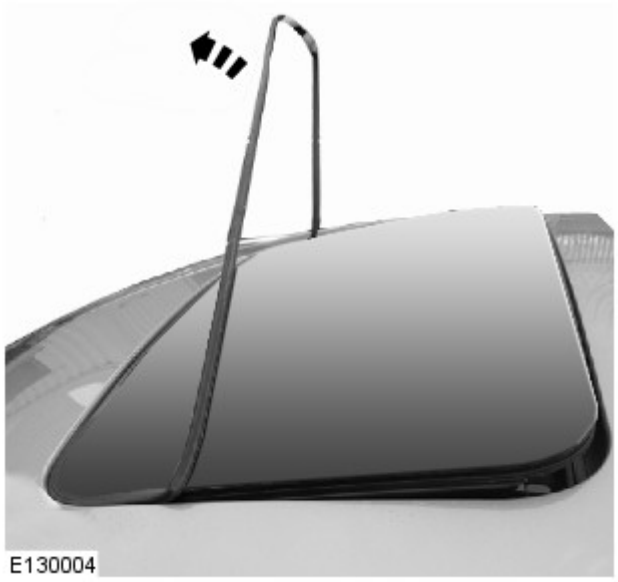
Removal and Installation

Removal

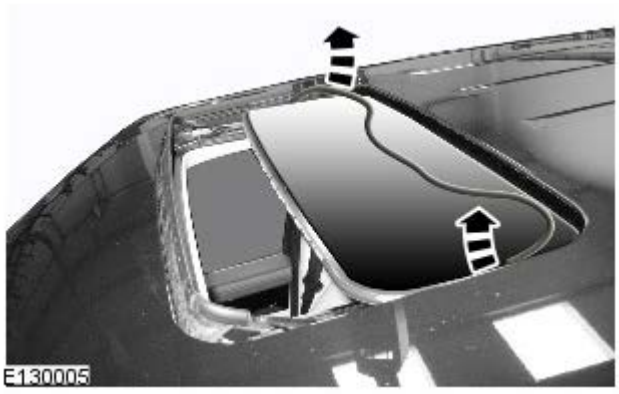


1. NOTE: Note the orientation of the roof opening panel weatherstrip to install the component correctly.

   Raise the roof opening panel as illustrated.



2. Release the roof opening panel weatherstrip from the rear of the panel.

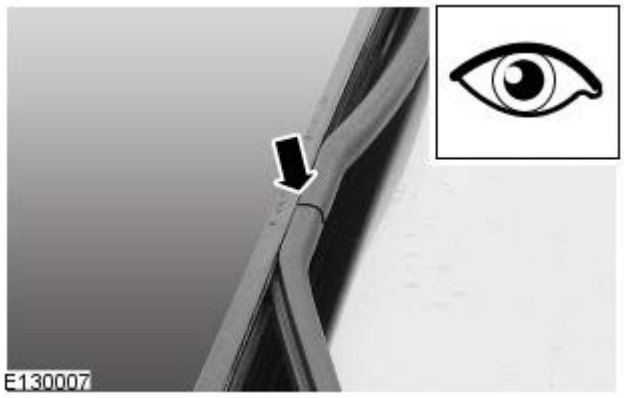


3. Operate the roof opening panel to the position illustrated, and remove the roof opening panel weatherstrip from the front of the panel.

Installation

1. Operate the roof opening panel to the position illustrated.





2. NOTE: Make sure that the roof opening panel weatherstrip is installed in the orientation noted on the removal process.

   Install the roof opening panel weatherstrip to the center of the panel, as indicated.



3. NOTE: To aid installation of the roof opening panel weatherstrip correctly, use a suitable plastic wedge between the roof opening panel apature and the seal.

   Install the roof opening panel weatherstrip into the locating grove in the panel as far as possible.



4. Using a suitable plastic tool, install the roof opening panel weatherstrip to the corners of the panel.

5. NOTE: Make sure that the roof opening panel wind deflector is in the fully open position.

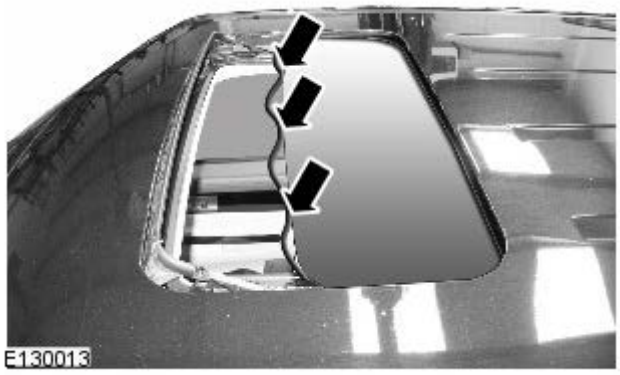
   Operate the roof opening panel to the position illustrated.



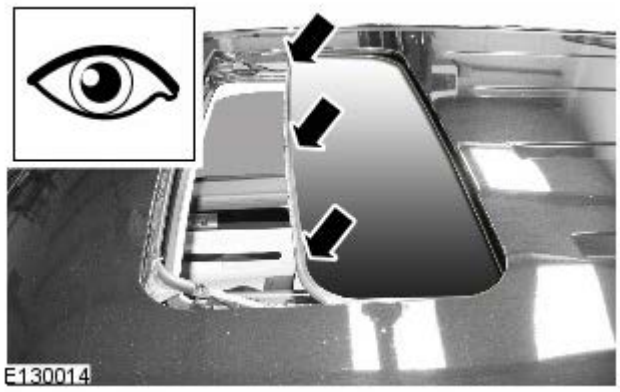


6. NOTE: Make sure that the excessive amount of weatherstrip is positioned evenly alone the front of the roof opening panel.

   Install the roof opening panel weatherstrip to the center of the panel, as indicated.



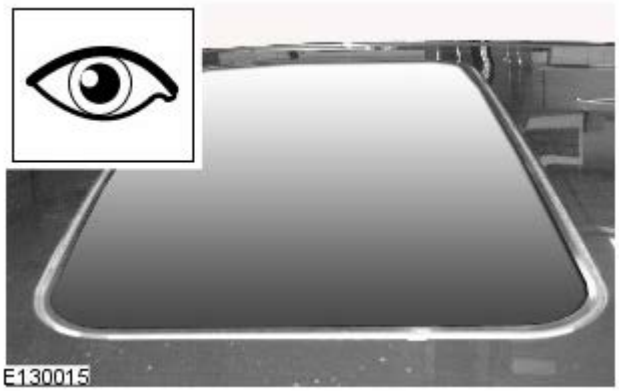
7. Install the roof opening panel weatherstrip evenly to the panel.



8. Check that the roof opening panel weatherstrip is correctly installed to the panel and no gaps are visible between the weatherstrip and panel.

9. Operate the roof opening panel to the closed position.

10. Visually inspect the roof opening panel weatherstrip for correct alignment and installation.


E130015

Published: 09-Mar-2011

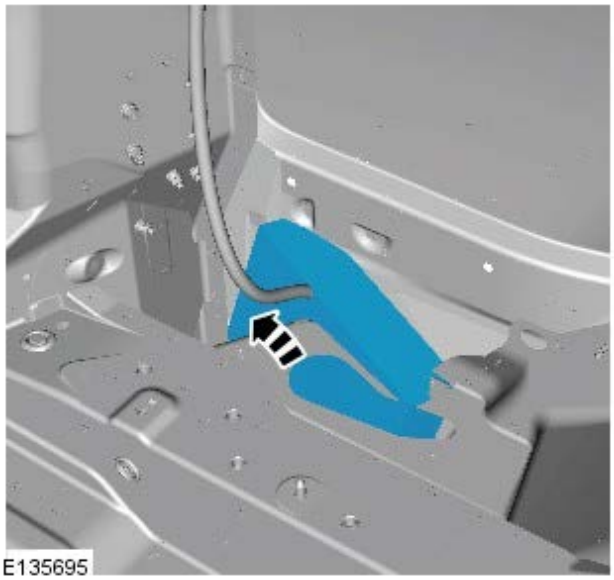
Roof Opening Panel - Roof Opening Panel Rear Drain Hose

Removal and Installation

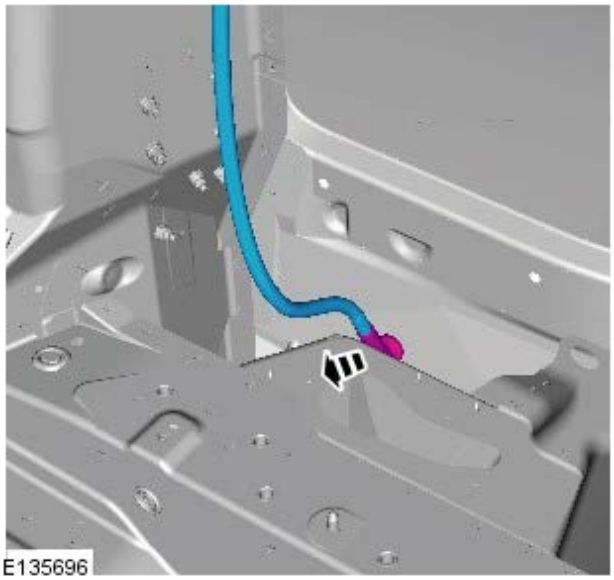
Removal

1. Refer to: Headliner (501-05, Removal and Installation).

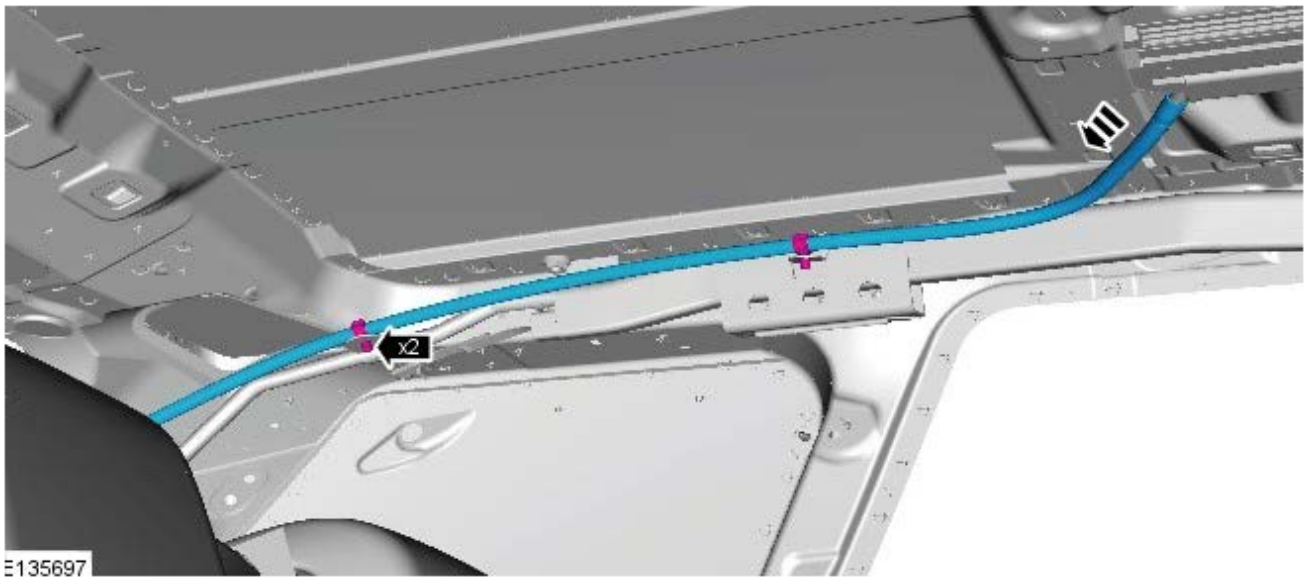
2.



3.



4.



Installation

1. CAUTION: Make sure that the roof opening panel drain tube(s) are free from distortion, kinks or bends.

   To install, reverse the removal procedure.

Published: 11-May-2011

Bumpers -

Description	Nm	lb-ft
Front bumper bolts	25	18
Windshield washer reservior bolts	5	3.5
Front bumper cover bolts	5	3.5

Published: 11-May-2011

Bumpers - Front Bumper

Removal and Installation

Removal

NOTES:

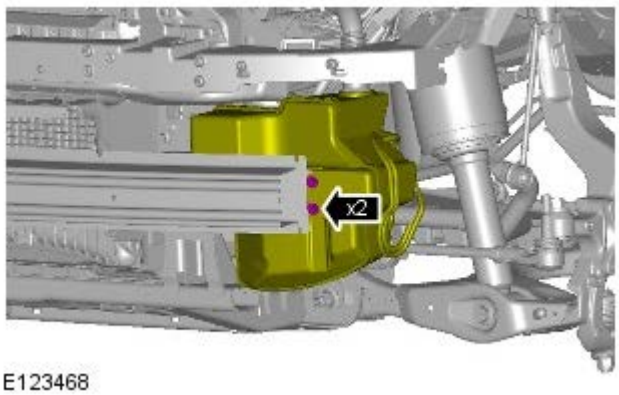
Removal steps in this procedure may contain installation details.

Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.

   Refer to: Specifications (414-00, Specifications).

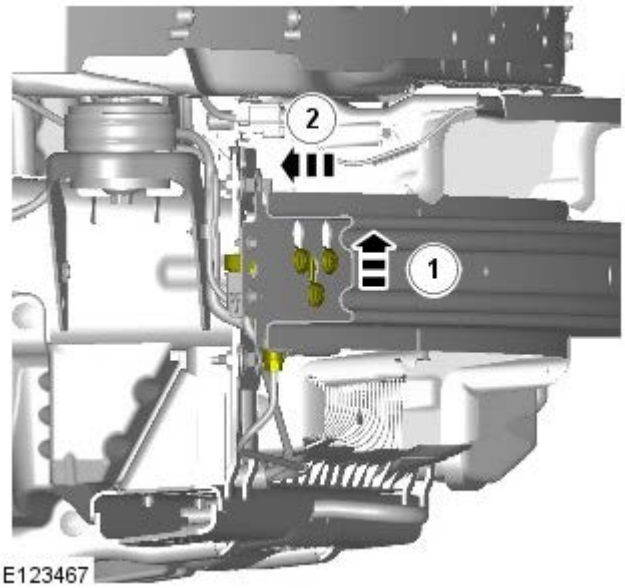
2. Refer to: Front Bumper Cover (501-19, Removal and Installation).



E123468

3. NOTE: Support as necessary.

   Torque: 10 Nm



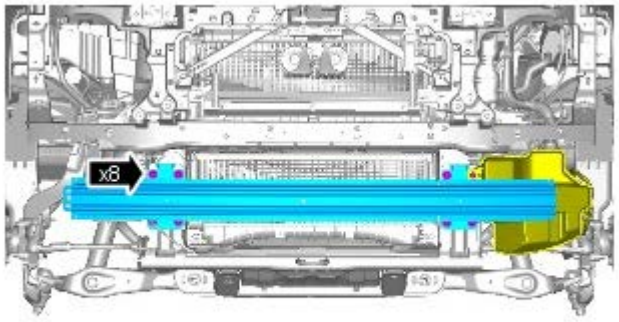
E123467

4. CAUTION: Take extra care not to damage the component.

   NOTE: Support as necessary.

5. NOTE: With assistance remove the component.

   Torque: 25 Nm



E123469

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Bumpers - Front Bumper Cover

Removal and Installation

Removal

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

1. Disconnect the battery ground cable.

   Refer to: Specifications (414-00, Specifications).

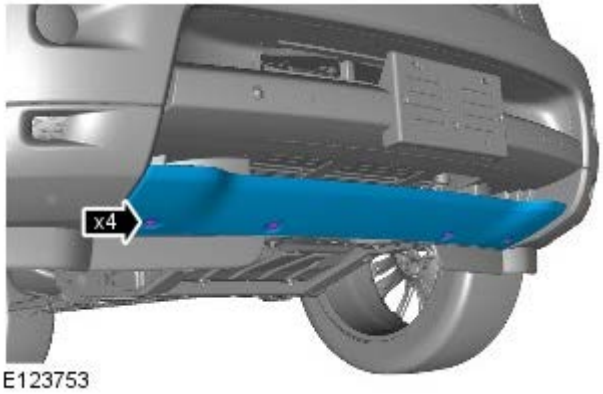
2. WARNING: Make sure to support the vehicle with axle stands.

   Remove the front road wheels and tires.

3. NOTE: The procedure must be carried out on both sides.

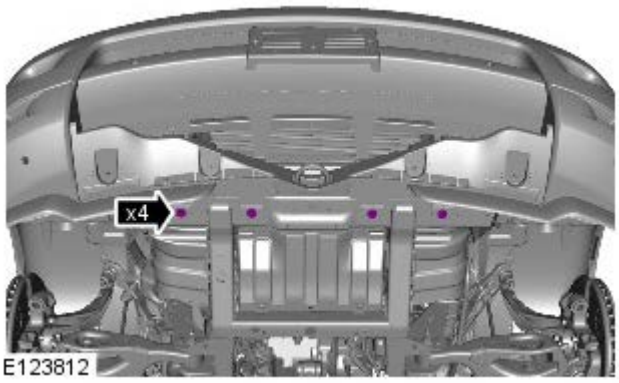
   Refer to: Headlamp Assembly (417-01, Removal and Installation).

4.



E123753

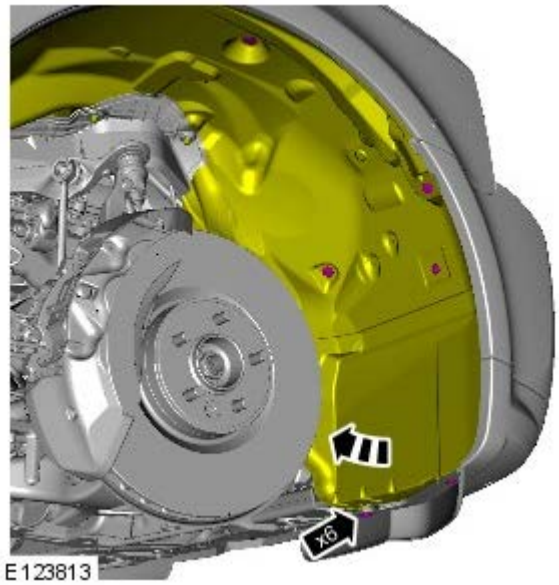
5. *Torque:* 5 Nm



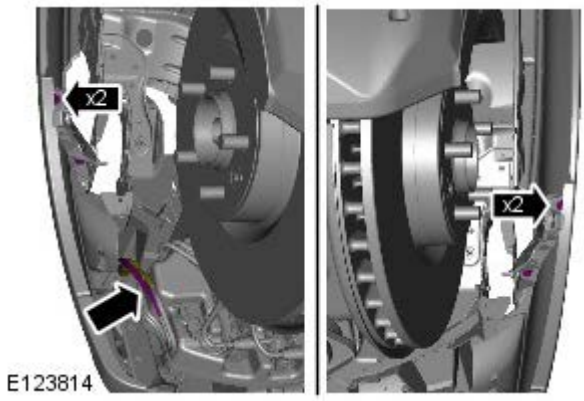
E123812

6. NOTE: The procedure must be carried out on both sides.

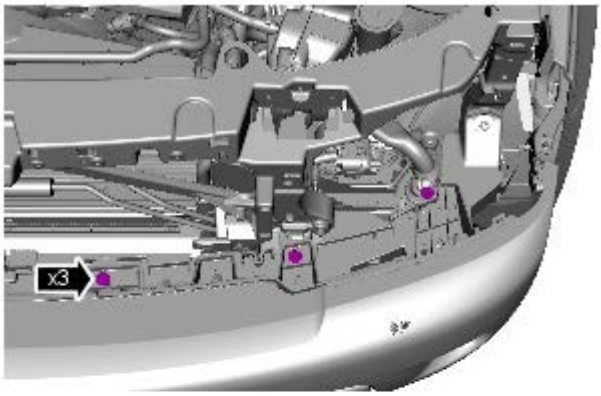
   Torque: 1 Nm

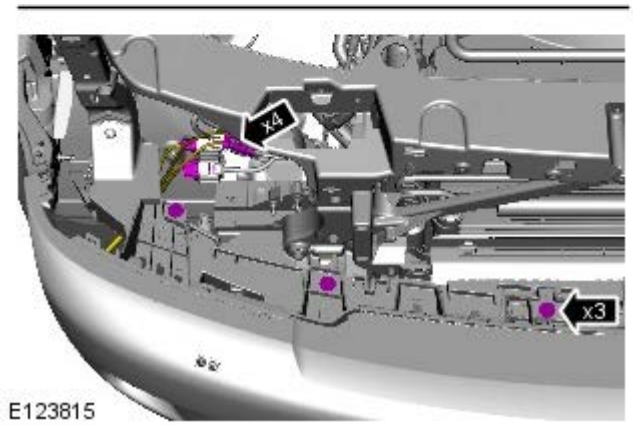


7. *Torque:* 5 Nm



8. *Torque:* 5 Nm





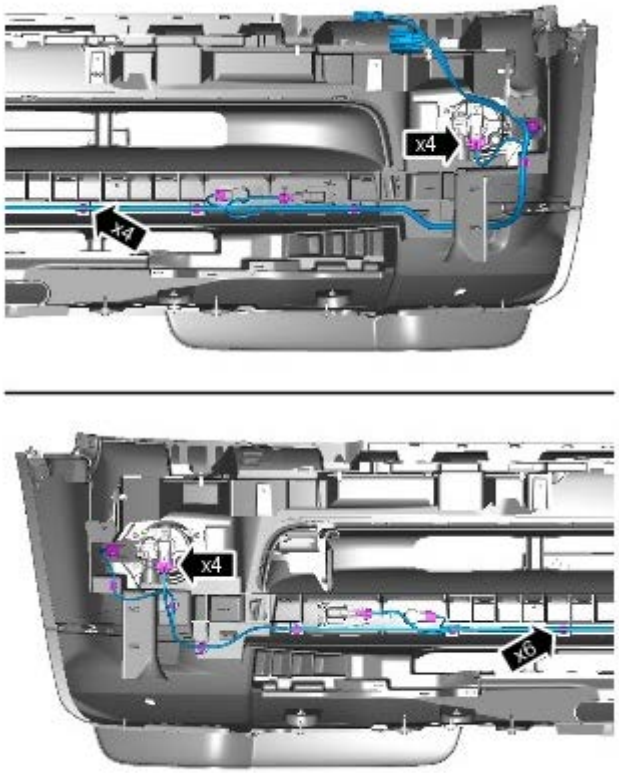
9. CAUTION: Protect the surrounding paintwork to avoid damage.



E123816

NOTE: This step requires the aid of another technician.

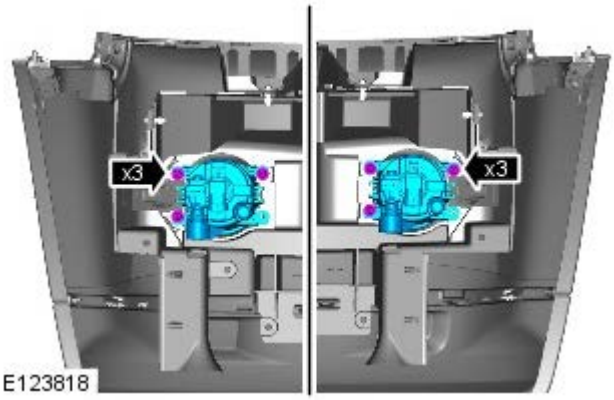
10. NOTE: Do not disassemble further if the component is removed for access only.



E123817

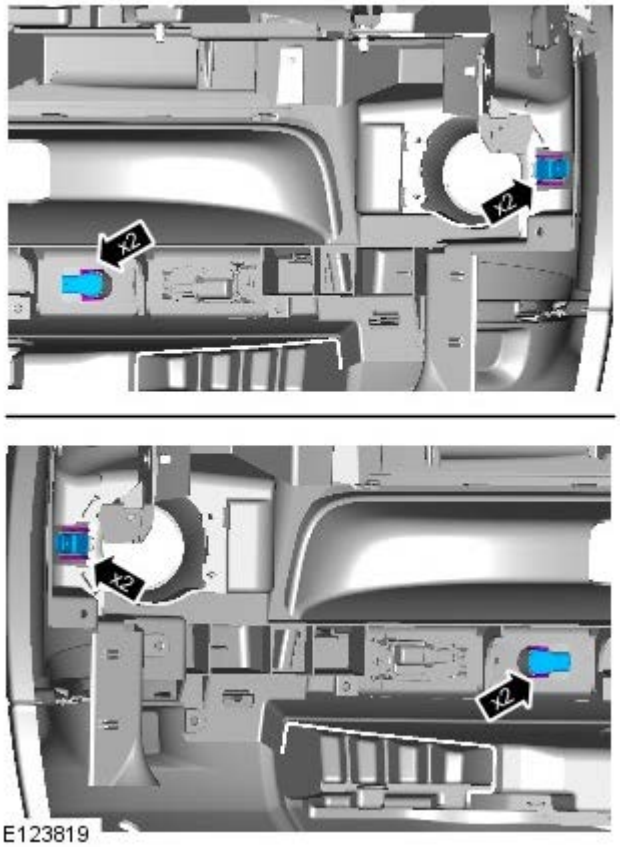
11. CAUTION: Make sure that the component is correctly located on the locating dowels.

Torque: 5 Nm

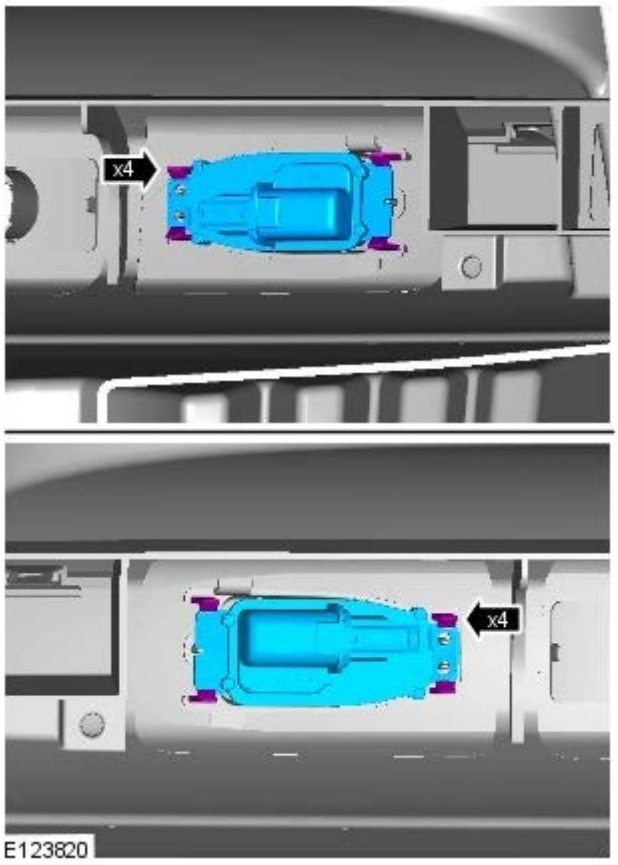


E123818

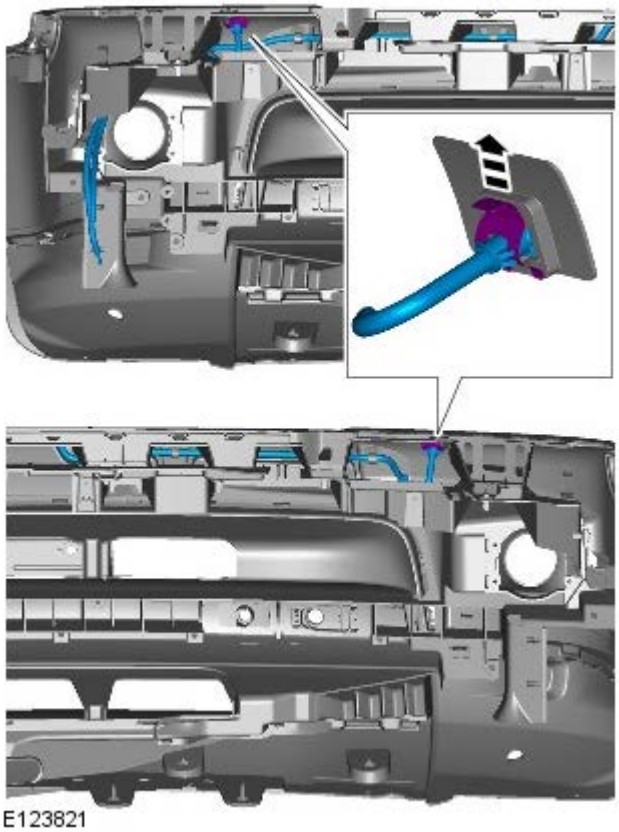
12.



13.

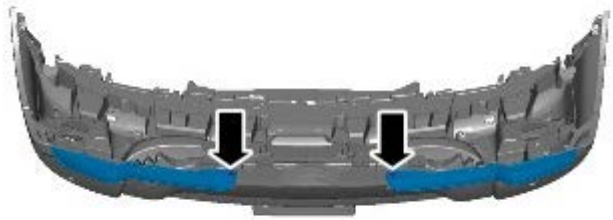


14.



E123821

15. *Torque:* 1 Nm



E123822

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

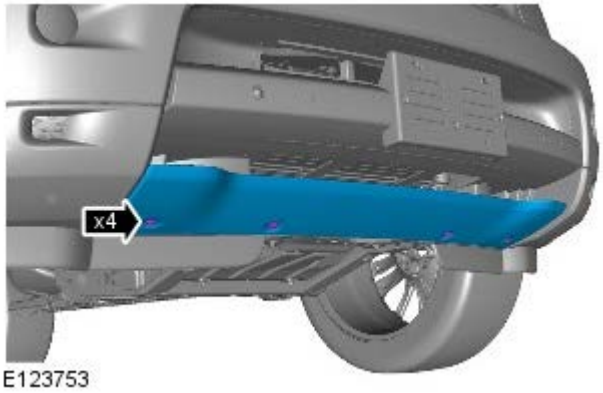
Bumpers - Front Bumper Lower Cover

Removal and Installation

Removal

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

1.



E123753

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Bumpers - Rear Bumper Cover

Removal and Installation

Removal

CAUTION: Always protect paintwork and glass when removing exterior components.

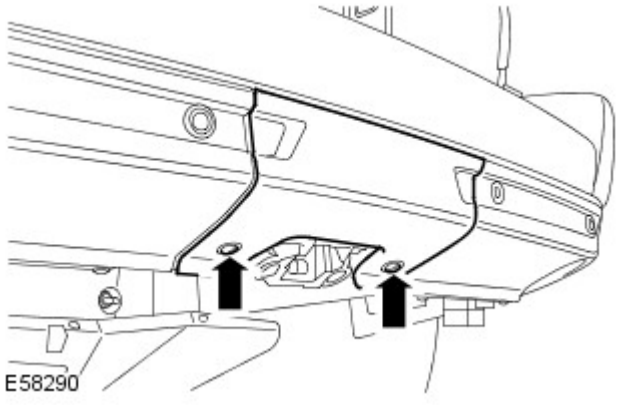
NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

All vehicles

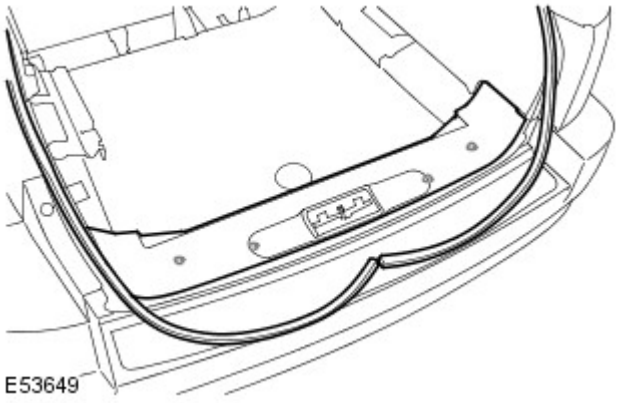
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Remove both rear lamp assemblies.
   For additional information, refer to: Rear Lamp Assembly (417-01, Removal and Installation).

3. Remove the rear bumper towing eye cover.
   - Release the 2 clips.



4. Release the liftgate seal.



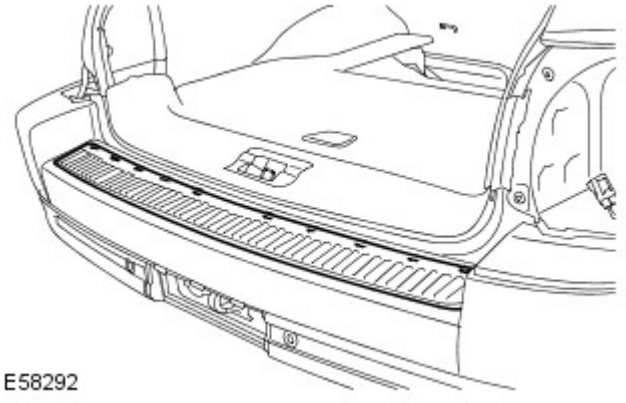
Vehicles with parking aid

5. Disconnect the parking aid sensor wiring harness electrical connector



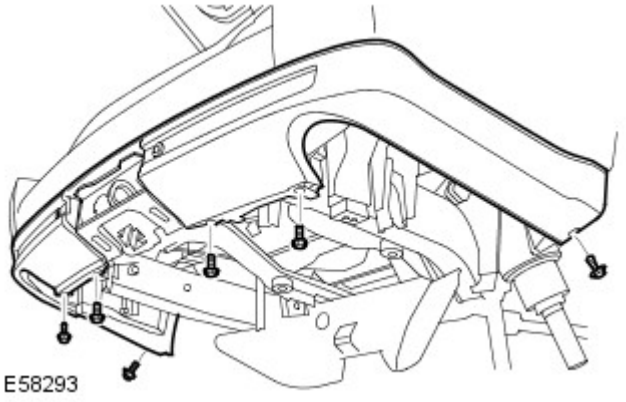
All vehicles

6. Remove the bumper scuff plate.

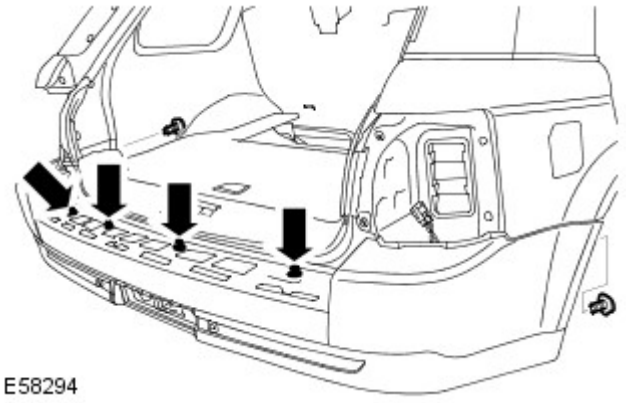

E58292

- Carefully release the 10 clips.

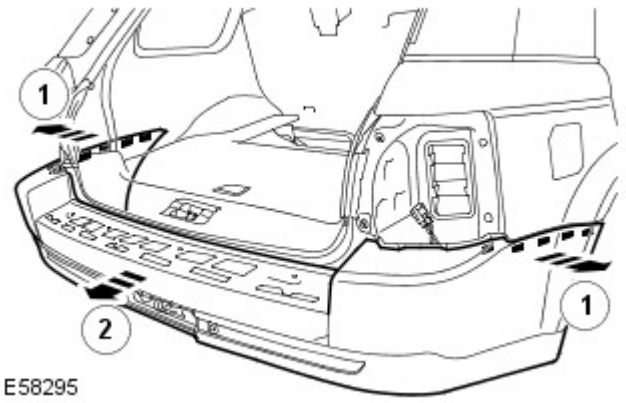
7. Remove the bumper cover lower fixings.
   - Remove the 6 screws.


E58293

8. Remove the bumper cover upper fixings.
   - Remove the 4 clips.
   - Remove the 2 screws.


E58294

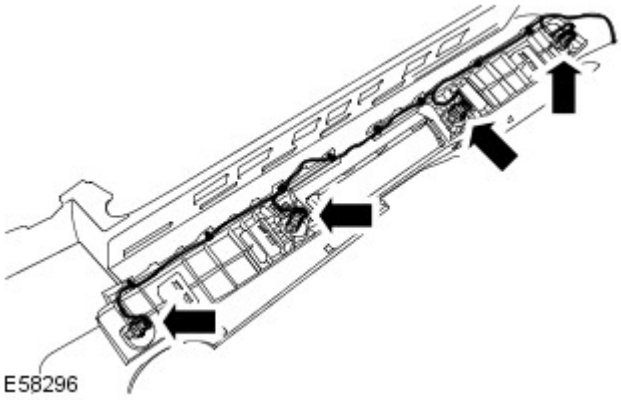
9. With assistance, remove the rear bumper cover.
   - Carefully release the 10 clips.



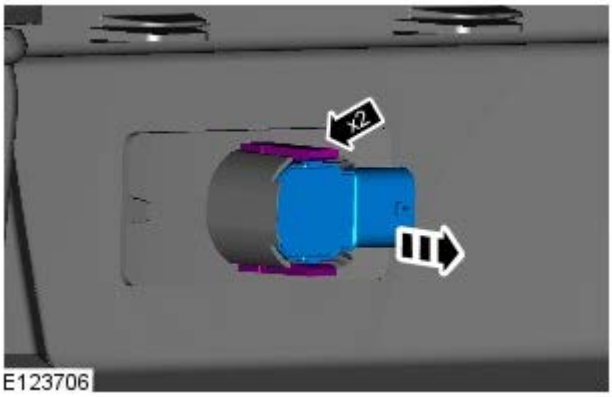
E58295

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

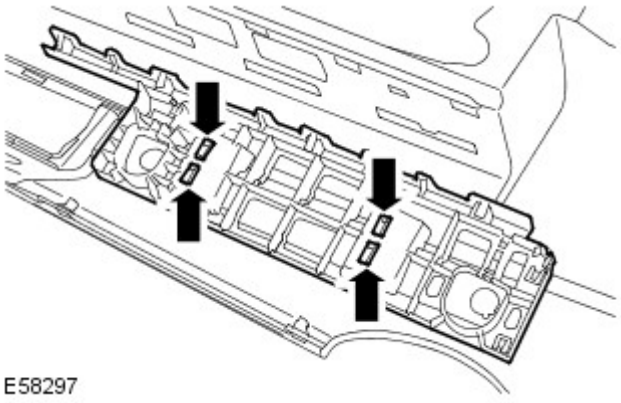
    Release the parking aid sensor wiring harness.
    - Release and disconnect the 4 electrical connectors.
    - Release the 16 clips.



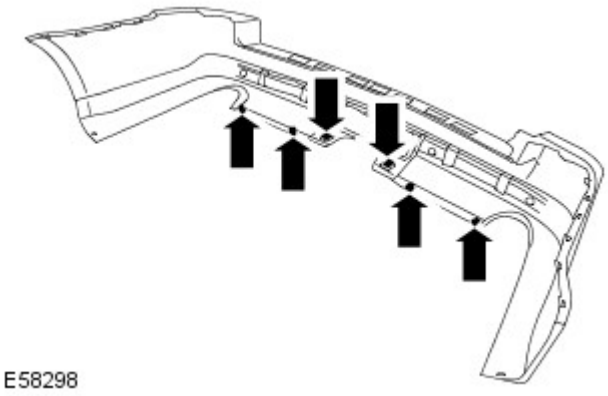
Vehicles with parking aid



11. Remove the parking aid sensor.
    - Release the 2 clips.
    - Repeat the above procedure for the remaining 3 sensors.



12. Remove the LH harness support trim panel.
    - Release the 4 clips.
    - Repeat the above procedure for the other side.



13. Remove the 6 clips.

Installation

All vehicles

1. Install the clips.
2. Install the harness support trim panels.
    - Secure the clips.

Vehicles with parking aid

3. Install the parking aid sensors.

4. Install the parking aid sensor wiring harness.
    - Connect the electrical connectors.

All vehicles

5. Install the rear bumper cover.
    - Secure in the clips.
    - Install the screws.

6. Install the bumper scuff plate.
    - Secure the clips.

Vehicles with parking aid

7. Connect the parking aid sensor wiring harness electrical connector.

All vehicles

8. Install the liftgate seal.

9. Install the towing eye cover.
    - Secure the clips.

10. Install both rear lamp assemblies.
    For additional information, refer to: Rear Lamp Assembly (417-01, Removal and Installation).

11. Connect the battery ground cable.
    For additional information, refer to: Specifications (414-00, Specifications).

Published: 11-May-2011

Safety Belt System -

Torque Specifications

Description	Nm	lb-ft
Front safety belt retractor Torx bolt	40	30
Front safety belt buckle Torx bolt	40	30
+ Front safety belt upper anchor Torx bolt	40	30
Rear safety belt retractor Torx bolt	40	30
+ Rear safety belt upper anchor Torx bolt	40	30
Rear safety belt buckle Torx bolt	25	18
Rear safety belt lower anchor nut	40	30
Rear safety belt buckle - RH - Torx bolt	40	30
Rear safety belt buckle - LH - Torx bolt - 60-40 split	25	18
Rear center safety belt buckle Torx bolt - 60-40 split	40	30
+ Rear seat Torx bolts	40	30

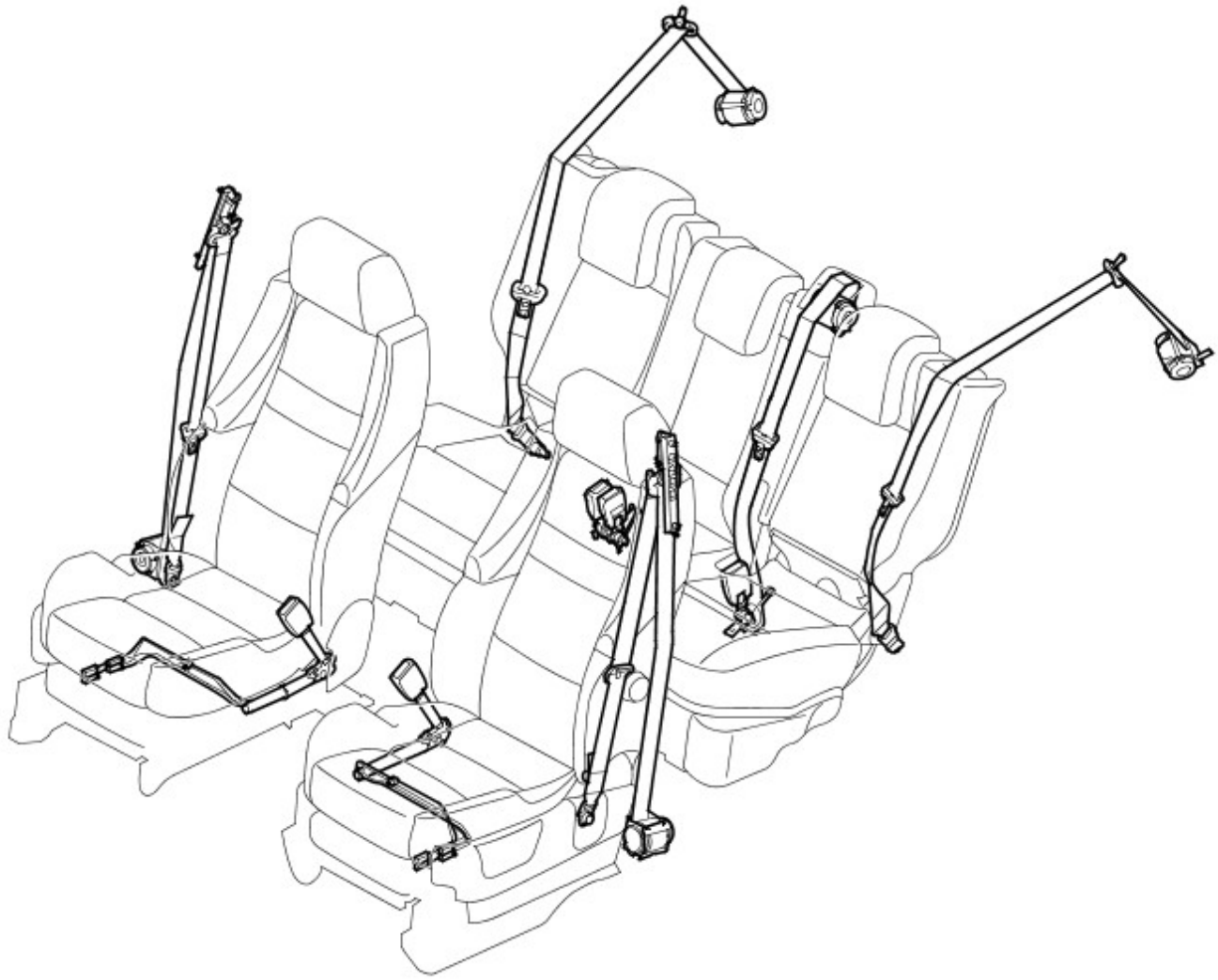
+ New Torx bolt/nut must be installed

Published: 17-Jan-2013

Safety Belt System - Safety Belt System

Description and Operation

COMPONENT LOCATIONS



E56082

GENERAL

A three point safety belt is installed at each seat position. Except in NAS (north American specification) markets, all of the safety belts have an ELR (emergency locking retractor). In NAS markets, only the driver seat is fitted with an ELR; all of the passenger safety belts have an ALR (automatic locking retractor).

Both types of retractor incorporate a liftshaft locking system with webbing sensor and car sensor activating mechanisms. The webbing sensor activates the locking system if the webbing is subjected to a sharp pull. The car sensor activates the locking system if the vehicle is subjected to sudden deceleration or a severe tilt angle.

The ALR has a mode of operation where the retractor will take up slack in the webbing, but not allow any slack to be paid out. This mode of operation can be used to secure a child seat.

- To engage the ALR child seat mode of operation: Pull the webbing out of the retractor to its full extent.
- To cancel the ALR child seat mode of operation: Allow the retractor to fully rewind the webbing.

A safety belt warning indicator is installed in the instrument cluster to remind the front seat occupants to fasten their safety belts. On NAS vehicles, when the ignition switch is turned to position II, the warning indicator illuminates if the safety belt of an occupied front seat is not fastened. The warning indicator remains illuminated until the safety belt of each occupied front seat is fastened, or the ignition is switched off. In all markets except NAS, a belt minder function provides a more intrusive reminder to fasten the front safety belts.

FRONT SAFETY BELTS

The retractor of each front safety belt is attached to the related B pillar. The webbing runs from the retractor through an upper mounting, attached to a shoulder height adjuster on the B pillar, to an anchor point on the front seat.

On NAS vehicles, a tension sensor is integrated into the anchor point of the passenger front safety belt. The tension sensor is part of the occupant classification system.
For additional information, refer to: Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) (501-20B Supplemental Restraint System, Description and Operation).

The retractor for each front safety belt incorporates a load limiter that allows the retractor reel to partially unwind when the load on the webbing exceeds a predetermined limit.

The buckle for each front safety belt is attached to a pretensioner secured to the inboard side of the related front seat frame. Each buckle incorporates a safety belt buckle sensor that provides a status input to the restraints control module (RCM), which uses the input to determine the air bag and pretensioner activation strategies. The RCM also relays the status of the safety belts to the instrument cluster on the high speed controller area network (CAN) bus.

Belt Minder Function (Where Fitted)

The belt minder function provides warnings to the driver if the appropriate front safety belts are not fastened when driving. The belt minder function is controlled by the instrument cluster using:

- Medium speed CAN bus messages, from the RCM, to monitor the status of the front safety belts.
- An input from the occupant detection system to monitor the status of the front passenger seat.
  For additional information, refer to: Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) (501-20B Supplemental Restraint System, Description and Operation).

When the ignition is in power mode 6 'on', the instrument cluster illuminates the safety belt warning indicator until one of the front safety belts is fastened or the belt minder function is triggered. The belt minder function is triggered when the ignition is in power mode 6 'on' and the following conditions coexist:

- The belt minder function is enabled.
- Vehicle speed is 8 km/h (5 mph) or more.
- The vehicle is not in reverse.
- The driver safety belt or, if the front passenger seat is occupied, the front passenger safety belt, is unfastened.

When the belt minder is triggered, the instrument cluster generates the following warnings for 10 seconds.

- Flashes the safety belt warning indicator at 2 Hz.
- Sounds a repeating chime in sequence with the flashing safety belt warning indicator.

After 10 seconds, the repeating chime is discontinued and the safety belt warning indicator changes from flashing to continuously illuminated. While the trigger conditions still coexist, the warnings are repeated every 30 seconds until one of the following occurs:

- 5 minutes has elapsed from when the warnings were first triggered.
- The safety belt of each occupied front seat is fastened.
- The ignition is in power mode 0 'off'.
- The vehicle speed decreases to 5 km/h (3 mph).

The belt minder function can be enabled and disabled using the driver safety belt switch. The instrument cluster changes the state of the belt minder function if, within 60 seconds of the ignition being in power mode 6 'on' , the driver safety belt is fastened and unfastened nine times. Successful completion of the change is indicated by a single chime and the safety belt warning indicator flashing five times, at 2 Hz. The belt minder function can also be enabled and disabled using an approved Land Rover diagnsotic system.

Safety Belt Warning Indicator



E132235

SECOND ROW SAFETY BELTS

The retractor of each outboard second row safety belt is attached to the body immediately behind the D pillar. The webbing runs from the retractor, through an upper mounting on the D pillar, to an anchor point at the front of the related wheel arch.

The retractor for the center second row safety belt is installed in the top of the seat back. The webbing runs from the retractor, over the top of the seat, to an anchor point at the base of the seat frame.

The buckles for the second row safety belts are attached to the related seat frame.

Published: 13-Feb-2013

Safety Belt System - Safety Belt System

Diagnosis and Testing

Principle of Operation

For a detailed description of the seatbelt system and operation, refer to the relevant description and operation section of the workshop manual REFER to: Safety Belt System (501-20 Safety Belt System, Description and Operation).

Safety Information

WARNINGS:

 To avoid accidental deployment the back-up power supply must be depleted before beginning any work on the SRS system or its components. Failure to follow this instruction may result in personal injury

 Do not use a multimeter to probe an SRS module. It is possible for the power from the multimeter battery to trigger the activation of the module. Failure to follow this instruction may result in personal injury

 NOTE: Do not to use a cellular phone or to have a cellular phone in close proximity when working on the SRS system or components

Power supply depletion

Before beginning any work on the SRS system or related components:

1. Remove the ignition key
2. Disconnect the battery leads, ground first
3. Wait 2 minutes for the power circuit to discharge

There are comprehensive instructions on the correct procedures for SRS system repairs, refer to the relevant section of the workshop manual

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 including pinpoint tests

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

Visual Inspection

Mechanical	Electrical
• Check for the installation of non-standard accessories which may affect or obstruct the function of the seatbelt system • Frayed or damaged webbing • Missing or damaged button stop • Pretensioner(s) Buckles/Stalks	• Fuses • Wiring harness fault • Correct engagement of electrical connectors • Loose or corroded connections • Warning lamp bulb(s) • Impact sensor(s) • Buckle sensor(s) • Pretensioner(s) • Belt tension sensor(s) • Restraints control module

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, carry out the test methods described below, alternatively check for diagnostic trouble codes and refer to the relevant diagnostic trouble code index

For a complete list of all diagnostic trouble codes that could be logged on this vehicle, please refer to section 100-00.
REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Restraints Control Module (100-00 General Information, Description and Operation).

Symptom Chart for Seatbelt Rows 1, 2 and 3

Symptom	Possible Causes	Action
Seatbelt jammed - Webbing tight	• Backlock effect-in action (webbing retracted quickly and came to sudden stop) • Seatbelt retractor not installed correctly • Rear centre seatbelt only. Mini-button (webbing travel limit stop) missing and seat squab has been moved causing tight fit • Automatic locking retractor activated (clicking – during retraction only)	• GO to Pinpoint Test A. • GO to Pinpoint Test F. • GO to Pinpoint Test H. • See the automatic locking retractor description below
Seat squab will not fold/jammed	NOTE: Rear centre seatbelt only • Mini-button (webbing travel limit stop) missing and seat squab has been moved causing excessive tension	• GO to Pinpoint Test H.
Seatbelt jammed - Webbing loose	• Seatbelt webbing trapped in seat • Seatbelt retractor webbing guide loose • Twist in webbing • Interference in webbing routing • D-loop not rotating correctly	• GO to Pinpoint Test B. • GO to Pinpoint Test C. • GO to Pinpoint Test D. • GO to Pinpoint Test E. • GO to Pinpoint Test G.
Seatbelt - Intermittent jamming	• Seatbelt retractor not installed correctly	• GO to Pinpoint Test F.
Seatbelt - Slow retraction	• Seatbelt retractor webbing guide loose • Twist in seatbelt webbing • Interference in webbing routing • Seatbelt retractor not installed correctly • D-loop not rotating correctly • Foreign object/debris	• GO to Pinpoint Test C. • GO to Pinpoint Test D. • GO to Pinpoint Test E. • GO to Pinpoint Test F. • GO to Pinpoint Test G. • GO to Pinpoint Test E.
Seatbelt - Not retracting	• Seatbelt retractor webbing guide loose • Twist in seatbelt webbing • D-loop not rotating correctly • Interference in webbing routing • Foreign object/debris	• GO to Pinpoint Test C. • GO to Pinpoint Test D. • GO to Pinpoint Test G. • GO to Pinpoint Test E. • GO to Pinpoint Test E.
Seatbelt - Not extracting	• Backlock effect-in action (webbing retracted quickly and came to sudden stop) • Seatbelt retractor not installed correctly • Seatbelt retractor webbing guide loose • Twist in seatbelt webbing • D-loop not rotating correctly • Interference in webbing routing • Foreign object/debris • Automatic locking retractor activated (clicking – during retraction only)	• GO to Pinpoint Test A. • GO to Pinpoint Test F. • GO to Pinpoint Test C. • GO to Pinpoint Test D. • GO to Pinpoint Test G. • GO to Pinpoint Test E. • GO to Pinpoint Test E. • See the automatic locking retractor description below
Seatbelt - Noisy during operation	• Automatic locking retractor activated (clicking–during retraction only) • Interference in webbing routing (rubbing)	• GO to Pinpoint Test B. • GO to Pinpoint Test E.
Seatbelt buckle - Not latching / jammed	• Foreign object/debris	CAUTION: Do not insert any objects or tools into the buckle head • GO to Pinpoint Test I.

Inertia Reel Seatbelts

The vehicle is equipped with (two row one), (three row two), and (two row three (seven seat versions only)) inertia reel seatbelts

These seatbelts are **"dual sensitive"** which means that they have:

- **Car sense system - A vehicle motion sensor, which locks the seatbelt webbing under braking, cornering, on steep hills and in adverse camber conditions, when parked on a steep incline or driveway or two wheels on a high curb**
- **Webb sense system - A webbing motion sensor, which locks when the seatbelt webbing is extracted suddenly**

The seatbelts in the following positions are equipped with an automatic locking retractor function:

Carline	Market	Seat position	Automatic Locking Retractor Installed	From Model Year
Defender (L316)	All	All	No	2007
Discovery / Range Rover Sport	All	Driver	No	2008

(L319/L320)				
Discovery / Range Rover Sport (L319/L320)	US	Passenger	Yes	2005
Discovery / Range Rover Sport (L319/L320)	All	Driver	No	2005
Discovery / Range Rover Sport (L319/L320)	ROW	Passenger	No	2005
Discovery (L319)	All	Row 2	Yes	2005
Discovery (L319)	All	Row 3	Yes	2005
Range Rover Sport (L320)	All	Row 2	Yes	2006
Freelander (L359)	All	Driver	No	2007
Freelander (L359)	ROW	Passenger	No	2007
Freelander (L359)	US	Passenger	Yes	2007
Freelander (L359)	ROW	Row 2	No	2007
Freelander (L359)	US	Row 2	Yes	2007
Range Rover Evoque (L538)	All	Driver	No	2011
Range Rover Evoque (L538)	ROW	Passenger	No	2011
Range Rover Evoque (L538)	US	Passenger	Yes	2011
Range Rover Evoque (L538)	ROW	Row 2	No	2011
Range Rover Evoque (L538)	US	Row 2	Yes	2011
Range Rover (L322)	All	Driver	No	2003
Range Rover (L322)	ROW	Passenger	No	2003
Range Rover (L322)	US	Passenger	Yes	2003
Range Rover (L322)	ROW	Row 2	No	2003
Range Rover (L322)	US	Row 2	Yes	2003

The **automatic locking retractor function** is a feature to secure a child seat or heavy load to the seat

Activation	Deactivation
NOTE: When automatic locking retractor is activated, no further webbing can be drawn from the seatbelt retractor, prior to disengagement of the automatic locking. This can be mistaken as a jammed seatbelt retractor Activated by total extraction of the webbing	Automatic locking retractor is deactivated by allowing the webbing to retract until the clicking stops (close to park position)
When activated the automatic locking retractor is identified by a clicking noise during webbing retraction	When deactivated the automatic locking retractor seatbelt changes state, from a **static** seatbelt to an **automatic** seatbelt

Seatbelt Locking Test

With the vehicle stationary and on level ground take firm hold of the seatbelt webbing (on the tongue side of the upper seatbelt anchor) and withdraw sharply, **the retractor should lock**. Preventing further webbing release **(repeat this test 3 times)**. Any seatbelt retractor which fails to lock **must not be used** and a **new seatbelt must be installed**.

DTC Index

For a list of diagnostic trouble codes that could be logged on this vehicle, please refer to Section 100-00 or for removal and installation/description and operation see Section 501-20

Diagnostic Guide Inertia Reel Seatbelts

PINPOINT TEST A : BACKLOCK	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: BACKLOCK	
	1 Visually inspect the condition of the suspect seatbelt
	2 Draw a maximum of 20mm of the webbing from the seatbelt retractor with moderate force. Then release the webbing
	3 Check for correct operation twice
	Does the webbing move freely then retract correctly? **Yes** No further action required **No** For first row seatbelt GO to Pinpoint Test C. For second and third row seatbelts GO to Pinpoint Test B.

PINPOINT TEST B : WEBBING - TRAPPED IN SEAT	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: WEBBING - TRAPPED IN SEAT	
	1 Visually inspect the condition of the suspect seatbelt
	2 Lift the seat base or release the seat backrest as required

	3	Free the trapped webbing, allow the webbing to retract **Note: If the automatic locking retractor is activated, allow the webbing to retract until the clicking stops**
	4	Check for correct operation **twice**
	Does the webbing move freely then retract correctly? **Yes** No further action required **No** GO to Pinpoint Test C.	

PINPOINT TEST C : SEATBELT RETRACTOR - WEBBING GUIDE LOOSE		
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**	
C1: SEATBELT RETRACTOR - WEBBING GUIDE LOOSE		
	1	Refer to 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point) and seatbelt retractor
	2	Check the webbing is not trapped or twisted and is centrally located on the seatbelt retractor spindle
	3	Attempt to withdraw the webbing from the seatbelt retractor **NOTE: If the seatbelt webbing is jammed, the automatic locking retractor could be engaged**
	4	To release the automatic locking retractor, manually wind the webbing onto the spindle until the automatic locking retractor deactivates (clicking stops)
	5	Fully extract webbing
	6	Confirm webbing guide location is correct , Confirm the fixing lugs are correctly located in the retractor frame
	7	Allow webbing to retract
	8	Check for correct operation **twice**
	Does the webbing move freely then retract correctly? **Yes** Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required **No** GO to Pinpoint Test D.	

PINPOINT TEST D : TWIST IN WEBBING		
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**	
D1: TWIST IN WEBBING		
	1	Refer to section 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point)
	2	Twist the webbing back the correct way in the loop
	3	Pass the twist through the pillar loop or escutcheon as required
	4	Check for correct operation **twice**
	Does the webbing move freely then retract correctly? **Yes** Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required **No** GO to Pinpoint Test E.	

PINPOINT TEST E : INTERFERENCE - WEBBING ROUTING		
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**	
E1: INTERFERENCE - WEBBING ROUTING		
	1	Refer to the 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point)
	2	Remove obstructions and foreign objects ensure the webbing does not catch or rub
	3	Confirm the seatbelt does not contact the wiring harness
	4	Check for correct operation **twice**
	Does the webbing move freely then retract correctly? **Yes** Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required **No** GO to Pinpoint Test F.	

PINPOINT TEST F : SEATBELT RETRACTOR - INCORRECT INSTALLATION		
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**	
F1: SEATBELT RETRACTOR - INCORRECT INSTALLATION		
	1	Refer to the 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point) and the seatbelt retractor
	2	Refer to the 501-20 removal and installation section of the workshop manual, correctly reinstall

	the seatbelt retractor ensure that the locating "T bar" and "anti rotation pins" are correctly located
	3 Check for correct operation **twice**
	Does the webbing move freely then retract correctly? **Yes** Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required **No** Replace as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component

PINPOINT TEST G : D-LOOP NOT ROTATING CORRECTLY	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
G1: D-LOOP NOT ROTATING CORRECTLY	
	1 Refer to the 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point) and the seatbelt retractor
	2 Ensure there are no obstructions and the webbing does not catch or rub, the D loop (anchor point) rotates correctly and if installed the confirm the height adjuster operates correctly
	3 Check for correct operation **twice**
	Does the webbing move freely then retract correctly? **Yes** Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required **No** Replace as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component

PINPOINT TEST H : MINI BUTTON - MISSING/DAMAGED	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
H1: MINI BUTTON - MISSING/DAMAGED	
NOTE: This test applies to the rear centre seatbelt retractor installed in the **seat back**	
	1 Refer to the 501-20 removal and installation section of the workshop manual, remove the seat cushion and the plastic escutcheon at the top of the seat back (where the webbing exits to expose the lower anchor fixing point of the center seatbelt)
	2 Remove the lower anchorage of the seatbelt
	3 With the seat back correctly latched, allow up to 20mm webbing to retract, then extract the webbing
	Is the mini-button (webbing travel limit stop) correctly installed to the webbing and in good condition? **Yes** Feed the mini-button back through the plastic escutcheon if required. Correctly reinstall the escutcheon to the seat back, extract the webbing then allow to retract, ensure the mini-button comes to rest outside the escutcheon stop **No** Replace as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component

PINPOINT TEST I : SEATBELT BUCKLE - NOT LATCHING/JAMMED	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
I1: SEATBELT BUCKLE - NOT LATCHING/JAMMED	
CAUTION: Do not insert any objects or tools into the buckle head	
	1 Visually inspect the buckle head for evidence of damage. If damaged replace as required
	2 Depress the buckle release (red button) and **(Using a torch)** carry out visual inspection for any evidence of debris/material or foreign objects in the buckle head
	3 If required remove the pretensioner from the vehicle. Remove the seat. Remove the pretensioner from the seat frame
	4 **Do not insert any objects or tools buckle head** With the buckle removed invert and attempt to shake out any debris
	5 Attempt to latch the tongue in the buckle
	Does the seatbelt buckle operate correctly **Yes** Reinstall any components, no further action required **No** Replace the pretensioner, Refer to section 501 20

Published: 11-May-2011

Safety Belt System - Front Safety Belt Retractor

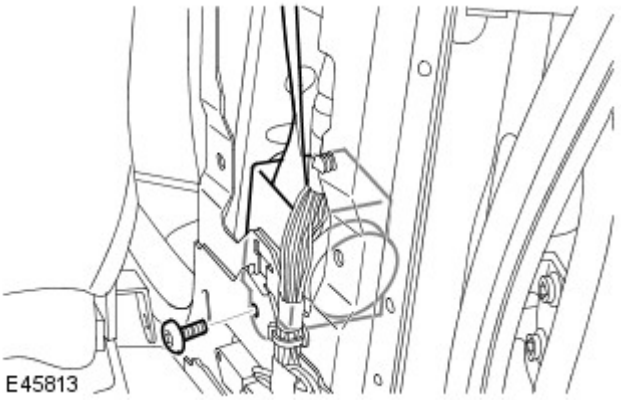
Removal and Installation

Removal

1. Position the front seat fully forwards.
2. Remove the scuff plate trim panel.
   For additional information, refer to: Scuff Plate Trim Panel (501-05, Removal and Installation).
3. Release the safety belt upper anchor.
   - Remove and discard the Torx bolt.



4. Remove the safety belt retractor assembly.
   - Remove and discard the Torx bolt.



Installation

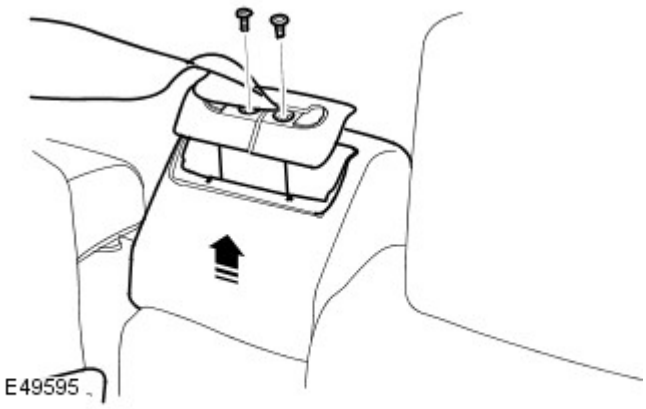
1. Install the front safety belt retractor.
   - Tighten the Torx bolt to 40 Nm (30 lb.ft).
2. Attach the safety belt upper anchor.
   - Tighten the Torx bolt to 40 Nm (30 lb.ft).
3. Install the scuff plate trim panel.
   For additional information, refer to: Scuff Plate Trim Panel (501-05, Removal and Installation).

Published: 11-May-2011

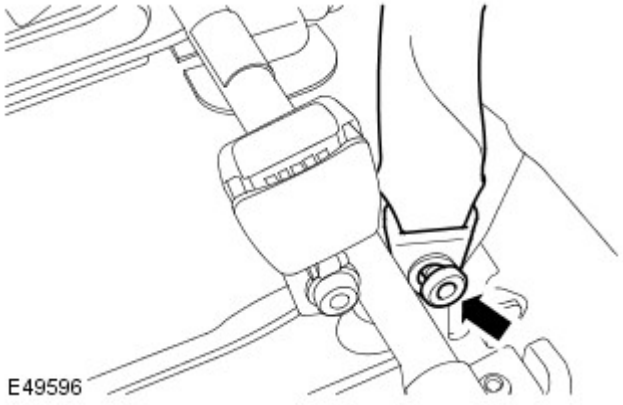
Safety Belt System - Second Row Center Safety Belt Retractor

Removal and Installation

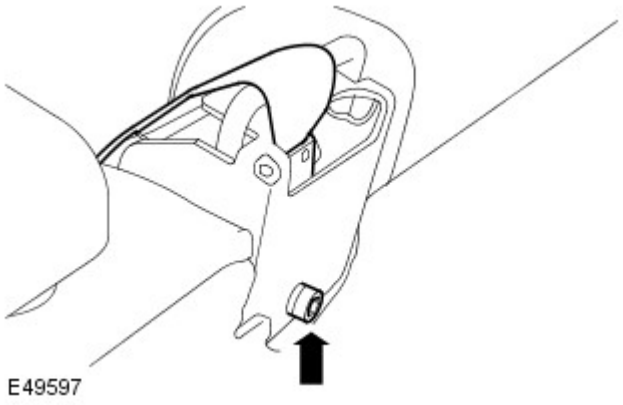
Removal



1. Release the safety belt retractor cover and guide
   - Remove the 2 screws.
   - Remove the safety belt guide.
   - Remove the retractor cover.



2. Remove the safety belt lower anchor.
   - Raise the seat cushion.
   - Remove and discard the nut.



3. Remove the safety belt retractor assembly.
   - Remove and discard the Torx bolt.

Installation

1. Install the safety belt retractor assembly.
   - Tighten the new Torx bolt to 40 Nm (30 lb.ft).
2. Install the safety belt guide and retractor cover.
   - Attach the safety belt guide and retractor cover.
   - Tighten the screws.
3. Install the safety belt lower anchor.
   - Tighten the new nut to 40 Nm (30 lb.ft).
   - Lower the seat cushion.

Published: 11-May-2011

Safety Belt System - Second Row Safety Belt Retractor

Removal and Installation

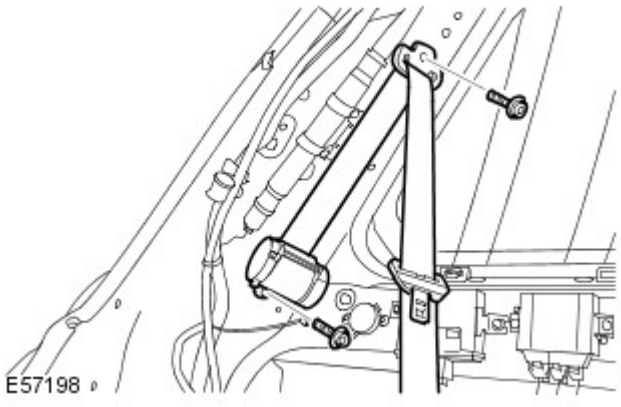
Removal

NOTE: Left-hand shown, right-hand similar.

1. Remove the D-pillar upper trim panel.
   For additional information, refer to: D-Pillar Trim Panel (501-05, Removal and Installation).

2. Release the safety belt upper anchor.
   - Remove and discard the Torx bolt.

3. Remove the second row safety belt retractor.
   - Remove and discard the Torx bolt.



Installation

1. Install the second row safety belt retractor.
   - Tighten the Torx bolt to 40 Nm (30 lb.ft).

2. Install the safety belt upper anchor.
   - Tighten the Torx bolt to 40 Nm (30 lb.ft).

3. Install the D-pillar upper trim panel.
   For additional information, refer to: D-Pillar Trim Panel (501-05, Removal and Installation).

Published: 11-May-2011

Safety Belt System - Front Safety Belt Buckle

Removal and Installation

Removal

WARNINGS:

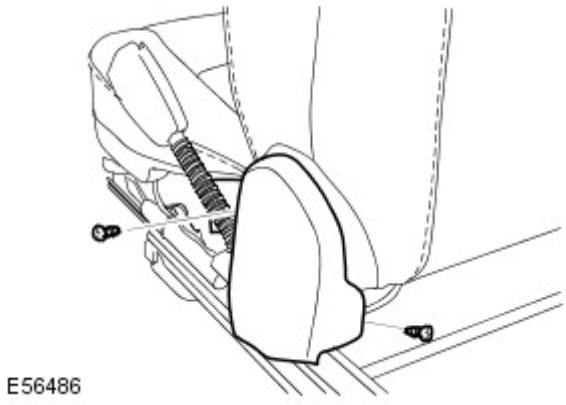
It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

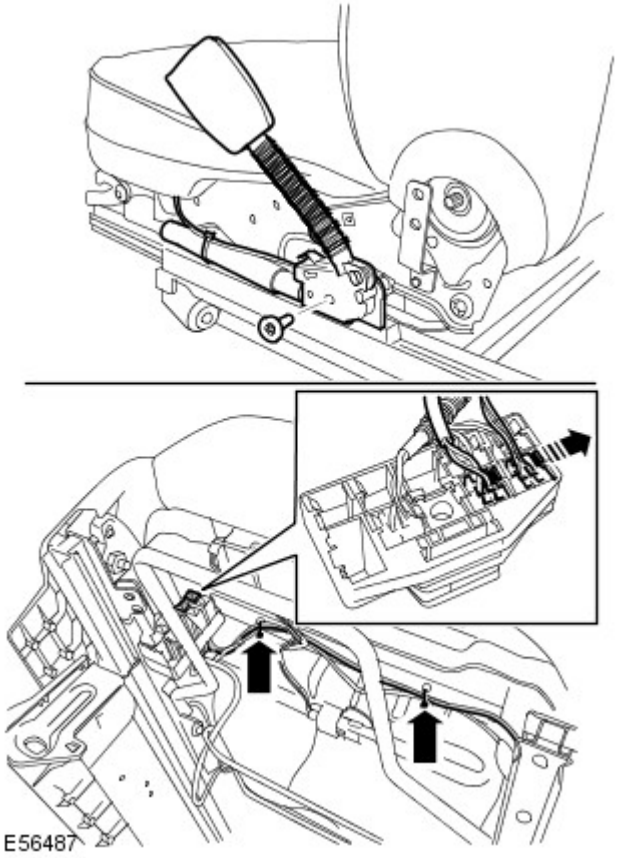
2. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

3. Remove the front seat.
   For additional information, refer to: Front Seat (501-10, Removal and Installation).



4. Remove the seat backrest hinge cover.
   - Remove the 2 screws.

5. Remove the front safety belt buckle.
   - Remove the Torx bolt.
   - Disconnect the 2 electrical connectors.
   - Release the wiring harness.



Installation

1. Install the front safety belt buckle.
    - Tighten the Torx bolt to 40 Nm (30 lb.ft).
    - Connect the electrical connectors.
    - Attach the wiring harness.

2. Install the seat backrest hinge cover.
    - Tighten the screws.

3. Install the front seat.
   For additional information, refer to: Front Seat (501-10, Removal and Installation).

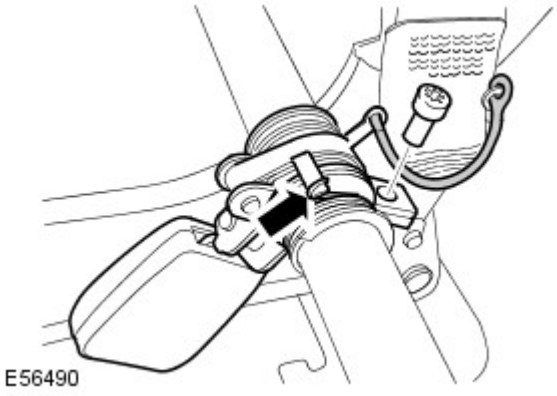
4. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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Safety Belt System - Rear Safety Belt Buckle LH Vehicles With: 60/40 Split Seat

Removal and Installation

Removal



1. Remove the safety belt buckle.
    - Raise the seat cushion.
    - Release the retaining strap.
    - Remove the Torx bolt.
    - Release the tension spring.

Installation

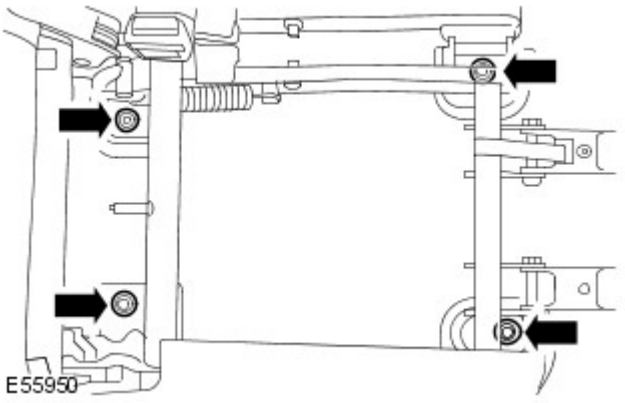
1. Install the safety belt buckle.
    - Attach the tension spring.
    - Tighten the Torx bolt to 25 Nm (18 lb.ft).
    - Attach the retaining strap.
    - Lower the seat cushion.

Published: 11-May-2011

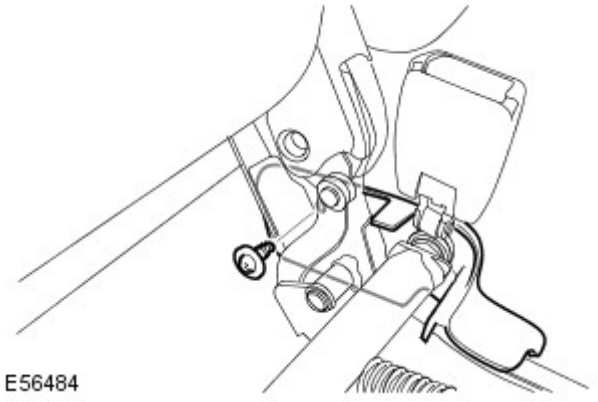
Safety Belt System - Rear Safety Belt Buckle RH Vehicles With: 60/40 Split Seat

Removal and Installation

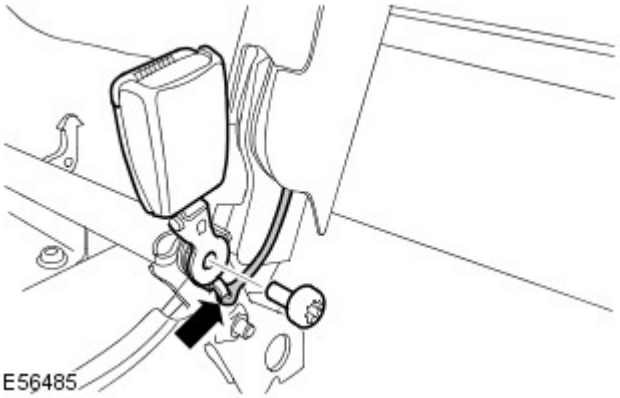
Removal



1. Release the RH rear seat.
   - Fold the seat cushion forward.
   - Remove and discard the 4 Torx bolts.
   - Fold down the rear seat backrest.
2. Remove the RH rear seat.



3. Remove the rear seat cushion side finisher.
   - Remove the screw.



4. Remove the safety belt buckle.
   - Raise the seat cushion.
   - Release the retaining strap.
   - Remove and discard the bolt.

Installation

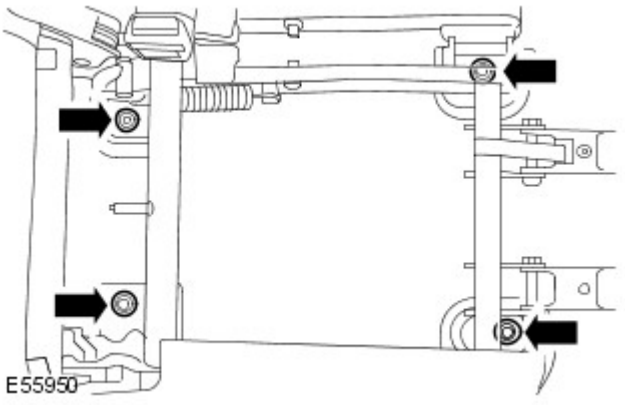
1. Install the safety belt buckle.
   - Tighten the Torx bolt to 40 Nm (30 lb.ft).
   - Attach the retaining strap.
   - Lower the seat cushion.
2. Install the rear seat cushion side finisher.
   - Tighten the screw.
3. Install the RH rear seat.
   - Position the seat on the dowels.
4. Secure the RH rear seat.
   - Return the seat backrest to the upright position.
   - Tighten the new bolts to 40 Nm (30 lb.ft).
   - Fold the seat cushion rearwards.

Published: 11-May-2011

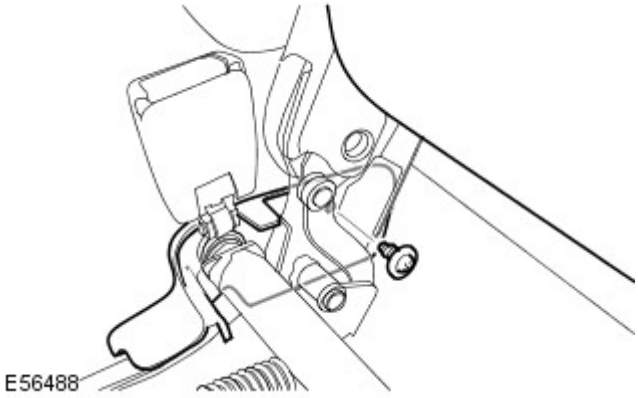
Safety Belt System - Rear Center Safety Belt Buckle Vehicles With: 60/40 Split Seat

Removal and Installation

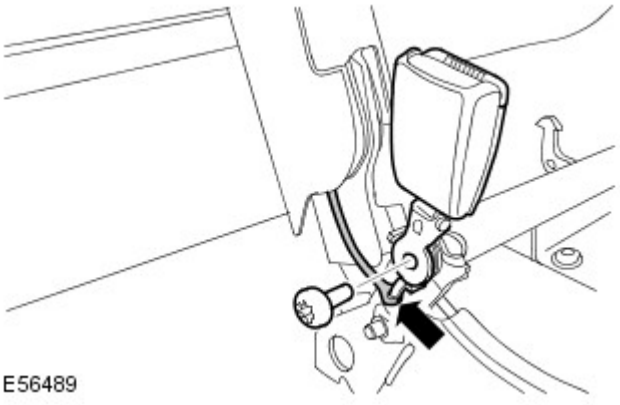
Removal



1. Release the RH rear seat.
   - Fold the seat cushion forward.
   - Remove and discard the 4 Torx bolts.
   - Fold down the rear seat backrest.
2. Remove the RH rear seat.



3. Remove the rear seat cushion side finisher.
   - Raise the seat cushion.
   - Remove the screw.



4. Remove the safety belt buckle.
   - Release the retaining strap.
   - Remove and discard the bolt.

Installation

1. Install the safety belt buckle.
   - Tighten the Torx bolt to 40 Nm (30 lb.ft).
   - Attach the retaining strap.
   - Lower the seat cushion.
2. Install the rear seat cushion side finisher.
   - Tighten the screw.
3. Install the RH rear seat.
   - Position the seat on the dowels.
4. Secure the RH rear seat.
   - Return the seat backrest to the upright position.
   - Tighten the new bolts to 40 Nm (30 lb.ft).
   - Fold the seat cushion rearwards.

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Supplemental Restraint System -

Torque Specifications

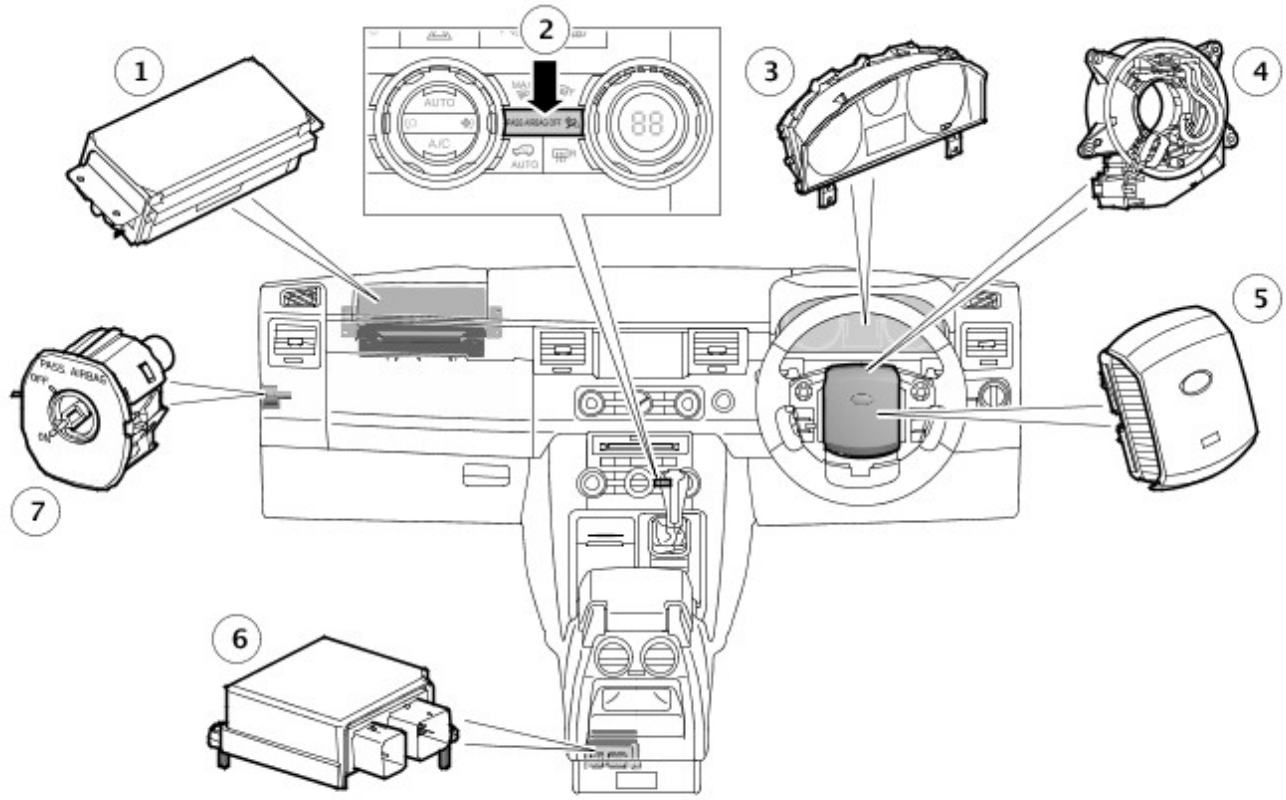
Description	Nm	lb-ft
Passenger air bag module bracket nuts	10	7
Passenger air bag module nuts	10	7
Rear side air curtain module Torx screws	10	7
C-pillar side impact sensor Torx bolts	8	6
Side air curtain module Torx screws	10	7
B-pillar side impact sensor Torx screws	8	6
Restraints control module (RCM) Torx screws	10	7
Front door side impact sensor Torx bolts	8	6
Side air bag module nuts	10	7
Front impact sensor Torx bolts	8	6

Published: 31-Jul-2013

Supplemental Restraint System - Air Bag and Safety Belt Pretensioner
Supplemental Restraint System (SRS)

Description and Operation

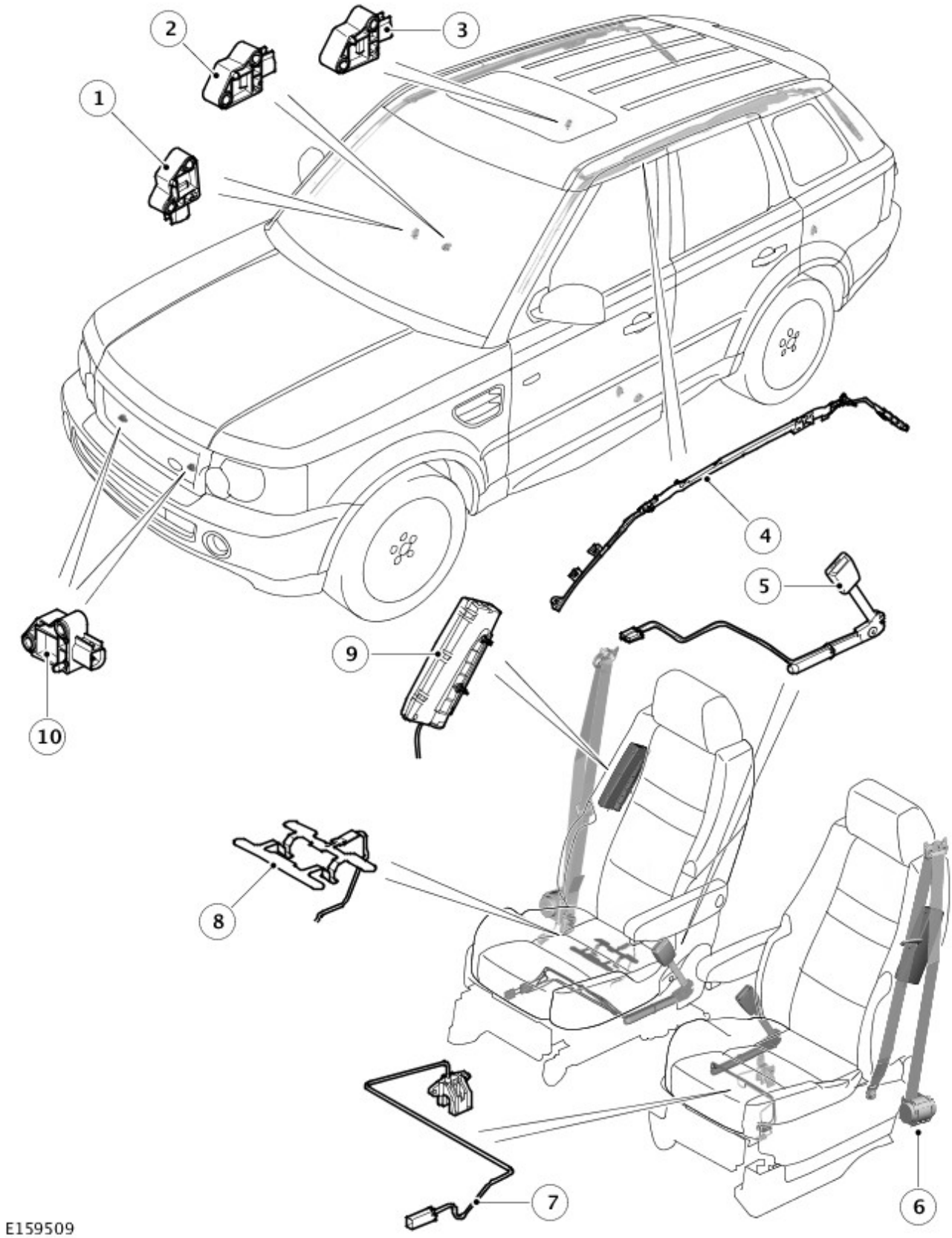
COMPONENT LOCATION - SHEET 1 OF 3



E159508

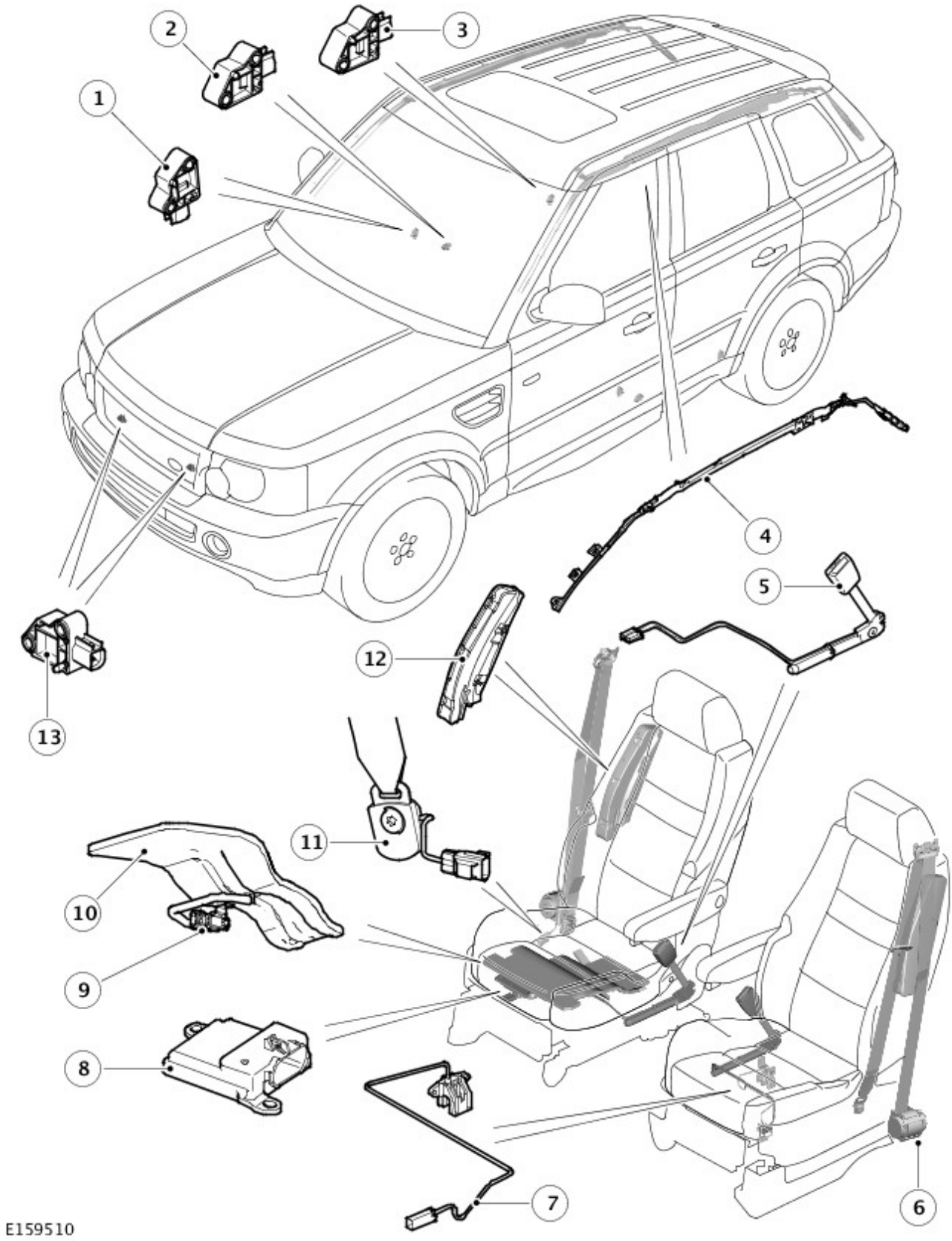
Item	Part Number	Description
1	-	Passenger air bag
2	-	Passenger air bag deactivation indicator
3	-	SRS (supplemental restraint system) warning indicator
4	-	Clockspring
5	-	Driver air bag
6	-	RCM (restraints control module)
7	-	Passenger air bag deactivation switch (all except NAS (North American Specification)

COMPONENT LOCATION - SHEET 2 OF 3 (ALL EXCEPT NAS)



Item	Part Number	Description
1	-	Door side impact sensor
2	-	B pillar side impact sensor
3	-	C pillar side impact sensor
4	-	Side air curtain
5	-	Safety belt buckle switch
6	-	Pretensioner
7	-	Seat position sensor
8	-	Occupant detection pressure sensor
9	-	Side air bag
10	-	Front impact sensors

COMPONENT LOCATION - SHEET 3 OF 3 (NAS ONLY)



Item	Part Number	Description
1	-	Door side impact sensor
2	-	B pillar side impact sensor
3	-	C pillar side impact sensor
4	-	Side air curtain
5	-	Safety belt buckle switch
6	-	Pretensioner
7	-	Seat position sensor
8	-	Occupant classification module
9	-	Seat cushion pressure sensor

10	-	Seat cushion pressure pad
11	-	Safety belt tension sensor
11	-	Side air bag
12	-	Front impact sensors

GENERAL

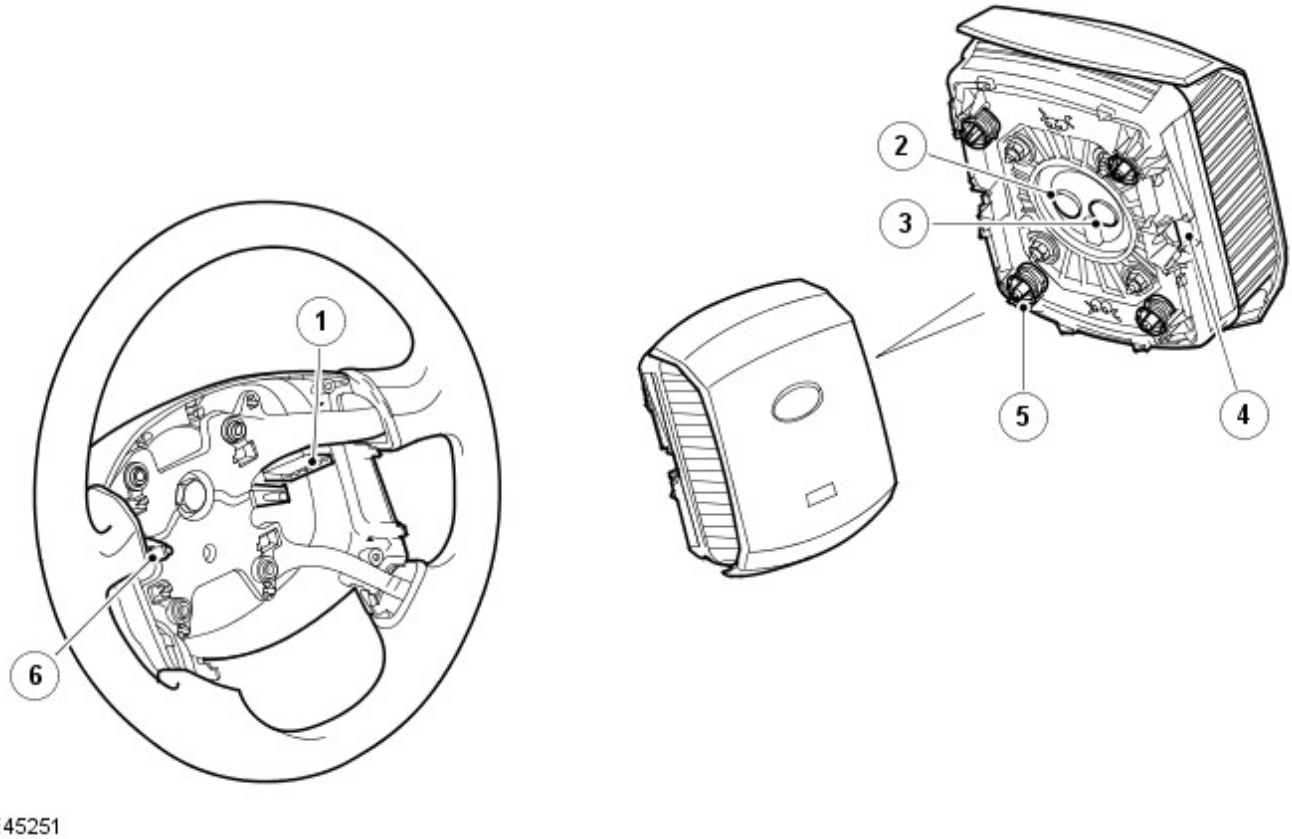
The SRS provides additional protection for occupants in certain vehicle accident conditions. The SRS consists of:

- A driver air bag.
- A passenger air bag.
- A side air bag on each front seat.
- Side air curtains for first and second row seats.
- A pretensioner for each front safety belt.
- A buckle sensor for each front safety belt.
- Front and side impact sensors.
- A passenger air bag deactivation indicator.
- A passenger air bag deactivation switch (all except NAS).
- An occupant monitoring system for the front passenger seat.
- A position sensor for the driver seat.
- An air bag warning indicator.
- A clockspring.
- A RCM.

WARNING: WARNING:All pyrotechnic devices are dangerous. Before performing any procedures on any pyrotechnic device, read all information contained within the Standard Workshop Practices section of this manual. For additional information, refer to: Standard Workshop Practices (100-00 General Information, Description and Operation).

The SRS features selective activation of the air bags and pretensioners, and two stage driver and passenger air bags. The RCM monitors internal and external sensors and activates the required safety belt pretensioners and air bags if the sensors detect an impact or roll-over above preset limits.

DRIVER AIR BAG



E45251

Item	Part Number	Description
1	-	Release tool slot and guide channel
2	-	Inflator stage 1 connector
3	-	Inflator stage 2 connector
4	-	Latch spring
5	-	Locating pin and spring
6	-	Latch hook

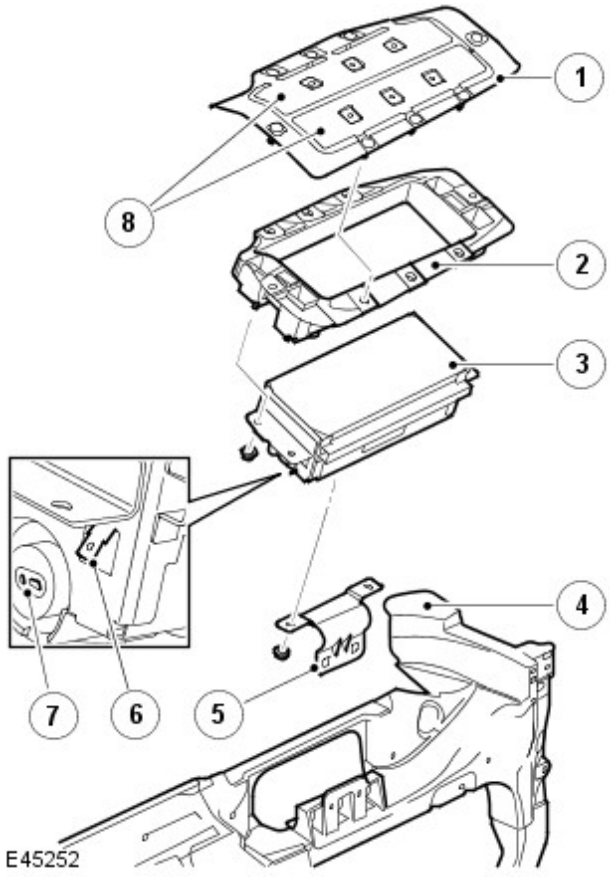
The driver air bag forms the center pad of the steering wheel. Four pins and two latches locate and secure the driver air bag to the steering wheel. The latches consist of wire springs on each side of the driver air bag which engage with hooks in the steering wheel. The driver air bag is released from the steering wheel by pulling on the wire springs with a special tool inserted through a slot on each side of the steering wheel hub. Springs on the locating pins then push the driver air bag away from the steering wheel.

A Lucar connector attaches a ground to the driver air bag.

The driver air bag has a two stage inflator, with separate electrical connectors for each stage. The inflator contains a non-azide propellant as the gas generator.

Lines molded into the inner surface of the driver air bag cover provide weak points that split open in a controlled manner when the air bag deploys. The inflated volume of the air bag is 57 liters (2.01 ft^3).

PASSENGER AIR BAG



Item	Part Number	Description
1	-	Reinforcement lid
2	-	Chute
3	-	Passenger air bag
4	-	In-vehicle crossbeam
5	-	Mounting bracket
6	-	Lucar connector
7	-	Inflator connector
8	-	Deployment doors

The passenger air bag is located in the instrument panel, behind the upper glove compartment. The bottom of the passenger air bag is attached to a mounting bracket on the in-vehicle crossbeam. The top of the passenger air bag is attached to a chute, which, in turn, is attached to a reinforcement lid in the top of the instrument panel. When the air bag deploys, the chute guides the air bag to the underside of the reinforcement lid. The reinforcement lid incorporates two deployment doors that are forced open, splitting the instrument panel covering, when the air bag deploys.

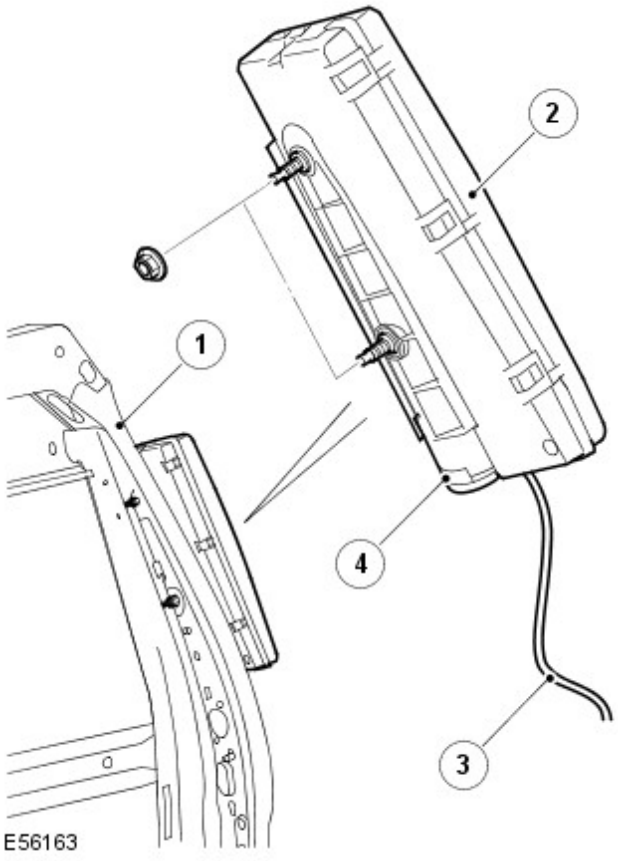
A Lucar connector attaches a ground to the passenger air bag.

The passenger air bag has a two stage inflator, with separate electrical connectors for each stage. The inflator contains a non-azide propellant as the gas generator. The inflator uses a high pressure mix of air and hydrogen gas as the inflation medium. The inflated volume of the air bag is 130 liters (4.59 ft^3).

SIDE AIR BAGS

Non NAS Side Air Bag

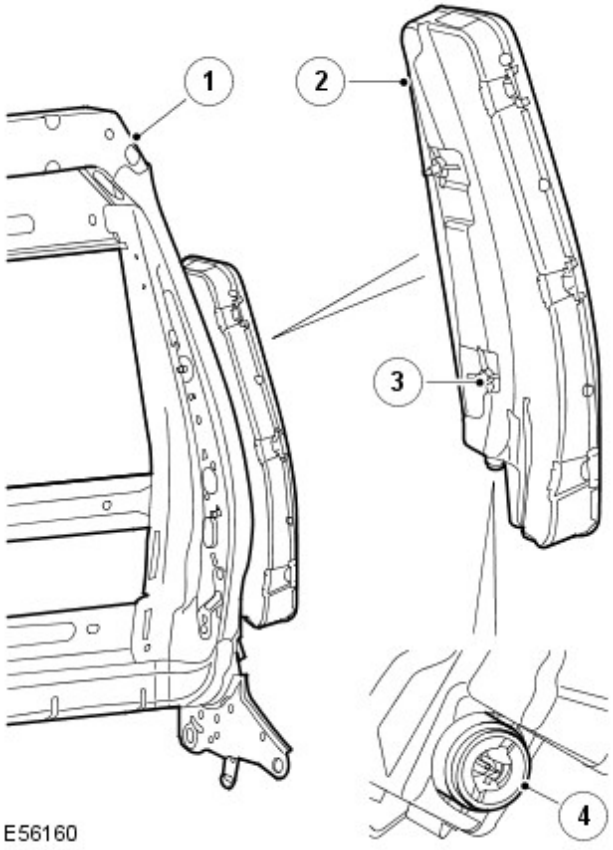
NOTE: Left side air bag shown, right side air bag is mirror image



Item	Part Number	Description
1	-	Seat backrest frame
2	-	Side air bag
3	-	Cable
4	-	Inflator

NAS Side Air Bag

NOTE: Left side air bag shown, right side air bag is mirror image



Item	Part Number	Description
1	-	Seat backrest frame
2	-	Side air bag
3	-	Inflator
4	-	Electrical connector

A side air bag is attached to the outside of each front seat backrest frame, under the backrest cover. In all markets except NAS, the side air bags each consist of a single section, which deploys to protect the thorax region. In NAS markets, the side air bags each consist of two sections, inflated using a common inflator, which deploy to protect both the thorax and the pelvic regions.

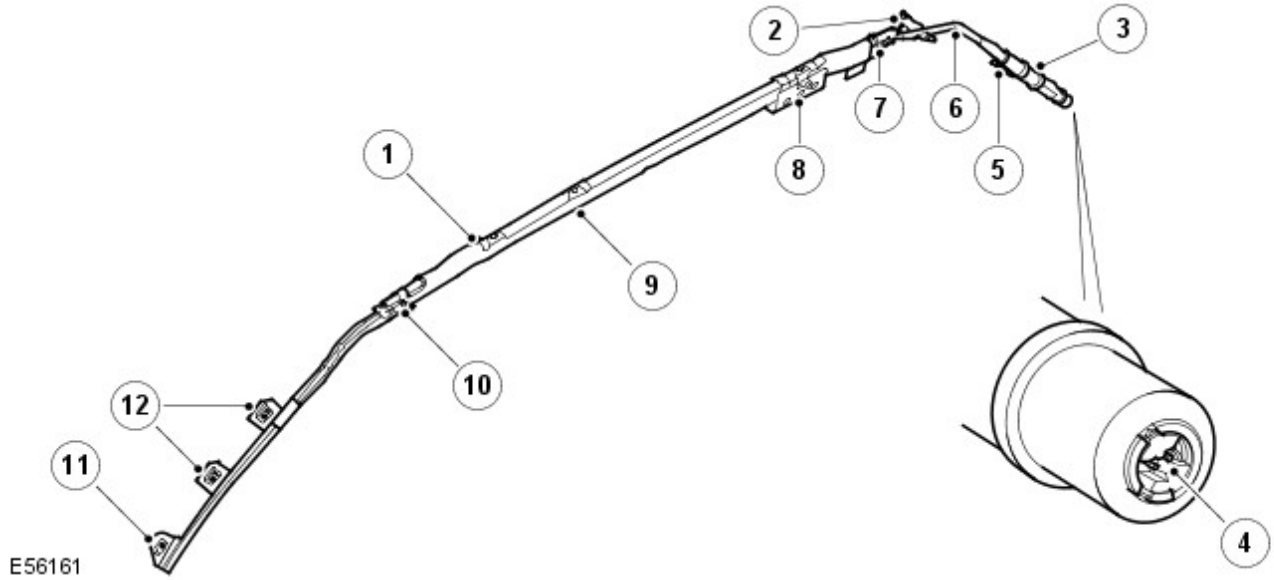
The side air bags are handed, and each consist of a molded plastic case which contains the folded air bag and the inflator. In all markets except NAS the side air bags incorporate a cable that connects the igniter of the inflator to a connector in the main seat harness connector block located under the front edge of the seat cushion. In NAS markets the seat harness is connected to an electrical connector in the base of the inflator.

When a side air bag deploys it forces the front edge of the molded plastic case apart and splits open the backrest cover.

The side air bags use compressed argon as the inflation medium. In all markets except NAS the inflated volume of each side air bag is approximately 12 liters (0.42 ft^3). In NAS markets the inflated volume of each side air bag is approximately 10 liters (0.35 ft^3) for the thorax section and 3 liters (0.11 ft^3) for the pelvic section.

SIDE AIR CURTAINS

NOTE: Right side air curtain shown, left side air curtain is mirror image



Item	Part Number	Description
1	-	B pillar ramp
2	-	Gas guide mounting bracket
3	-	Inflator
4	-	Inflator electrical connector
5	-	Inflator mounting bracket
6	-	Gas guide pipe
7	-	Rear tether
8	-	Ramp
9	-	Retainer cover
10	-	Front mounting bracket
11	-	Front tether anchor point
12	-	A pillar mounting clip

The side air curtains are designed to protect the head and upper body of first and second row occupants in side impact and roll-over situations. The side air curtains use compressed argon as the inflation medium.

The side air curtains are installed on the cant rails above the front and rear doors, behind the headliner.

Each side air curtain has an inflator, which is attached to the E pillar by a mounting bracket. The inflator is connected to the air curtain by a gas guide pipe.

The gas guide pipe and air curtain are secured along the cant rail by mounting brackets at each end of the gas guide pipe and two ramps. Tethers attached to the front and rear of the air curtain are anchored to the A pillar and the gas guide mounting bracket respectively. The front of the air curtain is secured to the A pillar by two mounting clips.

When the side air curtain deploys, it breaks out of the two ramps on the cant rail and extends downwards from behind the headliner. The deploying air curtain is tensioned between the tether anchor points on the A pillar and the gas guide mounting bracket. This retains the air curtain in position against the upper part of the doors and the B pillar.

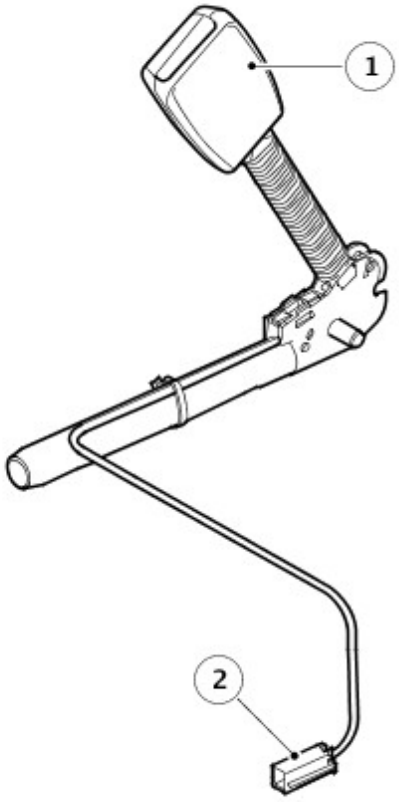
PRETENSIONERS



E149532

A pretensioner is incorporated into each of the safety belt retractors. They are pyrotechnic devices that are controlled by the RCM in the SRS. When deployed the safety belt retractor pretensioners fire and tighten the seatbelts during a collision to ensure the occupants are securely held in their seats.

SAFETY BELT BUCKLE SWITCH

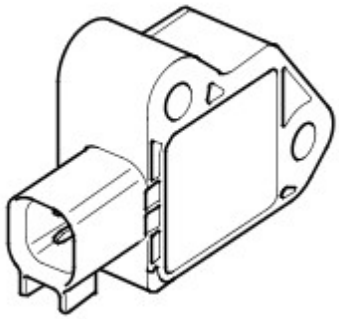


E159511

Item	Part Number	Description
1	-	Safety belt buckle
5	-	Electrical connector for buckle switch

The buckle of each front safety belt incorporates a Hall effect sensor that provides a safety belt status signal to the RCM. The RCM broadcasts the status of the two front safety belts on the high speed CAN (controller area network) bus for use by the instrument cluster.

IMPACT SENSORS



E45257

Impact sensors are installed in the front and both sides of the vehicle. The use of multiple impact sensors provides shorter air bag trigger times, through faster detection of lateral and longitudinal acceleration, and improves detection accuracy.

There are two front impact sensors attached to brackets on the body front support frame, just above each front longitudinal.

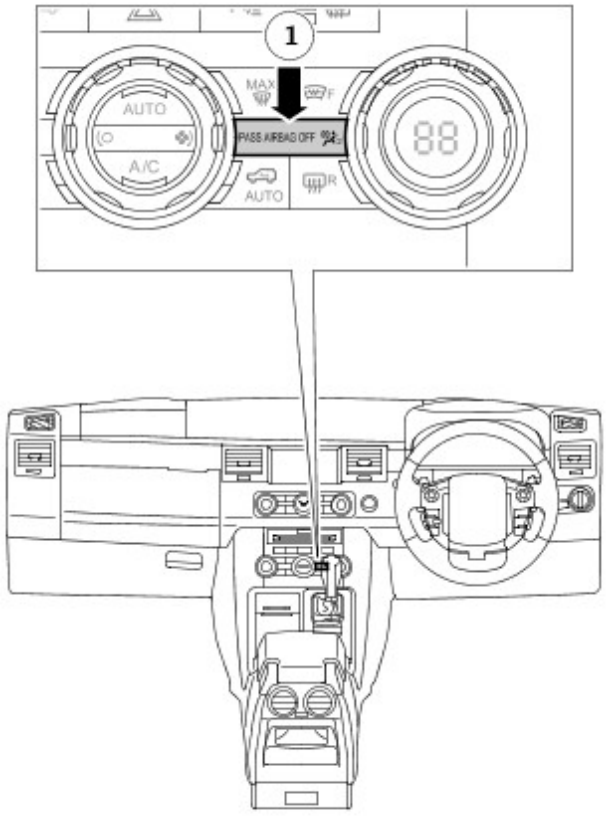
There are six side impact sensors located in the passenger compartment:

- One attached to each front door.
- One attached to the base of each B pillar.
- One attached to the base of each C pillar.

Each impact sensor incorporates an accelerometer and a microcontroller powered by a feed from the RCM. The power feed also provides the interface connection through which the impact sensor communicates with the RCM using serial data messages. Acceleration is evaluated by the microcontroller and transmitted to the RCM, which then makes the decision on whether or not to activate the air bags and pretensioners.

When the ignition is switched on the RCM supplies power to the impact sensors, which perform a self test. After satisfactory self tests the impact sensors continually output 'sensor active' messages to the RCM. If a fault is detected the relevant impact sensor sends a fault message, instead of the sensor active message, to the RCM. The RCM then stores a related fault code and illuminates the air bag warning indicator.

PASSENGER AIR BAG DEACTIVATION INDICATOR



E159520

Item	Part Number	Description
1	-	Passenger air bag deactivation indicator

The passenger air bag deactivation indicator is installed on the center switch pack of the instrument panel. When appropriate, the indicator illuminates to advise front seat occupants that the passenger air bag is disabled. Operation of the indicator is controlled by the RCM based on seat occupancy status derived from the occupant classification system (NAS vehicles) or the passenger air bag deactivation switch (all except NAS and Australian specification vehicles).

The RCM illuminates the indicator when:

- The passenger air bag is deactivated with the passenger air bag deactivation switch (where fitted). OR
- Required by passenger seat occupant monitoring (NAS vehicles only).

PASSENGER AIR BAG DEACTIVATION SWITCH



E128629

The passenger air bag deactivation switch provides a method of manually disabling the passenger air bag on all vehicles except Australian specification and those fitted with the occupant classification system. The switch is installed in the front passenger end of the instrument panel and is operated by the ignition key.

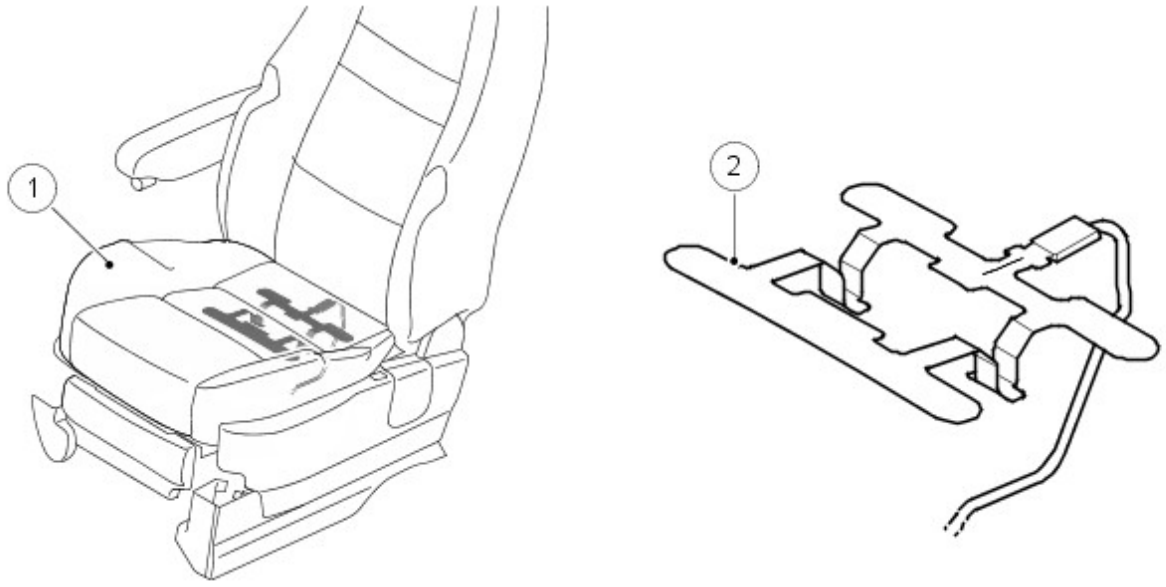
When the passenger air bag deactivation switch is operated, it changes a ground connection between two pins in the connectors of the RCM. When the passenger air bag deactivation switch is selected to OFF, the RCM disables the passenger air bag and, if the front passenger seat is occupied, illuminates the passenger air bag deactivation indicator.

OCCUPANT SENSING

There are 2 types of occupant sensing:

- In all markets except North America, vehicles have an occupant detection system to activate the seat belt minder
- On NAS vehicles, an occupant classification system provides signals to the RCM to allow the correct arming of the passenger air bag and corresponding indicator.

Occupant Detection System



E56164

Item	Part Number	Description
1	-	Seat cushion
2	-	Pressure switch

The occupant detection system can only determine if the front passenger seat is occupied or unoccupied. The occupant detection system consists of a pressure switch installed between the foam padding and the cover of the front passenger seat cushion.

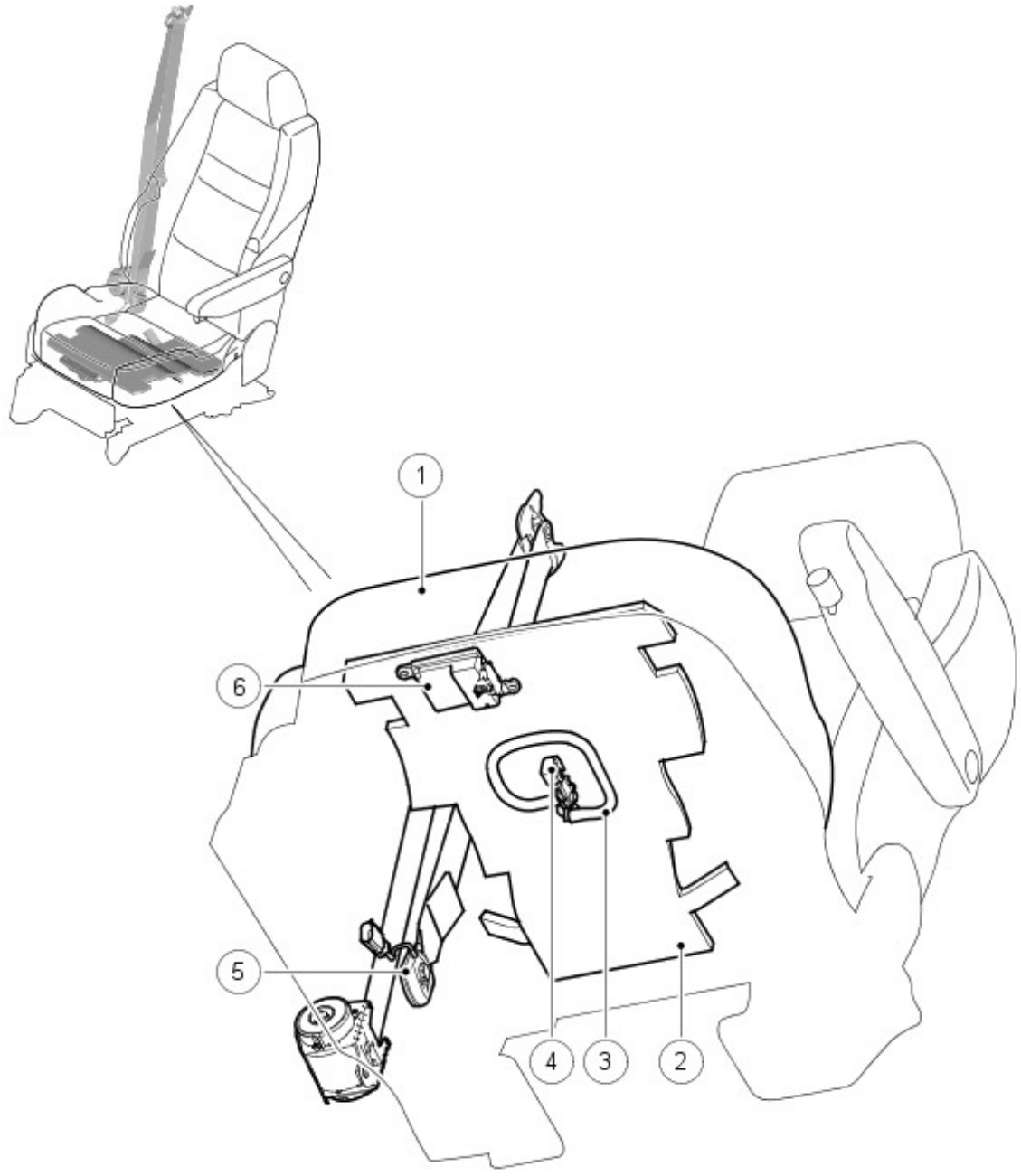
The pressure switch incorporates a number of load cells connected in series and embedded in a plastic film. Weight on the pressure sensor increases the resistance of the circuit.

The instrument cluster supplies a reference voltage to the pressure switch and measures the current draw to determine the occupancy status. From the occupancy status, and the status of the front passenger safety belt (received from the RCM on the high speed CAN bus), the instrument cluster determines the belt minder status.

Occupant Classification System

WARNING: All Land Rover vehicles, with the exception of Defender, are equipped with passenger air bags. Passenger air bags offer well documented benefits in crash protection for adult front passenger seat occupants but their deployment can be harmful to children and infants sat in the front passenger seat of the vehicle. Land Rover recommends that children and infants are placed in the rear seats of the vehicle.

NOTE: All new Land Rover vehicles sold in North America comply with the FMVSS208 legislation due to the fitment of the occupant classifications system.



Item	Part Number	Description

1	-	Seat cushion
2	-	Pressure pad
3	-	Pressure tube
4	-	Pressure sensor
5	-	Safety belt tension sensor
6	-	Occupant classification module

Occupant classification system comprises an ECU, attached to the underside of the seat, a silicon filled bladder with a pressure sensor fitted between the cushion foam and the seat pan and a seat belt tension sensor. When an occupant sits on the seat a pressure is created in the bladder and the occupant weight is determined from the pressure generated. The weight is compared against 4 classification thresholds. These are:

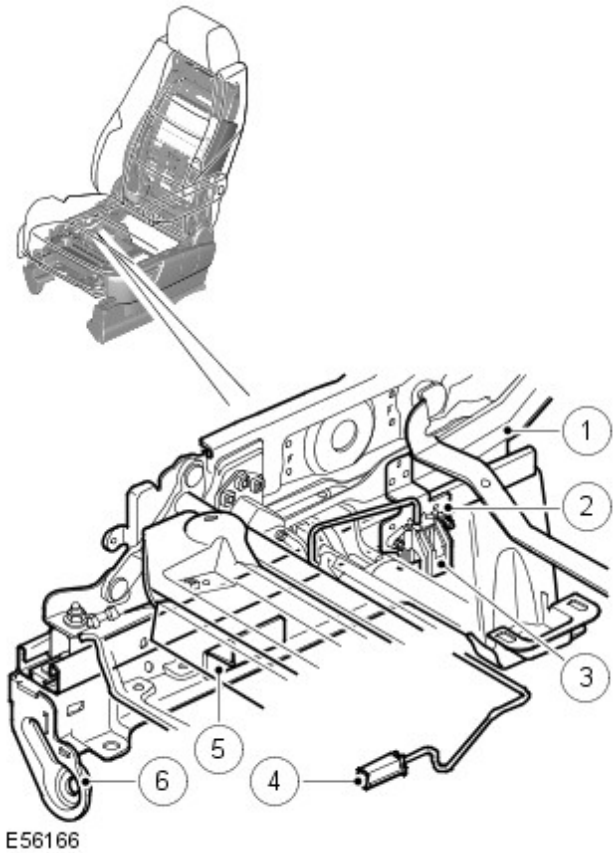
- Empty
- Occupied inhibit status (6 year old child, 3 year old child, rear facing/forward facing 12 month infant seats and booster seats)
- Occupied allow status (weight greater than 5th precentile female) and the airbag enabled/disabled as appropriate
- Indeterminate state.

Classification	Deactivation Indicator	SRS Warning Indicator
Seat unoccupied	OFF	OFF
Occupied inhibit	ON	OFF
Occupied allow	OFF	OFF
Indeterminate state	OFF	ON

OCS module contains accelerometers and algorithms to compensate for the effects of longitudinal, lateral and vertical forces acting on the vehicle whilst being driven. The belt tension sensor is used to offset loads forced into the seat by 'cinched' child seats (where a child seat load on the seat is increased by a highly tensioned seat belt) and also dynamic belt loading (Off-road/aggressive driving styles).

The belt minder system on cars equipped with the occupant classification system uses the RCM to detect seat occupancy status based on calculations within the RCM, with the instrument cluster then determining whether a seat belt reminder should be activated based on the status of the seat belt buckle switches and vehicle speed.

SEAT POSITION SENSOR



Item	Part Number	Description
1	-	Seat frame
2	-	Mounting plate
3	-	Seat position sensor
4	-	Electrical connector
5	-	Target plate
6	-	Seat base

The seat position sensor allows the RCM to detect when the driver seat is forward of a given point on the seat track. The seat position sensor consists of a Hall effect sensor attached to the driver seat frame and a target plate on the seat base. While the ignition is on, the RCM supplies the sensor with a power supply of 12V nominal, and monitors the return voltage. When the seat frame moves forwards, the sensor moves over the target plate, which changes the reluctance of the sensor. The change of voltage is detected by the RCM and used as a switching point. The switching point is when the center of the sensor is 3 ± 4 mm from the leading edge of the target plate.

When the driver seat is forward of the switching point, the RCM increases the time delay between firing the two stages of the inflator in the driver air bag. When the driver seat is rearward of the switching point, uses the normal time delay between firing the two stages.

AIR BAG WARNING INDICATOR

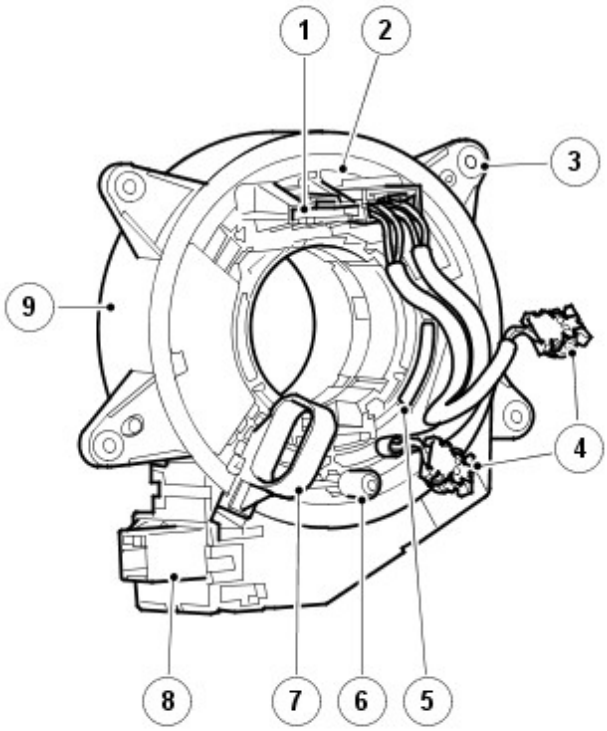


E159512

The air bag warning indicator consists of a yellow LED (light emitting diode) behind a SRS graphic in the instrument cluster.

Operation of the air bag warning indicator is controlled by a high speed CAN bus message from the RCM to the instrument cluster. The RCM illuminates the air bag warning indicator if a fault is detected, and for approximately 6 seconds during the bulb check at the beginning of each ignition cycle.

CLOCKSPRING



E45264

Item	Part Number	Description
1	-	Electrical connector for steering wheel switch packs and horn
2	-	Inner rotor
3	-	Outer housing securing lug
4	-	Driver air bag link leads
5	-	Viewing window
6	-	Drive peg
7	-	Stopper
8	-	Electrical connector for steering column harness
9	-	Outer cover

The clockspring is installed on the steering column to provide the electrical interface between the fixed wiring harness of the steering column and the components that rotate with the steering wheel, i.e. the driver air bag, the horn and the steering wheel switch packs.

The clockspring consists of a plastic cassette which incorporates an outer cover fixed to the steering column and an inner rotor which turns with the steering wheel. Four securing lugs attach the cover to the multifunction switch on the steering column. The rotor is keyed to the steering wheel by a drive peg. A lug on the underside of the rotor operates the self-cancelling feature of the turn signal indicator switch. A ribbon lead, threaded on rollers in the rotor, links two connectors on the cover to two connectors on the rotor. Link leads for the driver air bag are installed in one of the connectors on the rotor.

To prevent damage to the ribbon lead, both the steering and the clockspring must be centralized when removing and installing the clockspring or the steering wheel. The clockspring is centralized when the drive peg is at six o'clock and 50 - 100% of a yellow wheel is visible in the viewing window.

Replacement clocksprings are fitted with a stopper, which locks the cover to the rotor, in the central position. The stopper must be broken off when the replacement clockspring is installed.

RCM



E128616

The RCM is installed on the top of the transmission tunnel, in line with the B pillars, and controls operation of the SRS. The main functions of the RCM include:

- Crash detection and recording.
- Air bag and pretensioner firing.
- Self test and system monitoring, with status indication via the air bag warning lamp and non volatile storage of fault information.

A safing sensor in the RCM provides confirmation of an impact to verify if air bag and pretensioner activation is necessary. A roll-over sensor monitors the lateral attitude of the vehicle. Various firing strategies are employed by the RCM to ensure that during an accident only the appropriate air bags and pretensioners are fired. The firing strategy used also depends on the inputs from the safety belt switches and the occupant monitoring system.

An energy reserve in the RCM ensures there is always a minimum of 150 milliseconds of stored energy available if the power supply from the ignition switch is disrupted during a crash. The stored energy is sufficient to produce firing signals for the driver air bag, the passenger air bag and the safety belt pretensioners.

When the ignition is switched on the RCM performs a self test and then performs cyclical monitoring of the system. If a fault is detected the RCM stores a related fault code and illuminates the air bag warning indicator. The faults can be retrieved by the Land Rover approved diagnostic system on a dedicated link between the RCM and the diagnostic socket. If a fault that could cause a false fire signal is detected, the RCM disables the respective firing circuit, and keeps it disabled during a crash event.

SRS OPERATION

General

In a collision, the sudden deceleration or acceleration is measured by the safing sensor in the RCM and by the impact sensors. The RCM evaluates the readings to determine the impact point on the vehicle and whether the deceleration/acceleration readings exceed the limits for firing any of the air bags or pretensioners. During a collision, the RCM only fires the air bags and pretensioners if the safing sensor confirms that the data from the remote sensor(s) indicates an impact limit has been exceeded. The RCM also monitors the vehicle for a roll-over accident using the internal roll-over sensor and high speed CAN bus messages from the ABS (anti-lock brake system) module and the steering angle sensor.

The RCM incorporates the following impact thresholds to cater for different accident scenarios:

- Front impact, pretensioners.
- Front impact, driver and passenger air bags stage 1, belt unfastened.
- Front impact, driver and passenger air bags stage 2, belt unfastened.
- Front impact, driver and passenger air bags stage 1, belt fastened.
- Front impact, driver and passenger air bags stage 2, belt fastened.
- Rear impact.
- LH (left-hand) side impact.
- RH (right-hand) side impact.
- Roll-over.

The front impact thresholds increase in severity from pretensioners, through to driver and passenger air bag stage 2, belt fastened.

Firing Strategies

The seat belt pretensioners are fired when either the pretensioner impact limit or the roll-over limit is exceeded. The RCM only fires the pretensioners if the related safety belt is fastened. For the front passenger pretensioner to fire, the seat must also be occupied by a large person, i.e. someone over a given weight (NAS only).

The driver and passenger air bags are only fired in a frontal impact that exceeds the stage 1 threshold. Both stages of the inflator in the driver and passenger air bags are fired. At impacts between the stage 1 and 2 thresholds, the

delay between the firing of the two stages varies with the severity of the impact; the more severe the impact the shorter the delay. At stage 2 impact thresholds and above, the two stages of the inflator are fired almost simultaneously. The passenger air bag is disabled unless the front passenger seat is occupied by a large person (NAS only), or the passenger air bag deactivation switch is on (all except NAS). The time delay between firing the two stages of the inflator in the driver air bag is increased if the driver seat is forward of the seat position sensor switching point.

If there is a fault with a safety belt buckle sensor, the RCM assumes the related safety belt is fastened for the pretensioner firing strategy and unfastened for the driver and passenger air bag firing strategies. If there is a fault with the occupant detection system, or if there is a fault with the passenger air bag deactivation switch, the RCM increase the time delay between firing the two stages of the inflator in the passenger air bag.

If a side impact limit is exceeded, the RCM fires the side air bag and the side air curtain(s) on that side of the vehicle. If the side impact limit on the front passenger side of the vehicle is exceeded, the RCM also evaluates the input from the occupant classification system, and fires the side air bag only if the front passenger seat is occupied by a large person (NAS only).

The side air curtain(s) on both sides of the vehicle are fired if the roll-over limit is exceeded.

If multiple impacts occur during a crash event, after responding to the primary impact the RCM will output the appropriate fire signals in response to any further impacts if unfired units are available.

Crash Signal

When the RCM outputs any of the fire signals, it also outputs a hard wired crash signal to the ECM (engine control module) and changes the high speed CAN bus output message from 'no crash' to 'crash condition'. The high speed CAN bus message is used by the CJB (central junction box) and the FFBH (fuel fired booster heater).

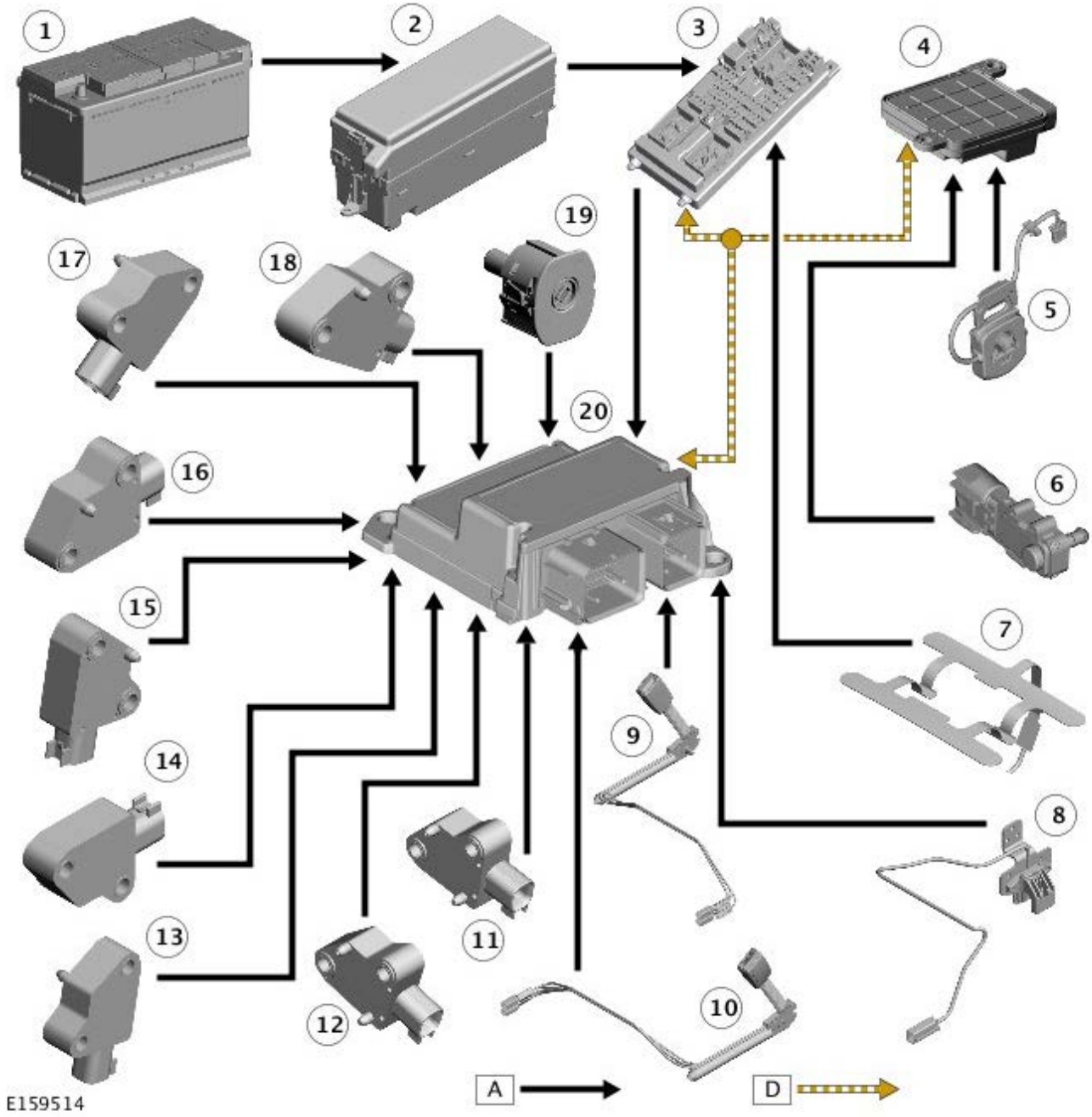
On receipt of the crash signals:

- The ECM disables the fuel pump.
- Operation of the FFBH is disabled.
- The CJB enters the crash mode and:
  - Activates all of the unlock signals of the vehicle locking system, even if the vehicle is already unlocked. After 3 seconds, the CJB activates the unlock signals again, in case a lock button is pressed during the crash, by flailing limbs for example.
  - Ignores all locking and superlocking inputs until the crash mode is cancelled, when it returns the locking system to normal operation.
  - Activates all of the courtesy lamps, except for the approach lamps. The activated courtesy lamps remain on until they are manually switched off at the lamp unit, or the CJB crash mode is cancelled, when they return to normal operation.
  - Activates the hazard warning lamps. The hazard warning lamps remain on until cancelled by turning the ignition switch from position II to position I or 0, or until the crash mode is cancelled.

The crash mode is cancelled by cycling the ignition switch.

SRS CONTROL DIAGRAM - SHEET 1 OF 2

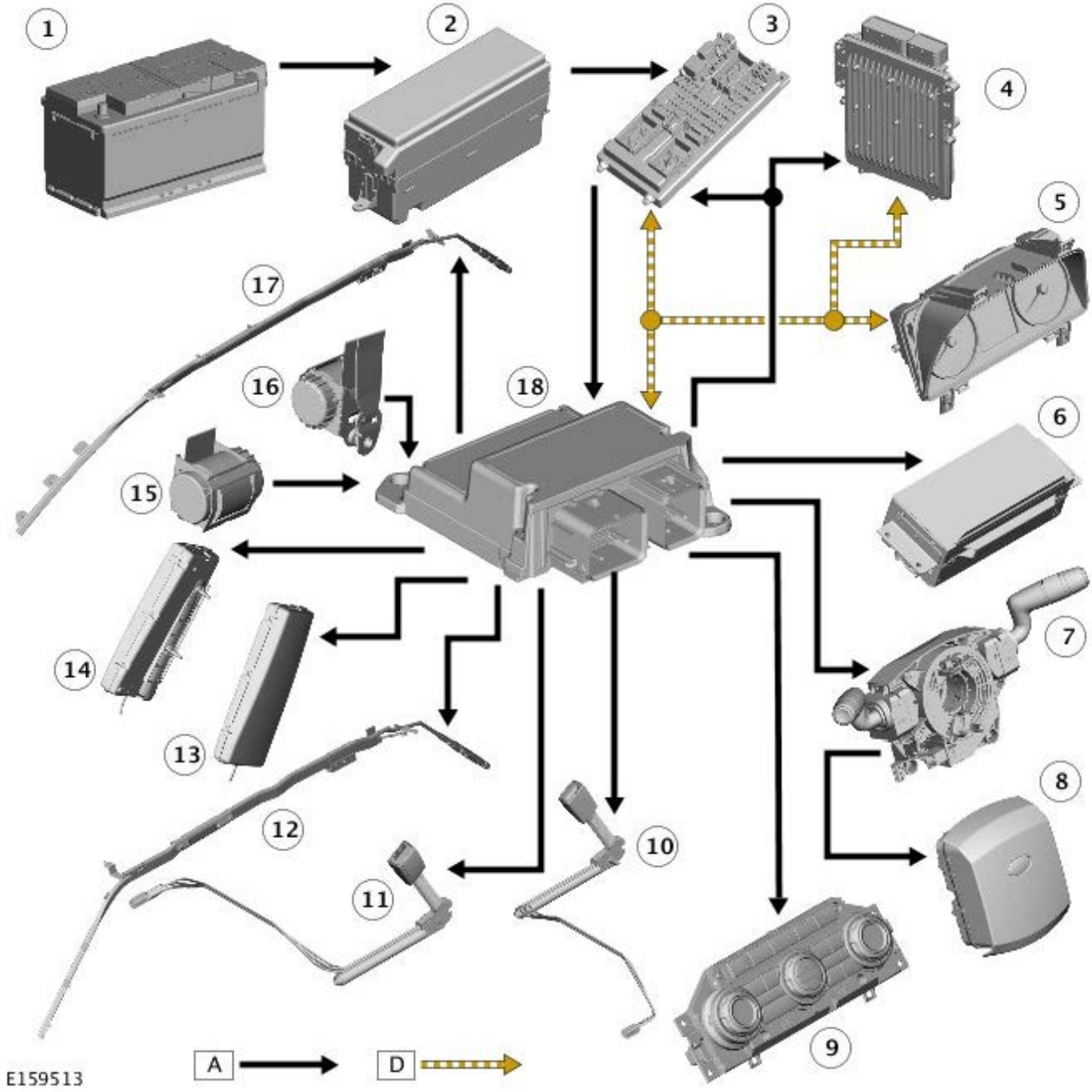
 NOTE: A = Hardwired connections; D = High speed CAN bus



Item	Part Number	Description
1	-	Battery
2	-	Engine junction box (EJB)
3	-	Central junction box (CJB)
4	-	Occupant classification module (NAS only)
5	-	Safety belt tension sensor (NAS only)
6	-	Occupant classification system pressure sensor (NAS only)
7	-	Occupant detection sensor (all except NAS)
8	-	Driver seat position sensor
9	-	Passenger safety belt buckle switch
10	-	Driver safety belt buckle switch
11	-	LH (left-hand) front impact sensor
12	-	RH (right-hand) front impact sensor
13	-	RH (right-hand) side impact sensor
14	-	LH (left-hand) side impact sensor
15	-	RH (right-hand) front door impact sensor
16	-	LH (left-hand) front door impact sensor
17	-	RH (right-hand) rear impact sensor
18	-	LH (left-hand) rear impact sensor
19	-	Passenger air bag deactivation switch
20	-	RCM

SRS CONTROL DIAGRAM - SHEET 2 OF 2

NOTE: A = Hardwired connections; D = High speed CAN bus



Item	Part Number	Description
1	-	Battery
2	-	Engine junction box (EJB)
3	-	Central junction box (CJB)
4	-	ECM
5	-	Instrument cluster
6	-	Passenger airbag module
7	-	Clockspring
8	-	Driver airbag module
9	-	Passenger air bag deactivation indicator
10	-	Left safety belt buckle switchRCM
11	-	Right safety belt buckle switch
12	-	Left side air curtain
13	-	Left side air bag
14	-	Right side air bag
15	-	Right side pretensioner
16	-	Left side pretensioner

17	-	Left side air curtain
18	-	RCM

Published: 24-Jul-2012

Supplemental Restraint System - Air Bag Supplemental Restraint System (SRS)

Diagnosis and Testing

Principle of Operation

For a detailed description of the air bag supplemental restraint system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) (501-20 Supplemental Restraint System, Description and Operation).

Safety Information

WARNINGS:

 To avoid accidental deployment the back-up power supply must be depleted before beginning any work on the SRS system or its components. Failure to follow this instruction may result in personal injury.

 Do not use a multimeter to probe an SRS actuator. It is possible for the power from the multimeter battery to trigger the activation of the actuator. Failure to follow this instruction may result in personal injury.

NOTES:

 It is advisable not to use a cellular phone or to have a cellular phone in close proximity when working on the SRS system or components.

 Given the legal implications of a restraints system failure, harness repairs to Air Bag module circuits are not acceptable. Where the text refers to "REPAIR the circuit", this will normally mean the replacement of a harness.

Power supply depletion

Before beginning any work on the SRS system or related components:

1. Remove the ignition key.
2. Disconnect the battery leads, ground first.
3. Wait 2 minutes for the power circuit to discharge.

There are comprehensive instructions on the correct procedures for SRS system repairs in the workshop manual. Refer to the relevant section of the workshop manual.

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.
   - Confirm the function of the warning lamp (if the warning lamp is inoperative, system faults will be signaled by an audible chime)
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
• Check for the installation of non-standard accessories which may affect or obstruct the function of the system • Check the condition of trim, etc at the SRS system components • Sensor(s) • Pretensioner(s) • Air bag module(s) • Occupant detection/classification sensors • Seat position sensor	• Fuses • Wiring harness • Confirm all electrical connector(s) are engaged correctly on the air bag circuits • Confirm the restraints control module (RCM) is correctly installed • Warning lamp bulb(s) • Impact sensor(s) • Buckle sensor(s) • Pretensioner(s) • Air bag module(s) • Air bag deactivation switch • Air bag deactivation warning lamp • Occupant detection/classification sensors • Seat position sensor • Clockspring

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 for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Seatbelt Buckle Pre Tensioner Diagnostics

This procedure should be used to aid diagnosis of the following supplementary restraints system (SRS) - buckle pre tensioner (PBP) fault codes

SRS Light Status	DTC
On	B1212-11
On	B1212-12
On	B1212-1A
On	B1212-1B
On	B1213-11
On	B1213-12
On	B1213-1A
On	B1213-1B

PINPOINT TEST A : BUCKLE PRE TENSIONER DIAGNOSTIC	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: DIAGNOSTIC PROCEDURE	
WARNINGS: Prior to any work on the SRS system the vehicle battery must be disconnected system the vehicle battery must be disconnected	
Please wait for 120 seconds to allow the air bag deployment energy reserve to dissipate	
	1 Check location of harness fly-lead ensuring there is no risk snagging and sufficient strain relief during full seat travel
	2 Disconnect under-seat buckle pre tensioner connectors
	3 Check connector for water ingress or signs of corrosion (white/green residue)
	4 Check for debris in female connector and remove as required
	5 Check for debris in male harness end connector and remove
	6 Check that male connector pins are secure and in good condition
	7 Check that all connector terminals are clean secure and in good condition
	8 Reconnect the connector • An audible click should be heard confirming security
	9 Check actuator harness fly-lead is connected and correctly routed
	10 Reconnect the vehicle battery
	11 Clear the DTC, cycle the ignition state off / on wait 30 seconds and re-test
	12 To confirm repair. Whilst sitting in seat, retest as follows: • **Seat fully up - move fully backwards and forwards** • **Seat fully down - move fully backwards and forwards**
	Is the warning lamp illuminated? **Yes** GO to Pinpoint Test B. **No** No further action required

PINPOINT TEST B : BUCKLE PRE TENSIONER DIAGNOSTIC	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: DIAGNOSTIC PROCEDURE	
WARNINGS: Prior to any work on the SRS system the vehicle battery must be disconnected system the vehicle battery must be disconnected	
Please wait for 120 seconds to allow the air bag deployment energy reserve to dissipate	
	1 Check routing and condition of harness along buckle pre tensioner tube • Pre 10 model year : x2 cable tie & tape • Post 10 model year : Cradle

	2	Ensure harness is in good condition with no damage
	3	Ensure harness is securely routed
	4	Reconnect the vehicle battery
	5	Clear the DTC, cycle the ignition state off / on wait 30 seconds and re-test
	6	To confirm repair. Whilst sitting in seat, retest as follows: • **Seat fully up - move fully backwards and forwards** • **Seat fully down - move fully backwards and forwards**
	Is the warning lamp illuminated? **Yes** GO to Pinpoint Test C. **No** No further action required	

PINPOINT TEST C : BUCKLE PRE TENSIONER DIAGNOSTIC		
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**	
C1: DIAGNOSTIC PROCEDURE		
WARNINGS:  Prior to any work on the SRS system the vehicle battery must be disconnected system the vehicle battery must be disconnected		
 Please wait for 120 seconds to allow the air bag deployment energy reserve to dissipate		
	1	Remove seat and check routing and condition of under-seat harness
	2	Ensure harness is in good condition with no damage
	3	Ensure harness is securely routed
	4	Ensure all fir tree clips and cable ties are correctly installed
	5	Reinstall seat
	6	Ensure harness is securely routed
	7	Reconnect the vehicle battery
	8	Clear the DTC, cycle the ignition state off / on wait 30 seconds and re-test
	9	To confirm repair. Whilst sitting in seat, retest as follows: • **Seat fully up - move fully backwards and forwards** • **Seat fully down - move fully backwards and forwards**
	Is the warning lamp illuminated? **Yes** Install new component **No** No further action required	

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: (100-00 General Information)

Diagnostic Trouble Code (DTC) Index - DTC: Occupant Classification Sensor Control Module (OCSCM) (Description and Operation),
Diagnostic Trouble Code (DTC) Index - DTC: Restraints Control Module (RCM) (Description and Operation).

Published: 11-May-2011

Supplemental Restraint System - Front Impact Severity Sensor

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

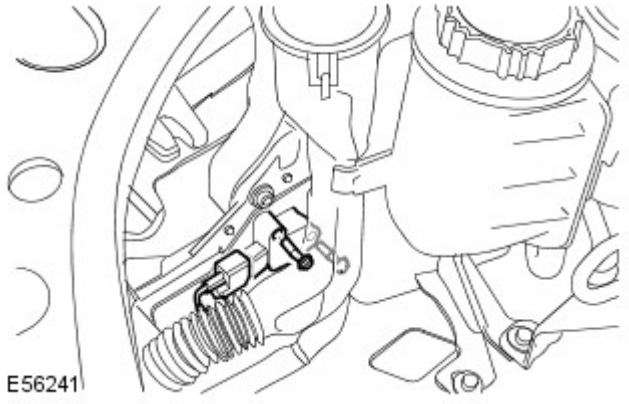
Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

2. Remove the headlamp assembly.
   For additional information, refer to: Headlamp Assembly (417-01, Removal and Installation).

3. Remove the front impact severity sensor.
   - Disconnect the electrical connector.
   - Remove the 2 Torx bolts.



Installation

1. Install the front impact severity sensor.
   - Tighten the Torx bolts to 8 Nm (6 lb.ft).
   - Connect the electrical connector.

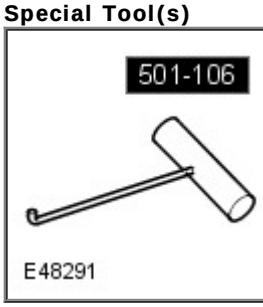
2. Install the headlamp assembly.
   For additional information, refer to: Headlamp Assembly (417-01, Removal and Installation).

Published: 11-May-2011

Supplemental Restraint System - Driver Air Bag Module

Removal and Installation

Special Tool(s)

	Driver air bag module remover 501-106

Removal

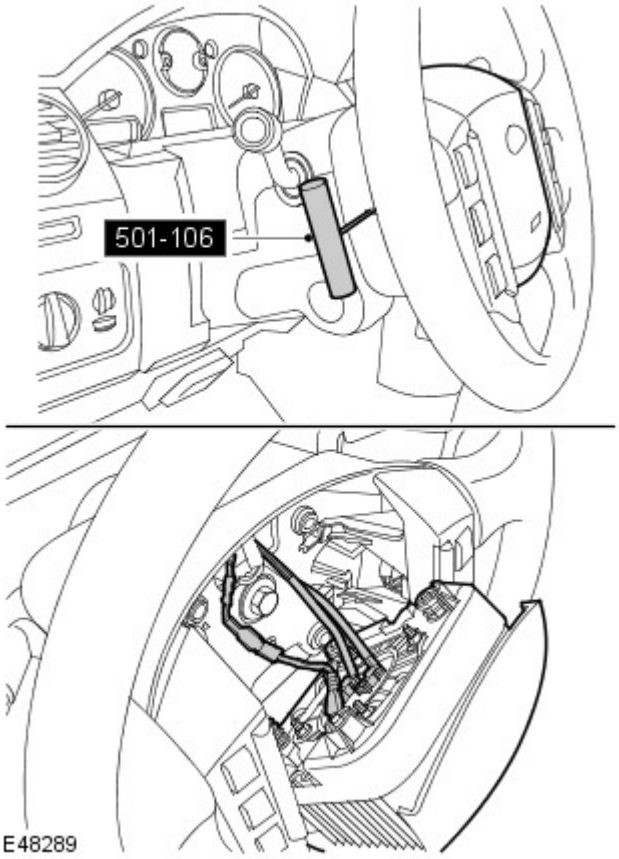
WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00 General Information, Description and Operation).
3. Remove the driver air bag module.
   - Using the special tool, release the clip.
   - Repeat the above procedure for the other side.
   - Disconnect the ground cable.
   - Release the clips and disconnect the 2 electrical connectors.

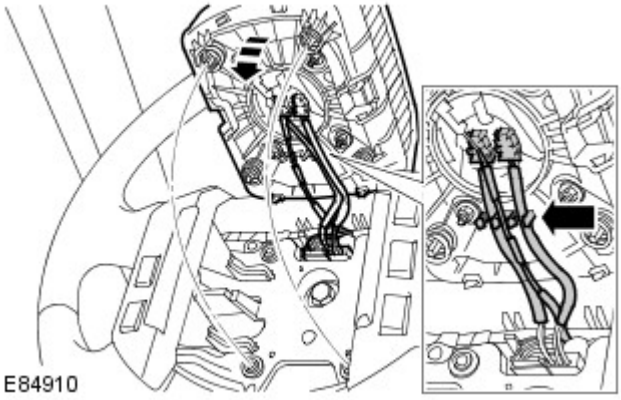


Installation

1. WARNING: The SRS electrical connectors are unique. DO NOT force, or attempt to connect electrical connectors to the wrong sockets.

   CAUTION: Make sure the cables/harnesses are not twisted before connecting them to the airbag module. Once connected, do not rotate the air bag module as this will cause the wires to twist, which can lead to harness damage and SRS faults.

   Attach the driver air bag module.
   - Connect the ground cable.
   - Connect the electrical connectors.



2. WARNING: Driver air bag module installation can be confirmed by hearing 2 audible clicks, 1 for each spring. The module edges should also be flush with the steering wheel.

   Install the driver air bag module.
   - Install top edge of module, then hinge upwards and make sure wires are connected to clips.
   - Make sure the wires are not trapped behind the module.
   - Hold wires in place while hinging module closed.
   - Align the locating pins and springs.

Published: 11-May-2011

Supplemental Restraint System - Passenger Air Bag Module

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

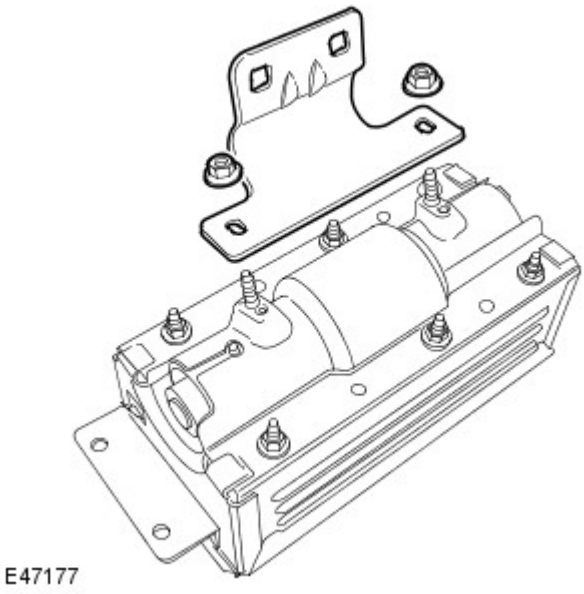
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

3. Remove the instrument panel upper section.
   For additional information, refer to: Instrument Panel Upper Section (501-12, Removal and Installation).



4. Remove the passenger air bag module.
   - Remove the 4 nuts.



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

   Remove the passenger air bag module bracket.
   - Remove the 2 nuts.

Installation

1. Install the passenger air bag module bracket.
   - Tighten the nuts to 10 Nm (7 lb.ft).

2. Install the passenger air bag module.
    - Tighten the nuts to 10 Nm (7 lb.ft).

3. Install the instrument panel upper section.
   For additional information, refer to: Instrument Panel Upper Section (501-12, Removal and Installation).

4. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

Published: 11-May-2011

Supplemental Restraint System - Side Air Curtain Module

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

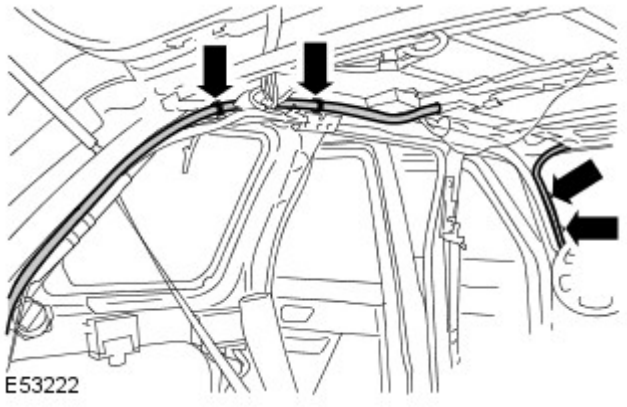
Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

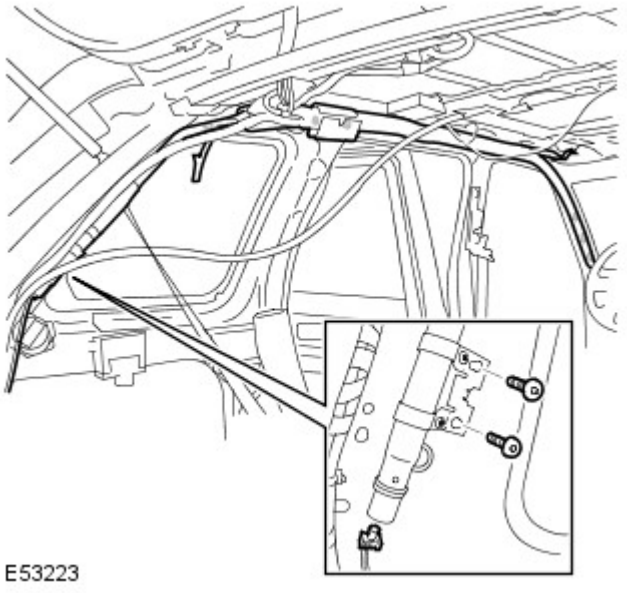
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

3. Remove the headliner.
   For additional information, refer to: Headliner (501-05 Interior Trim and Ornamentation, Removal and Installation).



4. Release the roof opening panel drain tube from the securing clips.
   - Release from the 2 clips.
   - Remove and discard 2 cable ties.



5. NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

   With assitance, remove the side air curtain module.
   - Disconnect the electrical connector.
   - Remove the 9 Torx bolts.
   - Remove the 2 screws.

Installation

1. With assistance, install the side air curtain module.
   - Tighten the Torx screws to 10 Nm (7 lb.ft).
   - Tighten the screws.

Connect the electrical connector.

2. Secure the roof opening panel drain tube into the clips.
   - Install new cable ties.

3. Install the headliner.
   For additional information, refer to: Headliner (501-05 Interior Trim and Ornamentation, Removal and Installation).

4. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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Supplemental Restraint System - Side Air Bag Module

Removal and Installation

Removal

WARNINGS:

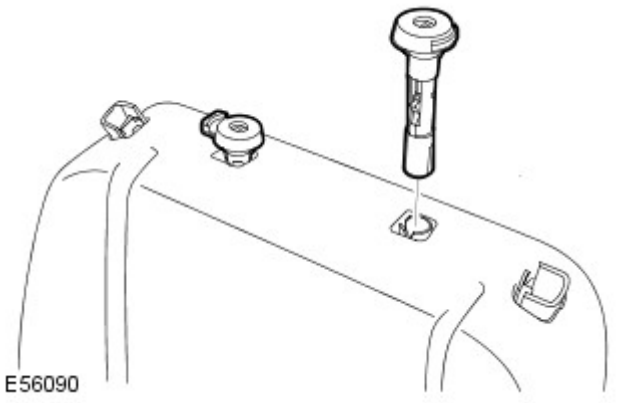
It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

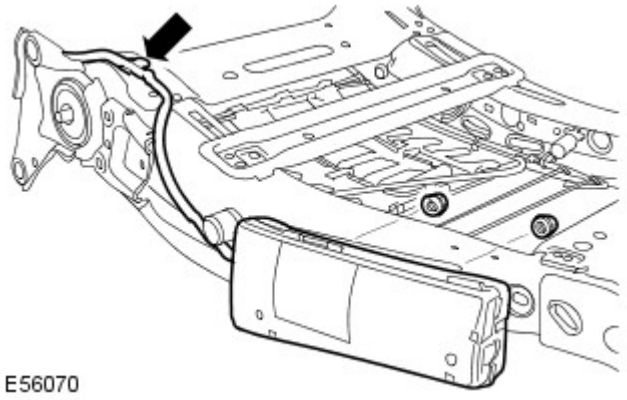
Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

2. Remove the front seat backrest cover.
   For additional information, refer to: Front Seat Backrest Cover (501-10, Removal and Installation).

3. Remove the front seat backrest pad.
   - Remove the front seat head restraint retaining clips.


E56090


E56070

4. NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

   Remove the side air bag module.
   - Release the side air bag module harness.
   - Remove the 2 nuts.

Installation

1. Install the side air bag module.
   - Tighten the nuts to 10 Nm (7 lb.ft).
   - Attach the wiring harness.

2. Install the front seat backrest pad.
   - Install the front seat head restraint retaining clips.

3. Install the front seat backrest cover.
   For additional information, refer to: Front Seat Backrest Cover (501-10, Removal and Installation).

Published: 11-May-2011

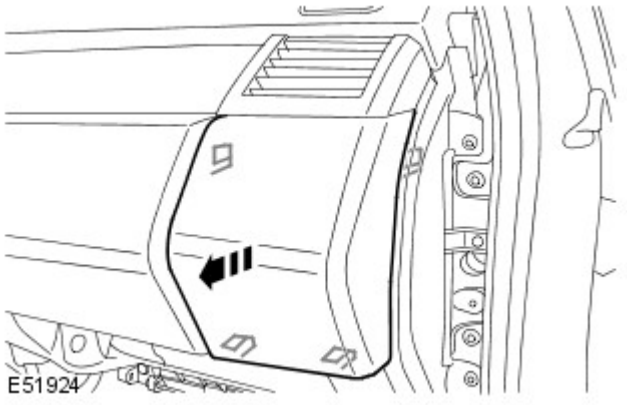
Supplemental Restraint System - Passenger Air Bag Deactivation (PAD) Switch

Removal and Installation

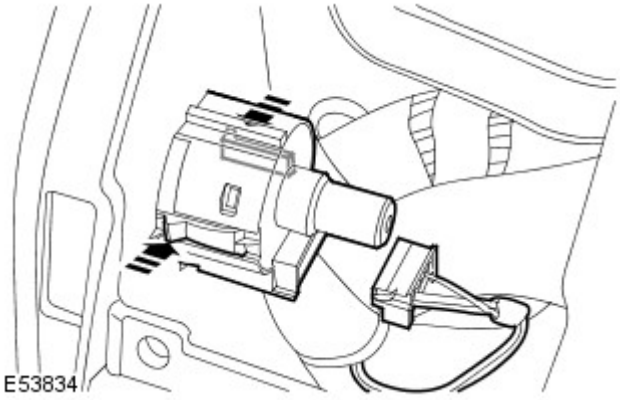
Removal

1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

2. Remove the stowage compartment side trim panel.
   - Release the 4 clips.



3. Remove the PAD switch.
   - Disconnect the electrical connector.
   - Release the 2 clips.



Installation

1. Install the PAD switch.
   - Connect the electrical connector.
   - Secure with the clips.

2. Install the stowage compartment side trim panel.
   - Secure the clips.

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Supplemental Restraint System - Clockspring

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

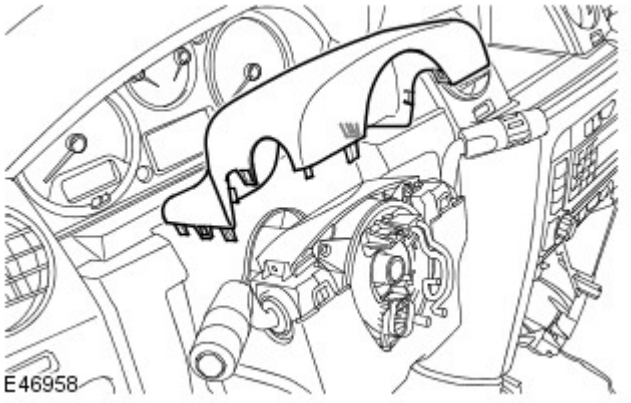
CAUTIONS:

Make sure the wheels are in the straight-ahead position. Failure to follow this instruction may result in damage to the components.

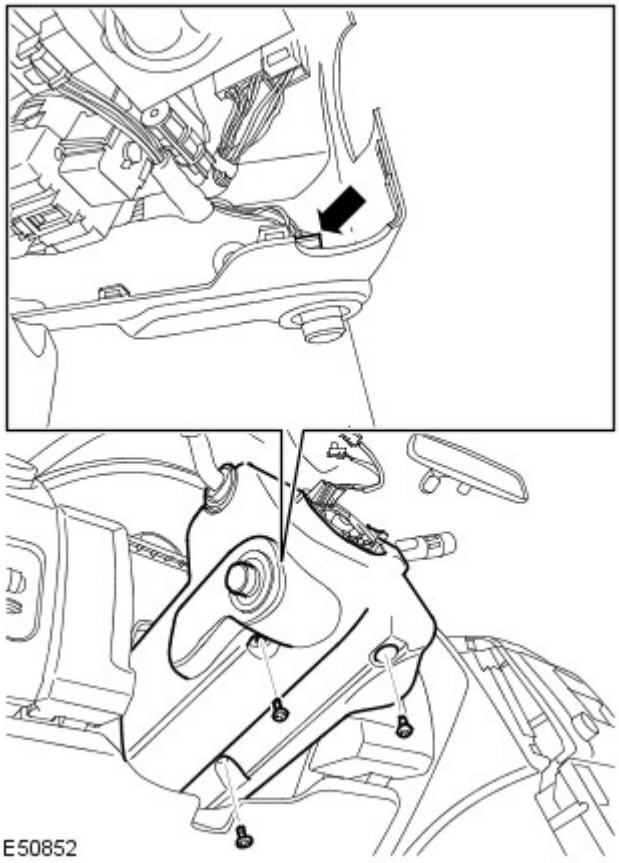
Correct clockspring alignment can be found by viewing a yellow marker through the window situated on the clockspring face. If the marker is not visible, carefully turn the clockspring. If the turning force increases before the marker is visible, reverse the direction to avoid component damage.

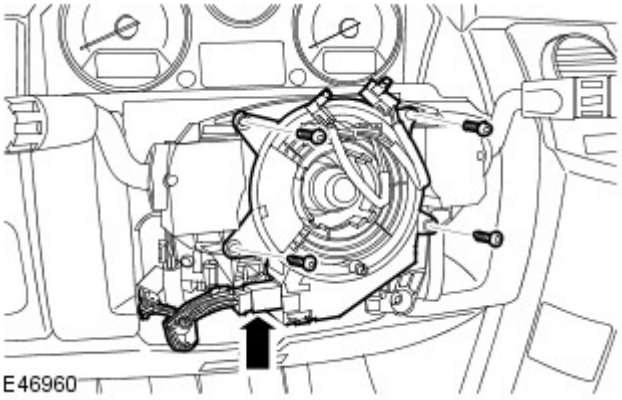
NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Fully extend the steering column for access.
2. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).
3. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).
4. Remove the steering wheel.
   For additional information, refer to: Steering Wheel (211-04, Removal and Installation).



5. Remove the steering column upper shroud.
   - Release the 6 clips.
6. Remove the steering column lower shroud.
   - Remove the 3 Torx screws.
   - Release the steering column adjustment lever.





7. CAUTION: Do not dismantle the clockspring, it has no servicable parts and must be replaced as a complete assembly.

   Remove the clockspring.
   - Disconnect the 2 electrical connectors.
   - Remove the 4 screws.

Installation

1. CAUTION: Correct clockspring alignment can be found by viewing a yellow marker through the window situated on the clockspring face. If the marker is not visible, carefully turn the clockspring. If the turning force increases before the marker is visible, reverse the direction to avoid component damage.

   To install, reverse the removal procedure.

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Supplemental Restraint System - B-Pillar Side Impact Sensor

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

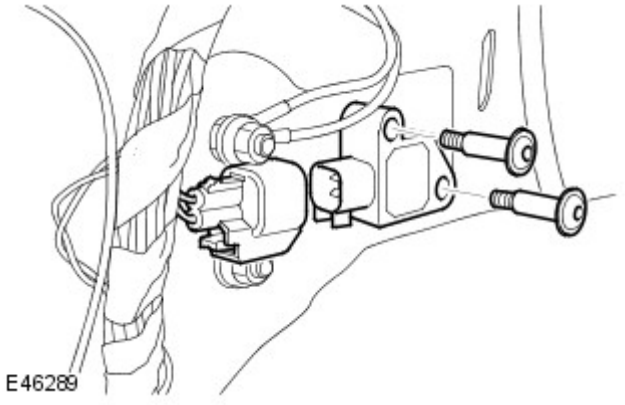
Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

2. Remove the scuff plate trim panel.
   For additional information, refer to: Scuff Plate Trim Panel (501-05, Removal and Installation).

3. Remove the side impact sensor.
   - Remove the 2 Torx bolts.
   - Disconnect the electrical connector.



Installation

1. Install the side impact sensor.
   - Connect the electrical connector.
   - Tighten the Torx bolts to 8 Nm (6 lb.ft).

2. Install the scuff plate trim panel.
   For additional information, refer to: Scuff Plate Trim Panel (501-05, Removal and Installation).

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Supplemental Restraint System - C-Pillar Side Impact Sensor

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

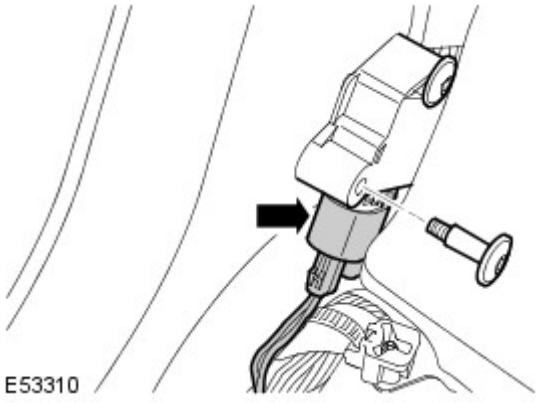
NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

3. Remove the rear quarter trim panel.
   For additional information, refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).

4. Remove the C-pillar side impact sensor.
   - Remove the 2 Torx bolts.
   - Disconnect the electrical connector.



Installation

1. Install the C-pillar side impact sensor.
   - Tighten the Torx bolts to 8 Nm (6 lb.ft).
   - Connect the electrical connector.

2. Install the rear quarter trim panel.
   For additional information, refer to: Rear Quarter Trim Panel (501-05, Removal and Installation).

3. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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Supplemental Restraint System - Front Door Side Impact Sensor

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

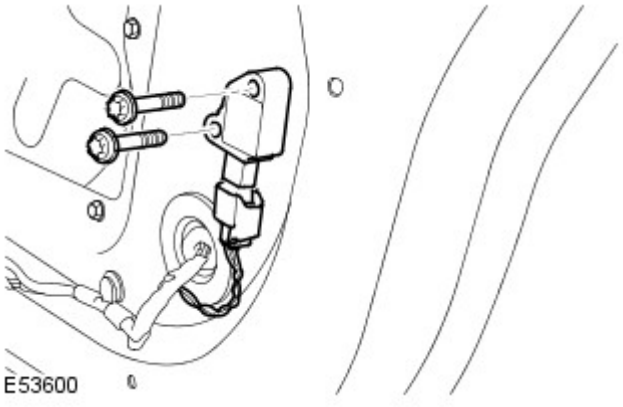
Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

2. Remove the front door trim panel.
   For additional information, refer to: Front Door Trim Panel (501-05, Removal and Installation).

3. Remove the front door side impact sensor.
   - Disconnect the electrical connector.
   - Remove the 2 Torx bolts.



Installation

1. Install the front door side impact sensor.
   - Tighten the Torx bolts to 8 Nm (6 lb.ft).
   - Connect the electrical connector.

2. Install the front door trim panel.
   For additional information, refer to: Front Door Trim Panel (501-05, Removal and Installation).

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Supplemental Restraint System - Restraints Control Module (RCM)

Removal and Installation

Removal

WARNINGS:

It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

Always disconnect both battery cables before beginning work on the SRS system. Disconnect the ground cable first. Never reverse connect the battery.

NOTES:

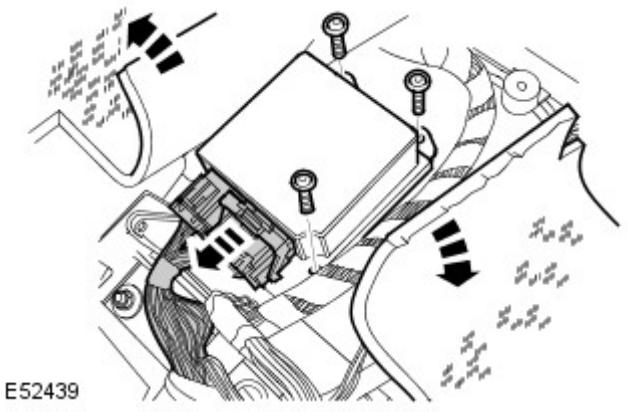
If the restraints control module (RCM) is to be replaced then T4 must be connected and the correct procedures adhered to, prior to battery disconnection.

If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Make the SRS system safe.
   For additional information, refer to: Standard Workshop Practices (100-00, Description and Operation).

3. Remove the floor console.
   For additional information, refer to: Floor Console (501-12, Removal and Installation).



4. CAUTION: Make sure the wiring harness is protected when cutting the carpet.

   Remove the restraints control module (RCM).
   - Cut the carpet for access.
   - Disconnect the 2 electrical connectors.
   - Remove the 3 Torx screws.

Installation

1. Install the RCM.
   - Tighten the Torx screws to 10 Nm (7 lb.ft).
   - Connect the electrical connectors.
   - Position the carpet.

2. Install the floor console.
   For additional information, refer to: Floor Console (501-12, Removal and Installation).

3. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

4. Using T4, initiate a new RCM.

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Supplemental Restraint System - Occupant Classification Sensor

Removal and Installation

Removal

NOTE: The occupant classification sensor is part of the passenger seat cushion. The sensor is only fitted to NAS models.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).
2. Remove the front seat cushion cover.
   For additional information, refer to: Front Seat Cushion Cover (501-10, Removal and Installation).

Installation

1. Install the front seat cushion cover.
   For additional information, refer to: Front Seat Cushion Cover (501-10, Removal and Installation).
2. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).
3. Using T4, configure a new occupant classification sensor.

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Body Repairs - General Information - Body Repairs

Description and Operation

General Information

Introduction

The body plays a significant role in the increasing trend of ever more rapidly changing model variants. The different customer groups are strongly influenced by the design and shape of the body. At the same time the stability of the body plays the most important part in ensuring passenger and driver safety. Lightweight construction, alternative materials, composite materials, plastics and appropriate joining processes are all design features that characterise modern Land Rover vehicle bodies.

In terms of manufacturing technology, modern safety cell bodies can be produced almost without any problems. Land Rover guarantee high quality standards by ensuring that mechanical strength properties are tried and tested in numerous computer simulations, crash tests, by testing materials and by employing sophisticated manufacturing technologies. In the event of repairs it is vital that the production quality standards are upheld. This requires a well-equipped workshop, and places particular emphasis on the qualifications of the workshop technicians. Up-to-date knowledge of current manufacturing technologies and continuous training on new repair methods and techniques are vital for high-quality body repairs. The model-specific repair manuals and the general repair techniques provide valuable support when undertaking body repairs.

Always follow the repair instructions published in this manual. Failure to observe this instruction can result in serious impairment of vehicle safety. All specified safety requirements must be met after the work has been carried out.

Vehicle design

The body

The Range Rover Sport’s body is manufactured like a conventional monocoque. Two monosides are welded to the floor, roof and bulkheads, creating a strong, single structure. Significant use is made of high-strength steels. Ultra high strength steel is used for the A and B-pillars, for added strength in front and side impacts. The roof structure can accommodate a roof opening panel. When a sunroof is not fitted, the outer roof panel is a single large steel pressing with styled swages to add strength and prevent booming.

The safety of the driver and the passengers is paramount for every body design. There are two key safety aspects in the body:

- Safety passenger cell
- Crumple zones

Safety passenger cell

- Stable pillars, rocker panel and door profiles.
- Side impact protection in the doors.
- Doors are designed to open even in the event of extreme deformation.

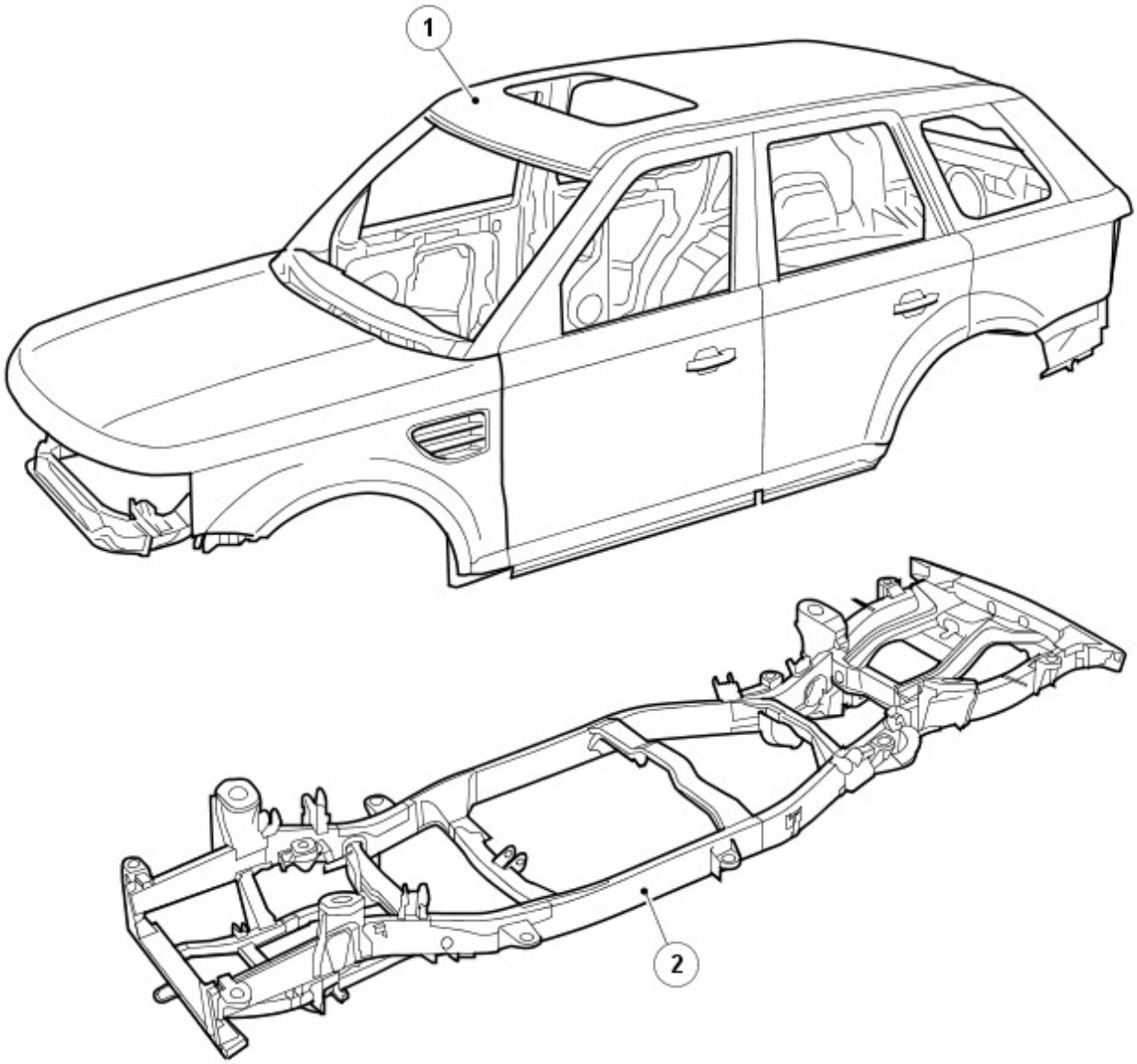
Crumple zone

- Dynamic absorption of deforming forces.
- Protection of the passenger cell.

Integral body frame

- The extremely stable integral body frame forms the base to which the body is bolted to and the vehicle components like the axles, engine etc, are attached. The integral body frame is made from DD11 (BS1449) mild steel. If necessary the body can be removed from the integral body frame to ease repairs.

Vehicle design



E58233

Item	Part Number	Description
1	-	Body
2	-	Integral body frame

High Strength Steels

Most modern vehicles are constructed from a number of different steels, partly to obtain an optimised body (collision, safety, rigidity, fuel economy, etc).

Steels are divided into several groups according to their tensile and yield strength, that is to say the force necessary to bring about plastic deformation of the material.

Yield Summary

Yield is the strength at which the metal changes from elastic to plastic in behaviour, the point of no return.

Tensile Summary

Tensile strength is the breaking strength of a material when subjected to a tensile (stretching) force, the point of no return.

SS	Soft Steel	Maximum Yield point of 220 MPa
DP	Dual Phase	Steel With a Yield Point up to 400 MPa
HS	High Strength Steel	Steel With a Yield Point 220 - 450 MPa
EHS	Extra High Strength Steel	Steel With a Yield Point 450 - 800 MPa
UHS	Ultra High Strength Steel	Steel With a Yield Point up to 1400 MPa

Ultra High Strength Steel:

The addition of ultra high strength steel gives steel greater strength. The profile of the steel is formed between a press and pad while the metal is red hot. The steel also hardens here.

Ultra high strength steel cannot be straightened due to its brittleness and must always be replaced. When replacing ultra high strength steel components it is recommended to remove spot welds from the adjacent panel which is normally low carbon DP, HS or EHS, which posses no great issues. When this is not an option it is recommended to either plasma cut or grind the weld areas. Conventional spot weld drills are not recommended as they are dulled after only several welds and this can prove to be an expensive option.

Welding Ultra High Strength Steel

Ultra high strength steel requires welding equipment which can achieve the following equipment settings.

Spot Welding

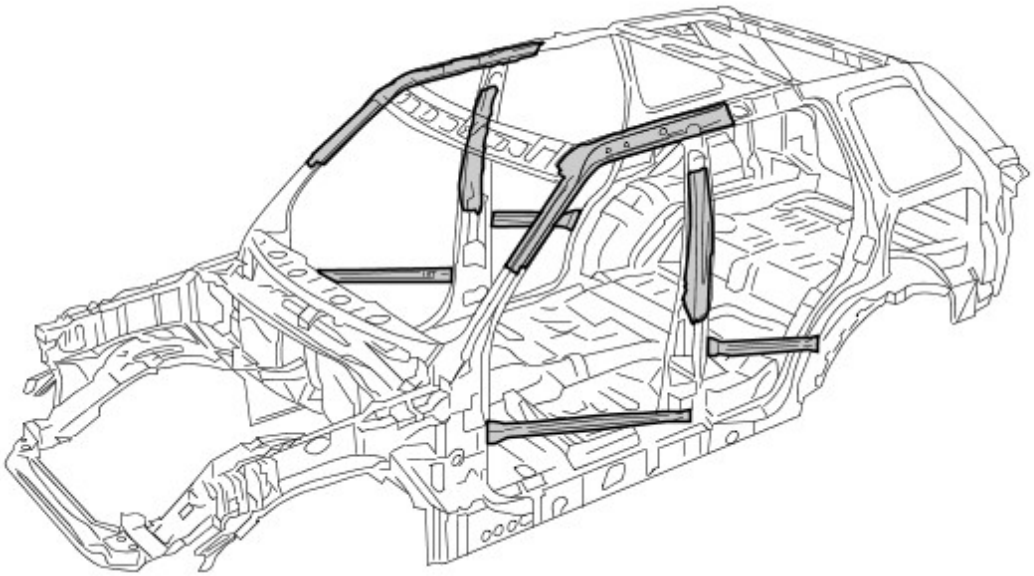
Car-O-Liner CR300 Machine, set at 2x2mm on extra program. Average Tip Pressure at 7 bar = 289Nmm².

Elektron MI100 Machine, set at 3 thickness on HS program and 2x2mm panel thickness. Average Tip Pressure at 9 Bar = 389 Nmm².

MIG Brazing

Fronius Trans Plus Synergic 2700 4 R/Z/AL MIG Welder, with CuSi3 (DIN 1733) 1.0mm filler wire with setting parameters 4, which is 92 Amps, Wire feed 4.6 m/min. Shielding gas L1 = pure Argon (DIN 439).

Ultra high strength steel in body structure



E58234

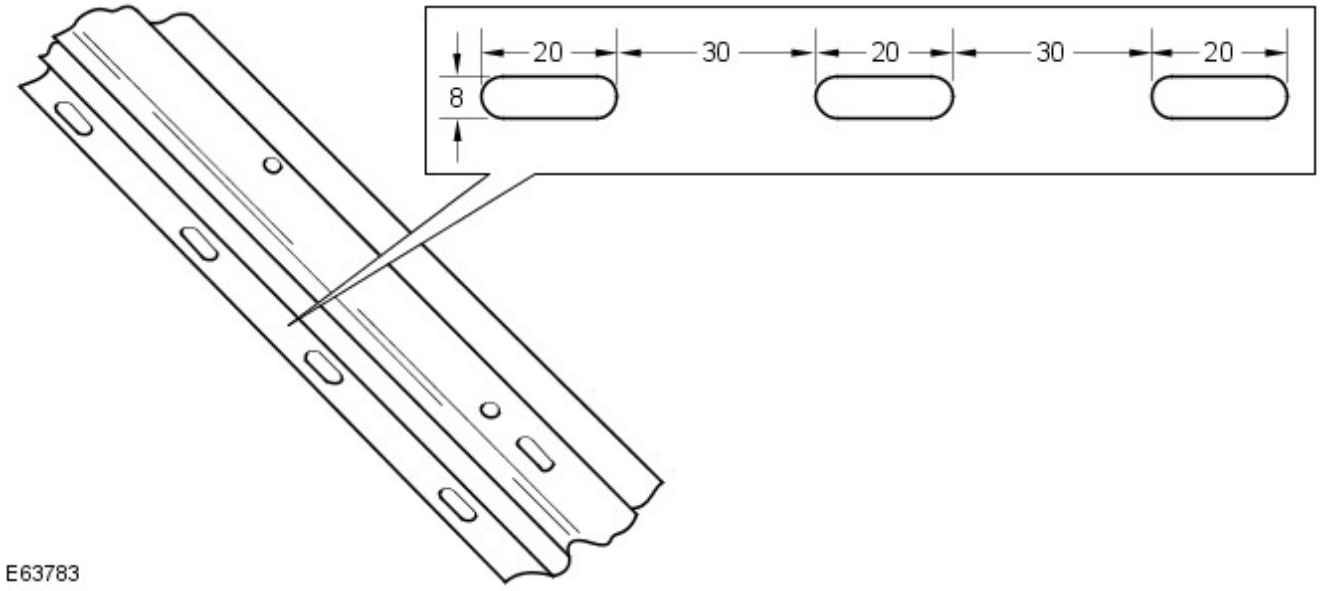
The addition of ultra high strength steel for the reinforcement of the A-Pillar, cantrail, B-Pillar and door panel gives the body greater strength in a front or side impact.

When installing a new A-pillar upper panel, it must be brazed onto the ultra high strength steel through slots that need to be cut into the new A-pillar upper panel.

Attaching a new panel to ultra high strength steel

- Abrade old and new A-pillar upper panel along both sides of the joint flanges.
- NOTE: The size of the slots are to be 20mm X 8 mm and 30 mm apart.

  Drill and slot the new A-pillar upper panel and abrade around the slot areas.



- Apply weld through primer to the inner surface of the new A-pillar upper panel, avoiding areas where bonding has to take place.
- Abrade the ultra high strength steel in the areas adjacent to the slots in the new panel.
- Apply weld through primer to A-pillar reinforcement and inner surfaces of the remaining joint surfaces, avoiding areas where bonding has to take place.
- Tack braze the butt joints into position.
- Spot weld along the joint flanges where required avoiding the ultra high strength steel.
- Remove the weld through primer from the slots in the new A-pillar upper panel using 60/80 abrasive cloth.
- NOTE: Mig brazing is carried out at a temperature of 650°C to 950°C. To avoid degradation of the ultra high strength steel material properties, the temperature must be below 950°C.

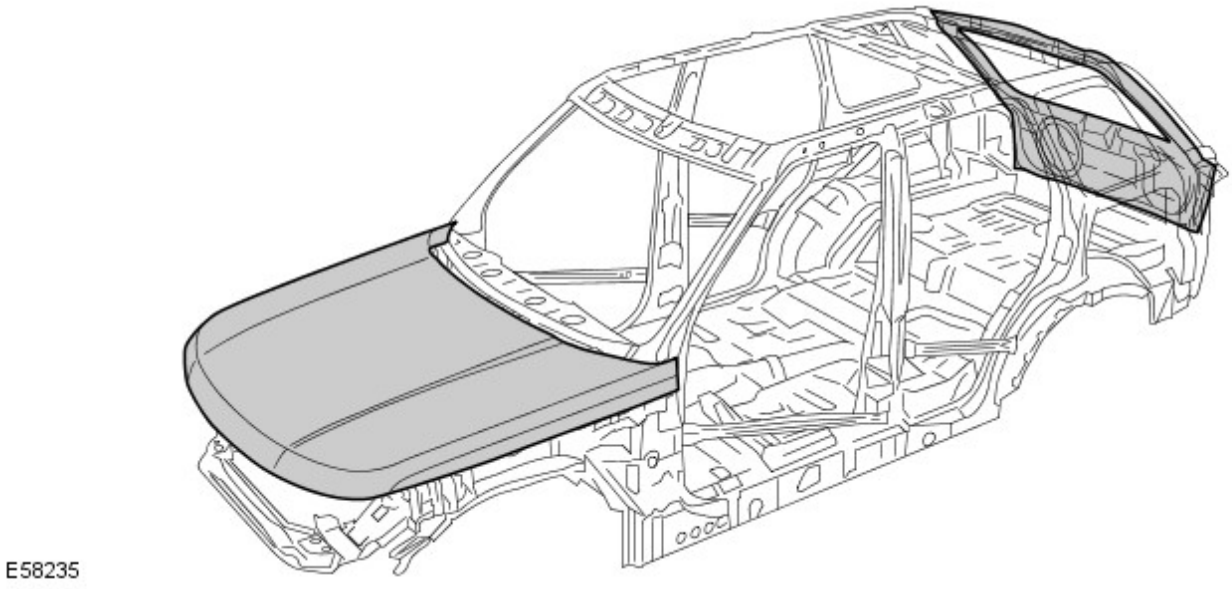
  Mig braze the slot(s) using Fronius Trans Plus Synergic 2700 4 R/Z/AL MIG Welder, with CuSi3 (DIN 1733) 1.0mm filler wire with setting parameters 4, which is 92 Amps, Wire feed 4.6 m/min. Shielding gas L1 = pure Argon (DIN 439).
- Dress the surface of the weld cap (brazed slot) with 60/80 grit belt sanders.

Aluminium

Aluminium 6000 series is used in the hood, tailgate and liftgate. It is made from magnesium/copper aluminium alloy and is heat treated during manufacturing/paint bake process resulting in a panel with increased strength and dent resistance.

When repairing aluminium you must use tools that have only been used on aluminium and never on steel panels, this is to prevent cross-contamination.

Aluminium in body structure

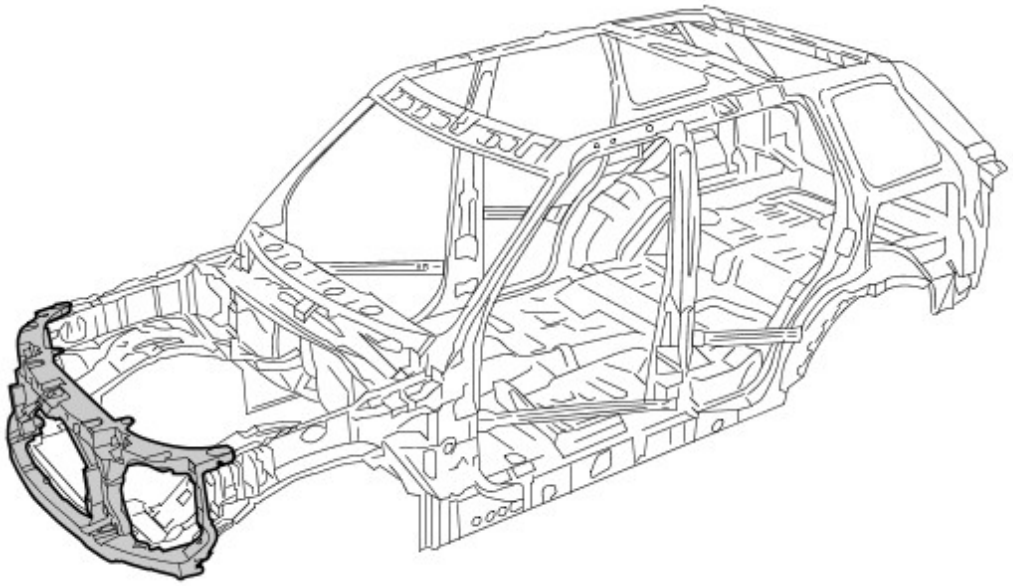


Magnesium

Magnesium AM60B is used to make the hood latch panel. It has good ductility and energy absorbing properties. It is also used on the instrument panel mounting beam.

It is recommended that no attempt should be made to weld or straighten the hood latch panel and it should be replaced in the event of an accident. If the corrosive coating is damaged it must be repaired using Land Rover 'Low Temperature Anti-Corrosion Coating' part no VEP 501 840 PMA.

Magnesium in body structure



E58236

Accident damage and diagnosis

General notes

Exact diagnosis of the extent of the damage enables proper repair planning.
All body repairs must be carried out in accordance with the guidelines in this Body Repair Manual.
The stability and strength properties of the body must be taken into account during body repairs. The body has exact defined deformation patterns that must not be affected by any repair work.
For instance, the crumple zones absorb the bulk of the impact energy. If any unprofessional repair techniques or methods are used in these areas then this can pose a fundamental threat to vehicle safety.

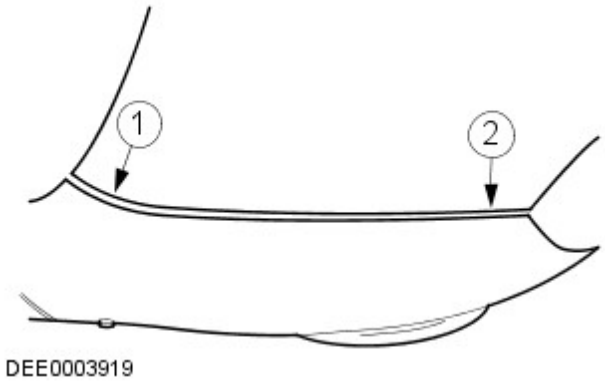
Hidden damage

As well as looking at external indicators like flaked off paint, it is vital to check for hidden body damage or deformation that is not visible from the outside. Large attached parts like bumpers and inner fenders often need to be removed to allow accurate assessment of damage to underlying body parts.

Gap dimensions

Gap dimensions offer another alternative for diagnosis by visual inspection. If any changes or misaligned edges are apparent, then this usually indicates that the dimensions of the affected part are incorrect.

Changes in gap dimension



DEE0003919

Item	Part Number	Description
1	-	Gap too wide
2	-	Gap too small

Impact effects on the body

NOTE: Vehicle components like drive shafts and trailer attachments transfer forces. If a vehicle is subjected to a rear impact then all connected body parts and mechanical components (e.g. transmission mountings) should be thoroughly checked. Electronic components should be checked to ensure that they still operate correctly.

Furthermore it is possible to deduce the overall extent of damage from the direction and magnitude of the impact

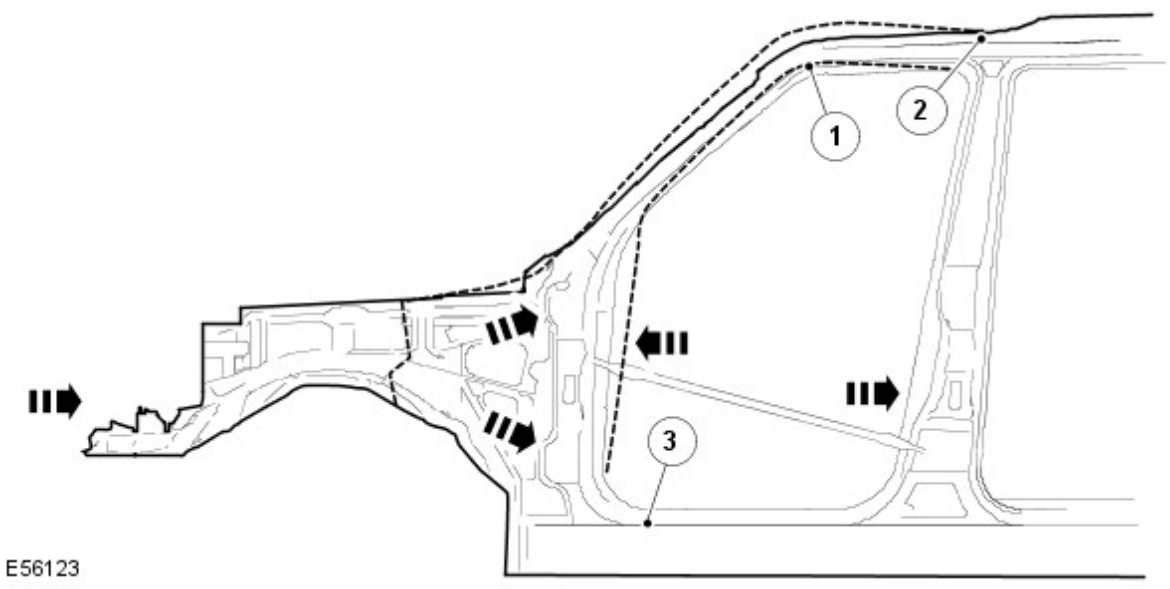
forces. This does however require extensive body-specific knowledge.

If, for instance, an impact occurs at the front left-hand side member, then the right-hand side member is usually also affected as a result of the rigid body-shell design (crossmember). Often the length of this side member will not have changed, but because of the rigid body-shell design it may have moved from its original position (often only by a very small amount). If any deviations are present this can usually be detected by checking the gap dimensions between door and fender or by checking for changes in dimension.

In the case of more severe impacts, the front part of the body cannot absorb all of the impact energy, and the passenger cell is also deformed. Here the impact energy is transferred via the side member to the A-pillar (see diagram). This results in deformations in the area of the roof and the door rocker panel.

The body reacts quite differently to side impacts where there is hardly any crumple zone. As the passenger cell is extremely stable, there are comparatively few local deformations at the site of the impact. However, the impact forces are transferred to the entire vehicle floor, which often results in so-called "banana damage", where the vehicle is bent into a banana shape.

Impact energy is transferred via the side member to the A-pillar



Item	Part Number	Description
1	-	Deformation area - roof rail
2	-	Deformation area - roof
3	-	Deformation area - door rocker panel

Body measurements

Measuring options

- Comparison measurements can also be made on the outside of the body. Depending on the damage, comparison measurements and diagonal measurements can be carried out using compass, telescopic rod, tape measure or ruler.
- NOTE: The same reference points must be chosen on both sides when checking for changed dimensions (e.g. bores, edges, beads/swage lines etc).

  All of the important external body dimensions are listed in Tolerance Checks.
  For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Measurements with a measuring/straightening jig.
- A measuring/straightening jig is required for accurate measurements of the body. The measuring systems are categorised by their means of operation:
- Mechanical measuring system.
- Optical measuring system.

Quick and accurate measuring results can be obtained using computerised measuring systems.

A minimum of three intact measuring points on the body are required for measurements of length, width and height dimensions.

In some cases this may mean making the measuring points accessible. All of these measuring systems can be used to make body measurements, provided all the equipment is available.

Planning a repair

The following decisions have to be made before the repairs are started:

- Does the vehicle need to be put on a straightening jig, or can it be straightened by other means?
- Does the body need to be measured?

- Do aggregates like engine or axles need to be removed?
- NOTE: It is preferable to repair body parts rather than to renew them, as this keeps the complete body-shell intact.

  Which body parts need to be renewed?
- Which body parts can be repaired?

Obtaining spare parts

The availability of spare parts often determines how easily the body repairs can be carried out. The following procedure is recommended:

- Obtain all the data for the vehicle, including type, vehicle identification number, trim code, engine identification letters, initial registration etc.
- Establish all of the metal parts that need to be renewed.
- Establish all of the attached parts that need to be renewed, including small parts like rivets, clips etc.

Straightening repairs

Straightening repairs are often required to restore the body to its original shape after an accident. This can be done with:

Alignment jigs.
Universal straightening and measuring jigs.
Welding jig system.

The following points must be followed to ensure that the repairs are carried out professionally and that all the dimensions are correct after the repairs have been carried out.

- Structure:
  - The repair sequence depends on the individual repair plan (taking any necessary disassembly work into account).
  - Clean the attachment areas.
  - Anchor the vehicle free of stress on the relevant system.
  - Support the aggregates to take strain off the body.
  - Decide on at least three measuring/mounting points that are undamaged and as far apart as possible (for basic adjustment).
  - Check the dimensions of the measuring/mounting points.
- Straightening:
  -

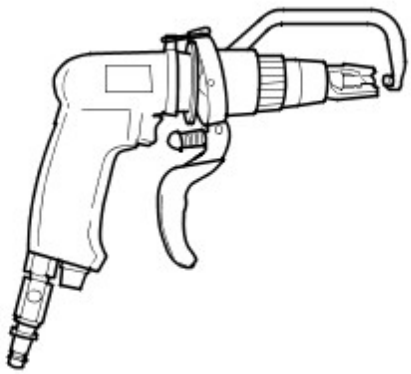
  NOTE: Check dimensions and gaps continuously during straightening.

  A body is always straightened in the opposite direction to that of the impact. Always carry out straightening repairs with the complete body shell assembled (do not cut out any parts beforehand). Carry out the straightening work in several stages. This prevents the risk of over stretching or of welded joints tearing out. During the individual straightening steps, relieve tension by striking with an aluminium hammer while the part is subjected to a tensile load (in the area of pre-determined folding points, dents, welded joins etc.).
- Special features:
  - Ultra high strength steel cannot be straightened due to its brittleness and must always be replaced.

Cutting out body parts

Depending on how the parts are joined/connected, different tools are suitable for cutting/separating body parts.

Spot-weld mill



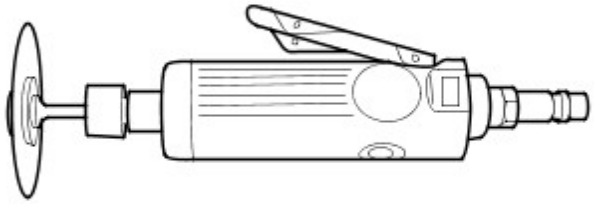
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NOTES:

All other parts like interior equipment, window glass etc. must be protected against flying sparks.

Ensure that the milling depth is set correctly to prevent the remaining flange from being weakened.

Rod sander

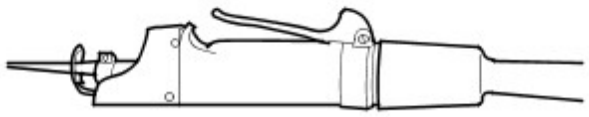


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NOTE: Wear protective clothing. Protect any vulnerable body or glass areas against flying sparks. Remove explosive materials from the vicinity.

Any spot welds that are inaccessible for the spot-weld mill (diameter > 8 mm) should be ground out using a rod sander. The same applies to MIG spot welds or seams.

Short stroke saw

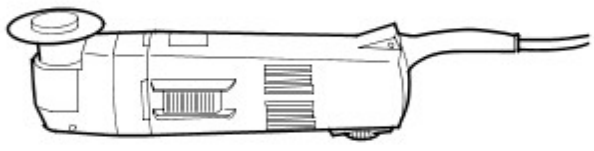


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NOTE: Underlying metal parts, wiring harnesses, hoses etc. must not be damaged - remove them beforehand if necessary.

Body saws are particularly versatile and are therefore very suitable for making severance cuts on body parts.

Reciprocating saw



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In addition to the short stroke saw, the reciprocating saw can be used. With this, it is possible to make narrow and straight cuts to an exact depth.

Carrying out the repairs

Complete replacement

- In a complete replacement the entire damaged old part is removed at its original joins/connections, and a complete new part is then installed. The following illustration shows a replacement new back panel.

Replacement of a new back panel



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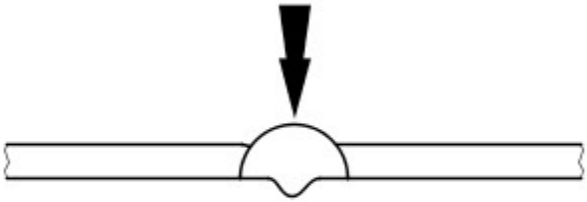
Sectional replacement

- In many cases it makes technical and economical sense to carry out a sectional replacement. The two main considerations are firstly, maintaining the original overall body shell structure and secondly, keeping the repair costs to a minimum.

The main method for sectional replacement:

- Butt joints.
- New part and old part are joined with a continuous MIG weld seam.
- Butt joints are most commonly used for sectional replacements on members and pillars, or on short severance cuts.

Butt joint



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NOTE: The severance cut should always be kept as short as possible on sectional replacement. Only cut at the severance lines shown in the repair chapters.

Do not make any cuts near reinforcements or pre-determined folding lines.

- Prepare parts remaining on the vehicle/new parts.
  - Reshape the adjoining surface of any dented body parts that are to remain on the vehicle using a hammer and a counterhold (ensure that the old part matches the shape of the new part). Grind off left over spot welds or seams with an angle grinder.
  - Cut the new parts to shape.
  - If necessary punch or drill holes for mig plug welding.
  -

    NOTE: Do not use a welding torch to remove paint residue (the heat could cause the metal to deform).

    Grind all joining flanges to bare metal on both sides. Do not use an angle grinder for this purpose (this could weaken the metal and damage the zinc layer). Suitable tools: rotating wire brush, belt sander or plastic disc.
  - Apply welding primer liberally to all weld flanges.
  - The primer must be well stirred before use.

NOTES:

When using aerosols, take care not to contaminate adjacent parts with spray mist.

For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).

Fit the new part.

It must be ensured that the new part fits exactly to the specified dimensions. Suitable equipment:

- Alignment jig.

- Universal measuring system.
- Jig system.
- Ruler or tape measure.
- Compass.
- Frame dimensions can be found in the model-specific repair manuals.

NOTE: Any attached body parts that require accurate alignment and fitting must be incorporated in this step; for instance bumpers, seals, headlamps, rear lamps and lock assembly components. If this is not done carefully it may result in water leaks, wind noises and substantial follow-on work.

Ensure that edges line up with adjacent parts and check that gaps are consistent (compare left and right-hand sides). Make sure that the shape of the vehicle is retained.

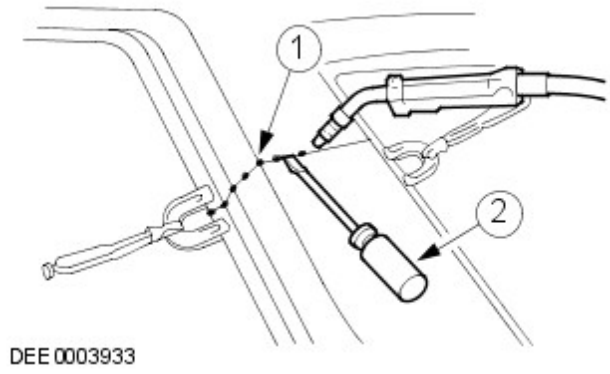
Secure the new part

NOTE: The need for subsequent follow-on work can be significantly reduced if aligning and tack-welding are carried out with due care.

Depending on accessibility the following methods for securing are available:
- Grip pliers (set of).
- Screw clamp (set of).
- Self-tapping screws.
- Tack welds.

Use a staking tool or a screwdriver to ensure that the edges of sectional replacements of profiled parts line up. The edge is then tack welded to ensure that it lines up.

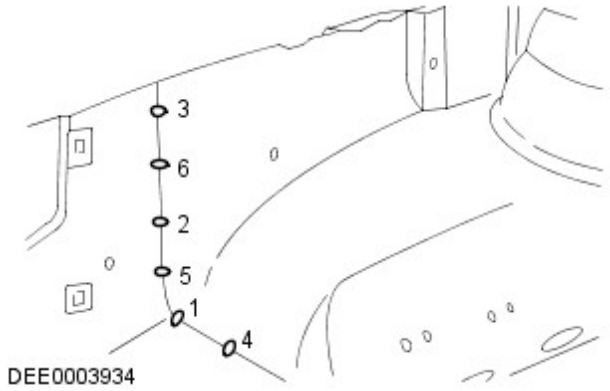
Aligning and tack weld



Item	Part Number	Description
1	-	Tack welds
2	-	Using a screwdriver to align

Longer joins are usually tack welded to prevent the panel from warping. It is important to carry out the tack welds in the correct sequence (see diagram).
Weld in the new part following the instructions in the repair manual.

Correct tack welding sequence



Follow on repairs/corrosion protection

- This step basically covers the following work:
  - Grinding welded seams.
  - Priming any bare metal.
  - Sealing welded seams.
  - Applying underbody protection.
  - Sticking damping matting in place.
  - Filling cavities with cavity wax.

-

NOTE: For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).

Cavity wax (after painting).

Panel Beating

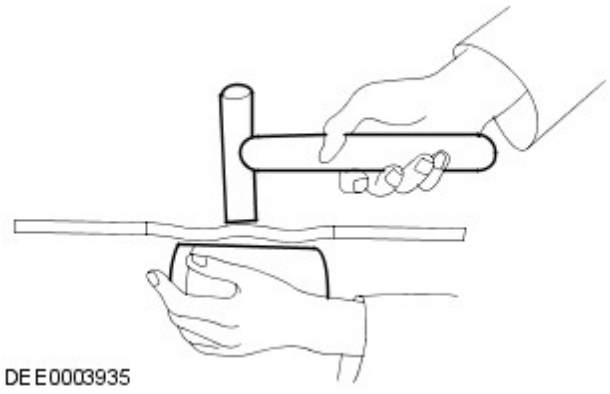
Fundamentals of panel beating

Before carrying out any sectional replacements or complete replacements of body panels, always check carefully whether the damaged panel(s) can be rectified by panel beating.
Panel beating is usually the easiest and most economical method of repairing a damaged panel.

Examples of applications of different panel beating techniques:

Aluminium hammer and mallet.
- Advantage: Low risk of overstretching the panel.
- Used for repairs of small dents on panels that are accessible from both sides.
- These two panel beating tools are usually used for "finishing repairs".

Fine straightening with an aluminium hammer and a universal dolly



Sliding hammer
- If the damaged panel is only accessible from the outside, use a sliding hammer to pull it back into shape. The discs or studs needed to mount the sliding hammer are welded onto the bare surface. Dents in the panel can be flattened out using controlled application of the sliding hammer.

Heat-treatment of panels

It is usually inevitable that some parts of the body panels show excess material as a result of mechanical strain. If there are any areas of excess material this will cause localised instabilities due to differences in tension. These localised instabilities can be stabilised by applying heat-treatment techniques.

NOTE: This does not apply to high-strength low alloy steel, ultra high strength steel and aluminium.

Rule: Flattening panels by heat-treatment reduces the amount of excess material by more than they were originally stretched.

Different heat-treatment techniques.

NOTE: Different heat-treatment techniques are used depending on the amount of excess material.

Flattening using a flame.
- A welding torch is used if the material excess extends over a larger area (torch size 0.5 - 1.0 mm). Use a soft flame.
- The surface of the metal is briefly spot-heated and then immediately cooled with a wet sponge.
- Requirement: Ability to handle a welding torch safely and knowledge of annealing colours of steel.
- Advantage: No damage to the surface of the metal.

Flattening using a flame, supported by hammer and counterhold.
-

NOTE: The flattening effect is increased by speeding up the heating and cooling stages.

If the material excess is concentrated, then the flattening effect can be increased after heating by carefully using an aluminium or wooden hammer.
- Requirement: Ability to recognise material tension by feeling the surface that is to be flattened.

Flattening using a carbon electrode.
- If panel areas are only accessible from one side, or the panel is only slightly destabilised, then the preferred method is flattening using a carbon electrode.
- Requirement: Bare metal surface.
- Disadvantage: Scarring and hardening of the surface.

Flattening using a copper electrode.
- Small, sharp dents that face outwards can be worked on with a copper electrode.

Flattening using a flame and body files.

-

 NOTE: When applied correctly, this method can be used with all the attached parts still in place (roof headlining, wiring harnesses etc.).

Small, soft dents (only slight stretching): Working at the edges of the dent in an inward spiral pattern, the dent is heated with an oxyacetylene torch (torch size 1 - 2 mm, excess gas flame) to approx. 250° C.

- Working rapidly with a body file extracts heat from the edge area until the dent is flattened. Preferably alternate between two files. This increases the amount of heat that can be extracted.

Safety measures

The electronic control modules (ECM) fitted to vehicles make it advisable to follow suitable precautions prior to carrying out welding repair operations. Harsh conditions of heat and vibration may be generated during these operations which could cause damage to the modules. In particular, it is essential to follow the appropriate precautions when disconnecting or removing the airbag RCM.
Do not allow electronic modules or lines to come into contact with the ground connection or the welding electrode.
Seat belt anchorages are a safety critical. When making repairs in these areas, it is essential to follow design specifications. Note that extra strength low alloy steel may be used for seat belt anchorages. Where possible, the original production assembly should be used, complete with its seat belt anchorages, or the cut line should be so arranged that the original seat belt anchorage is not disturbed.
All welds within 250mm (9.842) of seat belt anchorages must be carefully checked for weld quality, including spacing of spot welds.
Remove the battery before carrying out welding work in its vicinity.
Utmost care must be taken when welding near the fuel tank or other components that contain fuel. If the tank filler neck or a fuel line must be detached to allow access for welding work, then the fuel tank must be drained and removed.
Never weld, on components of a filled air conditioning system. The same applies if there is a risk of the air conditioning system heating up.
Connect the ground connection of the electrical welder directly to the part that is to be welded. Ensure that there are no electrically insulating parts between the ground connection and the welding point.
Adjacent vehicle parts and adjacent vehicles must be shielded against flying sparks and heat.

Resistance spot welding

Where resistance spot welds have been used in production, they must be reproduced with new spot welds in replacement where possible. All such reproduction spot welds should be spaced 25 to 30mm apart.

Setting up the equipment and co-ordinating the welding parameters.

Equipment:

- Follow the equipment manufacturer's instructions for the equipment settings.
- Select the correct electrode arms (as short as possible).
- Align the electrode arms and tips exactly.
- Electrode tips should be convex (rough shaping with a file, fine shaping with a sanding block).

Body:

- Ensure that the flanges to be joined lie perfectly flat to one another.
- Prepare a bare metal joint surface (inside and outside).

Notes on technique/method:

- Carry out a test weld on a sample piece of the material coated in welding paste.
- If any metal parts are located between the electrode arms then there will be a loss of induction and therefore power (adjust current setting).
- The power needs to be adjusted for high-strength low alloy steel.
- Repeated welding on old welding points often leads to poor quality welds.
- Keep the electrode tips as near as possible to an angle of 90° to the contact surface.
- Keep the pressure on the electrodes for a short period after finishing the weld.
- The electrodes work best if their shape is convex. Clean the contact surface of the electrodes regularly.

Resistance spot welding panels where the total thickness is 3 mm or more

For all repairs to modern Land Rover vehicles, spot-welding equipment should be suitable for reliable welding of zinc-plated, high-strength and high-tensile steels in three or more layers, up to 5 mm total thickness. If these requirements are not fulfilled, plug welding must be used for safety reasons. The electrical specifications (current, resistance, heat) of the spot-welding equipment have different validity, depending upon the type of equipment. Therefore, it is essential that the manufacturer's instructions are observed with regard to the actual welding performance.

MIG/MAG welding

Setting up the equipment and co-ordinating the welding parameters.

Any joins that are MIG/MAG welded in production must also be MIG/MAG welded during repairs. Also during repairs, some resistance spot welds need to be replaced by plug welds.
If access is difficult, or if a suitably powerful spot welder (see above) for total panel thicknesses of 3 mm or more is not available, resistance spot welding must be partially replaced by plug welding during repairs. In this case, the increased time needed and the correspondingly more demanding corrosion protection requirements, must be taken into account.
Welding repairs can only be carried out properly if the equipment is set up correctly and all the welding parameters are co-ordinated.

Equipment:

- Set up the equipment as directed by the manufacturer.
- The hoses must be untwisted.
- The core must be free of abraded rod particles.
- The gas and current nozzles must be free of slag and scale residue.
- Pay attention to the quality of the welding rod and the throughput of gas.

Body:

- Ensure that the joint surface is perfect.
- Prepare a bare metal joint surface.
- Maintain the correct gaps (formation of roots).

Notes on technique/method:

-

NOTES:

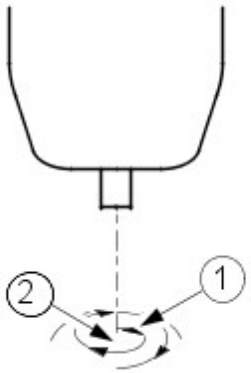
The increased application of heat during MIG welding destroys the welding primer/zinc layer over a much larger area than during resistance spot welding, as a result of which much more care needs to be taken when applying anti-corrosion protection afterwards.

A test weld should always be carried out to ensure that the welded joint is not just a surface connection.

Attach the ground cable right next to the welding point (ensure that good contact is made).

- During plug welding start welding on the lower panel to ensure adequate penetration.

Plug welding



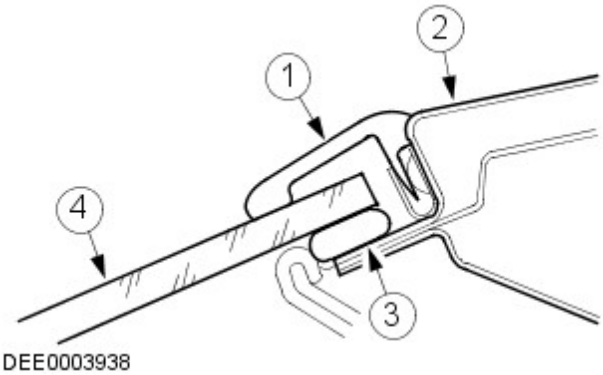
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Item	Part Number	Description
1	-	Welding direction: circular pattern working from the inside outwards
2	-	Welding starting point: centre of hole on lower panel

Bonded glazing

- The windscreen, side and rear windows are bonded directly onto the window frames on the body and liftgate.
- The windows are bonded primarily for reasons of adhesive strength. Bonded glazing provides additional torsional stiffness to the body.

Adhesive bonding of bonded windows



DEE0003938

Item	Part Number	Description
1	-	Rubber strip
2	-	Window frame
3	-	Adhesive
4	-	Window glass

Removing and installing bonded windows

Safety measures

The following safety measures must always be followed to prevent personal injury:
- Wear protective gloves.
- Wear protective goggles.

Preparations

Before cutting out a bonded window, undo and remove any attached parts in the cutting area that are at risk, e.g. trim panels and decorative strips, as well as all electrical connections.
Mask any painted areas that are adjacent to the window.
Cut off any surplus adhesive, as this makes it easier to cut out the window.
Secure vertical windows against dropping out.

Cutting out the window

Cut into the adhesive bead at easily accessible points using the cutting tool.
Carefully guide the cutting tool around the window, cutting through the adhesive bead.
Avoid touching the window frame and the body flange.
Use cup suction tools to lift the cut-out window out of the window aperture.

General preparations for bonding

Follow the manufacturer's instructions.
Cut back the remaining adhesive bead on the metal flange to a residual height of about 1mm. Do not touch or clean the cut surface afterwards.
Carefully rectify any paint damage (apply primer and top coat).
Renew the window stops as necessary.

Bonding the window glass

Apply an even bead of adhesive to the window or to the body flange.
Insert the window glass into the window aperture and centre it (2 technicians required).
Check the gaps.

NOTE: Open the windows and doors while the window is left to dry and do not move the vehicle (slamming doors creates excess pressure which could cause the window to become loose).

Use adhesive tape to prevent the window from falling out or slipping.

Finishing operations

Reconnect all electrical connections and check that the components operate correctly.
Install the attached parts and check that the fit is accurate and secure.
- Carry out a visual inspection to ensure that the gaps and joints are even.

Thoroughly clean the window glass.

Protective equipment and safety at work

Various safety measures and legal requirements must be met when carrying out repairs. All regulations relating to health and safety at work must be followed.

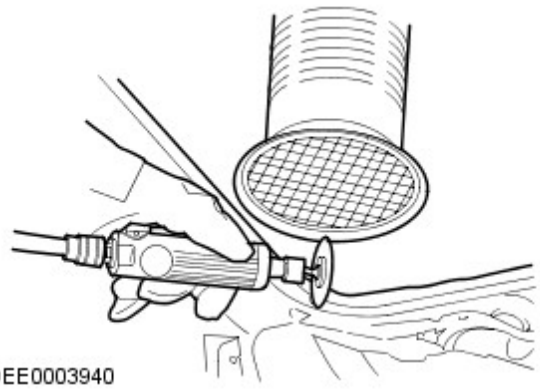
Welding safety precautions

The following safety precautions must be observed to prevent the risk of personal injury:
- Safety hood (face protection).
- Welding shield.
- Safety gloves.
- Safety shoes.
- Extraction unit for welding smoke.

Welding should always be carried out in well ventilated areas. A fire extinguisher must also always be within reach.

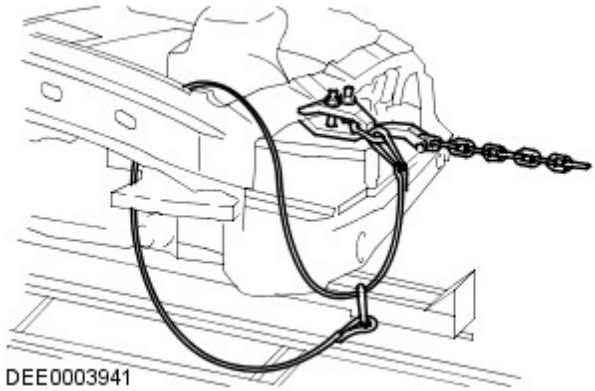
General body repair safety measures

Extraction unit


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Sealing compound, underbody protection etc. must not be burned off with a naked flame. This would produce toxic gases. If for instance PVC is burned, then gases containing hydrochloric acid are produced. For this reason a suitable extraction unit should always be used when performing grinding, welding or soldering work.
Always ensure good ventilation when working with materials that contain solvents, wear breathing equipment and use an extraction unit.
Ear defenders should always be worn when cutting, grinding or straightening metal, as the noise levels can reach or even exceed 85 - 90 dB(A).
Take care not to look directly into any laser measuring systems, for instance used to measure the under body.
When removing components from a vehicle mounted on a lifting ramp, watch out for a shift in its centre-of-gravity. When first placing the vehicle on the ramp, take into account that it may need to be secured against tipping over.
Chains and chain clamps must be secured with safety ropes during straightening work.

Safety rope


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Published: 11-May-2011

Body Repairs - Corrosion Protection - Corrosion Protection

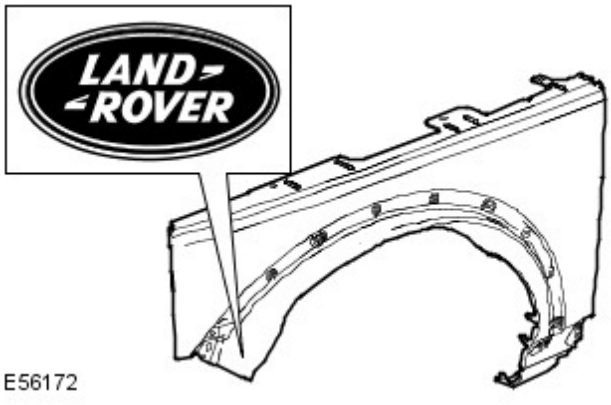
Description and Operation

General

The corrosion protection provided in production must be carefully maintained and/or reproduced during and after body repair work. It is only then that the long-term warranty against penetrative corrosion damage can be assured.

Only Land Rover original bodywork components and Land Rover approved repair materials (sealer, paint etc.) are to be used for bodywork repairs.

Land Rover Original Parts



All Land Rover bodywork components have a cathodic base coating. Individual bodywork components are zinc plated on one or both sides (in different areas depending on vehicle model).

Together with elastic paint coating, this guarantees an optimum, highly resistant protection against corrosion caused by the impact of small objects such as gravel.

NOTE: If possible, the individual protective layers (zinc, cathodic base coat) on Land Rover bodywork components must not be damaged or destroyed by sanding or other mechanical operations.

If hairline cracks at "bodywork connection areas" appear after reshaping work (e.g. at door hinges), it must be ensured that the corrosion protection provided in production is recreated. The complete paint covering must be re-created if necessary. The same applies to reshaping work on heavily profiled bodywork components (e.g. floor pan). Renew or touch-up the paint coating, sealing beads and underbody protection as necessary.

After repair, any interior surfaces which are no longer visible or accessible must be primed before cavity wax is applied. To be certain of an even coating on inner surfaces, careful application of spray (twice, with drying time in-between) must be carried out throughout the whole cavity.

If bodywork panels are strongly heated during repair work, this will invariably result in damage to or even destruction of the applied corrosion protection material. The effectiveness of the cavity protection material is reduced if heating occurs. Reworking of the affected areas is therefore vital.

Welded areas should be made good before corrosion protection is applied.

The corrosion protection measures to be taken when bodywork components are renewed are described on the following pages.

Corrosion Protection of New Components

All new components must be inspected for transport or storage damage such as scratches or dents. The following operations may be necessary, depending on the extent of damage:

Undamaged New Component

- Do not grind the cathodic dip primer.
- Thoroughly clean with silicone remover and rub dry.

Slightly Damaged New Component

- Sand out scratches.
- Finely sand the surrounding surface.
- Thoroughly clean with silicone remover and rub dry.
- Apply corrosion protection primer to bare areas.

Damaged New Components (bumps and dents)

- Beat out the dented area and sand down to bare metal.
- Apply polyester filler (only onto bare metal).
- Apply filler.
- Lightly sand the whole component.
- Thoroughly clean with silicone remover and rub dry.

Apply corrosion protection primer to bare areas.

The clinched flanges on the hood, doors, tailgate and liftgate must be sealed with clinched flange sealer.

Weld Components

Use a rotating tress wire brush to remove the dip coat on the inside and outside of the area to be welded, taking care not to damage the zinc coating.

NOTES:

The area to be ground should be kept as small as possible, the corrosion protection applied in production (cathodic primer) should be retained as much as is possible.

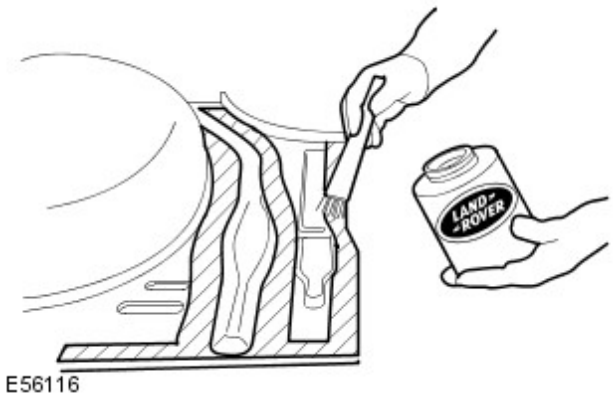
The welding primer must be stirred well or shaken before application.

Clean the repair area thoroughly (silicone remover).

Apply welding primer evenly to all weld flanges (old and new components).

NOTE: The welding primer must be allowed to dry before welding is carried out.

Apply Welding Primer



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All weld beads must be ground down after all welding is completed, taking care not to weaken the material.

Any unevenness at the joint must be made good.

If necessary, spot weld missing T-pins for trim strip clamps into position. The vehicle must be completely cleaned of sanding dust and metal swarf because of the danger of corrosion.

Clean and prime all internal areas and those to be sealed.

NOTE: The primer must be dry before sealing mastic or underbody protection is applied. Do not use thinners when applying sealing mastic (the mastic will not dry).

Partial Renewal

The procedure to follow when partially renewing components is the same as described in the section "Welded Components".

The main difference when components are partially, rather than completely renewed, concerns the preparation of butt or lap joints.

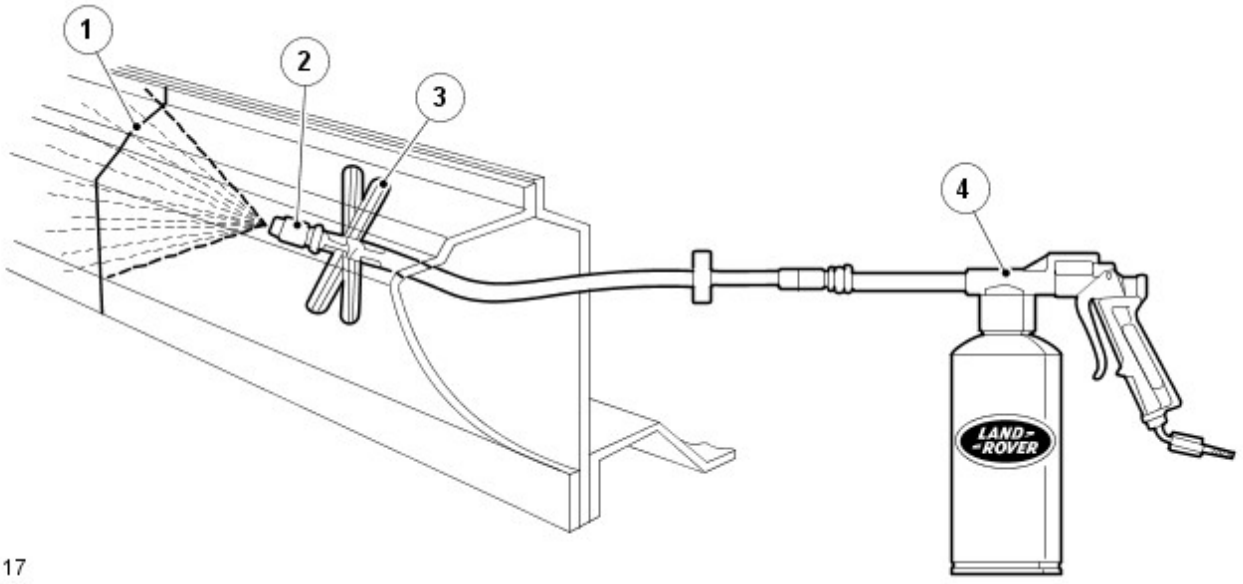
When bodywork components are cut through, attention must be paid to the adequate removal of the paint and zinc coatings on inner areas. This specially applies to areas which are difficult to access internally.
It is important for the weld quality that the inner area is bare metal. Zinc and paint residues in the weld area burn and cause serious hole formation during welding.
If the zinc layer and the paint coating are not removed, the zinc and paint will burn during welding. The soot produced prevents satisfactory cavity protection.

Procedure

The paint layer must be removed for a width of 30 mm from the line of the weld using a rotating tress wire brush.
This operation must be carried out on both the new and the old parts of the bodywork.
Depending on the bodywork component, a 10 mm width of the underlying zinc layer must also be removed along the weld line.

NOTE: A flat scraper or a wire brush can be used instead of the rotating brush if the cavity is small. Do not use an angle grinder, which would weaken the structure.

Application of Cavity Wax Protection on a Door Rocker Panel After Partial Repair



E56117

Item	Part Number	Description
1	-	Weld bead
2	-	Spray head
3	-	Distance maintainer
4	-	Spray gun

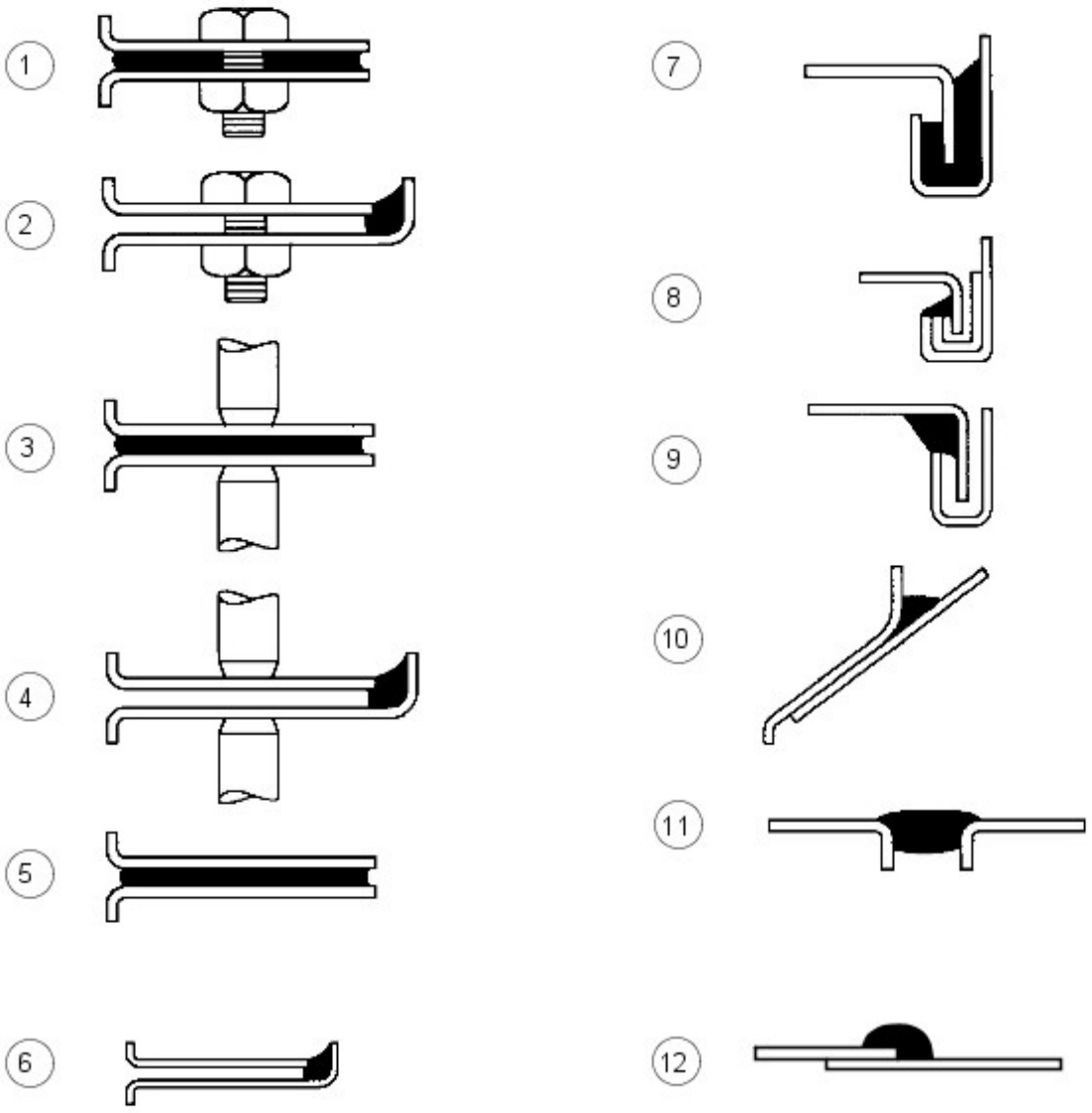
Classification of the different corrosion protection measures for dent removal

Corrosion Protection Method	Exterior Surfaces	Accessible Inner Surfaces	Inaccessible Inner Surfaces
Painting	X	X	
Cavity protection			X

Classification of Different Corrosion Protection Measures for Installation of New Components

Corrosion Protection Method	Weld Flanges Before Welding in Place (contact surfaces)	All Bare Sanded Areas	Weld Flange Area Accessible	Weld Flange Area Not Accessible
Welding primer	X			
Painting		X	X	
Clinched flange protection			X	
Cavity protection				X

Body Sealing Materials



E56018

Item	Part Number	Description
1	-	Between Panels - Bolted
2	-	Panel Edge Bolted
3	-	Between Panels - spot welded
4	-	Panel edges - spot welded
5	-	Between panels - bonded
6	-	Panel edges - bonded
7	-	Clinch joints - type A
8	-	Clinch joints - type B
9	-	Clinch joints - type C
10	-	Gaps between panels - type A
11	-	Gaps between panels - type B
12	-	Lap joint

Description - Usage	Supplier	Part Number
Cavity - Wax	-	-
Inner Cavity Wax (Amber)	3M	0890/11/21
Inner Cavity Wax (Transparent)	3M	08909/19/29
Cavity Wax	Croda	PW57
Engine Bay Waxes/Lacquers	-	-
Astrolan Engine Bay Wax and Cosmetic Wax	Astors	DA3243/1
Engine Bay and Cosmetic Wax/Lacquer	Croda	PW197
Engine Bay Cosmetic Lacquer	Dinol	4010

Miscellaneous Materials Aerosol Auto Adhesive (Trim) - impact adhesive for trim parts Flexible Parts Repair Material - rubber modified polypropylene parts Acoustic Foam (sika baffle 278) - expanding foam block repair Flexible Foam (anti - flutter) - between panels Water Shedder Repair (Aerosol) Low Temperature Anti-Corrosion Coating (Magnesium)	- 3M - Sika Duramix Teroson Land Rover	- 08080 - LR Part No AZL 500021. Ford Part No 6H22-11840-AA 4320 - VEP 501 840 PMA
Seam Sealers		
Body Caulking - type (b) gaps between panels	3M	08568
Drip Check Clear - bolted, spot welded and bonded panel edges; type (a) and (b) gaps between panels; type ©) clinch joints	3M	08401
Drip Check Heavy - type (b) gaps between panels; type ©) clinch joints	3M	08531
Polyurethane Seam Sealer - bolted, spot welded and bonded panel edges; type (a) and (b) gaps between panels; type (b) clinch joints	3M	08684/89/94
Polyurethane Sealer (Sachet) - bolted panel edges; type (b) clinch joints	3M	08703/83/88
Sprayable Sealer - lap joints	3M	08800/23
Super Seam Sealer - lap joints; type (b) clinch joints	3M	08537
Weld Thru' Sealer - between spot welded panels	3M	08626
Betafill Clinch and Brushable Sealer - type (b) clinch joints	Gurit-Essex	10211/15/20
Clinch, Joint and Underbody Coating - lap joint	Gurit-Essex	10101/10707
Leak Check Clear - between bolted panels; spot welded and bonded panel edges; type ©) clinch joints; type (a) gaps between panels	Kent Industries	10075
Putty - type (b) gaps between panels	Kent Industries	-
Polyurethane Seam Sealer - bolted, spot welded and bonded panel edges; between bonded panels; type (a) and (b) gaps between panels	PPG	6500
Polyurethane Seam Sealer - bolted, spot welded and bonded panel edges; between bonded panels; type (b) gaps between panels	Teroson	92
Terolan Light Seam Sealer - bolted, spot welded and bonded panel edges; between bonded panels; type (a) and (b) gaps between panels; between bonded panels; type ©) clinch joints	Teroson	-
Terolan Special Brushable Seam Sealer - lap joints	Teroson	-
Terostat Sprayable Seam Sealer - bolted, spot welded and bonded panel edges; between bonded panels; type (b) gaps between panels	Teroson	9320
Terostat 1K PU Seam Sealer (SE 20) - type (a) and (b) gaps between panels; spot welded and bonded panel edges	Teroson	-
Sealing Compound - bolted, spot welded and bonded panel edges; between bonded panels; type (b) gaps between panels	Wurths	8901001/-/6
Structural Adhesives		
Automotive Structural Adhesive - between bonded panels; type (a) clinch joints	3M	08122
Two Part structural Epoxy - between bonded and spot welded panels; type (a) clinch joints	Ciba-Geigy	XB5 106/7
Underbody Sealers		
Body-Schutz	3M	08861
Spray-Schutz	3M	08877
Crodapol Brushable Underbody Sealer	Croda	PV75
Terotex Underseal (CP02)	Teroson	9320
Underbody Waxes		
Stone Chip Coating (smooth)	3M	08158/9
Underbody Wax	Croda	PW61
Underbody Wax	Dinol	Tectacote 205
Weld - through Primers		
Weld Thru' Coating	3M	05913
Zinc Spray	3M	09113
Zinc Rich Primer	ICI	p-565 634

Material Equipment/Suppliers

3M

- Automotive Trade Group
- 3M UK Plc
- 3M House
- PO Box 1
- Market Place
- Bracknell
- Berks.
- RG12 1JU
- Telephone (01344) 858611

Cooper Pegler

- Burgess Hill

- Sussex
- RH 15 9LA
- Telephone (014446) 42526

SATA Spray Equipment

- Minden Industrial equipment
- 16 Greyfriars Road
- Moreton Hall
- Bury St Edmunds
- Suffolk
- IP32 7DX
- Telephone (01284) 760791

Teroson

- Watchmead
- Welwyn Garden City
- Hertfordshire
- AL7 1JB
- Telephone 01707 358800

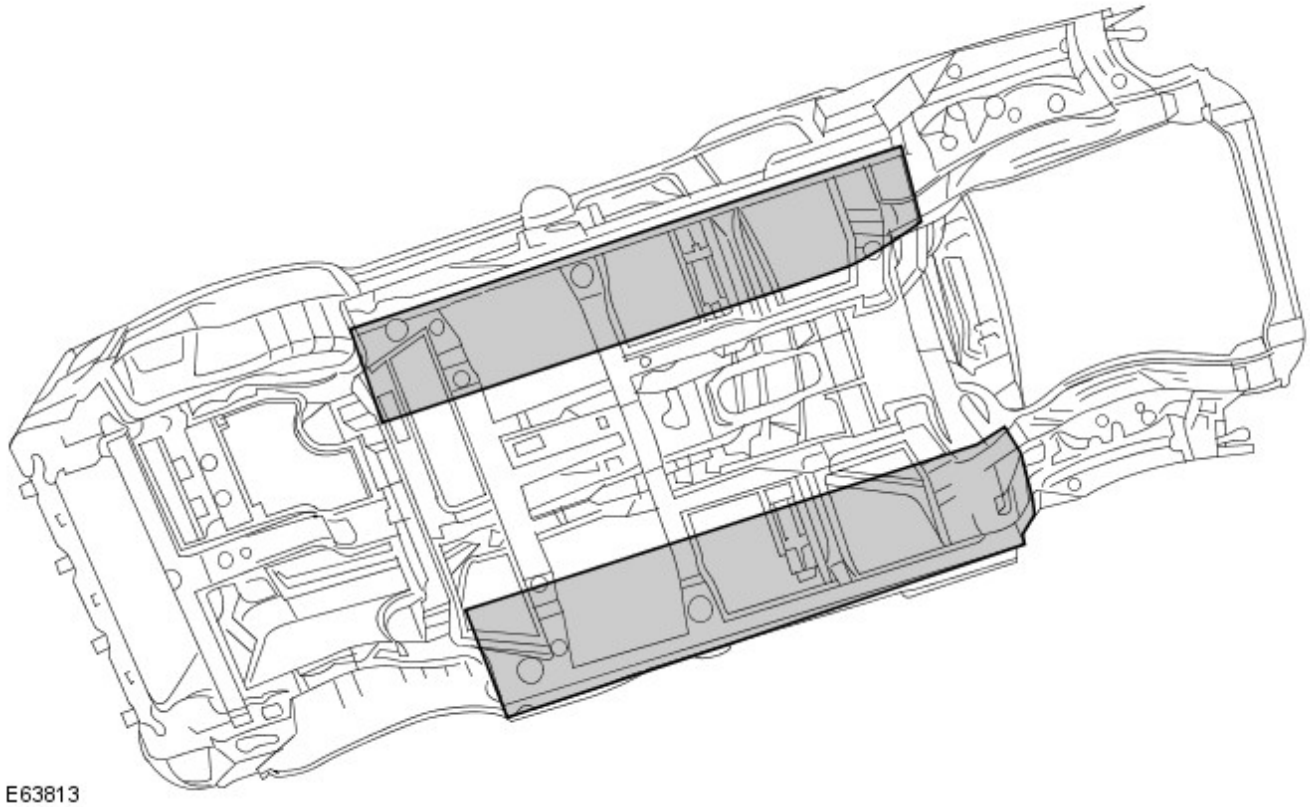
Underbody sealer

Under floor areas and rocker outer panels are treated with a plastisol PVC underbody sealer. This material is not suitable for re-treatment. When repairing areas of underbody sealer, strip the factory-applied underbody sealer back to a suitable break point. Ensure that a clean metal surface is exposed and that the edge of the existing adheres soundly to the panel.

Apply new underbody sealer between primer and surface paint operations. Apply seam sealer as necessary before application of underbody sealer. Ensure that blanking plugs and grommets in the floor pan (except those used for wax injection) are fitted before underbody sealer application. Refit any heat-fusible plugs which have been disturbed in repair with the aid of a hot air blower, or replace with rubber grommets

CAUTION: Ensure that suspension units, wheels, tires, power unit, drive shafts, exhaust and brakes (including all mounting points) are shielded prior to application of fresh underbody sealer.

Area of Underbody Sealer Application



Precautions During Body Repairs and Handling

Take care when handling the vehicle in the workshop. Underbody sealers, seam sealers, underbody wax and body panels may be damaged if the vehicle is carelessly lifted.

Proprietary Anti-corrosion Treatments

The application of proprietary anti corrosion treatments in addition to the factory-applied treatment could invalidate

the corrosion warranty and should be discouraged. This does not apply to approved, compatible, preservative waxes which may be applied on top of existing coatings.

Fitting Approved Accessories

When fitting accessories ensure that the vehicle corrosion protection is not affected, either by breaking the protective coating or by introducing a moisture trap.

Do not screw self-tapping screws directly into body panels. Fit suitable plastic inserts to the panel beforehand. Always ensure that the edges of holes drilled into panels, chassis members and other body parts are protected with a suitable zinc rich or acid etch primer, and follow with a protective wax coating brushed onto the surrounding area.

Do not attach painted metal surfaces of any accessory directly to the vehicle's bodywork unless suitably protected. Where metal surfaces are bolted together always interpose a suitable interface material such as weldable zinc rich primer, extruded strip, or zinc tape.

Steam Cleaning

Due to the high pressure/temperature generated by steam cleaning equipment, there is a risk that certain adhesives and corrosion prevention material may become softened or liquified.

Take care not to allow the steam jet to dwell on one area, and keep the nozzle at least 300mm from the panel surface.

 CAUTION: Do not remove wax or lacquer from underbody areas during repairs.

Inspection During Maintenance Servicing

It is a requirement of the corrosion warranty that the vehicle is checked for corrosion by an authorised Land Rover Authorised Repairers at least once a year, to ensure that the factory-applied protection remains effective.

Rectify any bodywork damage or evidence of corrosion found during inspection as soon as is practicable, both to minimise the extent of the damage and to ensure the long term effectiveness of the factory-applied corrosion prevention treatment.

Underbody Protection Repairs

Whenever body repairs have been carried out, ensure that full sealing and corrosion protection treatments are reinstated. This applies both to the damaged areas and also to areas where protection has been indirectly impaired, as a result either of accident damage or repair operations.

Remove corrosion protection from the damaged areas before straightening or panel beating. This applies in particular to panels coated with wax, PVC underbody sealer, sound deadening pads etc.

 CAUTION: Do not use oxy-acetylene to remove corrosion prevention material. Large volumes of fumes and gases are liberated by these materials when they burn.

The most common method of removal is by means of a hot air blower with an integral scraper. High temperatures can be generated with this equipment which may cause fumes. Take care during its use.

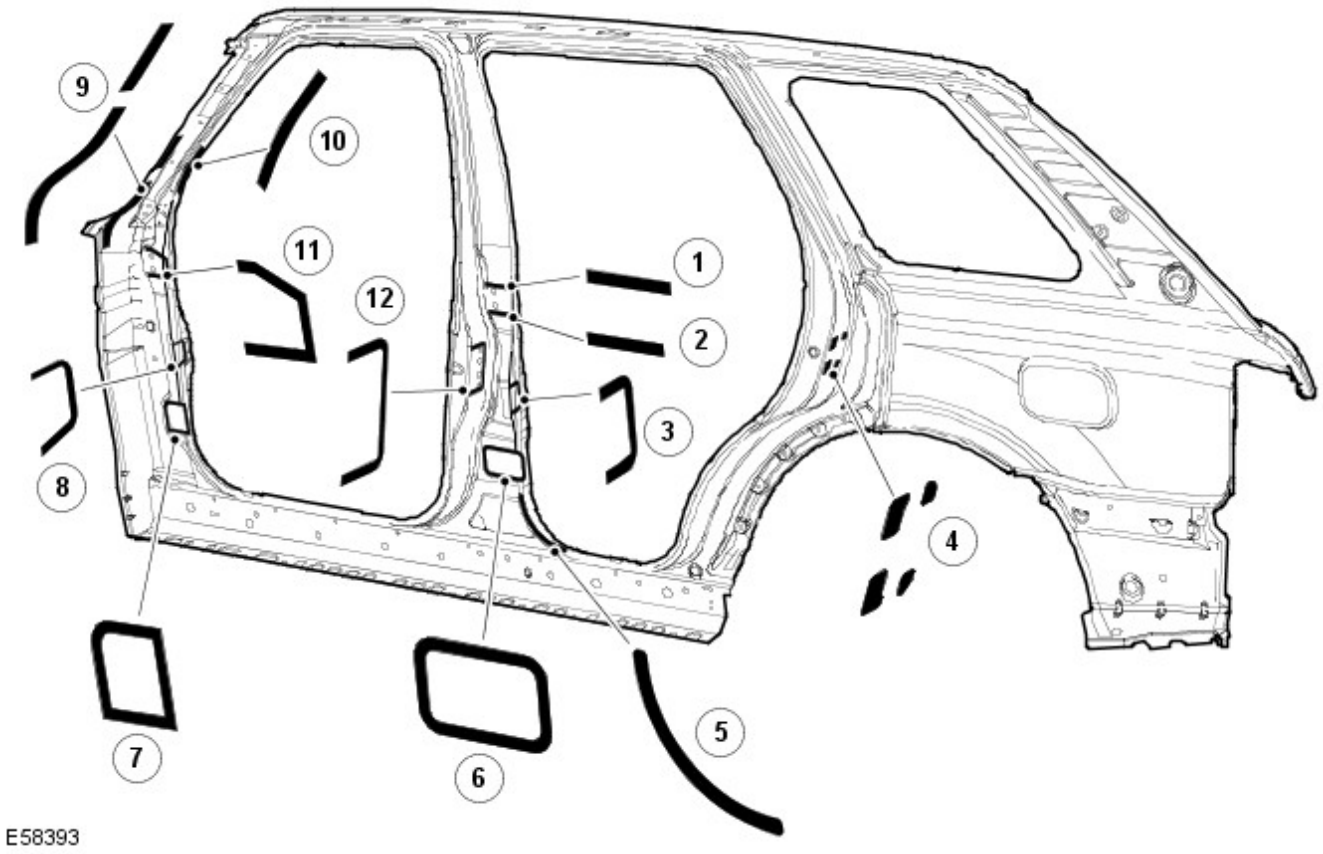
Structural Adhesive

Metal to metal adhesive is applied to critical joint areas during factory assembly. The material used is a high temperature, heat cured, nitrile phenolic which serves to bond two metal surfaces and also to seal the joint against ingress of dust, moisture and fumes. This material is not suitable for service use and, during repair, should be substituted by an approved structural adhesive.

 CAUTION: When separating a joint with metal to metal adhesive, it is important to avoid distortion. Heat gradually until the bond weakens sufficiently to permit panel separation.

 NOTE: When spot welding through metal to metal adhesive, take particular care to adjust the equipment setting to ensure a suitable weld.

Areas of Structural Adhesive



Item	Application	Function
1	B-pillar upper hinge RH/LH	Structural
2	B-pillar upper hinge RH/LH	Structural
3	B-pillar check-strap RH/LH	Structural
4	C-pillar striker reinforcement	Structural
5	B pillar rear door aperture	Structural
6	B-pillar lower hinge RH/LH	Structural
7	A-pillar lower hinge RH/LH	Structural
8	A-pillar check-strap RH/LH	Structural
9	A-pillar to windshield aperture	Structural
10	A-pillar to front door aperture	Structural
11	A-pillar upper hinge RH/LH	Structural
12	B-pillar latch face	Structural

Joints symmetrically opposite to those shown are also treated. Apply 3mm diameter beads to all joints shown. Leave rocker drain points free of adhesive.

Expanding Foam Acoustic Seals

Expanding foam acoustic seals are used in various closed-sections of the body to improve vehicle refinement. The seals are installed during the vehicle body manufacture and expand during the paint process up to ten times original size, thus locking them into position. They are located such that they prevent noise accentuation along a section and reflect air borne noise away from the cabin.

The seals have spilt functionality depending on location. The seals located at the base of the body pillars have a primary function of preventing water ingress when wading. Their secondary function is to prevent noise and dust ingress.

The seal around the fuel filler has a primary function of preventing both fuel and water ingress. With a secondary function of preventing noise and dust ingress.

The remaining seals primary function is to prevent noise accentuation along a section and reflect air borne noise away from the cabin.

Another advantage of the seals is that they marginally increase the overall stiffness of the body and its structural performance in case of a crash.

The seals are manufactured from an expandible polymer, 'Sika Baffle 250.'

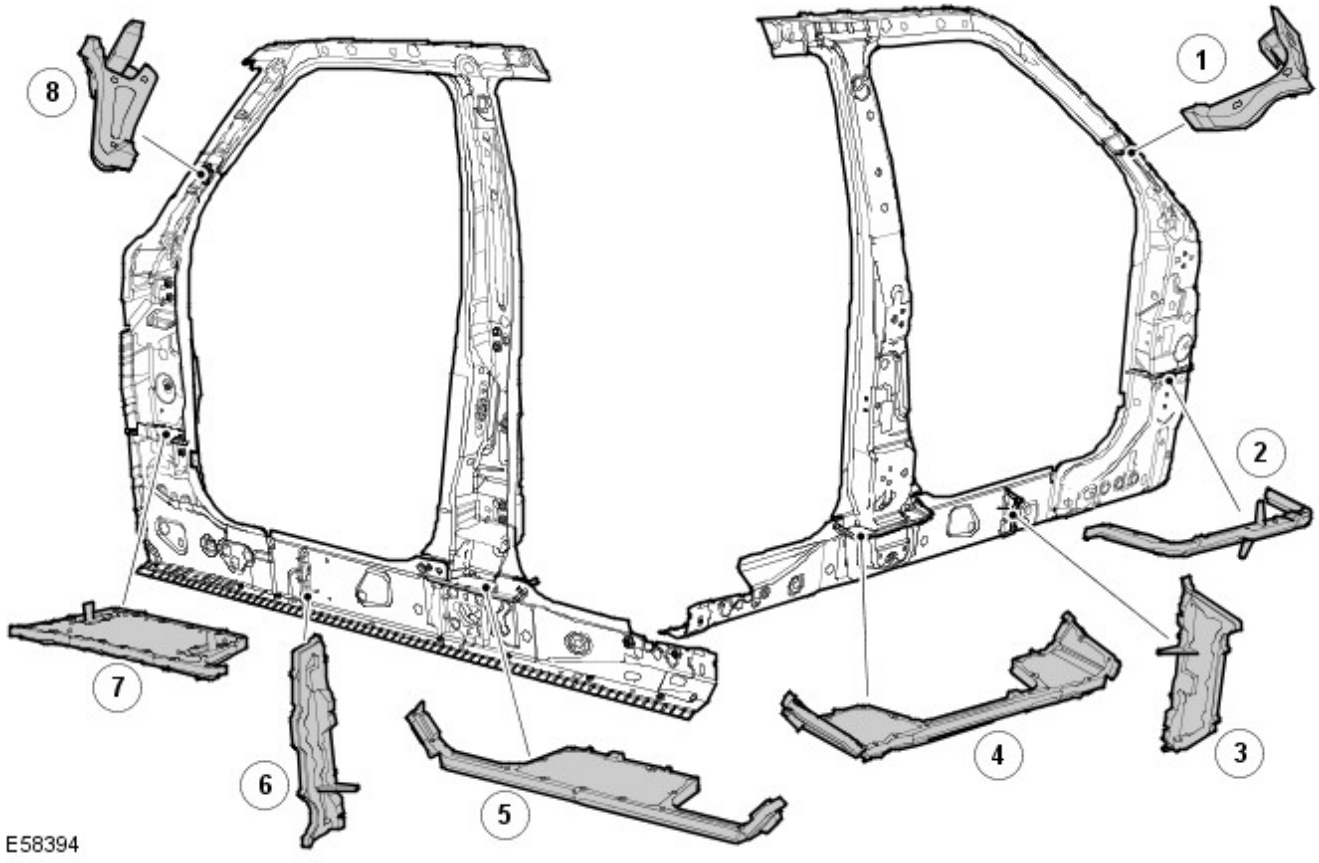
Replacing Foam Acoustic Seals

As paint oven temperatures used in a repair workshop are significantly lower than those that are used during manufacture of the vehicle, a different process is required to replace the seals.

After a repair that involves replacement of a section containing expanding foam acoustic seals, the new expanding foam acoustic seal is installed to the new section and injected with an approved acoustic foam. The acoustic foam

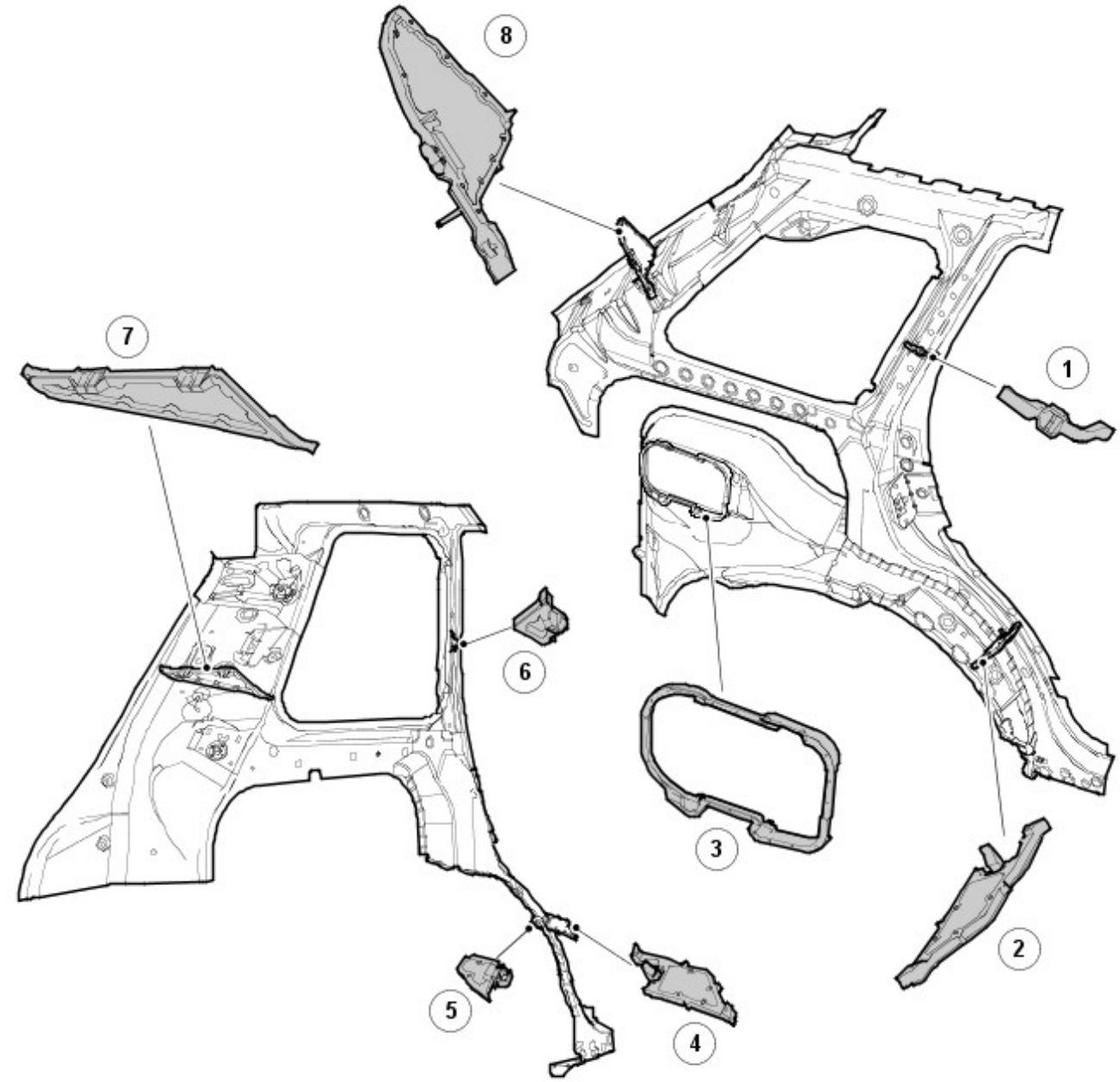
should be injected after paint refinishing, where possible. When injecting the foam, ensure the foam fills a complete cross section of the cavity and around the expanding foam acoustic seal.

Acoustic Seals in the Front Reinforcement Assembly



Item	Description	Function	Service part No
1	A-pillar upper outer	Acoustic	EUH500070
2	A-pillar lower outer	Water Ingress/Acoustic	EUH000540
3	Rocker panel outer	Acoustic	EUH000680
4	B-pillar lower outer	Water Ingress/Acoustic	EUH000570
5	B-pillar lower inner	Water Ingress/Acoustic	EUH000560
6	Rocker panel middle	Acoustic	EUH000670
7	A-pillar lower inner	Water Ingress/Acoustic	EUH000550
8	A-pillar upper inner	Acoustic	EUH500080

Acoustic Seals in the Rear Quarter Panel



E58395

Item	Description	Function	Service part No
1	C-pillar outer	Acoustic	EUH500100
2	Rear wheel arch outer	Water Ingress/Acoustic	EUH500060
3	Fuel filler aperture	Water/Fuel Ingress	ARY780030
4	Rear wheel arch inner	Water Ingress/Acoustic	EUH000580
5	Rear wheel arch inner	Water Ingress/Acoustic	
6	C-pillar inner	Acoustic	EUH500040
7	D-pillar inner	Acoustic	EUH500010
8	D-pillar outer	Acoustic	EUH500110

Seam Sealer

A heat cured, PVC based sealant is applied to specific joint seams during factory assembly. This material is not suitable for service use and during repair and should be substituted by an approved seam sealer.

Apply seam sealers after the application of primer and before the application of top coat. The sealer must form a continuous bead, with the profile of the bead dependent on the type of seam. If the seam sealer is applied with a brush take particular care to maintain the required coverage of the seam.

Ensure that all accessible repair seams are sealed following a repair. Damage to a vehicle often flexes areas of the body remote from the impact. As a result the seam sealer in these areas may be disturbed by subsequent straightening and repair operations. Check all seams in the vicinity of the area undergoing repair for evidence of cracked seam sealer, then clean out as required and apply fresh seam sealer using the following procedure:

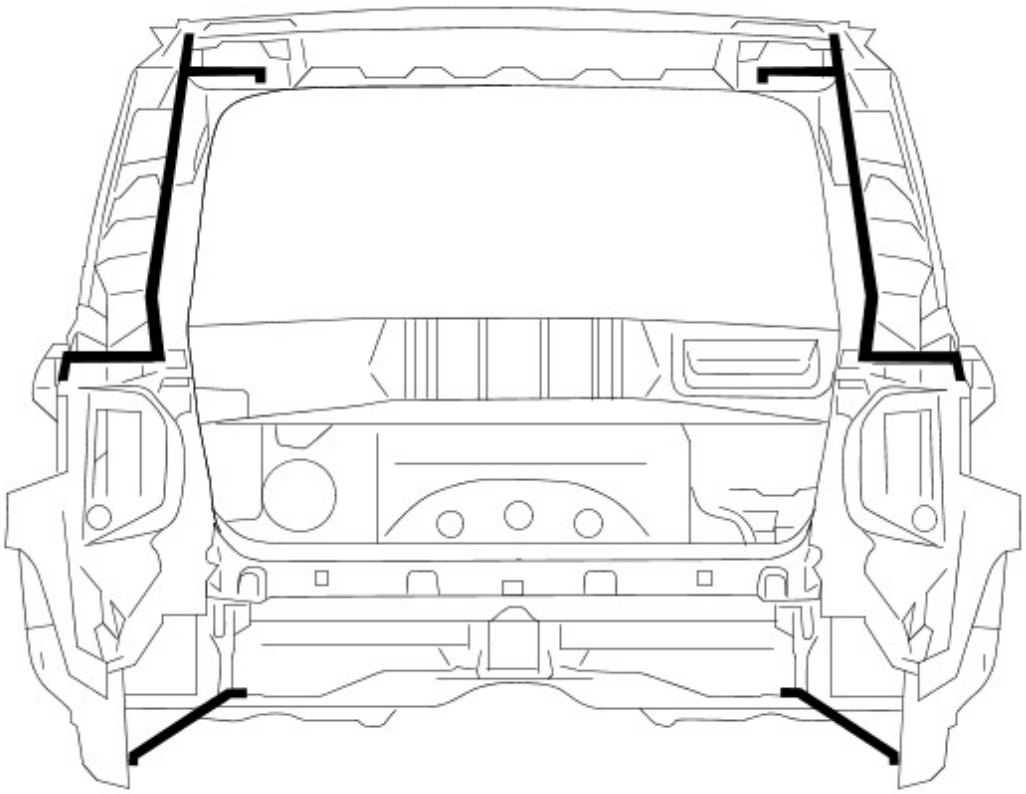
- Clean the affected seam and re-treat any exposed metal areas with a suitable etch phosphate primer.
- Treat affected area with an etch-acid primer.

- Apply appropriate seam sealer as necessary.
- apply appropriate colour coat (and under body sealer as applicable).

Where seams are inaccessible following the reassembly or fitting of components, ensure that a paste-type seam sealer is applied to such seams. Certain seams also become inaccessible after the completion of panel repairs. In such instances apply seam sealer and paint before final assembly

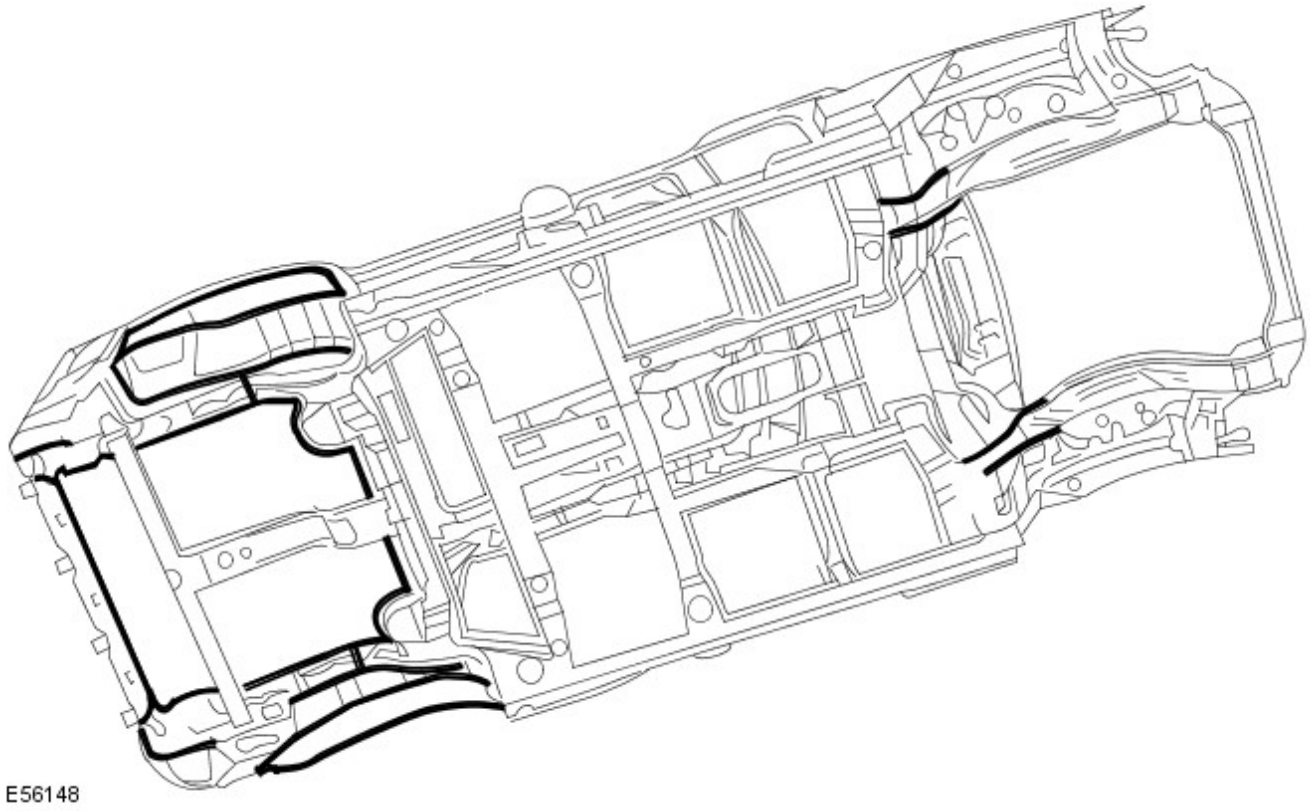
Provided access is adequate, apply seam sealer to both sides of a repair joint. Where access is limited to one side only (e.g. box section), treat the affected box member with cavity wax.

Seam Sealer on the Rear End



E58396

Underbody Seam Sealer



Cavity Wax

After repairs, always re-treat these areas with an approved cavity wax. In addition, treat all interior surfaces which have been disturbed during repairs whether they have been treated in production or not. This includes all box members, cavities and door interiors.

Before wax injection, ensure that the cavity to be treated is free from any contamination or foreign matter. Where necessary, clear out any debris.

Ensure that cavity wax is applied after the final paint process and before refitting any trim components.

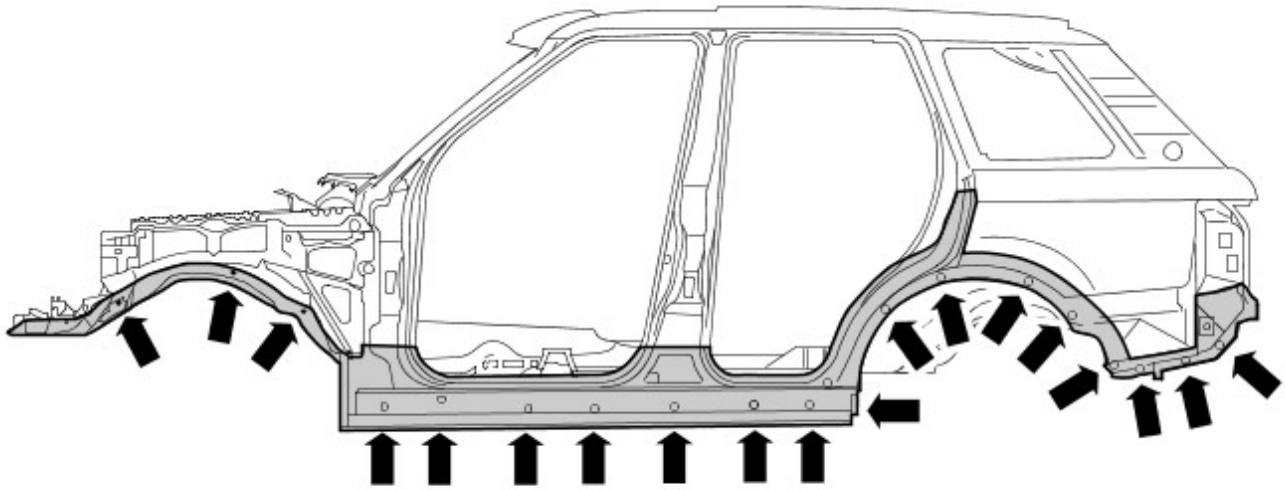
During application ensure that the wax covers all flanges and seam areas and that it is adequately applied to all repaired areas of both new and existing panels.

It should be noted that new panel assemblies and complete body shells are supplied without wax injection treatment. Ensure that such treatment is carried out after repairs.

Effective cavity wax protection is vital. Always observe the following points:

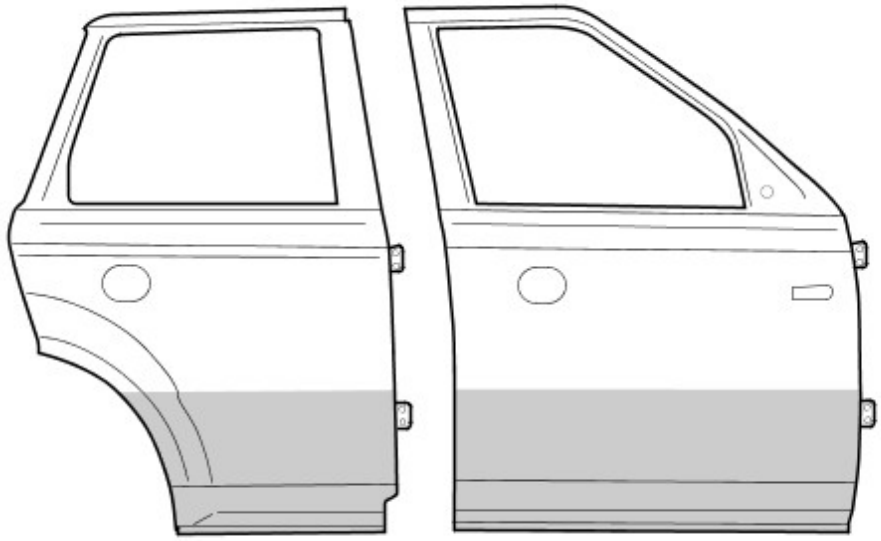
- Complete all paint refinish operations before wax application.
- Check the spray pattern of injection equipment.
- Mask all areas not to be waxed.
- Remove body fixings, such as seat belt retractors, if contamination is at all likely.
- Move door glasses to fully closed position before treating door interiors.
- Treat body areas normally covered by trim before refitting items.
- Check that body and door drain holes are clear after the protective wax has dried.
- Keep all equipment clean, especially wax injection nozzles.

Wax Injection Areas, Body



E58397

Wax Injection Areas, Doors



E58621

Published: 11-May-2011

Body Repairs - Water Leaks - Water Leaks

Description and Operation

General

If water leaks occur after bodywork repairs, the cause can be established using the checks described below. A systematic and logical procedure is required to locate water leaks. Before beginning extensive checks, a thorough visual inspection must be carried out.

Visual Inspection

- The following characteristics may indicate existing leaks:
- Check the clearance and accurate fit of ancillary components such as the hood, tailgate, liftgate, doors, and so on.
- Check for correct fit and possible damage to sealing elements such as blanking plugs, rubber door seals, and so on.
- Check water drain holes for unhindered flow.

Various tests can be used to provide further information on possible leaks:

- Water test
- Washer test
- Road test
- Chalk (powder) test

Practical execution of tests and checks

Water test

NOTE: Never aim a jet of water directly at a rubber seal.

Carry out the water test with a second person present (in the passenger compartment).
Use variable washer nozzles (concentrated water jet to fine spray mist).
Start in the lower section and spray the whole area, working upwards in stages.

Washer test

Further tests can be carried out in the washer system.
Some leaks originate here, or only occur here.
The relevant passenger compartment should be checked using a torch during the wash procedure.

Road test

If no leaks are located during the tests above, road tests should be carried out on wet roads.
Road tests under various conditions:

- At various speeds.
- On various road surfaces (asphalt to cobbles).
- With loaded or unloaded vehicle.
- Driving through puddles (splash water).

Chalk test (powder test)

In this test, the clamping load and the bearing surface of the seal are checked.
Performing the test:

- Dust the door seal with powder or coat with chalk.
- Coat the bearing surface of the seal with a thin film of vaseline.
- Slowly close the door and open it again.
- Check the width and continuity of the imprint on the door seal.

Other test equipment

Other equipment such as stethoscopes, UV lamps, special mirrors or ultrasound measuring instruments can be used to locate leaks.

Rectifying the leak using recommended tools, auxiliary equipment and materials

Tools and auxiliary equipment:

- Dry, absorbent cloths
- Variable washer nozzle
- Torch, fluorescent tube
- Mirror
- Compressed air
- Seal lip installer
- Wet/dry vacuum cleaner
- Sealing compound compressor
- Remover for interior trim
- Cutter blade or pocket knife
- Wedge (wood or plastic)
- Hot air blower
- Special mirror for concealed leaks
- Air flow checker
- Sealing compound (tape and plastic compound)
- Multi-purpose sticker
- Clinched flange sealer

- Window sealing compound
- Water shield (PVC)
- Double-sided adhesive tape for water shield
- Methylated spirit (available from trade outlets)
- PU adhesive
- Silicone remover
- Tar remover

Water leaks according to mileage or running time

Increasing mileage has an effect on the problem of leaks in a vehicle. Possible influencing factors are:

Servicing and maintenance of seals:
- No maintenance, lack of maintenance or incorrect maintenance
- Using an incorrect agent

Damaged seals:
- As a result of aging, wear or incorrect handling/assembly.

Heavy soiling of the vehicle:
- Heavy soiling of a vehicle can seriously impair the function of water drainage channels in particular, and also of rubber seals.

Age-related factors:
- Environmental factors
- UV radiation
- Extreme climatic conditions

Corrosion can have a serious impact on bodywork, in particular as a result of:
- Lightly or heavily rusted seal carriers
- Rusted body seal welds
- Perforation corrosion

Water leaks after body repairs

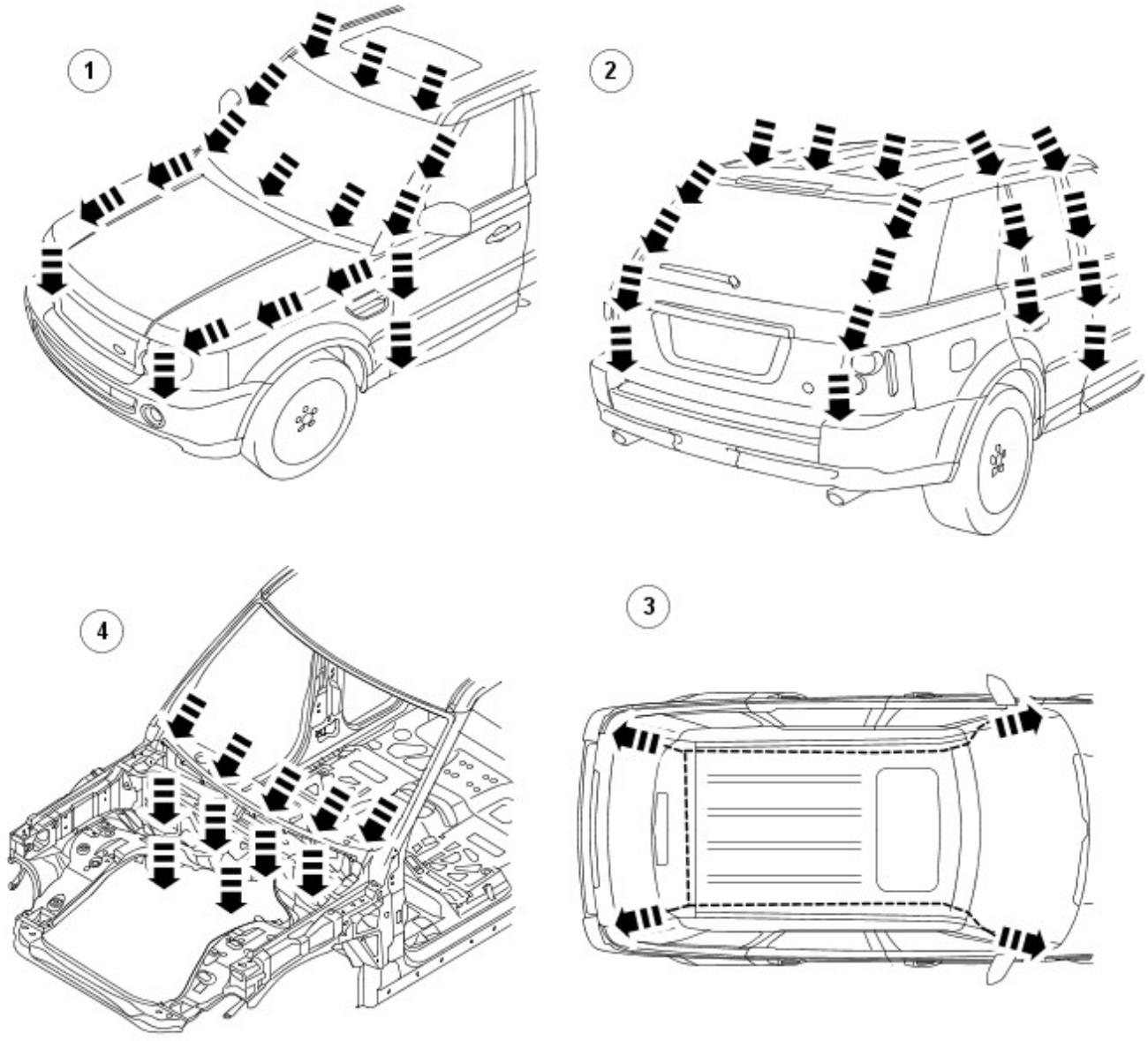
If a vehicle develops a leak after body repairs, the following points must be taken into consideration in particular:

The correct seating of ancillary components and their seals must be checked.
The correct alignment of doors/tailgate and liftgate must be checked. The associated seals must not be damaged and must be installed correctly.
Check that welded seams are correctly sealed.
The correct seating of rubber grommets must be checked.
Directly-glazed windows must have correct and complete bonding.

Water drainage system

If a vehicle develops water leaks, then areas into which water is routed or drained should be checked first.

Water drainage system



E58392

Item	Part Number	Description
1	-	Water drainage, front
2	-	Water drainage, side and rear
3	-	Roof drainage
4	-	Engine compartment drainage

Water leaks, diagnosis and corrective action: Front passenger compartment

Windscreen

Diagnosis:
- Ingress of water into A-pillar area or instrument cluster area and rocker panel area.

Cause:
- Breaks in adhesive beads

Corrective action:
- The breaks in adhesive beads can be located from inside by using compressed air. The leak can be identified from outside by the escaping air.
- The second test method is by means of a water test. The outer trims must be raised carefully using a plastic wedge. The leak should be located from inside by a second assistant.

Side windows

In the case of side windows, the same problems can arise as for a windscreen. The same corrective actions must therefore be used.

Door seal

Diagnosis:
- Water ingress in the lower part of the interior door trim or in the rocker panel area.

Cause:

- The water shield fitted behind the interior door trim exists to drain off water that has entered the door via the drainage holes, either downwards or outwards. If the water shield seal is damaged or has been fitted incorrectly, then water can get into the passenger compartment.
- In addition to this, the drainage holes can become clogged with leaves, dirt or excess cavity protection agents. Water gathers in the door and ingresses into the passenger compartment.
- Check water shield for damage or correct fitting.
- If the water shield needs to be re-bonded, then approved seam sealer should be used.
- Before the water shield is installed, the drainage holes must be checked for unhindered flow.

Door seals

Diagnosis:

- Ingress of water into the rocker panel area

Cause:

- Insufficient clamping load between seal and door.

Corrective action:

- Check clamping load:
- The easiest way to check the clamping load of a seal to the respective bearing surface is by means of a paper strip test. This consists of trapping strips of paper at various points between the door and the seal, and fully closing the door. If it is possible to pull out the paper with no great resistance, then the clamping load is too low.
-

NOTE: When adjusting the clamping load, the profile alignment of the relevant components must always be taken into consideration.

Adjust the clamping load:

- The clamping load is normally adjusted using the striker. When doing so, the edge alignment from the door to the side panel, or from the front door to the rear door must be taken into account.
- Another setting method is to realign the panel flange for the seal mounting. The clamping load is increased by moving the flange towards the door.
-

NOTE: Do not realign the flange too far in the direction of the door, as this can reduce the bearing surface of the seal to the door.

Check the bearing surface:

- Apply chalk evenly to the surface of the seal. Evenly coat the bearing surface of the door with vaseline.
- Close the door fully, the lock must engage. Open the door. The imprint of the chalk (bearing surface) can be identified in the film of vaseline.
- The bearing surface should be at least 5mm across at all points.

Other causes:

- The door seal must completely seal the door where it meets the bodywork.
- Water can ingress directly or indirectly into the interior of the vehicle if the seal is damaged at any point.

Corrective action:

- A damaged or worn door seal must always be renewed in full.
- When renewing the seal, the following must be taken into account:
- Always fit the seal first in the area of the narrow radii (corner points).
- Next, secure the seal to the flange evenly by tapping lightly with a rubber hammer. The installed seal must not be kinked at any point.

NOTE: The prescribed length of a seal must not be shortened.

Other cause:

- The door seal is attached to the welded flange all the way round. If this welded flange is uneven or damaged at any point (usually in areas with small radii) then this point could be subject to leaks.
- A stretched seal carrier can also cause a leak.
- In both cases, water gets into the vehicle interior under the seal carrier.

Corrective action:

- Align the deformed welded flange using a hammer and anvil block, prevent and, if necessary, repair any paint damage.

Sliding roof/tilting roof

Diagnosis:

- Ingress of water at sliding roof aperture

Cause:

- The sliding roof/tilting roof is installed in a water trap. The water drains off via the water trap, water drain holes and drain hoses. The drain hoses lead downwards on both sides via the A-pillar and C-pillar.
- The drain holes or drain hoses can become clogged with leaves, dirt, underbody protection and so on.

Corrective action:

-

NOTE: In the case of a sliding or tilting roof, the external rubber seal and the lock actuator or latch mechanism must be checked first of all.

Check the water trap for leaks.

- Check the drain hoses for leaks and for correct connection to the water trap.
- Check the drainage system for unhindered flow, and blow out with compressed air if necessary.
- Check the external seal and the correct adjustment of the sliding roof.

Tailgate and Liftgate

Diagnosis:
- Ingress of water into rear headlining area and luggage area.

Cause:
- The leak problems of the tailgate and liftgate correspond to those of the doors.
- In addition to this, the area to be sealed is much bigger. The routing holes for cables and hoses must also be sealed.
- The rubber grommets for the routing holes must be checked for damage and correct seating (fully unhooked).
- The mounting points of the tailgate and liftgate hinges may leak.

Corrective action:
- Check the rubber grommets and renew if necessary.
- Check the hinge mounting points, and re-seal with sealing compound if necessary.

Forced air extraction

Diagnosis:
- Ingress of water into side luggage compartment area

Cause:
- The forced air extraction for the vehicle interior is located in the D-pillar behind the rear lights.
- The rubber flap of the forced air extraction must be able to move freely.

Corrective action:
- Remove the forced air extraction.
- Check the seal area between the bodywork and housing, as well as the rubber flap.
- Renew seal if necessary.

Rear window

Diagnosis:
- Ingress of water into the luggage compartment area

Cause:
- Rear window leaking.
- Check for leak in the same way as for leaking windscreen.

Panel connections with seal welds

Diagnosis:
- Ingress of water into the luggage compartment area

Cause:
- Several panel connections must be fitted in production in the wheelhouse and luggage compartment areas. These connections are sealed with sealing compound.
- Uneven application of sealing compound can lead to a break in a seal weld.

Corrective action:
- Expose the seal weld.
- Locate the leak in the seal weld.
- Re-seal using sealing compound.

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Body Repairs - Vehicle Specific Information and Tolerance Checks - Body and Frame

Description and Operation

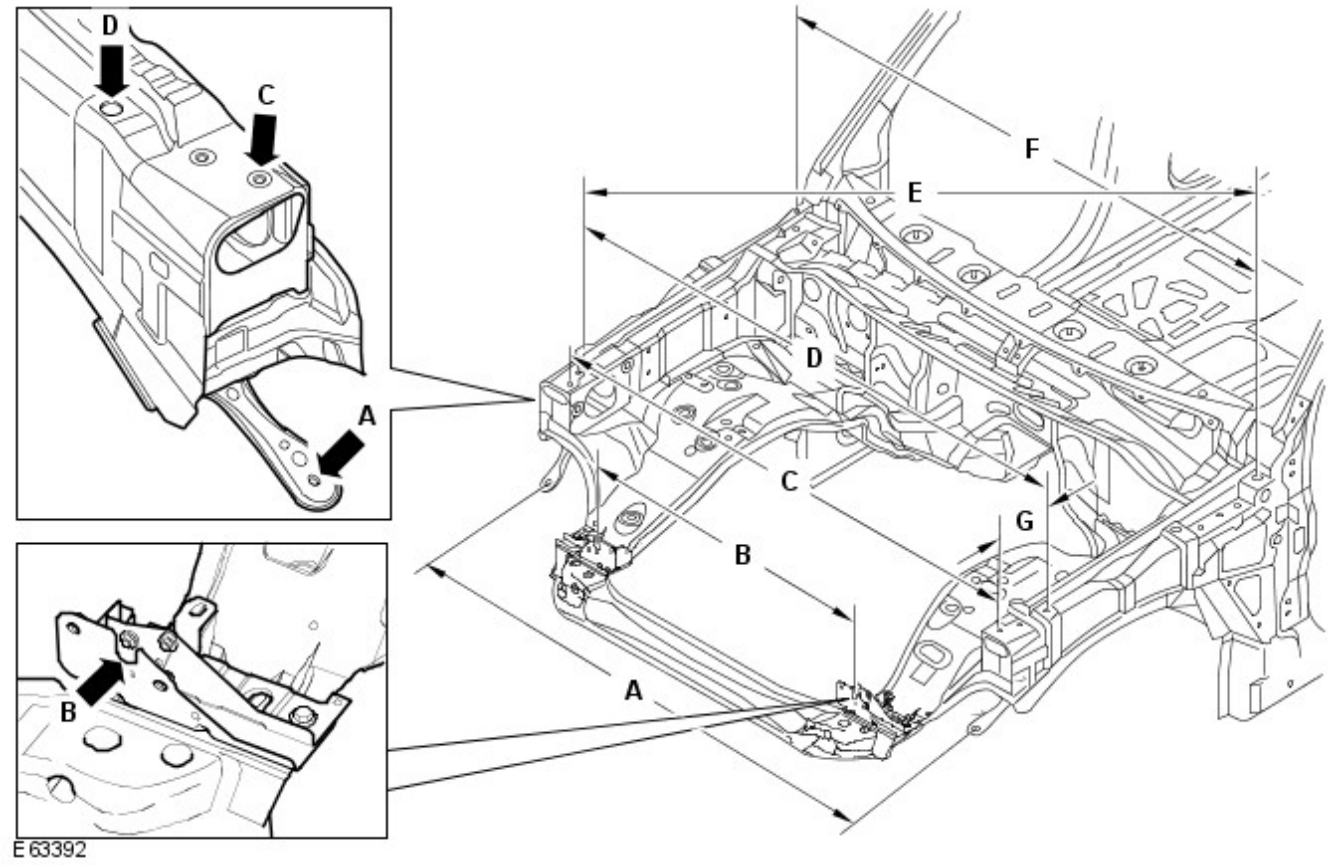
Body Repairs - Tolerance Checks

Point to Point Dimensional Information

Point to point measurements are actual distances between two points. These points can be holes or intersections points. Where holes are taken, the point of measurement is always from the hole centres.

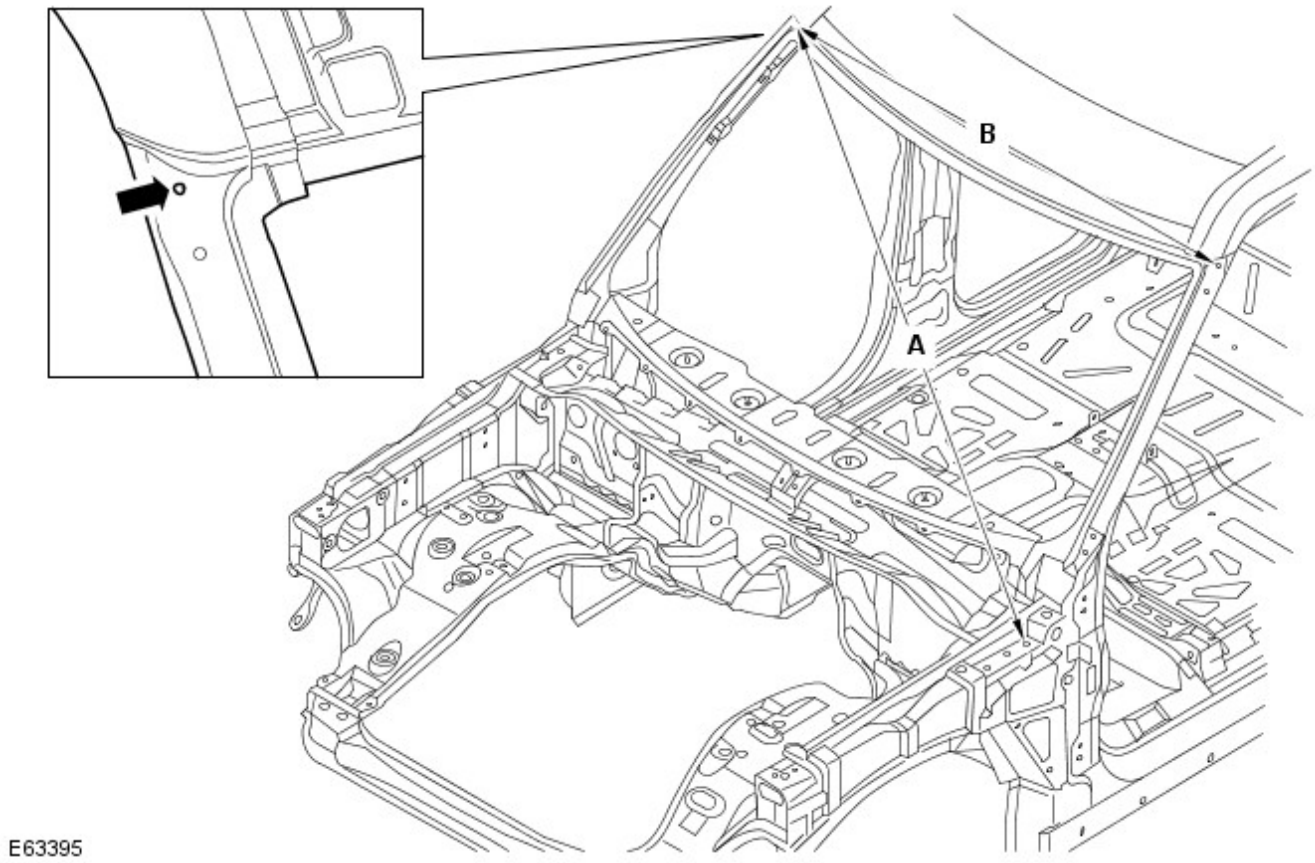
Measurements shown are in millimetres and inches. The measurements in brackets are in inches.

Front end dimensions



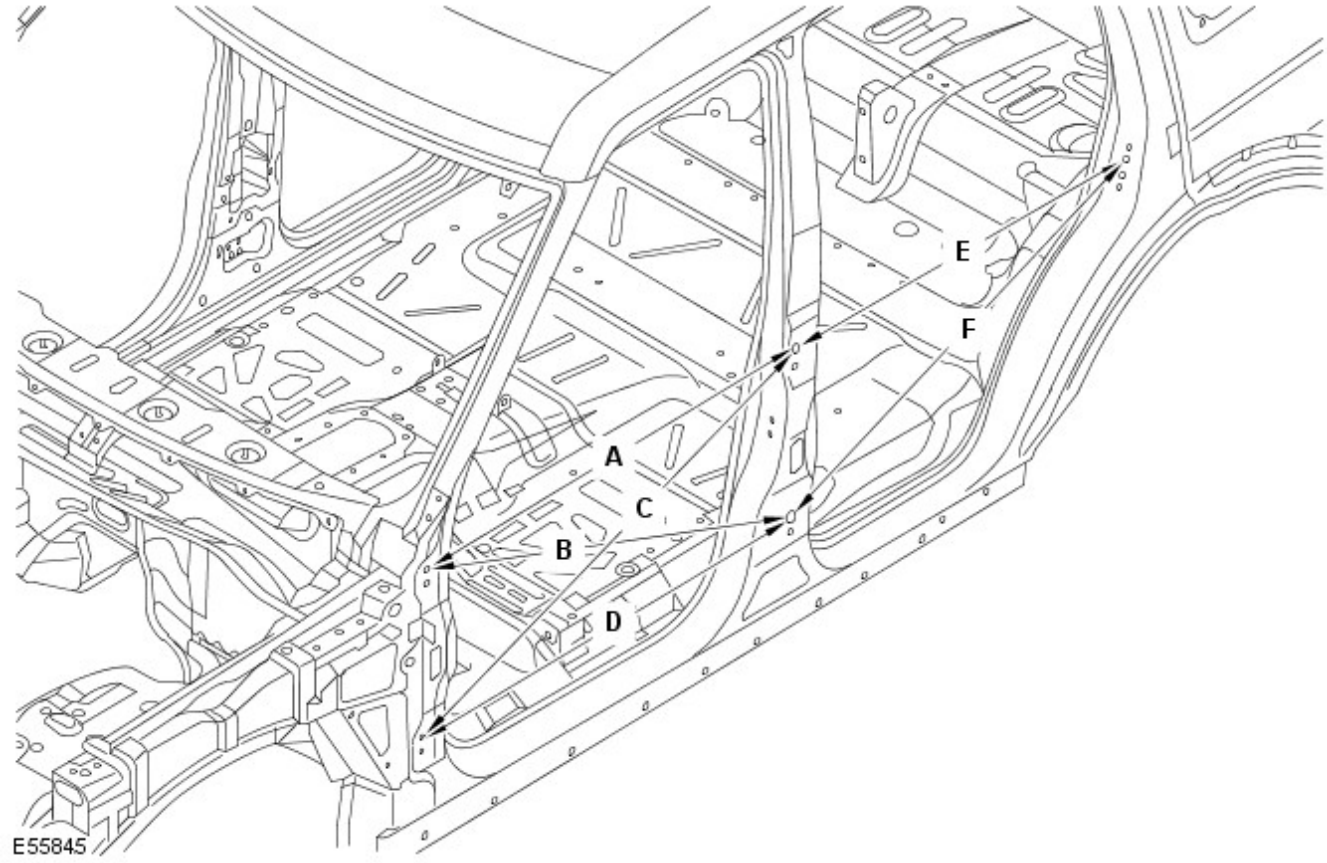
Item	From	To	Length
A	Hood latch panel, lower LH outer fixing	Hood latch panel, lower RH outer fixing	1503.2 (59.18)
B	Hood latch panel, LH locator slot	Hood latch panel, RH locator slot	900 (35.43)
C	Hood latch panel, LH locator dowel	Hood latch panel, RH locator dowels	1540.4 (60.64)
D	Fender, front LH fixing	Fender, front RH fixing	1617.8 (63.69)
E	Fender, rear LH fixing	Fender, front RH fixing	1780.3 (70.09)
F	Fender, rear LH fixing	Fender, rear RH fixing	1620 (63.77)
G	Fender, front fixing	Hood latch panel, locator dowel	114.4 (4.5)

Front end dimensions



Item	From	To	Length
A	LH hood hinge, rear fixing hole	RH windshield side upper finisher, fixing hole	1820.1 (71.65)
B	LH windshield side upper finisher, fixing hole	RH windshield side upper finisher, fixing hole	1420.4 (55.92)

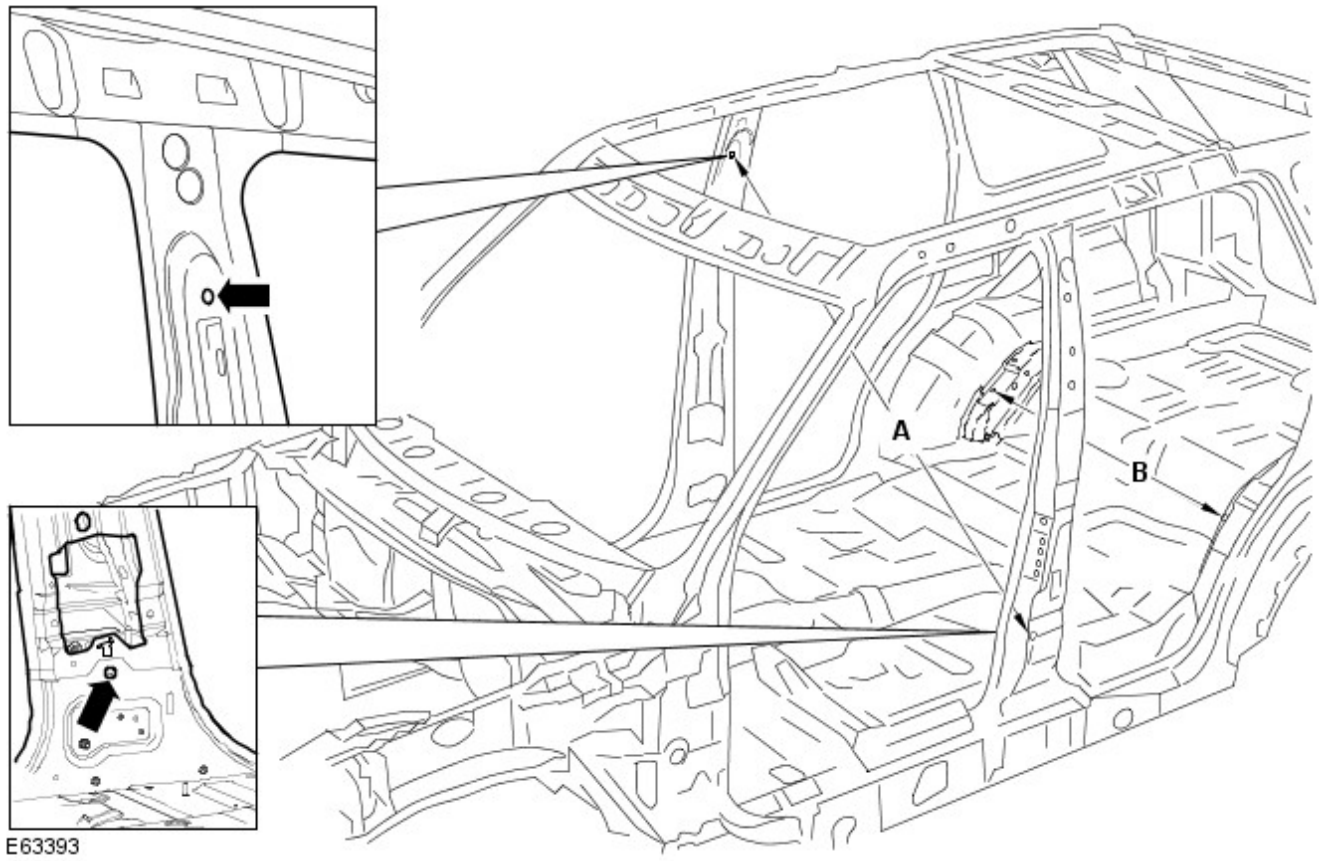
Side view dimensions



Item	From	To	Length
A	Front door top hinge, top fixing hole	Rear door top hinge, top fixing hole	1078.9 (42.47)
B	Front door top hinge, top fixing hole	Rear door bottom hinge, top fixing hole	1138.3 (44.81)
C	Front door bottom hinge, top fixing hole	Rear door top hinge, top fixing hole	1174.5 (46.24)

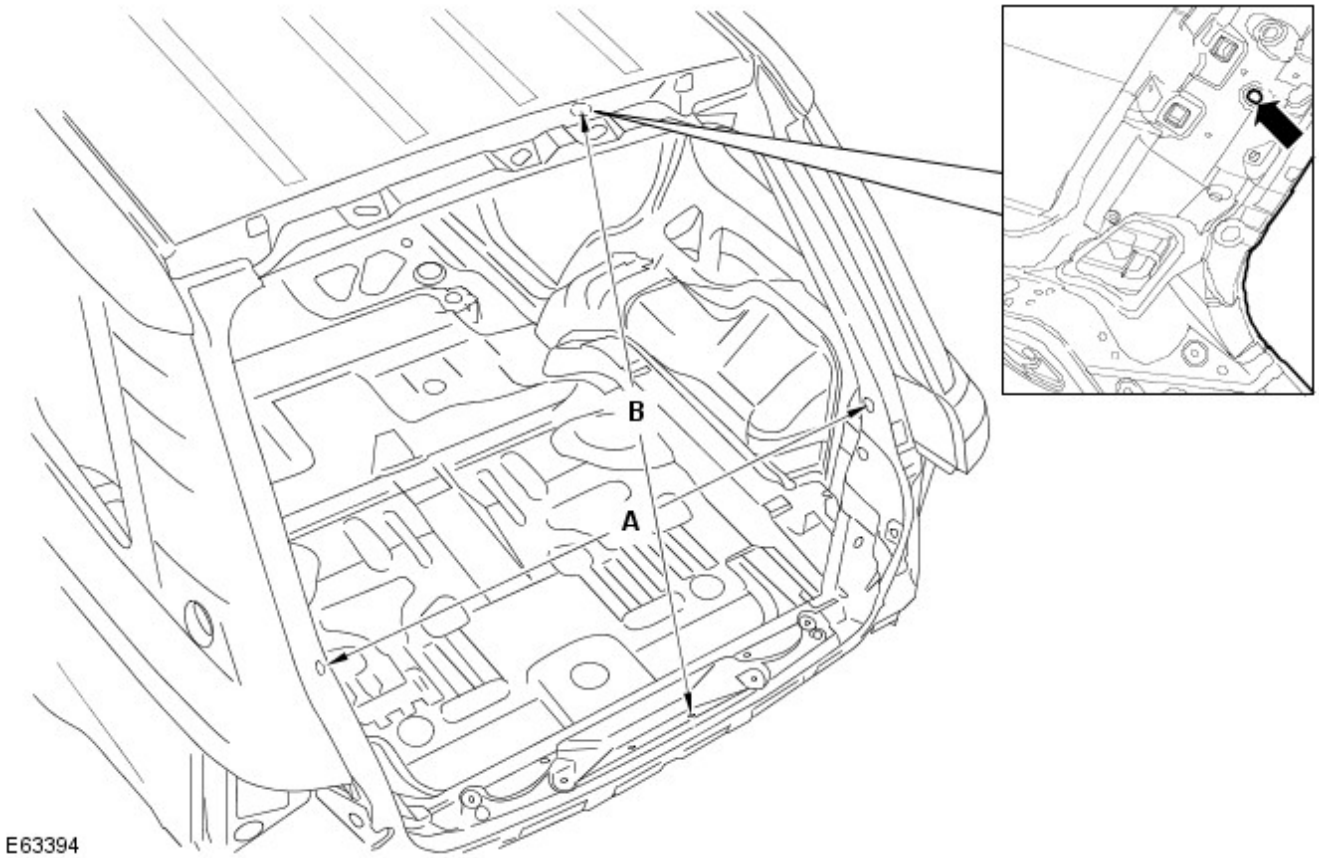
D	Front door bottom hinge, top fixing hole	Rear door bottom hinge, top fixing hole	1078.9 (42.47)
E	Rear door top hinge, top fixing hole	D pillar striker top fixing hole	924.0 (36.38)
F	Rear door bottom hinge, top fixing hole	D pillar striker top fixing hole	1017.9 (40.07)

Internal dimensions



Item	From	To	Length
A	LH safety belt anchorage, top fixing hole	RH safety belt retractor, lower fixing hole	1731.0 (68.15)
B	RH safety belt anchorage lower fixing	LH safety belt anchorage lower fixing	1117.6 (44.00)

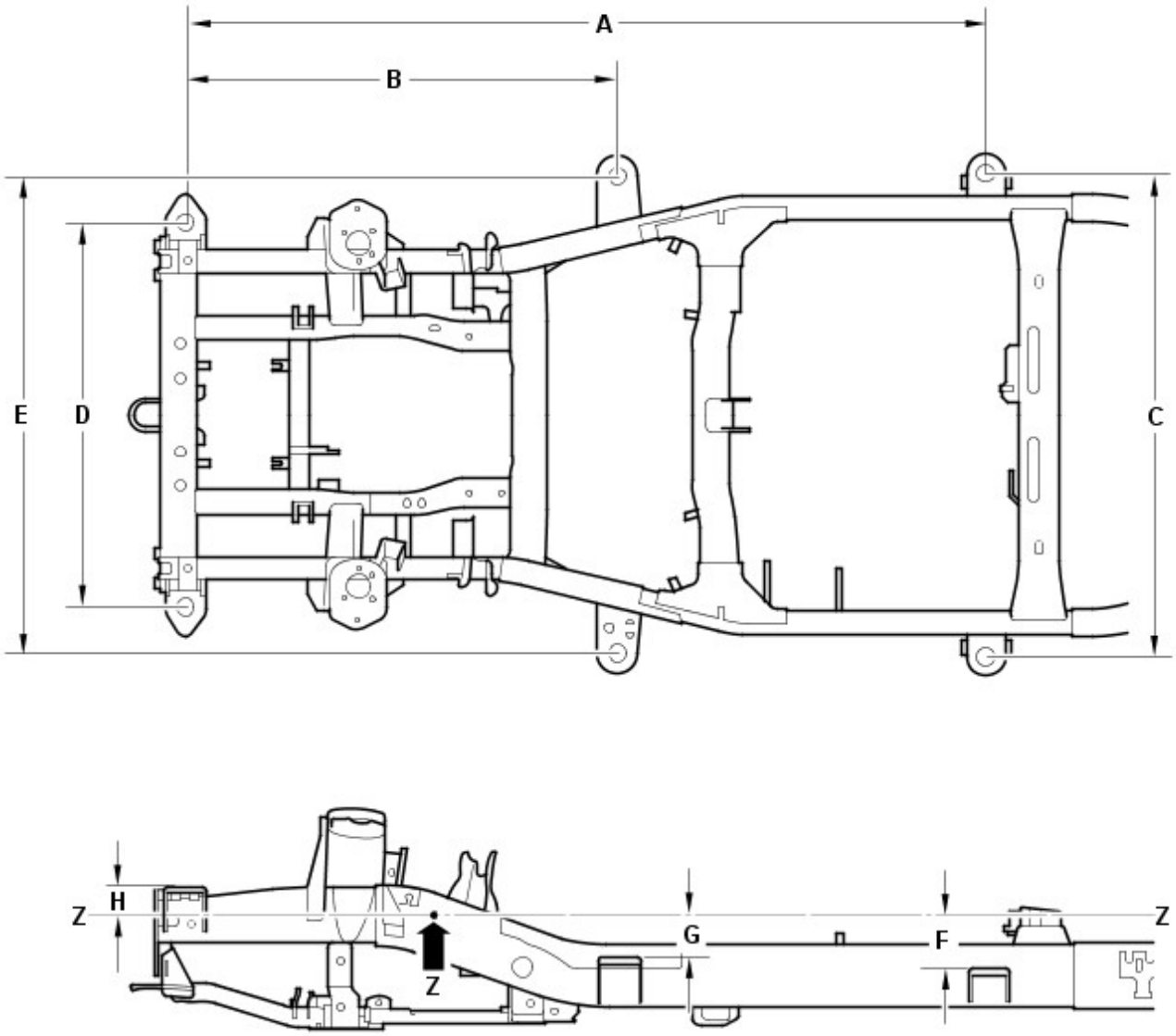
Rear view dimensions



Item	From	To	Length
A	LH upper trim panel, fixing hole	RH upper trim panel, fixing hole	1217.0 (47.91)
B	Liftgate, LH hinge cover, fixing hole	Liftgate, striker LH fixing hole	1186.6 (46.71)

Underbody Dimensional Information

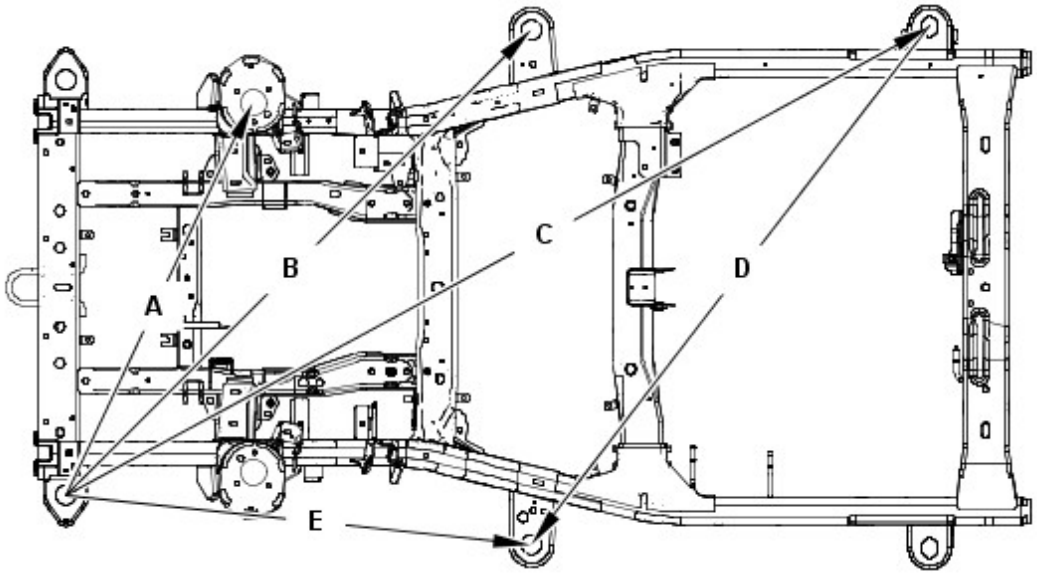
Front integral body frame dimensions



E55836

Item	From	To	Length
A	Body Mount 1 (front)	Body Mount 3	2113 (83.12)
B	Body Mount 1 (front)	Body Mount 2	1139 (44.84)
C	Body Mount 3 (LH)	Body Mount 3 (RH)	1275 (50.196)
D	Body Mount 1 (LH front)	Body Mount 1 (RH front)	1015 (39.96)
E	Body Mount 2 (LH)	Body Mount 2 (RH)	1258 (49.53)
F	Body mount 3	Datum line Z	136.5 (5.37)
G	Body mount 2	Datum line Z	105.5 (4.15)
H	Body mount 1	Datum line Z	78.8 (3.10)

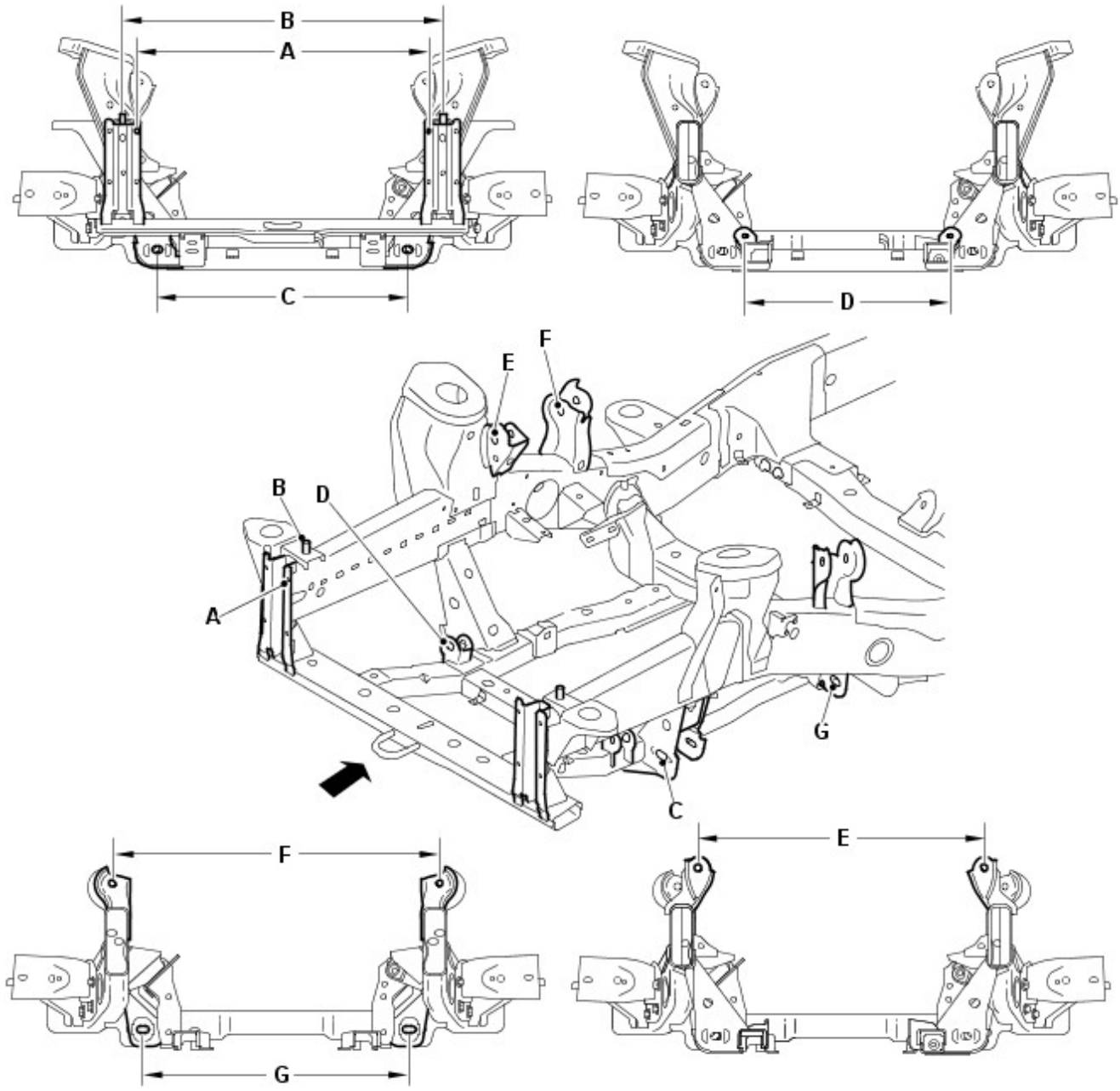
Front integral body frame dimensions



E55835

Item	From	To	Length
A	Body Mount 1 (LH front)	Damper Mounting (RH)	1063.1 (41.85)
B	Body Mount 1 (LH front)	Body Mount 2 (RH)	1609 (63.34)
C	Body Mount 1 (LH front)	Body Mount 3 (RH)	2403.3 (94.61)
D	Body Mount 2 (LH front)	Body Mount 3 (RH)	1597.7 (62.90)
E	Body Mount 1 (LH front)	Body Mount 2 (RH)	1164.63 (45.85)

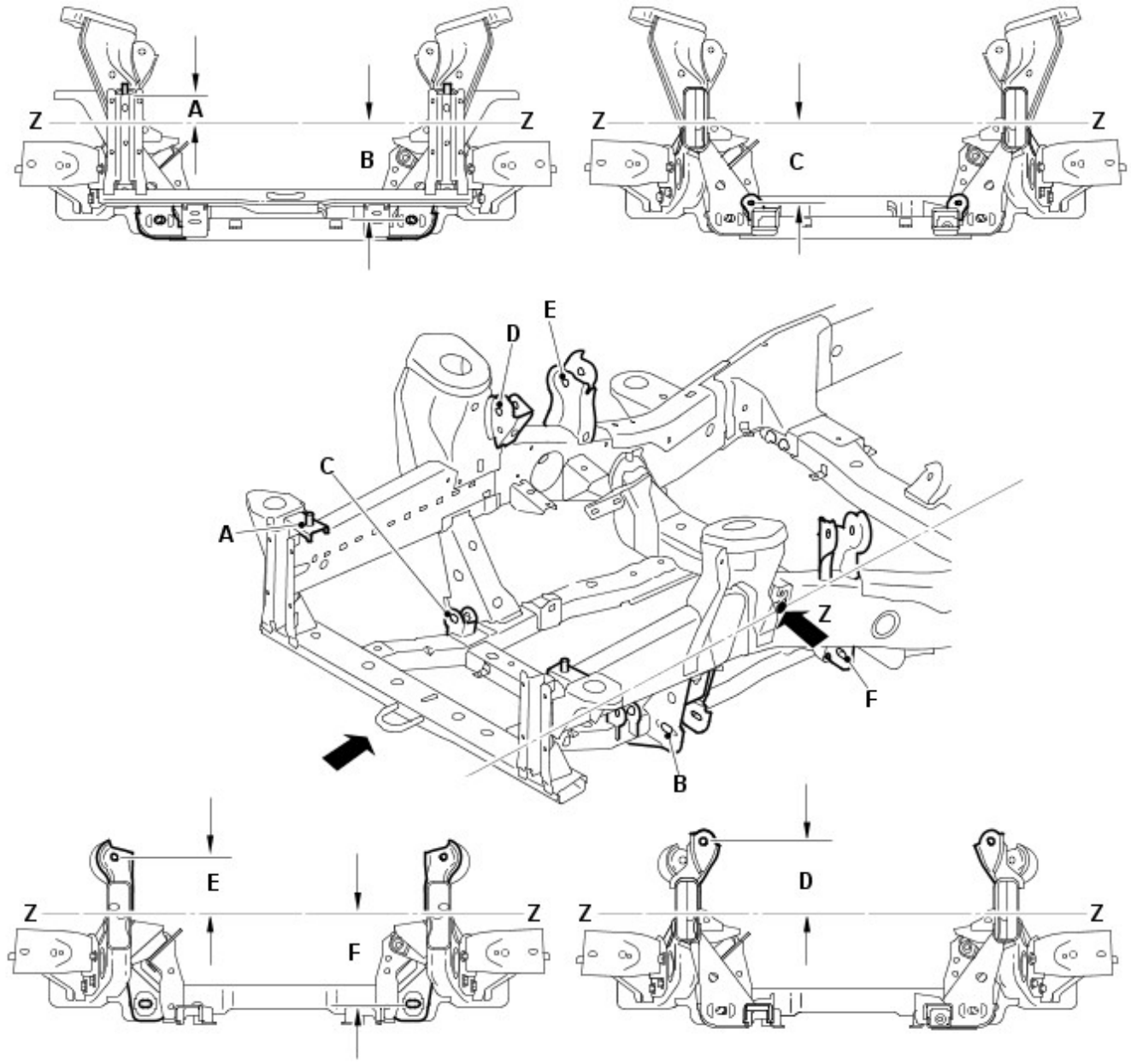
Front integral body frame dimensions



E64764

Item	From	To	Length
A	Front Bumper Mount (L/H)	Front Bumper Mount (R/H)	740 (29.13)
B	Cooling Pack Mount (LH)	Cooling Pack Mount (RH)	810 (31.8)
C	Lower Arm Front Mount (LH front)	Lower Arm Front Mount (RH front)	635.7 (25.02)
D	Steering Gear (LH)	Steering Gear (RH)	520 (20.4)
E	Upper Arm Front Mount (LH front)	Upper Arm Front Mount (RH front)	748.7 (29.47)
F	Upper Arm Rear Mount (LH front)	Upper Arm Rear Mount (RH front)	836.8 (32.9)
G	Lower Arm Rear Mount (LH front)	Lower Arm Rear Mount (RH front)	678.6 (26.71)

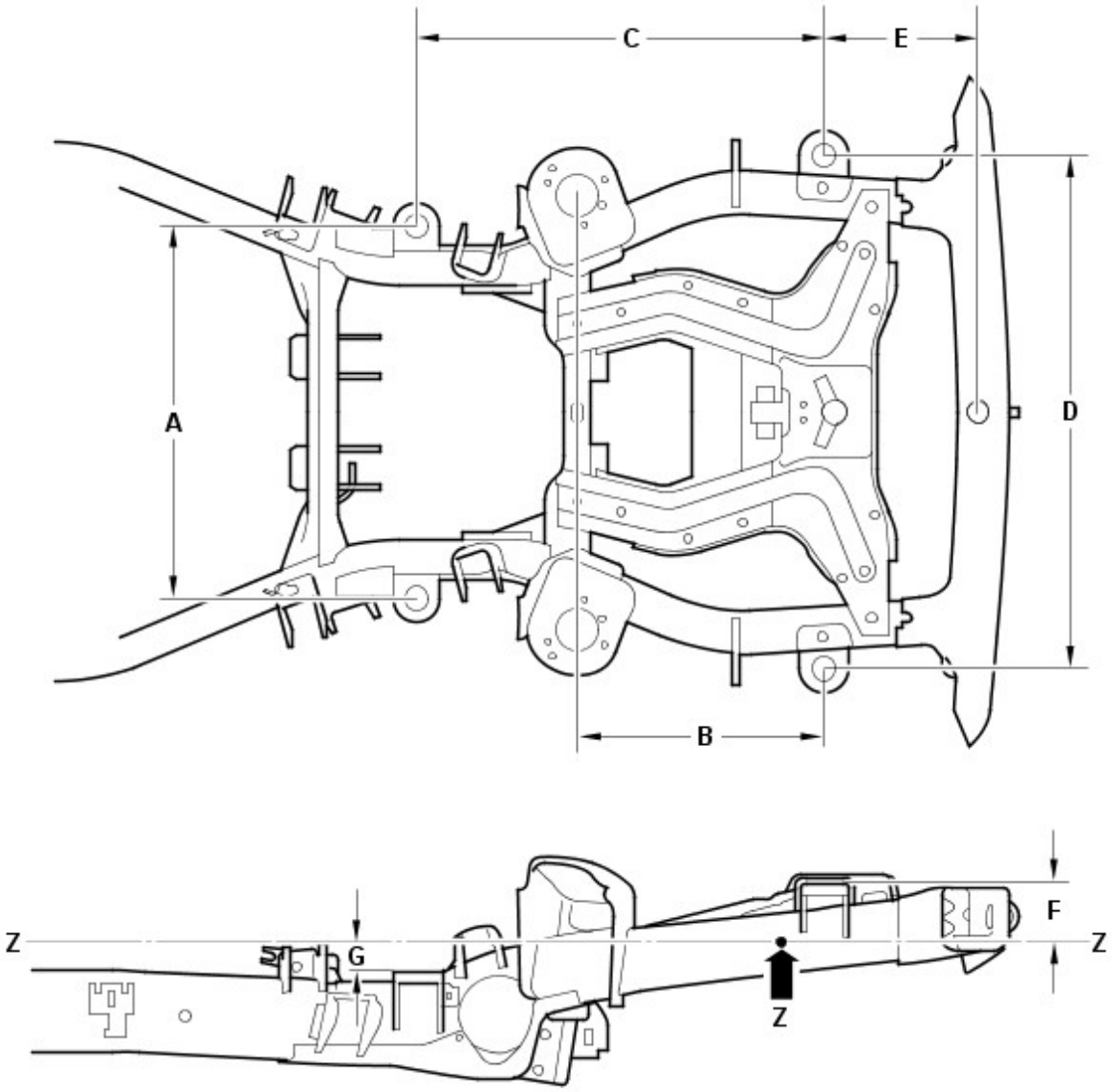
Front integral body frame dimensions



E64769

Item	From	To	Length
A	Datum Line (Z)	Cooling Pack Mount	78.8 (3.10)
B	Datum Line (Z)	Lower Arm Front Mount (front)	249.2 (9.81)
C	Datum Line (Z)	Steering Gear	209.6 (8.25)
D	Datum Line (Z)	Upper Arm Front	169.6 (6.68)
E	Datum Line (Z)	Upper Arm Rear	133.7 (5.26)
F	Datum Line (Z)	Lower Arm Rear Mount (front)	243.5 (9.58)

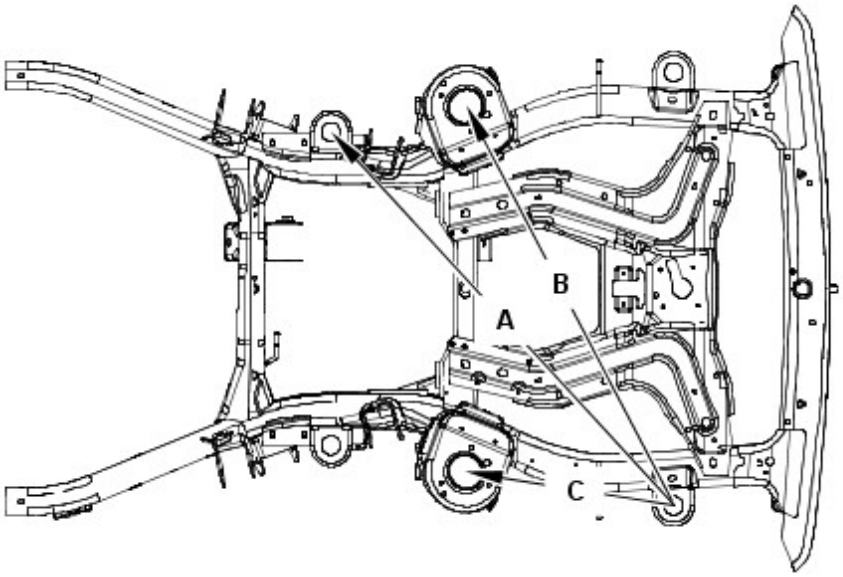
Rear integral body frame dimensions



E55834

Item	From	To	Length
A	Body Mount 4 (LH)	Body Mount 4 (RH)	806 (31.732)
B	Body Mount 5 (rear)	Damper Mounting	533.5 (21.00)
C	Body Mount 5 (rear)	Body Mount 4	882.8 (34.755)
D	Body Mount 5 (LH rear)	Body Mount 5 (RH rear)	1114 (43.858)
E	Body Mount 5 (rear)	Rear Crossmember	332 (13.07)
F	Body Mount 5	Datum line Z	127.5 (5.02)
G	Body Mount 4	Datum line Z	61.2 (2.41)

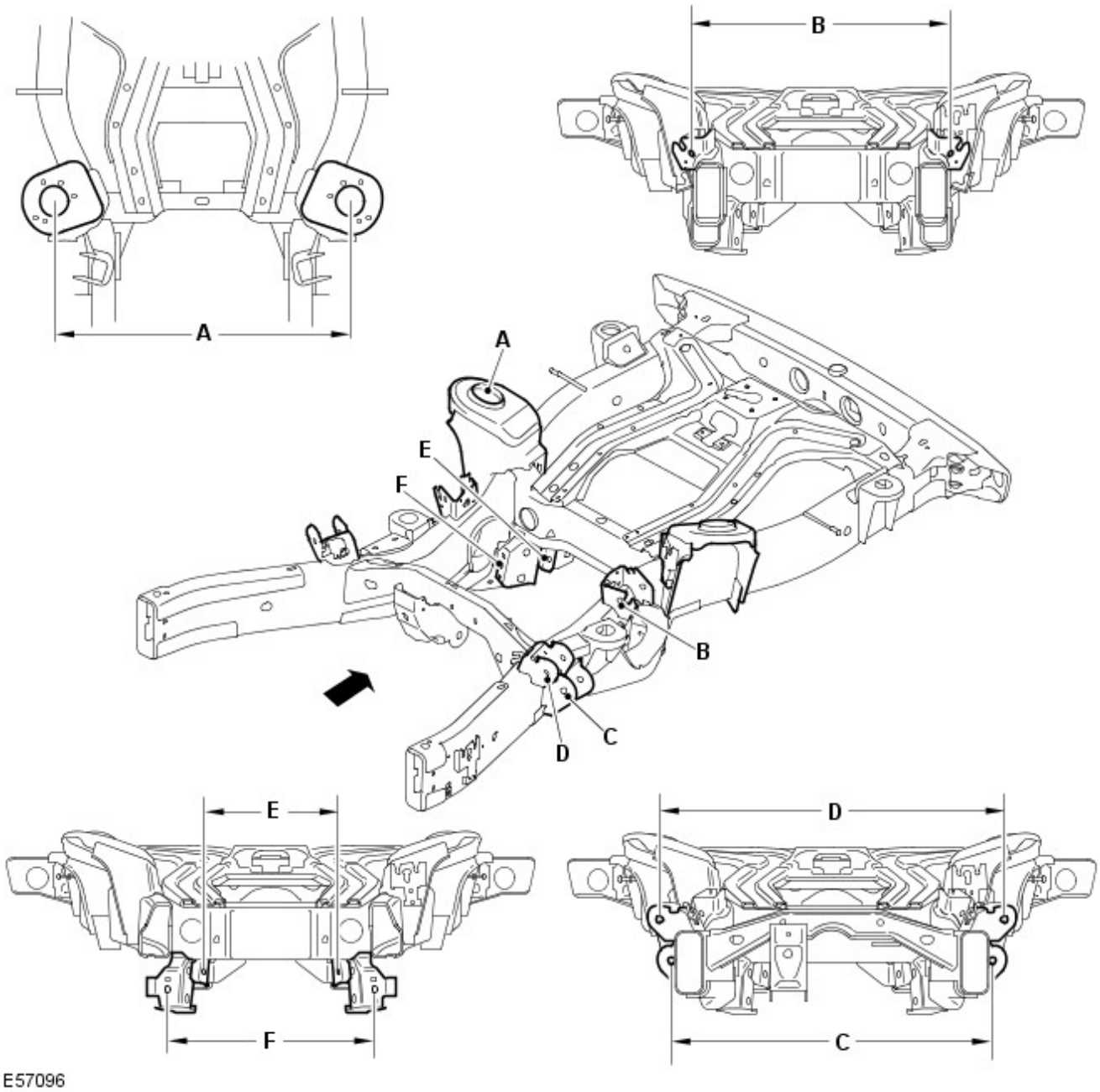
Rear integral body frame dimensions



E55833

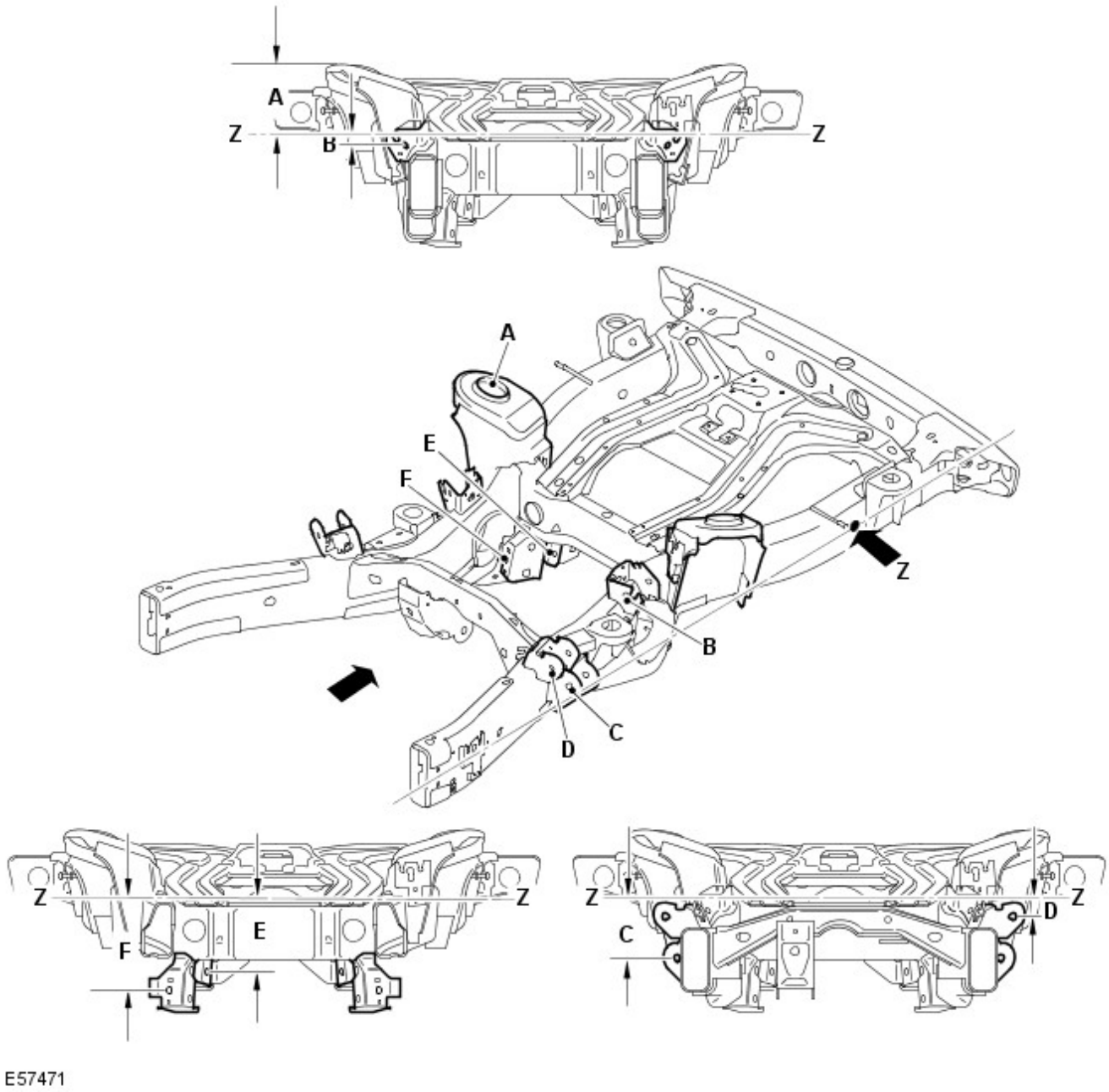
Item	From	To	Length
A	Body Mount 5 (LH rear)	Body Mount 4 (RH)	1304.2 (51.34)
B	Body Mount 5 (LH rear)	Rear Damper Mounting (RH)	1156 (45.51)
C	Body Mount 5 (LH rear)	Rear Damper Mounting (LH)	540.7 (21.29)

Rear integral body frame dimensions



Item	From	To	Length
A	Damper (LH)	Damper (RH)	937.1 (36.9)
B	Upper Arm Rear Mount (LH front)	Upper Arm Rear Mount (RH front)	757.4 (29.81)
C	Lower Arm Front Mount (LH front)	Lower Arm Front Mount (RH front)	881.6 (34.7)
D	Upper Arm Front Mount (LH front)	Upper Arm Front Mount (RH front)	946.5 (37.26)
E	Toe Link (LH)	Toe Link (RH)	339.8 (13.38)
F	Lower Arm Rear Mount (LH front)	Lower Arm Rear Mount (RH front)	564.8 (22.24)

Rear integral body frame dimensions



E57471

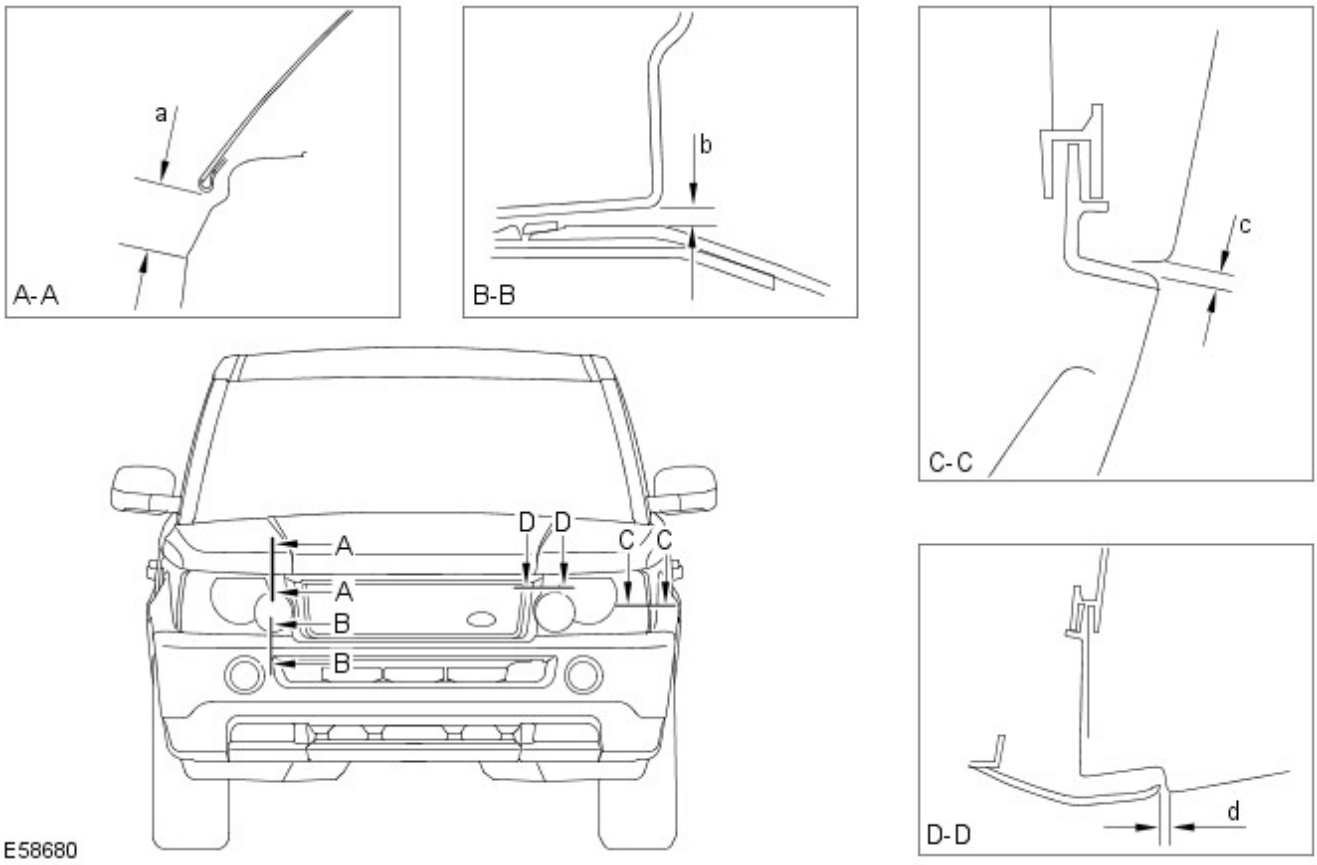
Item	From	To	Length
A	Datum Line (Z)	Damper	153 (6.02)
B	Datum Line (Z)	Upper Arm Rear Mount (front)	18.3 (0.72)
C	Datum Line (Z)	Lower Arm Front Mount (front)	162.1 (6.38)
D	Datum Line (Z)	Upper Arm Front Mount (front)	54.7 (2.15)
E	Datum Line (Z)	Toe Link	206.5 (8.13)
F	Datum Line (Z)	Lower Arm Rear Mount (front)	251.5 (9.90)

Gap and Profile Measurements

The following information is to be used as a guide to assist the technician in installing exterior body panels and trim items so as to achieve a correctly aligned and cosmetically acceptable vehicle.

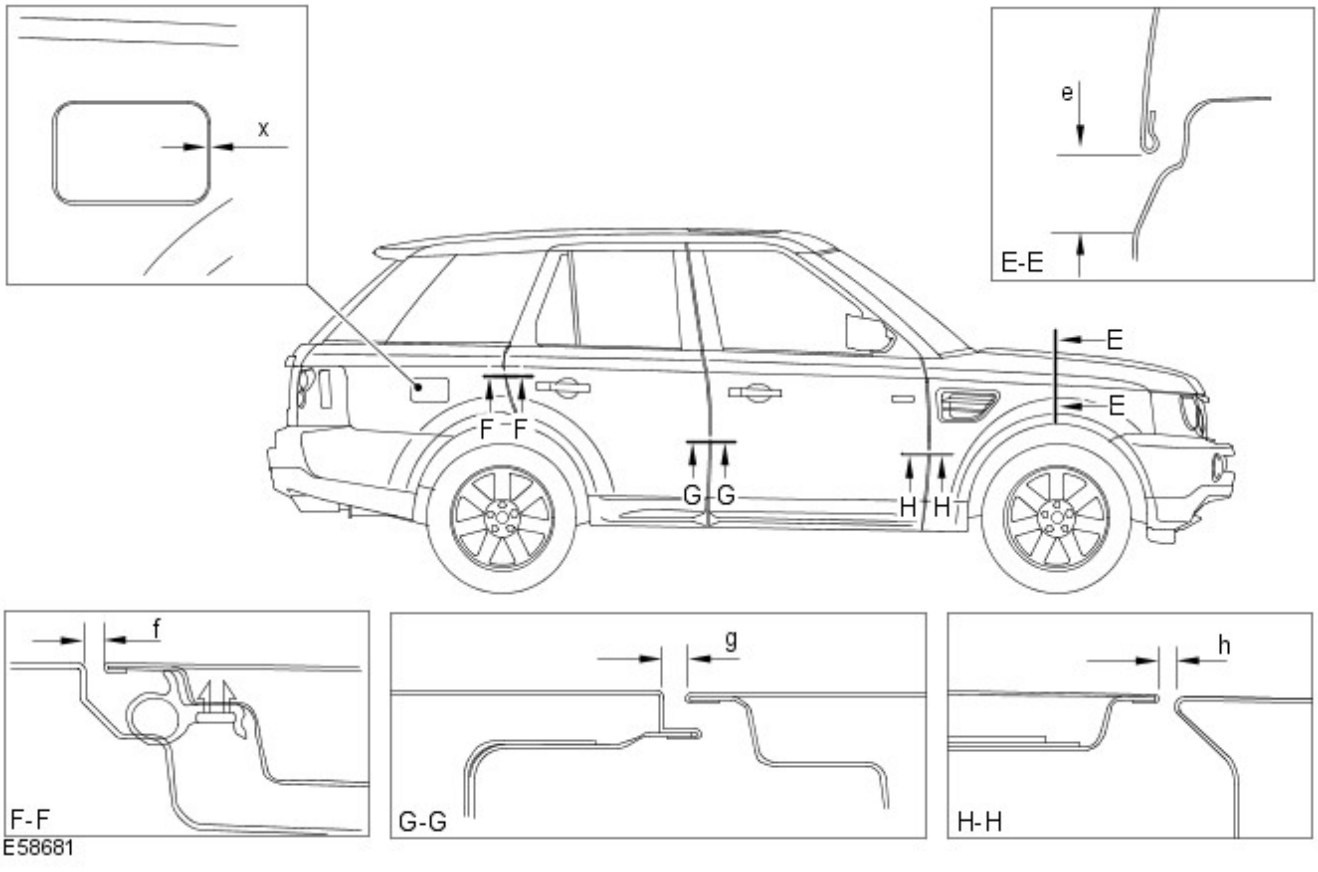
Measurements shown are in millimetres and inches. The measurements shown in brackets are in inches.

Front view dimensions



Section	Description	Gap	Profile
A-A	Headlamp to Hood	22.0 (0.866) ± 1.4 (0.055)	N/A
B-B	Headlamp to Bumper	5.0 (0.197) ± 1.8 (0.070)	N/A
C-C	Headlamp to Fender	3.0 (0.118) ± 1.2 (0.0472)	0.0 ± 1.2 (0.047)
D-D	Headlamp to Grille	4.0 (0.157) ± 1.2 (0.0472)	0.0 ± 1.0 (0.039)

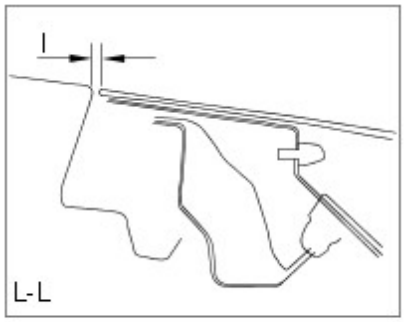
Side view dimensions

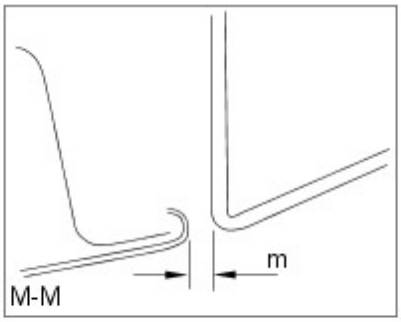


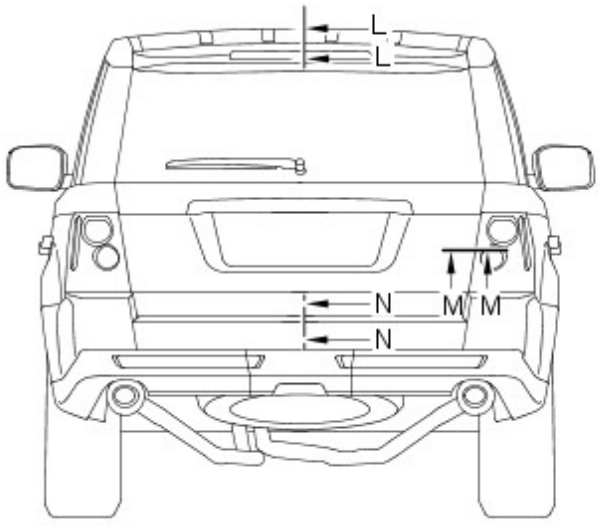
Section	Description	Gap	Profile
E-E	Hood to Fender	22.0 (0.866) ± 1.4 (0.055)	+ 1.0 (0.039)

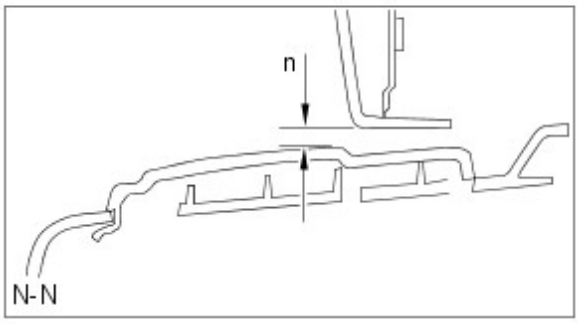
F-F	Rear Door to Bodyside	5.0 (0.196) ± 1.0 (0.039)	0.0 + 0.0 - 1.0 (0.039)
G-G	Front Door to Rear Door	5.0 (0.196) ± 1.0 (0.039)	0.0 + 0.0 - 1.4 (0.055)
H-H	Front Fender to Front Door	5.0 (0.196) ± 1.0 (0.039)	0.0 + 0.0 - 1.0 (0.039)
X-X	Fuel Filler Flap to Bodyside	2.9 (0.114) ± 1.0 (0.039)	1.0 (0.039) ± 1.0 (0.039)

Rear view dimensions









Section	Description	Gap	Profile
L-L	Roof to Spoiler	10.0 (0.393) ± 1.0 (0.039)	2.0 (0.079) ± 1.5 (0.059)
M-M	Liftgate to Rear Lamp	5.0 (0.196) ± 1.4 (0.055)	1.5 (0.059) ± 1.2 (0.047)
N-N	Liftgate to Bumper	7.0 (0.276) ± 2.0 (0.079)	N/A

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Front End Sheet Metal Repairs -

Torque Specifications

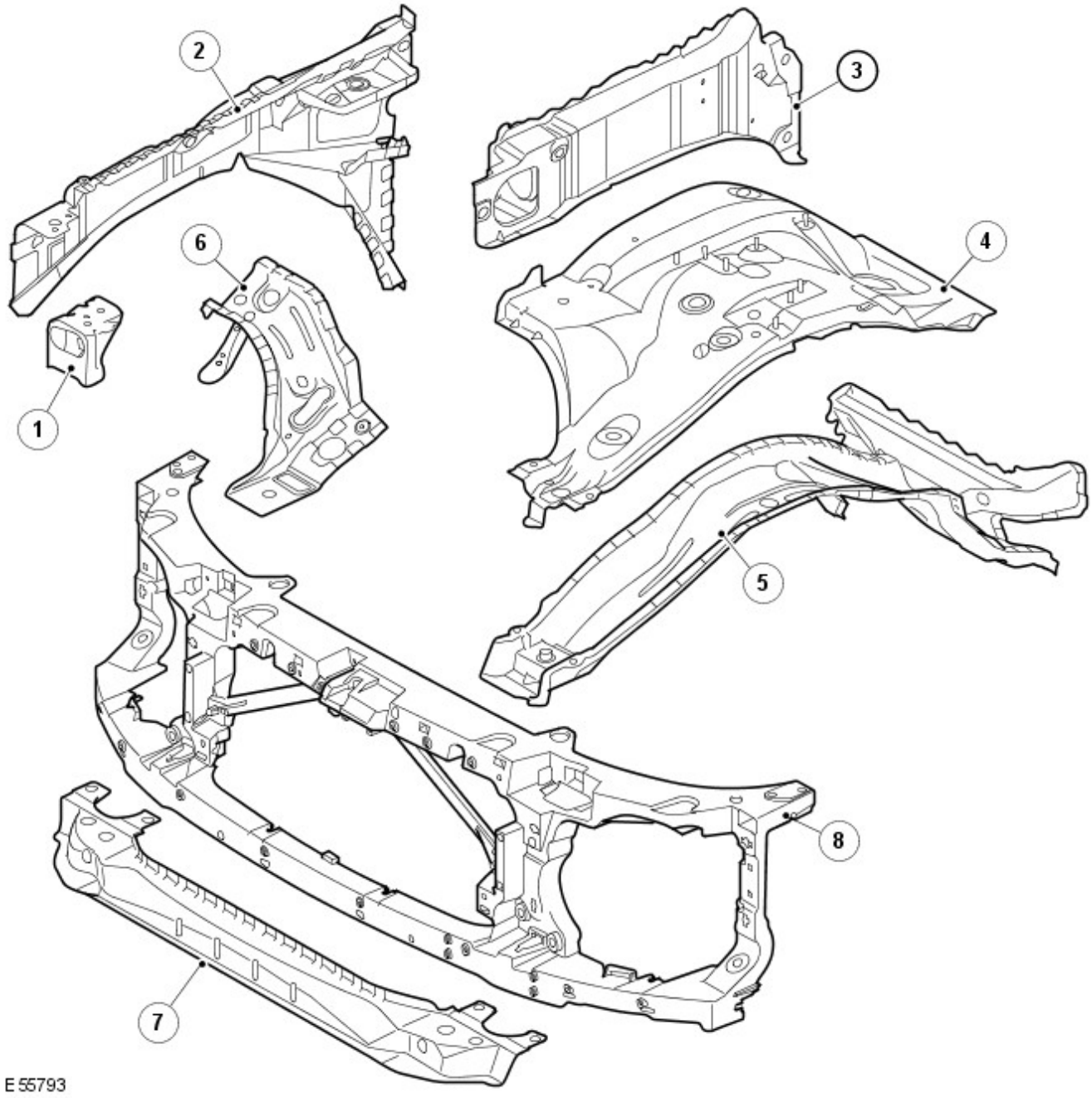
Description	Nm	lb-ft
Air deflector bolts	10	7
Hood latch Torx bolts	10	7
Hood panel bolts	25	18
Coolant expansion tank bolts	10	7
Speed control sensor bolts	10	7
ABS module mounting bracket to body nuts	23	17

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Front End Sheet Metal Repairs - Front End Sheet Metal

Description and Operation

Front end panels



Item	Description
1	Fender opening panel closing panel
2	Fender apron panel reinforcement
3	Fender apron panel
4	Front wheelhouse
5	Front side member
6	Front wheelhouse reinforcement
7	Front crossmember
8	Hood latch panel

Time schedules, front end

The following information shows the total time taken to replace single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim (MET) items, plus paint times based on Metallic Clear Over Base Paint.

The times shown were generated by Thatcham (the motor insurance repair and research centre) and are to be used as a guide only.

Single panel times

Panel Description	Total Time
Hood	8.0
Hood latch panel	2.9
Front fender	7.7

Combination panel replacement times

The following panel combination times show the total time to remove/refit body panels, MET items and any paint process.

Combination panel times

Panel Description	Petrol	Diesel
Hood		
Front bumper		
Hood latch panel		
Front crossmember		
Front grille		
Front fender		
Total Time	**18.1**	**18.1**

Combination panel times

Panel Description	Petrol	Diesel
Hood		
Front bumper		
Hood latch panel		
Front crossmember		
Front grille		
Front fender L/H and R/H		
Total Time	**18.5**	**18.5**

Combination panel times

Panel Description	Petrol	Diesel
Body off integrated frame		
Instrument panel		
Hood		
Front bumper		
Hood latch panel		
Front grille		
Front fender		
Front crossmember		
Front wheelhouse		
Front side member		
Fender apron panel		
Fender apron panel reinforcement		
Total Time	**L/H 40.1 R/H 39.1**	**L/H 40.2 R/H 40.1**

Combination panel times

Panel Description	Petrol	Diesel
Body off integrated frame		
Instrument panel		
Hood		
Front bumper		
Hood latch panel		
Front grille		
Front fender L/H and R/H		
Front crossmember		
Front wheelhouse L/H and R/H		
Front side member L/H and R/H		
Fender apron panel L/H and R/H		
Fender apron panel reinforcement L/H and R/H		
Total Time	**49.6**	**49.7**

Combination panel times

Panel Description	Petrol	Diesel
Body off integrated frame		
Hood		
Front bumper		
Hood latch panel		
Front side member		
Front grille		
Front fender		
Front crossmember		
Front wheelhouse section		
Fender apron panel reinforcement front section		
Fender apron panel front section		

Total Time	L/H 37.7 R/H 37.4	L/H 37.8 R/H 37.5

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Front End Sheet Metal Repairs - Hood Latch Panel

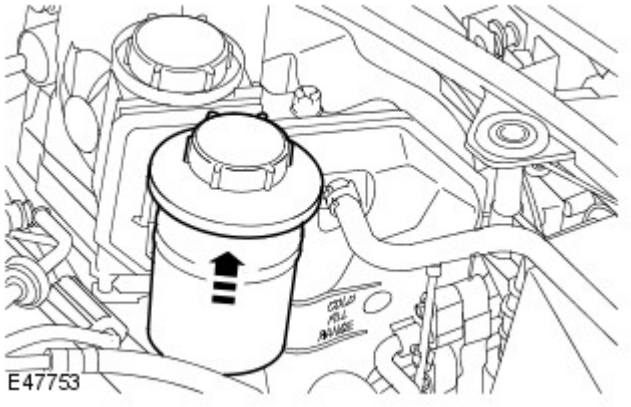
Removal and Installation

Removal

NOTE: If the hood latch panel coating is damaged or scratched, it must be repaired using the approved coating.
For additional information, refer to: Specifications (501-27 Front End Sheet Metal Repairs, Specifications).

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

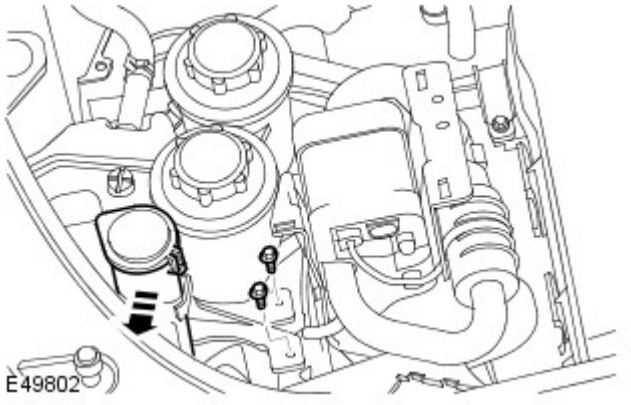
2. Remove the front bumper cover.
   For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).



3. Release the power steering fluid reservoir and position aside.
   - Release the clip.

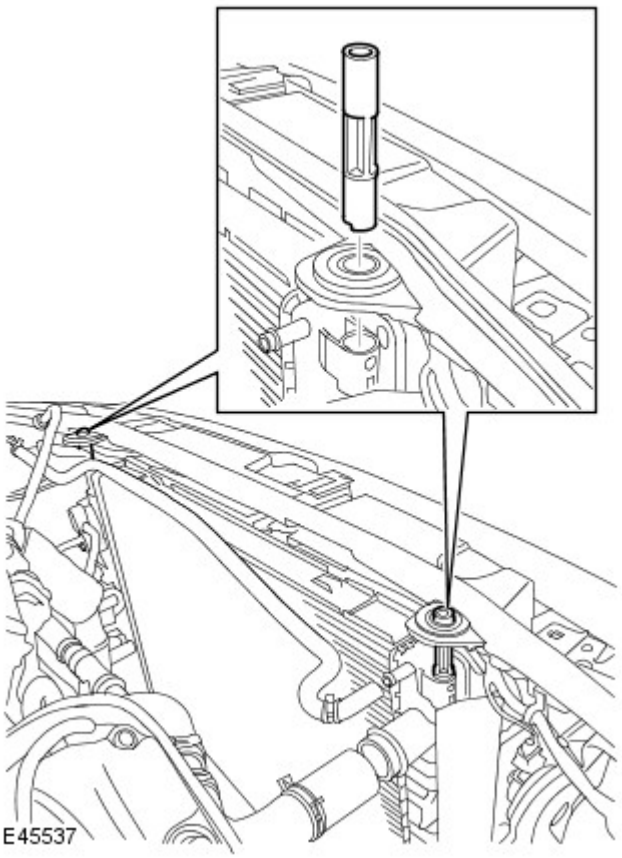
4. Release the washer reservoir filler neck from the coolant tank clip.

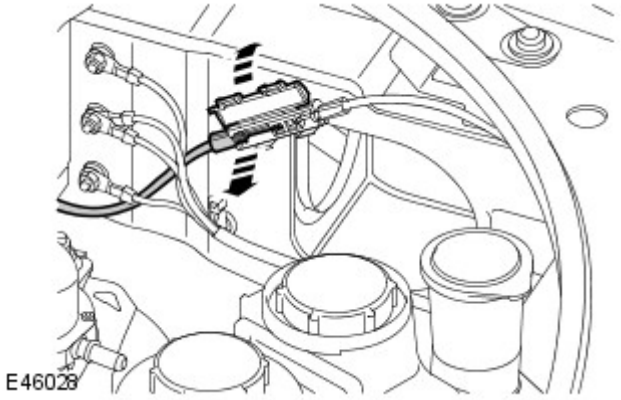
5. Remove the 2 coolant expansion tank mounting bolts.



6. Release the coolant expansion tank.
   - Lift coolant expansion tank vertically.

7. Remove the radiator securing pegs.

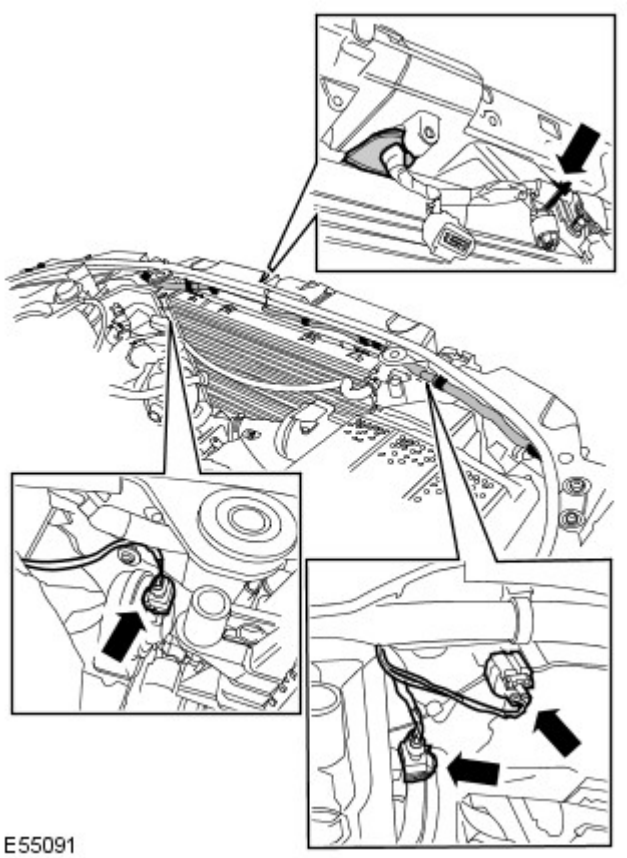




8. Disconnect the hood release cable from the connecting box.

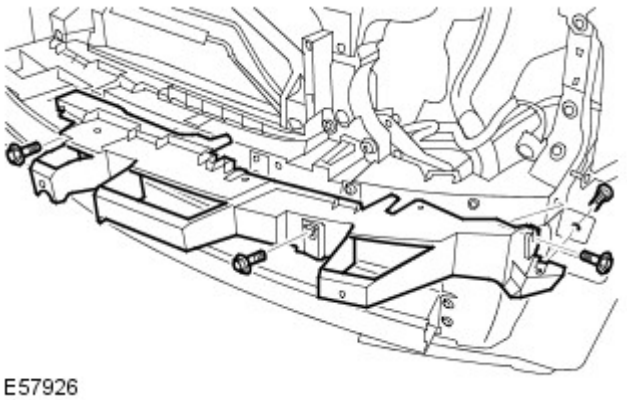
9. NOTE: Note the fitted position.

   Release the wiring harness.
   - Disconnect the 3 electrical connectors.
   - Release the 9 clips.
   - Release the grommet.
   - Carefully tie the harness aside.



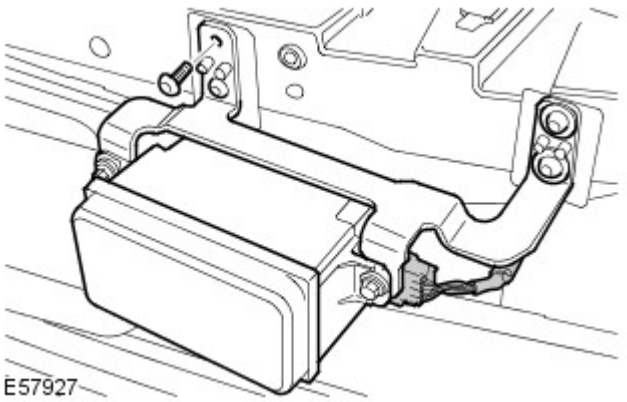
E55091

10. Remove the LH bumper support bracket.
    - Remove the 3 Torx screws.
    - Remove the screw.
    - Repeat the above procedure for the other side.



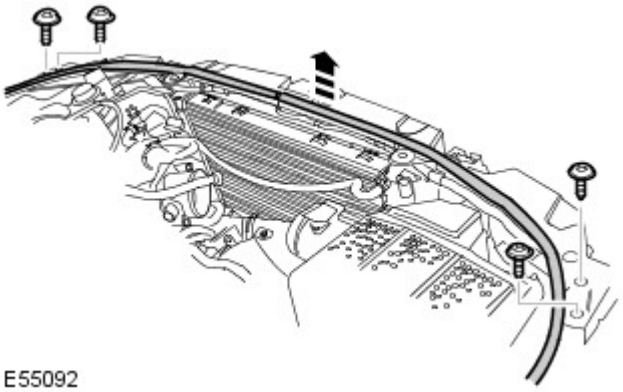
E57926

11. Remove the speed control sensor.
    - Remove the 4 Torx bolts.
    - Disconnect the electrical connector.



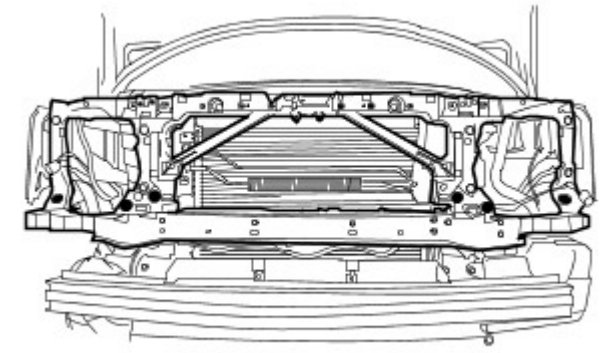
E57927

12. Remove the panel upper fixings.
    - Release the hood seal.
    - Remove the 4 Torx bolts.



E55092

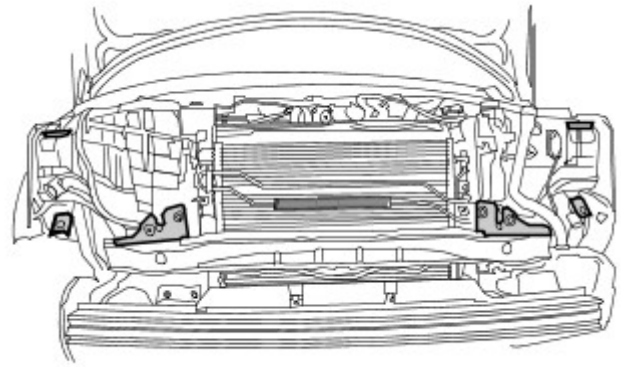
13. Remove the panel lower fixings.
    - Remove the 6 Torx bolts.



E55093

14. With assistance, remove the hood latch panel.

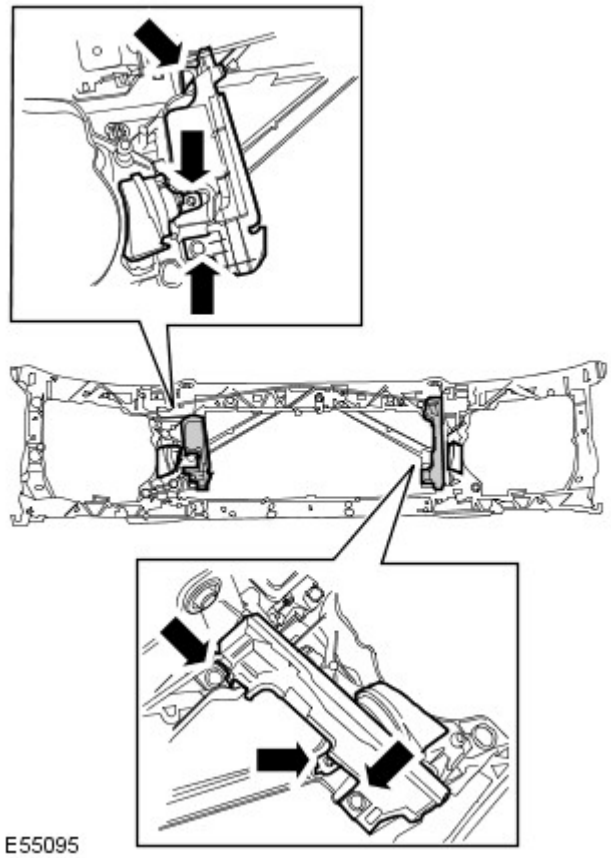
15. Noting the fitted position, remove the 6 spacers.
    - Remove the 2 clips.



E55094

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

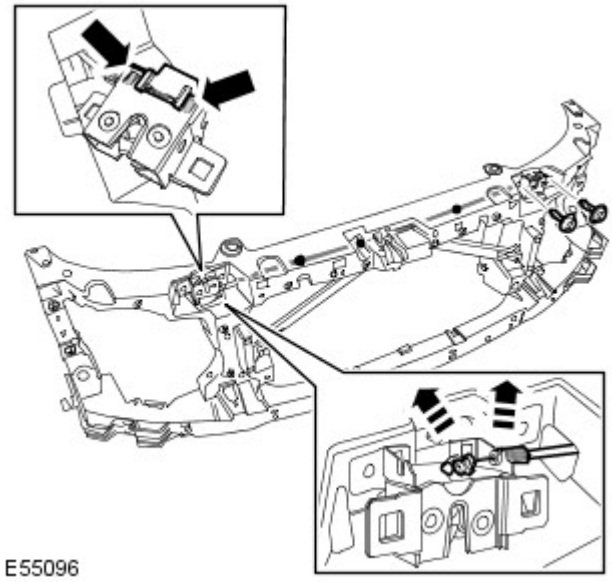
    Remove the 2 horn assemblies.
    - Remove the 2 air deflectors.
    - Remove the 2 Torx bolts.


E55095

17. Remove the hood switch.
    - Remove the 2 Torx bolts.
    - Release the 2 clips.

18. Remove the RH hood latch.
    - Release and remove the cable.

19. Remove the LH hood latch.
    - Remove the 2 Torx bolts.


E55096

Installation

1. Install the horn assemblies.
    - Install the air deflectors.
    - Install the bolts and tighten to 10 Nm (7 lb.ft).

2. Install the LH hood latch.
    - Tighten the Torx bolts to 10 Nm (7 lb.ft).

3. Install the RH hood latch.
    - Attach the hood release cable.
    - Install the hood switch.
    - Tighten the Torx bolts to 10 Nm (7 lb.ft).

4. Install the spacers.
    - Install the clips.

5.  NOTE: Align to the position noted on removal.

   With assistance, install the hood latch panel.

6. Install the panel fixings.
    - Install and tighten the bolts to 25 Nm (18 lb.ft).
    - Install the hood seal.

7. Install the wiring harness.
    - Secure the 6 clips.
    - Connect and secure the electrical connector.

8. Install the speed control sensor.
    - Evenly and progressively tighten the bolts to 10 Nm (7 lb.ft).
    - Connect and secure the electrical connector.

9. Install the bumper support bracket.
    - Tighten the screws.
    - Repeat the above procedure for the other side.

10. Install the hood release cable.
    - Secure in the 3 clips.

11. Install the radiator securing pegs.

12. Install the coolant expansion tank.
    - Position the coolant expansion tank, locate the spigot and lug.
    - Install the bolts and tighten to 10 Nm (7 lb.ft).

13. Install the windshield washer reservoir filler neck.
    - Locate in clip.

14. Install the power steering fluid reservoir.
    - Position and secure to mounting bracket.

15. Install the front bumper cover.
    For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).

16. Open and close the hood to check the hood latch operation.

17. Adjust both of the hood latches.
    - Loosen the 4 hood latch Torx bolts.
    - Lower the hood and check for alignment.
    - Open the hood and tighten the Torx bolts to 10 Nm (7 lb.ft).
    - Check for the correct operation of the hood safety catch.
    - If necessary, repeat the above adjustment procedure.

18. Connect the battery ground cable.
    For additional information, refer to: Battery Disconnect (414-01, General Procedures).

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Front End Sheet Metal Repairs - Front Crossmember

Removal and Installation

Removal

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).

3. Remove the radiator. For additional information, refer to:
   Radiator (303-03A Engine Cooling - 4.2L, Removal and Installation),
   Radiator (303-03B Engine Cooling - 4.4L, Removal and Installation),
   Radiator (303-03C Engine Cooling - 2.7L (TdV6) Diesel, Removal and Installation).

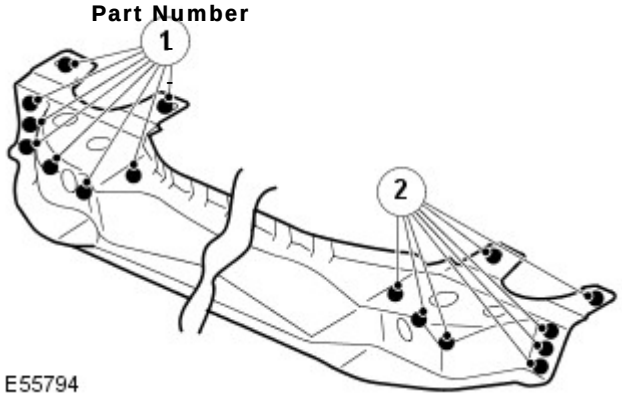
4. Remove both front impact severity sensors.
   For additional information, refer to: Front Impact Severity Sensor (501-20B Supplemental Restraint System, Removal and Installation).

5. Release the wiring harness from the crossmember.

6. Remove the fender moulding.

7.

Part Number	Item	Description
	1	8 spot welds.
	2	8 spot welds.



8. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Front Side Member

Removal and Installation

Removal

NOTES:

This procedure requires the body to be removed from the integrated body frame.

In this procedure the front side member is replaced in conjunction with the hood latch panel, front wheelhouse and front crossmember.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the body from the integrated body frame.
3. L/H side: Remove the battery.
4. Remove the front crossmember.
   For additional information, refer to: Front Crossmember (501-27 Front End Sheet Metal Repairs, Removal and Installation).
5. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).
6. Remove the hood pad.
7. Remove the hood wiring harness.
8. Remove the hood.
9. Remove both hood support struts.
10. L/H side: Remove the power steering fluid reservoir. For additional information, refer to: (211-02 Power Steering)
    - Power Steering Fluid Reservoir - 2.7L Diesel (Removal and Installation),
    - Power Steering Fluid Reservoir - 4.2L/4.4L (Removal and Installation).
11. R/H side: Remove the air cleaner. For additional information, refer to:
    - Air Cleaner (303-12C Intake Air Distribution and Filtering - 2.7L (TdV6) Diesel, Removal and Installation),
    - Air Cleaner (303-12A Intake Air Distribution and Filtering - 4.2L, Removal and Installation),
    - Air Cleaner (303-12B Intake Air Distribution and Filtering - 4.4L, Removal and Installation).
12. Remove the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).
13. Remove the instrument panel. For additional information, refer to: (501-12 Instrument Panel and Console)
    - Instrument Panel - 2.7L (TdV6) Diesel (Removal and Installation),
    - Instrument Panel - 4.2L (Removal and Installation),
    - Instrument Panel - 4.4L (Removal and Installation).
14. Remove the front brake pipe.
15. Remove the insulation from the inner and outer bulkhead.
16. R/H side: Release the ABS modulator.
17. R/H side: Remove the accelerator pedal. For additional information, refer to:
    - Accelerator Pedal (310-02C Acceleration Control - 2.7L (TdV6) Diesel, Removal and Installation),

Accelerator Pedal (310-02A Acceleration Control - 4.2L, Removal and Installation),
Accelerator Pedal (310-02B Acceleration Control - 4.4L, Removal and Installation).

18. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
    Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation),
    Battery Junction Box (BJB) - 4.2L (Removal and Installation),
    Battery Junction Box (BJB) - 4.4L (Removal and Installation).

19. Release the wiring harness from the bulkhead.

20. Release the wiring harness from the fender apron panel reinforcement.

21. Release the wiring harness from the side member.

22. L/H side: Remove the fuel fired booster heater.
    For additional information, refer to: Fuel Fired Booster Heater (412-02B Auxiliary Heating, Removal and Installation).

23. Remove the scuff plate trim panel.
    For additional information, refer to: Scuff Plate Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

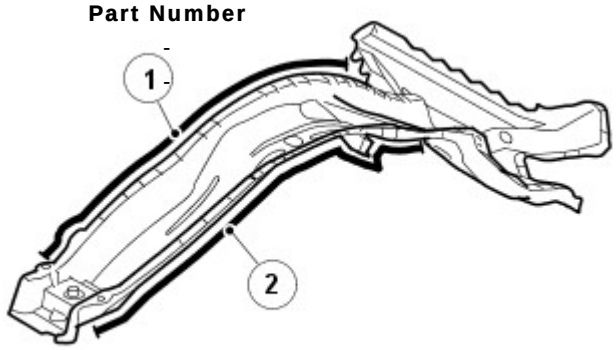
24. Remove the footrest.

25. Remove the cowl side trim panel.
    For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

26. Release the front carpet.

27.

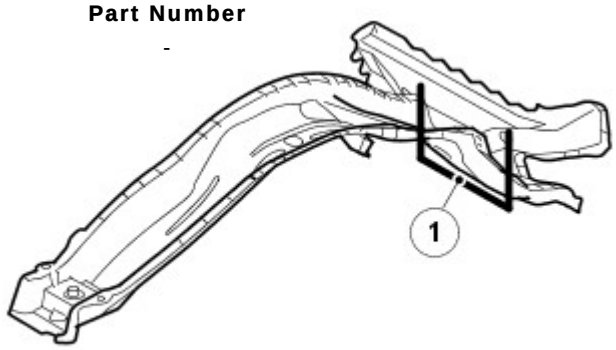
Part Number	Item	Description
-	1	18 spot welds.
	2	16 spot welds.



E55830

28.

Part Number	Item	Description
-	1	Butt weld and 6 plug welds.



E56906

29. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and

Operation).
- Corrosion protection.
  For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
- Tolerance checks.
  For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Front Side Member Section

Removal and Installation

Removal

NOTES:

This procedure requires the body to be removed from the integrated body frame.

In this procedure the front side member section is replaced in conjunction with the hood latch panel, front wheelhouse and front crossmember.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the body from the integrated body frame.
3. L/H side: Remove the battery.
4. Remove the crossmember.
   For additional information, refer to: Front Crossmember (501-27 Front End Sheet Metal Repairs, Removal and Installation).
5. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).
6. Remove the hood pad.
7. Remove the hood wiring harness.
8. Remove the hood.
9. Remove the hood support struts.
10. L/H side: Remove the power steering fluid reservoir. For additional information, refer to: (211-02 Power Steering)
    Power Steering Fluid Reservoir - 2.7L Diesel (Removal and Installation),
    Power Steering Fluid Reservoir - 4.2L/4.4L (Removal and Installation).
11. R/H side: Remove the air cleaner. For additional information, refer to:
    Air Cleaner (303-12C Intake Air Distribution and Filtering - 2.7L (TdV6) Diesel, Removal and Installation),
    Air Cleaner (303-12A Intake Air Distribution and Filtering - 4.2L, Removal and Installation),
    Air Cleaner (303-12B Intake Air Distribution and Filtering - 4.4L, Removal and Installation).
12. Remove the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).
13. Remove the instrument panel. For additional information, refer to: (501-12 Instrument Panel and Console)
    Instrument Panel - 2.7L (TdV6) Diesel (Removal and Installation),
    Instrument Panel - 4.2L (Removal and Installation),
    Instrument Panel - 4.4L (Removal and Installation).
14. Remove the front brake pipe.
15. Remove the insulation from the inner and outer bulkhead.
16. R/H side: Release the ABS modulator.
17. R/H side: Remove the accelerator pedal. For additional information, refer to:
    Accelerator Pedal (310-02C Acceleration Control - 2.7L (TdV6) Diesel, Removal and Installation),

Accelerator Pedal (310-02A Acceleration Control - 4.2L, Removal and Installation),
Accelerator Pedal (310-02B Acceleration Control - 4.4L, Removal and Installation).

18. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
    Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation),
    Battery Junction Box (BJB) - 4.2L (Removal and Installation),
    Battery Junction Box (BJB) - 4.4L (Removal and Installation).

19. Release the wiring harness from the bulkhead.

20. Release the wiring harness from the fender apron panel reinforcement.

21. Release the wiring harness from the side member.

22. L/H side: Remove the fuel fired booster heater.
    For additional information, refer to: Fuel Fired Booster Heater (412-02B Auxiliary Heating, Removal and Installation).

23. Remove the scuff plate trim panel.
    For additional information, refer to: Scuff Plate Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

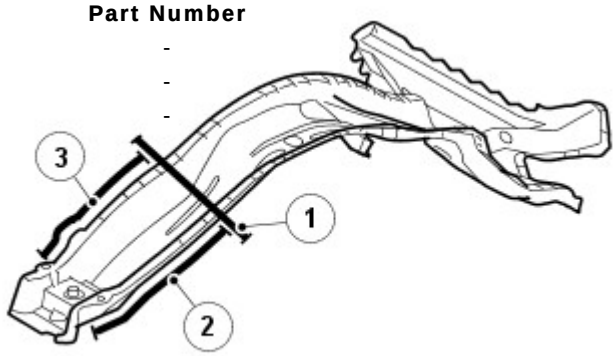
24. Remove the footrest.

25. Remove the cowl side trim panel.
    For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

26. Release the front carpet.

27.

Part Number	Item	Description
-	1	Butt weld.
-	2	7 spot welds.
-	3	8 spot welds.



E55831

28. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Fender Apron Panel Reinforcement

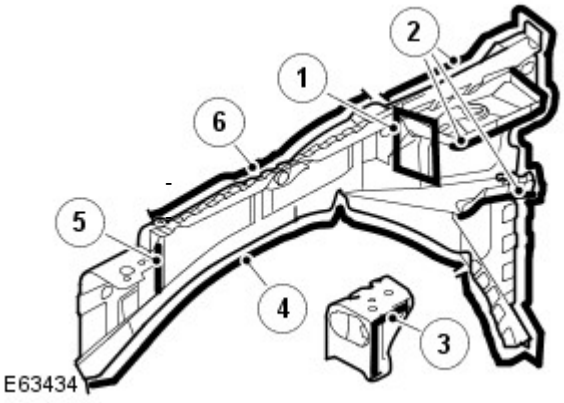
Removal and Installation

Removal

NOTE: In this procedure the fender apron panel reinforcement is replaced in conjunction with the fender apron panel closing.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the front fender.
   For additional information, refer to: Fender (501-02, Removal and Installation).
3. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27, Removal and Installation).
4. L/H side: Remove the battery junction box. For additional information, refer to: (418-00)
   - Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation),
   - Battery Junction Box (BJB) - 4.2L (Removal and Installation),
   - Battery Junction Box (BJB) - 4.4L (Removal and Installation).
5. L/H side: Remove the power steering fluid reservoir. For additional information, refer to: (211-02)
   - Power Steering Fluid Reservoir - 2.7L Diesel (Removal and Installation),
   - Power Steering Fluid Reservoir - 4.2L/4.4L (Removal and Installation).
6. L/H side: Remove the battery.
7. L/H side: Remove the fuel fired booster heater.
   For additional information, refer to: Fuel Fired Booster Heater (412-02B, Removal and Installation).
8. L/H side: Remove the fuel fired booster heater pipes.
9. R/H side: Remove the air cleaner. For additional information, refer to:
   - Air Cleaner (303-12A, Removal and Installation),
   - Air Cleaner (303-12B, Removal and Installation),
   - Air Cleaner (303-12C, Removal and Installation).
10. R/H side: Release the ABS modulator.
11. Remove the wiring harness.
12. Remove the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01, Removal and Installation).
13. Remove the hood pad.
14. Remove the hood wiring harness.
15. Remove the hood.
16. Remove both hood support struts.
17.

Part Number	Item	Description
-	1	Acoustic seal.
-	2	34 plug welds.
-	3	5 plug welds.
-	4	13 spot welds.



-	5	3 spot welds.
	6	14 spot welds.

18. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Fender Apron Panel

Removal and Installation

Removal

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the front fender.
   For additional information, refer to: Fender (501-02 Front End Body Panels, Removal and Installation).

3. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).

4. Remove the radiator.
   For additional information, refer to: Radiator (303-03C Engine Cooling - 2.7L (TdV6) Diesel, Removal and Installation).

5. Remove the radiator coolant expansion tank.
   For additional information, refer to: Coolant Expansion Tank (303-03C Engine Cooling - 2.7L (TdV6) Diesel, Removal and Installation).

6. L/H side: Remove the power steering fluid reservoir. For additional information, refer to: (211-02 Power Steering)
   - Power Steering Fluid Reservoir - 4.2L/4.4L (Removal and Installation),
   - Power Steering Fluid Reservoir - 2.7L Diesel (Removal and Installation).

7. Remove the hood.

8. Remove both hood support struts.

9. Remove the hood wiring harness.

10. Remove both wiper arms and blades.

11. Remove the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).

12. L/H side: Remove the battery.

13. Remove the battery wiring harness.

14. R/H side: Release the ABS modulator.

15. Remove the air cleaner.
    For additional information, refer to: Air Cleaner (303-12A Intake Air Distribution and Filtering - 4.2L, Removal and Installation).

16. Remove the insulation from the outer bulkhead.

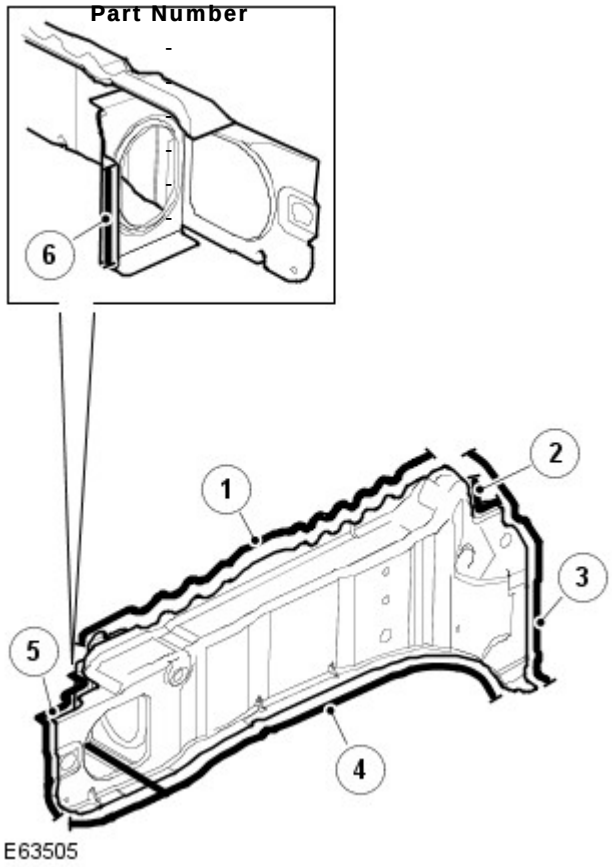
17. L/H side: Remove the fuel fired booster heater.
    For additional information, refer to: Fuel Fired Booster Heater (412-02B Auxiliary Heating, Removal and Installation).

18. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
    - Battery Junction Box (BJB) - 4.2L (Removal and Installation),
    - Battery Junction Box (BJB) - 4.4L (Removal and Installation),
    - Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation).

19. Remove the front wheelhouse wiring harness.

20.

Part Number	Item	Description
-	1	14 spot welds.
-	2	2 mig welds.
-	3	11 plug welds
-	4	19 plug welds.
-	5	5 plug welds.
-	6	3 spot welds



21. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Front End Sheet Metal Repairs - Fender Apron Panel Section

Removal and Installation

Removal

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the front fender.
   For additional information, refer to: Fender (501-02 Front End Body Panels, Removal and Installation).

3. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).

4. Remove the radiator coolant expansion tank. For additional information, refer to:
   Coolant Expansion Tank (303-03A Engine Cooling - 4.2L, Removal and Installation),
   Coolant Expansion Tank (303-03B Engine Cooling - 4.4L, Removal and Installation),
   Coolant Expansion Tank (303-03C Engine Cooling - 2.7L (TdV6) Diesel, Removal and Installation).

5. L/H side: Remove the power steering fluid reservoir. For additional information, refer to:
   Power Steering Fluid Reservoir - 2.7L Diesel (211-02 Power Steering, Removal and Installation),
   Power Steering Fluid Reservoir - 4.2L/4.4L (211-02, Removal and Installation).

6. Remove the air cleaner. For additional information, refer to:
   Air Cleaner (303-12A Intake Air Distribution and Filtering - 4.2L, Removal and Installation),
   Air Cleaner (303-12B Intake Air Distribution and Filtering - 4.4L, Removal and Installation),
   Air Cleaner (303-12C Intake Air Distribution and Filtering - 2.7L (TdV6) Diesel, Removal and Installation).

7. Remove the plenum chamber panel.
   For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).

8. Remove the hood pad.

9. Remove the hood wiring harness.

10. Remove the hood.

11. Remove both hood support struts.

12. L/H side: Remove the battery.

13. Remove the Wiring harness.

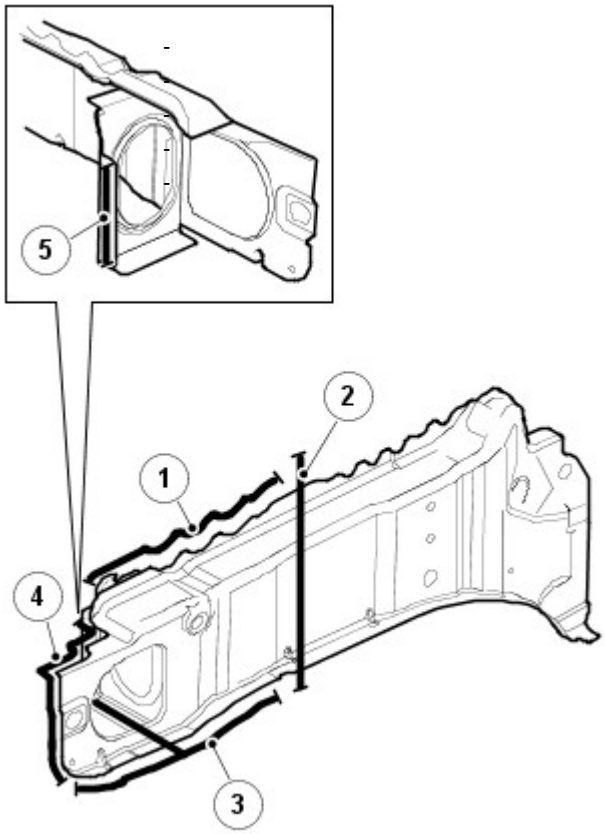
14. R/H side: Release the ABS modulator.

15. L/H side: Remove the fuel fired booster heater.
    For additional information, refer to: Fuel Fired Booster Heater (412-02B Auxiliary Heating, Removal and Installation).

16. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
    Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation),
    Battery Junction Box (BJB) - 4.2L (Removal and Installation),
    Battery Junction Box (BJB) - 4.4L (Removal and Installation).

17.

Part Number	Item	Description



E63435

1	5 spot-welds.
2	Butt weld.
3	9 mig-plug welds.
4	5 mig-plug welds.
5	3 spot-welds.

18. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Front Wheelhouse

Removal and Installation

Removal

NOTES:

This procedure requires the body to be removed from the integrated body frame.

In this procedure the front wheelhouse is replaced in conjunction with the front side member, hood latch panel and front crossmember.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the body from the integrated body frame.
3. L/H side: Remove the battery.
4. Remove the crossmember.
   For additional information, refer to: Front Crossmember (501-27 Front End Sheet Metal Repairs, Removal and Installation).
5. Remove the hood pad.
6. Remove the hood wiring harness.
7. Remove the hood.
8. Remove the hood support struts.
9. L/H side: Remove the power steering fluid reservoir. For additional information, refer to: (211-02 Power Steering)
   - Power Steering Fluid Reservoir - 2.7L Diesel (Removal and Installation),
   - Power Steering Fluid Reservoir - 4.2L/4.4L (Removal and Installation).
10. Remove the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).
11. Remove the instrument panel. For additional information, refer to: (501-12 Instrument Panel and Console)
    - Instrument Panel - 2.7L (TdV6) Diesel (Removal and Installation),
    - Instrument Panel - 4.2L (Removal and Installation),
    - Instrument Panel - 4.4L (Removal and Installation).
12. Remove the front brake pipe.
13. Remove the insulation from the inner and outer bulkhead.
14. R/H side: Release the ABS modulator.
15. R/H side: Remove the accelerator pedal. For additional information, refer to:
    - Accelerator Pedal (310-02C Acceleration Control - 2.7L (TdV6) Diesel, Removal and Installation),
    - Accelerator Pedal (310-02A Acceleration Control - 4.2L, Removal and Installation),
    - Accelerator Pedal (310-02B Acceleration Control - 4.4L, Removal and Installation).
16. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
    - Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation),
    - Battery Junction Box (BJB) - 4.2L (Removal and Installation),
    - Battery Junction Box (BJB) - 4.4L (Removal and

Installation).

17. Release the wiring harness from the bulkhead.

18. Release the wiring harness from the fender apron panel reinforcement.

19. Release the wiring harness from the side member.

20. L/H side: Remove the fuel fired booster heater.
For additional information, refer to: Fuel Fired Booster Heater (412-02B Auxiliary Heating, Removal and Installation).

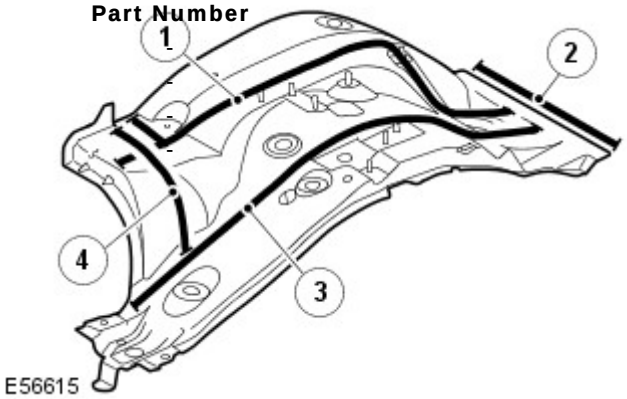
21. Remove the scuff plate trim panel.
For additional information, refer to: Scuff Plate Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

22. Remove the footrest.

23. Remove the cowl side trim panel.
For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

24. Release the front carpet.

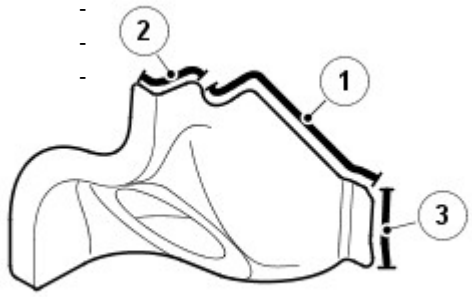
25.



E56615

Part Number	Item	Description
-	1	19 plug welds.
-	2	9 plug welds.
-	3	18 spot welds.
-	4	7 plug welds.

26.

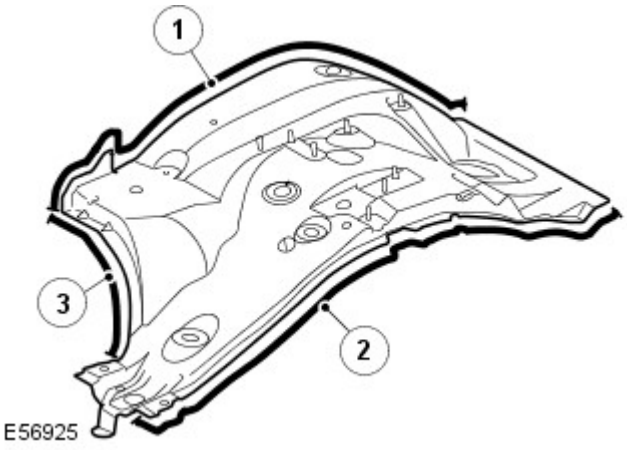


E63436

Part Number	Item	Description
-	1	4 spot welds.
-	2	Butt weld.
-	3	2 plug welds.

27.

Part Number	Item	Description
-	1	13 spot welds.
-	2	16 spot welds.
-	3	9 spot welds.



28. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Front Wheelhouse Reinforcement

Removal and Installation

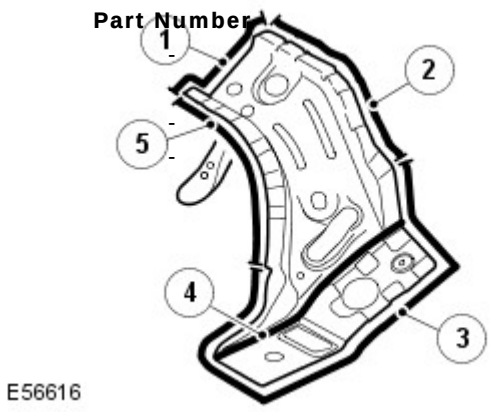
Removal

NOTE: In this procedure the front wheelhouse reinforcement is replaced in conjunction with the front side member and front wheelhouse.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the front wheelhouse.
   For additional information, refer to: Front Wheelhouse (501-27 Front End Sheet Metal Repairs, Removal and Installation).

3.



Item	Description
1	4 spot welds.
2	7 plug welds.
3, 4	20 plug welds.
5	9 spot welds.

4. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Front Wheelhouse Section

Removal and Installation

Removal

NOTES:

This procedure requires the body to be removed from the integrated body frame.

In this procedure the front wheelhouse is replaced in conjunction with the front side member, hood latch panel and front crossmember.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the body from the integrated body frame.
3. L/H side: Remove the battery.
4. Remove the crossmember.
   For additional information, refer to: Front Crossmember (501-27 Front End Sheet Metal Repairs, Removal and Installation).
5. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).
6. Remove the hood pad.
7. Remove the hood wiring harness.
8. Remove the hood.
9. Remove the hood support struts.
10. L/H side: Remove the power steering fluid reservoir. For additional information, refer to: (211-02 Power Steering)
    - Power Steering Fluid Reservoir - 2.7L Diesel (Removal and Installation),
    - Power Steering Fluid Reservoir - 4.2L/4.4L (Removal and Installation).
11. R/H side: Remove the air cleaner. For additional information, refer to:
    - Air Cleaner (303-12C Intake Air Distribution and Filtering - 2.7L (TdV6) Diesel, Removal and Installation),
    - Air Cleaner (303-12A Intake Air Distribution and Filtering - 4.2L, Removal and Installation),
    - Air Cleaner (303-12B Intake Air Distribution and Filtering - 4.4L, Removal and Installation).
12. Remove the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).
13. Remove the instrument panel. For additional information, refer to: (501-12 Instrument Panel and Console)
    - Instrument Panel - 2.7L (TdV6) Diesel (Removal and Installation),
    - Instrument Panel - 4.2L (Removal and Installation),
    - Instrument Panel - 4.4L (Removal and Installation).
14. Remove the front brake pipe.
15. Remove the insulation from the inner and outer bulkhead.
16. R/H side: Release the ABS modulator.
17. R/H side: Remove the accelerator pedal. For additional information, refer to:
    - Accelerator Pedal (310-02C Acceleration Control - 2.7L (TdV6) Diesel, Removal and Installation),

Accelerator Pedal (310-02A Acceleration Control - 4.2L, Removal and Installation),
Accelerator Pedal (310-02B Acceleration Control - 4.4L, Removal and Installation).

18. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
    Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation),
    Battery Junction Box (BJB) - 4.2L (Removal and Installation),
    Battery Junction Box (BJB) - 4.4L (Removal and Installation).

19. Release the wiring harness from the bulkhead.

20. Release the wiring harness from the fender apron panel reinforcement.

21. Release the wiring harness from the side member.

22. L/H side: Remove the fuel fired booster heater.
    For additional information, refer to: Fuel Fired Booster Heater (412-02B Auxiliary Heating, Removal and Installation).

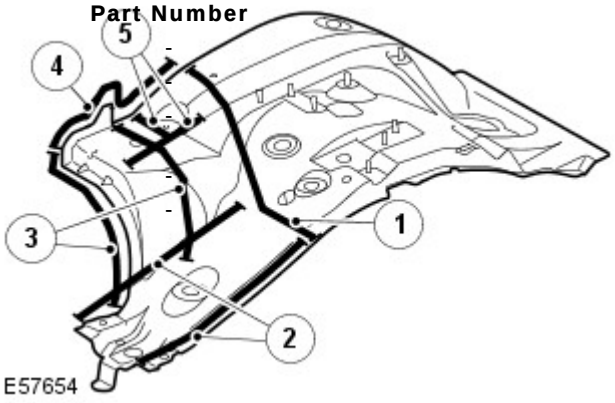
23. Remove the scuff plate trim panel.
    For additional information, refer to: Scuff Plate Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

24. Remove the footrest.

25. Remove the cowl side trim panel.
    For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

26. Release the front carpet.

27.



Part Number - Item	Description
1	Butt weld.
2	15 spot welds.
3	7 plug welds, 9 spot welds.
4	13 spot welds.
5	19 plug welds.

28. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Fender Apron Panel Closing Panel

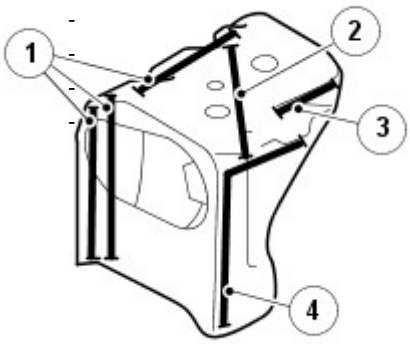
Removal and Installation

Removal

NOTE: In this procedure the fender apron closing panel is replaced in conjunction with the fender apron panel and/or the fender apron panel reinforcement.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the fender apron panel.
   For additional information, refer to: Fender Apron Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).
3. Remove the fender apron panel reinforcement.
   For additional information, refer to: Fender Apron Panel Reinforcement (501-27 Front End Sheet Metal Repairs, Removal and Installation).
4.

Part Number	Item	Description
-	1	7 plug welds.
-	2	2 spot welds.
-	3	2 spot welds.
-	4	5 plug welds.



E56612

5. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Front End Sheet Metal Repairs - Fender Apron Panel Reinforcement Front Section

Removal and Installation

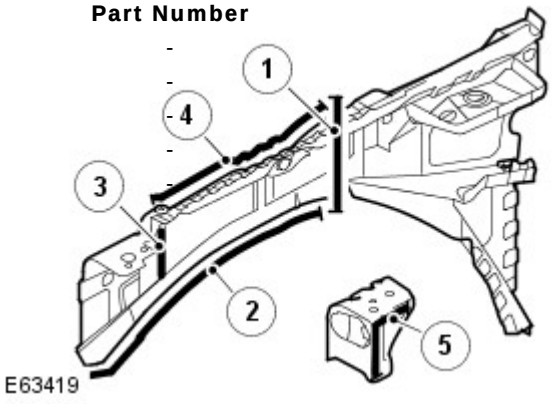
Removal

NOTE: In this procedure the fender apron panel reinforcement front section is replaced in conjunction with fender apron panel closing.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the front fender.
   For additional information, refer to: Fender (501-02 Front End Body Panels, Removal and Installation).
3. Remove the hood latch panel.
   For additional information, refer to: Hood Latch Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).
4. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
   - Battery Junction Box (BJB) - 4.2L (Removal and Installation),
   - Battery Junction Box (BJB) - 4.4L (Removal and Installation),
   - Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation).
5. Remove the central junction box.
   For additional information, refer to: Central Junction Box (CJB) (418-00 Module Communications Network, Removal and Installation).
6. L/H side: Remove the radiator coolant expansion tank.
   For additional information, refer to: Coolant Expansion Tank (303-03A Engine Cooling - 4.2L, Removal and Installation).
7. L/H side: Remove the power steering fluid reservoir. For additional information, refer to: (211-02 Power Steering)
   - Power Steering Fluid Reservoir - 4.2L/4.4L (Removal and Installation),
   - Power Steering Fluid Reservoir - 2.7L Diesel (Removal and Installation).
8. L/H side: Remove the battery.
9. Remove the air cleaner.
   For additional information, refer to: Air Cleaner (303-12C Intake Air Distribution and Filtering - 2.7L (TdV6) Diesel, Removal and Installation).
10. L/H side: Remove the fuel fired booster heater.
    For additional information, refer to: Fuel Fired Booster Heater (412-02B Auxiliary Heating, Removal and Installation).
11. L/H side: Remove the fuel fired booster heater pipes.
12. R/H side: Release the ABS modulator.
13. Remove the ABS modulator wiring harness.
14. Remove the plenum chamber panel.
    For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).
15. Remove the hood wiring harness.
16. Remove both hood support struts.
17. Remove the hood.

18. Remove the fender apron panel section wiring harness.

19.



Part Number	Item	Description
-	1	Butt weld.
-	2	20 spot welds.
-	3	3 spot welds.
-	4	11 spot welds.
-	5	5 plug-welds.

20. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

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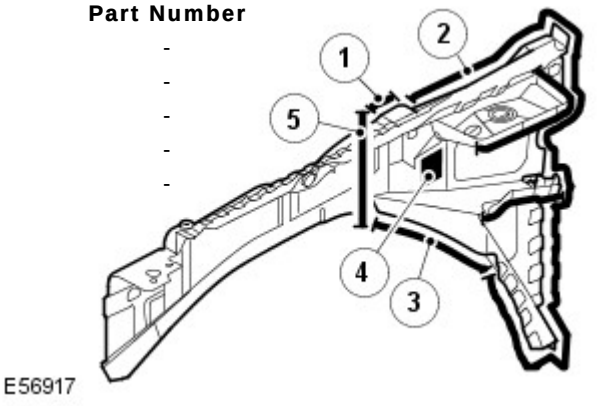
Front End Sheet Metal Repairs - Fender Apron Panel Reinforcement Rear Section

Removal and Installation

Removal

1. Disconnect both the battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the front fender.
   For additional information, refer to: Fender (501-02 Front End Body Panels, Removal and Installation).
3. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
   Battery Junction Box (BJB) - 4.2L (Removal and Installation),
   Battery Junction Box (BJB) - 4.4L (Removal and Installation),
   Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation).
4. R/H side: Release the ABS modulator.
5. Remove the wiring harness.
6. Remove the plenum chamber panel.
   For additional information, refer to: Plenum Chamber (412-01 Air Distribution and Filtering, Removal and Installation).
7. Remove the front wiper pivot arms.
   For additional information, refer to: Front Wiper Pivot Arm (501-16 Wipers and Washers, Removal and Installation).
8. Remove the hood wiring harness.
9. Remove both hood support struts.
10. Remove the hood.
11. Remove the wiring harness from both front wheelhouses.
12. L/H side: Remove the fender apron panel section wiring harness.
13.

Part Number	Item	Description
-	1	3 spot welds.
-	2	34 plug welds.
-	3	7 spot welds.
-	4	Acoustic seal.
-	5	Butt weld.



14. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame

(501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

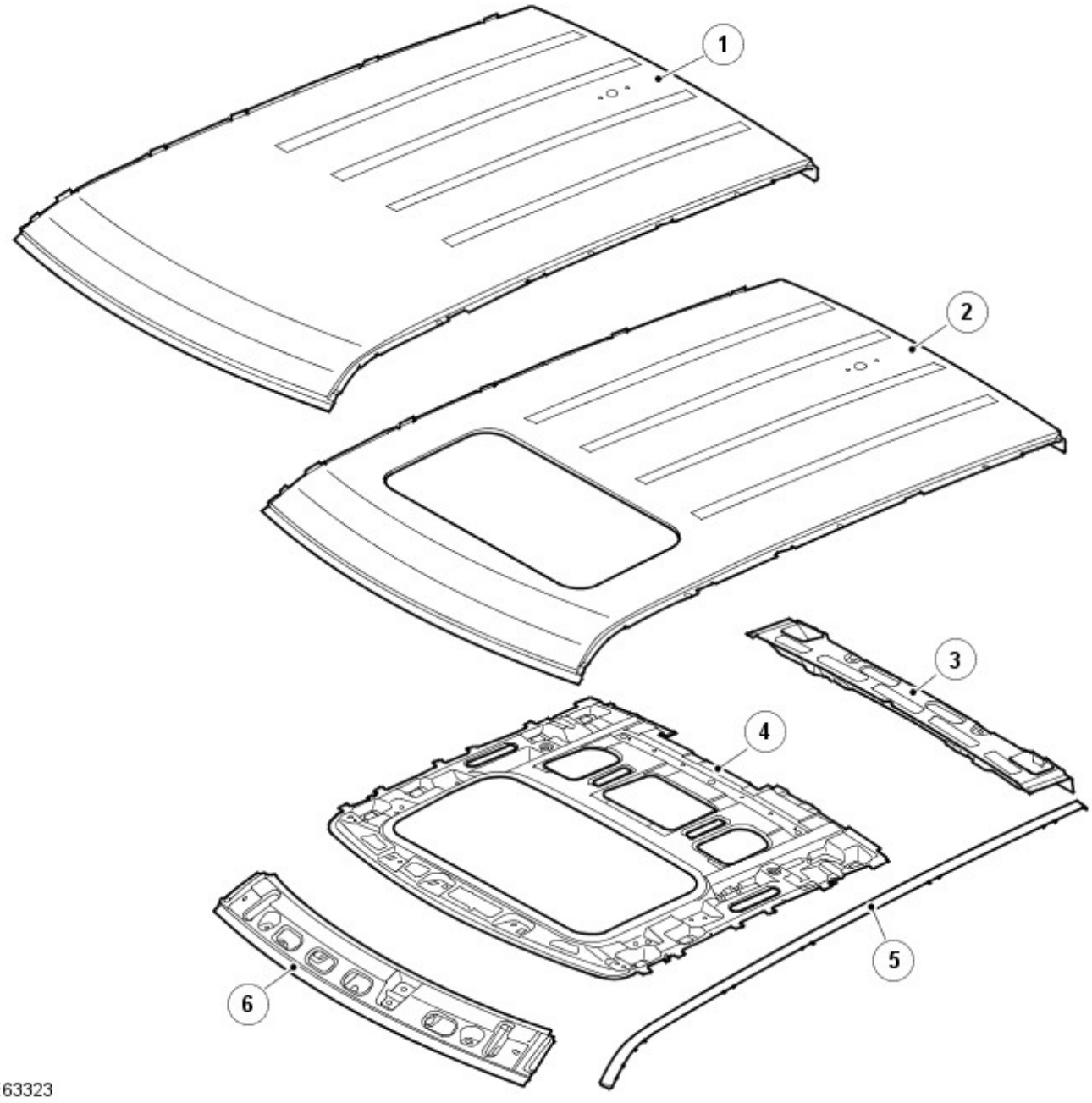
1. Install is the reversal of removal.

Published: 11-May-2011

Roof Sheet Metal Repairs - Roof

Description and Operation

Roof service panels



Item	Description
1	Roof panel
2	Roof panel (with roof opening panel)
3	Rear assembly
4	Roof reinforcement
5	Rail assembly
6	Header assembly

Time schedules, front end

The following information shows the total time taken to replace single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim (MET) items, plus paint times based on Metallic Clear Over Base Paint.

The times shown were generated by Thatcham (the motor insurance repair and research centre) and are to be used as a guide only.

Single panel times

Panel Description	Petrol	Diesel
Roof panel	24.7	24.7

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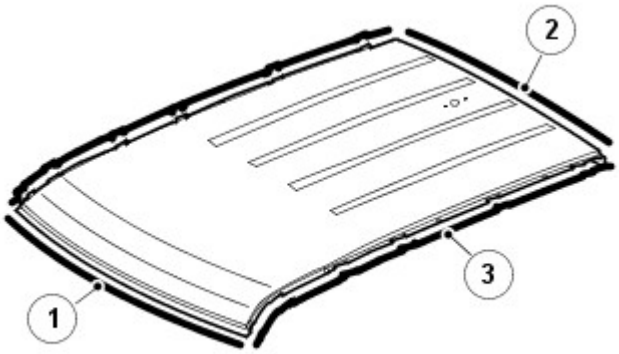
Roof Sheet Metal Repairs - Roof Panel

Removal and Installation

Removal

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove both air curtain modules.
   For additional information, refer to: Side Air Curtain Module (501-20B Supplemental Restraint System, Removal and Installation).
3. Remove the B-Pillar lower trim.
4. Remove the windshield glass.
   For additional information, refer to: Windshield Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).
5. If applicable, remove roof opening panel.
   For additional information, refer to: Roof Opening Panel (501-17 Roof Opening Panel, Removal and Installation).
6. Remove the rear quarter window glass.
   For additional information, refer to: Rear Quarter Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).
7. Remove both front seats.
   For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).
8. Remove both rear seats.
   For additional information, refer to: Rear Seat (501-10 Seating, Removal and Installation).
9. Remove the rear seat safety belt lower anchors.
10. Release the wiring harness from both A-pillars.
11. Release the wiring harness from the roof.
12. Remove both front door and rear door aperture weatherstrip.
13. Remove the tailgate weatherstrip.
14. Remove both front safety belt retractors.
    For additional information, refer to: Front Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).
15. R/H side: Remove the footrest.
16. Release the carpet
17. Remove the load space trims.
18. Remove the load space carpets.
19.

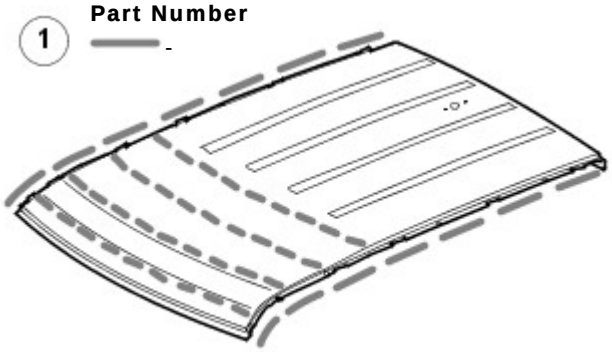
Part Number	Item	Description
-	1	43 spot welds.
-	2	27 spot welds.
-	3	36 spot welds.(R/H is symmetrically opposite to L/H).



E63256

20.

Part Number	Item	Description
-	1	Areas of adhesive.



E63257

21. For additional information:
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

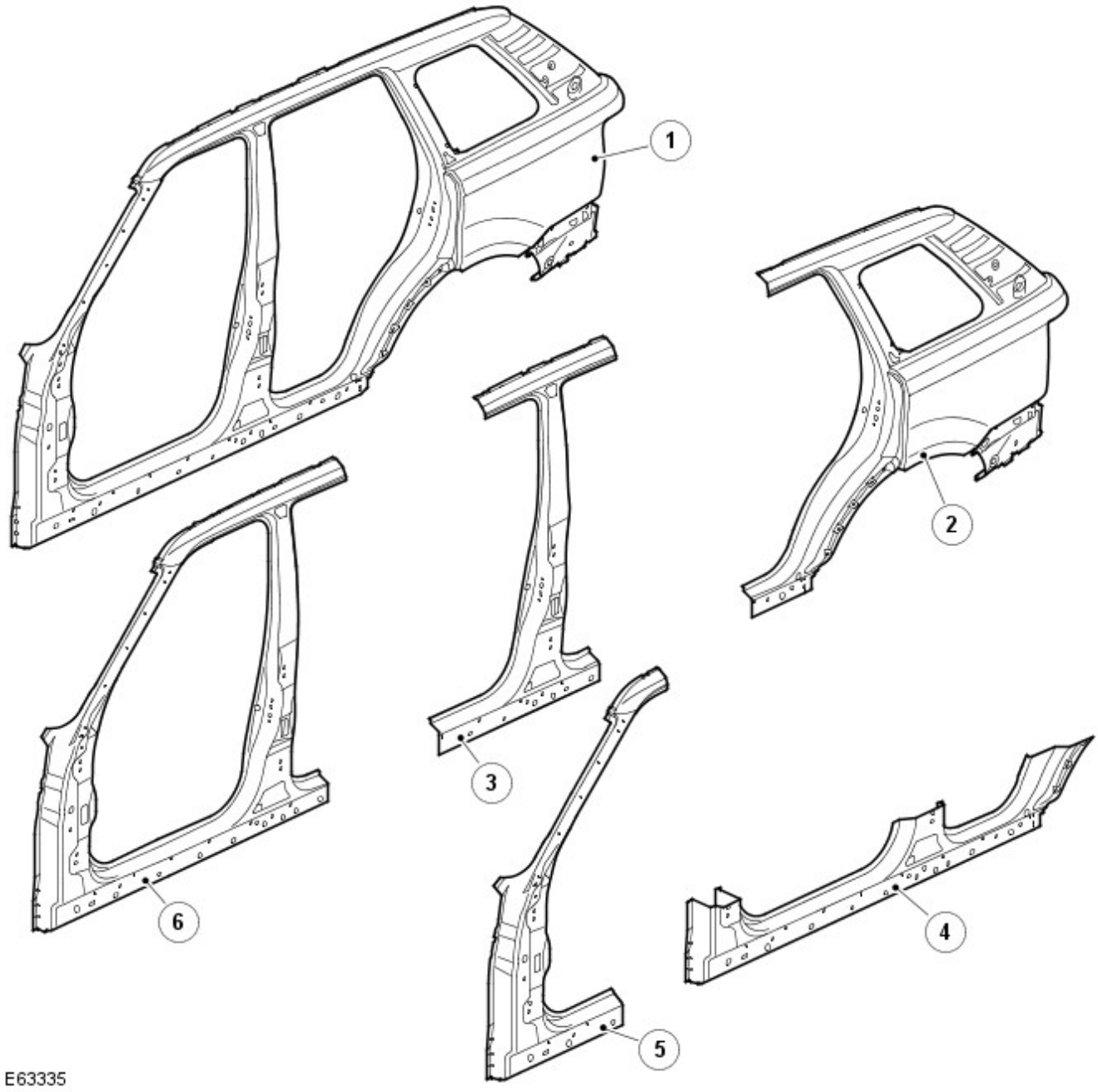
1. Install is the reversal of removal.

Published: 11-May-2011

Side Panel Sheet Metal Repairs - Side Panel Sheet Metal

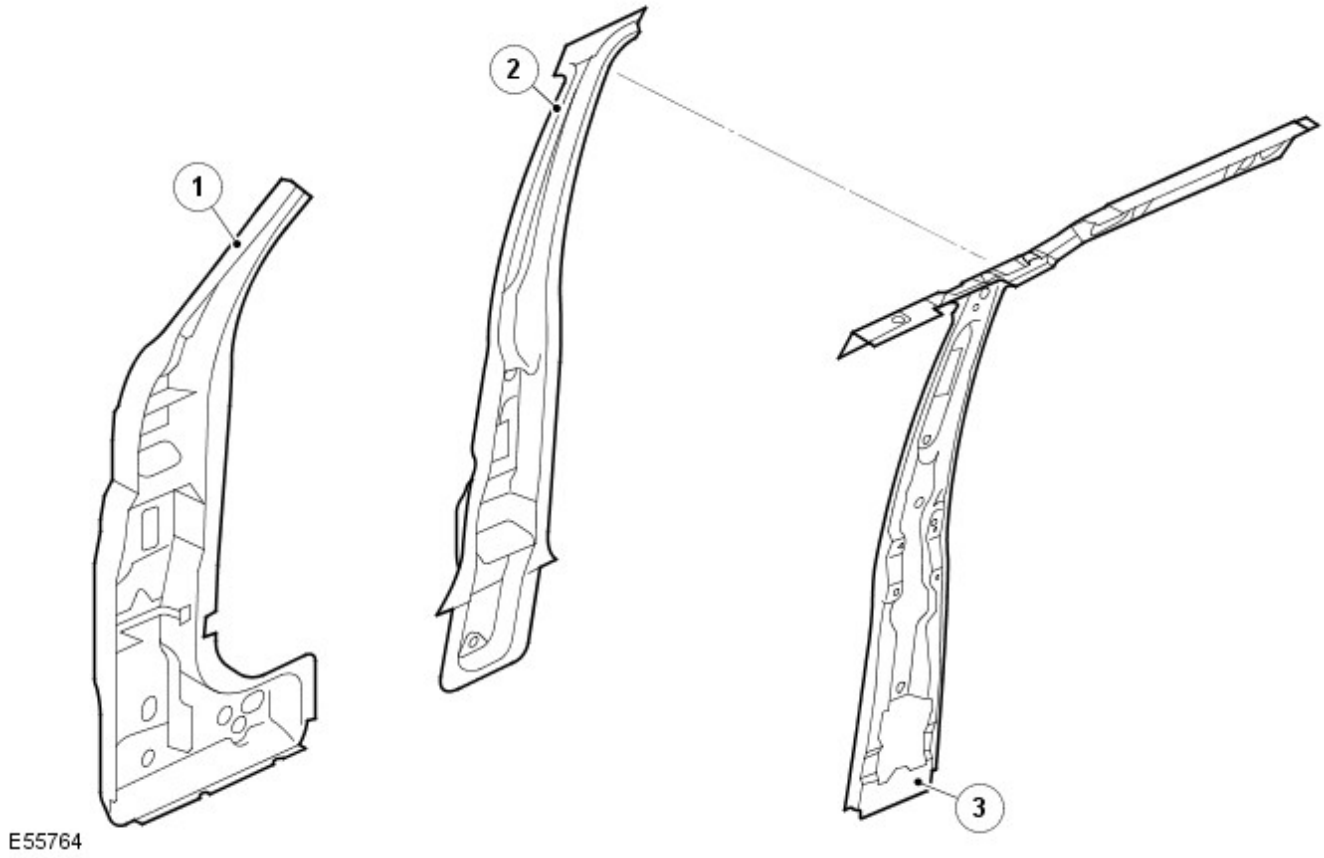
Description and Operation

Outer bodyside service panels



Item	Description
1	Side panel
2	Quarter panel
3	B-pillar
4	Rocker panel
5	A-pillar
6	Side panel front section

Inner bodyside service panels



Item	Description
1	A-pillar inner
2	B-pillar inner
3	B-pillar closing

paragraph

Time schedules, front end

The following information shows the total time taken to replace single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim (MET) items, plus paint times based on Metallic Clear Over Base Paint.

The times shown were generated by Thatcham (the motor insurance repair and research centre) and are to be used as a guide only.

Single panel times

Panel Description	Petrol	Diesel
Front door	9.6	9.6
Rear door	8.5	8.5
Rocker panel L/H	21.6	21.6
Rocker panel R/H	21.5	21.5

Combination panel replacement times

The following panel combination times show the total time to remove/refit body panels, MET items and any paint process.

Combination panel times

Panel Description	Petrol	Diesel
Front door		
Front fender		
Total Time	**12.0**	**12.0**

Combination panel times

Panel Description	Petrol	Diesel
Rear door		
Quarter panel		
Total Time	**L/H 27.8 R/H 28.5**	**L/H 27.8 R/H 28.5**

Combination panel times

Panel Description	Petrol	Diesel
B-pillar inner		
B-pillar outer		
B-pillar reinforcement		
Front door		

Rear door		
Headliner		
Total Time	**L/H 32.7 R/H 32.5**	**L/H 32.7 R/H 32.5**

Combination panel times

Panel Description	Petrol	Diesel
Front door		
Rear door		
Quarter panel		
Front fender		
Total Time	**L/H 33.9 R/H 34.7**	**L/H 33.9 R/H 34.7**

Combination panel times

Panel Description	Petrol	Diesel
A-pillar outer		
A-pillar reinforcement		
Front door		
Windshield glass		
Front fender		
Fender Apron Panel Reinforcement Rear Section		
Instrument panel		
Total Time	**L/H 36.1 R/H 36.9**	**L/H 36.3 R/H 36.9**

Combination panel times

Panel Description	Petrol	Diesel
Rear bumper		
Rear door		
Front fender		
Quarter panel		
Rear Wheelhouse outer		
Total Time	**L/H 35.6 R/H 36.3**	**L/H 35.6 R/H 36.3**

Combination panel times

Panel Description	Petrol	Diesel
Side panel		
Front door		
Rear door		
Windshield glass		
Front fender		
Fender Apron Panel Reinforcement Rear Section		
Instrument panel		
Headliner		
Total Time	**L/H 58.9 R/H 60.8**	**L/H 59.0 R/H 60.8**

Combination panel times

Panel Description	Petrol	Diesel
A-pillar outer		
A-pillar reinforcement		
Front door		
Instrument panel		
Windscreen glass		
Fender Apron Panel Reinforcement Rear Section		
Front fender		
Total Time	**L/H 36.3 R/H 36.9**	**L/H 36.1 R/H 36.9**

Published: 11-May-2011

Side Panel Sheet Metal Repairs - A-Pillar Outer Panel

Removal and Installation

Removal

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the instrument panel. For additional information, refer to: (501-12 Instrument Panel and Console)
   - Instrument Panel - 2.7L (TdV6) Diesel (Removal and Installation),
   - Instrument Panel - 4.4L (Removal and Installation),
   - Instrument Panel - 4.2L (Removal and Installation).

3. Remove the windshield glass.
   For additional information, refer to: Windshield Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).

4. Remove the hood pad.

5. Remove the hood wiring harness.

6. Remove the hood.

7. Remove the front fender.
   For additional information, refer to: Fender (501-02 Front End Body Panels, Removal and Installation).

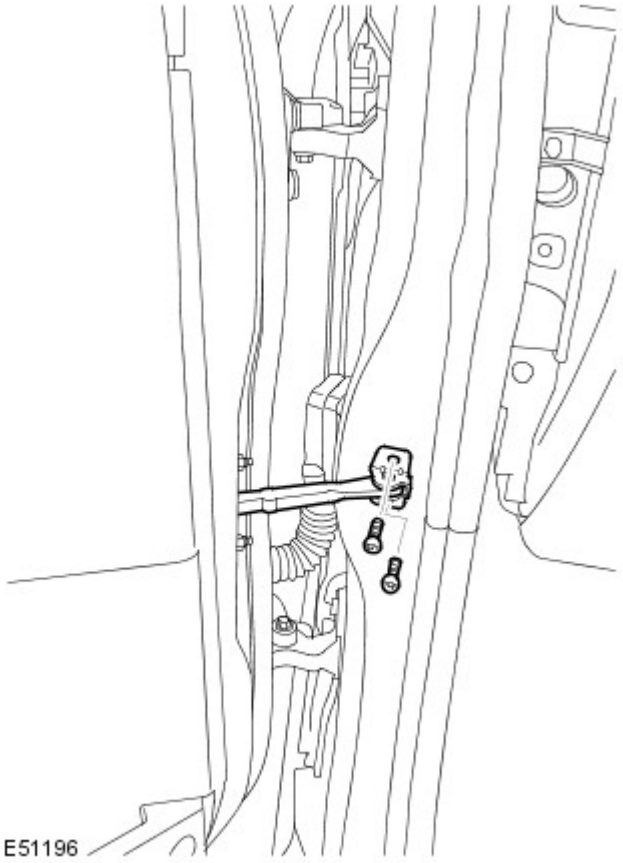
8. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
   - Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation),
   - Battery Junction Box (BJB) - 4.4L (Removal and Installation),
   - Battery Junction Box (BJB) - 4.2L (Removal and Installation).

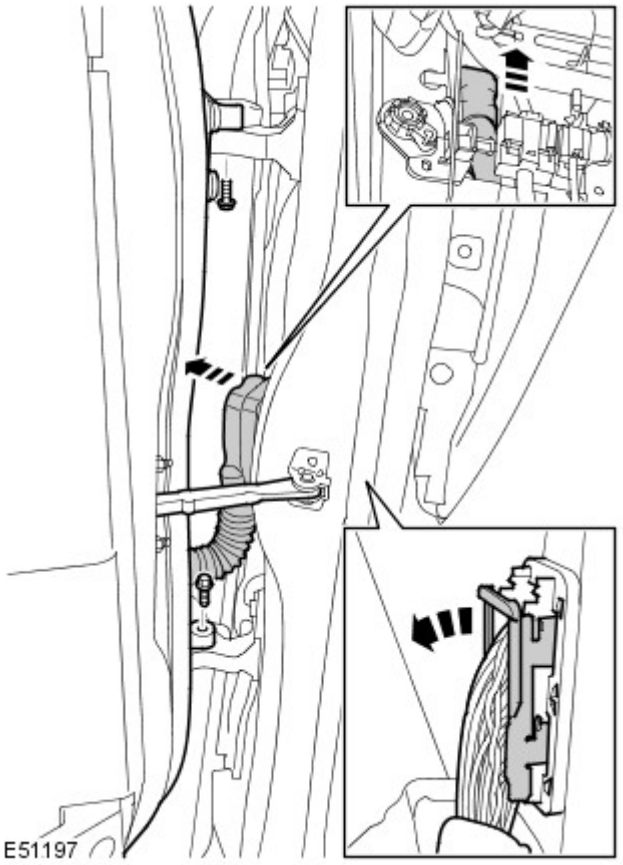
9. R/H side: Remove the ABS modulator.
   For additional information, refer to: Anti-Lock Brake System (ABS) Module (206-09A Anti-Lock Control - Traction Control, Removal and Installation).

10. R/H side: Remove the accelerator pedal. For additional information, refer to:
    - Accelerator Pedal (310-02B Acceleration Control - 4.4L, Removal and Installation),
    - Accelerator Pedal (310-02C Acceleration Control - 2.7L (TdV6) Diesel, Removal and Installation),
    - Accelerator Pedal (310-02A Acceleration Control - 4.2L, Removal and Installation).

11. R/H side: Remove the brake booster.
    For additional information, refer to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation).

12. Remove the front door check strap from the A-pillar.





13. Remove the front door assembly.
    - Disconnect the electrical connector
    - Release the wiring harness grommet
    - Release the wiring harness retaining clip
    - Remove the 2 bolts

14. Remove the insulation from the outer and inner bulkhead.

15. Remove the front and rear door weatherstrips.

16. Remove the cowl side trim panel.
    For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

17. Release the A-Pillar wiring harness.

18. Remove the footrest.

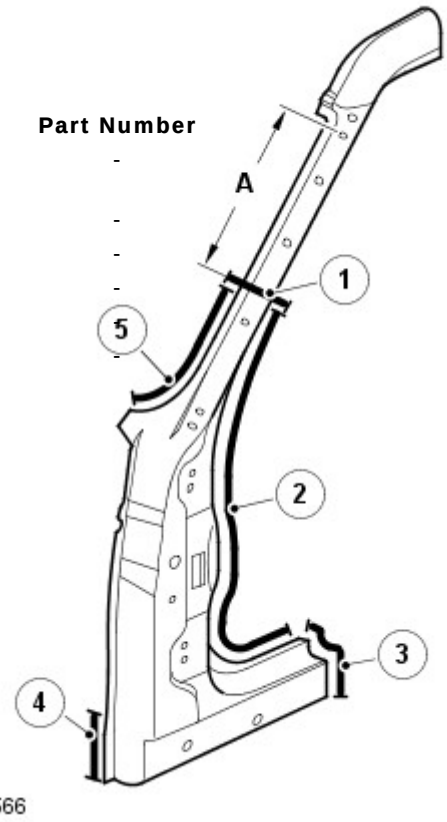
19. Remove the front seat.
    For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).

20. Remove the front safety belt retractor.
    For additional information, refer to: Front Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).

21. Remove the rocker panel outer trim.

22. Release the front carpet.

23. If the panel is not cut exactly where specified in the graphic, then it may be necessary to weld the A-pillar outer panel to a boron inner panel. For specific information regarding the welding of boron steel, refer to general information, body repairs. For additional information, refer to: Body Repairs (501-25A, Description and Operation).

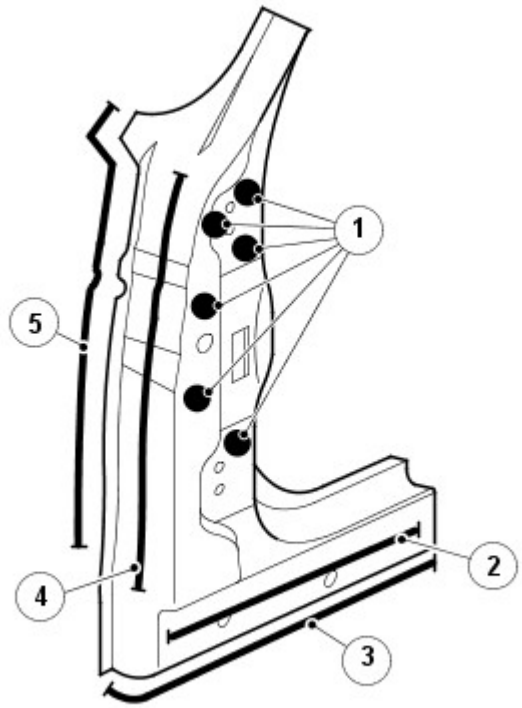


E63566

Part Number	Item	Description
-	A	Cut line 380 mm (14.96 inches).
-	1	Butt weld.
-	2	42 spot welds.
-	3	Butt weld.
-	4	8 spot welds.
-	5	27 spot welds.

24.

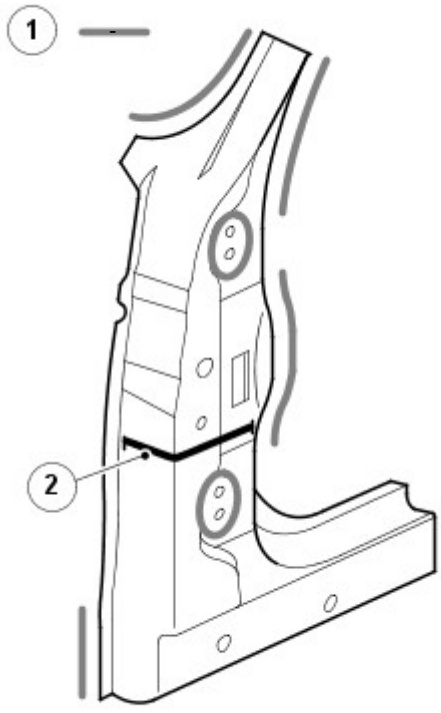
Part Number	Item	Description
-	1	6 plug welds.
-	2	4 plug welds.
-	3	12 plug welds.
-	4	10 plug welds.
-	5	13 plug welds.



E57675

25.

Part Number	Item	Description
-	1	Areas of adhesive.
-	2	Acoustic seal.



E57676

26. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.

For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reverse of removal.

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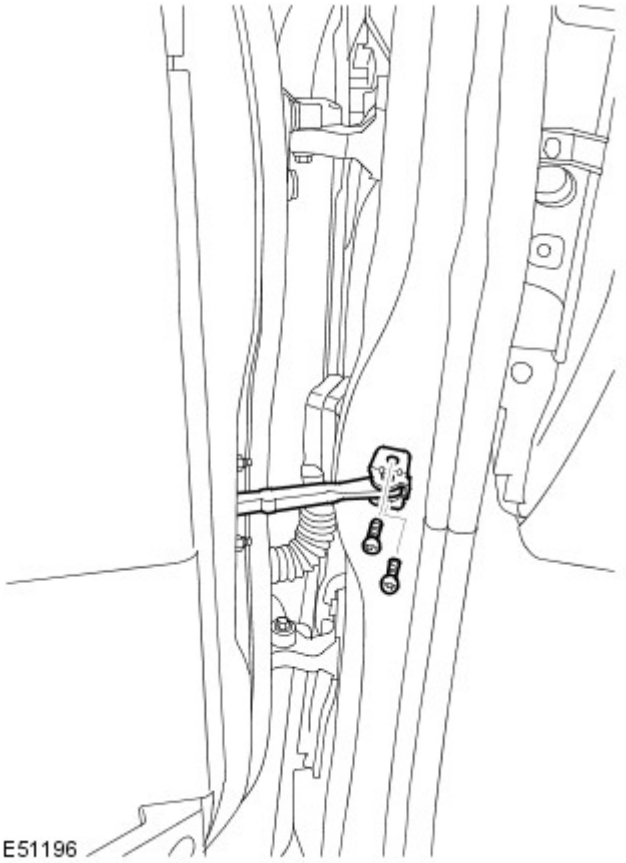
Side Panel Sheet Metal Repairs - B-Pillar Outer Panel

Removal and Installation

Removal

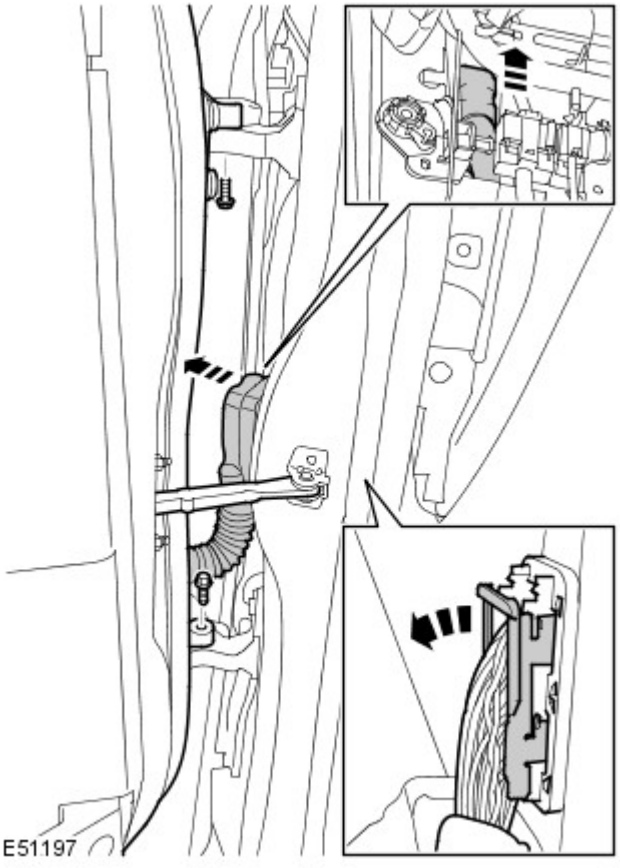
1. Load vehicle onto ramp.

2. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).



3. Release the front door check strap from the A-pillar and release the rear door check strap from the B-pillar.
   - Remove the 2 Torx bolts.

4. Remove the rear door assembly.
   - Disconnect the electrical connector.
   - Release the wiring harness grommet.
   - Release the wiring harness retaining clip.
   - Remove the 2 bolts.



5. Remove front door striker.

6. Remove the front seat.
   For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).

7. Remove the rear seat.
   For additional information, refer to: Rear Seat (501-10 Seating, Removal and Installation).

8. Remove the B-pillar side impact sensor.
   For additional information, refer to: B-Pillar Side Impact Sensor (501-20B Supplemental Restraint System, Removal and Installation).

9. Remove the side air curtain module.
   For additional information, refer to: Side Air Curtain Module (501-20B Supplemental Restraint System, Removal and Installation).

10. Remove the wiring harness from the B-pillar.

11. Release the wiring harness from the rocker panel.

12. Remove the front safety belt retractor.
    For additional information, refer to: Front Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).

13. Remove the front and rear seat safety belt lower anchors.

14. Remove the wiring harness from the roof.

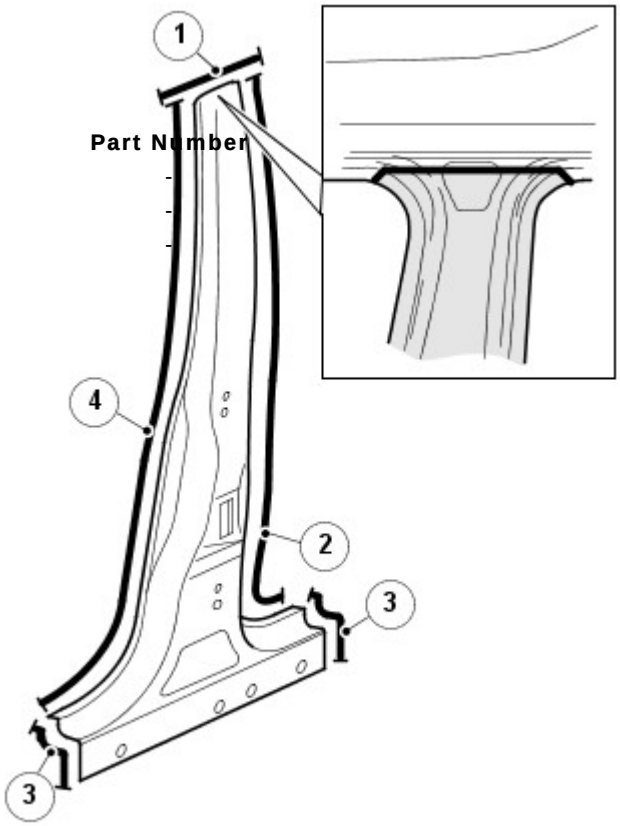
15. Remove the front and rear door weatherstrips.

16. Remove the rocker panel outer trim.

17. R/H side: Remove the footrest.

18. Release the carpet.

19. When cutting the damaged panel at the top of the B-pillar, make sure the boron panel behind it is not

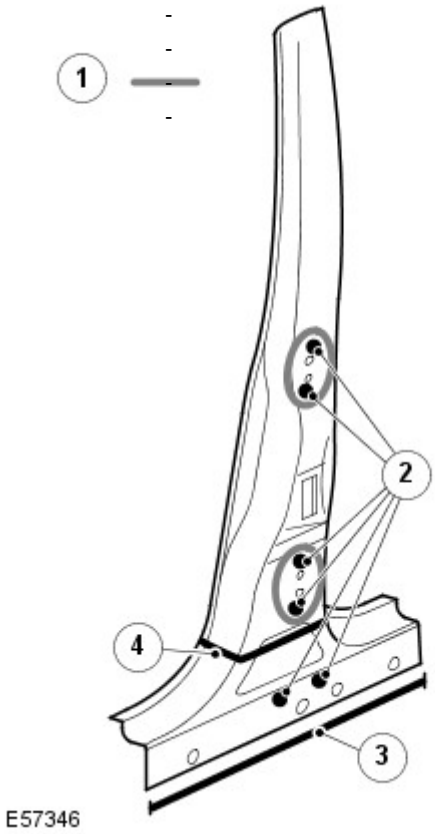


E55946

damaged. For additional information, refer to general information, body repairs.
For additional information, refer to: Body Repairs (501-25A, Description and Operation).

Part Number	Item	Description
-	1	Cut line and butt weld.
-	2,4	81 spot welds.
-	3	Butt welds.

20.



E57346

Part Number	Item	Description
-	1	Adhesive.
-	2	6 plug welds.
-	3	19 plug welds.
-	4	Acoustic seal.

21. For additional information:
- Welding.
  For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
- Corrosion protection.
  For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
- Tolerance checks.

For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

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Side Panel Sheet Metal Repairs - A-Pillar Reinforcement

Removal and Installation

Removal

NOTE: In this procedure the A-pillar reinforcement is replaced in conjunction with the A-pillar outer panel.

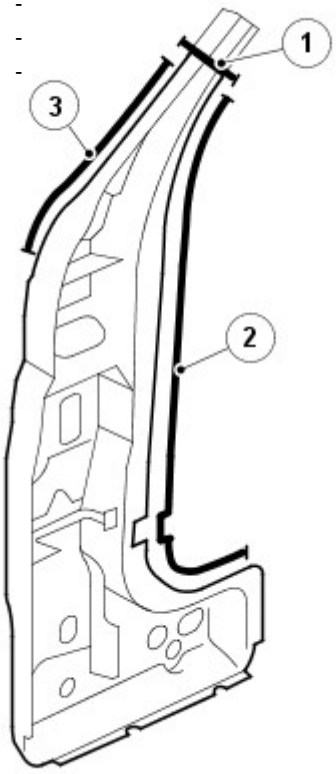
1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the A-pillar outer panel.
   For additional information, refer to: A-Pillar Outer Panel (501-29, Removal and Installation).

3. Remove the instrument panel. For additional information, refer to: (501-12 Instrument Panel and Console)
   Instrument Panel - 2.7L (TdV6) Diesel (Removal and Installation),
   Instrument Panel - 4.4L (Removal and Installation),
   Instrument Panel - 4.2L (Removal and Installation).

4.

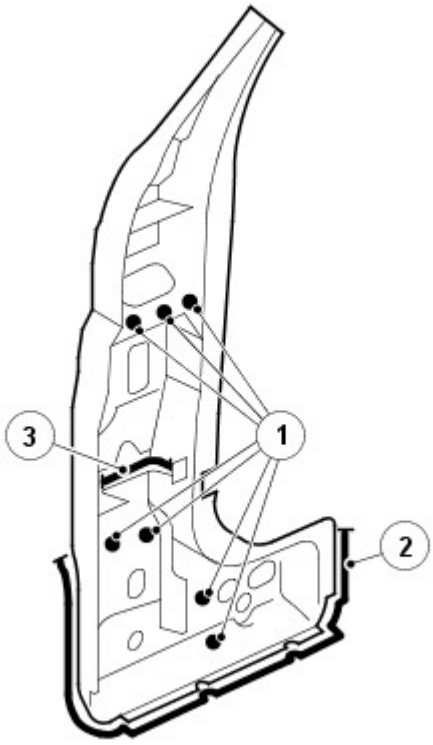
Part Number	Item	Description
-	1	Butt weld.
-	2	30 spot welds.
-	3	17 spot welds.



E63524

5.

Part Number	Item	Description
-	1	7 plug welds.
-	2	16 plug welds.
-	3	Acoustic seal.



E63525

6. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Side Panel Sheet Metal Repairs - B-Pillar Reinforcement

Removal and Installation

Removal

NOTES:

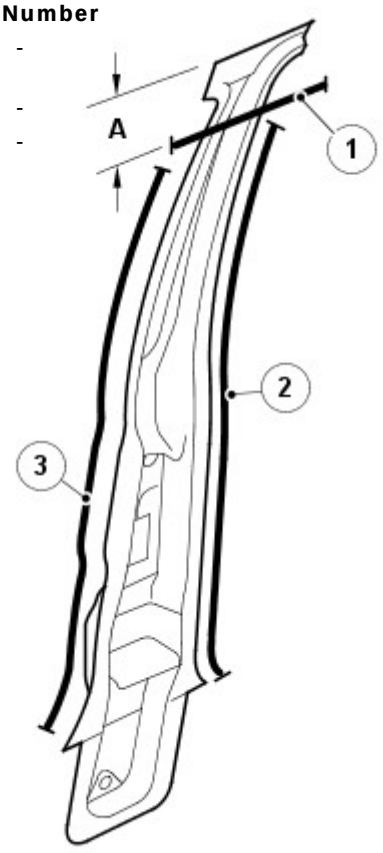
In this procedure the B-Pillar reinforcement is replaced in conjunction with the B-pillar outer panel.

The B-Pillar closing panel is fitted with the B-Pillar reinforcement.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the B-pillar outer panel.
   For additional information, refer to: B-Pillar Outer Panel (501-29 Side Panel Sheet Metal Repairs, Removal and Installation).

3.

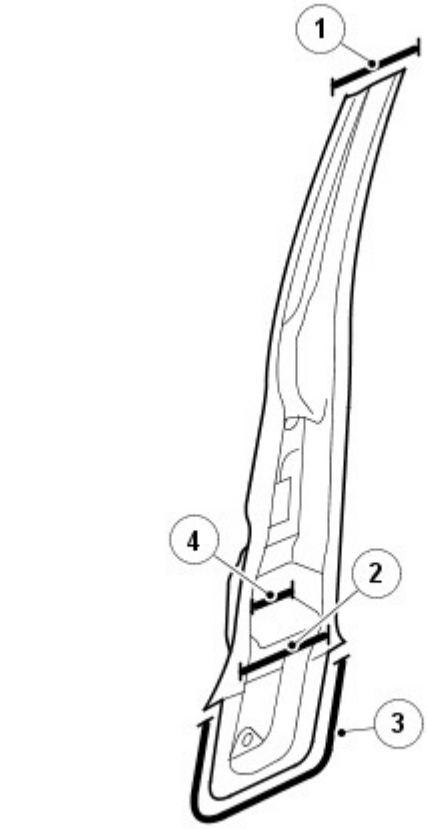


E55947

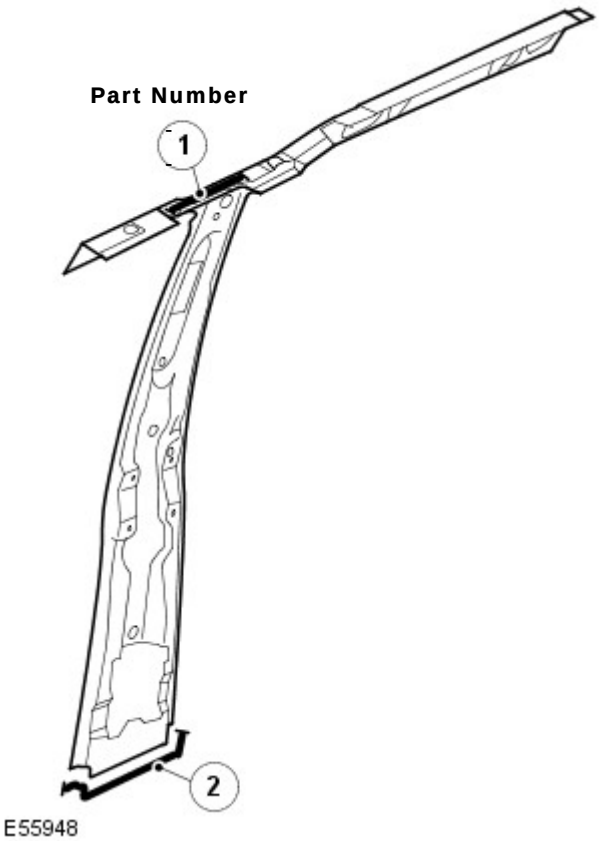
Part Number	Item	Description
-	A	Cut line 140.0mm (5.51 inches).
-	1	Butt weld.
-	2,3	81 spot welds. (including the B-Pillar closing panel).

4.

Part Number	Item	Description
-	1	Butt weld.
-	2	Acoustic seal.
-	3,4	12 plug welds.



E63514



E55948

5. The B-Pillar closing panel is supplied with the cantrail. Remove the B-Pillar closing panel from the cantrail and fit the B-pillar closing panel to the B-Pillar reinforcement, as shown in graphic E55948 and E55947.

Item	Description
1	9 plug welds.
2	4 spot welds.

6. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.

For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

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Side Panel Sheet Metal Repairs - Side Panel Front Section

Removal and Installation

Removal

1. Load vehicle onto ramp.

2. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

3. Remove the windshield glass.
   For additional information, refer to: Windshield Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).

4. Remove the front fender.
   For additional information, refer to: Fender (501-02 Front End Body Panels, Removal and Installation).

5. L/H side: Remove the battery junction box. For additional information, refer to: (418-00 Module Communications Network)
   Battery Junction Box (BJB) - 4.2L (Removal and Installation),
   Battery Junction Box (BJB) - 4.4L (Removal and Installation),
   Battery Junction Box (BJB) - 2.7L (TdV6) Diesel (Removal and Installation).

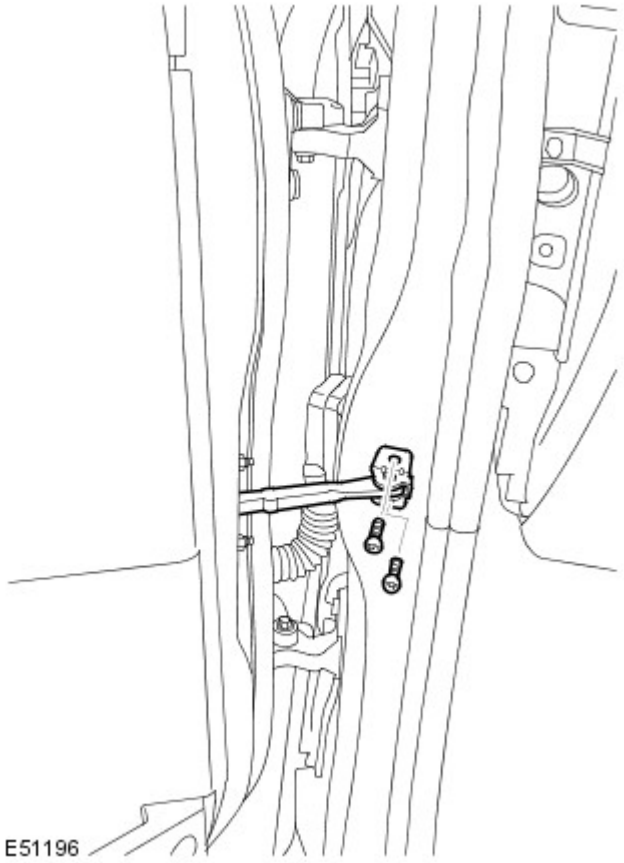
6. Remove the side air curtain.
   For additional information, refer to: Side Air Curtain Module (501-20B Supplemental Restraint System, Removal and Installation).

7. R/H side: Remove the brake booster.
   For additional information, refer to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation).

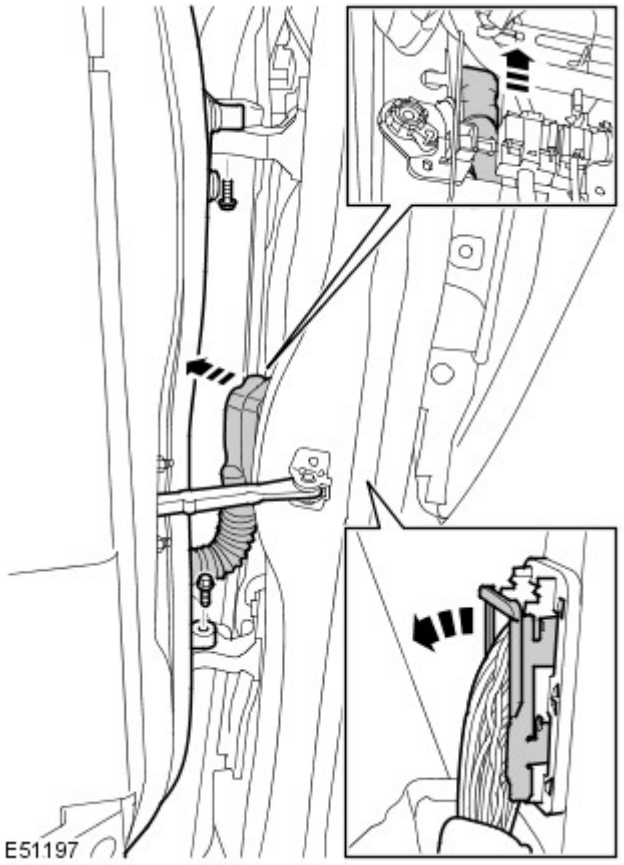
8. R/H side: Remove the ABS module.
   For additional information, refer to: Anti-Lock Brake System (ABS) Module (206-09A Anti-Lock Control - Traction Control, Removal and Installation).

9. R/H side: Remove the accelerator pedal.
   For additional information, refer to: Accelerator Pedal (310-02C Acceleration Control - 2.7L (TdV6) Diesel, Removal and Installation).

10. Release the front door check strap from the A-pillar and release the rear door check strap from the B-pillar.
    - Remove the 2 Torx bolts.



11. Remove the front and rear door assemblies.
    - Disconnect the electrical connector.
    - Release the wiring harness grommet.
    - Release the wiring harness retaining clip.
    - Remove the 2 bolts.



12. Remove front door striker.

13. Remove the front and rear door weatherstrip.

14. R/H side: Remove the footrest.

15. Remove the front safety belt retractor.
    For additional information, refer to: Front Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).

16. Remove the second row safety belt retractor.
    For additional information, refer to: Second Row Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).

17. Remove the front safety belt buckle.
    For additional information, refer to: Front Safety Belt Buckle (501-20A Safety Belt System, Removal and Installation).

18. L/H side: Remove the rear safety belt buckle.
    For additional information, refer to: Rear Safety Belt Buckle RH - Vehicles With: 60/40 Split Seat (501-20A Safety Belt System, Removal and Installation).

19. R/H side: Remove the rear safety belt buckle.
    For additional information, refer to: Rear Safety Belt Buckle RH - Vehicles With: 60/40 Split Seat (501-20A Safety Belt System, Removal and Installation).

20. Remove the B-Pillar side impact sensor.
    For additional information, refer to: B-Pillar Side Impact Sensor (501-20B Supplemental Restraint System, Removal and Installation).

21. Remove the side air curtain module.
    For additional information, refer to: Side Air Curtain Module (501-20B Supplemental Restraint System, Removal and Installation).

22. Remove the front seat.
    For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).

23. Remove the rear seat.
    For additional information, refer to: Rear Seat (501-10 Seating, Removal and Installation).

24. Remove the roof panel trim.

25. L/H side: Release the roof panel wiring harness.

26. Remove the rocker panel outer trim.

27. Release the rocker panel wiring harness.

28. Remove the facia carrier support panel.

29. Release the A-Pillar wiring harness.

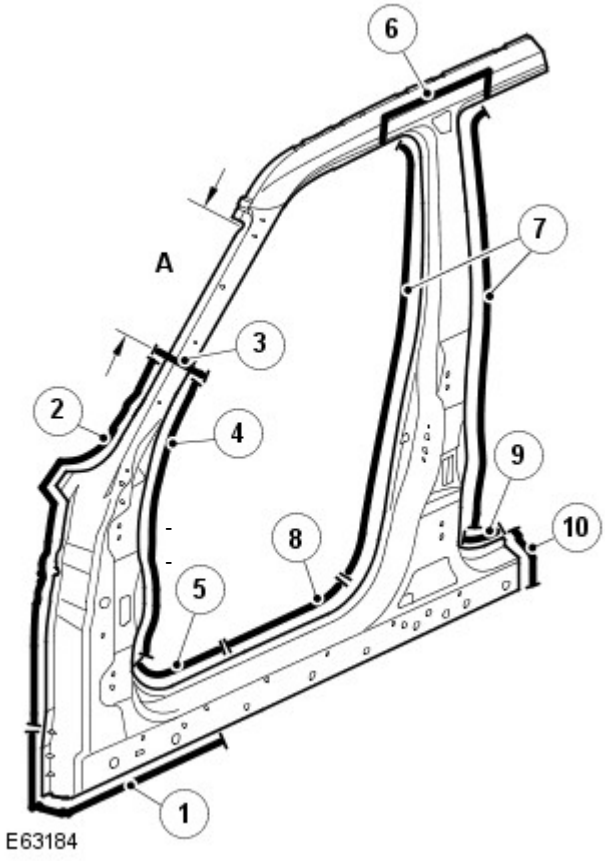
30. Remove the B-Pillar wiring harness.

31. Release the front and back carpet.

32. Remove the insulation from the outer and inner bulkhead.

33. If the panel is not cut exactly where specified in the graphic, then it may be necessary to weld the A-pillar outer panel to a boron inner panel. For specific information regarding the welding of boron steel, refer to general information, body repairs. For additional information, refer to: Body Repairs (501-25A, Description and Operation).

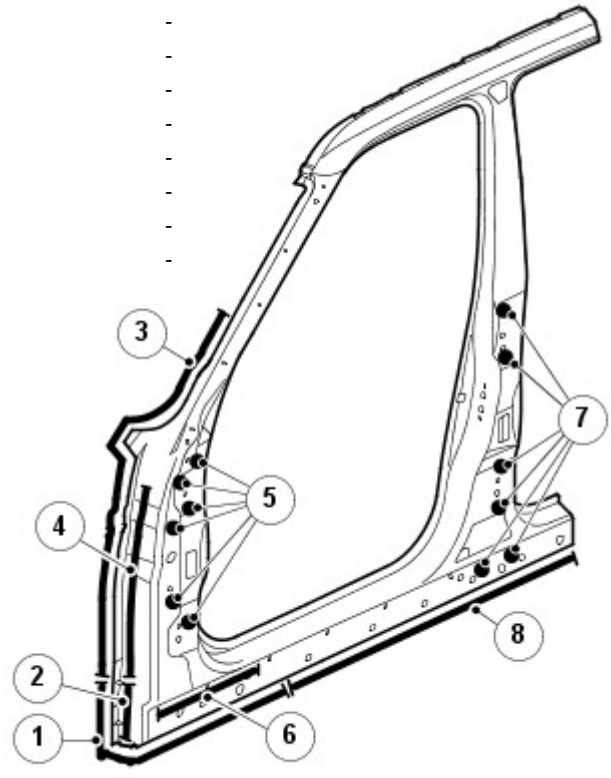
Part Number	Item	Description
-	A	Cut line 380 mm (14.96 inches).
-	1	8 spot welds.
-	2	35 spot welds.
-	3	Butt weld.
-	4	43 spot welds.
-	5	9 spot welds.
-	6	Butt weld.
-	7	81 spot welds.
-	8	26 spot welds.



E63184

34.

Part Number	Item	Description
-	9	8 spot welds.
-	10	Butt weld.

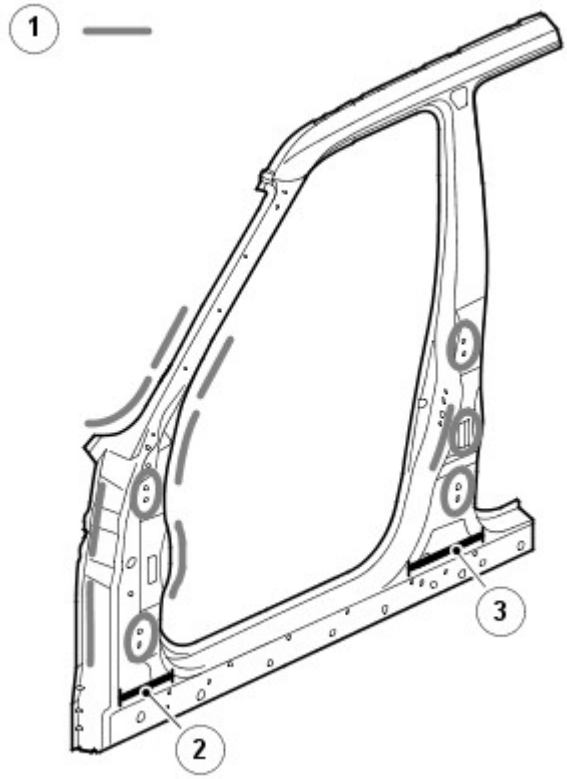


E63185

35.

Part Number	Item	Description
-	1	12 plug welds.
-	2	3 plug welds.
-	3	13 plug welds.
-	4	7 plug welds.
-	5	6 plug welds.
-	6	4 plug welds.
-	7	6 plug welds.
-	8	19 plug welds.

Part Number	Item	Description
-	1	Areas of adhesive.
-	2	Acoustic seal.
-	3	Acoustic seal.



E63186

36. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

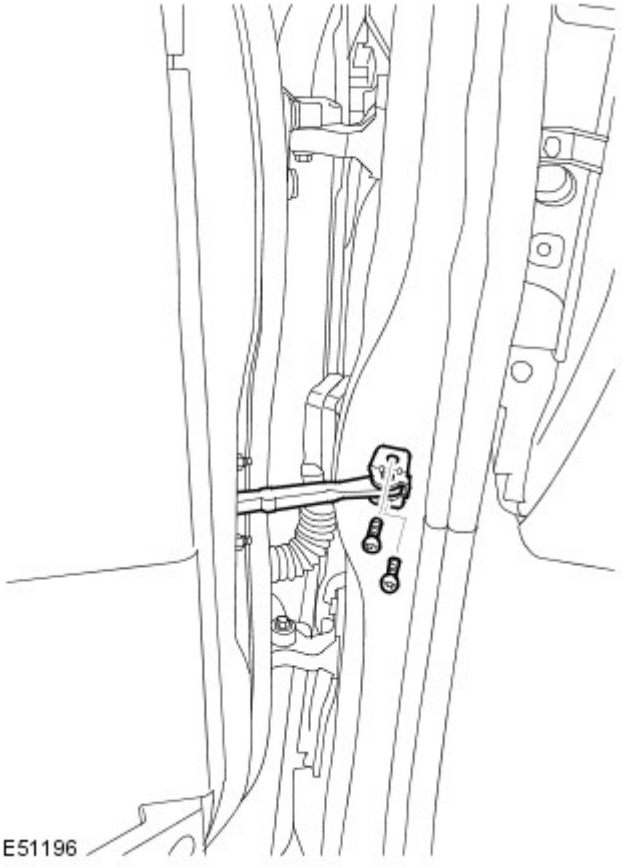
Published: 11-May-2011

Side Panel Sheet Metal Repairs - Rocker Panel

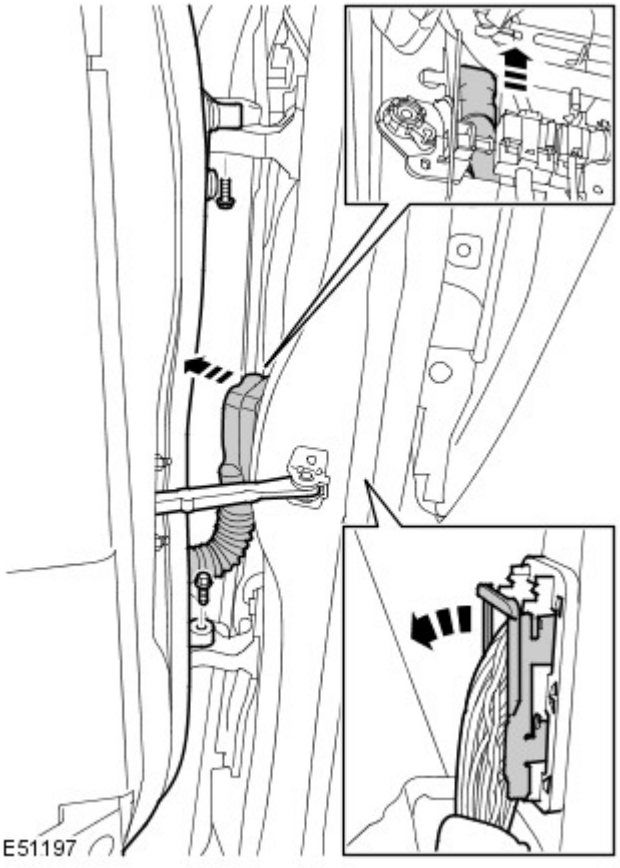
Removal and Installation

Removal

1. Load vehicle onto ramp.
2. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
3. Remove the rear wheel and tire.
4. Remove the rear fender splash shield.
5. Remove the front fender.
   For additional information, refer to: Fender (501-02 Front End Body Panels, Removal and Installation).



6. Release the front door check strap from the A-pillar and release the rear door check strap from the B-pillar.
   - Remove the 2 Torx bolts.
7. Remove the front and rear door assemblies.
   - Disconnect the electrical connector.
   - Release the wiring harness grommet.
   - Release the wiring harness retaining clip.
   - Remove the 2 bolts.



8. Remove the front and rear door weatherstrips.

9. Remove the front seat.
   For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).

10. Remove the rear seat.
    For additional information, refer to: Rear Seat (501-10 Seating, Removal and Installation).

11. Remove the cowl side trim panel.
    For additional information, refer to: Cowl Side Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

12. Release the wiring harness from A-pillar.

13. Remove the front safety belt retractor.
    For additional information, refer to: Front Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).

14. Remove the B-pillar side impact sensor.
    For additional information, refer to: B-Pillar Side Impact Sensor (501-20B Supplemental Restraint System, Removal and Installation).

15. Remove the second row safety belt retractor.
    For additional information, refer to: Second Row Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).

16. Remove the C-pillar side impact sensor.
    For additional information, refer to: C-Pillar Side Impact Sensor (501-20B Supplemental Restraint System, Removal and Installation).

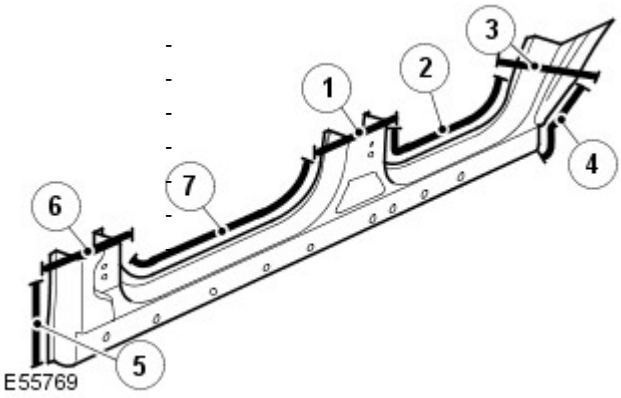
17. Release the carpet away from the area of repair.

18. Release the wiring harness from rocker panel and B-pillar.

19. Remove the rocker panel finisher.

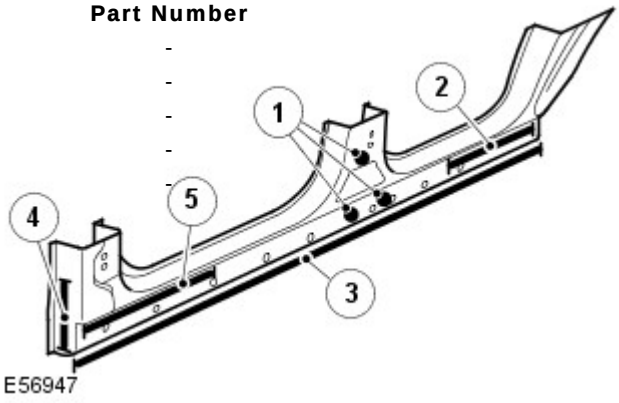
20.

Part Number	Item	Description



Part Number	Item	Description
-	1	Butt weld.
-	2	20 spot-welds.
-	3	Butt weld.
-	4	9 spot welds.
-	5	8 spot welds.
-	6	Butt weld.
-	7	35 spot welds.

21.



Part Number	Item	Description
-	1	3 plug welds.
-	2	3 plug welds.
-	3	38 plug welds.
-	4	3 plug welds.
-	5	4 plug welds.

22. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

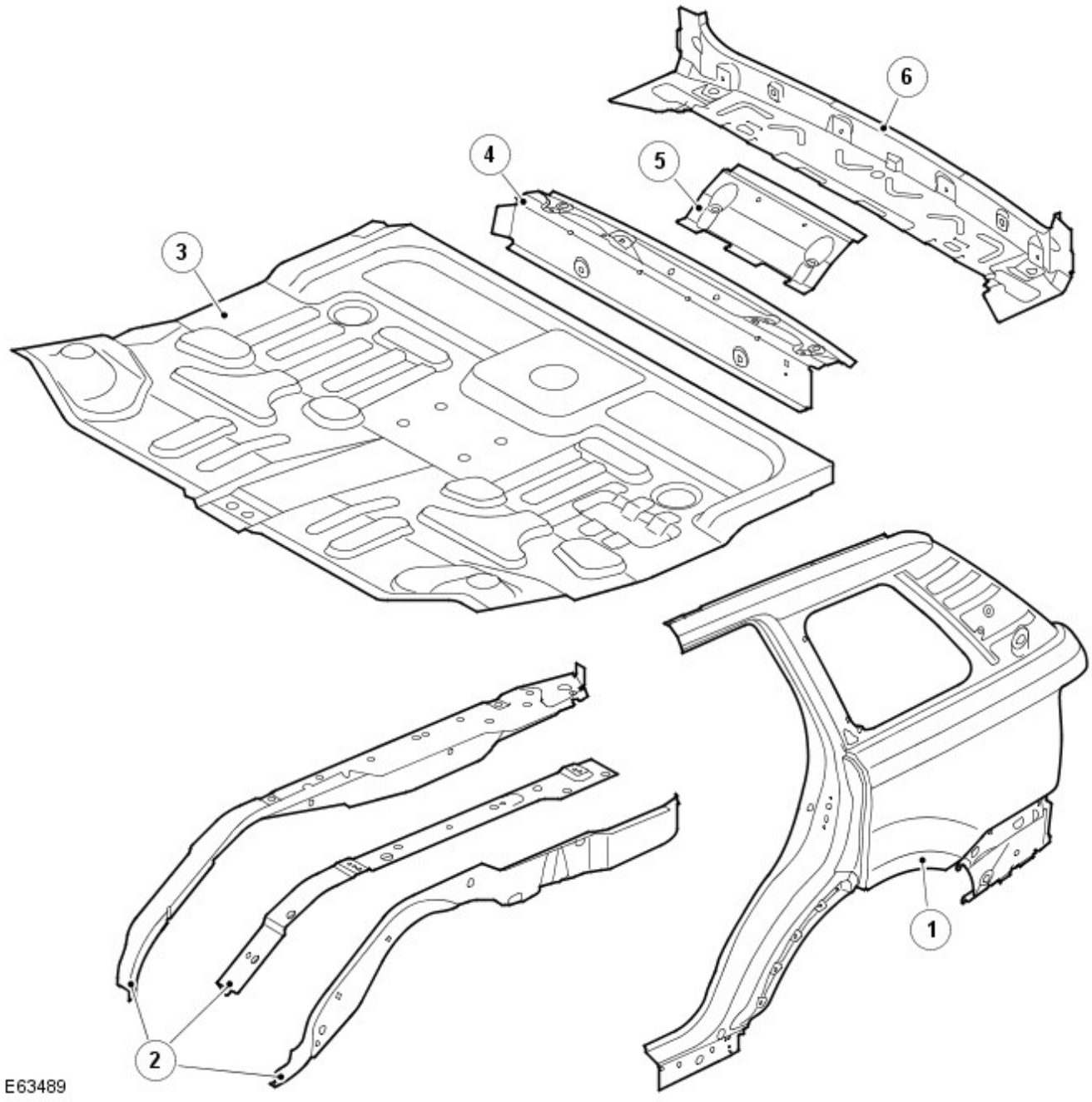
1. Install is the reversal of removal.

Published: 11-May-2011

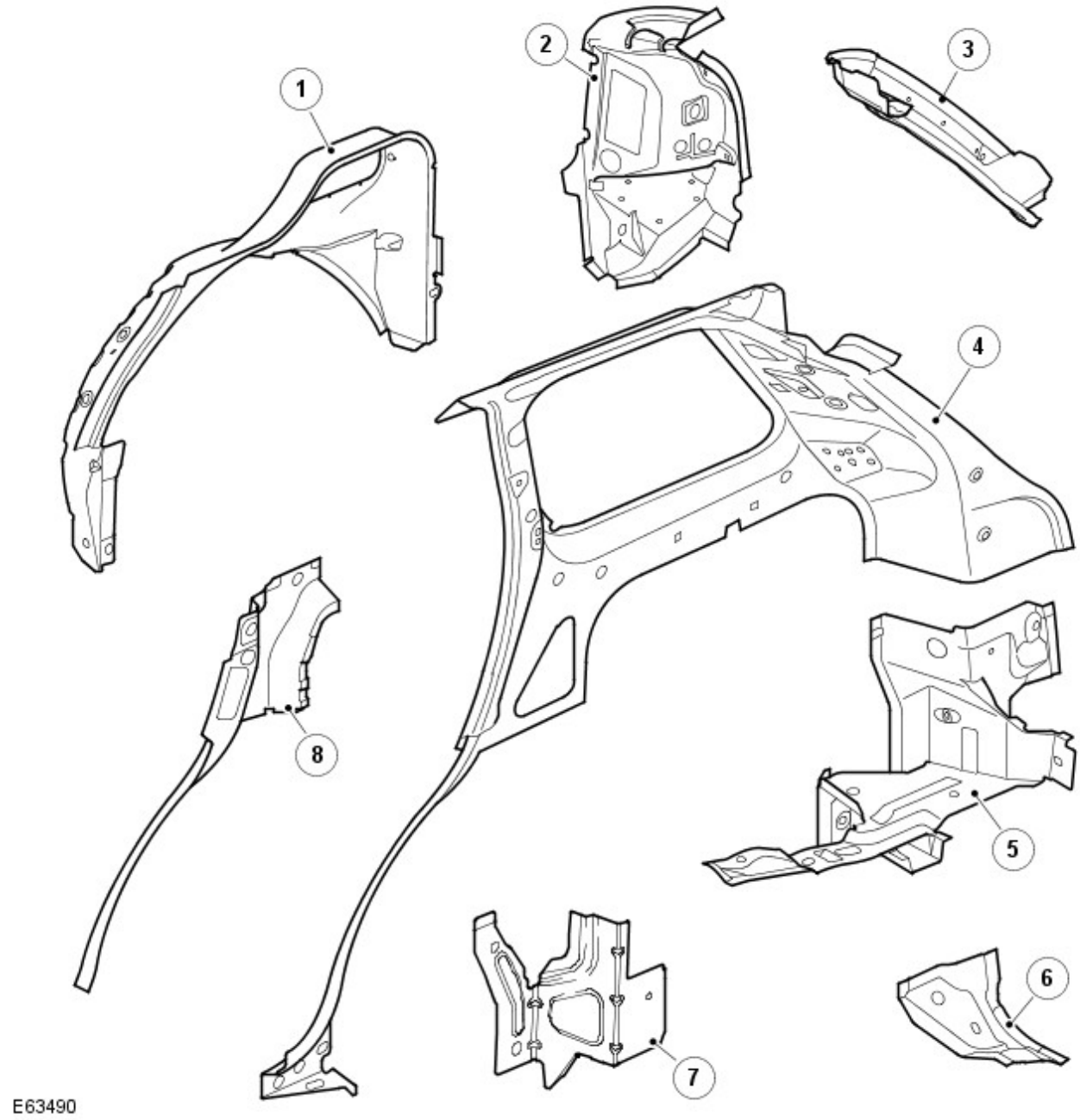
Rear End Sheet Metal Repairs - Rear End Sheet Metal

Description and Operation

Rear end panels



Item	Description
1	Quarter panel outer
2	Rear side members
3	Rear floor panel
4	Rear crossmember
5	Rear panel reinforcement
6	Rear panel



Item	Description
1	Rear wheelhouse outer
2	Rear lamp mounting panel
3	Water drain panel
4	Quarter/side panel rear section
5	D-pillar inner lower panel assembly
6	D-pillar closing panel
7	D-pillar inner lower panel
8	Inner quarter panel

Time schedules, rear end

The following information shows the total time taken to replace single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim (MET) items, plus paint times based on Metallic Clear Over Base Paint.

The times shown were generated by Thatcham (the motor insurance repair and research centre) and are to be used as a guide only.

Single panel times

Panel Description	Total Time
Tailgate	7.2
Quarter panel L/H	23.1
Quarter panel R/H	23.8

Combination panel replacement times

The following panel combination times show the total time to remove/refit body panels, MET items and any paint process.

Combination panel times

Panel Description	Petrol	Diesel
Rear bumper		
D-pillar closing panel		
Quarter panel		
Rear lamp panel		
Total Time	**L/H 33.1 R/H 34.3**	**L/H 33.1 R/H 34.3**

Combination panel times

Panel Description	Petrol	Diesel
Rear bumper		
D-pillar closing panel L/H and R/H		
Quarter panel L/H and R/H		
Rear lamp panel L/H and R/H		
Rear panel		
Total Time	**57**	**57**

Combination panel times

Panel Description	Petrol	Diesel
Body off integrated frame		
Rear Floor Panel Section		
Rear bumper		
Rear side member		
Rear crossmember		
D-pillar inner lower panel assembly		
D-pillar closing panel		
D-pillar inner lower panel L/H and R/H		
Quarter panel		
Rear lamp mounting panel		
Rear panel		
Total Time	**L/H 59.3 R/H 60.3**	**L/H 59.5 R/H 60.5**

Combination panel times

Panel Description	Petrol	Diesel
Body off integrated frame		
Rear Floor Panel Section		
Rear bumper		
Rear side member L/H and R/H		
Rear crossmember		
D-pillar inner lower panel assembly L/H and R/H		
D-pillar closing panel L/H and R/H		
D-pillar inner lower panel L/H and R/H		
Quarter panel L/H and R/H		
Rear lamp mounting panel L/H and R/H		
Rear panel		
Total Time	**81.2**	**81.4**

Combination panel times

Panel Description	Petrol	Diesel
Rear bumper		
D-pillar inner lower panel assembly L/H and R/H		
D-pillar closing panel L/H and R/H		
D-pillar inner lower panel L/H and R/H		
Quarter panel		
Rear lamp mounting panel		
Rear panel		
Total Time	**L/H 43.6 R/H 44.6**	**L/H 43.6 R/H 44.6**

Combination panel times

Panel Description	Petrol	Diesel
Rear bumper		
Rear crossmember		
D-pillar inner lower panel L/H and R/H		
Rear panel		
Total Time	**22.9**	**22.9**

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Rear End Sheet Metal Repairs - Quarter Panel

Removal and Installation

Removal

1. Load vehicle onto ramp.
2. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
3. Remove rear wheel and tire.
4. Remove rear bumper cover.
   For additional information, refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).
5. Remove forced air extraction grille.
6. Remove rear fender splash shield.
7. R/H side: Remove fuel tank. For additional information, refer to:
   Fuel Tank (310-01A Fuel Tank and Lines - 4.2L, Removal and Installation),
   Fuel Tank (310-01B Fuel Tank and Lines - 4.4L, Removal and Installation),
   Fuel Tank (310-01C Fuel Tank and Lines - 2.7L (TdV6) Diesel, Removal and Installation).
8. R/H side: Remove the fuel tank filler pipe. For additional information, refer to:
   Fuel Tank Filler Pipe (310-01A Fuel Tank and Lines - 4.2L, Removal and Installation),
   Fuel Tank Filler Pipe (310-01B Fuel Tank and Lines - 4.4L, Removal and Installation),
   Fuel Tank Filler Pipe (310-01C Fuel Tank and Lines - 2.7L (TdV6) Diesel, Removal and Installation).
9. R/H side: Remove the fuel filler interlock catch.
   For additional information, refer to: Fuel Filler Interlock Catch (501-03 Body Closures, Removal and Installation).
10. Remove the headliner.
    For additional information, refer to: Headliner (501-05 Interior Trim and Ornamentation, Removal and Installation).
11. Remove the second row safety belt retractor.
    For additional information, refer to: Second Row Safety Belt Retractor (501-20A Safety Belt System, Removal and Installation).
12. Remove the rear seat.
    For additional information, refer to: Rear Seat (501-10 Seating, Removal and Installation).
13. Remove the C-pillar side impact sensor.
    For additional information, refer to: C-Pillar Side Impact Sensor (501-20B Supplemental Restraint System, Removal and Installation).
14. Remove the side air curtain module.
    For additional information, refer to: Side Air Curtain Module (501-20B Supplemental Restraint System, Removal and Installation).
15. Remove the rear door latch.
    For additional information, refer to: Rear Door Latch (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).
16. Remove the quarter light.
    For additional information, refer to: Rear Quarter Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).

17. Remove rocker panel finisher.

18. Remove the exhaust heatshield.

19. Remove the tailgate latch.
    For additional information, refer to: Liftgate Latch (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

20. Remove tailgate weatherstrip.

21. With assistance remove the tailgate.

22. Remove the rear quarter trim panel.
    For additional information, refer to: Rear Quarter Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

23. Remove the load space trims.

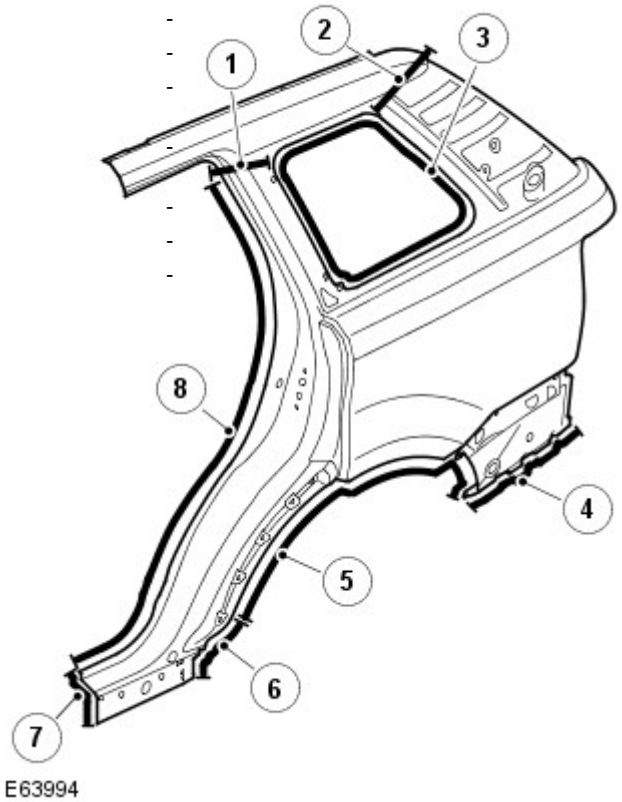
24. Remove the load space carpets.

25. Remove the loadspace scuff plate trim panel.
    For additional information, refer to: Loadspace Scuff Plate Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

26. Release wiring harness.

27.

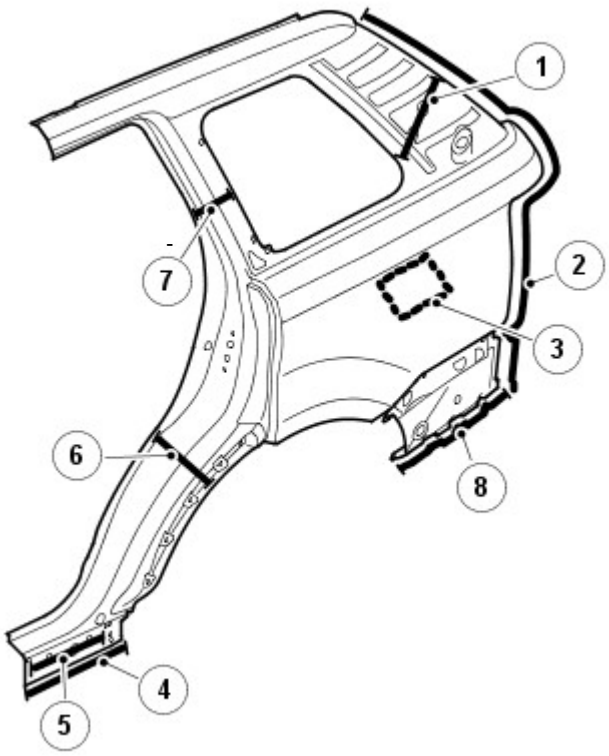
Part Number	Item	Description
-	1	Butt weld.
-	2	Butt weld.
-	3	45 spot welds.
-	4	6 spot welds and adhesive.
-	5	31 spot welds and adhesive.
-	6	9 spot welds.
-	7	Butt weld.
-	8	50 spot welds.



E63994

28.

Part Number	Item	Description
-	1	Acoustic seal.
-	2	30 plug welds.
-	3	Acoustic seal R/H.
-	4	7 plug welds and adhesive.
-	5	3 plug welds.
-	6	Acoustic seal.
-	7	Acoustic seal.



E63995

-		8	Adhesive.

29. Welding.
    For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    Corrosion protection.
    For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    Tolerance checks.
    For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal

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Rear End Sheet Metal Repairs - Inner Quarter Panel

Removal and Installation

Removal

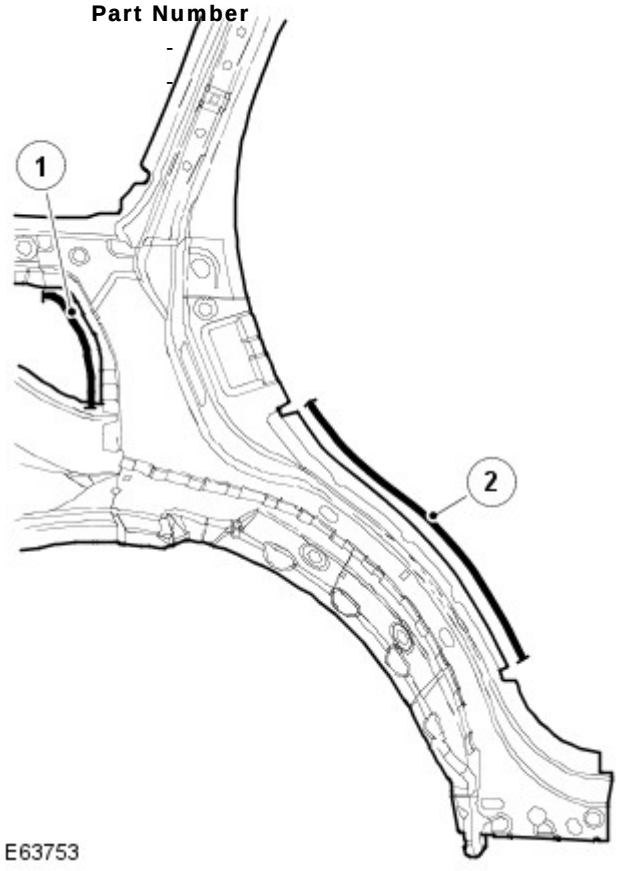
NOTE: In this procedure, the inner quarter panel is replaced in conjunction with the quarter panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30, Removal and Installation).

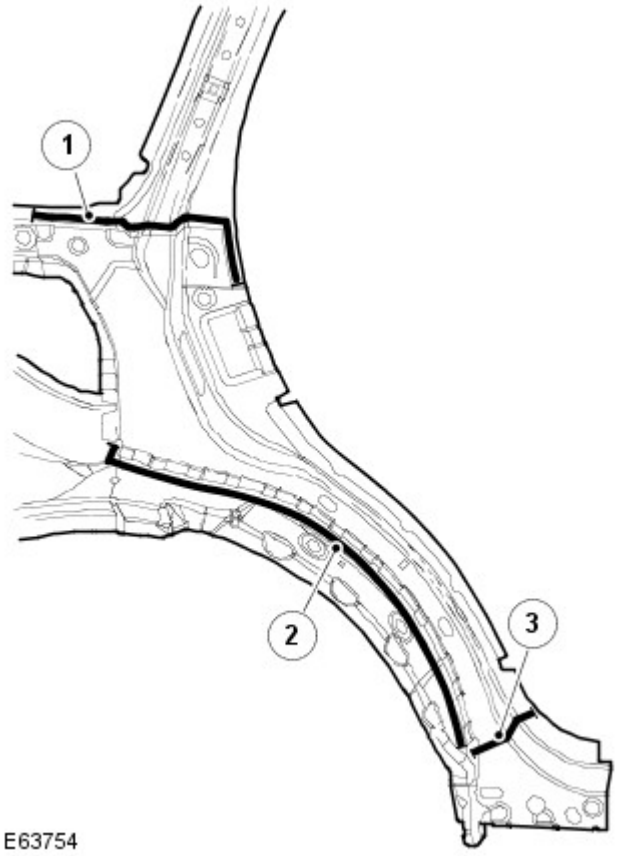
3.

Part Number	Item	Description
-	1	5 spot welds.
-	2	23 spot welds.



4.

Part Number	Item	Description
-	1	7 plug welds.
-	2	8 plug welds.
-	3	Butt Weld



5. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26, Description and Operation).

Installation

1. Install is the reversal of removal.

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Rear End Sheet Metal Repairs - Rear Inner Quarter Panel

Removal and Installation

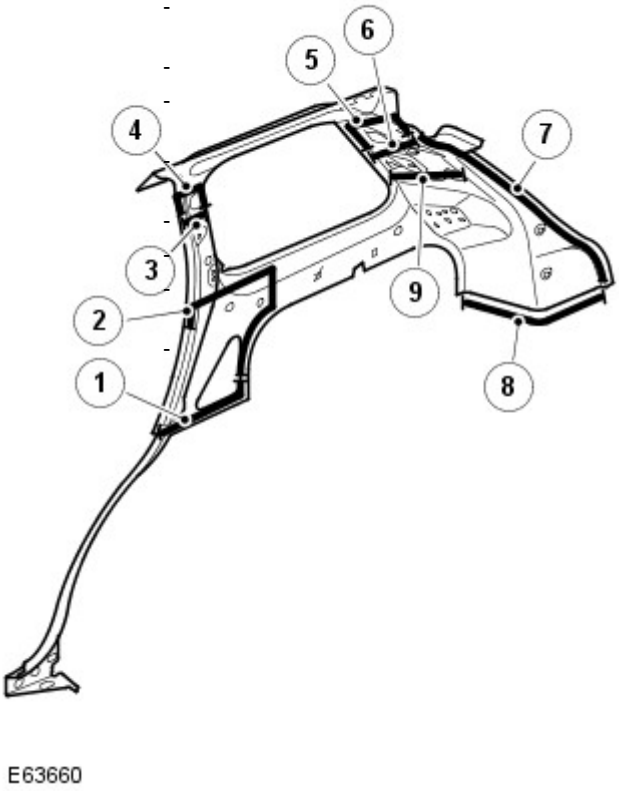
Removal

NOTE: In this procedure the inner quarter panel is replaced in conjunction with the quarter panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

3.

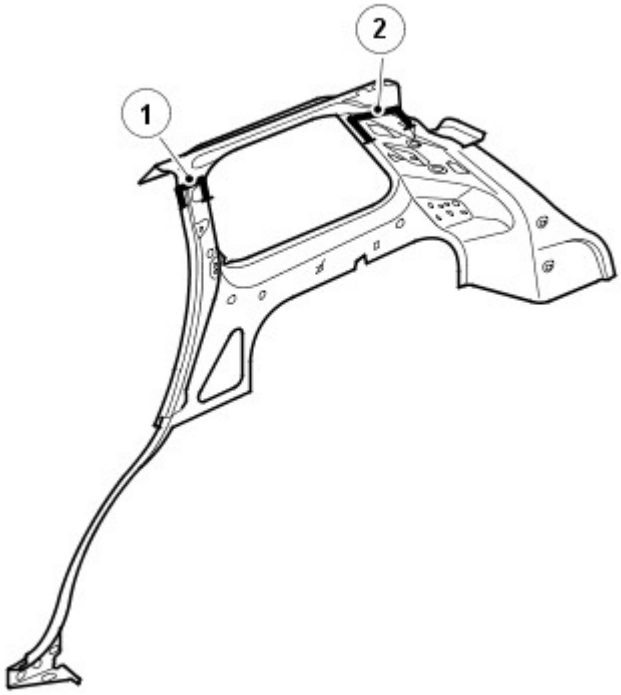


E63660

Part Number	Item	Description
-	1	5 plug welds.
-	2	7 plug welds and 5 spot welds.
-	3	Butt weld.
-	4	Butt weld and 4 spot welds.
	5	Butt weld and 4 spot welds.
-	6	Butt weld.
-	7	20 spot welds.
-	8	Butt weld and 8 spot welds.
-	9	Adhesive.

4.

Part Number	Item	Description
-	1	Acoustic seal.
-	2	Acoustic seal.



E63814

5. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Rear End Sheet Metal Repairs - Water Drain Panel

Removal and Installation

Removal

NOTES:

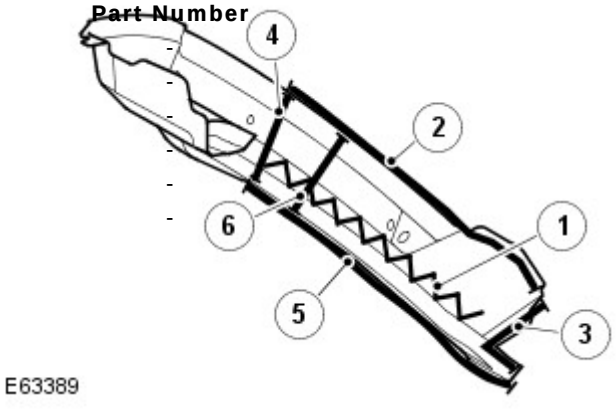
In this procedure, the water drain panel is replaced in conjunction with the quarter panel.

In this procedure, the bulkcut assists in a water drain panel repair by allowing closer access to the area of the panel to be repaired.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

3.



Part Number	Item	Description
-	1	Bulkcut.
-	2	12 plug-welds.
-	3	3 plug-welds.
-	4	Butt weld.
-	5	20 spot-welds.
-	6	Acoustic seal.

4. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

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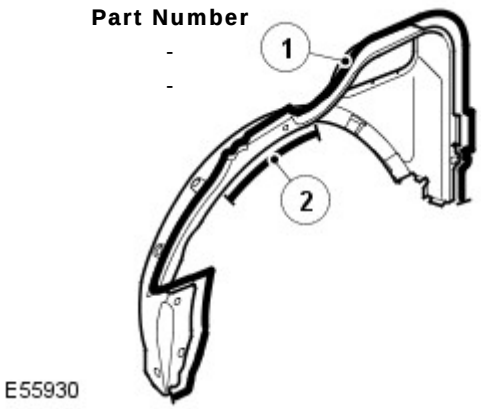
Rear End Sheet Metal Repairs - Rear Wheelhouse Outer

Removal and Installation

Removal

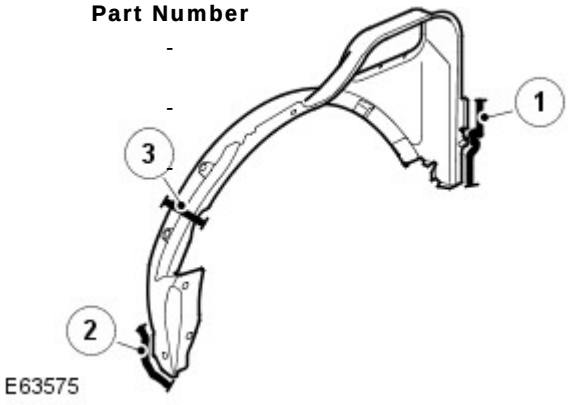
NOTE: In this procedure, the rear wheelhouse outer is replaced in conjunction with the quarter panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00, Specifications).
2. Disconnect the parking brake cables. For additional information, refer to: (206-05)
   Parking Brake Cable LH (Removal and Installation),
   Parking Brake Cable RH (Removal and Installation).
3. Remove the brake line.
4. Remove the rear suspension.
   For additional information, refer to: Rear Suspension (204-02, Description and Operation).
5. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30, Removal and Installation).
6.



Part Number	Item	Description
-	1	60 spot welds.
-	2	10 spot welds.

7.



Part Number	Item	Description
-	1	160mm (6.29 inches) adhesive.
-	2	2 plug welds and 5 spot welds.
-	3	Acoustic seal.

8. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26, Description and Operation).

Installation

1. Install is the reversal of removal.

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Rear End Sheet Metal Repairs - Rear Lamp Mounting Panel

Removal and Installation

Removal

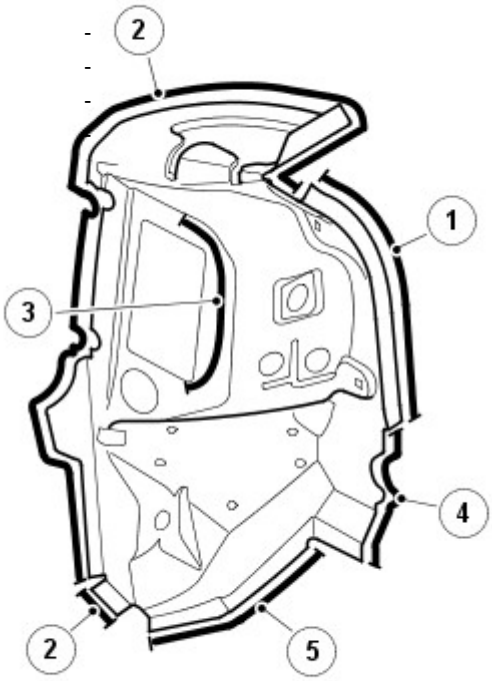
NOTE: In this procedure, the rear lamp mounting panel is replaced in conjunction with the quarter panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00, Specifications).

2. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30, Removal and Installation).

3.

Part Number	Item	Description
-	1	8 spot welds and adhesive.
-	2	21 plug welds.
-	3	7 plug welds.
-	4	3 plug welds.
-	5	7 spot welds.



E63755

4. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26, Description and Operation).

Installation

1. Install is the reversal of removal.

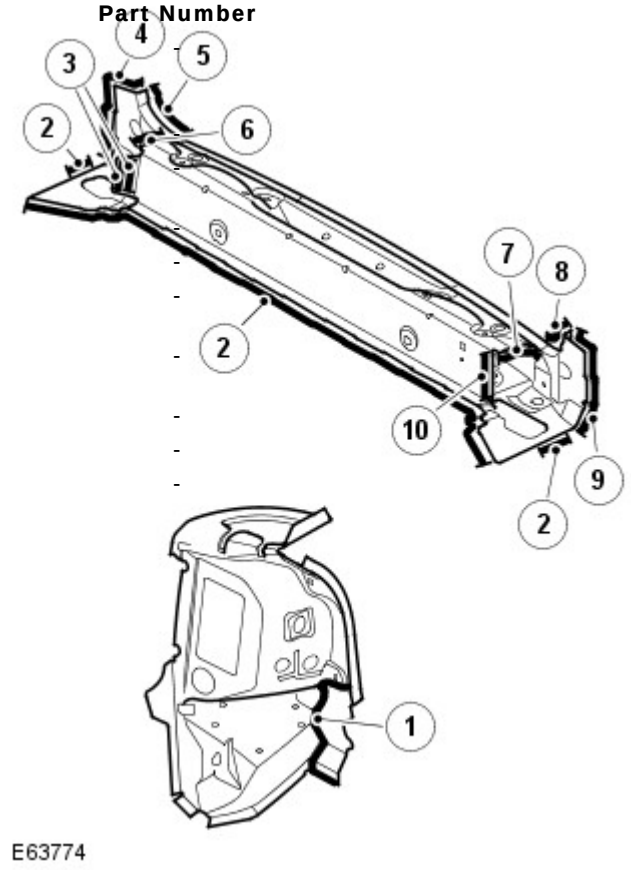
Published: 11-May-2011

Rear End Sheet Metal Repairs - Back Panel

Removal and Installation

Removal

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).
2. Remove the rear bumper cover.
   For additional information, refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).
3. Remove the rear D-pillar trim panels.
   For additional information, refer to: D-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
4. Remove the tailgate hinge trim cover.
5. Remove the tailgate weather seal.
6. Remove the loadspace scuff plate trim panel.
   For additional information, refer to: Loadspace Scuff Plate Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
7. Remove the loadspace carpets.
8. With assistance, remove the tailgate.
9. Remove the L/H exhaust tailpipe heatshield.
10. Remove the R/H exhaust tailpipe heatshield.
11. Remove the spare wheel and tire.
12. Release the back panel wiring harness.
13.



Part Number	Item	Description
-	1	Butt weld. (R/H is symmetrically opposite to L/H).
-	2	24 Plug welds.
-	3	2 plug welds and adhesive.
-	4	3 plug welds.
-	5	7 spot welds.
-	6	Mig weld and 1 spot weld.
-	7	Mig weld and 1 spot weld.
-	8	7 spot welds.
-	9	3 plug welds.
-	10	2 plug welds and adhesive.

14. For additional information:
    - Welding.

For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).

- Corrosion protection.
  For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
- Tolerance checks.
  For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

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Rear End Sheet Metal Repairs - Rear Floor Panel Section

Removal and Installation

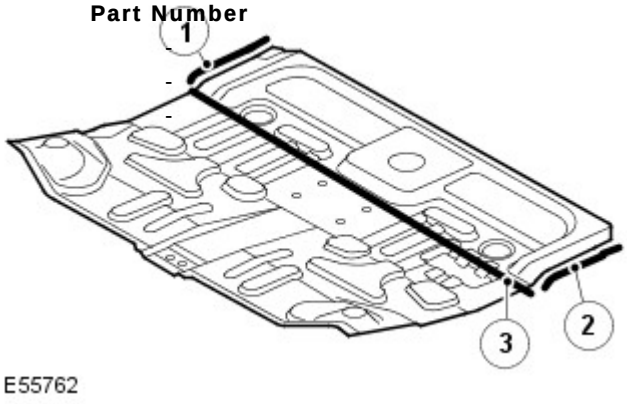
Removal

NOTE: In this procedure, the floor panel section is replaced in conjunction with the back panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the back panel.
   For additional information, refer to: Back Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

3.



E55762

Part Number	Item	Description
-	1	Mig-weld.
-	2	Mig-weld.
-	3	Mig-weld and 18 plug welds.

4. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Rear End Sheet Metal Repairs - Rear Side Member Section

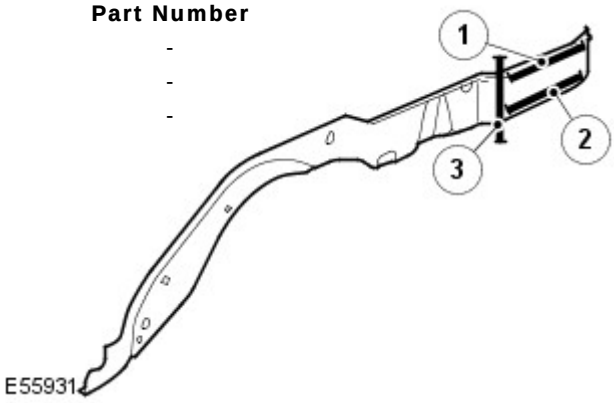
Removal and Installation

Removal

NOTE: In this procedure, the rear side member section is replaced in conjunction with the back panel and rear crossmember.

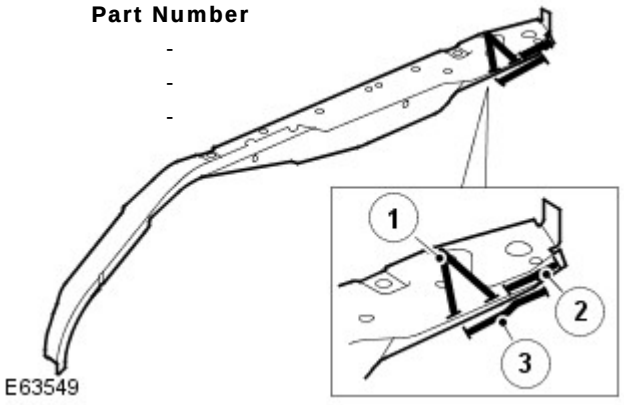
1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00, Specifications).
2. Remove the back panel.
   For additional information, refer to: Back Panel (501-30, Removal and Installation).
3. Remove the rear crossmember.
   For additional information, refer to: Rear Crossmember (501-30, Removal and Installation).
4.

Part Number	Item	Description
-	1	2 plug welds.
-	2	2 plug welds.
-	3	Butt weld.



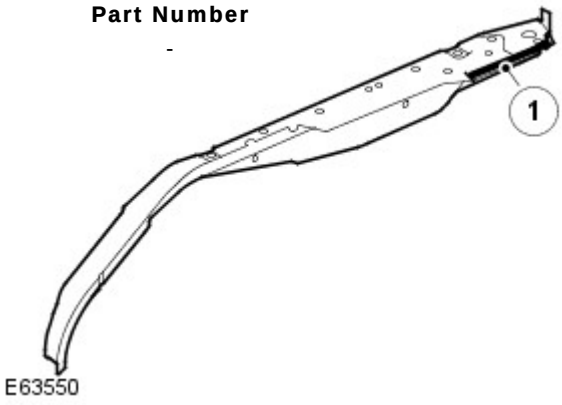
5.

Part Number	Item	Description
-	1	Butt weld.
-	2	2 plug welds.
-	3	4 plug welds.



6.

Part Number	Item	Description
-	1	Butt weld.



7. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A, Description and Operation).
   - Corrosion protection.

For additional information, refer to: Corrosion Protection (501-25B, Description and Operation).

- Tolerance checks.
  For additional information, refer to: Body and Frame (501-26, Description and Operation).

Installation

1. Install is the reverse of removal.

Published: 11-May-2011

Rear End Sheet Metal Repairs - D-Pillar Inner Lower Panel

Removal and Installation

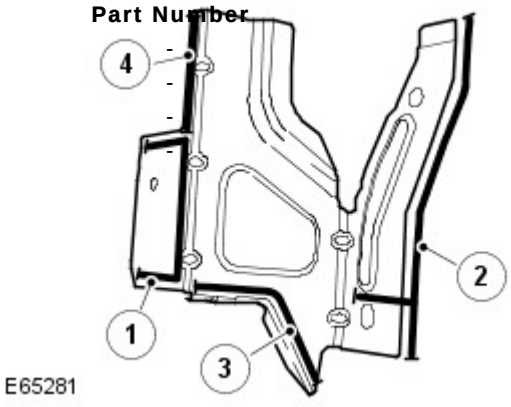
Removal

NOTE: In this procedure the D-pillar inner lower panel is replaced in conjunction with the quarter panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

3.



Item	Description
1	6 plug welds.
2	7 spot welds.
3	5 spot welds.
4	3 spot welds.

4. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Rear End Sheet Metal Repairs - D-Pillar Closing Panel

Removal and Installation

Removal

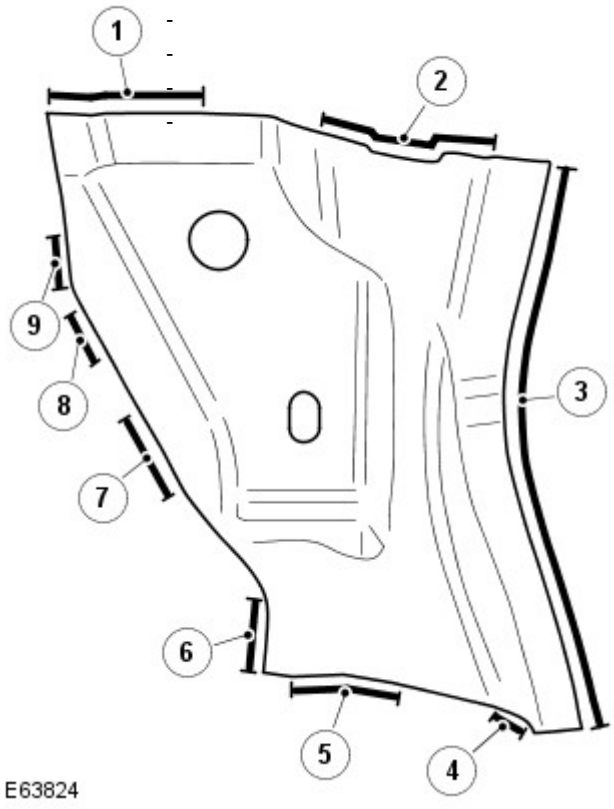
NOTE: In this procedure the D-pillar closing panel is replaced in conjunction with the quarter panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

3.

Part Number	Item	Description
-	1	Mig weld.
-	2	1 plug weld.
-	3	7 spot welds.
-	4	1 spot weld.
-	5,6,7,8,9	Mig weld.



4. For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reversal of removal.

Published: 11-May-2011

Rear End Sheet Metal Repairs - D-Pillar Inner Lower Panel Assembly

Removal and Installation

Removal

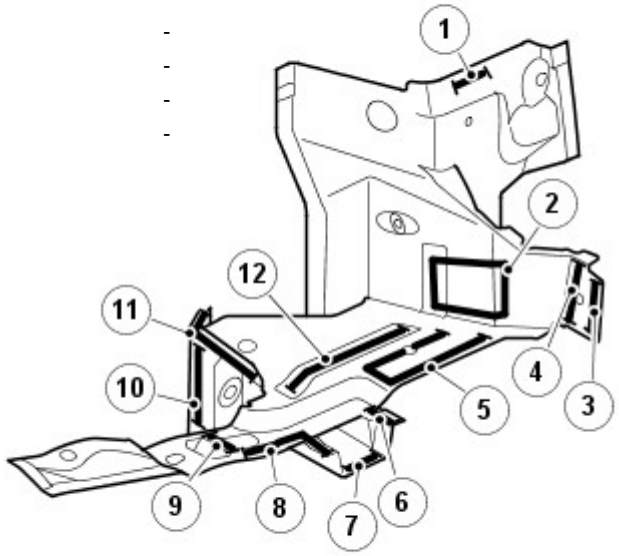
NOTE: In this procedure the D-pillar inner lower panel is replaced in conjunction with the quarter panel.

1. Disconnect both battery cables.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. Remove the quarter panel.
   For additional information, refer to: Quarter Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

3.

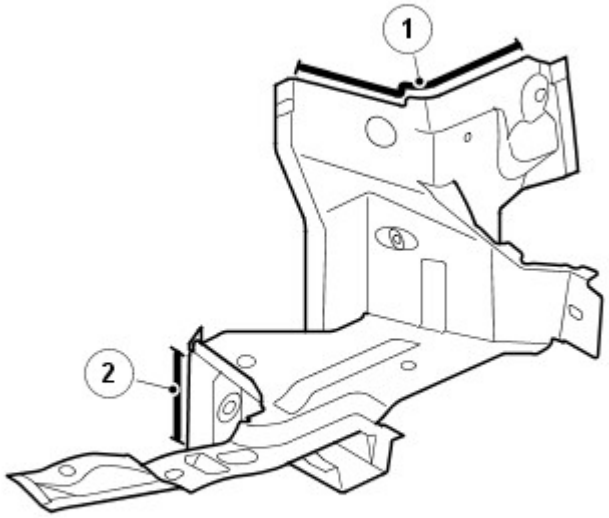
Part Number	Item	Description
-	1	Mig weld.
-	2	8 plug welds.
-	3, 4	2 plug welds.
-	5, 6, 7, 8	11 plug welds.
-	9	Butt weld.
-	10	Adhesive.
-	11	Mig weld.
-	12	6 plug welds.



E63815

4.

Part Number	Item	Description
-	1	9 spot welds.
-	2	4 spot welds.



E63816

5. For additional information:
    - Welding.
      For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
    - Corrosion protection.
      For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
    - Tolerance checks.
      For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

Installation

1. Install is the reverse of removal.

Published: 11-May-2011

Full Frame and Body Mounting -

Torque Specifications

Description	Nm	lb-ft
HO2s harness bracket bolt	10	7
Transmission support crossmember nuts and bolts	90	66
Transmission support insulator through-bolt	175	129
Transmission undershield bolts	10	7
*Integrated-body frame to body bolts	133	98

* New bolts must be installed

Published: 25-Nov-2011

Full Frame and Body Mounting - Tow Bar Mounting Check

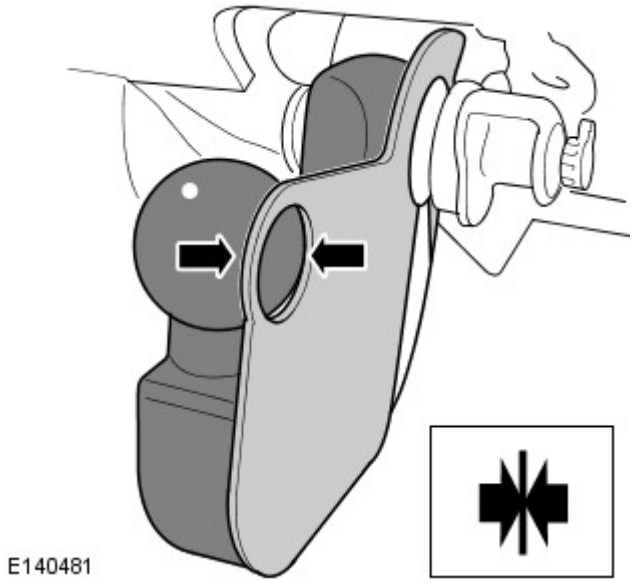
General Procedures

Special Tool(s)

 E140509	Tow Bar Gauge JLR-501-201

1. **Pre test:** Check the detachable tow bar locking pin is moving freely without sticking.

2. Insert the tow bar into the chassis following the owners handbook instruction.


E140481

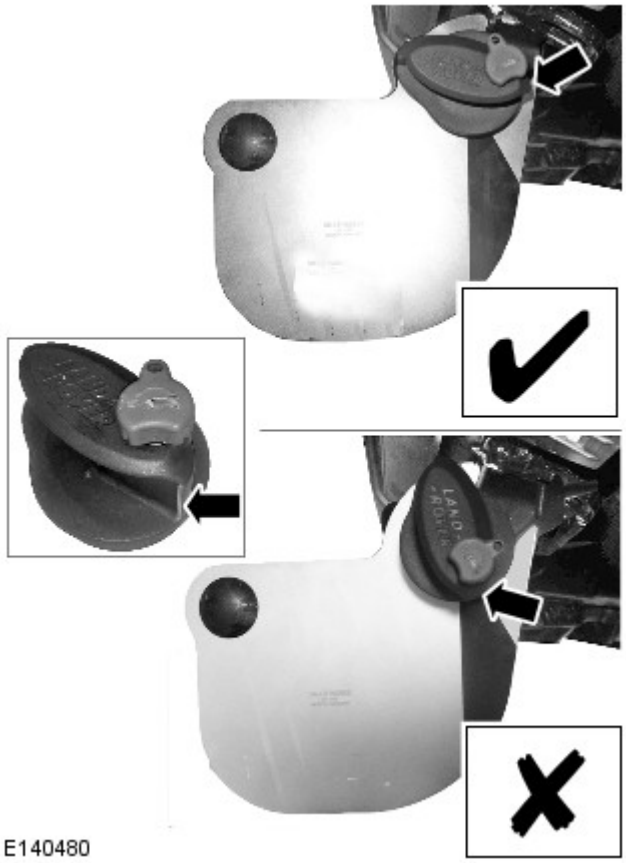
3. CAUTION: The special tool must be flat against the tow bar ball before taking measurements.

   Hold the special tool JLR-501-201 against the tow bar as shown, failure to follow this instruction may result in an incorrect measurement.

4. CAUTION: Make sure the special tool is mounted flush to the tow ball.

   NOTE: Note the position of the tow bar release handle.

   Install the special tool as shown.



5. Check the position of the tow bar release handle against the special tool, and observe the following:
    - If the tow bar release handle points to the red area of the special tool, go to Step 6.
    - If the tow bar release handle points outside of the red area of the special tool, then the tow bar mounting is correct and no further action is required.

6. Install a new tow bar and check the tow bar mounting following Steps 3 - 5.
    - If the tow bar release handle points to the red area of the special tool, install a new rear crossmember.
      For additional information, refer to: Rear Crossmember (502-02, Removal and Installation).

Published: 24-May-2013

Full Frame and Body Mounting - Body TDV6 3.0L Diesel

Removal and Installation

Removal

NOTES:

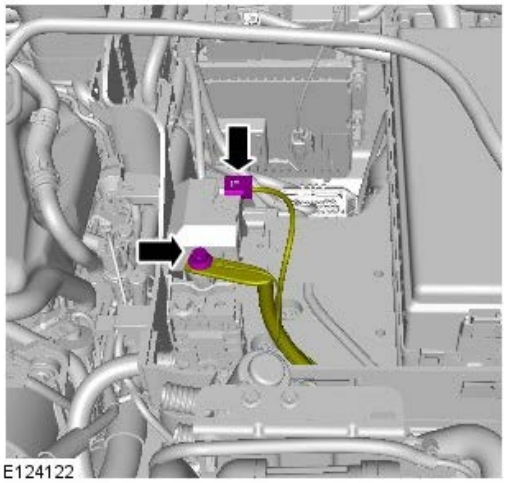
Some variation in the illustrations may occur, but the essential information is always correct.

Some illustrations may show the engine removed for clarity.

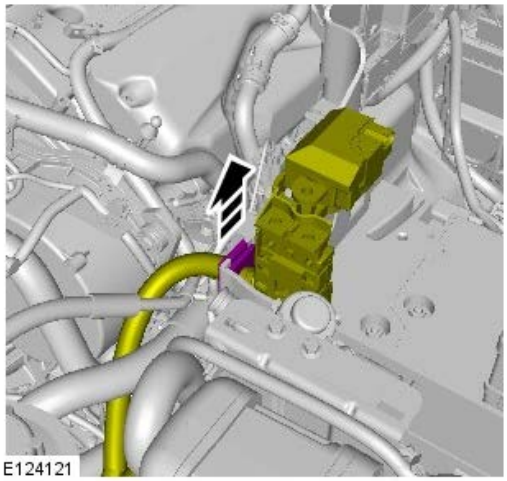
All vehicles

1. Remove the battery.
   For additional information, refer to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

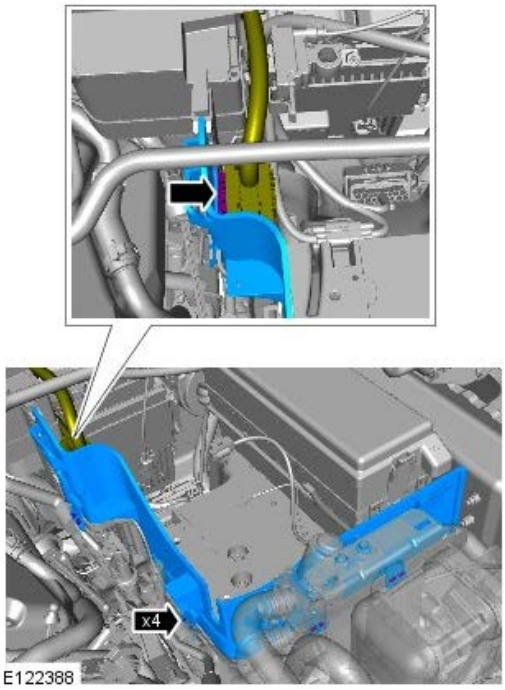
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E124122

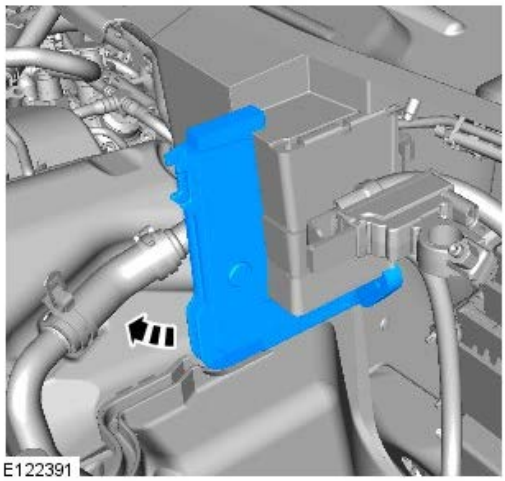
3.


E124121

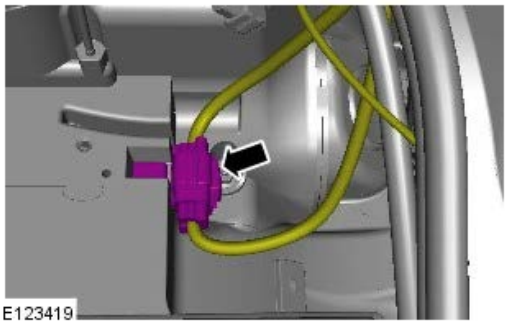
4. NOTE: RHD illustration shown, LHD is similar.



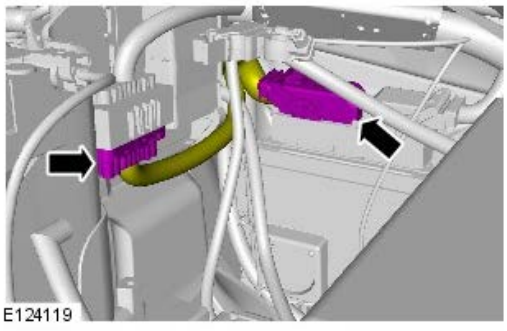
5.



6.



7.



8. For additional information, refer to: Air Cleaner (303-12A Intake Air Distribution and Filtering - TDV6 3.0L Diesel, Removal and Installation).

9. For additional information, refer to: Coolant Expansion Tank (303-03A Engine Cooling -

TDV6 3.0L Diesel, Removal and Installation).

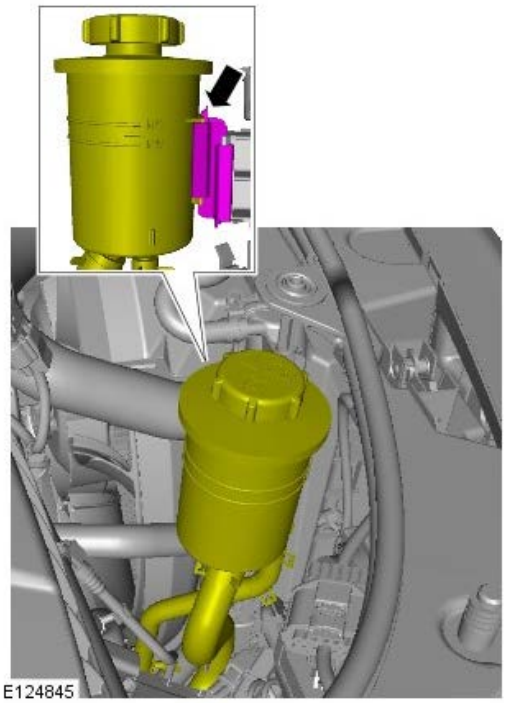
10.

11. For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

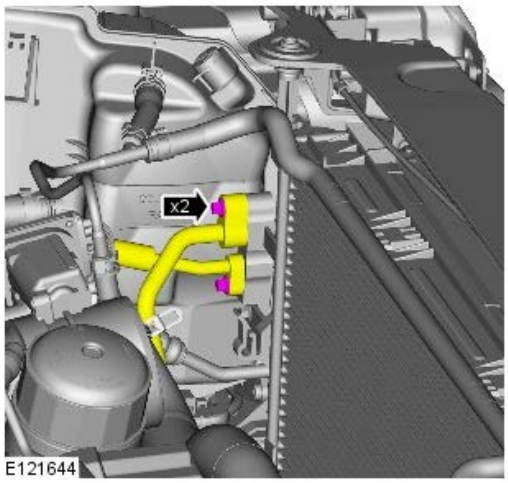
12.

Vehicles with active damping

13.



All vehicles

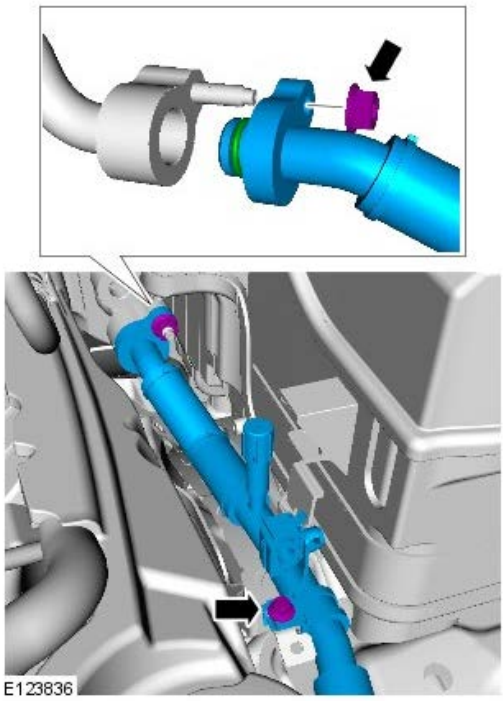


14. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

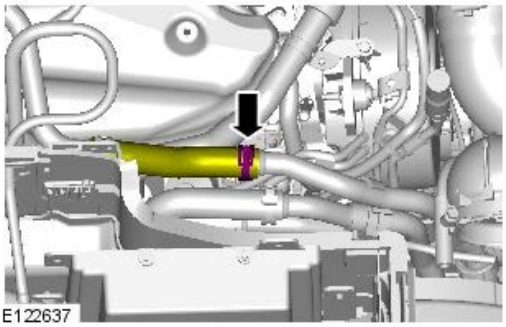
- Remove and discard the 2 O-ring seals.

15. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

- Discard the O-ring seal.

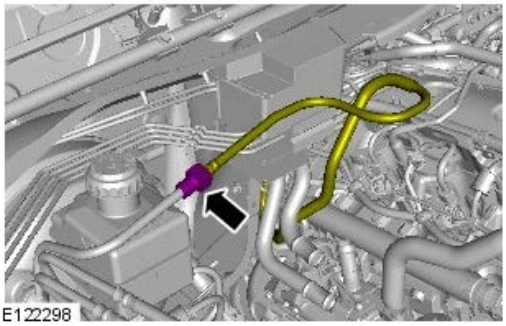


16. WARNING: Be prepared to collect escaping fluid.

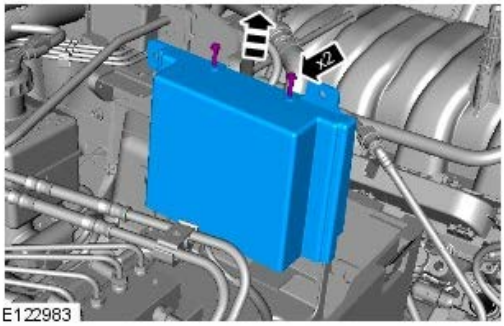


17. For additional information, refer to: Auxiliary Battery Tray (414-01 Battery, Mounting and Cables, Removal and Installation).

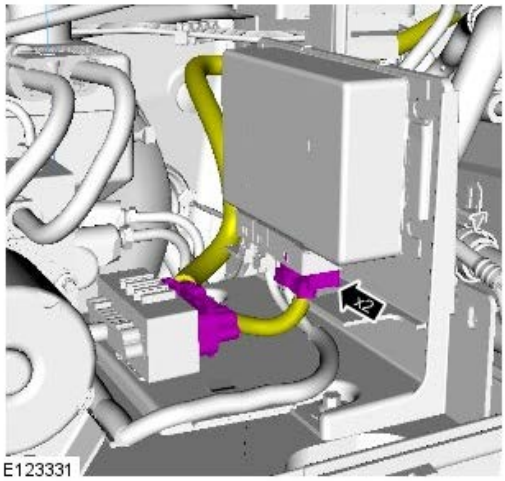
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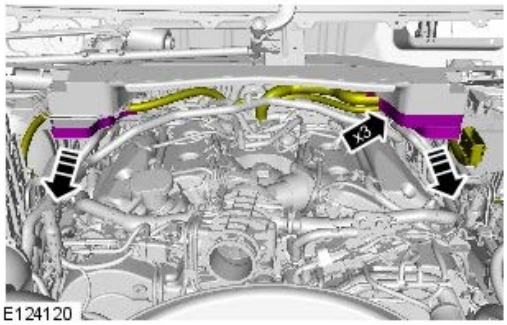
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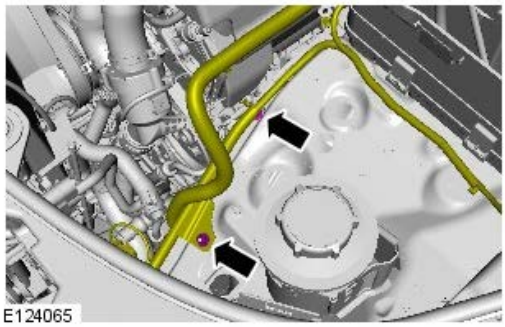
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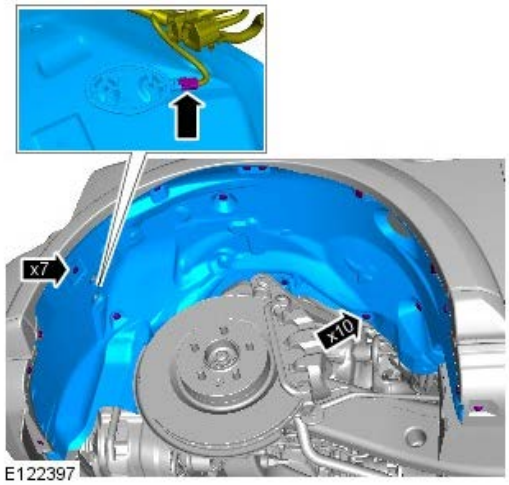
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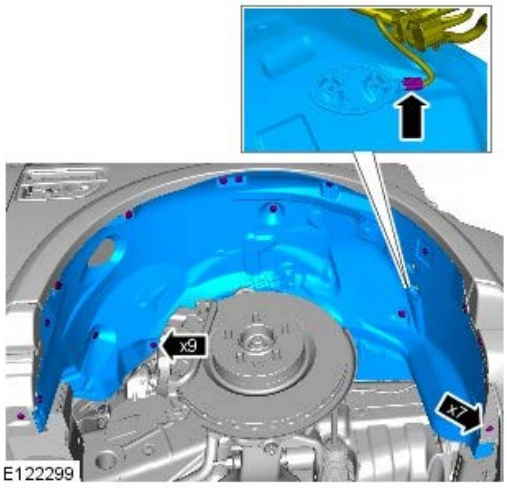
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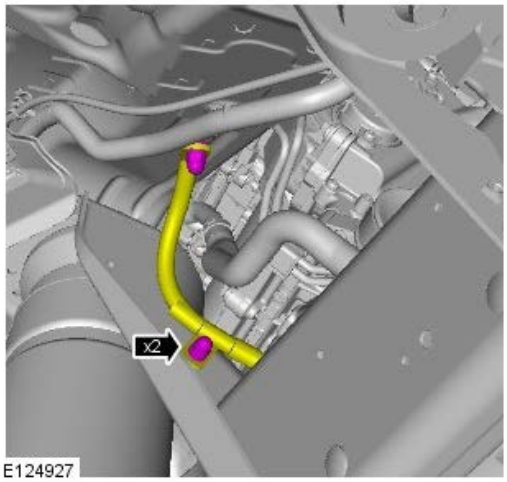
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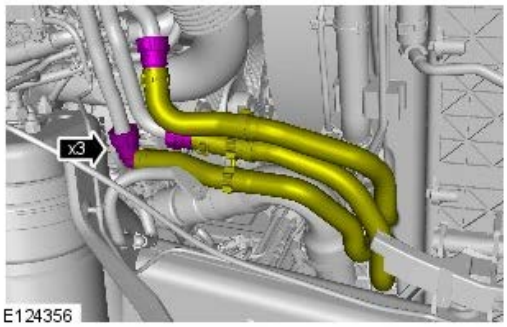
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25.

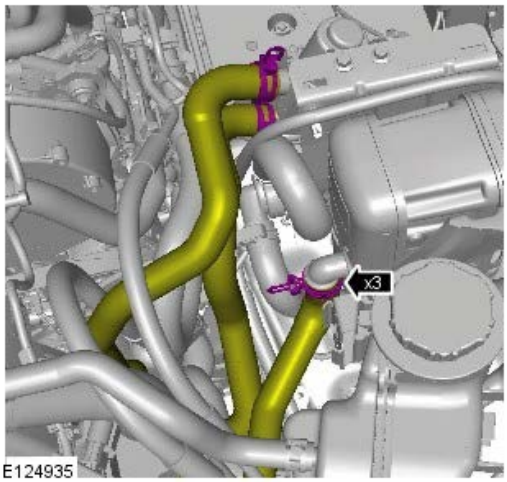


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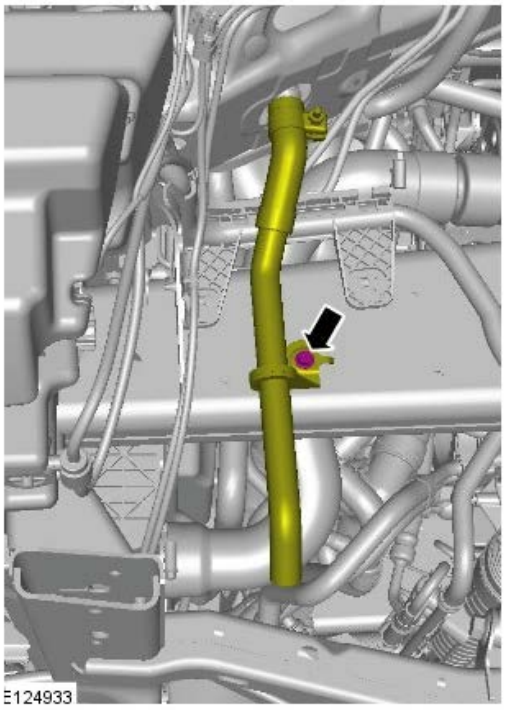


Vehicles with auxiliary heating

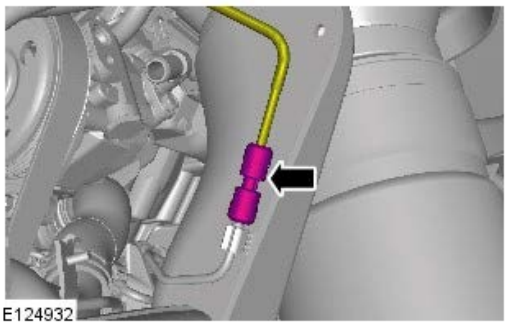
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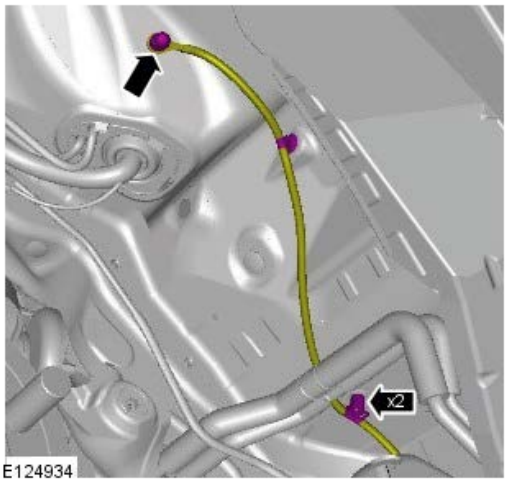


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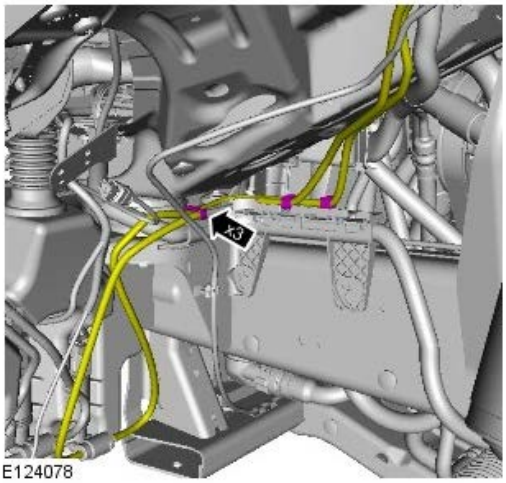


All vehicles

30.

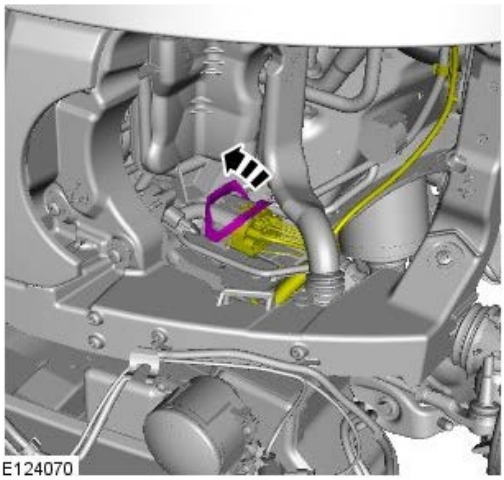


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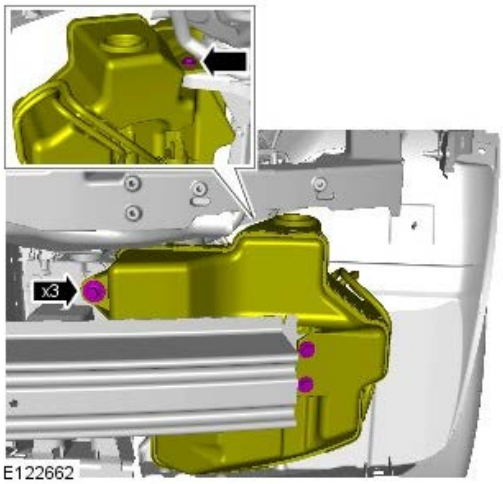


E124078

32.

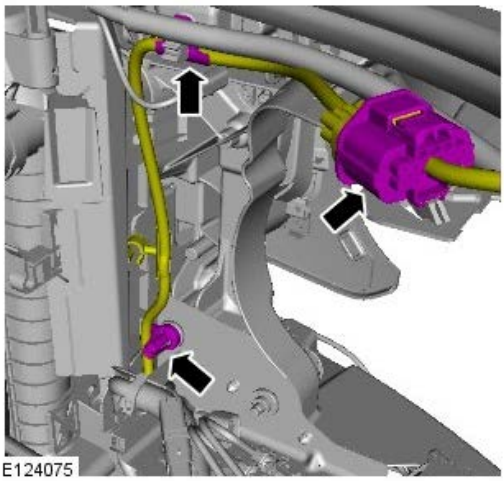

E124070

33.

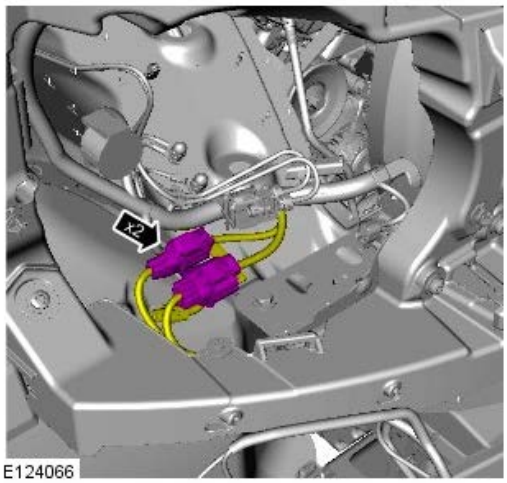


E122662

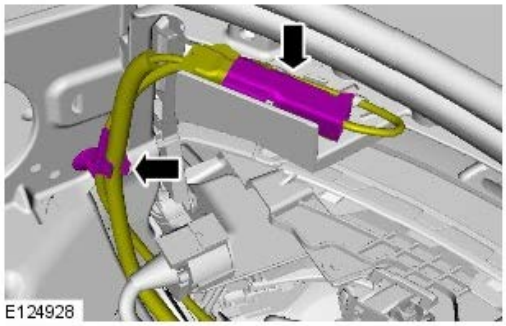
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E124075

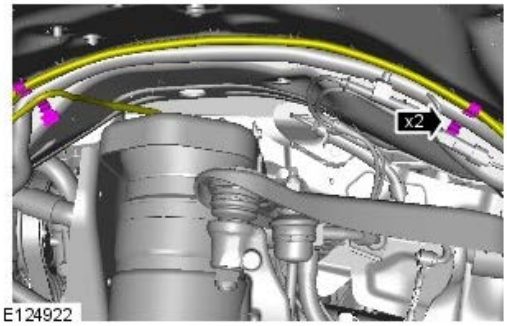
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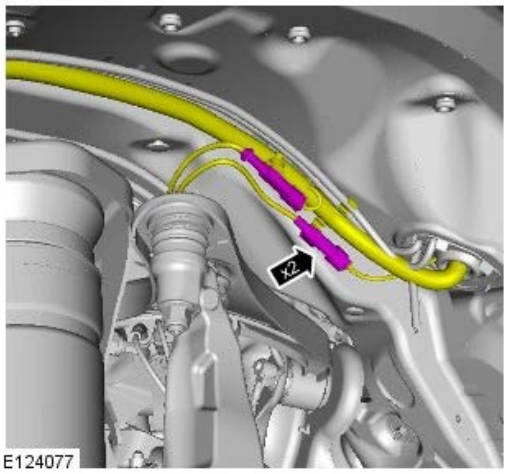
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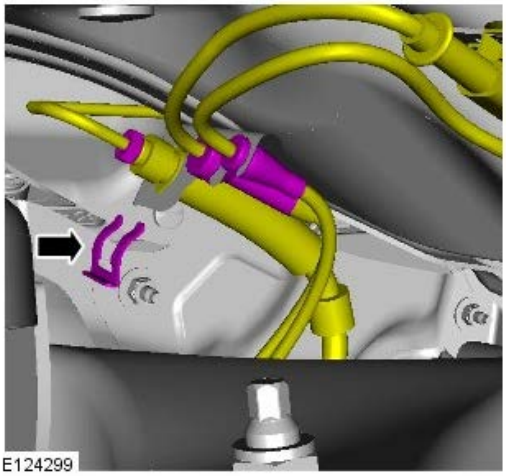


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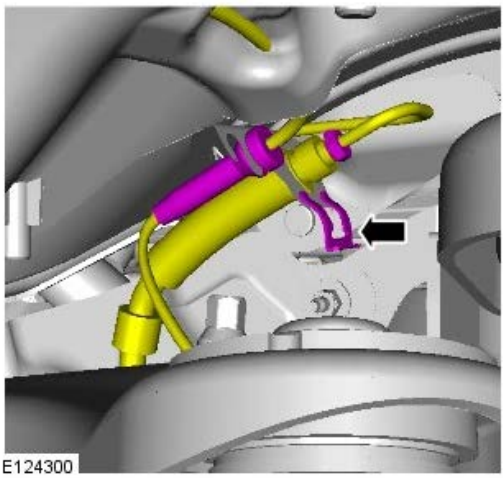
39. CAUTION: Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

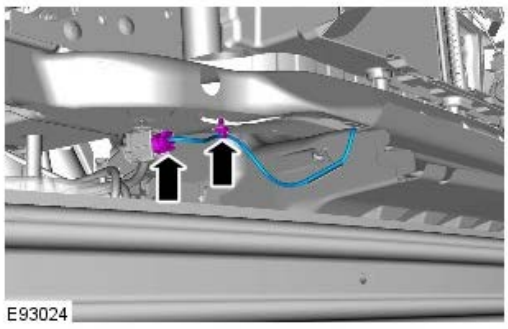


40. CAUTION: Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

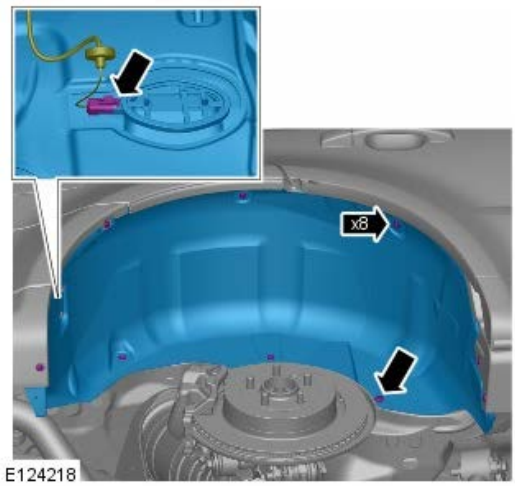
- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.



41.

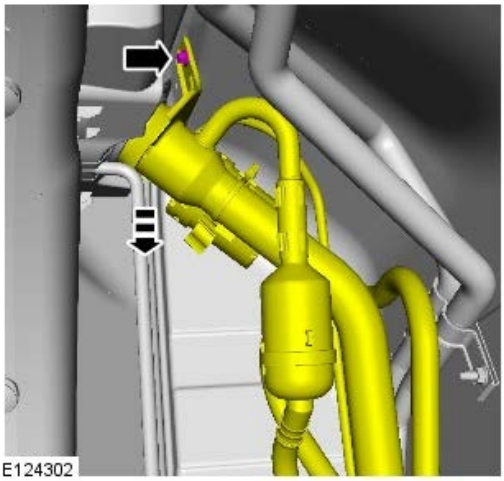


42.

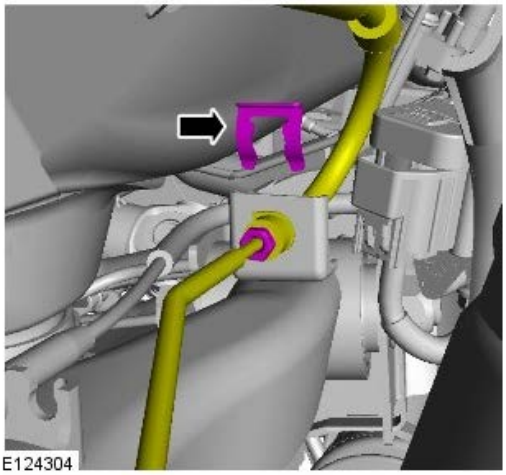


43. Remove the fuel filler cap.

44.

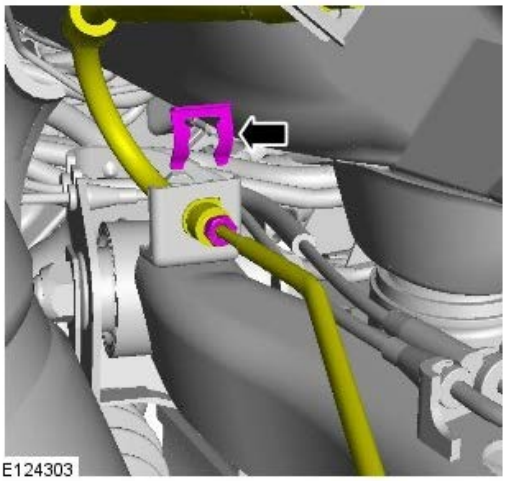

E124302

45. CAUTION: Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.


E124304

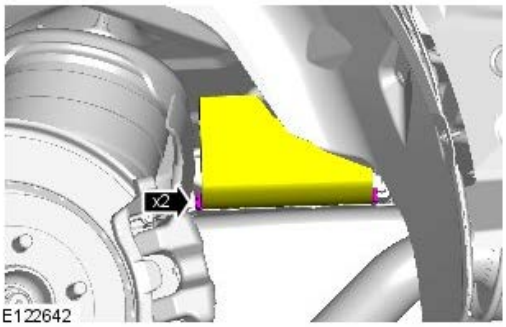
- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

46. CAUTION: Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.


E124303

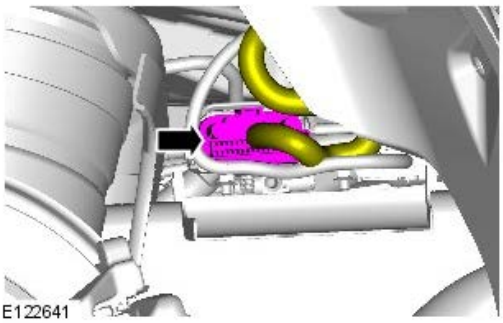
- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

47.

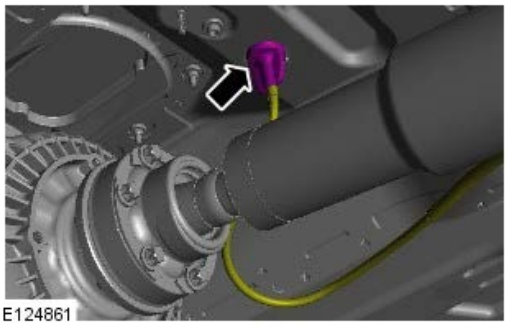


E122642

48.

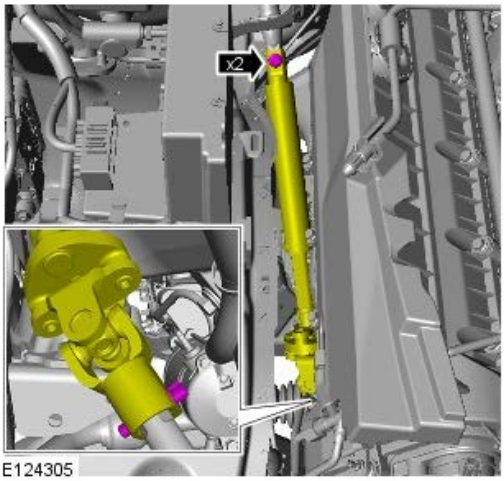


49. CAUTION: Note the fitted position of the seal.

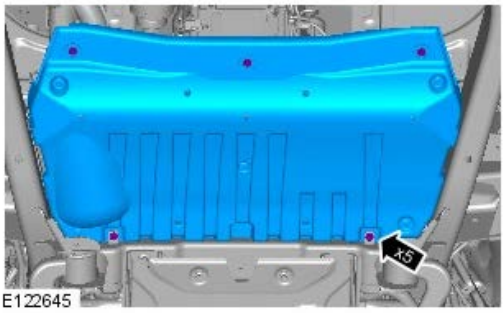


50.

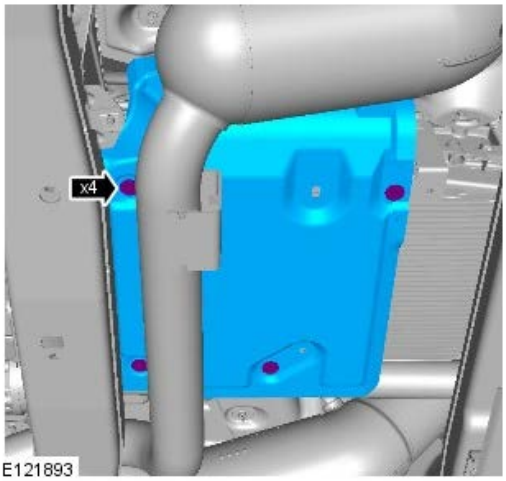
- Remove and discard the bolt.



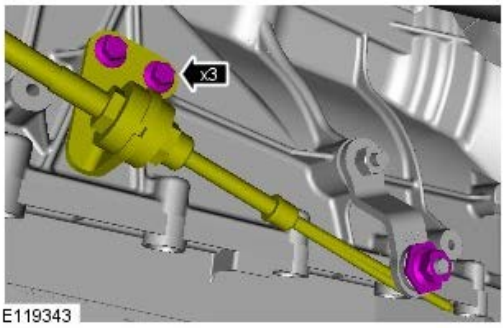
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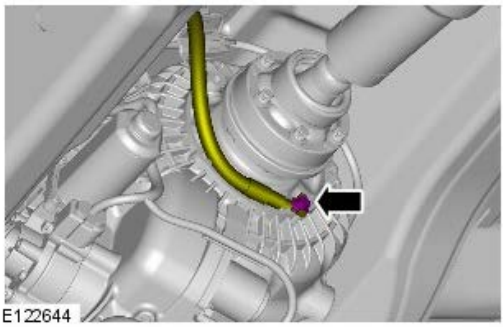
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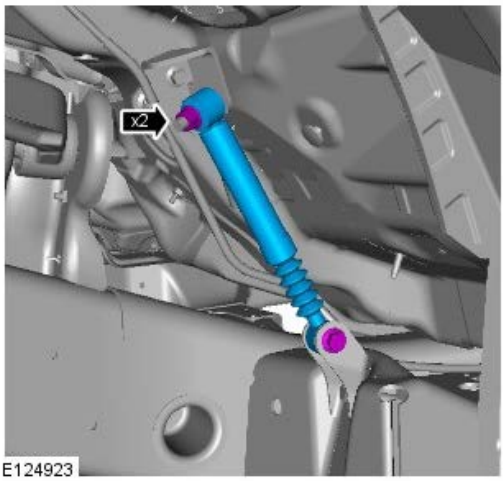
53.



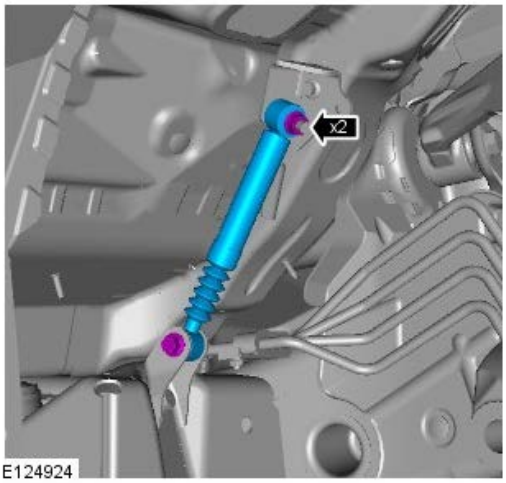
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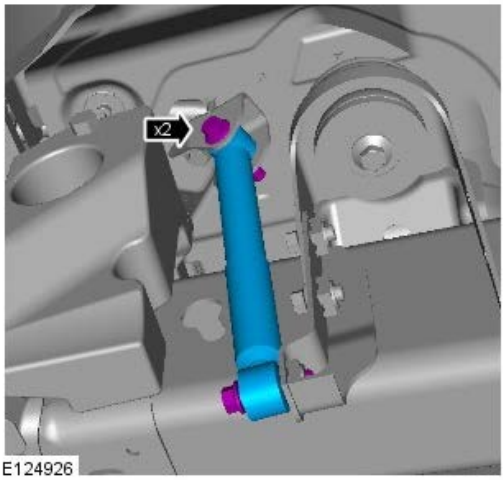
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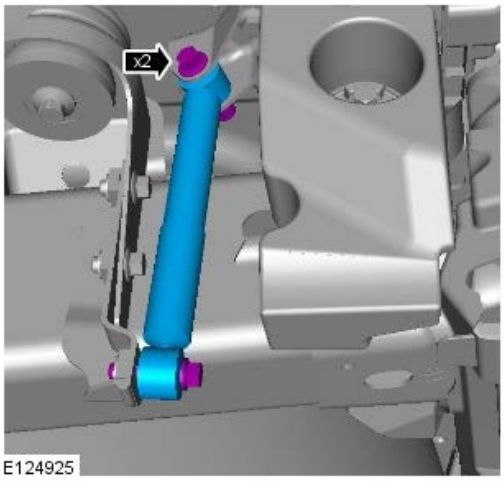
56.



57.

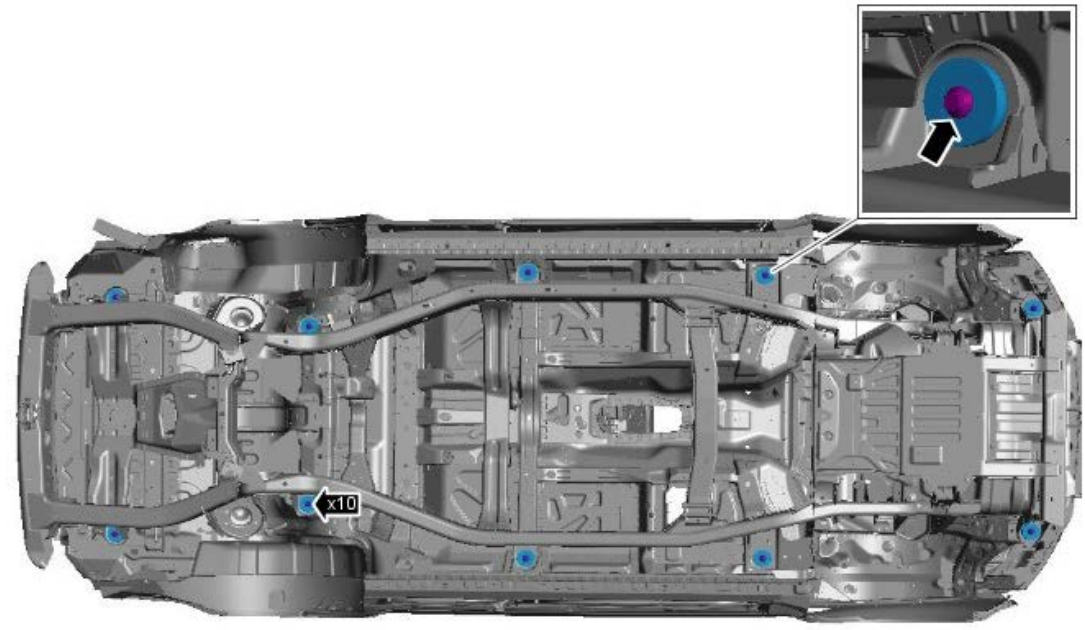


58.



59. Lower the vehicle.

60. Remove and discard the 10 body mount bolts.
    - Remove the 10 spacing washers.



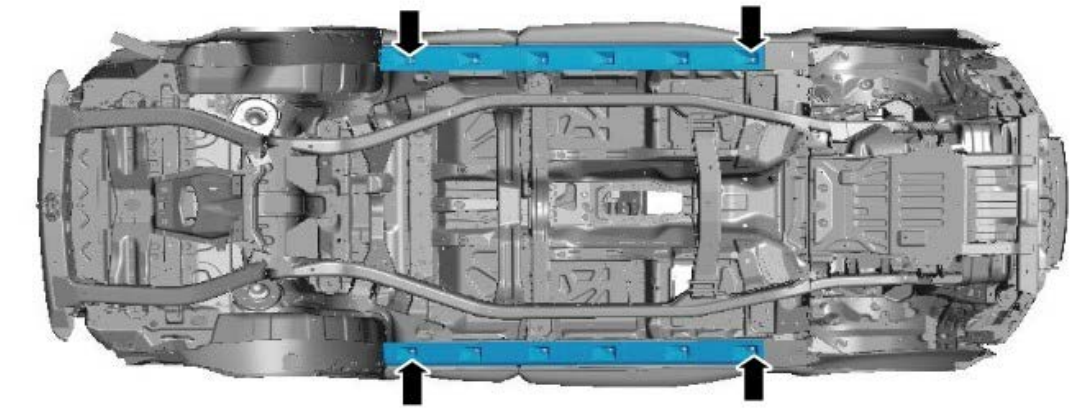
E124859

61. CAUTION: To prevent the body becoming unstable when raised from the integrated body frame, install the vehicle tie down straps.

NOTE: Note the fitted position of the body mounts.

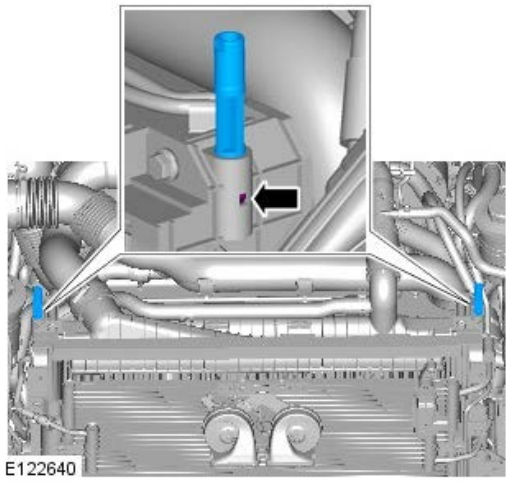
Using an assistant raise and support the body.

- Remove the body mounts.



E124860

62.



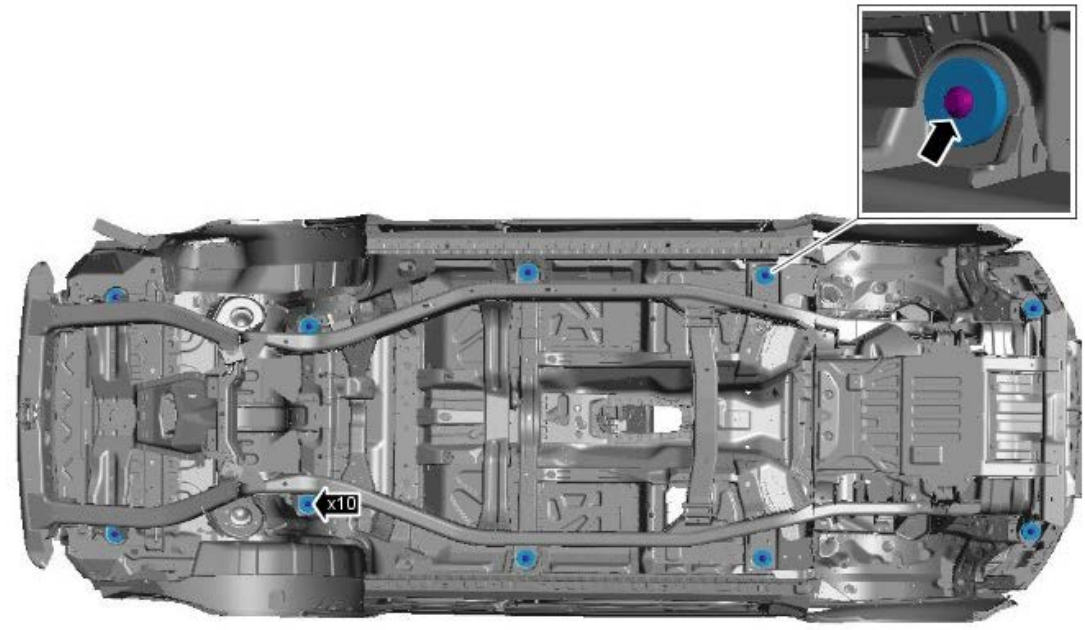
E122640

Installation

All vehicles

1. CAUTIONS:

Make sure that new bolts are installed.



E124859

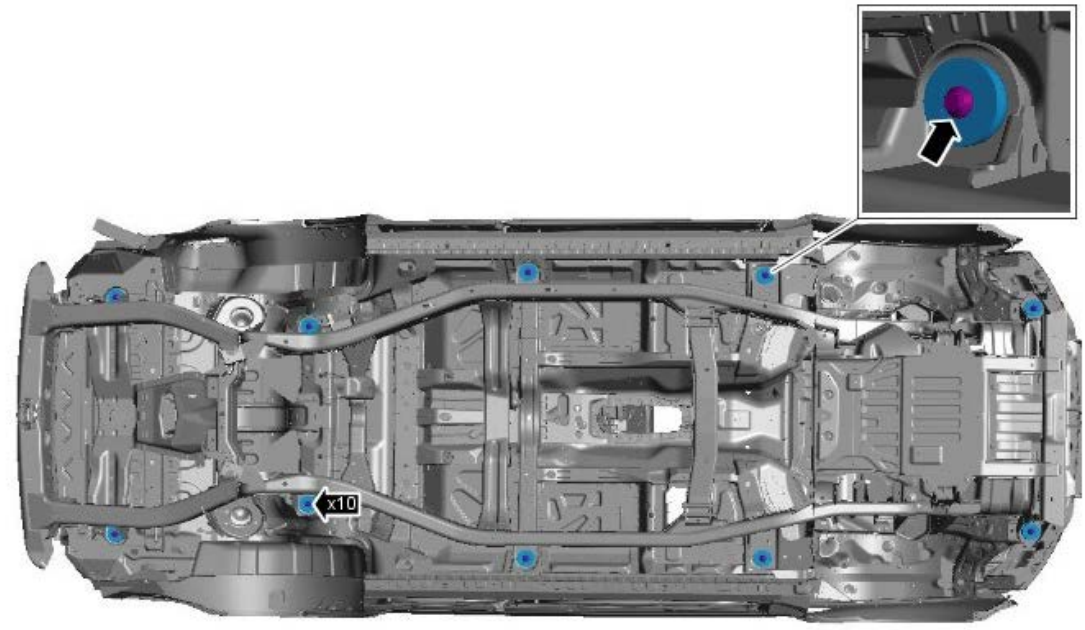
Make sure that all components are free and do not get caught up whilst lowering the body onto the integrated body frame.

Using an assistant install the body to the integrated body frame.

- Install the body mounts.
- With assistance align the body and integrated body frame mounts.
- Install the bolts, but do not tighten fully at this stage.

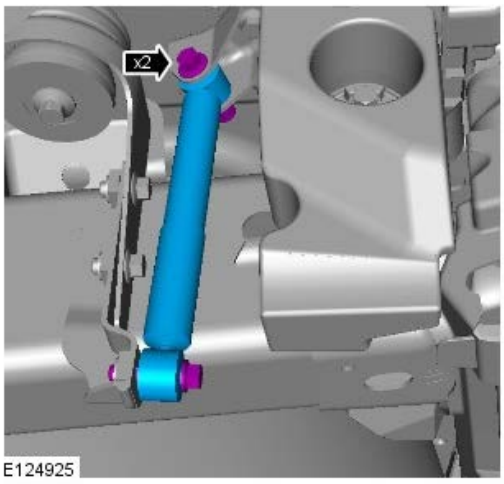
2. Remove the tie down straps securing the body.

3. TORQUE: 133 Nm

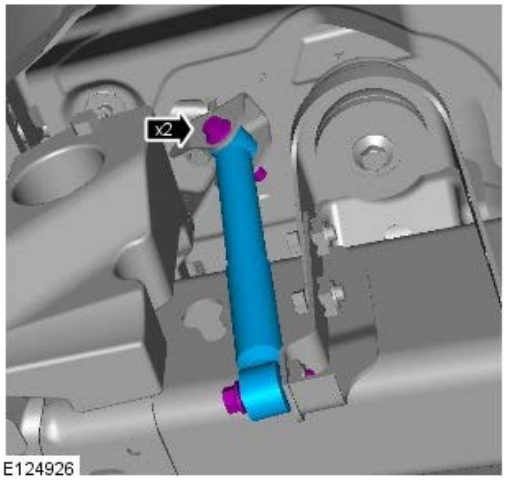


E124859

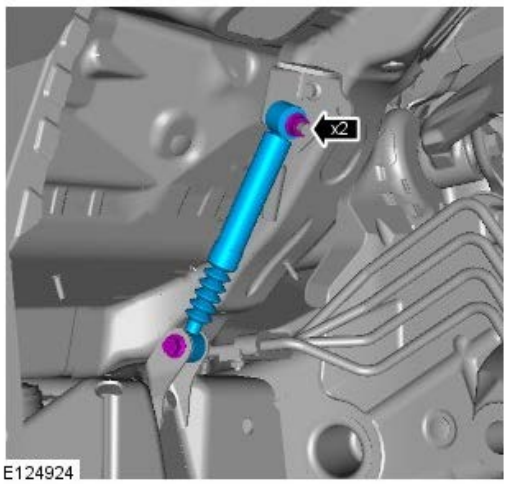
4. TORQUE: 45 Nm



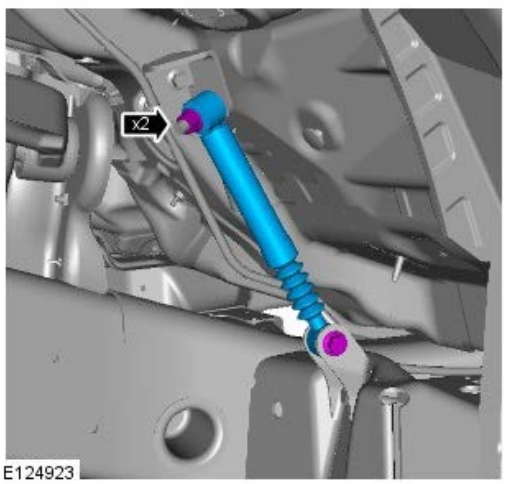
5. TORQUE: 45 Nm



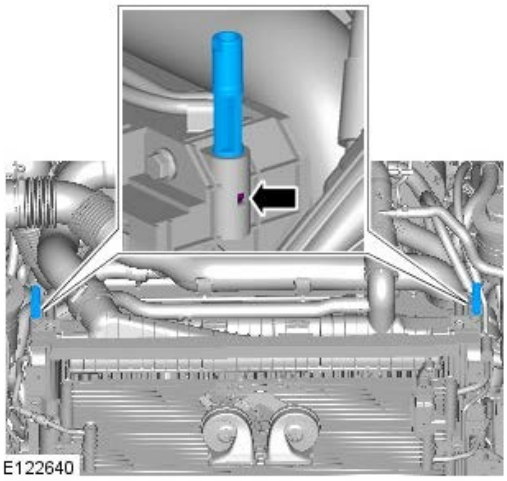
6. TORQUE: 45 Nm



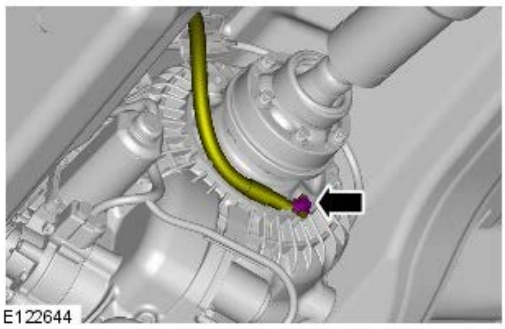
7. TORQUE: 45 Nm



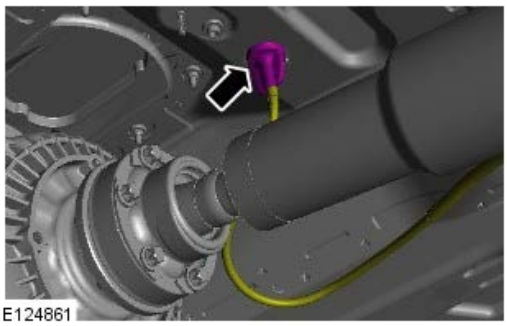
8.



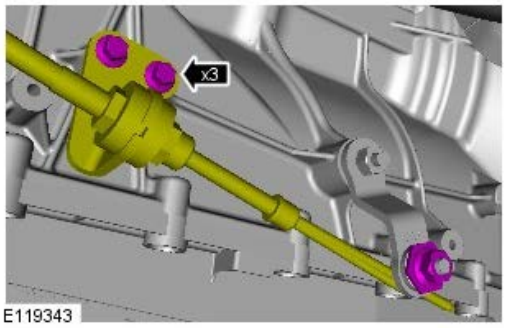
9. TORQUE: 25 Nm



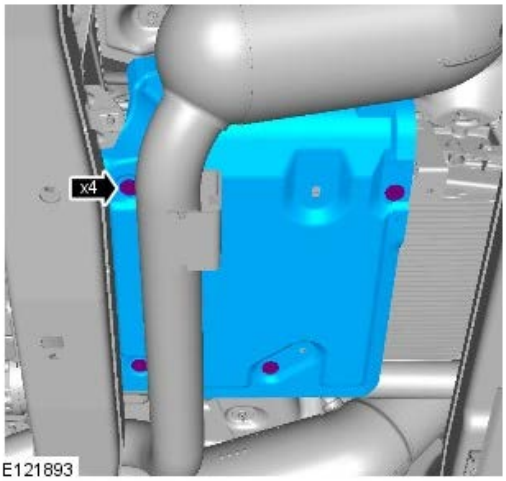
10.



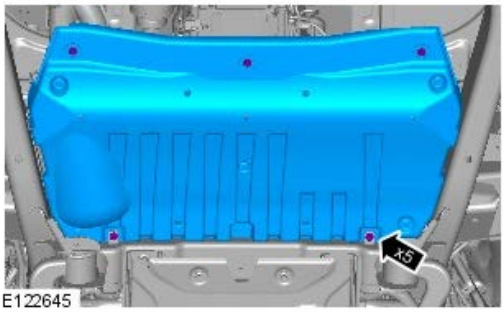
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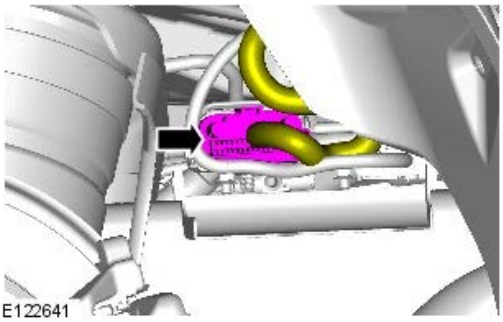
12. TORQUE: 12 Nm



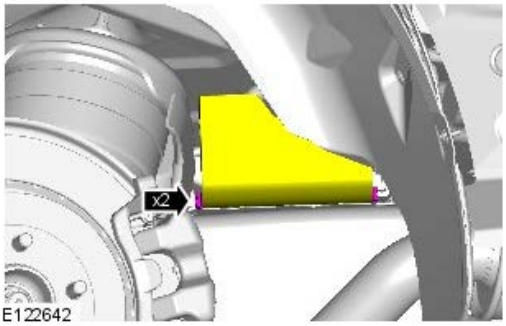
13. TORQUE: 12 Nm



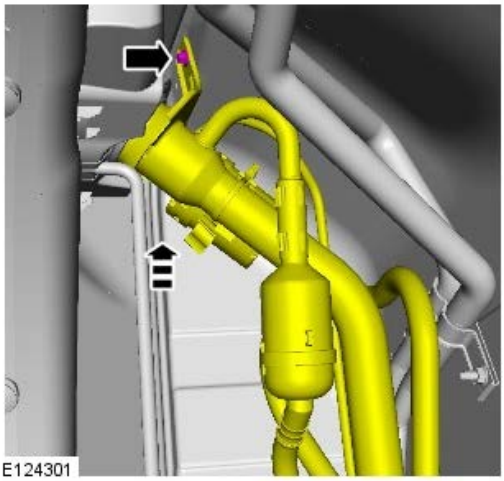
14.



15.

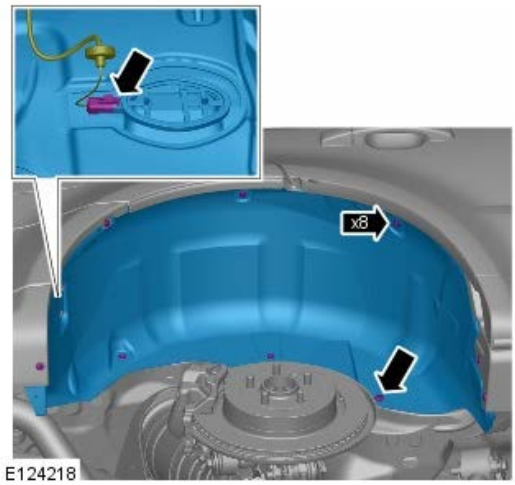


16. TORQUE: 12 Nm

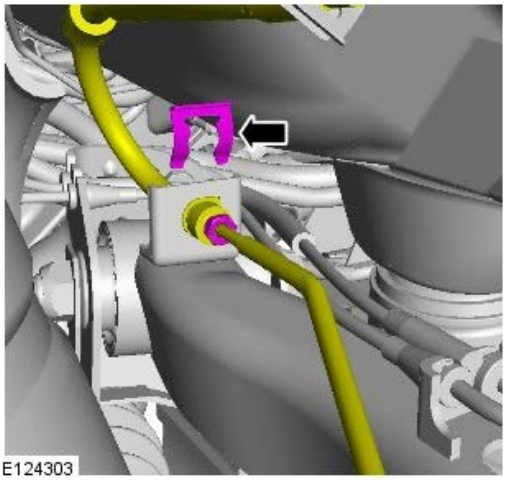


17. Install the fuel filler cap.

18.



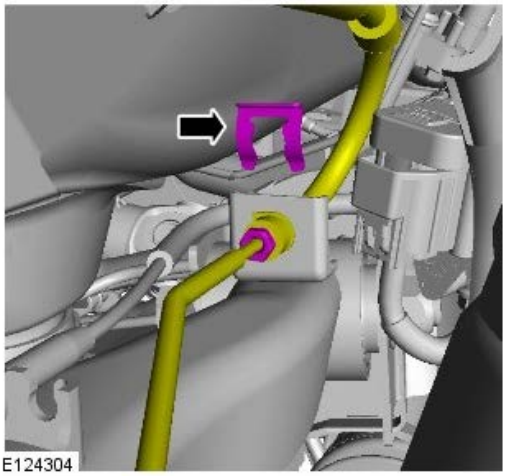
19. NOTE: Remove and discard the blanking caps.

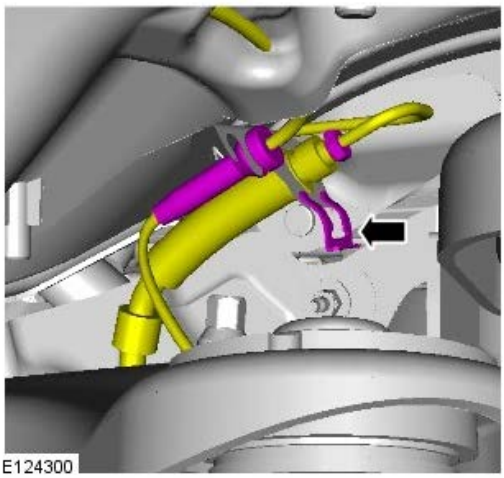


TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

20. NOTE: Remove and discard the blanking caps.

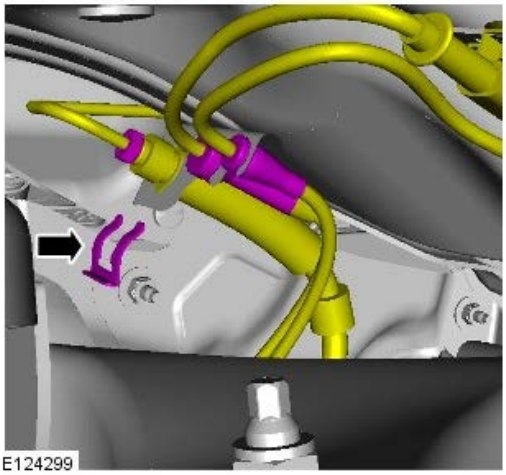
TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.


E124304


E124300

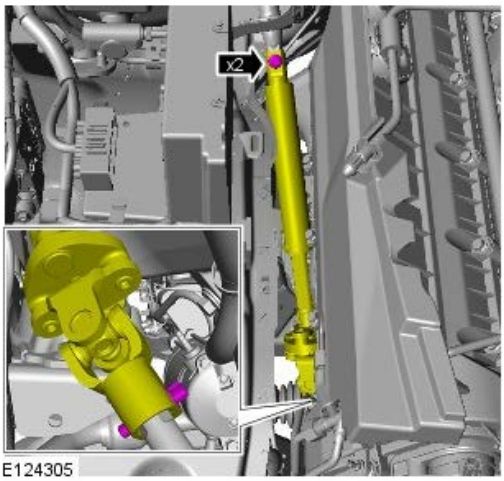
21. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.


E124299

22. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

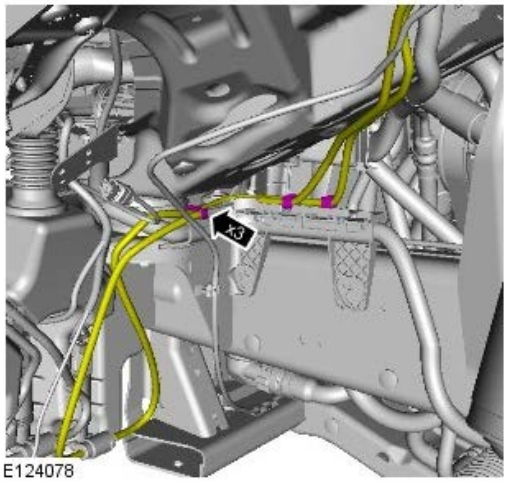


E124305

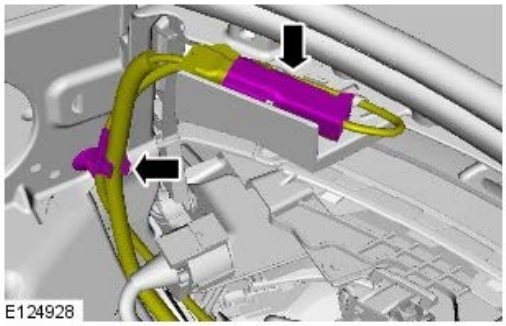
23. WARNING: Make sure that a new bolt is installed.

TORQUE: 25 Nm

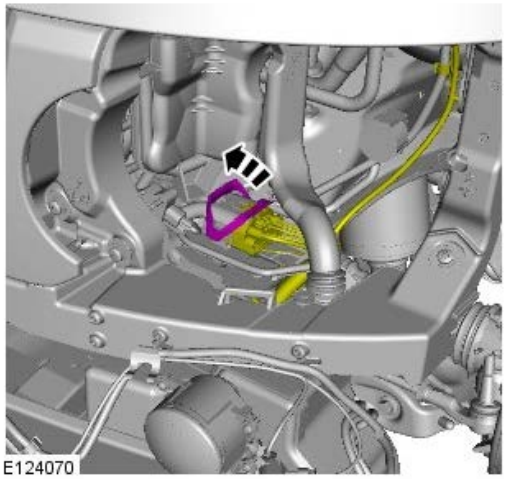
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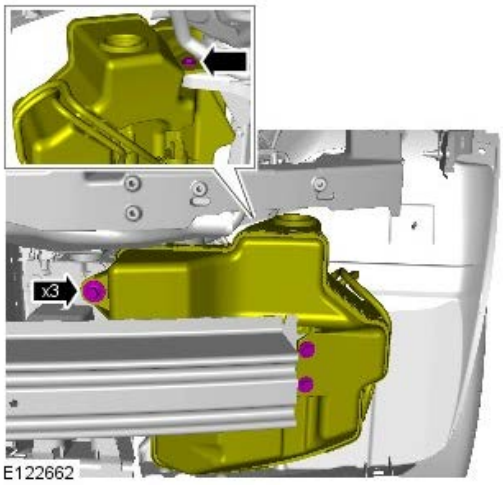
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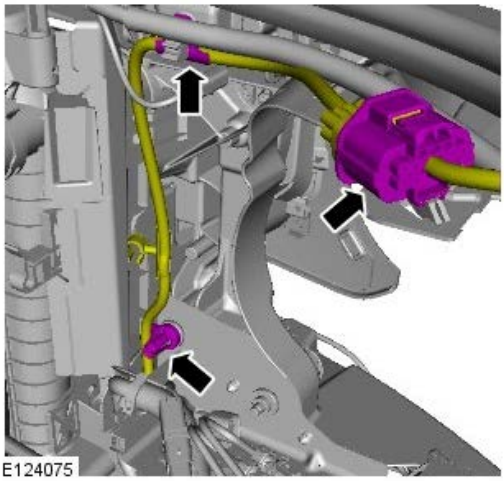
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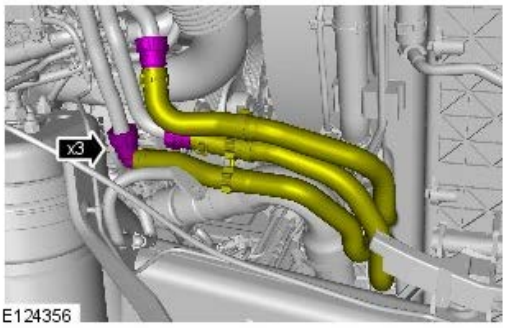
27. TORQUE: 12 Nm



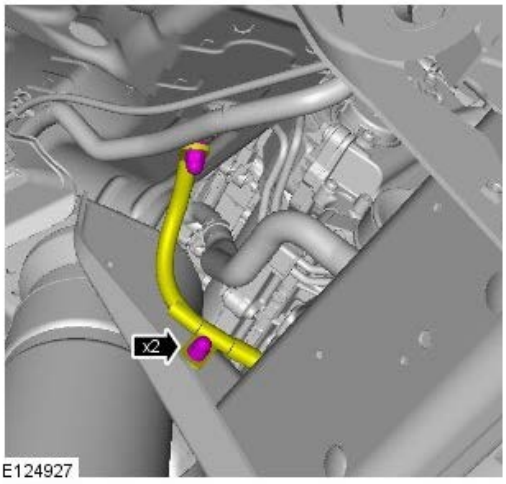
28.



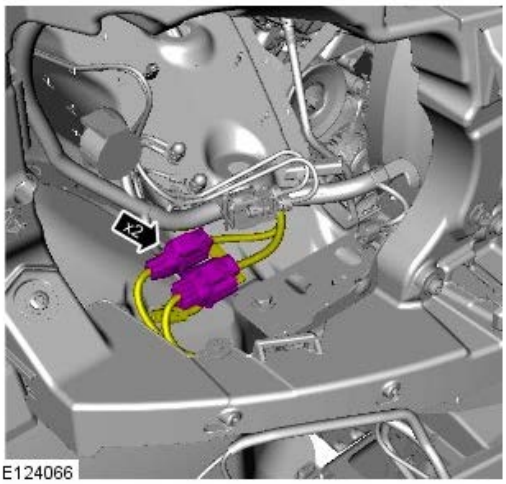
29.



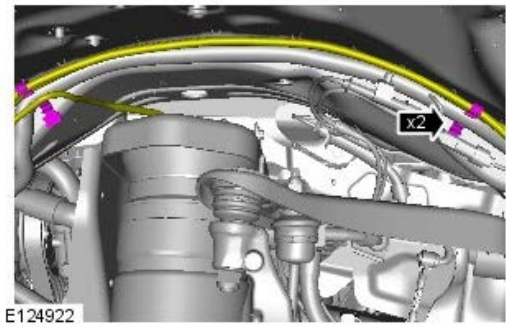
30. TORQUE: 20 Nm



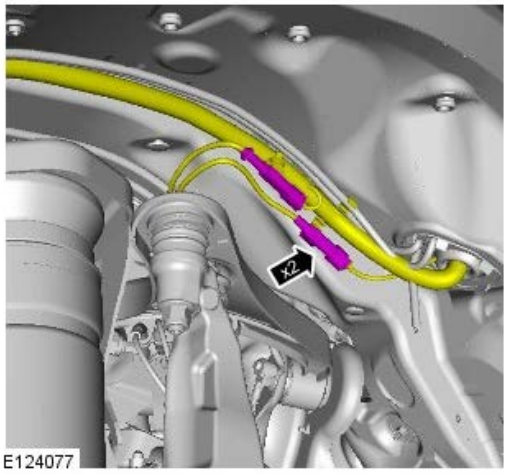
31.



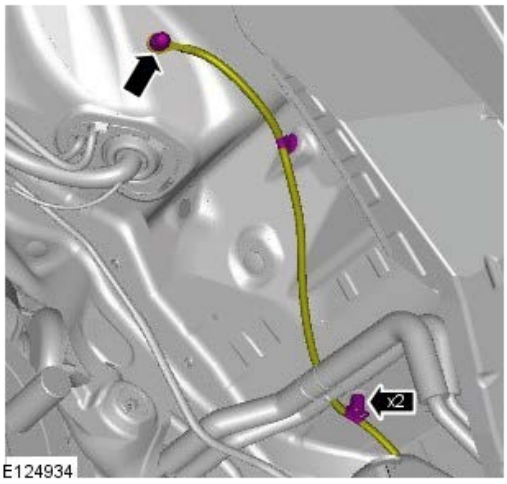
32.



33.

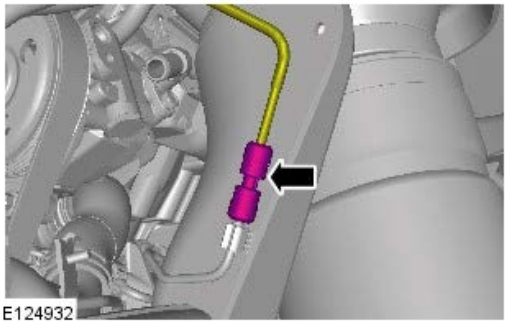


34. TORQUE: 20 Nm

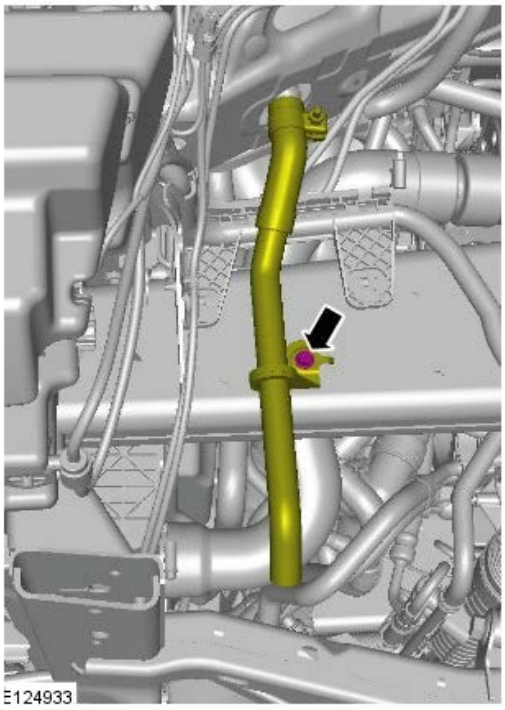


Vehicles with auxiliary heating

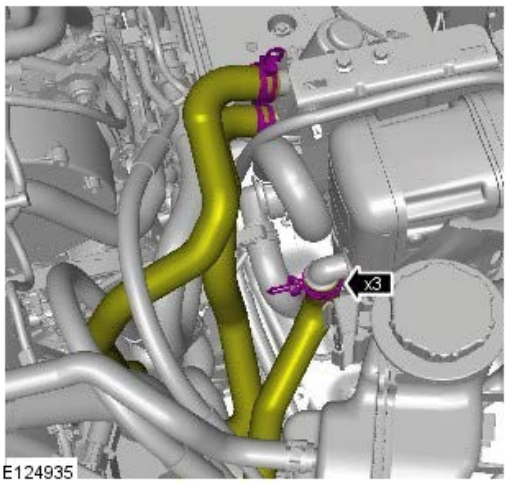
35.



36. TORQUE: 10 Nm

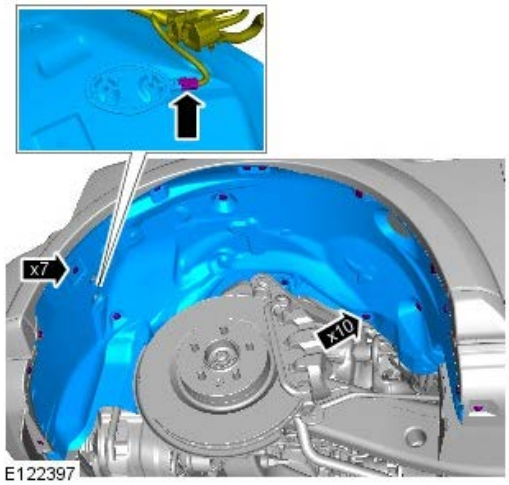


37.

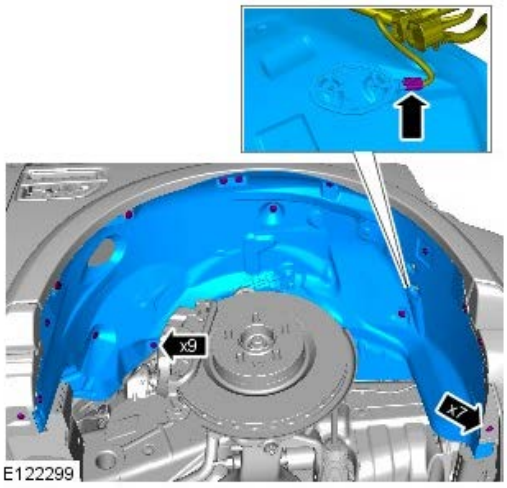


All vehicles

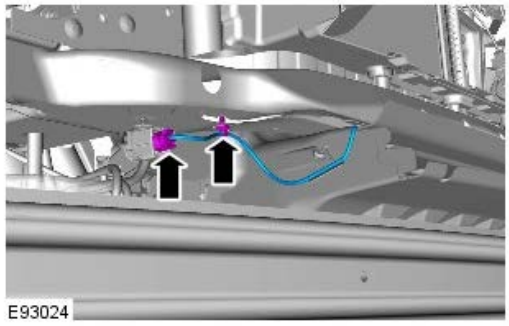
38.



39.

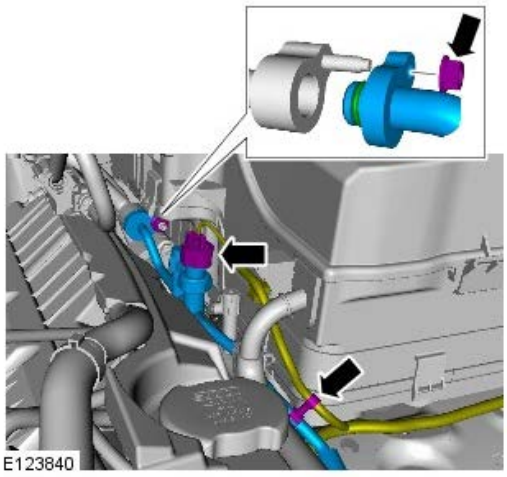


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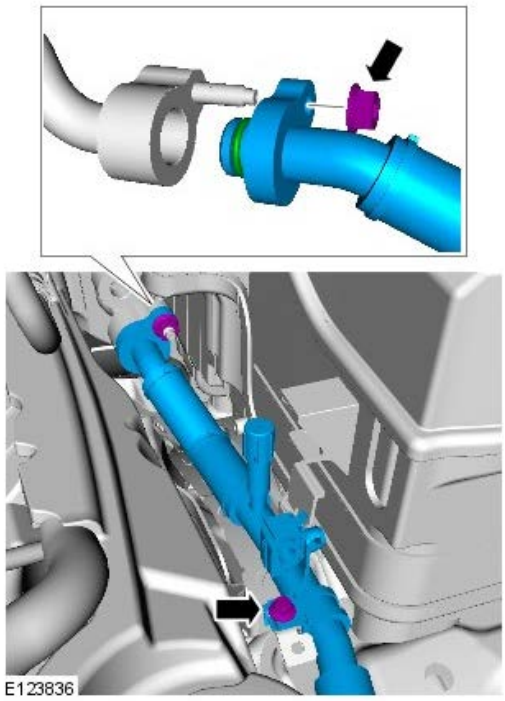
41. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

TORQUE: 12 Nm
- Install new O-ring seals.

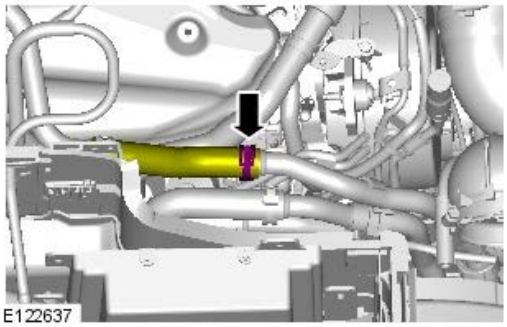


42. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

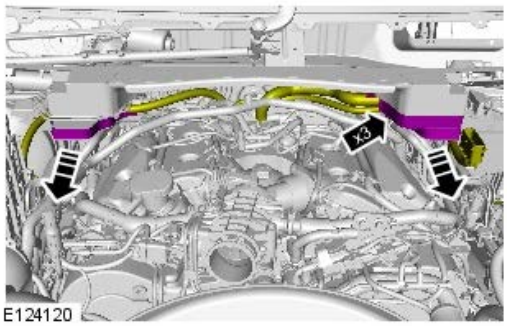
TORQUE: 12 Nm
- Install new O-ring seals.



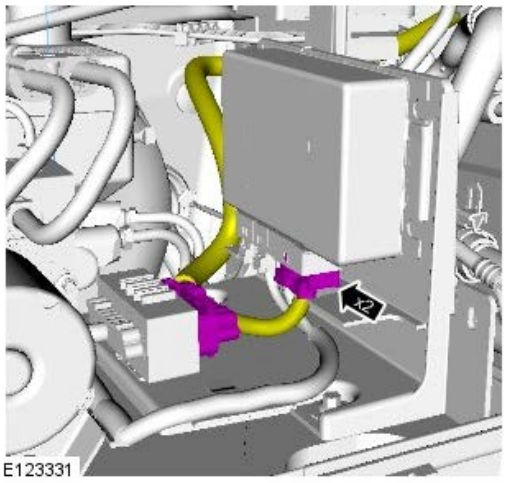
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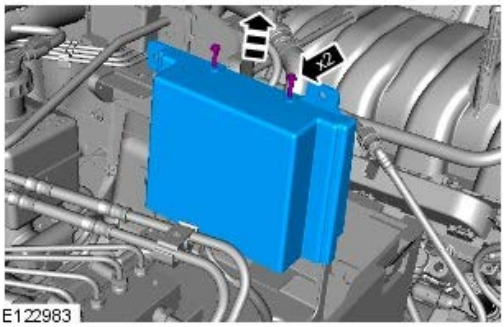
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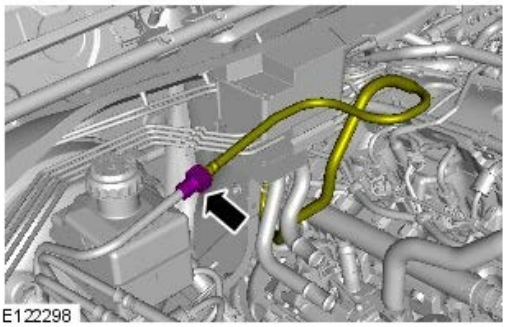
45.



46. TORQUE: 8 Nm

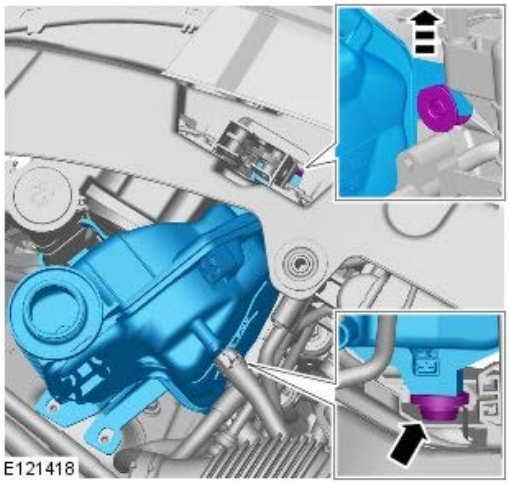


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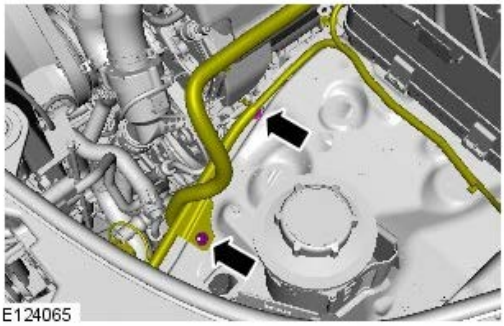


48. CAUTION: Be prepared to collect escaping coolant.

For additional information, refer to: Coolant Expansion Tank (303-03A Engine Cooling - TDV6 3.0L Diesel, Removal and Installation).



49. TORQUE: 10 Nm

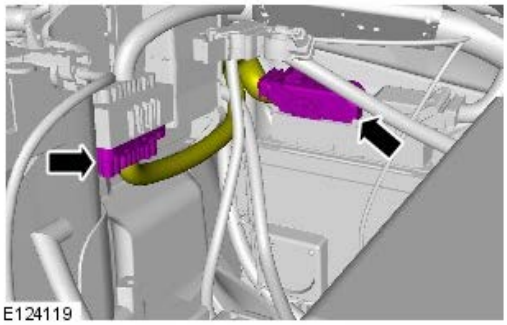


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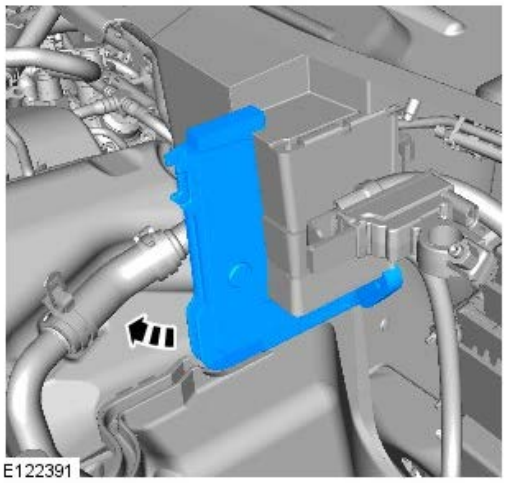
51.

52. For additional information, refer to: Air Cleaner (303-12A Intake Air Distribution and Filtering - TDV6 3.0L Diesel, Removal and Installation).

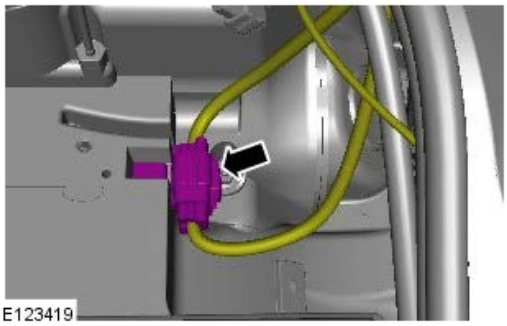
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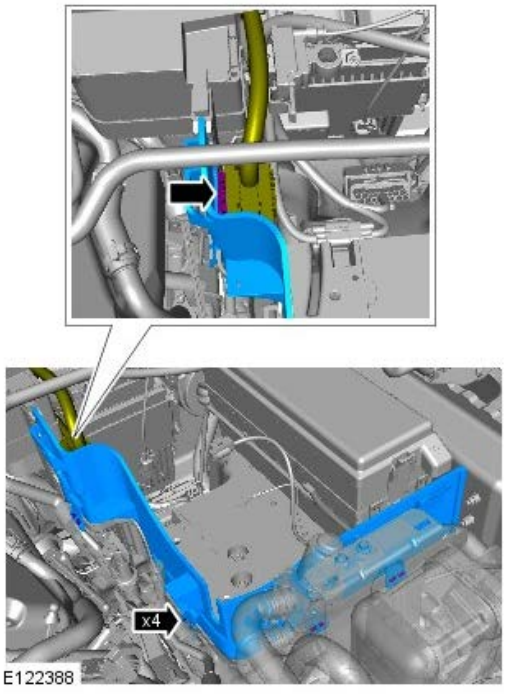
54.



55.

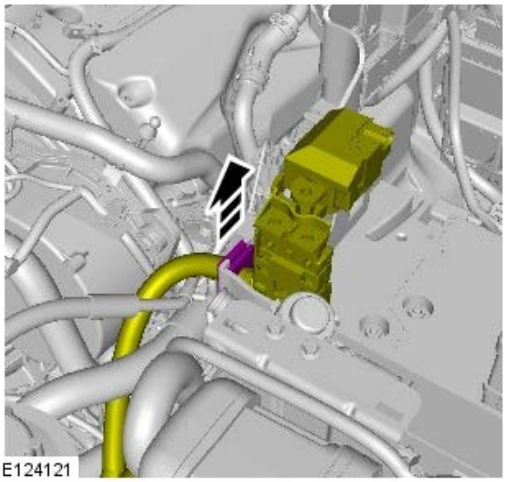


56. NOTE: RHD illustration shown, LHD is similar.

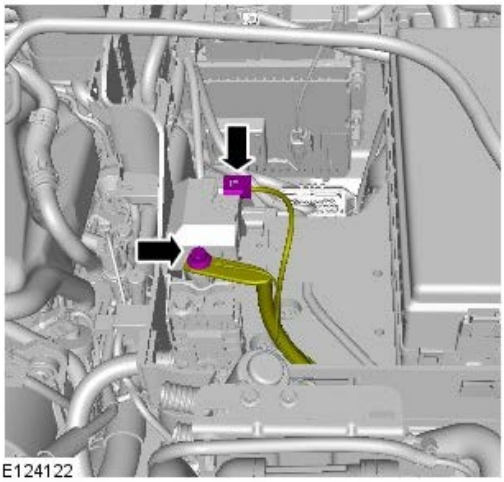


57.

- Cut the cable tie.


E124121

58. TORQUE: 10 Nm


E124122

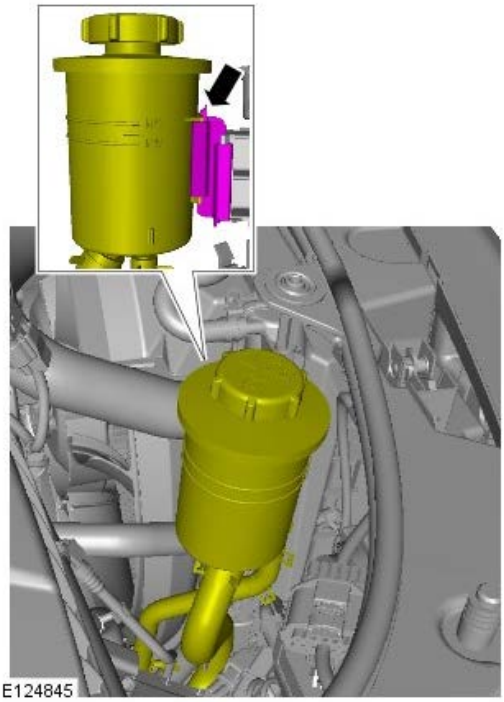
59. For additional information, refer to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

60. For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

61. Check and top-up the coolant.

Vehicles with active damping

62.


E124845

63. Bleed the braking system.
For additional information, refer to: Brake System Bleeding - Vehicles With: Standard

Brakes (206-00 Brake System - General Information, General Procedures).

Published: 18-Jan-2012

Full Frame and Body Mounting - Body V8 5.0L Petrol

Removal and Installation

Removal

NOTES:

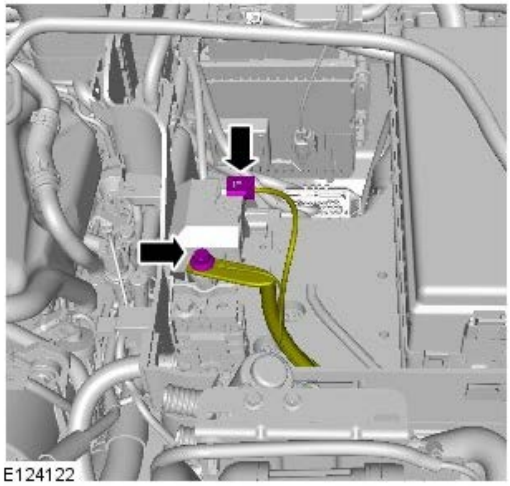
Some variation in the illustrations may occur, but the essential information is always correct.

Some illustrations may show the engine removed for clarity.

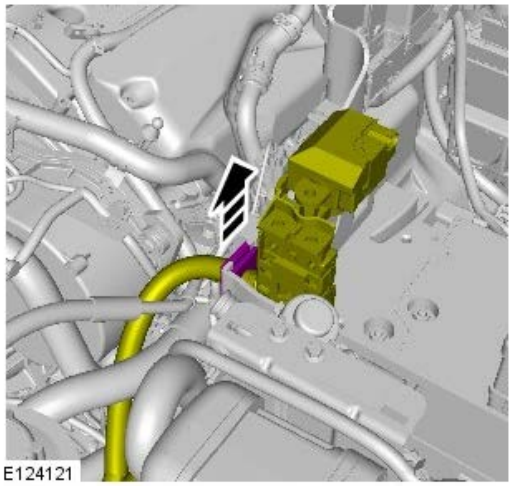
All vehicles

1. Remove the battery for access.
   For additional information, refer to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

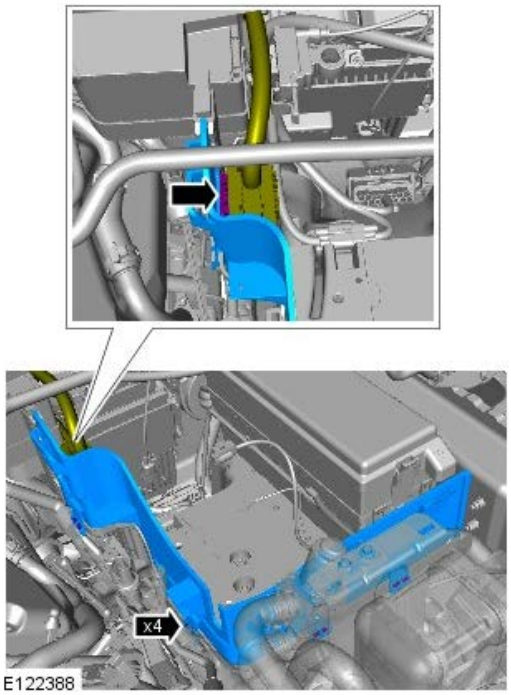
2.


E124122

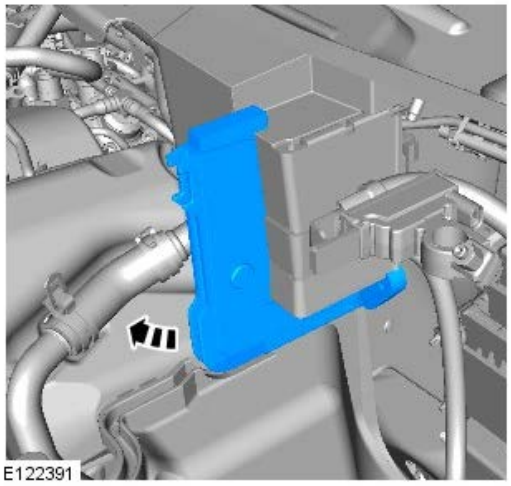
3.


E124121

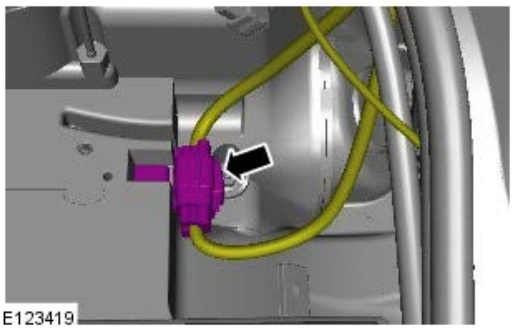
4. NOTE: RHD illustration shown, LHD is similar.



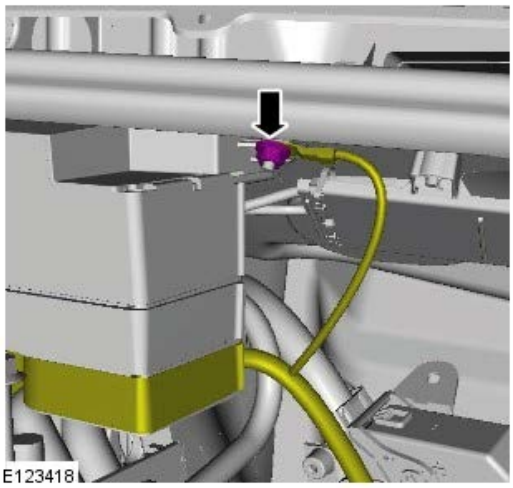
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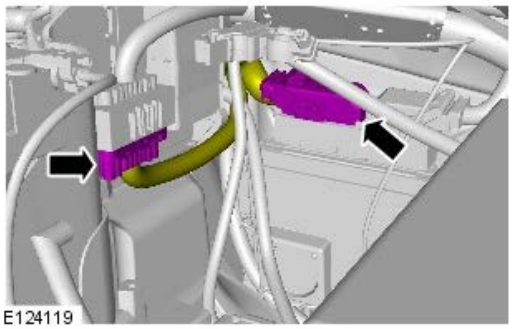
6.



7.



8.



9. For additional information, refer to: Air Cleaner LH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

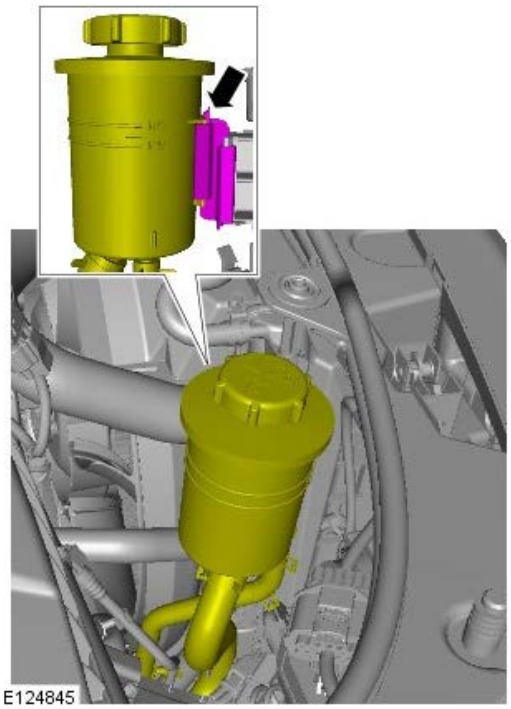
10. For additional information, refer to: Air Cleaner RH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

11. For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

12. For additional information, refer to: Coolant Expansion Tank - V8 5.0L Petrol, 5.0L (303-03 Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

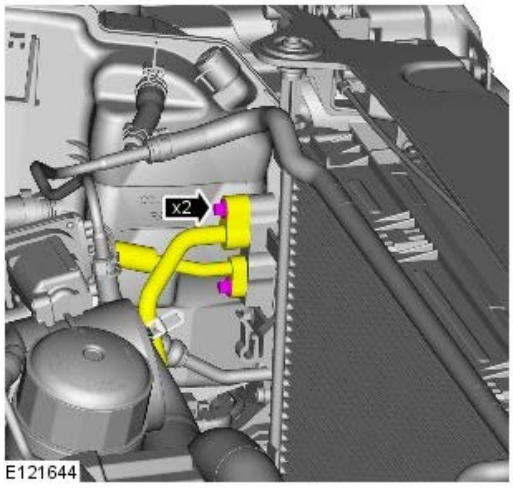
Vehicles with active damping

13.



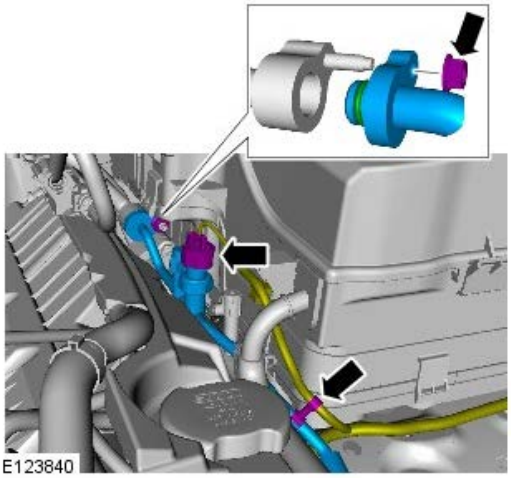
All vehicles

14. CAUTION: Make sure that all openings are sealed. Use new blanking



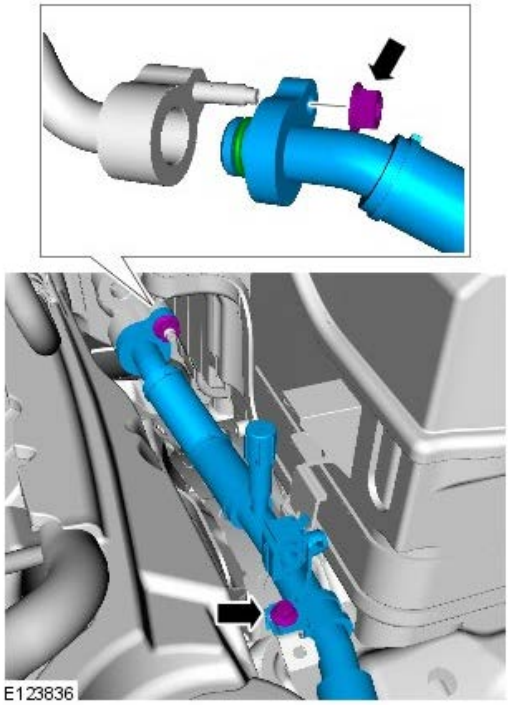
caps.

- Remove and discard the 2 O-ring seals.



15. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

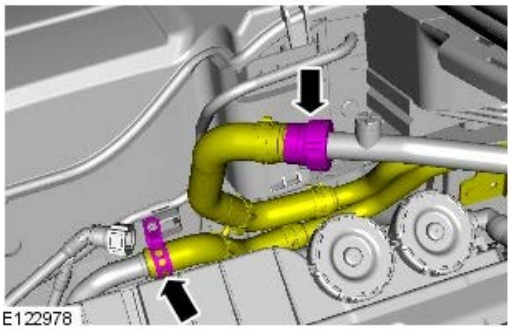
- Remove and discard the O-ring seal.



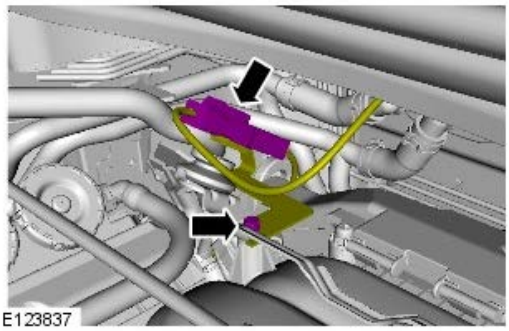
16. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

- Discard the O-ring seal.

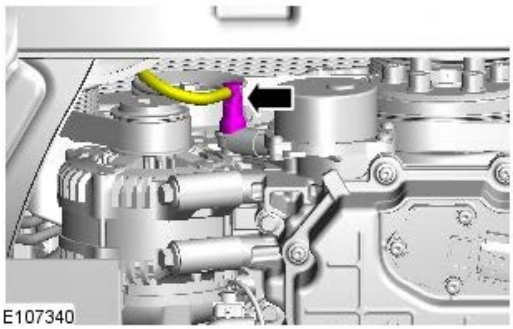
17. WARNING: Be prepared to collect escaping fluid.



18.

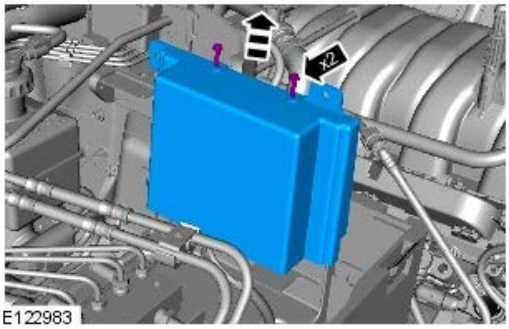


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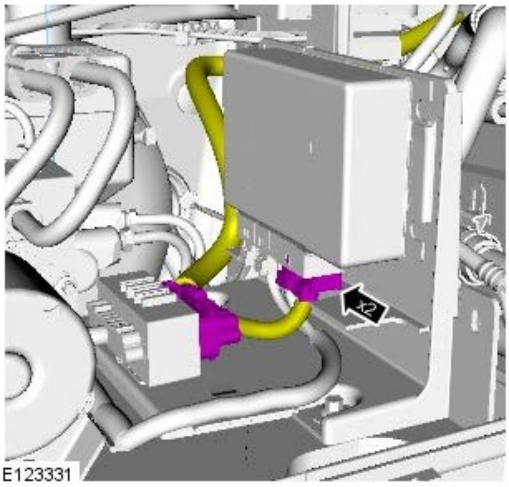


20. For additional information, refer to: Auxiliary Battery Tray (414-01 Battery, Mounting and Cables, Removal and Installation).

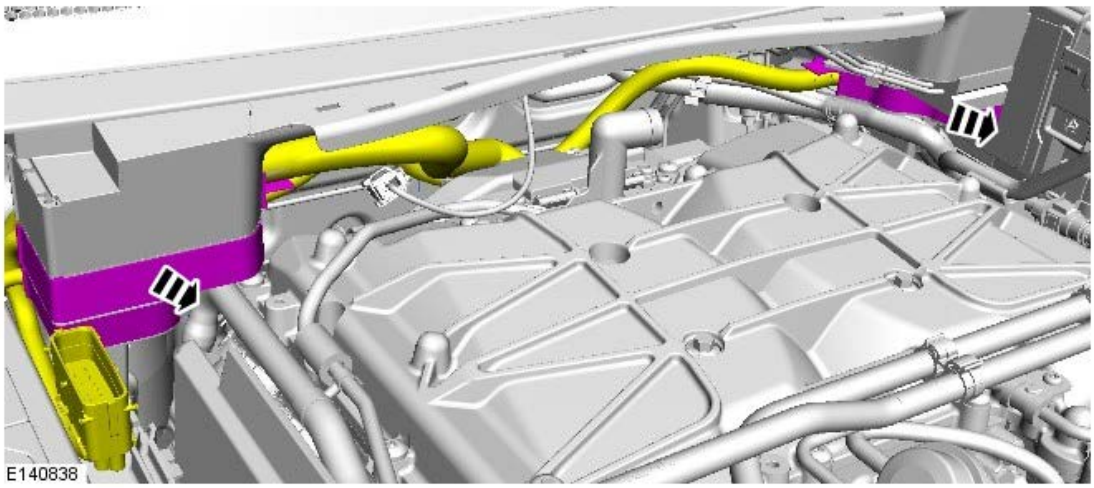
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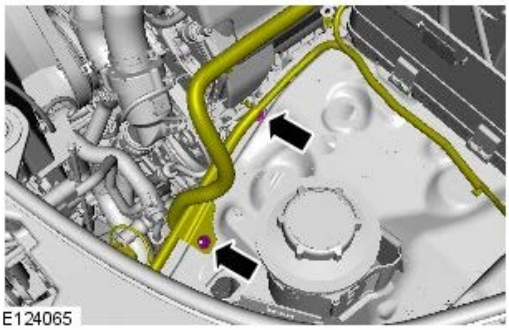
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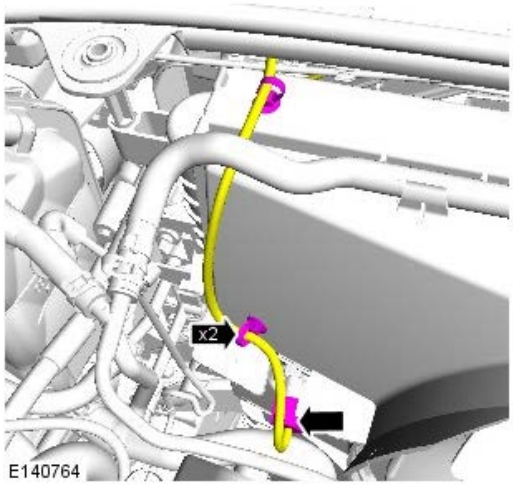
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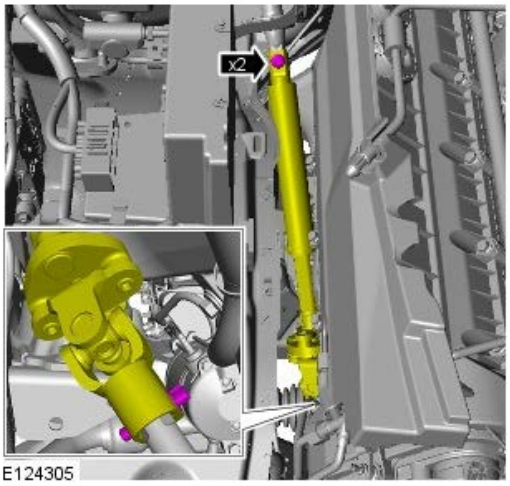


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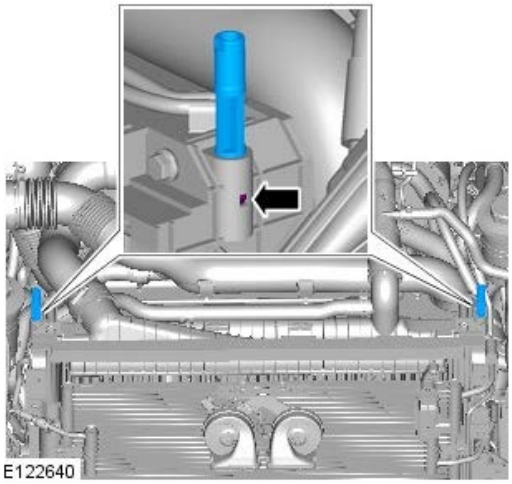


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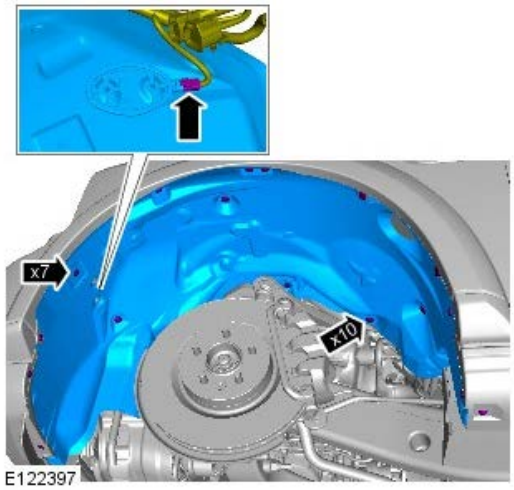
- Remove and discard the bolt.



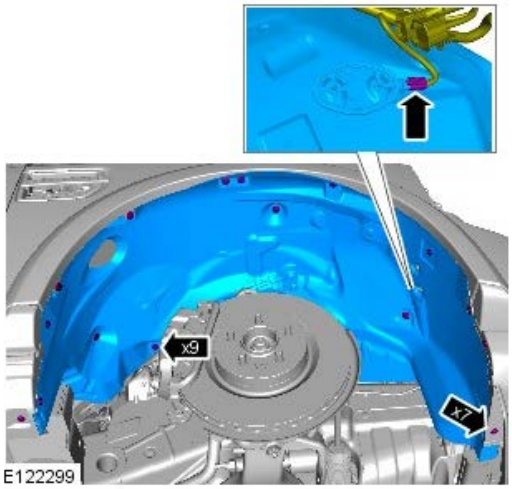
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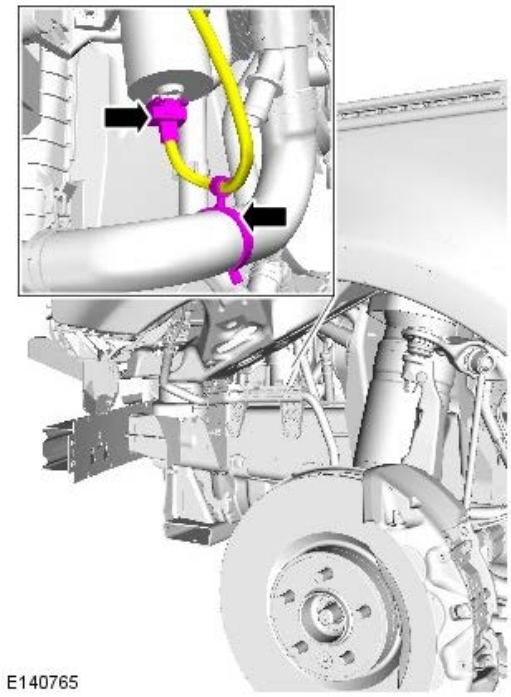
28.



29.



30.

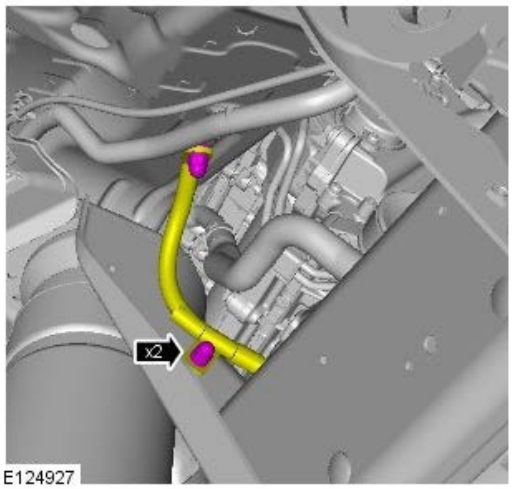


31. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

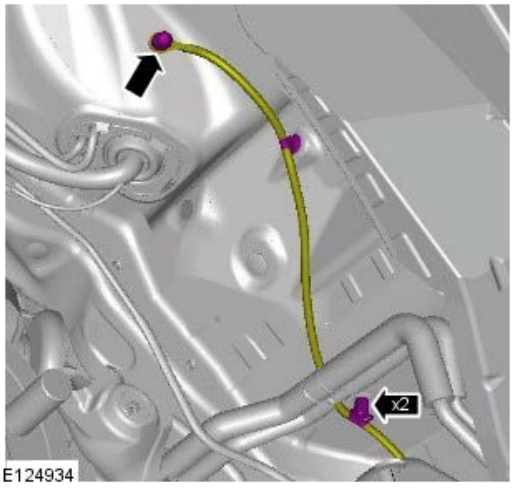
    Raise and support the vehicle.

32. For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).

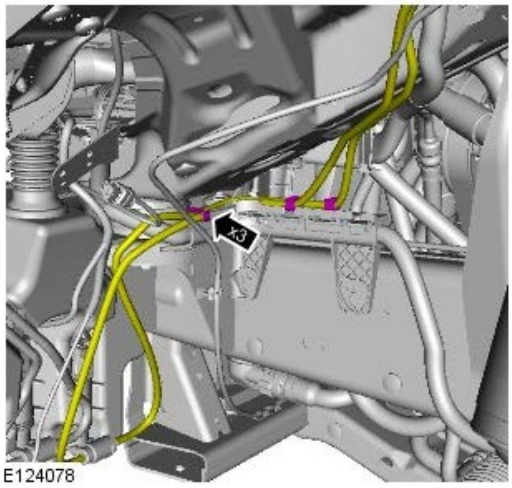
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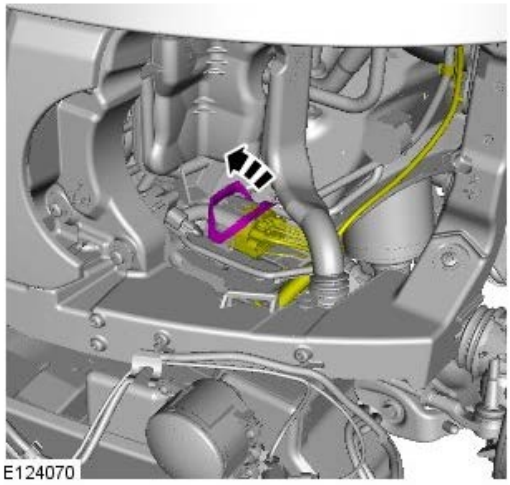
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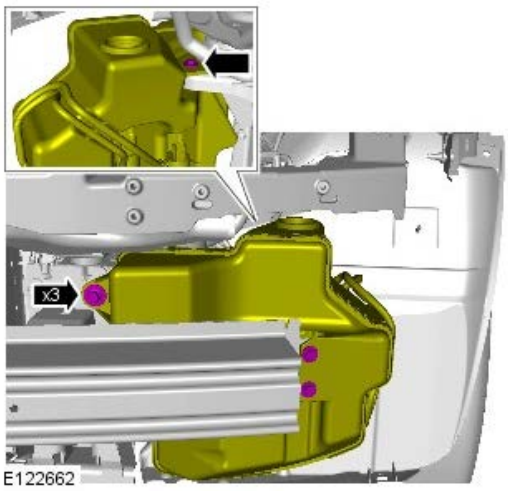
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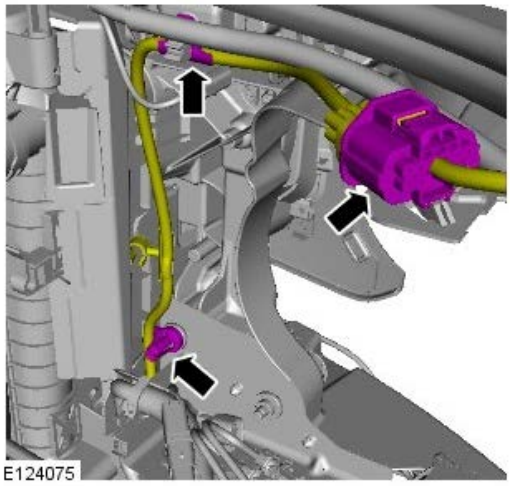
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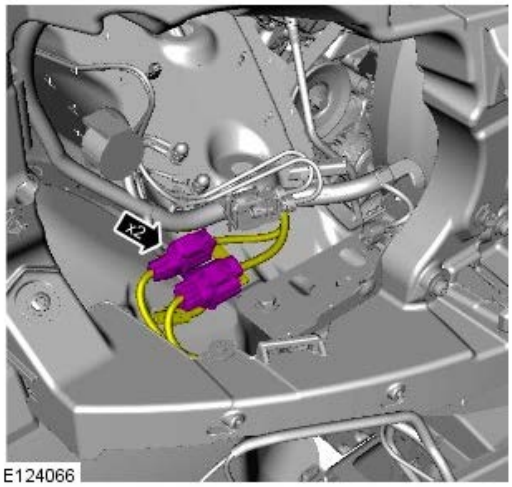
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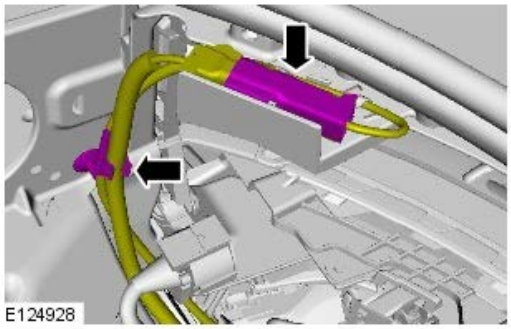
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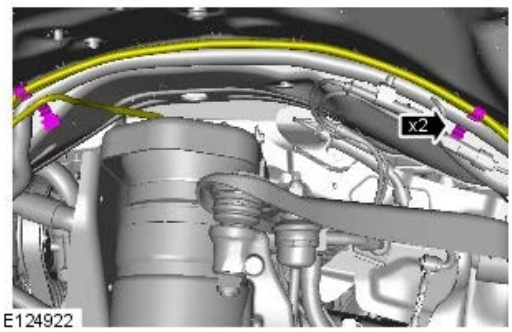
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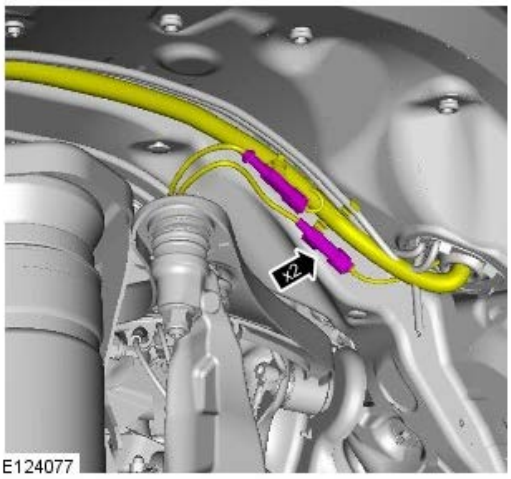
40.



41.



42.

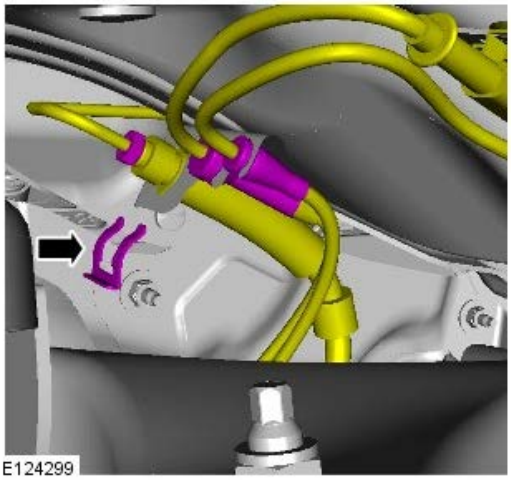


43. CAUTIONS:

Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

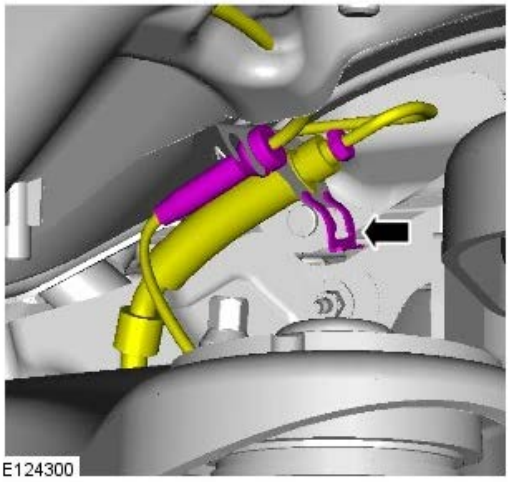


44. CAUTIONS:

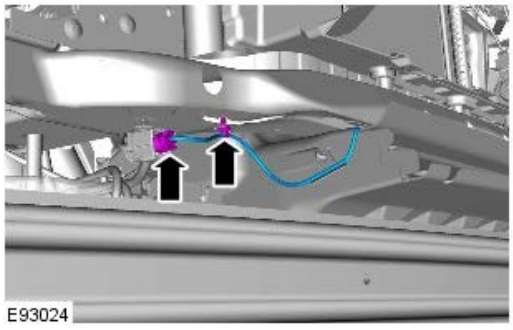
Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

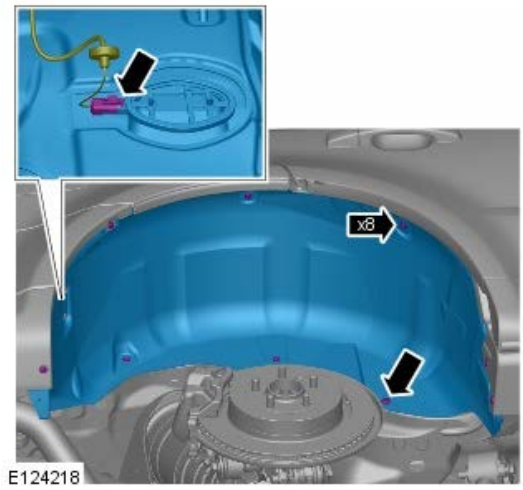
- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.



45.

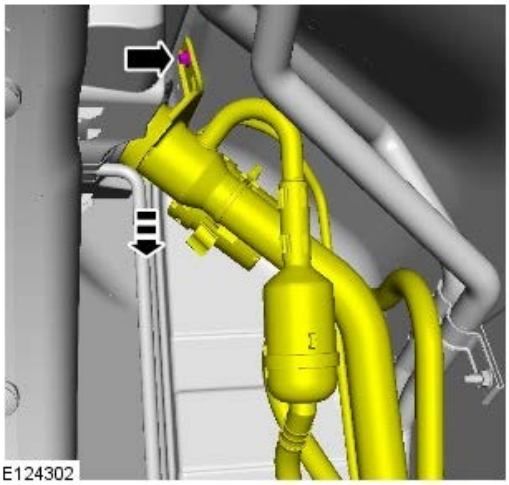


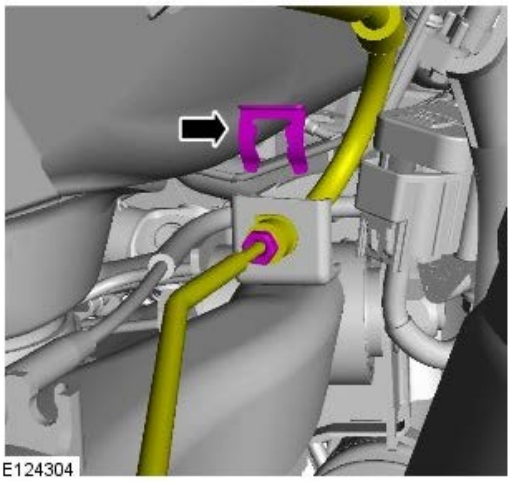
46.



47. Remove the fuel filler cap.

48.





49. CAUTIONS:

Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

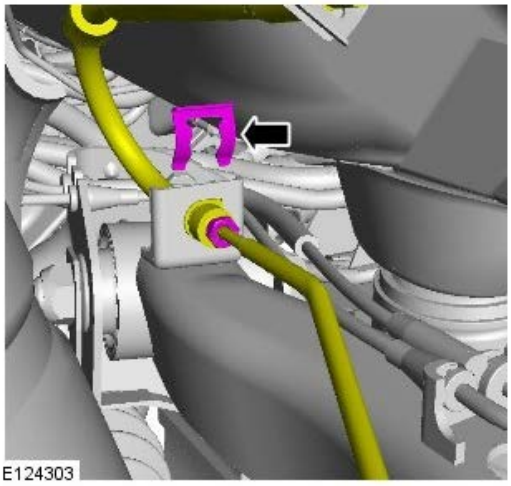
- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

50. CAUTIONS:

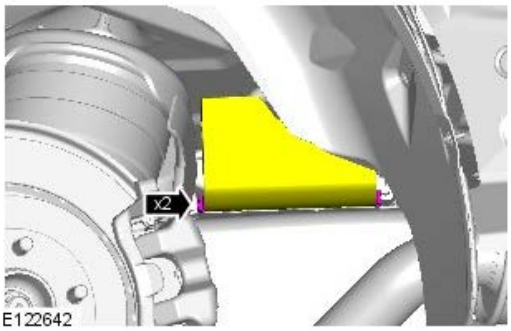
Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

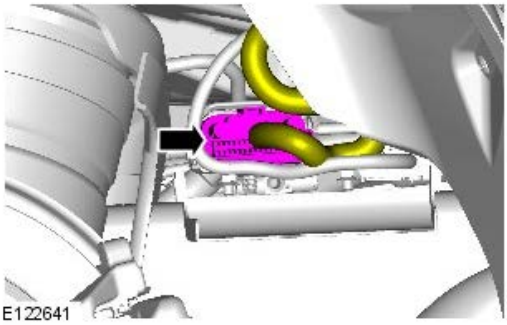
- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.



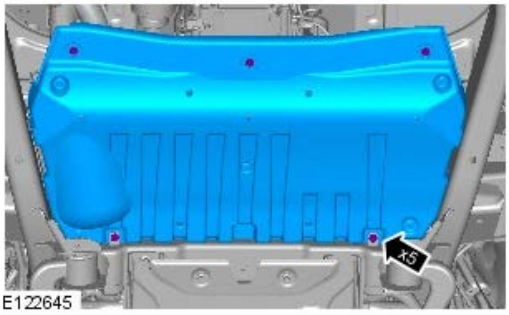
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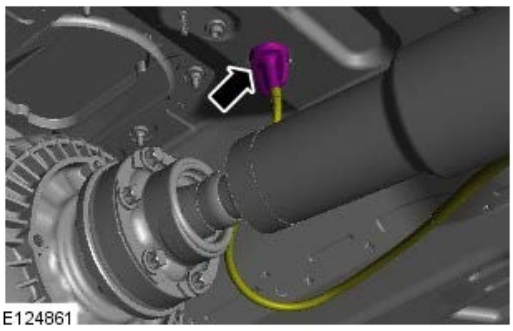
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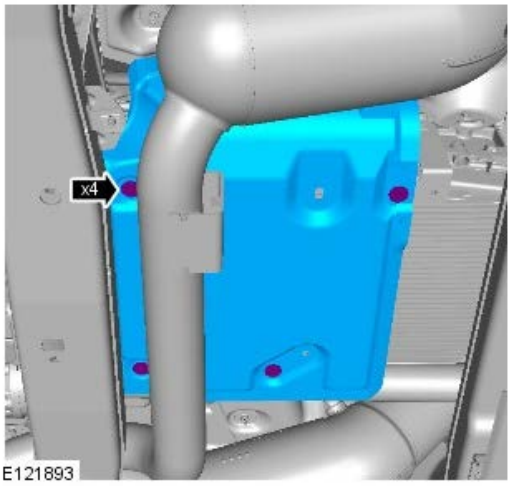
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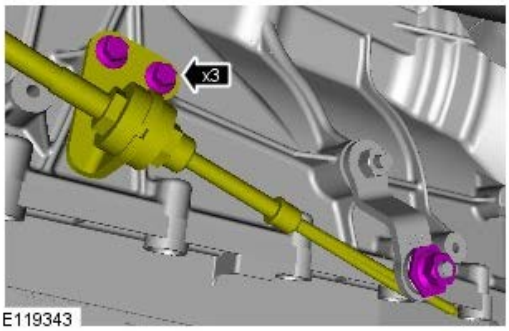
54. CAUTION: Note the fitted position of the seal.



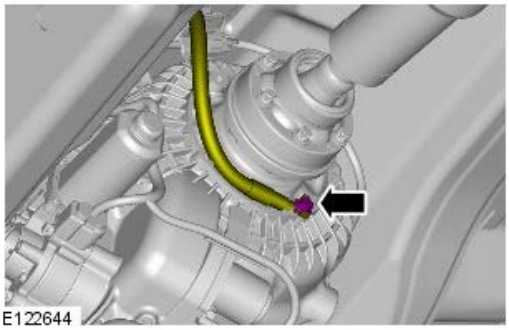
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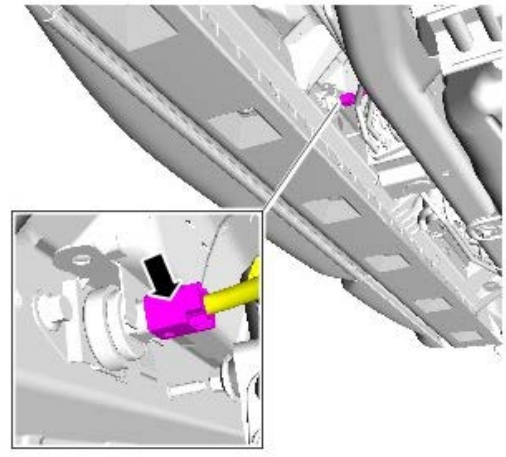
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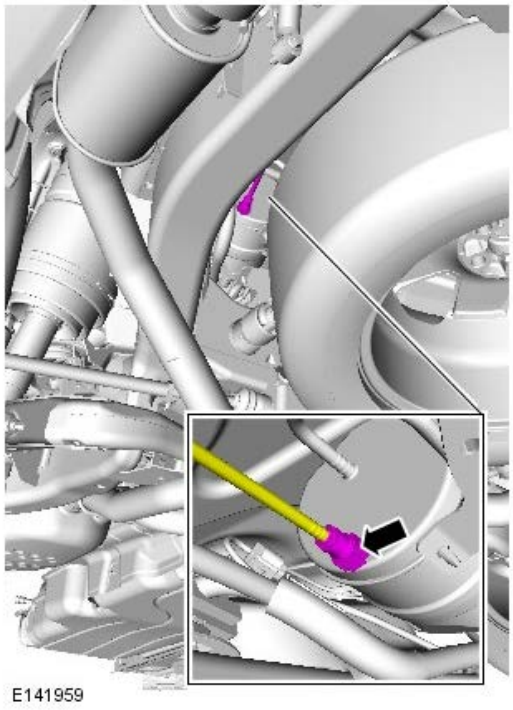
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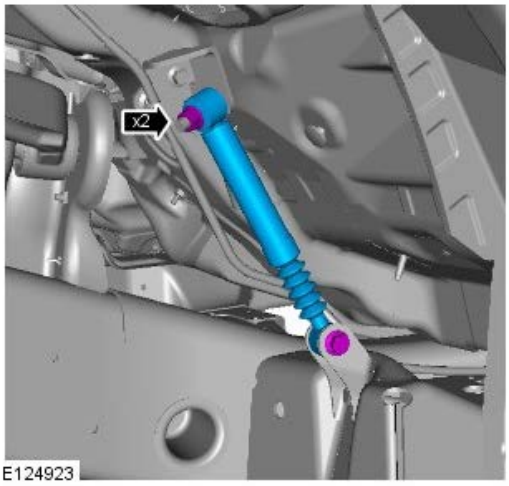
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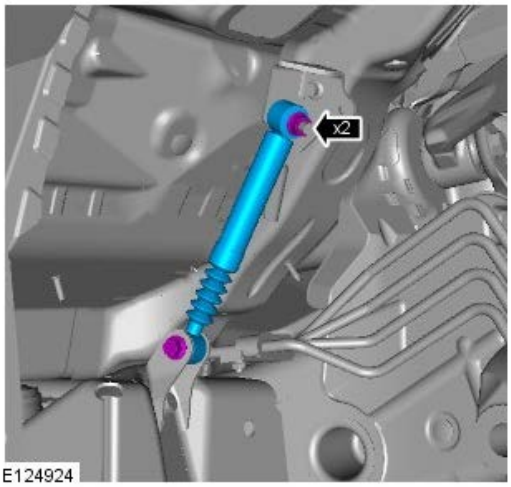
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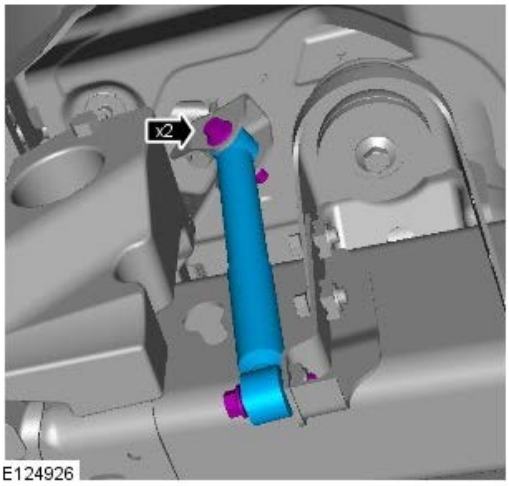
60.



61.

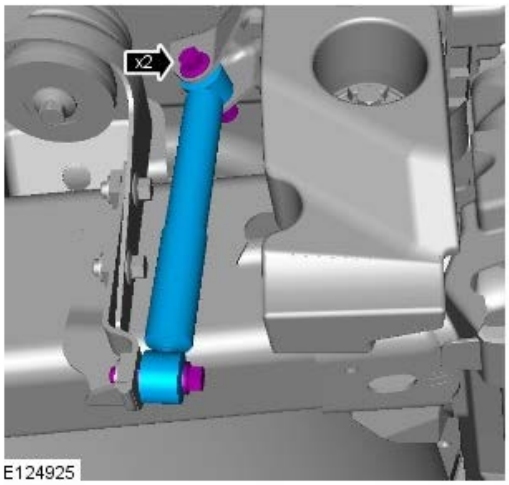


62.



E124926

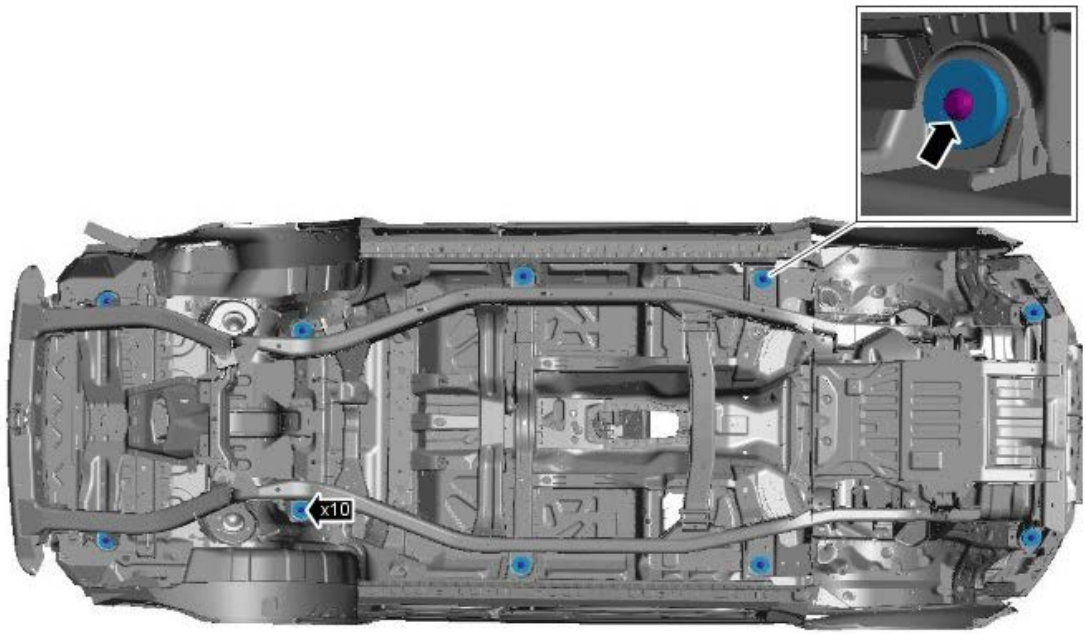
63.



E124925

64. Lower the vehicle.

65. Remove and discard the 10 body mount bolts.
    - Remove the 10 spacing washers.

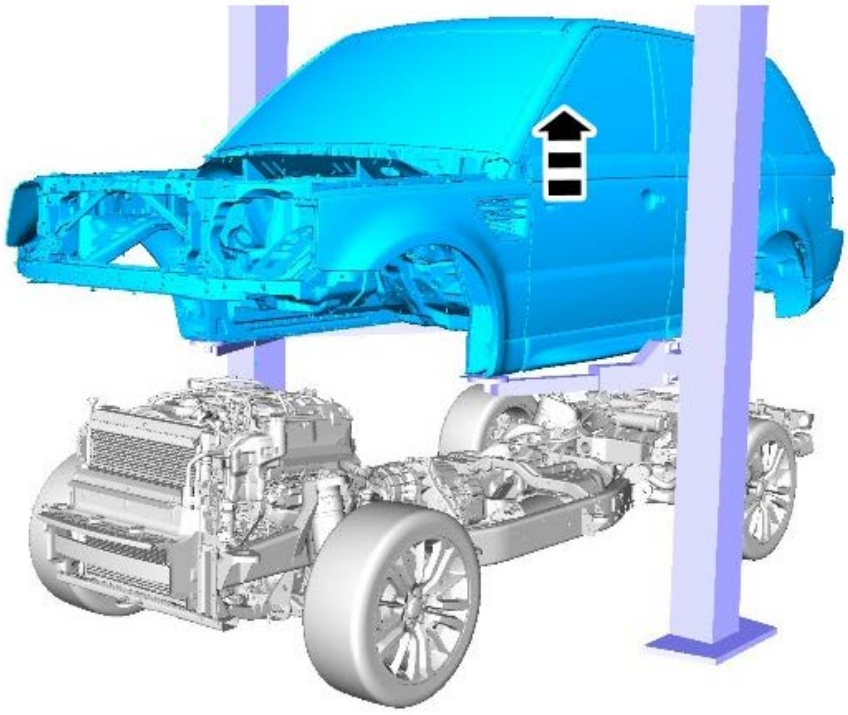


E124859

66. CAUTION: To prevent the body becoming unstable when raised from the integrated body frame, install the vehicle tie down straps.

NOTE: Note the fitted position of the body mounts.

Using an assistant raise and support the body.
- Remove the body mounts.



E140830

Installation

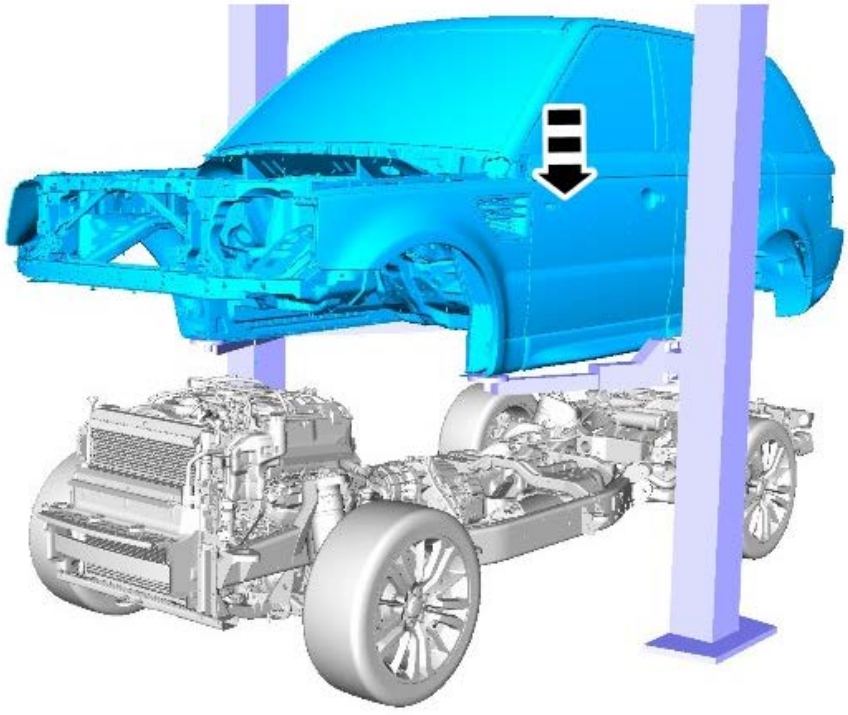
All vehicles

1. CAUTIONS:

   Make sure that new bolts are installed.

   Make sure that all components are free and do not get caught up whilst lowering the body onto the integrated body frame.

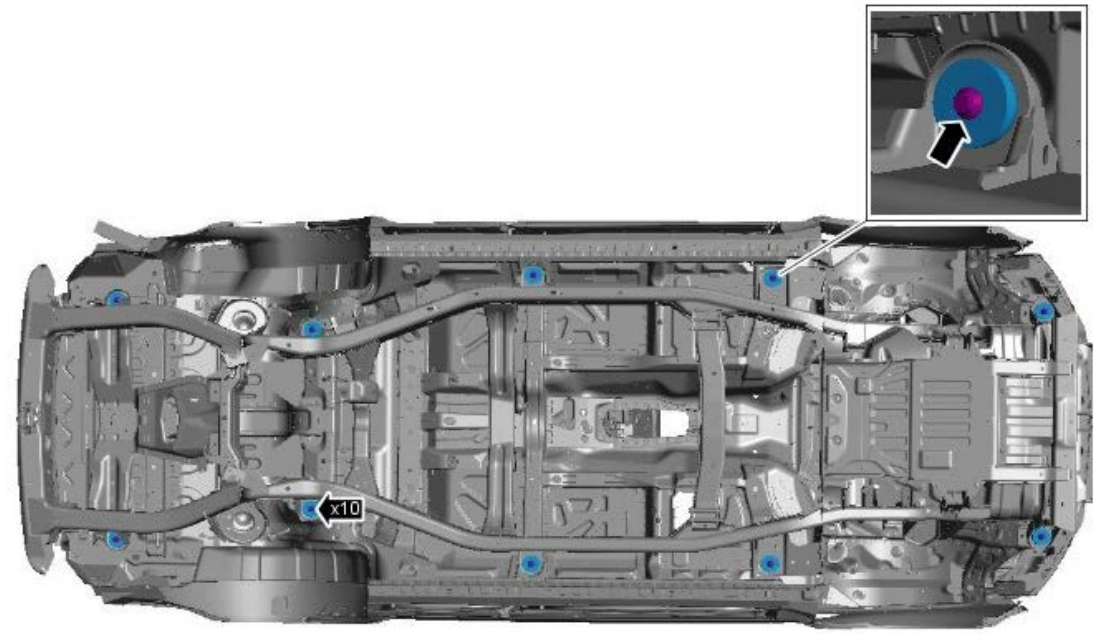
   Using an assistant install the body to the integrated body frame.
   - Install the body mounts.
   - With assistance align the body and integrated body frame mounts.
   - Install the bolts, but do not tighten fully at this stage.



E140831

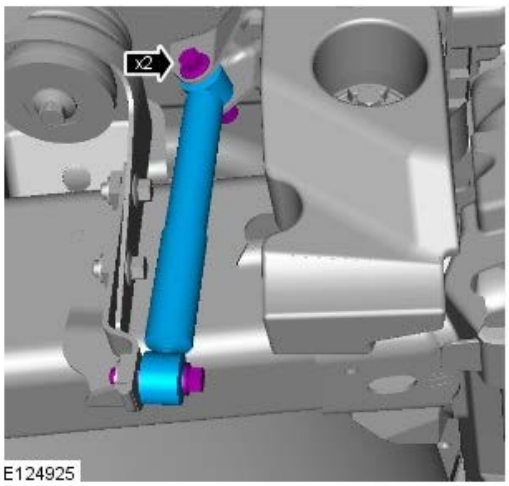
2. Remove the tie down straps securing the body.

3. TORQUE: 133 Nm



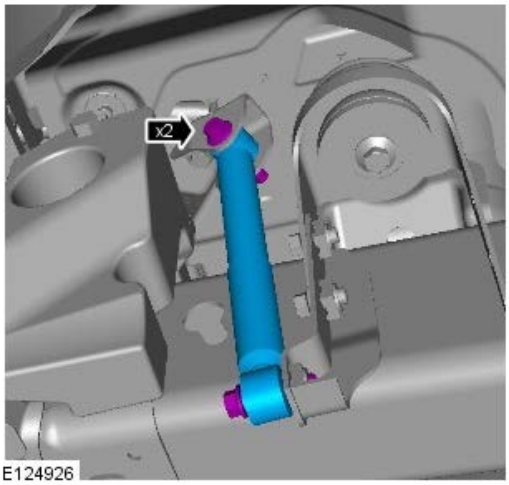
E124859

4. TORQUE: 45 Nm



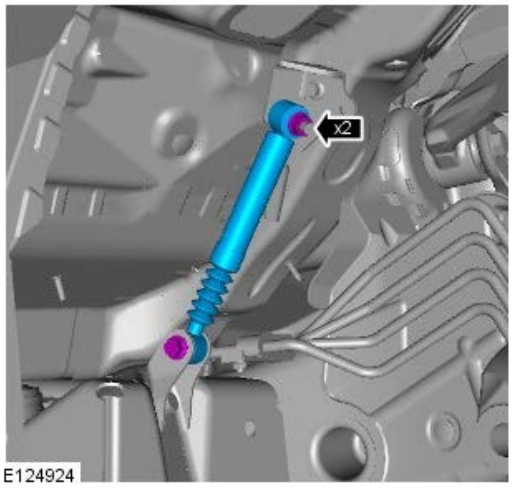
E124925

5. TORQUE: 45 Nm

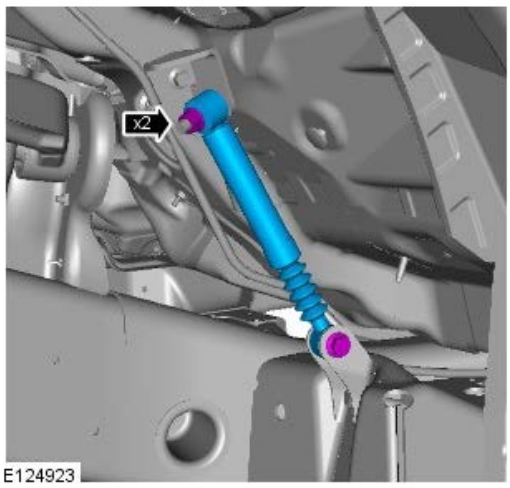


E124926

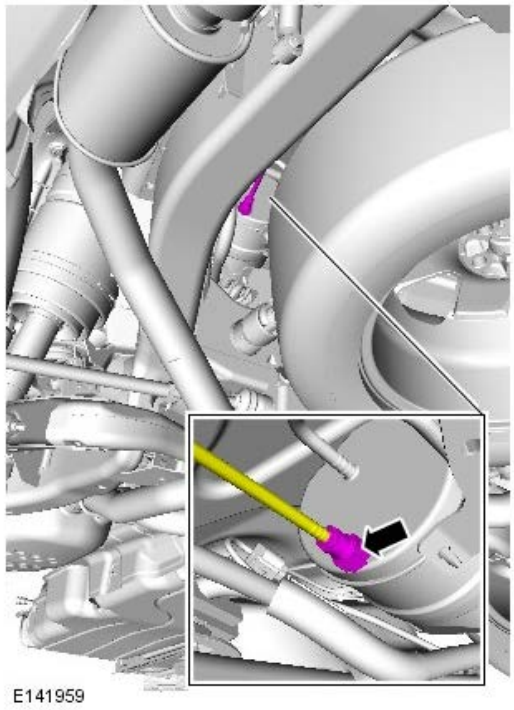
6. TORQUE: 45 Nm



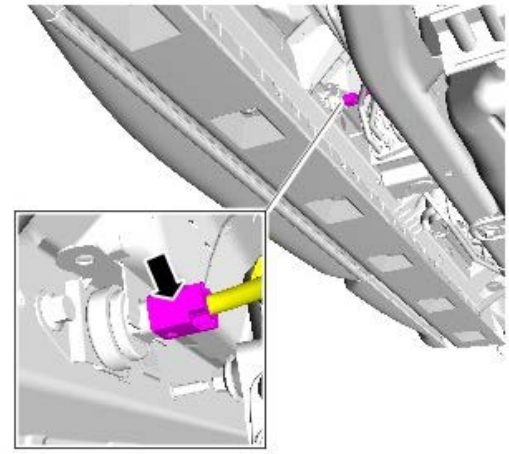
7. TORQUE: 45 Nm



8.

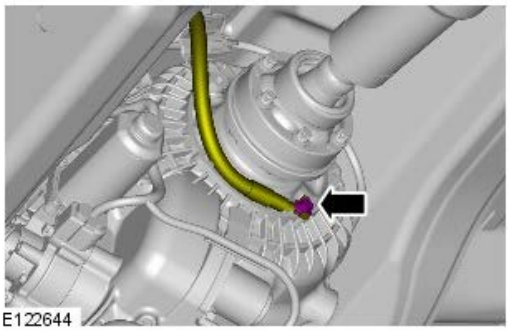


9.



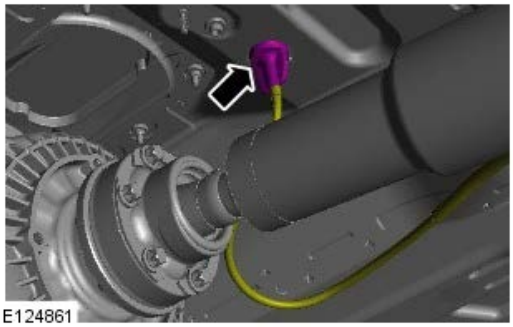
E140766

10. TORQUE: 25 Nm



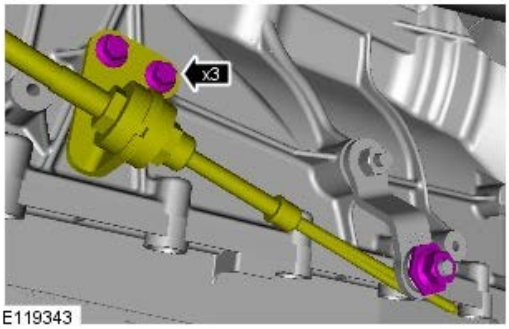
E122644

11.



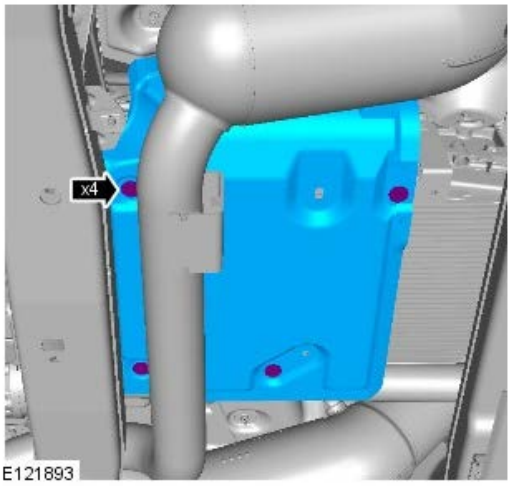
E124861

12.

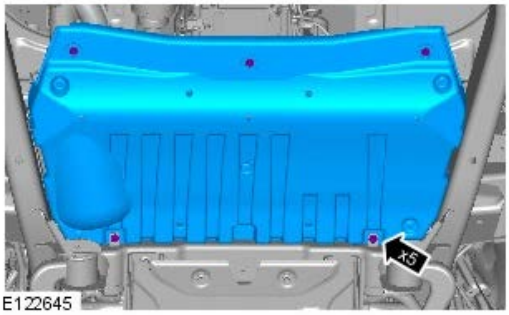


E119343

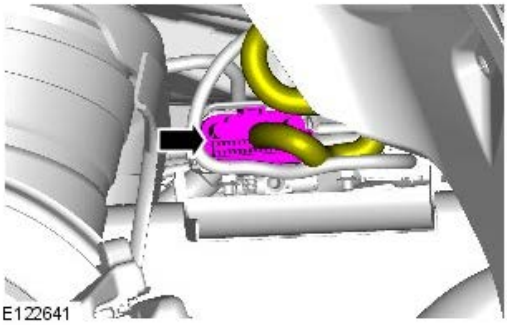
13. TORQUE: 12 Nm



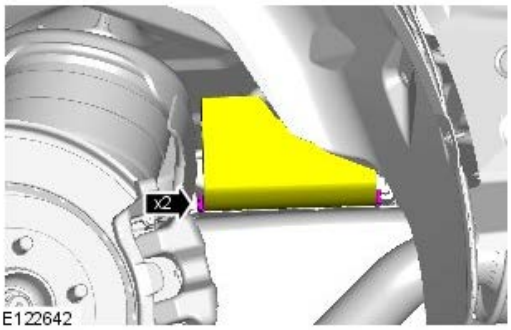
14. TORQUE: 12 Nm



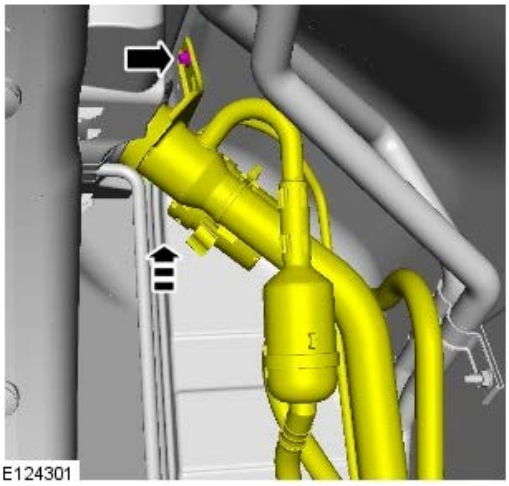
15.



16.

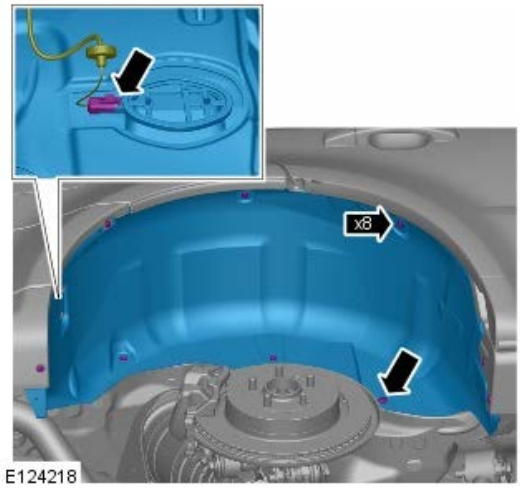


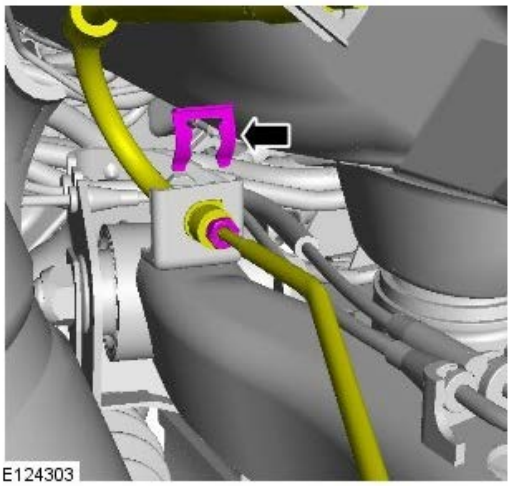
17. TORQUE: 12 Nm



18. Install the fuel filler cap.

19.



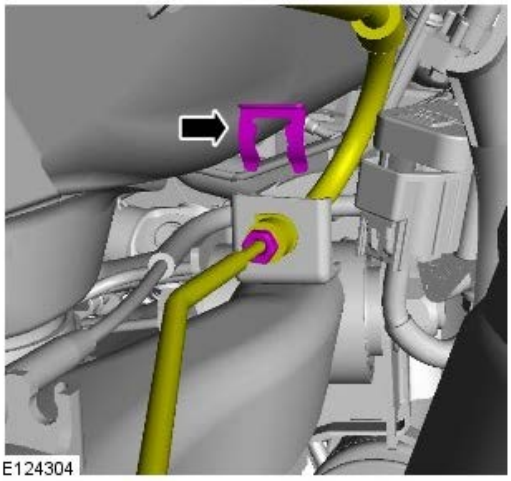


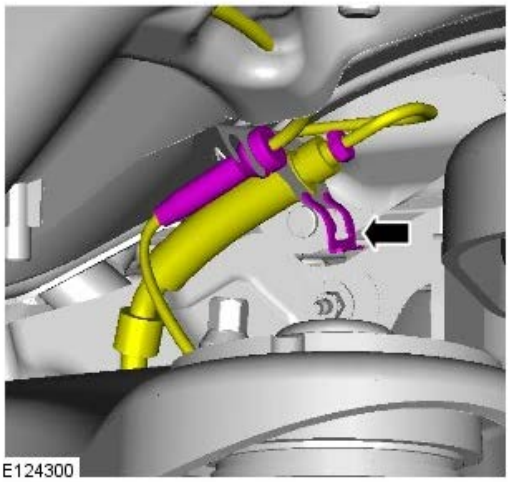
20. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

21. NOTE: Remove and discard the blanking caps.

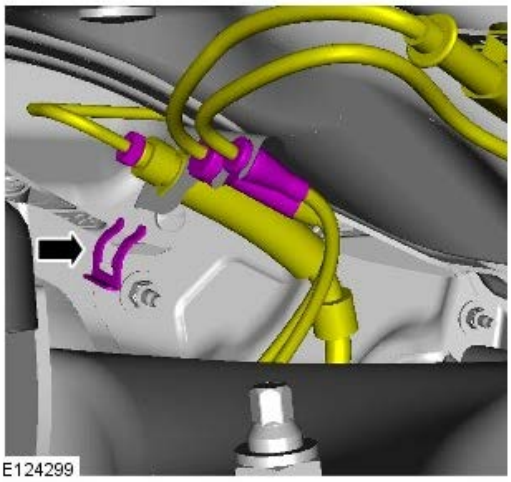
TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.


E124304


E124300

22. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

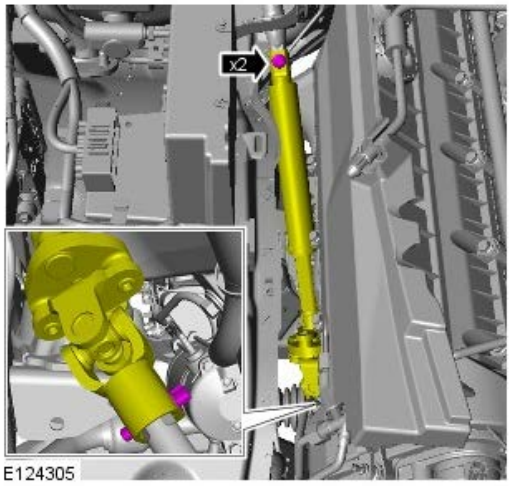

E124299

23. NOTE: Remove and discard the blanking caps.

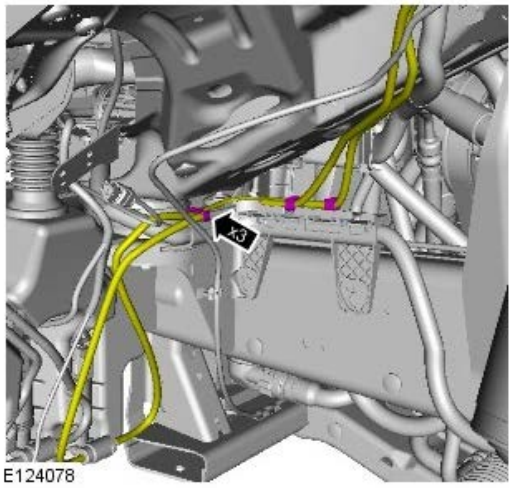
TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

24. WARNING: Make sure that a new bolt is installed.

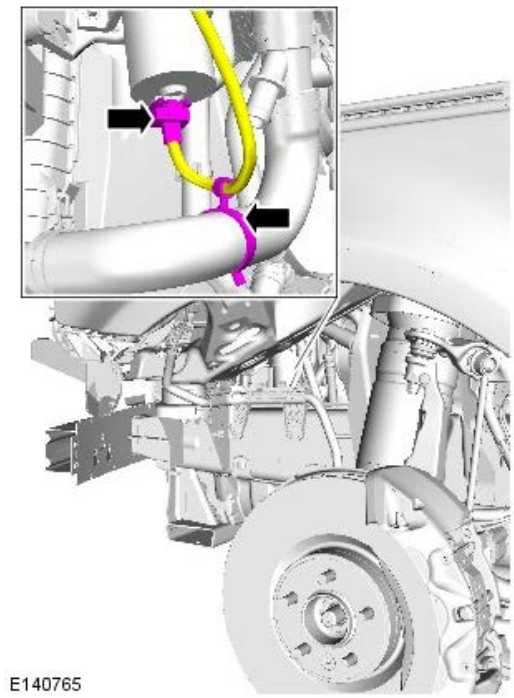
TORQUE: 25 Nm



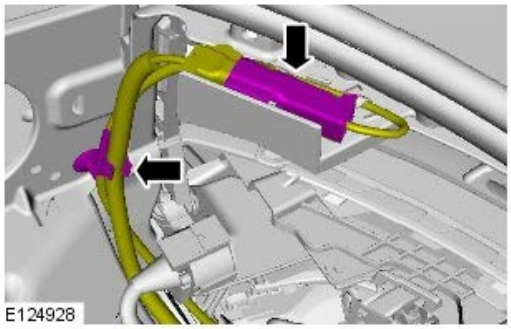
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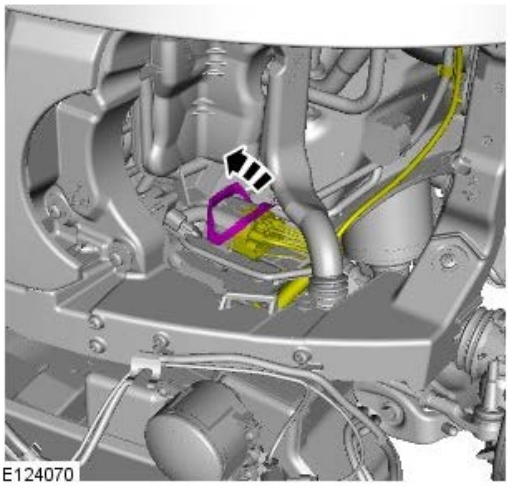
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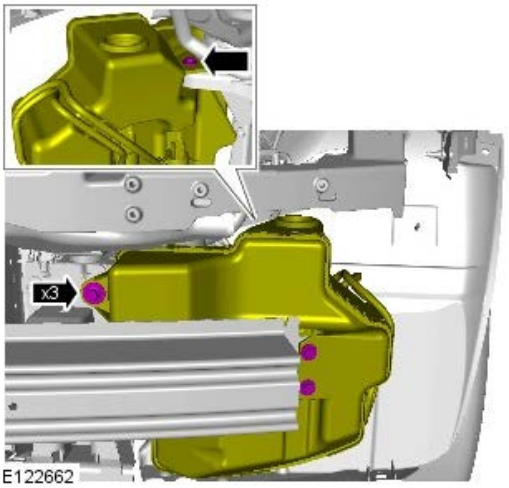
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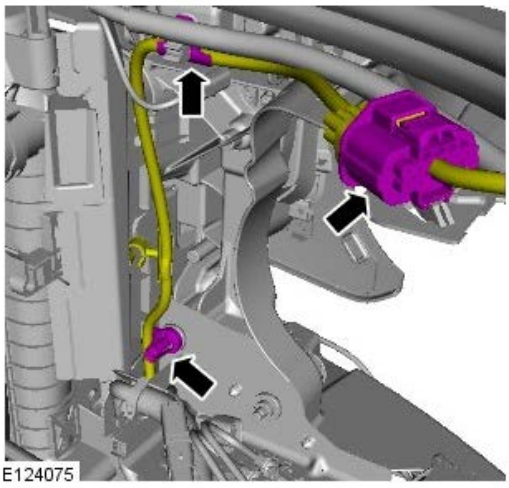
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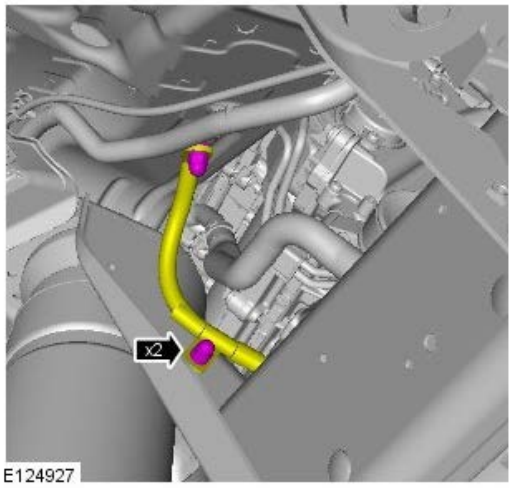
29. TORQUE: 12 Nm



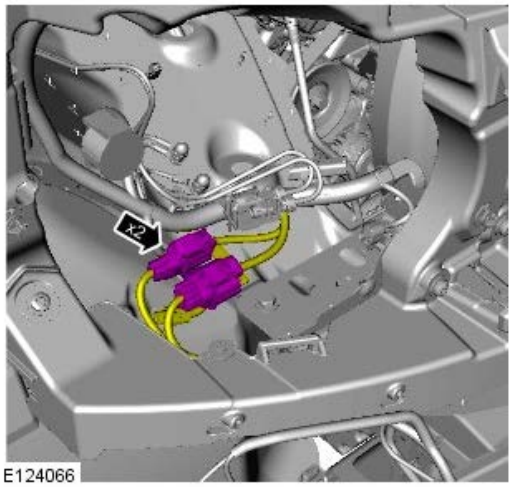
30.



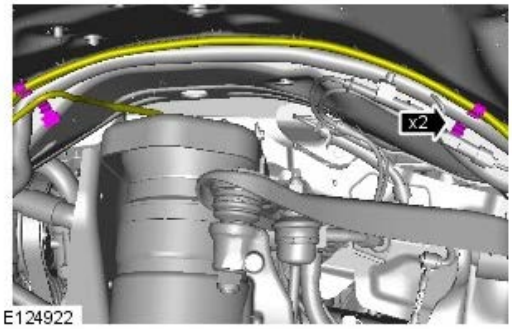
31. TORQUE: 20 Nm



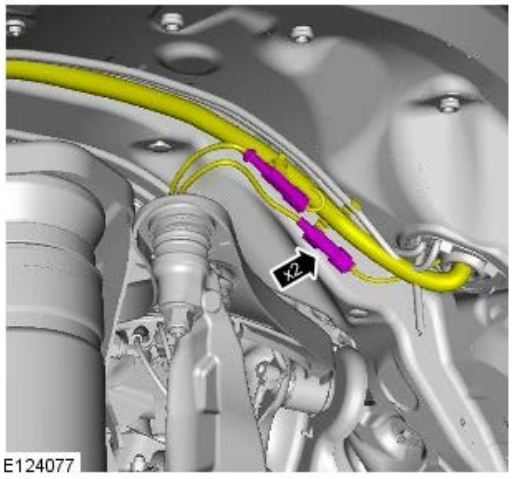
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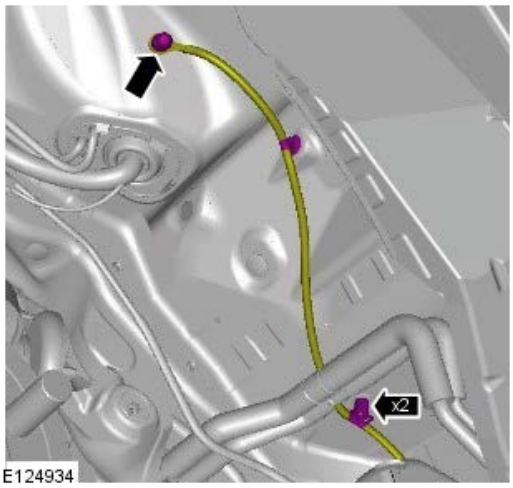
33.



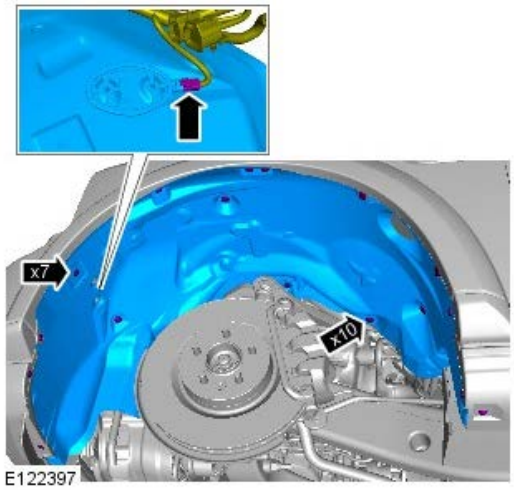
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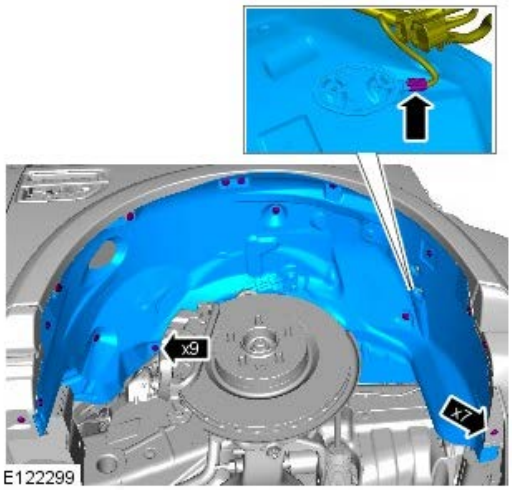
35. TORQUE: 20 Nm



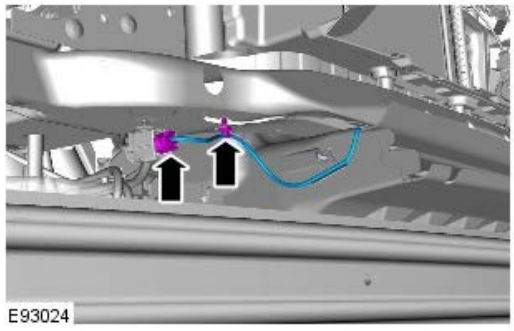
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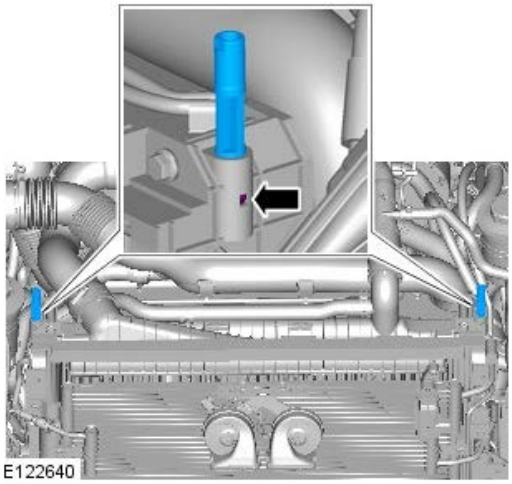
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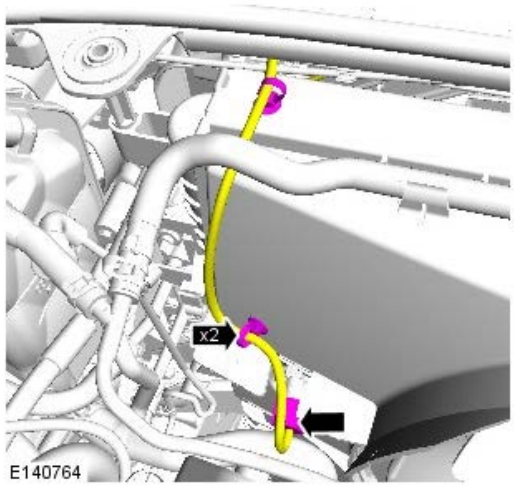
38.



39.

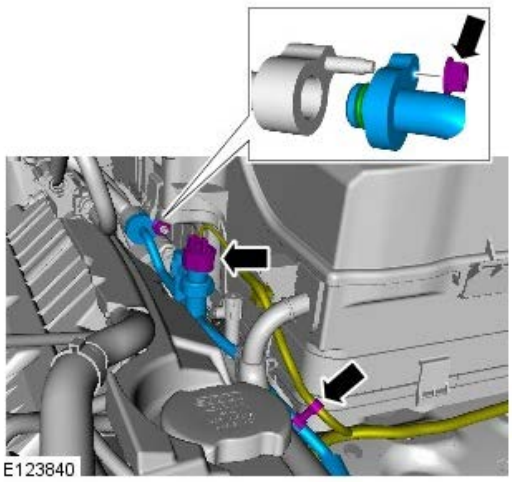


40.



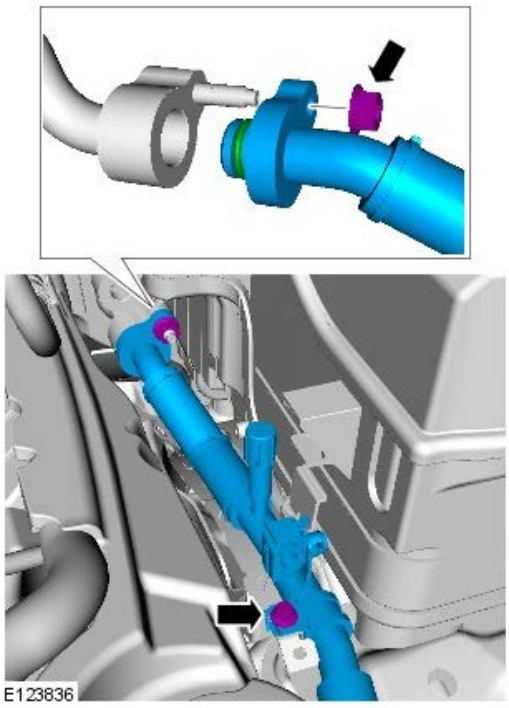
41. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

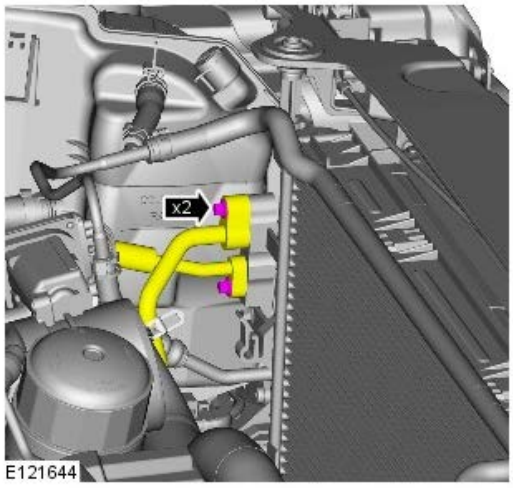
TORQUE: 12 Nm
- Install new O-ring seals.



42. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

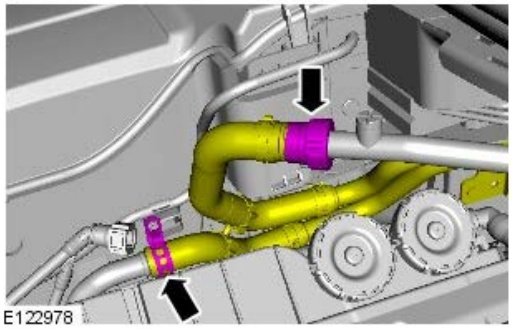
TORQUE: 12 Nm
- Install new O-ring seals.





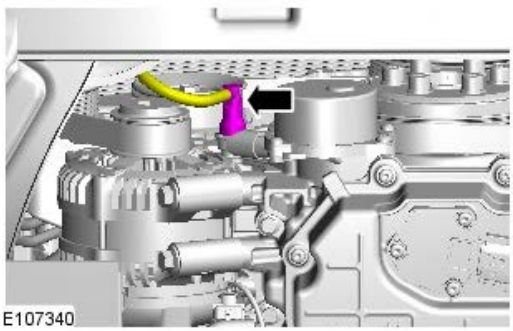
43. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

TORQUE: 12 Nm
- Install new O-ring seals.

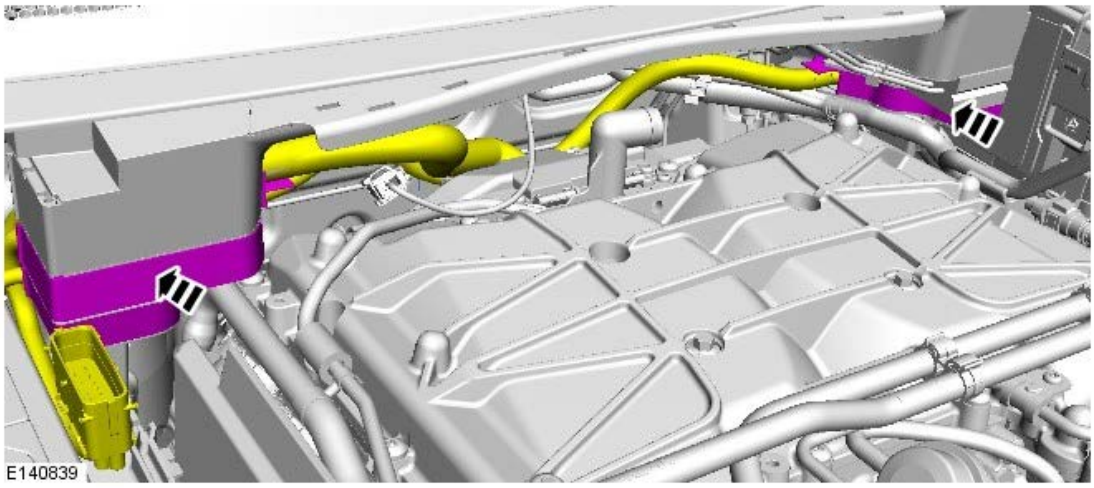


44. WARNING: Be prepared to collect escaping fluid.

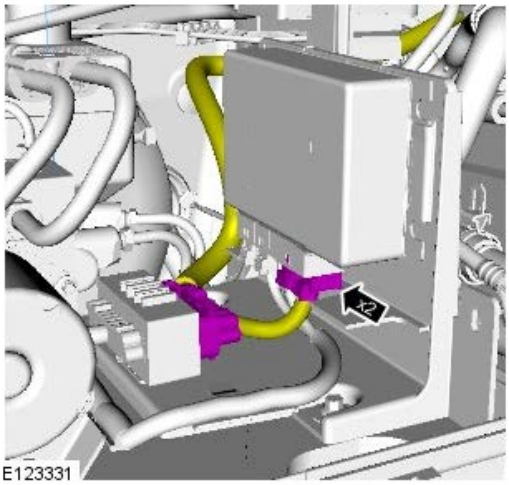
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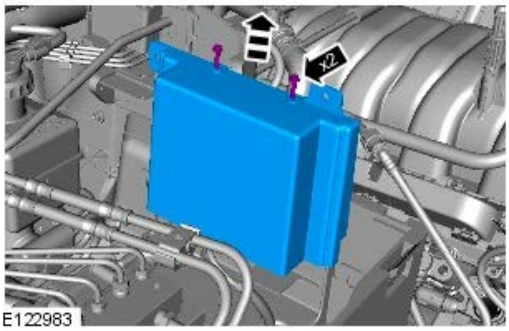
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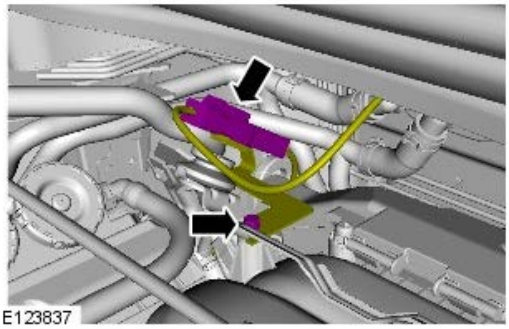
47.



48. TORQUE: 8 Nm

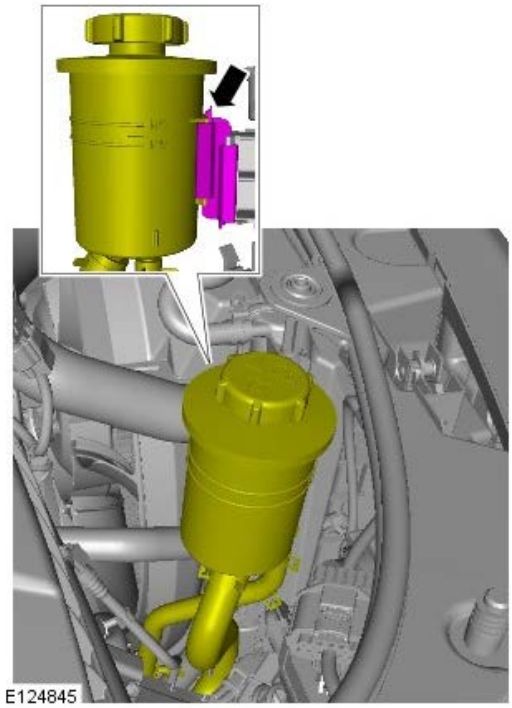


49. TORQUE: 10 Nm

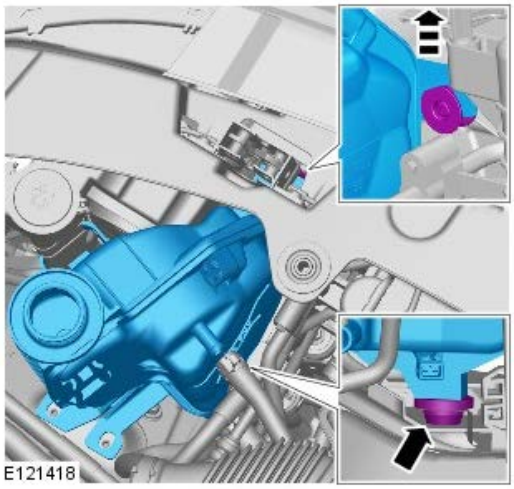


Vehicles with active damping

50.



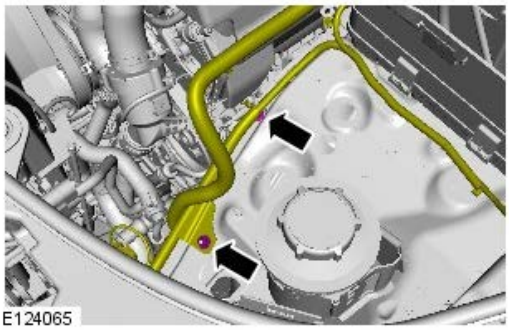
All vehicles



51. CAUTION: Be prepared to collect escaping coolant.

    For additional information, refer to: Coolant Expansion Tank - V8 5.0L Petrol, 5.0L (303-03 Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

52. TORQUE: 10 Nm



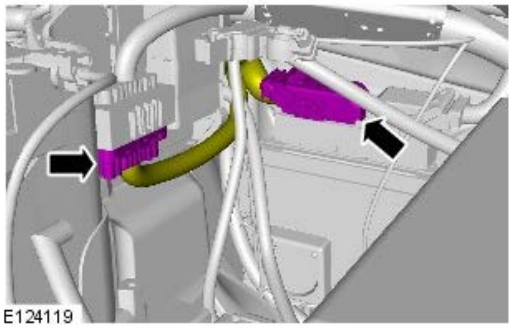
53. For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).

54. For additional information, refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).

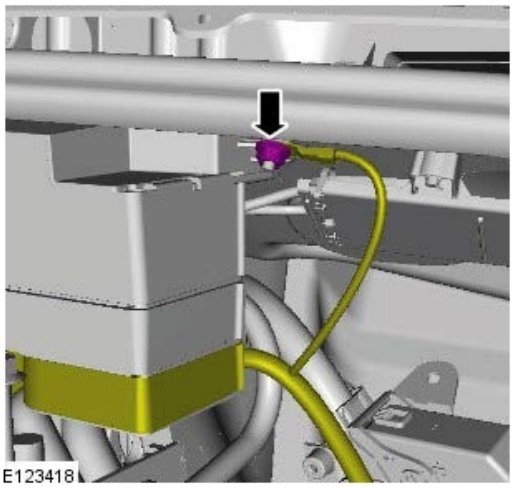
55. For additional information, refer to: Air Cleaner LH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

56. For additional information, refer to: Air Cleaner RH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

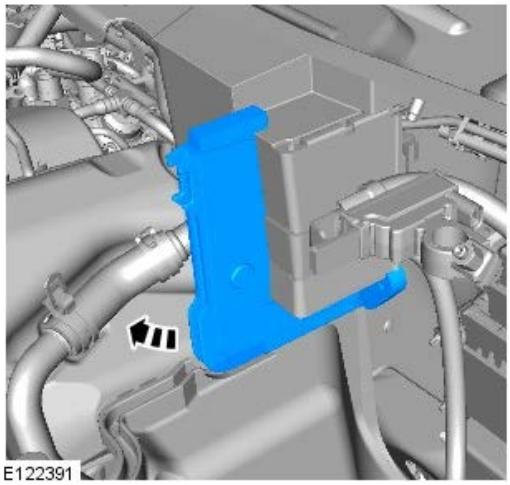
57.



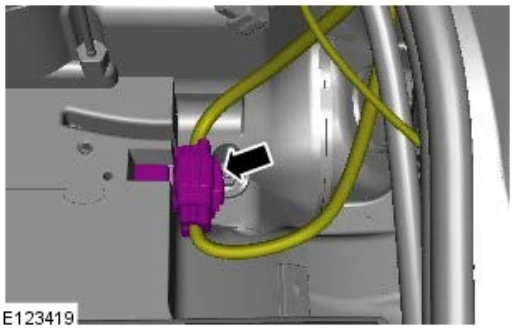
58. TORQUE: 10 Nm



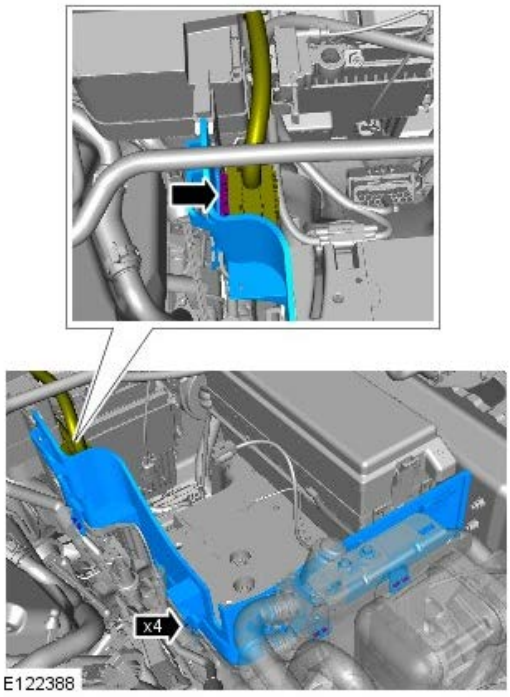
59.



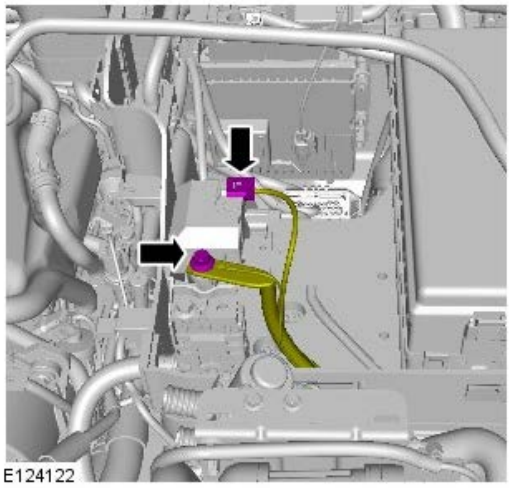
60.



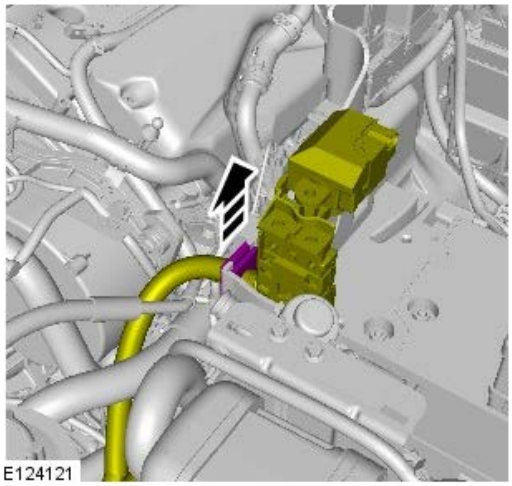
61. NOTE: RHD illustration shown, LHD is similar.



62.



63.



64. For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

65. For additional information, refer to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

66. Check and top-up the coolant
For additional information, refer to: Cooling System Draining, Filling and Bleeding - V8 5.0L Petrol (303-03C, General Procedures).
.

67. Bleed the braking system.
For additional information, refer to: Brake System Bleeding - Vehicles With: Standard Brakes (206-00 Brake System - General Information, General Procedures).

Published: 19-Jan-2012

Full Frame and Body Mounting - Body V8 S/C 5.0L Petrol

Removal and Installation

Removal

NOTES:

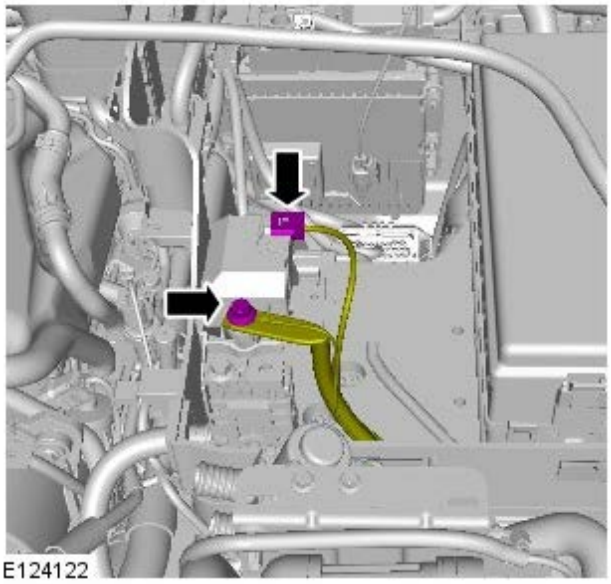
Some variation in the illustrations may occur, but the essential information is always correct.

Some illustrations may show the engine removed for clarity.

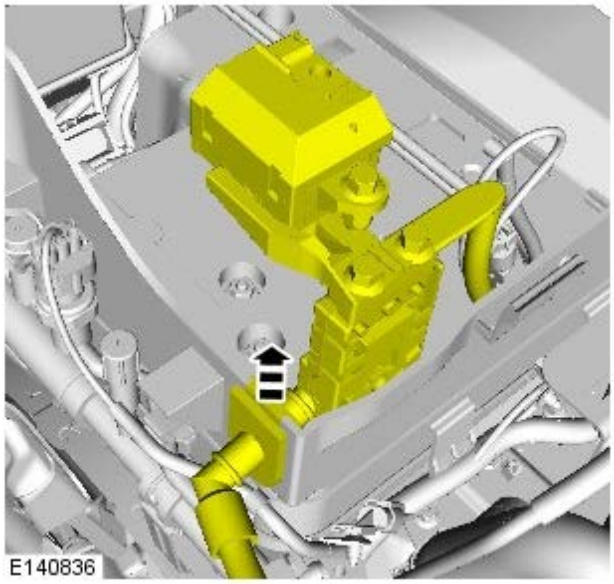
All vehicles

1. Remove the battery for access.
   For additional information, refer to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

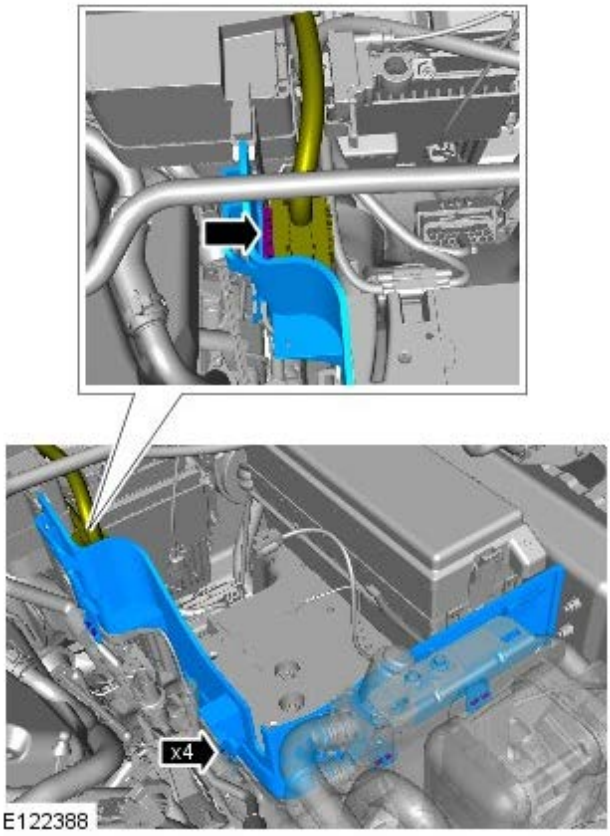
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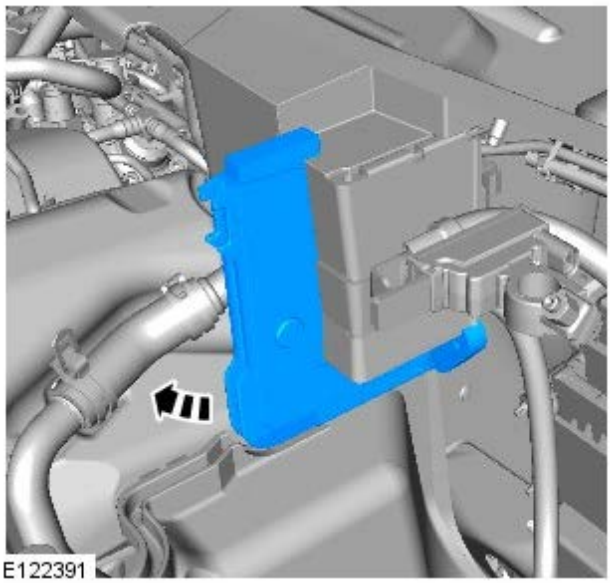
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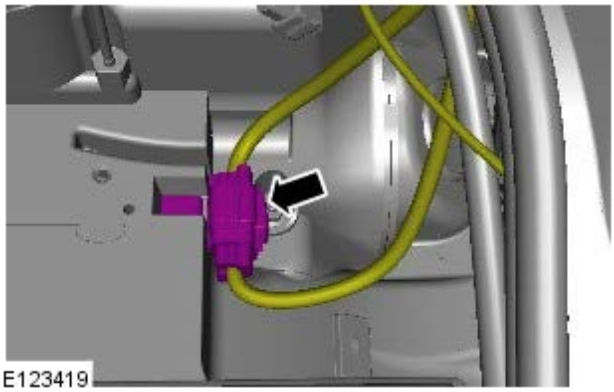
4. NOTE: RHD illustration shown, LHD is similar.



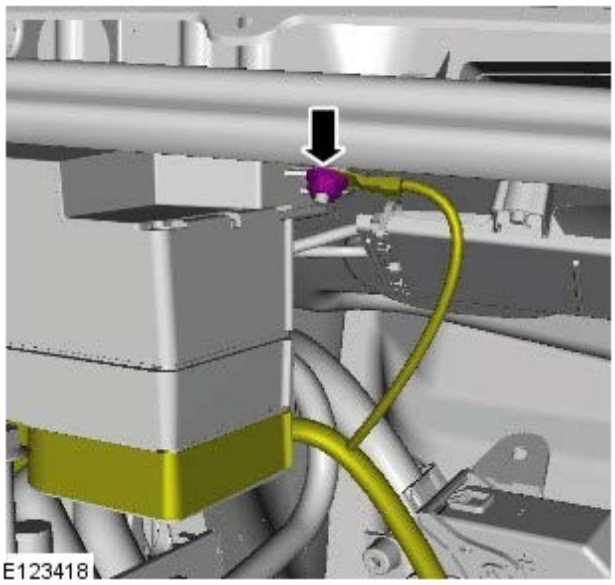
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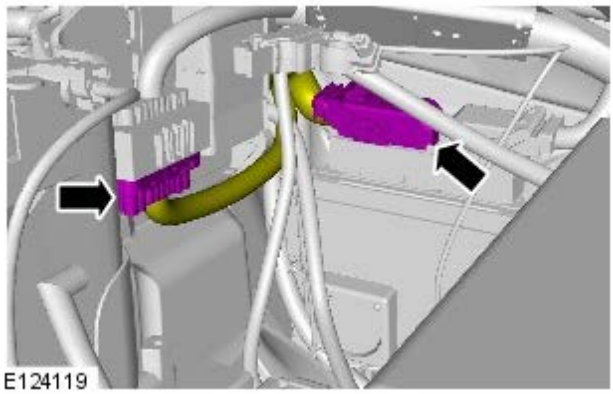
6.



7.



8.



9. For additional information, refer to: Air Cleaner LH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

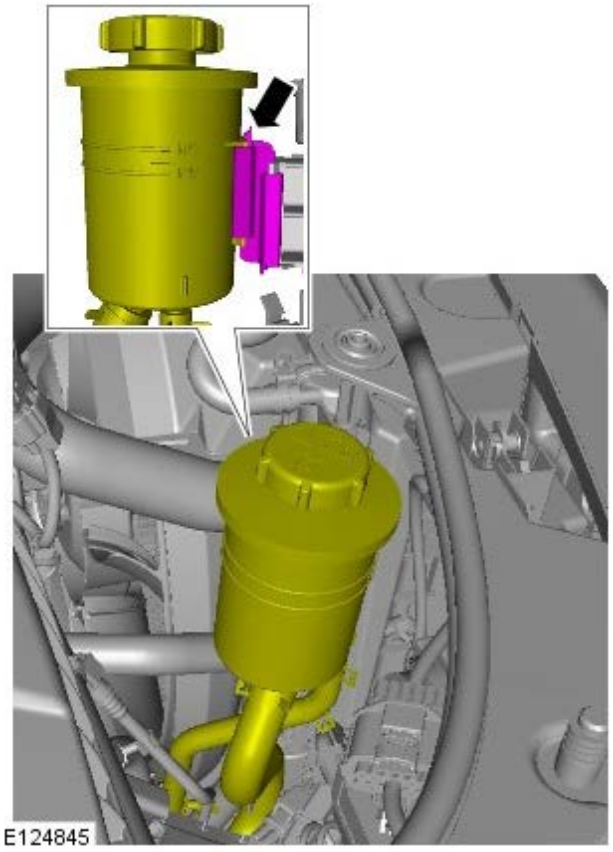
10. For additional information, refer to: Air Cleaner RH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

11. For additional information, refer to: Coolant Expansion Tank - V8 S/C 5.0L Petrol, 5.0L (303-03 Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

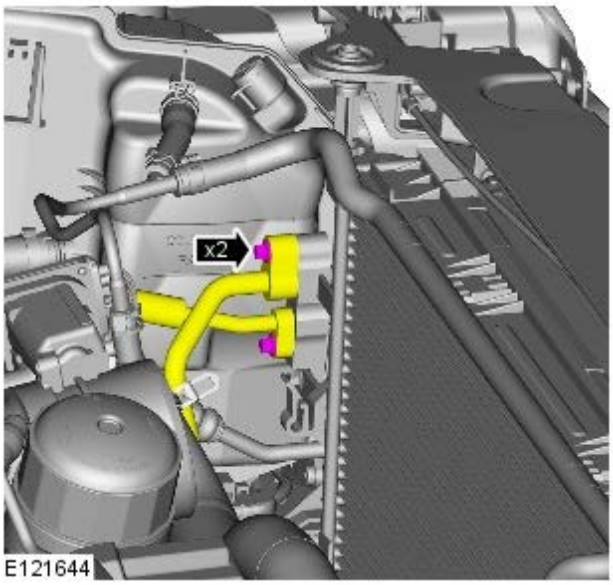
12. For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

Vehicles with active damping

13.

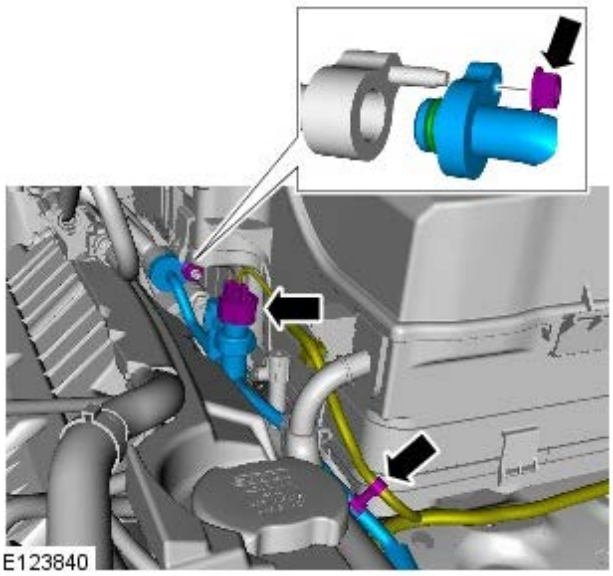


All vehicles

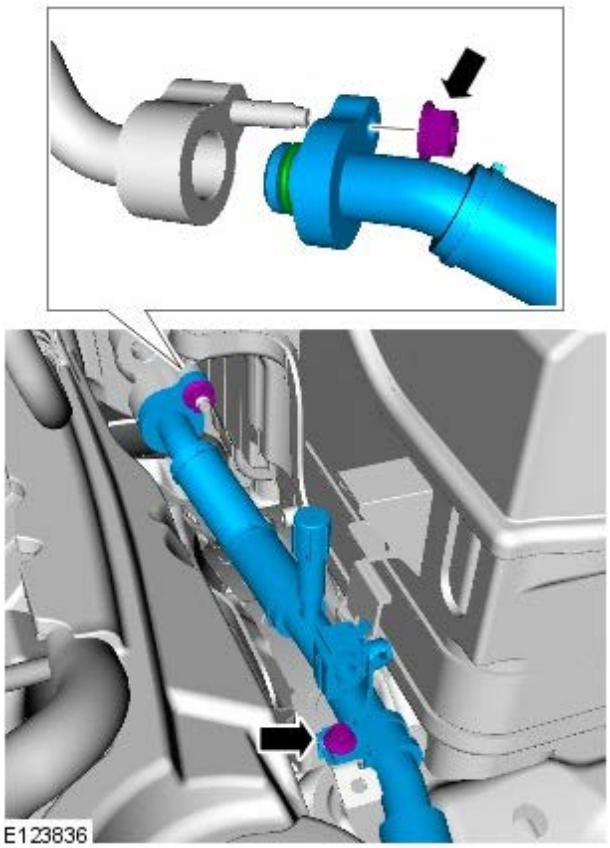


14. CAUTION: Make sure that all openings are sealed. Use new blanking caps.
    - Remove and discard the 2 O-ring seals.

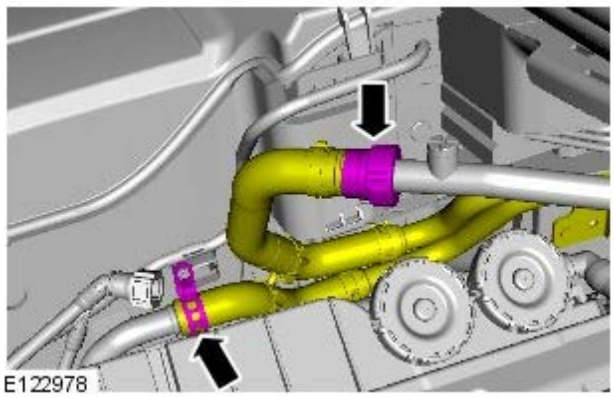
15. CAUTION: Make sure that all openings are sealed. Use new blanking caps.
    - Remove and discard the O-ring seal.



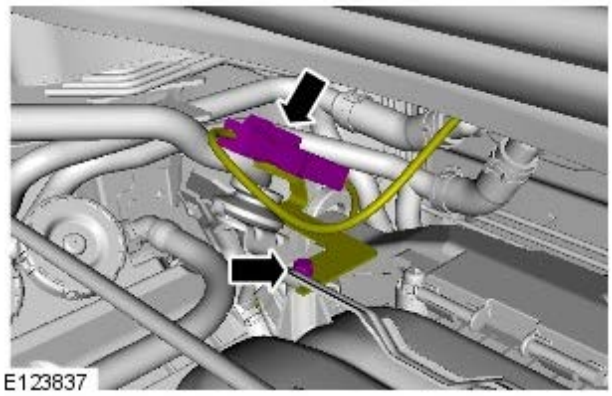
16. CAUTION: Make sure that all openings are sealed. Use new blanking caps.
    - Discard the O-ring seal.



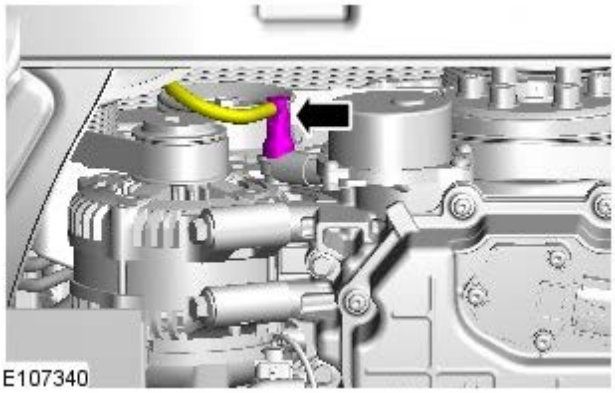
17. WARNING: Be prepared to collect escaping fluid.



18.

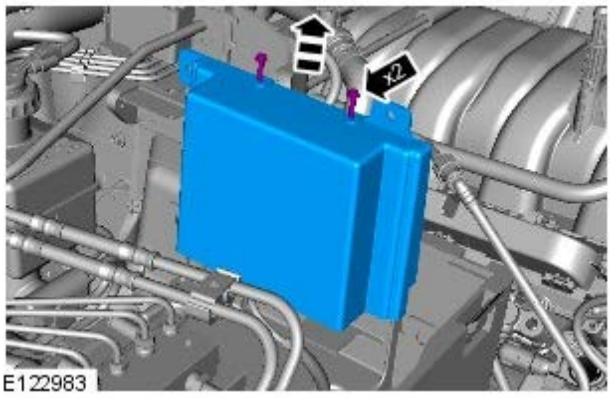


19.

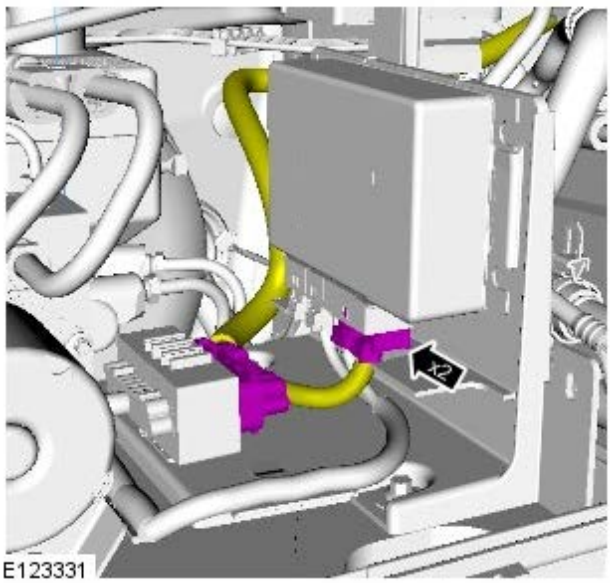


20. For additional information, refer to: Auxiliary Battery Tray (414-01 Battery, Mounting and Cables, Removal and Installation).

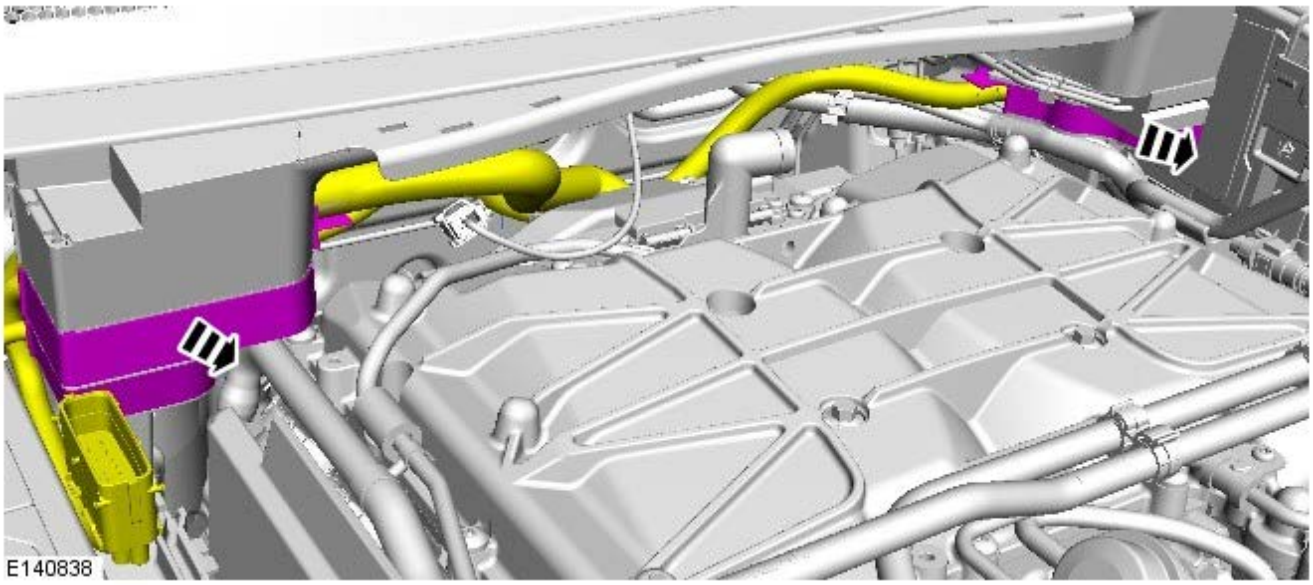
21.



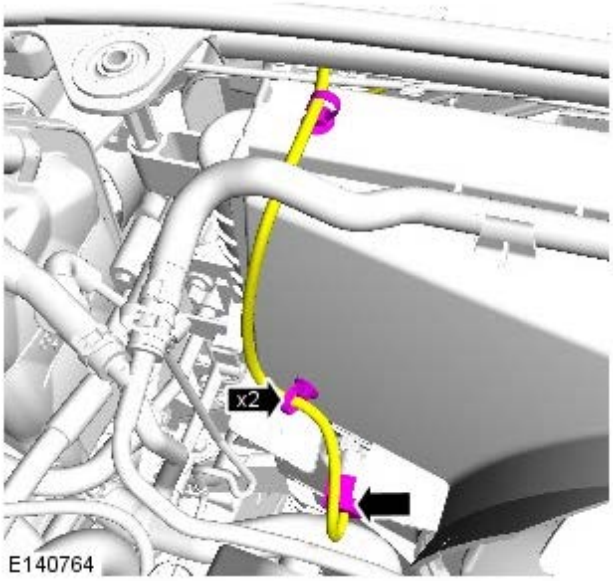
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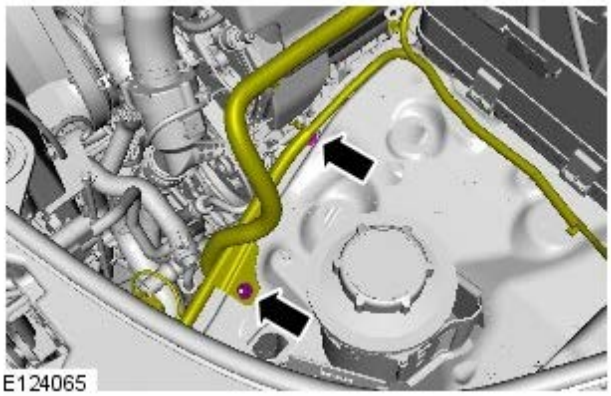
23.



24.

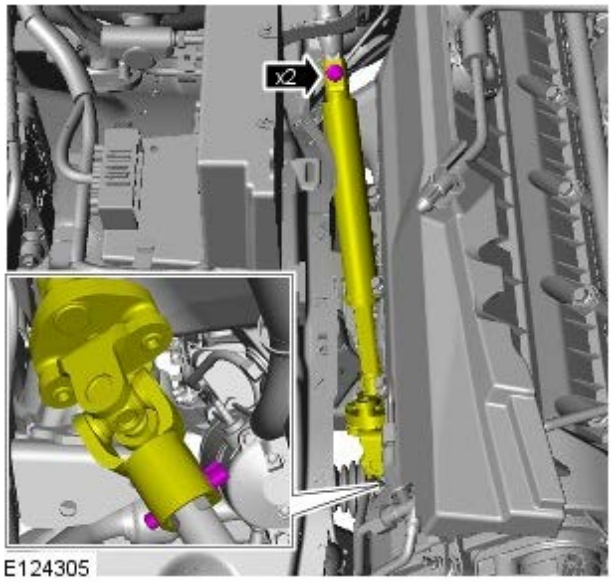


25.

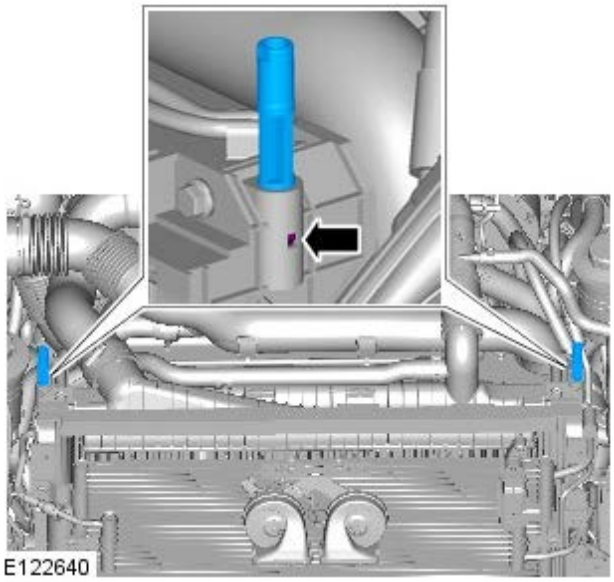


26.

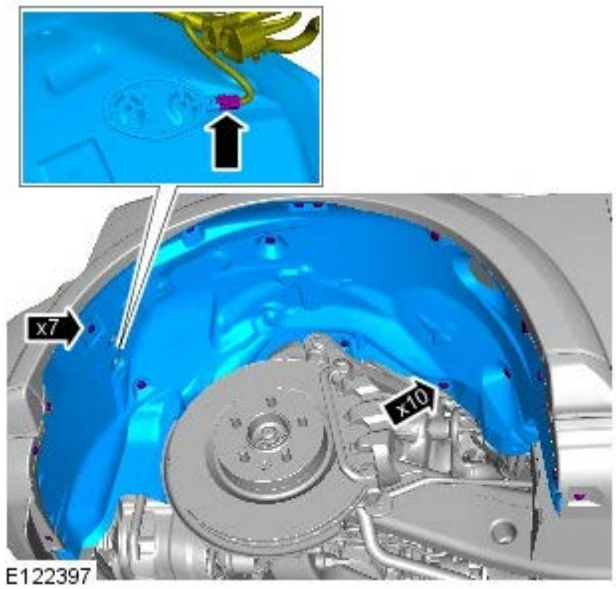
- Remove and discard the bolt.



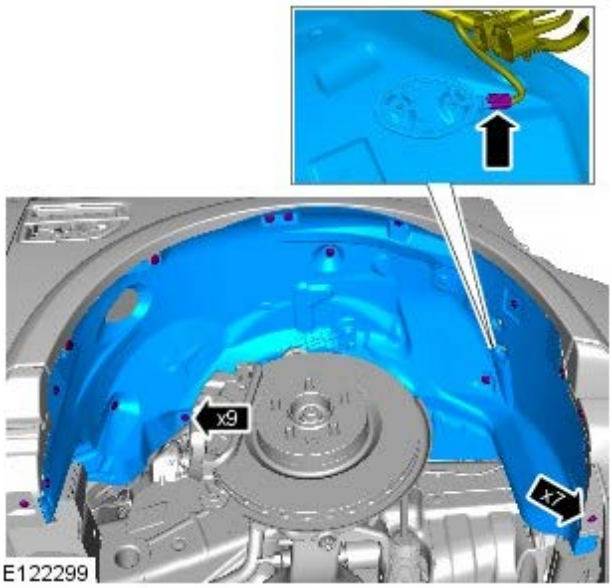
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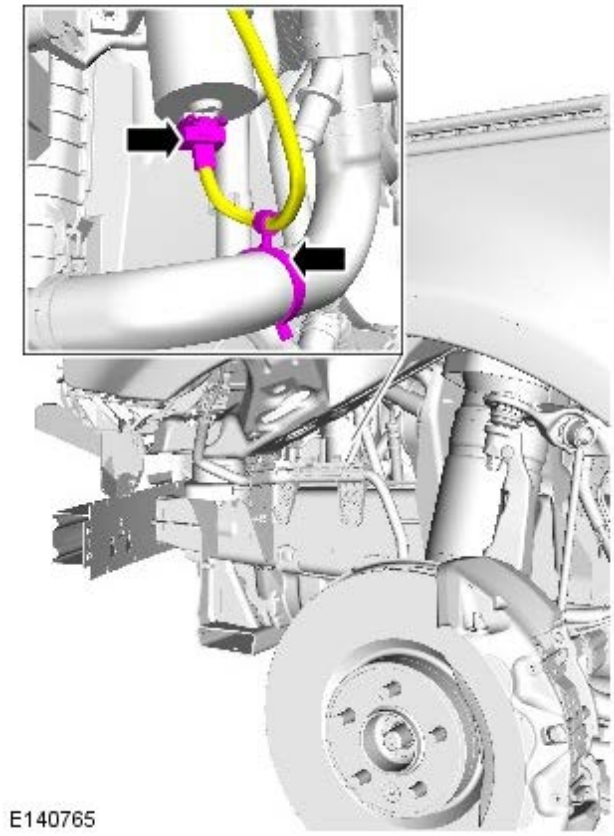
28.



29.



30.

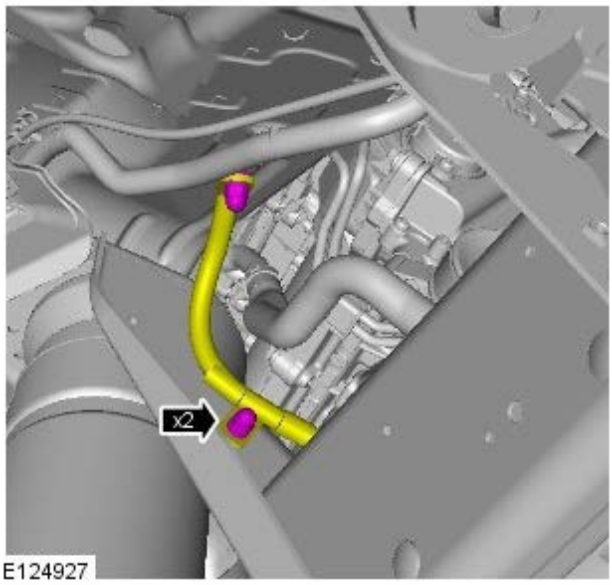


31. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

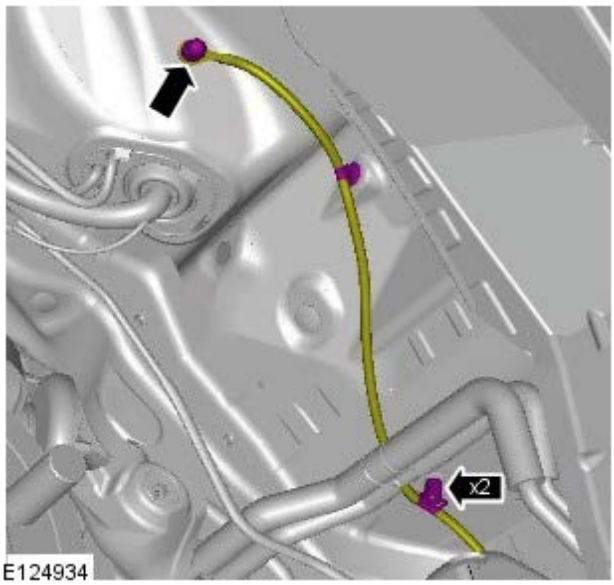
    Raise and support the vehicle.

32. For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).

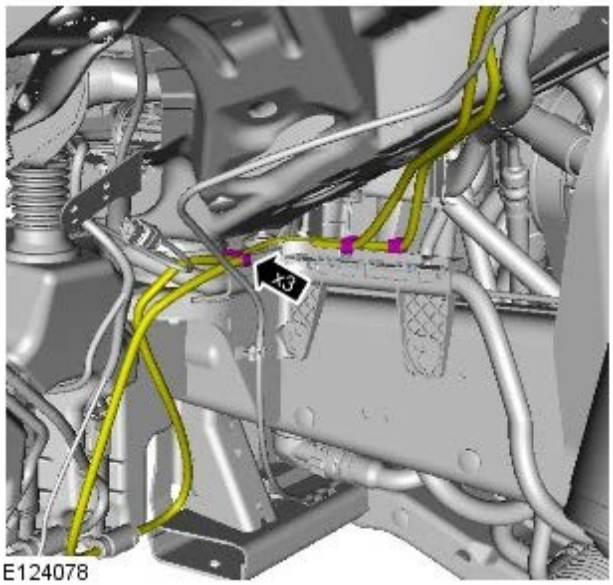
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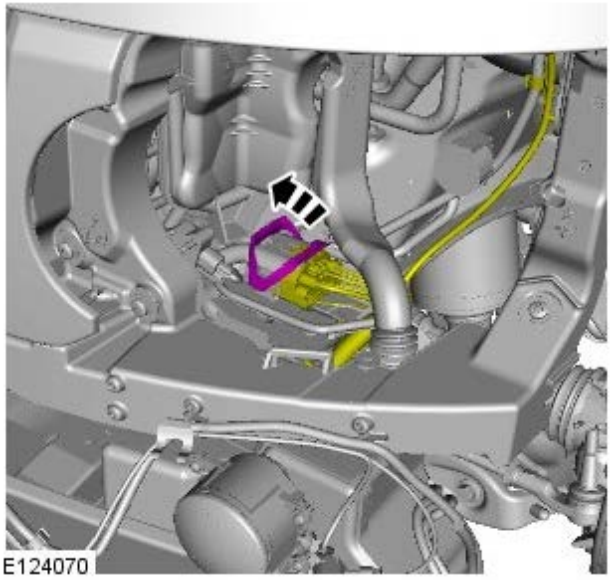
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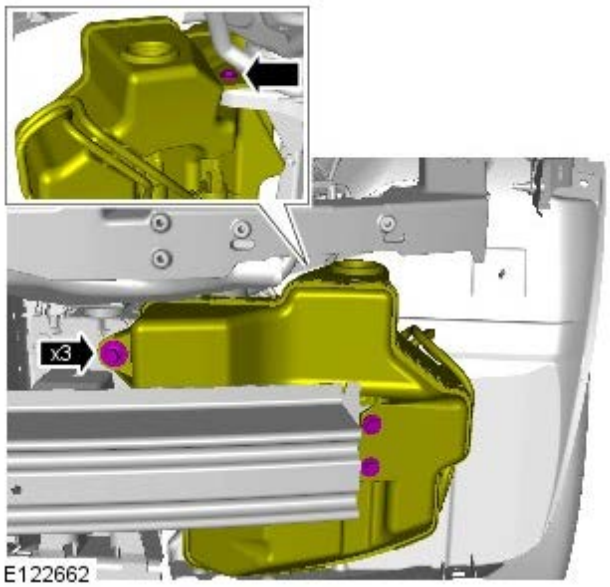
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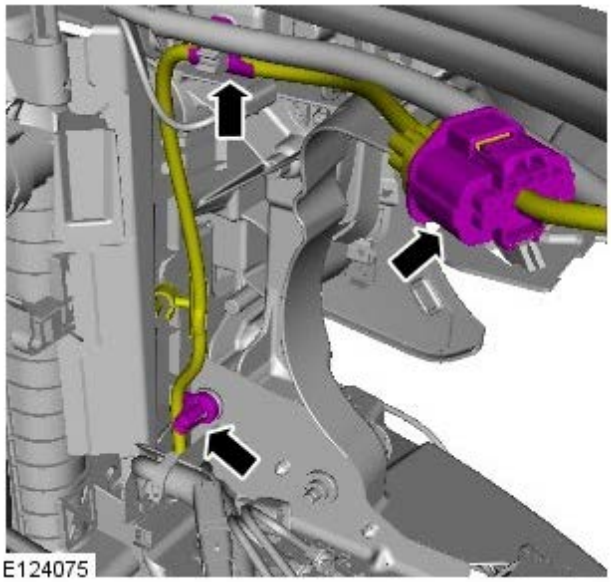
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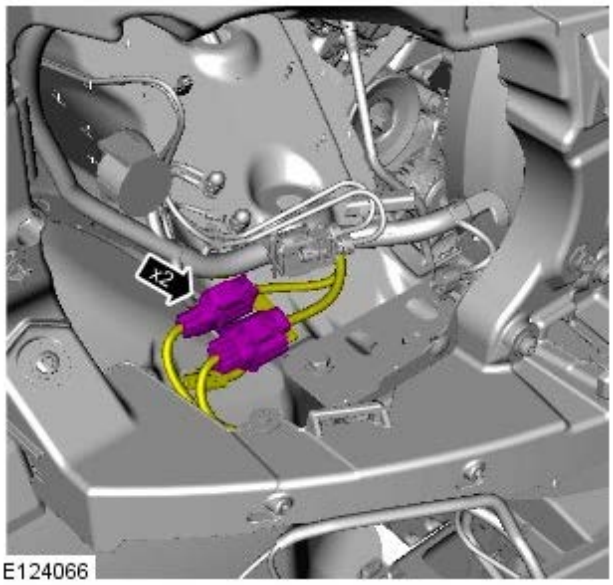
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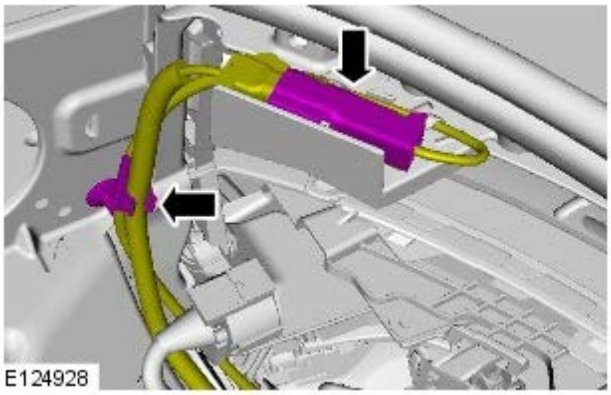
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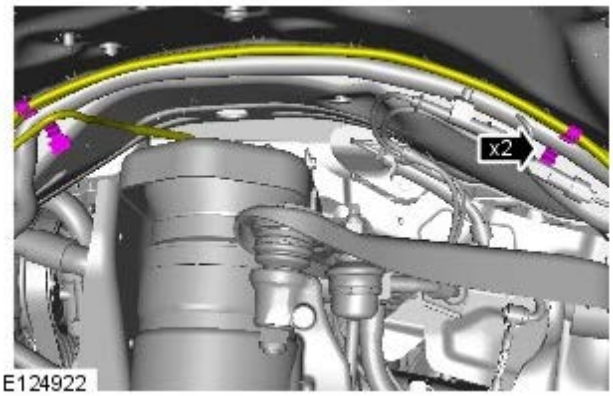
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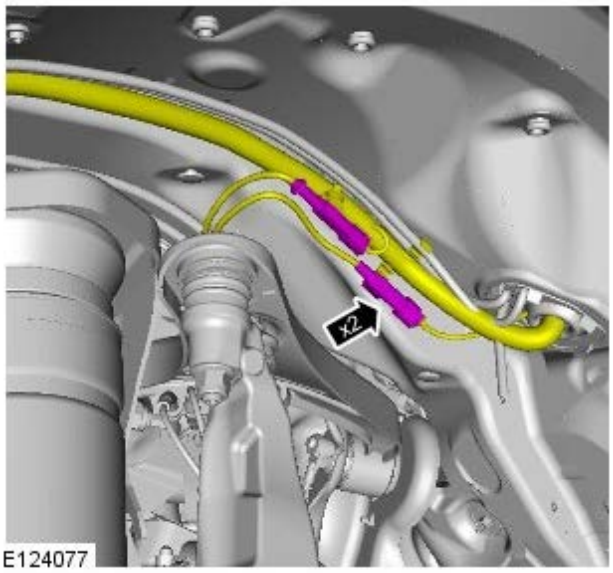
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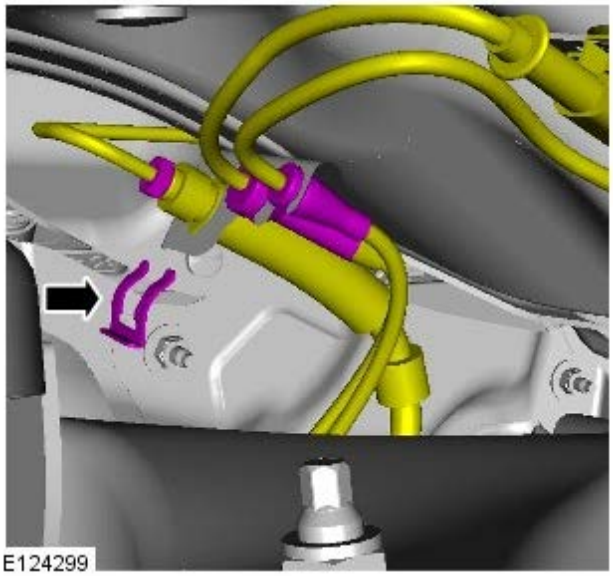


41.



42.



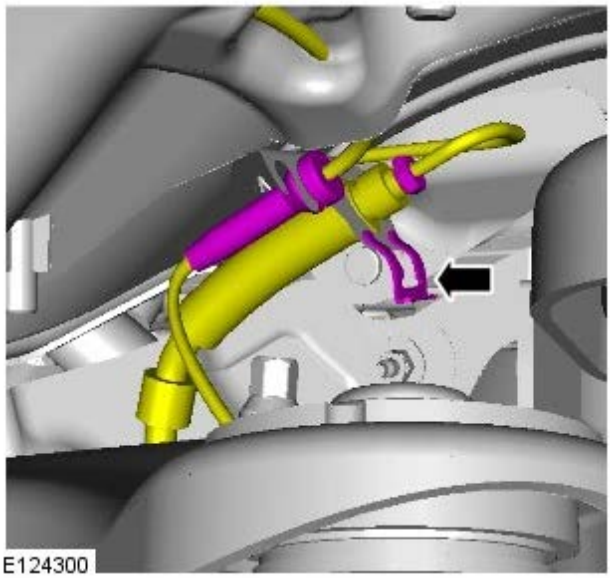


43. CAUTIONS:

Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.



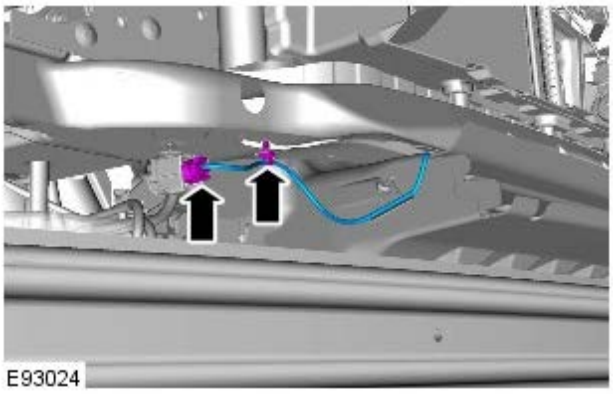
44. CAUTIONS:

Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

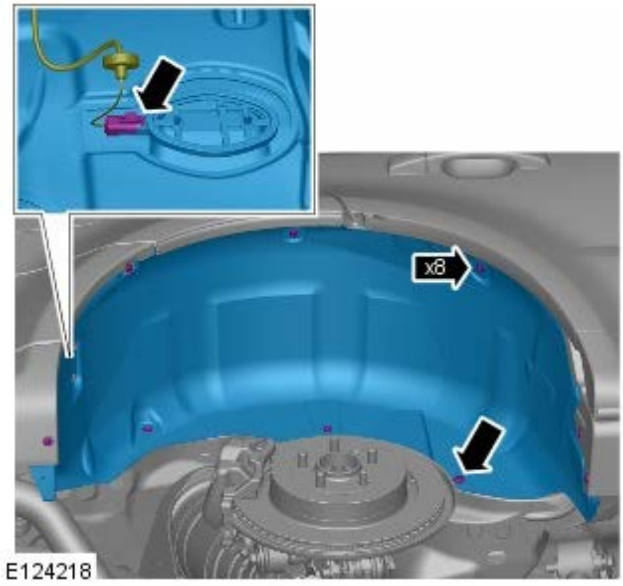
- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

45.



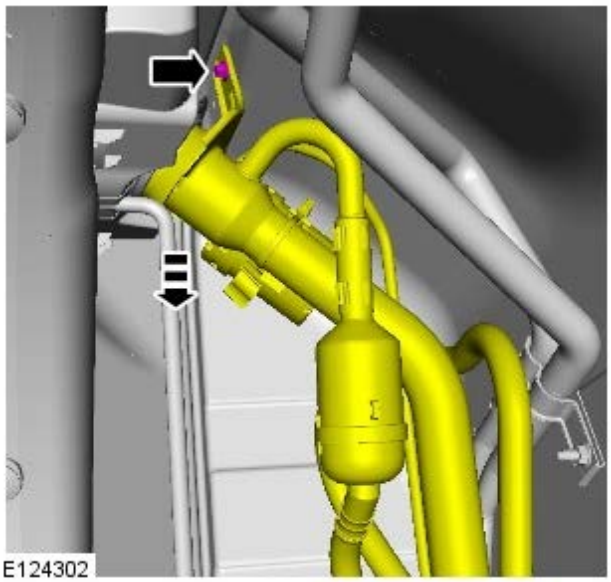
46. For additional information, refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).

47.



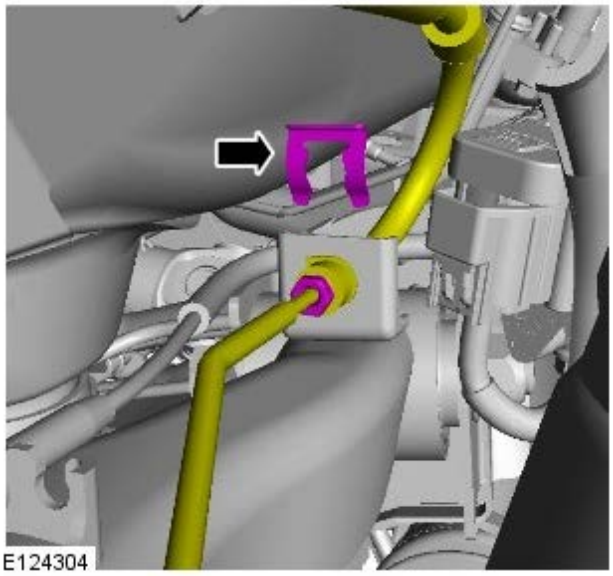
48. Remove the fuel filler cap.

49.



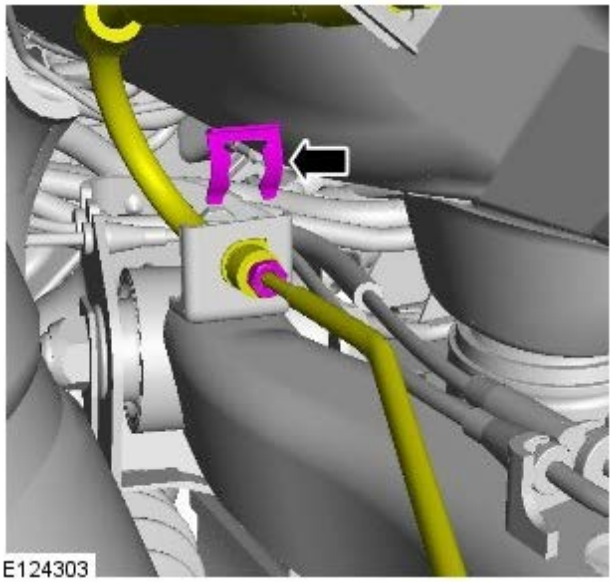
50. CAUTIONS:

Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.



If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

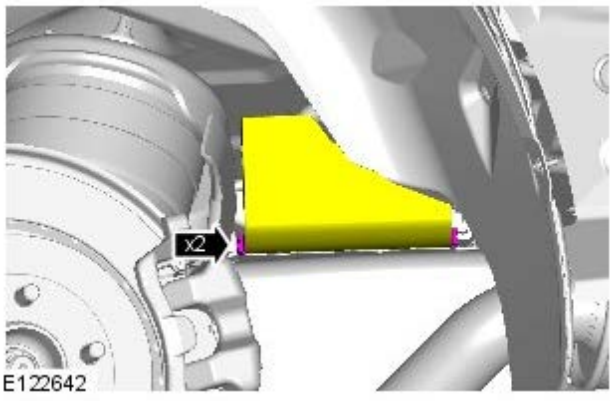


51. CAUTIONS:

Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

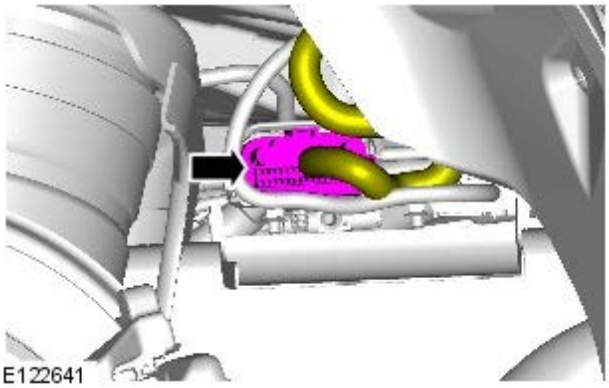
If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

- Position an absorbent cloth to collect fluid spillage.
- Disconnect the line union.
- Remove the clip.

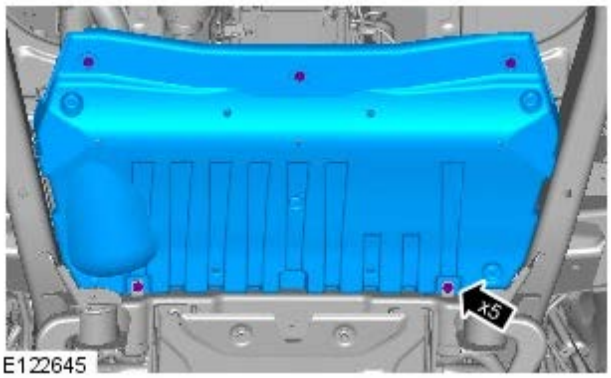


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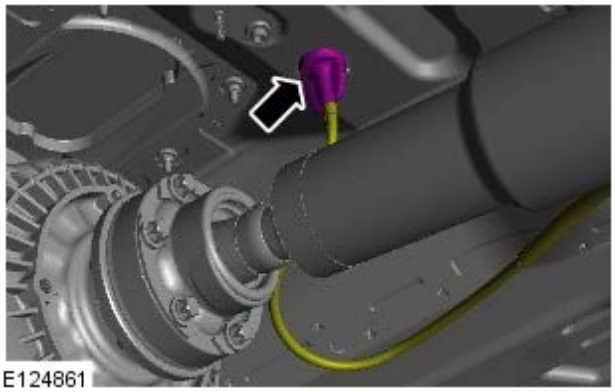
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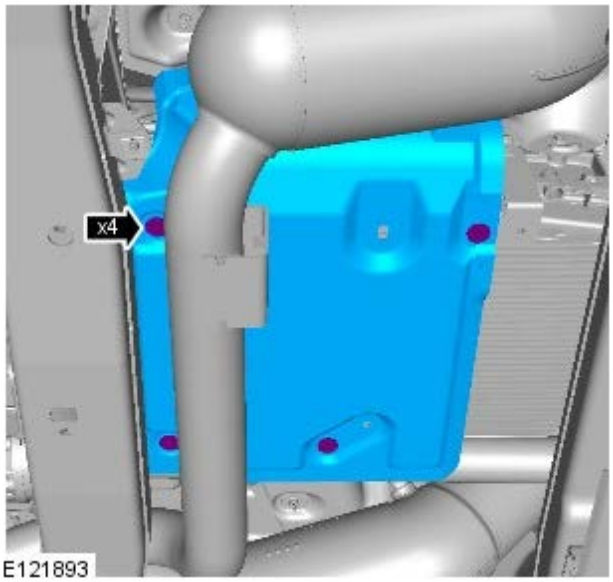
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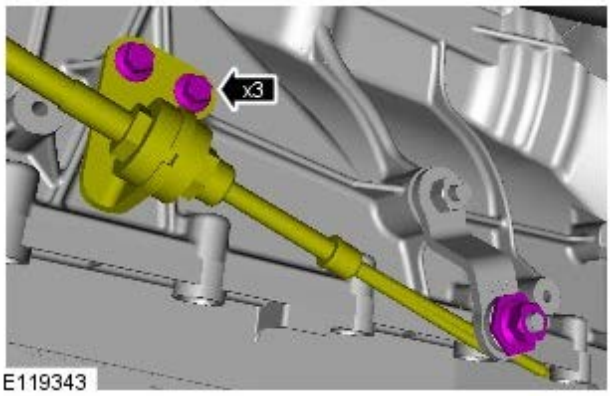
55. CAUTION: Note the fitted position of the seal.



56.

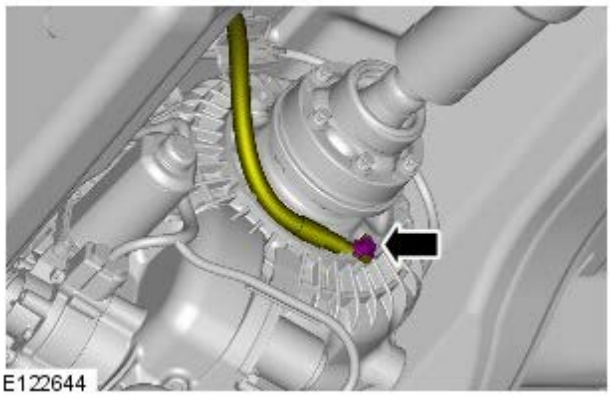


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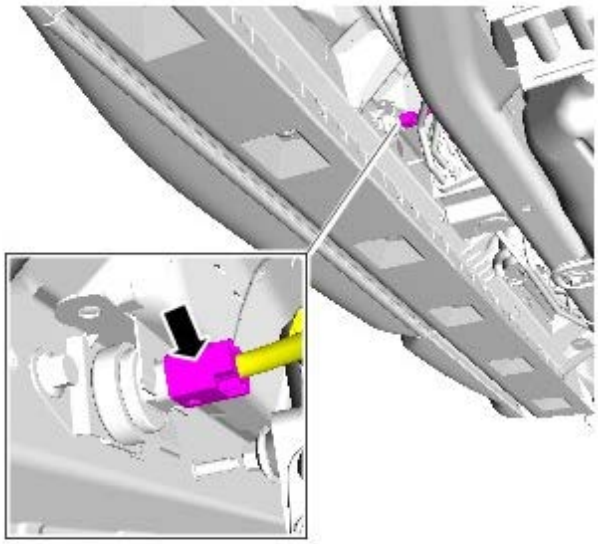


E119343

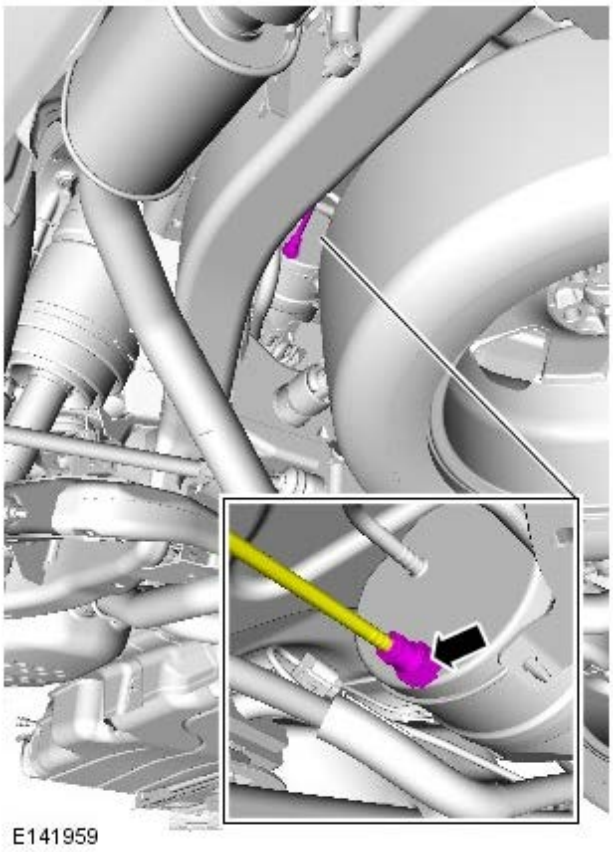
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E122644

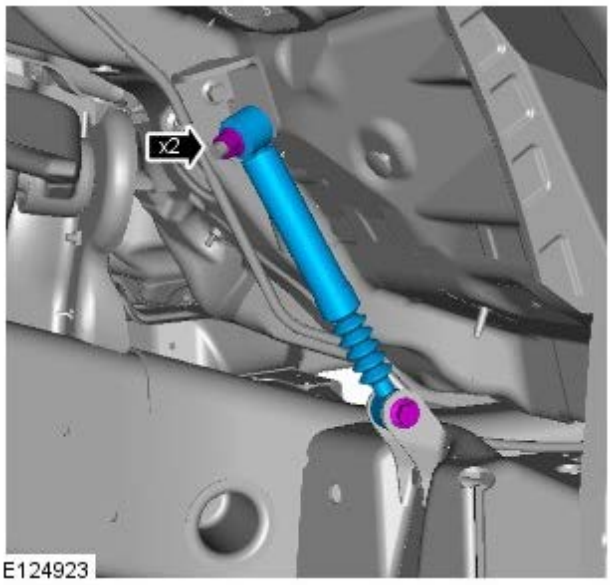
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E140766

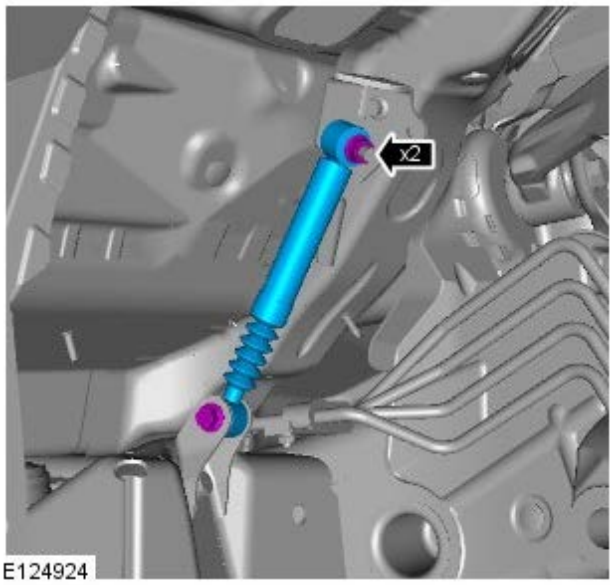
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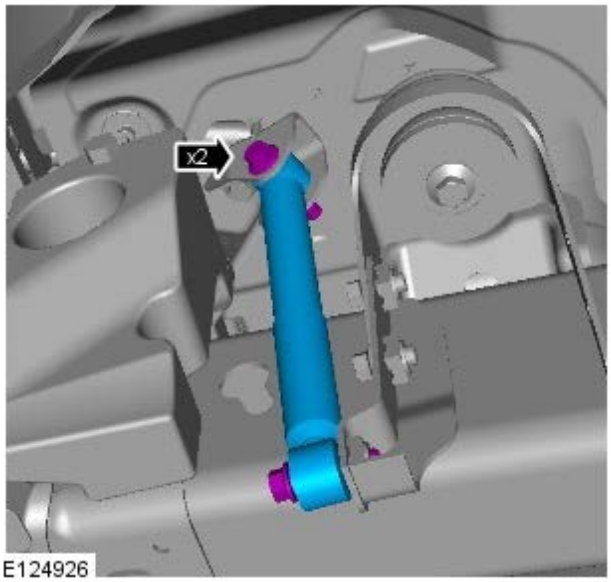
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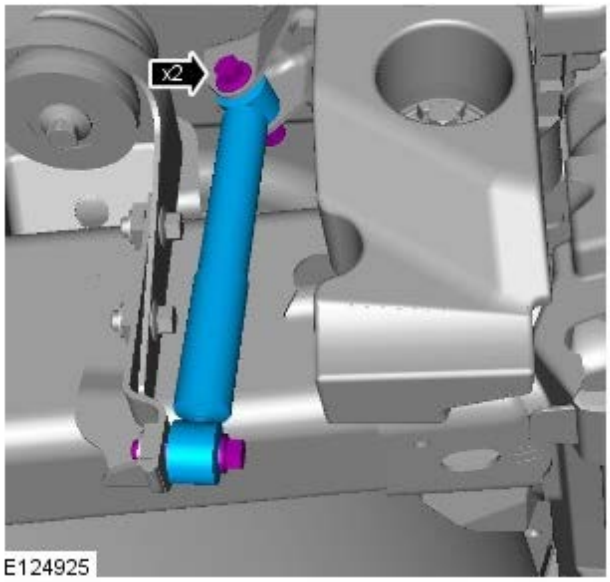
62.



63.

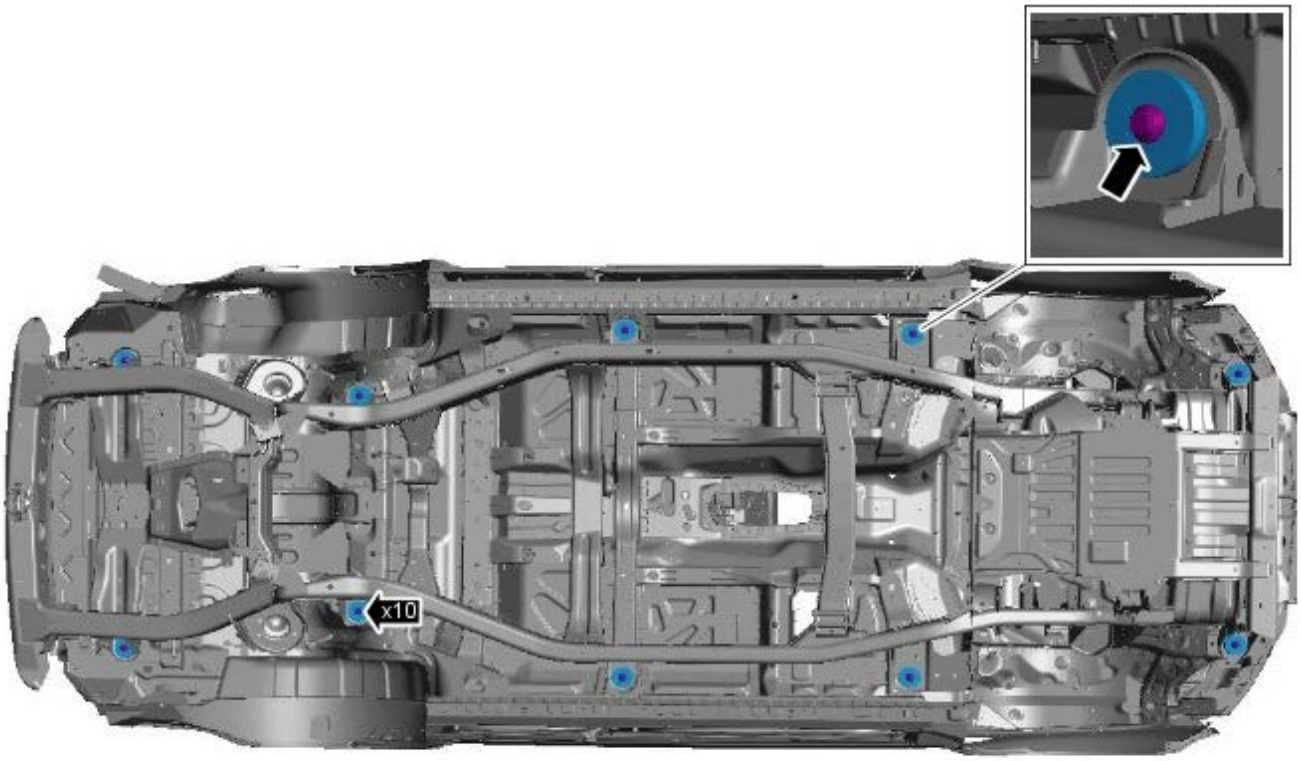


64.



65. Lower the vehicle.

66. Remove and discard the 10 body mount bolts.
    - Remove the 10 spacing washers.



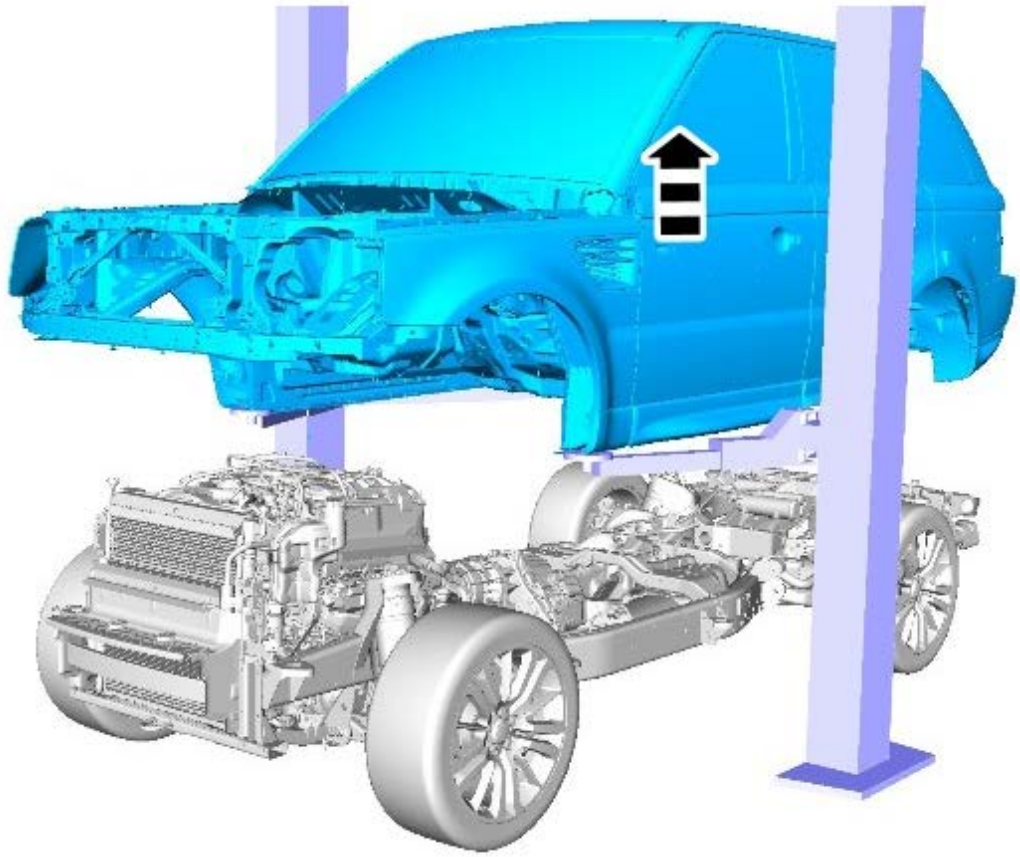
E124859

67. CAUTION: To prevent the body becoming unstable when raised from the integrated body frame, install the vehicle tie down straps.

NOTE: Note the fitted position of the body mounts.

Using an assistant raise and support the body.

- Remove the body mounts.



E140830

Installation

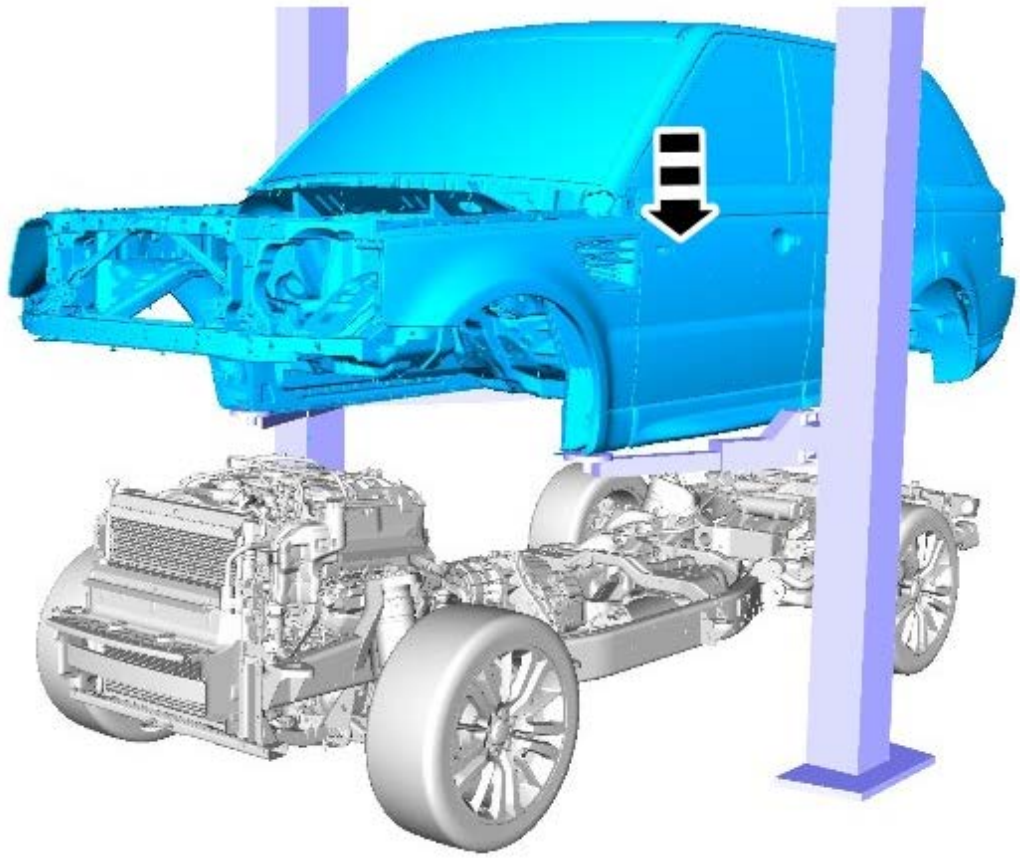
All vehicles

1. CAUTIONS:

   Make sure that new bolts are installed.

   Make sure that all components are free and do not get caught up whilst lowering the body onto the integrated body frame.

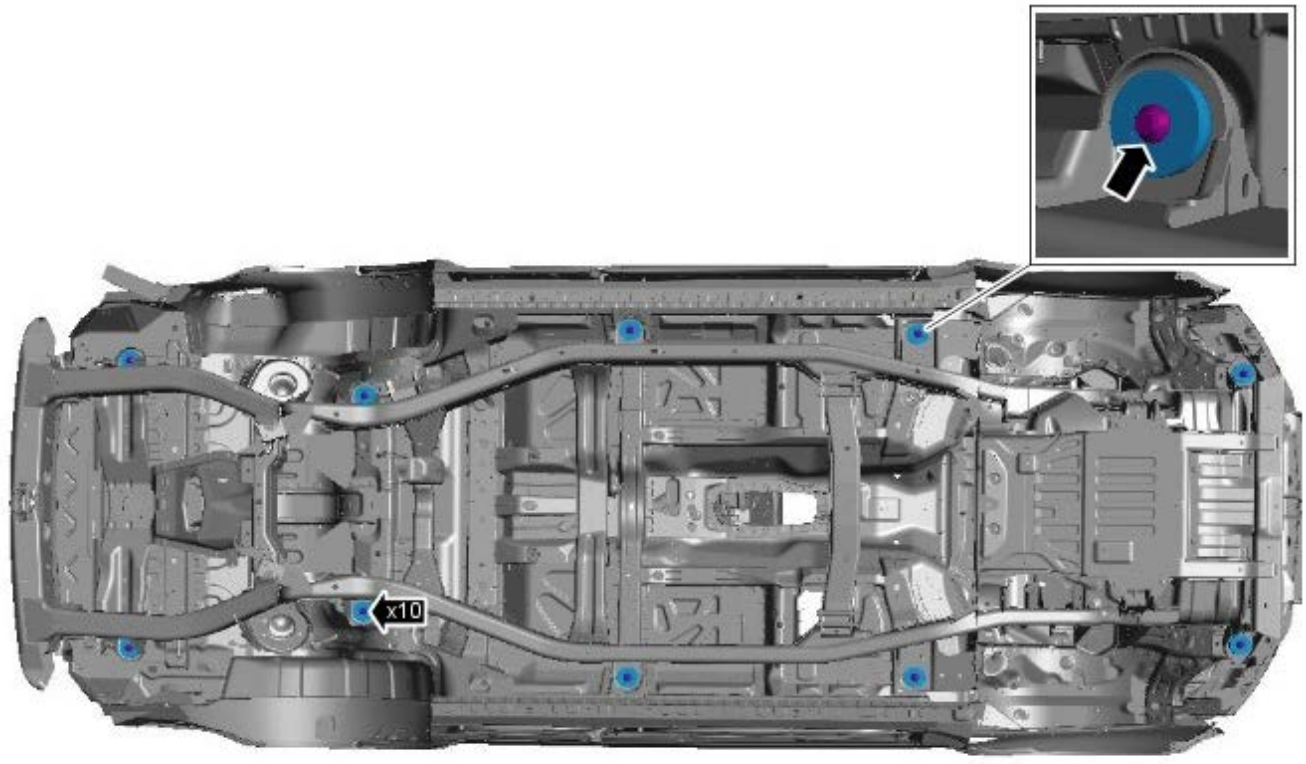
   Using an assistant install the body to the integrated body frame.
   - Install the body mounts.
   - With assistance align the body and integrated body frame mounts.
   - Install the bolts, but do not tighten fully at this stage.



E140831

2. Remove the tie down straps securing the body.

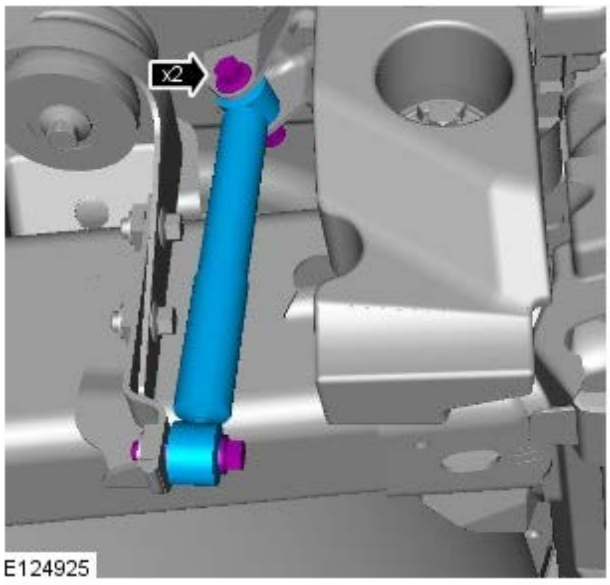
3. TORQUE: 133 Nm



E124859

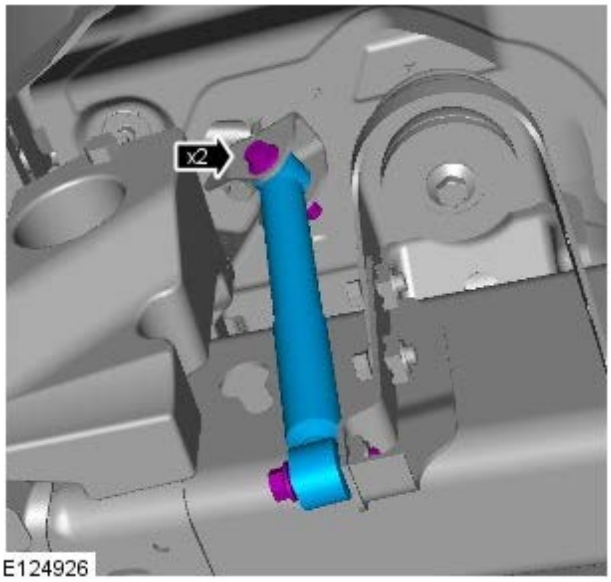
4. Raise the vehicle on the lift.

5. TORQUE: 45 Nm

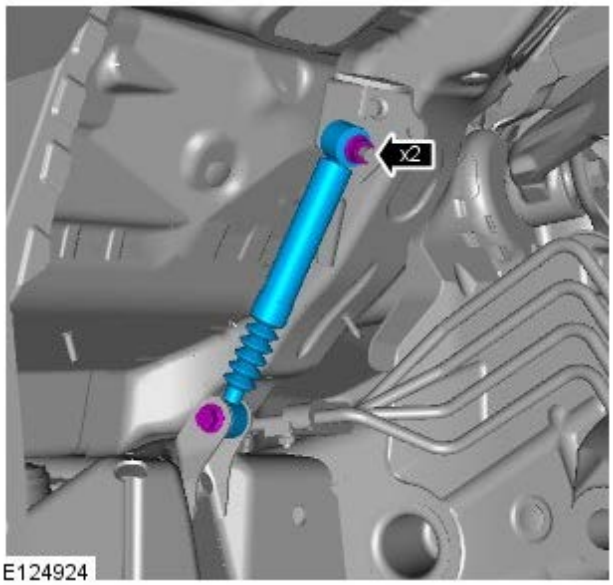


E124925

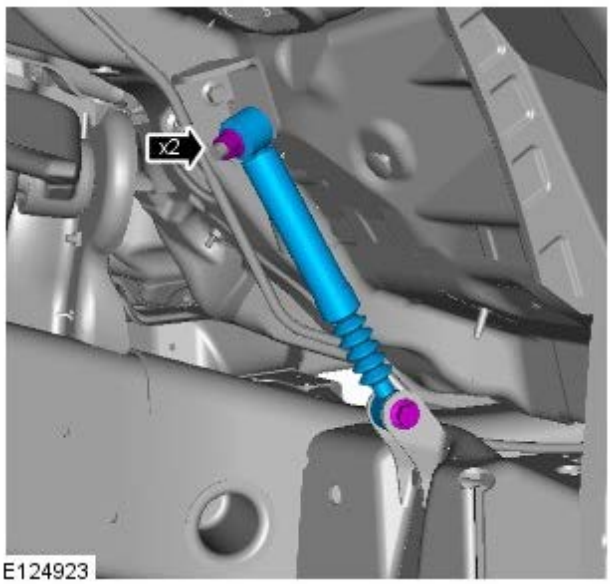
6. TORQUE: 45 Nm



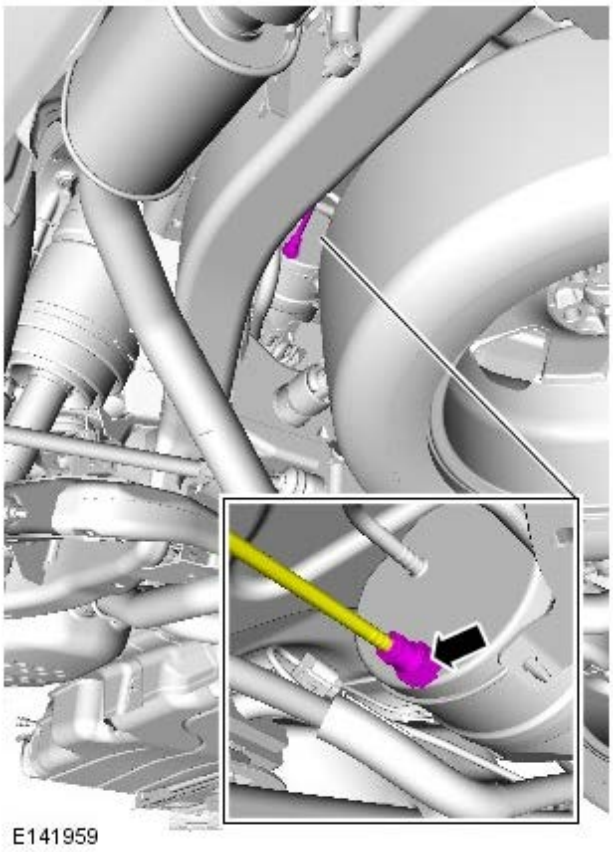
7. TORQUE: 45 Nm



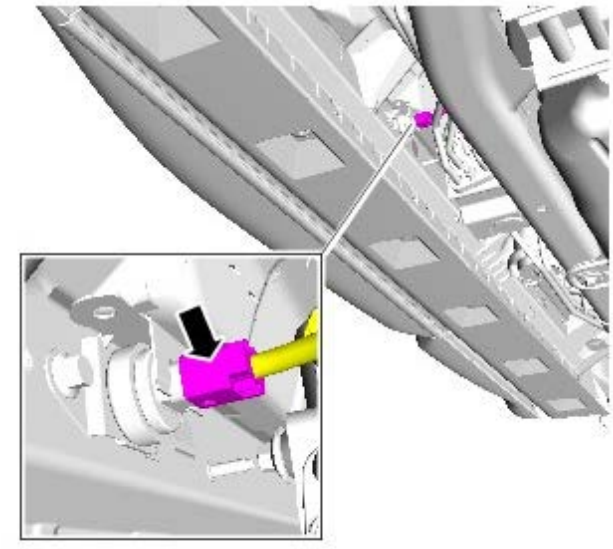
8. TORQUE: 45 Nm



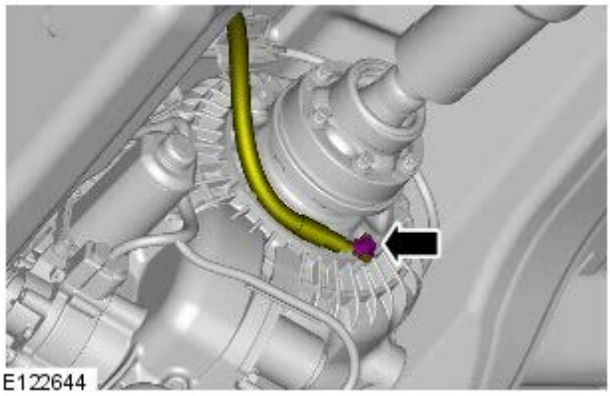
9.


E141959

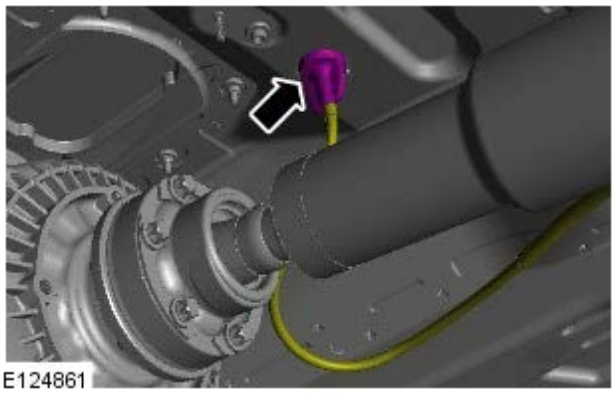
10.


E140766

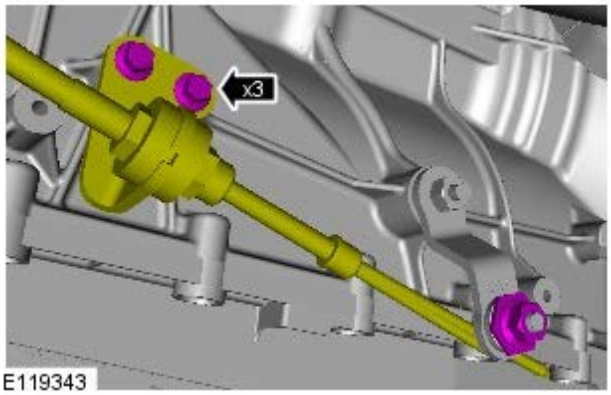
11. TORQUE: 25 Nm


E122644

12.

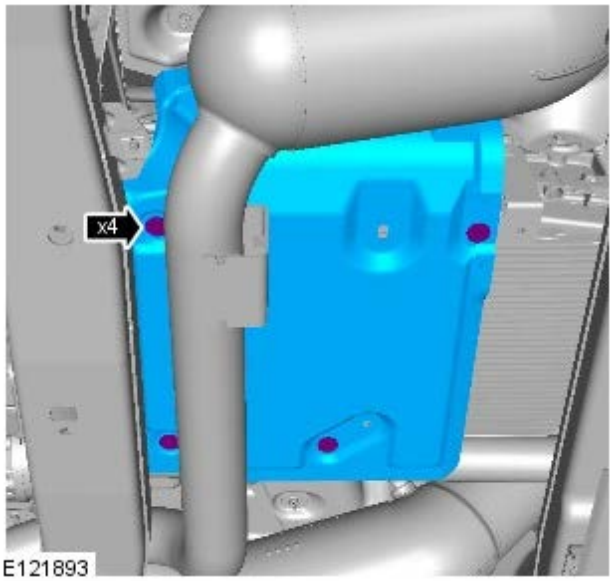

E124861

13.



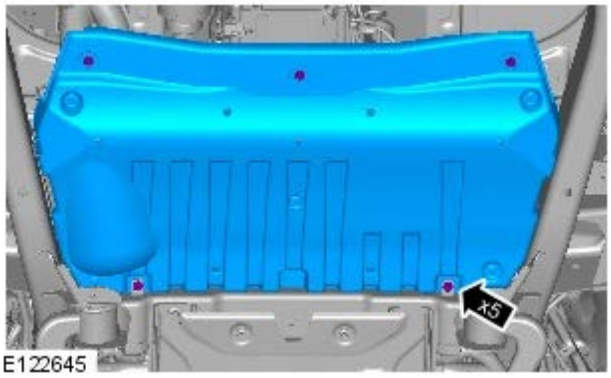
E119343

14. TORQUE: 12 Nm



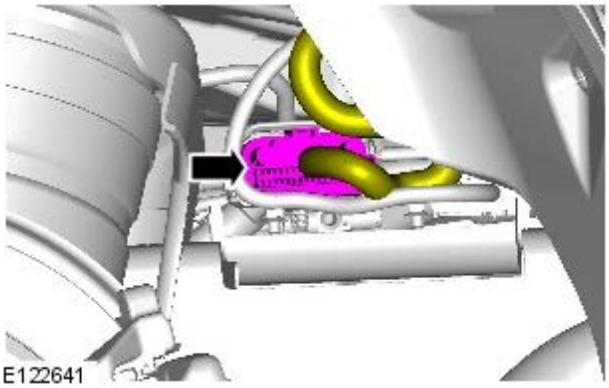
E121893

15. TORQUE: 12 Nm

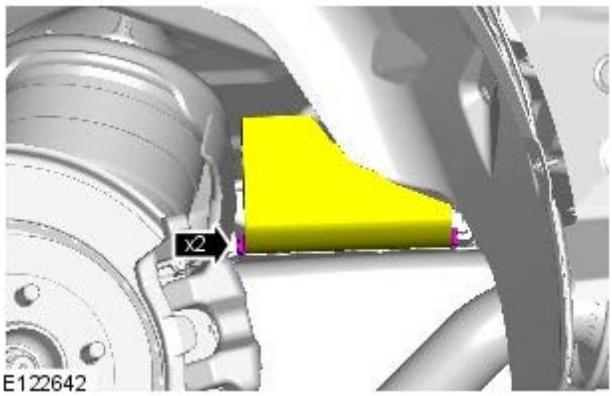


E122645

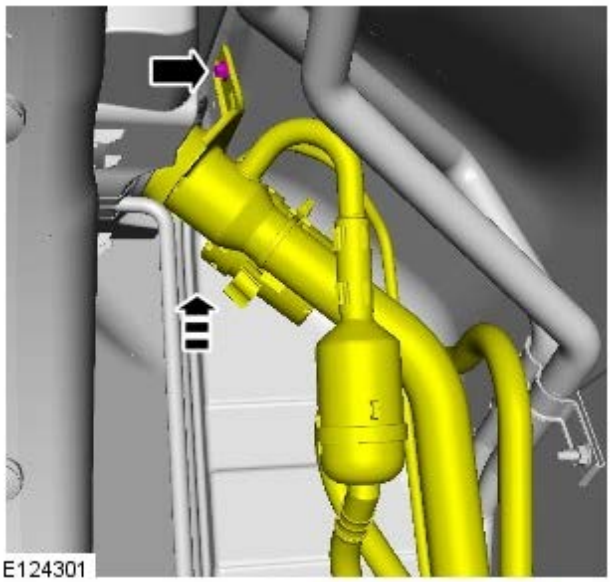
16.



17.

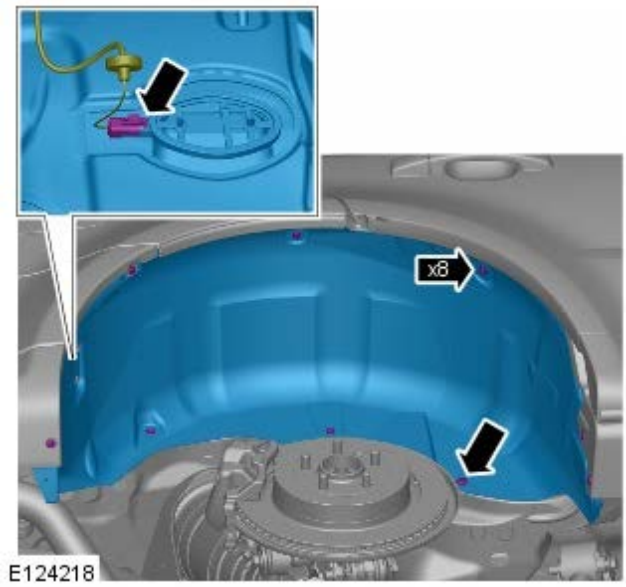


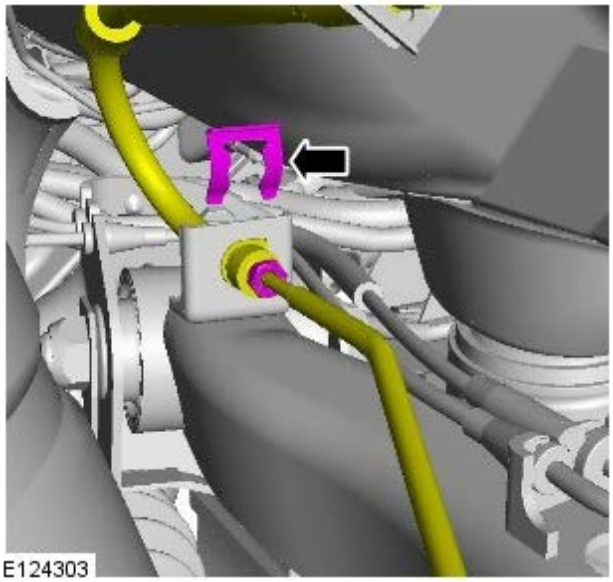
18. TORQUE: 12 Nm



19. Install the fuel filler cap.

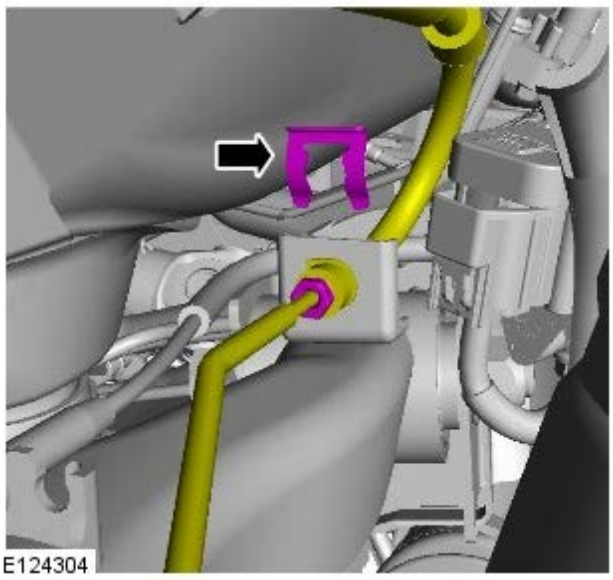
20.





21. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

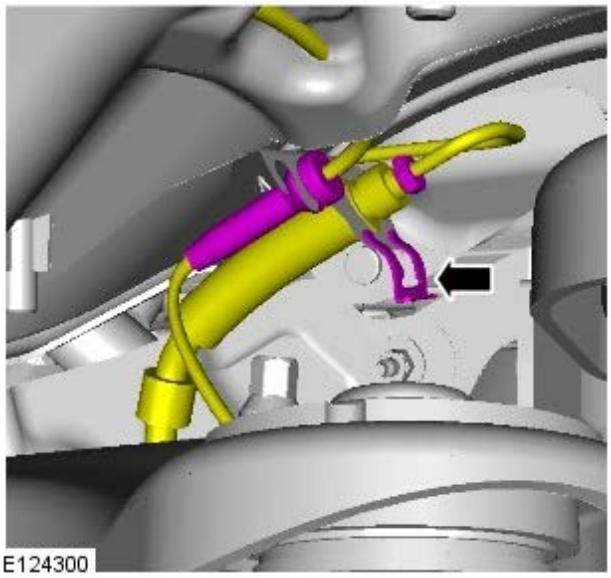


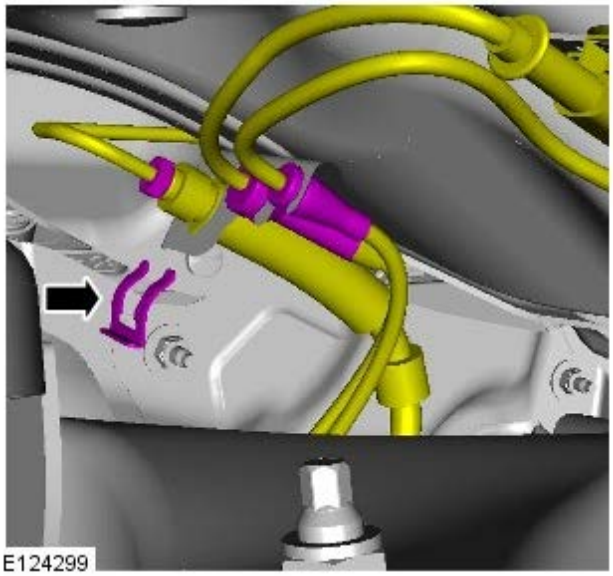
22. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

23. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm
- Clean the component mating faces.
- Secure the clip.

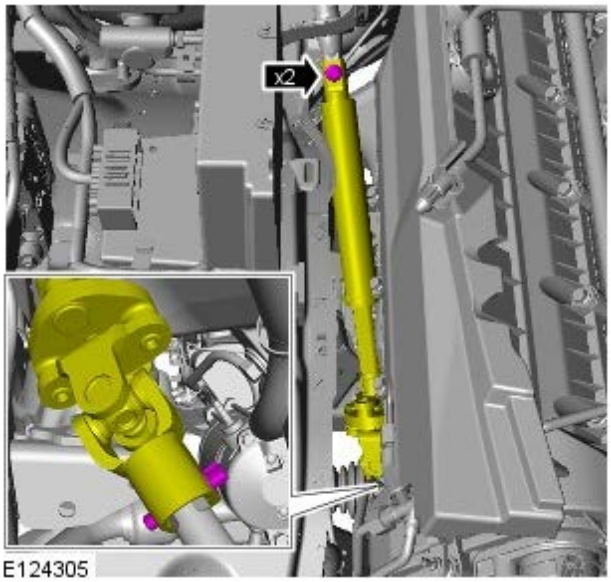




24. NOTE: Remove and discard the blanking caps.

TORQUE: 16 Nm

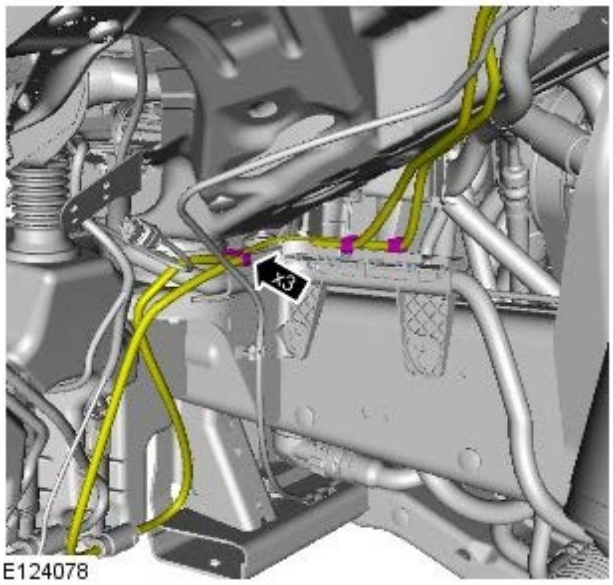
- Clean the component mating faces.
- Secure the clip.



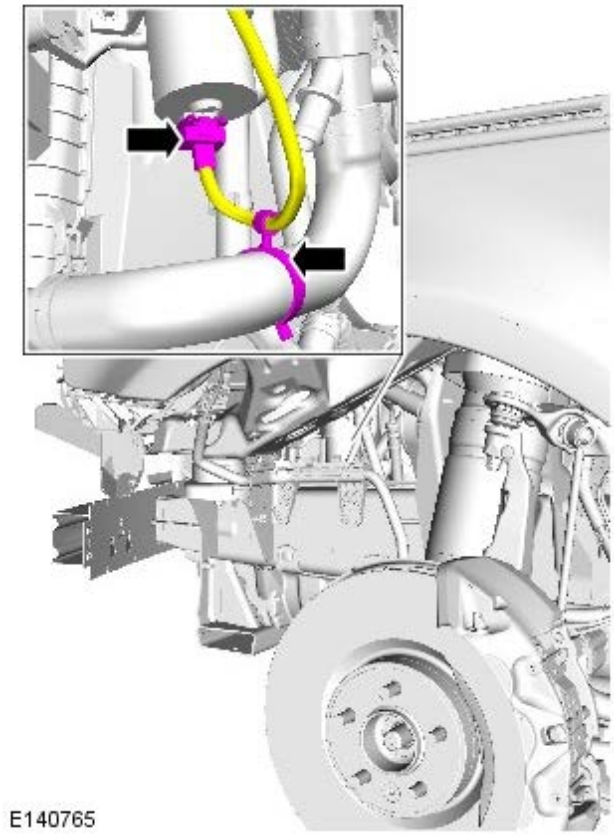
25. WARNING: Make sure that a new bolt is installed.

TORQUE: 25 Nm

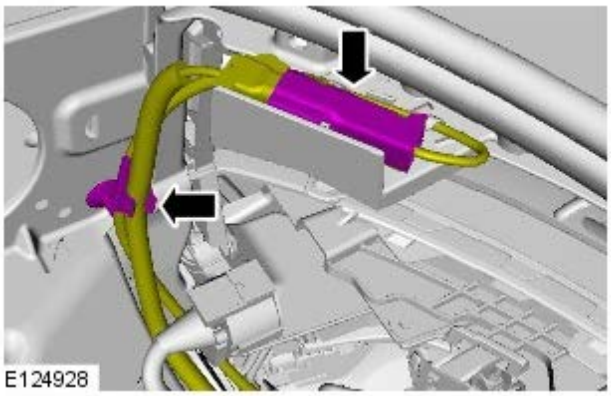
26.



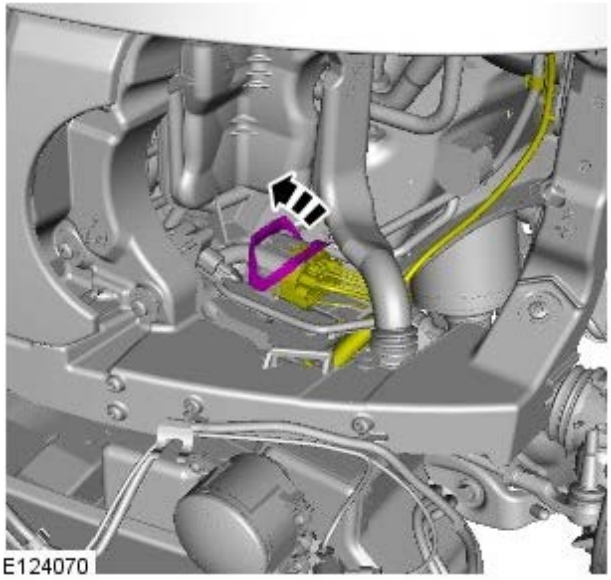
27.



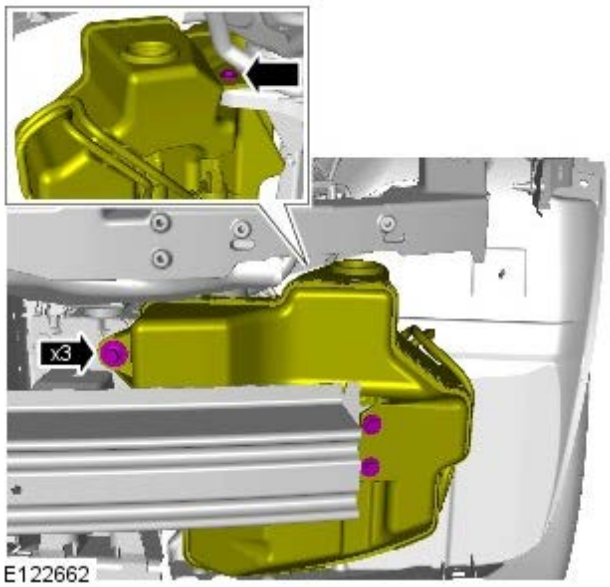
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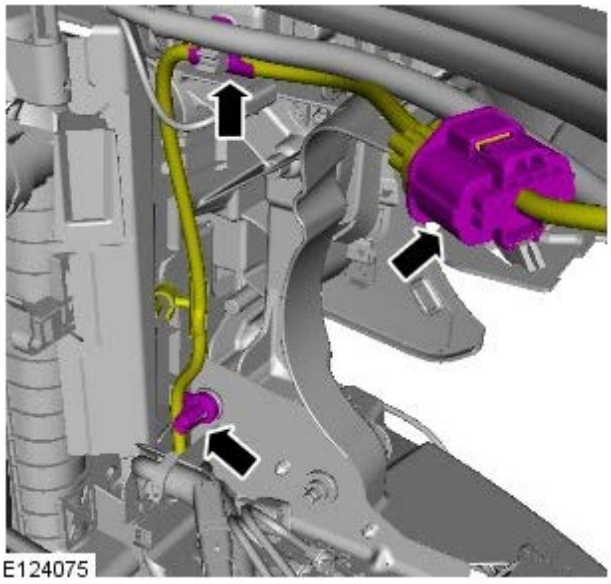
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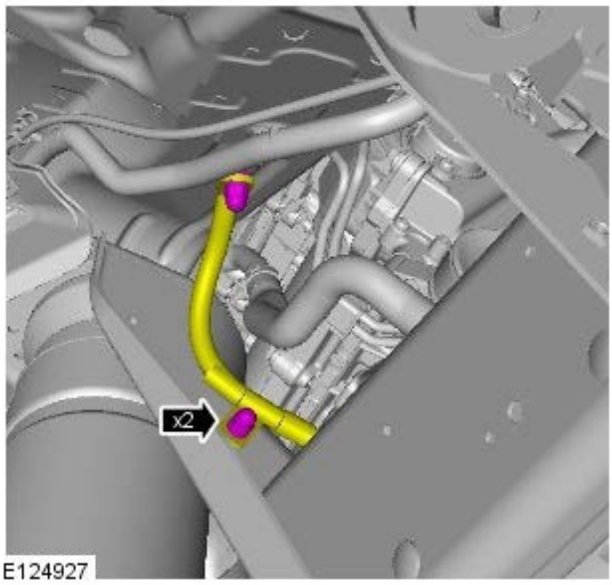
30. TORQUE: 12 Nm



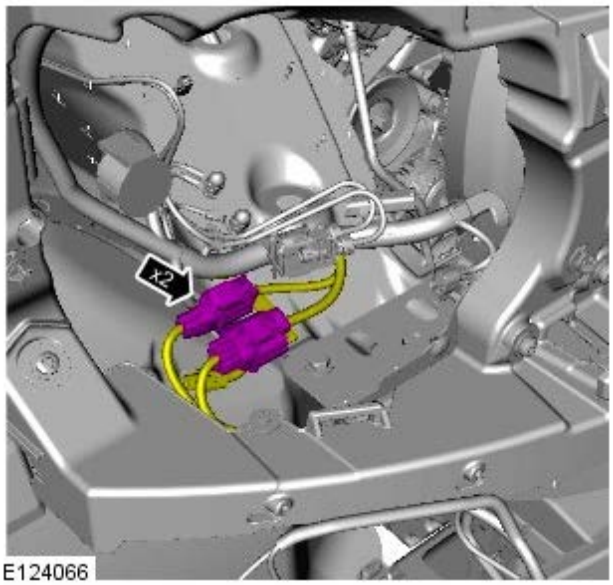
31.



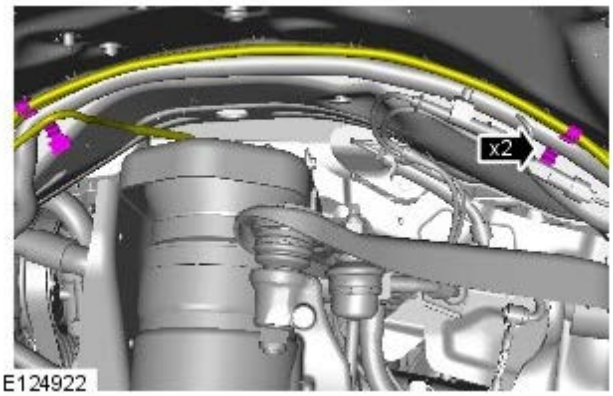
32. TORQUE: 20 Nm



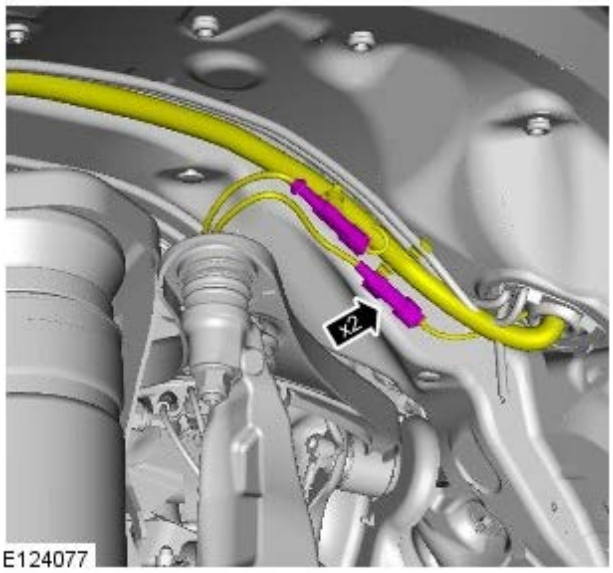
33.



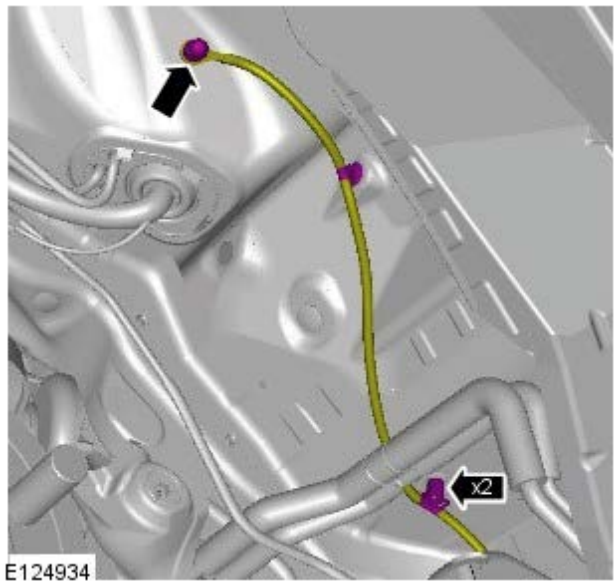
34.



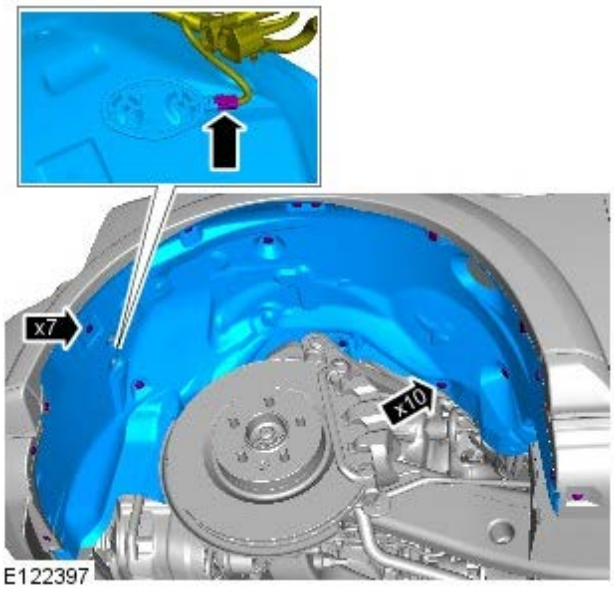
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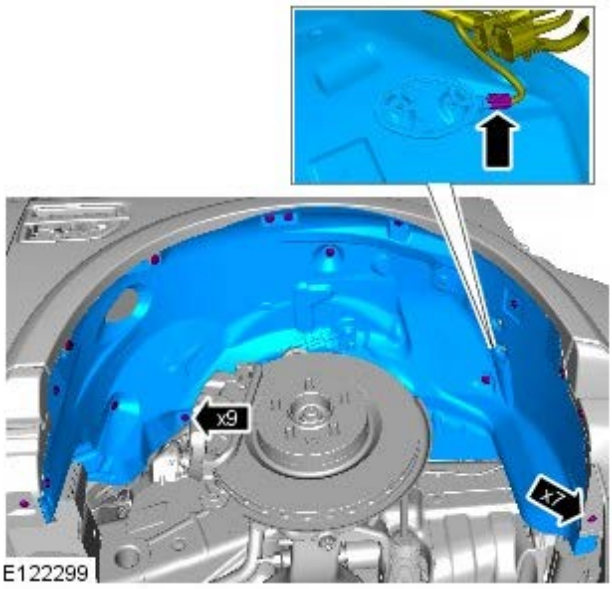
36. TORQUE: 20 Nm



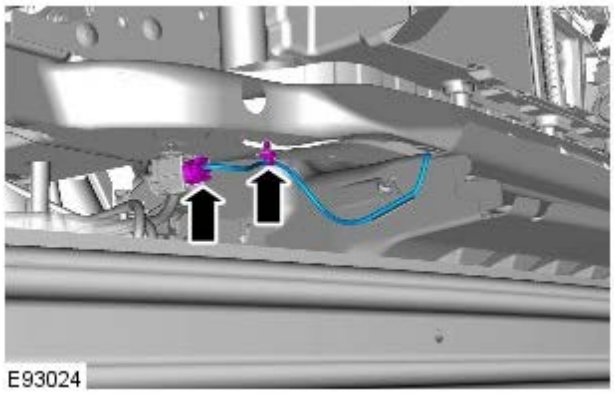
37.



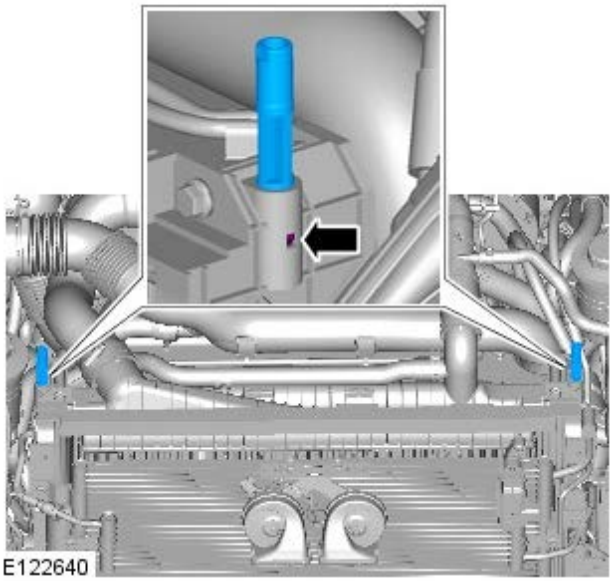
38.



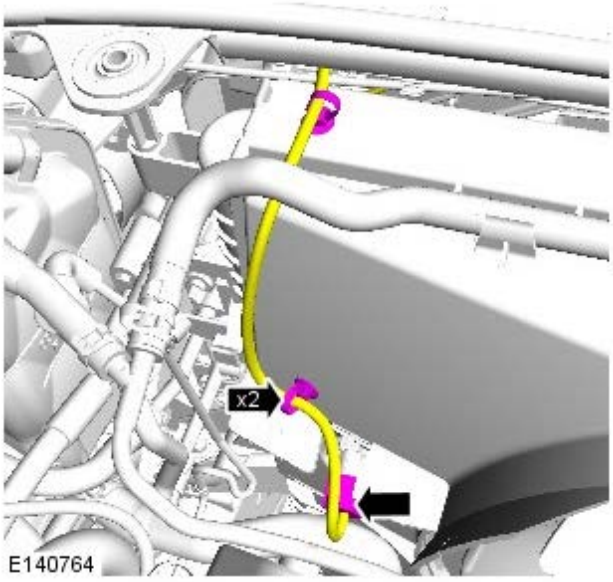
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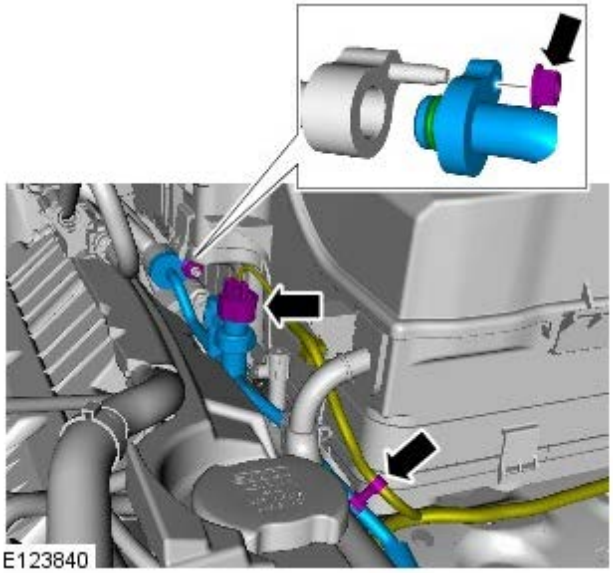


40.



41.



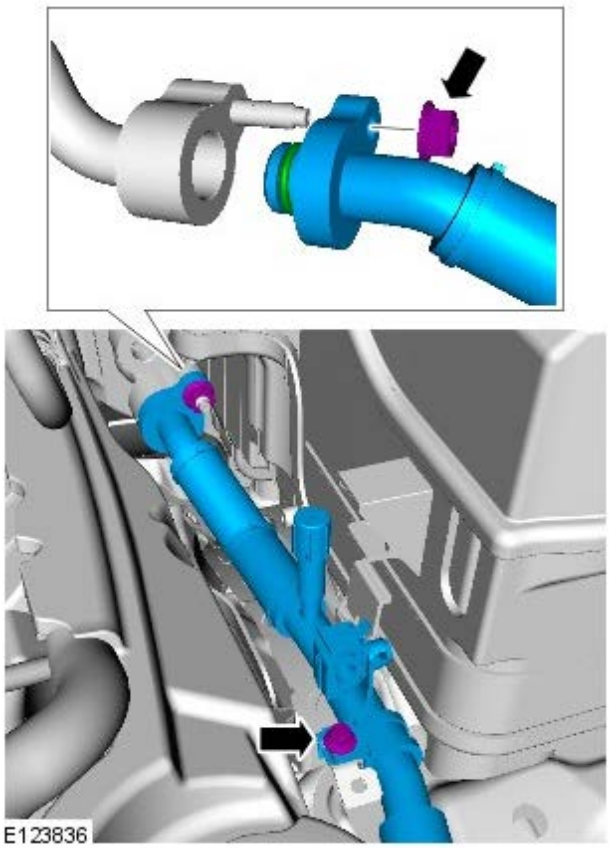


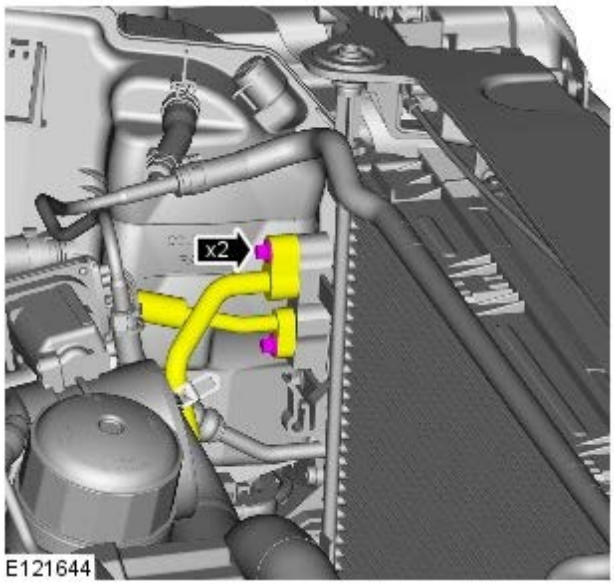
42. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

TORQUE: 12 Nm
- Install new O-ring seals.

43. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

TORQUE: 12 Nm
- Install new O-ring seals.

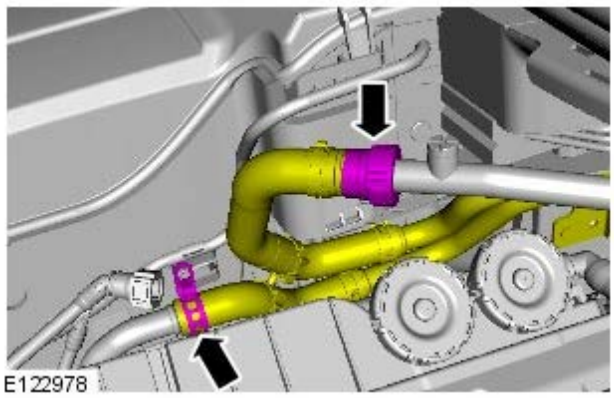




44. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

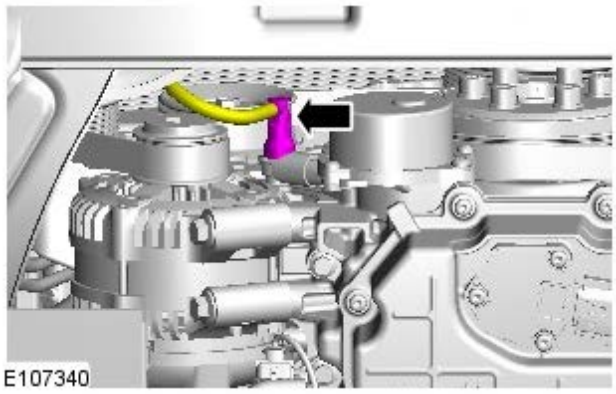
TORQUE: 12 Nm

- Install new O-ring seals.

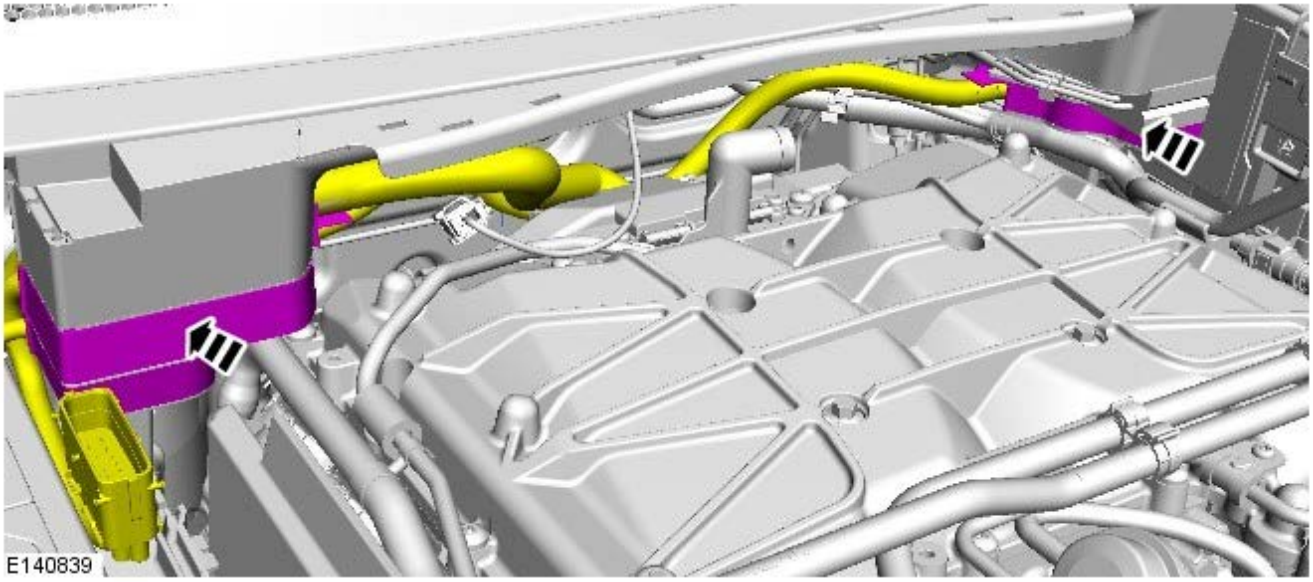


45. WARNING: Be prepared to collect escaping fluid.

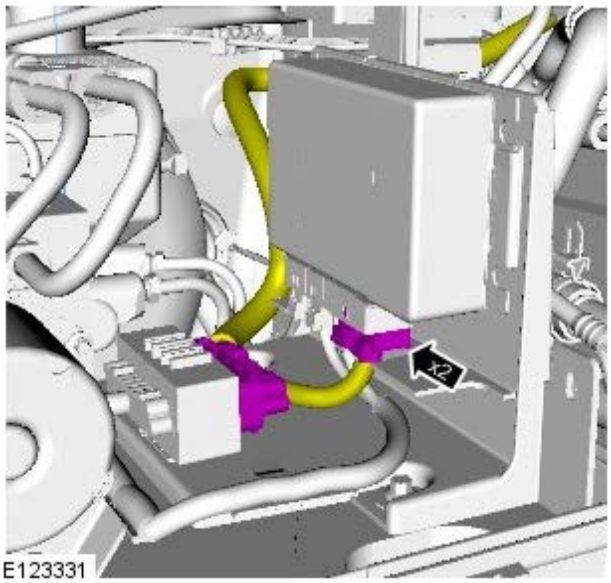
46.



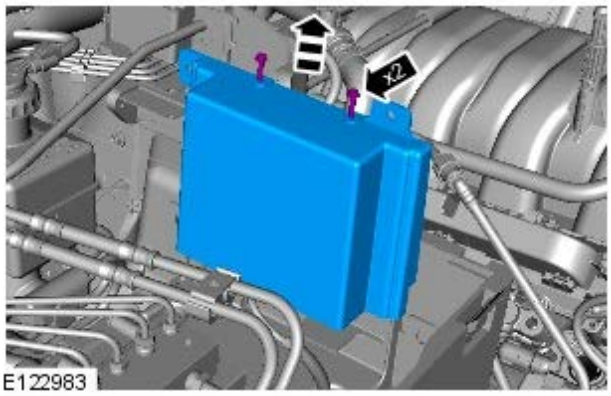
47.



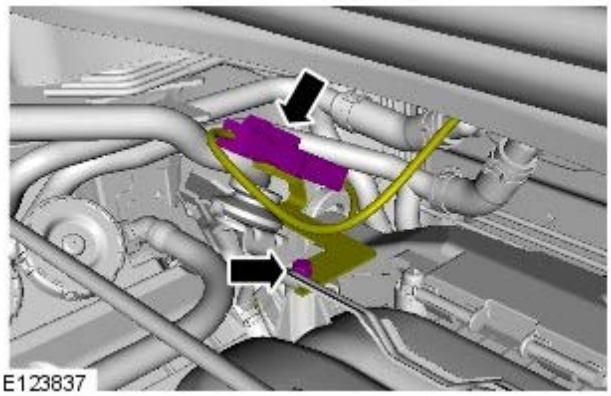
48.



49. TORQUE: 8 Nm

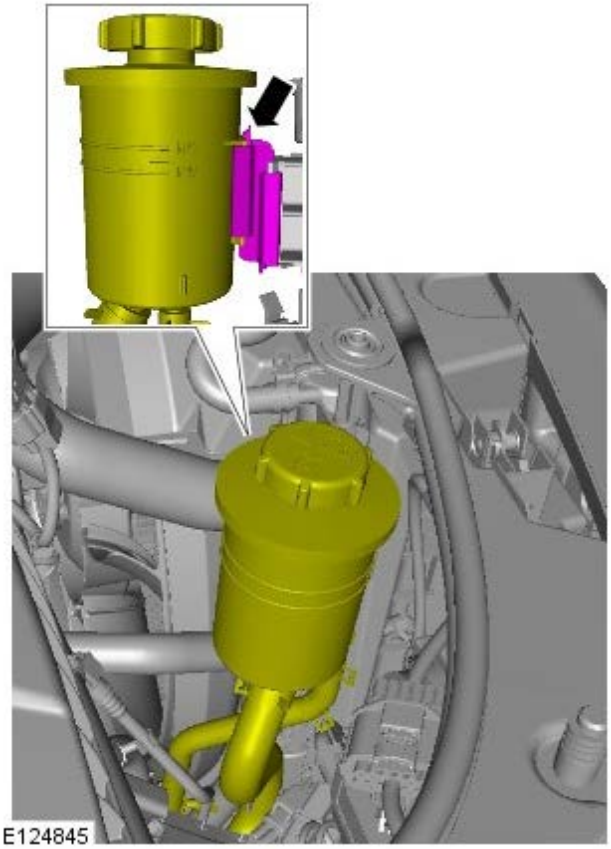


50. TORQUE: 10 Nm



Vehicles with active damping

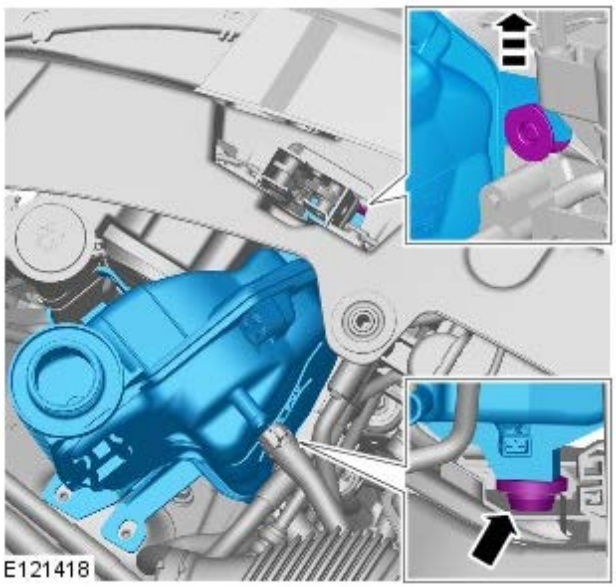
51.



All vehicles

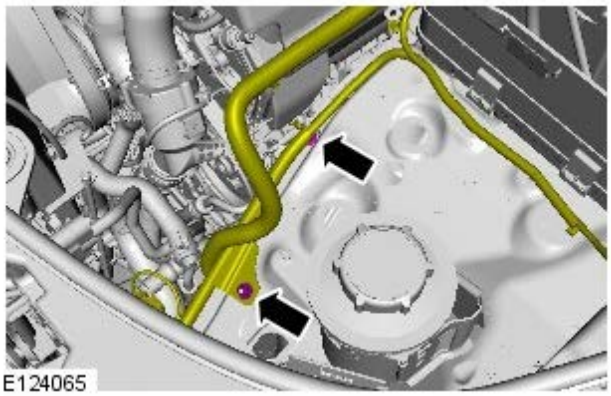
52. CAUTION: Be prepared to collect escaping coolant.

For additional information, refer to: Coolant Expansion Tank - V8 S/C 5.0L Petrol, 5.0L (303-03 Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol,



Removal and Installation).

53. TORQUE: 10 Nm



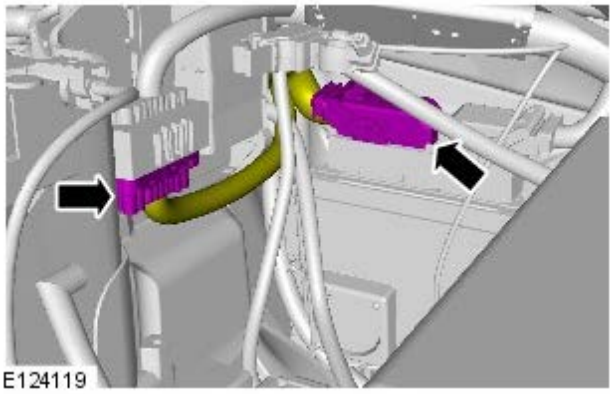
54. For additional information, refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).

55. For additional information, refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).

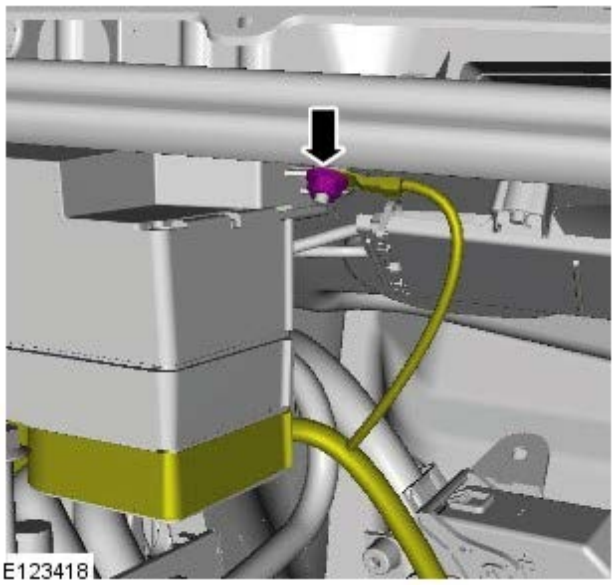
56. For additional information, refer to: Air Cleaner LH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

57. For additional information, refer to: Air Cleaner RH (303-12 Intake Air Distribution and Filtering - V8 5.0L Petrol, Removal and Installation).

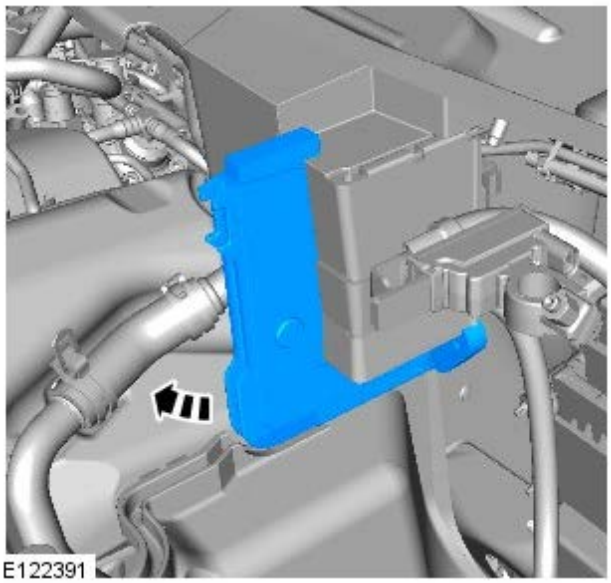
58.



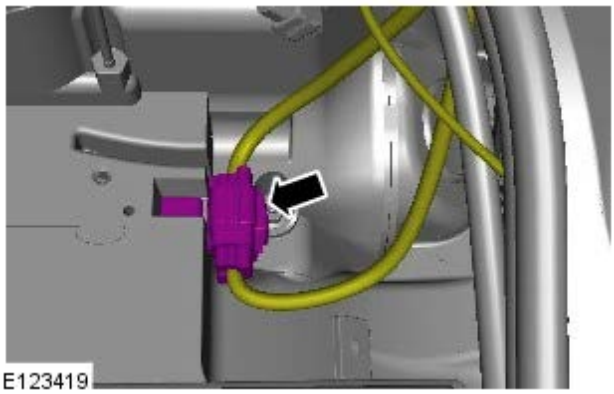
59. TORQUE: 10 Nm



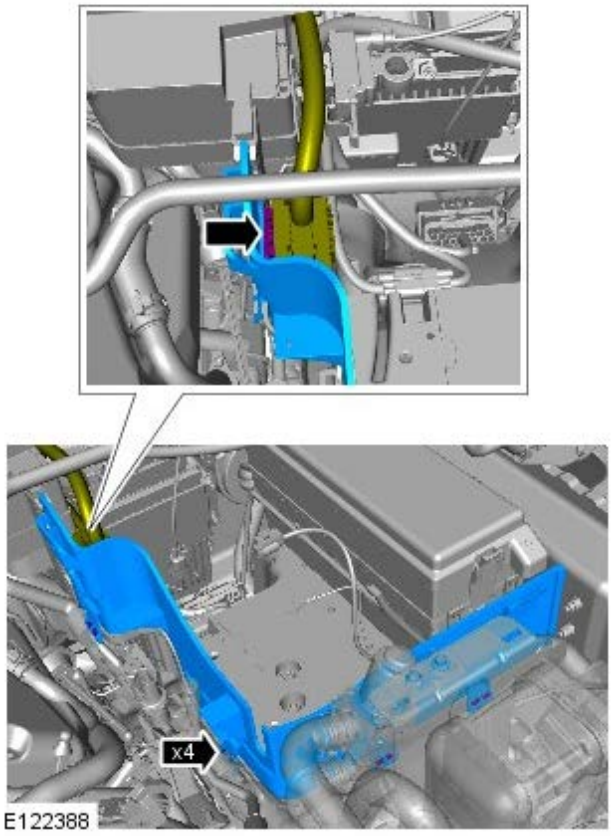
60.



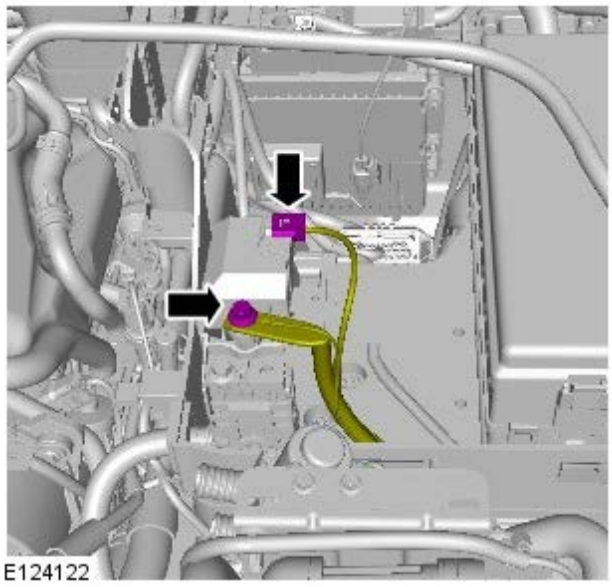
61.



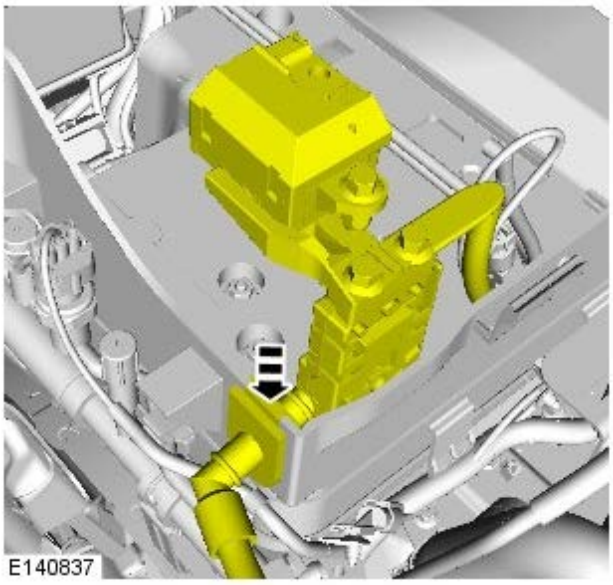
62. NOTE: RHD illustration shown, LHD is similar.



63.



64.



65. For additional information, refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

66. For additional information, refer to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

67. Check and top-up the coolant.
    For additional information, refer to: Cooling System Draining, Filling and Bleeding - V8 S/C 5.0L Petrol (303-03C, General Procedures).

68. Bleed the braking system.
    For additional information, refer to: Brake System Bleeding - Vehicles With: High Performance Brakes (206-00 Brake System - General Information, General Procedures).

Published: 14-Jan-2013

Full Frame and Body Mounting - Rear Crossmember

Removal and Installation

Removal

NOTE: Some illustrations may show the body removed for clarity.

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

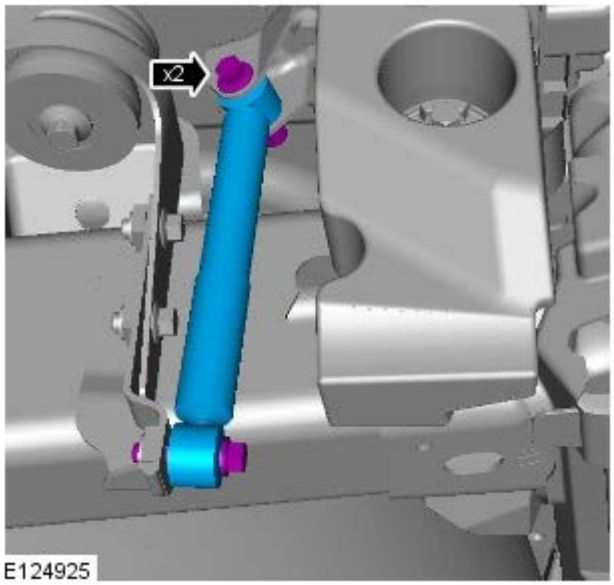
   Raise and support the vehicle.

2. Disconnect battery ground cable.
   For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

3. Disconnect the battery positive cable.

4. Remove the rear bumper cover.
   For additional information, refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).

5. Remove the spare wheel and tire.



6. NOTES:

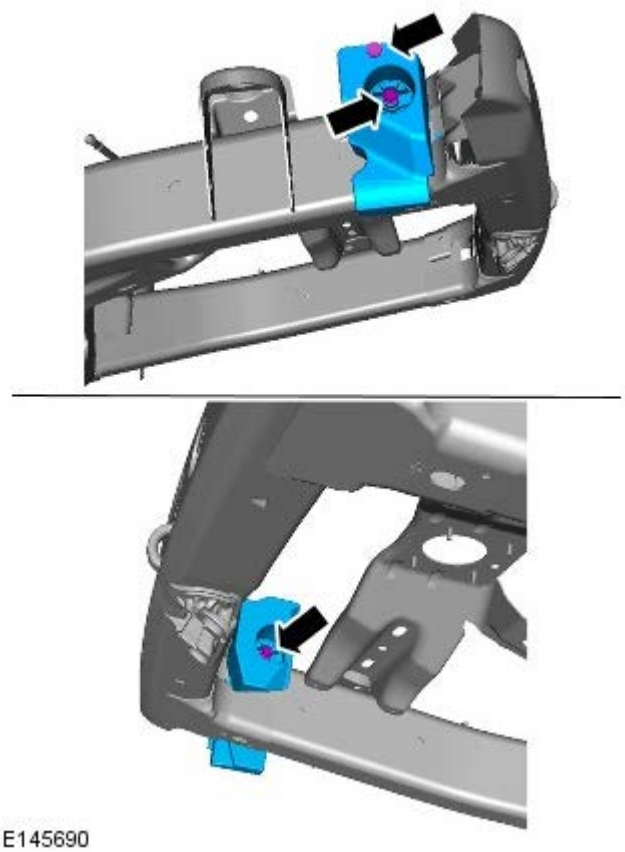
   If equipped.

   The procedure must be carried out on both sides.

   Remove both rear body mount dampers.

7. NOTE: The procedure must be carried out on both sides.

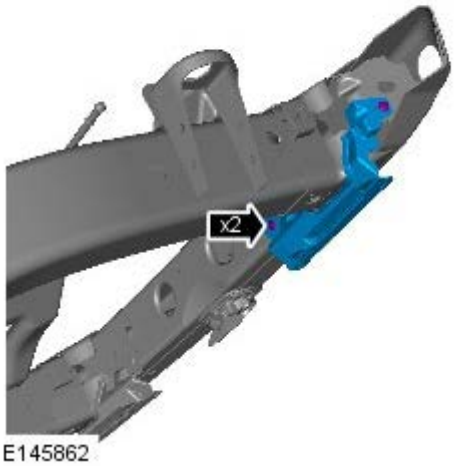
   Remove both rear body mass dampers.



E145690

8. NOTE: The procedure must be carried out on both sides.

   Remove the rear bumper cover lower brackets.
   - Remove the 2 scrivets.



E145862

9. Remove the rear bumper foam pads.



E145863

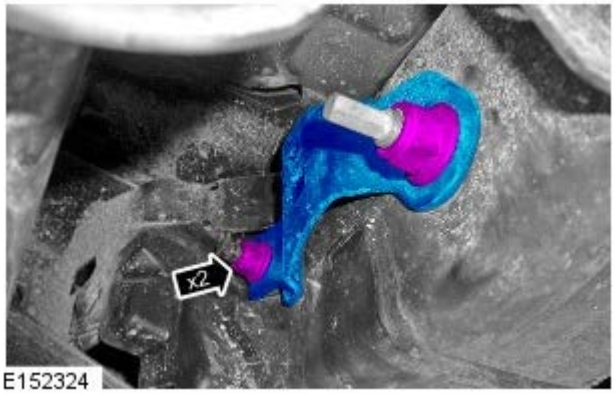


10. NOTES:

    Up to the end of 06MY.

    The procedure must be carried out on both sides.

    Remove the bracket.
    - Remove the 2 nuts.



E152324

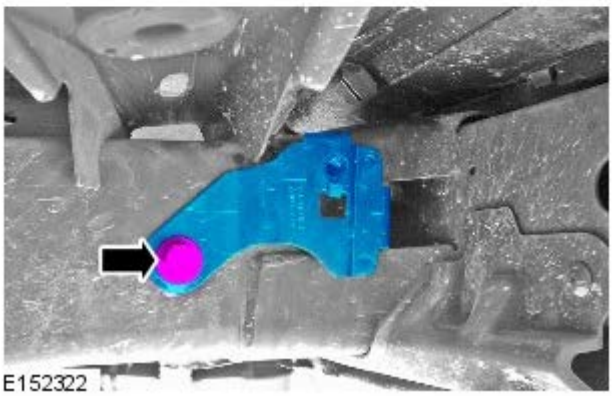
11. NOTES:

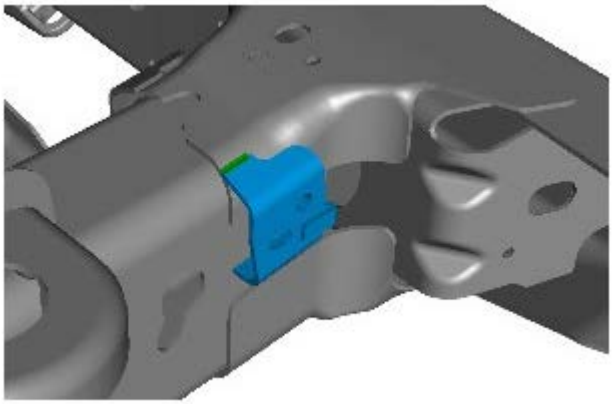
    Up to the end of 06MY.

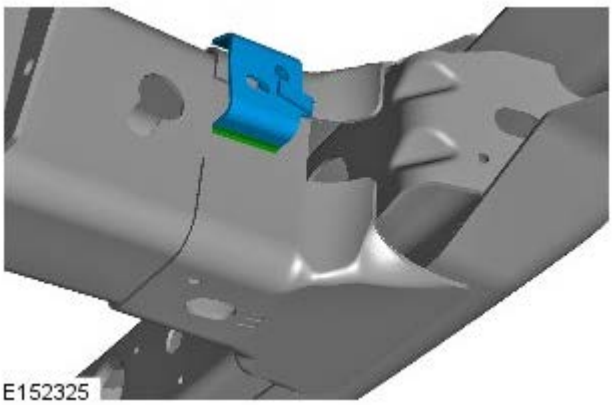
    The procedure must be carried out on both sides.

    Remove the bracket.
    - Remove the bolt.









12. NOTES:

    07MY onwards.

    Vehicles built from 07MY onwards have welded rear body mass damper brackets, these must be removed and replaced with the bolt-on style brackets.

    The procedure must be carried out on both sides.

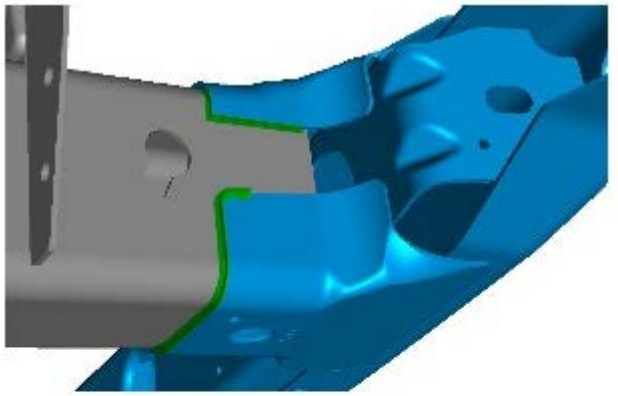
    Using suitable tools, remove and discard the 4 rear body mass damper brackets.

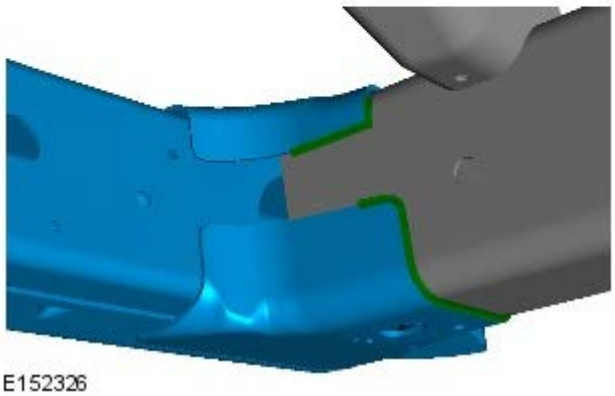
Item	Description
-	Mig weld. (Right-hand is symmetrically opposite to left-hand).

13. NOTE: The procedure must be carried out on both sides.

    Using suitable tools, remove and discard the rear crossmember.

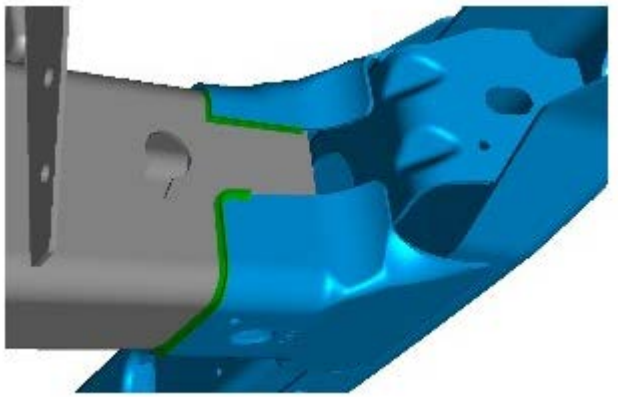
Item	Description
-	Mig weld. (Right-hand is symmetrically opposite to left-hand).





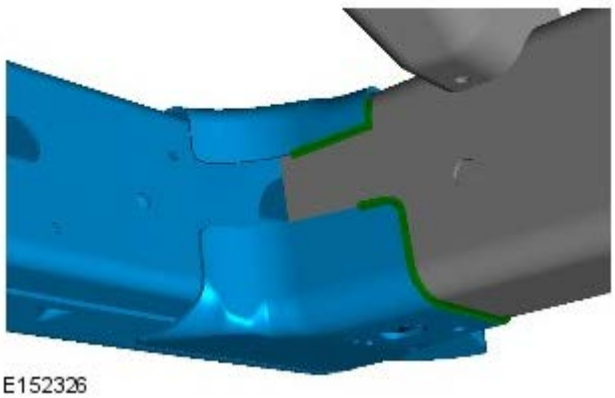
E152326

Installation



1. NOTE: The procedure must be carried out on both sides.

   Install the rear crossmember.
   - For additional information:
   - Welding.
     For additional information, refer to: Body Repairs (501-25A Body Repairs - General Information, Description and Operation).
   - Corrosion protection.
     For additional information, refer to: Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation).
   - Tolerance checks.
     For additional information, refer to: Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

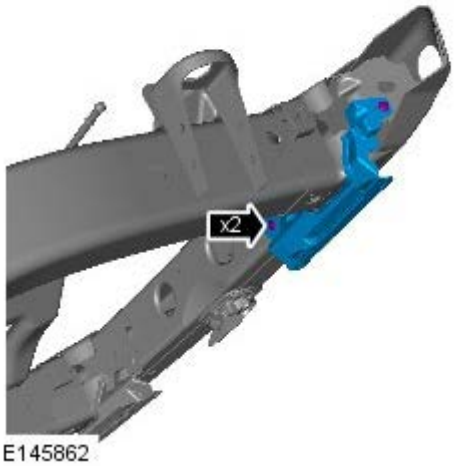


E152326

2. Install the rear bumper foam pads.



E145863



E145862

3. NOTE: The procedure must be carried out on both sides.

   Install the rear bumper cover lower brackets.
   - Secure the 2 scrivets.

4. NOTES:

   07MY onwards.

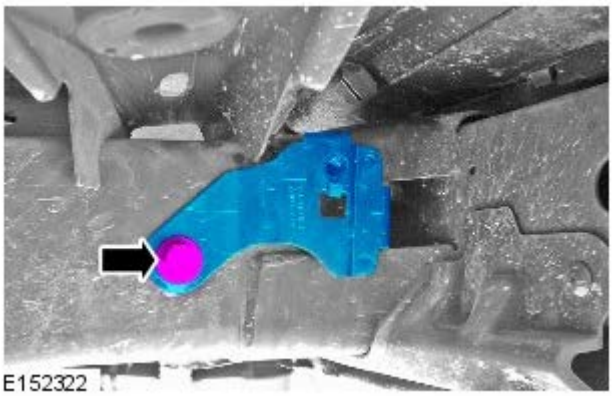
   The procedure must be carried out on both sides.

   Install the stiffener inside the chassis.









5. NOTES:

   All Vehicles.

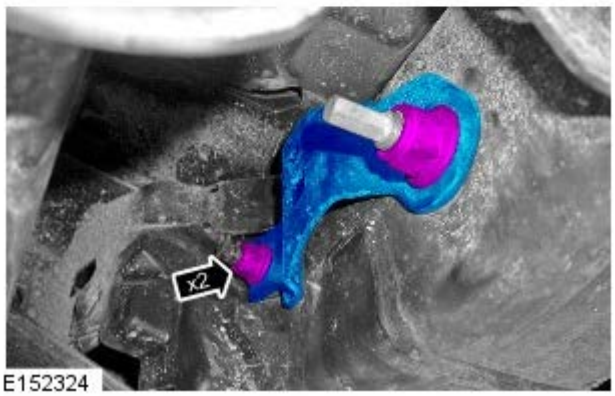
   The procedure must be carried out on both sides.

   Install the bracket.
   - Tighten the bolt to 175 Nm.

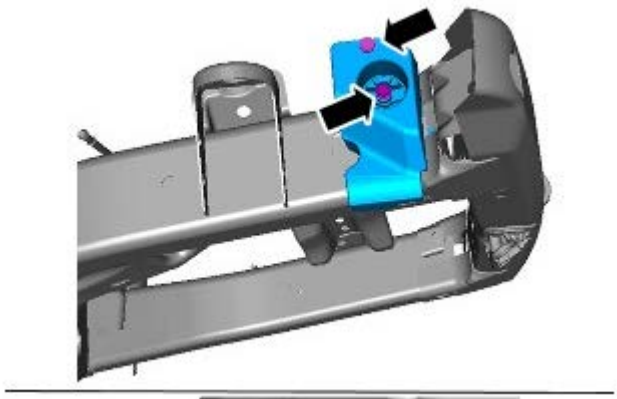
6. NOTE: The procedure must be carried out on both sides.

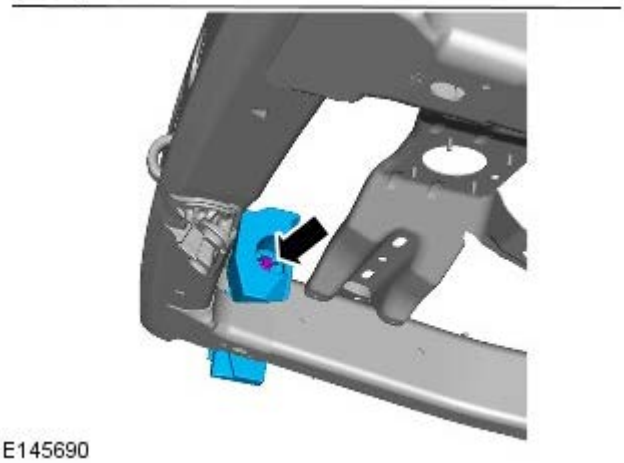
   Remove the bracket.
   - Tighten the M14 nut to 175 Nm.
   - Tighten the M10 nut to 45 Nm





E152324




E145690

7. NOTES:

   The procedure must be carried out on both sides.

   Left-hand shown, right-hand similar.

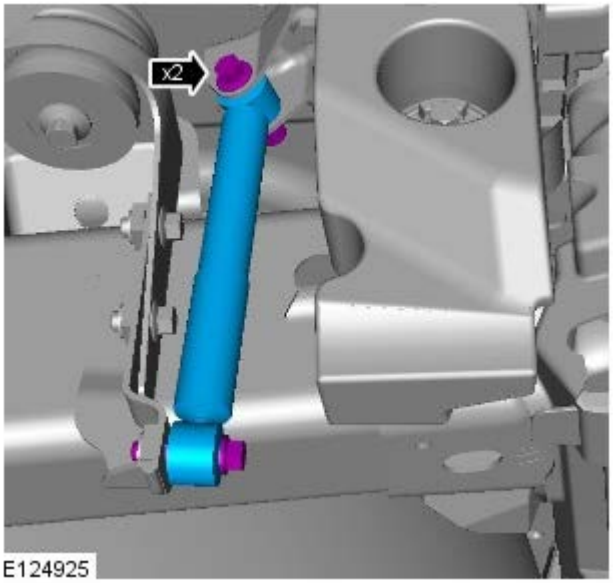
   Install both rear body mass dampers.
   - Tighten the M8 bolts to 25 Nm.
   - Tighten the M10 bolts to 40 Nm

8. NOTES:

   If equipped.

   The procedure must be carried out on both sides.

   Install both rear body mount dampers.



- Tighten the bolts to 45 Nm.

9. Install the spare wheel and tire.
10. Install the rear bumper cover.
    For additional information, refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).
11. Connect the battery positive cable.
    - Tighten the battery terminal to 5 Nm.
12. Connect the battery ground cable.
    For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

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Full Frame and Body Mounting - Transmission Support Crossmember TDV6 3.0L Diesel

Removal and Installation

Removal

NOTES:

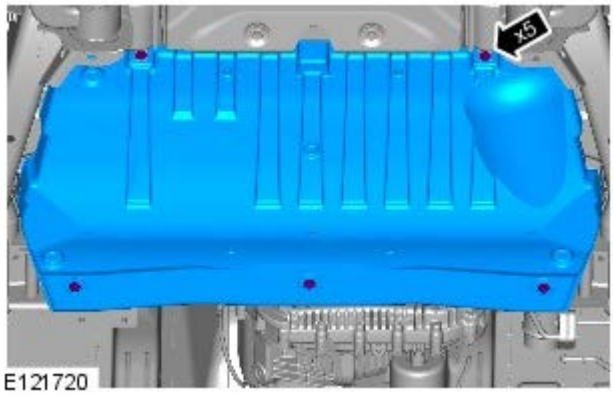
Some variation in the illustrations may occur, but the essential information is always correct.

Removal steps in this procedure may contain installation details.

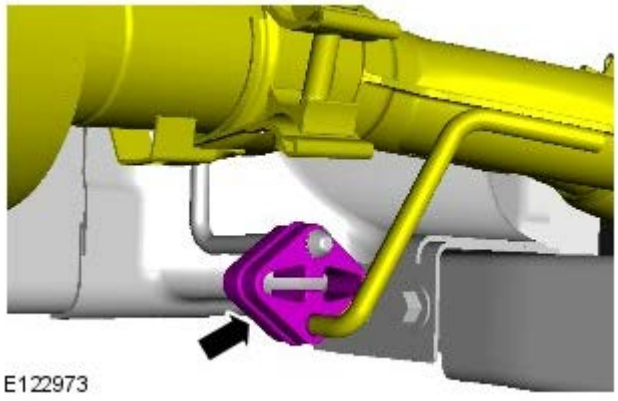
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

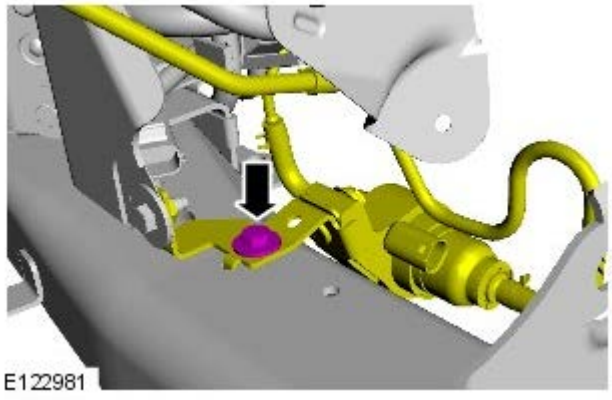
2.



3.

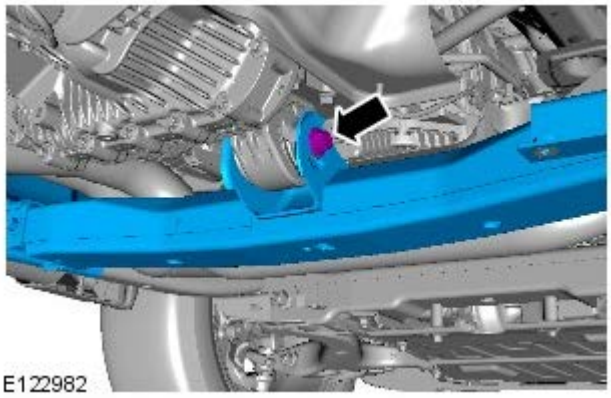


4.

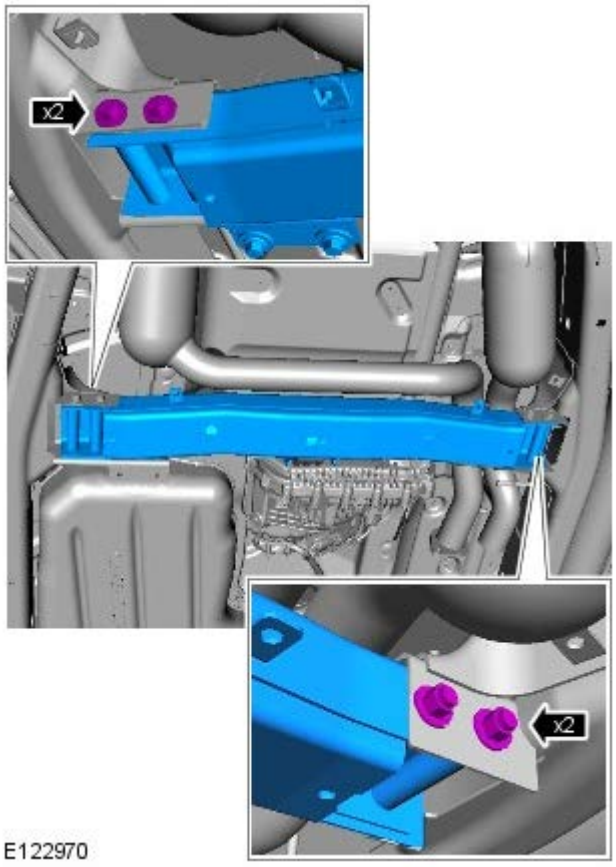


5.

- Support the transfer case.

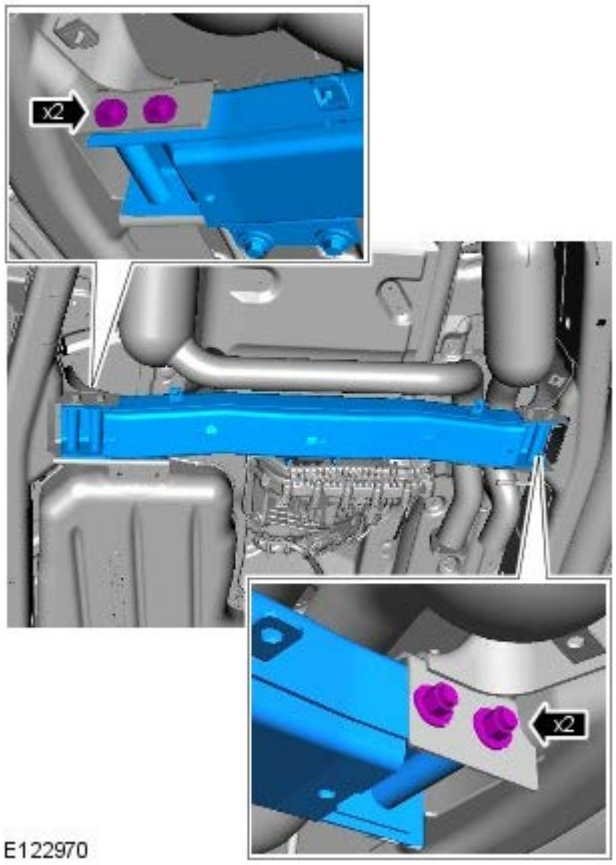


6.

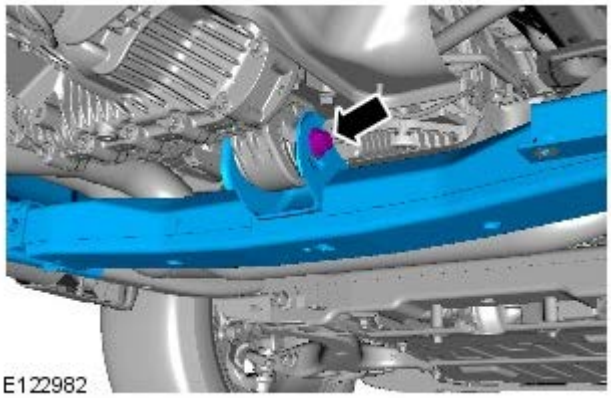


Installation

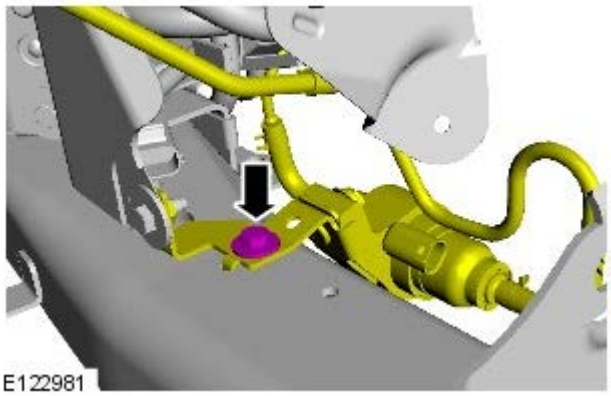
1. TORQUE: 115 Nm



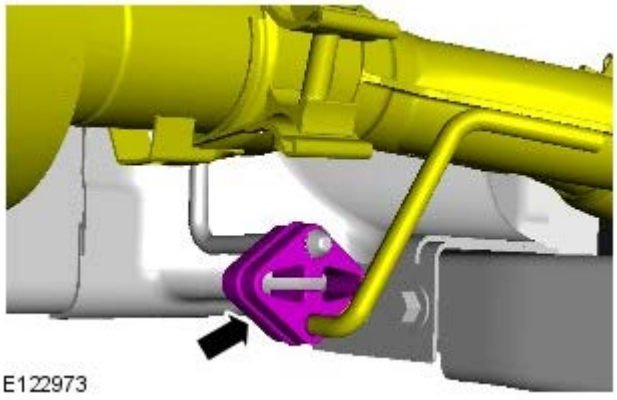
2. TORQUE: 175 Nm



3. TORQUE: 10 Nm

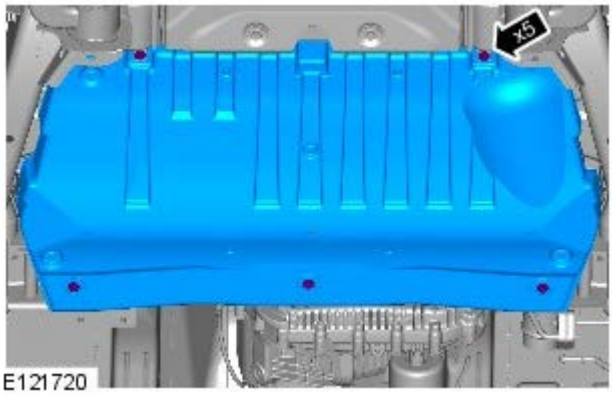


4.



E122973

5. TORQUE: 10 Nm



E121720

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Full Frame and Body Mounting - Transmission Support Crossmember V8 5.0L Petrol/V8 S/C 5.0L Petrol

Removal and Installation

Removal

NOTES:

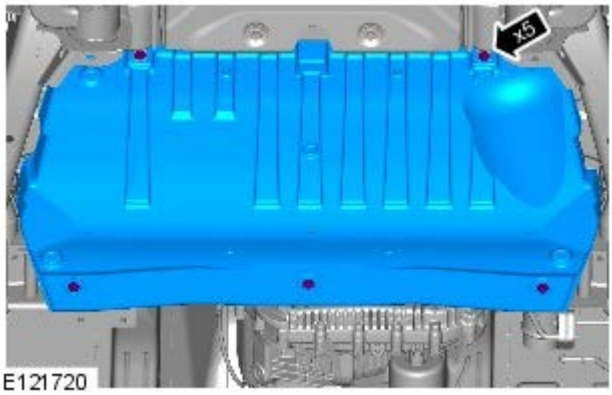
Some variation in the illustrations may occur, but the essential information is always correct.

Removal steps in this procedure may contain installation details.

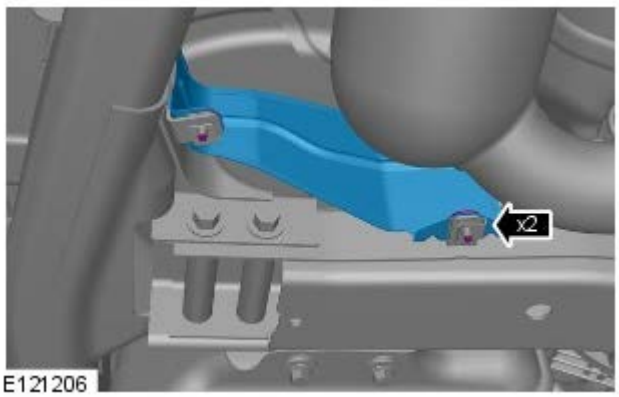
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

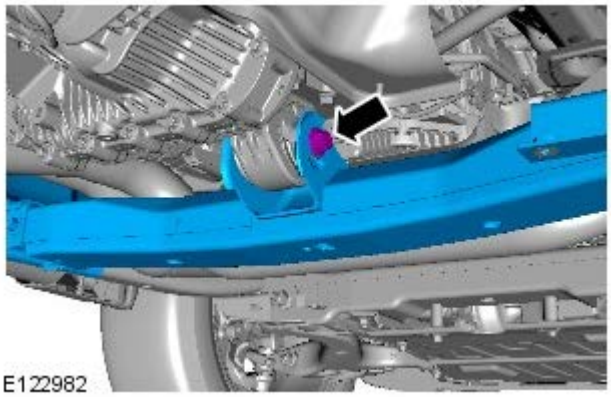
2.



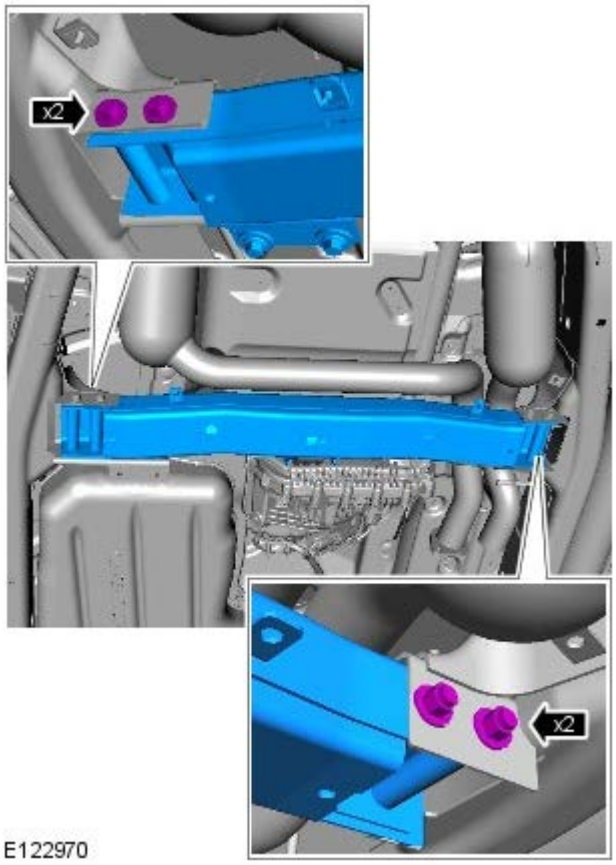
3.



4.

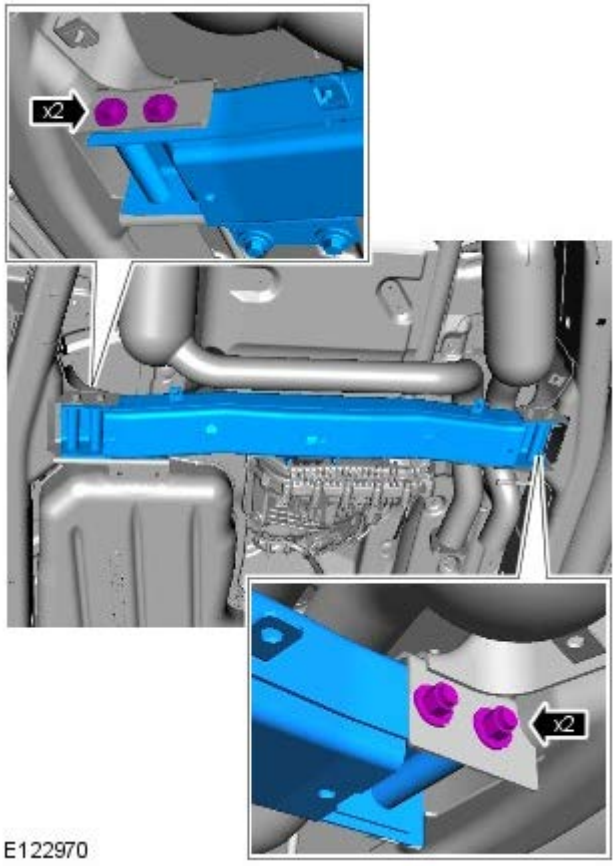


5.

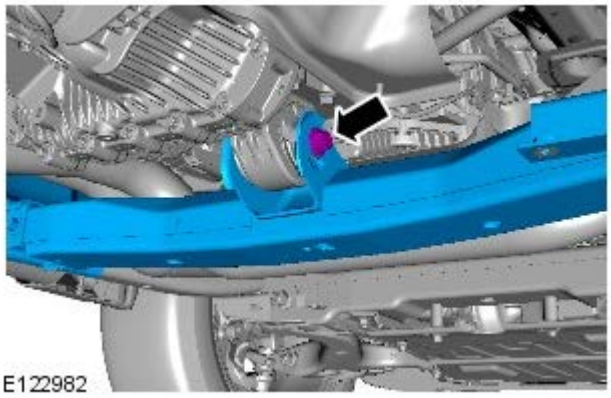


Installation

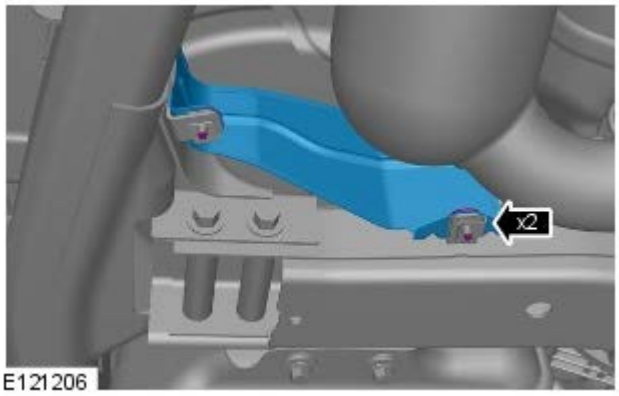
1. TORQUE: 115 Nm



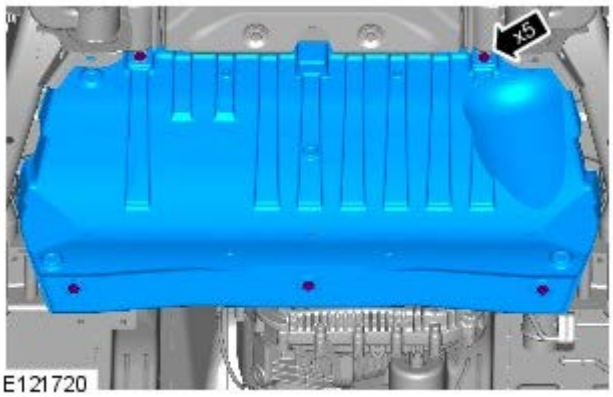
2. TORQUE: 175 Nm



3. TORQUE: 10 Nm



4. TORQUE: 10 Nm



5. Lower the vehicle.