FOREWORD

To the best of our knowledge, the illustrations, technical information, data and descriptions in this issue were correct at the time of going to print. The right to change prices, specifications, and equipment and maintenance instructions at any time without notice is reserved as part of FORD policy of continuous development and improvement for the benefit of our customers.

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GROUP

FORD FOCUS RS & ST

Body and Paint

5

SECTION TITLE PAGE

Body and Paint

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SECTION 501-00 Body System - General Information

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DESCRIPTION AND OPERATION

Body (Overview)..... 501-00-2
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DESCRIPTION AND OPERATION

Body – Overview

General information



E112836

Item	Description
1	Ventilation slits
2	Finisher
3	Large trapezoidal air inlet

The completely newly designed front bumper features a generously dimensioned, grille-covered air inlet in a trapezoidal shape with a high-gloss piano-black paint finish.

The trim strip at the front edge of the hood provides a striking contrast and is also finished in piano-black.

Two ventilation slits have been incorporated in the hood. These provided the engine with additional cooling.

The wheel arches of the front and rear fenders have been enlarged in order to afford enough space for the 19-inch wheels and to allow for the increased track width.

Triangular air vents with the RS emblem are integrated behind the front wheel arches.

DESCRIPTION AND OPERATION



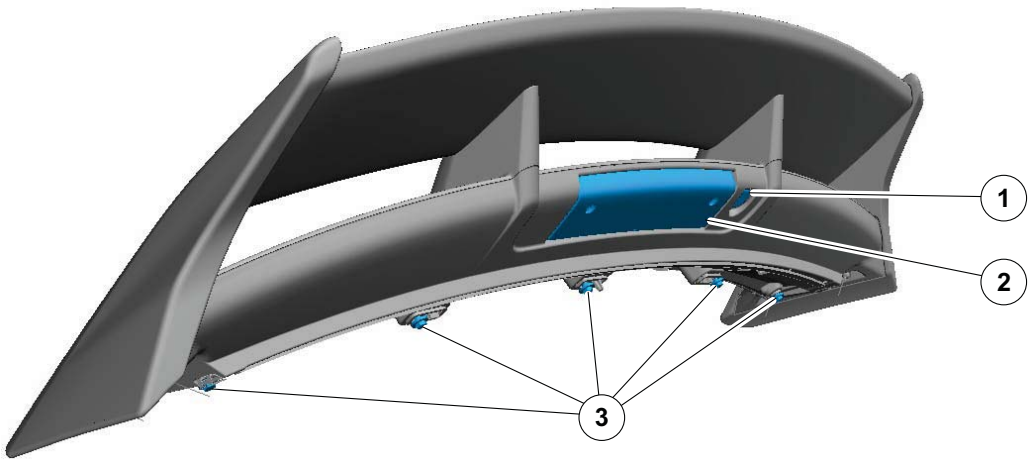
E112837

Item	Description
1	Split rear spoiler
2	High Mounted Stop Lamp Control
3	Diffuser plate

In order to increase downforce, a diffuser has been integrated in the lower part of the rear, along with a split rear spoiler above the rear window.

The diffuser is framed by two chrome-plated end pipes. Small vent openings on both sides of the rear apron further emphasize the width of the vehicle.

The high-mounted stoplamp and the rear window washer nozzle are integrated in the split rear spoiler.



E112838

DESCRIPTION AND OPERATION

Item	Description
1	Rear window washer nozzle
2	High Mounted Stop Lamp Control

Item	Description
3	Attachment bolts

The high-mounted stoplamp uses LEDs rather than conventional bulbs.

NOTE: The LEDs cannot be replaced individually. In event of failure the entire stoplamp needs to be replaced.

The rear window washer nozzle is positioned next to the high-mounted stoplamp.

The rear spoiler is attached to the tailgate with five bolts.

SECTION 501-02 Front End Body Panels

VEHICLE APPLICATION: 2011.00 Focus

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Hood Alignment..... (41 213 0) 501-02-2

REMOVAL AND INSTALLATION

Cowl Panel Grille..... 501-02-4
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Air Deflector..... 501-02-7

GENERAL PROCEDURES

Hood Alignment(41 213 0)

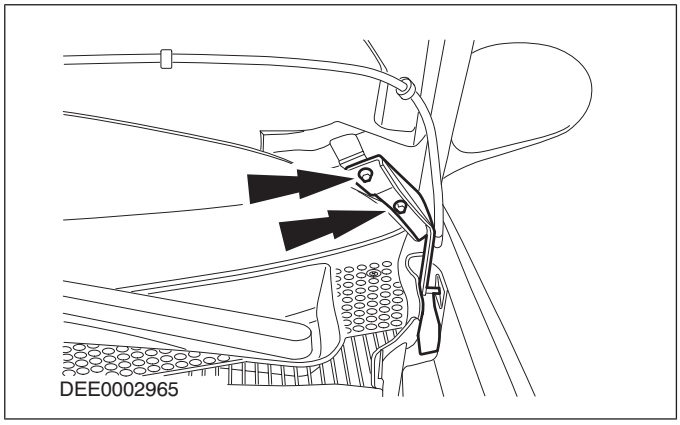
Adjustment

1. **NOTE: Adjust the hood without the hood latch.**

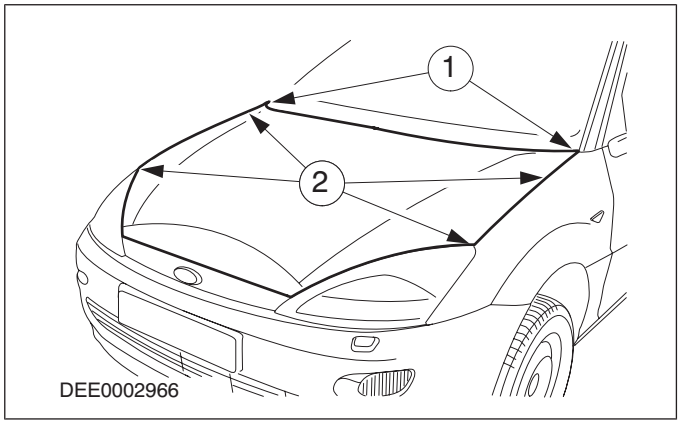
   Remove the hood latch. For additional information, refer to Section 501-14 [Handles, Locks, Latches and Entry Systems].

2. **NOTE: It is not possible to adjust the rear of the hood to the hight of the fender.**

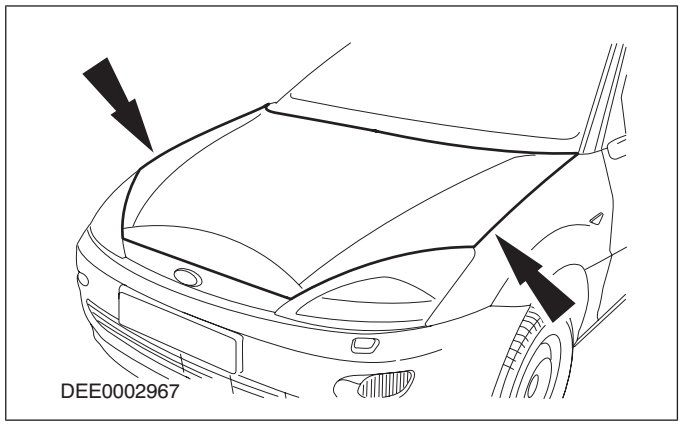
   Slacken the screws of the hood hinge approximately half a turn.



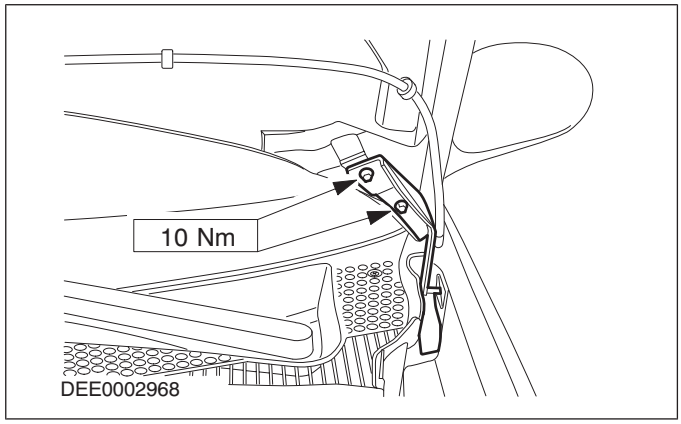
3. **Adjust the hood in the longitudinal direction.**
   1. Adjust the hood so that the rear edges of the fender and the edge of the hood line up.
   2. Check that the clearances with the left and right-hand fenders run parallel and correct them if necessary.



4. **Adjust the clearances with the left and right-hand fenders.**
   - The clearances with the fenders must be the same width on the left and right-hand sides. The clearances can be equalized by opening the hood on the hood support rod and correcting by pressing it to the left or right.

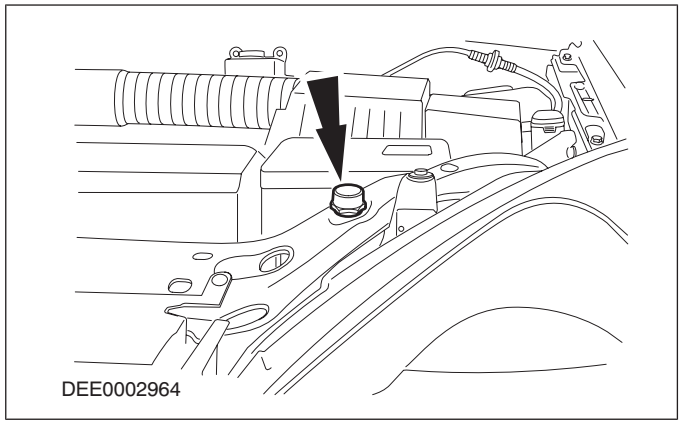


5. **Tighten the screws.**



6. **NOTE: The hood must rest uniformly on both bump stop rubbers.**

   Adjust the front of the hood to the height of the fenders.
   - Adjust the hood to the height of the fenders with the bump stop rubbers.



GENERAL PROCEDURES

7. **NOTE: The clearances and edge alignment must be correct before the hood latch is installed.**

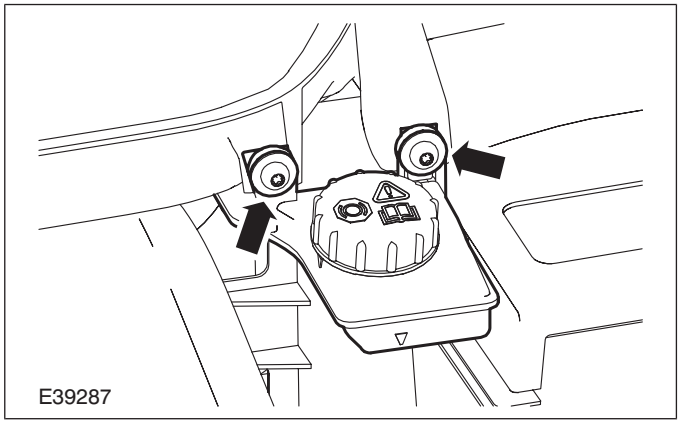
   Install the hood latch.

   - The hood latch must be installed so that the hood engages without stress and the clearances on the left and right-hand sides are not changed.

REMOVAL AND INSTALLATION

Cowl Panel Grille

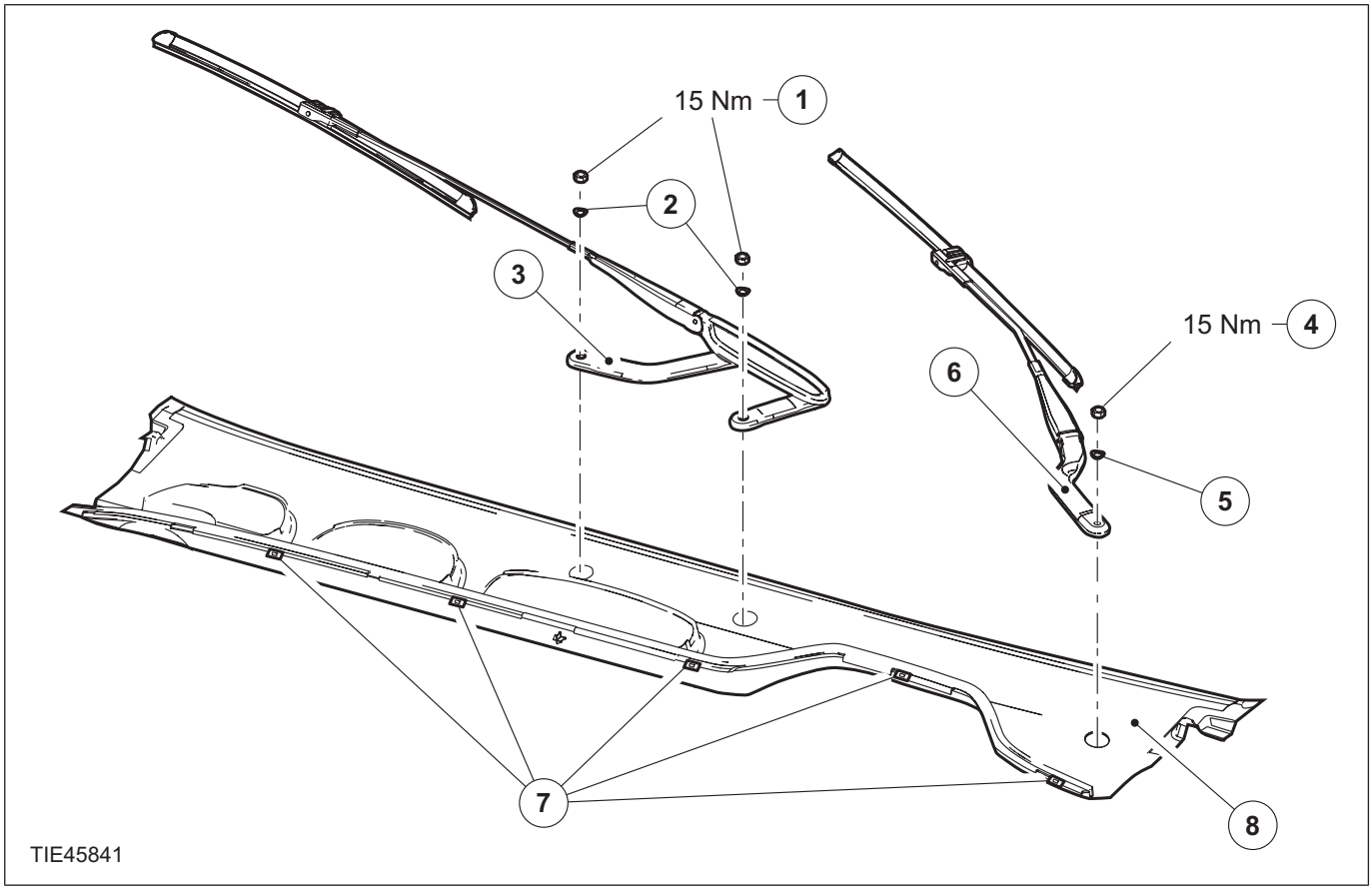
1. **Remove the brake fluid reservoir from the cowl panel.**



2. **Remove the components in the order indicated in the following illustration(s) and table(s).**

CAUTION: Ensure that the wiper motor is in the park position.

NOTE: Left-hand side shown.



Item	Description
1	Windshield wiper arm bolts (passenger side)
2	Windshield wiper arm washer (passenger side)

Item	Description
3	Windshield wiper arm (passenger side)
4	Windshield wiper arm bolts (driver side)
5	Windshield wiper arm washer (driver side)
6	Windshield wiper arm (driver side)

REMOVAL AND INSTALLATION

Item	Description
7	Cowl panel clips
8	Cowl panel

3. **To install, reverse the removal procedure.**

REMOVAL AND INSTALLATION

Fender

Removal

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

1. Detach the wheel and tire.

   Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

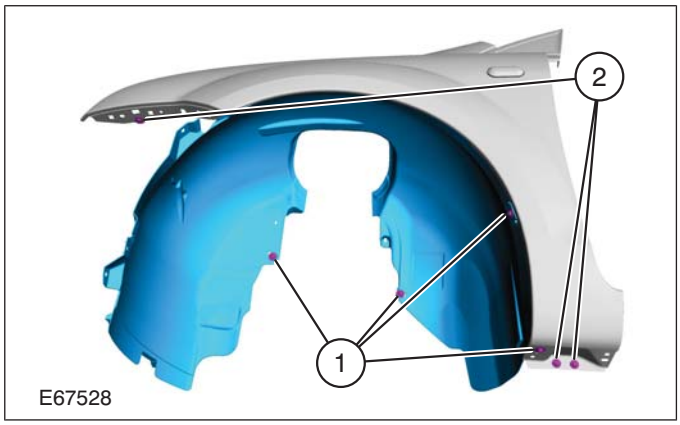
2. Detach the front bumper cover.

   Refer to: Front Bumper Cover - 2.5L Duratec-ST (VI5) (501-19 Bumpers, Removal and Installation).

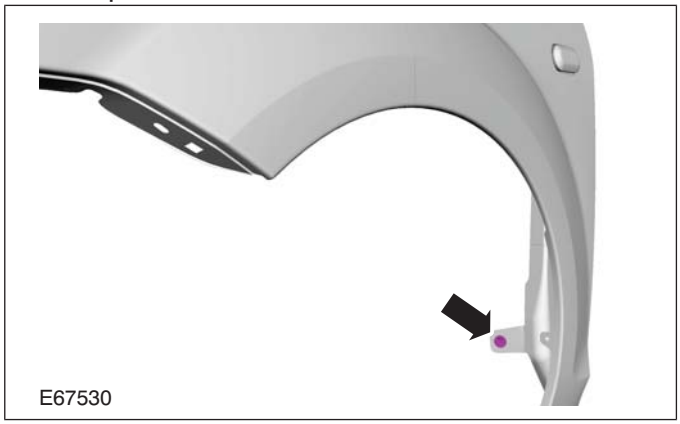
3. Remove the cowl panel grille.

   Refer to: Cowl Panel Grille (501-02 Front End Body Panels, Removal and Installation).

4. 1. Torque: 5 Nm
   2. Torque: 7 Nm



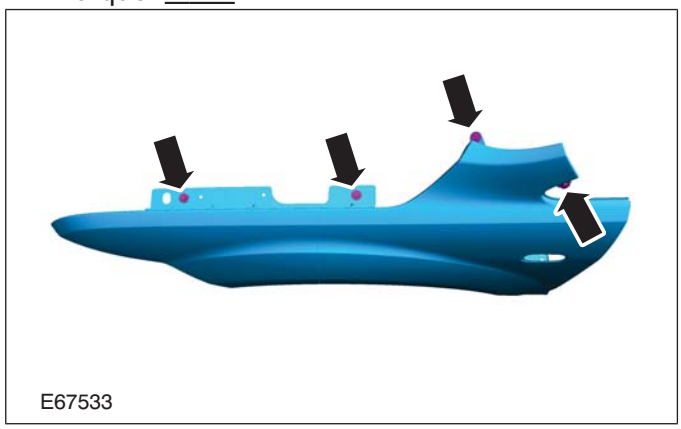
5. Torque: 7 Nm



6. Torque: 7 Nm



7. Torque: 7 Nm



Installation

1. To install, reverse the removal procedure.

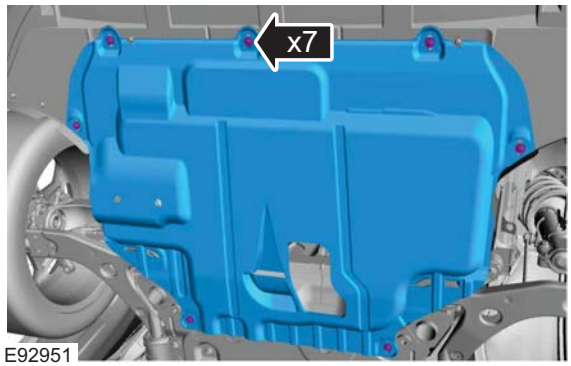
REMOVAL AND INSTALLATION

Air Deflector

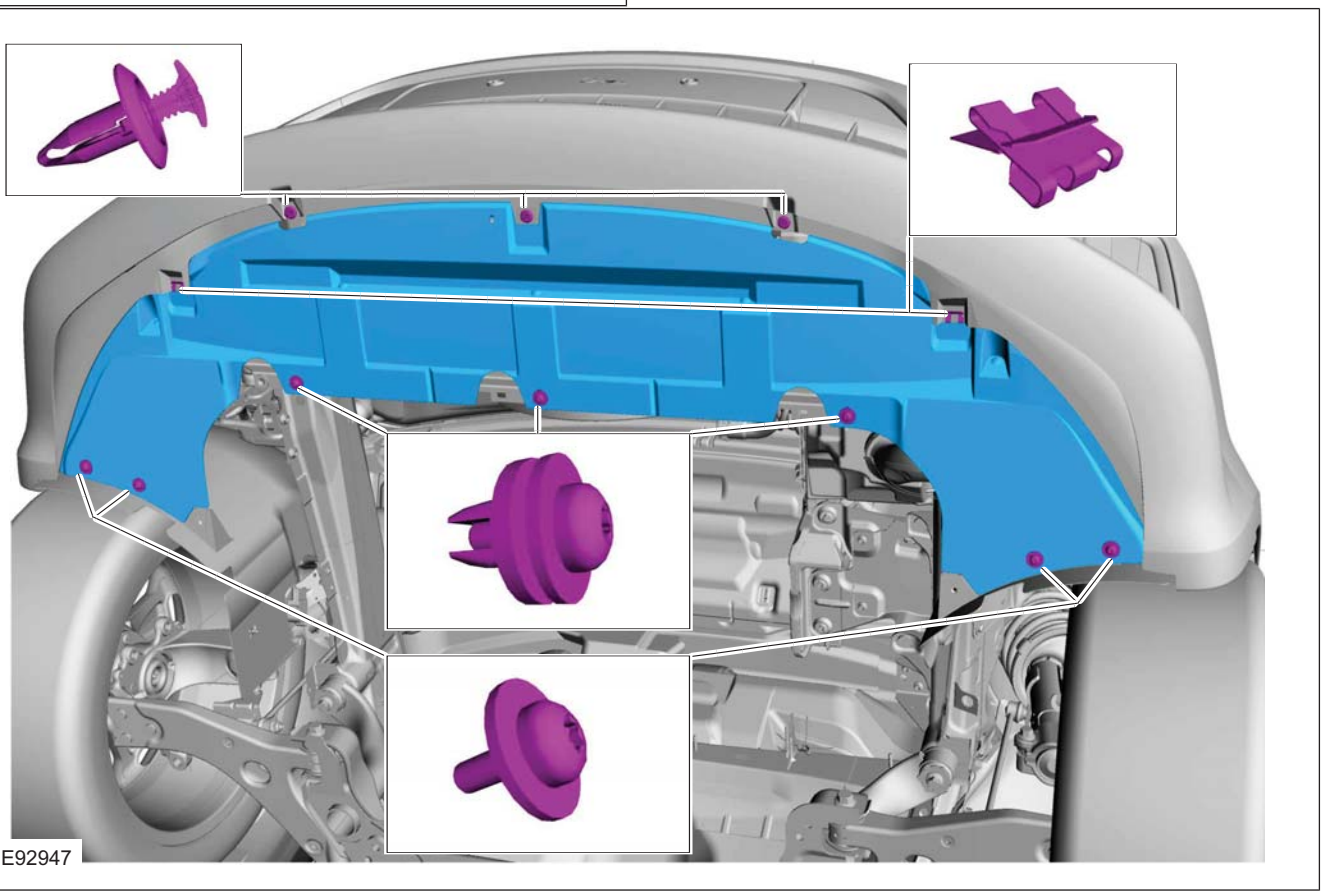
Removal

1. Refer to: Lifting (100-02 Jacking and Lifting, Description and Operation).

2.

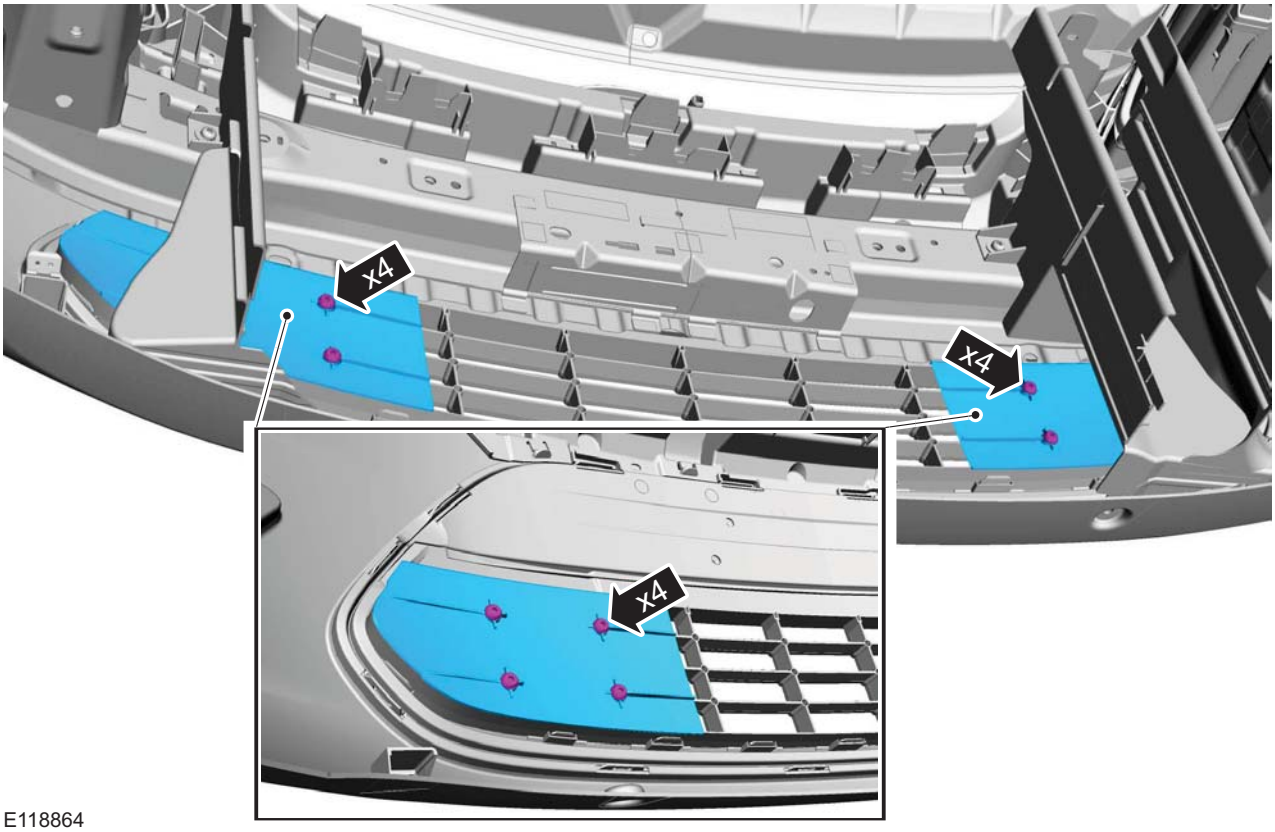


3.



4.

REMOVAL AND INSTALLATION



Installation

1. To install, reverse the removal procedure.

SECTION 501-03 Body Closures

VEHICLE APPLICATION: 2011.00 Focus

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Rear Door Alignment..... 501-03-21
Luggage Compartment Lid Alignment..... 501-03-25

SPECIFICATIONS

Lubricants, Fluids, Sealers and Adhesives

	Specifications
Adhesive - Loctite 243	WSK-M2G349-A7

Torque Specifications

Item	Nm	lb-ft	lb-in
Door hinge center retaining bolt	15	11	-
Door hinge to body retaining screws	30	22	-
Door hinge to door retaining screws	48	35	-
Door check strap to body retaining screw	23	17	-
Door check strap to door retaining nuts	11	8	-
Door latch to door retaining screws	8	-	71
Door striker to body retaining screws	20	15	-
Liftgate hinge to body retaining screw	23	17	-
Liftgate hinge to liftgate retaining screws	23	17	-
Liftgate latch to liftgate retaining bolts	20	15	-
Liftgate striker to body retaining screws	25	18	-
Hood hinge to body retaining nuts	23	17	-
Hood hinge to hood retaining nuts	9	-	80
Luggage compartment lid striker retaining bolts	25	18	-
Luggage compartment hinge to luggage compartment lid retaining bolts	23	17	-
Luggage compartment lid hinge to body retaining bolts	23	17	-
Luggage compartment lid hinge mechanism to luggage compartment lid retaining screws - Convertible	25	18	-
Luggage compartment lid latch to luggage compartment lid retaining screws - Convertible	25	18	-
Luggage compartment lid side latch to luggage compartment lid retaining screws - Convertible	10	7	-
Luggage compartment lid side latch motor to luggage compartment lid retaining screws - Convertible	10	7	-
Luggage compartment lid lift cylinder lower pin retaining nut - Convertible	7	-	62
Luggage compartment lid lift cylinder bracket retaining nuts - Convertible	10	7	-
Luggage compartment lid hinge mechanism retaining screws - Convertible	25	18	-
Luggage compartment lid side latch striker retaining screws - Convertible	4	-	35

SPECIFICATIONS

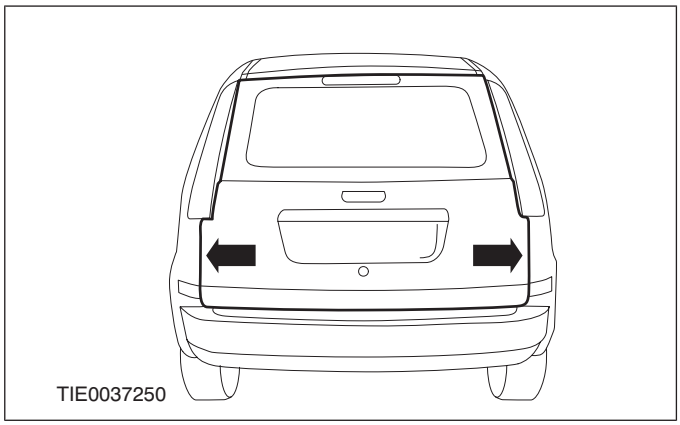
Item	Nm	lb-ft	lb-in
Luggage compartment lid hinge mechanism latch to body retaining screws - Convertible	25	18	-
Luggage compartment lid hinge mechanism latch to luggage compartment lid hinge mechanism retaining screws - Convertible	4	-	35
Luggage compartment cover bracket cover bolts - Convertible	3	-	27
Convertible top module electrical connector cover nuts	2.2	-	20
Convertible top hydraulic pump bracket nuts	25	18	-

GENERAL PROCEDURES

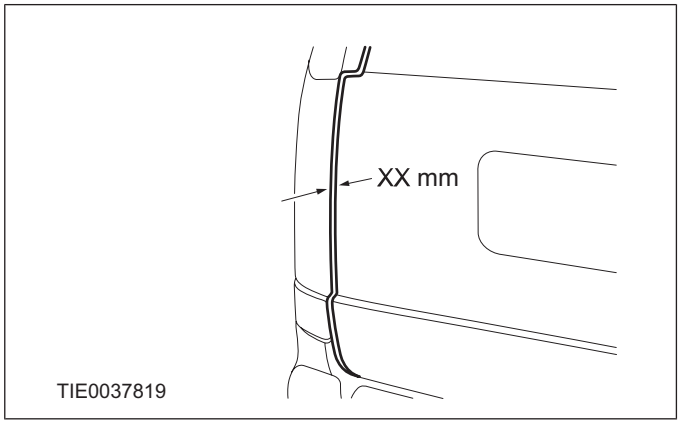
Liftgate Alignment(41 653 0)

1. **Make sure that the liftgate is in the fully closed position.**
2. **NOTE: The liftgate must be positioned centrally in the liftgate opening.**

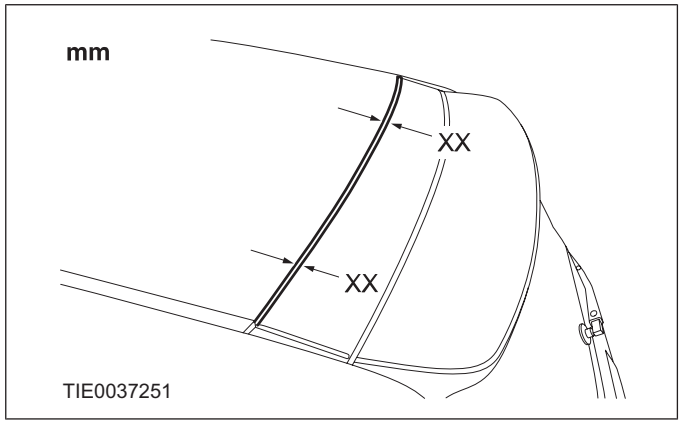
   Check and note any misalignment of the liftgate in relation to the liftgate opening.



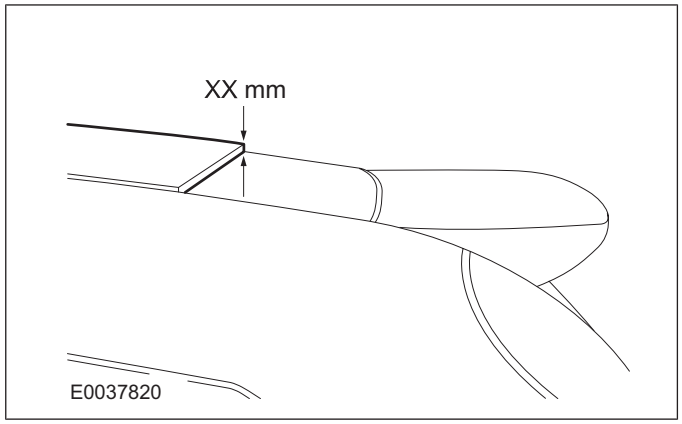
3. **Check and note any misalignment of the liftgate in relation to the rear body panel on both sides (left hand side shown).**
   - XX = -1.0 mm ± 1.0 mm.



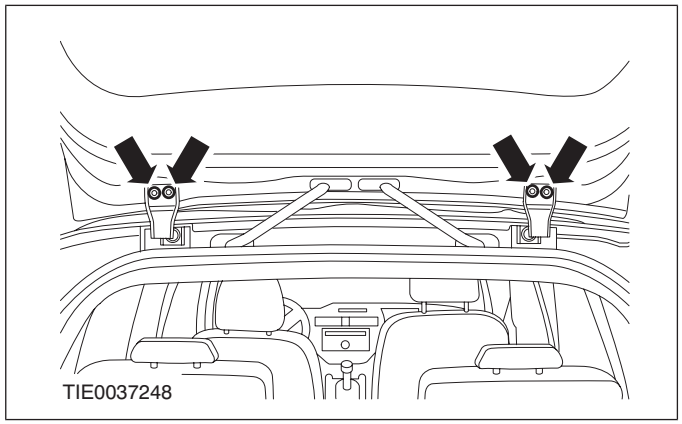
4. **Check and note any misalignment of the liftgate in relation to the roof panel.**
   - XX = 4.0 mm ± 1.0 mm.



5. **Check and note any misalignment of the liftgate in relation to the roof panel.**
   - XX = -1.0 mm ± 1.0 mm.

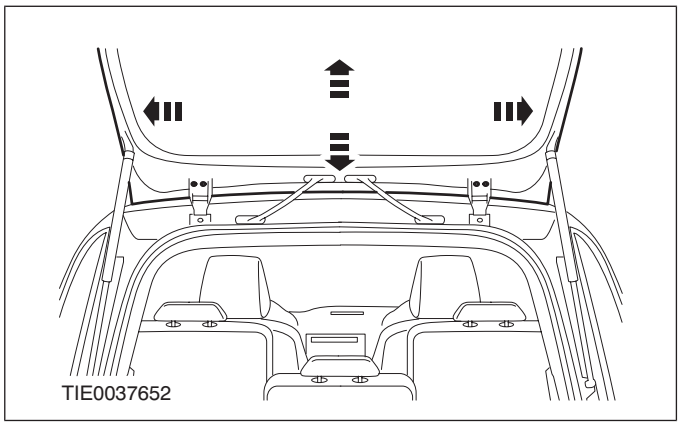


6. **If adjustment is required, open the liftgate and loosen the liftgate hinge to liftgate retaining screws one complete turn.**

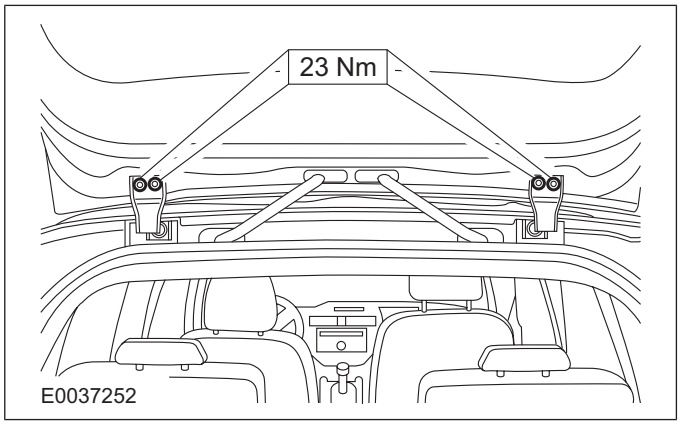


GENERAL PROCEDURES

7. **Adjust the liftgate as necessary.**



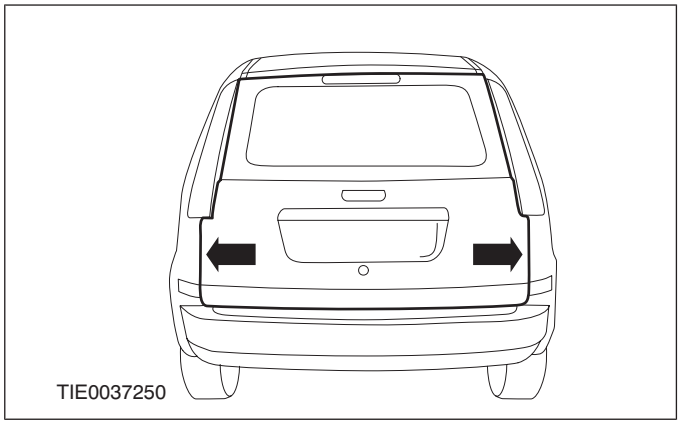
8. **Tighten the liftgate hinge to liftgate retaining screws.**



9. **Make sure that the liftgate is in the fully closed position.**

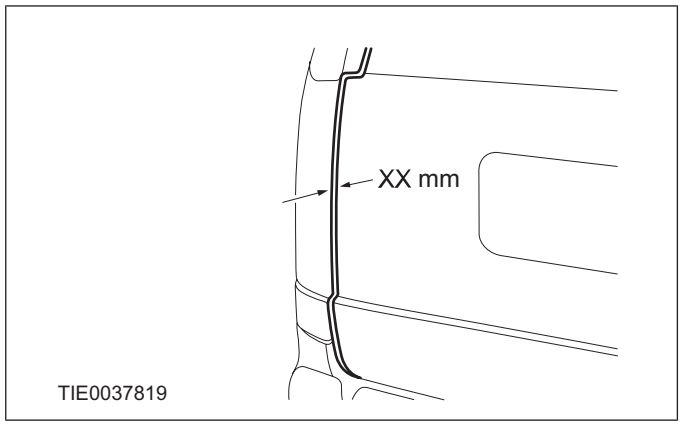
10. **NOTE: The liftgate must be positioned centrally in the liftgate opening.**

    Check and note any misalignment of the liftgate in relation to the liftgate opening.



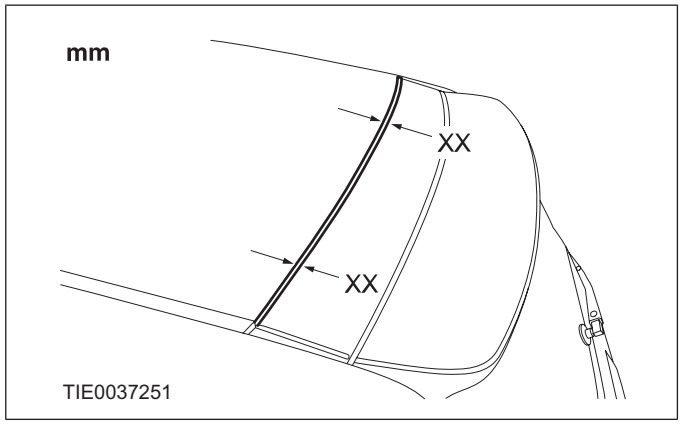
11. **Check and note any misalignment of the liftgate in relation to the rear body panel on both sides (left hand side shown).**

- XX = -1.0 mm ± 1.0 mm.



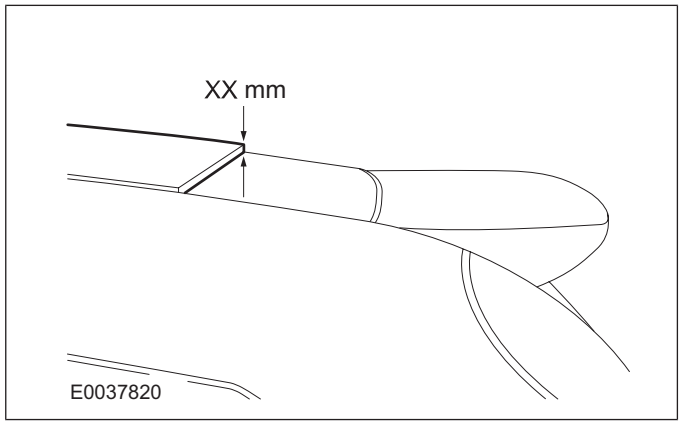
12. **Check and note any misalignment of the liftgate in relation to the roof panel.**

- XX = 4.0 mm ± 1.0 mm.



13. **Check and note any misalignment of the liftgate in relation to the roof panel.**

- XX = -1.0 mm ± 1.0 mm.



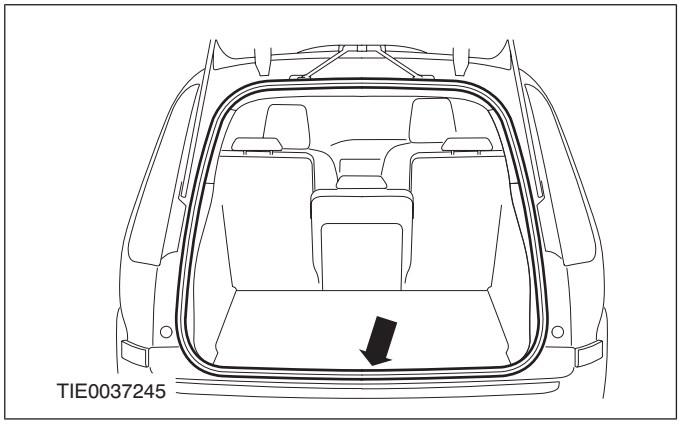
14. **NOTE: If the liftgate alignment cannot be achieved at the liftgate hinges to liftgate, adjustment must be carried out at the liftgate hinges to body.**

NOTE: If adjustment of the liftgate hinges to body is required the headliner must be removed.

GENERAL PROCEDURES

Open the liftgate.

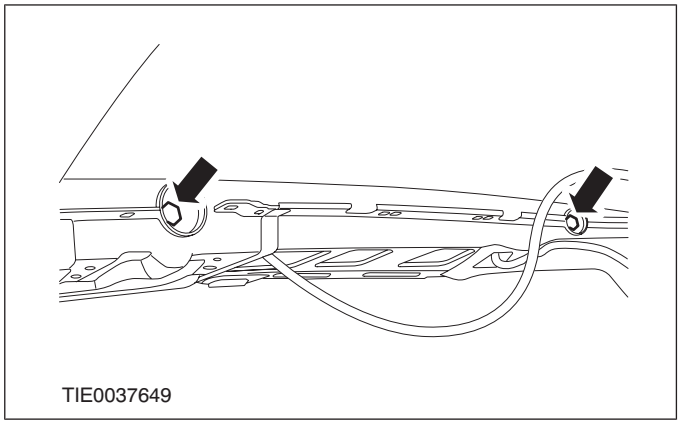
15. Remove the liftgate opening weatherstrip.



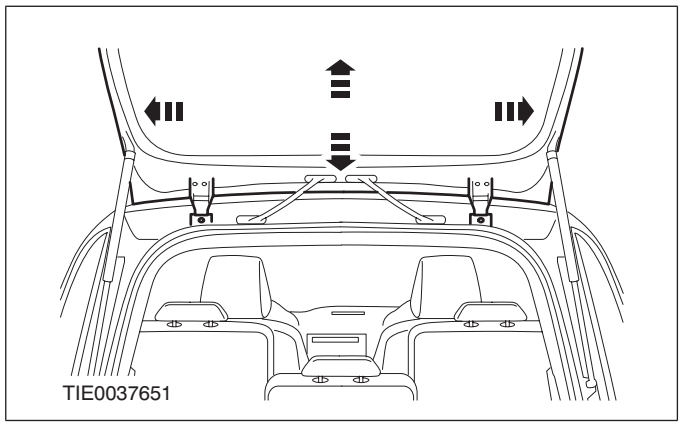
16. Remove the headliner.

    For additional information, refer to:
    Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation)
    / Headliner - 3-Door, Vehicles Without: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

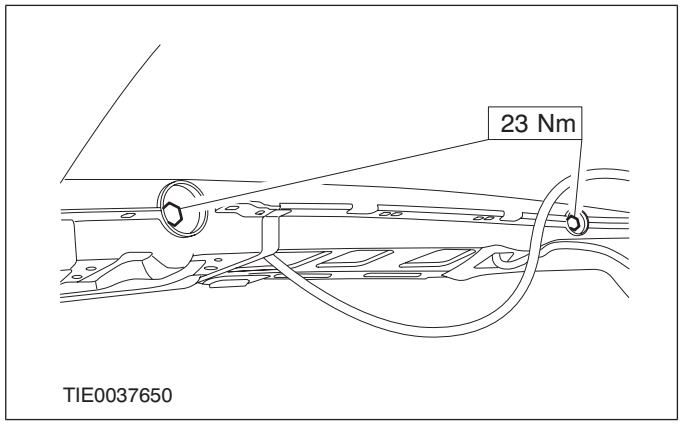
17. Loosen the liftgate hinge to body retaining screws one complete turn.



18. Adjust the liftgate as necessary.



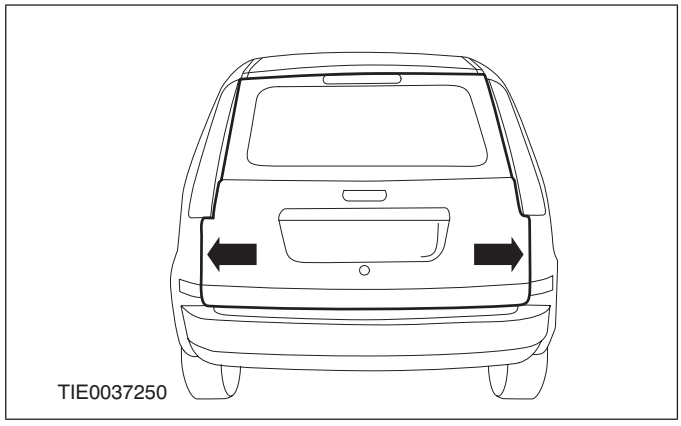
19. Tighten the liftgate hinge to body retaining screws.



20. Make sure that the liftgate is in the fully closed position.

21. NOTE: The liftgate must be positioned centrally in the liftgate opening.

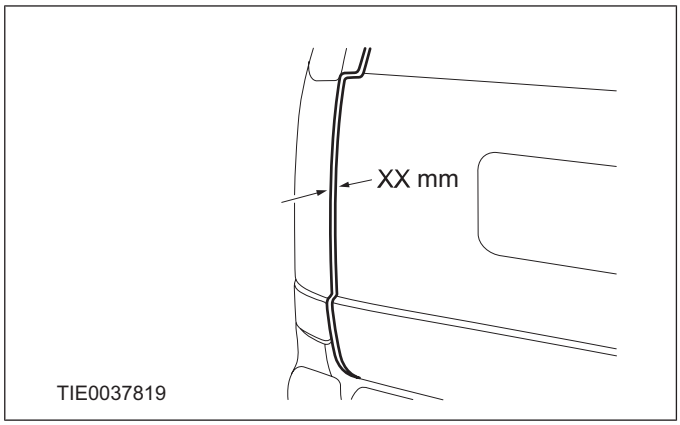
    Check and note any misalignment of the liftgate in relation to the liftgate opening.



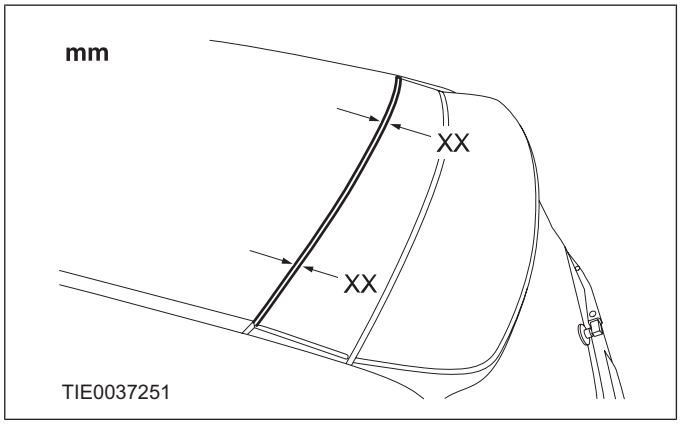
22. Check and note any misalignment of the liftgate in relation to the rear body panel on both sides (left hand side shown).

GENERAL PROCEDURES

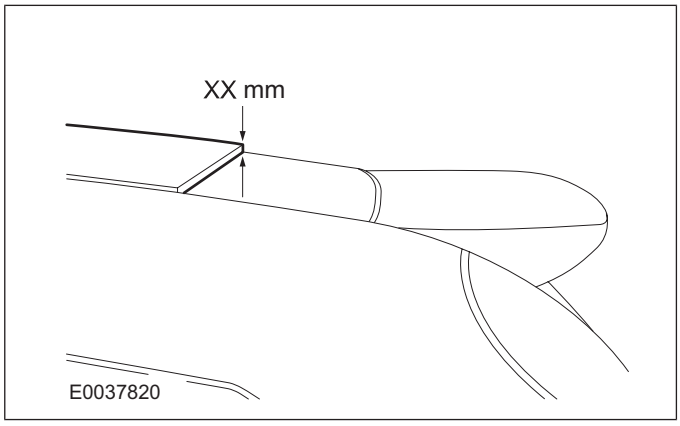
- XX = -1.0 mm ± 1.0 mm.



23. **Check and note any misalignment of the liftgate in relation to the roof panel.**
    - XX = 4.0 mm ± 1.0 mm.

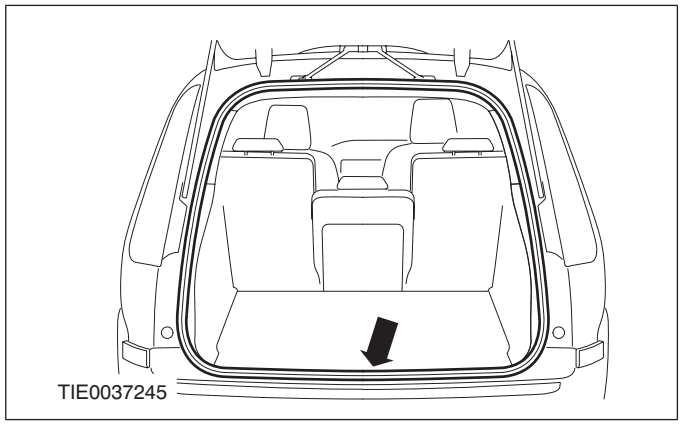


24. **Check and note any misalignment of the liftgate in relation to the roof panel.**
    - XX = -1.0 mm ± 1.0 mm.

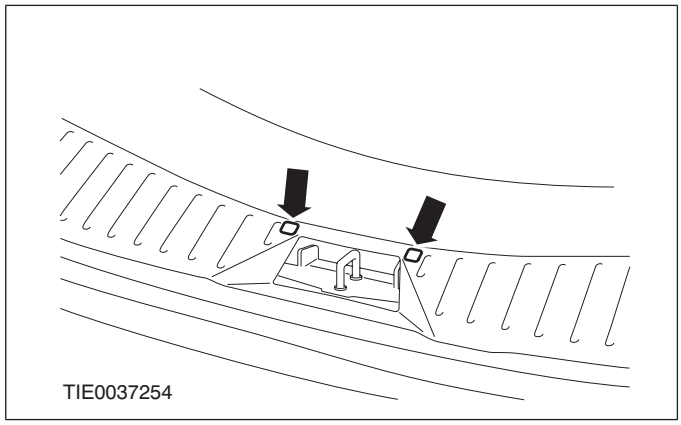


25. **If further adjustment is required repeat the liftgate hinge to body adjustment.**
26. **If no further adjustment is required open the liftgate.**
27. **Install the headliner.**

    For additional information, refer to:
    Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation)
    / Headliner - 3-Door, Vehicles Without: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
28. **Install the liftgate opening weatherstrip.**

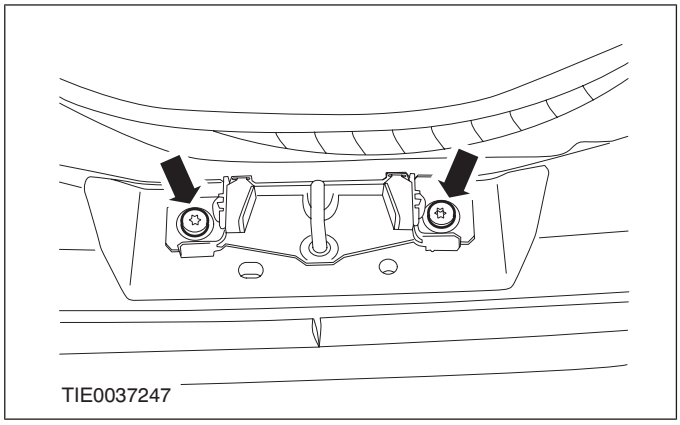


29. **With the aid of another technician on the inside of the vehicle, check and note any misalignment of the liftgate latch striker plate in relation to the liftgate latch.**
30. **Open the liftgate.**
31. **Remove the liftgate latch striker plate retaining screw covers.**

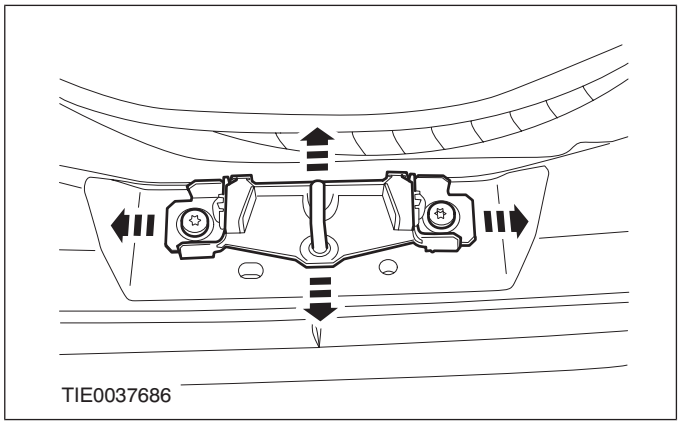


GENERAL PROCEDURES

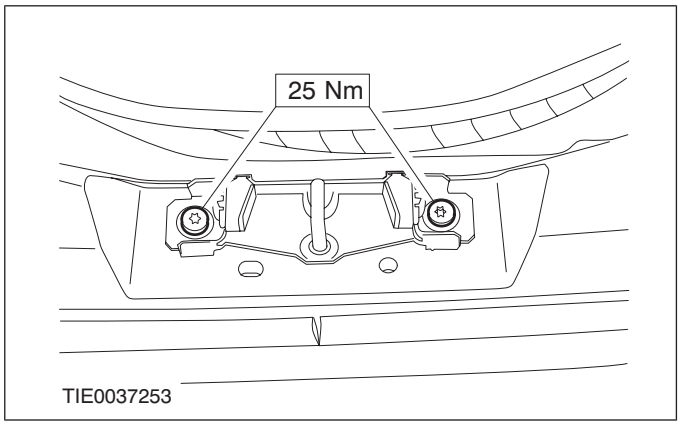
32. Loosen the liftgate latch striker plate retaining screws one half turn (liftgate opening scuff plate removed for clarity).



33. Adjust the liftgate latch striker plate as necessary (liftgate opening scuff plate removed for clarity).



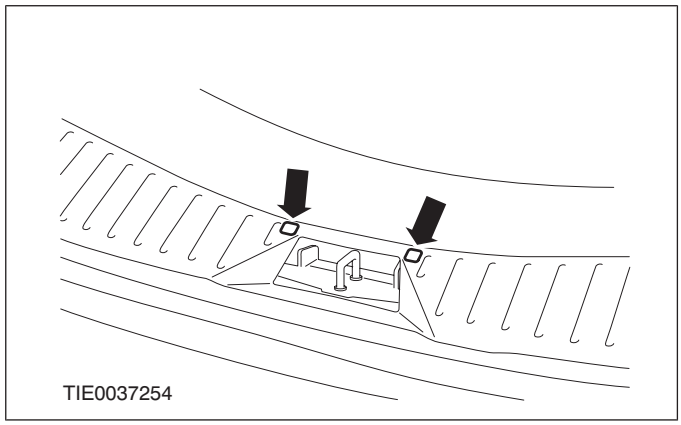
34. Tighten the liftgate latch striker plate retaining screws (liftgate opening scuff plate removed for clarity).



35. With the aid of another technician on the inside of the vehicle, check and note any misalignment of the liftgate latch striker plate in relation to the liftgate latch.

36. If further adjustment is required repeat the liftgate latch striker plate adjustment.

37. If no further adjustment is required, install the liftgate latch striker plate retaining screw covers.



GENERAL PROCEDURES

Door Alignment — 3-Door

General Equipment

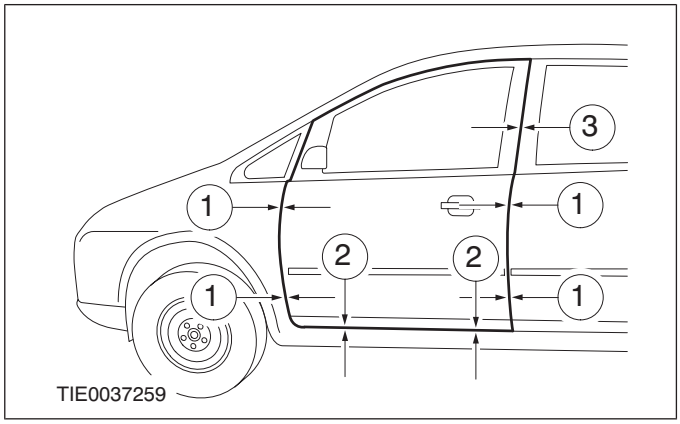
Transmission jack

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. **NOTE: Make sure that the door is in the fully closed position.**

   Check and note any misalignment of the door in relation to the door frame.

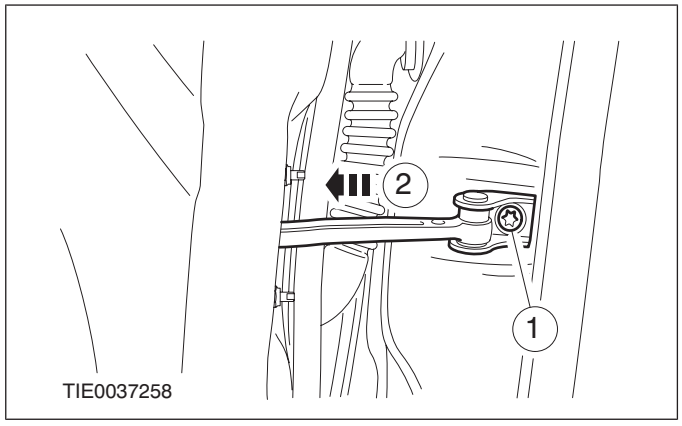
   1. 3.5 mm ± 1.0 mm.
   2. 6.0 mm ± 2.0 mm.
   3. 4.5 mm ± 1.5 mm.



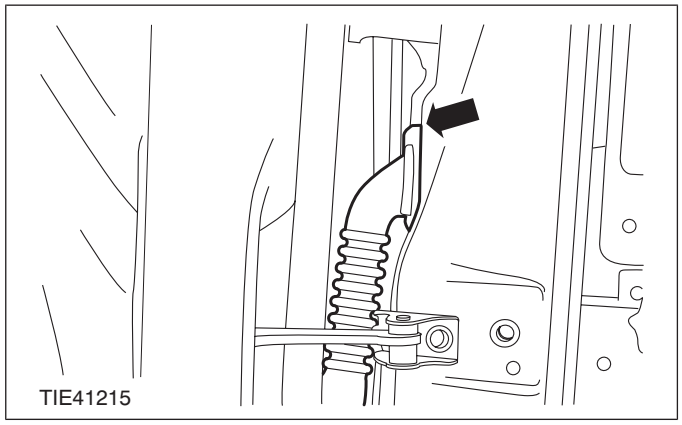
2. **If adjustment is required open the door and mark the position of the door hinges, to use as reference points as necessary.**
3. **NOTE: Due to limited access to the door hinge retaining screws on the A-pillar, the door must be removed.**

   Detach the door check strap from the A-pillar.

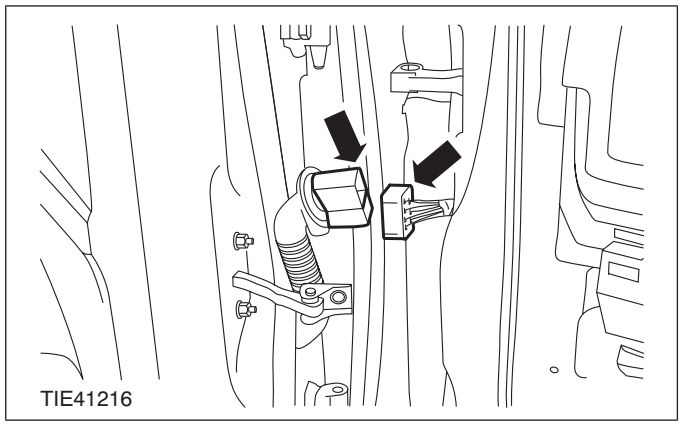
   1. Remove the retaining screw.
   2. Push the check strap to the fully closed position.



4. **Detach the electrical connector from the A-pillar.**



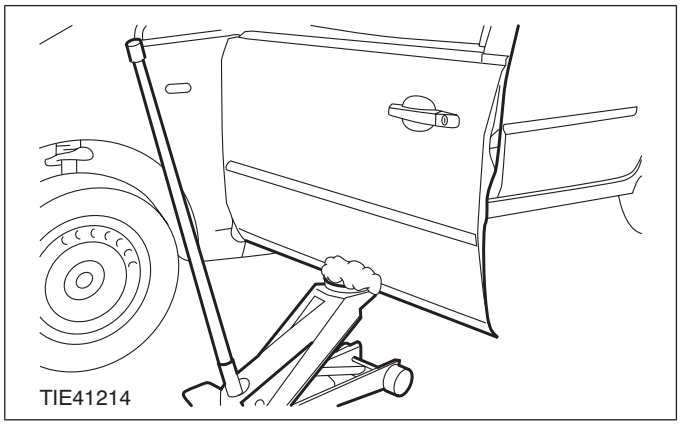
5. **Disconnect the electrical connector.**



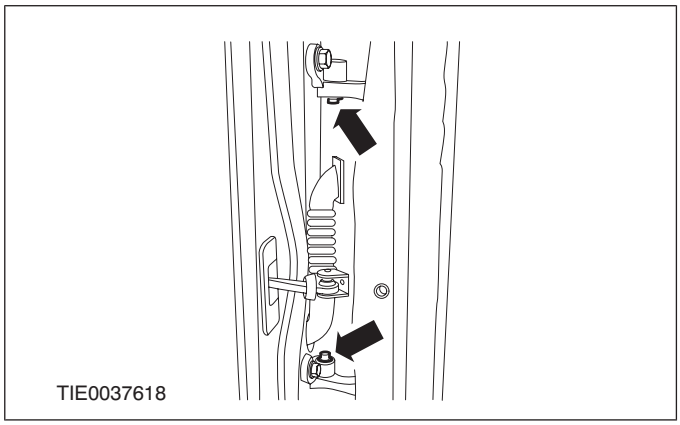
6. **CAUTION: Protect the door using a soft cloth to prevent damage.**

GENERAL PROCEDURES

With the aid of another technician and a suitable transmission jack, support the door.



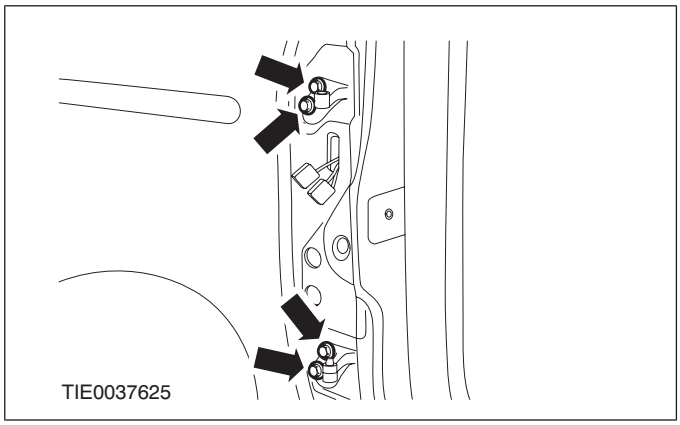
7. **Remove and discard the door hinge center retaining bolts.**



8. **CAUTION: Take care when moving the door upwards as considerable force may be required to separate the door hinges from the door hinge cones.**

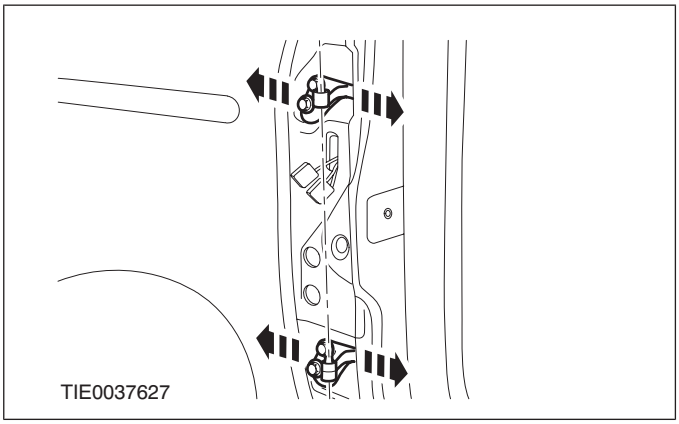
   With the aid of another technician remove the door.

9. **Loosen the door hinge to A-pillar retaining screws one half turn.**



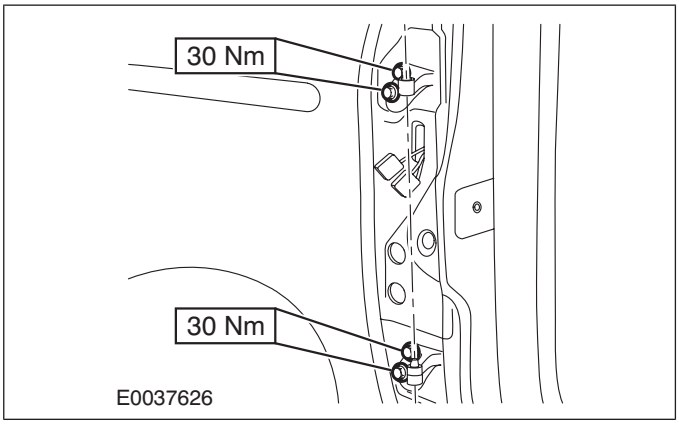
10. **CAUTION: Make sure that the door hinges maintain a common pivot center line.**

    Adjust the door hinges as necessary.



11. **CAUTION: Make sure that the door hinges maintain a common pivot center line.**

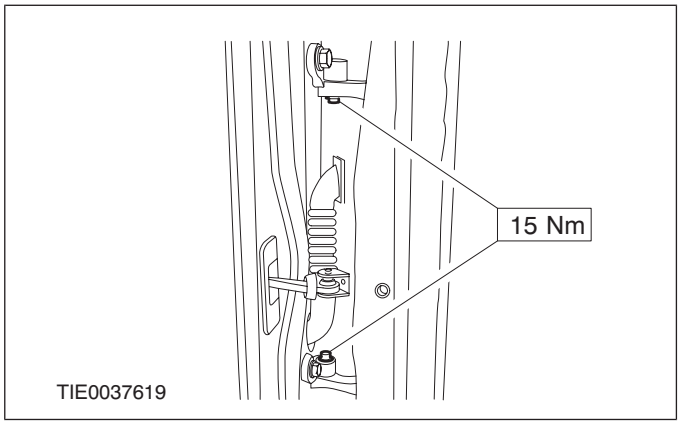
    Tighten the door hinge to A-pillar retaining screws.



12. **Install the door.**
    - Make sure that the door hinge cones are correctly located.
13. **NOTE: Do not apply adhesive at this stage.**

GENERAL PROCEDURES

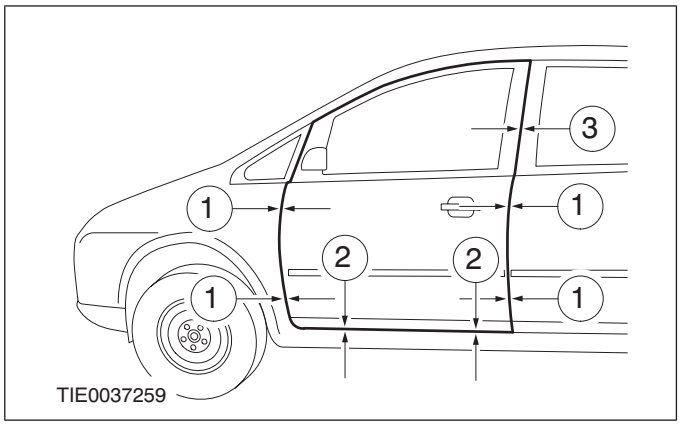
Install new door hinge center retaining bolts.



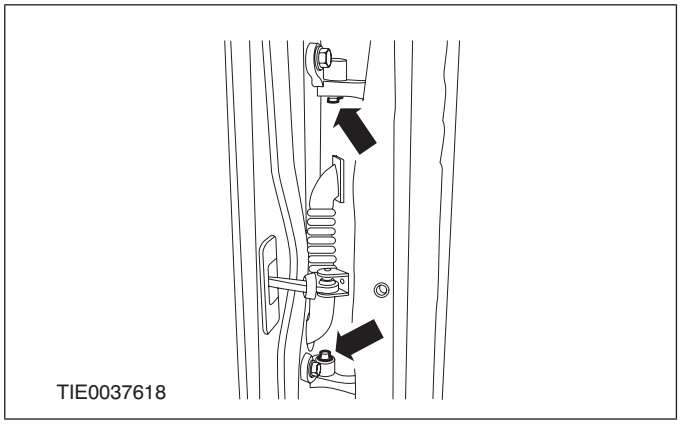
14. **Close the door.**
15. **NOTE: Make sure that the door is in the fully closed position.**

    Check and note any misalignment of the door in relation to the door frame.

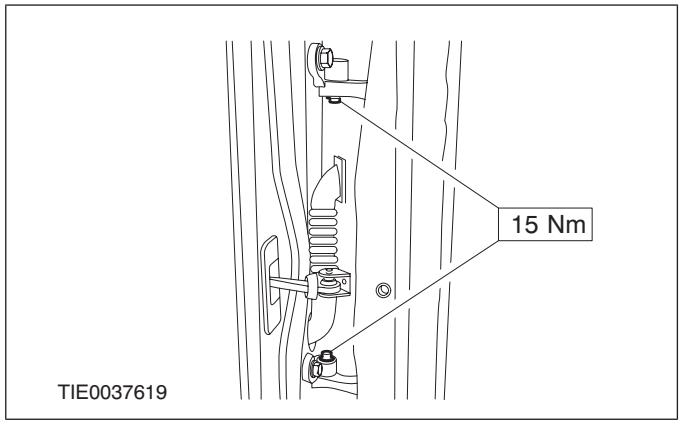
    1. 3.5 mm ± 1.0 mm.
    2. 6.0 mm ± 2.0 mm.
    3. 4.5 mm ± 1.5 mm.



16. **If further adjustment is required repeat the door hinge to A-pillar adjustment.**
17. **If no further adjustment is required, remove the door hinge center retaining bolts.**



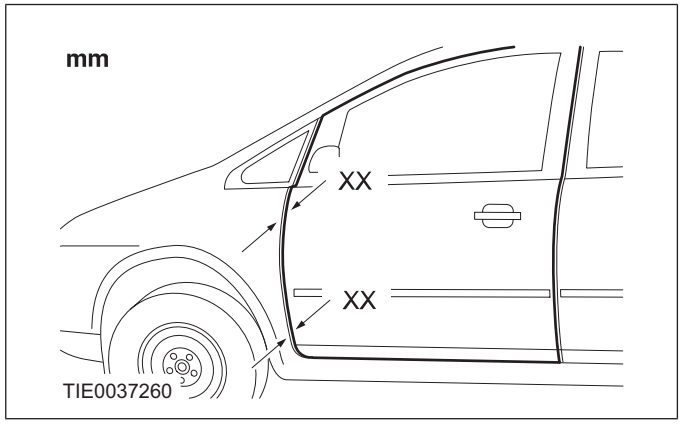
18. **Apply a coating of adhesive to the door hinge center retaining bolts.**
19. **Install the door hinge center retaining bolts.**



20. **Close the door.**
21. **NOTE: Make sure that the door is in the fully closed position.**

    Check and note any misalignment of the door in relation to the fender.

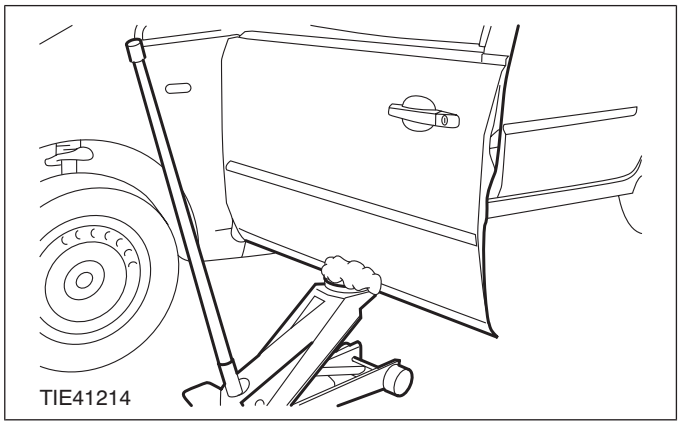
    - XX = -1.0 mm +1.0 mm to -2.0 mm.



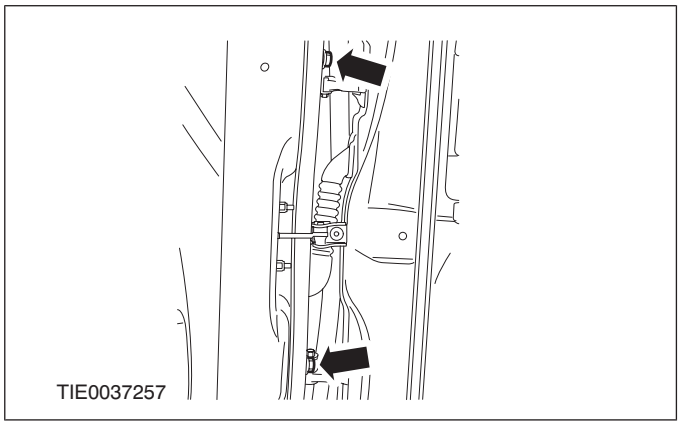
22. **Open the door.**
23. **CAUTION: Protect the door using a soft cloth to prevent damage.**

GENERAL PROCEDURES

With the aid of another technician and a suitable transmission jack, support the door.

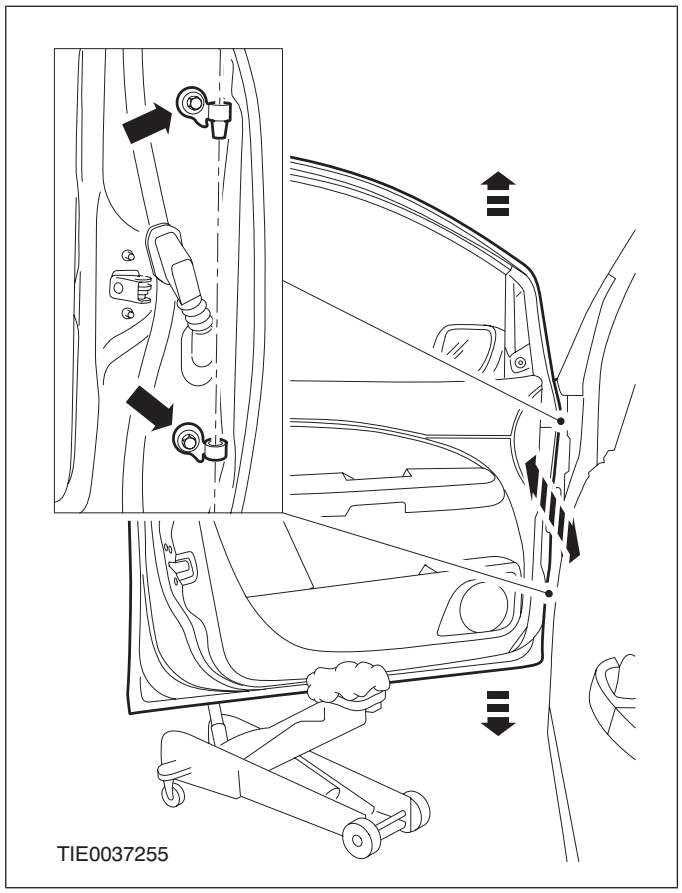


24. Loosen the door hinge to door retaining screws one complete turn.



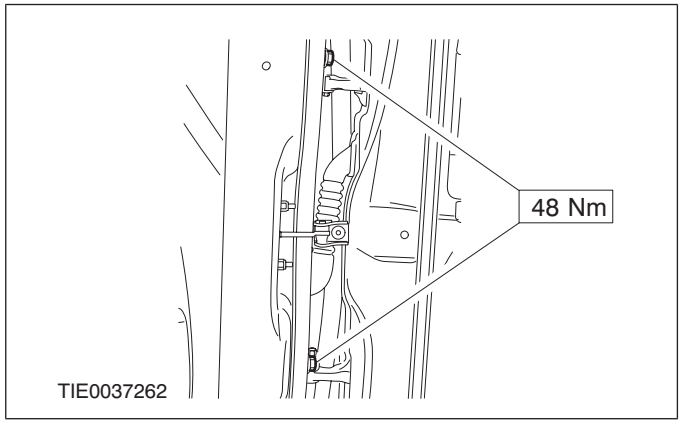
25. CAUTION: Make sure that the door hinge cones are correctly located and have a common pivot center line.

Adjust the door hinges as necessary.



26. CAUTION: Make sure that the door hinge cones are correctly located and have a common pivot center line.

Tighten the door hinge to door retaining screws.



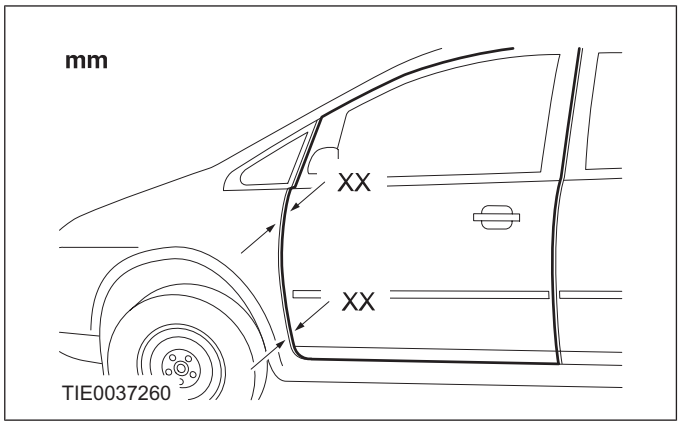
27. Close the door.

28. NOTE: Make sure that the door is in the fully closed position.

Check and note any misalignment of the door in relation to the fender.

GENERAL PROCEDURES

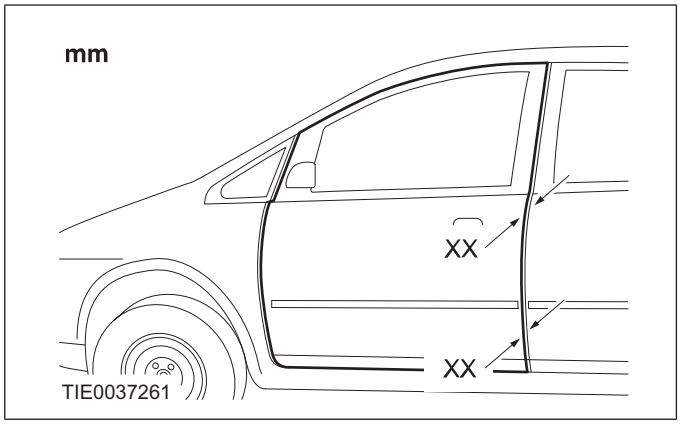
- XX = -1.0 mm +1.0 mm to -2.0 mm.



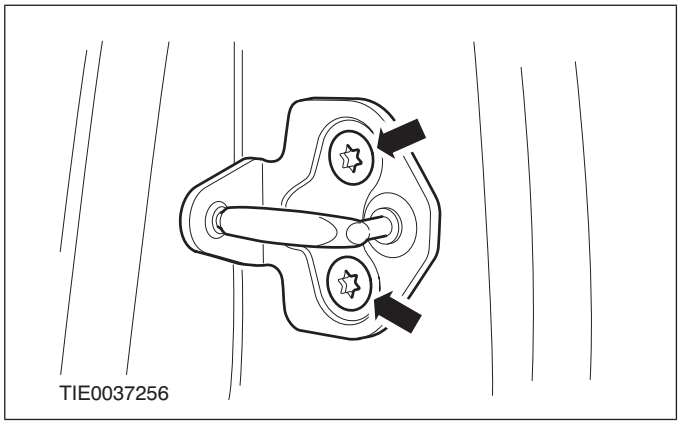
29. If further adjustment is required repeat the door hinge to door adjustment.
30. NOTE: Make sure that the door is in the fully closed position.

    If no further adjustment is required check and note any misalignment of the door in relation to the body side panel.

- XX = 0.0 mm +1.0 mm to -0.0 mm.

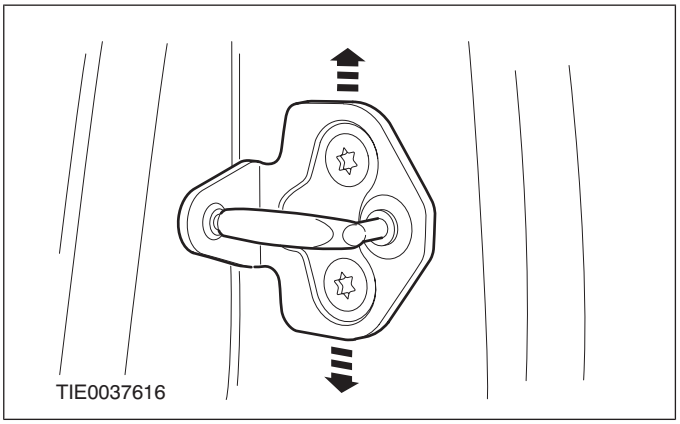


31. Open the door and mark the position of the door latch striker plate, to use as reference points as necessary.
32. Loosen the striker plate retaining screws one half turn.

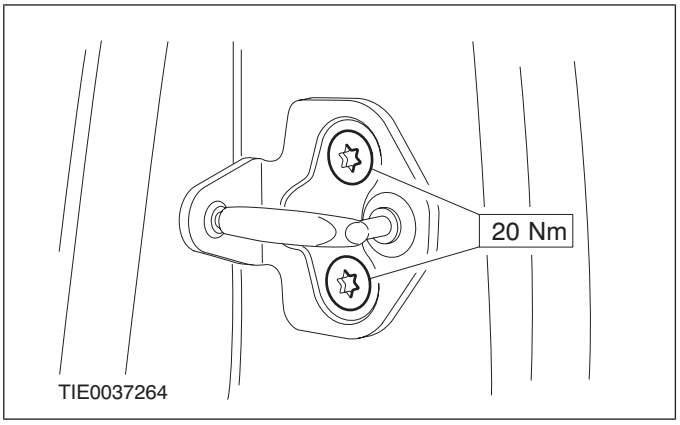


33. CAUTION: Protect the B-pillar using a soft cloth to prevent damage.

    Using a suitable soft faced hammer, adjust the striker plate as necessary.



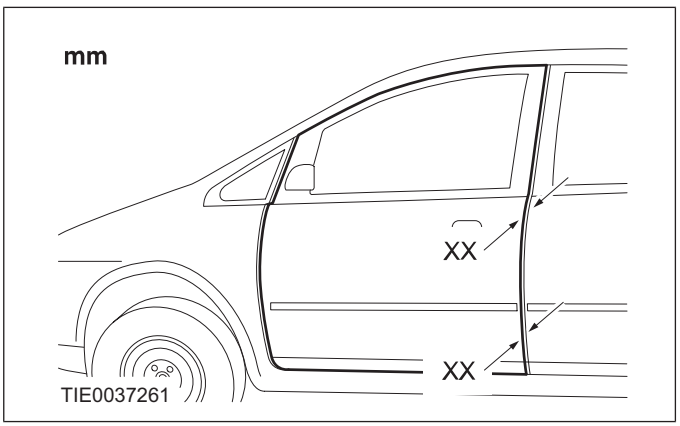
34. Tighten the striker plate retaining screws.



35. Close the door.
36. NOTE: Make sure that the door is in the fully closed position.

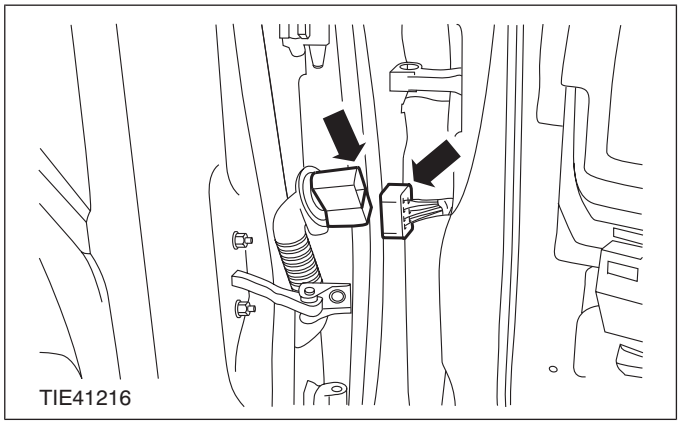
    Check and note any misalignment of the door in relation to the body side panel.

- XX = 0.0 mm +1.0 mm to -0.0 mm.

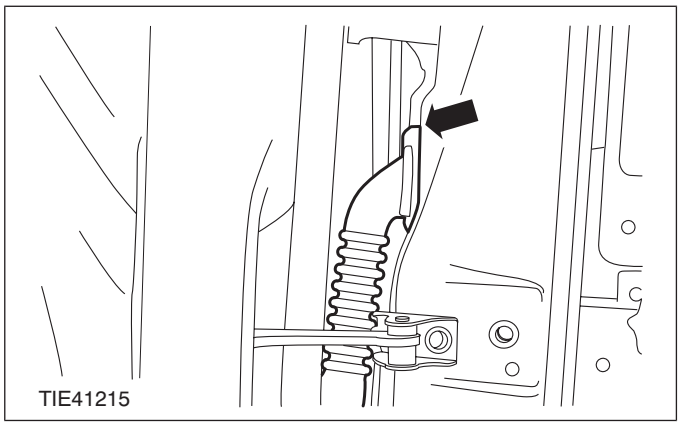


GENERAL PROCEDURES

37. **If further adjustment is required repeat the door latch striker plate to B-pillar adjustment.**
38. **If no further adjustment is required open the door.**
39. **Connect the electrical connector.**



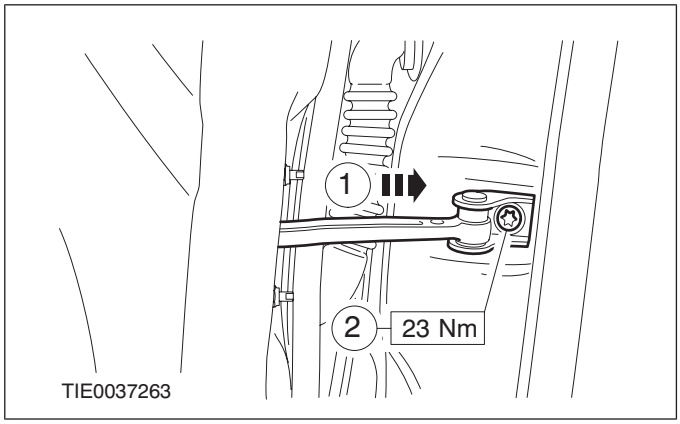
40. **Attach the electrical connector to the A-pillar.**



41. **CAUTION: Make sure that the door check strap is correctly aligned.**

Attach the door check strap to the A-pillar.

1. Pull the check strap to the open position.
2. Install the retaining screw.



GENERAL PROCEDURES

Front Door Alignment — 4-Door/5-Door/Wagon

General Equipment

Transmission jack

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

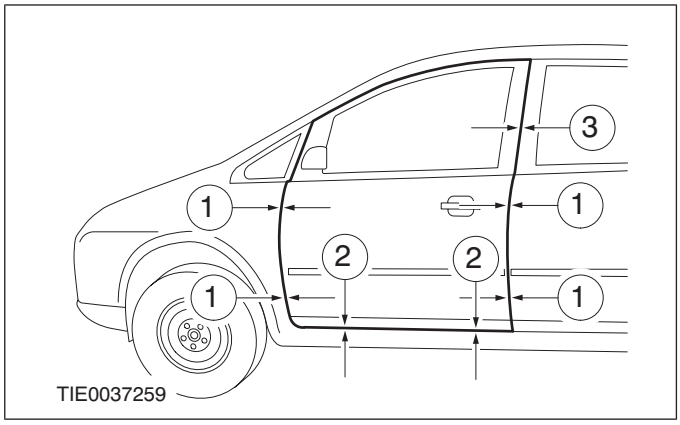
NOTE: The rear door alignment must be carried out before carrying out front door alignment.

For additional information, refer to: Rear Door Alignment (501-03 Body Closures, General Procedures).

1. **NOTE: Make sure that the front and rear doors are in the fully closed position.**

   Check and note any misalignment of the front door in relation to the door frame and the front edge of the rear door.

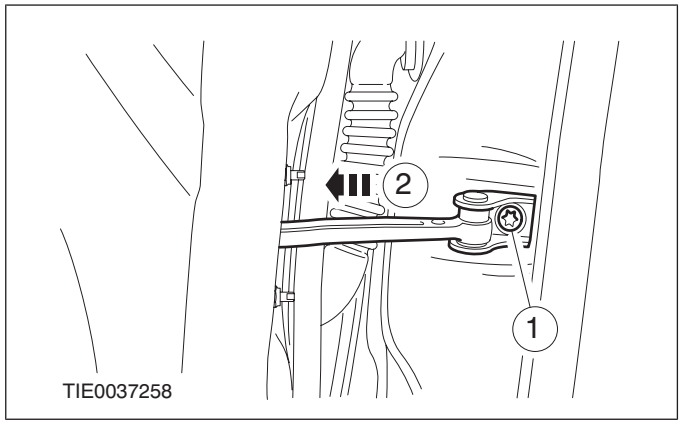
   1. 3.5 mm ± 1.0 mm.
   2. 6.0 mm ± 2.0 mm.
   3. 4.5 mm ± 1.5 mm.



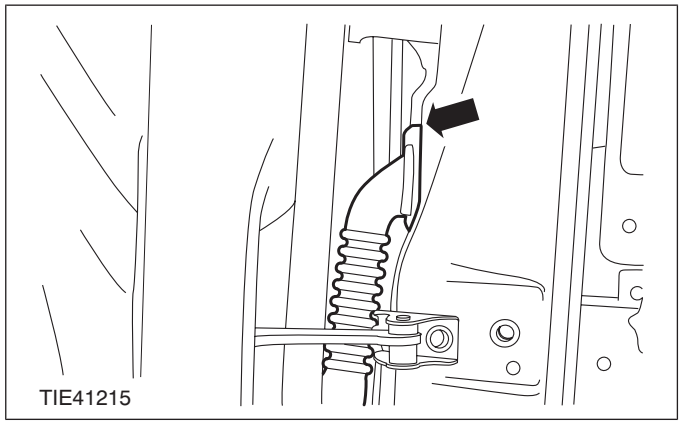
2. **If adjustment is required open the front door and mark the position of the front door hinges, to use as reference points as necessary.**
3. **NOTE: Due to limited access to the front door hinge retaining screws on the A-pillar, the front door must be removed.**

   Detach the door check strap from the A-pillar.

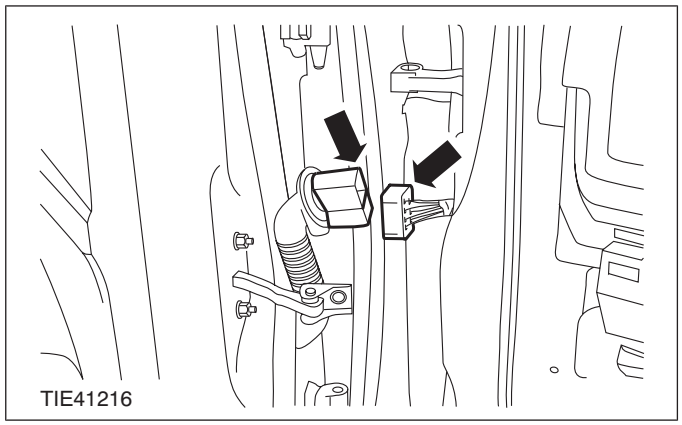
   1. Remove the retaining screw.
   2. Push the check strap to the fully closed position.



4. **Detach the electrical connector from the A-pillar.**



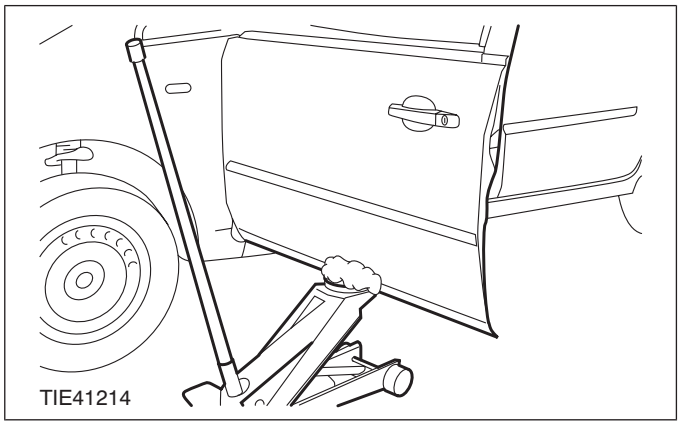
5. **Disconnect the electrical connector.**



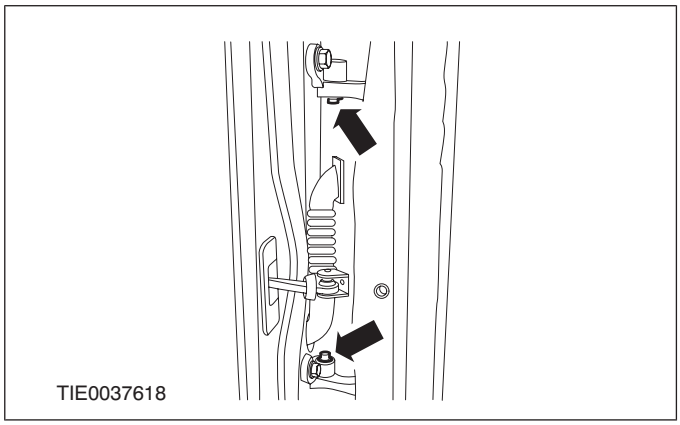
6. **CAUTION: Protect the door using a soft cloth to prevent damage.**

GENERAL PROCEDURES

With the aid of another technician and a suitable transmission jack, support the door.



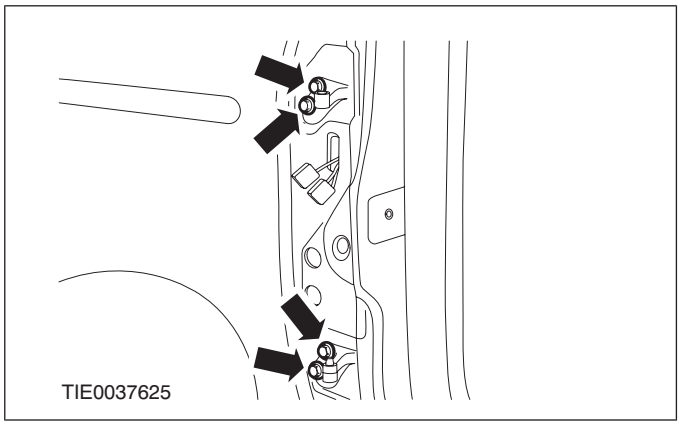
7. **Remove and discard the door hinge center retaining bolts.**



8. **CAUTION: Take care when moving the door upwards as considerable force may be required to separate the door hinges from the door hinge cones.**

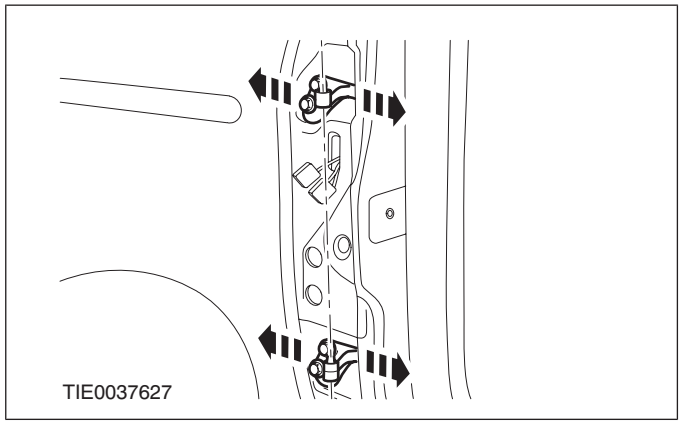
   With the aid of another technician remove the front door.

9. **Loosen the door hinge to A-pillar retaining screws one half turn.**



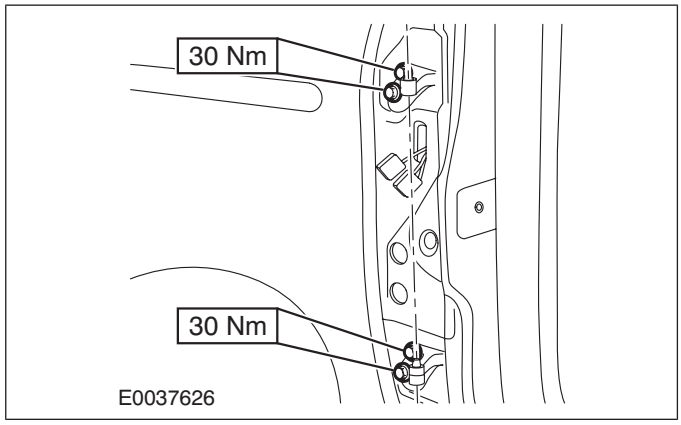
10. **CAUTION: Make sure that the door hinges maintain a common pivot center line.**

    Adjust the door hinges as necessary.



11. **CAUTION: Make sure that the door hinges maintain a common pivot center line.**

    Tighten the door hinge to A-pillar retaining screws.

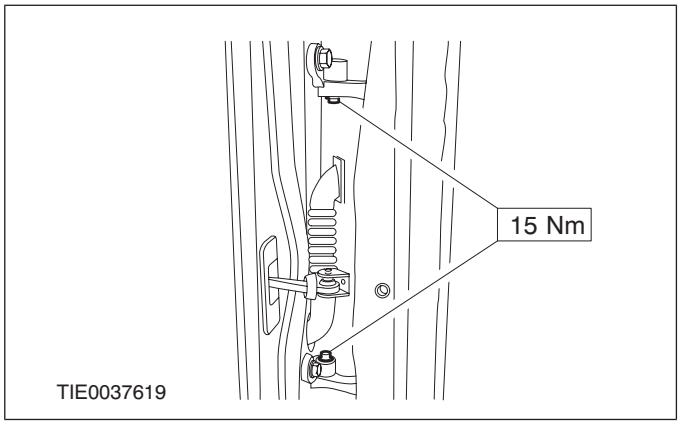


12. **Install the front door.**
    - Make sure that the door hinge cones are correctly located.

13. **NOTE: Do not apply adhesive at this stage.**

GENERAL PROCEDURES

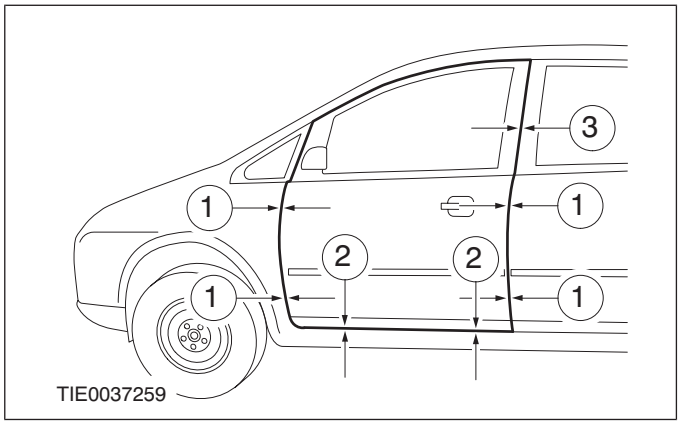
Install new door hinge center retaining bolts.



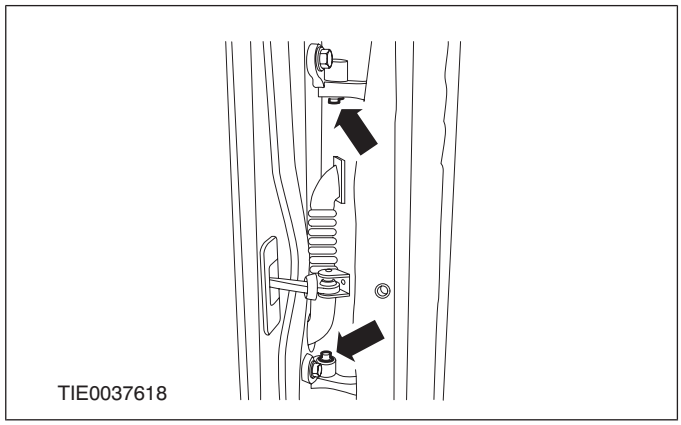
14. **Close the front door.**
15. **NOTE: Make sure that the front and rear doors are in the fully closed position.**

    Check and note any misalignment of the front door in relation to the door frame and the front edge of the rear door.

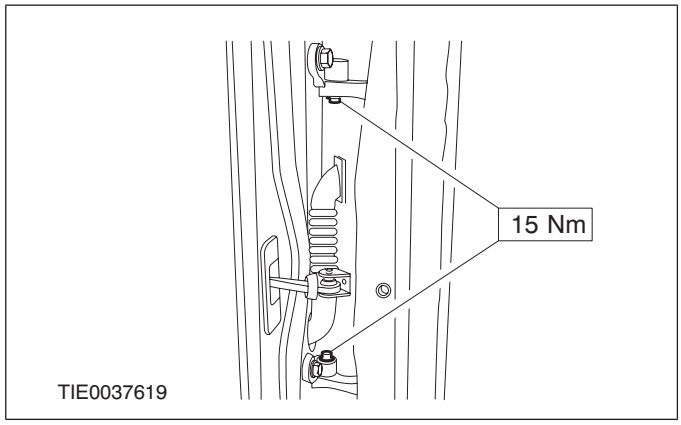
    1. 3.5 mm ± 1.0 mm.
    2. 6.0 mm ± 2.0 mm.
    3. 4.5 mm ± 1.5 mm.



16. **If further adjustment is required repeat the door hinge to A-pillar adjustment.**
17. **If no further adjustment is required, remove the door hinge center retaining bolts.**



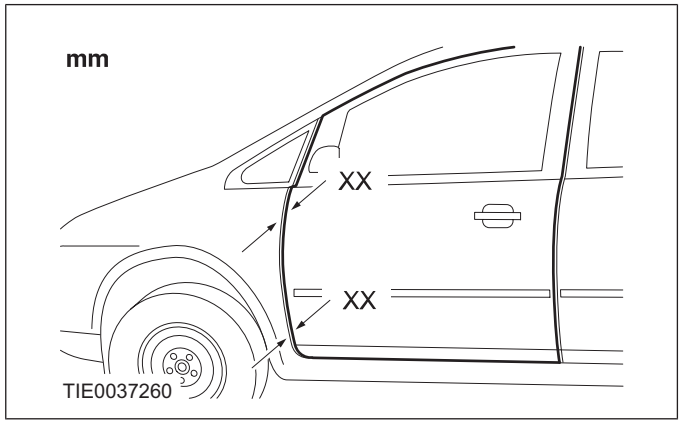
18. **Apply a coating of adhesive to the door hinge center retaining bolts.**
19. **Install the door hinge center retaining bolts.**



20. **Close the front door.**
21. **NOTE: Make sure that the front door is in the fully closed position.**

    Check and note any misalignment of the front door in relation to the fender.

    - XX = -1.0 mm +1.0 mm to -2.0 mm.

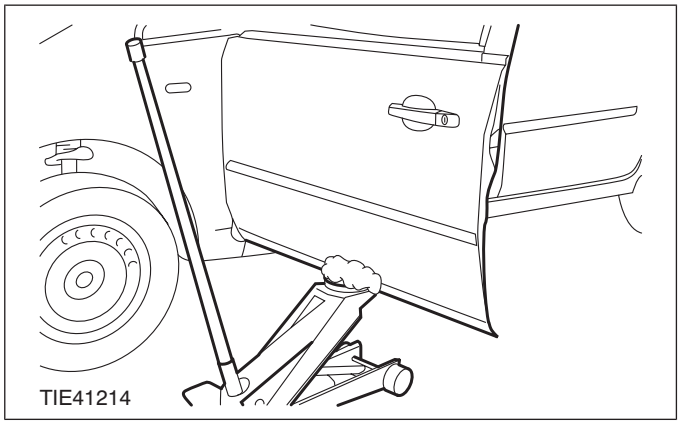


22. **Open the front door.**

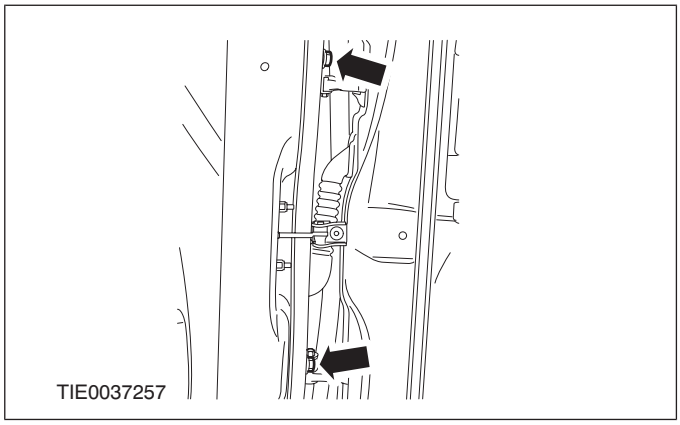
GENERAL PROCEDURES

23. CAUTION: Protect the door using a soft cloth to prevent damage.

With the aid of another technician and a suitable transmission jack, support the door.

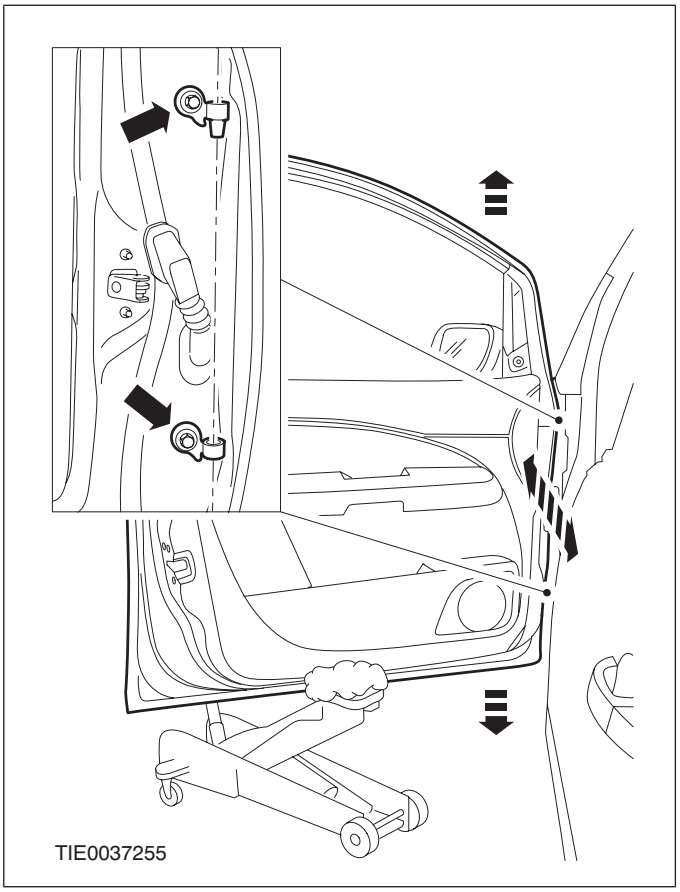


24. Loosen the door hinge to door retaining screws one complete turn.



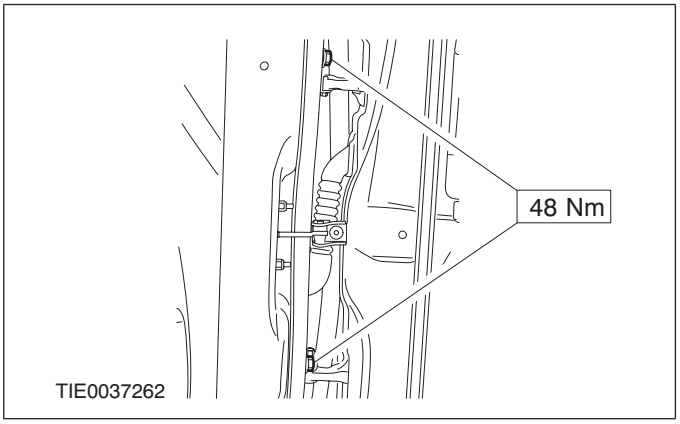
25. CAUTION: Make sure that the door hinge cones are correctly located and have a common pivot center line.

Adjust the door hinges as necessary.



26. CAUTION: Make sure that the door hinge cones are correctly located and have a common pivot center line.

Tighten the door hinge to door retaining screws.



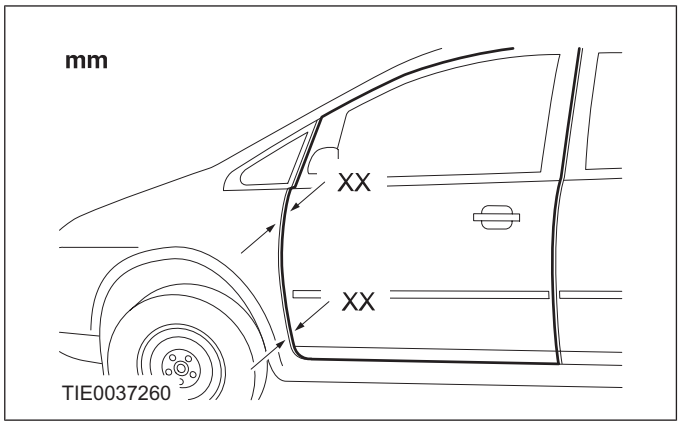
27. Close the front door.

28. NOTE: Make sure that the front door is in the fully closed position.

Check and note any misalignment of the front door in relation to the fender.

GENERAL PROCEDURES

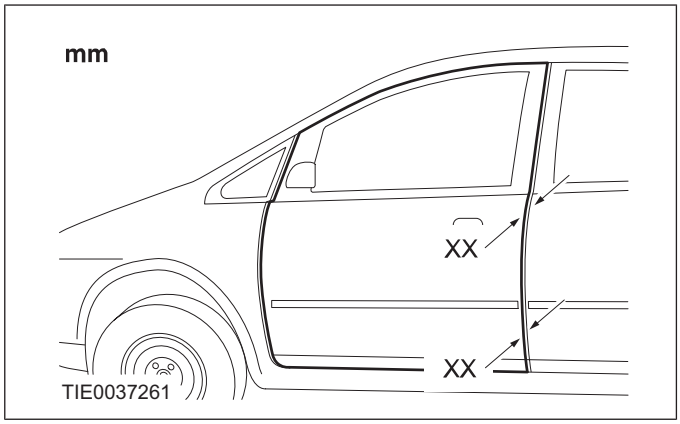
- XX = -1.0 mm +1.0 mm to -2.0 mm.



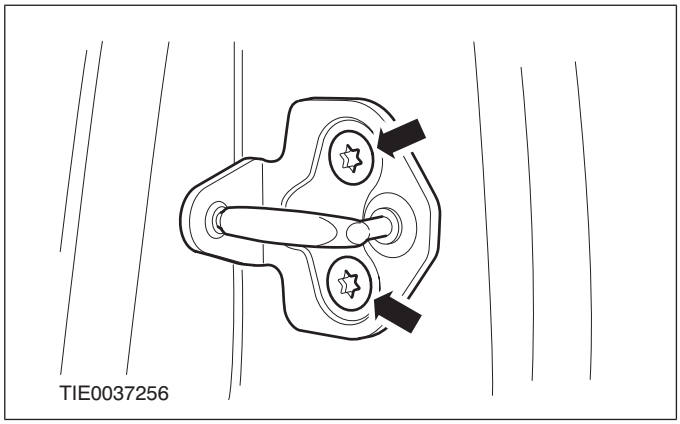
29. If further adjustment is required repeat the door hinge to door adjustment.
30. NOTE: Make sure that the front and rear doors are in the fully closed position.

    If no further adjustment is required check and note any misalignment of the front door in relation to the rear door.

- XX = 0.0 mm +1.0 mm to -0.0 mm.

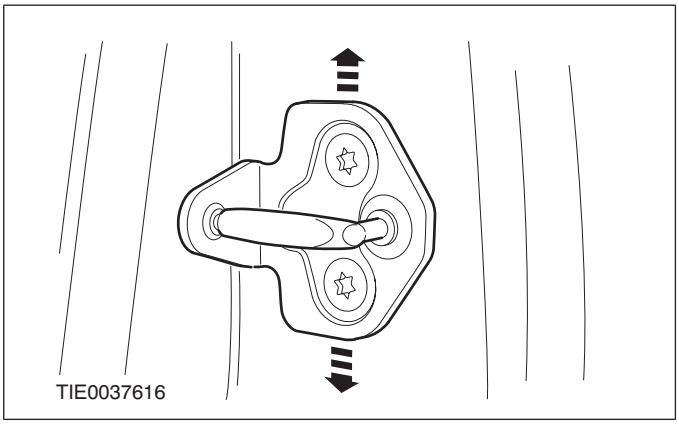


31. Open the front door and mark the position of the front door latch striker plate, to use as reference points as necessary.
32. Loosen the striker plate retaining screws one half turn.

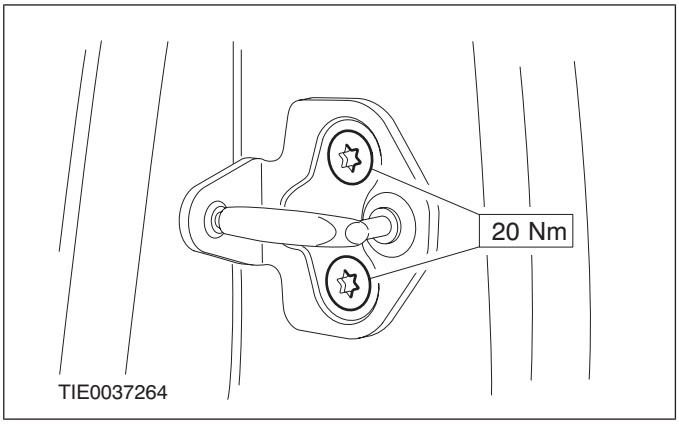


33. CAUTION: Protect the B-pillar using a soft cloth to prevent damage.

    Using a suitable soft faced hammer, adjust the striker plate as necessary.



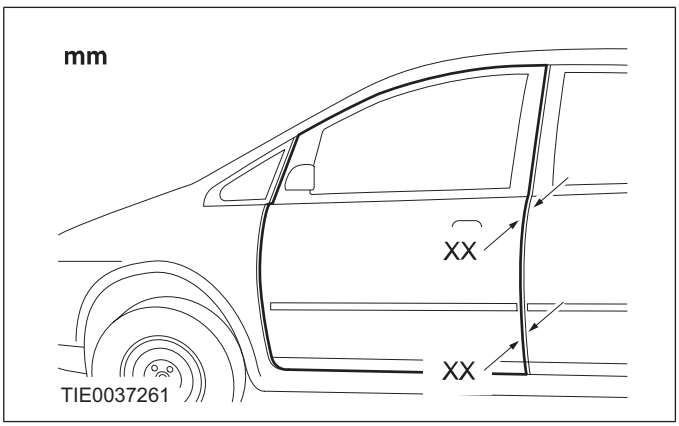
34. Tighten the striker plate retaining screws.



35. Close the front door.
36. NOTE: Make sure that the front and rear doors are in the fully closed position.

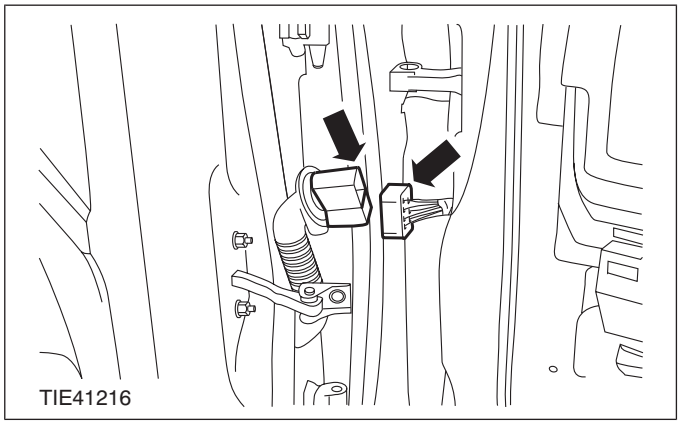
    Check and note any misalignment of the front door in relation to the rear door.

- XX = 0.0 mm +1.0 mm to -0.0 mm.

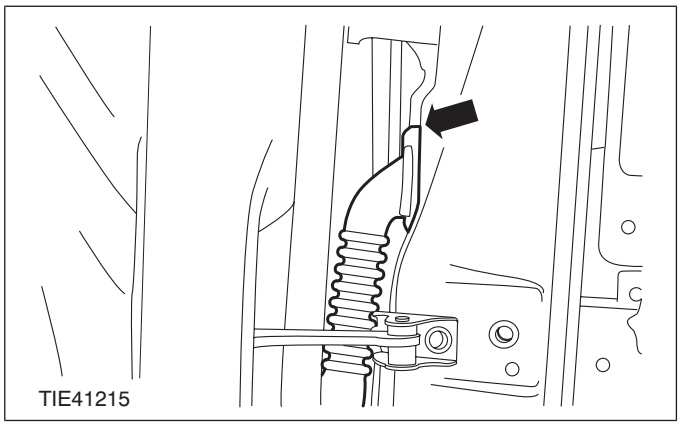


GENERAL PROCEDURES

37. **If further adjustment is required repeat the front door latch striker plate to B-pillar adjustment.**
38. **If no further adjustment is required open the front door.**
39. **Connect the electrical connector.**



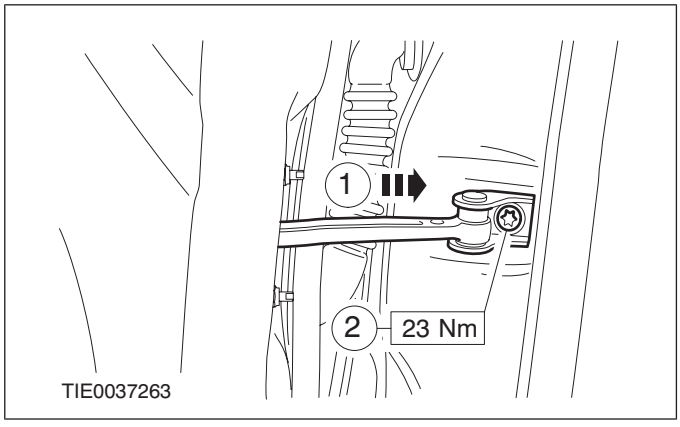
40. **Attach the electrical connector to the A-pillar.**



41. **CAUTION: Make sure that the door check strap is correctly aligned.**

Attach the door check strap to the A-pillar.

1. Pull the check strap to the open position.
2. Install the retaining screw.



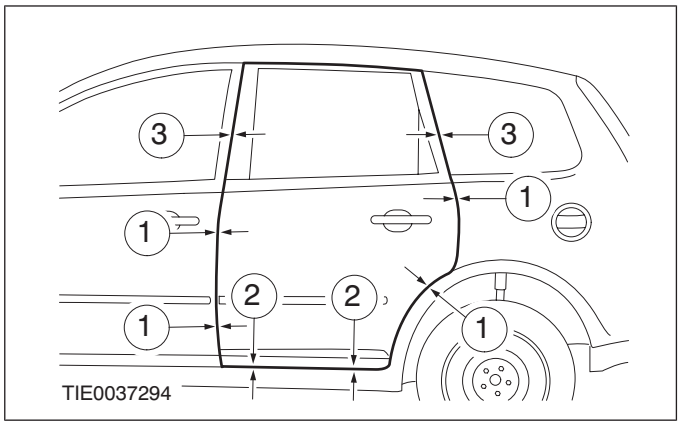
GENERAL PROCEDURES

Rear Door Alignment

1. **NOTE: Make sure that the front and rear doors are in the fully closed position.**

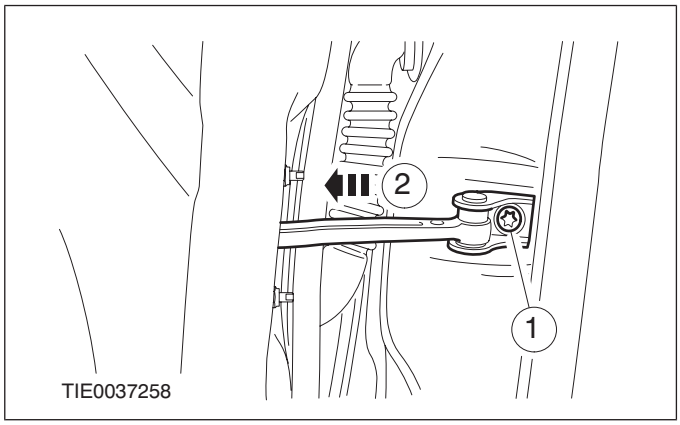
   Check and note any misalignment of the rear door in relation to the door frame and the rear edge of the front door.

   1. 3.5 mm ± 1.0 mm.
   2. 6.0 mm ± 2.0 mm.
   3. 4.5 mm ± 1.5 mm.

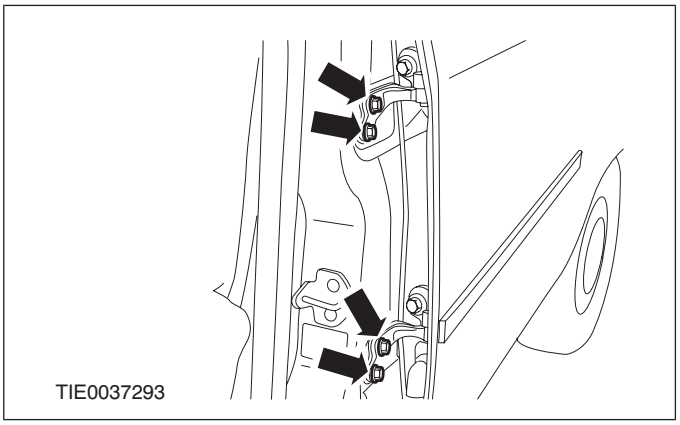


2. **If adjustment is required open the front door and mark the position of the rear door hinges, to use as reference points as necessary.**
3. **Open the rear door.**
4. **Detach the door check strap from the B-pillar.**

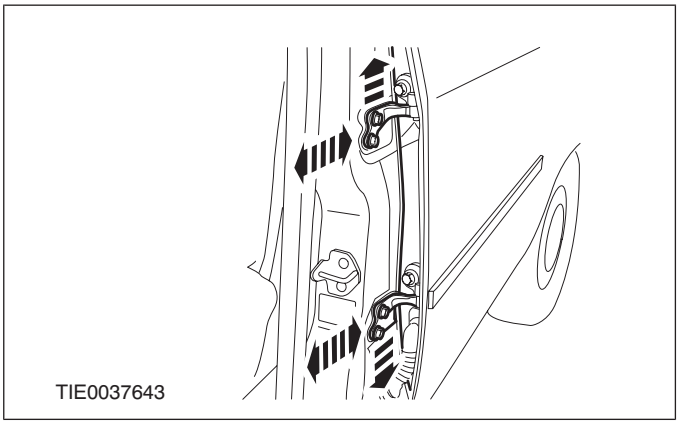
   1. Remove the retaining screw.
   2. Push the check strap to the fully closed position.



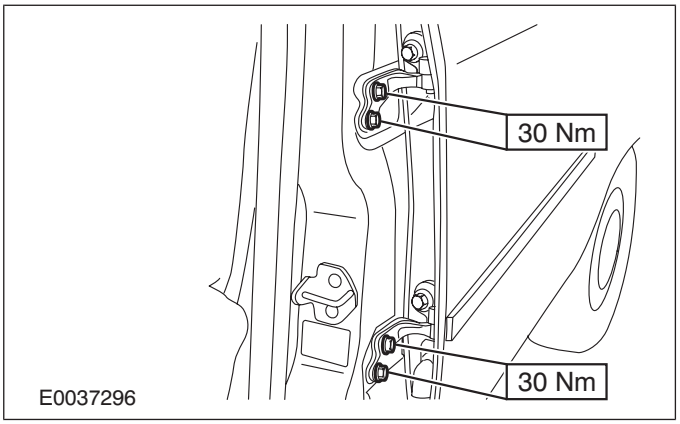
5. **Close the rear door.**
6. **Loosen the door hinge to B-pillar retaining screws one half turn.**



7. **Adjust the door hinges as necessary.**



8. **Tighten the door hinge to B-pillar retaining screws.**

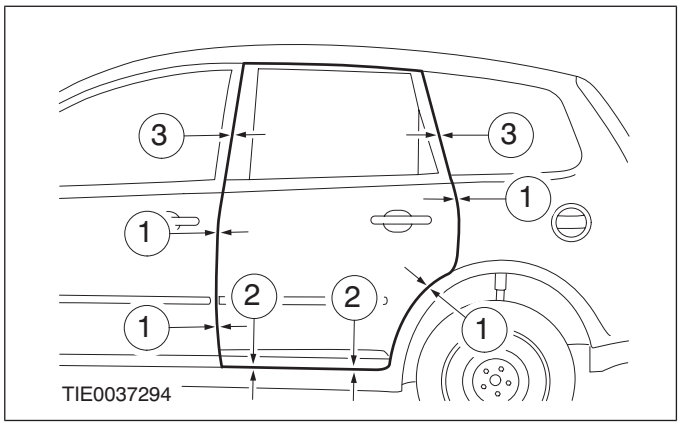


9. **Close the front door.**
10. **NOTE: Make sure that the front and rear doors are in the fully closed position.**

GENERAL PROCEDURES

Check and note any misalignment of the rear door in relation to the door frame and the rear edge of the front door.

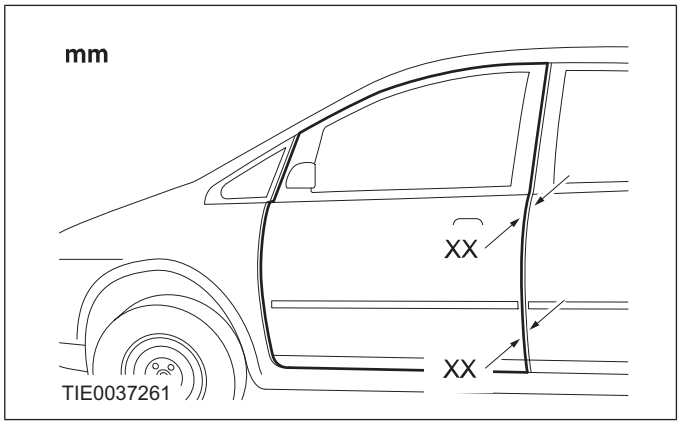
1. 3.5 mm ± 1.0 mm.
2. 6.0 mm ± 2.0 mm.
3. 4.5 mm ± 1.5 mm.



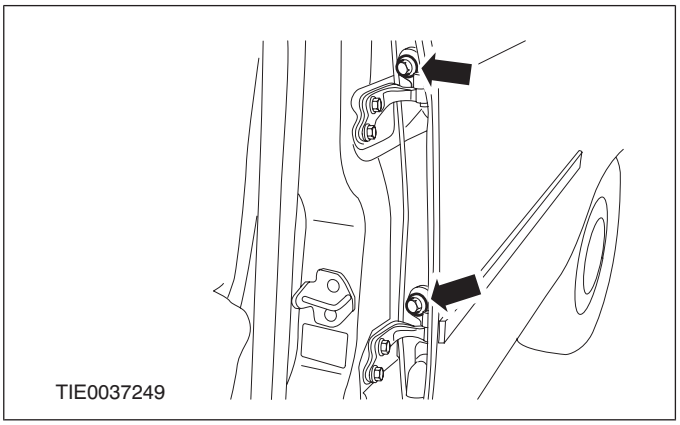
11. **If further adjustment is required repeat the door hinge to B-pillar adjustment.**
12. **NOTE: Make sure that the front and rear doors are in the fully closed position.**

    If no further adjustment is required check and note any misalignment of the rear door in relation to the front door.

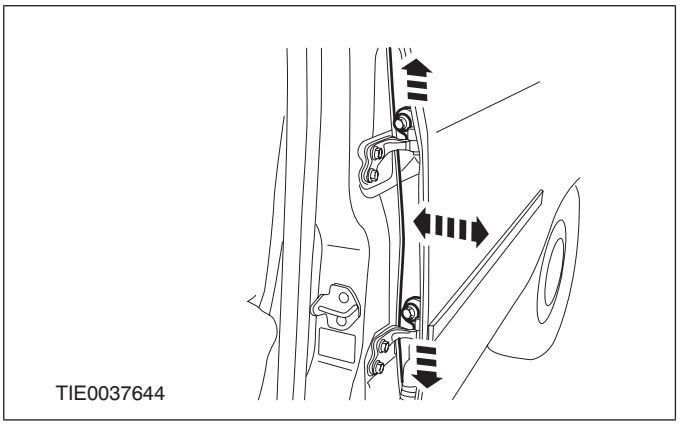
    - XX = 0.0 mm + 0.0 mm to - 1.0 mm.



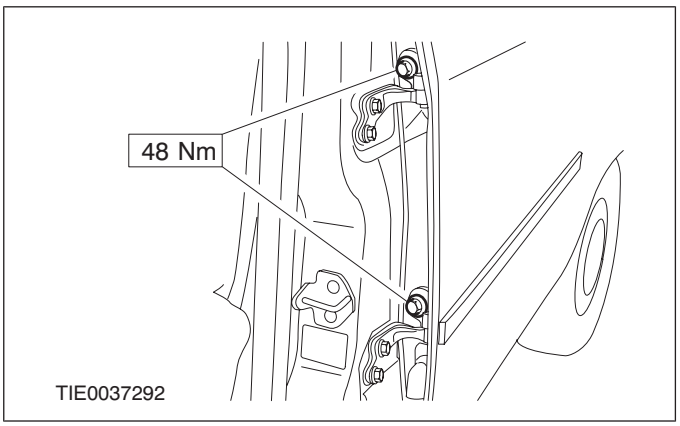
13. **Open the front door.**
14. **Loosen the rear door hinge to door retaining screws one complete turn.**



15. **Adjust the door hinges to door as necessary.**



16. **Tighten the door hinge to door retaining screws.**

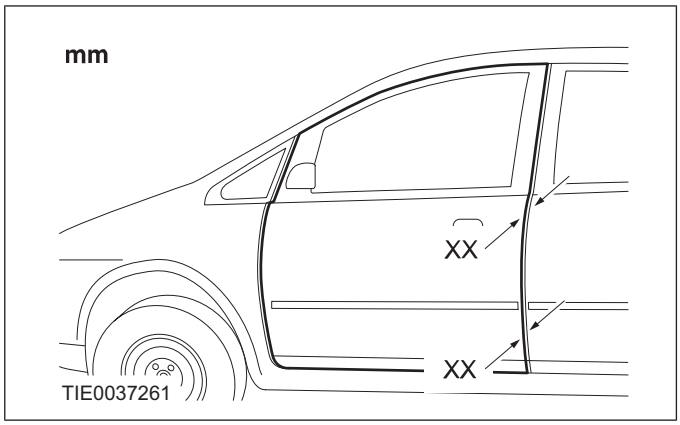


17. **Close the front door.**
18. **NOTE: Make sure that the front and rear doors are in the fully closed position.**

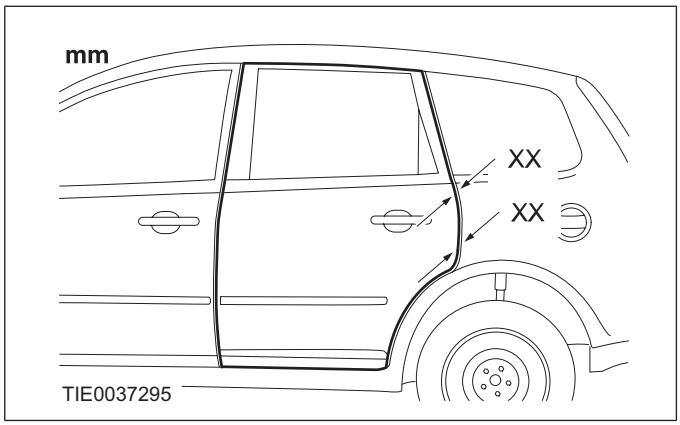
    Check and note any misalignment of the rear door in relation to the front door.

GENERAL PROCEDURES

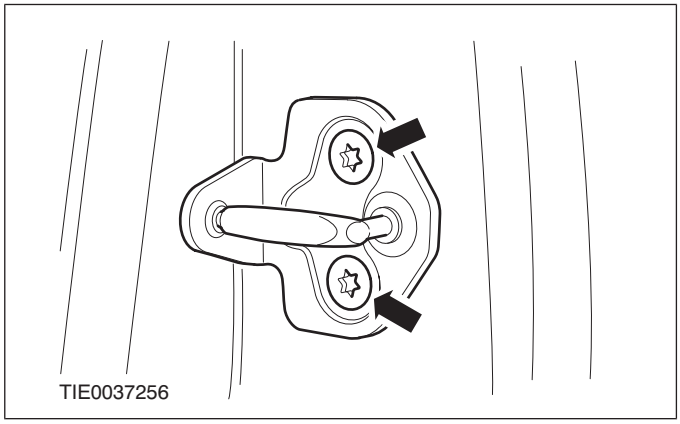
- XX = 0.0 mm + 0.0 mm to - 1.0 mm.



19. If further adjustment is required repeat the door hinge to door adjustment.
20. If no further adjustment is required check and note any misalignment of the rear door in relation to the rear body panel.
    - XX = 0.0 mm +1.0 mm to - 0.0 mm.

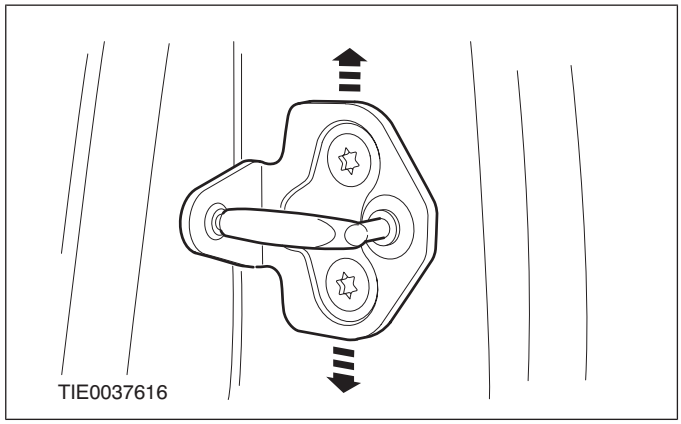


21. Open the rear door and mark the position of the rear door latch striker plate, to use as reference points as necessary.
22. Loosen the striker plate retaining screws one half turn.

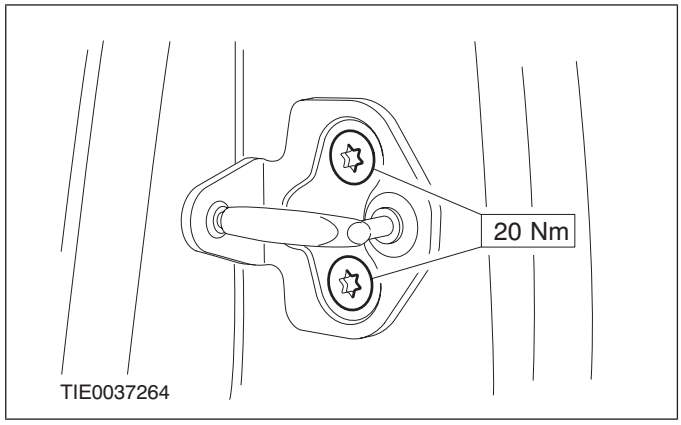


23. **CAUTION: Protect the C-pillar using a soft cloth to prevent damage.**

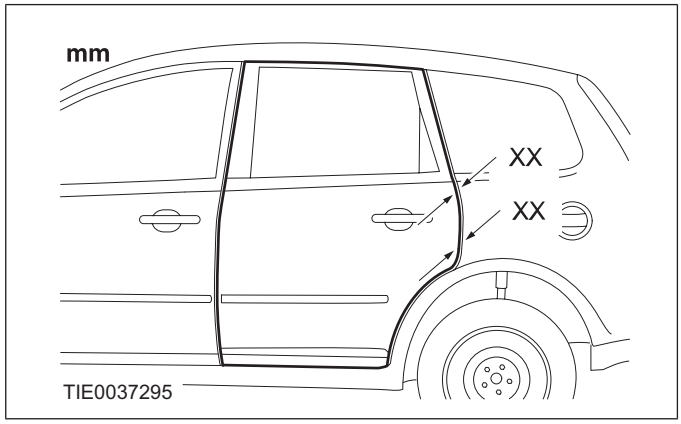
    Using a suitable soft faced hammer, adjust the striker plate as necessary.



24. Tighten the striker plate retaining screws.



25. Close the rear door.
26. Check and note any misalignment of the rear door in relation to the rear body panel.
    - XX = 0.0 mm +1.0 mm to - 0.0 mm.



27. If further adjustment is required repeat the rear door latch striker plate to C-pillar adjustment.

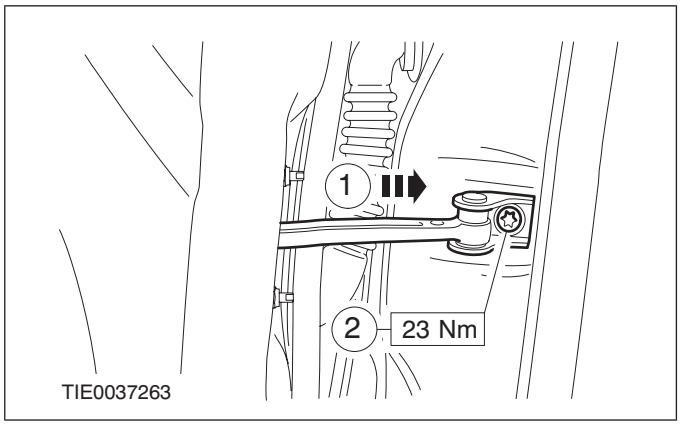
GENERAL PROCEDURES

28. **If no further adjustment is required open the rear door.**

29. **CAUTION: Make sure that the door check strap is correctly aligned.**

Attach the door check strap to the B-pillar.

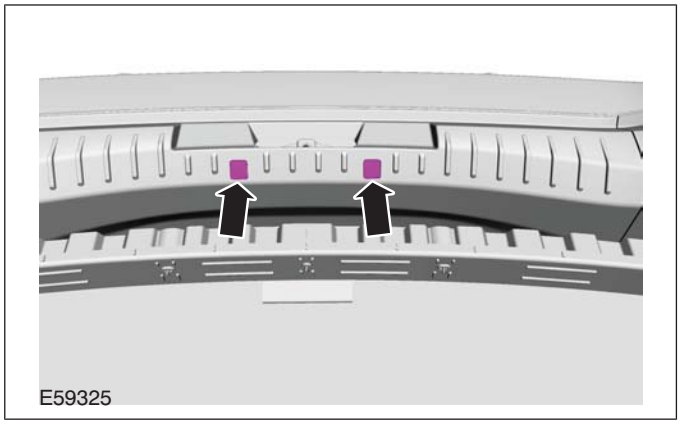
1. Pull the check strap to the open position.
2. Install the retaining screw.



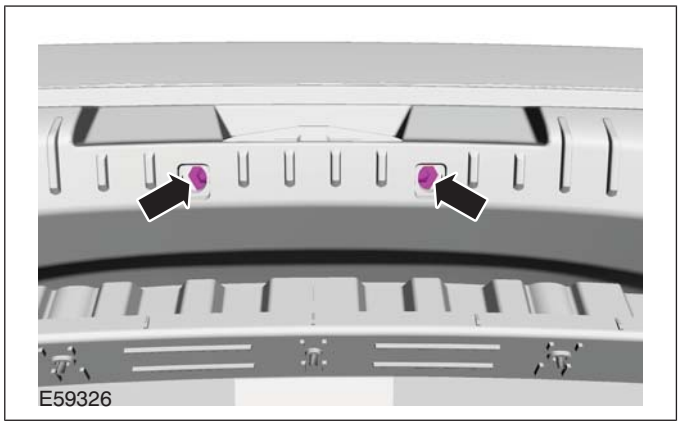
GENERAL PROCEDURES

Luggage Compartment Lid Alignment

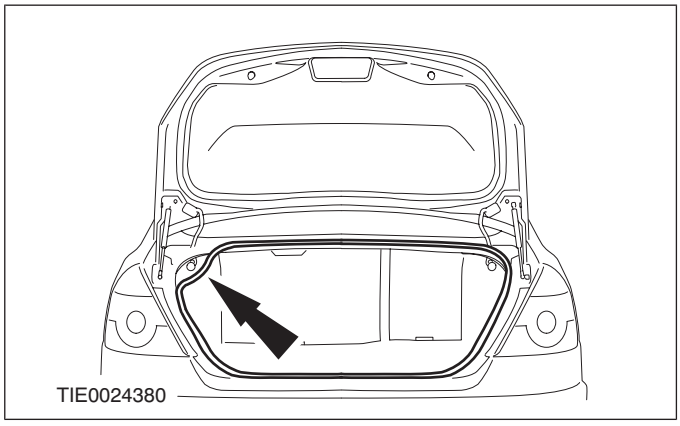
1. Open the luggage compartment lid.
2. Remove the luggage compartment lid striker retaining bolt covers.



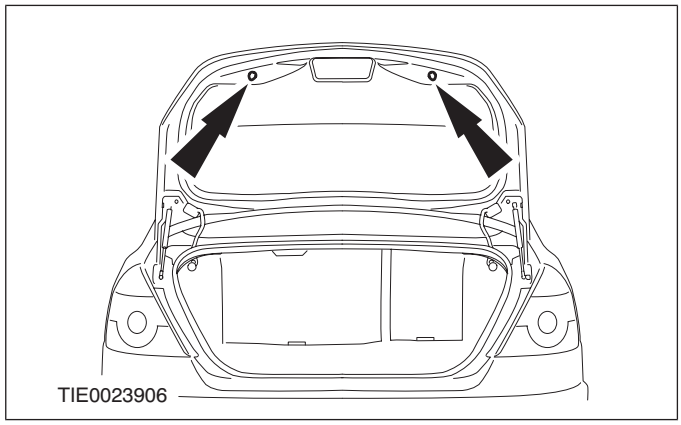
3. Loosen the luggage compartment lid striker retaining bolts.



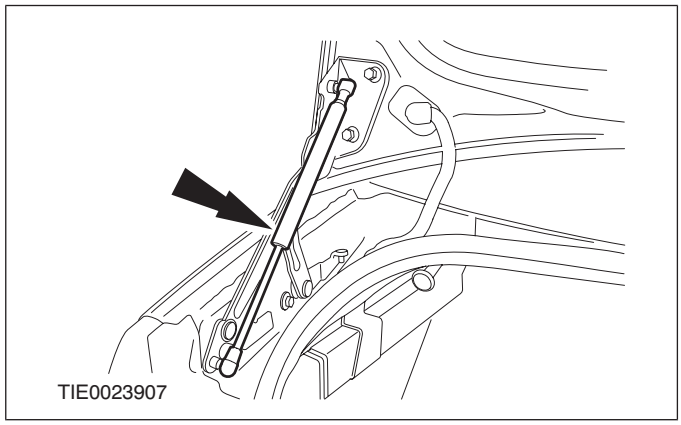
4. Remove the luggage compartment lid weatherstrip.



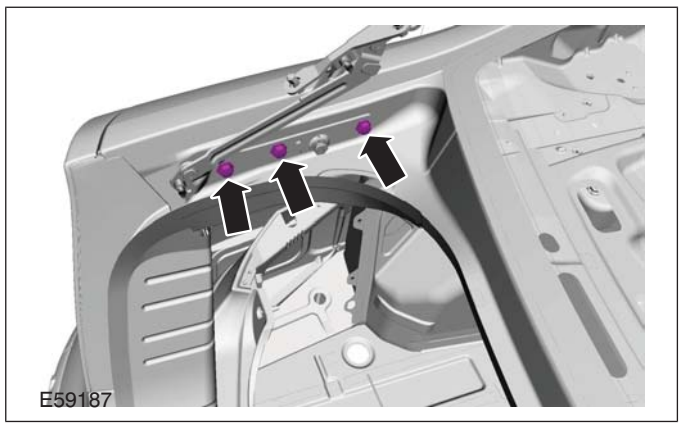
5. Remove the luggage compartment lid bump stops.



6. Support the luggage compartment lid and remove the support strut on both sides.



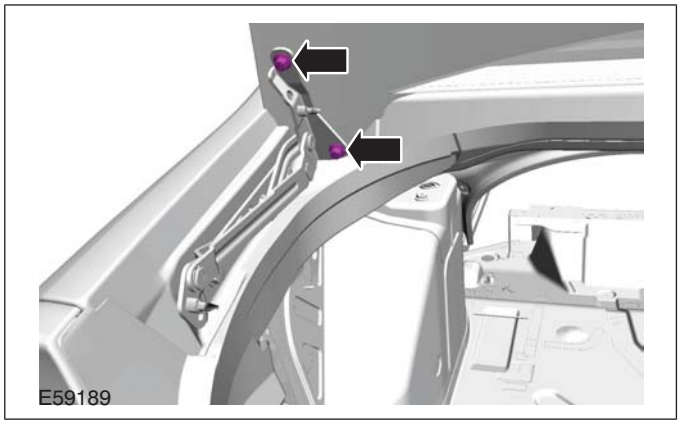
7. Loosen the luggage compartment lid hinge to body retaining bolts 2 complete turns on both sides (luggage compartment lid shown removed for clarity).



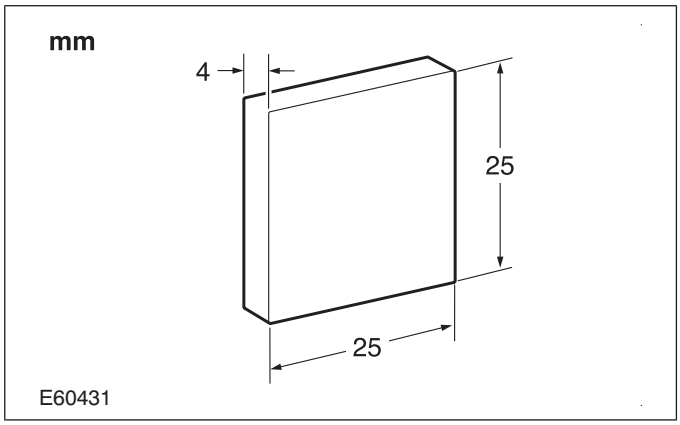
8. ⚠CAUTION: Protect the luggage compartment lid and vehicle body using soft cloth(s) to prevent damage.

GENERAL PROCEDURES

Loosen the luggage compartment lid hinge to luggage compartment lid retaining bolts 2 complete turns on both sides.

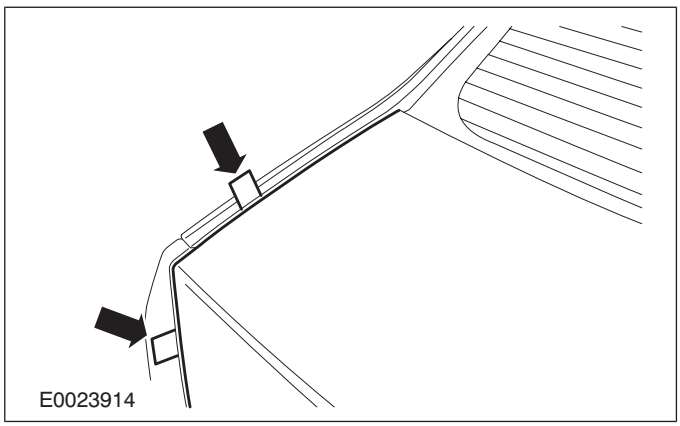


9. Using plastic material, fabricate 4 spacers.



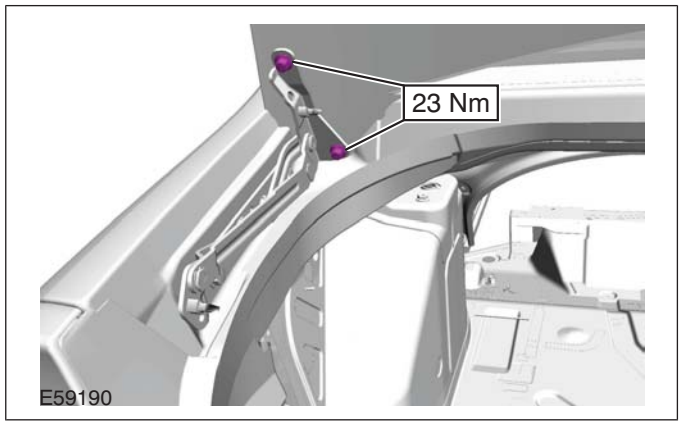
10. NOTE: Make sure that the luggage compartment lid is in the fully closed position.

    Insert the spacers between the outer edges of the luggage compartment lid and the rear quarter panels on both sides.

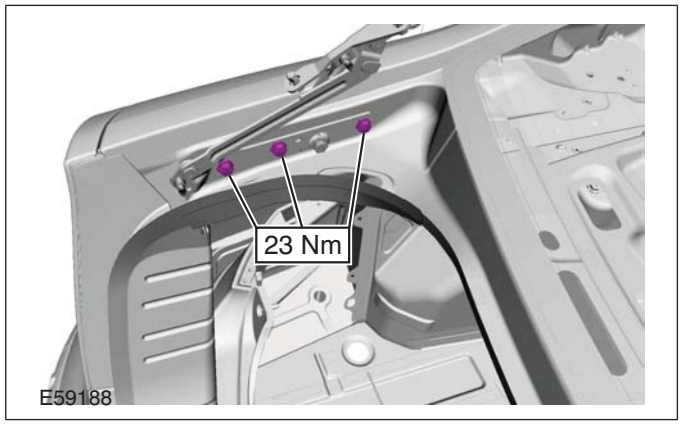


11. Push down in the luggage compartment lid hinge area until the luggage compartment lid is 2 mm below flush with the rear quarter panel on both sides.
12. Remove the spacers.
13. NOTE: Make sure that the luggage compartment lid does not move on the luggage compartment lid hinges.

    Carefully open the luggage compartment lid and tighten the luggage compartment lid hinge to luggage compartment lid retaining bolts on both sides.

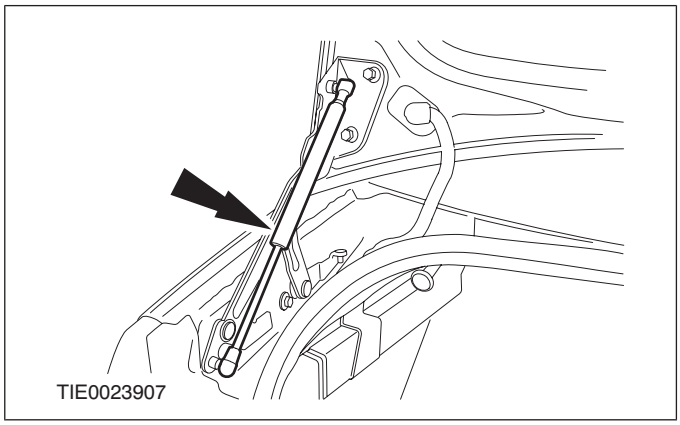


14. Tighten the luggage compartment lid hinge to body retaining bolts on both sides (luggage compartment lid shown removed for clarity).

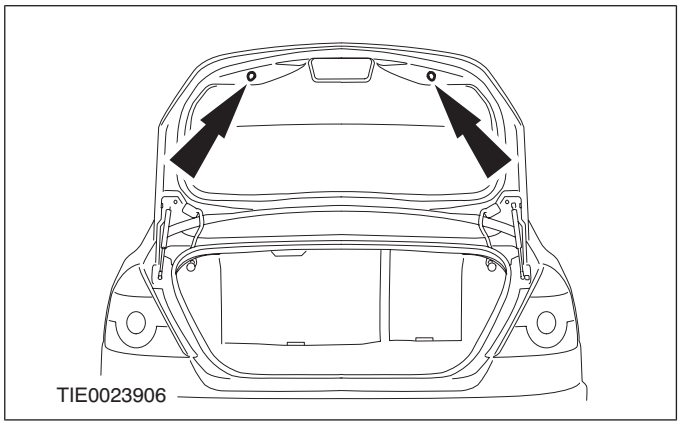


GENERAL PROCEDURES

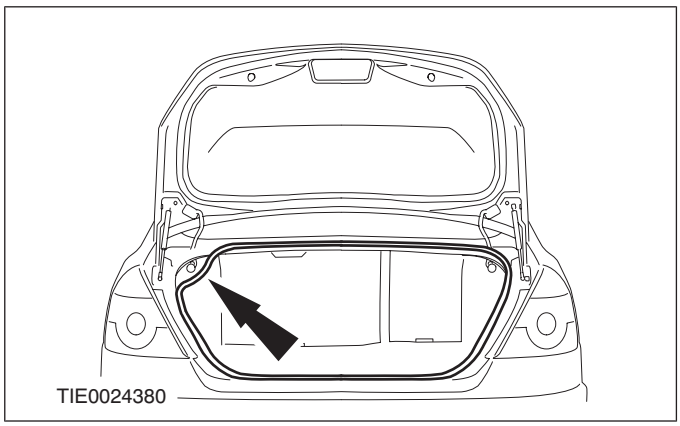
15. Install the luggage compartment lid support strut on both sides.



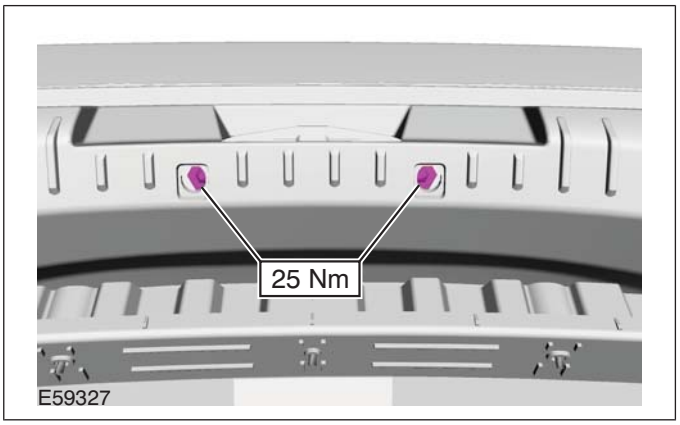
16. Install the luggage compartment lid bump stops.



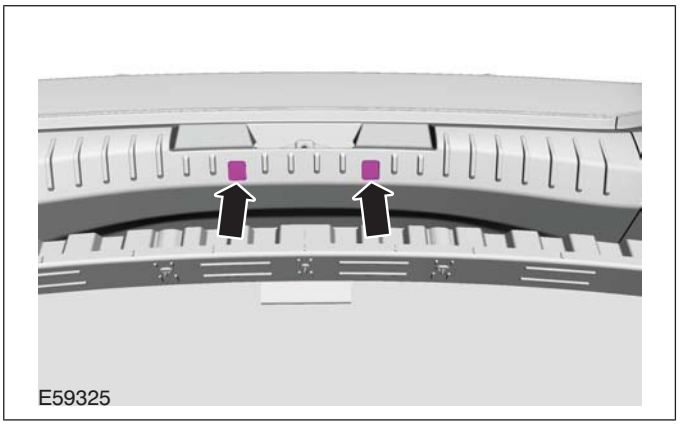
17. Install the luggage compartment lid weatherstrip.



18. Tighten the luggage compartment lid striker retaining bolts.



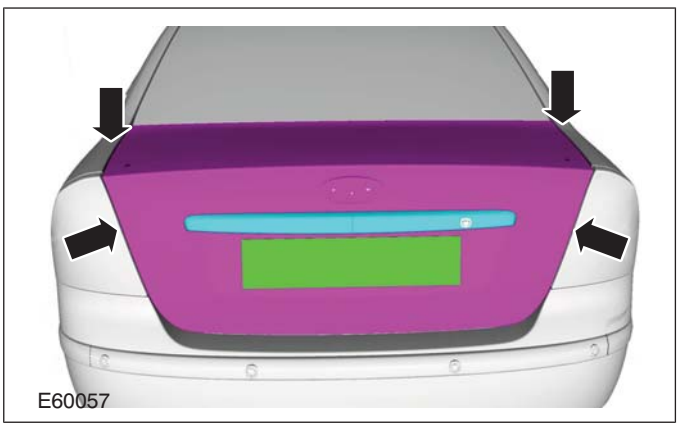
19. Install the luggage compartment lid striker retaining bolt covers.



20. NOTE: Make sure that the luggage compartment lid is in the fully closed position.

    Close the luggage compartment lid.

21. Check that the luggage compartment lid is flush with the rear quarter panel on both sides. Repeat the luggage compartment lid alignment procedure if necessary.



SECTION 501-05 Interior Trim and Ornamentation

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

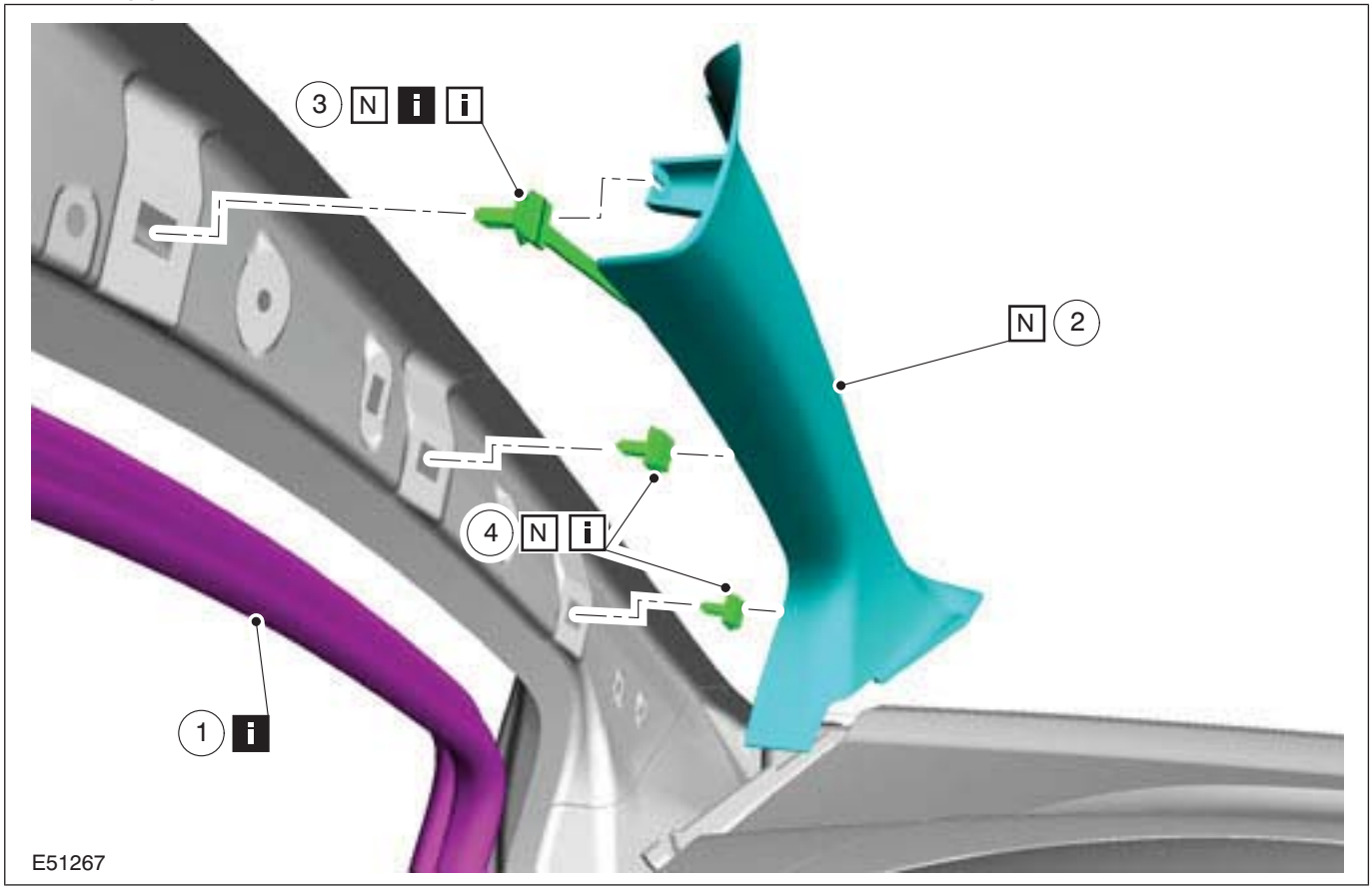
Torque Specifications

Description	Nm	lb-ft	lb-in
Front seat belt lower anchor retaining bolt	38	28	-
Rear seat belt lower anchor retaining bolt	38	28	-
Front door trim panel retaining bolts	8	-	71
Rear door trim panel retaining bolts	8	-	71

REMOVAL AND INSTALLATION

A-Pillar Trim Panel

1. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Front door opening weatherstrip See Removal Detail
2	A-pillar trim panel

Item	Description
3	A-pillar trim panel security strap See Removal Detail See Installation Detail
4	A-pillar trim panel retaining clips See Installation Detail

2. To install, reverse the removal procedure.

Removal Details

Item 1 Front door opening weatherstrip

1. Detach the front door opening weatherstrip.

REMOVAL AND INSTALLATION

Item 3 A-pillar trim panel security strap

1. Remove the security strap from the A-pillar.



Installation Details

Item 3 A-pillar trim panel security strap

1. Install the A-pillar trim panel security strap to the A-pillar.



Item 4 A-pillar trim panel retaining clips

1. Install the A-pillar trim panel retaining clips to the A-pillar trim panel.

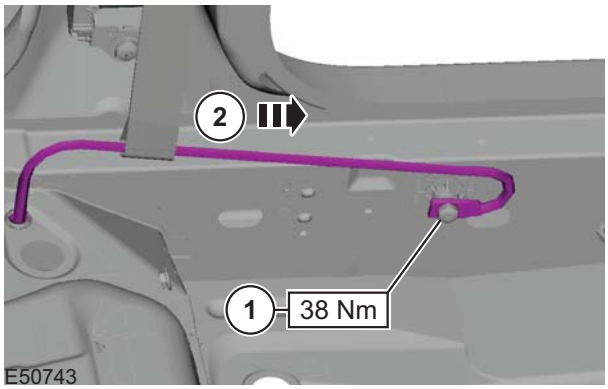
REMOVAL AND INSTALLATION

B-Pillar Trim Panel — 3-Door

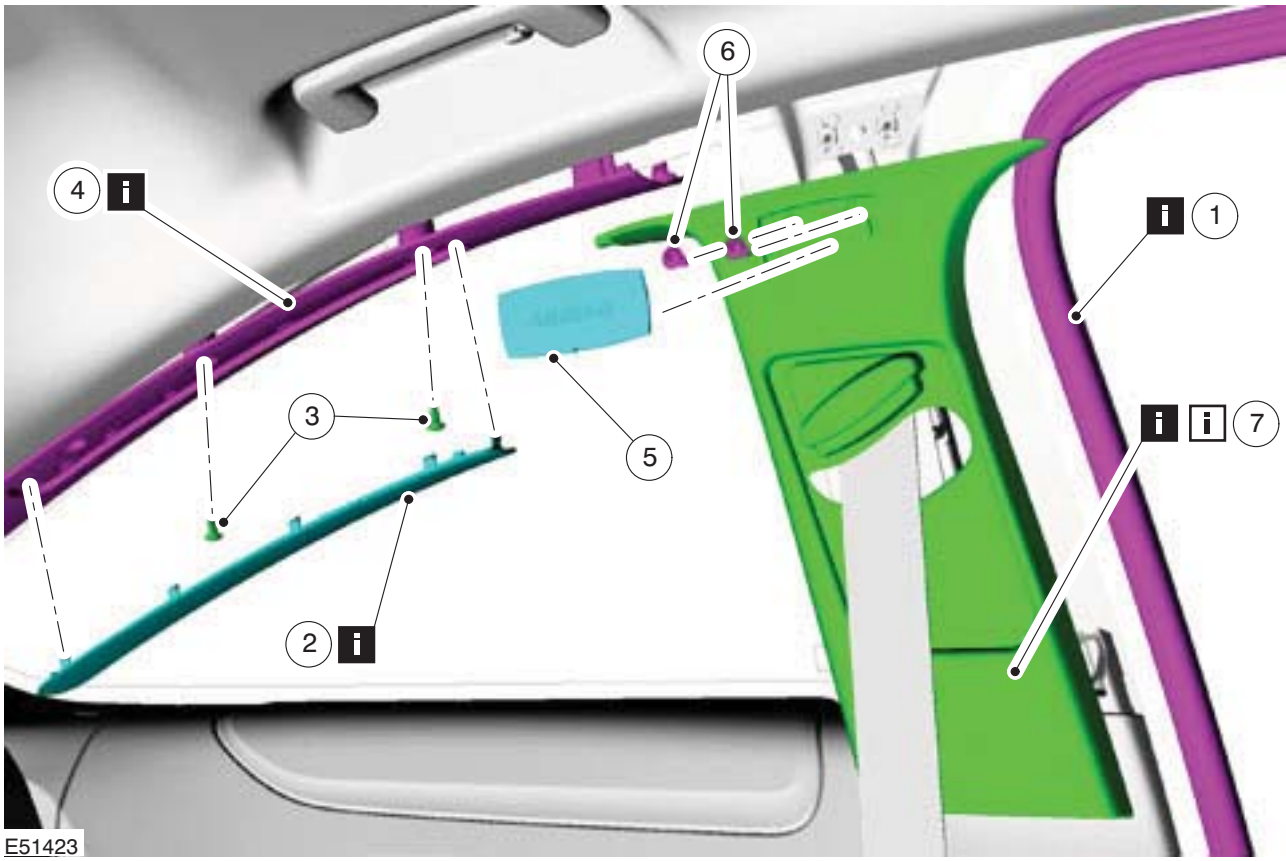
CAUTION: The bolt securing the safety belt anchor is held captive by a metal washer. The bolt, spacer and metal washer must remain on the safety belt anchor at all times when the safety belt is detached or removed.

1. Detach the safety belt lower anchor.

1. Remove the front safety belt lower anchor retaining bolt.
2. Slide the safety belt off the anchor rail.



2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Front door opening weatherstrip See Removal Detail
2	Rear quarter glass trim panel retaining screw trim cover See Removal Detail

Item	Description
3	Rear quarter glass trim panel retaining screws
4	Rear quarter glass trim panel See Removal Detail
5	B-pillar trim panel retaining screw cover

REMOVAL AND INSTALLATION

Item	Description
6	B-pillar trim panel retaining screws
7	B-pillar trim panel

Item	Description
	See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.

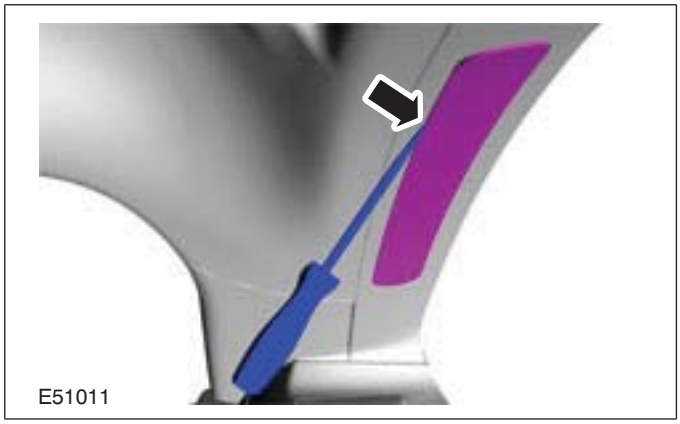
Removal Details

Item 1 Front door opening weatherstrip

1. Detach the front door opening weatherstrip.

Item 2 Rear quarter glass trim panel retaining screw trim cover

1. Using a suitable flat blade screwdriver, lever out the rear quarter glass trim panel retaining screw trim cover.



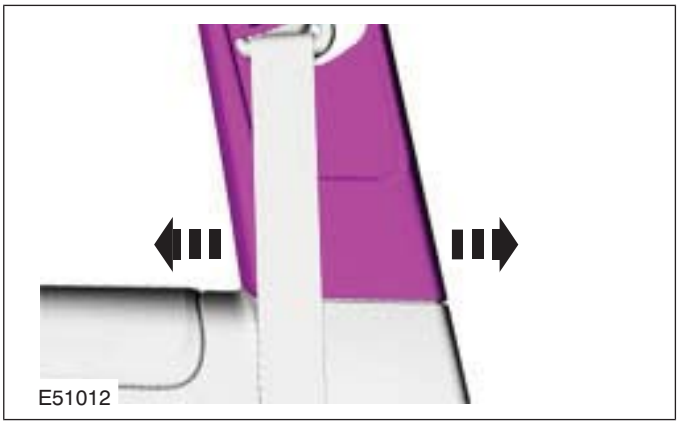
Item 4 Rear quarter glass trim panel

1. Detach the rear quarter glass trim panel.

Item 7 B-pillar trim panel

1. Detach the B-pillar trim panel.

- Feed the safety belt webbing through the B-pillar upper trim panel.



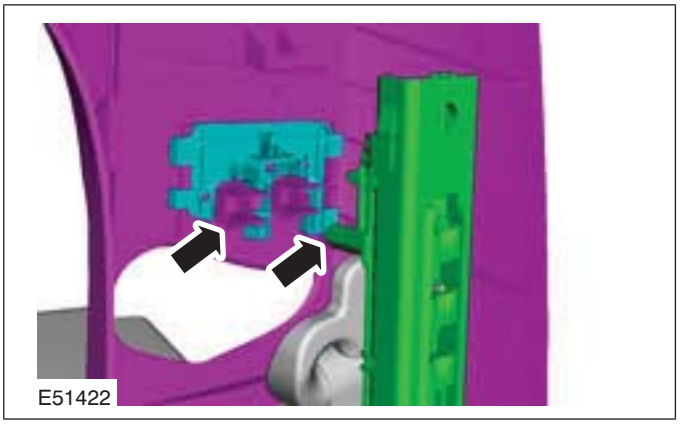
Installation Details

Item 7 B-pillar trim panel

1. Feed the safety belt webbing through the B-pillar upper trim panel before installation.

2. NOTE: Make sure the B-pillar seatbelt height adjustment lever is in alignment with the seatbelt height adjustment mechanism.

Install the B-pillar trim panel.



REMOVAL AND INSTALLATION

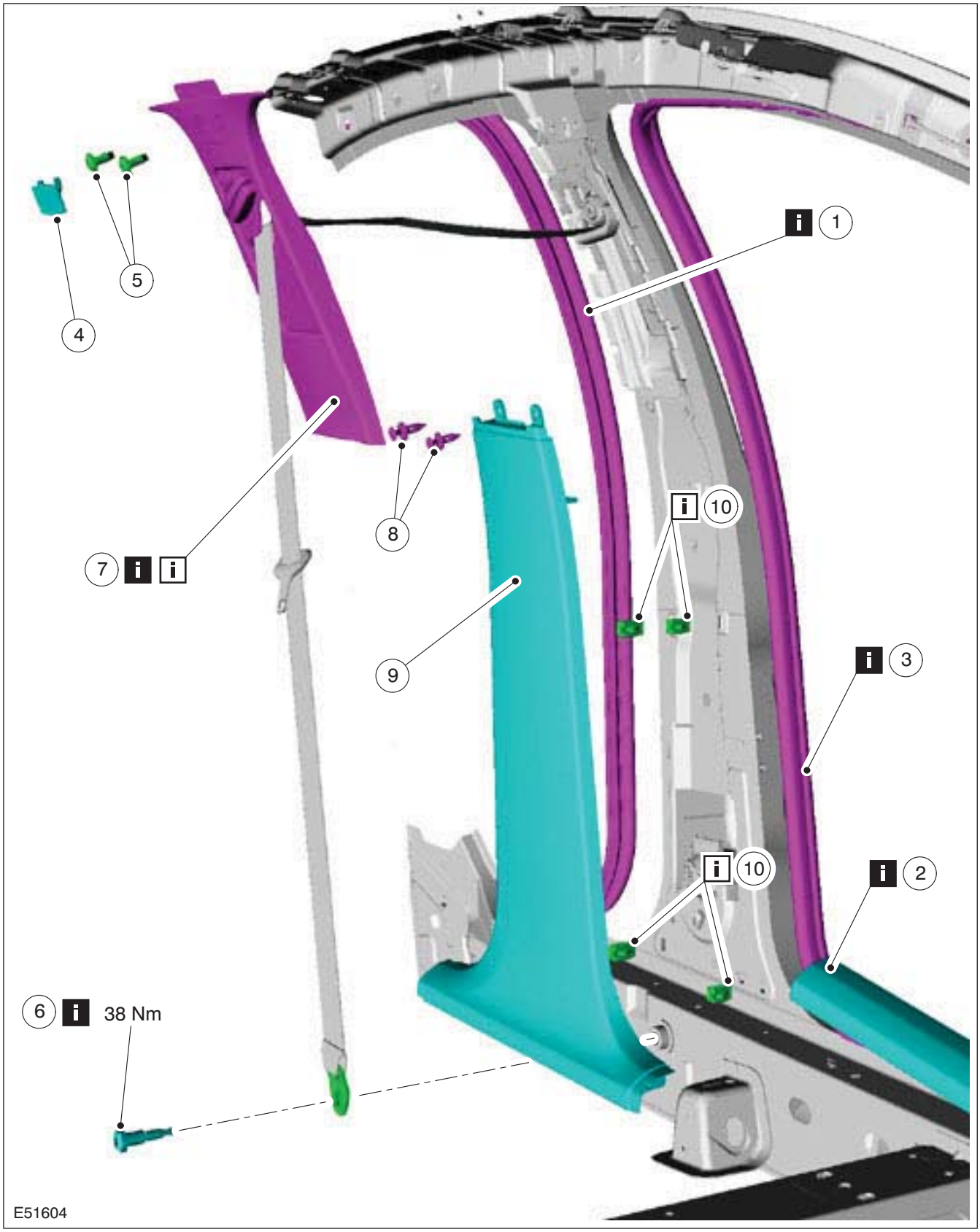
B-Pillar Trim Panel — 4-Door/5-Door

1. Remove the Rear Scuff Plate Trim Panel.

   For additional information, refer to: Rear Scuff Plate Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Remove the components in the order indicated in the following illustration(s) and table(s).

REMOVAL AND INSTALLATION



REMOVAL AND INSTALLATION

Item	Description
1	Rear door opening weatherstrip See Removal Detail
2	Front Scuff Plate Trim Panel See Removal Detail
3	Front door opening weatherstrip See Removal Detail
4	B-pillar upper trim panel retaining screws cover
5	B-pillar upper trim panel retaining screws

Item	Description
6	Front safety belt lower anchor See Removal Detail See Installation Detail
7	Upper B-pillar trim panel See Removal Detail See Installation Detail
8	Lower B-pillar trim panel retaining clips
9	Lower B-pillar trim panel
10	lower B-pillar trim panel retaining clips See Installation Detail

3. To install, reverse the removal procedure.

Removal Details

Item 1 Rear door opening weatherstrip

1. Detach the rear door opening weatherstrip.

Item 2 Front Scuff Plate Trim Panel

1. Detach the front scuff plate trim panel.

Item 3 Front door opening weatherstrip

1. Detach the front door opening weatherstrip.

Item 6 Front safety belt lower anchor

CAUTION: The bolt securing the safety belt anchor is held captive by a metal washer.

The bolt, spacer and metal washer must remain on the safety belt anchor at all times when the safety belt is detached or removed.

Item 7 Upper B-pillar trim panel

1. Remove the upper B-pillar trim panel.

- Feed the safety belt webbing through the B-pillar upper trim panel.

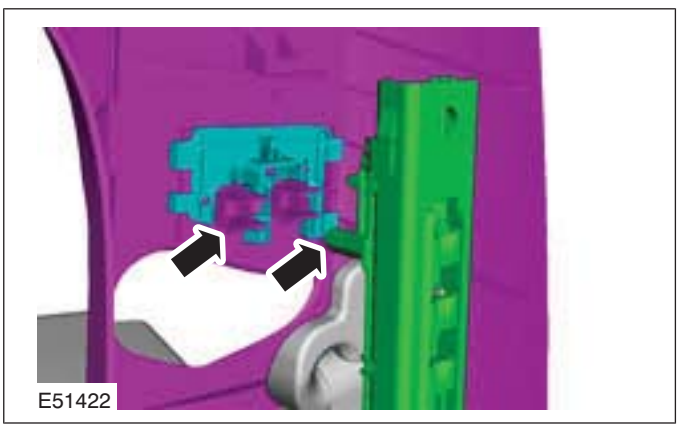
Installation Details

Item 7 Upper B-pillar trim panel

1. Feed the safety belt webbing through the upper B-pillar trim panel before installation.

2. NOTE: Make sure the B-pillar safety belt height adjustment lever is in alignment with the safety belt height adjustment mechanism.

Install the B-pillar trim panel.



REMOVAL AND INSTALLATION

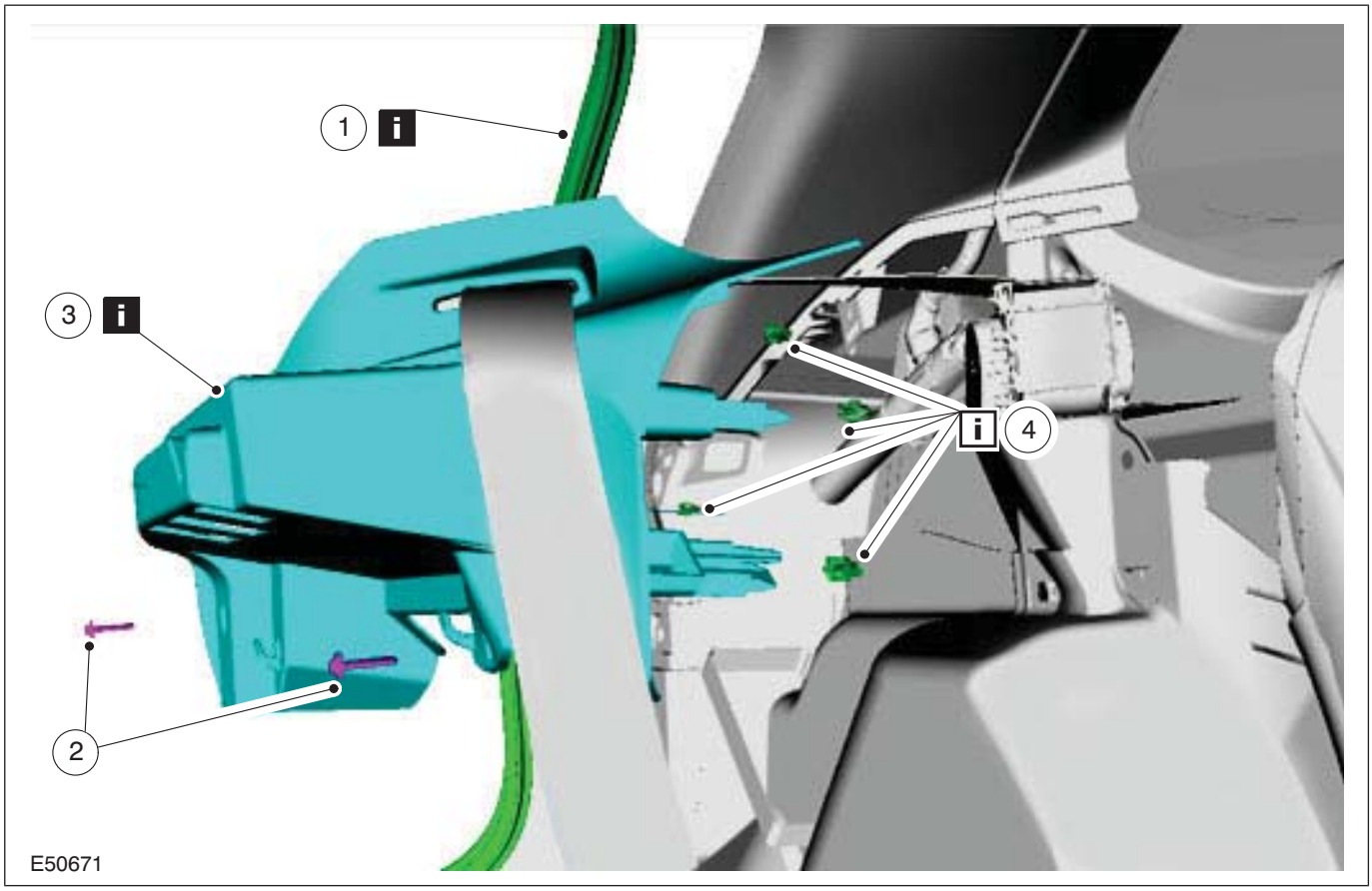
Item 10 lower B-pillar trim panel retaining clips

1. Install the lower B-pillar trim panel retaining clips to the lower B-pillar trim panel before installation.

REMOVAL AND INSTALLATION

C-Pillar Trim Panel — 3-Door

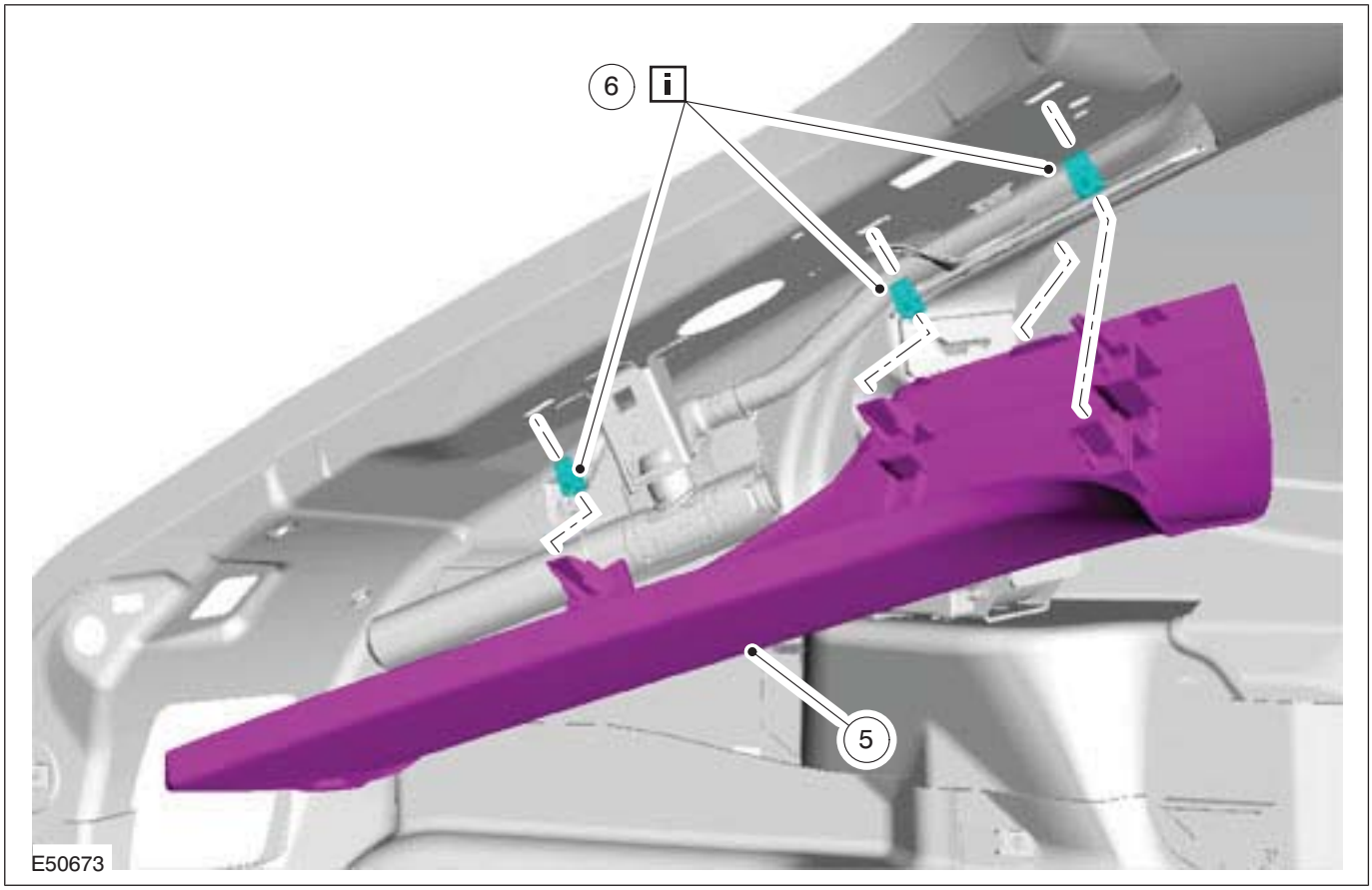
1. **Remove the rear parcel shelf.**
2. **Tilt the rear seat backrest forward.**
3. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Liftgate opening weatherstrip See Removal Detail
2	Rear parcel shelf support trim panel retaining screws

Item	Description
3	Rear parcel shelf support trim panel See Removal Detail
4	Rear parcel shelf support trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
5	C-pillar trim panel
6	C-pillar trim panel retaining clips See Installation Detail

4. To install, reverse the removal procedure.

Removal Details

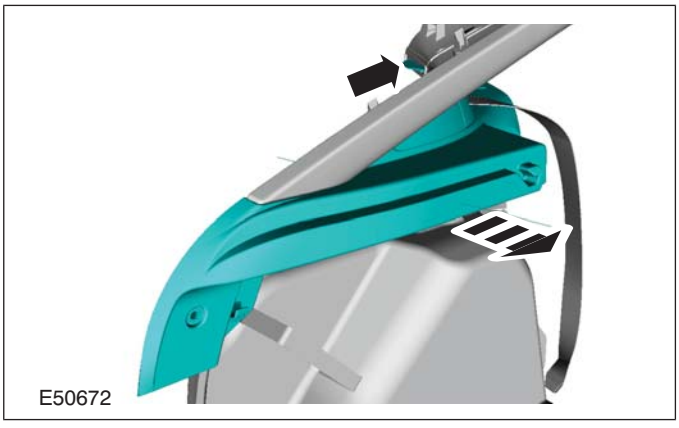
Item 1 Liftgate opening weatherstrip

1. Detach the liftgate opening weatherstrip.

Item 3 Rear parcel shelf support trim panel

1. Detach the rear parcel shelf support trim panel.

- Pull the rear parcel shelf support trim panel away from the rear quarter body panel to release the retaining tang from the rear quarter window glass trim panel.



Installation Details

REMOVAL AND INSTALLATION

Item 6 C-pillar trim panel retaining clips

1. Install the C-pillar trim panel retaining clips to the C-pillar trim panel before the C-pillar trim panel is installed to the vehicle.

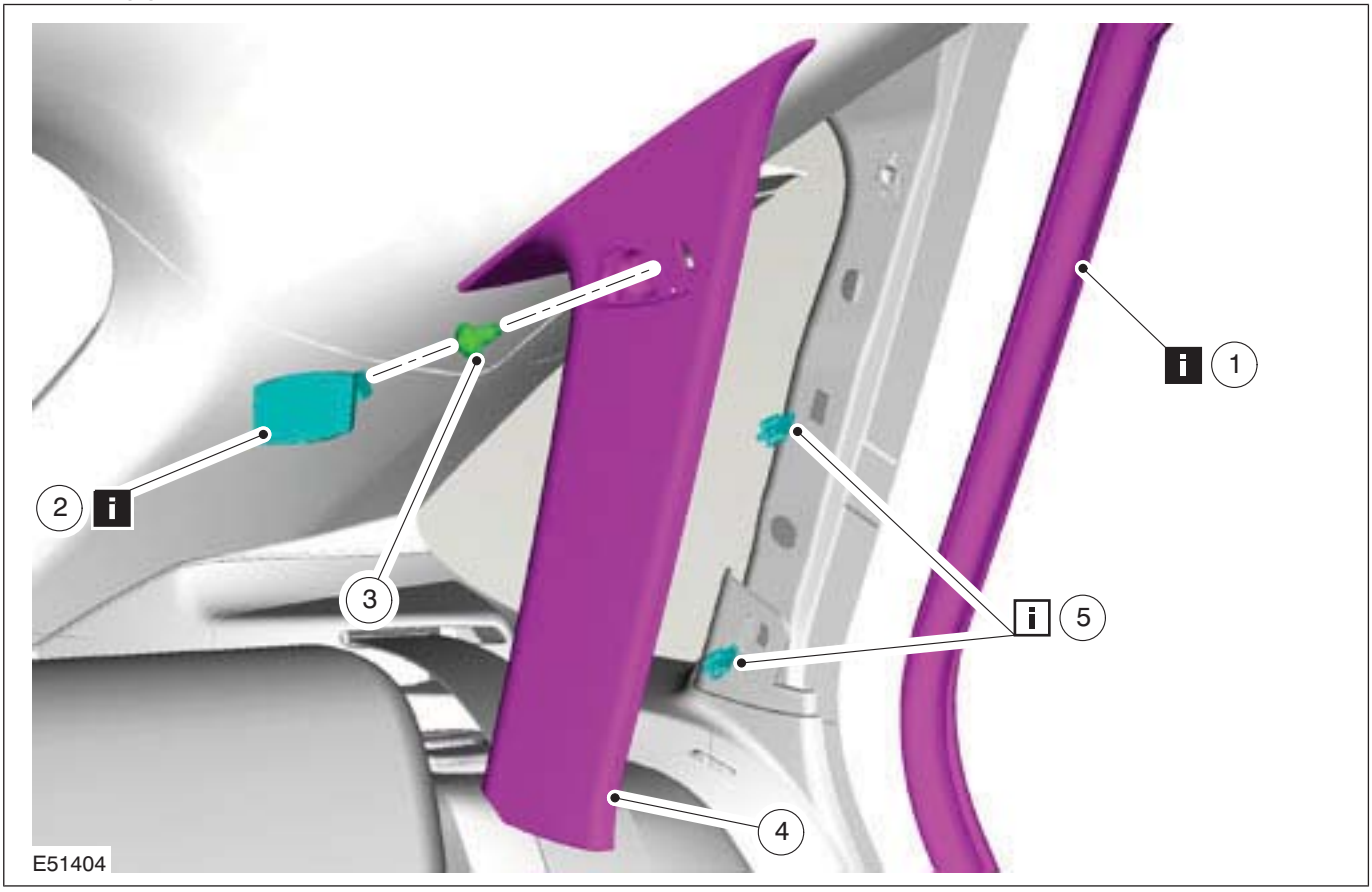
Item 4 Rear parcel shelf support trim panel retaining clips

1. Install the rear parcel shelf support trim panel retaining clips to the rear parcel shelf support trim panel before the rear parcel shelf support trim panel is installed to the vehicle.

REMOVAL AND INSTALLATION

C-Pillar Trim Panel — 4-Door/5-Door

1. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Rear door opening weatherstrip See Removal Detail
2	C-pillar trim panel retaining screw cover See Removal Detail
3	C-pillar trim panel retaining screw

Item	Description
4	C-pillar trim panel
5	C-pillar trim panel retaining clips See Installation Detail

2. To install, reverse the removal procedure.

Removal Details

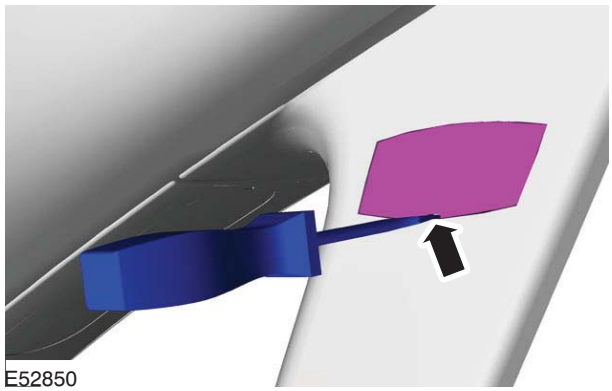
Item 1 Rear door opening weatherstrip

1. Detach the rear door opening weatherstrip.

REMOVAL AND INSTALLATION

Item 2 C-pillar trim panel retaining screw cover

1. Using a suitable flat blade screwdriver, remove the C-pillar retaining screw cover.


E52850

Installation Details

Item 5 C-pillar trim panel retaining clips

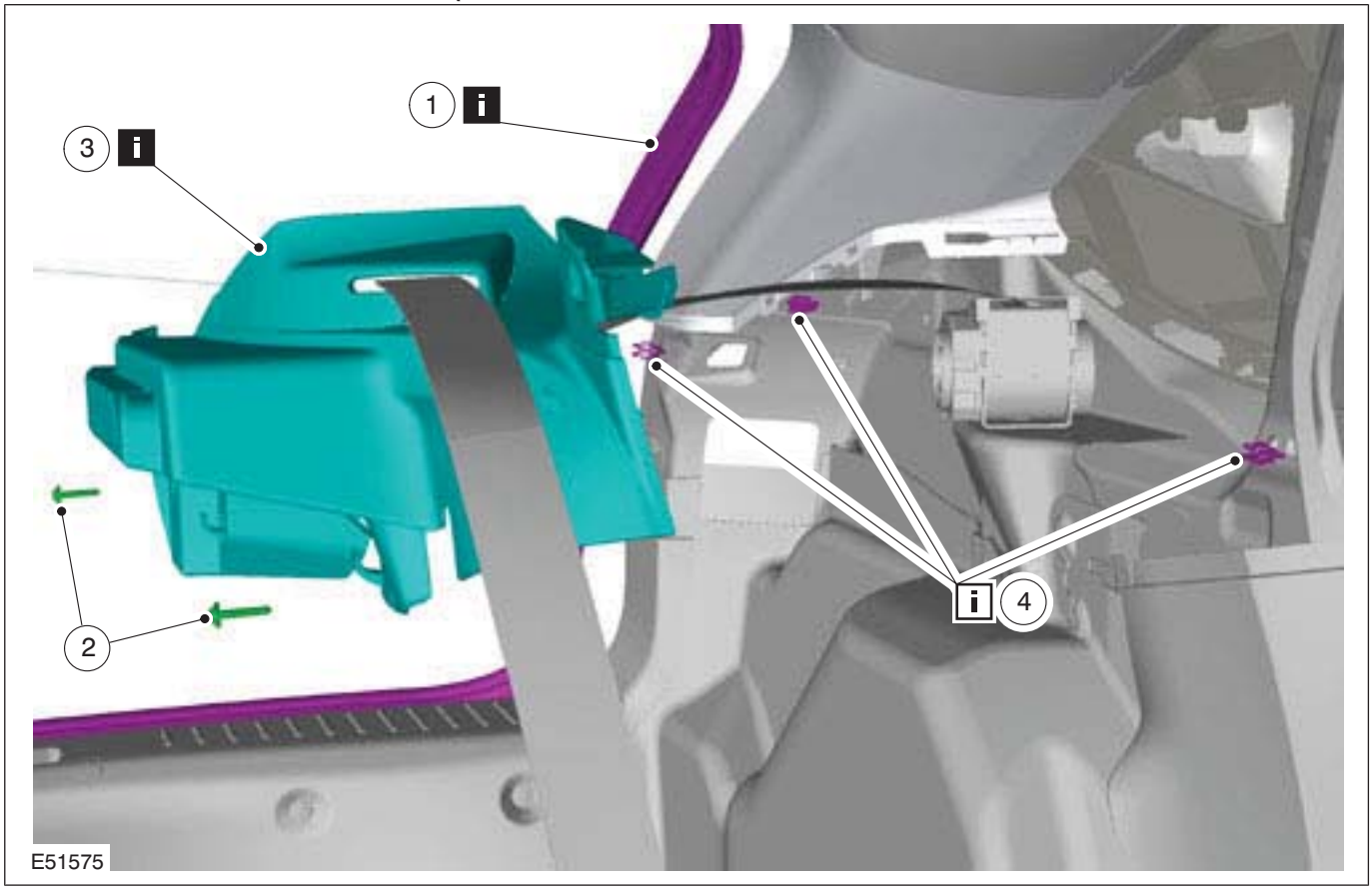
1. Install the C-pillar trim panel retaining clips to the trim panel before installation to the vehicle.

REMOVAL AND INSTALLATION

D-Pillar Trim Panel — 5-Door

1. Remove the Package tray trim panel.
2. Tilt the rear seat backrest forward.
3. Remove the C-pillar trim.

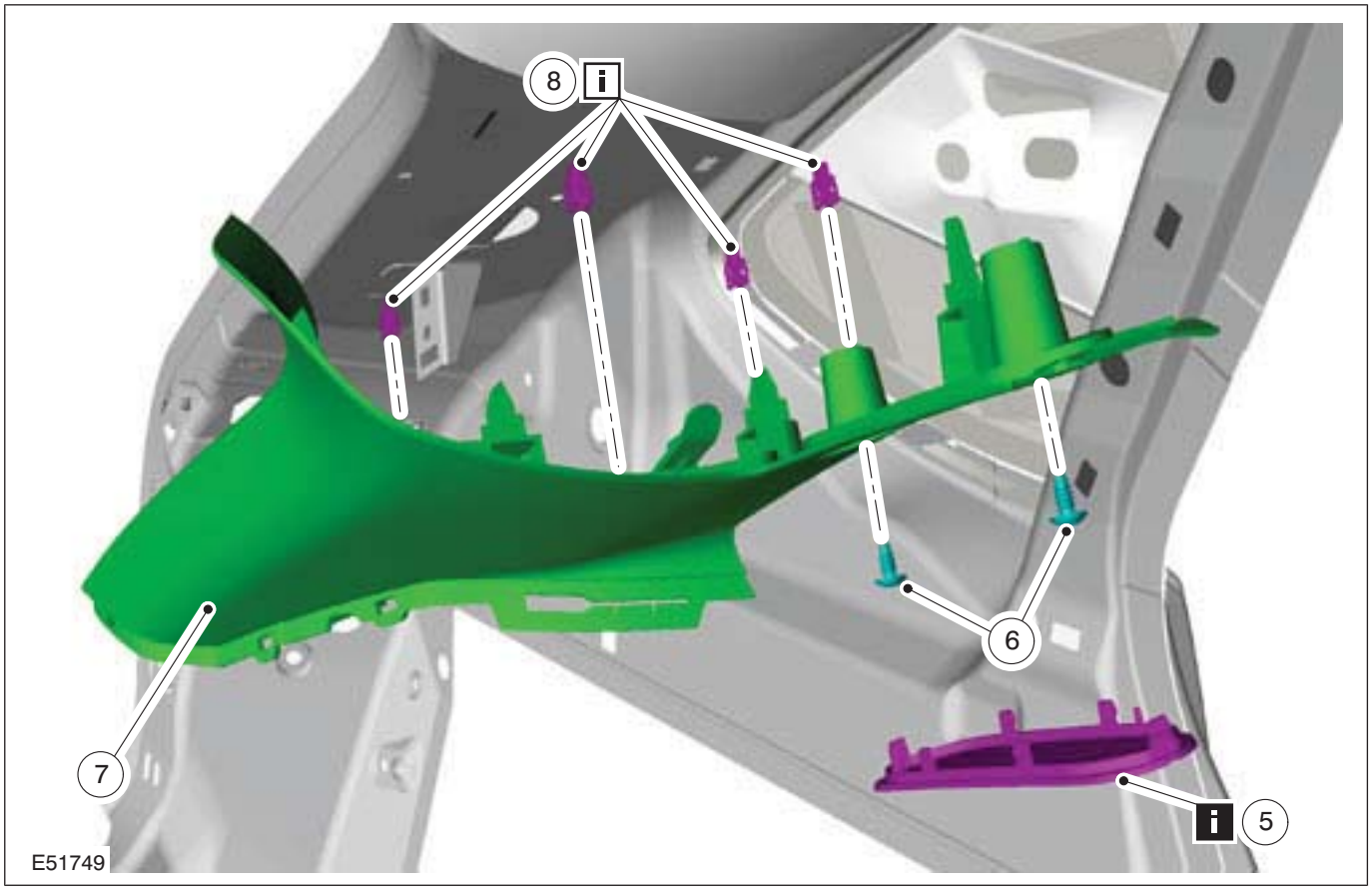
   For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).
4. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Liftgate opening weatherstrip See Removal Detail
2	Package tray support trim panel retaining screws

Item	Description
3	Package tray support trim panel See Removal Detail
4	Package tray support trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
5	D-pillar trim panel retaining screw cover See Removal Detail
6	D-pillar trim panel retaining screws.

Item	Description
7	D-pillar trim panel
8	D-pillar trim panel retaining clips See Installation Detail

5. To install, reverse the removal procedure.

Removal Details

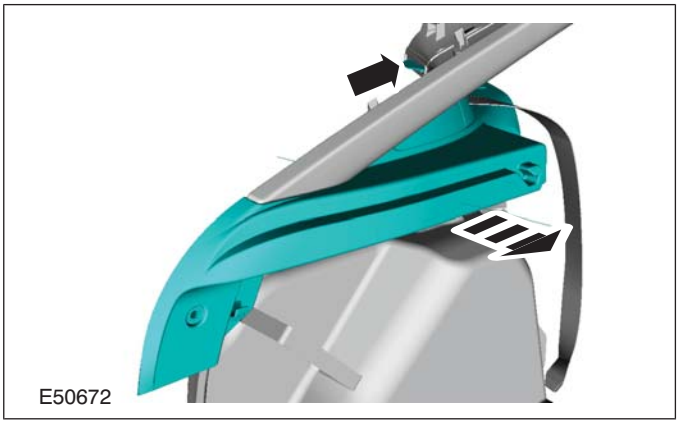
Item 1 Liftgate opening weatherstrip

1. Detach the liftgate opening weatherstrip.

Item 3 Package tray support trim panel

1. Detach the package tray support trim panel.

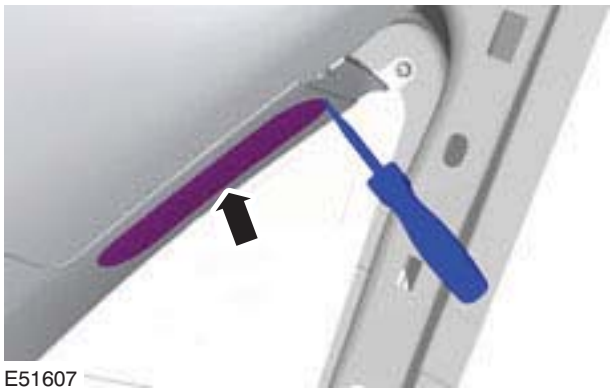
- Pull the package tray support trim panel away from the rear quarter body panel to release the retaining tang from the D-pillar trim panel.
- Feed the rear seatbelt harness through the package tray support trim panel.



REMOVAL AND INSTALLATION

Item 5 D-pillar trim panel retaining screw cover

1. Remove the D-pillar trim panel retaining screw cover.


E51607

Installation Details

Item 4 Package tray support trim panel retaining clips

1. Install the package tray support trim panel retaining clips to the trim panel before the trim panel is installed to the vehicle.

Item 8 D-pillar trim panel retaining clips

1. Install the D-pillar trim panel retaining clips trim panel before the trim panel is installed to the vehicle.

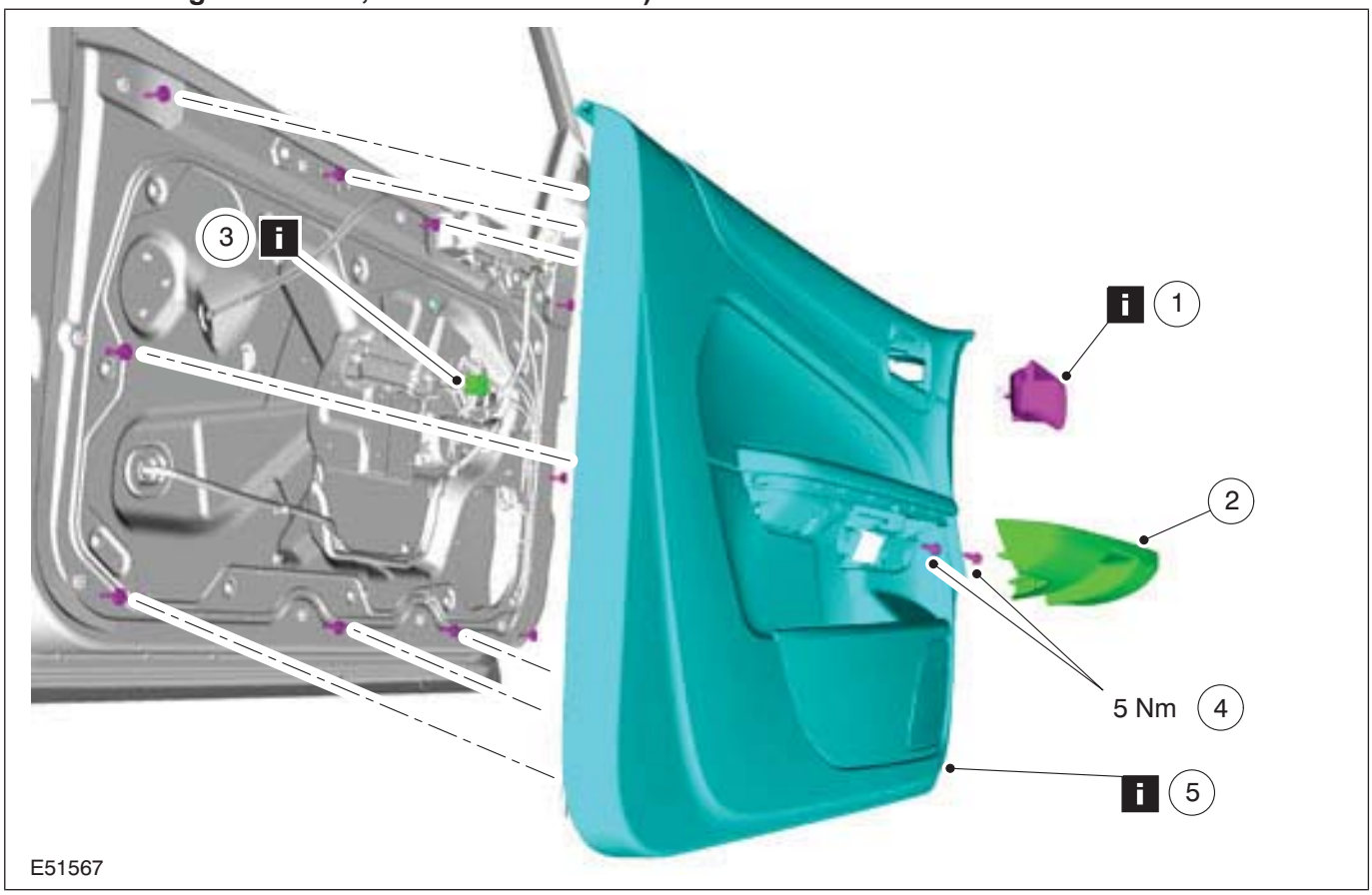
REMOVAL AND INSTALLATION

Front Door Trim Panel — 3-Door

1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

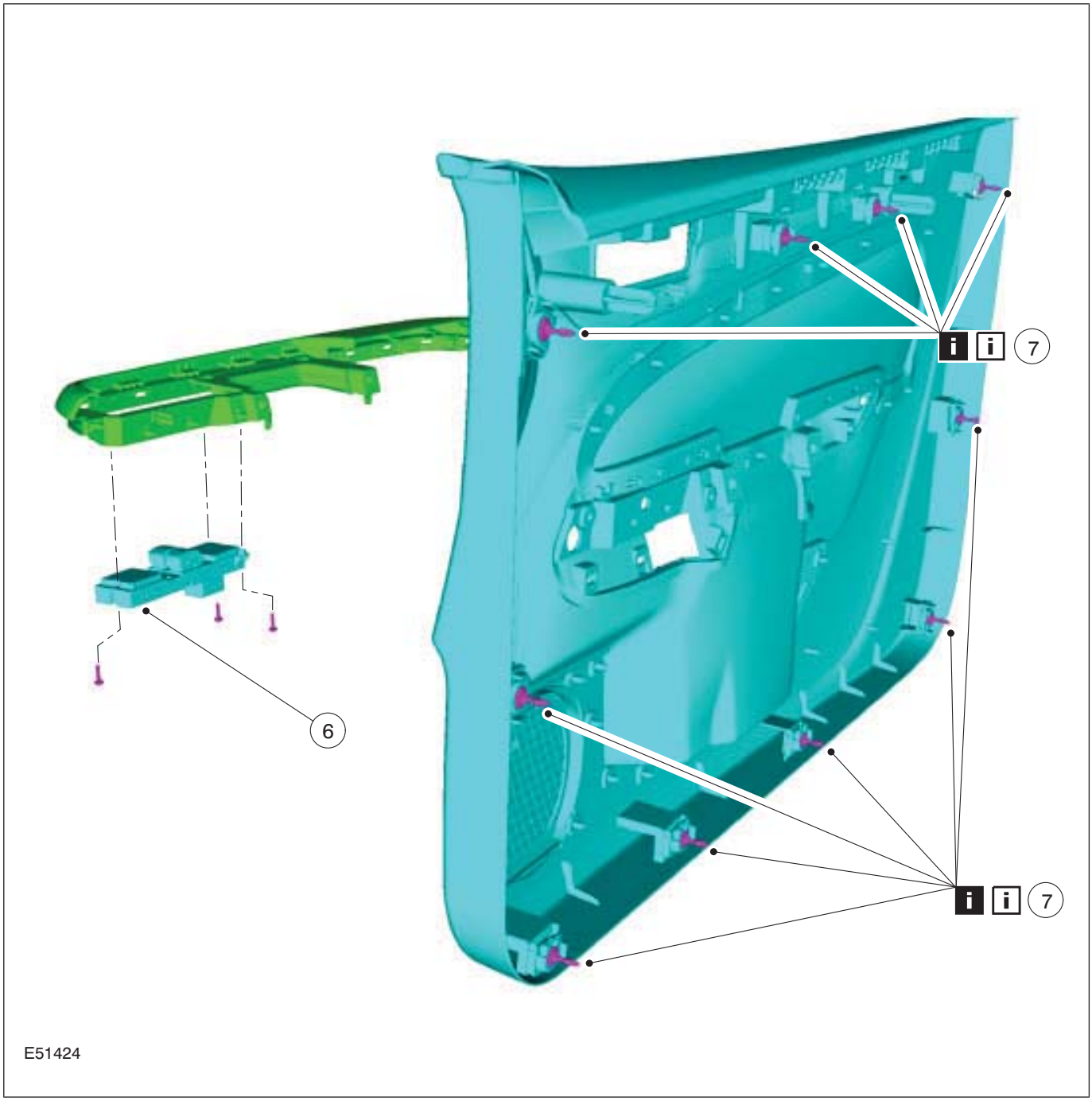
2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Front door latch remote control handle bezel See Removal Detail
2	Front door pull handle cover

Item	Description
3	Front door power window control unit electrical connector See Removal Detail
4	Front door pull handle retaining bolts
5	Front door trim panel See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
6	Power window control unit
7	Front door trim panel retaining clips See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.
4. Initialize the door window motors.

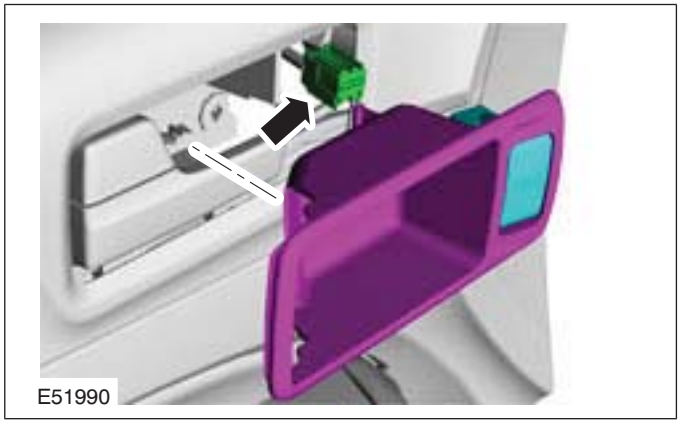
   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

REMOVAL AND INSTALLATION

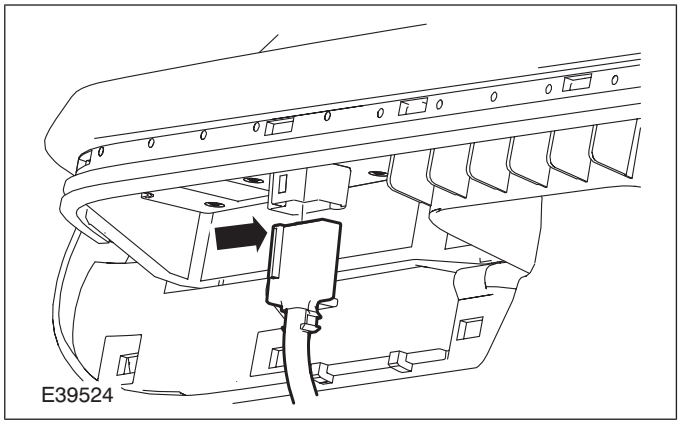
Item 1 Front door latch remote control handle bezel

1. **Remove the front door latch remote control bezel.**
   - Disconnect the remote keyless entry door lock button (if equipped).



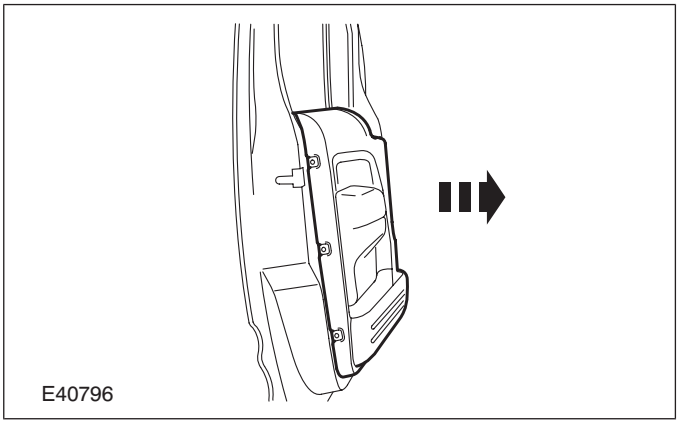
Item 3 Front door power window control unit electrical connector

1. **Disconnect the front door power window control unit electrical connector.**



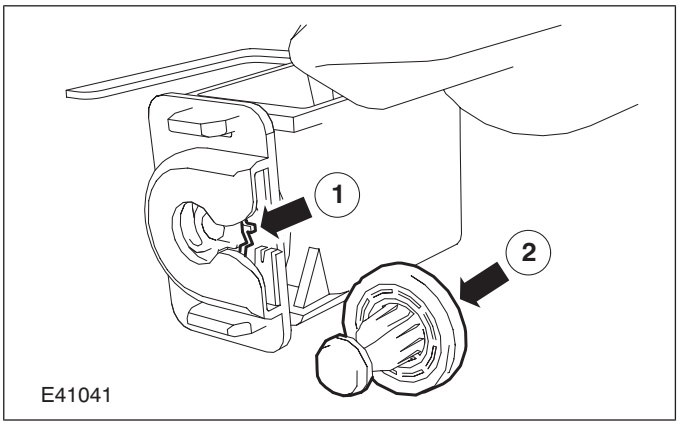
Item 5 Front door trim panel

1. **Remove the front door trim panel.**



Item 7 Front door trim panel retaining clips

1. **Remove the front door trim panel retaining clips.**
   1. Release the front door trim panel retaining clip locking tang.
   2. Remove the front door trim panel retaining clip.



Installation Details

Item 7 Front door trim panel retaining clips

1. **Install the front door trim retaining clips to the front door trim panel.**

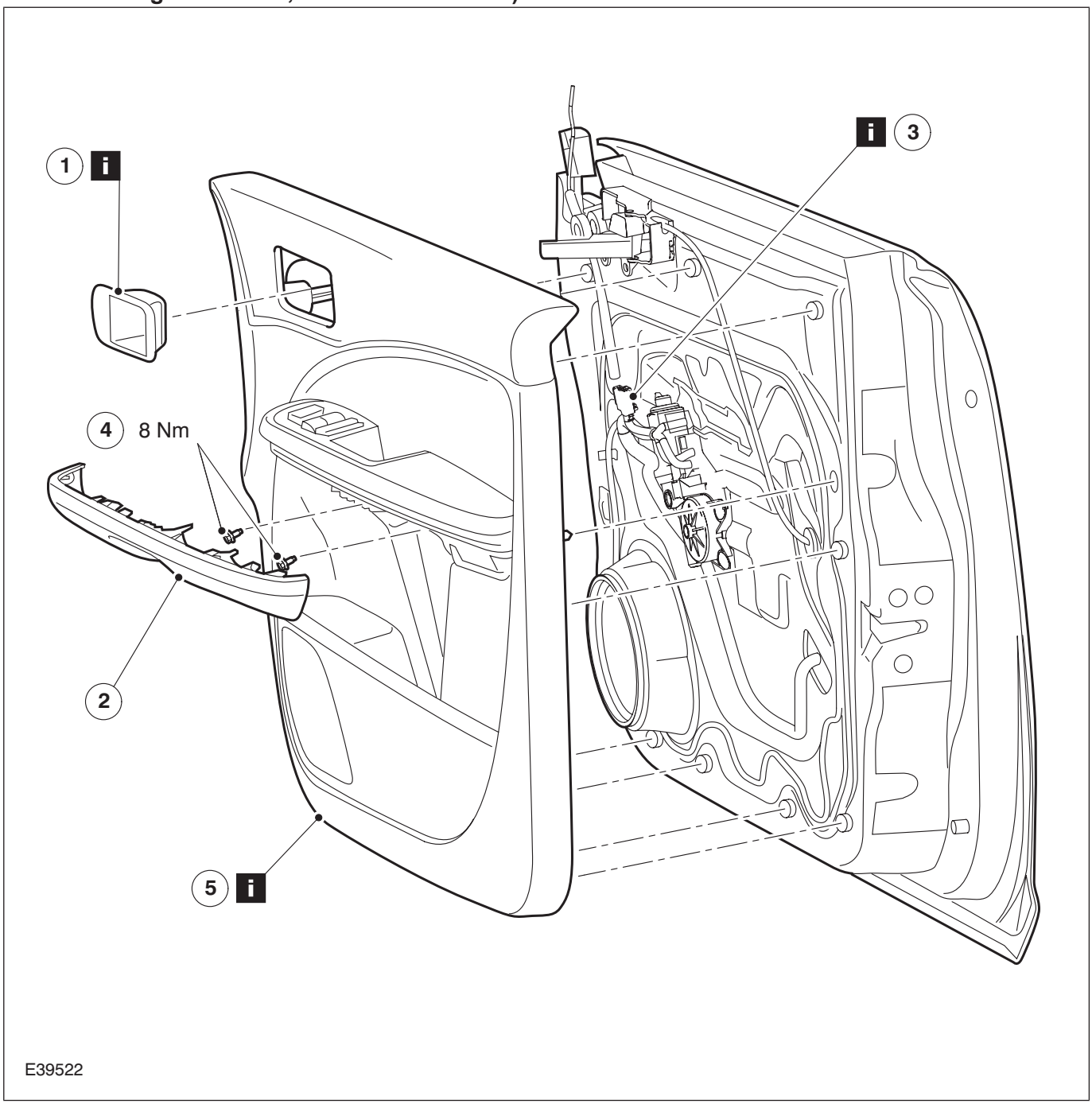
REMOVAL AND INSTALLATION

Front Door Trim Panel — 4-Door/5-Door/Wagon

1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



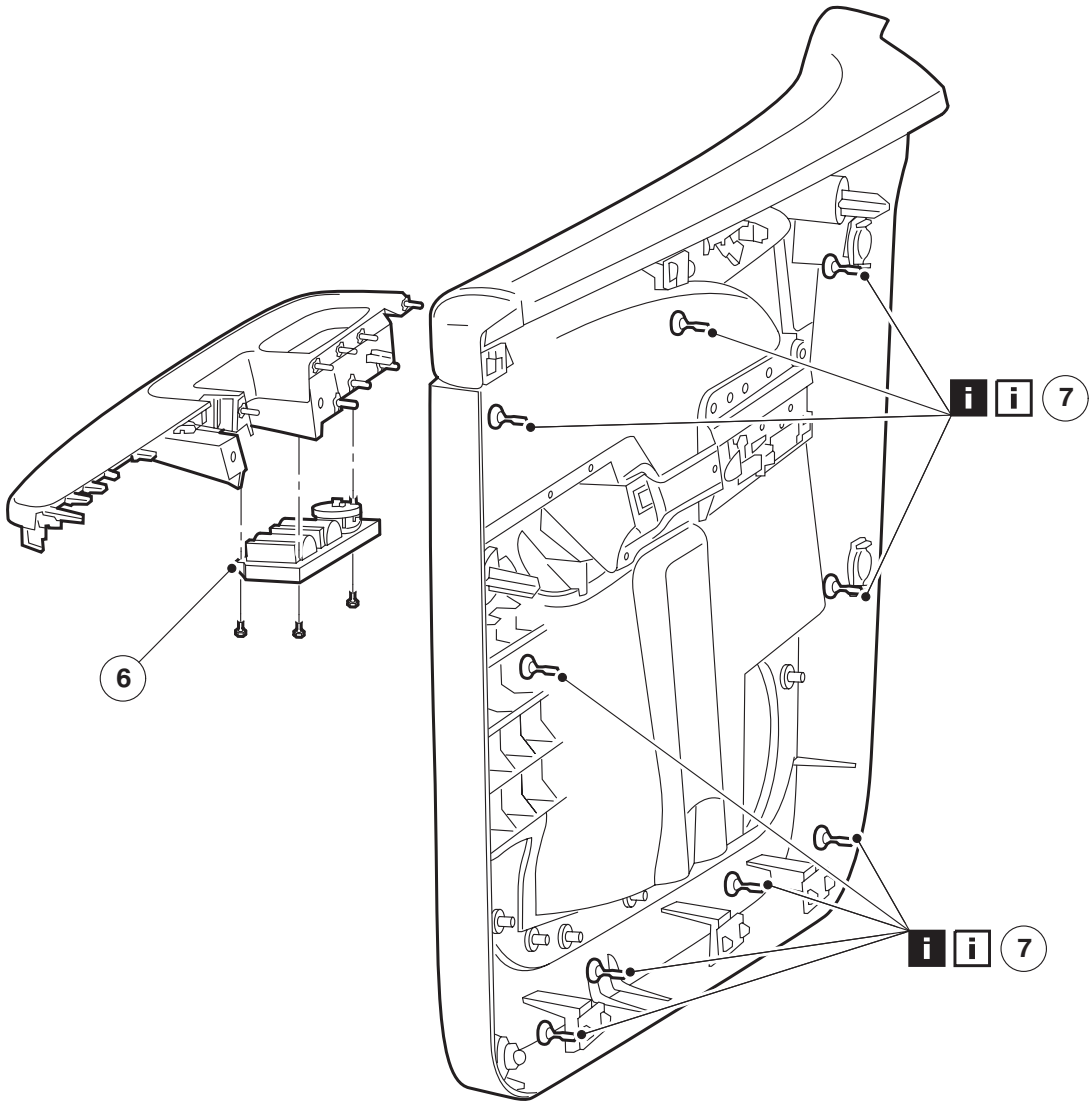
Item	Description
1	Front door latch remote control handle bezel See Removal Detail
2	Front door pull handle cover

Item	Description
3	Front power window control unit electrical connector See Removal Detail

REMOVAL AND INSTALLATION

Item	Description
4	Front door pull handle retaining bolts

Item	Description
5	Front door trim panel See Removal Detail



E39523

Item	Description
6	Front door power window control unit bezel (front door trim panel pull handle shown removed for clarity)
7	Front door trim panel retaining clips See Removal Detail See Installation Detail

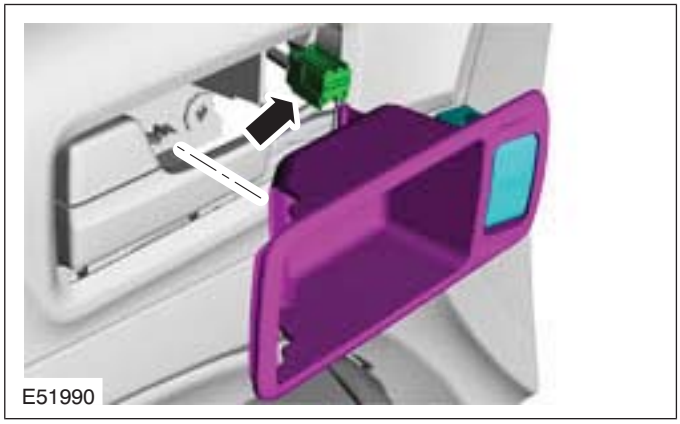
3. **To install, reverse the removal procedure.**
4. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

REMOVAL AND INSTALLATION

Removal Details

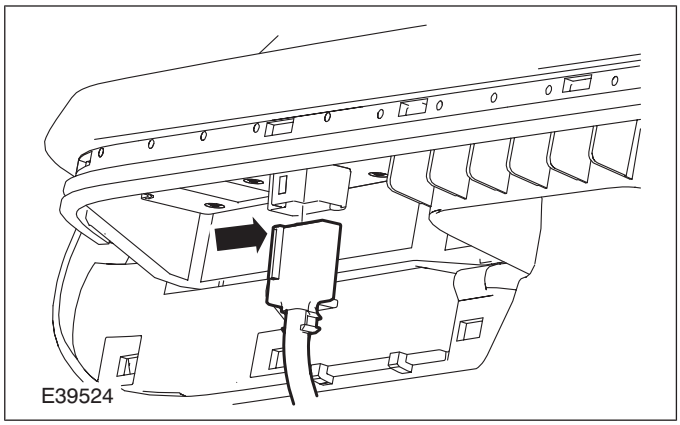
Item 1 Front door latch remote control handle bezel



1. **Remove the front door latch remote control bezel.**
   - Disconnect the remote keyless entry door lock button (if equipped).

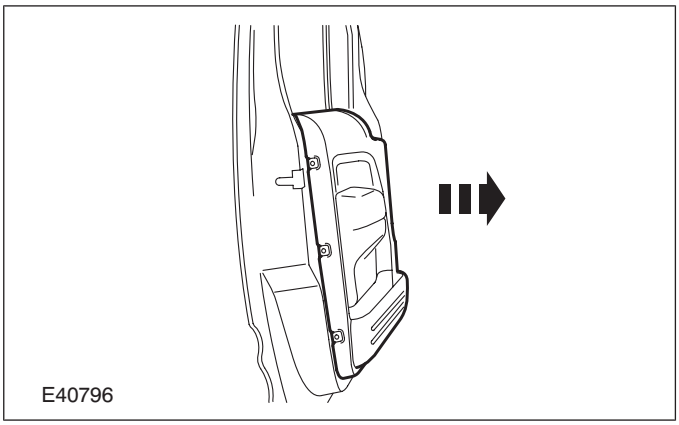
Item 3 Front power window control unit electrical connector

1. **Disconnect the front door power window control unit electrical connector.**



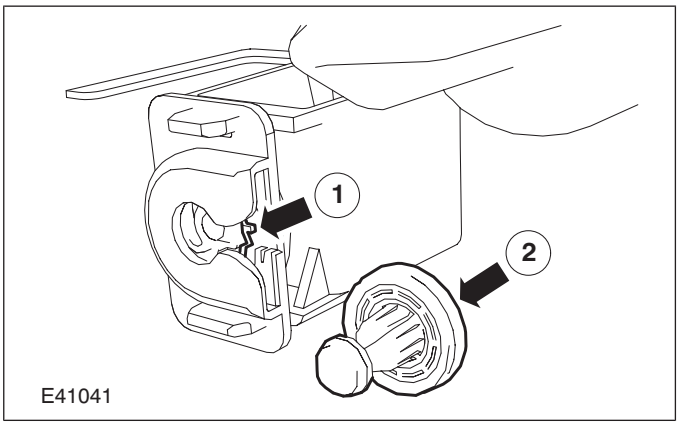
Item 5 Front door trim panel

1. **Remove the front door trim panel.**



Item 7 Front door trim panel retaining clips

1. **Remove the front door trim panel retaining clips.**
   1. Release the front door trim panel retaining clip locking tang.
   2. Remove the front door trim panel retaining clip.



Installation Details

Item 7 Front door trim panel retaining clips

1. **Install the front door trim panel retaining clips to the front door trim panel.**

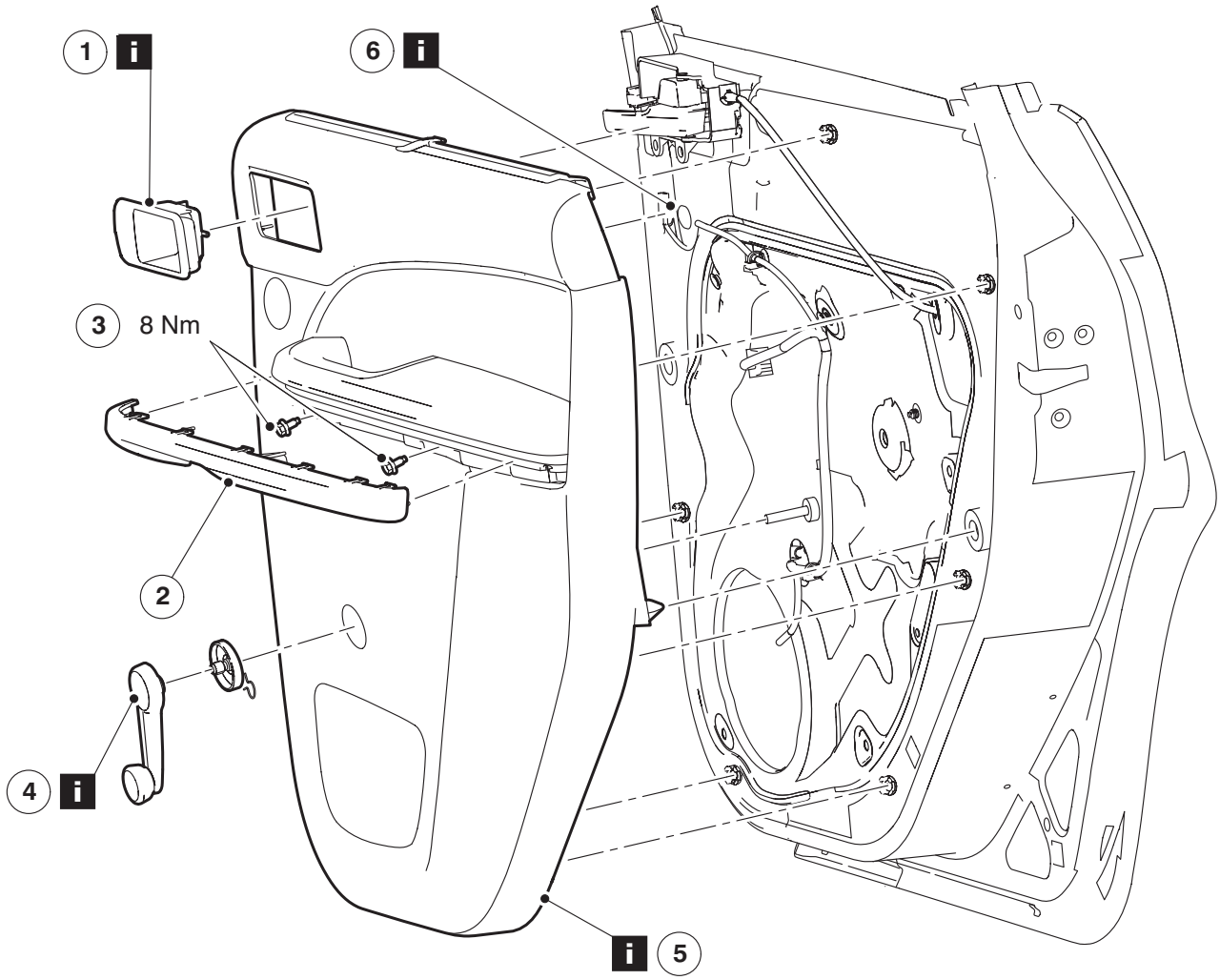
REMOVAL AND INSTALLATION

Rear Door Trim Panel — Vehicles With: Manual Windows

1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



E39510

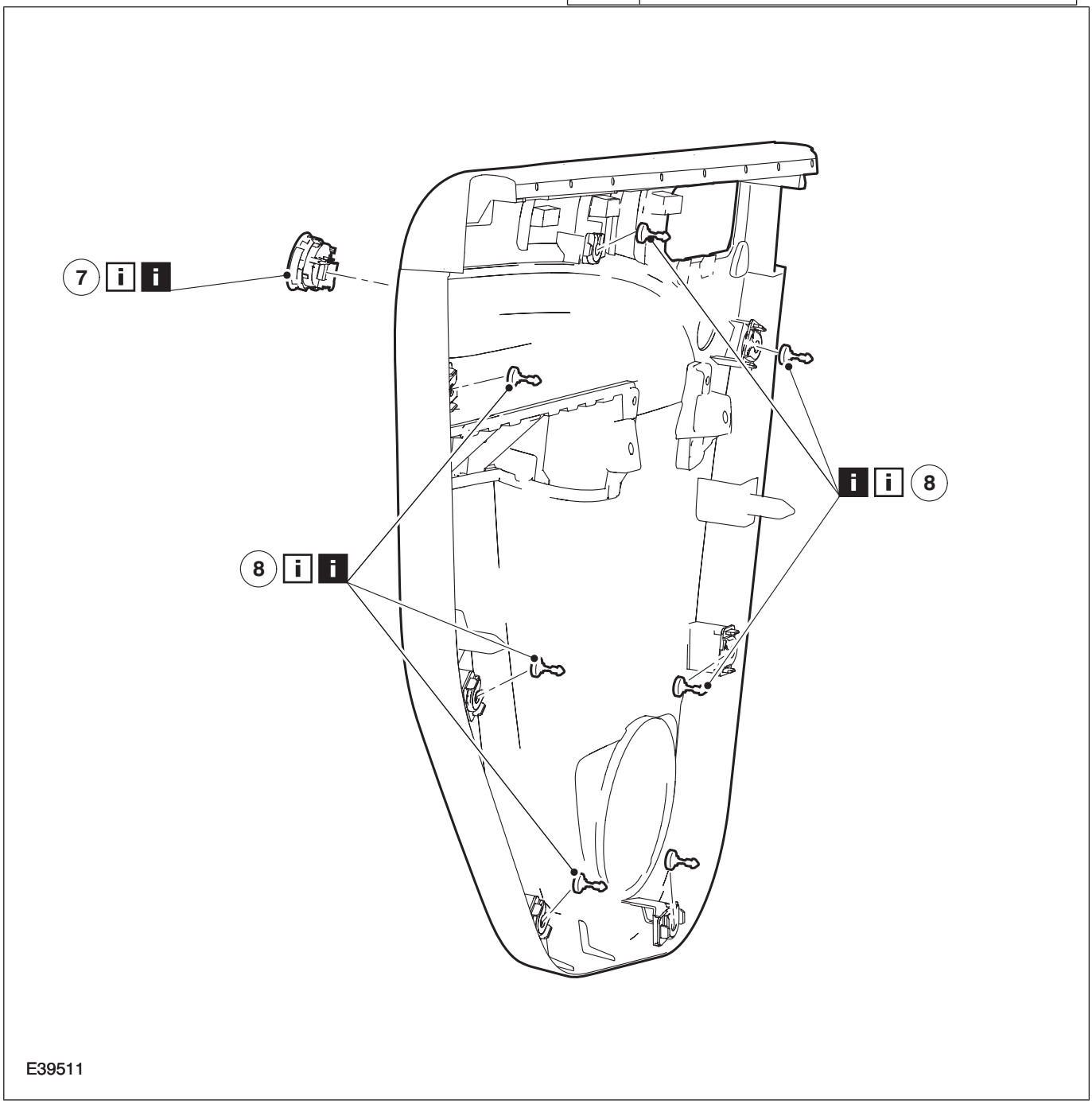
Item	Description
1	Rear door trim panel latch remote control handle bezel See Removal Detail
2	Rear door trim panel pull handle cover

Item	Description
3	Rear door trim panel pull handle retaining bolts

REMOVAL AND INSTALLATION

Item	Description
4	Rear door trim panel window regulator handle See Removal Detail

Item	Description
5	Rear door trim panel See Removal Detail
6	Rear door trim panel tweeter speaker electrical connector See Removal Detail



E39511

REMOVAL AND INSTALLATION

Item	Description
7	Rear door trim panel tweeter speaker See Removal Detail See Installation Detail
8	Rear door trim panel retaining clips See Removal Detail See Installation Detail

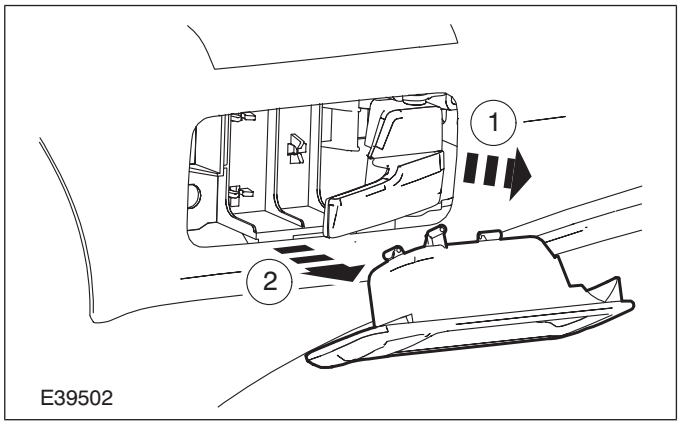
3. **To install, reverse the removal procedure.**
4. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

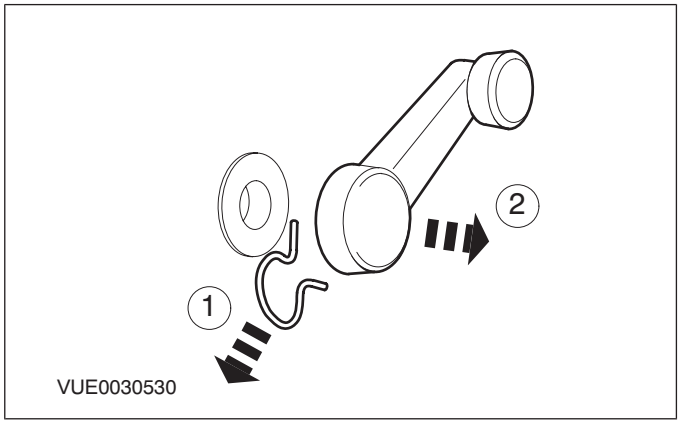
Item 1 Rear door trim panel latch remote control handle bezel

1. **Remove the rear door trim panel latch remote control bezel.**
   1. Operate the rear door trim panel latch remote control release handle.
   2. Remove the rear door latch remote control bezel from the rear door latch remote control.



Item 4 Rear door trim panel window regulator handle

1. **1. Fabricate a hook using a suitable piece of wire.**
   1. Remove window regulator handle retaining clip.
   2. Remove window regulator handle.

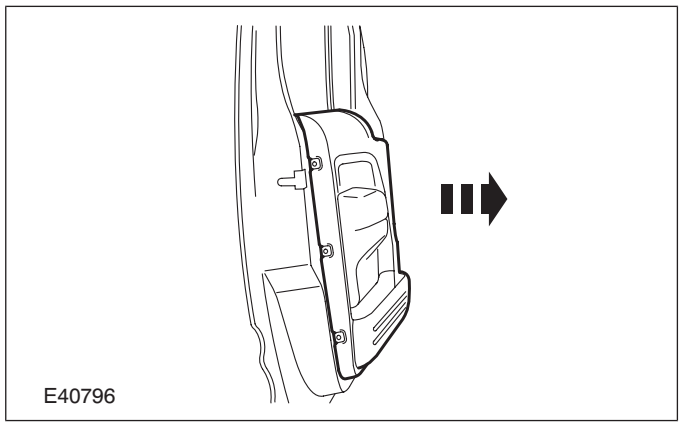


Item 5 Rear door trim panel

1. **NOTE: Detach the rear door trim panel starting from the top front corner down to the bottom rear corner of the door before the rear door trim panel is completly detached.**

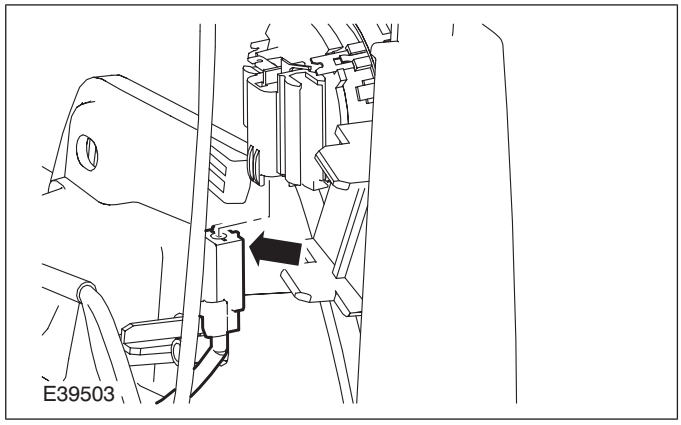
NOTE: Do not place excessive strain on the rear door trim panel tweeter speaker wiring harness.

Detach the rear door trim panel.



Item 6 Rear door trim panel tweeter speaker electrical connector

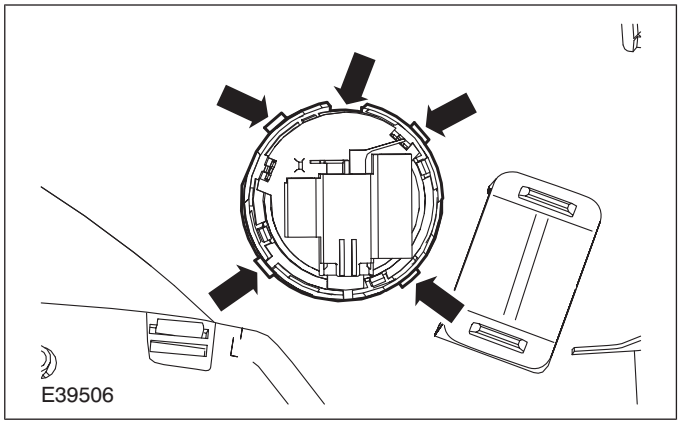
1. **Disconnect the rear door trim panel tweeter speaker electrical connector.**



REMOVAL AND INSTALLATION

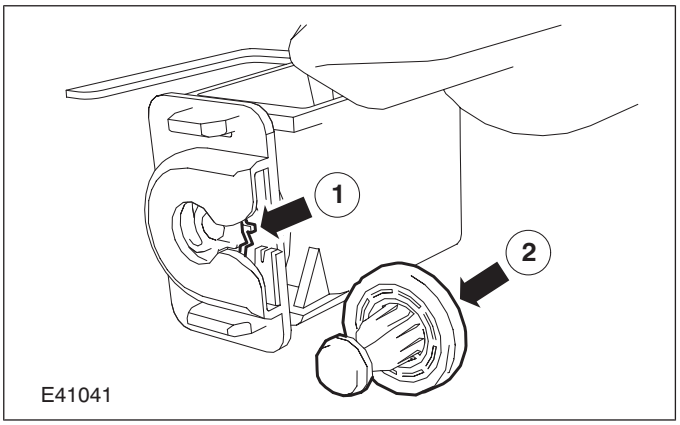
Item 7 Rear door trim panel tweeter speaker

1. **Remove the rear door trim panel tweeter speaker.**
   - Release the locking tangs.



Item 8 Rear door trim panel retaining clips

1. **Remove the rear door trim panel retaining clips.**
   1. Release the rear door trim panel retaining clip retainer locking tang.
   2. Remove the rear door trim panel retaining clip.



Installation Details

Item 8 Rear door trim panel retaining clips

1. **NOTE: Make sure that the rear door trim panel retaining clips are in the closed position.**

   Install the rear door trim panel retaining clips to the rear door trim panel retaining clip retainer.

Item 7 Rear door trim panel tweeter speaker

1. **CAUTION: Make sure that the locating tang on the top of the rear door tweeter speaker is correctly aligned with the rear door trim panel groove. Failure to follow this instruction may cause damage to the rear door trim panel.**

   Install the rear door trim panel tweeter speaker.

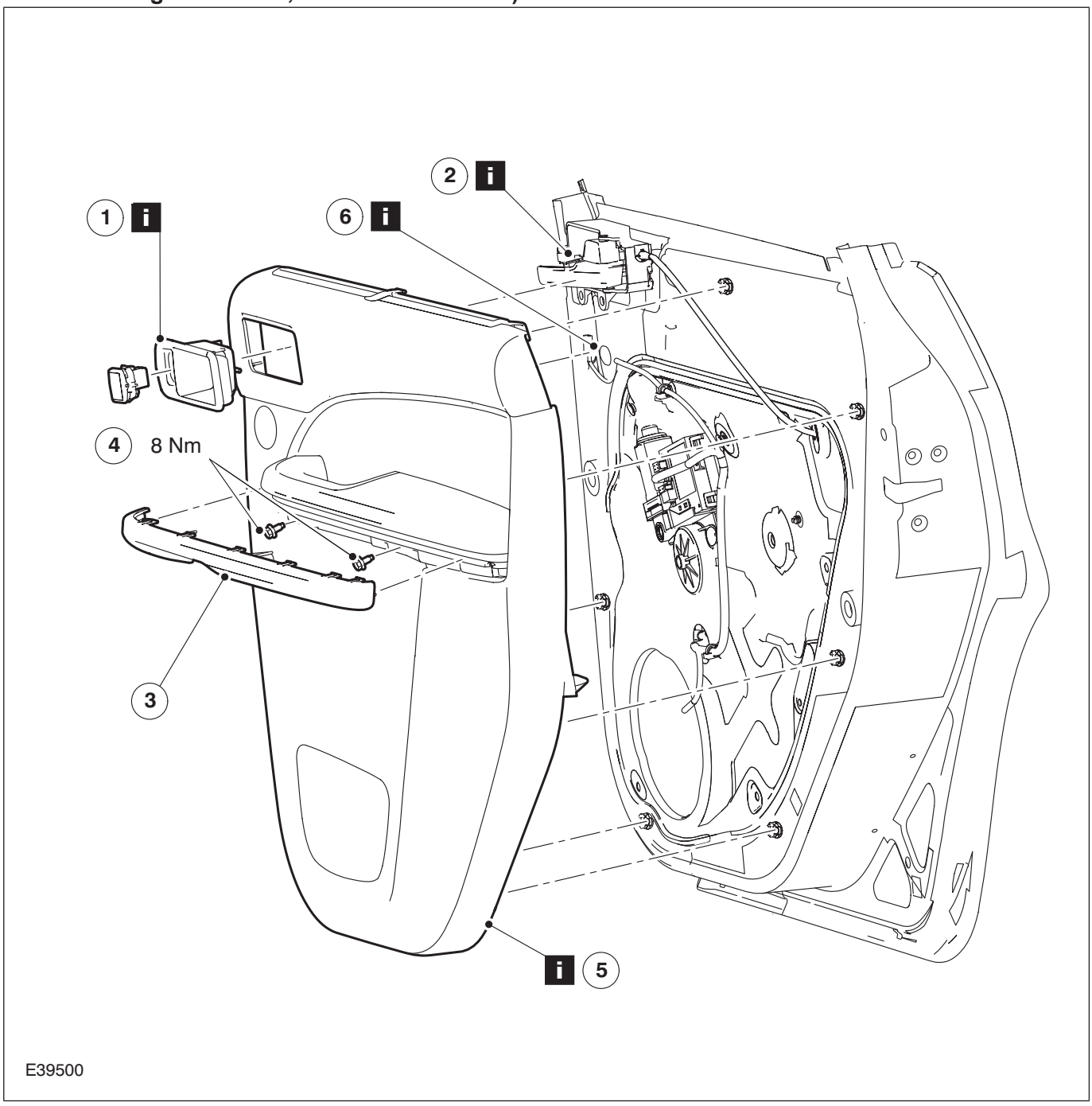
REMOVAL AND INSTALLATION

Rear Door Trim Panel — Vehicles With: Power Windows

1. Disconnect the battery ground cable.

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

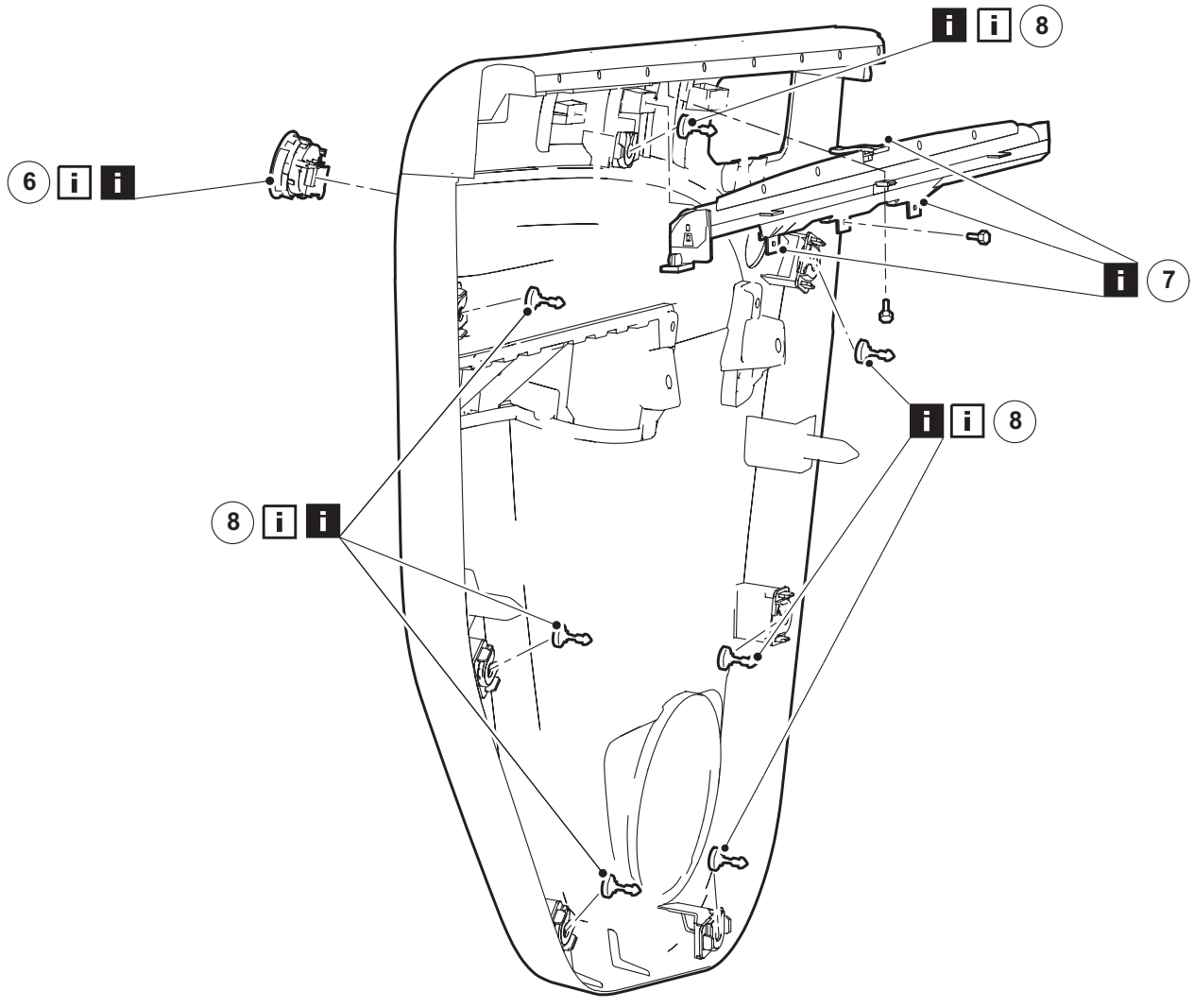
2. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Rear door trim panel latch remote control handle bezel See Removal Detail
2	Rear door trim panel power window switch See Removal Detail
3	Rear door trim panel pull handle cover

Item	Description
4	Rear door trim panel pull handle retaining bolts
5	Rear door trim panel See Removal Detail
6	Rear door trim panel tweeter speaker electrical connector See Removal Detail



E39504

REMOVAL AND INSTALLATION

Item	Description
6	Rear door trim panel tweeter speaker See Removal Detail See Installation Detail
7	Rear door trim panel blind assembly See Removal Detail
8	Rear door trim panel retaining clips See Removal Detail

Item	Description
	See Installation Detail

3. **To install, reverse the removal procedure.**
4. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

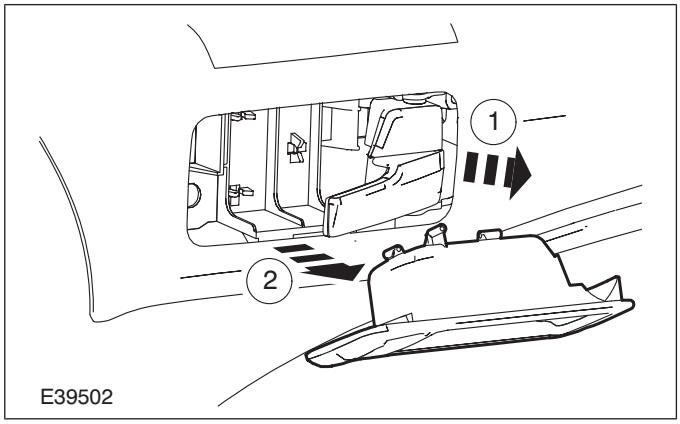
Removal Details

Item 1 Rear door trim panel latch remote control handle bezel

1. **NOTE: Do not place excessive strain on the rear door trim panel power window switch wiring harness).**

   Detach the rear door trim panel latch release handle bezel (rear door trim panel power window switch shown removed for clarity.

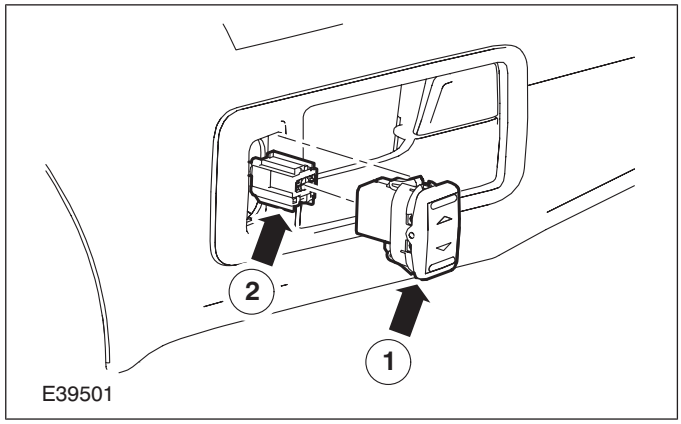
   1. Operate the Rear door latch release handle.
   2. Detach the rear door latch release handle bezel from the rear door latch release handle.



Item 2 Rear door trim panel power window switch

1. **Remove the rear door trim panel power window switch.**

   1. Detach the power window switch from the rear door trim panel latch remote control handle bezel.
   2. Disconnect the rear door power window switch electrical connector.

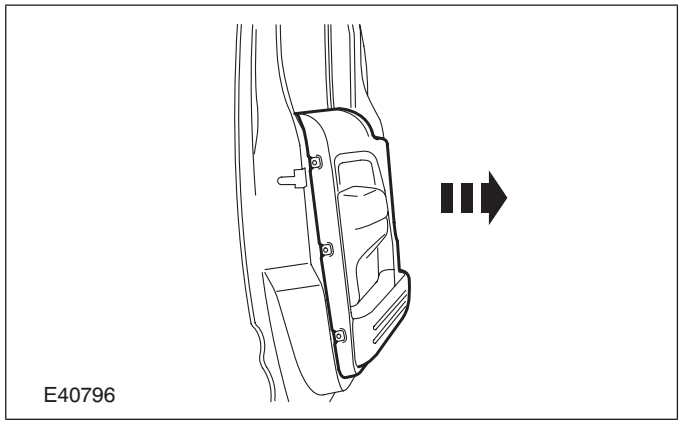


Item 5 Rear door trim panel

1. **NOTE: Detach the rear door trim panel starting from the top front corner down to the bottom rear corner of the door before the rear door trim panel is completly detached.**

NOTE: Do not place excessive strain on the rear door trim panel tweeter speaker wiring harness.

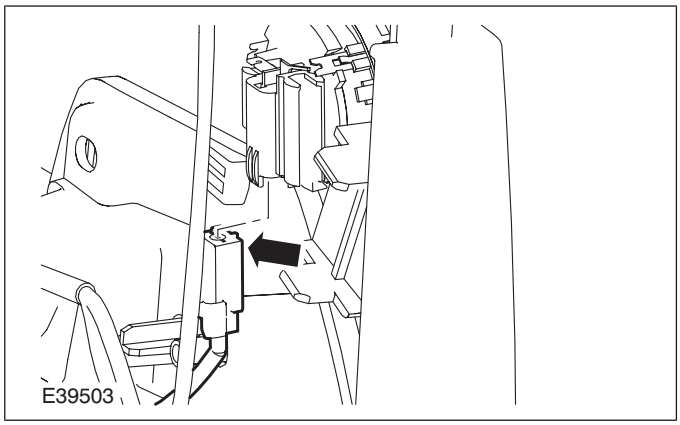
Detach the rear door trim panel.



REMOVAL AND INSTALLATION

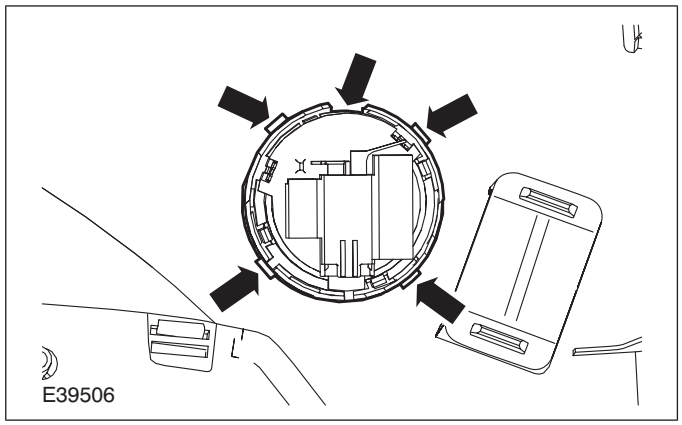
Item 6 Rear door trim panel tweeter speaker electrical connector

1. Disconnect the rear door trim panel tweeter speaker electrical connector.



Item 6 Rear door trim panel tweeter speaker

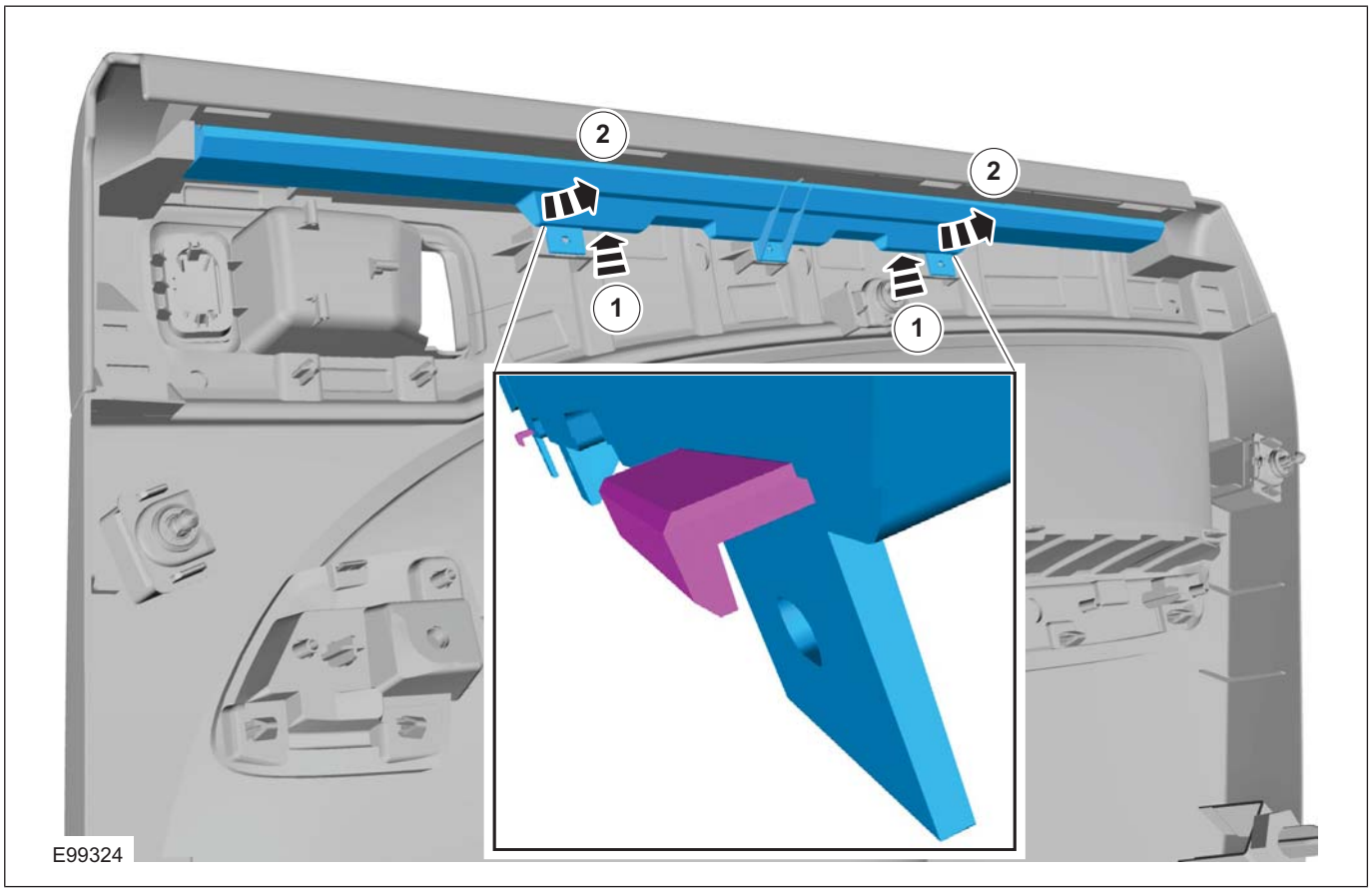
1. Remove the rear door trim panel tweeter speaker.
   - Release the locking tangs.



Item 7 Rear door trim panel blind assembly

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

   Detach the rear door trim panel blind assembly from the rear door trim panel.

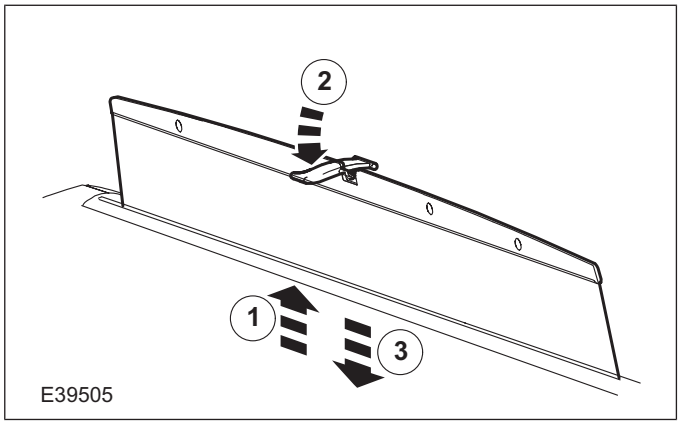


2.

1. Raise the rear door trim panel blind.
2. Move the rear door trim panel blind clip to the vertical position.

REMOVAL AND INSTALLATION

3. Lower the rear door trim panel blind and feed through the rear door trim panel.



Item 8 Rear door trim panel retaining clips

1. Remove the rear door trim panel retaining clips.

Installation Details

Item 8 Rear door trim panel retaining clips

1. NOTE: Make sure that the rear door trim panel retaining clips are in the closed position.

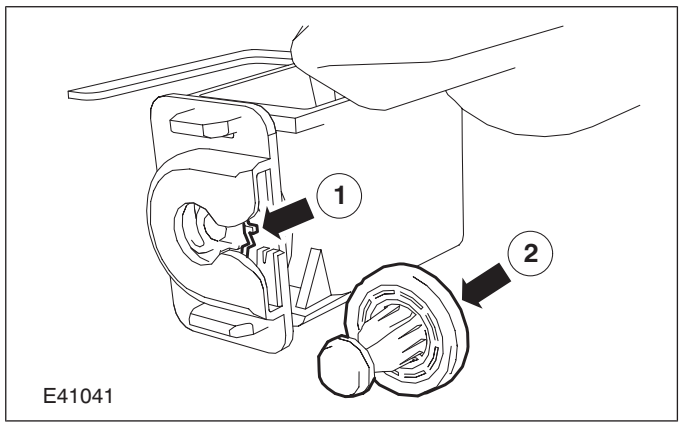
   Install the rear door trim panel retaining clips to the rear door trim panel retaining clip retainer.

Item 6 Rear door trim panel tweeter speaker

1. CAUTION: Make sure that the locating tang on the top of the rear door tweeter speaker is correctly aligned with the rear door trim panel groove. Failure to follow this instruction may cause damage to the rear door trim panel.

   Install the rear door trim panel tweeter speaker.

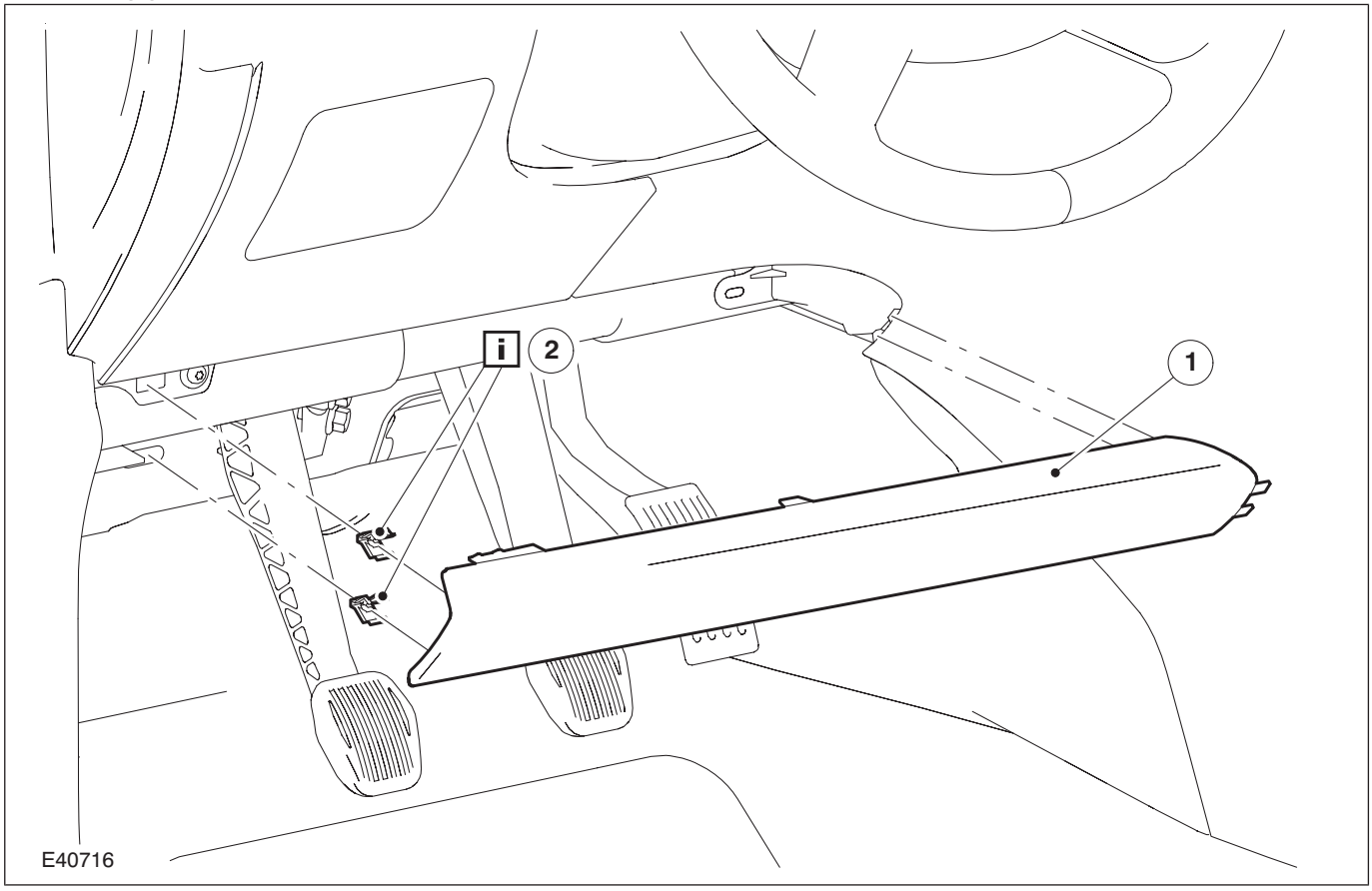
1. Release the rear door trim panel retaining clip retainer locking tang.
2. Remove the rear door trim panel retaining clip.



REMOVAL AND INSTALLATION

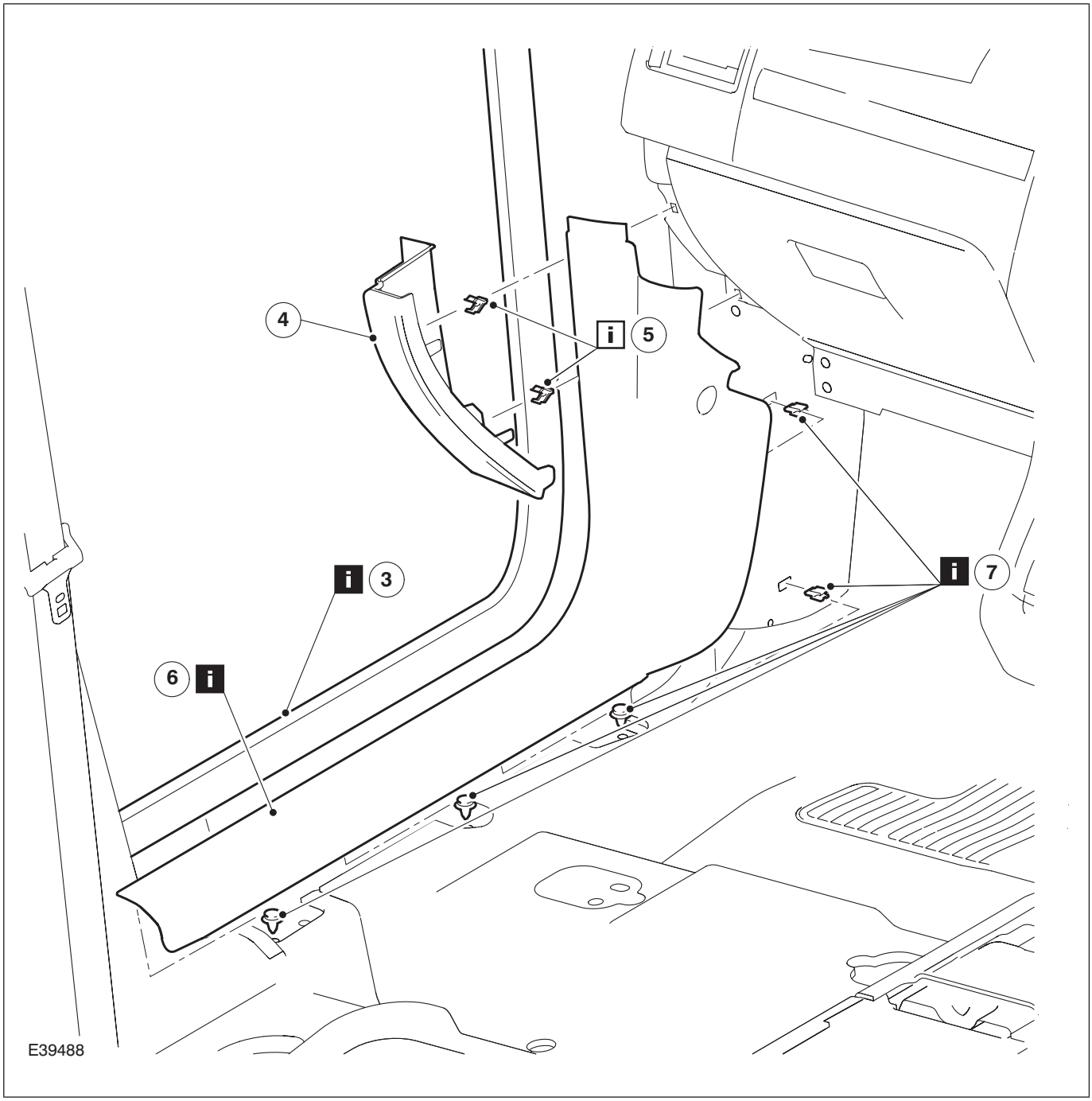
Front Scuff Plate Trim Panel

1. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Instrument panel lower trim panel
2	Instrument panel lower trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
3	Front door opening weatherstrip See Removal Detail
4	Instrument panel side trim panel
5	Instrument panel side trim panel retaining clips See Installation Detail

Item	Description
6	Front scuff plate trim panel See Removal Detail
7	Front scuff plate trim panel retaining clips See Installation Detail

2. To install, reverse the removal procedure.

Removal Details

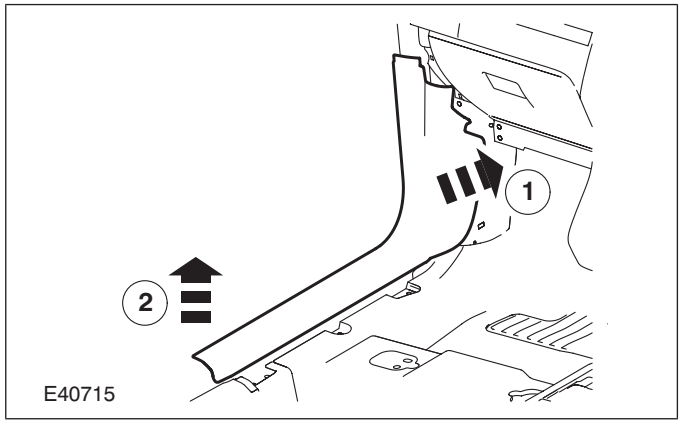
REMOVAL AND INSTALLATION

Item 3 Front door opening weatherstrip

1. locally Detach the front door weatherstrip.

Item 6 Front scuff plate trim panel

1. Remove the front scuff plate trim panel.



Installation Details

Item 7 Front scuff plate trim panel retaining clips

1. Install the front scuff plate trim panel retaining clips to the front scuff plate trim panel.

Item 5 Instrument panel side trim panel retaining clips

1. Install the instrument panel side trim panel retaining clips to the instrument panel side trim panel.

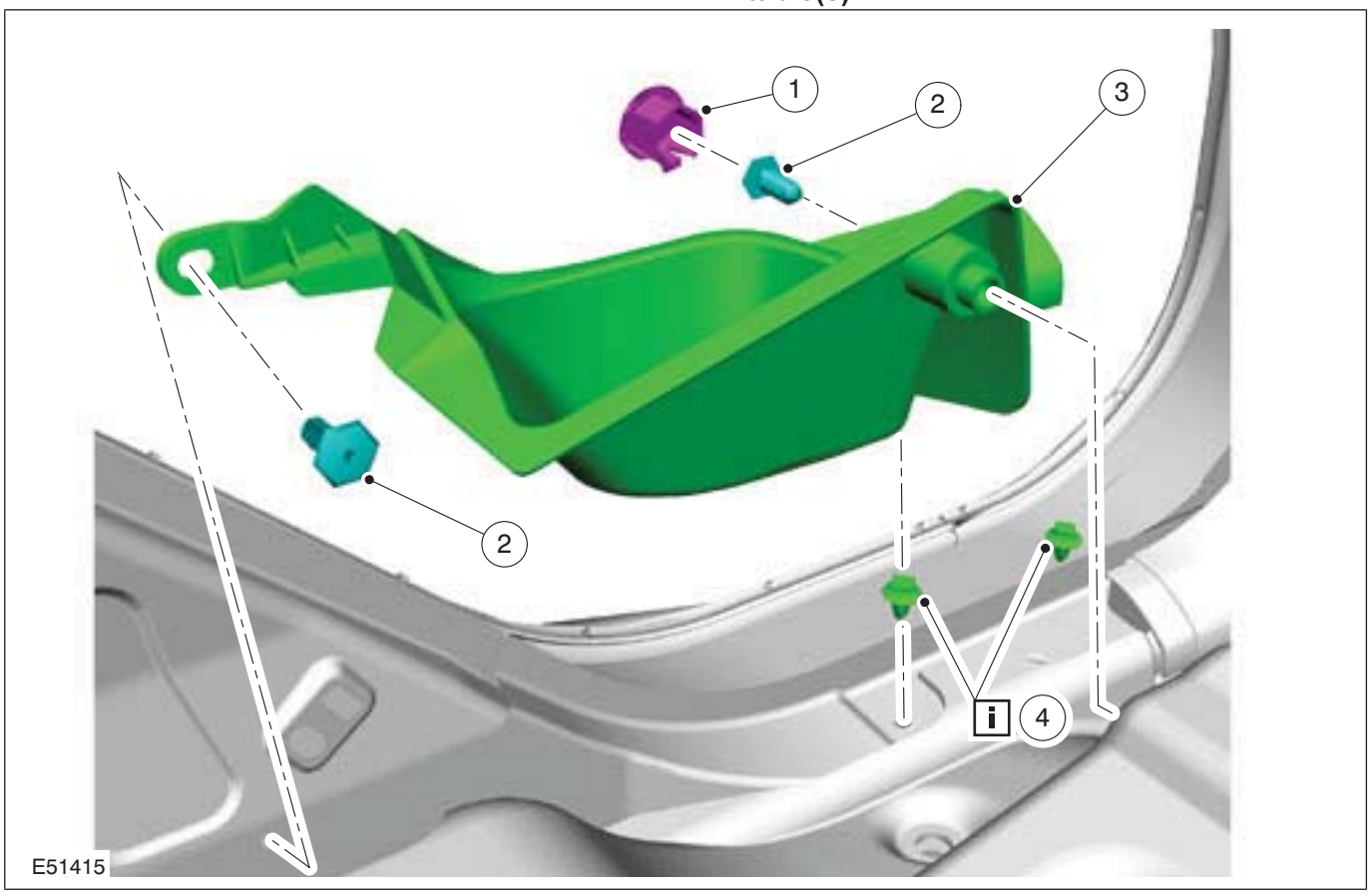
REMOVAL AND INSTALLATION

Rear Scuff Plate Trim Panel

1. Remove the rear quarter trim panel,

   For additional information, refer to: Rear Quarter Trim Panel - 5-Door/Wagon (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Rear scuff plate trim panel retaining clip cover
2	Rear scuff plate trim panel retaining clips

Item	Description
3	Rear scuff plate trim panel
4	Rear scuff plate trim panel retaining clips See Installation Detail

3. To install, reverse the removal procedure.

Installation Details

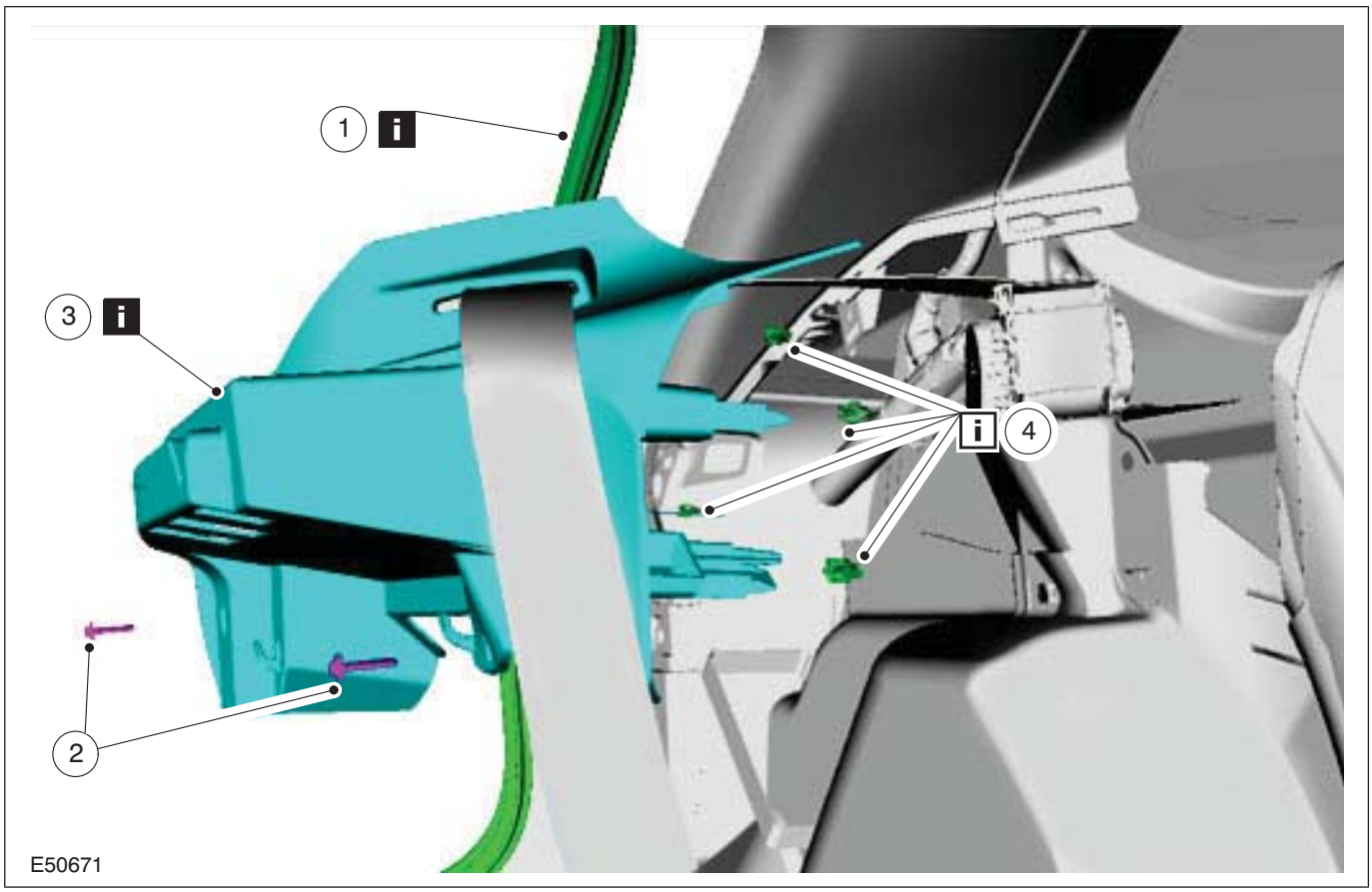
Item 4 Rear scuff plate trim panel retaining clips

1. Install the rear scuff plate trim panel retaining clips to the rear scuff plate trim panel before the trim panel is installed to the vehicle.

REMOVAL AND INSTALLATION

Loadspace Trim Panel — 3-Door

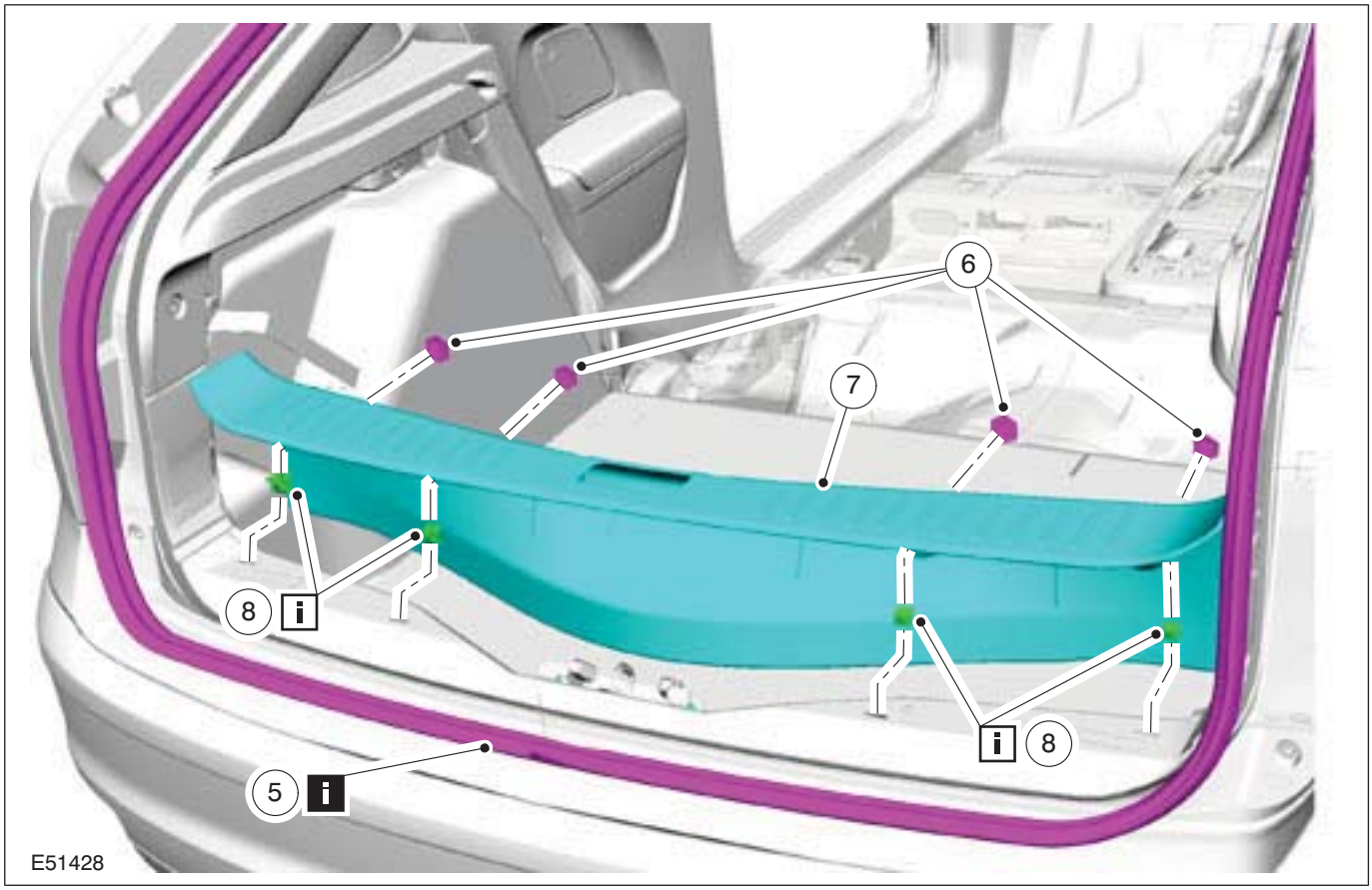
1. Remove the rear parcel shelf trim panel.
2. Remove the loadspace floor covering.
3. Tilt the rear seat cushion forward.
4. Tilt the rear seat backrest forward.
5. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Liftgate opening weatherstrip See Removal Detail
2	Rear parcel shelf support trim panel retaining screws

Item	Description
3	Rear parcel shelf support trim panel See Removal Detail
4	Rear parcel shelf support trim panel retaining clips See Installation Detail

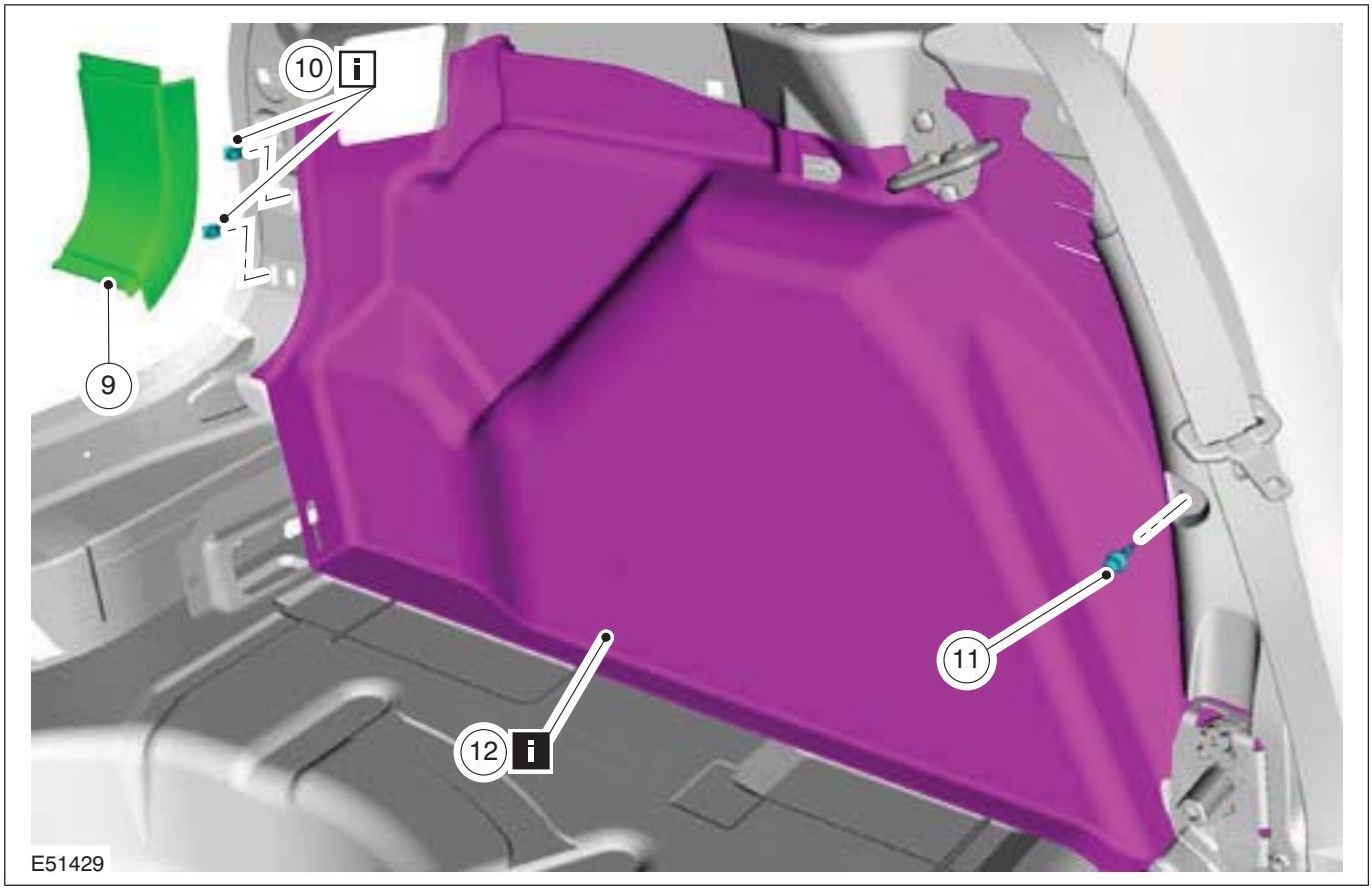
REMOVAL AND INSTALLATION



Item	Description
5	Liftgate opening weatherstrip See Removal Detail
6	Loadspace scuff plate trim panel retaining clips

Item	Description
7	Loadspace scuff plate trim panel
8	Loadspace scuff plate trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
9	Loadspace scuff plate trim panel extension trim panel
10	Loadspace scuff plate trim panel extension trim panel retaining clips See Installation Detail

Item	Description
11	Rear quarter trim panel retaining clip
12	Loadspace trim panel See Removal Detail

6. To install, reverse the removal procedure.

Removal Details

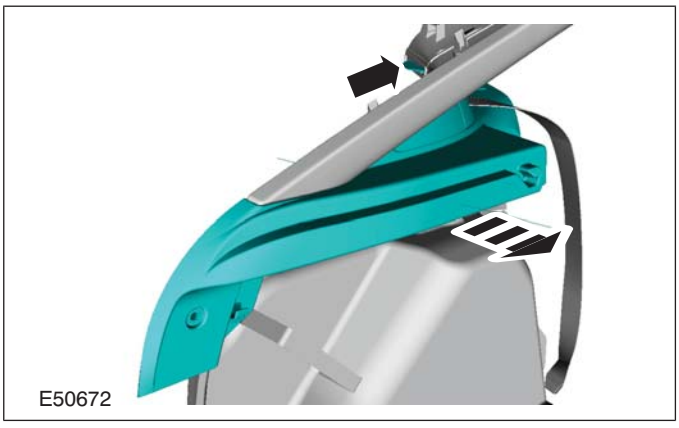
Item 1 Liftgate opening weatherstrip

1. Detach the liftgate opening weatherstrip.

Item 3 Rear parcel shelf support trim panel

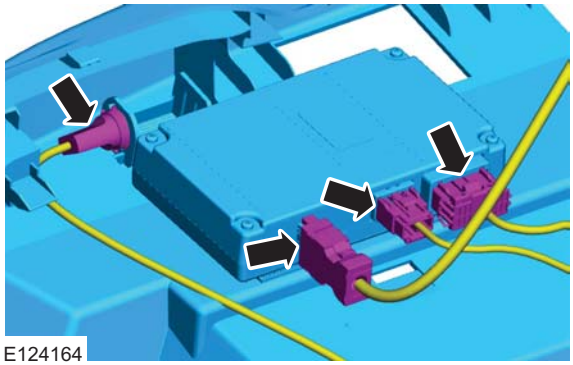
1. Detach the rear parcel shelf support trim panel.

- Pull the rear parcel shelf support trim panel away from the rear quarter body panel to release the retaining tang from the rear quarter window glass trim panel.



REMOVAL AND INSTALLATION

2. Disconnect the electrical connectors (if equipped).



Installation Details

Item 10 Loadspace scuff plate trim panel extension trim panel retaining clips

1. Install the loadspace scuff plate trim panel extension trim panel retaining clips to the loadspace scuff plate trim panel extension trim panel before the loadspace scuff plate trim panel extension trim panel is installed to the vehicle.

Item 8 Loadspace scuff plate trim panel retaining clips

1. Install the loadspace scuff plate trim panel retaining clips to the loadspace scuff plate trim panel before the loadspace scuff plate trim panel is installed to the vehicle.

Item 4 Rear parcel shelf support trim panel retaining clips

1. Install the rear parcel shelf support trim panel retaining clips to the rear parcel shelf support trim panel before the rear parcel shelf support trim panel is installed to the vehicle.

Item 5 Liftgate opening weatherstrip

1. Locally detach the liftgate opening weatherstrip.

Item 12 Loadspace trim panel

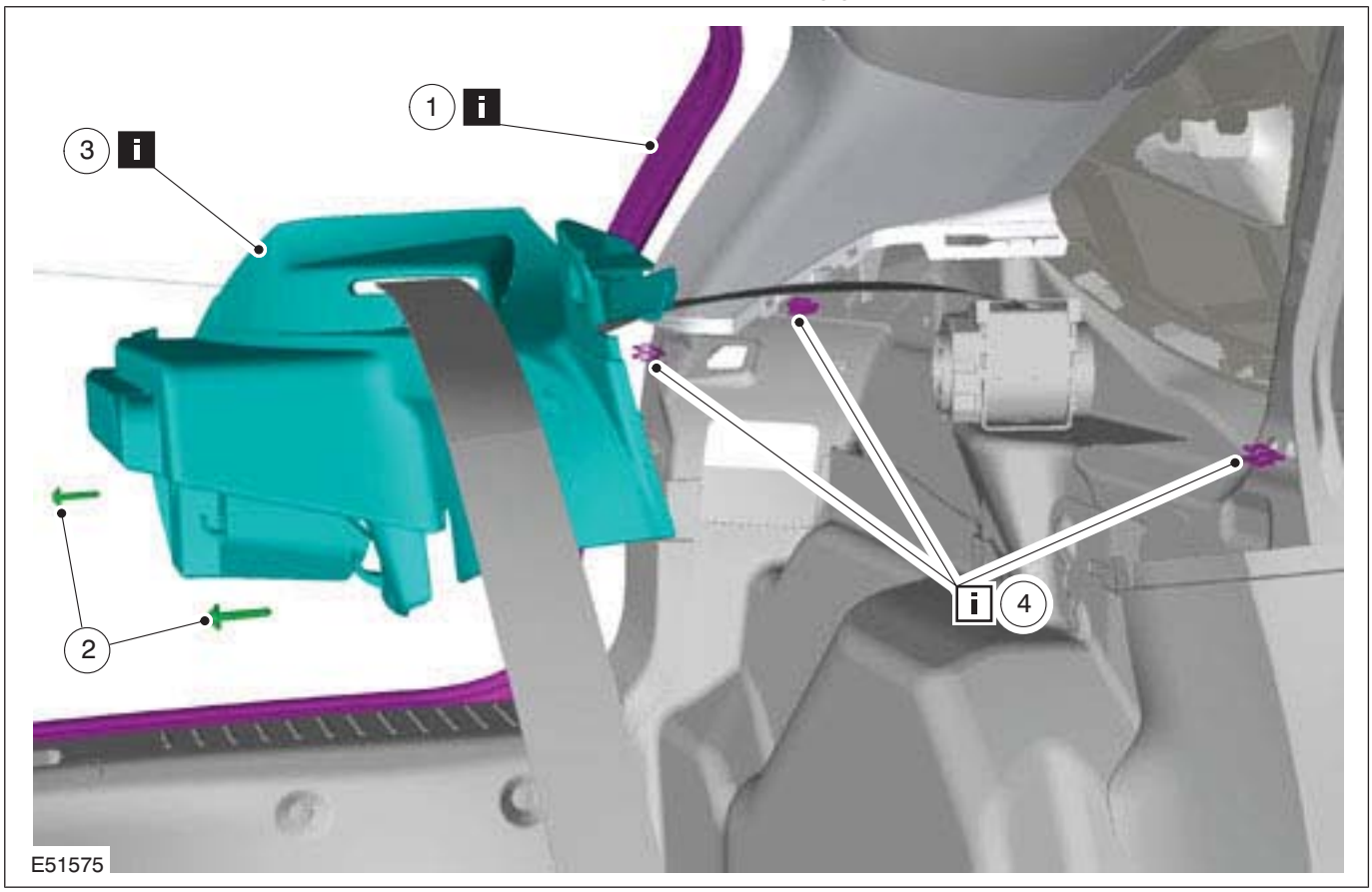
1. Gently Pull the rear quarter trim panel towards the center of the vehicle to allow the loadspace trim panel to be removed.

REMOVAL AND INSTALLATION

Loadspace Trim Panel — 5-Door

1. Remove the rear parcel shelf.
2. Remove the loadspace floor covering.
3. Tilt the rear seat cushion forward.
4. Tilt the rear seat backrest forward.
5. Remove the C-pillar trim panel.

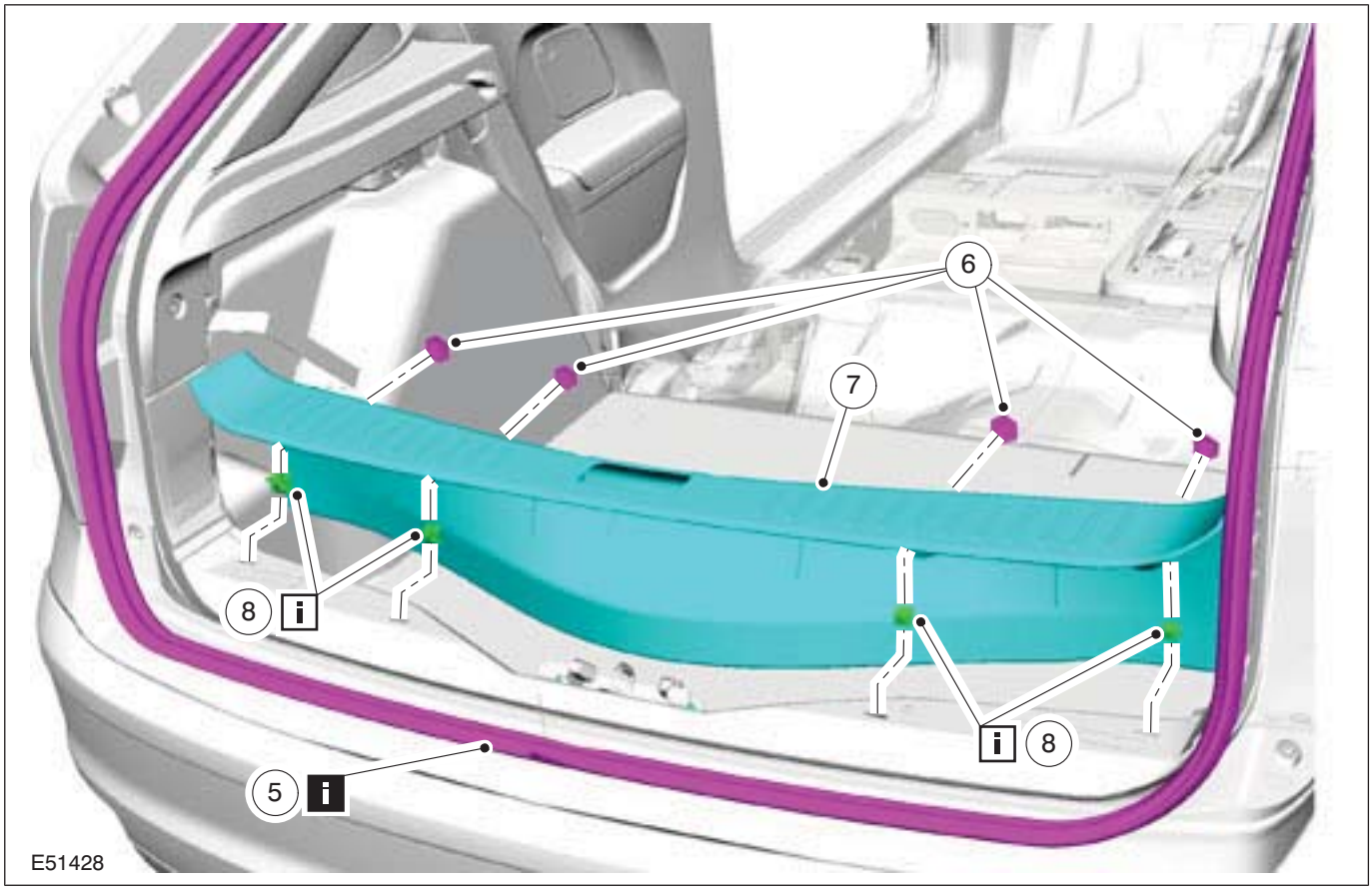
   For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).
6. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Liftgate opening weatherstrip See Removal Detail
2	Rear parcel shelf support trim panel retaining screws

Item	Description
3	Rear parcel shelf support trim panel See Removal Detail
4	Rear parcel shelf support trim panel retaining clips See Installation Detail

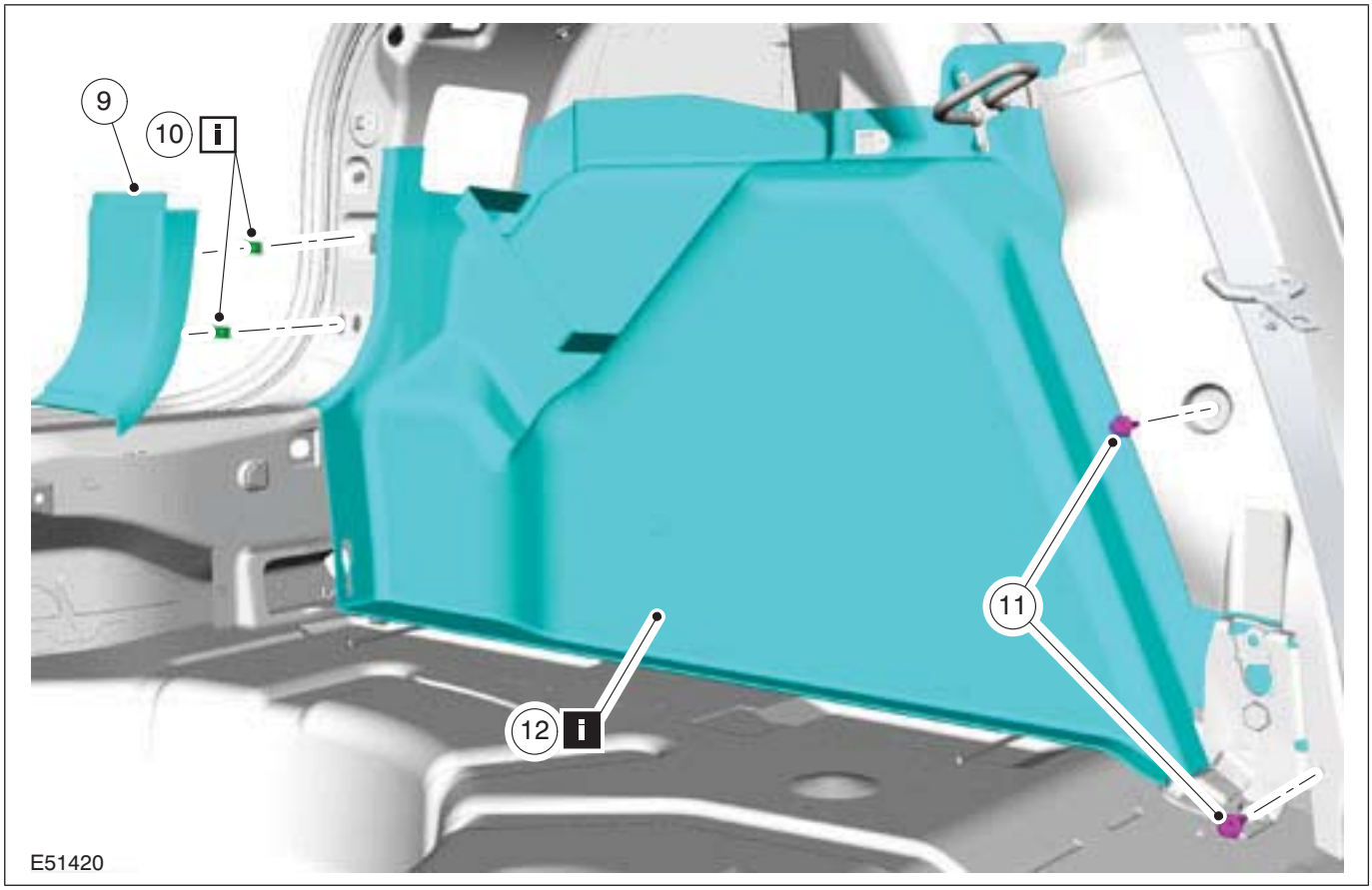
REMOVAL AND INSTALLATION



Item	Description
5	Liftgate opening weatherstrip See Removal Detail
6	Loadspace scuff plate trim panel retaining clips

Item	Description
7	Loadspace scuff plate trim panel
8	Loadspace scuff plate trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
9	Loadspace scuff plate trim panel extension trim panel
10	Loadspace scuff plate trim panel extension trim panel retaining clips See Installation Detail

Item	Description
11	Rear quarter trim panel retaining clips
12	Loadspace trim panel See Removal Detail

7. To install, reverse the removal procedure.

Removal Details

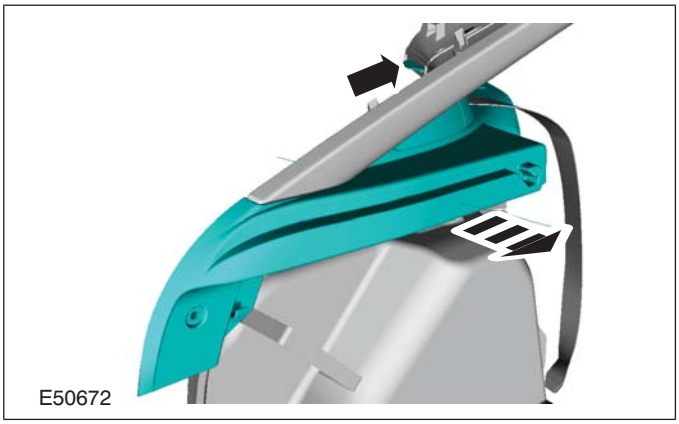
Item 1 Liftgate opening weatherstrip

1. Detach the liftgate opening weatherstrip.

Item 3 Rear parcel shelf support trim panel

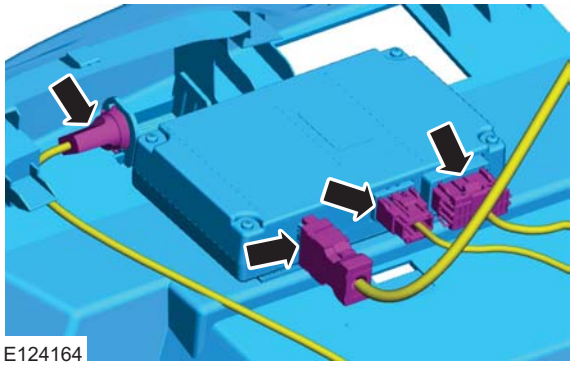
1. Detach the rear parcel shelf support trim panel.

- Pull the rear parcel shelf support trim panel away from the rear quarter body panel to release the retaining tang from the rear quarter window glass trim panel.



REMOVAL AND INSTALLATION

2. Disconnect the electrical connectors (if equipped).



Installation Details

Item 10 Loadspace scuff plate trim panel extension trim panel retaining clips

1. Install the loadspace scuff plate trim panel extension trim panel retaining clips to the loadspace scuff plate trim panel extension trim panel before the loadspace scuff plate trim panel extension trim panel is installed.

Item 8 Loadspace scuff plate trim panel retaining clips

1. Install the loadspace scuff plate trim panel retaining clips to the loadspace scuff plate trim panel before the loadspace scuff plate trim panel is installed.

Item 4 Rear parcel shelf support trim panel retaining clips

1. Install the rear parcel shelf support trim panel retaining clips to the rear parcel shelf support trim panel before the rear parcel shelf support trim panel is installed to the vehicle.

Item 5 Liftgate opening weatherstrip

1. Detach the liftgate opening weatherstrip.

Item 12 Loadspace trim panel

1. Gently pull the rear quarter trim panel towards the center of the vehicle to allow the loadspace trim panel to be removed.

REMOVAL AND INSTALLATION

Headliner — 3-Door, Vehicles With: Sliding Roof Opening Panel

General Equipment

Draw cord

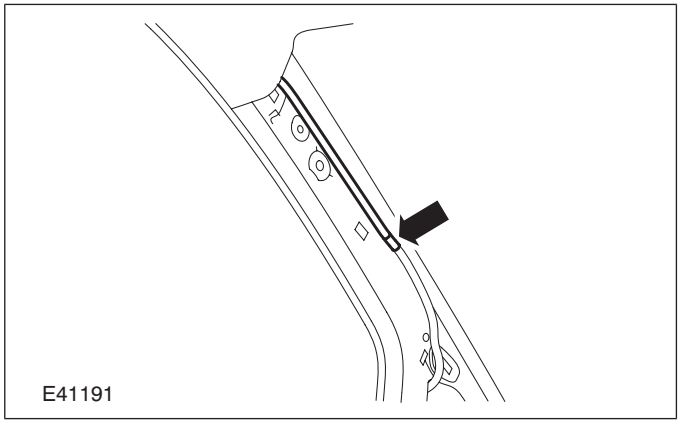
1. Disconnect the battery ground cable.

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Remove the A-pillar trim panels.

   For additional information, refer to: A-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

3. Disconnect the rear window washer tube.



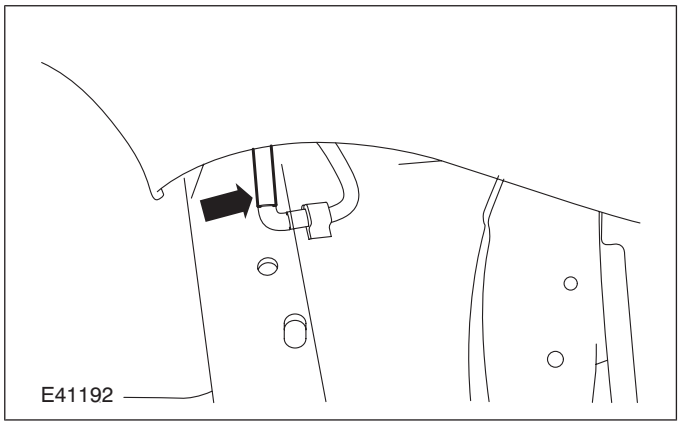
4. Remove the overhead console.

   For additional information, refer to: Overhead Console (501-12 Instrument Panel and Console, Removal and Installation).

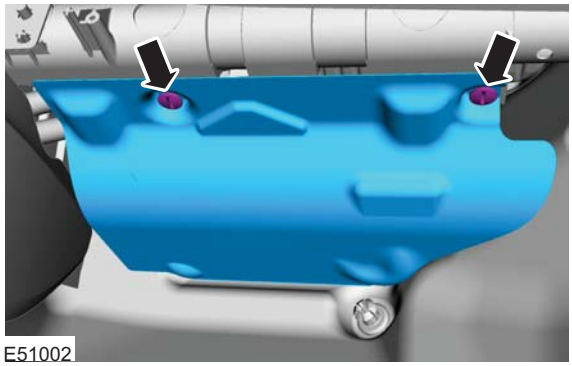
5. Remove the C-pillar trim panels.

   For additional information, refer to: C-Pillar Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

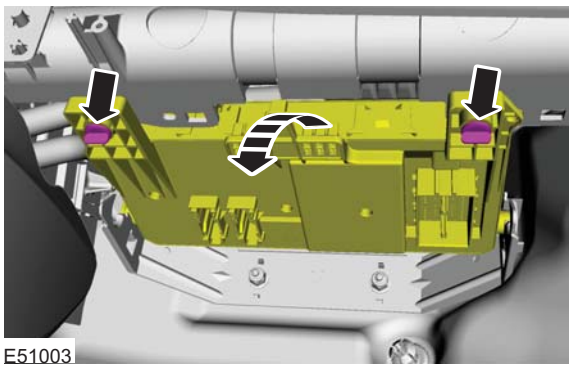
6. Disconnect the rear window washer tube.



7. Remove the instrument panel passenger side lower trim panel.

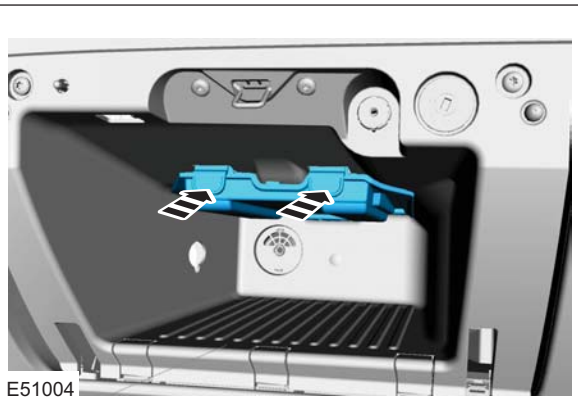


8. Lower the central junction box (CJB).



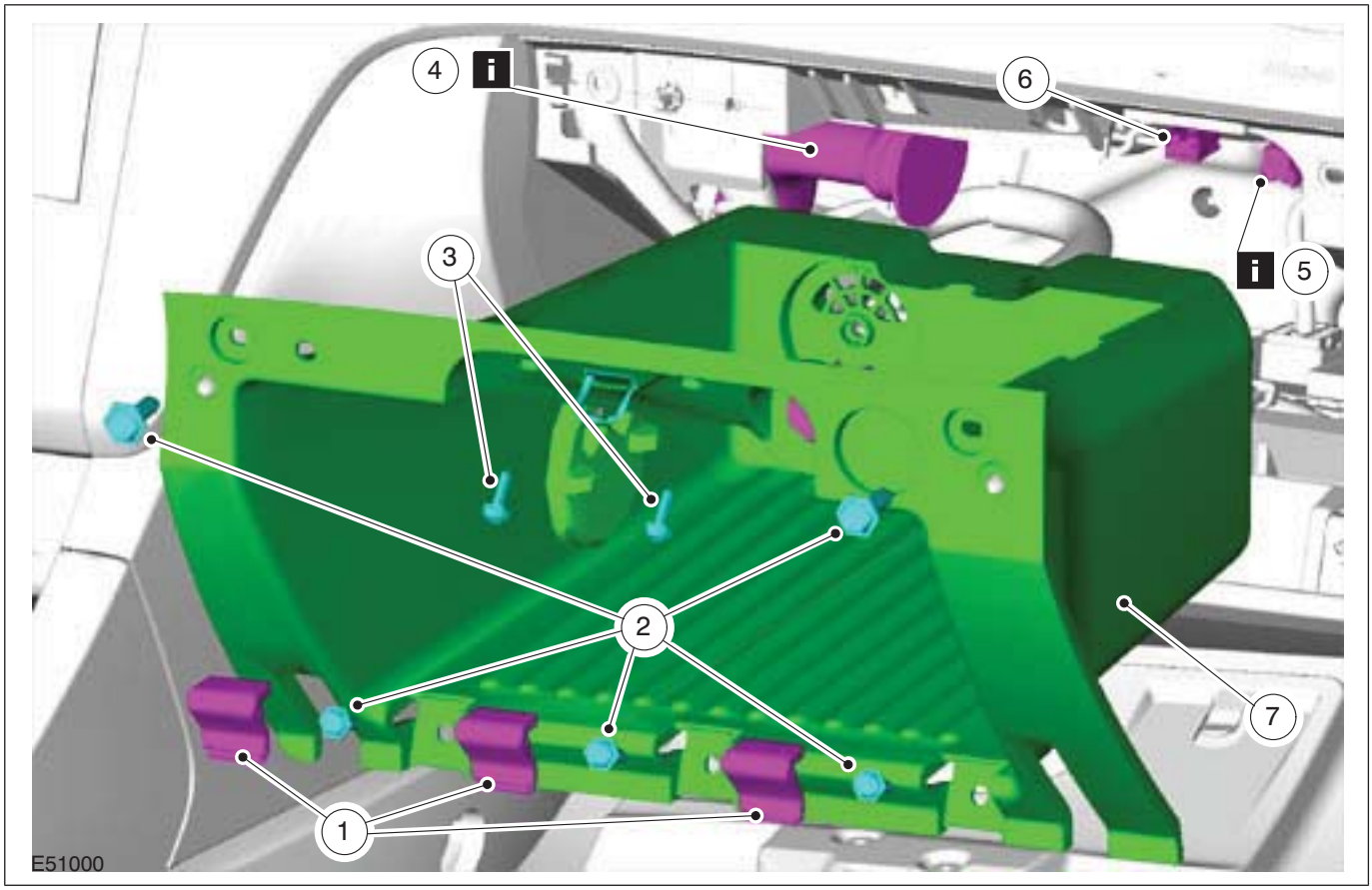
9. Open the glove compartment lid.

10. Remove the navigation system Digital Versatile Disc (DVD) unit access cover (if equipped).



11. Remove the components in the order indicated in the following illustration(s) and table(s).

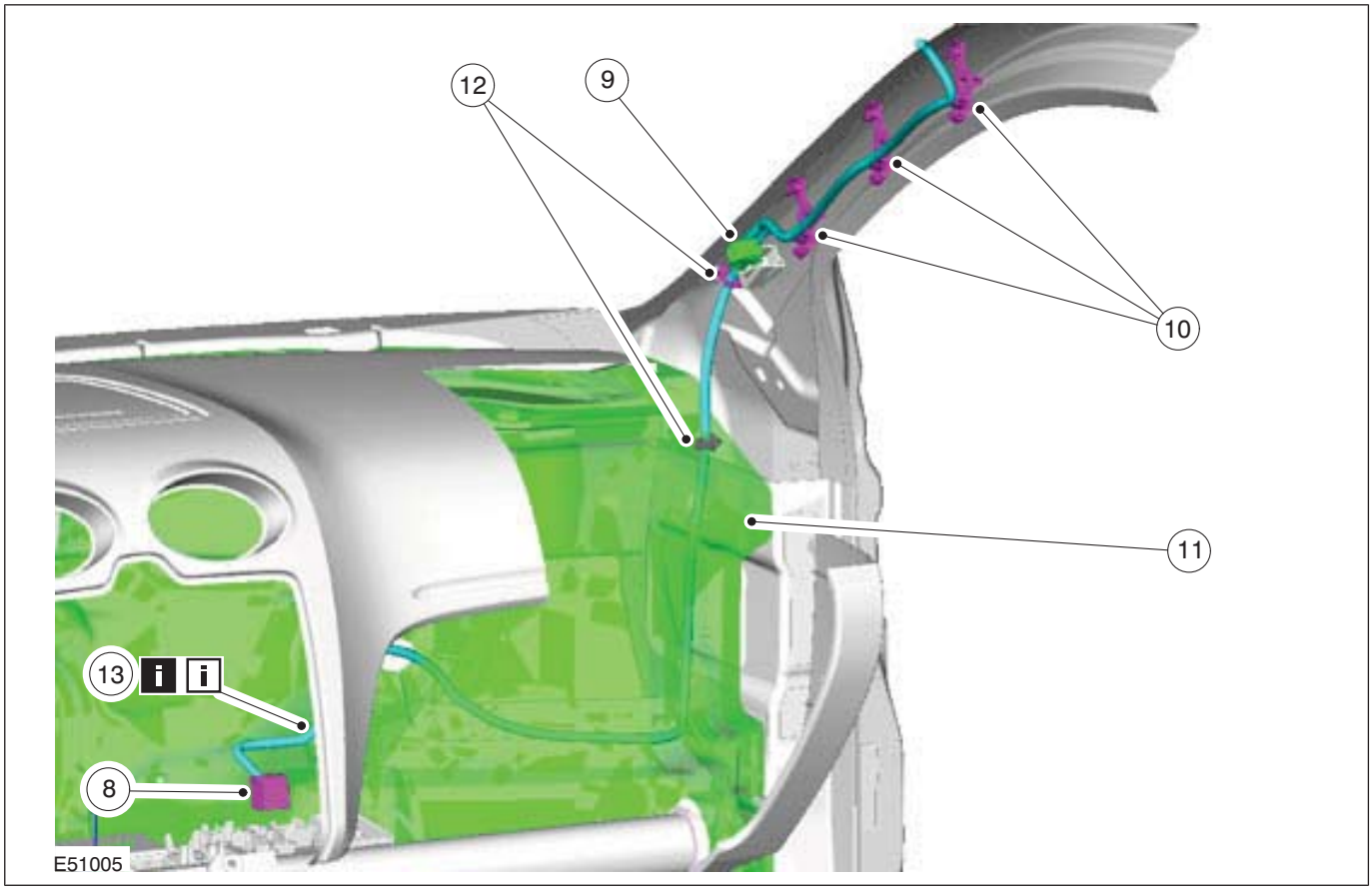
REMOVAL AND INSTALLATION



Item	Description
1	Glove compartment retaining screw covers
2	Glove compartment retaining screws
3	Glove compartment lid striker retaining screws
4	Glove compartment cooling hose See Removal Detail

Item	Description
5	Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector. (If equipped) See Removal Detail
6	Passenger airbag deactivation switch electrical connector. (If equipped)
7	Glove compartment housing

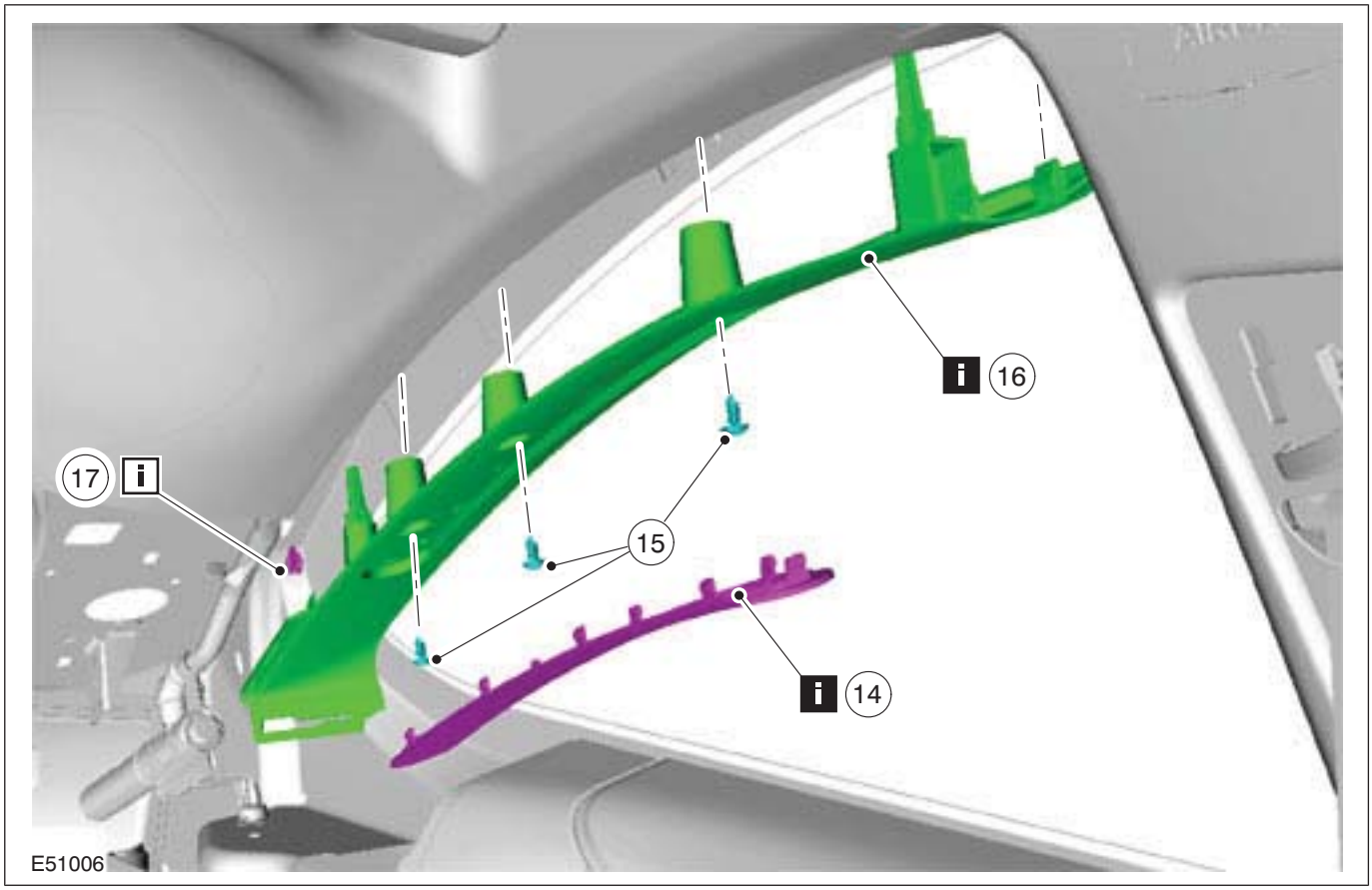
REMOVAL AND INSTALLATION



Item	Description
8	Roof wiring harness to CJB electrical connector
9	Roof wiring harness electrical connector
10	Roof wiring harness to A-pillar retaining clips

Item	Description
11	Noise, vibration and harshness (NVH) material See Removal Detail See Installation Detail
12	Roof wiring harness retaining clips
13	Roof wiring harness See Removal Detail See Installation Detail

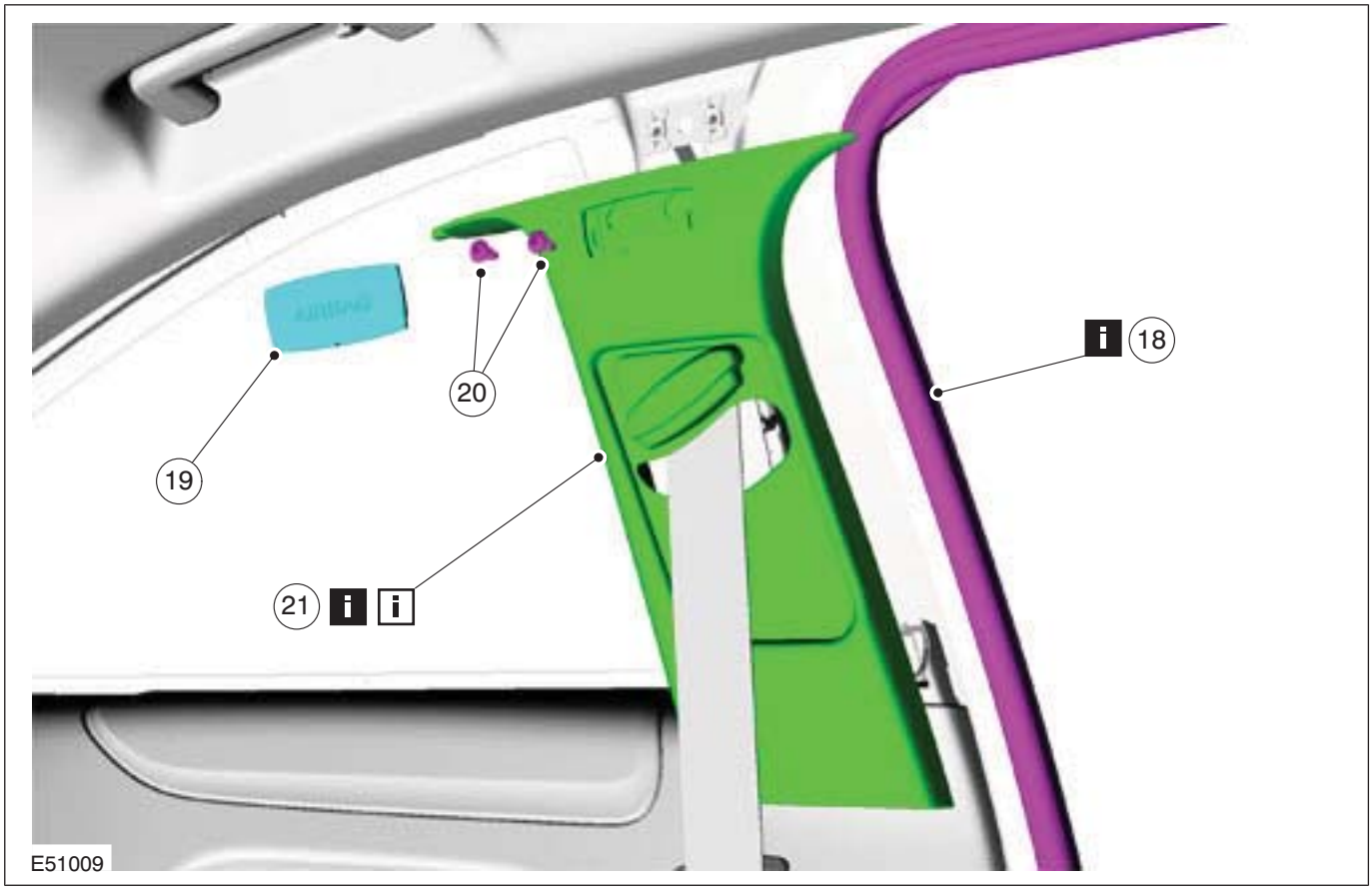
REMOVAL AND INSTALLATION



Item	Description
14	Rear quarter window glass trim panel retaining screw trim covers See Removal Detail
15	Rear quarter window glass trim panel retaining screws

Item	Description
16	Rear quarter window glass trim panels See Removal Detail
17	Rear quarter window glass trim panel retaining clips See Installation Detail

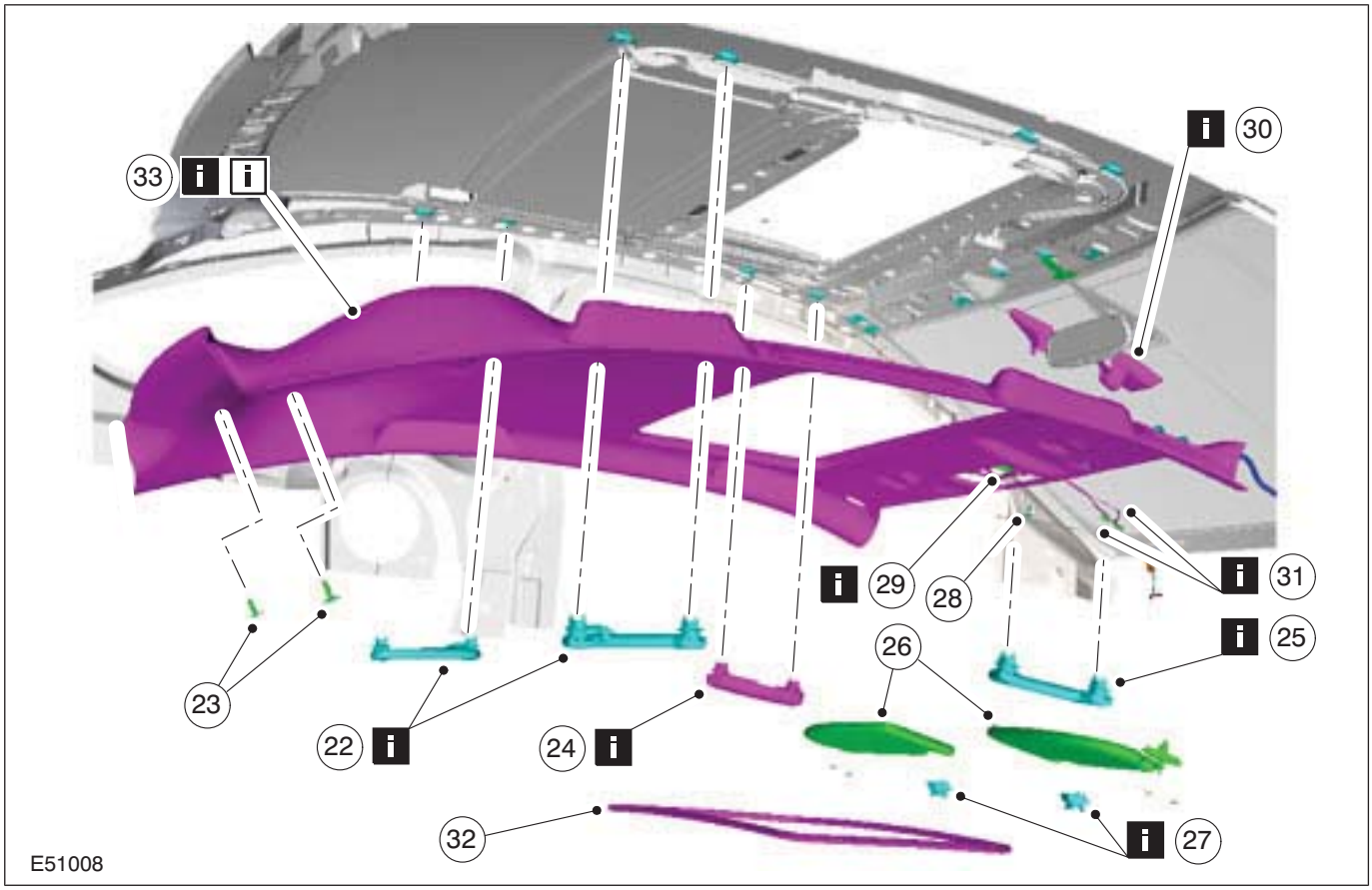
REMOVAL AND INSTALLATION



Item	Description
18	Door opening weatherstrips See Removal Detail
19	B-pillar trim panel retaining screw trim covers

Item	Description
20	B-pillar trim panel retaining screws
21	B-pillar trim panels See Removal Detail See Installation Detail

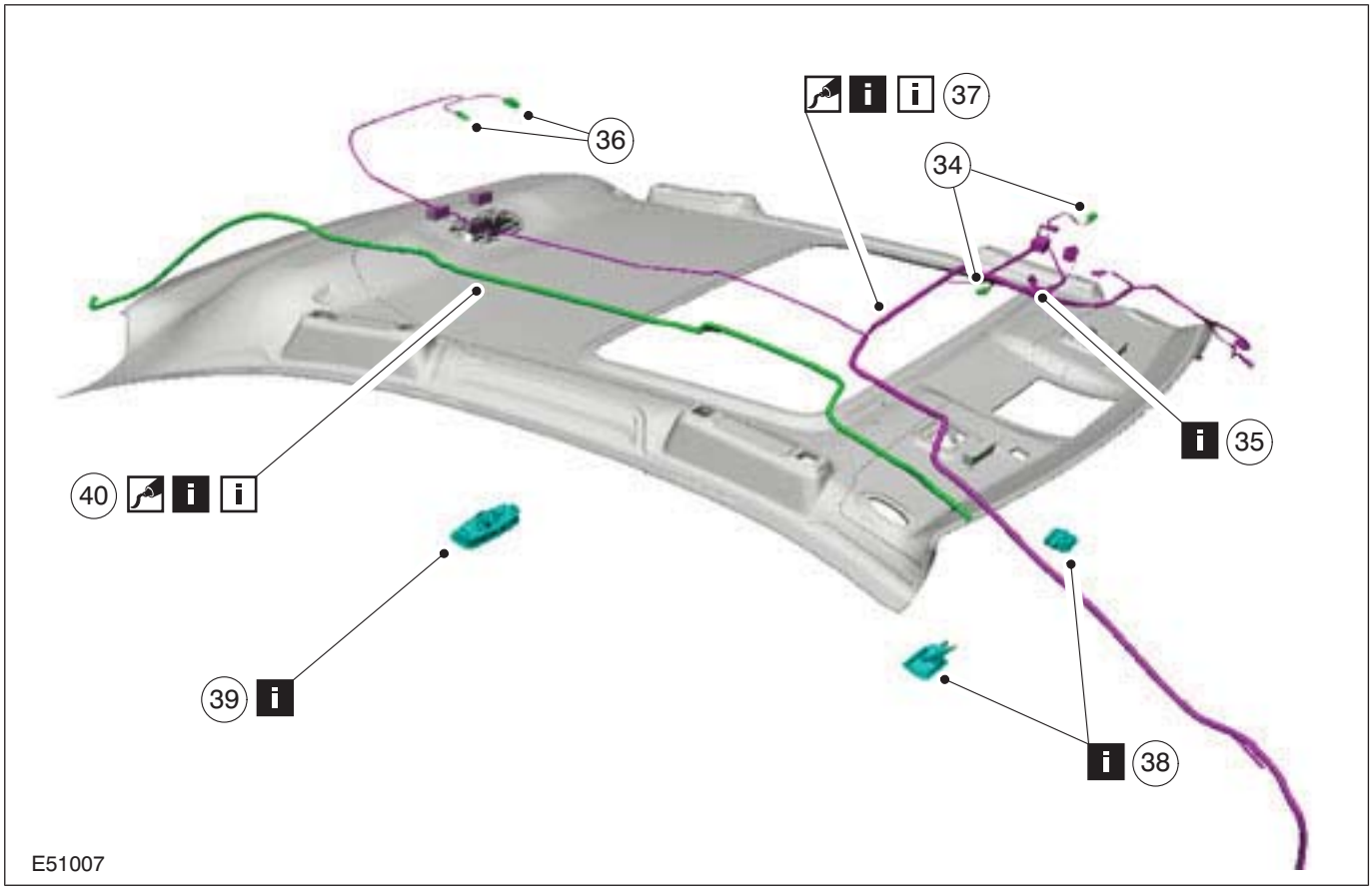
REMOVAL AND INSTALLATION



Item	Description
22	Rear passenger assist handles See Removal Detail
23	Headliner retaining clips
24	Glasses holder See Removal Detail
25	Front passenger assist handle See Removal Detail
26	Sun-visors
27	Sun-visor retaining clips See Removal Detail
28	Roof wiring harness ground connection retaining bolt See Removal Detail

Item	Description
29	Sliding roof opening panel motor electrical connector See Removal Detail
30	Auto-dimming interior mirror trim covers See Removal Detail
31	Auto-dimming interior mirror and rain sensor electrical connectors See Removal Detail
32	Sliding roof opening panel trim
33	Headliner trim panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
34	Sun visor illumination lamp electrical connectors
35	Radio frequency (RF) receiver See Removal Detail
36	Rear interior lamp electrical connector
37	Roof wiring harness See Removal Detail See Installation Detail
38	Sun visor illumination lamps See Removal Detail

Item	Description
39	Rear interior lamp See Removal Detail
40	Rear window washer tube See Removal Detail See Installation Detail

12. **To install, reverse the removal procedure.**
13. **Vehicles with global closing, initialize the door window motors.**

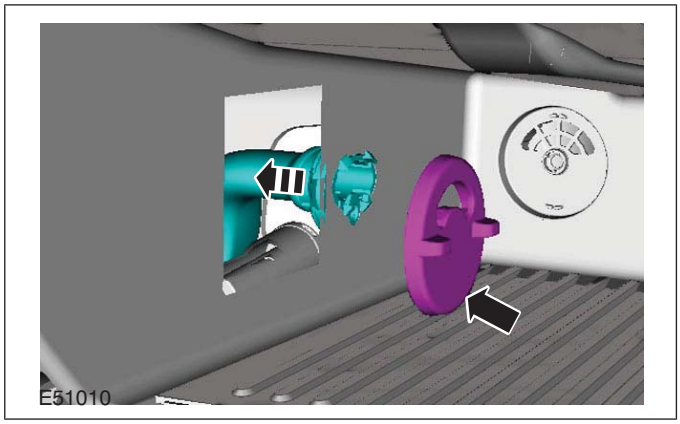
    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

REMOVAL AND INSTALLATION

Item 4 Glove compartment cooling hose

1. Detach the glove compartment cooling hose from the glove compartment cooling vent.



Item 5 Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector. (If equipped)

CAUTION: Do not place excessive strain on the electrical wiring harness when detaching the glove compartment.

1. Reposition the glove compartment and disconnect the MP3 auxiliary connector electrical connector. If equiped.

Item 11 Noise, vibration and harshness (NVH) material

1. Detach the NVH material from the upper A-pillar area to gain access to the roof wiring harness retaining clip.

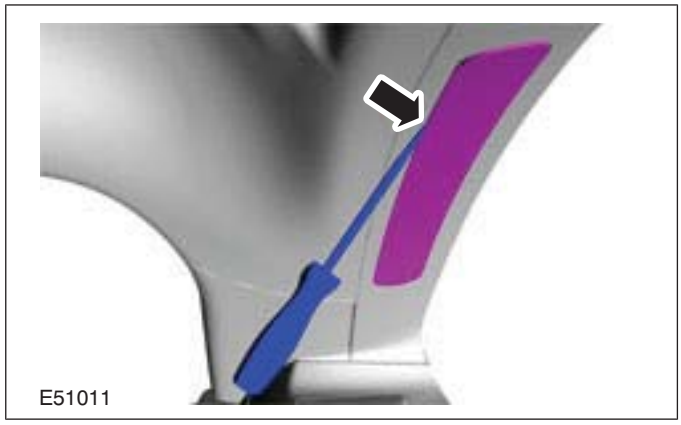
Item 13 Roof wiring harness

1. Attach a draw cord to the roof wiring harness and CJB electrical connector. Feed the wiring harness through the NVH material to above the instrument panel A-pillar area.

Item 14 Rear quarter window glass trim panel retaining screw trim covers

CAUTION: Care must be taken not to damage the rear quarter window glass trim panels and retaining screw trim covers.

1. Using a suitable flat blade screwdriver, lever out the rear quarter window glass trim panel retaining screw trim cover.



Item 16 Rear quarter window glass trim panels

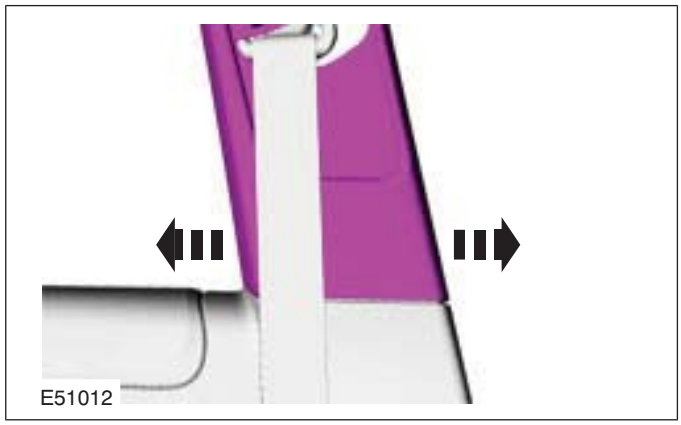
1. Detach the rear quarter window glass trim panel to B-pillar trim panel retaining clip.

Item 18 Door opening weatherstrips

1. Detach the door opening weatherstrip from the door opening upper area.

Item 21 B-pillar trim panels

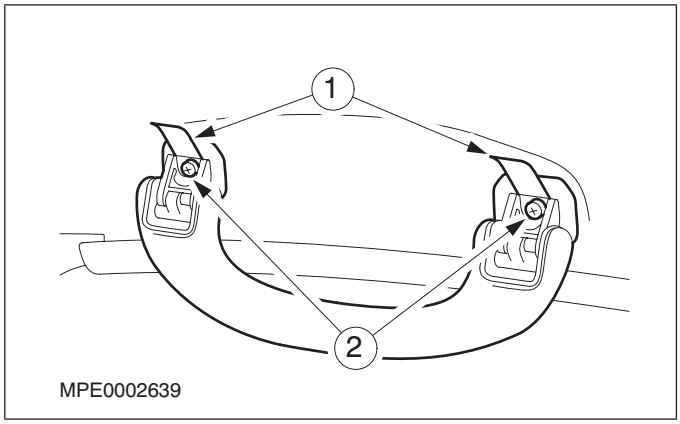
1. Detach the B-pillar trim panel and position to one side.



REMOVAL AND INSTALLATION

Item 22 Rear passenger assist handles

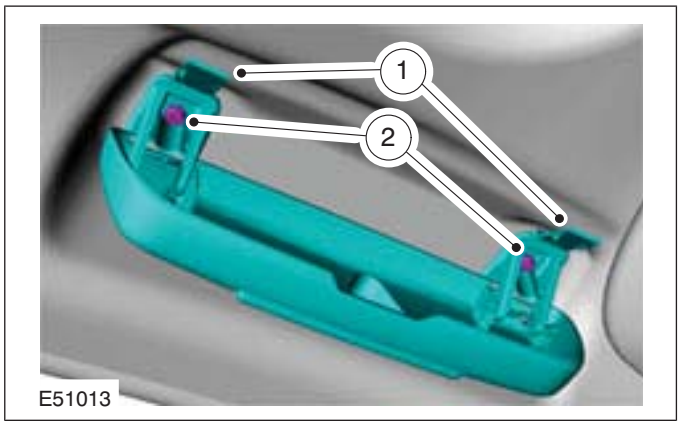
1. Lever open the rear passenger assist handle screw covers.



2. Remove the rear passenger assist handle retaining screws.

Item 24 Glasses holder

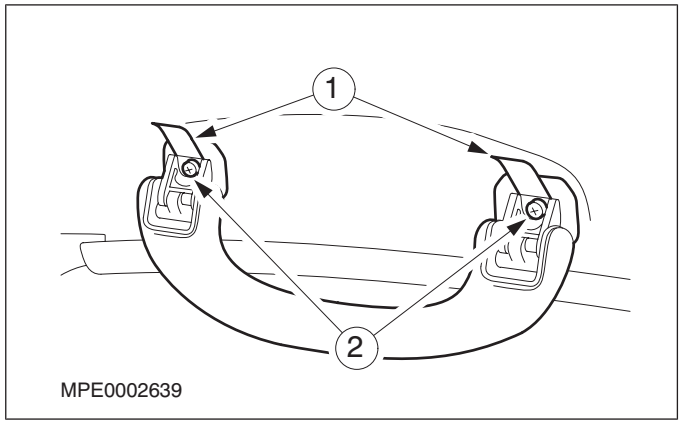
1. Lever open the glasses holder retaining screw covers.



2. Remove the glasses holder retaining screws.

Item 25 Front passenger assist handle

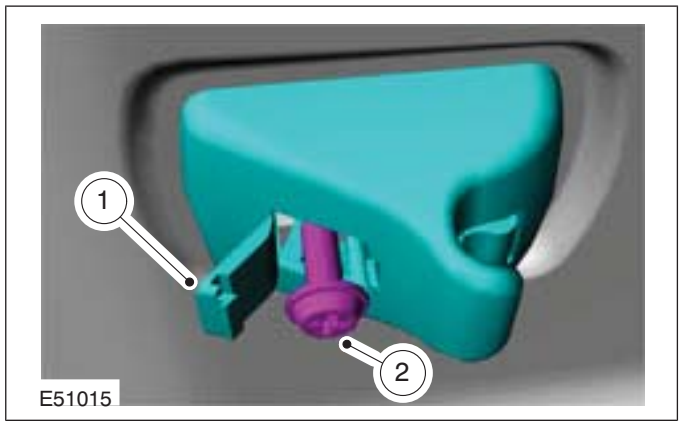
1. Lever open the front passenger assist handle retaining screw covers.



2. Remove the front passenger assist handle retaining screws.

Item 27 Sun-visor retaining clips

1. Lever open the sun visor retaining clips retaining screw cover.

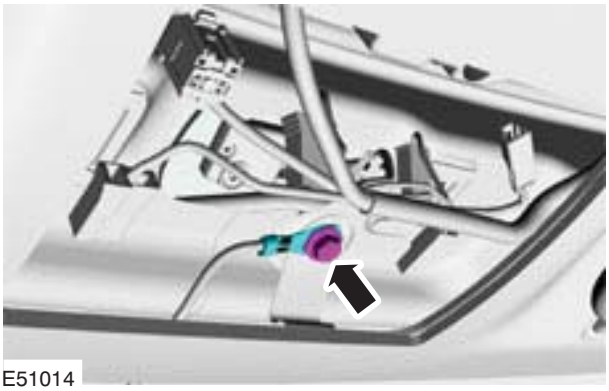


2. Remove the sun visor retaining clips retaining screw.

REMOVAL AND INSTALLATION

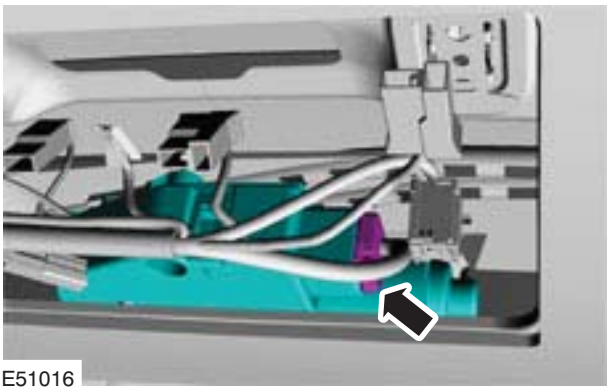
Item 28 Roof wiring harness ground connection retaining bolt

1. Detach the roof wiring harness and windscreen ground electrical connectors.



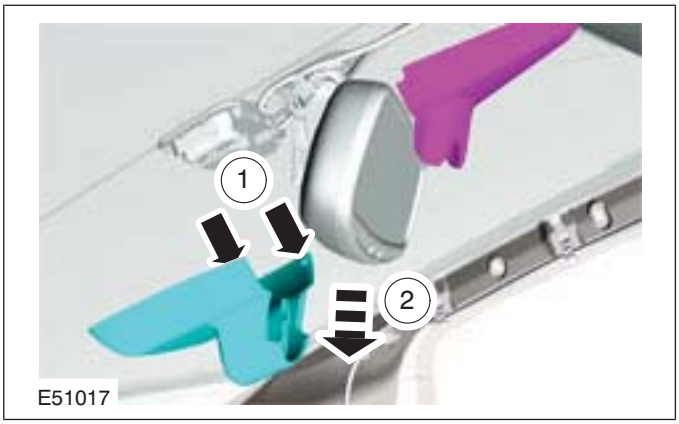
Item 29 Sliding roof opening panel motor electrical connector

1. Disconnect the sliding roof opening panel motor electrical connector.



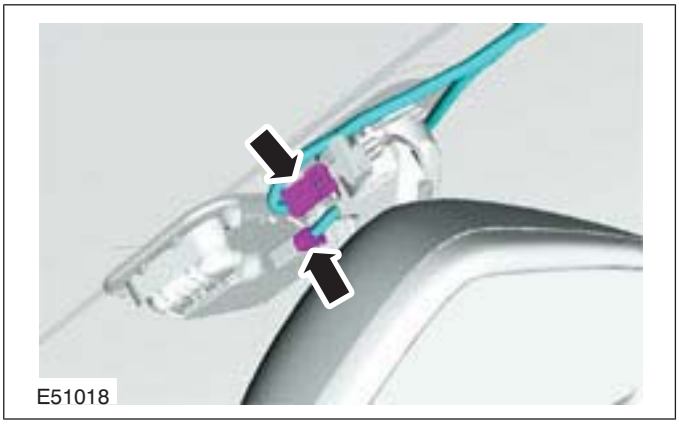
Item 30 Auto-dimming interior mirror trim covers

1. Remove the auto-dimming interior mirror and rain sensor trim covers.
   1. Release the locking clips.
   2. Slide the rain sensor trim cover off the auto-dimming interior mirror trim cover.



Item 31 Auto-dimming interior mirror and rain sensor electrical connectors

1. Disconnect the auto-dimming interior mirror and rain sensor electrical connectors.



Item 33 Headliner trim panel

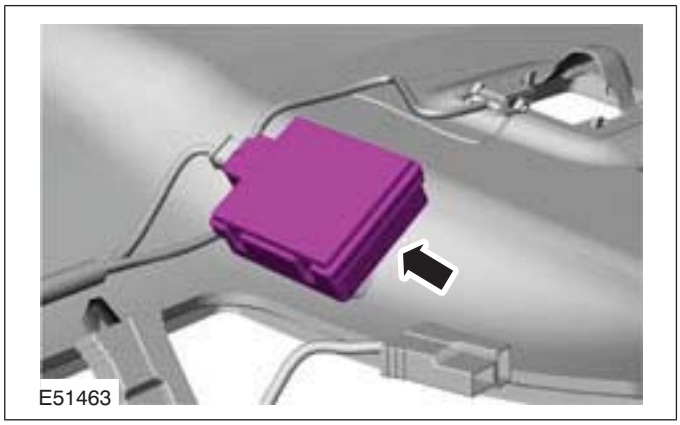
1. Tilt the front seats forward.
2. With the aid of another technician, remove the headliner through the liftgate opening.

Item 35 Radio frequency (RF) receiver

NOTE: Make a note of the position of the RF receiver to make sure that it is installed in exactly the same position as when removed.

REMOVAL AND INSTALLATION

1. Using a suitable knife, detach the RF receiver from the headliner.



Item 37 Roof wiring harness

CAUTIONS:

Take care not to damage the insulation of the roof wiring harness.

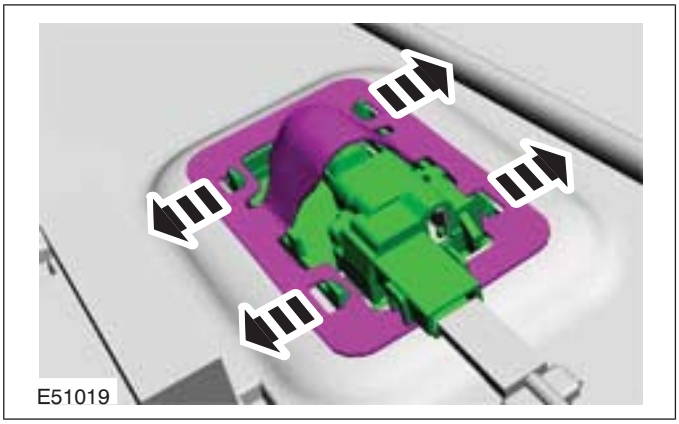
The roof wiring harness must be cut off of the headliner and not pulled or ripped. Failure to follow this instruction could result in the incorrect function of electrical components.

NOTE: Make a note of the position of the roof wiring harness to make sure that it is installed in exactly the same position as when removed.

1. Using a suitable knife, remove the roof wiring harness from the headliner.

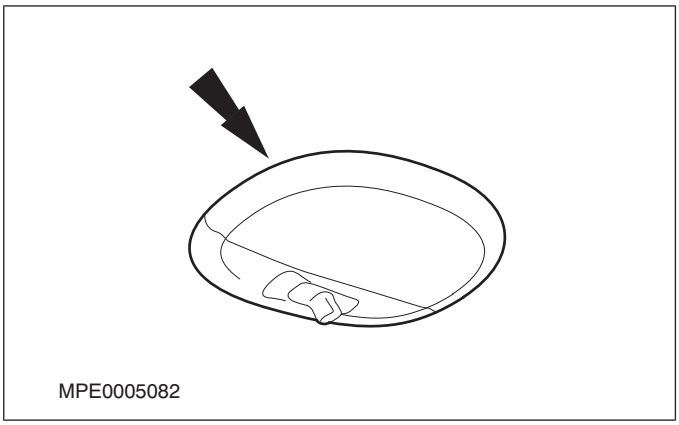
Item 38 Sun visor illumination lamps

1. Release the sunvisor illumination lamp retaining clips.



Item 39 Rear interior lamp

1. Lever out the rear interior lamp.



Item 40 Rear window washer tube

CAUTION: Take care not to damage the rear window washer tube. Failure to follow this instruction could result in damage to the headliner.

NOTE: Make a note of the position of the rear window washer tube to make sure that it is installed in exactly the same position as when removed.

1. Using a suitable knife, remove the rear window washer tube from the headliner.

Installation Details

Item 40 Rear window washer tube

CAUTION: The rear window washer tube must be installed in the same position as when removed.

1. Using a suitable adhesive, bond the rear window washer tube to the headliner.

REMOVAL AND INSTALLATION

Item 37 Roof wiring harness

CAUTION: The roof wiring harness must be installed in the same position as when removed.

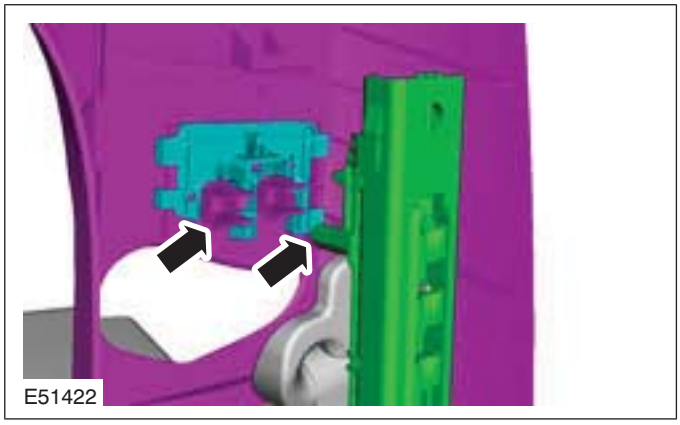
1. **Using a suitable adhesive, bond the roof wiring harness to the headliner.**

Item 33 Headliner trim panel

1. **With the aid of another technician, install the headliner.**

Item 21 B-pillar trim panels

NOTE: Make sure the B-pillar safety belt height adjustment lever is aligned with the safety belt height adjustment mechanism.



Item 17 Rear quarter window glass trim panel retaining clips

1. **Install the rear quarter window glass trim panel retaining clips to the rear quarter window glass trim panel.**

Item 13 Roof wiring harness

1. **Using the draw cord, feed the roof wiring harness through the NVH material.**

Item 11 Noise, vibration and harshness (NVH) material

1. **Reposition the NVH material.**

REMOVAL AND INSTALLATION

Headliner — 5-Door, Vehicles With: Sliding Roof Opening Panel

General Equipment

Draw cord

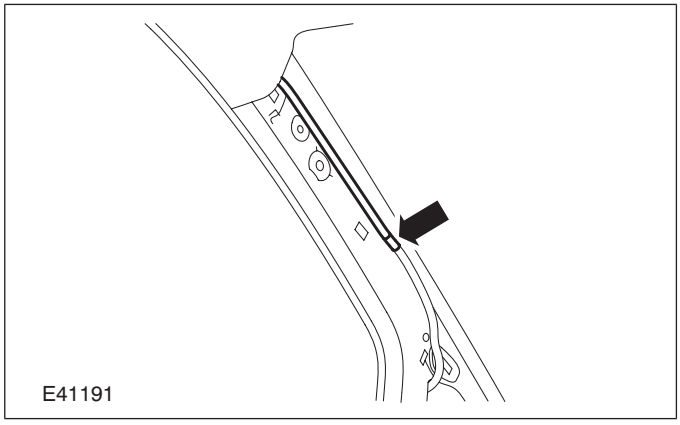
1. Disconnect the battery ground cable.

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Remove the A-pillar trim panels.

   For additional information, refer to: A-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

3. Disconnect the rear window washer tube.



4. Remove the overhead console.

   For additional information, refer to: Overhead Console (501-12 Instrument Panel and Console, Removal and Installation).

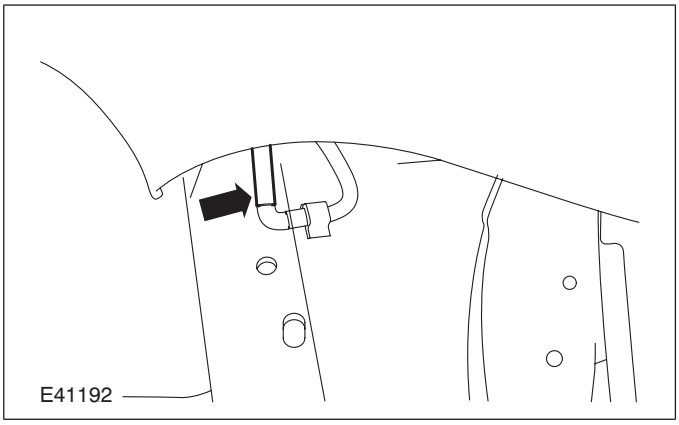
5. Remove the C-pillar trim panels.

   For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

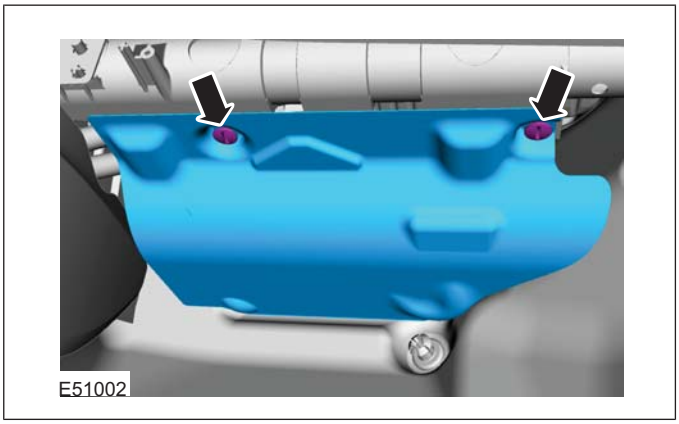
6. Remove the D-pillar trim panels.

   For additional information, refer to: D-Pillar Trim Panel - 5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

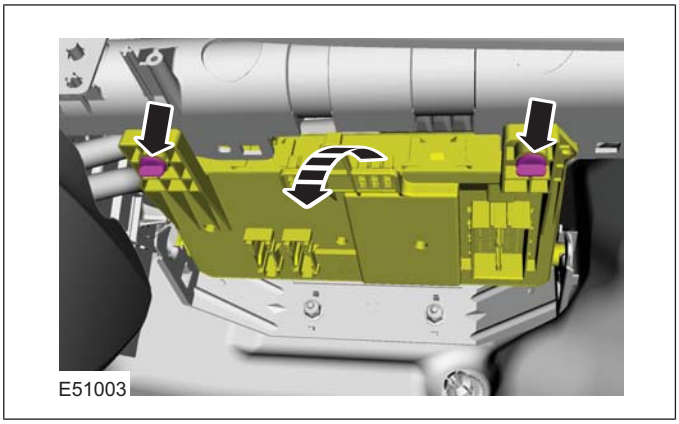
7. Disconnect the rear window washer tube.



8. Remove the instrument panel passenger side lower trim panel.



9. Lower the central junction box (CJB).



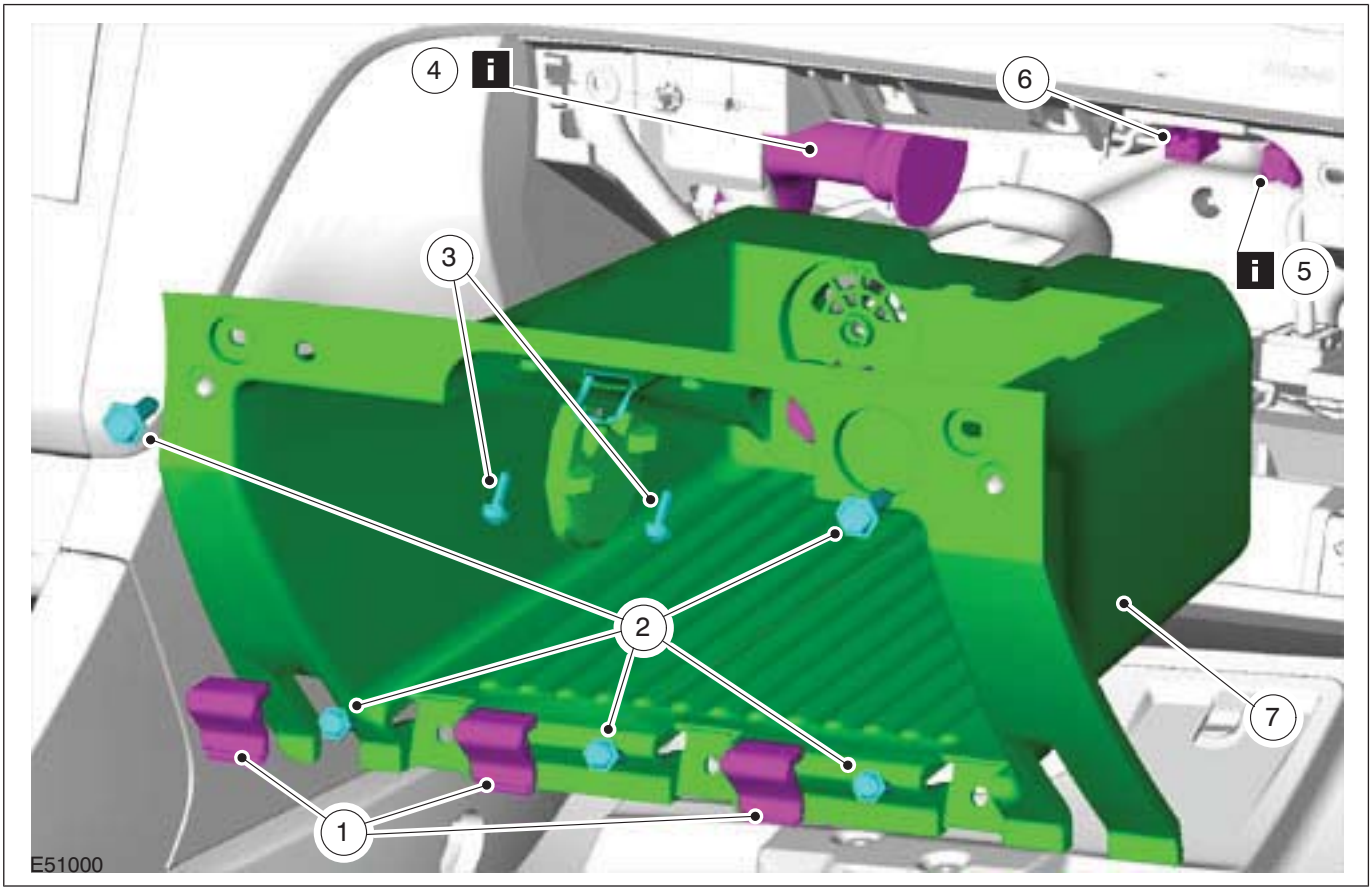
10. Open the glove compartment lid.

REMOVAL AND INSTALLATION

11. **Remove the navigation system digital versatile disc (DVD) unit access cover (if equipped).**



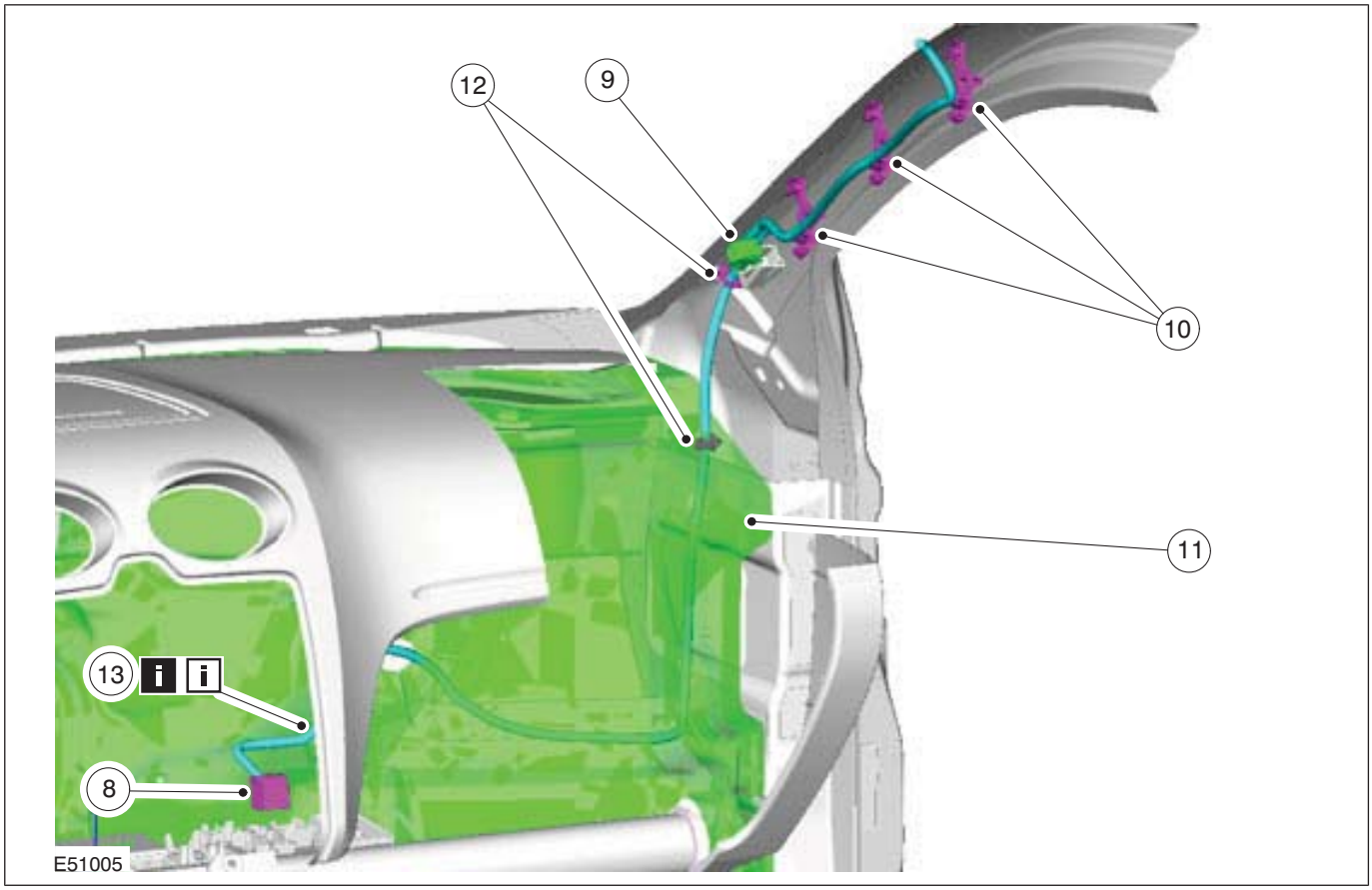
12. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Glove compartment retaining screw covers
2	Glove compartment retaining screws
3	Glove compartment lid striker retaining screws
4	Glove compartment cooling hose See Removal Detail

Item	Description
5	Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector See Removal Detail
6	Passenger airbag deactivation switch electrical connector
7	Glove compartment housing

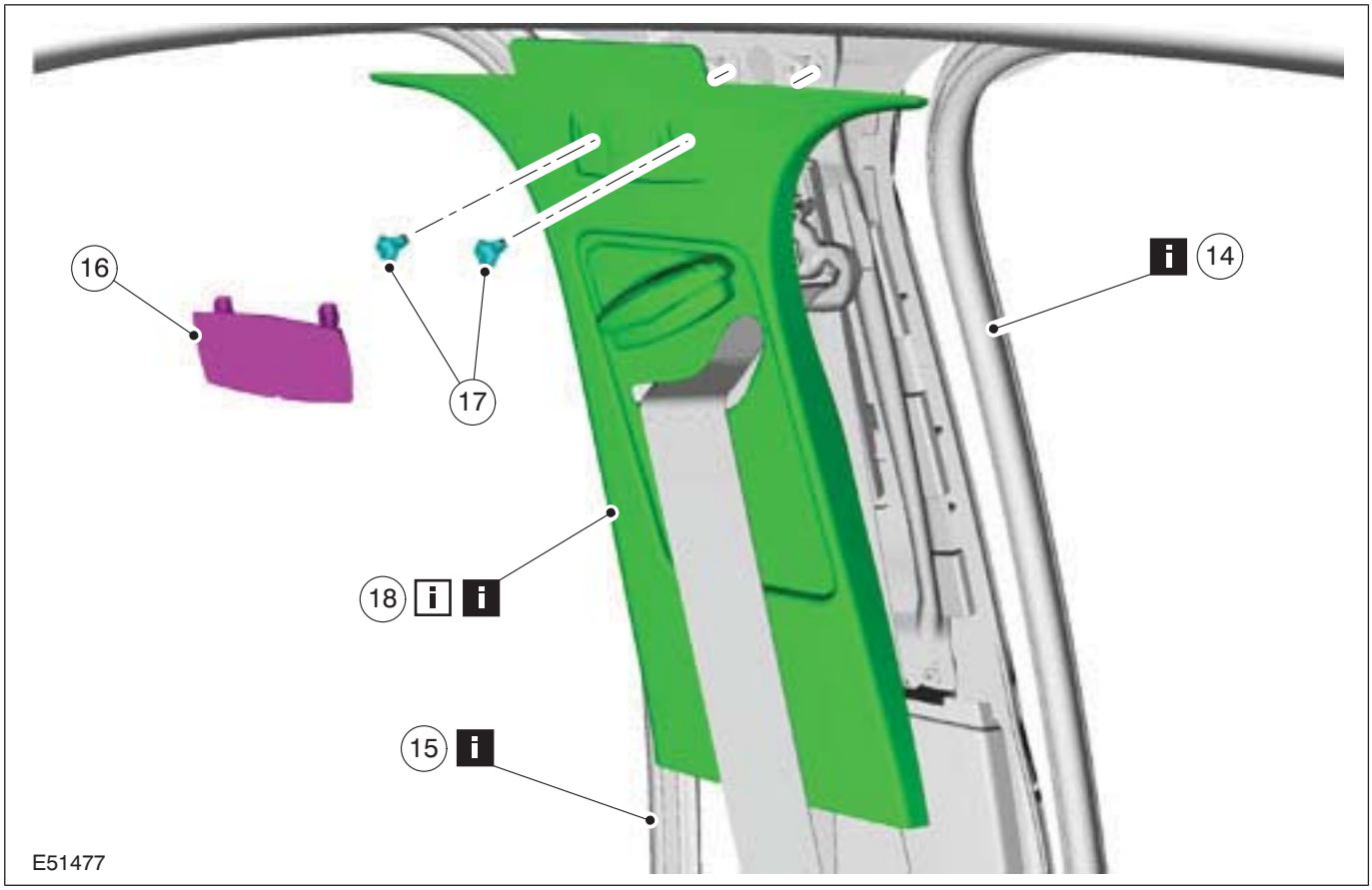
REMOVAL AND INSTALLATION



Item	Description
8	Roof wiring harness to CJB electrical connector
9	Roof wiring harness electrical connector
10	Roof wiring harness to A-pillar retaining clips

Item	Description
11	Noise, vibration and harshness (NVH) material See Removal Detail See Installation Detail
12	Roof wiring harness retaining clips
13	Roof wiring harness See Removal Detail See Installation Detail

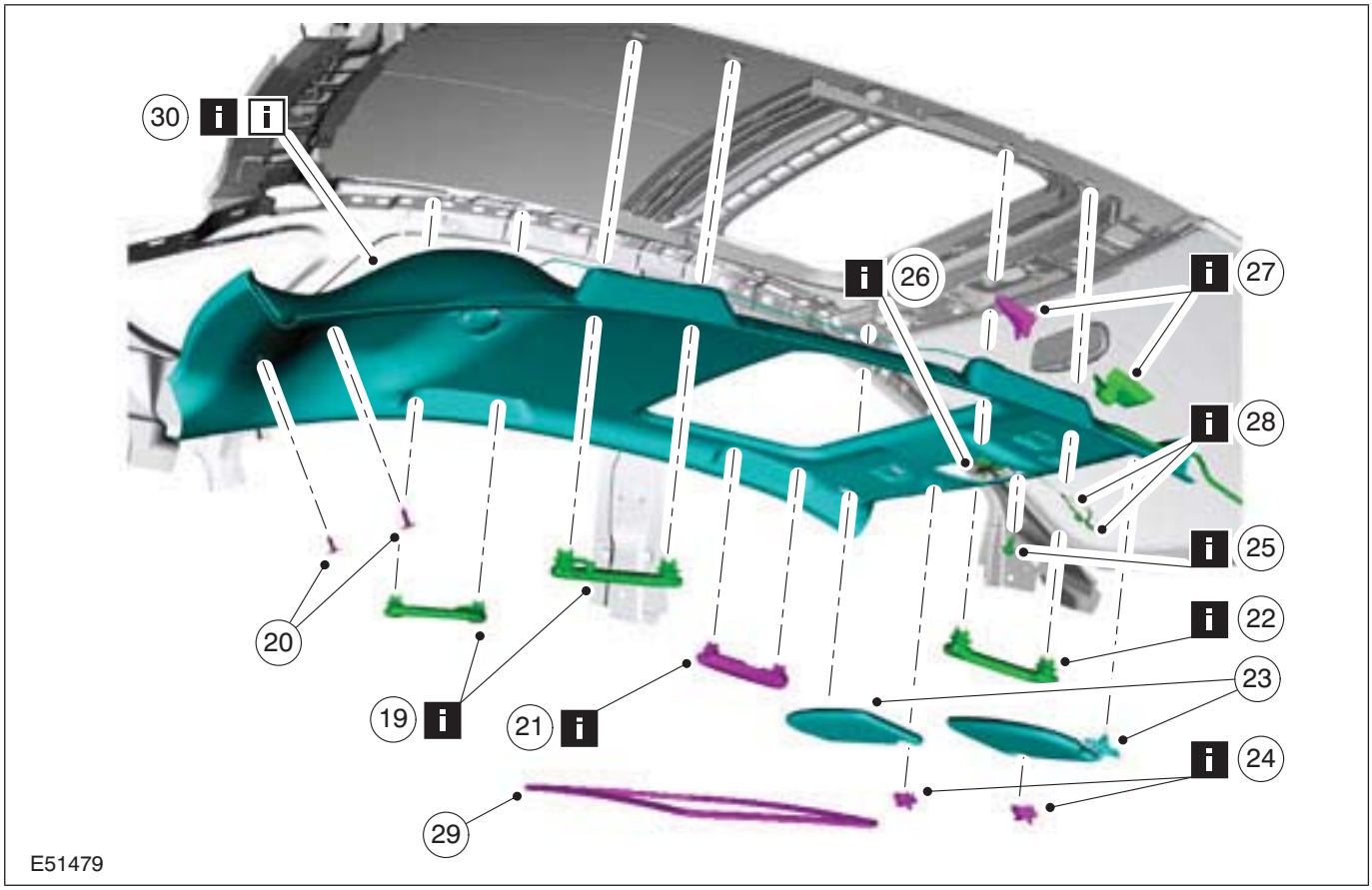
REMOVAL AND INSTALLATION



Item	Description
14	Front door opening weatherstrips See Removal Detail
15	Rear door opening weatherstrips See Removal Detail

Item	Description
16	B-pillar trim panel retaining screw trim covers
17	B-pillar trim panel retaining screws
18	B-pillar trim panels See Removal Detail See Installation Detail

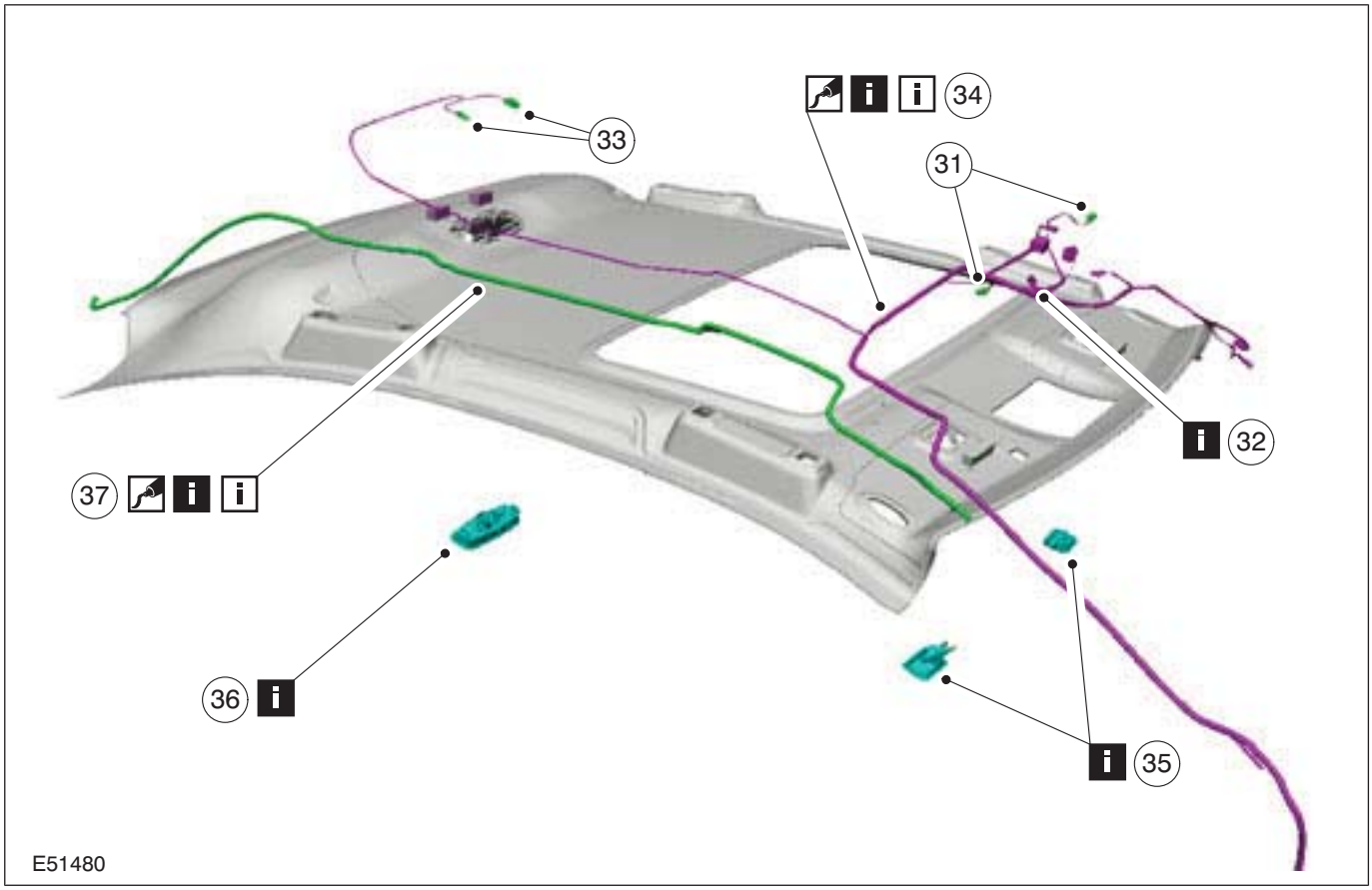
REMOVAL AND INSTALLATION



Item	Description
19	Rear passenger assist handles See Removal Detail
20	Headliner retaining clips
21	Glasses holder See Removal Detail
22	Front passenger assist handle See Removal Detail
23	Sun visors
24	Sun visor retaining clips See Removal Detail
25	Roof wiring harness ground connection retaining bolt See Removal Detail

Item	Description
26	Sliding roof opening panel motor electrical connector See Removal Detail
27	Auto-dimming interior mirror trim covers See Removal Detail
28	Auto-dimming interior mirror and rain sensor electrical connectors See Removal Detail
29	Sliding roof opening panel trim See Installation Detail
30	Headliner trim panel See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
31	Sunvisor illumination lamp electrical connectors
32	Radio frequency (RF) receiver See Removal Detail
33	Rear interior lamp electrical connector
34	Roof wiring harness See Removal Detail See Installation Detail
35	Sunvisor illumination lamps See Removal Detail

Item	Description
36	Rear interior lamp See Removal Detail
37	Rear window washer tube See Removal Detail See Installation Detail

13. **To install, reverse the removal procedure.**
14. **Vehicles with global closing, initialize the door window motors.**

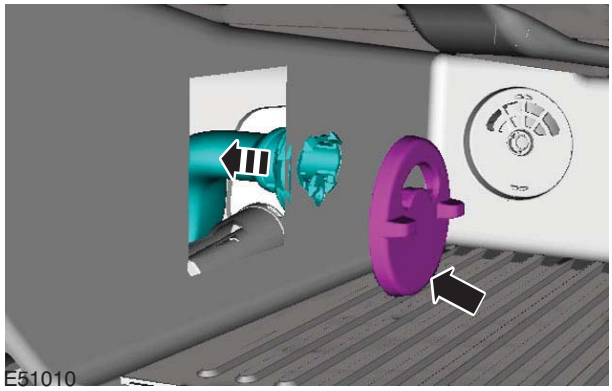
    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

REMOVAL AND INSTALLATION

Item 4 Glove compartment cooling hose

1. Detach the glove compartment cooling hose from the glove compartment cooling vent.



Item 5 Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector

CAUTION: Do not place excessive strain on the electrical wiring harness when detaching the glove compartment.

1. Reposition the glove compartment and disconnect the MP3 auxiliary connector electrical connector.

Item 11 Noise, vibration and harshness (NVH) material

1. Detach the NVH material from the upper A-pillar area to gain access to the roof wiring harness retaining clip.

Item 13 Roof wiring harness

1. Attach a draw cord to the roof wiring harness and CJB electrical connector. Feed the wiring harness through the NVH material to above the instrument panel A-pillar area.

Item 14 Front door opening weatherstrips

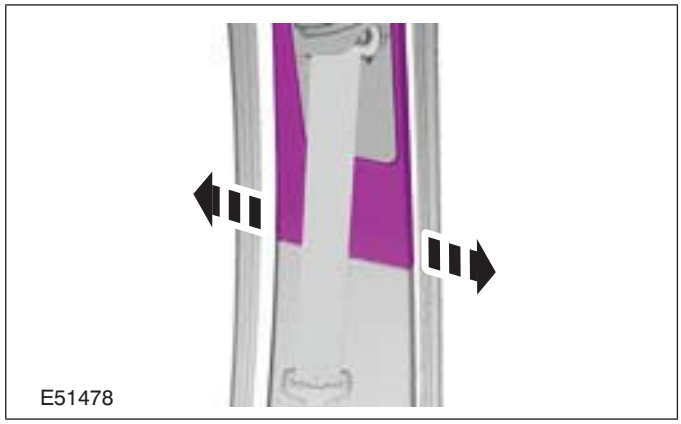
1. Detach the front door opening weatherstrip from the front door upper opening area.

Item 15 Rear door opening weatherstrips

1. Detach the rear door opening weatherstrip from the rear door upper opening area.

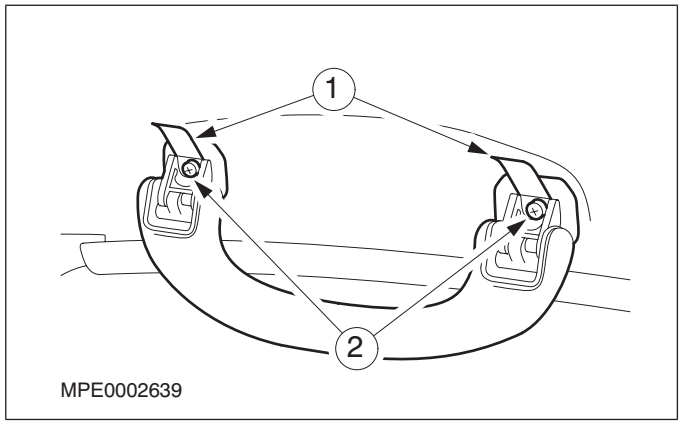
Item 18 B-pillar trim panels

1. Detach the B-pillar trim panels and position them to one side.



Item 19 Rear passenger assist handles

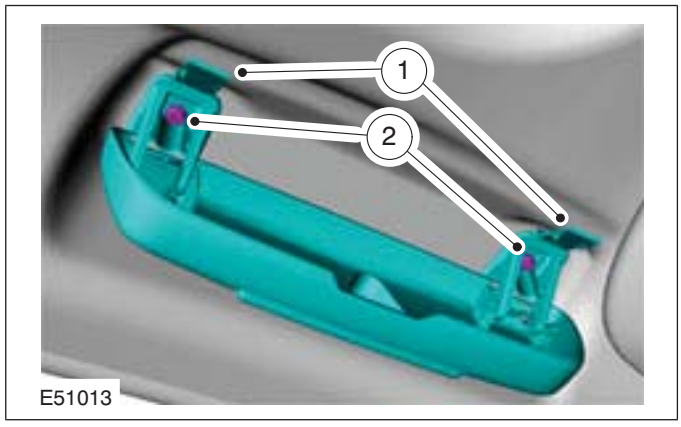
1. Lever open the rear passenger assist handle screw covers.



2. Remove the rear passenger assist handle retaining screws.

Item 21 Glasses holder

1. Lever open the glasses holder retaining screw covers.

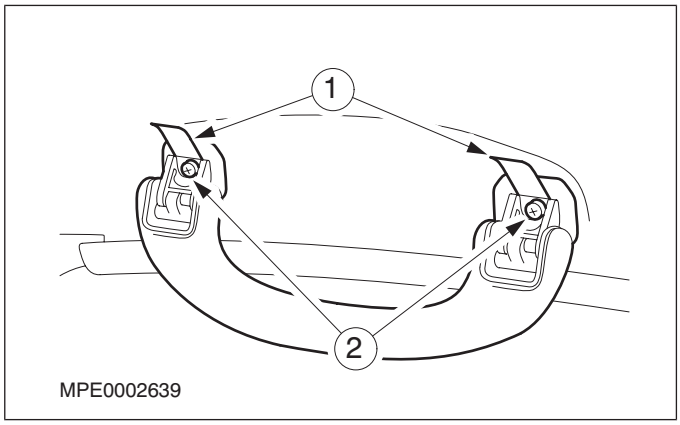


REMOVAL AND INSTALLATION

2. Remove the glasses holder retaining screws.

Item 22 Front passenger assist handle

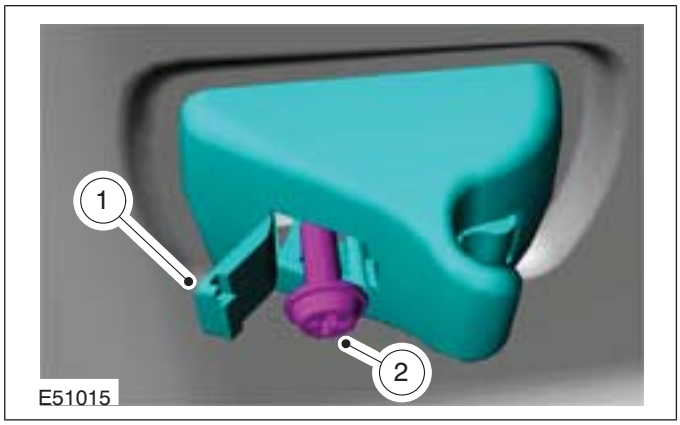
1. Lever open the front passenger assist handle retaining screw covers.



2. Remove the front passenger assist handle retaining screws.

Item 24 Sun visor retaining clips

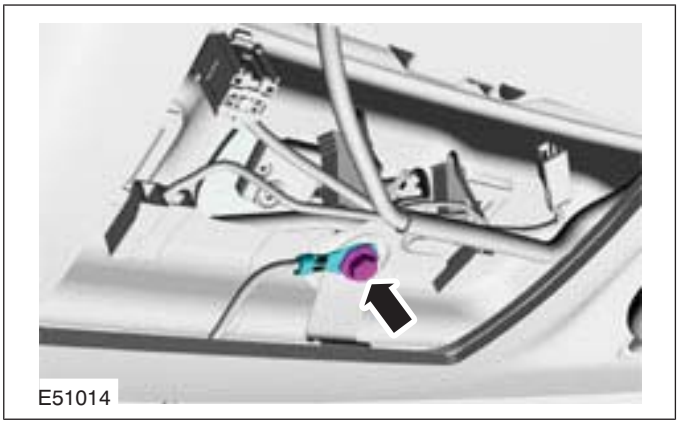
1. Lever open the sun visor retaining clips retaining screw cover.



2. Remove the sun visor retaining clips retaining screw.

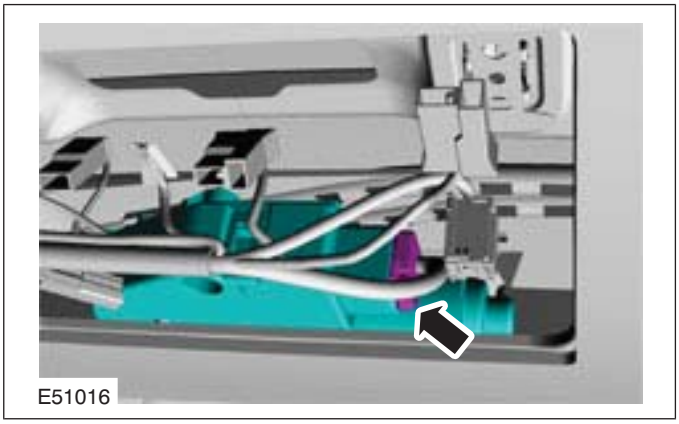
Item 25 Roof wiring harness ground connection retaining bolt

1. Detach the roof wiring harness and windscreen ground electrical connectors.



Item 26 Sliding roof opening panel motor electrical connector

1. Disconnect the sliding roof opening panel motor electrical connector.

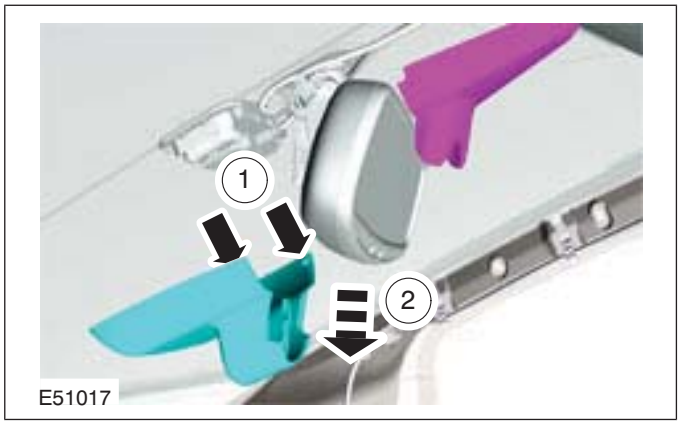


Item 27 Auto-dimming interior mirror trim covers

1. Remove the auto-dimming interior mirror and rain sensor trim covers.
   1. Release the locking clips.

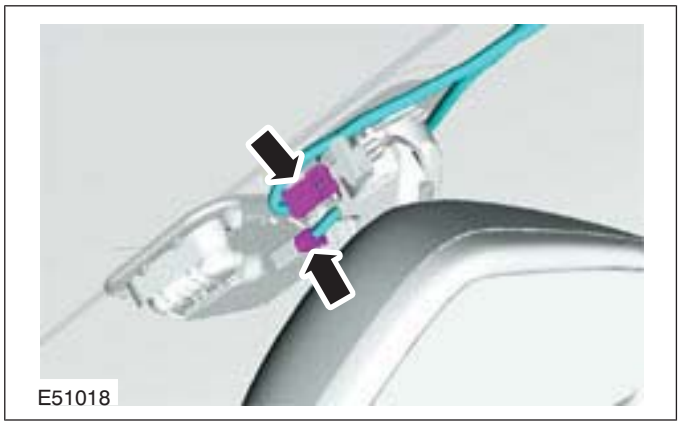
REMOVAL AND INSTALLATION

2. Slide the rain sensor trim cover off the auto-dimming interior mirror trim cover.



Item 28 Auto-dimming interior mirror and rain sensor electrical connectors

1. **Disconnect the auto-dimming interior mirror and rain sensor electrical connectors.**



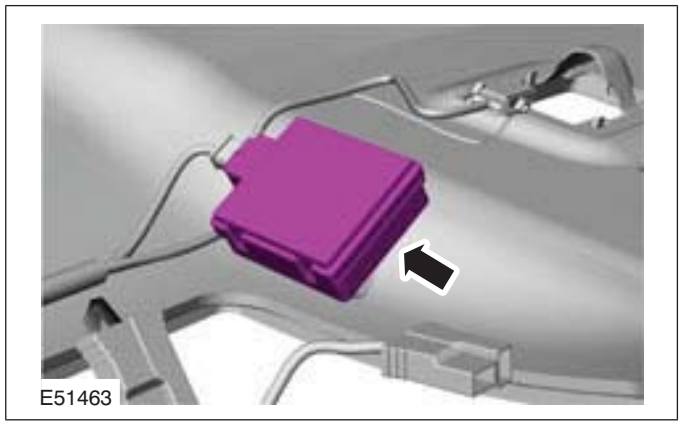
Item 30 Headliner trim panel

1. **Tilt the front seats forward.**
2. **With the aid of another technician, remove the headliner through the liftgate opening.**

Item 32 Radio frequency (RF) receiver

NOTE: Make a note of the position of the RF receiver to make sure that it is installed in exactly the same position as when removed.

1. **Using a suitable knife, detach the RF receiver from the headliner.**



Item 34 Roof wiring harness

CAUTIONS:

Take care not to damage the insulation of the roof wiring harness.

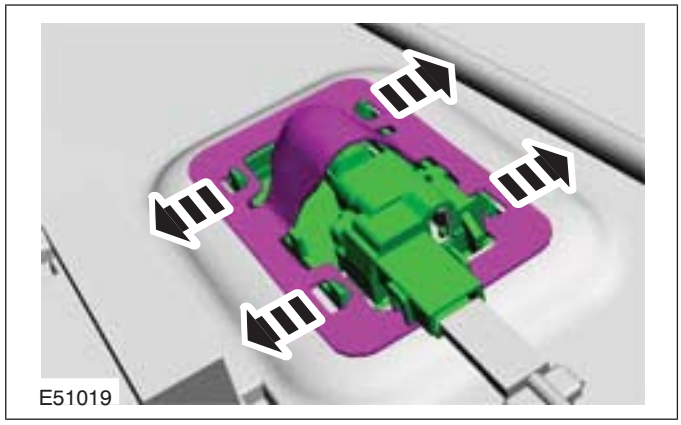
The roof wiring harness must be cut off of the headliner and not pulled or ripped. Failure to follow this instruction could result in the incorrect function of electrical components.

NOTE: Make a note of the position of the roof wiring harness to make sure that it is installed in exactly the same position as when removed.

1. **Using a suitable knife, remove the roof wiring harness from the headliner.**

Item 35 Sunvisor illumination lamps

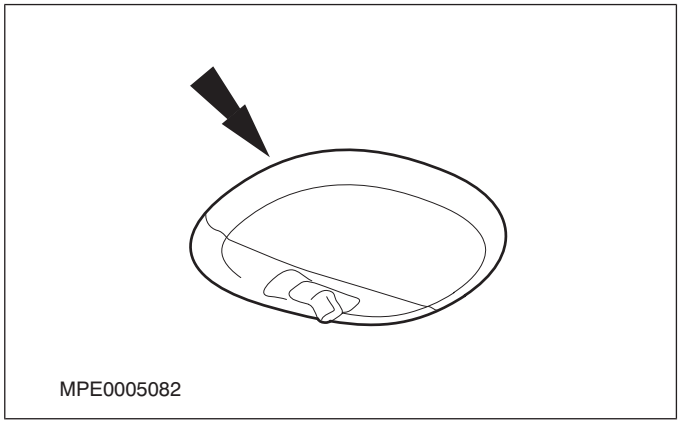
1. **Release the sunvisor illumination lamp retaining clips.**



REMOVAL AND INSTALLATION

Item 36 Rear interior lamp

1. Lever out the rear interior lamp.



Item 37 Rear window washer tube

CAUTION: Take care not to damage the rear window washer tube. Failure to follow this instruction could result in damage to the headliner.

NOTE: Make a note of the position of the rear window washer tube to make sure that it is installed in exactly the same position as when removed.

1. Using a suitable knife, remove the rear window washer tube from the headliner.

Installation Details

Item 37 Rear window washer tube

CAUTION: The rear window washer tube must be installed in the same position as when removed.

1. Using a suitable adhesive, bond the rear window washer tube to the headliner.

Item 34 Roof wiring harness

CAUTION: The roof wiring harness must be installed in the same position as when removed.

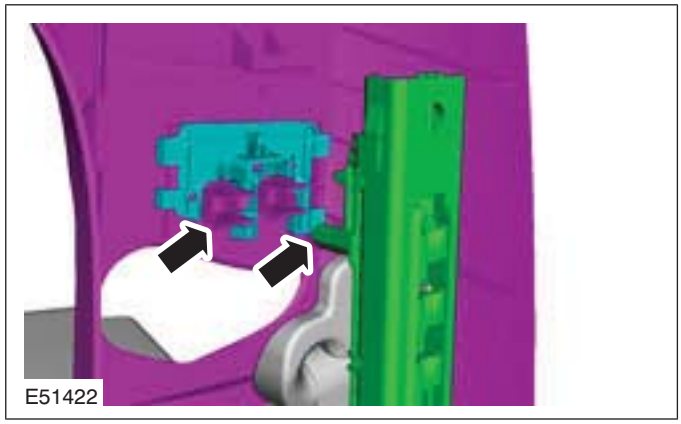
1. Using a suitable adhesive, bond the roof wiring harness to the headliner.

Item 29 Sliding roof opening panel trim

1. With the aid of another technician, install the headliner.

Item 18 B-pillar trim panels

NOTE: Make sure the B-pillar safety belt height adjustment lever is aligned with the safety belt height adjustment mechanism.



Item 13 Roof wiring harness

1. Using the draw cord, feed the roof wiring harness through the NVH material.

Item 11 Noise, vibration and harshness (NVH) material

1. Reposition the NVH material.

REMOVAL AND INSTALLATION

Headliner — 3-Door, Vehicles Without: Sliding Roof Opening Panel

General Equipment

Draw cord

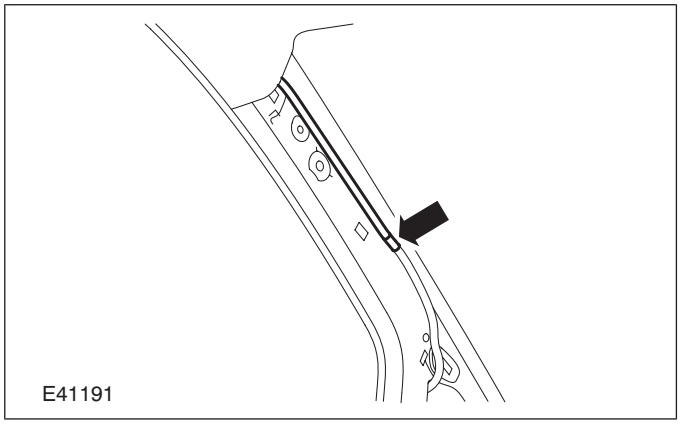
1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the A-pillar trim panels.**

   For additional information, refer to: A-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

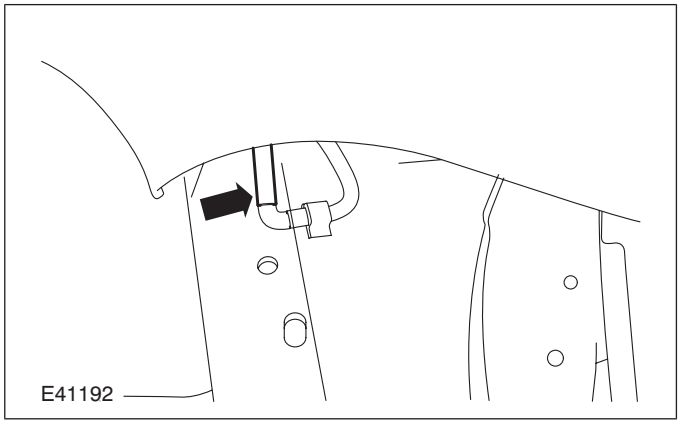
3. **Disconnect the rear window washer tube.**



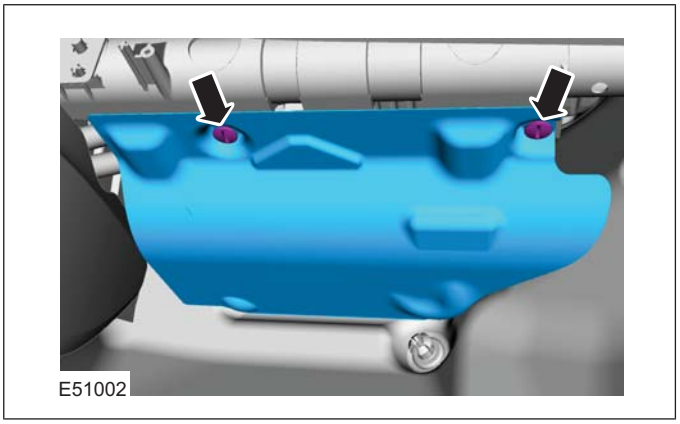
4. **Remove the overhead console.**

   For additional information, refer to: Overhead Console (501-12 Instrument Panel and Console, Removal and Installation).

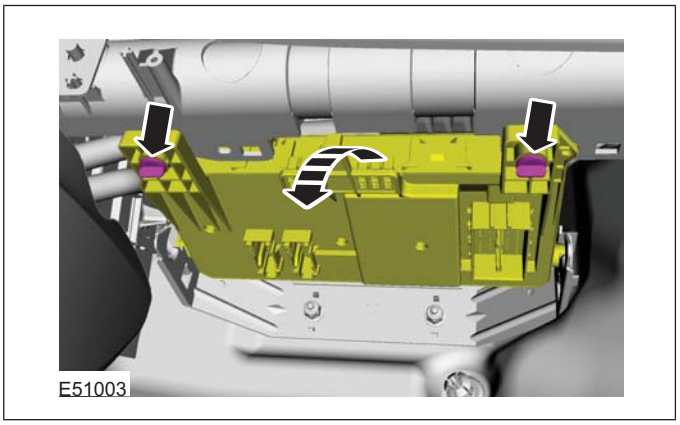
5. **Disconnect the rear window washer tube.**



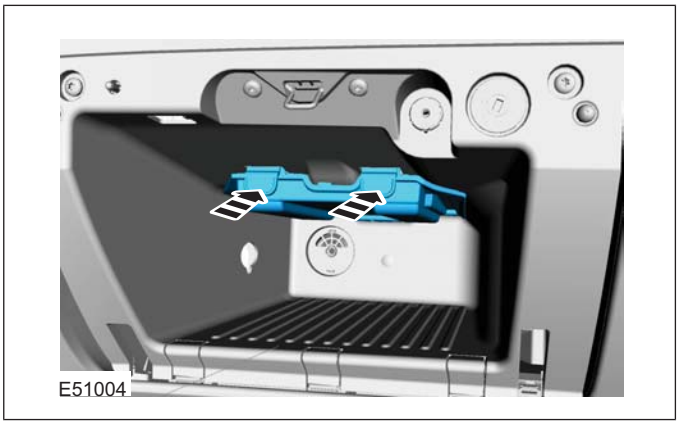
6. **Remove the instrument panel passenger side lower trim panel.**



7. **Lower the central junction box (CJB).**

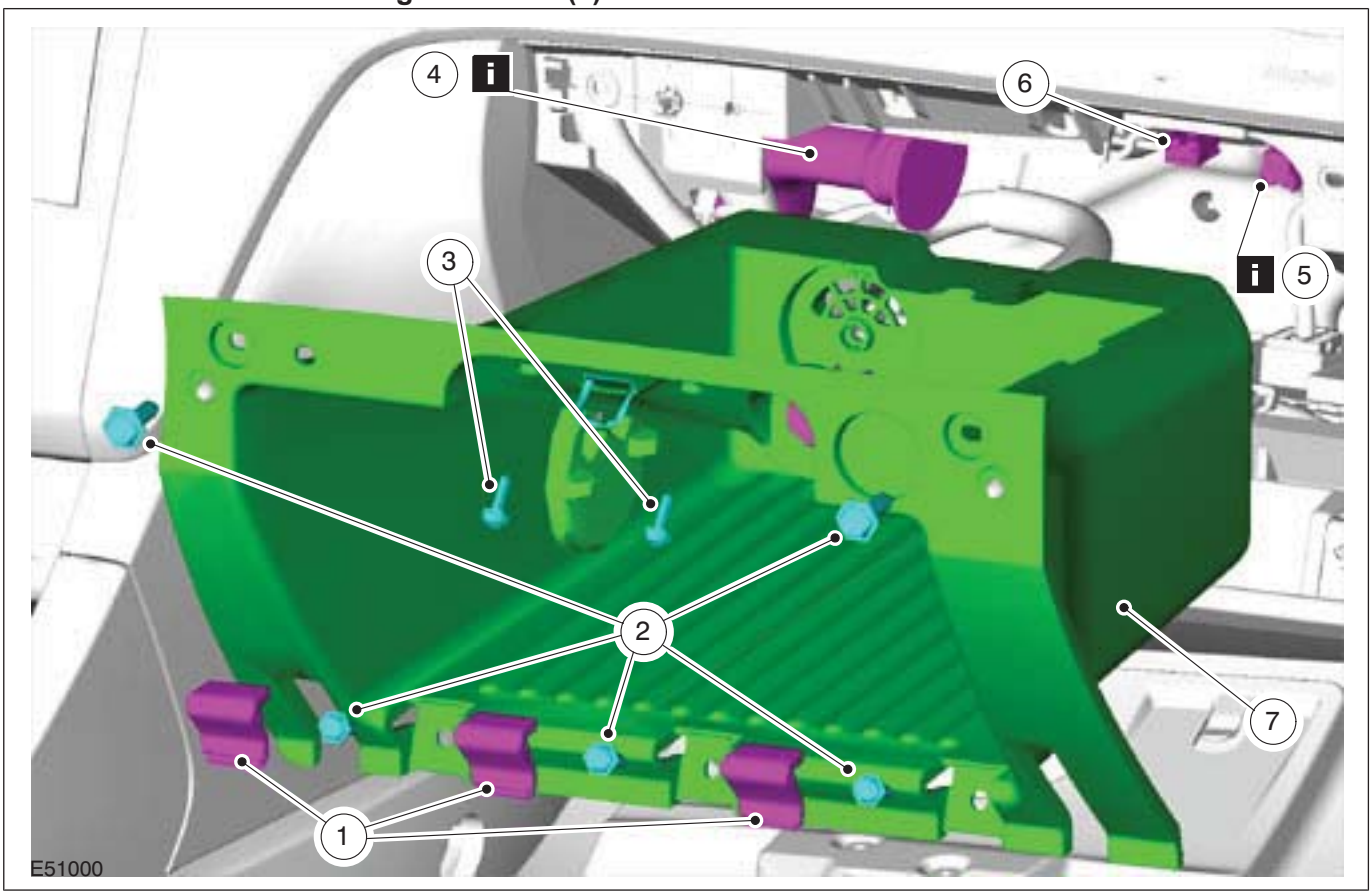


8. **Open the glove compartment lid.**
9. **Remove the navigation system digital versatile disc (DVD) unit access cover (if equipped).**



REMOVAL AND INSTALLATION

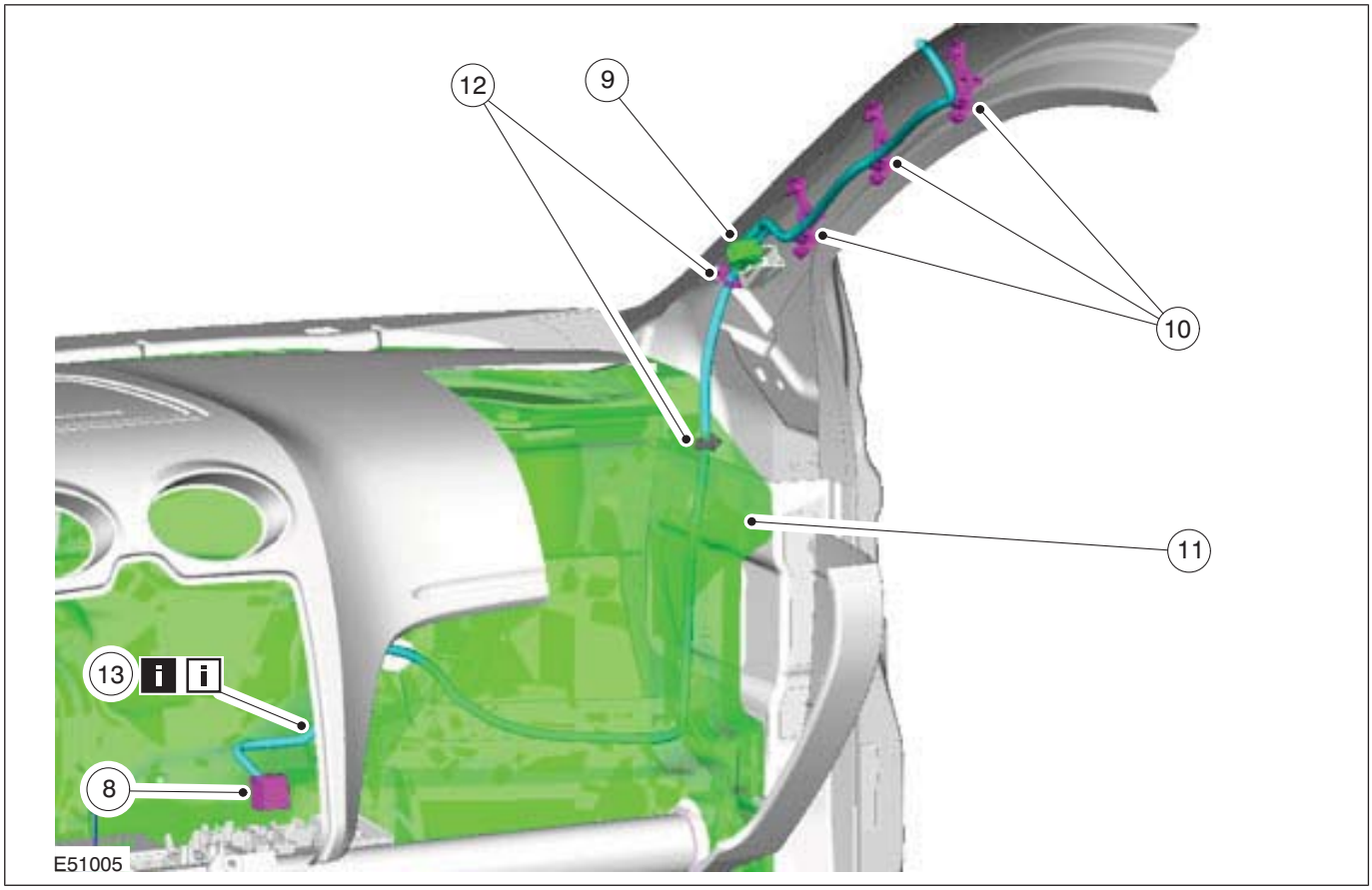
10. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Glove compartment retaining screw covers
2	Glove compartment retaining screws
3	Glove compartment lid striker retaining screws
4	Glove compartment cooling hose See Removal Detail

Item	Description
5	Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector See Removal Detail
6	Passenger airbag deactivation switch electrical connector
7	Glove compartment housing

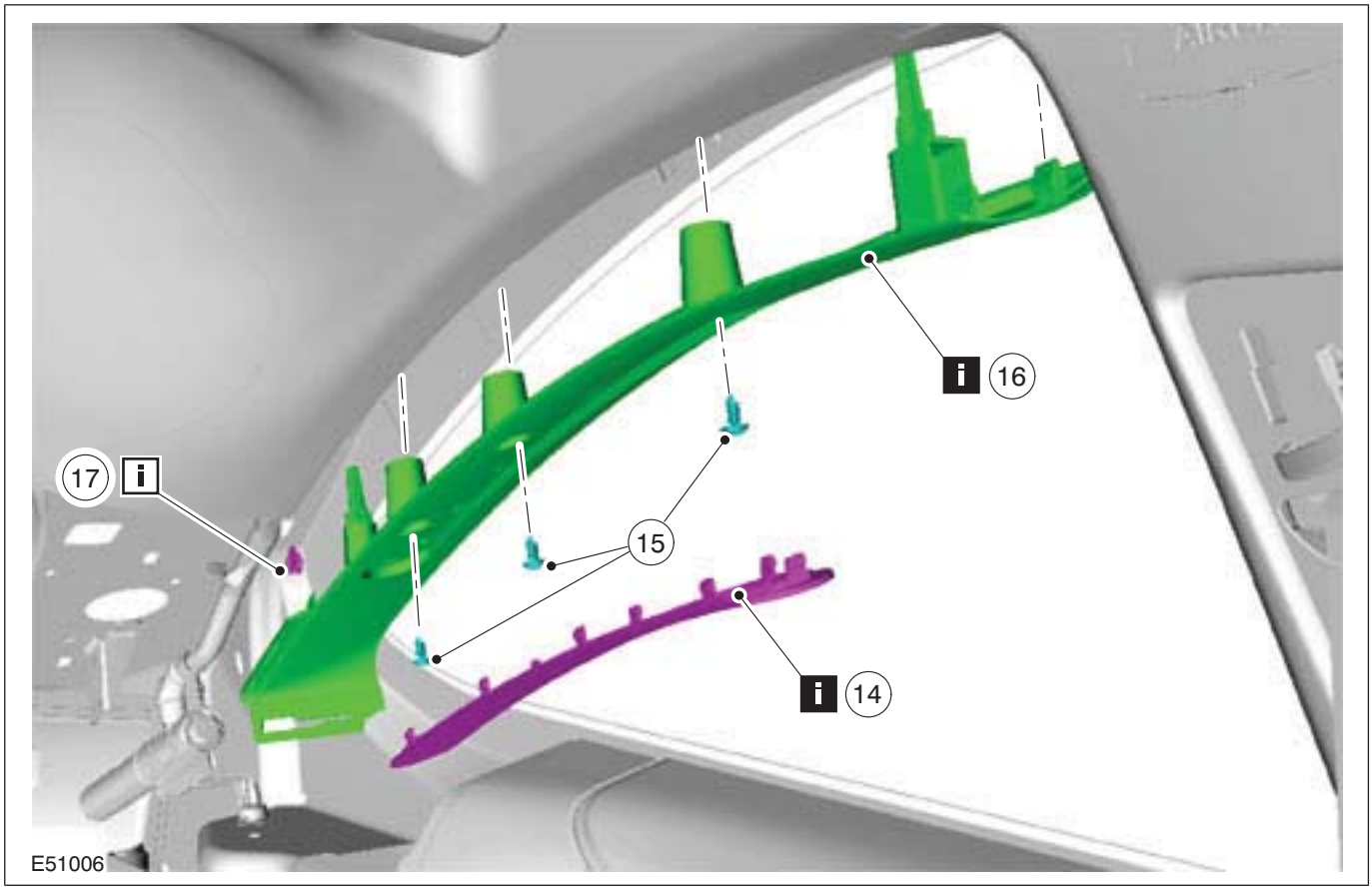
REMOVAL AND INSTALLATION



Item	Description
8	Roof wiring harness to CJB electrical connector
9	Roof wiring harness electrical connector
10	Roof wiring harness to A-pillar retaining clips

Item	Description
11	Noise, vibration and harshness (NVH) material See Removal Detail See Installation Detail
12	Roof wiring harness retaining clips
13	Roof wiring harness See Removal Detail See Installation Detail

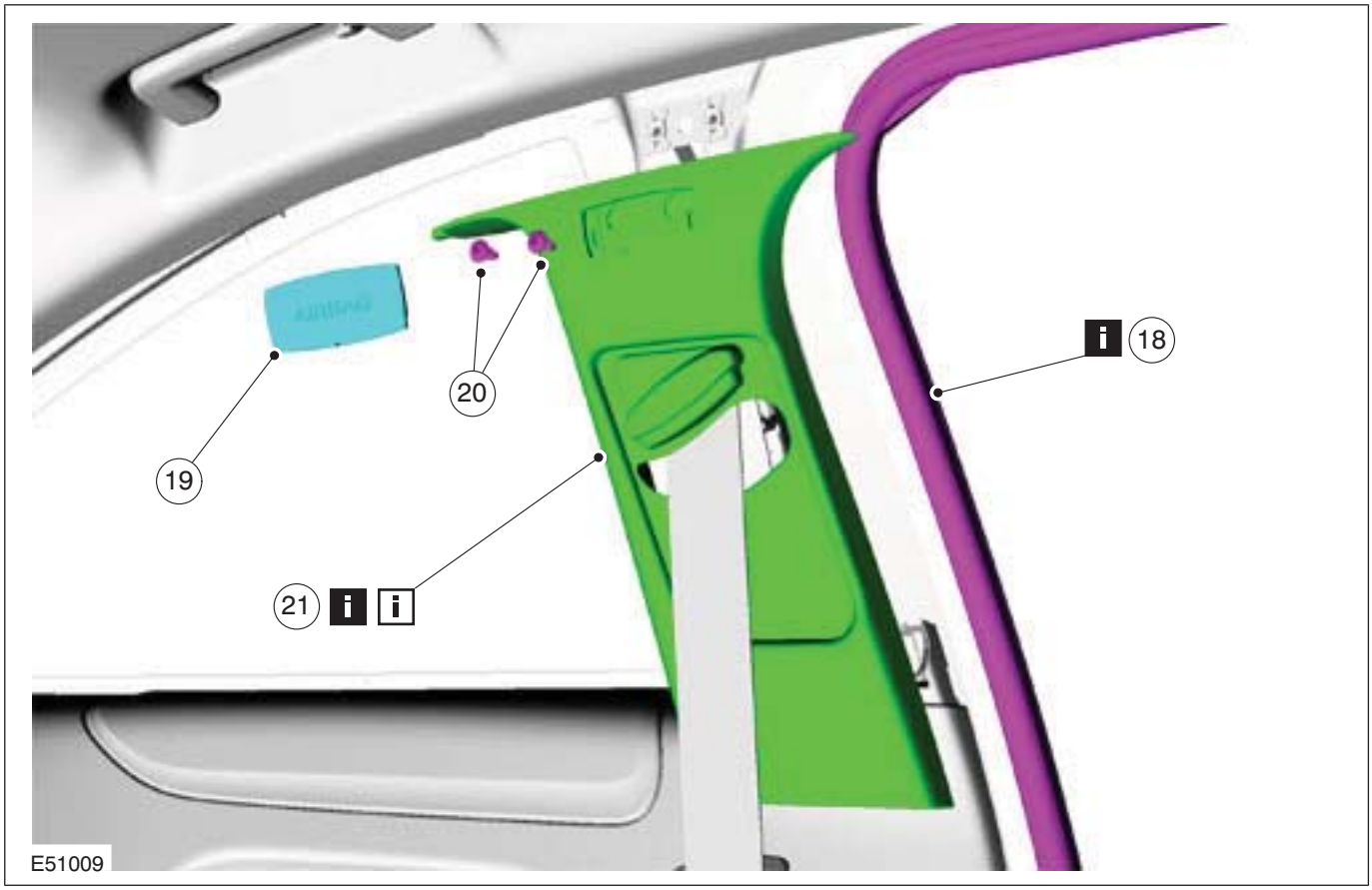
REMOVAL AND INSTALLATION



Item	Description
14	Rear quarter window glass trim panel retaining screw trim covers See Removal Detail
15	Rear quarter window glass trim panel retaining screws

Item	Description
16	Rear quarter window glass trim panels See Removal Detail
17	Rear quarter window glass trim panel retaining clips See Installation Detail

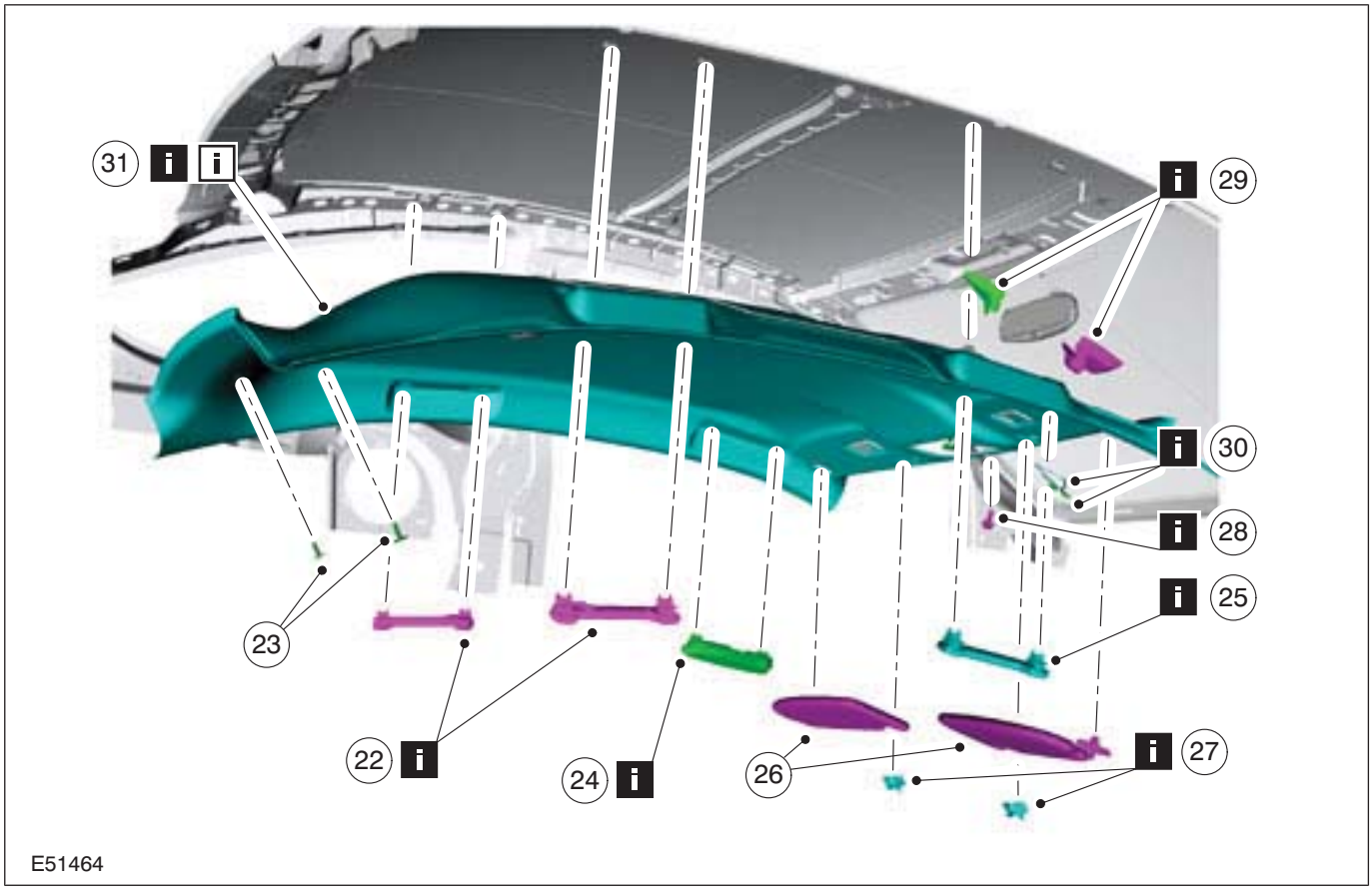
REMOVAL AND INSTALLATION



Item	Description
18	Door opening weatherstrips See Removal Detail
19	B-pillar trim panel retaining screw trim covers

Item	Description
20	B-pillar trim panel retaining screws
21	B-pillar trim panels See Removal Detail See Installation Detail

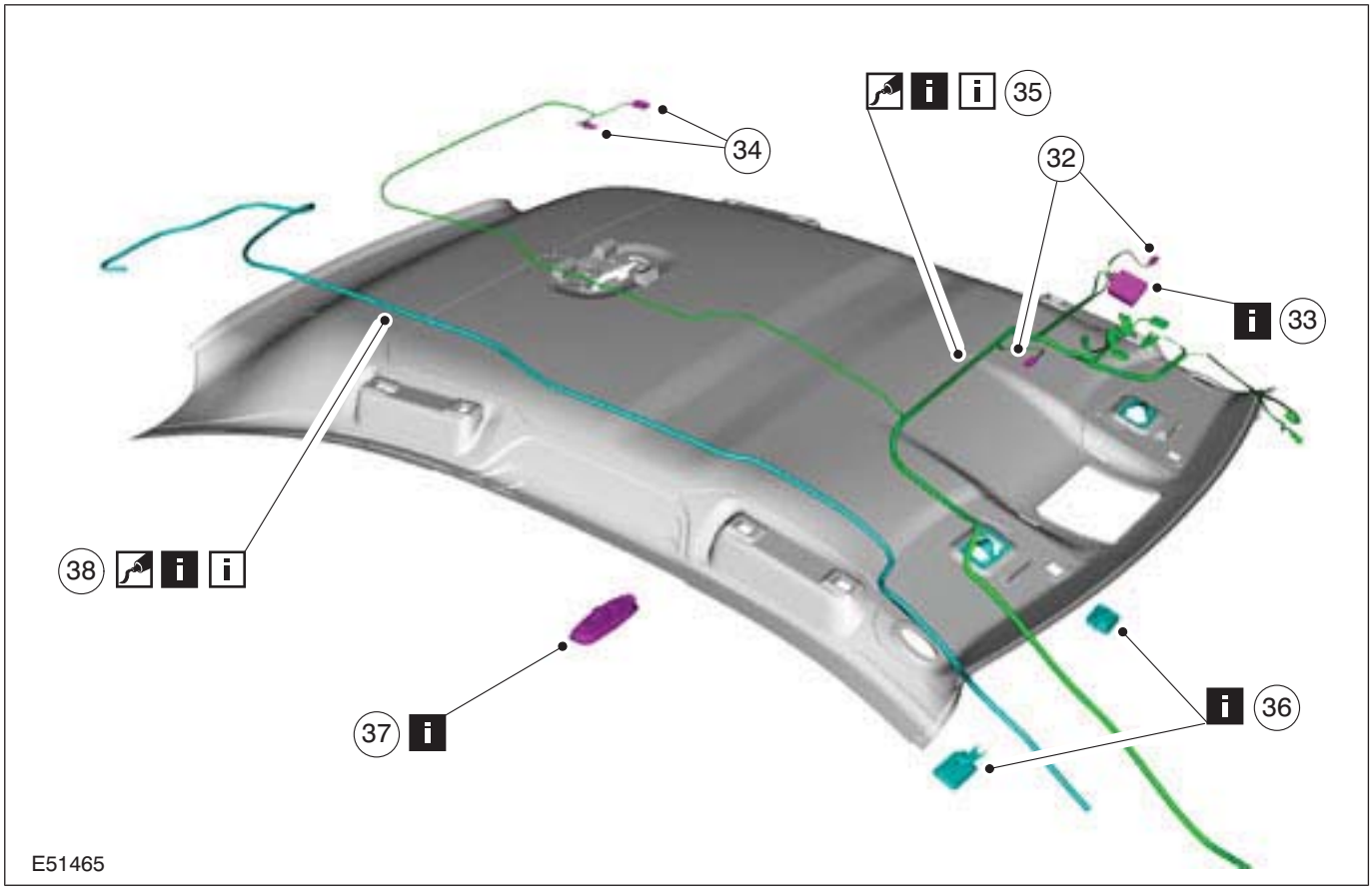
REMOVAL AND INSTALLATION



Item	Description
22	Rear passenger assist handles See Removal Detail
23	Headliner retaining clips
24	Glasses holder See Removal Detail
25	Front passenger assist handle See Removal Detail
26	Sun visors
27	Sun visor retaining clips See Removal Detail

Item	Description
28	Roof wiring harness ground connection retaining bolt See Removal Detail
29	Auto-dimming interior mirror trim covers See Removal Detail
30	Auto-dimming interior mirror and rain sensor electrical connectors
31	Headliner trim panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
32	Sunvisor illumination lamp electrical connectors See Installation Detail
33	Radio frequency (RF) receiver See Removal Detail
34	Rear interior lamp electrical connectors
35	Roof wiring harness See Removal Detail See Installation Detail
36	Sunvisor illumination lamps See Removal Detail

Item	Description
37	Rear interior lamp See Removal Detail
38	Rear window washer tube See Removal Detail See Installation Detail

11. **To install, reverse the removal procedure.**
12. **Vehicles with global closing, initialize the door window motors.**

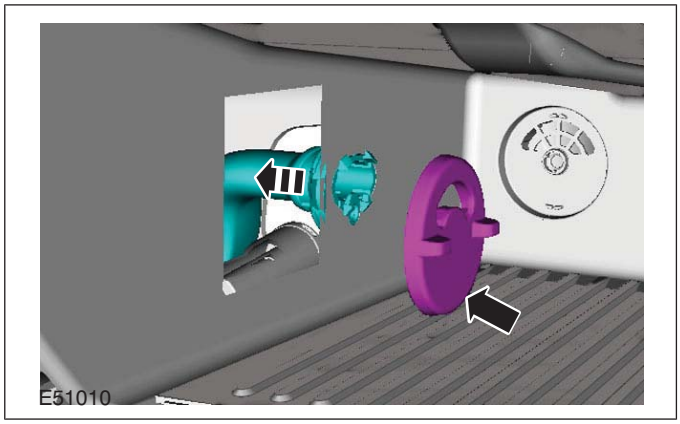
    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

REMOVAL AND INSTALLATION

Item 4 Glove compartment cooling hose

1. Detach the glove compartment cooling hose from the glove compartment cooling vent.



Item 5 Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector

CAUTION: Do not place excessive strain on the electrical wiring harness when detaching the glove compartment.

1. Reposition the glove compartment and disconnect the MP3 auxiliary connector electrical connector.

Item 11 Noise, vibration and harshness (NVH) material

1. Detach the NVH material from the upper A-pillar area to gain access to the roof wiring harness retaining clip.

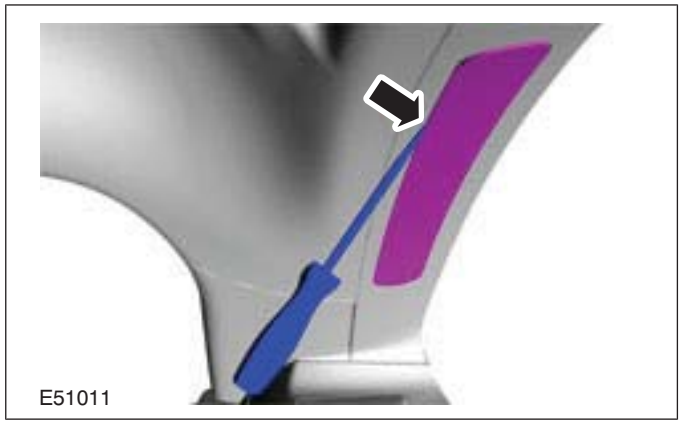
Item 13 Roof wiring harness

1. Attach a draw cord to the roof wiring harness and CJB electrical connector. Feed the wiring harness through the NVH material to above the instrument panel A-pillar area.

Item 14 Rear quarter window glass trim panel retaining screw trim covers

CAUTION: Care must be taken not to damage the rear quarter window glass trim panels and retaining screw trim covers.

1. Using a suitable flat blade screwdriver, lever out the rear quarter window glass trim panel retaining screw trim covers.



Item 16 Rear quarter window glass trim panels

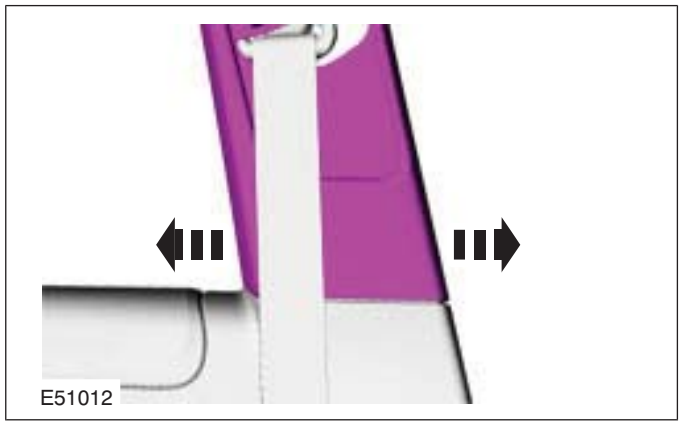
1. Detach the rear quarter window glass trim panel to B-pillar trim panel retaining clip.

Item 18 Door opening weatherstrips

1. Detach the door opening weatherstrips from the door opening upper area.

Item 21 B-pillar trim panels

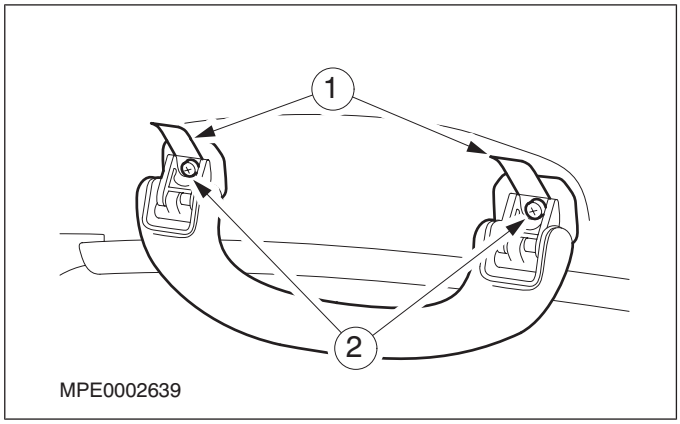
1. Detach the B-pillar trim panels and position them to one side.



REMOVAL AND INSTALLATION

Item 22 Rear passenger assist handles

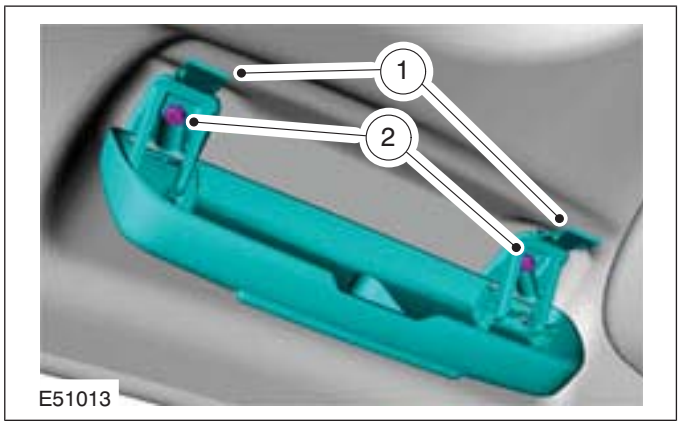
1. Lever open the rear passenger assist handle screw covers.



2. Remove the rear passenger assist handle retaining screws.

Item 24 Glasses holder

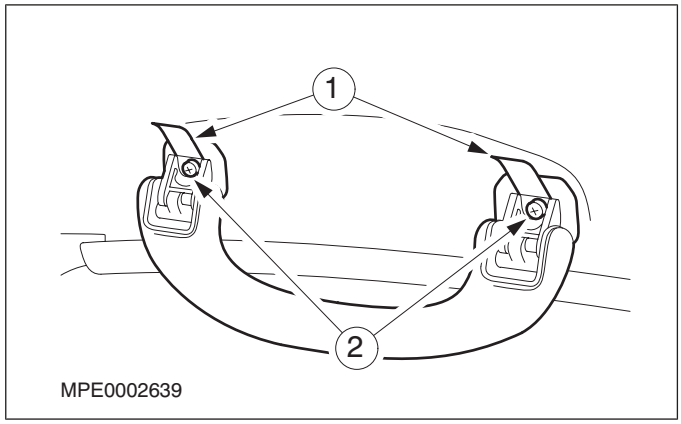
1. Lever open the glasses holder retaining screw covers.



2. Remove the glasses holder retaining screws.

Item 25 Front passenger assist handle

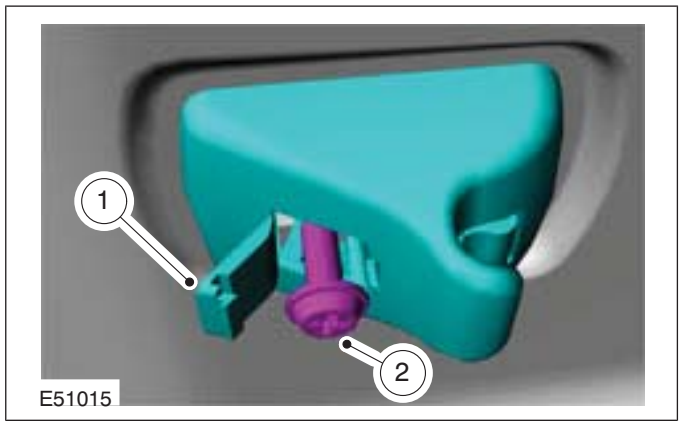
1. Lever open the front passenger assist handle retaining screw covers.



2. Remove the front passenger assist handle retaining screws.

Item 27 Sun visor retaining clips

1. Lever open the sun visor retaining clip retaining screw cover.

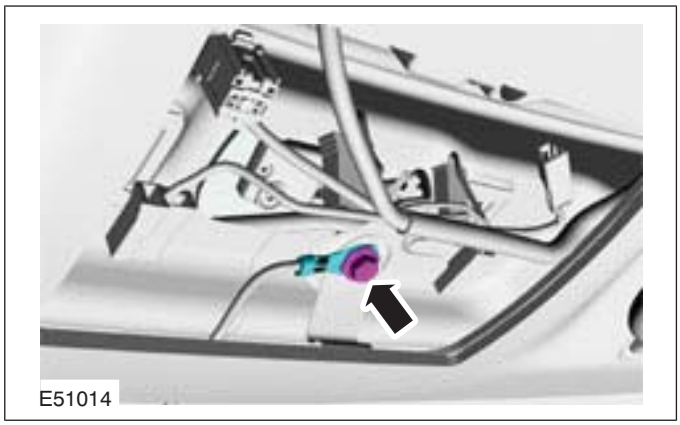


2. Remove the sun visor retaining clip retaining screw.

REMOVAL AND INSTALLATION

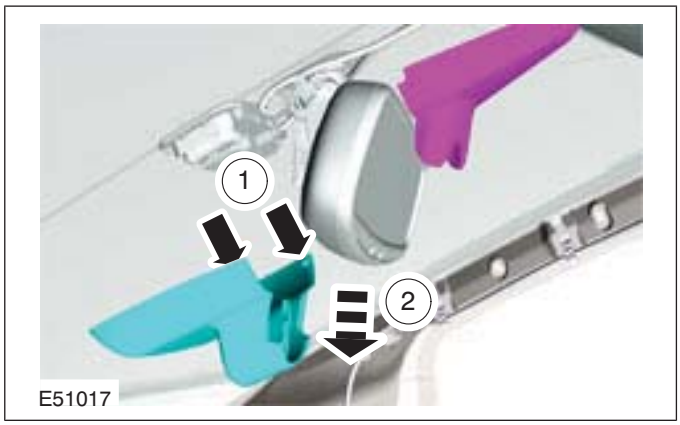
Item 28 Roof wiring harness ground connection retaining bolt

1. Detach the roof wiring harness and windscreen ground electrical connectors.



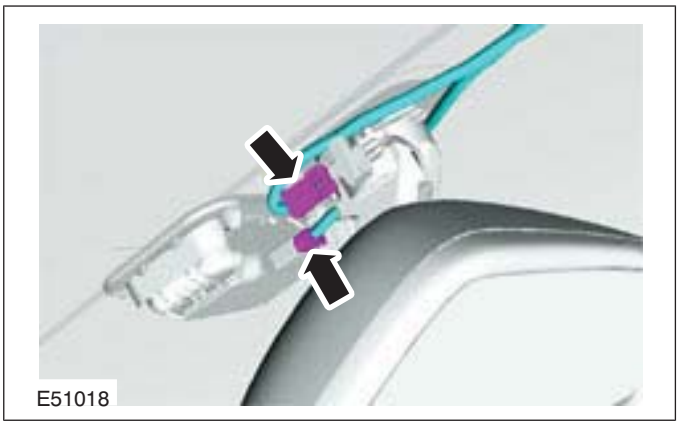
Item 29 Auto-dimming interior mirror trim covers

1. Remove the auto-dimming interior mirror and rain sensor trim covers.
   1. Release the locking clips.
   2. Slide the rain sensor trim cover off the auto-dimming interior mirror trim cover.



Item 30 Auto-dimming interior mirror and rain sensor electrical connectors

1. Disconnect the auto-dimming interior mirror and rain sensor electrical connectors.



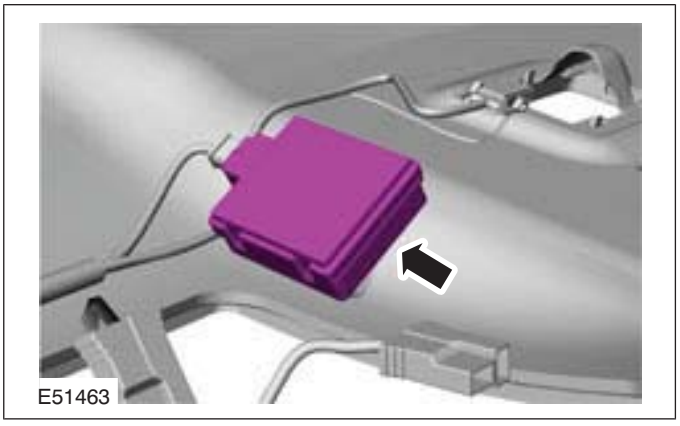
Item 31 Headliner trim panel

1. Tilt the front seats forward.
2. With the aid of another technician, remove the headliner through the liftgate opening.

Item 33 Radio frequency (RF) receiver

NOTE: Make a note of the position of the RF receiver to make sure that it is installed in exactly the same position as when removed.

1. Using a suitable knife, detach the RF receiver from the headliner.



Item 35 Roof wiring harness

CAUTIONS:

⚠ Take care not to damage the insulation of the roof wiring harness.

⚠ The roof wiring harness must be cut off the headliner and not pulled or ripped. Failure to follow this instruction could

REMOVAL AND INSTALLATION

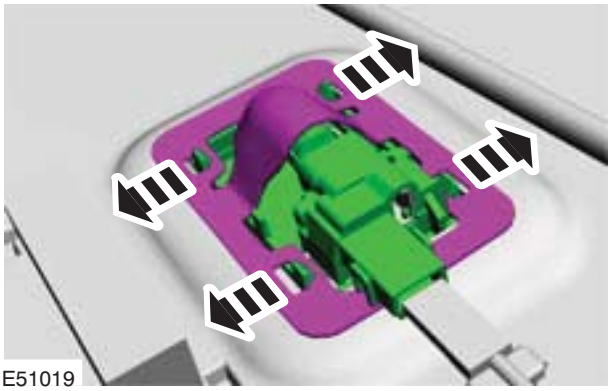
result in the incorrect function of electrical components.

NOTE: Make a note of the position of the roof wiring harness to make sure that it is installed in exactly the same position as when removed.

1. **Using a suitable knife, remove the roof wiring harness from the headliner.**

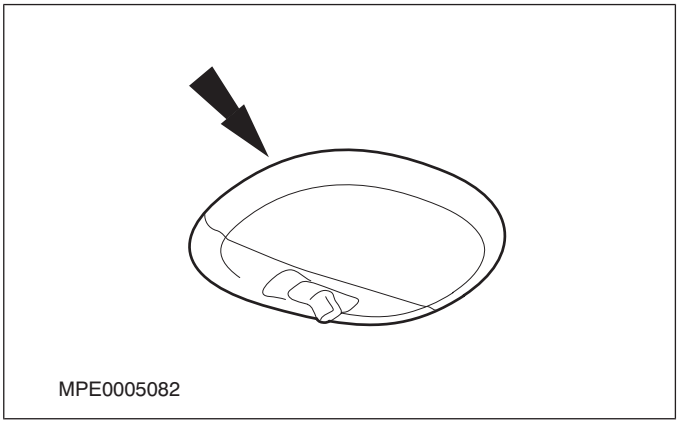
Item 36 Sunvisor illumination lamps

1. **Release the sun visor illumination lamp retaining clips.**


E51019

Item 37 Rear interior lamp

1. **Lever out the rear interior lamp.**


MPE0005082

Item 38 Rear window washer tube

CAUTION: Take care not to damage the rear window washer tube. Failure to follow this instruction could result in damage to the headliner.

NOTE: Make a note of the position of the rear window washer tube to make sure that it is installed in exactly the same position as when removed.

1. **Using a suitable knife, remove the rear window washer tube from the headliner.**

Installation Details

Item 38 Rear window washer tube

CAUTION: The rear window washer tube must be installed in the same position as when removed.

1. **Using a suitable adhesive, bond the rear window washer tube to the headliner.**

Item 35 Roof wiring harness

CAUTION: The roof wiring harness must be installed in the same position as when removed.

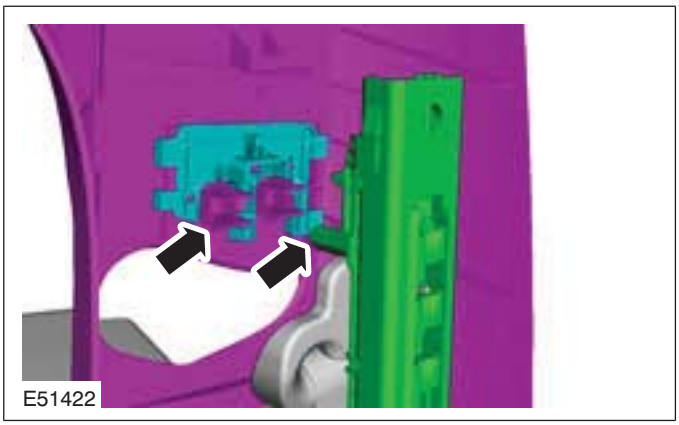
1. **Using a suitable adhesive, bond the roof wiring harness to the headliner.**

Item 31 Headliner trim panel

1. **With the aid of another technician, install the headliner.**

Item 21 B-pillar trim panels

NOTE: Make sure the B-pillar safety belt height adjustment lever is aligned with the safety belt height adjustment mechanism.


E51422

REMOVAL AND INSTALLATION

Item 17 Rear quarter window glass trim panel retaining clips

1. Install the rear quarter window glass trim panel retaining clips to the rear quarter window glass trim panel.

Item 13 Roof wiring harness

1. Using the draw cord, feed the roof wiring harness through the NVH material.

Item 11 Noise, vibration and harshness (NVH) material

1. Reposition the NVH material.

REMOVAL AND INSTALLATION

Headliner — 5-Door, Vehicles Without: Sliding Roof Opening Panel

General Equipment

Draw cord

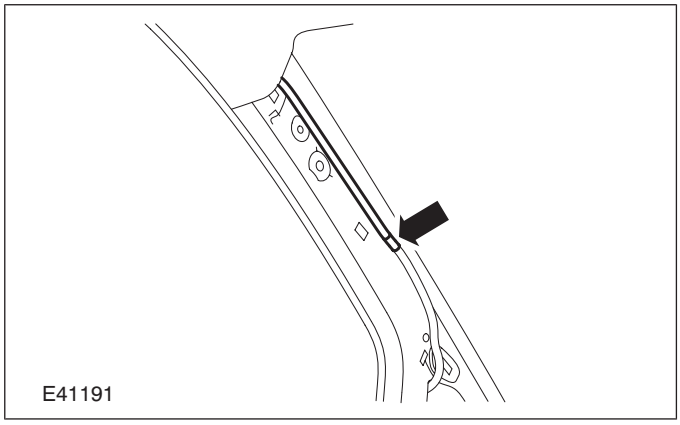
1. Disconnect the battery ground cable.

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Remove the A-pillar trim panels.

   For additional information, refer to: A-Pillar Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

3. Disconnect the rear window washer tube.



4. Remove the overhead console.

   For additional information, refer to: Overhead Console (501-12 Instrument Panel and Console, Removal and Installation).

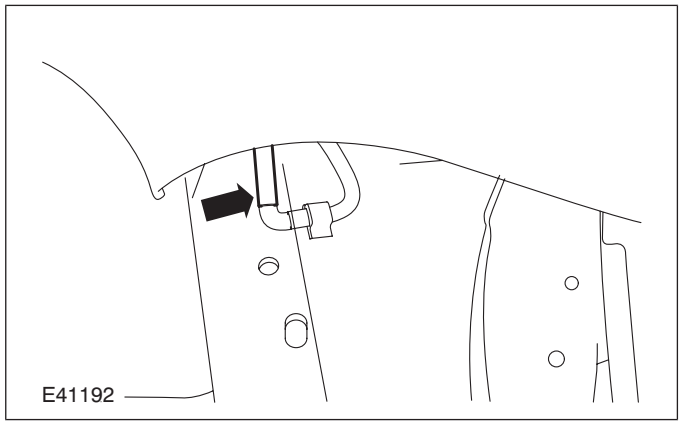
5. Remove the C-pillar trim panels.

   For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

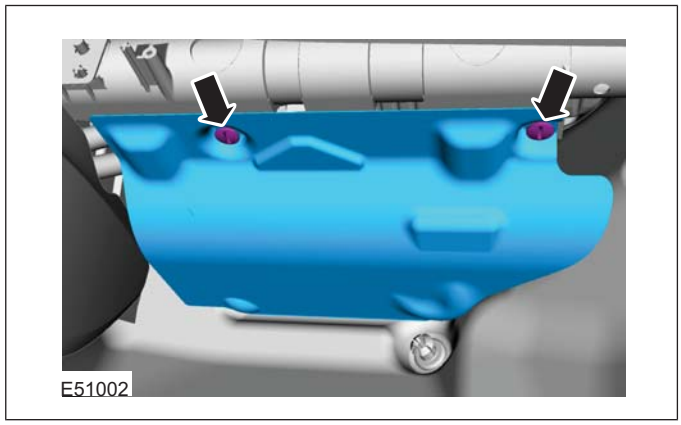
6. Remove the D-pillar trim panels.

   For additional information, refer to: D-Pillar Trim Panel - 5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

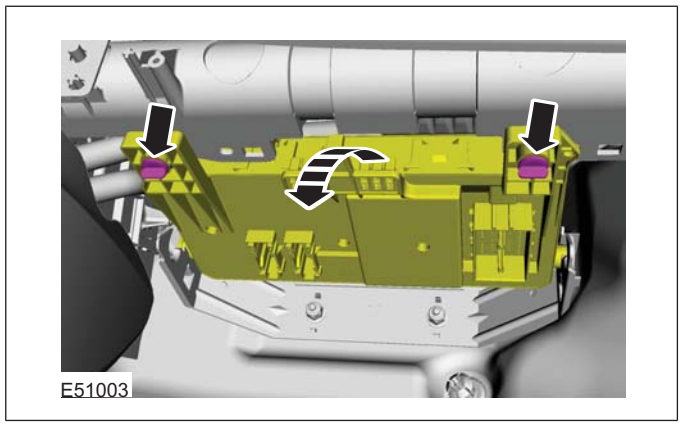
7. Disconnect the rear window washer tube.



8. Remove the instrument panel passenger side lower trim panel.



9. Lower the central junction box (CJB).



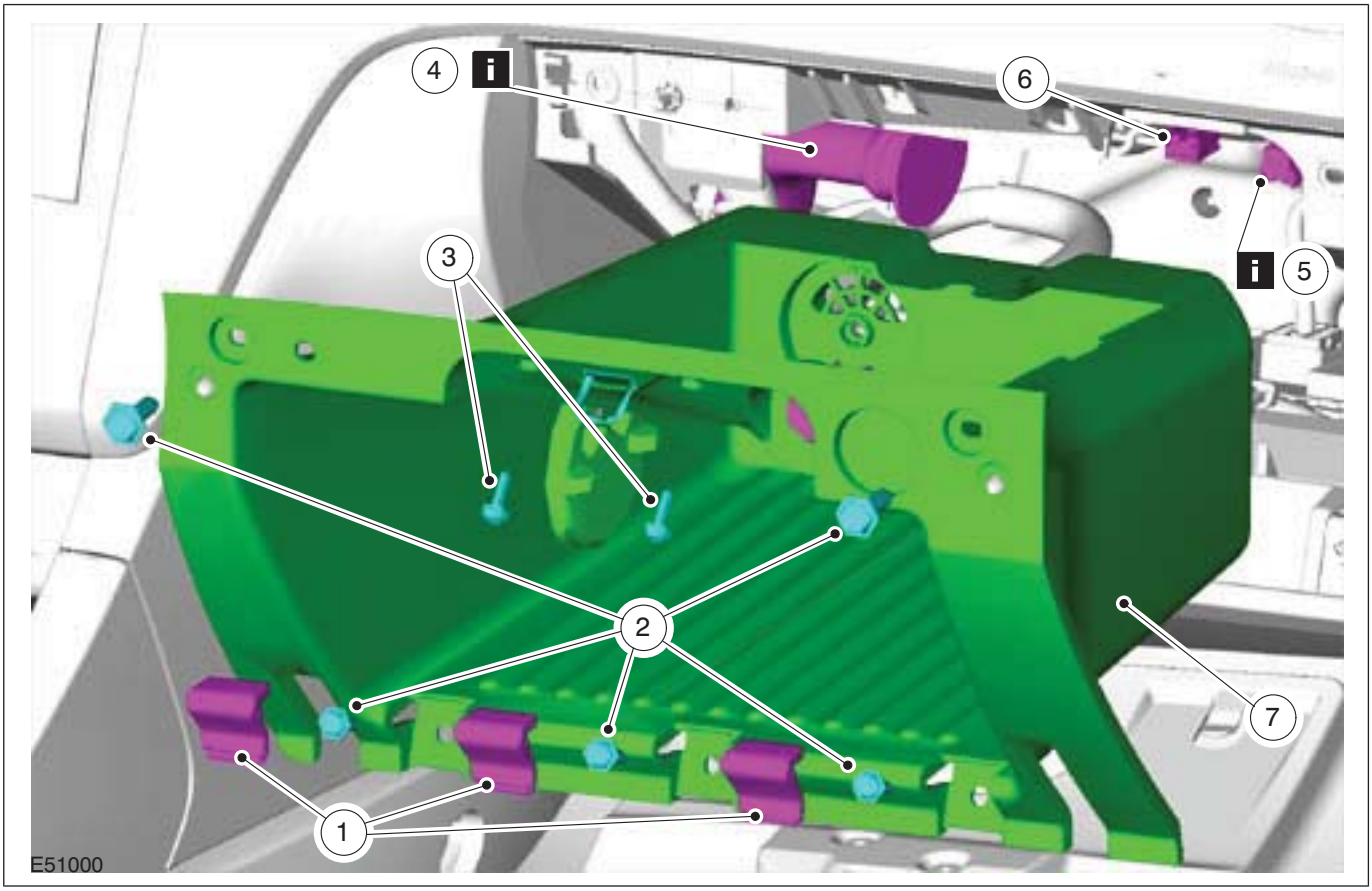
10. Open the glove compartment lid.

REMOVAL AND INSTALLATION

11. **Remove the navigation system digital versatile disc (DVD) unit access cover (if equipped).**



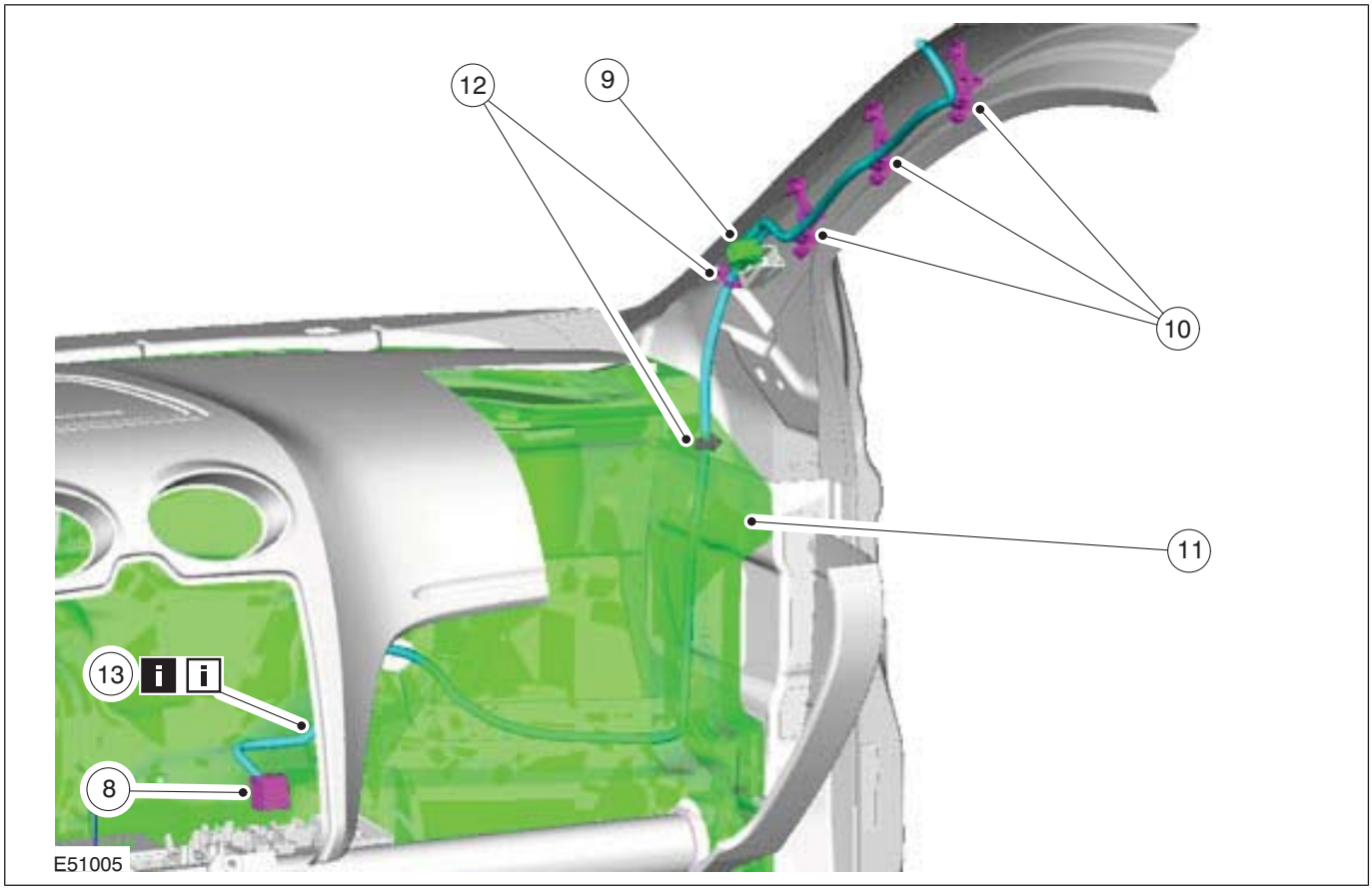
12. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Glove compartment retaining screw covers
2	Glove compartment retaining screws
3	Glove compartment lid striker retaining screws
4	Glove compartment cooling hose See Removal Detail

Item	Description
5	Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector See Removal Detail
6	Passenger airbag deactivation switch electrical connector
7	Glove compartment housing

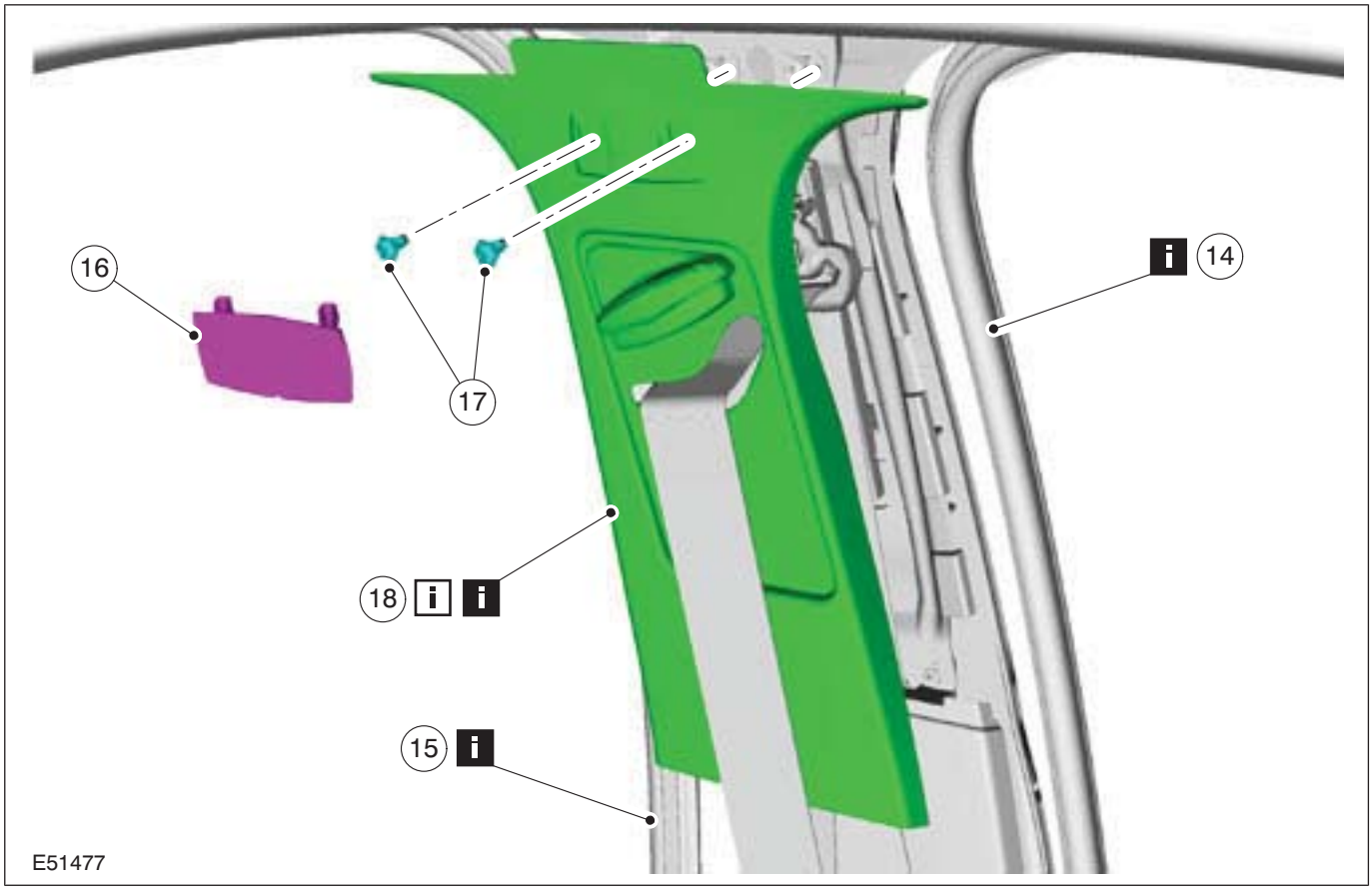
REMOVAL AND INSTALLATION



Item	Description
8	Roof wiring harness to CJB electrical connector
9	Roof wiring harness electrical connector
10	Roof wiring harness to A-pillar retaining clips

Item	Description
11	Noise, vibration and harshness (NVH) material See Removal Detail See Installation Detail
12	Roof wiring harness retaining clips
13	Roof wiring harness See Removal Detail See Installation Detail

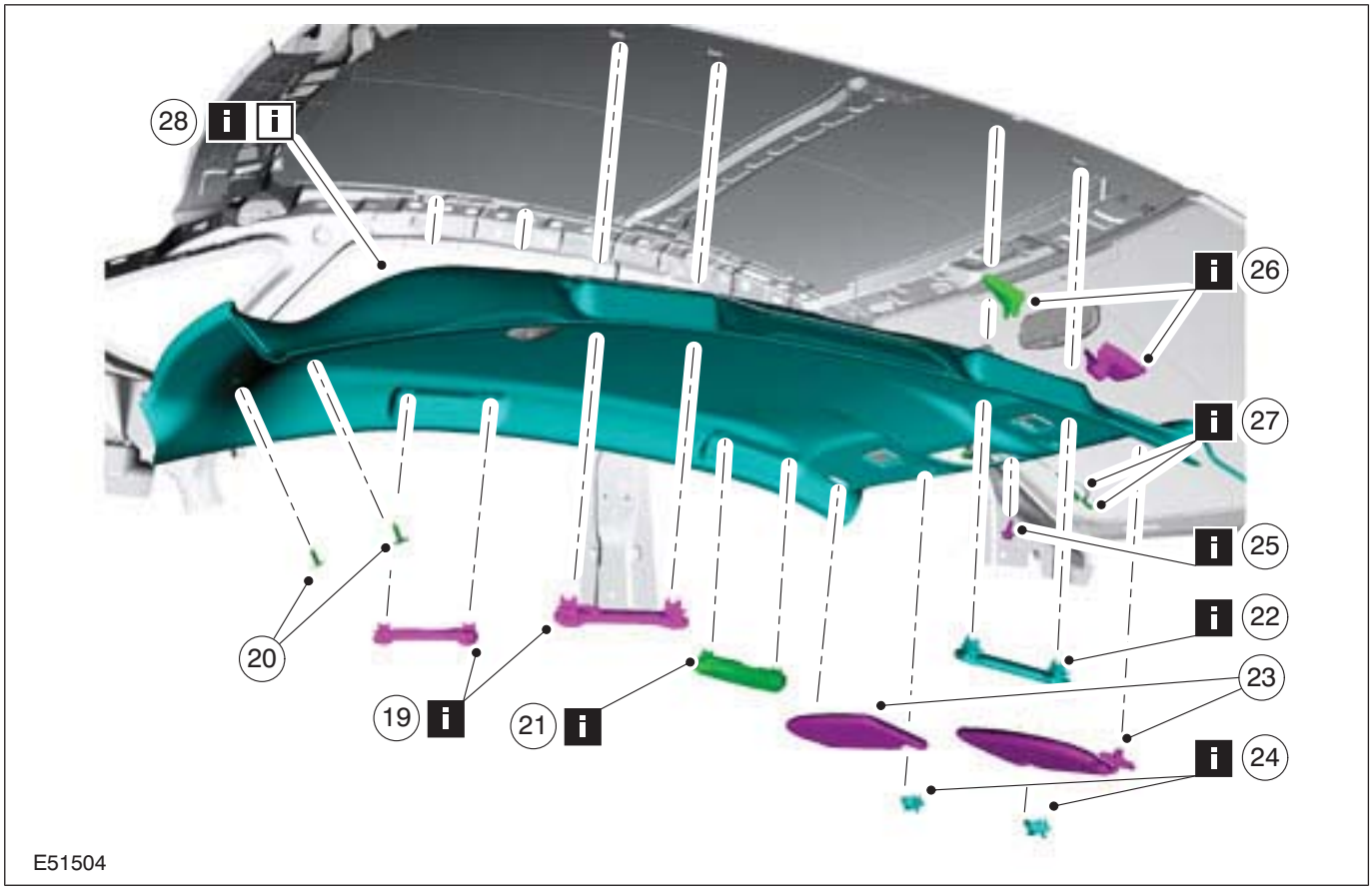
REMOVAL AND INSTALLATION



Item	Description
14	Front door opening weatherstrips See Removal Detail
15	Rear door opening weatherstrips See Removal Detail

Item	Description
16	B-pillar trim panel retaining screw trim covers
17	B-pillar trim panel retaining screws
18	B-pillar trim panels See Removal Detail See Installation Detail

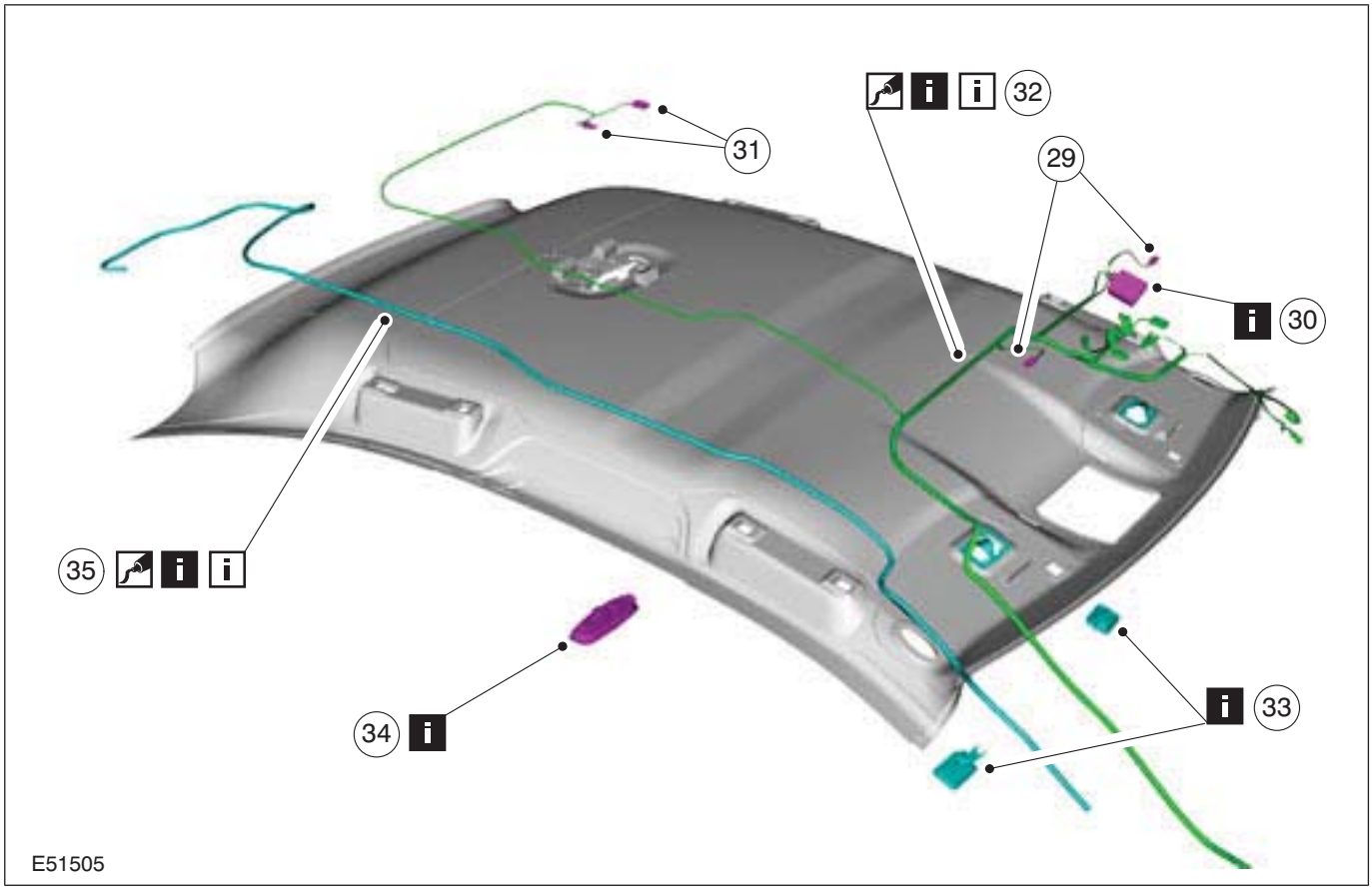
REMOVAL AND INSTALLATION



Item	Description
19	Rear passenger assist handles See Removal Detail
20	Headliner trim panel retaining clips
21	Glasses holder See Removal Detail
22	Front passenger assist handle See Removal Detail
23	Sun visors
24	Sun visor retaining clips See Removal Detail

Item	Description
25	Roof wiring harness ground connection retaining bolt See Removal Detail
26	Auto-dimming interior mirror trim covers See Removal Detail
27	Auto-dimming interior mirror and rain sensor electrical connectors See Removal Detail
28	Headliner trim panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
29	Sun-visor illumination lamp electrical connectors
30	Radio frequency (RF) receiver See Removal Detail
31	Rear interior lamp electrical connectors
32	Roof wiring harness See Removal Detail See Installation Detail
33	Sun-visor illumination lamps See Removal Detail

Item	Description
34	Rear interior lamp See Removal Detail
35	Rear window washer tube See Removal Detail See Installation Detail

13. **To install, reverse the removal procedure.**
14. **Vehicles with global closing, initialize the door window motors.**

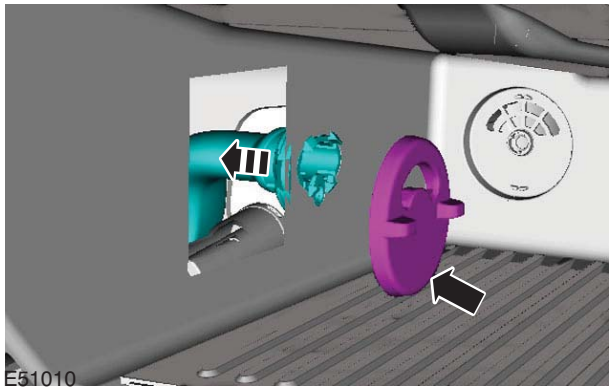
    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

REMOVAL AND INSTALLATION

Item 4 Glove compartment cooling hose

1. Detach the glove compartment cooling hose from the glove compartment cooling vent.



Item 5 Moving pictures experts group audio layer 3 (MP3) auxiliary connector electrical connector

CAUTION: Do not place excessive strain on the electrical wiring harness when detaching the glove compartment.

1. Reposition the glove compartment and disconnect the MP3 auxiliary connector electrical connector.

Item 11 Noise, vibration and harshness (NVH) material

1. Detach the NVH material from the upper A-pillar area to gain access to the roof wiring harness retaining clip.

Item 13 Roof wiring harness

1. Attach a draw cord to the roof wiring harness and CJB electrical connector. Feed the wiring harness through the NVH material to above the instrument panel A-pillar area.

Item 14 Front door opening weatherstrips

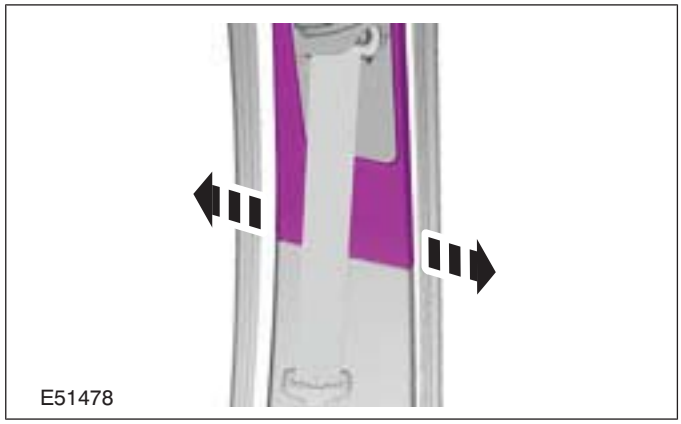
1. Detach the front door opening weatherstrips from the front door upper opening area.

Item 15 Rear door opening weatherstrips

1. Detach the rear door opening weatherstrips from the rear door upper opening area.

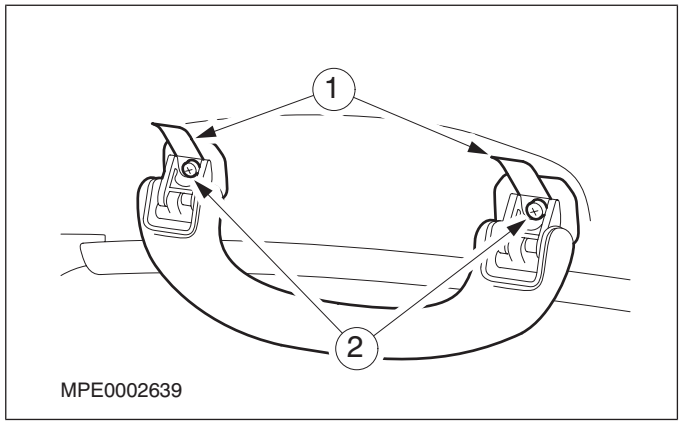
Item 18 B-pillar trim panels

1. Detach the B-pillar trim panels and position them to one side.



Item 19 Rear passenger assist handles

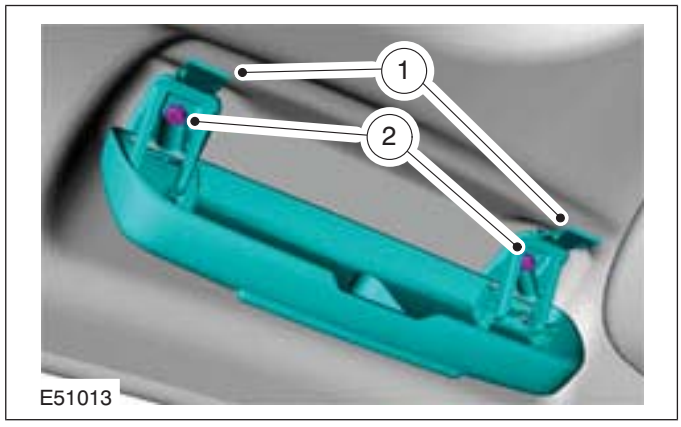
1. Lever open the rear passenger assist handle screw covers.



2. Remove the rear passenger assist handle retaining screws.

Item 21 Glasses holder

1. Lever open the glasses holder retaining screw covers.

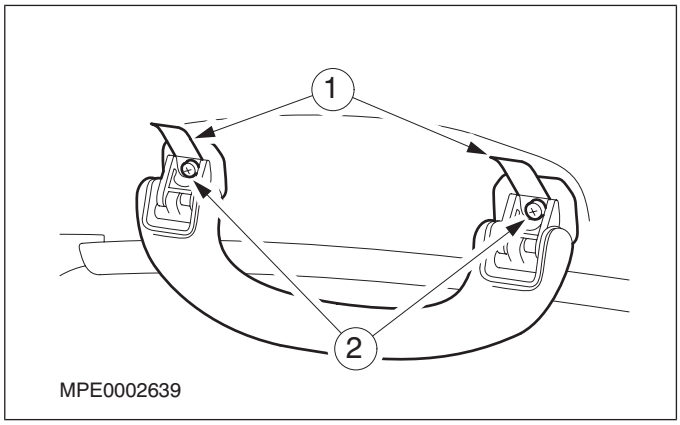


REMOVAL AND INSTALLATION

2. Remove the glasses holder retaining screws.

Item 22 Front passenger assist handle

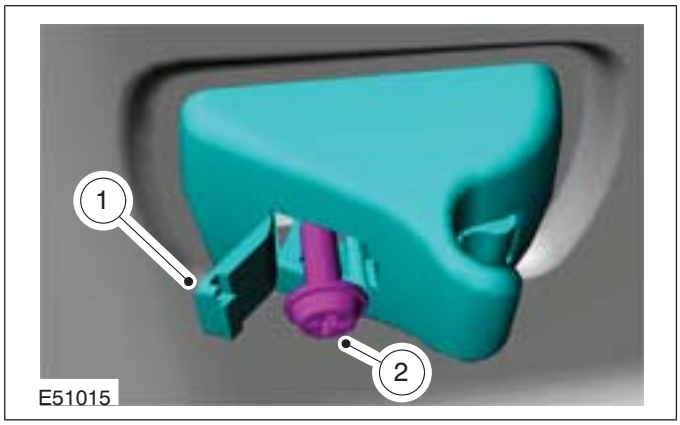
1. Lever open the front passenger assist handle retaining screw covers.



2. Remove the front passenger assist handle retaining screws.

Item 24 Sun visor retaining clips

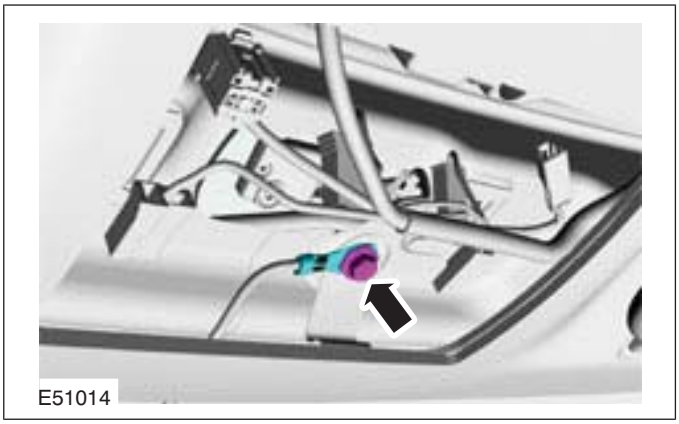
1. Lever open the sun-visor retaining clips retaining screw cover.



2. Remove the sun-visor retaining clips retaining screw.

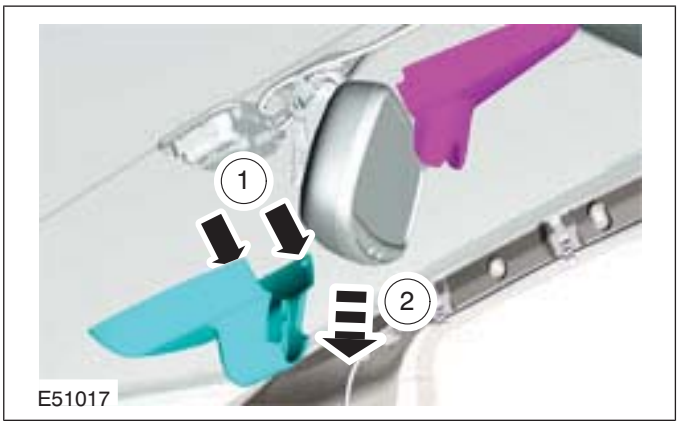
Item 25 Roof wiring harness ground connection retaining bolt

1. Detach the roof wiring harness and windscreen ground electrical connectors.



Item 26 Auto-dimming interior mirror trim covers

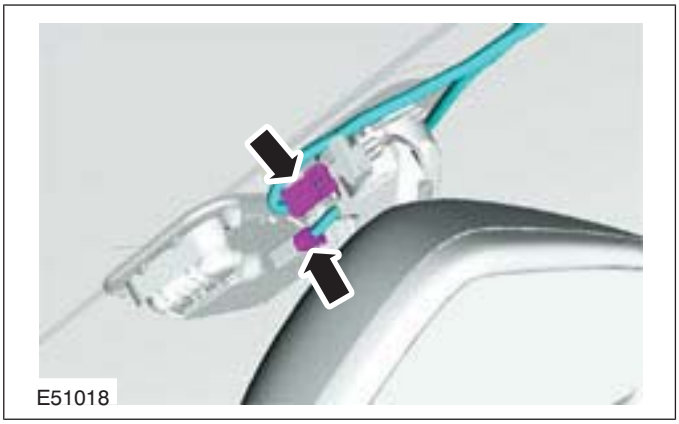
1. Remove the auto-dimming interior mirror and rain sensor trim covers.
   1. Release the locking clips.
   2. Slide the rain sensor trim cover off the auto-dimming interior mirror trim cover.



REMOVAL AND INSTALLATION

Item 27 Auto-dimming interior mirror and rain sensor electrical connectors

1. **Disconnect the auto-dimming interior mirror and rain sensor electrical connectors.**



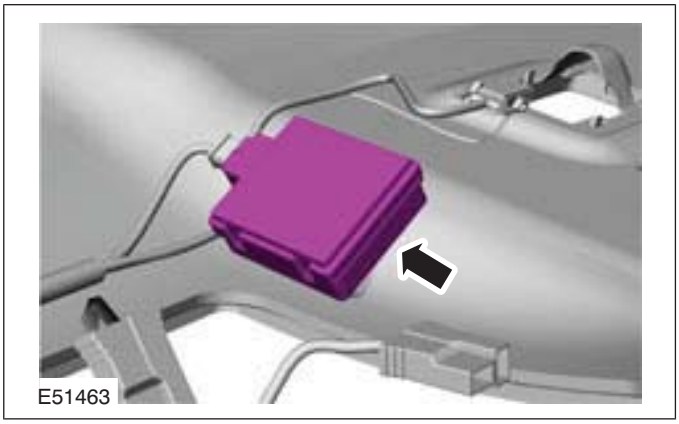
Item 28 Headliner trim panel

1. **Tilt the front seats forward.**
2. **With the aid of another technician, remove the headliner through the liftgate opening.**

Item 30 Radio frequency (RF) receiver

NOTE: Make a note of the position of the RF receiver to make sure that it is installed in exactly the same position as removed.

1. **Using a suitable knife, detach the RF receiver from the headliner.**



Item 32 Roof wiring harness

CAUTIONS:

Take care not to damage the insulation of the roof wiring harness.

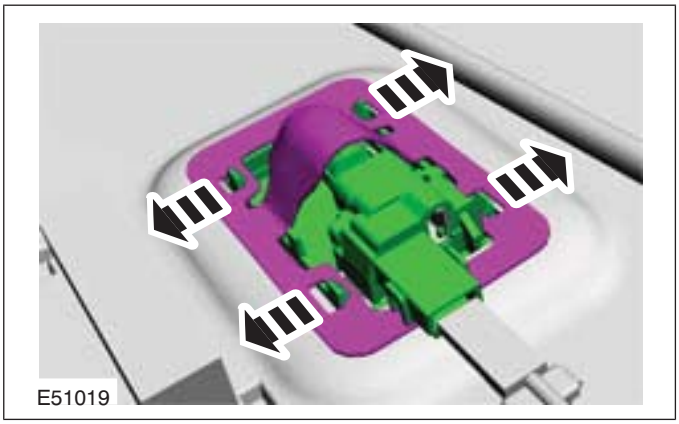
The roof wiring harness must be cut off the headliner and not pulled or ripped. Failure to follow this instruction could result in the incorrect function of electrical components.

NOTE: Make a note of the position of the roof wiring harness to make sure that it is installed in exactly the same position as removed.

1. **Using a suitable knife, remove the roof wiring harness from the headliner.**

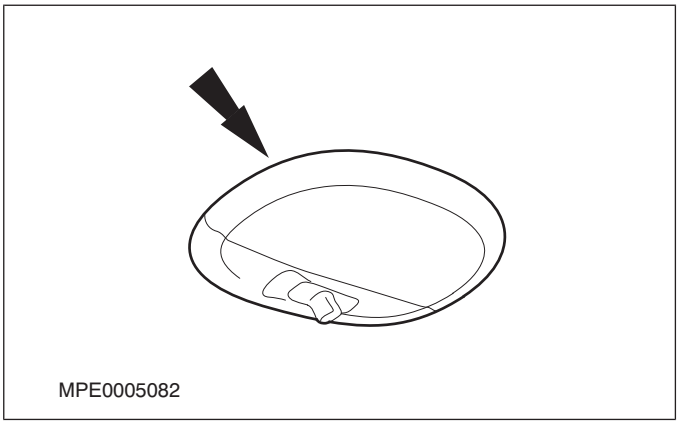
Item 33 Sun-visor illumination lamps

1. **Release the sunvisor illumination lamp retaining clips.**



Item 34 Rear interior lamp

1. **Lever out the rear interior lamp.**



Item 35 Rear window washer tube

CAUTION: Take care not to damage the rear window washer tube. Failure to follow this instruction could result in damage to the headliner.

NOTE: Make a note of the position of the rear window washer tube to make sure that it is installed in exactly the same position as removed.

1. **Using a suitable knife, remove the rear window washer tube from the headliner.**

REMOVAL AND INSTALLATION

Installation Details

Item 35 Rear window washer tube

CAUTION: The rear window washer tube must be installed in the same position as removed.

1. **Using a suitable adhesive, bond the rear window washer tube to the headliner.**

Item 32 Roof wiring harness

CAUTION: The roof wiring harness must be installed in the same position as removed.

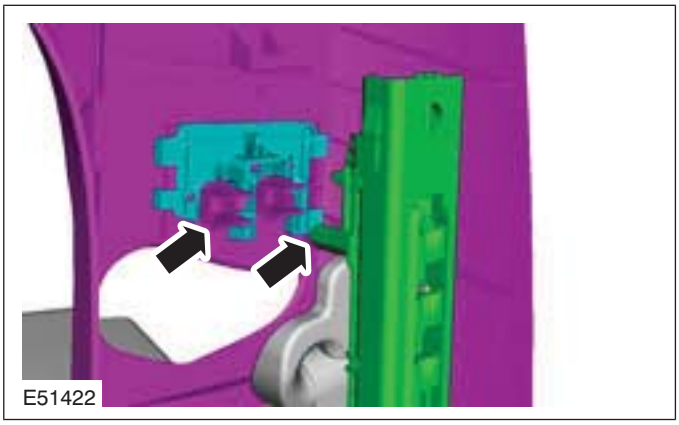
1. **Using a suitable adhesive, bond the roof wiring harness to the headliner.**

Item 28 Headliner trim panel

1. **With the aid of another technician, install the headliner.**

Item 18 B-pillar trim panels

NOTE: Make sure the B-pillar safety belt height adjustment lever is aligned with the safety belt height adjustment mechanism.


E51422

Item 13 Roof wiring harness

1. **Using the Draw cord, feed the roof wiring harness through the NVH material.**

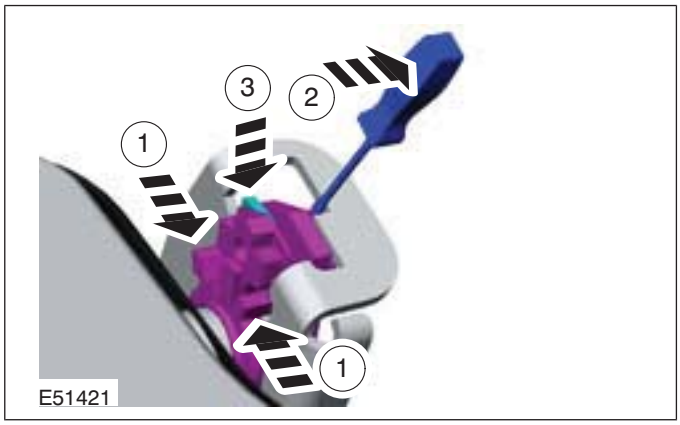
Item 11 Noise, vibration and harshness (NVH) material

1. **Reposition the NVH material.**

REMOVAL AND INSTALLATION

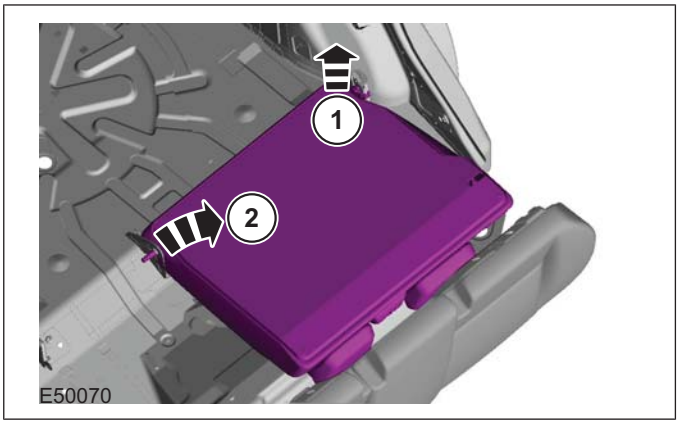
Rear Quarter Trim Panel — 3-Door

1. **Remove the parcel shelf trim panel.**
2. **Tilt the rear seat cushion forward.**
3. **Tilt the rear seat backrest forward.**
4. **Release the rear seat backrest outer pivot retaining lock.**
   1. Using a suitable pair of long nose pliers, press in the retaining clips.
   2. Using a suitable flat blade screwdriver, release the outer locking clip.
   3. Using a suitable flat blade screwdriver, rotate the outer mounting bracket pivot locking latch.



5. **CAUTION: The rear seat backrest inner pivot pin has radial grooves. Take care not to damage the backrest inner pivot bush.**

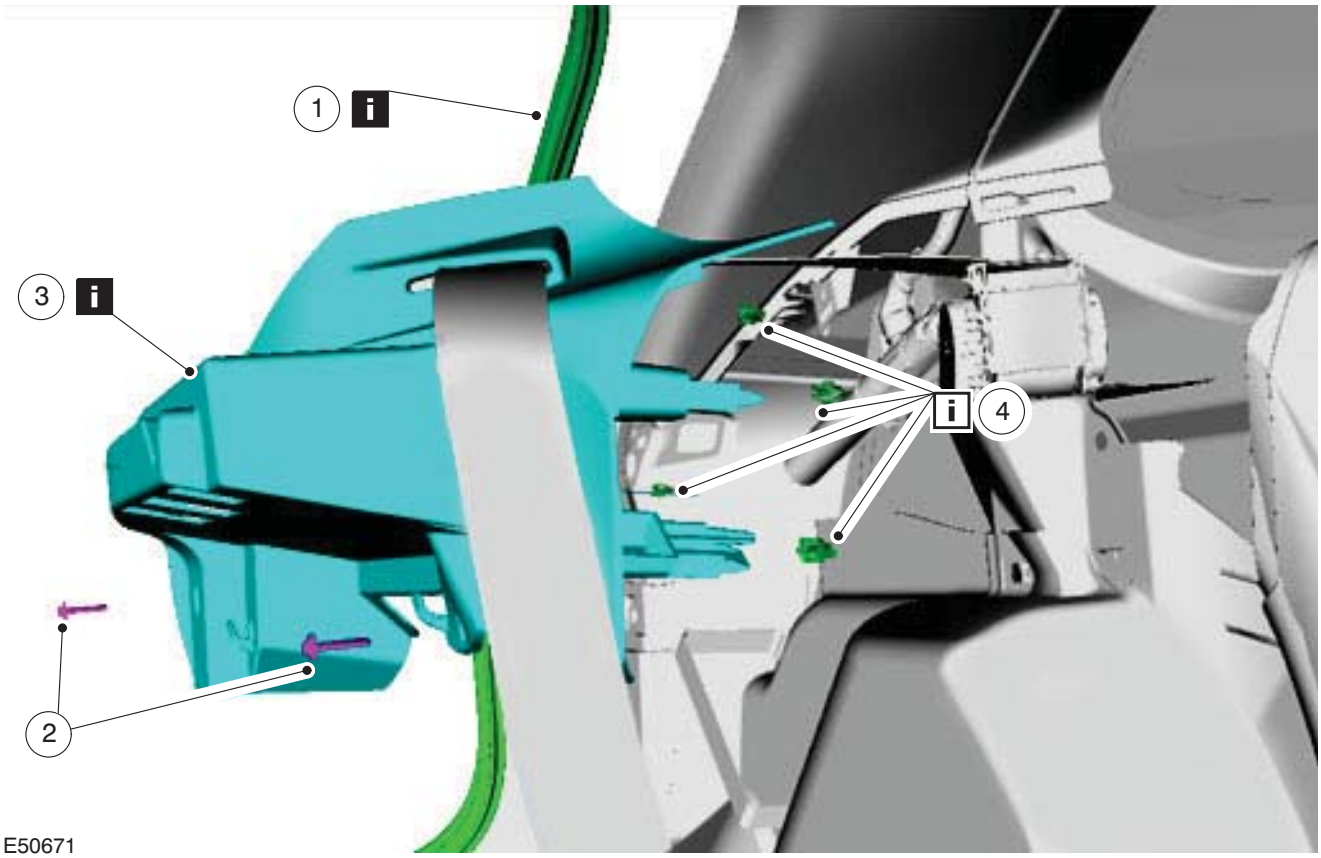
   Remove the rear seat backrest.
   1. Detach the rear seat backrest outer pivot pin from the outer mounting bracket.
   2. Slide the backrest from the center mounting bracket.



6. **Remove the B-pillar trim panel.**

   For additional information, refer to: B-Pillar Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).
7. **Remove the components in the order indicated in the following illustration(s) and table(s).**

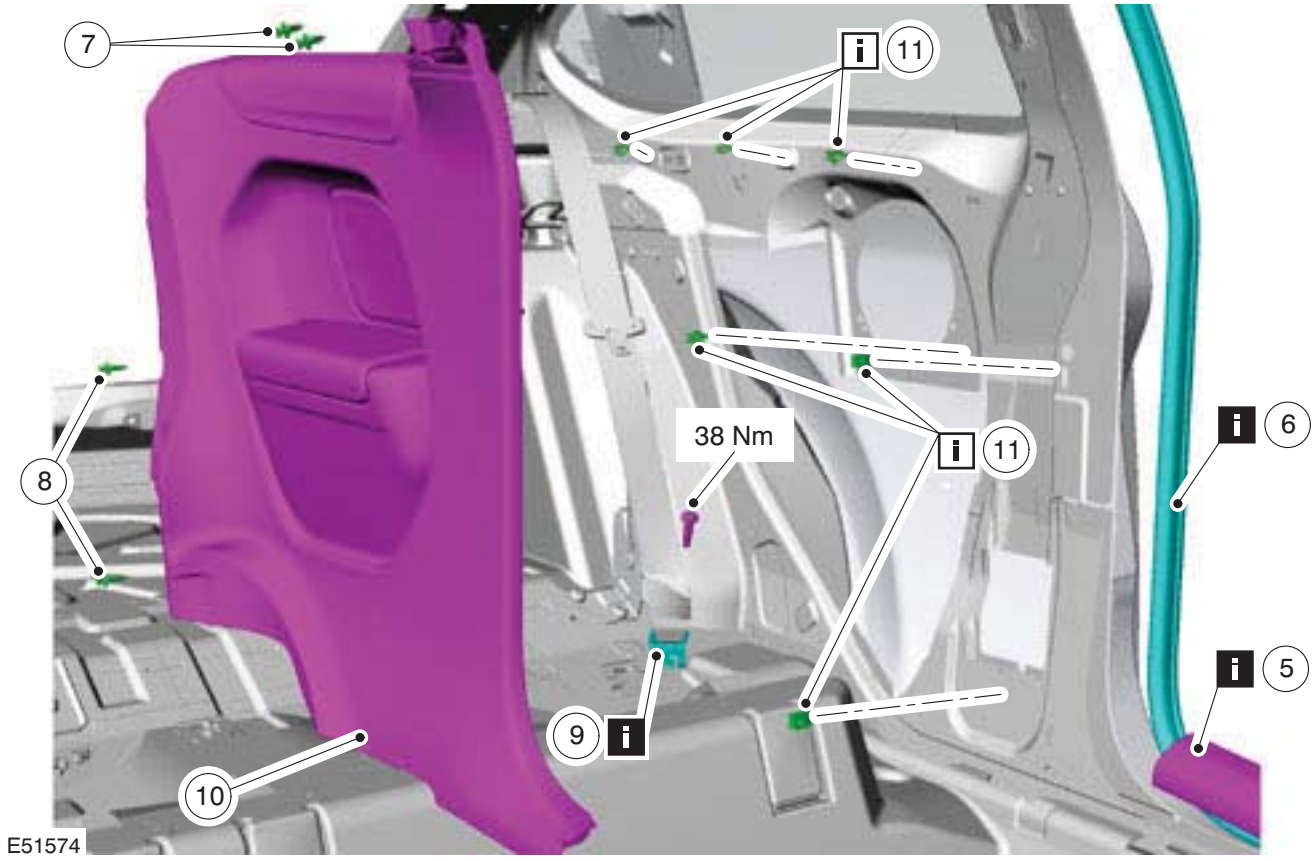
REMOVAL AND INSTALLATION



Item	Description
1	Liftgate opening weatherstrip See Removal Detail
2	Parcel shelf support trim panel retaining screws

Item	Description
3	Parcel shelf tray support trim panel See Removal Detail
4	Parcel shelf support trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
5	Front scuff plate See Removal Detail
6	Front door opening weatherstrip See Removal Detail
7	Rear quarter trim panel upper retaining clips
8	Rear quarter trim panel lower retaining clips

Item	Description
9	Rear safety belt lower anchor See Removal Detail
10	Rear quarter trim panel
11	Rear quarter trim panel retaining clips See Installation Detail

8. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

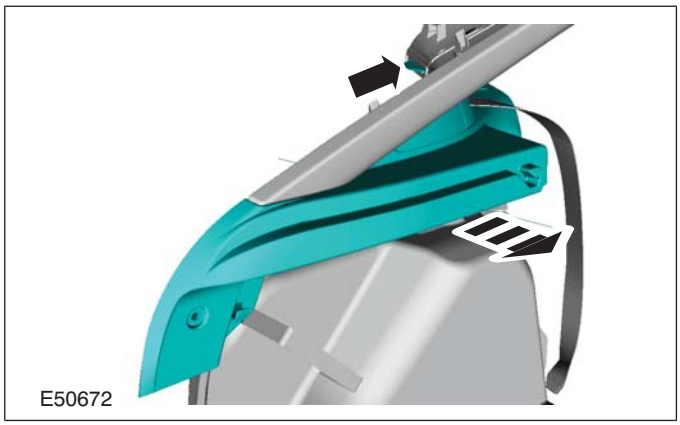
Removal Details

Item 1 Liftgate opening weatherstrip

1. Detach the liftgate opening weatherstrip.

Item 3 Parcel shelf tray support trim panel

1. Detach the parcel shelf support trim panel.
   - Pull the parcel shelf support trim panel away from the rear quarter body panel to release the retaining tang from the rear quater glass trim panel.
   - Feed the rear safety belt harness through the parcel shelf support trim panel.



Item 5 Front scuff plate

1. Detach the front scuff plate.

Item 6 Front door opening weatherstrip

1. Detach the front door opening weatherstrip.

Item 9 Rear safety belt lower anchor

1. Detach the rear safety belt lower anchor.

Installation Details

Item 11 Rear quarter trim panel retaining clips

1. Install the rear quarter trim panel retaining clips to the trim panel before the trim panel is installed to the vehicle.

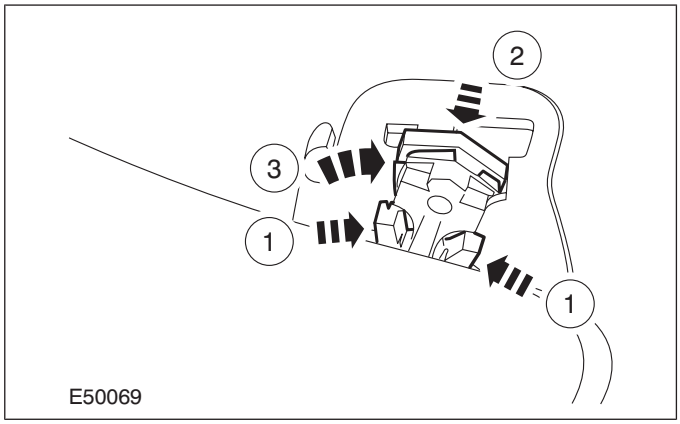
Item 4 Parcel shelf support trim panel retaining clips

1. Install the parcel shelf support trim panel retaining clips to the trim panel before the trim panel is installed to the vehicle.

REMOVAL AND INSTALLATION

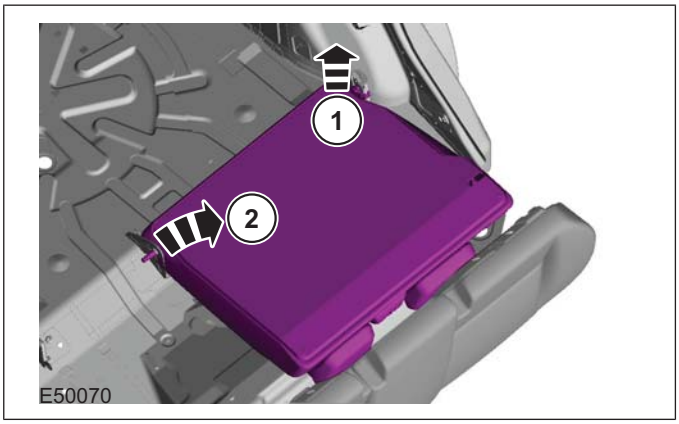
Rear Quarter Trim Panel — 5-Door/Wagon

1. **Tilt the rear seat cushion forward.**
2. **Tilt the rear seat backrest forward.**
3. **Release the rear seat backrest outer pivot retaining lock.**
   1. Using a suitable pair of long nose pliers, press in the retaining clips.
   2. Using a suitable flat blade screwdriver, release the outer locking clip.
   3. Using a suitable flat blade screwdriver, rotate the outer mounting bracket pivot locking latch.

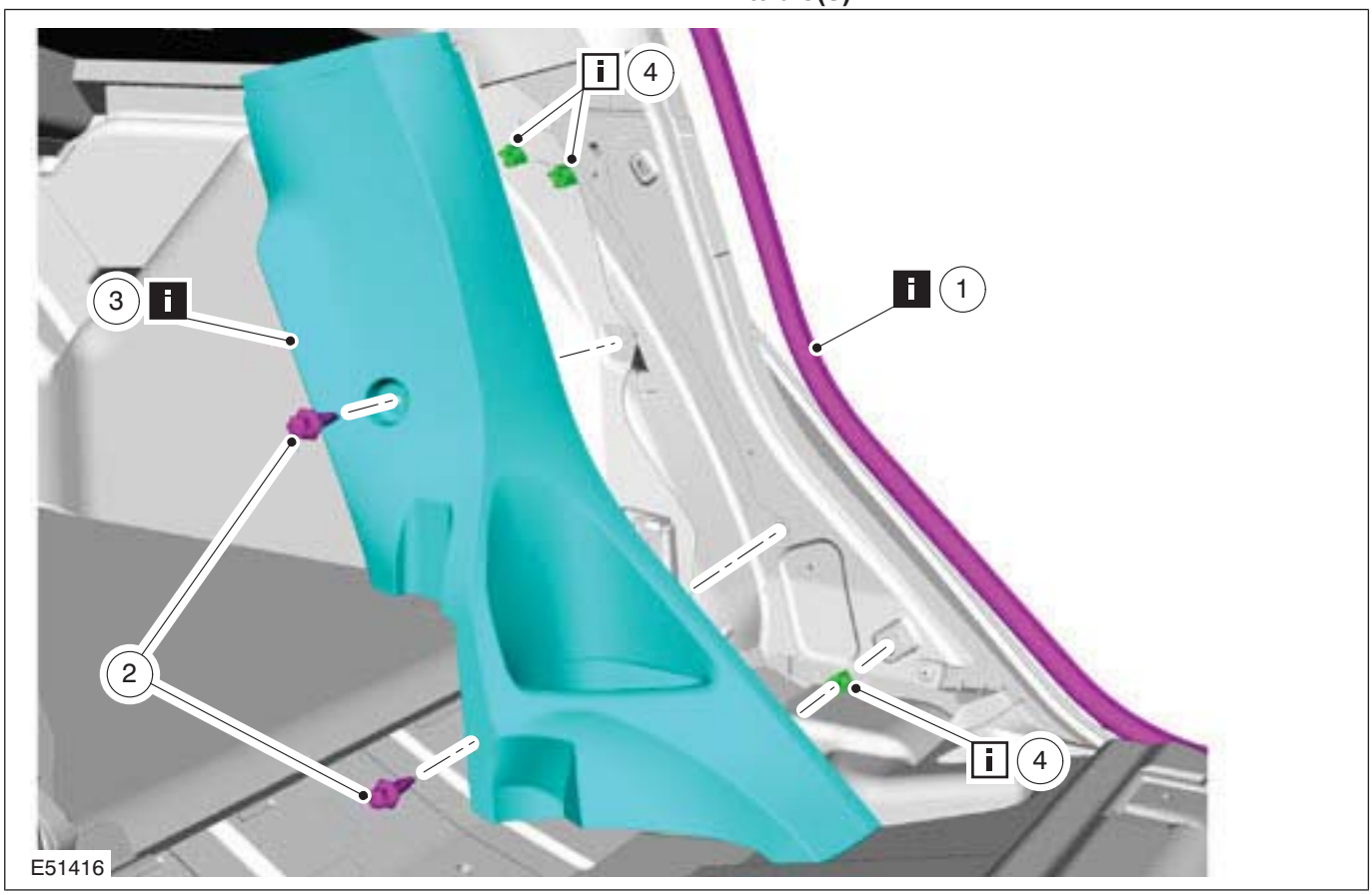


4. **CAUTION: The left-hand rear seat backrest inner pivot pin has radial grooves. Take care not to damage the backrest inner pivot bushing.**

   Remove the rear seat backrest.
   1. Detach the rear seat backrest outer pivot pin from the outer mounting bracket.
   2. Slide the backrest from the center mounting bracket.



5. **Remove the components in the order indicated in the following illustration(s) and table(s).**



REMOVAL AND INSTALLATION

Item	Description
1	Rear door opening weatherstrip See Removal Detail
2	Rear quarter trim panel retaining clips
3	Rear quarter trim panel See Removal Detail
4	Rear quarter trim panel retaining clips See Installation Detail

6. To install, reverse the removal procedure.

Removal Details

Item 1 Rear door opening weatherstrip

1. Detach the rear door opening weatherstrip.

Item 3 Rear quarter trim panel

CAUTION: When removing the rear quarter trim panel from under the rear parcel shelf support trim panel, do not place excessive strain on the rear quarter trim panel retaining clip mouldings.

Installation Details

Item 4 Rear quarter trim panel retaining clips

1. Install the rear quarter trim panel retaining clips to the rear quarter trim panel before the rear quarter trim panel is installed to the vehicle.

SECTION 501-08 Exterior Trim and Ornamentation

VEHICLE APPLICATION: 2011.00 Focus

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REMOVAL AND INSTALLATION

Rear Spoiler — 2.5L Duratec-ST (VI5)..... 501-08-2
Rocker Panel Moulding..... 501-08-3

REMOVAL AND INSTALLATION

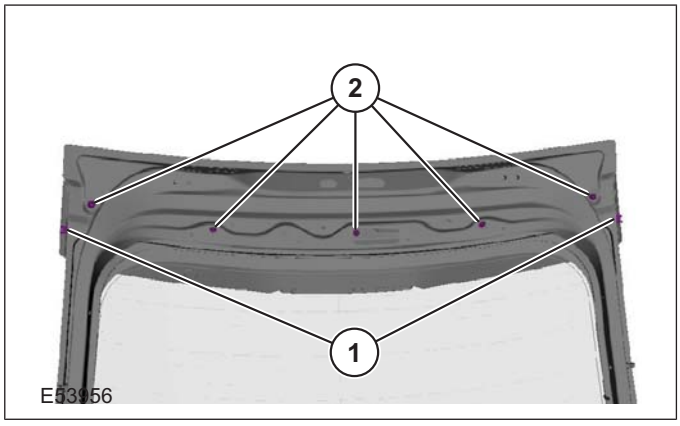
Rear Spoiler — 2.5L Duratec-ST (VI5)

Removal

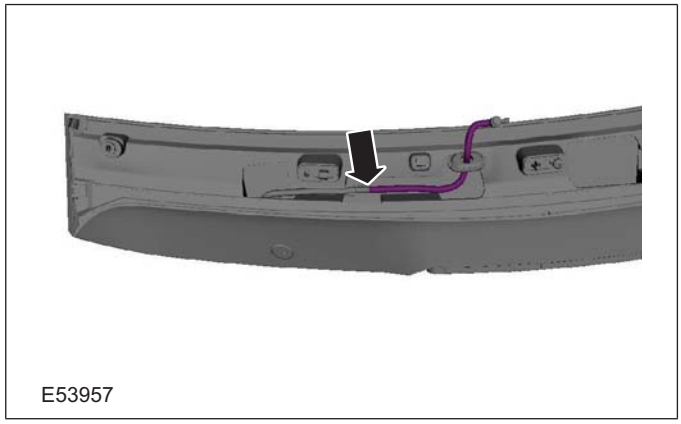
1. **Raise the liftgate.**
2. **Remove the liftgate upper trim panel.**



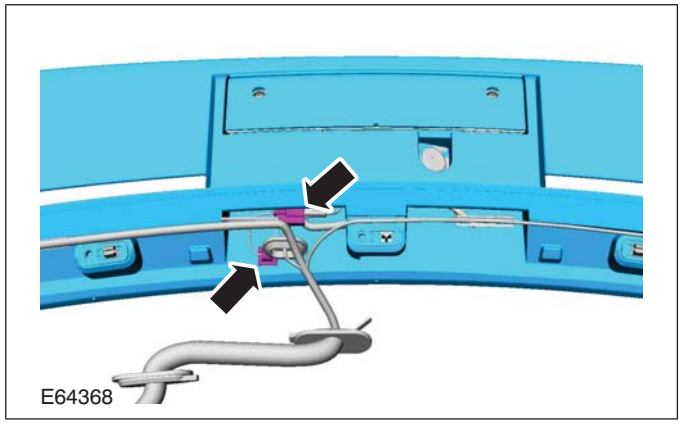
3. **Detach the rear spoiler from the liftgate.**
   1. Remove the rear spoiler retaining clips.
   2. Remove the rear spoiler retaining screws.



4. **Lower the liftgate.**
5. **Detach the liftgate glass washer nozzle hose from the rear spoiler.**
   - Disconnect the liftgate glass washer nozzle hose from the washer nozzle.



6. **Remove the rear spoiler.**
   - Disconnect the high mounted stoplamp electrical connector.



Installation

1. **To Install, reverse the removal procedure.**

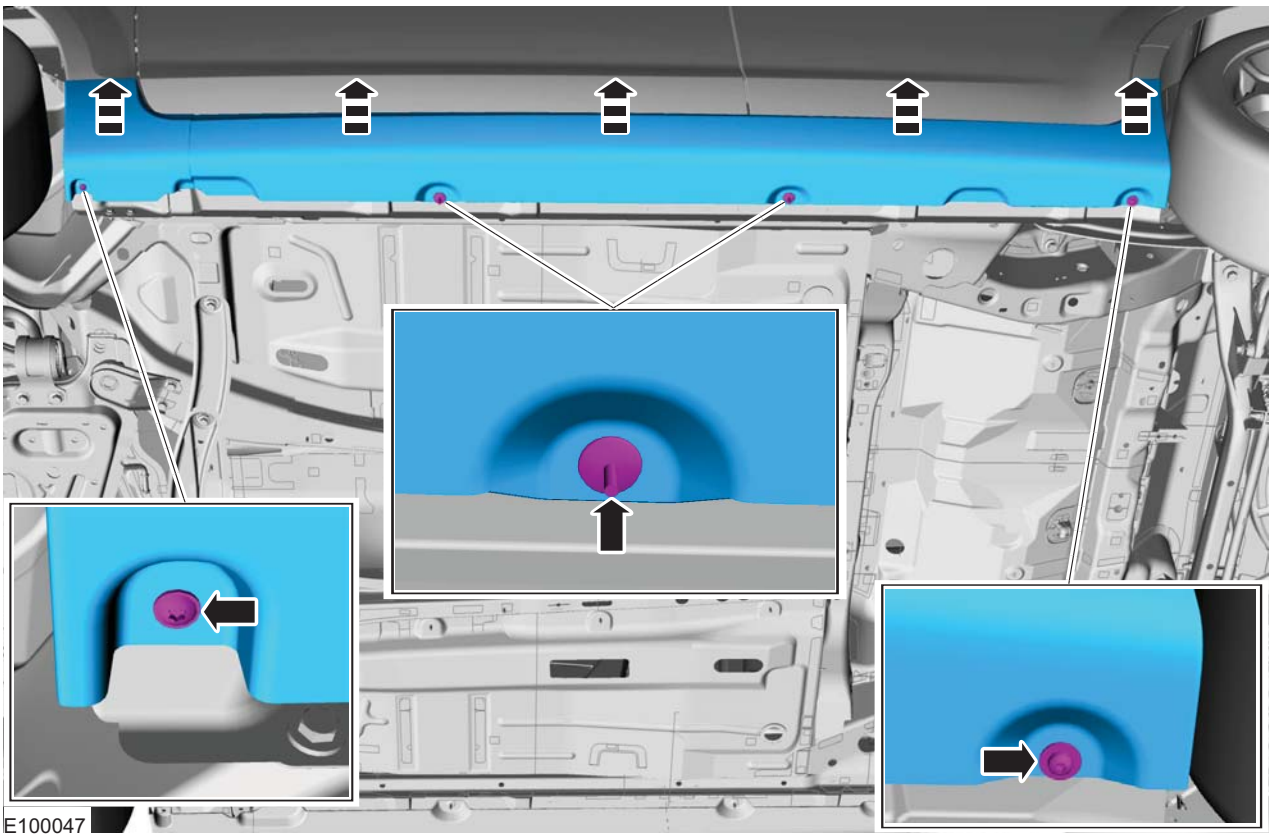
REMOVAL AND INSTALLATION

Rocker Panel Moulding

Removal

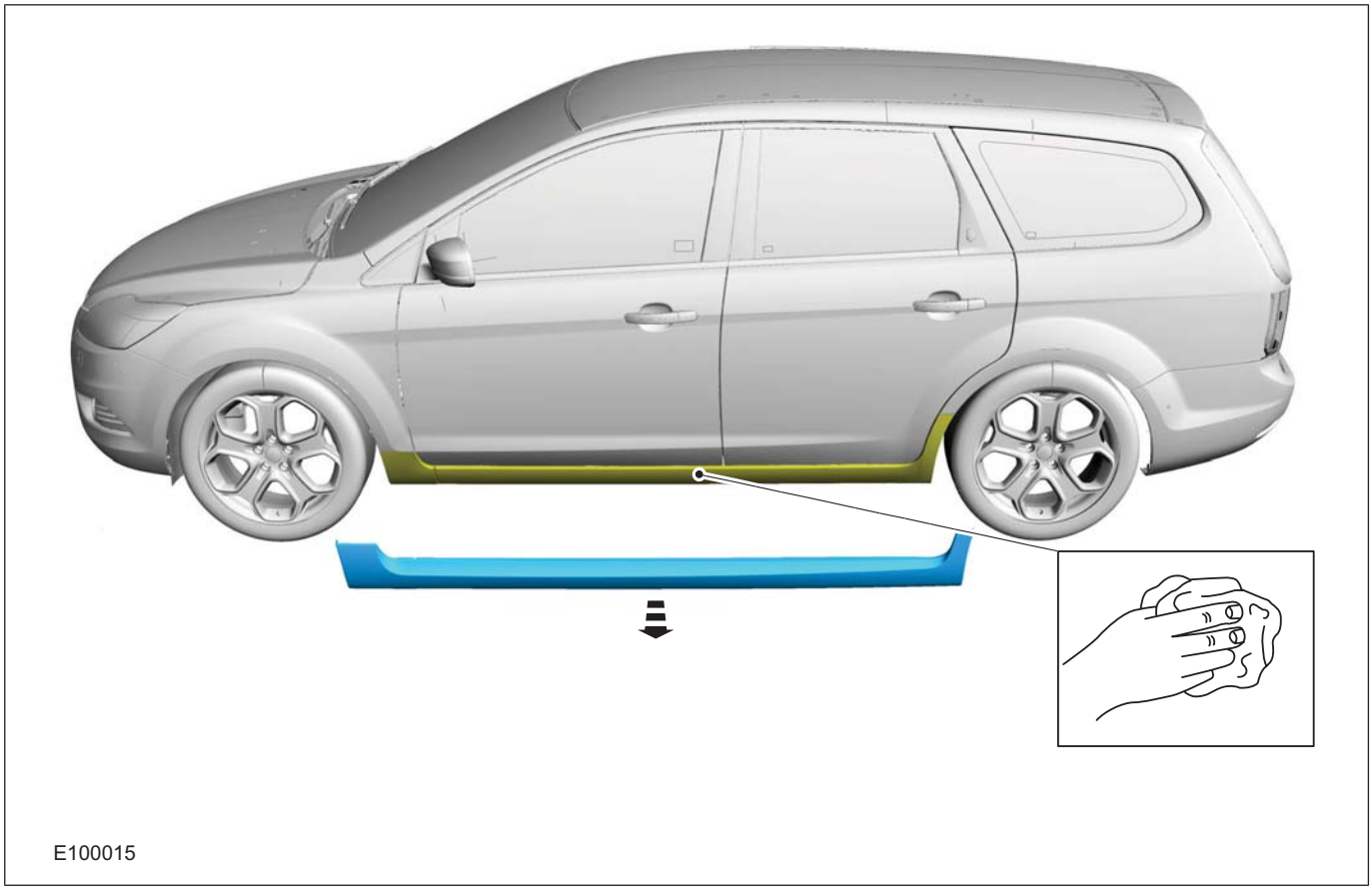
1. Refer to: Health and Safety Precautions (100-00 General Information, Description and Operation).
   Refer to: Specifications (501-25 Body Repairs - General Information, Specifications).
   Refer to: Lifting (100-02 Jacking and Lifting, Description and Operation).

2.



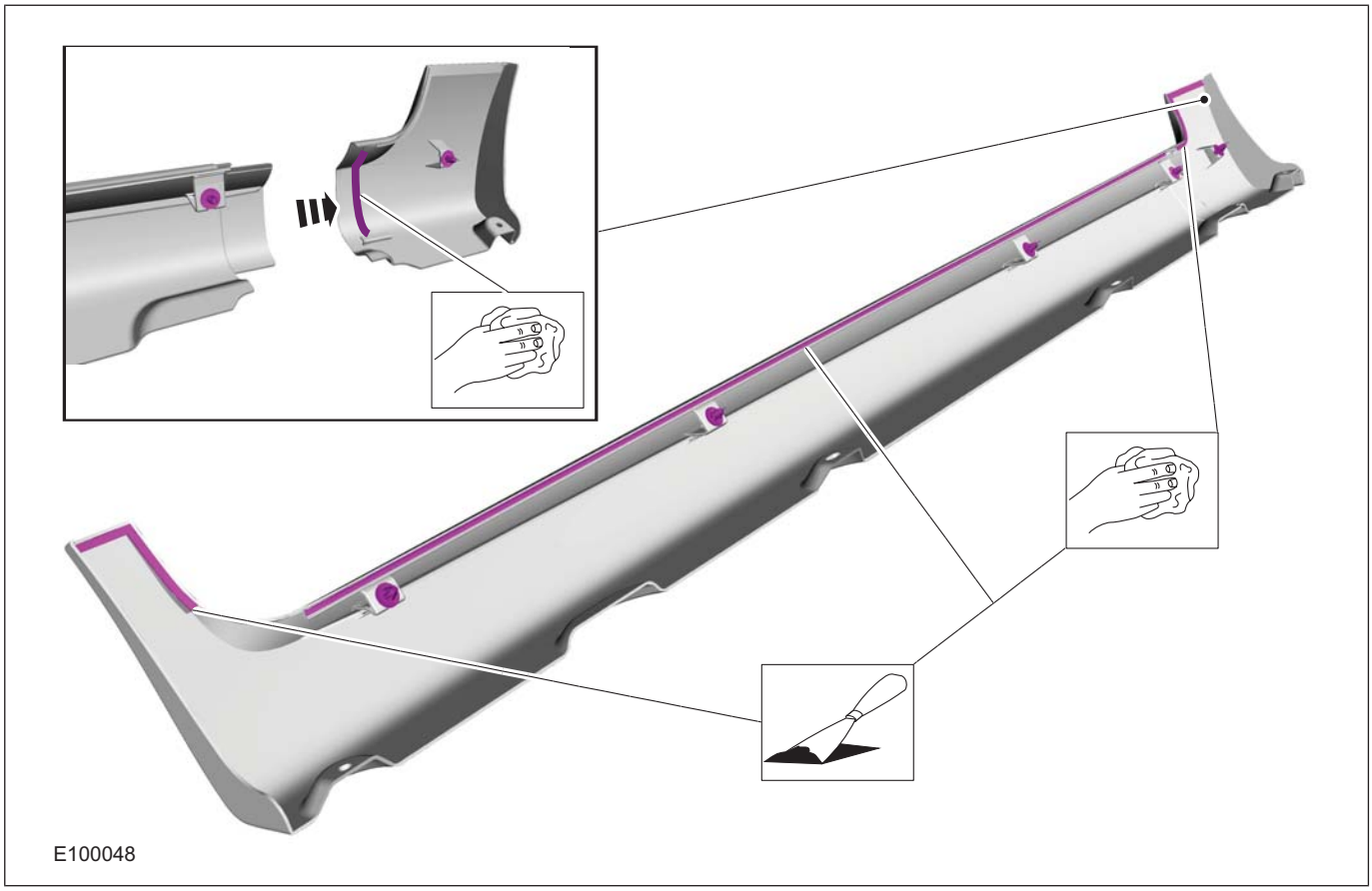
3.

REMOVAL AND INSTALLATION



E100015

4.

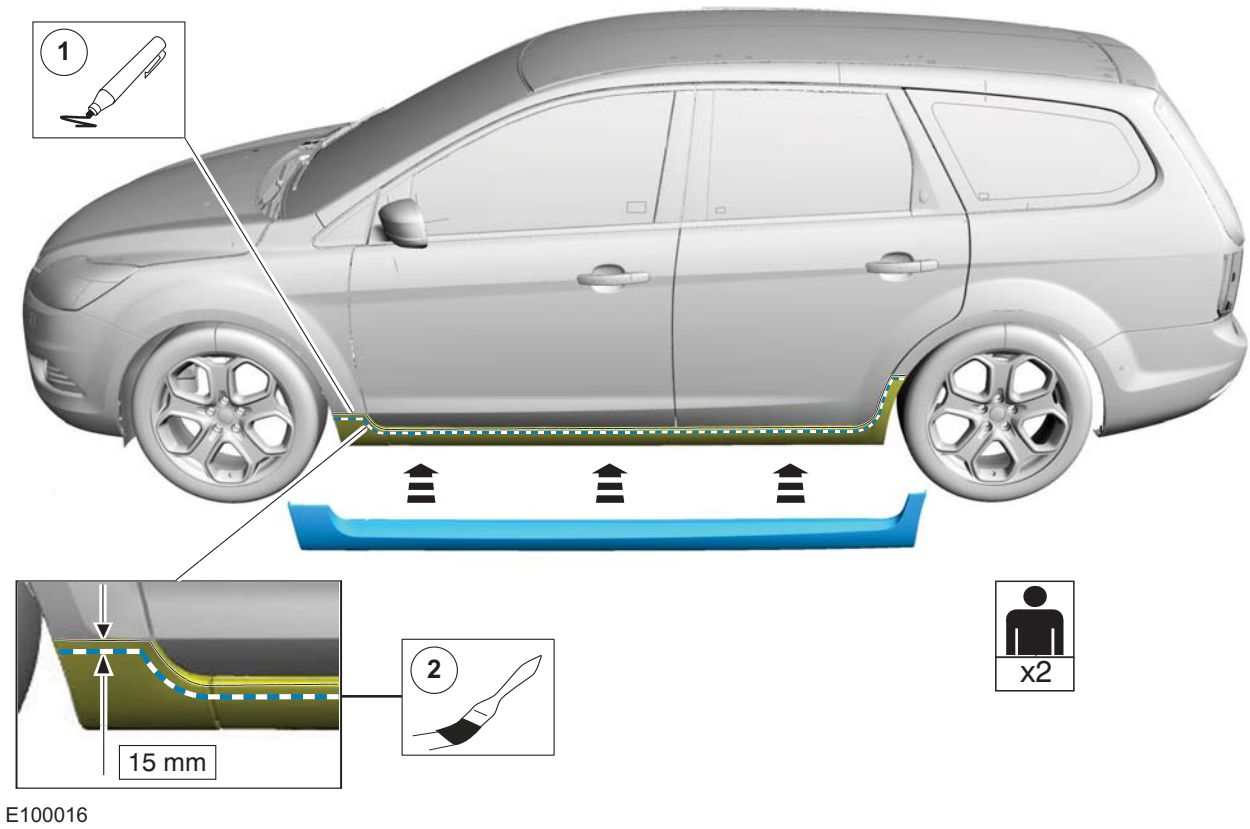


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REMOVAL AND INSTALLATION

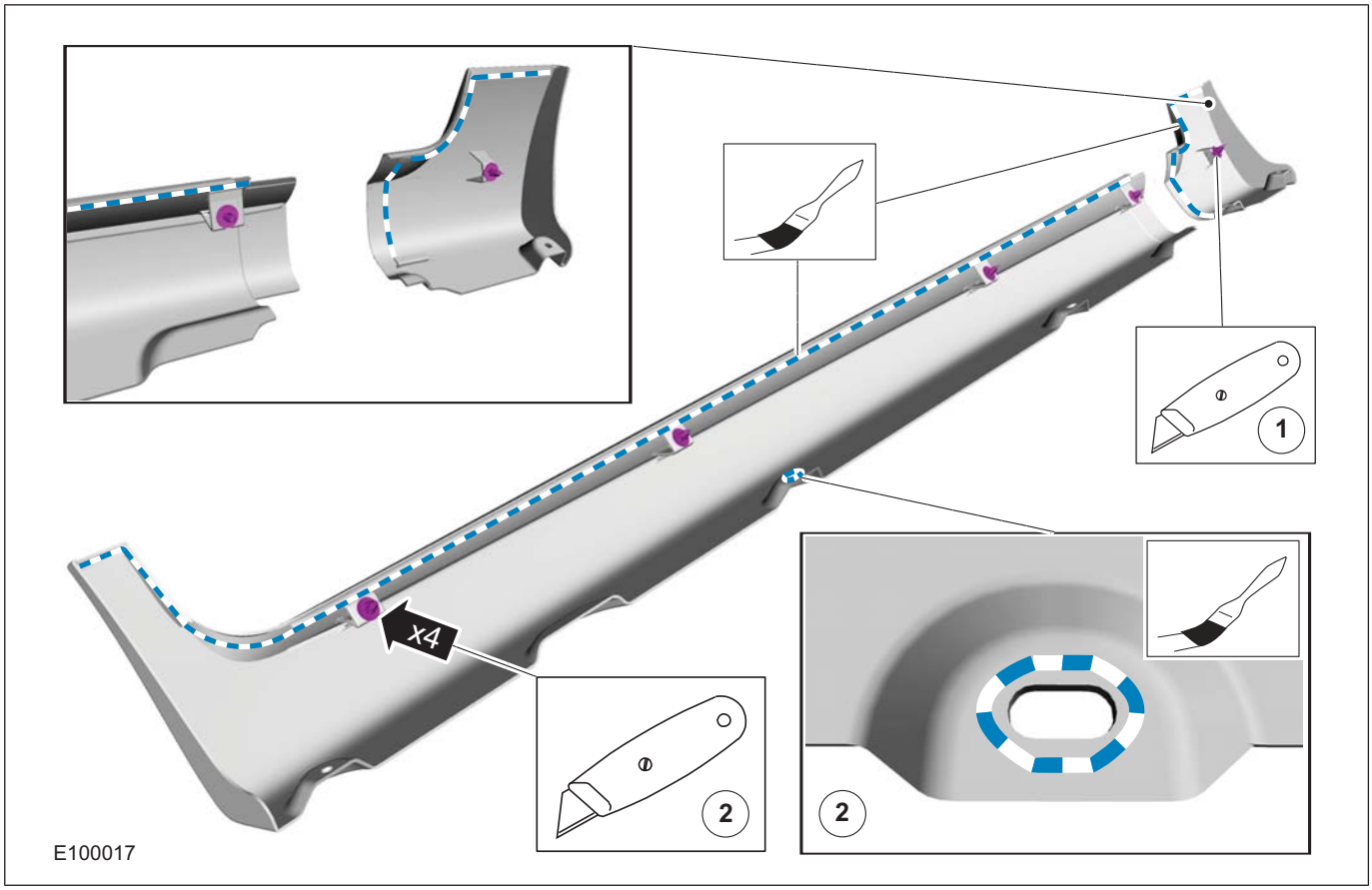
Installation

1.

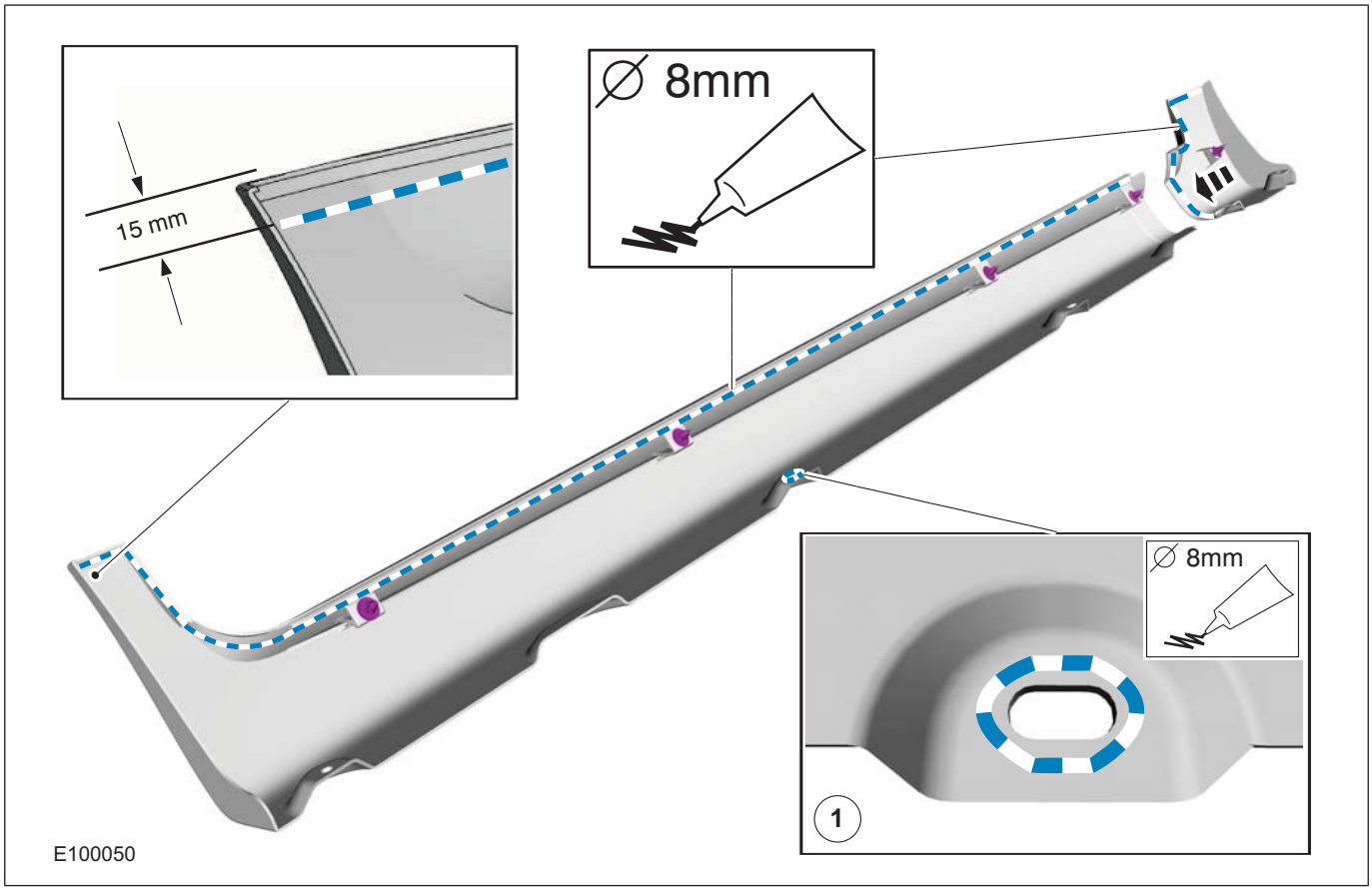


2. 1. If a service fender without fixing hole is fitted.
2. If a service rocker without fixing holes is fitted.

REMOVAL AND INSTALLATION

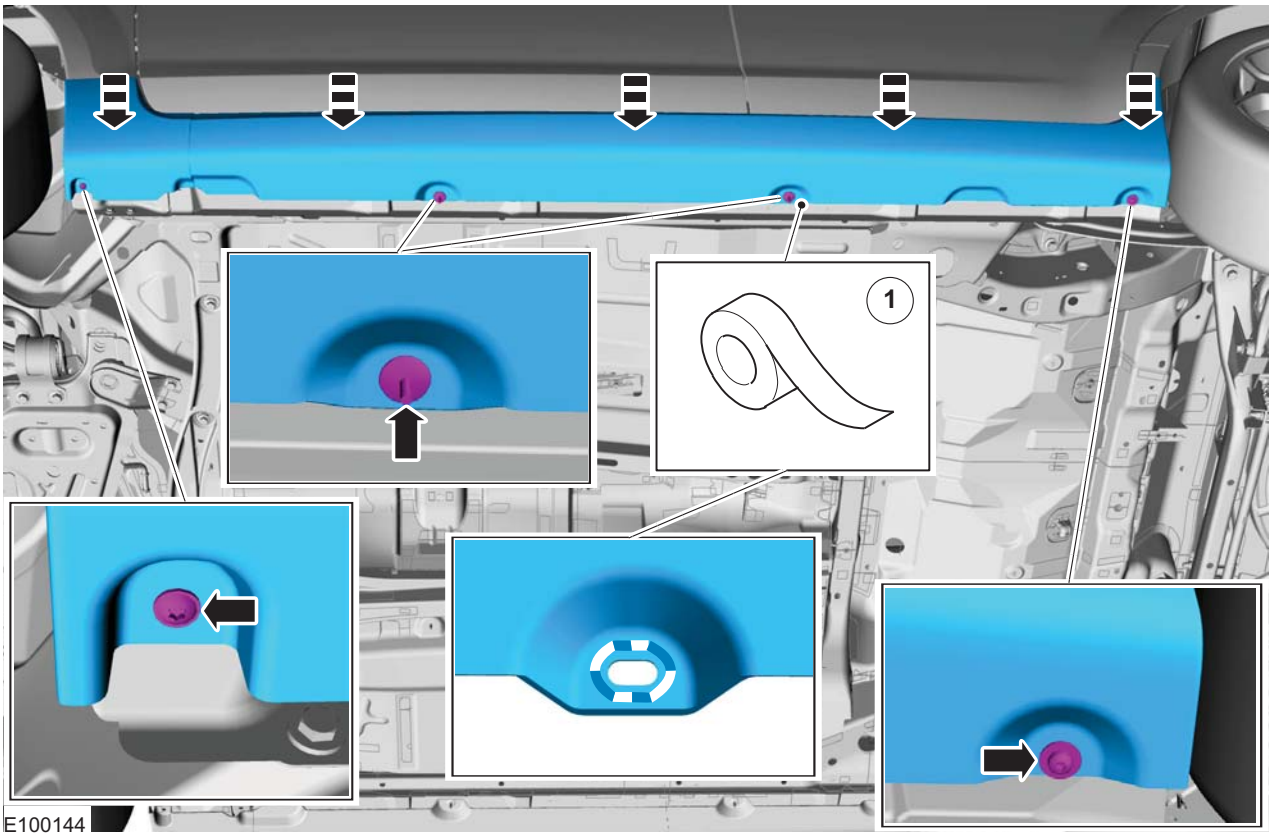


3. 1. If a service rocker without fixing holes is fitted.



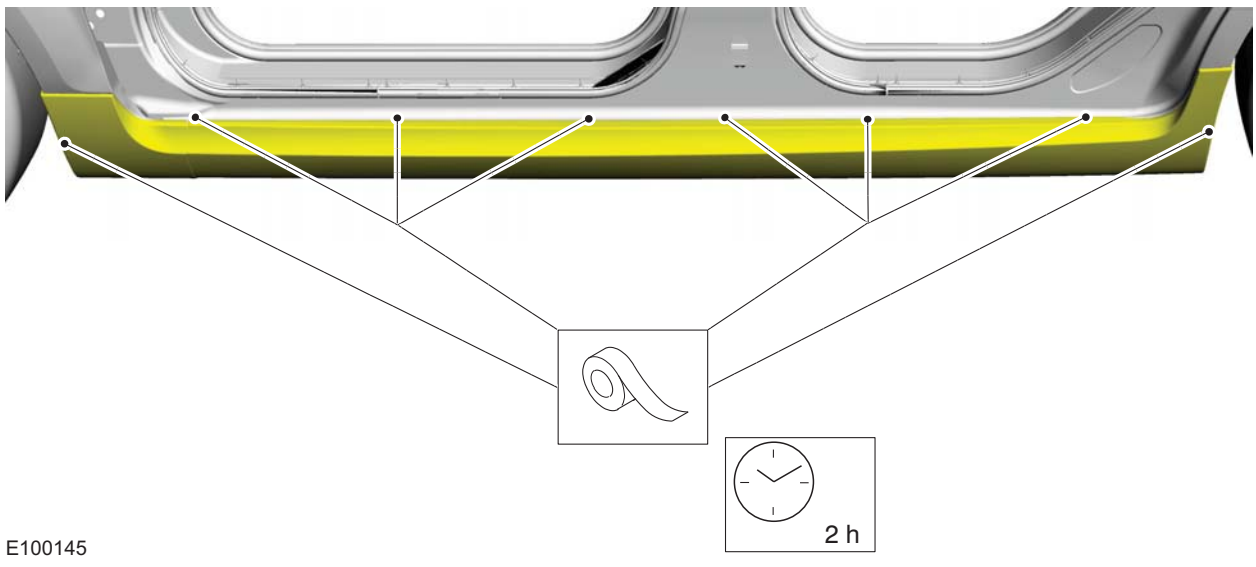
REMOVAL AND INSTALLATION

4. If a service rocker without fixing holes is fitted.



5. Observe a speed limit of 100 km/h for 12 hours.

6. Do not wash the car within 48 hours.



SECTION 501-09 Rear View Mirrors

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

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Auto-dimming Interior Mirror..... 501-09-3
Exterior Mirror Foldback Relay..... 501-09-3

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REMOVAL AND INSTALLATION

Exterior Mirror..... 501-09-24
Auto-Dimming Interior Mirror..... 501-09-26

SPECIFICATIONS

Torque Specifications

Item	Nm	lb-ft	lb-in
Exterior mirror retaining bolt	10	-	89

DESCRIPTION AND OPERATION

Rear View Mirrors

Auto-dimming Interior Mirror

When the ignition is switched on the auto-dimming interior mirror will darken automatically depending on the amount of light shining into the vehicle through the rear window glass. The auto-dimming feature will turn off when reverse gear is selected.

The auto-dimming feature on the interior rear view mirror will not operate correctly if light through the rear window glass is obstructed.

Exterior Mirror Foldback Relay

NOTE: On left-hand drive vehicles, the exterior mirror foldback relay is positioned on the left–hand side of the vehicle under the rear seat cushion. On right-hand drive vehicles, the exterior mirror foldback relay is positioned on the right–hand side of the vehicle under the rear seat cushion.

To gain access to the exterior mirror foldback relay, the C-pillar lower trim panel and the rear scuff plate trim panel must be removed to allow the carpet to be detached from the floor panel.


E54291

DIAGNOSIS AND TESTING

Rear View Mirrors — Vehicles Without: Global Closing

Refer to Wiring Diagrams Section 501-09, for schematic and connector information.

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
• Exterior mirror(s) • Auto-dimming interior mirror	• Fuse(s) • Relay • Electrical connector(s) • Exterior mirror control switch • Heated rear window control switch

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

Symptom Chart

Symptom Chart

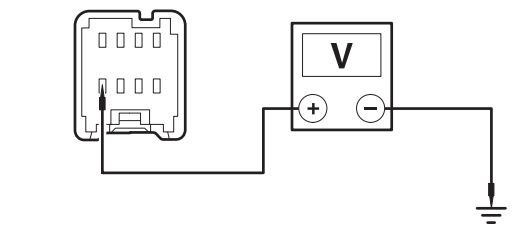
Symptom	Possible Sources	Action
• The exterior mirrors are inoperative	• Exterior mirror control switch.	• CARRY OUT the Exterior Mirror Control Switch Component Test. REFER to the Wiring Diagrams.
	• Circuit(s).	• GO to Pinpoint Test A.
• A single exterior mirror is inoperative	• Exterior mirror control switch.	• CARRY OUT the Exterior Mirror Control Switch Component Test. REFER to the Wiring Diagrams.
	• Exterior mirror motor(s). • Circuit(s).	• GO to Pinpoint Test B.
• A single exterior mirror does not function with switch logic	• Exterior mirror control switch.	• CARRY OUT the Exterior Mirror Control Switch Component Test. REFER to the Wiring Diagrams.
	• Exterior mirror motor(s). • Circuit(s).	• GO to Pinpoint Test C.
• The heated exterior mirror is inoperative	• Heated rear window control switch.	• CARRY OUT the Heated Rear Window Control Switch Component Test. REFER to the Wiring Diagrams.
	• Relay. • Heated mirror element(s). • Circuit(s).	• GO to Pinpoint Test D.

DIAGNOSIS AND TESTING

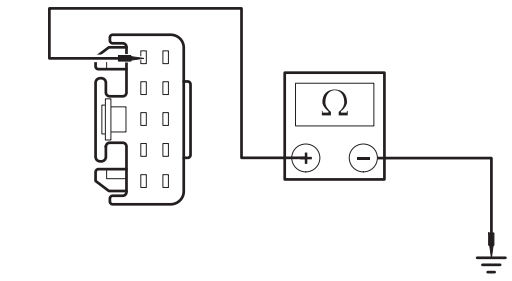
Symptom	Possible Sources	Action
• The auto-dimming interior mirror does not operate correctly	• Auto-dimming interior mirror. • Circuit(s).	• GO to Pinpoint Test E.

Pinpoint Tests

PINPOINT TEST A : THE EXTERIOR MIRRORS ARE INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Use a digital multimeter for all electrical measurements.	
A1: CHECK THE INTERIOR LAMP DELAY FUNCTION	
	1 CHECK the interior lamp delay function. • Does the interior lamp delay function operate correctly? → **Yes** GO to A2. → **No** CHECK the battery saver relay operation.
A2: CHECK THE VOLTAGE TO THE EXTERIOR MIRROR CONTROL SWITCH CIRCUIT	
	1 Disconnect Exterior Mirror Control Switch C741.
	2 Ignition switch in position II.
 TIE0037297	3 Measure the voltage between the exterior mirror control switch C741 pin 1, circuit 29-AD12 (OG/YE), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to A3. → **No** REPAIR circuit 29-AD12 (OG/YE). TEST the system for normal operation.
A3: CHECK THE EXTERIOR MIRROR CONTROL SWITCH GROUND CIRCUIT FOR CONTINUITY	
NOTE: The circuit number changes at soldered joint S197.	
NOTE: The exterior mirror control switch and the driver side exterior window control switch have a common ground circuit.	
	1 Ignition switch in position 0.

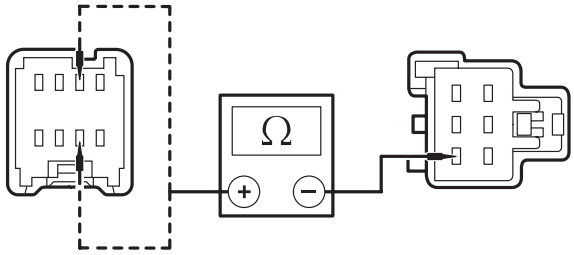
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect Driver Side Exterior Window Control Switch C488.
 TIE0023402	3 Measure the resistance between the driver side exterior mirror control switch C488 pin 1, circuit 31-AJ7 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** VERIFY the customer concern. → **No** REPAIR circuit 31-AJ7 (BK). TEST the system for normal operation.

PINPOINT TEST B : A SINGLE EXTERIOR MIRROR IS INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Use a digital multimeter for all electrical measurements.	
B1: CHECK FOR CONTINUITY BETWEEN THE EXTERIOR MIRROR CONTROL SWITCH AND THE INOPERATIVE EXTERIOR MIRROR	
	1 Disconnect Exterior Mirror Control Switch C741.
	2 Disconnect Inoperative Exterior Mirror C808 or C822.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E0037298	3 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 7, circuit 32-AD6 (WH), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6 (WH), harness side. • Exterior mirror control switch C741 pin 3, circuit 32-AD9 (WH/GN), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 3, circuit 32-AD6C (WH), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6C (WH), harness side. • Exterior mirror control switch C741 pin 7, circuit 32-AD9C (WH/GN), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 32-AD6 (WH), or circuit 32-AD6C (WH), or circuit 32-AD9 (WH/GN) or circuit 32-AD9C (WH/GN). TEST the system for normal operation.

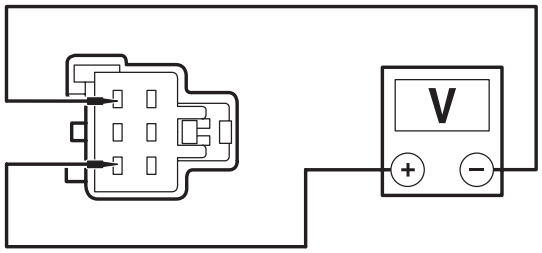
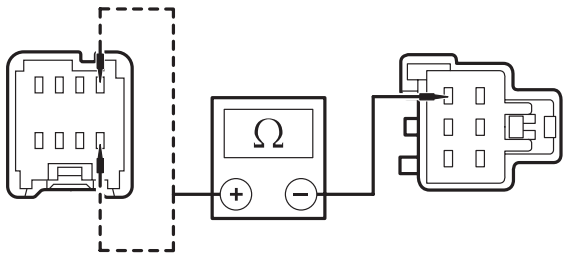
PINPOINT TEST C : A SINGLE EXTERIOR MIRROR DOES NOT FUNCTION WITH SWITCH LOGIC

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Use a digital multimeter for all electrical measurements.	
C1: CHECK THE EXTERIOR MIRROR FUNCTIONS WITH SWITCH LOGIC	
	1 Ignition switch in position II.

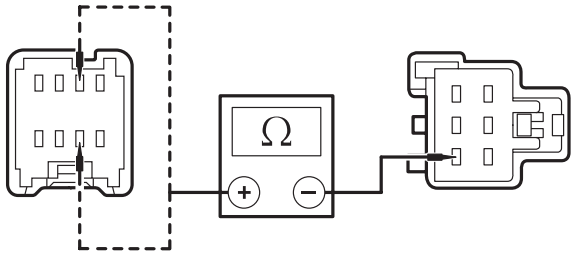
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Operate the exterior mirror control switch. • Does the exterior mirror function with switch logic? → **Yes** VERIFY the customer concern. → **No** Driver side exterior mirror UP/DOWN inoperative - GO to C2. Driver side exterior mirror LEFT/RIGHT inoperative - GO to C5. Passenger side exterior mirror UP/DOWN inoperative - GO to C8. Passenger side exterior mirror LEFT/RIGHT inoperative - GO to C11.
C2: CHECK THE DRIVER SIDE EXTERIOR MIRROR UP/DOWN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Exterior Mirror C808.
	3 Ignition switch in position II.
	4 Select the driver side exterior mirror. While operating the exterior mirror control switch UP and DOWN, measure the voltage between the:

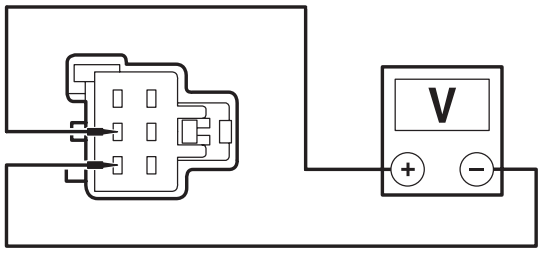
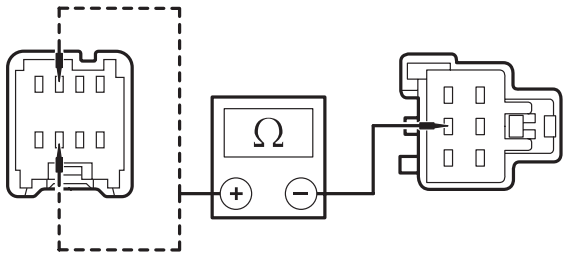
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E55391	Left-hand drive vehicles • Driver side exterior mirror C808 pin 1, circuit 34-AD7 (BU/RD), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6 (WH), harness side. Right-hand drive vehicles • Driver side exterior mirror C808 pin 1, circuit 34-AD7C (BU/RD), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6C (WH), harness side. • Is the voltage greater than 10 volts when the exterior mirror control switch is moved to the UP position and is the polarity reversed when moved to the DOWN position? → **Yes** INSTALL a new driver side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** GO to C3.
C3: CHECK CIRCUIT 34-AD7 (BU/RD) FOR CONTINUITY	
	1 Ignition switch in position 0.
	2 Disconnect Exterior Mirror Control Switch C741.
 E0037300	3 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 8, circuit 34-AD7 (BU/RD), harness side and the driver side exterior mirror C808 pin 1, circuit 34-AD7 (BU/RD), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 4, circuit 34-AD7C (BU/RD), harness side and the driver side exterior mirror C822 pin 1, circuit 34-AD7C (BU/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to C4. → **No** REPAIR circuit 34-AD7 (BU/RD) or circuit 34-AD7C (BU/RD). TEST the system for normal operation.

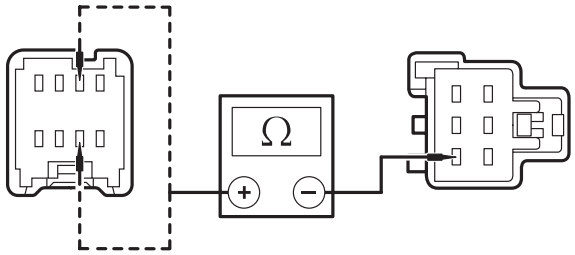
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C4: CHECK CIRCUIT 32-AD6 (WH) FOR CONTINUITY	
 E0037298	1 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 7, circuit 32-AD6 (WH), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6 (WH), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 3, circuit 32-AD6C (WH), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6C (WH), harness side.
	• Is the resistance less than 5 ohms? → **Yes** INSTALL a new driver side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 32-AD6 (WH) or circuit 32-AD6C (WH). TEST the system for normal operation.
C5: CHECK THE DRIVER SIDE EXTERIOR MIRROR LEFT/RIGHT CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Exterior Mirror C808.
	3 Ignition switch in position II.

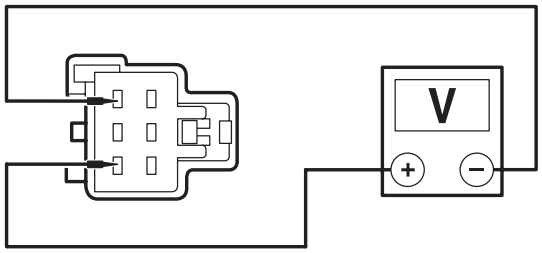
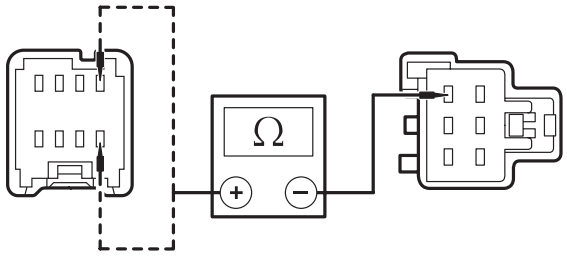
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E0037449	4 Select the driver side exterior mirror. While operating the exterior mirror control switch LEFT and RIGHT, measure the voltage between the: Left-hand drive vehicles • Driver side exterior mirror C808 pin 2, circuit 33-AD8 (YE/BU), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6 (WH), harness side. Right-hand drive vehicles • Driver side exterior mirror C808 pin 2, circuit 33-AD8C (YE/BU), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6C (WH), harness side. • Is the voltage greater than 10 volts when the exterior mirror control switch is moved to the LEFT position and is the polarity reversed when moved to the RIGHT position? → **Yes** INSTALL a new driver side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** GO to C6.
C6: CHECK CIRCUIT 33-AD8 (YE/BU) FOR CONTINUITY	
	1 Ignition switch in position 0.
	2 Disconnect Exterior Mirror Control Switch C741.
 E0037302	3 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 6, circuit 33-AD8 (YE/BU), harness side and the driver side exterior mirror C808 pin 2, circuit 33-AD8 (YE/BU), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 2, circuit 33-AD8C (YE/BU), harness side and the driver side exterior mirror C808 pin 2, circuit 33-AD8C (YE/BU), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to C7. → **No** REPAIR circuit 33-AD8 (YE/BU) or circuit 33-AD8C (YE/BU). TEST the system for normal operation.

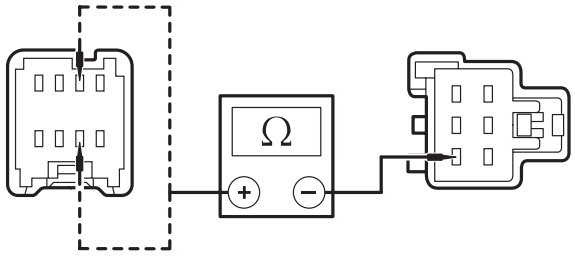
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C7: CHECK CIRCUIT 32-AD6 (WH) FOR CONTINUITY	
 E0037298	1 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 7, circuit 32-AD6 (WH), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6 (WH), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 3, circuit 32-AD6C (WH), harness side and the driver side exterior mirror C808 pin 3, circuit 32-AD6C (WH), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new driver side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 32-AD6 (WH) or circuit 32-AD6 (WH). TEST the system for normal operation.
C8: CHECK THE PASSENGER SIDE MIRROR UP/DOWN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Exterior Mirror C822.
	3 Ignition switch in position II.

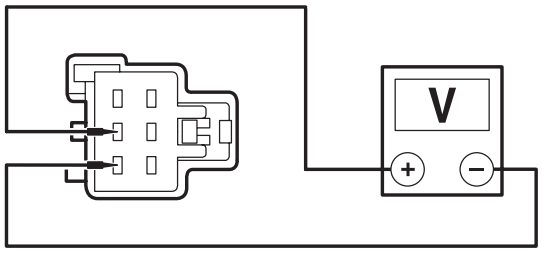
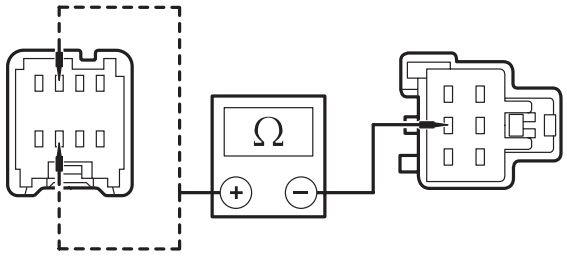
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E55391	4 Select the passenger side exterior mirror. While operating the exterior mirror control switch UP and DOWN, measure the voltage between the passenger side exterior mirror C822 pin 1, circuit 34-AD10 (BU/YE), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side. • Is the voltage greater than 10 volts when the exterior mirror control switch is moved to the UP position and is the polarity reversed when moved to the DOWN position? → **Yes** INSTALL a new passenger side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** GO to C9.
C9: CHECK CIRCUIT 34-AD10 (BU/YE) FOR CONTINUITY	
	1 Ignition switch in position 0.
	2 Disconnect Exterior Mirror Control Switch C741.
 E0037300	3 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 4, circuit 34-AD10 (BU/YE), harness side and the passenger side exterior mirror C822 pin 1, circuit 34-AD10 (BU/YE), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 8, circuit 34-AD10C (BU/YE), harness side and the passenger side exterior mirror C822 pin 1, circuit 34-AD10 (BU/YE), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to C10. → **No** REPAIR circuit 34-AD10 (BU/YE) or circuit 34-AD10C (BU/YE). TEST the system for normal operation.

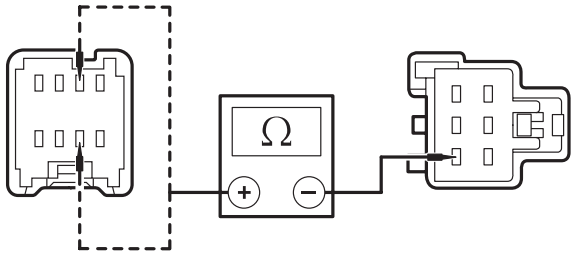
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C10: CHECK CIRCUIT 32-AD9 (WH/GN) FOR CONTINUITY	
 E0037298	1 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 3, circuit 32-AD9 (WH/GN), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 7, circuit 32-AD9C (WH/GN), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side.
	• Is the resistance less than 5 ohms? → **Yes** INSTALL a new passenger side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 32-AD9 (WH/GN) or circuit 32-AD9C (WH/GN). TEST the system for normal operation.
C11: CHECK THE PASSENGER SIDE EXTERIOR MIRROR LEFT/RIGHT CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Exterior Mirror C822.
	3 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E0037449	4 Select the passenger side exterior mirror. While operating the exterior mirror control switch LEFT and RIGHT, measure the voltage between the passenger side exterior mirror C822 pin 2, circuit 33-AD11 (YE/VT), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side. • Is the voltage greater than 10 volts when the exterior mirror control switch is moved to the LEFT position and is the polarity reversed when moved to the RIGHT position. → **Yes** INSTALL a new passenger side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** GO to C12.
C12: CHECK CIRCUIT 33-AD11 (YE/VT) FOR CONTINUITY	
	1 Ignition switch in position 0. 2 Disconnect Exterior Mirror Control Switch C741.
 E0037302	3 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 2, circuit 33-AD11 (YE/VT), harness side and the passenger side exterior mirror C822 pin 2, circuit 33-AD11 (YE/VT), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 6, circuit 33-AD11C (YE/VT), harness side and the passenger side exterior mirror C822 pin 2, circuit 33-AD11 (YE/VT), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to C13. → **No** REPAIR circuit 33-AD11 (YE/VT) or circuit 33-AD11C (YE/VT). TEST the system for normal operation.

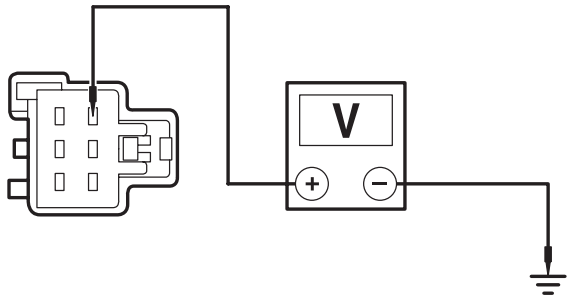
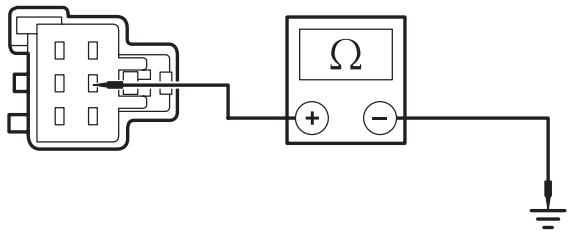
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C13: CHECK CIRCUIT 32-AD9 (WH/GN) FOR CONTINUITY	
 E0037298	1 Measure the resistance between the: Left-hand drive vehicles • Exterior mirror control switch C741 pin 3, circuit 32-AD9 (WH/GN), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side. Right-hand drive vehicles • Exterior mirror control switch C741 pin 7, circuit 32-AD9C (WH/GN), harness side and the passenger side exterior mirror C822 pin 3, circuit 32-AD9 (WH/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new passenger side exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 32-AD9 (WH/RD) or circuit 32-AD9C (WH/RD). TEST the system for normal operation.

PINPOINT TEST D : THE HEATED EXTERIOR MIRROR IS INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Use a digital multimeter for all electrical measurements.	
D1: CHECK THE OPERATION OF THE HEATED REAR WINDOW	
	1 Ignition switch in position II.
	2 Operate the heated rear window control switch. • Does the heated rear window function correctly? → **Yes** GO to D2. → **No** REPAIR the heated rear window. REFER to: Glass, Frames and Mechanisms - Vehicles With: Global Closing (501-11 Glass, Frames and Mechanisms, Diagnosis and Testing).
D2: CHECK THE VOLTAGE TO THE INOPERATIVE EXTERIOR MIRROR	
	1 Ignition switch in position 0.

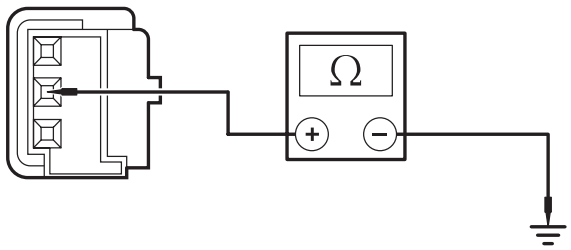
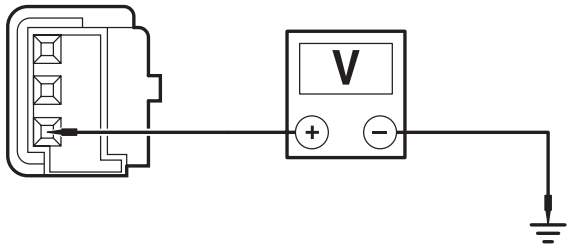
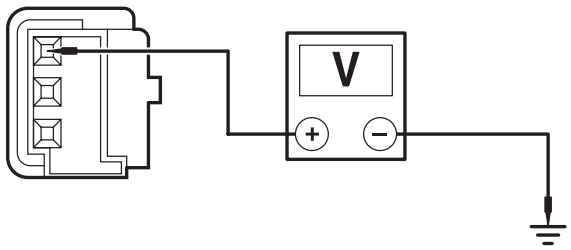
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect Inoperative Exterior Mirror C808 or C822.
	3 Ignition switch in position II.
	4 Operate the heated rear window control switch.
 E55392	5 Measure the voltage between the: • Driver side exterior mirror C808 pin 4, circuit 15S-HB35 (GN/BK), harness side and ground. • Passenger side exterior mirror C822 pin 4, circuit 15S-HB36 (GN/OG), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to D3. → **No** REPAIR circuit 15S-HB35 (GN/BK) or circuit 15S-HB36 (GN/OG). TEST the system for normal operation.
D3: CHECK THE INOPERATIVE EXTERIOR MIRROR GROUND CIRCUIT FOR CONTINUITY	
	1 Ignition switch in position 0.
 E55393	2 Measure the resistance between the: • Driver side exterior mirror C808 pin 5, circuit 31-HB35 (BK), harness side and ground. • Passenger side exterior mirror C822 pin 5, circuit 31-HB36 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new heated exterior mirror glass. TEST the system for normal operation. → **No** REPAIR circuit 31-HB35 (BK) or circuit 31-HB36 (BK). TEST the system for normal operation.

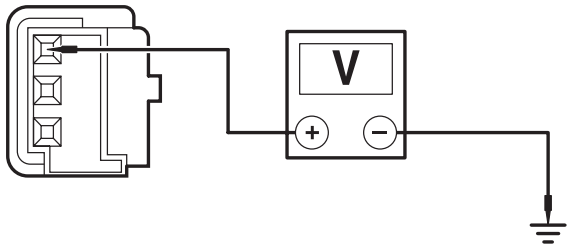
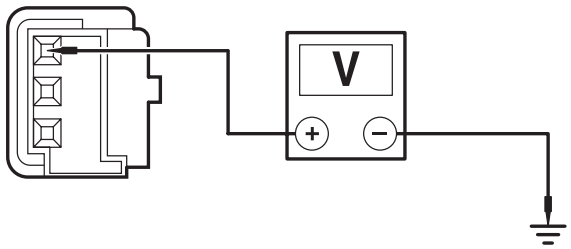
PINPOINT TEST E : THE AUTO-DIMMING INTERIOR MIRROR DOES NOT OPERATE CORRECTLY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Use a digital multimeter for all electrical measurements.	
E1: CHECK FOR CONTINUITY BETWEEN THE AUTO-DIMMING INTERIOR MIRROR AND GROUND	
	1 Disconnect Auto-dimming Interior Mirror C742.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E55394	2 Measure the resistance between the auto-dimming interior mirror C742 pin 2, circuit 91-AD15 (BK/OG), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to E2. → **No** REPAIR circuit 91-AD15 (BK/OG). TEST the system for normal operation.
E2: CHECK THE VOLTAGE TO THE AUTO-DIMMING INTERIOR MIRROR	
	1 Ignition switch in position II.
 E55395	2 Measure the voltage between the auto-dimming interior mirror C742 pin 1, circuit 29-AD15 (OG), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to E3. → **No** REPAIR circuit 29-AD15 (OG). TEST the system for normal operation.
E3: CHECK THE REVERSE CUT-OUT VOLTAGE TO THE AUTO-DIMMING INTERIOR MIRROR	
 E55396	**NOTE:** Make sure the selector lever is in the 'N' (NEUTRAL) position. 1 Measure the voltage between the auto-dimming interior mirror C742 pin 3, circuit 15S-AD15 (GN/RD), harness side and ground. • Is any voltage present? → **Yes** GO to E4. → **No** GO to E5.
E4: CHECK FOR VOLTAGE TO THE AUTO-DIMMING INTERIOR MIRROR	
	1 Ignition switch in position 0.
	2 Disconnect Transmission Switch C864 or Transmission Switch C866 or Reversing Lamps Relay C1003.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Ignition switch in position II.
 E55396	4 Measure the voltage between the auto-dimming interior mirror C742 pin 3, circuit 15S-AD15 (GN/RD), harness side and ground. • Is any voltage present? → **Yes** INSTALL a new transmission switch or reversing lamp relay. TEST the system for normal operation. → **No** REPAIR circuit 15S-AD15 (GN/RD). TEST the system for normal operation.
E5: CHECK THE REVERSE CUT-OUT VOLTAGE TO THE AUTO-DIMMING INTERIOR MIRROR	
	1 Select R (REVERSE).
 E55396	2 Measure the voltage between the auto-dimming interior mirror C742 pin 3, circuit 15S-AD15 (GN/RD), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new auto-dimming interior mirror. REFER to: Auto-Dimming Interior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 15S-AD15 (GN/RD). TEST the system for normal operation.

DIAGNOSIS AND TESTING

Rear View Mirrors — Vehicles With: Global Closing

Refer to Wiring Diagrams Section 501-09, for schematic and connector information.

General Equipment

Worldwide Diagnostic System (WDS)

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
• Exterior mirror(s)	• Fuse(s) • Relay • Electrical connector(s) • Switch

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

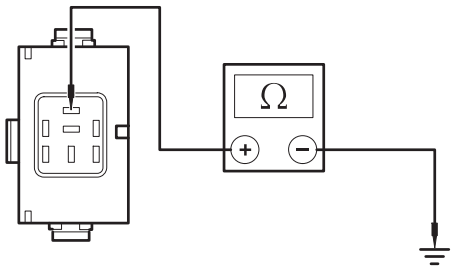
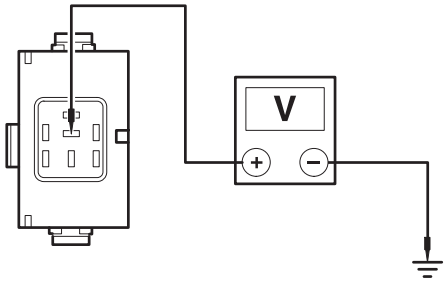
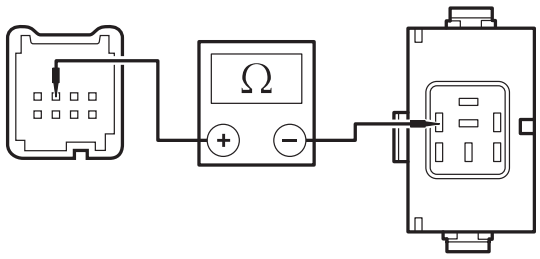
Symptom Chart

Symptom	Possible Sources	Action
• The mirrors are inoperative	• Exterior mirror control switch. • Circuit(s).	• REFER to WDS.
• A single mirror is inoperative	• Exterior mirror control switch. • Circuit(s). • Exterior mirror motor(s).	• REFER to WDS.
• A single mirror does not function with switch logic	• Exterior mirror control switch. • Circuit(s). • Exterior mirror motor(s).	• REFER to WDS.
• The heated exterior mirror does not defrost	• Heated rear window control switch. • Relay. • Circuit(s). • Heated mirror element(s).	• REFER to WDS.
• The power folding mirrors do not operate	• Power fold mirror control switch. • Circuit(s).	• GO to Pinpoint Test A.
• The power folding mirrors do not operate correctly	• Power fold mirror(s). • Power fold mirror control switch. • Circuit(s).	• GO to Pinpoint Test B.

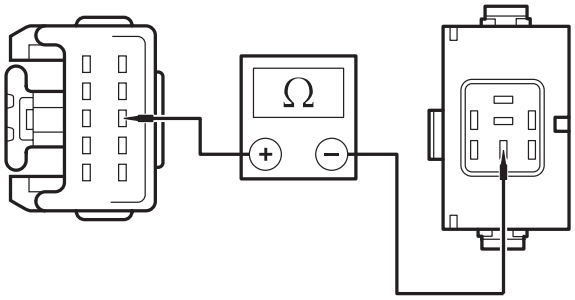
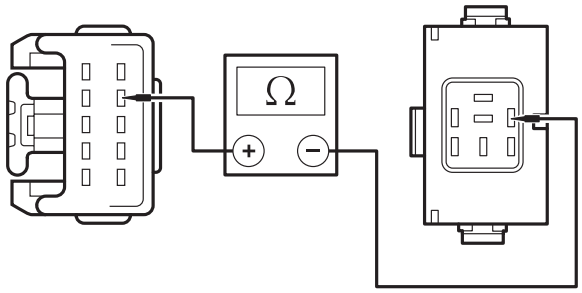
PINPOINT TEST F : THE POWER FOLDING MIRRORS DO NOT OPERATE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: CHECK THE POWER FOLDING MIRROR MODULE GROUND CIRCUIT FOR CONTINUITY	
	1 Disconnect Power Folding Mirror Module C743.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0024495	2 Measure the resistance between the power folding mirror module C743 pin 5, circuit 31-AD27 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to A2. → **No** REPAIR circuit 31-AD27 (BK). TEST the system for normal operation.
A2: CHECK THE VOLTAGE TO THE POWER FOLDING MIRROR MODULE	
 TIE0024535	1 Measure the voltage between the power folding mirror module C743 pin 4, circuit 29-AD27 (OG/BK), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to A3. → **No** REPAIR circuit 29-AD27 (OG). TEST the system for normal operation.
A3: CHECK FOR CONTINUITY BETWEEN THE POWER FOLDING MIRROR CONTROL SWITCH AND THE POWER FOLDING MIRROR MODULE	
	1 Disconnect Power Fold Mirror Control Switch C222.
 E53185	2 Measure the resistance between the power folding mirror control switch C222 pin 2, circuit 91S-AD24 (BK/RD), harness side and the power folding mirror module C743 pin 2, circuit 31S-AD24 (BK/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to A4. → **No** REPAIR circuit 31S-AD24 (BK/RD) or circuit 91S-AD24 (BK/RD). TEST the system for normal operation.

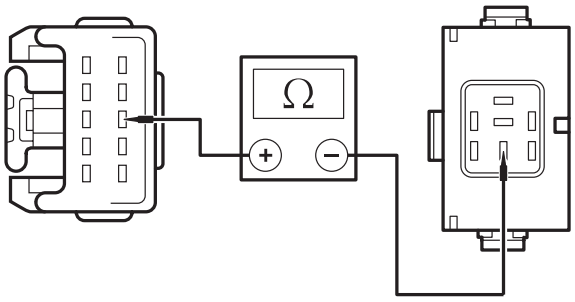
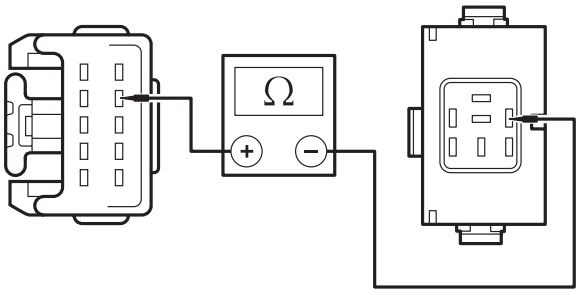
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A4: CHECK FOR CONTINUITY BETWEEN THE POWER FOLDING MIRROR MODULE AND THE DRIVER POWER FOLDING MIRROR MOTOR	
 E53186	1 Measure the resistance between the driver power folding mirror motor C807 pin 8, circuit 32-AD27 (WH/GN), harness side and the power folding mirror module C743 pin 3, circuit 32-AD27 (WH/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to A5. → **No** REPAIR circuit 32-AD27 (WH/GN). TEST the system for normal operation.
A5: CHECK FOR CONTINUITY BETWEEN THE POWER FOLDING MIRROR MODULE AND THE DRIVER POWER FOLDING MIRROR MOTOR	
 E53187	1 Measure the resistance between the driver power folding mirror motor C807 pin 9, circuit 33-AD27 (YE/GN), harness side and the power folding mirror module C743 pin 1, circuit 33-AD27 (YE/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new power folding mirror module. TEST the system for normal operation. → **No** REPAIR circuit 33-AD27 (YE/GN). TEST the system for normal operation.

PINPOINT TEST G : THE POWER FOLDING MIRRORS DO NOT OPERATE CORRECTLY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK FOR CONTINUITY BETWEEN THE POWER FOLDING MIRROR MODULE AND THE INOPERATIVE POWER FOLDING MIRROR MOTOR	
	1 Disconnect Inoperative Power Folding Mirror Motor C807 or C821.
	2 Disconnect Power Folding Mirror Module C743.

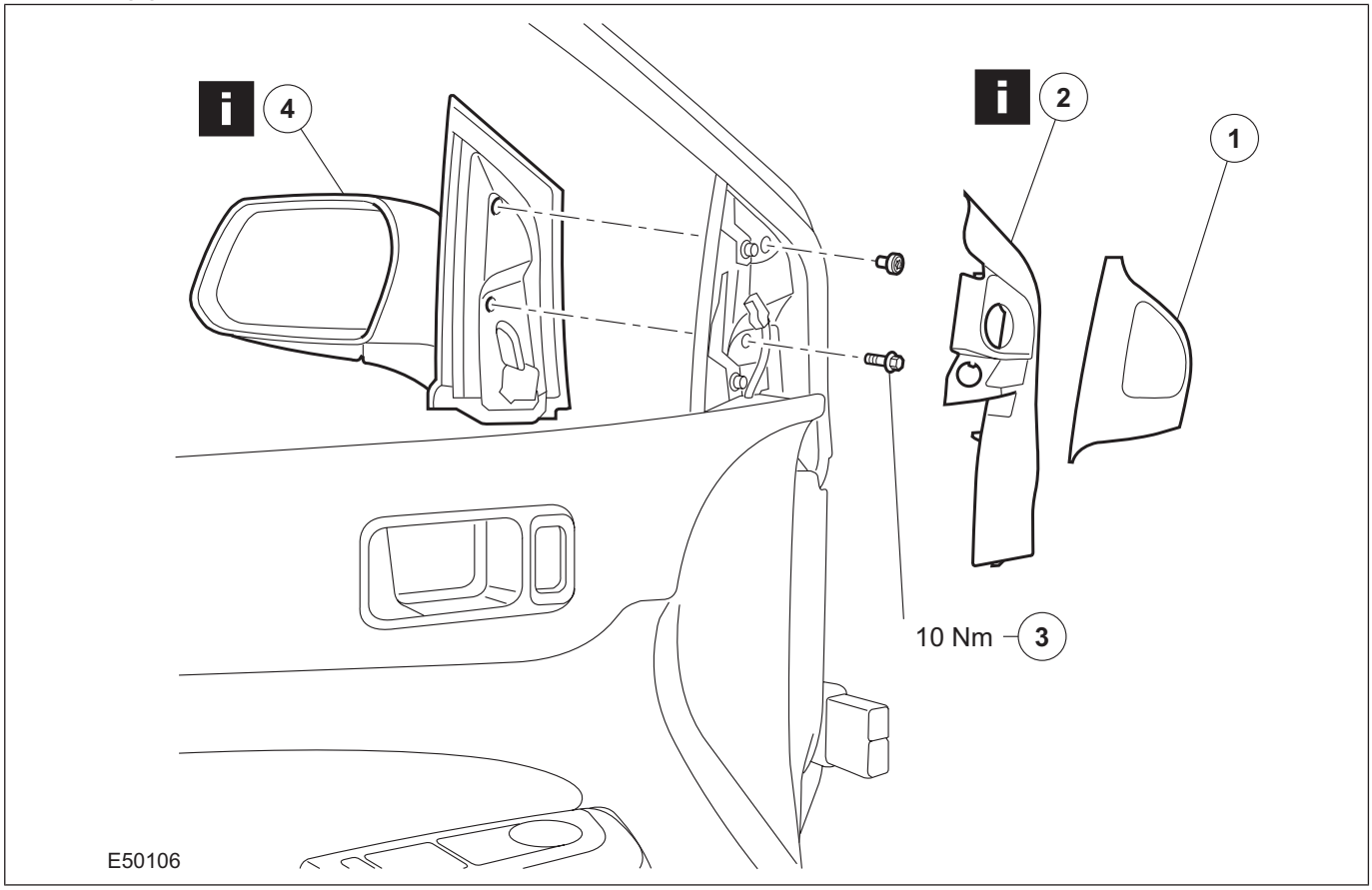
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E53186	3 Measure the resistance between the: • Driver power folding mirror - power folding mirror motor C807 pin 8, circuit 32-AD27 (WH/GN), harness side and the power folding mirror module C743 pin 3, circuit 32-AD27 (WH/GN), harness side. • Passenger power folding mirror - power folding mirror motor C821 pin 8, circuit 32-AD28 (WH/GN), harness side and the power folding mirror module C743 pin 3, circuit 32-AD28 (WH/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to B2. → **No** REPAIR circuit 32-AD27 (WH/GN) or circuit 32-AD28 (WH/GN). TEST the system for normal operation.
B2: CHECK FOR CONTINUITY BETWEEN THE POWER FOLDING MIRROR MODULE AND THE INOPERATIVE POWER FOLDING MIRROR MOTOR	
 E53187	1 Measure the resistance between the: • Driver power folding mirror - power folding mirror motor C807 pin 9, circuit 33-AD27 (YE/GN), harness side and the power folding mirror module C743 pin 1, circuit 33-AD27 (YE/GN), harness side. • Passenger power folding mirror - power folding mirror motor C821 pin 9, circuit 33-AD28 (YE/GN), harness side and the power folding mirror module C743 pin 1, circuit 33-AD28 (YE/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new power folding exterior mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 33-AD27 (YE/GN) or circuit 33-AD28 (YE/GN). TEST the system for normal operation.

REMOVAL AND INSTALLATION

Exterior Mirror

1. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Speaker cover
2	Exterior mirror trim panel See Removal Detail

Item	Description
3	Exterior mirror retaining bolt
4	Exterior mirror See Removal Detail

2. To install, reverse the removal procedure.

Removal Details

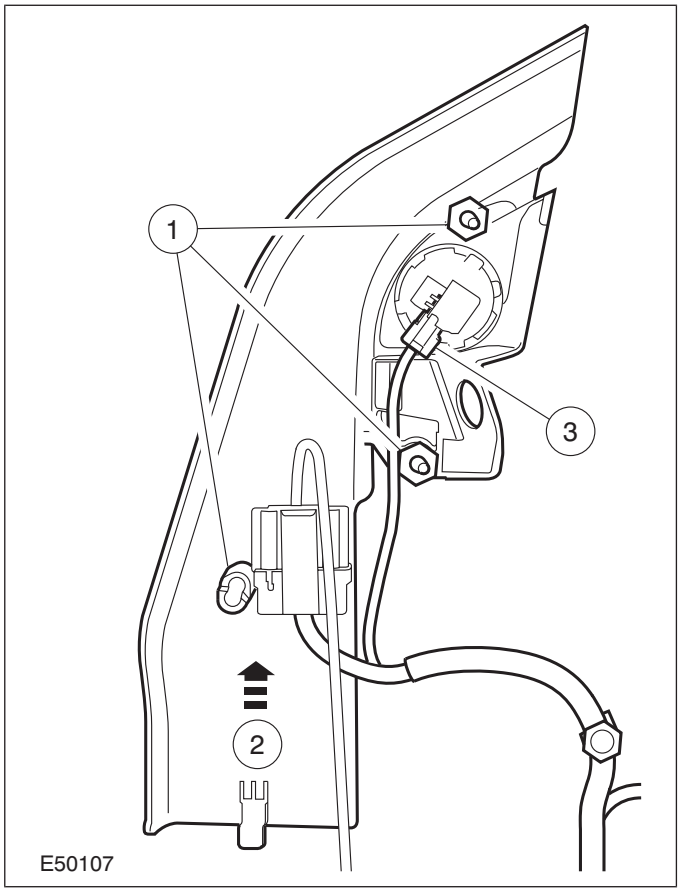
Item 2 Exterior mirror trim panel

1. Detach the exterior mirror trim panel from the door panel.

1. Detach the clips.
2. Detach the trim panel.

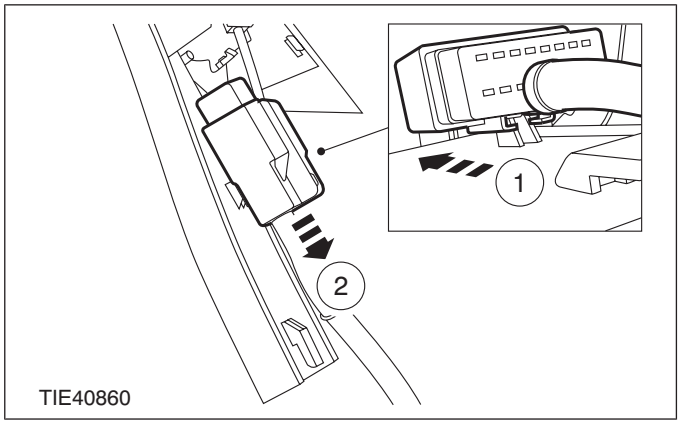
REMOVAL AND INSTALLATION

3. Disconnect the speaker electrical connector (if equipped).



2. Remove the exterior mirror trim panel.

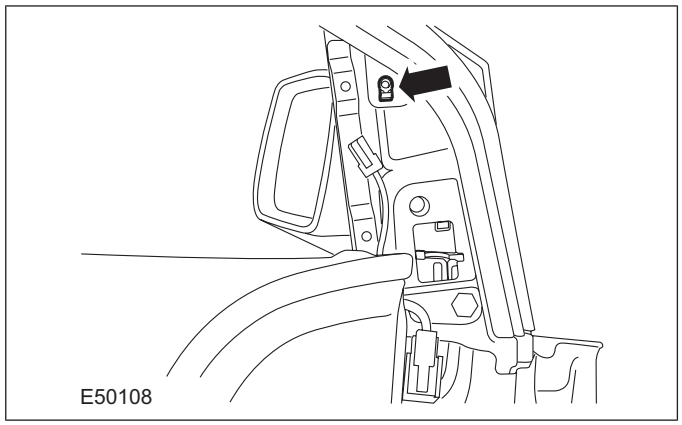
1. Detach the mirror electrical connector from the trim panel.
2. Disconnect the mirror electrical connector.



Item 4 Exterior mirror

1. Remove the exterior mirror.

- Release the clip.



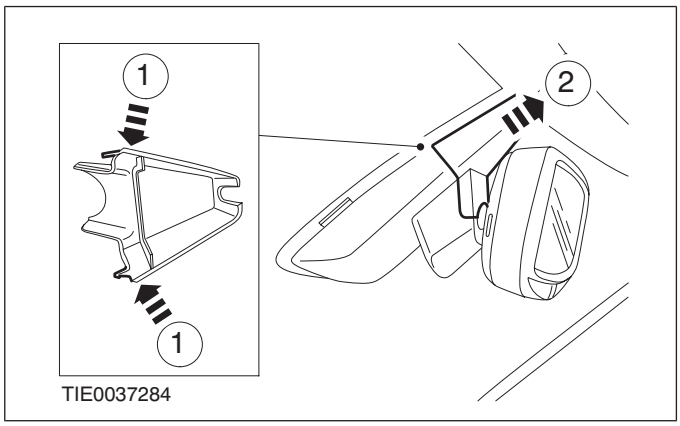
REMOVAL AND INSTALLATION

Auto-Dimming Interior Mirror

Removal

1. Remove the auto-dimming interior mirror upper trim panel.

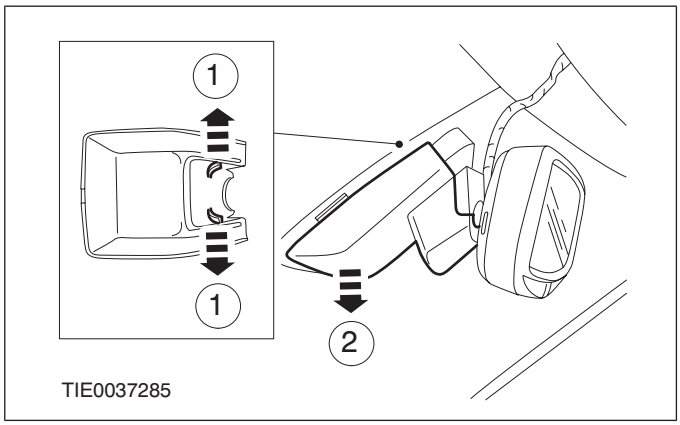
1. Release the clips.
2. Pull the auto-dimming interior mirror upper trim panel rearwards.



TIE0037284

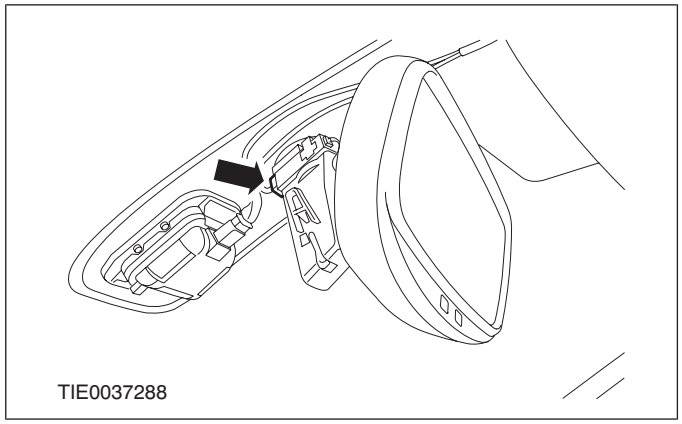
2. Remove the auto-dimming interior mirror lower trim panel.

1. Release the clips.
2. Pull the auto-dimming interior mirror lower trim panel downwards.



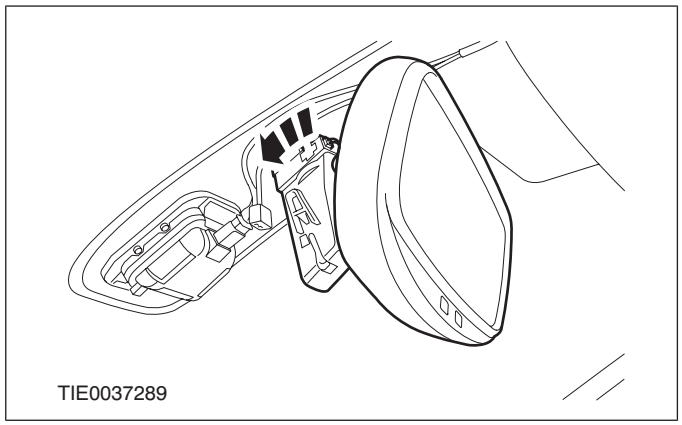
TIE0037285

3. Disconnect the auto-dimming interior mirror electrical connector.


TIE0037288

4. Remove the auto-dimming interior mirror.

- Rotate the mirror bracket 60 degrees counterclockwise.


TIE0037289

Installation

1. To install, reverse the removal procedure.

SECTION 501-10 Seating

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Torque Specifications

Item	Nm	lb-ft	lb-in
Front seat retaining bolts	35	26	-
Front seat cushion base retaining bolts	23	17	-
Front seat backrest retaining bolts	27	20	-
Front seat safety belt buckle and pretensioner retaining bolt	47	35	-
Rear seat cushion retaining bolts	25	18	-
Rear seat backrest hinge retaining bolts	35	26	-
Rear seat backrest striker retaining bolts	25	18	-
Rear seat backrest outer pivot pin bush retaining bolt	35	26	-
Rear seat backrest latch retaining bolts	23	17	-
Rear center safety belt lower anchor and buckle assembly retaining bolt	55	41	-
Front seat height adjustment link retaining screw	10	-	89
Front seat backrest recliner motor retaining bolt	5	-	44
Rear seat backrest retaining screws - Convertible	22	16	-

DIAGNOSIS AND TESTING

Seats

Refer to Wiring Diagrams Section 501-10, for schematic and connector information.

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
• Damaged switch(es)	• Fuse(s) • Wiring harness • Electrical connector(s) • Motor(s) • Switch(es)

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.

Symptom Chart

Symptom Chart

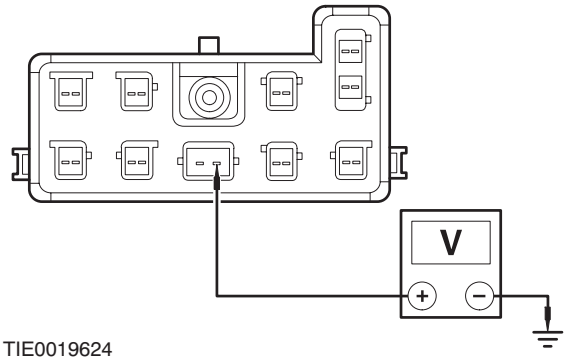
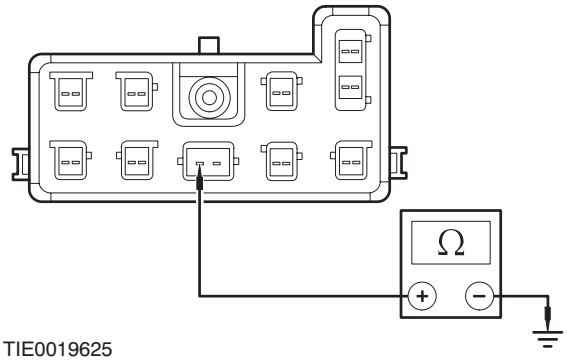
Symptom	Possible Sources	Action
• The power seat is inoperative	• Seat control switch.	• CARRY OUT the Seat Control Switch Component Test. REFER to the Wiring Diagrams.
	• Motor(s). • Circuit(s).	• GO to Pinpoint Test A.
• The power seat does not move vertically	• Seat control switch.	• CARRY OUT the Seat Control Switch Component Test. REFER to the Wiring Diagrams.
	• Motor(s). • Circuit(s).	• GO to Pinpoint Test B.
• The power seat does not recline	• Seat control switch.	• CARRY OUT the Seat Control Switch Component Test. REFER to the Wiring Diagrams.
	• Motor. • Circuit(s).	• GO to Pinpoint Test C.
• The power seat does not move horizontally	• Seat control switch.	• CARRY OUT the Seat Control Switch Component Test. REFER to the Wiring Diagrams.
	• Motor. • Circuit(s).	• GO to Pinpoint Test D.
• The heated seat is inoperative	• Heated seat control switch(es).	• CARRY OUT the Heated Seat Control Switch Component Test. REFER to the Wiring Diagrams.
	• Circuit(s).	• GO to Pinpoint Test E.

DIAGNOSIS AND TESTING

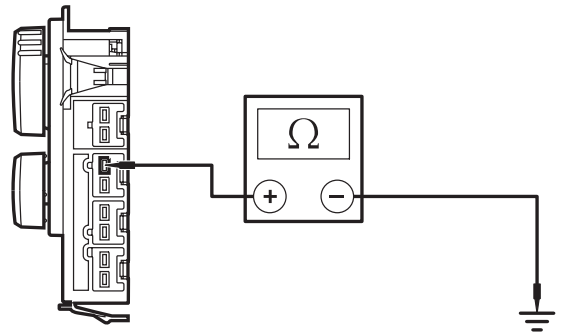
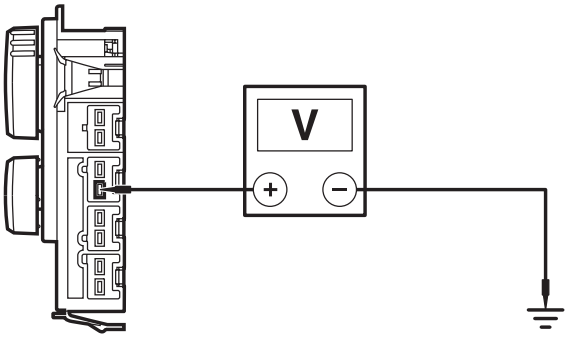
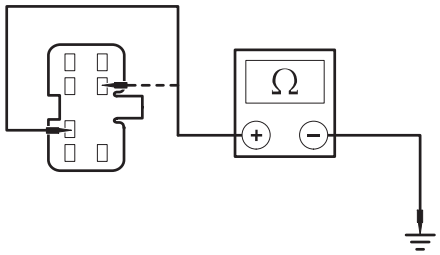
Pinpoint Tests

NOTE: Use a digital multimeter for all electrical measurements.

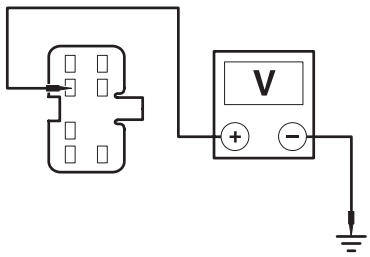
PINPOINT TEST A : THE POWER SEAT IS INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: CHECK FOR VOLTAGE TO THE DRIVER POWER SEAT	
	1 Disconnect Driver Power Seat Underseat Connector C30.
	2 Ignition switch in position II.
 TIE0019624	3 Measure the voltage between the driver power seat C30 pin 15, circuit 29-AH35 (OG/YE), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to A2. → **No** REPAIR circuit 29-AH35 (OG/YE). TEST the system for normal operation.
A2: CHECK THE DRIVER POWER SEAT GROUND CIRCUIT FOR CONTINUITY	
	1 Ignition switch in position 0.
 TIE0019625	2 Measure the resistance between the driver power seat C30 pin 16, circuit 31-DA14 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** Vehicles with 6-way power seats GO to A3. Vehicles with 2-way power seats GO to A5. → **No** REPAIR circuit 31-DA14 (BK). TEST the system for normal operation.
A3: CHECK THE DRIVER POWER SEAT CONTROL SWITCH GROUND CIRCUIT FOR CONTINUITY	
	1 Connect Driver Power Seat Underseat Connector C30.
	2 Disconnect Driver Power Seat Control Switch C755.

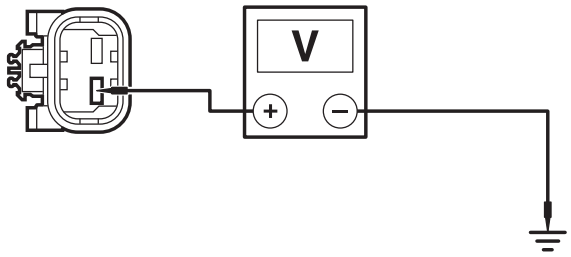
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E51577	3 Measure the resistance between the driver power seat control switch C755 pin 1, circuit 31-DA14 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to A4. → **No** REPAIR circuit 31-DA14 (BK). TEST the system for normal operation.
A4: CHECK THE DRIVER POWER SEAT CONTROL SWITCH POWER CIRCUIT FOR CONTINUITY	
	1 Ignition switch in position II.
 E51578	2 Measure the voltage between the driver power seat control switch C755 pin 2, circuit 29-AH35 (OG/YE), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** VERIFY the customer concern. → **No** REPAIR circuit 29-AH35 (OG/YE). TEST the system for normal operation.
A5: CHECK THE DRIVER POWER SEAT CONTROL SWITCH GROUND CIRCUIT FOR CONTINUITY	
	1 Connect Driver Power Seat Underseat Connector C30.
	2 Disconnect Driver Power Seat Control Switch C715.
 TIE0014346	3 Measure the resistance between the: • driver power seat control switch C715 pin 3, circuit 31-AH35 (BK), harness side and ground. • driver power seat control switch C715 pin 6, circuit 31-AH35A (BK), harness side and ground. • Are the resistances less than 5 ohms? → **Yes** GO to A6. → **No** REPAIR circuit 31-AH35 (BK) or circuit 31-AH35A (BK). TEST the system for normal operation.

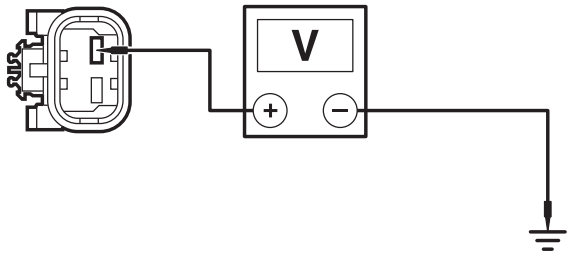
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A6: CHECK THE DRIVER POWER SEAT CONTROL SWITCH POWER CIRCUIT FOR CONTINUITY	
	1 Ignition switch in position II.
 TIE0014348	2 Measure the voltage between the driver power seat control switch C715 pin 2, circuit 29-AH35 (OG/YE), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** VERIFY the customer concern. → **No** REPAIR circuit 29-AH35 (OG/YE). TEST the system for normal operation.

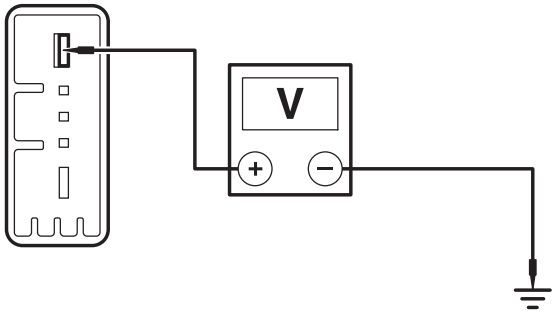
PINPOINT TEST B : THE POWER SEAT DOES NOT MOVE VERTICALLY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK THE DOWN VOLTAGE TO THE SEAT HEIGHT ADJUSTMENT MOTOR	
	1 Detach the seat assembly from the floor panel.
	2 Disconnect Seat Height Adjustment Motor C759.
	3 Ignition switch in position II.
 E51579	4 Operate the power seat height control switch to the DOWN position and measure the voltage between the seat height adjustment motor C759 pin 1, circuit 33-AH38 (YE/BK), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to B2. → **No** REPAIR circuit 33-AH38 (YE/BK). TEST the system for normal operation.

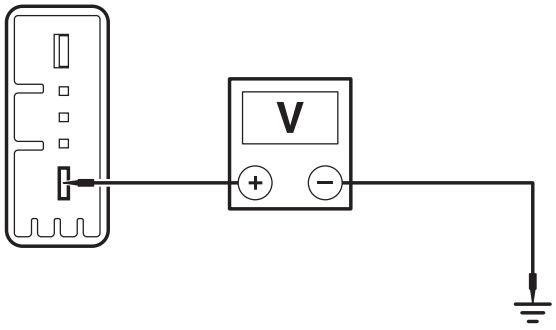
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B2: CHECK THE UP VOLTAGE TO THE SEAT HEIGHT ADJUSTMENT MOTOR	
 E51580	1 Operate the power seat height control switch to the UP position and measure the voltage between the seat height adjustment motor C759 pin 2, circuit 32-AH38 (WH/BK), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new front seat height adjustment motor. REFER to: Front Seat Height Adjustment Motor (501-10 Seating, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 32-AH38 (WH/BK). TEST the system for normal operation.

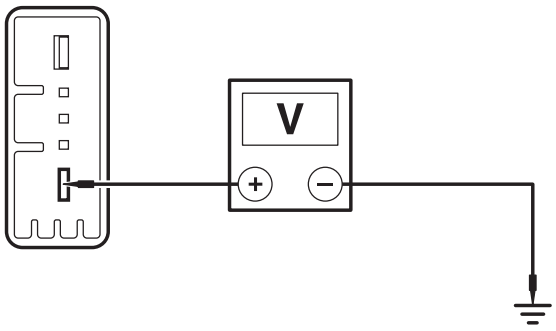
PINPOINT TEST C : THE POWER SEAT DOES NOT RECLINE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: CHECK THE REARWARD VOLTAGE TO THE SEAT BACKREST MOVEMENT MOTOR	
	1 Detach the seat assembly from the floor panel.
	2 Disconnect Seat Backrest Motor C760.
	3 Ignition switch in position II.
 E51581	4 Operate the power seat backrest control switch to the REARWARD position and measure the voltage between the seat backrest movement motor C760 pin 5, circuit 33-AH36 (YE/RD), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to C2. → **No** REPAIR circuit 33-AH36 (YE/RD). TEST the system for normal operation.

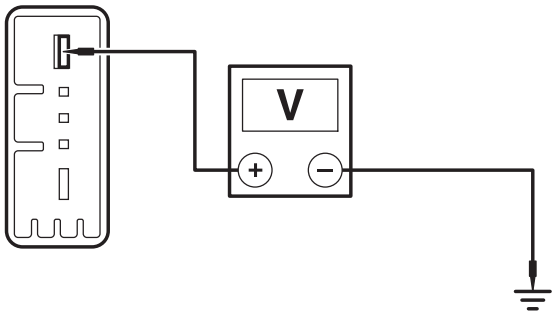
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C2: CHECK THE FORWARD VOLTAGE TO THE SEAT BACKREST MOVEMENT MOTOR	
 E51582	1 Operate the power seat backrest control switch to the FORWARD position and measure the voltage between the seat backrest movement motor C760 pin 1, circuit 32-AH36 (WH/RD), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new seat backrest movement motor. REFER to: Front Seat Backrest - 3-Door (501-10 Seating, Disassembly and Assembly) / Front Seat Backrest - 4-Door/5-Door/Wagon (501-10 Seating, Disassembly and Assembly). TEST the system for normal operation. → **No** REPAIR circuit 32-AH36 (WH/RD). TEST the system for normal operation.

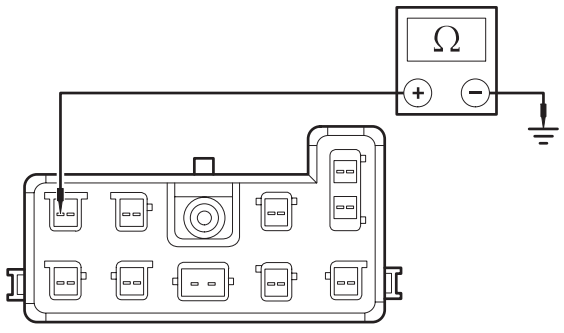
PINPOINT TEST D : THE POWER SEAT DOES NOT MOVE HORIZONTALLY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: CHECK THE REARWARD VOLTAGE TO THE FRONT SEAT TRACK MOTOR	
	1 Detach the seat assembly from the floor panel.
	2 Disconnect Front Seat Track Motor C761.
	3 Ignition switch in position II.
 E51582	4 Operate the front seat track motor control switch to the REARWARD position and measure the voltage between the front seat track motor C761 pin 1, circuit 33-AH37 (YE/GN), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to D2. → **No** REPAIR circuit 33-AH37 (YE/GN). TEST the system for normal operation.

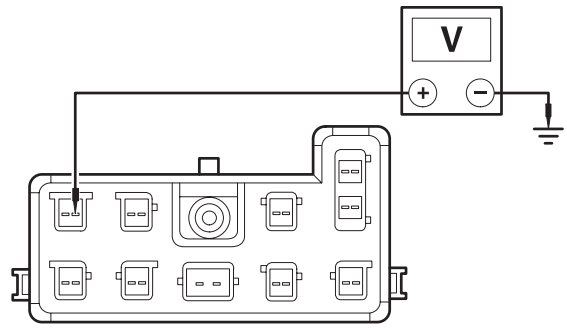
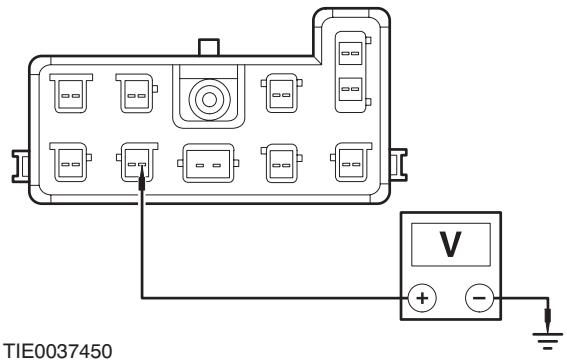
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D2: CHECK THE FORWARD VOLTAGE TO THE FRONT SEAT TRACK MOTOR	
 E51581	1 Operate the front seat track motor control switch to the FORWARD position and measure the voltage between the front seat track motor C761 pin 5, circuit 32-AH37 (WH/GN), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new front seat track motor. REFER to: Front Seat Track Motor (501-10 Seating, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 32-AH37 (WH/GN). TEST the system for normal operation.

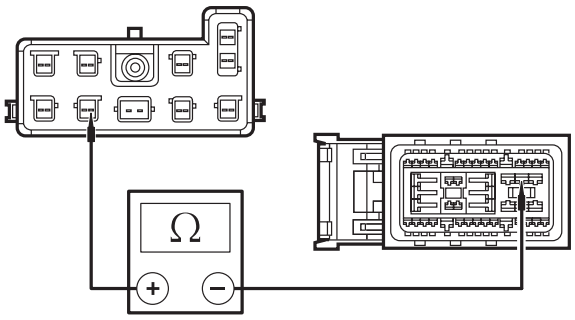
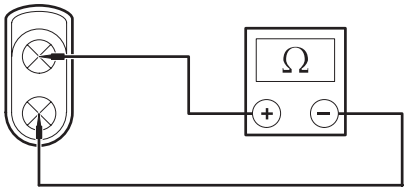
PINPOINT TEST E : THE HEATED SEAT IS INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: CHECK THE INOPERATIVE HEATED SEAT GROUND CIRCUIT	
	1 Disconnect Inoperative Heated Seat C30 or C31.
 TIE0037451	2 Measure the resistance between the: – Left-hand drive vehicles • driver heated seat C30 pin 10, circuit 31-HC8 (BK), harness side and ground. • passenger heated seat C31 pin 10, circuit 31-HC11 (BK), harness side and ground. – Right-hand drive vehicles • driver heated seat C30 pin 10, circuit 31-HC11 (BK), harness side and ground. • passenger heated seat C31 pin 10, circuit 31-HC8 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to E2. → **No** REPAIR circuit 31-HC8 (BK) or circuit 31-HC11 (BK). TEST the system for normal operation.
E2: CHECK FOR BATTERY VOLTAGE TO THE INOPERATIVE HEATED SEAT	
	1 Ignition switch in position II.

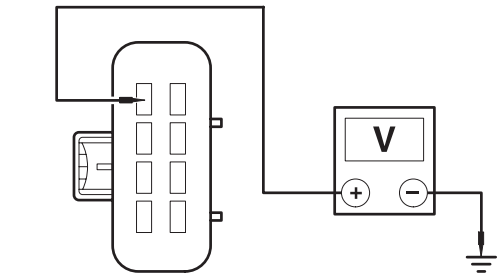
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0019634	2 Measure the voltage between the: – Left-hand drive vehicles • driver heated seat C30 pin 9, circuit 15-HC8 (GN/RD), harness side and ground. • passenger heated seat C31 pin 9, circuit 15-HC11 (GN/WH), harness side and ground. – Right-hand drive vehicles • driver heated seat C30 pin 9, circuit 15-HC11 (GN/WH), harness side and ground. • passenger heated seat C31 pin 9, circuit 15-HC8 (GN/RD), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to E3. → **No** REPAIR circuit 15-HC8 (GN/RD) or circuit 15-HC11 (GN/WH). TEST the system for normal operation.
E3: CHECK FOR SWITCH VOLTAGE TO THE INOPERATIVE HEATED SEAT	
	1 Operate the heated seat control switch.
 TIE0037450	2 Measure the voltage between the: – Left-hand drive vehicles • driver heated seat C30 pin 17, circuit 15S-HC8 (GN/RD), harness side and ground. • passenger heated seat C31 pin 17, circuit 15S-HC11 (GN/WH), harness side and ground. – Right-hand drive vehicles • driver heated seat C30 pin 17, circuit 15S-HC11 (GN/WH), harness side and ground. • passenger heated seat C31 pin 17, circuit 15S-HC8 (GN/RD), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to E4. → **No** GO to E6.
E4: CHECK THE HEATED SEAT SUPPLY CIRCUIT FOR CONTINUITY	
	1 Disconnect Fuse 70.
	2 Disconnect Passenger Junction Box C102.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E52019	3 Measure the resistance between the passenger junction box C102 pin 5, circuit 15-DA4 (GN/BK), harness side and the driver heated seat C30 pin 17, circuit 15S-HC8 (GN/RD), harness side. • Is the resistance between 2,600 and 7,800 ohms? → **Yes** GO to E5. → **No** INSTALL a new heated seat control switch. REFER to: Heated Seat Switch (501-10 Seating, Removal and Installation). TEST the system for normal operation.
E5: CHECK THE HEATED SEAT BACKREST HEATER MAT FOR CONTINUITY	
	1 Ignition switch in position 0.
	2 Disconnect Inoperative Heated Seat Backrest.
 TIE0013081	3 Measure the resistance between the heated seat backrest pins 1 and 2, component side. • Is the resistance less than 9 ohms? → **Yes** INSTALL a new heated seat cushion heater mat and heater module. TEST the system for normal operation. → **No** INSTALL a new heated seat backrest heater mat. REFER to: Front Seat Backrest - 3-Door (501-10 Seating, Disassembly and Assembly) / Front Seat Backrest - 4-Door/5-Door/Wagon (501-10 Seating, Disassembly and Assembly). TEST the system for normal operation.
E6: CHECK FOR VOLTAGE TO THE HEATED SEAT CONTROL SWITCH	
	1 Ignition switch in position 0.
	2 Disconnect Inoperative Heated Seat Control Switch C694 or C695.
	3 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0019639	4 Measure the voltage between the: • inoperative left-hand heated seat control switch C694 pin 4, circuit 15-HC14 (GN/YE), harness side and ground. • inoperative right-hand heated seat control switch C695 pin 4, circuit 15-HC9 (GN/BK), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** REPAIR circuit 15S-HC8 (GN/RD) or circuit 15S-HC11 (GN/WH). TEST the system for normal operation. → **No** REPAIR circuit 15-HC9 (GN/BK) or circuit 15-HC14 (GN/YE). TEST the system for normal operation.

REMOVAL AND INSTALLATION

Front Seat

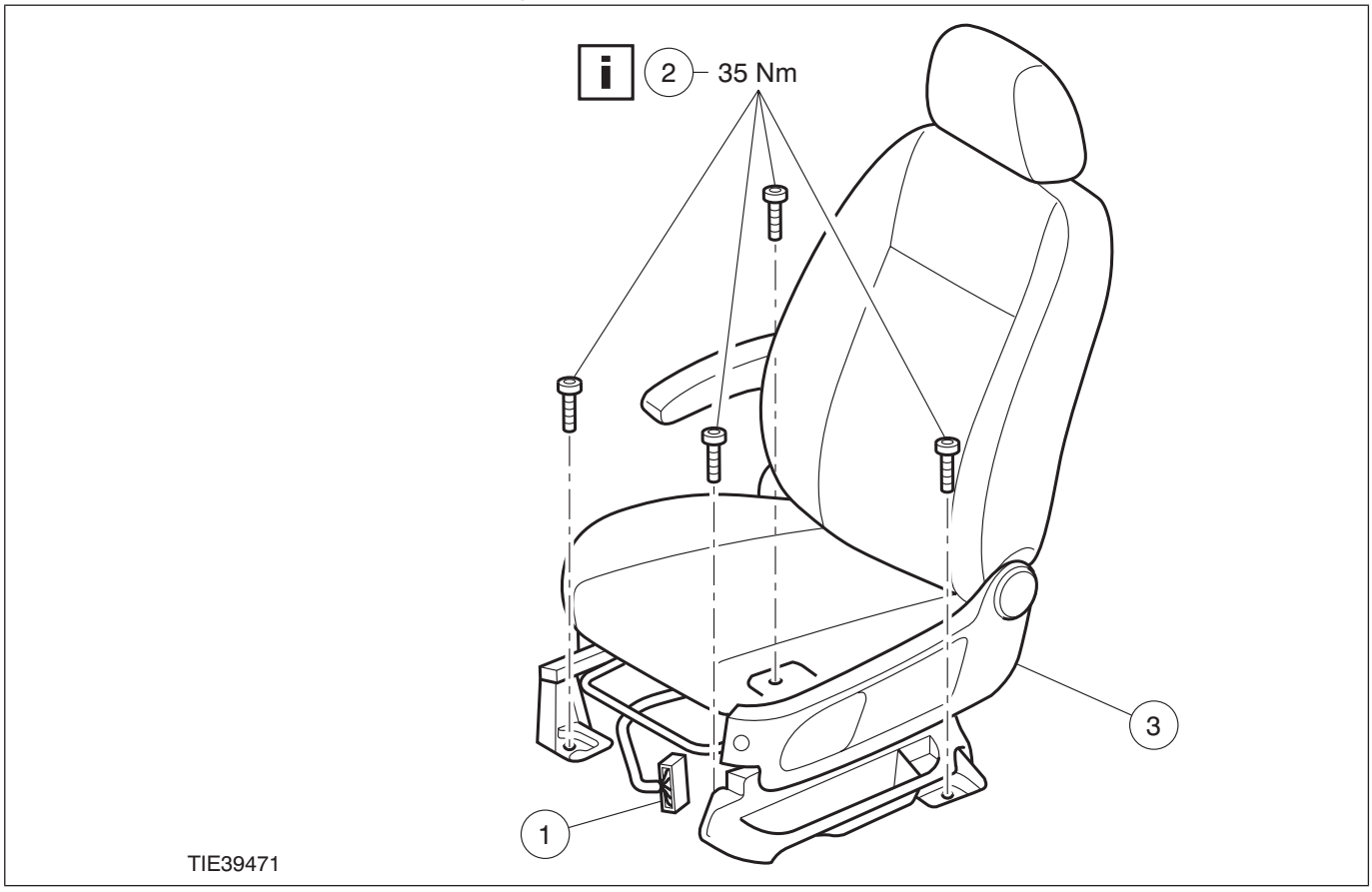
WARNINGS:

To avoid accidental deployment, the air bag 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.

Note the position of the wiring harnesses, to aid installation. An incorrectly routed wiring harness could become damaged when the seat is moved. Failure to follow this instruction may result in personal injury.

1. **Disconnect the battery ground cable.**

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Underseat connector
2	Front seat retaining bolts See Installation Detail
3	Front seat

All vehicles

3. **To install, reverse the removal procedure.**

Vehicles with front and rear power windows

4. **Initialize the door window motors. For additional information, refer to Section 501-11 [Glass, Frames and Mechanisms].**

REMOVAL AND INSTALLATION

Installation Details

Item 2 Front seat retaining bolts

1. Install the front seat retaining bolts in the following sequence.

1. Rear inner retaining bolt.
2. Rear outer retaining bolt.
3. Front outer retaining bolt.
4. Front inner retaining bolt.

REMOVAL AND INSTALLATION

Front Seat — 2.5L Duratec-RS (224kW/305PS) - VI5(40 100 0; 40 100 4; 40 101 0)

Removal

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

1. Torque: 40 Nm



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Front Seat Armrest

Removal

1.



E118570

Installation

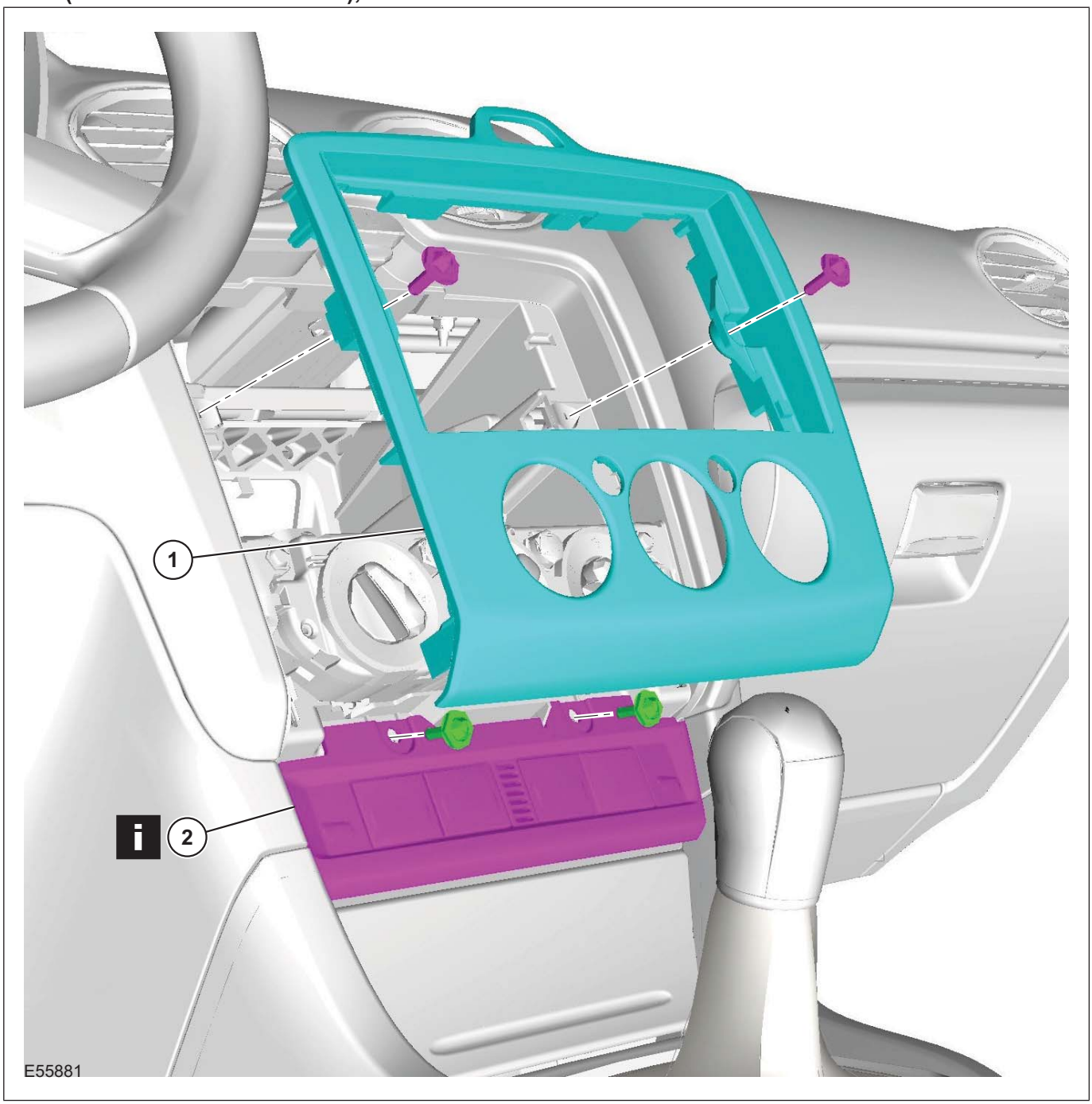
1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Heated Seat Switch

1. Remove the audio unit. For additional information, refer to: (415-01 Audio Unit)
   Audio Unit - Vehicles Built From: 03/2007 (Removal and Installation),

2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Instrument panel console
2	Instrument panel console switch panel assembly See Removal Detail

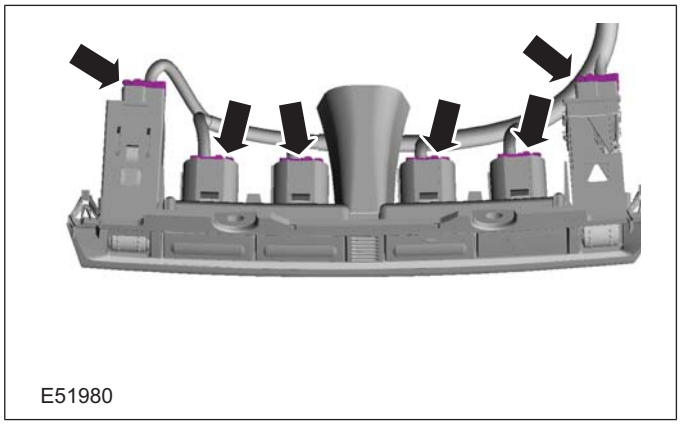
3. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Removal Details

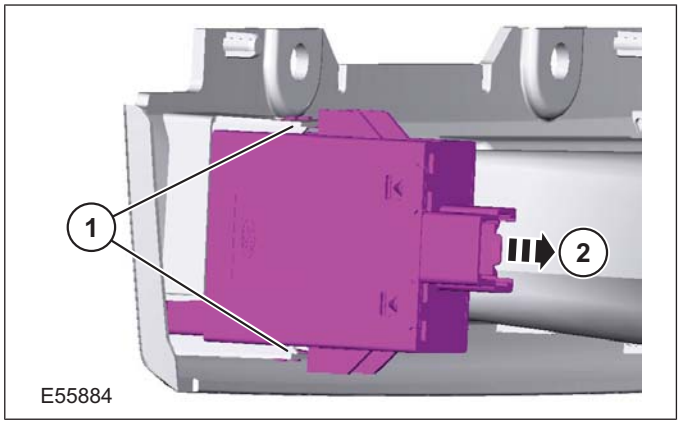
Item 2 Instrument panel console switch panel assembly

1. **Disconnect the instrument panel console switch panel assembly electrical connectors.**



E51980

2. **Remove the heated seat switch.**
   1. Release the retaining clips.
   2. Slide the heated seat switch out of the instrument panel console switch panel assembly.



E55884

REMOVAL AND INSTALLATION

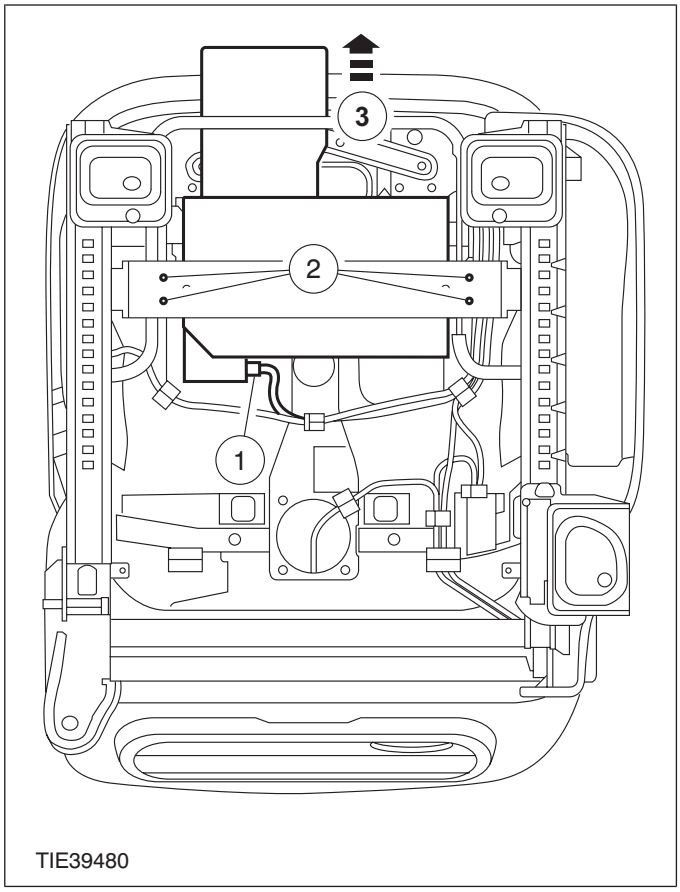
Front Seat Height Adjustment Motor(33 797 0; 33 797 4)

General Equipment

Electric hand drill
Blind rivet hand-gun

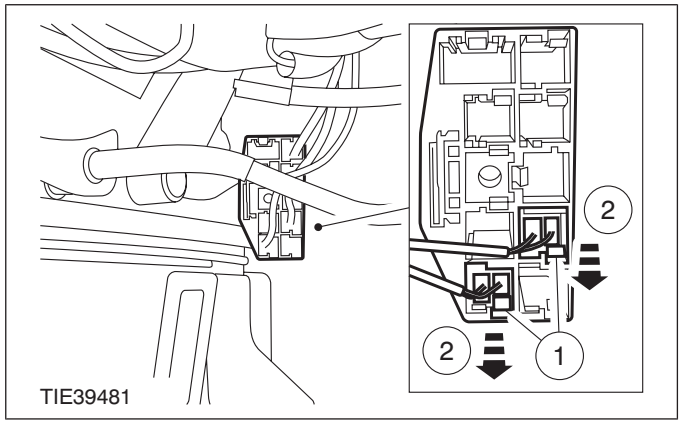
Removal

1. **Remove the compact disc (CD) changer (if equipped).**
   1. Disconnect the CD changer electrical connector.
   2. Using a suitable electric hand drill, remove the rivets.
   3. Slide the CD changer forwards.



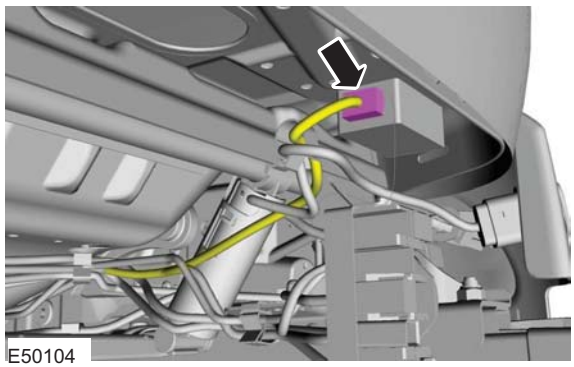
TIE39480

2. **Detach the heater mat electrical connectors from the underside of the seat (if equipped).**
   1. Using a suitable screwdriver, depress the locking tangs.
   2. Detach the electrical connectors.



TIE39481

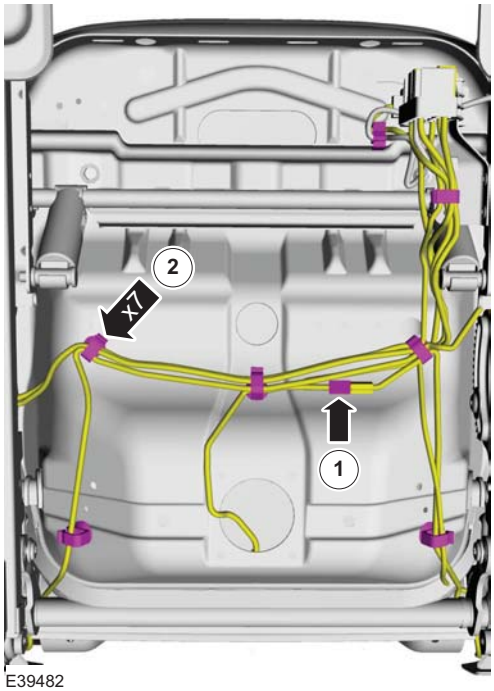
3. **Detach the heated seat module electrical connector (if equipped).**


E50104

4. **Detach the electrical harnesses from the underside of the front seat cushion.**
   1. Disconnect the electrical connectors.

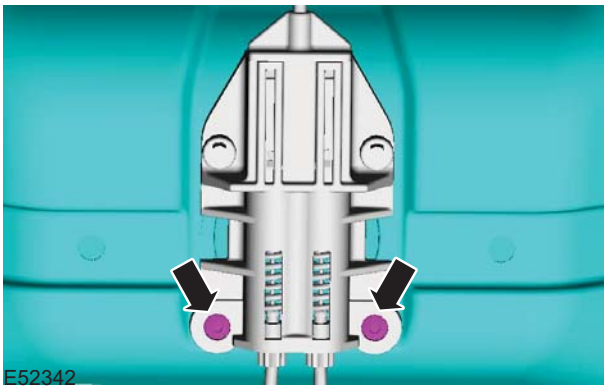
REMOVAL AND INSTALLATION

2. Detach the retaining clips.

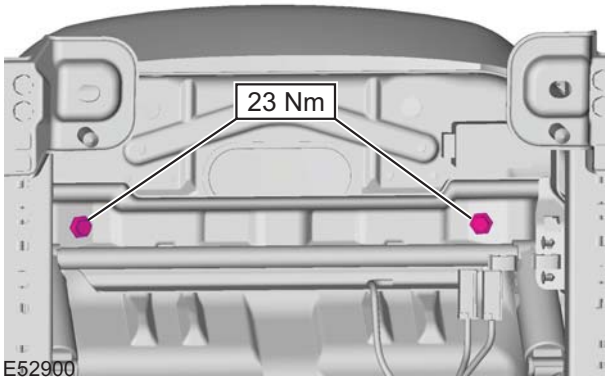


5. Detach the seat track release cable assembly from the underside of the front seat cushion (if equipped).

- Using a suitable electric hand drill, remove the rivets.



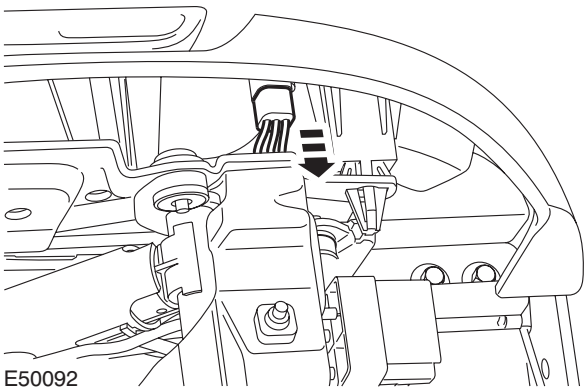
6. Remove the front seat cushion.



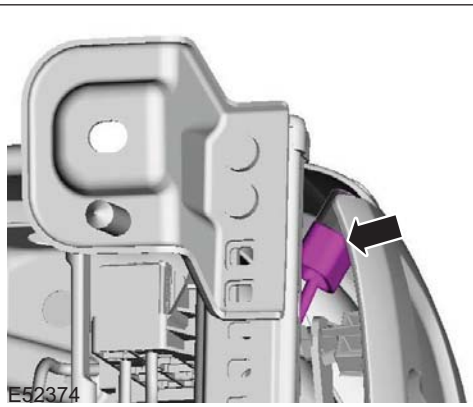
7. CAUTION: To avoid damage to the front seat backrest recliner handwheel, even pressure must be applied to the opposite sides of the handwheel.

Remove the front seat backrest recliner handwheel (if equipped).

8. Disconnect the front seat position adjustment switch electrical connector(s).

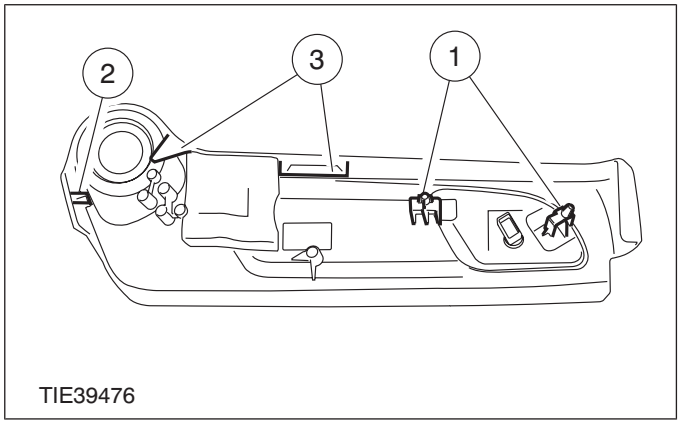


9. Disconnect the adjustable clutch pedal and adjustable brake pedal switch electrical connector (if equipped).

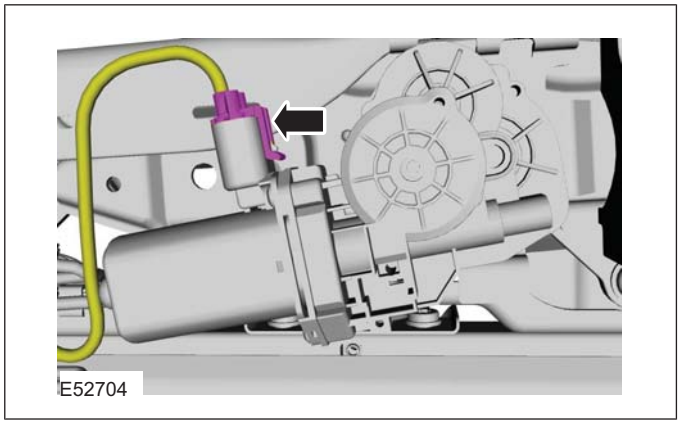


REMOVAL AND INSTALLATION

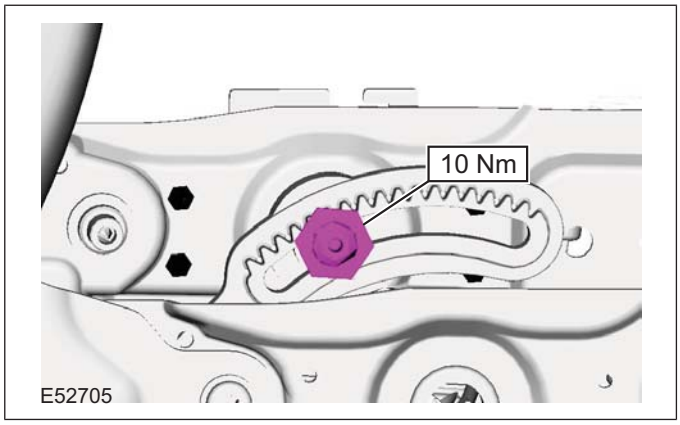
10. **Remove the seat track outer side trim panel.**
    - Release the retaining clips in the sequence shown.



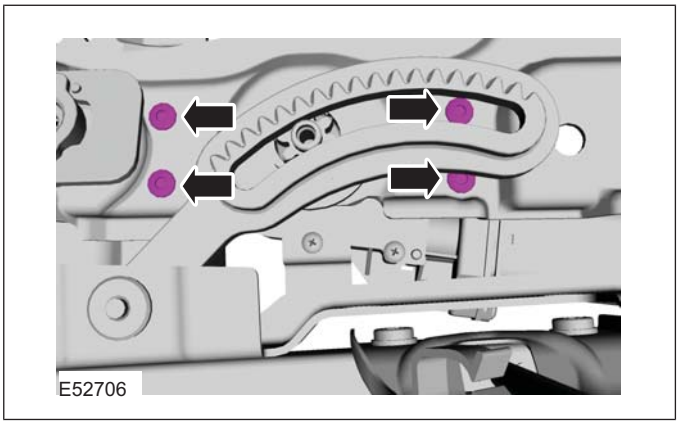
11. **Disconnect the front seat height adjustment motor electrical connector.**



12. **Remove the front seat height adjustment motor regulator retaining screw and washer.**

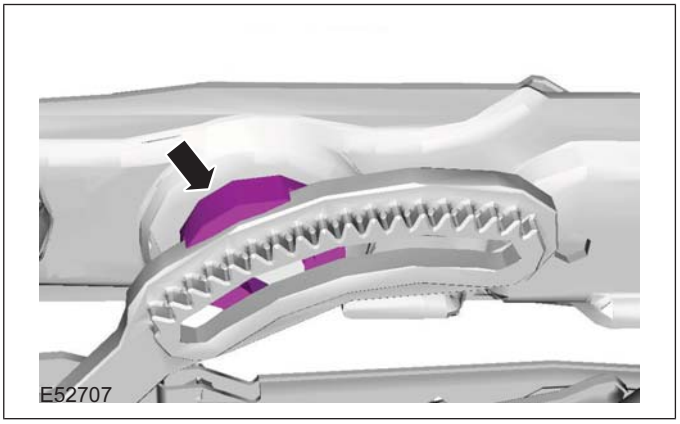


13. **Remove the front seat height adjustment motor.**
    - Using a suitable electric hand drill, remove the rivets.



14. **NOTE: Note the position of the front seat height adjustment motor spacer, to aid installation.**

    Remove the front seat height adjustment motor spacer.



Installation

1. **NOTE: Using a suitable blind rivet hand-gun, install new rivets.**

   To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

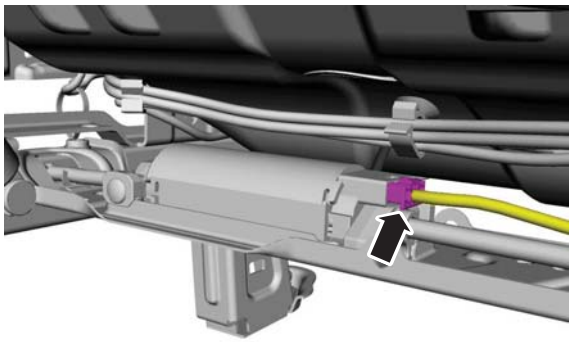
Front Seat Track Motor(33 784 0; 33 784 4)

Removal

1. **Remove the front seat.**

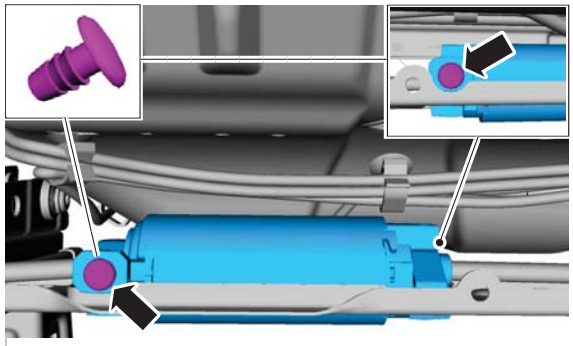
   For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).

2. **Disconnect the front seat track motor electrical connector.**



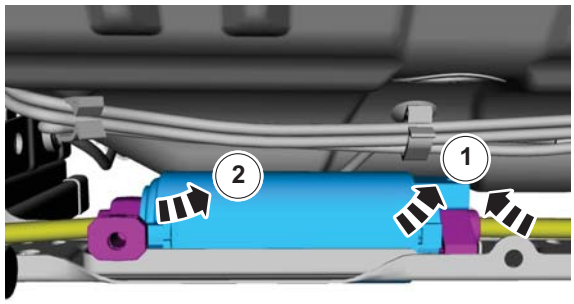
E52701

3. **Detach the front seat track motor from the front seat track motor retaining bracket.**
   - Release the retaining clips on both sides.



E52702

4. **Remove the front seat track motor.**
   1. Detach the front seat track motor from the long front seat track operating cable.
   2. Detach the front seat track motor from the short front seat track operating cable.



E52703

Installation

1. **To install, reverse the removal procedure.**

REMOVAL AND INSTALLATION

Front Seat Backrest Cover — 2.5L Duratec-ST (VI5)(40 108 0)

Removal

All vehicles

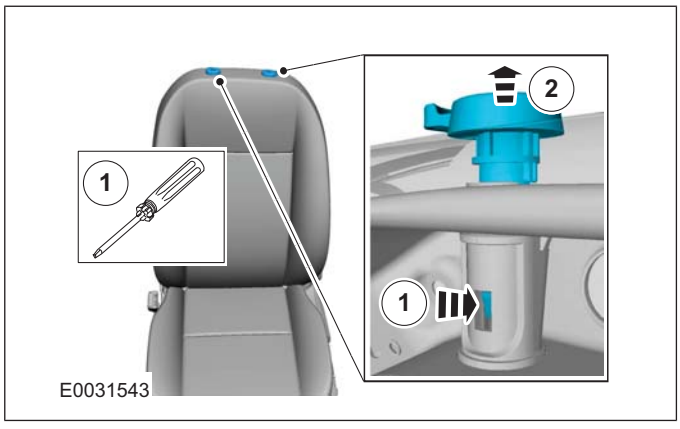
CAUTION: Take extra care not to damage the wiring harnesses.

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

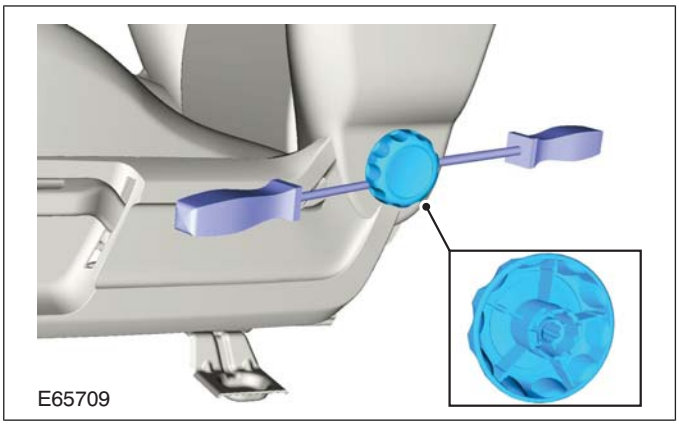
1.



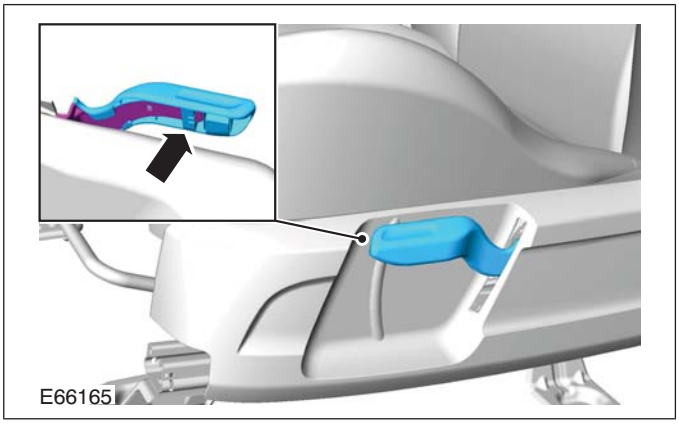
2.



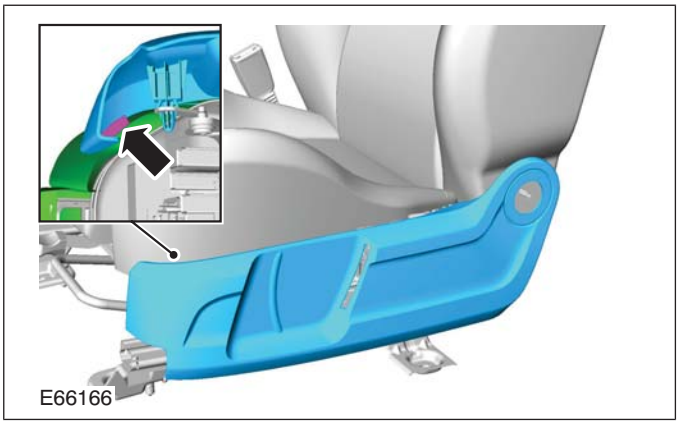
3.



4.



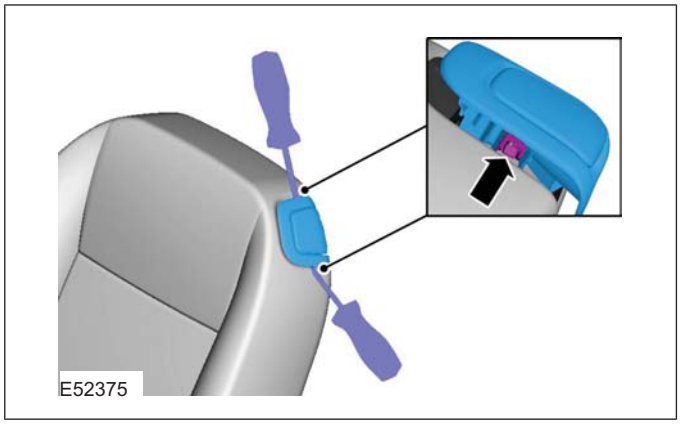
5.



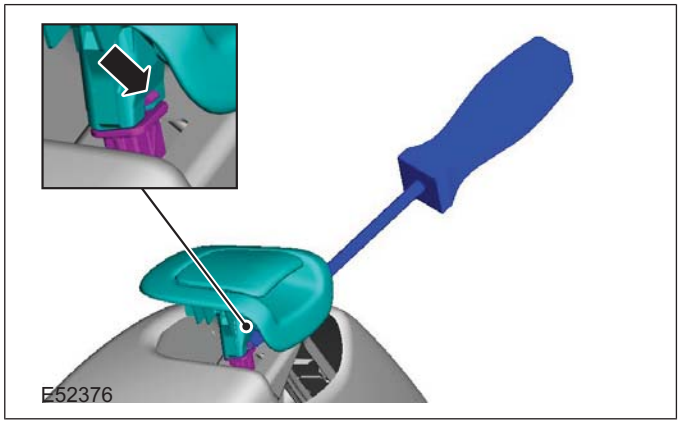
REMOVAL AND INSTALLATION

3-door

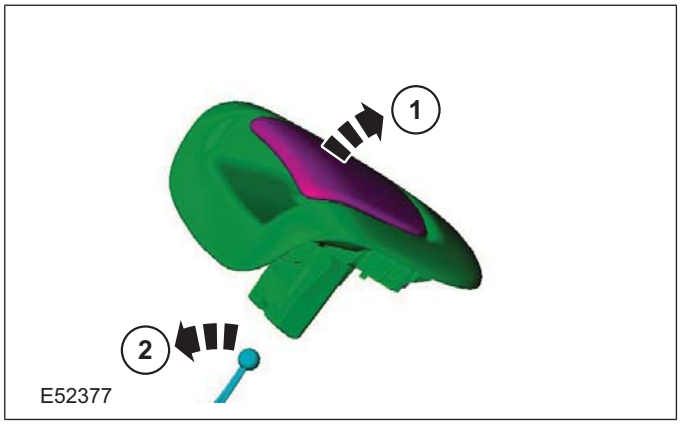
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7.

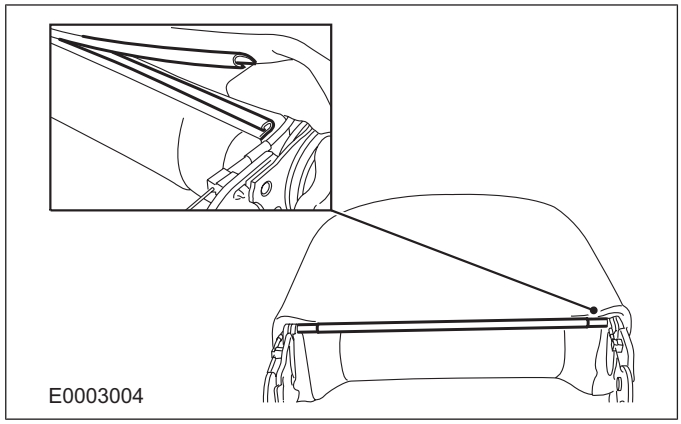


8.

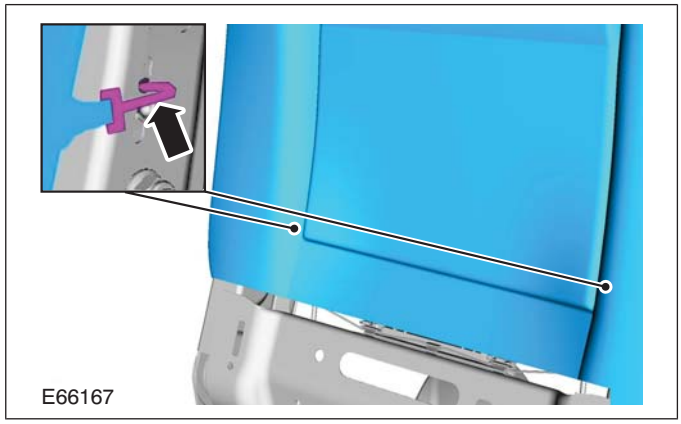


All vehicles

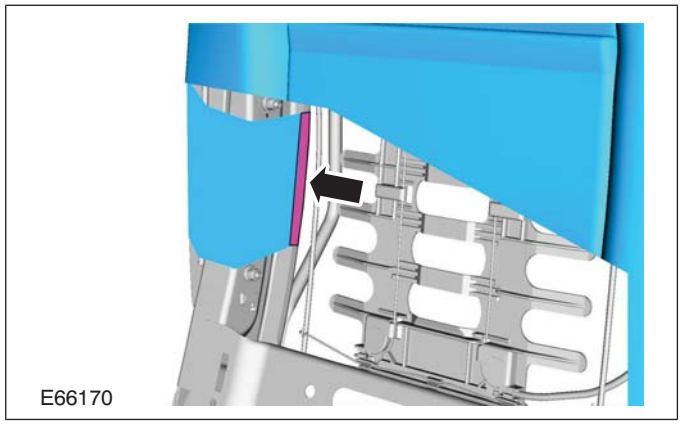
9.



10.

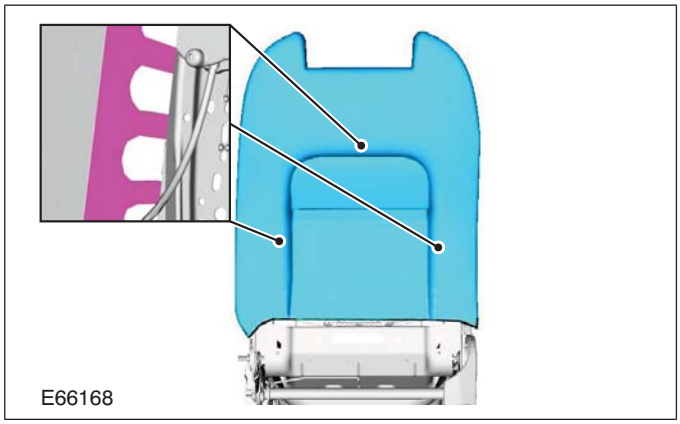


11.

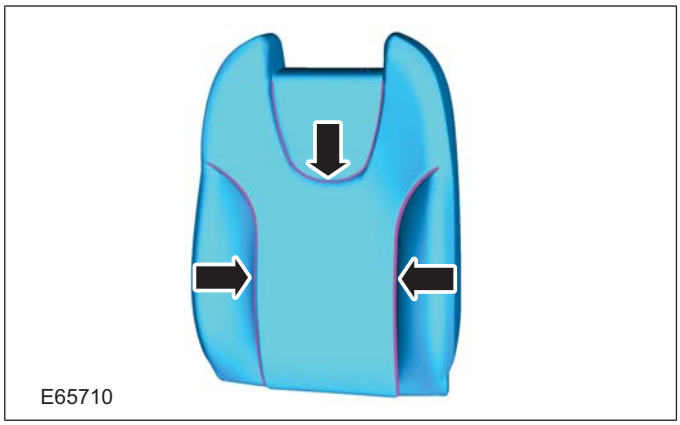


REMOVAL AND INSTALLATION

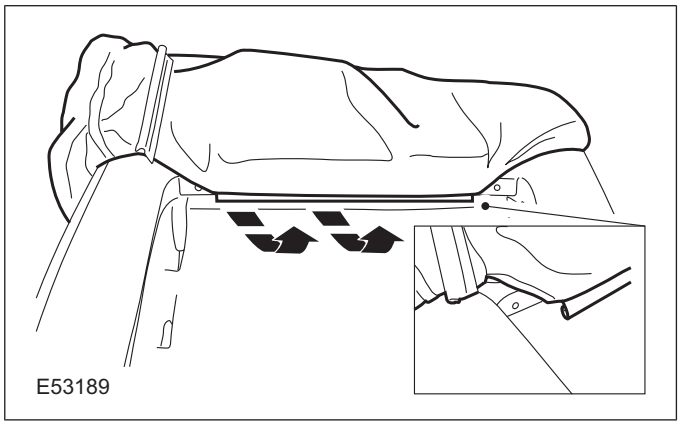
12.



13. **CAUTION: Equal pressure should be applied to both surfaces of the hook loop tape.**



14.



3-door

15.



Installation

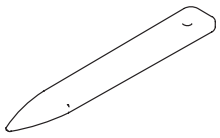
WARNING: Make sure that the seat backrest heater mat (if equipped) is correctly located with the seat backrest cover hook loop tape.

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Front Seat Backrest Cover — 2.5L Duratec-RS (224kW/305PS) - VI5(40 108 0)

Special Tool(s)

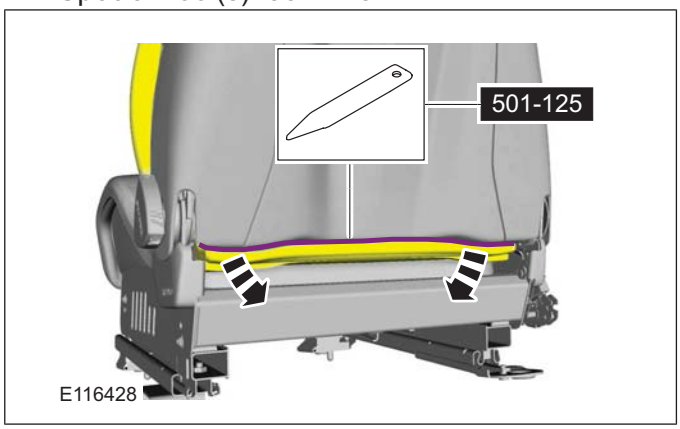
 E84511	501-125 Remover, Grab Handle Cover

Removal

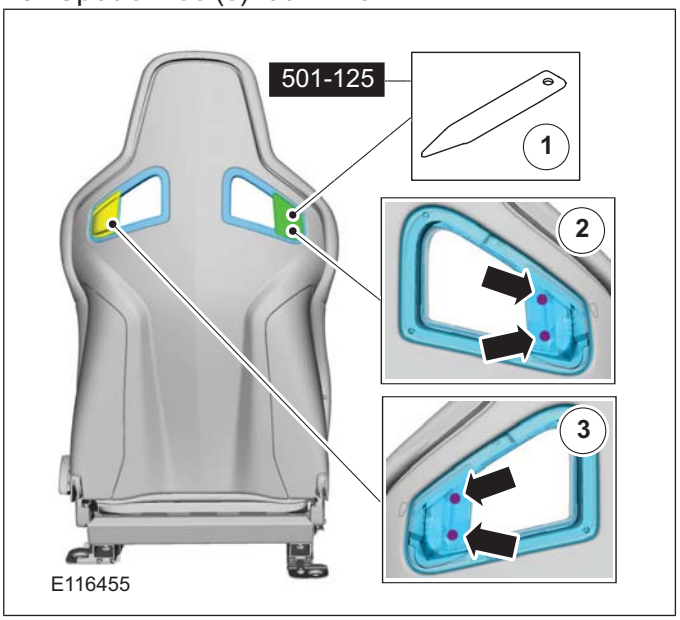
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Front Seat - 2.5L Duratec-RS (224kW/305PS) - VI5 (501-10 Seating, Removal and Installation).

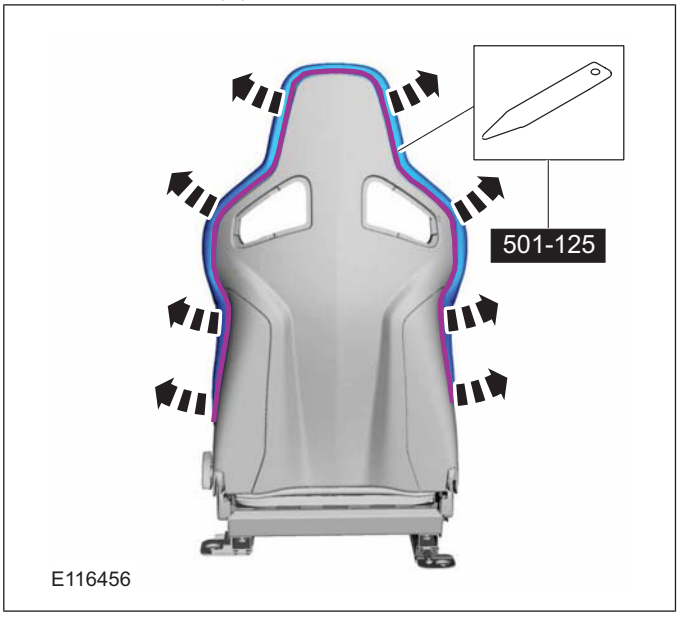
2. Special Tool(s): 501-125



3. Special Tool(s): 501-125



4. Special Tool(s): 501-125



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Front Seat Cushion Cover — 2.5L Duratec-ST (166kW/226PS) - VI5(40 105 0)

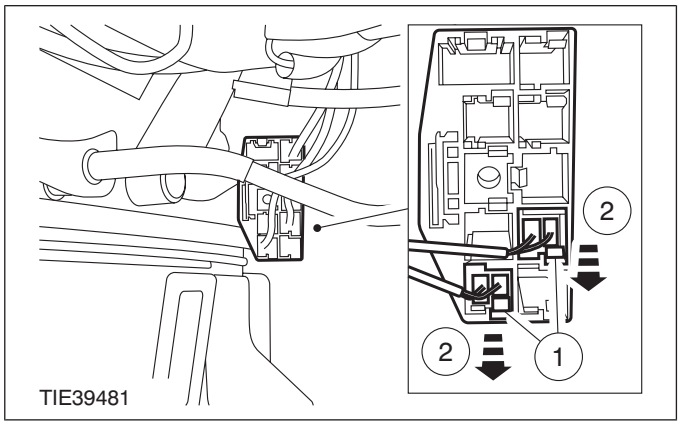
Removal

All vehicles

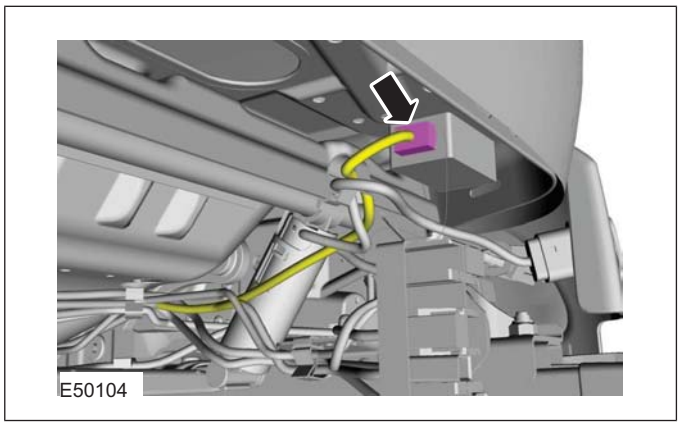
CAUTION: Take extra care not to damage the wiring harnesses.

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

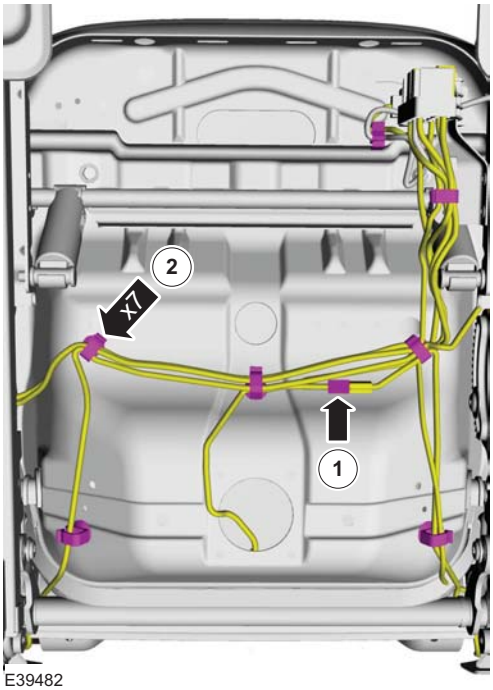
1.



2.

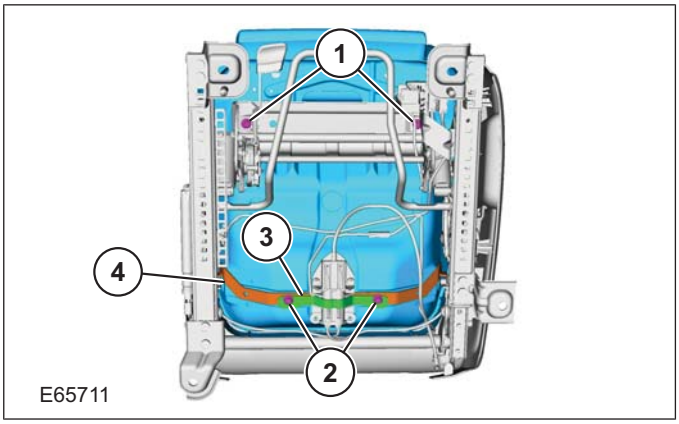


3.



3-door

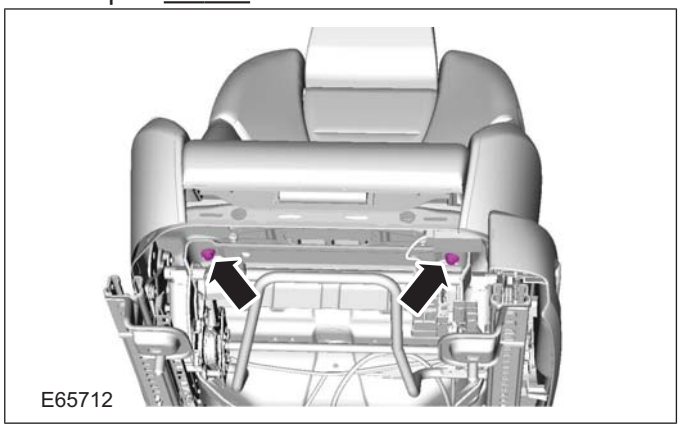
4. 1. Torque: 23 Nm



REMOVAL AND INSTALLATION

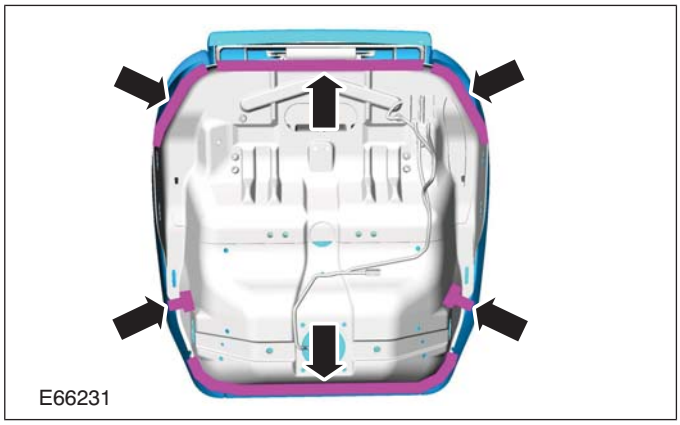
5-door

5. Torque: 23 Nm

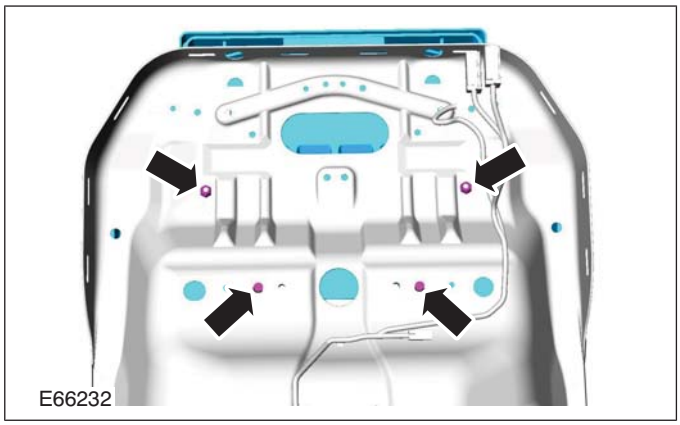


All vehicles

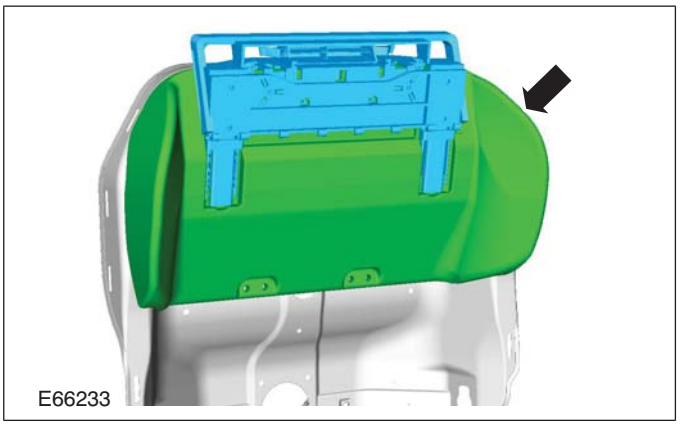
6.



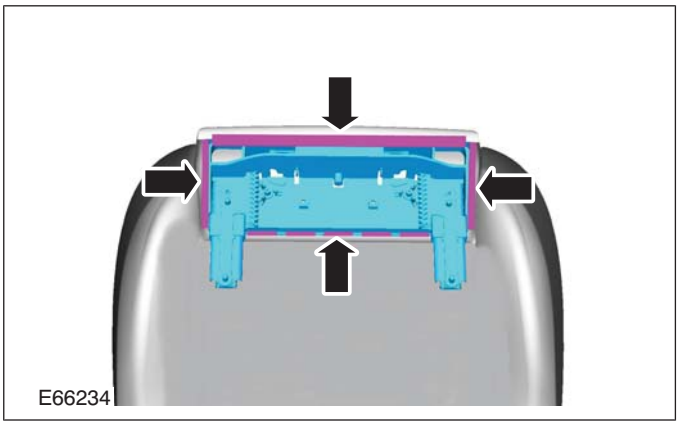
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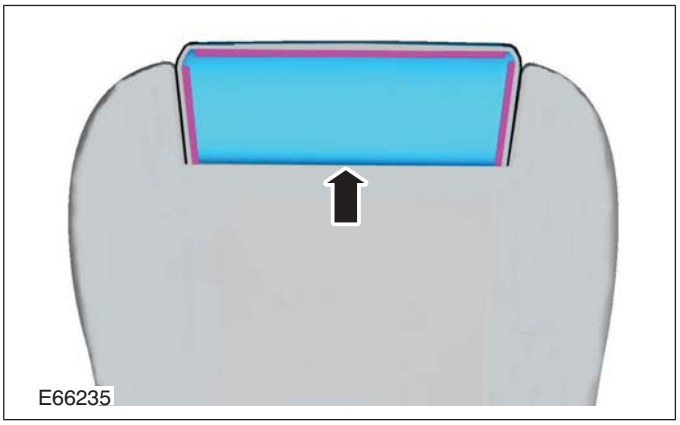
8.



9.

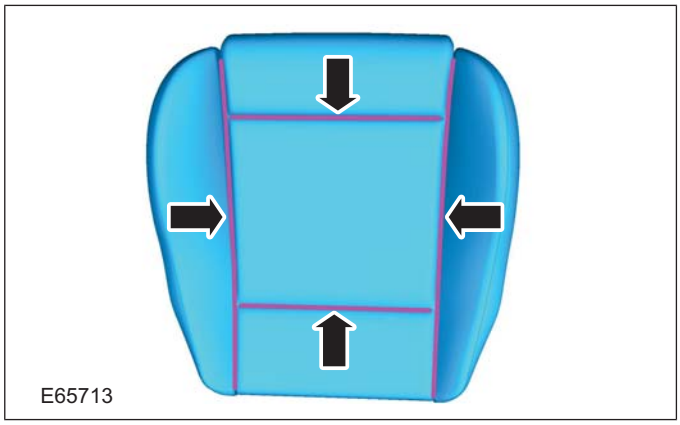


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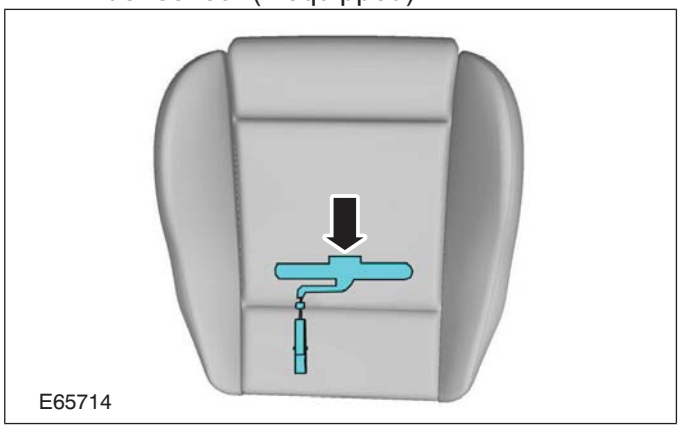


REMOVAL AND INSTALLATION

11. **CAUTION: Equal pressure must be applied to both surfaces of the hook and loop tape.**



12. Remove the front passenger seat safety belt minder sensor (if equipped).



Installation

1. **WARNINGS:**

   Make sure that the safety belt minder sensor (if equipped) is correctly located with the seat cushion cover and the seat cushion heater mat (if equipped).

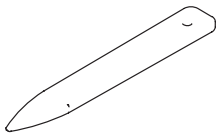
   Make sure that the seat cushion heater mat (if equipped) is correctly located with the seat cushion cover hook and loop tape.

   To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Front Seat Cushion Cover — 2.5L Duratec-RS (224kW/305PS) - VI5(40 105 0)

Special Tool(s)

 E84511	501-125 Remover, Grab Handle Cover

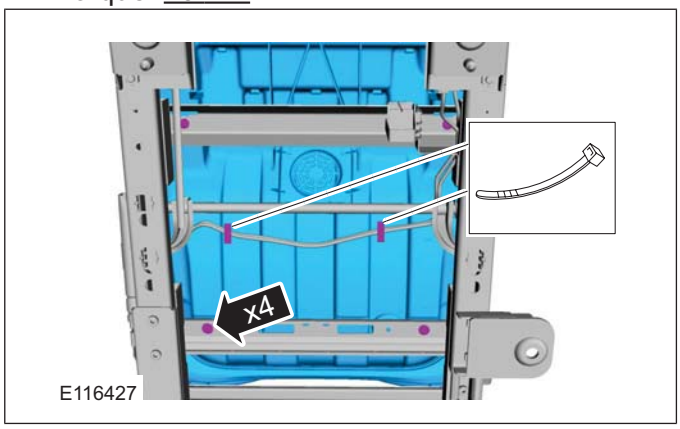
General Equipment

Cable Ties

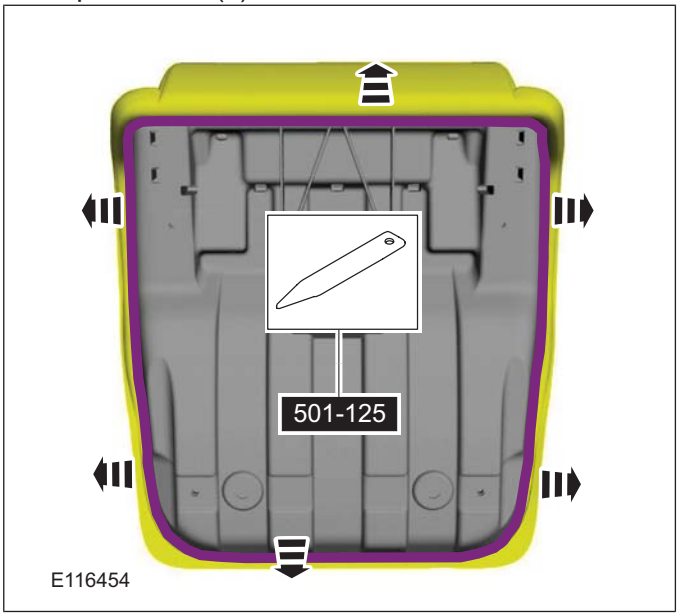
Removal

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

1. Refer to: Front Seat - 2.5L Duratec-RS (224kW/305PS) - VI5 (501-10 Seating, Removal and Installation).
2. General Equipment: Cable Ties
   Torque: 23 Nm

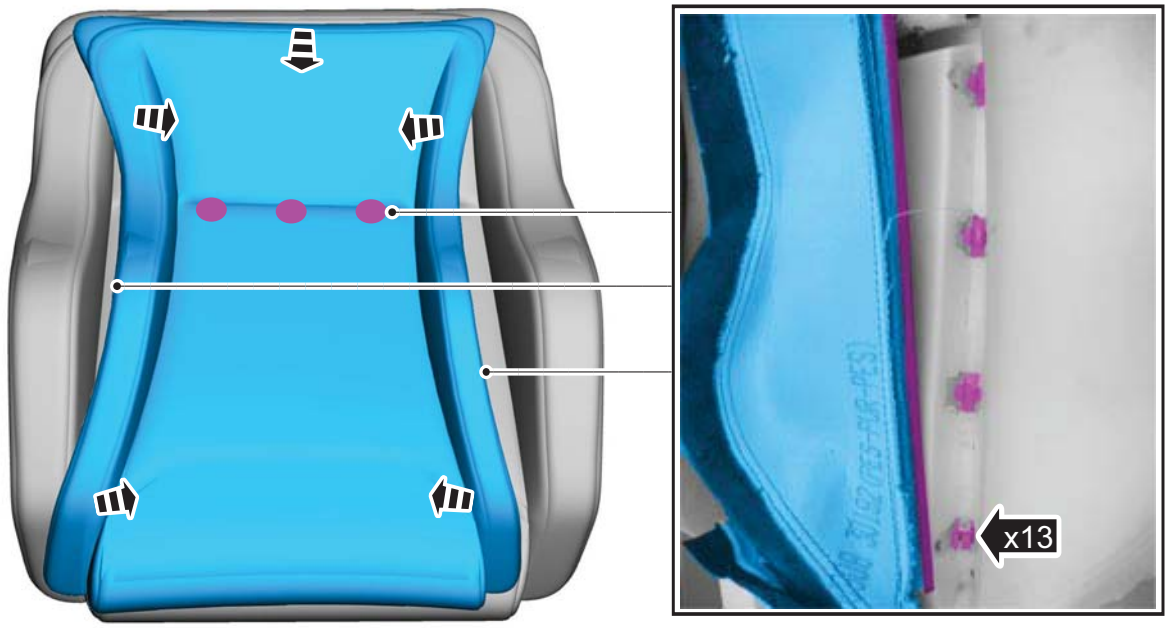


3. Special Tool(s): 501-125



4.

REMOVAL AND INSTALLATION



E116429

Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Rear Seat Backrest Cover

General Equipment

Hog ring pliers

NOTE: Left-hand rear seat backrest shown.

1. **Remove the components in the order indicated in the following illustration(s) and table(s).**



REMOVAL AND INSTALLATION

Item	Description
1	Armrest (if equipped) See Removal Detail See Installation Detail
2	Armrest backing plate (if equipped) See Removal Detail See Installation Detail
3	Rear seat backrest outer pivot pin bush See Removal Detail
4	Head restraints (if equipped)
5	Head restraint guide tubes (if equipped) See Removal Detail
6	Rear seat backrest release button trim panel
7	Rear center safety belt webbing trim panel See Removal Detail See Installation Detail
8	Rear seat backrest frame See Removal Detail See Installation Detail
9	Rear seat backrest pad See Removal Detail See Installation Detail
10	Rear seat backrest cover See Installation Detail

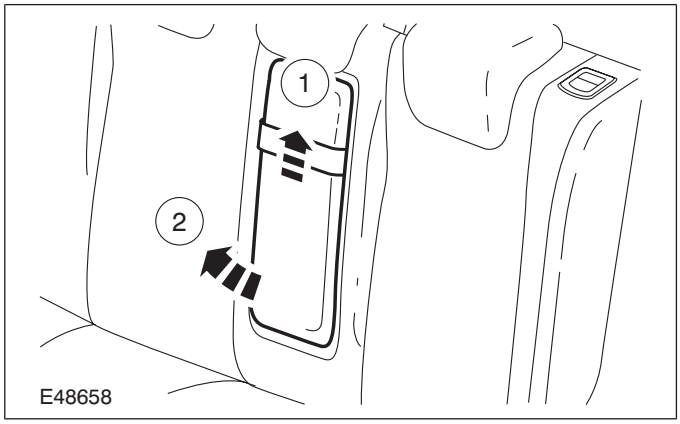
2. To install, reverse the removal procedure.

Removal Details

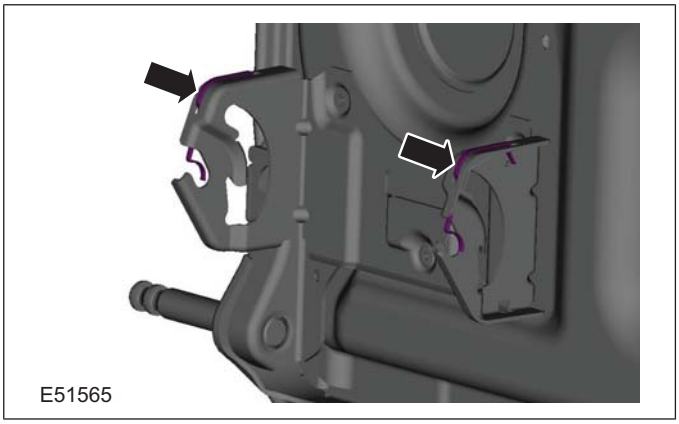
Item 1 Armrest (if equipped)

1. Remove the armrest.

1. Slide the armrest upwards.
2. Slide the armrest outwards.



2. Remove and discard the armrest pivot bush spring clips (the rear seat backrest cover and pad are shown removed for clarity).

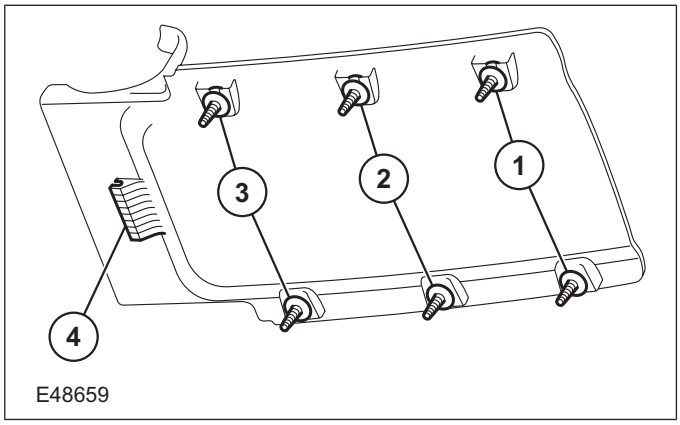


Item 2 Armrest backing plate (if equipped)

1. Remove the armrest backing plate.

REMOVAL AND INSTALLATION

- Detach the retaining clips from the rear seat backrest in the sequence shown.



2. Detach the right-hand rear seat backrest from the left-hand rear seat backrest.



Item 3 Rear seat backrest outer pivot pin bush

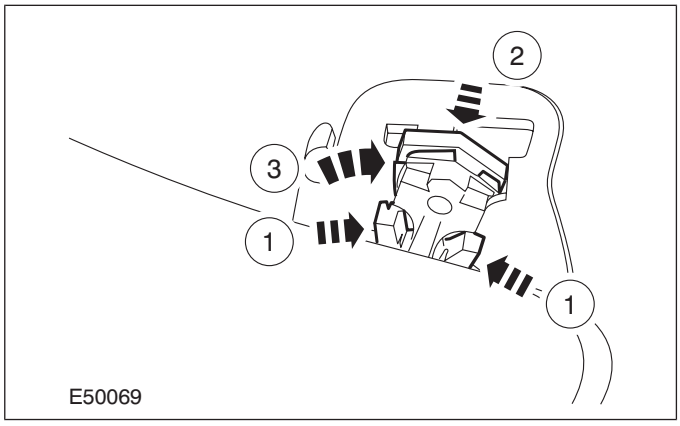
1. Fold the rear seat cushions forwards.

2. Release the rear seat backrest upper latch on both sides.

3. Fold the rear seat backrests forwards.

4. Release the rear seat backrest from the outer mounting bracket on both sides.

1. Using a pair of long nose pliers, depress the clips.
2. Push the clip inwards.
3. Using a screwdriver, release the locking latch.



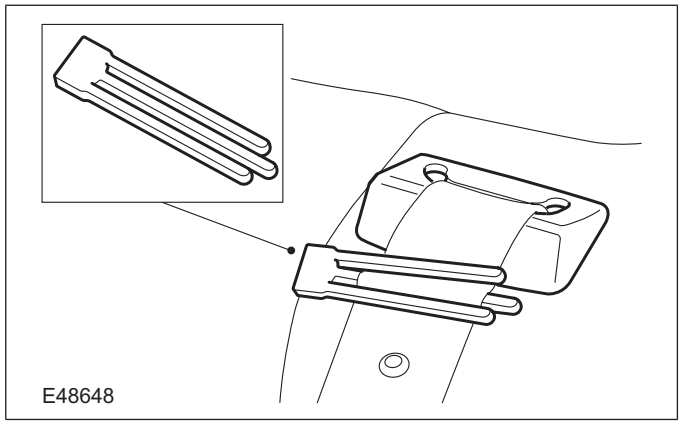
5. CAUTION: The left-hand rear seat backrest inner pivot pin has radial grooves. Take care not to damage the right-hand rear seat backrest inner pivot bush.

Remove the right-hand rear seat backrest.

1. Detach the outer pivot pin from the mounting bracket.

6. CAUTION: Make sure that a webbing retainer is installed at least 200 mm towards the rear center safety belt retractor from the webbing stop.

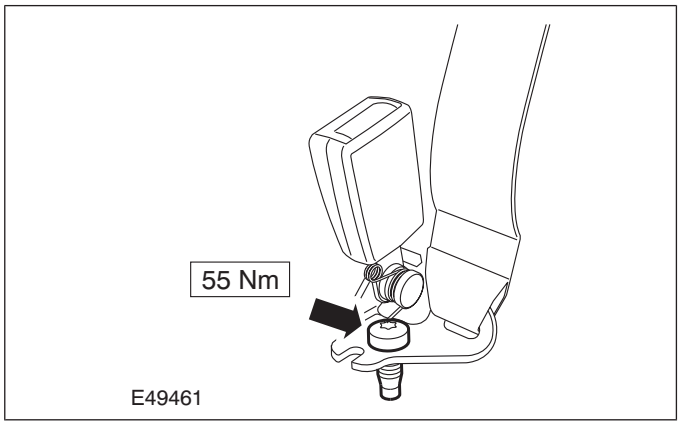
Install the safety belt webbing retainer.



7. CAUTION: The bolt securing the rear center safety belt lower anchor is held captive by a metal washer. The bolt and metal washer must remain on the safety belt lower anchor at all times when the safety belt is detached or removed.

REMOVAL AND INSTALLATION

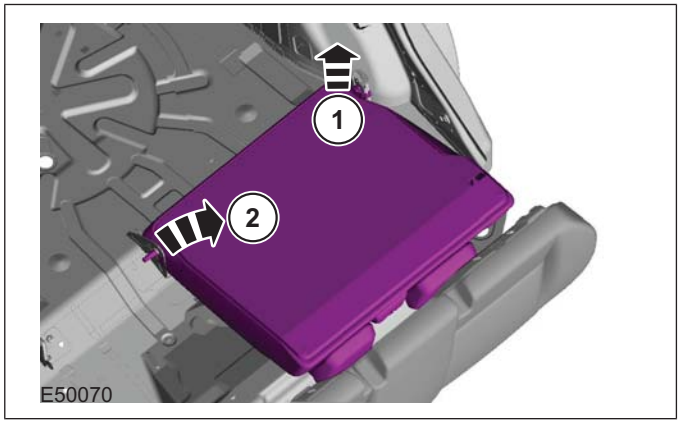
Remove the rear center safety belt lower anchor retaining bolt.



8. **CAUTION: The left-hand rear seat backrest inner pivot pin has radial grooves. Take care not to damage the center hinge pivot bush.**

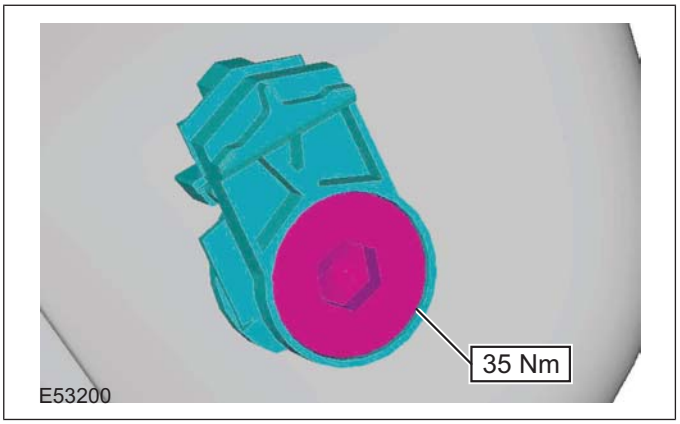
   Remove the left-hand rear seat backrest.

   1. Detach the outer pivot pin from the mounting bracket.
   2. Slide the backrest from the center mounting bracket.



9. **Remove the rear seat backrest outer pivot pin bush.**

- Remove the rear seat backrest outer pivot pin bush retaining bolt.

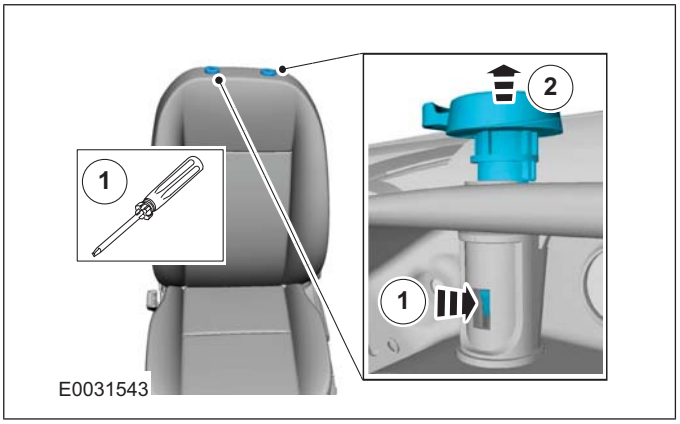


Item 5 Head restraint guide tubes (if equipped)

1. **CAUTION: Make sure that the head restraint guide tube locking tang is fully depressed before removal.**

   Remove the head restraint guide tubes.

   1. Using a screwdriver, depress the locking tang.
   2. Pull the guide tube upwards.

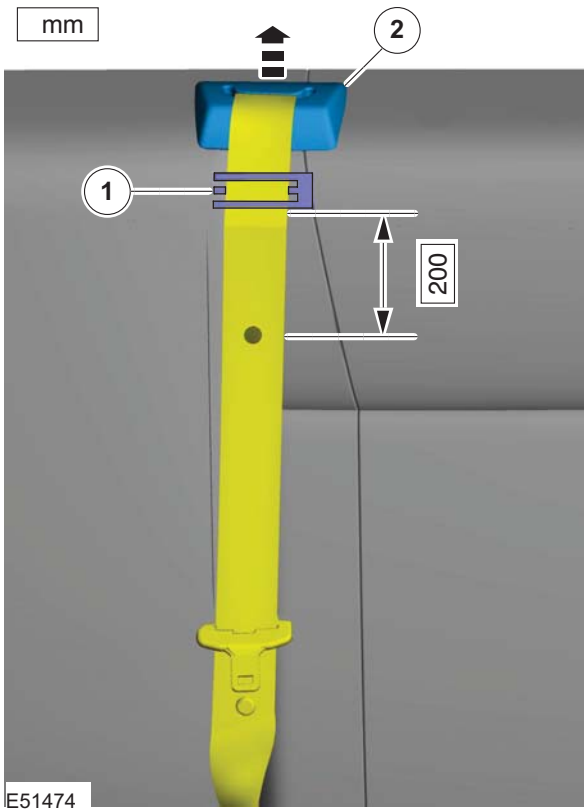


Item 7 Rear center safety belt webbing trim panel

1. **CAUTION: Make sure that a webbing retainer is installed at least 200 mm towards the rear center safety belt retractor from the webbing stop.**

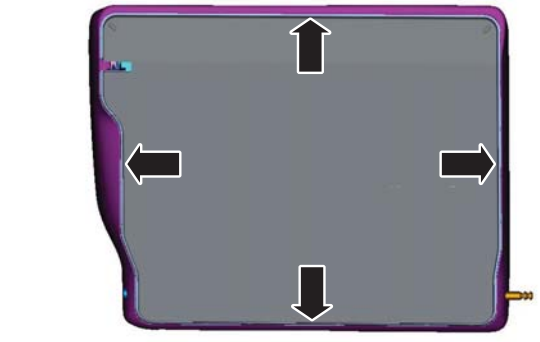
REMOVAL AND INSTALLATION

Remove the rear center safety belt webbing trim panel.

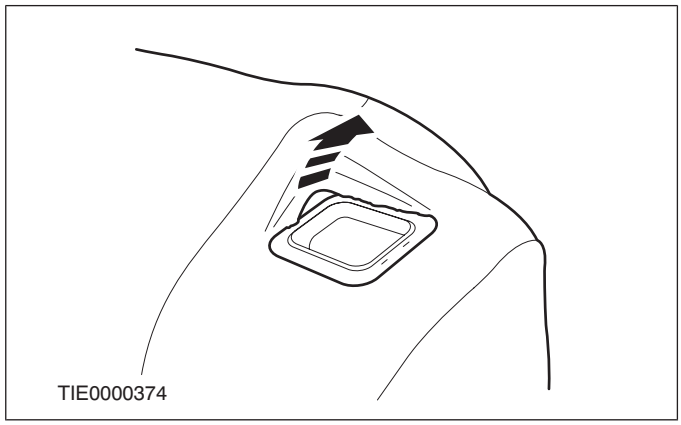


Item 8 Rear seat backrest frame

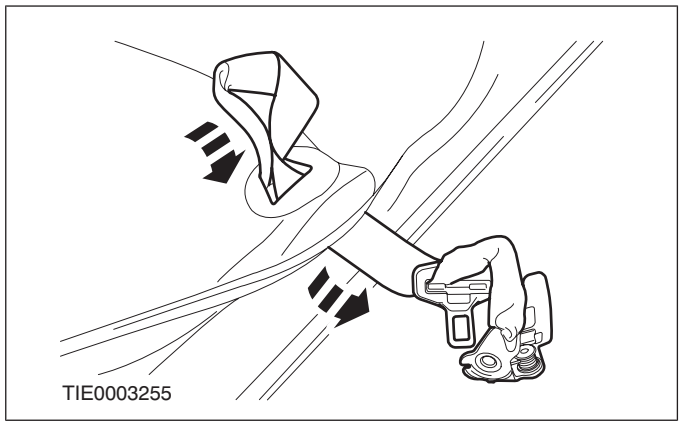
1. **Detach the rear seat backrest cover from the rear seat backrest frame.**



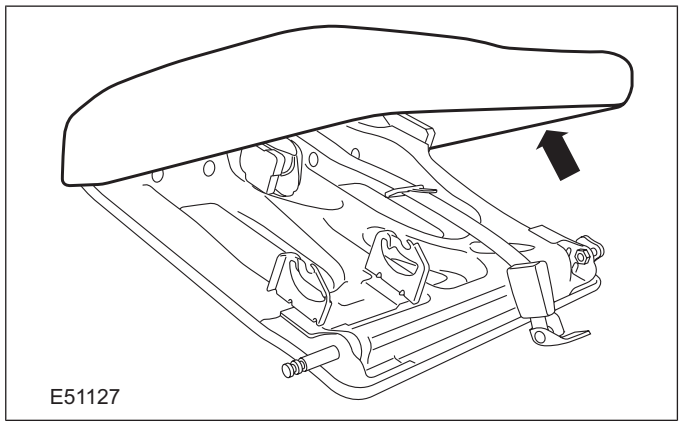
2. **Detach the rear seat backrest cover from the rear seat backrest release button.**



3. **Feed the rear center safety belt and lower anchor through the rear seat backrest cover and pad.**



4. **Remove the rear seat backrest cover and pad.**

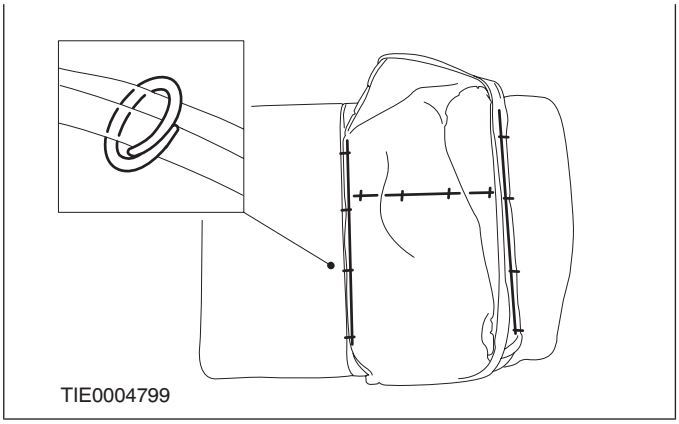


Item 9 Rear seat backrest pad

1. **Remove the rear seat backrest cover.**
   - Cut the hog rings.

REMOVAL AND INSTALLATION

- Discard the hog rings.



Installation Details

Item 10 Rear seat backrest cover

NOTE: If a replacement rear seat backrest cover is to be installed, cut out holes for the head restraint guide tubes and rear center safety belt webbing trim panel. Use the existing rear seat backrest cover as a template.

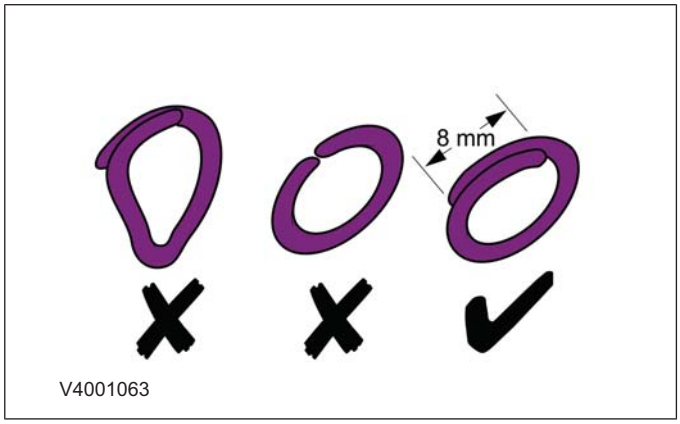
Item 9 Rear seat backrest pad

1. **NOTE: If a replacement rear seat backrest cover is to be installed, cut out a hole for the rear center safety belt webbing trim panel. Use the existing rear seat backrest pad as a template.**

NOTE: Use hog ring pliers to close the hog rings. Do not use any other tool. The hog rings must be closed to overlap as illustrated.

NOTE: Install new hog rings.

Using hog ring pliers, install the hog rings.



Item 8 Rear seat backrest frame

CAUTIONS:

Make sure that a webbing retainer is installed at least 200 mm towards the rear center safety belt retractor from the webbing stop.

When attaching the rear seat backrest cover and pad take care not to detach the safety belt webbing retainer.

After installation check for correct operation of the rear center safety belt retractor.

Item 7 Rear center safety belt webbing trim panel

CAUTIONS:

Make sure that a webbing retainer is installed at least 200 mm towards the rear center safety belt retractor from the webbing stop.

After installation check for correct operation of the rear center safety belt retractor.

1. **Install the rear center safety belt webbing trim panel.**

REMOVAL AND INSTALLATION



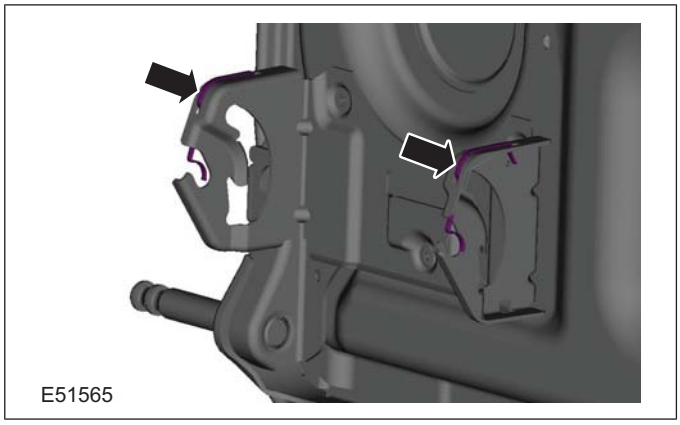
Item 2 Armrest backing plate (if equipped)

1. **CAUTION: Install the armrest to the rear seat backrest before installing the armrest backing plate.**

Item 1 Armrest (if equipped)

WARNING: New armrest pivot bush spring clips must be installed. Failure to follow this instruction may result in personal injury.

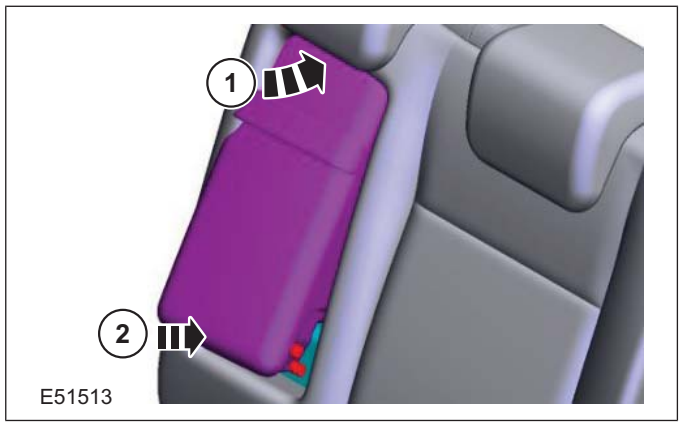
1. **Install the armrest pivot bush spring clips (the rear seat backrest cover and pad are shown removed for clarity).**



2. **NOTE: Make sure that the armrest pivot bush spring clips locate in the armrest pivot bush grooves.**

   Install the armrest.

   1. Place the upper end of the armrest into the upper end of the armrest aperture.
   2. Locate the armrest pivot bushes into the armrest retaining bracket.



REMOVAL AND INSTALLATION

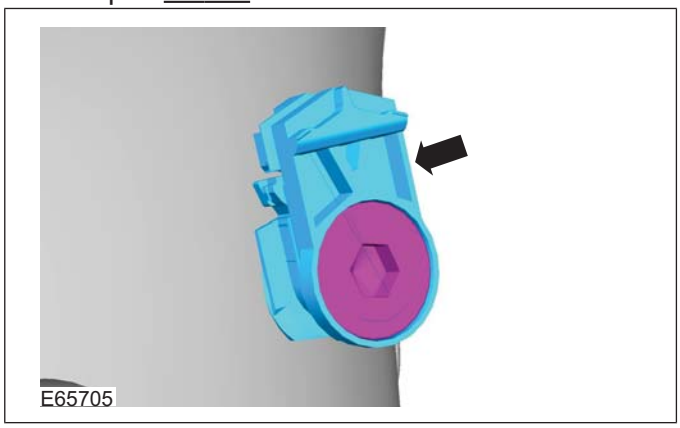
Rear Seat Backrest Cover — 2.5L Duratec-ST (166kW/226PS) - VI5

Removal

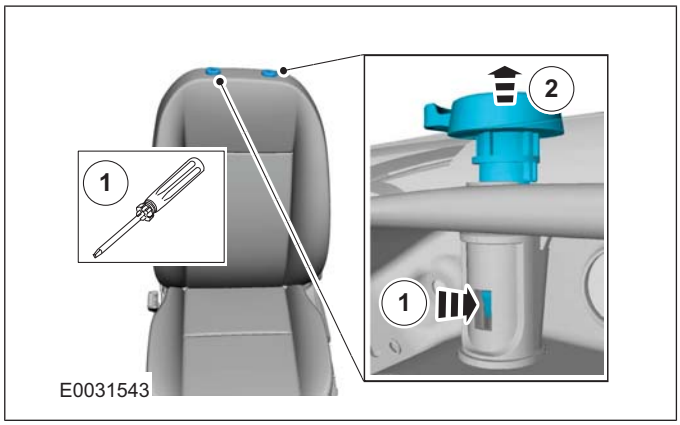
NOTE: Removal steps in this procedure may contain installation details.

All vehicles

1. Torque: 35 Nm

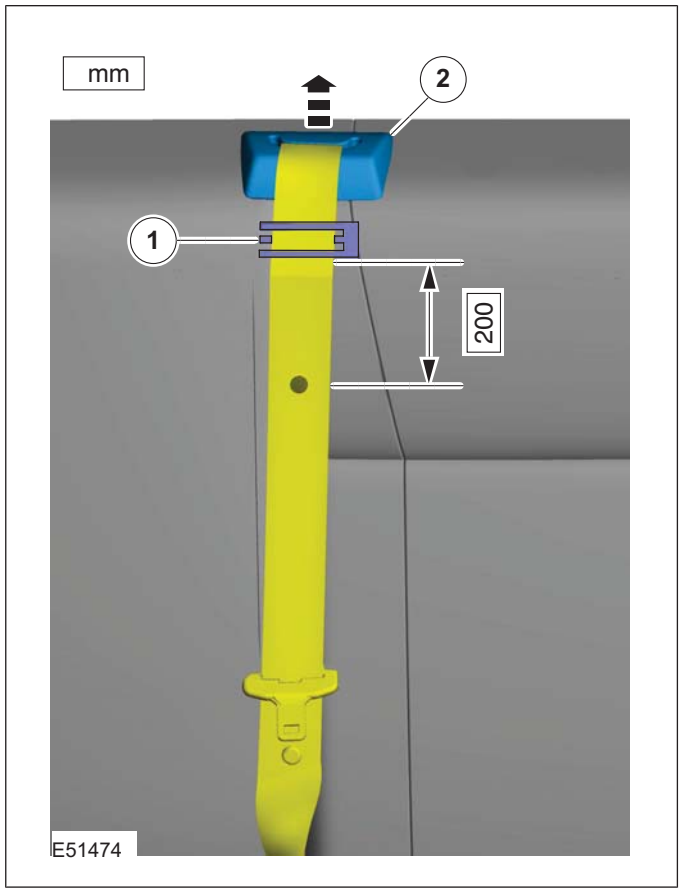


2.

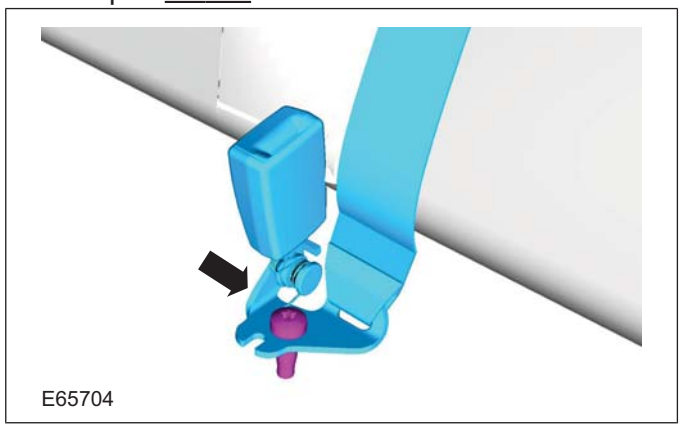


Vehicles with seat mounted safety belt retractors

3. **NOTE:** If the safety belt webbing retracts further than the safety belt webbing stop, a new safety belt retractor must be installed.



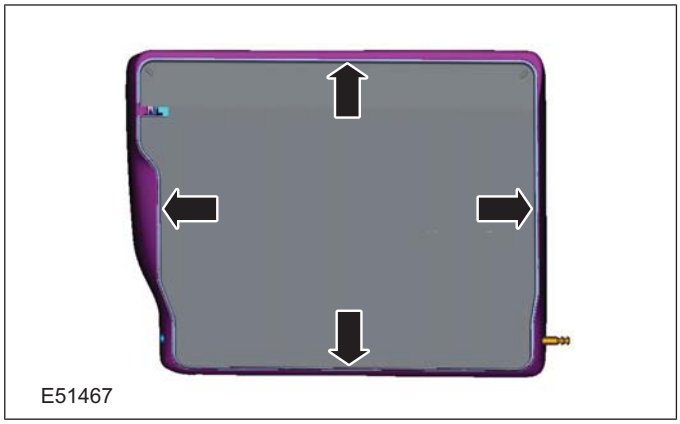
4. Torque: 55 Nm



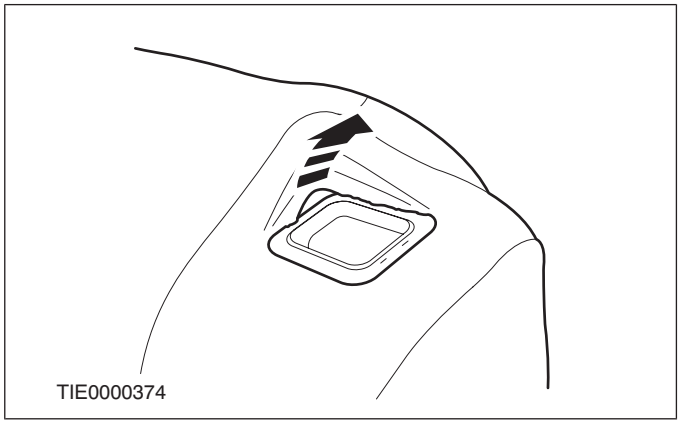
REMOVAL AND INSTALLATION

All vehicles

5.

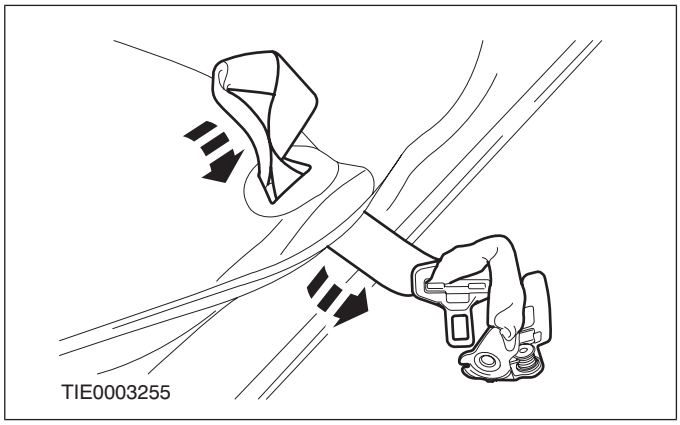


6.

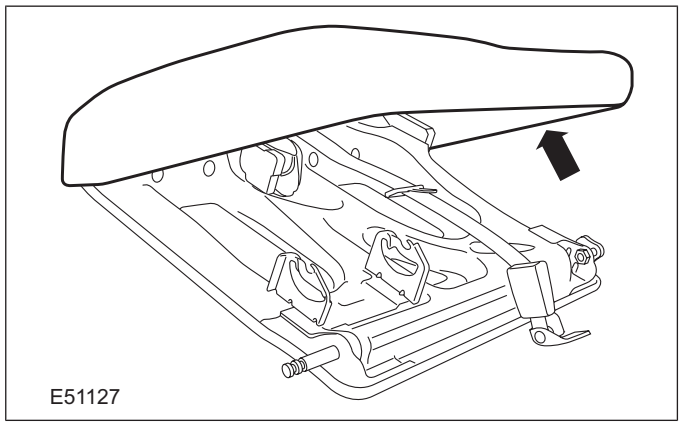


Vehicles with seat mounted safety belt retractors

7.

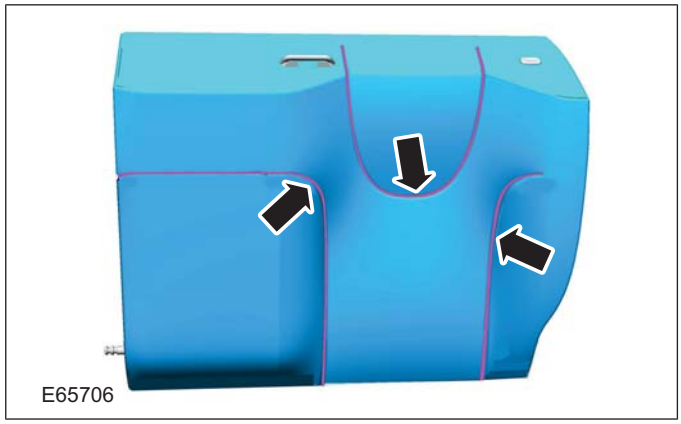


8.



All vehicles

9. ⚠ **CAUTION: Equal pressure should be applied to both surfaces of the hook and loop tape.**



Installation

1. **NOTE:** Use the original rear seat backrest cover as a template.

   Cut out the holes for the head restraint guides and rear center safety belt webbing trim panel.

2. To install, reverse the removal procedure.

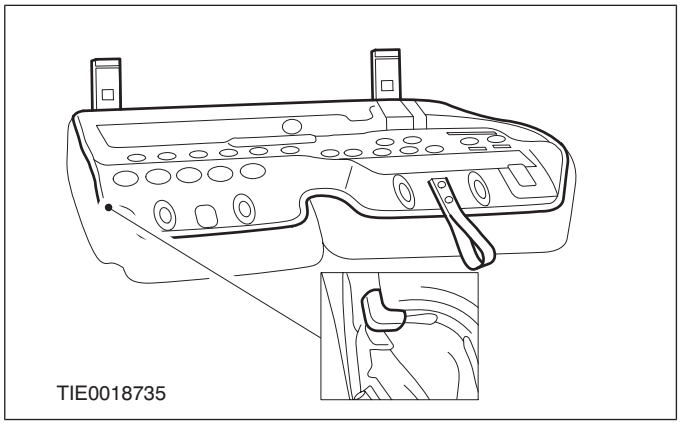
REMOVAL AND INSTALLATION

Rear Seat Cushion Cover — 2.5L Duratec-ST (166kW/226PS) - VI5

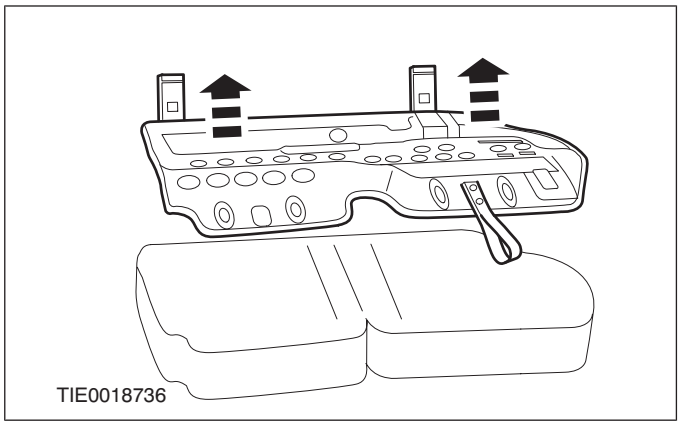
Removal

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

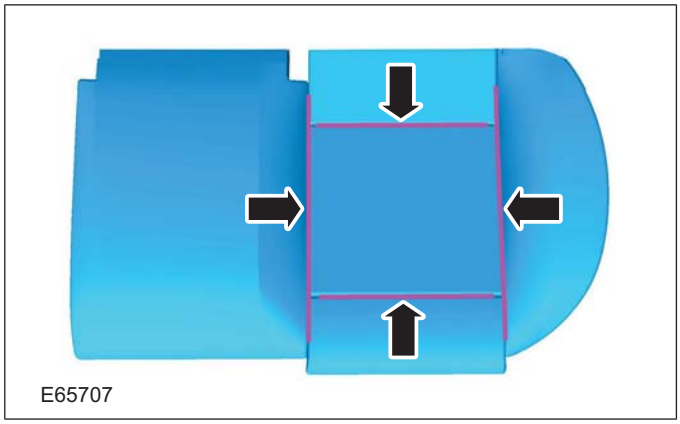
1.



2.



3. **CAUTION: Equal pressure should be applied to both surfaces of the hook loop tape.**



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Seat Base

General Equipment

Blind Rivet Gun

General Equipment

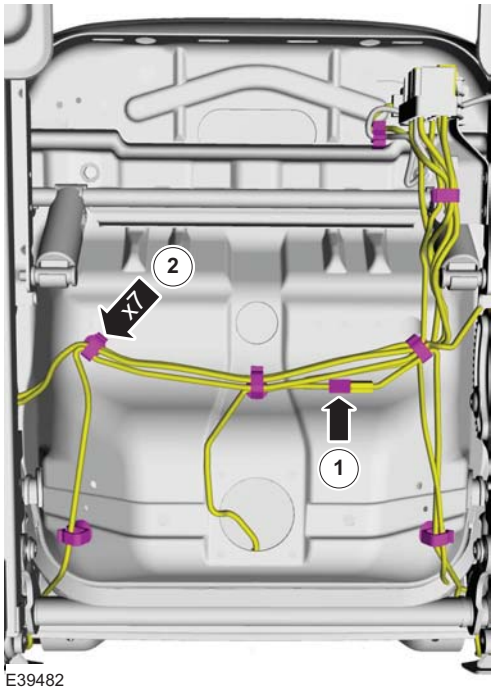
Electric Drill

Removal

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

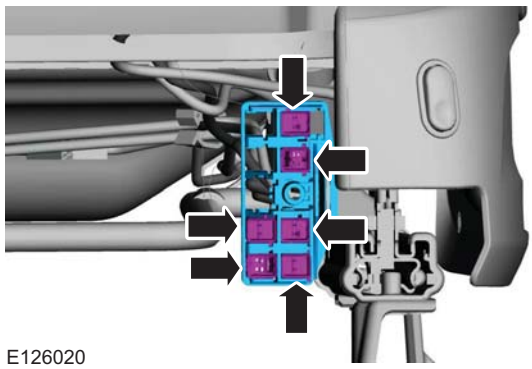
1. Refer to: Front Seat (501-10 Seating, Removal and Installation).
2. If equipped.

   Refer to: Compact Disc (CD) Changer (415-01 Audio Unit, Removal and Installation).
3. 1. If equipped.

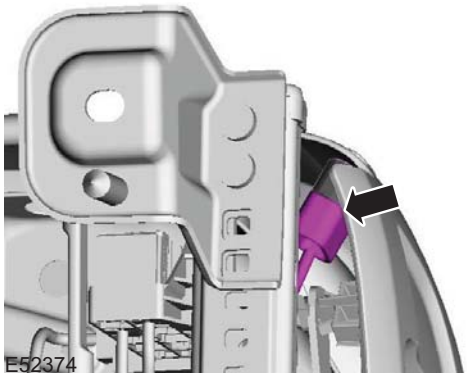


E39482

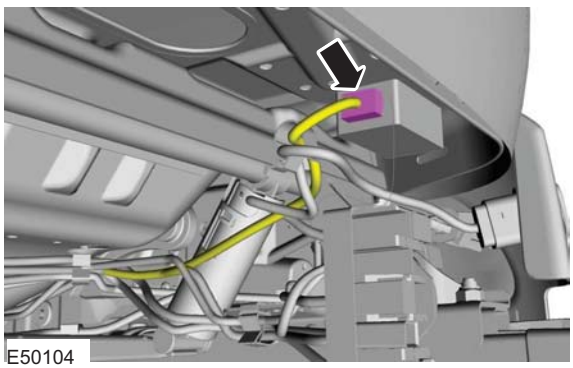
4.


E126020

5. If equipped.

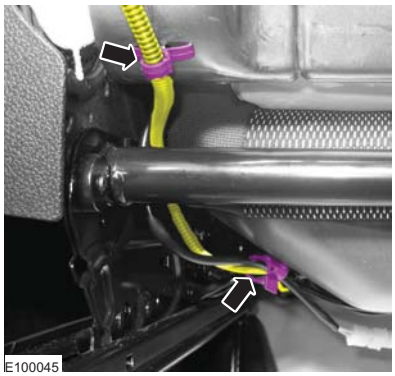

E52374

6. If equipped.

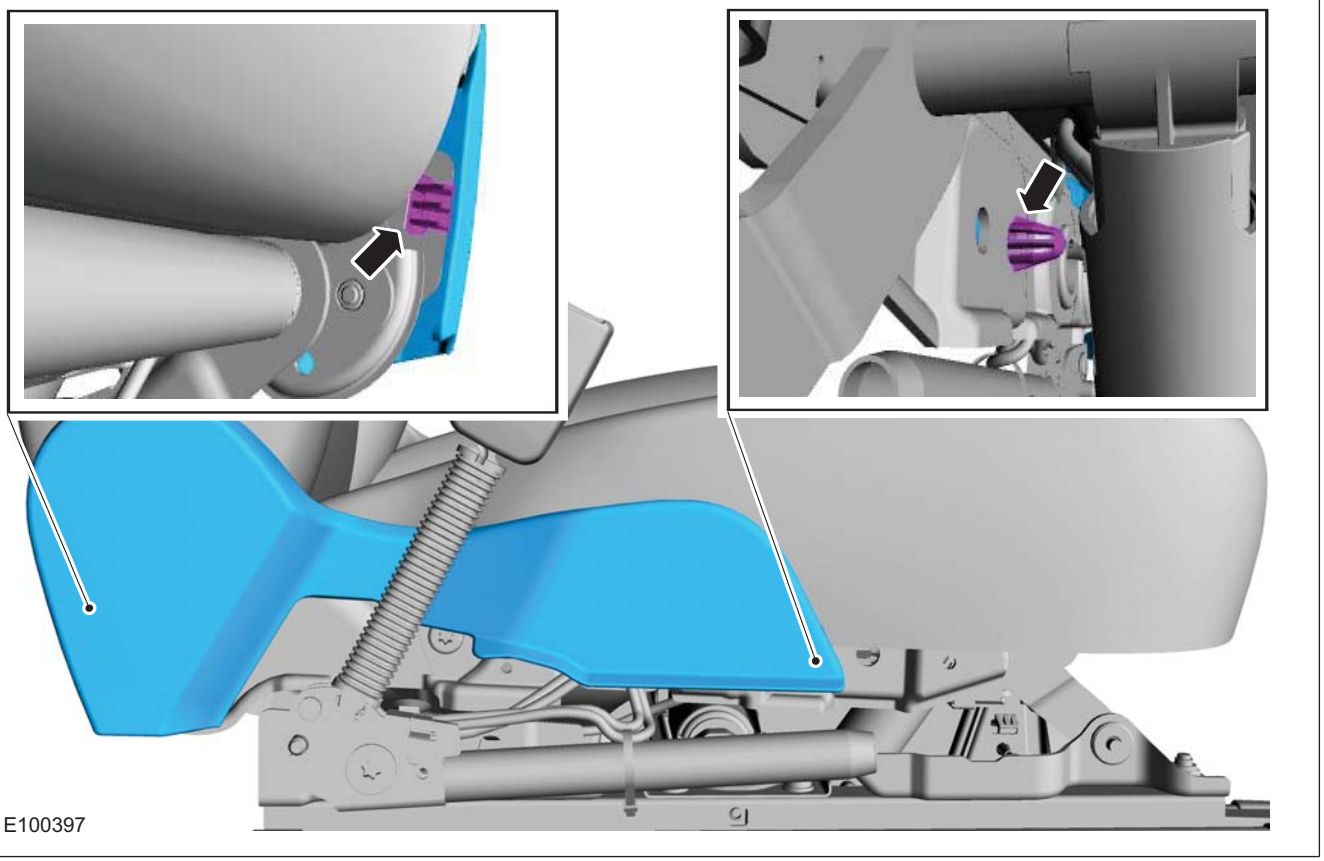

E50104

REMOVAL AND INSTALLATION

7.



8.

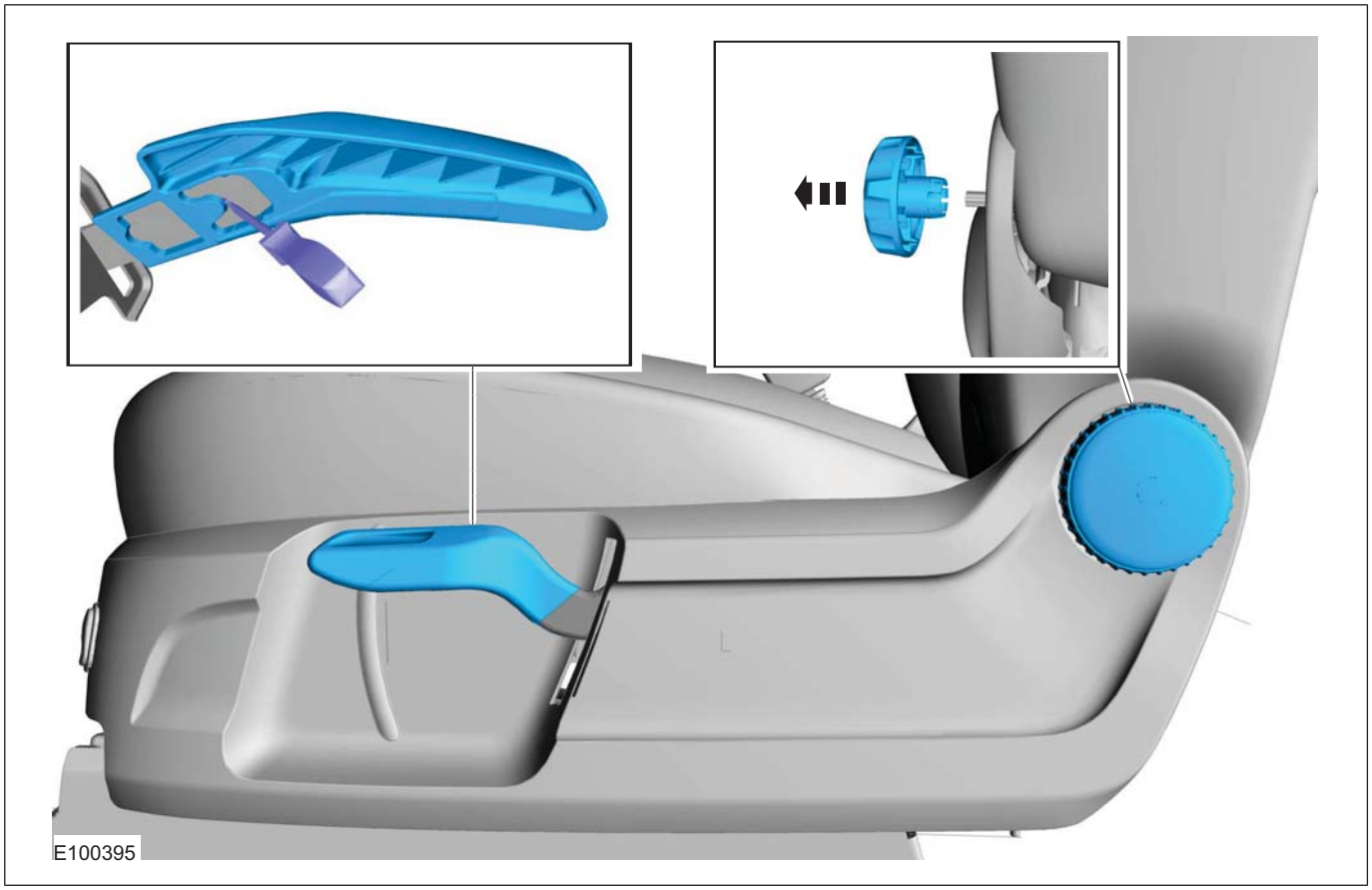


9. Torque: 47 Nm



10.

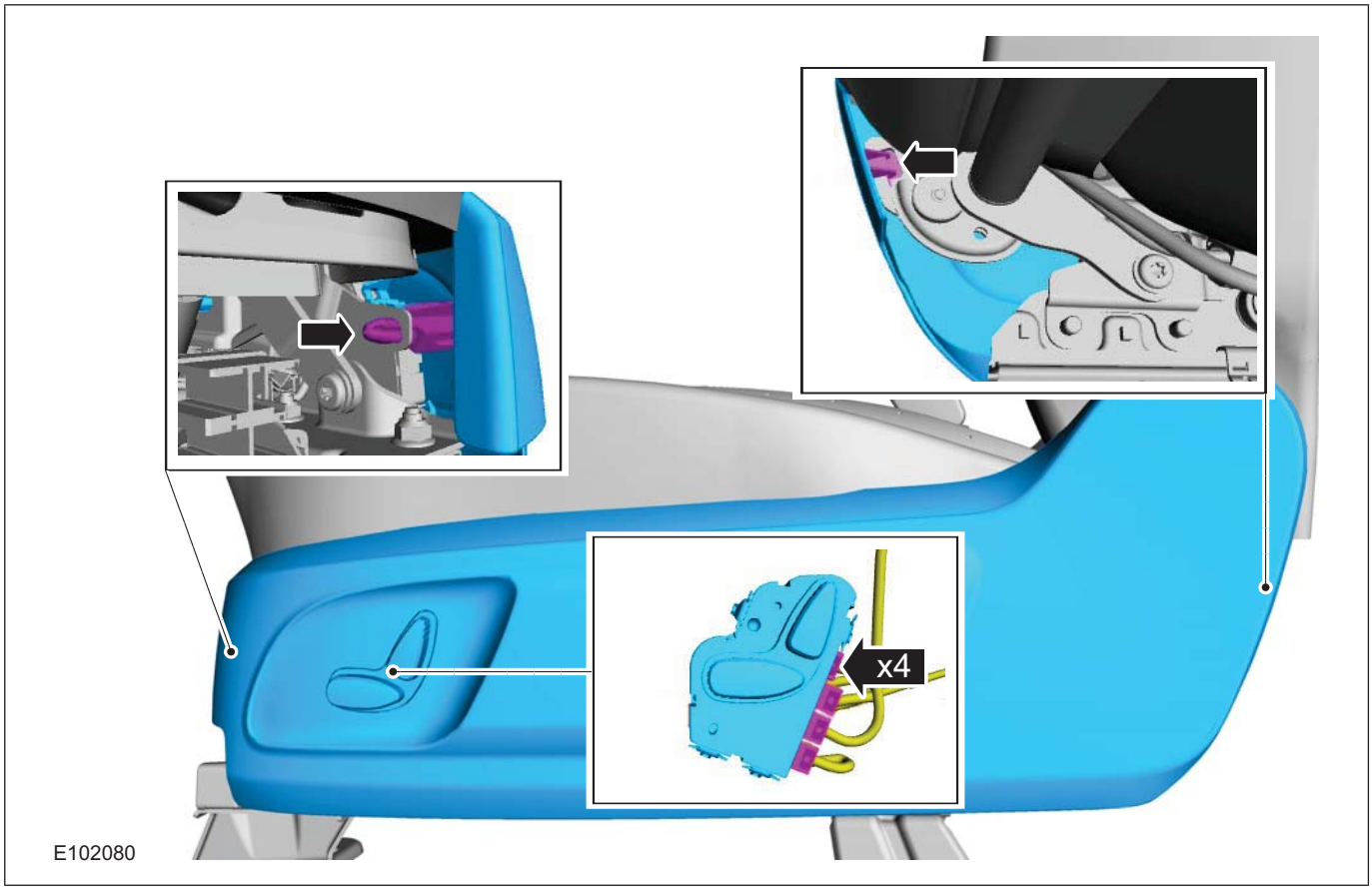
REMOVAL AND INSTALLATION



Vehicles with power seats

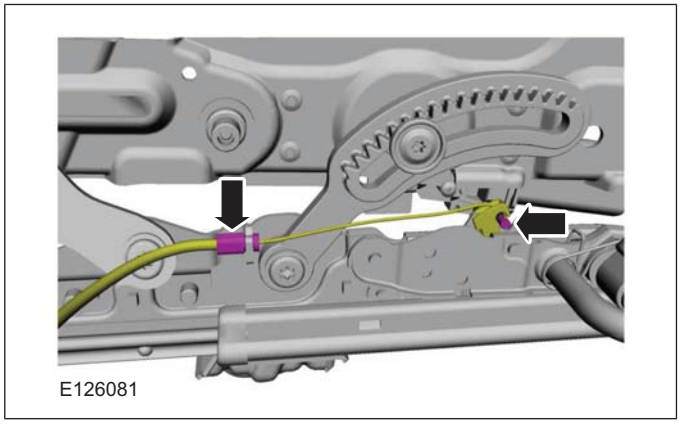
11.

REMOVAL AND INSTALLATION

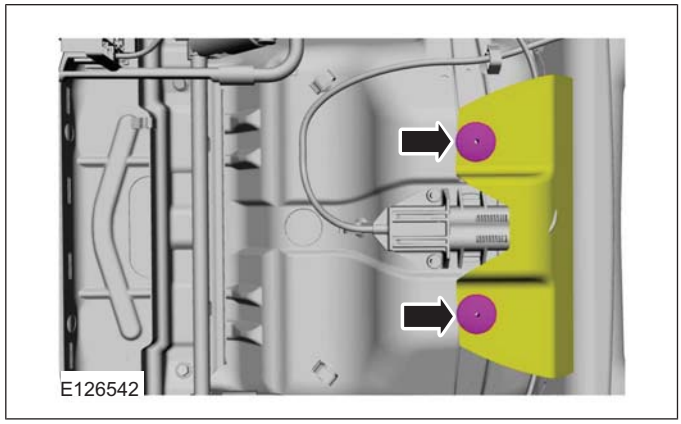


3-door

12. On both sides.

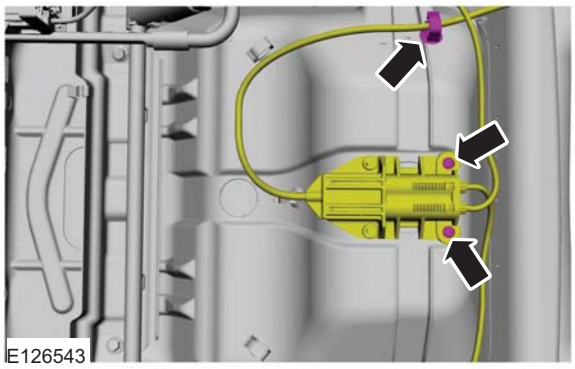


13.



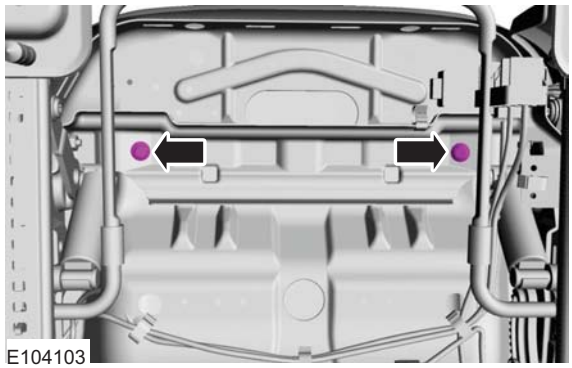
REMOVAL AND INSTALLATION

14. General Equipment: Electric Drill
General Equipment: Blind Rivet Gun



All vehicles

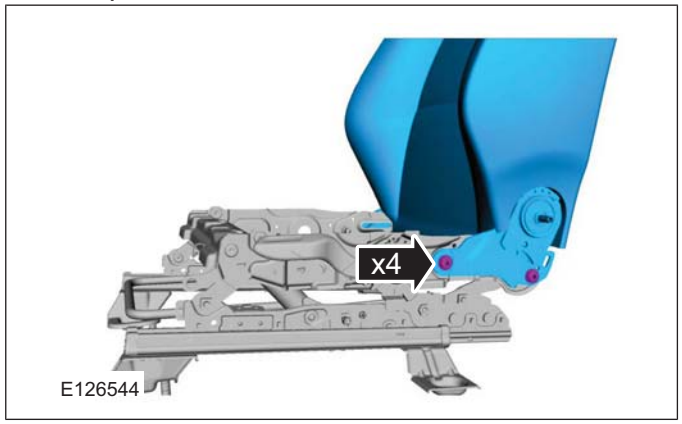
15. Torque: 23 Nm



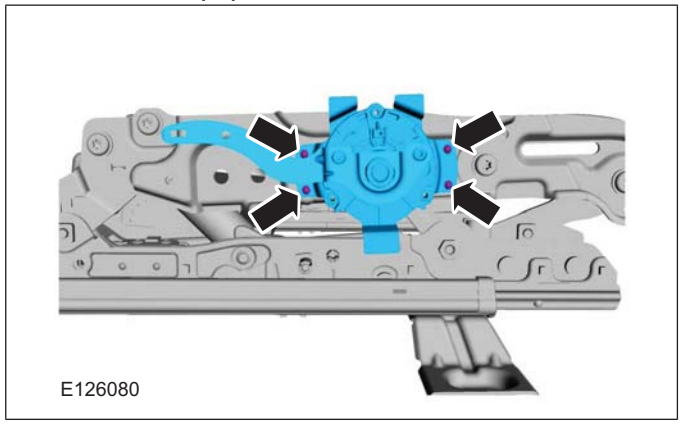
16.



17. Torque: 27 Nm

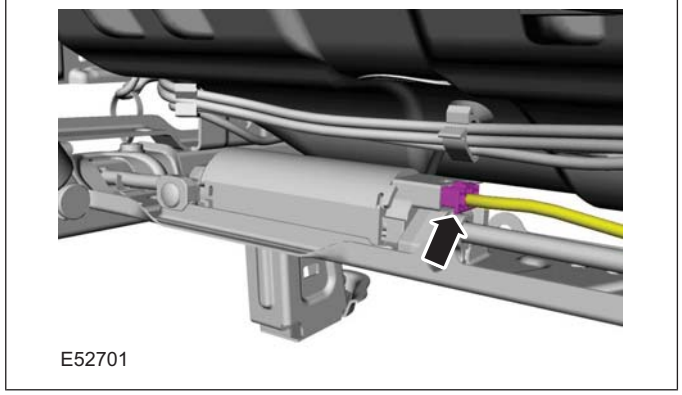


18. General Equipment: Electric Drill
General Equipment: Blind Rivet Gun



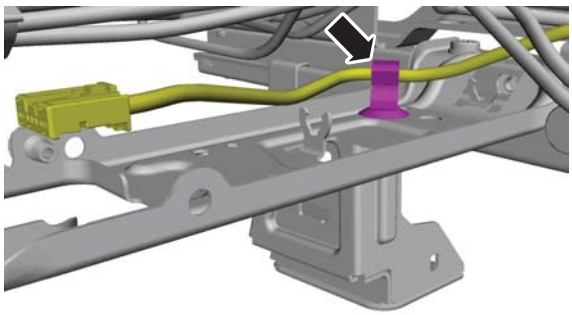
Vehicles with power seats

19. If equipped.

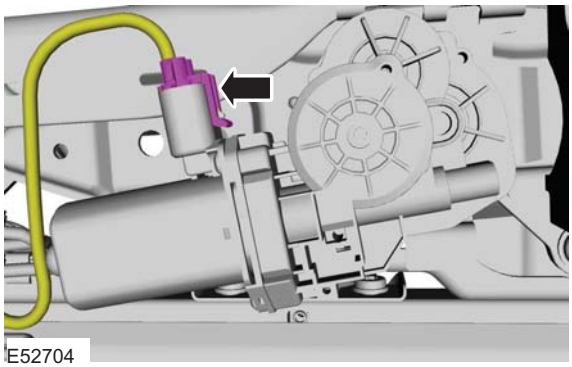


REMOVAL AND INSTALLATION

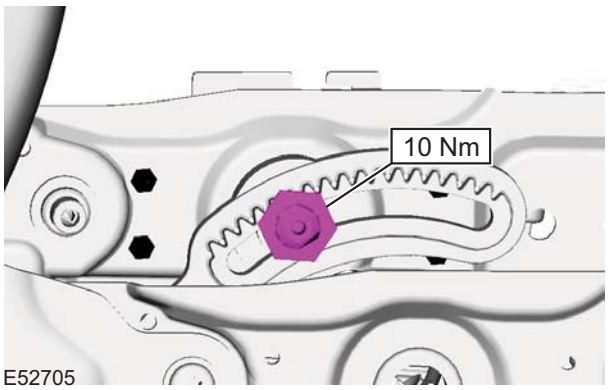
20. If equipped.



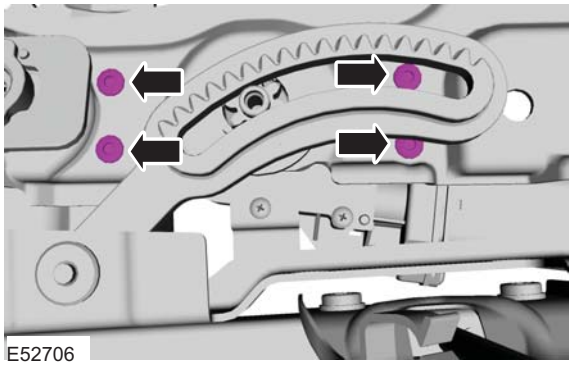
21.



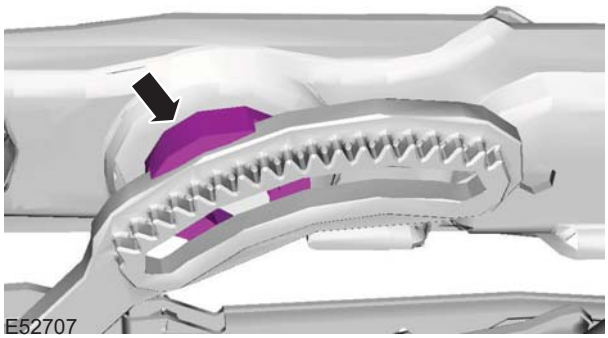
22. Torque: 10 Nm



23. General Equipment: Electric Drill
General Equipment: Blind Rivet Gun



24.



Installation

1. To install, reverse the removal procedure.

DISASSEMBLY AND ASSEMBLY

Rear Seat Cushion

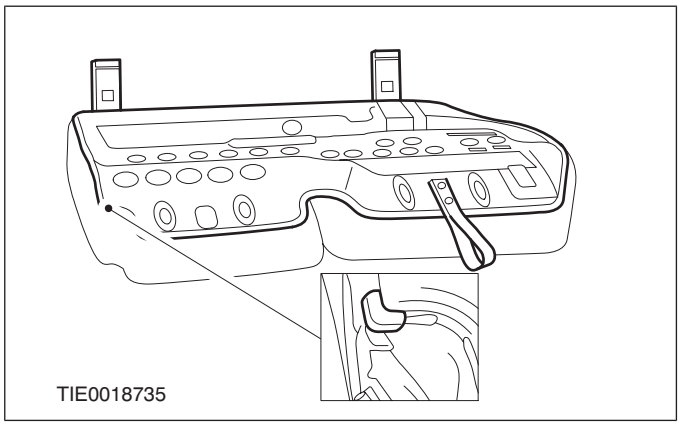
Disassembly

NOTE: The rear seat double cushion is shown in the procedure. The single cushion is similar.

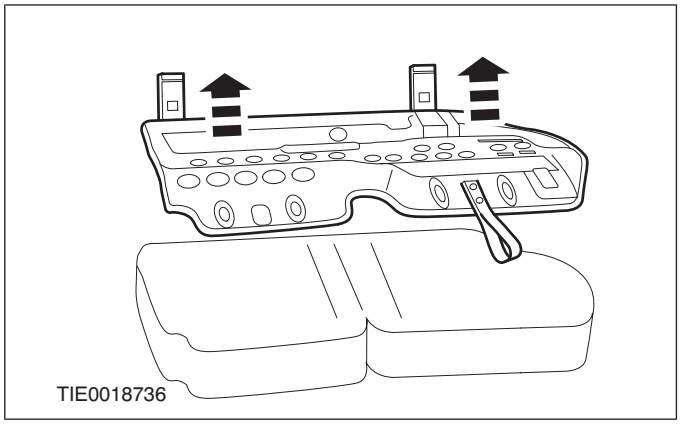
1. **NOTE: Retain the corner protector.**

   Detach the seat cushion cover from the seat base.

   - Detach the plastic retaining strip.

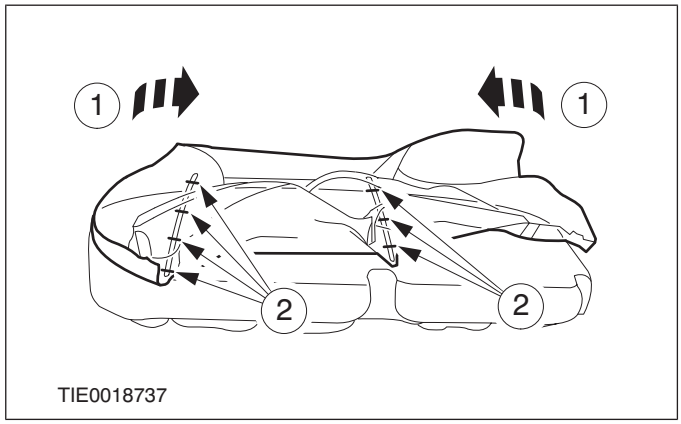


2. **Remove the seat base.**



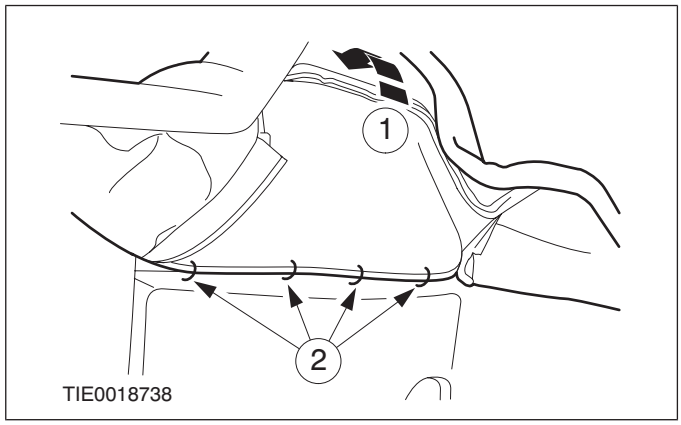
3. **Detach the cushion cover from each side of the cushion.**

   1. Roll the cushion cover towards the center to access the pleating hog rings.
   2. Cut the hog rings.



4. **Remove the cushion cover.**

   1. Roll the cushion cover back to access the pleating hog rings.
   2. Cut the hog rings.

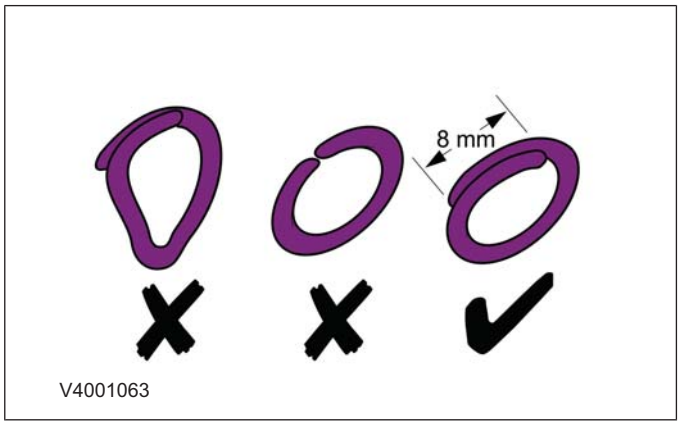


Assembly

1. **NOTE: Use hog ring pliers to close the hog rings. Do not use any other tool. The hog rings must be closed to overlap 8 mm as illustrated.**

DISASSEMBLY AND ASSEMBLY

To assemble, reverse the disassembly procedure.



V4001063

DISASSEMBLY AND ASSEMBLY

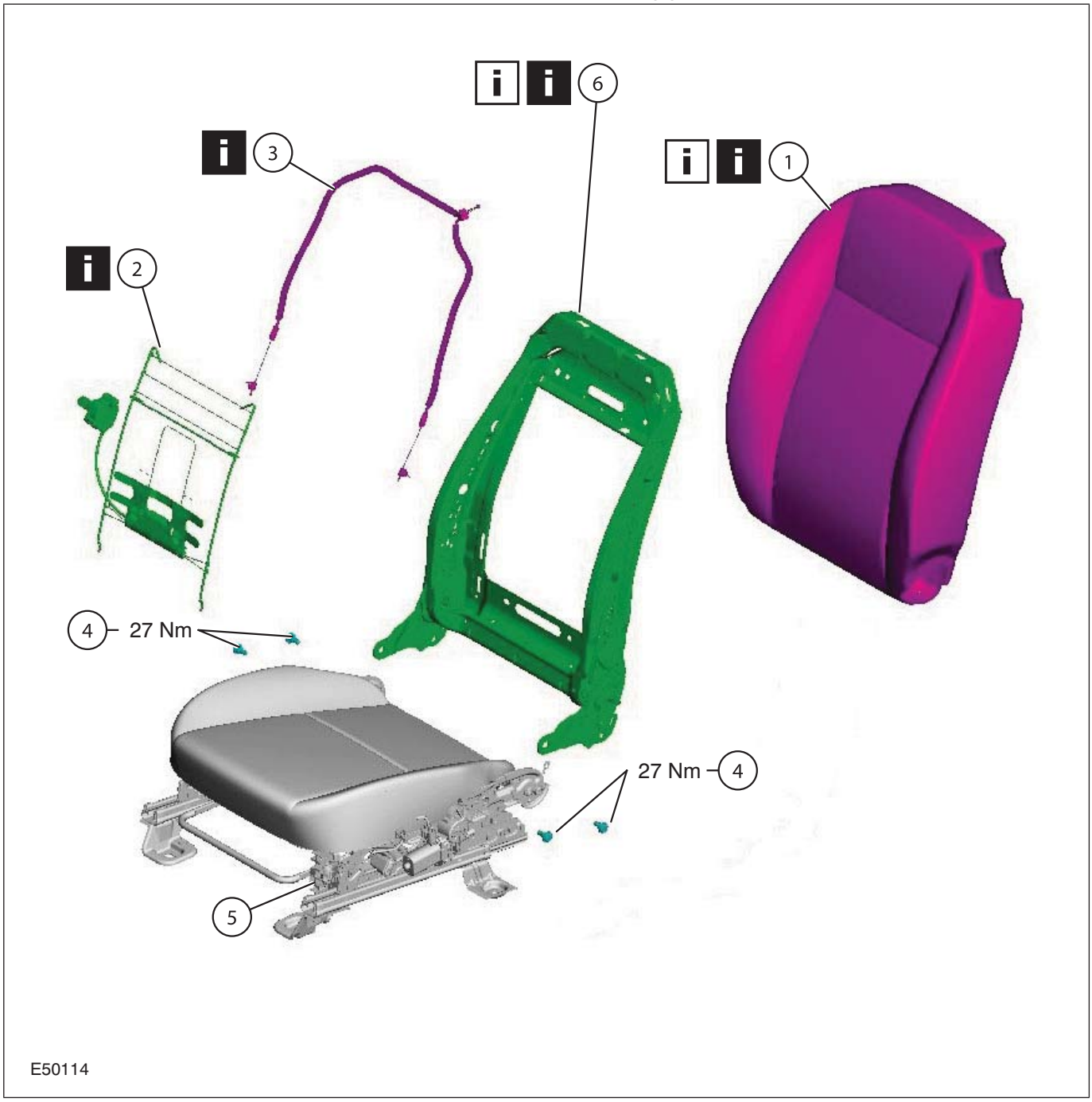
Front Seat Backrest — 3-Door

WARNING: Note the position of the wiring harnesses, to aid installation. An incorrectly routed wiring harness could become damaged when the front seat is moved. Failure to follow this instruction may result in personal injury.

1. **Remove the side air bag module.**

   For additional information, refer to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation).

2. **Disassemble the components in the order indicated in the following illustration(s) and table(s).**



DISASSEMBLY AND ASSEMBLY

Item	Description
1	Front seat backrest pad See Disassembly Detail See Assembly Detail
2	Front seat backrest lumbar support (if equipped) See Disassembly Detail
3	Front seat backrest release lever cable assembly See Disassembly Detail
4	Front seat backrest frame retaining bolts
5	Front seat frame
6	Front seat backrest frame See Disassembly Detail See Assembly Detail

3. To assemble, reverse the disassembly procedure.

Disassembly Details

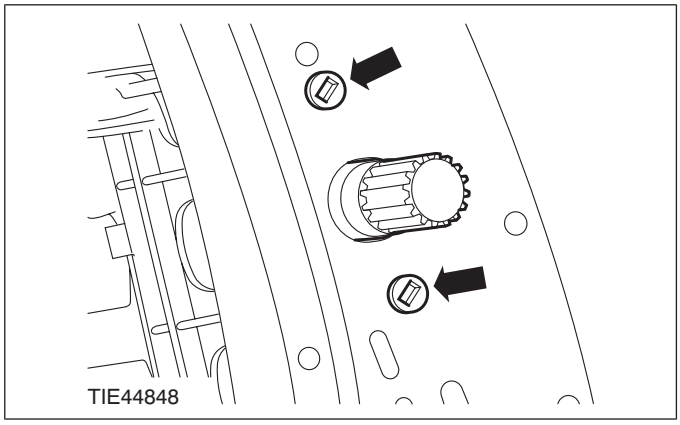
Item 1 Front seat backrest pad

NOTE: Note the position of the front seat backrest anti-squeak mat to aid assembly.

Item 2 Front seat backrest lumbar support (if equipped)

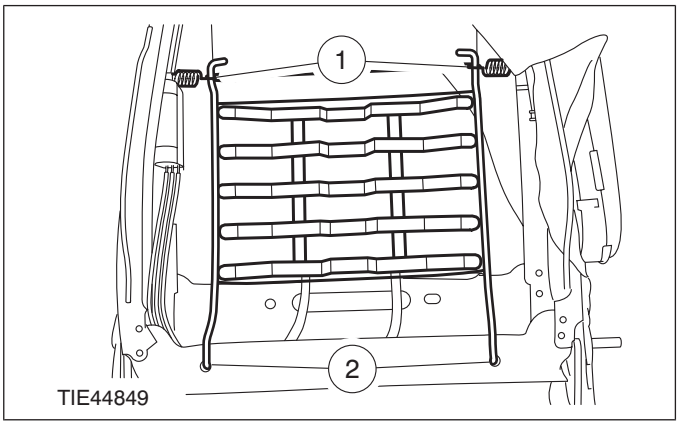
1. Detach the front seat backrest lumbar support adjuster from the front seat backrest frame.

- Remove the screws.



2. Remove the front seat backrest lumbar support.

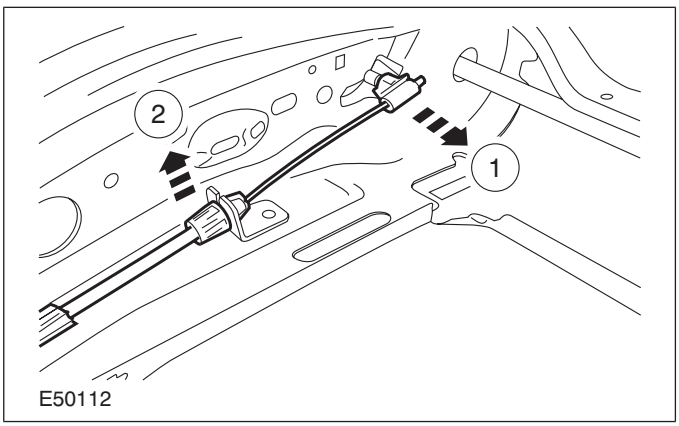
1. Detach the retaining springs.
2. Detach the retaining tangs.



Item 3 Front seat backrest release lever cable assembly

1. Detach the front seat backrest release lever cables from the lower end of the front seat backrest on both sides.

1. Detach the inner cable from the release catch.
2. Detach the outer cable from the front seat backrest frame.



DISASSEMBLY AND ASSEMBLY

Item 6 Front seat backrest frame

1. **Detach the front seat track release cable from the lower end of the front seat backrest frame.**



Assembly Details

Item 6 Front seat backrest frame

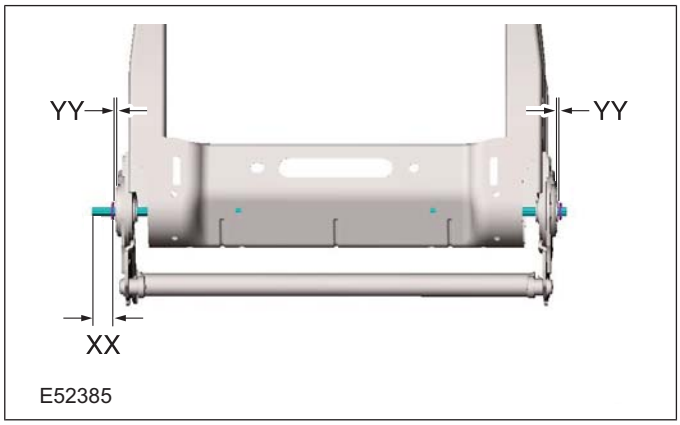
CAUTION: After installation check for correct operation of the front seat track release cable.

Failure to follow this instruction may result in personal injury.

1. **NOTE: If installing a new front seat backrest frame that is equipped with a front seat backrest recliner handwheel, the front seat backrest recliner handwheel drive shaft is to be aligned.**

   Align the front seat backrest recliner handwheel drive shaft.

   - Front seat backrest recliner handwheel drive shaft end protusion at the outer side of the backrest frame XX = 25 mm.
   - Clearance between the front seat backrest frame and the front seat backrest recliner handwheel drive shaft retaining clips YY = 2 mm.



Item 1 Front seat backrest pad

WARNING: Side air bag deployment may be impaired if the front seat backrest pad and anti-squeak mat are not correctly positioned around the side air bag module.

DISASSEMBLY AND ASSEMBLY

Front Seat Backrest — 4-Door/5-Door/Wagon

WARNING: Note the position of the wiring harnesses, to aid installation. An incorrectly routed wiring harness could become damaged when the front seat is moved. Failure to follow this instruction may result in personal injury.

1. **Remove the side air bag module.**

   For additional information, refer to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation).

2. **Disassemble the components in the order indicated in the following illustration(s) and table(s).**



DISASSEMBLY AND ASSEMBLY

Item	Description
1	Front seat backrest pad See Disassembly Detail See Assembly Detail
2	Front seat backrest lumbar support (if equipped) See Disassembly Detail
3	Front seat backrest recliner motor (if equipped) See Disassembly Detail See Assembly Detail
4	Front seat backrest frame retaining bolts
5	Front seat frame
6	Front seat backrest frame See Assembly Detail

3. To assemble, reverse the disassembly procedure.

Disassembly Details

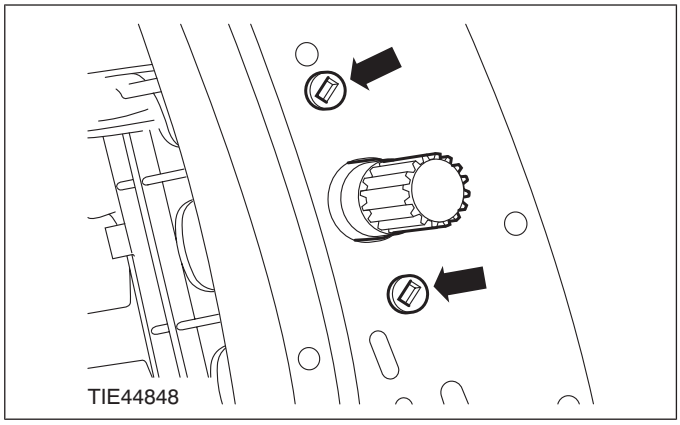
Item 1 Front seat backrest pad

NOTE: Note the position of the front seat backrest anti-squeak mat to aid assembly.

Item 2 Front seat backrest lumbar support (if equipped)

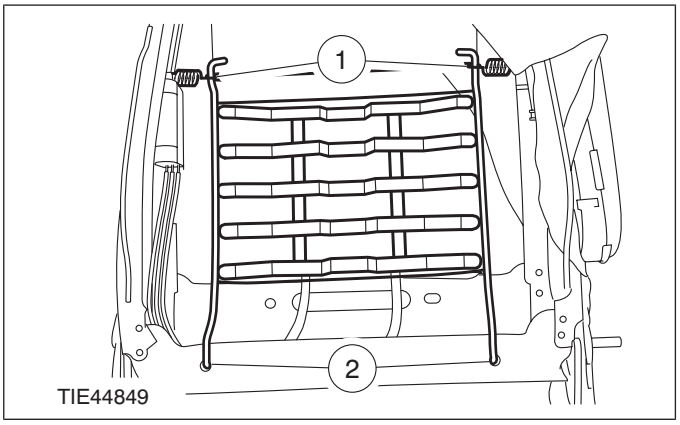
1. Detach the front seat lumbar support adjuster from the front seat backrest frame.

- Remove the screws.



2. Remove the front seat backrest lumbar support.

1. Detach the retaining springs.
2. Detach the retaining tangs.



Item 3 Front seat backrest recliner motor (if equipped)

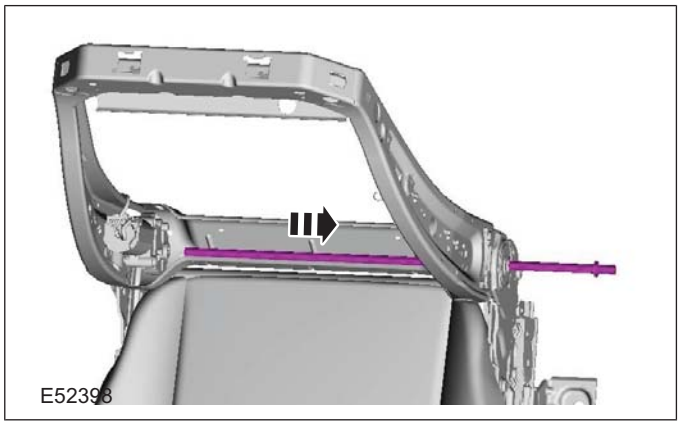
1. Remove the front seat backrest recliner motor drive shaft inner retaining clip.

- Discard the retaining clip.

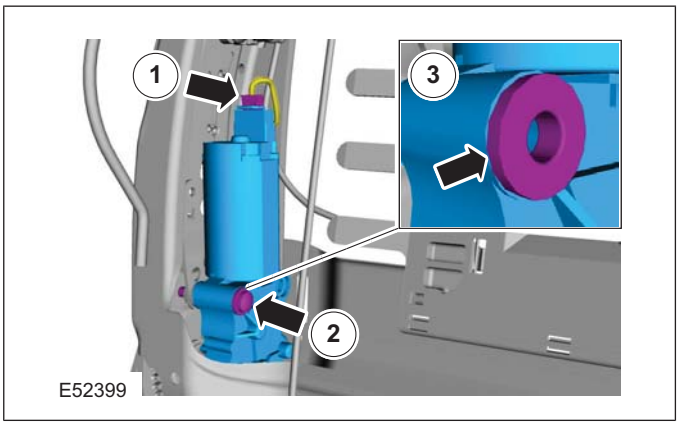


DISASSEMBLY AND ASSEMBLY

2. **Detach the front seat backrest recliner motor drive shaft from the motor.**



1. Disconnect the electrical connector.
2. Remove the retaining bolt.
3. Remove the retaining bolt bushes.



3. **Remove the front seat backrest recliner motor.**

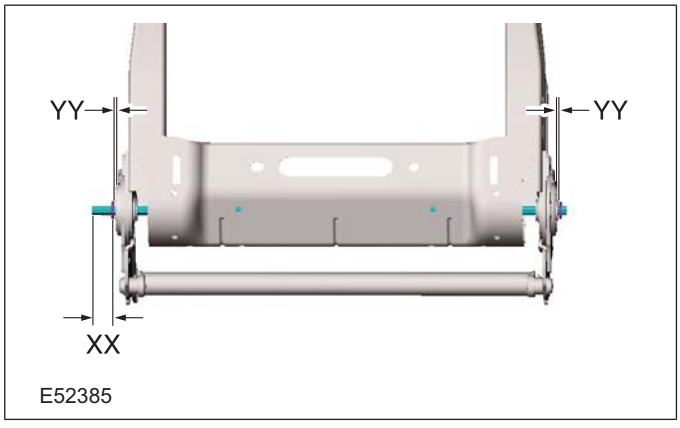
Assembly Details

Item 6 Front seat backrest frame

1. **NOTE: If installing a new front seat backrest frame that is equipped with a front seat backrest recliner handwheel, the front seat backrest recliner handwheel drive shaft is to be aligned.**

   Align the front seat backrest recliner handwheel drive shaft.

   - Front seat backrest recliner handwheel drive shaft end protusion at the outer side of the backrest frame XX = 25 mm.
   - Clearance between the front seat backrest frame and the front seat backrest recliner handwheel drive shaft retaining clips YY = 2 mm.



Item 3 Front seat backrest recliner motor (if equipped)

NOTE: Install a new front seat backrest recliner motor drive shaft inner retaining clip.

Item 1 Front seat backrest pad

WARNING: Side air bag deployment may be impaired if the front seat backrest pad and anti-squeak mat are not correctly positioned around the side air bag module. Failure to follow this instruction may result in personal injury.

SECTION 501-11 Glass, Frames and Mechanisms

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Lubricants, Fluids, Sealers and Adhesives

	Specifications
Cleaner	WSK-M2G342-A
Primer	WSK-M2G343-A
2K Adhesive	WSK-M11P57-A
2K Hardener	WSK-M2G322-B2

Torque Specifications

Item	Nm	lb-ft	lb-in
Door window regulator motor retaining screws	6	-	53
Front door window regulator motor retaining screws - Convertible	6	-	53
Front door window regulator upper retaining screws - Convertible	6	-	53
Front door window regulator lower retaining screws - Convertible	12	9	-
Door inner panel retaining screws	8	-	71
Door latch retaining screws	8	-	71
Door window glass clamp retaining bolts	8	-	71
Front door window glass clamp retaining screws - Convertible	5	-	44
Rear quarter window glass clamp retaining screws - Convertible	5	-	44
Rear quarter window regulator upper retaining screw - Convertible	6	-	53
Rear quarter window regulator upper retaining nut - Convertible	6	-	53
Rear quarter window regulator lower retaining nuts - Convertible	12	9	-
Windshield wiper arm retaining nut	15	11	-
Heated windshield glass ground cable retaining nut	11	8	-

DESCRIPTION AND OPERATION

Glass, Frames and Mechanisms

Fixed Glass

Fixed window glass is directly glazed to the window opening flange by means of a polyurethane (PU) adhesive bead. In addition to fixing the glass to the opening flange, the adhesive bead also forms a water tight seal around the inner edge of the glass.

All vehicles have a heated rear window, a heated windshield is available as an option.

Moving Glass - 3-Door, 4-Door, 5-Door and Wagon

The front power windows have a one-touch down and a one-touch up function, combined with anti-trap protection, which is active whenever the window is closing. The anti-trap function will automatically deactivate if operated more than twice consecutively. The anti-trap function will reset automatically when the window is closed, after 10 seconds, or if the ignition is switched OFF then ON.

Front power windows are installed as standard.

Global closing of the front power windows is standard. Global closing on the front power windows can only be operated by using the remote key.

Rear power windows do not have anti-trap functionality and are not part of global closing.

Vehicles equipped with front and rear power windows require an initialization process to be carried out on each window motor. The initialization process is carried out before the vehicle leaves the production plant. However the initialization process will need to be carried out again whenever the power supply has been disconnected.

The multiple switch on the driver door incorporates a safety switch which, when operated, prevents the rear power windows from being opened by the rear power window switches. However, the rear power windows can still be operated from the driver switch.

Moving Glass - Convertible

The front power windows have a one-touch down and a one-touch up function, combined with anti-trap protection, which is active whenever the window is closing. The anti-trap function will automatically deactivate if operated more than twice consecutively. The anti-trap function will reset automatically when the window is closed, after 10 seconds, or if the ignition is switched OFF then ON.

Front and rear quarter power windows are installed as standard.

Global closing of the front power windows is standard. Global closing on the front power windows can only be operated by using the remote key.

Rear quarter power windows do not have anti-trap functionality and are not part of global closing.

Vehicles require an initialization process to be carried out on each window motor. The initialization process is carried out before the vehicle leaves the production plant. However the initialization process will need to be carried out again whenever the power supply has been disconnected.

The multiple switch on the driver door incorporates a safety switch which, when operated, prevents the rear quarter power windows from being opened by the rear quarter power window switches. However, the rear quarter power windows can still be operated from the driver switch.

When the convertible roof is opened, the front and rear quarter power windows have a drop movement. When the convertible roof is closed, the front and rear quarter power windows move upwards to a fully closed position after the convertible roof has locked.

DIAGNOSIS AND TESTING

Glass, Frames and Mechanisms — Vehicles Without: Global Closing

Refer to Wiring Diagrams Section 501-11, for schematic and connector information.

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
• Window seal • Door window frame	• Fuse(s) • Electrical connector(s) • Switch(es) • Grid wire(s) • Circuit(s)

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.

Symptom Chart

Symptom Chart

Symptom	Possible Sources	Action
• All power windows are inoperative - front power windows	• Circuit(s).	• GO to Pinpoint Test A.
• The left or right power window is inoperative - driver side	• Driver side power window control switch.	• CARRY OUT the Driver Side Power Window Control Switch Component Test. REFER to the Wiring Diagrams.
	• Driver side front door window regulator motor. • Circuit(s).	• GO to Pinpoint Test B.
• The left or right power window is inoperative - passenger side	• Passenger side power window control switch.	• CARRY OUT the Passenger Side Power Window Control Switch Component Test. REFER to the Wiring Diagrams.
	• Driver side power window control switch.	• CARRY OUT the Driver Side Power Window Control Switch Component Test. REFER to the Wiring Diagrams.
	• Passenger side front door window regulator motor. • Circuit(s).	• GO to Pinpoint Test C.
• The one-touch down feature is inoperative - front power windows	• Driver side power window control switch.	• CARRY OUT the Driver Side Power Window Control Switch Component Test. REFER to the Wiring Diagrams.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• The defrost system is inoperative	• Central Junction Box (CJB).	• For additional information, REFER to WDS.
	• Heated windshield glass relay.	• For additional information, REFER to WDS.
	• Heated windshield glass control switch.	• CARRY OUT the Heated Windshield Glass Control Switch Component Test. REFER to the Wiring Diagrams.
	• Heated rear window glass relay.	• For additional information, REFER to WDS.
	• Heated rear window glass control switch.	• CARRY OUT the Heated Rear Window Glass Control Switch Component Test. REFER to the Wiring Diagrams.
	• Heated rear window glass grid wire. • Circuit(s).	• For additional information, REFER to WDS.
• The defrost system will not shut off automatically	• Central Junction Box (CJB). • Heated windshield glass relay. • Heated rear window glass relay.	• For additional information, REFER to WDS.

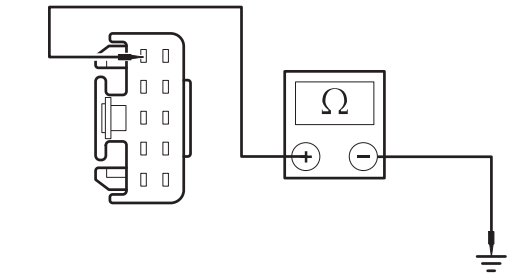
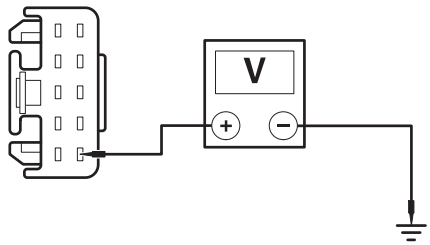
Pinpoint Tests

NOTE: Use a digital multimeter for all electrical measurements.

PINPOINT TEST A : ALL POWER WINDOWS ARE INOPERATIVE - FRONT POWER WINDOWS

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: CHECK FOR VOLTAGE TO THE POWER WINDOW CONTROL SWITCHES	
	1 Ignition switch in position II. • Do the power window control switch LEDs illuminate? → **Yes** VERIFY the customer concern. → **No** GO to A2.
A2: CHECK FOR CONTINUITY BETWEEN THE DRIVER SIDE POWER WINDOW CONTROL SWITCH AND GROUND	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Power Window Control Switch C488.

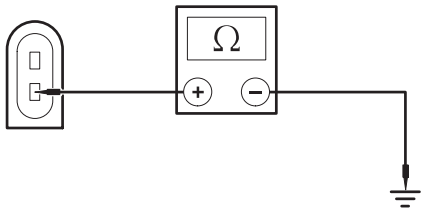
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0023402	3 Measure the resistance between the driver side power window control switch C488 pin 1, circuit 31-AJ7 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to A3. → **No** REPAIR circuit 31-AJ7 (BK). TEST the system for normal operation.
A3: CHECK FOR VOLTAGE TO THE DRIVER SIDE POWER WINDOW CONTROL SWITCH	
	1 Ignition switch in position II.
 TIE0023403	2 Measure the voltage between the driver side power window control switch C488 pin 10, circuit 15-AJ7 (GN/BU), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** VERIFY the customer concern. → **No** REPAIR circuit 15-AJ7 (GN/BU). TEST the system for normal operation.

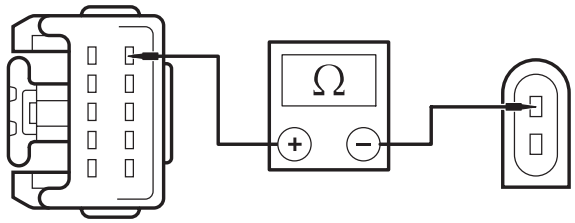
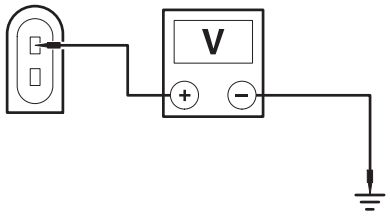
PINPOINT TEST B : THE LEFT OR RIGHT POWER WINDOW IS INOPERATIVE - DRIVER SIDE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Use a digital multimeter for all electrical measurements.	
B1: CHECK FOR VOLTAGE TO THE DRIVER SIDE POWER WINDOW CONTROL SWITCH	
	1 Ignition switch in position II. • Does the driver side power window control switch LED illuminate? → **Yes** Left-hand drive vehicles – 3-door or right-hand drive vehicles – 4-door/5-door GO to B2. Left-hand drive vehicles – 4-door/5-door or right-hand drive vehicles – 3-door GO to B5. → **No** GO to B8.

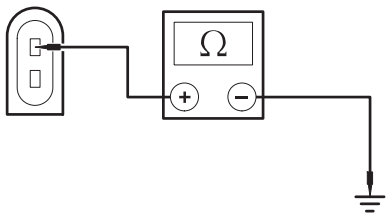
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B2: CHECK FOR CONTINUITY BETWEEN THE DRIVER SIDE FRONT DOOR WINDOW REGULATOR MOTOR AND GROUND - LEFT-HAND DRIVE VEHICLES 3-DOOR AND RIGHT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Front Door Window Regulator Motor C782 or Driver Side Front Door Window Regulator Motor C783.
 TIE0010881	3 Measure the resistance between the: Left-hand drive vehicles – 3-door • Driver side front door window regulator motor C782 pin 2, circuit 33-AJ26B (YE), harness side and ground. Right-hand drive vehicles – 4-door/5-door • Driver side front door window regulator motor C783 pin 2, circuit 33-AJ26A (YE), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to B3. → **No** REPAIR circuit 33-AJ26A (YE) or circuit 33-AJ26B (YE). TEST the system for normal operation.
B3: CHECK FOR CONTINUITY BETWEEN THE DRIVER SIDE WINDOW CONTROL SWITCH AND THE DRIVER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 3-DOOR AND RIGHT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR	
	1 Disconnect Driver Side Power Window Control Switch C488.

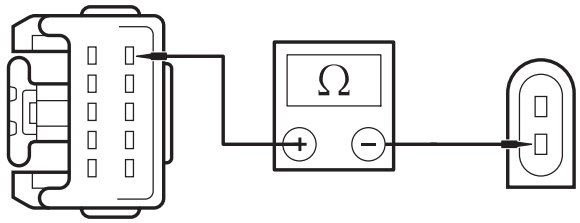
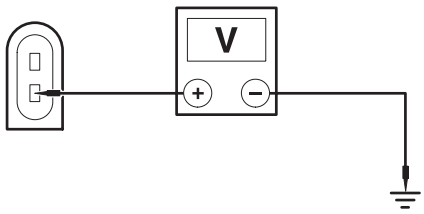
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E52014	2 Measure the resistance between the: Left-hand drive vehicles – 3-door • Driver side power window control switch, C488 pin 6, circuit 32-AJ26B (WH), harness side and the driver side front door window regulator motor C782 pin 1, circuit 32-AJ26B (WH) harness side. Right-hand drive vehicles – 4-door/5-door • Driver side power window control switch, C488 pin 6, circuit 32-AJ26A (WH), harness side and the driver side front door window regulator motor C783 pin 1, circuit 32-AJ26A (WH), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to B4. → **No** REPAIR circuit 32-AJ26A (WH) or circuit 32-AJ26B (WH). TEST the system for normal operation.
B4: CHECK FOR VOLTAGE TO THE DRIVER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 3-DOOR AND RIGHT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR	
	1 Connect Driver Side Power Window Control Switch C488. 2 Ignition switch in position II. 3 Operate the driver side power window control switch to the DOWN position.
 TIE0029413	4 Measure the voltage between the: Left-hand drive vehicles – 3-door • Driver side front door window regulator motor C782 pin 1, circuit 32-AJ26B (WH), harness side and ground. Right-hand drive vehicles – 4-door/5-door • Driver side front door window regulator motor C783 pin 1, circuit 32-AJ26A (WH), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** Install a new driver side front door window regulator motor. TEST the system for normal operation. → **No** Install a new driver side power window control switch. TEST the system for normal operation.

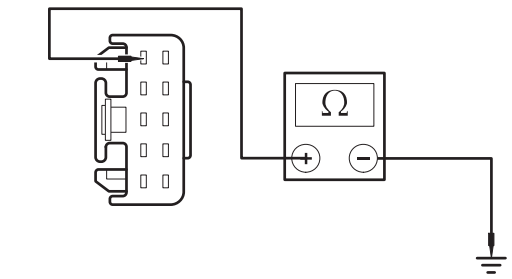
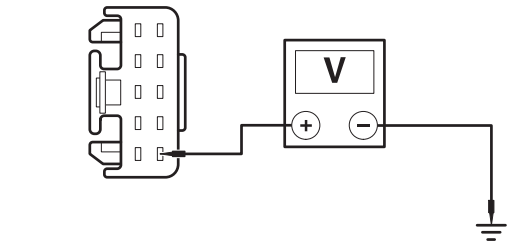
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B5: CHECK FOR CONTINUITY BETWEEN THE DRIVER SIDE FRONT DOOR WINDOW REGULATOR MOTOR AND GROUND - LEFT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR AND RIGHT-HAND DRIVE VEHICLES 3-DOOR	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Front Door Window Regulator Motor C782 or Driver Side Front Door Window Regulator Motor C783.
 TIE0014344	3 Measure the resistance between the: Left-hand drive vehicles – 4-door/5-door • Driver side front door window regulator motor C782 pin 1, circuit 33-AJ26 (YE), harness side and ground. Right-hand drive vehicles – 3-door • Driver side front door window regulator motor C783 pin 1, circuit 33-AJ26C (YE), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to B6. → **No** REPAIR circuit 33-AJ26 (YE) or circuit 33-AJ26C (YE). TEST the system for normal operation.
B6: CHECK FOR CONTINUITY BETWEEN THE DRIVER SIDE POWER WINDOW CONTROL SWITCH AND THE DRIVER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR AND RIGHT-HAND DRIVE VEHICLES 3-DOOR	
	1 Disconnect Driver Side Power Window Control Switch C488.

DIAGNOSIS AND TESTING

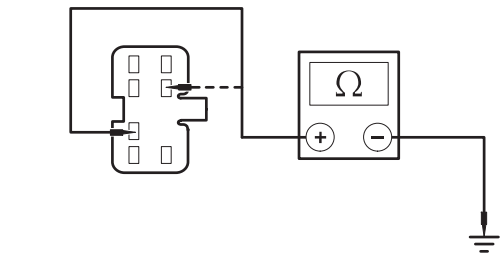
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E52015	2 Measure the resistance between the: Left-hand drive vehicles – 4-door/5-door • Driver side power window control switch, C488 pin 6, circuit 32-AJ26 (WH), harness side and the driver side front door window regulator motor C782 pin 2, circuit 32-AJ26 (WH) harness side. Right-hand drive vehicles – 3-door • Driver side power window control switch, C488 pin 6, circuit 32-AJ26B (WH), harness side and the driver side front door window regulator motor C783 pin 2, circuit 32-AJ26B (WH), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to B7. → **No** REPAIR circuit 32-AJ26A (WH) or circuit 32-AJ26B (WH). TEST the system for normal operation.
B7: CHECK FOR VOLTAGE TO THE DRIVER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR AND RIGHT-HAND DRIVE VEHICLES 3-DOOR	
	1 Connect Driver Side Power Window Control Switch C488.
	2 Ignition switch in position II.
	3 Operate the driver side power window control switch to the DOWN position.
 E0024115	4 Measure the voltage between the: Left-hand drive vehicles – 4-door/5-door • Driver side front door window regulator motor C782 pin 2, circuit 32-AJ26 (WH), harness side and ground. Right-hand drive vehicles – 3-door • Driver side front door window regulator motor C783 pin 2, circuit 32-AJ26C (WH), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** Install a new driver side front door window regulator motor. TEST the system for normal operation. → **No** Install a new driver side power window control switch. TEST the system for normal operation.

DIAGNOSIS AND TESTING

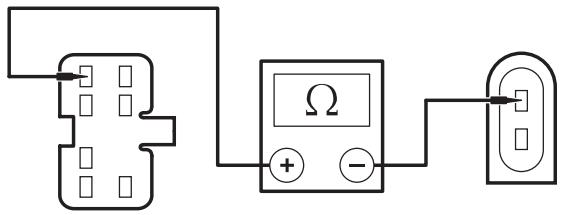
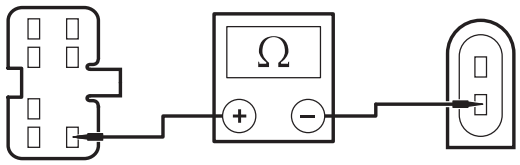
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B8: CHECK THE DRIVER SIDE POWER WINDOW CONTROL SWITCH FOR CONTINUITY TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Power Window Control Switch C488.
 TIE0023402	3 Measure the resistance between the driver side power window control switch C488 pin 1, circuit 31-AJ7 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to B9. → **No** REPAIR circuit 31-AJ7 (BK). TEST the system for normal operation.
B9: CHECK FOR VOLTAGE TO THE DRIVER SIDE POWER WINDOW CONTROL SWITCH	
	1 Ignition switch in position II.
 TIE0023403	2 Measure the voltage between the driver side power window control switch C488 pin 10, circuit 15-AJ7 (GN/BU), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** VERIFY the customer concern. → **No** REPAIR circuit 15-AJ7 (GN/BU). TEST the system for normal operation.

DIAGNOSIS AND TESTING

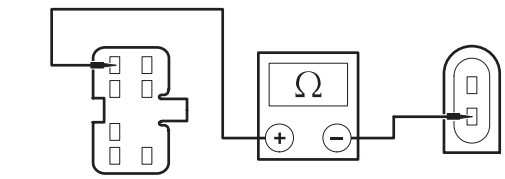
PINPOINT TEST C : THE LEFT OR RIGHT POWER WINDOW IS INOPERATIVE - PASSENGER SIDE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Use a digital multimeter for all electrical measurements.	
C1: CHECK FOR VOLTAGE TO THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH	
	1 Ignition switch in position II. • Does the passenger side power window control switch LED illuminate? → **Yes** GO to C2. → **No** GO to C7.
C2: CHECK THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH GROUND CIRCUITS	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Power Window Control Switch C489.
 TIE0014346	3 Measure the resistance between the: • Passenger side power window control switch C489 pin 3, circuit 32-AJ18 (WH/VT), harness side and ground. • Passenger side power window control switch C489 pin 6, circuit 33-AJ18 (YE/VT), harness side and ground. • Are the resistances less than 5 ohms? → **Yes** Left-hand drive vehicles – 3-door or right-hand drive vehicles – 4-door/5-door GO to C3. Left-hand drive vehicles – 4-door/5-door or right-hand drive vehicles – 3-door GO to C5. → **No** Repair circuit 32-AJ18 (WH/VT) or circuit 33-AJ18 (YE/VT). TEST the system for normal operation.
C3: CHECK FOR CONTINUITY BETWEEN THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH DOWN CIRCUIT AND THE PASSENGER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 3-DOOR AND RIGHT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR	
	1 Disconnect Passenger Side Front Door Window Regulator Motor C782 or Passenger Side Front Door Window Regulator Motor C783.

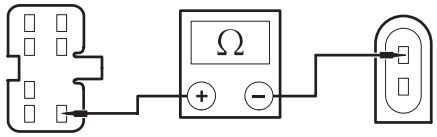
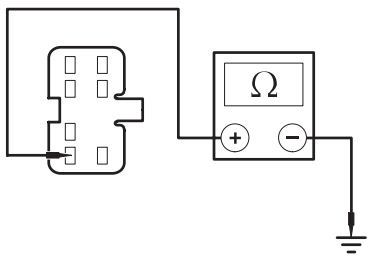
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E51963	2 Measure the resistance between the: Left-hand drive vehicles – 3-door • Passenger side power window control switch C489 pin 1, circuit 33-AJ17B (YE/VT), harness side and the passenger side front door window regulator motor C783 pin 1, circuit 33-AJ17B (YE/VT), harness side. Right-hand drive vehicles – 4-door/5-door • Passenger side power window control switch C489 pin 1, circuit 33-AJ17A (YE/VT), harness side and the passenger side front door window regulator motor C782 pin 1, circuit 33-AJ17A (YE/VT), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to C4. → **No** REPAIR circuit 33-AJ17A (YE/VT) or circuit 33-AJ17B (YE/VT). TEST the system for normal operation.
C4: CHECK FOR CONTINUITY BETWEEN THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH UP CIRCUIT AND THE PASSENGER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 3-DOOR AND RIGHT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR	
 E51964	1 Measure the resistance between the: Left-hand drive vehicles – 3-door • Passenger side power window control switch C489 pin 7, circuit 32-AJ17B (WH/VT), harness side and the passenger side front door window regulator motor C783 pin 2, circuit 32-AJ17B (WH/VT), harness side. Right-hand drive vehicles – 4-door/5-door • Passenger side power window control switch C489 pin 7, circuit 32-AJ17A (WH/VT), harness side and the passenger side front door window regulator motor C782 pin 2, circuit 32-AJ17A (WH/VT), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new passenger side front door window regulator motor. TEST the system for normal operation. → **No** REPAIR circuit 32-AJ17A (WH/VT) or circuit 32-AJ17B (WH/VT). TEST the system for normal operation.

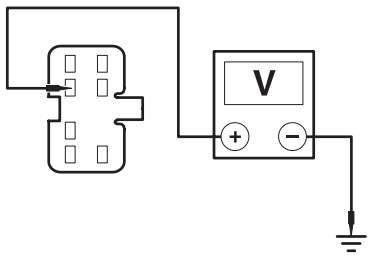
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C5: CHECK FOR CONTINUITY BETWEEN THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH DOWN CIRCUIT AND THE PASSENGER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR AND RIGHT-HAND DRIVE VEHICLES 3-DOOR	
	1 Disconnect Passenger Side Front Door Window Regulator Motor C782 or Passenger Side Front Door Window Regulator Motor C783.
 TIE0014347	2 Measure the resistance between the: Left-hand drive vehicles – 4-door/5-door • Passenger side power window control switch C489 pin 1, circuit 33-AJ17 (YE/VT), harness side and the passenger side front door window regulator motor C783 pin 2, circuit 33-AJ17 (YE/VT), harness side. Right-hand drive vehicles – 3-door • Passenger side power window control switch C489 pin 1, circuit 33-AJ17C (YE/VT), harness side and the passenger side front door window regulator motor C782 pin 2, circuit 33-AJ17C (YE/VT), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to C6. → **No** REPAIR circuit 33-AJ17 (YE/VT) or circuit 33-AJ17C (YE/VT). TEST the system for normal operation.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C6: CHECK FOR CONTINUITY BETWEEN THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH UP CIRCUIT AND THE PASSENGER SIDE FRONT DOOR WINDOW REGULATOR MOTOR - LEFT-HAND DRIVE VEHICLES 4-DOOR/5-DOOR AND RIGHT-HAND DRIVE VEHICLES 3-DOOR	
 TIE0014345	1 Measure the resistance between the: Left-hand drive vehicles – 4-door/5-door • Passenger side power window control switch C489 pin 7, circuit 32-AJ17 (WH/VT), harness side and the passenger side front door window regulator motor C783 pin 1, circuit 32-AJ17 (WH/VT), harness side. Right-hand drive vehicles – 3-door • Passenger side power window control switch C489 pin 7, circuit 32-AJ17C (WH/VT), harness side and the passenger side front door window regulator motor C782 pin 1, circuit 32-AJ17C (WH/VT), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new passenger side front door window regulator motor. TEST the system for normal operation. → **No** REPAIR circuit 32-AJ17 (WH/VT) or circuit 32-AJ17C (WH/VT). TEST the system for normal operation.
C7: CHECK THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH GROUND CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Power Window Control Switch C489.
 TIE0014349	3 Measure the resistance between the passenger side power window control switch C489 pin 4, circuit 31-LH31 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to C8. → **No** REPAIR circuit 31-LH31 (BK). TEST the system for normal operation.
C8: CHECK FOR VOLTAGE TO THE PASSENGER SIDE POWER WINDOW CONTROL SWITCH	
	1 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0014348	2 Measure the voltage between the passenger side power window control switch C489 pin 2, circuit 15-AJ18 (GN/WH), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** VERIFY the customer concern. → **No** REPAIR circuit 15-AJ18 (GN/WH). TEST the system for normal operation.

DIAGNOSIS AND TESTING

Glass, Frames and Mechanisms — Vehicles With: Global Closing

Refer to Wiring Diagrams Section 501-11, for schematic and connector information.

General Equipment

Worldwide diagnostic system (WDS)

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
• Window seal • Door window frame	• Fuse(s) • Electrical connector(s) • Switch(es) • Circuit(s)

3. Initialize the door window motors.

   REFER to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).
4. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
5. If the cause is not visually evident, verify the symptom and refer to WDS.

GENERAL PROCEDURES

Door Window Motor Initialization

WARNING: The door window anti-trap function will not operate during the door window motor initialization procedure. Make sure that the door window opening is free of all foreign material. Failure to follow this instruction may result in personal injury.

NOTE: After the battery has been disconnected it is necessary to initialize each door window motor separately.

NOTE: If a single door window motor has been disconnected, it is necessary to initialize that door window motor.

NOTE: If the fuse for a front or rear door window motor has been disconnected, it is necessary to initialize that door window motor.

NOTE: If the battery junction box (BJB) fuse for the front power windows has been disconnected, it is necessary to initialize both front door window motors.

NOTE: If the battery junction box (BJB) fuse for the rear power windows has been disconnected, it is necessary to initialize both rear door window motors.

NOTE: Leave a period of at least one minute before connecting the battery, fuse or door window motor(s).

All vehicles

1. **Press and hold the power window control switch close button until the door window is fully closed.**
2. **Release the power window control switch close button and press again for three seconds.**
3. **Briefly press the power window control switch open button to the second detent and release the button.**
   - The door window should open automatically.
4. **Briefly press the power window control switch close button to the second detent and release the button.**
   - If the door window does not close automatically, repeat the complete procedure.
5. **Repeat the door window motor initialization for each door window motor.**

Convertible

6. **Press and hold the convertible top switch CLOSE button until the convertible top is fully closed. Hold the switch closed for three seconds.**

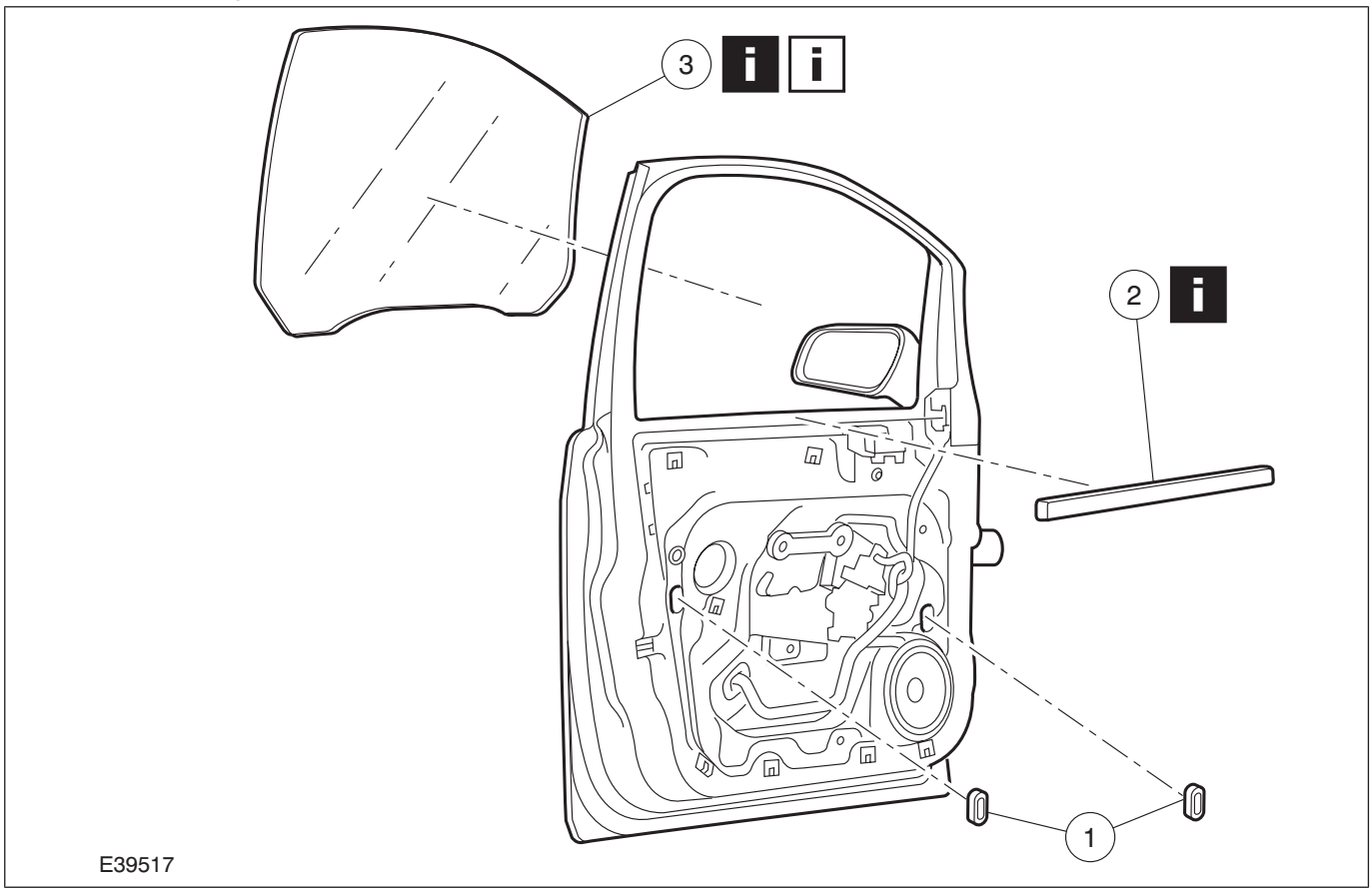
REMOVAL AND INSTALLATION

Front Door Window Glass

1. Remove the front door trim panel. For additional information, refer to: (501-05 Interior Trim and Ornamentation)

   Front Door Trim Panel - 3-Door (Removal and Installation),
   Front Door Trim Panel - 4-Door/5-Door/Wagon (Removal and Installation).

2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Front door panel grommets
2	Front door interior weatherstrip See Removal Detail
3	Front door window glass See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.

Removal Details

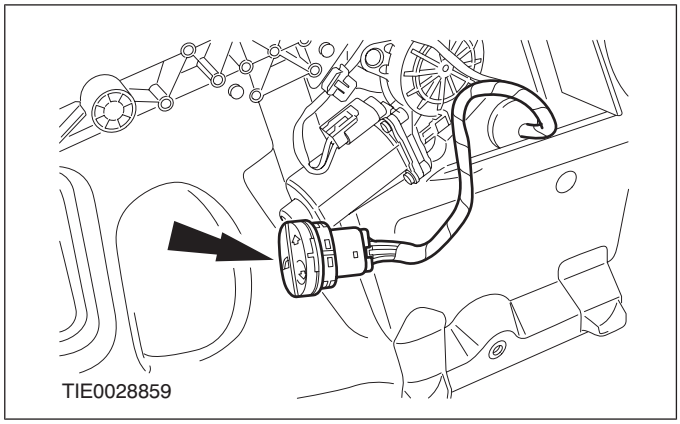
Item 2 Front door interior weatherstrip

CAUTION: To avoid damage, care must be taken when removing the front door interior weatherstrip.

REMOVAL AND INSTALLATION

Item 3 Front door window glass

1. **Connect the front door power window control switch electrical connector.**

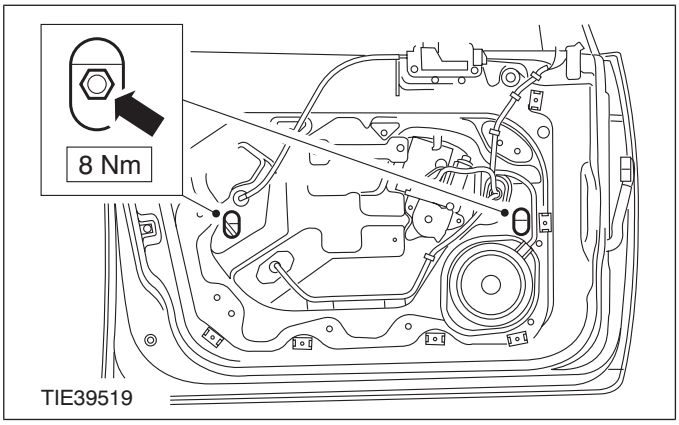


2. **Connect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

3. **Loosen the front door window glass clamp retaining bolts by two turns.**

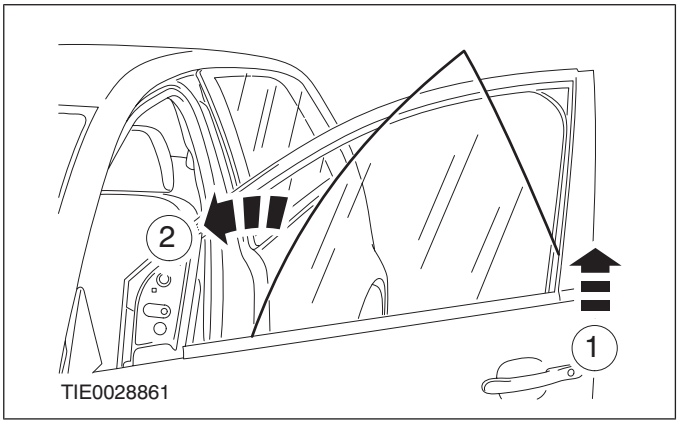
- Align the front door window glass clamp retaining bolts with the access holes.



4. **NOTE: The front door window glass must be removed towards the outside of the window opening.**

   Remove the front door window glass.

   1. Lift the front door window glass.
   2. Tip the front door window glass forwards and remove it from the front door.



Installation Details

Item 3 Front door window glass

NOTE: The front door window glass must be installed from the outside of the window opening.

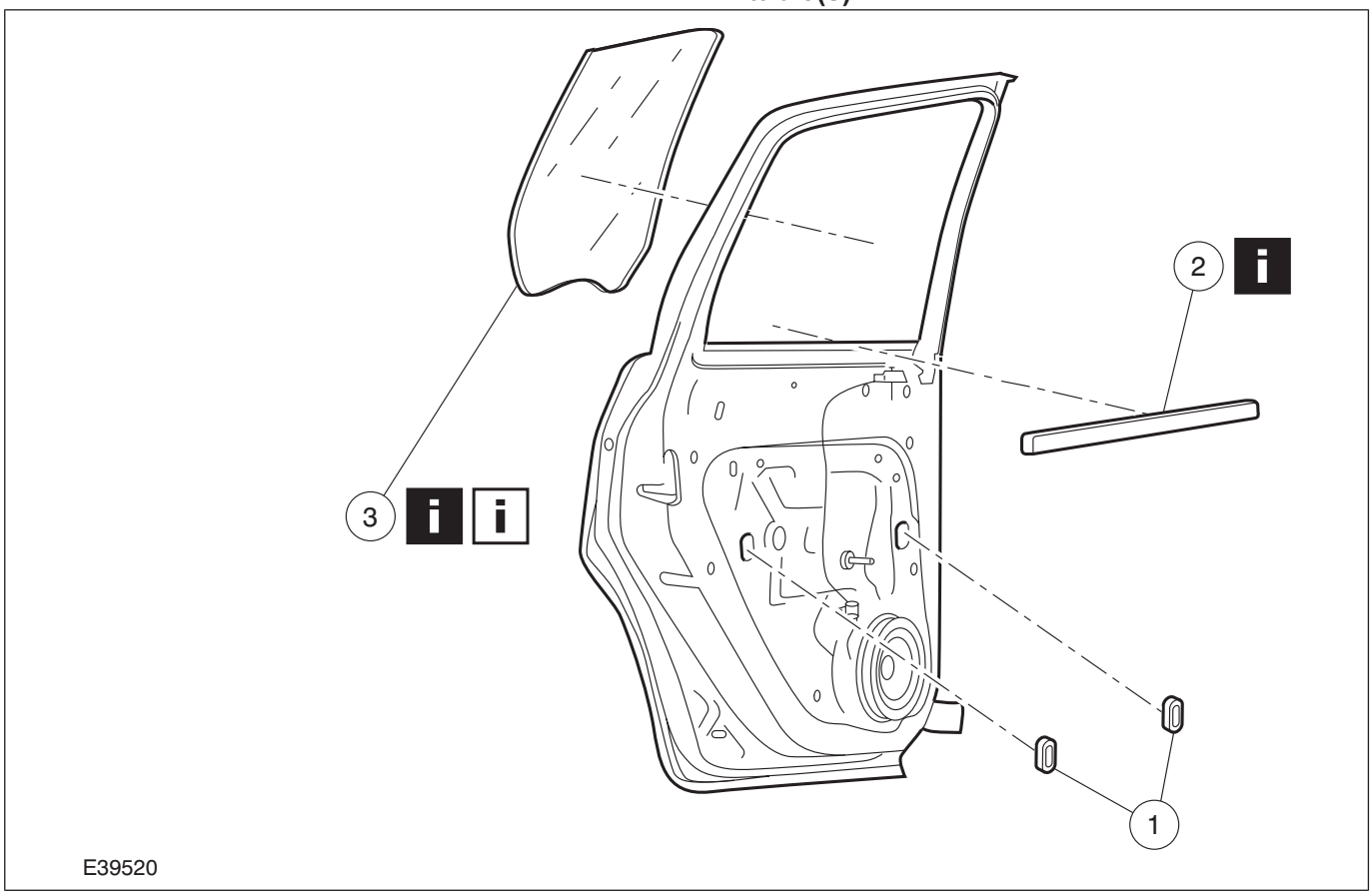
REMOVAL AND INSTALLATION

Rear Door Window Glass — Vehicles With: Manual Windows

1. Remove the rear door trim panel.

   For additional information, refer to: Rear Door Trim Panel - Vehicles With: Manual Windows (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Grommets
2	Interior weatherstrip See Removal Detail
3	Window glass See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.

Removal Details

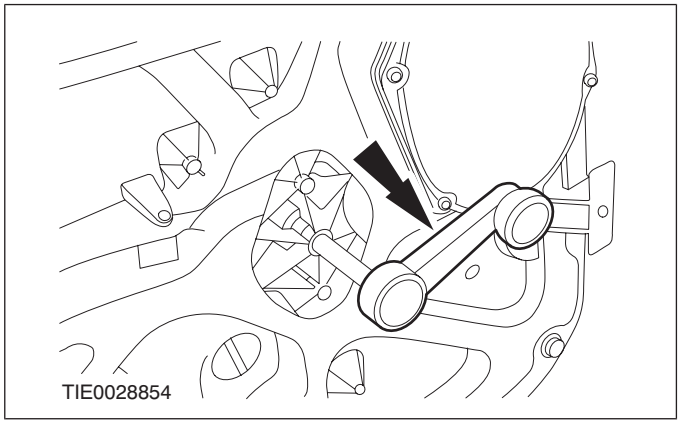
Item 2 Interior weatherstrip

CAUTION: Carefully remove the interior weatherstrip to avoid damage.

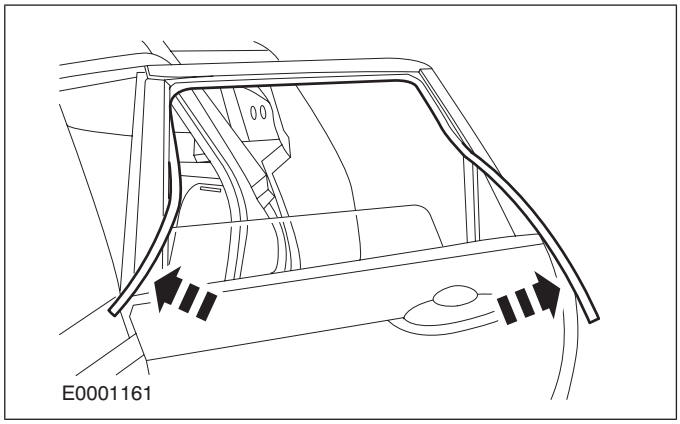
REMOVAL AND INSTALLATION

Item 3 Window glass

1. **Install the window regulator handle.**

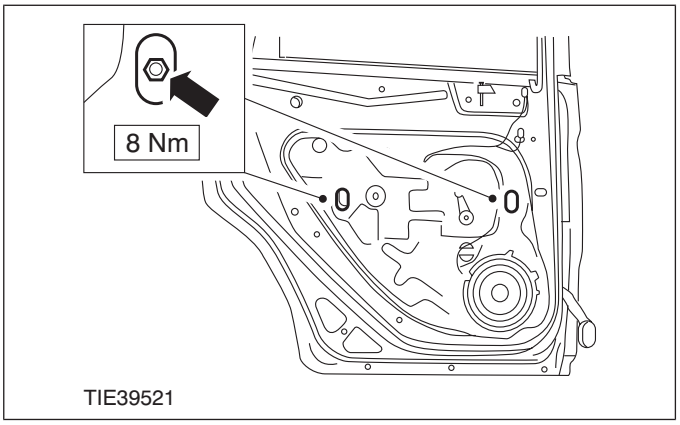


2. **Fully lower the window glass.**
3. **Position the lower part of the door glass top run outside the door.**



4. **Loosen the rear door window glass clamp retaining bolts two complete turns.**

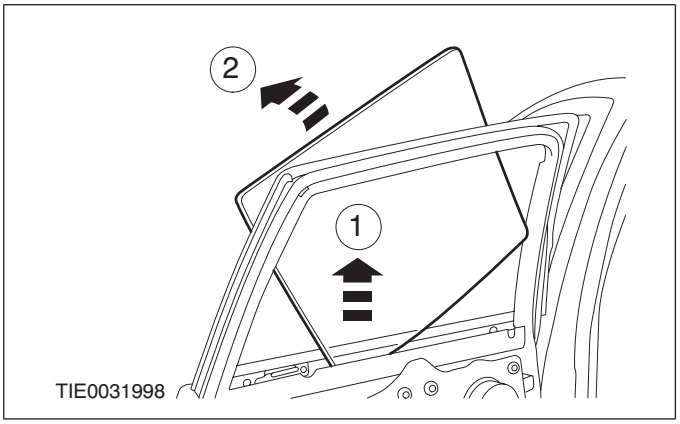
- Align the window glass clamp retaining bolts with the access holes.



5. **NOTE: The rear door window glass must be removed towards the outside of the window opening.**

   Remove the rear door window glass.

   1. Lift the window glass.
   2. Tip the window glass outwards and remove the window glass from the rear door.



Installation Details

Item 3 Window glass

NOTE: The rear door window glass must be installed from the outside of the window opening.

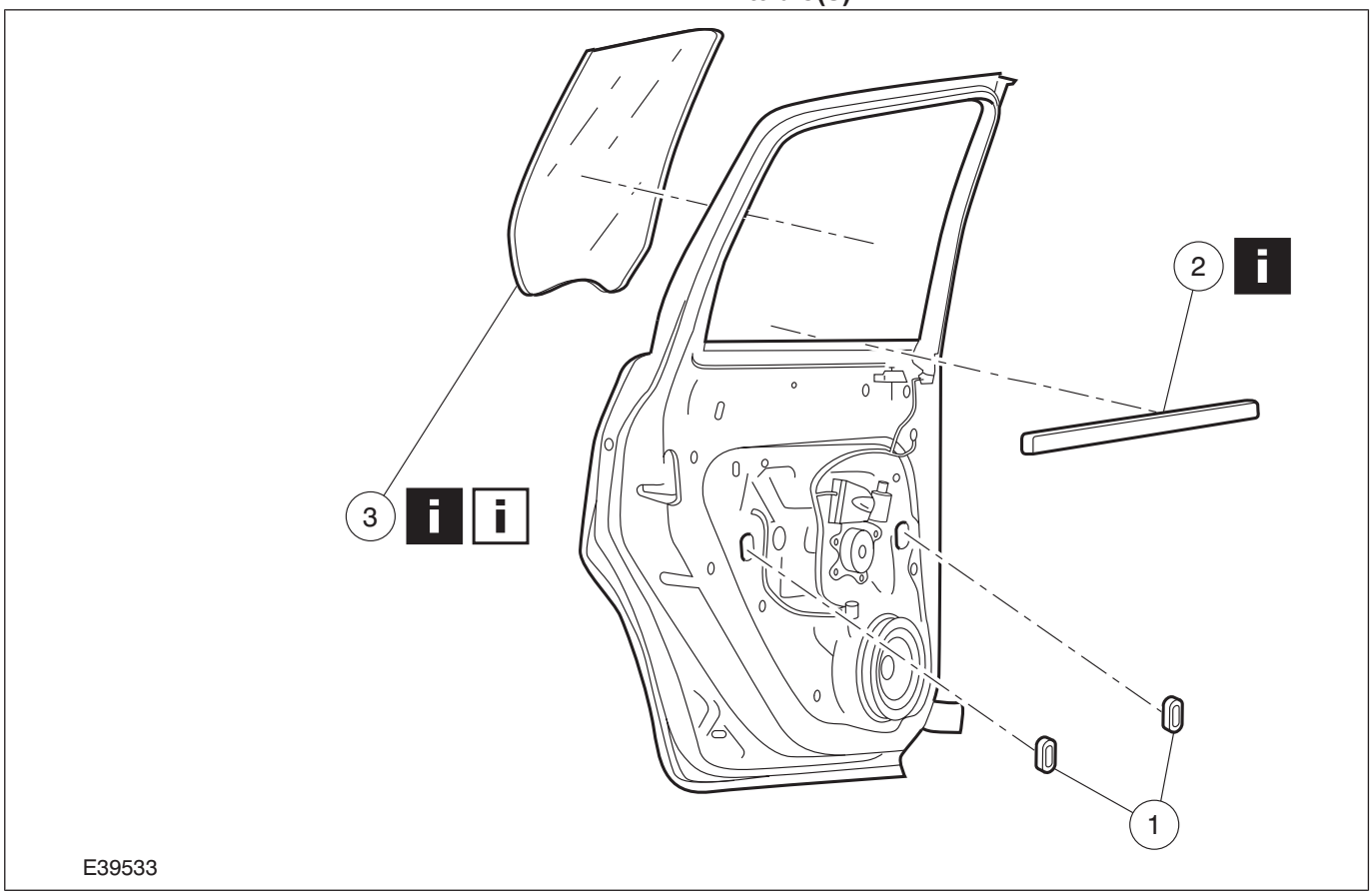
REMOVAL AND INSTALLATION

Rear Door Window Glass — Vehicles With: Power Windows

1. Remove the rear door trim panel.

   For additional information, refer to: Rear Door Trim Panel - Vehicles With: Power Windows (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Grommets
2	Interior weatherstrip See Removal Detail
3	Window glass See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.

Removal Details

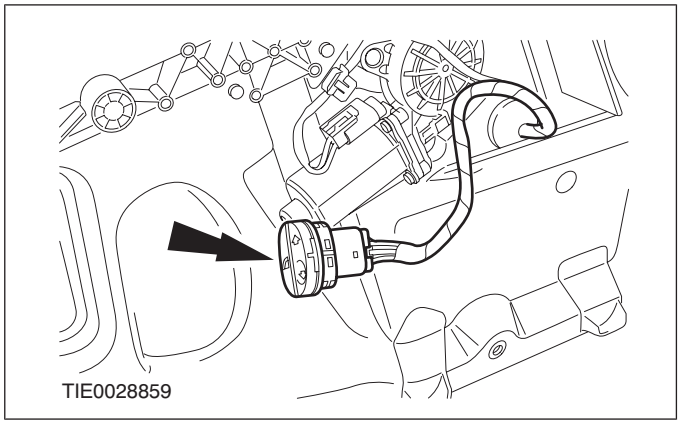
Item 2 Interior weatherstrip

CAUTION: Carefully remove the interior weatherstrip to avoid damage.

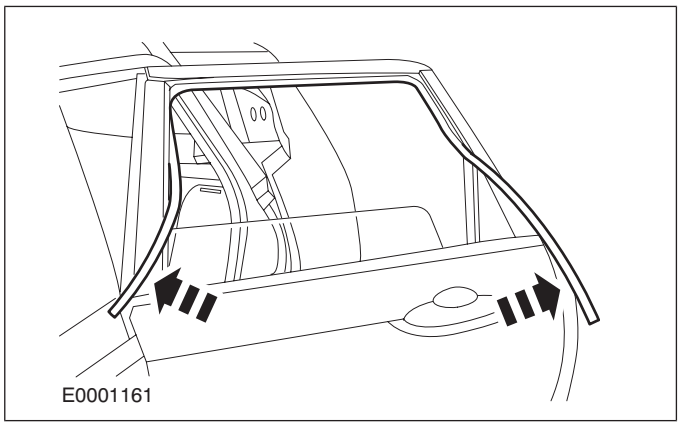
REMOVAL AND INSTALLATION

Item 3 Window glass

1. **Connect the power window control switch electrical connector.**



2. **Fully lower the window glass.**
3. **Position the lower part of the door glass top run outside the door.**



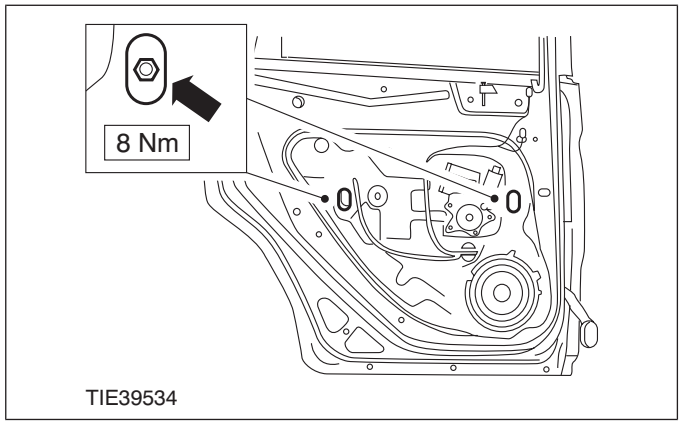
4. **Loosen the rear door window glass clamp retaining bolts two complete turns.**

Installation Details

Item 3 Window glass

NOTE: The rear door window glass must be installed from the outside of the window opening.

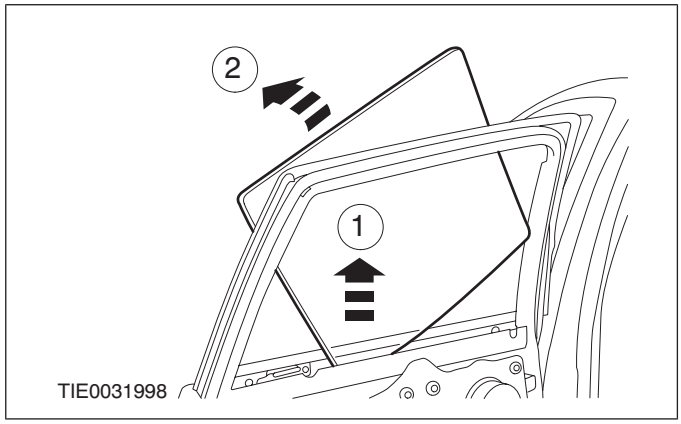
- Align the window glass clamp retaining bolts with the access holes.



5. **NOTE: The rear door window glass must be removed towards the outside of the window opening.**

   Remove the rear door window glass.

   1. Lift the window glass.
   2. Tip the window glass outwards and remove the window glass from the rear door.



REMOVAL AND INSTALLATION

Rear Quarter Window Glass — 3-Door/5-Door(42 514 0)

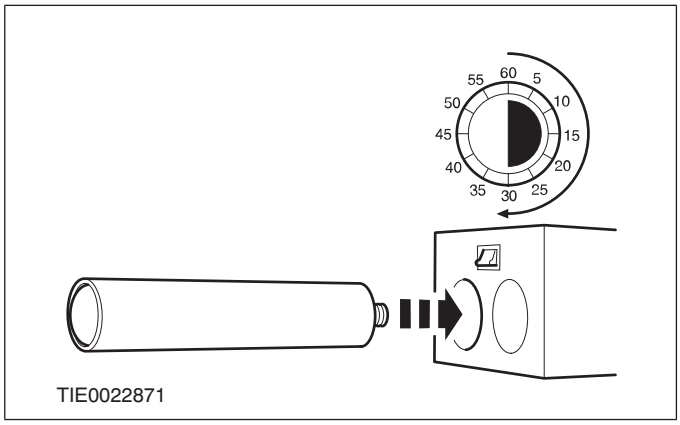
General Equipment

Hot air gun
Direct glazing cutter for bonded glass
Direct glazing adhesive kit
Direct glazing adhesive oven
Glazing suction cups

Removal

All vehicles

1. **Remove the polyurethane (PU) adhesive cap and heat the PU adhesive for a minimum of 30 minutes.**



3-door

2. **Remove the B-pillar trim panel.**

   For additional information, refer to: B-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

3. **WARNING: Wear gloves and eye protection when working with the glass cutting tool as the cutting operation may produce splinters. When using the cutter wear ear protectors. Failure to follow these instructions may result in personal injury.**

CAUTIONS:

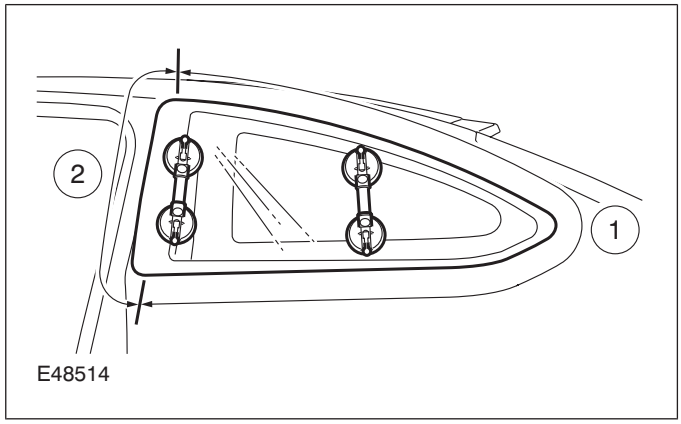
Place a suitable piece of flexible plastic card between the direct glazing cutter blade and vehicle body to avoid damage to the vehicle body when cutting from outside the vehicle.

Make sure the cutting blades are changed where the cutting depth changes to avoid damage to the body and trim panels when cutting from inside the vehicle.

NOTE: Some resistance may be encountered when cutting through the glass locating pegs in the corners of the glass.

Using a suitable direct glazing cutter, cut the PU adhesive and, with the aid of another technician, use glazing suction cups to remove the rear quarter window glass.

1. From outside the vehicle, cut the PU adhesive.
2. From inside the vehicle, cut the PU adhesive to a maximum depth of 55 mm.



5-door

4. **Remove the C-pillar trim panel.**

   For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

5. **WARNING: Wear gloves and eye protection when working with the glass cutting tool as the cutting operation may produce splinters. When using the cutter wear ear protectors. Failure to follow these instructions may result in personal injury.**

CAUTIONS:

Place a suitable piece of flexible plastic card between the direct glazing cutter blade and vehicle body to avoid damage to the vehicle body when cutting from outside the vehicle.

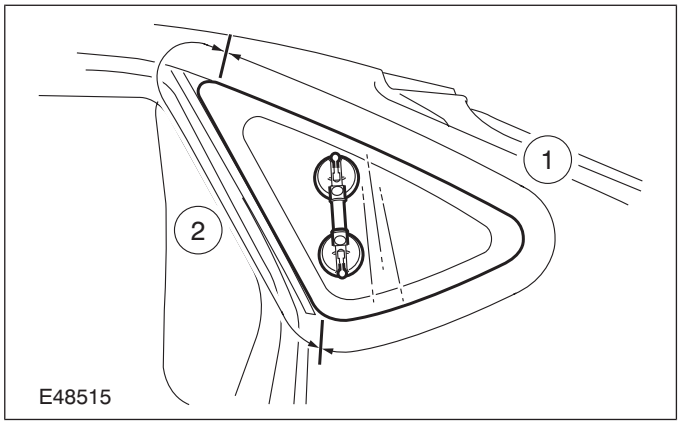
REMOVAL AND INSTALLATION

Make sure the cutting blades are changed where the cutting depth changes to avoid damage to the body and trim panels when cutting from inside the vehicle.

NOTE: Some resistance may be encountered when cutting through the glass locating pegs in the corners of the glass.

Using a suitable direct glazing cutter, cut the PU adhesive and, with the aid of another technician, use glazing suction cups to remove the rear quarter window glass.

1. From outside the vehicle, cut the PU adhesive.
2. From inside the vehicle, cut the PU adhesive to a maximum depth of 25 mm.

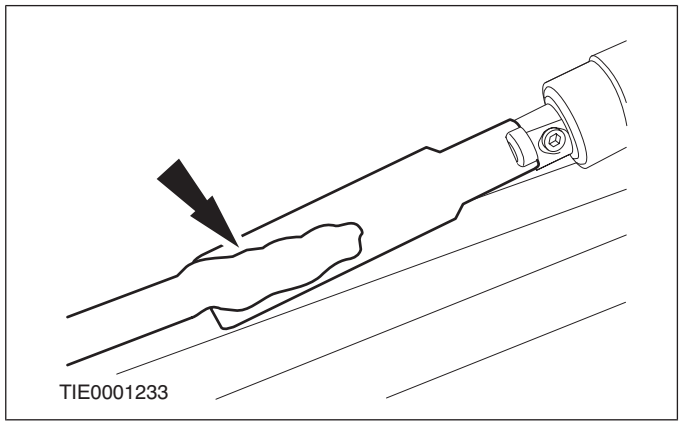


Installation

All vehicles

1. **Carefully remove the remaining part of the locating pegs from the rear quarter window glass flange.**
2. **CAUTION: Do not touch the adhesive surface as re-bonding will be impaired.**

   Carefully trim the remaining PU adhesive from the rear quarter window glass flange to leave approximately 1 mm of trimmed PU adhesive adhered to the flange.

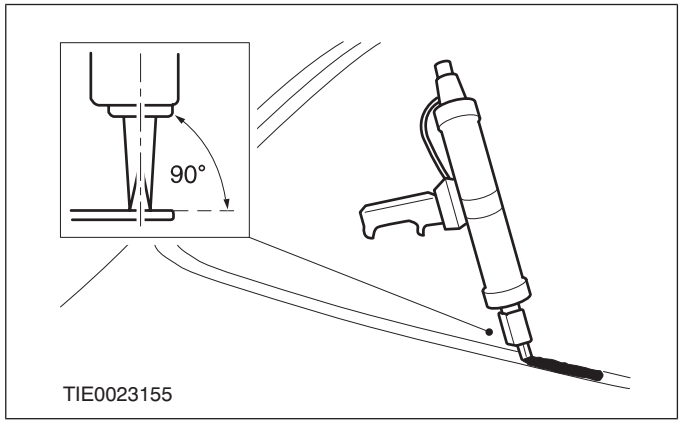


3. **Check the rear quarter window glass flange for damaged sheet metal, rust or foreign material which may have caused, or may cause, glass breakage.**
4. **CAUTION: To make sure that the PU adhesive cures, it is essential that all bonding surfaces are free of moisture.**

   Using a hot air gun, apply warm air (25°C) to the rear quarter window glass flange and glass bond line to remove all traces of moisture.
5. **Prepare the glass, rear quarter window glass flange and trimmed PU adhesive in accordance with the instructions supplied with the PU adhesive kit.**
6. **NOTE: Discard the first 100 mm of PU adhesive as this may have a reduced working time.**

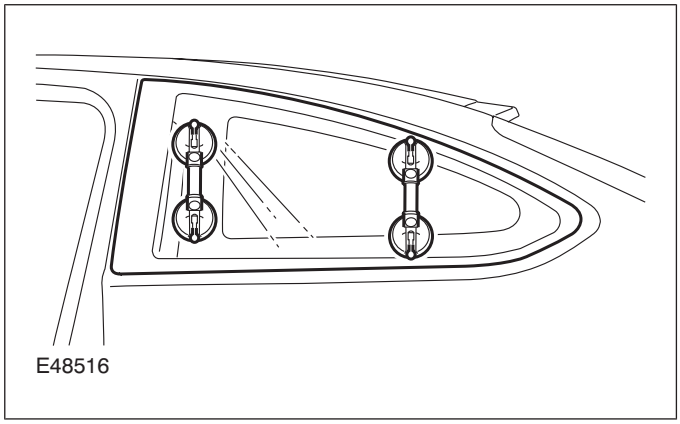
NOTE: To avoid water leaks, any breakage in the continuous bead should be overlapped by 20 mm.

Apply the PU adhesive in a continuous bead of between 8 and 10 mm in height to the rear quarter window glass flange along the bond line.



REMOVAL AND INSTALLATION

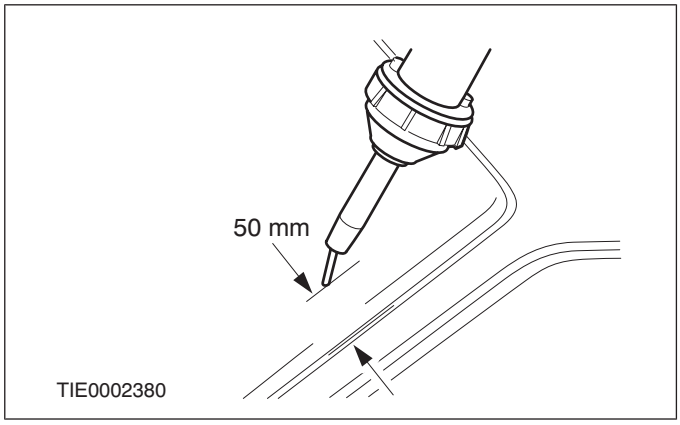
7. **Use glazing suction cups to install the rear quarter window glass (3 door shown).**
   - Press firmly and evenly into position.



8. **CAUTION: During the curing period of the PU adhesive, the door windows must be left open to avoid a build up of pressure when the doors are opened and closed.**

   Using suitable tape, secure the rear quarter window glass in the correct position until the PU adhesive has cured.

9. **If the ambient temperature falls below 10°C, use a hot air gun and apply warm air (25°C) continuously for 15 minutes (inside or outside the vehicle).**



3-door

10. **Install the B-pillar trim panel.**

    For additional information, refer to: B-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

5-door

11. **Install the C-pillar trim panel.**

    For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

REMOVAL AND INSTALLATION

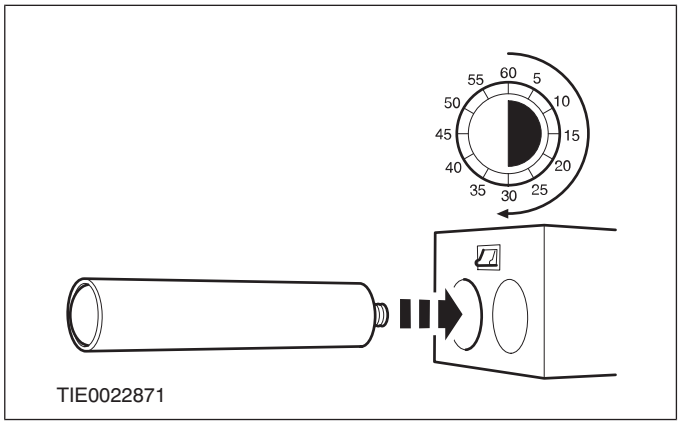
Rear Quarter Window Glass — 4-Door(42 514 0)

General Equipment

Hot air gun
Direct glazing cutter for bonded glass
Direct glazing adhesive kit
Direct glazing adhesive oven
Glazing suction cups

Removal

1. **Remove the polyurethane (PU) adhesive cap and heat the PU adhesive for a minimum of 30 minutes.**



2. **Remove the C-pillar trim panel.**

   For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

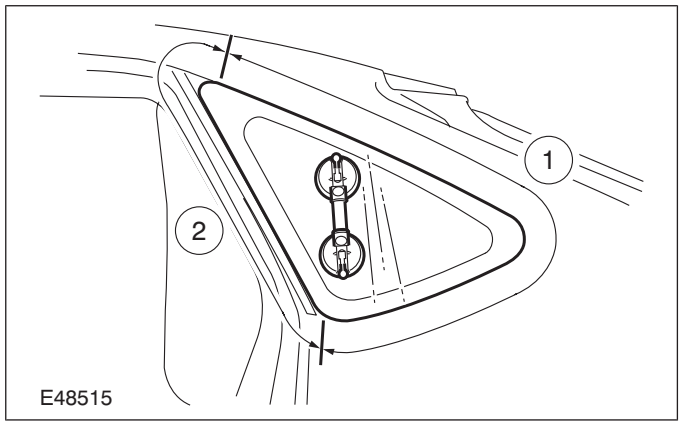
3. **WARNING: Wear gloves and eye protection when working with the direct glazing cutter for bonded glass as the cutting operation may produce splinters. When using the direct glazing cutter for bonded glass wear ear protectors. Failure to follow these instructions may result in personal injury.**

CAUTION: Place a piece of flexible plastic card between the direct glazing cutter for bonded glass cutting blade and vehicle body to avoid damage to the vehicle body when cutting from outside the vehicle.

NOTE: Some resistance may be encountered when cutting through the glass locating pegs in the corners of the rear quarter window glass.

Using a direct glazing cutter for bonded glass, cut the PU adhesive and, with the aid of another technician, use glazing suction cups to remove the rear quarter window glass.

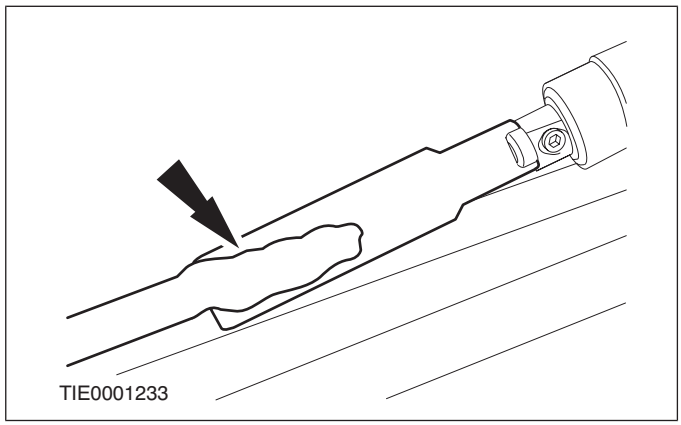
1. From outside the vehicle, cut the PU adhesive.
2. From inside the vehicle, cut the PU adhesive to a maximum depth of 25 mm.



Installation

1. **Carefully remove the remaining part of the locating pegs from the rear quarter window glass flange.**
2. **CAUTION: Do not touch the adhesive surface as re-bonding will be impaired.**

   Carefully trim the remaining PU adhesive from the rear quarter window glass flange to leave approximately 1 mm of trimmed PU adhesive adhered to the flange.



3. **Check the rear quarter window glass flange for damaged sheet metal, rust or foreign material which may have caused, or may cause, glass breakage.**

REMOVAL AND INSTALLATION

4. **CAUTION: To make sure that the PU adhesive cures, it is essential that all bonding surfaces are free of moisture.**

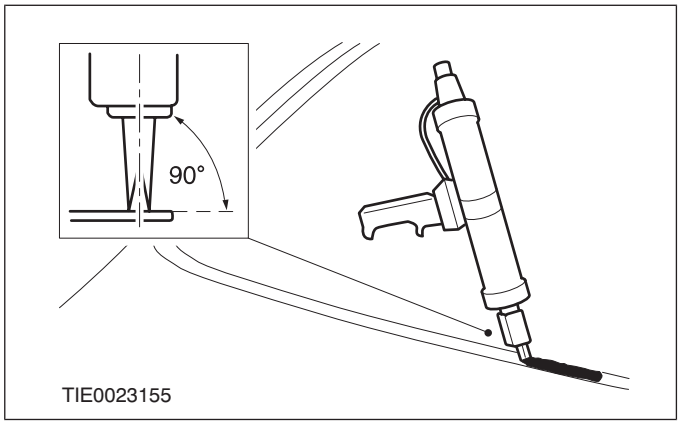
   Using a hot air gun, apply warm air (25°C) to the rear quarter window glass flange and rear quarter window glass bond line to remove all traces of moisture.

5. **Prepare the rear quarter window glass, rear quarter window glass flange and trimmed PU adhesive in accordance with the instructions supplied with the direct glazing adhesive kit.**

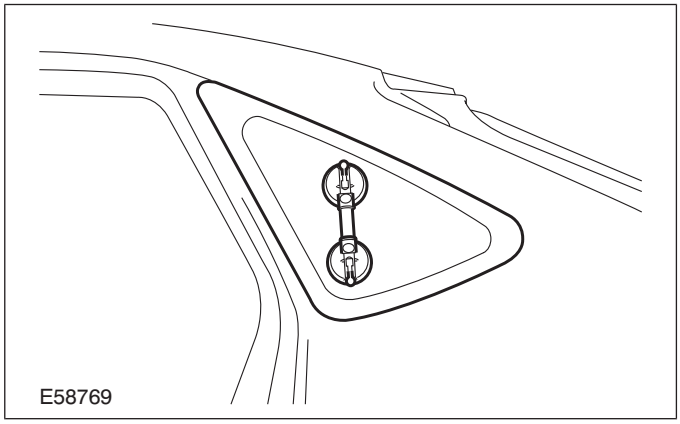
6. **NOTE: Discard the first 100 mm of PU adhesive as this may have a reduced working time.**

NOTE: To avoid water leaks, any breakage in the continuous bead should be overlapped by 20 mm.

Apply the PU adhesive in a continuous bead of between 8 and 10 mm in height to the rear quarter window glass flange along the bond line.



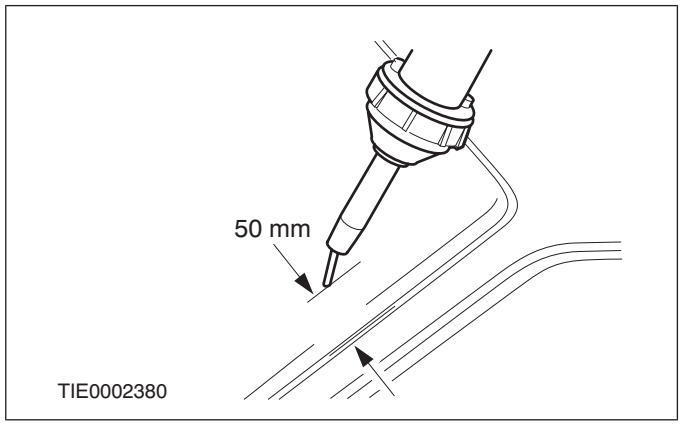
7. **Using glazing suction cups, install the rear quarter window glass.**
   - Press firmly and evenly into position.



8. **CAUTION: During the curing period of the PU adhesive, the door windows must be left open to avoid a build up of pressure when the doors are opened and closed.**

   Using tape, secure the rear quarter window glass in the correct position until the PU adhesive has cured.

9. **If the ambient temperature falls below 10°C, use a hot air gun and apply warm air (25°C) continuously for 15 minutes (inside or outside the vehicle).**



10. **Install the C-pillar trim panel.**

    For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

REMOVAL AND INSTALLATION

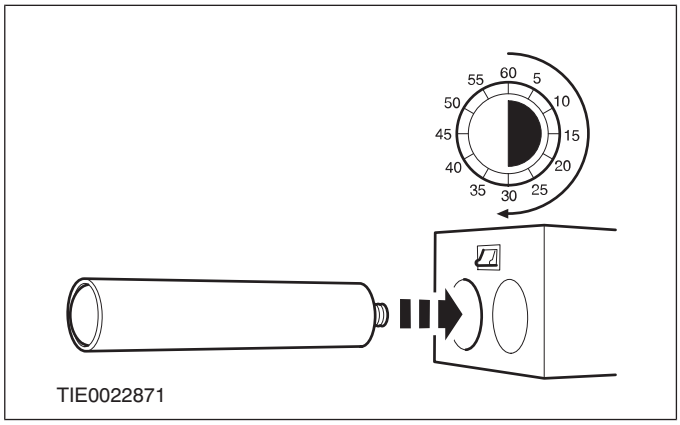
Liftgate Window Glass — 3-Door/5-Door

General Equipment

Hot air gun
Direct glazing cutter for bonded glass
Direct glazing adhesive kit
Direct glazing adhesive oven
Glazing suction cups

Removal

1. **Remove the polyurethane (PU) adhesive cap and heat the PU adhesive for a minimum of 30 minutes.**



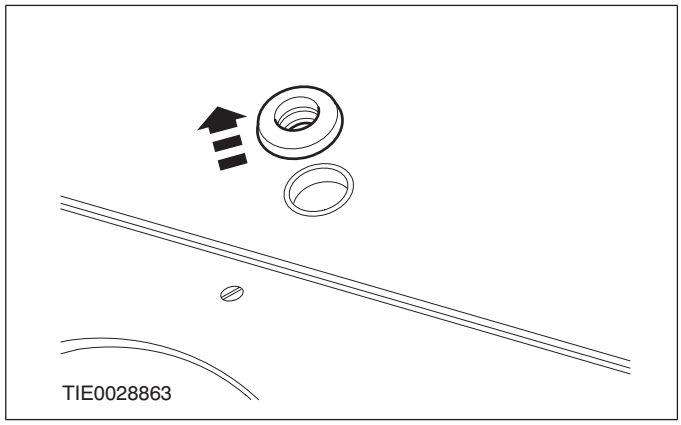
2. **Remove the rear spoiler.**

   For additional information, refer to: Rear Spoiler - 2.5L Duratec-ST (VI5) (501-08 Exterior Trim and Ornamentation, Removal and Installation).

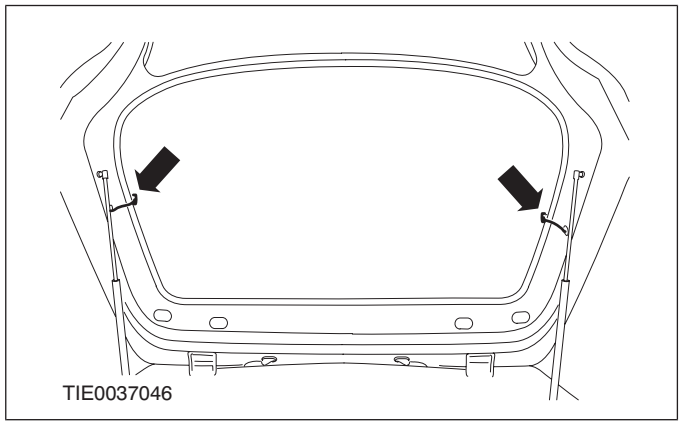
3. **Remove the rear window wiper motor.**

   For additional information, refer to: Rear Window Wiper Motor (501-16 Wipers and Washers, Removal and Installation).

4. **Remove the rear window wiper motor spindle grommet.**



5. **Disconnect the heated liftgate window glass electrical connectors.**



6. **WARNING: Wear gloves and eye protection when working with the glass cutting tool as the cutting operation may produce splinters. When using the cutter wear ear protectors. Failure to follow these instructions may result in a personal injury.**

   CAUTION: Make sure the cutting blades are changed where the cutting depth changes to avoid damage to the body and trim panels.

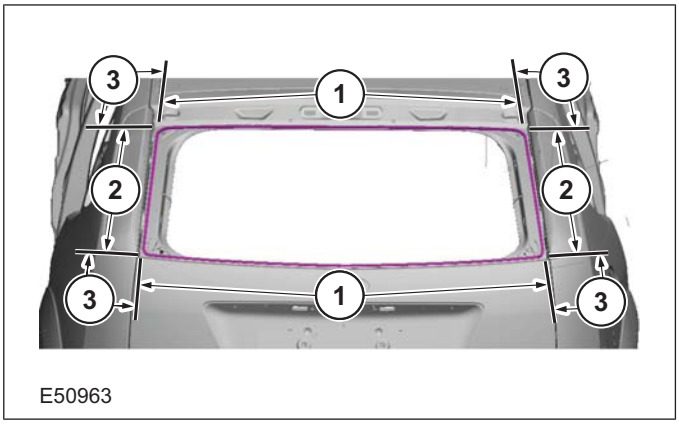
NOTE: Some resistance may be encountered when cutting through the glass locating pegs in the corners of the glass.

From inside the vehicle using a suitable direct glazing cutter, cut the PU adhesive to the given maximum depths.

1. 25 mm.
2. 60 mm.

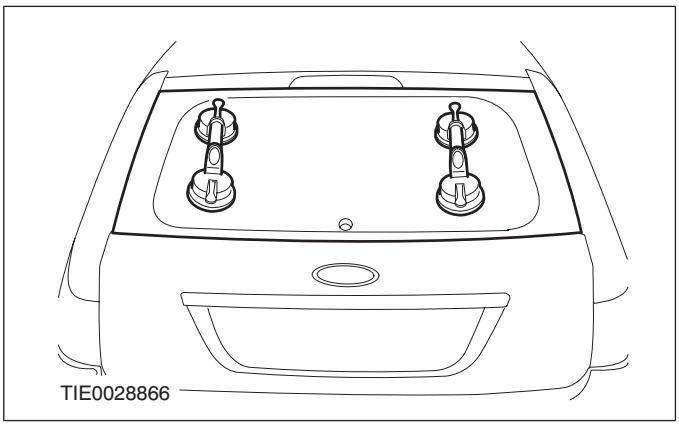
REMOVAL AND INSTALLATION

3. 110 mm.



E50963

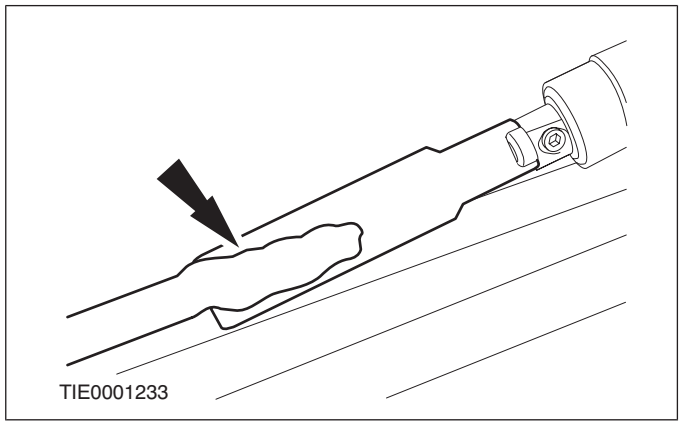
7. **With the aid of another technician, use glazing suction cups to remove the liftgate window glass.**


TIE0028866

Installation

1. **Carefully remove the remaining part of the locating pegs from the liftgate window glass flange.**
2. **CAUTION: Do not touch the adhesive surface as re-bonding will be impaired.**

   Carefully trim the remaining polyurethane (PU) adhesive from the liftgate window glass flange to leave approximately 1 mm of trimmed PU adhesive adhered to the flange.

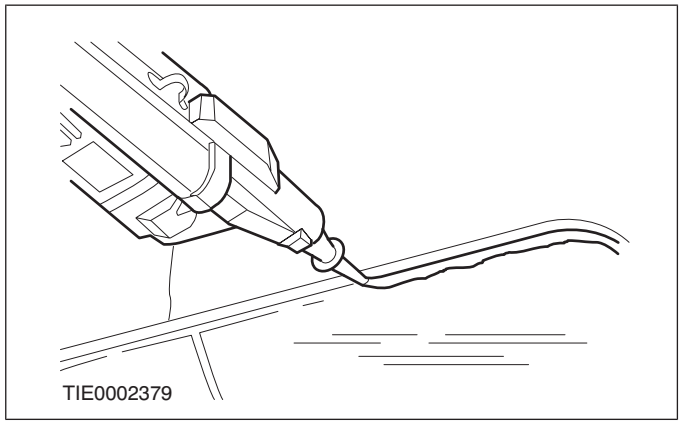

TIE0001233

3. **Check the liftgate window glass flange for damaged sheet metal, rust or foreign material which may have caused, or may cause, glass breakage.**
4. **CAUTION: To make sure that the PU adhesive cures, it is essential that all the bonding surfaces are free of moisture.**

   Using a hot air gun, apply warm air (25°C) to the liftgate window glass flange and glass bond line to remove all traces of moisture.
5. **Prepare the glass, liftgate window glass flange and trimmed PU adhesive in accordance with the instructions supplied with the PU adhesive kit.**
6. **NOTE: Discard the first 100 mm of PU adhesive as this may have a reduced working time.**

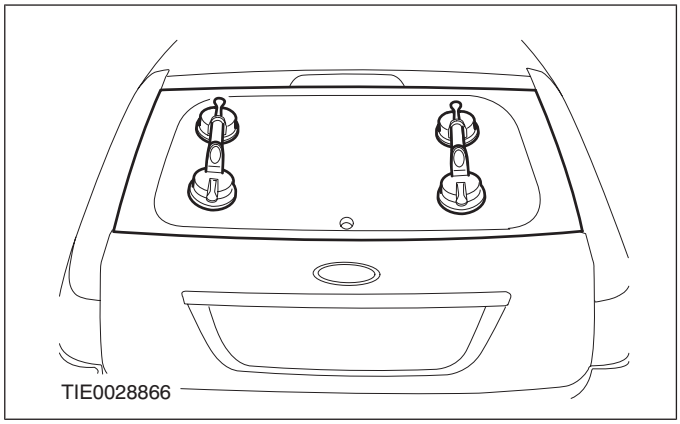
NOTE: To avoid water leaks, any breakage in the continuous bead must be overlapped by 20 mm.

Apply the PU adhesive in a continuous bead of between 8 and 10 mm in height to the liftgate window glass flange along the bond line.


TIE0002379

REMOVAL AND INSTALLATION

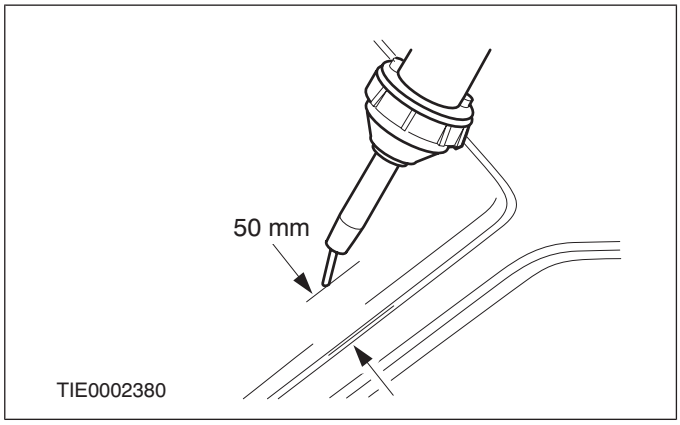
7. **With the aid of another technician, use glazing suction cups to install the liftgate window glass.**
   - Press firmly and evenly into position.



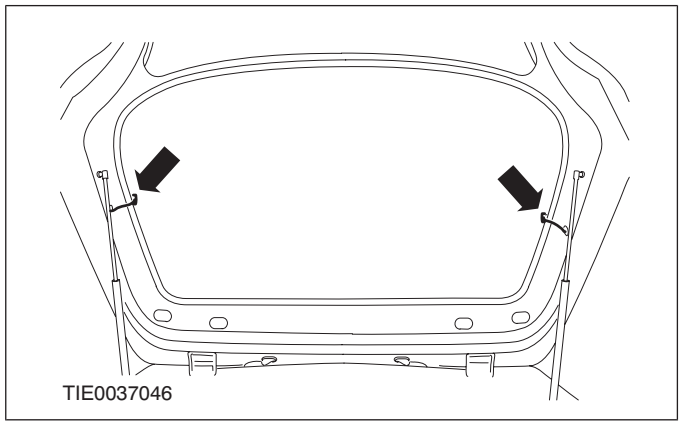
8. **CAUTION: During the curing period of the PU adhesive, the door windows must be left open to avoid a build up of pressure when the doors are opened and closed.**

   Using suitable tape, secure the liftgate window glass in the correct position until the PU adhesive has cured.

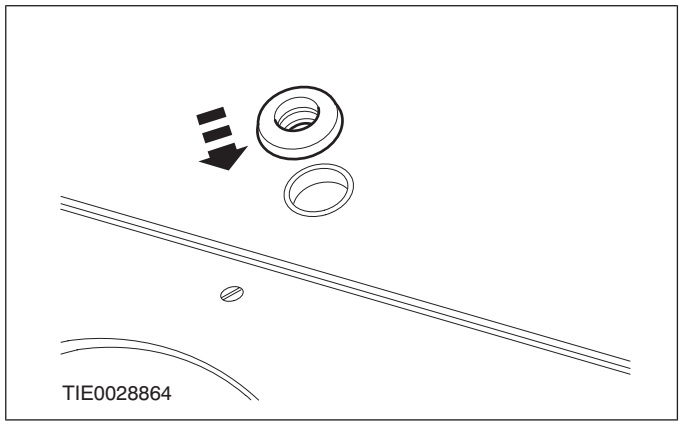
9. **If the ambient temperature falls below 10°C, use a hot air gun and apply warm air (25°C) continuously for 15 minutes (inside or outside the vehicle).**



10. **Connect the heated liftgate window glass electrical connectors.**



11. **Install the rear window wiper motor spindle grommet.**



12. **Install the rear spoiler.**

    For additional information, refer to: Rear Spoiler - 2.5L Duratec-ST (VI5) (501-08 Exterior Trim and Ornamentation, Removal and Installation).

13. **Install the rear window wiper motor.**

    For additional information, refer to: Rear Window Wiper Motor (501-16 Wipers and Washers, Removal and Installation).

REMOVAL AND INSTALLATION

Front Door Window Regulator — 3-Door

General Equipment

Electric hand drill
Blind rivet gun-hand

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

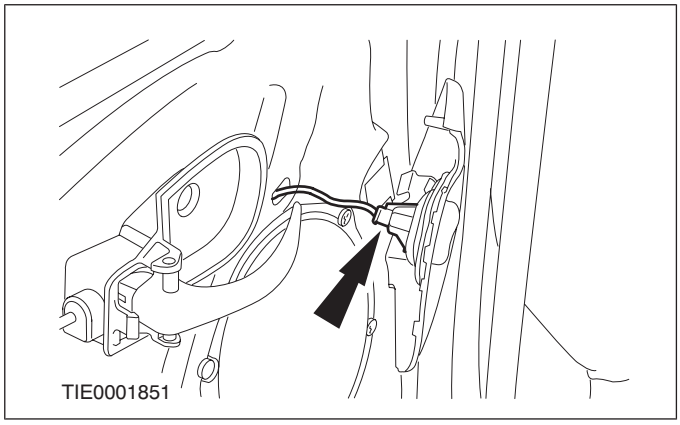
1. **Remove the front door window glass.**

   For additional information, refer to: Front Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).

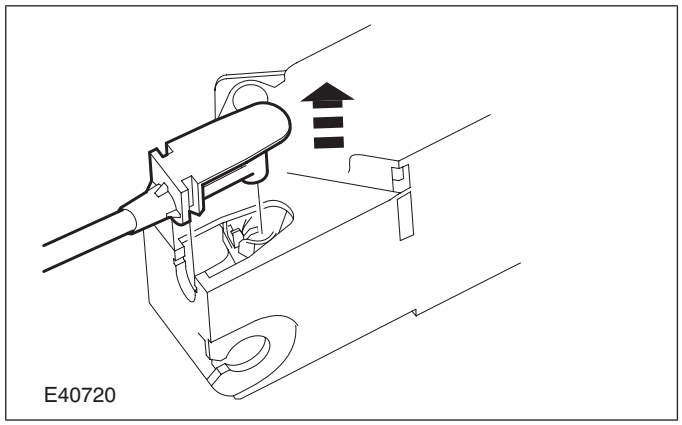
2. **Remove the front door window regulator motor.**

   For additional information, refer to: Front Door Window Regulator Motor - Vehicles With: Global Closing (501-11 Glass, Frames and Mechanisms, Removal and Installation).

3. **Disconnect the power window control switch electrical connector.**



4. **Disconnect the door latch remote control cable from the door latch remote control.**
   - Operate the door latch remote control handle lock to the lock position.

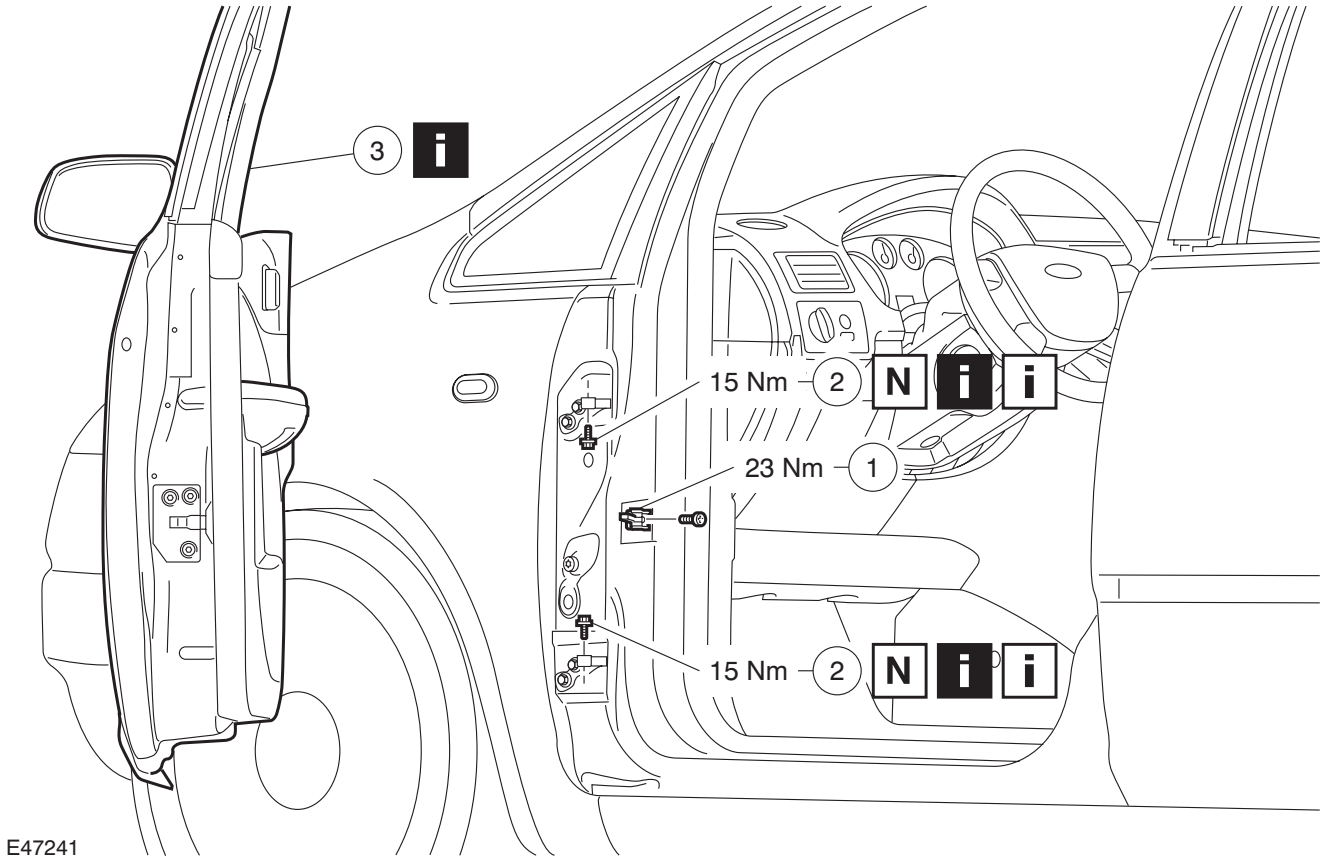


5. **Remove the exterior front door handle.**

   For additional information, refer to: Exterior Front Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

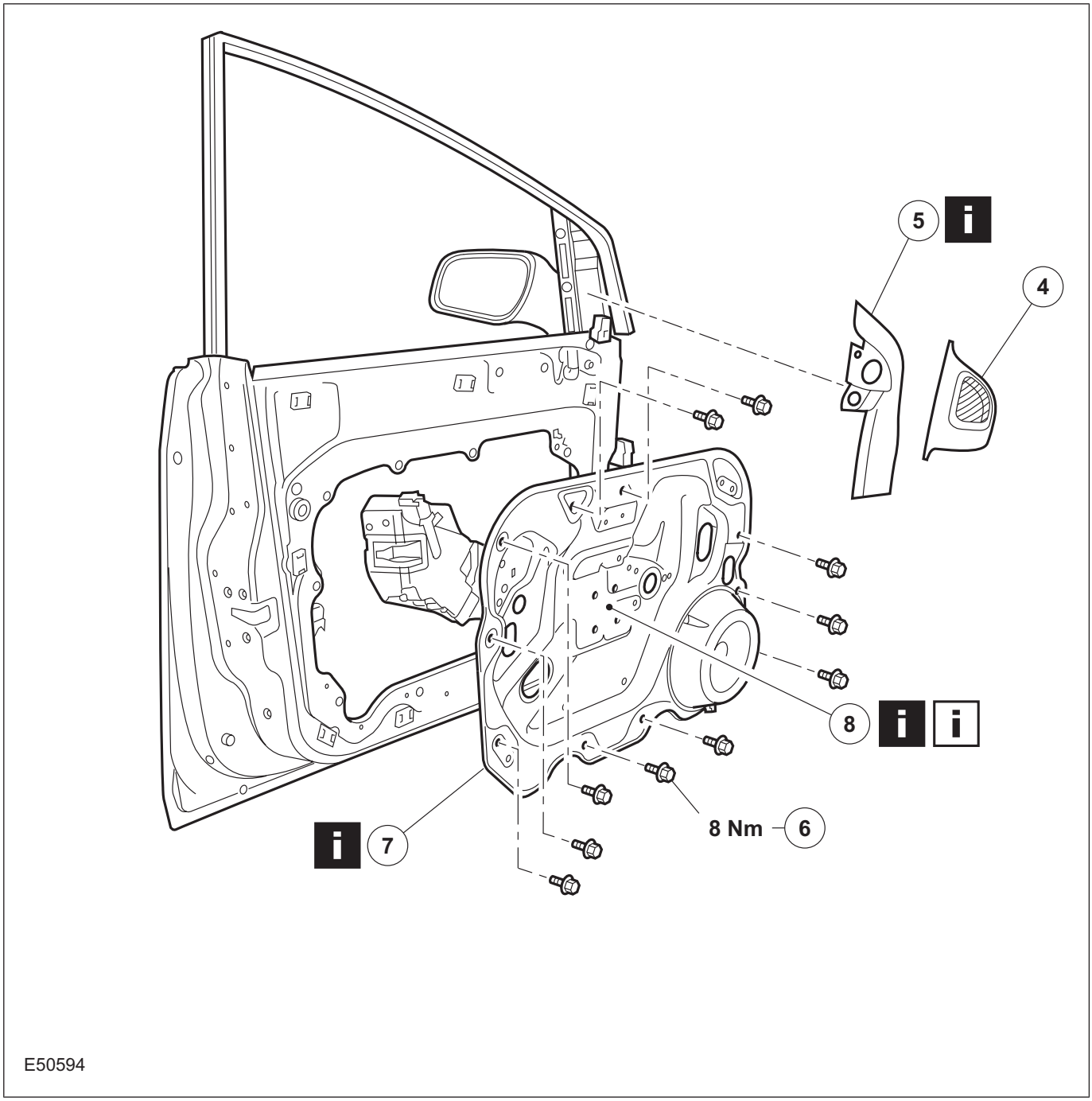
6. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



Item	Description
1	Door check strap
2	Door hinge center retaining bolts See Removal Detail See Installation Detail
3	Door (left-hand door shown) See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
4	Speaker cover
5	Exterior mirror trim panel See Removal Detail
6	Door inner panel retaining bolts

Item	Description
7	Door inner panel See Removal Detail
8	Front door window regulator See Removal Detail See Installation Detail

7. To install, reverse the removal procedure.

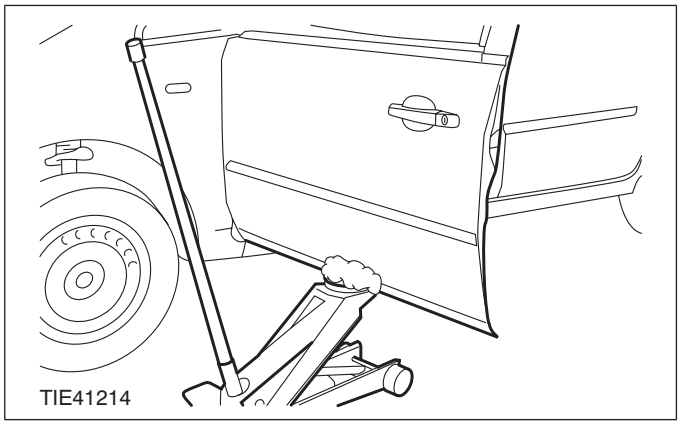
Removal Details

REMOVAL AND INSTALLATION

Item 2 Door hinge center retaining bolts

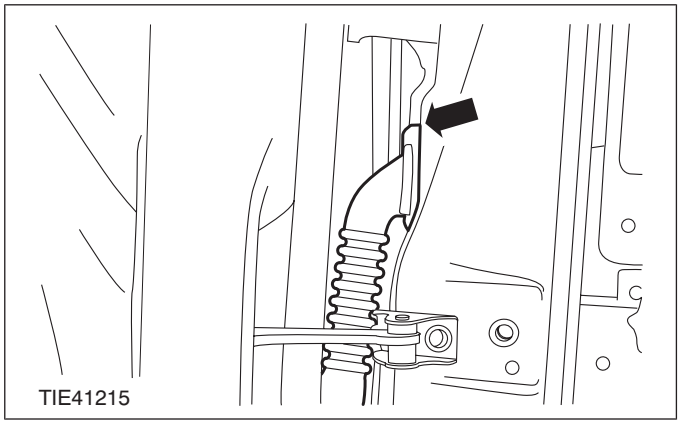
1. **⚠CAUTION: Protect the door using a soft cloth to prevent damage.**

   With the aid of another technician and a suitable trolley jack, support the door.

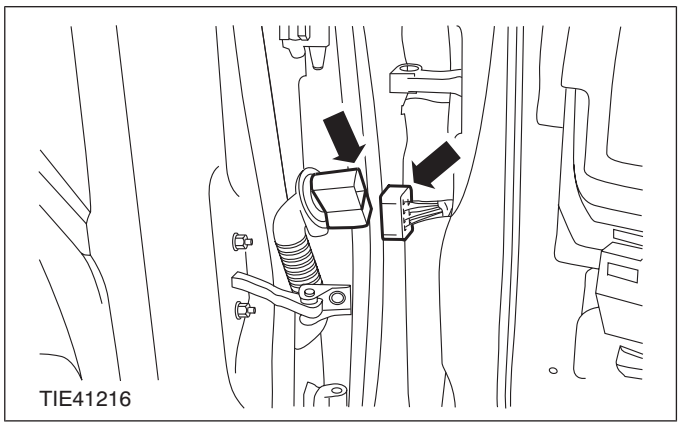


Item 3 Door (left-hand door shown)

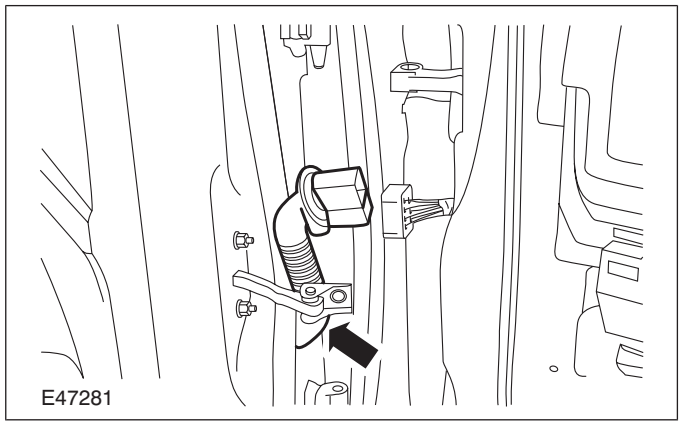
1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**
   - Disconnect the electrical connector.

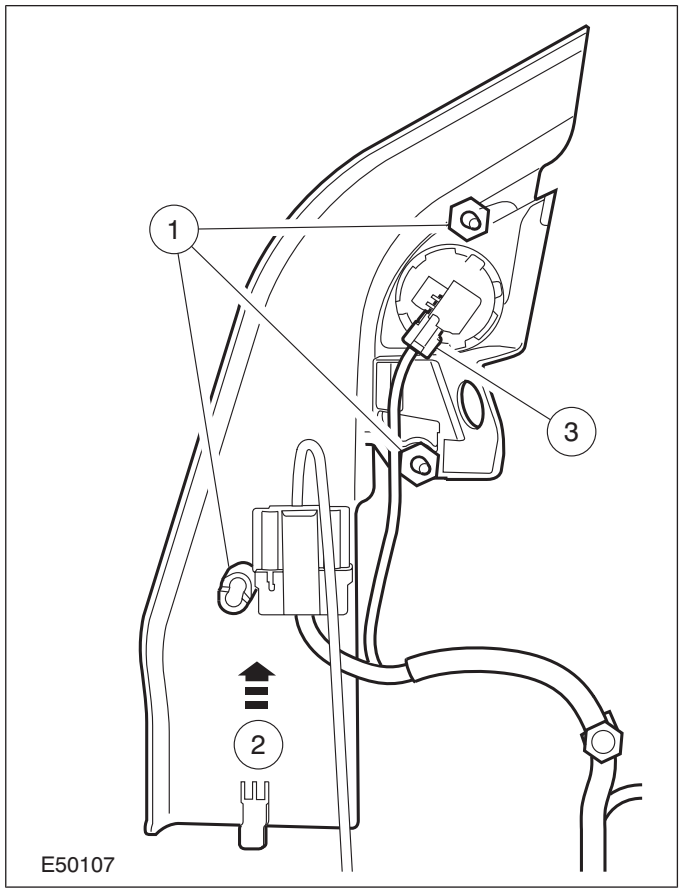


3. **Push the front door wiring harness into the door.**



Item 5 Exterior mirror trim panel

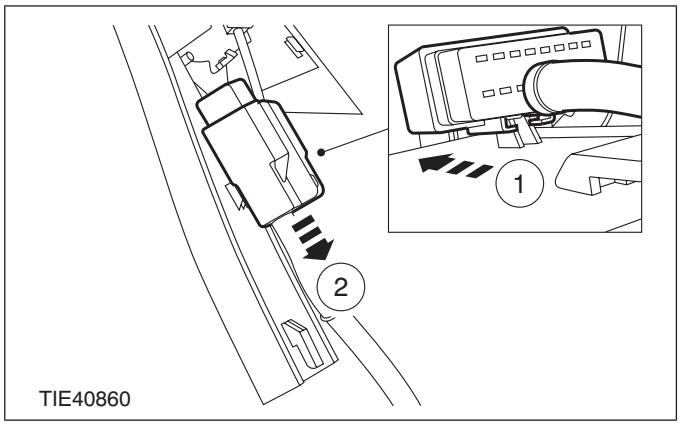
1. **Detach the exterior mirror trim panel from the door panel.**
   1. Detach the clips.
   2. Detach the trim panel.
   3. Disconnect the speaker electrical connector (if equipped).



2. **Remove the exterior mirror trim panel.**
   1. Detach the mirror electrical connector from the trim panel.

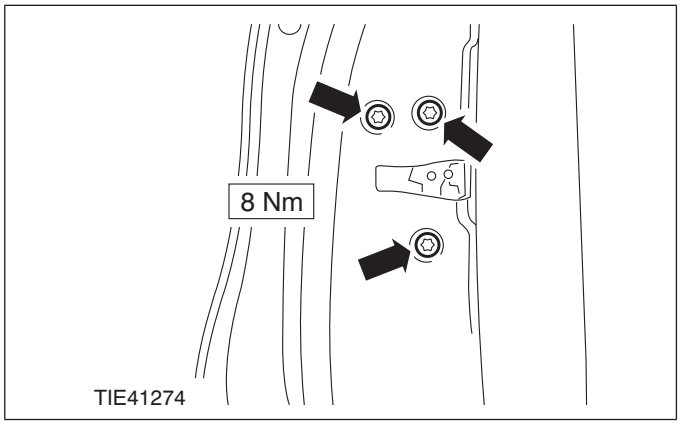
REMOVAL AND INSTALLATION

2. Disconnect the mirror electrical connector.

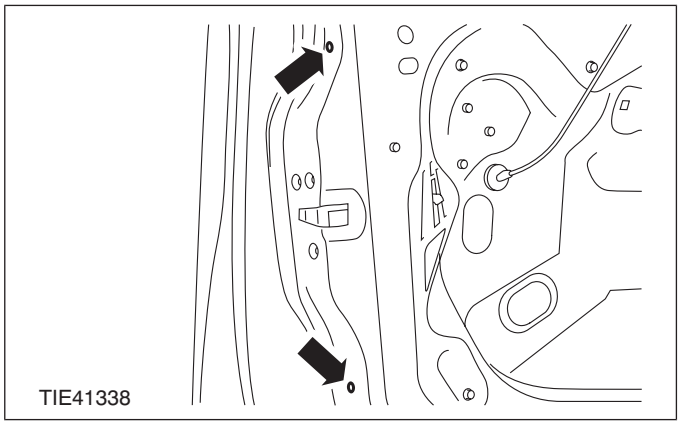


Item 7 Door inner panel

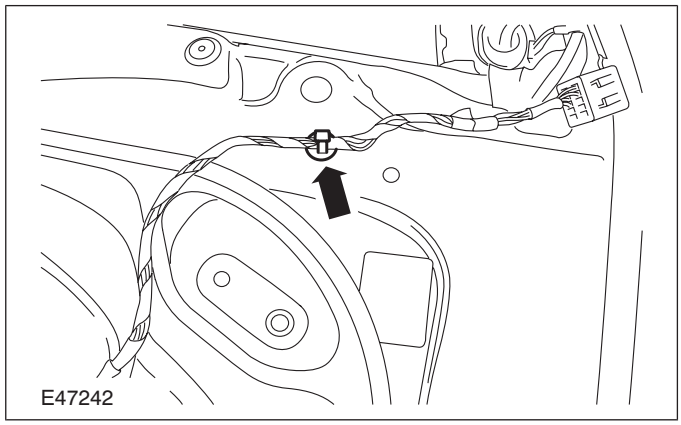
1. **Remove the front door latch retaining screws.**



2. **Remove the front door latch bracket retaining screws.**

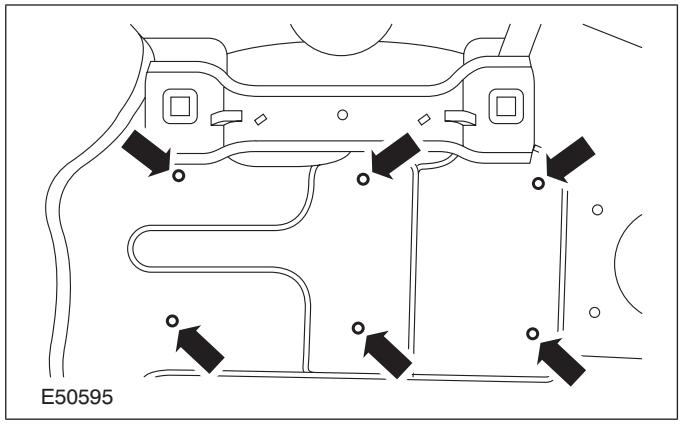


3. **Detach the exterior mirror wiring harness retaining clip.**



Item 8 Front door window regulator

1. **Using a suitable electric hand drill, remove the rivets.**

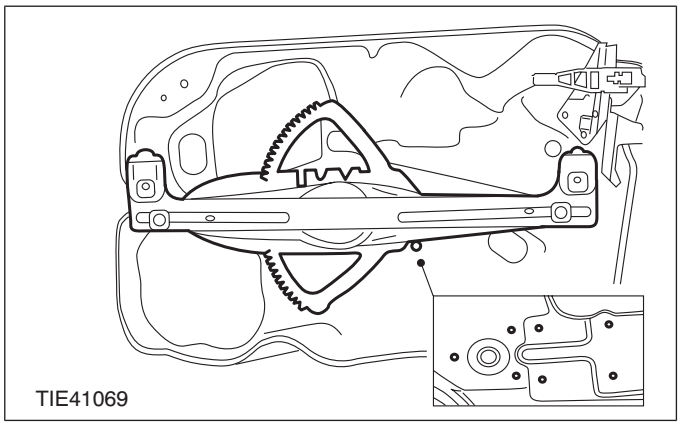


Installation Details

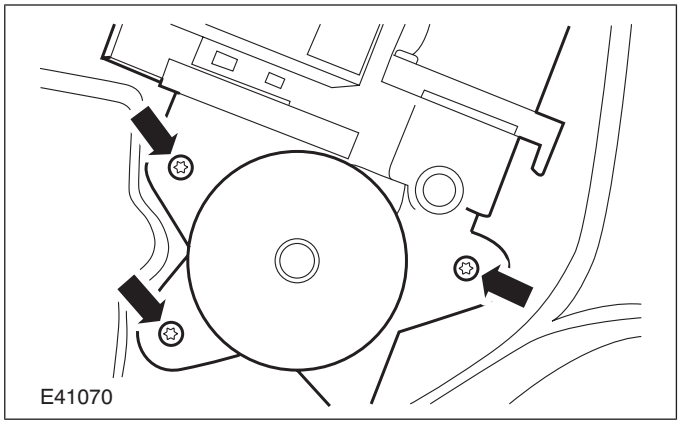
REMOVAL AND INSTALLATION

Item 8 Front door window regulator

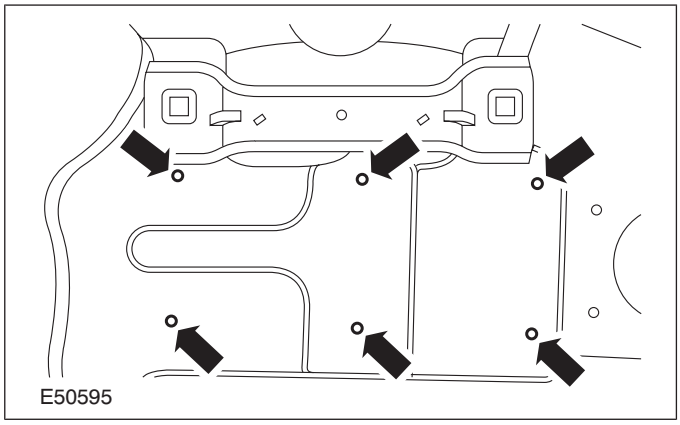
1. Align the window regulator with the window regulator motor retaining screw holes and rivet holes in the door inner panel.



2. Install the window regulator motor.



3. Using a suitable blind rivet gun-hand, install new rivets in a diagonally opposed pattern.



Item 2 Door hinge center retaining bolts

1. Apply a coating of adhesive to the door hinge center retaining bolts.

REMOVAL AND INSTALLATION

Front Door Window Regulator — 4-Door/5-Door/Wagon

General Equipment

Electric hand drill
Blind rivet gun-hand

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

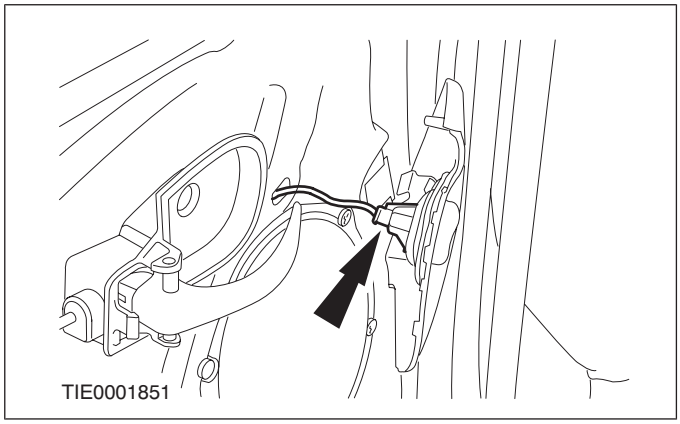
1. **Remove the front door window glass.**

   For additional information, refer to: Front Door Window Glass (501-11 Glass, Frames and Mechanisms, Removal and Installation).

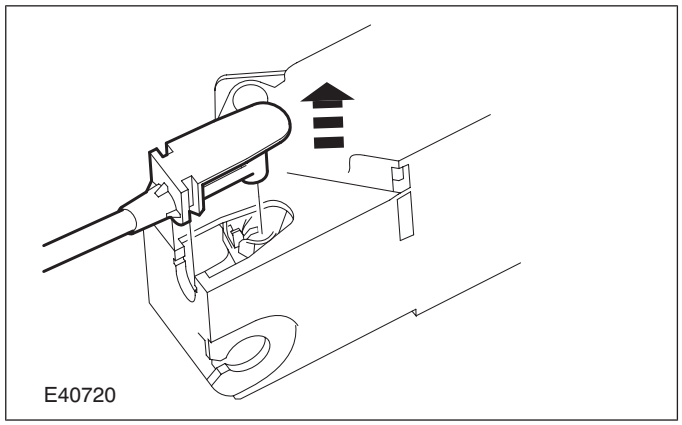
2. **Remove the front door window regulator motor.**

   For additional information, refer to: Front Door Window Regulator Motor - Vehicles With: Global Closing (501-11 Glass, Frames and Mechanisms, Removal and Installation).

3. **Disconnect the power window control switch electrical connector.**



4. **Disconnect the door latch remote control cable from the door latch remote control.**
   - Operate the door latch remote control handle lock to the lock position.

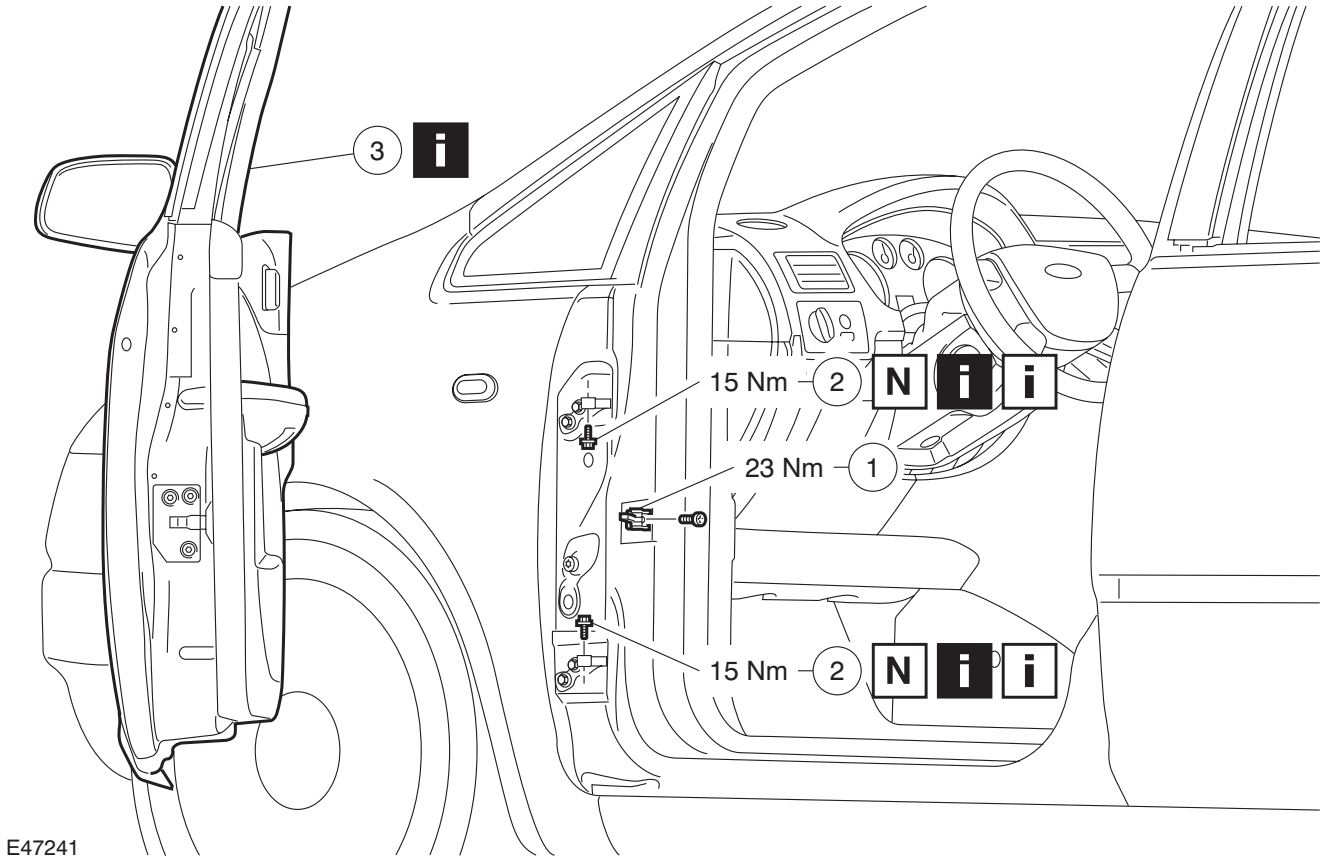


5. **Remove the exterior front door handle.**

   For additional information, refer to: Exterior Front Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

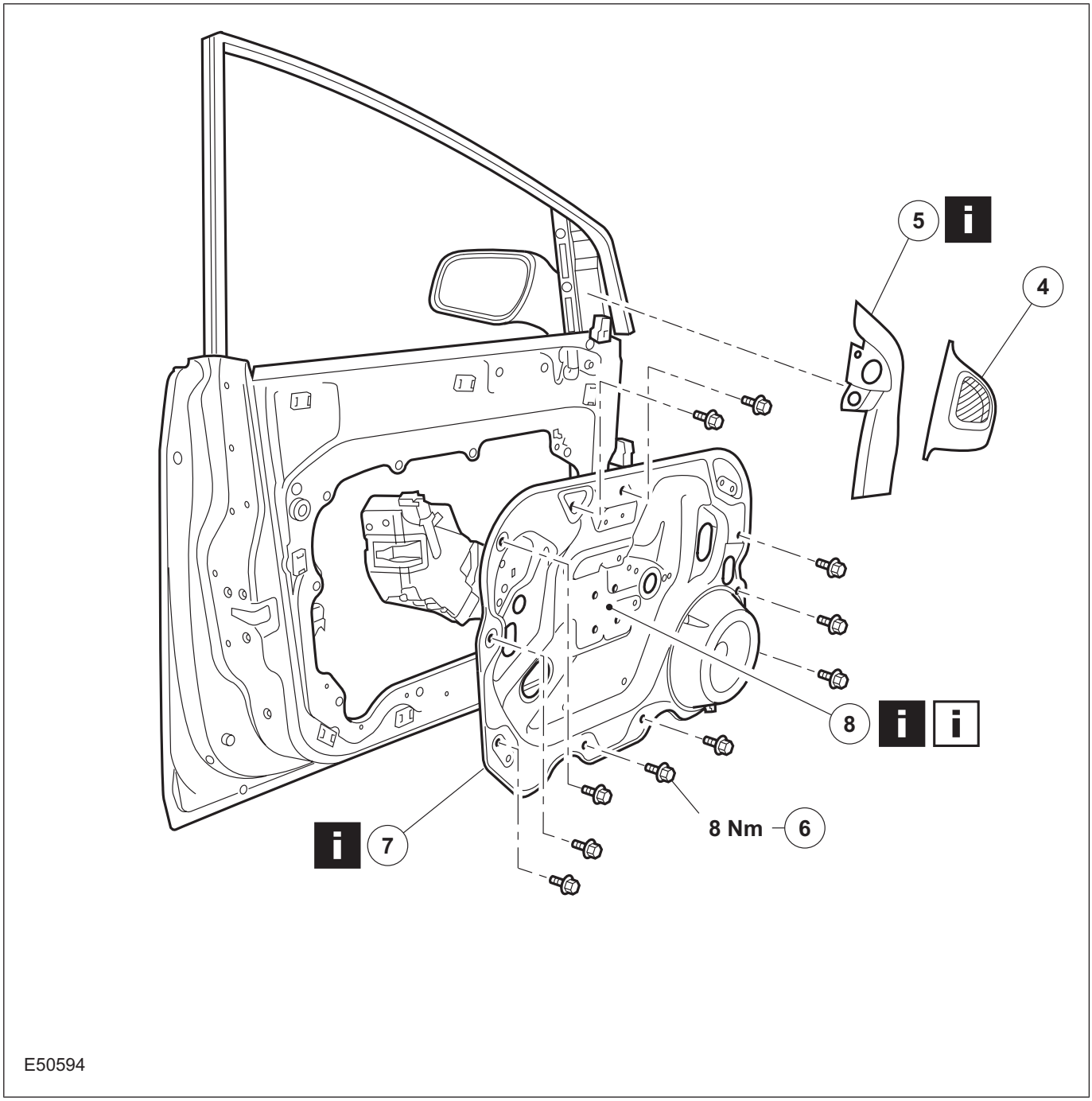
6. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



Item	Description
1	Door check strap
2	Door hinge center retaining bolts See Removal Detail See Installation Detail
3	Door (left-hand door shown) See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
4	Speaker cover
5	Exterior mirror trim panel See Removal Detail
6	Door inner panel retaining bolts

Item	Description
7	Door inner panel See Removal Detail
8	Front door window regulator See Removal Detail See Installation Detail

7. To install, reverse the removal procedure.

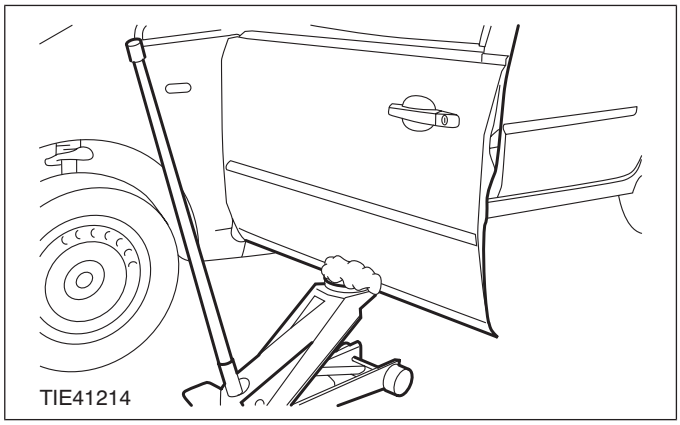
Removal Details

REMOVAL AND INSTALLATION

Item 2 Door hinge center retaining bolts

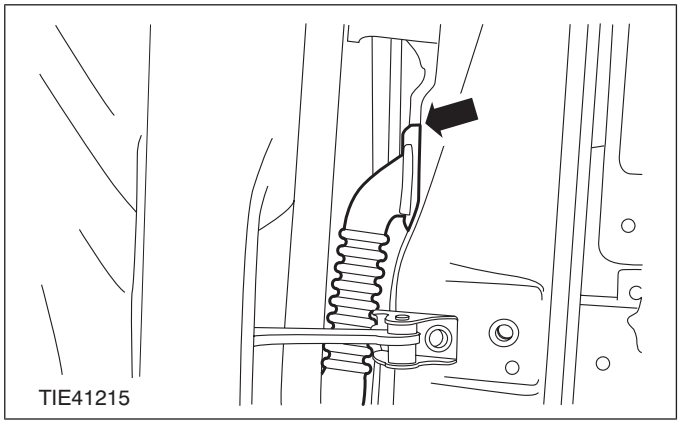
1. **⚠CAUTION: Protect the door using a soft cloth to prevent damage.**

   With the aid of another technician and a suitable trolley jack, support the door.

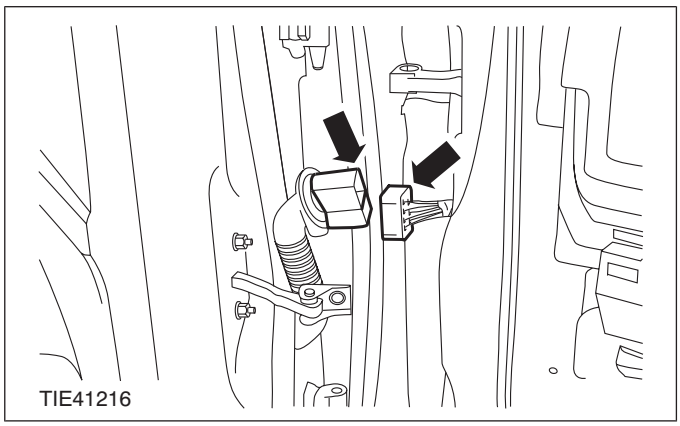


Item 3 Door (left-hand door shown)

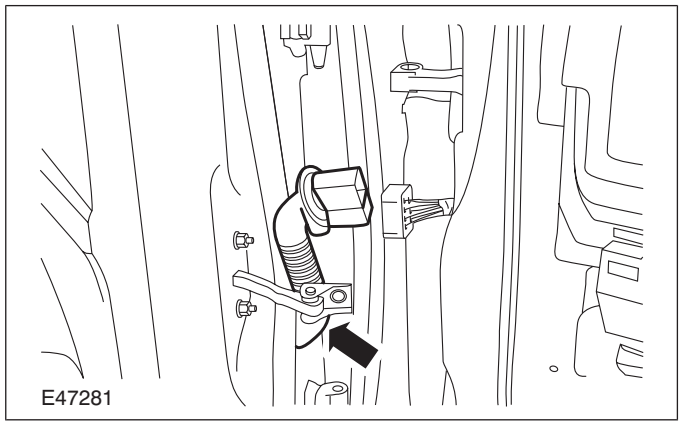
1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**
   - Disconnect the electrical connector.

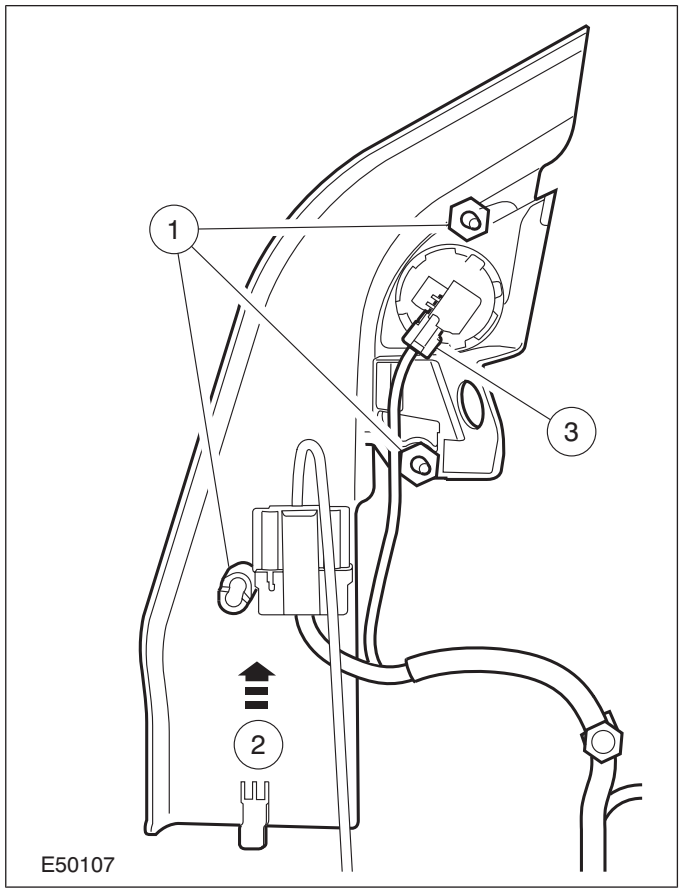


3. **Push the front door wiring harness into the door.**



Item 5 Exterior mirror trim panel

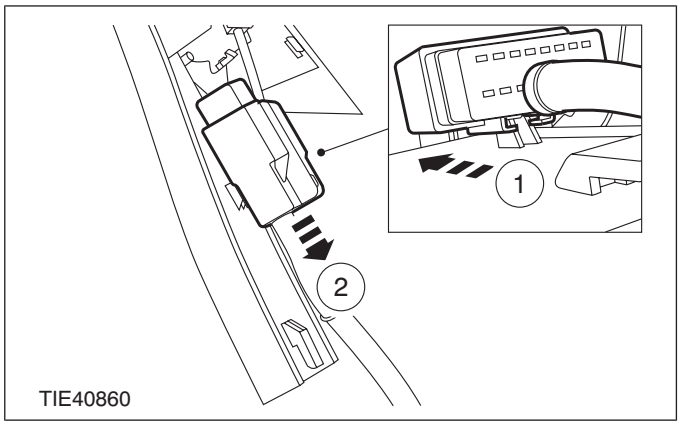
1. **Detach the exterior mirror trim panel from the door panel.**
   1. Detach the clips.
   2. Detach the trim panel.
   3. Disconnect the speaker electrical connector (if equipped).



2. **Remove the exterior mirror trim panel.**
   1. Detach the mirror electrical connector from the trim panel.

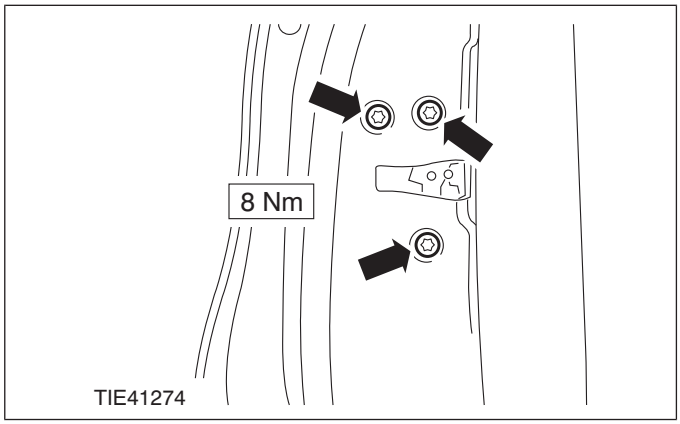
REMOVAL AND INSTALLATION

2. Disconnect the mirror electrical connector.

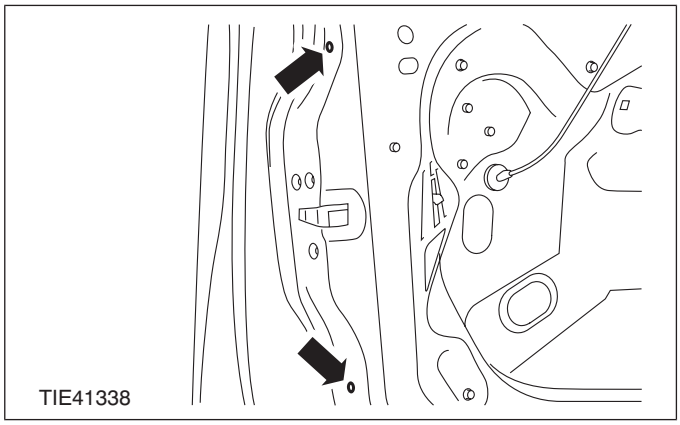


Item 7 Door inner panel

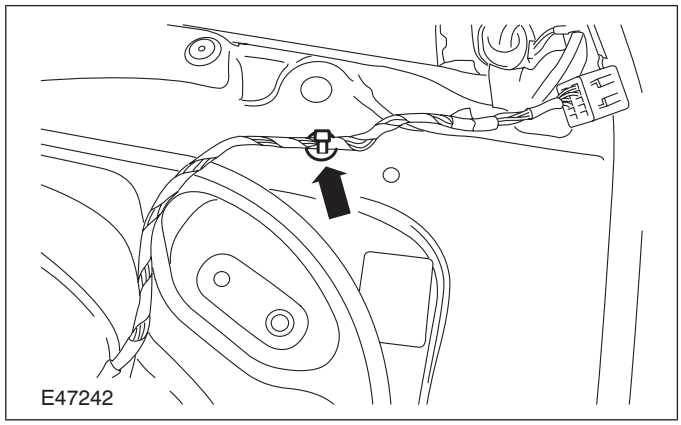
1. **Remove the front door latch retaining screws.**



2. **Remove the front door latch bracket retaining screws.**

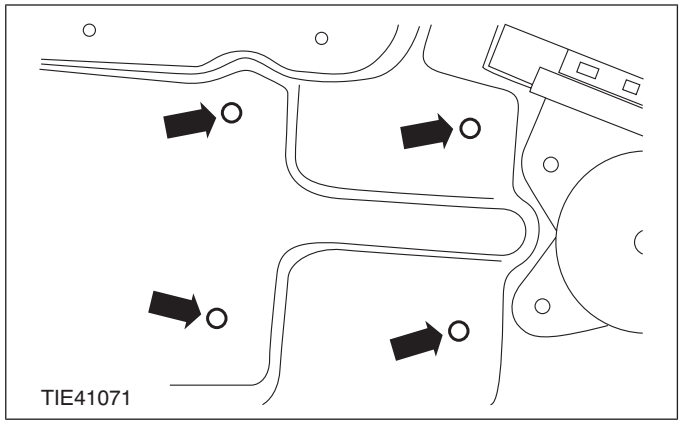


3. **Detach the exterior mirror wiring harness retaining clip.**



Item 8 Front door window regulator

1. **Using a suitable electric hand drill, remove the rivets.**

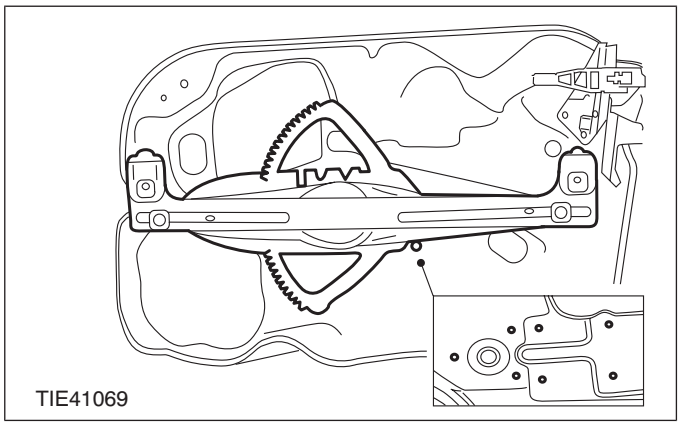


Installation Details

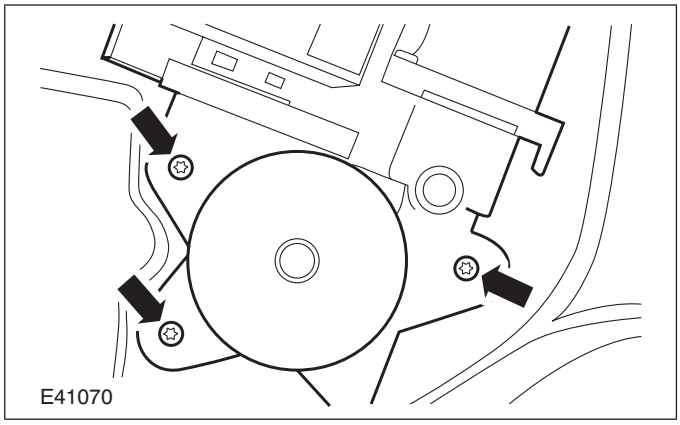
REMOVAL AND INSTALLATION

Item 8 Front door window regulator

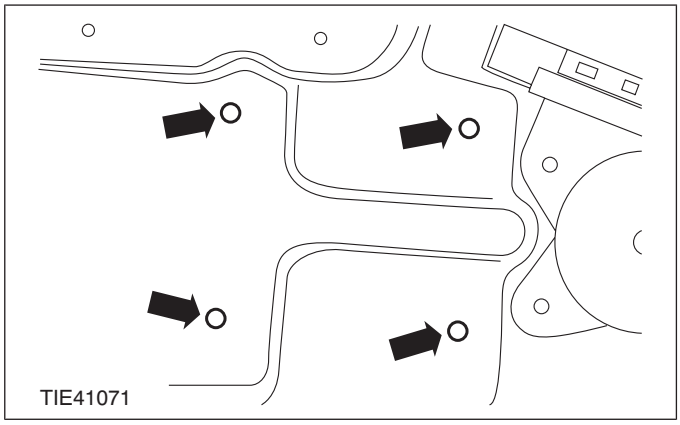
1. Align the window regulator with the window regulator motor retaining screw holes and rivet holes in the door inner panel.



2. Install the window regulator motor.



3. Using a suitable blind rivet gun-hand, install new rivets in a diagonally opposed pattern.



Item 2 Door hinge center retaining bolts

1. Apply a coating of adhesive to the door hinge center retaining bolts.

REMOVAL AND INSTALLATION

Rear Door Window Regulator — Vehicles With: Power Windows

General Equipment

Electric hand drill
Blind rivet gun-hand

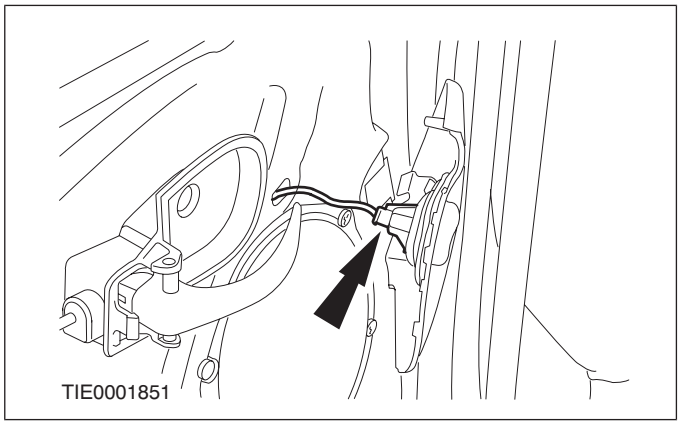
1. **Remove the rear door window glass.**

   For additional information, refer to: Rear Door Window Glass - Vehicles With: Power Windows (501-11 Glass, Frames and Mechanisms, Removal and Installation).

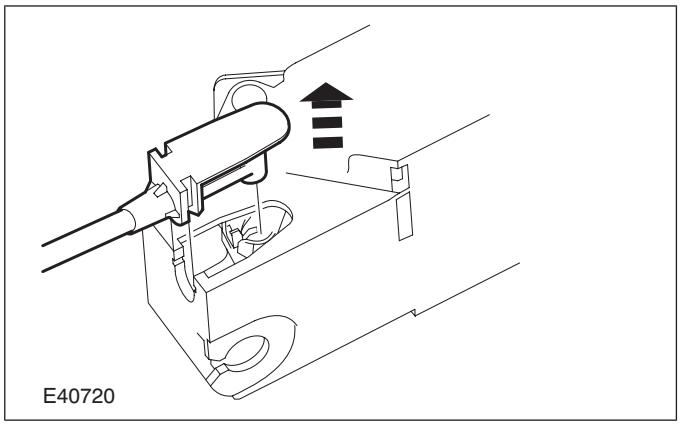
2. **Remove the rear door window regulator motor.**

   For additional information, refer to: Rear Door Window Regulator Motor (501-11 Glass, Frames and Mechanisms, Removal and Installation).

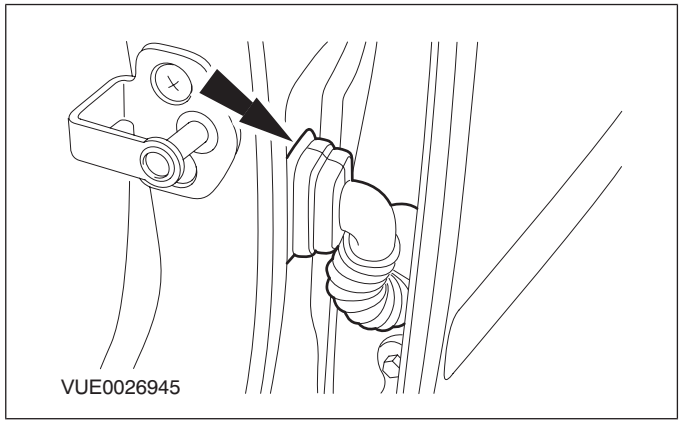
3. **Disconnect the power window control switch electrical connector.**



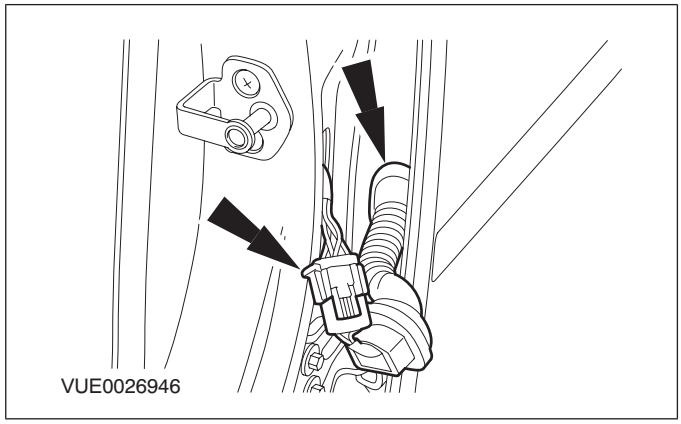
4. **Disconnect the door latch remote control cable from the door latch remote control.**
   - Operate the door latch remote control handle lock to the lock position.



5. **Close the rear door.**
6. **Detach the wiring harness from the B-pillar.**



7. **Disconnect the wiring harness at the B-pillar and push it into the door.**

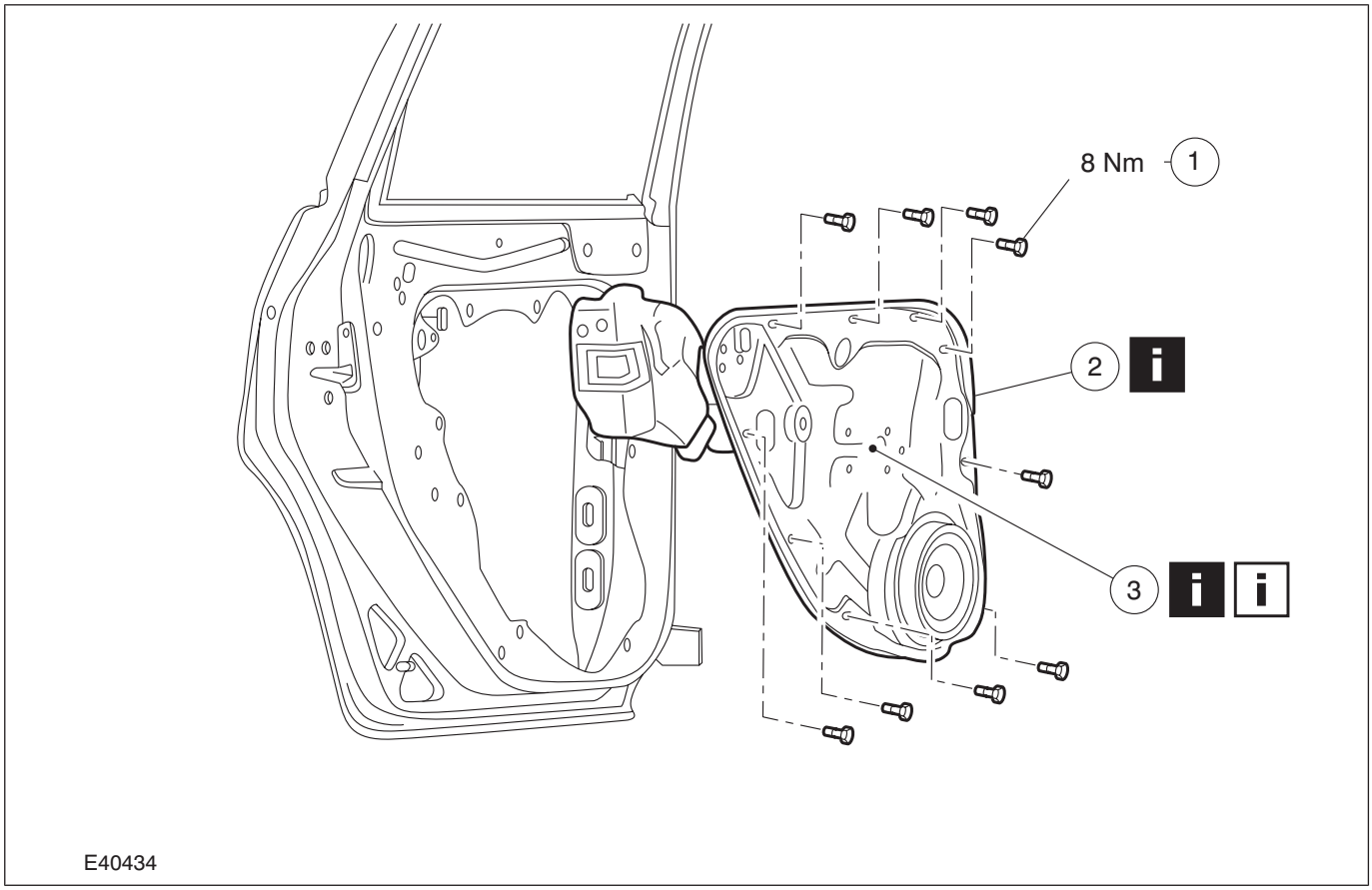


8. **Open the rear door.**
9. **Remove the exterior rear door handle.**

   For additional information, refer to: Exterior Rear Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

10. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



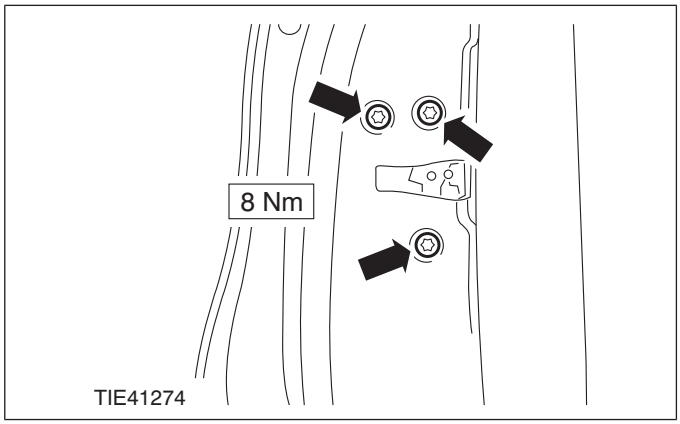
Item	Description
1	Door inner panel retaining bolts
2	Door inner panel See Removal Detail
3	Rear door window regulator See Removal Detail See Installation Detail

11. To install, reverse the removal procedure.

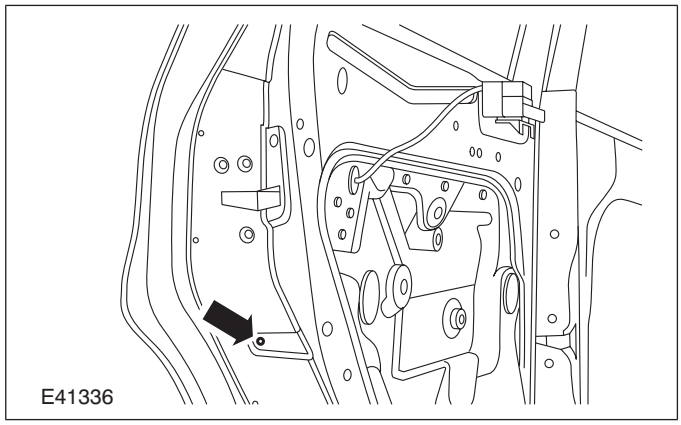
Removal Details

Item 2 Door inner panel

1. Remove the rear door latch retaining screws.



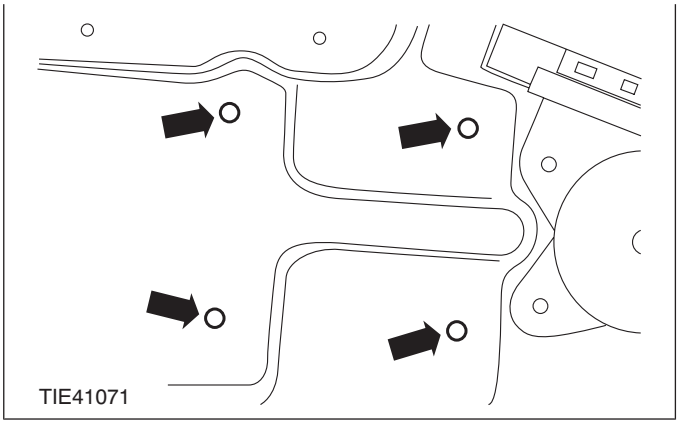
2. Remove the rear door latch bracket retaining screw.



REMOVAL AND INSTALLATION

Item 3 Rear door window regulator

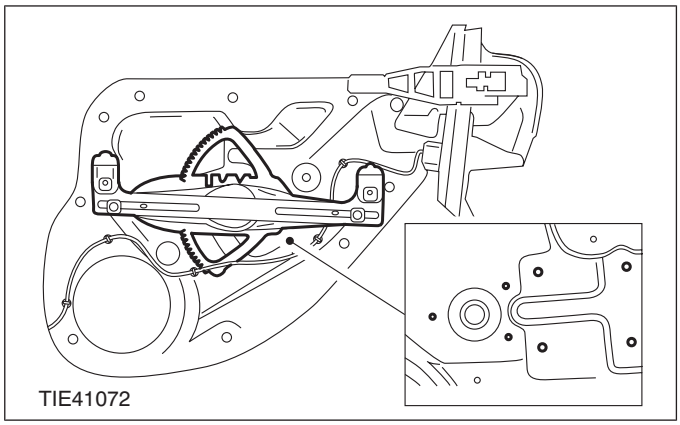
1. **Using a suitable electric hand drill, remove the rivets.**



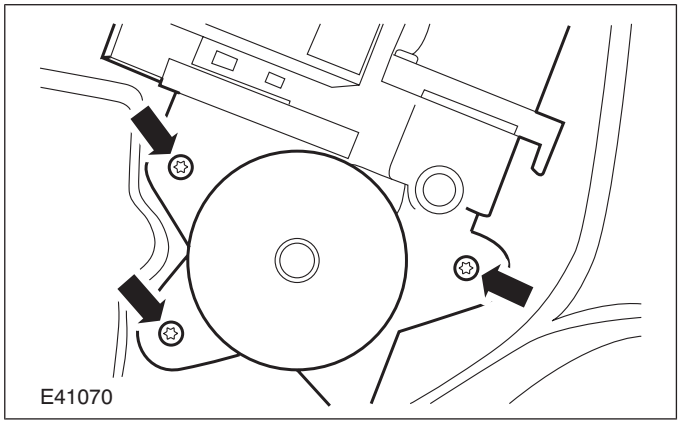
Installation Details

Item 3 Rear door window regulator

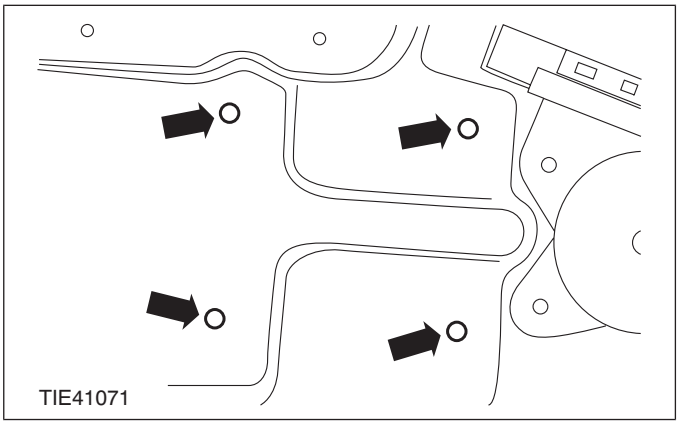
1. **Align the window regulator with the window regulator motor retaining screw holes and rivet holes in the door inner panel.**



2. **Install the window regulator motor.**



3. **Using a suitable blind rivet gun-hand, install new rivets in a diagonally opposed pattern.**



REMOVAL AND INSTALLATION

Rear Door Window Regulator — Vehicles With: Manual Windows

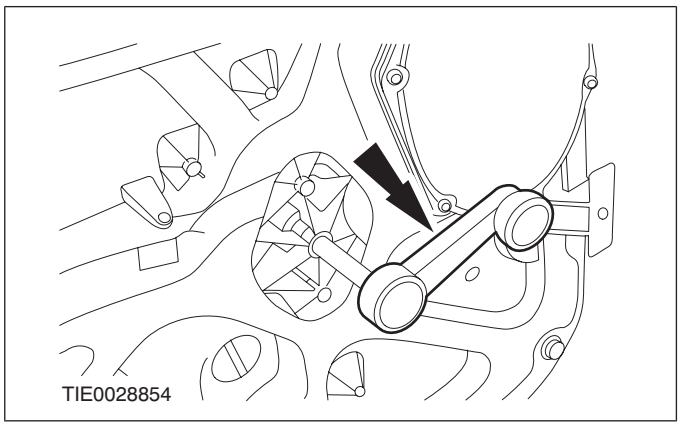
General Equipment

Electric hand drill
Blind rivet gun-hand

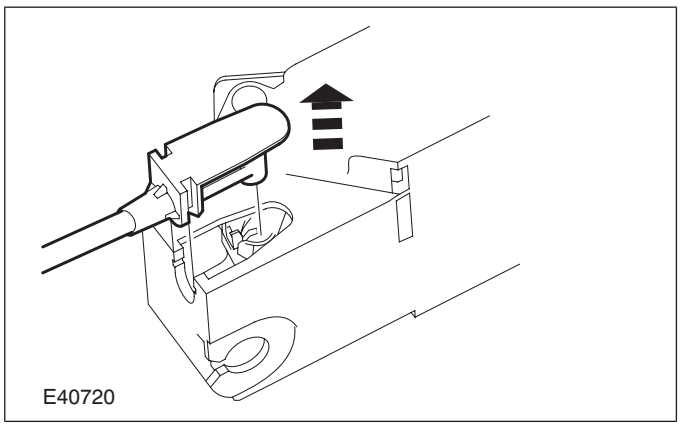
1. **Remove the rear door window glass.**

   For additional information, refer to: Rear Door Window Glass - Vehicles With: Manual Windows (501-11 Glass, Frames and Mechanisms, Removal and Installation).

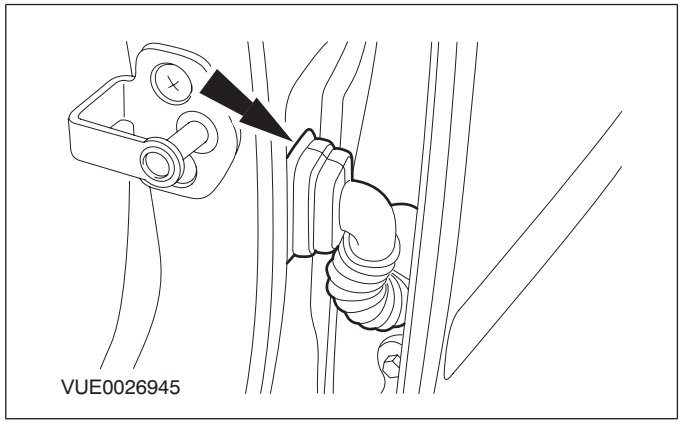
2. **Remove the window regulator handle.**



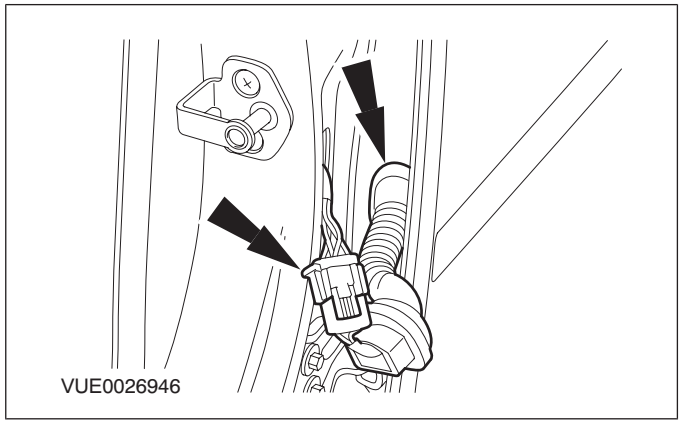
3. **Disconnect the door latch remote control cable from the door latch remote control.**
   - Operate the door latch remote control handle lock to the lock position.



4. **Close the rear door.**
5. **Detach the wiring harness from the B-pillar.**



6. **Disconnect the wiring harness at the B-pillar and push it into the door.**

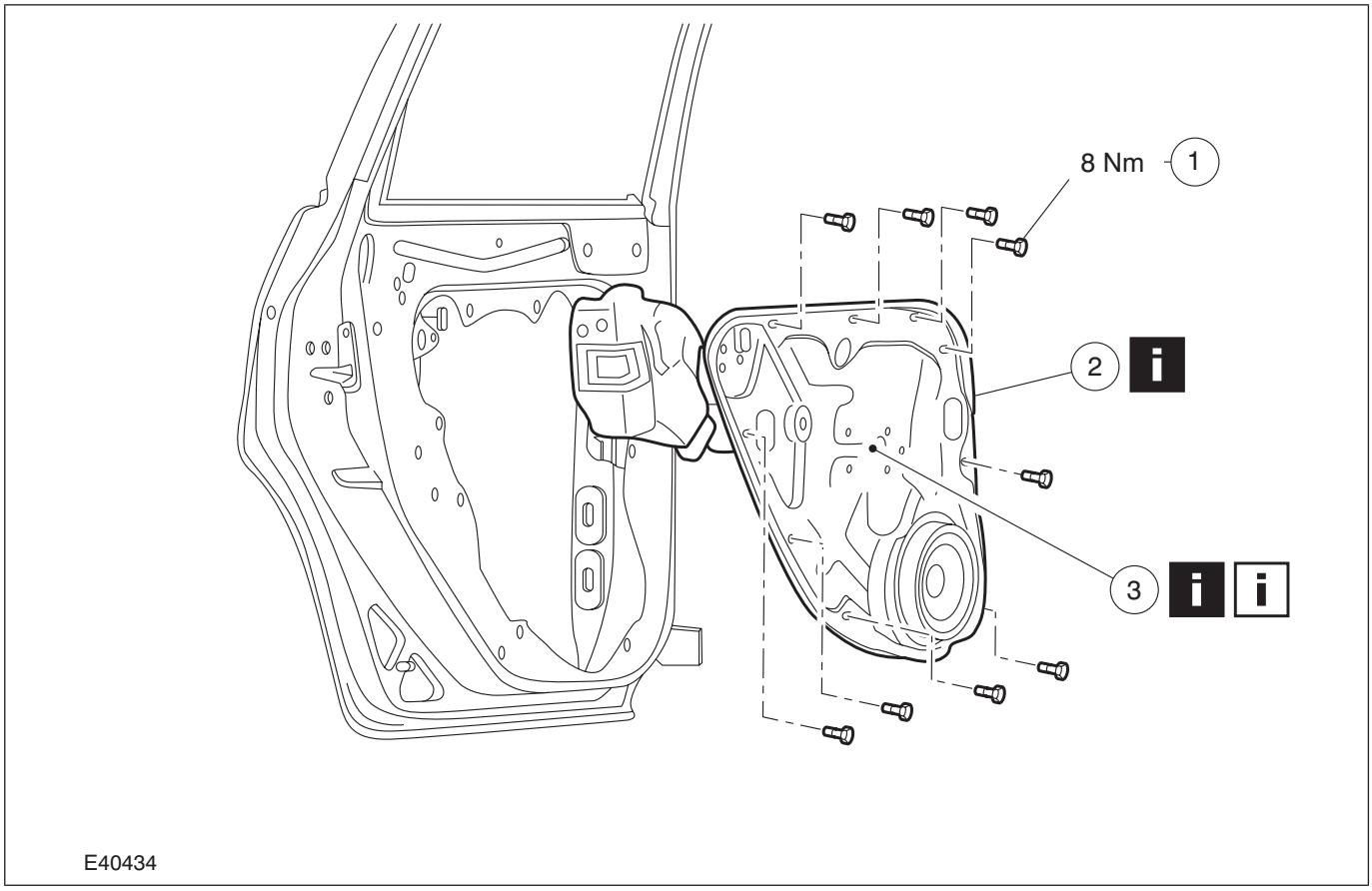


7. **Open the rear door.**
8. **Remove the exterior rear door handle.**

   For additional information, refer to: Exterior Rear Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

9. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



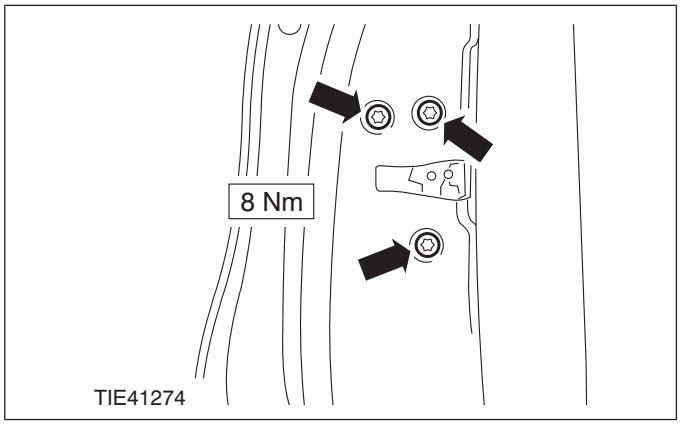
Item	Description
1	Door inner panel retaining bolts
2	Door inner panel See Removal Detail
3	Rear door window regulator See Removal Detail See Installation Detail

10. To install, reverse the removal procedure.

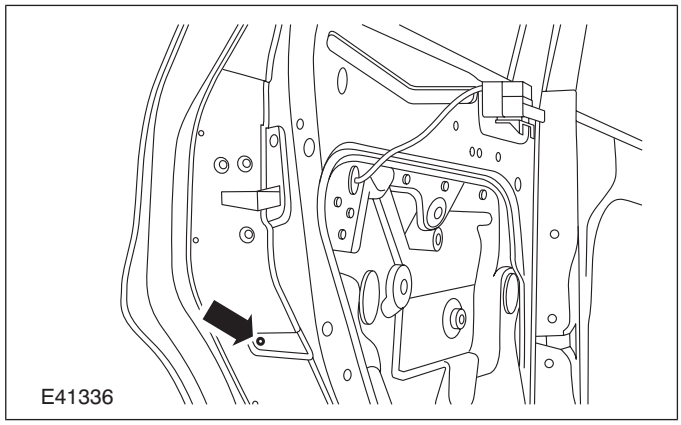
Removal Details

Item 2 Door inner panel

1. Remove the rear door latch retaining screws.



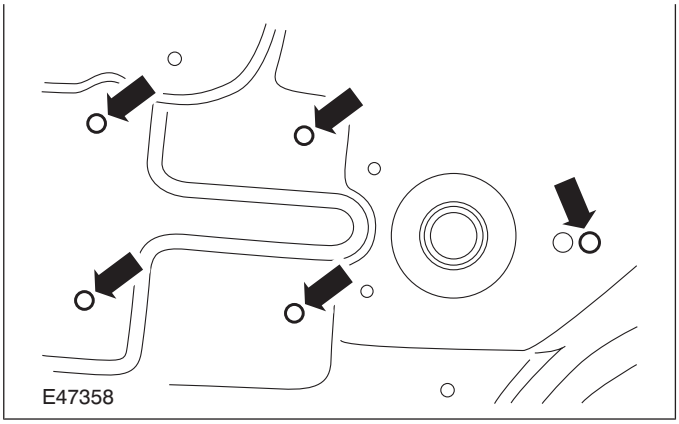
2. Remove the rear door latch bracket retaining screws.



REMOVAL AND INSTALLATION

Item 3 Rear door window regulator

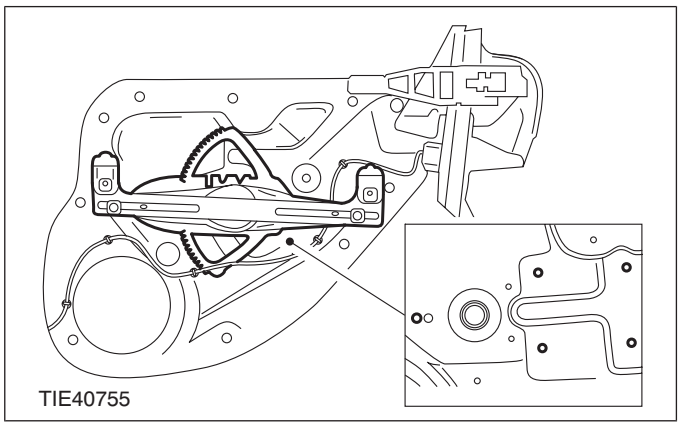
1. Using a suitable electric hand drill, remove the rivets.



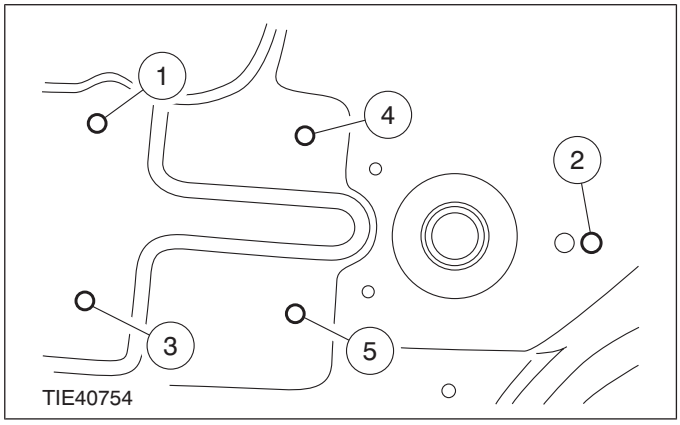
Installation Details

Item 3 Rear door window regulator

1. Align the window regulator with the rivet holes in the door inner panel.



2. Using a suitable blind rivet gun-hand, install new rivets in the sequence shown.



REMOVAL AND INSTALLATION

Front Door Window Regulator Motor — Vehicles With: Global Closing

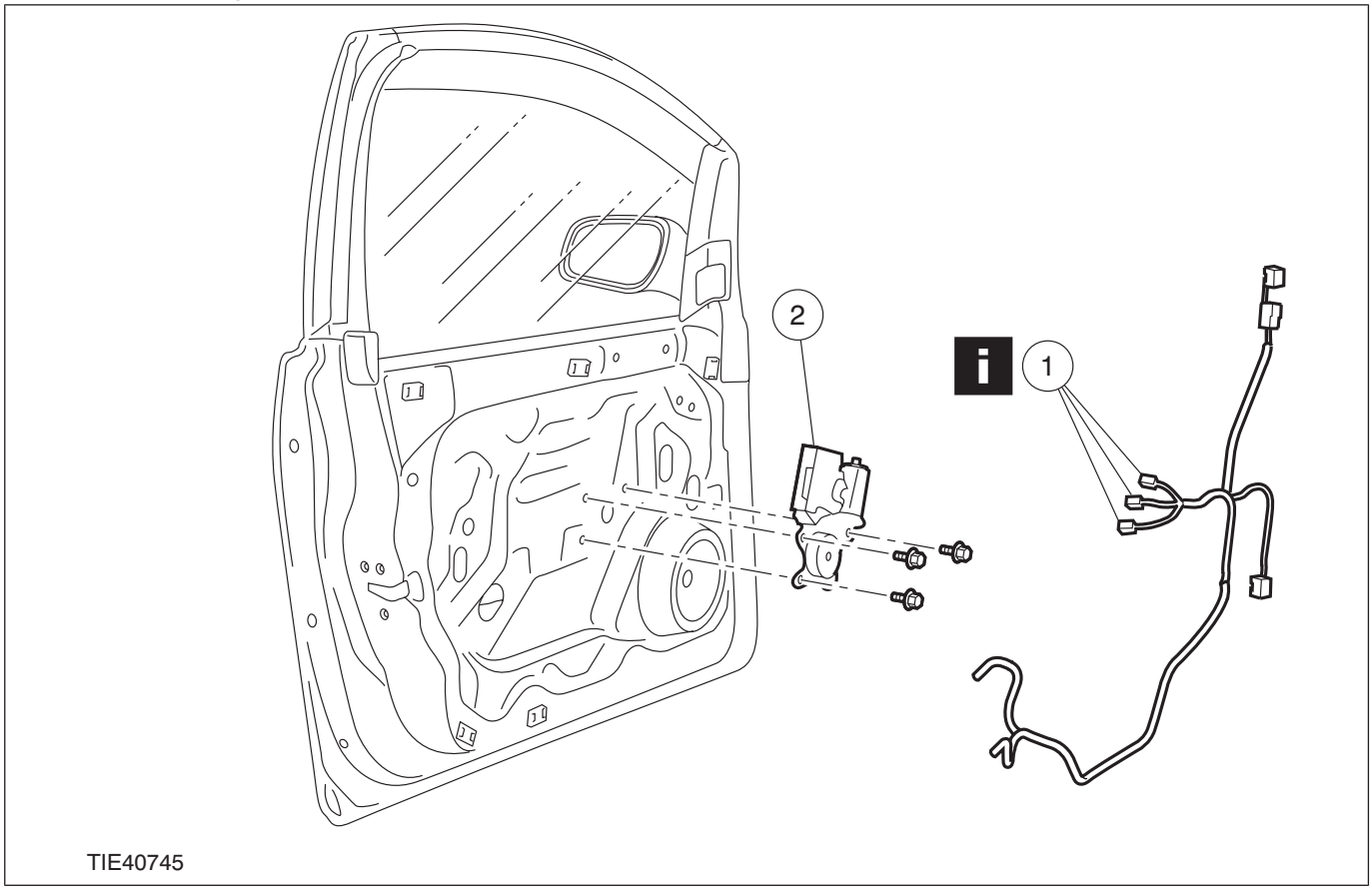
General Equipment

Worldwide diagnostic system (WDS)

1. **Remove the front door trim panel. For additional information, refer to: (501-05 Interior Trim and Ornamentation)**

   Front Door Trim Panel - 3-Door (Removal and Installation),
   Front Door Trim Panel - 4-Door/5-Door/Wagon (Removal and Installation).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



TIE40745

Item	Description
1	Front door window regulator motor electrical connectors See Removal Detail
2	Front door window regulator motor

3. **To install, reverse the removal procedure.**

4. **NOTE: This step must be carried out if installing a new front door window regulator motor.**

   Configure the front door window regulator motor control module using WDS.

5. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

REMOVAL AND INSTALLATION

Removal Details

Item 1 Front door window regulator motor electrical connectors

NOTE: The driver side front door window regulator motor has three electrical connectors, the passenger side front door window regulator motor has two.

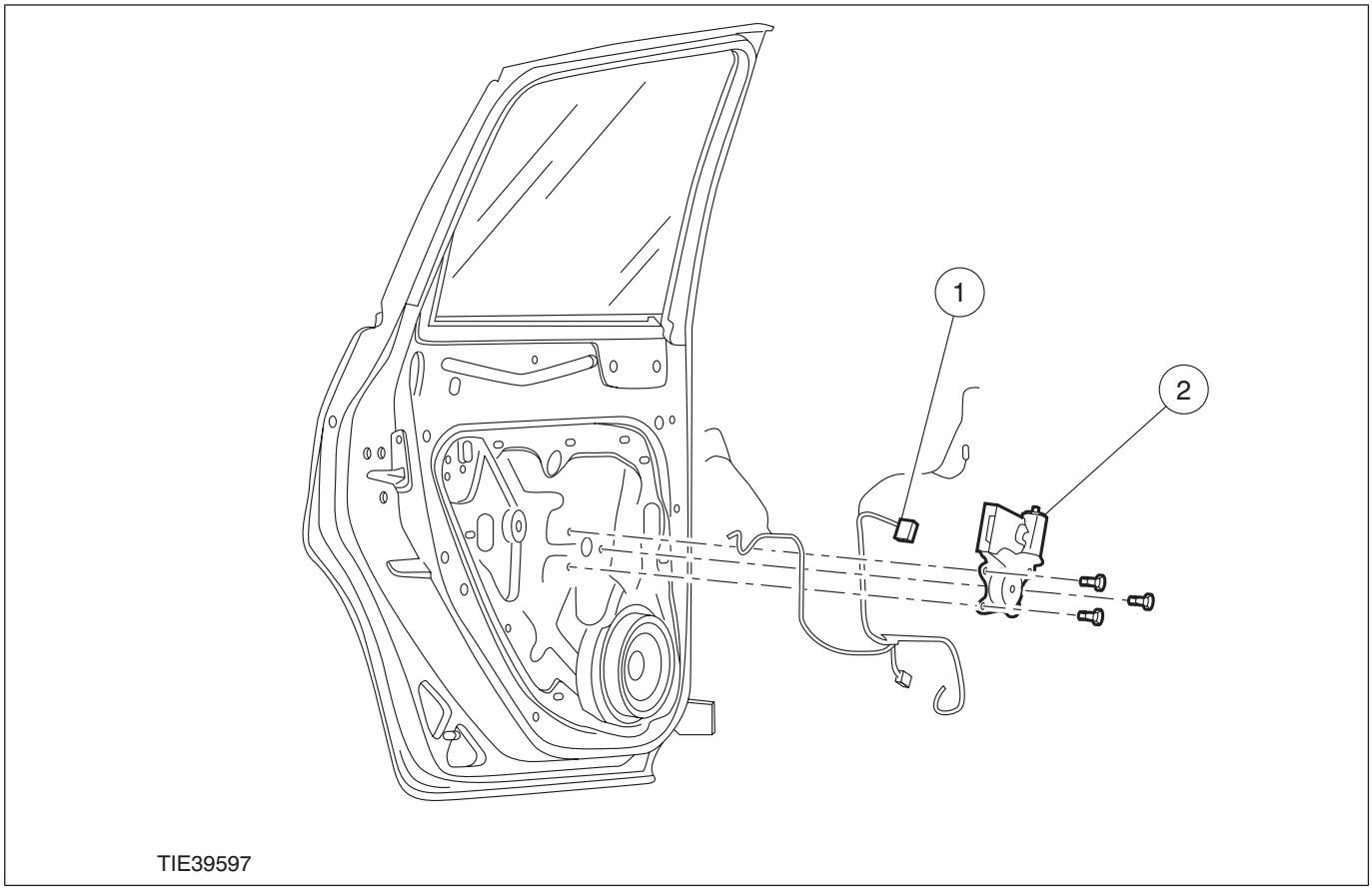
REMOVAL AND INSTALLATION

Rear Door Window Regulator Motor

General Equipment

Worldwide diagnostic system (WDS)

1. **Remove the rear door trim panel. For additional information, refer to Section 501-05 [Interior Trim and Ornamentation].**
2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Window regulator motor electrical connector
2	Window regulator motor

3. **To install, reverse the removal procedure.**
4. **NOTE: This step should only be carried out if installing a new window regulator motor.**

   Configure the window regulator motor control module using worldwide diagnostic system (WDS).
5. **Initialize the door window motors.**

   For additional information, refer to Door Window Motor Initialization in this section.

REMOVAL AND INSTALLATION

Windshield Glass

Materials	
Name	**Specification**
Windscreen Adhesive Kit - 1 Component	WSK-M11P57-A3 / 7U7J-T03863-AA
Windshield Adhesive Kit	WSS-M11P57-A5

General Equipment

Adhesive Tape
Direct Glazing Removal/Replacement Equipment
Knife
Two Leg Puller

Removal

1. ⚠ **CAUTION:**

Refer to: Window Glass Health and Safety Precautions (100-00 General Information, Description and Operation).

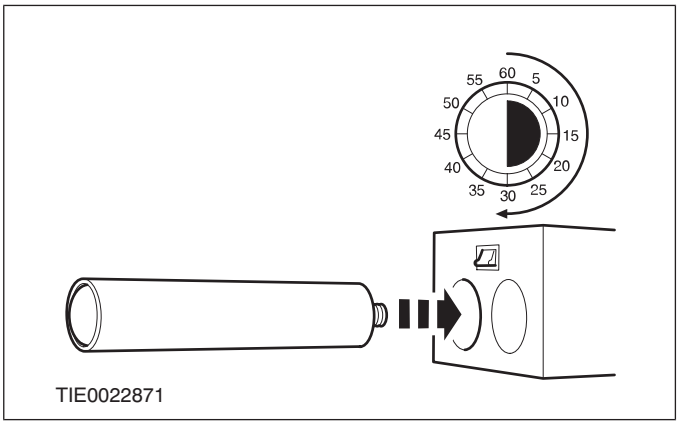
2. 1. Material: Windshield Adhesive Kit (WSS-M11P57-A5)

2. Remove the polyurethane (PU) adhesive cap and heat the 2K-PU adhesive for a minimum of 30 minutes.

   General Equipment: Direct Glazing Removal/Replacement Equipment

3. Repairs under warranty:

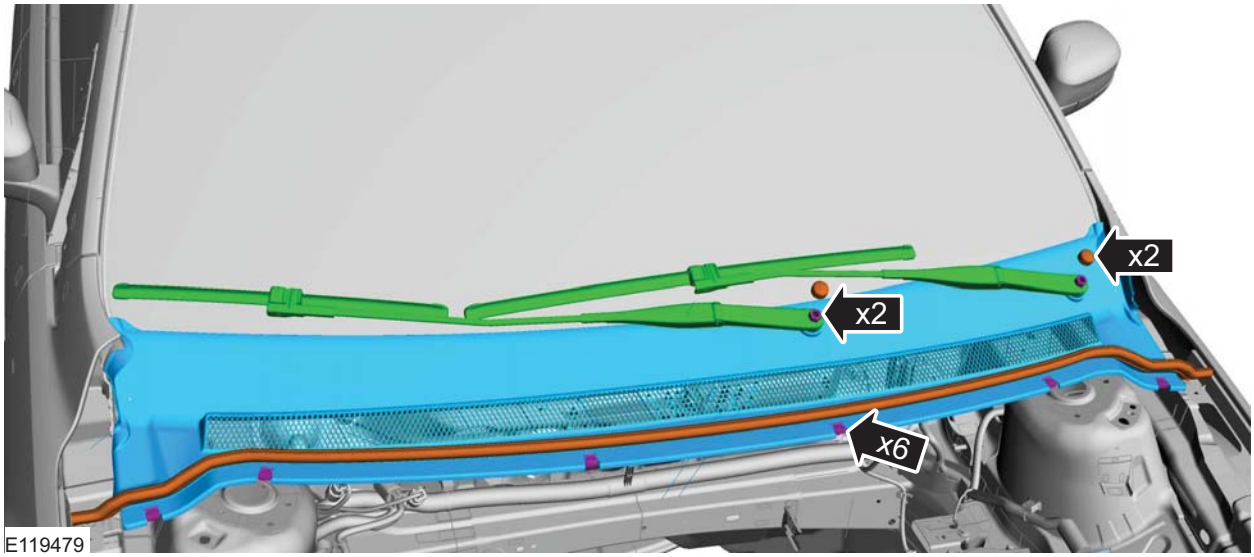
   Material: Windscreen Adhesive Kit - 1 Component (WSK-M11P57-A3 / 7U7J-T03863-AA)



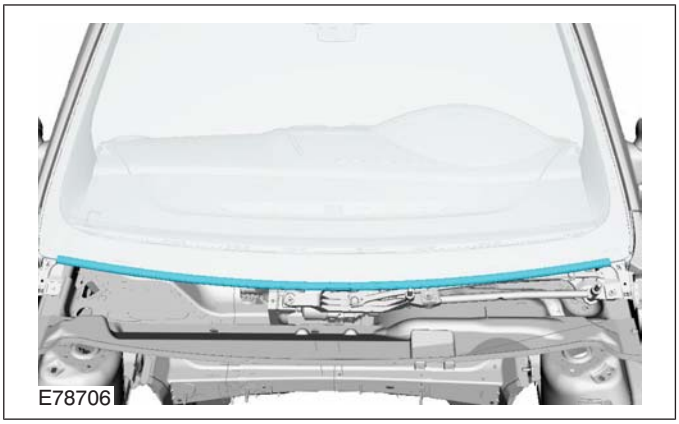
3. ⚠ **CAUTION: Make sure that the motor is in the park position.**

General Equipment: Two Leg Puller

REMOVAL AND INSTALLATION

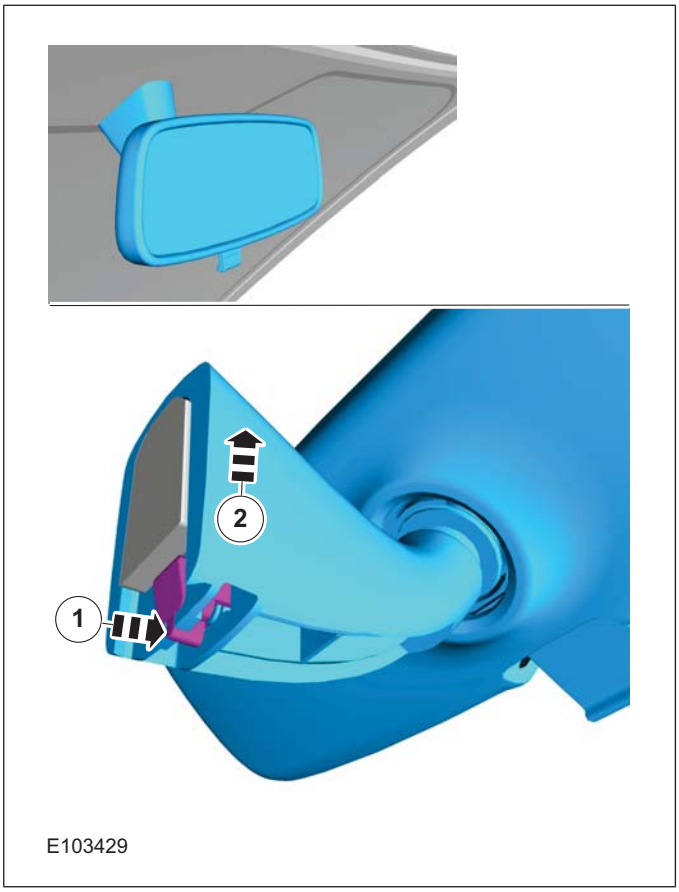


4.



Vehicles with manual dimming interior mirror

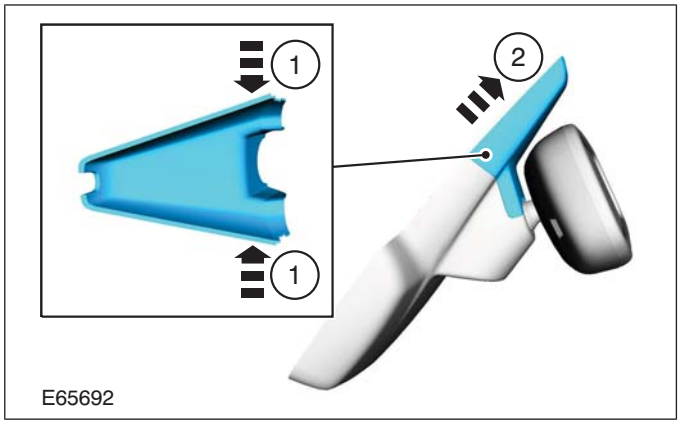
5.



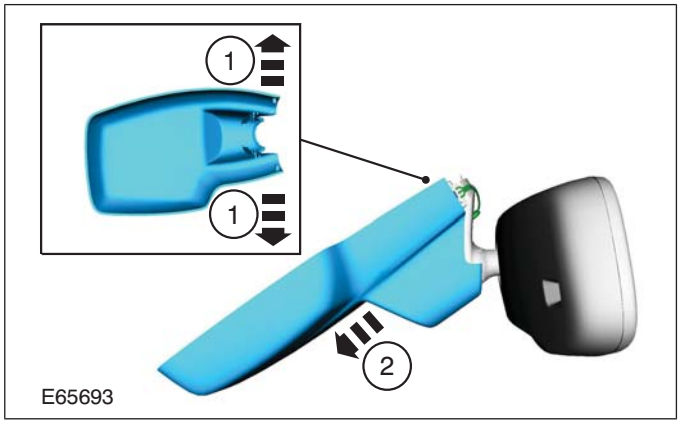
REMOVAL AND INSTALLATION

Vehicles with autolamps and rain sensor

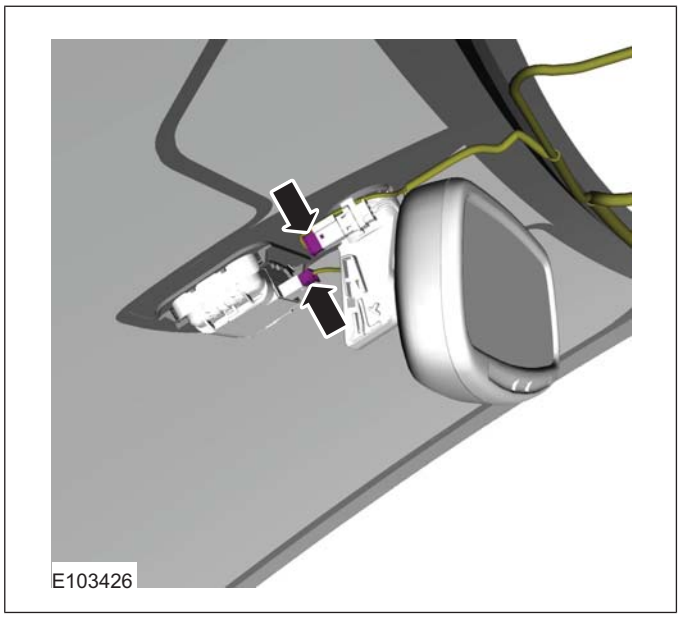
6.



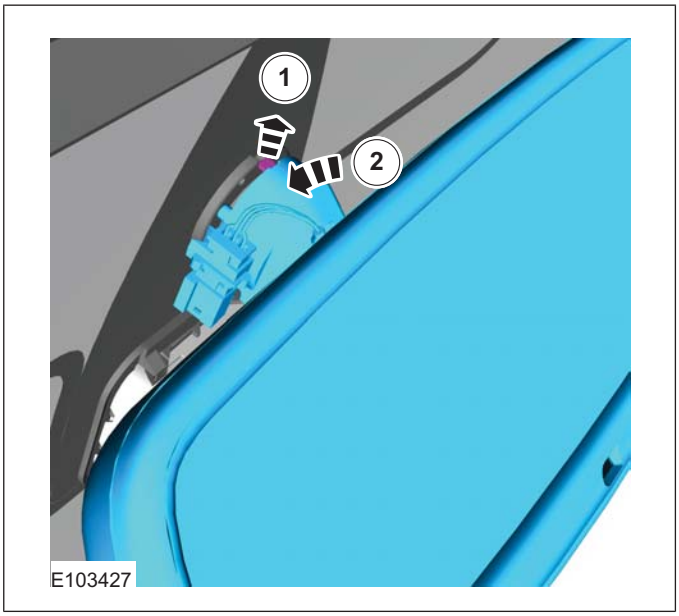
7.



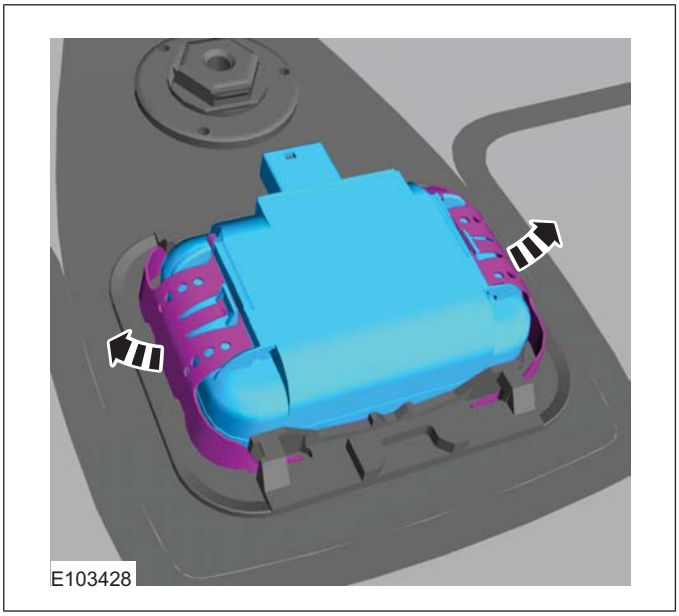
8.



9.



10.

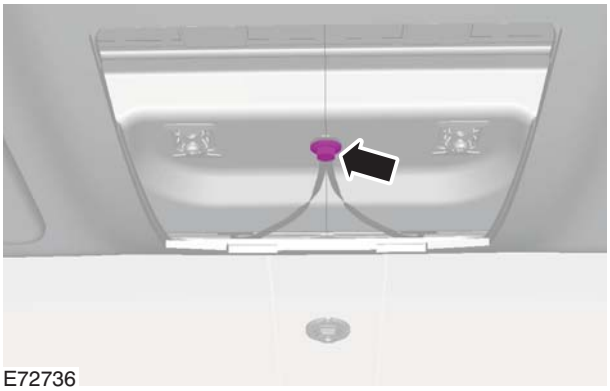


REMOVAL AND INSTALLATION

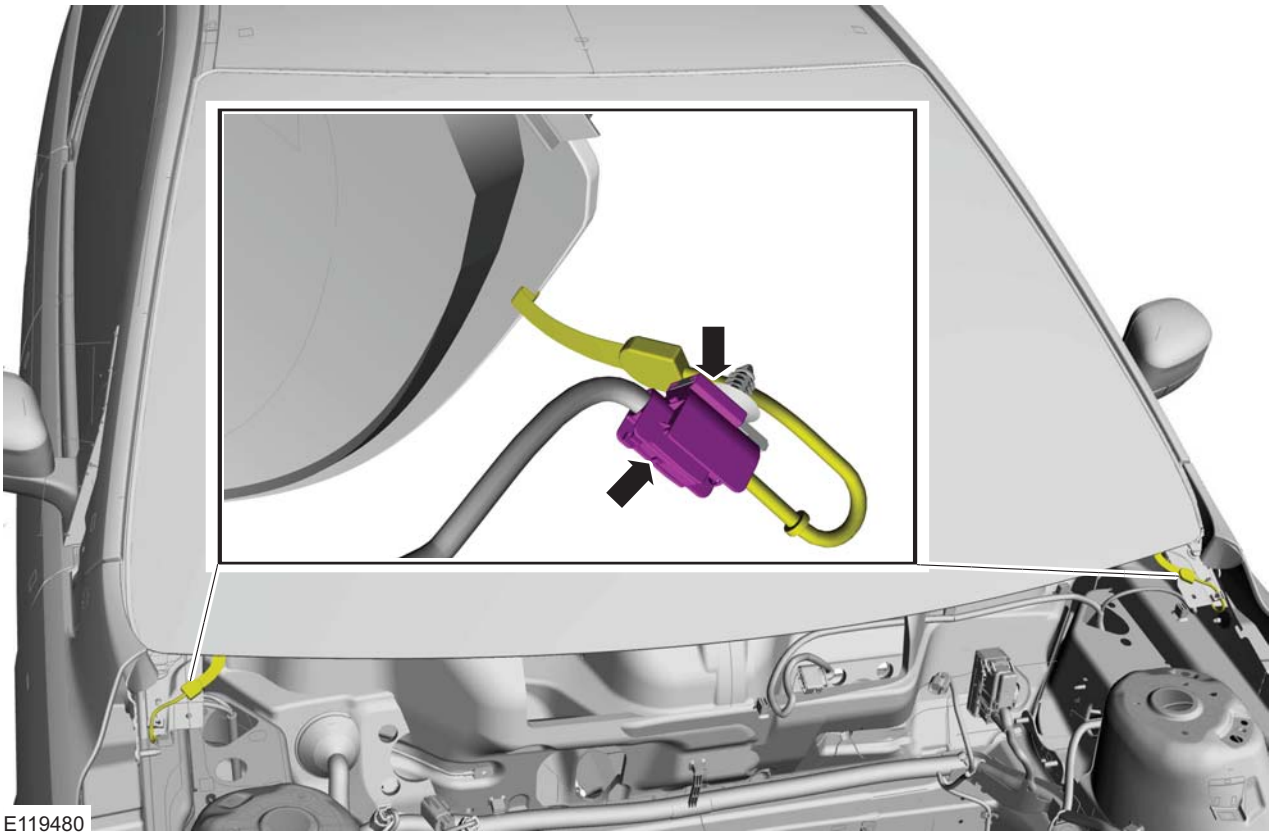
Vehicles with heated windshield

11. Refer to: Overhead Console (501-12 Instrument Panel and Console, Removal and Installation).

12.


E72736

13.


E119480

All vehicles

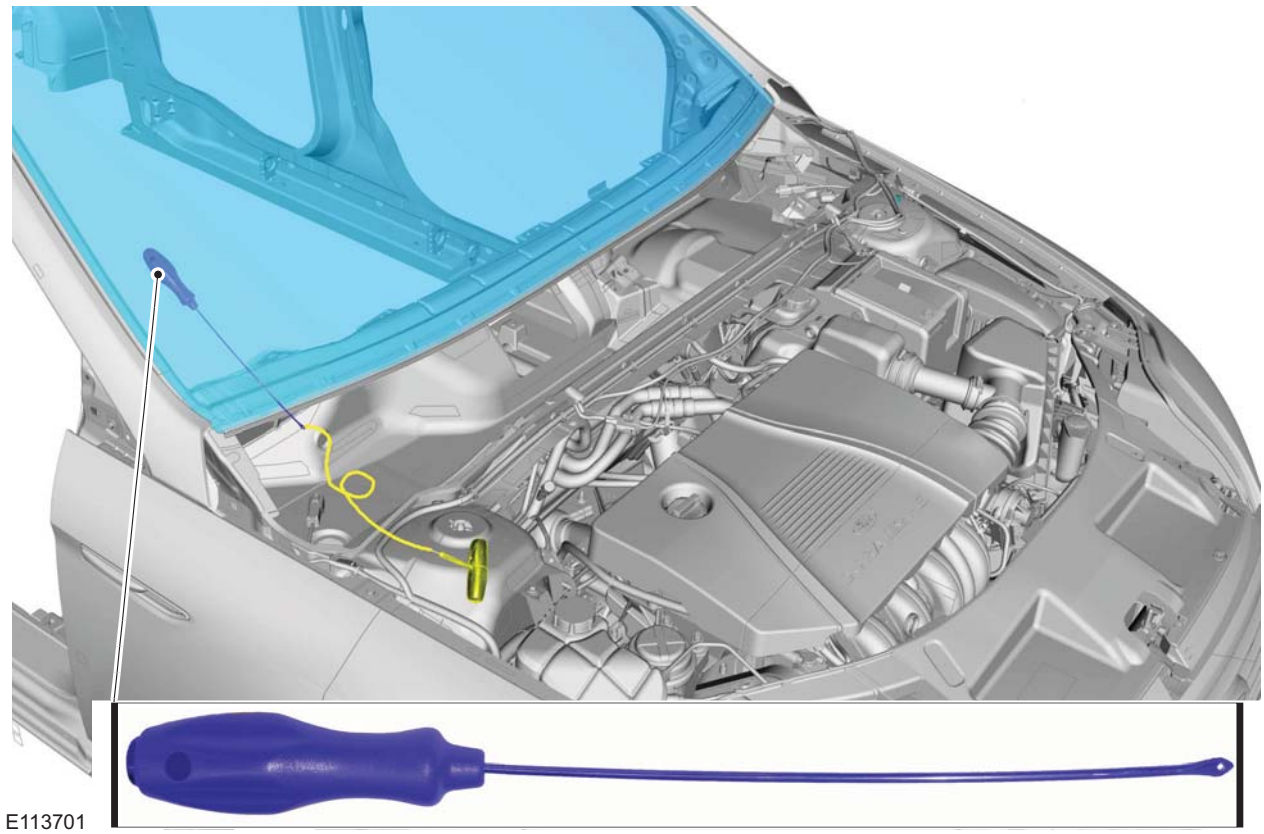
14.



Use a suitable awl to thread the cutting wire.

General Equipment: Direct Glazing Removal/Replacement Equipment

REMOVAL AND INSTALLATION



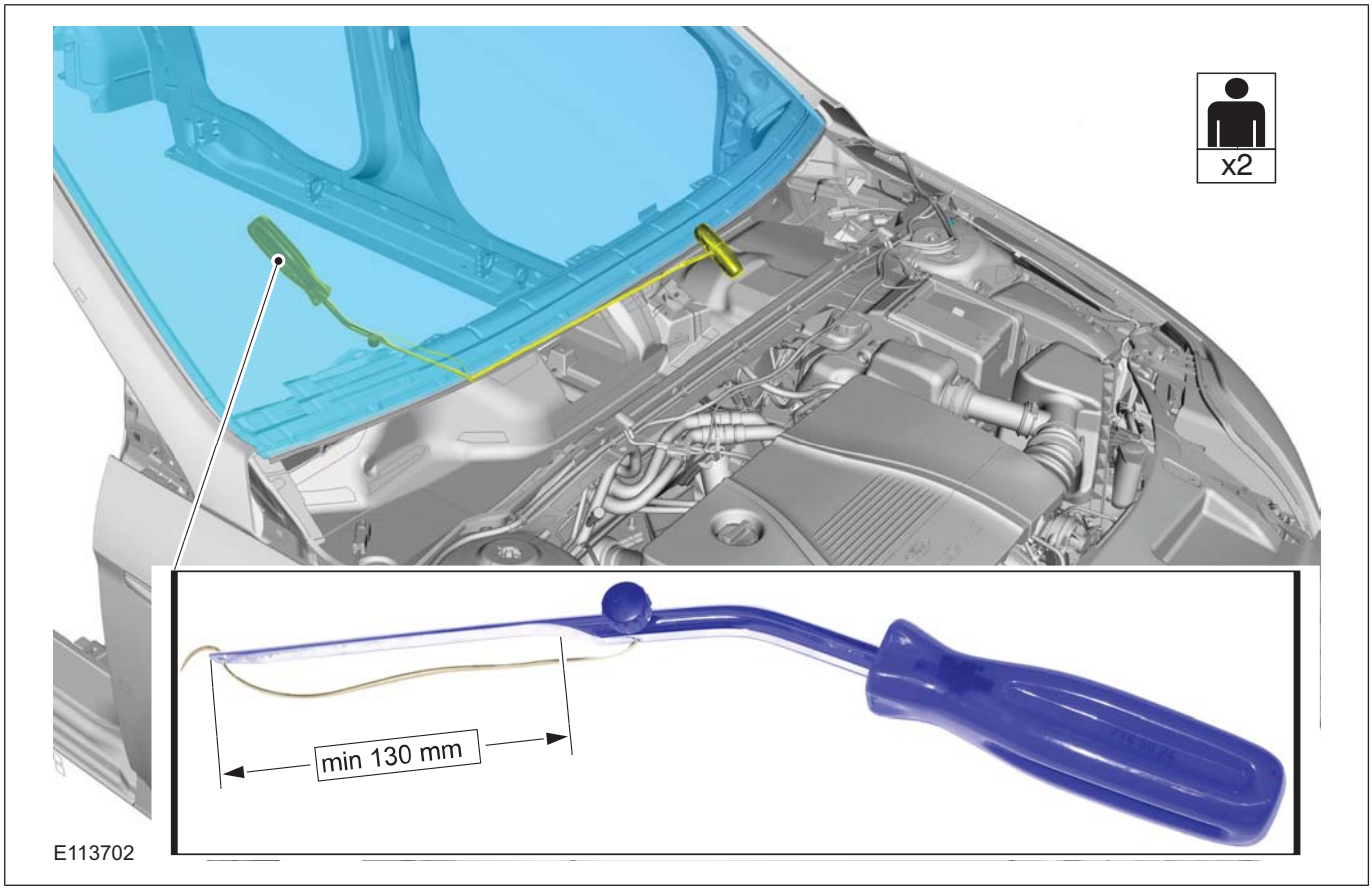
15. 

CAUTION: If the original window glass is to be installed, take care not to damage the electrical connectors and the weatherstrip (if equipped).

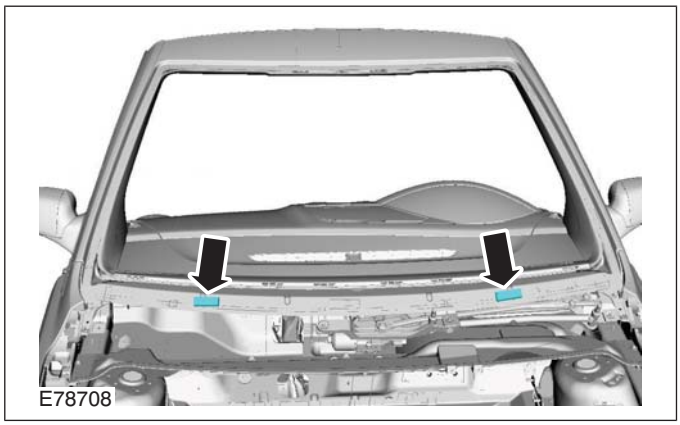
Use a suitable brace to prevent trim damages.

General Equipment: Direct Glazing Removal/Replacement Equipment

REMOVAL AND INSTALLATION



16. **NOTE:** Note the position of each glass locating spacer.

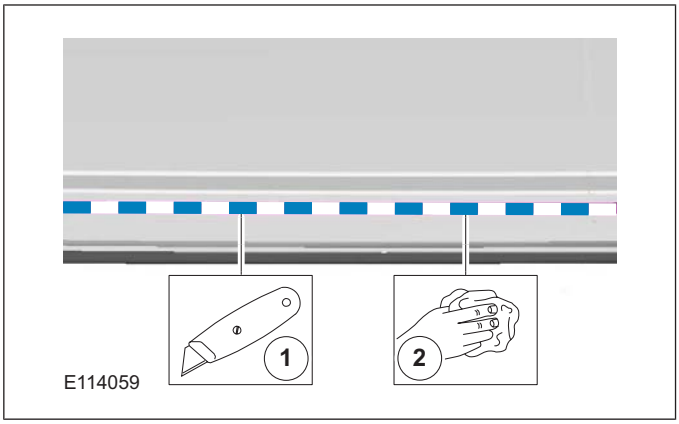


Installation

1. 1. **NOTE:** Minimum 1 mm bead thickness.

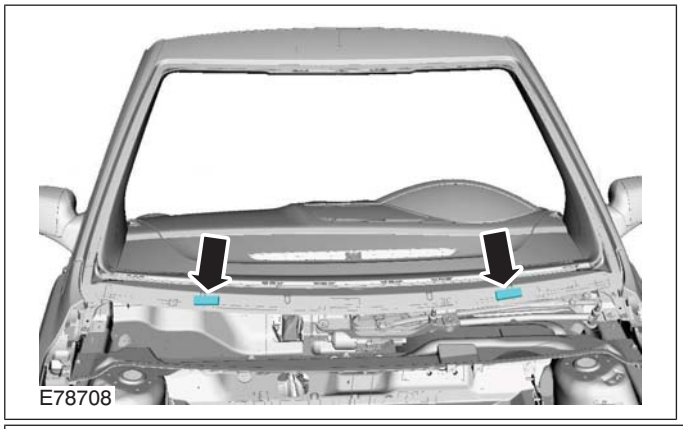
   General Equipment: Knife
   2. **NOTE:** Make sure that the mating faces are clean and free of foreign material.
   3. **NOTE:** Touching the adhesive surface will impair rebonding.

      Prepare the windshield glass, windshield glass flange and trimmed PU adhesive in accordance with the instructions supplied with the glass adhesive kit.

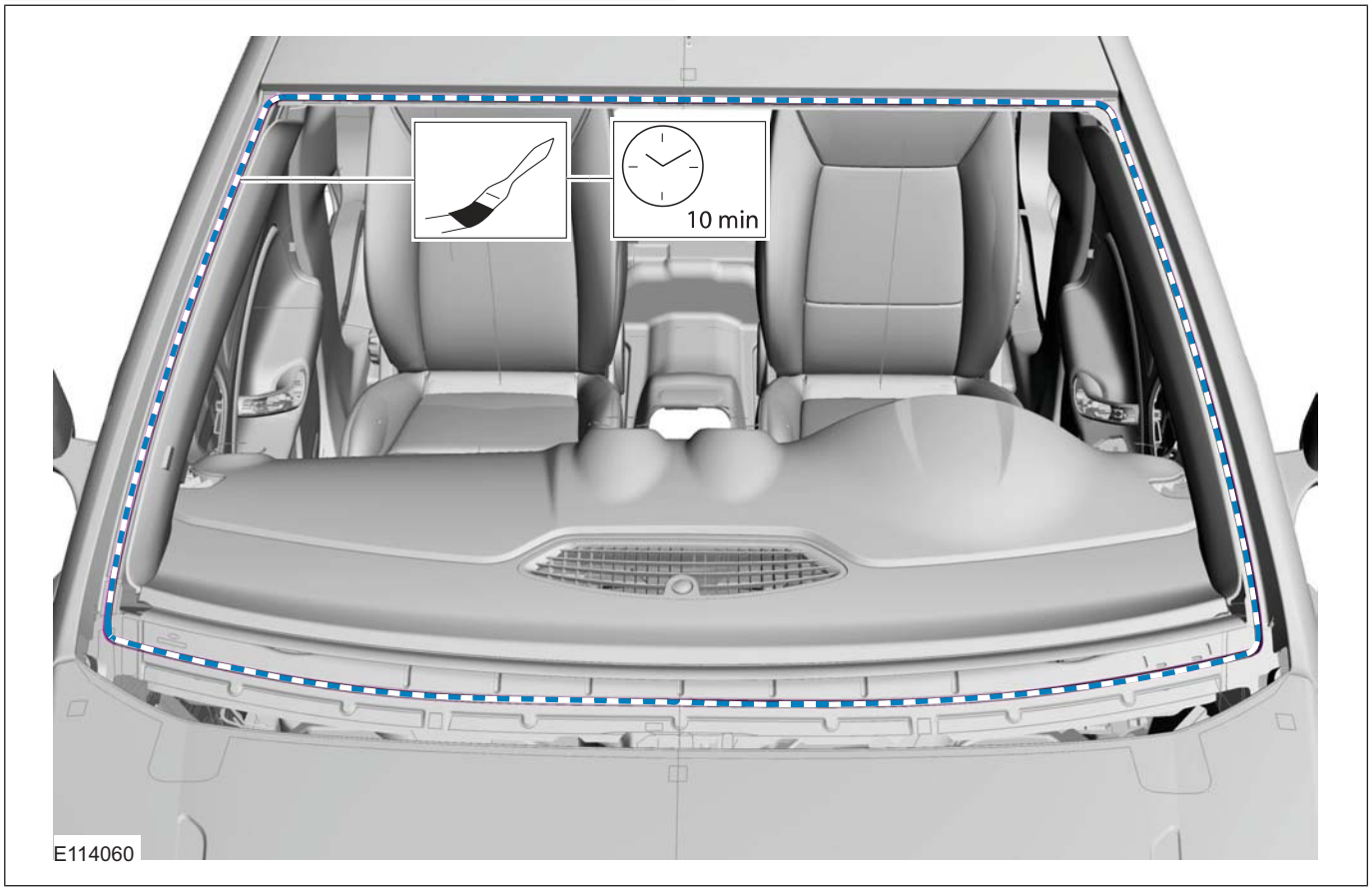


REMOVAL AND INSTALLATION

2. **NOTE:** Make sure that new components are installed.

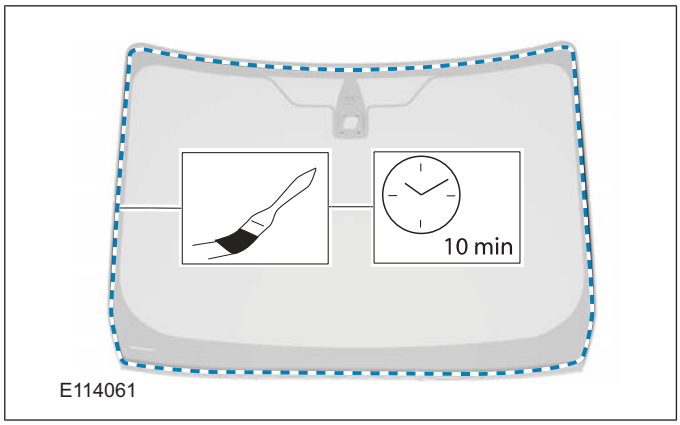


3. Apply the activator/ primer in accordance with the instructions supplied with the glass adhesive kit.



REMOVAL AND INSTALLATION

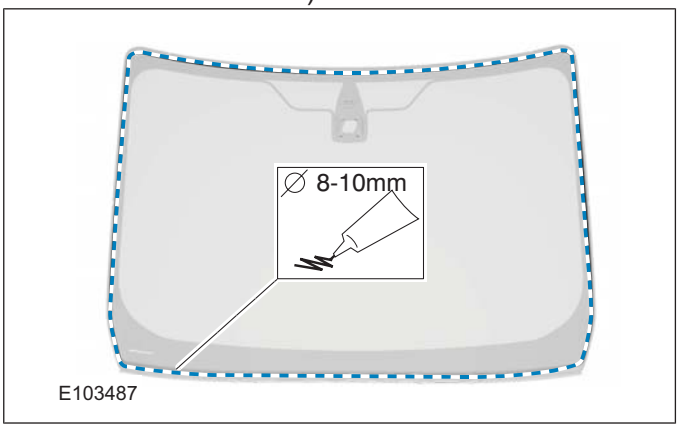
4. Apply the activator/ primer in accordance with the instructions supplied with the glass adhesive kit.



5. **NOTE:** Discard the first 100 mm of adhesive as this may have a reduced working time.

NOTE: Make sure that any breakage in the continuous bead of adhesive is overlapped by 20 mm.

General Equipment: Direct Glazing Removal/Replacement Equipment
Material: Windshield Adhesive Kit (WSS-M11P57-A5)
Material: Windscreen Adhesive Kit - 1 Component (WSK-M11P57-A3 / 7U7J-T03863-AA)



6. • Press firmly and evenly into position.

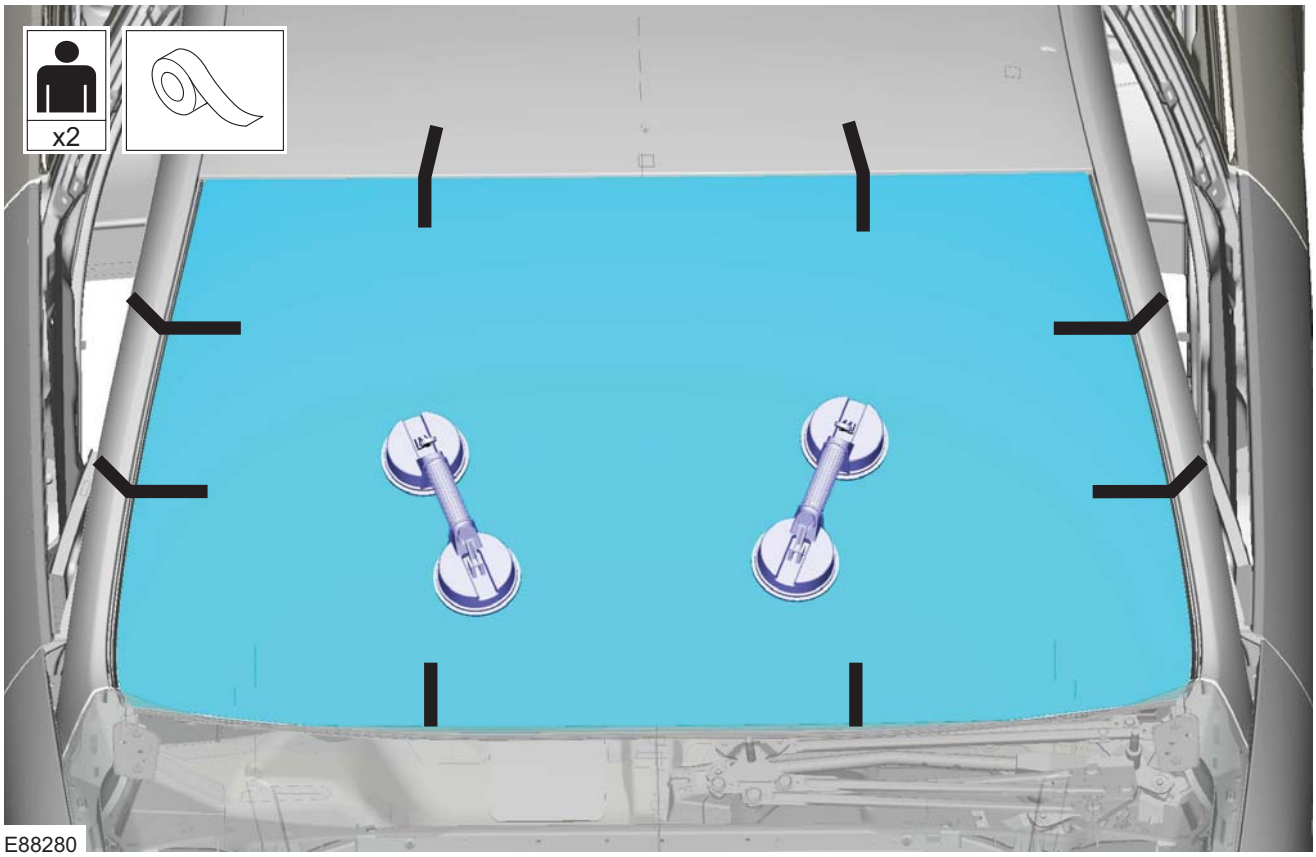
   General Equipment: Direct Glazing Removal/Replacement Equipment

   • **CAUTION: During the curing time of the polyurethane (PU) adhesive, the door windows must be left open.**

   Using tape, secure the windshield glass in the correct position until the PU adhesive has cured.

   General Equipment: Adhesive Tape

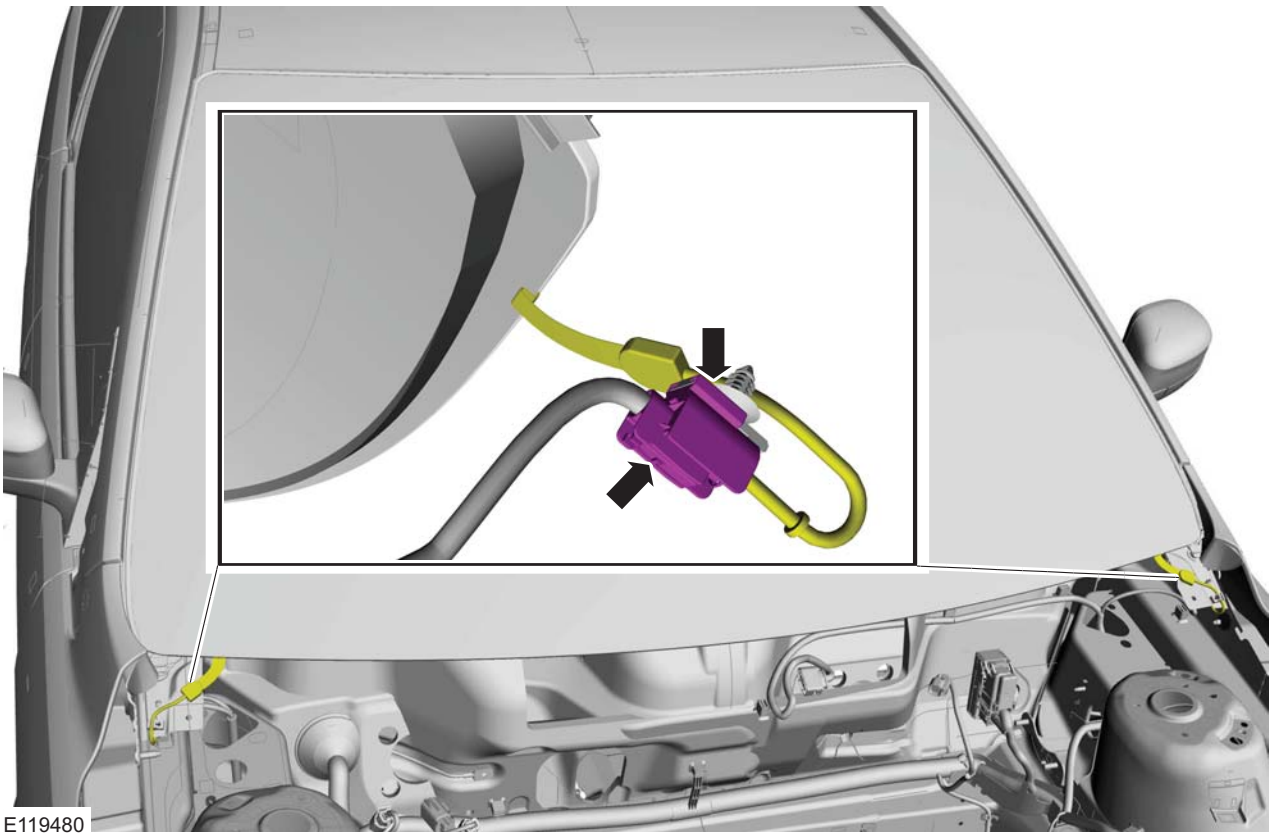
REMOVAL AND INSTALLATION



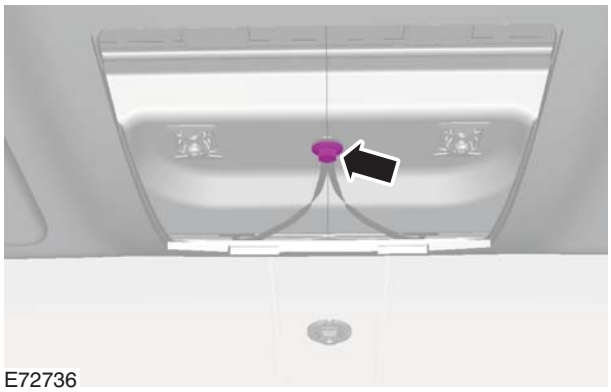
Vehicles with heated windshield

7.

REMOVAL AND INSTALLATION



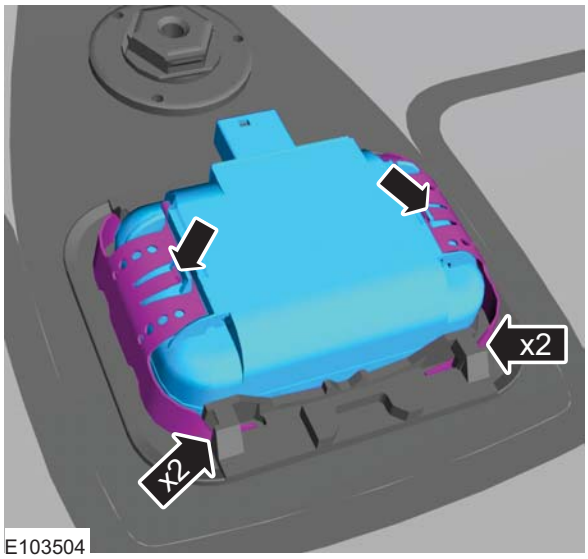
8. Torque: 12 Nm



9. Refer to: Overhead Console (501-12 Instrument Panel and Console, Removal and Installation).

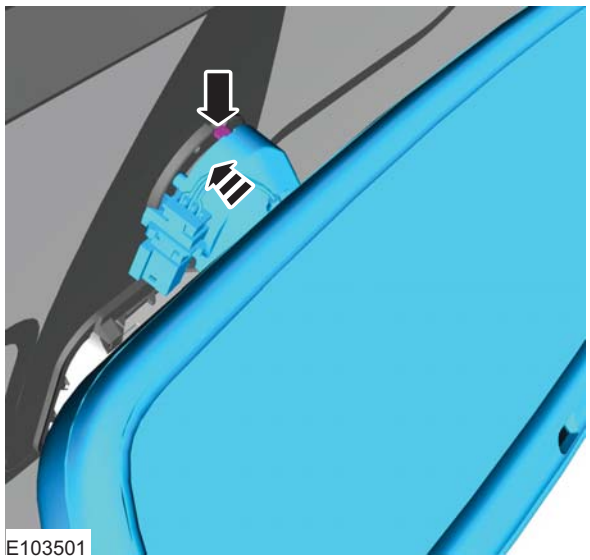
Vehicles with autolamps and rain sensor

10.

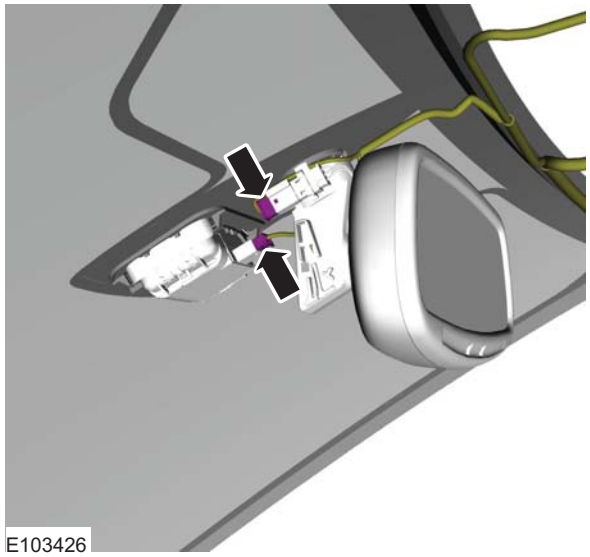


REMOVAL AND INSTALLATION

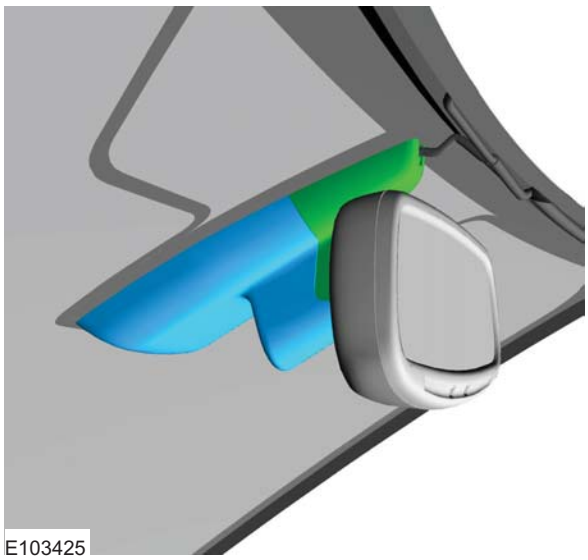
11.



12.

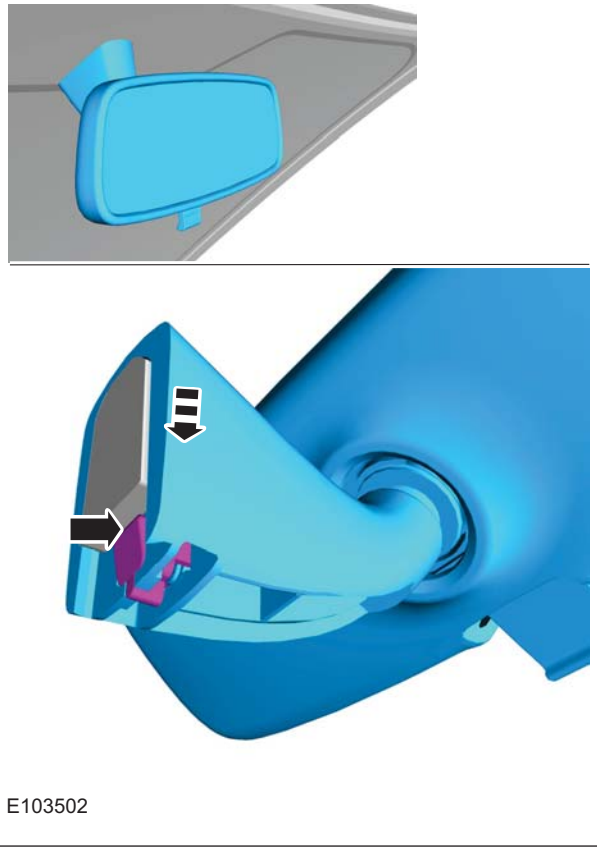


13.



Vehicles with manual dimming interior mirror

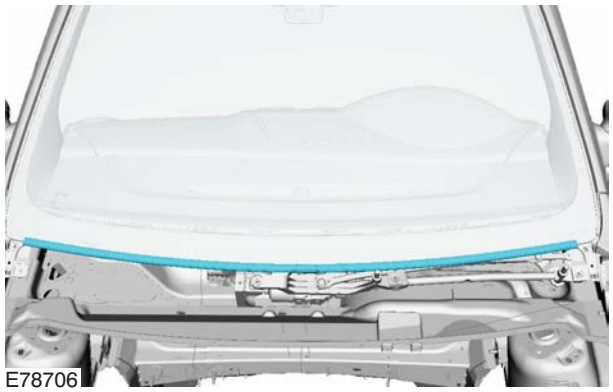
14.



REMOVAL AND INSTALLATION

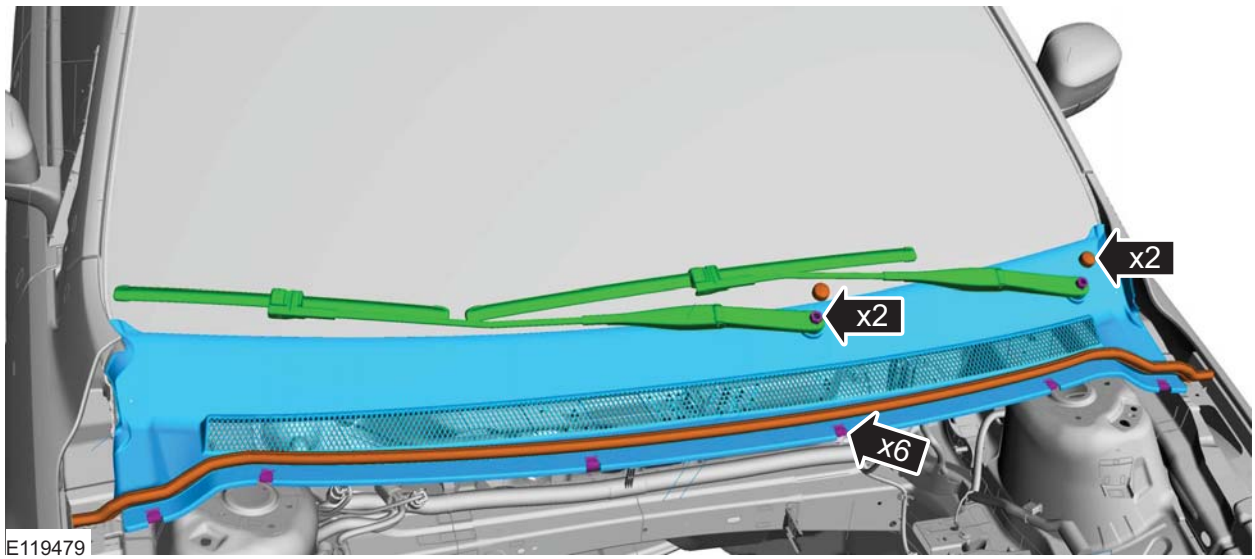
All vehicles

15.



16. ⚠ **CAUTION: Make sure that the motor is in the park position.**

Torque: 15 Nm



REMOVAL AND INSTALLATION

Rear Quarter Window Glass — 3-Door/5-Door

Materials	
Name	**Specification**
Windscreen Adhesive Kit - 1 Component	WSK-M11P57-A3 / 7U7J-T03863-AA
Windshield Adhesive Kit	WSS-M11P57-A5

General Equipment

Adhesive Tape
Direct Glazing Removal/Replacement Equipment
Knife
Laminated Card

Removal

1. **CAUTION:**

Refer to: Window Glass Health and Safety Precautions (100-00 General Information, Description and Operation).

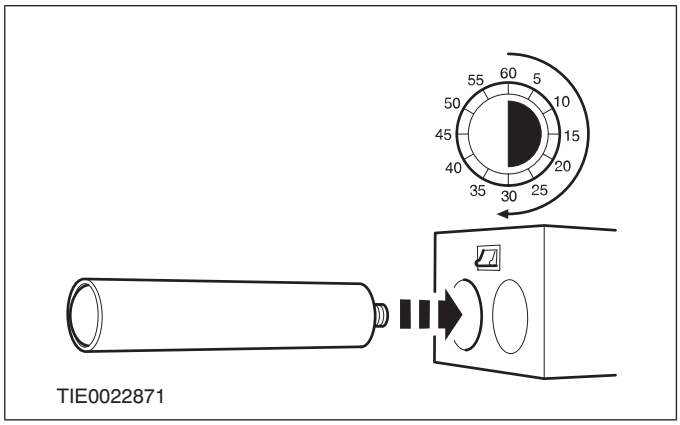
2. 1. Material: Windshield Adhesive Kit (WSS-M11P57-A5)

2. Remove the polyurethane (PU) adhesive cap and heat the 2K-PU adhesive for a minimum of 30 minutes.

General Equipment: Direct Glazing Removal/Replacement Equipment

3. Repairs under warranty:

Material: Windscreen Adhesive Kit - 1 Component (WSK-M11P57-A3 / 7U7J-T03863-AA)



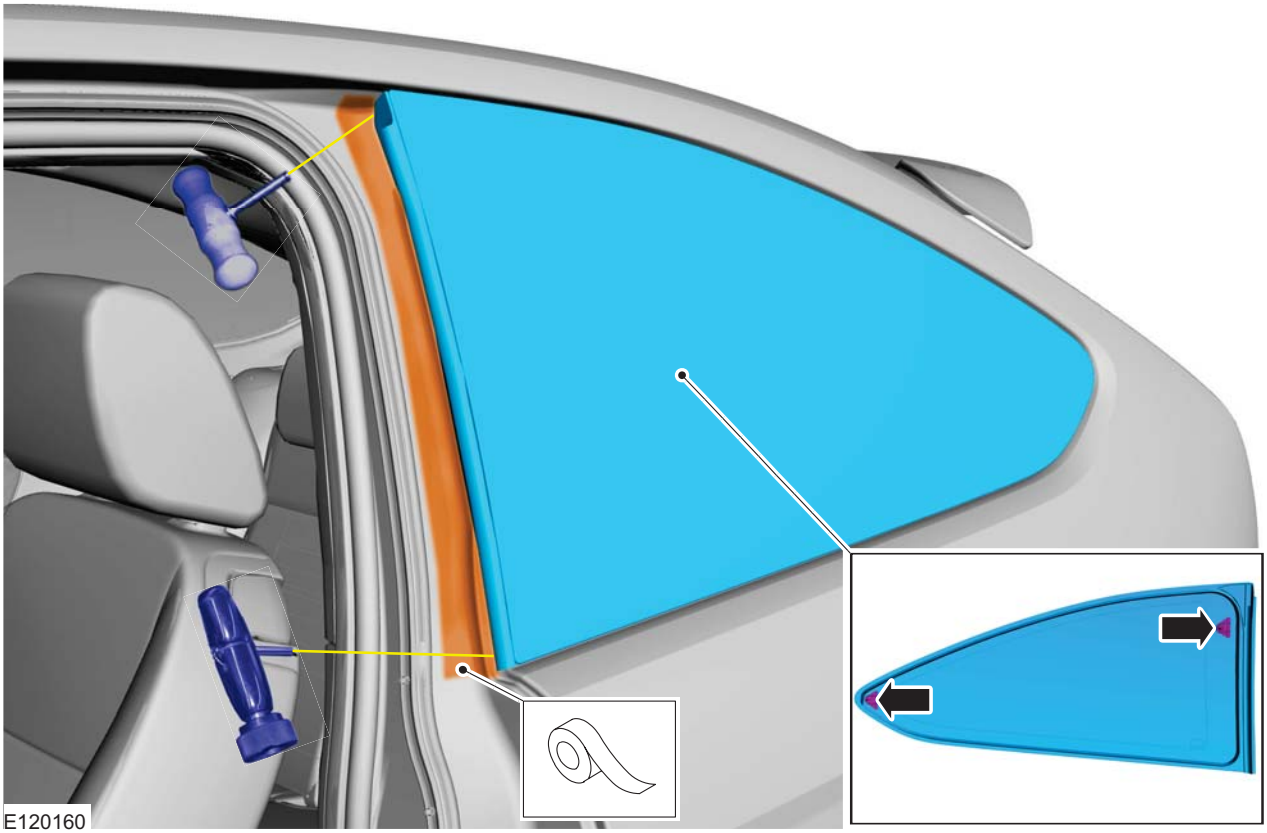
3-door

3. **WARNING: Make sure that the component paintwork is not damaged.**

NOTE: Some resistance may be encountered when cutting through the glass locating spacers.

General Equipment: Adhesive Tape
General Equipment: Laminated Card
General Equipment: Direct Glazing Removal/Replacement Equipment

REMOVAL AND INSTALLATION



5-door

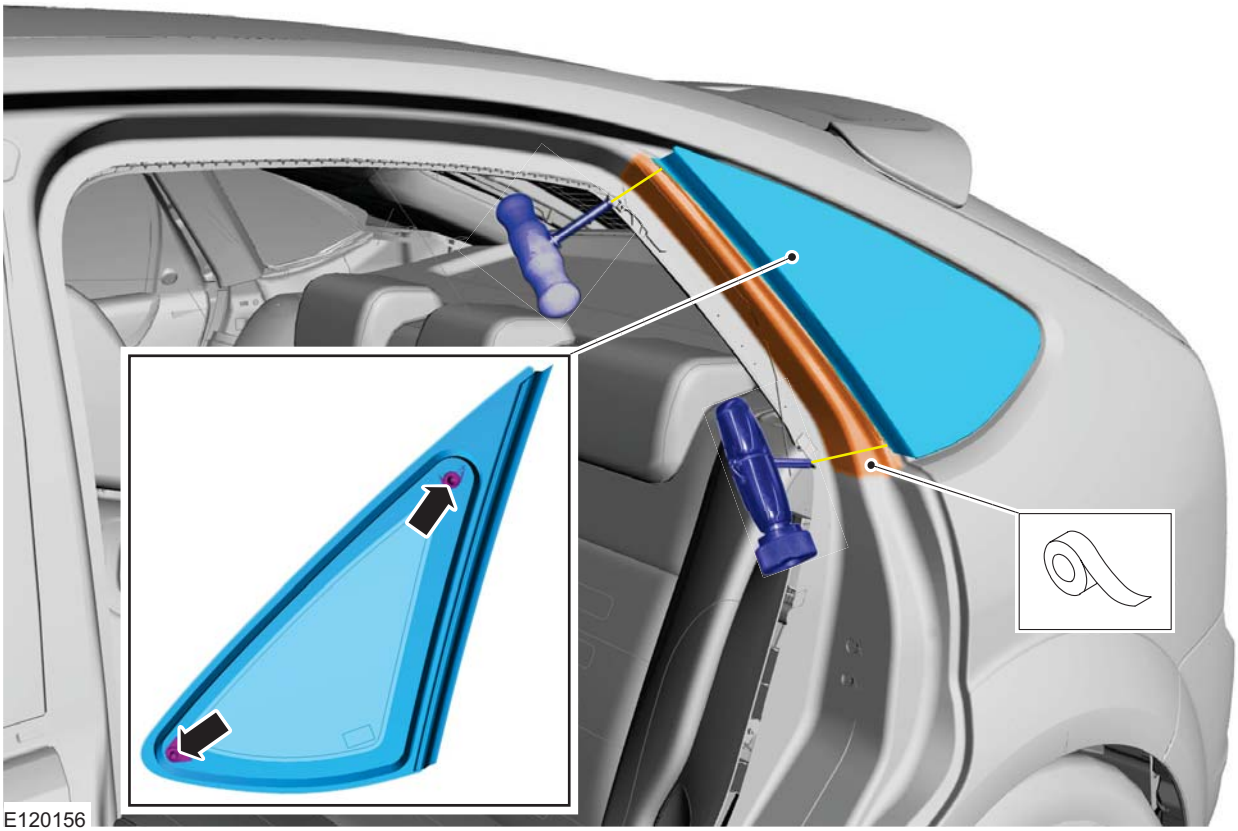
4. Refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).
   Refer to: D-Pillar Trim Panel - 5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

5. **WARNING: Make sure that the component paintwork is not damaged.**

NOTE: Some resistance may be encountered when cutting through the glass locating spacers.

General Equipment: Adhesive Tape
General Equipment: Laminated Card
General Equipment: Direct Glazing Removal/Replacement Equipment

REMOVAL AND INSTALLATION

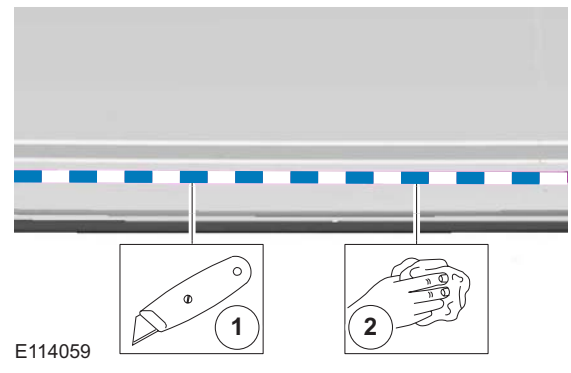


Installation

1. 1. **NOTE:** Minimum 1 mm bead thickness.

   General Equipment: Knife
   2. **NOTE:** Make sure that the mating faces are clean and free of foreign material.
   3. **NOTE:** Touching the adhesive surface will impair rebonding.

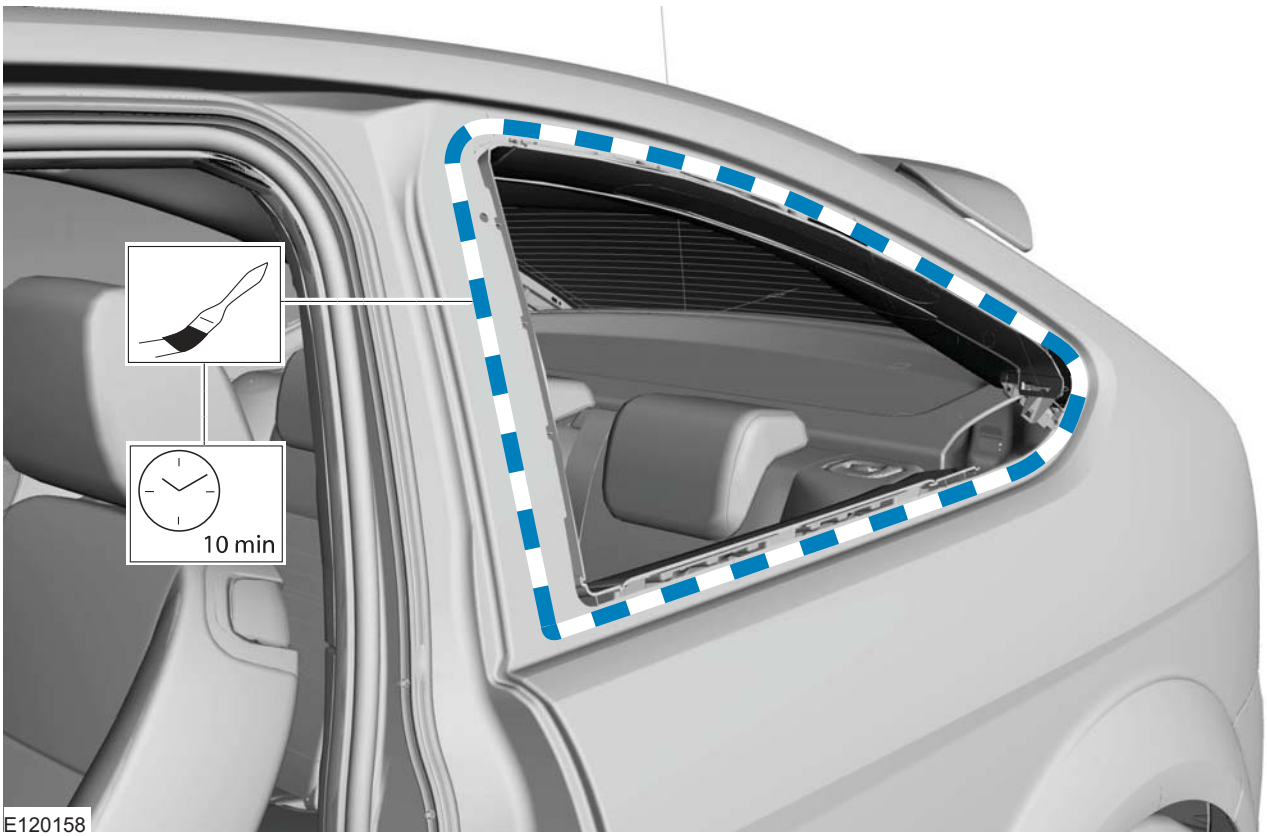
   Prepare the rear quarter window glass, rear quarter window glass flange and trimmed PU adhesive in accordance with the instructions supplied with the glass adhesive kit.



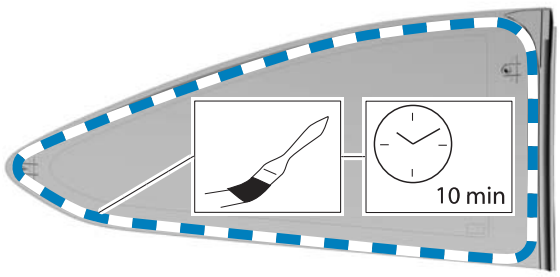
3-door

2. Apply the activator/ primer in accordance with the instructions supplied with the glass adhesive kit.

REMOVAL AND INSTALLATION



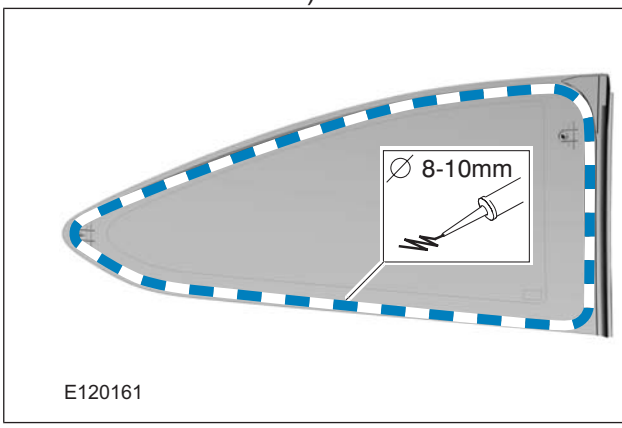
3. Apply the activator/ primer in accordance with the instructions supplied with the glass adhesive kit.



4. **NOTE:** Discard the first 100 mm of adhesive as this may have a reduced working time.

NOTE: Make sure that any breakage in the continuous bead of adhesive is overlapped by 20 mm.

General Equipment: Direct Glazing Removal/Replacement Equipment
Material: Windshield Adhesive Kit (WSS-M11P57-A5)
Material: Windscreen Adhesive Kit - 1 Component (WSK-M11P57-A3 / 7U7J-T03863-AA)



REMOVAL AND INSTALLATION

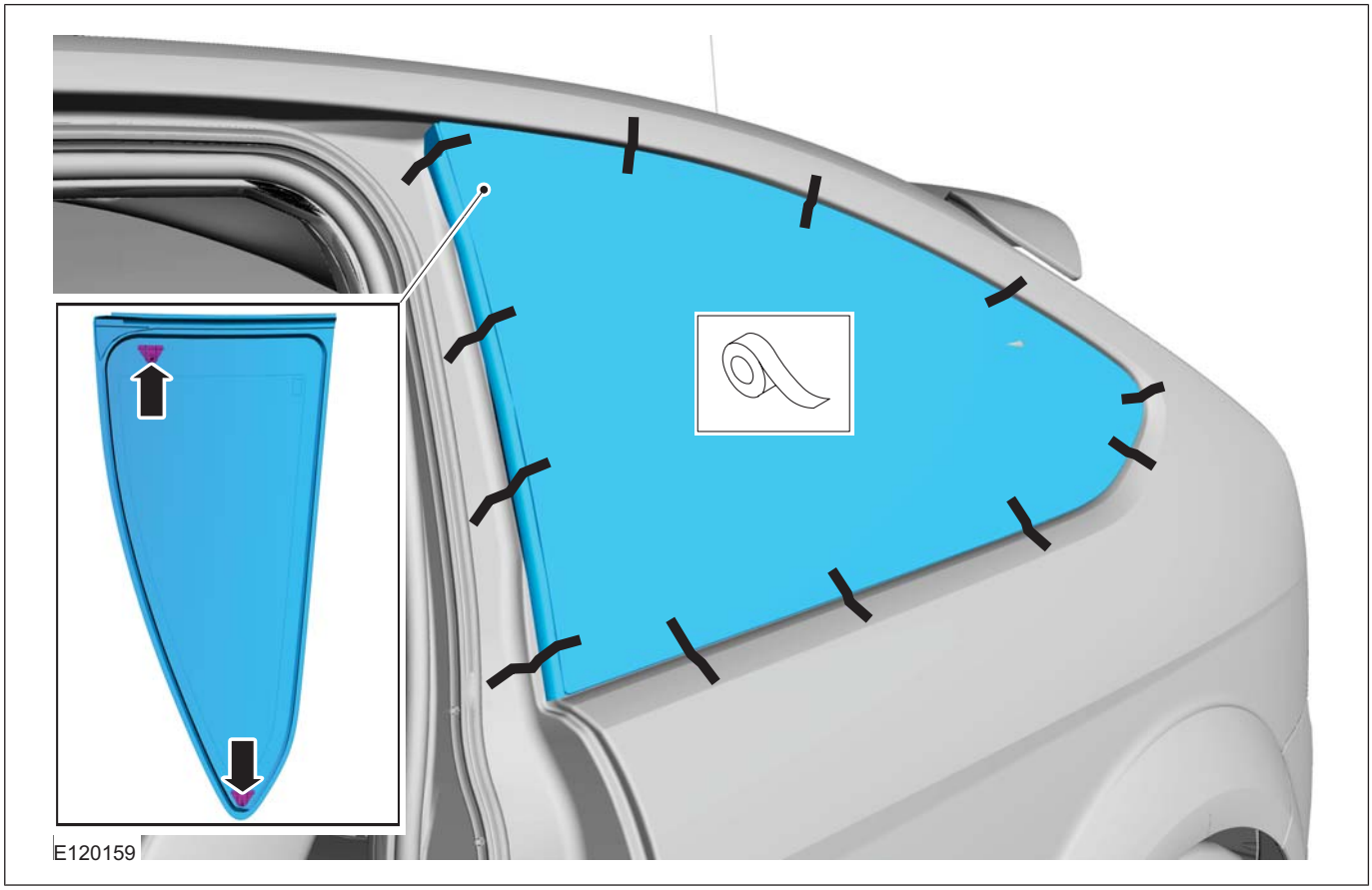
5. • Press firmly and evenly into position.

   General Equipment: Direct Glazing Removal/Replacement Equipment

   • **CAUTION: During the curing time of the polyurethane (PU) adhesive, the door windows must be left open.**

   Using tape, secure the rear quarter window glass in the correct position until the PU adhesive has cured.

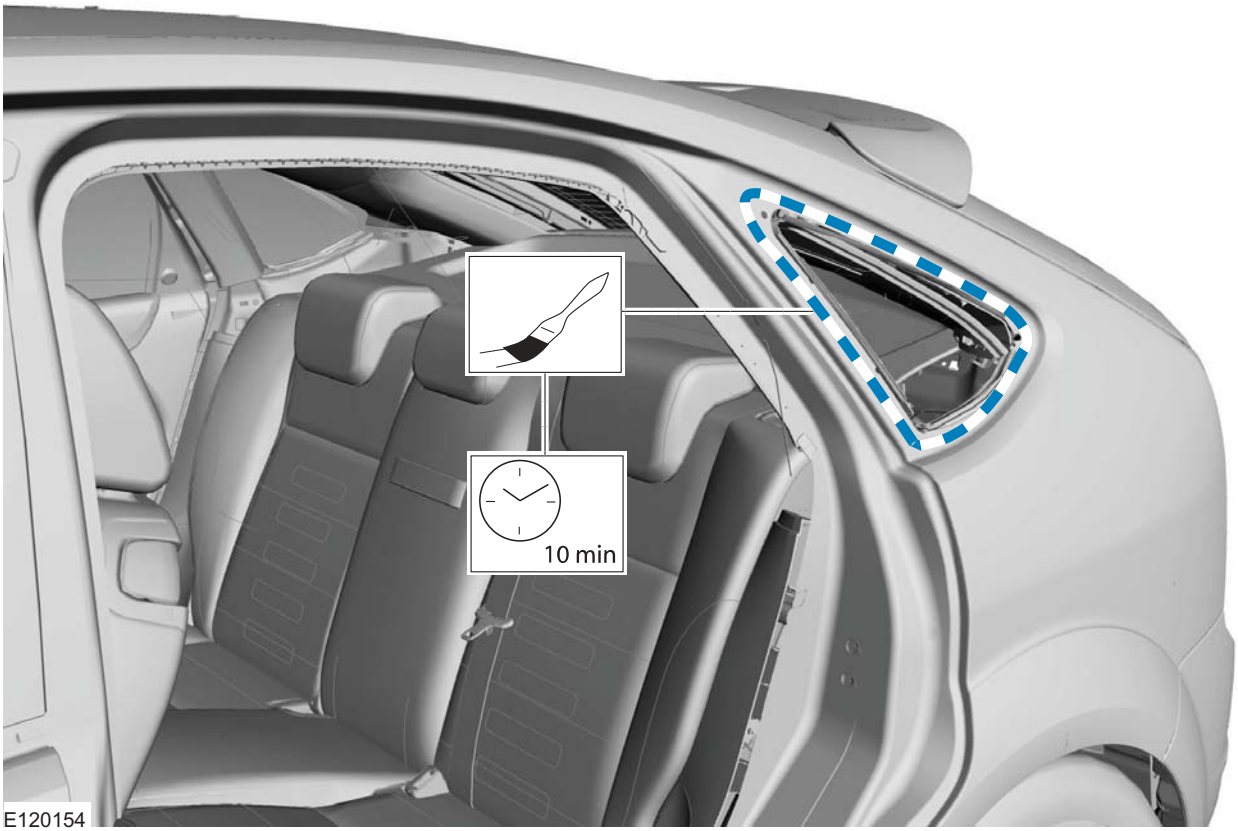
   General Equipment: Adhesive Tape



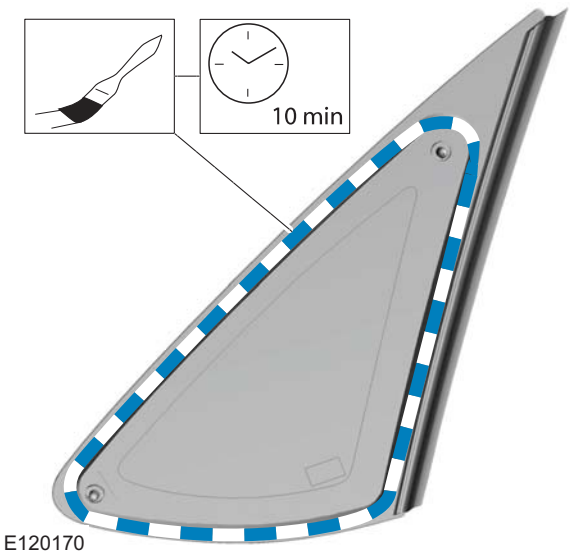
5-door

6. Apply the activator/ primer in accordance with the instructions supplied with the glass adhesive kit.

REMOVAL AND INSTALLATION



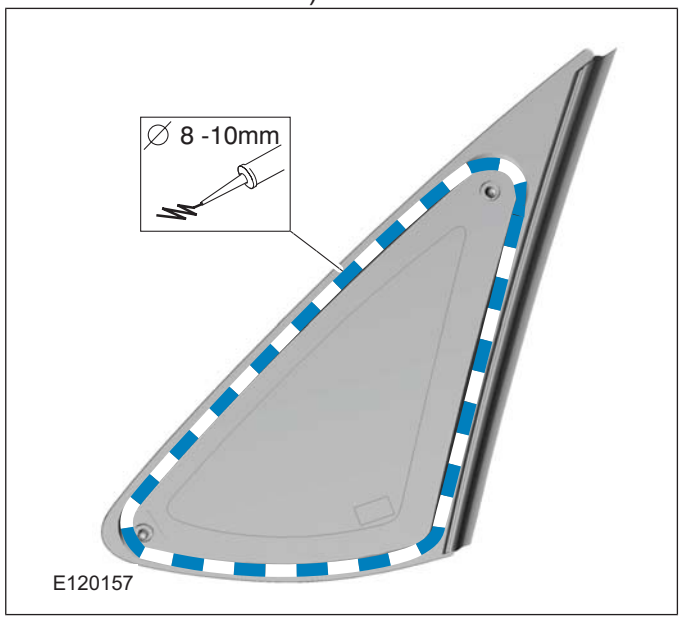
7. Apply the activator/ primer in accordance with the instructions supplied with the glass adhesive kit.



8. **NOTE:** Discard the first 100 mm of adhesive as this may have a reduced working time.

NOTE: Make sure that any breakage in the continuous bead of adhesive is overlapped by 20 mm.

General Equipment: Direct Glazing Removal/Replacement Equipment
Material: Windshield Adhesive Kit (WSS-M11P57-A5)
Material: Windscreen Adhesive Kit - 1 Component (WSK-M11P57-A3 / 7U7J-T03863-AA)



REMOVAL AND INSTALLATION

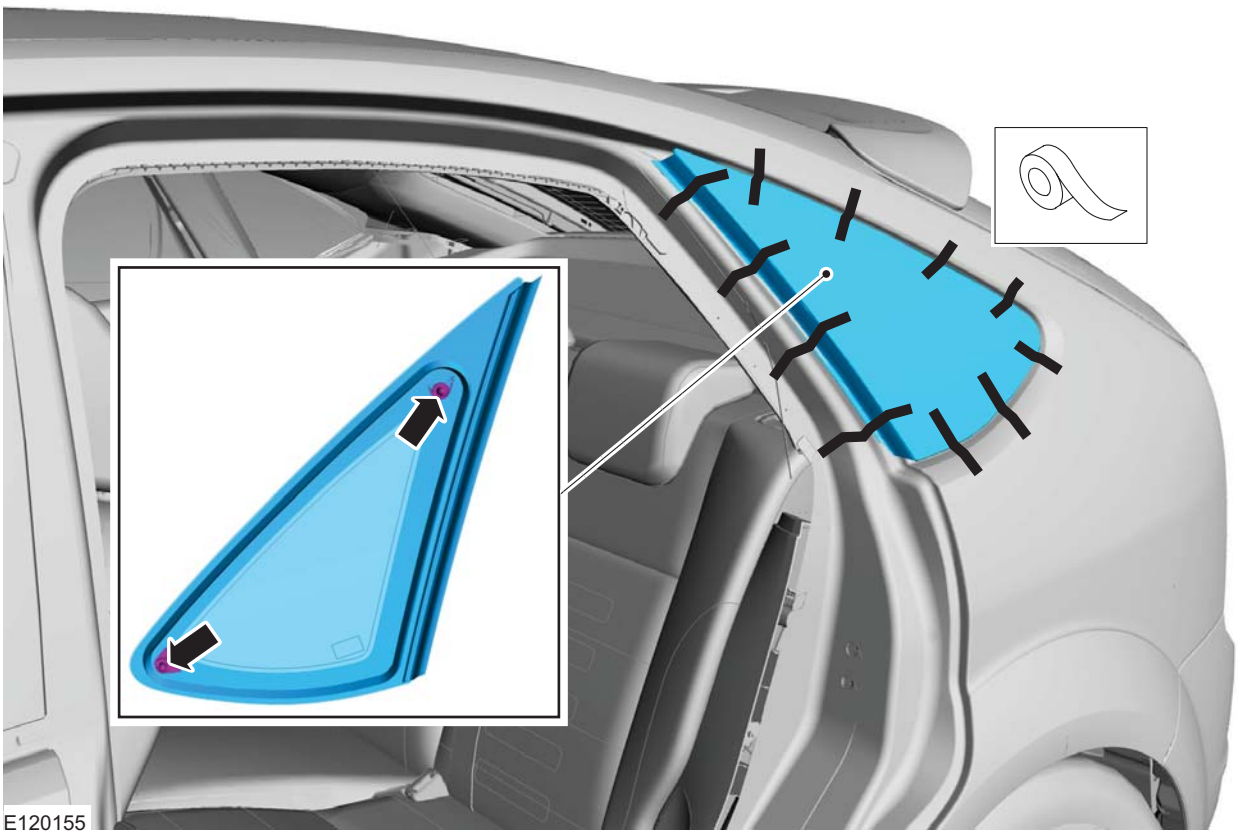
9. • Press firmly and evenly into position.

   General Equipment: Direct Glazing Removal/Replacement Equipment

   • **CAUTION: During the curing time of the polyurethane (PU) adhesive, the door windows must be left open.**

   Using tape, secure the rear quarter window glass in the correct position until the PU adhesive has cured.

   General Equipment: Adhesive Tape



10. Refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).
    Refer to: D-Pillar Trim Panel - 5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

SECTION 501-12 Instrument Panel and Console

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Specifications..... 501-12-2

REMOVAL AND INSTALLATION

Instrument Panel..... 501-12-3
Floor Console..... 501-12-11
Floor Console — Vehicles Built From: 03/2007, Vehicles With: Center Armrest..... 501-12-13
Overhead Console..... 501-12-15

DISASSEMBLY AND ASSEMBLY

Floor Console..... 501-12-18

SPECIFICATIONS

Torque Specifications

Item	Nm	lb-ft	lb-in
Passenger airbag module retaining bolts	8	-	71
Steering column retaining bolts	25	18	-

REMOVAL AND INSTALLATION

Instrument Panel

All vehicles

1. Remove the floor console. For additional information, refer to:

   Floor Console (501-12 Instrument Panel and Console, Removal and Installation),
   Floor Console - Vehicles Built From: 03/2007, Vehicles With: Center Armrest (501-12 Instrument Panel and Console, Removal and Installation).

2. Remove the climate control assembly.

Vehicles built up to 04/2006

3. Remove the passenger air bag module.

Vehicles built 04/2006 onwards

WARNINGS:

The supplemental restraint system (SRS) is active for a certain length of time after the power supply has been disconnected. Wait for a minimum of 3 minutes before disconnecting or removing any SRS components.

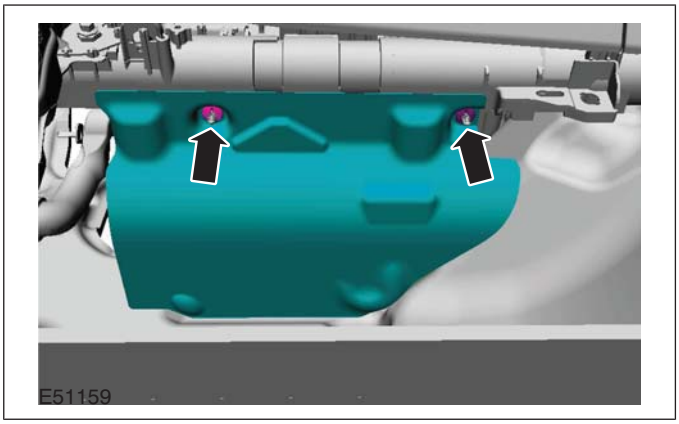
Wear safety goggles.

Do not probe supplemental restraint system (SRS) electrical connectors.

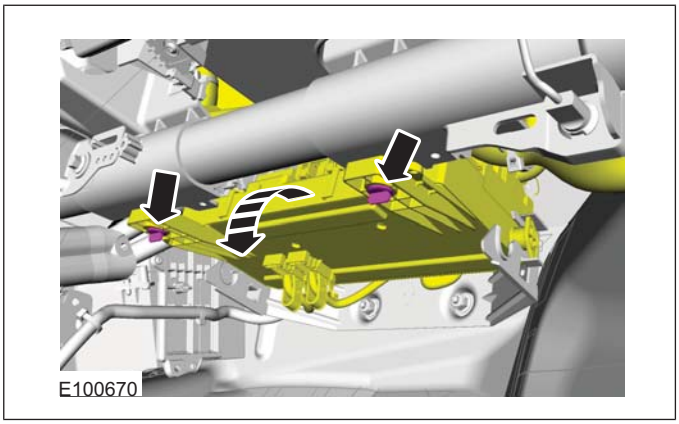
4. Disconnect the battery ground cable.

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

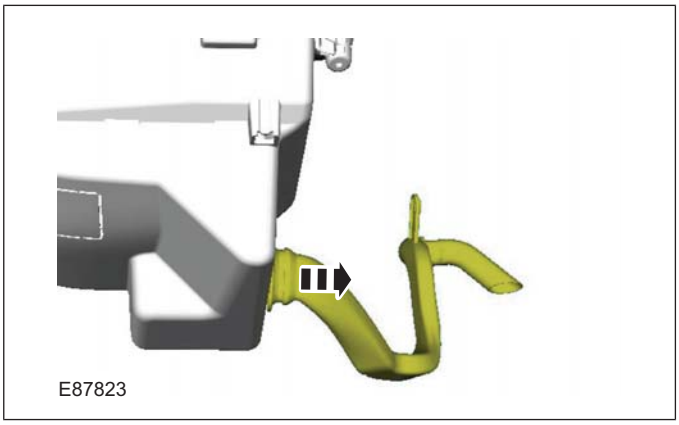
5. Remove the central junction box (CJB) cover.
   - Remove the retaining screws.



6. Detach the CJB from the in-vehicle crossbeam.
   - Rotate the retaining screws clockwise.

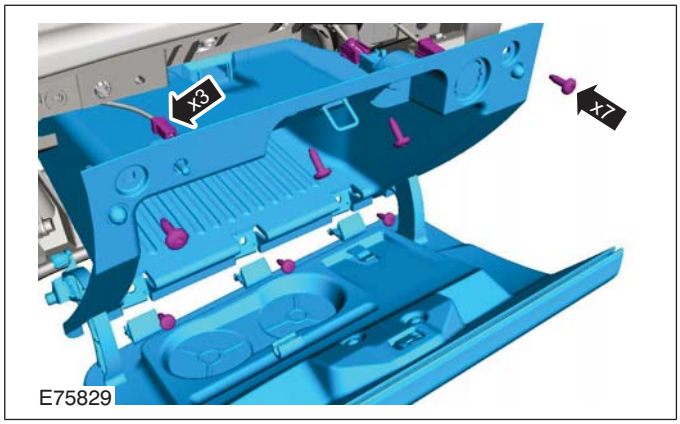


7. Disconnect the glove compartment cooling hose from the glove compartment.

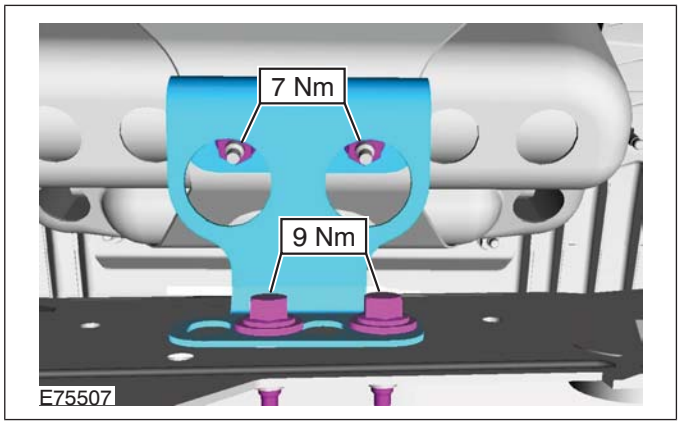


REMOVAL AND INSTALLATION

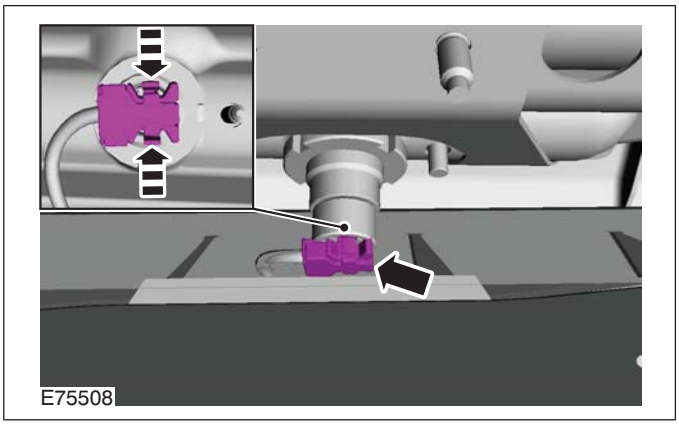
8. Remove the glove compartment.



9. Remove passenger air bag module support bracket.



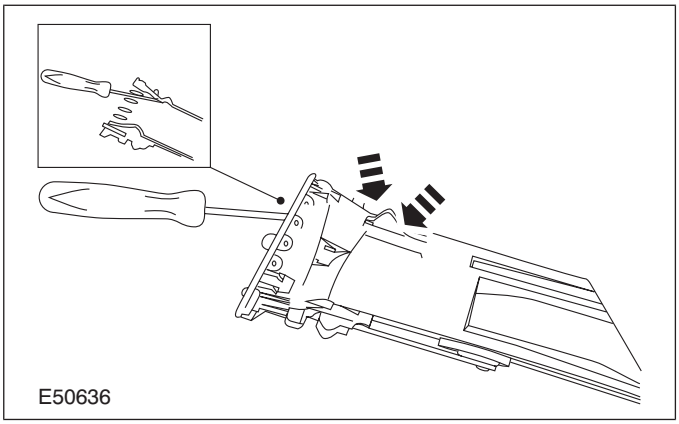
10. Disconnect passenger air bag module electrical connector.



11. NOTE: The registers are retained by four locking tangs. Releasing the upper locking tangs will provide enough movement to release the lower locking tangs.

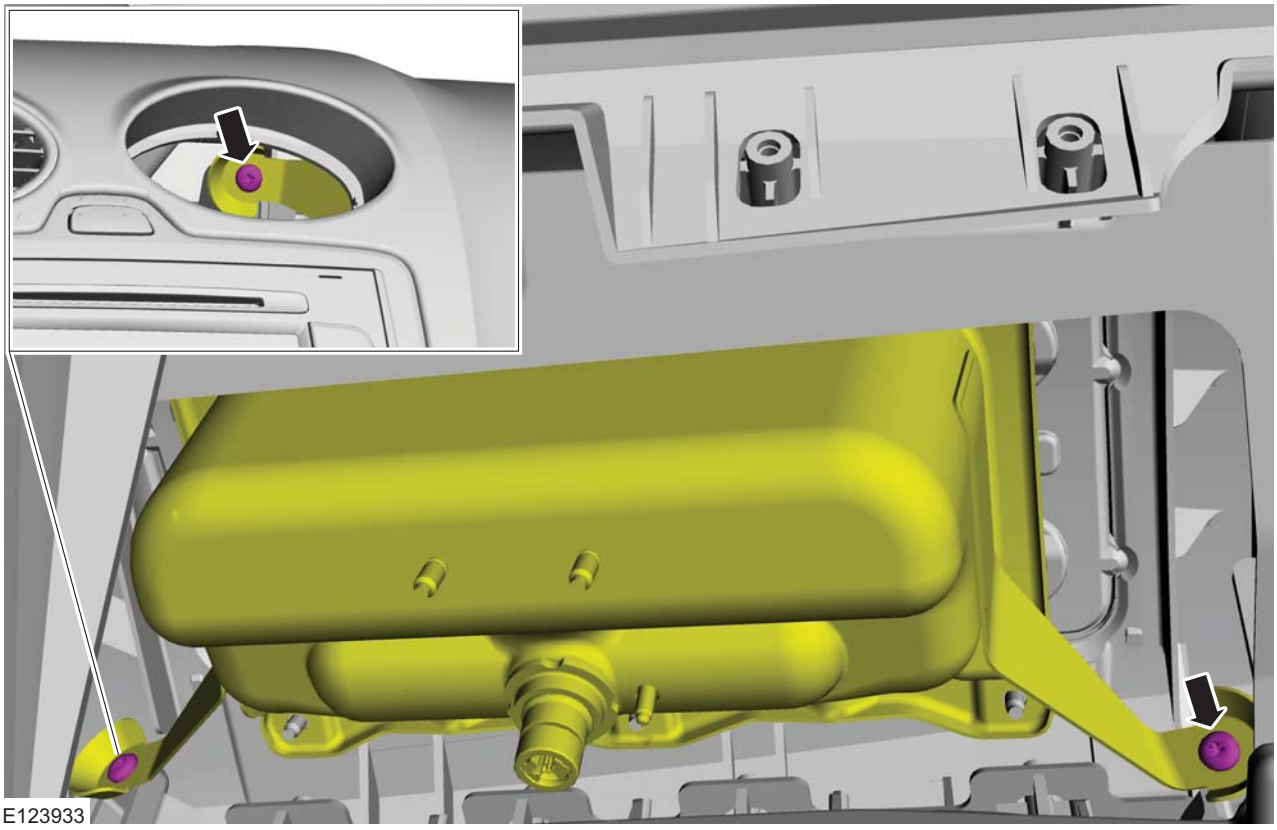
Remove the passenger side inner register.

- Using a suitable thin bladed screwdriver, release the upper locking tangs.



12. Remove the passenger air bag module outer retaining bolts.

REMOVAL AND INSTALLATION



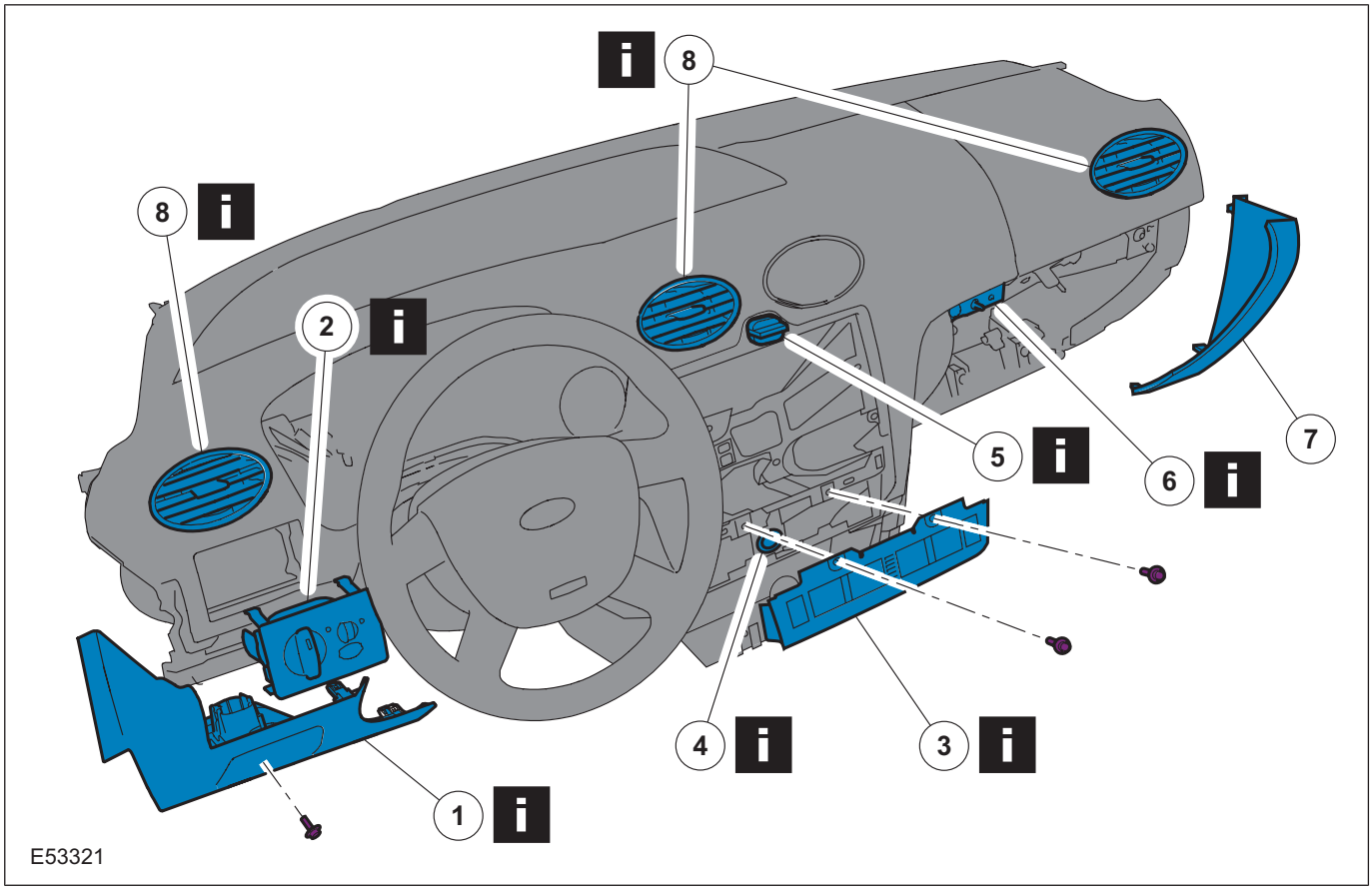
All vehicles

WARNING: When removing or installing the instrument panel, care must be taken not to scratch or damage the instrument panel surface.

13. **Remove the instrument cluster.**

14. **Remove the components in the order indicated in the following illustration(s) and table(s).**

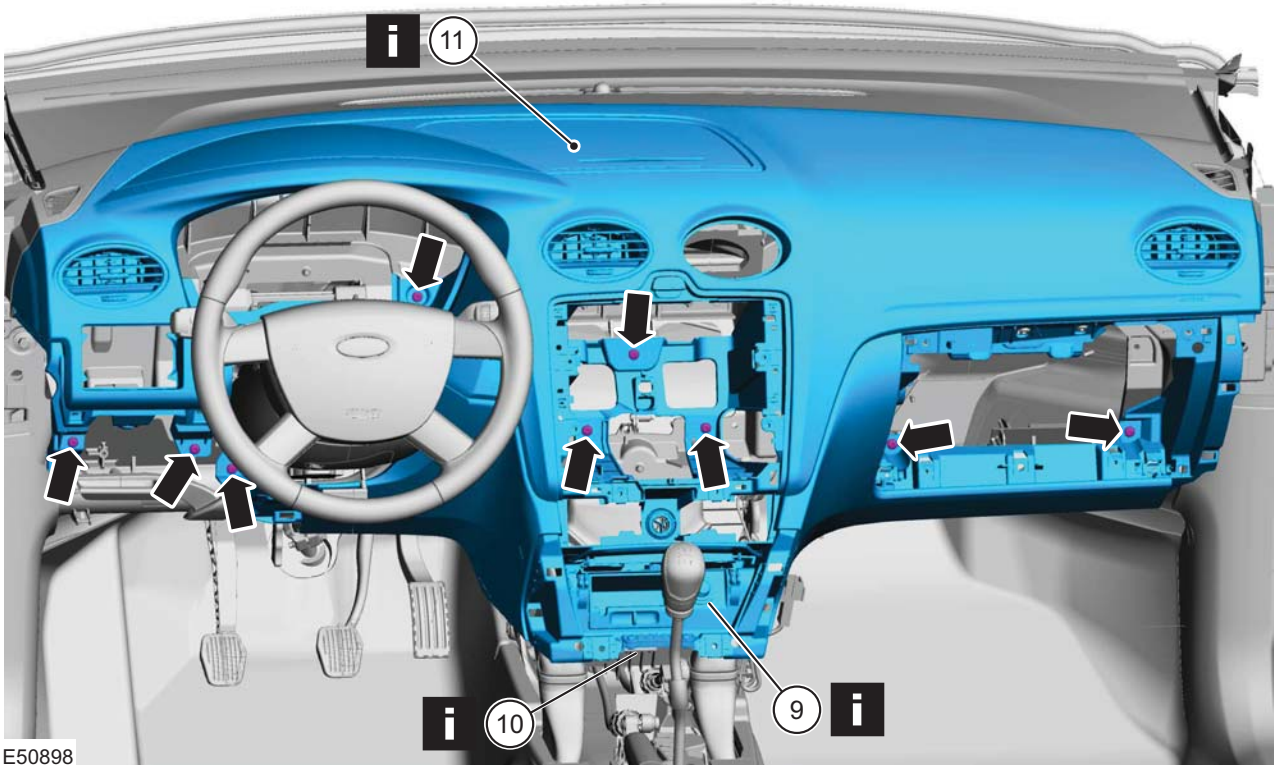
REMOVAL AND INSTALLATION



Item	Description
1	Instrument panel driver side lower panel See Removal Detail
2	Headlamp switch See Removal Detail
3	Instrument panel console switch panel See Removal Detail
4	In-vehicle temperature sensor See Removal Detail

Item	Description
5	Hazard flasher switch See Removal Detail
6	Glove compartment lamp switch See Removal Detail
7	Instrument panel passenger side outer trim panel
8	Registers See Removal Detail

REMOVAL AND INSTALLATION



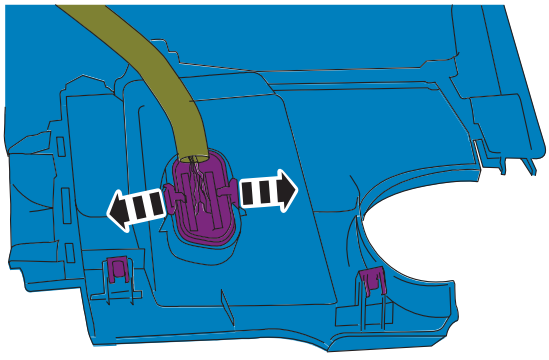
Item	Description
9	Cigar lighter See Removal Detail
10	Keyless entry antenna (if equipped) See Removal Detail
11	Instrument panel See Removal Detail

15. To install, reverse the removal procedure.

Removal Details

Item 1 Instrument panel driver side lower panel

1. Disconnect the data link connector (DLC).



Item 2 Headlamp switch

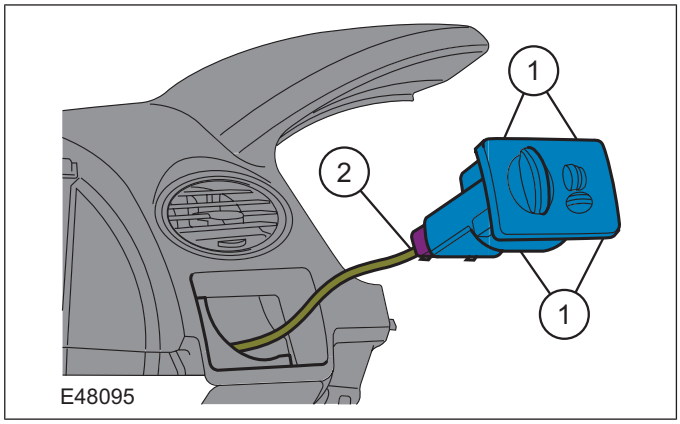
1. NOTE: Access to the headlamp switch is from behind the instrument panel.

Remove the headlamp switch.

1. Release the retaining clips.

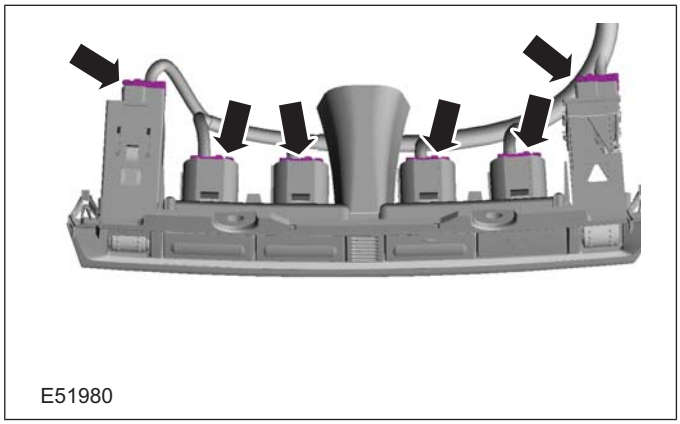
REMOVAL AND INSTALLATION

2. Disconnect the electrical connector.



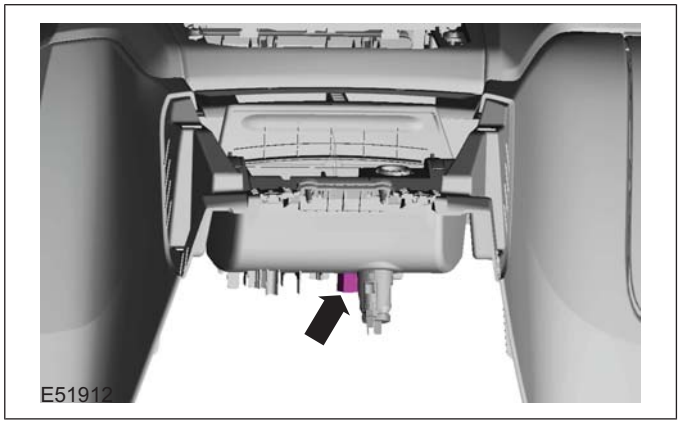
Item 3 Instrument panel console switch panel

1. **Disconnect the instrument panel console switch panel electrical connectors.**



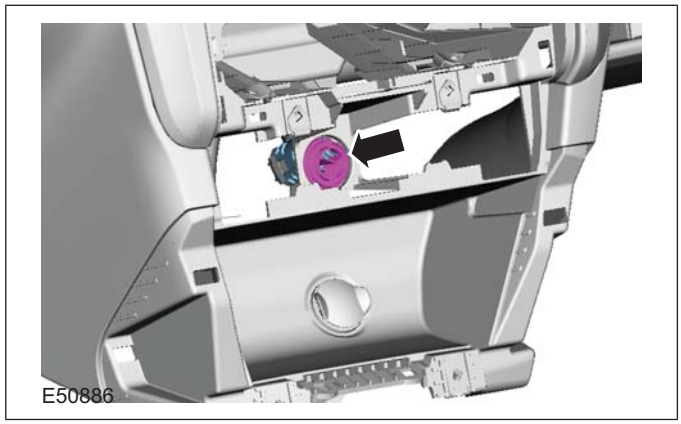
Item 4 In-vehicle temperature sensor

1. **Disconnect the in-vehicle temperature sensor electrical connector.**



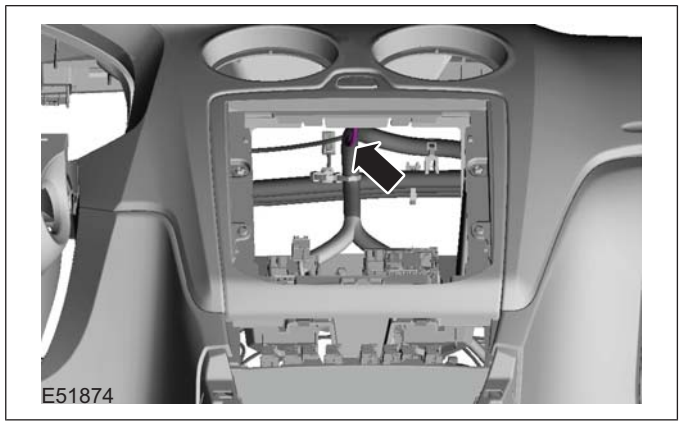
2. **NOTE: This step is only necessary if installing a new instrument panel.**

Remove the in-vehicle temperature sensor.



Item 5 Hazard flasher switch

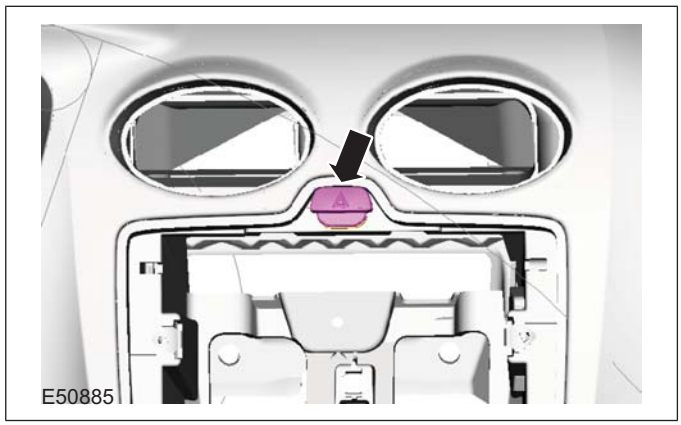
1. **Disconnect the hazard flasher switch electrical connector.**



2. **NOTE: This step is only necessary if installing a new instrument panel.**

Remove the hazard flasher switch.

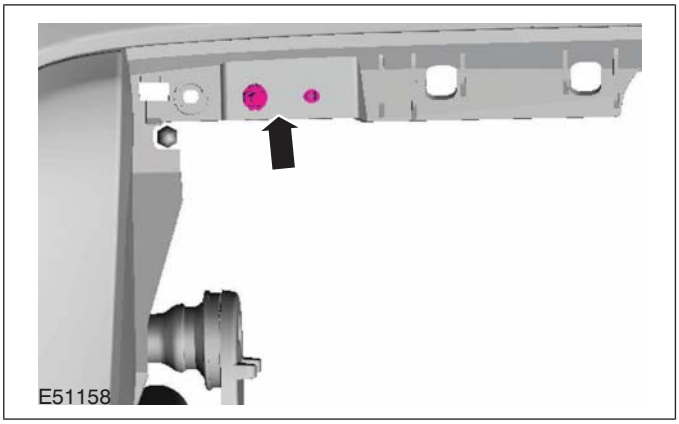
- Release the retaining clips.



REMOVAL AND INSTALLATION

Item 6 Glove compartment lamp switch

1. Detach the glove compartment lamp switch from the instrument panel.



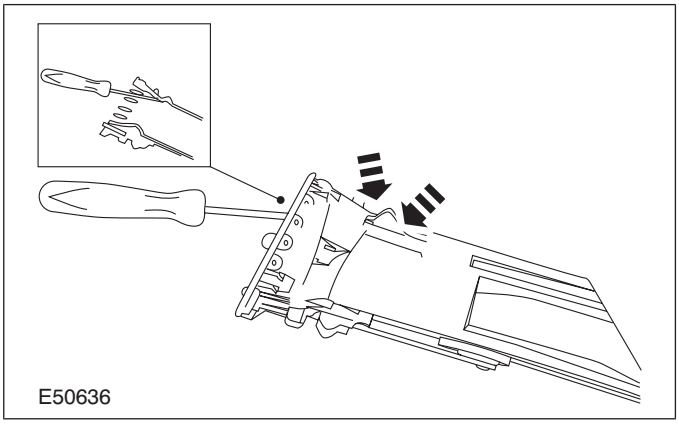
Item 8 Registers

1. NOTE: This step is only necessary if installing a new instrument panel.

NOTE: The registers are retained by four locking tangs. Releasing the upper locking tangs will provide enough movement to release the lower locking tangs.

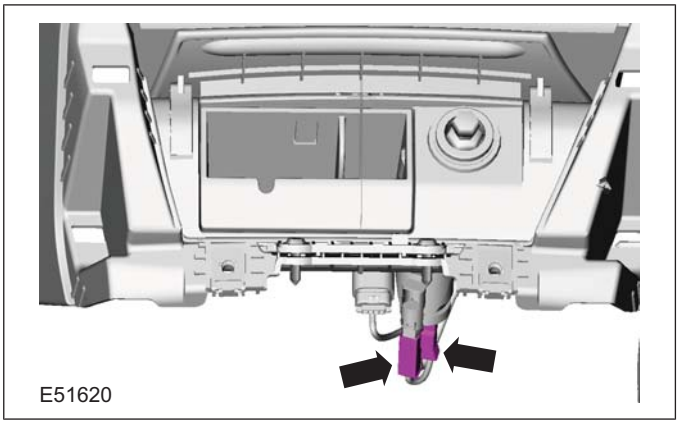
Remove the registers.

- Using a suitable thin bladed screwdriver, release the upper locking tangs.



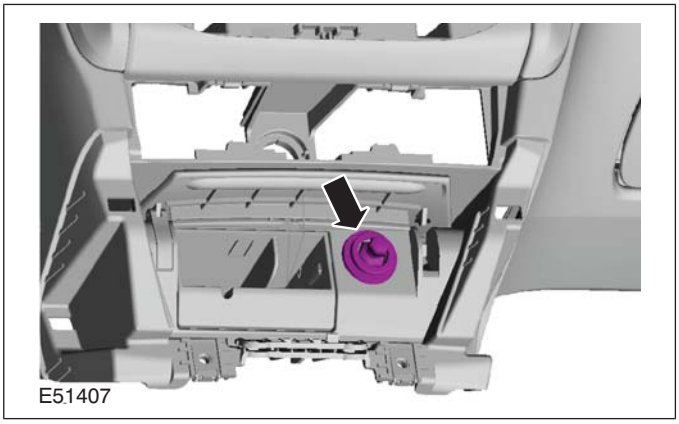
Item 9 Cigar lighter

1. Disconnect the cigar lighter electrical connectors.



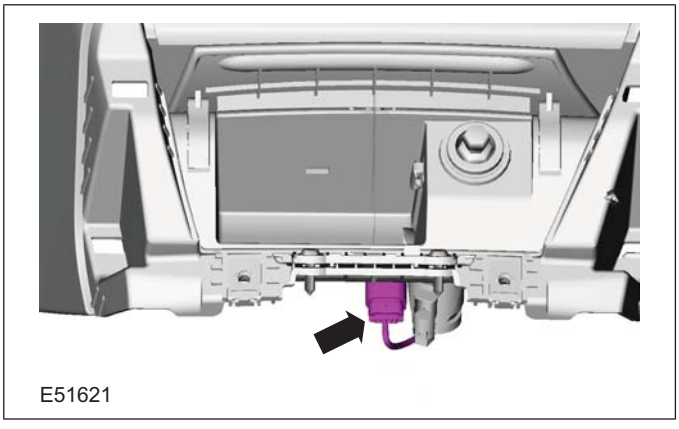
2. NOTE: This step is only necessary if installing a new instrument panel.

Remove the cigar lighter.



Item 10 Keyless entry antenna (if equipped)

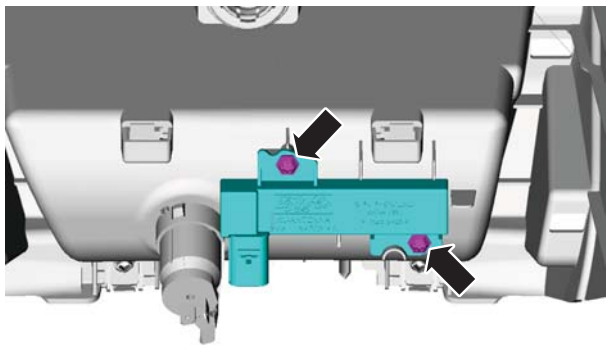
1. Disconnect the keyless entry antenna electrical connector.



2. NOTE: This step is only necessary if installing a new instrument panel.

REMOVAL AND INSTALLATION

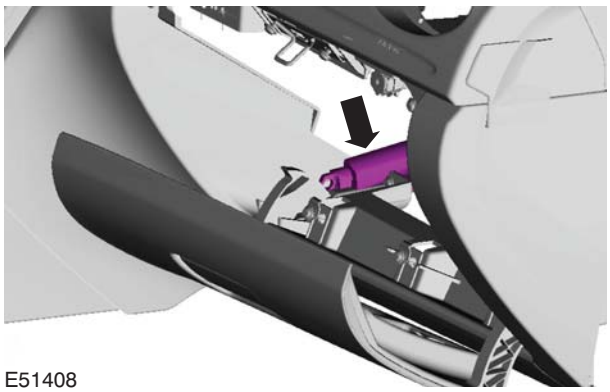
Remove the keyless entry antenna.



E51622

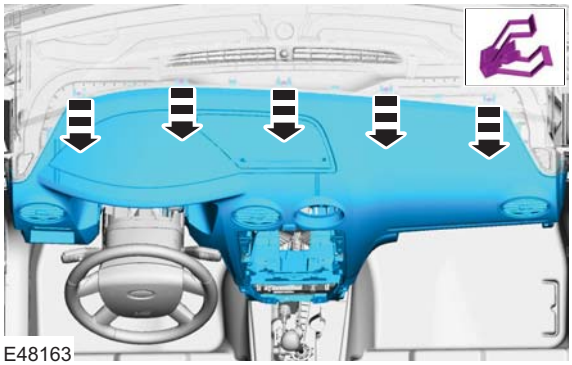
Item 11 Instrument panel

1. **Detach the glove compartment lid damper from the glove compartment lid.**



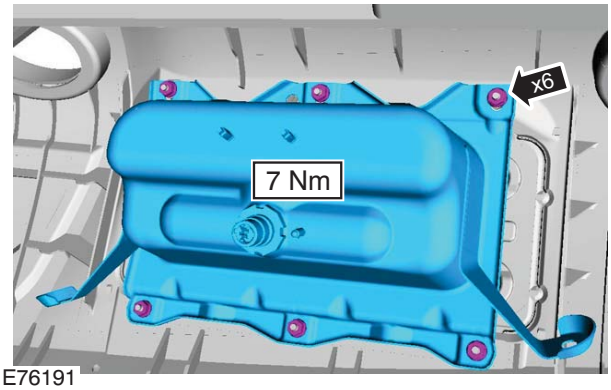
E51408

2. **Remove the instrument panel.**
   - Pull the instrument panel rearwards away from the extension panel to release the retaining clips.



E48163

3. **Remove the passenger air bag module (if equipped).**



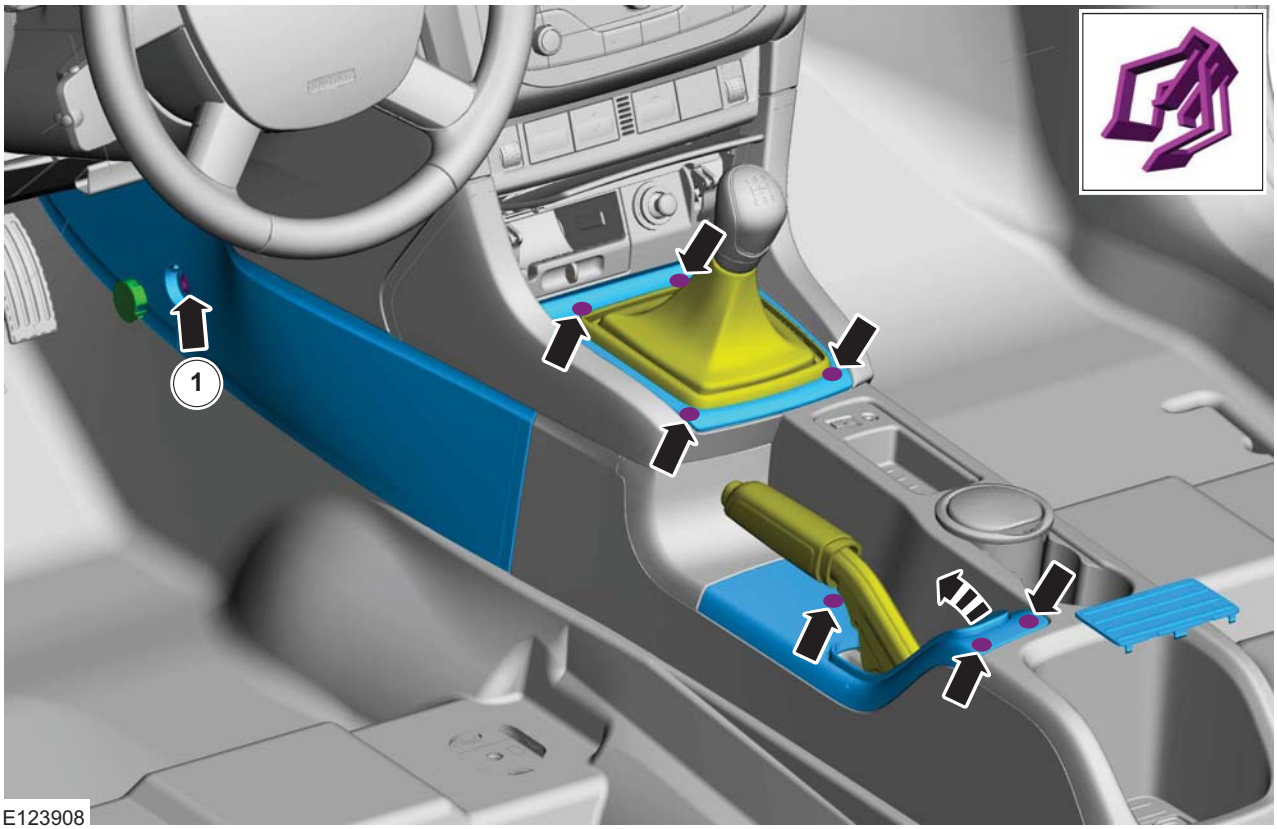
E76191

REMOVAL AND INSTALLATION

Floor Console

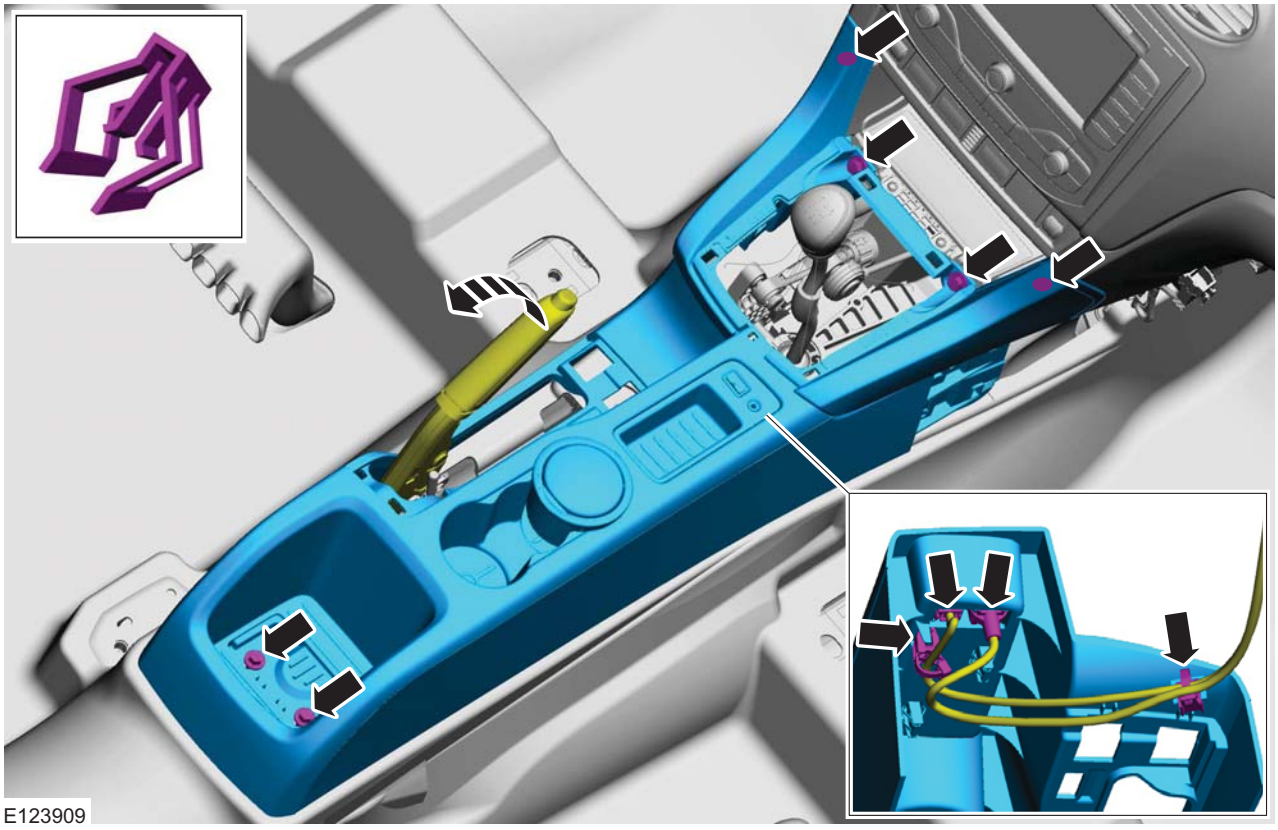
Removal

1. 1. On both sides.



2.

REMOVAL AND INSTALLATION



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Floor Console — Vehicles Built From: 03/2007, Vehicles With: Center Armrest

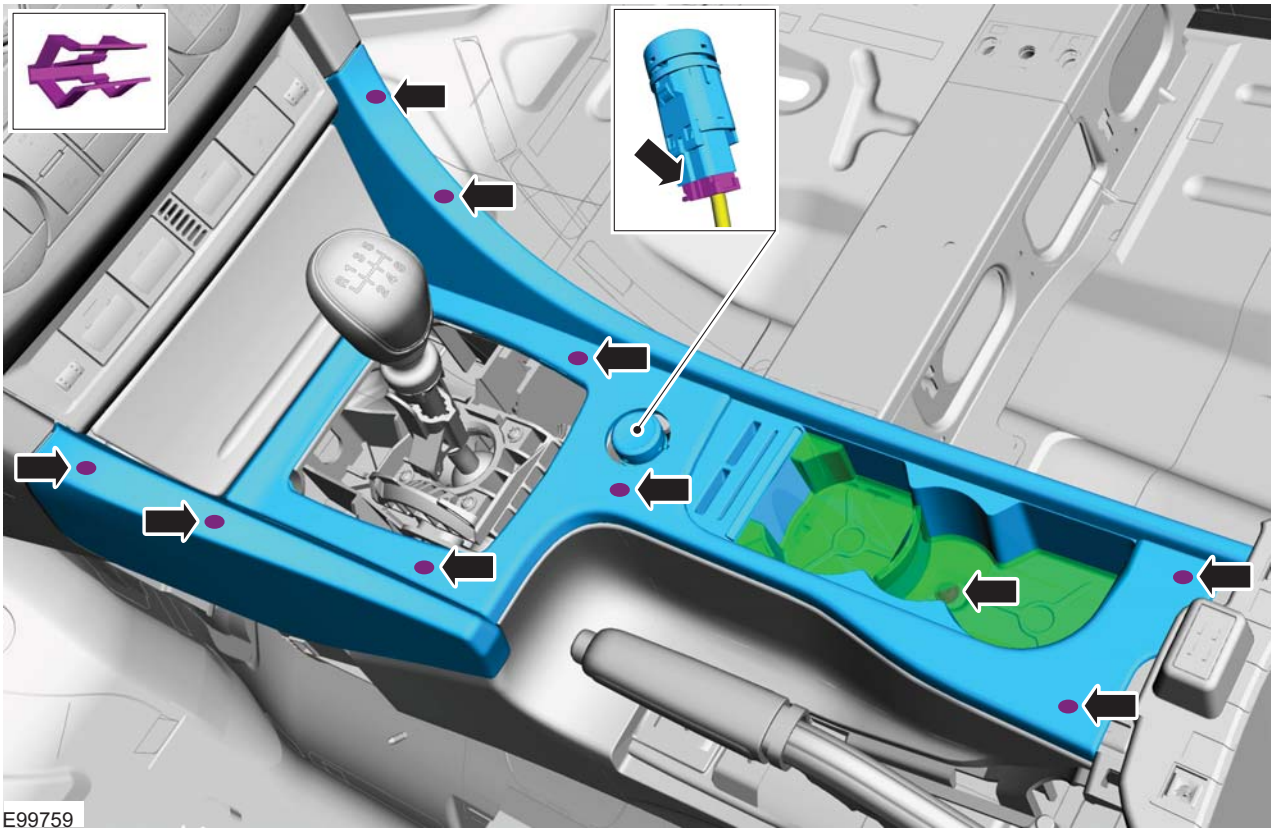
Removal

1.

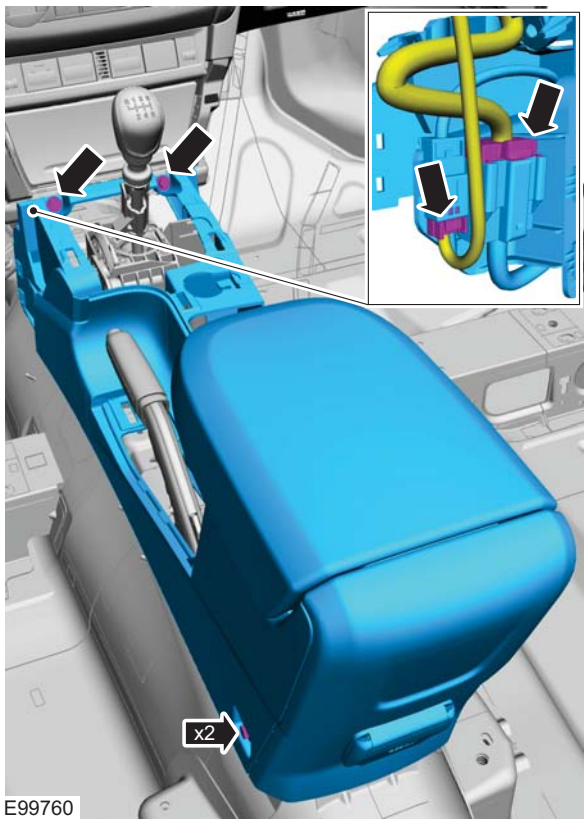


2.

REMOVAL AND INSTALLATION



3.



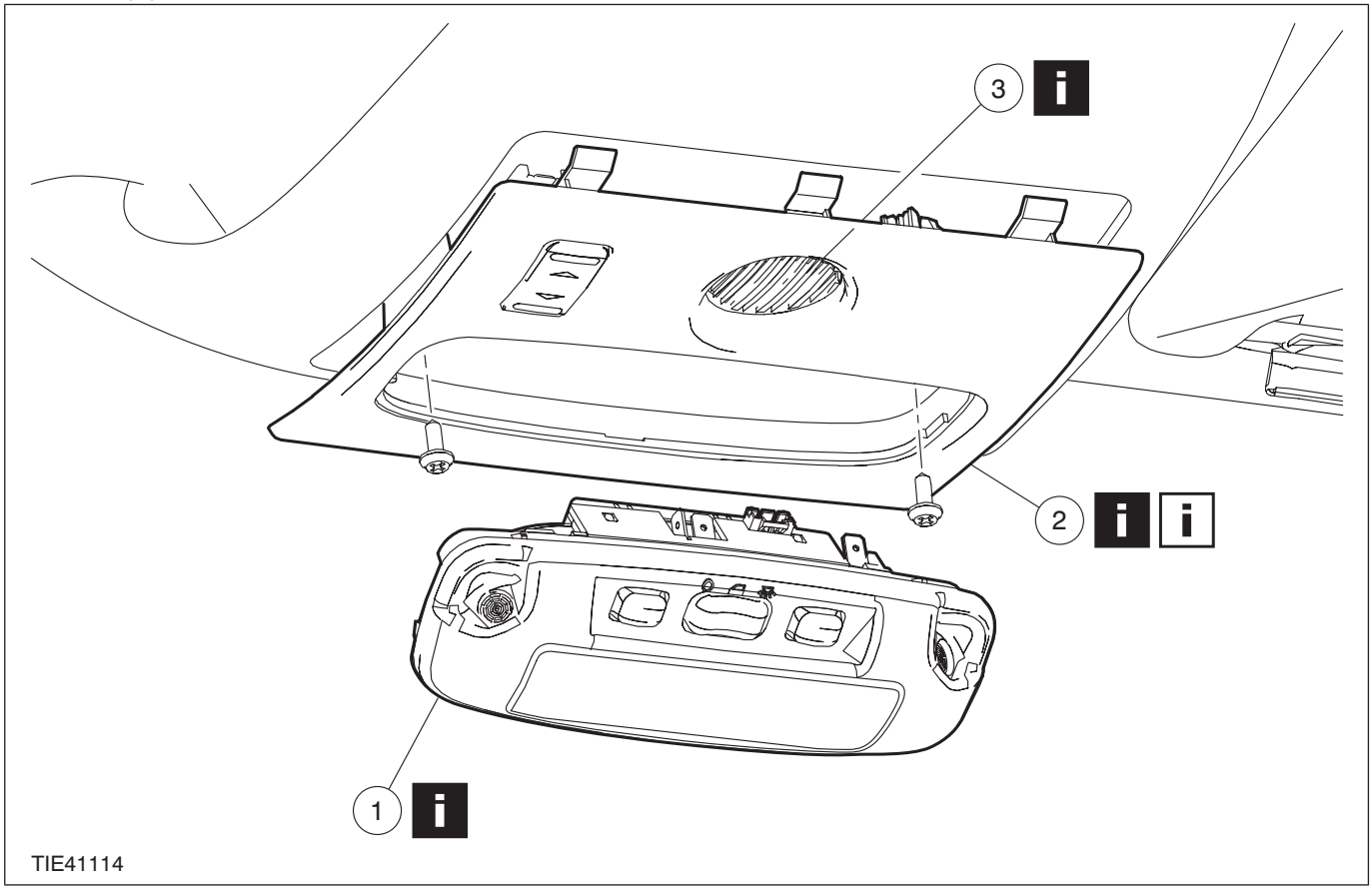
Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Overhead Console

1. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Interior lamp See Removal Detail
2	Overhead console See Removal Detail See Installation Detail
3	Microphone (if equipped) See Removal Detail

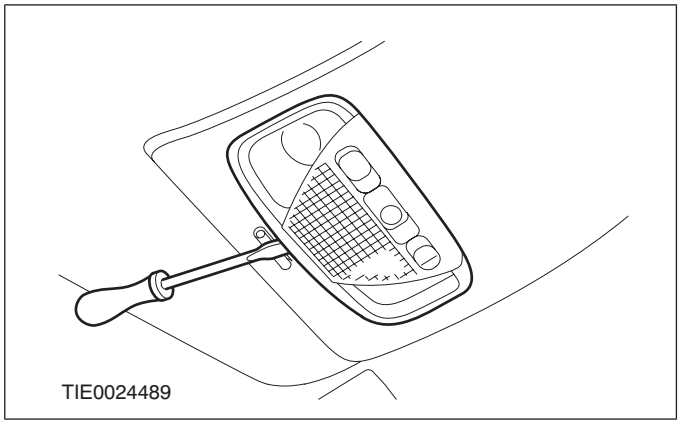
2. **To install, reverse the removal procedure.**

Removal Details

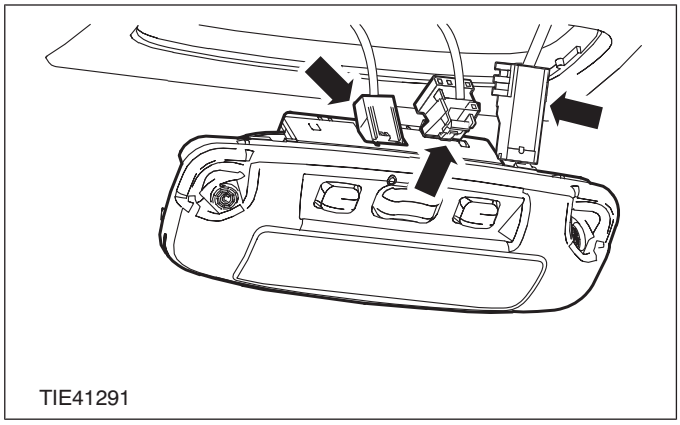
REMOVAL AND INSTALLATION

Item 1 Interior lamp

1. Using a suitable screwdriver, detach the interior lamp from the overhead console.

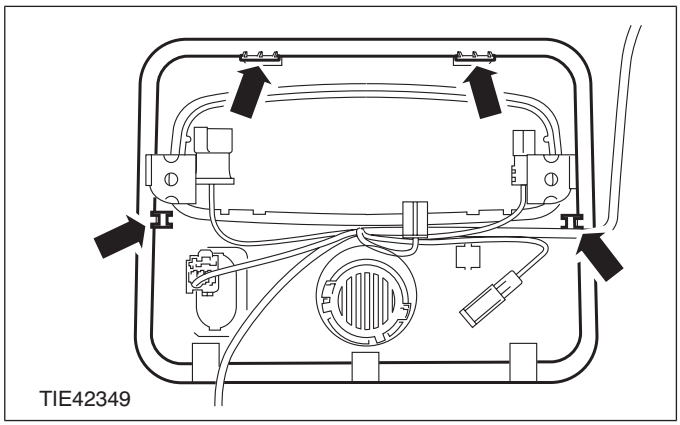


2. Disconnect the electrical connectors and remove the interior lamp.



Item 2 Overhead console

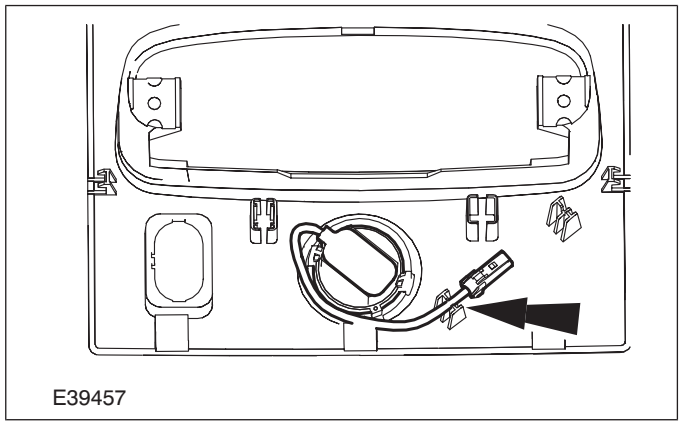
1. Detach the overhead console from the overhead console reinforcement.



2. Disconnect the power roof opening panel control switch electrical connector.
3. Disconnect the microphone electrical connector (if equipped).

Item 3 Microphone (if equipped)

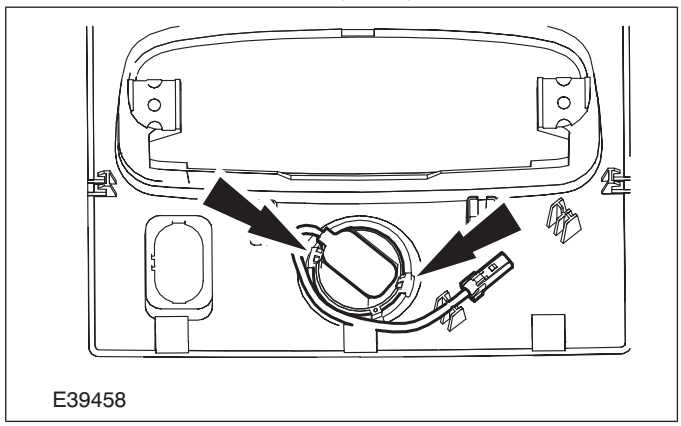
1. Detach the microphone wiring harness from the overhead console.



2. NOTE: Note the position of the microphone to aid installation.

   Remove the microphone.

   - Release the locking tangs.



Installation Details

REMOVAL AND INSTALLATION

Item 2 Overhead console

NOTE: Make sure the overhead console retaining clips are fully engaged to the overhead console opening reinforcement.

DISASSEMBLY AND ASSEMBLY

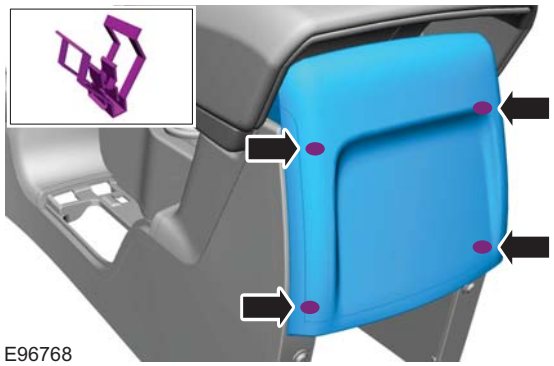
Floor Console

General Equipment

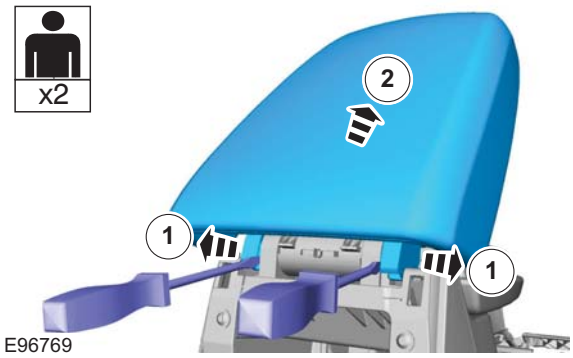
Flat-bladed screwdriver

Disassembly

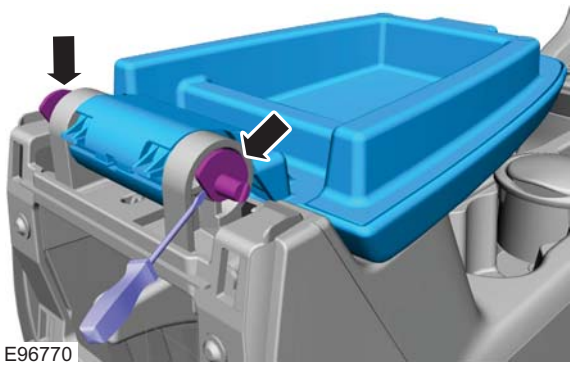
1.



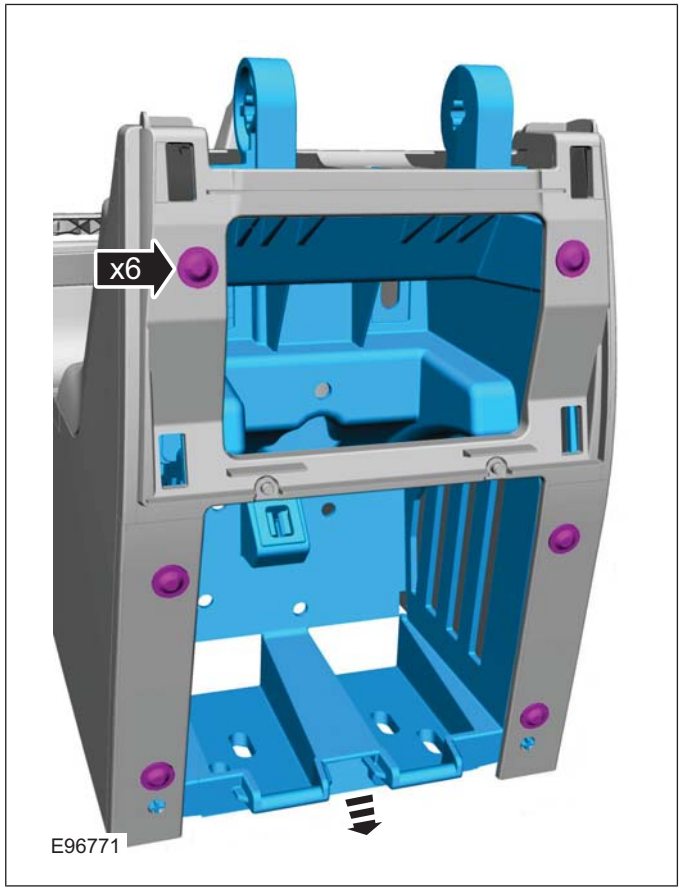
2. General Equipment: Flat-bladed screwdriver



3. General Equipment: Flat-bladed screwdriver



4.



Assembly

5. To assemble, reverse the disassembly procedure.

SECTION 501-14 Handles, Locks, Latches and Entry Systems

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Hood latch retaining bolts	9	-	80
Hood latch striker retaining bolts	11	8	-
Front door inner panel retaining bolts	8	-	71
Front door latch retaining bolts	8	-	71
Front door lock retaining bolt	1	-	9
Rear door inner panel retaining bolts	8	-	71
Rear door latch retaining bolts	8	-	71
Liftgate latch retaining bolts	20	15	-
Liftgate release handle retaining bolts	3	-	27
Front door window glass clamp retaining bolt	8	-	71
Front door hinge retaining bolts	15	11	-

DESCRIPTION AND OPERATION

Handles, Locks, Latches and Entry Systems

Vehicles with Central Locking

A base level locking system is available which has central locking function only.

This system consists of hard wired door latches, linked to the central junction box (CJB).

The key position signal is sent from the driver door lock cylinder to the CJB. The CJB operates the lock or unlock relays, reversing the polarity of the door latch central locking motors.

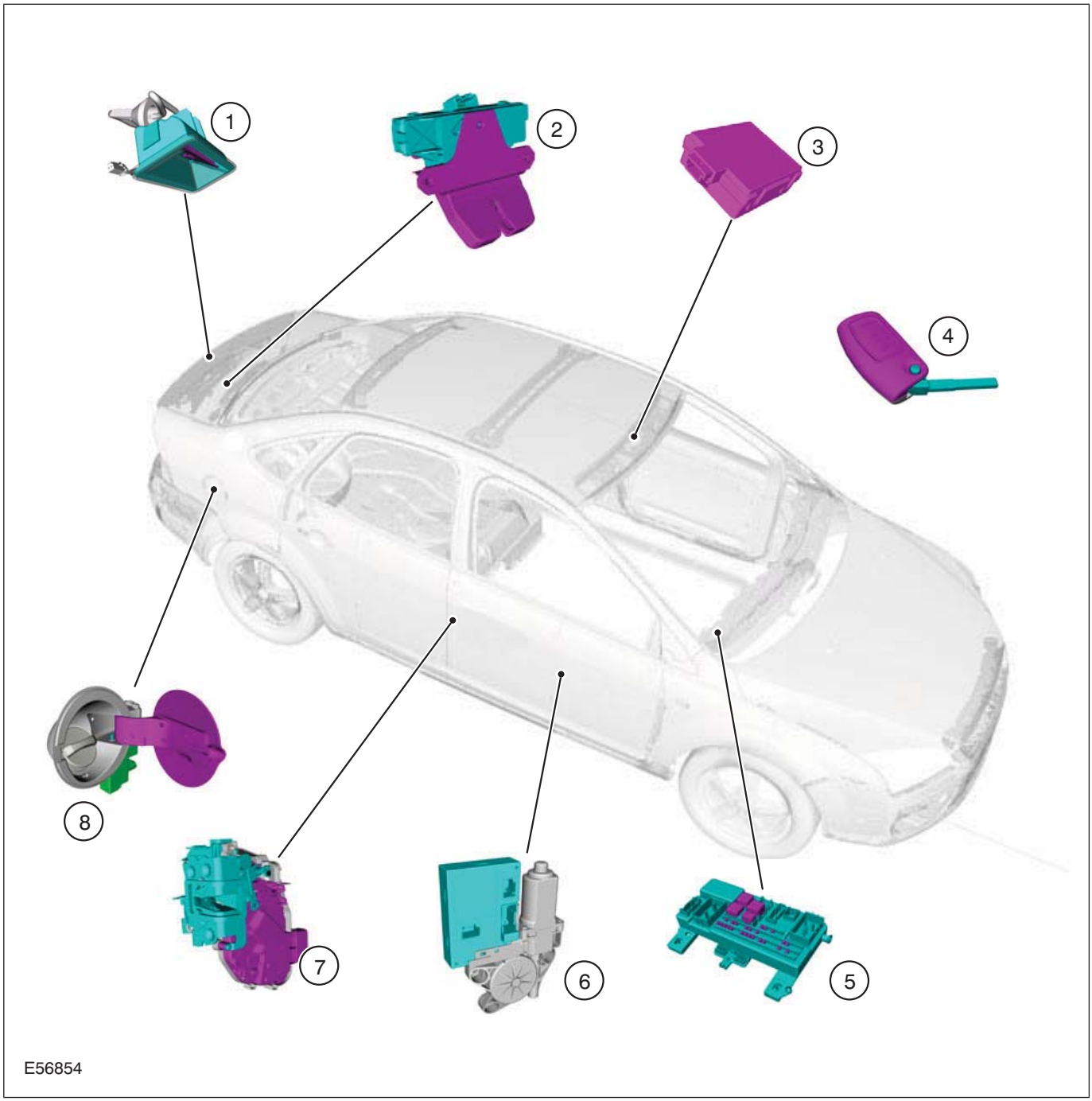
Liftgate/luggage compartment lid latch release operation is by a switch ground signal to the CJB and a pulsed output voltage from the CJB to the liftgate latch.

The fuel filler door lock is parallel wired to the driver door latch central locking motor.

DESCRIPTION AND OPERATION

Vehicles with Remote Keyless Entry (RKE) System

General

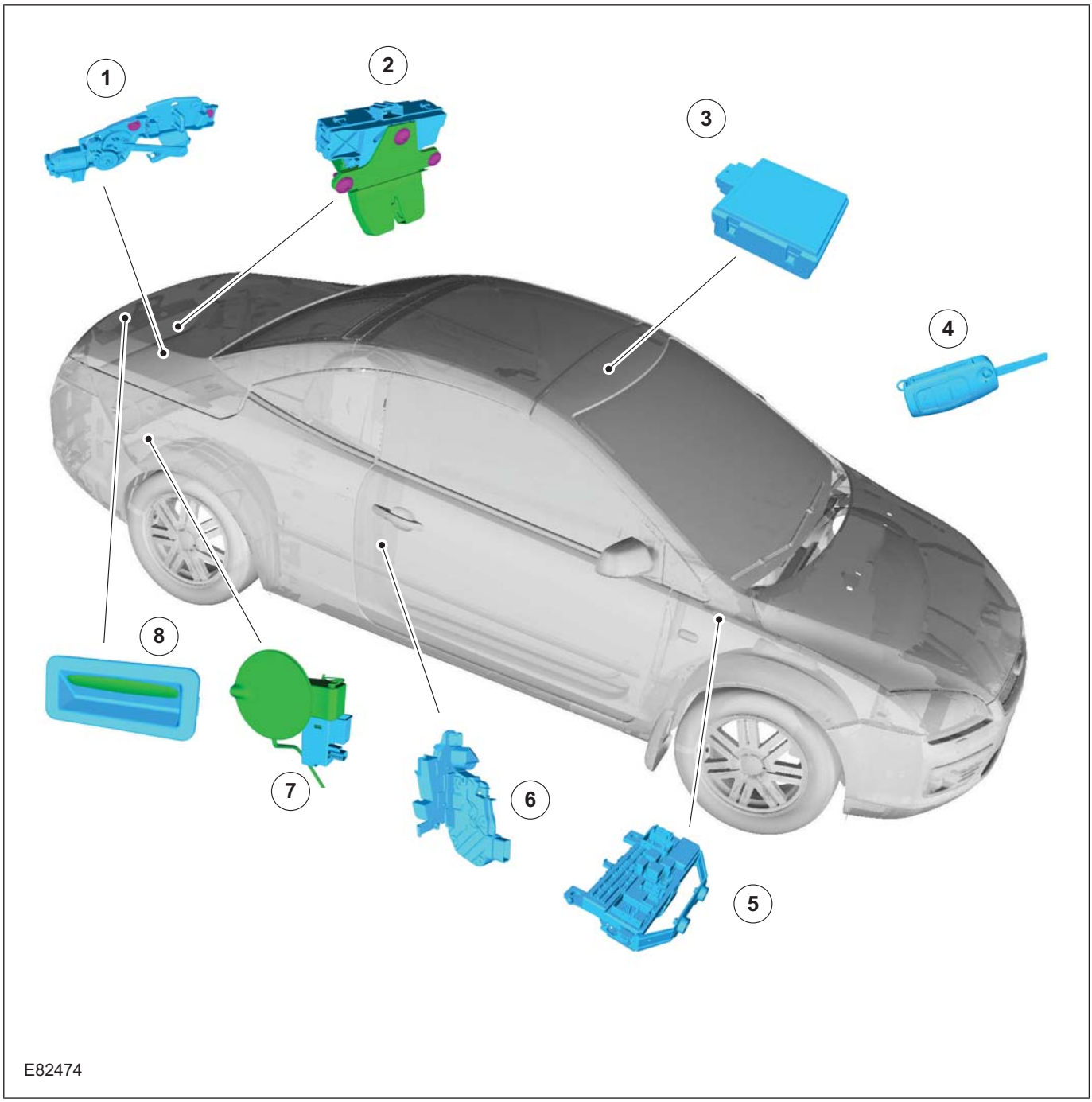


Item	Description
1	Liftgate/luggage compartment lid release switch
2	Liftgate/luggage compartment lid latch
3	Radio frequency (RF) receiver
4	RKE ignition key

Item	Description
5	Central junction box (CJB)
6	Door control module
7	Door latch
8	Fuel filler door lock

DESCRIPTION AND OPERATION

Convertible



Item	Description
1	Luggage compartment lid latch actuator
2	Luggage compartment lid latch
3	Radio frequency (RF) receiver
4	RKE ignition key
5	Central junction box (CJB)
6	Door latch

Item	Description
7	Fuel filler door lock
8	Luggage compartment lid release switch

RKE systems use mechanical/electrical door latches individually controlled by the corresponding door control module.

Door control modules send and receive commands between each other and the CJB using the central area network (CAN) bus.

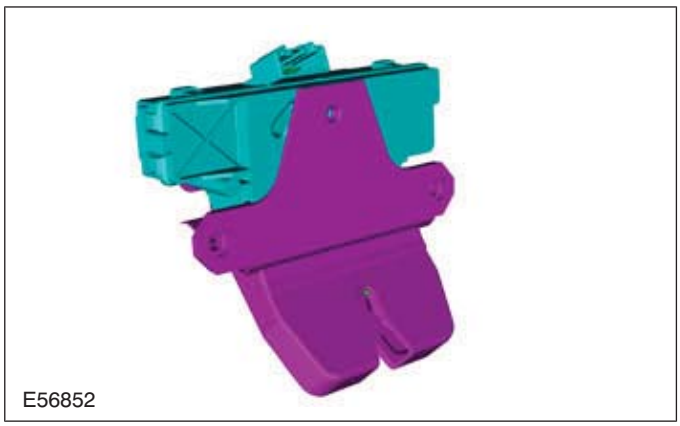
DESCRIPTION AND OPERATION

When a key is turned in the door lock cylinder, a lock or unlock signal is sent to the associated door control module. The door control module sends a signal to the CJB. The CJB issues a signal to the remaining door control modules, which in turn command the latches to operate.

RKE is achieved by the transmission of a coded RF signal from a transmitter contained in the vehicle key. The signal is received by the RF receiver located above the headliner in the vicinity of the overhead console. The received signal is passed onto the CJB where it is decoded. If the coded signal is valid, the CJB will issue a command on the CAN bus circuit to operate the door latches or liftgate/luggage compartment lid release.

The signals received by the CJB from the RF antenna or the door control modules is also used to arm and disarm the vehicle security systems, illuminate the interior lights and operate the global closing functions.

Liftgate/Luggage Compartment Lid Latch

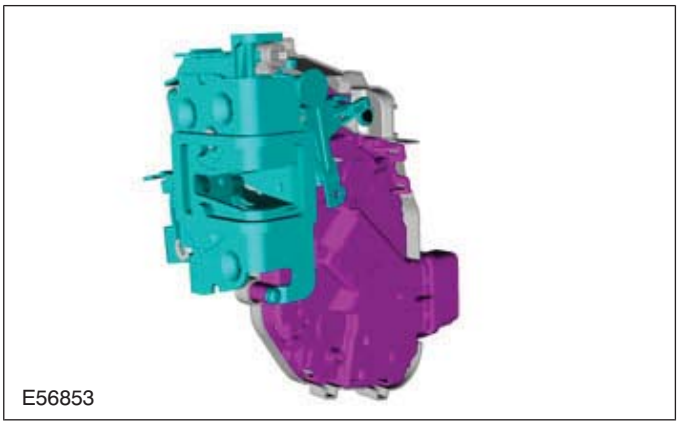

E56852

The liftgate/luggage compartment lid latch is a mechanical latch with a electric motor to drive the latch release. The liftgate/luggage compartment lid latch has no remote mechanical release facility.

The command to open the liftgate/luggage compartment lid latch is sent by the CJB. But the input command to the CJB can be issued by the exterior liftgate/luggage compartment lid release switch, the interior liftgate/luggage compartment lid release switch or the RF receiver.

When the liftgate/luggage compartment lid is closed, the latch is automatically locked.

Door latch


E56853

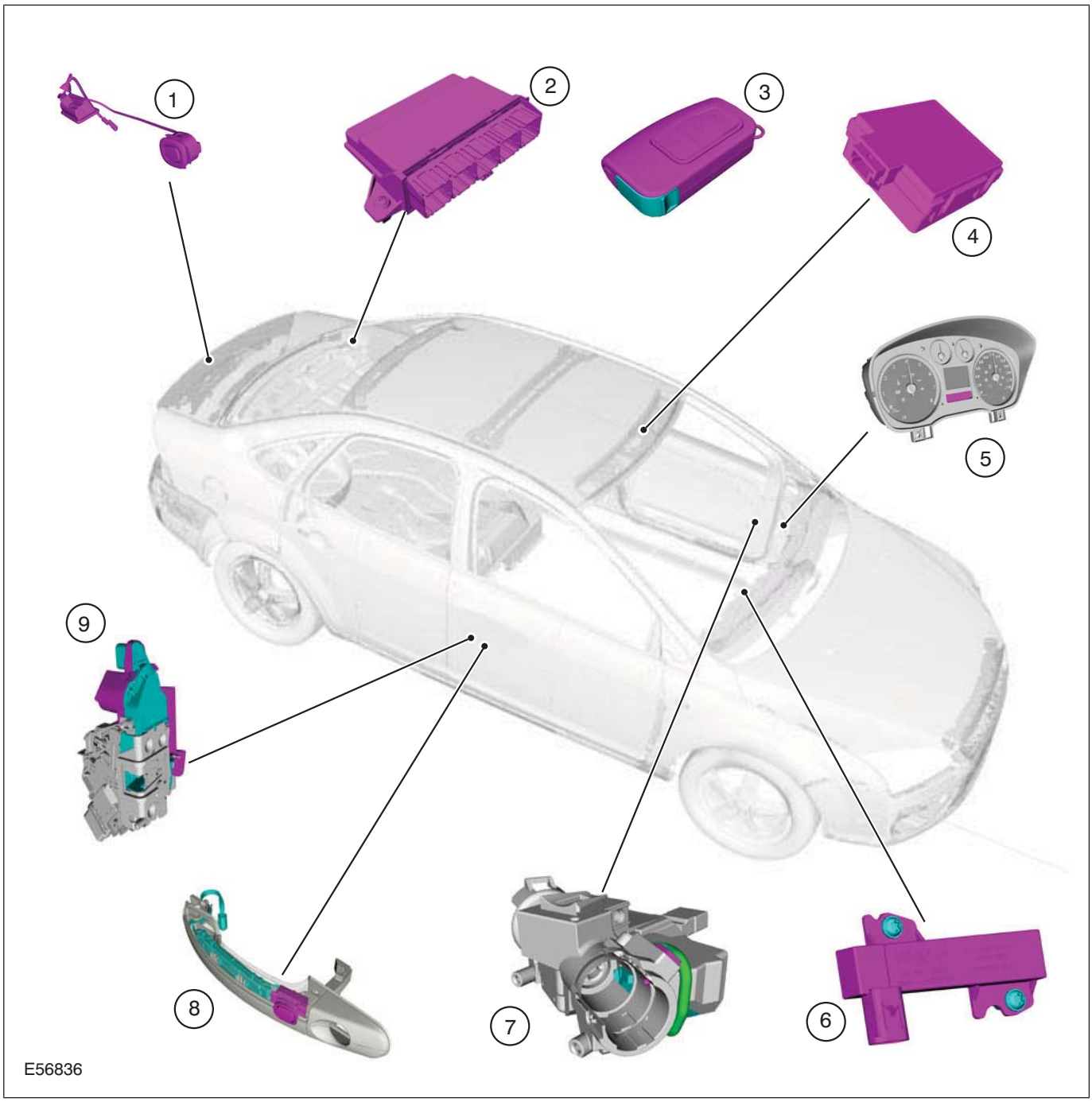
Door latches have mechanical latch release with electric motor operated locking and double locking function.

When the door latch is locked, the exterior door handle is disengaged from the door latch.

Incorporated within the door latch is a door ajar switch. The door ajar switch monitors the latch position and supplies information to the door control module. This information is sent to the CJB for use in warning systems, locking functions and alarm system.

DESCRIPTION AND OPERATION

Vehicles with Keyless Vehicle System

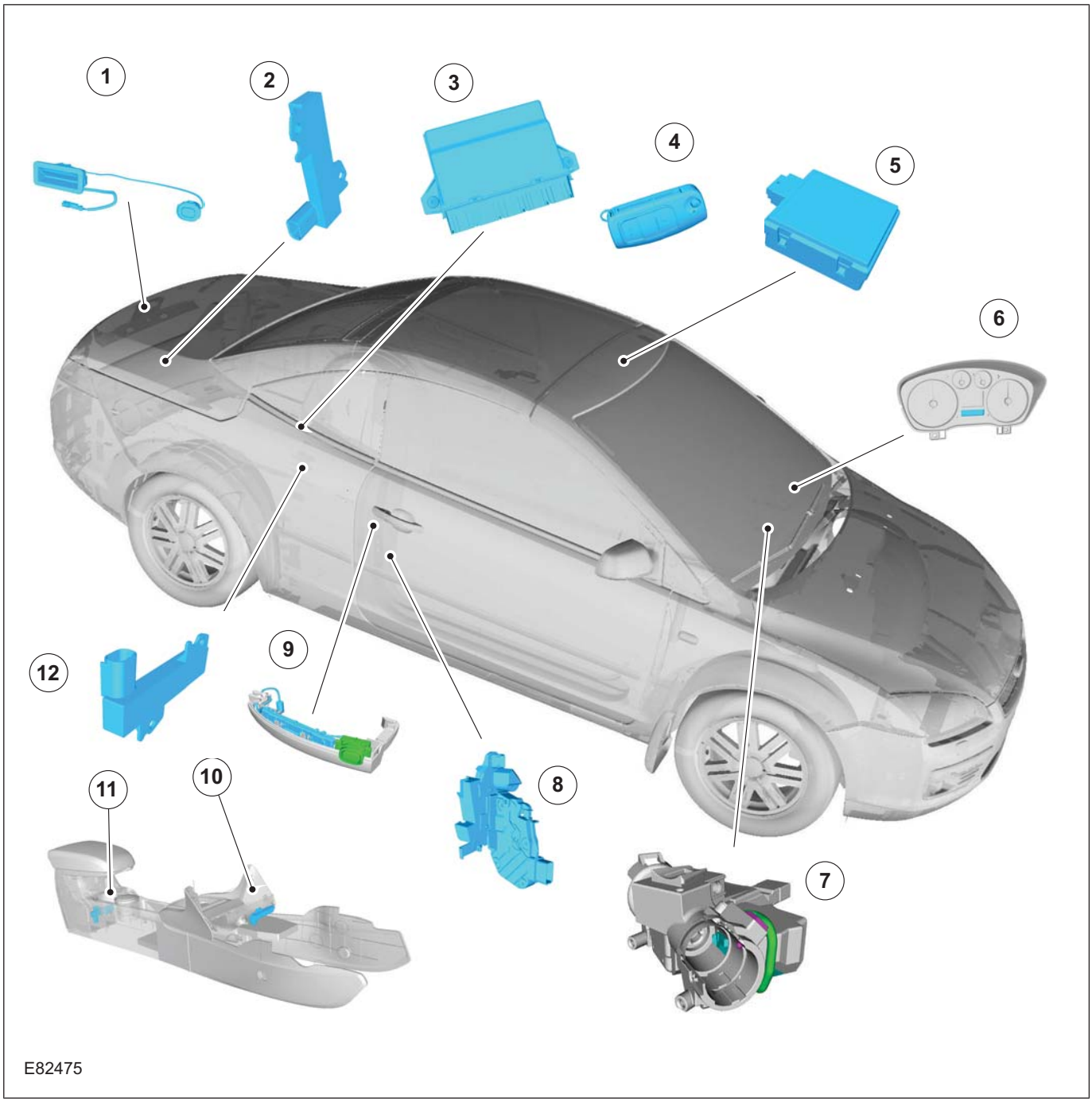


Item	Description
1	Liftgate/luggage compartment lid lock switch
2	Keyless vehicle module
3	Keyless vehicle passive key
4	Radio frequency (RF) receiver

Item	Description
5	Instrument cluster
6	Keyless vehicle antenna (interior)
7	Steering column lock control unit
8	Exterior door handle, keyless vehicle antenna and lock switch
9	Door latch

DESCRIPTION AND OPERATION

Convertible



Item	Description
1	Luggage compartment lid lock switch
2	Keyless vehicle luggage compartment antenna
3	Keyless vehicle module
4	Keyless vehicle passive key
5	Radio frequency (RF) receiver
6	Instrument cluster

Item	Description
7	Steering column lock control unit
8	Door latch
9	Exterior door handle, keyless vehicle antenna and lock switch
10	Keyless vehicle front antenna
11	Keyless vehicle center antenna
12	Keyless vehicle rear antenna

DESCRIPTION AND OPERATION

General

The system is designed to eliminate the need to use any form of key.

The basic function of the system is to allow the operator to gain entry to and operate the vehicle without the turning of keys or the pressing of buttons. This must be achieved without compromising the security or safety of the vehicle.

To gain access to the vehicle, a passive vehicle key must be about the person that is trying to gain access. At a distance of approximately 2 meters from the keyless antenna built into the exterior door handle or the rear exterior keyless antenna located behind the rear bumper cover, the passive vehicle key can receive a low frequency (LF) challenge to confirm its identity.

The vehicle system will not attempt to challenge the coded passive vehicle key, until a door handle is pulled or the liftgate/luggage compartment lid release switch is pressed. This reduces the current drain on the vehicle battery during the armed condition.

To lock the vehicle, all doors must be closed and a passive vehicle key coded to the vehicle must be in range of the exterior keyless vehicle antenna before the lock button on the exterior door handle or liftgate/luggage compartment lid is pressed.

To minimize the risk of scanning during the use of the passive key, the system is equipped with a rolling code. This means that the code received by the keyless vehicle module changes after each successful operation.

The start function is also controlled by the passive vehicle key. If the clutch pedal on manual vehicles or brake pedal for automatic vehicles is pressed, the keyless vehicle module will challenge the passive vehicle key using the interior keyless antenna and allow the steering column lock control unit to release. This allows the operator to rotate the ignition switch turning knob and start the engine.

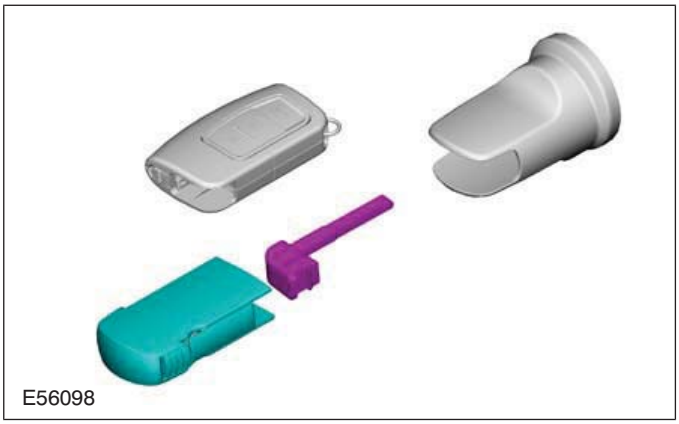
The passive anti theft system (PATS) is disarmed when the passive vehicle key emergency key transponder is read by the PATS transceiver during the starting function.

Passive vehicle Key


E56103

The passive vehicle key is designed to be unobtrusive and robust.

The primary function of the passive vehicle key is to receive requests from and transmit coded signal to the keyless vehicle module. Concealed within the passive vehicle key, is an emergency mechanical key.


E56098

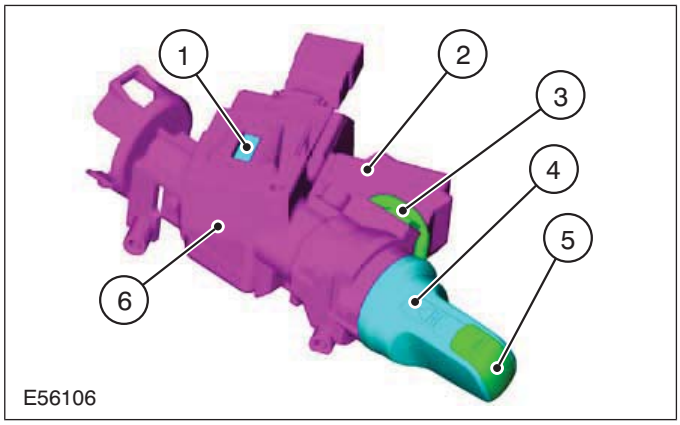
The mechanical key when removed from the passive vehicle key can be used to open the driver door to gain access to the vehicle. The mechanical key must be assembled to the ignition switch turning knob insert before it can then be used to release the steering lock and start the engine.

The passive vehicle key also has remote keyless entry (RKE) functionality.

RKE permits the operator to unlock and lock the vehicle and release the liftgate/luggage compartment lid from a location remote from the vehicle.

DESCRIPTION AND OPERATION

Steering Column Lock Control Unit



E56106

Item	Description
1	Steering column lock pin
2	Steering lock cylinder release solenoid
3	Mechanical key insertion detection switch
4	Ignition switch turning knob
5	Ignition switch turning knob insert
6	Steering column lock

The steering column lock control unit operates the same as the standard key operated steering lock but also has the added functionality of a solenoid operated ignition lock cylinder release.

Under the correct conditions, the ignition lock cylinder will be released and allowed to rotate to the accessory, run and start positions.

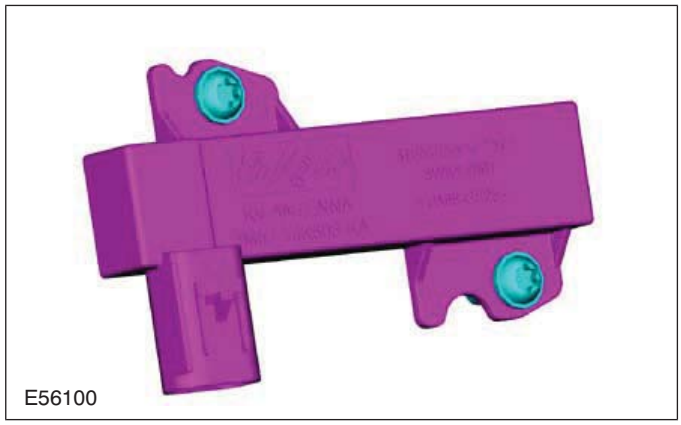
To achieve the correct conditions,

- A valid passive vehicle key must be detected by the keyless vehicle module within the vehicle
- The brake pedal in automatic transmission vehicles must be pressed and the clutch pedal in manual transmission vehicles must be pressed
- The ignition switch turning knob must be pressed in

Only when all of these conditions are met, can the ignition switch turning knob be rotated, so rotating the ignition lock cylinder and releasing the steering lock.

If the emergency key is inserted into the ignition switch turning knob, the steering column lock control unit detects the key and the keyless vehicle system is disabled.

Interior Keyless Antenna


E56100

The interior keyless vehicle antenna function is to transmit a LF signal to the passive vehicle key while it is inside the vehicle passenger compartment.

If at any time the passive vehicle key leaves the passenger compartment while the vehicle is unlocked or the ignition switch turning knob is in the accessory, run or start position, the interior keyless vehicle antenna will loose the signal from the passive vehicle key and the keyless vehicle module will indicate in the instrument cluster warning display, that no passive key is present in the vehicle.

There are 4 keyless vehicle antennas installed within the vehicle. They are located in the front and rear of the floor console, behind the rear seat backrest and in the loadspace rear panel.

Liftgate/Luggage Compartment Lid Lock Switch


E56178

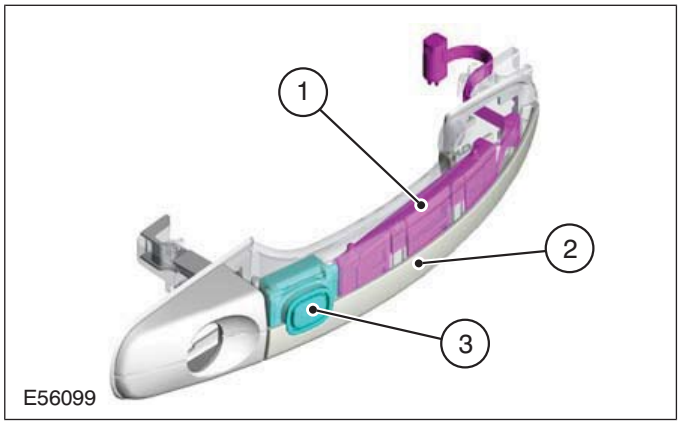
The liftgate/luggage compartment lid lock switch is located in the licence plate illumination panel and can be used to lock the entire vehicle.

When the liftgate/luggage compartment lid lock switch is pressed, a challenge is sent to the passive

DESCRIPTION AND OPERATION

vehicle key, if the passive vehicle key is valid, a signal triggers the keyless module to initiate the central locking.

Exterior Door Handle Keyless Vehicle Antenna and Lock Switch



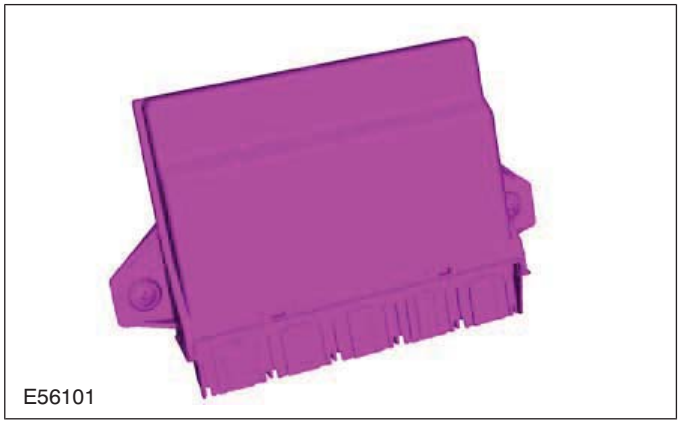
Item	Description
1	Exterior keyless vehicle antenna
2	Exterior front door handle
3	Exterior keyless vehicle system lock button

The exterior door handle keyless vehicle antenna and lock switch is a combined unit that is seen simply as the exterior door handle lock switch.

The function of the lock switch is to send a signal to the keyless vehicle module to indicate the intent to lock the vehicle.

The function of the exterior door handle keyless vehicle antenna is to challenge the passive vehicle key within a pre-defined area of the front exterior door handle.

Keyless Vehicle Module

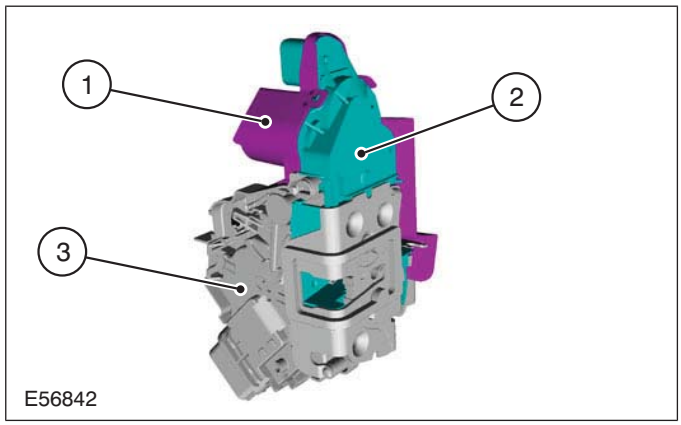


The keyless vehicle module is located in the loadspace trim panel area. Its function is to interface with the components that comprise the keyless vehicle system. These include:

- Door latches and integral motors
- Instrument cluster liquid crystal display (LCD)
- Exterior door handle keyless vehicle antenna
- Exterior door lock buttons
- Interior door lock button
- Liftgate/luggage compartment lid lock switch
- Interior keyless vehicle antennas
- Steering column lock control unit

Communication between the component and the keyless vehicle module is predominantly by hard wire as this reduces the delay in communication between components. But the medium speed central area network (CAN) bus is used where it is adequate.

Door Latch



Item	Description
1	Door latch release electric motor
2	Door latch
3	Door latch central and double locking electric motors

Keyless vehicle door latches incorporate an extra electric motor to replace the exterior door handle mechanical latch release function during keyless vehicle system operation.

In the event of mechanical key operation, the normal latch exterior door handle linkage will be utilized.

DESCRIPTION AND OPERATION

Instrument Cluster


E56837

The instrument cluster displays the keyless vehicle system state in the LCD warning display.

The instrument cluster also acts as the interface between the PATS transceiver, powertrain control module (PCM) and keyless vehicle module.

DIAGNOSIS AND TESTING

Locks, Latches and Entry Systems

General Equipment

Worldwide Diagnostic System (WDS)

Principles of Operation (Vehicles with Central Locking)

Central locking system overview

This system consists of mechanical/electrical operated latches. The latch motors are interlinked by solid wiring. Central locking is achieved with mechanical switching in the door latch by key or remote handle.

When a key is rotated in the door lock cylinder or an interior remote handle is operated, switching contacts within the door latch supply ground signals to the central junction box (CJB) electronic control, which in turn controls central locking relays. The relays supply battery voltage and ground to the door latch motors. By reversing the battery voltage and ground connections at the central locking relays, the door latches can be locked or unlocked.

The liftgate or luggage compartment lid is opened when the vehicle is in the unlocked mode by a ground signal from the liftgate/luggage compartment lid release switch to the CJB control. The CJB will then supply a voltage to the liftgate/luggage compartment lid latch motor.

If the vehicle is locked, the input from the liftgate/luggage compartment lid release switch to the CJB will be ignored.

Principles of Operation (Vehicles with Remote Keyless Entry (RKE)

RKE locking system overview

This system consists of mechanical/electrical operated door latches driven by inputs from electronic door control modules. The system uses a radio frequency (RF) transmitter and receiver to operate the remote lock/unlock functions and normal key or remote door handle inputs for standard central and double locking functions.

When a key is rotated in the door lock cylinder or an interior remote handle is operated, switching contacts within the door latch supply a command signal to the door control module. The door control module communicates with the CJB using the central area network (CAN) bus circuit. Dependant upon the current state of the locking system, commands are then sent to all of the door control modules, which in turn allow battery voltage to be applied to the door latch motors.

The fuel filler door lock function is controlled by the CJB. The CJB receives the lock command from the door control module. The CJB operates the lock relay which supplies a voltage to the fuel filler door lock motor. To unlock the fuel filler door, the supplied voltage is reversed using the driver door/fuel filler door unlock relay.

The liftgate or luggage compartment lid is opened when the vehicle is in the unlocked mode by a ground signal from the liftgate/luggage compartment lid release switch to the CJB. The CJB will supply a voltage to the liftgate or luggage compartment lid latch motor.

If the vehicle is locked, the input from the liftgate/luggage compartment lid release switch will be ignored.

The RKE functions are operated by sending a radio frequency (RF) signal from the key transmitter. The signal is received by the vehicle remote RF receiver. The signal received is transferred as a data signal to the CJB, where the transmitted signal is validated and control commands are sent to the door control modules on the CAN bus circuit and to the liftgate/luggage compartment lid latch motor by direct wiring.

Inspection and Verification (Vehicles with Remote Keyless Entry (RKE)

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

DIAGNOSIS AND TESTING

Visual Inspection Chart

Mechanical	Electrical
– Misaligned door(s), hood, liftgate, tailgate, luggage compartment and hood – Door latch(es) – Liftgate latch – Luggage compartment lid latch – Hood latch – Actuating Cable(s) – Exterior door handle(s) – Door latch remote control(s) – Door lock cylinder(s) – Liftgate lock cylinder	– Fuse(s) – Relay(s) – Wiring harness – Electrical connector(s) – Door latch(s) – Remote transmitter batteries – Vehicle battery – Remote transmitter – RF receiver – Liftgate exterior release switch – Luggage compartment lid release switch – Door control module(s) – CJB

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, connect WDS to the data link connector.
5. Select the **Generic Electronic Module** menu.
6. Retrieve the diagnostic trouble codes (DTCs) and refer to the Diagnostic Trouble Code (DTC) Index - CJB.

Principles of Operation (Vehicles with Keyless vehicle system)

Keyless Component Installation, Programing and Initialization

If new components for the keyless vehicle system have been installed, dependant upon which component is installed, programing using **WDS** will be required.

NOTE: Before any programing or initialization for the keyless vehicle system components can be carried out, an operational valid passive anti-theft system (PATS) emergency key must be present in the ignition switch turning knob.

Passive Key programing

Passive key programing can only be carried out using WDS. To program a new passive key, clear passive keys or count passive keys follow the WDS menu sequence:

- Vehicle communication
- Toolbox
- Body
- Security
- Remote Keyless Entry

From the Remote Keyless Entry screen you can choose to:

- Add Keys
- Clear Keys
- Count Keys

Steering column lock control unit initialization

If a new steering column lock control unit is installed, the only procedure required providing the original steering lock barrel has been installed and the original emergency key is used, is **Initialize System** using the following WDS menu sequence:

- Vehicle communication
- Toolbox
- Body
- Security
- Remote Keyless Entry
- Initialize System

Keyless vehicle module programing

If a new keyless vehicle module is installed, the following programing sequence must be followed using WDS.

- Keyless Vehicle Module (KVM) programing. (From the module programing menu)
- Initialize System
- Add Keys

Instrument cluster programing

If a new instrument cluster is installed, the following programing sequence must be followed using WDS.

- Instrument cluster module programing. (From the module programing menu).
- PATS key learning. (From the PATS menu)

DIAGNOSIS AND TESTING

- Initialize with the powertrain control module. (From the PATS menu)
- Initialize with the keyless vehicle module. (From the Remote Keyless Entry menu)

Keyless Vehicle System Overview

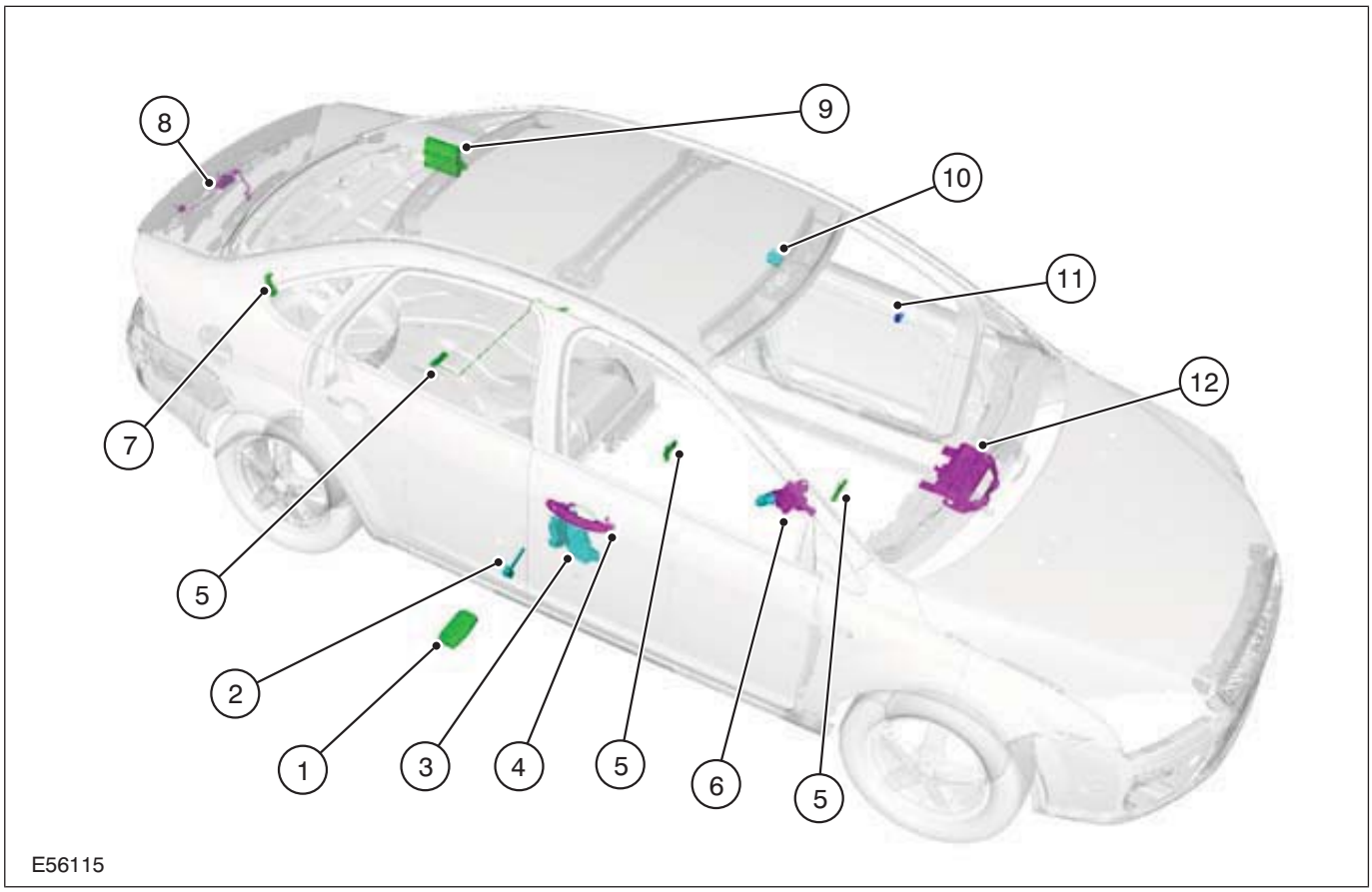
The keyless vehicle system also incorporates RKE functions, however the main purpose of the system is to allow the operator of the vehicle to gain access to and operate the vehicle without carrying out any actions with a key or remote buttons.

The keyless vehicle system can be turned off to give basic key operation if required.

To isolate the keyless vehicle system, the emergency key must be inserted into the ignition switch turning knob and the ignition switch turning knob rotated to position II. It is now possible to select the KEY FREE ON or KEY FREE OFF from the instrument cluster liquid crystal display (LCD) using the remote steering column stalk control. In the OFF mode, the RKE functions still work.

Vehicles equipped with keyless vehicle systems, will be delivered from production in shipping mode. Shipping mode reduces the vehicle battery drain to a minimum to extend the period of time the vehicle can remain dormant without discharging the vehicle battery.

To exit the shipping mode, the emergency key must be inserted into the ignition switch turning knob and rotated to position II. The shipping mode can now be deselected from the instrument cluster LCD display using the steering column stalk control.



E56115

Item	Description
1	Passive vehicle key
2	Emergency key
3	Door latch
4	Door exterior handle keyless vehicle antenna and lock switch
5	Interior keyless vehicle antennas

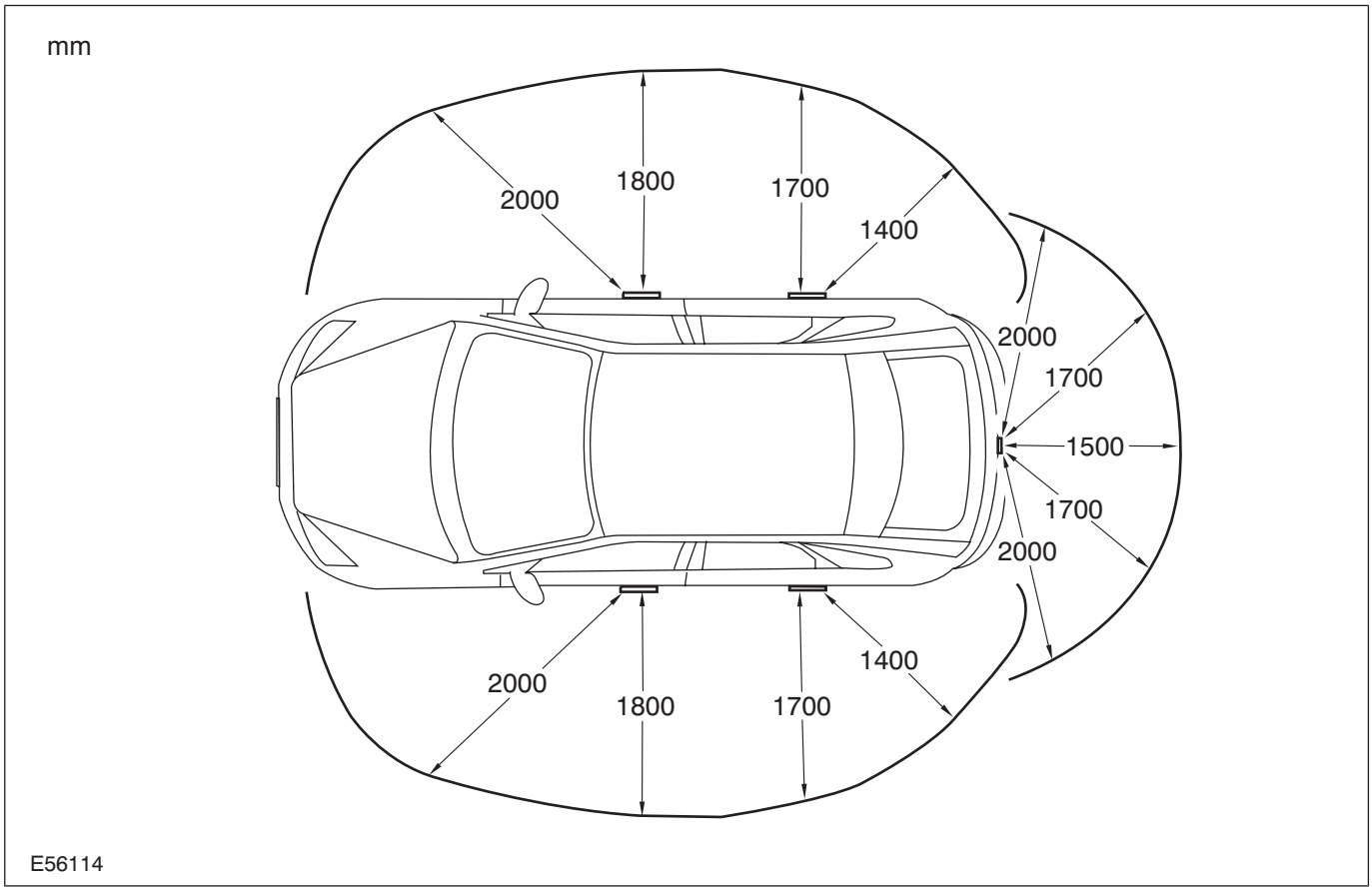
Item	Description
6	Steering column lock control unit
7	Rear exterior keyless vehicle antenna
8	Liftgate/luggage compartment lid lock switch
9	Keyless vehicle module
10	RKE antenna

DIAGNOSIS AND TESTING

Item	Description
11	Interior unlock button

Item	Description
12	Central junction box

Passive Key



The passive vehicle key can receive an identification challenge from the vehicle door exterior handle keyless vehicle antennas within a range of approximately 1.5 meters to 2.0 meters. The challenge from the rear exterior keyless vehicle antenna will be received at up to 1.5 meters from the center rear of the vehicle. On receiving the identification challenge, the passive vehicle key will emit a coded radio frequency (RF) signal to the RF receiver. No RF signal will be emitted if the passive vehicle key does not recognize the coded low frequency challenge from the keyless vehicle module.

If the system is functioning correctly, the operator will be able to open the vehicle doors, liftgate or luggage compartment lid, as long as a valid passive key is within the defined areas.

If a valid passive vehicle key detects a low frequency challenge from the interior keyless antenna and emits a valid RF coded signal, the keyless vehicle module will switch on the passive go functionality.

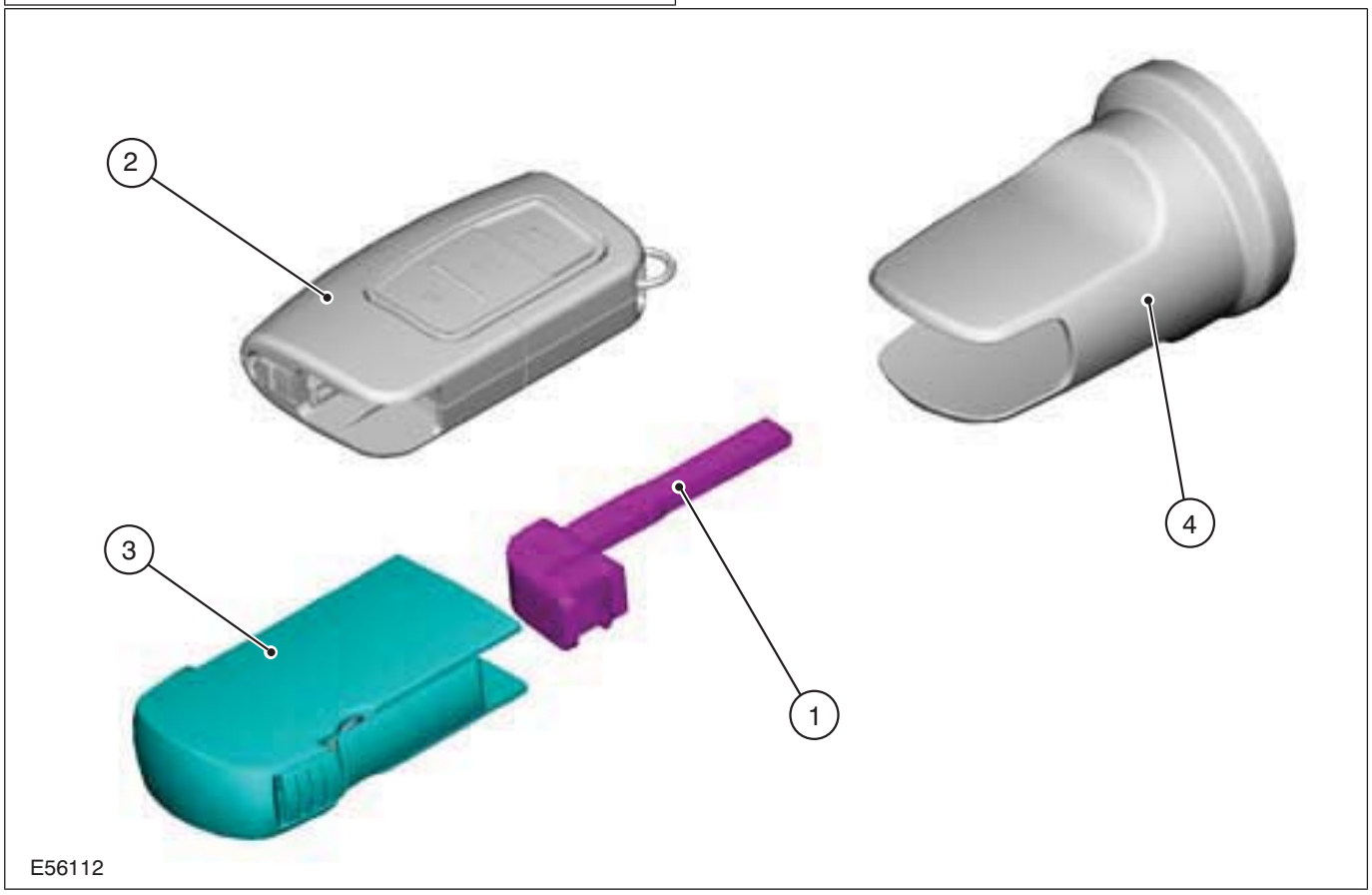
If a valid passive vehicle key is left in the vehicle and the vehicle is locked using a second valid passive vehicle key. The instrument cluster will indicate the presence of a valid key in the vehicle and the passive vehicle key left in the vehicle will be disabled. The disabled passive vehicle key can only be reactivated by starting the vehicle with the emergency key.

Up to 8 passive vehicle keys can be programmed to one keyless vehicle module. Passive vehicle keys can only be programmed using the **Teach Keys** menu in WDS.

DIAGNOSIS AND TESTING


E56103

The passive vehicle key is equipped with RKE function buttons. When an RKE function button is pressed, the RF signal emitted is received by the RF receiver within the vehicle. Data is sent from the RF receiver to the keyless vehicle module. The keyless vehicle module will validate the transmitted signal and if valid, operate the relevant function.



E56112

Item	Description
1	Emergency mechanical key
2	Passive vehicle key
3	Ignition switch turning knob insert
4	Ignition switch turning knob

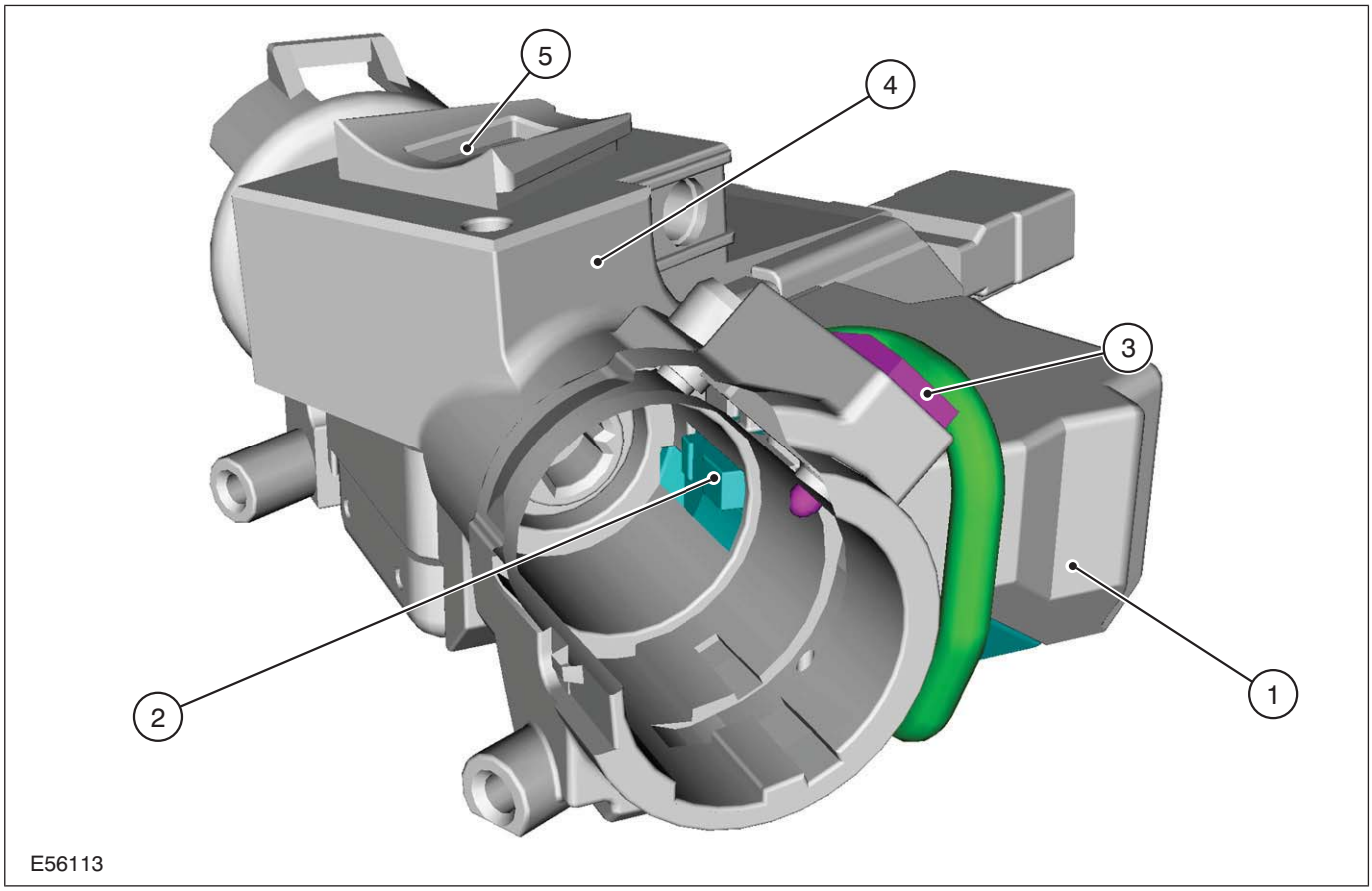
Within the passive vehicle key is concealed a emergency mechanical key. The mechanical key can be used to open the drivers door and start the vehicle. The mechanical key is equipped with a passive anti-theft system (PATS) transducer.

To start the vehicle with the emergency key, it must first be assembled to the ignition switch turning knob insert. When the assembled key is inserted into the ignition switch turning knob, the key insertion detection switch sends a signal to the keyless vehicle module indicating a key has been inserted. The keyless vehicle module will then switch off the passive go and revert to standard PATS functionality.

The emergency key will override the ignition lock cylinder electrical locking function.

DIAGNOSIS AND TESTING

Steering Column Lock Control Unit



Item	Description
1	Ignition lock cylinder release solenoid
2	Ignition lock cylinder rotation lock
3	Mechanical key insertion detection switch
4	Steering column lock
5	Steering column lock pin

The steering column lock control unit still carries out the same function as the standard steering column lock, but now it has the added functionality of a solenoid operated ignition lock cylinder release.

For the steering column lock to release in keyless vehicle mode, certain criteria must be fulfilled:

- vehicles with automatic transmissions must have the brake pedal pressed
- vehicles with manual transmissions must have the clutch pedal pressed
- a valid passive vehicle key must be within the detection range of the interior keyless vehicle antenna

When the brake or clutch pedal is pressed, the keyless vehicle module is triggered to search for a valid passive vehicle key. If a valid passive vehicle key is detected, the ignition lock cylinder solenoid releases and the ignition switch turning knob can be pressed in. This will release the steering lock and allow the ignition switch turning knob to be rotated to positions I, II and III.

To lock the steering column, the ignition switch turning knob must be turned to the 0 position and pulled out by approximately 5mm.

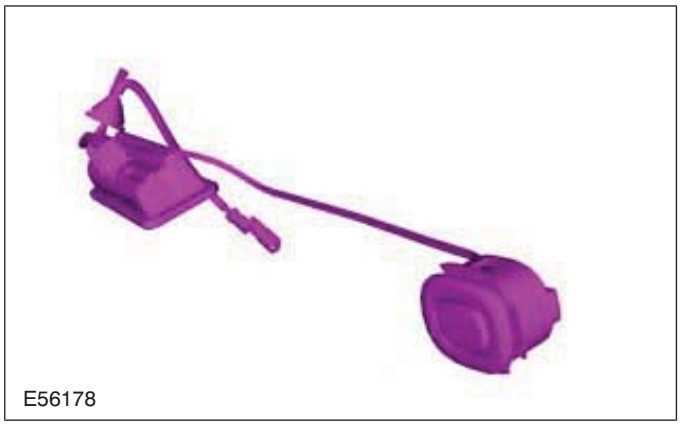
The PATS function is armed until the ignition switch turning knob has reached position II. When the ignition switch turning knob is in position II, the keyless vehicle module receives a request from the steering column lock control unit to identify the passive key PATS transducer. The keyless vehicle module then sends a command on the medium speed CAN bus to the instrument cluster. The instrument cluster verifies the validity of the passive vehicle key PATS transducer and in turn communicates with the powertrain control module (PCM) and allows the vehicle to start.

If a new steering column lock control unit is installed to a vehicle, before it will function, it must

DIAGNOSIS AND TESTING

be initialized using the **Initialize System** menu in WDS.

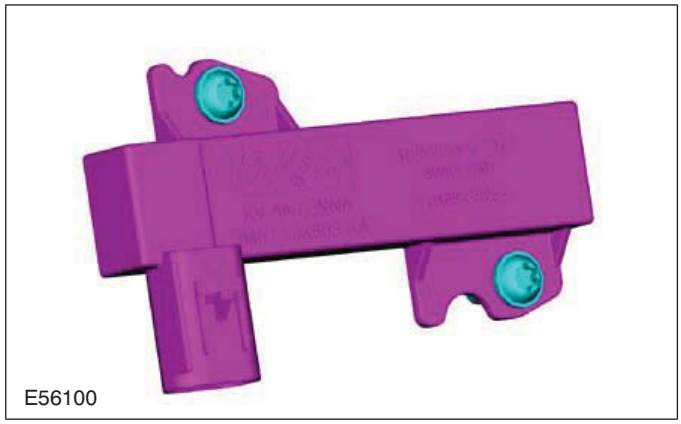
Liftgate/Luggage Compartment Lid Lock Button


E56178

The liftgate/luggage compartment lid lock button is located in the licence plate illumination panel.

If the liftgate/luggage compartment lid is closed and the exterior lock button is pressed while a valid passive vehicle key in the loadspace area, the keyless vehicle module will request that the external keyless vehicle antennas issue a passive vehicle key challenge. If no valid passive vehicle key signal is detected by the RF receiver, the liftgate/luggage compartment lid will be automatically opened. If a valid passive vehicle key signal is detected by the exterior keyless vehicle antennas, the passive vehicle key in the loadspace area will be deactivated and the vehicle allowed to lock in the normal way. The deactivated passive vehicle key will be reactivated after the ignition switch turning knob has been turned to position II with either a valid passive vehicle key or a mechanical emergency key.

Interior Keyless Vehicle Antenna


E56100

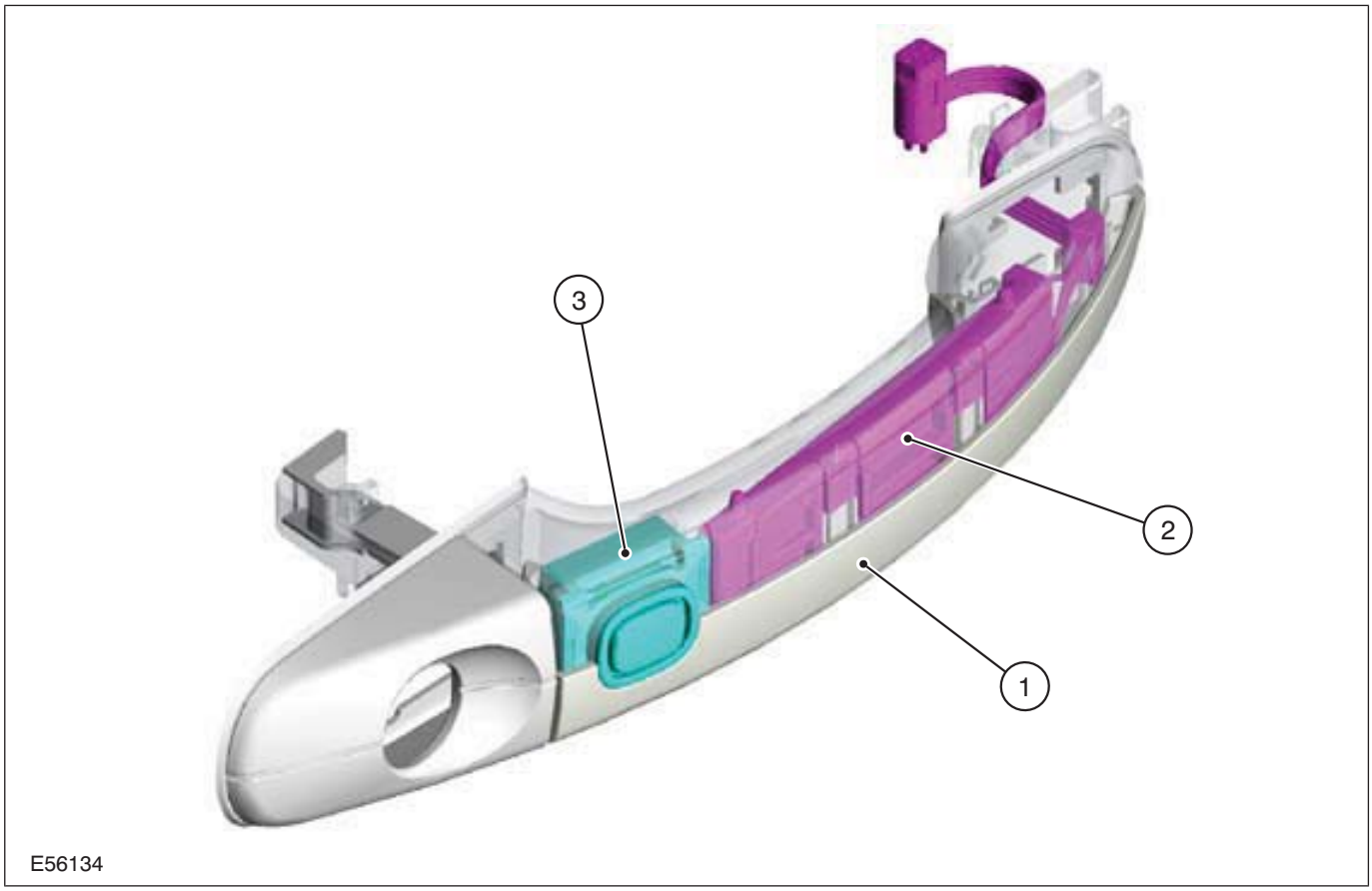
The interior keyless vehicle antenna function is to issue a low frequency challenge to the passive vehicle key while it is in the passenger compartment.

The vehicle is equipped with two interior keyless vehicle antennas in the passenger compartment area and one in the loadspace area.

The loadspace keyless vehicle antenna is fitted to prevent the possibility of accidently locking the passive vehicle key in the loadspace area.

DIAGNOSIS AND TESTING

Exterior Door Handle Antenna and Lock Switch



E56134

Item	Description
1	Exterior door handle
2	Exterior keyless vehicle antenna
3	Exterior door lock switch

With the vehicle locked and the keyless vehicle system active, the exterior keyless vehicle antennas are dormant and do not scan for a valid passive vehicle key. The exterior keyless vehicle antenna will only wake up and issue a challenge for a valid passive vehicle key when the operator has begun to pull the exterior door handle.

In the time it takes to open a door, the signal determining handle movement is sent to the keyless vehicle module, a request of the exterior keyless vehicle antenna to detect a valid passive vehicle key, the receiving and validation of the passive vehicle key code and the command to the door latch to unlock has occurred. This whole process takes approximately 150 ms.

The only time this function will be impaired is if the vehicle has been left standing for at least 5 days. The keyless vehicle module will then enter a state of reduced energy consumption and when the vehicle door handle is pulled, it will take a noticeably increased period for the keyless system to wake up and unlock the door(s).

When the operator exits the vehicle, the vehicle is locked by pressing the lock button fitted into the exterior door handle.

With all doors and liftgate/luggage compartment lid closed, the exterior door lock button will initiate a request from the keyless vehicle module to scan the interior and exterior of the vehicle around the pressed lock button for valid passive vehicle key. If a valid passive vehicle key is detected on the exterior of the vehicle only, the door latches will be locked. The door latches will remain locked for a period of 3 seconds to allow for the operator to pull the exterior door handle to check if the door is locked. After 3 seconds, if the exterior door handle is pulled, the door latch will release as in a normal keyless vehicle entry. If a valid passive vehicle key is detected in the interior of the vehicle and not on the exterior, the latches will not be locked. The vehicle will also not be locked if the ignition switch turning knob is in the II position. Passive vehicle locking will be confirmed by the operation of the vehicles turn signal lamps.

DIAGNOSIS AND TESTING

If the ignition turning knob is in position I or 0 and the steering column lock is not engaged, the keyless vehicle module will allow the locking to operate. A warning chime will sound and a warning **ENGAGE STEERING LOCK** will be displayed in the instrument cluster LCD area if driver's door is opened.

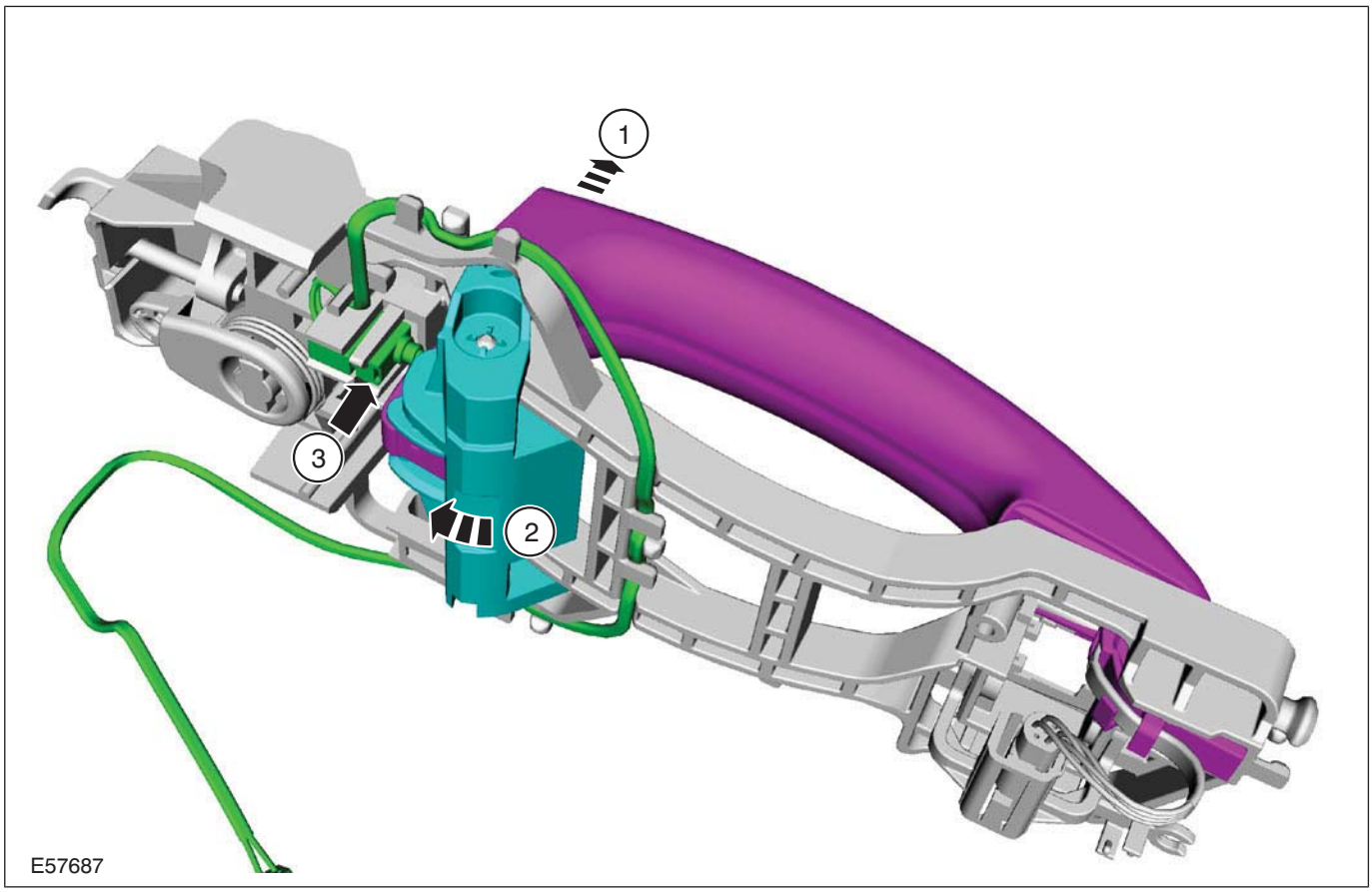
To double lock the vehicle, requires the exterior lock button to be pressed twice. The second pressing of the exterior lock button must occur within 3 seconds of it first being pressed.

To operate the global closing feature, requires the exterior lock button on the drivers door only, to be pressed and held pressed for a period of 2 seconds.

The keyless vehicle central unlocking function can be programed to operate the drivers door only or all the doors. To set the desired function, the lock and unlock button at the passive key has to be pressed in parallel for 4 seconds. If a rear exterior door handle or passenger exterior door handle is pulled when the keyless vehicle system is in driver door unlock mode, all doors will remain locked. If the driver exterior door handle is pulled when the keyless vehicle system is in driver door unlock mode, only the driver door will unlock and the door handle passive entry for the rear doors and passenger door will be inoperative.

In driver door unlock mode, the passenger doors can only be unlocked using the interior keyless vehicle system unlock button.

Exterior Door Handle Pull Switch

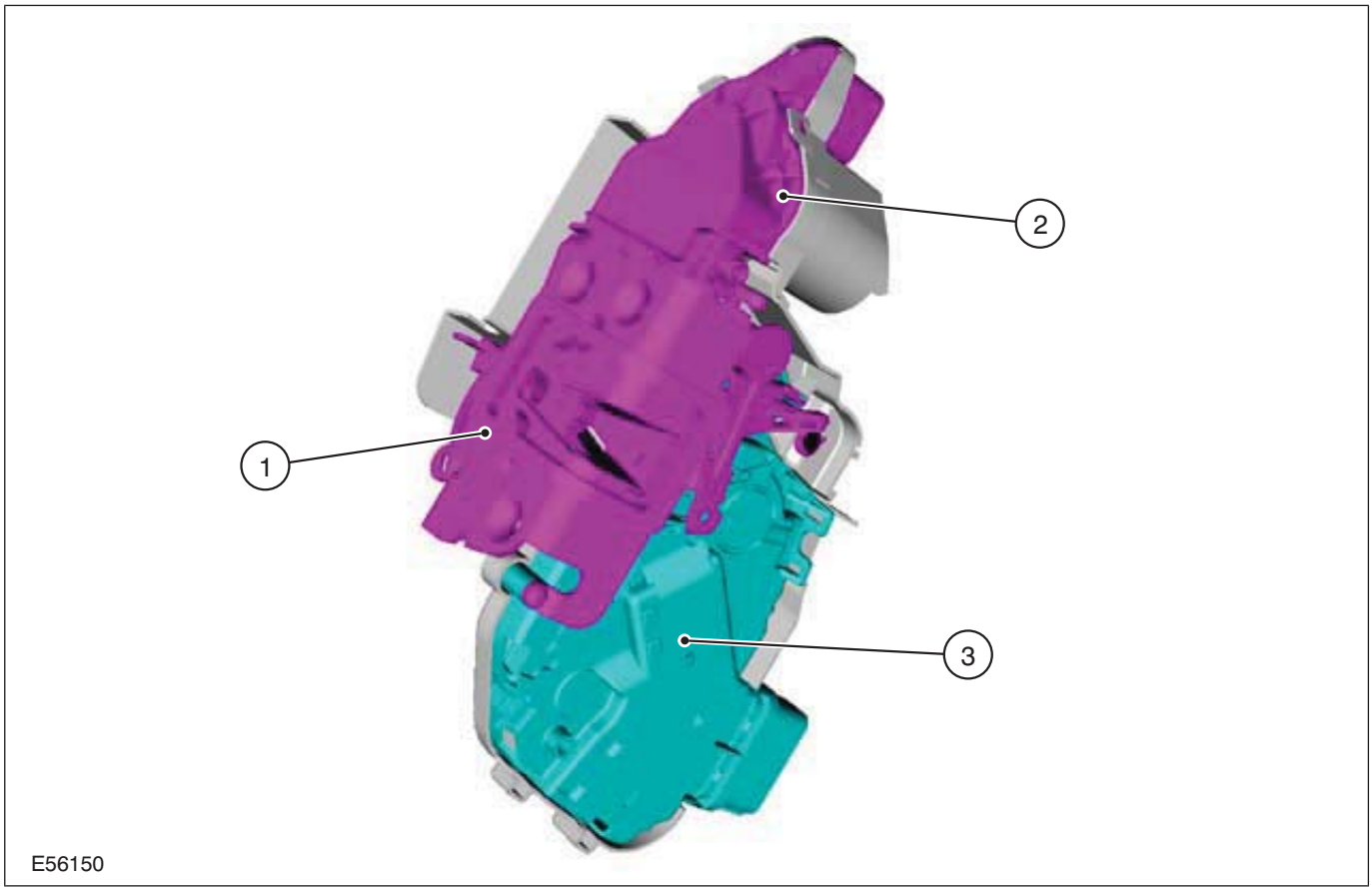


Item	Description
1	Exterior door handle
2	Door latch actuator
3	Exterior door handle pull switch

The exterior door handle switch is operated from a cam lobe attached to the door latch actuator. As the exterior door handle is pulled, the door latch actuator rotates and operates the exterior door handle pull switch.

DIAGNOSIS AND TESTING

Door Latch



Item	Description
1	Door latch
2	Door latch unlatch motor
3	Central/double locking motor

The keyless vehicle locking system requires unique door latches.

The door latches are equipped with electric motors that replace the mechanical unlatch function of the exterior door handle when the vehicle is in keyless vehicle system mode. This is because the exterior door handle is already in a semi pulled state before the latch unlatch command is received by the latch lock motors, the latch linkage is not in a position to engage with the exterior door handle.

If the emergency key is used to enter the vehicle, the standard mechanical latch linkage is utilized.

Central and double locking is still controlled by the door control modules, however the commands to lock and unlock are relayed through the keyless vehicle module on the high-speed CAN bus circuit.

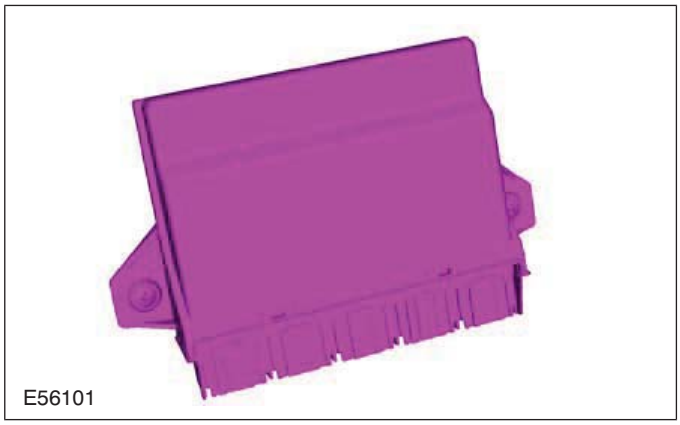
Interior Unlock Switch



The interior unlock switches function, is to unlock the rear doors and passenger door locks when the vehicle has been entered using the passive entry system in drivers unlock mode.

DIAGNOSIS AND TESTING

Keyless Vehicle Module


E56101

The keyless vehicle module is at the heart of the keyless vehicle system. It communicates with the PJB and with the instrument cluster on the medium speed CAN bus circuit. The keyless vehicle module stores the passive vehicle key codes. If a new keyless vehicle module is installed in a vehicle, the following sequence must be followed before the system can function.

- Using WDS Program Module routine, program the keyless vehicle module.
- Using the Initialize System routine, initialize the keyless vehicle module to the CJB and to the steering column lock control unit.
- Using the Teach Key function, teach the minimum number of passive keys required.

Inspection and Verification (Vehicles with Keyless Entry)

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

Visual Inspection Chart

Mechanical	Electrical
– Misaligned door(s), hood, liftgate, tailgate, luggage compartment and hood – Door latch(es) – Liftgate latch – Luggage compartment lid latch – Hood latch – Actuating Cable(s) – Exterior door handle(s) – Door latch remote control(s) – Door lock cylinder	– Fuse(s) – Relay(s) – Wiring harness – Electrical connector(s) – Door latch motor(s) – Vehicle battery – Liftgate lock switch – Luggage compartment lid lock switch – Passive vehicle key – Keyless vehicle module – Keyless vehicle interior antenna(s) – Keyless vehicle exterior antenna(s) – RF receiver – Ignition lock cylinder key insert switch – Ignition lock cylinder release solenoid – Liftgate exterior release switch – Luggage compartment lid release switch

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, connect WDS to the data link connector.
5. Select the **Remote Keyless Entry** menu.
6. Retrieve the diagnostic trouble codes (DTC) and refer to the Diagnostic Trouble Code (DTC) Index - Keyless Vehicle Module.
7. If no DTC(s) are stored in the keyless vehicle module, retrieve the DTC(s) from the CJB and refer to the DTC index - CJB.

DIAGNOSIS AND TESTING

Diagnostic Trouble Code (DTC) Index - Keyless Vehicle Module

DTC	Description	Possible Source	Action
B2477	Keyless vehicle module configuration failure	• Keyless vehicle module programing • Keyless vehicle module	Using WDS, Program Module menu. PROGRAM the keyless vehicle module. TEST the system for normal operation. If the DTC is repeated, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). Using WDS, Remote Keyless Entry, Initialize System menu. INITIALIZE the keyless entry system. TEST the system for normal operation
B1342	Keyless vehicle module failure	Keyless vehicle module	INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). Using WDS, Remote Keyless Entry, Initialize System menu. INITIALIZE the keyless entry system. TEST the system for normal operation
B1096	Communication failure between keyless vehicle module and steering column lock control unit	• Wiring harness • Keyless vehicle module • Steering column lock control unit	GO to Pinpoint Test A.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
B1095	Steering column lock control unit failure	Steering column lock control unit	INSTALL a new steering column lock control unit. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). Using WDS, Remote Keyless Entry, Initialize System menu. INITIALIZE the keyless entry system. TEST the system for normal operation
B1094	Steering column lock control unit identification not stored	Steering column lock control unit initialization	Using WDS, Remote Keyless Entry, Initialize System menu. INITIALIZE the keyless entry system. Test the system for normal operation
B1093	Steering column lock control unit identification does not match stored data	Steering column lock control unit initialization	Using WDS, Remote Keyless Entry, Initialize System menu. INITIALIZE the keyless entry system. TEST the system for normal operation
B1092	Steering column lock control unit to keyless vehicle module wiring harness short to battery positive	• Wiring harness • Steering column lock control unit • Keyless vehicle module	GO to Pinpoint Test B.
B1069	Keyless vehicle module secure identification missing	Keyless vehicle module initialization	Using WDS, Remote Keyless Entry, Initialize System menu. INITIALIZE the keyless entry system. TEST the system for normal operation
B2090	RF antenna data circuit, short to battery or short to ground	• RF antenna harness • RF antenna • Keyless vehicle module • Central junction box	GO to Pinpoint Test C.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
B2091	RF antenna data circuit, open circuit	• RF antenna harness • RF antenna • Keyless vehicle module • Central junction box	GO to Pinpoint Test D.
B1087	Passenger side rear door latch clutch switch active without door handle unlock pull switch functioning	• Passenger side rear door latch wiring harness • Passenger side rear door latch • Passenger side rear door unlock switch	For LHD vehicles, GO to Pinpoint Test E.
B1088	Drivers side rear door latch clutch switch active without door handle unlock pull switch functioning	• Drivers side rear door latch wiring harness • Drivers side rear door latch • Drivers side rear door unlock switch	GO to Pinpoint Test F.
B1089	Passenger side front door latch clutch switch active without door handle unlock pull switch functioning	• Passenger side front door latch wiring harness • Passenger side front door latch • Passenger side front door unlock switch	GO to Pinpoint Test G.
B1090	Drivers side front door latch clutch switch active without door handle unlock pull switch functioning	• Drivers side front door latch wiring harness • Drivers side front door latch • Drivers side front door unlock switch	GO to Pinpoint Test H.
B1078	Drivers side door exterior keyless antenna circuit, short to battery positive	• Drivers side door exterior keyless vehicle antenna wiring harness • Drivers side door exterior keyless vehicle antenna • Key-free module	GO to Pinpoint Test I.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
B1079	Passengers side door exterior keyless vehicle antenna circuit, short to battery positive	• Passengers side door exterior keyless vehicle antenna wiring harness • Passengers side door exterior keyless vehicle antenna • Keyless vehicle module	GO to Pinpoint Test J.
B1080	Liftgate/luggage compartment lid exterior keyless vehicle antenna circuit, short to battery positive	• Liftgate/luggage compartment lid exterior keyless vehicle antenna wiring harness • Liftgate/luggage compartment lid exterior keyless vehicle antenna • Keyless vehicle module	GO to Pinpoint Test K.
B1081	Interior passenger area keyless vehicle antenna circuit, short to battery positive	• Interior keyless vehicle antenna wiring harness • Interior keyless vehicle antenna(s) • Keyless vehicle module	• Using the Passive Key Detection Test, in this section, Identify the inoperative keyless vehicle interior antenna. • If the front interior keyless vehicle antenna is inoperative, GO to Pinpoint Test L. • If the center interior keyless vehicle antenna is inoperative, GO to Pinpoint Test M.
B1082	Interior loadspace keyless vehicle antenna circuit, short to battery positive	• Interior loadspace keyless vehicle antenna wiring harness • Interior loadspace keyless vehicle antenna • keyless vehicle module	GO to Pinpoint Test N.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
B1077	Drivers side door exterior keyless vehicle antenna circuit, short to ground	• Drivers side door exterior keyless vehicle antenna wiring harness • Drivers side door exterior keyless vehicle antenna • Keyless vehicle module	GO to Pinpoint Test O.
B1083	Passenger side door exterior keyless vehicle antenna circuit, short to ground	• Passengers side door exterior keyless vehicle antenna wiring harness • Passengers side door exterior keyless vehicle antenna • Keyless vehicle module	GO to Pinpoint Test P.
B1086	Liftgate/luggage compartment lid exterior keyless vehicle antenna circuit, short to ground	• Liftgate/luggage compartment lid exterior keyless vehicle antenna wiring harness • Liftgate/luggage compartment exterior keyless vehicle antenna • Keyless vehicle module	GO to Pinpoint Test Q.
B1070	Interior passenger area keyless vehicle antenna circuit, short to ground	• Interior keyless vehicle antenna wiring harness • Interior keyless vehicle antenna(s) • Keyless vehicle module	• Using the Passive Key Detection Test, Identify the inoperative keyless vehicle interior antenna. • If the front interior keyless vehicle antenna is inoperative, GO to Pinpoint Test R. • If the center interior keyless vehicle antenna is inoperative, GO to Pinpoint Test S.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
B1071	Interior loadspace keyless vehicle antenna circuit, short to ground	• Interior loadspace keyless vehicle antenna wiring harness • Interior loadspace keyless vehicle antenna • keyless vehicle module	GO to Pinpoint Test T.
B1072	Drivers side door exterior keyless vehicle antenna circuit, open circuit	• Drivers side door exterior keyless vehicle antenna wiring harness • Drivers side door exterior keyless vehicle antenna • keyless vehicle module	GO to Pinpoint Test U.
B1073	Passenger side door exterior keyless vehicle antenna circuit, open circuit	• Passengers side door exterior keyless vehicle antenna wiring harness • Passengers side door exterior keyless vehicle antenna • keyless vehicle module	GO to Pinpoint Test V.
B1074	Liftgate/luggage compartment lid exterior keyless vehicle antenna circuit, open circuit	• Liftgate/luggage compartment lid exterior keyless vehicle antenna wiring harness • Liftgate/luggage compartment lid exterior keyless vehicle antenna • keyless vehicle module	GO to Pinpoint Test W.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
B1075	Interior passenger area keyless vehicle antenna circuit, open circuit	• Interior keyless vehicle antenna wiring harness • Interior keyless vehicle antenna(s) • keyless vehicle module	• Using the Passive Key Detection Test, Identify the inoperative keyless vehicle interior antenna. • If the front interior keyless vehicle antenna is inoperative, GO to Pinpoint Test X. • If the center interior keyless vehicle antenna is inoperative, GO to Pinpoint Test Y.
B1076	Interior loadspace keyless vehicle antenna circuit, open circuit	• Interior loadspace keyless vehicle antenna wiring harness • Interior loadspace keyless vehicle antenna • keyless vehicle module	GO to Pinpoint Test Z.
B1091	Passive vehicle key programming error	Less than minimum number of passive vehicle keys known to the keyless vehicle module	Using WDS, Remote Keyless Entry, Clear Keys menu, CLEAR all programmed passive keys. Using the Add Keys menu, PROGRAM the minimum required number of passive keys to the keyless vehicle module. TEST the system for normal operation.

Diagnostic Trouble Code (DTC) Index - CJB

DTC	Description	Possible Source	Action
B1311 - Vehicles with keyless vehicle system only.	Unlock switch circuit open circuit	• Unlock switch wiring harness • Unlock switch	GO to Pinpoint Test AE.
B1320 - All vehicles.	Drivers side front door ajar switch circuit open circuit	• Drivers side front door latch wiring harness • Drivers side front door latch	GO to Pinpoint Test AF.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
B1331 - All vehicles.	Liftgate/luggage compartment lid latch ajar switch circuit short to ground	• Liftgate/luggage compartment lid latch ajar switch wiring harness • Liftgate/luggage compartment lid latch ajar switch	GO to Pinpoint Test AG.
B2090 - Vehicles without keyless vehicle system.	• RF receiver data circuit, short circuit • RF receiver data circuit, short to battery positive	• RF receiver wiring harness • RF receiver • CJB	GO to Pinpoint Test AA.
B2091 - Vehicles without keyless vehicle system.	• RF receiver data circuit, open circuit • No communication between RF receiver and CJB	• RF receiver wiring harness • RF receiver • CJB	GO to Pinpoint Test AB.
B2094 - Vehicles without keyless vehicle system.	RKE transmitter low battery	RKE transmitter battery	INSTALL a new RKE transmitter battery. Refer to the owners handbook. TEST the system for normal operation
B2425 - Vehicles without keyless vehicle system.	RKE transmitter out of synchronization	RKE transmitter	CHECK that all known RKE keys function correctly. CLEAR the DTC. TEST the system for normal operation.
B2894 - All vehicles.	• Liftgate/luggage compartment lid release output circuit, short to ground • Liftgate/luggage compartment lid release output circuit, open circuit	• Liftgate/luggage compartment lid latch wiring harness • liftgate/luggage compartment lid latch motor • CJB	GO to Pinpoint Test AC.
B2970 - All vehicles.	liftgate/luggage compartment lid exterior release switch circuit, short to ground	• liftgate/luggage compartment lid exterior release switch wiring harness • liftgate/luggage compartment lid exterior release switch • CJB	GO to Pinpoint Test AD.

DIAGNOSIS AND TESTING

DTC	Description	Possible Source	Action
U1900	CAN bus communication error	• Instrument cluster • CJB • Keyless vehicle module • CAN bus circuit	If this code is related to the keyless vehicle system, the RKE functions and central door locking functions will not operate. To continue the diagnostic,

Keyless Vehicle Service Test Procedure(s)

To carry out a passive key detection test or keyless vehicle actuator test, the keyless vehicle module diagnosis entry procedure must be carried out first.

Keyless Vehicle Module Passive key Diagnosis Entry

1. **NOTE: Test mode entry possible on drivers door only (No entry if drivers door lock button is defect.**

   Insert the emergency mechanical key into the ignition lock cylinder.
2. Rotate the emergency key to position II.
3. Pull, and hold the driver-side front exterior door handle.
4. Press the driver-side front exterior door handle lock button 10 times.
5. Rotate the emergency mechanical key to position 0.
6. Remove the emergency mechanical key from the ignition lock cylinder.

The keyless vehicle module is now in passive key diagnosis mode. The module will remain in diagnosis mode for 30 seconds or until the ignition lock cylinder is rotated to position II.

Passive Key Detection Test

After each activation of a keyless vehicle system function, the 30 second time out will be restarted.

1. Press the driver-side front exterior door handle lock button.
2. Position the passive vehicle key in the defined reception area of the driver-side front exterior door handle keyless vehicle antenna. For every successful detection of the passive vehicle key, the vehicle indicator lights will flash once.
3. Press the passenger-side front exterior door handle lock button.
4. Position the passive vehicle key in the defined reception area of the passenger side front exterior door handle keyless vehicle antenna. For every successful detection of the passive vehicle key, the vehicle indicator lights will flash once.
5. Press the liftgate or luggage compartment lid lock button.
6. Position the passive vehicle key in the defined reception area of the rear bumper keyless vehicle antenna. For every successful detection of the passive vehicle key, the vehicle indicator lights will flash once.
7. Push in the ignition switch turning knob.
8. Position the passive vehicle key in the front of the passenger compartment. For every successful detection of the passive vehicle key by the front interior keyless vehicle antenna, the vehicle indicator lights will flash once.
9. Position the passive vehicle key towards the center rear of the passenger compartment. For every successful detection of the passive vehicle key by the center interior keyless vehicle antenna, the vehicle indicator lights will flash once.
10. Position the passive vehicle key in the luggage compartment area of the vehicle. For every successful detection of the passive vehicle key by the luggage compartment keyless vehicle

DIAGNOSIS AND TESTING

antenna, the vehicle indicator lights will flash once.

The interior keyless vehicle antenna can also be activated for testing by pressing the clutch pedal once, if equipped.

If the vehicle indicator lights do not flash, a fault is indicated with the antenna or antenna circuit(s).

Keyless Vehicle Module Actuator test Diagnosis Entry

NOTE: To carry out a keyless vehicle actuator test, the keyless vehicle module diagnosis entry procedure must be carried out first.

NOTE: Test mode entry possible on drivers door only (No entry if drivers door lock button is defect).

1. Insert the emergency mechanical key into the ignition lock cylinder.
2. Rotate the emergency key to position II and back to position I.
3. Pull, and hold the driver-side front exterior door handle.
4. Press the driver-side front exterior door handle lock button 10 times.
5. Rotate the emergency mechanical key to position 0.
6. Remove the emergency mechanical key from the ignition lock cylinder.

The keyless vehicle module is now in Actuator test diagnosis mode. The module will remain in diagnosis mode for 30 seconds.

Keyless Vehicle Actuator Test

After each activation of a keyless vehicle system function, the 30 second time out will be restarted.

1. Press the driver-side front exterior door handle lock button. The vehicle indicator lights will flash once.
2. Press the passenger-side front exterior door handle lock button. The vehicle indicator lights will flash once.
3. Pull the driver-side front exterior door handle. The vehicle indicator lights will flash once.
4. Pull the passenger-side front exterior door handle. The vehicle indicator lights will flash once.
5. Pull the passenger-side rear exterior door handle. The vehicle indicator lights will flash once.
6. Pull the driver-side rear exterior door handle. The vehicle indicator lights will flash once.
7. Press the liftgate or luggage compartment lid exterior release switch. The vehicle indicator lights will flash once.
8. Press the liftgate or luggage compartment lid lock switch. The vehicle indicator lights will flash once.
9. Press the clutch pedal (if equipped). The vehicle indicator lights will flash once.
10. Press the brake pedal. The vehicle indicator lights will flash once.
11. Push in the ignition switch turning knob. The vehicle indicator lights will flash once.
12. Pull out the ignition switch turning knob. The vehicle indicator lights will flash once.
13. Insert the emergency key into the ignition lock cylinder. The vehicle indicator lights will flash once.
14. Press the interior unlock switch. The vehicle indicator lights will flash once.

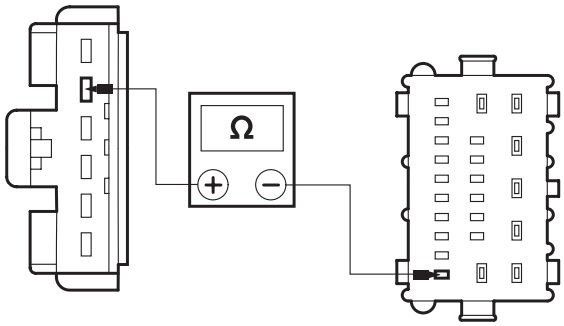
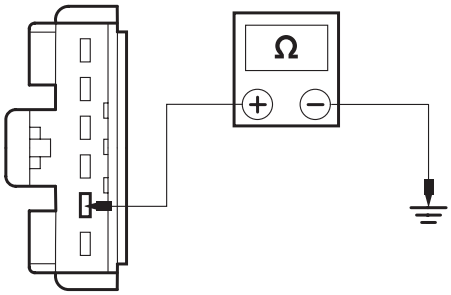
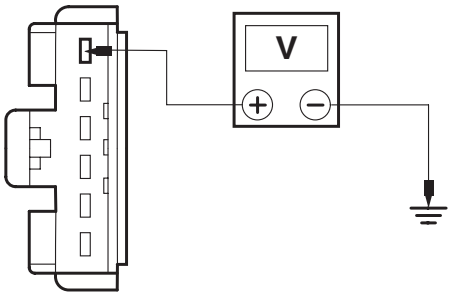
If the vehicle indicator lights do not flash, a fault is indicated with the the component or circuit(s) of the operated component.

Pinpoint Test (Vehicles with Keyless Vehicle System)

PINPOINT TEST A : DTC: B1096

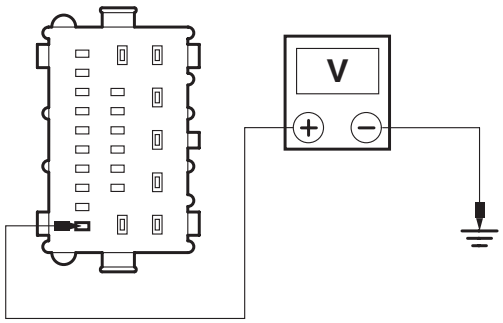
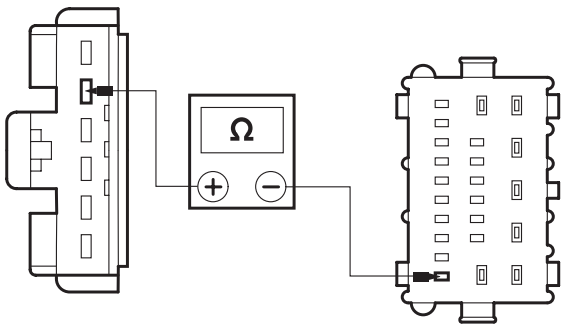
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: CHECK CIRCUIT 8-AB33 (WH/BK) FOR OPEN CIRCUIT	
	1 Disconnect Steering Column Lock Control Unit C233.
	2 Disconnect Keyless Vehicle Module C216.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57183	3 Measure the resistance between the steering column lock control unit C233 pin 5, circuit 8-AB33 (WH/BK), harness side and the keyless vehicle module C216 pin 14, circuit 8-AB33 (WH/BK), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to A2. → **No** REPAIR circuit 8-AB33 (WH/BK). TEST the system for normal operation.
A2: CHECK CIRCUIT 91-AB33 (BK/RD) FOR OPEN CIRCUIT	
 E57184	1 Measure the resistance between the steering column lock control unit C233 pin 2, circuit 91-AB33 (BK/RD), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to A3. → **No** REPAIR circuit 91-AB33 (BK/RD). TEST the system for normal operation.
A3: CHECK CIRCUIT 30-AB33 (RD) FOR VOLTAGE	
	1 Insert the vehicle emergency mechanical key into the ignition switch turning knob.
	2 Ignition switch in position II.
 E57185	3 Measure the voltage between the steering column lock control unit C233 pin 6, circuit 30-AB33 (RD), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new steering column lock control unit. TEST the system for normal operation. If the concern is still evident, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 30-AB33 (RD). TEST the system for normal operation.

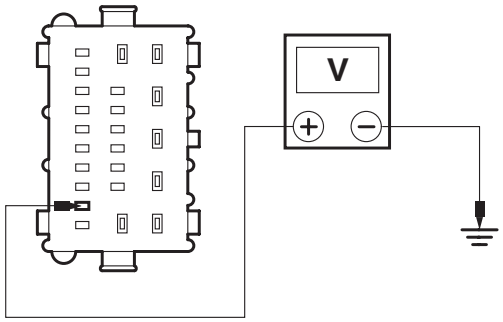
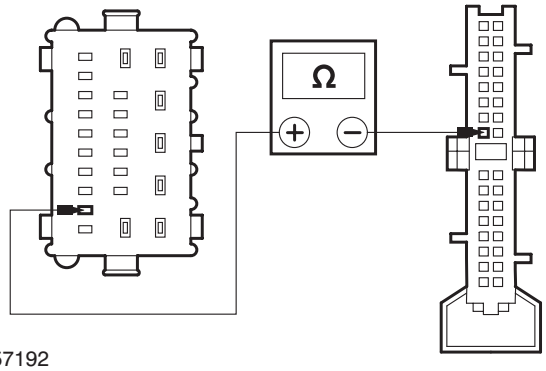
DIAGNOSIS AND TESTING

PINPOINT TEST B : DTC: B1092

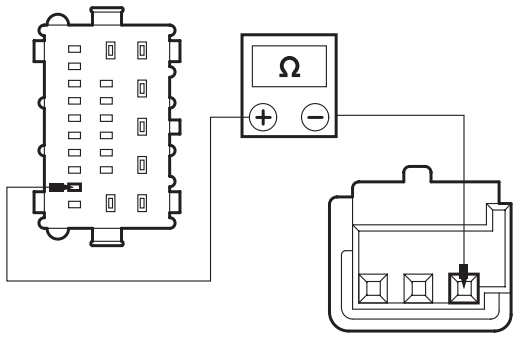
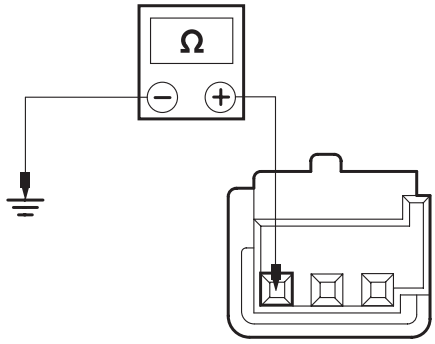
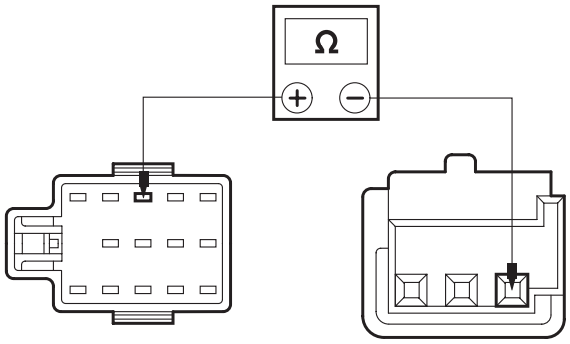
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK CIRCUIT 8-AB33 (WH/BK) FOR SHORT TO BATTERY VOLTAGE	
	1 Disconnect Keyless Vehicle Module C216.
	2 Insert the vehicle emergency mechanical key into the ignition switch turning knob.
	3 Ignition switch in position II.
 E57186	4 Measure the voltage between the keyless vehicle module C216 pin 14, circuit 8-AB33 (WH/BK), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** GO to B2.
B2: CHECK THE STEERING COLUMN LOCK CONTROL UNIT FOR SHORT TO BATTERY VOLTAGE	
	1 Ignition switch in position 0.
	2 Disconnect Steering Column Lock Control Unit C233.
	3 Ignition switch in position II.
 E57183	4 Measure the resistance between the keyless vehicle module C216 pin 14, circuit 8-AB33 (WH/BK), and Steering Column Lock Control Unit C233 pin 5. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new steering column lock control unit. TEST the system for normal operation. → **No** REPAIR circuit 8-AB33 (WH/BK). TEST the system for normal operation.

DIAGNOSIS AND TESTING

PINPOINT TEST C : DTC: B2090

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: DETERMINE THE EQUIPMENT LEVEL OF THE CENTRAL JUNCTION BOX (CJB).	
	1 Unfasten the CJB and fold it down. • Is the location for connector C100 on the top of the CJB? → **Yes** GO to C7. → **No** GO to C8.
C2: CHECK CIRCUIT 8-AB22 (WH/GN) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C216.
	2 Insert the vehicle emergency mechanical key into the ignition switch turning knob.
	3 Ignition switch in position II.
 E57188	4 Measure the voltage between the keyless vehicle module C216 pin 15, circuit 8-AB22 (WH/GN), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** GO to C3.
C3: CHECK CIRCUIT 8-AB22 (WH/GN) FOR SHORT TO GROUND	
	1 Disconnect CJB C99.
 E57192	2 Measure the resistance between the keyless vehicle module C216 pin 15, circuit 8-AB22 (WH/GN), harness side and CJB C99 pin 25, circuit 8-AB22 (WH/GN), harness side. • Is the resistance less then 5 ohms? → **Yes** GO to C4. → **No** REPAIR circuit 8-AB22 (WH/GN). TEST the system for normal operation.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C4: CHECK THE RF RECEIVER DATA LINE TO KEYLESS VEHICLE MODULE	
	1 Disconnect RF Receiver C390.
 E74068	2 Measure the resistance between the RF Receiver C390 pin 1, circuit 8-AA57 (WH), and keyless vehicle module C216 pin 15, circuit 8-AB22 (WH/GN). • Is the resistance less than 5 ohms? → **Yes** GO to C5. → **No** GO to C6.
C5: CHECK CIRCUIT 8-AA57 (WH) FOR POWER	
	1 Disconnect RF Receiver C390.
 E74069	2 Measure the voltage between the RF Receiver C390 pin 3, circuit 29-AA57 (OG/YE), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new RF receiver. TEST the system for normal operation. → **No** GO to C8.
C6: CHECK CIRCUIT 8-AA57 FOR RESISTANCE	
	1 Disconnect CJB C98.
 E57473	2 Measure the resistance between the CJB C98 pin 6, circuit 8-AA57 (WH), and RF Receiver C390 pin 1, circuit 8-AA57 (WH). • Is the resistance less than 5 ohms? → **Yes** INSTALL a new CJB. TEST the system for normal operation. → **No** REPAIR circuit 8-AA57 (WH). TEST the system for normal operation.

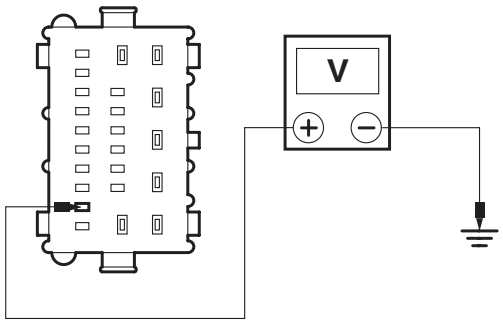
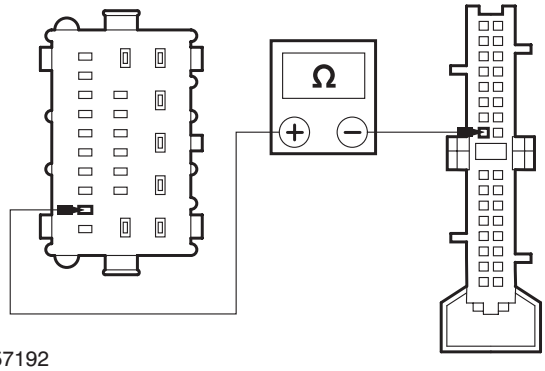
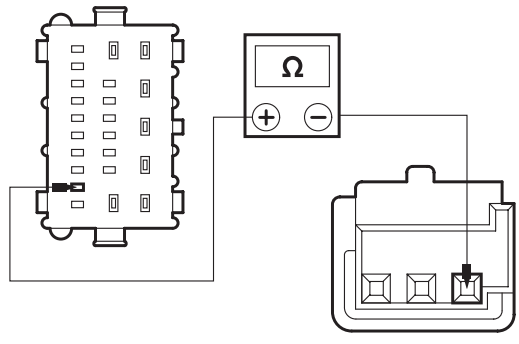
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C7: CHECK CJB FUSE F102(10A)	
	1 Check Fuse F102(10A) at CJB. • Is the fuse OK? → **Yes** INSTALL a new CJB. TEST the system for normal operation. → **No** INSTALL a new Fuse. TEST the System for normal operation.
C8: CHECK CJB FUSE F43 (10A)	
	1 Check Fuse F43 (10A) at CJB. • Is the Fuse OK? → **Yes** INSTALL a new CJB. → **No** INSTALL a new Fuse. TEST the System for normal operation.

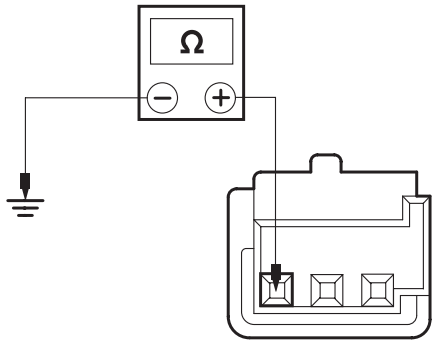
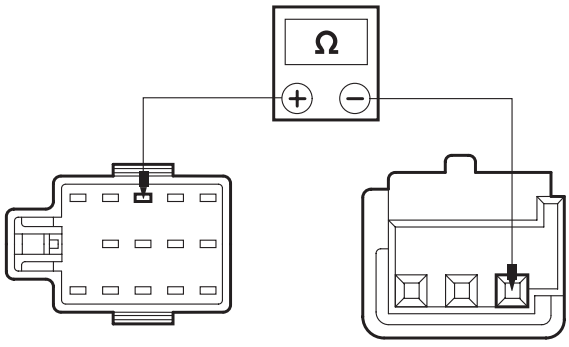
PINPOINT TEST D : DTC: B2091

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: CHECK CIRCUIT 8-AB22 (WH/GN) FOR OPEN CIRCUIT	
	1 Disconnect Keyless Vehicle Module C216.
	2 Ignition switch in position II.

DIAGNOSIS AND TESTING

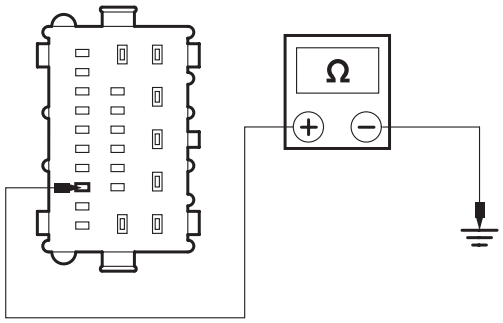
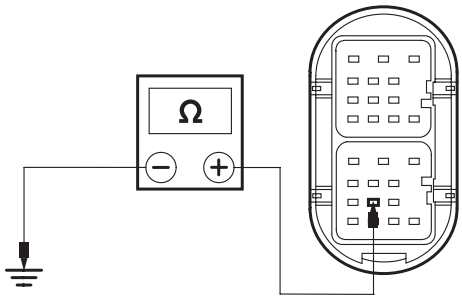
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57188	3 Measure the voltage between the keyless vehicle module C216 pin 15, circuit 8-AB22 (WH/GN), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** GO to D2.
D2: CHECK CIRCUIT 8-AB22 (WH/GN) FOR SHORT TO GROUND	
	1 Disconnect CJB C99.
 E57192	2 Measure the resistance between the keyless vehicle module C216 pin 15, circuit 8-AB22 (WH/GN), harness side and CJB C99 pin 25, circuit 8-AB22 (WH/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to D3. → **No** REPAIR circuit 8-AB22 (WH/GN). TEST the system for normal operation.
D3: CHECK CIRCUIT 8-AA57 (WH) FOR OPEN CIRCUIT	
	1 Disconnect RF Receiver C390.
 E74068	2 Measure the resistance between the RF Receiver C390 pin 1, circuit 8-AA57 (WH), and keyless vehicle module C216 pin 15, circuit 8-AB22 (WH/GN). • Is the resistance less than 5 ohms? → **Yes** GO to D4. → **No** GO to D5.

DIAGNOSIS AND TESTING

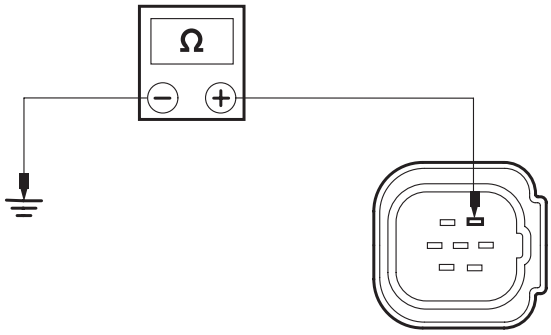
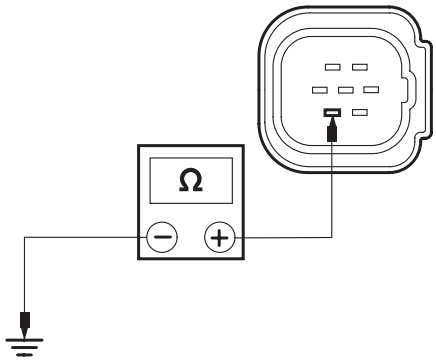
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D4: CHECK RF RECEIVER POWER SUPPLY 8-AA57	
 E74069	1 Measure the voltage between the RF Receiver C390 pin 3, circuit 29-AA57 (OG/YE), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new RF receiver. TEST the system for normal operation. → **No** GO to D6.
D5: CHECK CIRCUIT 8-AA57 FOR RESISTANCE	
	1 Disconnect CJB C98..
 E57473	2 Measure the resistance between the CJB C98 pin 6, circuit 8-AA57 (WH), and RF Receiver C390 pin 1, circuit 8-AA57 (WH). • Is the resistance less than 5 ohms? → **Yes** INSTALL a new CJB. TEST the system for normal operation. → **No** REPAIR circuit 8-AA57 (WH). TEST the system for normal operation.
D6: CHECK CJB FUSEF43 (10A)	
	1 Check Fuse F43 (10A) at CJB • Is the Fuse OK? → **Yes** INSTALL a new CJB. TEST the system for normal operation. → **No** INSTALL a new Fuse. TEST the System for normal operation.

DIAGNOSIS AND TESTING

PINPOINT TEST E : DTC: B1087

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: CHECK FUNCTIONALITY OF SUB-SYSTEM	
	1 Disconnect Keyless Vehicle Module C218.
 E57475	2 Measure the resistance between the keyless vehicle module C218 pin 16, circuit 91S-AB29 (BK/GN), harness side and ground during the passengers rear door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. TEST the system for normal operation. → **No** GO to E2.
E2: CHECK THE WIRING TO RR-UNLOCK SWITCH	
	1 Disconnect Passenger door connector C55 .
 E74070	2 Measure the resistance between C45 pin 21, circuit 91S-AB18 (BK/GN), component side and ground, during the passengers rear door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 91S-AB29 (BK/GN). TEST the system for normal operation. → **No** GO to E3.
E3: CHECK DOOR WIRING TO RR UNLOCK PULL SWITCH	
	1 Disconnect Right Hand Rear Door Latch C208.

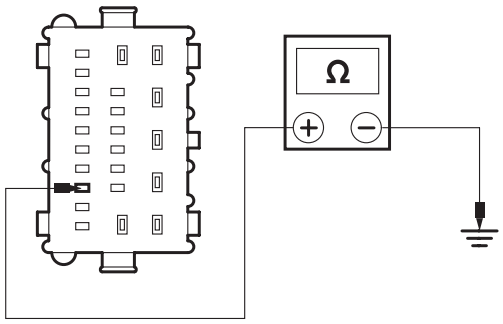
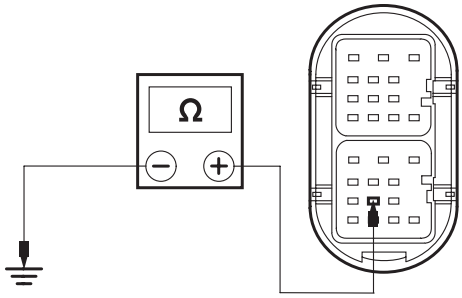
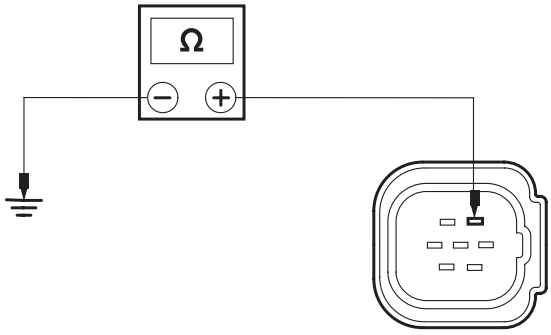
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E74072	2 Measure the resistance between the right-hand rear exterior door handle switch C208 pin 3, circuit 91S-AB18 (BK/GN), component side and ground during the right rear door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 91S-AB18 (BK/GN). TEST the system for normal operation. → **No** GO to E4.
E4: CHECK DOOR WIRING TO GROUND	
 E74071	1 Measure the resistance between the right-hand rear exterior door handle switch C208 pin 5, circuit 91S-AB18 (BK/GN), component side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new right-hand rear exterior door handle. REFER to: Exterior Rear Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 91-AB18 (BK/GN). TEST the system for normal operation.

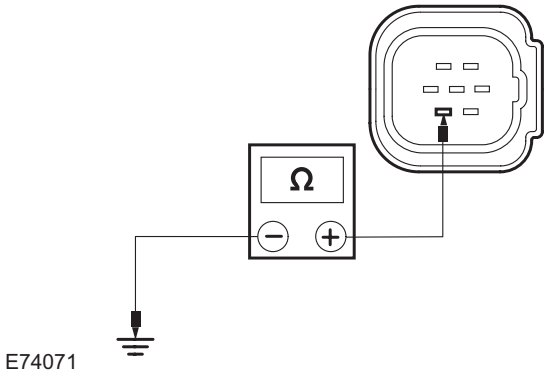
PINPOINT TEST F : DTC: B1088

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F1: CHECK FUNCTIONALITY OF SUB-SYSTEM	
	1 Disconnect Keyless Vehicle Module C215.

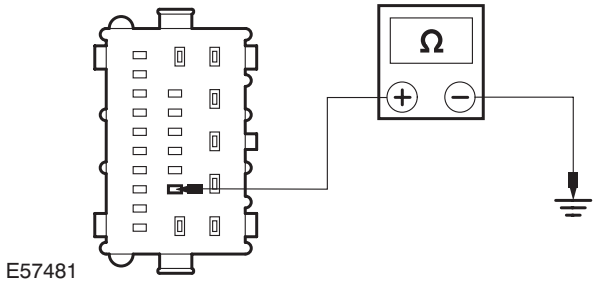
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57475	2 Measure the resistance between the keyless vehicle module C215 pin 16, circuit 91S-AB18 (BK/GN), harness side and ground during the passengers rear door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** GO to F2.
F2: CHECK THE WIRING TO RR-UNLOCK SWITCH	
	1 Disconnect Door connector C53 for LHD vehicles or C55 for RHD vehicles..
 E74070	2 Measure the resistance between C45 pin 21, circuit 91S-AB18 (BK/GN), component side and ground, during the passengers rear door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 91S-AB18 (BK/GN). TEST the system for normal operation. → **No** GO to F3.
F3: CHECK DOOR WIRING TO RR UNLOCK PULL SWITCH	
	1 Disconnect Left-Hand Rear Door Latch C208.
 E74072	2 Measure the resistance between the left-hand rear exterior door handle switch C208 pin 3, circuit 91S-AB18 (BK/GN), component side and ground during the right rear door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 91S-AB18 (BK/GN). TEST the system for normal operation. → **No** GO to F4.

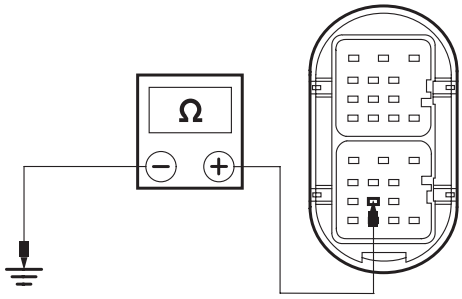
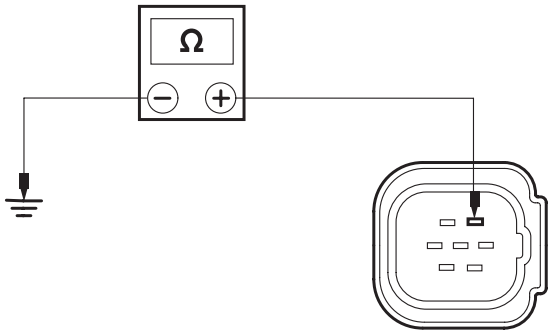
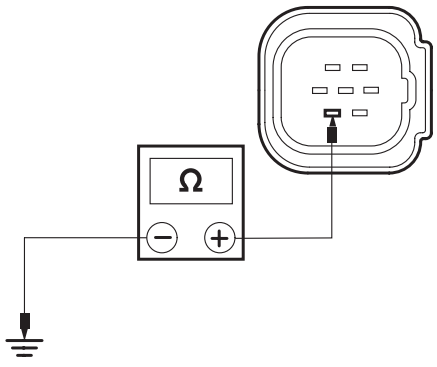
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F4: CHECK DOOR WIRING TO GROUND	
	1 Disconnect Left-Hand Rear Exterior Door Handle Switch C208.
	2 Measure the resistance between the left hand rear exterior door handle switch C208 pin 5, circuit 91-AB18 (BK/GN), component side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new left-hand rear exterior door handle. REFER to: Exterior Rear Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 91-AB18 (BK/GN). TEST the system for normal operation.

PINPOINT TEST G : DTC: B1089

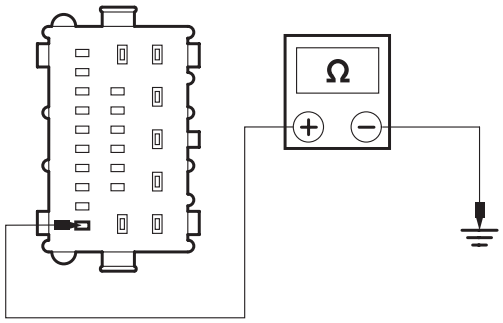
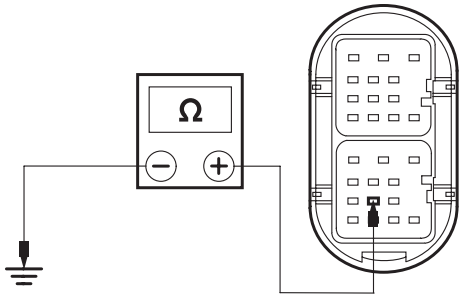
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G1: CHECK FUNCTIONALITY OF SUB-SYSTEM	
	1 Disconnect Keyless Vehicle Module C218.
	2 Measure the resistance between the keyless vehicle module C218 pin 8, circuit 91S-AB24 (BK/GN), harness side and ground during the passengers front door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Exterior Rear Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** GO to G2.
G2: CHECK THE WIRING TO RR-UNLOCK SWITCH	
	1 Disconnect Door connector C51 for LHD vehicles or C47 for RHD vehicles..

DIAGNOSIS AND TESTING

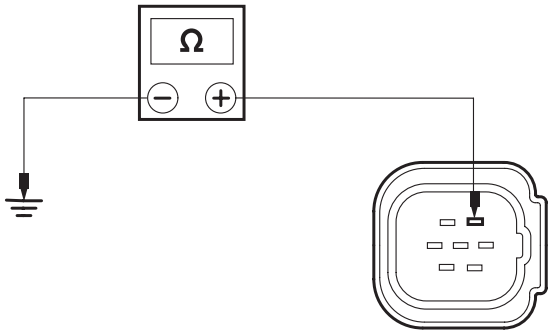
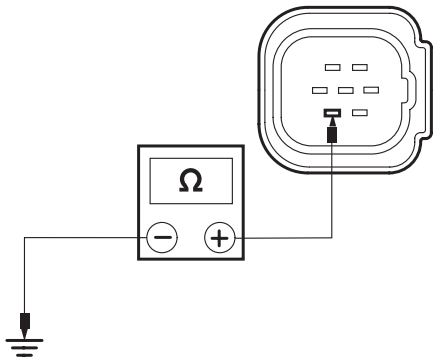
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E74070	2 Measure the resistance between C43 pin 21, circuit 91S-AB24 (BK/GN), component side and ground, during the passengers front door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 91S-AB24 (BK/GN). TEST the system for normal operation. → **No** GO to G3.
G3: CHECK DOOR WIRING TO RR UNLOCK PULL SWITCH	
	1 Disconnect Right-Hand Front Door Latch C204.
 E74072	2 Measure the resistance between the right-hand front exterior door handle switch C204 pin 3, circuit 91S-AB24(BK/GN), component side and ground during the right front door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 91S-AB24 (BK/GN). TEST the system for normal operation. → **No** GO to G4.
G4: CHECK DOOR WIRING TO GROUND	
	1 Disconnect Right Hand Front Door Latch C204.
 E74071	2 Measure the resistance between the right-hand front exterior door handle switch C204 pin 5, circuit 91-AB24 (BK/GN), component side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new right-hand front exterior door handle. REFER to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 91-AB24 (BK/GN). TEST the system for normal operation.

DIAGNOSIS AND TESTING

PINPOINT TEST H : DTC: B1090

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
H1: CHECK CIRCUIT 91S-AB14 (BK/RD) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect Keyless Vehicle Module C215.
 E57508	2 Measure the resistance between the keyless vehicle module C215 pin 14, circuit 91S-AB13 (BK/GN), harness side and ground during the driver front door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new right-hand front exterior door handle. REFER to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** GO to H2.
H2: CHECK THE WIRING TO RR-UNLOCK SWITCH	
	1 Disconnect Door connector C47 for LHD vehicles or C51 for RHD vehicles..
 E74070	2 Measure the resistance between C41 pin 21, circuit 91S-AB13 (BK/GN), component side and ground, during the driver front door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 91S-AB13 (BK/GN). TEST the system for normal operation. GO to H3.
H3: CHECK DOOR WIRING TO RR UNLOCK PULL SWITCH	
	1 Disconnect Left-Hand Front Door Latch C212.

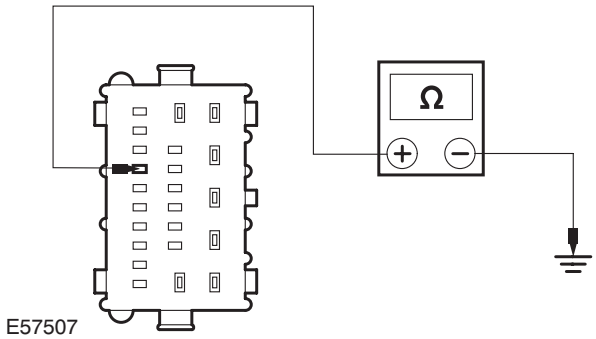
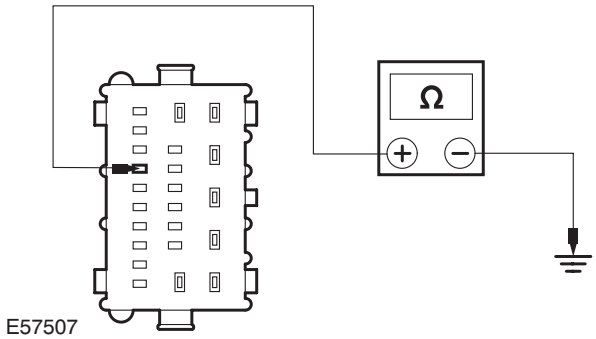
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E74072	2 Measure the resistance between the left-hand front exterior door handle switch C212 pin 3, circuit 91S-AB13 (BK/GN), component side and ground during the left front door handle is pulled. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 91S-AB13 (BK/GN). TEST the system for normal operation. → **No** GO to H4.
H4: CHECK DOOR WIRING TO GROUND	
	1 Disconnect Left-Hand Front Exterior Door Handle Switch C212.
 E74071	2 Measure the resistance between the left hand front exterior door handle switch C212 pin 5, circuit 91-AB13 (BK/GN), component side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new left-hand front exterior door handle. REFER to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 91-AB13 (BK/GN). TEST the system for normal operation.

PINPOINT TEST I : DTC: B1078

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
I1: CHECK CIRCUIT 1/2-AB16 (WH/RD) FOR SHORT TO GROUND	
	1 Disconnect keyless Vehicle Module C218.

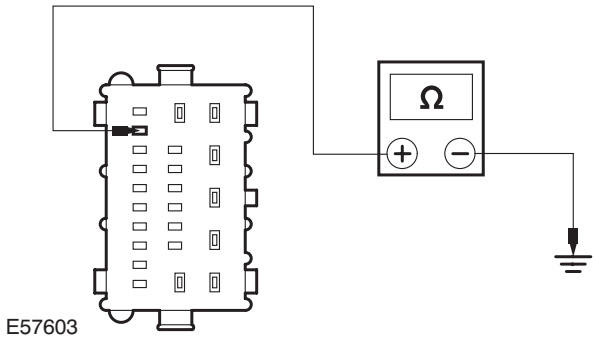
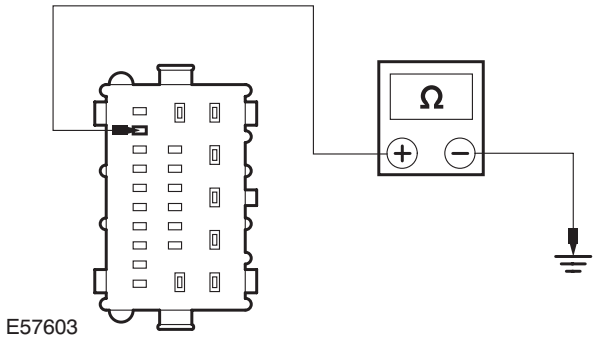
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Measure the resistance between the keyless vehicle module C218 pin 20, circuit 1-AB16 (WH/RD), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB16 (BK/RD) or 2-AB16 (GY/RD). TEST the system for normal operation. → **No** GO to I2.
I2: CHECK CIRCUIT 2-AB16 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
	1 Measure the resistance between the keyless vehicle module C218 pin 20, circuit 1-AB16 (WH/RD), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB16 (BK/RD) or 2-AB16 (GY/RD). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

PINPOINT TEST J : DTC: B1079

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
J1: CHECK CIRCUIT 1/2-AB16 (WH/RD) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C218.

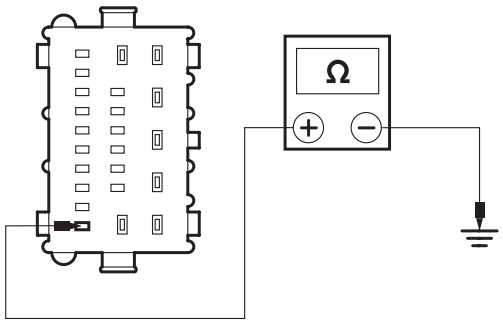
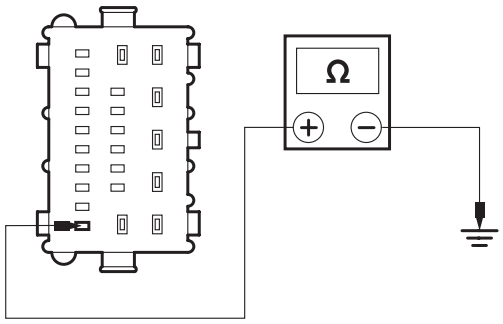
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57603	2 Measure the resistance between the keyless vehicle module C218 pin 22, circuit 1-AB27 (WH/RD), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB27 (BK/RD) or 2-AB27 (GY/RD). TEST the system for normal operation. → **No** GO to J2.
J2: CHECK CIRCUIT 2-AB27 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
 E57603	1 Measure the resistance between the keyless vehicle module C218 pin 22, circuit 1-AB16 (WH/RD), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB27 (BK/RD) or 2-AB27 (GY/RD). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

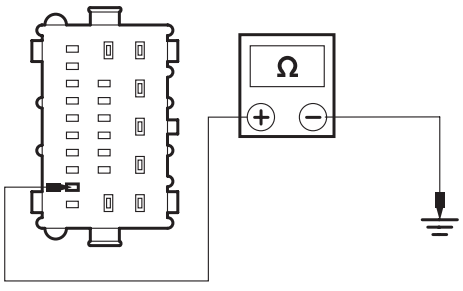
PINPOINT TEST K : DTC: B1080

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
K1: CHECK CIRCUIT 1/2-AB10 (WH) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C219.

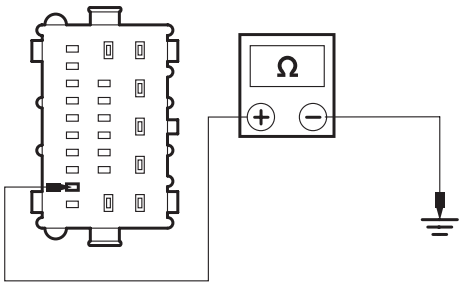
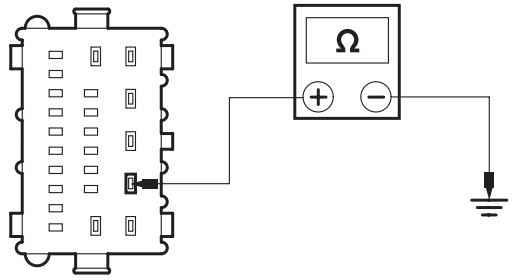
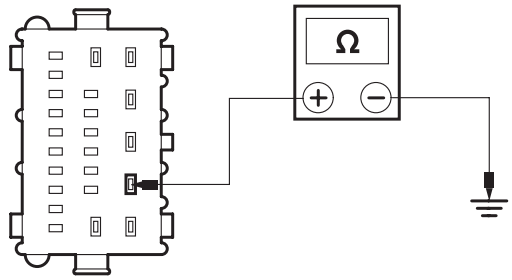
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57508	2 Measure the resistance between the keyless vehicle module C219 pin 14, circuit 1-AB10 (WH), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB10 WH) or 2-AB10 (GY). TEST the system for normal operation. → **No** GO to K2.
K2: CHECK CIRCUIT 1/2-AB16 (GY/RD) FOR SHORT TO BATTERY POSITIVEE	
 E57508	1 Measure the resistance between the keyless vehicle module C219 pin 14, circuit 1-AB10 (WH), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB10 (WH) or 2-AB10 (GY). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

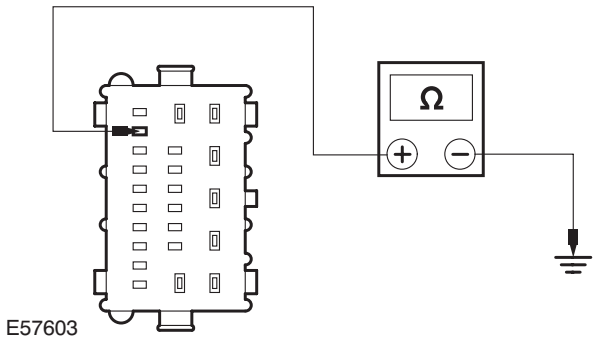
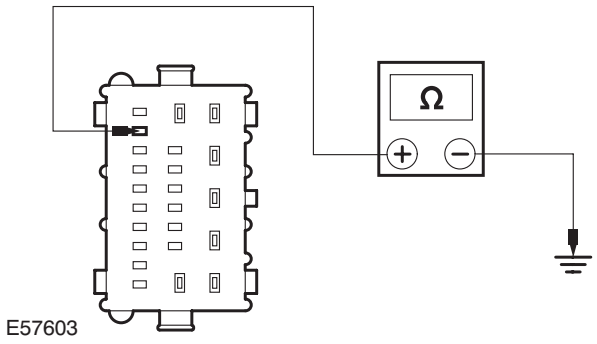
PINPOINT TEST L : DTC: B1081

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L1: CHECK CIRCUIT 1/2-AB35 (WH/BU) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C219.
 E74073	2 Measure the resistance between the keyless vehicle module C219 pin 18, circuit 1-AB35 (WH/BU), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35 (WH/BU) or 2-AB35 (GY/VT). TEST the system for normal operation. → **No** GO to L2.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L2: CHECK CIRCUIT 1/2-AB35 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
 E74073	1 Measure the resistance between the keyless vehicle module C219 pin 18, circuit 1-AB35 (WH/BU), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35 (WH/BU) or 2-AB35 (GY/VT). TEST the system for normal operation. → **No** GO to L3.
L3: CHECK CIRCUIT 1/2-AB35 (WH/BU) FOR SHORT TO GROUND	
 E57502	1 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB35A (WH/BU), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35A (WH/BU) or 2-AB35A (GY/VT). TEST the system for normal operation. → **No** GO to L4.
L4: CHECK CIRCUIT 1/2-AB35 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
 E57502	1 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB35A (WH/BU), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35A (WH/BU) or 2-AB35A (GY/VT). TEST the system for normal operation. → **No** GO to L5.

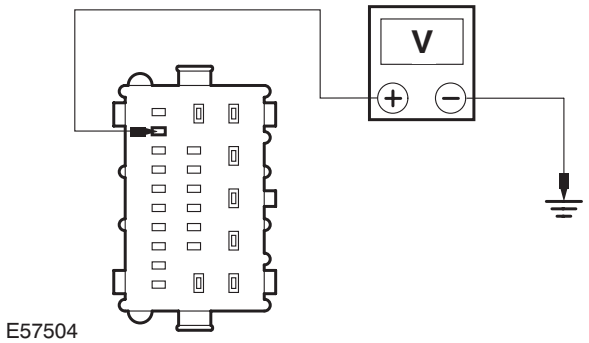
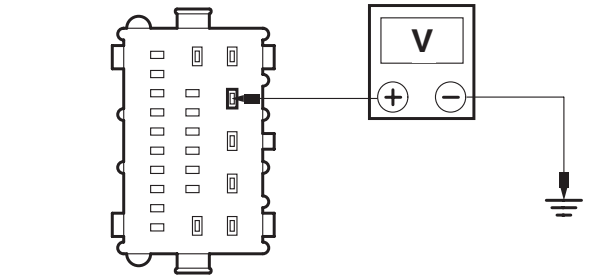
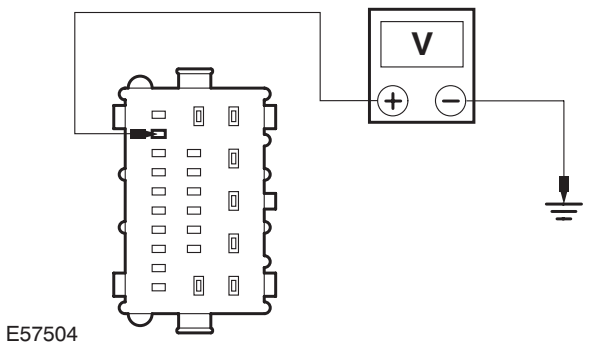
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L5: CHECK CIRCUIT 1/2-AB36B (GY/OG) FOR SHORT TO GROUND	
	1 Measure the resistance between the keyless vehicle module C219 pin 22, circuit 1-AB36A (GY/OG), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB36A (GY/OG) or 2-AB36A (WH/GN). TEST the system for normal operation. → **No** GO to L6.
L6: CHECK CIRCUIT 1/2-AB35 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
	1 Measure the resistance between the keyless vehicle module C219 pin 22, circuit 1-AB36A (WH/GN), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB36A (GY/OG) or 2-AB36A (WH/GN). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

PINPOINT TEST M : DTC: 1081

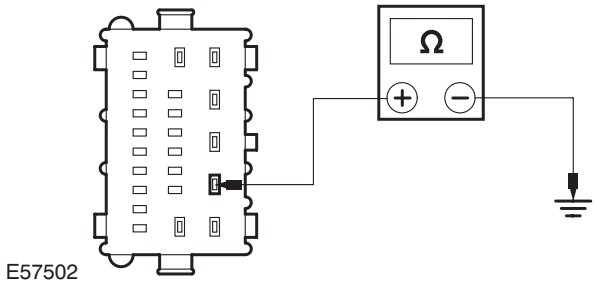
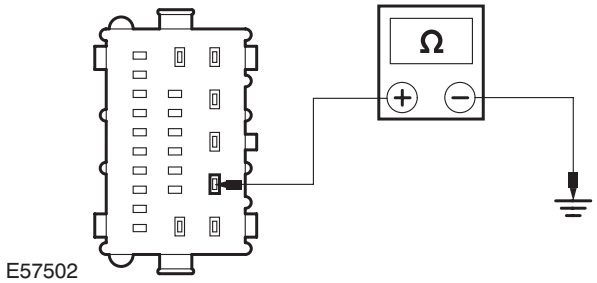
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
M1: CHECK CIRCUIT 1-AB36B (WH/GN) FOR SHORT TO BATTERY POSITIVE	
	1 Disconnect Keyless Vehicle Module C219.
	2 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57504	3 Measure the voltage between the keyless vehicle module C219 pin 22, circuit 1-AB36B (WH/GN), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to M2. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.
M2: CHECK CIRCUIT 2-AB36B (GY/OG) FOR SHORT TO BATTERY POSITIVE	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Compartment Center Keyless Vehicle Antenna C226.
	3 Ignition switch in position II.
 E57503	4 Measure the voltage between the keyless vehicle module C219 pin 4, circuit 2-AB36B (GY/OG), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** REPAIR circuit 2-AB36B (GY/OG). TEST the system for normal operation. → **No** GO to M3.
M3: CHECK CIRCUIT 1-AB36B (WH/BU) FOR SHORT TO BATTERY POSITIVE	
 E57504	1 Measure the voltage between the keyless vehicle module C219 pin 22, circuit 1-AB36B (WH/BU), harness side and ground. • Is the voltage greater than 0 volts? → **Yes** REPAIR circuit 1-AB36B (WH/BU). TEST the system for normal operation. → **No** INSTALL a new passenger compartment center keyless vehicle antenna. TEST the system for normal operation.

DIAGNOSIS AND TESTING

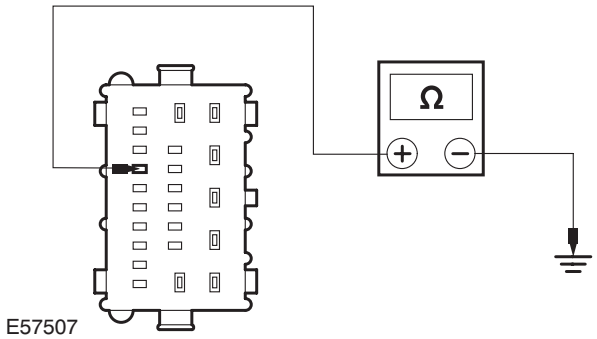
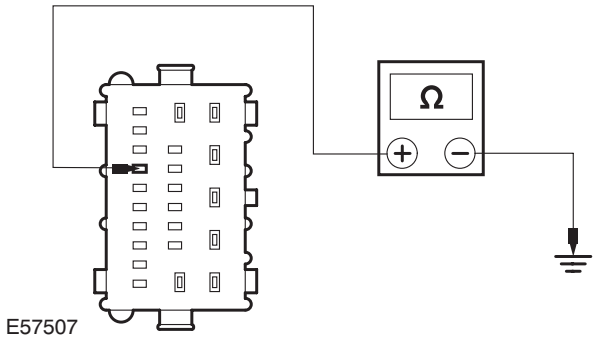
PINPOINT TEST N : DTC: B1082

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
N1: CHECK CIRCUIT 1/2-AB34 (WH/RD) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C219.
	2 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB34 (WH/RD), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB34 (WH/RD) or 2-AB34 (GY/RD). TEST the system for normal operation. → **No** GO to N2.
N2: CHECK CIRCUIT 2-AB34 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
	1 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB34 (WH/RD), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB34 (WH/RD) or 2-AB34 (GY/RD). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

PINPOINT TEST O : DTC: B1077

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
O1: CHECK CIRCUIT 1/2-AB16 (WH/RD) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C218.

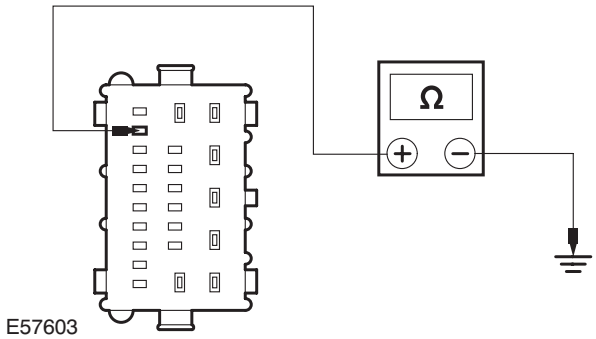
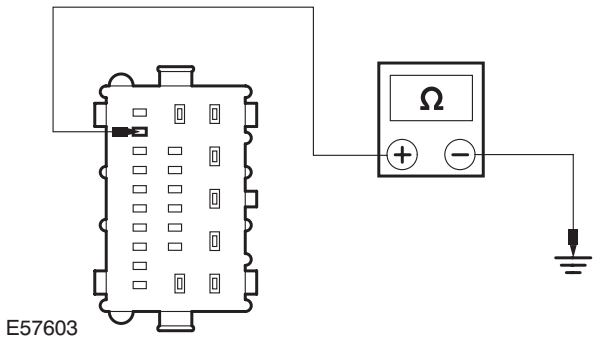
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57507	2 Measure the resistance between the keyless vehicle module C218 pin 20, circuit 1-AB16 (WH/RD), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB16 (WH/RD) or 2-AB16 (GY/RD). TEST the system for normal operation. → **No** GO to O2.
O2: CHECK CIRCUIT 1/2-AB16 (WH/RD) FOR SHORT TO BATTERY POSITIVE	
 E57507	1 Measure the resistance between the keyless vehicle module C218 pin 20, circuit 1-AB16 (WH/RD), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB16 (WH/RD) or 2-AB16 (GY/RD). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

PINPOINT TEST P : DTC: B1083

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
P1: CHECK CIRCUIT 1-AB27 (WH/RD) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect Keyless Vehicle Module C218.

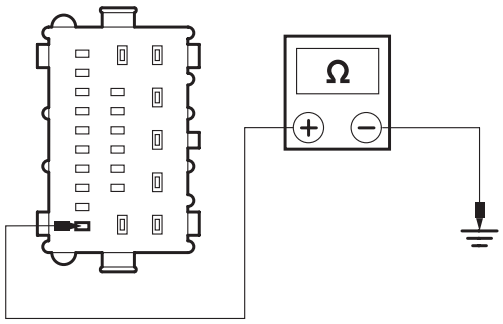
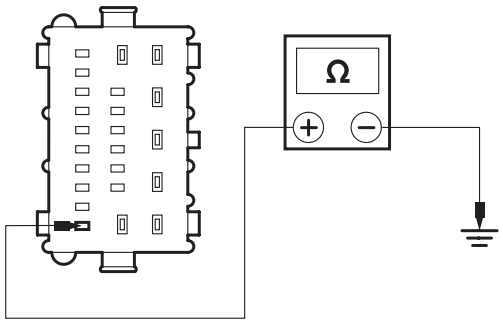
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Measure the resistance between the keyless vehicle module C218 pin 22, circuit 1-AB27 (WH/RD), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB27 (WH/RD) or 2-AB27 (GY/RD). TEST the system for normal operation. → **No** GO to P2.
P2: CHECK CIRCUIT 2-AB27 (GY/RD) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect Passenger Side Exterior Front Door Handle C203.
	2 Measure the resistance between the keyless vehicle module C218 pin 22, circuit 1-AB27 (WH/RD), harness side and battery positive. • Is the resistance greater than 10,000 ohms? → **Yes** REPAIR circuit 1-AB27 (WH/RD) or 2-AB27 (GY/RD). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

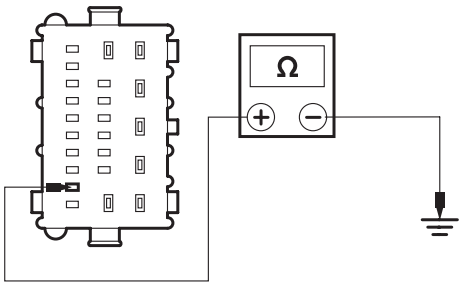
PINPOINT TEST Q : DTC: B1086

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Q1: CHECK CIRCUIT 1/2-AB10 (WH) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C219.

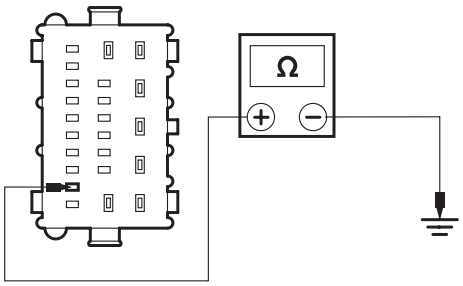
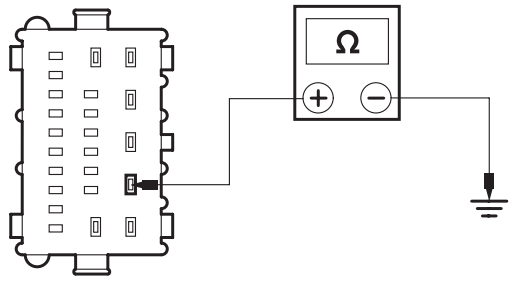
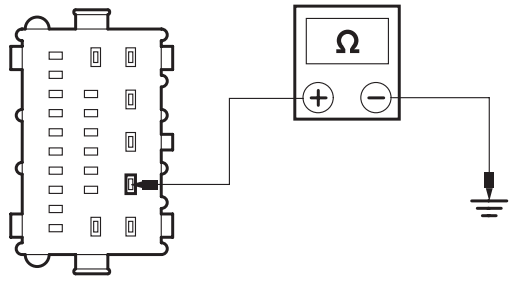
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57508	2 Measure the resistance between the keyless vehicle module C219 pin 14, circuit 1-AB10 (WH), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB10 WH) or 2-AB10 (GY). TEST the system for normal operation. → **No** GO to Q2.
Q2: CHECK CIRCUIT 1/2-AB16 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
 E57508	1 Measure the resistance between the keyless vehicle module C219 pin 14, circuit 1-AB10 (WH), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB10 (WH) or 2-AB10 (GY). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

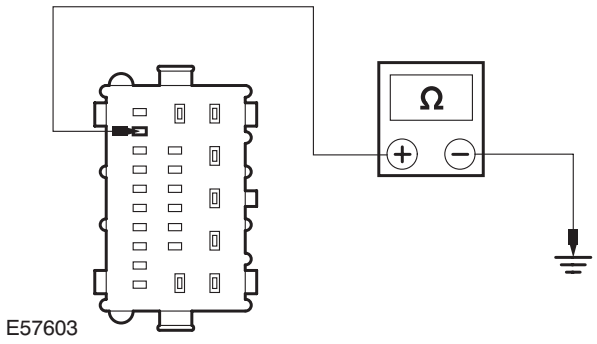
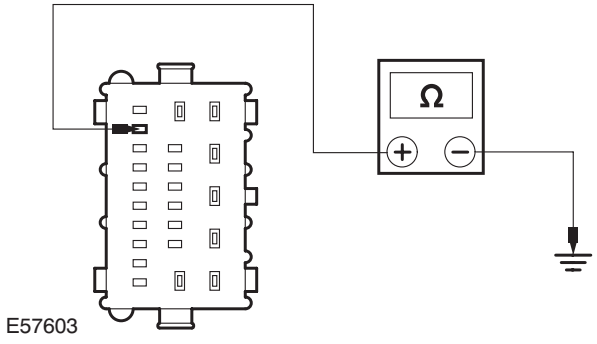
PINPOINT TEST R : DTC: B1070

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
R1: CHECK CIRCUIT 1/2-AB35 (WH/BU) FOR SHORT TO GROUND	
	1 Disconnect Keyless Vehicle Module C219.
 E74073	2 Measure the resistance between the keyless vehicle module C219 pin 18, circuit 1-AB35 (WH/BU), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35 (WH/BU) or 2-AB35 (GY/VT). TEST the system for normal operation. → **No** GO to R2.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
R2: CHECK CIRCUIT 1/2-AB35 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
 E74073	1 Measure the resistance between the keyless vehicle module C219 pin 18, circuit 1-AB35 (WH/BU), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35 (WH/BU) or 2-AB35 (GY/VT). TEST the system for normal operation. → **No** GO to R3.
R3: CHECK CIRCUIT 1/2-AB35 (WH/BU) FOR SHORT TO GROUND	
 E57502	1 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB35A (WH/BU), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35A (WH/BU) or 2-AB35A (GY/VT). TEST the system for normal operation. → **No** GO to R4.
R4: CHECK CIRCUIT 1/2-AB35 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
 E57502	1 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB35A (WH/BU), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB35A (WH/BU) or 2-AB35A (GY/VT). TEST the system for normal operation. → **No** GO to R5.

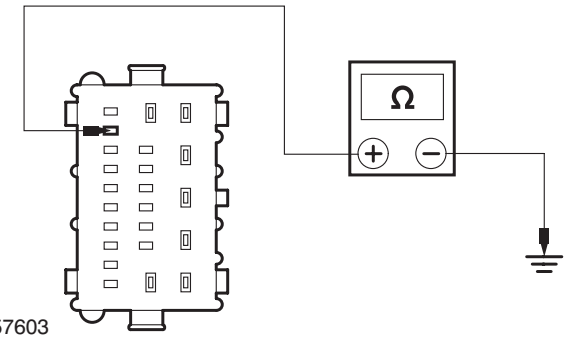
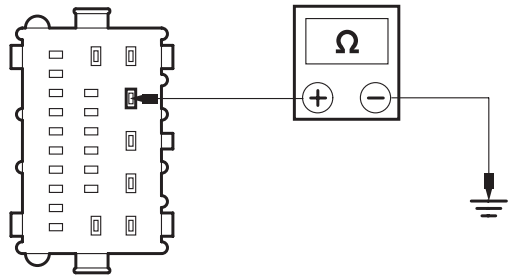
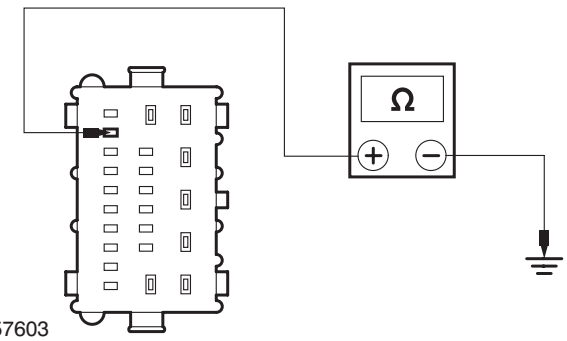
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
R5: CHECK CIRCUIT 1/2-AB36B (GY/OG) FOR SHORT TO GROUND	
	1 Measure the resistance between the keyless vehicle module C219 pin 22, circuit 1-AB36A (GY/OG), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB36A (GY/OG) or 2-AB36A (WH/GN). TEST the system for normal operation. → **No** GO to R6.
R6: CHECK CIRCUIT 1/2-AB35 (GY/RD) FOR SHORT TO BATTERY POSITIVE	
	1 Measure the resistance between the keyless vehicle module C219 pin 22, circuit 1-AB36A (WH/GN), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB36A (GY/OG) or 2-AB36A (WH/GN). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

PINPOINT TEST S : DTC: B1070

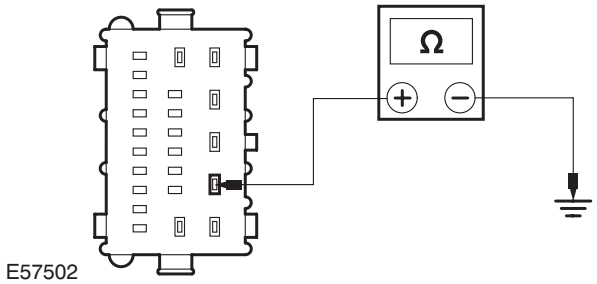
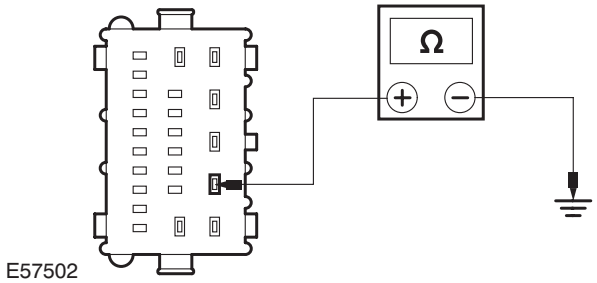
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
S1: CHECK CIRCUIT 1-AB36B (WH/GN) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect Keyless Vehicle Module C219.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57603	2 Measure the resistance between the keyless vehicle module C219 pin 22, circuit 1-AB36B (WH/GN), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** GO to S2.
S2: CHECK CIRCUIT 2-AB36B (GY/OG) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect Passenger Compartment Center Keyless Vehicle Antenna C226.
 E57602	2 Measure the resistance between the keyless vehicle module C219 pin 4, circuit 2-AB36B (GY/OG), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** GO to S3. → **No** REPAIR circuit 2-AB36B (GY/OG). TEST the system for normal operation.
S3: CHECK CIRCUIT 1-AB36B (WH/GN) FOR SHORT CIRCUIT TO GROUND	
 E57603	1 Measure the resistance between the keyless vehicle module C219 pin 22, circuit 1-AB36B (WH/GN), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new passenger compartment center keyless vehicle antenna. TEST the system for normal operation. → **No** REPAIR circuit 1-AB36B (WH/GN). TEST the system for normal operation.

DIAGNOSIS AND TESTING

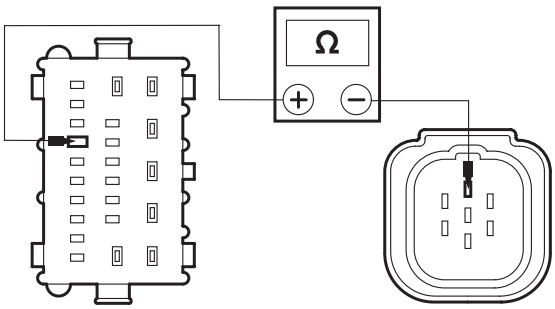
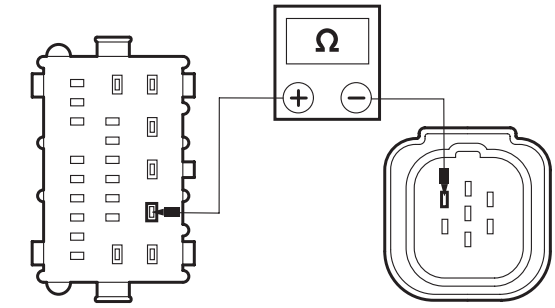
PINPOINT TEST T : DTC: B1071

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
T1: CHECK CIRCUIT 1-AB34 (WH/RD) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect Keyless Vehicle Module C219.
	2 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB34 (WH/RD), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB34 (WH/RD) or 2-AB34 (GY/RD). TEST the system for normal operation. → **No** GO to T2.
T2: CHECK CIRCUIT 1/2-AB34 (WH/RD) FOR SHORT TO BATTERY POSITIVE	
	1 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 1-AB34 (WH/RD), harness side and battery positive. • Is the resistance less than 5 ohms? → **Yes** REPAIR circuit 1-AB34 (WH/RD) or 2-AB34 (GY/RD). TEST the system for normal operation. → **No** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new keyless vehicle module. REFER to: Keyless Vehicle Module (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation.

PINPOINT TEST U : DTC: B1072

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
U1: CHECK CIRCUIT 1-AB16 FOR OPEN CIRCUIT	
	1 Disconnect Keyless Vehicle Module C218.
	2 Disconnect Driver Side Exterior Front Door Handle Keyless Vehicle Antenna C211.

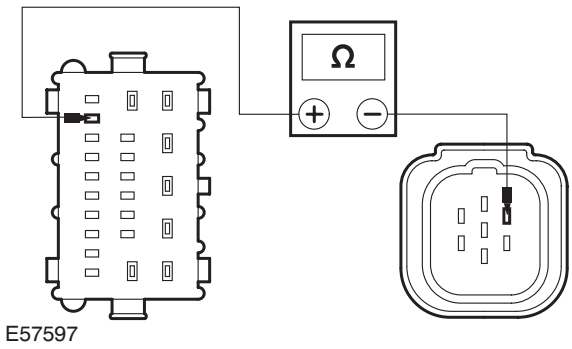
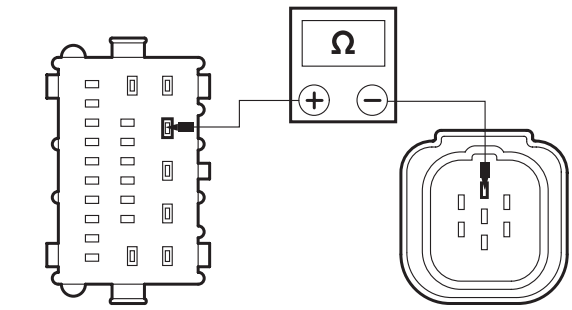
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E74074	3 Measure the resistance between the keyless vehicle module C218 pin 20, circuit 1-AB16 (WH/RD), harness side and the driver side exterior front door handle keyless vehicle antenna C211 pin 1, circuit 1-AB16 (WH/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to U2. → **No** REPAIR circuit 1-AB16 (WH/RD). TEST the system for normal operation.
U2: CHECK CIRCUIT 2-AB16 (GY/RD) FOR OPEN CIRCUIT	
 E74075	1 Measure the resistance between the keyless vehicle module C218 pin 2, circuit 2-AB16 (GY/RD), harness side and the driver side exterior front door handle keyless vehicle antenna C211 pin 2, circuit 2-AB16 (GY/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new driver side exterior front door handle. REFER to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). → **No** REPAIR circuit 2-AB16 (GY/RD). TEST the system for normal operation.

PINPOINT TEST V : DTC: B1073

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
V1: CHECK CIRCUIT 1-AB27 (WH/RD) FOR OPEN CIRCUIT	
	1 Disconnect Keyless Vehicle Module C218.
	2 Disconnect Passenger Side Exterior Front Door Handle Keyless Vehicle Antenna C203.

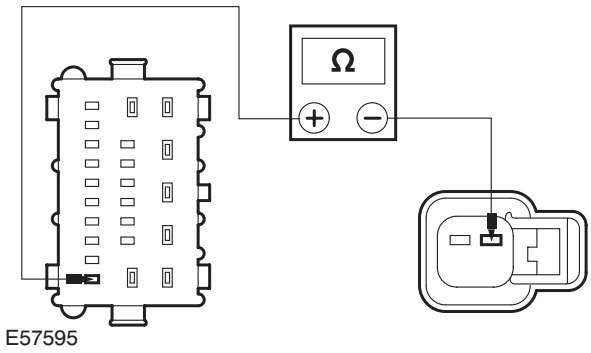
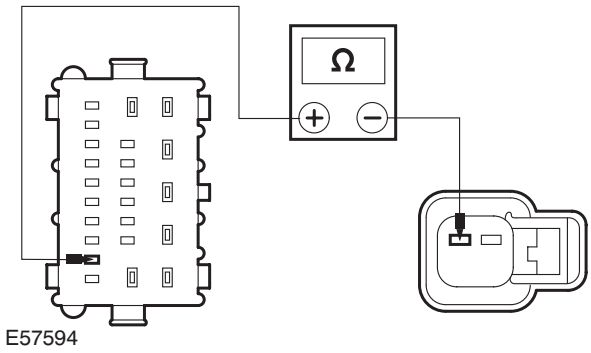
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57597	3 Measure the resistance between the keyless vehicle module C218 pin 22, circuit 1-AB27 (WH/RD), harness side and the passenger side exterior front door handle keyless vehicle antenna C203 pin 1, circuit 1-AB27 (WH/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to V2. → **No** REPAIR circuit 1-AB27 (WH/RD). TEST the system for normal operation.
V2: CHECK CIRCUIT 2-AB27 (GY/RD) FOR OPEN CIRCUIT	
 E57596	1 Measure the resistance between the keyless vehicle module C218 pin 4, circuit 2-AB27 (GY/RD), harness side and the passenger side exterior front door handle keyless vehicle antenna C203 pin 2, circuit 2-AB27 (GY/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new passenger side exterior front door handle. REFER to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). → **No** REPAIR circuit 2-AB27 (GY/RD). TEST the system for normal operation.

PINPOINT TEST W : DTC: B1074

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
W1: CHECK CIRCUIT 1-AB10 (WH) FOR OPEN CIRCUIT	
	1 Disconnect Keyless Vehicle Module C219.
	2 Disconnect Rear Bumper Keyless Vehicle Antenna C227.

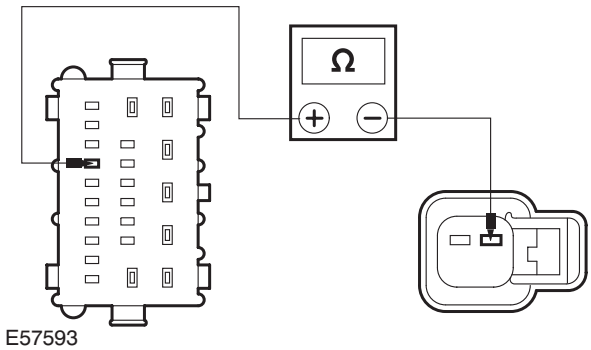
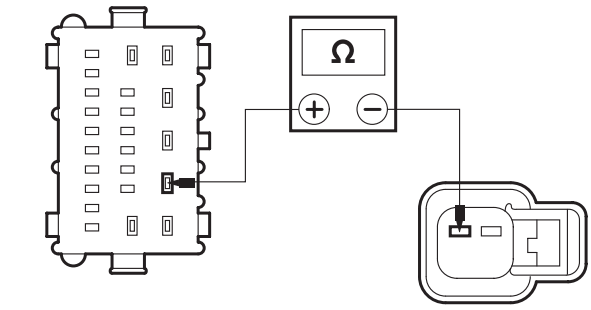
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Measure the resistance between the keyless vehicle module C219 pin 14, circuit 1-AB10 (WH), harness side and the rear bumper keyless vehicle antenna C227 pin 1, circuit 1-AB10 (WH), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to W2. → **No** REPAIR circuit 1-AB10 (WH). TEST the system for normal operation.
W2: CHECK CIRCUIT 2-AB10 (GY) FOR OPEN CIRCUIT	
	1 Measure the resistance between the keyless vehicle module C219 pin 15, circuit 2-AB10 (GY), harness side and the rear bumper keyless vehicle antenna C227 pin 2, circuit 2-AB10 (GY), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new rear bumper keyless vehicle antenna. TEST the system for normal operation. → **No** REPAIR circuit 2-AB10 (GY). TEST the system for normal operation.

PINPOINT TEST X : DTC: B1075

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
X1: CHECK CIRCUIT 1-AB35 (WH/BU) FOR OPEN CIRCUIT	
	1 Disconnect Keyless Vehicle Module C219.
	2 Disconnect Passenger Compartment Front Keyless Vehicle Antenna C226.

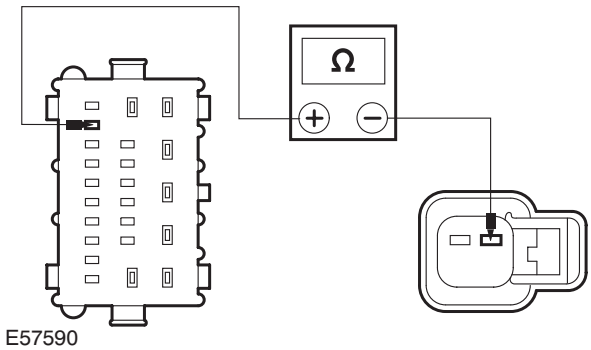
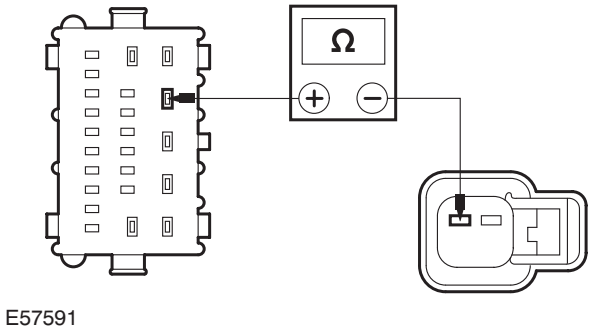
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57593	3 Measure the resistance between the keyless vehicle module C219 pin 20, circuit 1-AB35 (WH/BU), harness side and the passenger compartment front keyless vehicle antenna C226 pin 2, circuit 1-AB35 (WH/BU), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to X2. → **No** REPAIR circuit 1-AB35 (WH/BU). TEST the system for normal operation.
X2: CHECK CIRCUIT 2-AB35 (GY/VT) FOR OPEN CIRCUIT	
 E57592	1 Measure the resistance between the keyless vehicle module C219 pin 2, circuit 2-AB35 (GY/VT), harness side and the passenger compartment front keyless vehicle antenna C226 pin 1, circuit 2-AB35 (GY/VT), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new passenger compartment front keyless vehicle antenna. TEST the system for normal operation. → **No** REPAIR circuit 2-AB35 (GY/VT). TEST the system for normal operation.

PINPOINT TEST Y : DTC: B1075

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Y1: CHECK CIRCUIT 1-AB36B (WH/GN) FOR OPEN CIRCUIT	
	1 Disconnect Keyless Vehicle Module C219.
	2 Disconnect Passenger Compartment Center Keyless Vehicle Antenna C221.

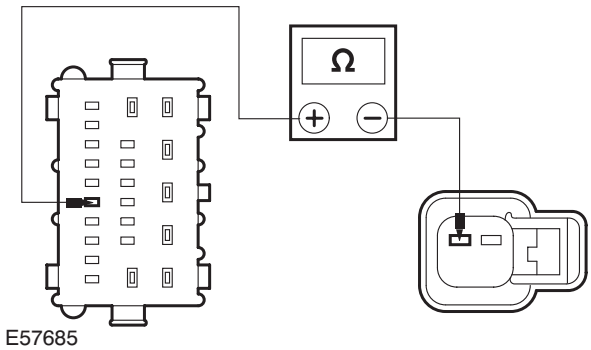
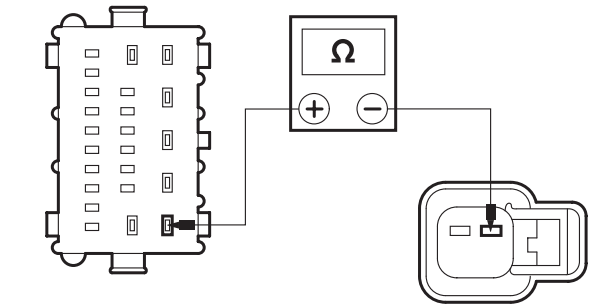
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57590	3 Measure the resistance between the keyless vehicle module C219 pin 22, circuit 1-AB36B (WH/GN), harness side and the passenger compartment center keyless vehicle antenna C221 pin 2, circuit 1-AB36B (WH/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to Y2. → **No** REPAIR circuit 1-AB36B (WH/GN). TEST the system for normal operation.
Y2: CHECK CIRCUIT 2-AB36B (GY/OG) FOR OPEN CIRCUIT	
 E57591	1 Measure the resistance between the keyless vehicle module C219 pin 4, circuit 2-AB36B (GY/OG), harness side and the passenger compartment center keyless vehicle antenna C221 pin 1, circuit 2-AB36B (GY/OG), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new passenger compartment center keyless vehicle antenna. TEST the system for normal operation. → **No** REPAIR circuit 2-AB36B (GY/OG). TEST the system for normal operation.

PINPOINT TEST Z : DTC: B1076

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Z1: CHECK CIRCUIT 1-AB34 (WH-RD) FOR OPEN CIRCUIT	
	1 Disconnect Keyless Vehicle Module C219.
	2 Disconnect Luggage Compartment Keyless Vehicle Antenna C224.

DIAGNOSIS AND TESTING

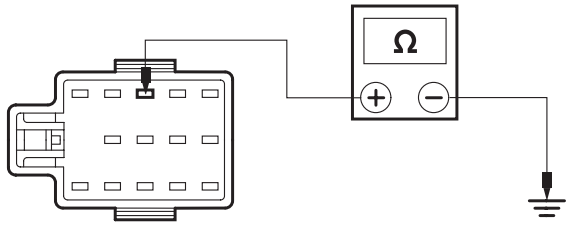
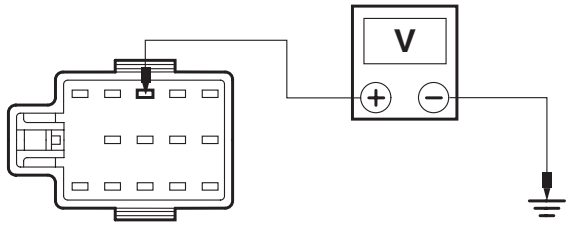
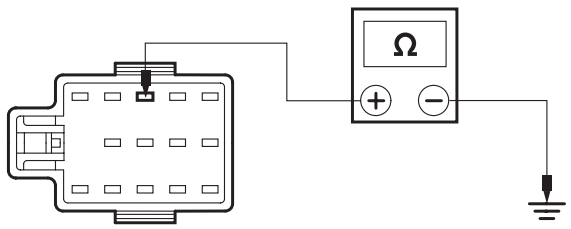
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57685	3 Measure the resistance between the keyless vehicle module C219 pin 18, circuit 1-AB34 (WH/RD), harness side and the luggage compartment keyless vehicle antenna C224 pin 1, circuit 1-AB34 (WH/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to Z2. → **No** REPAIR circuit 1-AB34 (WH/RD). TEST the system for normal operation.
Z2: CHECK CIRCUIT 2-AB34 (GY/RD) FOR OPEN CIRCUIT	
 E57686	1 Measure the resistance between the keyless vehicle module C219 pin 1, circuit 2-AB34 (GY/RD), harness side and the luggage compartment keyless vehicle antenna C224 pin 2, circuit 2-AB34 (GY/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new luggage compartment keyless vehicle antenna. REFER. TEST the system for normal operation. → **No** REPAIR circuit 2-AB34 (GY/RD). TEST the system for normal operation.

Pinpoint Test (vehicles with RKE)

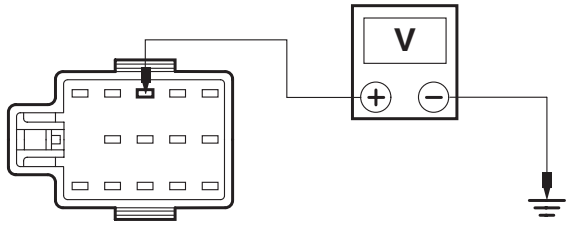
PINPOINT TEST AA : DTC: B2090

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AA1: CHECK CIRCUIT 8-AA57 (WH) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect CJB C98.

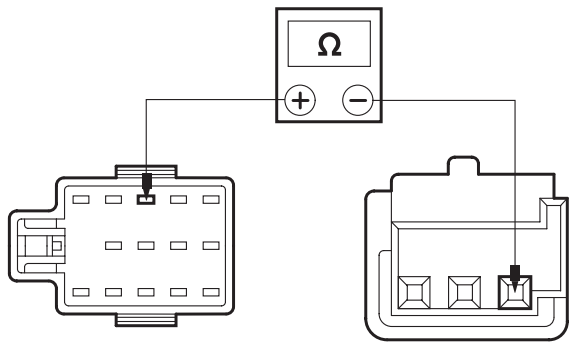
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57189	2 Measure the resistance between the CJB C98 pin 6, circuit 8-AA57 (WH), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** GO to AA2. → **No** GO to AA3.
AA2: CHECK CIRCUIT 8-AA57 (WH) FOR SHORT CIRCUIT TO BATTERY POSITIVE	
	1 Ignition switch in position II.
 E57190	2 Measure the voltage between the CJB C98 pin 6, circuit 8-AA57 (WH), harness side and ground. • Is the voltage 0 volts? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new CJB. REFER to: Generic Electronic Module (GEM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). TEST the system for normal operation. → **No** GO to AA4.
AA3: CHECK THE RF RECEIVER FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect RF Receiver C390.
 E57189	2 Measure the resistance between the CJB C98 pin 6, circuit 8-AA57 (WH), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new RF receiver. TEST the system for normal operation. → **No** REPAIR circuit 8-AA57 (WH). TEST the system for normal operation.
AA4: CHECK THE RF RECEIVER FOR SHORT TO BATTERY POSITIVE	
	1 Ignition switch in position 0.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect RF Receiver C390.
	3 Ignition switch in position II.
 E57190	4 Measure the voltage between the CJB C98 pin 6, circuit 8-AA57 (WH), harness side and ground. • Is the voltage 0 volts? → **Yes** INSTALL a new RF receiver. TEST the system for normal operation. → **No** REPAIR circuit 8-AA57 (WH). TEST the system for normal operation.

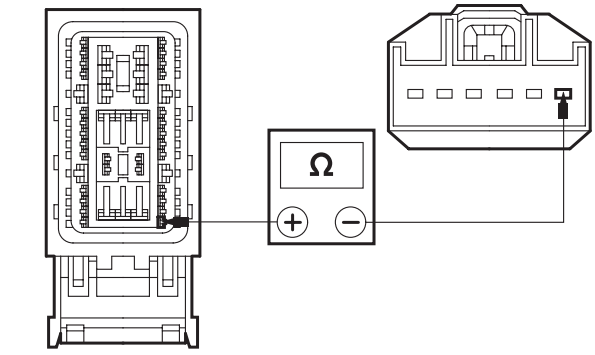
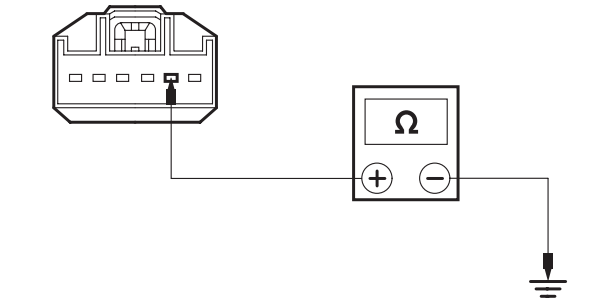
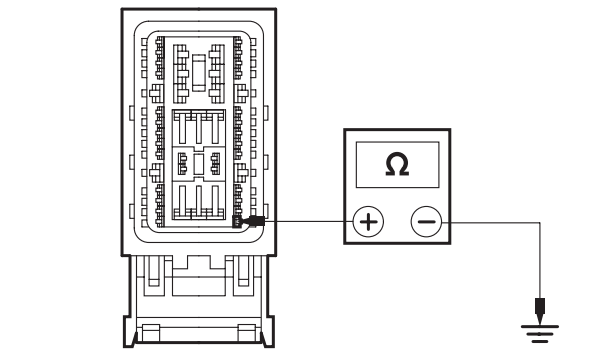
PINPOINT TEST AB : DTC: B2091

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AB1: CHECK CIRCUIT 8-AA57 (WH) FOR OPEN CIRCUIT	
	1 Disconnect CJB C98.
	2 Disconnect RF Receiver C390.
 E57473	3 Measure the resistance between the CJB C98 pin 6, circuit 8-AA57 (WH), harness side and the RF receiver C390 pin 1, circuit 8-AA57 (WH), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new RF receiver. TEST the system for normal operation. If the DTC is repeated, INSTALL a new CJB. REFER to: Generic Electronic Module (GEM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). TEST the system for normal operation. → **No** REPAIR circuit 8-AA57 (WH). TEST the system for normal operation.

PINPOINT TEST AC : DTC: B2894

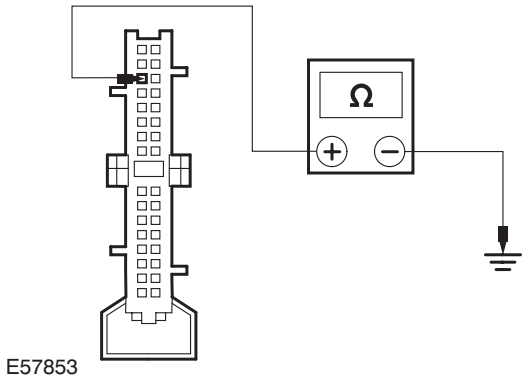
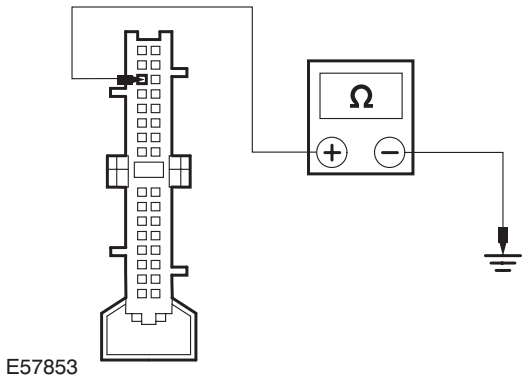
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AC1: CHECK CIRCUIT 32-AA27 (WH/GN) FOR OPEN CIRCUIT	
	1 Disconnect CJB C100.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect Liftgate/Luggage Compartment Lid Latch C798.
 E57856	3 Measure the resistance between the CJB C100 pin 46, circuit 32-AA27 (WH/GN), harness side and the liftgate/luggage compartment lid latch C798 pin 1, circuit 32-AA27 (BK), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to AC2. → **No** REPAIR circuit 32-AA27 (WH/GN) or circuit 32-AA27 (BK). TEST the system for normal operation.
AC2: CHECK CIRCUIT 31-GL20 (BK) FOR OPEN CIRCUIT	
 E57855	1 Measure the resistance between the liftgate/luggage compartment lid latch C798 pin 2, circuit 31-GL20 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to AC3. → **No** REPAIR circuit 31-GL20 (BK). TEST the system for normal operation.
AC3: CHECK CIRCUIT 32-AA27 (WH/GN) FOR SHORT CIRCUIT TO GROUND	
 E57854	1 Measure the resistance between the CJB C100 pin 46, circuit 32-AA27 (WH/GN), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new liftgate/luggage compartment lid latch. REFER to: Liftgate Latch - 3-Door/5-Door (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) TEST the system for normal operation. → **No** REPAIR circuit 32-AA27 (WH/GN) or circuit 32-AA27 (BK). TEST the system for normal operation.

DIAGNOSIS AND TESTING

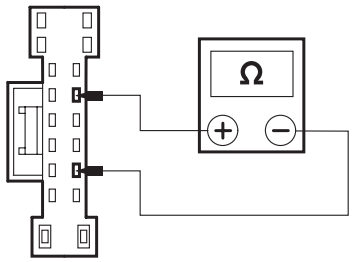
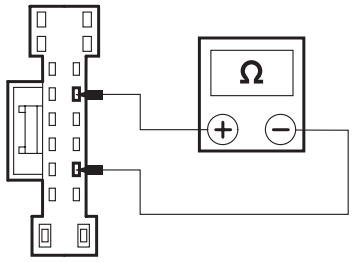
PINPOINT TEST AD : DTC: B2970

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AD1: CHECK CIRCUIT 31S-AA30 (BK/YE) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect CJB C99.
 E57853	2 Measure the resistance between the CJB C99 pin 30, circuit 31S-AA30 (BK/YE), harness side and ground. • With the liftgate or luggage compartment lid closed, is the resistance greater than 10,000 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new CJB. REFER to: Generic Electronic Module (GEM) (419-10 Multifunction Electronic Modules, Removal and Installation). TEST the system for normal operation. → **No** GO to AD2.
AD2: CHECK THE LIFTGATE/LUGGAGE COMPARTMENT LID EXTERIOR RELEASE SWITCH FOR CLOSED CIRCUIT	
	1 Disconnect Liftgate/Luggage Compartment Lid Exterior Release Switch C799.
 E57853	2 Measure the resistance between the CJB C99 pin 30, circuit 31S-AA30 (BK/YE), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new liftgate/luggage compartment lid exterior release switch. TEST the system for normal operation. → **No** REPAIR circuit circuit 31S-AA30 (BK/YE). TEST the system for normal operation.

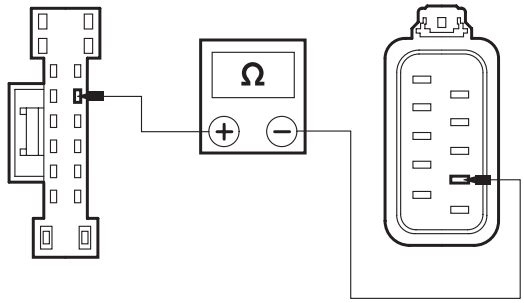
PINPOINT TEST AE : DTC: B1311

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: The door latches must be in the locked mode to conduct this test.	
AE1: CHECK CIRCUIT 91S-AA64 (BK/GN) FOR OPEN CIRCUIT	
	1 Disconnect Right-Hand Side Front Door Control Module C722.

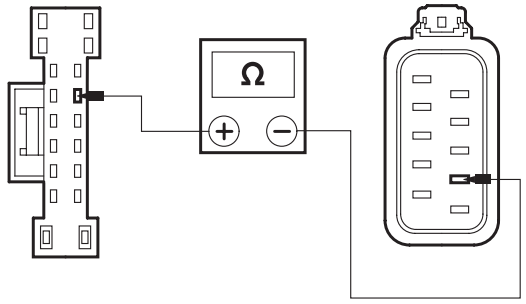
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57852	2 Measure the resistance between the right-hand front door control module C722 pin 13, circuit 91S-AA64 (BK/GN), harness side and the right-hand front door control module C722 pin 16, circuit 91-AA58 (BK/YE), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to AE2. → **No** GO to AE3.
AE2: CHECK CIRCUIT 91S-AA64A (BK/GN) FOR OPEN CIRCUIT	
	1 Disconnect Left-Hand Side Front Door Control Module C729.
 E57852	2 Measure the resistance between the left-hand side front door control module C729 pin 13, circuit 91S-AA64A (BK/GN), harness side and the left-hand side front door control module C729 pin 16, circuit 91-AA58A (BK/YE), harness side. • Is the resistance less than 5 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new left-hand side front door control module. CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new right-hand side front door control module. CLEAR the DTC. TEST the system for normal operation. → **No** GO to AE4.
AE3: CHECK THE RIGHT-HAND FRONT DOOR LATCH UNLOCK SWITCH FOR OPEN CIRCUIT	
	1 Disconnect Right-Hand Side Front Door Latch C149.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57851	2 Measure the resistance between the right-hand side front door control module C722 pin 13, circuit 91S-AA64 (BK/GN), harness side and the right-hand side front door latch C149 pin 9, circuit 91S-AA64 (BK/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new right-hand side front door latch. REFER to: Front Door Latch - 3-Door (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 3-Door, Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 4-Door/5-Door/Wagon (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 4-Door/5-Door/Wagon, Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 91S-AA64 (BK/GN). TEST the system for normal operation.

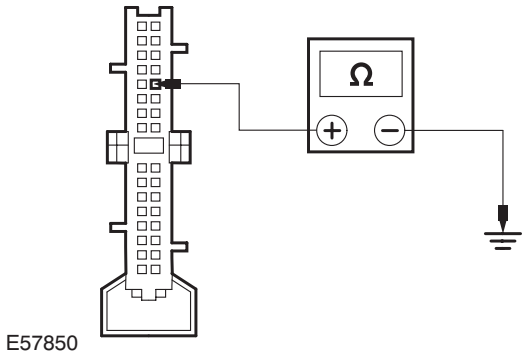
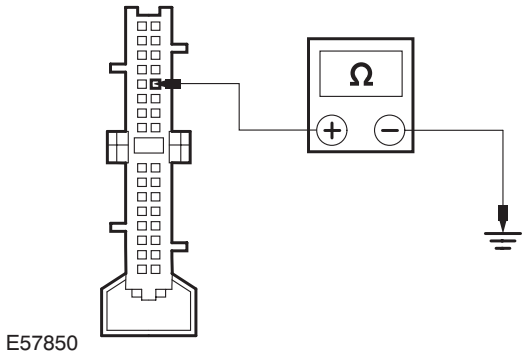
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AE4: CHECK THE LEFT-HAND FRONT DOOR LATCH UNLOCK SWITCH FOR OPEN CIRCUIT	
 E57851	1 Measure the resistance between the left-hand side front door control module C729 pin 13, circuit 91S-AA64A (BK/GN), harness side and the left-hand side front door latch C148 pin 9, circuit 91S-AA64A (BK/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new left-hand side front door latch. REFER to: Front Door Latch - 3-Door (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 3-Door, Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 4-Door/5-Door/Wagon (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 4-Door/5-Door/Wagon, Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 91S-AA64A (BK/GN). TEST the system for normal operation.

PINPOINT TEST AF : DTC: B1320

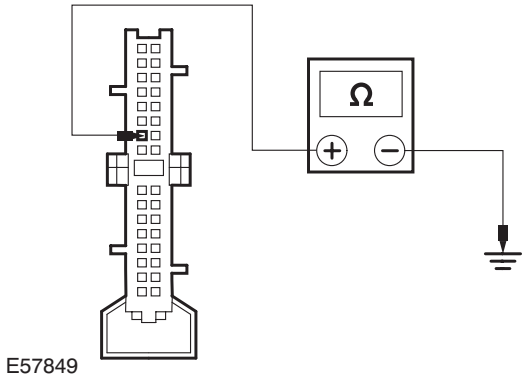
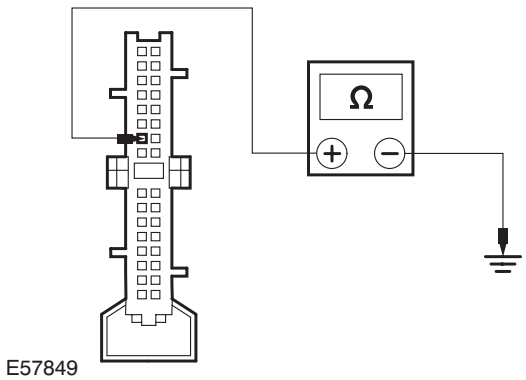
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: The door latch must be in the open position to conduct this test.	
AF1: CHECK CIRCUIT 31S-GL9A (BK/YE) FOR OPEN CIRCUIT	
	1 Disconnect CJB C99.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E57850	2 Measure the resistance between the CJB C99 pin 12, circuit 31S-GL9A (BK/YE), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new CJB. REFER to: Generic Electronic Module (GEM) (419-10 Multifunction Electronic Modules, Removal and Installation). TEST the system for normal operation. → **No** GO to AF2.
AF2: CHECK CIRCUIT 31S-GL9A (BK/YE) FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect Driver Side Front Door Latch C148.
 E57850	2 Measure the resistance between the CJB C99 pin 12, circuit 31S-GL9A (BK/YE), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new driver side front door latch. REFER to: Front Door Latch - 3-Door (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 3-Door, Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 4-Door/5-Door/Wagon (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) / Front Door Latch - 4-Door/5-Door/Wagon, Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 31S-GL9A (BK/YE). TEST the system for normal operation.

DIAGNOSIS AND TESTING

PINPOINT TEST AG : DTC: B1331

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: The door latch must be in the open position to conduct this test.	
AG1: CHECK CIRCUIT 31S-GL20 (BK/RD) FOR OPEN CIRCUIT	
	1 Disconnect CJB C99.
 E57849	2 Measure the resistance between the CJB C99 pin 26, circuit 31S-GL20 (BK/RD), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** Using WDS, CLEAR the DTC. TEST the system for normal operation. If the DTC is still present, INSTALL a new CJB. REFER to: Generic Electronic Module (GEM) (419-10 Multifunction Electronic Modules, Removal and Installation). TEST the system for normal operation. → **No** GO to AG2.
AG2: CHECK CIRCUIT 31S-GL20 (BK/RD) FOR SHORT TO GROUND	
	1 Disconnect Liftgate/Luggage Compartment Lid C58.
 E57849	2 Measure the resistance between the CJB C99 pin 26, circuit 31S-GL20 (BK/RD), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new liftgate/luggage compartment lid latch. REFER to: Liftgate Latch - 3-Door/5-Door (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation) TEST the system for normal operation. → **No** Repair circuit 31S-GL20 (BK/RD). TEST the system for normal operation.

GENERAL PROCEDURES

Remote Transmitter Programming(41 004 0)

1. **NOTE: A maximum of eight keyless entry remote transmitters can be programmed to the Central Junction Box (CJB). Programming must be done at the same time for all the transmitters.**

NOTE: To enter programming mode, first make sure that the vehicle battery is fully charged and the anti-theft system is not armed or triggered (if equipped).

NOTE: Make sure the turn signal indicators are in the OFF position.

Fasten the safety belts and close all doors to make sure conflicting chimes do not sound during programming.

2. **NOTE: The ignition must be turned to position II exactly four times during remote transmitter programming.**

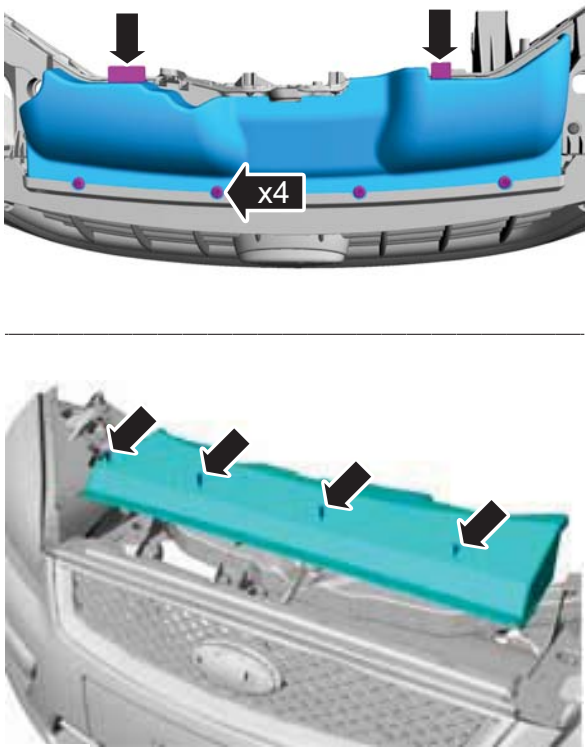
   Turn the ignition switch from position I to position II four times exactly within six seconds.

3. **Turn the ignition switch to position 0.**
4. **An audible chime will be heard (only in vehicles built before 2008 model year) to indicate that it is now possible to programme the keys for ten seconds.**
5. **Press and hold one of the buttons on the remote transmitter until a chime sounds. This indicates a new transmitter code has been successfully received.**
6. **To program additional transmitters, repeat step 5.**
7. **The system will leave the learning mode after the ignition switch is turned to either position II, or if no new transmitter is programmed during the 10 seconds, or if eight remote transmitters have been programmed.**

REMOVAL AND INSTALLATION

Hood Latch

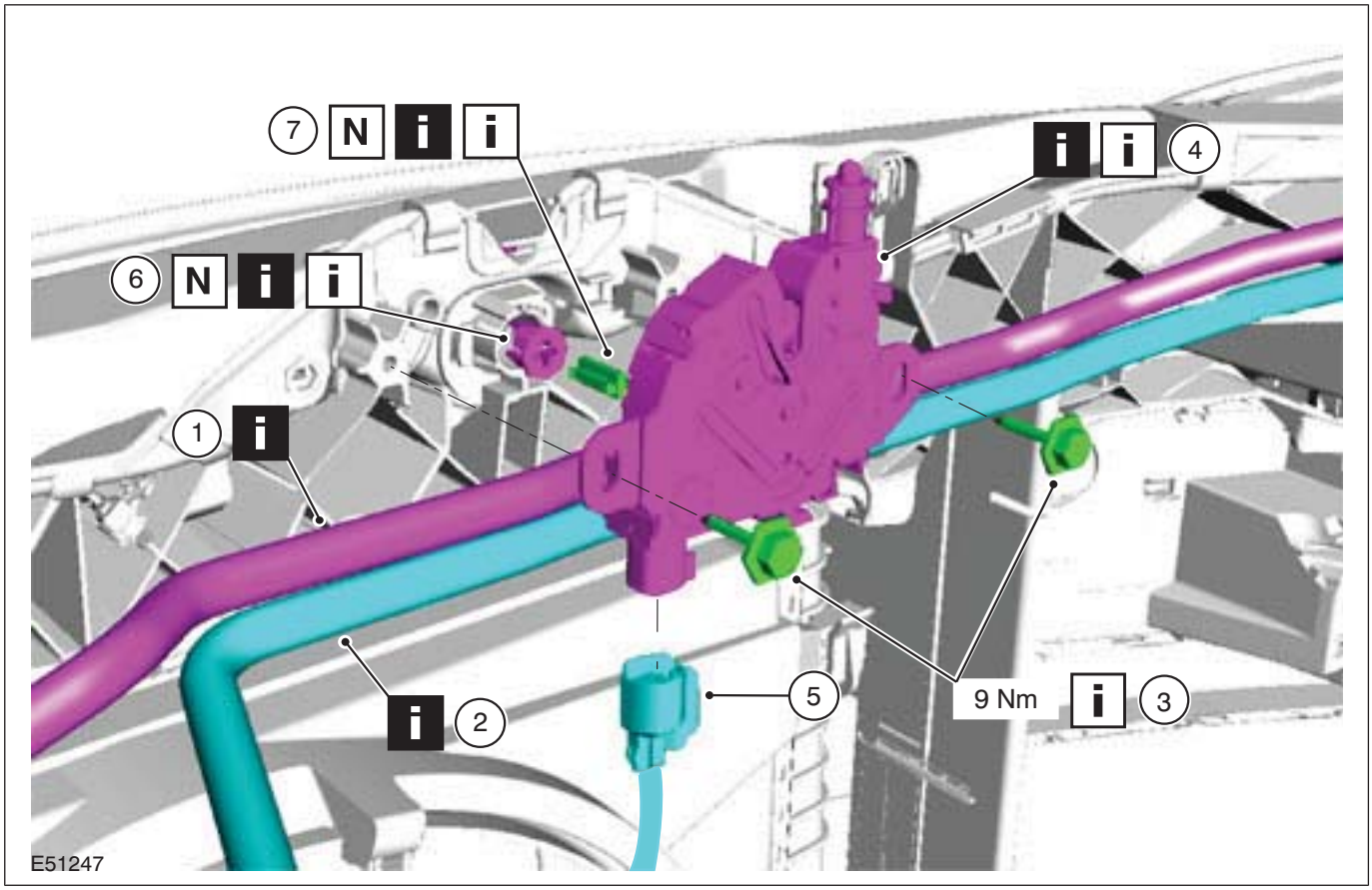
1. Remove the air deflector.



E112650

2. Remove the components in the order indicated in the following illustration(s) and table(s).

REMOVAL AND INSTALLATION



Item	Description
1	Coolant expansion tank to radiator hose See Removal Detail
2	Coolant expansion tank to coolant outlet connector hose See Removal Detail
3	Hood latch retaining bolts See Installation Detail
4	Hood latch See Removal Detail See Installation Detail

Item	Description
5	Hood latch electrical connector
6	Hood lock cylinder connecting clip See Removal Detail See Installation Detail
7	Hood lock cylinder connecting shaft See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.

Removal Details

Item 1 Coolant expansion tank to radiator hose

1. Detach the coolant expansion tank to radiator hose from the coolant hose retaining clamp.

Item 2 Coolant expansion tank to coolant outlet connector hose

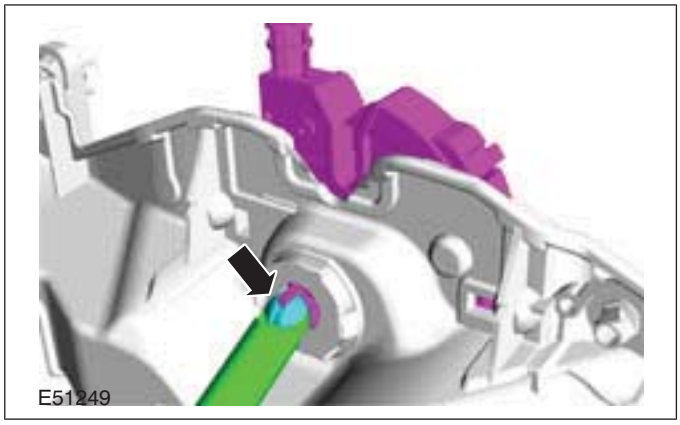
1. Detach the coolant expansion tank to coolant outlet connector hose from the hose retaining clamp.

Item 4 Hood latch

1. NOTE: Make a note of the position and orientation of the hood lock cylinder connecting clip.

REMOVAL AND INSTALLATION

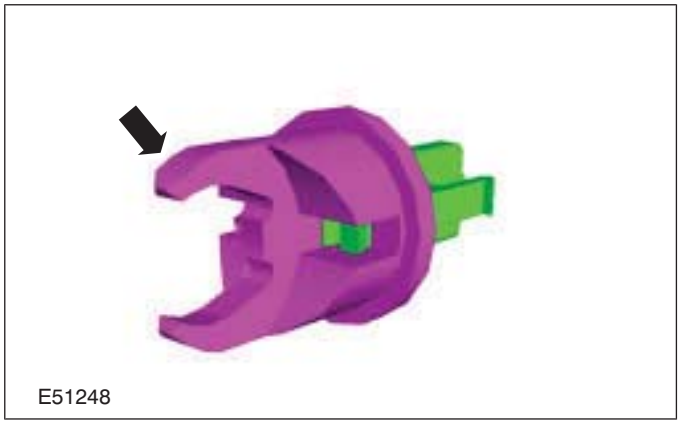
Detach the hood lock cylinder to hood latch rod swivel joint from the hood latch connecting clip.



Item 6 Hood lock cylinder connecting clip

1. **NOTE: Make a note of the position and orientation of the hood lock cylinder connecting shaft.**

   Remove the hood lock cylinder connecting clip from the hood lock cylinder connecting shaft (hood latch shown removed for clarity).

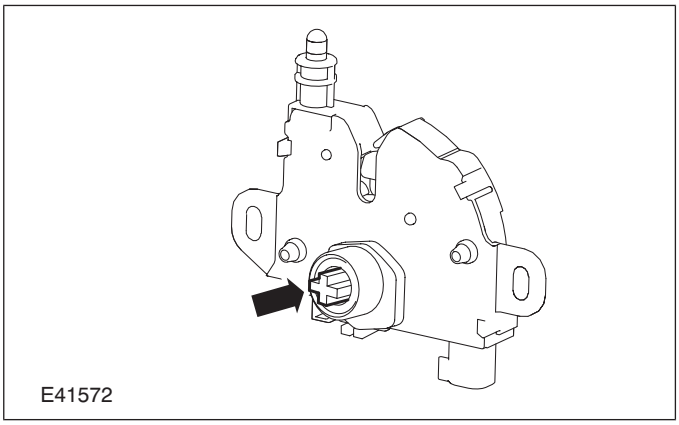


Item 7 Hood lock cylinder connecting shaft

1. **NOTE: Make a note of the position and orientation of the hood lock cylinder connecting shaft.**

   Remove the hood lock cylinder connecting shaft from the hood latch.

   - Discard the hood lock cylinder connecting shaft.



Installation Details

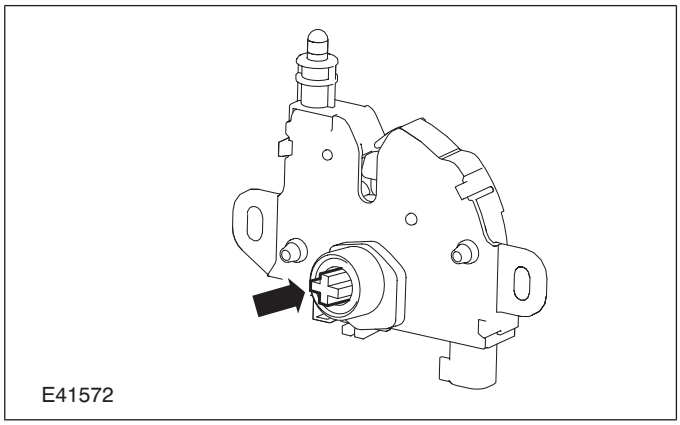
Item 7 Hood lock cylinder connecting shaft

1. **NOTE: Make sure that the hood lock cylinder connecting shaft is installed in the same position and alignment as removed.**

NOTE: Make sure that the hood lock cylinder connecting shaft clips are facing the correct way. The long clips of the hood lock cylinder connecting shaft should be installed into the hood latch.

REMOVAL AND INSTALLATION

Install the hood lock cylinder connecting shaft to the hood latch.

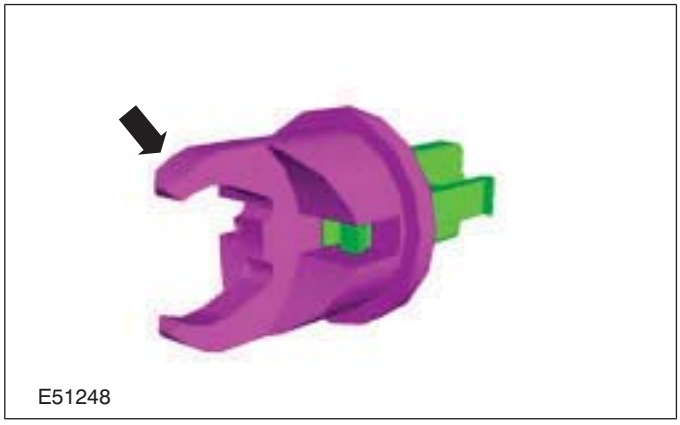


Item 6 Hood lock cylinder connecting clip

1. **NOTE: Make sure that the hood lock cylinder connecting shaft clips are facing the correct way. The short clips of the hood lock cylinder connecting shaft should be installed into the hood lock cylinder connecting clip.**

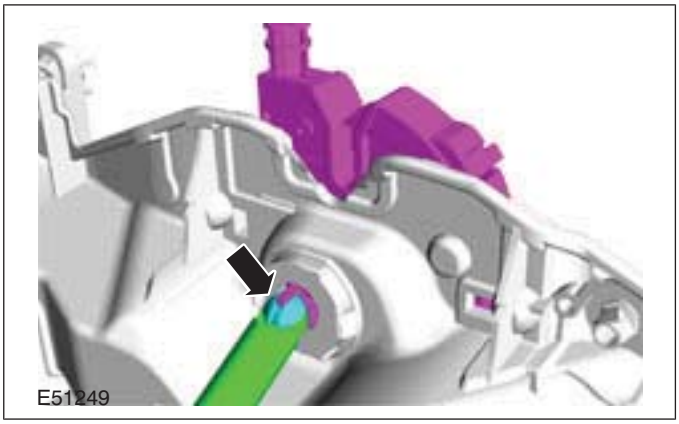
NOTE: The hood lock cylinder connecting shaft clips must be compressed before being installed into the hood lock cylinder connecting clip.

Using a suitable flat bladed screwdriver, install the hood lock cylinder connecting clip to the hood lock cylinder connecting shaft (hood latch shown removed for clarity).



Item 4 Hood latch

1. **Connect the hood lock cylinder shaft swivel joint to the hood latch connecting clip.**



Item 3 Hood latch retaining bolts

1. **Tighten the hood latch retaining bolts.**
   - Adjust the hood latch so that the hood alignment is correct.

     For additional information, refer to: Hood Alignment (501-02 Front End Body Panels, General Procedures).

REMOVAL AND INSTALLATION

Front Door Latch — 3-Door

General Equipment

Electric hand drill
Rivet gun

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. Remove the front door trim panel.

   For additional information, refer to: Front Door Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

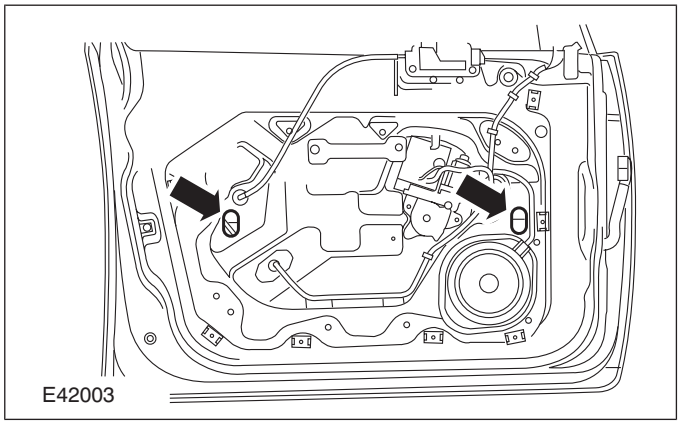
2. Remove the exterior front door handle.

   For additional information, refer to: Exterior Front Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. Connect the battery ground cable.

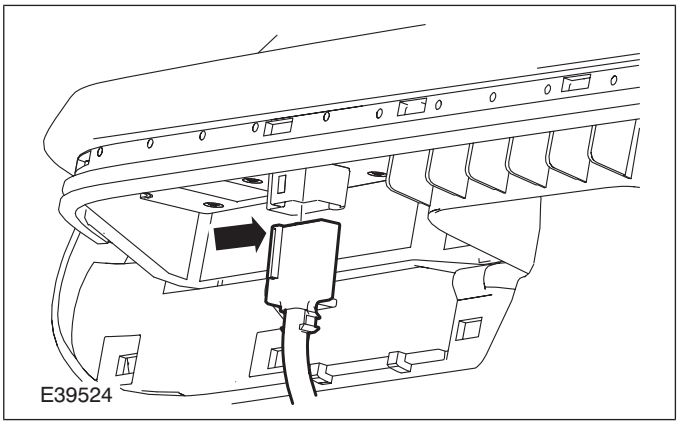
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. Remove the front door window regulator grommets.

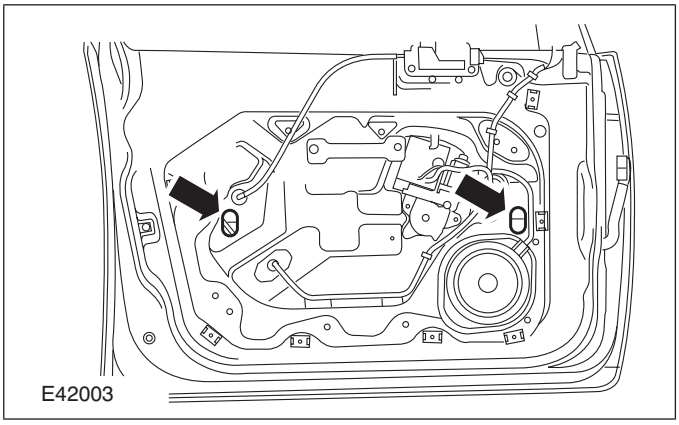


5. NOTE: Support the front door power window control unit.

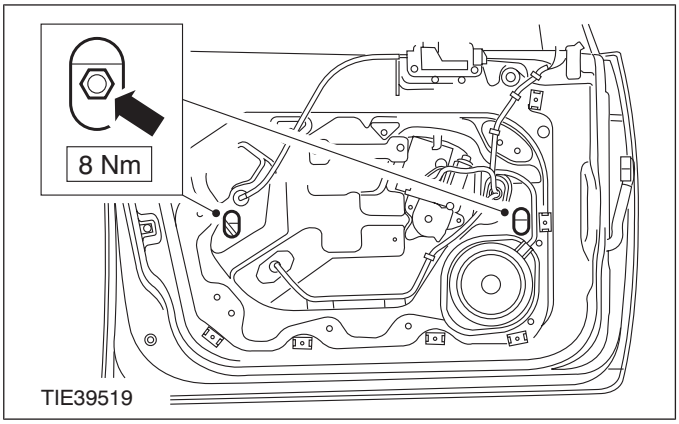
Connect the front door power window control switch electrical connector.



6. Using the front door power window control switch, align the window glass clamp retaining bolts with the access holes.



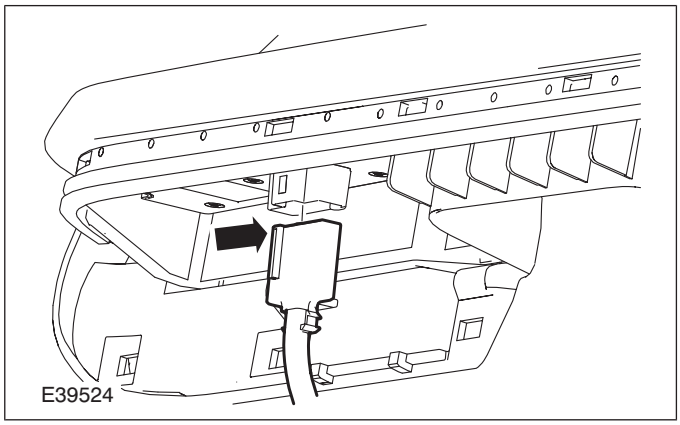
7. Loosen the front door window glass clamp retaining bolts.



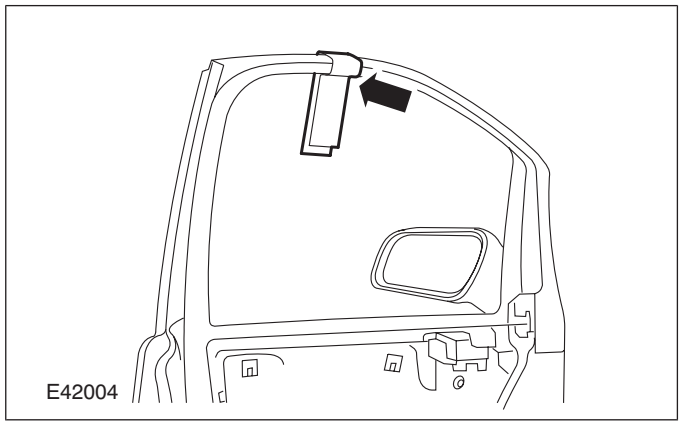
8. Raise the front door window glass.

REMOVAL AND INSTALLATION

9. Disconnect the front door power window control switch electrical connector.



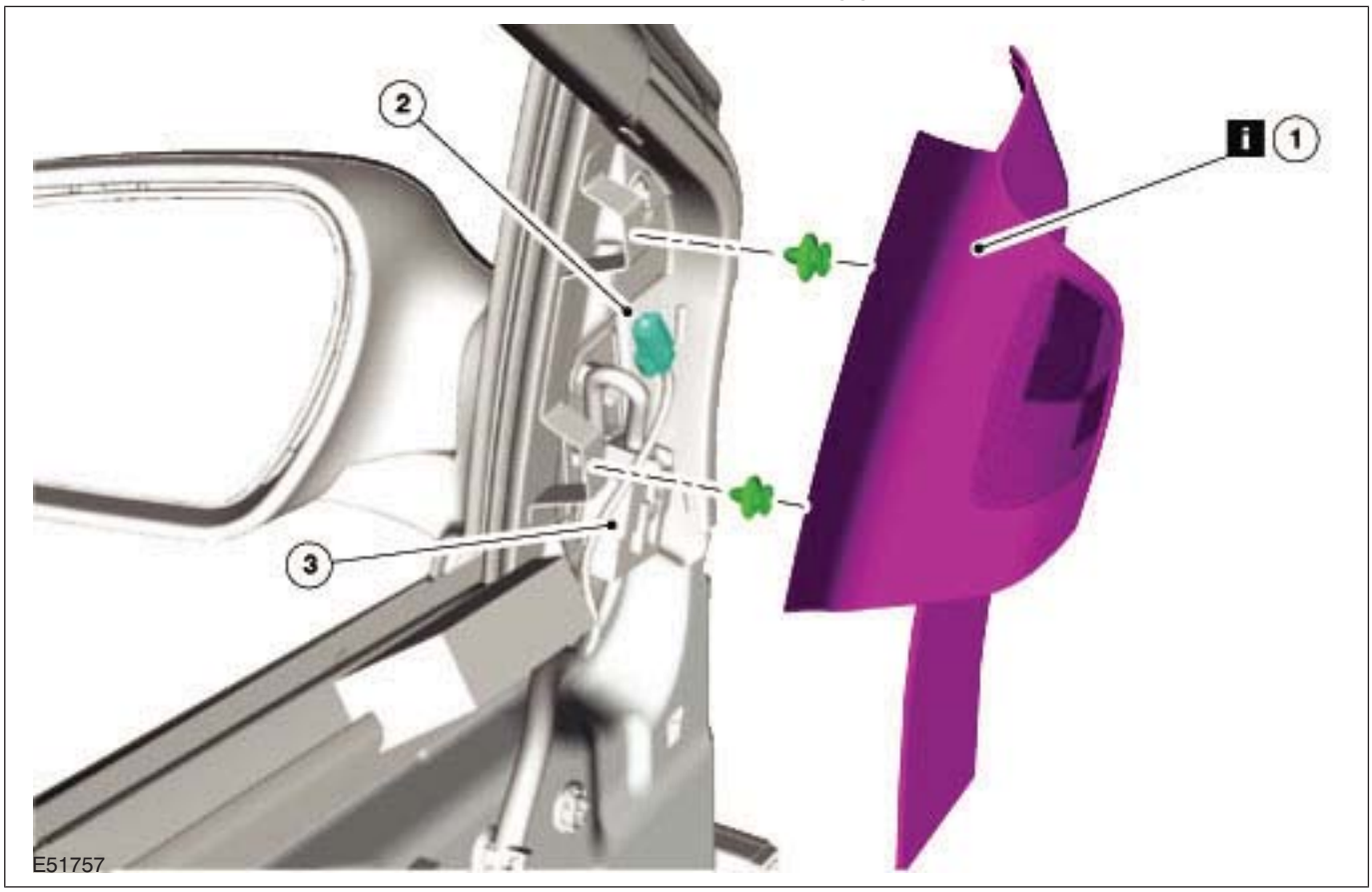
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

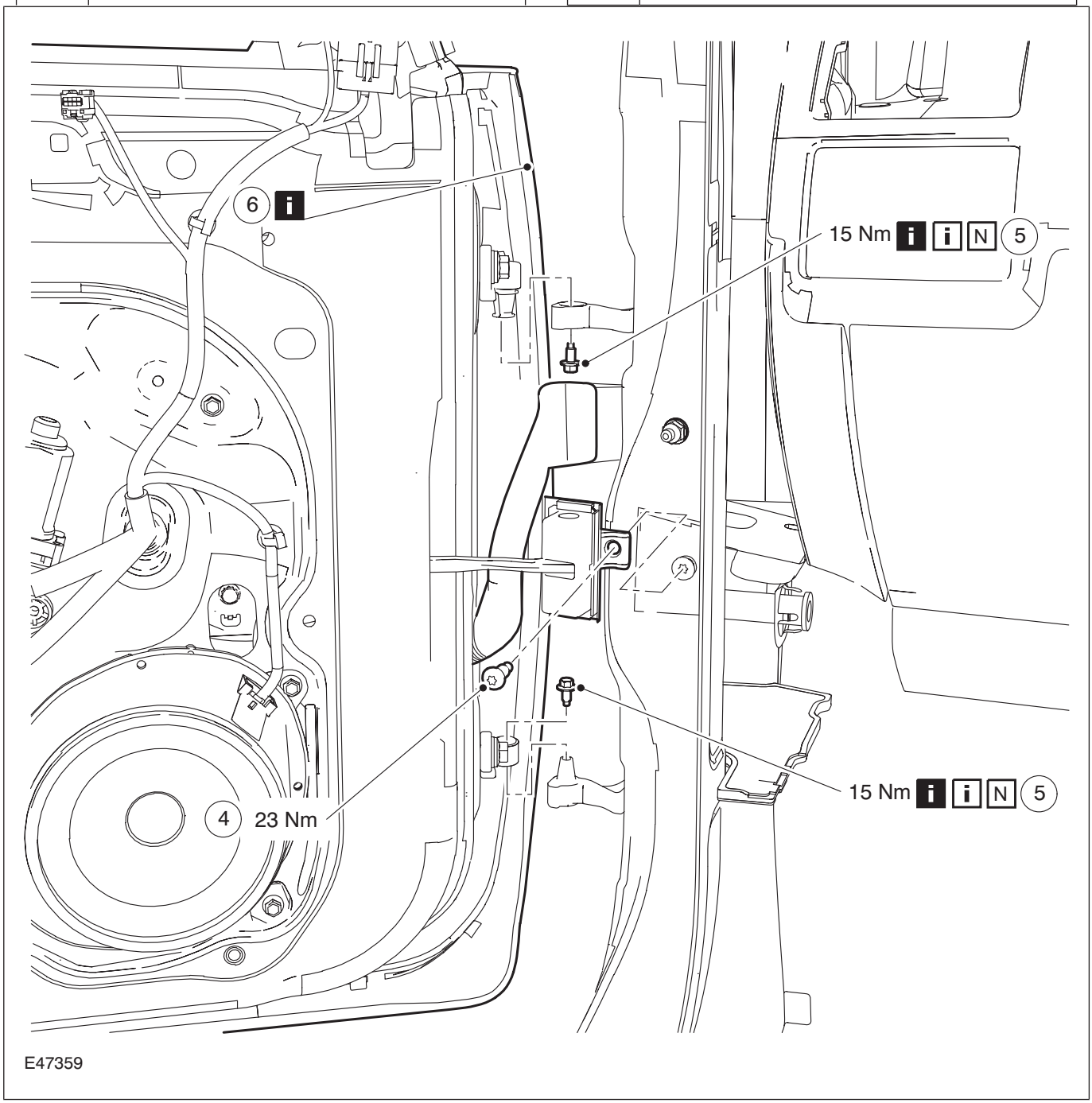
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

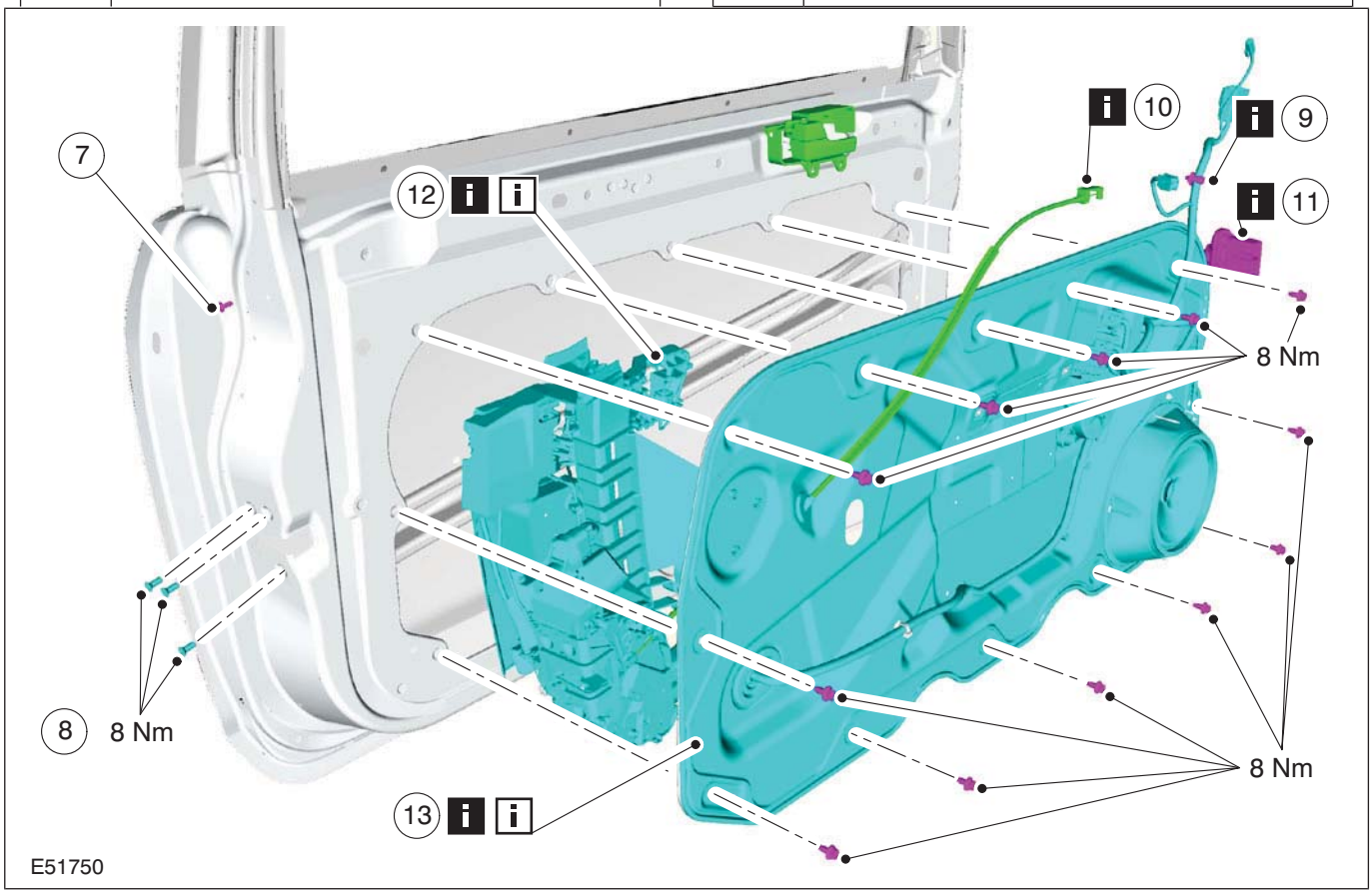
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap retaining bolt
5	Door hinge retaining bolts See Removal Detail

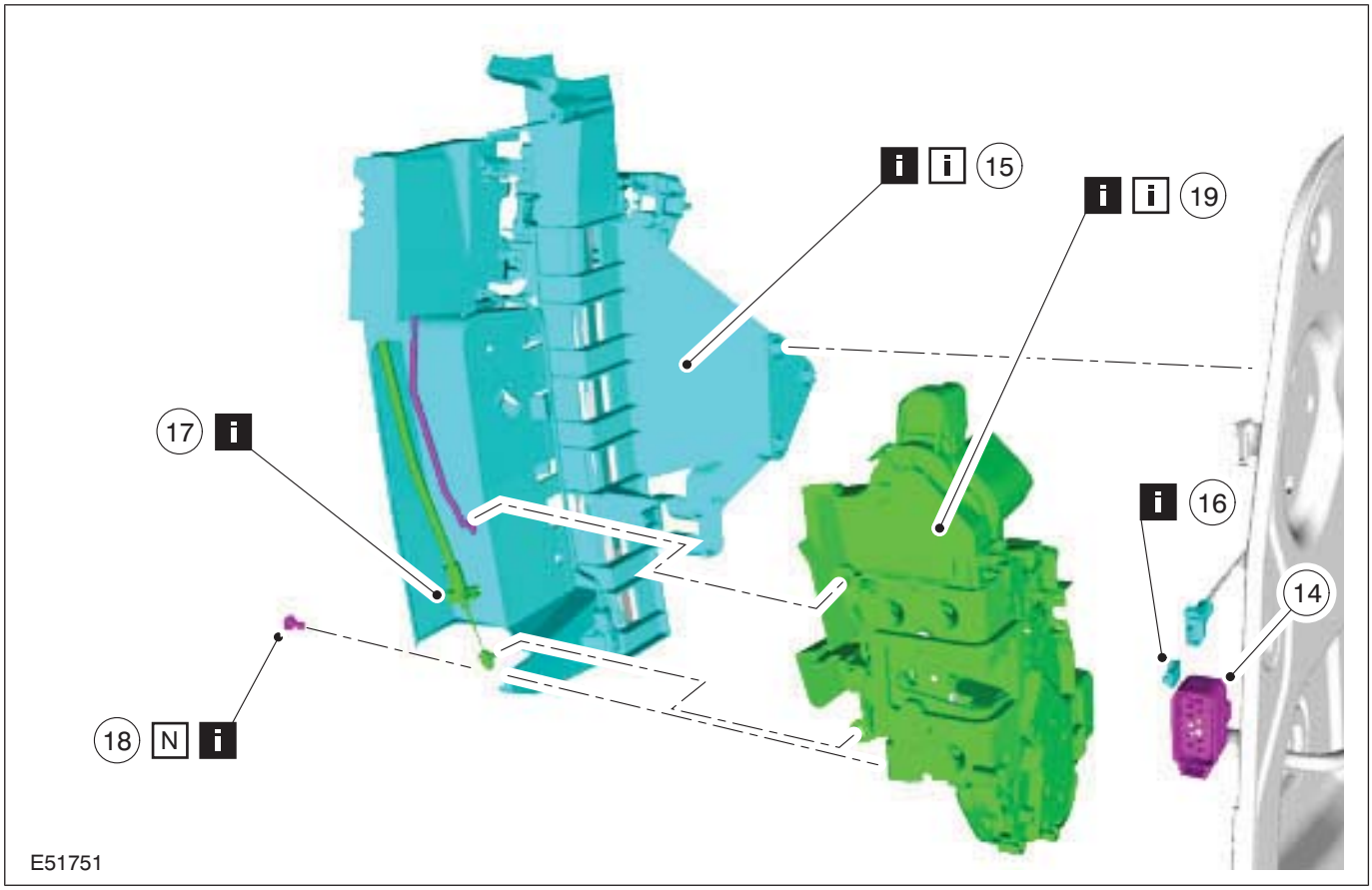
Item	Description
	See Installation Detail
6	Door (left-hand door shown) See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screw
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Front door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Front door latch electrical connector
15	Front door handle, lock and latch retaining bracket See Removal Detail See Installation Detail
16	Front door latch remote control cable See Removal Detail
17	Front exterior door handle remote control cable See Removal Detail

Item	Description
18	Front door latch retaining bracket retaining rivet See Removal Detail
19	Front door latch See Removal Detail See Installation Detail

13. **To install, reverse the removal procedure.**
14. **Vehicles with global closing, initialize the door window motors.**

    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

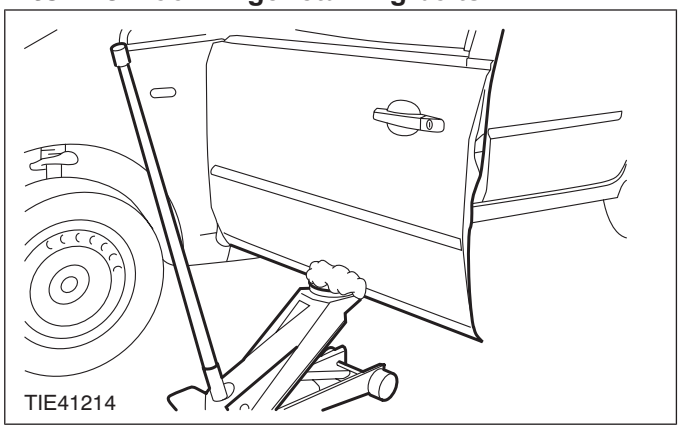
Removal Details

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

REMOVAL AND INSTALLATION

Item 5 Door hinge retaining bolts

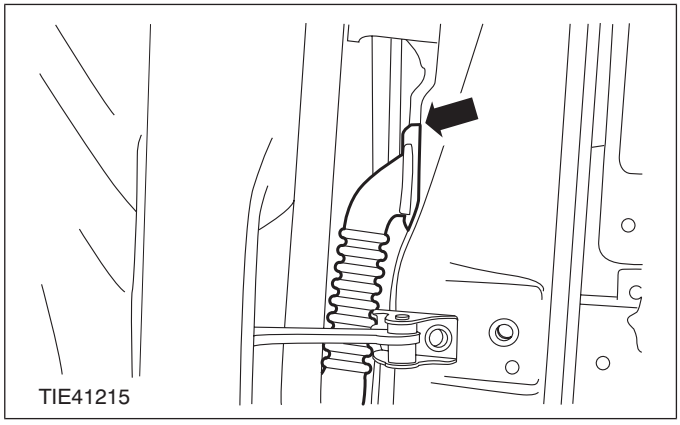


1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

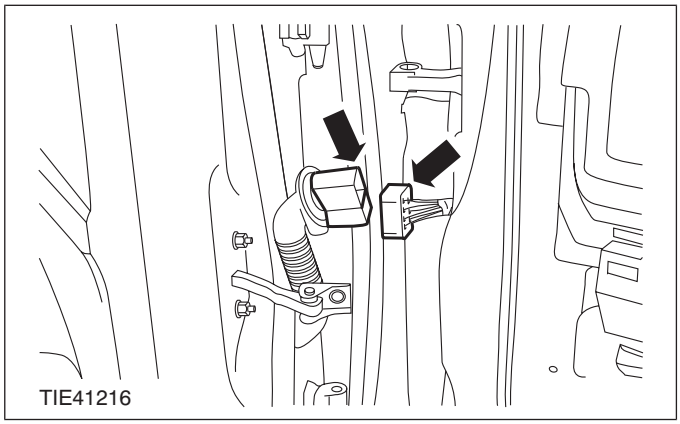
   With the aid of another technician and a suitable trolly jack, support and detach the front door from the front door hinges.

Item 6 Door (left-hand door shown)

1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**
   - Disconnect the electrical connector.

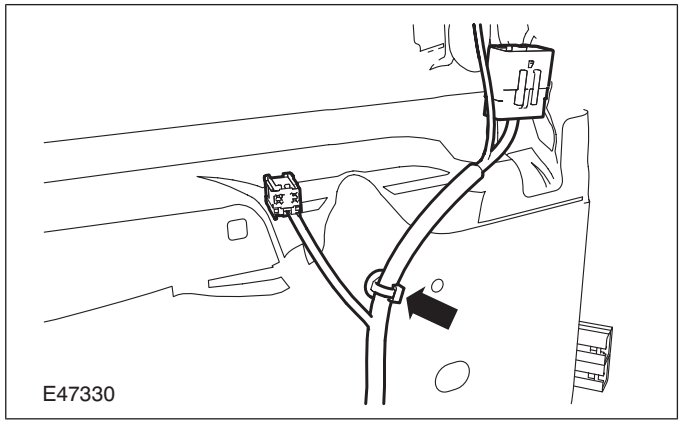


3. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

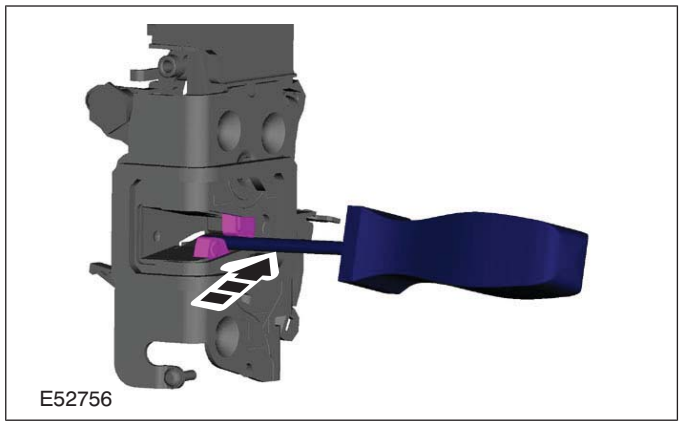
Item 9 Front door wiring harness retaining clip

1. **Detach the front door wiring harness retaining clip from the front door.**



Item 10 Front door latch remote control cable

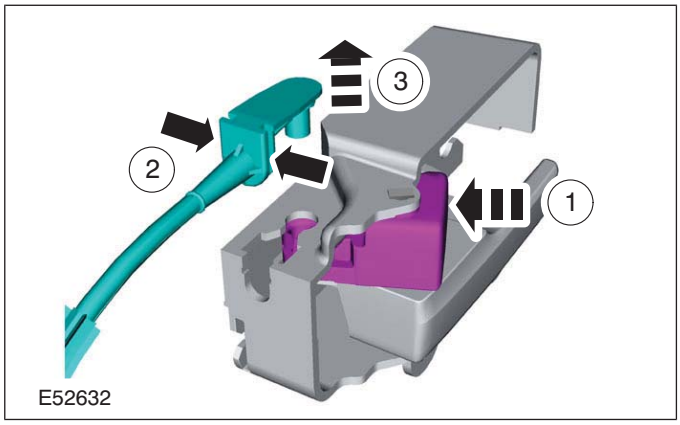
1. **Using a suitable screwdriver, latch the front door lock into the closed position.**



2. **Detach the front door latch remote control cable from the front door latch remote control handle.**
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.

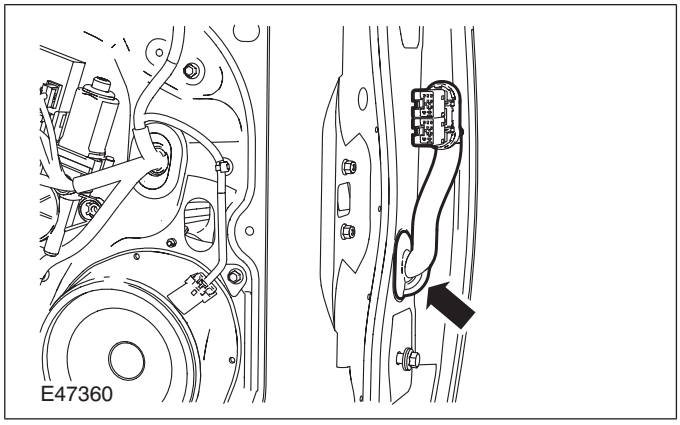
REMOVAL AND INSTALLATION

3. Detach the inner remote control cable from the remote control handle lock lever.



Item 11 Front door wiring harness

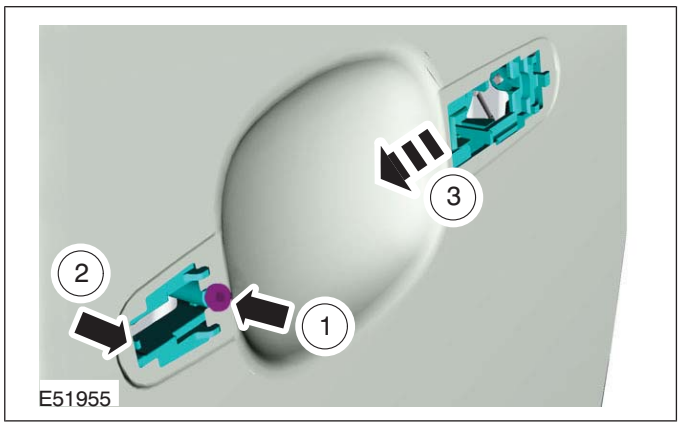
1. Detach and push the front door wiring harness into the front door.



Item 12 Front door lock actuator retaining screw

1. Detach the front door lock actuator.

1. Loosen the door lock actuator retaining screw.
2. Release the door lock actuator retaining clip.
3. Slide the door lock actuator towards the front of the vehicle.

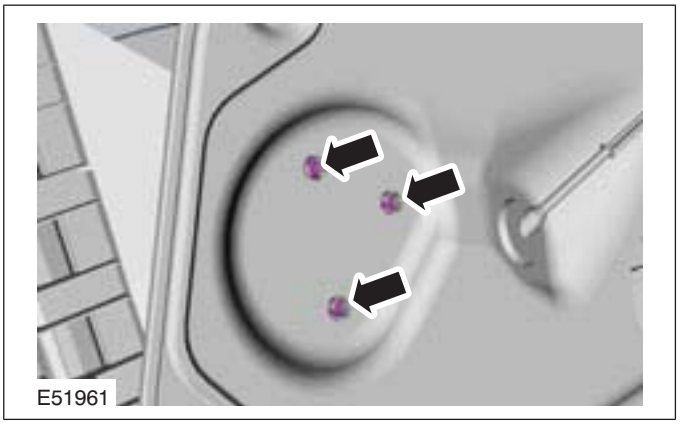


Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

Item 15 Front door handle, lock and latch retaining bracket

1. Press in the centers of the front door handle, lock and latch retaining bracket retaining clip locking pins.



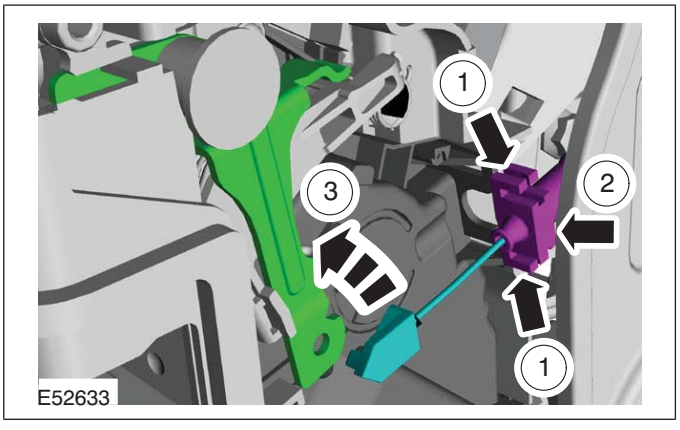
Item 16 Front door latch remote control cable

1. NOTE: Do not kink the front door latch remote control cable.

NOTE: In order to remove the front door latch remote control cable from the front door latch lever the cable must be rotated.

Disconnect the front door latch remote control cable from the front door latch.

1. Using a suitable screwdriver, release the front door latch remote control cable locking tangs from the front door latch.
2. Detach the front door latch remote control outer cable from the front door latch.
3. Rotate the front door latch remote control cable.



REMOVAL AND INSTALLATION

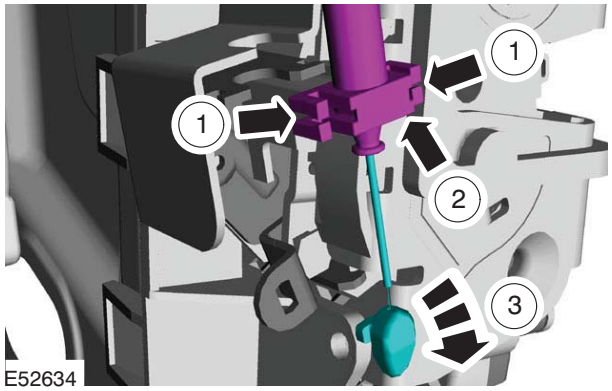
Item 17 Front exterior door handle remote control cable

1. **NOTE: Do not kink the front exterior door handle remote control cable.**

NOTE: In order to remove the front exterior door handle remote control cable from the front door latch lever the cable must be rotated.

Disconnect the front exterior door handle remote control cable from the front door latch.

1. Using a suitable screwdriver, release the front exterior door handle remote control outer cable locking tangs from the front door latch.
2. Detach the front exterior door handle remote control cable from the front door latch.
3. Rotate the front exterior door handle remote control cable.

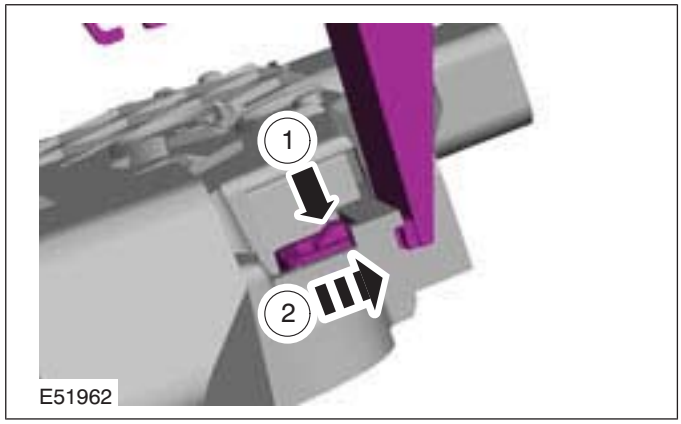


Item 18 Front door latch retaining bracket retaining rivet

1. **Using a suitable Electric hand drill remove and discard the door latch retaining bracket retaining rivet.**

Item 19 Front door latch

1. **Detach the front door latch actuator from the front door handle, lock and latch retaining bracket.**
   1. Press the front door handle, lock and latch retaining bracket release clip.
   2. Slide the front door handle, lock and latch retaining bracket out of the front door latch.



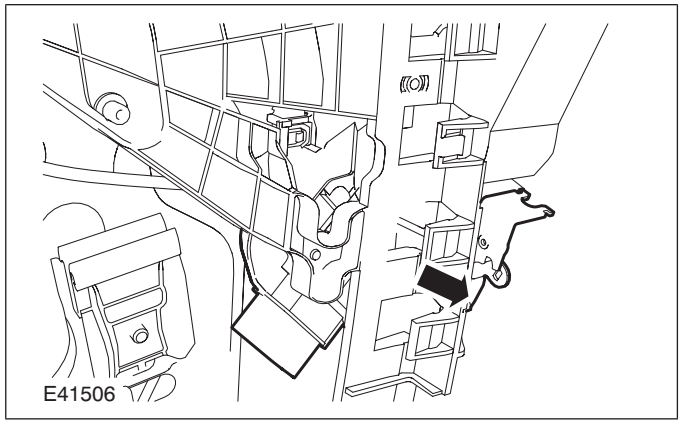
2. **Detach the front door lock cylinder actuator rod from the front door latch.**

Installation Details

Item 19 Front door latch

1. **Connect the front door lock cylinder actuator rod to the front door latch.**
2. **Install the front door latch.**

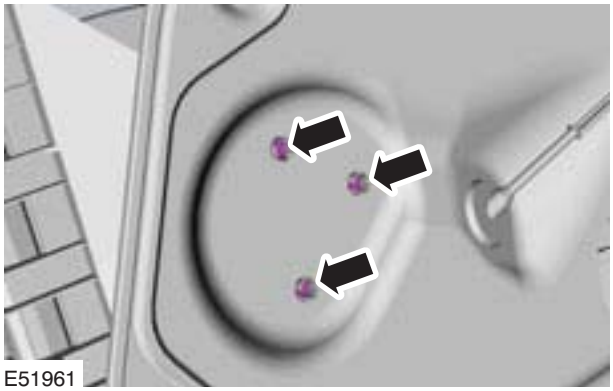
- Using a suitable Rivet gun install a new front door latch rivet.



REMOVAL AND INSTALLATION

Item 15 Front door handle, lock and latch retaining bracket

1. Install the front door handle, lock and latch retaining bracket to the door inner panel.
2. From the back of the front door handle, lock and latch retaining bracket press in the retaining clip locking pins.


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Item 13 Front door inner panel

1. Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.

Item 12 Front door lock actuator retaining screw

1. Install the front door lock actuator to the front door.
2. Tighten the front door lock actuator retaining screw.

Item 5 Door hinge retaining bolts

1. Apply a coating of adhesive to the door hinge center retaining bolts.

REMOVAL AND INSTALLATION

Front Door Latch — 3-Door, Vehicles With: Keyless Vehicle System

General Equipment

Electric hand drill
Rivet gun

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. **Remove the front door trim panel.**

   For additional information, refer to: Front Door Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

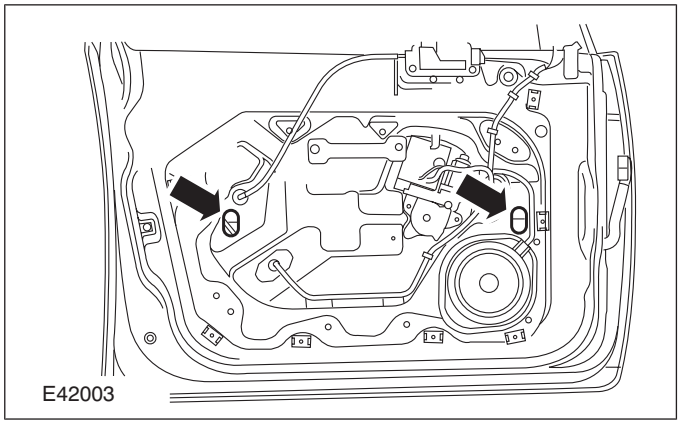
2. **Remove the exterior front door handle.**

   For additional information, refer to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. **Connect the battery ground cable.**

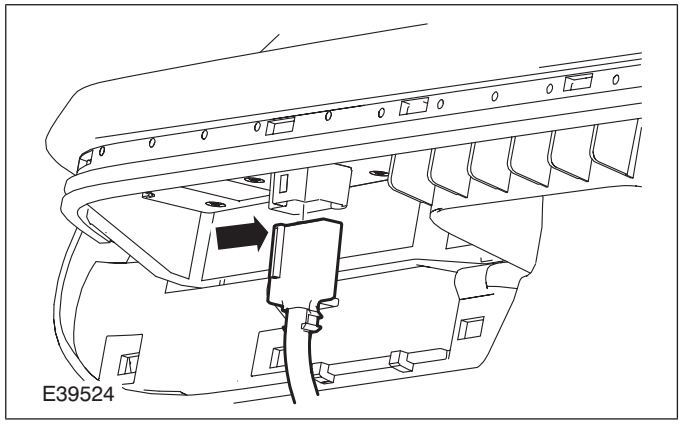
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. **Remove the front door window regulator grommets.**

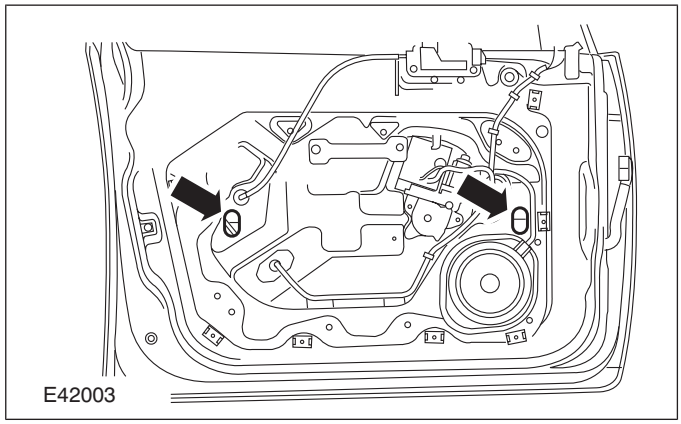


5. **NOTE: Support the front door power window control unit.**

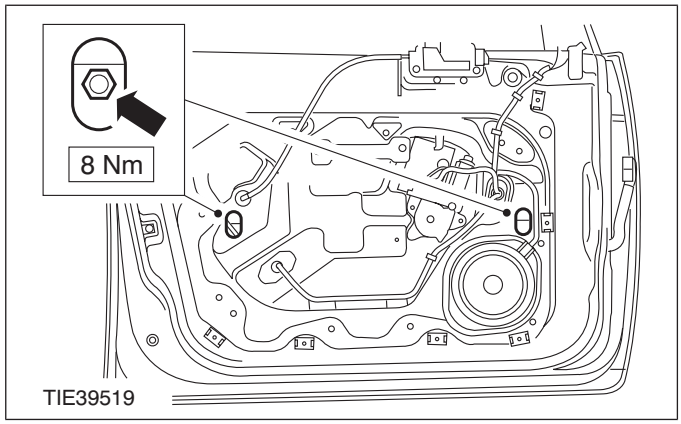
Connect the front door power window control switch electrical connector.



6. **Using the front door power window control switch, align the window glass clamp retaining bolts with the access holes.**



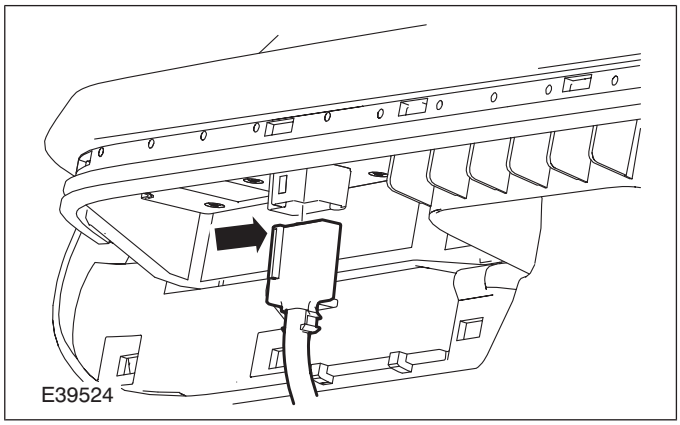
7. **Loosen the front door window glass clamp retaining bolts.**



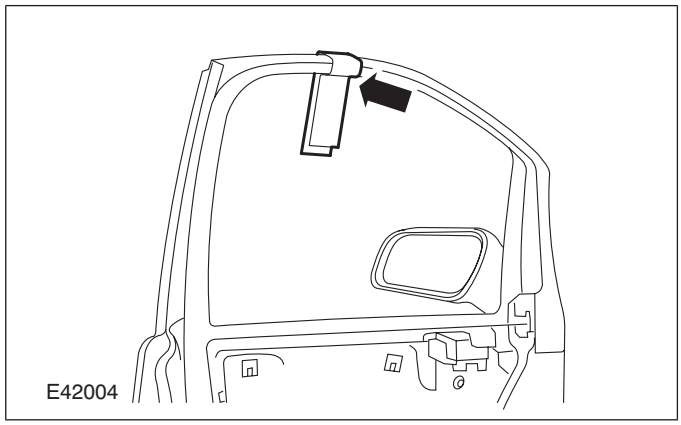
8. **Raise the front door window glass.**

REMOVAL AND INSTALLATION

9. Disconnect the front door power window control switch electrical connector.



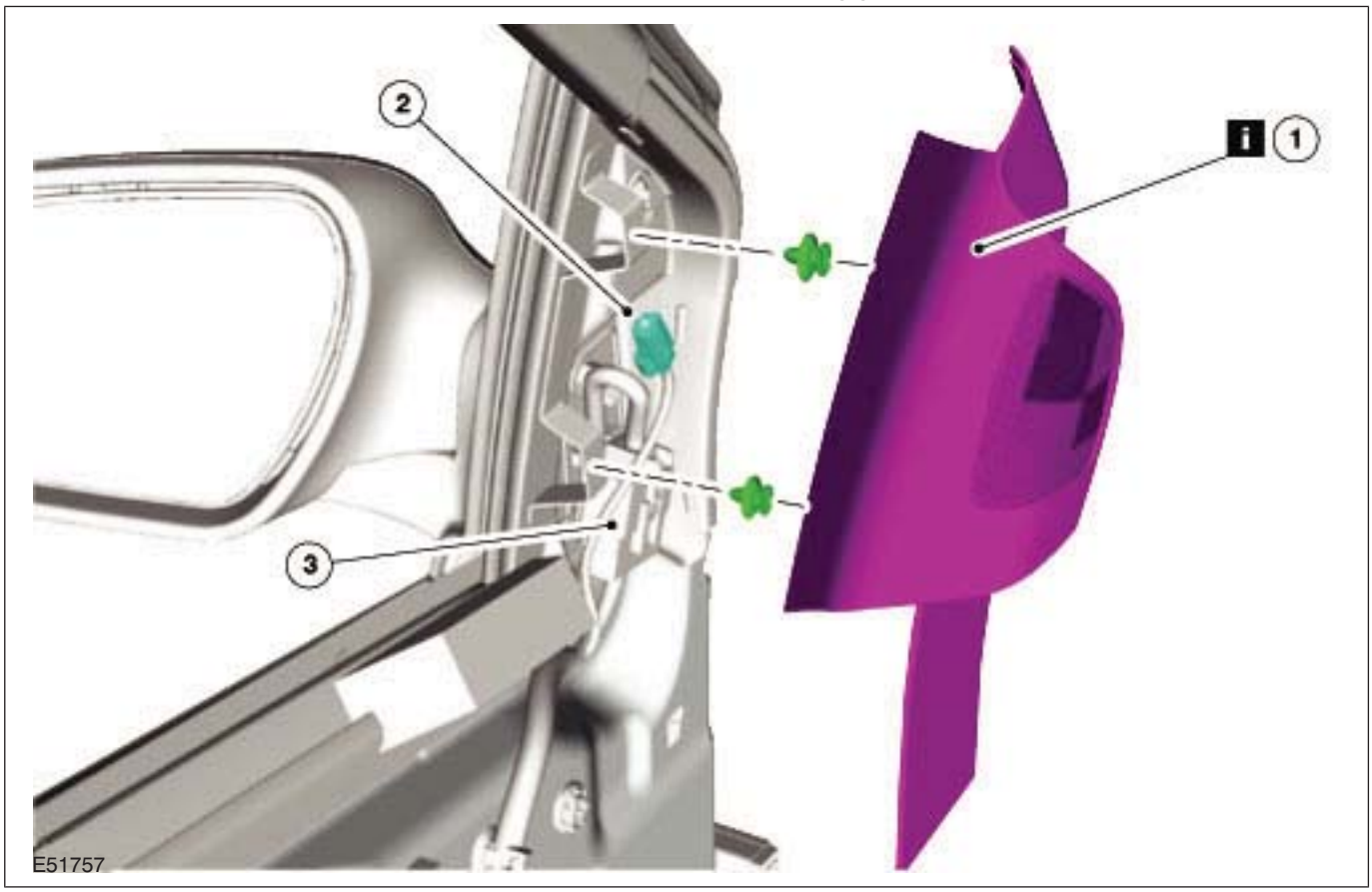
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

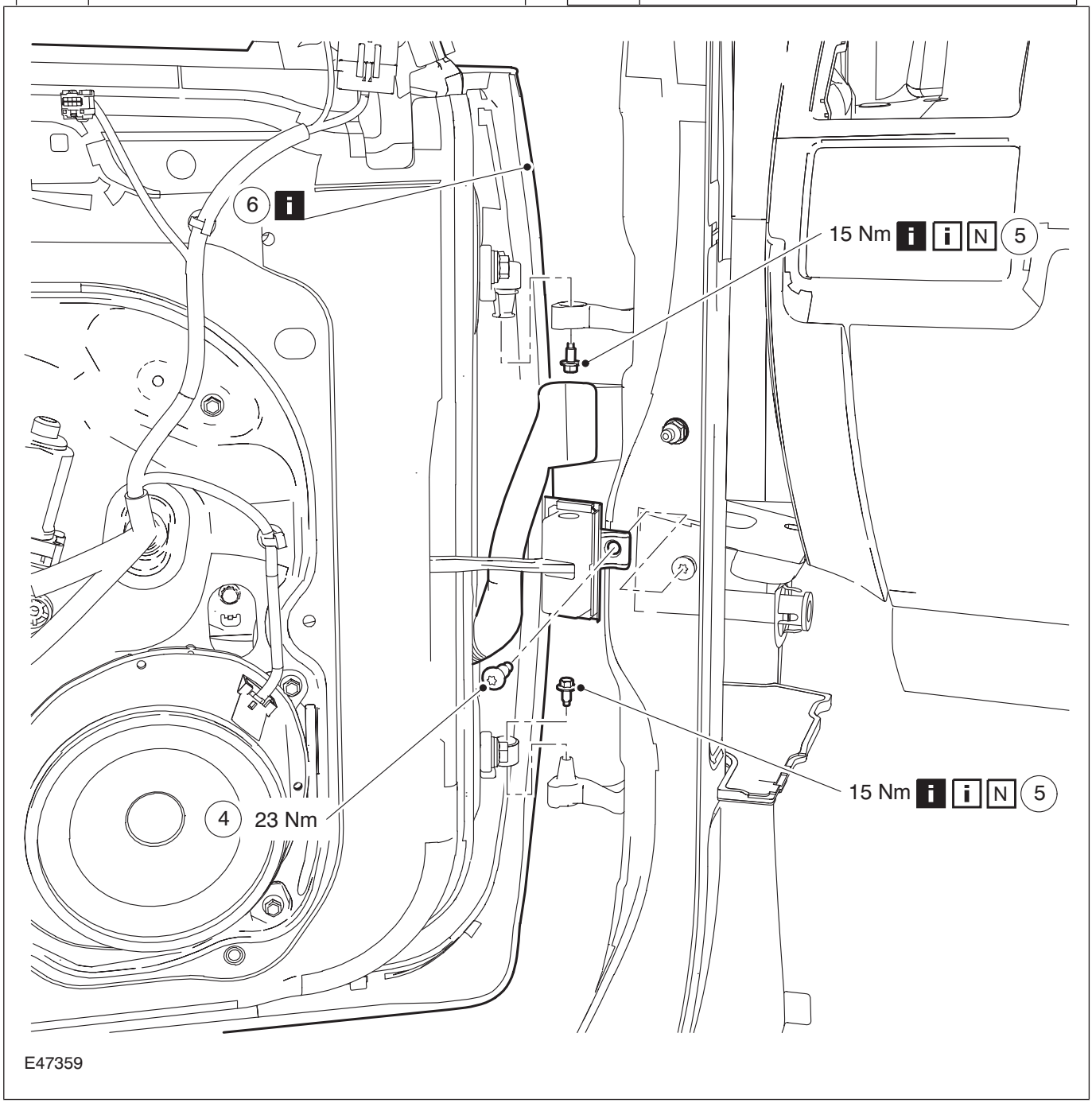
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

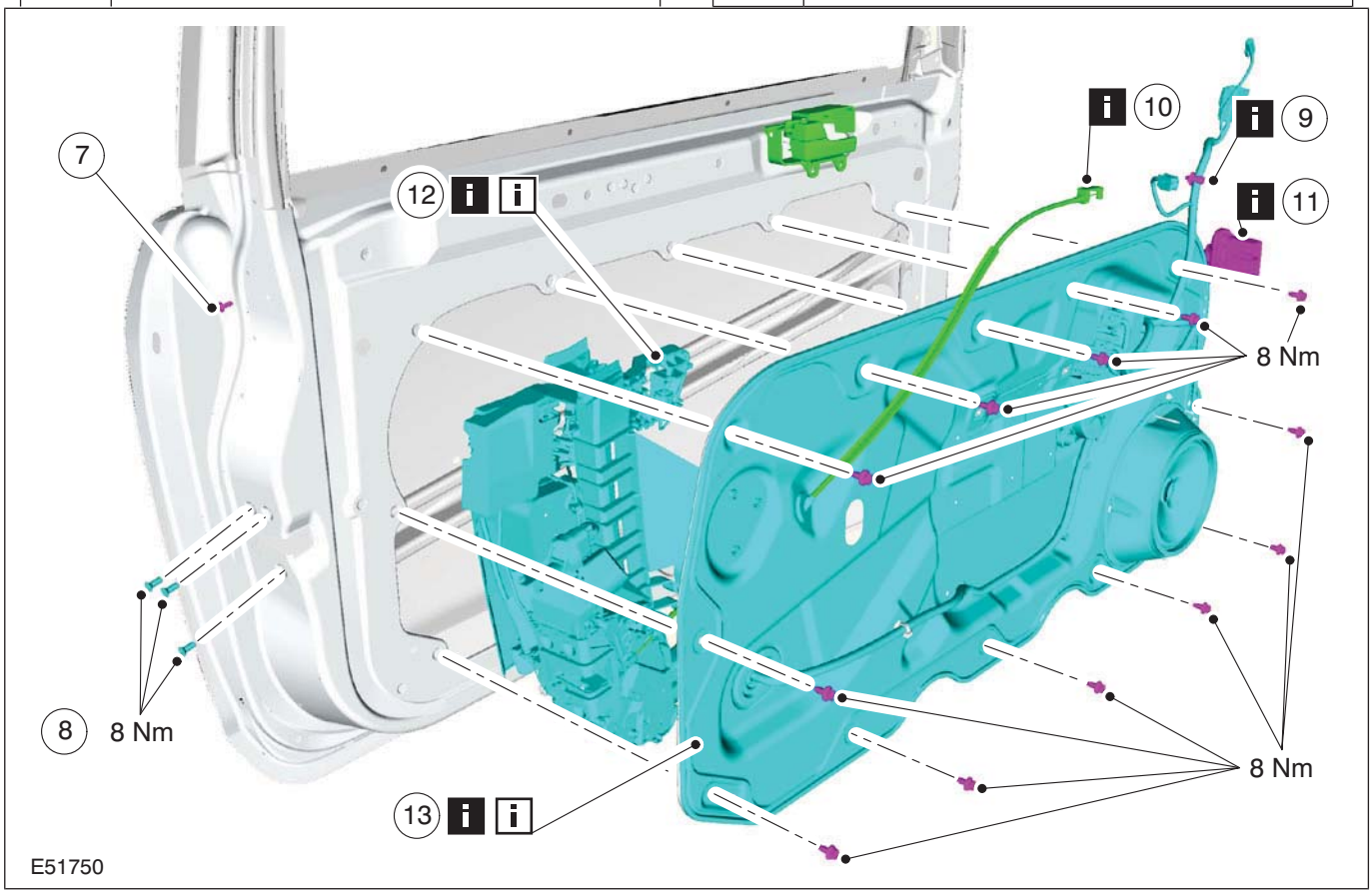
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap retaining bolt
5	Door hinge retaining bolts See Removal Detail

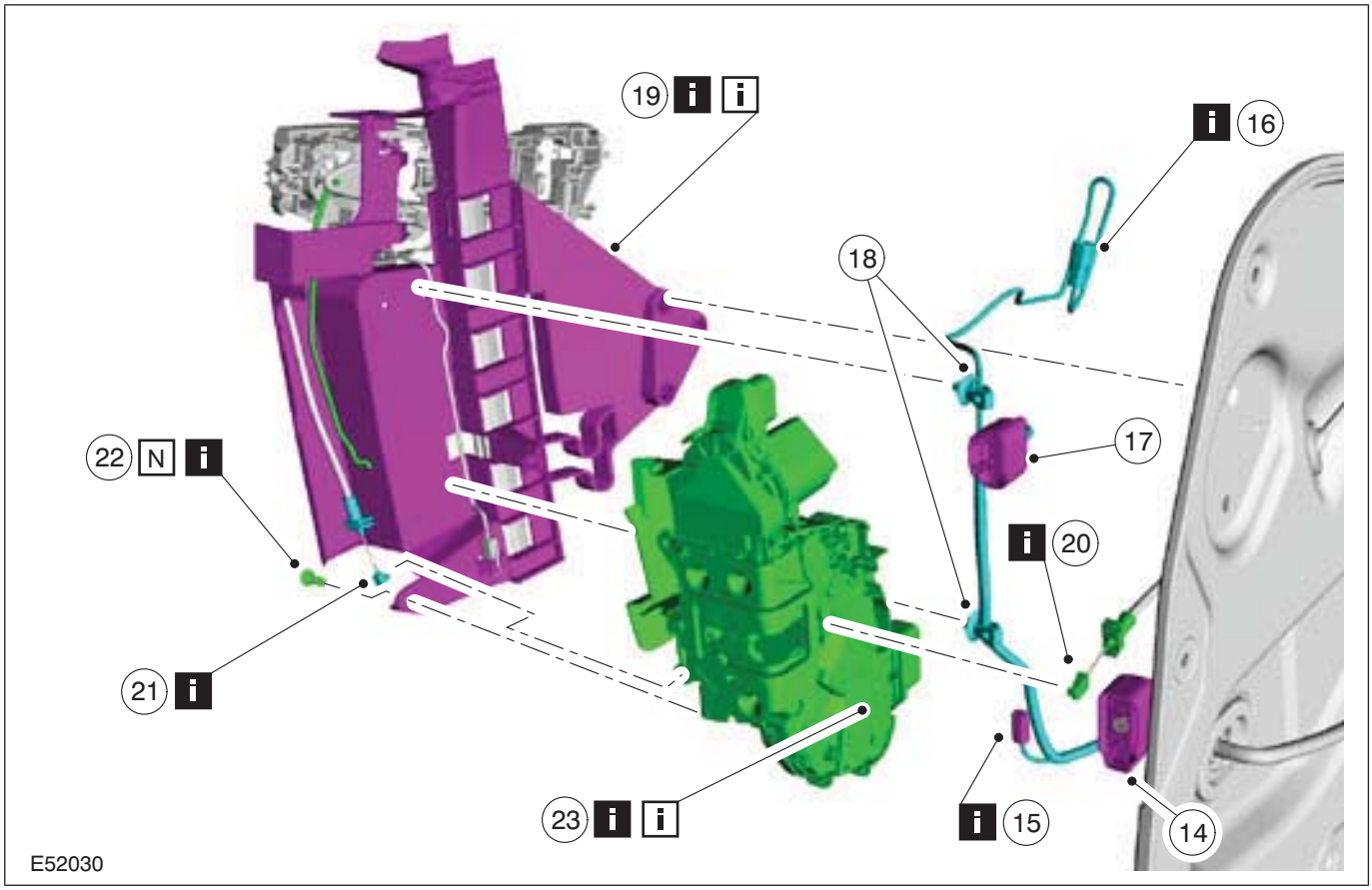
Item	Description
	See Installation Detail
6	Door (left-hand door shown) See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screw
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Front door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Front door latch electrical connector
15	Front door lock cylinder position sensor electrical connector See Removal Detail
16	Exterior front door handle RKE electrical connector See Removal Detail
17	Front door latch RKE electrical connector
18	Exterior front door handle RKE wiring harness retaining clips
19	Front door handle, lock and latch retaining bracket See Removal Detail See Installation Detail
20	Front door latch remote control cable See Removal Detail

Item	Description
21	Front exterior door handle remote control cable See Removal Detail
22	Front door latch retaining bracket retaining rivet See Removal Detail
23	Front door latch See Removal Detail See Installation Detail

13. **To install, reverse the removal procedure.**
14. **Vehicles with global closing, initialize the door window motors.**

    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

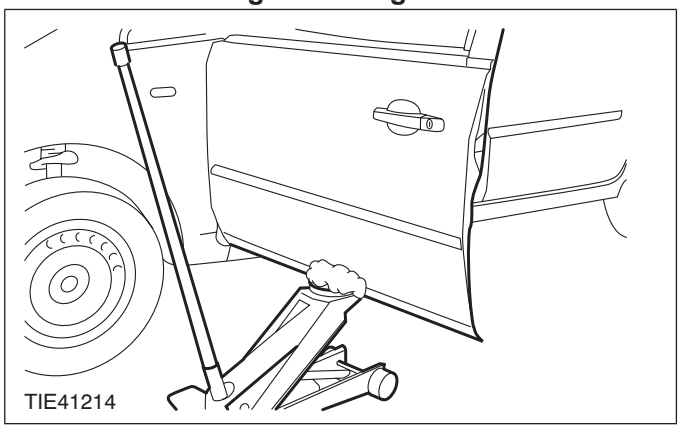
Removal Details

REMOVAL AND INSTALLATION

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

Item 5 Door hinge retaining bolts

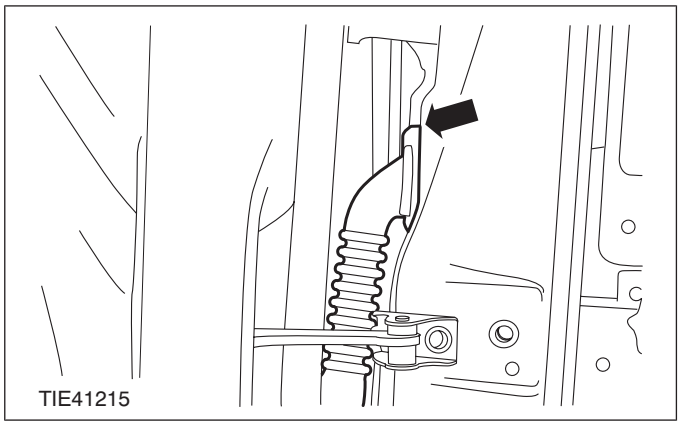


1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

   With the aid of another technician and a suitable trolly jack, support and detach the front door from the front door hinges.

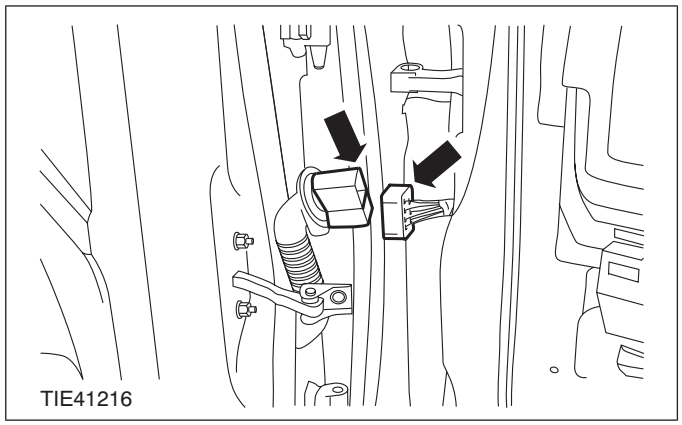
Item 6 Door (left-hand door shown)

1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**

- Disconnect the electrical connector.

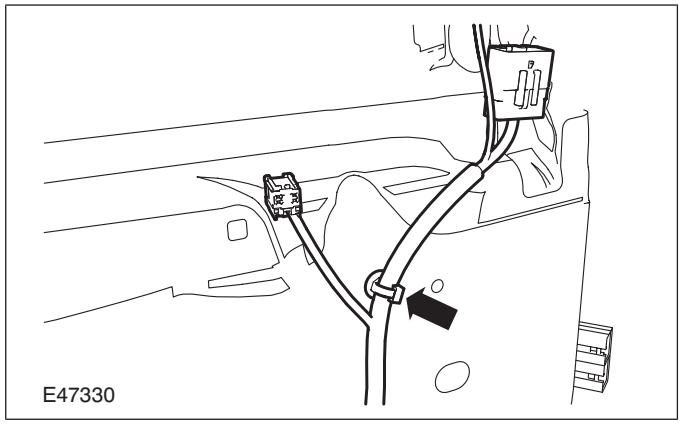


3. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

Item 9 Front door wiring harness retaining clip

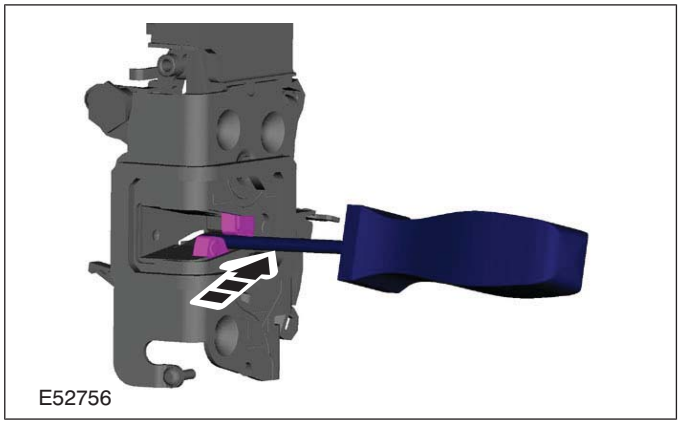
1. **Detach the front door wiring harness retaining clip from the front door.**



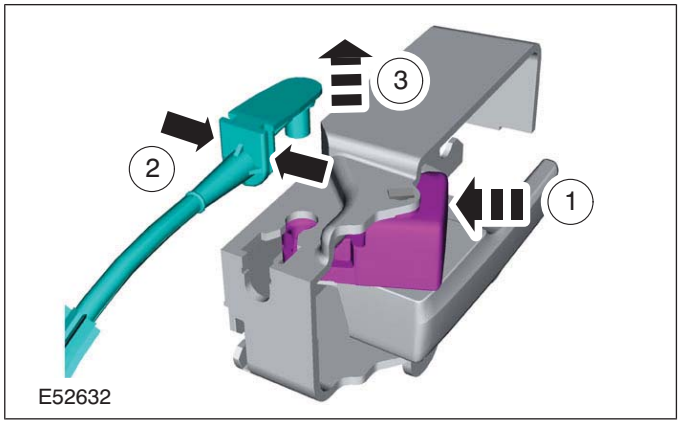
REMOVAL AND INSTALLATION

Item 10 Front door latch remote control cable

1. **Using a suitable screwdriver, latch the front door lock into the closed position.**

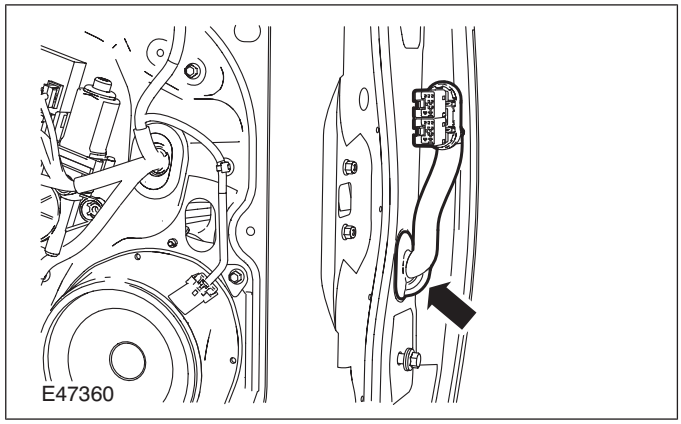


2. **Detach the front door latch remote control cable from the front door latch remote control handle.**
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.
   3. Detach the inner remote control cable from the remote control handle lock lever.



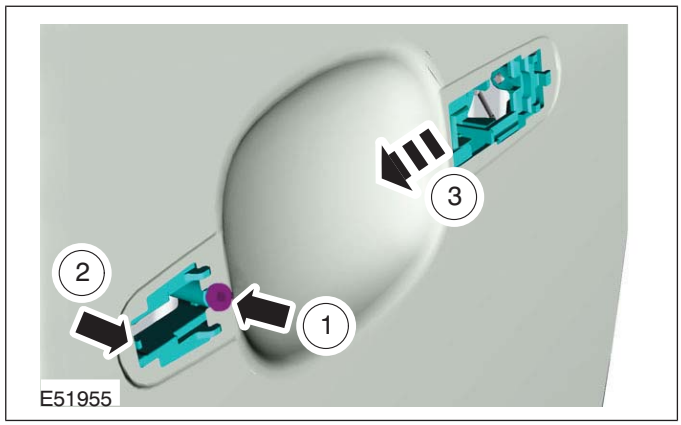
Item 11 Front door wiring harness

1. **Detach and push the front door wiring harness into the front door.**



Item 12 Front door lock actuator retaining screw

1. **Detach the front door lock actuator.**
   1. Loosen the front door lock actuator retaining screw.
   2. Release the front door lock actuator retaining clip.
   3. Slide the front door lock actuator towards the front of the vehicle.



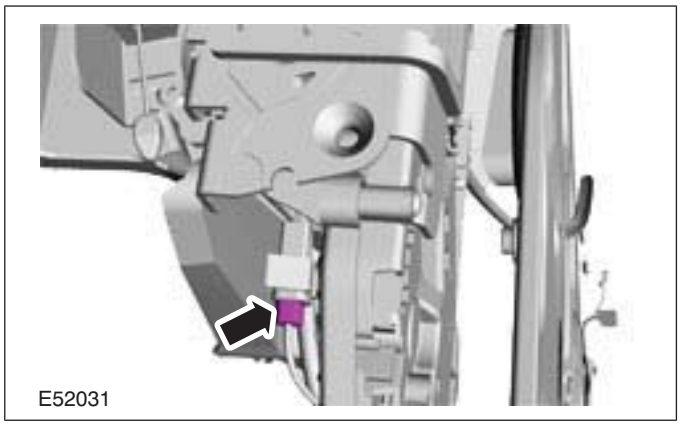
Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

REMOVAL AND INSTALLATION

Item 15 Front door lock cylinder position sensor electrical connector

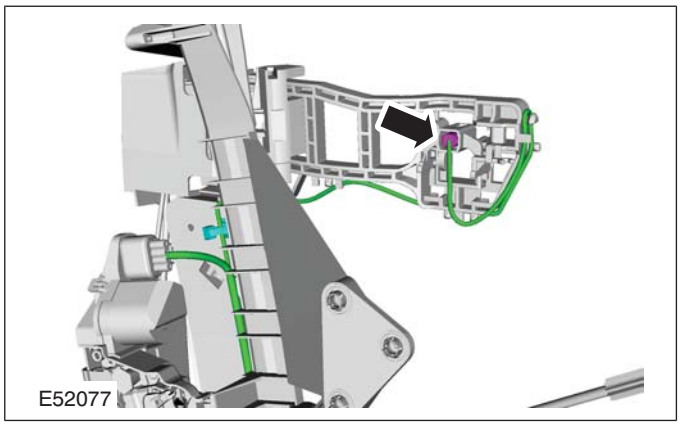
1. **Disconnect the front door lock cylinder position sensor electrical connector.**



Item 16 Exterior front door handle RKE electrical connector

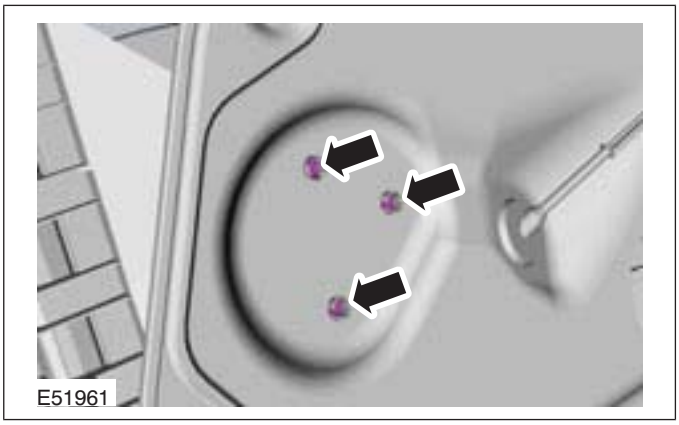
NOTE: Make a note of the clipping position of the exterior front door handle RKE harness.

1. **Detach the exterior front door handle RKE electrical connector and harness from the front door handle reinforcement.**



Item 19 Front door handle, lock and latch retaining bracket

1. **Press in the centers of the front door handle, lock and latch retaining bracket retaining clip locking pins.**



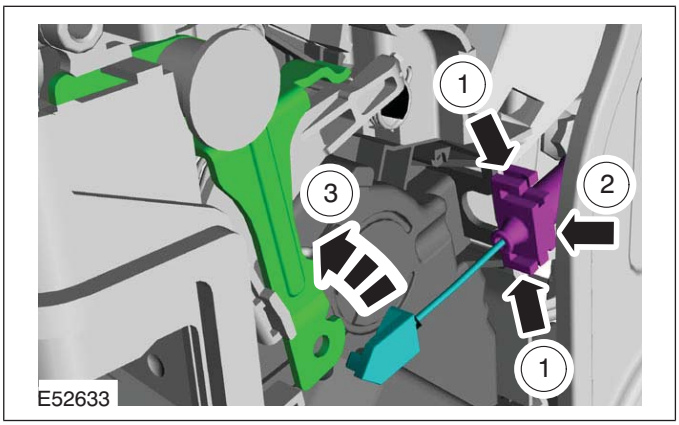
Item 20 Front door latch remote control cable

1. **NOTE: Do not kink the front door latch remote control cable.**

NOTE: In order to remove the front door latch remote control cable from the front door latch lever the cable must be rotated.

Disconnect the front door latch remote control cable from the front door latch.

1. Using a suitable screwdriver, release the front door latch remote control cable locking tangs from the front door latch.
2. Detach the front door latch remote control outer cable from the front door latch.
3. Rotate the front door latch remote control cable.



Item 21 Front exterior door handle remote control cable

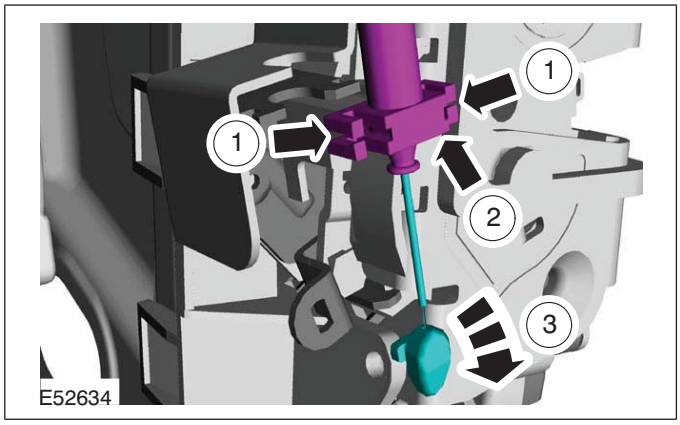
1. **NOTE: Do not kink the front exterior door handle remote control cable.**

REMOVAL AND INSTALLATION

NOTE: In order to remove the front exterior door handle remote control cable from the front door latch lever the cable must be rotated.

Disconnect the front exterior door handle remote control cable from the front door latch.

1. Using a suitable screwdriver, release the front exterior door handle remote control outer cable locking tangs from the front door latch.
2. Detach the front exterior door handle remote control cable from the front door latch.
3. Rotate the front exterior door handle remote control cable.

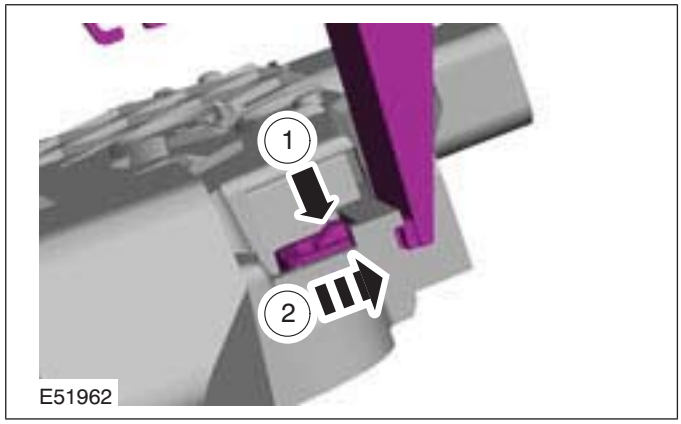


Item 22 Front door latch retaining bracket retaining rivet

1. **Using a suitable Electric hand drill remove and discard the door latch retaining bracket retaining rivet.**

Item 23 Front door latch

1. **Detach the front door latch actuator from the front door handle, lock and latch retaining bracket.**
   1. Press the front door handle, lock and latch retaining bracket release clip.
   2. Slide the front door handle, lock and latch retaining bracket out of the front door latch.

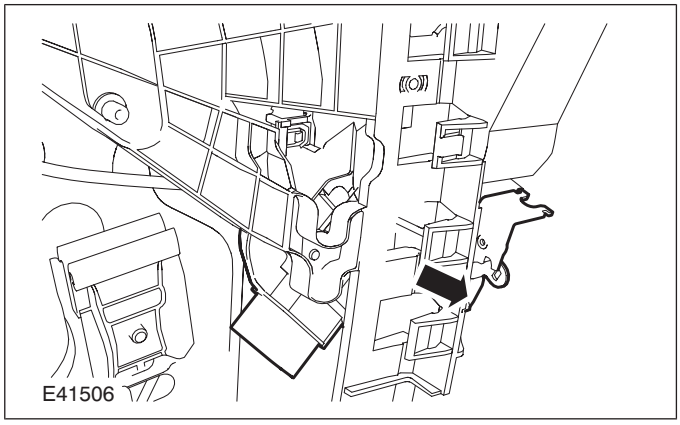


2. **Detach the front door lock cylinder actuator rod from the front door latch.**

Installation Details

Item 23 Front door latch

1. **Connect the front door lock cylinder actuator rod to the front door latch.**
2. **Install the front door latch.**
   - Using a suitable Rivet gun install a new front door latch rivet.

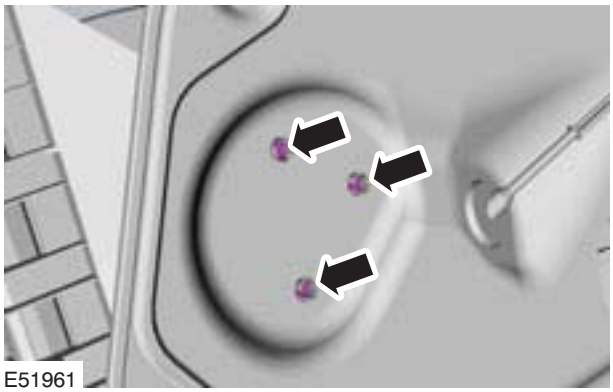


Item 19 Front door handle, lock and latch retaining bracket

1. **Install the front door handle, lock and latch retaining bracket to the door inner panel.**

REMOVAL AND INSTALLATION

2. From the back of the front door handle, lock and latch retaining bracket press in the retaining clip locking pins.


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Item 13 Front door inner panel

1. Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.

Item 12 Front door lock actuator retaining screw

1. Install the front door lock actuator to the front door.
2. Tighten the front door lock actuator retaining screw.

Item 5 Door hinge retaining bolts

1. Apply a coating of adhesive to the door hinge center retaining bolts.

REMOVAL AND INSTALLATION

Front Door Latch — 4-Door/5-Door/Wagon

General Equipment

Hand drill
Rivet gun
Trolley jack

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. **Remove the front door trim panel.**

   For additional information, refer to: Front Door Trim Panel - 4-Door/5-Door/Wagon (501-05 Interior Trim and Ornamentation, Removal and Installation).

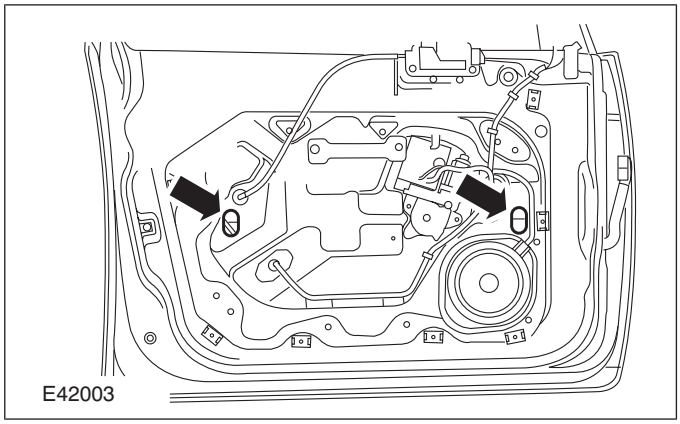
2. **Remove the exterior front door handle.**

   For additional information, refer to: Exterior Front Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. **Connect the battery ground cable.**

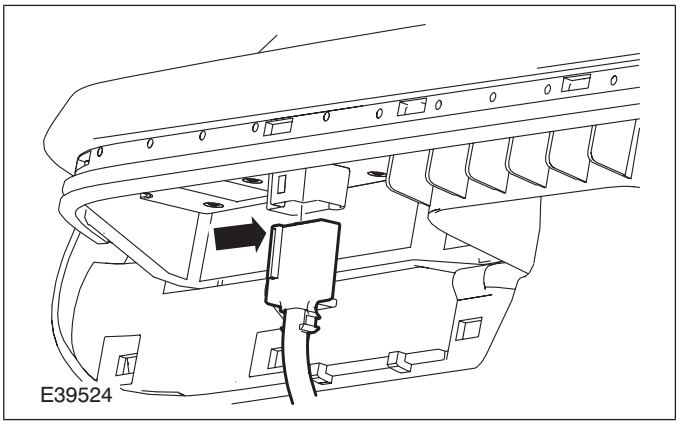
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. **Remove the front door window regulator grommets.**

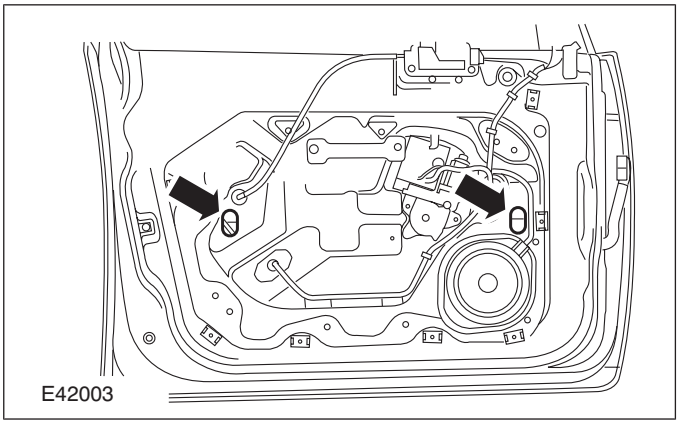


5. **NOTE: Support the front door power window control unit.**

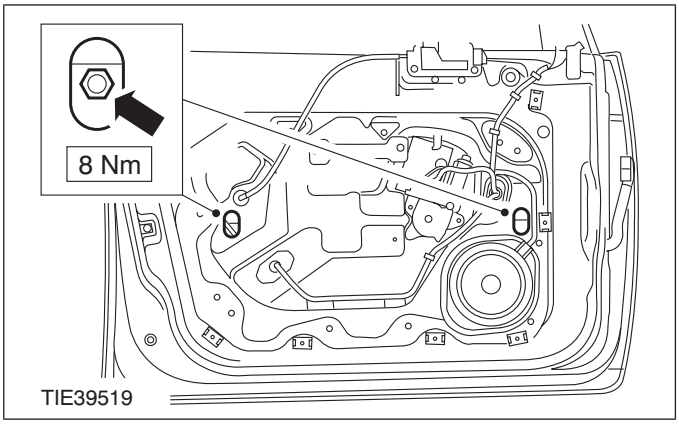
Connect the front door power window control unit electrical connector.



6. **Using the front door power window control unit, align the front door window glass clamp retaining bolts with the access holes.**

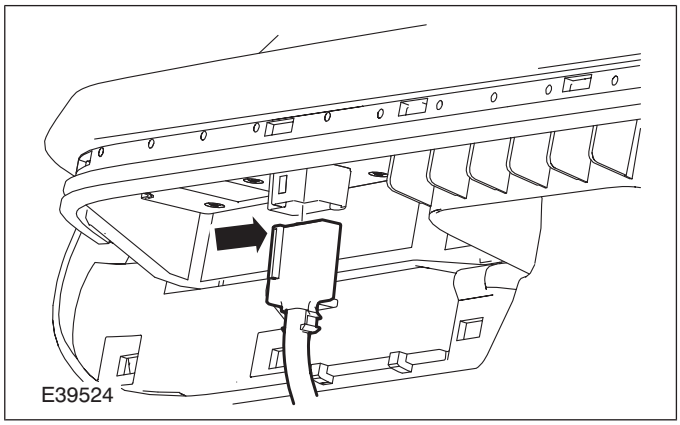


7. **Loosen the front door window glass clamp retaining bolts.**



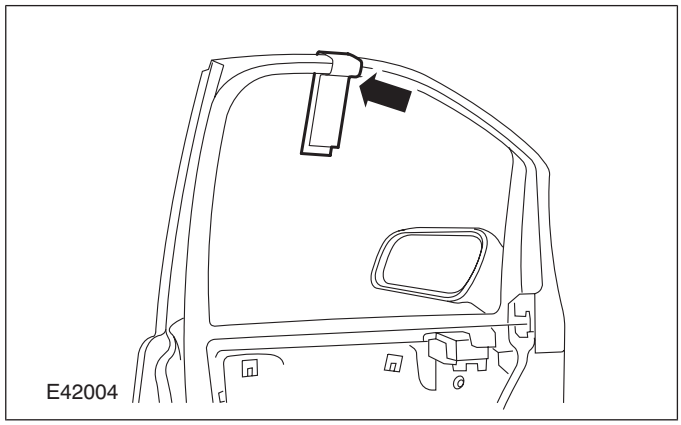
REMOVAL AND INSTALLATION

8. Disconnect the front door power window control unit electrical connector.



9. Raise the front door window glass.

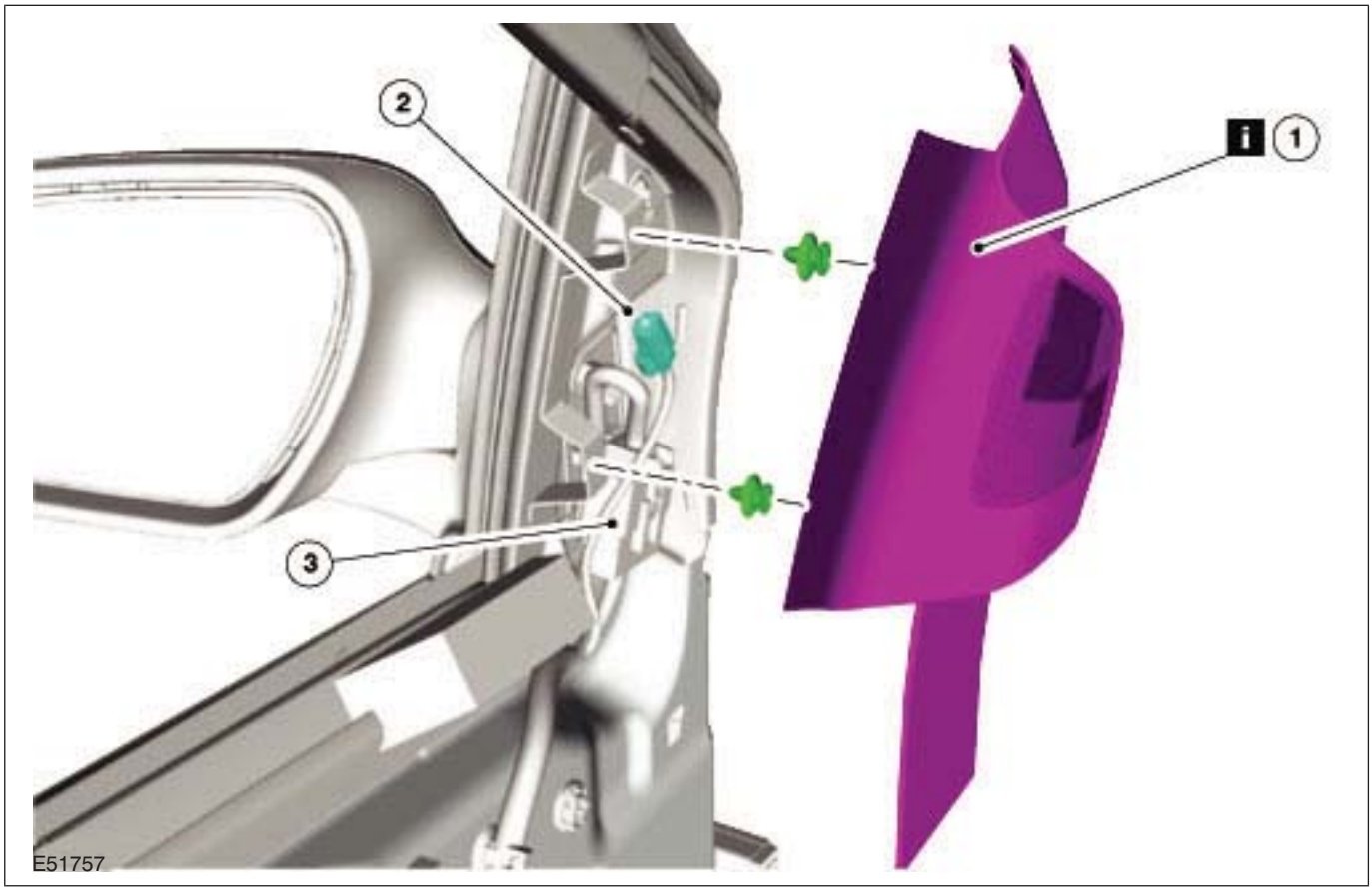
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

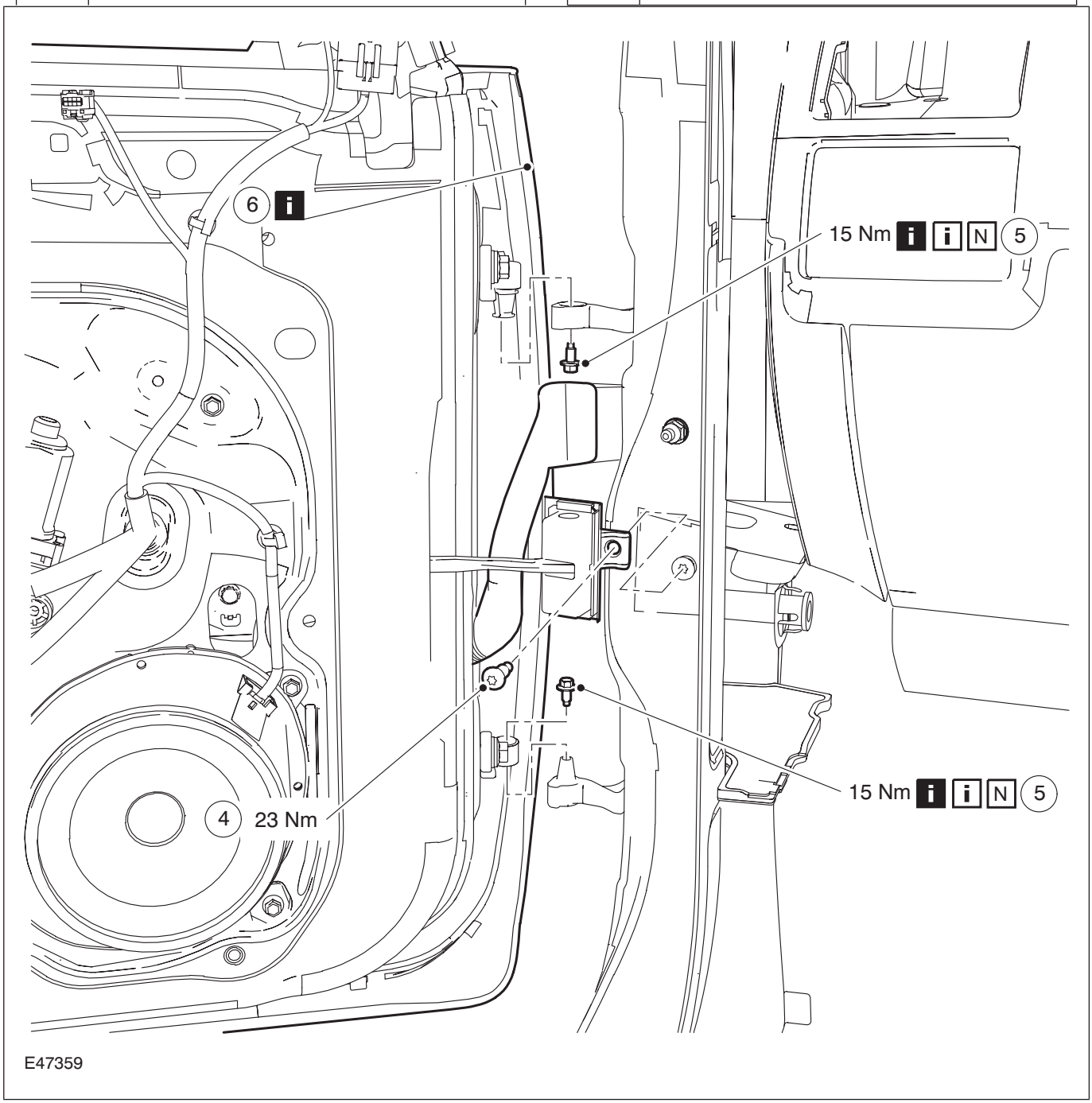
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

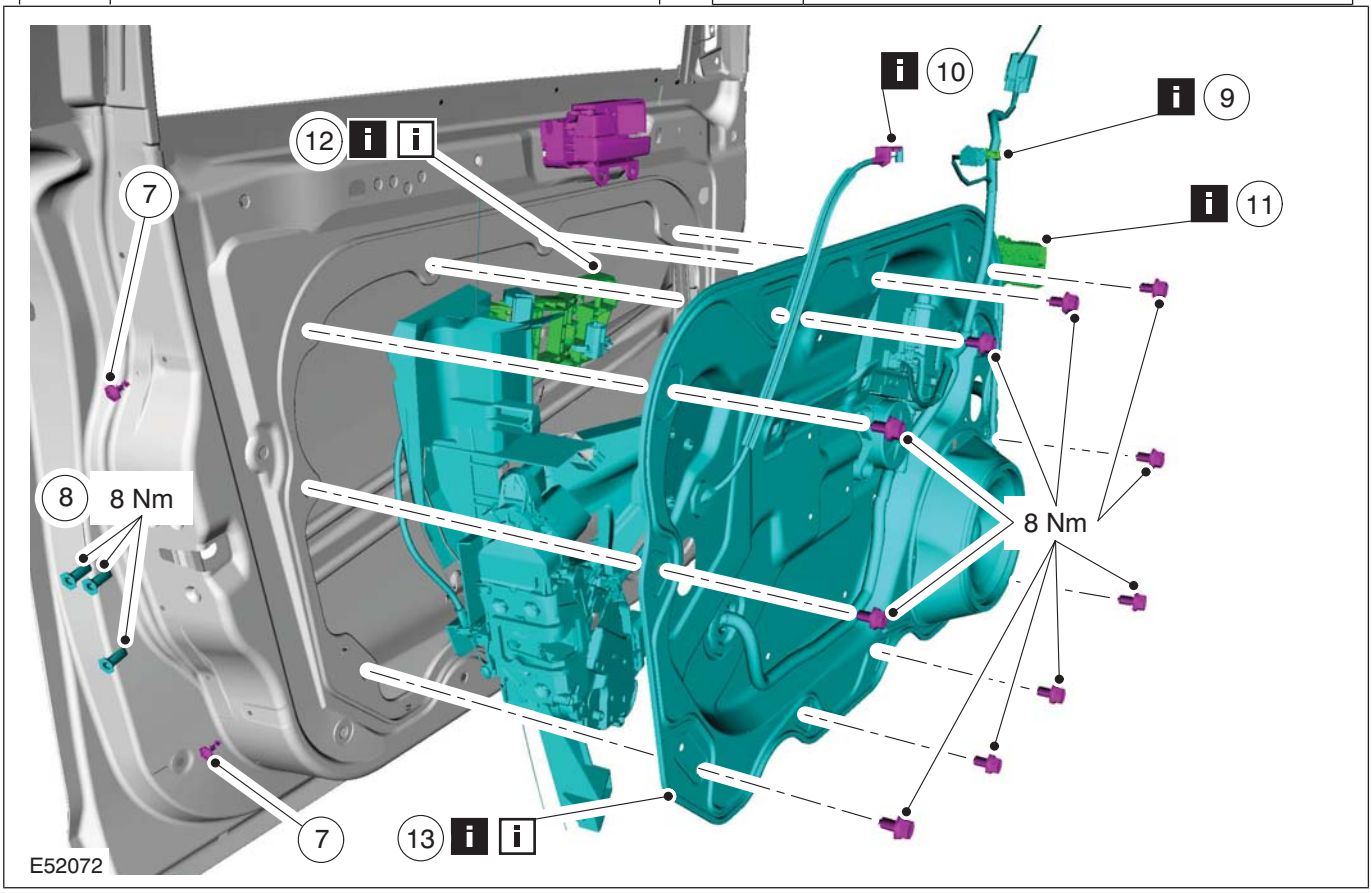
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap
5	Door hinge retaining bolts See Removal Detail

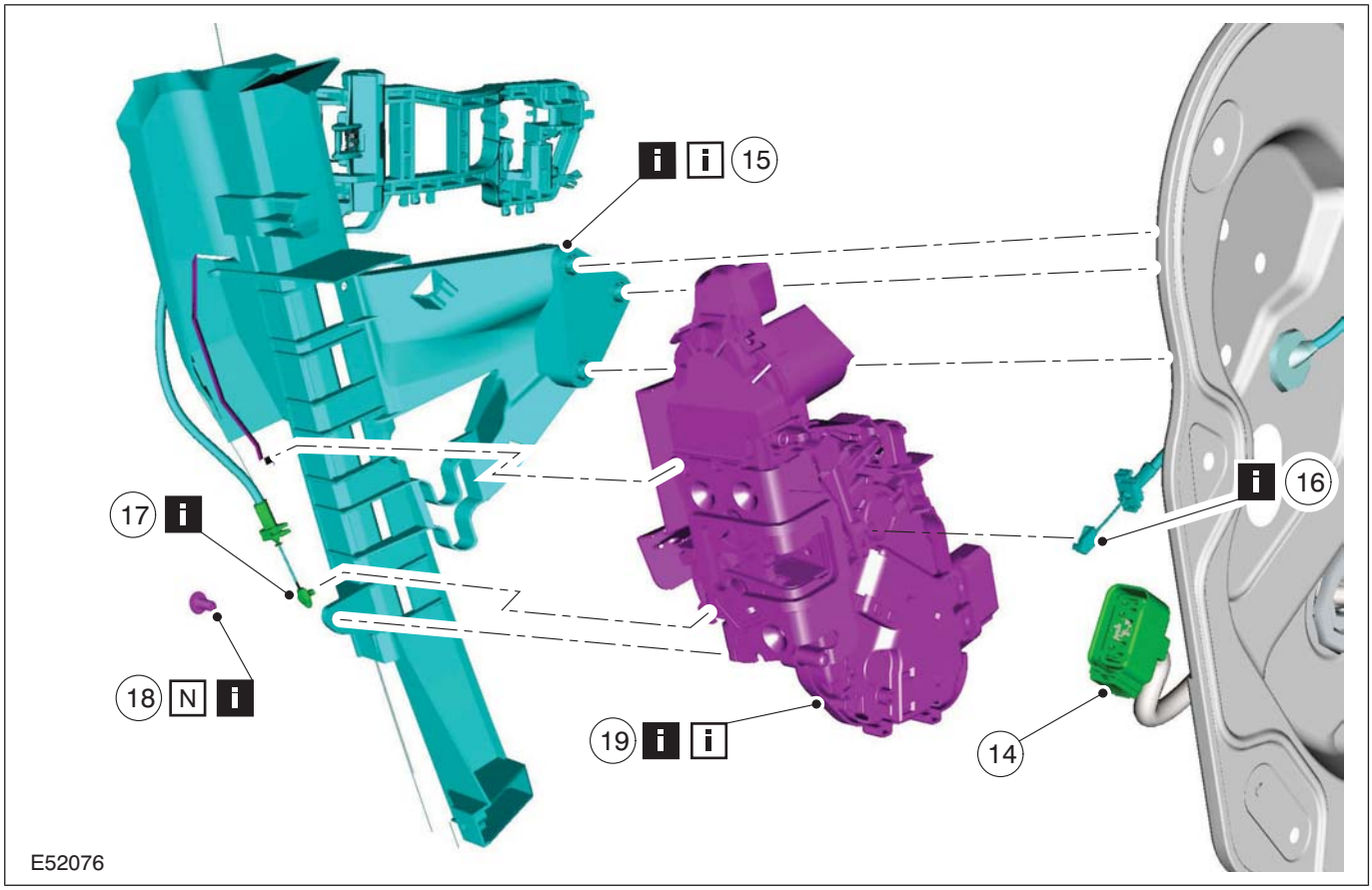
Item	Description
	See Installation Detail
6	Door See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screws
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Exterior front door latch electrical connector
15	Front door handle, lock and latch retaining bracket See Removal Detail See Installation Detail
16	Front door latch remote control cable See Removal Detail
17	Exterior front door handle remote control cable See Removal Detail

Item	Description
18	Front door latch retaining bracket retaining rivet See Removal Detail
19	Front door latch See Removal Detail See Installation Detail

13. **To install, reverse the removal procedure.**
14. **Vehicles with global closing, initialize the door window motors.**

    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

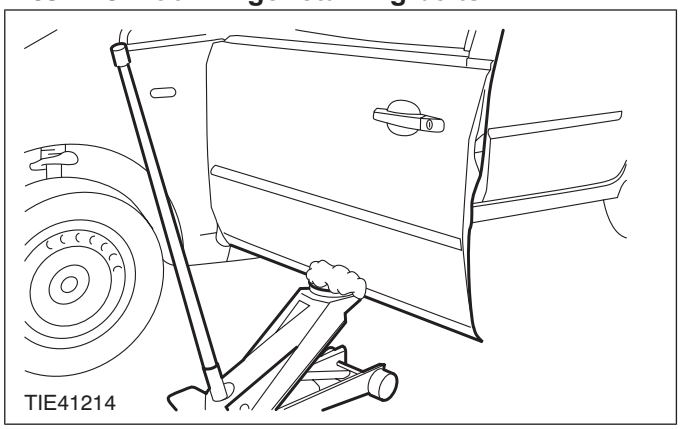
Removal Details

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

REMOVAL AND INSTALLATION

Item 5 Door hinge retaining bolts

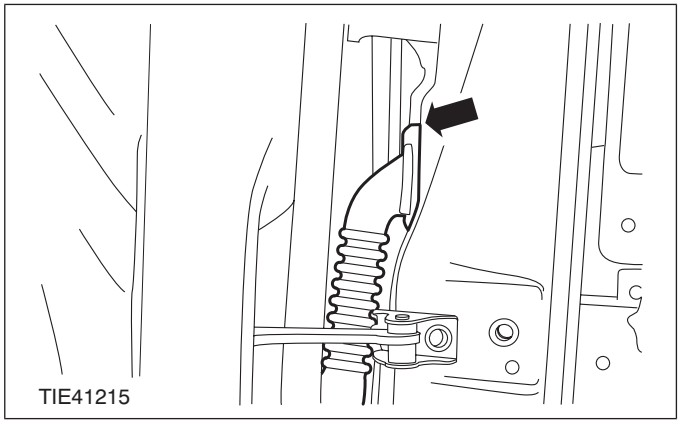


1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

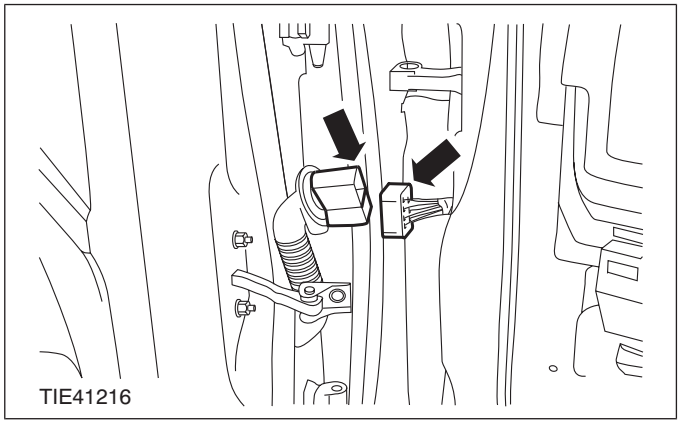
   With the aid of another technician and a suitable trolley jack, support and detach the front door from the front door hinges.

Item 6 Door

1. **Detach the front door wiring harness from the A-pillar.**



2. **Disconnect the front door wiring harness electrical connector.**

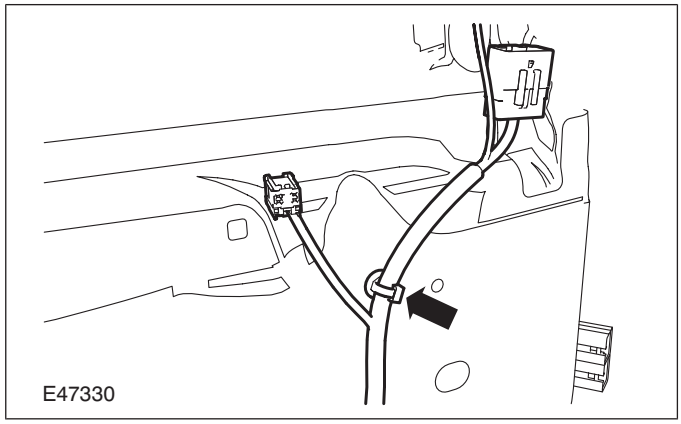


3. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

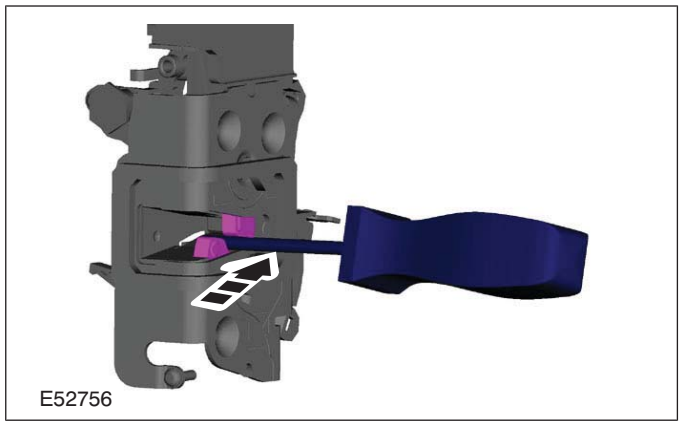
Item 9 Front door wiring harness retaining clip

1. **Detach the front door wiring harness retaining clip from the front door.**



Item 10 Front door latch remote control cable

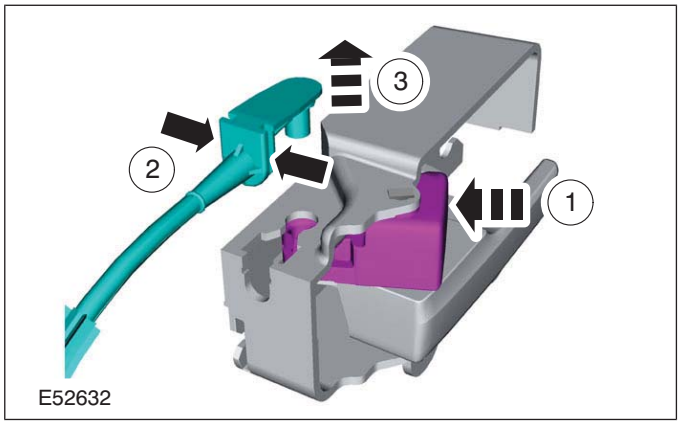
1. **Using a suitable screwdriver, latch the front door lock into the closed position.**



2. **Detach the front door latch remote control cable from the front door latch remote control handle.**
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.

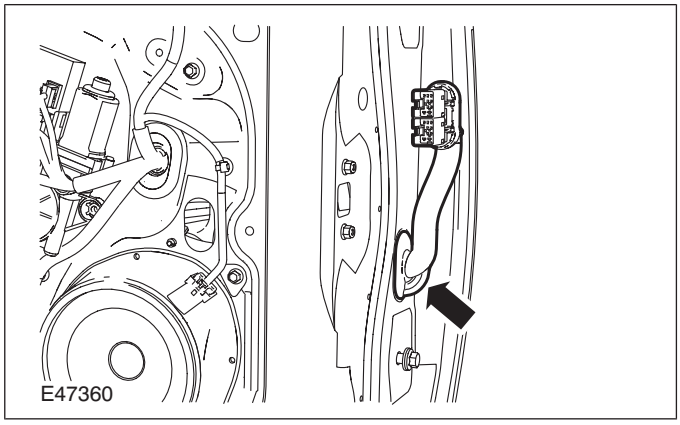
REMOVAL AND INSTALLATION

3. Detach the inner remote control cable from the remote control handle lock lever.



Item 11 Front door wiring harness

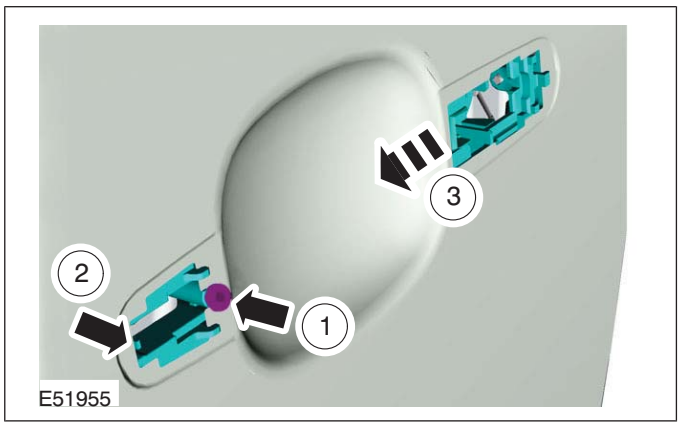
1. Detach and push the front door wiring harness into the front door.



Item 12 Door lock actuator retaining screw

1. Detach the front door lock actuator.

1. Loosen the door lock actuator retaining screw.
2. Release the door lock actuator retaining clip.
3. Slide the door lock actuator towards the front of the vehicle.

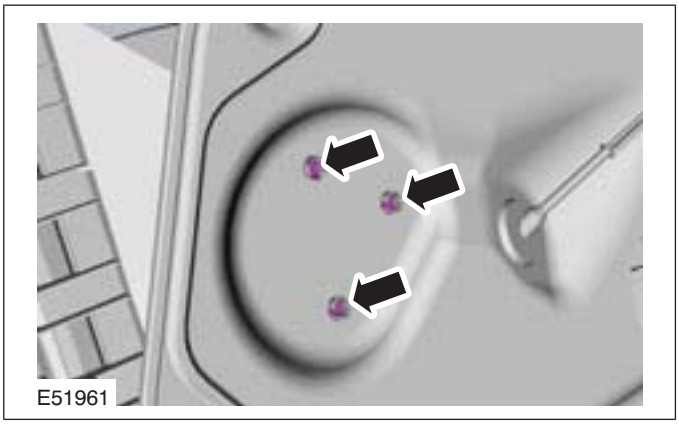


Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

Item 15 Front door handle, lock and latch retaining bracket

1. Press in the centers of the front door handle, lock and latch retaining bracket retaining clip locking pins.



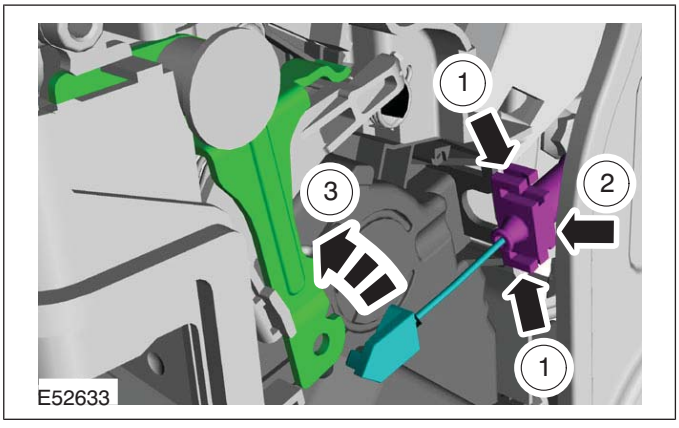
Item 16 Front door latch remote control cable

1. NOTE: Do not kink the front door latch remote control cable.

NOTE: In order to remove the front door latch remote control cable from the front door latch lever the cable must be rotated.

Disconnect the front door latch remote control cable from the front door latch.

1. Using a suitable screwdriver, release the front door latch remote control cable locking tangs from the front door latch.
2. Detach the front door latch remote control outer cable from the front door latch.
3. Rotate the front door latch remote control cable.



REMOVAL AND INSTALLATION

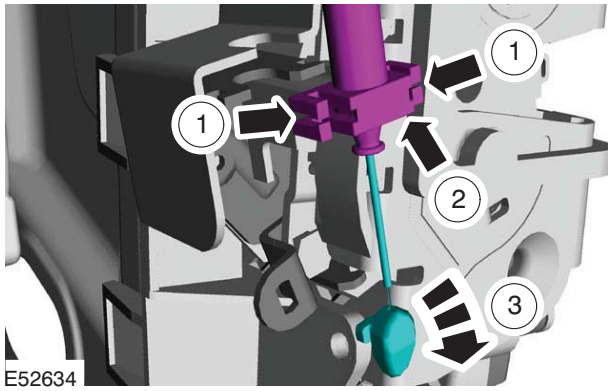
Item 17 Exterior front door handle remote control cable

1. **NOTE: Do not kink the exterior front door handle remote control cable.**

NOTE: In order to remove the exterior front door handle remote control cable from the front door latch lever the cable must be rotated.

Disconnect the exterior front door handle remote control cable from the front door latch.

1. Using a suitable screwdriver, release the exterior front door handle remote control outer cable locking tangs from the front door latch.
2. Detach the exterior front door handle remote control cable from the front door latch.
3. Rotate the exterior front door handle remote control cable.

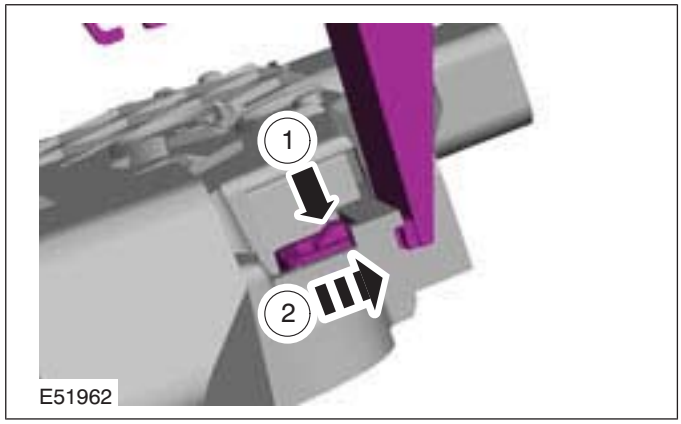


Item 18 Front door latch retaining bracket retaining rivet

1. **Using a suitable hand drill remove and discard the door latch retaining bracket retaining rivet.**

Item 19 Front door latch

1. **Detach the front door lock actuator from the front door handle, lock and latch retaining bracket.**
   1. Press the front door handle, lock and latch retaining bracket release clip.
   2. Slide the front door handle, lock and latch retaining bracket out of the front door latch.



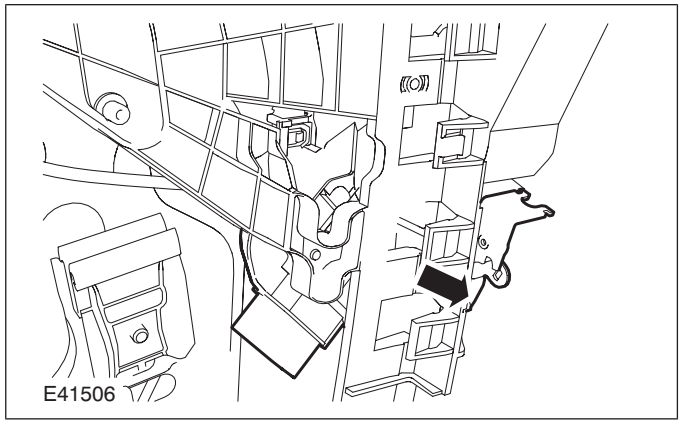
2. **Detach the door lock cylinder actuator rod from the front door latch.**

Installation Details

Item 19 Front door latch

1. **Connect the door lock cylinder actuator rod to the front door latch.**
2. **Install the front door latch.**

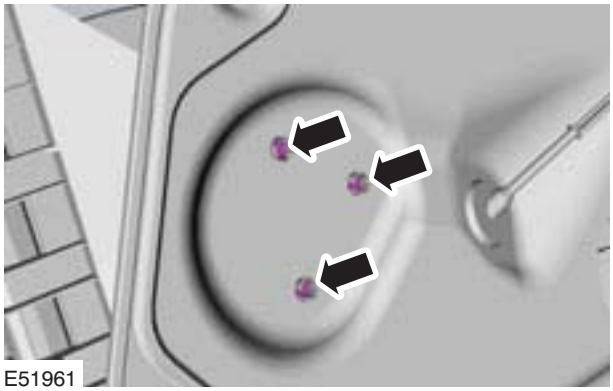
- Using a suitable Rivet gun install a new front door latch rivet.



REMOVAL AND INSTALLATION

Item 15 Front door handle, lock and latch retaining bracket

1. Install the front door handle, lock and latch retaining bracket to the door inner panel.
2. From the back of the front door handle, lock and latch retaining bracket press in the retaining clip locking pins.


E51961

Item 13 Front door inner panel

1. Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.

Item 12 Door lock actuator retaining screw

1. Install the front door lock actuator to the front door.
2. Tighten the front door lock actuator retaining screw.

Item 5 Door hinge retaining bolts

1. Apply a coating of adhesive to the door hinge retaining bolts.

REMOVAL AND INSTALLATION

Front Door Latch — 4-Door/5-Door/Wagon, Vehicles With: Keyless Vehicle System

General Equipment

Electric hand drill
Rivet gun

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. **Remove the front door trim panel.**

   For additional information, refer to: Front Door Trim Panel - 4-Door/5-Door/Wagon (501-05 Interior Trim and Ornamentation, Removal and Installation).

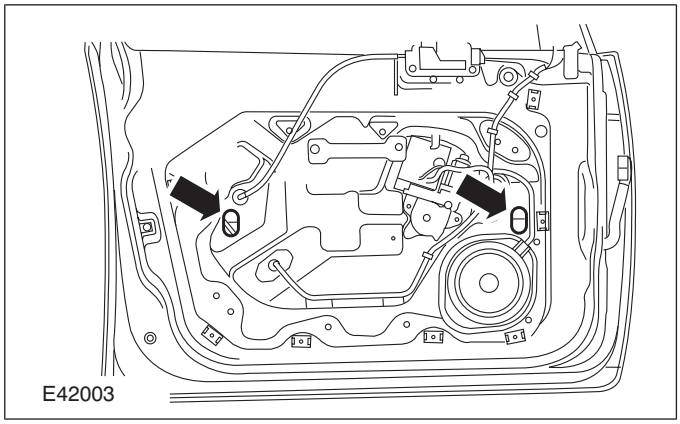
2. **Remove the exterior front door handle.**

   For additional information, refer to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. **Connect the battery ground cable.**

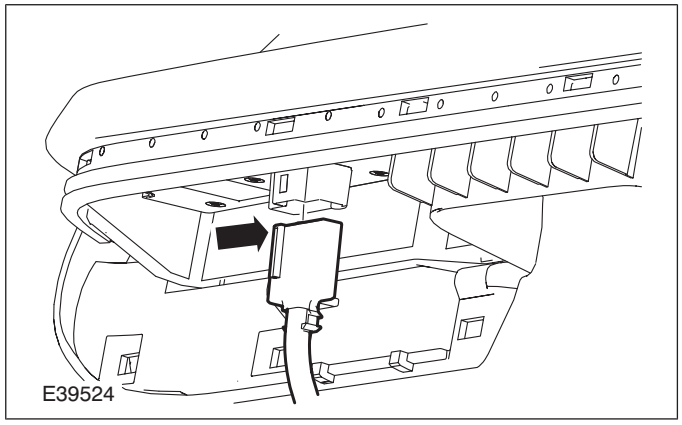
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. **Remove the front door window regulator grommets.**

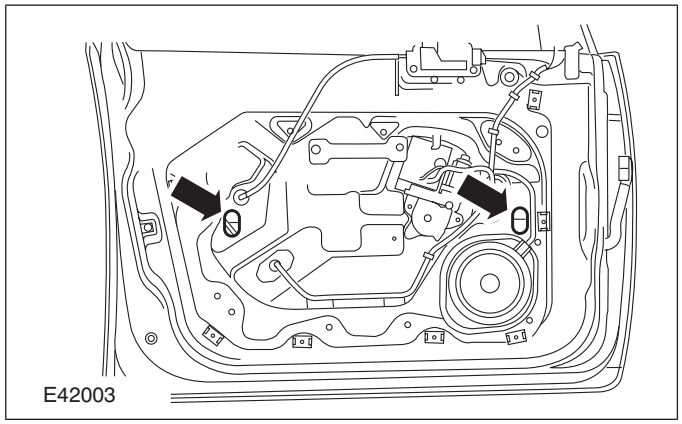


5. **NOTE: Support the front door power window control unit.**

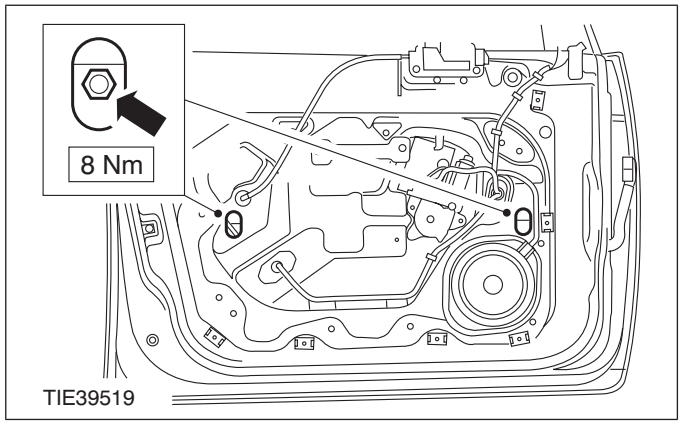
Connect the front door power window control switch electrical connector.



6. **Using the front door power window control switch, align the window glass clamp retaining bolts with the access holes.**



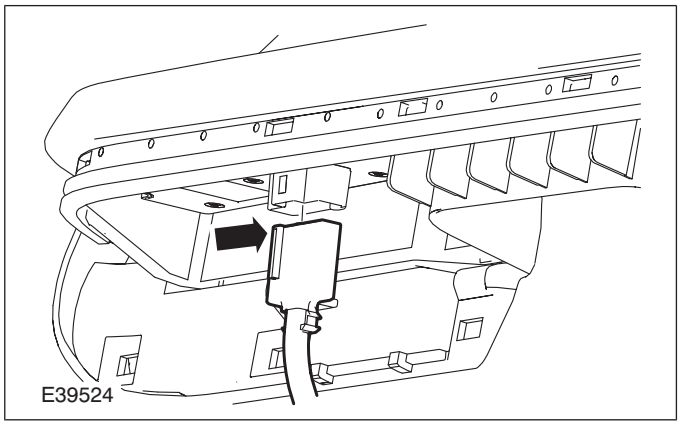
7. **Loosen the front door window glass clamp retaining bolts.**



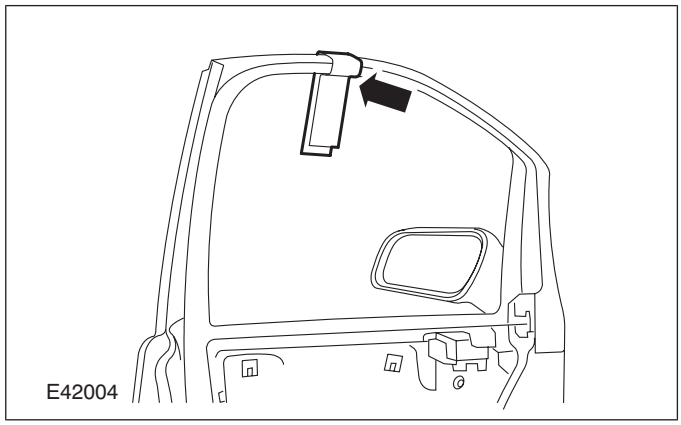
8. **Raise the front door window glass.**

REMOVAL AND INSTALLATION

9. Disconnect the front door power window control switch electrical connector.



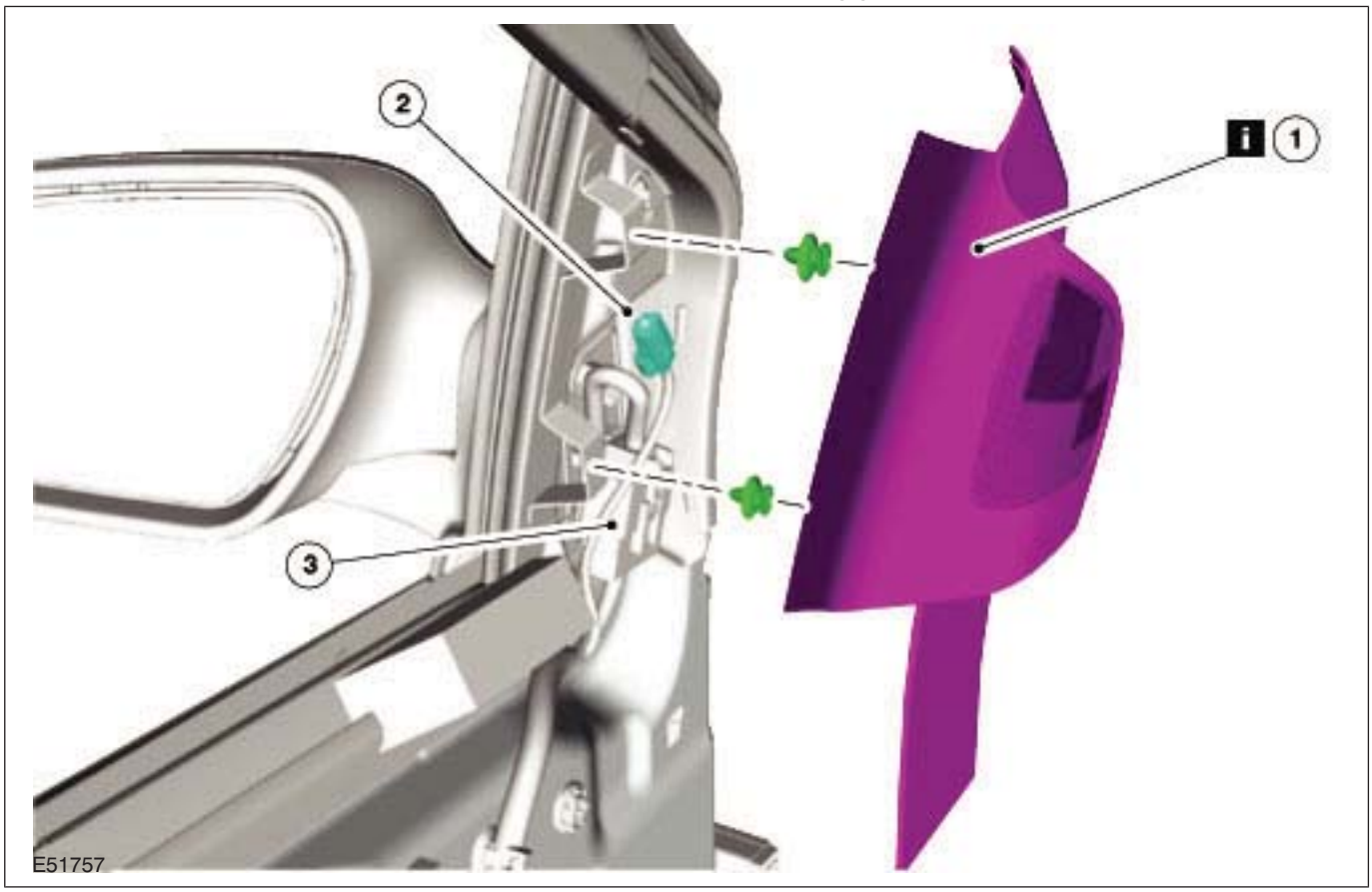
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

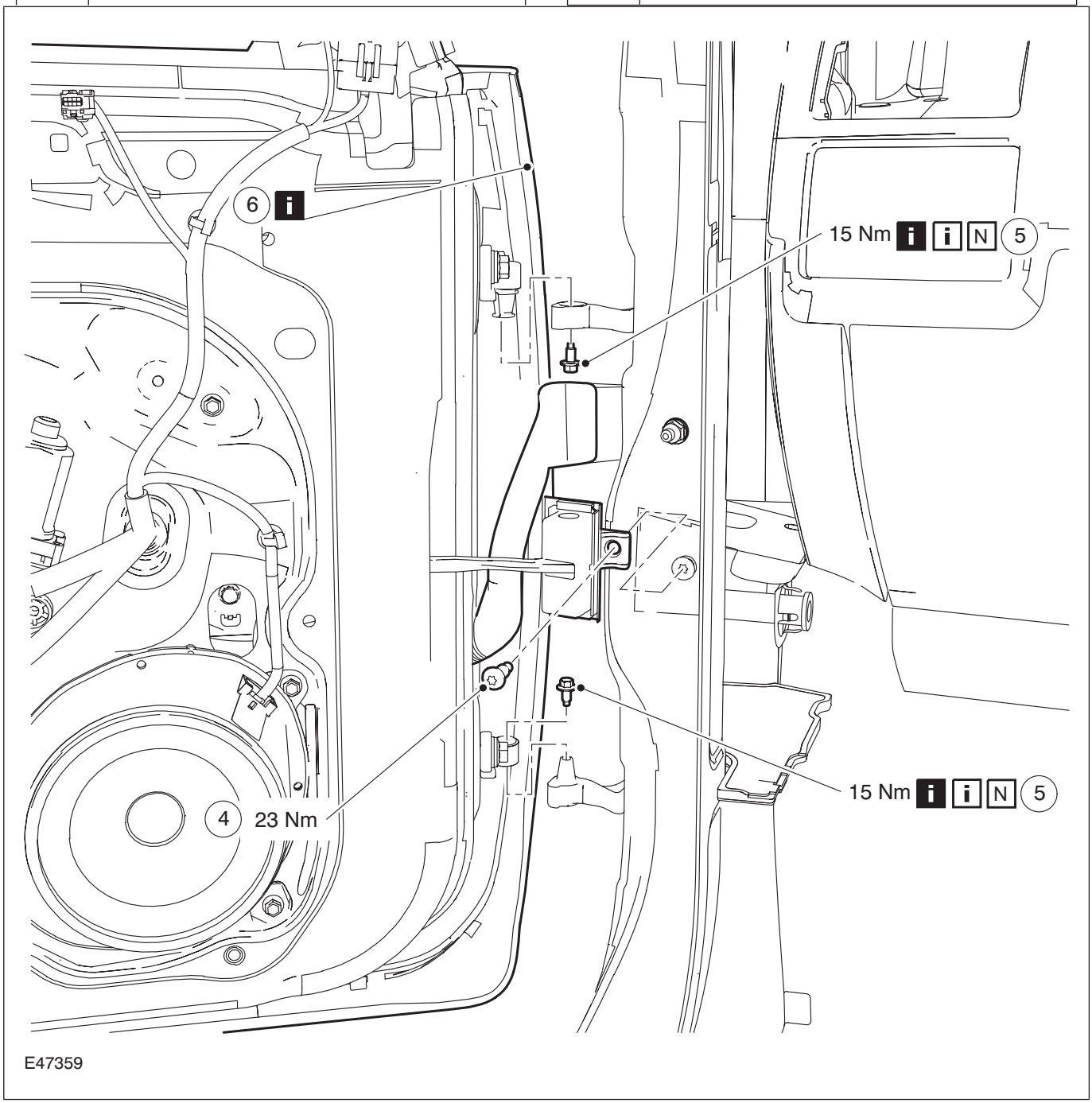
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

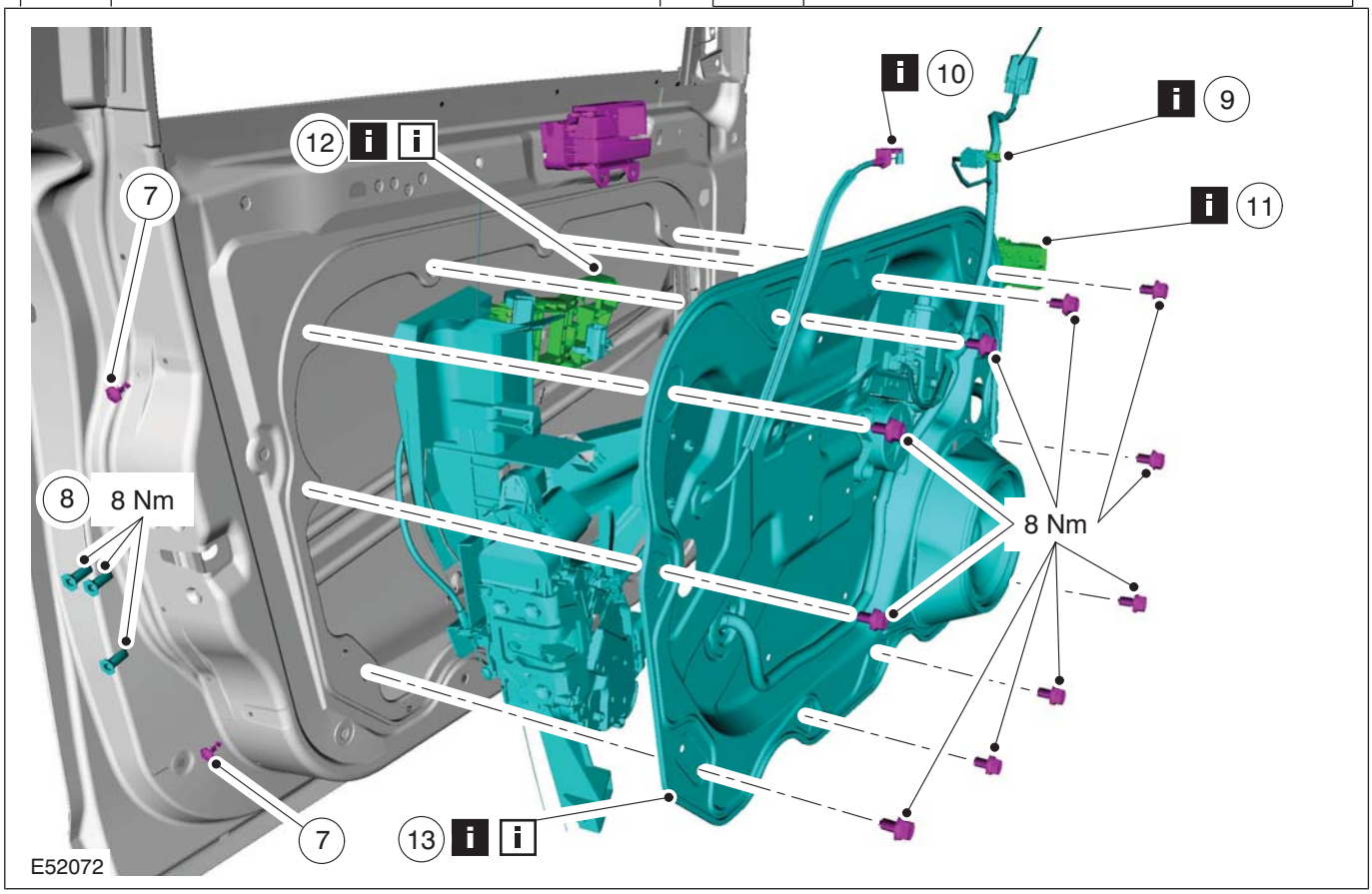
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap retaining bolt
5	Door hinge retaining bolts See Removal Detail

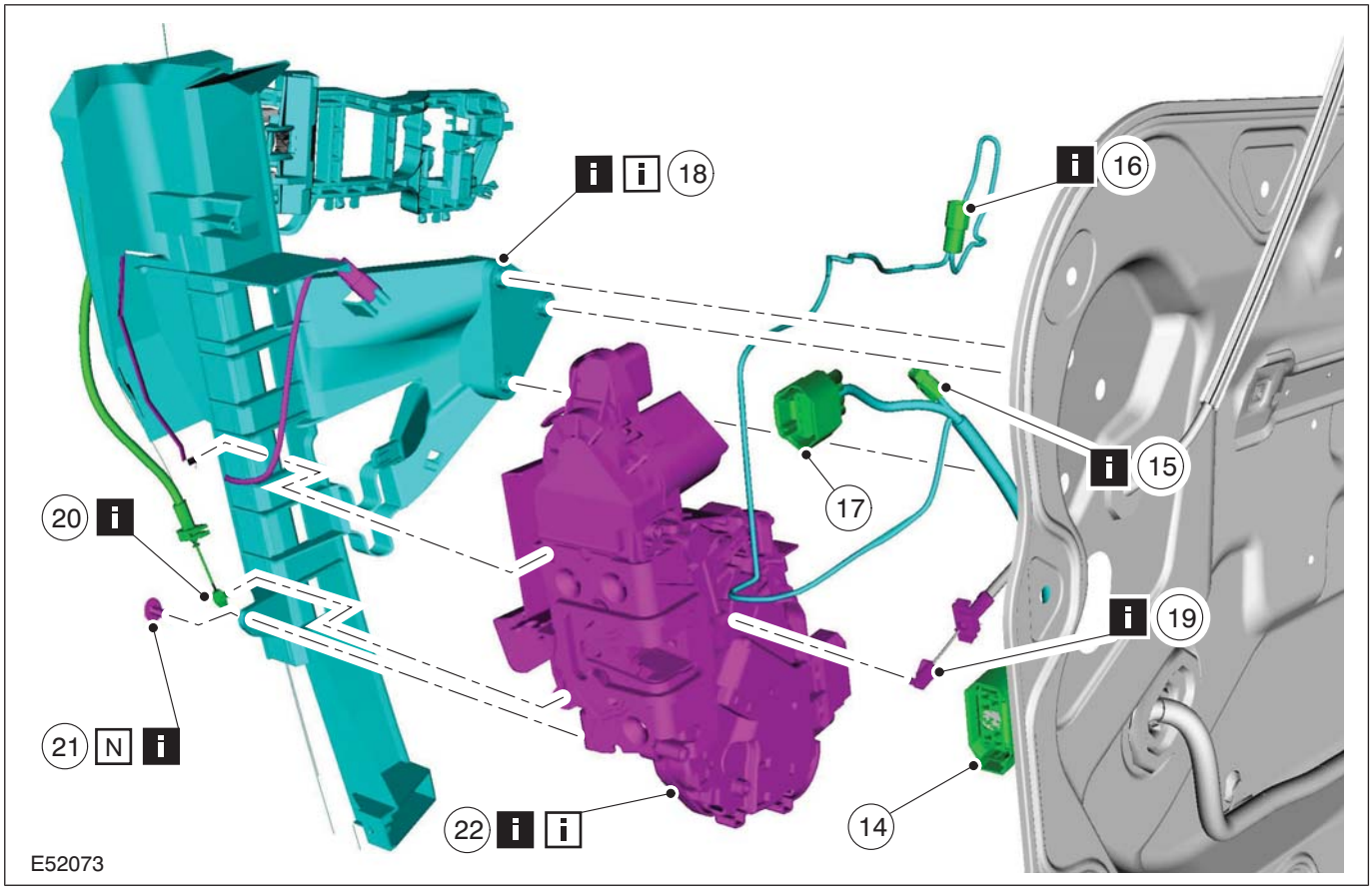
Item	Description
	See Installation Detail
6	Door (left-hand door shown) See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screws
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Front door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Front door latch electrical connector
15	Front door lock cylinder position sensor electrical connector See Removal Detail
16	Exterior front door handle RKE electrical connector See Removal Detail
17	Front door latch RKE electrical connector
18	Front door handle, lock and latch retaining bracket See Removal Detail See Installation Detail
19	Front door latch remote control cable See Removal Detail

Item	Description
20	Front exterior door handle remote control cable See Removal Detail
21	Front door latch retaining bracket retaining rivet See Removal Detail
22	Front door latch See Removal Detail See Installation Detail

13. **To install, reverse the removal procedure.**
14. **Vehicles with global closing, initialize the door window motors.**

    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

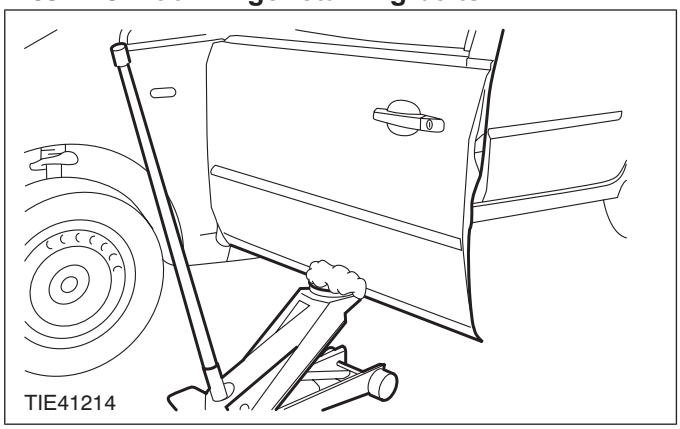
Removal Details

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

REMOVAL AND INSTALLATION

Item 5 Door hinge retaining bolts

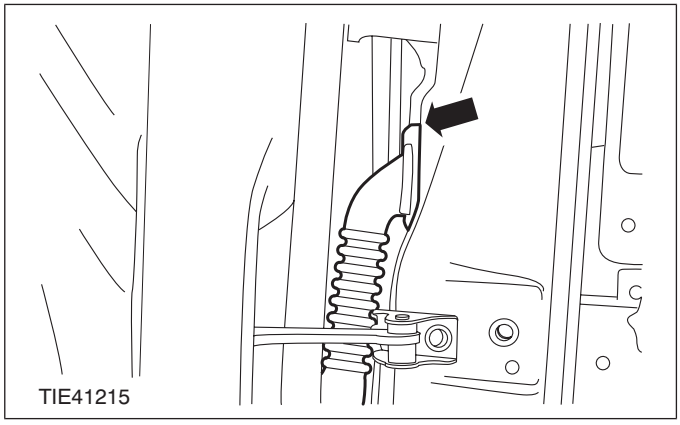


1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

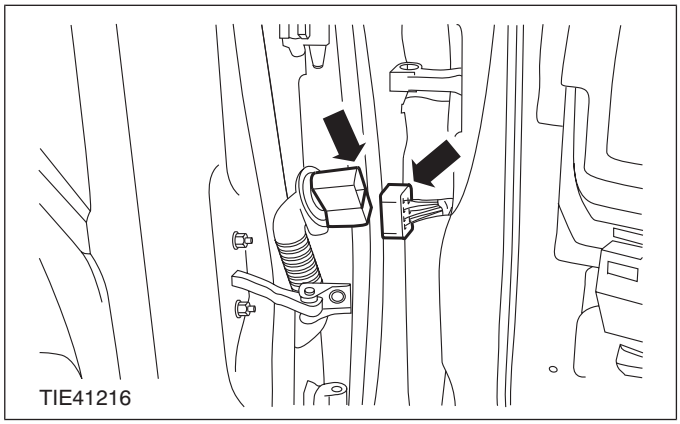
   With the aid of another technician and a suitable trolly jack, support and detach the front door from the front door hinges.

Item 6 Door (left-hand door shown)

1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**
   - Disconnect the electrical connector.

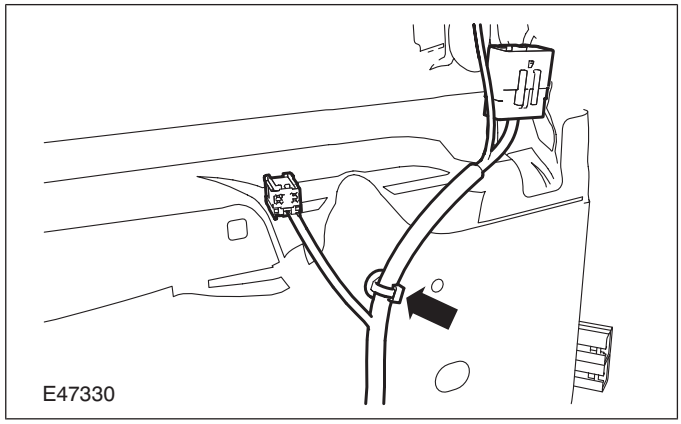


3. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

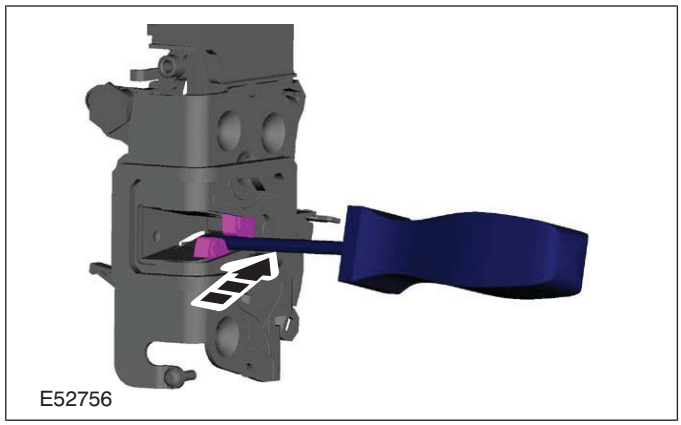
Item 9 Front door wiring harness retaining clip

1. **Detach the front door wiring harness retaining clip from the front door.**



Item 10 Front door latch remote control cable

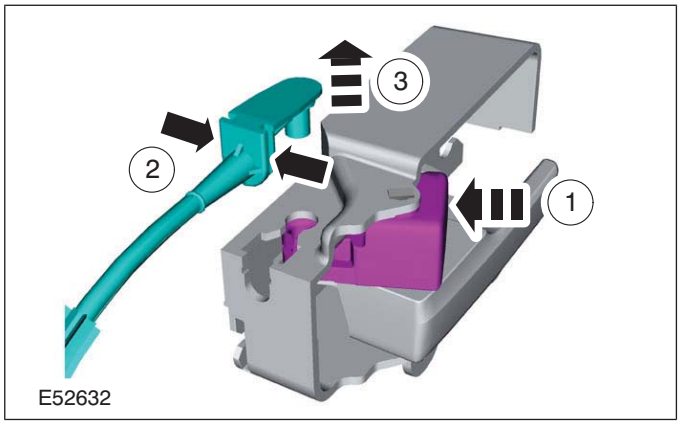
1. **Using a suitable screwdriver, latch the front door lock into the closed position.**



2. **Detach the front door latch remote control cable from the front door latch remote control handle.**
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.

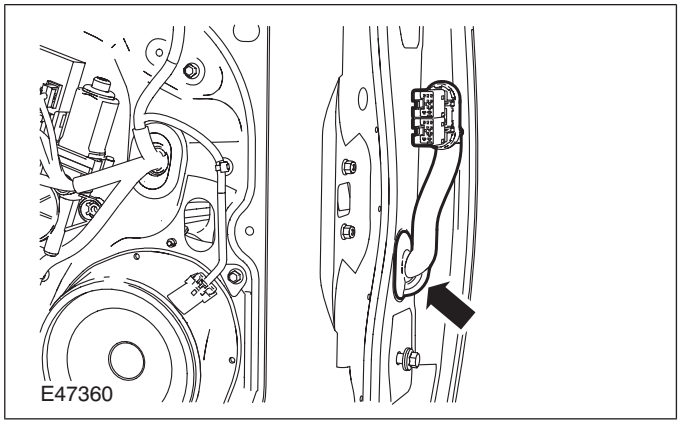
REMOVAL AND INSTALLATION

3. Detach the inner remote control cable from the remote control handle lock lever.



Item 11 Front door wiring harness

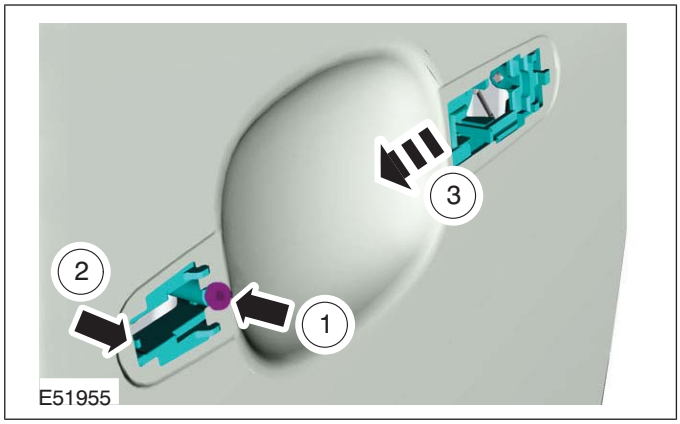
1. Detach and push the front door wiring harness into the front door.



Item 12 Front door lock actuator retaining screw

1. Detach the front door lock actuator.

1. Loosen the front door lock actuator retaining screw.
2. Release the front door lock actuator retaining clip.
3. Slide the front door lock actuator towards the front of the vehicle.

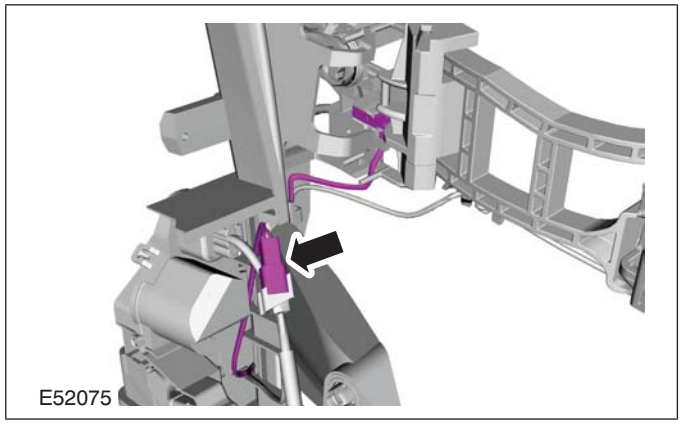


Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

Item 15 Front door lock cylinder position sensor electrical connector

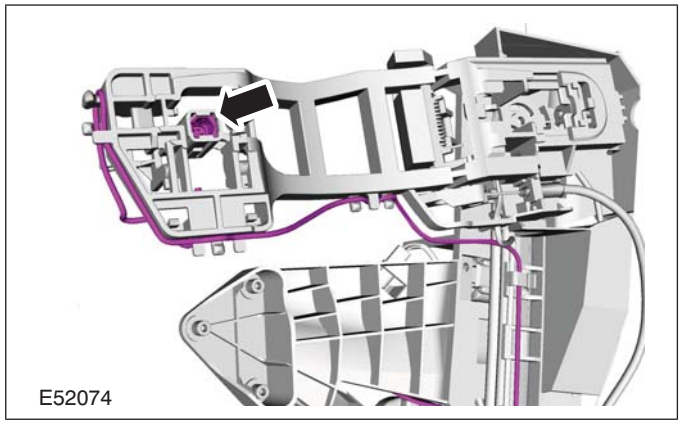
1. Disconnect the front door lock cylinder position sensor electrical connector.



Item 16 Exterior front door handle RKE electrical connector

NOTE: Make a note of the clipping position of the exterior front door handle RKE harness.

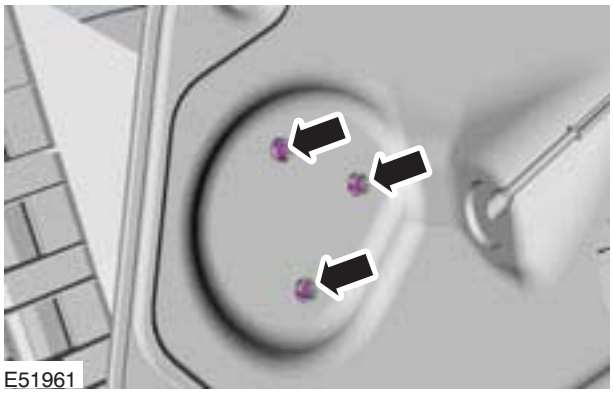
1. Detach the exterior front door handle RKE electrical connector and harness from the front door handle reinforcement.



REMOVAL AND INSTALLATION

Item 18 Front door handle, lock and latch retaining bracket

1. **Press in the centers of the front door handle, lock and latch retaining bracket retaining clip locking pins.**


E51961

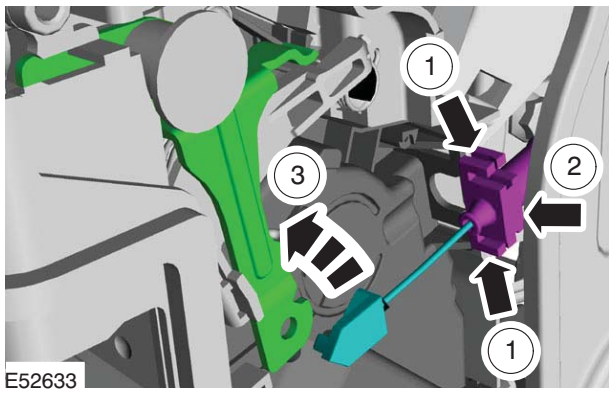
Item 19 Front door latch remote control cable

1. **NOTE: Do not kink the front door latch remote control cable.**

NOTE: In order to remove the front door latch remote control cable from the front door latch lever the cable must be rotated.

Disconnect the front door latch remote control cable from the front door latch.

1. Using a suitable screwdriver, release the front door latch remote control cable locking tangs from the front door latch.
2. Detach the front door latch remote control outer cable from the front door latch.
3. Rotate the front door latch remote control cable.



E52633

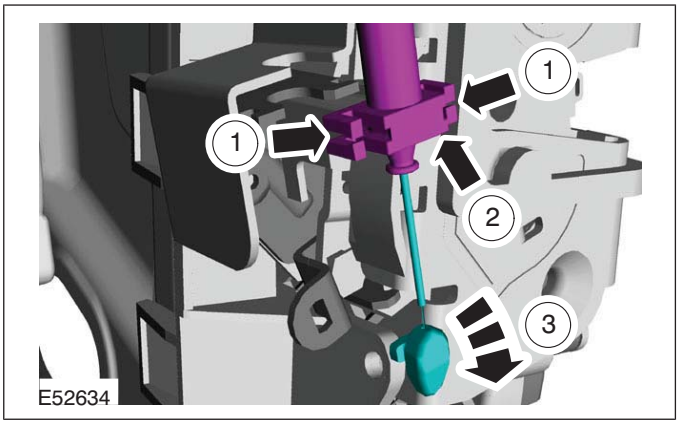
Item 20 Front exterior door handle remote control cable

1. **NOTE: Do not kink the front exterior door handle remote control cable.**

NOTE: In order to remove the front exterior door handle remote control cable from the front door latch lever the cable must be rotated.

Disconnect the front exterior door handle remote control cable from the front door latch.

1. Using a suitable screwdriver, release the front exterior door handle remote control outer cable locking tangs from the front door latch.
2. Detach the front exterior door handle remote control cable from the front door latch.
3. Rotate the front exterior door handle remote control cable.



E52634

Item 21 Front door latch retaining bracket retaining rivet

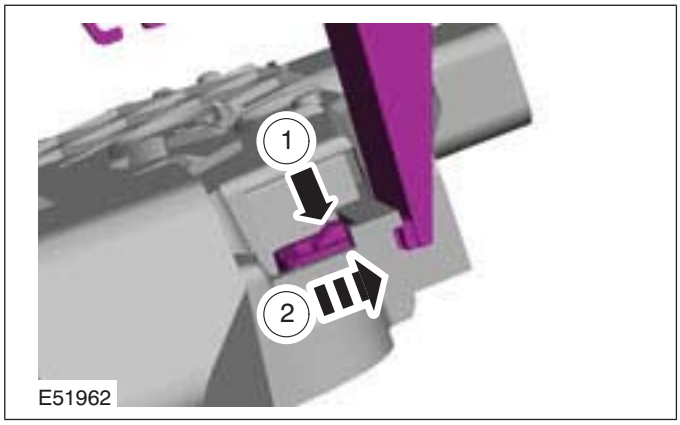
1. **Using a suitable Electric hand drill remove and discard the door latch retaining bracket retaining rivet.**

Item 22 Front door latch

1. **Detach the front door latch actuator from the front door handle, lock and latch retaining bracket.**
   1. Press the front door handle, lock and latch retaining bracket release clip.

REMOVAL AND INSTALLATION

2. Slide the front door handle, lock and latch retaining bracket out of the front door latch.



2. Detach the front door lock cylinder actuator rod from the front door latch.

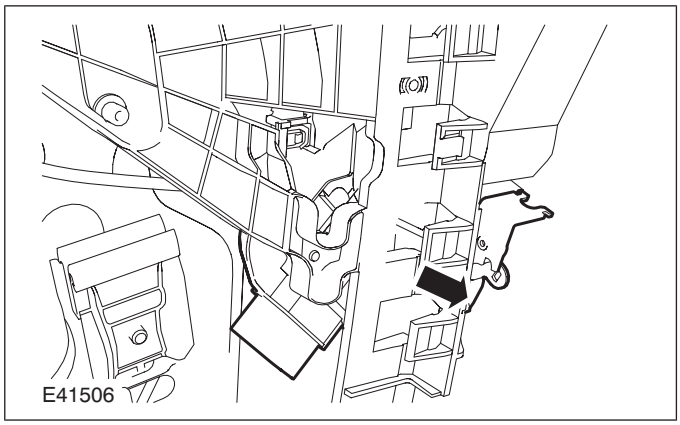
Installation Details

Item 22 Front door latch

1. Connect the front door lock cylinder actuator rod to the front door latch.

2. Install the front door latch.

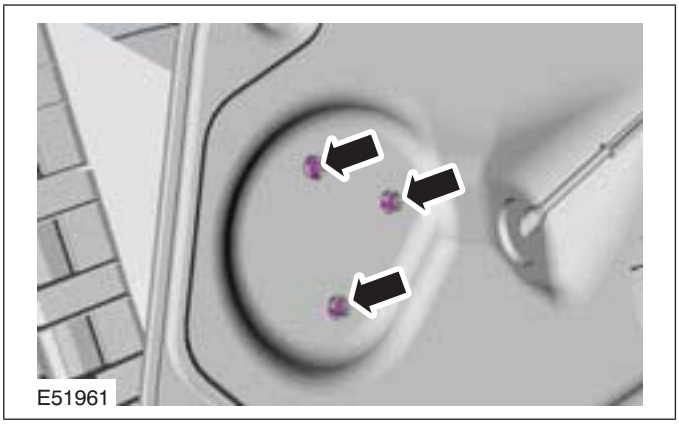
- Using a suitable Rivet gun install a new front door latch rivet.



Item 18 Front door handle, lock and latch retaining bracket

1. Install the front door handle, lock and latch retaining bracket to the door inner panel.

2. From the back of the front door handle, lock and latch retaining bracket press in the retaining clip locking pins.



Item 13 Front door inner panel

1. Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.

Item 12 Front door lock actuator retaining screw

1. Install the front door lock actuator to the front door.

2. Tighten the front door lock actuator retaining screw.

Item 5 Door hinge retaining bolts

1. Apply a coating of adhesive to the door hinge center retaining bolts.

REMOVAL AND INSTALLATION

Front Door Lock Actuator — 3-Door

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. Remove the front door trim panel.

   For additional information, refer to: Front Door Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

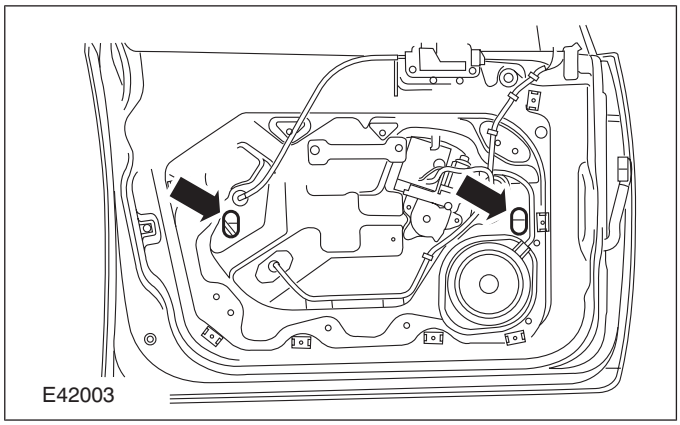
2. Remove the exterior front door handle.

   For additional information, refer to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. Connect the battery ground cable.

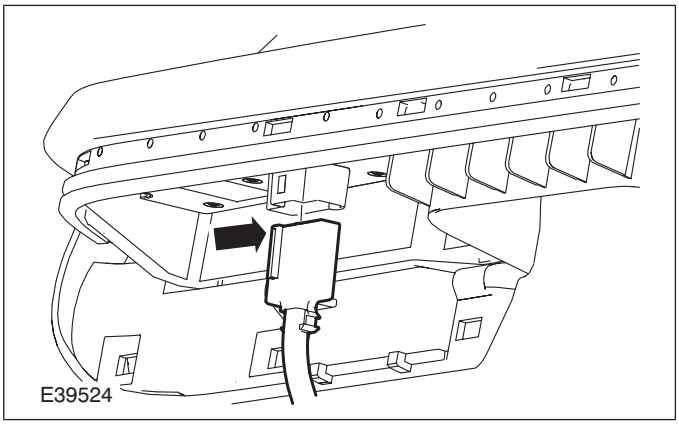
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. Remove the front door window regulator grommets.

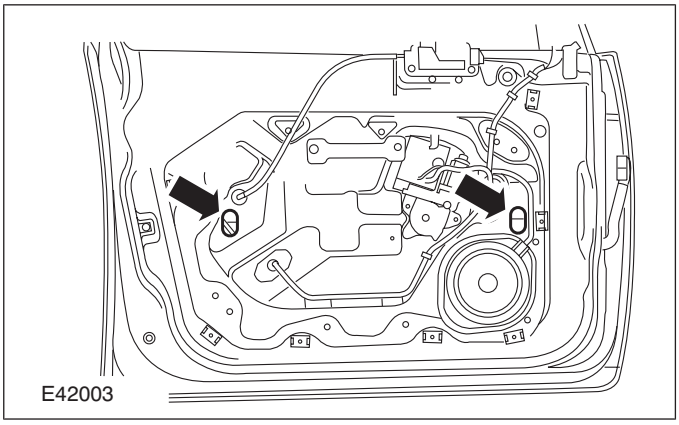


5. NOTE: Support the front door power window control unit.

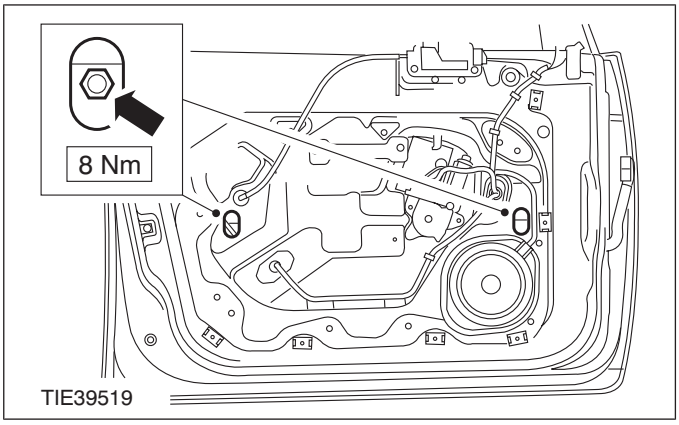
   Connect the front door power window control switch electrical connector.



6. Using the front door power window control switch, align the window glass clamp bolts with the access holes.



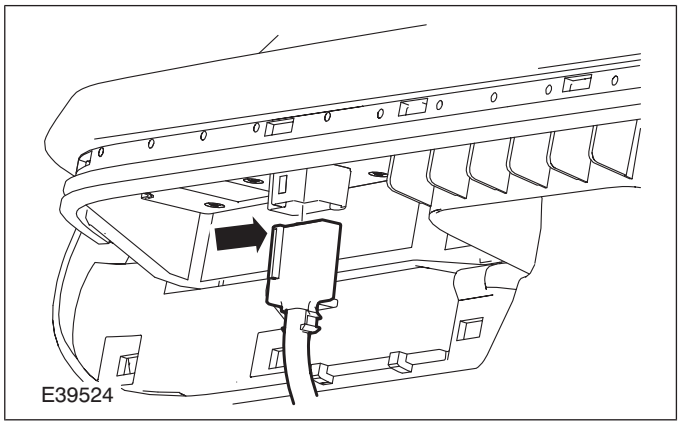
7. Loosen the front door window glass clamp retaining bolts.



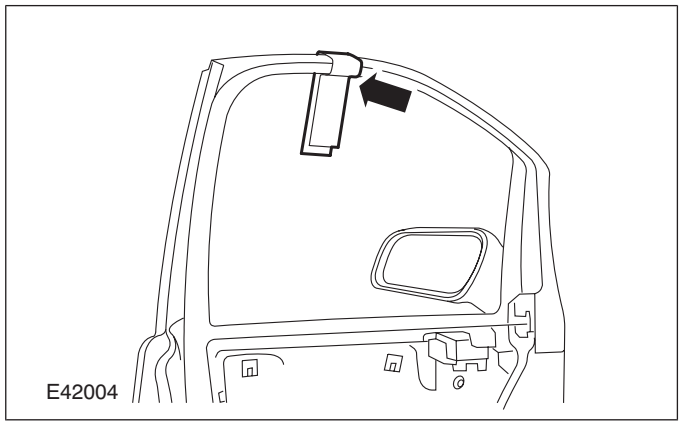
8. Raise the front door window glass.

REMOVAL AND INSTALLATION

9. Disconnect the front door power window control unit electrical connector.



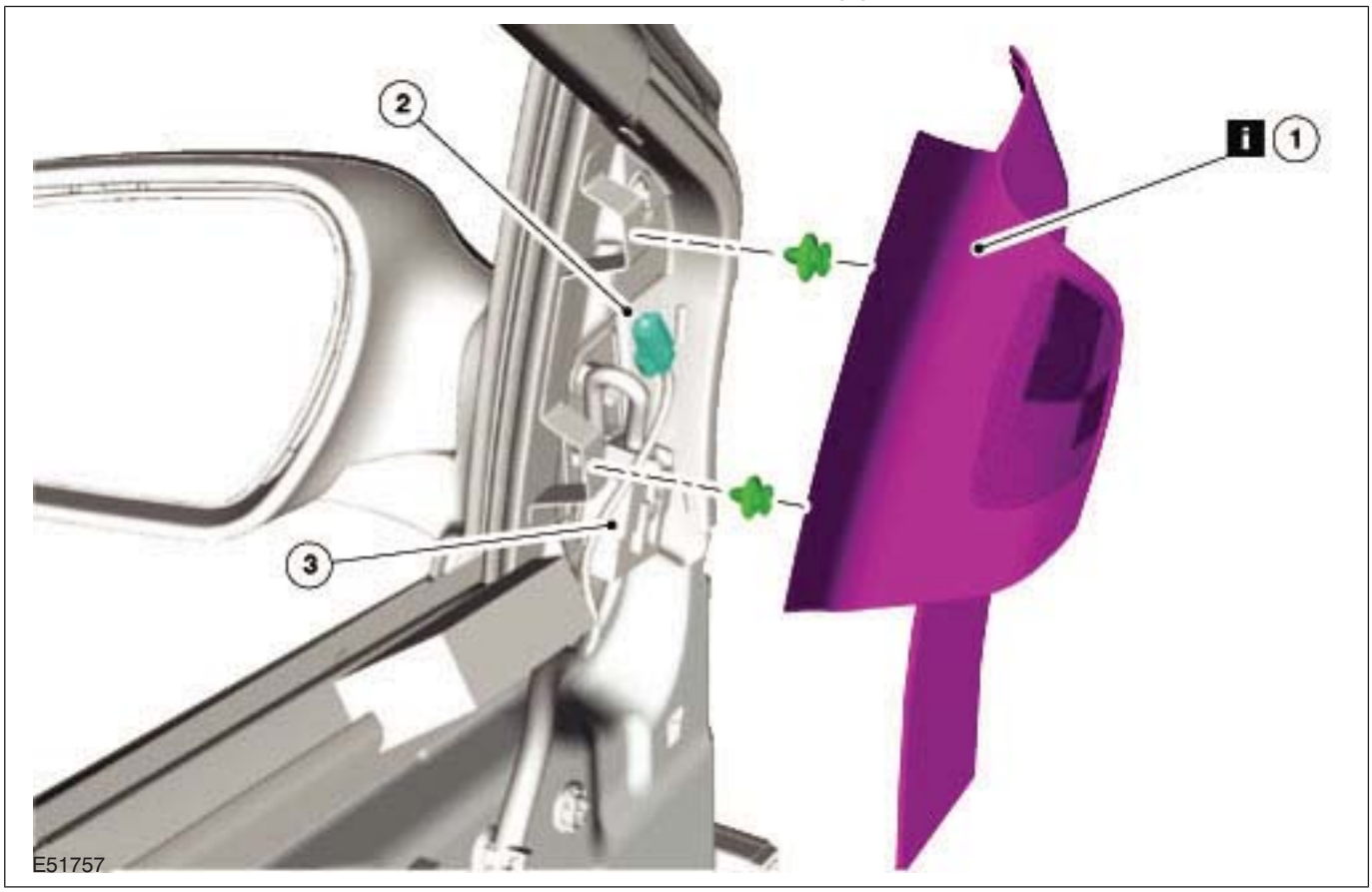
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

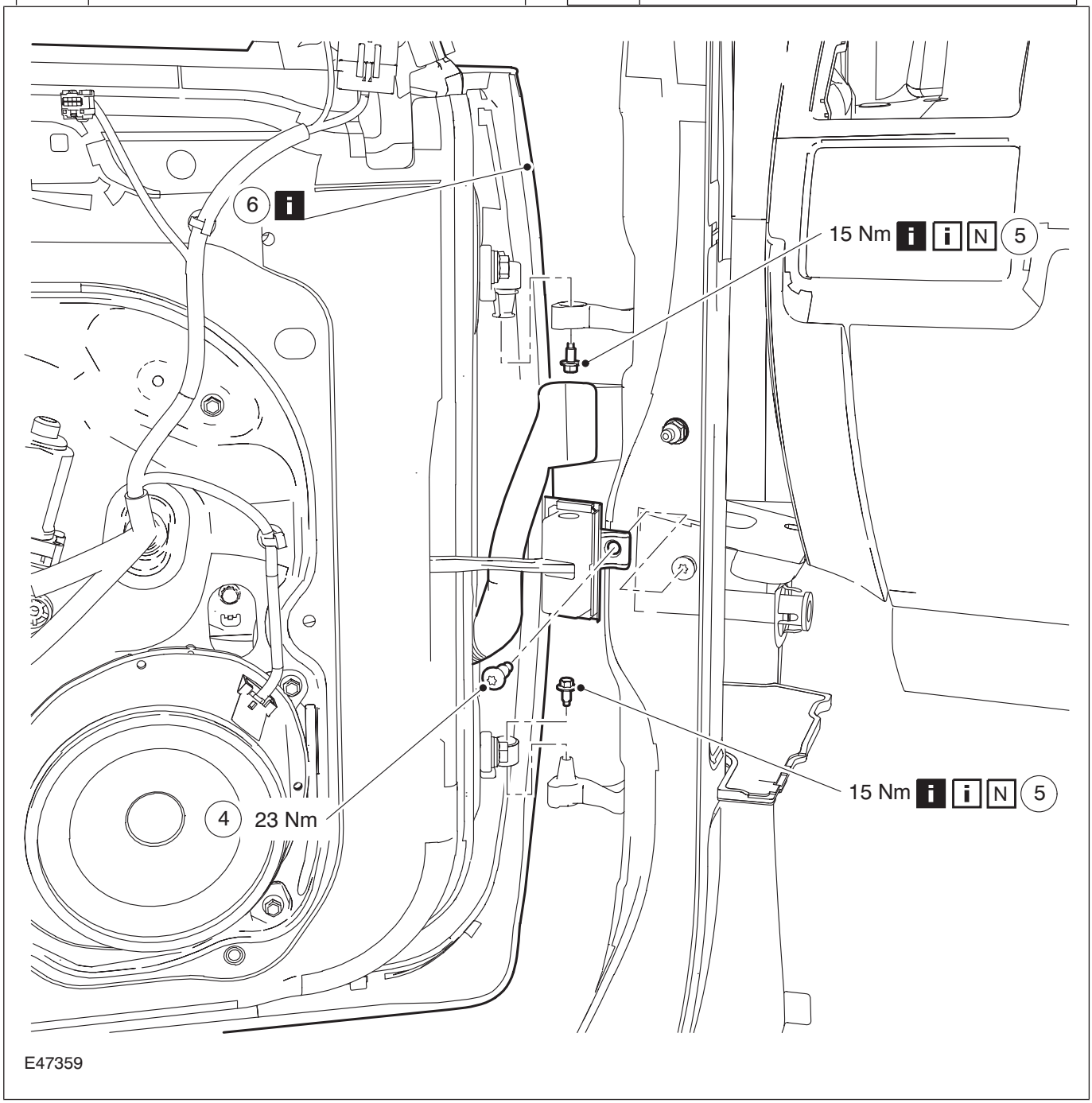
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

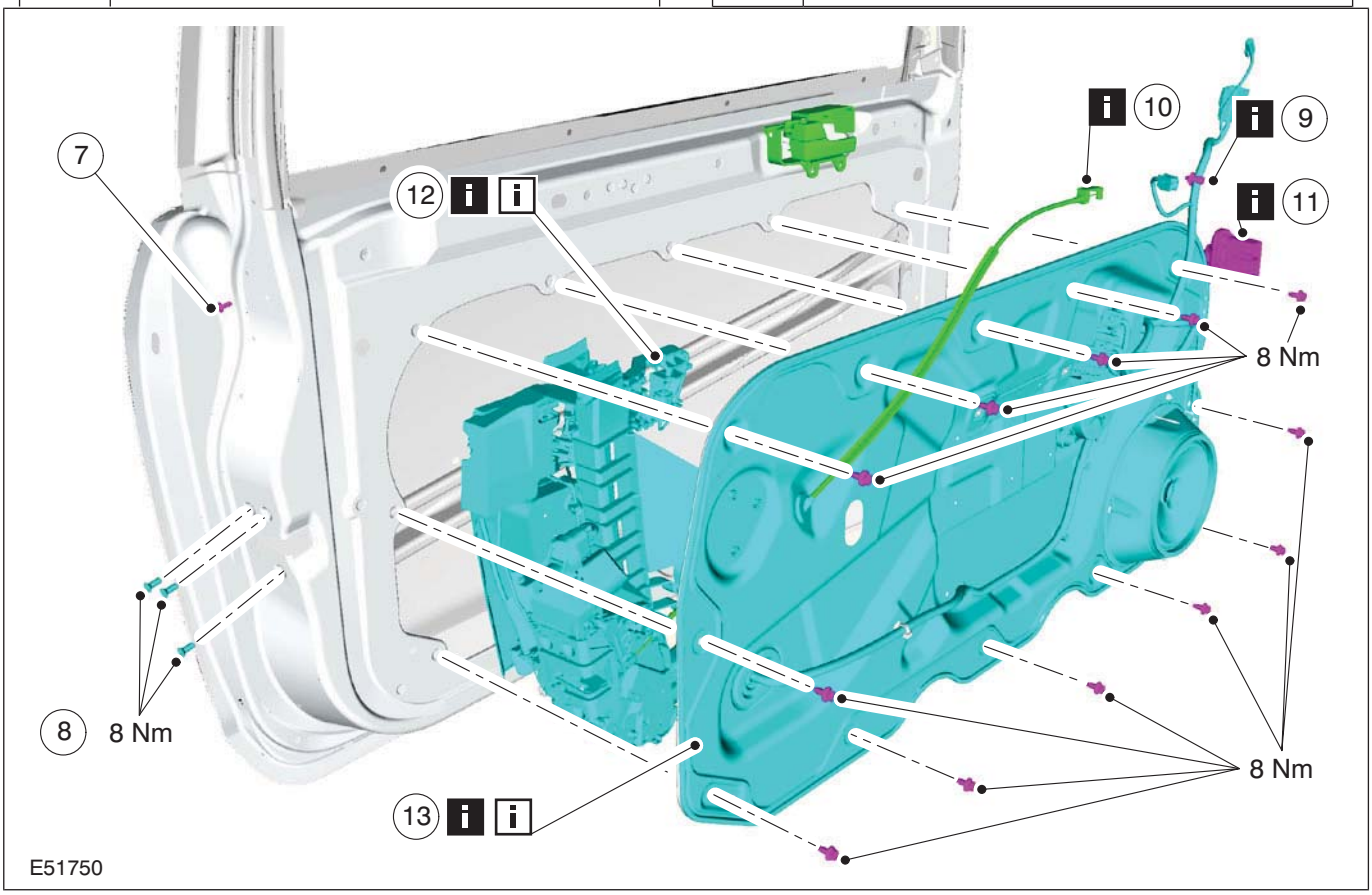
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap
5	Door hinge retaining bolts See Removal Detail

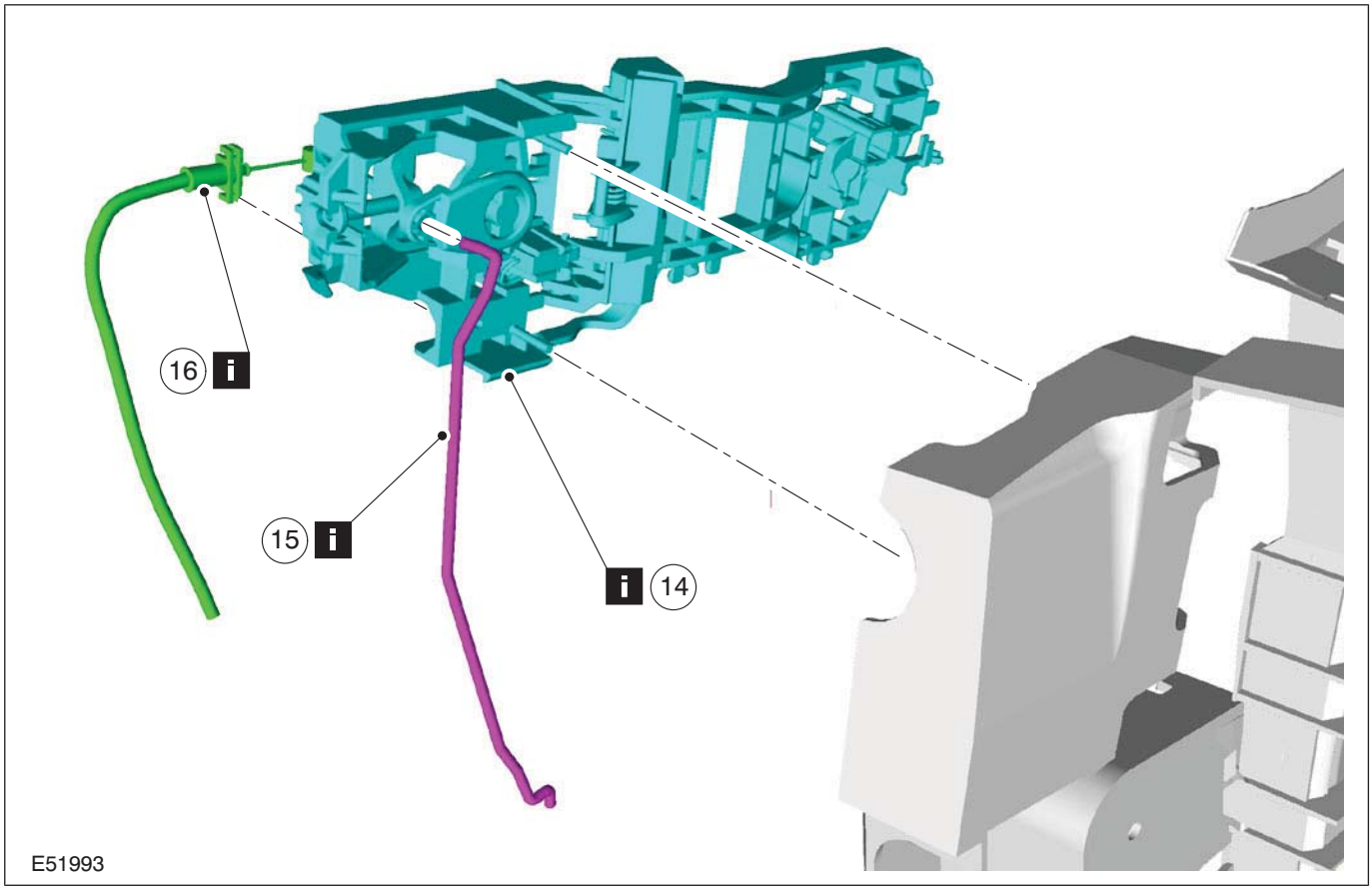
Item	Description
	See Installation Detail
6	Door (left-hand door shown) See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screw
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Front door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Front door handle reinforcement See Removal Detail
15	Front door lock cylinder actuator rod See Removal Detail
16	Front door exterior handle remote control cable See Removal Detail

13. To install, reverse the removal procedure.
14. Vehicles with global closing, initialize the door window motors.

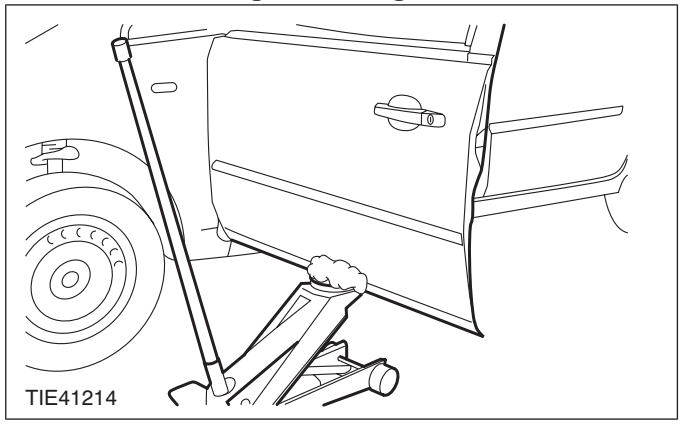
    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

Item 5 Door hinge retaining bolts



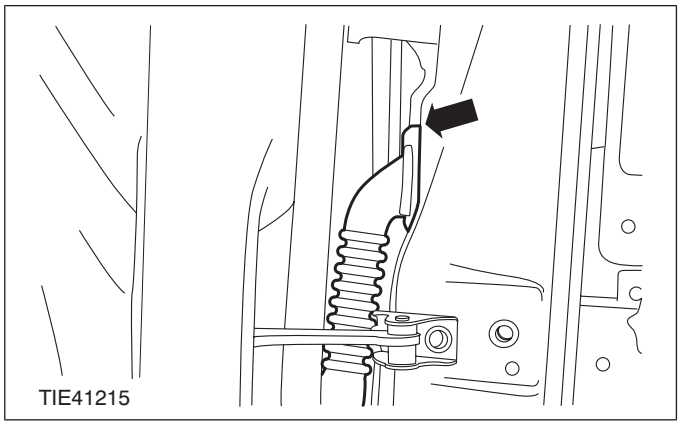
REMOVAL AND INSTALLATION

1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

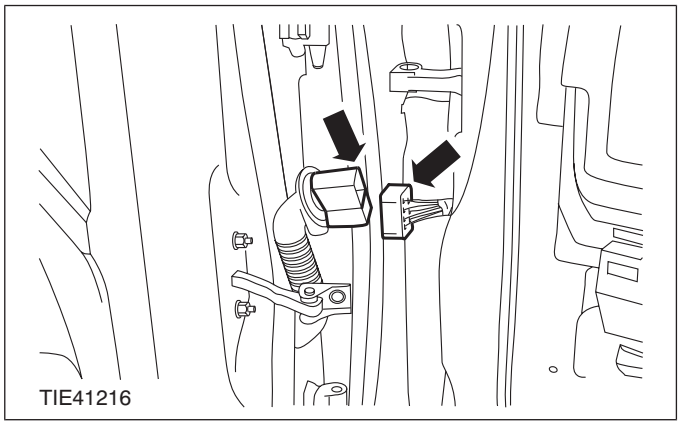
   With the aid of another technician and a suitable trolly jack, support and detach the front door from the front door hinges.

Item 6 Door (left-hand door shown)

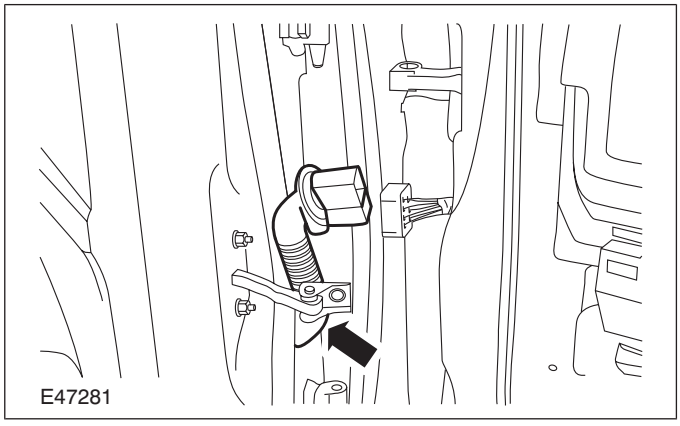
1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**
   - Disconnect the electrical connector.



3. **Push the front door wiring harness into the door.**

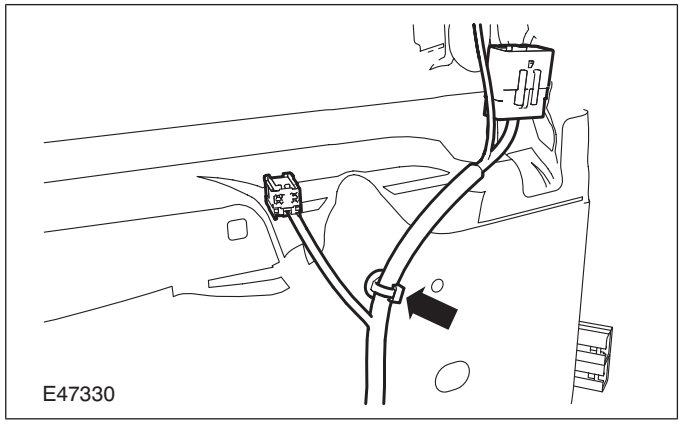


4. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

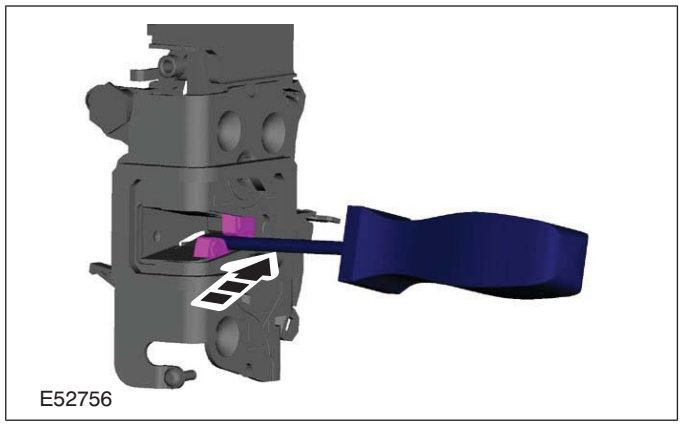
Item 9 Front door wiring harness retaining clip

1. **Detach the front door wiring harness retaining clip from the front door.**



Item 10 Front door latch remote control cable

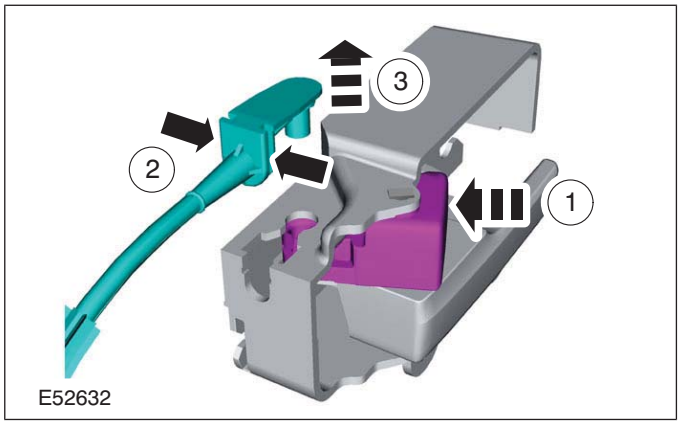
1. **Using a suitable screwdriver, latch the front door lock into the closed position.**



2. **Detach the front door latch remote control cable from the front door latch remote control handle.**
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.

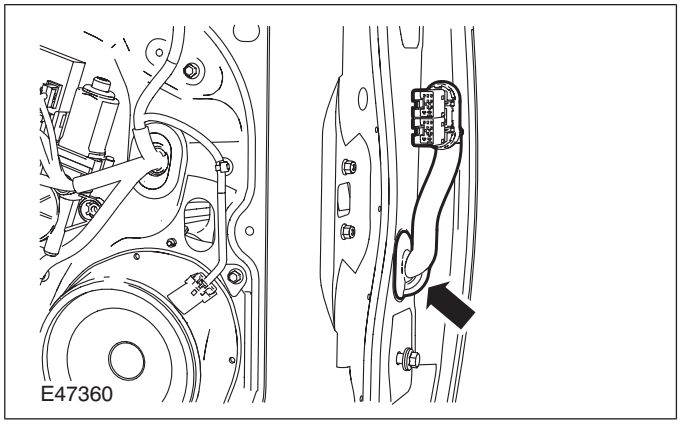
REMOVAL AND INSTALLATION

3. Detach the inner remote control cable from the remote control handle lock lever.



Item 11 Front door wiring harness

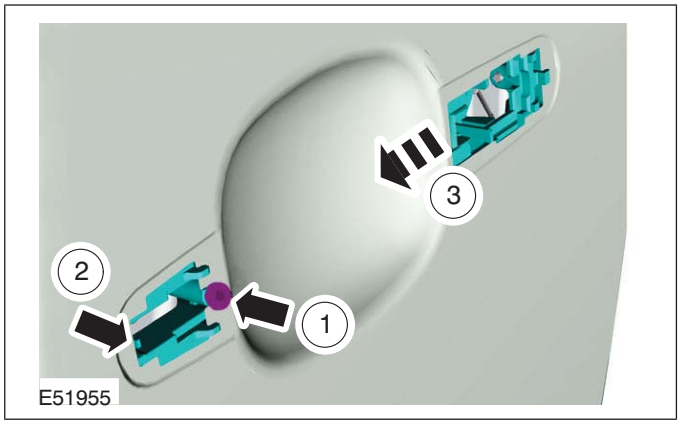
1. Detach and push the front door wiring harness into the front door.



Item 12 Front door lock actuator retaining screw

1. Detach the front door lock actuator.

1. Loosen the front door lock actuator retaining screw.
2. Release the front door lock actuator retaining clip.
3. Slide the front door lock actuator towards the front of the vehicle.

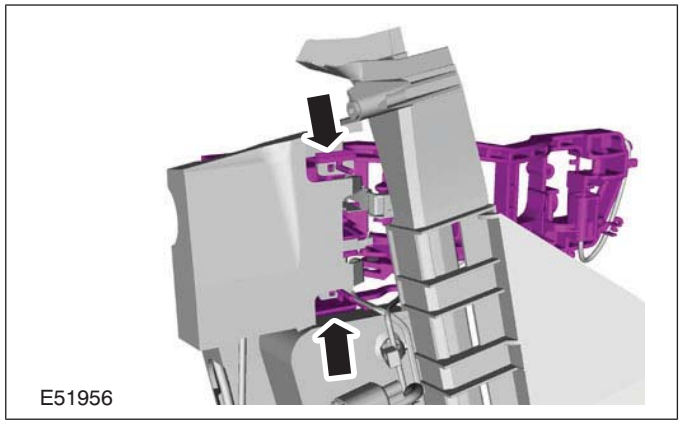


Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

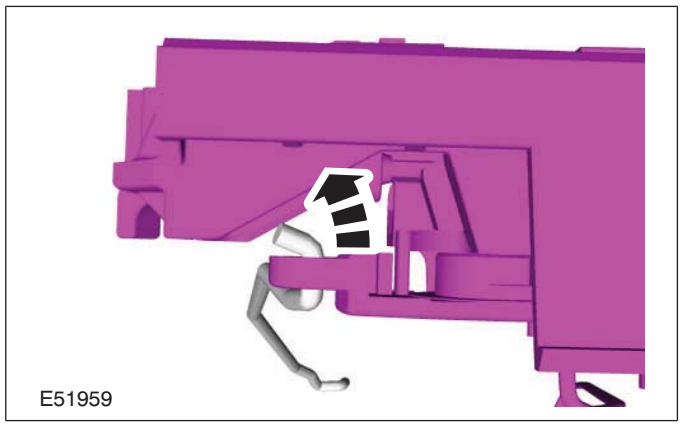
Item 14 Front door handle reinforcement

1. Detach the front door handle reinforcement from the front door handle, lock and latch retaining bracket.



Item 15 Front door lock cylinder actuator rod

1. Detach the front door lock cylinder actuator rod from the front door handle reinforcement.



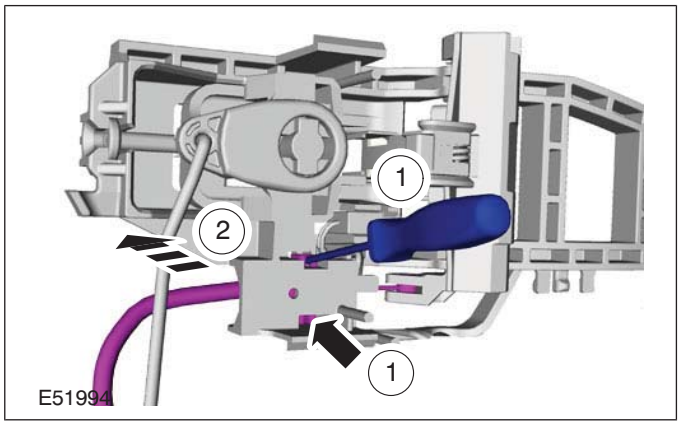
Item 16 Front door exterior handle remote control cable

1. Detach the front door exterior handle remote control cable from the front door handle reinforcement.

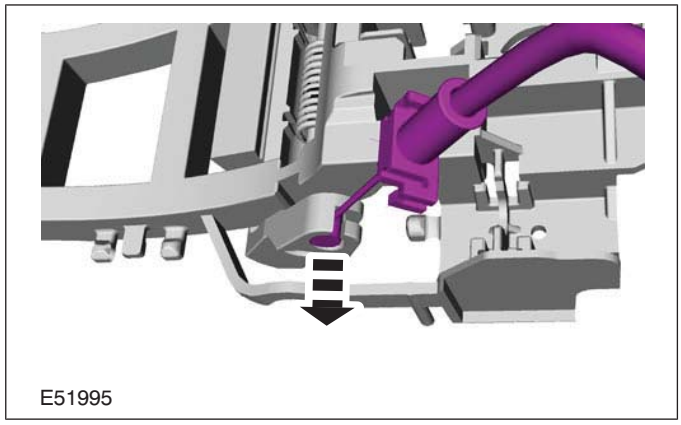
1. Using a suitable flat blade screwdriver, release the front door exterior handle remote control cable retaining clips.

REMOVAL AND INSTALLATION

2. Slide the front door exterior handle remote control cable off of the front door handle reinforcement retainers.



2. Align the front door exterior handle remote control inner cable with the slot in the front door handle reinforcement and remove.



Installation Details

Item 13 Front door inner panel

1. **Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.**

Item 12 Front door lock actuator retaining screw

1. **Install the front door lock actuator to the front door.**
2. **Tighten the front door lock actuator retaining screw.**

Item 5 Door hinge retaining bolts

1. **Apply a coating of adhesive to the door hinge retaining bolts.**

REMOVAL AND INSTALLATION

Front Door Lock Actuator — 3-Door, Vehicles With: Keyless Vehicle System

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. Remove the front door trim panel.

   For additional information, refer to: Front Door Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

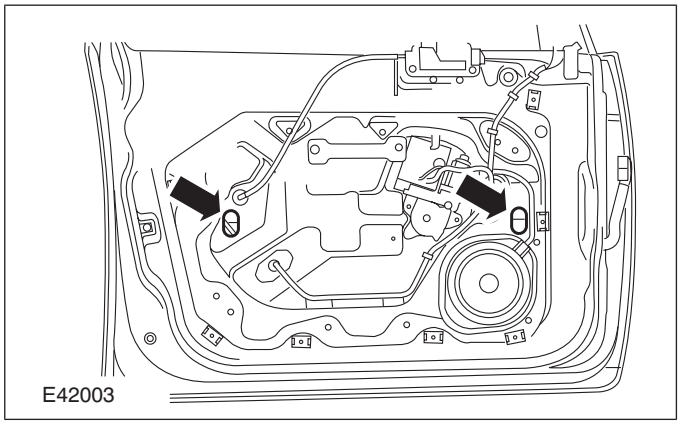
2. Remove the exterior front door handle.

   For additional information, refer to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. Connect the battery ground cable.

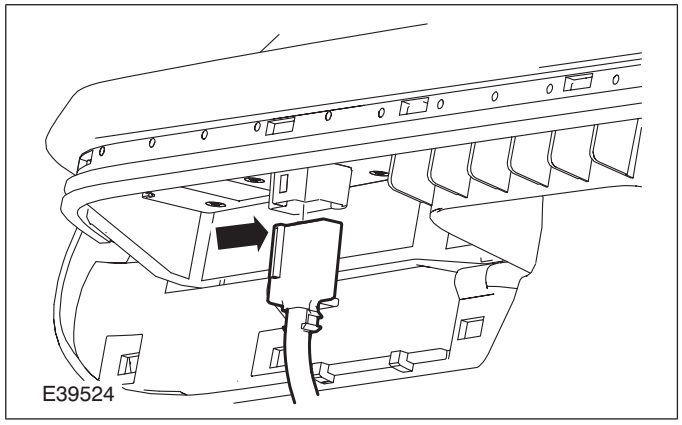
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. Remove the front door window regulator grommets.

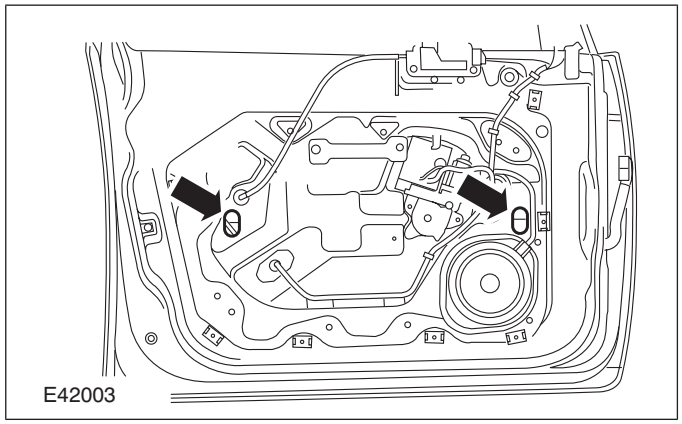


5. NOTE: Support the front door power window control unit.

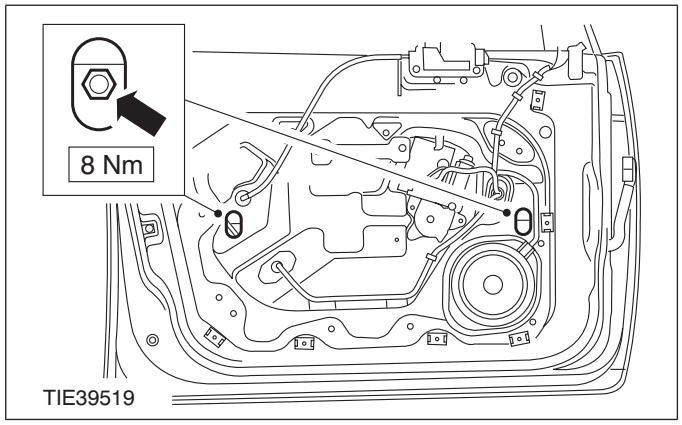
   Connect the front door power window control switch electrical connector.



6. Using the front door power window control switch, align the window glass clamp bolts with the access holes.



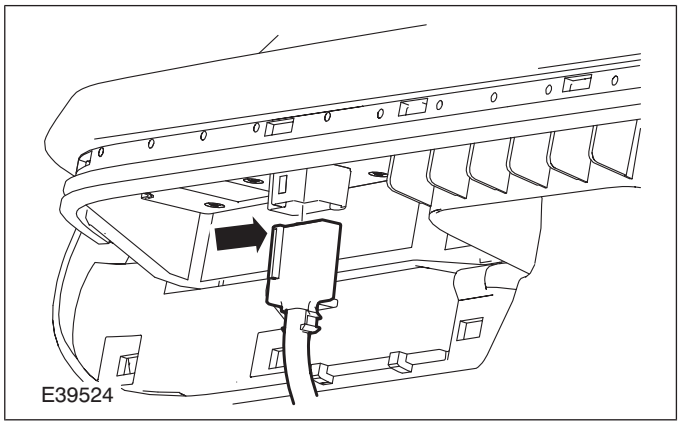
7. Loosen the front door window glass clamp retaining bolts.



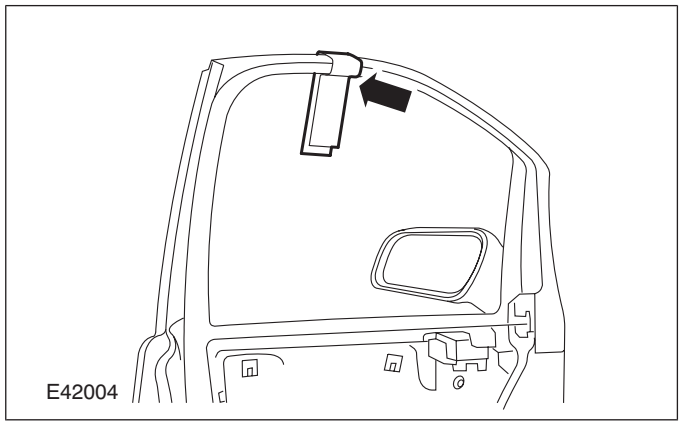
8. Raise the front door window glass.

REMOVAL AND INSTALLATION

9. Disconnect the front door power window control switch electrical connector.



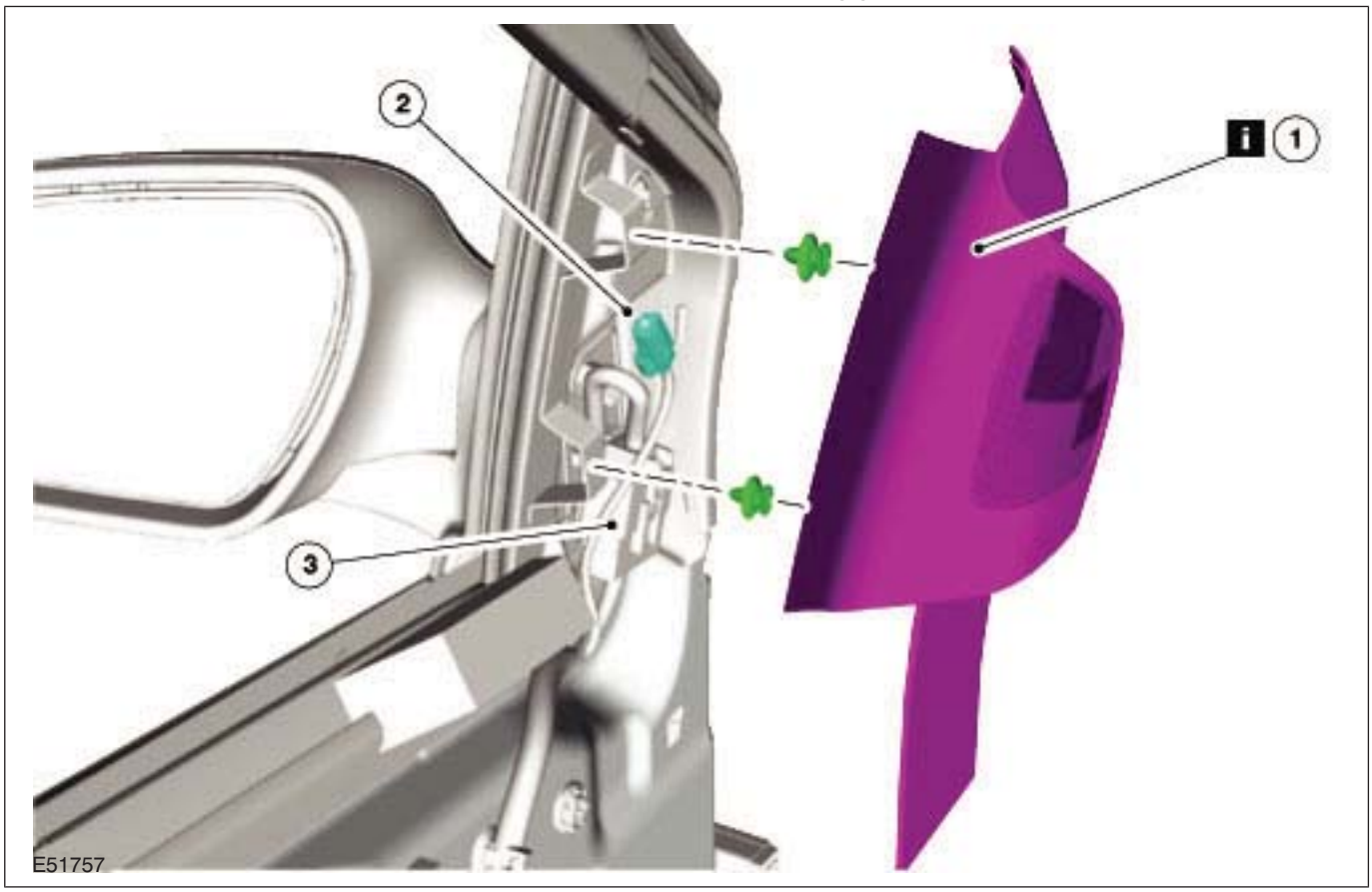
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

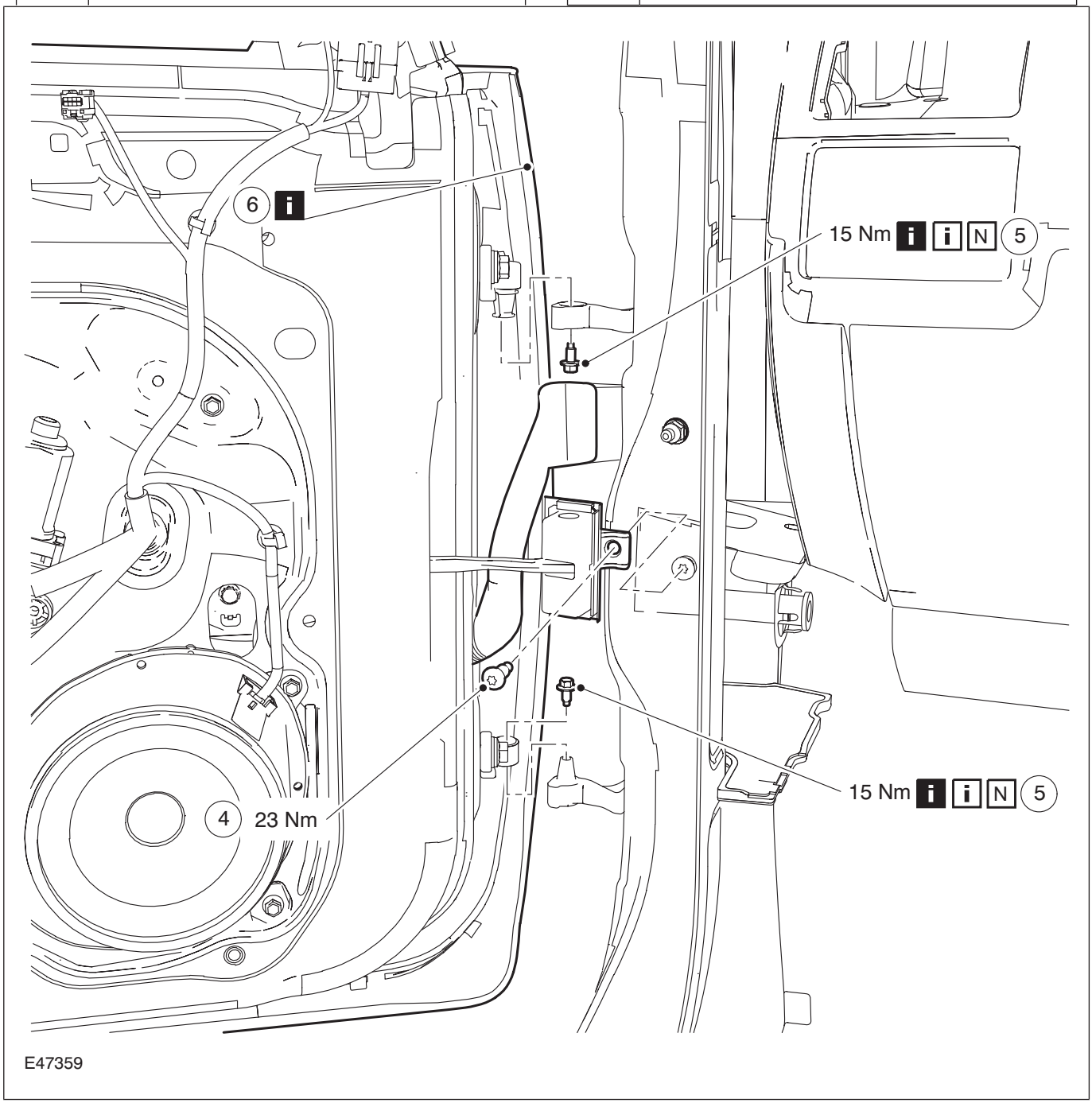
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

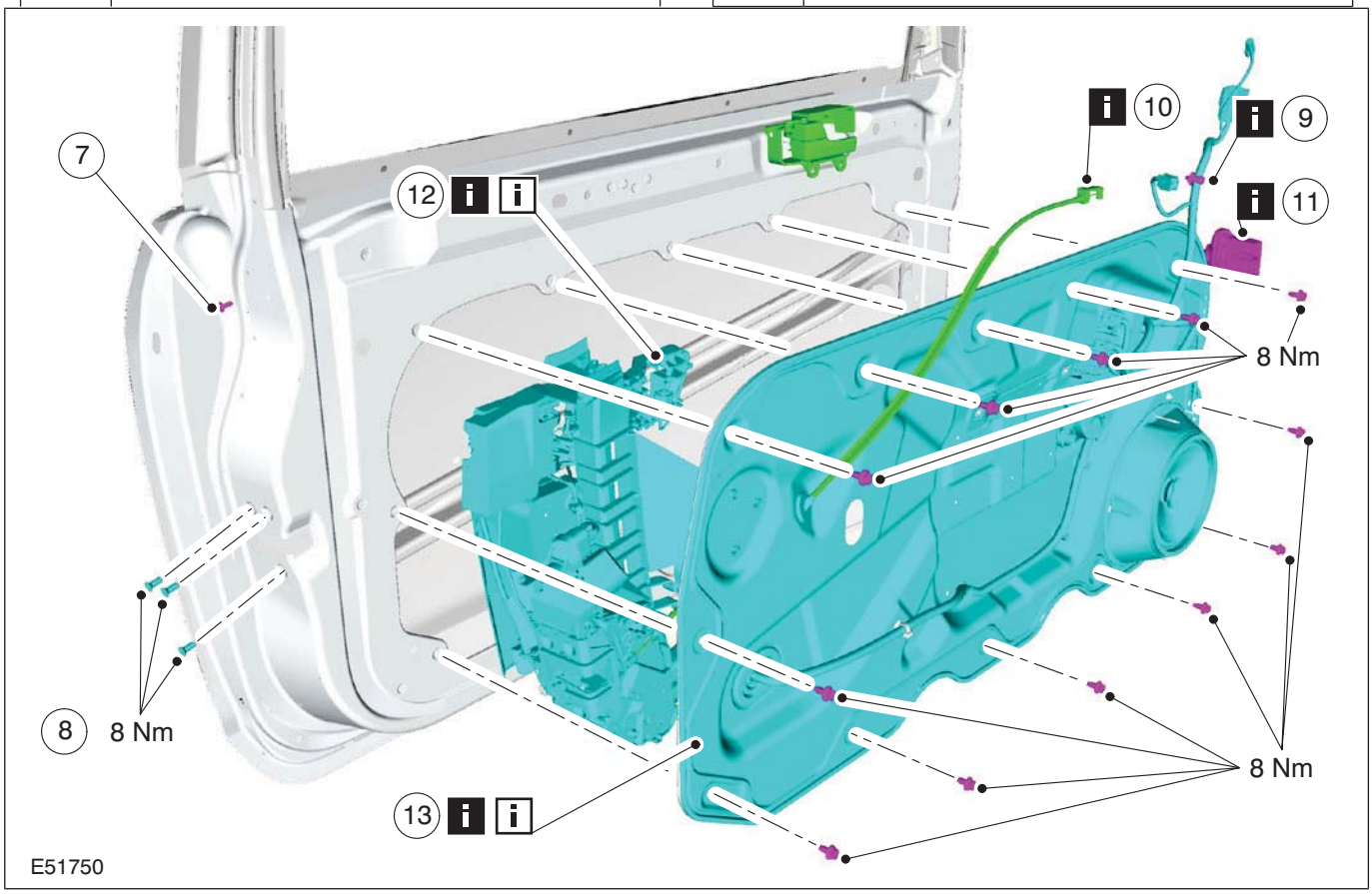
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap
5	Door hinge retaining bolts. See Removal Detail

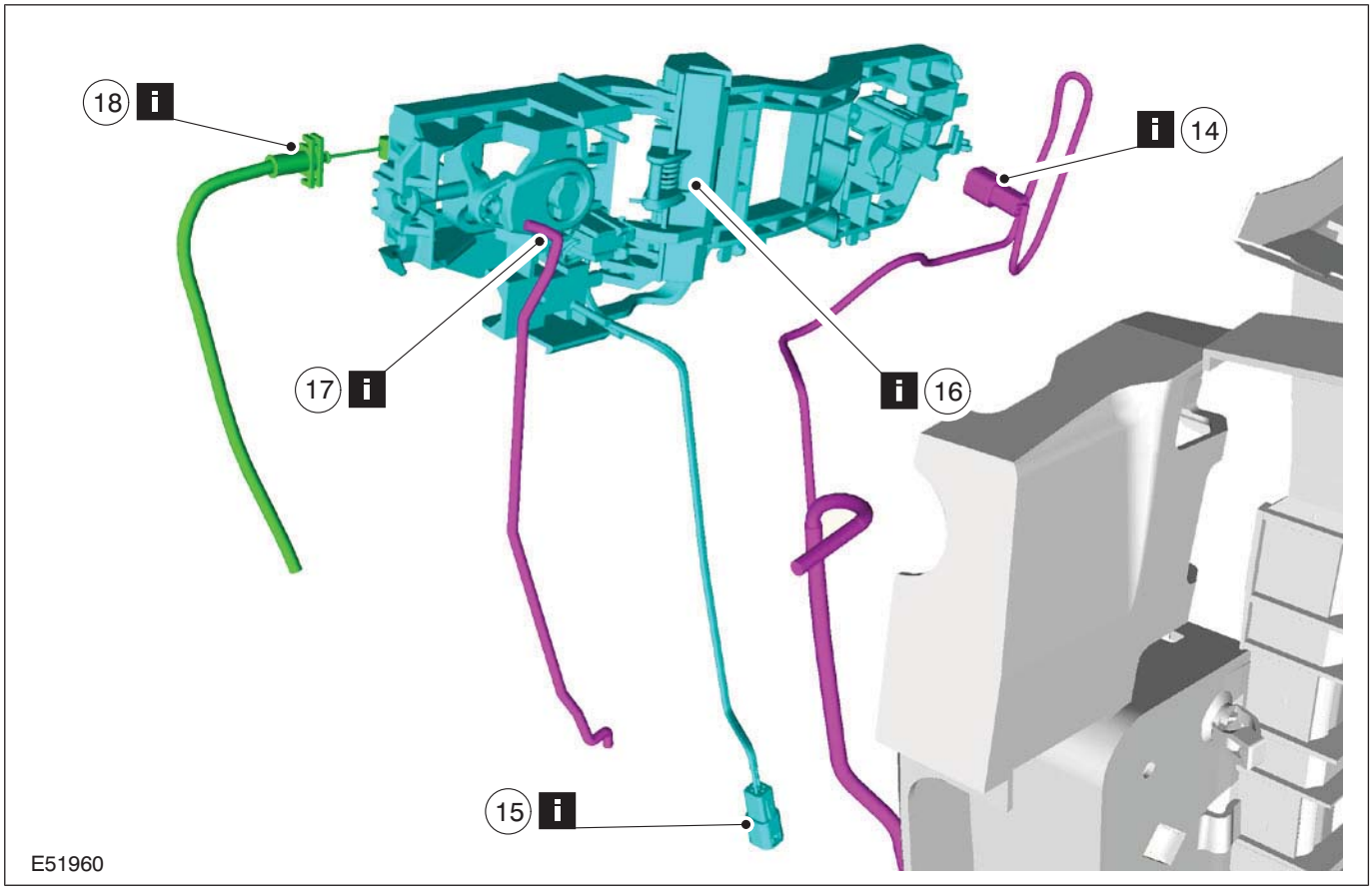
Item	Description
	See Installation Detail
6	Door (left-hand door shown) See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screw
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Front door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Exterior front door handle RKE electrical connector See Removal Detail
15	Front door lock cylinder position sensor electrical connector See Removal Detail
16	Front door handle reinforcement See Removal Detail
17	Front door lock cylinder actuator rod See Removal Detail
18	Front door exterior handle remote control cable See Removal Detail

13. **To install, reverse the removal procedure.**
14. **Vehicles with global closing, initialize the door window motors.**

    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

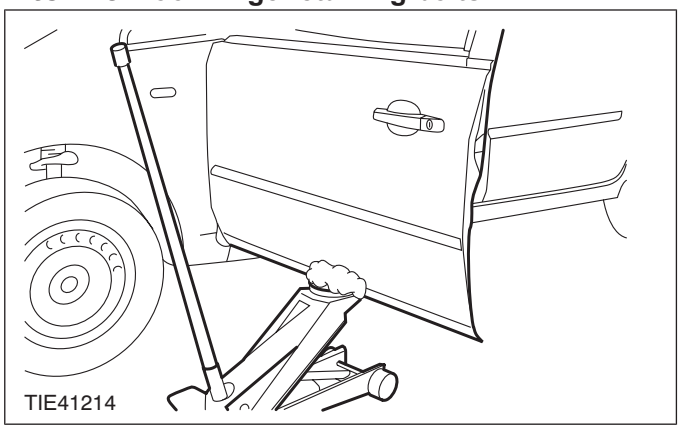
Removal Details

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

REMOVAL AND INSTALLATION

Item 5 Door hinge retaining bolts.

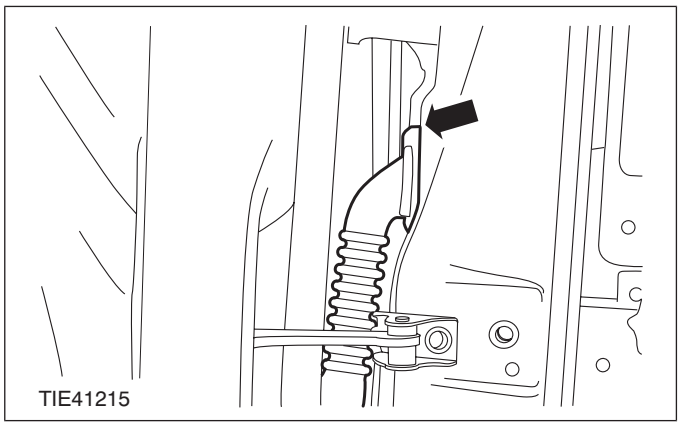


1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

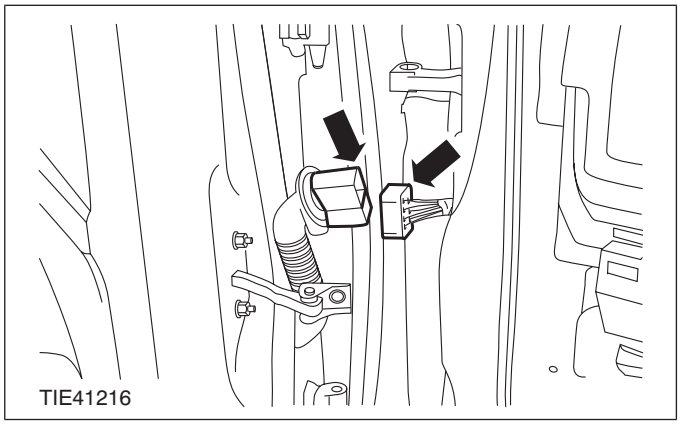
   With the aid of another technician and a suitable trolly jack, support and detach the front door from the front door hinges.

Item 6 Door (left-hand door shown)

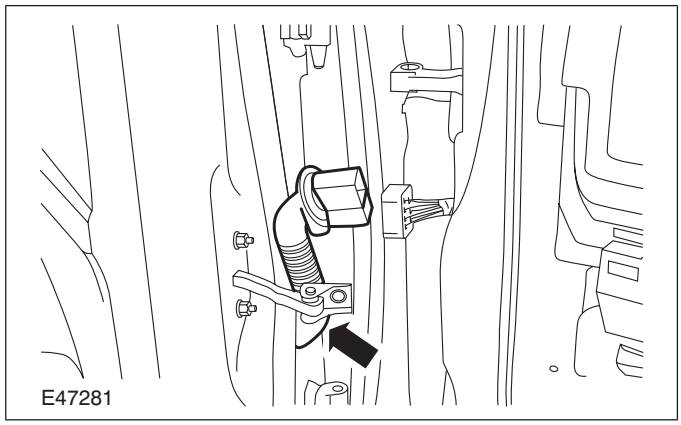
1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**
   - Disconnect the electrical connector.



3. **Push the front door wiring harness into the door.**

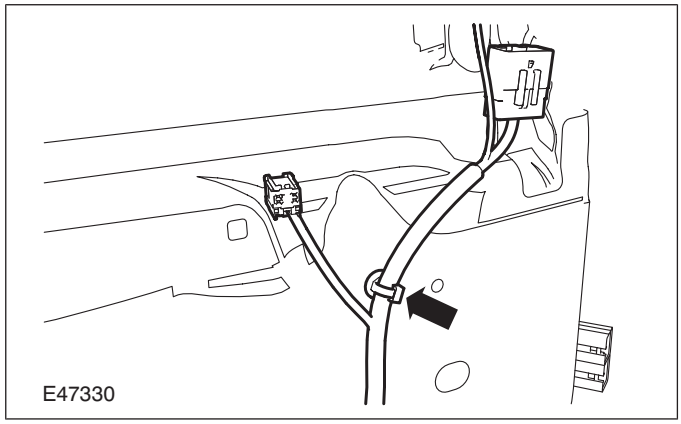


4. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

Item 9 Front door wiring harness retaining clip

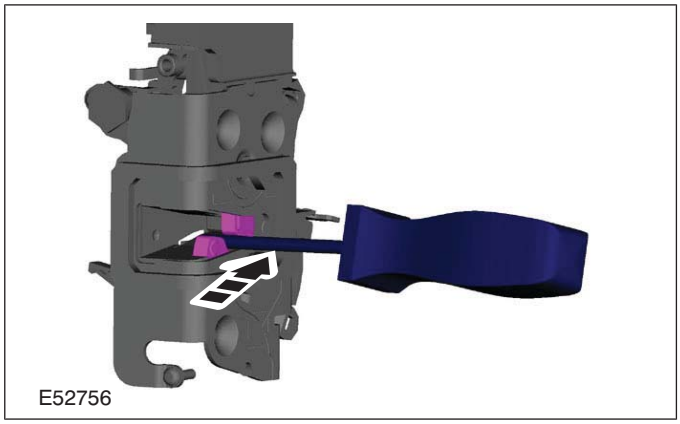
1. **Detach the front door wiring harness retaining clip from the front door.**



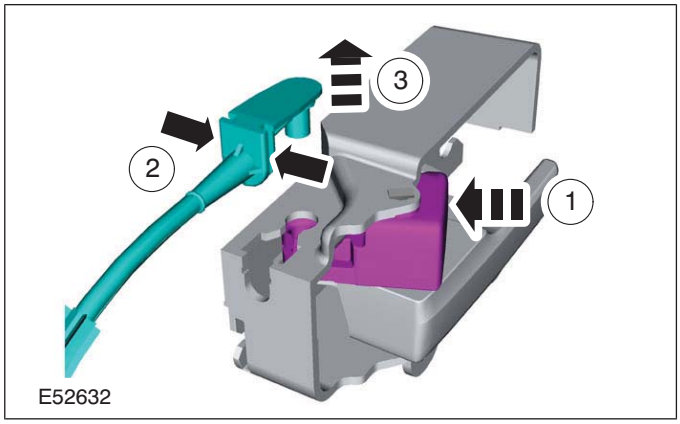
REMOVAL AND INSTALLATION

Item 10 Front door latch remote control cable

1. **Using a suitable screwdriver, latch the front door lock into the closed position.**

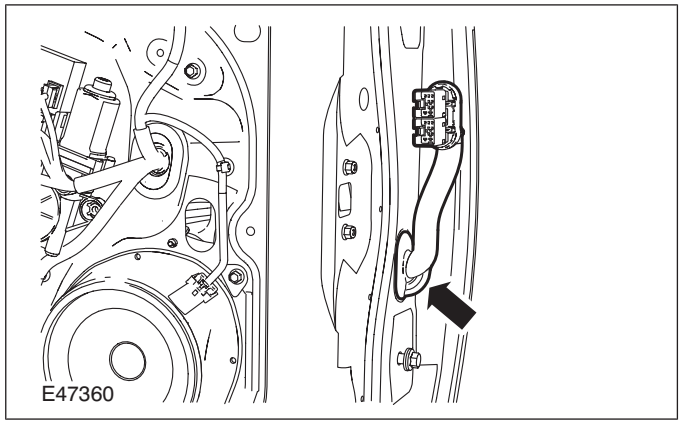


2. **Detach the front door latch remote control cable from the front door latch remote control handle.**
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.
   3. Detach the inner remote control cable from the remote control handle lock lever.



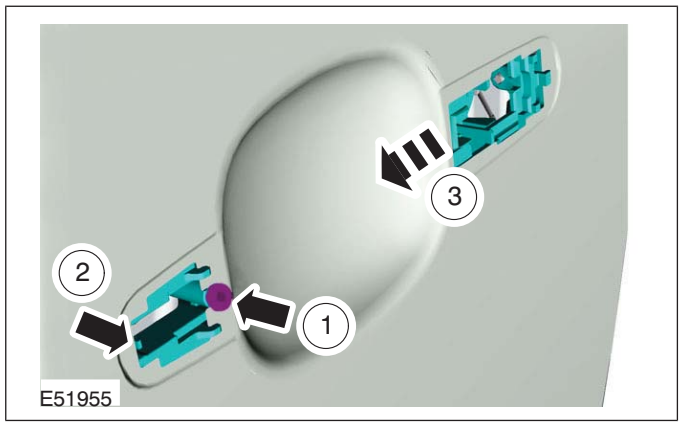
Item 11 Front door wiring harness

1. **Detach and push the front door wiring harness into the front door.**



Item 12 Front door lock actuator retaining screw

1. **Detach the front door lock actuator.**
   1. Loosen the front door lock actuator retaining screw.
   2. Release the front door lock actuator retaining clip.
   3. Slide the front door lock actuator towards the front of the vehicle.



Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

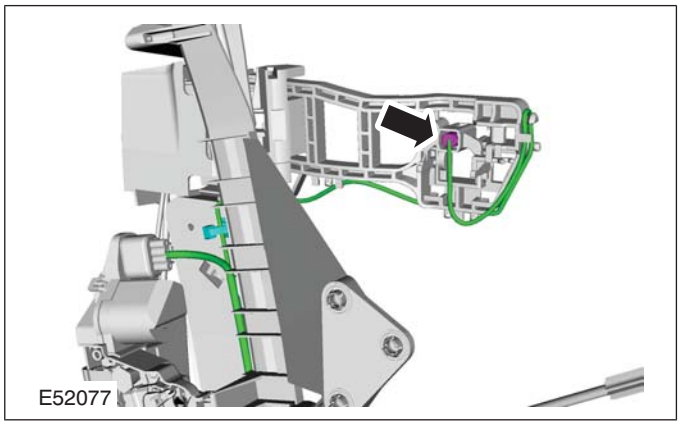
Item 14 Exterior front door handle RKE electrical connector

NOTE: Make a note of the clipping position of the exterior front door handle RKE harness.

1. **Disconnect the front door handle RKE electrical connector and detach the wiring**

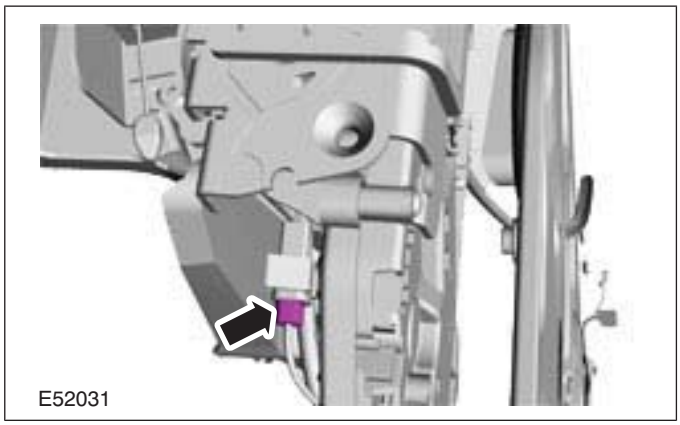
REMOVAL AND INSTALLATION

harness from the front door handle reinforcement.



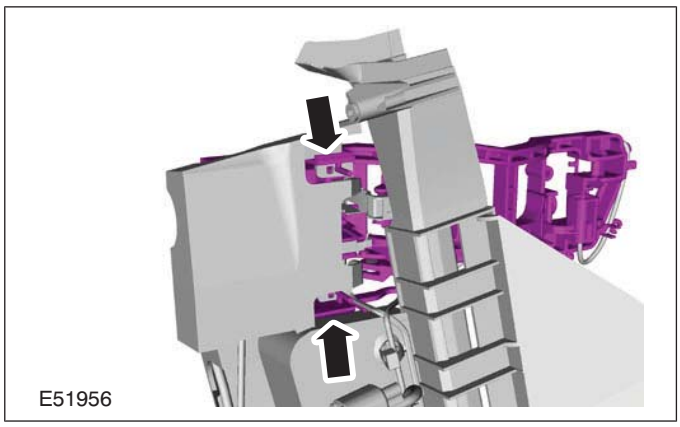
Item 15 Front door lock cylinder position sensor electrical connector

1. **Disconnect the front door lock cylinder position sensor electrical connector.**



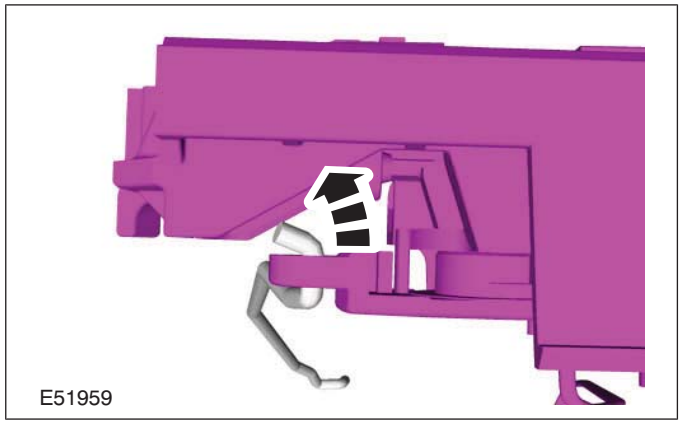
Item 16 Front door handle reinforcement

1. **Detach the front door handle reinforcement from the front door handle, lock and latch retaining bracket.**



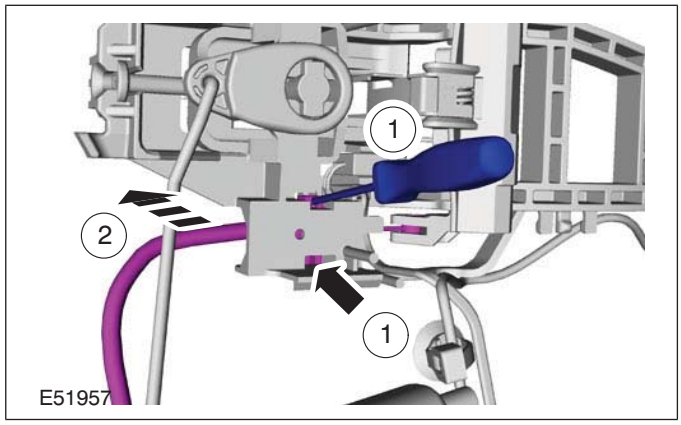
Item 17 Front door lock cylinder actuator rod

1. **Detach the front door lock cylinder actuator rod from the front door handle reinforcement.**



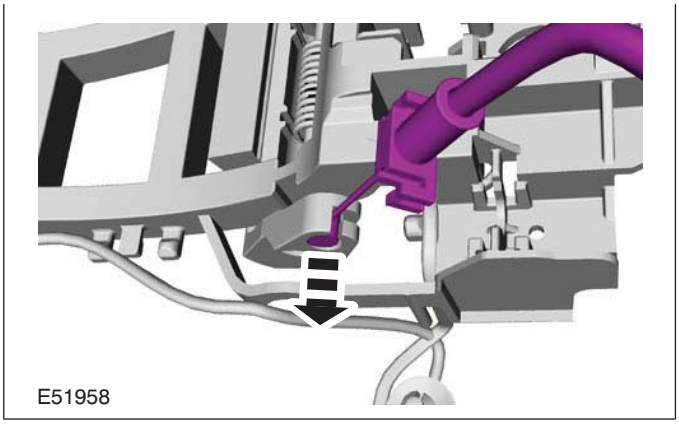
Item 18 Front door exterior handle remote control cable

1. **Detach the front door exterior handle remote control cable from the front door handle reinforcement.**
   1. Using a suitable flat blade screwdriver, release the front door exterior handle remote control cable retaining clips.
   2. Slide the front door exterior handle remote control cable off of the front door handle reinforcement retainers.



REMOVAL AND INSTALLATION

2. Align the front door exterior handle remote control inner cable with the slot in the front door handle reinforcement and remove.



Installation Details

Item 13 Front door inner panel

1. Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.

Item 12 Front door lock actuator retaining screw

1. Install the front door lock actuator to the front door.
2. Tighten the front door lock actuator retaining screw.

Item 5 Door hinge retaining bolts.

1. Apply a coating of adhesive to the door hinge retaining bolts.

REMOVAL AND INSTALLATION

Front Door Lock Actuator — 4-Door/5-Door/Wagon

General Equipment

Trolley jack

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. Remove the front door trim panel.

   For additional information, refer to: Front Door Trim Panel - 4-Door/5-Door/Wagon (501-05 Interior Trim and Ornamentation, Removal and Installation).

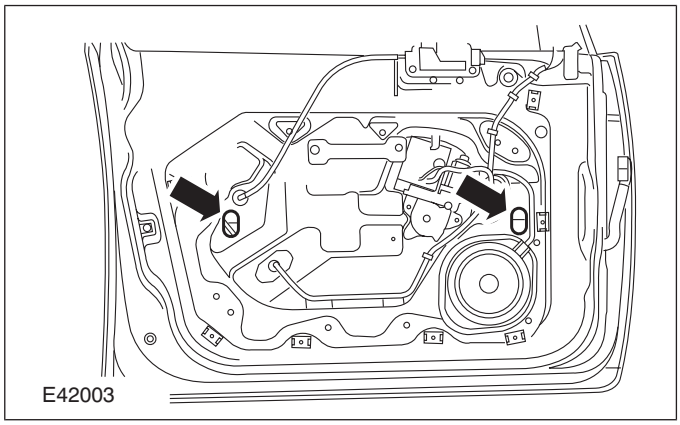
2. Remove the exterior front door handle.

   For additional information, refer to: Exterior Front Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. Connect the battery ground cable.

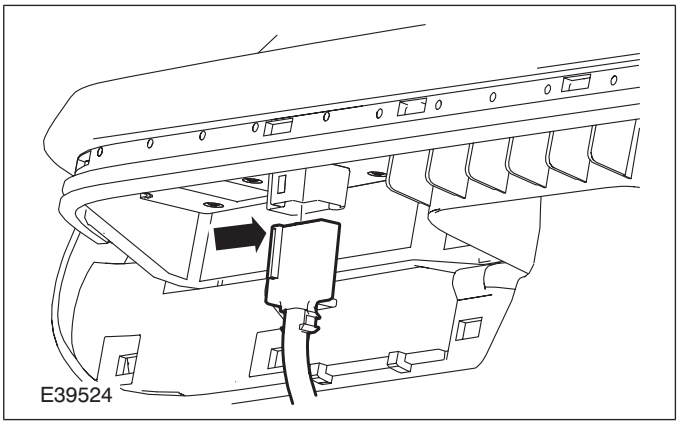
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. Remove the front door window regulator grommets.

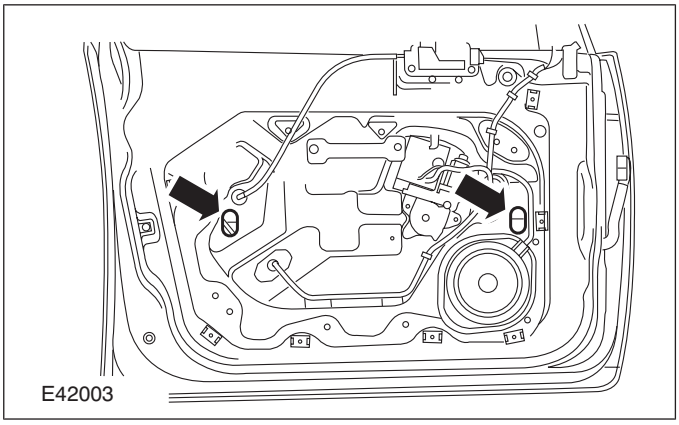


5. NOTE: Support the front door power window control unit.

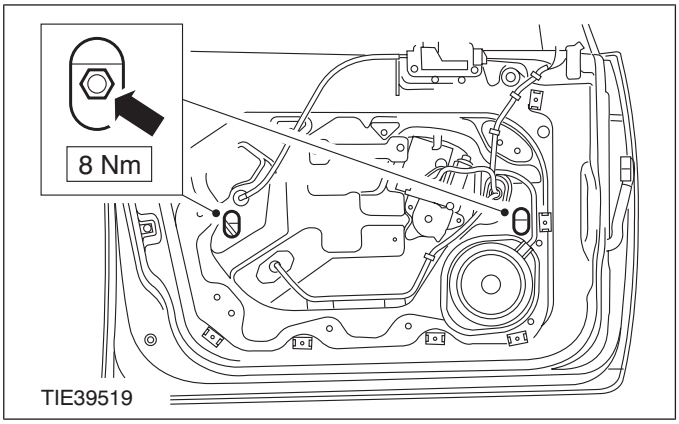
   Connect the front door power window control unit electrical connector.



6. Using the front door power window control unit, align the front door window glass clamp bolts with the access holes.

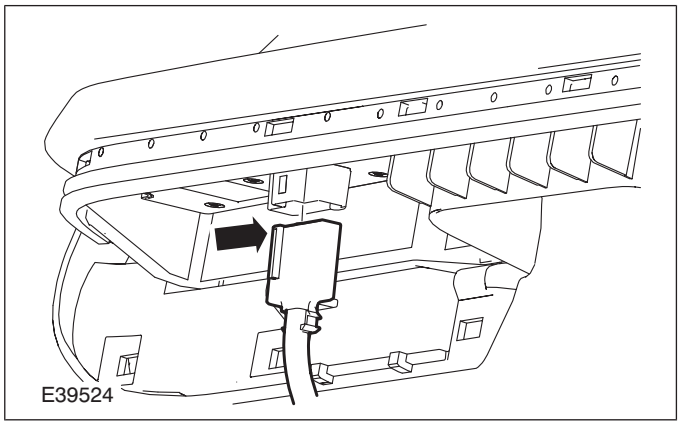


7. Loosen the front door window glass clamp retaining bolts.



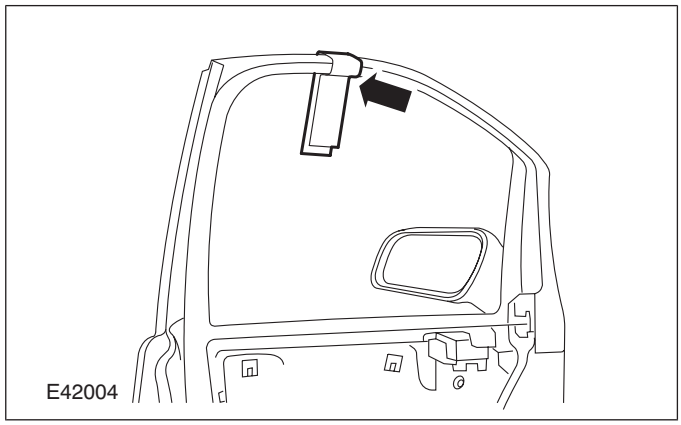
REMOVAL AND INSTALLATION

8. Disconnect the front door power window control unit electrical connector.



9. Raise the front door window glass.

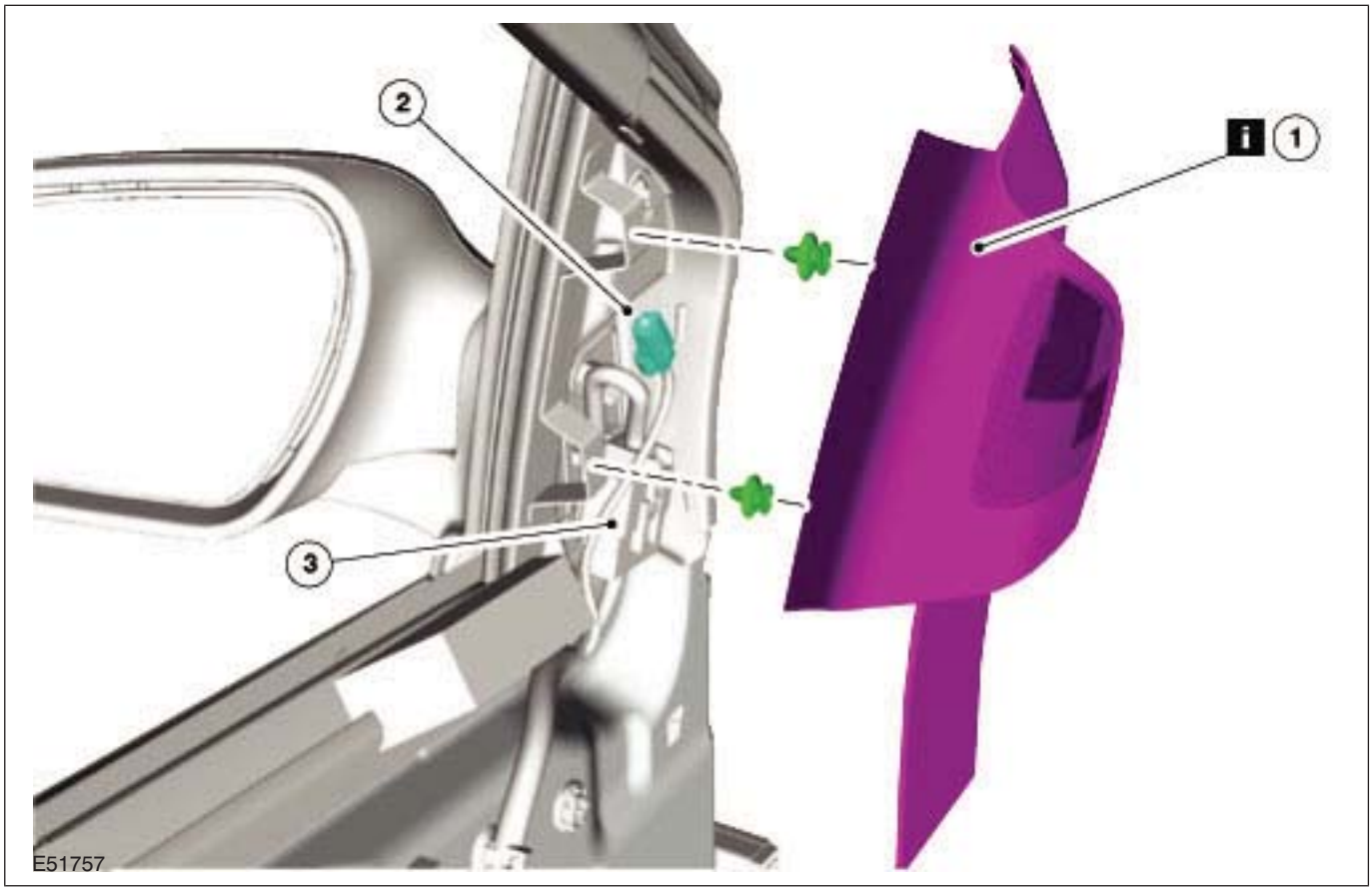
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

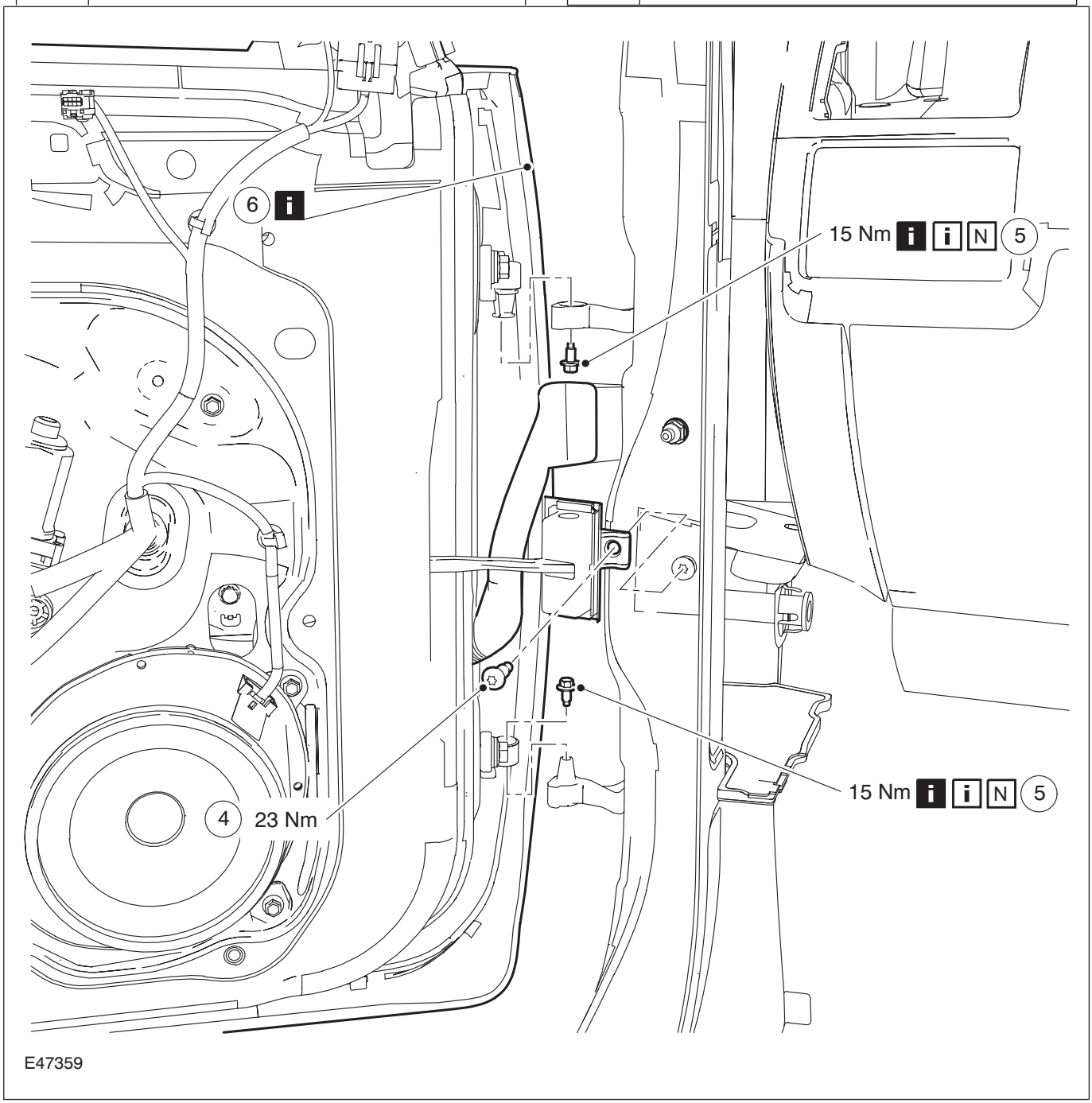
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

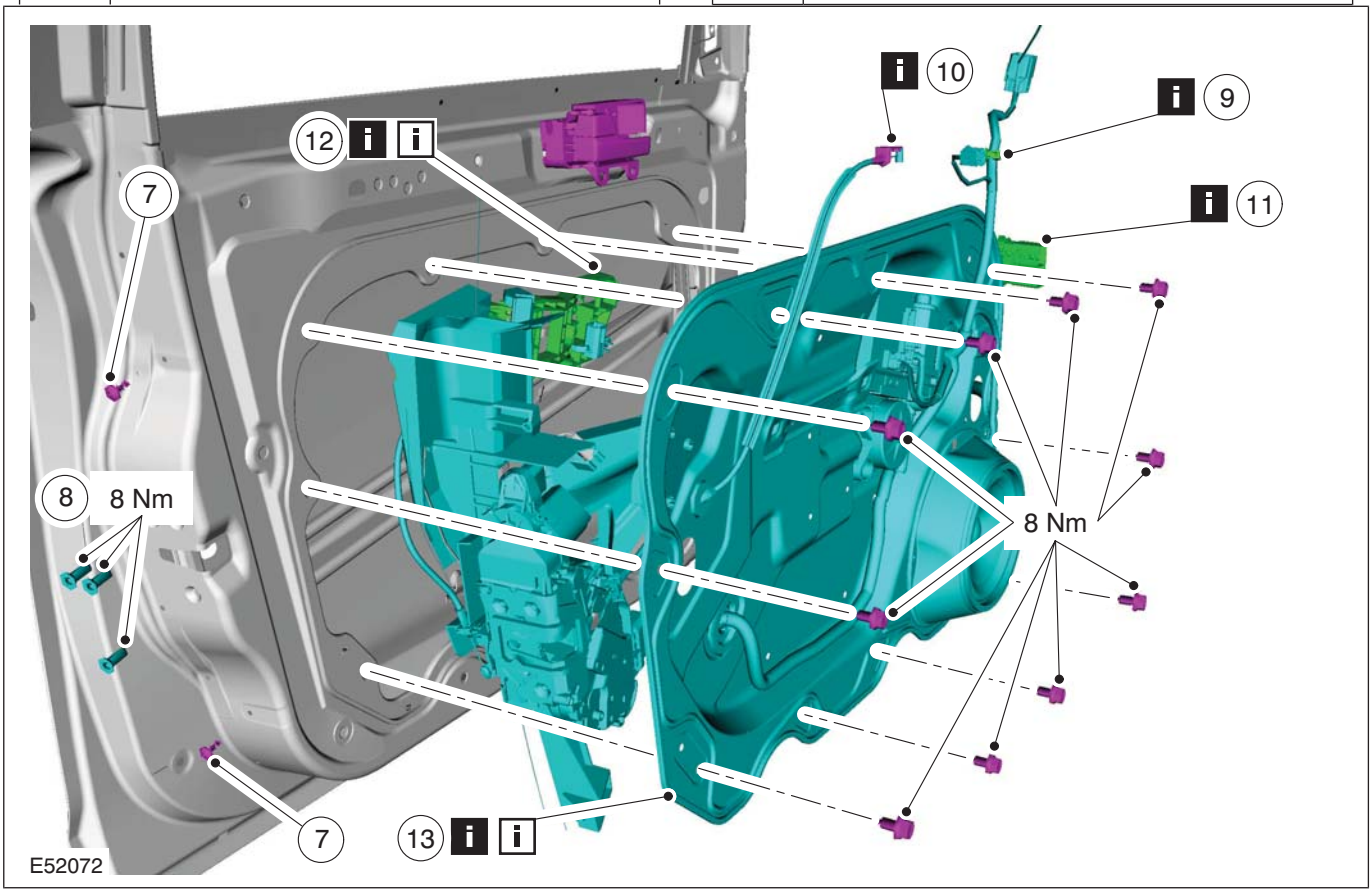
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap
5	Door hinge retaining bolts See Removal Detail

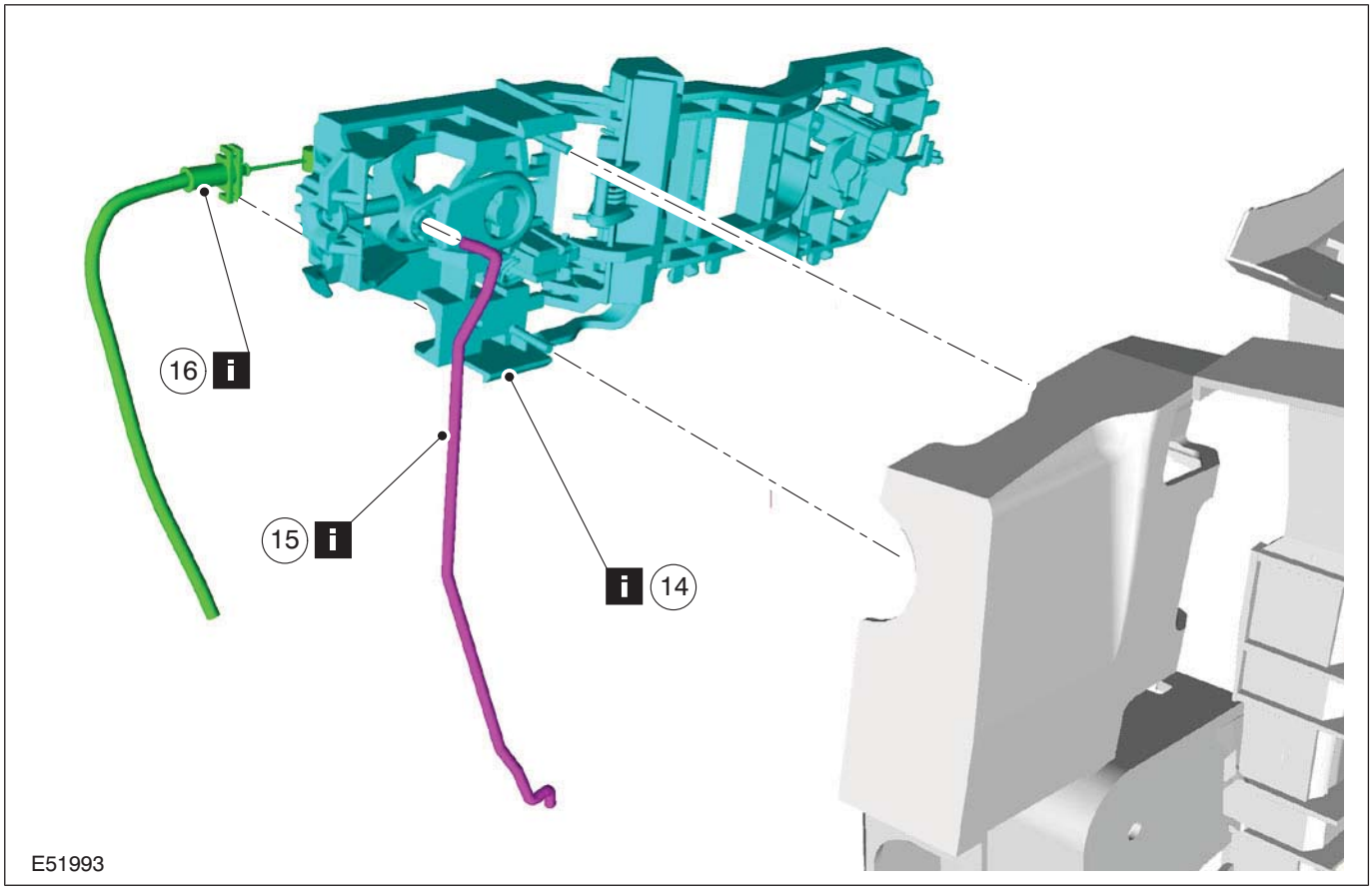
Item	Description
	See Installation Detail
6	Door See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screws
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Front door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Front door lock actuator See Removal Detail
15	Front door lock cylinder actuator rod See Removal Detail
16	Front door exterior handle remote control cable See Removal Detail

13. To install, reverse the removal procedure.
14. Vehicles with global closing, initialize the door window motors.

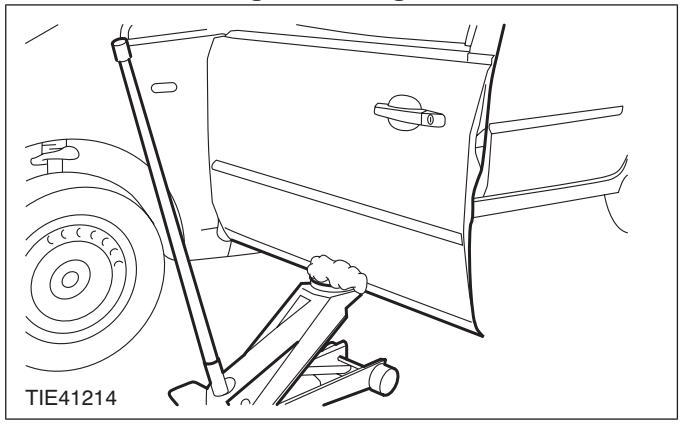
    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

Removal Details

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

Item 5 Door hinge retaining bolts



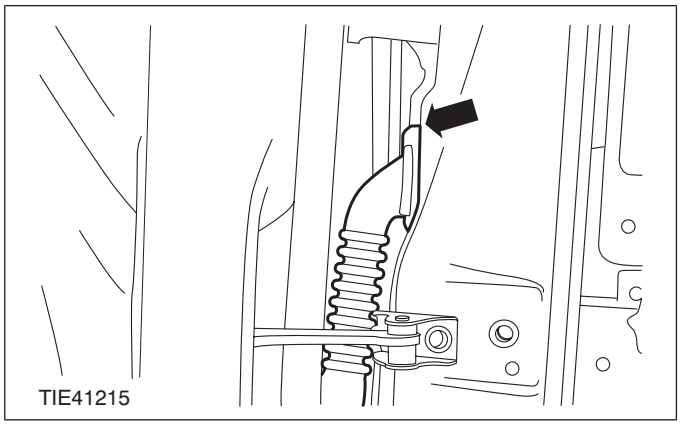
REMOVAL AND INSTALLATION

1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

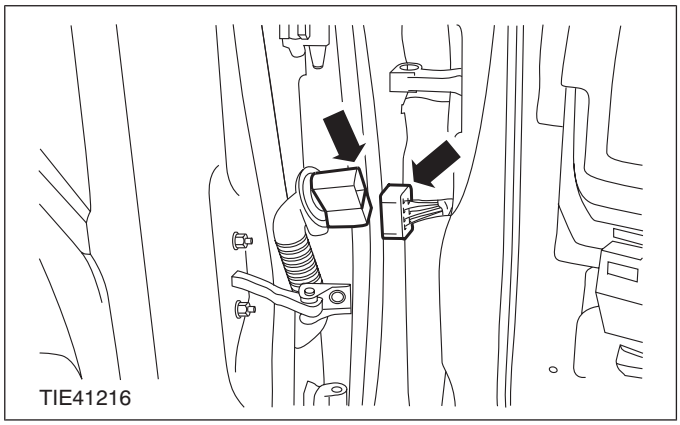
   With the aid of another technician and a suitable trolley jack, support and detach the front door from the front door hinges.

Item 6 Door

1. **Detach the front door wiring harness from the A-pillar.**



2. **Disconnect the front door wiring harness electrical connector.**

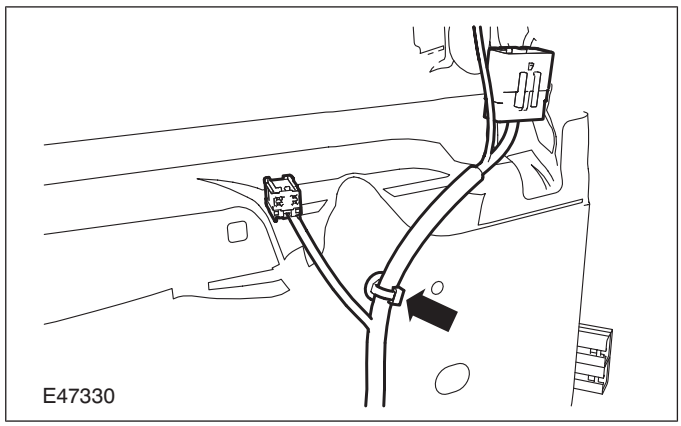


3. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

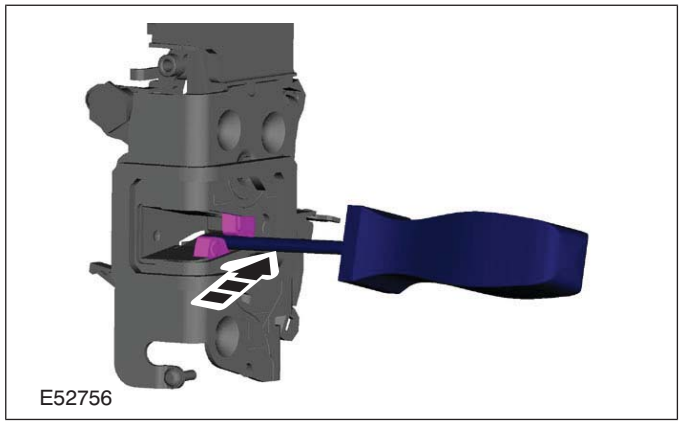
Item 9 Front door wiring harness retaining clip

1. **Detach the front door wiring harness retaining clip from the front door.**



Item 10 Front door latch remote control cable

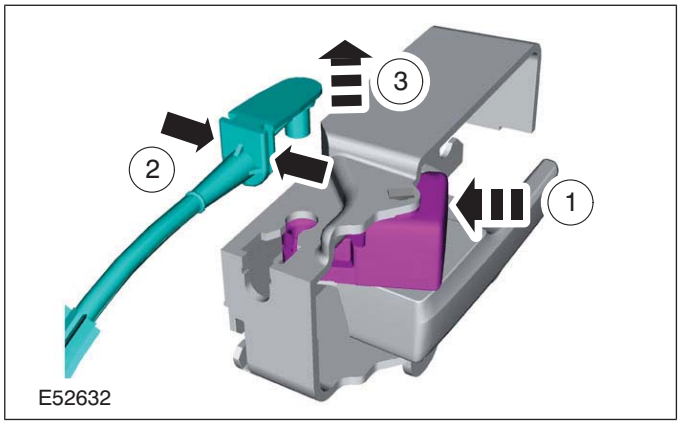
1. **Using a suitable screwdriver, latch the front door lock into the closed position.**



2. **Detach the front door latch remote control cable from the front door latch remote control handle.**
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.

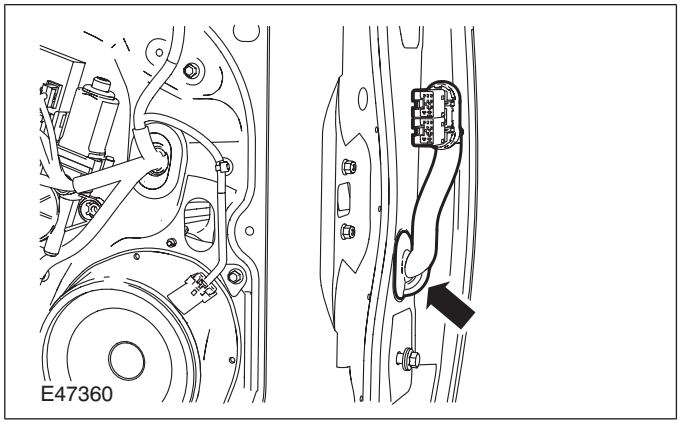
REMOVAL AND INSTALLATION

3. Detach the inner remote control cable from the remote control handle lock lever.



Item 11 Front door wiring harness

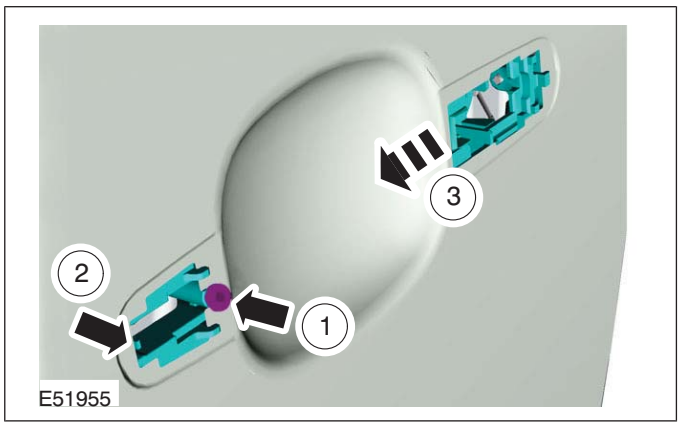
1. Detach and push the front door wiring harness into the front door.



Item 12 Front door lock actuator retaining screw

1. Detach the front door lock actuator .

1. Loosen the door lock actuator retaining screw.
2. Release the door lock actuator retaining clip.
3. Slide the door lock actuator towards the front of the vehicle.

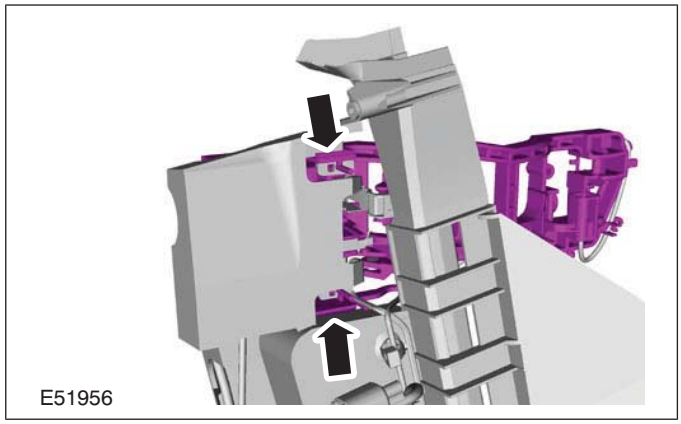


Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

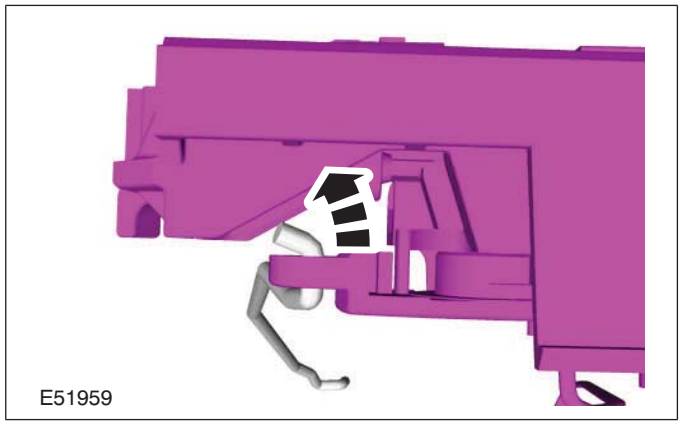
Item 14 Front door lock actuator

1. Detach the front door lock actuator from the front door handle, lock and latch retaining bracket.



Item 15 Front door lock cylinder actuator rod

1. Detach the front door lock cylinder actuator rod from the front door lock actuator.



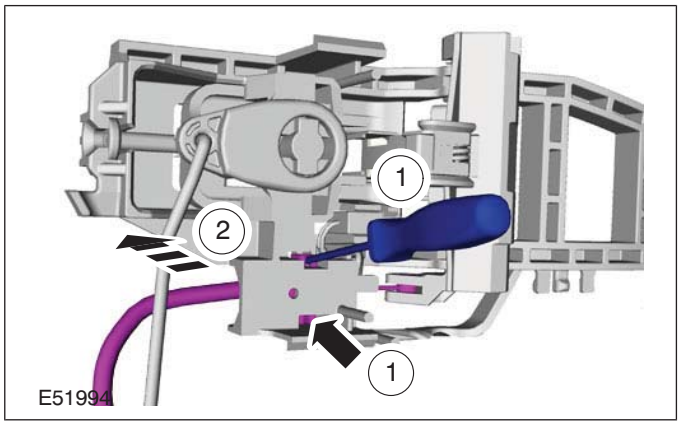
Item 16 Front door exterior handle remote control cable

1. Detach the front exterior door handle remote control cable from the front door lock actuator.

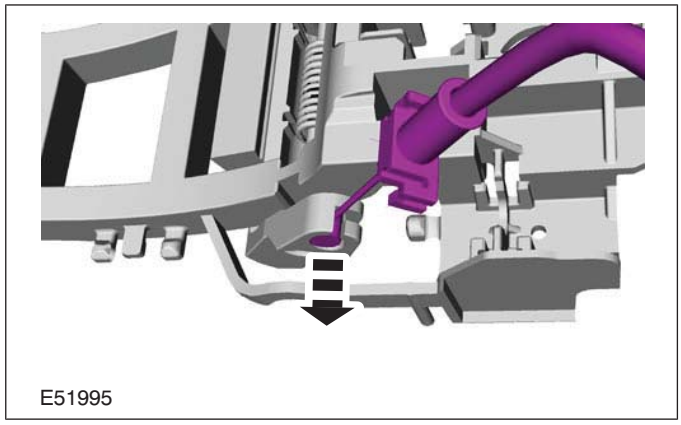
1. Using a suitable flat blade screwdriver, release the exterior front door handle remote control cable retaining clips.

REMOVAL AND INSTALLATION

2. Slide the exterior front door handle remote control cable off of the front door lock actuator.



2. Align the exterior front door handle remote control inner cable with the slot in the front door lock actuator and remove.



Installation Details

Item 13 Front door inner panel

1. **Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.**

Item 12 Front door lock actuator retaining screw

1. **Install the front door lock actuator to the front door.**
2. **Tighten the front door lock actuator retaining screw.**

Item 5 Door hinge retaining bolts

1. **Apply a coating of adhesive to the door hinge retaining bolts.**

REMOVAL AND INSTALLATION

Front Door Lock Actuator — 4-Door/5-Door/Wagon, Vehicles With: Keyless Vehicle System

Materials	
Name	**Specification**
Adhesive - Loctite 243	WSK-M2G349-A7

1. Remove the front door trim panel.

   For additional information, refer to: Front Door Trim Panel - 4-Door/5-Door/Wagon (501-05 Interior Trim and Ornamentation, Removal and Installation).

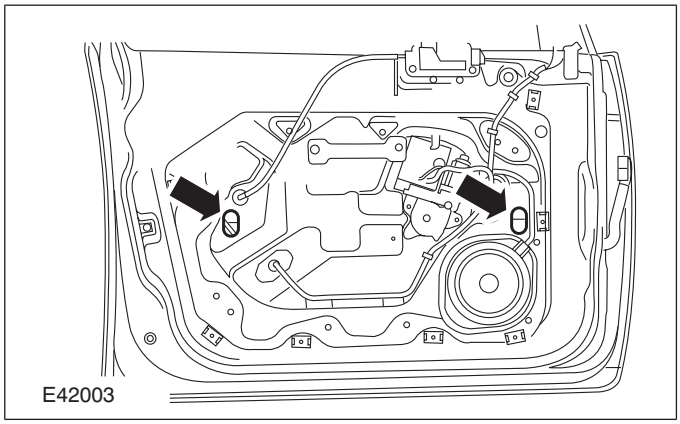
2. Remove the exterior front door handle.

   For additional information, refer to: Exterior Front Door Handle - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. Connect the battery ground cable.

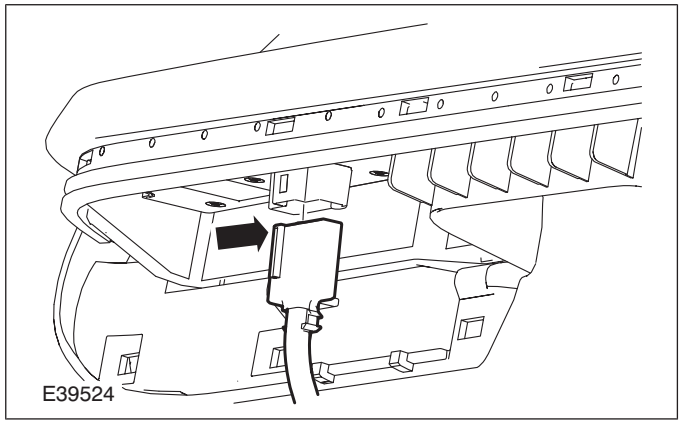
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

4. Remove the front door window regulator grommets.

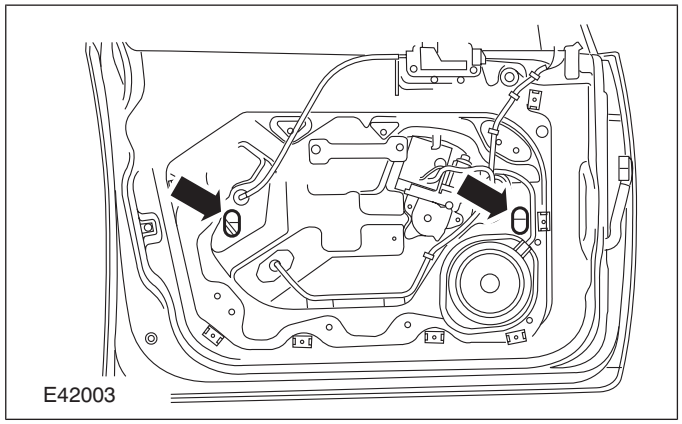


5. NOTE: Support the front door power window control unit.

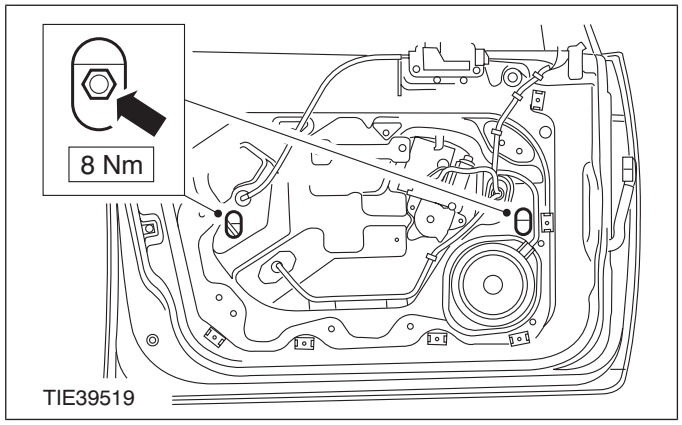
   Connect the front door power window control switch electrical connector.



6. Using the front door power window control switch, align the window glass clamp bolts with the access holes.



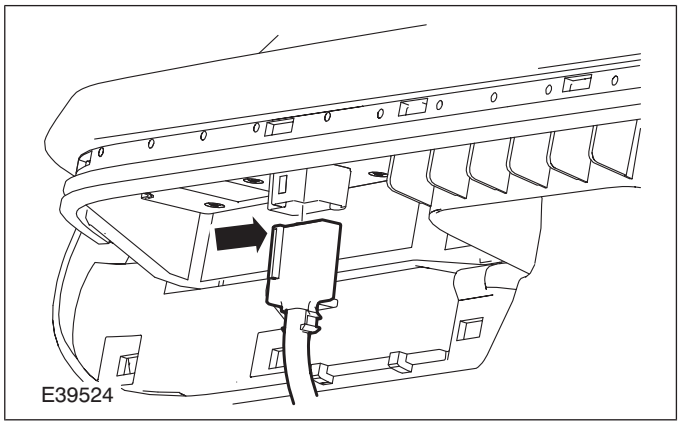
7. Loosen the front door window glass clamp retaining bolts.



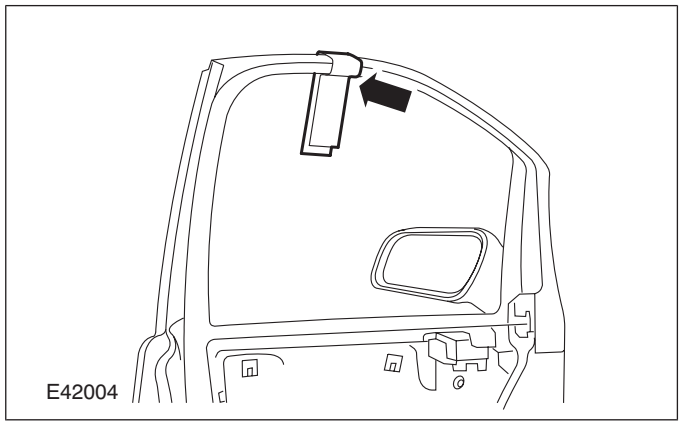
8. Raise the front door window glass.

REMOVAL AND INSTALLATION

9. Disconnect the front door power window control switch electrical connector.



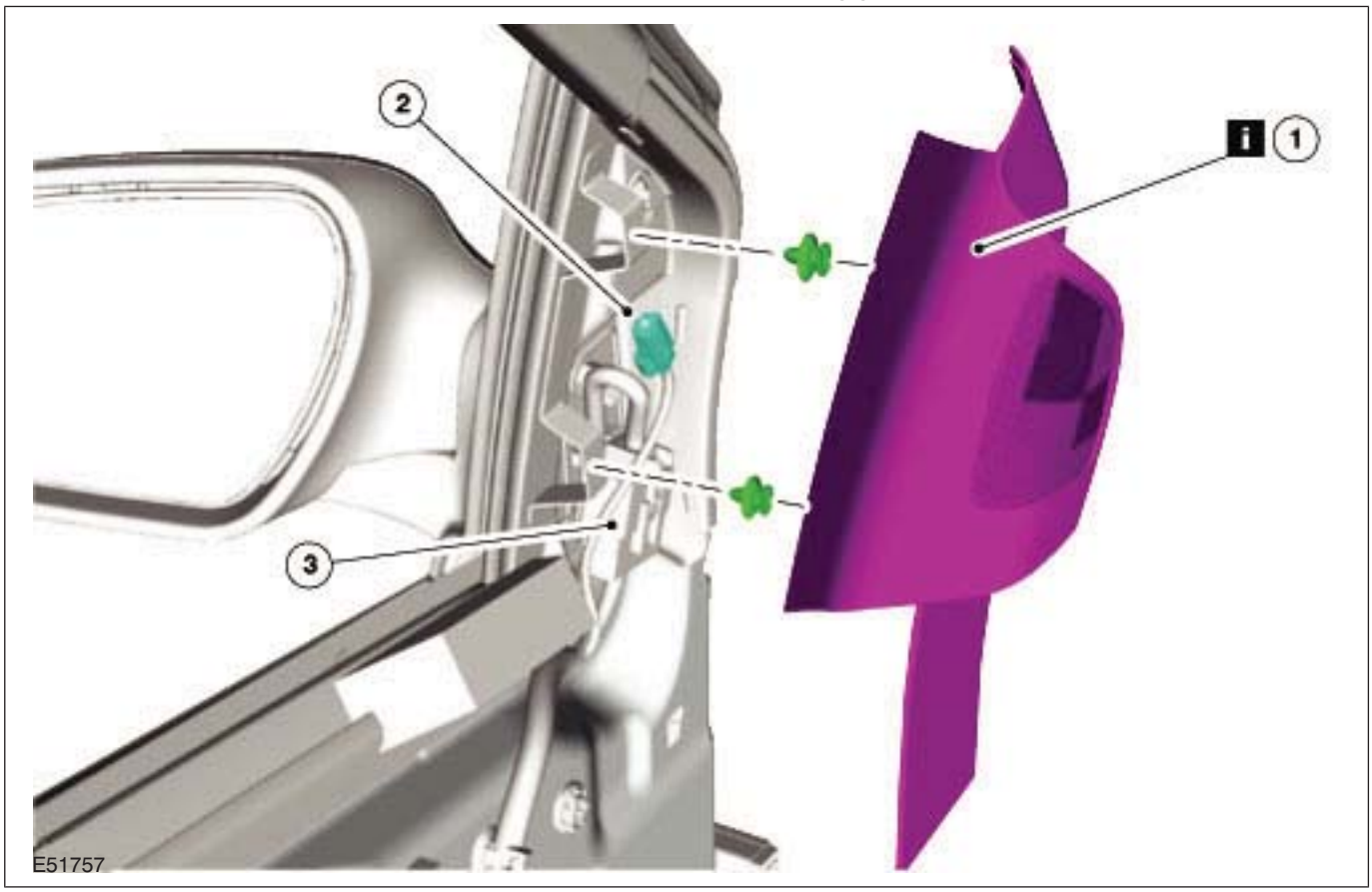
10. Using suitable tape, secure the front door window glass to the front door.



11. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

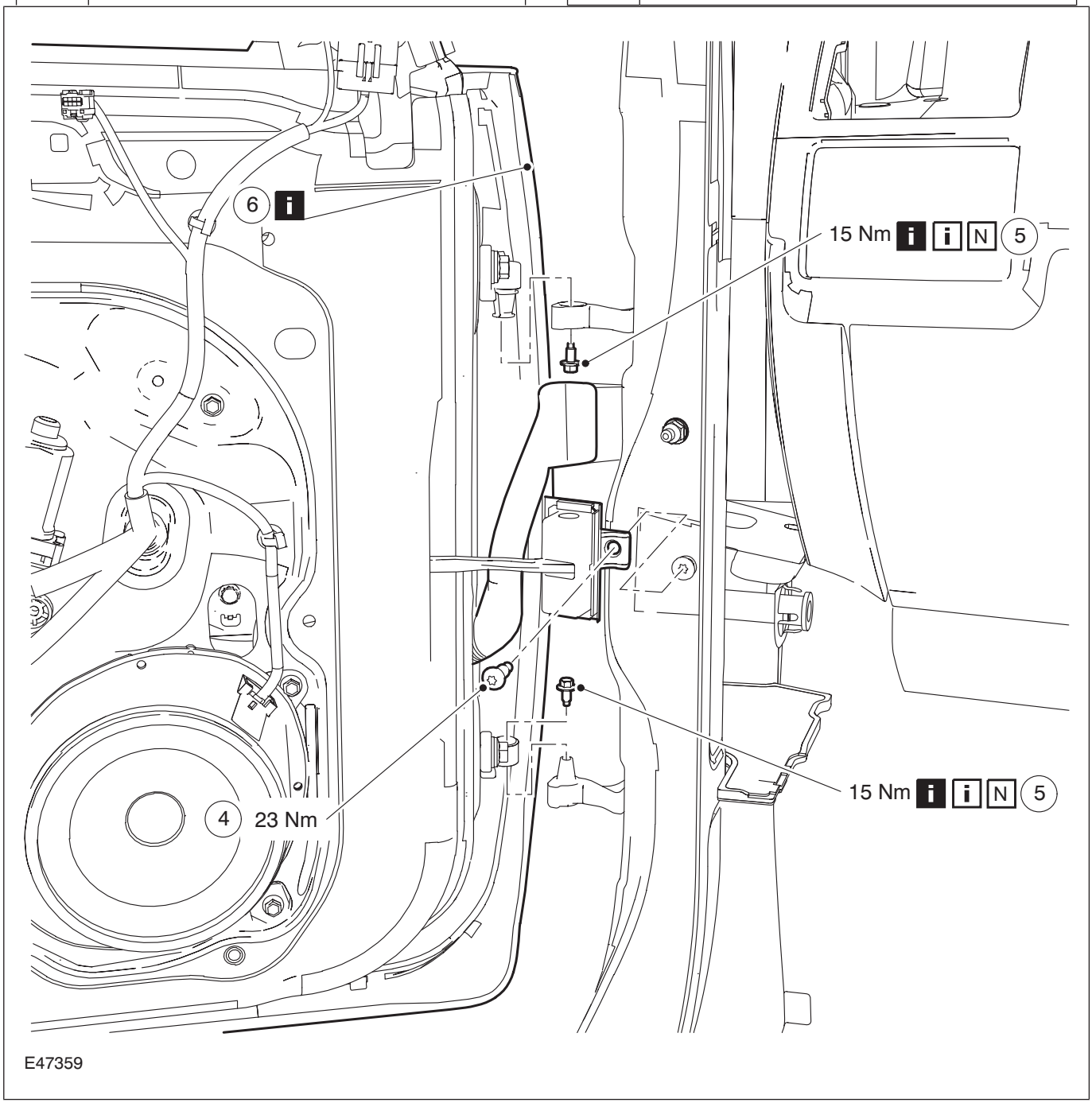
12. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Exterior mirror interior trim panel See Removal Detail
2	Front door tweeter speaker electrical

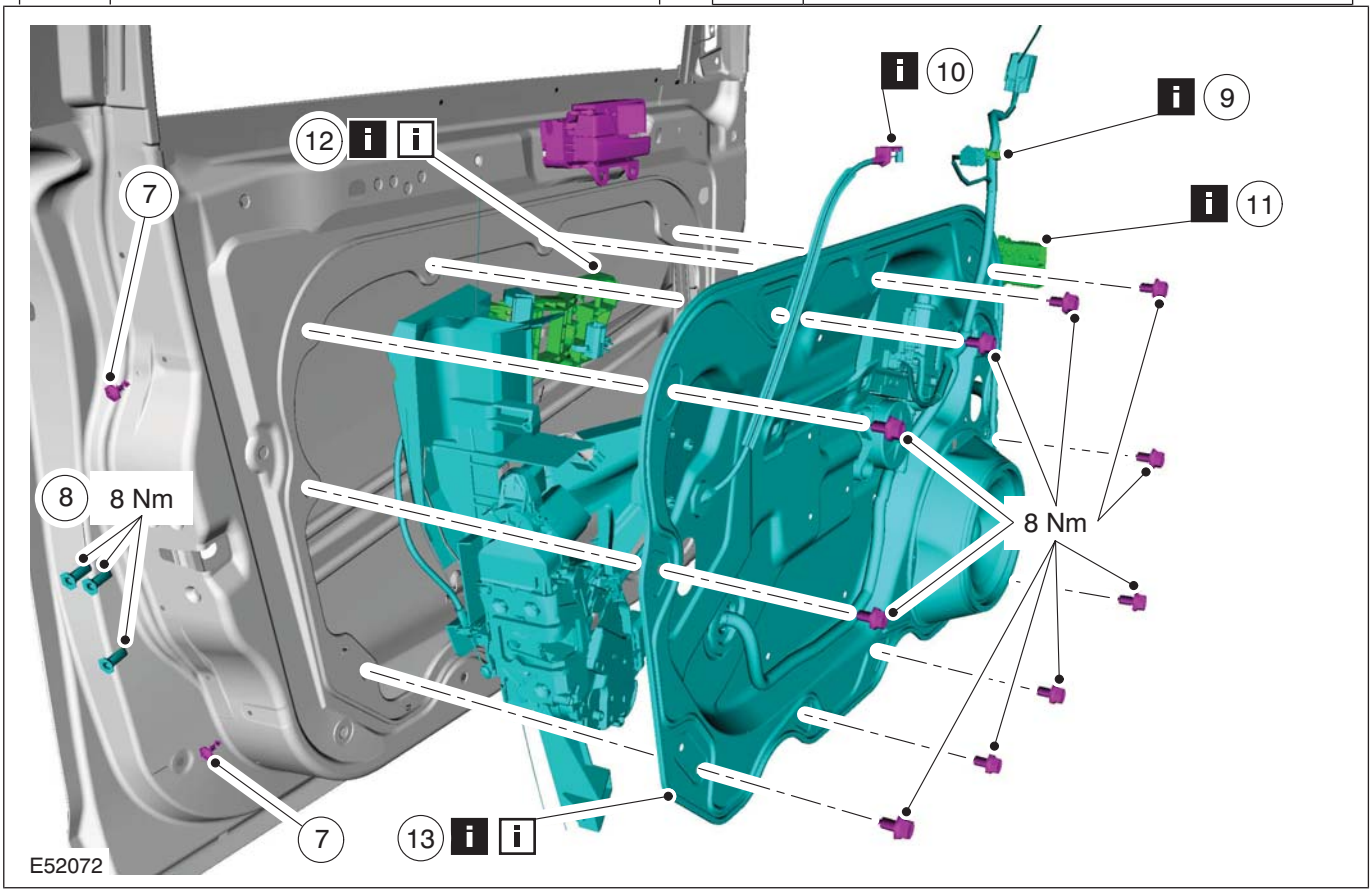
Item	Description
	connector
3	Exterior mirror electrical connector (if equipped)



REMOVAL AND INSTALLATION

Item	Description
4	Door check strap
5	Door hinge retaining bolts See Removal Detail

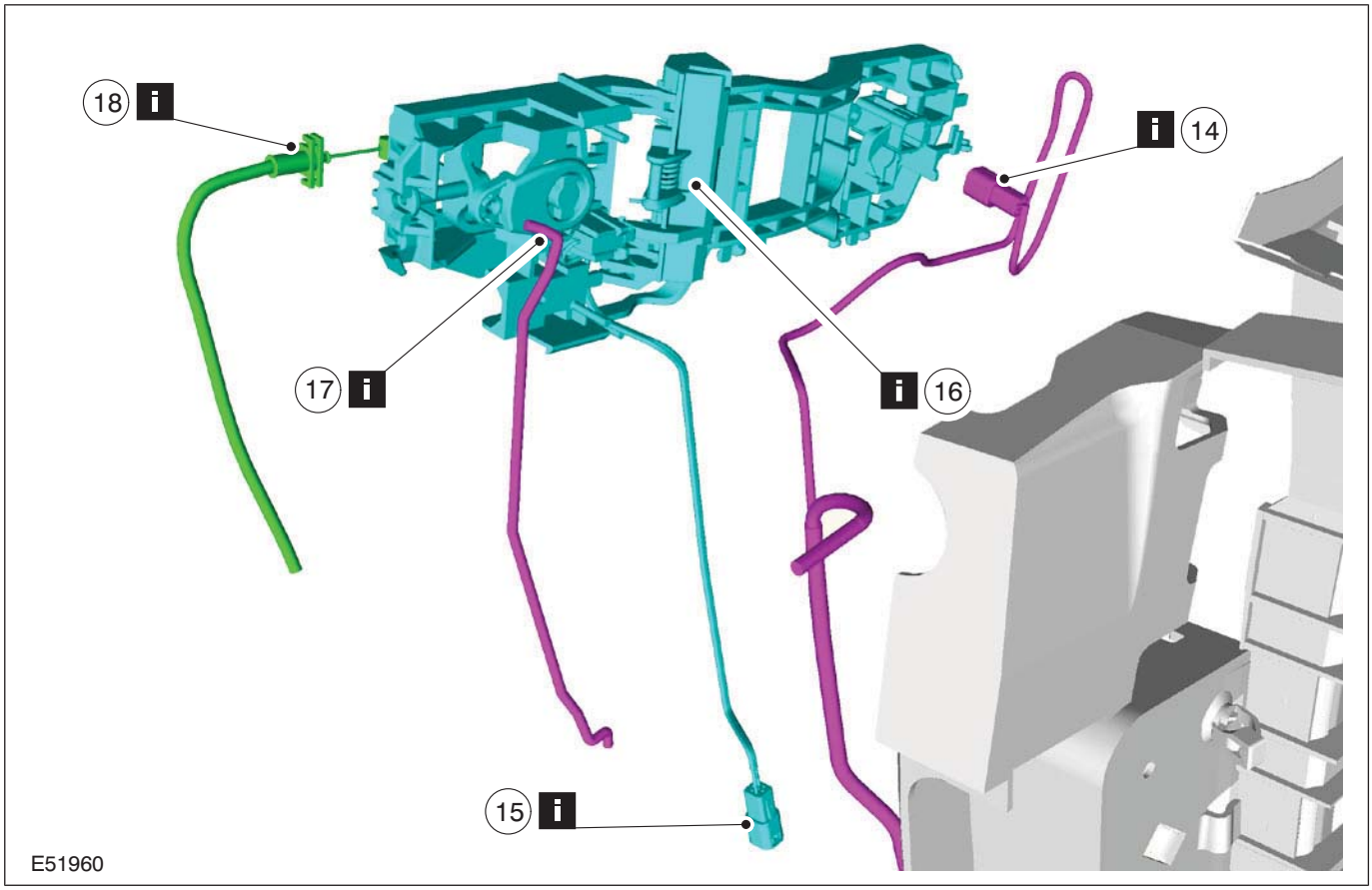
Item	Description
	See Installation Detail
6	Door (left-hand door shown) See Removal Detail



Item	Description
7	Front door handle, lock and latch retaining bracket retaining screw
8	Front door latch retaining bolts
9	Front door wiring harness retaining clip See Removal Detail
10	Front door latch remote control cable See Removal Detail

Item	Description
11	Front door wiring harness See Removal Detail
12	Front door lock actuator retaining screw See Removal Detail See Installation Detail
13	Front door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
14	Exterior front door handle RKE electrical connector See Removal Detail
15	Front door lock cylinder position sensor electrical connector See Removal Detail
16	Front door handle reinforcement See Removal Detail
17	Front door lock cylinder actuator rod See Removal Detail
18	Front door exterior handle remote control cable See Removal Detail

13. To install, reverse the removal procedure.

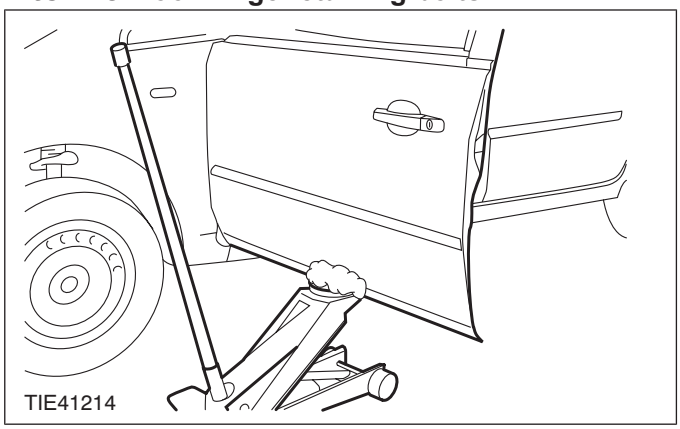
Removal Details

Item 1 Exterior mirror interior trim panel

CAUTION: Do not place excessive strain on the exterior mirror and front door tweeter speaker wiring harness.

REMOVAL AND INSTALLATION

Item 5 Door hinge retaining bolts

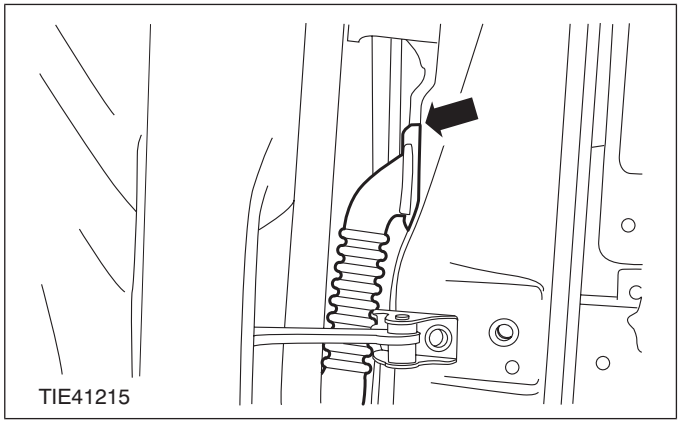


1. **CAUTION: Protect the door using a soft cloth to prevent damage to the front door.**

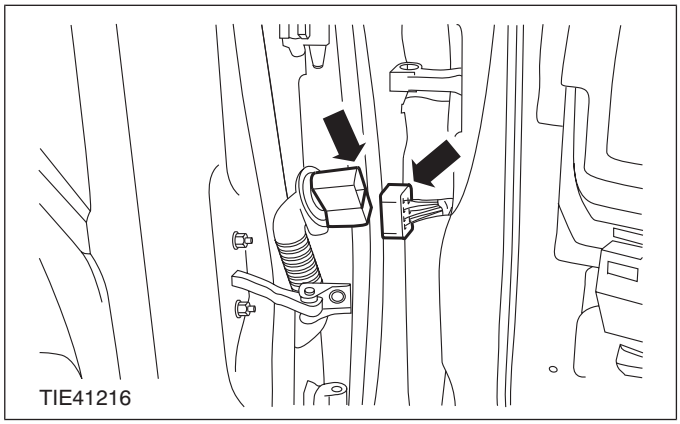
   With the aid of another technician and a suitable trolly jack, support and detach the front door from the front door hinges.

Item 6 Door (left-hand door shown)

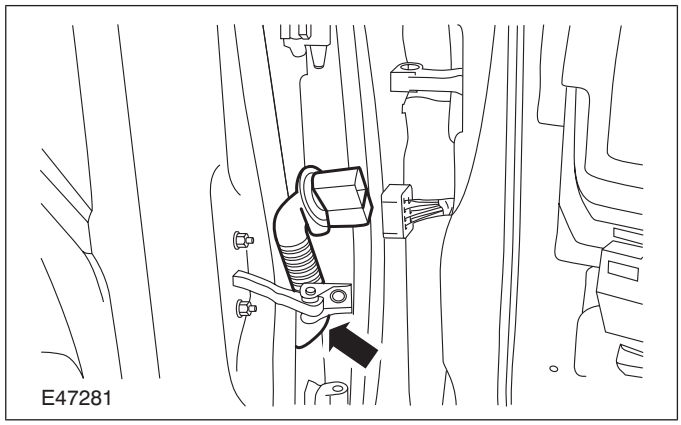
1. **Detach the electrical connector from the A-pillar.**



2. **Remove the front door.**
   - Disconnect the electrical connector.



3. **Push the front door wiring harness into the door.**

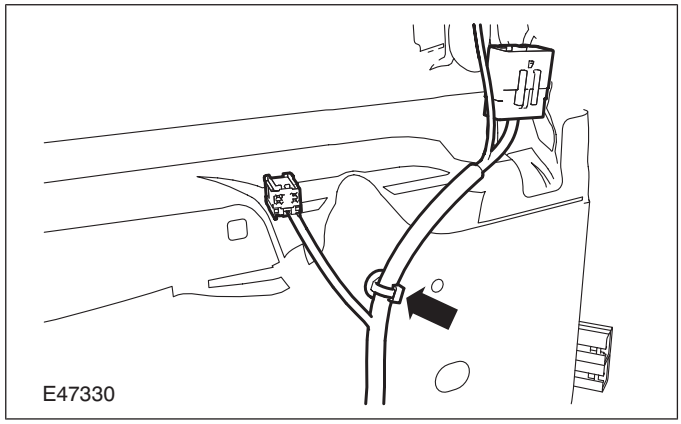


4. **CAUTION: After the front door wiring harness electrical connector has been disconnected, position the front door back onto the front door hinges. Failure to follow this instruction may cause damage to the front door.**

   Position the front door onto the front door hinges.

Item 9 Front door wiring harness retaining clip

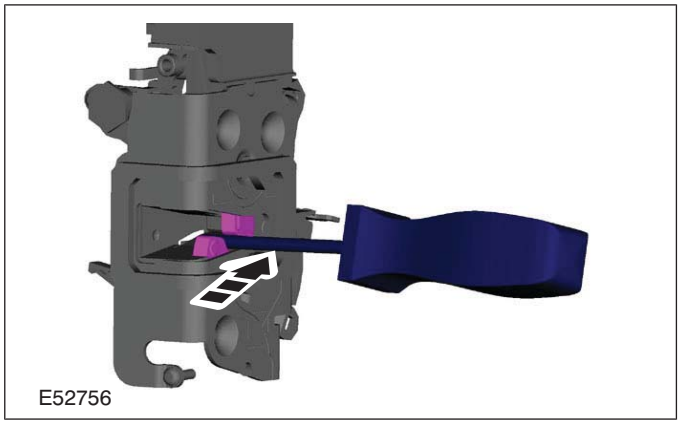
1. **Detach the front door wiring harness retaining clip from the front door.**



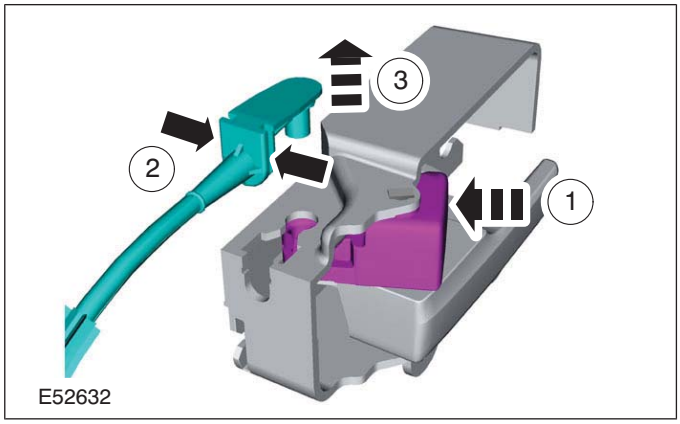
REMOVAL AND INSTALLATION

Item 10 Front door latch remote control cable

1. Using a suitable screwdriver, latch the front door lock into the closed position.

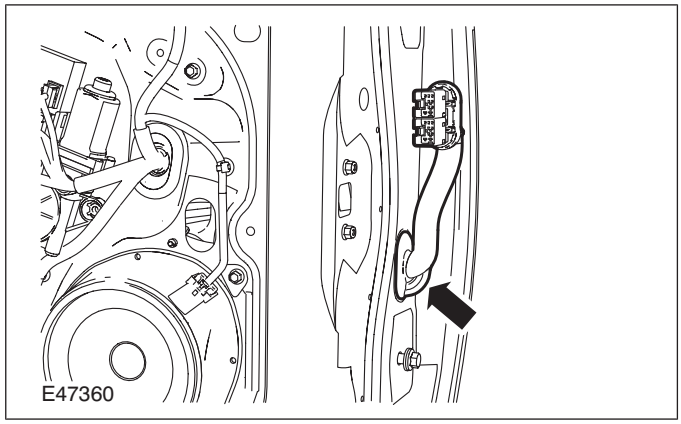


2. Detach the front door latch remote control cable from the front door latch remote control handle.
   1. Operate the door latch remote control handle lock to the lock position.
   2. Release the remote control cable retaining clips.
   3. Detach the inner remote control cable from the remote control handle lock lever.



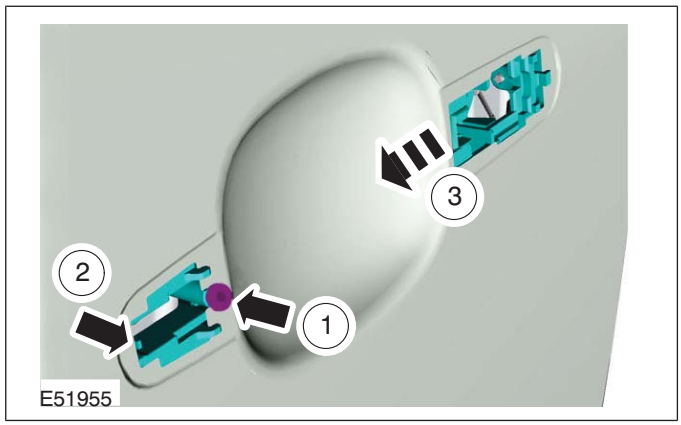
Item 11 Front door wiring harness

1. Detach and push the front door wiring harness into the front door.



Item 12 Front door lock actuator retaining screw

1. Detach the front door lock actuator.
   1. Loosen the front door lock actuator retaining screw.
   2. Release the front door lock actuator retaining clip.
   3. Slide the front door lock actuator towards the front of the vehicle.



Item 13 Front door inner panel

CAUTION: When removing the front door inner panel, care must be taken that the door wiring harness is not trapped or placed under excessive strain.

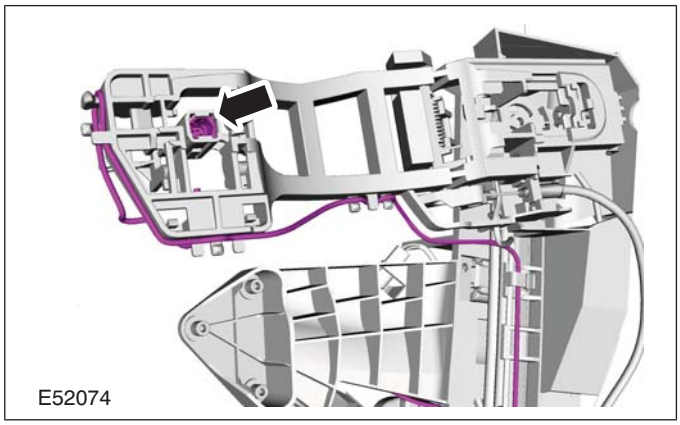
Item 14 Exterior front door handle RKE electrical connector

NOTE: Make a note of the clipping position of the exterior front door handle RKE harness.

1. Disconnect the front door handle RKE electrical connector and detach the wiring

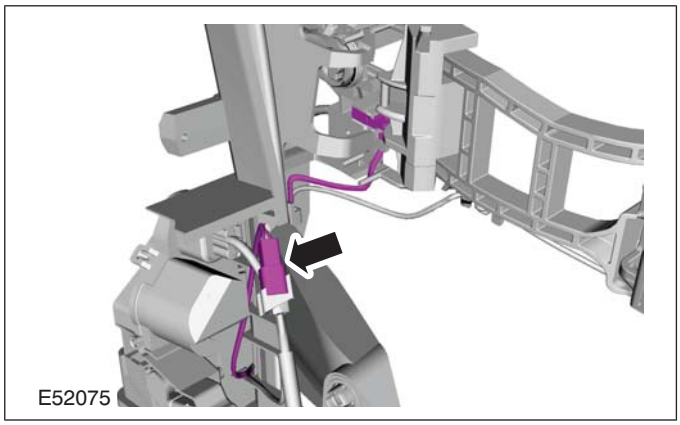
REMOVAL AND INSTALLATION

harness from the front door handle reinforcement.



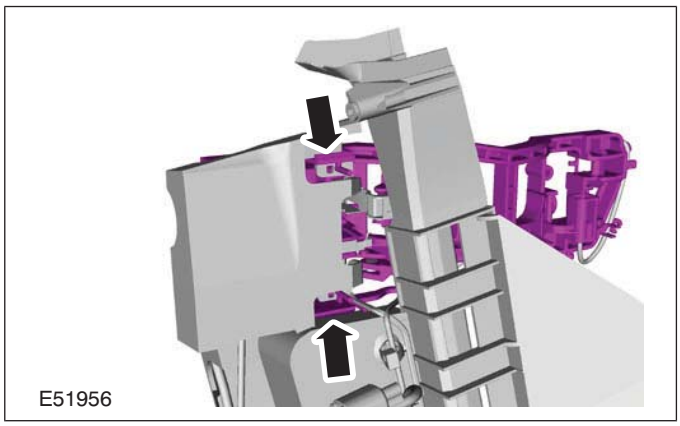
Item 15 Front door lock cylinder position sensor electrical connector

1. **Disconnect the front door lock cylinder position sensor electrical connector and detach the sensor harness from the retaining clips.**



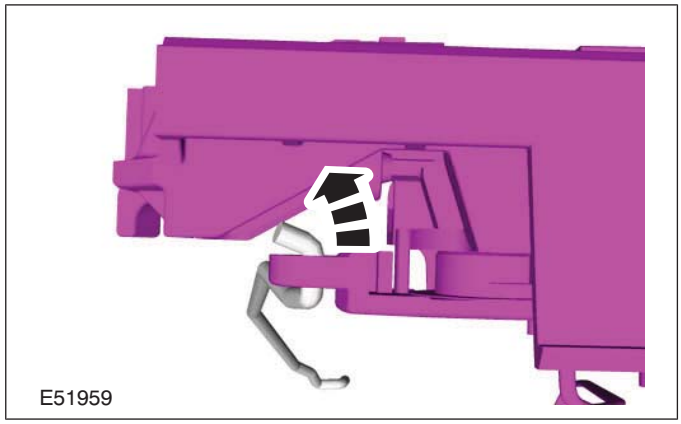
Item 16 Front door handle reinforcement

1. **Detach the front door handle reinforcement from the front door handle, lock and latch retaining bracket.**



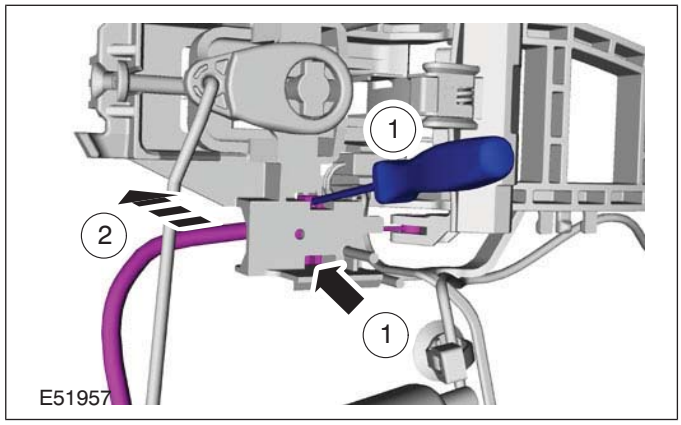
Item 17 Front door lock cylinder actuator rod

1. **Detach the front door lock cylinder actuator rod from the front door handle reinforcement.**



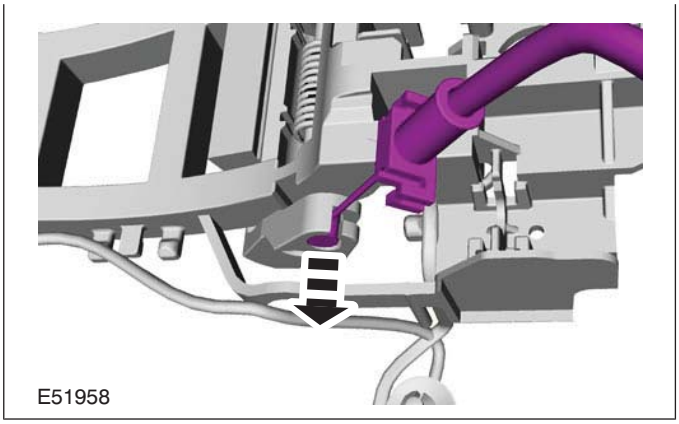
Item 18 Front door exterior handle remote control cable

1. **Detach the front door exterior handle remote control cable from the front door handle reinforcement.**
   1. Using a suitable flat blade screwdriver, release the front door exterior handle remote control cable retaining clips.
   2. Slide the front door exterior handle remote control cable off of the front door handle reinforcement retainers.



REMOVAL AND INSTALLATION

2. Align the front door exterior handle remote control inner cable with the slot in the front door handle reinforcement and remove.



Installation Details

Item 13 Front door inner panel

1. Before installing the front door inner panel retaining bolts, feed the door wiring harness electrical connector through the front door wiring harness hole.

Item 12 Front door lock actuator retaining screw

1. Install the front door lock actuator to the front door.
2. Tighten the front door lock actuator retaining screw.

Item 5 Door hinge retaining bolts

1. Apply a coating of adhesive to the door hinge retaining bolts.

REMOVAL AND INSTALLATION

Rear Door Lock Actuator

All vehicles

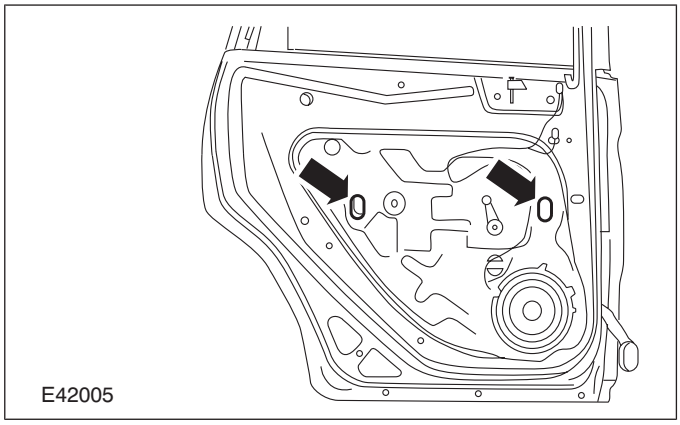
1. **Remove the rear door trim panel.**

   For additional information, refer to: Rear Door Trim Panel - Vehicles With: Manual Windows (501-05 Interior Trim and Ornamentation, Removal and Installation) / Rear Door Trim Panel - Vehicles With: Power Windows (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. **Remove the exterior rear door handle.**

   For additional information, refer to: Exterior Rear Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

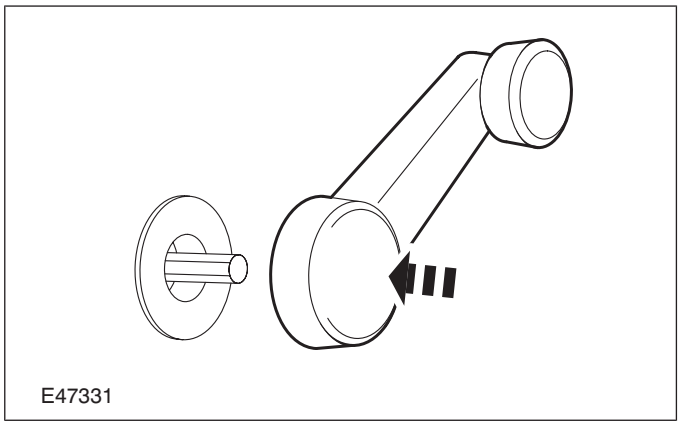
3. **Remove the rear door window regulator grommets.**



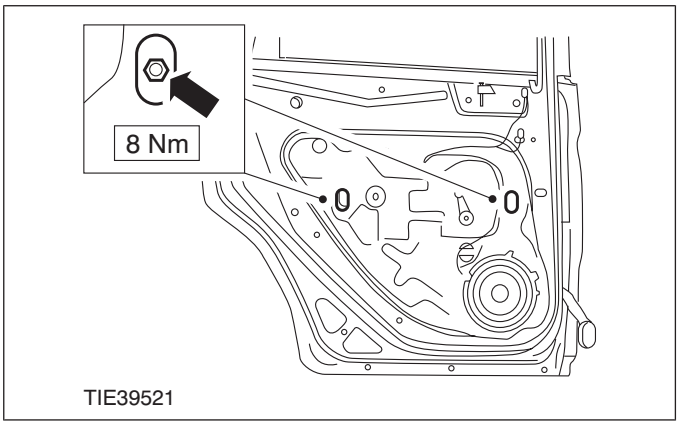
Vehicles with manual windows

4. **Install the window regulator handle.**

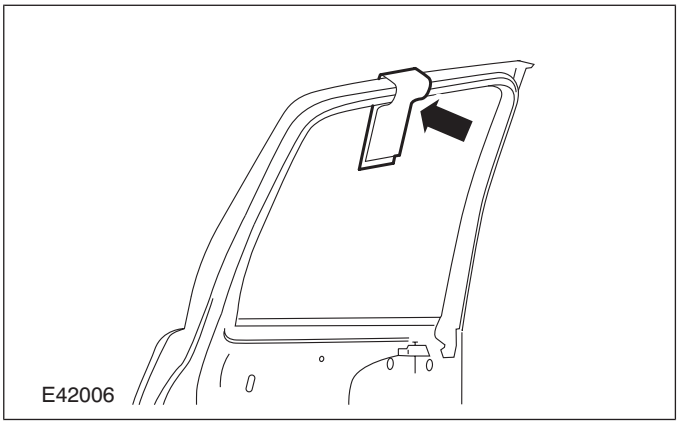
   - Using the rear door window regulator handle, align the window glass clamp bolts with the access holes.



5. **Loosen the rear door window glass clamp bolts.**



6. **Raise the rear door window glass.**
7. **Using suitable tape, secure the rear door window glass to the rear door.**



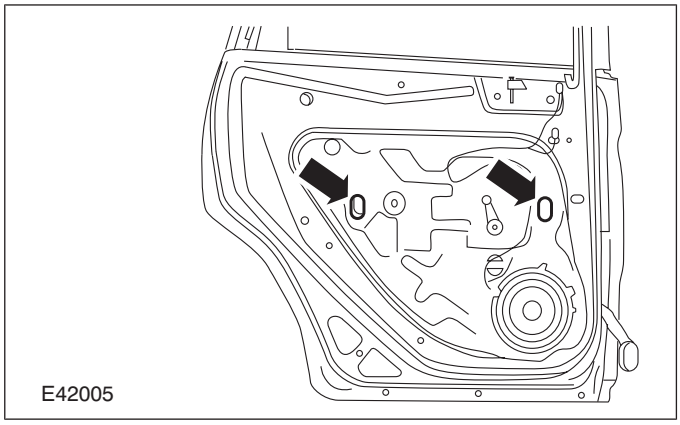
Vehicles with power windows

8. **Connect the battery ground cable.**

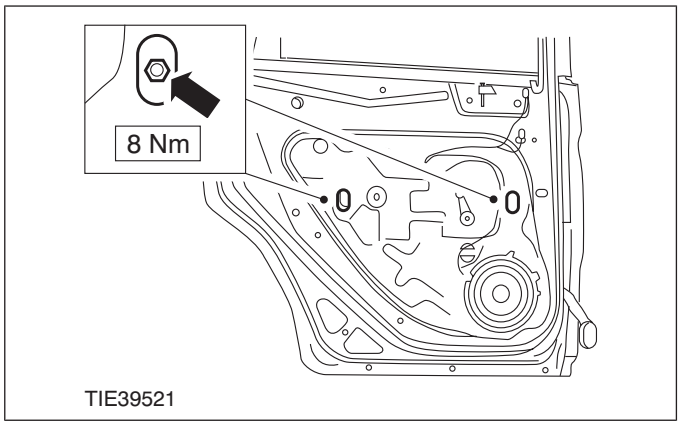
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

REMOVAL AND INSTALLATION

9. Using the front door power window control unit, align the rear door window glass clamp bolts with the access holes.

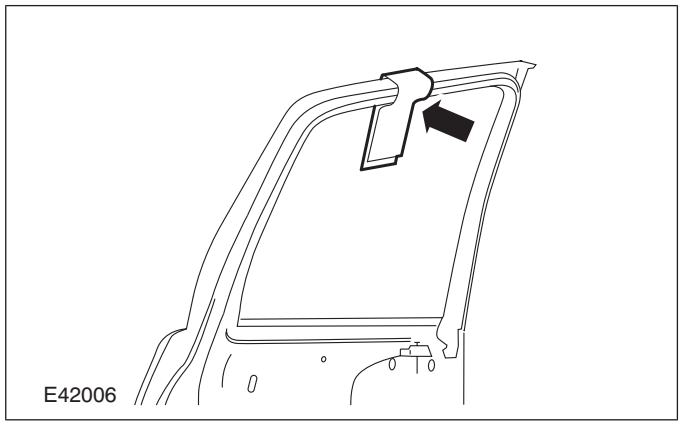


10. Loosen the rear door window glass clamp bolts.



11. Raise the rear door window glass.

12. Using suitable tape, secure the rear door window glass to the rear door.

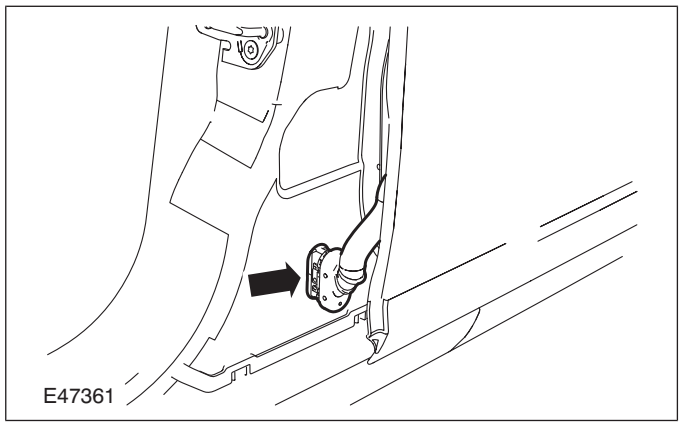


13. Disconnect the battery ground cable.

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

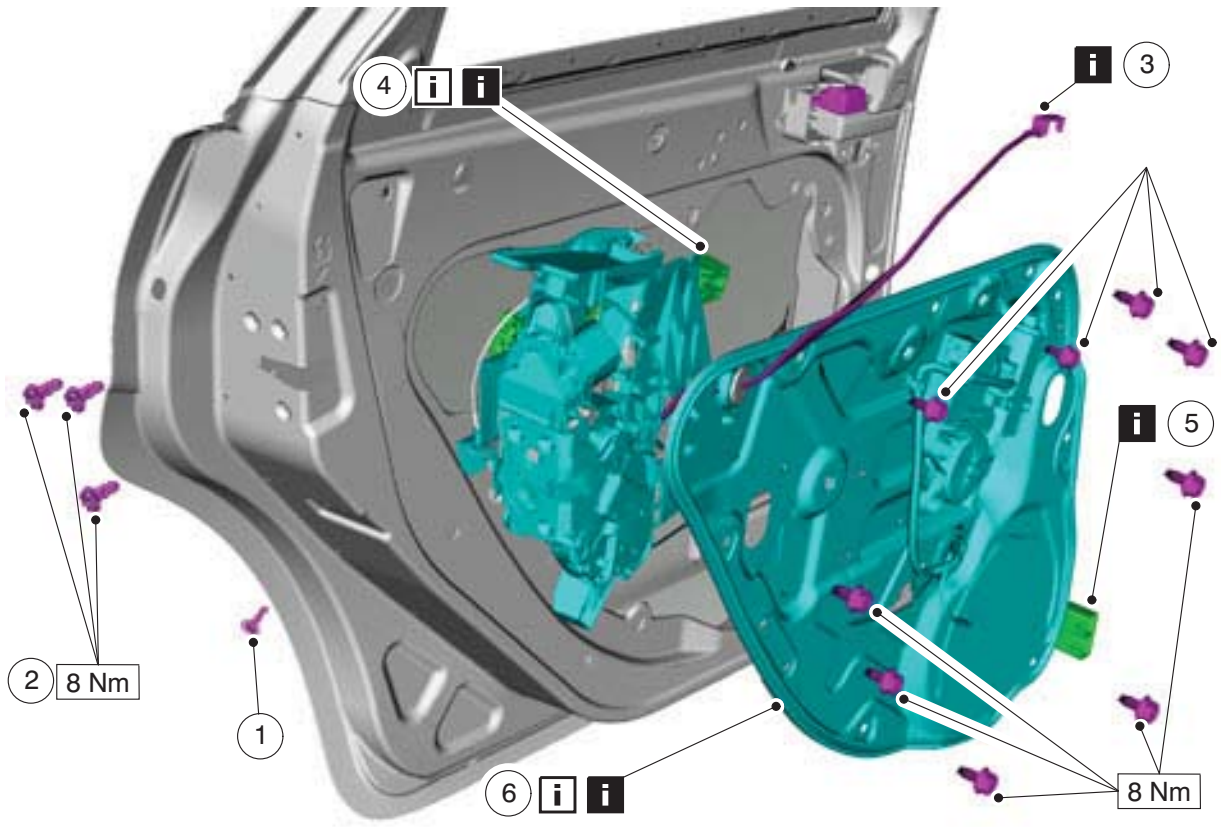
All vehicles

14. Detach and disconnect the rear door wiring harness.



15. Remove the components in the order indicated in the following illustration(s) and table(s).

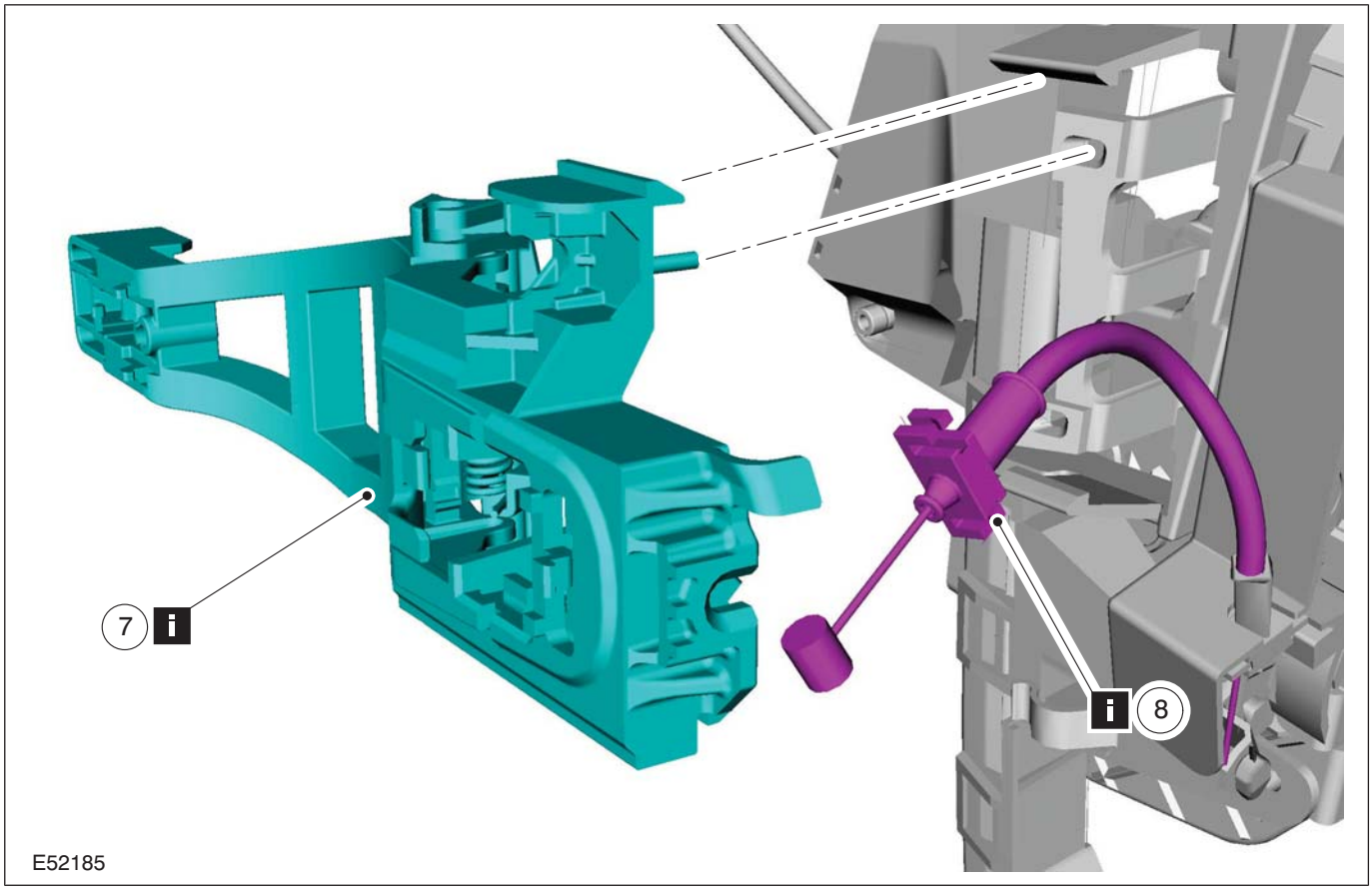
REMOVAL AND INSTALLATION



Item	Description
1	Rear door latch bracket retaining screw
2	Rear door latch retaining bolts
3	Rear door latch remote control cable See Removal Detail
4	Rear door lock actuator retaining screw See Removal Detail See Installation Detail

Item	Description
5	Rear door wiring harness See Removal Detail
6	Rear door inner panel See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



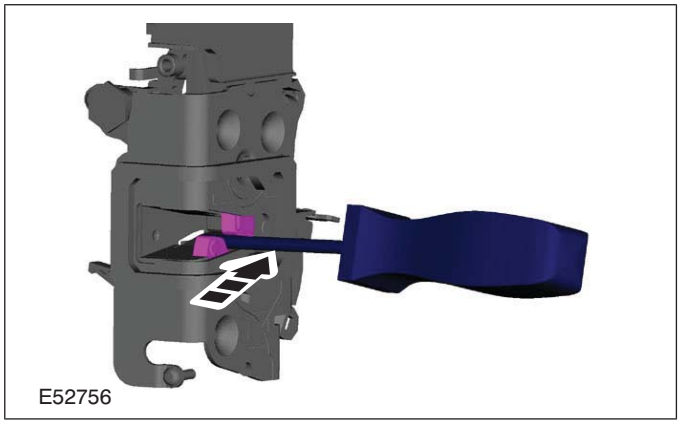
Item	Description
7	Rear door lock actuator See Removal Detail
8	Exterior rear door handle remote control cable See Removal Detail

16. To install, reverse the removal procedure.

Removal Details

Item 3 Rear door latch remote control cable

1. Using a suitable screwdriver, latch the rear door lock into the closed position.

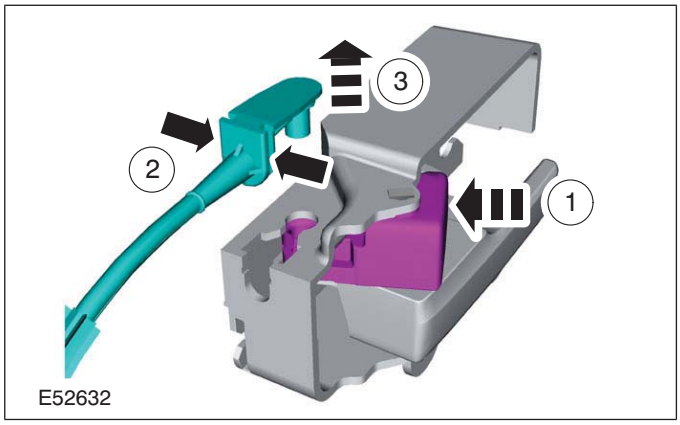


2. Detach the rear door latch remote control cable from the rear door latch remote control handle.

1. Operate the door latch remote control handle lock to the lock position.
2. Release the remote control cable retaining clips.

REMOVAL AND INSTALLATION

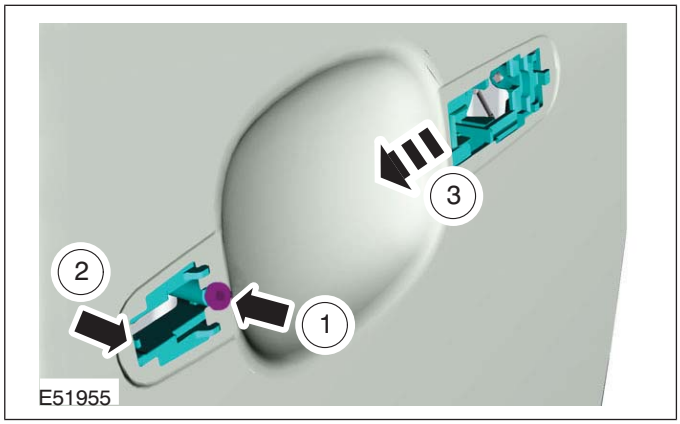
3. Detach the inner remote control cable from the remote control handle lock lever.



Item 4 Rear door lock actuator retaining screw

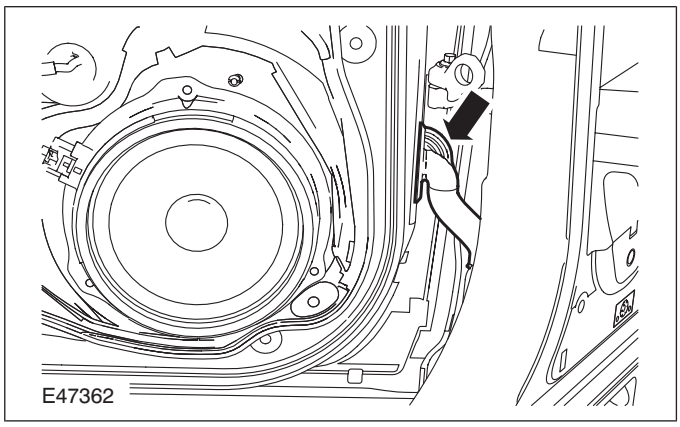
1. Detach the rear door lock actuator.

1. Loosen the door lock actuator retaining screw.
2. Release the door lock actuator retaining clip.
3. Slide the door lock actuator towards the front of the vehicle.



Item 5 Rear door wiring harness

1. Detach and push the rear door wiring harness into the rear door.



Item 6 Rear door inner panel

CAUTION: When removing the front door inner panel, do not trap or place excessive strain on the door wiring harness.

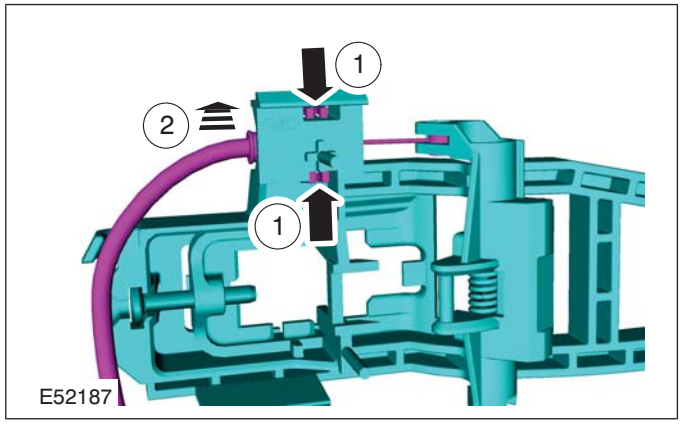
Item 7 Rear door lock actuator

1. Detach the rear door lock actuator from the latch support bracket.

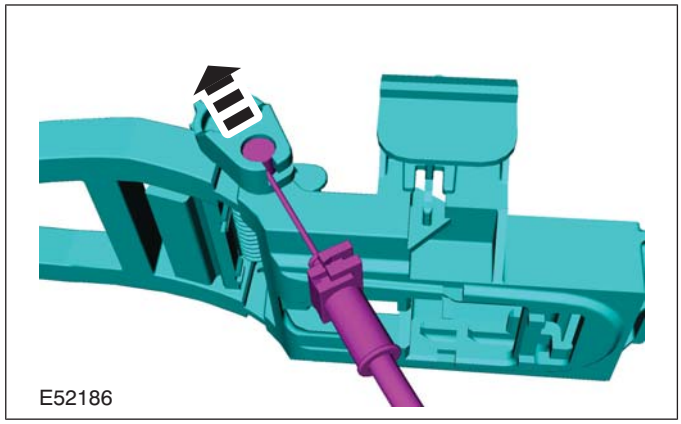
Item 8 Exterior rear door handle remote control cable

1. Detach the exterior rear door handle remote control cable from the rear door lock actuator.

1. Using a suitable flat blade screwdriver, release the exterior rear door handle remote control cable retaining clips.
2. Slide the exterior rear door handle remote control cable off the rear door lock actuator retainers.



2. Align the exterior rear door handle remote control inner cable with the slot in the door lock actuator and remove.



REMOVAL AND INSTALLATION

Installation Details

Item 6 Rear door inner panel

1. Before installing the rear door inner panel retaining bolts, feed the door wiring harness electrical connector through the rear door wiring harness hole.

Item 4 Rear door lock actuator retaining screw

1. Install the rear door lock actuator to the rear door.
2. Tighten the rear door lock actuator retaining screw.

REMOVAL AND INSTALLATION

Rear Door Latch

General Equipment

Electric hand drill
Rivet gun

All vehicles

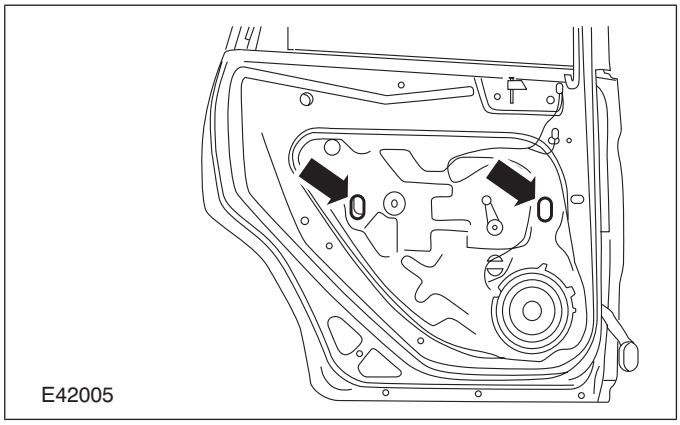
1. **Remove the rear door trim panel.**

   For additional information, refer to: Rear Door Trim Panel - Vehicles With: Manual Windows (501-05 Interior Trim and Ornamentation, Removal and Installation) / Rear Door Trim Panel - Vehicles With: Power Windows (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. **Remove the exterior rear door handle.**

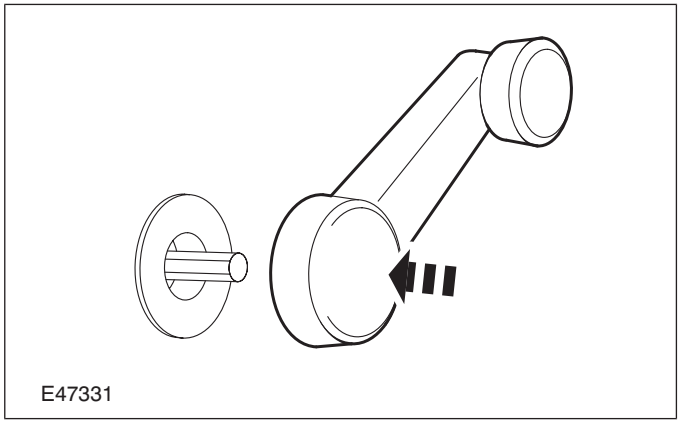
   For additional information, refer to: Exterior Rear Door Handle (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. **Remove the rear door window regulator grommets.**

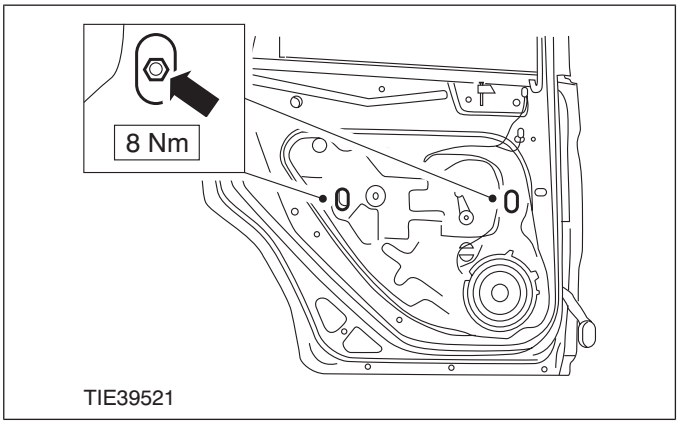


Vehicles with manual windows

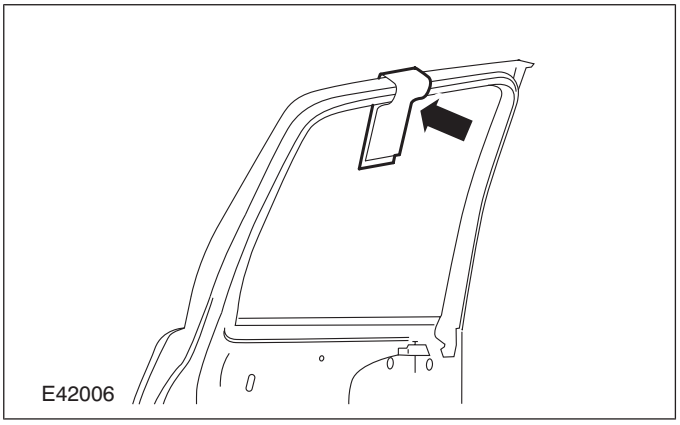
4. **Install the window regulator handle.**



5. **Loosen the rear door window glass clamp bolts.**
   - Using the rear door window regulator handle , align the window glass clamp bolts with the access holes.



6. **Raise the rear door widow glass.**
7. **Using suitable tape, support the rear door window glass to the rear door.**



Vehicles with power windows

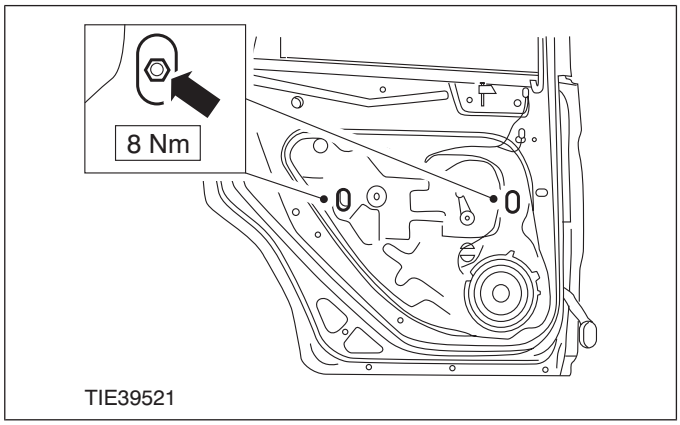
8. **Connect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

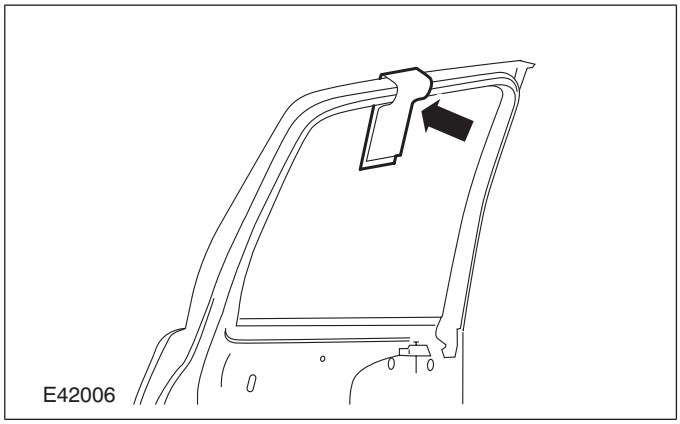
9. **Loosen the rear door window glass clamp bolts.**

REMOVAL AND INSTALLATION

- Using the front door power window control unit, align the window glass clamp bolts with the access holes.



10. **Raise the rear door widow glass.**
11. **Using suitable tape, support the rear door window glass to the rear door.**

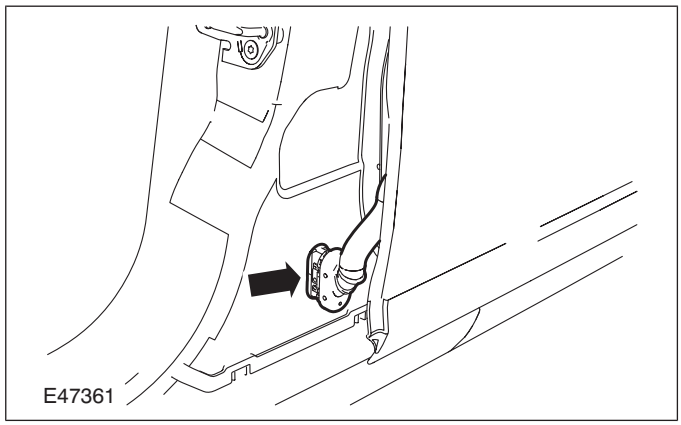


12. **Disconnect the battery ground cable.**

    For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

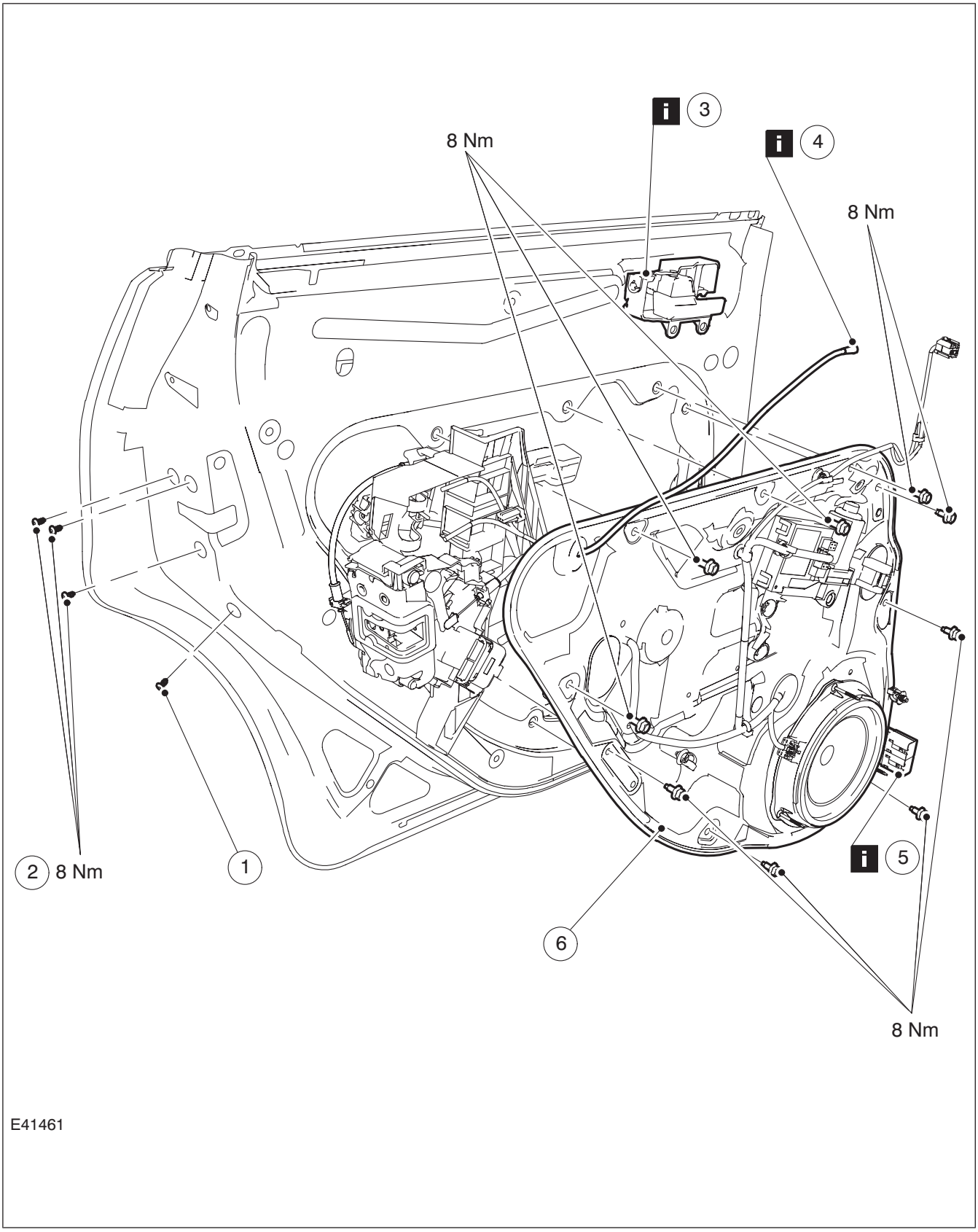
All vehicles

13. **Detach and disconnect the rear door wiring harness.**



14. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



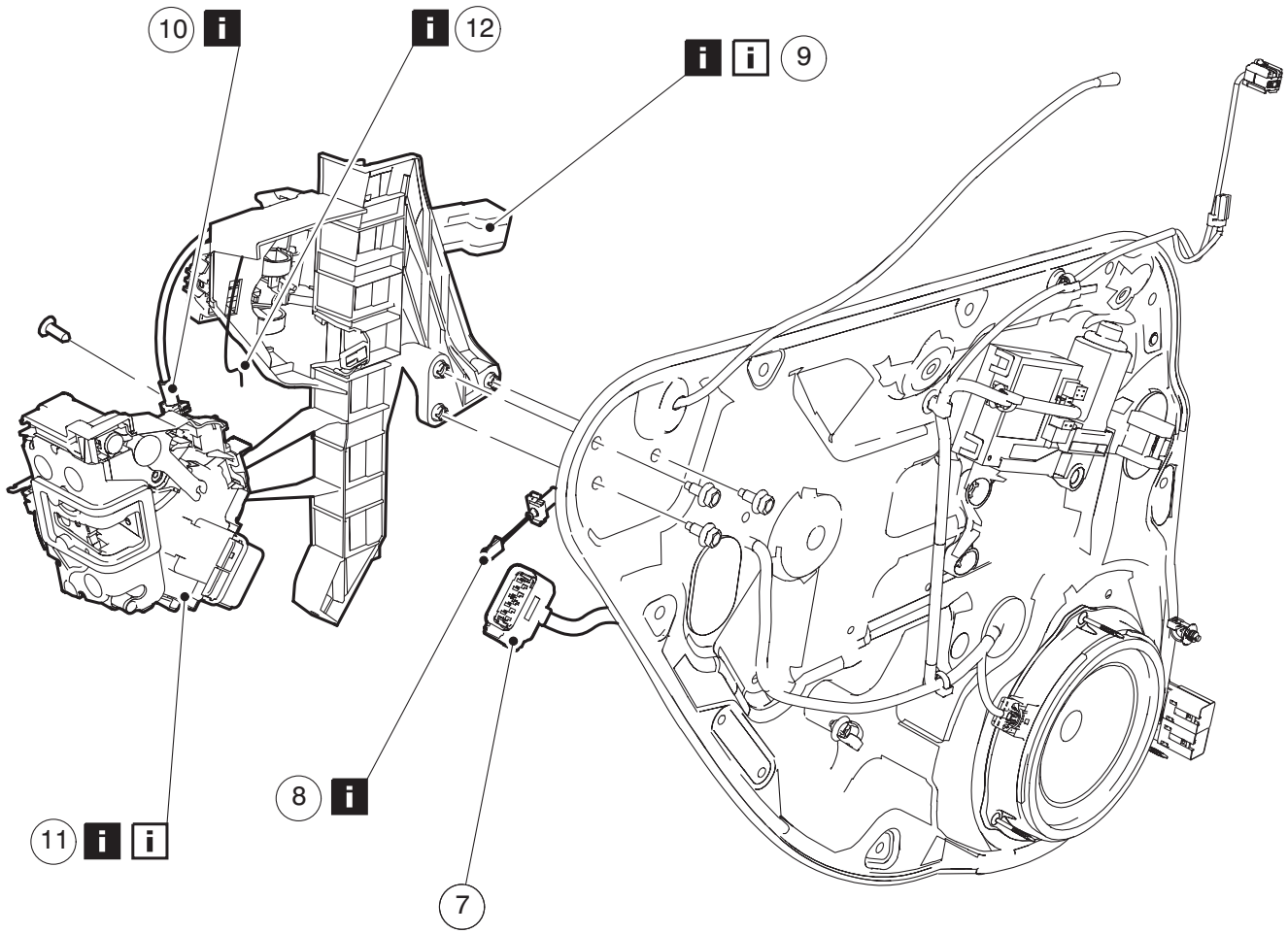
Item	Description
1	Rear door latch bracket retaining screw
2	Rear door latch retaining bolts

Item	Description
3	Rear door latch remote control handle lock See Removal Detail

REMOVAL AND INSTALLATION

Item	Description
4	Rear door latch remote control cable See Removal Detail

Item	Description
5	Rear door wiring harness See Removal Detail
6	Rear door inner panel



E41462

Item	Description
7	Rear door latch electrical connector
8	Rear door latch remote control cable See Removal Detail

Item	Description
9	Rear door handle, lock and latch retaining bracket See Removal Detail See Installation Detail
10	Rear exterior door handle remote control See Removal Detail

REMOVAL AND INSTALLATION

Item	Description
11	Rear door latch See Removal Detail See Installation Detail
12	Rear door latch remote control handle actuator rod See Removal Detail

15. To install, reverse the removal procedure.
16. Initialize the door window motors.

    For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

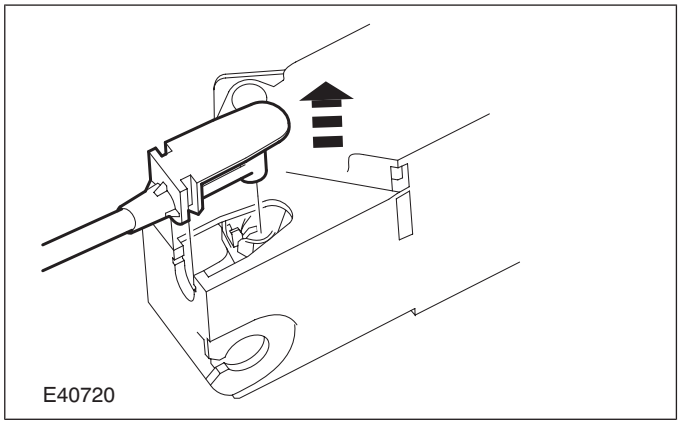
Removal Details

Item 3 Rear door latch remote control handle lock

1. Operate the door latch remote control handle lock to the lock position.

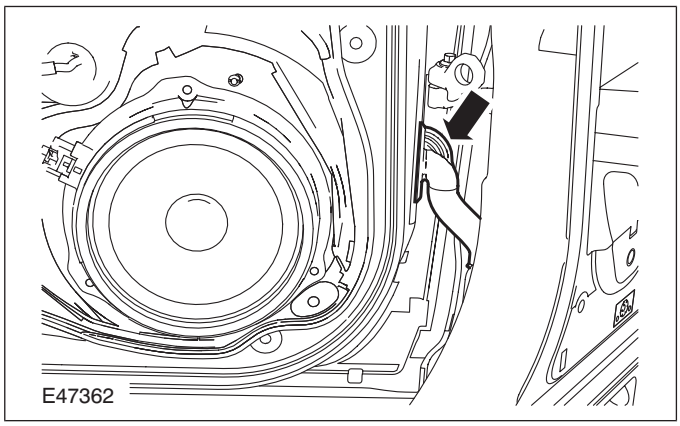
Item 4 Rear door latch remote control cable

1. Disconnect the rear door latch remote control cable from the rear door latch remote control.



Item 5 Rear door wiring harness

1. Detach and push the rear door wiring harness into the rear door.



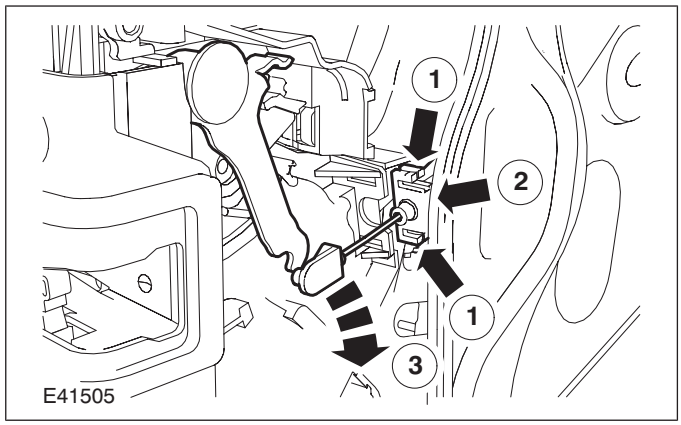
Item 8 Rear door latch remote control cable

1. NOTE: Do not kink the rear door latch remote control cable.

NOTE: In order to remove the rear door latch remote control cable from the rear door latch lever the cable must be rotated.

Disconnect the rear door latch remote control cable from the rear door latch.

1. Using a suitable screwdriver, detach the rear door latch remote control cable locking tangs from the rear door latch.
2. Detach the rear door latch remote control outer cable from the rear door latch.
3. Rotate the rear door latch remote control cable.



Item 9 Rear door handle, lock and latch retaining bracket

1. Using a suitable Electric hand drill remove the rear door handle, lock and latch retaining bracket rivets.

Item 10 Rear exterior door handle remote control

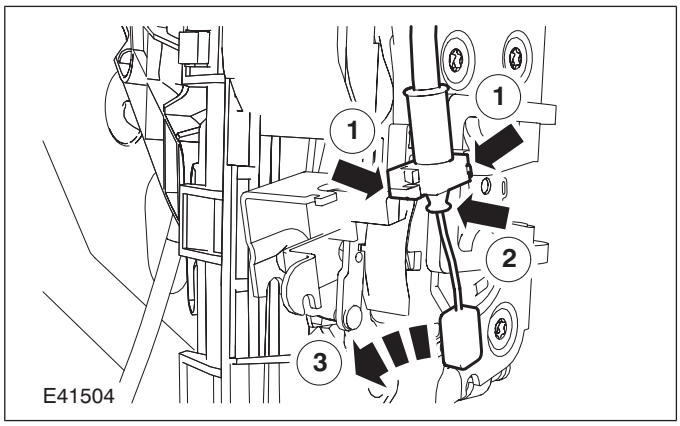
1. NOTE: Do not kink the rear exterior door handle remote control cable.

REMOVAL AND INSTALLATION

NOTE: In order to remove the rear exterior door handle remote control cable from the rear door latch lever the cable must be rotated.

Disconnect the rear exterior door handle remote control cable from the rear door latch.

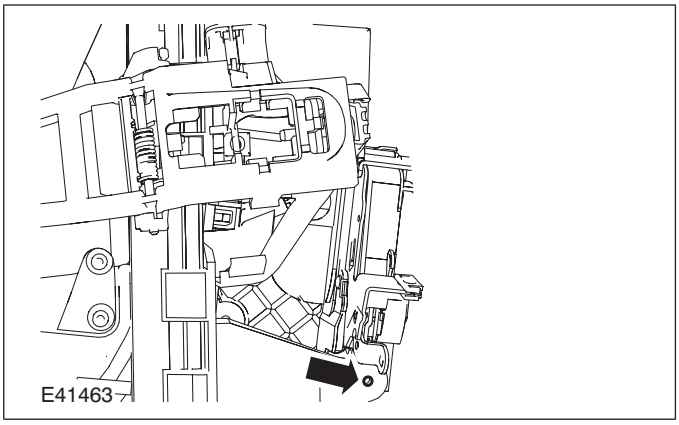
1. Using a suitable screwdriver, detach the rear exterior door handle remote control outer cable locking tangs from the rear door latch.
2. Detach the rear exterior door handle remote control cable from the rear door latch.
3. Rotate the rear exterior door handle remote control cable.



Item 11 Rear door latch

1. Detach the rear door latch.

- Using a suitable Electric hand drill remove the rear door latch rivet.



Item 12 Rear door latch remote control handle actuator rod

1. Remove the rear door latch.

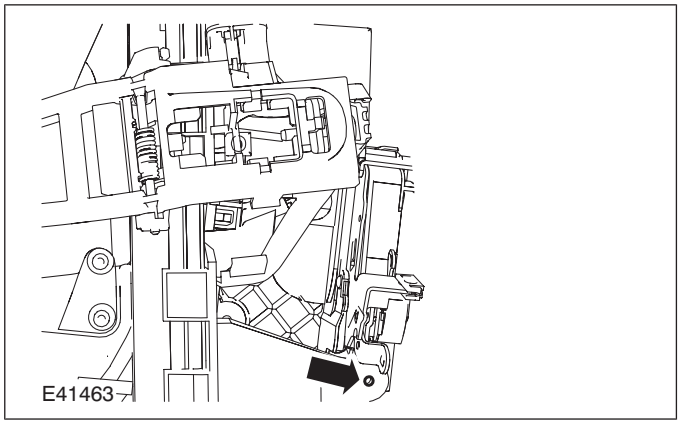
1. Detach the rear door latch remote control handle actuator rod from the front door latch.

Installation Details

Item 11 Rear door latch

1. Install the rear door latch.

- Using a suitable Rivet gun install the rear door latch rivet.



Item 9 Rear door handle, lock and latch retaining bracket

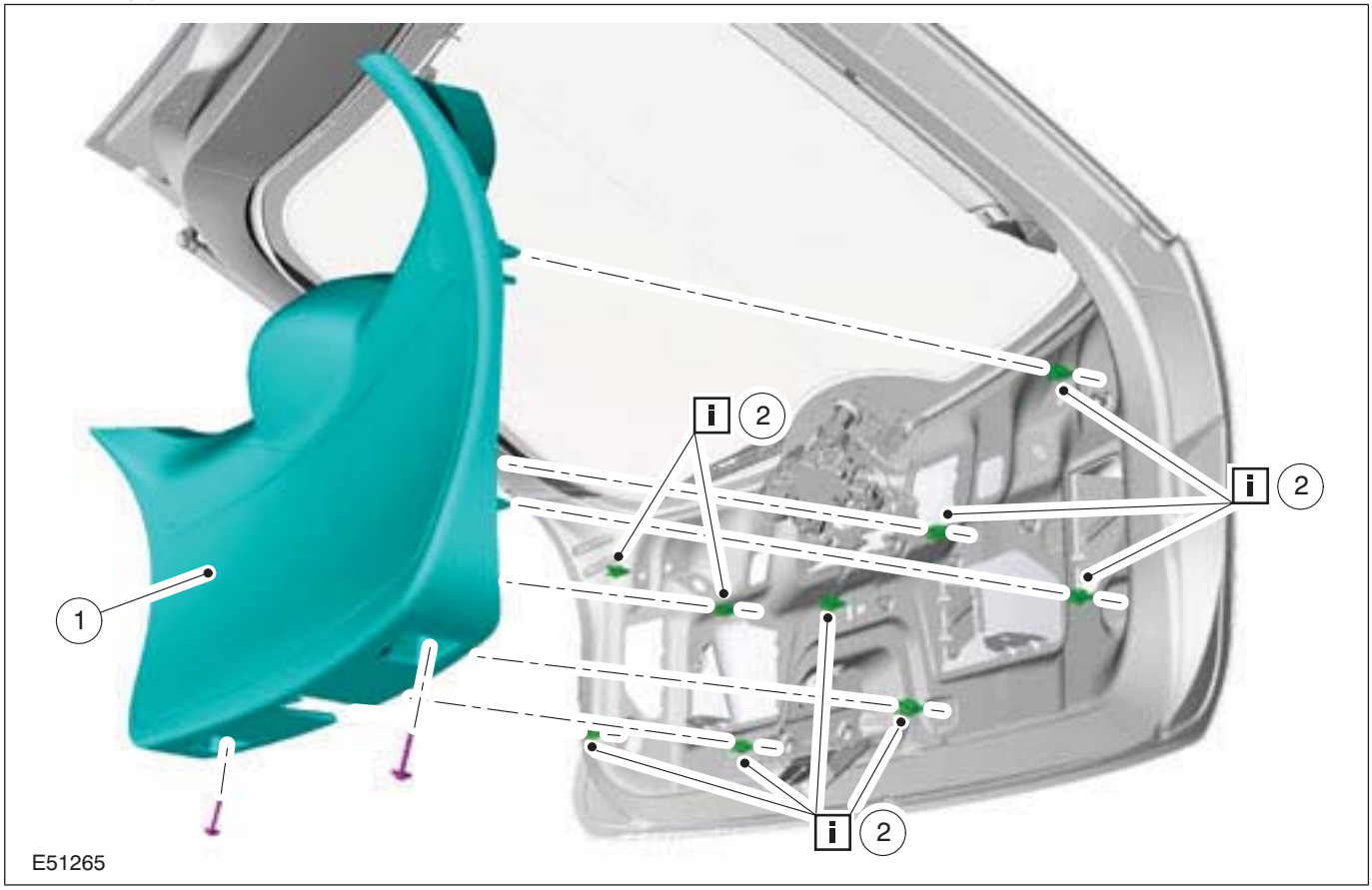
1. Align the rear door handle, lock and latch retaining bracket to the rear door inner panel.

- Using suitable screws attach the rear door handle, lock and latch retaining bracket to the rear door inner panel.

REMOVAL AND INSTALLATION

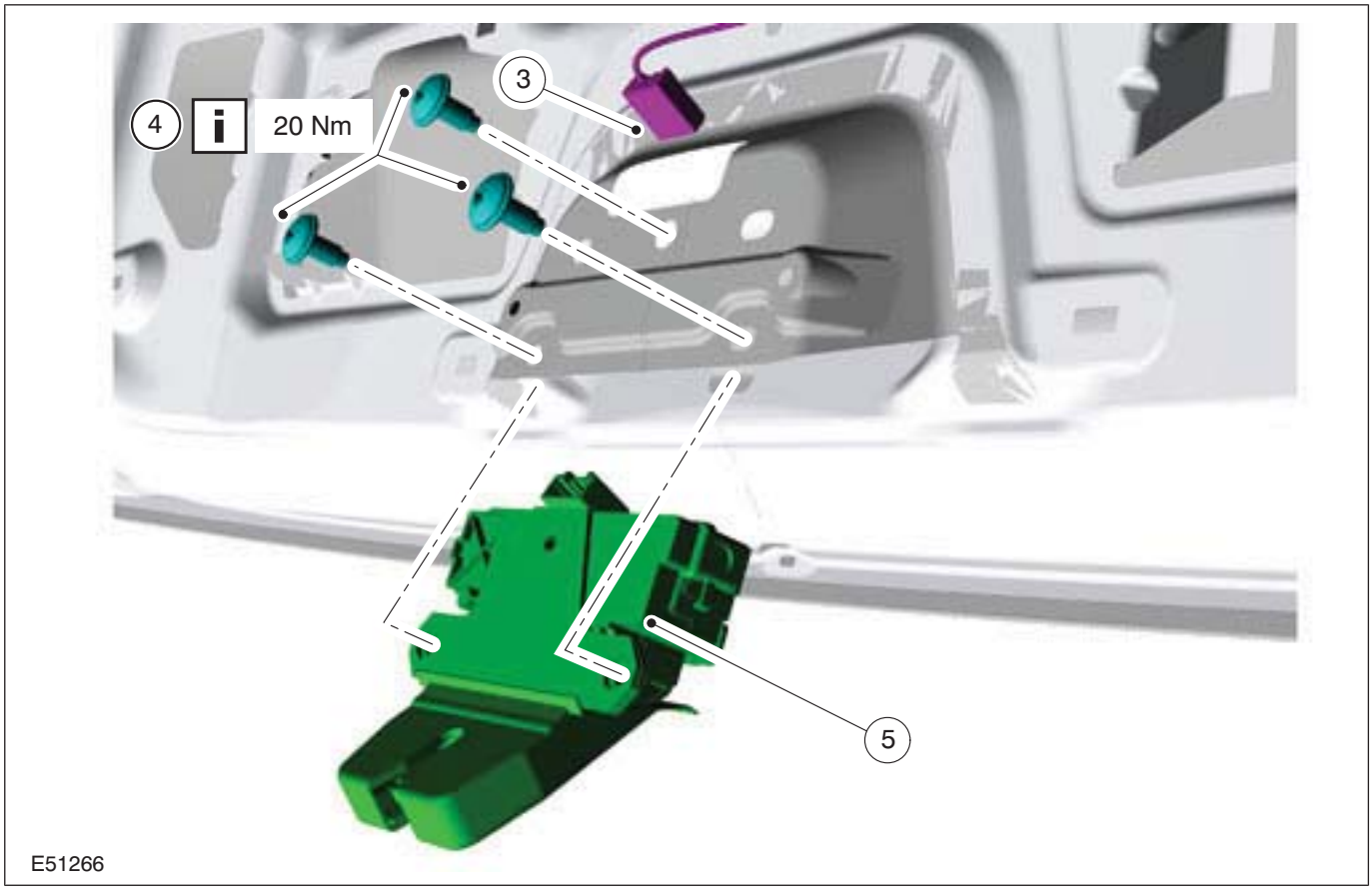
Liftgate Latch — 3-Door/5-Door

1. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Liftgate trim panel
2	Liftgate trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



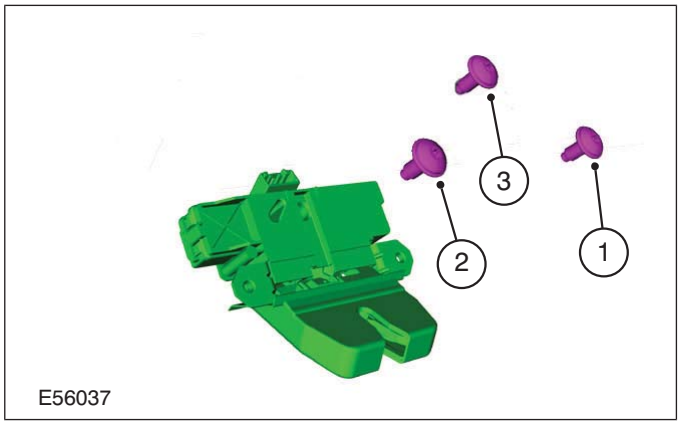
Item	Description
3	Liftgate latch electrical connector
4	Liftgate latch retaining bolts See Installation Detail
5	Liftgate latch

2. To install, reverse the removal procedure.

Installation Details

Item 4 Liftgate latch retaining bolts

1. Install the liftgate latch retaining bolts finger tight in the order shown.



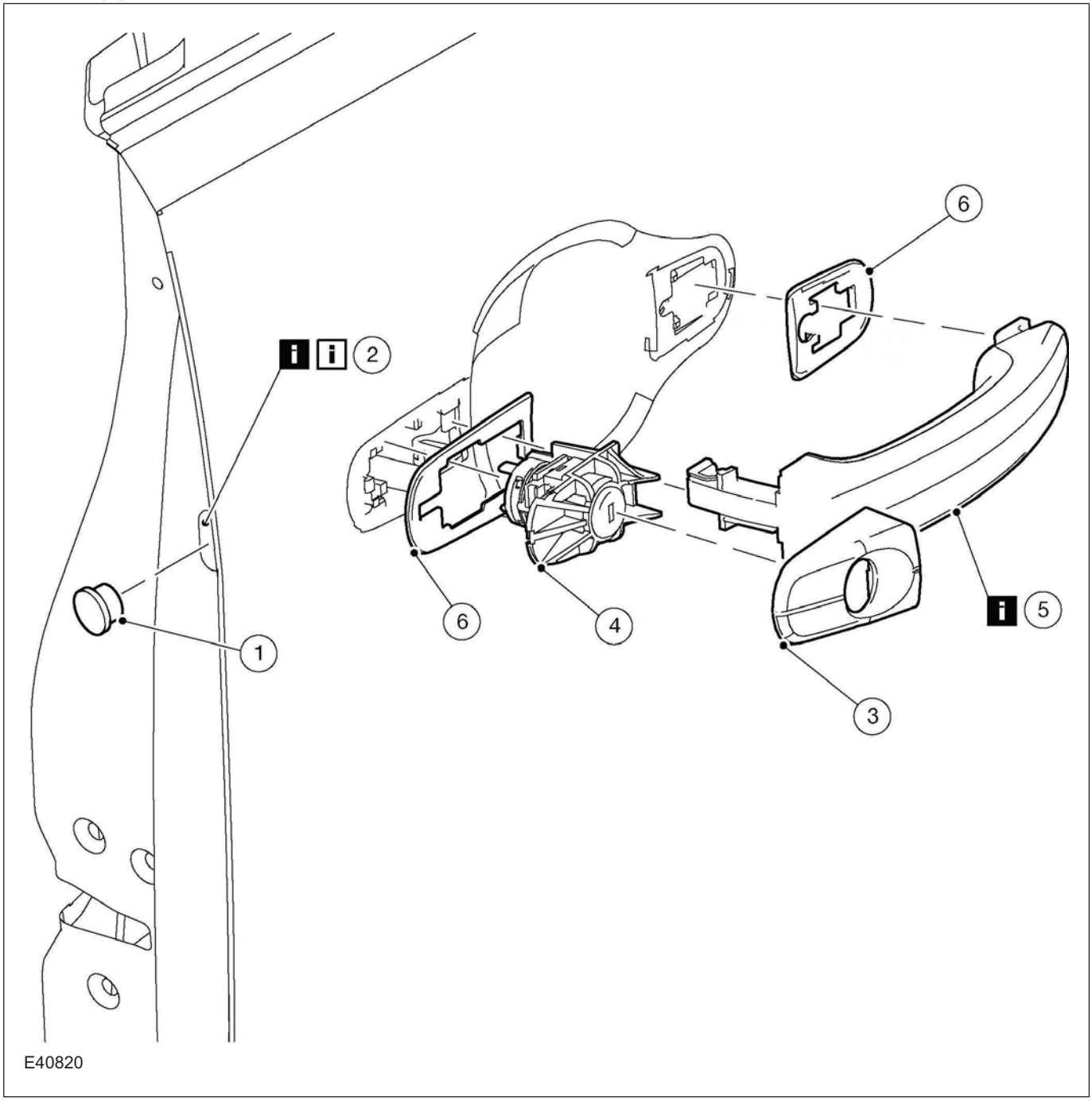
Item 2 Liftgate trim panel retaining clips

1. Install the liftgate trim panel retaining clips to the liftgate trim panel before installing to the liftgate.

REMOVAL AND INSTALLATION

Exterior Front Door Handle

1. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Exterior front door handle retaining screw grommet
2	Exterior front door handle retaining screw See Removal Detail See Installation Detail

Item	Description
3	Exterior front door handle trim
4	Door lock cylinder
5	Exterior front door handle See Removal Detail
6	Exterior front door handle seals

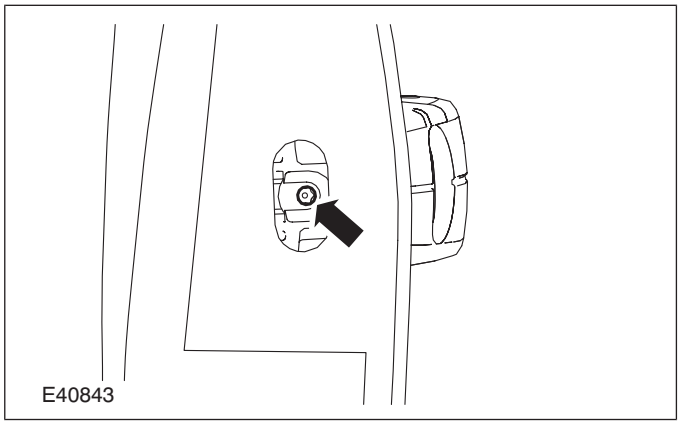
REMOVAL AND INSTALLATION

2. To install, reverse the removal procedure.

Removal Details

Item 2 Exterior front door handle retaining screw

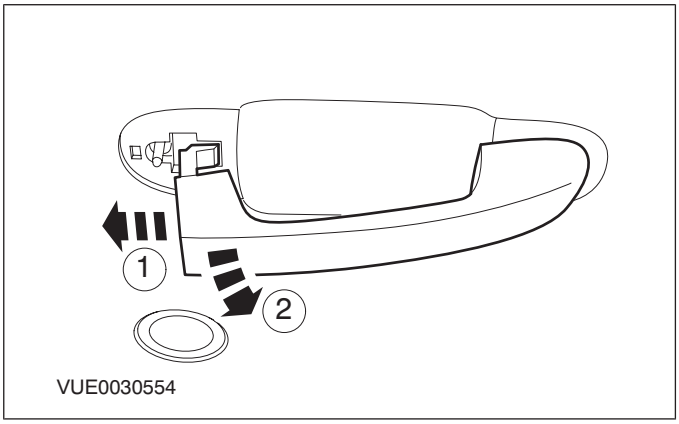
1. Loosen the exterior front door handle retaining screw.



Item 5 Exterior front door handle

1. Remove the exterior front door handle.

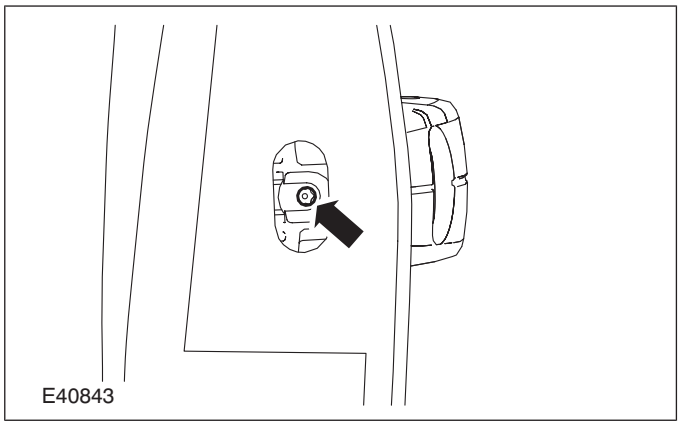
1. Slide the exterior front door handle rearwards to disengage it from the exterior front door handle bracket.
2. Remove the exterior front door handle.



Installation Details

Item 2 Exterior front door handle retaining screw

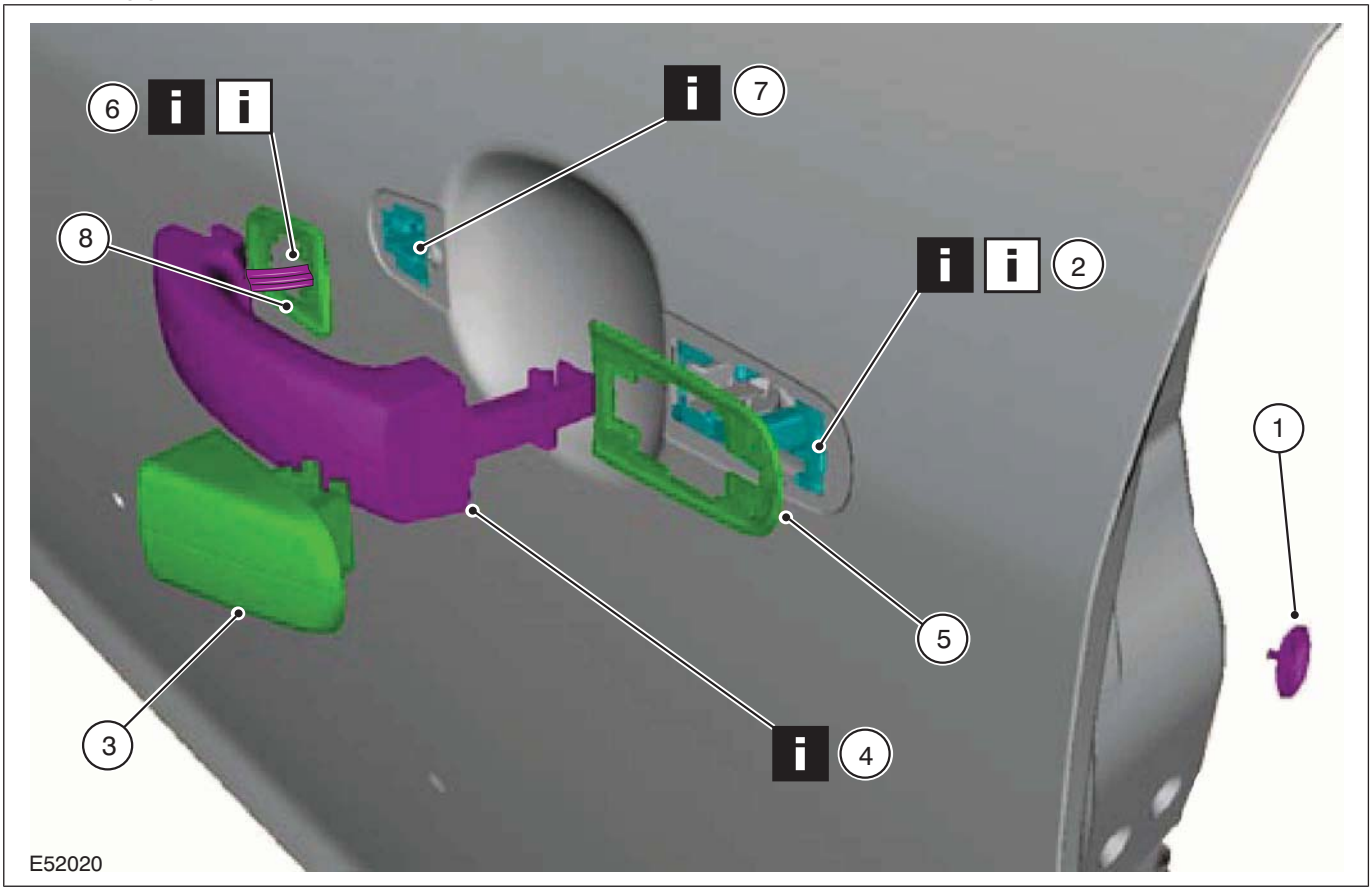
1. Tighten the exterior front door handle retaining screw.



REMOVAL AND INSTALLATION

Exterior Front Door Handle — Vehicles With: Keyless Vehicle System

1. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Exterior front door handle retaining screw grommet
2	Exterior front door handle retaining screw See Removal Detail See Installation Detail
3	Exterior front door handle bezel
4	Exterior front door handle See Removal Detail
5	Exterior front door handle gasket

Item	Description
6	Exterior front door handle antenna wiring harness See Removal Detail See Installation Detail
7	Exterior front door handle antenna electrical connector See Removal Detail
8	Exterior front door handle seal

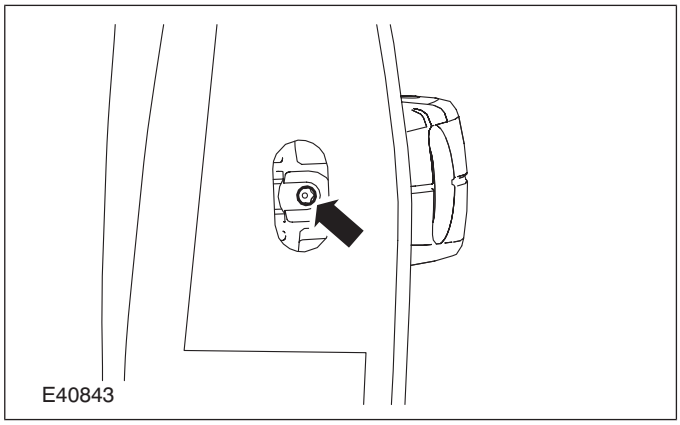
2. To install, reverse the removal procedure.

Removal Details

REMOVAL AND INSTALLATION

Item 2 Exterior front door handle retaining screw

1. **Loosen the exterior front door handle retaining screw until the exterior front door handle bezel can be removed.**

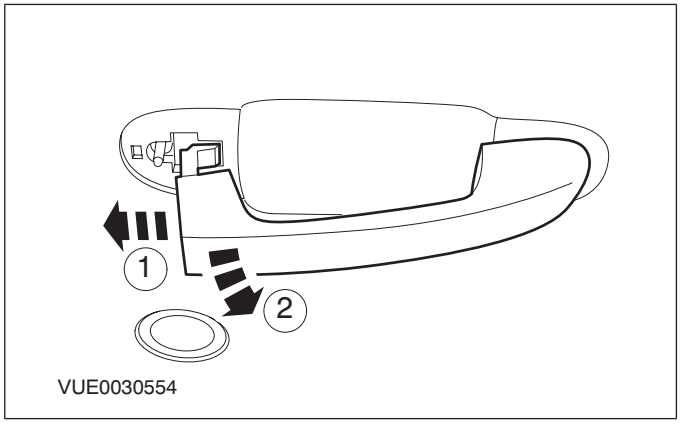


Item 4 Exterior front door handle

1. **NOTE: Do not place excessive strain on exterior front door handle antenna wiring harness.**

   Detach the exterior front door handle.

   1. Slide the exterior front door handle rearwards to disengage it from the exterior front door handle bracket.
   2. Detach the exterior front door handle.



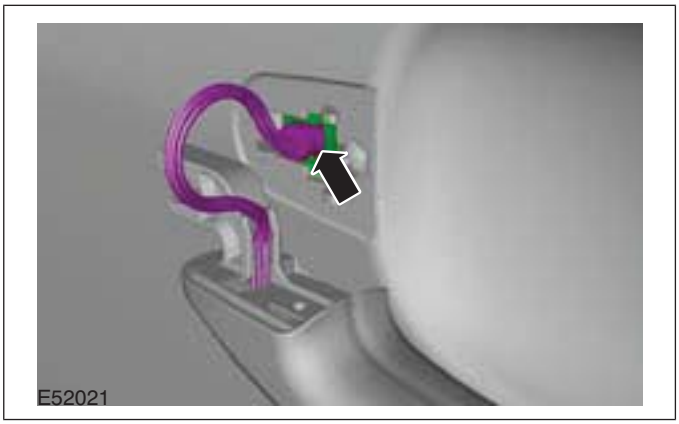
Item 6 Exterior front door handle antenna wiring harness

NOTE: Do not place excessive strain on the exterior front door handle antenna wiring harness.

1. **Pull the exterior front door handle antenna wiring harness until an audible click is heard and the exterior front door handle antenna wiring harness electrical connector is in the horizontal position.**

Item 7 Exterior front door handle antenna electrical connector

1. **Disconnect the exterior front door handle antenna electrical connector from the exterior front door handle antenna electrical connector and holder.**



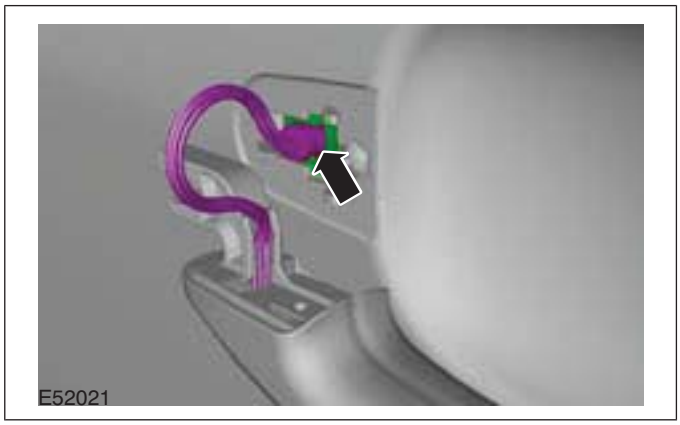
Installation Details

Item 6 Exterior front door handle antenna wiring harness

1. **Lift and push the exterior front door handle antenna wiring harness electrical into the**

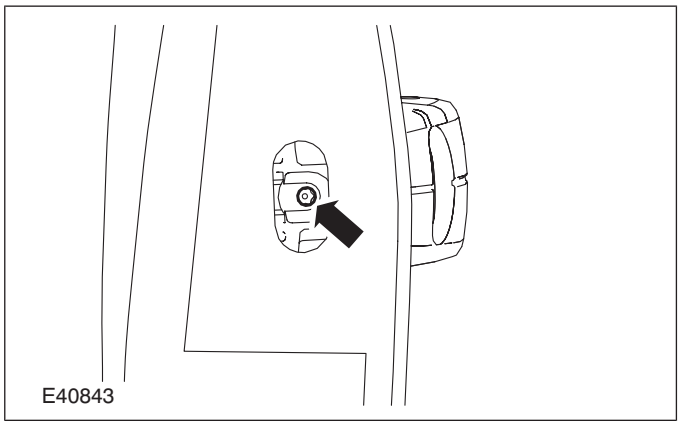
REMOVAL AND INSTALLATION

exterior front door handle antenna electrical connector and holder.



Item 2 Exterior front door handle retaining screw

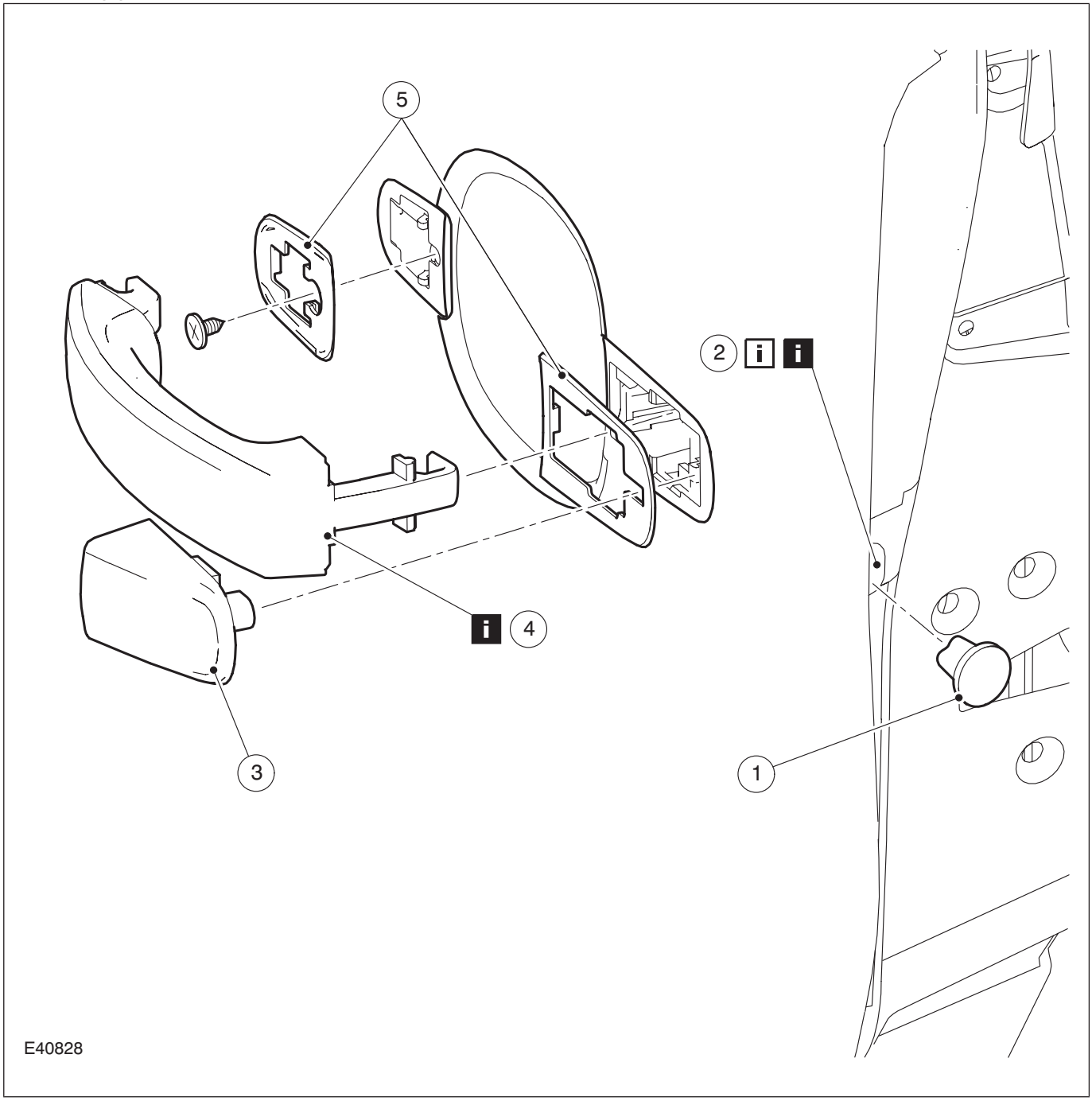
1. **Tighten the exterior front door handle retaining screw.**



REMOVAL AND INSTALLATION

Exterior Rear Door Handle

1. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Exterior rear door handle retaining screw grommet
2	Exterior rear door handle retaining screw See Removal Detail See Installation Detail

Item	Description
3	Exterior rear door handle trim
4	Exterior rear door handle See Removal Detail
5	Exterior front door handle seals

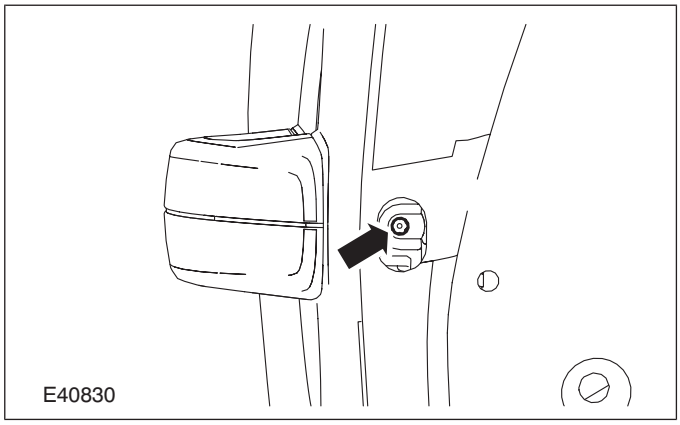
2. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Removal Details

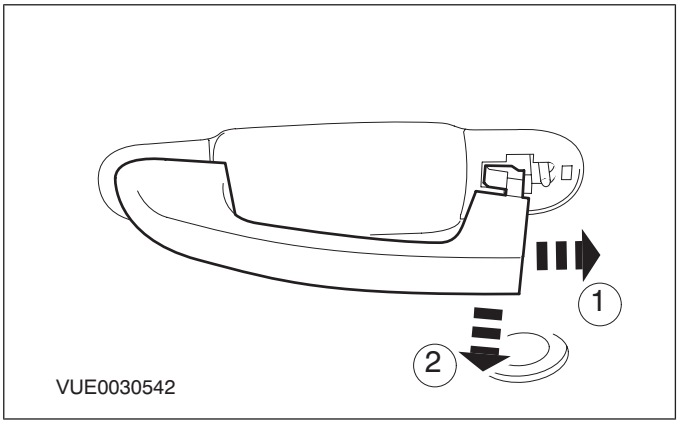
Item 2 Exterior rear door handle retaining screw

1. **Loosen the exterior rear door handle retaining screw.**



Item 4 Exterior rear door handle

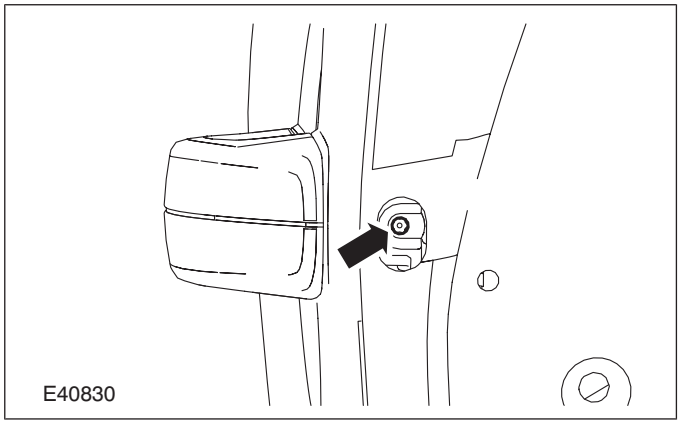
1. **Remove the exterior rear door handle.**
   1. Slide the exterior rear door handle towards the rear of the vehicle to disengage it from the exterior rear door handle bracket.
   2. Remove the exterior rear door handle.



Installation Details

Item 2 Exterior rear door handle retaining screw

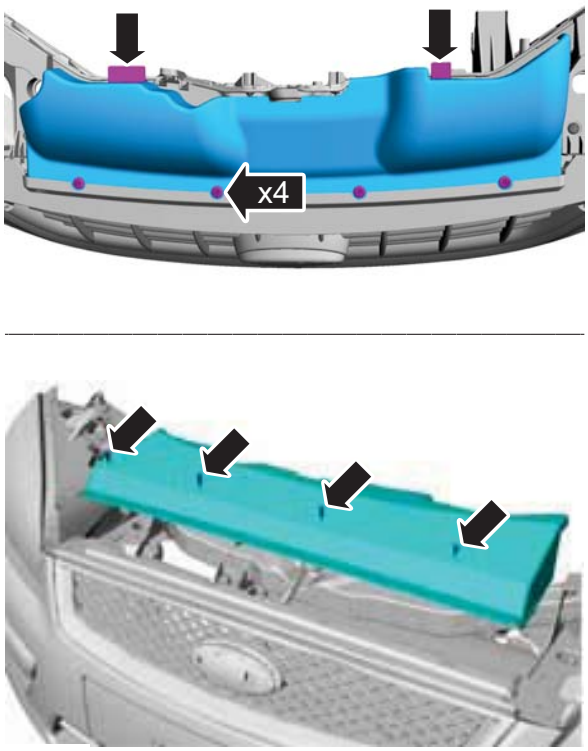
1. **Tighten the exterior rear door handle retaining screw.**



REMOVAL AND INSTALLATION

Hood Lock Cylinder

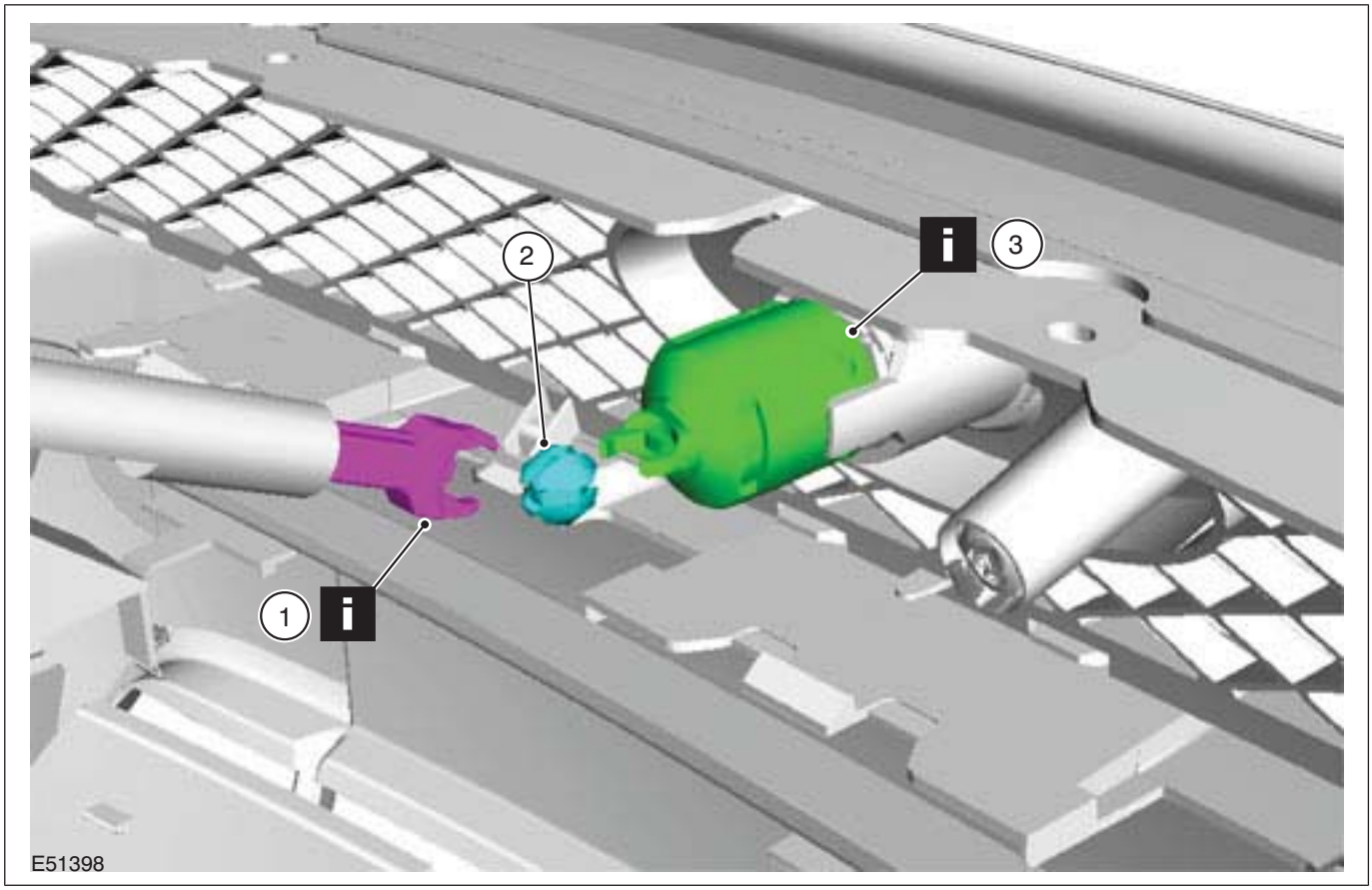
1. Remove the air deflector.



E112650

2. Remove the components in the order indicated in the following illustration(s) and table(s).

REMOVAL AND INSTALLATION



Item	Description
1	Hood lock cylinder to hood latch connecting rod See Removal Detail
2	Hood lock cylinder rod swivel joint
3	Hood lock cylinder See Removal Detail

3. **To install, reverse the removal procedure.**

Removal Details

Item 1 Hood lock cylinder to hood latch connecting rod

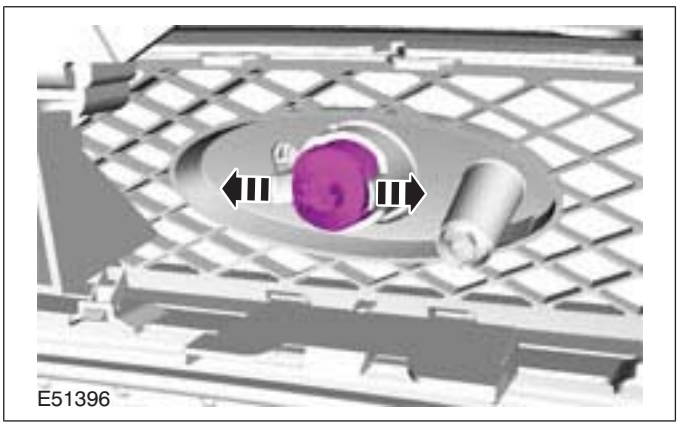
1. **NOTE: Make a note of the position and orientation of the hood lock cylinder to hood latch connecting rod.**

   Disconnect the hood lock cylinder to hood latch connecting rod from the hood lock cylinder swivel joint.

Item 3 Hood lock cylinder

1. **Detach the hood lock cylinder from the radiator grille.**

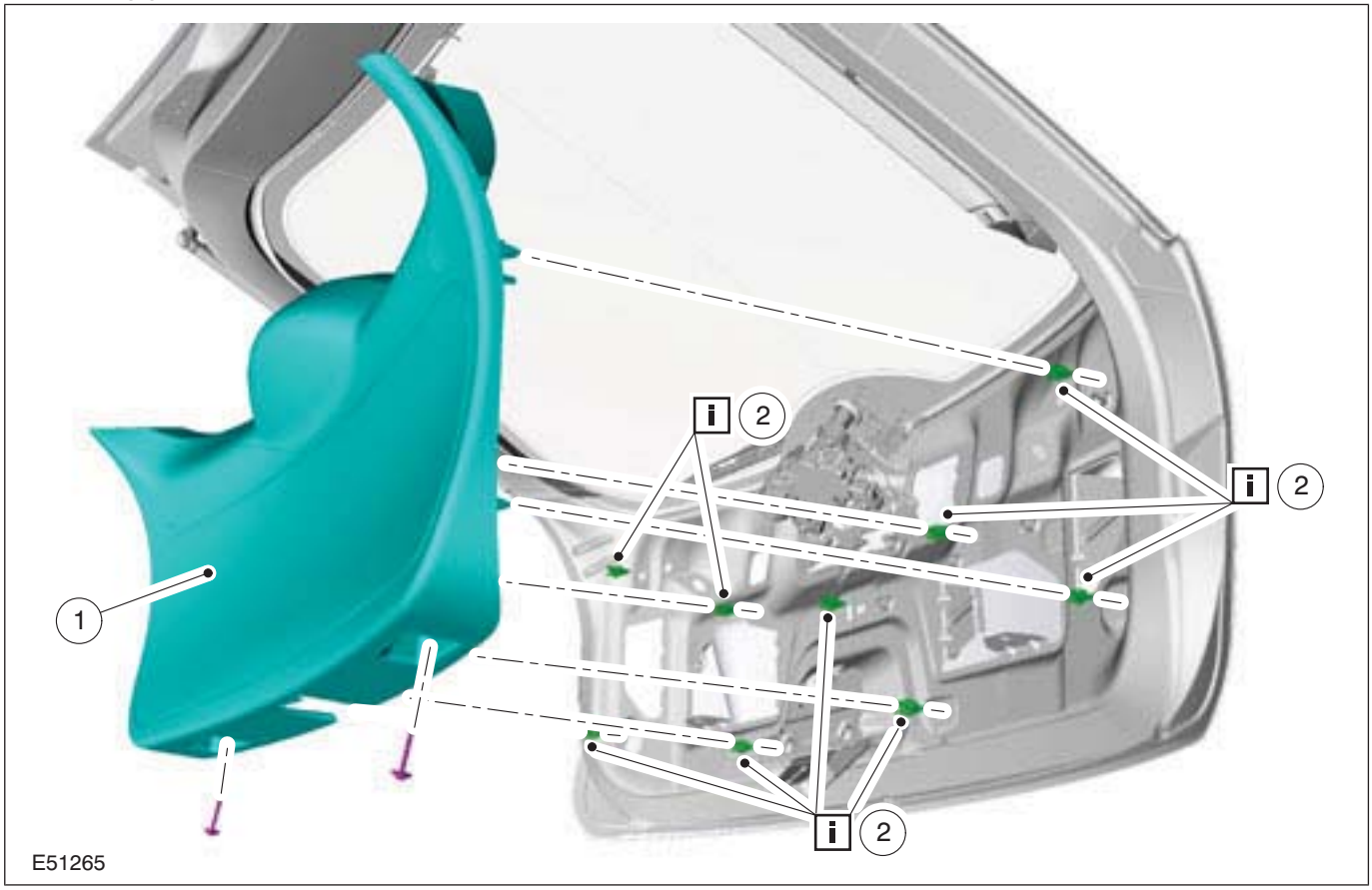
- Release the locking tangs.



REMOVAL AND INSTALLATION

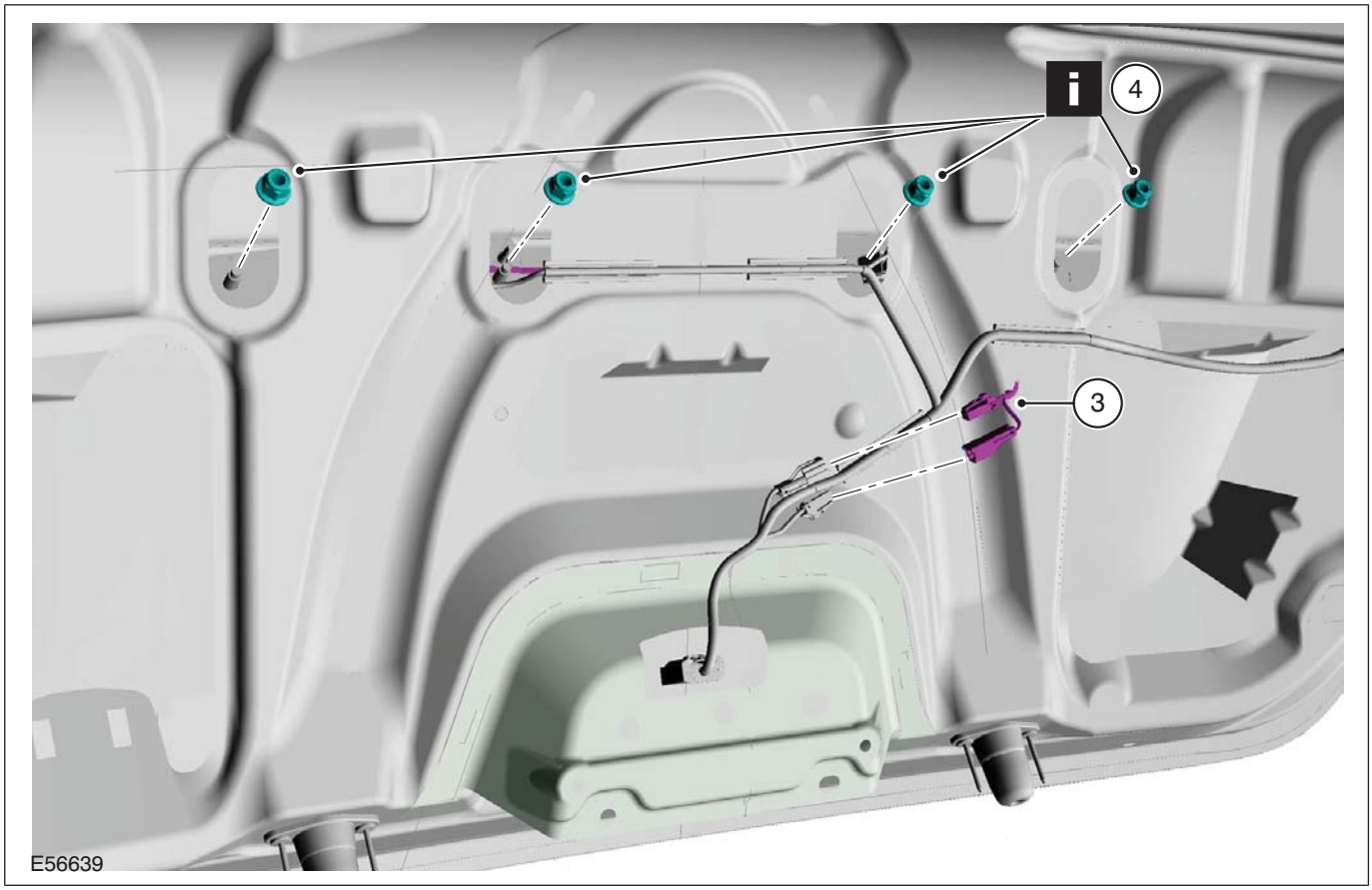
Exterior Liftgate Release Switch — 3-Door/5-Door

1. Remove the components in the order indicated in the following illustration(s) and table(s).



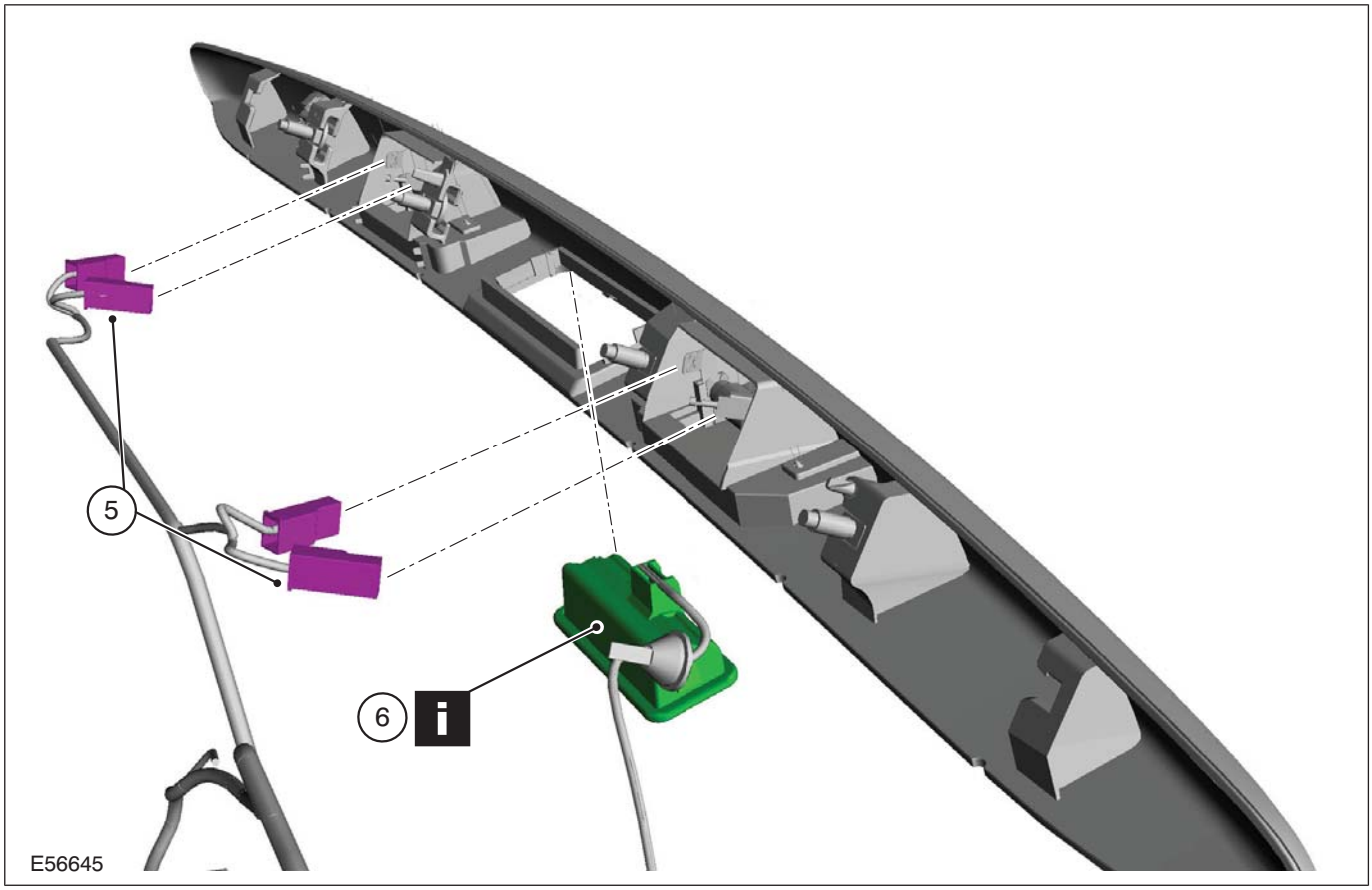
Item	Description
1	Liftgate trim panel
2	Liftgate trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
3	Exterior liftgate release switch electrical connectors
4	Licence plate illumination panel retaining nuts See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
5	Licence plate illumination electrical connectors
6	Exterior liftgate release switch See Removal Detail

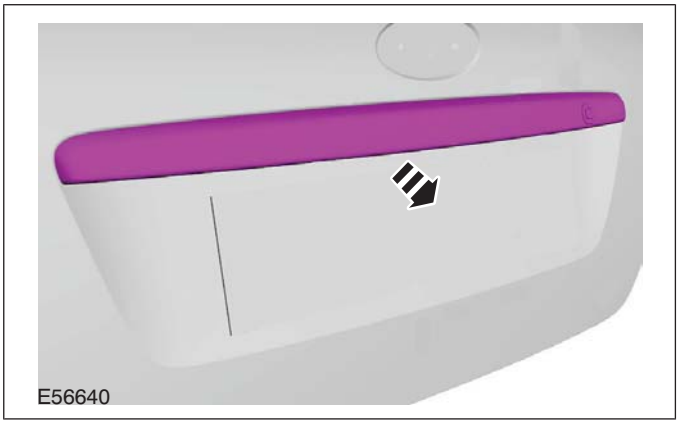
2. To install, reverse the removal procedure.

Removal Details

Item 4 Licence plate illumination panel retaining nuts

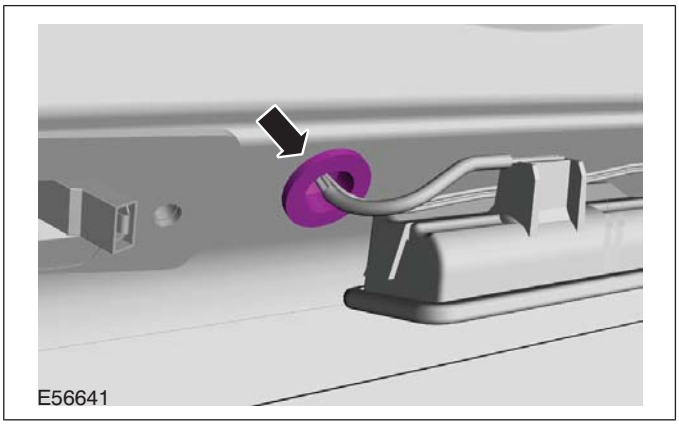
1. CAUTION: Make sure that excessive strain is not placed on the licence plate illumination panel electrical connectors and wiring harnesses.

Detach the licence plate illumination panel from the liftgate.



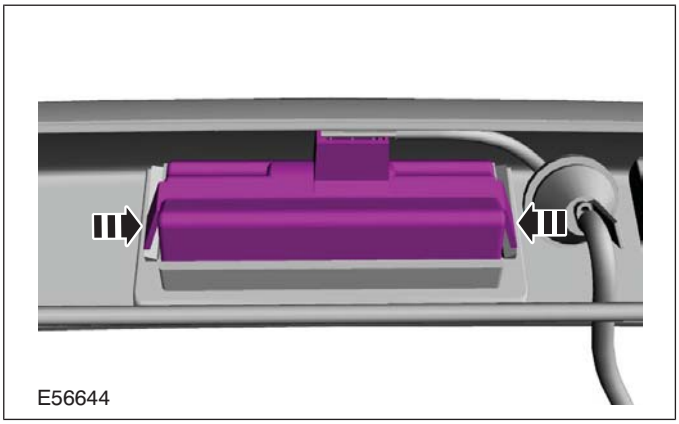
REMOVAL AND INSTALLATION

2. Detach the exterior liftgate release switch wiring harness grommet from the liftgate.



Item 6 Exterior liftgate release switch

1. Press the clips and remove the exterior liftgate release switch from the licence plate illumination panel.



Installation Details

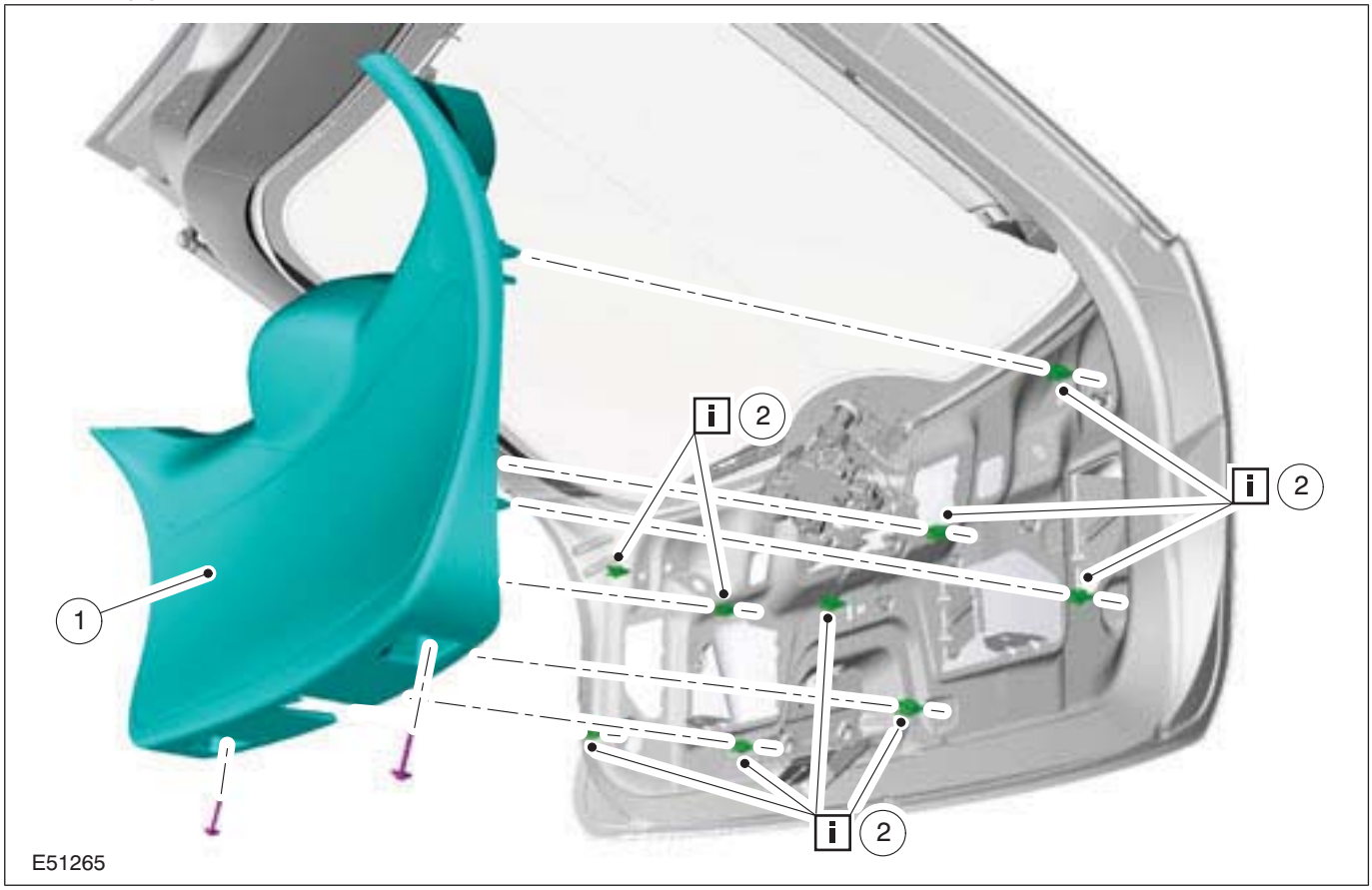
Item 2 Liftgate trim panel retaining clips

1. Install the liftgate trim panel retaining clips to the liftgate trim panel before installation to the liftgate.

REMOVAL AND INSTALLATION

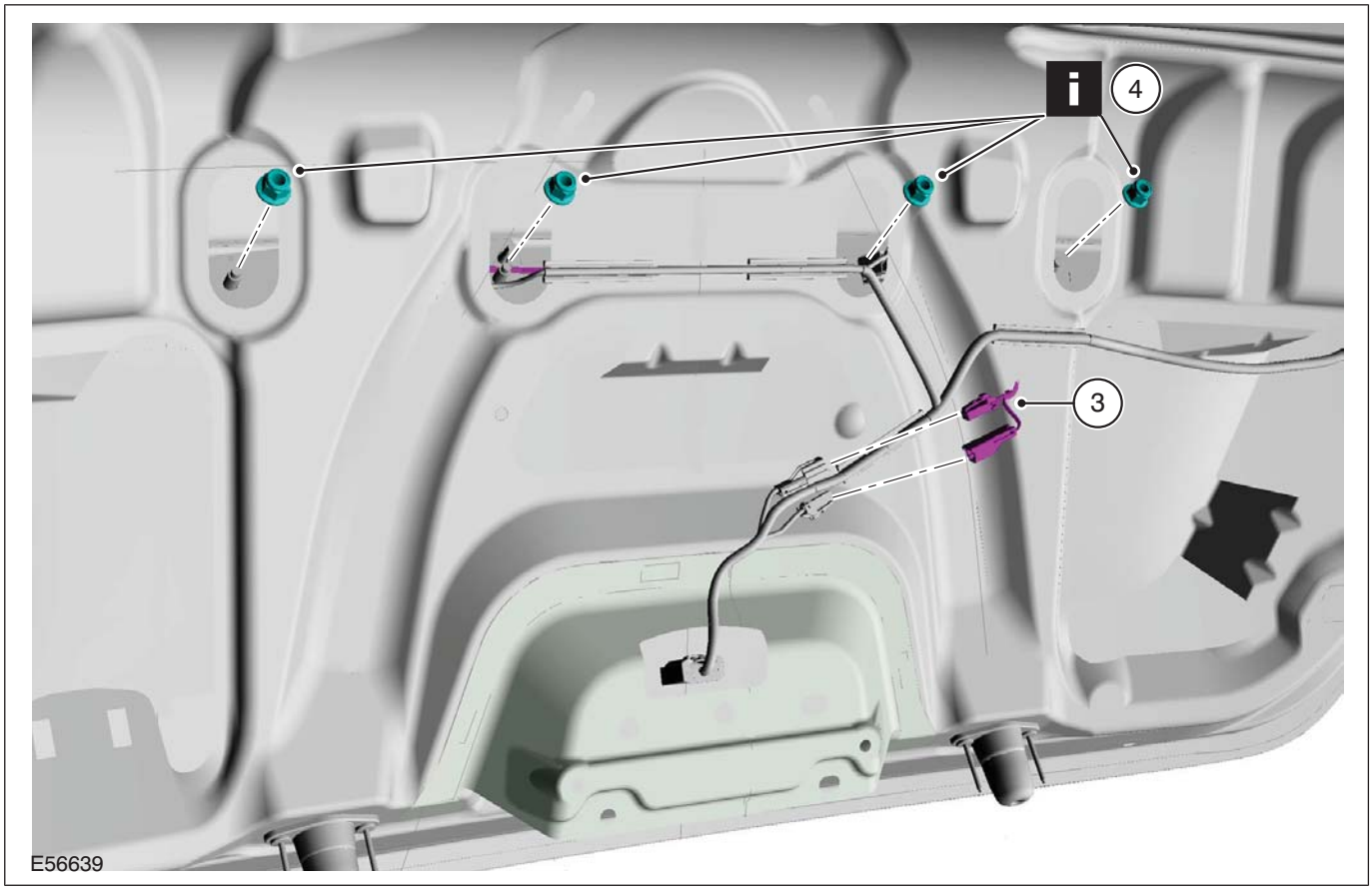
Exterior Liftgate Release Switch — 3-Door/5-Door, Vehicles With: Keyless Vehicle System

1. Remove the components in the order indicated in the following illustration(s) and table(s).



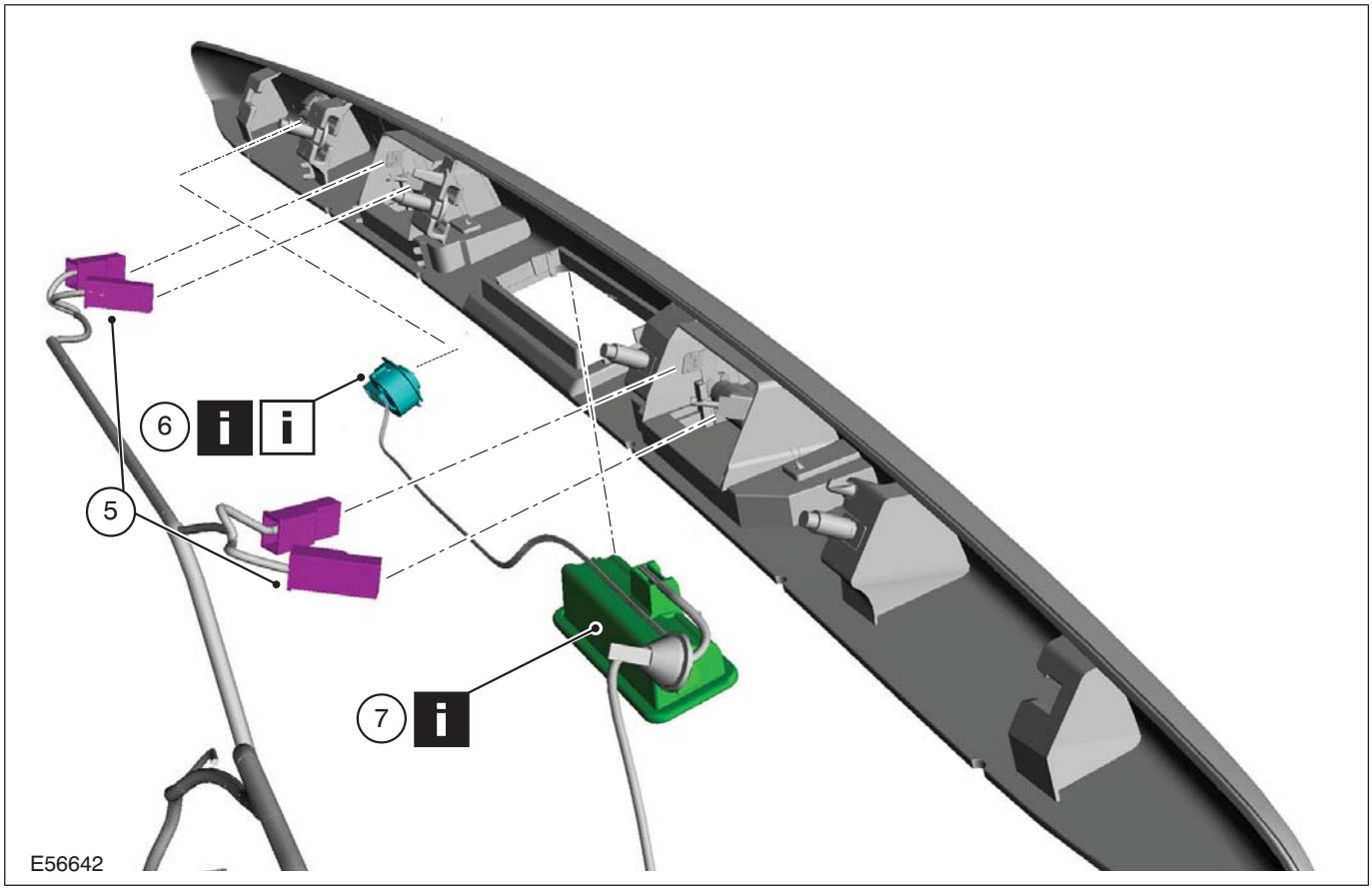
Item	Description
1	Liftgate trim panel
2	Liftgate trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
3	Exterior liftgate release switch electrical connectors
4	Licence plate illumination panel retaining nuts See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
5	Licence plate illumination electrical connectors
6	Keyless vehicle liftgate lock button See Removal Detail See Installation Detail
7	Exterior liftgate release switch See Removal Detail

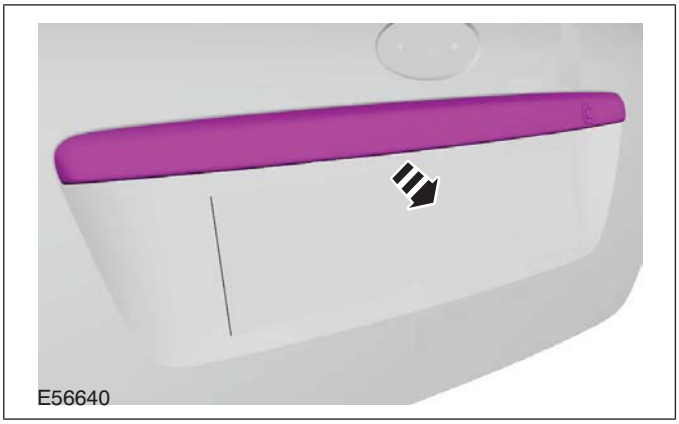
2. **To install, reverse the removal procedure.**

Removal Details

Item 4 Licence plate illumination panel retaining nuts

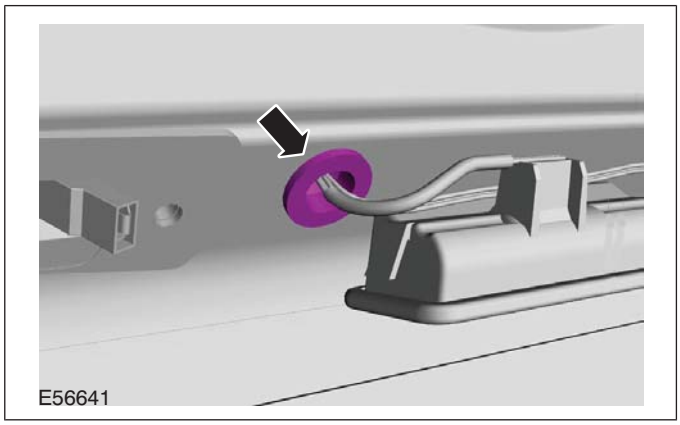
1. **CAUTION: Make sure that excessive strain is not placed on the licence plate illumination panel electrical connectors and wiring harnesses.**

Detach the licence plate illumination panel from the liftgate.



REMOVAL AND INSTALLATION

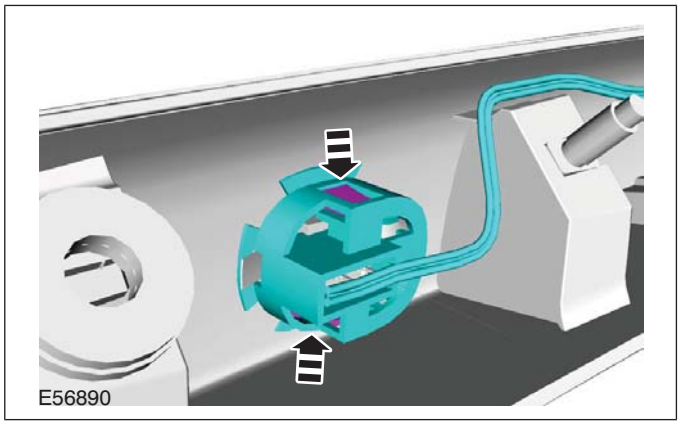
2. Detach the exterior liftgate release switch wiring harness grommet from the liftgate.



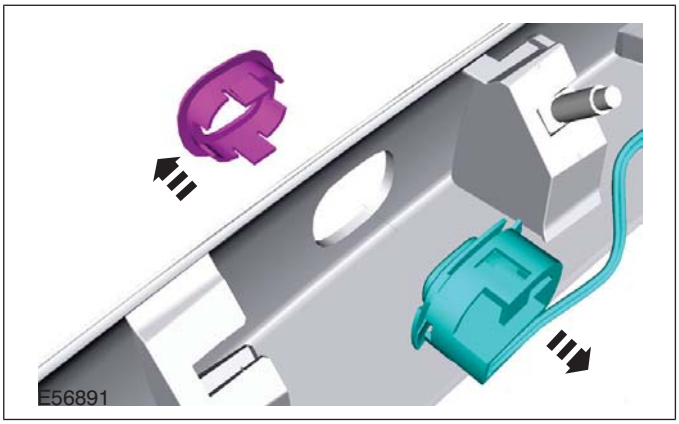
Item 6 Keyless vehicle liftgate lock button

1. NOTE: Make a note of the routing of the keyless vehicle liftgate lock button wiring harness.

   Detach the keyless vehicle liftgate lock button from the keyless vehicle liftgate lock button retainer.

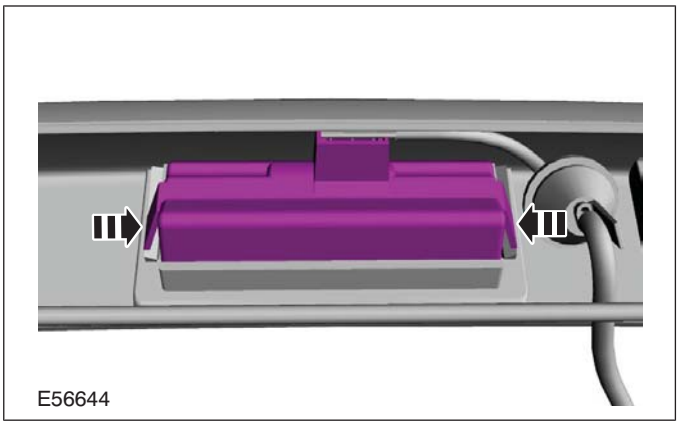


2. Remove the keyless vehicle liftgate lock button and keyless vehicle liftgate lock button retainer from the licence plate illumination panel.



Item 7 Exterior liftgate release switch

1. Press the clips and remove the exterior liftgate release switch from the licence plate illumination panel.



Installation Details

Item 6 Keyless vehicle liftgate lock button

⚠ CAUTION: Make sure the routing of the keyless vehicle liftgate lock button wiring harness is the same as when removed. Failure to follow this instruction may result in damage to the wiring harness.

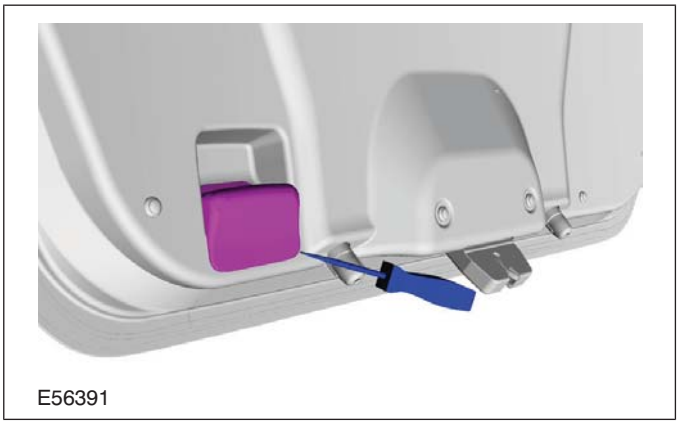
Item 2 Liftgate trim panel retaining clips

1. Install the liftgate trim panel retaining clips to the liftgate trim panel before installation to the liftgate.

REMOVAL AND INSTALLATION

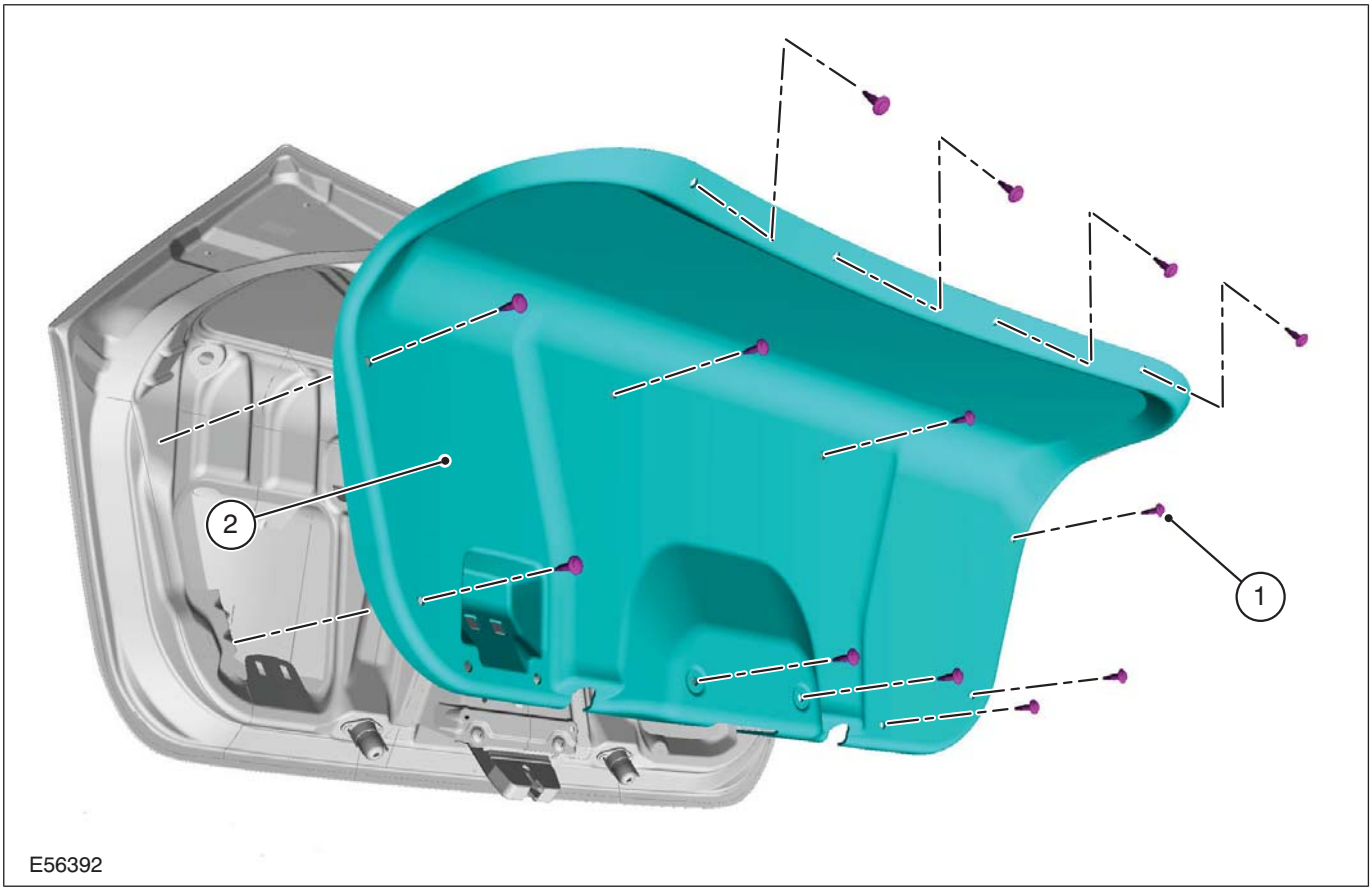
Exterior Luggage Compartment Lid Release Switch

1. **Using a suitable flat blade screwdriver, remove the luggage compartment lid trim panel handle from the luggage compartment lid trim panel.**



E56391

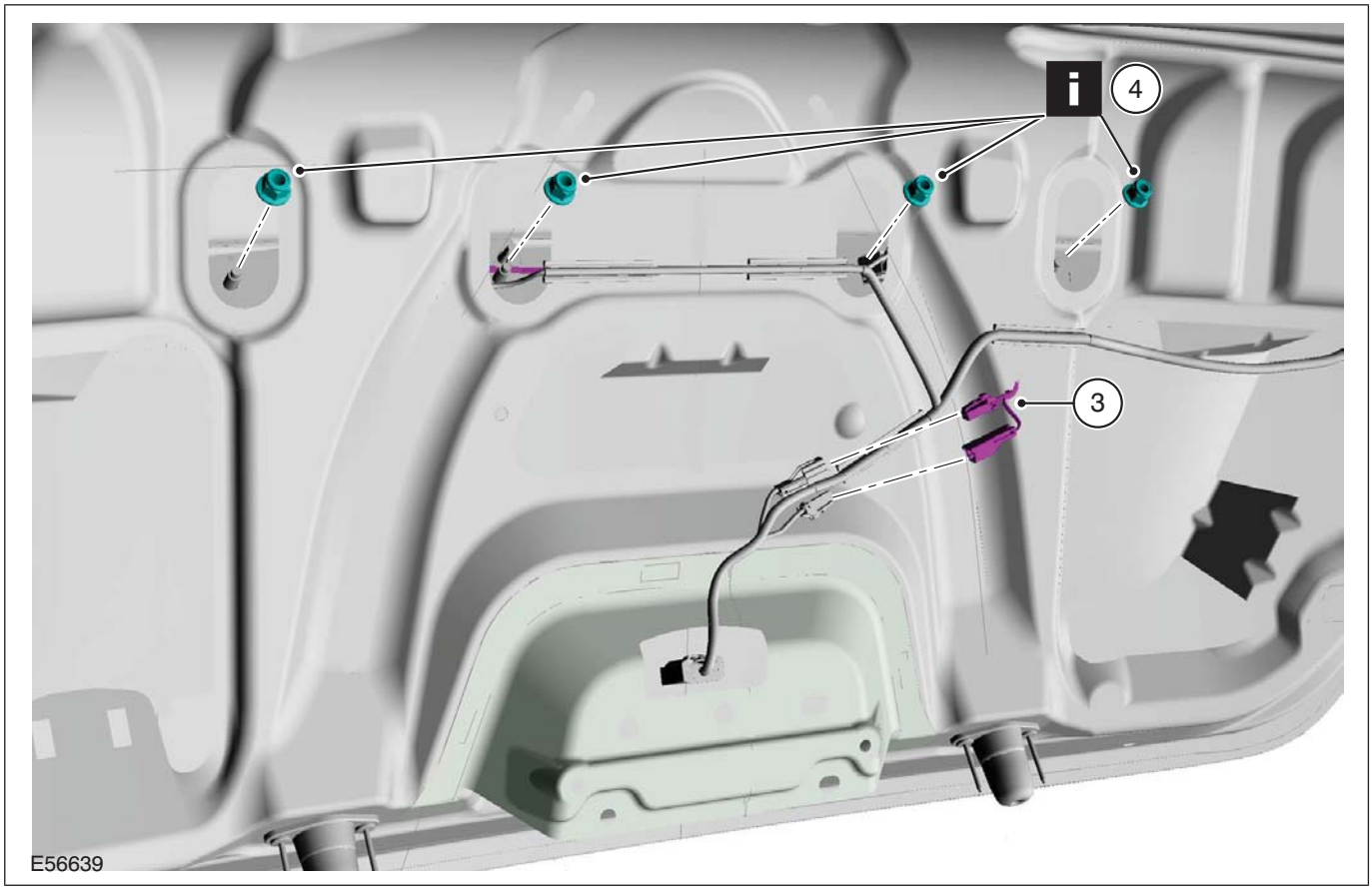
2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



E56392

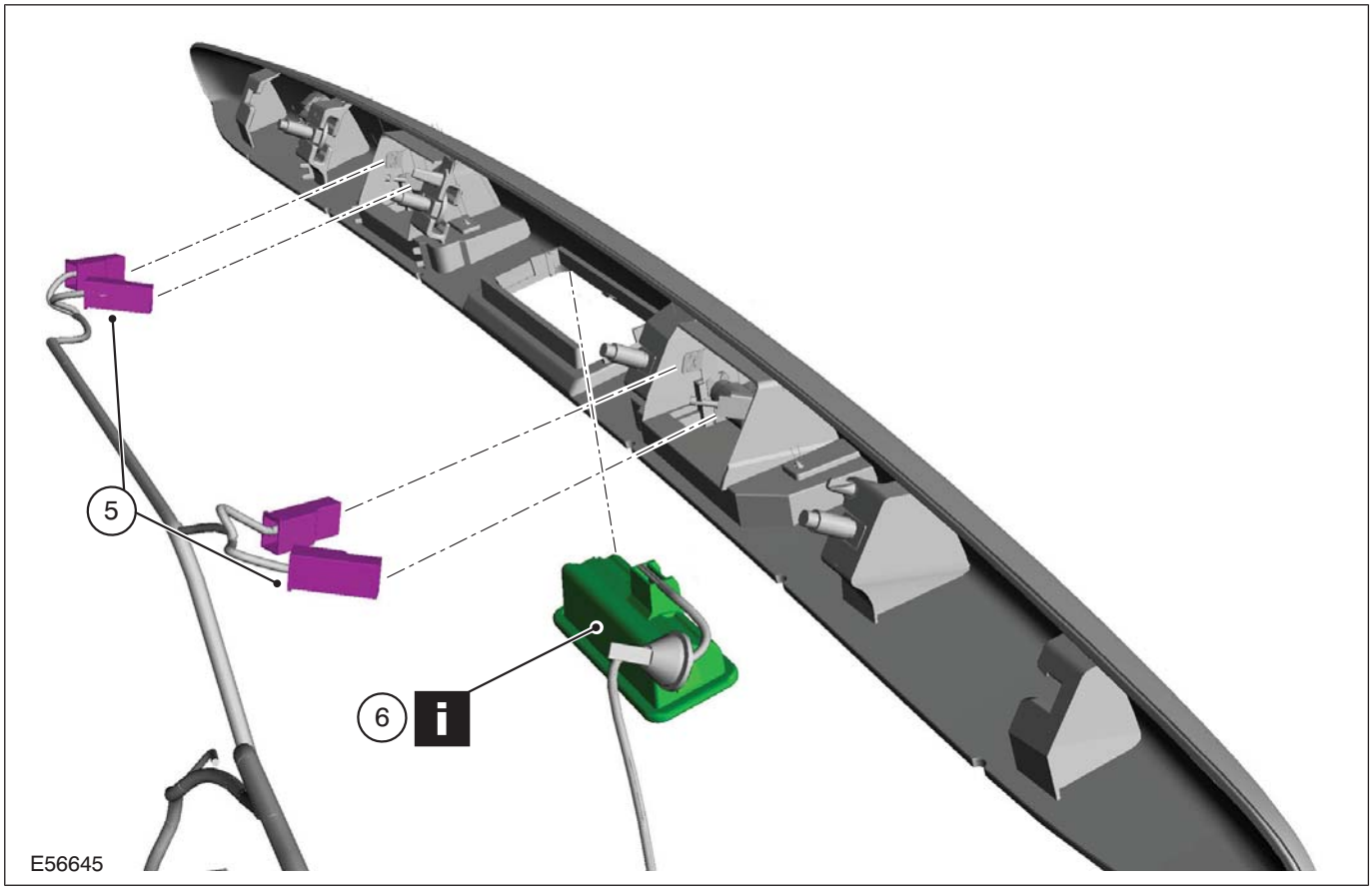
Item	Description
1	Luggage compartment lid trim panel retaining clips
2	Luggage compartment lid trim panel

REMOVAL AND INSTALLATION



Item	Description
3	Exterior luggage compartment lid release switch electrical connectors
4	Licence plate illumination panel retaining nuts See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
5	Licence plate illumination panel electrical connectors
6	Exterior luggage compartment lid release switch See Removal Detail

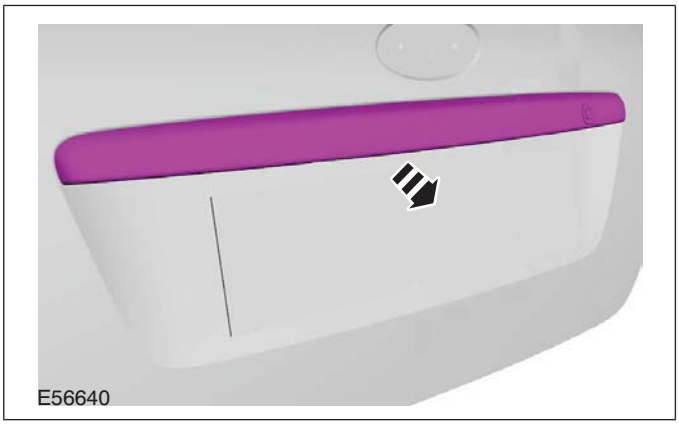
3. To install, reverse the removal procedure.

Removal Details

Item 4 Licence plate illumination panel retaining nuts

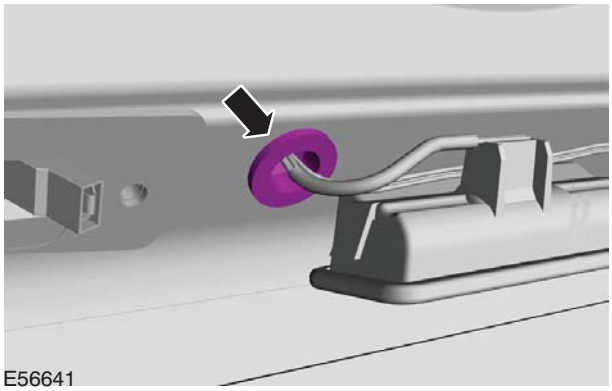
1. CAUTION: Make sure that excessive strain is not placed on the licence plate illumination panel electrical connectors and wiring harnesses.

Detach the licence plate illumination panel from the luggage compartment lid.



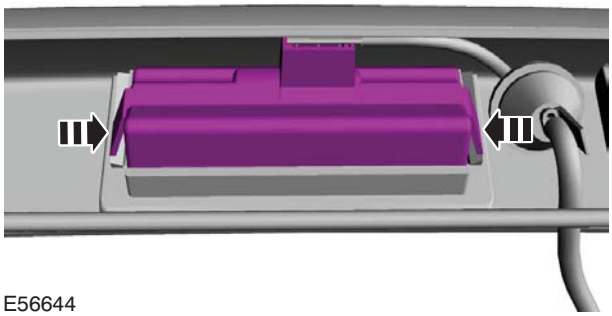
REMOVAL AND INSTALLATION

2. Detach the exterior luggage compartment lid release switch wiring harness grommet from the luggage compartment lid.



Item 6 Exterior luggage compartment lid release switch

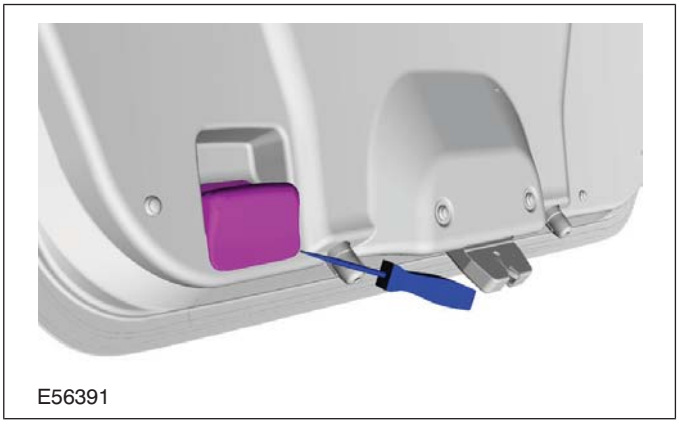
1. Press the clips and remove the luggage compartment lid release switch from the licence plate illumination panel.



REMOVAL AND INSTALLATION

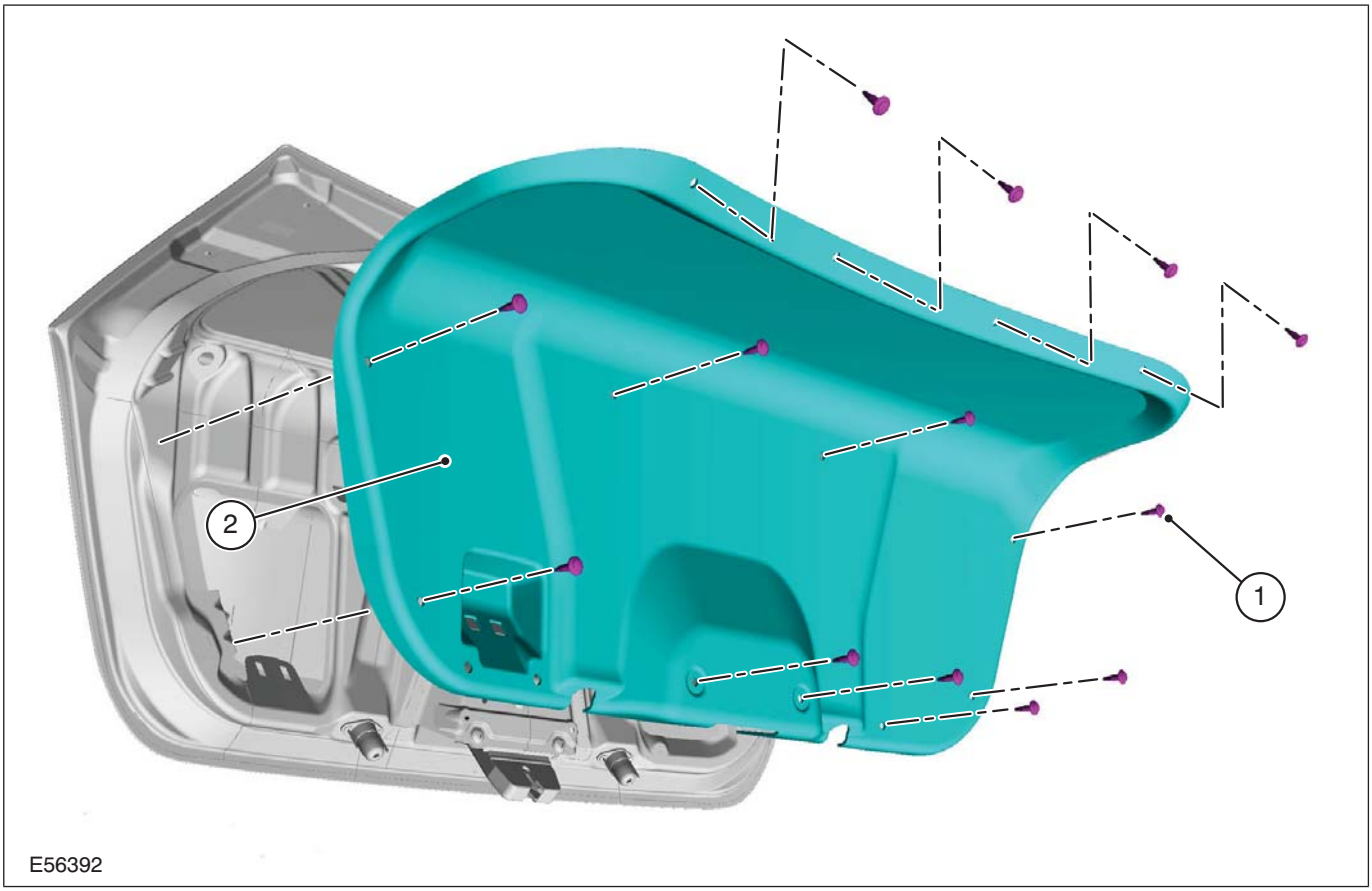
Exterior Luggage Compartment Lid Release Switch — Vehicles With: Keyless Vehicle System

1. **Using a suitable flat blade screwdriver, remove the luggage compartment lid trim panel handle from the luggage compartment lid trim panel.**



E56391

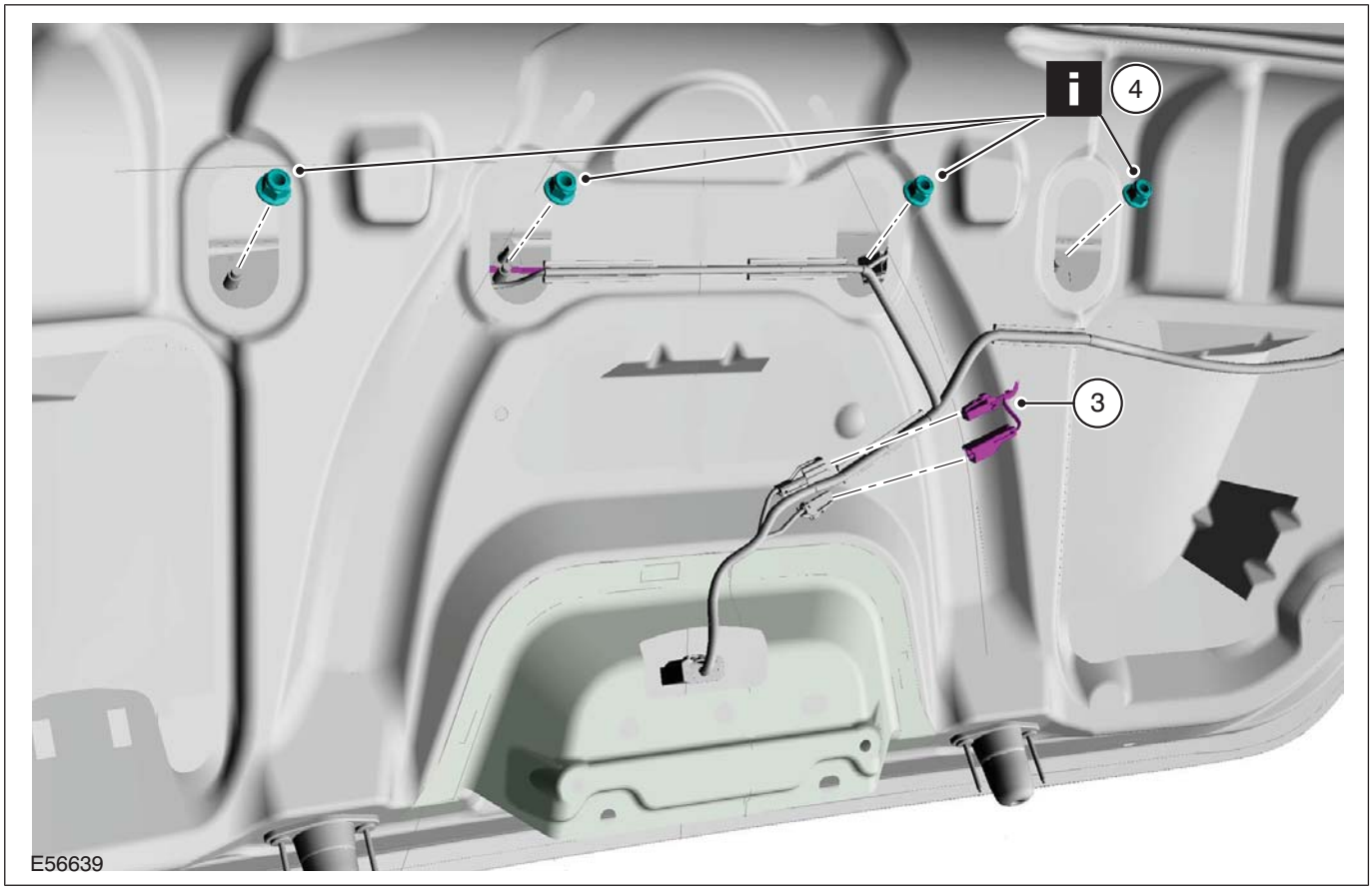
2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



E56392

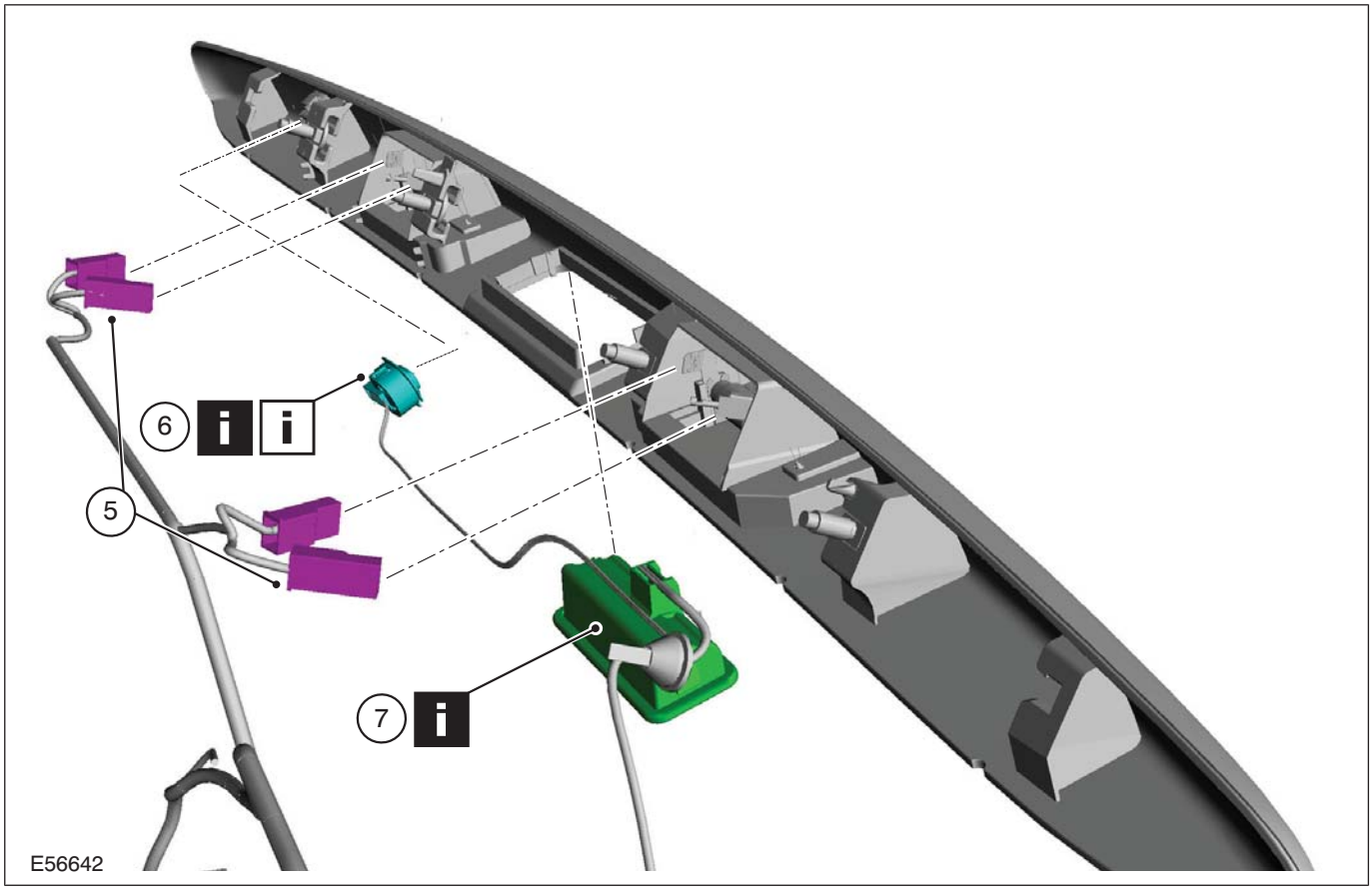
Item	Description
1	Luggage compartment lid trim panel retaining clips
2	Luggage compartment lid trim panel

REMOVAL AND INSTALLATION



Item	Description
3	Exterior luggage compartment lid release switch electrical connectors
4	Licence plate illumination panel retaining nuts See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
5	Licence plate illumination panel electrical connectors
6	Keyless vehicle luggage compartment lid lock button See Removal Detail See Installation Detail
7	Exterior luggage compartment lid release handle See Removal Detail

3. **To install, reverse the removal procedure.**

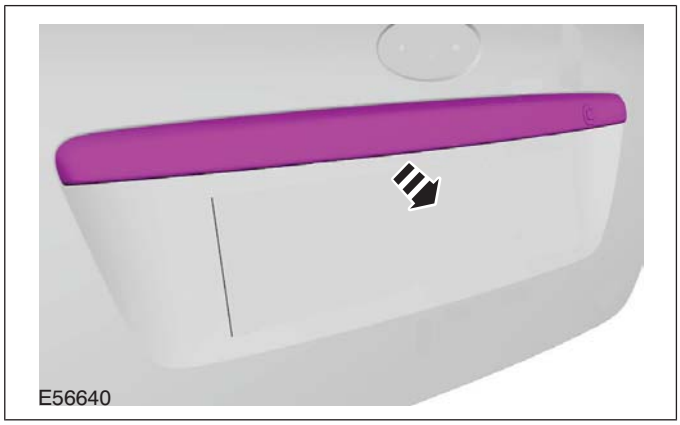
Removal Details

Item 4 Licence plate illumination panel retaining nuts

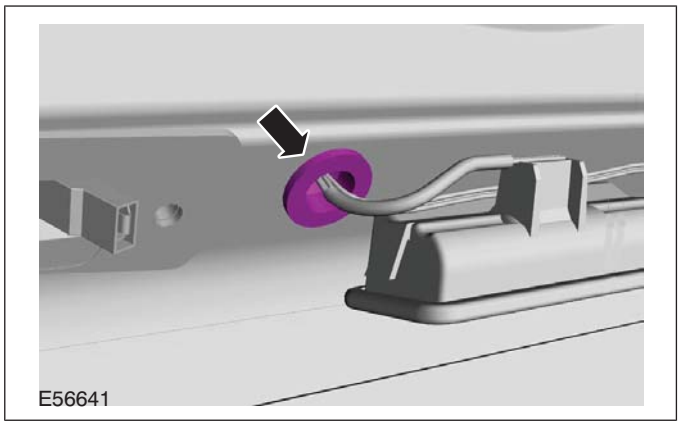
1. **CAUTION: Make sure that excessive strain is not placed on the licence plate illumination panel electrical connectors and wiring harnesses.**

REMOVAL AND INSTALLATION

Detach the licence plate illumination panel from the luggage compartment lid.



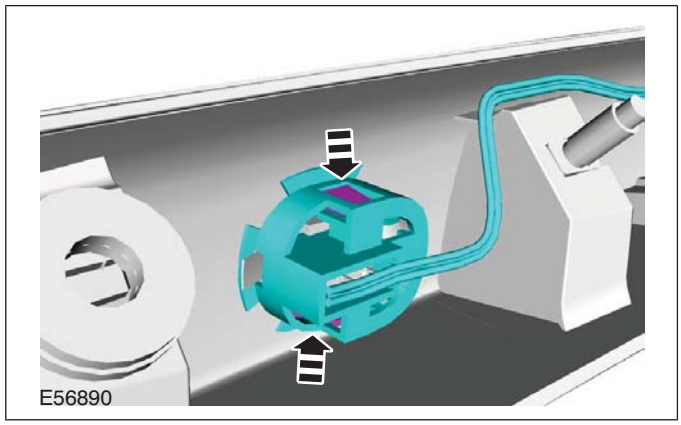
2. Detach the exterior luggage compartment release switch wiring harness grommet from the luggage compartment lid.



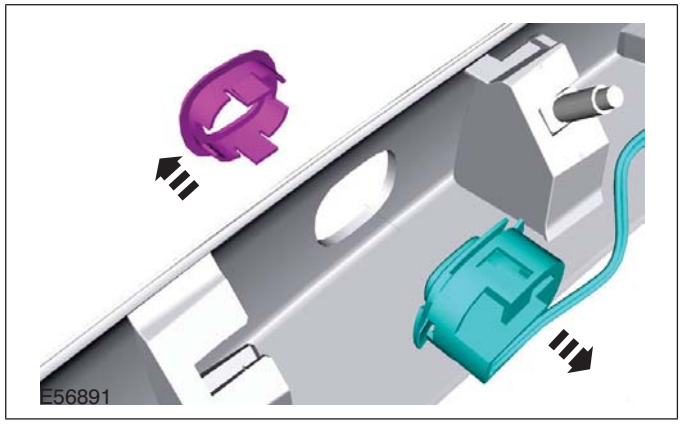
Item 6 Keyless vehicle luggage compartment lid lock button

1. NOTE: Make a note of the routing of the keyless vehicle liftgate lock button wiring harness.

   Detach the keyless vehicle luggage compartment lid lock button from the keyless vehicle luggage compartment lock button retainer.

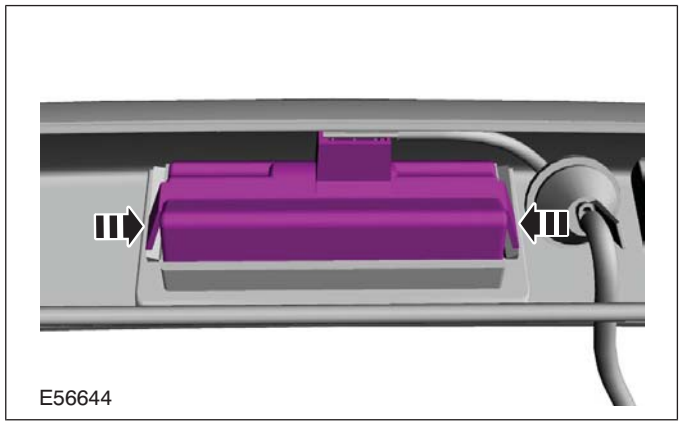


2. Remove the keyless vehicle luggage compartment lid lock button and keyless vehicle luggage compartment lid lock button retainer from the licence plate illumination panel.



Item 7 Exterior luggage compartment lid release handle

1. Press the clips and remove the luggage compartment lid release switch from the licence plate illumination panel.



REMOVAL AND INSTALLATION

Installation Details

Item 6 Keyless vehicle luggage compartment lid lock button

CAUTION: Make sure the routing of the keyless vehicle luggage compartment lid lock button wiring harness is the same as when removed. Failure to follow this instruction may result in damage to the wiring harness.

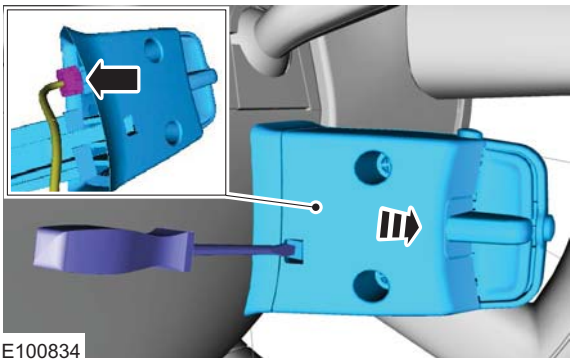
REMOVAL AND INSTALLATION

Ignition Lock Cylinder — Vehicles With: Keyless Vehicle System

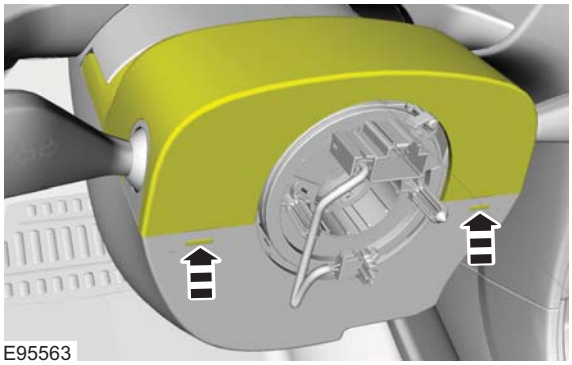
Removal

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

1. If equipped.



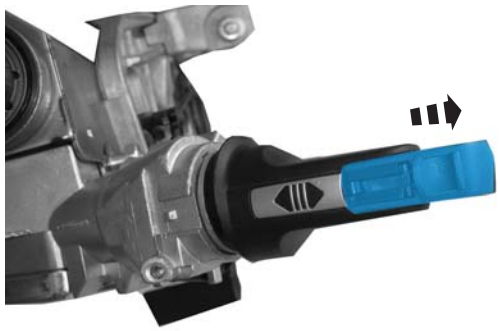
2.



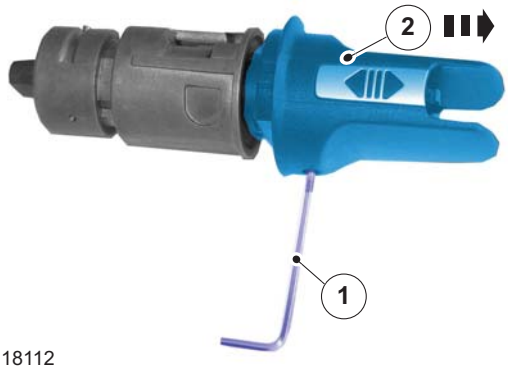
3.



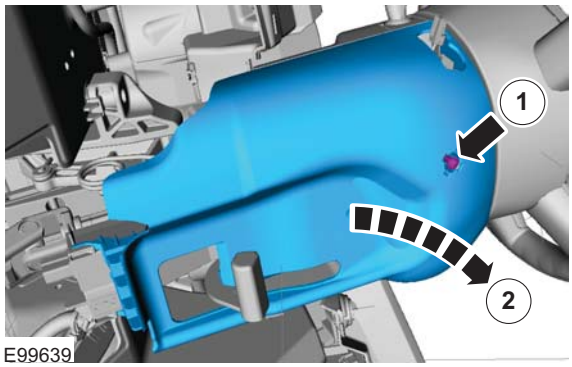
4.



5.

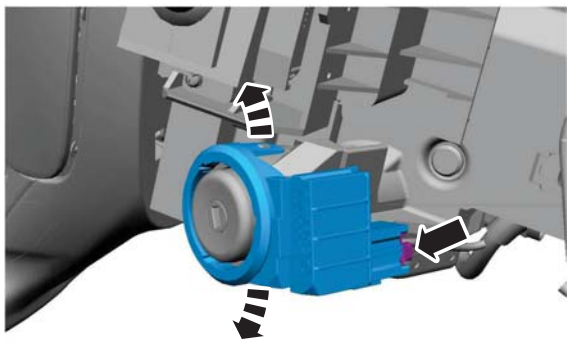


6.



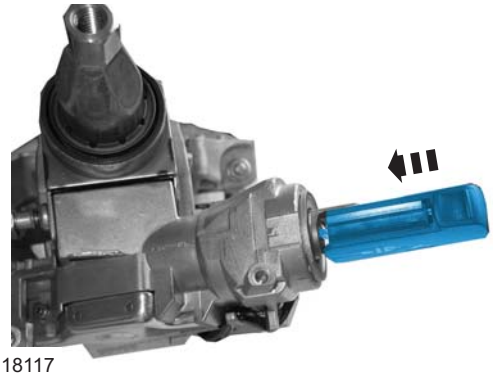
REMOVAL AND INSTALLATION

7.



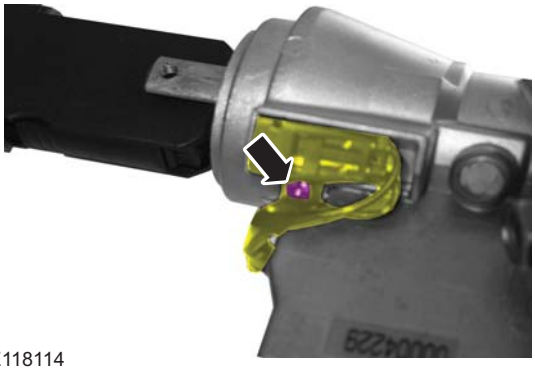
E69785

8.



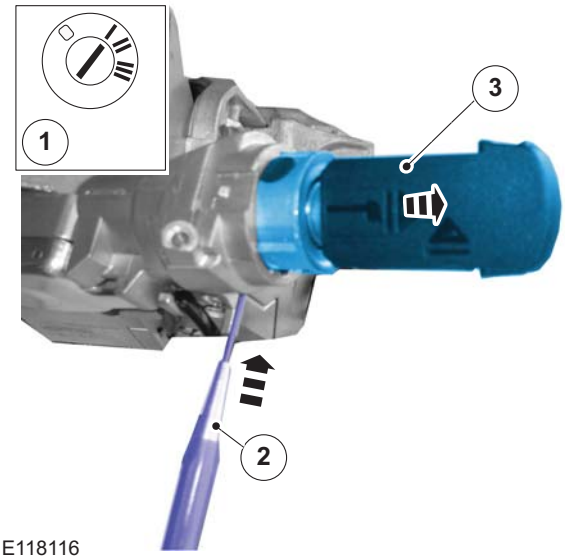
E118117

9.



E118114

10.



E118116

Installation

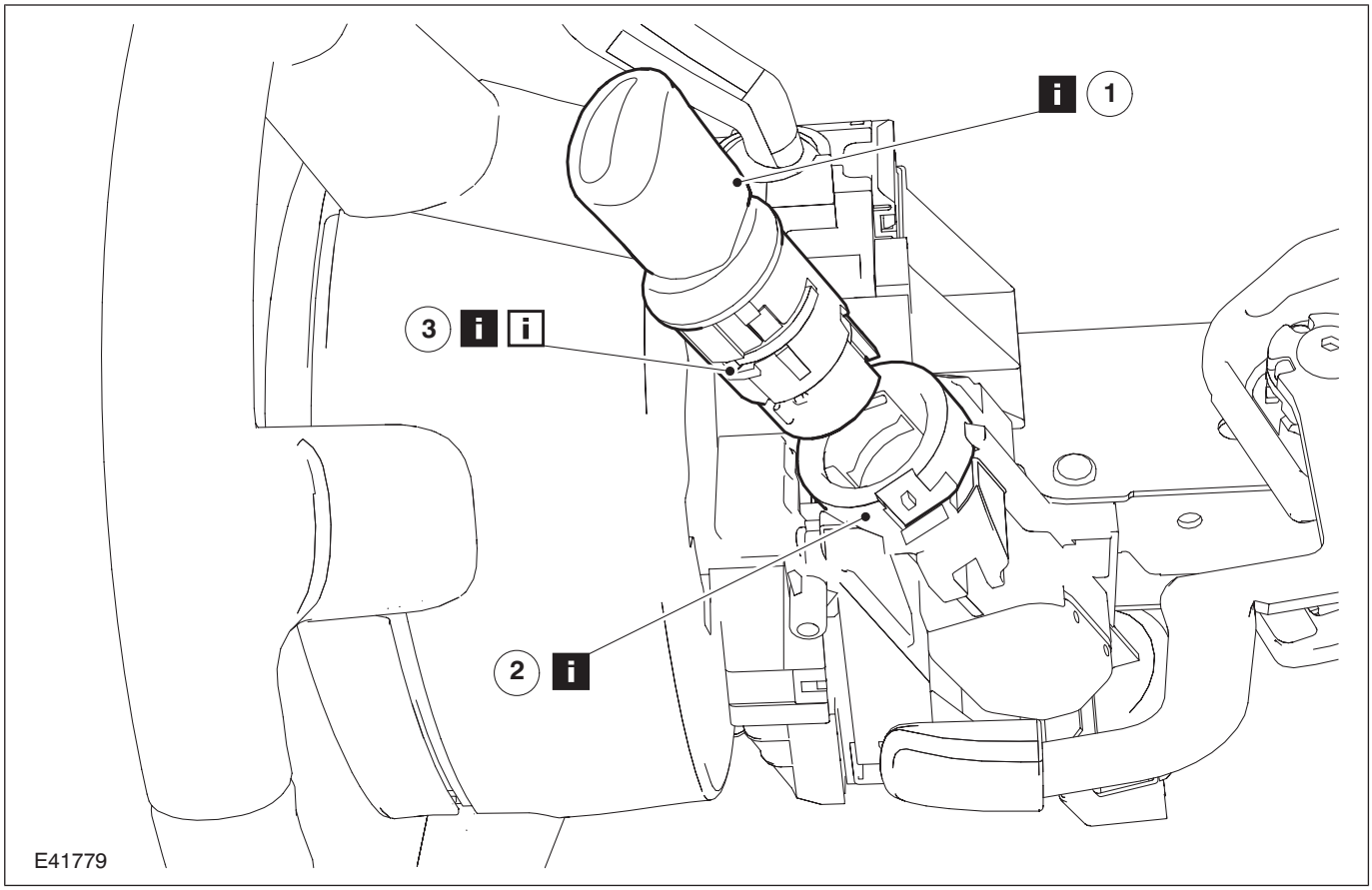
1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Ignition Lock Cylinder — Vehicles Without: Keyless Vehicle System

1. **Remove the passive anti-theft system (PATS) transceiver.** For additional information, refer to Section 419-01A [Anti-Theft - Active] / 419-01B [Anti-Theft - Passive].

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Ignition key See Removal Detail
2	Ignition lock cylinder locking button See Removal Detail
3	Ignition lock cylinder See Removal Detail See Installation Detail

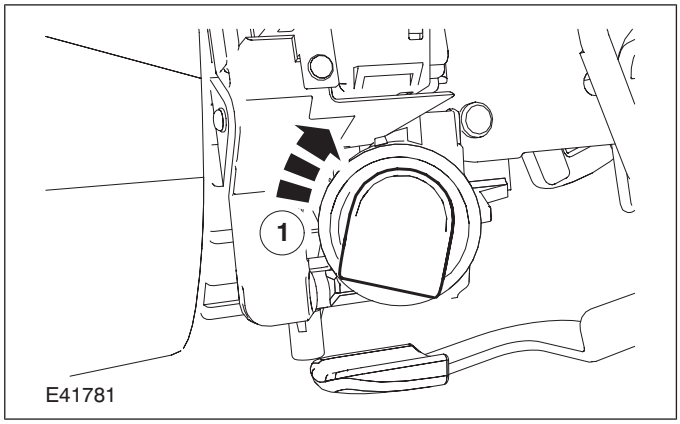
3. **To install, reverse the removal procedure.**

Removal Details

REMOVAL AND INSTALLATION

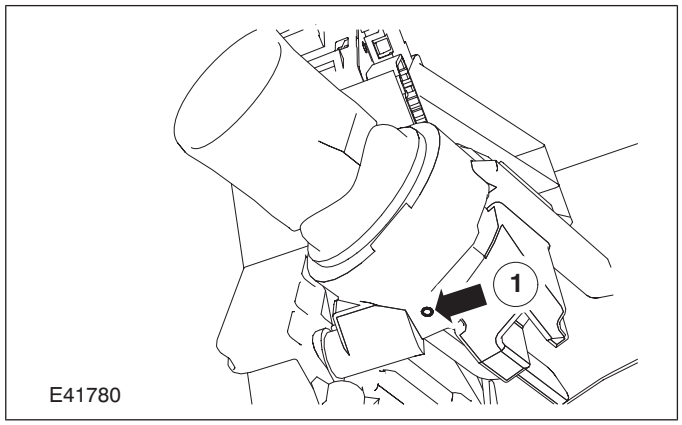
Item 1 Ignition key

1. Turn the ignition key to the ACCESSORY position.



Item 2 Ignition lock cylinder locking button

1. Using a suitable punch press the ignition lock cylinder locking button until the ignition lock cylinder is released from the steering column.



Item 3 Ignition lock cylinder

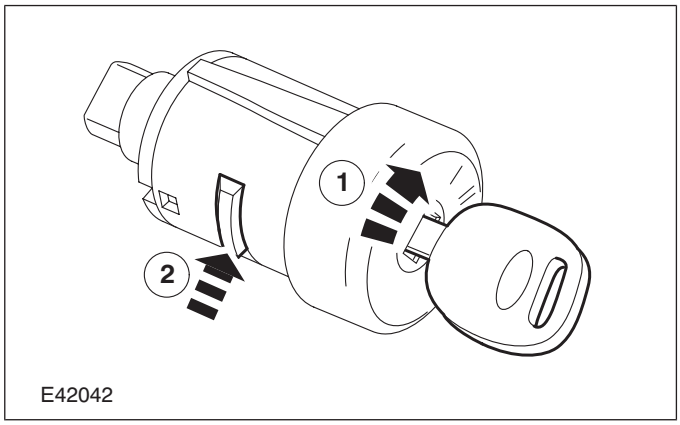
1. NOTE: Make sure the ignition lock cylinder locking button is released before the removal of the ignition lock cylinder.

   Remove the ignition lock cylinder and ignition key.

Installation Details

Item 3 Ignition lock cylinder

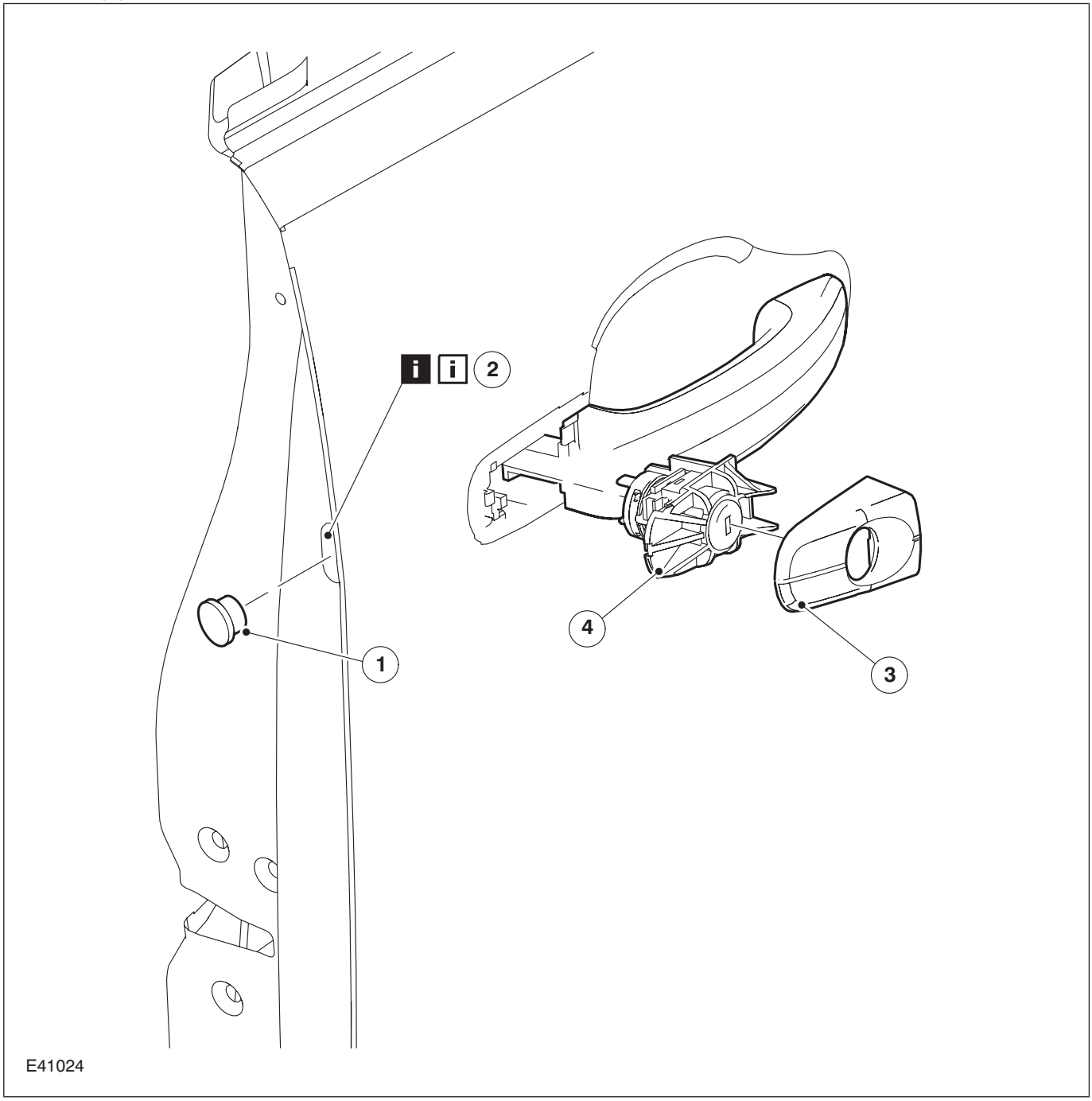
1. Install the ignition lock cylinder.
   1. Turn the ignition key to the ACCESSORY position.
   2. Press the ignition lock cylinder locking button.



REMOVAL AND INSTALLATION

Door Lock Cylinder

1. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Exterior front door handle retaining screw grommet
2	Exterior front door handle retaining screw See Removal Detail See Installation Detail

Item	Description
3	Exterior front door handle trim
4	Door lock cylinder

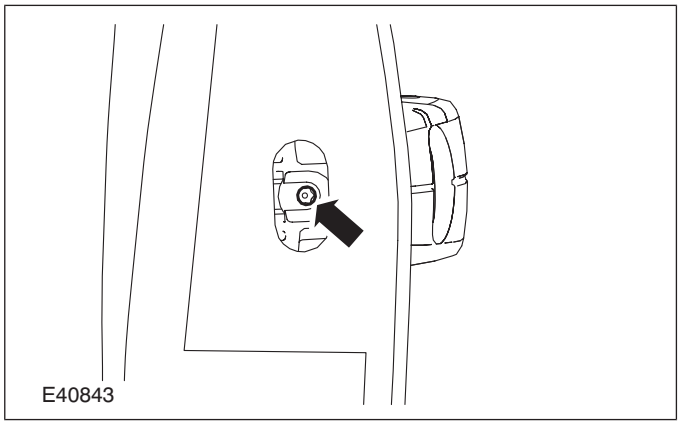
2. **To install, reverse the removal procedure.**

REMOVAL AND INSTALLATION

Removal Details

Item 2 Exterior front door handle retaining screw

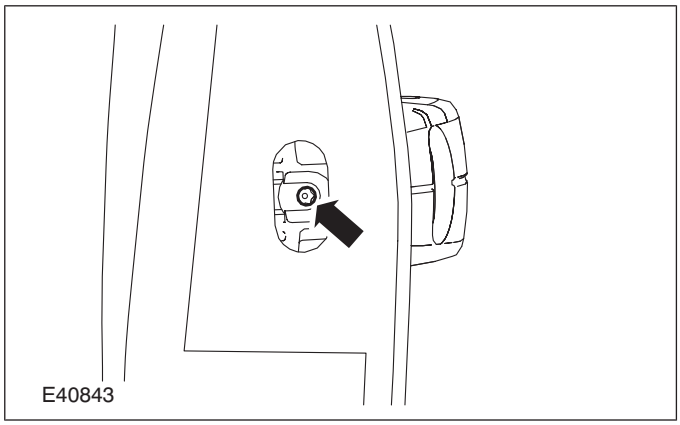
1. **Loosen the exterior front door handle retaining screw.**



Installation Details

Item 2 Exterior front door handle retaining screw

1. **Tighten the exterior front door handle retaining screw.**

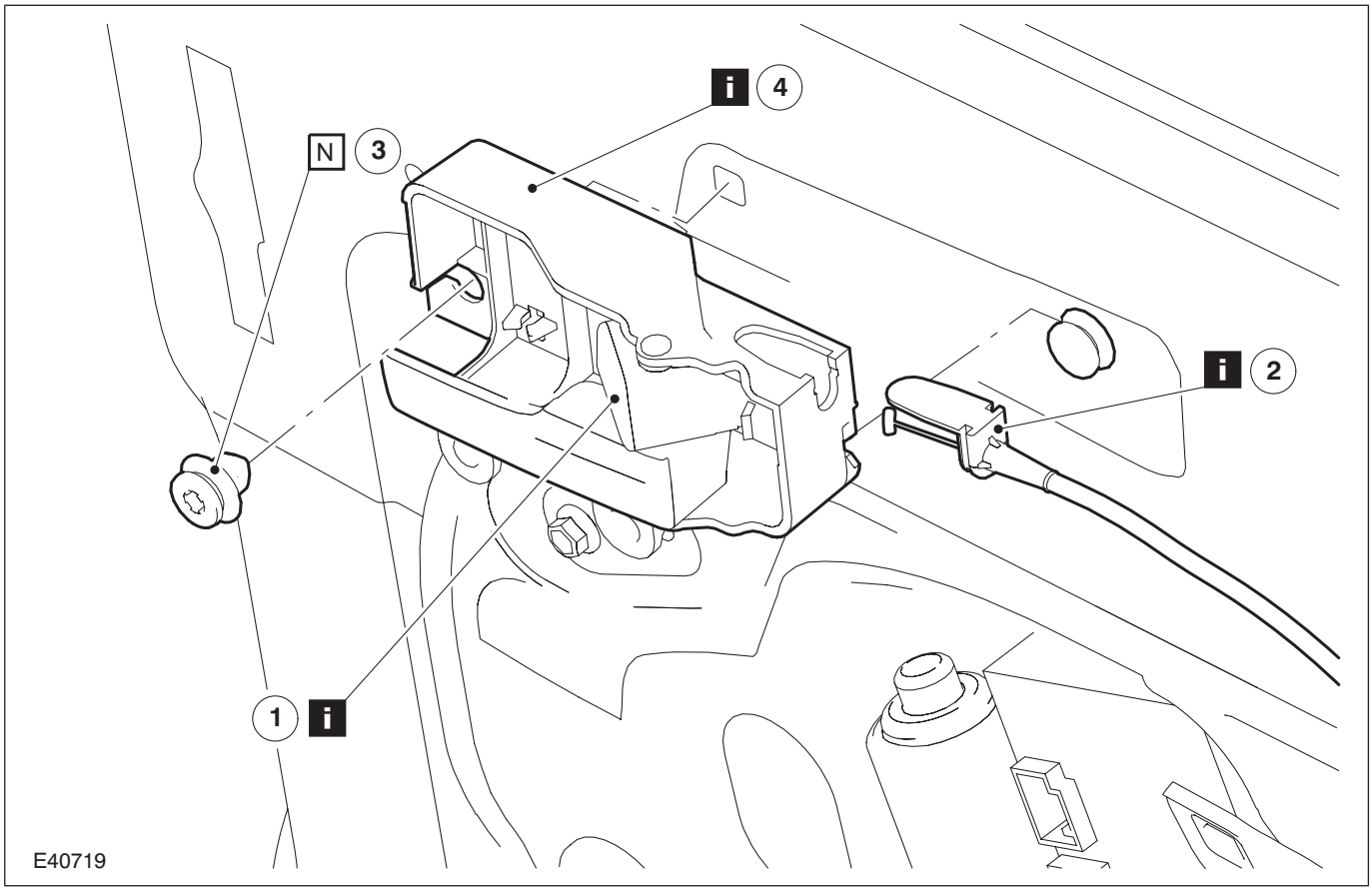


REMOVAL AND INSTALLATION

Door Latch Remote Control

1. Remove the door trim panel. For additional information, refer to Section 501-05 [Interior Trim and Ornamentation].

2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Door latch remote control handle lock See Removal Detail
2	Door latch remote control cable See Removal Detail

Item	Description
3	Door latch remote control retaining clip
4	Door latch remote control See Removal Detail

3. To install, reverse the removal procedure.

Removal Details

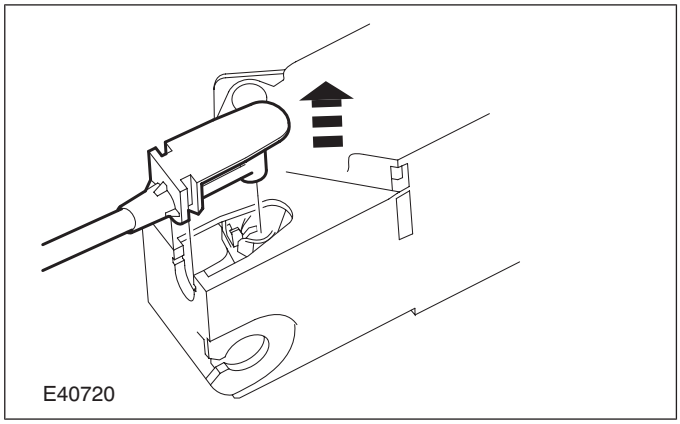
Item 1 Door latch remote control handle lock

1. Operate the door latch remote control handle lock to the lock position.

REMOVAL AND INSTALLATION

Item 2 Door latch remote control cable

1. Disconnect the door latch remote control cable from the door latch remote control.



Item 4 Door latch remote control

1. Slide the door latch remote control away from the door latch remote control retaining clip.

REMOVAL AND INSTALLATION

Keyless Vehicle Module

General Equipment

Worldwide Diagnostic System (WDS)

Removal

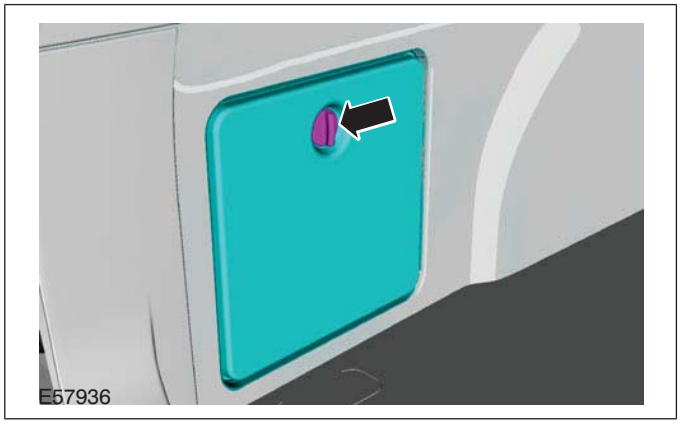
All vehicles

1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

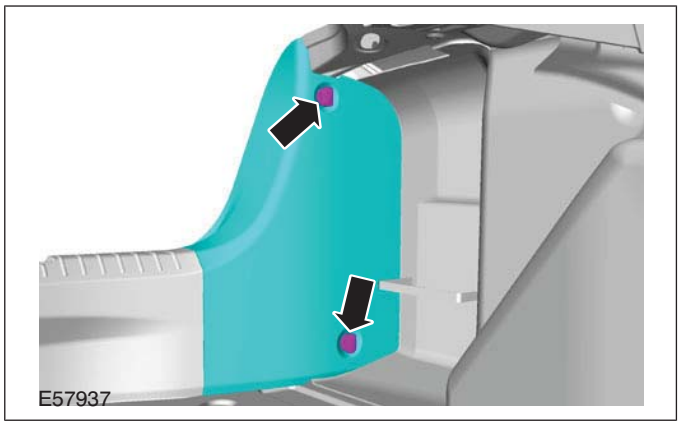
Wagon

2. **Open the loadspace storage compartment lid.**

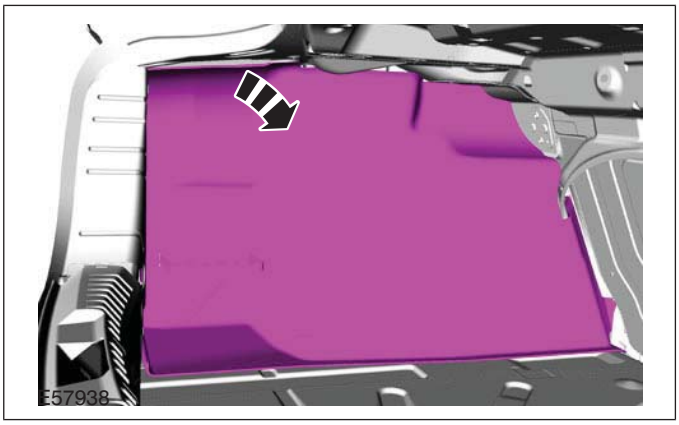


4-door

3. **Remove the loadspace floor covering.**
4. **Remove the rear lamp assembly access trim panel.**
   - Remove the rear lamp assembly access trim panel retaining clips.



5. **Detach the loadspace trim panel to gain access to the keyless vehicle module.**

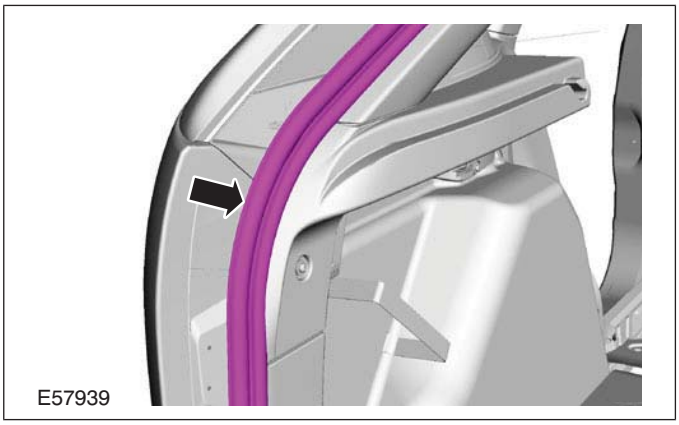


3-door and 5-door

6. **Remove the loadspace floor covering.**
7. **Tilt the rear seat cushion forward.**
8. **Tilt the rear seat backrest forward.**
9. **Remove the C-pillar trim.**

   For additional information, refer to: C-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

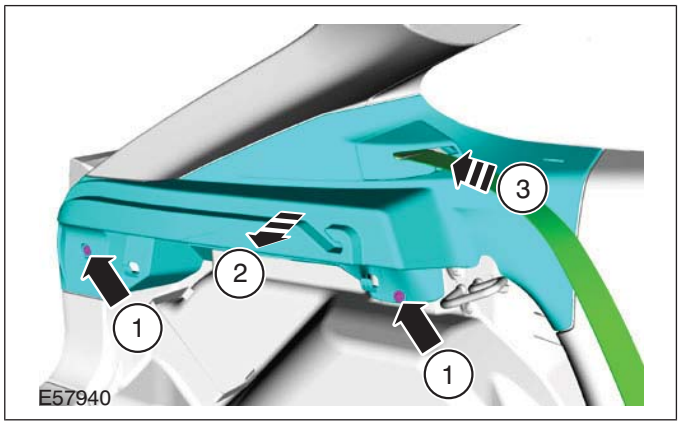
10. **Detach the liftgate opening weather strip.**



11. **Detach the parcel shelf support trim panel. (3 door vehicle shown, 5 door vehicle similar).**
    1. Remove the parcel shelf support trim panel retaining screws.
    2. Pull the parcel shelf support trim panel away from the body panel to disengage the locking clips between the D-pillar trim panel and the parcel shelf support trim panel.

REMOVAL AND INSTALLATION

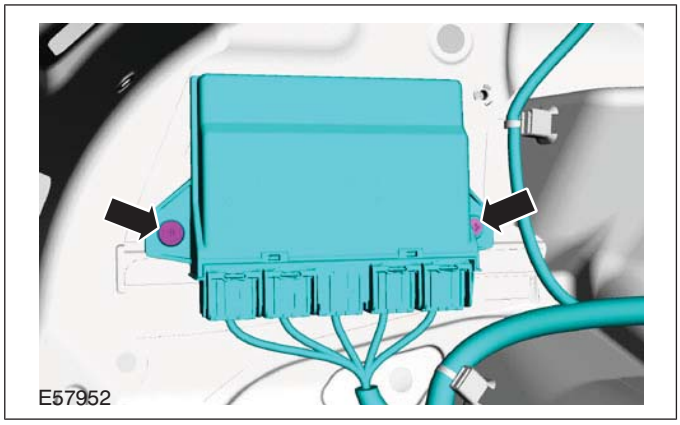
3. Feed the rear seat safety belt through the parcel shelf support trim panel and position the parcel shelf trim panel to one side.



All vehicles

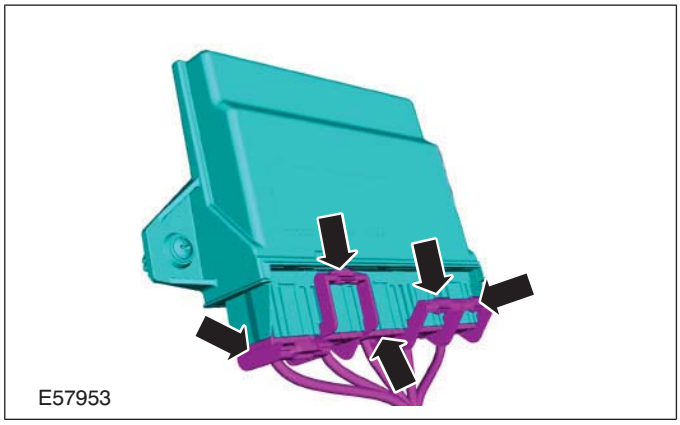
12. Detach the keyless vehicle module. (3 door vehicle shown, 5 door, 4 door and wagon vehicles similar).

- Remove the keyless vehicle module retaining screws.



13. Remove the keyless vehicle module.

- Disconnect the keyless vehicle module electrical connectors.



Installation

All vehicles

1. **To install, reverse the removal procedure.**
2. **If a new keyless vehicle module is installed, program the new keyless vehicle module using the WDS Program Module routine.**
3. **If a new keyless vehicle module is installed, initialize the new keyless vehicle module to the central junction box (CJB) and the steering column lock control unit, using the WDS Initialize System routine.**
4. **If a new keyless vehicle module is installed, teach the minimum required number of keys to the keyless vehicle module, using the WDS Teach Key function.**

Vehicles with global closing

5. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

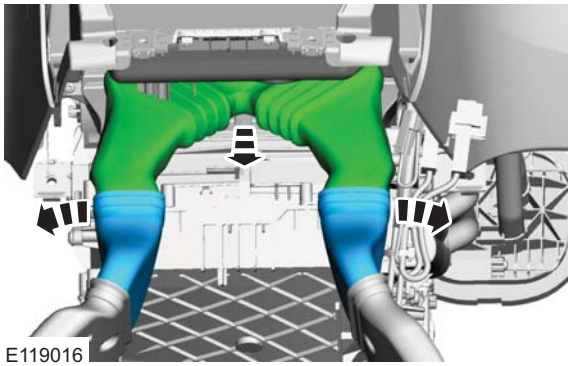
REMOVAL AND INSTALLATION

Keyless Vehicle Front Antenna

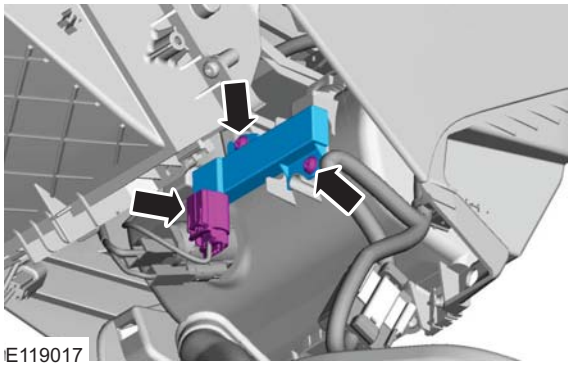
Removal

1. Refer to: Floor Console - Vehicles Built From: 03/2007, Vehicles With: Center Armrest (501-12 Instrument Panel and Console, Removal and Installation).

2.



3.



Installation

1. To install, reverse the removal procedure.

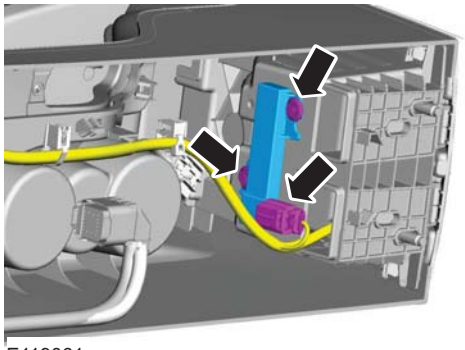
REMOVAL AND INSTALLATION

Keyless Vehicle Center Antenna

Removal

1. Refer to: Floor Console - Vehicles Built From: 03/2007, Vehicles With: Center Armrest (501-12 Instrument Panel and Console, Removal and Installation).

2.



E119061

Installation

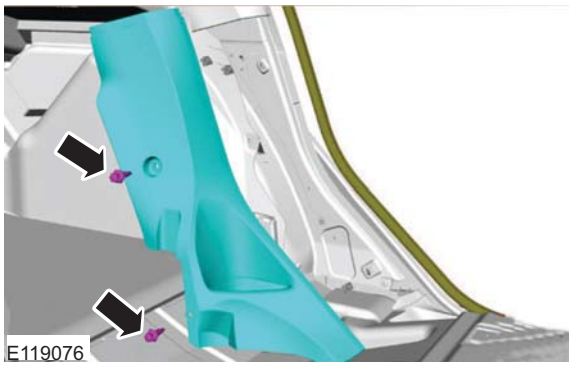
1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

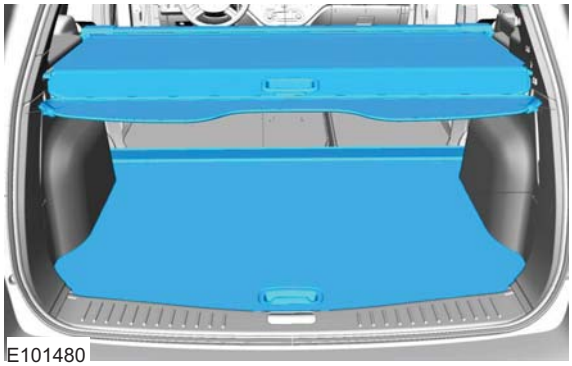
Keyless Vehicle Rear Antenna

Removal

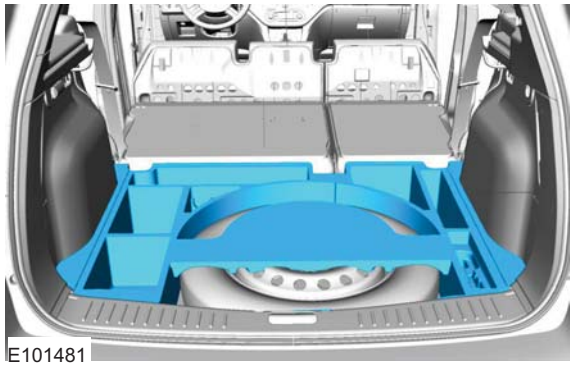
1.



2.

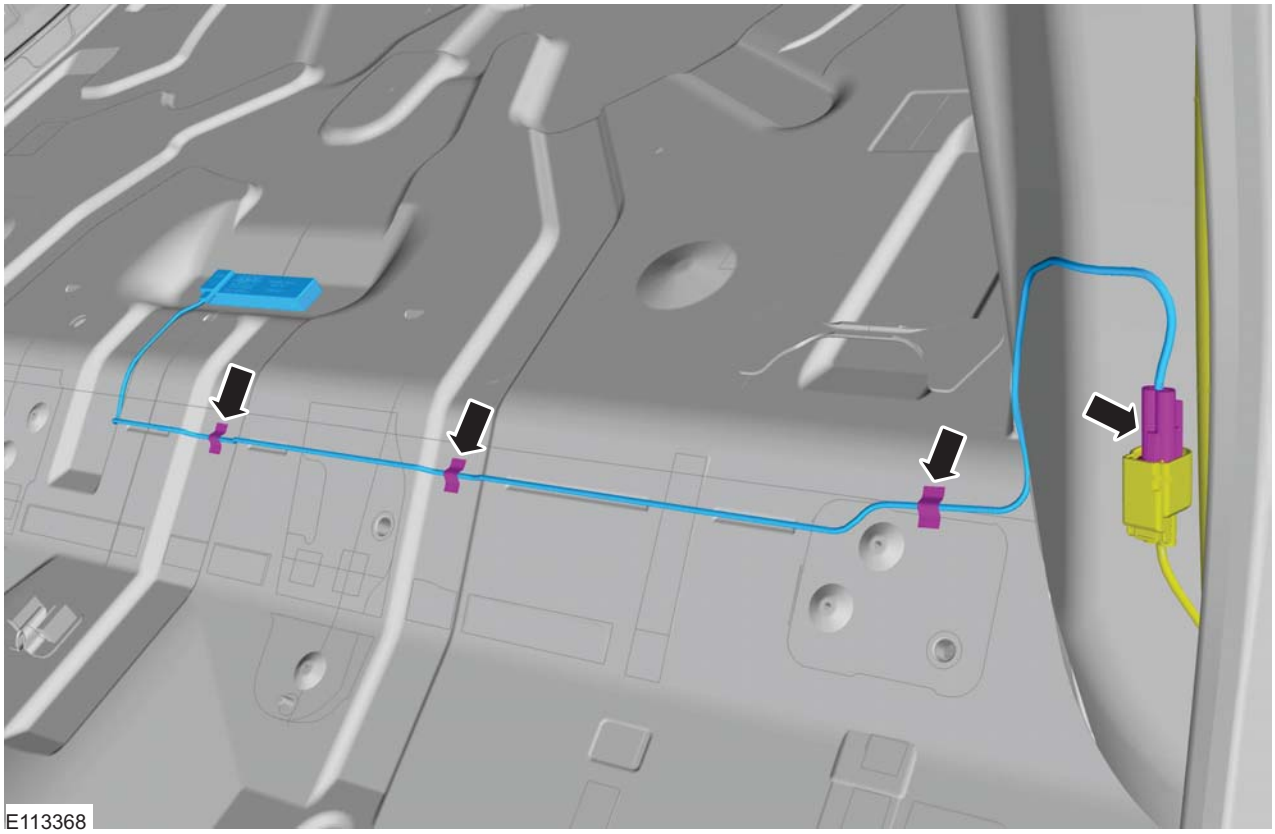


3.



4.

REMOVAL AND INSTALLATION



Installation

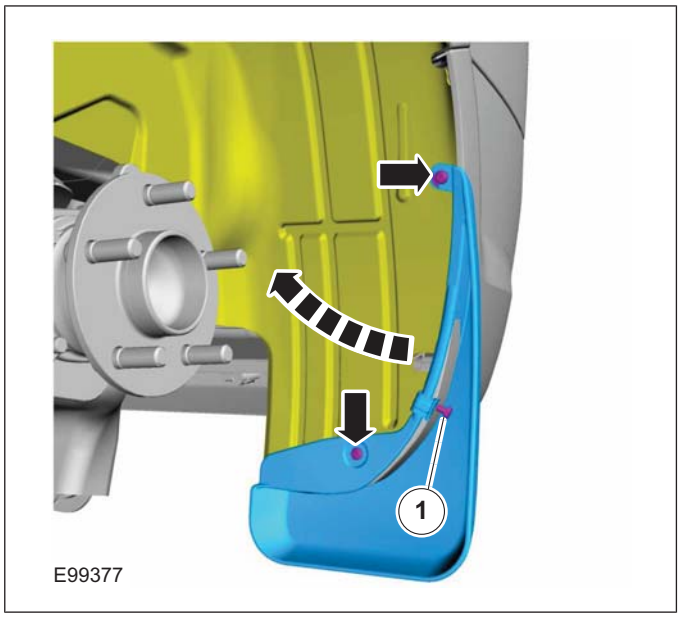
1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

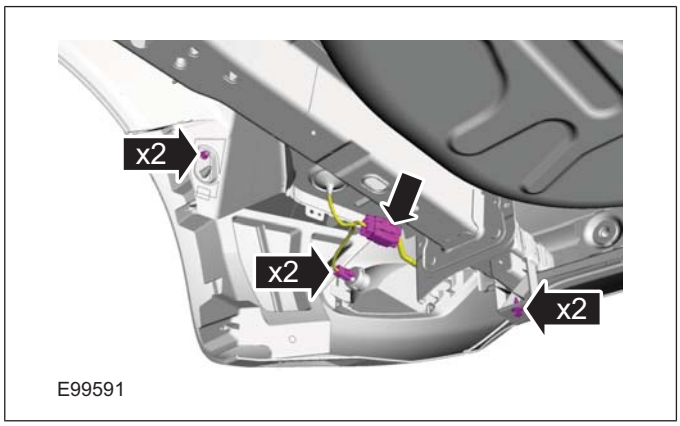
Keyless Vehicle Rear Bumper Antenna

Removal

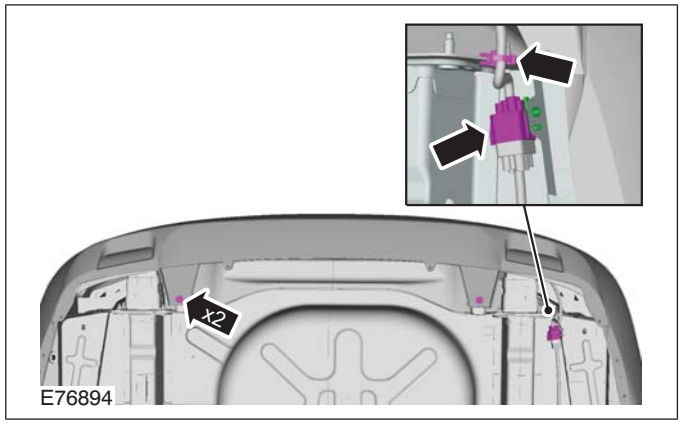
1. Refer to: Jacking (100-02 Jacking and Lifting, Description and Operation).
   Refer to: Lifting (100-02 Jacking and Lifting, Description and Operation).
2.
3. 1. If equipped.
   2. On both sides.



4.

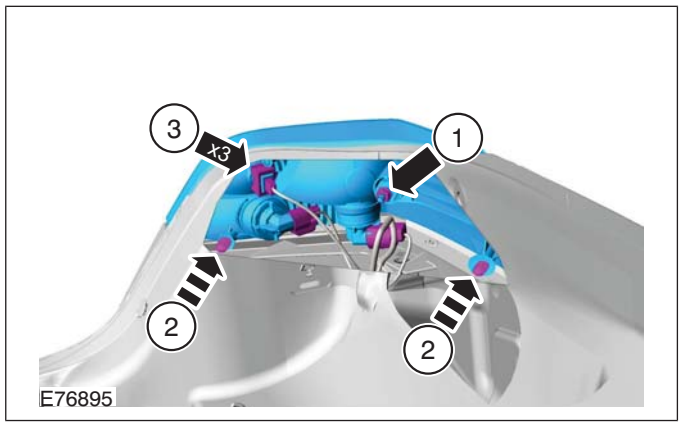


5.



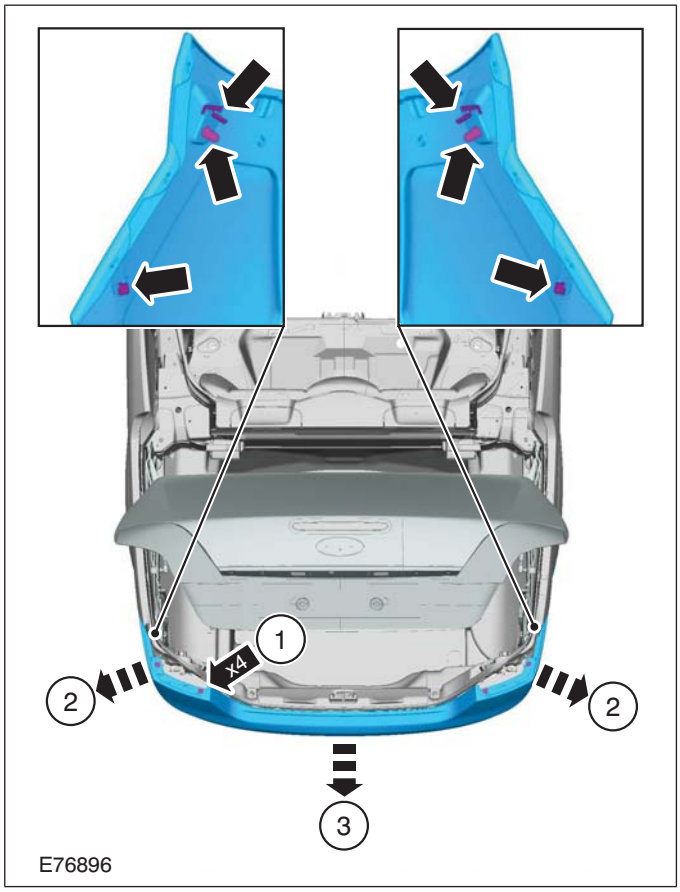
Convertible

6.



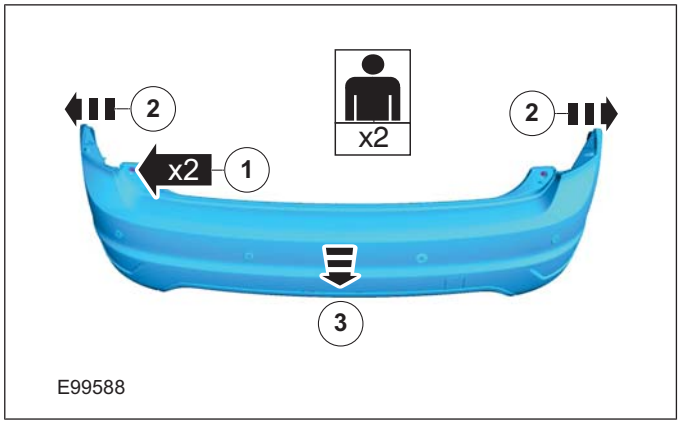
REMOVAL AND INSTALLATION

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



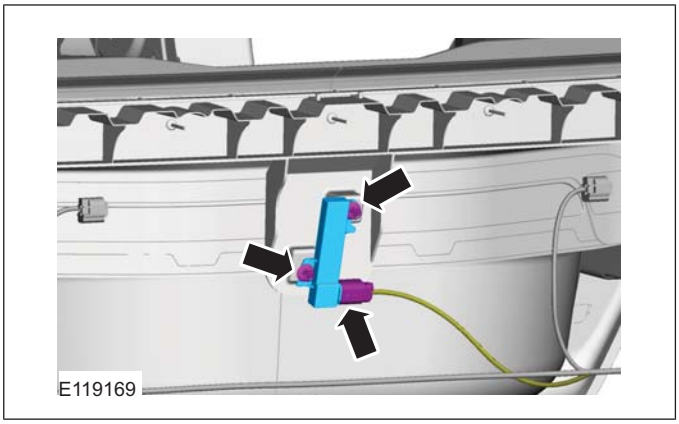
3-door, 4-door and 5-door

8.



All vehicles

9.



Installation

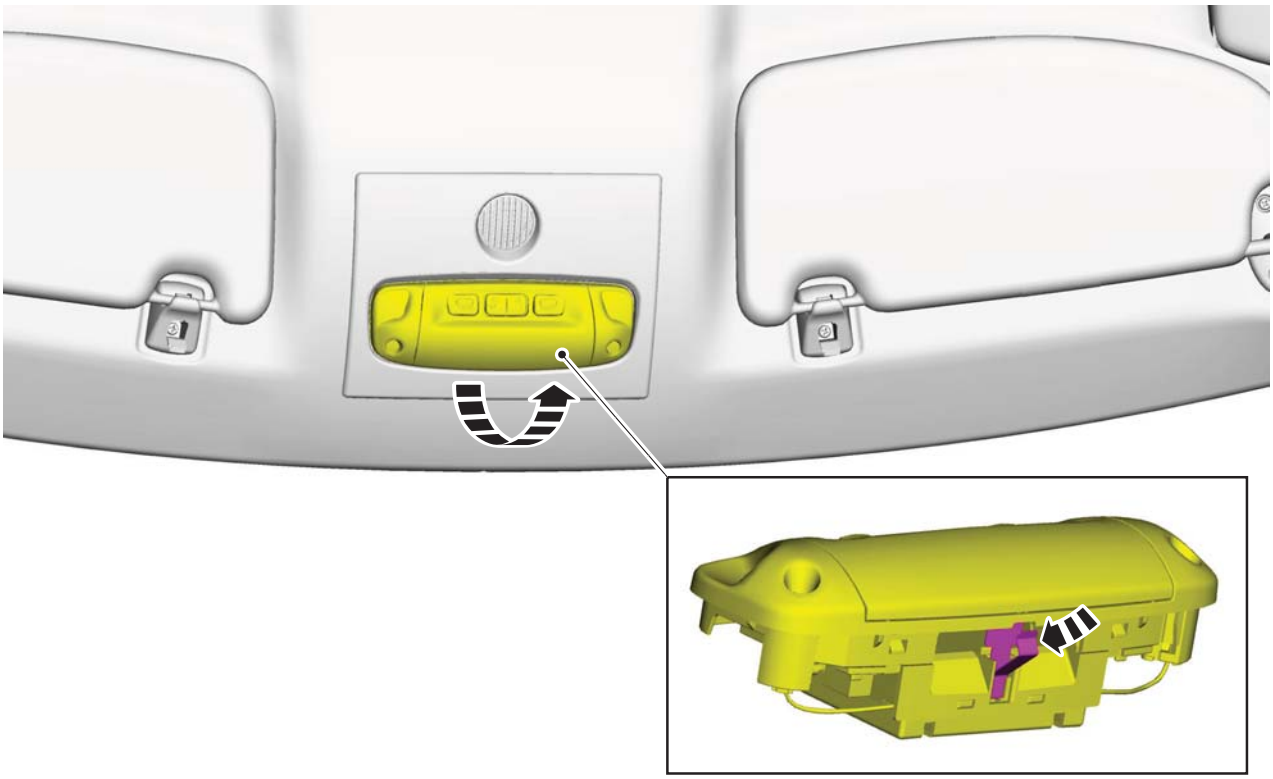
1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Radio Frequency (RF) Receiver

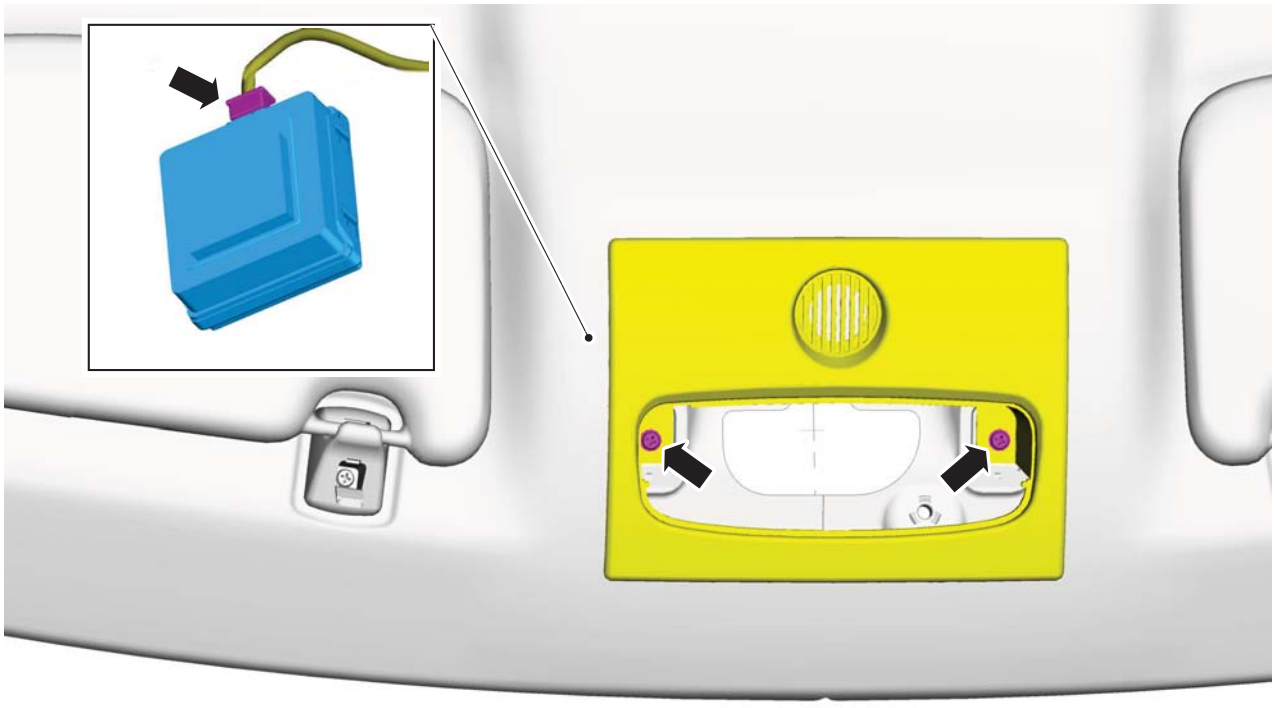
Removal

1.



2.

REMOVAL AND INSTALLATION



E119794

Installation

1. To install, reverse the removal procedure.

DISASSEMBLY AND ASSEMBLY

Hood Lock Cylinder

General Equipment

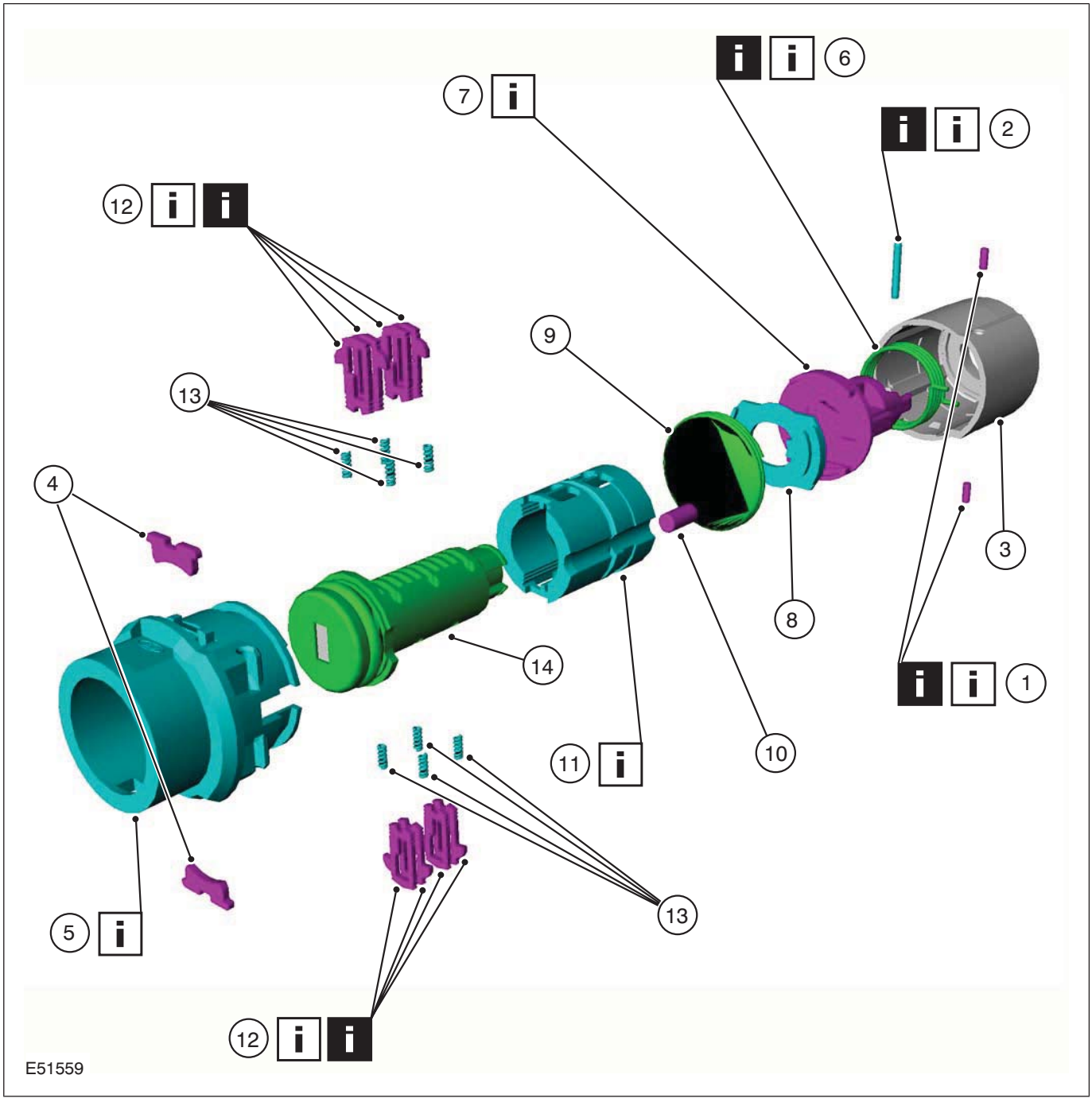
Punch

NOTE: To obtain the key code, please use either the driver door lock cylinder, ignition lock cylinder or tailgate lock cylinder. The hood lock cannot be used, because two of the ten tumblers have been removed from the hood lock cylinder.

1. **Remove the hood lock cylinder.**

   For additional information, refer to: Hood Lock Cylinder (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

2. **Disassemble the components in the order indicated in the following illustration(s) and table(s).**



DISASSEMBLY AND ASSEMBLY

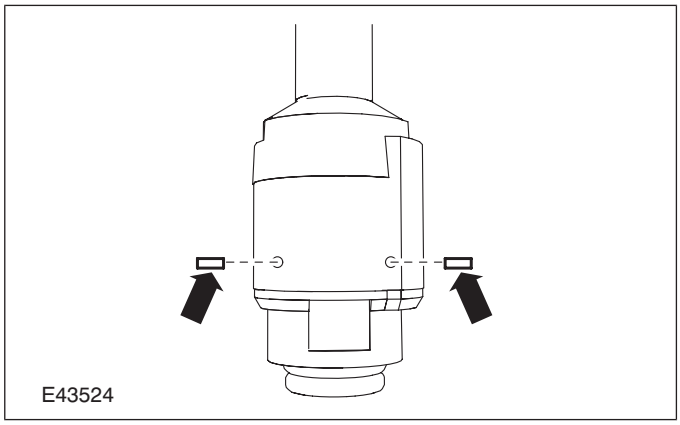
Item	Description
1	Hood lock cylinder locking pins See Disassembly Detail See Assembly Detail
2	Hood lock cylinder locking pin See Disassembly Detail See Assembly Detail
3	Hood lock cylinder housing
4	Hood lock cylinder barrel cover locking clips See Disassembly Detail
5	Hood lock cylinder barrel cover See Assembly Detail
6	Hood lock cylinder return spring See Disassembly Detail See Assembly Detail
7	Hood lock cylinder connecting clip See Assembly Detail
8	Hood lock cylinder washer
9	Hood lock cylinder spring
10	Hood lock cylinder roll pin
11	Hood lock cylinder barrel cover See Disassembly Detail See Assembly Detail
12	Hood lock cylinder barrel tumblers See Disassembly Detail See Assembly Detail
13	Hood lock cylinder barrel tumbler springs
14	Hood lock cylinder barrel

3. **To assemble, reverse the disassembly procedure.**

Disassembly Details

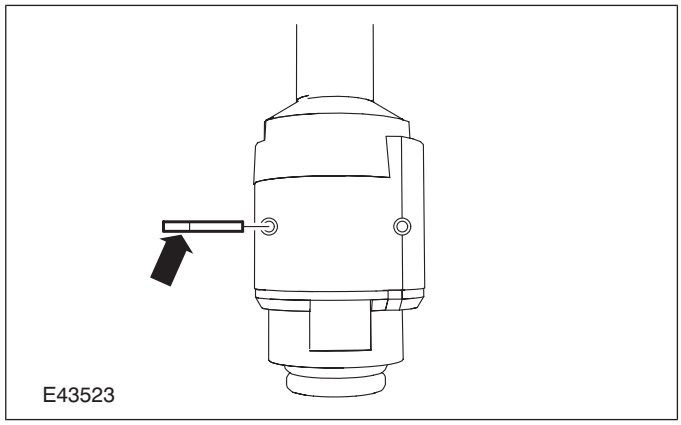
Item 1 Hood lock cylinder locking pins

1. **Using a suitable Punch, remove the hood lock cylinder locking pins.**



Item 2 Hood lock cylinder locking pin

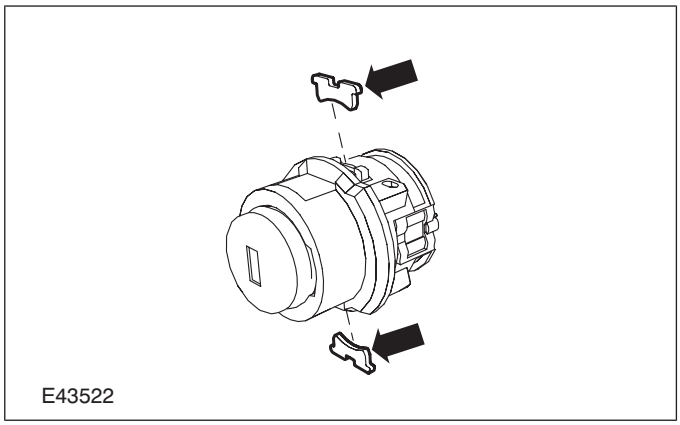
1. **Using a suitable Punch, remove the hood lock cylinder locking pin.**



DISASSEMBLY AND ASSEMBLY

Item 4 Hood lock cylinder barrel cover locking clips

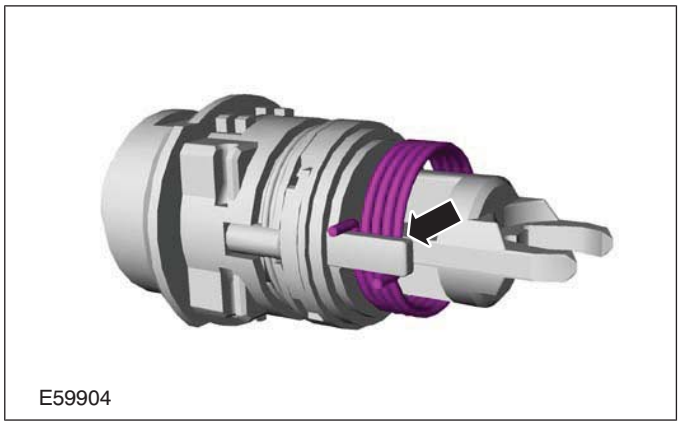
1. Using a suitable tool, remove the hood lock cylinder barrel cover locking clips.



Item 6 Hood lock cylinder return spring

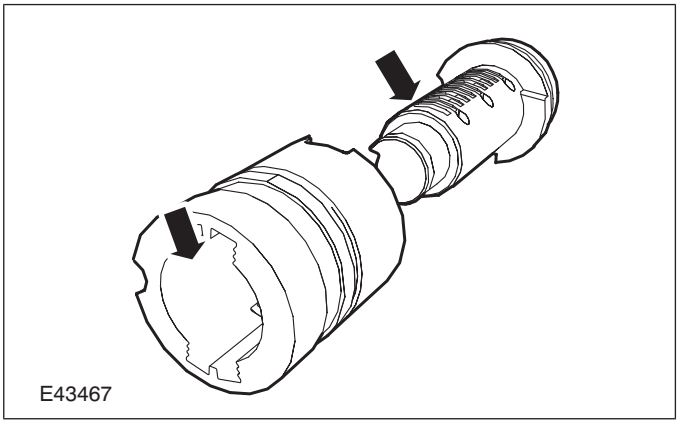
1. NOTE: Make a note of the position of the hood lock cylinder return spring.

   Remove the hood lock cylinder return spring.



Item 11 Hood lock cylinder barrel cover

1. Remove the hood lock cylinder barrel guide.

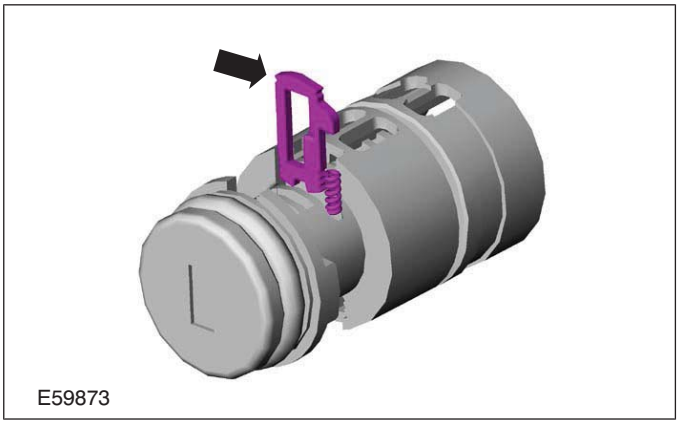


Item 12 Hood lock cylinder barrel tumblers

1. NOTE: Make sure to read the key code from the key entry to the end of the lock barrel in sequence.

NOTE: Make a note of the position and orientation of the hood lock cylinder barrel tumblers.

Remove the hood lock cylinder barrel tumblers in the correct order.



Assembly Details

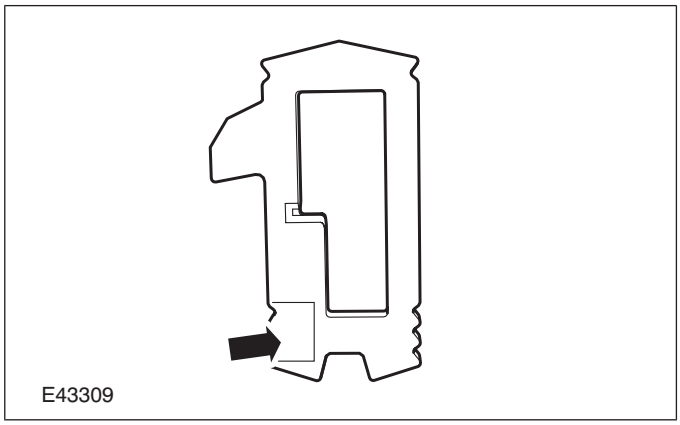
Item 12 Hood lock cylinder barrel tumblers

1. NOTE: Make sure to read the key code from the key entry to the end of the lock barrel in sequence.

NOTE: One group of tumblers is signed with a one digit number (1 to 5), the other group of tumblers is signed with a two digit number (11 to 15).

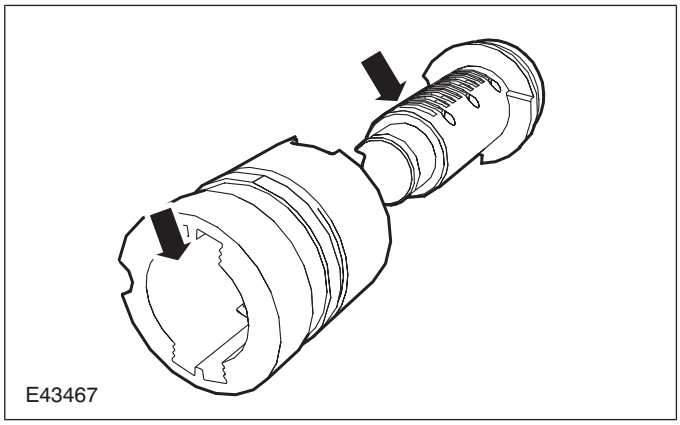
DISASSEMBLY AND ASSEMBLY

Assemble the hood lock cylinder barrel tumblers in the correct order.



Item 11 Hood lock cylinder barrel cover

NOTE: Make sure that the hood lock cylinder cover guide indents align with the hood lock cylinder barrel.

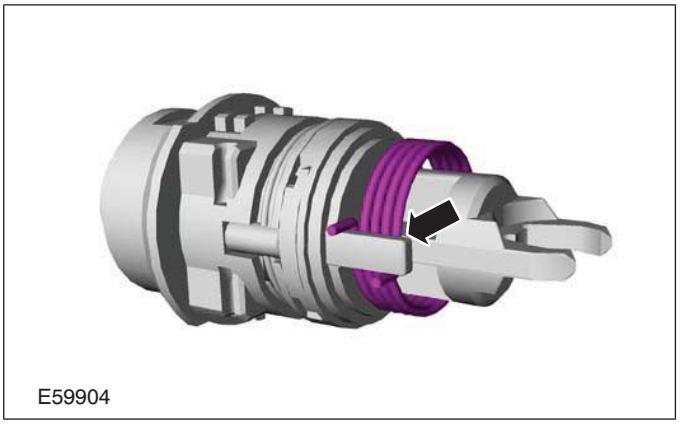


Item 7 Hood lock cylinder connecting clip

NOTE: An audible click can be heard when the hood lock cylinder return spring cap is installed correctly.

Item 6 Hood lock cylinder return spring

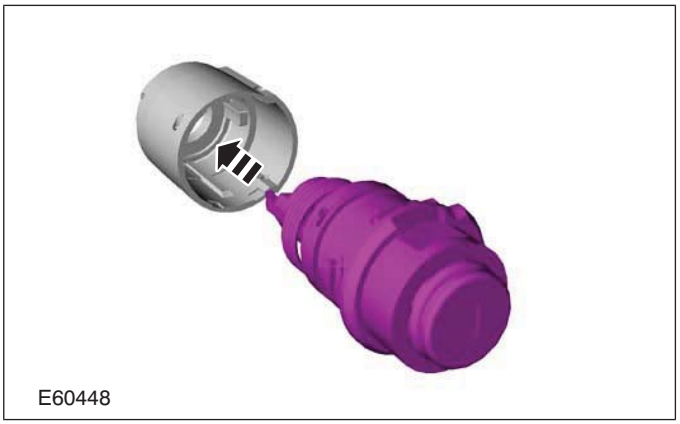
1. **Install the hood lock cylinder return spring in the same position as removed.**



Item 5 Hood lock cylinder barrel cover

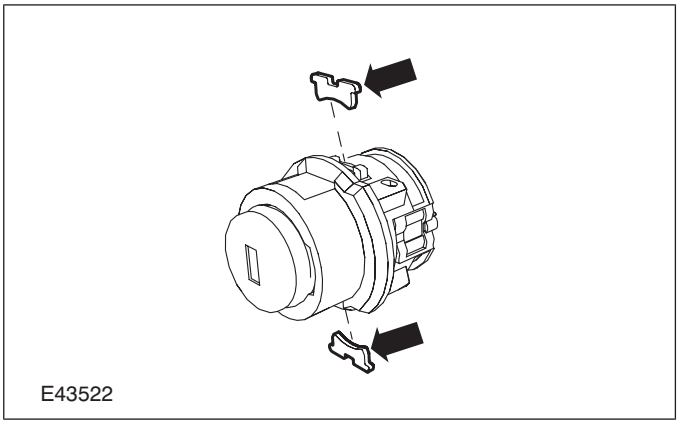
1. **NOTE: The hood lock cylinder can only be installed to the hood lock cylinder housing in one position.**

   Install the hood lock cylinder barrel cover into the hood lock cylinder housing.



Item 4 Hood lock cylinder barrel cover locking clips

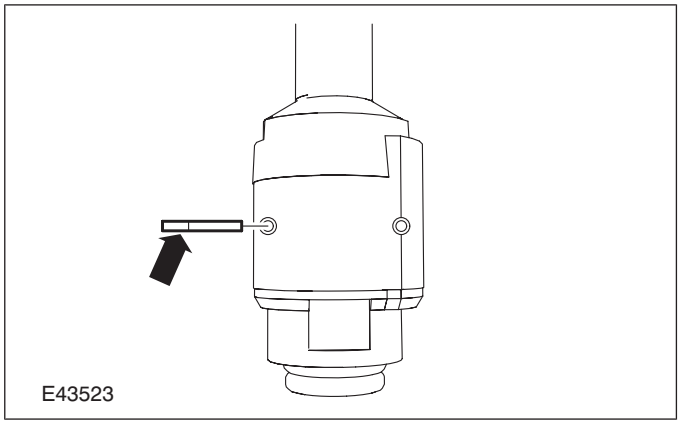
1. **Install the hood lock cylinder barrel cover locking clips.**



DISASSEMBLY AND ASSEMBLY

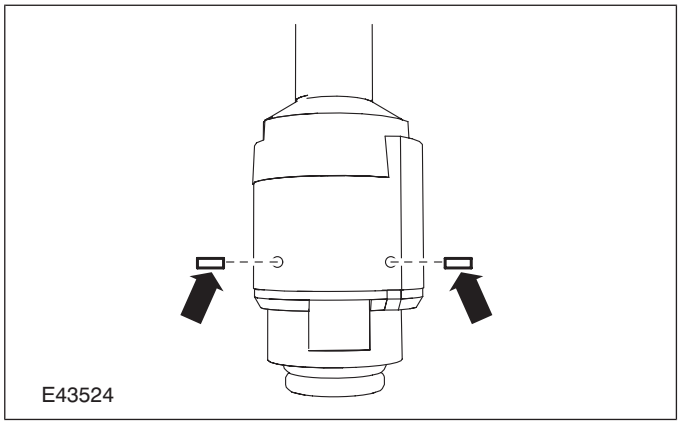
Item 2 Hood lock cylinder locking pin

1. Using a suitable **Punch**, install the hood lock cylinder locking pin.



Item 1 Hood lock cylinder locking pins

1. Using a suitable **Punch**, install the hood lock cylinder locking pins.



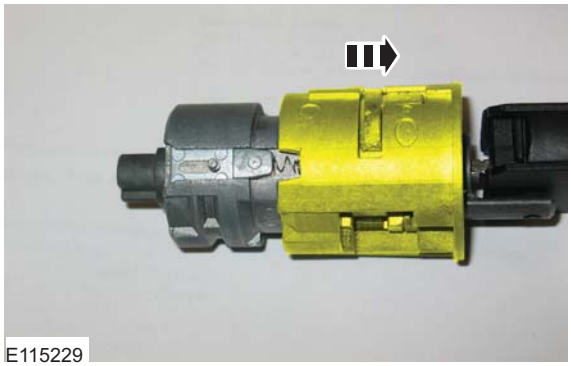
DISASSEMBLY AND ASSEMBLY

Ignition Lock Cylinder — Vehicles With: Keyless Vehicle System

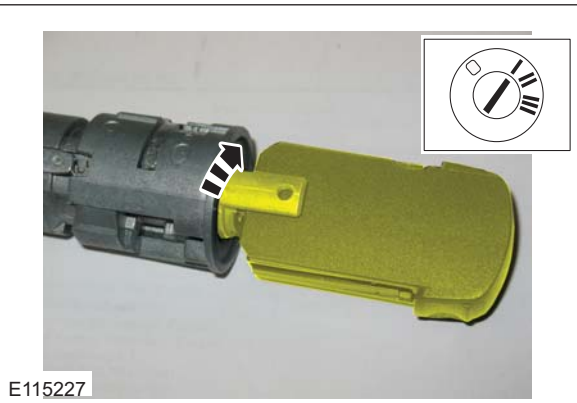
Disassembly

1. Refer to: Ignition Lock Cylinder - Vehicles With: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

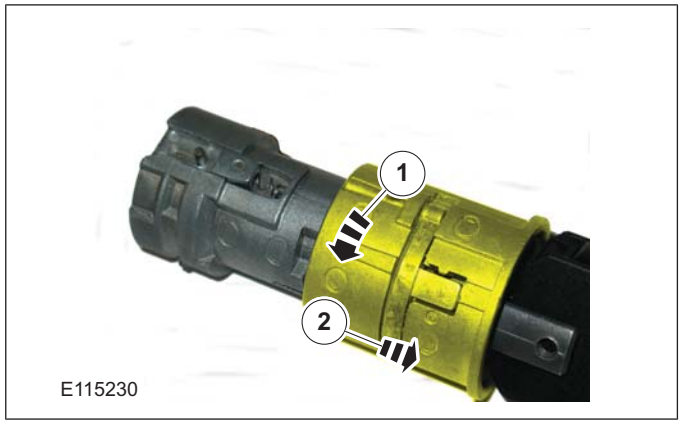
2.



3.



4.



5.

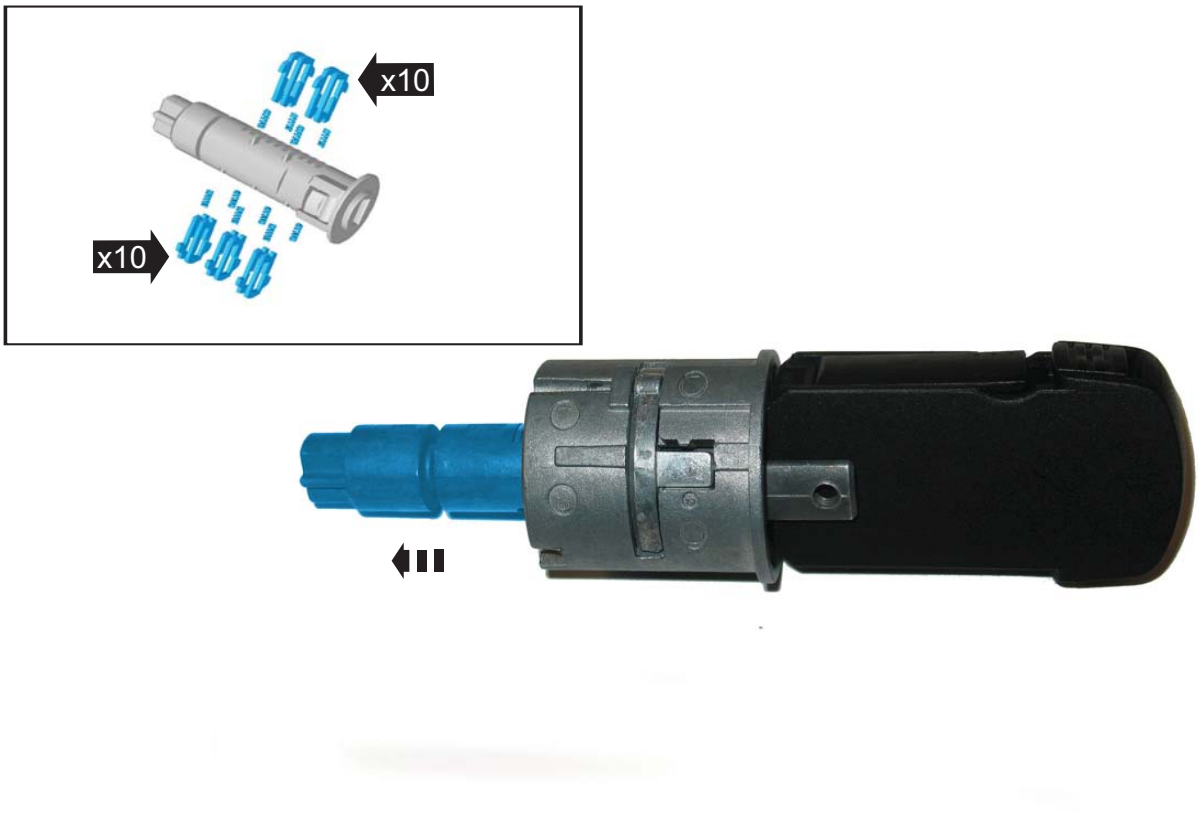


6. **NOTE:** Make sure to read the key code from the key entry to the end of the lock barrel in sequence.

   NOTE: Make a note of the position and orientation of the ignition lock cylinder barrel tumblers.

   NOTE: One group of tumblers is signed with a one digit number (1 to 5), the other group of tumblers is signed with a two digit number (11 to 15).

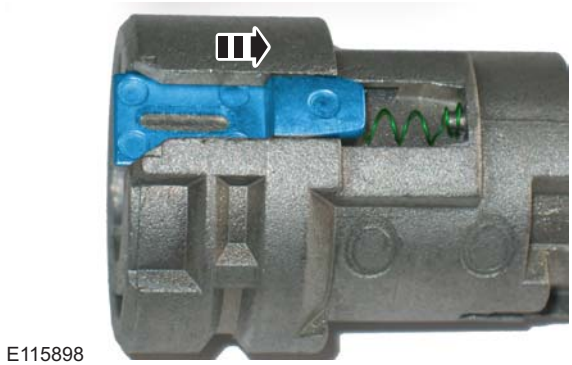
DISASSEMBLY AND ASSEMBLY



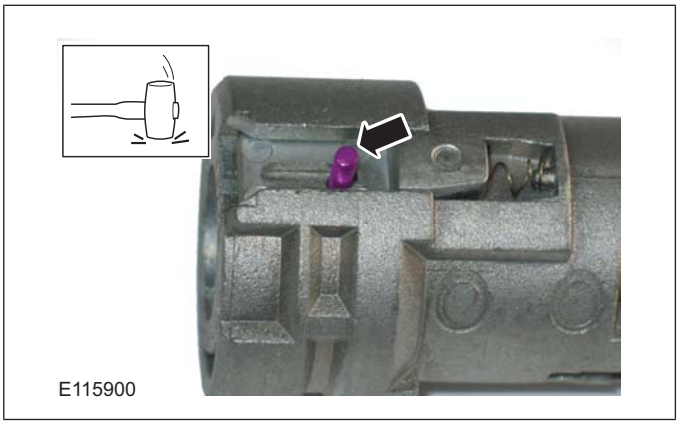
E115740

Assembly

7.


E115898

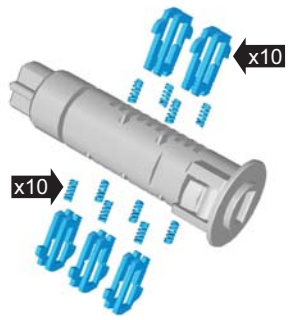
8.


E115900

9. NOTE: One group of tumblers is signed with a one digit number (1 to 5), the other group of

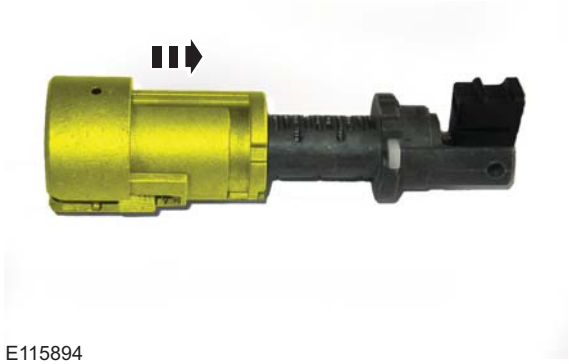
DISASSEMBLY AND ASSEMBLY

tumblers is signed with a two digit number (11 to 15).



E70124

10.



E115894

11.



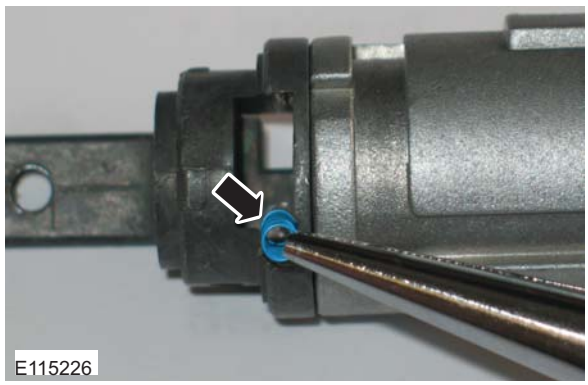
E115906

12.



E115909

13.



E115226

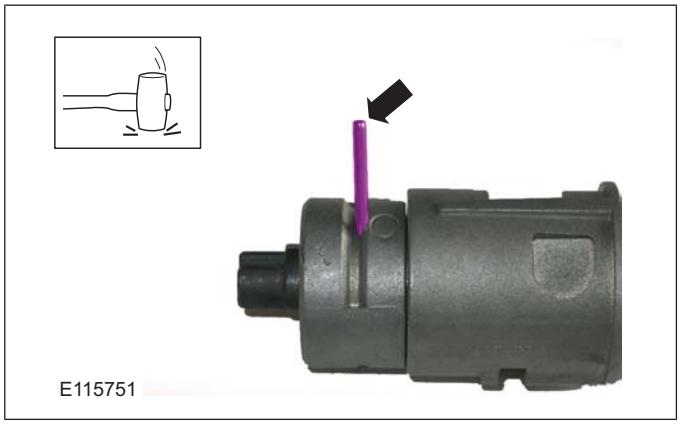
14.



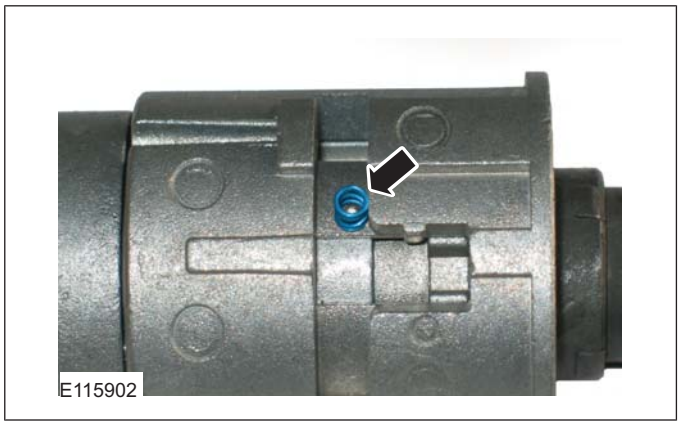
E115746

DISASSEMBLY AND ASSEMBLY

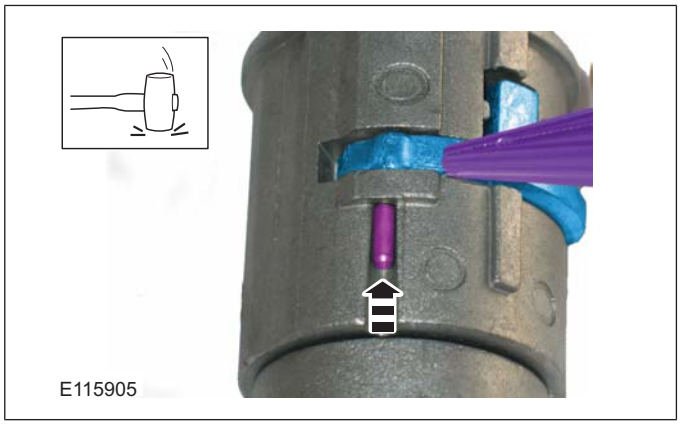
15.



16.



17.



DISASSEMBLY AND ASSEMBLY

Ignition Lock Cylinder — Vehicles Without: Keyless Vehicle System

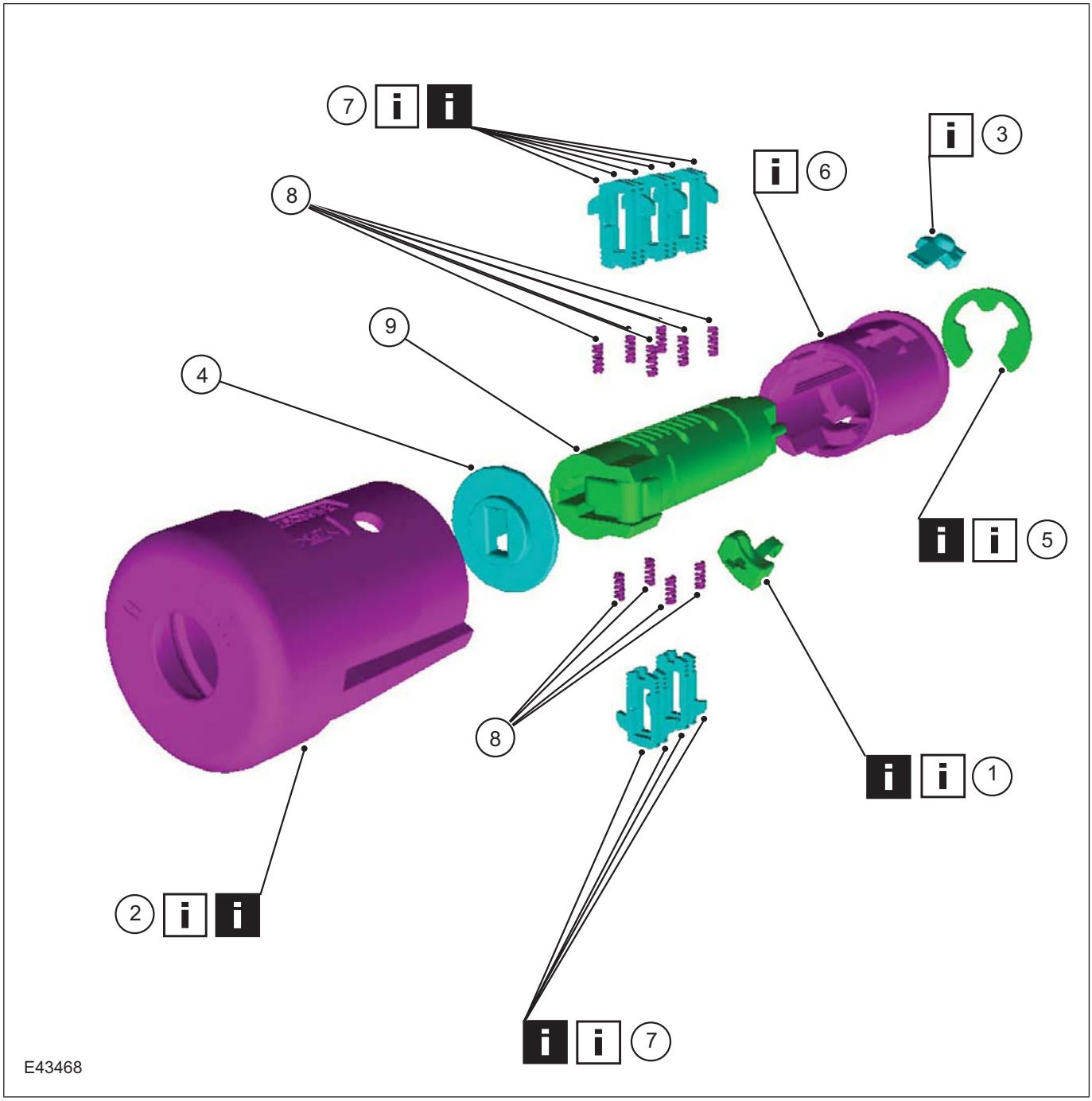
General Equipment

Flat-bladed screwdriver

1. **Remove the ignition lock cylinder.**

   For additional information, refer to: Ignition Lock Cylinder - Vehicles Without: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

2. **Disassemble the components in the order indicated in the following illustration(s) and table(s).**



DISASSEMBLY AND ASSEMBLY

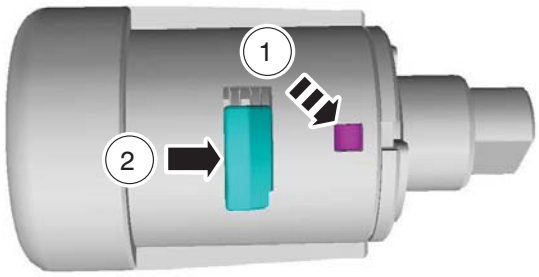
Item	Description
1	Ignition lock cylinder locking button See Disassembly Detail See Assembly Detail
2	Ignition lock cylinder housing See Disassembly Detail See Assembly Detail
3	Ignition lock cylinder retaining clip See Assembly Detail
4	Ignition lock cylinder barrel cover
5	Ignition lock cylinder retaining clip See Disassembly Detail See Assembly Detail
6	Ignition lock cylinder barrel guide See Assembly Detail
7	Ignition lock cylinder barrel tumblers See Disassembly Detail See Assembly Detail
8	Ignition lock cylinder barrel tumbler springs
9	Ignition lock cylinder barrel

3. **To assemble, reverse the disassembly procedure.**
4. **Install the ignition lock cylinder.**

   For additional information, refer to: Ignition Lock Cylinder - Vehicles Without: Keyless Vehicle System (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

Disassembly Details

Item 1 Ignition lock cylinder locking button

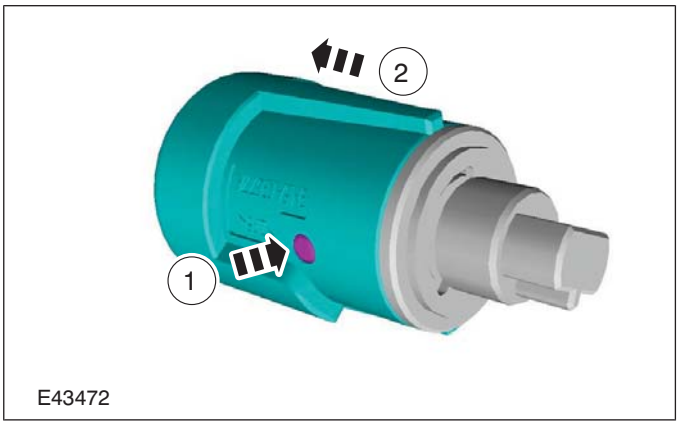


E62270

1. **Remove the ignition lock cylinder locking button.**
   1. Using a suitable tool, release the ignition lock cylinder locking button leaf spring and remove the ignition lock cylinder locking button leaf spring.
   2. Detach the ignition lock cylinder locking button from the ignition lock cylinder housing and remove the ignition lock cylinder locking button.

Item 2 Ignition lock cylinder housing

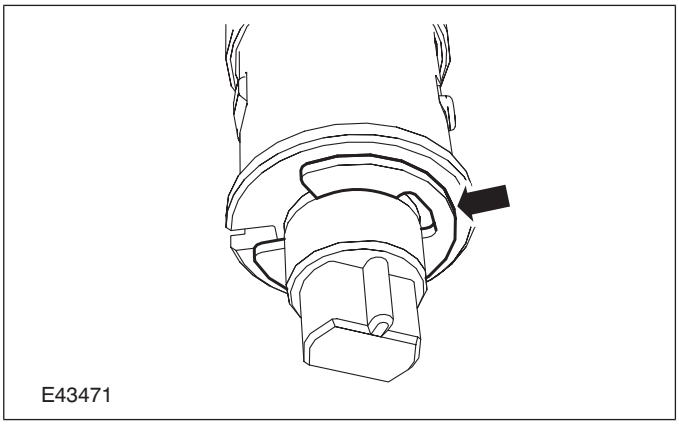
1. **Remove the ignition lock cylinder housing.**
   1. Operate the ignition lock cylinder retaining clip.
   2. Slide the ignition lock cylinder housing away from the ignition lock cylinder barrel guide.



E43472

Item 5 Ignition lock cylinder retaining clip

1. **Using a suitable Flat-bladed screwdriver remove the ignition lock cylinder retaining clip.**



E43471

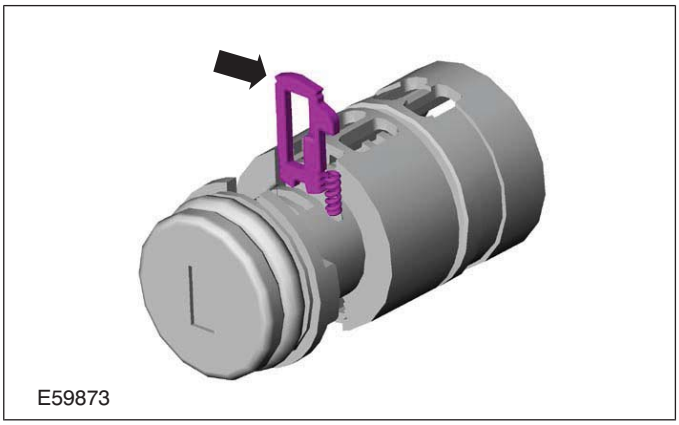
DISASSEMBLY AND ASSEMBLY

Item 7 Ignition lock cylinder barrel tumblers

1. **NOTE: Make sure to read the key code from the key entry to the end of the lock barrel in sequence.**

NOTE: Make a note of the position and orientation of the ignition lock cylinder barrel tumblers.

Remove the ignition lock cylinder barrel tumblers and springs in the correct order.



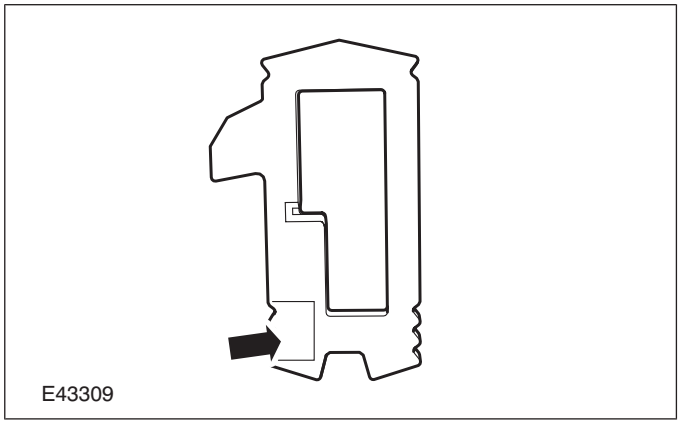
Assembly Details

Item 7 Ignition lock cylinder barrel tumblers

1. **NOTE: Make sure to read the key code from the key entry to the end of the lock barrel in sequence.**

NOTE: One group of tumblers is signed with a one digit number (1 to 5), the other group of tumblers is signed with a two digit number (11 to 15).

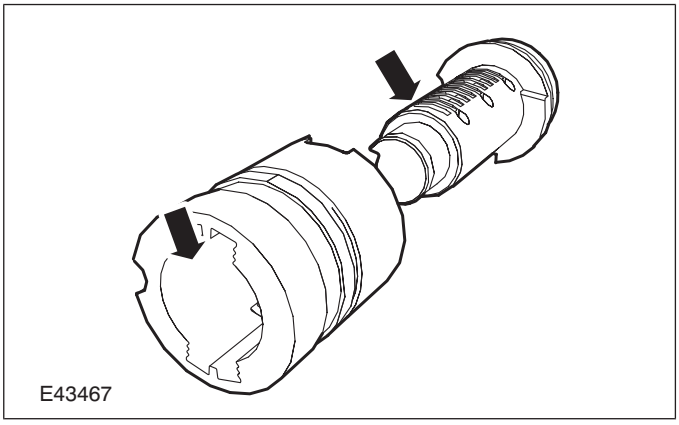
Assemble the ignition lock cylinder barrel tumblers and springs in the correct order.



Item 6 Ignition lock cylinder barrel guide

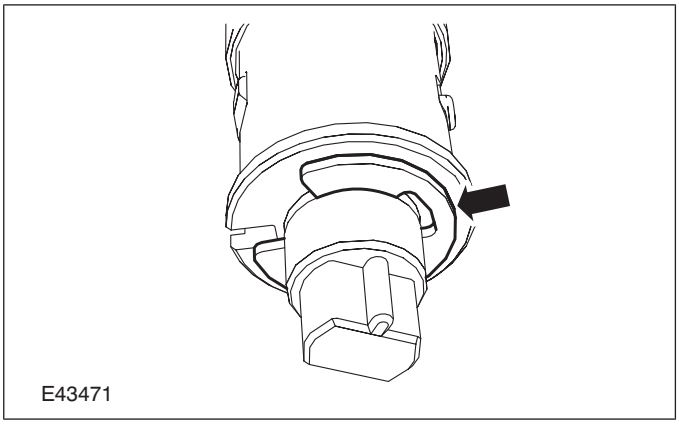
1. **NOTE: Make sure that the ignition lock cylinder barrel guide indents align with the ignition lock cylinder barrel guide.**

Install the key and the assembled lock cylinder barrel into the ignition lock cylinder barrel guide and remove the key.



Item 5 Ignition lock cylinder retaining clip

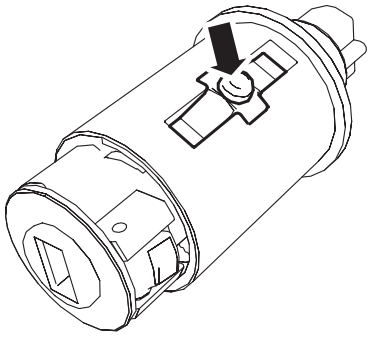
1. **Install the ignition lock cylinder retaining clip.**



DISASSEMBLY AND ASSEMBLY

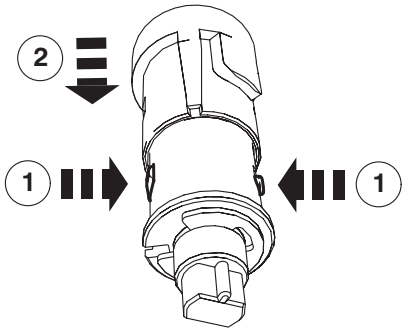
Item 3 Ignition lock cylinder retaining clip

1. **Install the ignition lock cylinder retaining clip in the position shown.**



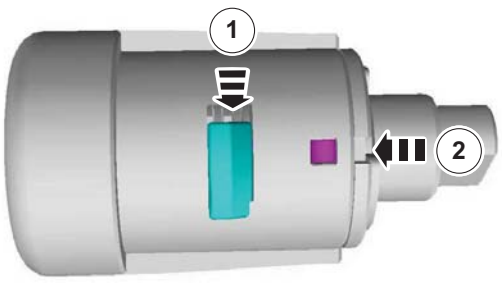
Item 2 Ignition lock cylinder housing

1. **Install the ignition lock cylinder housing.**
   1. Operate the ignition lock cylinder retaining spring and locking button.
   2. Slide the ignition lock cylinder housing onto from the ignition lock cylinder barrel guide.



Item 1 Ignition lock cylinder locking button

1. **Assemble the ignition lock cylinder locking button and leaf spring and install in the position shown.**



DISASSEMBLY AND ASSEMBLY

Door Lock Cylinder

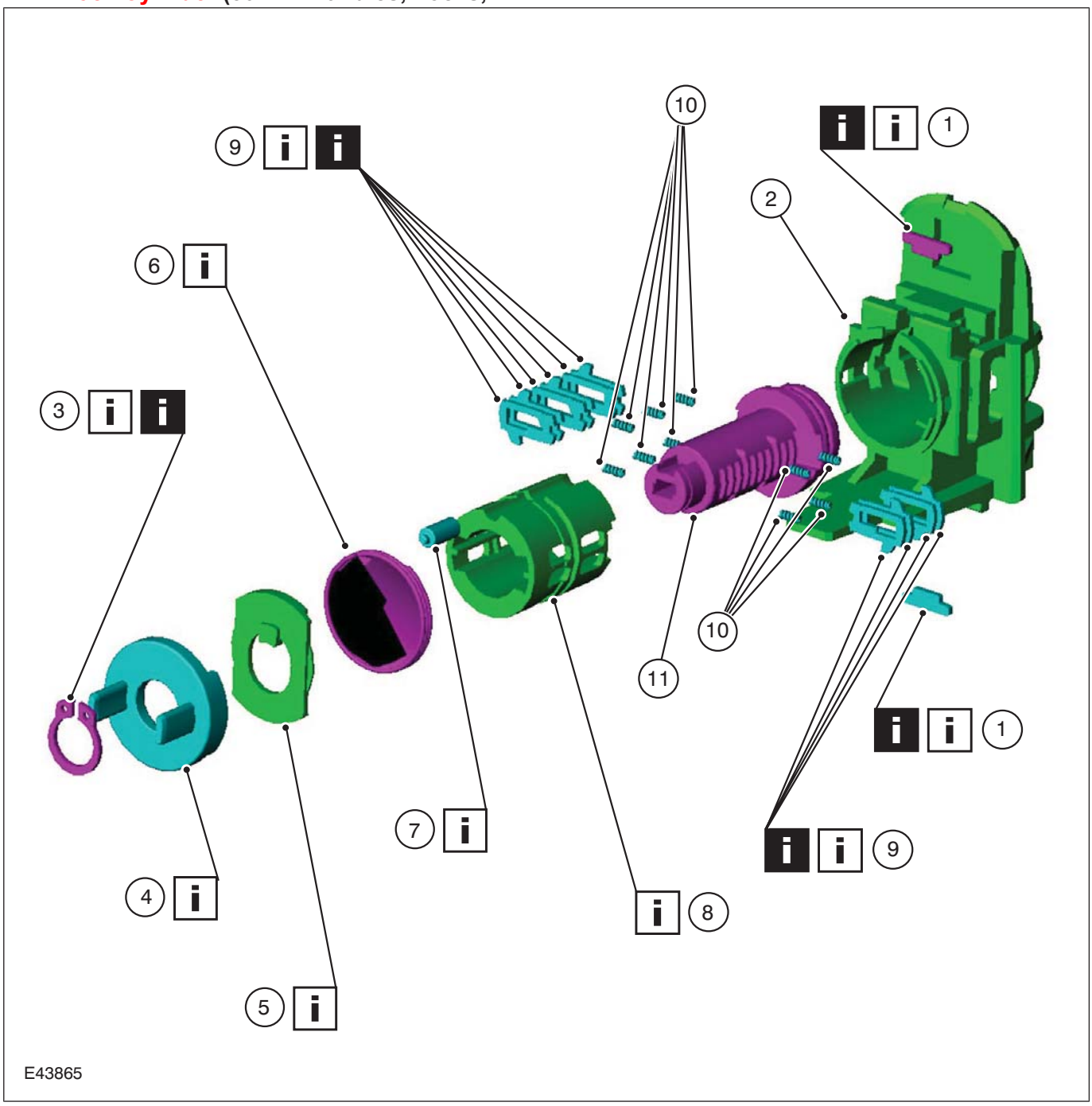
General Equipment

Punch

1. **Remove the door lock cylinder.**

   For additional information, refer to: Door Lock Cylinder (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

2. **Disassemble the components in the order indicated in the following illustration(s) and table(s).**



DISASSEMBLY AND ASSEMBLY

Item	Description
1	Door lock cylinder barrel locking pins See Disassembly Detail See Assembly Detail
2	Door lock cylinder barrel housing
3	Door lock cylinder retaining clip See Disassembly Detail See Assembly Detail
4	Door lock cylinder latch actuator See Assembly Detail
5	Door lock cylinder latch actuator driver See Assembly Detail
6	Door lock cylinder guide pin retaining spring See Assembly Detail
7	Door lock cylinder guide pin See Assembly Detail
8	Door lock cylinder barrel guide See Assembly Detail
9	Door lock cylinder barrel tumblers See Disassembly Detail See Assembly Detail
10	Door lock cylinder barrel tumbler springs
11	Door lock cylinder barrel

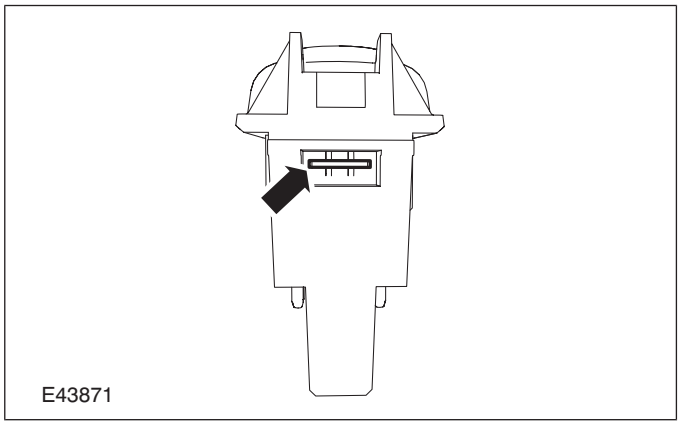
3. **To assemble, reverse the disassembly procedure.**
4. **Install the door lock cylinder.**

   For additional information, refer to: Door Lock Cylinder (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

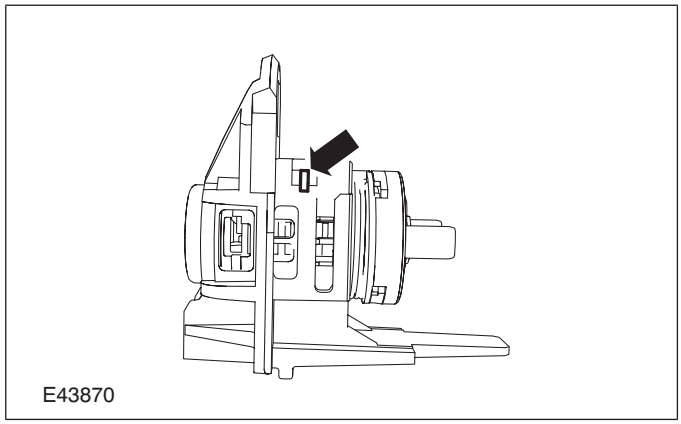
Disassembly Details

Item 1 Door lock cylinder barrel locking pins

1. **Remove the door lock cylinder lower retaining pin.**



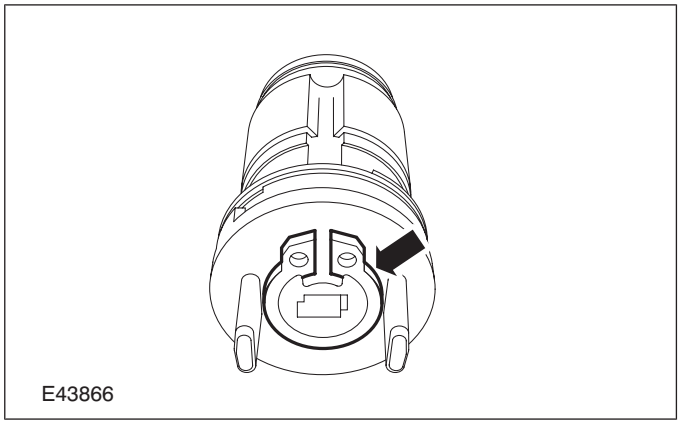
2. **Using a suitable Punch, remove door lock cylinder upper retaining pin.**



DISASSEMBLY AND ASSEMBLY

Item 3 Door lock cylinder retaining clip

1. **Remove the door lock cylinder retaining clip from the door lock cylinder.**

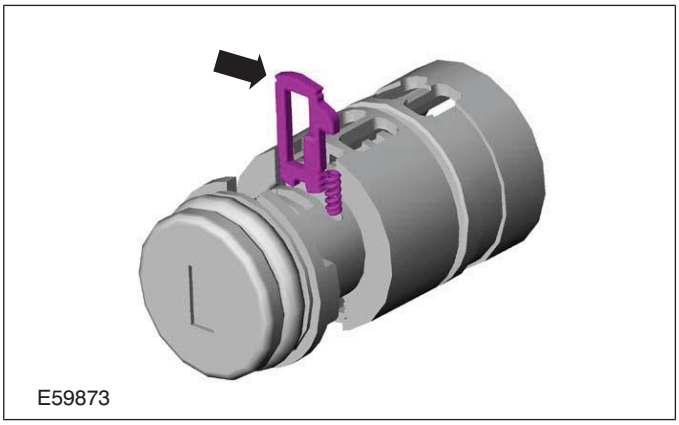


Item 9 Door lock cylinder barrel tumblers

1. **NOTE: Make sure to read the key code from the key entry to the end of the lock barrel in sequence.**

NOTE: Make a note of the position and orientation of the door lock cylinder barrel tumblers.

Remove the door lock cylinder barrel tumblers and springs in the correct order.



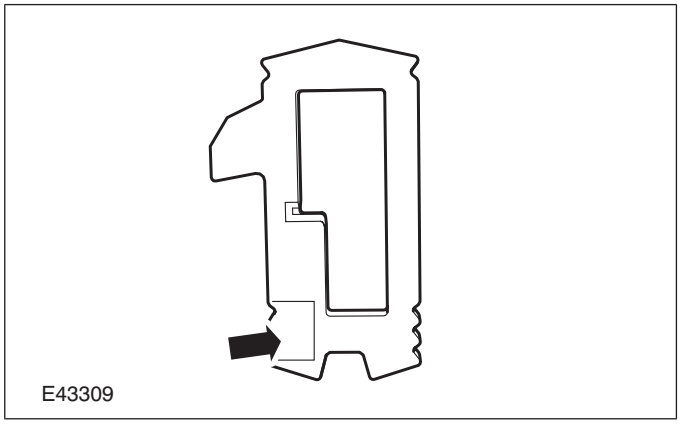
Assembly Details

Item 9 Door lock cylinder barrel tumblers

1. **NOTE: Make sure to read the key code from the key entry to the end of the lock barrel in sequence.**

NOTE: One group of tumblers is signed with a one digit number (1 to 5), the other group of tumblers is signed with a two digit number (11 to 15).

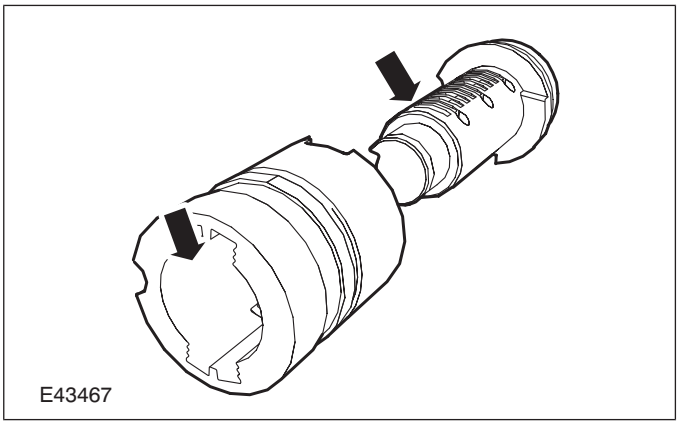
Assemble the door lock cylinder barrel tumblers and springs in the correct order.



Item 8 Door lock cylinder barrel guide

1. **NOTE: Make sure that the door lock cylinder cover guide indents align with the door lock cylinder barrel.**

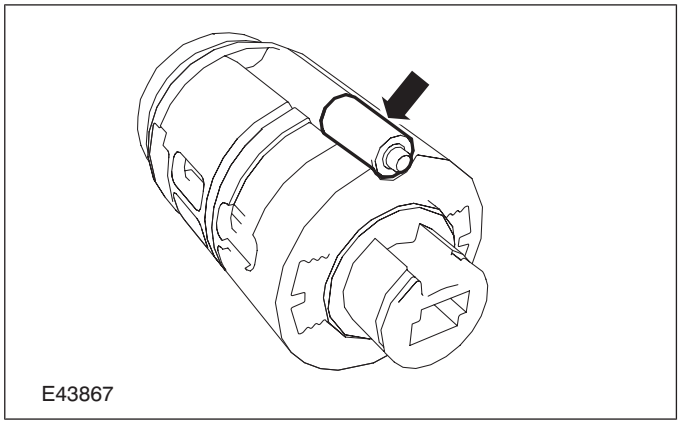
Install the key and the assembled lock cylinder barrel into the door lock cylinder barrel guide and remove the key.



DISASSEMBLY AND ASSEMBLY

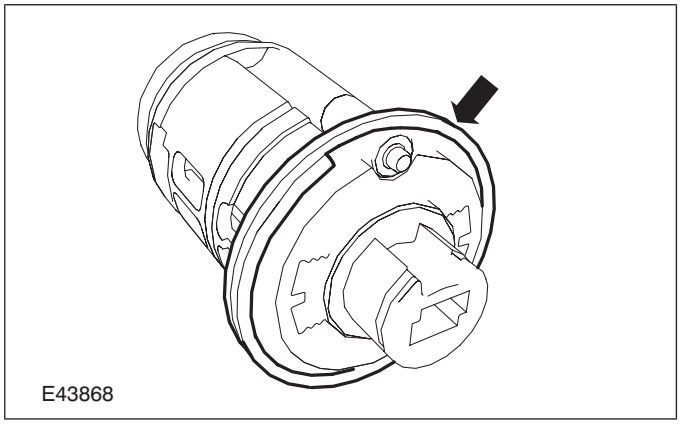
Item 7 Door lock cylinder guide pin

1. Place the door lock cylinder guide pin in the door lock cylinder barrel guide recess.



Item 6 Door lock cylinder guide pin retaining spring

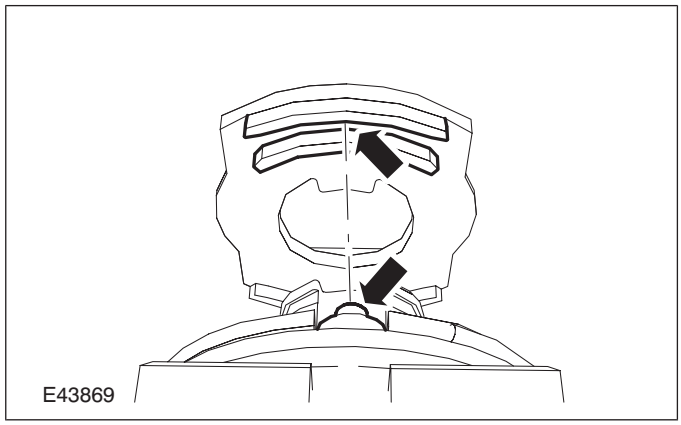
1. Assemble the door lock cylinder guide pin retaining spring on to the door lock cylinder barrel guide.



Item 5 Door lock cylinder latch actuator driver

1. NOTE: Make sure that the door lock cylinder guide pin retaining spring is located in the door lock cylinder latch actuator driver groove.

Install the door lock cylinder latch actuator driver.

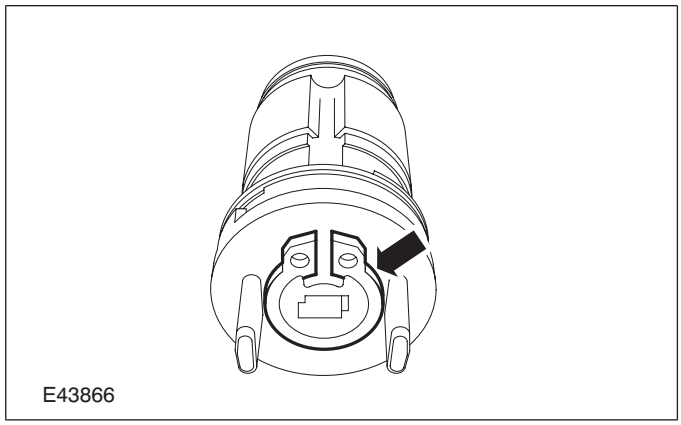


Item 4 Door lock cylinder latch actuator

NOTE: An audible click can be heard when the door lock cylinder latch actuator is installed correctly.

Item 3 Door lock cylinder retaining clip

1. Install the door lock cylinder retaining clip.

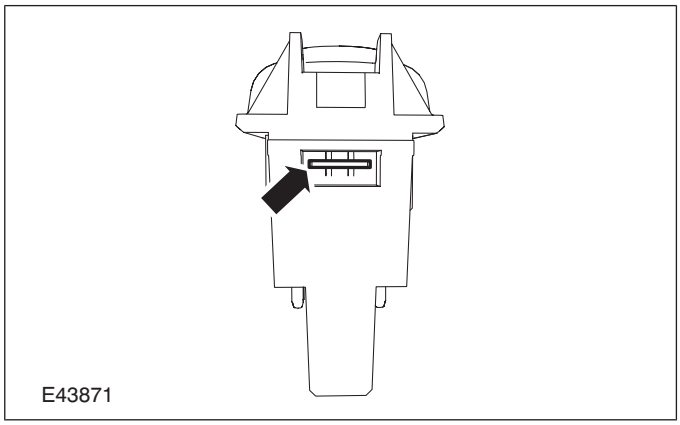


Item 1 Door lock cylinder barrel locking pins

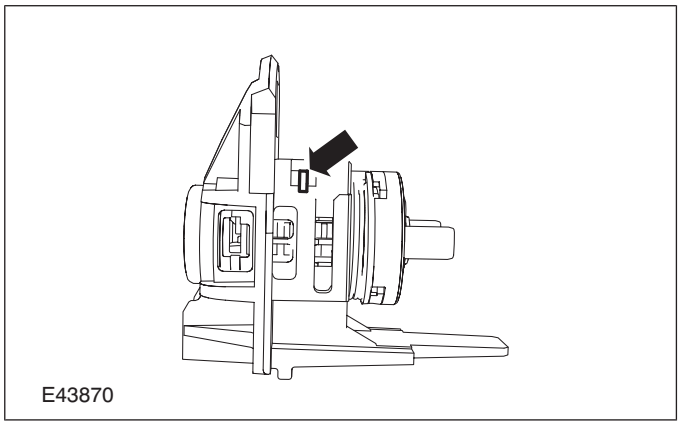
1. NOTE: After the door lock cylinder lower retaining pin has been installed the door lock cylinder housing locking pins must be knocked down, locking the door lock cylinder lower retaining pin in place.

DISASSEMBLY AND ASSEMBLY

Install the door lock cylinder barrel retaining pin.



2. **Install the door lock cylinder barrel retaining pin.**



SECTION 501-16 Wipers and Washers

VEHICLE APPLICATION: 2011.00 Focus

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Headlamp Washer Pump..... 501-16-78

SPECIFICATIONS

Settings for wiper arms

	Degrees
Angle of wiper arms to windscreen, driver's side (LHD/RHD)	5 ±1
Angle of wiper arms to windscreen, passenger side (LHD/RHD)	4 ±1

Setting for rear wiper arm

	Degrees
Angle between the wiper arm and the rear window, wagon variant	5 ±1
Angle between the wiper arm and the rear window, 3-/5-door variant (not adjustable)	3 ±1

Torque Specifications

Description	Nm	lb-ft	lb-in
Rear window wiper motor bracket retaining bolts	7	-	62
Rear window wiper arm retaining nut	15	11	-
Nuts, windshield wiper arms	22	16	-
Bolts for windshield wiper motor with linkage	7	-	62
Front wiper motor retaining screws	9	-	80

DESCRIPTION AND OPERATION

Wipers and Washers

Rain sensor

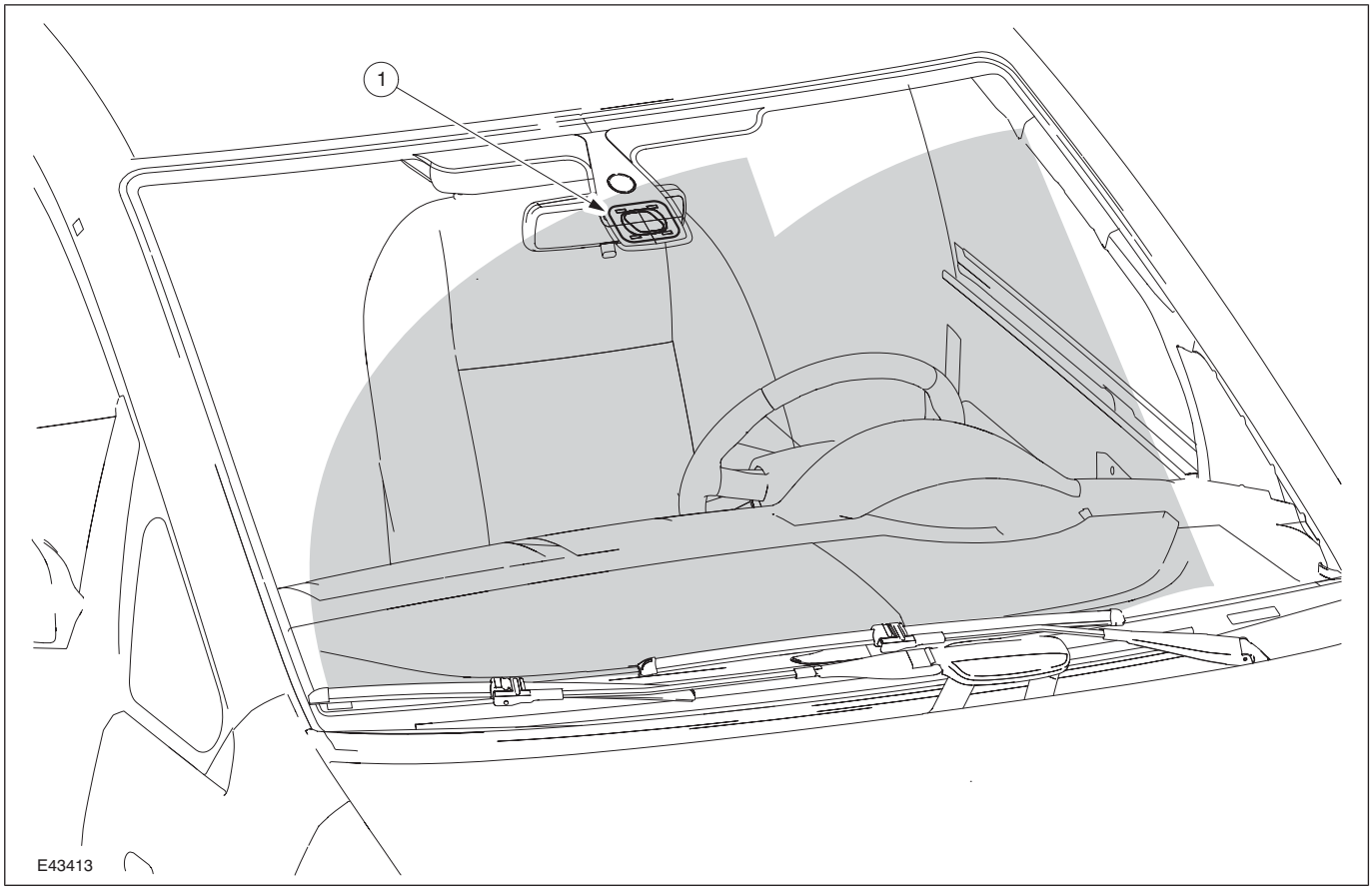
CAUTIONS:

The automatic windshield wipers must be switched off before the vehicle is driven into a car wash.

If the windshield is iced up, the wipers may only be activated by the rain sensor after the windshield has been completely defrosted.

NOTE: The rain sensor is an optical measuring instrument. Contamination such as oil, grease or dust impair its correct function. Before switching on the automatic windshield wipers, the windshield must be clean in the area of the rain sensor.

The rain sensor is built into a housing which is mounted behind the rear view mirror on the windshield.

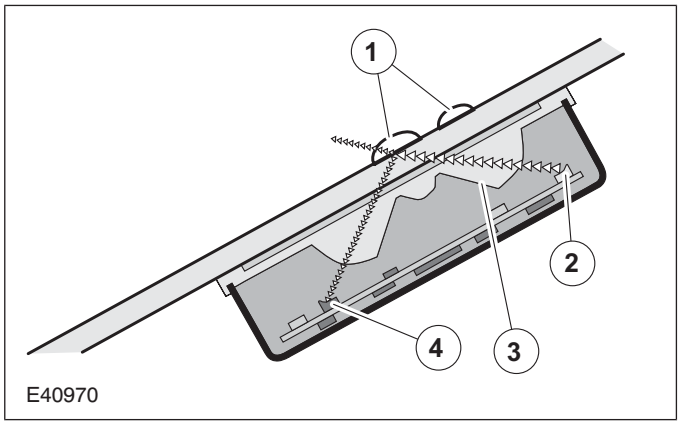


The rain sensor (1) consists of an opto-electronic measuring and evaluation circuit. The sensor can calculate the amount of precipitation falling on the windshield and request that the windshield wipers are switched on.

On the basis of the information provided by the rain sensor, the windshield wipers are then set to the required wipe speed by the generic electronic module (GEM).

DESCRIPTION AND OPERATION

Mode of operation of the rain sensor



E40970

Item	Description
1	Raindrop
2	LED
3	Lens
4	Photodiode

The rain sensor consists of three optical components:

- an LED
- a photodiode
- the lens

The photodiode emits an infrared light beam of known intensity; the emitted light passes through the lens and is reflected by the windshield.

The reflected light beam enters back through the lens and then reaches the photodiode. The corresponding value taken without moisture on the windshield is used as the reference value for the automatic calibration process.

Subsequent deviations from this value cause the windshield wipers to be switched on.

If rain lands on the windshield then the light reflected by the windshield has a lower intensity. This loss of intensity is registered by the photodiode and, proportionally to the loss of intensity, the module switches on the windshield wipers with the required wipe speed (in intermittent or continuous mode).

When the automatic windshield wipers are switched on (wiper switch set to intermittent mode) the rain sensor is switched on and performs an automatic calibration according to the current conditions at the windshield.

To perform the automatic calibration, the windshield wipers perform a single wipe regardless of whether the windshield is wet or dry.

If the windshield remains dry after this wipe then the windshield wipers stop until moisture is registered on the windshield above the sensor.

On vehicles built from 12/2005, automatic calibration only takes place if the wiper switch was not set to the rain sensing function before the ignition was switched on.

The sensitivity of the rain sensor can be changed by adjusting the control resistor for the intermittent mode of the windshield wipers.

- Adjusting ring position 1: high sensitivity
  - The wipers wipe even if only a small amount of water has been measured on the windshield.
- Adjusting ring position 6: low sensitivity:
  - The wipers only wipe if a large amount of water has been measured on the windshield.

Windshield wash/wipe system

Wiper functions

The windshield wash/wipe system will only operate if the ignition switch is in the position "I" or "II".

Five wash functions are available: "Off", "Flick-wipe", "Speed 1", "Speed 2" and "Intermittent" or "Automatic wipe" (depending on the vehicle specification).

In "Speed 1" or "Speed 2" mode, the wipers are operating continuously at either normal speed or fast speed.

When the intermittent wipe mode is switched on the windshield wipers operate at normal speed with the following wiper delays:

- Wiper delay 1: 1 second
- Wiper delay 2: 3.5 seconds
- Wiper delay 3: 6 seconds
- Wiper delay 4: 9.5 seconds
- Wiper delay 5: 15.5 seconds
- Wiper delay 6: 22 seconds

NOTE: In the event of a failure, or if the control resistor is not connected the default time for the wiper delay is 8 seconds.

When the windshield washer switch is operated washer fluid is sprayed onto the windshield. After a short delay designed to protect the wiper blades the wipers perform 2 or 3 wipes at low speed.

If when the windshield washer switch is activated the windshield wipers are switched off, then a

single wipe is performed 4 seconds after the wipers have returned to the home position after performing the 2 or 3 wipes.

If when the windshield washer switch is activated the wipers are in intermittent mode, and if the selected wiper delay time is longer than 6 seconds, then a single wipe is performed 6 seconds after the wipers have returned to the home position after performing the 2 or 3 wipes. If the selected delay time is less than 6 seconds then no post wipe is required.

The post wipe function on the windshield ensures that any water remaining on the windshield after washing is wiped away. It is only required if the wipers are switched off or they are set to intermittent mode.

Automatic wiper function

In vehicles built from 12/2005 without rain sensor, a speed-dependent wiper function is implemented in the GEM on the mid and high-end equipment versions.

When the windshield wipers are switched on, the GEM reduces the wiper speed by one setting if the vehicle is driven at walking speed or comes to a standstill.

When the vehicle speed is increased, the wiper speed automatically returns to the previous setting.

If the wiper lever is actuated during automatic function, the automatic wiper function is switched off and the wiper speed corresponds to the newly-selected setting.

Rear window wash/wipe system

The rear window wash/wipe system will only operate if the ignition switch is in the position "II".

The GEM changes the wiper delay time of the rear window wiper according to the switch setting of the windshield wipers.

If the wiper switch is in the "OFF" position, or in "intermittent" mode or the "automatic wipe" setting (no wiping or low speed wiping), then the wiper delay time for the rear window is 10 seconds.

If the wiper switch is in the "normal speed" position, "fast speed" position or the "automatic wipe" setting (high speed wiping), then the wiper delay time for the rear window is 6 seconds.

If the switch for the rear window washer is pressed, then washer fluid is sprayed onto the rear window, and the wiper operates continuously at low speed. When the switch is released the rear window wiper performs another 2-3 wipes.

If the switch for the rear window washer fails while switched ON, or if it is continuously operated for more than 60 seconds, then the switch signal is ignored by the GEM, the wiper returns to the park position and a trouble code is stored for the switch.

If reverse gear is engaged and the windshield wiper switch is in the normal, high speed or automatic windshield wiper (wiping at high speed) position, the rear window wiper operates continuously until the gearshift lever is moved back to the neutral position.

If reverse gear is engaged and the windshield wiper switch is in the "intermittent mode" or "automatic windshield wiper" (no wiping or low speed) position, then the rear window wiper follows the movement of the windshield wipers. When the wipers leave the park position the rear window wiper also performs a wipe.

Headlamp washer system

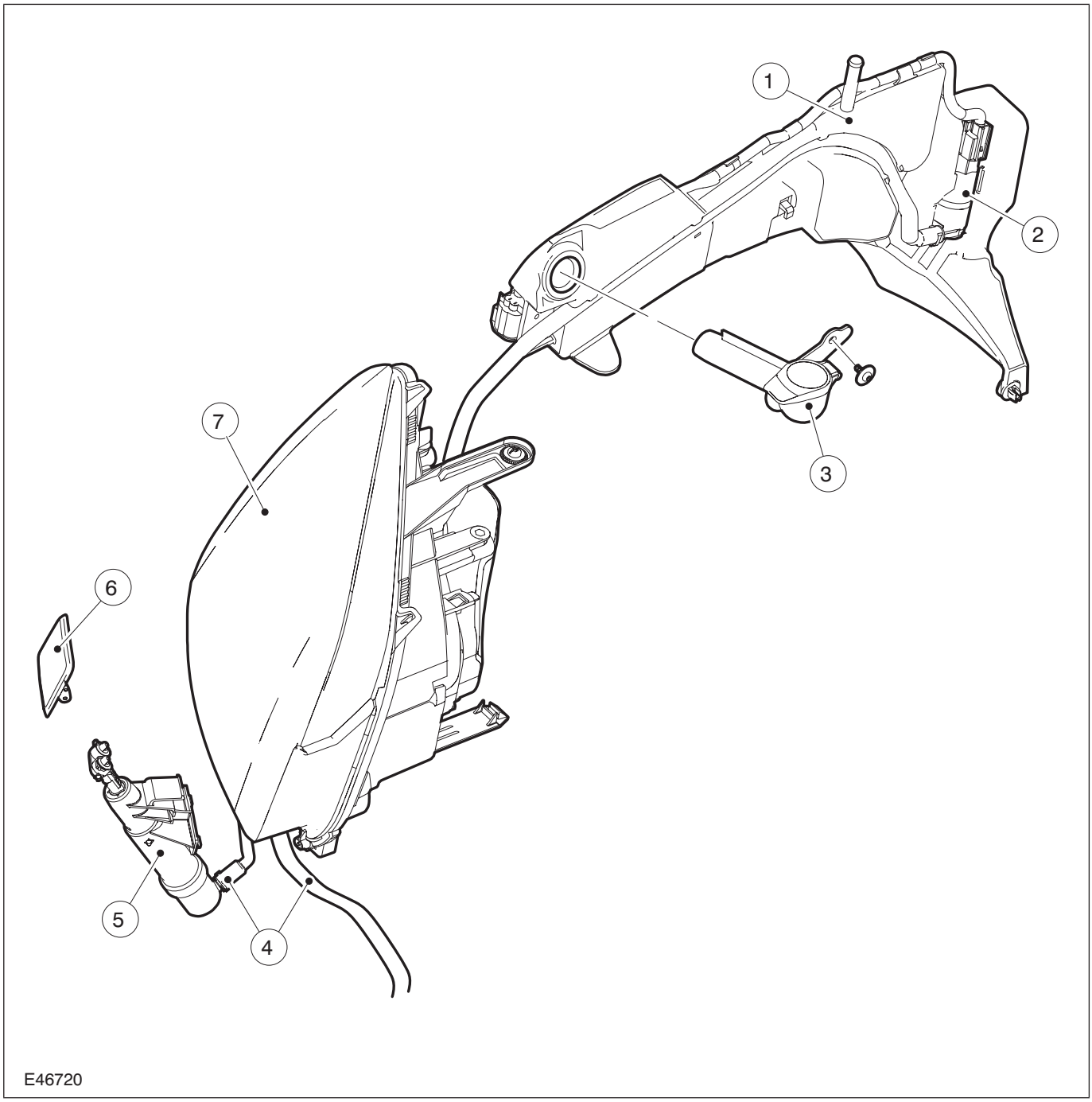
CAUTION: Do not operate the headlamp washer system for more than 10 seconds, and never with an empty fluid reservoir.

The headlamp washer system operates when the windshield washers are actuated if, at the same time, the light switch is set to "low beam" or if the "autolamp" function has switched on the headlamps. The system is controlled electrically by the headlamp washer relay, which is actuated by the GEM.

In order to prevent excessive washer water consumption in vehicles built from 12/2005, the headlamp washer system is only activated on every fourth actuation of the windshield washer switch, provide that 10 minutes have not elapsed since the first actuation of the headlamp washer system. If the windshield washer switch is actuated again after 10 minutes, the headlamp washer system is activated and the timer is restarted.

DESCRIPTION AND OPERATION

Overview



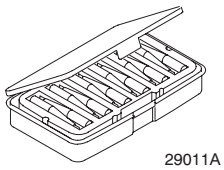
Item	Description
1	Windshield washer reservoir
2	Pump - headlamp washer system
3	Windshield washer reservoir filler neck
4	Hoses - headlamp washer system
5	Headlamp washer system nozzle
6	Cover, headlamp washer system nozzle
7	Headlamp

DIAGNOSIS AND TESTING

Wipers and Washers

Refer to Wiring Diagrams Section 501-16, for schematic and connector information.

Special Tool(s)

 29011A	Terminal Probe Kit 29-011A

General Equipment

Digital multimeter
The Ford approved diagnostic tool

Description of operation

A diagnosis of the generic electronic module (GEM) can be performed with the Ford approved diagnostic tool. Furthermore, an integrated service mode enables testing of the input and output signals without the need for further tools. To enable activation of service mode:

- switch off the ignition,
- switch off all other electrical consumers,
- apply the handbrake,
- shift to neutral
- and close the doors.

Activating the service mode

Proceed as follows to activate the service mode:

- OPERATE the switch of the heated rear window and HOLD IT THERE
- Turn on the ignition.
- RELEASE the switch of the heated rear window

A signal sounds and the turn signal lamps come on to indicate that service mode has been successfully activated.

NOTE: If the alarm is activated (in vehicles fitted with an anti-theft alarm system), service mode cannot be activated.

Inputs

SWITCH the windshield wiper switch to the "OFF" position to test the input signals. The following is a list of the switch signals to be tested, in no particular order:

- Turn signals (right, left, hazard warning lights)
- Windshield wiper stage I
- Windshield wiper stage II
- Windshield washer system
- Rear window wiper
- Rear window washer system
- Doors open/closed
- Remote control for central locking with double locking
- Hood open/closed (in vehicles equipped with an anti-theft alarm system)
- Tailgate open/closed
- A/C request signal
- Heated windscreen (if fitted)
- Parking Brake
- Brake reservoir fluid level
- Speed control system
- Autolamps
- Low beam
- High beam
- Headlamp flasher
- Marker Lamps
- Reversing lamp
- Liftgate release
- Ignition switch, terminal 15 (turn key to 0 position, then turn key to II position.)

An acoustic signal sounds and the turn signal lamps flash to indicate receipt of each input signal by the generic electronic module.

Test the windshield wiper "intermittent mode" stage input signal (only vehicles with adjustable intermittent mode)

The windshield wiper switch must be switched to "intermittent mode" in order to test the input signal. The delay times of the input signals can then be tested by operating the rotary switch. Each change of the rotary switch position is indicated by an acoustic signal and illumination of the turn signals.

Output signals

SWITCH the wiper switch to the "intermittent"" position to test the output signals. PRESSING the heated rear window switch activates the output signals in the following order:

a. Turn Indicator Left Hand
b. Turn Indicator Right Hand

DIAGNOSIS AND TESTING

c. High beam
d. Low beam
e. Windshield wiper stage I
f. Windshield wiper stage II
g. Heated rear window
h. Heater blower motor
i. Headlamp washer (vehicles with gas discharge headlamps)
j. Electric booster heater (if fitted)
k. Autolamps (if fitted)
l. Alarm horn (vehicles with alarm system)
m. Rear window wiper
n. Rear heated window relay

When the heated rear window switch is pressed again, the test of the relevant signal is terminated. When the heated rear window switch is pressed once more, the test for the next signal in the list is started.

Ending the service mode

The GEM automatically ends service mode 20 seconds after the last input or at a driving speed of over 7 km/h. However, service mode can be manually ended at any time by proceeding as follows:

- OPERATE the switch of the heated rear window and HOLD IT THERE
- SWITCH OFF the ignition
- RELEASE the switch of the heated rear window

3 signals sound and the turn signal lamps illuminate to indicate that service mode has ended.

Reset service mode

If, after completion of service mode, some functions do not operate or do not operate properly, check the following functions:

- Instrument cluster illumination, side lamps and license plate lamp in autolamps mode
- Rear wiper
- Headlamp Washers
- Electric booster heater
- Active anti-theft sounder
- Heated windshield

If one or more of the listed functions is not OK, it's possible that the cause of the fault is due to not exiting service mode properly. To reactivate the functions correctly, perform the following steps:

1. SWITCH OFF the ignition
2. SWITCH OFF the switch for the windscreen wash/wipe system
3. OPERATE the switch of the heated rear window and HOLD IT THERE
4. Turn on the ignition.
5. RELEASE the heated rear window switch (an acoustic signal will sound if activation has been performed correctly)
6. SWITCH the windscreen wash/wipe switch to the "Intermittent wipe" position
7. OPERATE the heated rear window switch 6 times (the main beam headlamps switch on and off automatically)
8. SWITCH OFF the switch for the windscreen wash/wipe system
9. OPERATE the switch of the heated rear window and HOLD IT THERE
10. SWITCH OFF the ignition
11. RELEASE the heated rear window switch (three acoustic signals will sound if activation has been performed correctly)

After completion of the work, check all the functions.

Inspection and Checking

NOTE: The generic electronic module (GEM) forms part of the central junction box (CJB).

NOTE: If the generic electronic module (GEM) is changed, the new one must be reinitialized. For this purpose, the vehicle-specific data is read out of the module to be replaced using the Ford approved diagnostic tool and is transferred to the new module.

NOTE: Before reading out the vehicle-specific data, remake all the electrical connections to the module to be removed, so that communication between the module and the Ford approved diagnostic tool is ensured.

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

NOTE: Ensure correct engagement of the wiring harness connectors.

DIAGNOSIS AND TESTING

Visual Inspection Chart

Mechanical	Electrical
• Wiper blade(s) • Wiper arm shaft • Washer reservoir • Hose(s) • Nozzles • Check the passenger-side wiper blade for residue-free wiping in the vicinity of the rain sensor. • Check the adhesive pad between the rain sensor and the windshield for trapped air. • Clean wax residues from the windshield in the vicinity of the rain sensor. • Check the wind-shield for damage/cracks in the vicinity of the rain sensor. • Check that the rain sensor retaining frame is correctly attached to the windshield.	• Fuse(s) • Connector • Wiring harness • Washer pump motor • Headlamp cleaning system pump • Headlamp cleaning system relay • Front/rear window wiper motor • Wash/wipe system switch • Central junction box (CJB) • Battery junction box (BJB)

3. Resolve any obvious causes or concerns found during the visual inspection before carrying out any further tests.
4. If the concern persists after the visual inspection, PERFORM a fault diagnosis on the generic electronic module (GEM) using the Ford approved diagnostic tool and RESOLVE the fault(s) displayed according to the fault description. CHECK the operation of the system.
5. On a vehicle without stored fault(s), continue according to the Symptom Chart and the corresponding symptom.
6. After checking or rectifying the fault(s) and finishing the work, READ OUT the fault memory in the generic electronic module (GEM) and DELETE any saved faults. After performing a road test and CHECKING the system, READ OUT the fault memories again.

Trouble Code Table - Generic Electronic Module (GEM)

Trouble Code Table - Generic Electronic Module (GEM)

DTC	Description	Action
B1447	Circuit of windshield wiper limit switch (park position) faulty (short to ground)	GO to Pinpoint Test G.
B1614	Circuit of rear window wiper switch faulty (short to ground)	GO to Pinpoint Test C.
B2114	Circuit of windshield washer system switch faulty (short to ground)	GO to Pinpoint Test J.
B2115	Circuit of rear window washer system switch faulty (short to ground)	GO to Pinpoint Test J.
B2179	Circuit of front windshield wash/wipe system switch (Intermittent switch posi-tion) faulty (short to ground)	GO to Pinpoint Test F.

DIAGNOSIS AND TESTING

DTC	Description	Action
B2180	Circuit of windshield wiper switch (switch position 2) faulty (short to ground)	GO to Pinpoint Test B.
B2181	Circuit of windshield wiper switch (switch position 3) faulty (short to ground)	GO to Pinpoint Test B.
B2258	Circuit of headlamp wash/wipe system relay faulty	GO to Pinpoint Test L.

Symptom Chart

Symptom Chart

Symptom	Possible Sources	Action
• Wipers inoperative	• Fuse • Circuit(s) • Wash/wipe system switch • Front wiper motor • Rear wiper motor • Central junction box (CJB) • Generic Electronic Module (GEM)	• GO to Pinpoint Test A.
• Brief wipe is inoperative (slow wipe OK)	• Wash/wipe system switch	• RENEW the wash/wipe system switch. CHECK the operation of the system.
• The rear window wiper is inoperative when the windshield wiper is switched on and reverse gear engaged (normal wipe function OK).	• Circuit(s) • Generic Electronic Module (GEM)	• CHECK the GEM using the Ford approved diagnostic tool, RENEW if necessary. CHECK the operation of the system. If the concern persists:
• The windshield wiper runs constantly at a slow wipe speed with the ignition switched off.	• Central junction box (CJB)	• RENEW the central junction box (CJB). CHECK the operation of the system.
• The windshield wiper runs continuously	• Circuit(s) • Wash/wipe system switch • Central junction box (CJB) • Generic Electronic Module (GEM)	• GO to Pinpoint Test B.
• The rear window wiper runs continuously	• Circuit(s) • Wash/wipe system switch • Central junction box (CJB) • Generic Electronic Module (GEM) • Rear wiper motor	• GO to Pinpoint Test C.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• Slow/fast wipe not working.	• Circuit(s) • Wash/wipe system switch • Front wiper motor • Central junction box (CJB) • Generic Electronic Module (GEM)	• GO to Pinpoint Test D.
• Intermittent wipe mode of windshield wiper inoperative, vehicles with and without rain sensor (fast/slow wipe OK)	• Circuit(s) • Wash/wipe system switch • Central junction box (CJB) • Generic Electronic Module (GEM) • Rain sensor	• GO to Pinpoint Test E.
• The windshield wiper runs continuously in intermittent mode	• Circuit(s) • Wash/wipe system switch • Central junction box (CJB) • Generic Electronic Module (GEM)	• GO to Pinpoint Test F.
• The windshield wiper motor does not return to the park position after being switched off	• Circuit(s) • Front wiper motor • Central junction box (CJB) • Generic Electronic Module (GEM)	• GO to Pinpoint Test G.
• The rear window wiper motor does not return to the park position after being switched off	• Fuse • Circuit(s) • Rear wiper motor • Central junction box (CJB) • Rear wiper relay	• GO to Pinpoint Test H.
• The front and rear wash/wipe functions are inoperative (wipe and intermittent function OK)	• Fuse • Circuit(s) • Wash/wipe system switch • Central junction box (CJB) • Generic Electronic Module (GEM)	• GO to Pinpoint Test I.
• Wash and wipe function (front or rear) in continuous operation for 60 seconds	• Wash/wipe system switch	• GO to Pinpoint Test J.
• The front wash/wipe function is inoperative (rear wash/wipe function OK)	• Wash/wipe system switch	• RENEW the wash/wipe system switch. CHECK the operation of the system.
• The rear wash/wipe function is inoperative (front wash/wipe function OK)	• Wash/wipe system switch	• RENEW the wash/wipe system switch. CHECK the operation of the system.
• Washer system is inoperative	• Circuit(s) • Washer pump motor, front/rear • Central junction box (CJB)	• GO to Pinpoint Test K.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• Headlamp washer system is inoperative	• Fuse • Circuit(s) • Central junction box (CJB) • Generic Electronic Module (GEM) • Battery junction box (BJB) • Headlamp cleaning system pump • Headlamp cleaning system relay	• GO to Pinpoint Test L.
• Headlamp washer system operates continuously	• Fuse • Circuit(s) • Headlamp cleaning system relay • Central junction box (CJB) • Generic Electronic Module (GEM) • Battery junction box (BJB)	• GO to Pinpoint Test M.
• Windshield washer nozzle heater is inoperative	• Circuit(s) • Left/right windshield washer nozzle heater.	• GO to Pinpoint Test N.

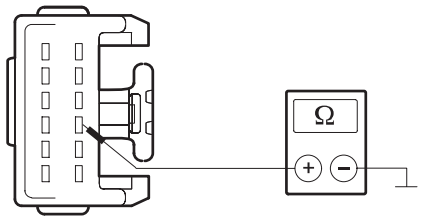
System Check

NOTE: Use a digital multimeter for all electrical measurements.

PINPOINT TEST A : WIPERS INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: DETERMINE THE FAULT CONDITION	
	1 Ignition switch in position II.
	2 SWITCH ON windshield wiper.
	3 SWITCH ON rear window wiper. • Are both windshield wipers inoperative? → **Yes** GO to A2. → **No** - Windshield wipers inoperative: GO to A4. - Rear window wiper inoperative: GO to A12. - Rear window wiper not returning to the park position: GO to Pinpoint Test H.
A2: CHECK THE GROUND CONNECTION OF THE WASH/WIPE SYSTEM SWITCH FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.

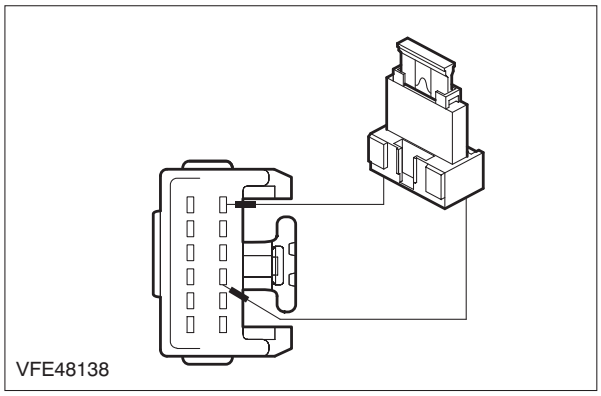
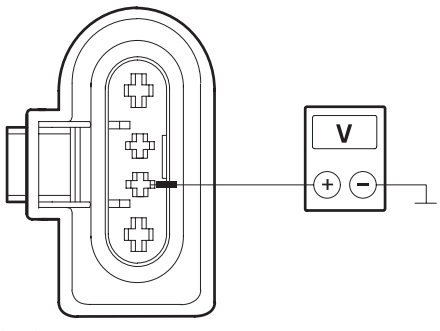
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038540	3 Measure resistance between wash/wipe system switch, connector C441, pin 3, circuit 91-KA12 (BK/WH), wiring harness side and ground. • Is a resistance of less than 2 Ohms registered? → **Yes** RENEW the wash/wipe system switch. CHECK the operation of the system. If the concern is not rectified, INSTALL A NEW GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and soldered connection S12 using the Wiring Diagrams. CHECK the operation of the system.
A3: DETERMINE THE EQUIPMENT LEVEL OF THE CENTRAL JUNCTION BOX (CJB).	
	1 Unfasten the CJB and fold it down. • Is the location for connector C100 on the top of the CJB? → **Yes** GO to A4. → **No** GO to A6.
A4: CHECK FUSE F129 (20 A) (CJB)	
	1 Ignition switch in position 0.
	2 Disconnect Fuse F129 (20 A) (CJB).
	3 CHECK Fuse F129 (20 A) (CJB). • Is the fuse OK? → **Yes** GO to A5. → **No** RENEW fuse F129 (20 A) (CJB) and CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
A5: CHECK THE VOLTAGE SUPPLY TO FUSE F129 (20 A) (CJB) FOR OPEN CIRCUIT	
	1 Connect Fuse F129 (20 A) (CJB).
	2 Ignition switch in position II.

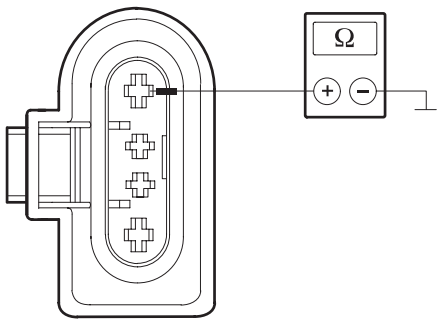
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Measure the voltage between fuse F129 (20 A) (CJB) and ground. • Does the meter display battery voltage? → **Yes** GO to A8. → **No** RENEW the CJB. CHECK the operation of the system.
A6: CHECK FUSE F50 (20 A) (CJB).	
	1 Ignition switch in position 0.
	2 Disconnect fuse F50 (20 A) (CJB).
	3 CHECK fuse F50 (20 A) (CJB). • Is the fuse OK? → **Yes** GO to A7. → **No** RENEW fuse F50 (20 A) (CJB) and CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
A7: CHECK THE VOLTAGE SUPPLY TO FUSE F50 (20A) (CJB) FOR OPEN CIRCUIT	
	1 Connect fuse F50 (20 A) (CJB).
	2 Ignition switch in position II.
	3 Measure the voltage between fuse F50 (20 A) (CJB) and ground. • Does the meter display battery voltage? → **Yes** GO to A8. → **No** RENEW the CJB. CHECK the operation of the system.
A8: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE48138	3 Connect a fused jumper wire (10 A) at the wash/wipe system switch, connector C441, pin 6, circuit 91S-KA10 (BK/GN) and pin 3, circuit 91-KA12 (BK/WH), wiring harness side.
	4 Ignition switch in position II. • Does the windshield wiper motor run continuously at slow wipe speed? → **Yes** RENEW the wash/wipe system switch. CHECK the operation of the system. → **No** GO to A9.
A9: CHECK VOLTAGE AT THE WINDSHIELD WIPER MOTOR	
NOTE: The fused jumper wire used in the previous test step is still connected to the wash/wipe system switch.	
	1 Ignition switch in position 0.
	2 Disconnect windshield wiper motor from connector C848.
	3 Ignition switch in position II.
 VFE0038543	4 Measure the voltage between the front windscreen wiper motor, connector C848, pin 2, circuit 32-KA10 (WH/GN), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** GO to A10. → **No** INSTALL a new GEM. CHECK the operation of the system.
A10: CHECK THE GROUND CONNECTION OF THE FRONT WIPER MOTOR FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.

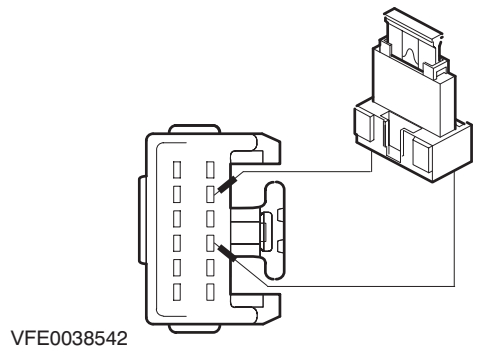
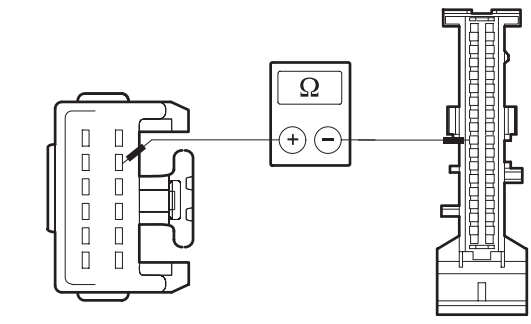
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038544	2 Measure the resistance between the front windscreen wiper motor, connector C848, pin 4, circuit 31-KA9B (BK), wiring harness side and ground. • Is a resistance of less than 2 Ohms registered? → **Yes** RENEW the windshield wiper motor. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the front wiper motor and soldered connection S111 using the Wiring Diagrams. CHECK the operation of the system.
A11: DETERMINE THE EQUIPMENT LEVEL OF THE CENTRAL JUNCTION BOX (CJB).	
	1 Unfasten the CJB and fold it down. • Is the location for connector C100 on the top of the CJB? → **Yes** GO to A12. → **No** GO to A14.
A12: CHECK FUSE F131 (15 A) (CJB)	
	1 Ignition switch in position 0.
	2 Disconnect Fuse F131 (15 A) (CJB).
	3 CHECK Fuse F131 (15 A) (CJB). • Is the fuse OK? → **Yes** GO to A13. → **No** RENEW fuse F131 (15 A) and CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
A13: CHECK THE VOLTAGE SUPPLY TO FUSE F131 (15 A) (CJB) FOR OPEN CIRCUIT	
	1 Connect Fuse F131 (15 A) (CJB).
	2 Ignition switch in position II.

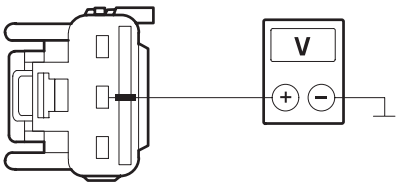
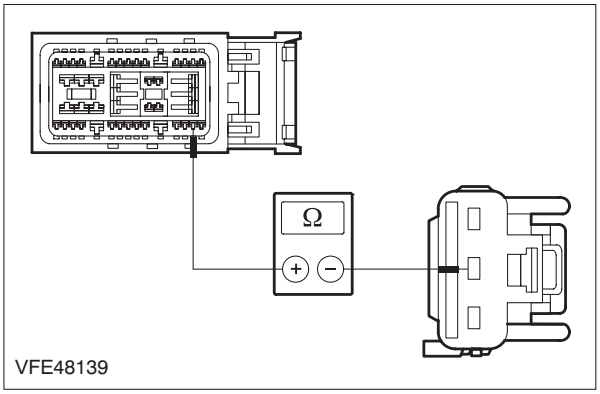
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Measure the voltage between fuse F131 (15 A) (CJB) and ground. • Does the meter display battery voltage? → **Yes** GO to A16. → **No** RENEW the CJB. CHECK the operation of the system.
A14: CHECK FUSE F78 (15 A) (CJB).	
	1 Ignition switch in position 0.
	2 Disconnect fuse F78 (15 A) (CJB).
	3 CHECK fuse F78 (15 A) (CJB). • Is the fuse OK? → **Yes** GO to A15. → **No** RENEW fuse F78 (15 A) and CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
A15: CHECK THE VOLTAGE SUPPLY TO FUSE F78 (15A) (CJB) FOR OPEN CIRCUIT	
	1 Connect fuse F78 (15 A) (CJB).
	2 Ignition switch in position II.
	3 Measure the voltage between fuse F78 (15 A) (CJB) and ground. • Does the meter display battery voltage? → **Yes** GO to A16. → **No** RENEW the CJB. CHECK the operation of the system.
A16: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.

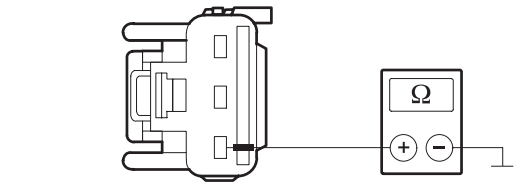
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038542	3 Connect a fused jumper wire (10 A) at the wash/wipe system switch, connector C441, pin 5, circuit 91S-KA35 (BK/BU) and pin 3, circuit 91-KA12 (BK/WH), wiring harness side.
	4 Ignition switch in position II. • Is the rear window wiper motor running in intermittent wipe mode? → **Yes** RENEW the wash/wipe system switch. CHECK the operation of the system. → **No** GO to A17.
A17: CHECK CIRCUIT 91S-KA35 (BK/BU) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C103.
 VFE0038545	3 Measure the resistance between the wash/wipe system switch, connector C441, pin 5, circuit 91S-KA35 (BK/BU), wiring harness side and the CJB, connector C103, pin 24, circuit 91S-KA35 (BK/BU), CJB side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to A18. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
A18: CHECK VOLTAGE AT THE REAR WINDOW WIPER MOTOR	
NOTE: The minimum measurement duration is 20 seconds.	
	1 Connect Wash/wipe system switch to connector C441.
	2 Connect CJB to connector C103.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Disconnect rear window wiper motor from connector C971.
	4 Ignition switch in position II.
	5 SWITCH ON rear window wiper.
 VFE0038546	6 Measure the voltage between the rear window wiper motor, connector C971, pin 2, circuit 32-KA28 (BK), wiring harness side and ground. • Is battery voltage measured approximately every 10 seconds? → **Yes** GO to A20. → **No** GO to A19.
A19: CHECK CIRCUIT 32-KA28 (WH/RD OR BK) BETWEEN CENTRAL JUNCTION BOX (CJB) AND REAR WINDOW WIPER MOTOR FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C100.
 VFE48139	3 Measure the resistance between the CJB, connector C100, pin 14, circuit 32-KA28 (WH/RD), wiring harness side and rear window wiper motor, connector C971, pin 2, circuit 32-KA28 (BK), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between CJB and the rear window wiper motor using the Wiring Diagrams. CHECK the operation of the system.
A20: CHECK THE GROUND CONNECTION OF THE REAR WIPER MOTOR FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.

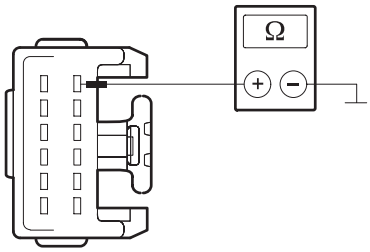
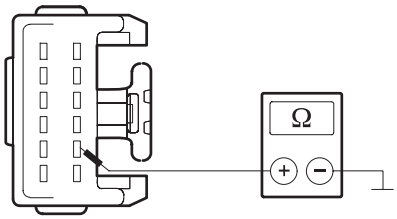
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038547	2 Measure the resistance between the rear window wiper motor, connector C971, pin 3, circuit 31-KA28 (BK), wiring harness side and ground. • Is a resistance of less than 2 Ohms registered? → **Yes** INSTALL a new rear window wiper motor. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the rear wiper motor and soldered connection S196 using the Wiring Diagrams. CHECK the operation of the system.

PINPOINT TEST B : THE WINDSHIELD WIPER RUNS CONTINUOUSLY

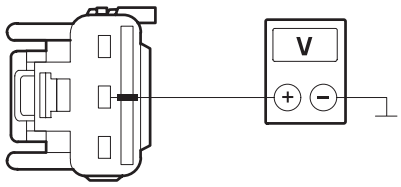
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: DETERMINE THE FAULT CONDITION	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.
	3 Ignition switch in position II. • Does the windscreen wiper motor run continuously? → **Yes** - The windscreen wiper motor runs continuously at slow wipe speed. GO to B2. - The windscreen wiper motor runs continuously at fast wipe speed. GO to B3. → **No** RENEW the wash/wipe system switch. CHECK the operation of the system.
B2: CHECK CIRCUIT 91S-KA10 (BK/GN) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C103.

DIAGNOSIS AND TESTING

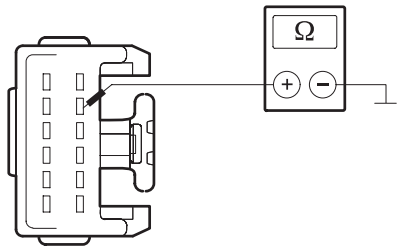
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038549	3 Measure resistance between wash/wipe system switch, connector C441, pin 6, circuit 91S-KA10 (BK/GN), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
B3: CHECK CIRCUIT 91S-KA11 (BK/RD) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C103.
 VFE0038550	3 Measure resistance between wash/wipe system switch, connector C441, pin 2, circuit 91S-KA11 (BK/RD), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to B4. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
B4: CHECK CIRCUIT 32-KA11 (WH/BK) BETWEEN CENTRAL JUNCTION BOX (CJB) AND FRONT WIPER MOTOR FOR SHORT TO BATTERY VOLTAGE	
	1 Disconnect CJB from connector C96.
	2 Ignition switch in position II. • Does the windshield wiper motor run continuously at fast wipe speed? → **Yes** LOCATE and RECTIFY short to battery voltage in circuit 32-KA11 (WH/BK) between CJB and the front wiper motor using the Wiring Diagrams. CHECK the operation of the system. → **No** INSTALL a new GEM. CHECK the operation of the system.

DIAGNOSIS AND TESTING

PINPOINT TEST C : THE REAR WINDOW WIPER RUNS CONTINUOUSLY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: DETERMINE THE FAULT CONDITION	
	1 Ignition switch in position II. • Does the rear window wiper motor run continuously in intermittent wipe mode? → **Yes** GO to C3. → **No** - The rear window wiper motor runs continuously (not in intermittent mode) when the front windscreen wiper is switched off: GO to C2. - The rear window wiper motor runs continuously (not in intermittent mode) when the front wiper is switched on:
C2: CHECK THE CJB	
	1 Ignition switch in position 0.
	2 Disconnect rear window wiper motor from connector C971.
	3 Ignition switch in position II.
 VFE0038546	4 Measure the voltage between the rear window wiper motor, connector C971, pin 2, circuit 32-KA28 (BK), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** INSTALL a new rear window wiper motor. CHECK the operation of the system.
C3: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.

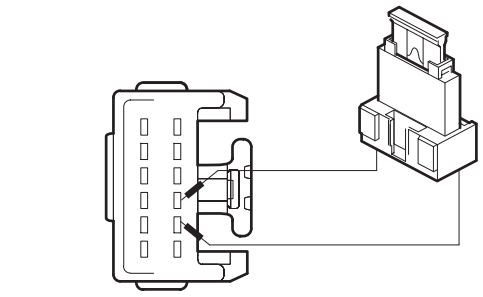
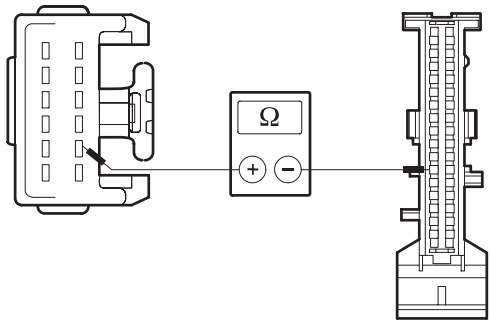
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Ignition switch in position II. • Is the rear window wiper motor running in intermittent wipe mode? → **Yes** GO to C4. → **No** RENEW the wash/wipe system switch. CHECK the operation of the system.
C4: CHECK CIRCUIT 91S-KA35 (BK/BU) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C103.
 VFE0038551	3 Measure resistance between wash/wipe system switch, connector C441, pin 5, circuit 91S-KA35 (BK/BU), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.

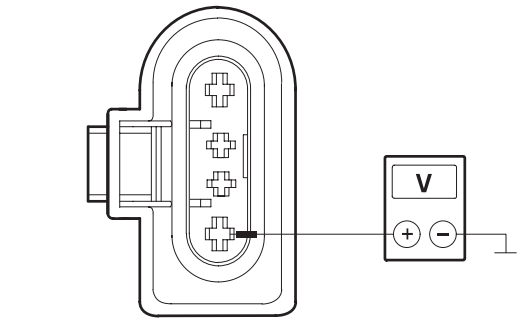
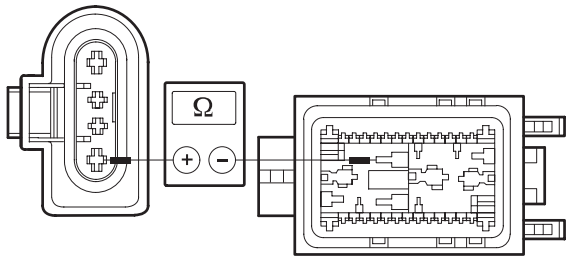
PINPOINT TEST D : SLOW/FAST WIPE NOT WORKING.

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: DETERMINE THE FAULT CONDITION	
	1 Ignition switch in position II.
	2 SWITCH ON slow wipe speed.
	3 SWITCH ON fast wipe speed.
	4 CHECK windshield wipers. • Do the windshield wipers operate at slow speed? → **Yes** Fast wipe speed inoperative. GO to D2. → **No** Slow wipe speed inoperative. GO to D6.
D2: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.

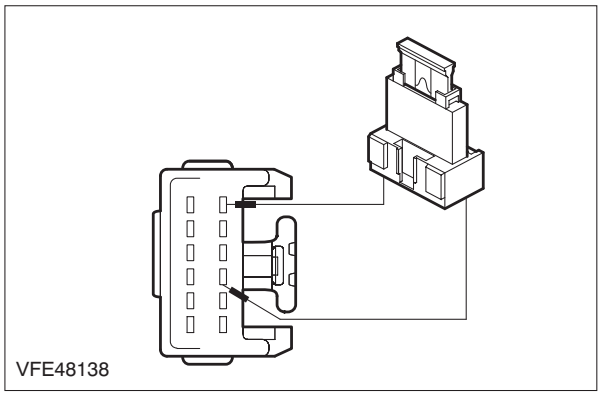
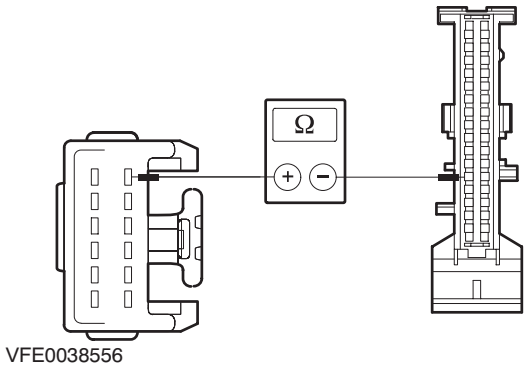
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect wash/wipe system switch from connector C441.
 VFE0038552	3 Connect a fused jumper wire (10 A) at the wash/wipe system switch, connector C441, pin 2, circuit 91S-KA11 (BK/RD) and pin 3, circuit 91-KA12 (BK/WH), wiring harness side.
	4 Ignition switch in position II. • Do the wipers operate at fast speed? → **Yes** RENEW the wash/wipe system switch. CHECK the operation of the system. → **No** GO to D3.
D3: CHECK CIRCUIT 91S-KA11 (BK/RD) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C103.
 VFE0038553	3 Measure the resistance between the wash/wipe system switch, connector C441, pin 2, circuit 91S-KA11 (BK/RD), wiring harness side and the CJB, connector C103, pin 22, circuit 91S-KA11 (BK/RD), wiring harness side. • Is a resistance of less than 2 Ohm registered? → **Yes** GO to D4. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
D4: CHECK VOLTAGE AT THE WINDSHIELD WIPER MOTOR	
	1 Connect Wash/wipe system switch to connector C441.
	2 Connect CJB to connector C103.

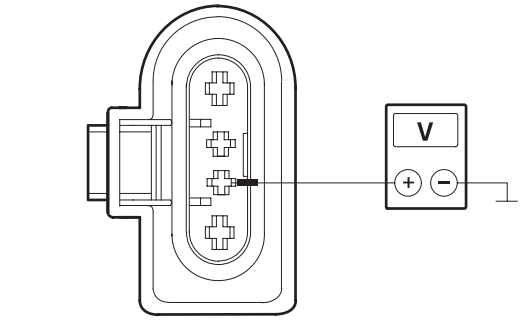
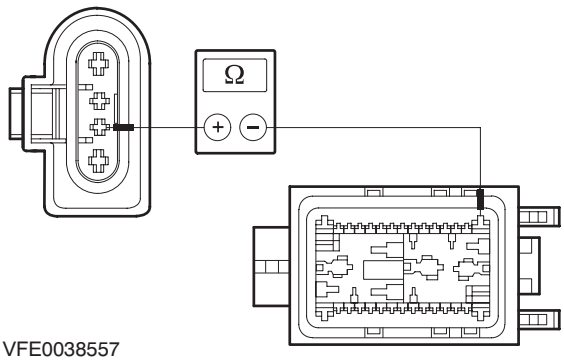
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Disconnect windshield wiper motor from connector C848.
	4 Ignition switch in position II.
	5 SWITCH ON fast wipe speed.
 VFE0038554	6 Measure the voltage between the front windscreen wiper motor, connector C848, pin 1, circuit 32-KA11 (WH/BK), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** RENEW the windshield wiper motor. CHECK the operation of the system. → **No** GO to D5.
D5: CHECK CIRCUIT 32-KA11 (WH/BK) BETWEEN CENTRAL JUNCTION BOX (CJB) AND FRONT WIPER MOTOR FOR BREAKS	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C96.
 VFE0038555	3 Measure the resistance between the CJB, connector C96, pin 23, circuit 32-KA11 (WH/BK), wiring harness side and rear window wiper motor, connector C848, pin 1, circuit 32-KA11 (WH/BK), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between CJB and the windshield wiper motor using the Wiring Diagrams. CHECK the operation of the system.
D6: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE48138	3 Connect a fused jumper wire (10 A) at the wash/wipe system switch, connector C441, pin 6, circuit 91S-KA10 (BK/GN) and pin 3, circuit 91-KA12 (BK/WH), wiring harness side.
	4 Ignition switch in position II. • Do the windshield wipers operate at slow speed? → **Yes** RENEW the wash/wipe system switch. CHECK the operation of the system. → **No** GO to D7.
D7: CHECK CIRCUIT 91S-KA10 (BK/GN) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C103.
 VFE0038556	3 Measure the resistance between the wash/wipe system switch, connector C441, pin 6, circuit 91S-KA10 (BK/GN), wiring harness side and the CJB, connector C103, pin 21, circuit 91S-KA10 (BK/GN), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to D8. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
D8: CHECK VOLTAGE AT THE WINDSHIELD WIPER MOTOR	
	1 Connect Wash/wipe system switch to connector C441.
	2 Connect CJB to connector C103.
	3 Disconnect windshield wiper motor from connector C848.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	4 SWITCH ON slow wipe speed.
	5 Ignition switch in position II.
 VFE0038543	6 Measure the voltage between the front windscreen wiper motor, connector C848, pin 2, circuit 32-KA10 (WH/GN), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** RENEW the windshield wiper motor. CHECK the operation of the system. → **No** GO to D9.
D9: CHECK CIRCUIT 32-KA10 (WH/GN) BETWEEN CENTRAL JUNCTION BOX (CJB) AND FRONT WIPER MOTOR FOR BREAKS	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C96.
 VFE0038557	3 Measure the resistance between the front windscreen wiper motor, connector C848, pin 2, circuit 32-KA10 (WH/GN), wiring harness side and the CJB, connector C96, pin 41, circuit 32-KA10 (WH/GN), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between CJB and the windshield wiper motor using the Wiring Diagrams. CHECK the operation of the system.

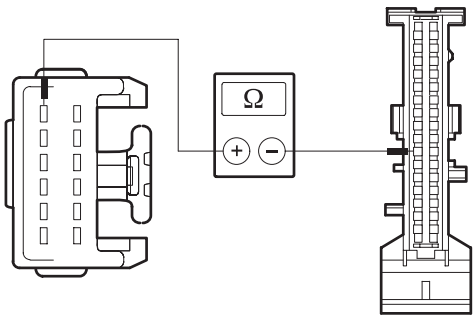
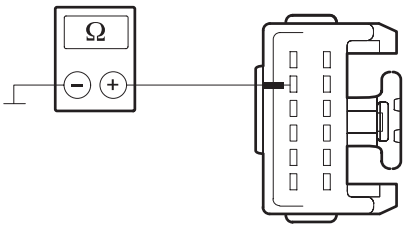
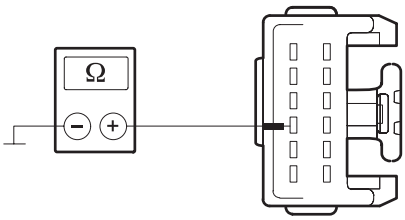
PINPOINT TEST E : INTERMITTENT WIPE MODE OF WINDSHIELD WIPER INOPERATIVE, VEHICLES WITH AND WITHOUT RAIN SENSOR (FAST/SLOW WIPE OK)

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: DETERMINE THE FAULT CONDITION	
	1 Ignition switch in position II.
	2 SWITCH ON slow wipe speed.

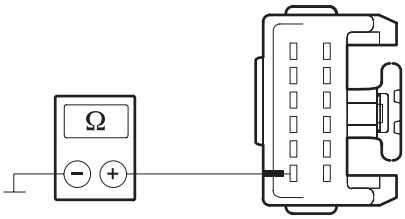
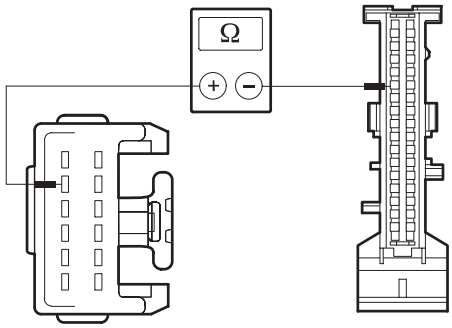
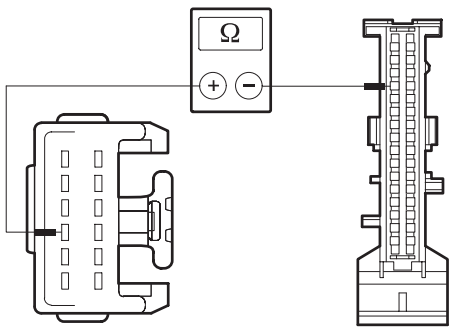
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 SWITCH OFF slow wipe speed. • Does the windshield wiper return to the park position? → **Yes** GO to E2. → **No** GO to Pinpoint Test G.
E2: NARROW DOWN THE FAULT CONDITION	
NOTE: For vehicles with rain sensor, wet the windshield several times with water in the vicinity of the rain sensor, in order to check whether the windshield wiper motor runs in intermittent wipe mode.	
	1 SWITCH ON intermittent mode at the wash/wipe system switch. • Does the front wiper perform a different wipe cycle to the one set with the wash/wipe switch? → **Yes** GO to E5. → **No** - Windshield wiper mode is inoperative: GO to E3. - Vehicles with rain sensor: The windshield wiper motor performs a wipe cycle every six seconds: GO to E12.
E3: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.
	3 CHECK the wash/wipe system switch according to the component check at the end of this section. • Is the wash/wipe system switch OK? → **Yes** GO to E4. → **No** RENEW the wash/wipe system switch. CHECK the operation of the system.
E4: CHECK CIRCUIT 10-KA8 (GY/RD) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Disconnect CJB from connector C103.

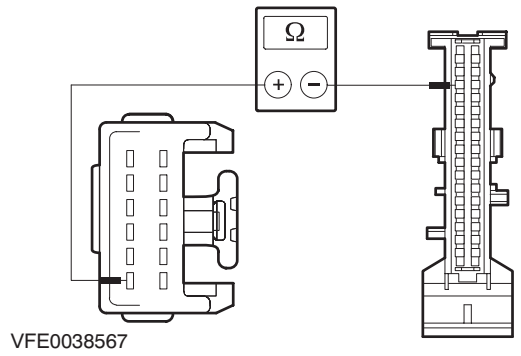
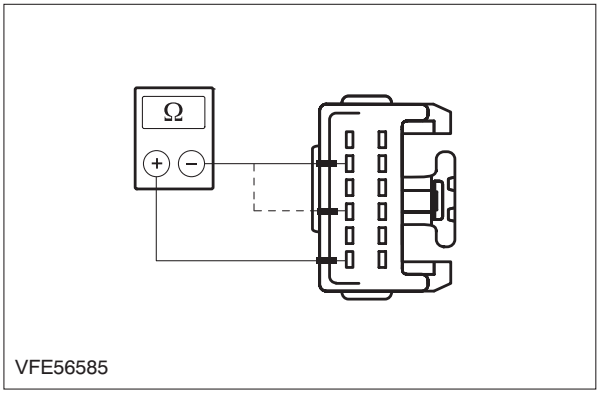
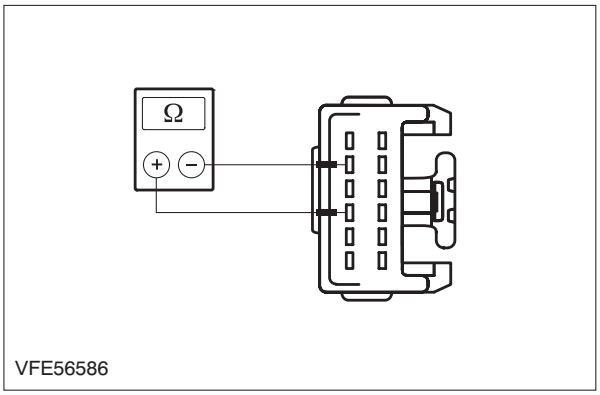
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038558	2 Measure the resistance between the wash/wipe system switch, connector C441, pin 12, circuit 91S-KA8 (GY/RD), wiring harness side and the CJB, connector C103, pin 23, circuit 10-KA8 (GY/RD), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
E5: CHECK CIRCUIT 8-KA47 (WH/GN) FOR SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C103.
 VFE0038562	3 Measure resistance between wash/wipe system switch, connector C441, pin 11, circuit 8-KA47 (WH/GN), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to E6. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
E6: CHECK CIRCUIT 8-KA46 (WH/BU) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
 VFE0038563	1 Measure resistance between wash/wipe system switch, connector C441, pin 9, circuit 8-KA46 (WH/BU), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to E7. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.

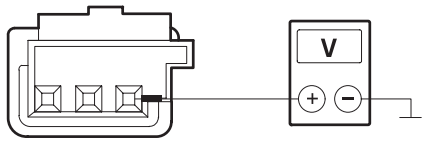
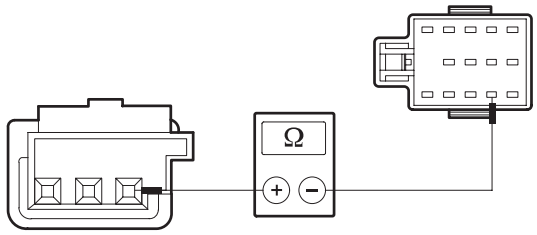
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E7: CHECK CIRCUIT 8-KA45 (WH/RD) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
 VFE0038564	1 Measure resistance between wash/wipe system switch, connector C441, pin 7, circuit 8-KA45 (WH/RD), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to E8. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
E8: CHECK CIRCUIT 8-KA47 (WH/GN) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
 VFE0038565	1 Measure the resistance between the wash/wipe system switch, connector C441, pin 11, circuit 8-KA47 (WH/GN), wiring harness side and the CJB, connector C103, pin 28, circuit 8-KA47 (WH/GN), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to E9. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
E9: CHECK CIRCUIT 8-KA46 (WH/BU) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
 VFE0038566	1 Measure the resistance between the wash/wipe system switch, connector C441, pin 9, circuit 8-KA46 (WH/BU), wiring harness side and the CJB, connector C103, pin 29, circuit 8-KA46 (WH/BU), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to E10. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.

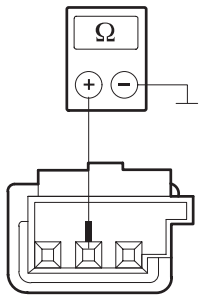
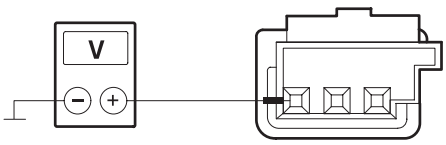
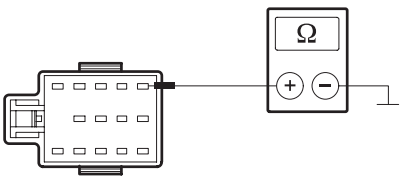
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E10: CHECK CIRCUIT 8-KA45 (WH/RD) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
 VFE0038567	1 Measure the resistance between the wash/wipe system switch, connector C441, pin 7, circuit 8-KA45 (WH/RD), wiring harness side and the CJB, connector C103, pin 30, circuit 8-KA45 (WH/RD), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to E11. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
E11: CHECK CONTROL WIRES FOR SHORT AGAINST EACH OTHER	
 VFE56585	1 Measure the resistance between the wash/wipe system witch, connector C441, pin 7, circuit 8-KA45 (WH/RD) and pin 11, circuit 8-KA47 (WH/GN) and between pin 7, circuit 8-KA45 (WH/RD) and pin 9, circuit 8-KA46 (WH/BU), wiring harness side.
 VFE56586	2 Measure the resistance between the wash/wipe system switch, connector C441, pin 9, circuit 8-KA46 (WH/BU), and pin 11, circuit 8-KA47 (WH/GN), wiring harness side. • Is the resistance in all the measurements more than 10,000 Ohms? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the short in the circuits between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
E12: CHECK VOLTAGE SUPPLY TO RAIN SENSOR FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.

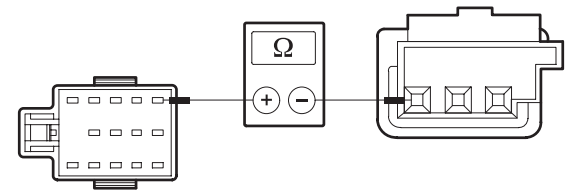
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect rain sensor from connector C526.
	3 Ignition switch in position II.
 VFE0038444	4 Measure the voltage between rain sensor, connector C526, pin 1: – Vehicles with sliding sunroof: circuit 15-KA41 (GN/BK), wiring harness side and ground. – Vehicles without sliding sunroof: circuit 15-AG12B (GN/BK), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** GO to E14. → **No** GO to E13.
E13: CHECK THE CJB	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C98.
 VFE0038568	3 Measure resistance between CJB, connector C98, pin 11: – Vehicles with sliding sunroof: circuit 15-AG12A (GN/BK), wiring harness side and rain sensor, connector C526, pin 1, circuit 15-KA41 (GN/BK), wiring harness side. – Vehicles without sliding sunroof: circuit 15-AG12B (GN/BK), wiring harness side and rain sensor, connector C526, pin 1, circuit 15-AG12B (GN/BK), wiring harness side. • Is the resistance less than 2 ohms? → **Yes** RENEW the CJB. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between CJB and the rain sensor using the Wiring Diagrams. CHECK the operation of the system.
E14: CHECK THE GROUND CONNECTION OF THE RAIN SENSOR FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038446	2 Measure resistance between rain sensor, connector C526, pin 2, circuit 91-KA41 (GN/BK), wiring harness side and ground. • Is the resistance less than 2 ohms? → **Yes** GO to E15. → **No** LOCATE and RECTIFY the break in the circuit between the rain sensor and soldered connection S203 using the Wiring Diagrams. CHECK the operation of the system.
E15: CHECK SIGNAL CABLE OF RAIN SENSOR FOR SHORT TO BATTERY VOLTAGE	
	1 Disconnect CJB from connector C98.
	2 Ignition switch in position II.
 VFE0038449	3 Measure voltage between rain sensor, connector C526, pin 3, circuit 8-KA41 (WH/GN), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** LOCATE and RECTIFY the short to battery voltage in the circuit between CJB and the rain sensor using the Wiring Diagrams. CHECK the operation of the system. → **No** GO to E16.
E16: CHECK SIGNAL CABLE OF RAIN SENSOR FOR SHORT TO GROUND	
	1 Ignition switch in position 0.
 VFE0038450	2 Measure resistance between the CJB, connector C98, pin 12, circuit 8-KA41 (WH/GN), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to E17. → **No** LOCATE and RECTIFY the short to ground in the circuit between CJB and the rain sensor using the Wiring Diagrams. CHECK the operation of the system.

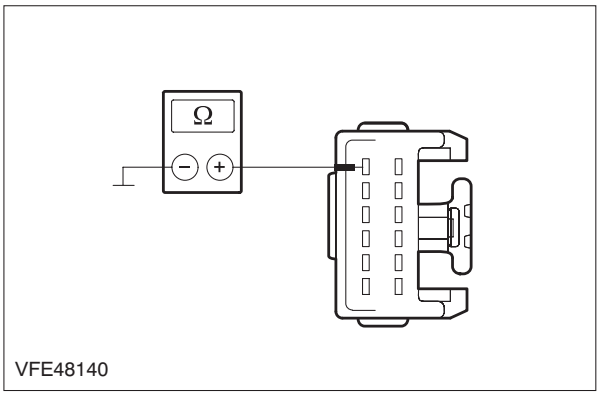
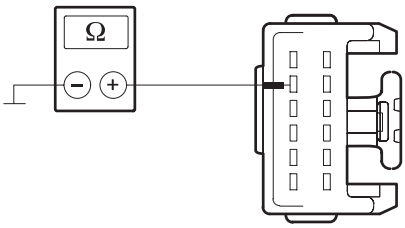
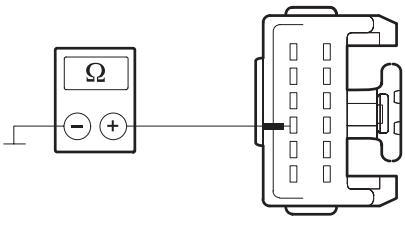
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E17: CHECK SIGNAL CABLE OF RAIN SENSOR FOR OPEN CIRCUIT	
 VFE0038451	1 Measure the resistance between the CJB, connector C98, pin 12, circuit 8-KA41 (WH/GN), wiring harness side and the rain sensor, connector C526, pin 3, circuit 8-KA41 (WH/GN), wiring harness side. • Is the resistance less than 2 ohms? → **Yes** RENEW the rain sensor. CHECK the operation of the system. If the concern is not rectified, INSTALL A NEW GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between CJB and the rain sensor using the Wiring Diagrams. CHECK the operation of the system.

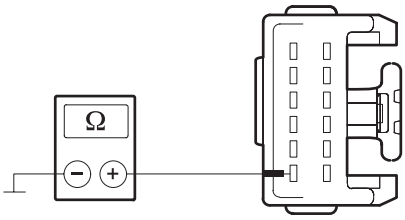
PINPOINT TEST F : THE WINDSHIELD WIPER RUNS CONTINUOUSLY IN INTERMITTENT MODE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F1: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.
	3 CHECK the wash/wipe system switch according to the component check at the end of this section. • Is the wash/wipe system switch OK? → **Yes** GO to F2. → **No** RENEW the wash/wipe system switch. CHECK the operation of the system.
F2: CHECK CIRCUIT 10-KA8 (GY/RD) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
	1 Disconnect CJB from connector C103.

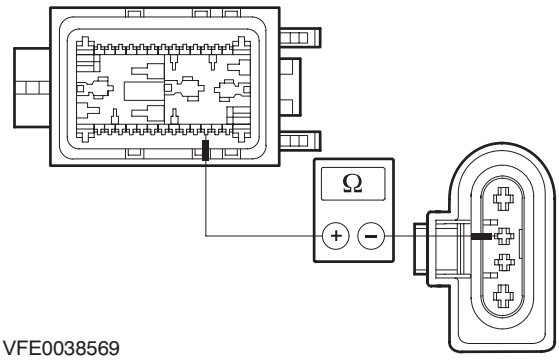
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE48140	2 Measure the resistance between the wash/wipe system switch, connector C441, pin 12, circuit 10-KA8 (GY/RD), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to F3. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
F3: CHECK CIRCUIT 8-KA47 (WH/GN) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
 VFE0038562	1 Measure resistance between wash/wipe system switch, connector C441, pin 11, circuit 8-KA47 (WH/GN), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to F4. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
F4: CHECK CIRCUIT 8-KA46 (WH/BU) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
 VFE0038563	1 Measure resistance between wash/wipe system switch, connector C441, pin 9, circuit 8-KA46 (WH/BU), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to F5. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.

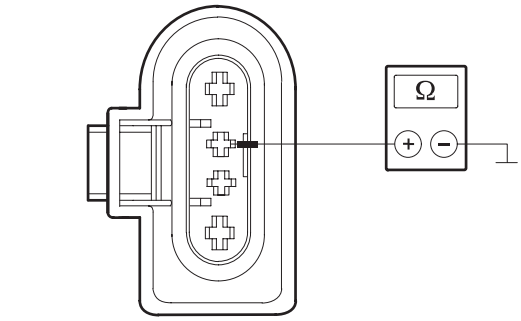
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F5: CHECK CIRCUIT 8-KA45 (WH/RD) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND	
 VFE0038564	1 Measure resistance between wash/wipe system switch, connector C441, pin 7, circuit 8-KA45 (WH/RD), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the short to ground in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.

PINPOINT TEST G : THE WINDSHIELD WIPER MOTOR DOES NOT RETURN TO THE PARK POSITION AFTER BEING SWITCHED OFF

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G1: CHECK CIRCUIT 31S-KA9 (BK/OG) BETWEEN FRONT WIPER MOTOR AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Ignition switch in position 0.
	2 Disconnect windshield wiper motor from connector C848.
	3 Disconnect CJB from connector C96.
 VFE0038569	4 Measure the resistance between the front windscreen wiper motor, connector C848, pin 3, circuit 31S-KA9 (BK/OG), wiring harness side and the CJB, connector C96, pin 12, circuit 31S-KA9 (BK/OG), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to G2. → **No** LOCATE and RECTIFY the break in the circuit between windshield wiper motor and the CJB using the Wiring Diagrams. CHECK the operation of the system.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G2: CHECK CIRCUIT 31S-KA9 (BK/OG) BETWEEN CENTRAL JUNCTION BOX (CJB) AND FRONT WIPER MOTOR FOR SHORT TO GROUND	
 VFE0038570	1 Measure the resistance between the front windscreen wiper motor, connector C848, pin 3, circuit 31S-KA9 (BK/OG), wiring harness side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** CHECK the front wiper motor according to the component test at the end of this section and RENEW as necessary. CHECK the operation of the system. If the concern is not rectified, INSTALL A NEW GEM. CHECK the operation of the system. → **No** LOCATE and RECTIFY the short to ground in the circuit between CJB and the windshield wiper motor using the Wiring Diagrams. CHECK the operation of the system.

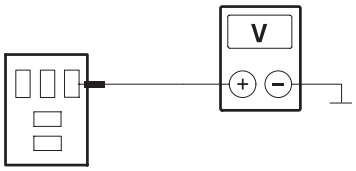
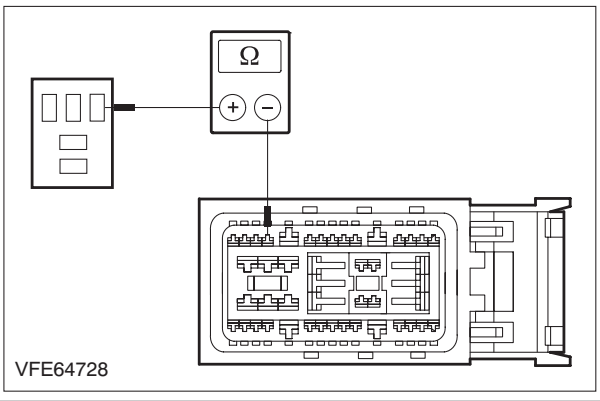
PINPOINT TEST H : THE REAR WINDOW WIPER MOTOR DOES NOT RETURN TO THE PARK POSITION AFTER BEING SWITCHED OFF

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
H1: DETERMINE THE BUILD YEAR	
	1 Check the build date via the chassis number. • Was the vehicle built before 03/2005? → **Yes** GO to H13. → **No** GO to H2.
H2: DETERMINE THE EQUIPMENT LEVEL OF THE CENTRAL JUNCTION BOX (CJB).	
	1 Unfasten the CJB and fold it down. • Is the location for connector C100 on the top of the CJB? → **Yes** GO to H3. → **No** GO to H5.
H3: CHECK FUSE F141 (10 A) (CJB)	
	1 Ignition switch in position 0.
	2 Disconnect Fuse F141 (10 A) (CJB).

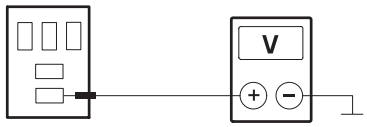
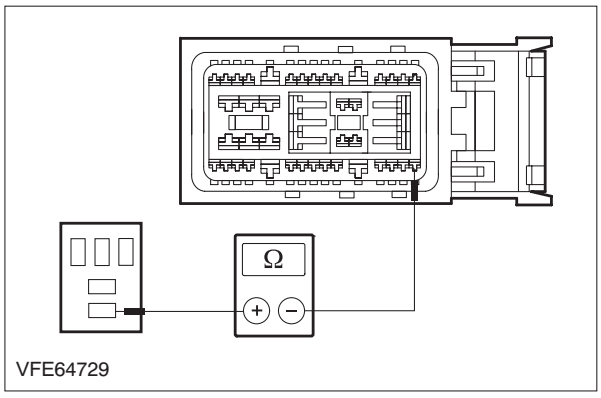
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 CHECK Fuse F141 (10 A) (CJB). • Is the fuse OK? → **Yes** GO to H4. → **No** RENEW fuse F141 (10 A) (CJB) and CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
H4: CHECK THE VOLTAGE SUPPLY TO FUSE F141 (10 A) (CJB) FOR OPEN CIRCUIT	
	1 Connect Fuse F141 (10 A) (CJB).
	2 Ignition switch in position II.
	3 Measure the voltage between fuse F141 (10 A) (CJB) and ground. • Does the meter display battery voltage? → **Yes** GO to H7. → **No** RENEW the CJB. CHECK the operation of the system.
H5: CHECK FUSE F84 (10 A) (CJB).	
	1 Ignition switch in position 0.
	2 Disconnect Fuse F84 (10 A) (CJB).
	3 CHECK Fuse F84 (10 A) (CJB). • Is the fuse OK.? → **Yes** GO to H6. → **No** RENEW fuse F84 (10 A) (CJB) and CHECK the operation of the system. If fuse blows again, LOCATE and REMEDY the short to ground with the aid of the wiring diagrams. CHECK the operation of the system.
H6: CHECK THE VOLTAGE SUPPLY TO FUSE F84 (10A) (CJB) FOR OPEN CIRCUIT	
	1 Connect Fuse F84 (10 A) (CJB).
	2 Ignition switch in position II.

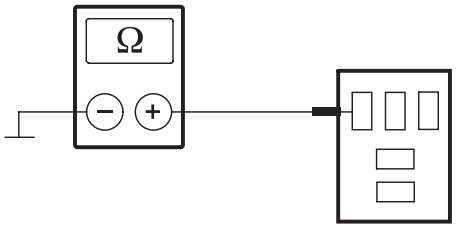
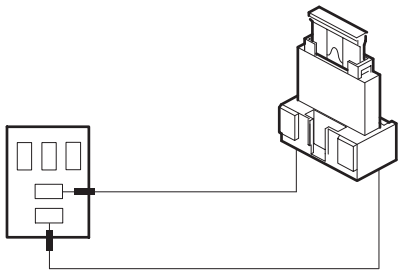
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Measure the voltage between fuse F84 (10 A) (CJB) and ground. • Is battery voltage measured? → **Yes** GO to H7. → **No** RENEW the CJB. CHECK the operation of the system.
H7: CHECK VOLTAGE SUPPLY TO REAR WIPER RELAY FOR OPEN CIRCUIT (PIN 1)	
	1 Ignition switch in position 0.
	2 Disconnect Rear wiper relay from socket C1100.
	3 Ignition switch in position II.
 E0036110	4 Measure the voltage between the rear wiper relay, socket C1100, pin 1, circuit 15S-KA28 (GN/BU), socket side and ground. • Is battery voltage measured? → **Yes** GO to H9. → **No** GO to H8.
H8: CHECK CIRCUIT 15S-KA28 (GN/BU) BETWEEN CENTRAL JUNCTION BOX (CJB) AND REAR WIPER RELAY (PIN 1) FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C100.
 VFE64728	3 Measure the resistance between the CJB, connector C100, pin 35, circuit 15S-KA28 (GN/BU), wiring harness side and the rear wiper relay, socket C1100, pin 1, circuit 15S-KA28 (GN/BU), socket side. • Is a resistance of less than 2 Ohm registered? → **Yes** RENEW the CJB. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the CJB and the rear wiper relay using the Wiring Diagrams. CHECK the operation of the system.

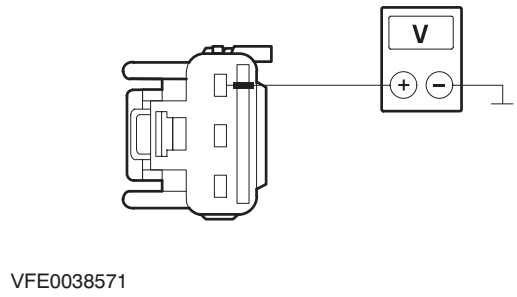
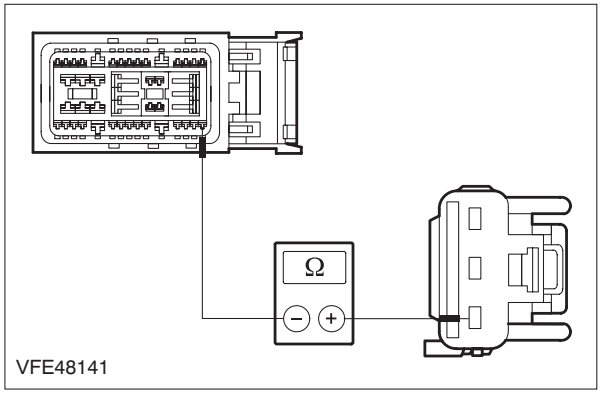
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
H9: CHECK VOLTAGE SUPPLY TO REAR WIPER RELAY FOR OPEN CIRCUIT (PIN 3)	
 VFE0016103	1 Measure the voltage between the rear wiper relay, socket C1100, pin 3, circuit 29-KA28 (OG/BU), socket side and ground. • Is battery voltage measured? → **Yes** GO to H11. → **No** GO to H10.
H10: CHECK CIRCUIT 29-KA28 (OG/BU) BETWEEN CENTRAL JUNCTION BOX (CJB) AND REAR WIPER RELAY (PIN 3) FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C100.
 VFE64729	3 Measure the resistance between the CJB, connector C100, pin 15, circuit 29-KA28 (OG/BU), wiring harness side and the rear wiper relay, socket C1100, pin 3, circuit 29-KA28 (OG/BU), socket side. • Is a resistance of less than 2 Ohms registered? → **Yes** RENEW the CJB. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the CJB and the rear wiper relay using the Wiring Diagrams. CHECK the operation of the system.
H11: CHECK THE GROUND CONNECTION OF THE REAR WIPER RELAY FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0016108	2 Measure the resistance between the rear wiper relay, socket C1100, pin 2, circuit 31-KA28 (BK), socket side and ground. • Is a resistance of less than 2 Ohm registered? → **Yes** GO to H12. → **No** LOCATE and RECTIFY the break in the circuit between the rear window wiper relay and soldered connection S216 using the Wiring Diagrams. CHECK the operation of the system.
H12: CHECK THE REAR WIPER RELAY	
 VFE0008746	1 Connect a fused bridging cable (15 A) to the rear wiper relay, socket C1100, pin 3, circuit 29-KA28 (OG/BU) and pin 5, circuit 29S-KA28 (OG/BU), socket side.
	2 Ignition switch in position II.
	3 SWITCH the rear wiper ON and OFF.
	4 CHECK the rear wiper. • Does the rear wiper return to the park position? → **Yes** RENEW the rear wiper relay. CHECK the operation of the system. → **No** GO to H13.
H13: CHECK THE VOLTAGE SUPPLY TO THE REAR WIPER MOTOR	
NOTE: Only for vehicles built from 03/2005: The fused bridging cable used in the previous step is still connected to the rear wiper relay.	
	1 Ignition switch in position 0.
	2 Disconnect rear window wiper motor from connector C971.
	3 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038571	4 Measure the voltage between the rear window wiper motor, connector C971, pin 1, circuit 29-KA28 (BK), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** INSTALL a new rear window wiper motor. CHECK the operation of the system. → **No** - Vehicles built from 03/2005: LOCATE and RECTIFY the break in the circuit between the rear wiper relay and the rear wiper motor using the Wiring Diagrams. CHECK the operation of the system. - Vehicles built before 03/2005: GO to H14.
H14: CHECK CIRCUIT 29-KA28 (OG/BU AND BK) BETWEEN CENTRAL JUNCTION BOX (CJB) AND REAR WINDOW WIPER MOTOR FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
 VFE48141	2 Measure the resistance between the CJB, connector C100, pin 15, circuit 29-KA28 (OG/BU), wiring harness side and rear window wiper motor, connector C971, pin 1, circuit 29-KA28 (BK), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** RENEW the CJB. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between CJB and the rear window wiper motor using the Wiring Diagrams. CHECK the operation of the system.

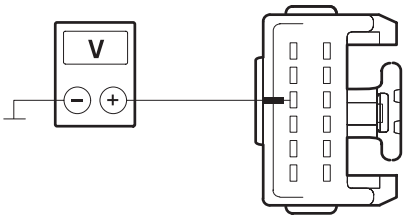
PINPOINT TEST I : THE FRONT AND REAR WASH/WIPE FUNCTIONS ARE INOPERATIVE (WIPE AND INTERMITTENT FUNCTION OK)

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
I1: DETERMINE THE EQUIPMENT LEVEL OF THE CENTRAL JUNCTION BOX (CJB).	
	1 Unfasten the CJB and fold it down. • Is the location for connector C100 on the top of the CJB? → **Yes** GO to I2. → **No** GO to I4.

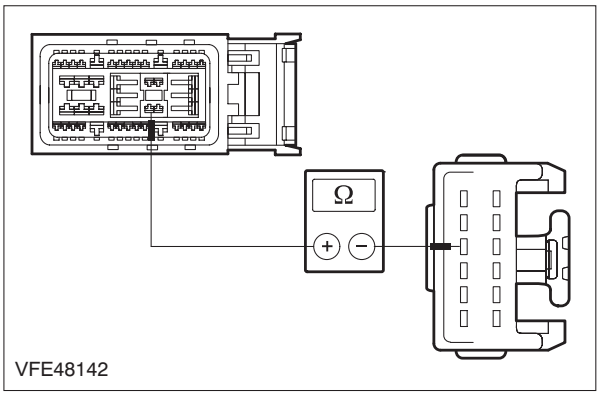
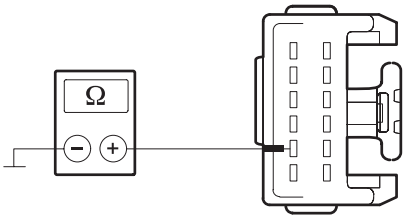
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
I2: CHECK FUSE F136 (15 A) (CJB)	
	1 Ignition switch in position 0.
	2 Disconnect Fuse F136 (15 A) (CJB).
	3 CHECK Fuse F136 (15 A) (CJB). • Is the fuse OK? → **Yes** GO to I3. → **No** RENEW fuse F136 (15 A) (CJB). CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
I3: CHECK THE VOLTAGE SUPPLY TO FUSE F136 (CJB) FOR OPEN CIRCUIT	
	1 Connect Fuse F136 (15 A) (CJB).
	2 Ignition switch in position II.
	3 Measure the voltage between fuse F136 (15 A) (CJB) and ground. • Does the meter display battery voltage? → **Yes** GO to I6. → **No** RENEW the CJB. CHECK the operation of the system.
I4: CHECK FUSE F47 (15 A) (CJB).	
	1 Ignition switch in position 0.
	2 Disconnect fuse F47 (15 A) (CJB).
	3 CHECK fuse F47 (15 A) (CJB). • Is the fuse OK? → **Yes** GO to I5. → **No** RENEW fuse F47 (15 A) (CJB). CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
I5: CHECK THE VOLTAGE SUPPLY TO FUSE F47 (CJB) FOR OPEN CIRCUIT	
	1 Connect fuse F47 (15 A) (CJB).

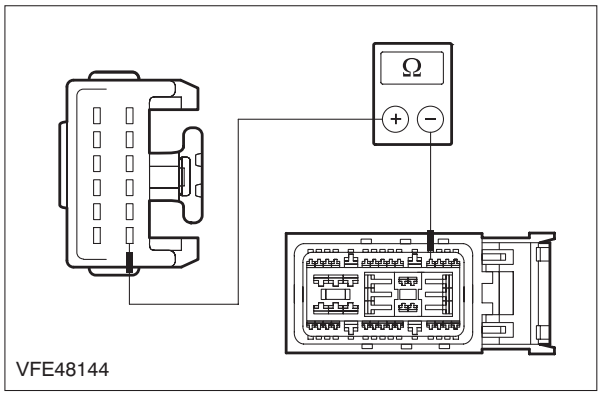
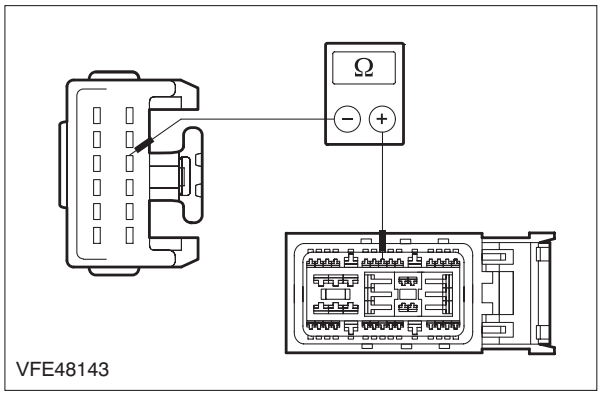
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Ignition switch in position II.
	3 Measure the voltage between fuse F47 (15 A) (CJB) and ground. • Does the meter display battery voltage? → **Yes** GO to I6. → **No** RENEW the CJB. CHECK the operation of the system.
I6: CHECK VOLTAGE AT THE WASH/WIPE SYSTEM SWITCH.	
	1 Ignition switch in position 0.
	2 Disconnect wash/wipe system switch from connector C441.
	3 Ignition switch in position II.
 VFE0038573	4 Measure voltage between wiper/washer switch, connector C441, pin 10, circuit 15-KA19 (GN/OG), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** GO to I8. → **No** GO to I7.
I7: CHECK THE CJB	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C102.

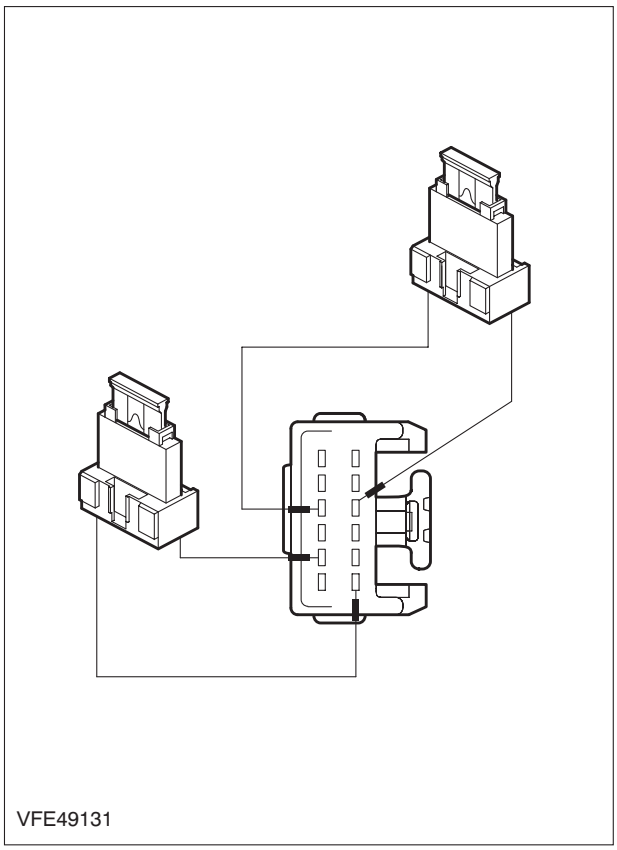
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE48142	3 Measure resistance between CJB, connector C102, pin 20, circuit 15-KA19 (GN/OG), wiring harness side and wash/wipe system switch, connector C441, pin 10, circuit 15-KA19 (GN/OG), wiring harness side. • Is the resistance less than 2 ohms? → **Yes** RENEW the CJB. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the CJB and the wash/wipe system switch using the Wiring Diagrams. CHECK the operation of the system.
I8: CHECK THE GROUND CONNECTION OF THE WASH/WIPE SYSTEM SWITCH FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
 VFE0038575	2 Measure the resistance between the wash/wipe system switch, connector C441, pin 8, circuit 31-KA36 (BK), wiring harness side and ground. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to I9. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and soldered connection S6 using the Wiring Diagrams. CHECK the operation of the system.
I9: CHECK CIRCUIT 32-KA34 (WH/BK) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Disconnect CJB from connector C102.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE48144	2 Measure the resistance between the wash/wipe system switch, connector C441, pin 1, circuit 32-KA34 (WH/BK), wiring harness side and the CJB, connector C102, pin 43, circuit 32-KA34 (WH/BK), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to I10. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
I10: CHECK CIRCUIT 33-KA34 (YE/BK) BETWEEN WASH/WIPE SWITCH AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
 VFE48143	1 Measure the resistance between the wash/wipe system switch, connector C441, pin 4, circuit 33-KA34 (YE/BK), wiring harness side and the CJB, connector C102, pin 39, circuit 33-KA34 (YE/BK), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** GO to I11. → **No** LOCATE and RECTIFY the break in the circuit between the wash/wipe system switch and CJB using the Wiring Diagrams. CHECK the operation of the system.
I11: CHECK THE WASH/WIPE SYSTEM SWITCH.	
	1 Connect CJB to connector C102.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Two fused jumper wires (10 A) at the wash/wipe system switch, connector C441: – Connect pin 8, circuit 31-KA36 (BK) and Pin 1, circuit 32-KA34 (WH/BK), wiring harness side. – Connect pin 10, circuit 15-KA19 (GN/OG) and Pin 4, circuit 33-KA34 (YE/BK), wiring harness side.
	3 Ignition switch in position II. • Is the front wash/wipe function operative? → **Yes** RENEW the wash/wipe system switch. CHECK the operation of the system. → **No** RENEW the CJB. CHECK the operation of the system.

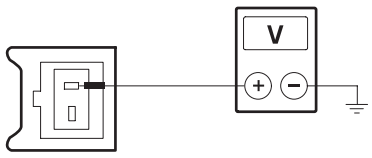
PINPOINT TEST J : WASH AND WIPE FUNCTION (FRONT OR REAR) IN CONTINUOUS OPERATION FOR 60 SECONDS

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
J1: DETERMINE THE FAULT CONDITION	
	1 Ignition switch in position II.

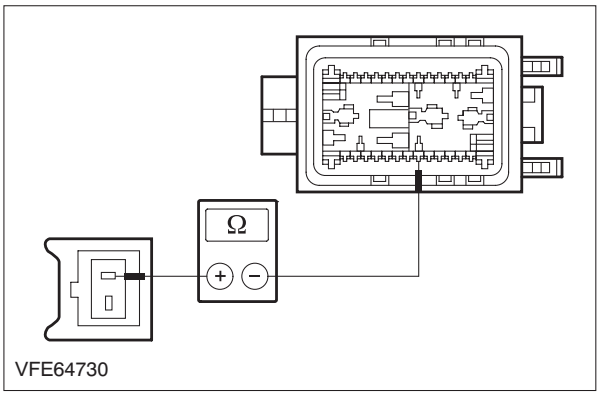
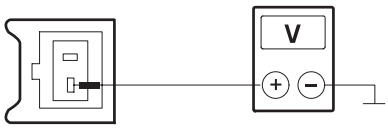
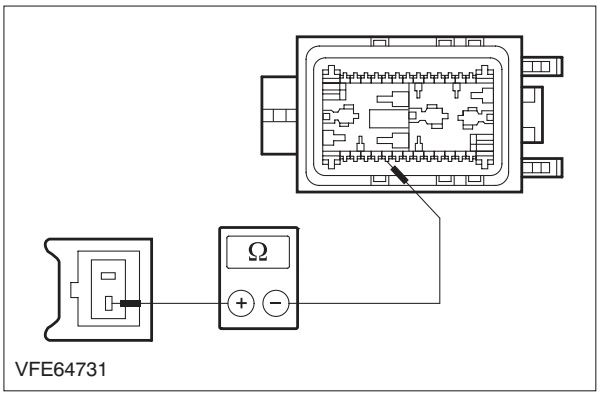
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 CHECK the front or rear wash/wipe function. • Is the wash/wipe function (front) in continuous operation for 60 seconds and then automatically switched off? → **Yes** RENEW the wash/wipe system switch. CHECK the operation of the system. → **No** Wash and wipe function (rear) in continuous operation for 60 seconds: RENEW the wash/wipe switch. CHECK the operation of the system.

PINPOINT TEST K : WASHER SYSTEM IS INOPERATIVE

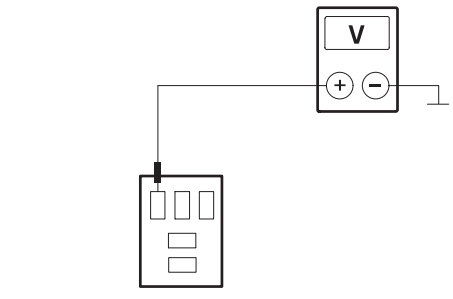
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
K1: CHECK THE VOLTAGE AT THE FRONT/REAR WASHER PUMP MOTOR	
NOTE: Wash/wipe system switch in the OFF position	
	1 Ignition switch in position 0.
	2 Disconnect front/rear washer pump motor from connector C828.
	3 Ignition switch in position II.
 VFE0008568	4 Measure the voltage between the front/rear washer pump motor, connector C828, pin 1, circuit 33-KA34(A) (YE/BK), wiring harness side and ground. • Is battery voltage measured? → **Yes** GO to K3. → **No** GO to K2.
K2: CHECK CIRCUIT 33-KA34(A) (YE/BK) BETWEEN FRONT/REAR WASHER PUMP MOTOR AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C96.

DIAGNOSIS AND TESTING

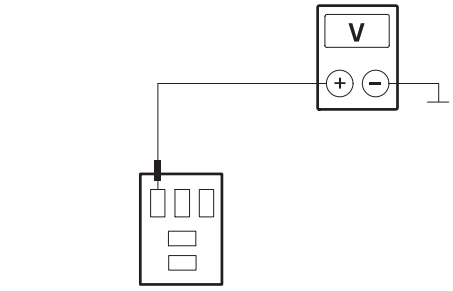
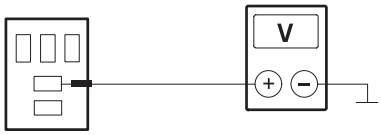
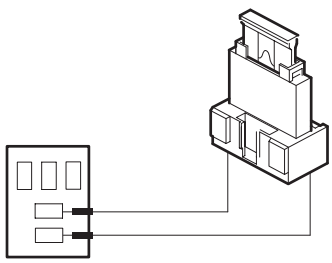
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE64730	3 Measure the resistance between the front/rear washer pump motor, connector C828, pin 1, circuit 33-KA34(A) (YE/BK), wiring harness side and the CJB, connector C96, pin 9, circuit 33-KA34(A) (YE/BK), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** RENEW the CJB. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between front/rear washer pump motor and the CJB using the Wiring Diagrams. CHECK the operation of the system.
K3: CHECK THE VOLTAGE AT THE WASHER PUMP MOTOR	
 VFE0015948	1 Measure the voltage between the front/rear washer pump motor, connector C828, pin 2, circuit 32-KA34(A) (WH/BK), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** INSTALL A NEW front/rear washer pump motor. CHECK the operation of the system. → **No** GO to K4.
K4: CHECK CIRCUIT 32-KA34(A) (WH/BK) BETWEEN FRONT/REAR WASHER PUMP MOTOR AND CENTRAL JUNCTION BOX (CJB) FOR BREAKS	
	1 Ignition switch in position 0.
 VFE64731	2 Measure the resistance between the front/rear washer pump motor, connector C828, pin 2, circuit 32-KA34(A) (WH/BK), wiring harness side and the CJB, connector C96, pin 6, circuit 32-KA34(A) (WH/BK), wiring harness side. • Is a resistance of less than 2 Ohms registered? → **Yes** RENEW the CJB. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between front/rear washer pump motor and the CJB using the Wiring Diagrams. CHECK the operation of the system.

DIAGNOSIS AND TESTING

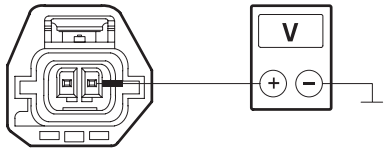
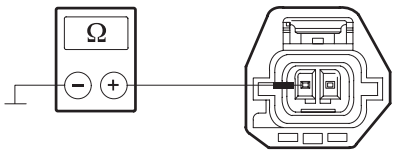
PINPOINT TEST L : HEADLAMP WASHER SYSTEM IS INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L1: CHECK FUSE F23 (30 A) (BJB)	
	1 Ignition switch in position 0.
	2 Disconnect fuse F23 (30 A) (BJB).
	3 CHECK fuse F23 (30 A) (BJB). • Is the fuse OK? → **Yes** GO to L2. → **No** RENEW fuse F23 (30 A) (BJB) CHECK the operation of the system. If the fuse blows again, LOCATE and RECTIFY the short to ground using the Wiring Diagrams. CHECK the operation of the system.
L2: CHECK THE VOLTAGE SUPPLY TO FUSE F23 (30 A) (BJB) FOR OPEN CIRCUIT	
	1 Connect fuse F23 (30 A) (BJB).
	2 Measure the voltage between fuse F23 (30 A) (BJB) and ground. • Does the meter display battery voltage? → **Yes** GO to L3. → **No** CHECK BJB and if necessary RENEW. CHECK the operation of the system.
L3: CHECK CIRCUIT 31S-KA24 (BK/RD) BETWEEN THE HEADLAMP WASHER RELAY AND THE GEM FOR SHORT TO BATTERY VOLTAGE.	
	1 Disconnect headlamp cleaning system relay from socket C1009.
	2 Ignition switch in position II.
 VFE0016132	3 Measure the voltage between the headlamp washer relay, socket C1009, pin 2, circuit 31S-KA24 (BK/RD), BJB side and ground. • Does the meter display battery voltage? → **Yes** GO to L4. → **No** GO to L5.

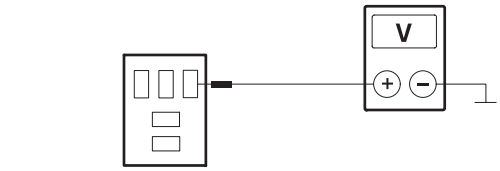
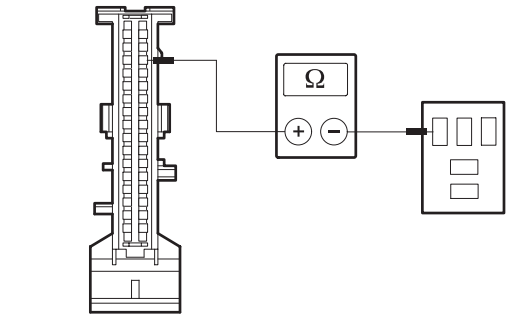
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L4: CHECK CIRCUIT 31S-KA24 (BK/RD) BETWEEN THE HEADLAMP WASHER RELAY AND THE CJB FOR SHORT TO BATTERY VOLTAGE.	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C95.
 VFE0016132	3 Measure the voltage between the headlamp washer relay, socket C1009, pin 2, circuit 31S-KA24 (BK/RD), BJB side and ground. • Does the meter display battery voltage? → **Yes** LOCATE and RECTIFY the short to battery voltage in the circuit between the headlamp washer relay and the CJB with the aid of the Wiring Diagrams. CHECK the operation of the system. → **No** INSTALL a new GEM. CHECK the operation of the system.
L5: CHECK VOLTAGE SUPPLY OF HEADLAMP CLEANING SYSTEM RELAY FOR OPEN CIRCUIT	
 VFE0019862	1 Measure the voltage between the headlamp cleaning system relay, socket C1009, pin 5, circuit 30-KA25 (RD), BJB side and ground. • Does the meter display battery voltage? → **Yes** GO to L6. → **No** LOCATE and RECTIFY the break in the circuit between fuse F23 (BJB) and the headlamp cleaning system relay using the Wiring Diagrams. CHECK the operation of the system.
L6: CHECK HEADLAMP RELAY	
 VFE0019865	1 Connect a fused jumper wire (30 A) at the headlamp cleaning system relay, socket C1009, between pin 5 and pin 3, BJB side. • Does the headlamp cleaning system pump run? → **Yes** GO to L9. → **No** GO to L7.

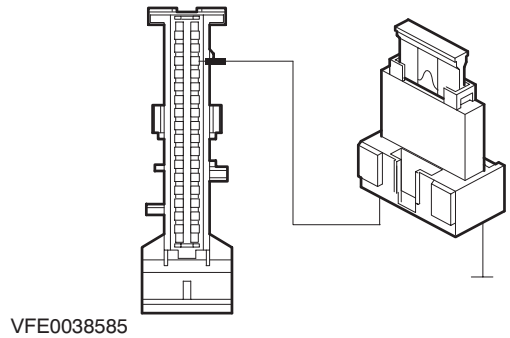
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L7: CHECK CIRCUIT 15S-KA21(A) (GN/YE) BETWEEN THE HEADLAMP CLEANING SYSTEM RELAY AND THE HEADLAMP CLEANING SYSTEM PUMP FOR OPEN CIRCUIT	
NOTE: The fused jumper wire used in the previous test step is still connected to the headlamp cleaning system relay.	
	1 Disconnect headlamp cleaning system pump from connector C745.
 VFE0038583	2 Measure the voltage between the headlamp washer pump, connector C745, pin 1, circuit 15S-KA21(A) (GN/YE), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** GO to L8. → **No** LOCATE and RECTIFY the break in the circuit between the headlamp cleaning system relay and the headlamp cleaning system pump using the Wiring Diagrams. CHECK the operation of the system.
L8: CHECK GROUND SUPPLY OF HEADLAMP CLEANING SYSTEM PUMP FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
 VFE0038584	2 Measure the resistance between the headlamp washer pump, connector C745, pin 2, circuit 31-KA21(A) (BK), wiring harness side and ground. • Is the resistance less than 2 ohms? → **Yes** RENEW the headlamp cleaning system pump. CHECK the operation of the system. → **No** LOCATE and RECTIFY the break in the circuit between the headlamp cleaning system pump and soldered connection S109 using the Wiring Diagrams. CHECK the operation of the system.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L9: CHECK VOLTAGE SUPPLY OF HEADLAMP CLEANING SYSTEM RELAY (CONTROL CIRCUIT) FOR OPEN CIRCUIT	
 VFE0016104	1 Measure the voltage between the headlamp cleaning system relay, socket C1009, pin 1, circuit 15-KA24 (GN/OG), BJB side and ground. • Does the meter display battery voltage? → **Yes** GO to L10. → **No** LOCATE and RECTIFY the break in the circuit between soldered connection S164 and the headlamp cleaning system relay using the Wiring Diagrams. CHECK the operation of the system.
L10: CHECK CONTROL CIRCUIT OF HEADLAMP CLEANING SYSTEM RELAY FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C95.
 VFE0038586	3 Measure the resistance between the headlamp cleaning system relay, socket C1009, pin 2, circuit 31S-KA24 (BK/RD), BJB side and CJB, connector C95, pin 14, circuit 31S-KA24 (BK/RD), wiring harness side. • Is the resistance less than 2 ohms? → **Yes** GO to L11. → **No** LOCATE and RECTIFY the break in the circuit between the headlamp cleaning system relay and CJB using the Wiring Diagrams. CHECK the operation of the system.
L11: CHECK HEADLAMP CLEANING SYSTEM RELAY	
	1 Connect headlamp cleaning system relay to socket C1009.
	2 Ignition switch in position II.

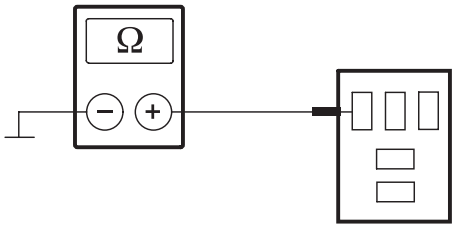
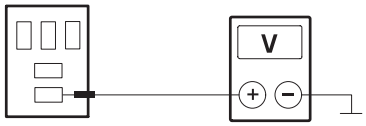
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0038585	3 Use a fused jumper wire (10 A) to connect to the CJB, connector C95, pin 14, circuit 31S-KA24 (BK/RD) and ground. • Does the headlamp cleaning system pump run? → **Yes** INSTALL a new GEM. CHECK the operation of the system. → **No** RENEW the headlamp cleaning system relay. CHECK the operation of the system.

PINPOINT TEST M : HEADLAMP WASHER SYSTEM OPERATES CONTINUOUSLY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
M1: NARROW DOWN THE FAULT CONDITION	
	1 Ignition switch in position 0.
	2 Disconnect CJB from connector C95.
	3 Ignition switch in position II.
	4 CHECK headlamp cleaning system pump. • Does the headlamp cleaning system pump run continuously? → **Yes** GO to M2. → **No** INSTALL a new GEM. CHECK the operation of the system.
M2: CHECK HEADLAMP CLEANING SYSTEM RELAY	
	1 Ignition switch in position 0.
	2 Disconnect headlamp cleaning system relay from socket C1009.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0016108	3 Measure the resistance between the headlamp cleaning system relay, socket C1009, pin 2, circuit 31S-KA24 (BK/RD), BJB side and ground. • Is the resistance greater than 10,000 Ohms? → **Yes** GO to M3. → **No** LOCATE and RECTIFY the short to ground in the circuit between headlamp cleaning system relay and the CJB using the Wiring Diagrams. CHECK the operation of the system.
M3: CHECK CIRCUIT 15S-KA21 (GN/YE) BETWEEN HEADLAMP CLEANING SYSTEM RELAY AND HEADLAMP CLEANING SYSTEM PUMP FOR SHORT TO BATTERY VOLTAGE	
	1 Ignition switch in position II.
 VFE0016103	2 Measure the voltage between the headlamp cleaning system relay, socket C1009, pin 3, circuit 15S-KA21 (GN/YE), BJB side and ground. • Does the meter display battery voltage? → **Yes** LOCATE and RECTIFY the short to battery voltage in circuit 15S-KA21 (GN/YE) between the headlamp cleaning system relay and the headlamp cleaning system pump using the Wiring Diagrams. CHECK the operation of the system. → **No** RENEW the headlamp cleaning system relay. CHECK the operation of the system.

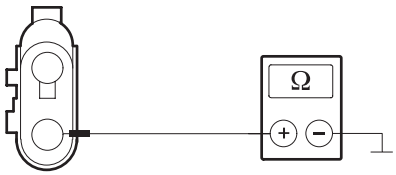
PINPOINT TEST N : WINDSHIELD WASHER NOZZLE HEATER IS INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
N1: DETERMINE THE FAULT CONDITION	
	1 Ignition switch in position II.

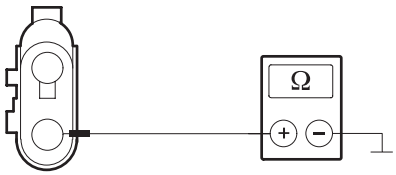
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 DETERMINE which windshield washer nozzle heater is inoperative. • Are both windshield washer nozzle heaters inoperative? → **Yes** GO to N2. → **No** - Left windscreen washer nozzle heater is inoperative: GO to N3. - Right windscreen washer nozzle heater is inoperative: GO to N5.
N2: CHECK VOLTAGE SUPPLY TO WINDSHIELD WASHER NOZZLE HEATER FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Left-hand windshield washer nozzle heater from connector C721.
	3 Ignition switch in position II.
 VFE0016017	4 Measure voltage between left-hand windshield washer nozzle heater, connector C721, pin 1, circuit 15-HB13 (GN/BU), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** LOCATE and RECTIFY break in circuit 31-HB1 (BK), between soldered connection S122 and soldered connection S109 using the Wiring Diagrams. CHECK the operation of the system. → **No** LOCATE and RECTIFY break in circuit 15-HB1 (GN/BU), between soldered connection S123 and fuse F47 (CJB) using the Wiring Diagrams. CHECK the operation of the system.
N3: CHECK VOLTAGE SUPPLY TO LEFT WINDSHIELD WASHER NOZZLE HEATER FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Left-hand windshield washer nozzle heater from connector C721.
	3 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0016017	4 Measure voltage between left-hand windshield washer nozzle heater, connector C721, pin 1, circuit 15-HB13 (GN/BU), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** GO to N4. → **No** LOCATE and RECTIFY break in circuit between soldered connection S123 and left-hand windshield washer nozzle heater using the Wiring Diagrams. CHECK the operation of the system.
N4: CHECK GROUND SUPPLY TO LEFT WINDSHIELD WASHER NOZZLE HEATER FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
 VFE0022794	2 Measure the resistance between the left-hand windshield washer nozzle heater, connector C721, pin 2, circuit 31-HB13 (BK), wiring harness side and ground. • Is the resistance less than 2 ohms? → **Yes** RENEW the left-hand windshield washer nozzle heater. CHECK the operation of the system. → **No** LOCATE and RECTIFY break in circuit between left-hand windshield washer nozzle heater and soldered connection S122 using the Wiring Diagrams. CHECK the operation of the system.
N5: CHECK VOLTAGE SUPPLY TO RIGHT WINDSHIELD WASHER NOZZLE HEATER FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Right-hand windshield washer nozzle heater from connector C720.
	3 Ignition switch in position II.

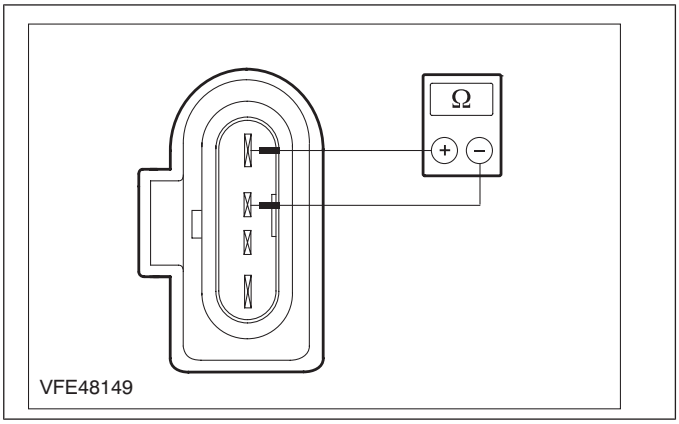
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VFE0016017	4 Measure voltage between right-hand windshield washer nozzle heater, connector C720, pin 1, circuit 15-HB26 (GN/RD), wiring harness side and ground. • Does the meter display battery voltage? → **Yes** GO to N6. → **No** LOCATE and RECTIFY break in circuit between soldered connection S123 and right-hand windshield washer nozzle heater using the Wiring Diagrams. CHECK the operation of the system.
N6: CHECK GROUND SUPPLY TO RIGHT WINDSHIELD WASHER NOZZLE HEATER FOR OPEN CIRCUIT	
	1 Ignition switch in position 0.
 VFE0022794	2 Measure the resistance between the right-hand windshield washer nozzle heater, socket C720, pin 2, circuit 31-HB26 (BK), wiring harness side and ground. • Is the resistance less than 2 ohms? → **Yes** RENEW the right-hand windshield washer nozzle heater. CHECK the operation of the system. → **No** LOCATE and RECTIFY break in circuit between right-hand windshield washer nozzle heater and soldered connection S122 using the Wiring Diagrams. CHECK the operation of the system.

Component Tests

Front wiper motor

1. TEST the front windshield wiper motor in park position:
   - Measure the resistance at the front windscreen wiper motor between pin 3 and pin 4 (or the housing of the wiper motor).
   - Is the resistance less than 2 ohms?
     - If yes then the wiper motor is OK.
     - If not, RENEW the wiper motor.

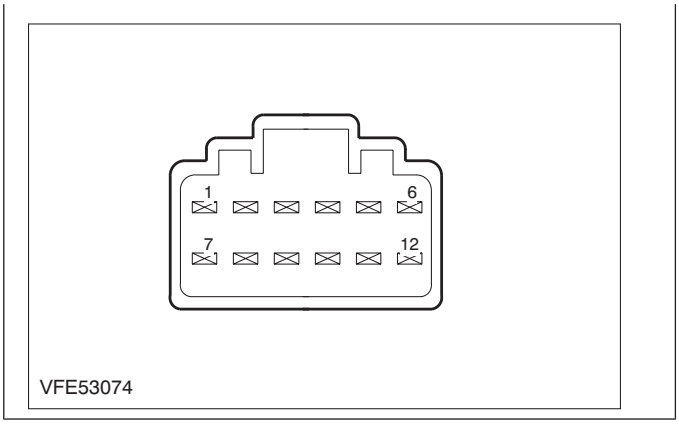


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DIAGNOSIS AND TESTING

Wash/wipe system switch

Pin assignment:

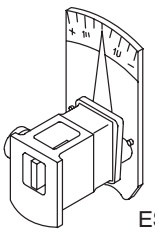


Circuit to test	Connect ohmmeter to the following terminal pins	Set the switch to the following position	The switch is OK if
Intermittent	3 and 12	Intermittent	Circuit closed
Variable delay	3 and 7	Intermittent level 1	Circuit closed
	3 and 9	Intermittent level 1	Circuit open
	3 and 11	Intermittent level 1	Circuit open
Variable delay	3 and 7	Intermittent level 2	Circuit closed
	3 and 9	Intermittent level 2	Circuit closed
	3 and 11	Intermittent level 2	Circuit open
Variable delay	3 and 7	Intermittent level 3	Circuit open
	3 and 9	Intermittent level 3	Circuit closed
	3 and 11	Intermittent level 3	Circuit open
Variable delay	3 and 7	Intermittent level 4	Circuit open
	3 and 9	Intermittent level 4	Circuit closed
	3 and 11	Intermittent level 4	Circuit closed
Variable delay	3 and 7	Intermittent level 5	Circuit closed
	3 and 9	Intermittent level 5	Circuit closed
	3 and 11	Intermittent level 5	Circuit closed
Variable delay	3 and 7	Intermittent level 6	Circuit closed
	3 and 9	Intermittent level 6	Circuit open
	3 and 11	Intermittent level 6	Circuit closed

GENERAL PROCEDURES

Windshield Wiper Blade and Pivot Arm Adjustment

Special Tool(s)

 ES32006	Aligner, Wiper Arm 501-027 (32-006)

General Equipment

Aero-Wiper Measuring and Adjusting Tools AWPE 02 (Order No. 511 5124 001 00)

Vehicles without beam blade wipers

1. **⚠CAUTION: Make sure that the wiper motor is in the park position.**

   Remove the wiper blade.

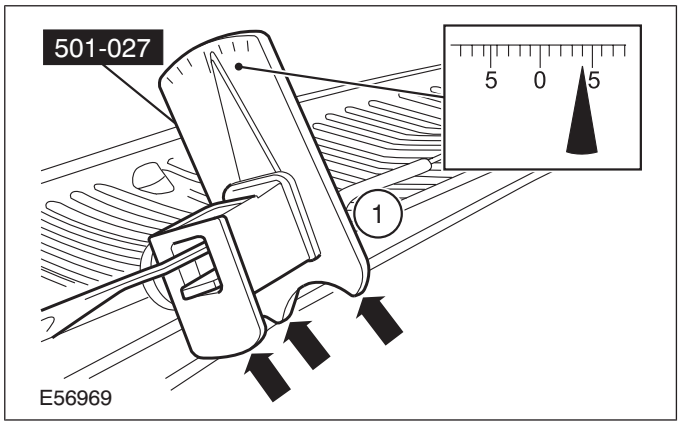
2. **Insert the wiper arm in the special tool and place the special tool on the windshield.**

3. **NOTE: All three support points of the special tool must be in contact with the glass.**

NOTE: The angle of the wiper on the scale must point from the zero center line to the center of the windshield/rear window. Ignore the sign (+/-) on the alignment tool.

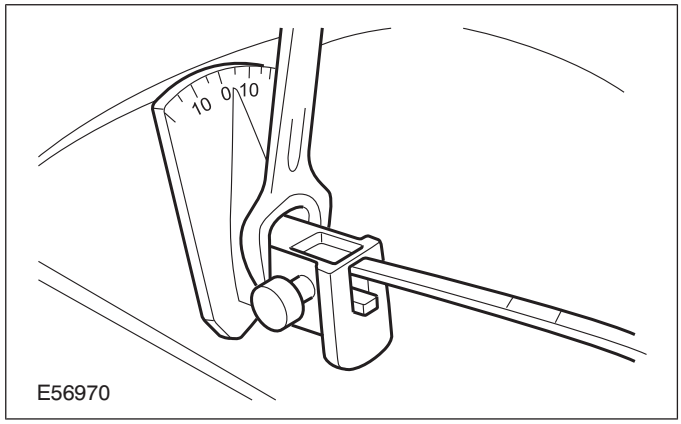
Using the special tool, read off the angle between the wiper arm and the windshield.

1. Center of windshield



4. **NOTE: Lift the special tool away from the glass when correcting the angle, in order to prevent damage.**

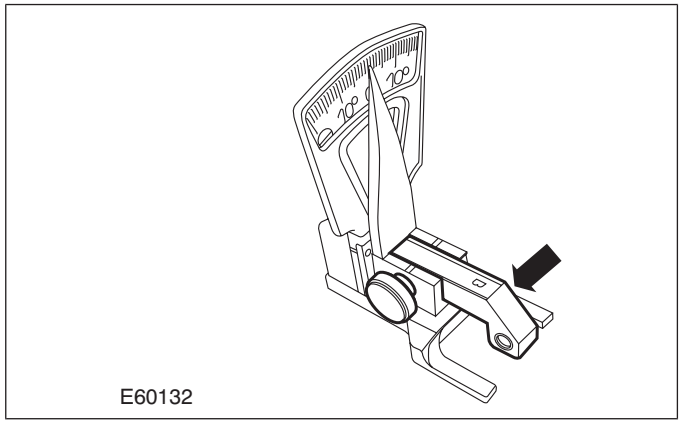
Using an open-ended wrench on the special tool, adjust the wiper arm. For additional information, refer to Specifications.



5. **Remove the special tool.**
6. **Install the wiper blade.**

Vehicles with beam blade wipers

1. **Connect the adapter "B" with the angle measuring instrument.**
   - Tighten the knurled screw finger tight.



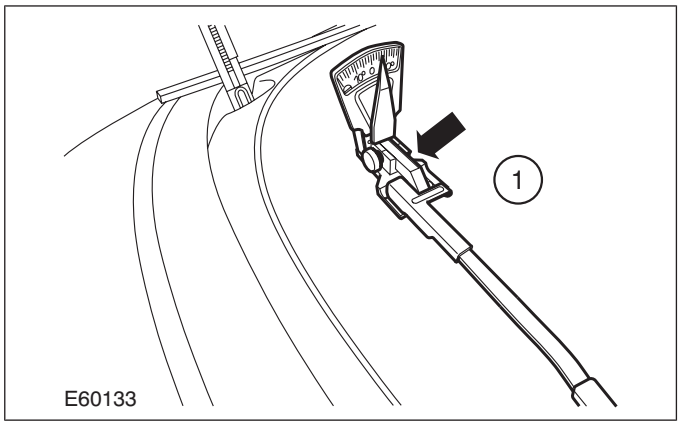
2. **⚠CAUTION: Make sure that the wiper motor is in the park position.**

   Remove the wiper blade.

3. **Insert the wiper arm in the angle measuring instrument and place the angle measuring instrument on the windshield.**

GENERAL PROCEDURES

1. Center of windshield



4. **NOTE: All three support points of the angle measuring instrument must be in contact with the glass.**

NOTE: The angle of the wiper on the scale must point from the zero center line to the center of the windshield/rear window. Ignore the sign (+/-) on the alignment tool.

Using the angle measuring instrument, read off the angle between the wiper arm and the windshield.

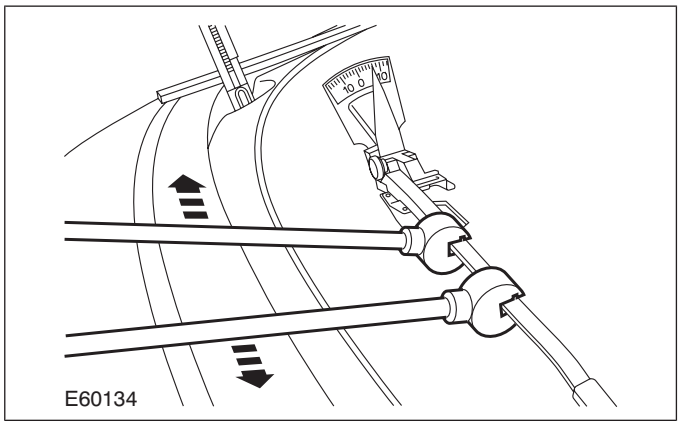
5. **CAUTIONS:**

Make sure that no mechanical force is applied to the wiper blade holder while adjusting the angle.

The wiper arm must not be adjusted by more than three degrees. If a bigger adjustment is necessary, check the wiper arm for damage, replace if necessary.

NOTE: Lift the angle measuring instrument away from the glass when correcting the angle, in order to prevent damage.

Using the adjusting tool and the counter holder, adjust the wiper arm. For additional information, refer to Specifications.



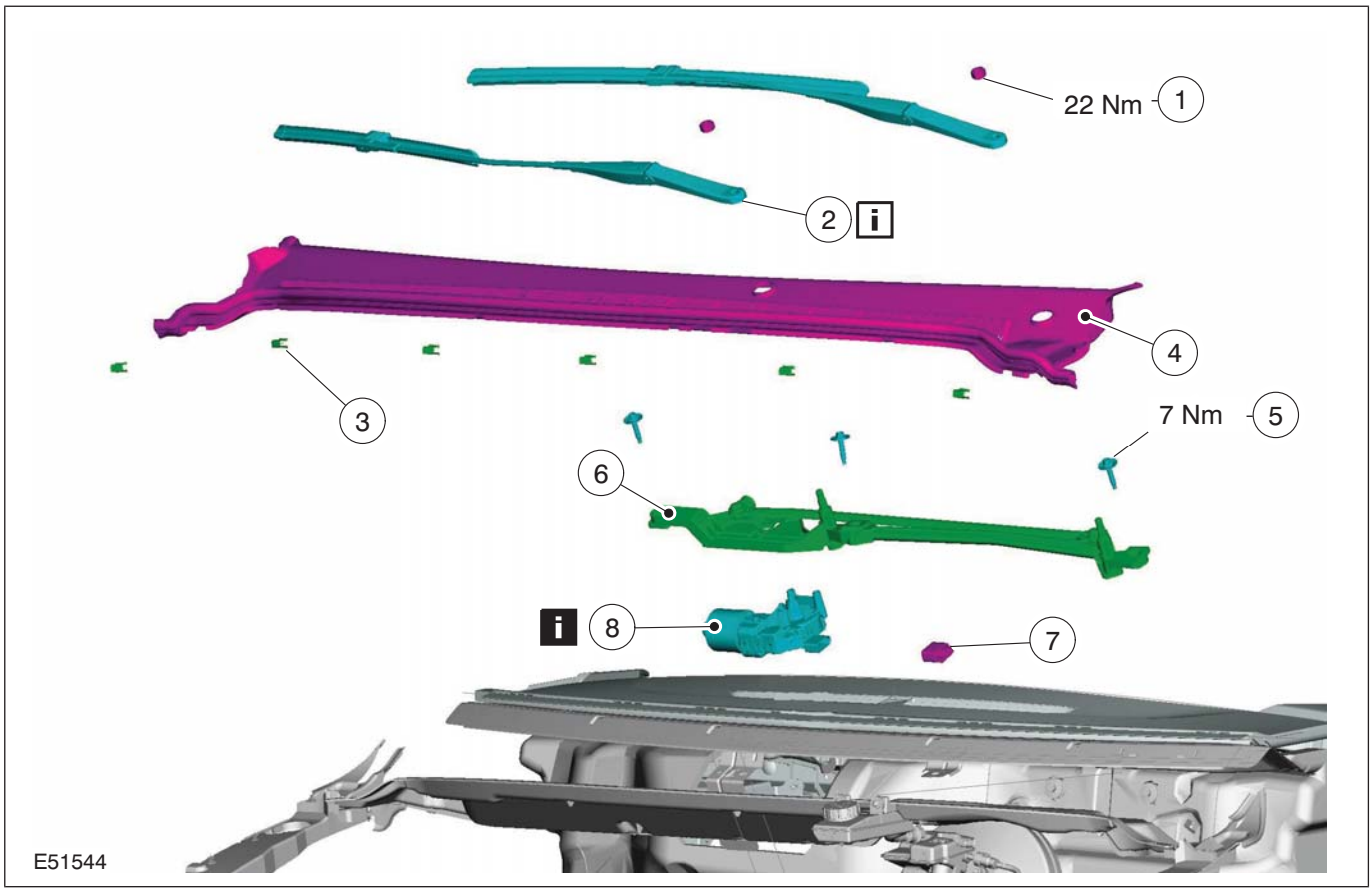
6. **Remove the angle measuring instrument.**
7. **Install the wiper blade.**

REMOVAL AND INSTALLATION

Windshield Wiper Motor

1. **Remove the components in the order indicated in the following illustration(s) and table(s).**

CAUTION: Make sure that the windshield wiper motor is in the park position.



Item	Description
1	Windshield wiper arm nuts
2	Windshield wiper arms See Installation Detail
3	Clips, cowl panel grille
4	Cowl panel grille
5	Bolts for windshield wiper motor with linkage
6	Front wiper linkage

Item	Description
7	Windshield wiper motor connector
8	Windshield wiper motor See Removal Detail

2. **To install, reverse the removal procedure.**
3. **Check the angle of the windshield wiper arms in relation to the windshield.**

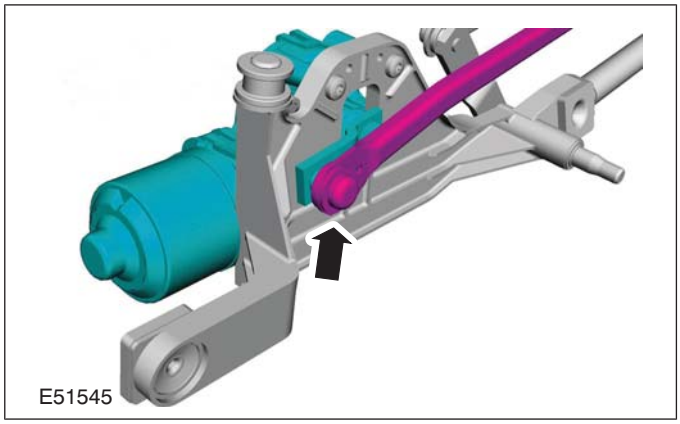
   For additional information, refer to: Windshield Wiper Blade and Pivot Arm Adjustment (501-16 Wipers and Washers, General Procedures).

Removal Details

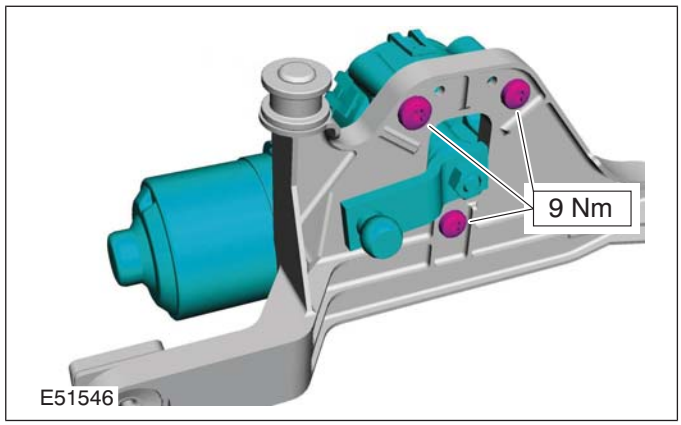
REMOVAL AND INSTALLATION

Item 8 Windshield wiper motor

1. Detach the wiper linkage from the Windshield wiper motor lever arm.



2. Remove the windshield wiper motor bolts.



3. Pull windshield wiper motor from the wiper motor bracket.



Installation Details

Item 2 Windshield wiper arms

CAUTION: Move the windshield wiper motor to park position before installing the windshield wiper arms.

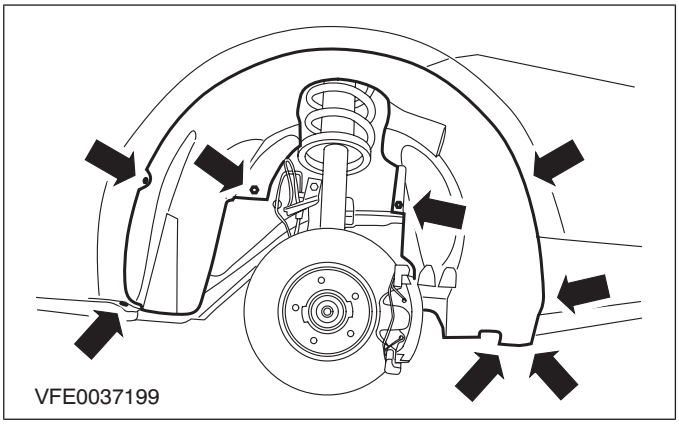
REMOVAL AND INSTALLATION

Windshield Washer Pump(32 624 0)

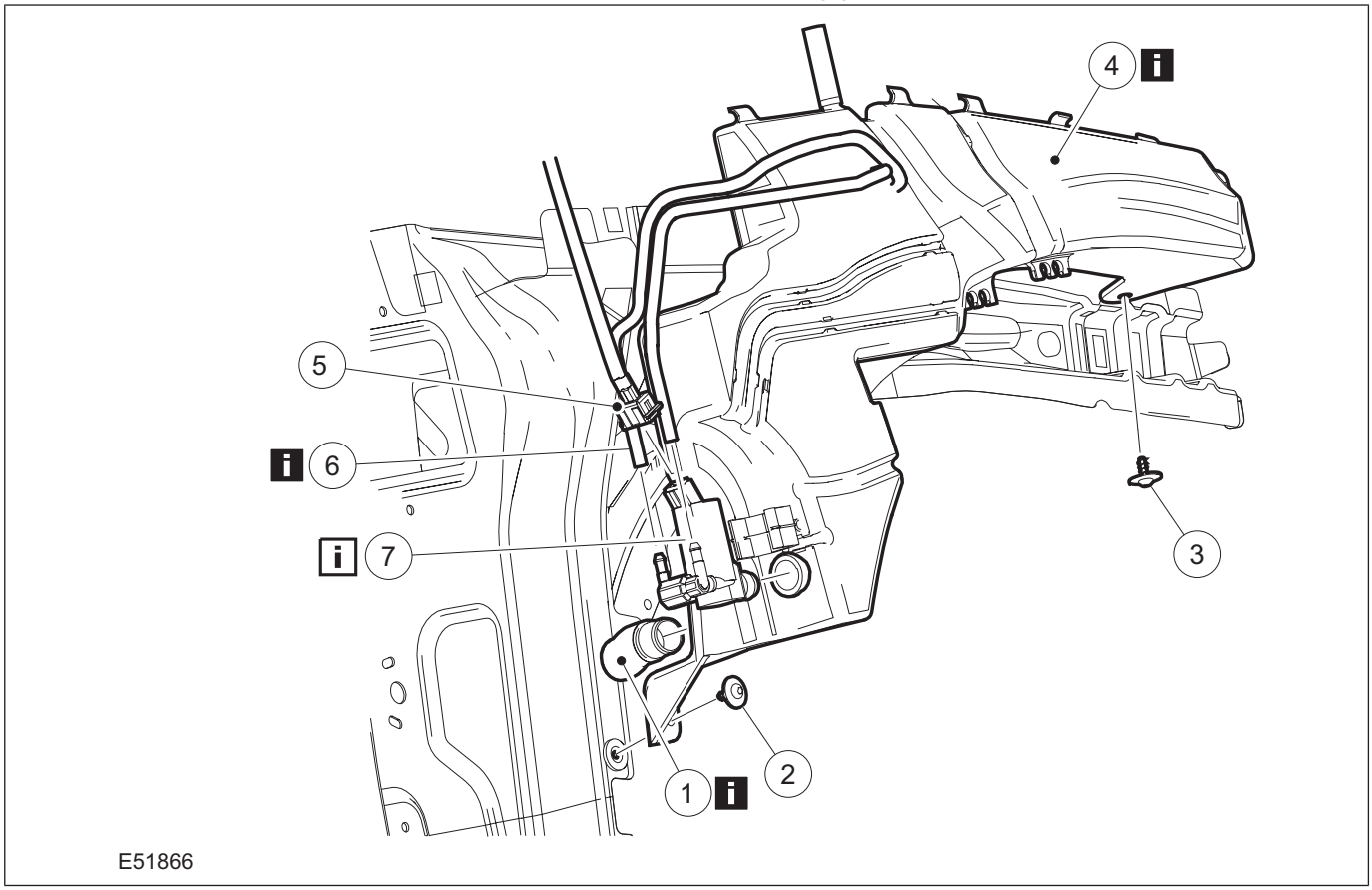
1. Empty the windshield washer reservoir.
2. Detach the right-hand front wheel.

   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3. Remove the right-hand wheelhouse cover.



4. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Front windscreen washer lower reservoir connecting piece See Removal Detail
2	Windshield washer upper reservoir lower retaining bolt

Item	Description
3	Windshield washer upper reservoir upper retaining bolt
4	Windshield washer upper reservoir See Removal Detail
5	Front windscreen washer pump connector

REMOVAL AND INSTALLATION

Item	Description
6	Windshield washer pump hoses. See Removal Detail

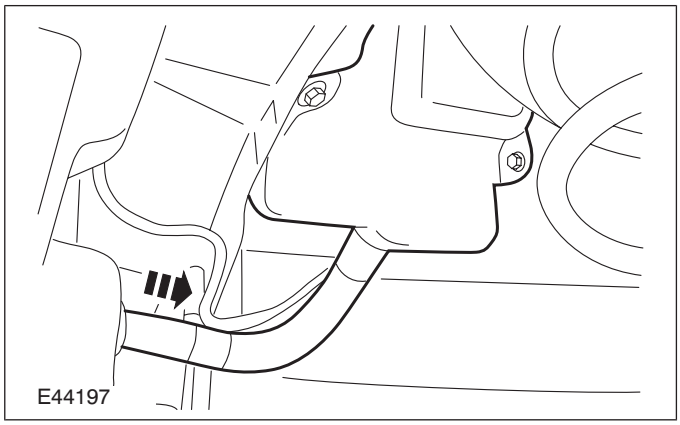
Item	Description
7	Windshield washer pump See Installation Detail

5. To install, reverse the removal procedure.

Removal Details

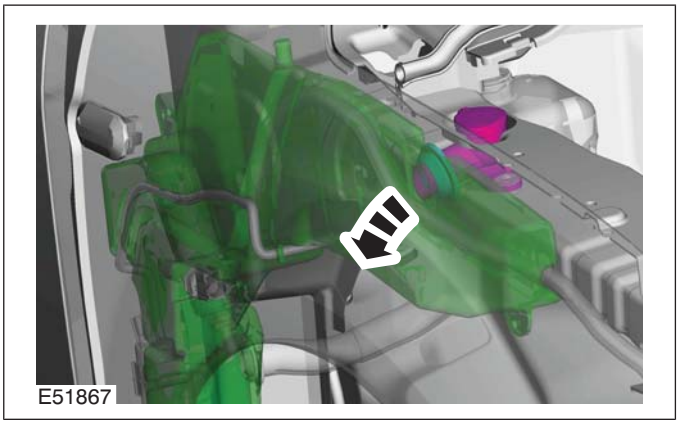
Item 1 Front windscreen washer lower reservoir connecting piece

1. Pull the connecting piece of the lower reservoir from the upper reservoir.



Item 4 Windshield washer upper reservoir

1. Pull the reservoir from the filler neck.



Item 6 Windshield washer pump hoses.

1. Unclip the reservoir hoses.

Installation Details

Item 7 Windshield washer pump

1. Coat the pump rubber seal – on the front windscreen washer with soap prior to installation.

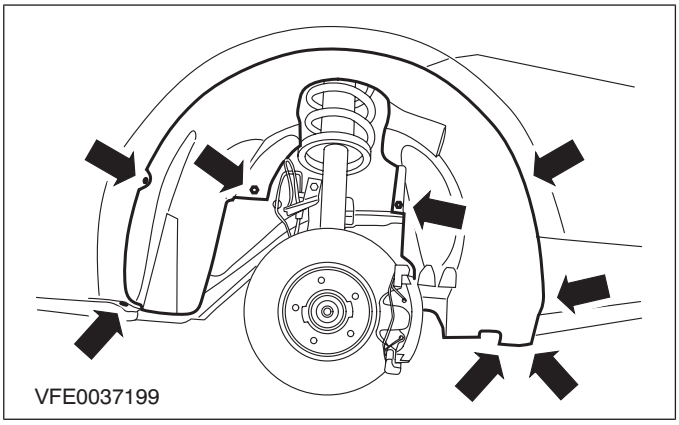
REMOVAL AND INSTALLATION

Windshield Washer Pump and Reservoir

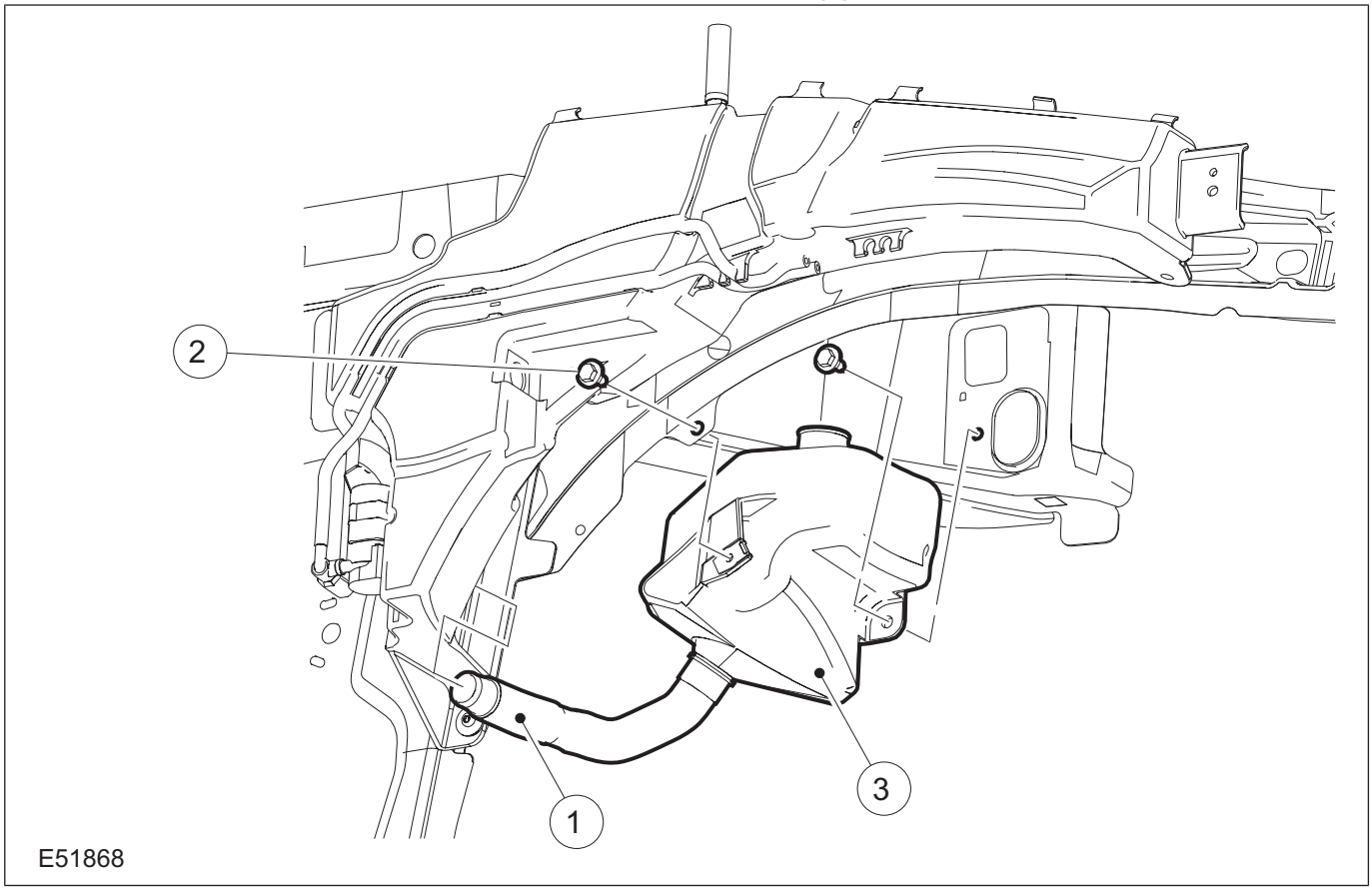
1. Empty the windshield washer reservoir.
2. Detach the right-hand front wheel.

   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3. Remove the right-hand wheelhouse cover.

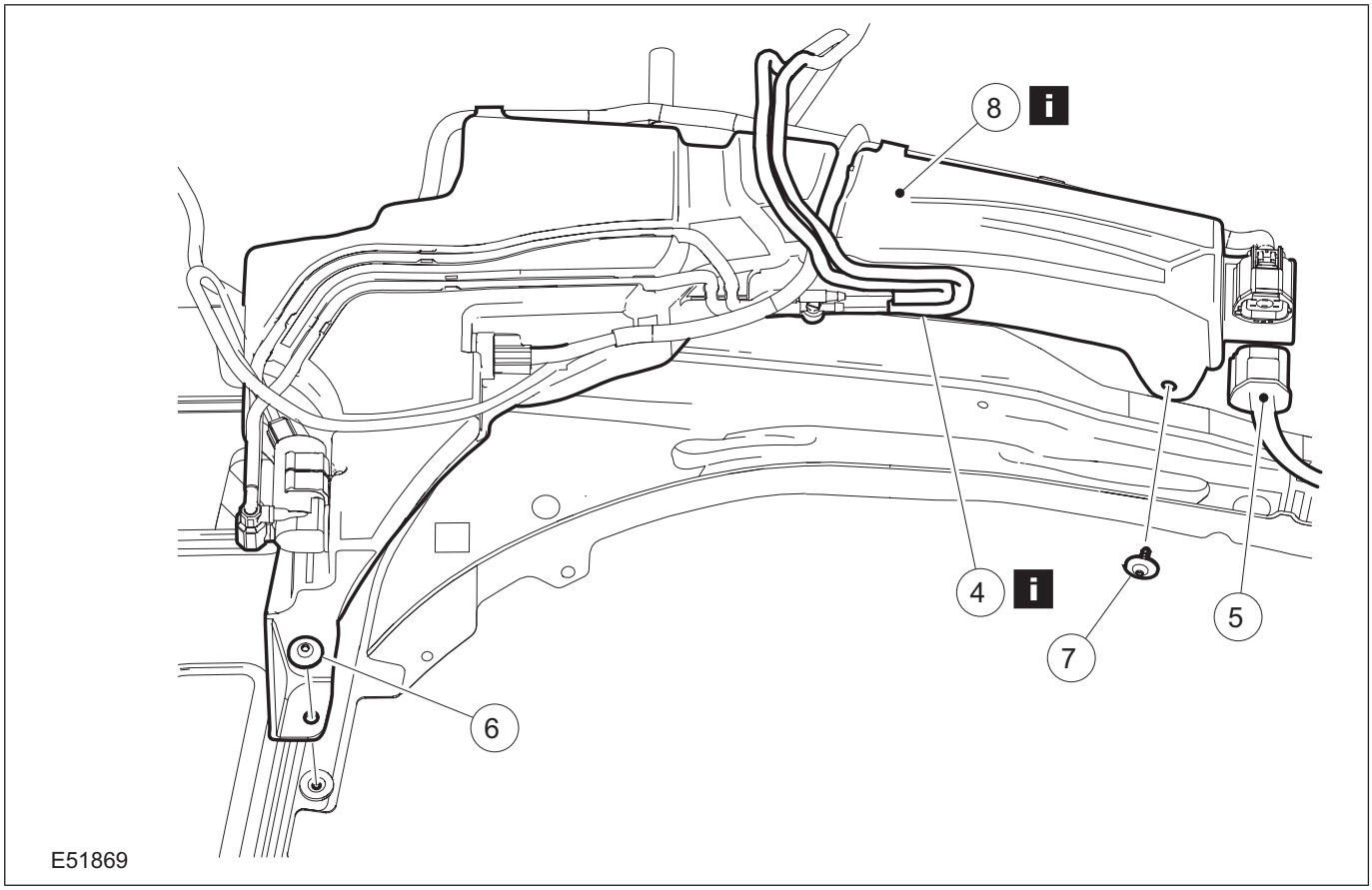


4. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Front windscreen washer lower reservoir connecting piece
2	Front windscreen washer lower reservoir retaining bolts
3	Front windscreen washer lower reservoir

REMOVAL AND INSTALLATION



Item	Description
4	Windshield washer pump hoses. See Removal Detail
5	Front windscreen washer upper reservoir wiring harness connector
6	Windshield washer upper reservoir lower retaining bolt

Item	Description
7	Windshield washer upper reservoir upper retaining bolt
8	Windshield washer upper reservoir See Removal Detail

5. To install, reverse the removal procedure.

Removal Details

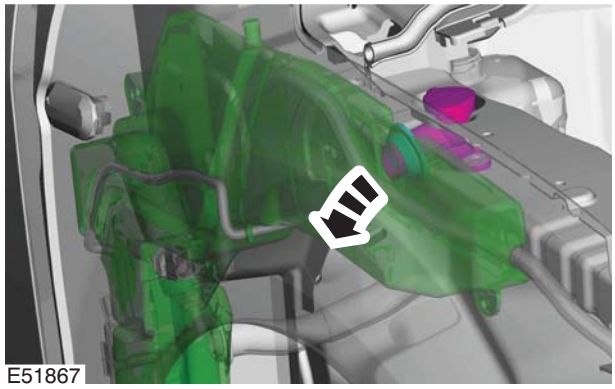
Item 4 Windshield washer pump hoses.

1. Unclip the reservoir hoses.

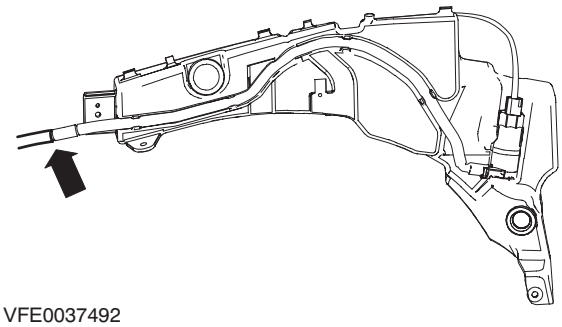
REMOVAL AND INSTALLATION

Item 8 Windshield washer upper reservoir

1. Pull the reservoir from the filler neck.


E51867

2. Disconnect windsheild washer pump hose (if fitted).

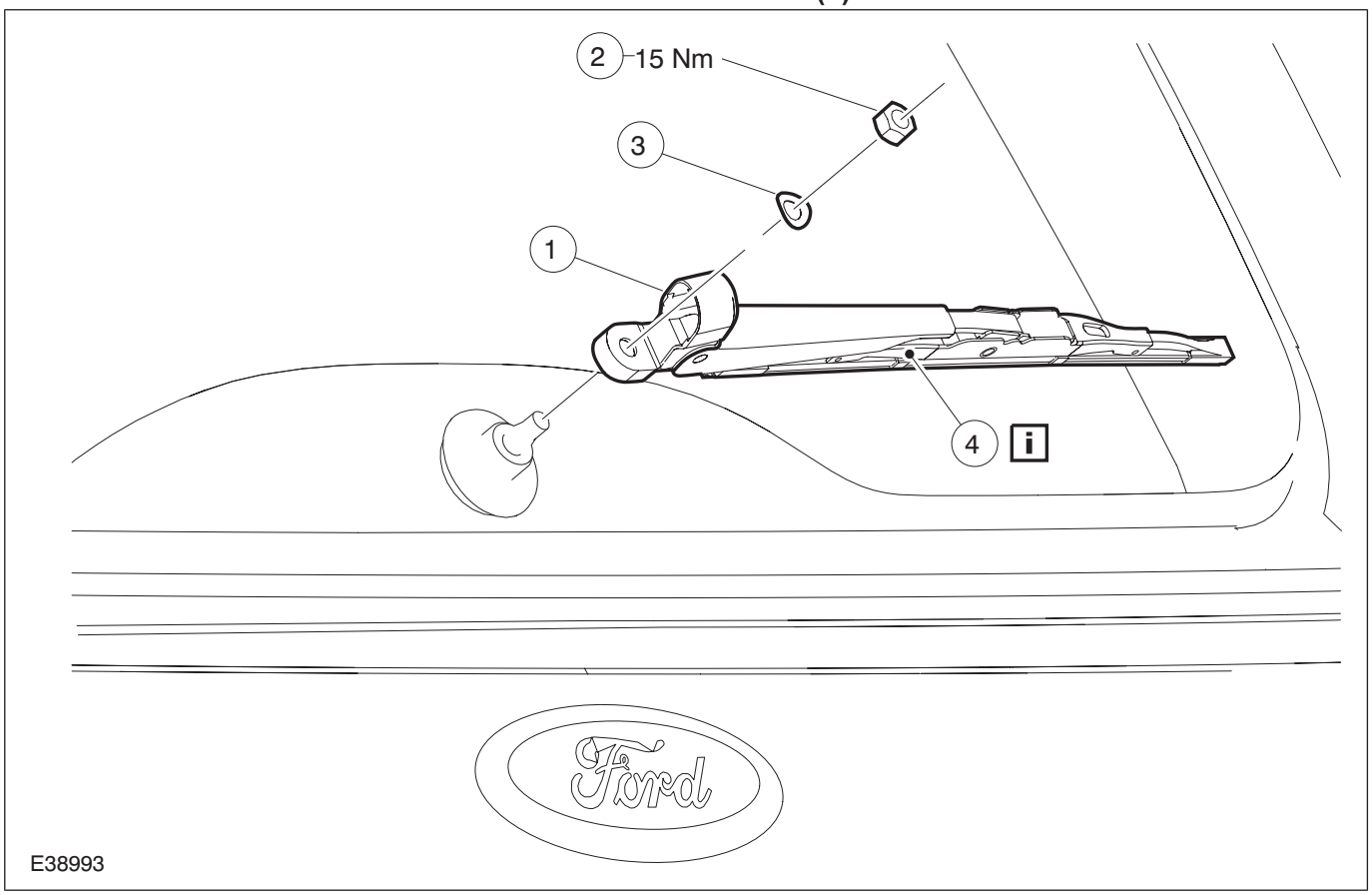

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REMOVAL AND INSTALLATION

Rear Window Wiper Motor

CAUTION: Ensure that the wiper motor is in the park position.

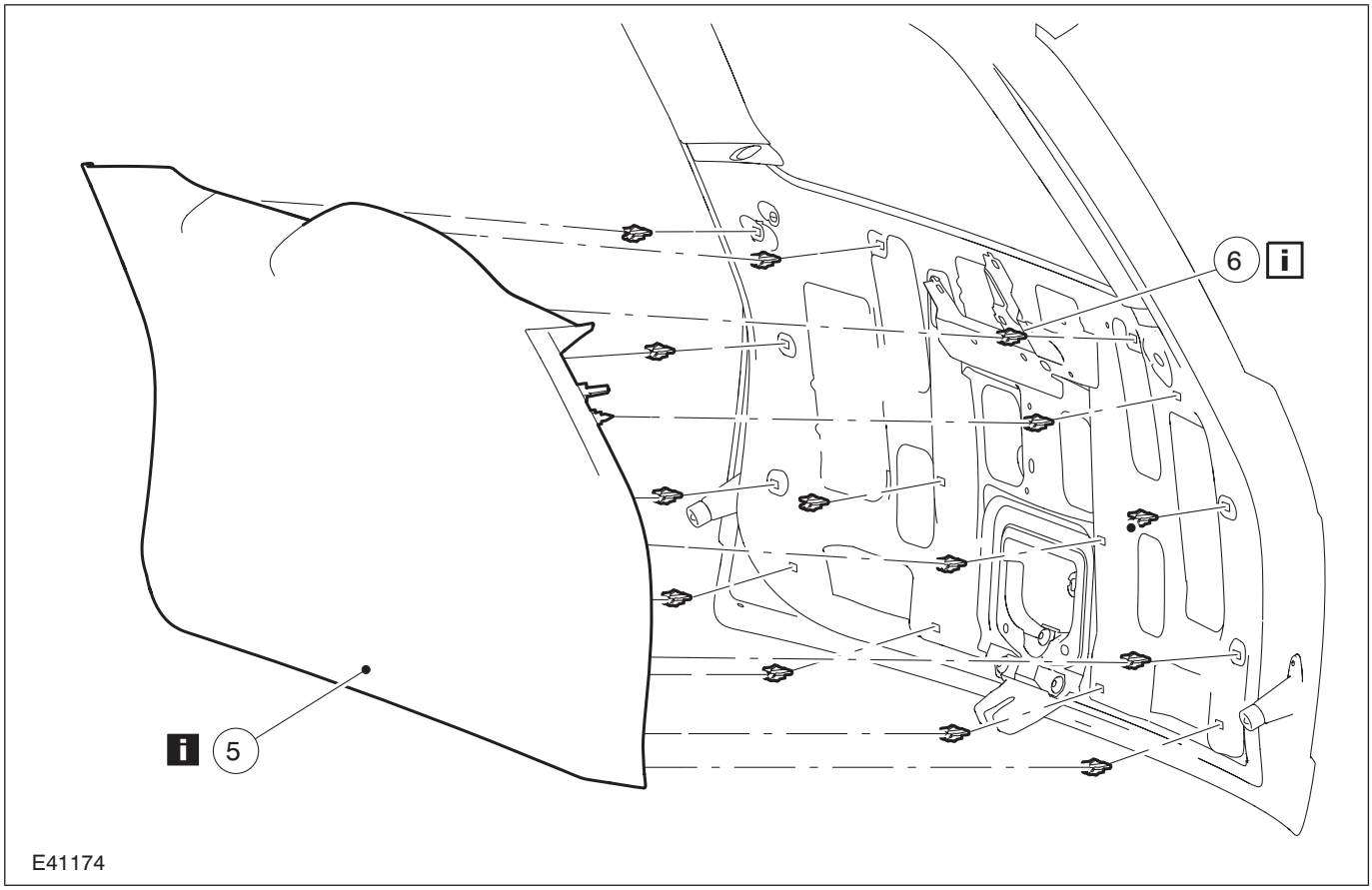
1. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Cap of rear window wiper arm nut
2	Nut of rear window wiper arm

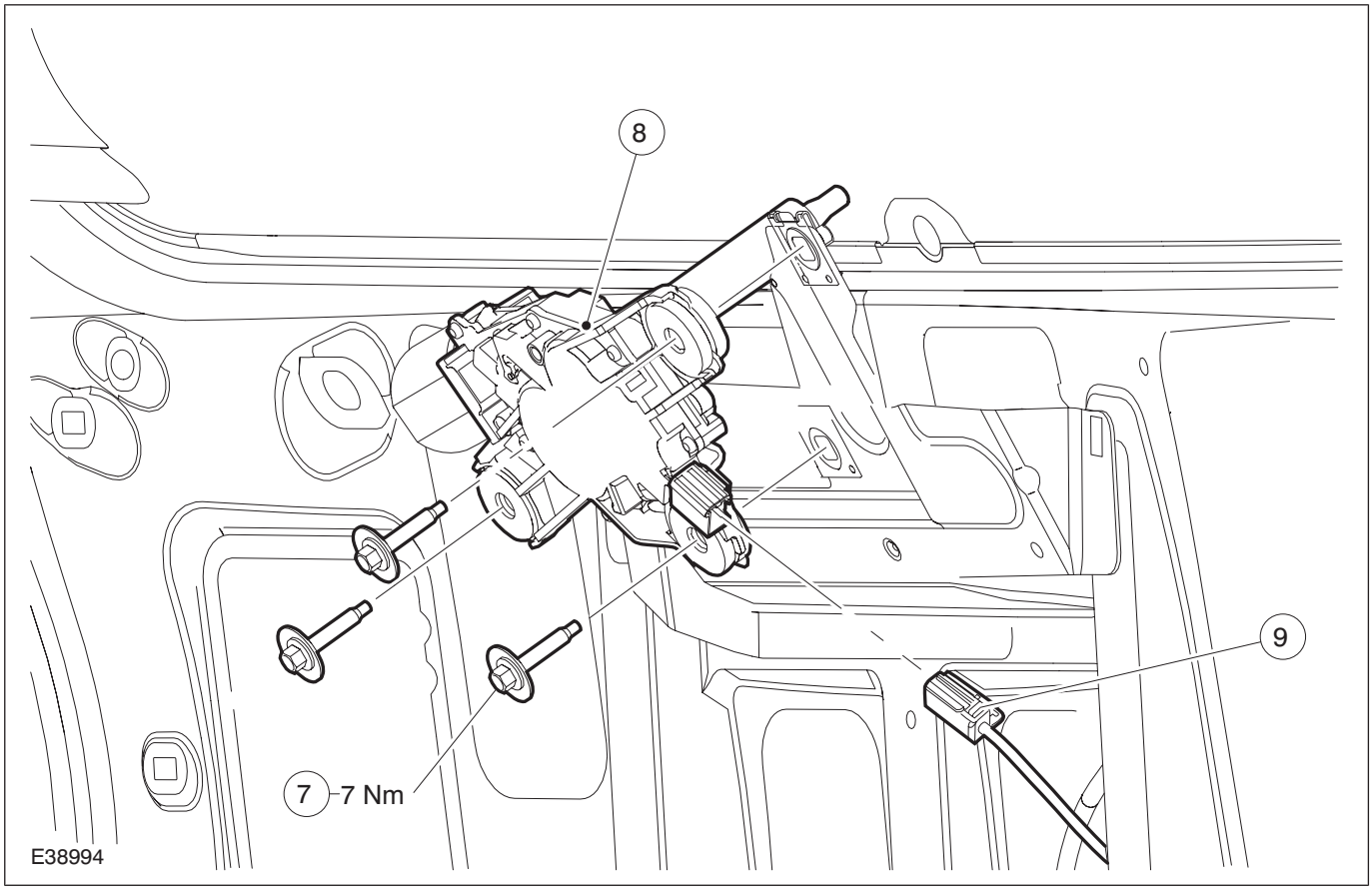
Item	Description
3	Washer of rear window wiper arm
4	Rear window wiper arm See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
5	Liftgate trim panel See Removal Detail
6	Liftgate trim panel retaining clips See Installation Detail

REMOVAL AND INSTALLATION



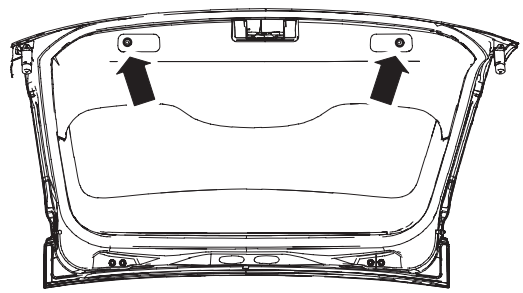
Item	Description
7	Rear window wiper motor bolts
8	Rear window wiper motor
9	Rear window wiper motor connector

2. To install, reverse the removal procedure.

Removal Details

Item 5 Liftgate trim panel

1. Remove the liftgate trim panel bolts.



Installation Details

REMOVAL AND INSTALLATION

Item 4 Rear window wiper arm

CAUTION: Move the rear window wiper motor to the park position before installing the rear window wiper arm.

Item 6 Liftgate trim panel retaining clips

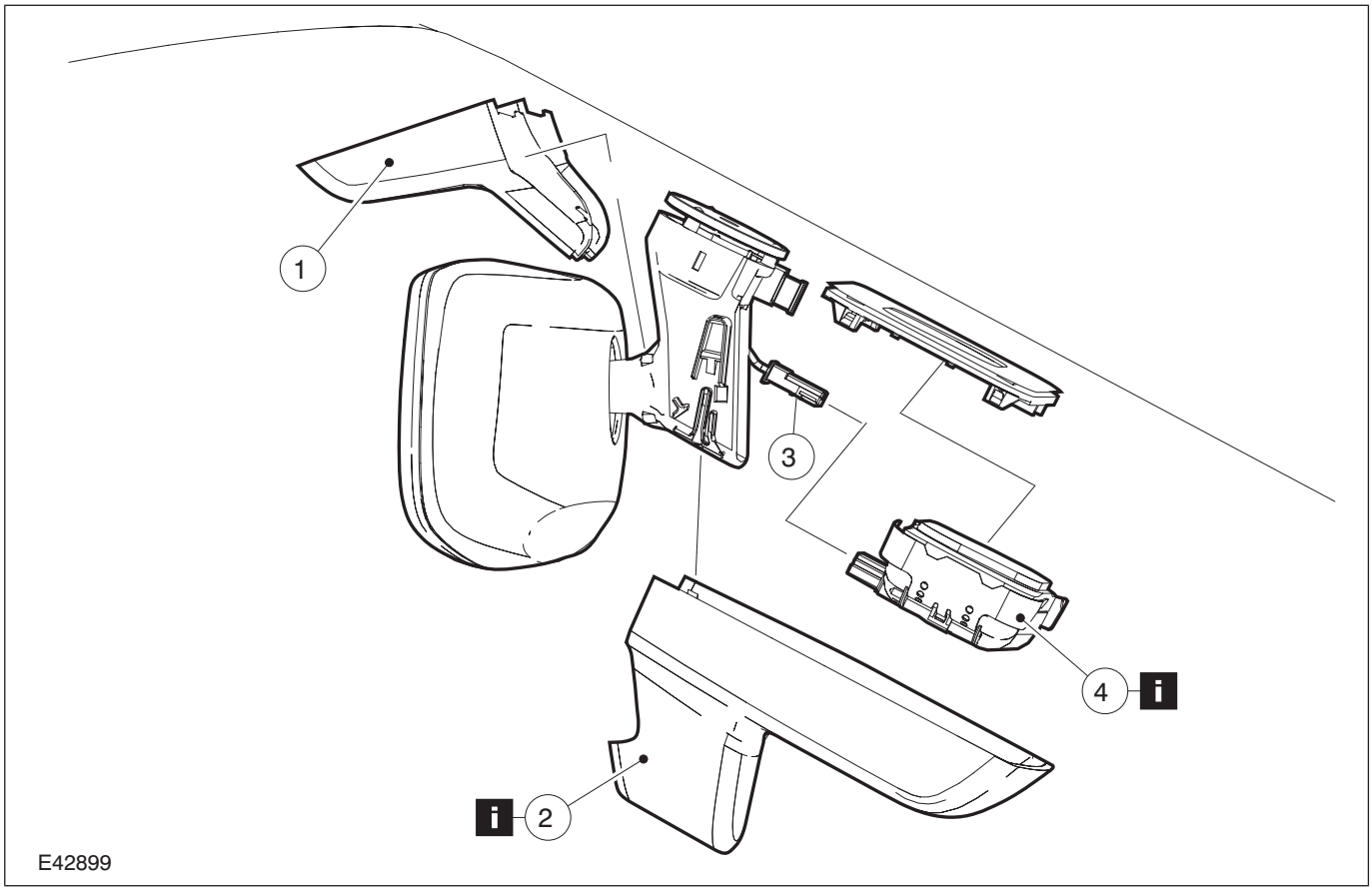
1. Install the liftgate trim panel retaining clips.

REMOVAL AND INSTALLATION

Rain Sensor

CAUTION: Do not touch the optical sensor silicon pads in order to prevent damage and dirt ingress.

1. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Upper mirror bracket cover
2	Lower mirror bracket cover See Removal Detail

Item	Description
3	Rain sensor connector
4	Rain sensor See Removal Detail

2. **To install, reverse the removal procedure.**

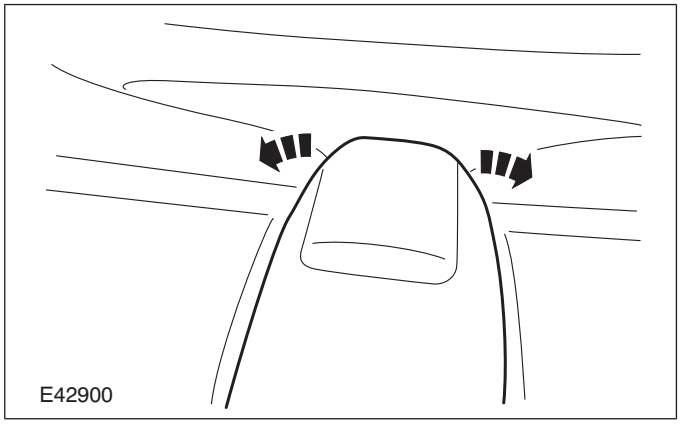
CAUTION: Make sure that the mating faces are clean and free of foreign material.

Removal Details

REMOVAL AND INSTALLATION

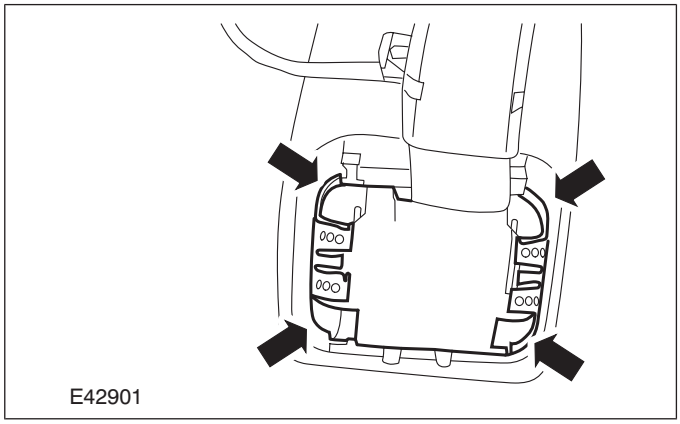
Item 2 Lower mirror bracket cover

1. Unclip the lower mirror bracket cover.

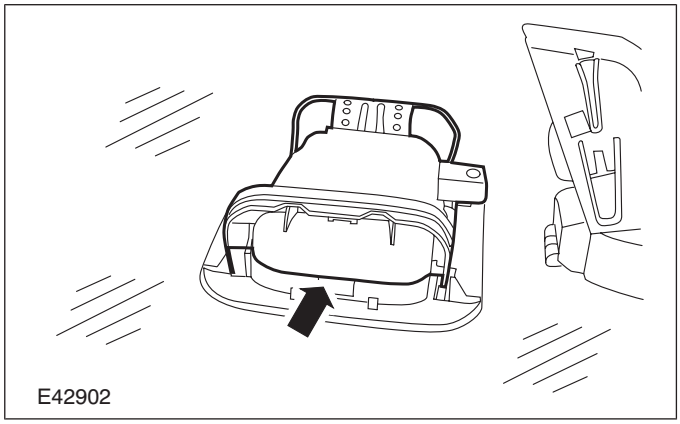


Item 4 Rain sensor

1. Release the catches.



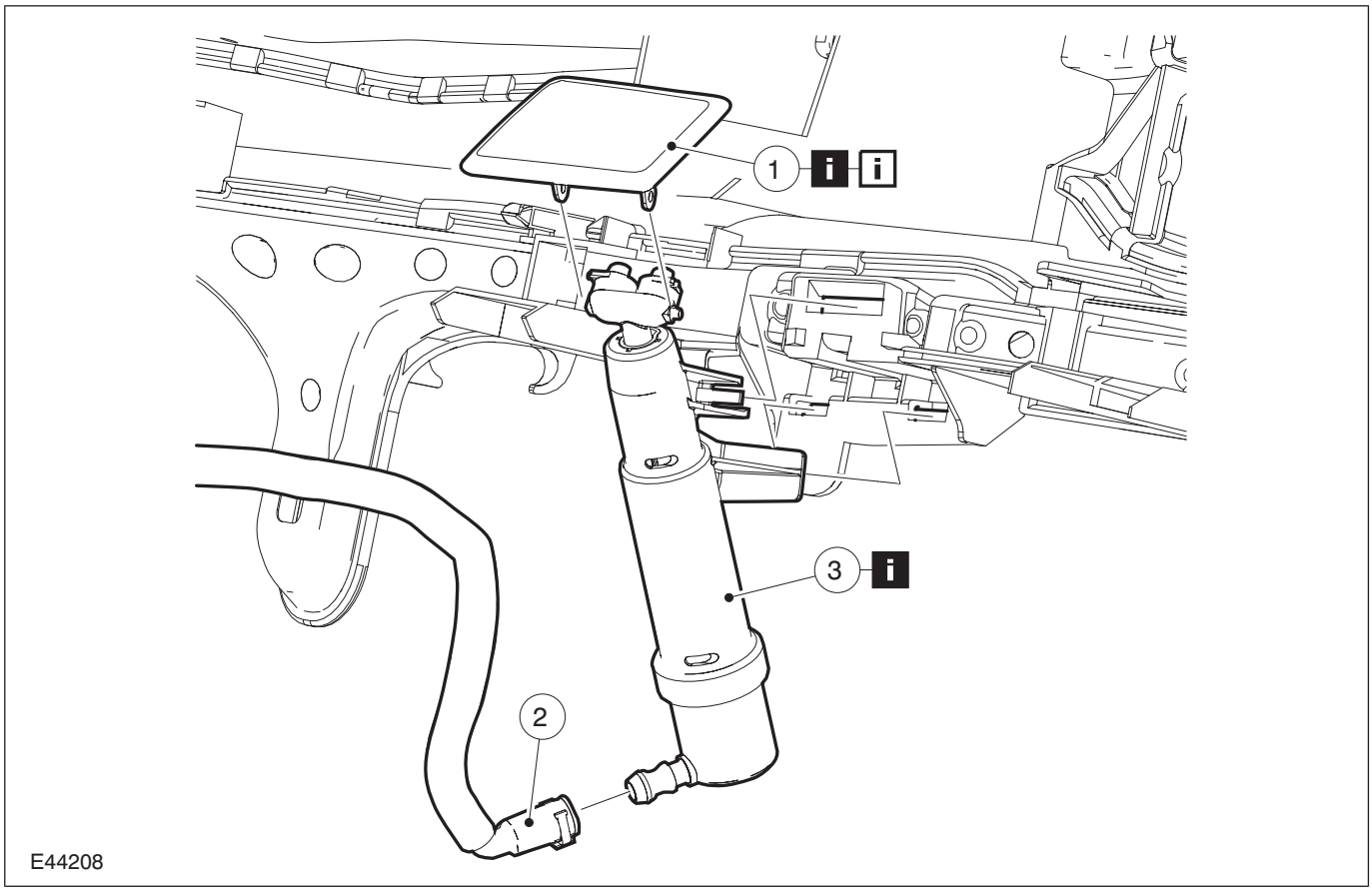
2. Unclip the rain sensor (right-hand side shown).



REMOVAL AND INSTALLATION

Headlamp Washer Jet(32 678 0)

1. Remove the headlamp assembly.
2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Cover, headlamp washer system nozzle See Removal Detail See Installation Detail
2	Headlamp washer jet pressure hose
3	Headlamp washer jet See Removal Detail

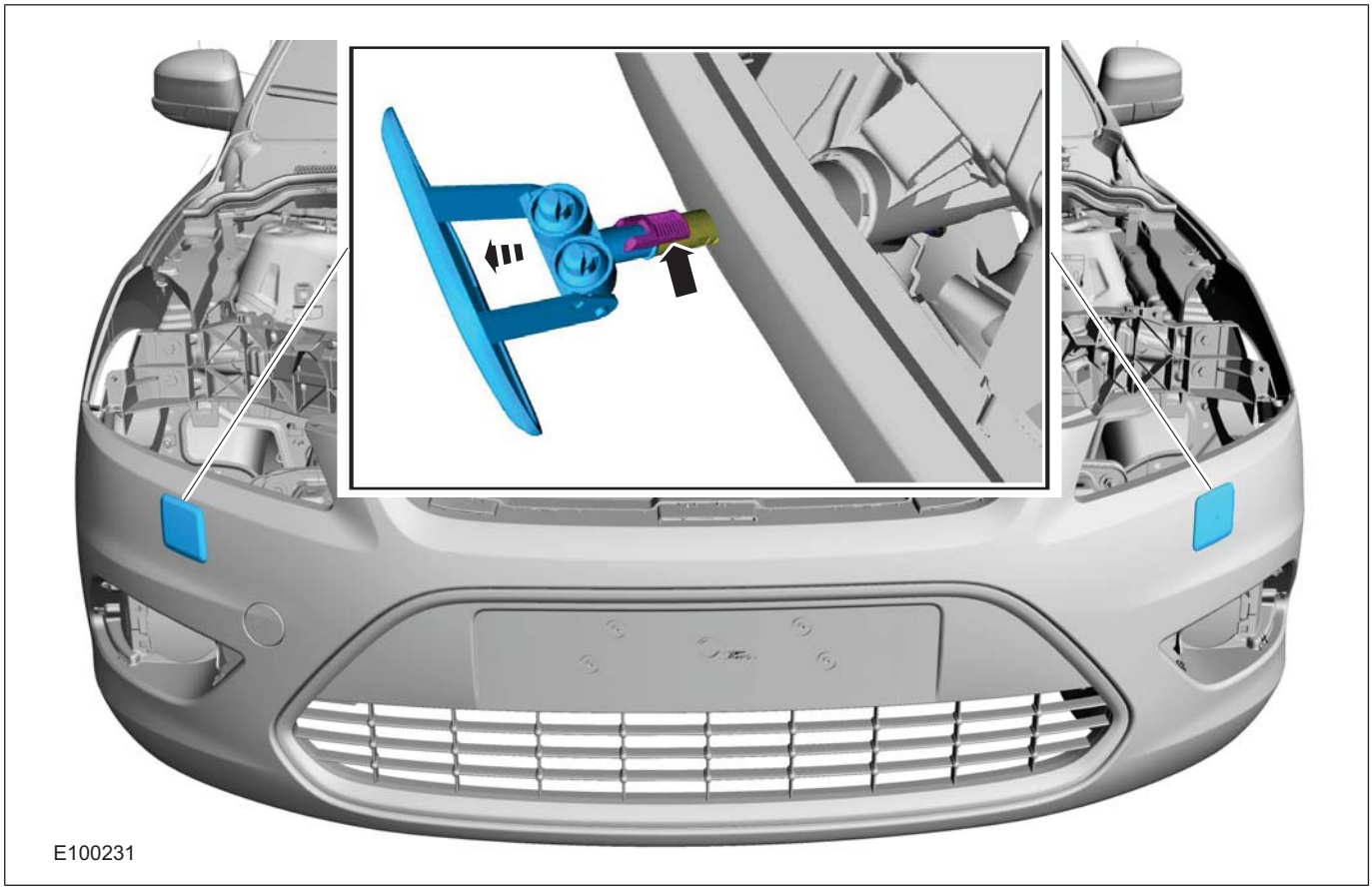
3. To install, reverse the removal procedure.

Removal Details

Item 1 Cover, headlamp washer system nozzle

1. Pull out and hold the headlamp washer jet telescopic rod.

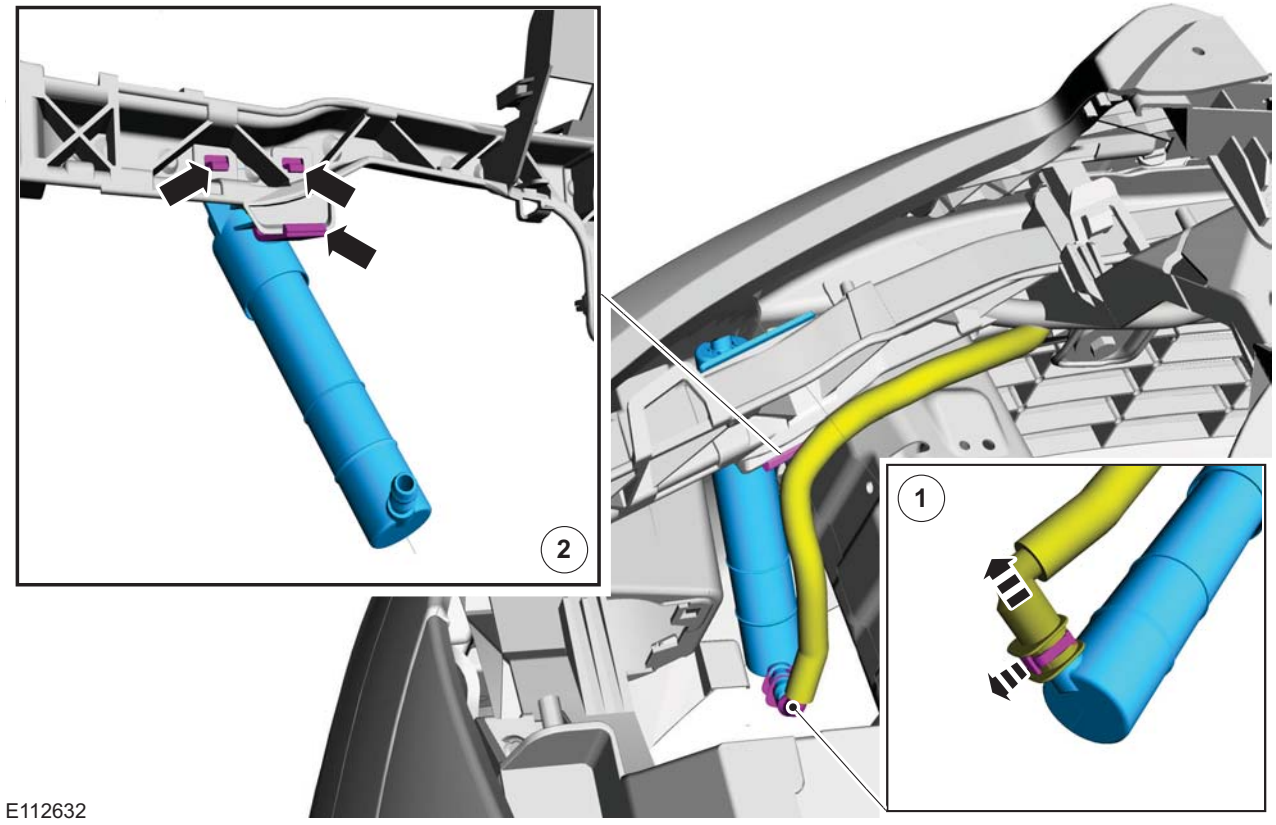
REMOVAL AND INSTALLATION



Item 3 Headlamp washer jet

1. Disconnect the high-pressure hose from the headlamp washer jet.
2. Unclip the headlamp washer jet from behind.

REMOVAL AND INSTALLATION



Installation Details

Item 1 Cover, headlamp washer system nozzle

1. **Push the headlamp washer jet cover together with the telescopic rod to the stop on the bumper cover.**

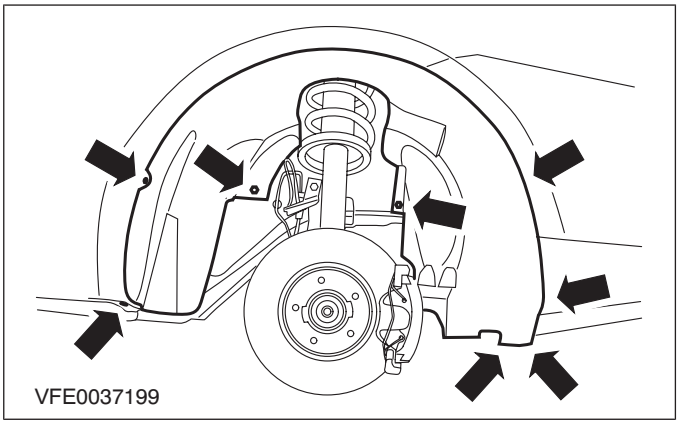
REMOVAL AND INSTALLATION

Headlamp Washer Pump

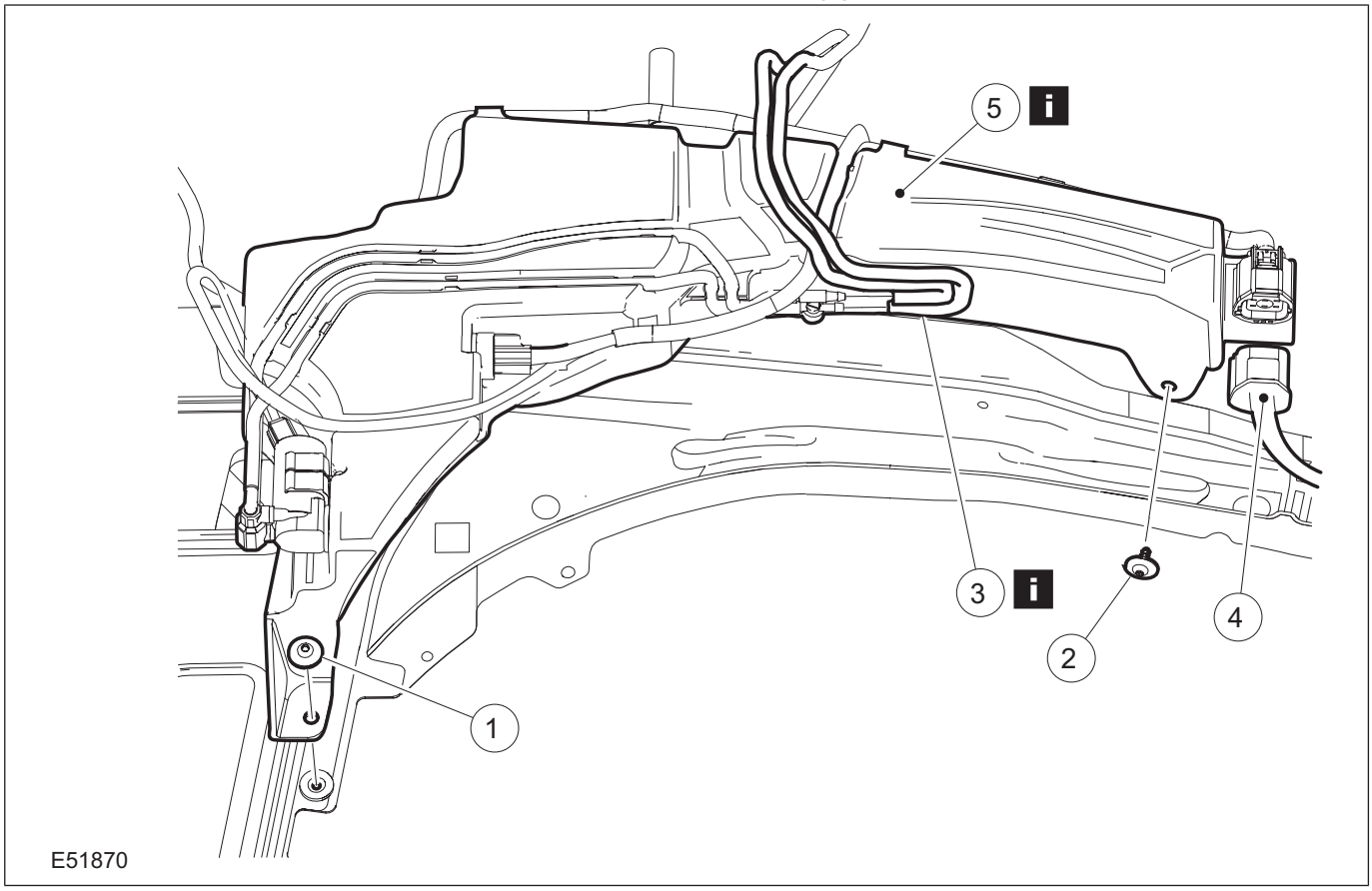
1. Empty the windshield washer reservoir.
2. Detach the right-hand front wheel.

   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3. Remove the right-hand wheel arch trim panel.



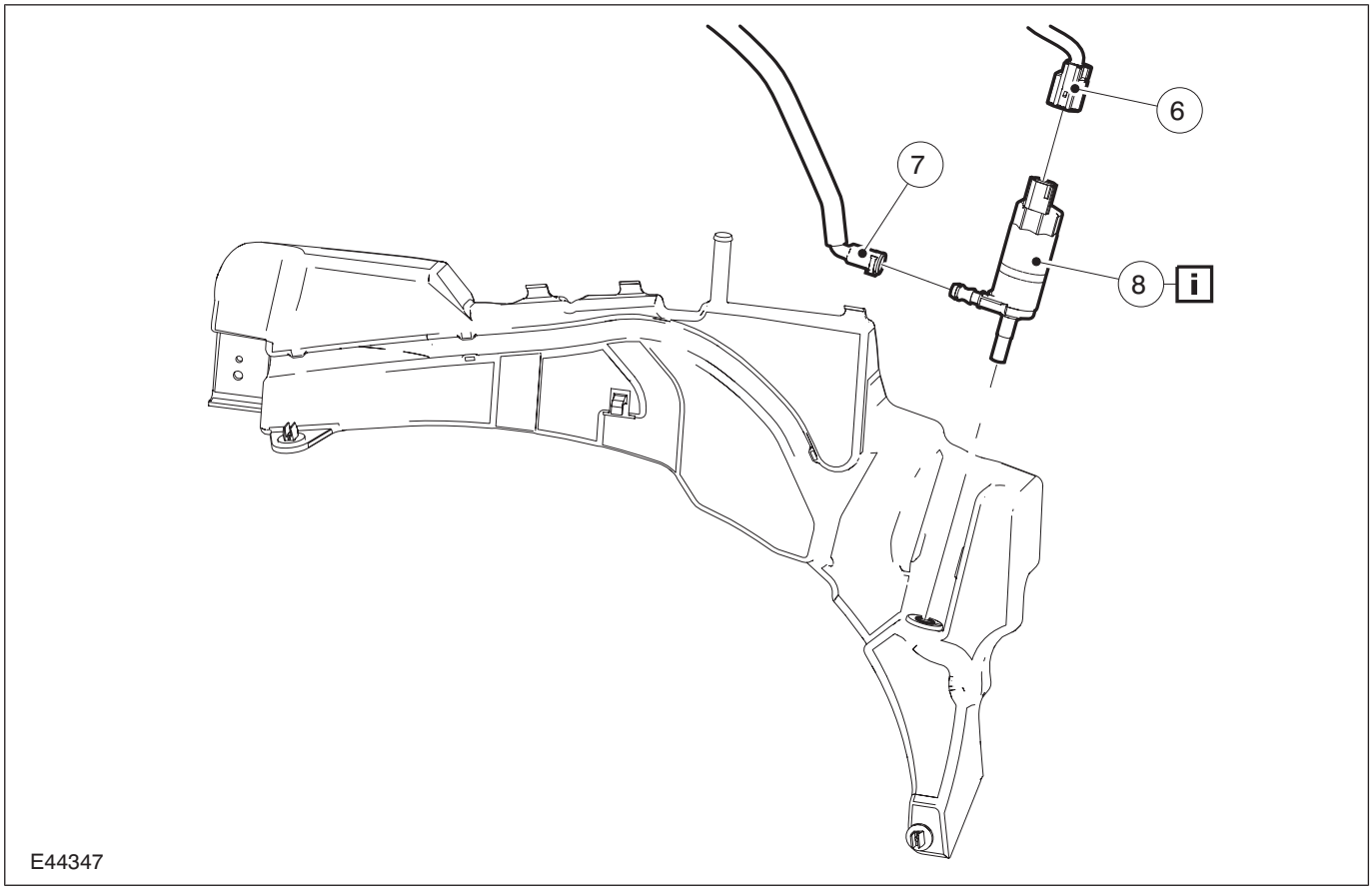
4. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Windshield washer upper reservoir lower retaining bolt
2	Windshield washer upper reservoir upper retaining bolt

Item	Description
3	Windshield washer pump hoses. See Removal Detail
4	Front windscreen washer pump connector
5	Windshield washer upper reservoir See Removal Detail

REMOVAL AND INSTALLATION



Item	Description
6	Headlamp washer pump connector
7	Headlamp washer pump hose –
8	Headlamp washer pump – See Installation Detail

5. To install, reverse the removal procedure.

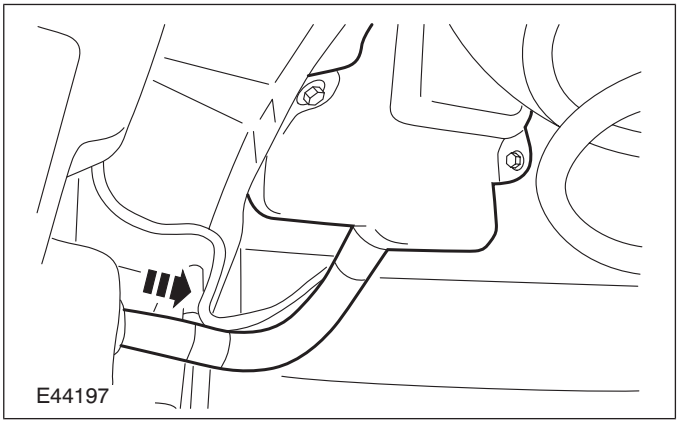
Removal Details

Item 3 Windshield washer pump hoses.

1. Unclip the reservoir hoses.

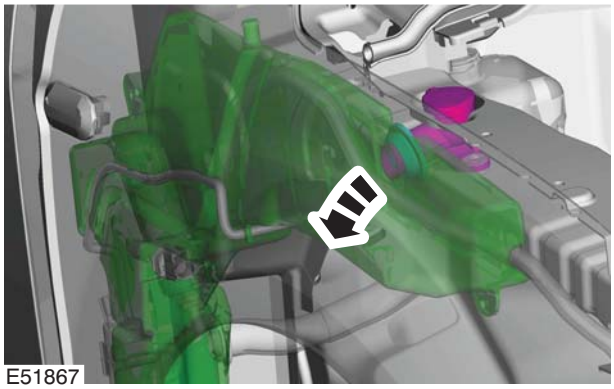
Item 5 Windshield washer upper reservoir

1. Pull the connecting piece of the lower reservoir from the upper reservoir.



REMOVAL AND INSTALLATION

2. Pull the reservoir from the filler neck.


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Installation Details

Item 8 Headlamp washer pump –

1. Coat the pump rubber seal on the headlamp washer with soap solution prior to installation.

SECTION 501-17 Roof Opening Panel

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Torque Specifications

Item	Nm	lb-ft	lb-in
Roof opening panel frame retaining screws	6	-	53
Roof opening panel frame locking clamp retaining screws	6	-	53
Roof opening panel motor retaining screws	3	-	27
Roof opening panel glass retaining screws	3	-	27

DIAGNOSIS AND TESTING

Roof Opening Panel

General Equipment

Worldwide diagnostic system (WDS)

Roof Opening Panel

Refer to Wiring Diagrams Section 501-17, for schematic and connector information.

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
• Roof opening panel • Seal(s) • Weatherstrip • Alignment	• Fuse(s) • Electrical connector(s)

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.

Symptom Chart

Symptom Chart

Symptom	Possible Sources	Action
• The roof opening panel leaks	• Drain tubes.	• CHECK the drain tubes for blockage or obstruction. CARRY OUT the Water Drainage System Check and Water Leak Corrections. REFER to: Water Drainage System Check and Water Leak Corrections (501-17 Roof Opening Panel, General Procedures).
• The roof opening panel rattles	• Headliner.	• CHECK the headliner for security. REFER to: Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
	• Guides and track.	• CHECK for worn or damaged components. CARRY OUT the Roof Opening Panel Alignment. REFER to: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures).

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• The roof opening panel is noisy during operation	• Guides and track. • Motor. • Roof Opening Panel Glass.	• CHECK for worn or damaged components. CARRY OUT the Roof Opening Panel Alignment. REFER to: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures).
• The roof opening panel does not open or close	• Switch.	• CARRY OUT the Roof Opening Panel Control Switch Component Test in this section.
	• Motor.	• CARRY OUT the Roof Opening Panel Motor Initialization. REFER to: Roof Opening Panel Motor Initialization (501-17 Roof Opening Panel, General Procedures).
	• Circuits.	• GO to Pinpoint Test A.
• The roof opening panel does not stop in flush from any position	• Guides and track.	• CHECK for worn or damaged components. CARRY OUT the Roof Opening Panel Alignment. REFER to: Roof Opening Panel Alignment (501-17 Roof Opening Panel, General Procedures).
	• Motor.	• CARRY OUT the Roof Opening Panel Motor Initialization. REFER to: Roof Opening Panel Motor Initialization (501-17 Roof Opening Panel, General Procedures).
• The roof opening panel shows unexpected bounce back at high speed	• Motor. • Circuit(s).	• GO to Pinpoint Test B.
• No communication with the global closing module	• Global closing module. • Motor. • Circuit.	• GO to Pinpoint Test C.

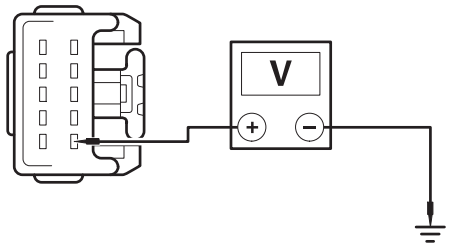
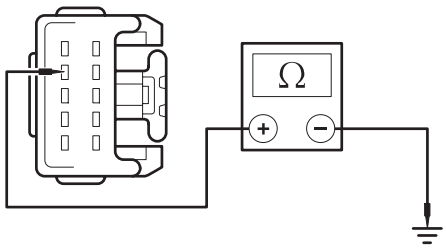
Pinpoint Tests

NOTE: Use a digital multimeter for all electrical measurements.

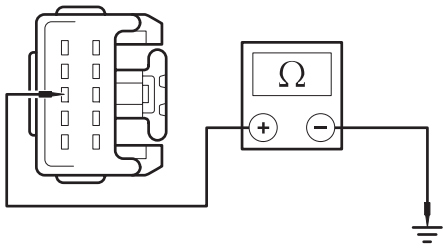
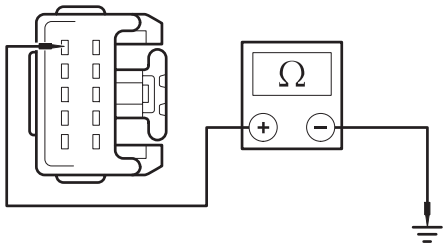
PINPOINT TEST A : THE ROOF OPENING PANEL DOES NOT OPEN OR CLOSE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: CHECK FOR VOLTAGE TO THE ROOF OPENING PANEL CONTROL SWITCH	
	1 Ignition switch in position II.

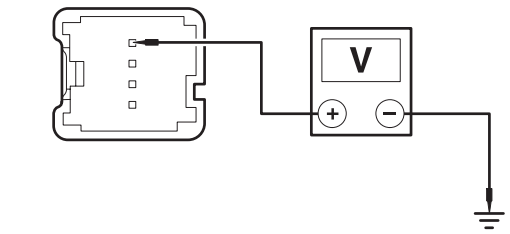
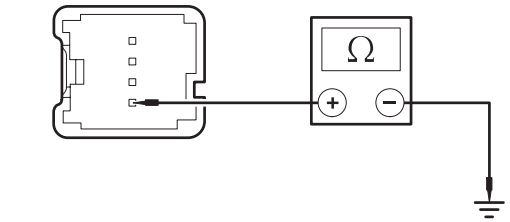
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 CHECK the operation of the roof opening panel control switch lamp. • Does the roof opening panel control switch lamp illuminate? → **Yes** GO to A2. → **No** GO to A6.
A2: CHECK THE SUPPLY VOLTAGE TO THE ROOF OPENING PANEL CONTROL UNIT, CIRCUIT 29-AG12 (OG/BK)	
	1 Ignition switch in position 0.
	2 Disconnect Fuse 40 (20A).
	3 Disconnect Roof Opening Panel Control Unit C525.
	4 Connect Fuse 40 (20A).
 TIE0020841	5 Measure the voltage between the roof opening panel control unit C525 pin 1, circuit 29-AG12 (OG/BK), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to A3. → **No** REPAIR circuit 29-AG12 (OG/BK). TEST the system for normal operation.
A3: CHECK THE ROOF OPENING PANEL CONTROL SWITCH DOWN/OPEN GROUND CIRCUIT	
	1 Operate the roof opening panel control switch to the DOWN/OPEN position and keep it pressed.
 TIE0020843	2 Measure the resistance between the roof opening panel control unit C525 pin 9, circuit 31S-AG27 (BK/WH), harness side and ground. • Is the resistance less than 100 ohms? → **Yes** GO to A4. → **No** REPAIR circuit 31S-AG27 (BK/WH). TEST the system for normal operation.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A4: CHECK THE ROOF OPENING PANEL CONTROL SWITCH UP/CLOSE GROUND CIRCUIT	
	1 Operate the roof opening panel control switch to the UP/CLOSE position and keep it pressed.
 TIE0020842	2 Measure the resistance between the roof opening panel control unit C525 pin 8, circuit 31S-AG7 (BK/BU), harness side and ground. • Is the resistance less than 100 ohms? → **Yes** GO to A5. → **No** REPAIR circuit 31S-AG7 (BK/BU). TEST the system for normal operation.
A5: CHECK THE ROOF OPENING PANEL CONTROL UNIT GROUND CIRCUIT	
 TIE0020846	1 Measure the resistance between the roof opening panel control unit C525 pin 10, circuit 31-AG12 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new roof opening panel motor. REFER to: Roof Opening Panel Motor (501-17 Roof Opening Panel, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 31-AG12 (BK). TEST the system for normal operation.
A6: CHECK THE VOLTAGE TO THE ROOF OPENING PANEL CONTROL SWITCH LAMP, CIRCUIT 15-AG7 (GN/BU)	
	1 Ignition switch in position 0.
	2 Disconnect Roof Opening Panel Control Switch C522.
	3 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0037447	4 Measure the voltage between the roof opening panel control switch C522 pin 1, circuit 15-AG7 (GN/BU), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to A7. → **No** REPAIR circuit 15-AG7 (GN/BU). TEST the system for normal operation.
A7: CHECK THE ROOF OPENING PANEL CONTROL SWITCH GROUND CIRCUIT	
	1 Ignition switch in position 0.
 TIE0037448	2 Measure the resistance between the roof opening panel control switch C522 pin 4, circuit 31-AG7 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** VERIFY the customer concern. → **No** REPAIR circuit 31-AG7 (BK). TEST the system for normal operation.

PINPOINT TEST B : THE ROOF OPENING PANEL SHOWS UNEXPECTED BOUNCE BACK AT HIGH SPEED

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK THE OPERATION OF THE MULTIFUNCTION DISPLAY	
	1 Drive the vehicle.
	2 Observe the multi-function display 'Average speed' function. • Does the display operate correctly? → **Yes** GO to B2. → **No**
B2: CHECK FOR A SHORT TO GROUND	
	1 Disconnect Roof Opening Panel Control Unit C525.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect Central Junction Box C98.
	3 Measure the resistance between the roof opening panel control unit C525 pin 6, circuit 8-GB8 (WH/BU), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** GO to B3. → **No** REPAIR circuit 8-GB8 (WH/BU). TEST the system for normal operation.
B3: CHECK FOR CONTINUITY BETWEEN THE CENTRAL JUNCTION BOX (CJB) AND THE ROOF OPENING PANEL CONTROL UNIT	
	1 Ignition switch in position 0.
	2 Measure the resistance between the central junction box C98 pin 8, circuit 8-GB8 (WH/BU), harness side and the roof opening panel control unit C525 pin 6, circuit 8-GB8 (WH/BU), harness side. • Is the resistance less than 5 ohms? → **Yes** Install a new roof opening panel motor. REFER to: Roof Opening Panel Motor (501-17 Roof Opening Panel, Removal and Installation). TEST the system for normal operation. → **No** REPAIR circuit 8-GB8 (WH/BU). TEST the system for normal operation.

PINPOINT TEST C : NO COMMUNICATION WITH THE GLOBAL CLOSING MODULE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: CHECK OPERATION OF THE GLOBAL CLOSING	
	1 Operate the global closing function. • Do the door windows close? → **Yes** GO to C2. → **No** Refer to WDS.
C2: CHECK FOR A SHORT TO GROUND	
	1 Disconnect Roof Opening Panel Control Unit C525.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect Central Junction Box C98.
	3 Measure the resistance between the roof opening panel control unit C525 pin 2, circuit 8-AG12 (WH/GN), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** GO to C3. → **No** REPAIR circuit 8-AG12 (WH/GN). TEST the system for normal operation.
C3: CHECK FOR CONTINUITY BETWEEN THE CENTRAL JUNCTION BOX (CJB) AND THE ROOF OPENING PANEL CONTROL UNIT	
	1 Measure the resistance between the central junction box C98 pin 2, circuit 8-AG12 (WH/GN), harness side and the roof opening panel control unit C525 pin 2, circuit 8-AG12 (WH/GN), harness side. • Is the resistance less than 5 ohms? → **Yes** Install a new roof opening panel motor. REFER to: Roof Opening Panel Motor (501-17 Roof Opening Panel, Removal and Installation). → **No** REPAIR circuit 8-AG12 (WH/GN). TEST the system for normal operation.

Components Tests

Roof Opening Panel Control Switch

1. Measure the resistance between the following:

Roof Opening Panel Control Switch Position	Roof Opening Panel Control Switch Terminals		Measurements
	Multimeter Positive Lead	Multimeter Negative Lead	
Neutral	1	2	Greater than 10,000 ohms
Neutral	1	3	Greater than 10,000 ohms
Neutral	1	4	Less than 100 ohms
Neutral	4	1	Greater than 10,000 ohms
First detente Up/Close	2	4	Less than 5 ohms

DIAGNOSIS AND TESTING

Roof Opening Panel Control Switch Position	Roof Opening Panel Control Switch Terminals		Measurements
	Multimeter Positive Lead	Multimeter Negative Lead	
Fully Up/Close	2	4	Less than 5 ohms
First detente Down/Open	2	4	Greater than 10,000 ohms
Fully Down/Open	2	4	Less than 5 ohms
First detente Down/Open	3	4	Less than 5 ohms
Fully Down/Open	3	4	Less than 5 ohms
First detente Up/Close	3	4	Greater than 10,000 ohms
Fully Up/Close	3	4	Less than 5 ohms

2. If all measurements of the roof opening panel control switch are as noted, return to the Pinpoint Test. Otherwise install a new roof opening panel control switch.

GENERAL PROCEDURES

Water Drainage System Check and Water Leak Corrections(41 002 0)

1. If a drain hose blockage or obstruction is suspected, check the drain hoses by pouring 500 ml of water into the drain trough and checking the flow from under the vehicle rocker panels. Attempt to clear any blockage or obstruction using a drain clearing wire (nylon). If the blockage or obstruction cannot be cleared the drain hose must be removed.

   For additional information, refer to Roof Opening Panel Front Drain Hose - / Roof Opening Panel Rear Drain Hose - in this section.

2. If a drain hose leak is suspected the drain hose must be removed and inspected for cracks or splits.

   For additional information, refer to Roof Opening Panel Front Drain Hose - / Roof Opening Panel Rear Drain Hose - in this section.

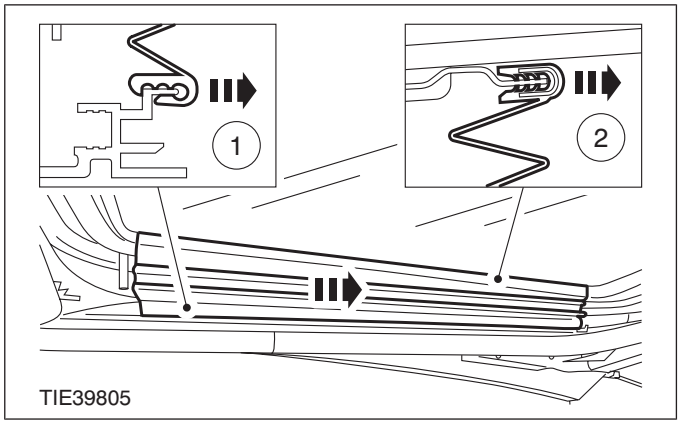
GENERAL PROCEDURES

Roof Opening Panel Alignment(41 113 0)

1. **NOTE: The roof opening panel must be in the closed position for alignment.**

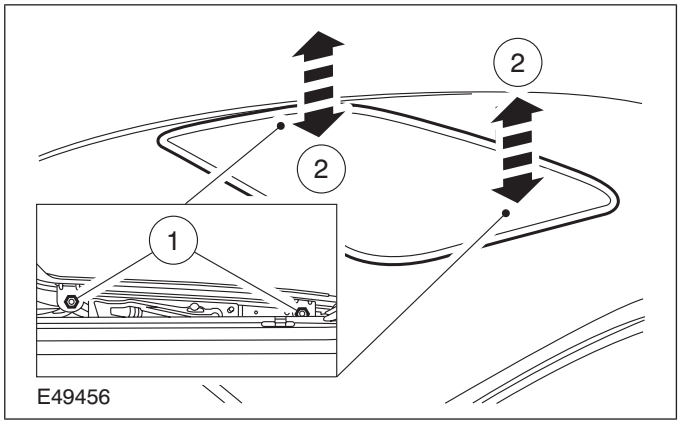
   Starting at the rear of the roof opening panel, remove the roof opening panel guide arm covers (left-hand side shown).

   1. Release the lower clip.
   2. Release the upper clip.



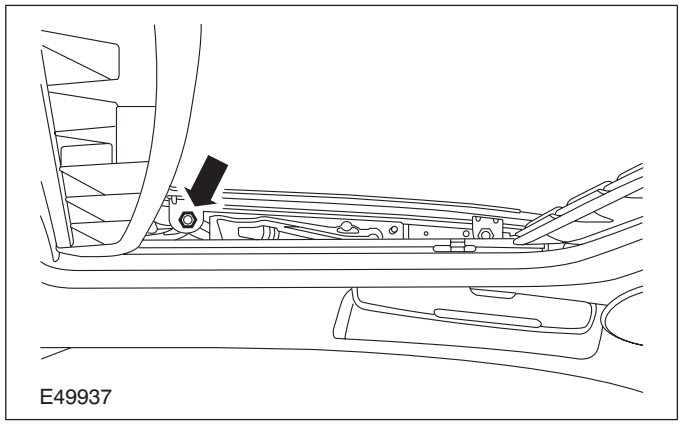
2. **Adjust the rear edge of the roof opening panel glass.**

   1. Loosen the retaining screws on both sides (left-hand side shown).
   2. Push the rear edge up or down to give the correct alignment (flush to + 1 mm).



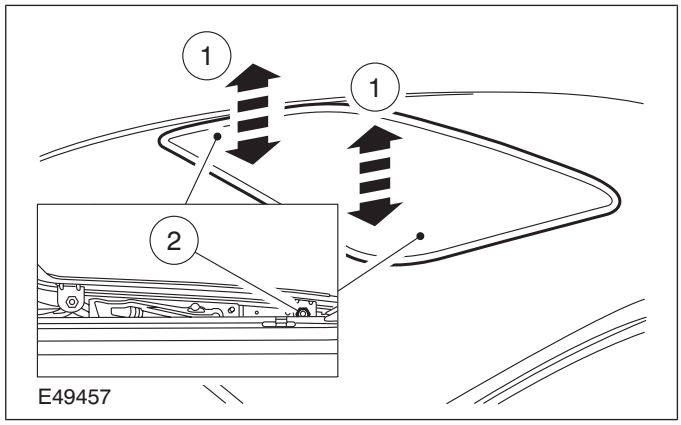
3. **Make sure that the roof opening panel glass is located centrally in the roof panel opening.**

4. **Tighten the roof opening panel glass rear retaining screws (left-hand side shown).**



5. **Adjust the front edge of the roof opening panel glass.**

   1. Push the front edge up or down to give the correct alignment (flush to -1 mm).
   2. Tighten the front retaining screws (left-hand side shown).



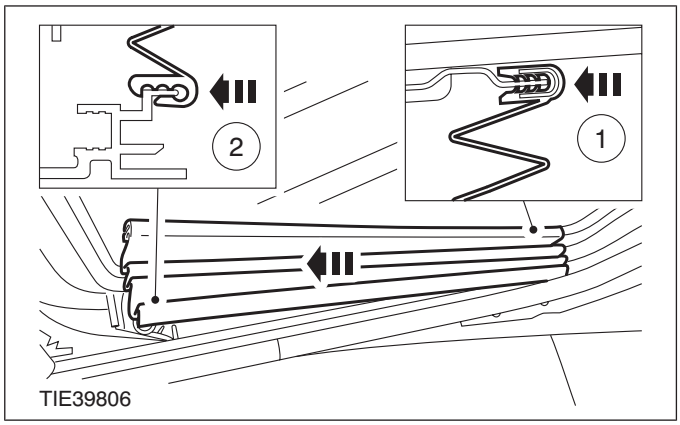
6. **NOTE: An audible click can be heard when the lower edge of the guide arm cover is correctly located.**

   Starting at the front of the roof opening panel, install the roof opening panel guide arm covers (left-hand side shown).

   1. Install the upper clip.

GENERAL PROCEDURES

2. Install the lower clip.



7. Operate the roof opening panel and check the alignment.

GENERAL PROCEDURES

Roof Opening Panel Motor Initialization

Updating Roof Opening Panel Motor Initialization

WARNING: The roof opening panel anti-trap function will not operate during the updating roof opening panel motor initialization procedure. Make sure that the roof opening panel opening is free of all foreign material. Failure to follow this instruction may result in personal injury.

NOTE: This procedure should only be carried out when the roof opening panel motor has not been disconnected.

NOTE: The roof opening panel alignment must be carried out prior to carrying out roof opening panel motor initialization.

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

1. **Operate the roof opening panel control switch to the up/close position until the roof opening panel is in the fully vent position.**
2. **Release the roof opening panel control switch.**
3. **Operate the roof opening panel control switch to the up/close position and hold for 30 seconds until there is a small movement (approximately 2 mm) and the roof opening panel motor stops.**
4. **Release the roof opening panel control switch.**
5. **NOTE: In one complete cycle the roof opening panel will close, fully open and return to the fully closed position.**

   Operate the roof opening panel control switch to the up/close position again within 3 seconds until the roof opening panel stops (one complete cycle).

Initial Roof Opening Panel Motor Initialization

WARNING: The roof opening panel anti-trap function will not operate during the updating roof opening panel motor initialization procedure. Make sure that the roof opening panel opening is free of all foreign material. Failure to follow this instruction may result in personal injury.

NOTE: This procedure must be carried out when installing any roof opening panel motor or roof opening panel.

NOTE: The roof opening panel alignment must be carried out prior to carrying out roof opening panel motor initialization.

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

1. **Operate the roof opening panel control switch to the up/close position.**
2. **Release the roof opening panel control switch.**
3. **NOTE: In one complete cycle the roof opening panel will close, fully open and return to the fully closed position.**

   Operate the roof opening panel control switch to the up/close position again within 3 seconds until the roof opening panel stops (one complete cycle).

Erasing Roof Opening Panel Motor Initialization

NOTE: The erasing procedure is to be carried out only when the roof opening panel motor has been detached from the roof opening panel.

NOTE: This procedure must be carried out before installing a previously used roof opening panel motor.

1. **Operate the roof opening panel control switch to the up/close position until the roof opening panel motor stops.**
2. **Release the roof opening panel control switch.**
3. **Operate the roof opening panel control switch again to the up/close position and hold for 30 seconds. With the roof opening panel control switch held, the roof opening panel motor will rotate in one direction.**
4. **Release the roof opening panel control switch.**
5. **Operate the roof opening panel control switch to the down/open position. If the roof opening panel motor does not rotate, the erasing procedure has been carried out successfully.**

GENERAL PROCEDURES

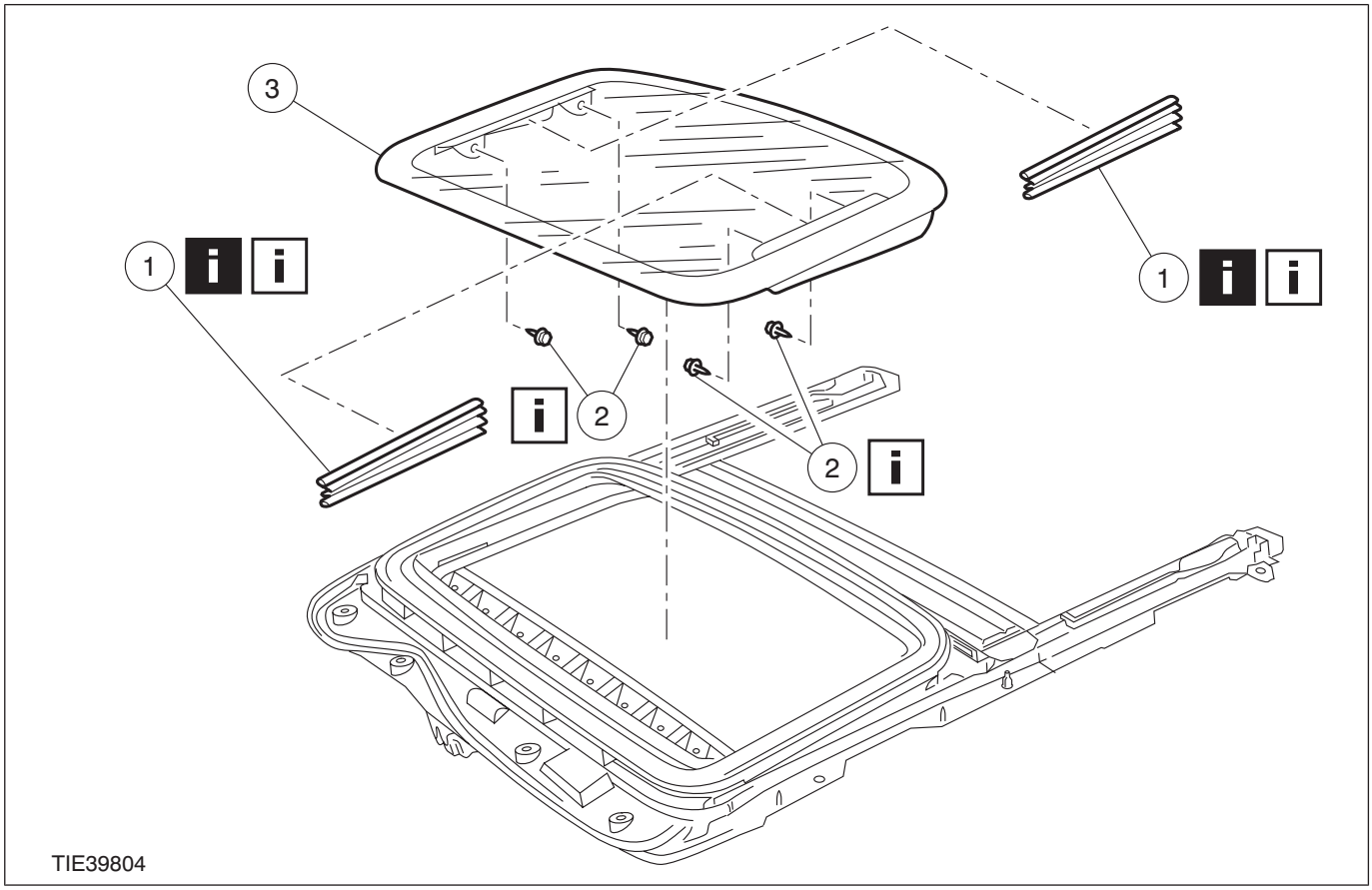
6. If the roof opening panel motor rotates (with the roof opening panel control switch in the down/open position), repeat the procedure.

REMOVAL AND INSTALLATION

Roof Opening Panel Glass

1. **Move the roof opening panel shield rearwards.**

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Roof opening panel guide arm covers See Removal Detail See Installation Detail
2	Roof opening panel glass retaining screws See Installation Detail
3	Roof opening panel glass

3. **To install, reverse the removal procedure.**

Removal Details

Item 1 Roof opening panel guide arm covers

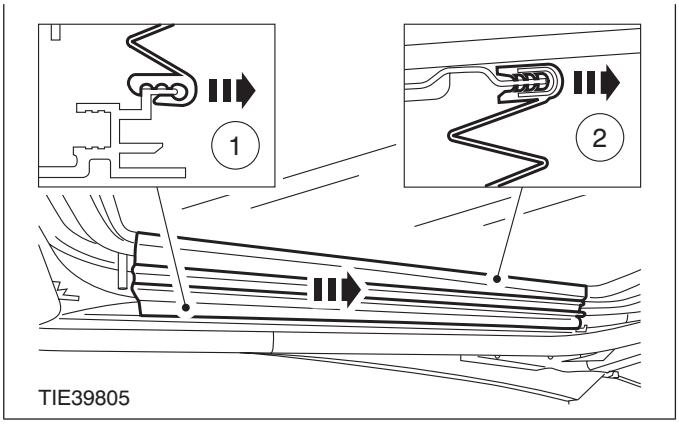
1. **NOTE: Make sure the roof opening panel is in the closed position.**

   Starting at the rear of the roof opening panel, remove the roof opening panel guide arm covers (left-hand side shown).

   1. Release the lower clip.

REMOVAL AND INSTALLATION

2. Release the upper clip.

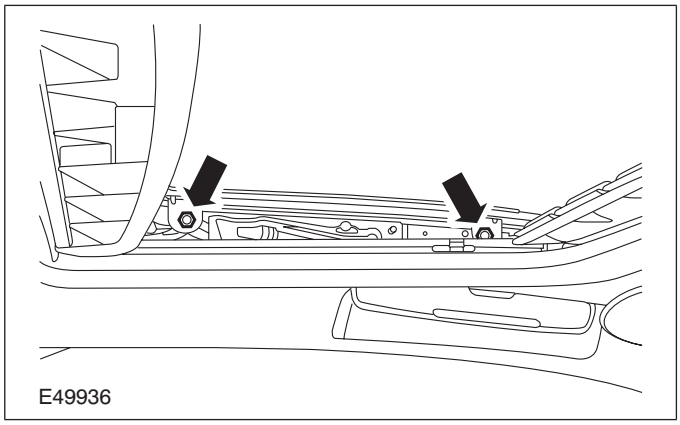


Installation Details

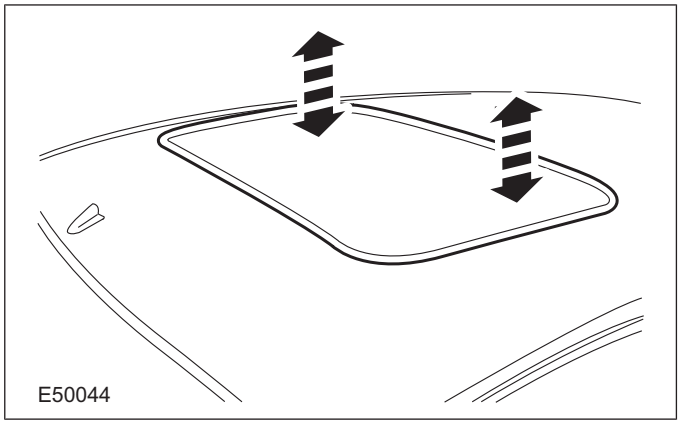
Item 2 Roof opening panel glass retaining screws

1. **NOTE: Do not fully tighten the retaining screws at this stage.**

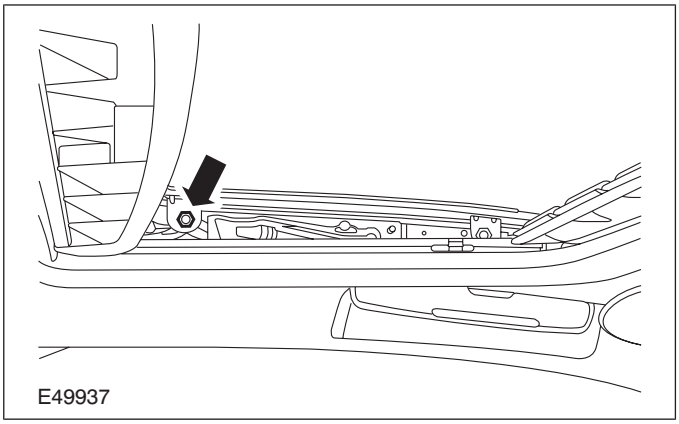
   Install the roof opening panel glass retaining screws on both sides (left-hand side shown).



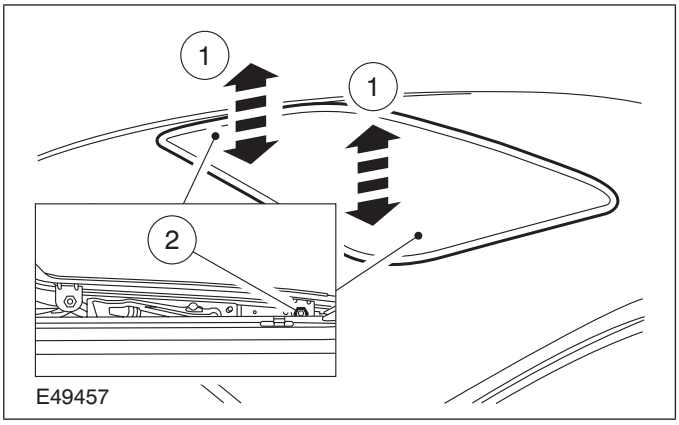
2. **Adjust the rear edge of the roof opening panel glass.**
   - Push the rear edge up or down to give the correct alignment (flush to + 1 mm).



3. **Make sure that the roof opening panel glass is located centrally in the roof panel opening.**
4. **Tighten the roof opening panel glass rear retaining screws (left-hand side shown).**



5. **Adjust the front edge of the roof opening panel glass.**
   1. Push the front edge up or down to give the correct alignment (flush to -1 mm).
   2. Tighten the front retaining screws (left-hand side shown).



REMOVAL AND INSTALLATION

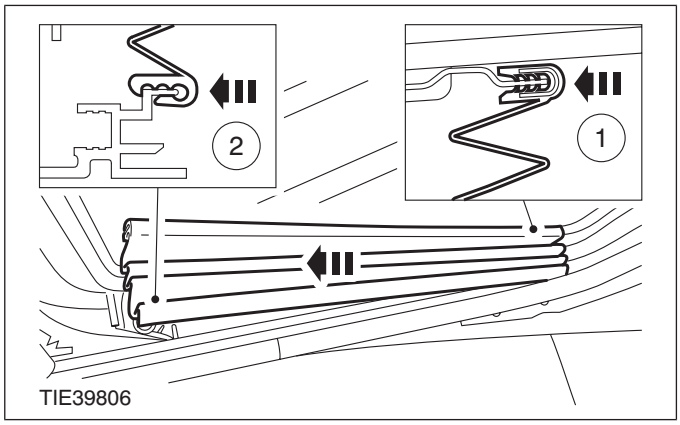
6. **Operate the roof opening panel and check the alignment.**

Item 1 Roof opening panel guide arm covers

1. **NOTE: An audible click can be heard when the lower edge of the guide arm cover is correctly located.**

   Starting at the front of the roof opening panel, install the roof opening panel guide arm covers (left-hand side shown).

   1. Install the upper clip.
   2. Install the lower clip.



REMOVAL AND INSTALLATION

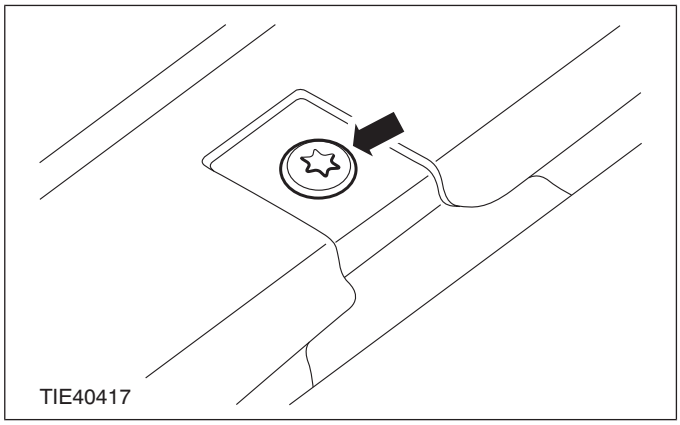
Roof Opening Panel Shield(41 123 0)

Removal

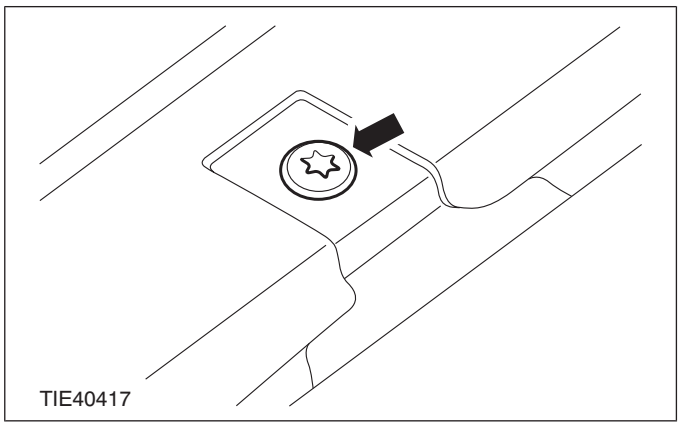
1. **Remove the roof opening panel glass.**

   For additional information, refer to: Roof Opening Panel Glass (501-17 Roof Opening Panel, Removal and Installation).

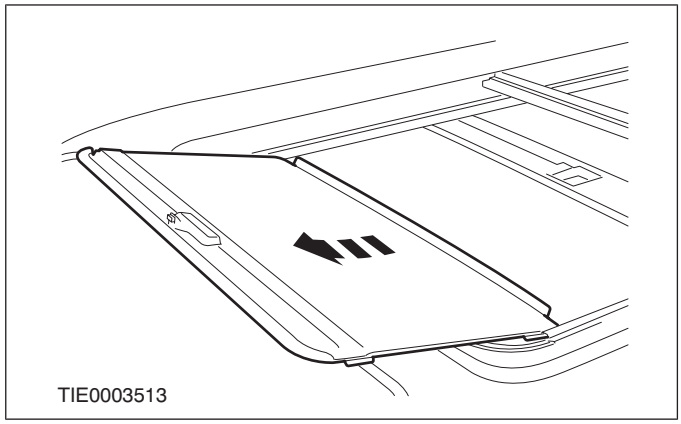
2. **Close the roof opening panel shield.**
3. **Remove the roof opening panel shield front retaining screws on both sides.**



4. **Move the roof opening panel shield forwards to gain access to the roof opening panel shield rear retaining screws.**
5. **Remove the roof opening panel shield rear retaining screws on both sides.**



6. **Remove the roof opening panel shield.**



Installation

1. **To install, reverse the removal procedure.**

REMOVAL AND INSTALLATION

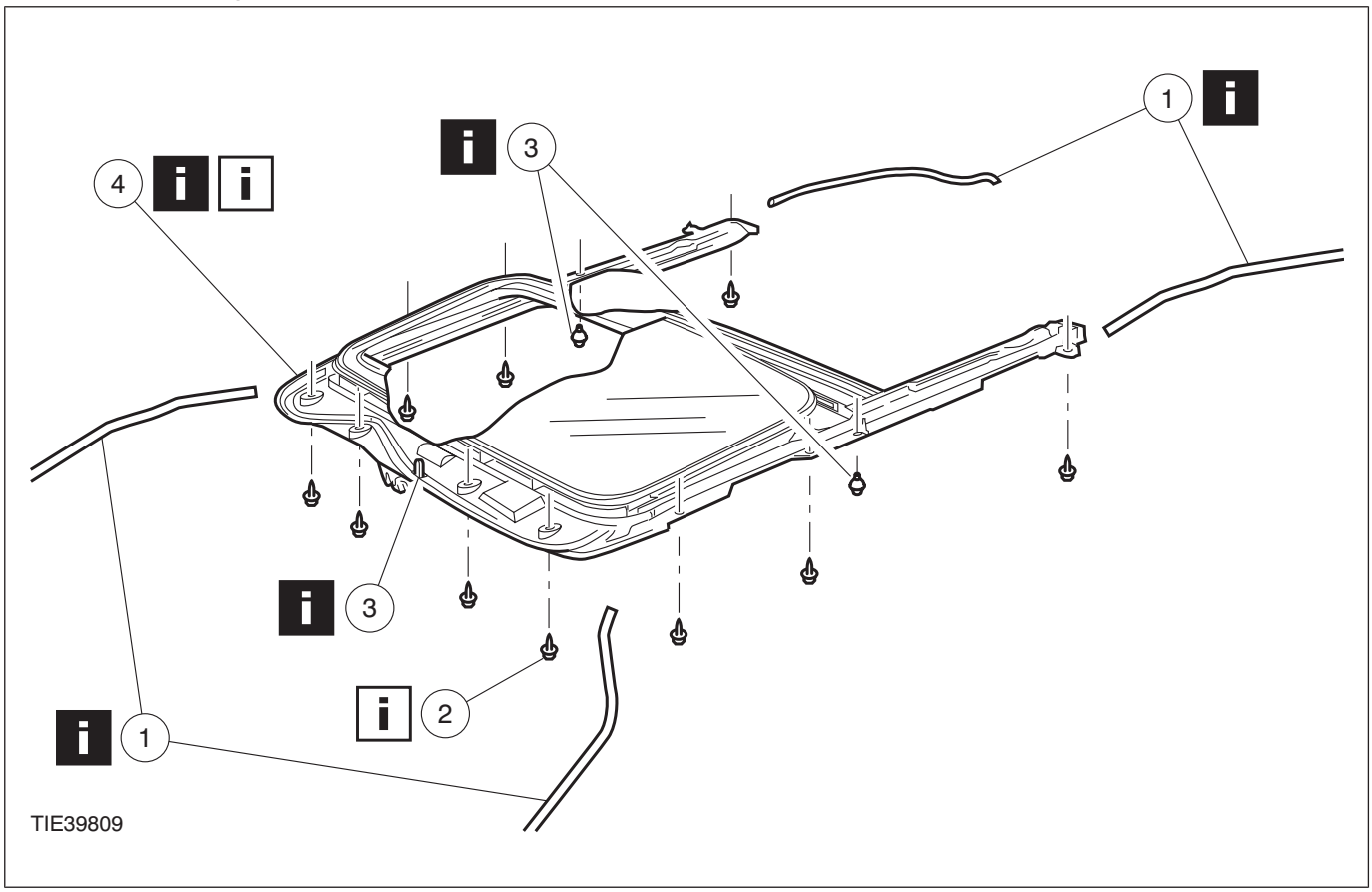
Roof Opening Panel

NOTE: Make sure the roof opening panel is in the closed position.

1. **Remove the headliner. For additional information, refer to: (501-05 Interior Trim and Ornamentation)**

   Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (Removal and Installation),

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Roof opening panel drain hoses See Removal Detail
2	Roof opening panel retaining bolts See Installation Detail

Item	Description
3	Roof opening panel retaining clips See Removal Detail
4	Roof opening panel See Removal Detail See Installation Detail

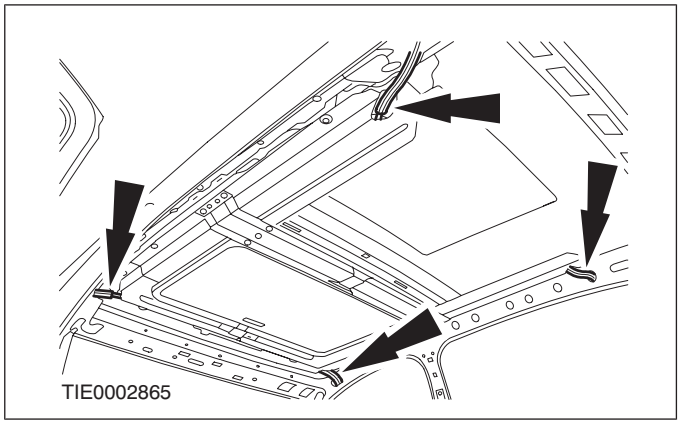
3. **To install, reverse the removal procedure.**

Removal Details

REMOVAL AND INSTALLATION

Item 1 Roof opening panel drain hoses

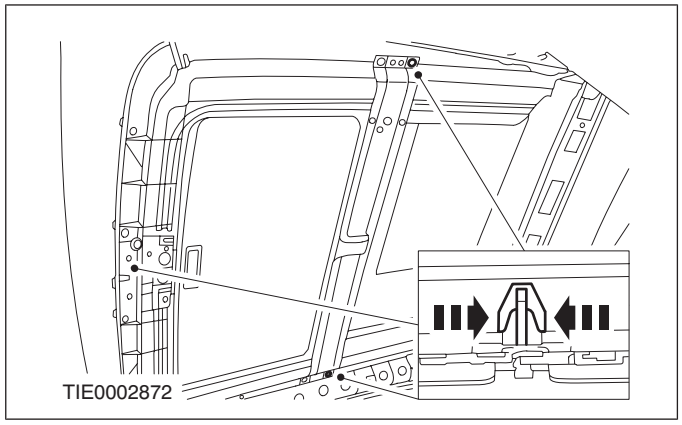
1. Detach the roof opening panel drain hoses from the roof opening panel.



Item 3 Roof opening panel retaining clips

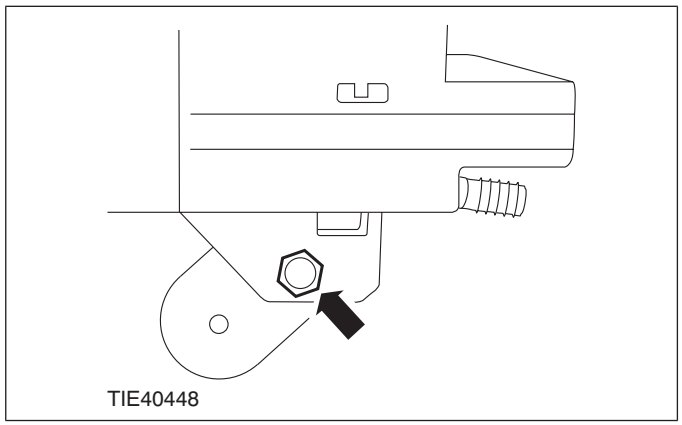
1. ⚠CAUTION: The roof opening panel front retaining clip is fixed to the roof opening panel frame and is not a service item.

With the aid of another technician, compress the legs of the roof opening panel retaining clips and lower the roof opening panel.



Item 4 Roof opening panel

1. Loosen the roof opening panel locking clamp retaining bolt by two turns on both sides.

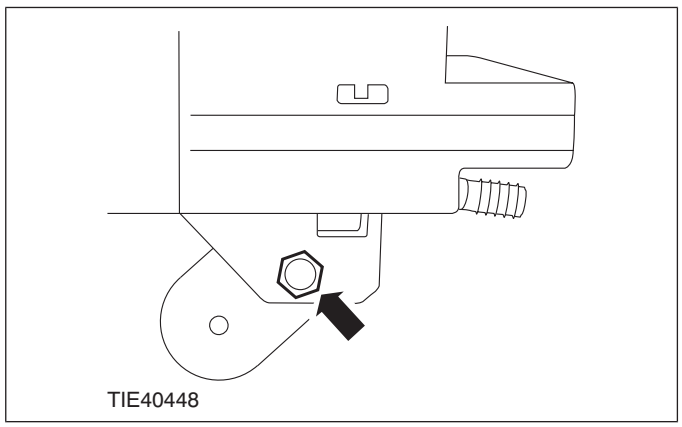


Installation Details

Item 4 Roof opening panel

1. NOTE: This step should only be carried out if installing a new roof opening panel.

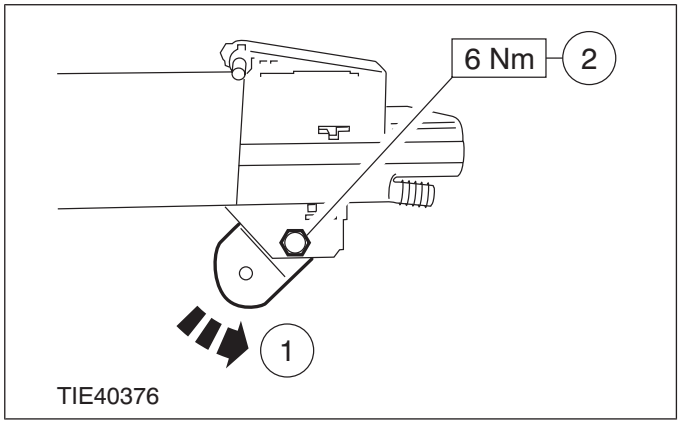
Loosen the roof opening panel locking clamp retaining bolt by two turns on both sides.



2. Tighten the roof opening panel locking clamp retaining bolt on both sides.

REMOVAL AND INSTALLATION

1. Position the roof opening panel locking clamp.
2. Tighten the roof opening panel locking clamp retaining bolt.



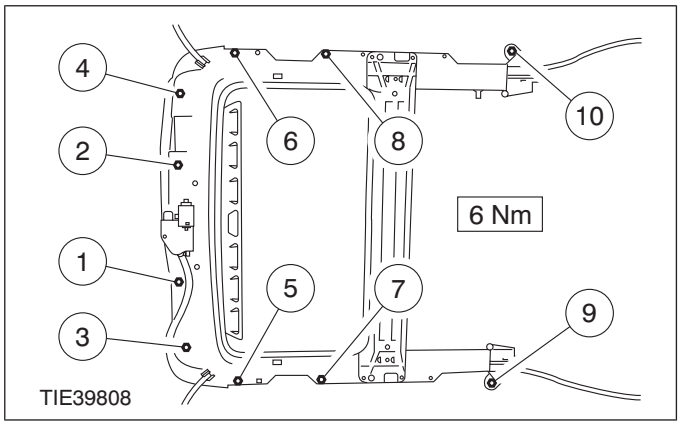
Item 2 Roof opening panel retaining bolts

1. **NOTE: Do not fully tighten the roof opening panel retaining bolts at this stage.**

NOTE: The roof opening panel must be correctly located on the retaining clips before tightening the roof opening panel retaining bolts.

With the aid of another technician, install the roof opening panel.

2. **Tighten the roof opening panel retaining bolts in the sequence shown.**



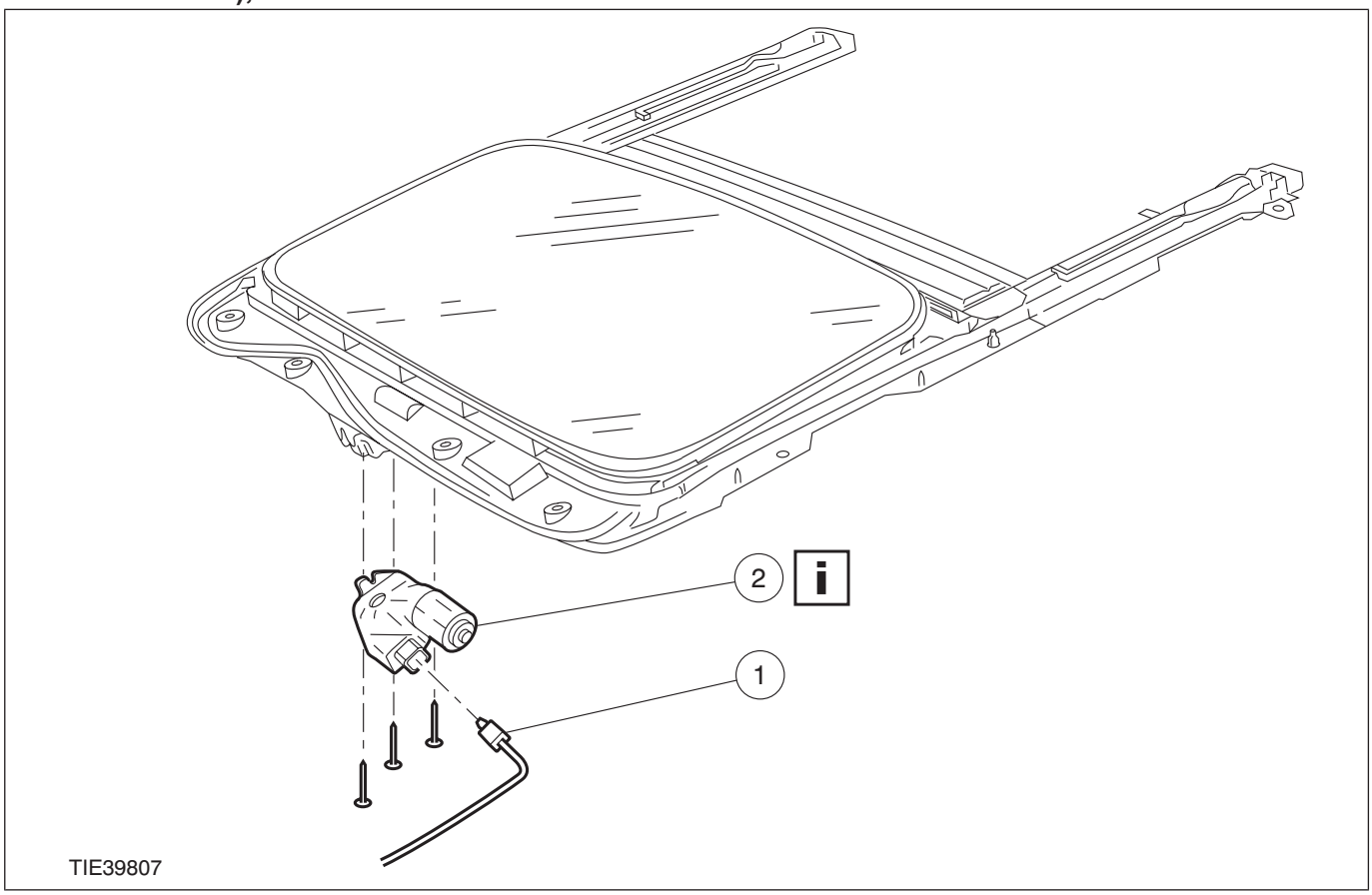
REMOVAL AND INSTALLATION

Roof Opening Panel Motor

1. Remove the headliner. For additional information, refer to: (501-05 Interior Trim and Ornamentation)

   Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (Removal and Installation),

2. Remove the components in the order indicated in the following illustration(s) and table(s).



Item	Description
1	Roof opening panel motor electrical connector
2	Roof opening panel motor See Installation Detail

3. To install, reverse the removal procedure.
4. Carry out the initial roof opening panel motor initialization procedure.

   For additional information, refer to: Roof Opening Panel Motor Initialization (501-17 Roof Opening Panel, General Procedures).

Installation Details

Item 2 Roof opening panel motor

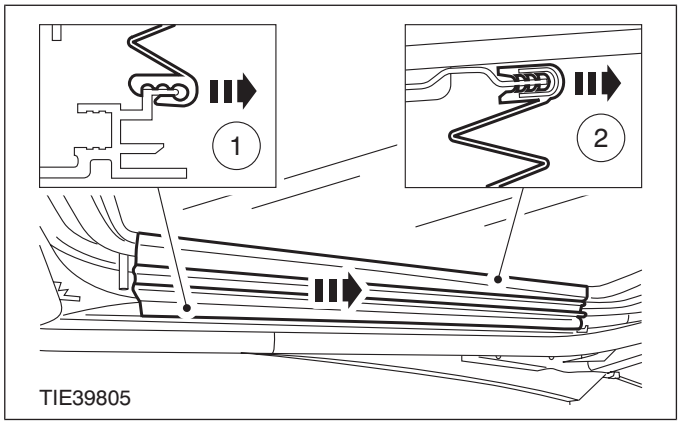
CAUTION: The roof opening panel motor must not be installed at this stage.

1. Starting at the rear of the roof opening panel, remove the roof opening panel guide arm covers (left-hand side shown).

1. Release the roof opening panel guide arm cover lower clip.

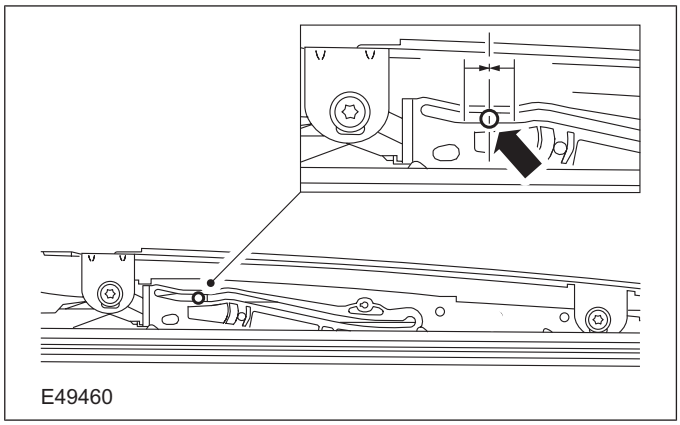
REMOVAL AND INSTALLATION

2. Release the roof opening panel guide arm cover upper clip.

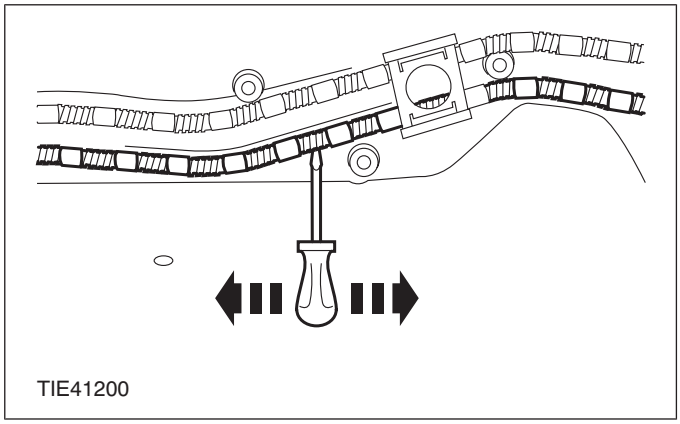


2. **CAUTION: The roof opening panel guide pins must be aligned centrally in the flat area of the roof opening panel guide arm as shown.**

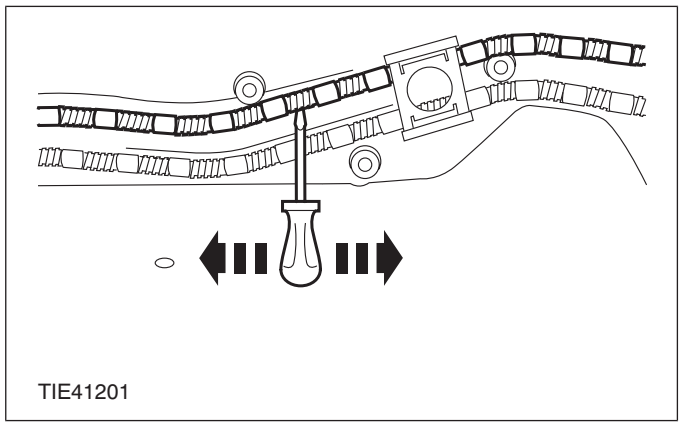
   Check the alignment of the left-hand and right-hand roof opening panel guide pins (left-hand side shown).



3. **Adjust the left-hand roof opening panel guide pin if necessary.**
   - Using a suitable screwdriver, move the roof opening panel operating cable in the required direction.

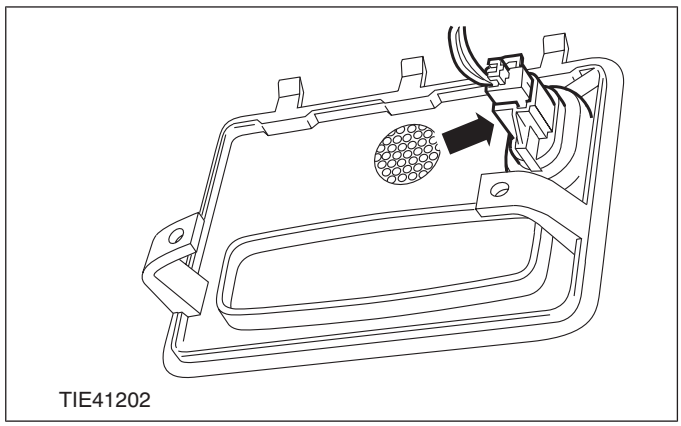


4. **Adjust the right-hand roof opening panel guide pin if necessary.**
   - Using a suitable screwdriver, move the roof opening panel operating cable in the required direction.



5. **NOTE: This step is not necessary when installing a new roof opening panel motor.**

   With the aid of another technician, support the overhead console and connect the roof opening panel control switch electrical connector.



6. **NOTE: This step is not necessary when installing a new roof opening panel motor.**

   Connect the battery ground cable.

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

7. **CAUTION: This step must be carried out if installing a previously used roof opening panel motor.**

NOTE: This step is not necessary when installing a new roof opening panel motor.

REMOVAL AND INSTALLATION

Carry out the erasing roof opening panel motor initialization procedure.

For additional information, refer to: Roof Opening Panel Motor Initialization (501-17 Roof Opening Panel, General Procedures).

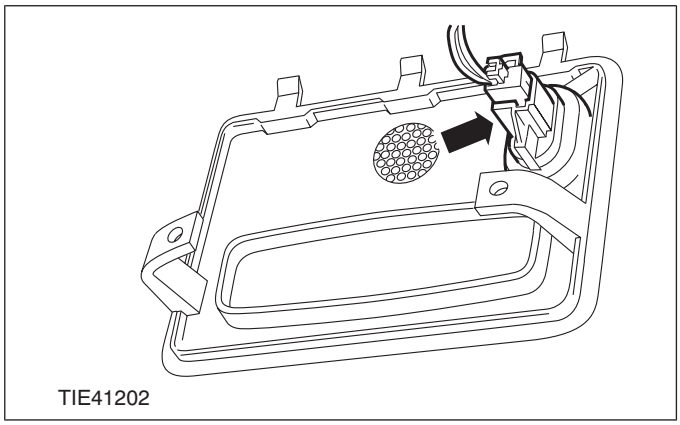
8. **NOTE: This step is not necessary when installing a new roof opening panel motor.**

   Disconnect the battery ground cable.

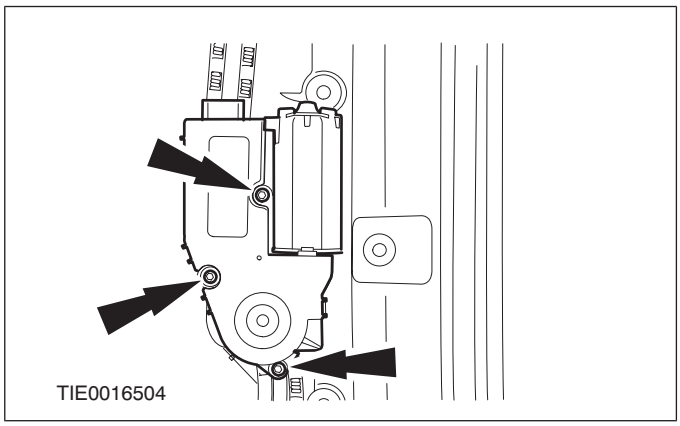
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

9. **NOTE: This step is not necessary when installing a new roof opening panel motor.**

   Disconnect the roof opening panel control switch electrical connector.


TIE41202

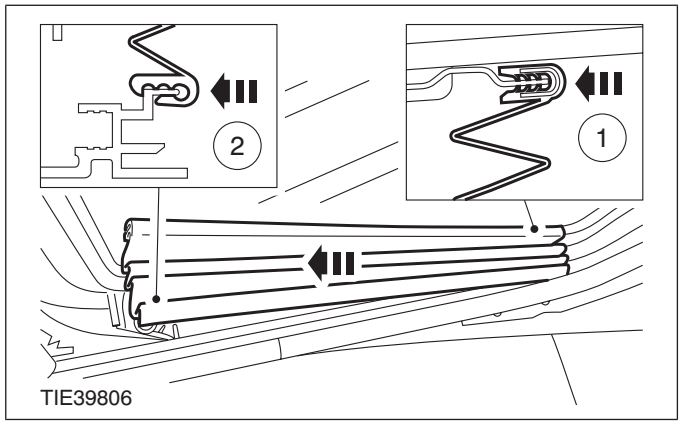
10. **Install the roof opening panel motor.**


TIE0016504

11. **NOTE: An audible click can be heard when the lower edge of the roof opening panel guide arm cover is correctly located.**

    Starting at the front of the roof opening panel, install the roof opening panel guide arm covers (left-hand side shown).

    1. Install the roof opening panel guide arm cover upper clip.
    2. Install the roof opening panel guide arm cover lower clip.



TIE39806

REMOVAL AND INSTALLATION

Roof Opening Panel Rear Drain Hose — 3-Door/5-Door

Removal

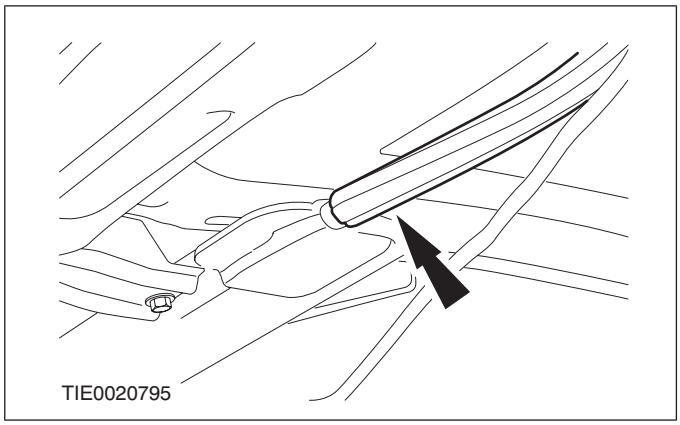
1. **Remove the headliner.**

   For additional information, refer to: Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation)

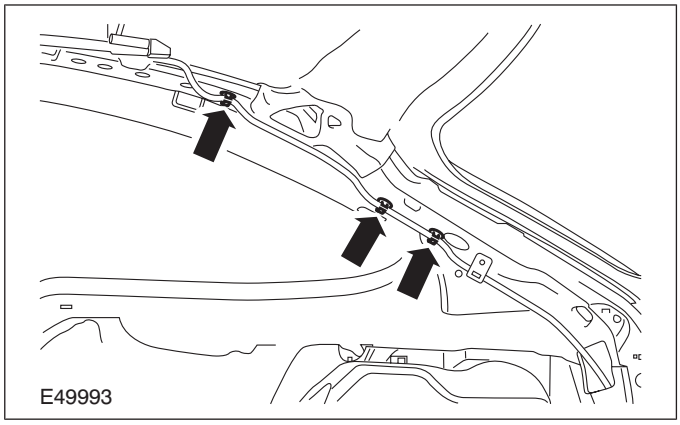
2. **Remove the load space trim panel.**

   For additional information, refer to: Loadspace Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation)

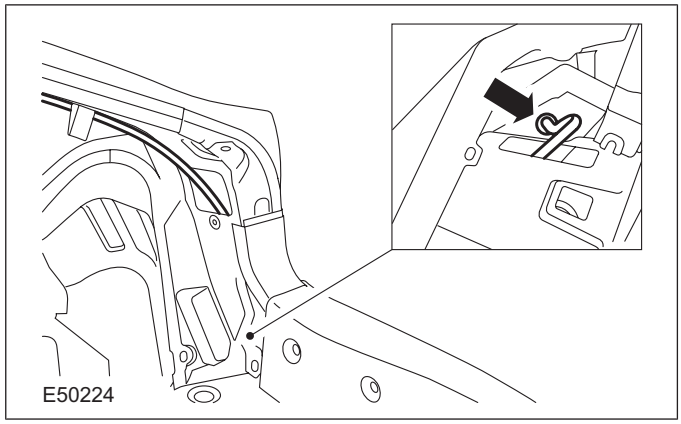
3. **Detach the roof opening panel rear drain hose from the roof opening panel.**



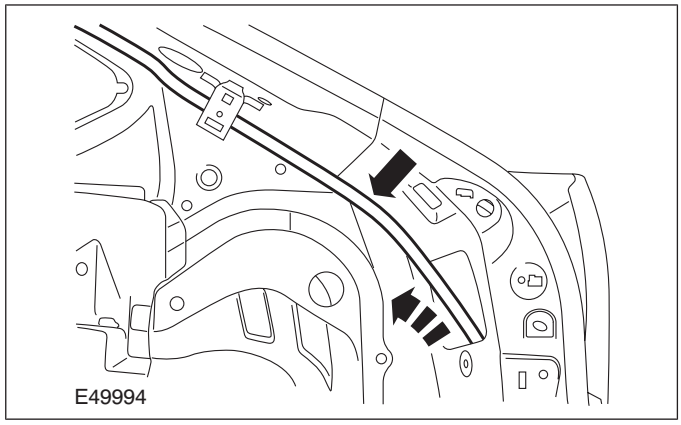
4. **Detach the roof opening panel rear drain hose from the retaining clips (3 door shown).**



5. **Detach the roof opening panel rear drain hose from the drain bung.**



6. **Remove the roof opening panel rear drain hose.**



Installation

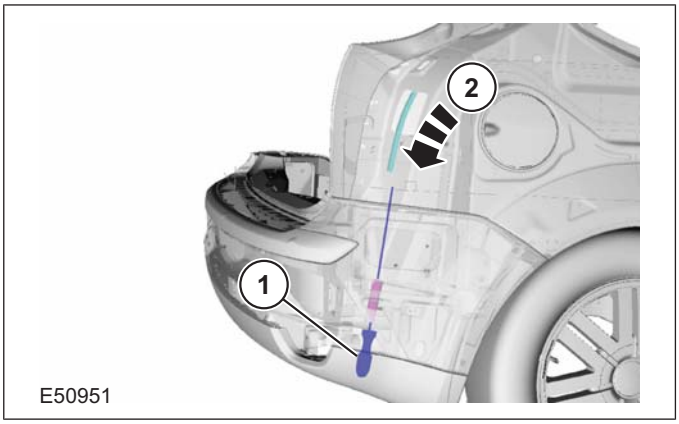
1. **NOTE: Make sure that the drain bung is free of foreign material before installing the roof opening panel rear drain hose.**

   Attach the roof opening panel rear drain hose to the drain bung.

   1. With the aid of another technician, position a suitable long bladed screwdriver in the drain bung from the underside of the vehicle.
   2. Push the drain hose over the screwdriver to position it in the drain bung.

REMOVAL AND INSTALLATION

- Remove the screwdriver.



2. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

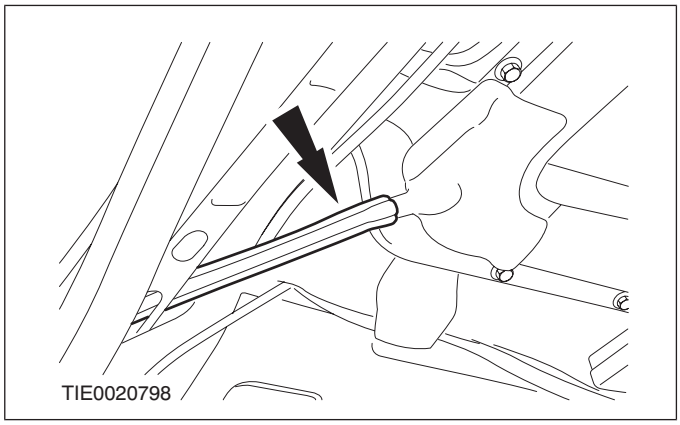
Driver Side Roof Opening Panel Front Drain Hose

Removal

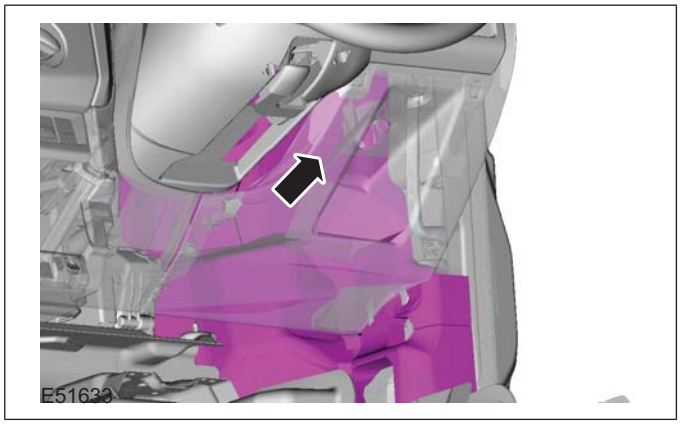
1. **Remove the headliner.**

   For additional information, refer to: Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation)

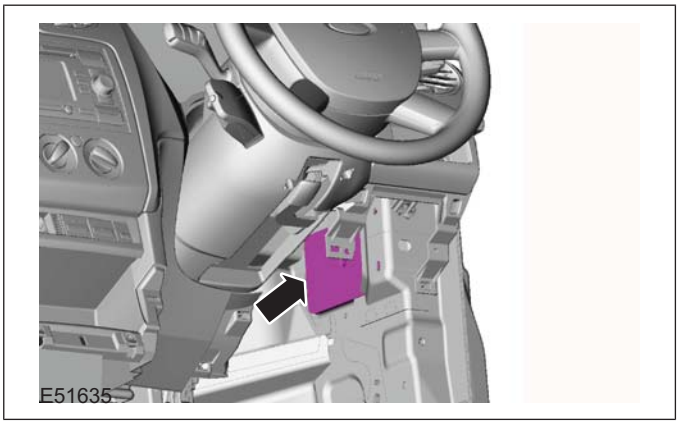
2. **Detach the roof opening panel front drain hose from the roof opening panel.**



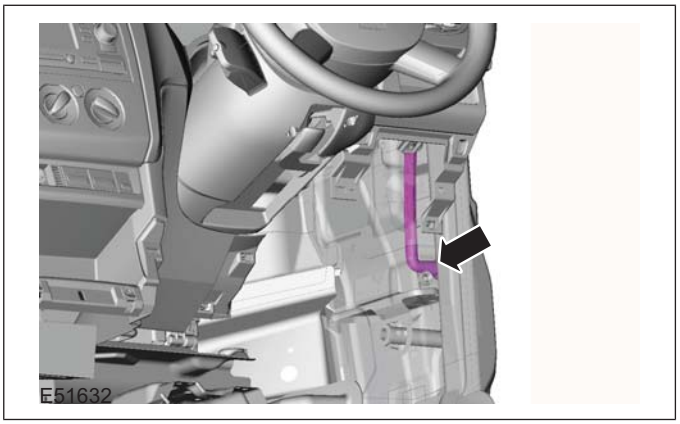
3. **Detach the driver side footwell noise, vibration and harshness (NVH) insulation material from the A-pillar to gain access to the A-pillar access hole.**



4. **Remove the NVH insulation material from the A-pillar access hole (part of instrument panel removed for clarity).**



5. **Detach the roof opening panel front drain hose and drain hose valve from the A-pillar and position them in the A-pillar access hole (part of the instrument panel removed for clarity).**

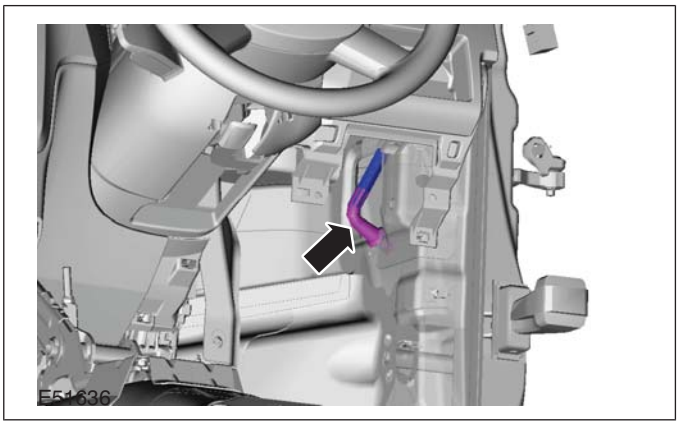


6. **NOTE: Do not remove the roof opening panel front drain hose at this stage.**

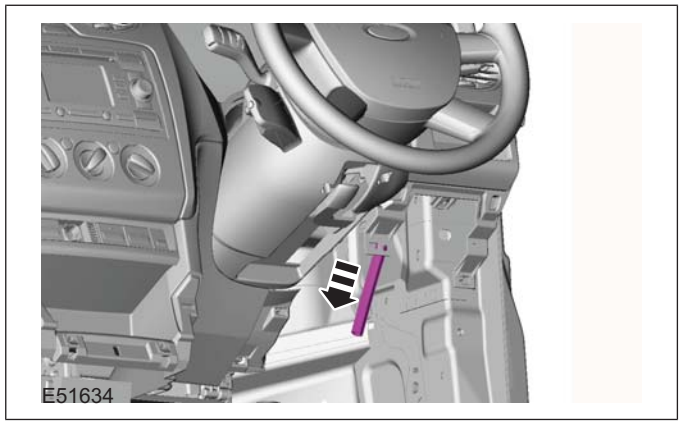
NOTE: The new and the original roof opening panel drain hoses must be connected before the original roof opening panel front drain hose is removed from the A-pillar, to aid installation.

REMOVAL AND INSTALLATION

Remove the drain hose valve (part of the instrument panel removed for clarity).



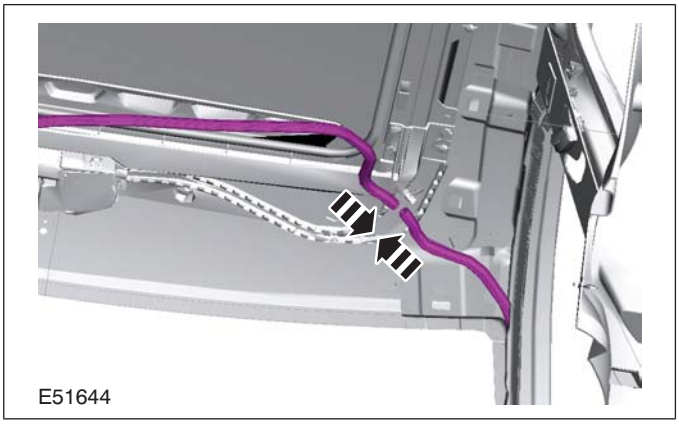
- Pull the drain hose into the driver footwell through the A-pillar access hole.



Installation

1. **NOTE: Apply a suitable lubricant to the new roof opening panel front drain hose, to aid installation.**

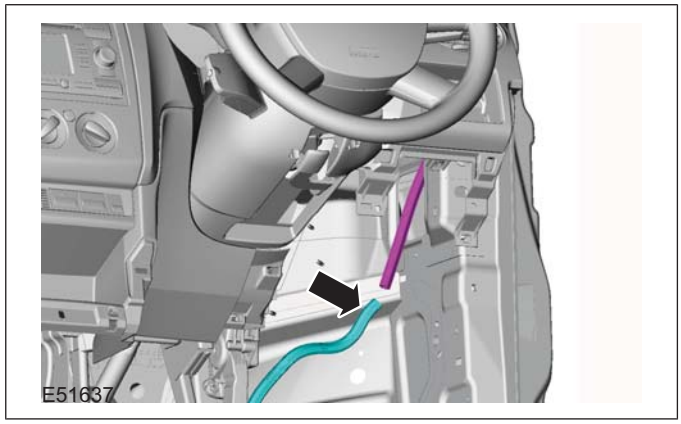
   Using suitable tape, attach the new roof opening panel front drain hose to the original roof opening panel front drain hose at the roof opening panel.



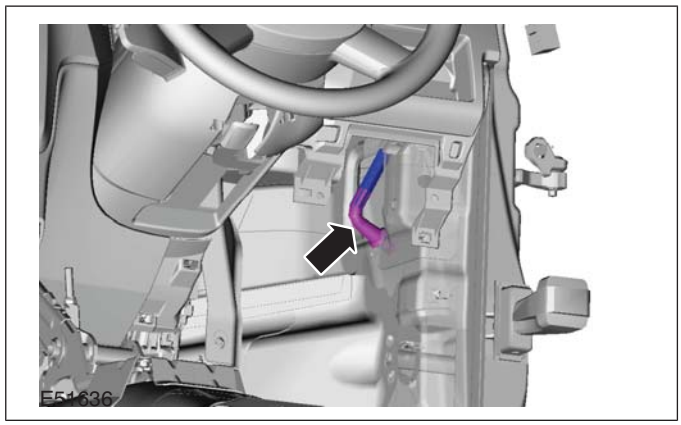
2. **NOTE: Make sure that a minimum of 200 mm of the new roof opening panel front drain hose remains at the roof opening panel.**

   With the aid of another technician, detach the original roof opening panel front drain hose from the A-pillar (part of the instrument panel removed for clarity).

3. **Remove the original roof opening panel front drain hose (part of the instrument panel removed for clarity).**

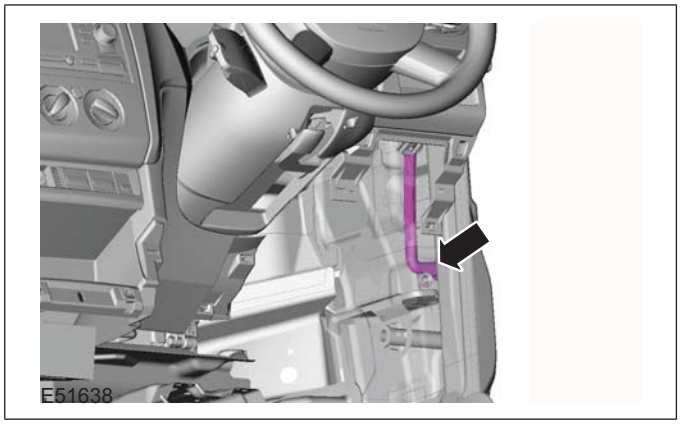


4. **Attach the drain hose valve to the roof opening panel front drain hose (part of the instrument panel removed for clarity).**

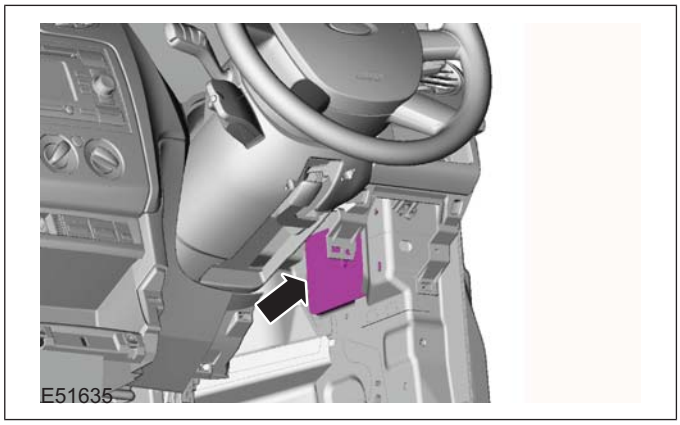


REMOVAL AND INSTALLATION

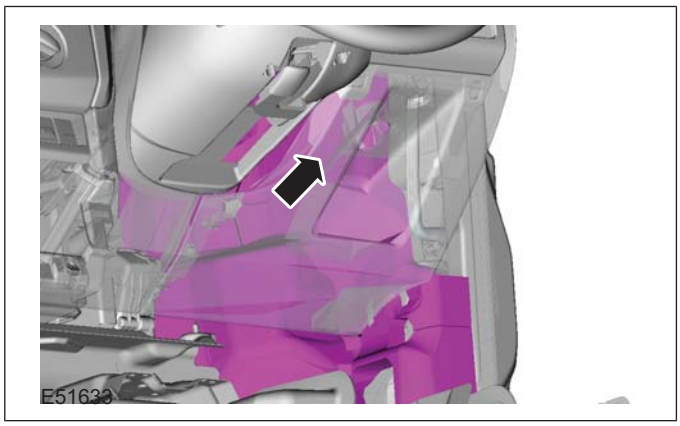
5. Install the roof opening panel front drain hose and drain hose valve (part of the instrument panel removed for clarity).



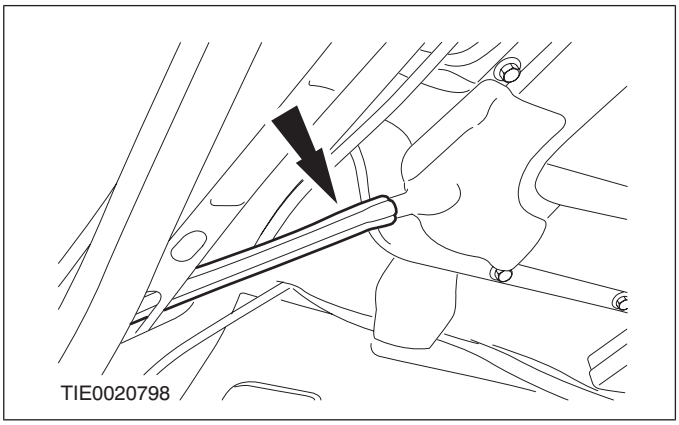
6. Install the NVH insulation material to the A-pillar access hole (part of the instrument panel removed for clarity).



7. Attach the driver side footwell NVH insulation material to the A-pillar.



8. Attach the roof opening panel front drain hose to the roof opening panel.



9. Install the headliner.

   For additional information, refer to: Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation)

REMOVAL AND INSTALLATION

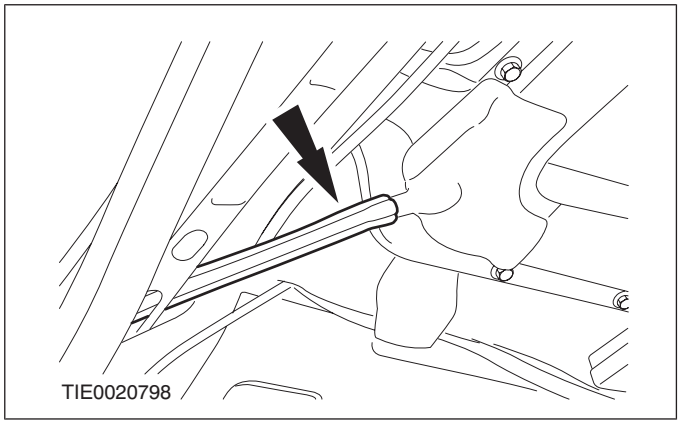
Passenger Side Roof Opening Panel Front Drain Hose

Removal

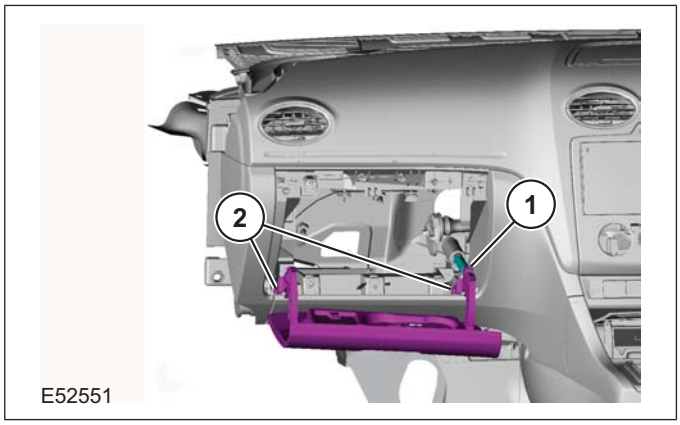
1. **Remove the headliner. For additional information, refer to: (501-05 Interior Trim and Ornamentation)**

   Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (Removal and Installation),

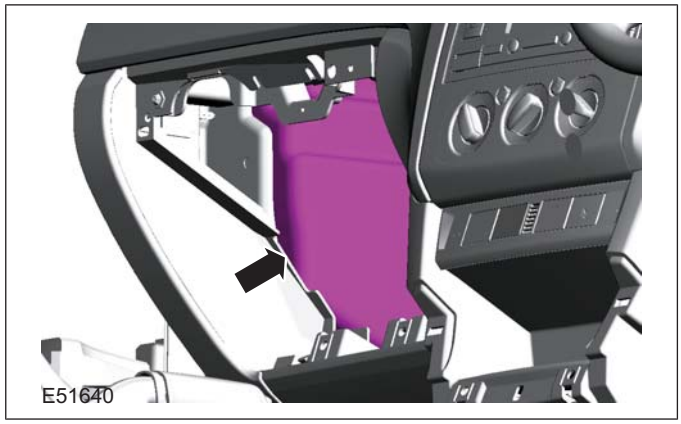
2. **Detach the roof opening panel front drain hose from the roof opening panel.**



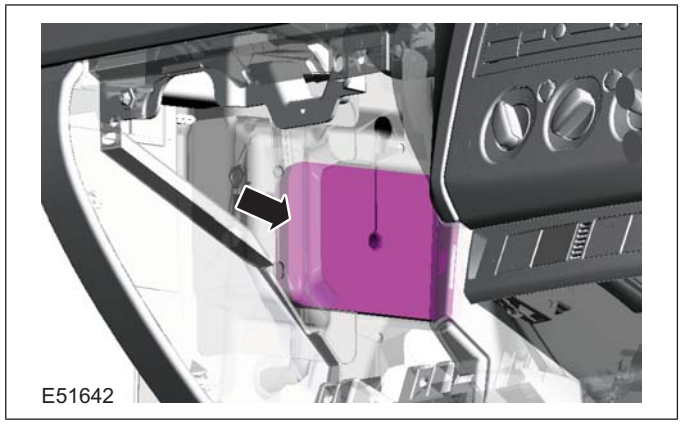
3. **Remove the glove compartment lid.**
   1. Detach the glove compartment lid damper from the glove compartment lid hinge (if equipped).
   2. Detach the glove compartment lid hinges.



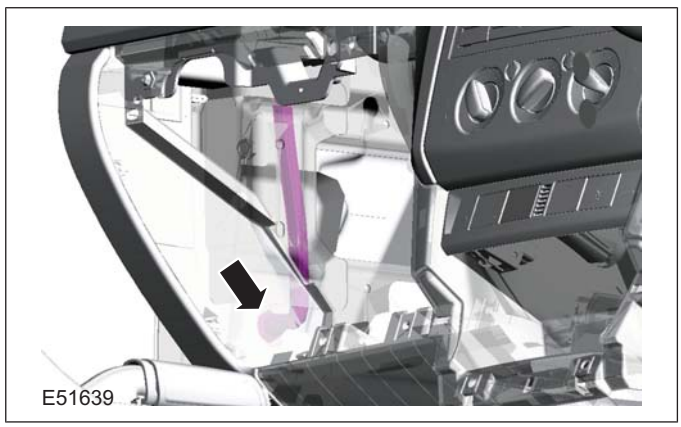
4. **Detach the passenger side footwell noise, vibration and harshness (NVH) insulation material from the A-pillar to gain access to the A-pillar access hole.**



5. **Remove the NVH insulation material from the A-pillar access hole.**



6. **Detach the roof opening panel front drain hose and roof opening panel front drain hose valve from the A-pillar and position them in the A-pillar access hole.**

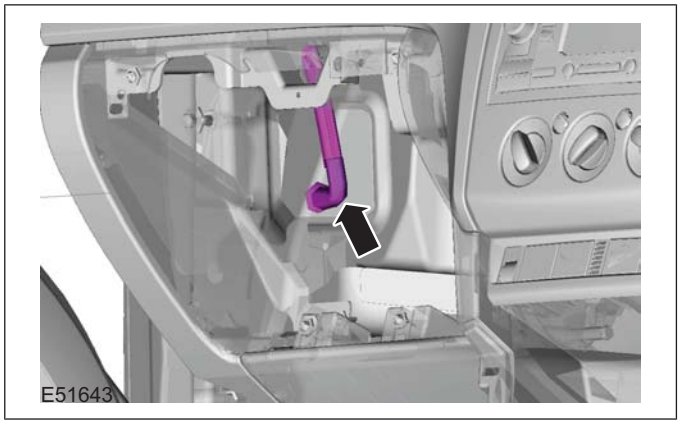


REMOVAL AND INSTALLATION

7. **NOTE: Do not remove the roof opening panel front drain hose at this stage.**

NOTE: The new and the original roof opening panel drain hoses must be connected together before the original roof opening panel front drain hose is removed from the A-pillar, to aid installation.

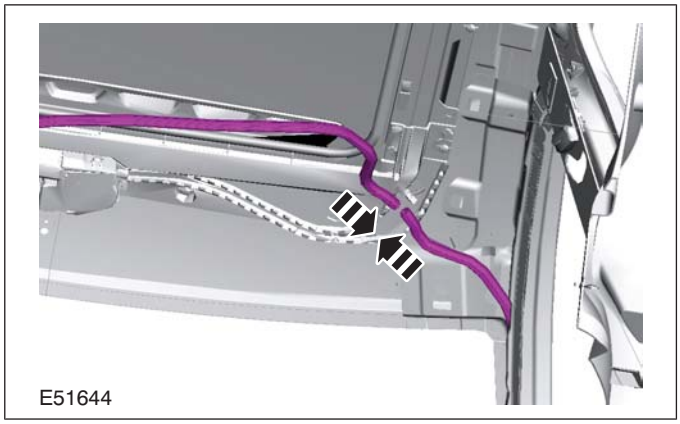
Remove the roof opening panel front drain hose valve.



Installation

1. **NOTE: Apply a suitable lubricant to the new roof opening panel front drain hose, to aid installation.**

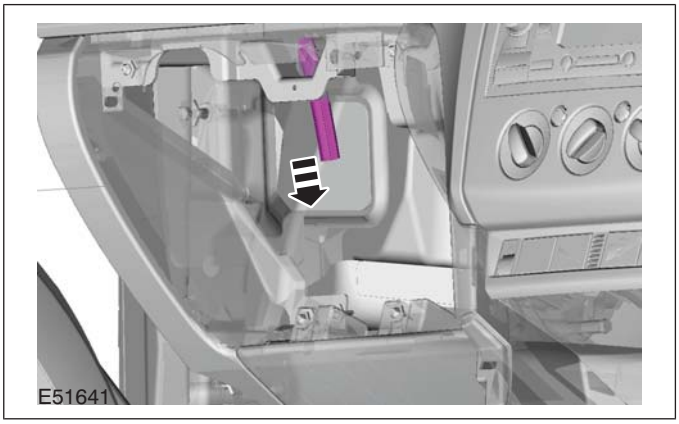
   Using suitable tape, attach the new roof opening panel front drain hose to the original roof opening panel front drain hose at the roof opening panel.



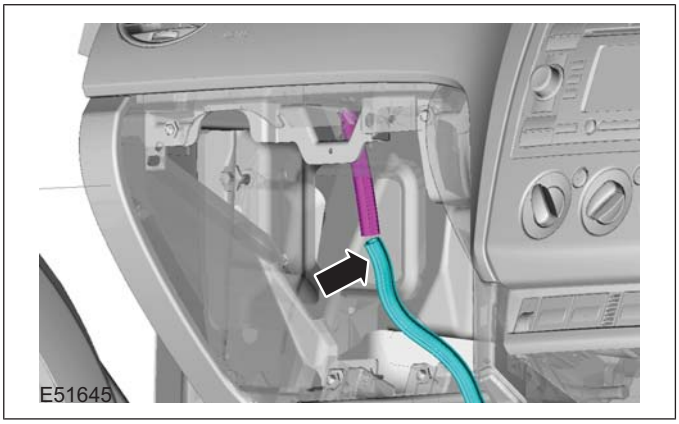
2. **NOTE: Make sure that a minimum of 200 mm of the new roof opening panel front drain hose remains at the roof opening panel.**

   With the aid of another technician, detach the original roof opening panel front drain hose from the A-pillar.

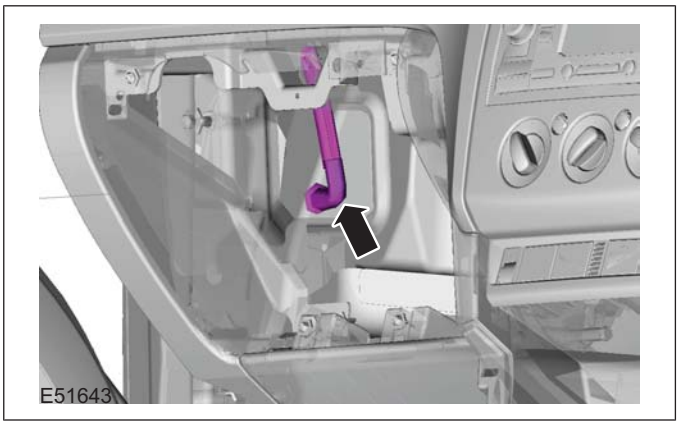
- Pull the roof opening panel front drain hose into the passenger footwell through the A-pillar access hole.



3. **Remove and discard the original roof opening panel front drain hose and tape.**

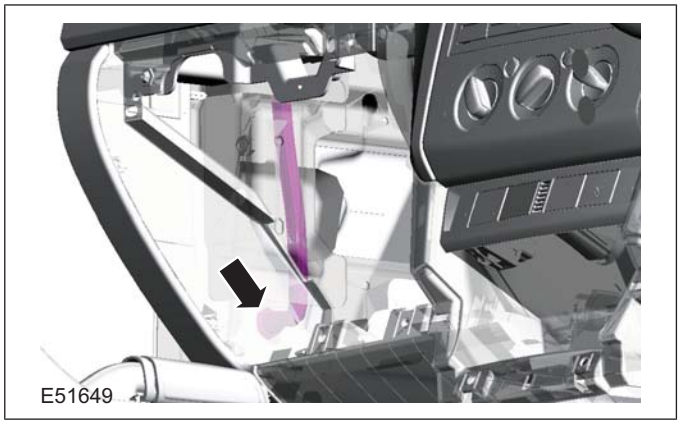


4. **Install the roof opening panel front drain hose valve.**

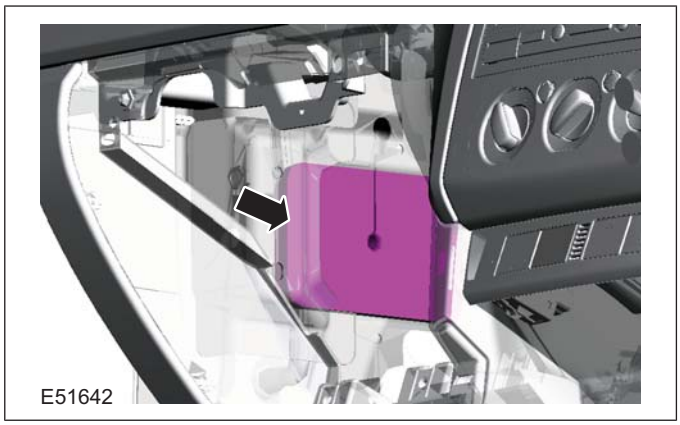


REMOVAL AND INSTALLATION

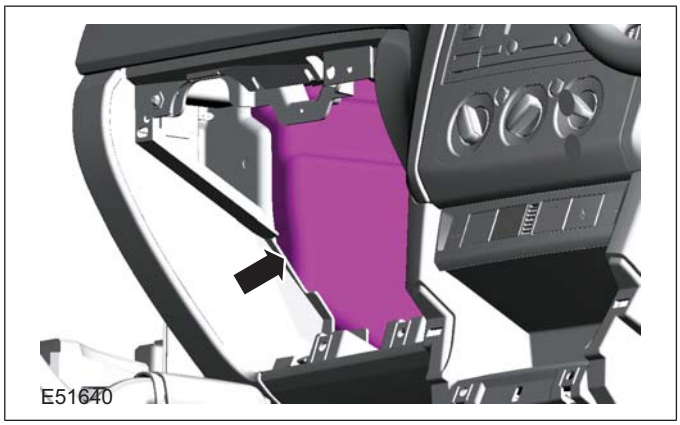
5. Attach the roof opening panel front drain hose and roof opening panel front drain hose valve to the A-pillar.



6. Install the NVH insulation material to the A-pillar access hole.

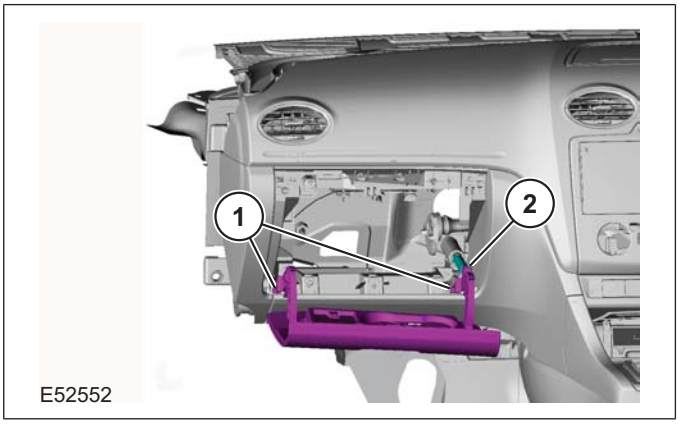


7. Attach the passenger side footwell NVH insulation material to the A-pillar.

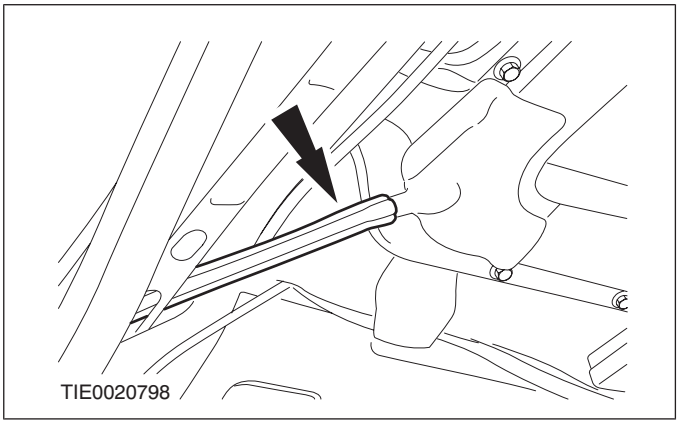


8. Install the glove compartment lid.

1. Attach the glove compartment lid hinges.
2. Attach the glove compartment lid damper to the glove compartment lid hinge (if equipped).



9. Attach the roof opening panel front drain hose to the roof opening panel.



10. Install the headliner. For additional information, refer to: (501-05 Interior Trim and Ornamentation)

Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (Removal and Installation),

SECTION 501-19 Bumpers

VEHICLE APPLICATION: 2011.00 Focus

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Front Bumper..... (43 423 0) 501-19-3
Front Bumper Cover — 2.5L Duratec-ST (VI5)..... 501-19-6
Rear Bumper Cover — 2.5L Duratec-ST (VI5)..... 501-19-9

SPECIFICATIONS

Torque Specifications

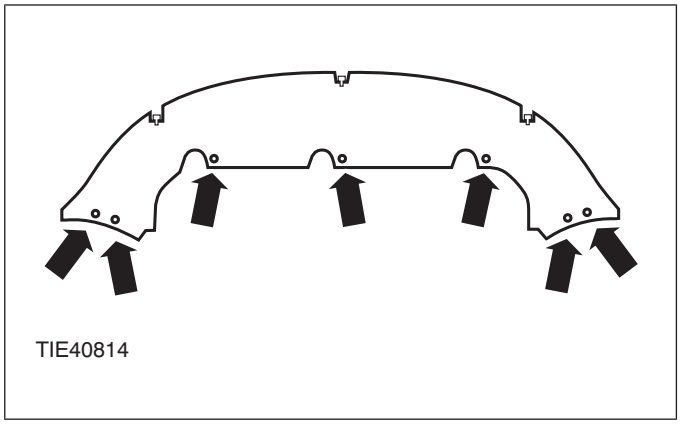
Item	Nm	lb-ft	lb-in
Front bumper retaining bolts	25	18	-
Rear bumper retaining bolts	20	15	-
Radiator support bracket retaining bolts	25	18	-
Radiator grille opening panel reinforcement retaining bolts	23	17	-
Horn bracket retaining bolt	25	18	-
Intake air resonator retaining bolt	9	-	80

REMOVAL AND INSTALLATION

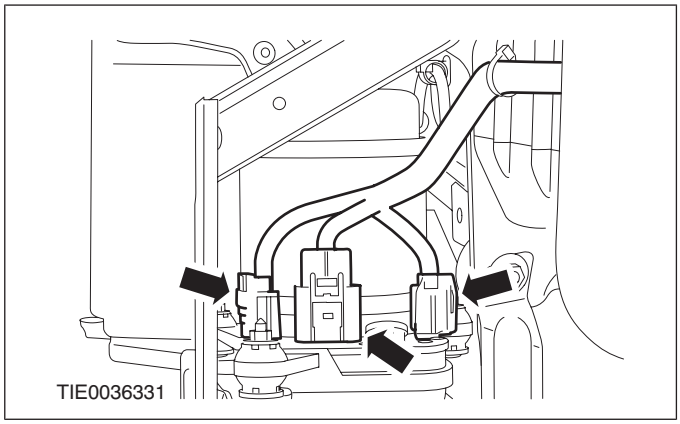
Front Bumper(43 423 0)

Removal

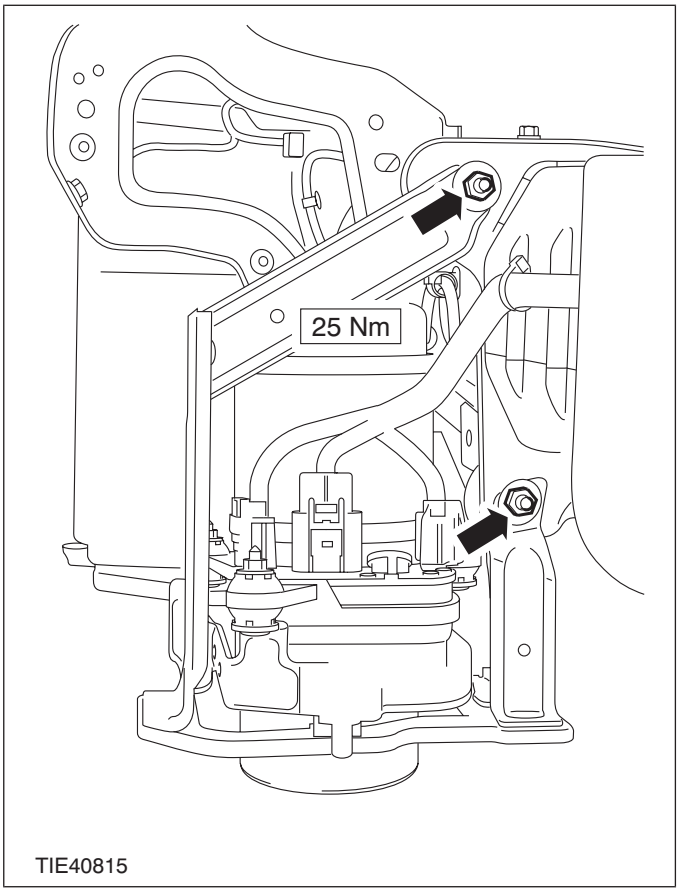
1. **Remove the front bumper cover.**
2. **Remove the radiator splash shield.**



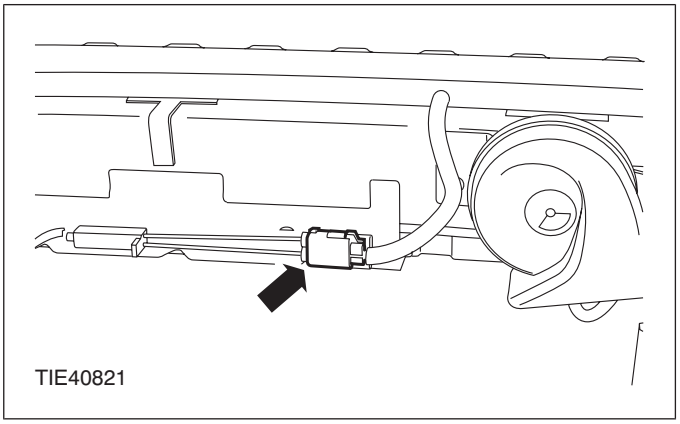
3. **Disconnect the power steering pump electrical connectors.**



4. **Detach the power steering pump support bracket from the bumper.**



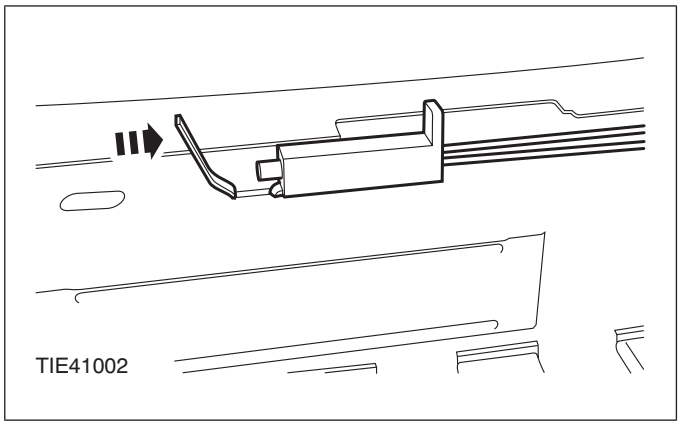
5. **Disconnect the air temperature sensor electrical connector.**



6. **Remove the air temperature sensor.**

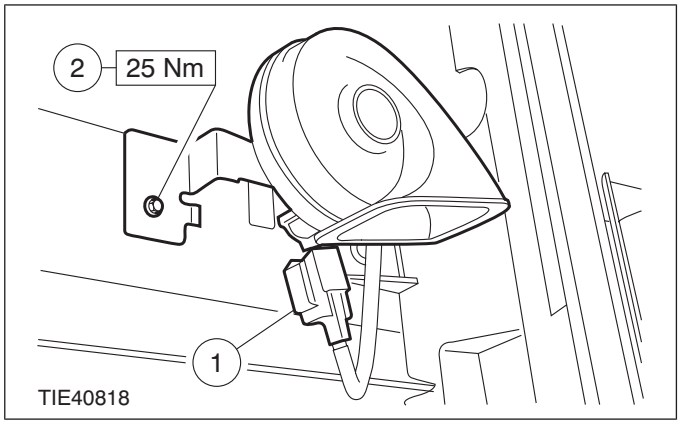
REMOVAL AND INSTALLATION

- Release the clip.



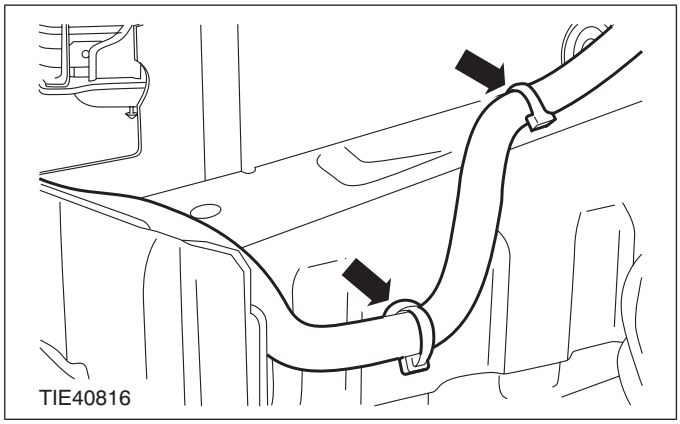
7. Remove the horn and bracket assembly.

1. Disconnect the electrical connector.
2. Remove the bolt.

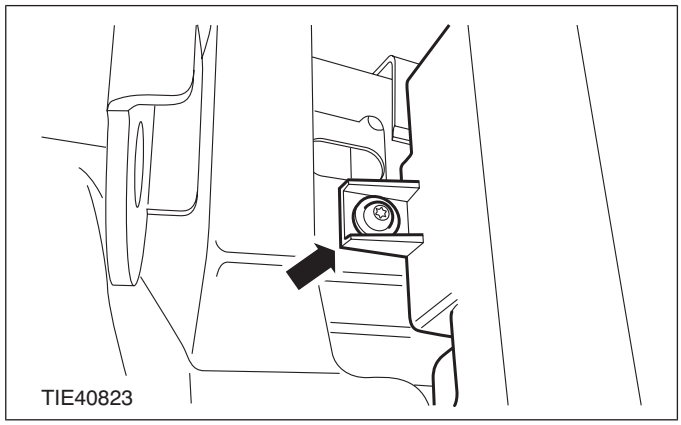


8. Detach the wiring harness from the bumper on both sides (left-hand side shown).

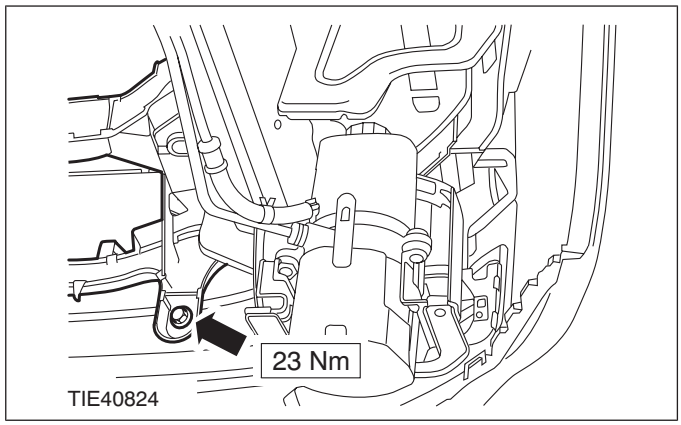
- Detach the clips.



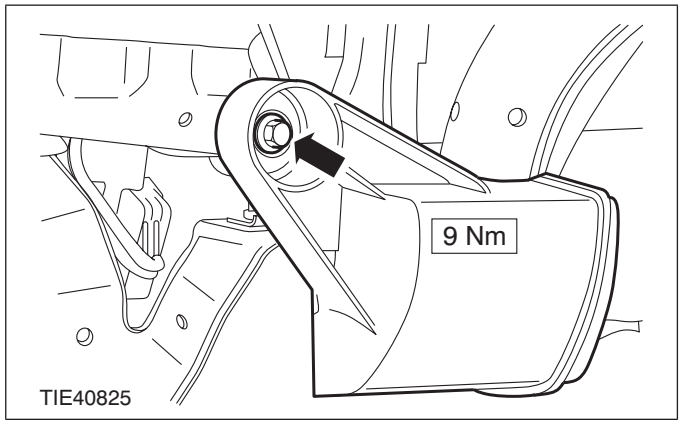
9. Remove the air deflector on both sides (left-hand side shown).



10. Detach the radiator grille opening panel reinforcement from the bumper on both sides (right-hand side shown).



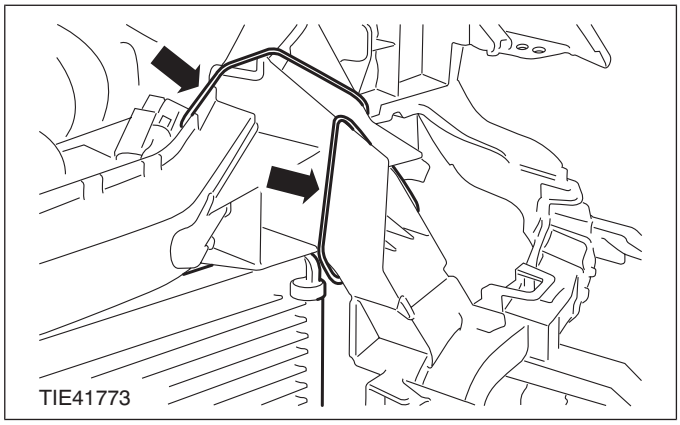
11. Detach the intake air resonator from the bumper.



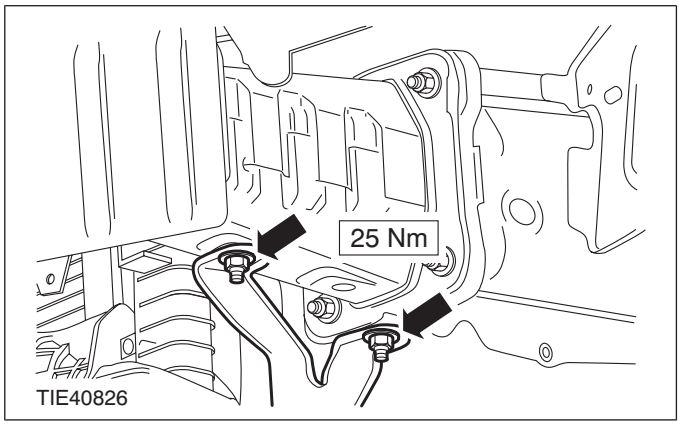
12. Support the radiator on both sides (left-hand side shown).

REMOVAL AND INSTALLATION

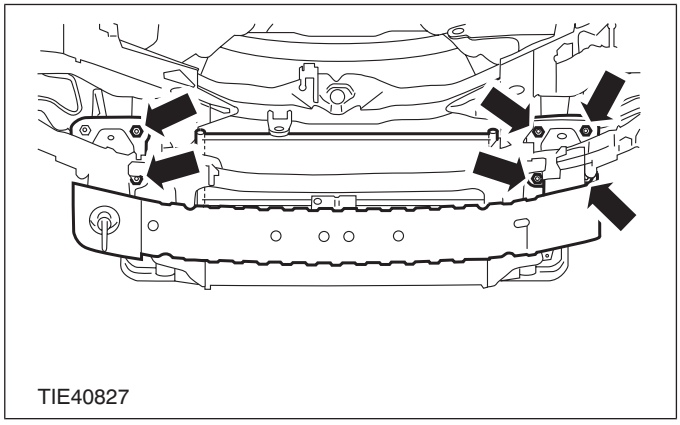
- Using cable ties, secure the radiator to the radiator grille opening panel reinforcement.



13. Detach the radiator support bracket from the bumper on both sides (left-hand side shown).



14. Remove the bumper.



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Front Bumper Cover — 2.5L Duratec-ST (VI5)

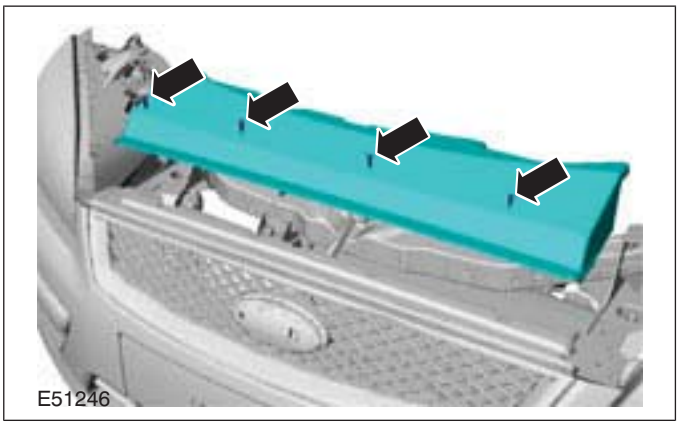
Removal

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

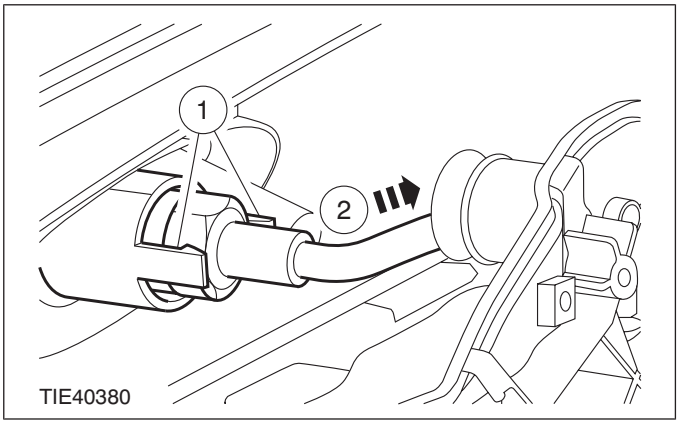
1. Remove the headlamp assemblies.

   Refer to: Headlamp Assembly (417-01 Exterior Lighting, Removal and Installation).

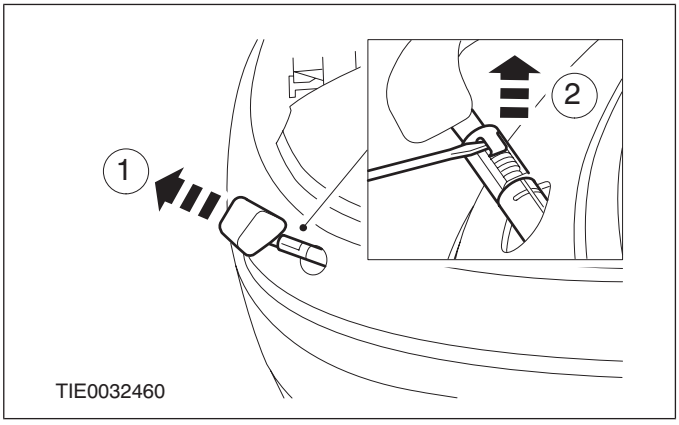
2.



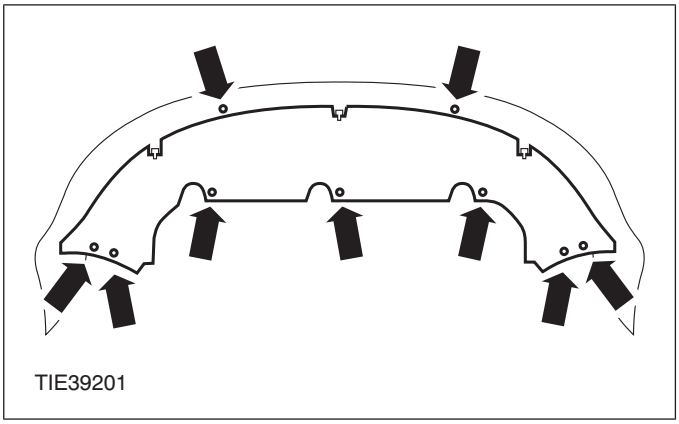
3.



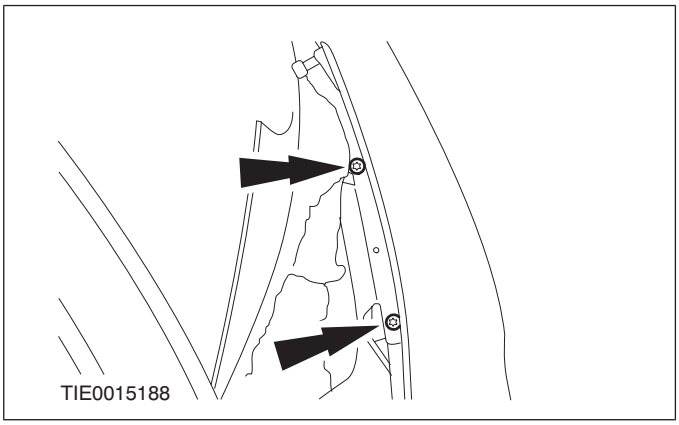
4.



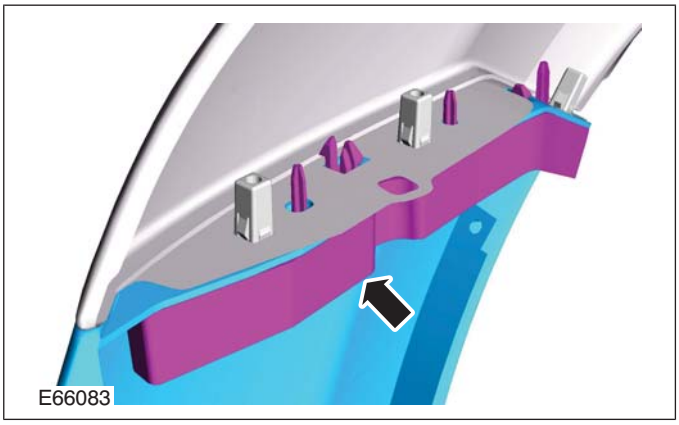
5.



6.

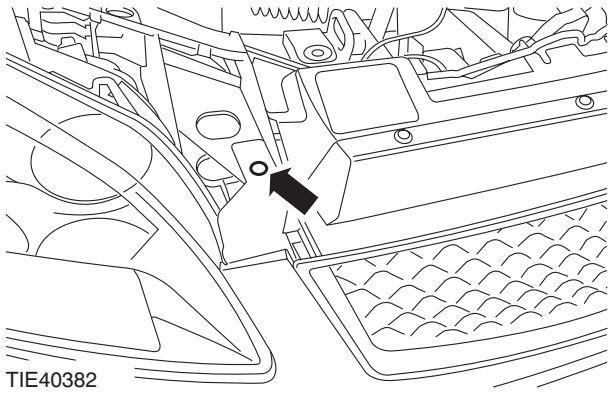


7.

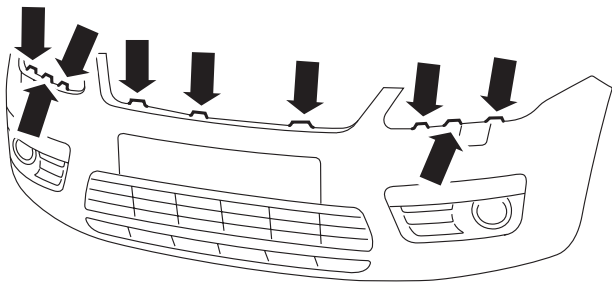


REMOVAL AND INSTALLATION

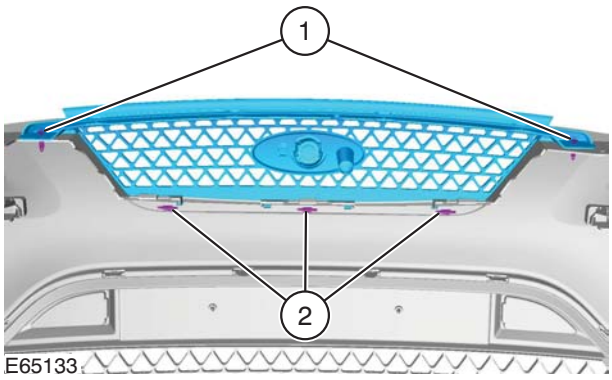
8.



9.



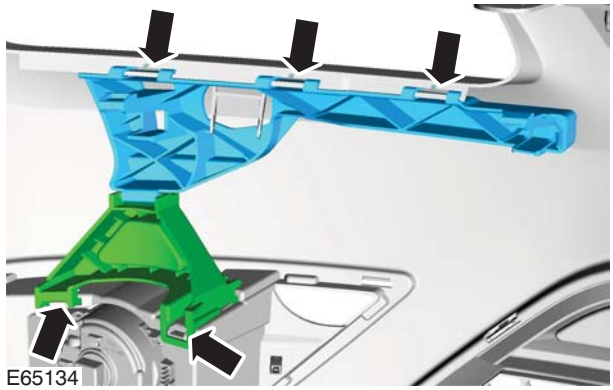
10.



11.



12.

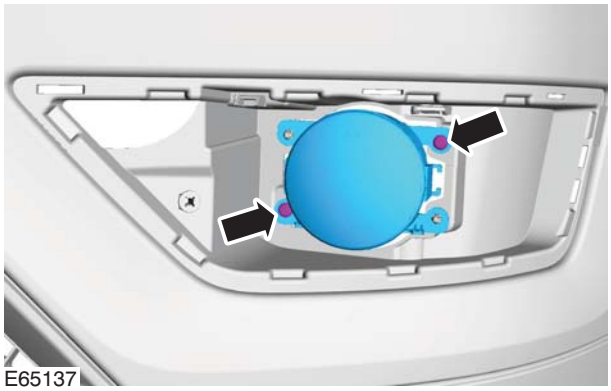


13.



REMOVAL AND INSTALLATION

14.



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Rear Bumper Cover — 2.5L Duratec-ST (VI5)

General Equipment

5 mm Drill Bit

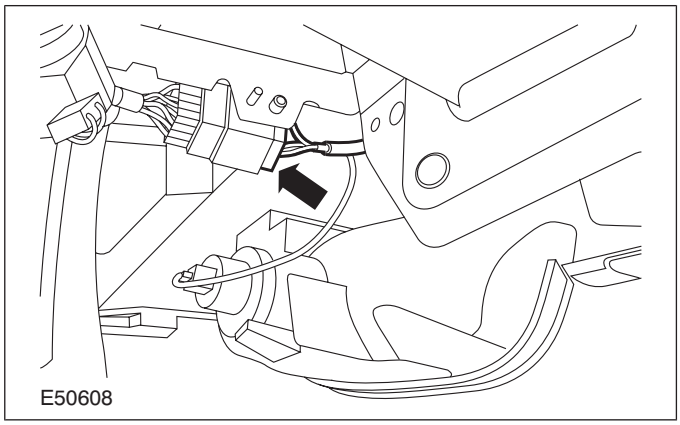
General Equipment

Blind Rivet Gun
Electric Drill

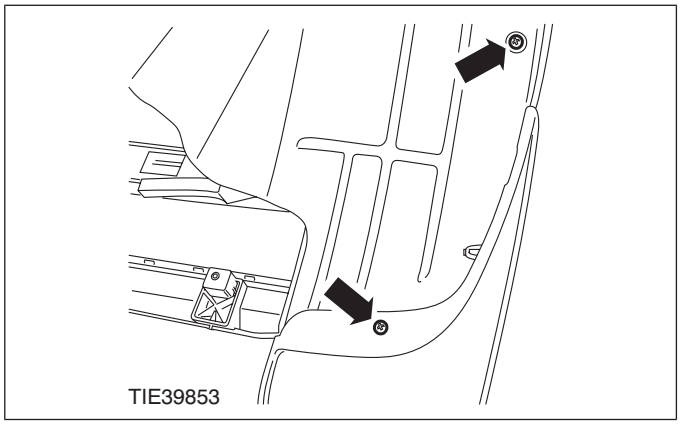
Removal

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

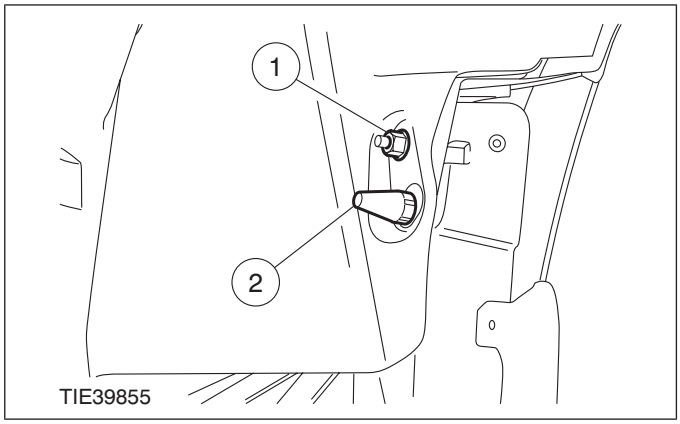
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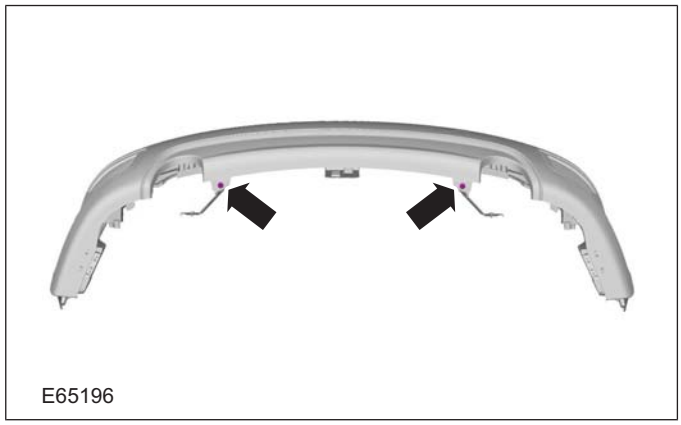
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3.



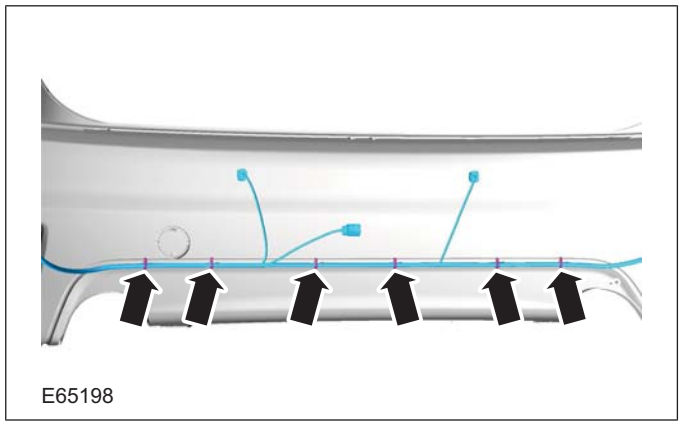
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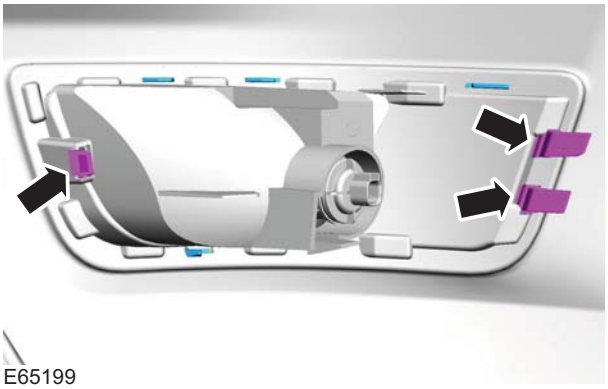


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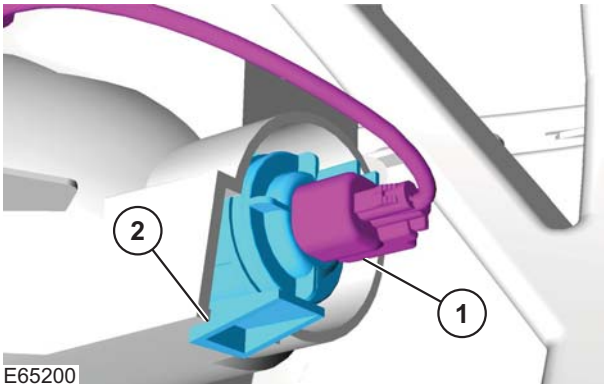


REMOVAL AND INSTALLATION

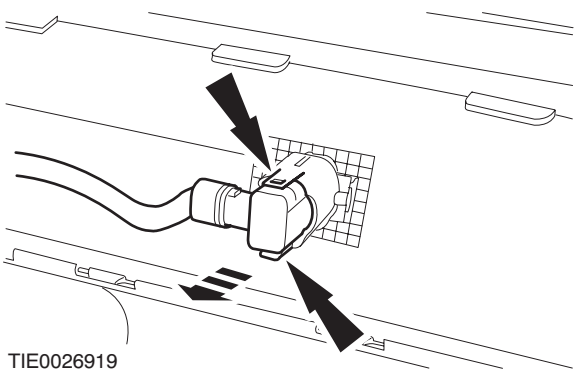
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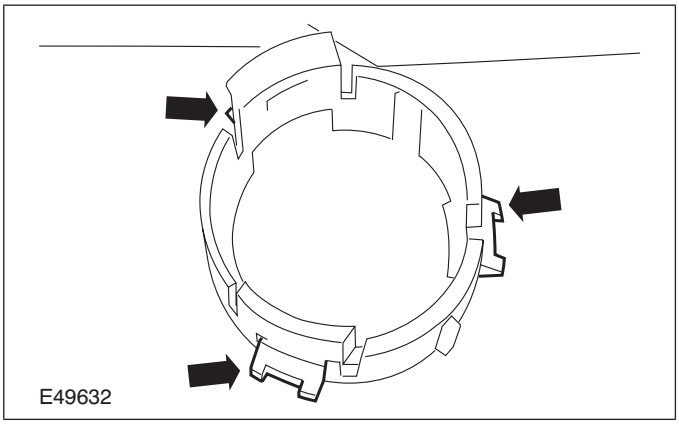
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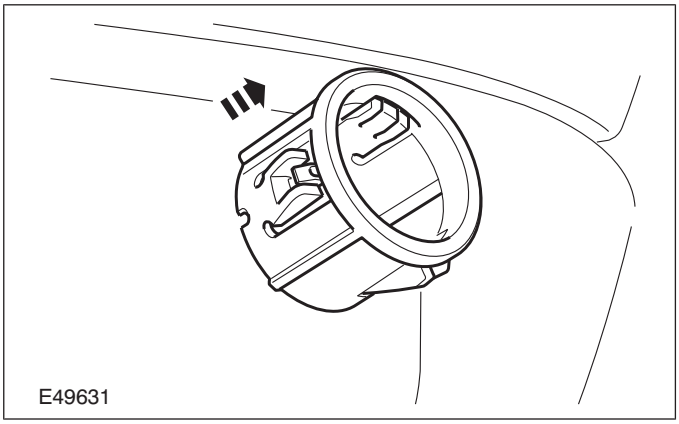
9. ⚠ **CAUTION: Pressure must not be applied to the outer face of the parking aid sensor.**



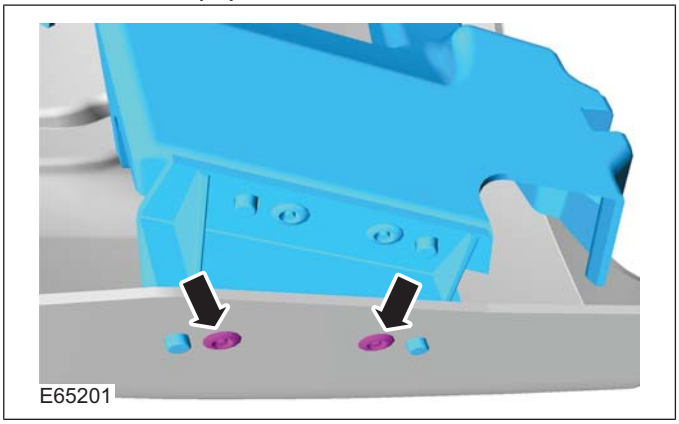
10.



11.

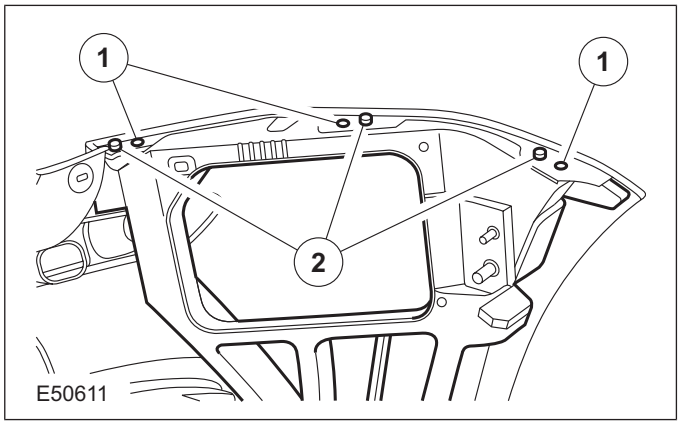


12. General Equipment: Electric Drill
General Equipment: 5 mm Drill Bit
General Equipment: Blind Rivet Gun



REMOVAL AND INSTALLATION

13. 1. General Equipment: Electric Drill
General Equipment: 5 mm Drill Bit
General Equipment: Blind Rivet Gun



Installation

1. To install, reverse the removal procedure.

SECTION 501-20A Safety Belt System

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Torque Specifications

Item	Nm	lb-ft	lb-in
Front safety belt upper anchor retaining bolt	35	26	-
Front safety belt lower anchor retaining bolt	38	28	-
Front safety belt retractor retaining bolt	35	26	-
Rear outer safety belt retractor retaining bolt	40	30	-
Rear outer safety belt lower anchor retaining bolt	38	28	-
Rear center safety belt retractor retaining bolt	35	26	-
Rear center safety belt lower anchor retaining bolt	55	41	-
Rear center safety belt buckle retaining bolt	55	41	-
Safety belt shoulder height adjuster retaining bolt	35	26	-
Safety belt buckle and pretensioner retaining bolt	47	35	-
Safety belt upper anchor retaining bolt - vehicles with convertible top	40	30	-
Safety belt lower anchor retaining bolt - vehicles with convertible top	40	30	-
Safety belt retractor retaining bolt - vehicles with convertible top	40	30	-
Rear safety belt buckle retaining bolt - vehicles with convertible top	40	30	-

DESCRIPTION AND OPERATION

Safety Belt System

System overview

WARNING: All safety belt components including retractors, buckles, child safety seat tether brackets and attaching hardware in use during a collision must be removed and new components installed. New safety belt components should also be installed where safety belts not in use during a collision, are inspected and found to be damaged or operate incorrectly. Failure to follow these instructions may result in personal injury.



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WARNING: All vehicles equipped with a passenger air bag have a WARNING sticker attached to the instrument panel PROHIBITING the use of rear facing child seats in the front seating positions. Failure to follow this instruction may result in personal injury.

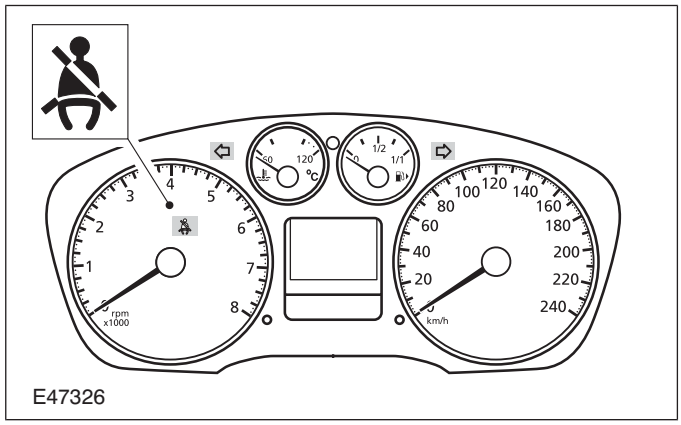
CAUTION: Do not attempt to repair or lubricate the retractor / buckle mechanisms or modify the belts.

The safety belt system utilizes three-point lap and diagonal safety belts in all seat positions.

The front safety belt retractors incorporate a load limiting device, which allows progressive payout of additional safety belt webbing when the force exerted exceeds a predetermined limit.

The front safety belt upper anchors are connected to safety belt shoulder height adjusters mounted in the B-pillar.

The front seat safety belt buckles incorporates pretensioners and on the driver side a safety belt buckle switch. Both the safety belt buckle switch and the safety belt buckle pretensioner are connected to the air bag control module. The air bag control module monitors both circuits and if a fault is detected will illuminate the air bag warning indicator located in the instrument cluster. The belt pretensioner is not deployed in any side, rear or minor frontal collisions.



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When the vehicle speed exceeds 7 km/h (4 mph) and the driver safety belt is unfastened, the safety belt minder will provide the driver with an audible and visual warning. The warning will continue for up to ten minutes by sounding a chime and illuminating a warning indicator located in the instrument cluster.

The safety belt buckle pretensioners have a lower deployment threshold than that required by the air bags. Hence it is possible during a minor collision, which exceeds the deployment threshold, that only the safety belt pretensioners will deploy.

The additional safety belt minder feature can be disabled. For additional information, refer to Section 413-09.

The rear centre seat belt retractor is fitted in the roof and is engaged into the smaller belt buckle to the right of the centre seat and can be left there when the seat is not in use. The larger chrome buckle is engaged to the standard buckle to the left of the seat.

Rear seat safety belt retractors and buckles are of the conventional type.

DIAGNOSIS AND TESTING

Safety Belt System

Principles of Operation

WARNING: All safety belt components including retractors, buckles, child safety seat tether brackets and attaching hardware in use during a collision must be removed and new components installed. New safety belt components should also be installed where safety belts not in use during a collision, are inspected and found to be damaged or operate incorrectly. Failure to follow these instructions may result in personal injury.

The occupant restraint system utilizes three-point lap and diagonal safety belts in all seat positions.

Front seats are equipped with safety belt buckle pretensioners, which are controlled as part of the supplemental restraint system (SRS). For additional information,

REFER to: Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) (501-20 Supplemental Restraint System, Description and Operation).

The rear seat safety belt buckles are mounted directly to the floor panel.

The safety belt retractor, mounted within the base of the B-pillar, incorporates a torsion bar load limiting device. The device consists of a retractor reel which is mounted onto a spindle (torsion bar) which, once the sensor has locked the retractor reel and predetermined load is applied, twists and pays out additional webbing into the system. The deceleration force required to initiate this sequence is approximately the same as that required to initiate air bag deployment. The torsion bar load limiting device will only react if the safety belt is in use at the time of impact.

Rear seat safety belt retractors do not use this type of retractor, they are equipped with a conventional retractor.

Emergency Locking Retractor (ELR)

The retractors in all seat positions feature ELR. The ELR is part of the safety belt system that in normal operation allows free movement of the belted occupant. In an emergency the ELR will lock, preventing webbing payout and hence forward movement of the occupant. Locking may be achieved by one of two mechanisms:

Vehicle Motion Sensor (VMS)

VMS is operated by sudden deceleration of the vehicle or excessive tilt. Once operated the VMS causes a locking pawl to be engaged, thus locking the retractor, preventing webbing payout. When the vehicle is stationary, the VMS stabilizes, causing the pawl to disengage and unlock the retractor, allowing webbing payout.

Webbing Motion Sensor (WMS)

The ELR WMS is operated by rapid acceleration of the webbing. Once operated, it causes a locking pawl to be engaged thus locking the retractor. Webbing payout is prevented in the same manner as VMS.

Inspection and Verification

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

Visual Inspection Chart

Mechanical
• Safety belt retractor • Safety belt buckle and pretensioner • Safety belt buckle

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.

DIAGNOSIS AND TESTING

Symptom Chart

Symptom	Possible Sources	Action
• Normal mode - occupant restraint system inoperative	• Safety belt retractor.	• CARRY OUT the Safety Belt Component Test in this section.

Component Test

Poor Retraction

If a safety belt does not retract correctly, check that the anchor covers and trim bezels are correctly installed and not rubbing against the safety belt webbing. Where necessary, check that the safety belt webbing is not rubbing at one end of the retractor cover slot and, if so, correct by loosening the retaining bolt, aligning the retractor to centralize the safety belt webbing and retighten the bolt.

The safety belts are "dual sensitive" which means that they have:

- a vehicle motion sensor, which locks the safety belt webbing under braking, cornering, on steep hills and in adverse camber conditions.
- a webbing motion sensor, which locks when the safety belt webbing is quickly extracted.

Both systems should be fully operational and can be checked by the tests below:

Vehicle Motion Sensor Test

Either of the following two procedures may be used to check correct operation of the vehicle motion sensor. Both methods require two technicians but note that technicians of larger than normal build should not be asked to conduct these tests. This is to avoid the possibility of a fully unrolled safety belt webbing being mistaken for a correctly locked safety belt retractor.

Test Method 1 (braking)

WARNING: It is important that during this test, the driver and passenger allow the safety belts to provide the restraint and do not attempt to anticipate the sudden deceleration. The steering wheel should not be used as a brace. However, both driver and passenger should prepare themselves for the possibility that the safety belt will not lock. The passenger should hold their hands in front of them, just clear of the instrument panel or front seat backrest, depending on which safety belt is being tested. Failure to follow these instructions may result in personal injury.

- Select for this test a quiet or private stretch of road. Make sure that the road is clear and that full visibility is maintained at all times.
- Both driver and passenger should adopt a normal, comfortable seating position. Both occupants should wear the safety belts and the safety belt webbing must be correctly adjusted, with no slack.
- Proceed at a speed of 10 km/h (6 mph). Do not exceed 10 km/h (6 mph) for this test.
- Apply the foot brake sharply to stop the vehicle. If the vehicle motion sensitive lock mechanism is operating correctly, the safety belt webbing will lock and restrain the wearer.
- Conduct the test twice in each front and rear passenger seat position.
- Any safety belt retractor which does not restrain the wearer during this test must not be reused. A new safety belt must be installed.

Test Method 2 (turning circle)

This method requires a flat open area of private road, sufficient for the vehicle to be driven in a continuous circle on full steering lock.

- The driver should wear the safety belt provided and the belt webbing must be correctly adjusted, with no slack.
- The passenger should occupy a rear seat with the safety belt correctly adjusted, with no slack.
- Start the engine and, with the steering on full right-hand lock, drive the vehicle in a continuous circle at 16 km/h (10 mph). Do not exceed 16 km/h (10 mph) for this test.

DIAGNOSIS AND TESTING

- When the speed is stable, the passenger should attempt to slowly extract the safety belt webbing from each safety belt retractor in turn. If the vehicle motion sensitive lock mechanism is operating correctly, it will not be possible to extract the webbing.
- Any safety belt retractor from which it is possible to extract the webbing during this test must not be used. A new safety belt must be installed.

Static Test

With the vehicle stationary and on level ground take firm hold of the safety belt webbing (on the tongue side of the upper safety belt anchor) and pull out quickly. The retractor should lock within 0.25 meter (10 inches), preventing further webbing payout. Any safety belt retractor from which it is possible to extract further webbing must not be used. A new safety belt must be installed.

REMOVAL AND INSTALLATION

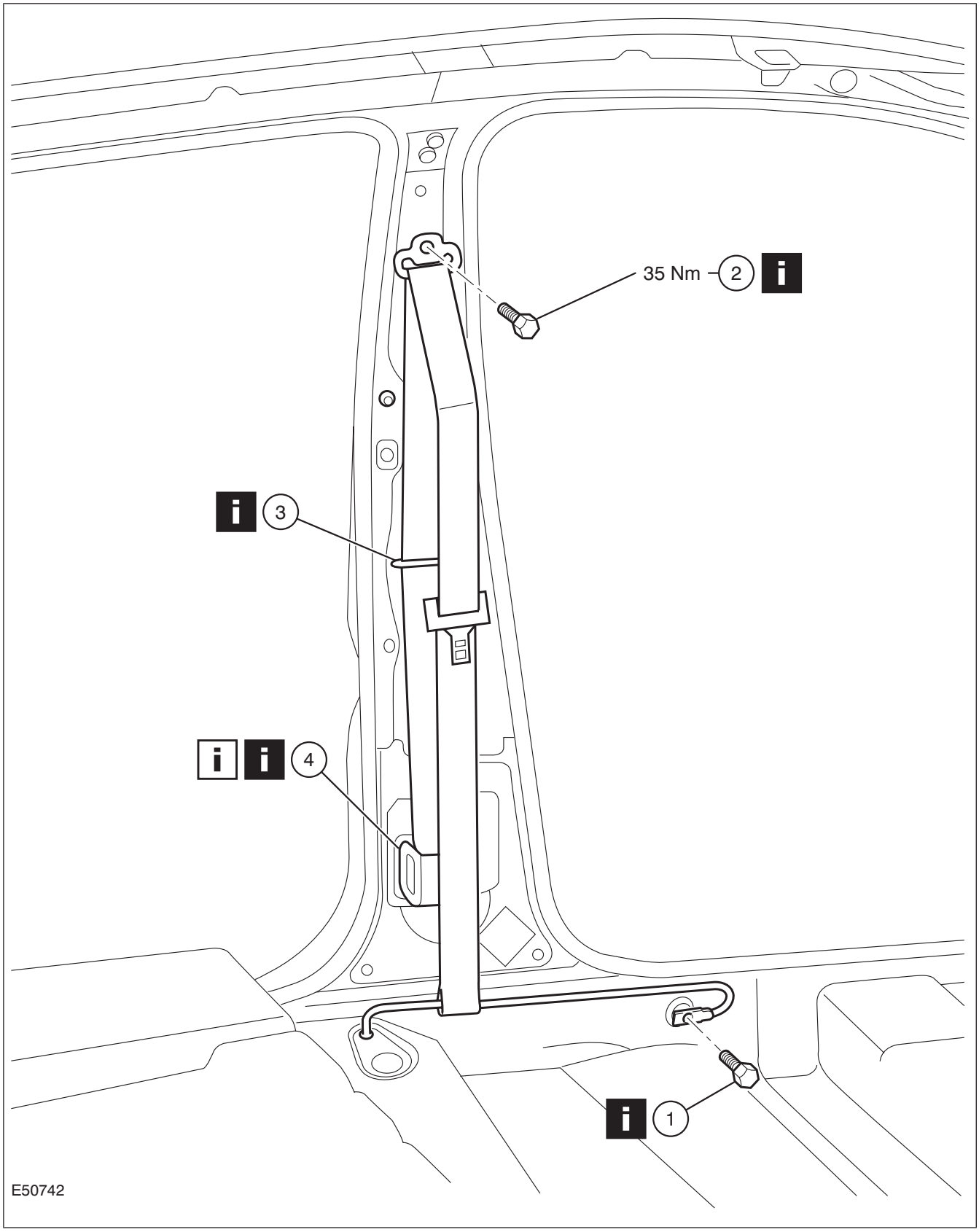
Front Safety Belt Retractor — 3-Door

1. Remove the B-pillar trim panel.

   For additional information, refer to: B-Pillar Trim Panel - 3-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Remove the components in the order indicated in the following illustration(s) and table(s).

REMOVAL AND INSTALLATION



REMOVAL AND INSTALLATION

Item	Description
1	Safety belt lower anchor See Removal Detail
2	Safety belt upper anchor See Removal Detail

Item	Description
3	Guide loop See Removal Detail
4	Safety belt retractor See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.

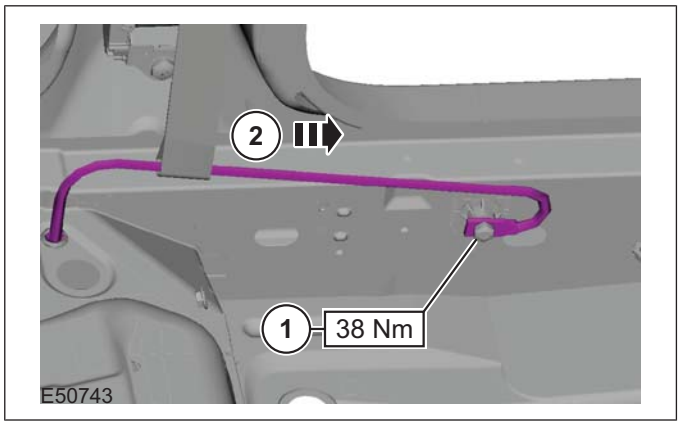
Removal Details

Item 1 Safety belt lower anchor

CAUTION: The bolt securing the safety belt anchor is held captive by a metal washer. The bolt, spacer and metal washer must remain on the safety belt anchor at all times when the safety belt is detached or removed.

1. Detach the safety belt lower anchor.

1. Remove the Torx bolt from the anchor rail.
2. Slide the safety belt off the anchor rail.



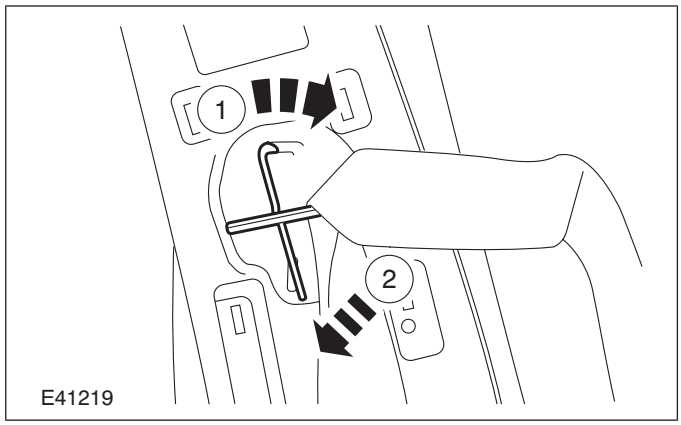
Item 2 Safety belt upper anchor

CAUTION: The bolt securing the safety belt anchor is held captive by a metal washer. The bolt, spacer and metal washer must remain on the safety belt anchor at all times when the safety belt is detached or removed.

Item 3 Guide loop

1. Detach the guide loop from the B-pillar.

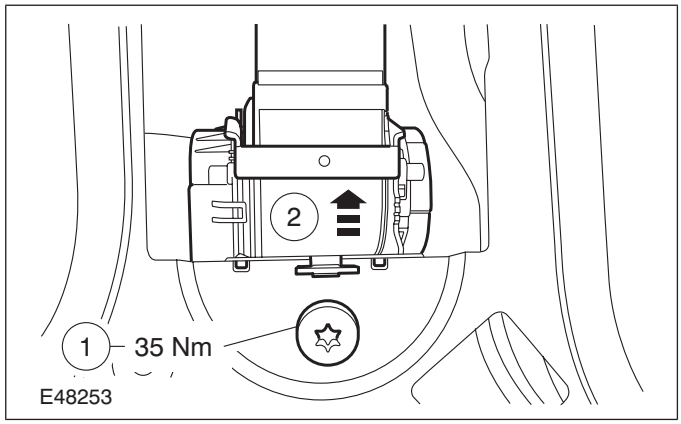
1. Rotate the guide in a clockwise direction.
2. Slide the guide outwards.



Item 4 Safety belt retractor

1. Remove the front safety belt retractor.

1. Remove the bolt.
2. Lift the retractor to detach the locating tang.



Installation Details

REMOVAL AND INSTALLATION

Item 4 Safety belt retractor

CAUTION: Make sure the safety belt retractor locating tang is correctly located.

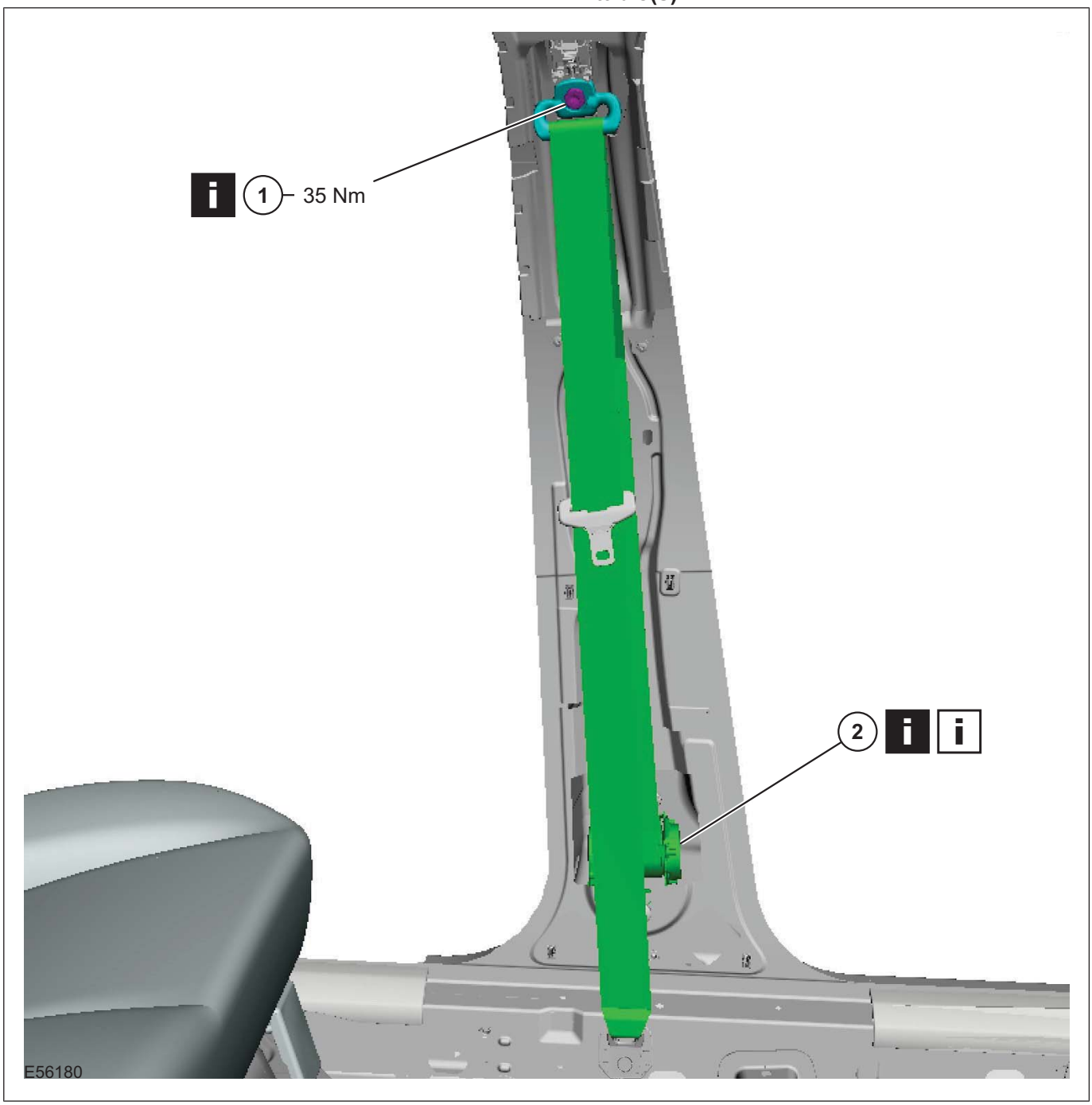
REMOVAL AND INSTALLATION

Front Safety Belt Retractor — 4-Door/5-Door/Wagon

1. Remove the B-pillar trim panel.

   For additional information, refer to: B-Pillar Trim Panel - 4-Door/5-Door (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Remove the components in the order indicated in the following illustration(s) and table(s).



REMOVAL AND INSTALLATION

Item	Description
1	Front safety belt upper anchor retaining bolt See Removal Detail

Item	Description
2	Front safety belt retractor See Removal Detail See Installation Detail

3. To install, reverse the removal procedure.

Removal Details

Item 1 Front safety belt upper anchor retaining bolt

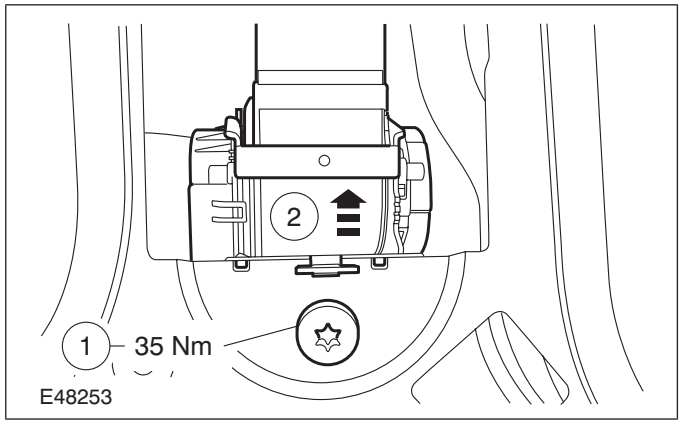
1. CAUTION: The bolt securing the front safety belt upper anchor is held captive by a metal washer. The bolt, spacer and metal washer must remain on the front safety belt upper anchor at all times when the front safety belt is detached or removed.

Detach the front safety belt upper anchor from the front safety belt shoulder height adjuster.

Item 2 Front safety belt retractor

1. Remove the front safety belt retractor.

1. Remove the front safety belt retractor retaining bolt.
2. Lift the front safety belt retractor to detach the locating tang.



Installation Details

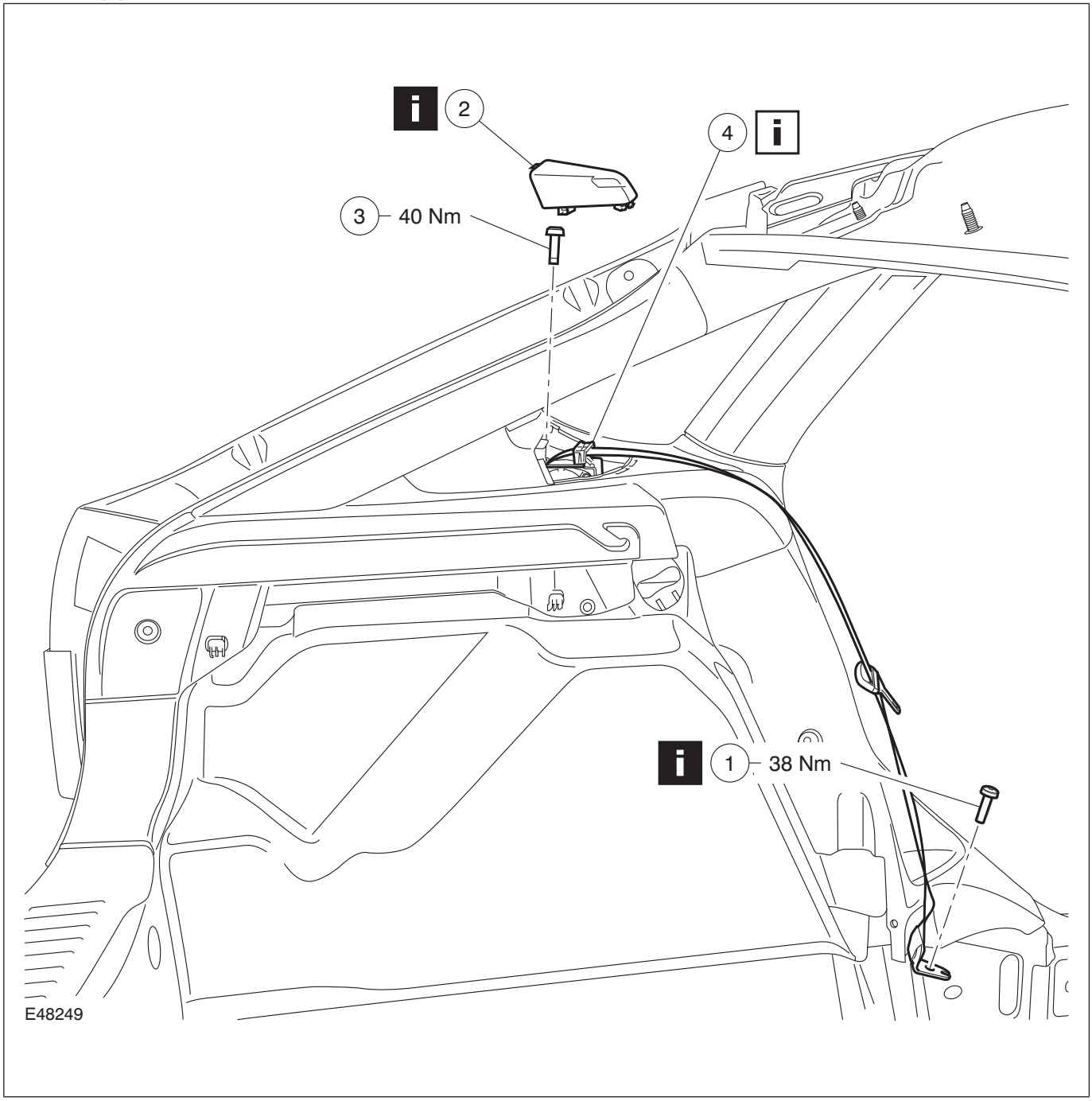
Item 2 Front safety belt retractor

CAUTION: Make sure that the front safety belt retractor locating tang is correctly located.

REMOVAL AND INSTALLATION

Rear Safety Belt Retractor — 3-Door/5-Door/Wagon

1. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Safety belt lower anchor retaining bolt See Removal Detail
2	Safety belt retractor cover See Removal Detail

Item	Description
3	Safety belt upper anchor retaining bolt
4	Safety belt retractor See Installation Detail

2. **To install, reverse the removal procedure.**

REMOVAL AND INSTALLATION

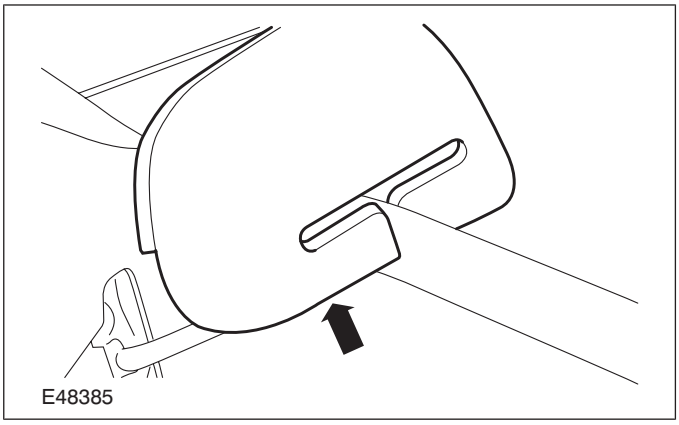
Removal Details

Item 1 Safety belt lower anchor retaining bolt

1. Fold the rear seat cushion forward, to gain access to the rear safety belt lower anchor retaining bolt.

Item 2 Safety belt retractor cover

1. Remove the rear safety belt retractor cover.

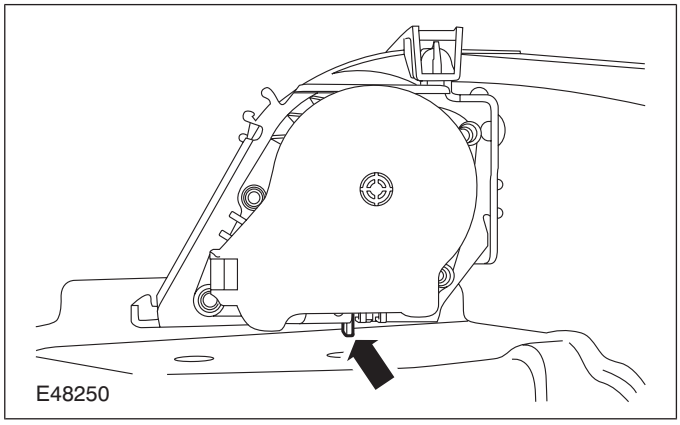


Installation Details

Item 4 Safety belt retractor

1. ⚠CAUTION: Make sure the rear safety belt retractor locating tang is correctly located.

   Install the rear safety belt retractor.



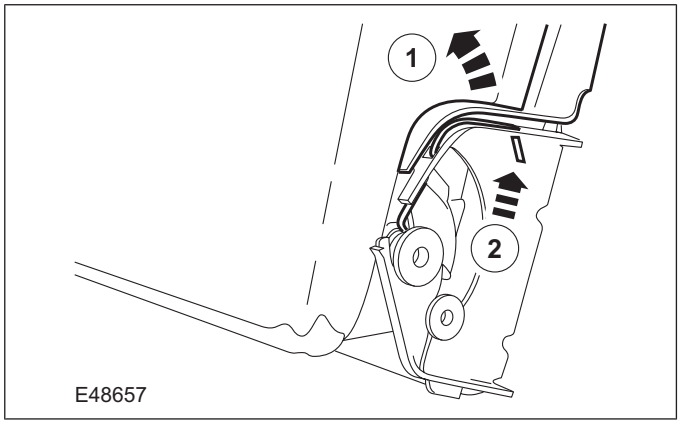
REMOVAL AND INSTALLATION

Rear Center Safety Belt Retractor

Materials	
Name	**Specification**
Cleaner	WSK-M5B401-A1
Adhesive	WSK-M2G402-A4

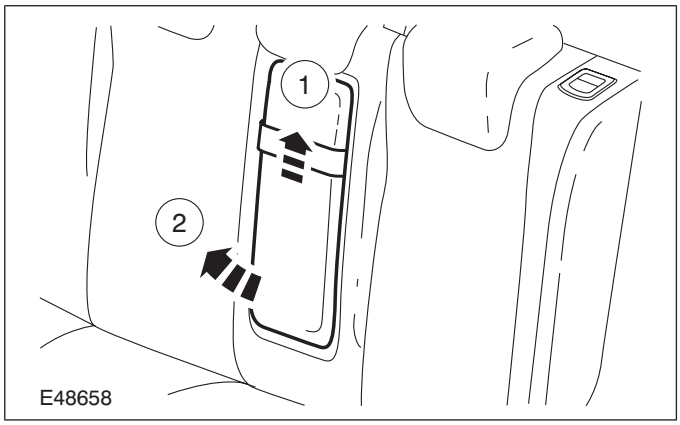
1. Detach the armrest pivot pins from the armrest retaining bracket on both sides (if equipped).

1. Pull the outer edge of the armrest backing panel upwards to gain access to the spring clip.
2. Using a thin bladed screwdriver, release the spring clip.



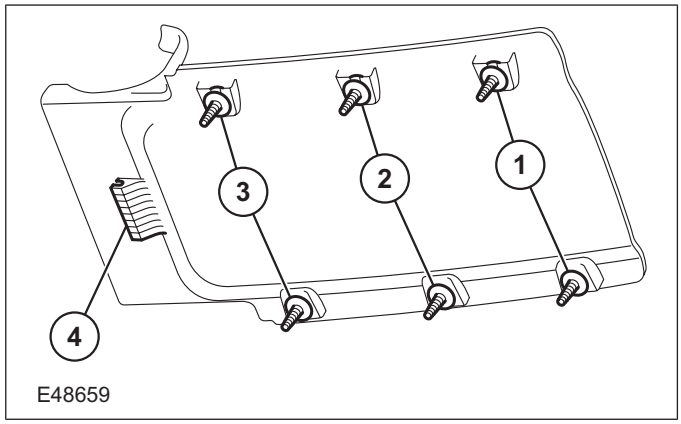
2. Remove the armrest (if equipped).

1. Slide the armrest upwards.
2. Slide the armrest outwards.



3. Remove the armrest backing panel (if equipped).

1. Detach the retaining clips from the left hand rear seat backrest in the sequence shown.



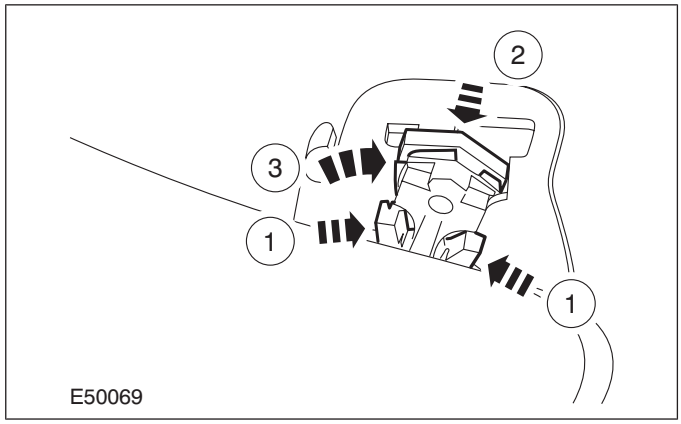
4. Fold the rear seat cushions forwards.

5. Release the rear seat backrest upper latch on both sides.

6. Fold the rear seat backrests forwards.

7. Release the rear seat backrest from the outer mounting bracket on both sides.

1. Using a suitable pair of long nose pliers, depress the clips.
2. Push the clip inwards.
3. Using a suitable screwdriver, release the locking latch.



8. CAUTION: The left-hand rear seat backrest inner pivot pin has radial grooves. Take care not to damage the right-hand seat backrest inner pivot bush.

Remove the right-hand rear seat backrest.

1. Detach the outer pivot pin from the mounting bracket.

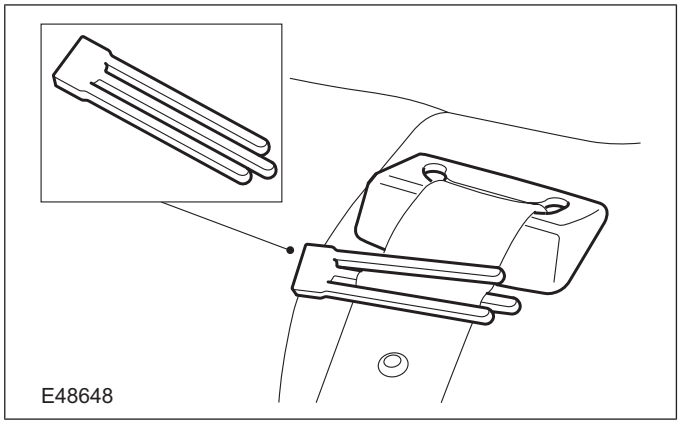
REMOVAL AND INSTALLATION

2. Detach the right-hand seat backrest from the left-hand seat backrest.



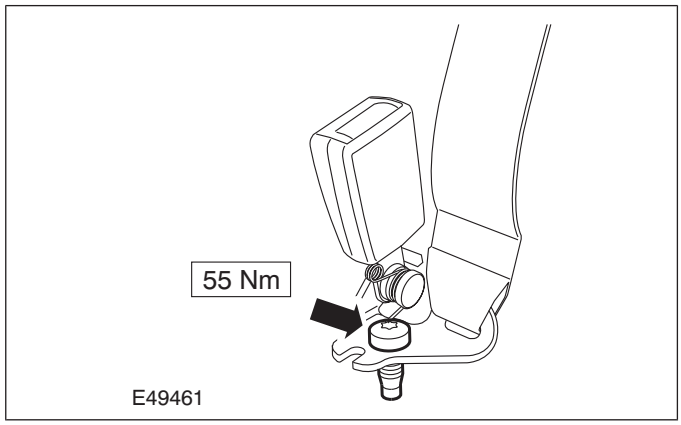
9. **CAUTION: Make sure a webbing retainer is installed at least 200 mm towards the safety belt retractor from the webbing stop.**

   Install the safety belt webbing retainer.



10. **CAUTION: The bolt securing the safety belt anchor is held captive by a metal washer. The bolt, spacer and metal washer must remain on the safety belt anchor at all times when the safety belt is detached or removed.**

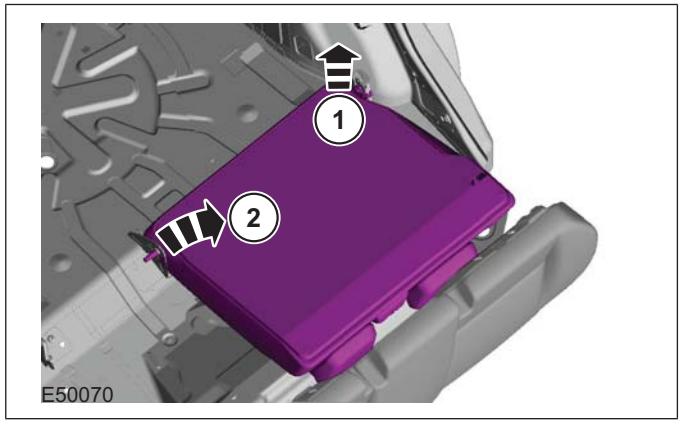
Remove the rear center safety belt lower anchor retaining bolt.



11. **CAUTION: The left-hand rear seat backrest inner pivot pin has radial grooves. Take care not to damage the center hinge pivot bush.**

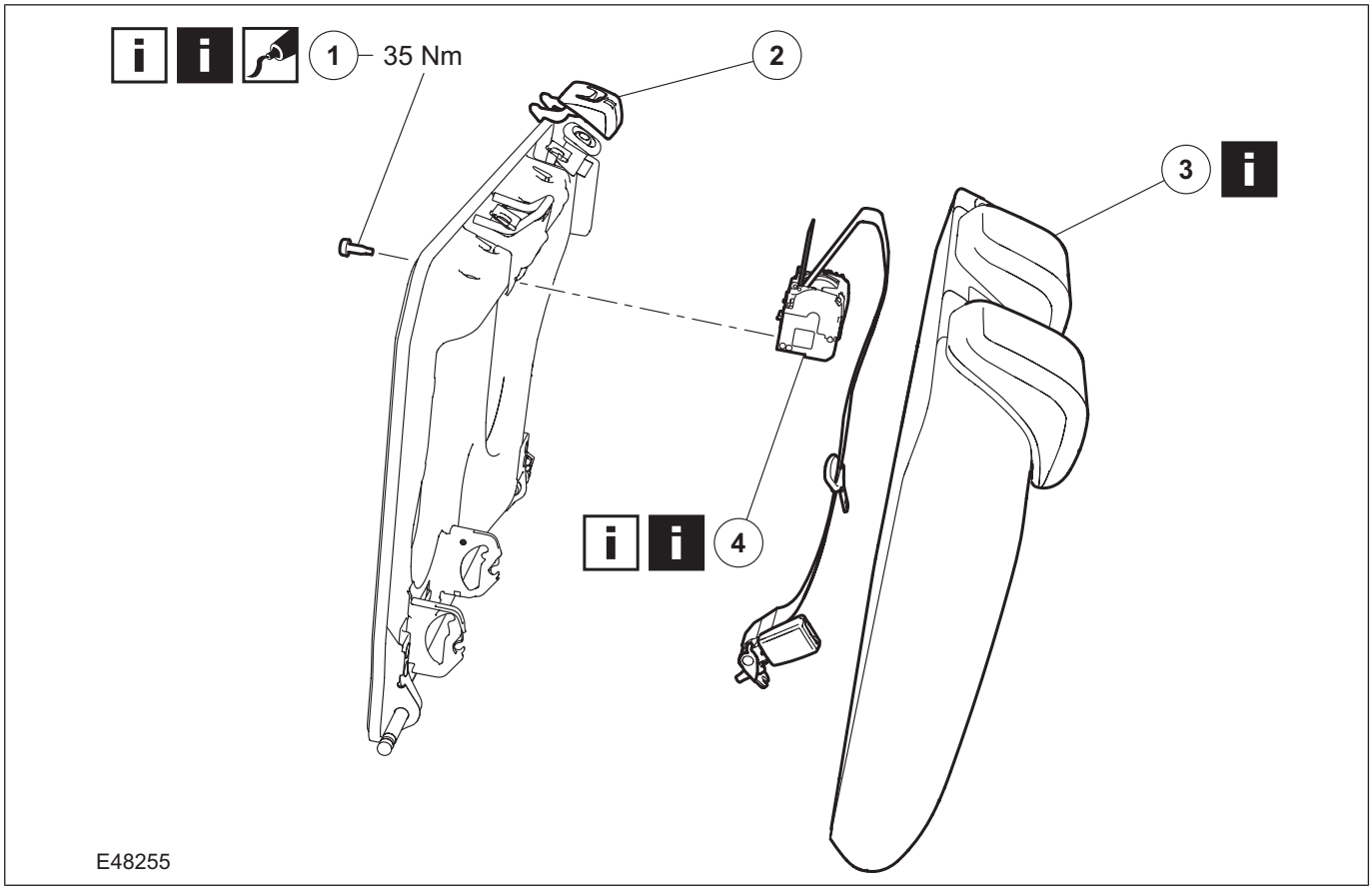
Remove the left-hand rear seat backrest.

1. Detach the outer pivot pin from the outer mounting bracket.
2. Slide the backrest from the center mounting bracket.



12. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



Item	Description
1	Rear center safety belt retractor upper anchor retaining bolt See Removal Detail See Installation Detail
2	Rear center safety belt webbing trim panel

Item	Description
3	Left-hand backrest cover and pad See Removal Detail
4	Rear center safety belt retractor See Removal Detail See Installation Detail

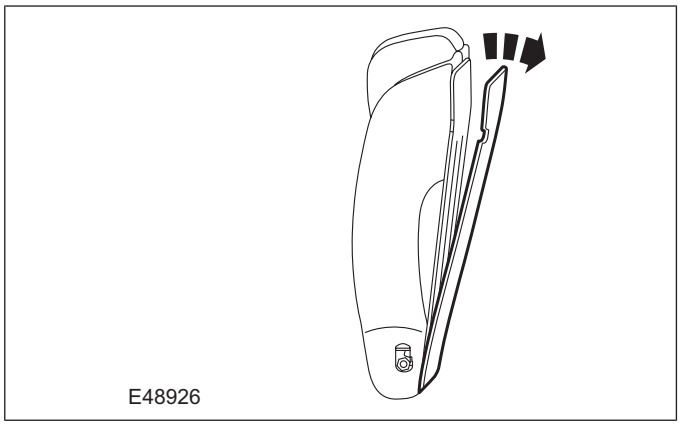
13. To install, reverse the removal procedure.

Removal Details

REMOVAL AND INSTALLATION

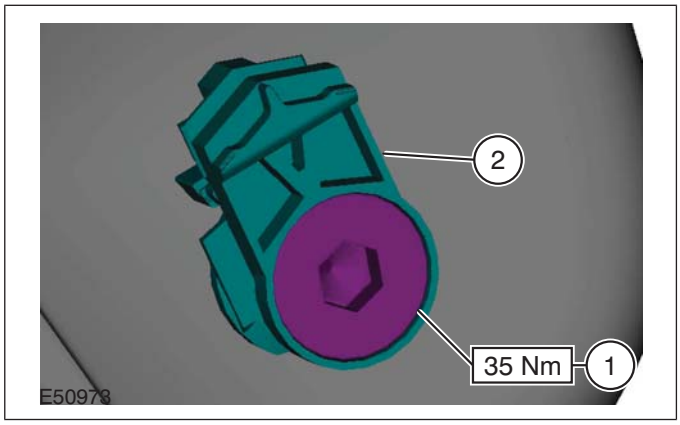
Item 1 Rear center safety belt retractor upper anchor retaining bolt

1. Detach the rear seat backrest carpet from the left-hand rear seat backrest.

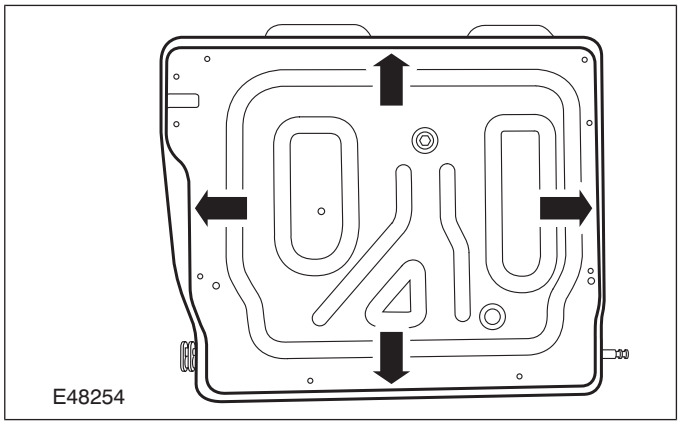


Item 3 Left-hand backrest cover and pad

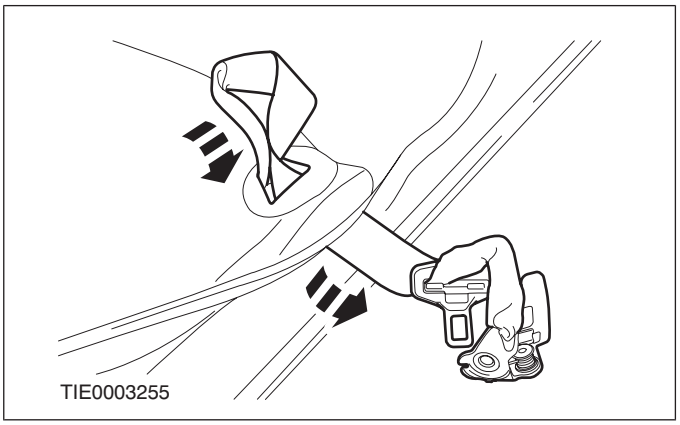
1. Remove the backrest outer pivot pin bush.
   1. Remove the pivot pin bush retaining bolt.
   2. Remove the bush.



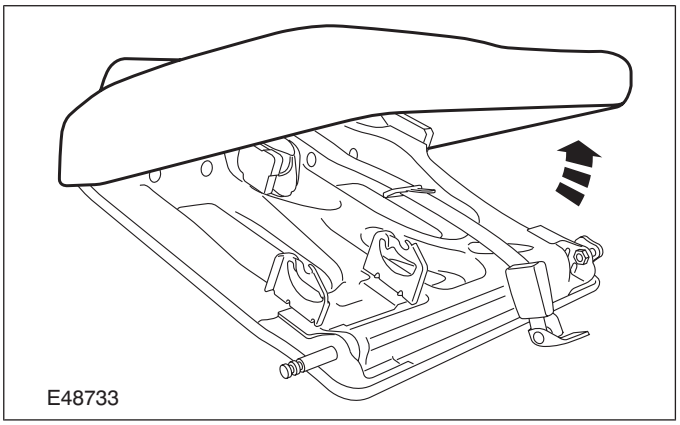
2. Detach the rear seat cover and pad from the rear seat backrest.



3. Feed the rear center seat safety belt and anchor through the reat seat cover and pad.

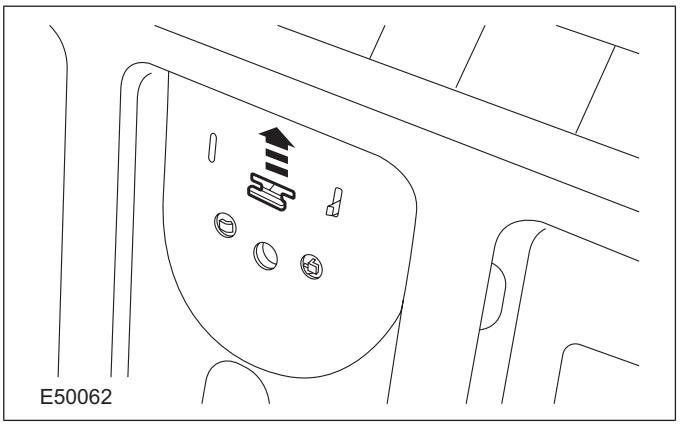


4. Raise the rear seat cover and pad to gain access to the rear center safety belt retractor.



Item 4 Rear center safety belt retractor

1. Remove the rear seat center safety belt retractor.
   - Release the locking tang.



Installation Details

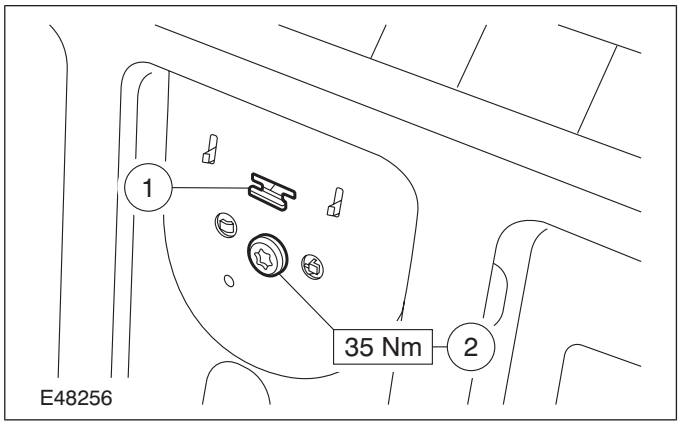
REMOVAL AND INSTALLATION

Item 4 Rear center safety belt retractor

1. **CAUTION: Make sure the rear center safety belt retractor locating tang is correctly located.**

   Install the rear center seat belt retractor.

   1. Locate the locking tang.
   2. Install the retaining bolt.



Item 1 Rear center safety belt retractor upper anchor retaining bolt

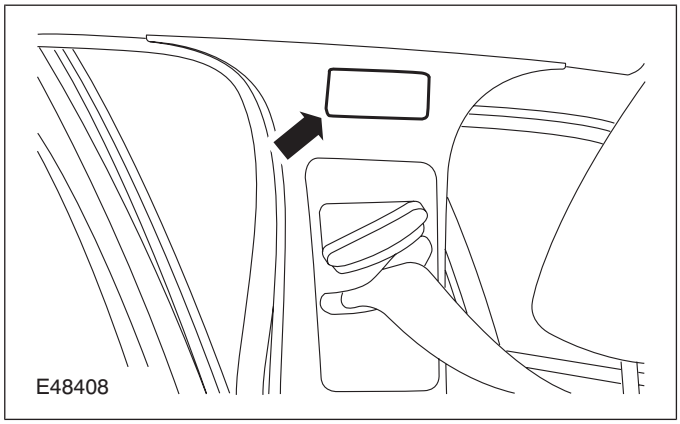
1. **Using a suitable cleaner, remove the old adhesive from the rear seat backrest.**
2. **Using a suitable adhesive, attach the rear seat backrest carpet to the rear seat backrest.**

REMOVAL AND INSTALLATION

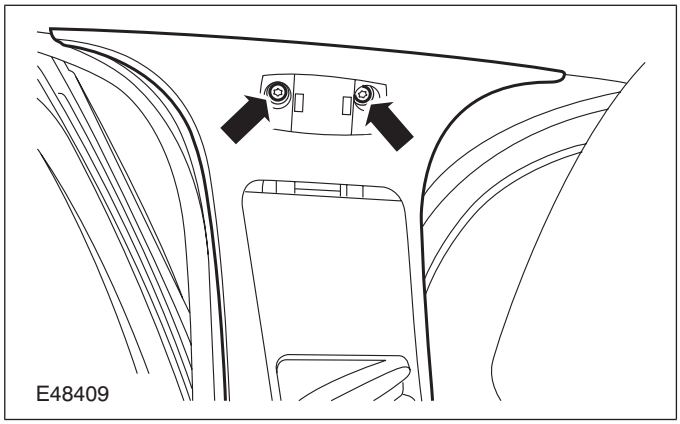
Safety Belt Shoulder Height Adjuster(40 225 0)

Removal

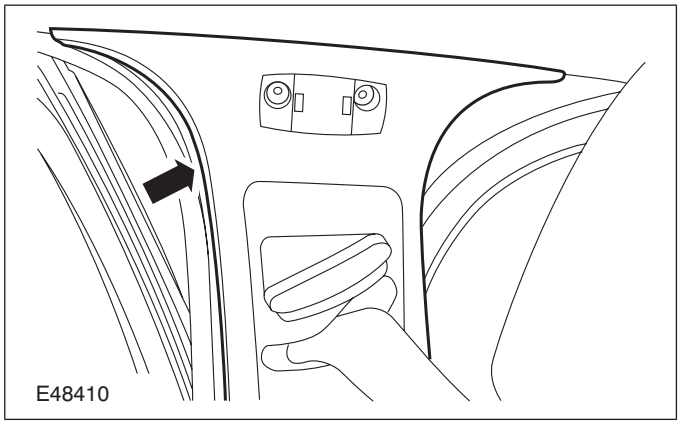
1. **Using a thin bladed screwdriver, remove the B-pillar upper trim panel retaining screws cover.**



2. **Remove the B-pillar upper trim panel retaining screws.**

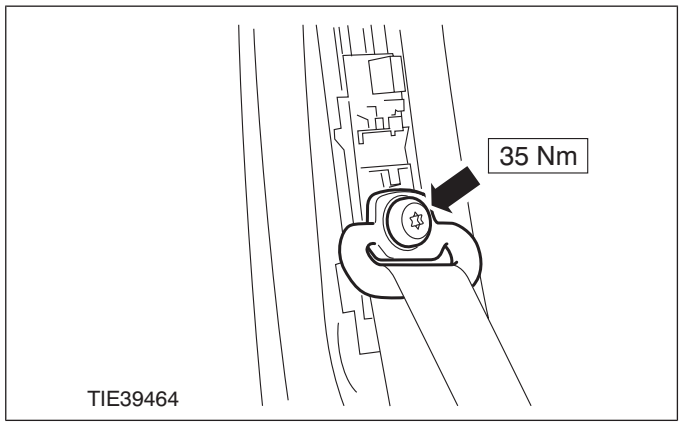


3. **Locally detach the front and rear door weatherstrips.**
4. **Detach the B-pillar upper trim panel from the B-pillar.**

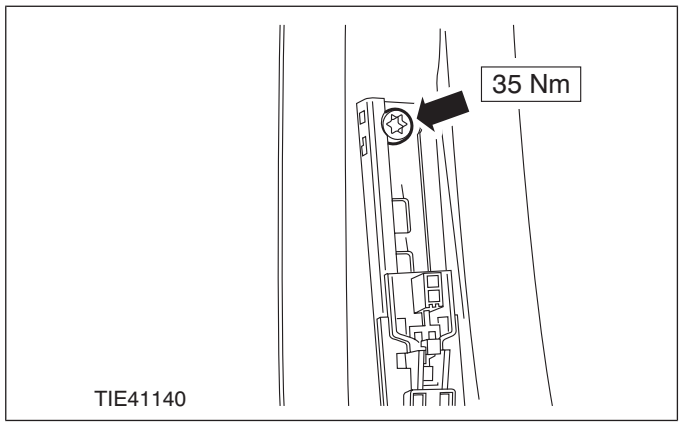


5. **CAUTION: The bolt securing the safety belt anchor is held captive by a metal washer. The bolt, spacer and metal washer must remain on the safety belt anchor at all times when the safety belt is detached or removed.**

   Detach the safety belt upper anchor from the safety belt shoulder height adjuster.



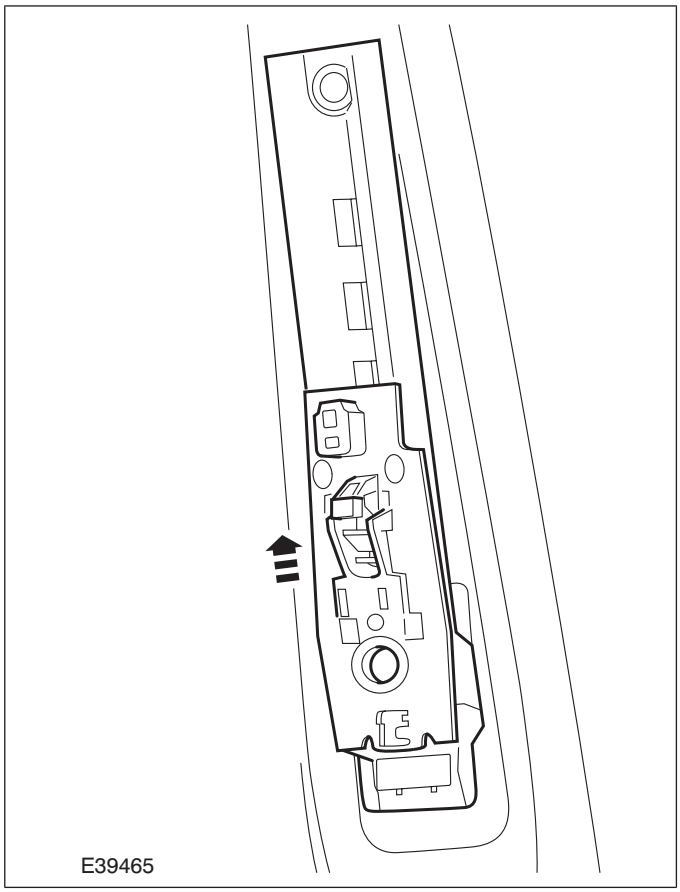
6. **Remove the safety belt shoulder height adjuster retaining bolt.**



7. **Remove the safety belt shoulder height adjuster.**

REMOVAL AND INSTALLATION

- Lift the adjuster to detach the locating tangs.



Installation

1. **CAUTION: Make sure the safety belt shoulder height adjuster locating tangs are correctly located.**

NOTE: Make sure the safety belt shoulder height adjuster locking control is correctly located on the safety belt shoulder height adjuster.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Safety Belt Buckle and Pretensioner(40 232 0)

Removal

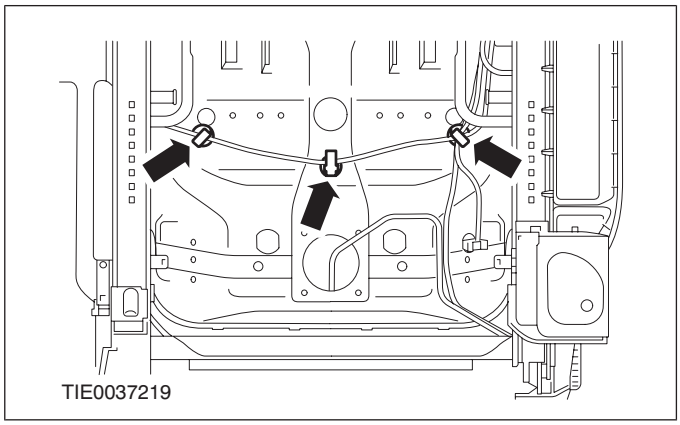
WARNING: Never probe the electrical connectors of air bag modules or any other supplemental restraint system component. Failure to follow this instruction may result in personal injury.

1. **Remove the front seat.**

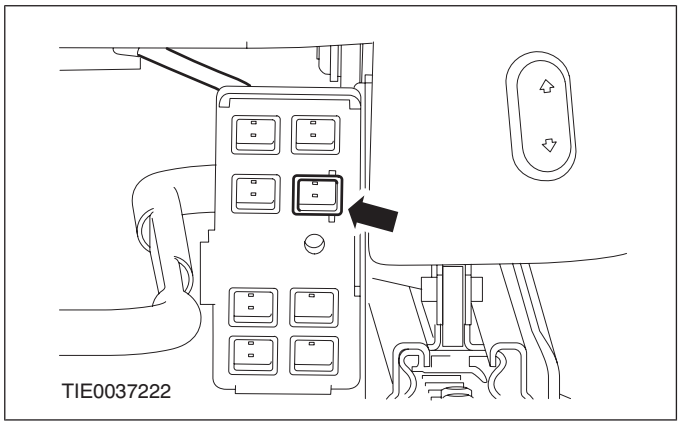
   For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).

2. **CAUTION: Note the position and routing of the safety belt buckle pretensioner wiring harnesses to aid installation. An incorrectly routed wiring harness may lead to the wiring harness becoming damaged on the seat mechanism.**

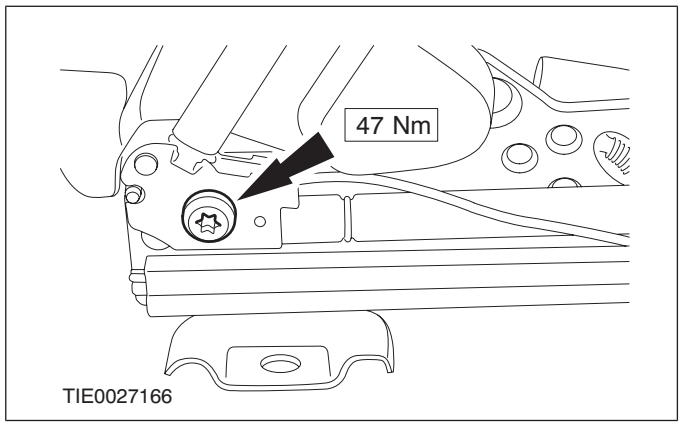
   Detach the safety belt buckle pretensioner wiring harness from the seat.


TIE0037219

3. **Detach the safety belt buckle pretensioner electrical connector from the seat frame**


TIE0037222

4. **Remove the safety belt buckle and pretensioner.**



TIE0027166

Installation

WARNING: 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.

1. **To install, reverse the removal procedure.**

SECTION 501-20B Supplemental Restraint System

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Special Tool Usage

Description	Simulator	Test and Deployment Lead (Part of Test and Deployment Lead, Air Bag/Pyrotechnic Safety Belt [418-S055])
Driver air bag module	501-073A	418-525
Passenger air bag module	501-073A	418-525
Side air curtain module	501-073A	418-525
Side air bag module	501-077	418-555
Safety belt buckle pretensioner	501-077	418-555

Torque Specifications

Item	Nm	lb-ft	lb-in
Passenger air bag module bracket retaining bolts	8	-	71
Side air bag module retaining nuts	5	-	44
Restraints control module retaining bolts	10	-	89
Side impact sensor retaining bolt	9	-	80
Crash sensor retaining bolt	9	-	80
Side air curtain retaining bolts	11	8	-
Roll over protection unit bolts	25	18	-
Torsion wall upper trim panel	25	18	-

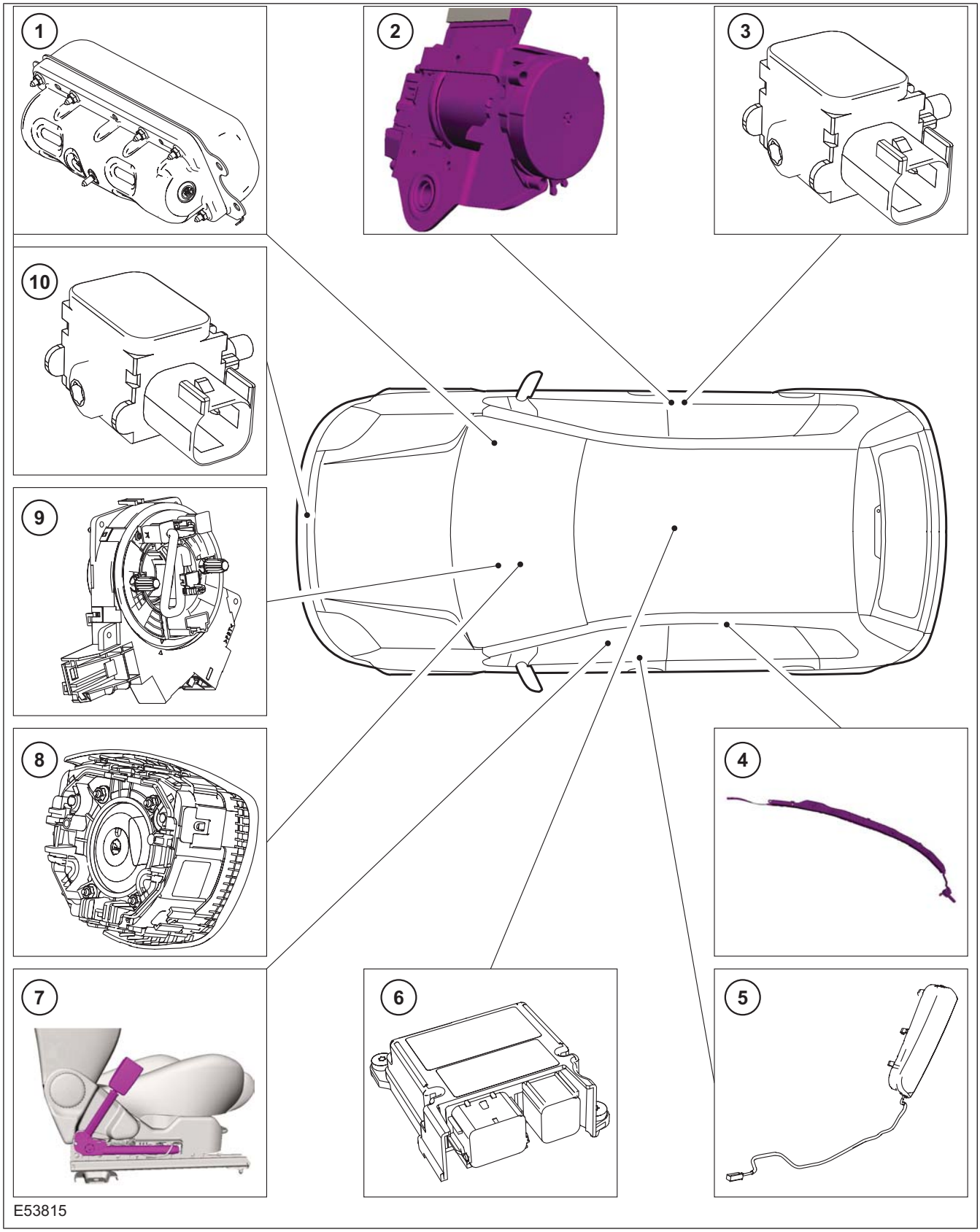
DESCRIPTION AND OPERATION

Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)

System overview

SEE DIAGRAM ON THE NEXT PAGE

DESCRIPTION AND OPERATION



E53815

Item	Description
1	Passenger air bag module
2	Safety belt retractor

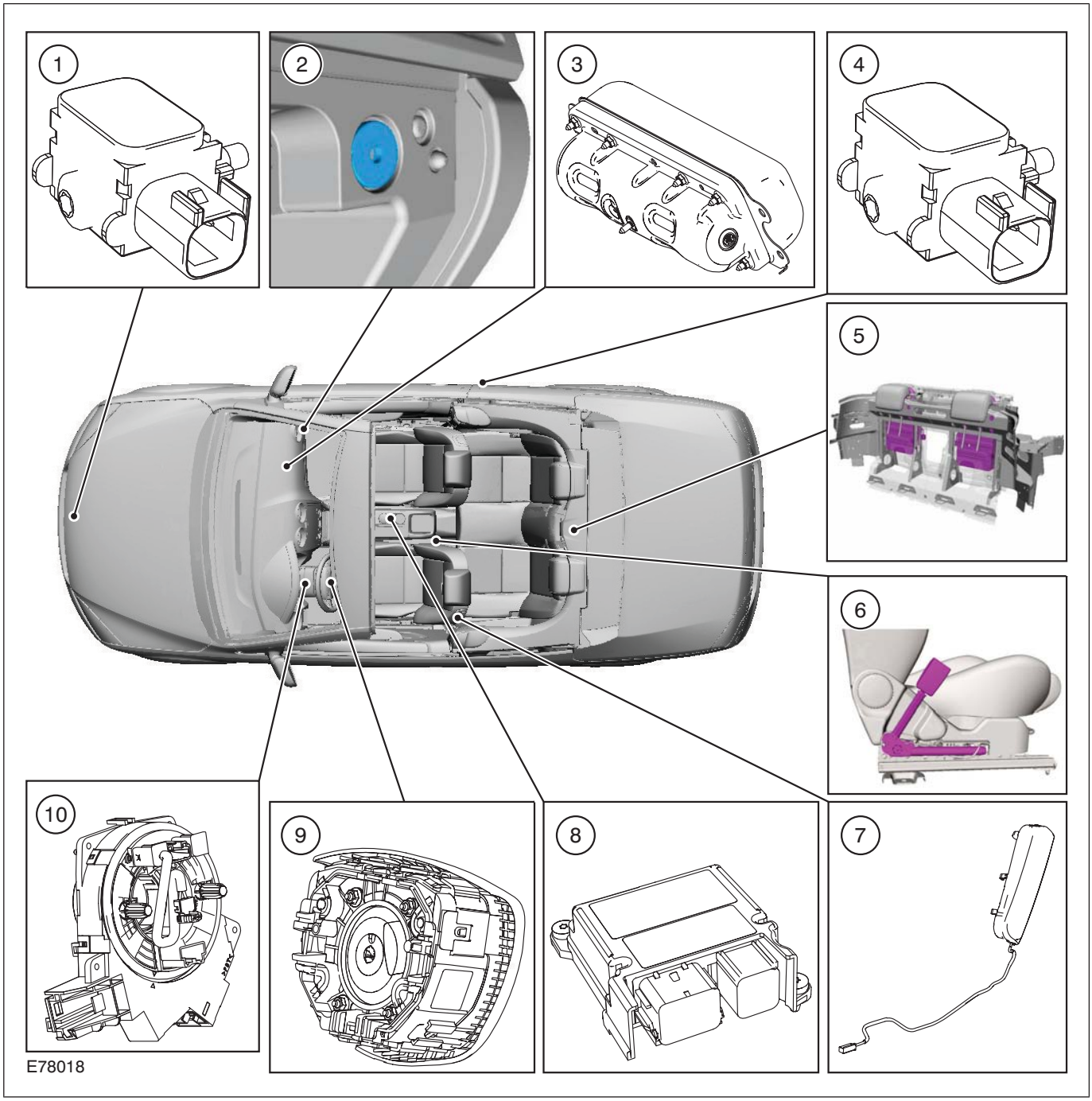
Item	Description
3	Side impact sensor
4	Side air curtain module

DESCRIPTION AND OPERATION

Item	Description
5	Side air bag module
6	Restraints control module (RCM)
7	Safety belt buckle and pretensioner

Item	Description
8	Driver air bag module
9	Clockspring
10	Crash sensor

Vehicles with a convertible top



Item	Description
1	Crash sensor
2	Passenger air bag module deactivation (PAD) switch

Item	Description
3	Passenger air bag module
4	Side impact sensor
5	Torsion wall and roll over protection units

DESCRIPTION AND OPERATION

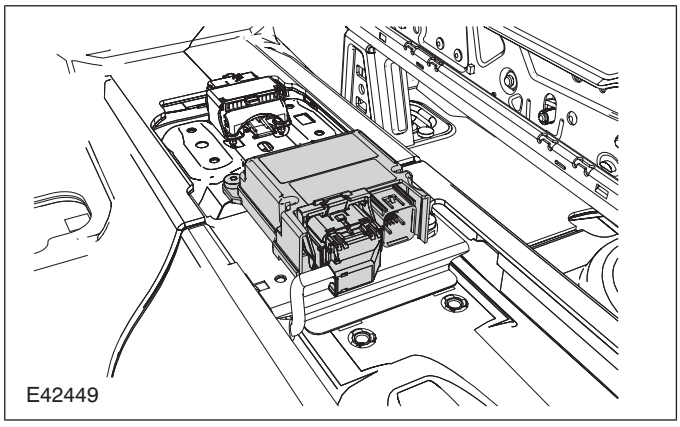
Item	Description
6	Safety belt buckle and pretensioner
7	Side air bag module
8	RCM
9	Driver air bag module
10	Clockspring

System Structure

The following components form part of the supplemental restraint system (SRS):

- RCM
- Single-stage driver and passenger air bag modules
- Side air bag modules
- Side air curtain modules - except vehicles with convertible top
- Crash sensor
- Side impact sensors
- Clockspring
- Front safety belts with front safety belt buckle switch on driver side and front safety belt pretensioners
- Safety belt retractors
- Air bag warning indicator
- Passenger Air Bag Deactivation (PAD) switch (optional)
- Roll over protection unit - vehicles with convertible top

RCM


E42449

The RCM is located under the floor console, near to the gearshift lever. Installation marks on the module are to make sure it is aligned correctly.

Micromechanical sensors are incorporated into the RCM; this measures the vehicle's acceleration/deceleration in the event of a collision. The calculated value is evaluated by the RCM to determine the severity of the impact.

The RCM compares the values it receives from the crash sensor (if equipped), the side impact sensors and the internal micromechanical sensors. If the deceleration due to a frontal or side impact exceeds a stored value then the RCM triggers the air bag modules and safety belt pretensioners as required.

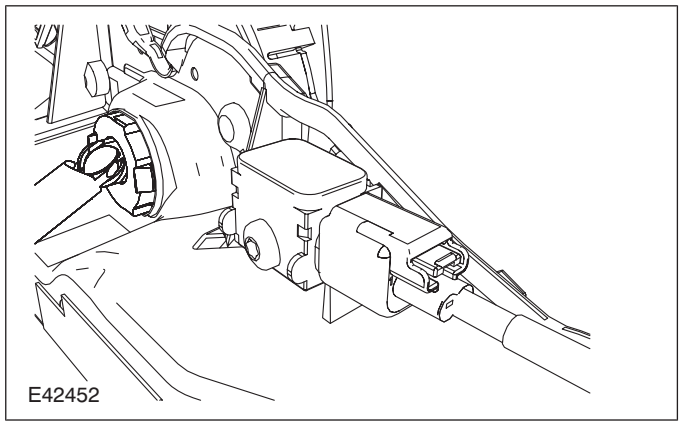
If the vehicle battery is destroyed in the collision, a voltage hold circuit in the RCM will still enable the air bag modules to be triggered up to 150 ms after the start of the impact.

If a system fault is detected by the RCM, the air bag warning lamp is illuminated. The fault can be located by carrying out a diagnostics check using the Worldwide Diagnostic System (WDS).

The RCM can be used again after a collision for up to 5 times, provided that the RCM is not physically damaged and that it passes a self-test.

The air bag modules are triggered by a direct current signal.

Crash Sensor - Vehicles built up to 05/2005


E42452

All vehicles, except vehicles with a convertible top, built 05/2005 onwards are not equipped with a crash sensor.

The crash sensor is installed at the front of the vehicle, behind the radiator grille. Data from the crash sensor is evaluated by the RCM to assess the severity of a frontal impact. The crash sensor transmits digitally encoded acceleration information to the RCM.

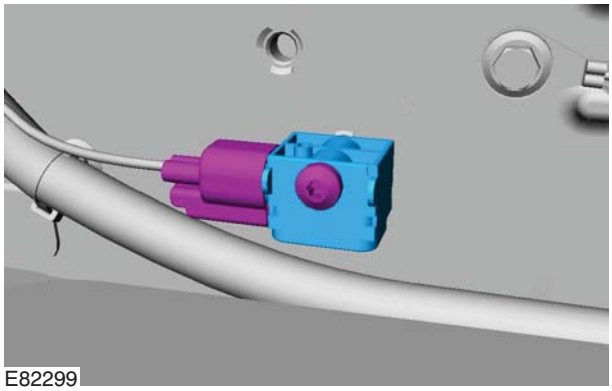
DESCRIPTION AND OPERATION

Power is supplied to the crash sensor by the RCM. If a crash sensor fails, the RCM stores a Diagnostic Trouble Code (DTC) .

Continued use of the crash sensor is permissible provided it has not been physically damaged and it passes a self-test.

The external shape of the crash sensor prevents it from being installed incorrectly.

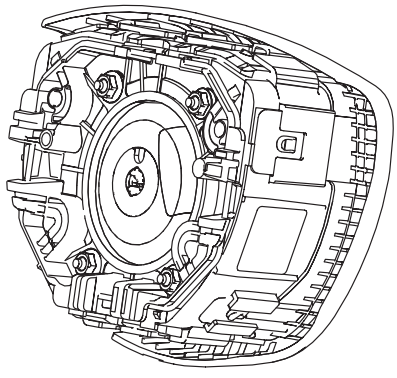
Side Impact Sensors


E82299

The side impact sensors are located at the bottom of the B-pillars and transmit digitally encoded acceleration information to the RCM.

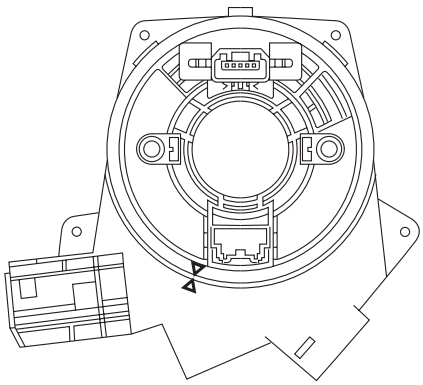
Continued use of the side impact sensor is permissible provided it has not been physically damaged and it passes a self-test.

Driver and Passenger Air Bag Modules


E51936

The driver and passenger air bags are single-stage air bags.

Clockspring


E55880

The clockspring is designed to carry signals between the RCM and the driver air bag module. The clockspring is installed on the steering column, and consists of fixed and moving parts connected by a coiled Mylar tape with internal conducting tracks. The Mylar tape is able to 'wind up' and 'unwind' as the steering wheel is rotated, maintaining electrical contact at all times between the RCM and the driver air bag module.

Vehicles with stability assist have a steering wheel rotation sensor as an integral part of the clockspring.

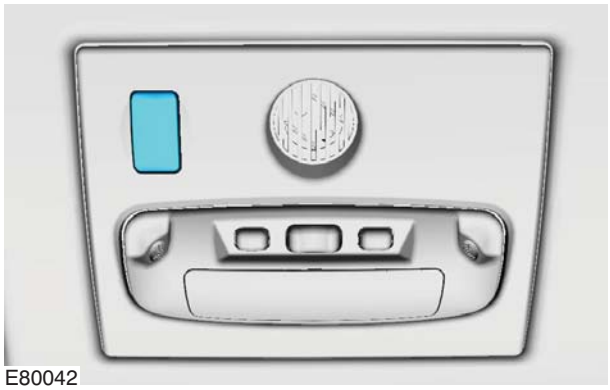
Passenger Air Bag Deactivation


E51996

A passenger air bag deactivation (PAD) switch can be fitted by the dealer as an optional extra; the PAD switch is installed in the glove box. The driver can operate the PAD switch with a key to deactivate the passenger air bag module.

When the ignition is switched on, a warning lamp in the instrument panel indicates to the driver and passenger that the passenger air bag module has been deactivated.

DESCRIPTION AND OPERATION


E80042

For vehicles with a convertible top, the PAD warning lamp is located in the overhead console.

After installing a PAD switch kit, the RCM must be re-configured using WDS.

Side Air Curtain Modules and Side Air Bag Modules

Side Air Curtains


E54899

The side air curtain modules are located in the roof rail between the A-pillar and C-pillar. They are attached to the upper part of the side panel and are hidden behind the vehicle trim panels.

The electrical connections for the 3-door are located at the base of the C-pillar, 4-door/ 5-door are located at the base of the D-pillar in the rear luggage compartment. The electrical connection for the Wagon is located in the roof in front of the liftgate.

In the event of a side impact the relevant side air curtain is deployed and forms a protective cushion between the corresponding side window and the head of the person(s) sat on the front and rear seat.

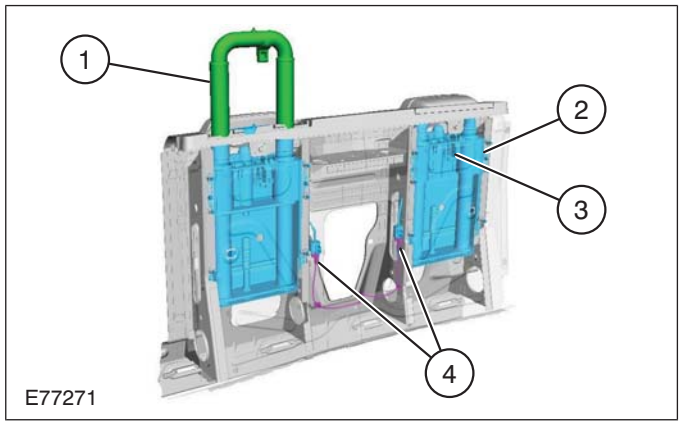
The side air curtains are deployed simultaneously with the side air bags.

Side Air Bags

The side air bags are incorporated in the front seat backrests; a sewn-on label on the respective backrest indicates the vehicle is equipped with side air bag modules.

When a side air bag is deployed, the seam of the seat cover tears open enabling the side air bag to inflate unhindered from the front seat backrest.

Roll Over Protection Unit - Convertible



E77271

Item	Description
1	Roll over bar deployed
2	Roll over protection unit
3	Roll over bar lock
4	Roll over protection unit electrical connector

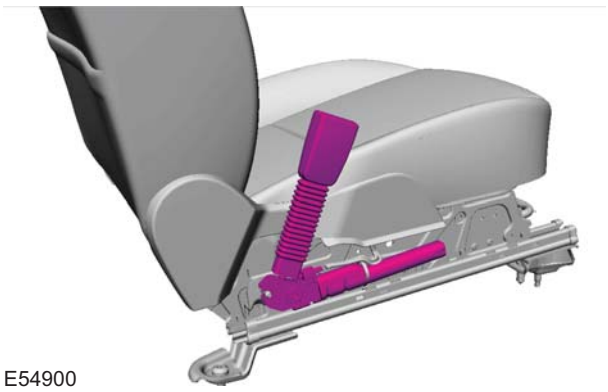
Sensors within the RCM monitor the vehicle for roll over in the event of a collision. If the roll over exceeds the stored value the RCM will trigger the roll over protection units.

When a signal is sent from the RCM to the rollover protection unit, the roll over bar lock is released, the roll over bar is deployed by spring pressure and is then locked in its fully extended position.

After a roll over protection unit is deployed the torsion wall and the roll over protection units are to be renewed.

DESCRIPTION AND OPERATION

Safety Belt Buckle and Pretensioners


E54900

The pyrotechnic pretensioners for the driver and front passenger safety belts are incorporated into the safety belt buckle stalks.

The driver's safety belt buckle has a switch for the safety belt monitoring facility, which is required by law in some markets.

The switch is connected to the RCM by means of a wiring harness.

In the event of a collision, the safety belt pretensioners can be deployed in one of two ways:

- On their own
- Simultaneously with the front air bag module(s)

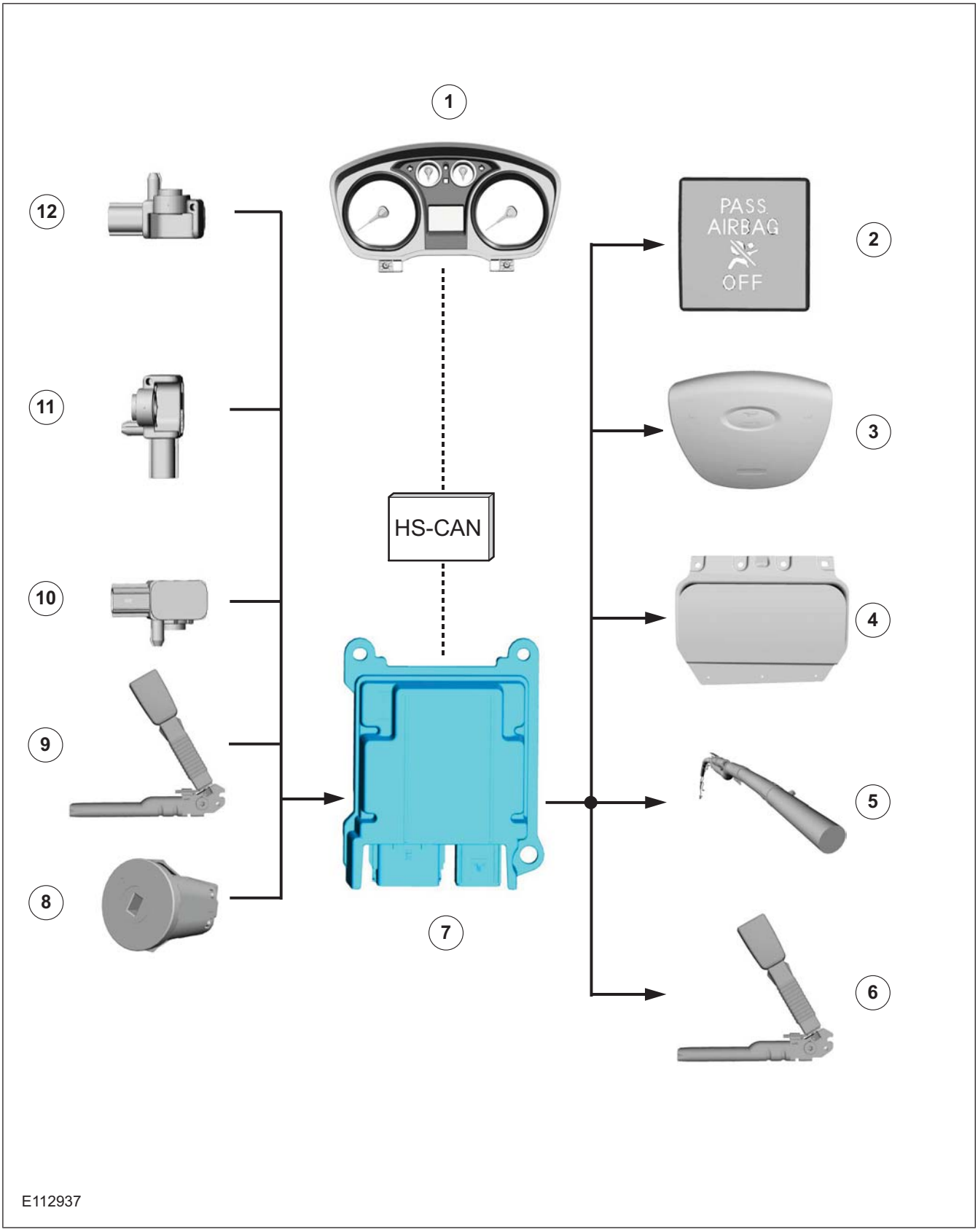
DESCRIPTION AND OPERATION

Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) – System Operation and Component Description

Control Diagram

SEE DIAGRAM ON THE NEXT PAGE

DESCRIPTION AND OPERATION



DESCRIPTION AND OPERATION

Item	Description
1	Airbag indicator light and safety belt warning light in the instrument cluster
2	PAD (passenger air bag deactivation) indicator light
3	Driver Air bag
4	Front passenger airbag
5	Driver and passenger head airbag

Item	Description
6	Driver and passenger-side safety belt pre-tensioners
7	RCM (restraints control module)
8	PAD deactivator switch
9	Safety belt switch
10	Crash sensor – right-hand
11	Front impact sensor
12	Crash sensor – left-hand

System Operation

When the ignition is switched on, the RCM performs a self-diagnostic.

During the self-diagnosis, all of the components of the supplementary restraint system are checked except the seatbelt buckle switch on the driver's side. If a fault is detected, the airbag indicator light is activated for 8 seconds after the ignition is switched on. The first 8 seconds of the ignition cycle always follow the same pattern: 3.2 seconds on followed by 4.8 seconds off. After these 8 seconds the airbag indicator lamp can be used as a fault indicator.

Triggering of the airbags and belt pretensioners is dependent on the impact speed and the impact angle.

Safety Belt Warning Indicator

The seatbelt warning lamp is actuated by the RCM via the MS-CAN (controller area network) databus. The following signals are evaluated by the module for control purposes:

- Driver safety belt buckle switch,
- vehicle speed signal via the HS-CAN data bus.

Driver side function

When the ignition is switched on, the RCM checks by means of the safety belt buckle switch to see whether the driver side safety belt is fastened.

If a road speed of approx. 25 km/h has been reached and the safety belt is not fastened, the safety belt warning lamp lights up and an audible signal is sounded.

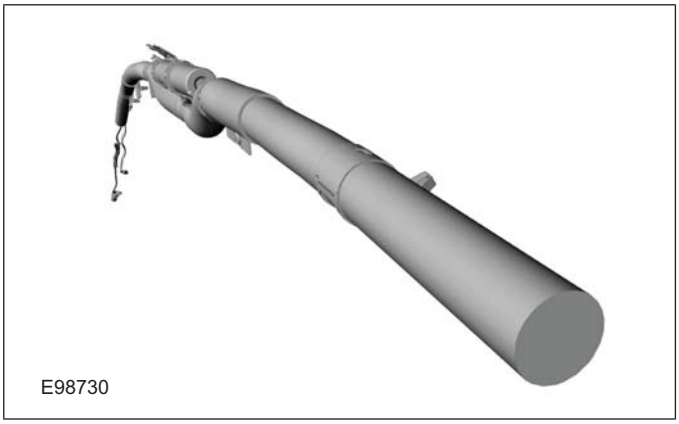
Deactivation/activation of the safety belt warning light

The safety belt warning light can be permanently deactivated. To do this:

- turn the ignition switch to position "II",
- Within a period of 60 seconds, slowly close and reopen the safety belt buckle nine times, then leave it open.
- the safety belt warning indicator flashes three times to confirm the change in status.

Component Description

Head Airbag



Due to the shape of the Recaro seats, **no** side airbag can be integrated in the backrest of the seats. In order to still offer occupants sufficient protection in the event of a side impact, head airbags are fitted to all equipment variants.

In the event of a side impact the relevant side air curtain is deployed and forms a protective cushion

DESCRIPTION AND OPERATION

between the corresponding side window and the head of the person(s) sat on the front and rear seat.

PAD deactivator switch

The PAD deactivator switch can optionally be fitted on all versions.

This device is pre-prepared at the factory and needs to be finalized in an authorized workshop.

A kit is available for this purpose which comprises a deactivation switch (key-operated switch) and a switch panel with integrated PAD indicator lamp.

The deactivator switch is installed in the glove box.

The switch panel with integrated PAD indicator lamp is fitted underneath the air conditioning control unit.

After the components are installed, the RCM must be programmed with IDS (Integrated Diagnostic System).

The driver can operate the PAD deactivator switch with the vehicle key to deactivate the passenger airbag.

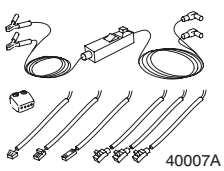
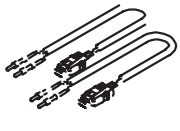
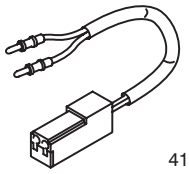
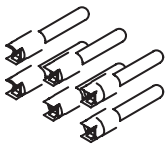
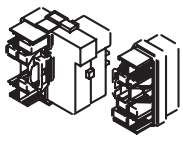
When the passenger airbag is deactivated the PAD indicator lamp lights up.

DIAGNOSIS AND TESTING

Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)

Refer to Wiring Diagrams Section 501-20B, for schematic and connector information.

Special Tool(s)

 40007A	Test and Deployment Lead, Air Bag/Pyrotechnic Safety Belt 418-S055
 418525	Test and Deployment Lead; Driver, Passenger and Side Air Curtain Module 418–525
 418142	Test and Deployment Lead, Side Air Bag Module 418–555
 501073	Simulator, Driver and Passenger Air Bags and Side Air Curtains 501-073A
 501077	Simulator, Occupant Restraint Systems 501–077

General Equipment

Ford approved diagnostic tool

Diagnosing Customer Concerns Without Hard DTCs

WARNING: To avoid accidental deployment, the restraints control module (RCM) 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.

NOTE: Following the pinpoint tests when a diagnostic trouble code (DTC) is not present, or the air bag warning lamp is not permanently illuminated, will result in needless replacement of air bag system components and repeat repairs.

Speak with the customer to determine if a particular set of conditions must be met in order for a fault to occur. If an illuminated air bag warning lamp is reported by the customer but is not present when the vehicle comes in for repair, pinpoint test diagnostics cannot be used.

Diagnosing Customer Concerns with Hard DTCs

WARNING: Do not use substitute air bag simulators when working on the SRS. Use only the appropriate tool. Failure to follow these instructions may result in personal injury.

Most air bag system diagnostic procedures require the use of system deactivation and system reactivation procedures. These procedures require the air bag module(s) and safety belt buckle pretensioners to be disconnected from the SRS, thereby removing the risk of air bag deployment while diagnostics are carried out.

Air bag simulators are required to carry out diagnosis and testing of the air bag system. The simulator contains a resistor, used to simulate an air bag module connection to the system. It is not acceptable to short-circuit the air bag module connections with a 0 ohm jumper wire. If a 0 ohm jumper wire is used to short-circuit the air bag

DIAGNOSIS AND TESTING

module connections, an illuminated air bag warning lamp will be displayed and a DTC logged by the RCM.

Deactivation

WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.

1. Disconnect the battery ground cable.

   REFER to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
2. Wait at least one minute for the backup power supply in the RCM to deplete its stored energy.

WARNING: 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.

3. Remove the driver air bag module from the vehicle.

   REFER to: Driver Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation).
4. Connect the driver air bag simulator to the sub-harness in place of the driver air bag module at the top of the steering column.
5. Disconnect the passenger air bag module electrical connector.

   REFER to: Passenger Air Bag Module - Vehicles Built From: 04/2006 (501-20 Supplemental Restraint System, Removal and Installation).
6. Connect the passenger air bag simulator to the wiring harness in place of the passenger air bag module.
7. Disconnect the side air curtain module electrical connector on both sides. REFER to: (501-20 Supplemental Restraint System)

   Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation),
8. Connect the side air curtain simulators to the wiring harnesses in place of the side air curtain modules.
9. Disconnect the driver side underseat occupant restraint systems electrical connector.
10. Connect the occupant restraint systems simulator to the driver side underseat occupant restraint systems electrical connector in place of the safety belt pretensioner and side air bag module.
11. Disconnect the passenger side underseat occupant restraint systems electrical connector.
12. Connect the occupant restraint systems simulator to the passenger side underseat occupant restraint systems electrical connector in place of the safety belt pretensioner and side air bag module.
13. Connect the battery ground cable.

    REFER to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

Reactivation

WARNING: The air bag simulators must be removed and the air bag modules reconnected when reactivated to avoid non-deployment in a collision. Failure to follow this instruction may result in personal injury.

1. Disconnect the battery ground cable.

   REFER to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
2. Wait at least one minute for the backup power supply in the RCM to deplete its stored energy.
3. Remove the driver air bag simulator from the sub-harness at the top of the steering column.
4. Connect and install the driver air bag module.

   REFER to: Driver Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation).
5. Remove the passenger air bag simulator from the passenger air bag module wiring harness.
6. Connect and install the passenger air bag module.
   / Passenger Air Bag Module - Vehicles Built From: 04/2006 (501-20 Supplemental Restraint System, Removal and Installation).
7. Remove the side air curtain simulators from the side air curtain module wiring harnesses.

DIAGNOSIS AND TESTING

8. Connect and install the side air curtain modules. REFER to: (501-20 Supplemental Restraint System)

   Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation),
9. Remove the driver side underseat occupant restraint systems simulator.
10. Connect the driver side underseat occupant restraint systems electrical connector.
11. Remove the passenger side underseat occupant restraint systems simulator.
12. Connect the passenger side underseat occupant restraint systems electrical connector.
13. Connect the battery ground cable.

    REFER to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
14. Prove out the system.

Glossary

Air Bag Simulator

Air bag simulators are used to simulate air bag module connections to the system.

Deactivate the System

Deactivate the system means to carry out the deactivation procedure. REFER to Deactivation in this procedure.

Prove Out the System

The air bag warning indicator will illuminate for three seconds. If there is a fault condition, the air bag warning indicator will stay illuminated or illuminate after a five second delay.

Reactivate the System

Reactivate the system means to carry out the reactivation procedure. REFER to Reactivation in this procedure.

Principles of Operation

SRS Operation

The vehicle is equipped with a DC fired sensing system.

In the event of a severe frontal or three-quarter frontal impact, in excess of a predetermined limit, the driver and passenger front air bags and safety belt buckle pretensioners will deploy.

In the event of a severe full side impact, in excess of a predetermined limit, either the driver or passenger side air bag, side air curtain (if equipped) and both safety belt buckle pretensioners will deploy.

Air bag deployment will only occur, in the event of a severe collision, when the ignition key is in the RUN position. The passenger air bag deactivation (PAD) switch (if equipped) will deactivate the passenger air bag, passenger safety belt buckle pretensioner and passenger side air bag in the event of a severe frontal or side impact; it will not deactivate the passenger side air curtain.

RCM

The RCM retains full control of the whole system, providing continual system checks and full diagnostic capabilities. The non-volatile memory stores the diagnostic trouble codes, which can then be downloaded through the data link connector (DLC) to the Ford approved diagnostic tool.

In the event of a failure in the vehicle supply during an accident, the RCM provides a backup power supply, sufficient to deploy the air bag(s) for a minimum of 150 ms. The backup power supply is discharged by the RCM within 60 seconds of the battery ground cable being disconnected.

RCM - Vehicles built up to 05/2005

The RCM contains electronic acceleration sensors which measure the longitudinal acceleration and the lateral acceleration and provide both signals to the micro-controller proportional to the amount of acceleration measured. When these sensors sense an impact in excess of a predetermined limit, and the crash sensor or side impact sensor sends a signal to the RCM, the RCM initiates the circuit to deploy the air bag(s). The RCM also contains a safing sensor which enables the front air bags and the safety belt buckle pretensioners in the event of a front impact. The safing sensor also prevents unintentional deployment of the front air bags and safety belt buckle pretensioners in the event of a fault in the electronic acceleration sensor(s).

RCM - Vehicles built from 05/2005

The RCM contains two electronic acceleration sensors which measure longitudinal acceleration and one electronic acceleration sensor which measures lateral acceleration. One longitudinal

acceleration sensor replaces the crash sensor as a safing sensor. Longitudinal and lateral signals, proportional to the amount of acceleration measured, are fed to a safing micro-controller. The second longitudinal acceleration sensor and the side impact sensors also feed signals, proportional to the amount of acceleration, to a micro-controller. When both micro-controllers sense an impact in excess of a predetermined limit the RCM initiates the circuit to deploy the air bag(s). The safing micro-controller enables the front air bags and the safety belt buckle pretensioners in the event of a front impact. The safing micro-controller also prevents unintentional deployment of the front air bags and safety belt buckle pretensioners in the event of a fault in the electronic acceleration sensor(s).

Crash Sensor – Vehicles built up to 05/2005

NOTE: From 05/2005 onwards the vehicle will not be equipped with a crash sensor.

The crash sensor contains an acceleration sensor, filter, amplifier and an application specific integrated circuit for signal transmitting and is mounted on the radiator grille opening panel reinforcement. The crash sensor sends a signal at a level determined by the crash severity to the RCM. The RCM will evaluate the signal against stored data and deploy the frontal air bags and safety belt buckle pretensioners if required. Both the crash sensor and the internal RCM longitudinal acceleration sensor must exceed a preset limit to initiate the air bag.

Side Impact Sensor

The side impact sensors are mounted at the base of the B-pillar on either side of the vehicle, to facilitate remote lateral impact sensing. Each side impact sensor contains an acceleration sensor, filter, amplifier and an application specific integrated circuit for signal transmitting. In the event of an impact, in excess of a predetermined limit, the side impact sensor sends a signal at a level determined by the crash severity to the RCM. The RCM will evaluate the signal against stored data and deploy the side air bag on the side the deployment request was initiated. Both the side impact sensor and the internal RCM lateral acceleration sensor must exceed a preset limit to initiate the air bag. The RCM retains control of the side air bags, side air curtains and safety belt buckle pretensioners.

Air Bag Warning Indicator

The air bag warning indicator is incorporated into the instrument cluster, together with the automatic detach detect circuit. The air bag warning indicator illuminates for three seconds at key ON. If the system self-tests OK the indicator extinguishes, if there is a fault condition, the air bag warning indicator will stay illuminated or illuminate after a five second delay.

The system is designed to illuminate the air bag warning indicator continuously if the RCM circuit is broken, either by loss of power, ground supply, module disconnect or CAN BUS failure. The RCM retaining bolts are the ground circuit.

Diagnostic evaluation of the SRS can be made through the DLC and the Ford approved diagnostic tool to establish the nature of the concern. Once the DTC is known the appropriate course of action can be selected from the Symptom Chart.

Inspection and Verification

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

Visual Inspection Chart

Electrical
• Fuse(s) • Electrical connector(s) • Circuit(s) • Wiring harness • Air bag module(s)

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, connect the Ford approved diagnostic tool to the DLC and select the vehicle to be tested from the Ford approved diagnostic tool menu.
5. Retrieve the DTCs and refer to the Symptom Chart.

DIAGNOSIS AND TESTING

Symptom Chart

NOTE: It is only allowed to repair circuits between connectors. If damage has occurred within a connector a connector replacement kit, if available, must be installed. If a connector replacement kit is not available a new wiring harness must be installed. Connectors must not be disassembled.

Symptom	Possible Sources	Action
• No communication with the module	• DLC. • RCM. • Circuit(s).	• GO to Pinpoint Test A.
• DTC B1046: Driver side air curtain cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test B.
• DTC B1047: Driver side air bag cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test C.
• DTC B1048: Passenger air bag cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test D.
• DTC B1049: Passenger safety belt pretensioner cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test E.
• DTC B104B: Driver side impact sensor cross link to another sensor	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another sensor' DTC before carrying out the pinpoint test. • GO to Pinpoint Test F.
• DTC B104C: Passenger side impact sensor cross link to another sensor	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another sensor' DTC before carrying out the pinpoint test. • GO to Pinpoint Test G.
• DTC B104D: Front crash sensor cross link to another sensor	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another sensor' DTC before carrying out the pinpoint test. • GO to Pinpoint Test H.
• DTC B104E: Driver side impact sensor short to ground or battery	• Circuit(s).	• GO to Pinpoint Test I.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• DTC B104F: Passenger side impact sensor internal fault	• Side impact sensor.	• INSTALL a new side impact sensor. REFER to: Side Impact Sensor (501-20 Supplemental Restraint System, Removal and Installation) REPEAT the self-test, CLEAR the DTCs.
• DTC B1050: Passenger side impact sensor short to ground or battery	• Circuit(s).	• GO to Pinpoint Test J.
• DTC B1051: Driver side impact sensor internal fault	• Side impact sensor.	• INSTALL a new side impact sensor. REFER to: Side Impact Sensor (501-20 Supplemental Restraint System, Removal and Installation) REPEAT the self-test, CLEAR the DTCs.
• DTC B1052: Passenger safety belt buckle switch cross link to another circuit	• Circuit(s).	• GO to Pinpoint Test K.
• DTC B1053: Driver safety belt buckle switch cross link to another circuit	• Circuit(s).	• GO to Pinpoint Test L.
• DTC B1054: Driver safety belt pretensioner cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test M.
• DTC B1055: Passenger side air bag cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test N.
• DTC B1056: Passenger side air curtain cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test O.
• DTC B1057: Driver air bag cross link to another firing circuit	• Circuit(s).	**NOTE:** Check for a matching 'cross link to another firing circuit' DTC before carrying out the pinpoint test. • GO to Pinpoint Test P.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• DTC B105A: Restraints control module (RCM) crash counter full	• RCM.	• INSTALL a new RCM. REFER to: Restraints Control Module (RCM) (501-20 Supplemental Restraint System, Removal and Installation) REPEAT the self-test, CLEAR the DTCs.
• DTC B1231: Longitudinal acceleration threshold exceeded	• Crash data memory full.	**NOTE:** The data memory can be cleared a maximum of five times. • Clear the data memory using the Ford approved diagnostic tool. REPEAT the self-test, CLEAR the DTCs.
• DTC B1317: Battery voltage high	• Charging system.	• Check the charging system. REFER to: Charging System (414-00 Charging System - General Information, Diagnosis and Testing). REPEAT the self-test, CLEAR the DTCs.
• DTC B1318: Battery voltage low	• Battery. • Charging system. • Circuit.	• GO to Pinpoint Test Q.
• DTC B1342: Restraints control module (RCM) is defective	• RCM.	• INSTALL a new RCM. REFER to: Restraints Control Module (RCM) (501-20 Supplemental Restraint System, Removal and Installation) REPEAT the self-test, CLEAR the DTCs.
• DTC B1868: Air bag warning indicator lamp circuit failure	• Instrument cluster.	• Check the instrument cluster. REPEAT the self-test, CLEAR the DTCs.
• DTC B1871: Passenger air bag deactivation (PAD) module fault	• Mismatch between PAD indicator and PAD switch circuit.	• GO to Pinpoint Test R.
• DTC B1877: Driver safety belt pretensioner open circuit	• Driver safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test S.
• DTC B1878: Driver safety belt pretensioner short to battery	• Driver safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test T.
• DTC B1879: Driver safety belt pretensioner short to ground	• Driver safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test U.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• DTC B1881: Passenger safety belt pretensioner open circuit	• Passenger safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test V.
• DTC B1882: Passenger safety belt pretensioner short to battery	• Passenger safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test W.
• DTC B1883: Passenger safety belt pretensioner short to ground	• Passenger safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test X.
• DTC 1884: Passenger air bag deactivation (PAD) indicator inoperative	• RCM. • PAD indicator. • Circuit(s).	• GO to Pinpoint Test Y.
• DTC B1885: Driver safety belt pretensioner low resistance	• Driver safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test Z.
• DTC B1886: Passenger safety belt pretensioner low resistance	• Passenger safety belt pretensioner. • Circuit(s).	• GO to Pinpoint Test AA.
• DTC B1890: Passenger air bag deactivation (PAD) indicator short to battery	• PAD indicator. • Circuit(s).	• GO to Pinpoint Test AB.
• DTC B1916: Driver air bag short to battery	• Clockspring. • Circuit(s).	• GO to Pinpoint Test AC.
• DTC B1921: Air bag diagnostic monitor ground circuit open	• RCM internal fault.	• GO to Pinpoint Test AD.
• DTC B1925: Passenger air bag short to battery	• Circuit(s).	• GO to Pinpoint Test AE.
• DTC B1932: Driver air bag open circuit	• Driver air bag module. • Clockspring. • Circuit(s).	• GO to Pinpoint Test AF.
• DTC B1933: Passenger air bag open circuit	• Passenger air bag module. • Circuit(s).	• GO to Pinpoint Test AG.
• DTC B1934: Driver air bag circuit low resistance	• Driver air bag module. • Clockspring. • Circuit(s).	• GO to Pinpoint Test AH.
• DTC B1935: Passenger air bag circuit low resistance	• Passenger air bag module. • Circuit(s).	• GO to Pinpoint Test AI.
• DTC B1936: Driver air bag circuit short to ground	• Driver air bag module. • Clockspring. • Circuit(s).	• GO to Pinpoint Test AJ.
• DTC B1938: Passenger air bag circuit short to ground	• Passenger air bag module. • Circuit(s).	• GO to Pinpoint Test AK.
• DTC B1992: Driver side air bag circuit short to battery	• Driver side air bag module. • Circuit(s).	• GO to Pinpoint Test AL.
• DTC B1993: Driver side air bag circuit short to ground	• Driver side air bag module. • Circuit(s).	• GO to Pinpoint Test AM.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• DTC B1994: Driver side air bag circuit open circuit	• Driver side air bag module. • Circuit(s).	• GO to Pinpoint Test AN.
• DTC B1995: Driver side air bag circuit low resistance	• Driver side air bag module. • Circuit(s).	• GO to Pinpoint Test AO.
• DTC B1996: Passenger side air bag circuit short to battery	• Passenger side air bag module. • Circuit(s).	• GO to Pinpoint Test AP.
• DTC B1997: Passenger side air bag circuit short to ground	• Passenger side air bag module. • Circuit(s).	• GO to Pinpoint Test AQ.
• DTC B1998: Passenger side air bag circuit open circuit	• Passenger side air bag module. • Circuit(s).	• GO to Pinpoint Test AR.
• DTC B1999: Passenger side air bag circuit low resistance	• Passenger side air bag module. • Circuit(s).	• GO to Pinpoint Test AS.
• DTC B2226: Front crash sensor internal fault	• Crash sensor.	• INSTALL a new crash sensor. REFER to: Crash Sensor (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs.
• DTC B2227: Front crash sensor communications fault	• Crash sensor. • RCM. • Circuit(s).	• GO to Pinpoint Test AT.
• DTC B2433: Driver safety belt buckle switch circuit short to battery	• Driver safety belt buckle switch. • Circuit(s).	• GO to Pinpoint Test AU.
• DTC B2437: Passenger safety belt buckle switch circuit short to battery	• Passenger safety belt buckle switch. • Circuit(s).	• GO to Pinpoint Test AV.
• DTC B2477: Restraints control module (RCM) configuration failure	• New RCM incorrectly configured.	• CHECK model option content. CONFIGURE the RCM. For additional information, REFER to the Ford approved diagnostic tool.
• DTC B2773: Driver side air curtain circuit low resistance	• Driver side air curtain module. • Circuit(s).	• GO to Pinpoint Test AW.
• DTC B2774: Driver side air curtain circuit open circuit	• Driver side air curtain module. • Circuit(s).	• GO to Pinpoint Test AX.
• DTC B2775: Driver side air curtain circuit short to ground	• Driver side air curtain module. • Circuit(s).	• GO to Pinpoint Test AY.
• DTC B2776: Driver side air curtain circuit short to battery	• Circuit(s).	• GO to Pinpoint Test AZ.
• DTC B2777: Passenger side air curtain circuit low resistance	• Passenger side air curtain module. • Circuit(s).	• GO to Pinpoint Test BA.

DIAGNOSIS AND TESTING

Symptom	Possible Sources	Action
• DTC B2778: Passenger side air curtain circuit open circuit	• Passenger side air curtain module. • Circuit(s).	• GO to Pinpoint Test BB.
• DTC B2779: Passenger side air curtain circuit short to ground	• Passenger side air curtain module. • Circuit(s).	• GO to Pinpoint Test BC.
• DTC B2780: Passenger side air curtain circuit short to battery	• Circuit(s).	• GO to Pinpoint Test BD.
• DTC B2855: Front crash sensor circuit short to battery or ground	• Circuit(s).	• GO to Pinpoint Test BE.
• DTC B2856: Front crash sensor to restraints control module (RCM) mismatch	• Incorrect new crash sensor installed.	• INSTALL the correct crash sensor. REFER to: Crash Sensor (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs.
• DTC B2886: Passenger side impact sensor to restraints control module (RCM) mismatch	• Incorrect new side impact sensor installed.	• INSTALL the correct side impact sensor. REFER to: Side Impact Sensor (501-20 Supplemental Restraint System, Removal and Installation) REPEAT the self-test, CLEAR the DTCs.
• DTC B2887: Driver side impact sensor to restraints control module (RCM) mismatch	• Incorrect new side impact sensor installed.	• INSTALL the correct side impact sensor. REFER to: Side Impact Sensor (501-20 Supplemental Restraint System, Removal and Installation) REPEAT the self-test, CLEAR the DTCs.
• DTC U0073: Restraints control module (RCM) communication bus off	• Circuit(s).	• GO to Pinpoint Test BF.
• DTC U1900: CAN communication bus fault	• Circuit(s).	• GO to Pinpoint Test BG.
• DTC U2017: Driver side impact sensor communications fault	• Driver side impact sensor. • RCM. • Circuit(s).	• GO to Pinpoint Test BH.
• DTC U2018: Passenger side impact sensor communications fault	• Passenger side impact sensor. • RCM. • Circuit(s).	• GO to Pinpoint Test BI.

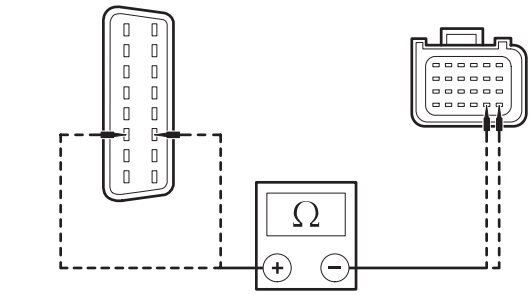
DIAGNOSIS AND TESTING

Pinpoint Tests

PINPOINT TEST A : NO COMMUNICATION WITH THE MODULE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: CHECK THE AIR BAG WARNING INDICATOR	
	1 Ignition switch in position II.
	2 The air bag warning indicator should illuminate when the ignition is in the ON position for three seconds then go out. If a fault is present, the air bag warning indicator will illuminate after five seconds. • Does the air bag warning indicator illuminate after five seconds? → **Yes** INSTALL a new RCM. REFER to: Restraints Control Module (RCM) (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to A2.
A2: CHECK THE DLC CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Ignition switch in position 0.
	2 Deactivate the SRS.
	3 Disconnect RCM C426.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036828	4 Measure the resistance between the: • DLC C200 pin 3, circuit 4-EC10 (GY) and the RCM C426 pin 19, circuit 4-EC10N (GY), harness side. • DLC C200 pin 11, circuit 5-EC10 (BU) and the RCM C426 pin 20, circuit 5-EC10N (BU), harness side. • Are the resistances less than 5 ohms? → **Yes** INSTALL a new RCM. REFER to: Restraints Control Module (RCM) (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 4-EC10N (GY) or circuit 5-EC10N (BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST B : DTC B1046: DRIVER SIDE AIR CURTAIN CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK THE DRIVER SIDE AIR CURTAIN CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Air Curtain Module Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C429 pin 1, circuit 91S-JA50 (BK/RD), harness side and the inoperative air bag module circuits. • RCM C429 pin 2, circuit 15S-JA50 (GN/OG), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST C : DTC B1047: DRIVER SIDE AIR BAG CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: CHECK THE DRIVER SIDE AIR BAG CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and the inoperative air bag module circuits. • RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST D : DTC B1048: PASSENGER AIR BAG CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: CHECK THE PASSENGER AIR BAG CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.
	3 Disconnect Passenger Air Bag Module Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C426 pin 9, circuit 15S-JA31 (GN/WH), harness side and the inoperative air bag module circuits. • RCM C426 pin 10, circuit 91S-JA31 (BK/WH), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

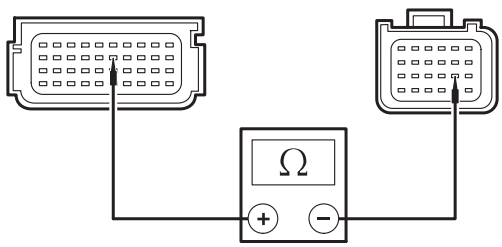
PINPOINT TEST E : DTC B1049: PASSENGER SAFETY BELT PRETENSIONER CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

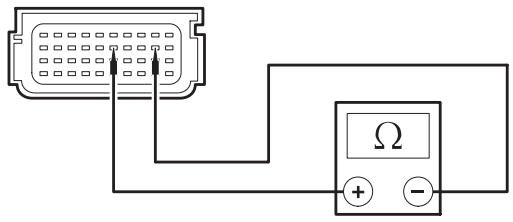
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C429 pin 9, circuit 91S-JA34 (BK/RD), harness side and the inoperative air bag module circuits. • RCM C429 pin 10, circuit 15S-JA34 (GN/OG), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST F : DTC B104B: DRIVER SIDE IMPACT SENSOR CROSS LINK TO ANOTHER SENSOR

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F1: CHECK FOR A CROSS LINK BETWEEN THE CRASH SENSOR AND THE DRIVER SIDE IMPACT SENSOR	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.
	3 Disconnect RCM C429.
	4 Disconnect Crash Sensor C420.
	5 Disconnect Driver Side Impact Sensor C427.
 E64733	6 Measure the resistance between the RCM C426 pin 14, circuit 8-JA49 (WH), harness side and the RCM C429 pin 26, circuit 8-JA39 (WH), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** GO to F2. → **No** REPAIR circuit 8-JA39 (WH) and circuit 8-JA49 (WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

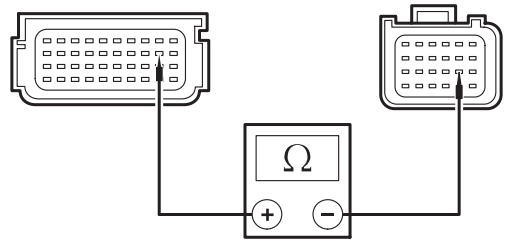
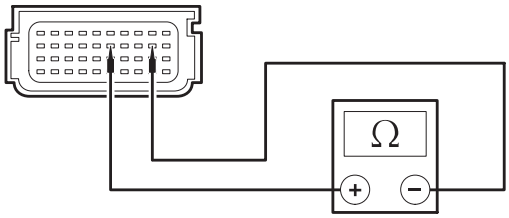
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F2: CHECK FOR A CROSS LINK BETWEEN THE DRIVER SIDE IMPACT SENSOR CIRCUIT AND THE PASSENGER SIDE IMPACT SENSOR CIRCUIT	
	1 Disconnect Passenger Side Impact Sensor C428.
 E64734	2 Measure the resistance between the RCM C429 pin 26, circuit 8-JA39 (WH), harness side and the RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA39 (WH) and circuit 8-JA40 (WH/VT). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST G : DTC B104C: PASSENGER SIDE IMPACT SENSOR CROSS LINK TO ANOTHER SENSOR

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G1: CHECK FOR A CROSS LINK BETWEEN THE CRASH SENSOR AND THE PASSENGER SIDE IMPACT SENSOR	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.
	3 Disconnect RCM C429.
	4 Disconnect Crash Sensor C420.
	5 Disconnect Passenger Side Impact Sensor C428.

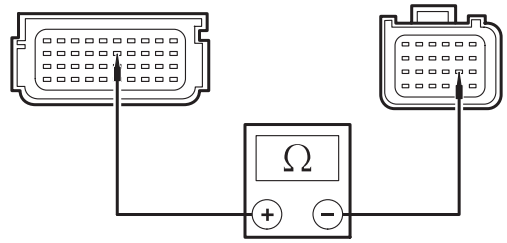
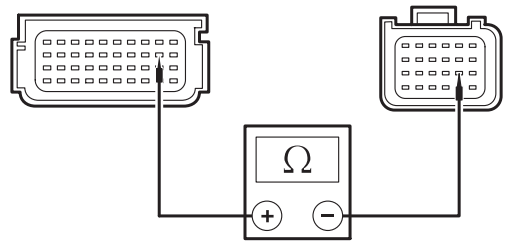
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E64840	6 Measure the resistance between the RCM C426 pin 14, circuit 8-JA49 (WH), harness side and the RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** GO to G2. → **No** REPAIR circuit 8-JA40 (WH/VT) and circuit 8-JA49 (WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
G2: CHECK FOR A CROSS LINK BETWEEN THE DRIVER SIDE IMPACT SENSOR CIRCUIT AND THE PASSENGER SIDE IMPACT SENSOR CIRCUIT	
	1 Disconnect Driver Side Impact Sensor C427.
 E64734	2 Measure the resistance between the RCM C429 pin 26, circuit 8-JA39 (WH), harness side and the RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA39 (WH) and circuit 8-JA40 (WH/VT). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST H : DTC B104D: FRONT CRASH SENSOR CROSS LINK TO ANOTHER SENSOR

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
H1: CHECK FOR A CROSS LINK BETWEEN THE CRASH SENSOR AND THE DRIVER SIDE IMPACT SENSOR	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.
	3 Disconnect RCM C429.
	4 Disconnect Crash Sensor C420.
	5 Disconnect Driver Side Impact Sensor C427.

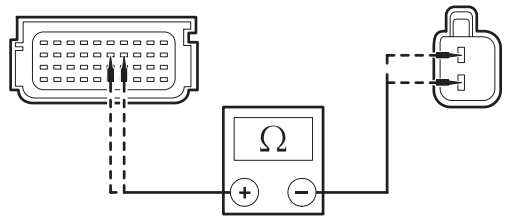
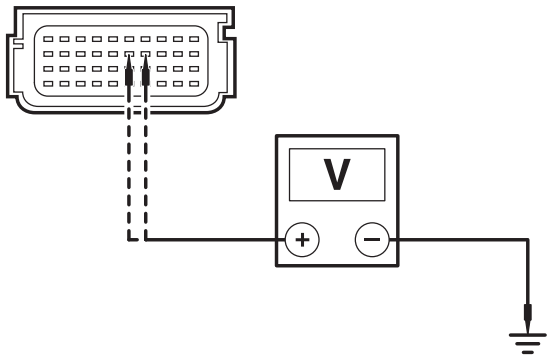
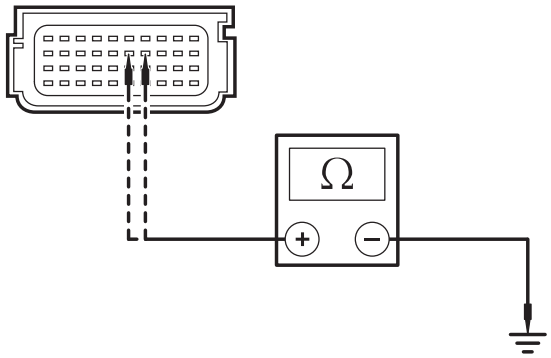
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E64733	6 Measure the resistance between the RCM C426 pin 14, circuit 8-JA49 (WH), harness side and the RCM C429 pin 26, circuit 8-JA39 (WH), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** GO to H2. → **No** REPAIR circuit 8-JA39 (WH) and circuit 8-JA49 (WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
H2: CHECK FOR A CROSS LINK BETWEEN THE CRASH SENSOR AND THE PASSENGER SIDE IMPACT SENSOR	
	1 Disconnect Passenger Side Impact Sensor C428.
 E64840	2 Measure the resistance between the RCM C426 pin 14, circuit 8-JA49 (WH), harness side and the RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA40 (WH/VT) and circuit 8-JA49 (WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST I : DTC B104E: DRIVER SIDE IMPACT SENSOR SHORT TO GROUND OR BATTERY

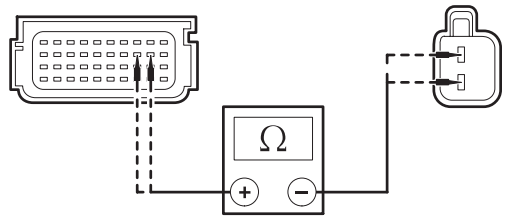
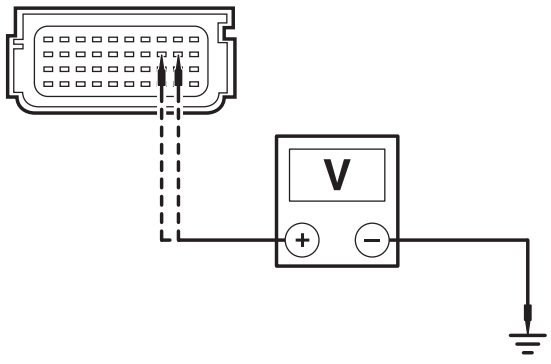
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
I1: DTC B104E: CHECK THE DRIVER SIDE IMPACT SENSOR CIRCUITS	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Impact Sensor C427.

DIAGNOSIS AND TESTING

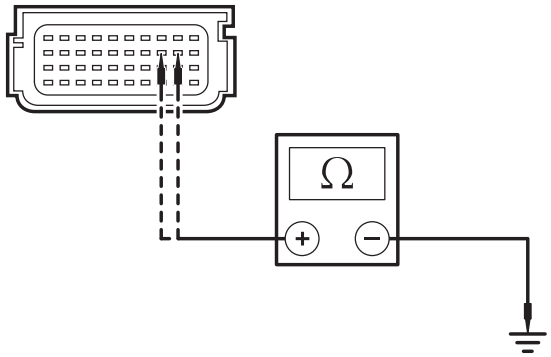
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036518	4 Measure the resistance between the: • RCM C429 pin 26, circuit 8-JA39 (WH), harness side and the driver side impact sensor C427 pin 1, circuit 8-JA39 (WH), harness side. • RCM C429 pin 27, circuit 9-JA39 (BN), harness side and the driver side impact sensor C427 pin 2, circuit 9-JA39 (BN), harness side. • Are the resistances less than 5 ohms? → **Yes** GO to I2. → **No** REPAIR circuit 8-JA39 (WH) or circuit 9-JA39 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
I2: CHECK THE DRIVER SIDE IMPACT SENSOR FOR SHORT TO BATTERY	
	1 Ignition switch in position II.
 E51133	2 Measure the voltage between the: • RCM C429 pin 26, circuit 8-JA39 (WH), harness side and ground. • RCM C429 pin 27, circuit 9-JA39 (BN), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 8-JA39 (WH) or circuit 9-JA39 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to I3.
I3: CHECK THE DRIVER SIDE IMPACT SENSOR FOR SHORT TO GROUND	
	1 Ignition switch in position 0.
 E51134	2 Measure the resistance between the: • RCM C429 pin 26, circuit 8-JA39 (WH), harness side and ground. • RCM C429 pin 27, circuit 9-JA39 (BN), harness side and ground. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA39 (WH) or circuit 9-JA39 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

PINPOINT TEST J : DTC B1050: PASSENGER SIDE IMPACT SENSOR SHORT TO GROUND OR BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
J1: CHECK THE PASSENGER SIDE IMPACT SENSOR CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Impact Sensor C428.
 TIE0036519	4 Measure the resistance between the: • RCM C429 pin 28, circuit 9-JA40 (BN/WH), harness side and the driver side impact sensor C428 pin 2, circuit 9-JA40 (BN/WH), harness side. • RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side and the driver side impact sensor C428 pin 1, circuit 8-JA40 (WH/VT), harness side. • Are the resistances less than 5 ohms? → **Yes** GO to J2. → **No** REPAIR circuit 8-JA40 (WH/VT) or circuit 9-JA40 (BN/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
J2: CHECK THE PASSENGER SIDE IMPACT SENSOR FOR SHORT TO BATTERY	
	1 Ignition switch in position II.
 E51135	2 Measure the voltage between the: • RCM C429 pin 28, circuit 9-JA40 (BN/WH), harness side and ground. • RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 8-JA40 (WH/VT) or circuit 9-JA40 (BN/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to J3.

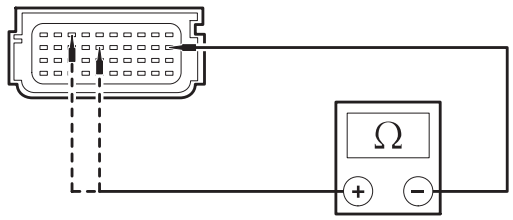
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
J3: CHECK THE PASSENGER SIDE IMPACT SENSOR FOR SHORT TO GROUND	
	1 Ignition switch in position 0.
 E51136	2 Measure the resistance between the: • RCM C429 pin 28, circuit 9-JA40 (BN/WH), harness side and ground. • RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side and ground. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA40 (WH/VT) or circuit 9-JA40 (BN/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST K : DTC B1052: PASSENGER SAFETY BELT BUCKLE SWITCH CROSS LINK TO ANOTHER CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
K1: CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	4 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.

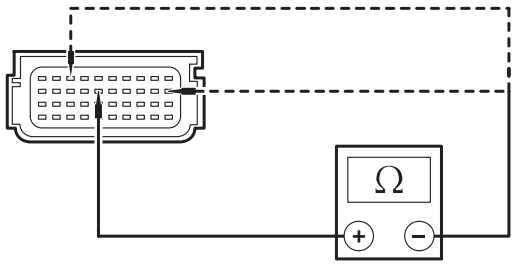
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E64735	5 Measure the resistance between the: • RCM C429 pin 25, circuit 8-JA54 (WH), harness side and the RCM C429 pin 30, circuit 8-JA55 (WH/BK), harness side. • RCM C429 pin 30, circuit 8-JA55 (WH/BK), harness side and the RCM C429 pin 33, circuit 8-JA52 (WH/GN), harness side. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA52 (WH/GN) or circuit 8-JA54 (WH) or circuit 8-JA55 (WH/BK). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST L : DTC B1053: DRIVER SAFETY BELT BUCKLE SWITCH CROSS LINK TO ANOTHER CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
L1: CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	4 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 E64841	5 Measure the resistance between the: • RCM C429 pin 25, circuit 8-JA54 (WH), harness side and the RCM C429 pin 30, circuit 8-JA55 (WH/BK), harness side. • RCM C429 pin 25, circuit 8-JA54 (WH), harness side and the RCM C429 pin 33, circuit 8-JA52 (WH/GN), harness side. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA52 (WH/GN) or circuit 8-JA54 (WH) or circuit 8-JA55 (WH/BK). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST M : DTC B1054: DRIVER SAFETY BELT PRETENSIONER CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
M1: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C429 pin 17, circuit 15S-JA33 (GN/BU), harness side and the inoperative air bag module circuits. • RCM C429 pin 18, circuit 91S-JA33 (BK/BU), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST N : DTC B1055: PASSENGER SIDE AIR BAG CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
N1: CHECK THE PASSENGER SIDE AIR BAG CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and the inoperative air bag module circuits. • RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST O : DTC B1056: PASSENGER SIDE AIR CURTAIN CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
O1: CHECK THE PASSENGER SIDE AIR CURTAIN CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Air Curtain Module Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C429 pin 11, circuit 91S-JA51 (BK/BU), harness side and the inoperative air bag module circuits. • RCM C429 pin 12, circuit 15S-JA51 (GN/BU), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST P : DTC B1057: DRIVER AIR BAG CROSS LINK TO ANOTHER FIRING CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
P1: CHECK THE DRIVER AIR BAG CIRCUITS	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.
	3 Disconnect Driver Air Bag Module Simulator.
	4 Disconnect Inoperative Air Bag Module Simulator.

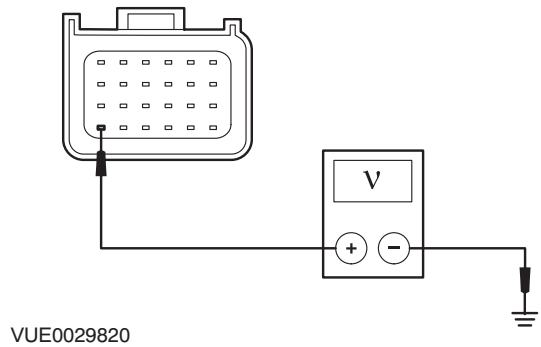
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	NOTE: Refer to the Wiring Diagrams for pin detail. 5 Measure the resistance between the: • RCM C426 pin 3, circuit 15S-JA8 (GN/RD), harness side and the inoperative air bag module circuits. • RCM C426 pin 4, circuit 91S-JA8 (BK/OG), harness side and the inoperative air bag module circuits. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR the circuits. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST Q : DTC B1318: BATTERY VOLTAGE LOW

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Q1: CHECK THE BATTERY VOLTAGE	
	1 Ignition switch in position II.
	2 Check the battery voltage with the ignition in the ON position. • Is the battery voltage greater than 8 volts? → **Yes** GO to Q2. → **No** CHECK the battery and charging system. REPEAT the self-test, CLEAR the DTCs.
Q2: CHECK THE RCM SUPPLY CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Ignition switch in position 0.
	2 Deactivate the SRS.
	3 Disconnect RCM C426.
	4 Ignition switch in position II.

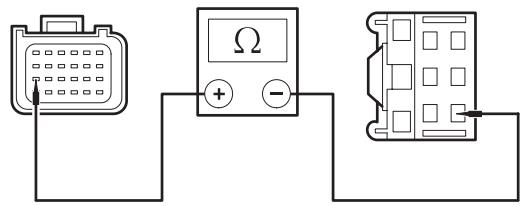
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VUE0029820	5 Measure the voltage between the RCM C426 pin 24, circuit 15-JA10 (GN/OG), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** GO to Q3. → **No** REPAIR circuit 15-JA10 (GN/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
Q3: CHECK THE RCM SUPPLY CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Fuse 65.
	3 Measure the resistance between the RCM C426 pin 24, circuit 15-JA10 (GN/OG), harness side and fuse 65, harness side. • Is the resistance less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15-JA10 (GN/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

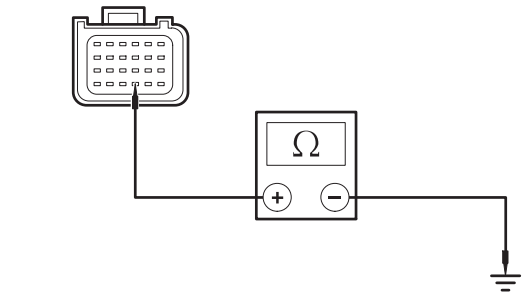
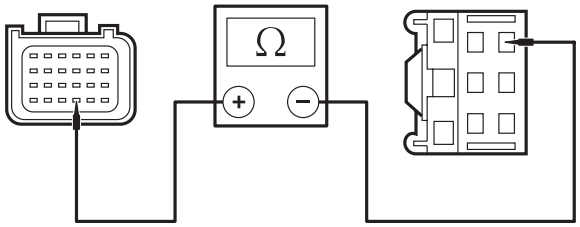
PINPOINT TEST R : DTC B1871: PASSENGER AIR BAG DEACTIVATION (PAD) MODULE FAULT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
R1: CHECK FOR VOLTAGE TO THE PAD CONTROL SWITCH	
	1 Ignition switch in position II.
	2 Operate the PAD control switch to the OFF position. • Does the PAD indicator LED illuminate? → **Yes** GO to R2. → **No** GO to R3.
R2: CHECK FOR CONTINUITY BETWEEN THE RCM AND THE PAD CONTROL SWITCH	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing	

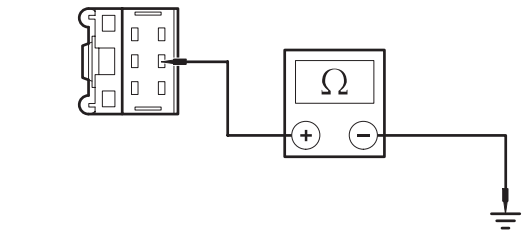
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Ignition switch in position 0.
	2 Deactivate the SRS.
	3 Disconnect RCM C426.
	4 Disconnect PAD Switch C619.
 TIE0036491	5 Measure the resistance between the RCM C426 pin 18, circuit 31S-JA31 (BK/WH), harness side and the PAD control switch C619 pin 6, circuit 31S-JA31 (BK/WH), harness side. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new PAD control switch. REFER to: Passenger Air Bag Deactivation (PAD) Switch (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 31S-JA31 (BK/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
R3: CHECK FOR CONTINUITY BETWEEN THE RCM AND GROUND	
	1 Ignition switch in position 0.
	2 Deactivate the SRS.
	3 Disconnect RCM C426.
	4 Operate the PAD switch to the ON position.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0030702	5 Measure the resistance between the RCM C426 pin 21, circuit 31S-JA47 (BK/OG), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** CONFIGURE the PAD switch, REFER to the Ford approved diagnostic tool. CLEAR the DTCs. REACTIVATE the system. If the concern remains, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to R4.
R4: CHECK FOR CONTINUITY BETWEEN THE RCM AND THE PAD SWITCH	
	1 Disconnect PAD switch C619.
 E0036492	2 Measure the resistance between the RCM C426 pin 21, circuit 31S-JA47 (BK/OG), harness side and the PAD switch C619 pin 4, circuit 31S-JA47 (BK/OG), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to R5. → **No** REPAIR circuit 31S-JA47 (BK/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

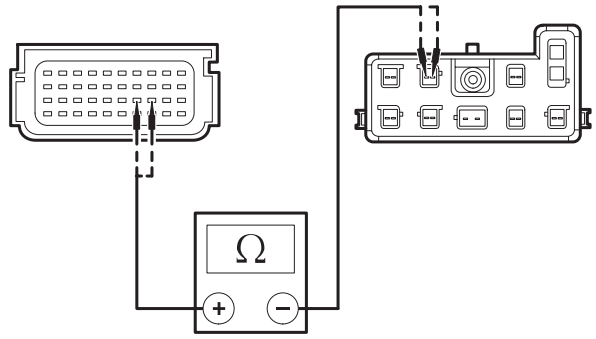
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
R5: CHECK FOR CONTINUITY BETWEEN THE PAD SWITCH AND GROUND	
 TIE0030703	1 Measure the resistance between the PAD switch C619 pin 5, circuit 31-JA47 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new PAD switch. REFER to: Passenger Air Bag Deactivation (PAD) Switch (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 31-JA47 (BK). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST S : DTC B1877: DRIVER SAFETY BELT PRETENSIONER OPEN CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
S1: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to S2. → **No** GO to S3.
S2: PROVE OUT THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Driver Side Underseat Occupant Restraint Systems Electrical Connector C30.
	4 Ignition switch in position II.

DIAGNOSIS AND TESTING

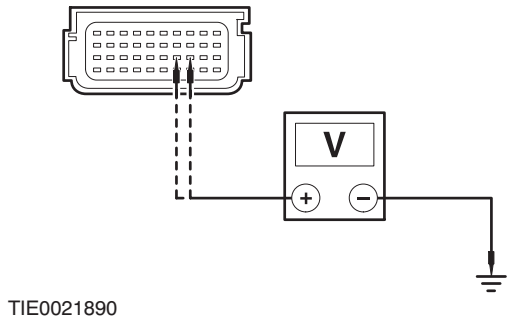
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
S3: CHECK THE DRIVER SAFETY BELT PRETENSIONER FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
 E57098	4 Measure the resistance between the: • RCM C429 pin 17, circuit 15S-JA33 (GN/BU), harness side and the driver side underseat occupant restraint systems electrical connector C30 pin 7, circuit 15S-JA33 (GN/BU), harness side. • RCM C429 pin 18, circuit 91S-JA33 (BK/BU), harness side and the driver side underseat occupant restraint systems electrical connector C30 pin 8, circuit 91S-JA33 (BK/BU), harness side. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA33 (GN/BU) or circuit 91S-JA33 (BK/BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

PINPOINT TEST T : DTC B1878: DRIVER SAFETY BELT PRETENSIONER SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
T1: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to T2. → **No** GO to T3.
T2: PROVE OUT THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Driver Side Underseat Occupant Restraint Systems Electrical Connector C30.
	4 Ignition switch in position II.
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
T3: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT FOR A SHORT TO BATTERY	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.

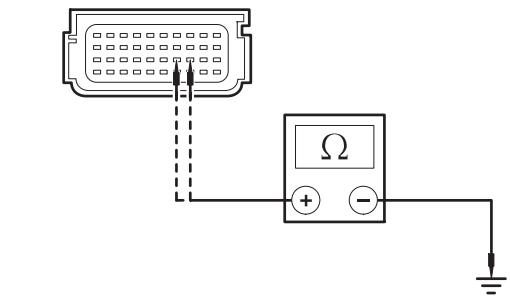
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	4 Ignition switch in position II.
 TIE0021890	5 Measure the voltage between the: • RCM C429 pin 17, circuit 15S-JA33 (GN/BU), harness side and ground. • RCM C429 pin 18, circuit 91S-JA33 (BK/BU), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 15S-JA33 (GN/BU) or circuit 91S-JA33 (BK/BU) and circuit 15-JA10 (GN/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST U : DTC B1879: DRIVER SAFETY BELT PRETENSIONER SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
U1: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to U2. → **No** GO to U3.
U2: PROVE OUT THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Driver Side Underseat Occupant Restraint Systems Electrical Connector C30.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	4 Ignition switch in position II.
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
U3: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
 TIE0021891	4 Measure the resistance between the: • RCM C429 pin 17, circuit 15S-JA33 (GN/BU), harness side and ground. • RCM C429 pin 18, circuit 91S-JA33 (BK/BU), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA33 (GN/BU) or circuit 91S-JA33 (BK/BU) and circuit 91-JA10 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

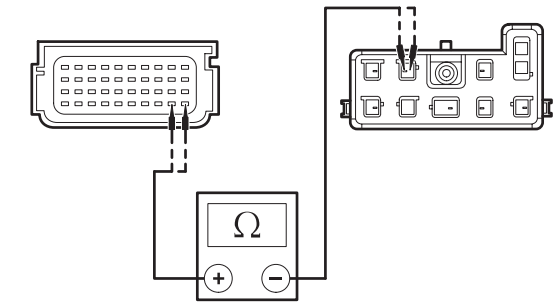
PINPOINT TEST V : DTC 1881: PASSENGER SAFETY BELT PRETENSIONER OPEN CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
V1: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to V2. → **No** GO to V3.
V2: PROVE OUT THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Passenger Side Underseat Occupant Restraint Systems Electrical Connector C31.
	4 Ignition switch in position II.
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
V3: CHECK THE PASSENGER SAFETY BELT PRETENSIONER FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.

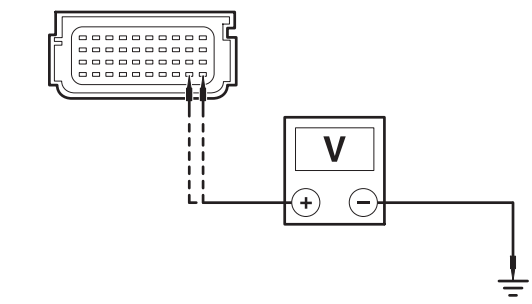
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036493	4 Measure the resistance between the: • RCM C429 pin 9, circuit 91S-JA34 (BK/RD), harness side and the passenger side underseat occupant restraint systems electrical connector C31 pin 8, 91S-JA34 (BK/RD), harness side. • RCM C429 pin 10, circuit 15S-JA34 (GN/OG), harness side and the passenger side underseat occupant restraint systems electrical connector C31 pin 7, 15S-JA34 (GN/OG), harness side. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA34 (GN/OG) or circuit 91S-JA34 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST W : DTC B1882: PASSENGER SAFETY BELT PRETENSIONER SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
W1: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to W2. → **No** GO to W3.
W2: PROVE OUT THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Passenger Side Underseat Occupant Restraint Systems Electrical Connector C31.
	4 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
W3: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT FOR A SHORT TO BATTERY	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	4 Ignition switch in position II.
 TIE0036494	5 Measure the voltage between the: • RCM C429 pin 9, circuit 91S-JA34 (BK/RD), harness side and ground. • RCM C429 pin 10, circuit 15S-JA34 (GN/OG), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit circuit 15S-JA34 (GN/OG) or circuit 91S-JA34 (BK/RD) and circuit 15-JA10 (GN/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPEAT self-test. CLEAR the DTCs. REACTIVATE the system.

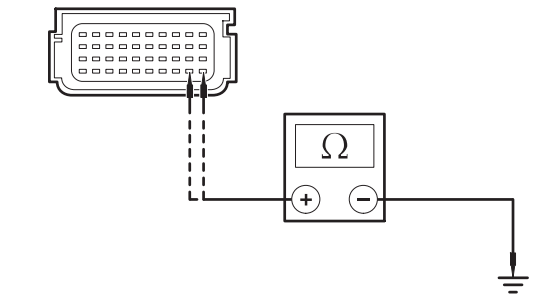
PINPOINT TEST X : DTC B1883: PASSENGER SAFETY BELT PRETENSIONER SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
X1: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing	

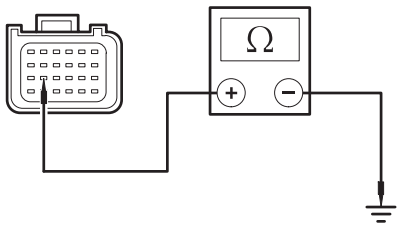
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to X2. → **No** GO to X3.
X2: PROVE OUT THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Passenger Side Underseat Occupant Restraint Systems Electrical Connector C31.
	4 Ignition switch in position II.
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
X3: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.

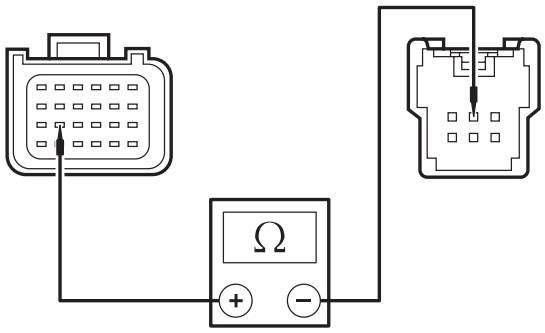
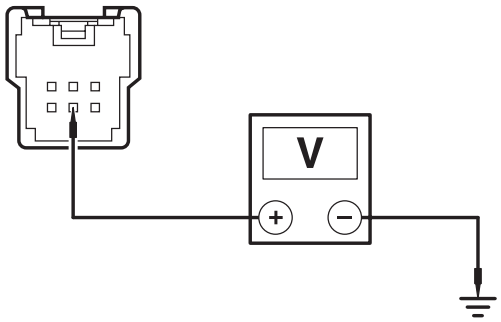
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036495	4 Measure the resistance between the: • RCM C429 pin 9, circuit 91S-JA34 (BK/RD), harness side and ground. • RCM C429 pin 10, circuit 15S-JA34 (GN/OG), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA34 (GN/0G) or circuit 91S-JA34 (BK/RD) and circuit 91-JA10 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST Y : DTC B1884: PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR INOPERATIVE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Y1: CHECK FOR CONTINUITY BETWEEN THE RCM AND GROUND	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.
	3 Disconnect PAD Indicator C453.
 TIE0038192	4 Measure the resistance between the RCM C426 pin 17, circuit 91S-JA56 (BK/RD), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** GO to Y2. → **No** REPAIR circuit 91S-JA56 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Y2: CHECK FOR CONTINUITY BETWEEN THE RCM AND THE PAD INDICATOR	
 E49412	1 Measure the resistance between the RCM C426 pin 17, circuit 91S-JA56 (BK/RD), harness side and the PAD indicator C453 pin 2, circuit 91S-JA56 (BK/RD), harness side. • Is the resistance less than 5 ohms? → **Yes** GO to Y3. → **No** REPAIR circuit 91S-JA56 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
Y3: CHECK THE PAD INDICATOR SUPPLY CIRCUIT	
	1 Ignition switch in position II.
 E49413	2 Measure the voltage between the PAD indicator C453 pin 5, circuit 15-JA56 (GN/OG), harness side and ground. • Is the voltage greater than 10 volts? → **Yes** INSTALL a new PAD indicator. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15-JA56 (GN/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

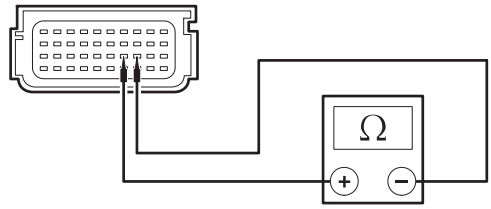
PINPOINT TEST Z : DTC B1885: DRIVER SAFETY BELT PRETENSIONER LOW RESISTANCE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Z1: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to Z2. → **No** GO to Z3.
Z2: PROVE OUT THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Driver Side Underseat Occupant Restraint Systems Electrical Connector C30.
	4 Ignition switch in position II.
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
Z3: CHECK THE DRIVER SAFETY BELT PRETENSIONER CIRCUIT FOR LOW RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.

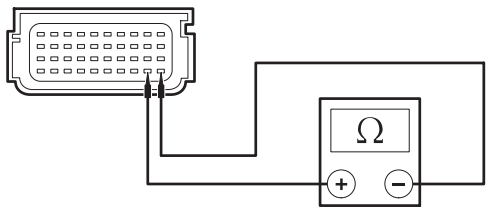
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0033427	4 Measure the resistance between the RCM C429 pin 17, circuit 15S-JA33 (GN/BU), harness side and the RCM C429 pin 18, circuit 91S-JA33 (BK/BU), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA33 (GN/BU) and circuit 91S-JA33 (BK/BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AA : DTC B1886: PASSENGER SAFETY BELT PRETENSIONER LOW RESISTANCE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AA1: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AA2. → **No** GO to AA3.
AA2: PROVE OUT THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	3 Connect Passenger Side Underseat Occupant Restraint Systems Electrical Connector C31.
	4 Ignition switch in position II.

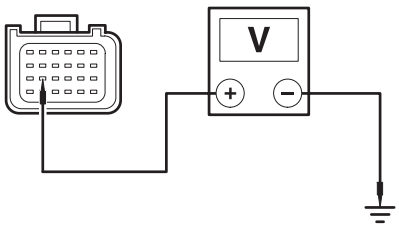
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	5 Carry out the self-test. • Does the system prove out correctly? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger safety belt buckle and pretensioner. REFER to: Safety Belt Buckle and Pretensioner (501-20 Safety Belt System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AA3: CHECK THE PASSENGER SAFETY BELT PRETENSIONER CIRCUIT FOR LOW RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
 TIE0036496	4 Measure the resistance between the RCM C429 pin 9, circuit 91S-JA34 (BK/RD), harness side and the RCM C429 pin 10, circuit 15S-JA34 (GN/OG), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA34 (GN/OG) and circuit 91S-JA34 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

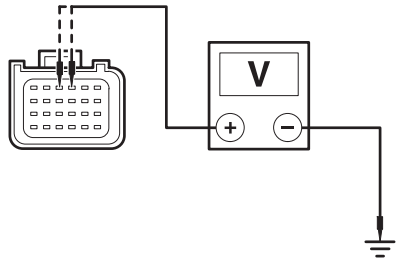
PINPOINT TEST AB : DTC B1890: PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AB1: CHECK THE PAD INDICATOR TO RCM CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect PAD Indicator C453.

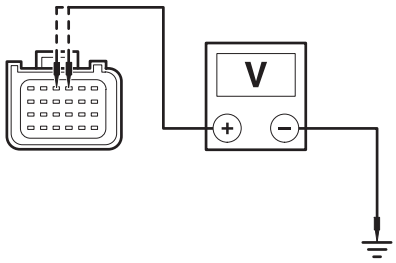
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Disconnect RCM C426.
 TIE0036497	4 Measure the voltage between the RCM C426 pin 17, circuit 91S-JA56 (BK/RD), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 91S-JA56 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new PAD indicator. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

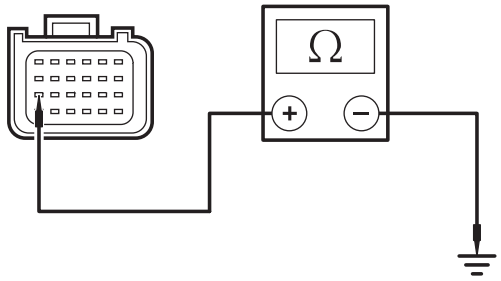
PINPOINT TEST AC : DTC B1916: DRIVER AIR BAG SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AC1: CHECK THE DRIVER AIR BAG WIRING HARNESS FOR A SHORT TO BATTERY	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Driver Air Bag Module Simulator.
	3 Disconnect RCM C426.
	4 Ignition switch in position II.
 TIE0020913	5 Measure the voltage between the: • RCM C426 pin 3, circuit 15S-JA8 (GN/RD), harness side and ground. • RCM C426 pin 4, circuit 91S-JA8 (BK/OG), harness side and ground. • Is any voltage present? → **Yes** GO to AC2. → **No** CONNECT the driver air bag module simulator and the RCM C426. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AC2: CHECK THE CLOCKSPRING FOR A SHORT TO BATTERY	
	1 Ignition switch in position 0.
	2 Disconnect Clockspring C896.

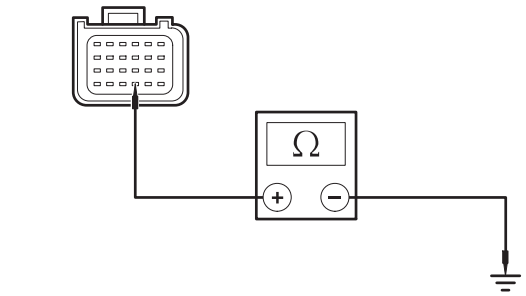
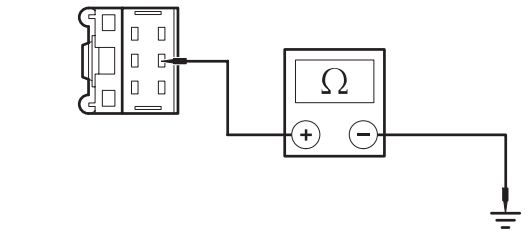
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Ignition switch in position II.
 TIE0020913	4 Measure the voltage between the: • RCM C426 pin 3, circuit 15S-JA8 (GN/RD) harness side and ground. • RCM C426 pin 4, circuit 91S-JA8 (BK/OG) harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 15S-JA8 (GN/RD) or circuit 91S-JA8 (BK/OG) and circuit 15-JA10 (GN/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new clockspring. REFER to: Clockspring (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AD : DTC B1921: AIR BAG DIAGNOSTIC MONITOR GROUND CIRCUIT OPEN

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AD1: CHECK THE RCM GROUND CIRCUIT - PASSENGER AIR BAG ACTIVATED	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
NOTE: CHECK that the PAD switch is in the air bag live position before carrying out this test.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.
 E51216	3 Measure the resistance between the RCM C426 pin 18, circuit 31S-JA31 (BK/WH), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** GO to AD2. → **No** GO to AD3.

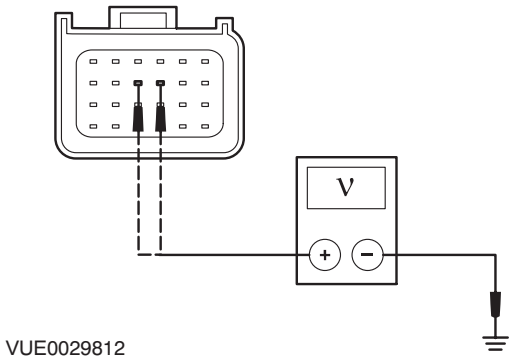
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AD2: CHECK THE RCM GROUND CIRCUIT - PASSENGER AIR BAG DE-ACTIVATED	
	1 Operate the PAD switch to the OFF position.
 TIE0030702	2 Measure the resistance between the RCM C426 pin 21, circuit 31S-JA47 (BK/OG), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** VERIFY the customer concern. → **No** GO to AD3.
AD3: CHECK THE PAD SWITCH GROUND CIRCUIT	
	1 Disconnect PAD Switch C619.
 TIE0030703	2 Measure the resistance between the PAD Switch C619 pin 5, circuit 31-JA47 (BK), harness side and ground. • Is the resistance less than 5 ohms? → **Yes** INSTALL a new PAD switch. REFER to: Passenger Air Bag Deactivation (PAD) Switch (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 31-JA47 (BK). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AE : DTC B1925: PASSENGER AIR BAG SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AE1: CHECK THE PASSENGER AIR BAG CIRCUIT FOR A SHORT TO BATTERY	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Passenger Air Bag Module Simulator.

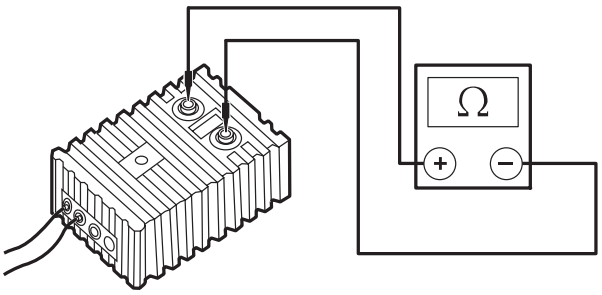
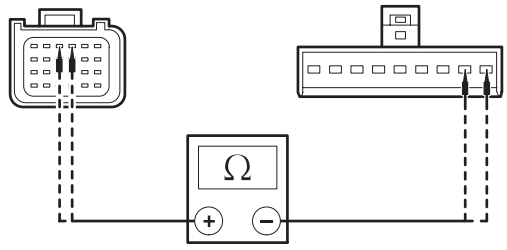
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Disconnect RCM C426.
	4 Ignition switch in position II.
 VUE0029812	5 Measure the voltage between the: • RCM C426 pin 9, circuit 15S-JA31 (GN/WH) harness side and ground. • RCM C426 pin 10, circuit 91S-JA31 (BK/WH) harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 15S-JA31 (GN/WH) or circuit 91S-JA31 (BK/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** CONNECT the passenger air bag module simulator and the RCM C426. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AF : DTC B1932: DRIVER AIR BAG OPEN CIRCUIT

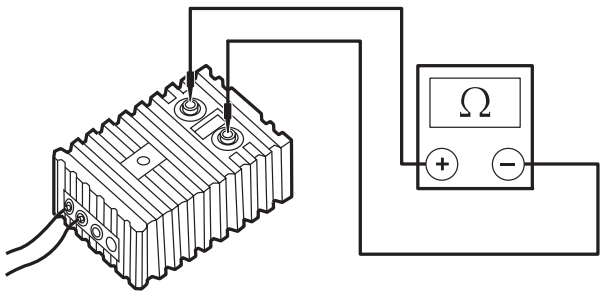
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AF1: CHECK THE DRIVER AIR BAG CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AF2. → **No** GO to AF3.
AF2: CHECK THE DRIVER AIR BAG MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the driver air bag module.

DIAGNOSIS AND TESTING

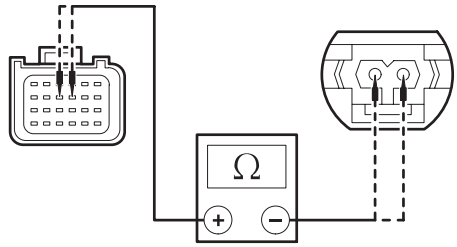
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 TIE39388	4 Measure the resistance of the driver air bag module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver air bag module. REFER to: Driver Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AF3: CHECK THE CLOCKSPRING FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C426.
	3 Disconnect Clockspring C896.
 TIE0036499	4 Measure the resistance between the: • RCM C426 pin 3, circuit 15S-JA8 (GN/RD), harness side and the clockspring C896 pin 1, circuit 15S-JA8 (GN/RD), harness side. • RCM C426 pin 4, circuit 91S-JA8 (BK/OG), harness side and the clockspring C896 pin 2, circuit 91S-JA8 (BK/OG), harness side. • Are the resistances less than 5 ohms? → **Yes** Install a new clockspring. REFER to: Clockspring (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA8 (GN/RD) or circuit 91S-JA8 (BK/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

PINPOINT TEST AG : DTC B1933: PASSENGER AIR BAG OPEN CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AG1: CHECK THE PASSENGER AIR BAG CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AG2. → **No** GO to AG3.
AG2: CHECK THE PASSENGER AIR BAG MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the passenger air bag module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 TIE39388	4 Measure the resistance of the passenger air bag module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger air bag module. Passenger Air Bag Module - Vehicles Built From: 04/2006 (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AG3: CHECK THE PASSENGER AIR BAG WIRING HARNESS FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.

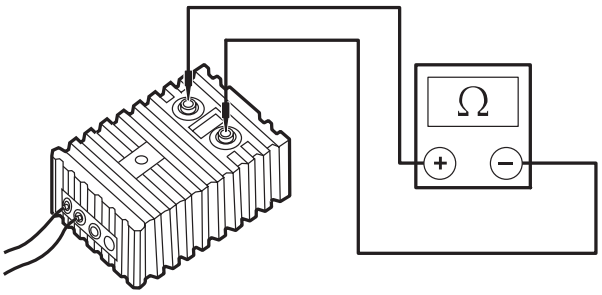
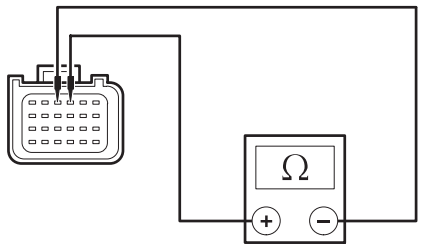
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect RCM C426.
	3 Disconnect Passenger Air Bag Module Simulator.
 TIE0036500	4 Measure the resistance between the: • RCM C426 pin 9, circuit 15S-JA31 (GN/WH), harness side and the passenger air bag module C425 pin 1, circuit 15S-JA31 (GN/WH), harness side. • RCM C426 pin 10, circuit 91S-JA31 (BK/WH), harness side and the passenger air bag module C425 pin 2, circuit 91S-JA31 (BK/WH), harness side. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA31 (GN/WH) or circuit 91S-JA31 (BK/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AH : DTC B1934: DRIVER AIR BAG CIRCUIT LOW RESISTANCE

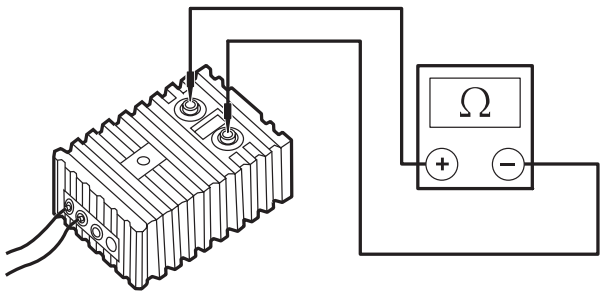
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AH1: CHECK THE DRIVER AIR BAG CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AH2. → **No** GO to AH3.

DIAGNOSIS AND TESTING

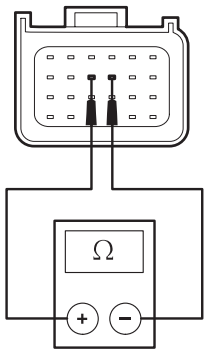
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AH2: CHECK THE DRIVER AIR BAG MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the driver air bag module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 TIE39388	4 Measure the resistance of the driver air bag module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver air bag module. REFER to: Driver Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AH3: CHECK THE CLOCKSPRING FOR LOW RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C426.
	3 Disconnect Clockspring C896.
 TIE0020915	4 Measure the resistance between the RCM C426 pin 3, circuit 15S-JA8 (GN/RD), harness side and the RCM C426 pin 4, circuit 91S-JA8 (BK/OG), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new clockspring. REFER to: Clockspring (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA8 (GN/RD) and circuit 91S-JA8 (BK/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

PINPOINT TEST AI : DTC B1935: PASSENGER AIR BAG CIRCUIT LOW RESISTANCE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AI1: CHECK THE PASSENGER AIR BAG CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AI2. → **No** GO to AI3.
AI2: CHECK THE PASSENGER AIR BAG MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the passenger air bag module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 TIE39388	4 Measure the resistance of the passenger air bag module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger air bag module. / Passenger Air Bag Module - Vehicles Built From: 04/2006 (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AI3: CHECK THE PASSENGER AIR BAG CIRCUIT FOR LOW RESISTANCE	
	1 Ignition switch in position 0.

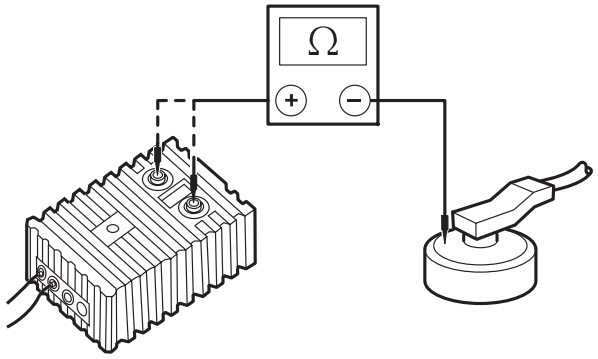
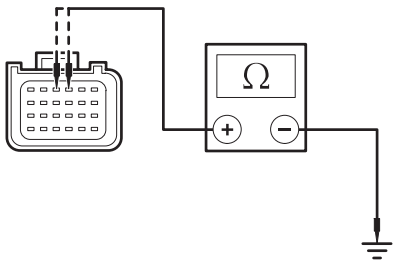
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect Passenger Air Bag Module Simulator.
	3 Disconnect RCM C426.
 VUE0029823	4 Measure the resistance between the RCM C426 pin 9, circuit 15S-JA31 (GN/WH), harness side and the RCM C426 pin 10, circuit 91S-JA31 (BK/WH), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA31 (GN/WH) and circuit 91S-JA31 (BK/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AJ : DTC B1936: DRIVER AIR BAG CIRCUIT SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AJ1: CHECK THE DRIVER AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AJ2. → **No** GO to AJ3.
AJ2: CHECK THE DRIVER AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the driver air bag module.
	2 Select DMM specific on the Ford approved diagnostic tool.

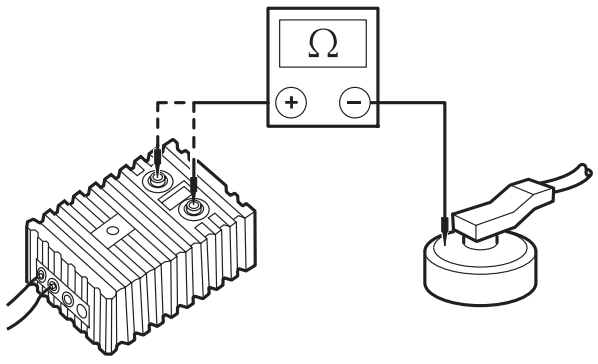
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 E39389	4 Measure the resistance between each of the terminals and the air bag module casing. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver air bag module. REFER to: Driver Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AJ3: CHECK THE CLOCKSPRING FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect RCM C426.
	3 Disconnect Clockspring C896.
 TIE0020912	4 Measure the resistance between the: • RCM C426 pin 3, circuit 15S-JA8 (GN/RD), harness side and ground. • RCM C426 pin 4, circuit 91S-JA8 (BK/OG), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** INSTALL a new clockspring. REFER to: Clockspring (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA8 (GN/RD) or circuit 91S-JA8 (BK/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

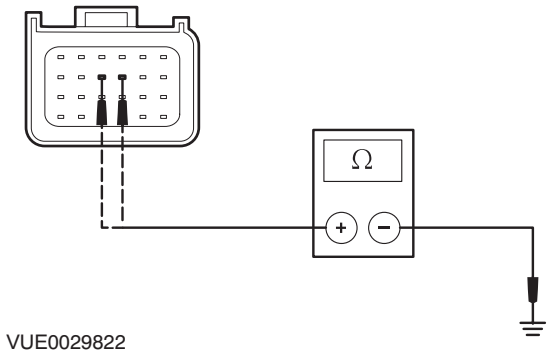
PINPOINT TEST AK : DTC B1938: PASSENGER AIR BAG CIRCUIT SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AK1: CHECK THE PASSENGER AIR BAG CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing	

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AK2. → **No** GO to AK3.
AK2: CHECK THE PASSENGER AIR BAG MODULE	
⚠ **WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.**	
	1 Connect the test and deployment lead to the passenger air bag module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 E39389	4 Measure the resistance between each of the terminals and the passenger air bag module casing. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger air bag module. / Passenger Air Bag Module - Vehicles Built From: 04/2006 (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AK3: CHECK THE PASSENGER AIR BAG MODULE WIRING HARNESS FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect RCM C426.
	3 Disconnect Passenger Air Bag Module Simulator.

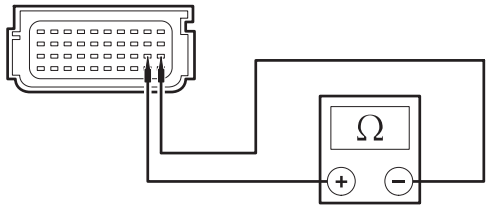
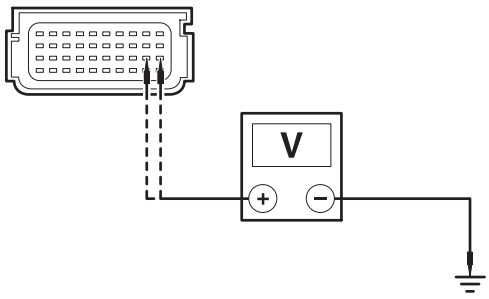
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 VUE0029822	4 Measure the resistance between the: • RCM C426 pin 9, circuit 15S-JA31 (GN/WH), harness side and ground. • RCM C426 pin 10, circuit 91S-JA31 (BK/WH), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA31 (GN/WH) or circuit 91S-JA31 (BK/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AL : DTC B1992: DRIVER SIDE AIR BAG CIRCUIT SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AL1: CHECK THE DRIVER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AL2. → **No** GO to AL3.
AL2: CHECK THE DRIVER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Disconnect RCM C429.

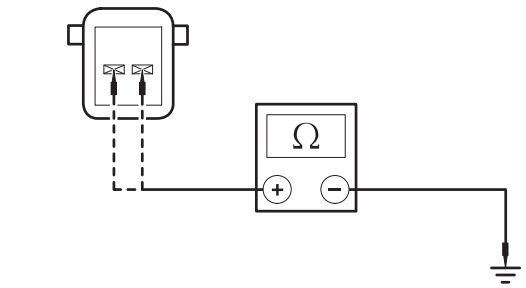
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036502	4 Measure the resistance between the RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and the RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver side air bag module. REFER to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AL3: CHECK THE DRIVER SIDE AIR BAG CIRCUIT FOR A SHORT TO BATTERY	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	4 Ignition switch in position II.
 TIE0022427	5 Measure the voltage between the: • RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and ground. • RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 15S-JA37 (GN/BK) or circuit 91S-JA37 (BK/GN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

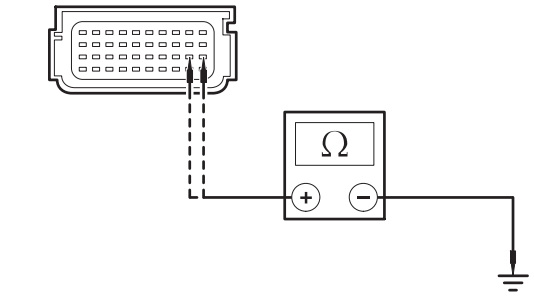
PINPOINT TEST AM : DTC B1993: DRIVER SIDE AIR BAG CIRCUIT SHORT TO GROUND.

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AM1: CHECK THE DRIVER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing	

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AM2. → **No** GO to AM3.
AM2: CHECK THE DRIVER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
 TIE0020905	3 Measure the resistance between the: • Driver side air bag module underseat connector C331 pin 1, circuit 15S-JA37 (GN/BK) component side and ground. • Driver side air bag module underseat connector C331 pin 2, circuit 91S-JA37 (BK/GN) component side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver side air bag module. REFER to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AM3: CHECK THE DRIVER SIDE AIR BAG CIRCUIT FOR A SHORT TO GROUND.	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.

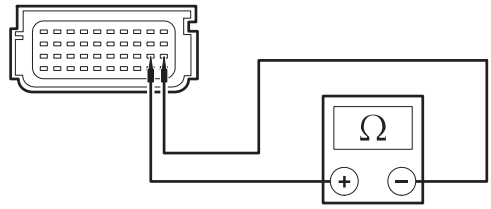
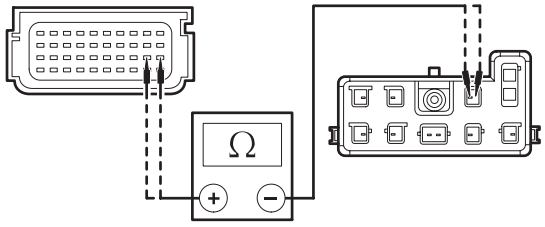
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0022428	4 Measure the resistance between the: • RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and ground. • RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA37 (GN/BK) or circuit 91S-JA37 (BK/GN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AN : DTC B1994: DRIVER SIDE AIR BAG CIRCUIT OPEN CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AN1: CHECK THE DRIVER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AN2. → **No** GO to AN3.
AN2: CHECK THE DRIVER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Disconnect RCM C429.

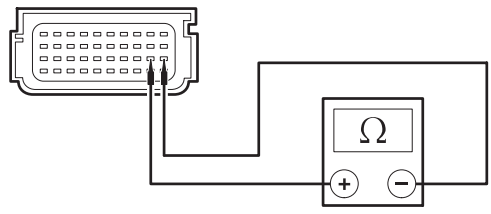
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036502	4 Measure the resistance between the RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and the RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to AN3.
AN3: CHECK THE DRIVER SIDE AIR BAG FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
 TIE0036501	4 Measure the resistance between the: • RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and the driver side underseat occupant restraint systems connector C30 pin 6, circuit 91S-JA37 (BK/GN), harness side. • RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side and the driver side underseat occupant restraint systems connector C30 pin 5, circuit 15S-JA37 (GN/BK), harness side. • Are the resistances less than 5 ohms? → **Yes** INSTALL a new driver side air bag module. REFER to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA37 (GN/BK) or circuit 91S-JA37 (BK/GN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

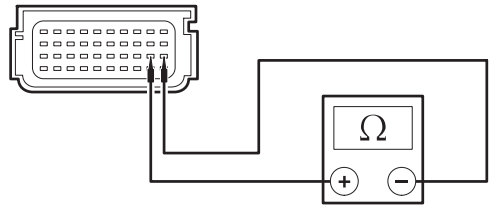
PINPOINT TEST AO : DTC B1995: DRIVER SIDE AIR BAG CIRCUIT LOW RESISTANCE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AO1: CHECK THE DRIVER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing	

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AO2. → **No** GO to AO3.
AO2: CHECK THE DRIVER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Disconnect RCM C429.
 TIE0036502	4 Measure the resistance between the RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and the RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to AO3.
AO3: CHECK THE DRIVER SIDE AIR BAG CIRCUIT FOR LOW RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.

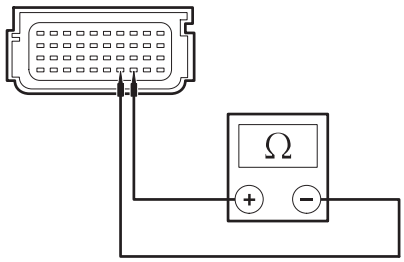
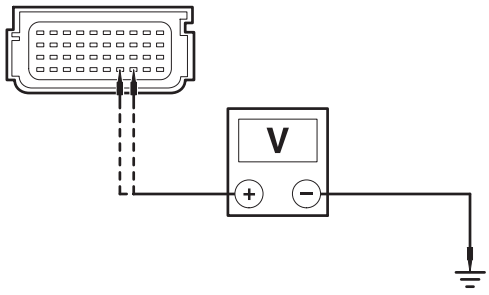
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036502	4 Measure the resistance between the RCM C429 pin 19, circuit 91S-JA37 (BK/GN), harness side and the RCM C429 pin 20, circuit 15S-JA37 (GN/BK), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new driver side air bag module. REFER to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA37 (GN/BK) and circuit 91S-JA37 (BK/GN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AP : DTC B1996: PASSENGER SIDE AIR BAG CIRCUIT SHORT TO BATTERY.

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AP1: CHECK THE PASSENGER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with simulators installed. • Does the system prove out correctly? → **Yes** GO to AP2. → **No** GO to AP3.
AP2: CHECK THE PASSENGER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Disconnect RCM C429.

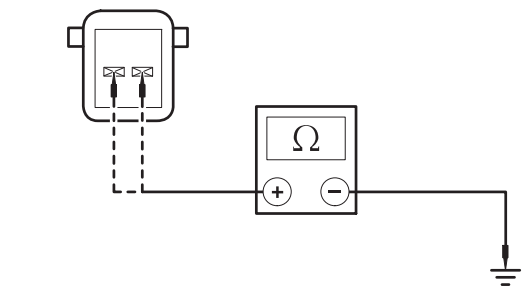
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036506	4 Measure the resistance between the RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and the RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger side air bag module. REFER to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AP3: CHECK THE PASSENGER SIDE AIR BAG CIRCUIT FOR A SHORT TO BATTERY	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	4 Ignition switch in position II.
 TIE0036503	5 Measure the voltage between the: • RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and ground. • RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 15S-JA38 (GN/OG) or circuit 91S-JA38 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

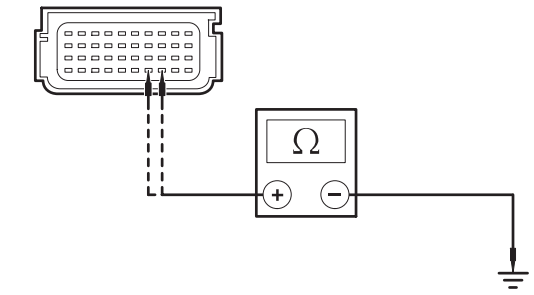
PINPOINT TEST AQ : DTC B1997: PASSENGER SIDE AIR BAG CIRCUIT SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AQ1: CHECK THE PASSENGER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing	

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with simulators installed. • Does the system prove out correctly? → **Yes** GO to AQ2. → **No** GO to AQ3.
AQ2: CHECK THE PASSENGER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Disconnect RCM C429.
 TIE0020905	4 Measure the resistance between the: • Passenger side air bag module underseat connector C341 pin 1, circuit 15S-JA38 (GN/OG) component side and ground. • Passenger side air bag module underseat connector C341 pin 2, circuit 91S-JA38 (BK/RD) component side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger side air bag module. REFER to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AQ3: CHECK THE PASSENGER SIDE AIR BAG FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.

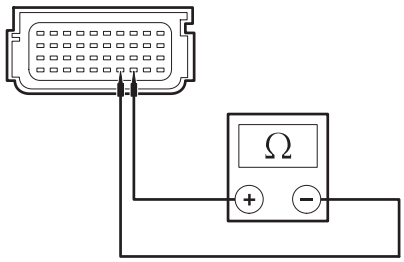
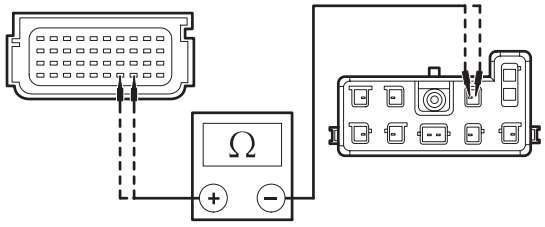
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
 TIE0036504	4 Measure the resistance between the: • RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and ground. • RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA38 (GN/OG) or circuit 91S-JA38 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AR : DTC B1998: PASSENGER SIDE AIR BAG CIRCUIT OPEN CIRCUIT

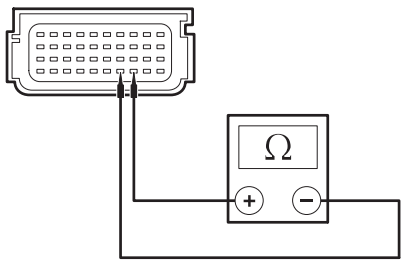
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AR1: CHECK THE PASSENGER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AR2. → **No** GO to AR3.
AR2: CHECK THE PASSENGER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Disconnect RCM C429.

DIAGNOSIS AND TESTING

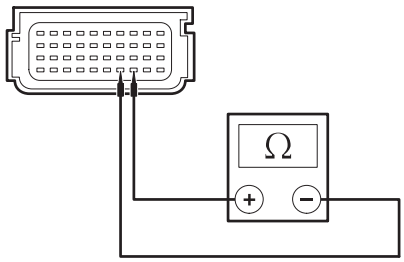
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036506	4 Measure the resistance between the RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and the RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to AR3.
AR3: CHECK THE PASSENGER SIDE AIR BAG FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
 TIE0036505	4 Measure the resistance between the: • RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and the passenger side underseat occupant restraint systems electrical connector C31 pin 5, circuit 15S-JA38 (GN/OG), harness side. • RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side and the passenger side underseat occupant restraint systems electrical connector C31 pin 6, circuit 91S-JA38 (BK/RD), harness side. • Are the resistances less than 5 ohms? → **Yes** INSTALL a new RCM. REFER to: Restraints Control Module (RCM) (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA38 (GN/OG) or circuit 91S-JA38 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

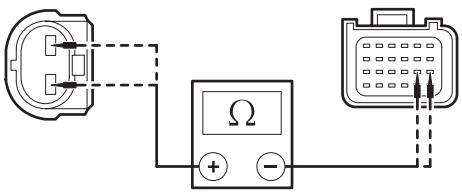
PINPOINT TEST AS : DTC B1999: PASSENGER SIDE AIR BAG CIRCUIT LOW RESISTANCE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AS1: CHECK THE PASSENGER SIDE AIR BAG CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AS2. → **No** GO to AS3.
AS2: CHECK THE PASSENGER SIDE AIR BAG MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Ignition switch in position 0.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Disconnect RCM C429.
 TIE0036506	4 Measure the resistance between the RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and the RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to AS3.
AS3: CHECK THE PASSENGER SIDE AIR BAG FOR LOW RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.

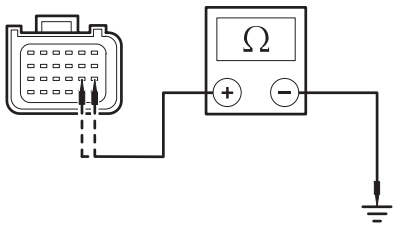
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036506	4 Measure the resistance between the RCM C429 pin 7, circuit 15S-JA38 (GN/OG), harness side and the RCM C429 pin 8, circuit 91S-JA38 (BK/RD), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** INSTALL a new passenger side air bag module. REFER to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA38 (GN/OG) and circuit 91S-JA38 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AT : DTC B2227: FRONT CRASH SENSOR COMMUNICATIONS FAULT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AT1: CHECK THE CRASH SENSOR CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Crash Sensor C420.
	3 Disconnect RCM C426.
 TIE0036507	4 Measure the resistance between the: • RCM C426 pin 13, circuit 9-JA49 (BN), harness side and the crash sensor C420 pin 2, circuit 9-JA49 (BN), harness side. • RCM C426 pin 14, circuit 8-JA49 (WH), harness side and the crash sensor C420 pin 1, circuit 8-JA49 (WH), harness side. • Are the resistances less than 5 ohms? → **Yes** GO to AT2. → **No** REPAIR circuit 8-JA49 (WH) and circuit 9-JA49 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

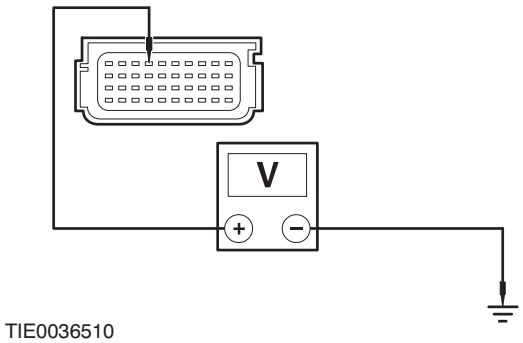
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AT2: CHECK THE CRASH SENSOR FOR A SHORT TO GROUND	
 TIE0020920	1 Measure the resistance between the: • RCM C426 pin 13, circuit 9-JA49 (BN), harness side and ground. • RCM C426 pin 14, circuit 8-JA49 (WH), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA49 (WH) or circuit 9-JA49 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

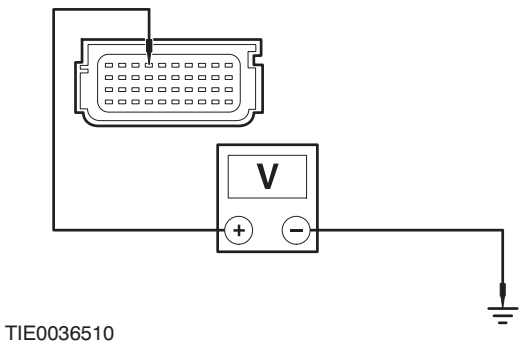
PINPOINT TEST AU : DTC B2433: DRIVER SAFETY BELT BUCKLE SWITCH CIRCUIT SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AU1: CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR A SHORT TO BATTERY	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Underseat Occupant Restraint Systems Simulator.
	4 Ignition switch in position II.

DIAGNOSIS AND TESTING

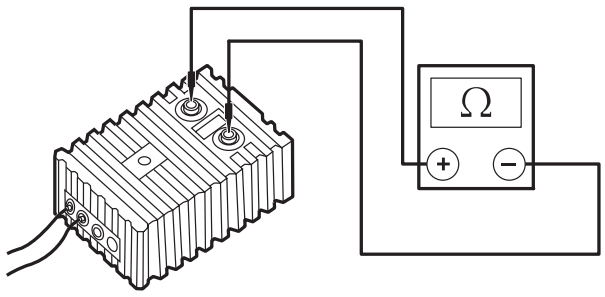
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036510	5 Measure the voltage between the: * Vehicles built up to 11/2004 • RCM C429 pin 34, circuit 9-JA54 (BN), harness side and ground. * Vehicles built from 11/2004 • RCM C429 pin 34, circuit 9-JA10 (BN/YE), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 9-JA10 (BN/YE) or circuit 9-JA54 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AV : DTC B2437: PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUIT SHORT TO BATTERY

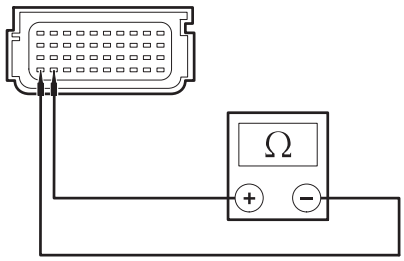
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AV1: CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR A SHORT TO BATTERY	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Underseat Occupant Restraint Systems Simulator.
	4 Ignition switch in position II.
 TIE0036510	5 Measure the voltage between the RCM C429 pin 34, circuit 9-JA10 (BN/YE), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 9-JA10 (BN/YE). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

PINPOINT TEST AW : DTC B2773: DRIVER SIDE AIR CURTAIN CIRCUIT LOW RESISTANCE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AW1: CHECK THE DRIVER SIDE AIR CURTAIN MODULE CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AW2. → **No** GO to AW3.
AW2: CHECK THE DRIVER SIDE AIR CURTAIN MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the driver side air curtain module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 TIE39388	4 Measure the resistance of the driver side air curtain module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver side air curtain module. REFER to: (501-20 Supplemental Restraint System) Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation), REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AW3: CHECK THE DRIVER SIDE AIR CURTAIN WIRING HARNESS FOR LOW RESISTANCE	
	1 Ignition switch in position 0.

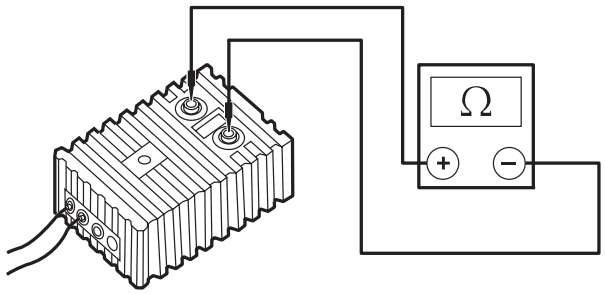
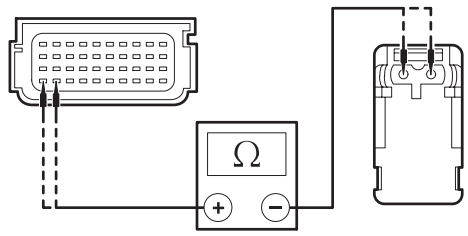
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect Driver Side Air Curtain Module Simulator.
	3 Disconnect RCM C429.
 TIE0020884	4 Measure the resistance between the RCM C429 pin 1, circuit 91S-JA50 (BK/RD), harness side and the RCM C429 pin 2, circuit 15S-JA50 (GN/OG), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA50 (GN/OG) and circuit 91S-JA50 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AX : DTC B2774: DRIVER SIDE AIR CURTAIN CIRCUIT OPEN CIRCUIT

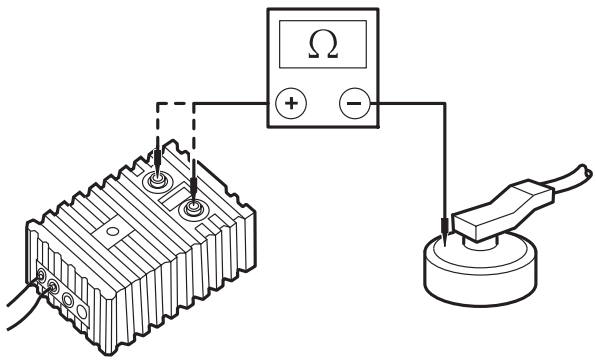
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AX1: CHECK THE DRIVER SIDE AIR CURTAIN CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AX2. → **No** GO to AX3.
AX2: CHECK THE DRIVER SIDE AIR CURTAIN MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the driver side air curtain module.
	2 Select DMM specific on the Ford approved diagnostic tool.

DIAGNOSIS AND TESTING

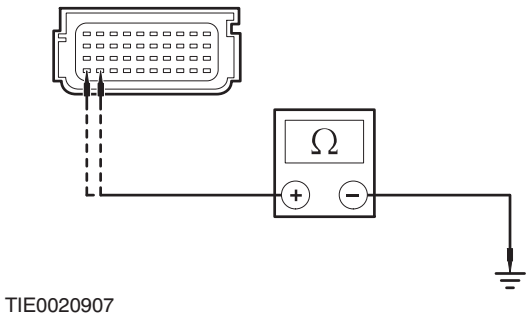
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 TIE39388	4 Measure the resistance of the driver side air curtain module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver side air curtain module. REFER to: (501-20 Supplemental Restraint System) Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation), REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AX3: CHECK THE DRIVER SIDE AIR CURTAIN WIRING HARNESS FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Air Curtain Module Simulator.
 TIE0036512	4 Measure the resistance between the: • RCM C429 pin 1, circuit 91S-JA50 (BK/RD), harness side and the driver side air curtain module C710 pin 2, circuit 91S-JA50 (BK/RD), harness side. • RCM C429 pin 2, circuit 15S-JA50 (GN/OG), harness side and the driver side air curtain module C710 pin 1, circuit 15S-JA50 (GN/OG), harness side. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA50 (GN/OG) or circuit 91S-JA50 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

PINPOINT TEST AY : DTC B2775: DRIVER SIDE AIR CURTAIN CIRCUIT SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AY1: CHECK THE DRIVER SIDE AIR CURTAIN CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to AY2. → **No** GO to AY3.
AY2: CHECK THE DRIVER SIDE AIR CURTAIN MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the driver side air curtain module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 E39389	4 Measure the resistance between each of the terminals and the side air curtain module casing. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new driver side air curtain module. REFER to: (501-20 Supplemental Restraint System) Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation), REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
AY3: CHECK THE DRIVER SIDE AIR CURTAIN WIRING HARNESS FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.

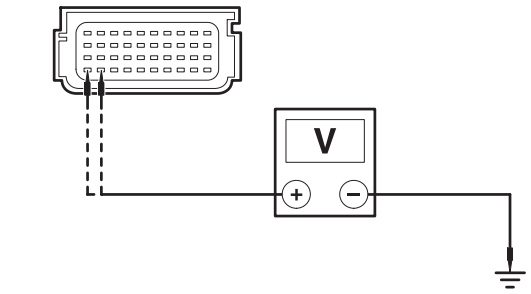
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	2 Disconnect RCM C429.
	3 Disconnect Driver Side Air Curtain Module Simulator.
 TIE0020907	4 Measure the resistance between the: • RCM C429 pin 1, circuit 91S- JA50 (BK/RD), harness side and ground. • RCM C429 pin 2, circuit 15S-JA50 (GN/OG), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA50 (GN/OG) or circuit 91S-JA50 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST AZ : DTC B2776: DRIVER SIDE AIR CURTAIN CIRCUIT SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AZ1: CHECK THE DRIVER SIDE AIR CURTAIN WIRING HARNESS FOR A SHORT TO BATTERY OR IGNITION	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Driver Side Air Curtain Module Simulator.
	3 Disconnect RCM C429.
	4 Ignition switch in position II.

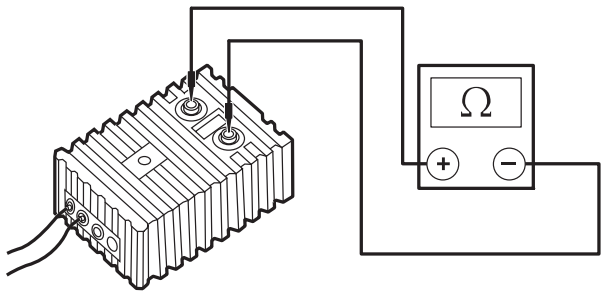
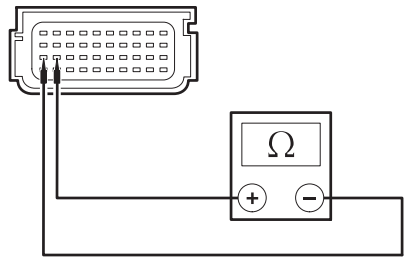
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0020904	5 Measure the voltage between the: • RCM C429 pin 1, circuit 91S- JA50 (BK/RD), harness side and ground. • RCM C429 pin 2, circuit 15S-JA50 (GN/OG), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 15S-JA50 (GN/OG) or circuit 91S-JA50 (BK/RD). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** CONNECT the driver side air curtain module simulator and the RCM C429. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST BA : DTC B2777: PASSENGER SIDE AIR CURTAIN CIRCUIT LOW RESISTANCE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BA1: CHECK THE PASSENGER SIDE AIR CURTAIN MODULE CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to BA2. → **No** GO to BA3.
BA2: CHECK THE PASSENGER SIDE AIR CURTAIN MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the passenger side air curtain module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.

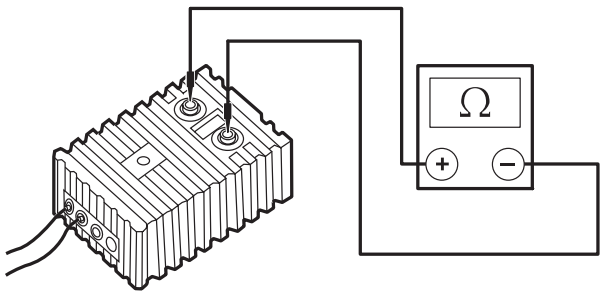
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE39388	4 Measure the resistance of the passenger side air curtain module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger side air curtain module. REFER to: (501-20 Supplemental Restraint System) Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation), REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
BA3: CHECK THE PASSENGER SIDE AIR CURTAIN WIRING HARNESS FOR LOW RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect Passenger Side Air Curtain Module Simulator.
	3 Disconnect RCM C429.
 TIE0036513	4 Measure the resistance between the RCM C429 pin 11, circuit 91S-JA51 (BK/BU), harness side and the RCM C429 pin 12, circuit 15S-JA51 (GN/BU), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA51 (GN/BU) and circuit 91S-JA51 (BK/BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

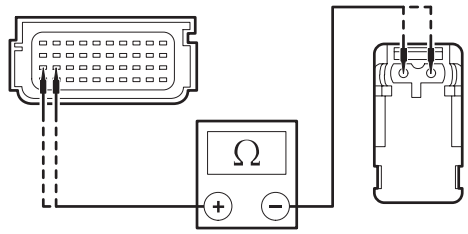
PINPOINT TEST BB : DTC B2778: PASSENGER SIDE AIR CURTAIN CIRCUIT OPEN CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BB1: CHECK THE PASSENGER SIDE AIR CURTAIN CIRCUIT RESISTANCE	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.

DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to BB2. → **No** GO to BB3.
BB2: CHECK THE PASSENGER SIDE AIR CURTAIN MODULE SQUIB RESISTANCE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the passenger side air curtain module.
	2 Select DMM specific on the Ford approved diagnostic tool.
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 TIE39388	4 Measure the resistance of the passenger side air curtain module squib. • Is the resistance between 2 and 3 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger side air curtain module. REFER to: (501-20 Supplemental Restraint System) Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation), REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
BB3: CHECK THE PASSENGER SIDE AIR CURTAIN WIRING HARNESS FOR OPEN CIRCUIT OR HIGH RESISTANCE	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Air Curtain Module Simulator.

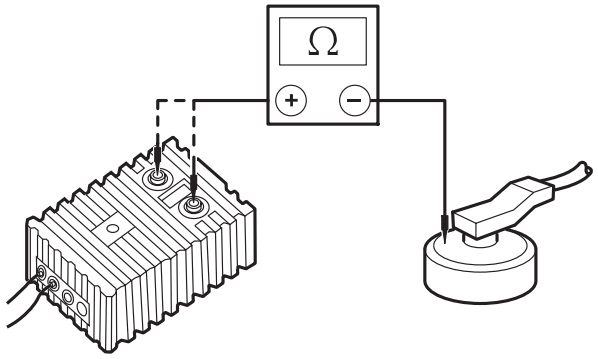
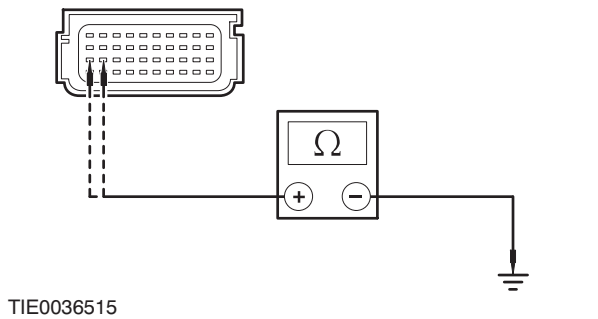
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0036514	4 Measure the resistance between the: • RCM C429 pin 11, circuit 91S-JA51 (BK/BU), harness side and the passenger side air curtain module C711 pin 2, circuit 91S-JA51 (BK/BU), harness side. • RCM C429 pin 12, circuit 15S-JA51 (GN/BU), harness side and the passenger side air curtain module C711 pin 1, circuit 15S-JA51 (GN/BU), harness side. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA51 (GN/BU) or circuit 91S-JA51 (BK/BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST BC : DTC B2779: PASSENGER SIDE AIR CURTAIN CIRCUIT SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BC1: CHECK THE PASSENGER SIDE AIR CURTAIN CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Ignition switch in position II.
	3 Carry out the self-test with the simulators installed. • Does the system prove out correctly? → **Yes** GO to BC2. → **No** GO to BC3.
BC2: CHECK THE PASSENGER SIDE AIR CURTAIN MODULE	
WARNING: Do not proceed with this test unless using the Ford approved diagnostic tool. Failure to follow this instruction may result in personal injury.	
	1 Connect the test and deployment lead to the passenger side air curtain module.
	2 Select DMM specific on the Ford approved diagnostic tool.

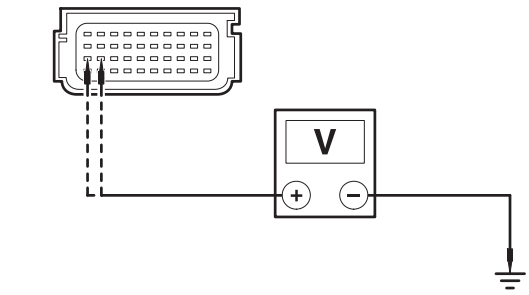
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	3 Connect the test and deployment lead to the Ford approved diagnostic tool.
 E39389	4 Measure the resistance between each of the terminals and the passenger side air curtain module casing. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** INSTALL a new passenger side air curtain module. REFER to: (501-20 Supplemental Restraint System) Side Air Curtain Module - Vehicles Built From: 22-06-2007 (Removal and Installation), REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
BC3: CHECK THE PASSENGER SIDE AIR CURTAIN WIRING HARNESS FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.
	2 Disconnect RCM C429.
	3 Disconnect Passenger Side Air Curtain Module Simulator.
 TIE0036515	4 Measure the resistance between the: • RCM C429 pin 11, circuit 91S- JA51 (BK/BU), harness side and ground. • RCM C429 pin 12, circuit 15S-JA51 (GN/BU), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 15S-JA51 (GN/BU) or circuit 91S-JA51 (BK/BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST BD : DTC B2780: PASSENGER SIDE AIR CURTAIN CIRCUIT SHORT TO BATTERY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BD1: CHECK THE PASSENGER SIDE AIR CURTAIN WIRING HARNESS FOR A SHORT TO BATTERY OR IGNITION	
WARNING: To avoid accidental deployment, the RCM backup power supply must be depleted. Wait at least one minute after disconnecting the battery ground cable(s) before commencing	

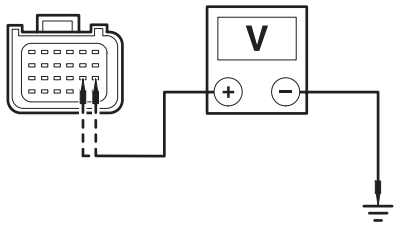
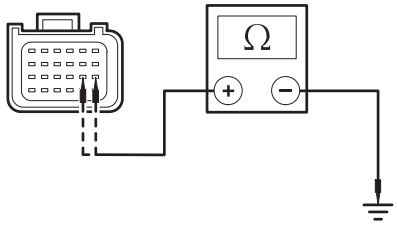
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
any repair or adjustment to the SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Passenger Side Air Curtain Module Simulator.
	3 Disconnect RCM C429.
	4 Ignition switch in position II.
 TIE0036516	5 Measure the voltage between the: • RCM C429 pin 11, circuit 91S- JA51 (BK/BU), harness side and ground. • RCM C429 pin 12, circuit 15S-JA51 (GN/BU), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 15S-JA51 (GN/BU) or circuit 91S-JA51 (BK/BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** CONNECT the passenger side air curtain module simulator and the RCM C429. REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST BE : DTC B2855: FRONT CRASH SENSOR CIRCUIT SHORT TO BATTERY OR GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BE1: CHECK THE CRASH SENSOR FOR A SHORT TO BATTERY	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Crash Sensor C420.
	3 Disconnect RCM C426.
	4 Ignition switch in position II.

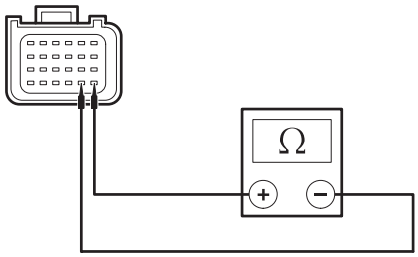
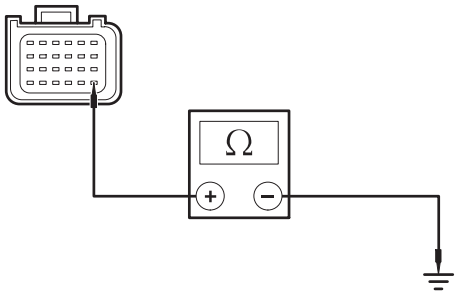
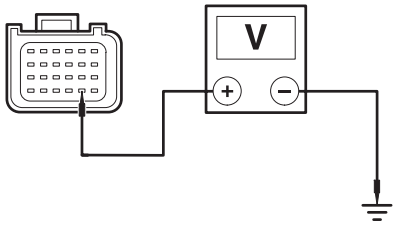
DIAGNOSIS AND TESTING

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0020921	5 Measure the voltage between the: • RCM C426 pin 13, circuit 9-JA49 (BN), harness side and ground. • RCM C426 pin 14, circuit 8-JA49 (WH), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 8-JA49 (WH) or circuit 9-JA49 (BN) and circuit 15-JA10 (GN/OG). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** GO to BE2.
BE2: CHECK THE CRASH SENSOR FOR A SHORT TO GROUND	
	1 Ignition switch in position 0.
 TIE0020920	2 Measure the resistance between the: • RCM C426 pin 13, circuit 9-JA49 (BN), harness side and ground. • RCM C426 pin 14, circuit 8-JA49 (WH), harness side and ground. • Are the resistances greater than 10,000 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA49 (WH) or circuit 9-JA49 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST BF : DTC U0073: RESTRAINTS CONTROL MODULE COMMUNICATION BUS OFF

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BF1: CHECK THE RCM COMMUNICATION BUS CIRCUIT FOR A SHORT CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect RCM C426.

DIAGNOSIS AND TESTING

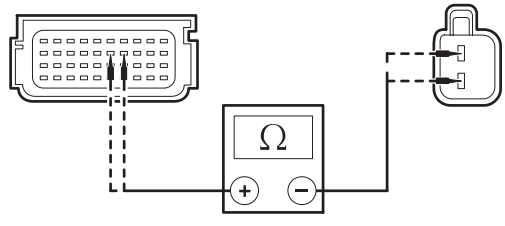
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 TIE0037880	3 Measure the resistance between the RCM C426 pin 19, circuit 4-EC10N (GY), harness side and the RCM C426 pin 20, circuit 5-EC10N (BU), harness side. • Is the resistance greater than 10,000 ohms? → **Yes** GO to BF2. → **No** REPAIR circuits 4-EC10N (GY) and 5-EC10N (BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
BF2: CHECK THE RCM COMMUNICATION BUS CIRCUIT FOR A SHORT TO GROUND	
 TIE0020987	1 Measure the resistance between the RCM C426 pin 19, circuit 4-EC10N (GY), harness side and ground. • Is the resistance greater than 10,000 ohms? → **Yes** GO to BF3. → **No** REPAIR circuit 4-EC10N (GY). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.
BF3: CHECK THE RCM COMMUNICATION BUS CIRCUIT FOR A SHORT CIRCUIT TO BATTERY OR IGNITION	
	1 Ignition switch in position II.
 TIE0037881	2 Measure the voltage between the RCM C426 pin 20, circuit 5-EC10N (BU), harness side and ground. • Is any voltage present? → **Yes** REPAIR circuit 5-EC10N (BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

PINPOINT TEST BG : DTC U1900: CAN COMMUNICATION BUS FAULT

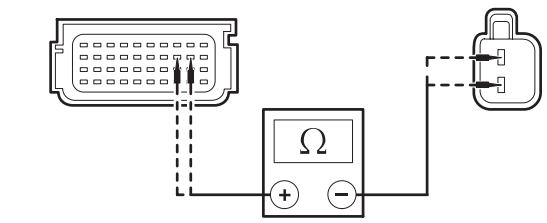
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BG1: CHECK THE CAN BUS CIRCUIT	
	1 Select an alternative system to address. • Is the Ford approved diagnostic tool able to communicate with the instrument cluster? → **Yes** REPAIR circuit 4-EC10N (GY) or circuit 5-EC10N (BU). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** CHECK the CAN bus. CLEAR the DTCs. REACTIVATE the system.

PINPOINT TEST BH : DTC U2017: DRIVER SIDE IMPACT SENSOR COMMUNICATIONS FAULT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BH1: CHECK THE DRIVER SIDE IMPACT SENSOR CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Driver Side Impact Sensor C427.
	3 Disconnect RCM C429.
 TIE0036518	4 Measure the resistance between the: • RCM C429 pin 26, circuit 8-JA39 (WH), harness side and the driver side impact sensor C427 pin 1, circuit 8-JA39 (WH), harness side. • RCM C429 pin 27, circuit 9-JA39 (BN), harness side and the driver side impact sensor C427 pin 2, circuit 9-JA39 (BN), harness side. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA39 (WH) or circuit 9-JA39 (BN). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

DIAGNOSIS AND TESTING

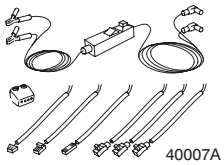
PINPOINT TEST BI : DTC U2018: PASSENGER SIDE IMPACT SENSOR COMMUNICATIONS FAULT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
BI1: CHECK THE PASSENGER SIDE IMPACT SENSOR CIRCUIT	
WARNING: To avoid accidental deployment, the RCM 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 SRS, or any component(s) adjacent to the SRS sensors. Failure to follow these instructions may result in personal injury.	
	1 Deactivate the SRS.
	2 Disconnect Passenger Side Impact Sensor C428.
	3 Disconnect RCM C429.
 TIE0036519	4 Measure the resistance between the: • RCM C429 pin 28, circuit 9-JA40 (BN/WH), harness side and the passenger side impact sensor C428 pin 2, circuit 9-JA40 (BN/WH), harness side. • RCM C429 pin 29, circuit 8-JA40 (WH/VT), harness side and the passenger side impact sensor C428 pin 1, circuit 8-JA40 (WH/VT), harness side. • Are the resistances less than 5 ohms? → **Yes** REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system. → **No** REPAIR circuit 8-JA40 (WH/VT) or circuit 9-JA40 (BN/WH). REPEAT the self-test, CLEAR the DTCs. REACTIVATE the system.

GENERAL PROCEDURES

Air Bag and Safety Belt Pretensioner Disposal

Special Tool(s)

 40007A	Test and Deployment Lead, Air Bag/Pyrotechnic Safety Belt 418-S055 (40-007A)

General Equipment

12 volt battery
Wooden blocks

All vehicles

WARNINGS:

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 benches which have been ground bonded and with the trim cover facing up. Failure to follow these instructions may result in personal injury.

Air bag modules and safety belt pretensioners must be deployed in well ventilated areas. Failure to follow this instruction may result in personal injury.

Before deploying the air bag module or safety belt buckle pretensioner, make sure that all personnel in the vicinity are aware that a loud noise (bang) is about to occur. Do not let anybody approach closer than six meters. Failure to follow this instruction may result in personal injury.

The air bag module or the safety belt pretensioner should not be handled immediately following deployment as the air bag module or safety belt pretensioner will be hot. Failure to follow this instruction may result in personal injury.

After deployment, the inflator(s) become inert, direct contact with the skin or eyes of any free pyrotechnic residues should be avoided. Failure to follow this instruction may result in personal injury.

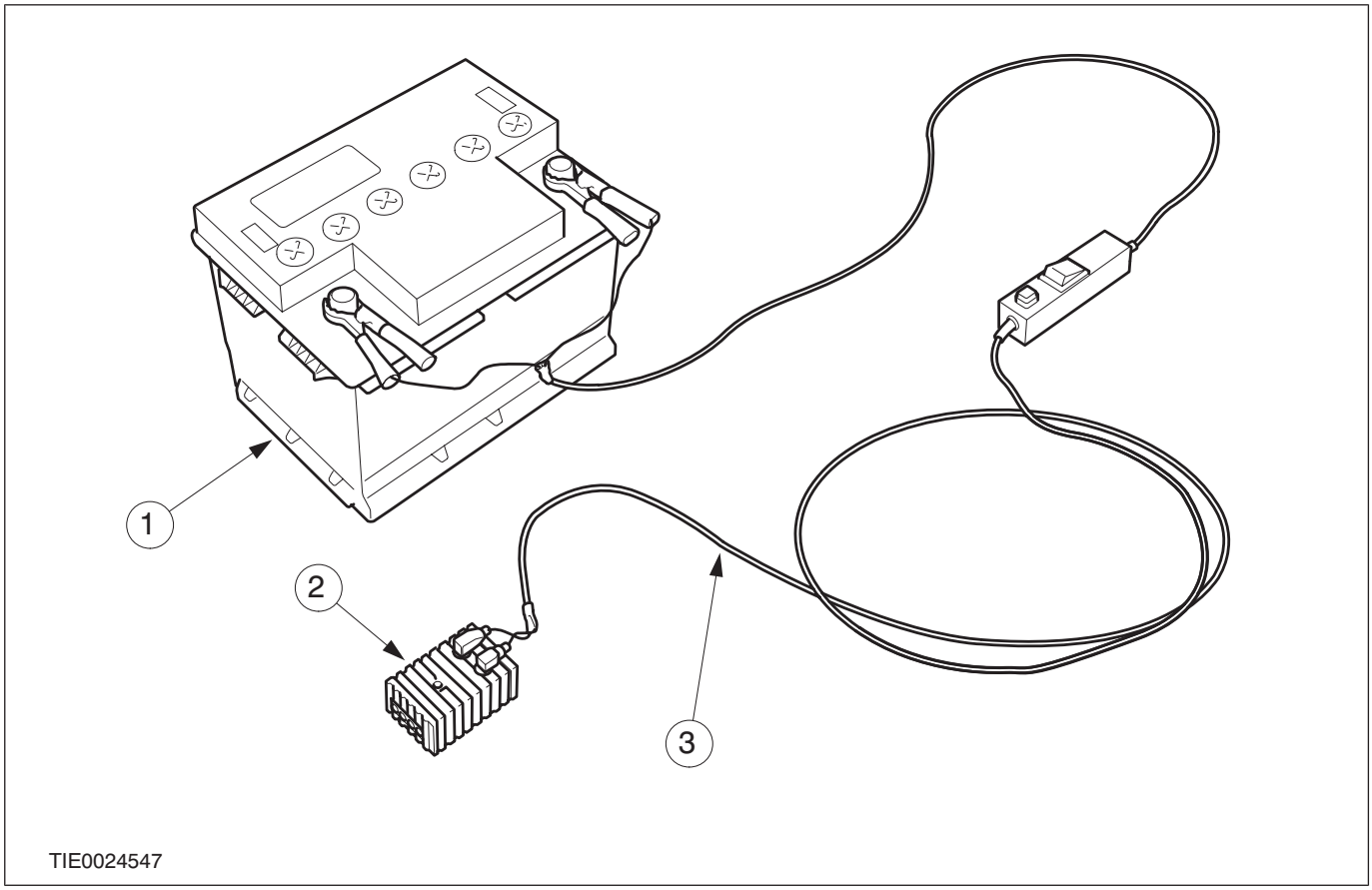
Always wear gloves and safety glasses when handling deployed air bag modules and safety belt pretensioners. Failure to follow this instruction may result in personal injury.

If the air bag module or safety belt pretensioner pyrotechnic residue should contact the eyes immediately, wash the eyes thoroughly with clean water and seek medical assistance. Failure to follow this instruction may result in personal injury.

If a large amount of air bag module or safety belt pretensioner pyrotechnic residue is inhaled, seek medical assistance. Failure to follow this instruction may result in personal injury.

1. **Remove the air bag module(s) to be deployed. For additional information, refer to the relevant procedure(s) in this section.**
2. **Connect the special tools as shown.**
   1. 12 volt battery.
   2. Adapter box (AC) (Part of Test and Deployment lead, Air Bag/Pyrotechnic Safety Belt).
   3. Deployment lead (Part of Test and Deployment lead, Air Bag/Pyrotechnic Safety Belt).

GENERAL PROCEDURES

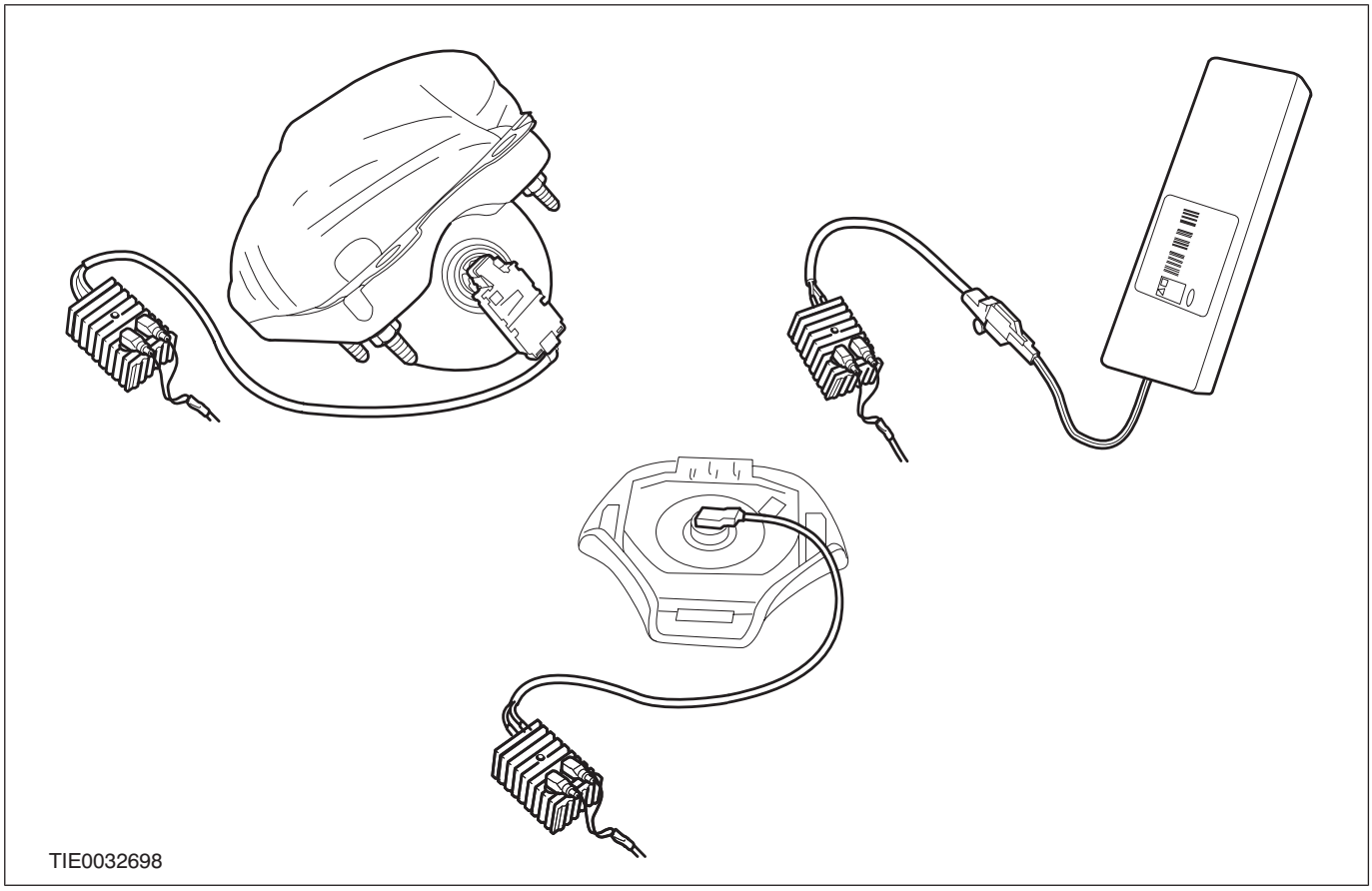


Single stage air bag modules

3. **Connect the test lead to the air bag module and the adapter.**

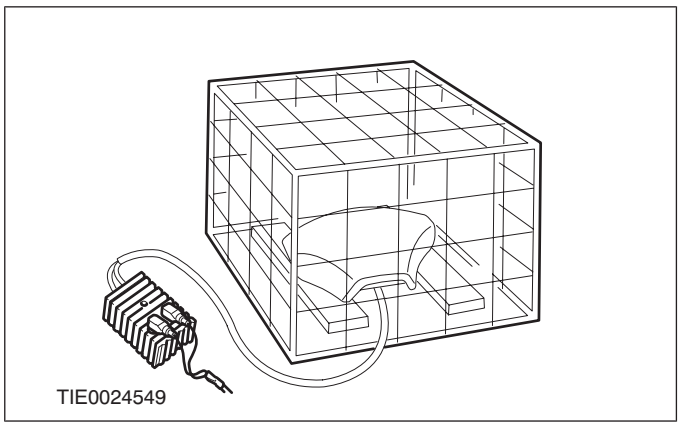
   For additional information, refer to Specifications in this section.

GENERAL PROCEDURES

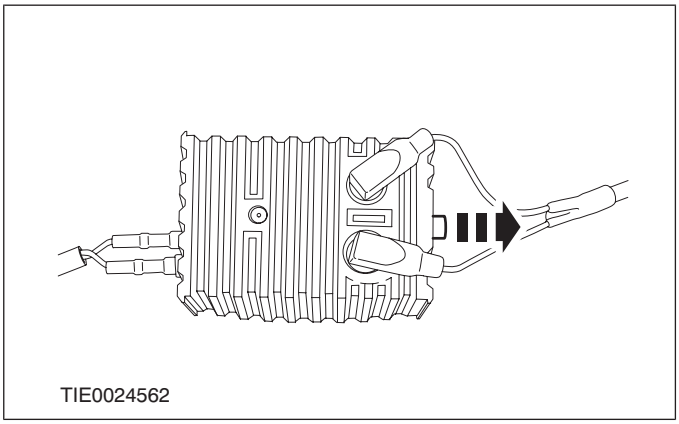


4. **⚠CAUTION: To protect the test lead electrical connectors from damage during deployment, raise the air bag off the ground on two wooden blocks.**

   Place the air bag module inside a suitable rigid wire cage with the air bag module cover upper most (driver air bag shown).

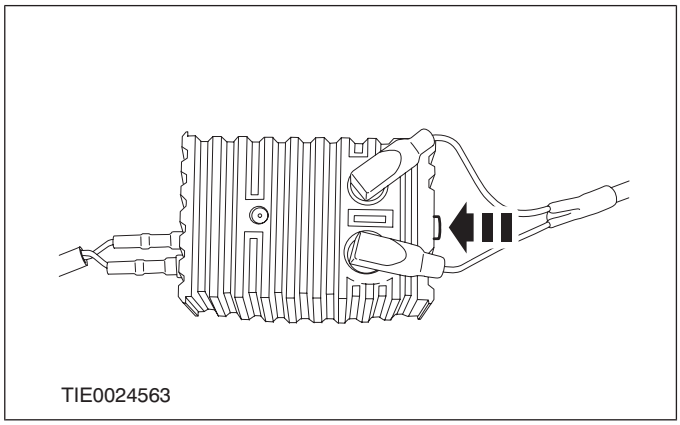


5. **To deploy the driver or passenger air bag module, release the adapter box AC button.**



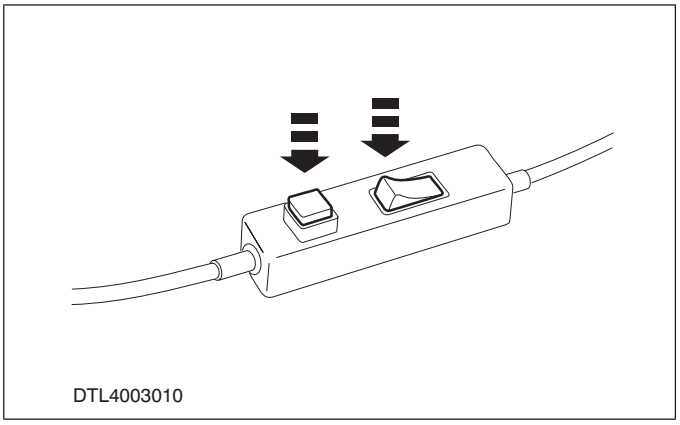
GENERAL PROCEDURES

6. To deploy the side air bag module, depress the adapter box AC button.



TIE0024563

7. Move as far away as possible from the air bag module and depress both switches to deploy the air bag module.



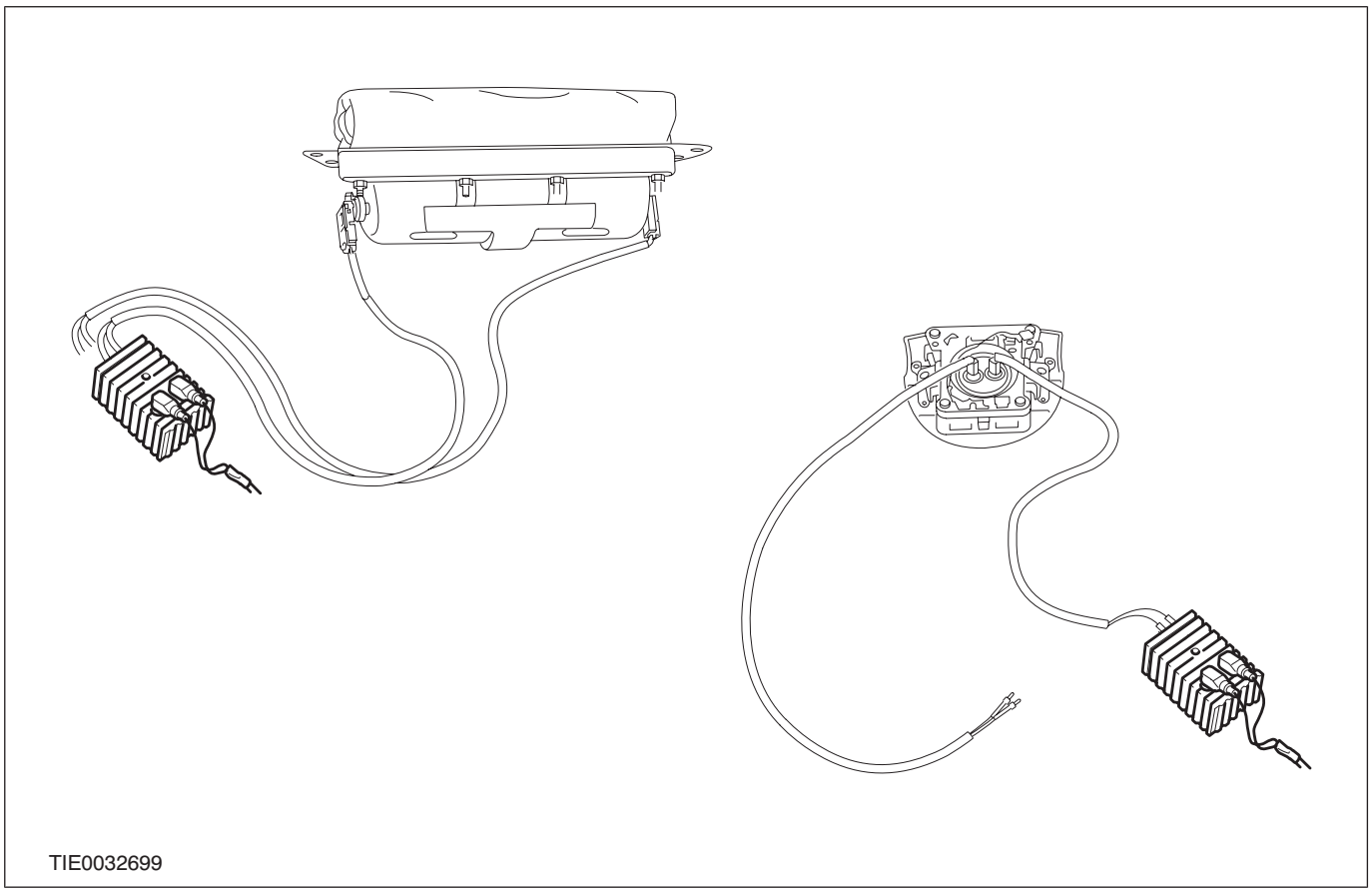
DTL4003010

Two stage air bag modules

8. **WARNING: DO not connect both test leads to the adapter at this stage. Each inflator must be deployed separately. Failure to follow this instruction may result in personal injury.**

   Connect the test leads to the air bag module and one of the test leads to the adapter.

   For additional information, refer to Specifications in this section.

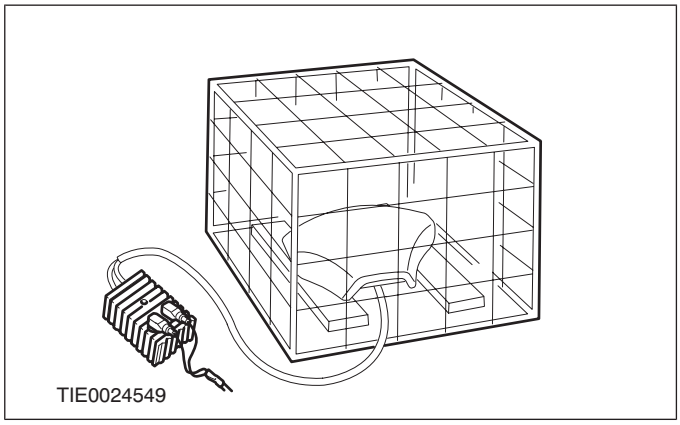


TIE0032699

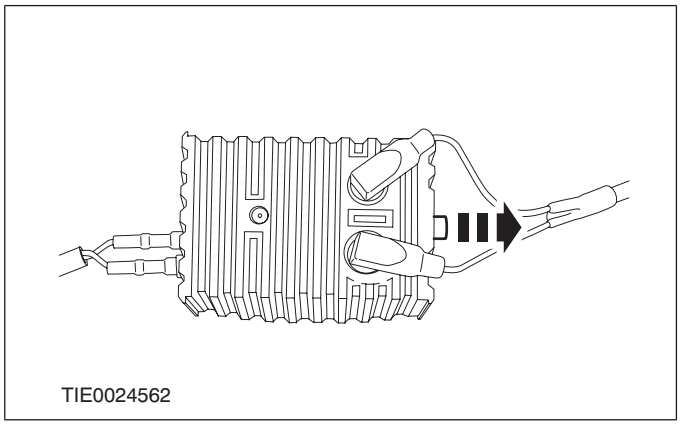
GENERAL PROCEDURES

9. **⚠CAUTION: To protect the test lead electrical connectors from damage during deployment, raise the air bag off the ground on two wooden blocks.**

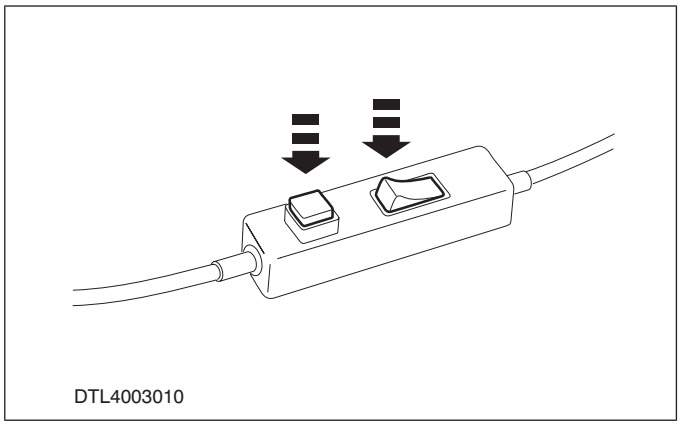
   Place the air bag module inside a suitable rigid wire cage with the air bag module cover upper most (driver air bag shown).


TIE0024549

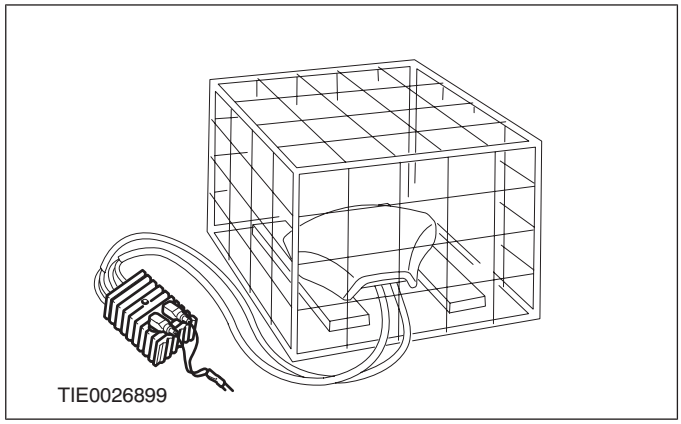
10. **To deploy the driver or passenger air bag module first inflator, release the adapter box AC button.**


TIE0024562

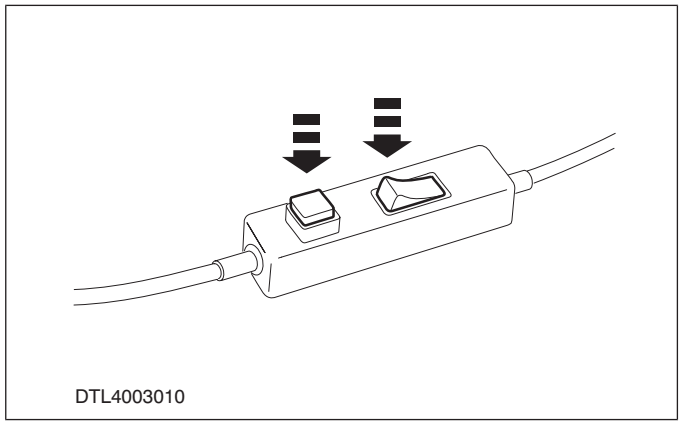
11. **Move as far away as possible from the air bag module and depress both switches to deploy the air bag module.**


DTL4003010

12. **To deploy the driver or passenger air bag module second inflator, connect the second test lead to the adapter.**


TIE0026899

13. **Move as far away as possible from the air bag module and depress both switches to deploy the air bag module.**


DTL4003010

Vehicles with safety belt buckle pretensioners

14. **NOTE: Certain vehicles require the removal of the front seat to access the safety belt buckle pretensioner electrical connector.**

    Remove the front seat (if necessary). For additional information, refer to Section 501-10 [Seating].

15. **Detach the safety belt buckle pretensioner electrical connector from the front seat.**

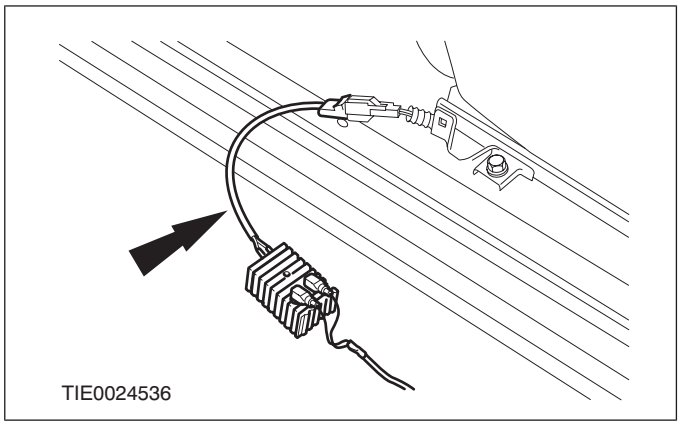
16. **Install the front seat (if necessary). For additional information, refer to Section 501-10 [Seating].**

17. **⚠CAUTION: Make sure the front seat mounting bolts are installed.**

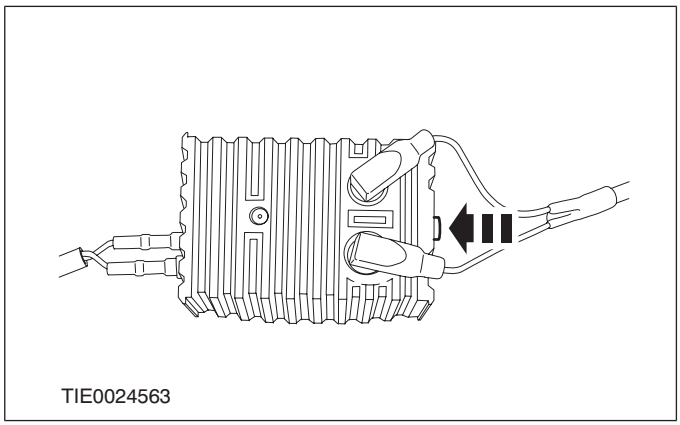
GENERAL PROCEDURES

Connect the test lead to the safety belt buckle pretensioner electrical connector.

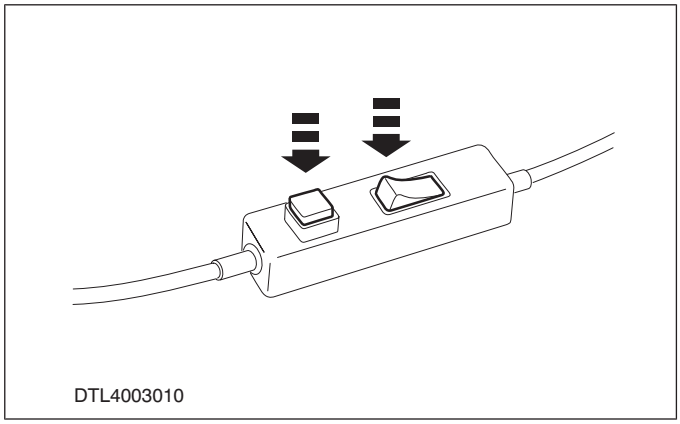
For additional information, refer to Specifications in this section.



18. **To deploy the safety belt buckle pretensioner, depress the adapter box AC button.**



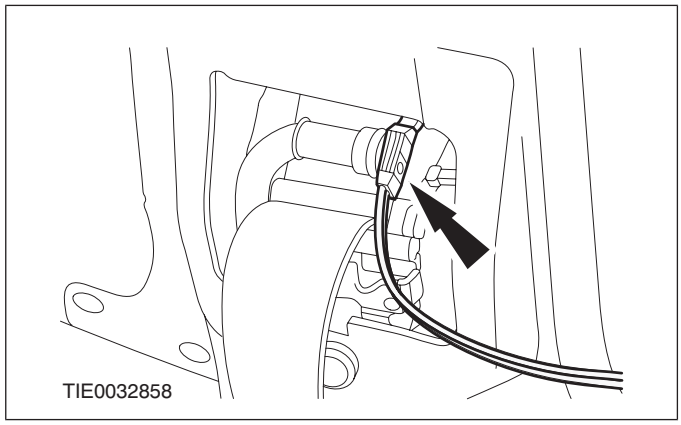
19. **Move as far away as possible from the vehicle and depress both switches to deploy the safety belt buckle pretensioner.**



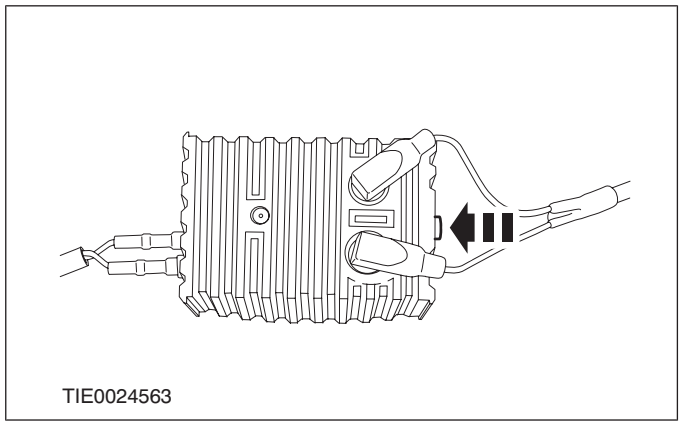
Vehicles with safety belt retractor pretensioners

20. **Connect the test lead to the safety belt retractor pretensioner electrical connector.**

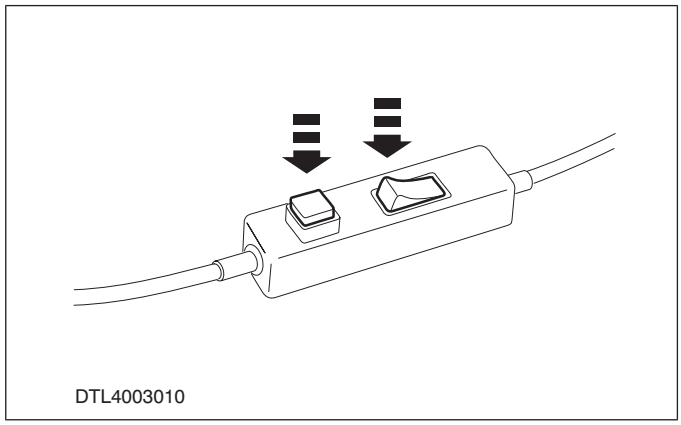
For additional information, refer to Specifications in this section.



21. **To deploy the safety belt retractor pretensioner, depress the adapter box AC button.**



22. **Move as far away as possible from the vehicle and depress both switches to deploy the safety belt retractor pretensioner.**



GENERAL PROCEDURES

All vehicles

23. **Deployed air bag module(s) and safety belt pretensioners should be sealed in suitable bags and then disposed of in accordance with local contaminated waste regulations.**

24. **WARNINGS:**

    Under no circumstances is an unserviceable air bag module or safety belt buckle pretensioner to be returned through the local mailing system. Failure to follow this instruction may result in personal injury.

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

NOTE: All unserviceable air bag modules have been placed on the Mandatory Return List. All discolored or damaged air bag modules should be treated the same as any unserviceable live air bag module being returned.

If an air bag module or safety belt buckle pretensioner fails to deploy, seal the unserviceable air bag module or safety belt buckle pretensioner in suitable packaging and return to the Exchange Plan Center, as appointed through the local National Sales Company.

GENERAL PROCEDURES

Deployed Air Bag Disposal

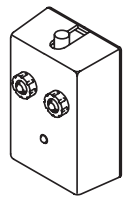
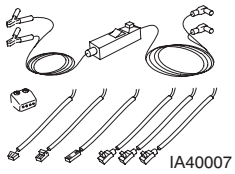
WARNING: After deployment, the air bag module surface may contain deposits of sodium hydroxide, a product of the gas generate combustion, that is irritating to the skin. Use protective gloves when handling any deployed air bag module. Failure to follow this instruction may result in personal injury.

1. **Remove the deployed air bag module(s). For additional information, refer to the relevant procedure in this section.**
2. **Seal the deployed air bag module(s) in the packaging from the new air bag module(s) or a suitable polythene bag, and then dispose of in accordance with local contaminated waste regulations.**

GENERAL PROCEDURES

Scrapped Vehicle Air Bag and Safety Belt Pretensioner Disposal - In-Vehicle Disposal

Special Tool(s)

 418143	418-143 Adapter Box (AC)
 IA40007	418-S055C Test and Deployment Lead, Air Bag/Pyrotechnic Safety Belt

Disposal

WARNINGS:

To avoid accidental deployment, the restraints control module (RCM) 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.

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

Before deploying the air bag module or safety belt pretensioner pyrotechnic make sure that all personnel in the vicinity are aware that a loud noise (bang) is about to occur. Do not let anybody approach closer than 6 meters. Failure to follow this instruction may result in personal injury.

The air bag module or the safety belt pretensioner should not be handled immediately following deployment as the air bag module will be very hot. Failure to follow this instruction may result in personal injury.

After deployment, the inflator(s) becomes inert, direct contact to the skin or eyes of any free pyrotechnic residues should be avoided. Failure to follow this instruction may result in personal injury.

Always wear gloves and safety glasses when handling deployed air bag modules and safety belt pretensioners, Failure to follow this instruction may result in personal injury.

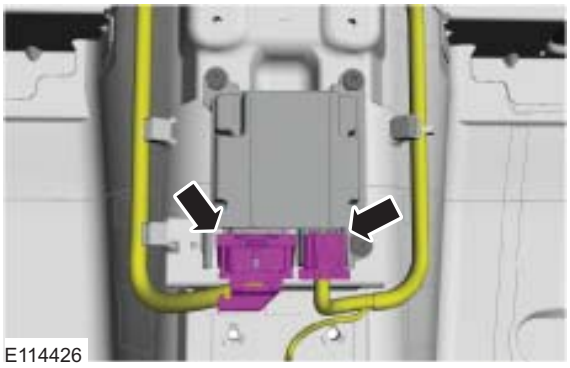
If the air bag module or safety belt pretensioner pyrotechnic residue should contact the eyes, wash the eyes with clean water and seek medical assistance. Failure to follow this instruction may result in personal injury.

If a large amount of air bag or safety belt pretensioner pyrotechnic residue is inhaled, seek medical assistance. Failure to follow this instruction may result in personal injury.

1. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).
   Refer to: Floor Console - Vehicles Built From: 03/2007, Vehicles With: Center Armrest (501-12 Instrument Panel and Console, Removal and Installation).

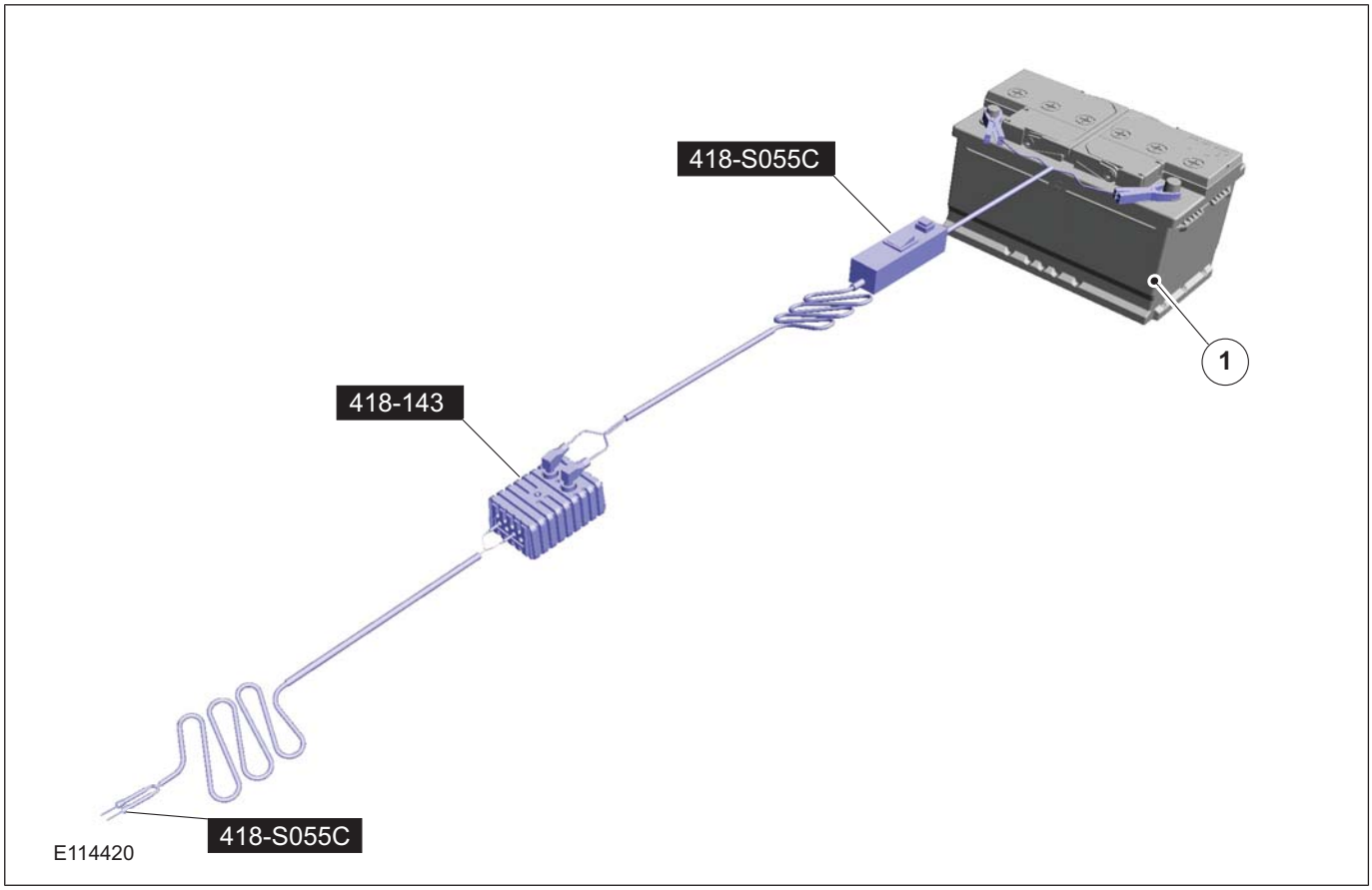
3.



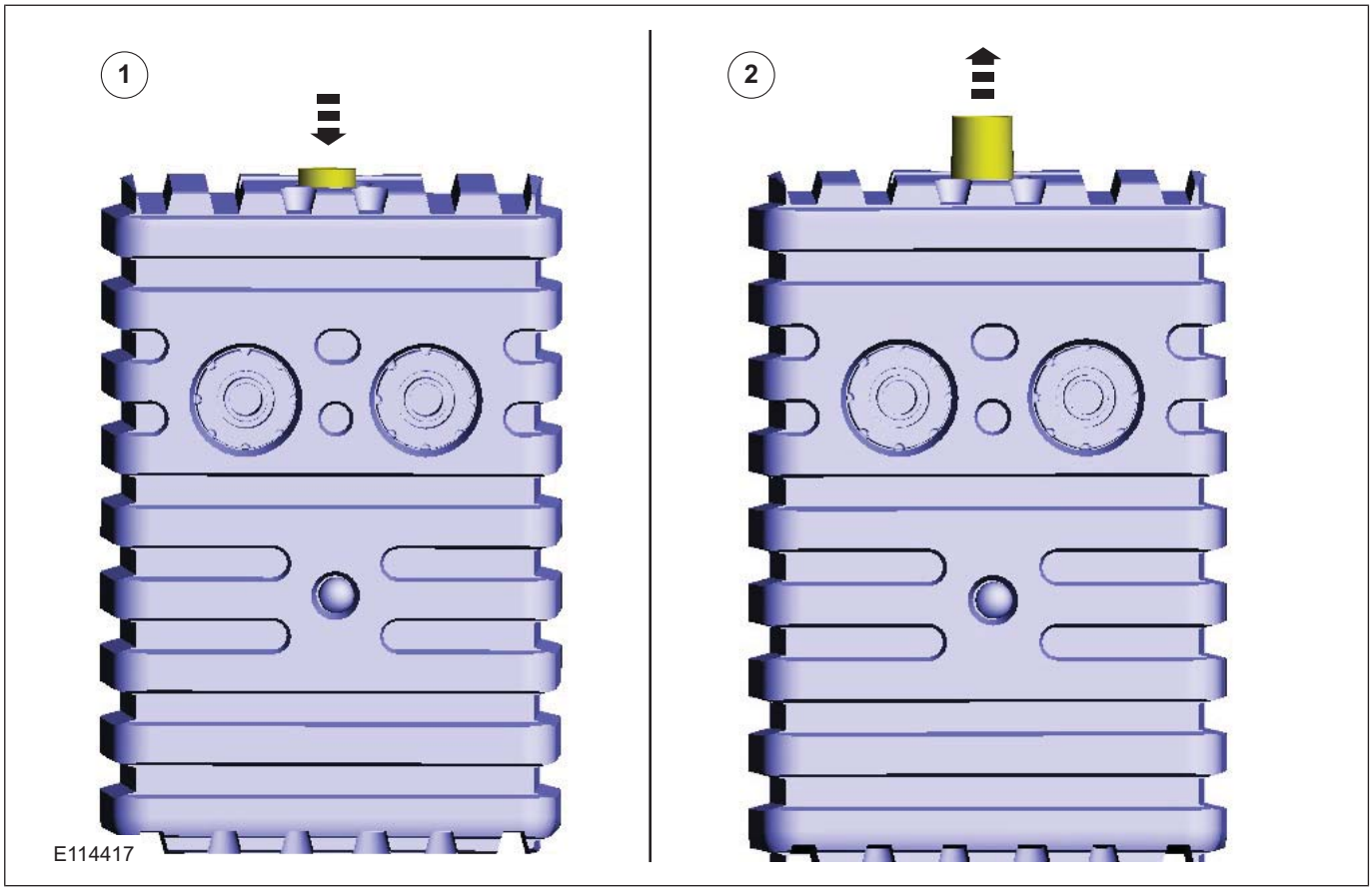
4. 1. 12 volt battery.

   Special Tool(s): 418-143, 418-S055C

GENERAL PROCEDURES

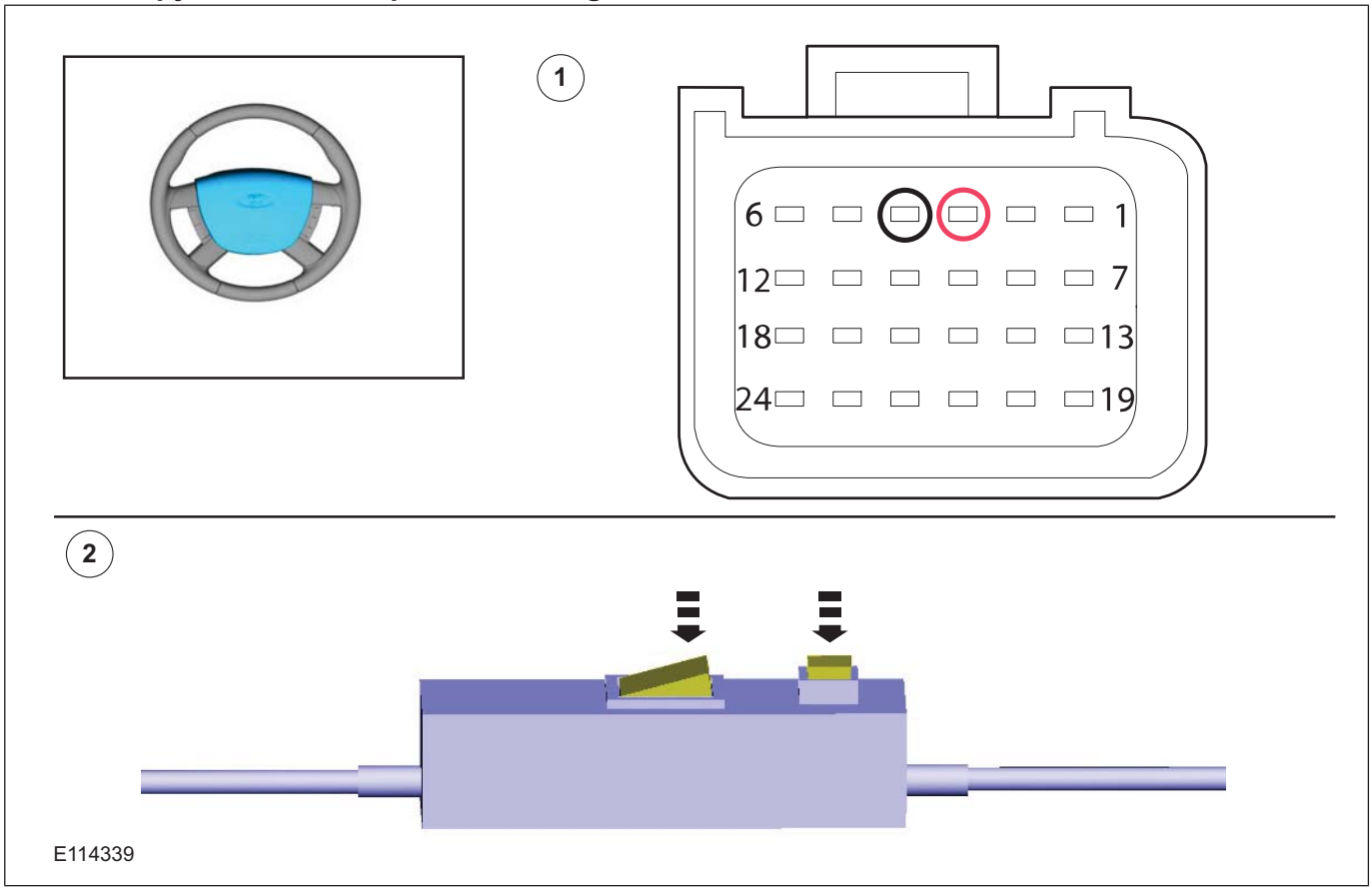


5.



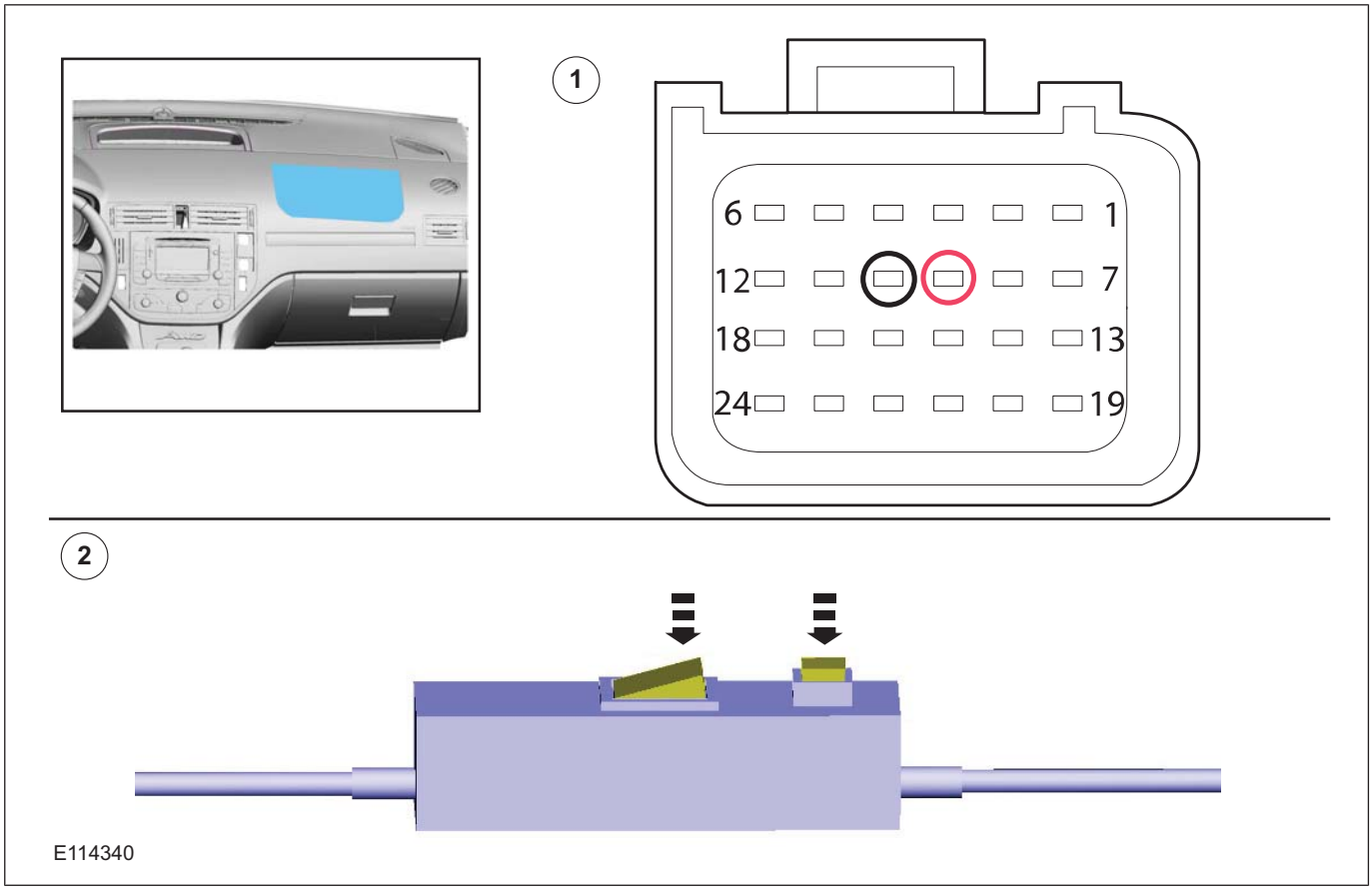
GENERAL PROCEDURES

6. 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**



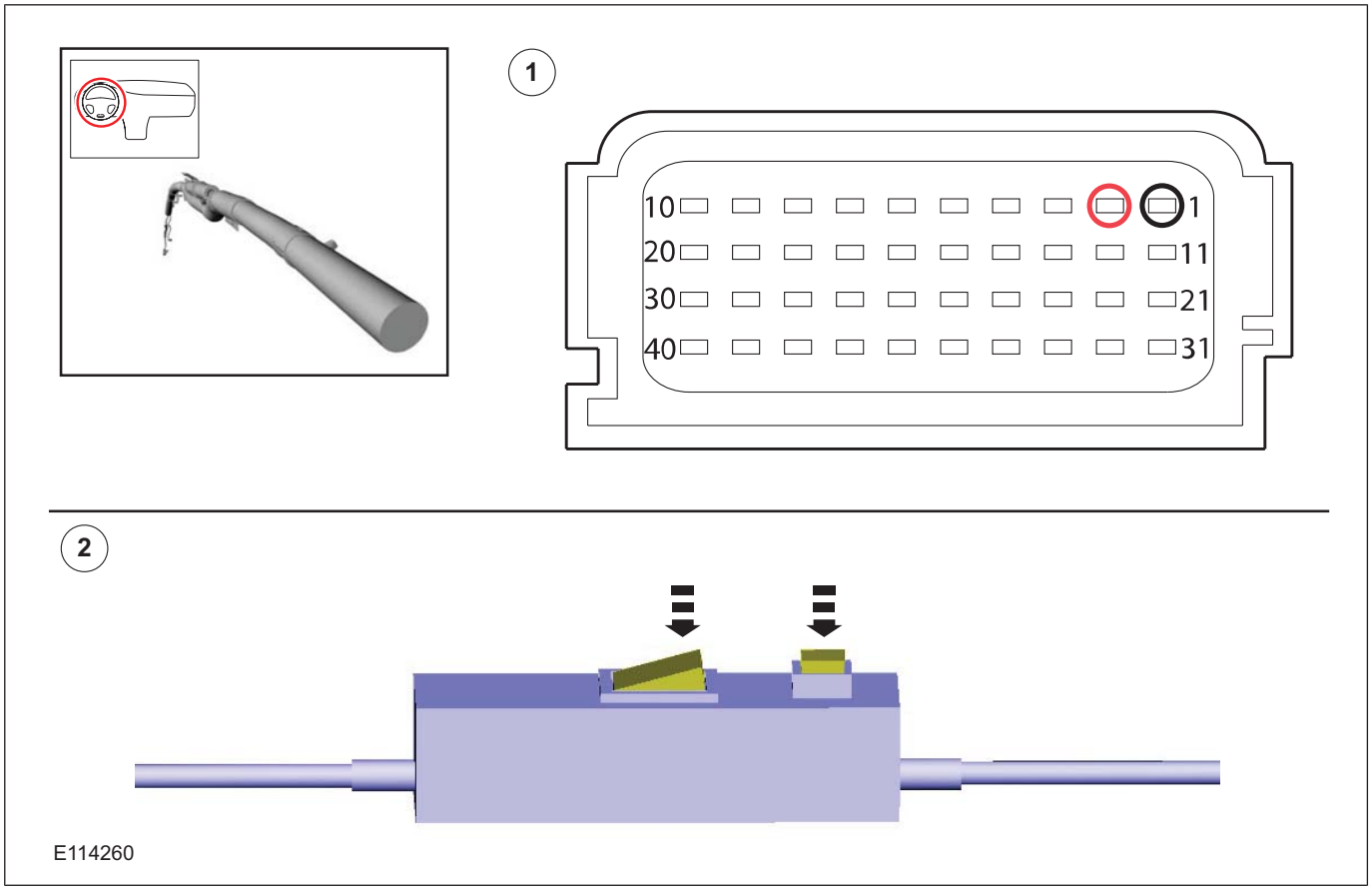
7. 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**

GENERAL PROCEDURES



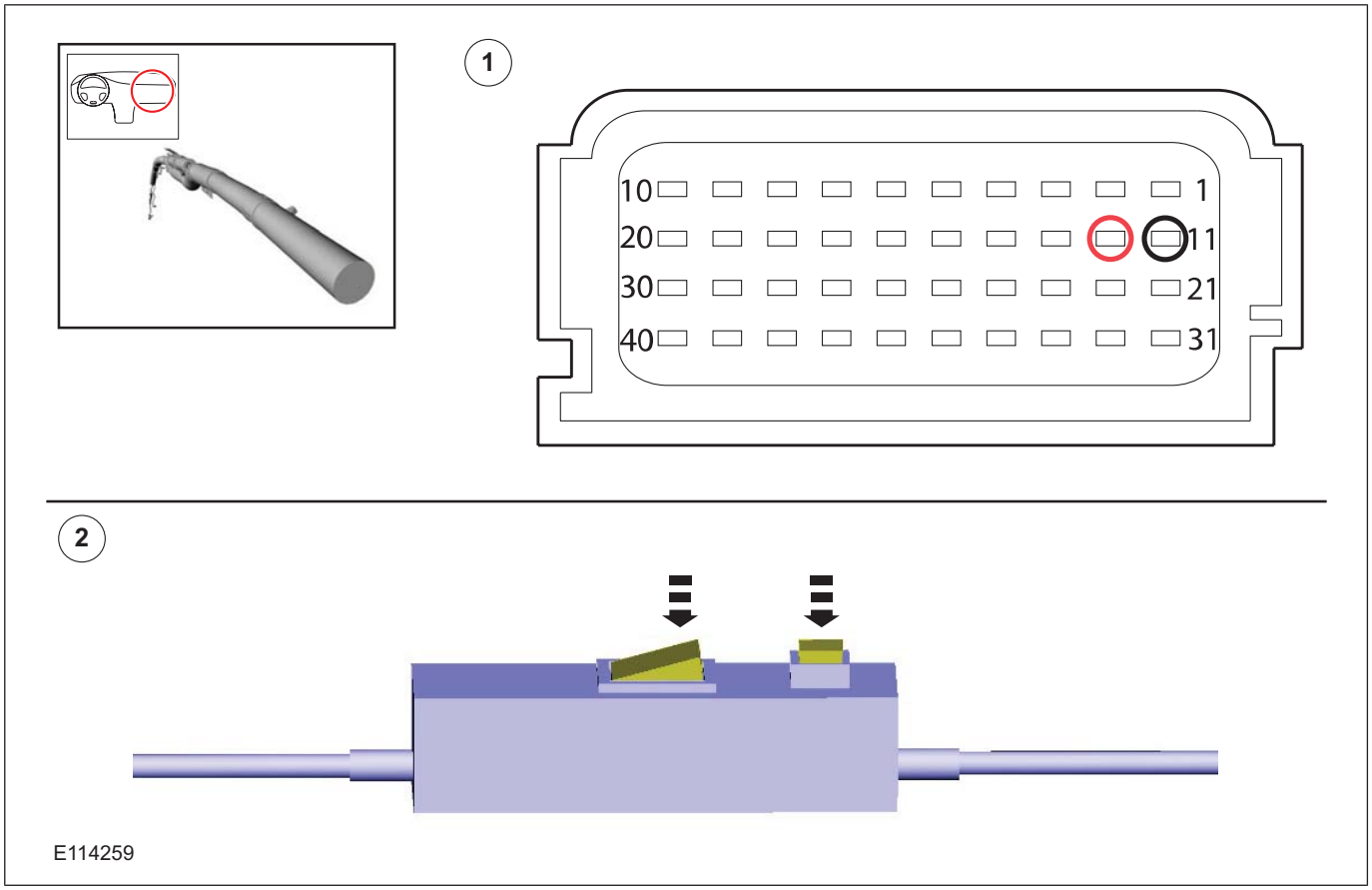
8. 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**

GENERAL PROCEDURES



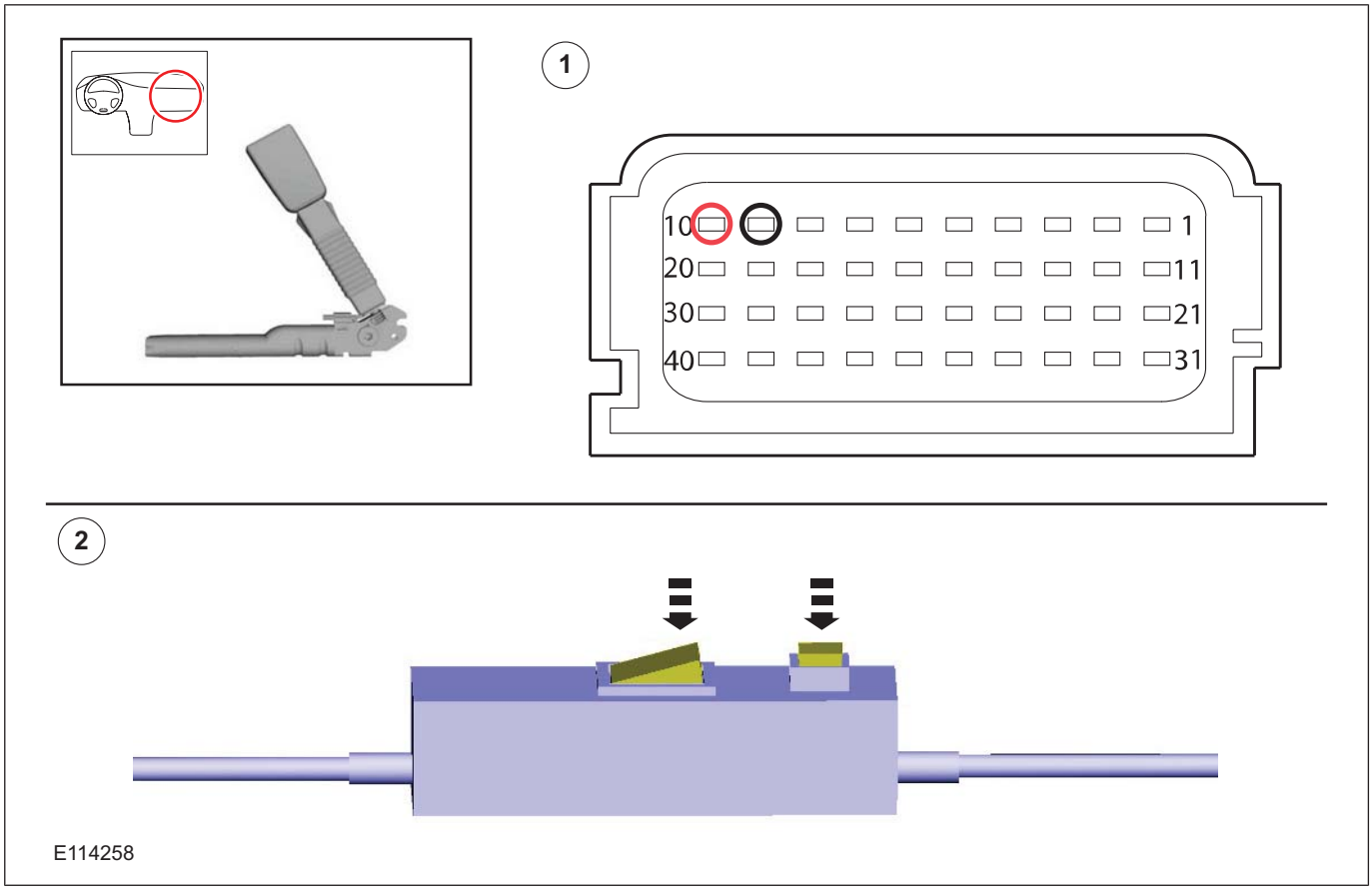
9. 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**

GENERAL PROCEDURES



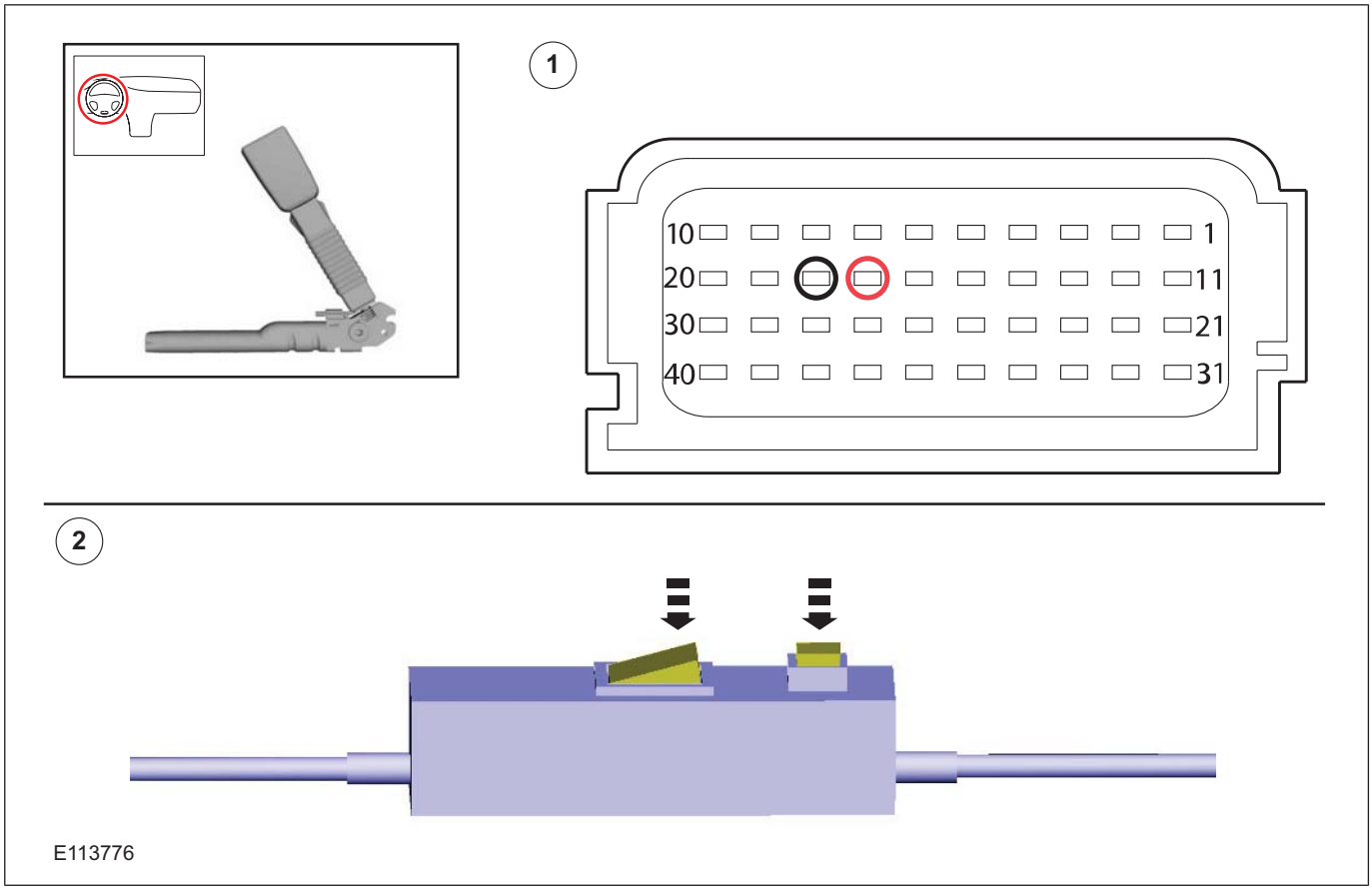
10. 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**

GENERAL PROCEDURES



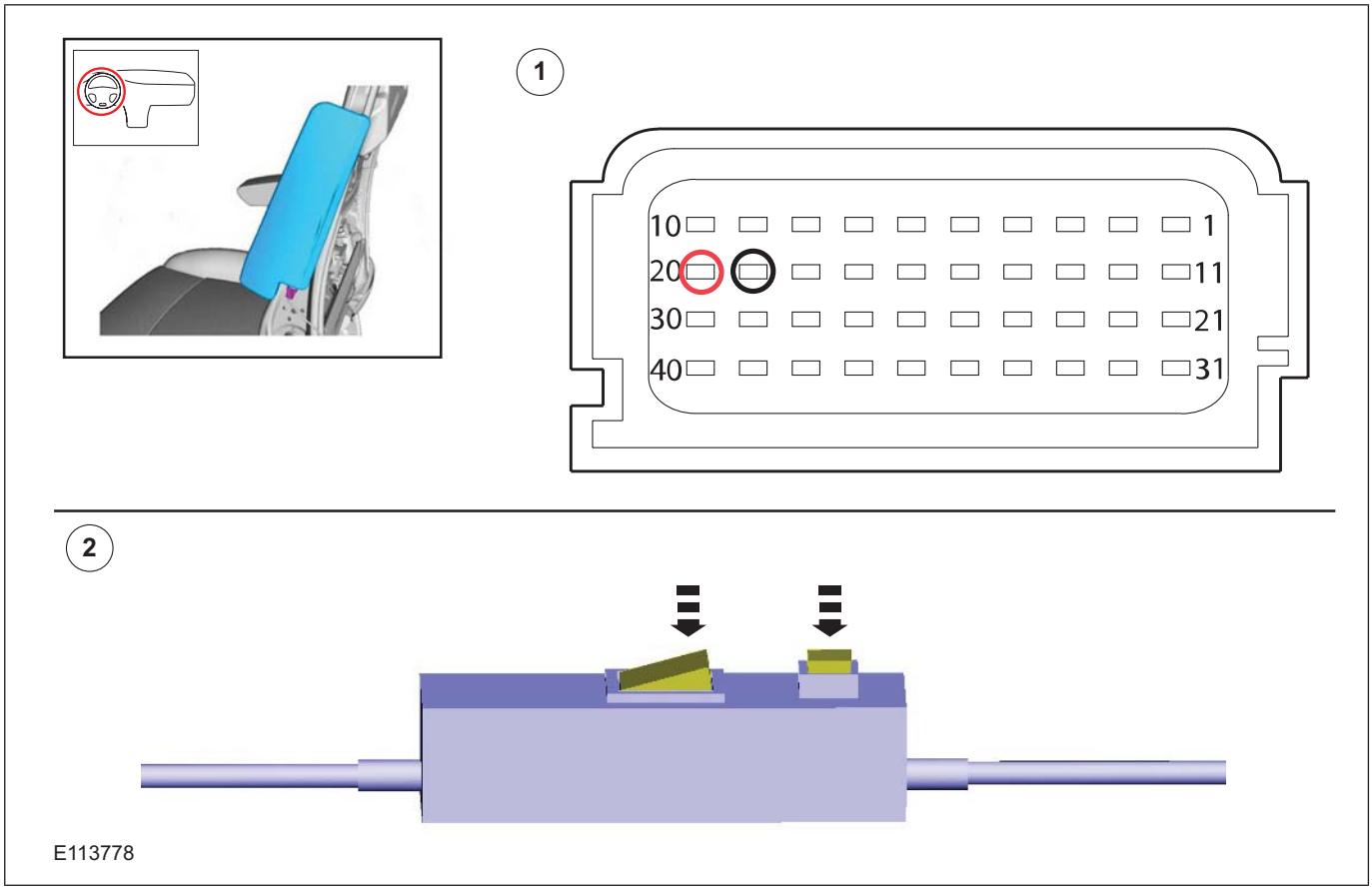
11. 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**

GENERAL PROCEDURES



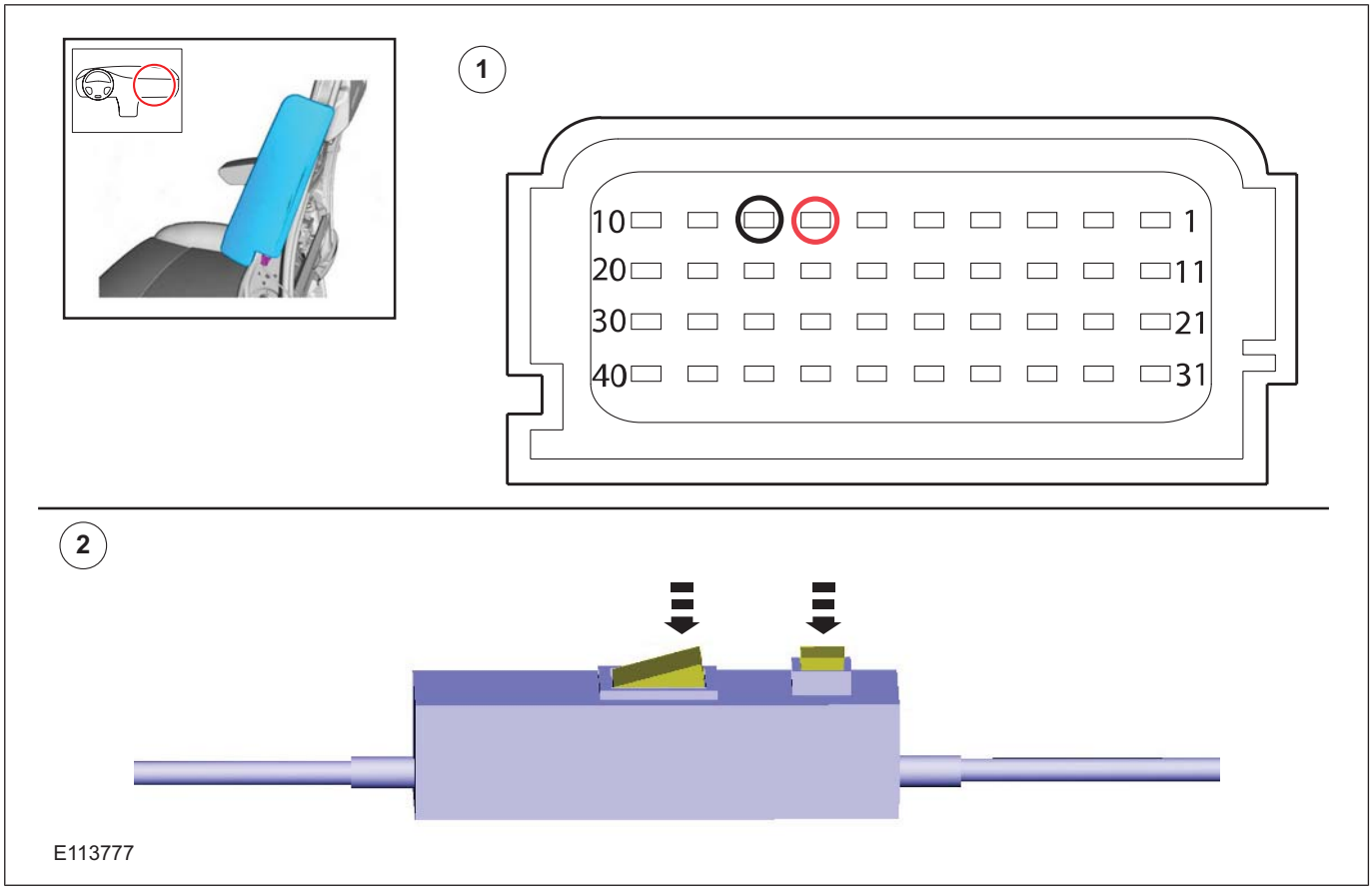
12 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**

GENERAL PROCEDURES



13. 2. **WARNING: Make sure to be a minimum distance of 6 meters from pyrotechnic components during deployment. If possible stand behind a wall.**

GENERAL PROCEDURES



14. Deployed air bag module(s) and safety belt pretensioners should be sealed in suitable bags and then disposed of in accordance with local contaminated waste regulations.

15. **NOTE:** All unserviceable air bag modules have been placed on the Mandatory Return List. All discolored or damaged air bag modules should be treated the same as any unserviceable live air bag module being returned.

    Refer to: Front Safety Belt Retractor - 4-Door/5-Door/Wagon (501-20 Safety Belt System, Removal and Installation).
    Refer to: Driver Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation).
    Refer to: Passenger Air Bag Module - Vehicles Built From: 04/2006 (501-20 Supplemental Restraint System, Removal and Installation).
    Refer to: Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation).
    Refer to: Side Air Curtain Module - Vehicles Built From: 22-06-2007 (501-20 Supplemental Restraint System, Removal and Installation).

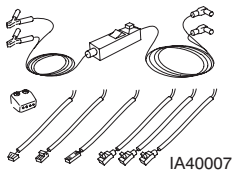
16. **WARNING: Under no circumstances is an unserviceable air bag module or safety belt pretensioner to be returned through the local mailing system. Failure to follow this instruction may result in personal injury.**

    If an air bag module or safety belt pretensioner fails to deploy, seal the unserviceable air bag module or safety belt pretensioner in suitable packaging and return to the Exchange Plan Center, as appointed through the local National Sales Company

GENERAL PROCEDURES

Scrapped Vehicle Undeployed Air Bag Disposal

Special Tool(s)

 IA40007	Test and Deployment Lead, Air Bag/Pyrotechnic Safety Belt 418-S055 (40-007A)

General Equipment

12 volt battery

All vehicles

WARNINGS:

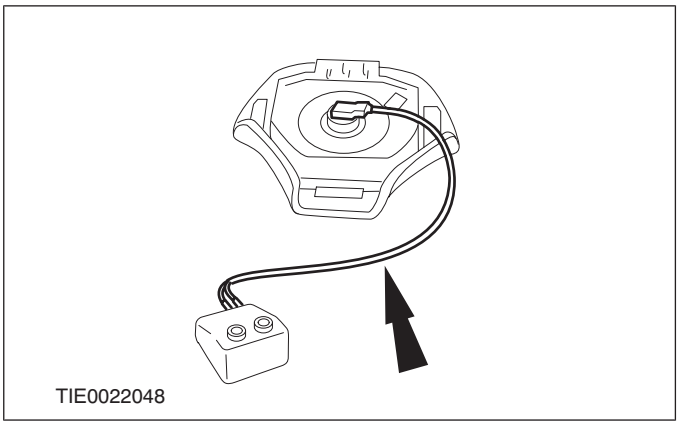
To minimize the possibility of injury in the event of premature deployment, always carry a live air bag module with the bag and trim cover pointed away from the body. Failure to follow this instruction may result in personal injury.

To minimize the possibility of premature deployment, live air bag modules must only be placed on work benches which have been ground bonded. Failure to follow this instruction may result in personal injury.

1. **Disconnect the battery ground cable. For**
2. **Remove the air bag module(s) to be deployed. For additional information, refer to the relevant procedure(s) in this section.**

Single stage air bag modules

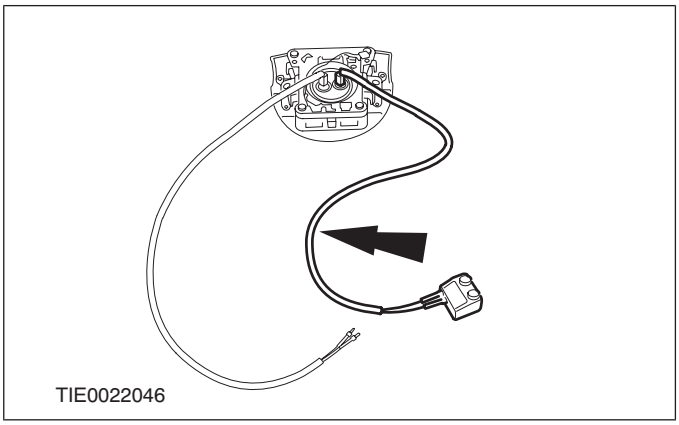
3. **Connect the test lead to the air bag module and the adapter (driver air bag module shown).**



Two stage air bag modules

4. **CAUTION: Do not connect both test leads to the adapter. Both air bag module inflators must be deployed separately.**

   Connect two test leads to the air bag module and the other end of one of the test leads to the adapter (driver air bag module shown).

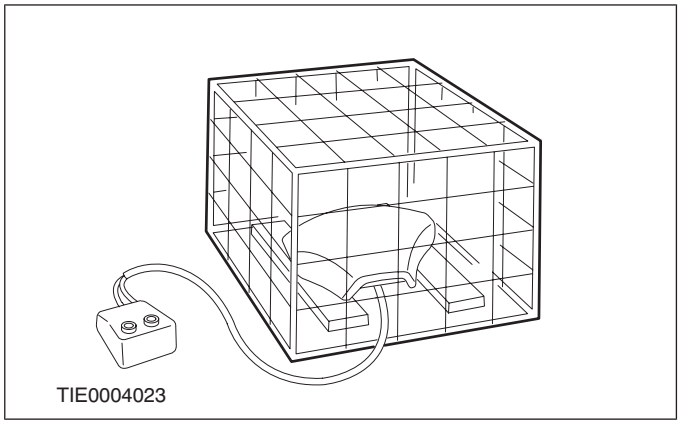


All air bag modules

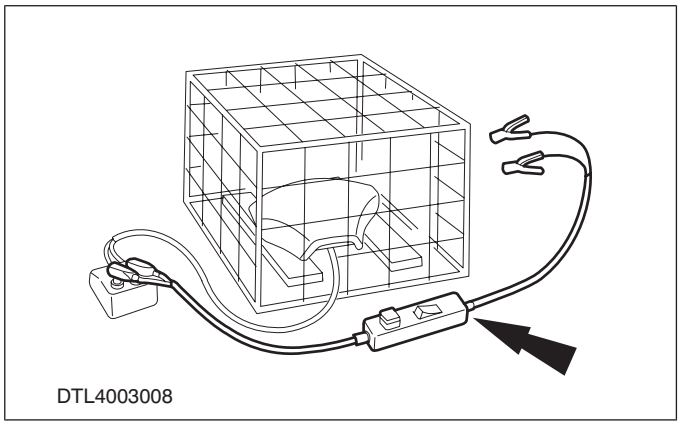
5. **CAUTION: To protect the test lead electrical connector(s) from damage during deployment, raise the air bag module off the ground on two wooden blocks.**

GENERAL PROCEDURES

Place the air bag module inside a suitable rigid wire cage with the air bag module cover uppermost.

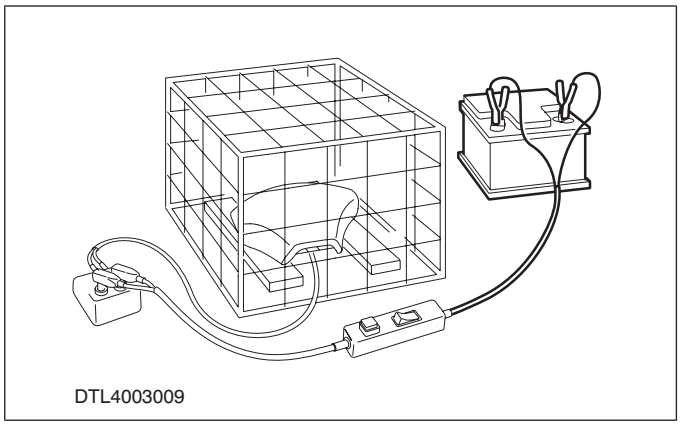

TIE0004023

6. **Connect the deployment lead to the adapter.**


DTL4003008

7. **WARNING: Before proceeding make sure that all personnel in the vicinity are aware that a loud noise (bang) is about to occur. Do not let anybody approach closer than six meters. Failure to follow this instruction may result in personal injury.**

   Move as far away as possible from the air bag module and connect the deployment lead to the battery.

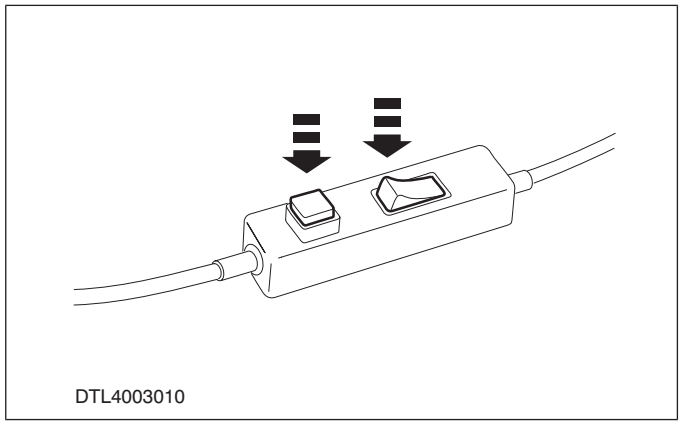

DTL4003009

8. **CAUTIONS:**

   The air bag module should not be handled immediately following deployment as the air bag module will be very hot.

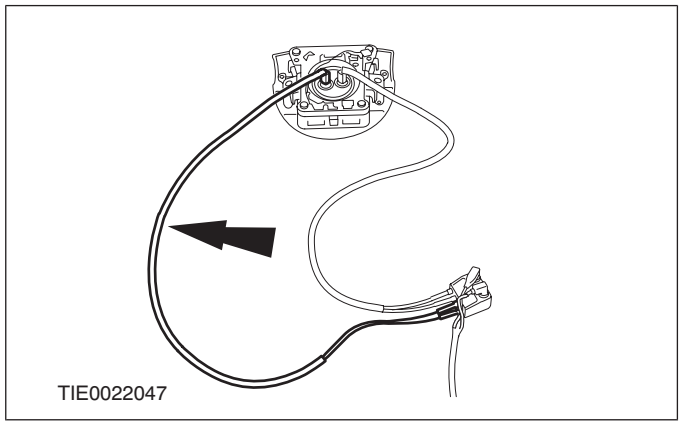
   After deployment, the air bag module surface may contain deposits of sodium hydroxide, a product of the gas generate combustion, that is irritating to the skin. Use protective gloves when handling any deployed air bag module.

   Depress both switches to deploy the air bag.


DTL4003010

Two stage air bag modules

9. **Connect the second test lead to the adapter.**


TIE0022047

10. **WARNING: Before proceeding make sure that all personnel in the vicinity are aware that a loud noise (bang) is about to occur. Do not let anybody approach closer than six meters. Failure to follow this instruction may result in personal injury.**

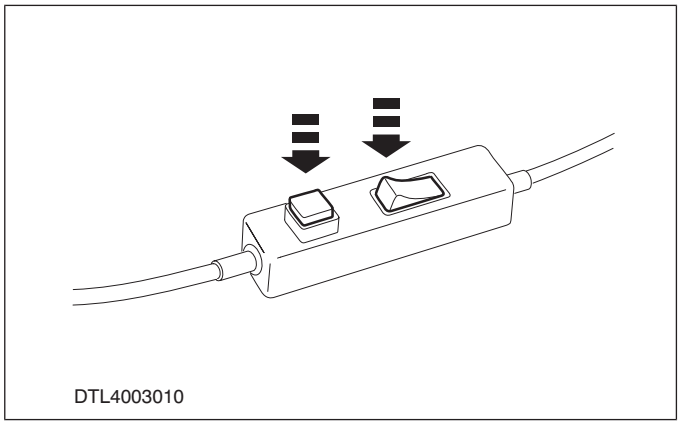
CAUTIONS:

The air bag module should not be handled immediately following deployment as the air bag module will be very hot.

GENERAL PROCEDURES

After deployment, the air bag module surface may contain deposits of sodium hydroxide, a product of the gas generate combustion, that is irritating to the skin. Use protective gloves when handling any deployed air bag module.

Depress both switches to deploy the air bag.



All air bag modules

11. **Deployed air bag module(s) should be sealed in a suitable bag and then disposed of in accordance with local contaminated waste regulations.**

GENERAL PROCEDURES

Unserviceable Air Bag Disposal

1. **WARNINGS:**

   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 prevent premature deployment, live air bag modules must only be placed on work benches which have been ground bonded. Failure to follow this instruction may result in personal injury.

   NOTE: All unserviceable air bag modules have been placed on the Mandatory Return List. All discolored or damaged air bag modules should be treated the same as any unserviceable live air bag module being returned.

   Remove the unserviceable air bag module. For additional information, refer to the relevant procedure in this section.

2. **WARNING: Under no circumstances is an unserviceable air bag module(s) to be returned through the local mailing system. Failure to follow this instruction may result in personal injury.**

   Seal the unserviceable air bag module(s) in the packaging from the new air bag module(s) and address to the appropriate manufacturer. The package should then be forwarded to the Exchange Plan Center (as appointed through the national sales company) who will arrange forwarding to the manufacturer.

3. **NOTE: Autoliv air bag modules and seat belt pretensioners.**

   Autoliv Gmbh, Theodor Heuss Strasse 2, 85221, Dachau, Germany.

4. **NOTE: TRW air bag modules.**

   TRW Occupant Restraint Systems, FAO Rene Getto, Industriestr 20, 73551, Aldorf, Germany.

5. **NOTE: TRW seat belt pretensioners.**

   TRW Occupant Restraint Systems, FAO Helmut Goss, Industriestr 20, 73551, Aldorf, Germany.

6. **NOTE: Takata Petri air bag modules.**

   Takata Petri AG, Grossostheimer Strasse 223, D-63741 Aschaffenburg, (Supplier Code P790M) Germany.

REMOVAL AND INSTALLATION

Crash Sensor

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.

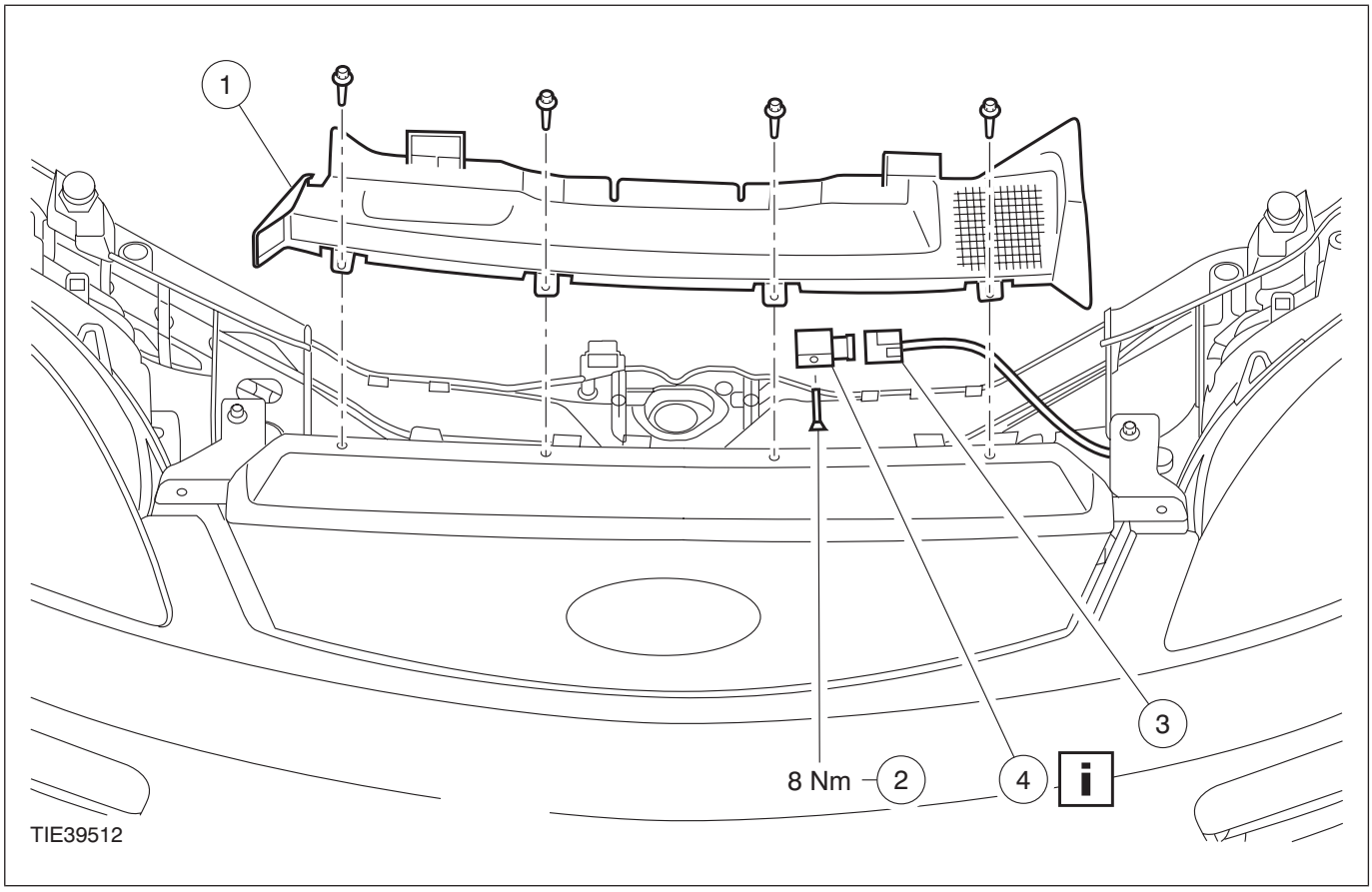
To minimize the possibility of premature deployment, do not use radio key code savers when working on the supplemental restraint system. Failure to follow this instruction may result in personal injury.

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.

1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Radiator air deflector
2	Crash sensor retaining bolt
3	Crash sensor electrical connector
4	Crash sensor See Installation Detail

All vehicles

3. **To install, reverse the removal procedure.**

Vehicles with global closing

4. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass,

REMOVAL AND INSTALLATION

Frames and Mechanisms, General Procedures).

Installation Details

Item 4 Crash sensor

WARNING: Make sure the crash sensor locating tang is correctly located in the grille opening panel. Failure to follow this instruction may result in personal injury.

REMOVAL AND INSTALLATION

Side Impact Sensor

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.

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.

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.

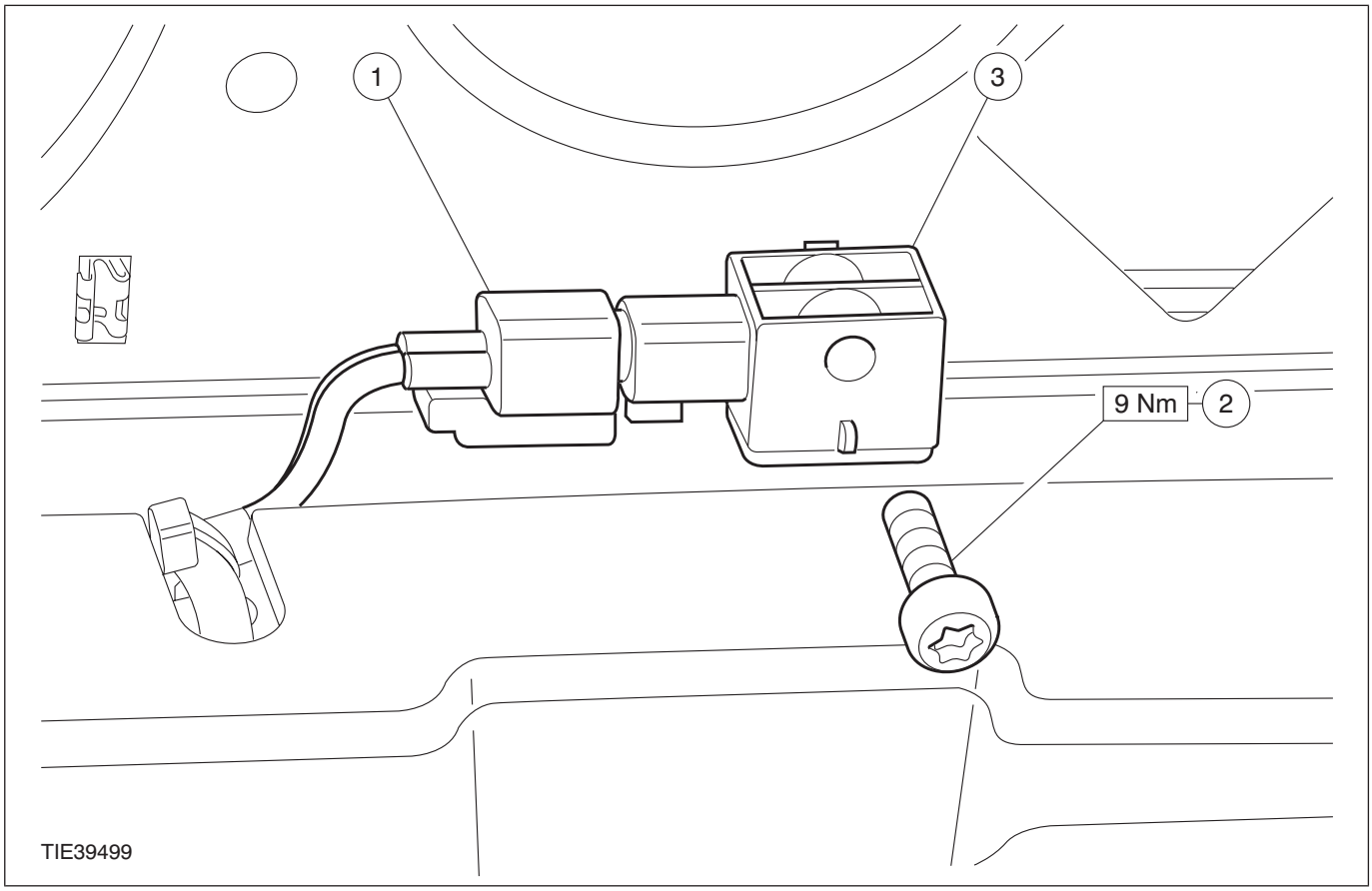
1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the B-pillar trim panel. For additional information, refer to: (501-05 Interior Trim and Ornamentation)**

   B-Pillar Trim Panel - 3-Door (Removal and Installation),
   B-Pillar Trim Panel - 4-Door/5-Door (Removal and Installation).

3. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Side impact sensor electrical connector
2	Side impact sensor retaining bolt
3	Side impact sensor

All vehicles

WARNING: Make sure the side impact sensor locating tangs are correctly located into the floor pan. Failure to follow this instruction may result in personal injury.

REMOVAL AND INSTALLATION

4. **To install, reverse the removal procedure.**

Vehicles with global closing

5. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

REMOVAL AND INSTALLATION

Restraints Control Module (RCM)

General Equipment

Worldwide diagnostic system (WDS)

WARNINGS:

To avoid accidental deployment, the restraints control module (RCM) 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.

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.

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.

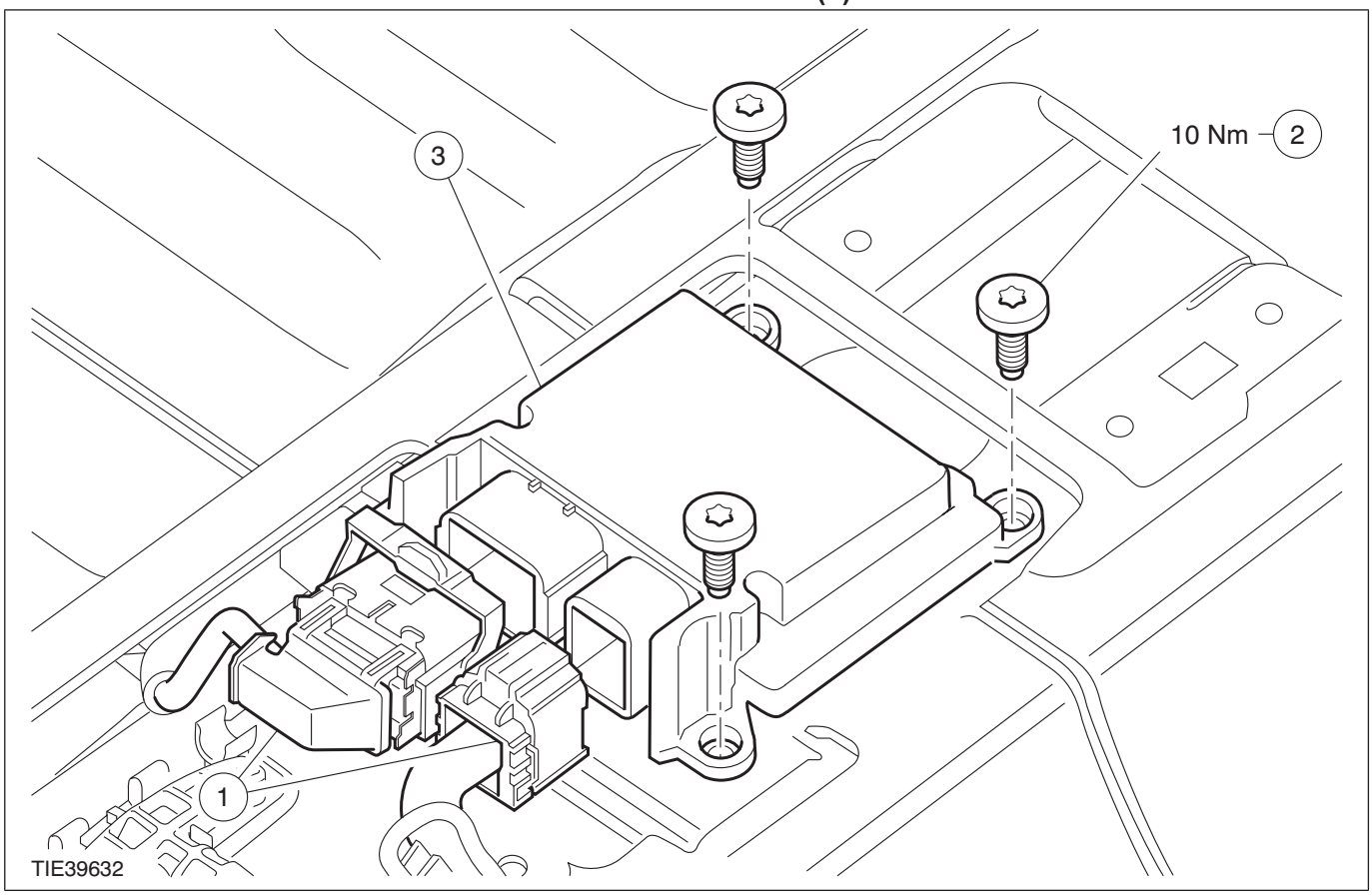
1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the floor console. For additional information, refer to:**

   Floor Console (501-12 Instrument Panel and Console, Removal and Installation), Floor Console - Vehicles Built From: 03/2007, Vehicles With: Center Armrest (501-12 Instrument Panel and Console, Removal and Installation).

3. **Remove the components in the order indicated in the following illustration(s) and table(s).**



REMOVAL AND INSTALLATION

Item	Description
1	Electrical connectors
2	Retaining bolts
3	Restraints control module

All vehicles

4. **To install, reverse the removal procedure.**

5. **WARNING: A new restraints control module must be configured following installation. Failure to follow this instruction may result in personal injury.**

   When a new restraints control module is installed, configure the restraints control module using WDS.

Vehicles with global closing

6. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

REMOVAL AND INSTALLATION

Driver Air Bag Module

WARNINGS:

To avoid accidental deployment, the restraints control module (RCM) 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 SRS. 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 SRS component. Failure to follow this instruction may result in personal injury.

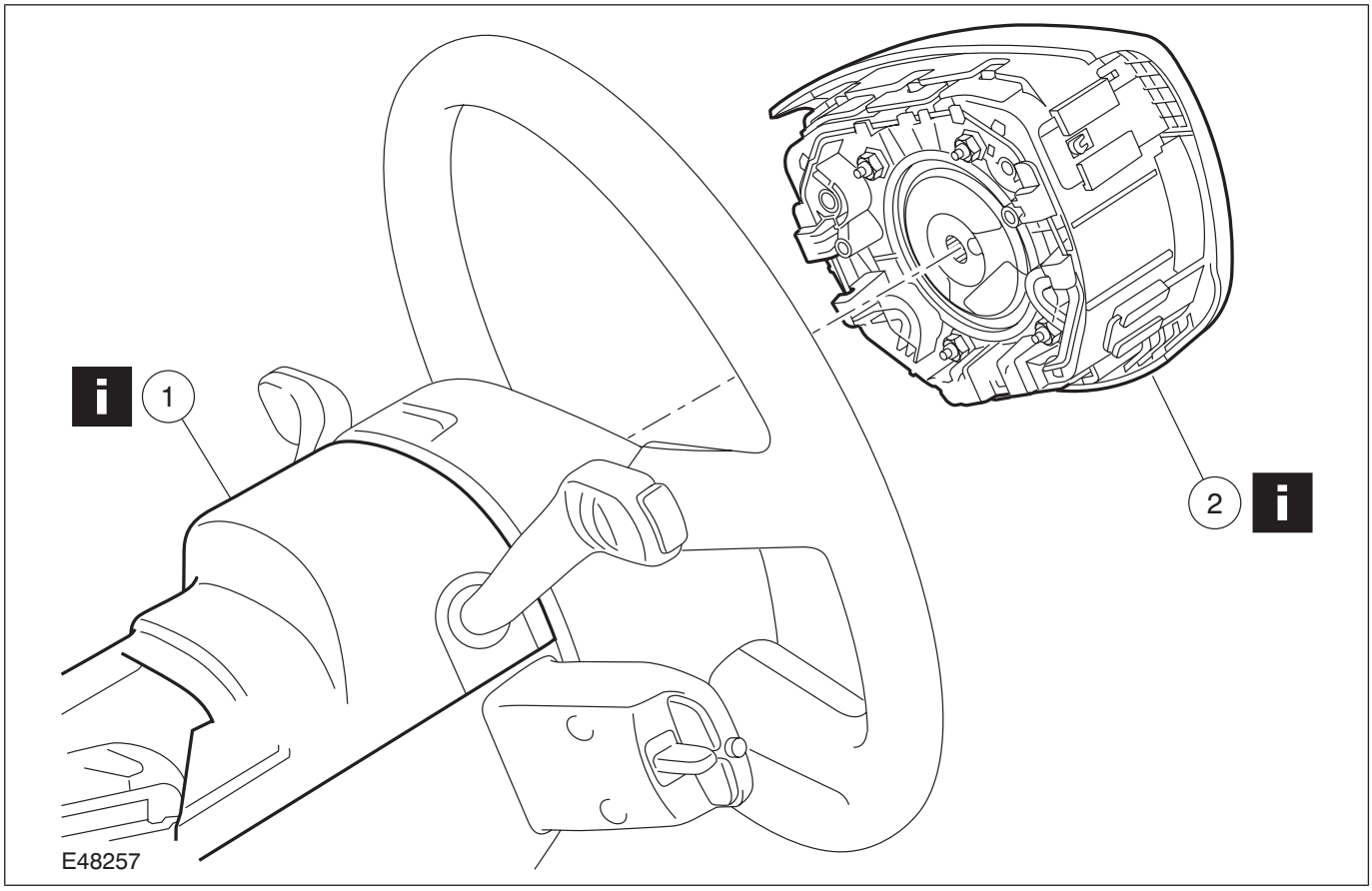
Painting over the driver air bag module trim cover or instrument panel could lead to deterioration of the trim cover and air bags. Do not for any reason attempt to paint discolored or damaged air bag module trim covers or instrument panel. Install a new component. Failure to follow this instruction may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

1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



Item	Description
1	Steering column upper shroud See Removal Detail
2	Driver air bag module See Removal Detail

All vehicles

3. To install, reverse the removal procedure.

Vehicles with global closing

4. Initialize the door window motors.

For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

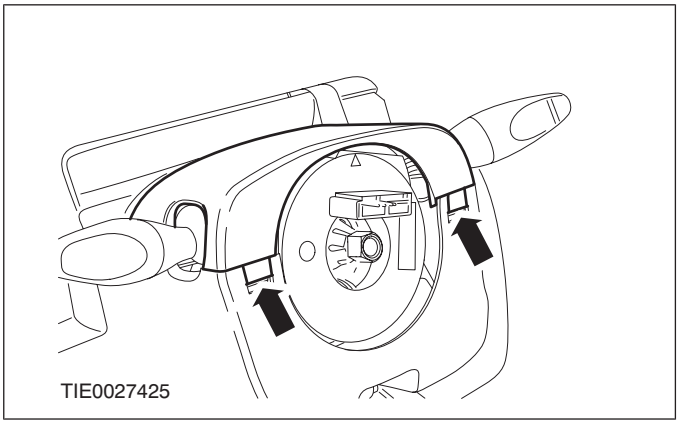
Removal Details

Item 1 Steering column upper shroud

1. NOTE: Turn the steering wheel to access the steering column upper shroud retaining clips.

Remove the steering column upper shroud (steering wheel shown removed for clarity).

- Using a thin bladed screwdriver, release the retaining clips.



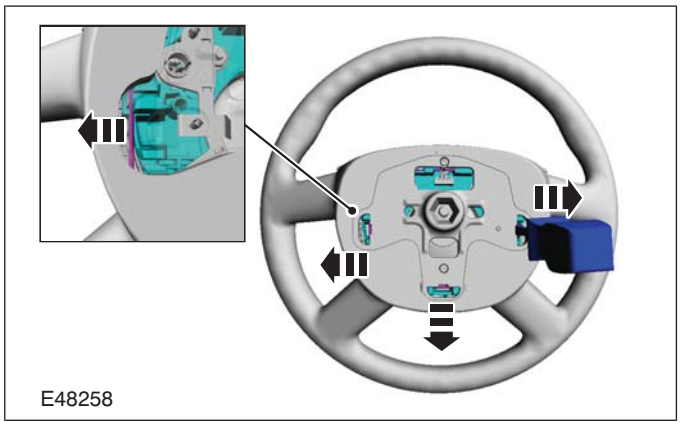
REMOVAL AND INSTALLATION

Item 2 Driver air bag module

1. **NOTE: Turn the steering wheel to access the driver air bag module retaining clips.**

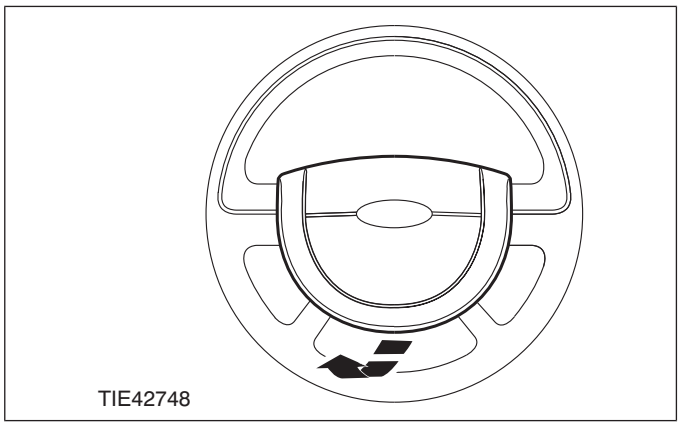
   Using a thin bladed screwdriver, detach the driver air bag module from the steering wheel (steering wheel shown removed for clarity).

   - Release the spring clip.



2. **WARNING: The driver air bag module should only be inverted long enough to disconnect the driver air bag module electrical connector. Handle with extreme care making sure that, if for any reason this procedure is interrupted, the driver air bag module is turned the correct way up, with the trim cover side uppermost. Failure to follow these instructions may result in personal injury.**

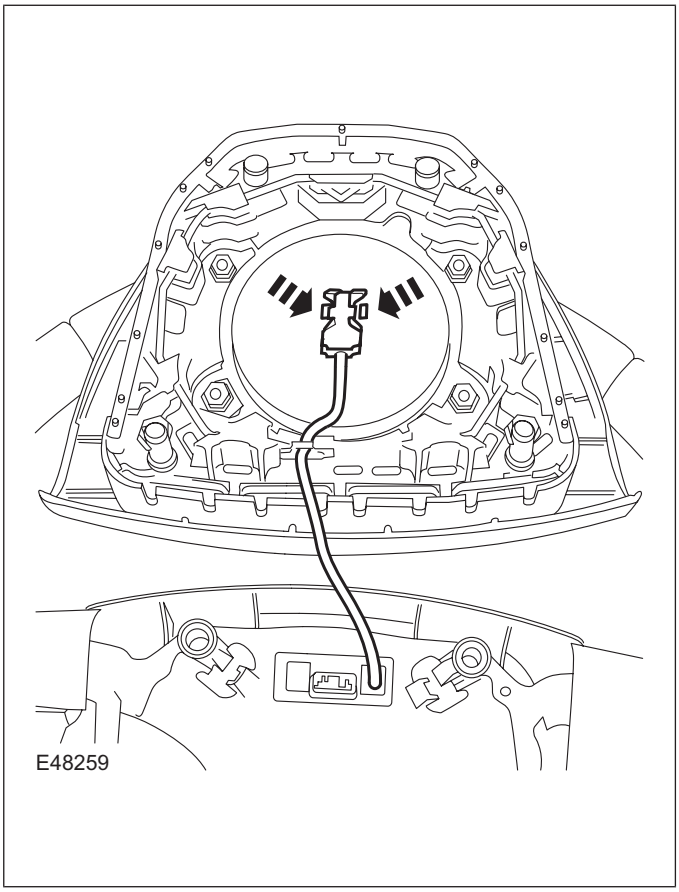
   Invert the driver air bag module to access the driver air bag module wiring harness.



3. **NOTE: It may be necessary to use a pair of pointed nose pliers to release the driver air bag module electrical connector locking tangs.**

   Disconnect the driver air bag module electrical connector.

   - Disconnect the driver air bag module ground cable (if equipped).



REMOVAL AND INSTALLATION

Passenger Air Bag Module — Vehicles Built From: 04/2006

Removal

WARNINGS:

The supplemental restraint system (SRS) is active for a certain length of time after the power supply has been disconnected. Wait for a minimum of 3 minutes before disconnecting or removing any SRS components.

Wear safety goggles.

Make sure that the vehicle electrical system is fully depowered and no other power source is connected.

Do not probe supplemental restraint system (SRS) electrical connectors.

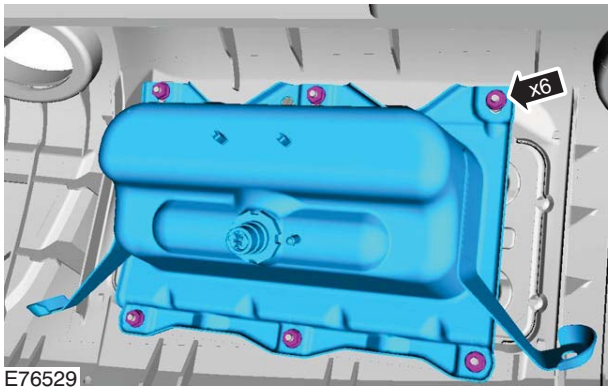
Refer to: Supplemental Restraint System (SRS) Health and Safety Precautions (100-00 General Information, Description and Operation).

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

1. Remove the instrument panel.

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

2. Torque: 8 Nm



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Side Air Bag Module

WARNINGS:

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.

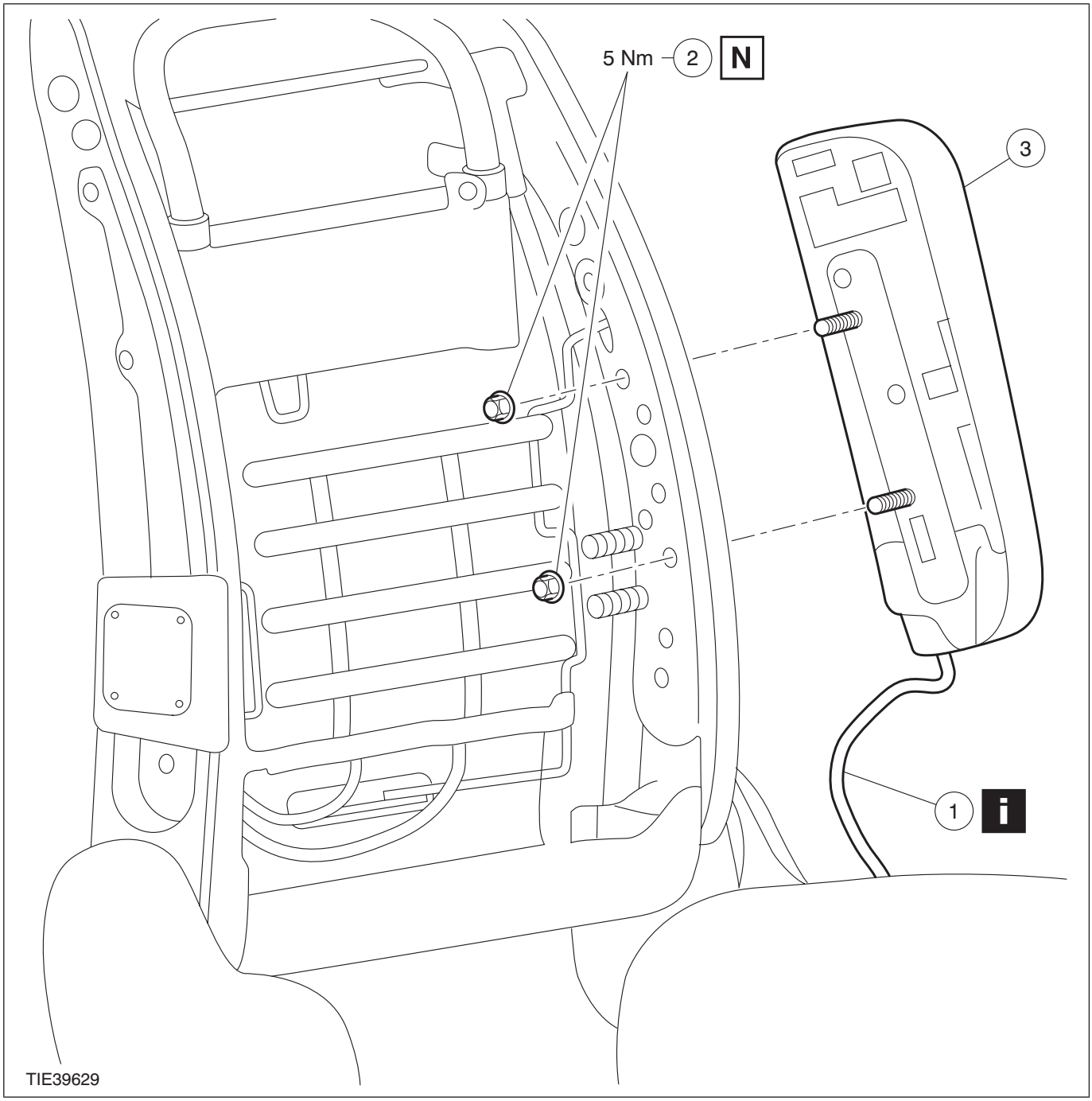
1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the front seat backrest cover. For additional information, refer to: (501-10 Seating)**
   Front Seat Backrest Cover - 2.5L Duratec-RS (224kW/305PS) - VI5 (Removal and Installation),
   Front Seat Backrest Cover - 2.5L Duratec-ST (VI5) (Removal and Installation).

3. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



Item	Description
1	Side air bag module wiring harness See Removal Detail
2	Side air bag module retaining nuts
3	Side air bag module

All vehicles

4. To install, reverse the removal procedure.

Vehicles with global closing

5. Initialize the door window motors.

For additional information, refer to: Door Window Motor Initialization (501-11 Glass, Frames and Mechanisms, General Procedures).

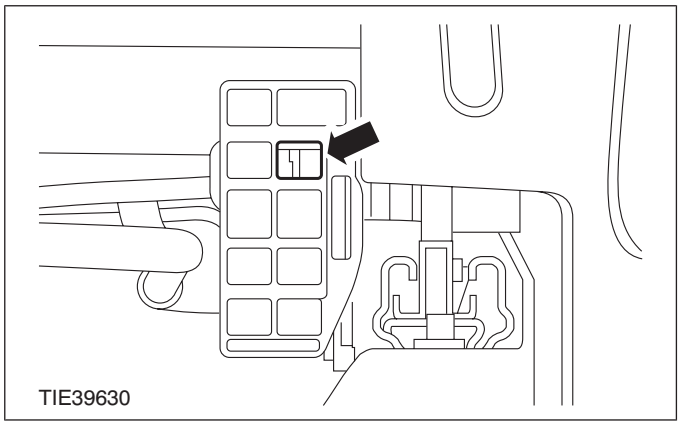
Removal Details

REMOVAL AND INSTALLATION

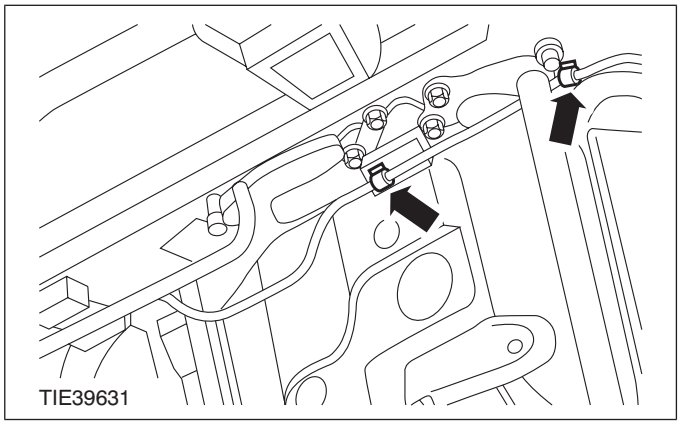
Item 1 Side air bag module wiring harness

1. **WARNING: Note the position of the wiring harness, to aid installation. An incorrectly routed wiring harness could become damaged when the seat is moved. Failure to follow this instruction may result in personal injury.**

   Detach the side air bag electrical connector from the connector block.



2. **Detach the side air bag module wiring harness from the seat frame.**
   - Use a trim tool to carefully release the retaining clips.



REMOVAL AND INSTALLATION

Side Air Curtain Module — Vehicles Built From: 22-06-2007

General Equipment

Long Nose Pliers

Removal

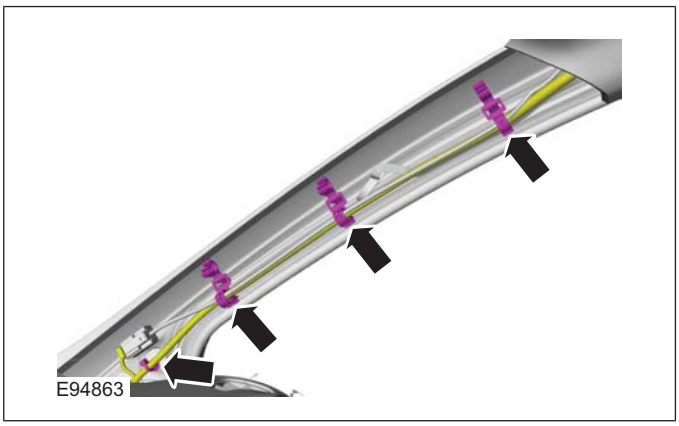
WARNINGS:

After the power supply has been disconnected, wait for a minimum of 3 minutes before disconnecting or removing any pyrotechnic components.

Make sure that the vehicle electrical system is fully depowered and no other power source is connected.

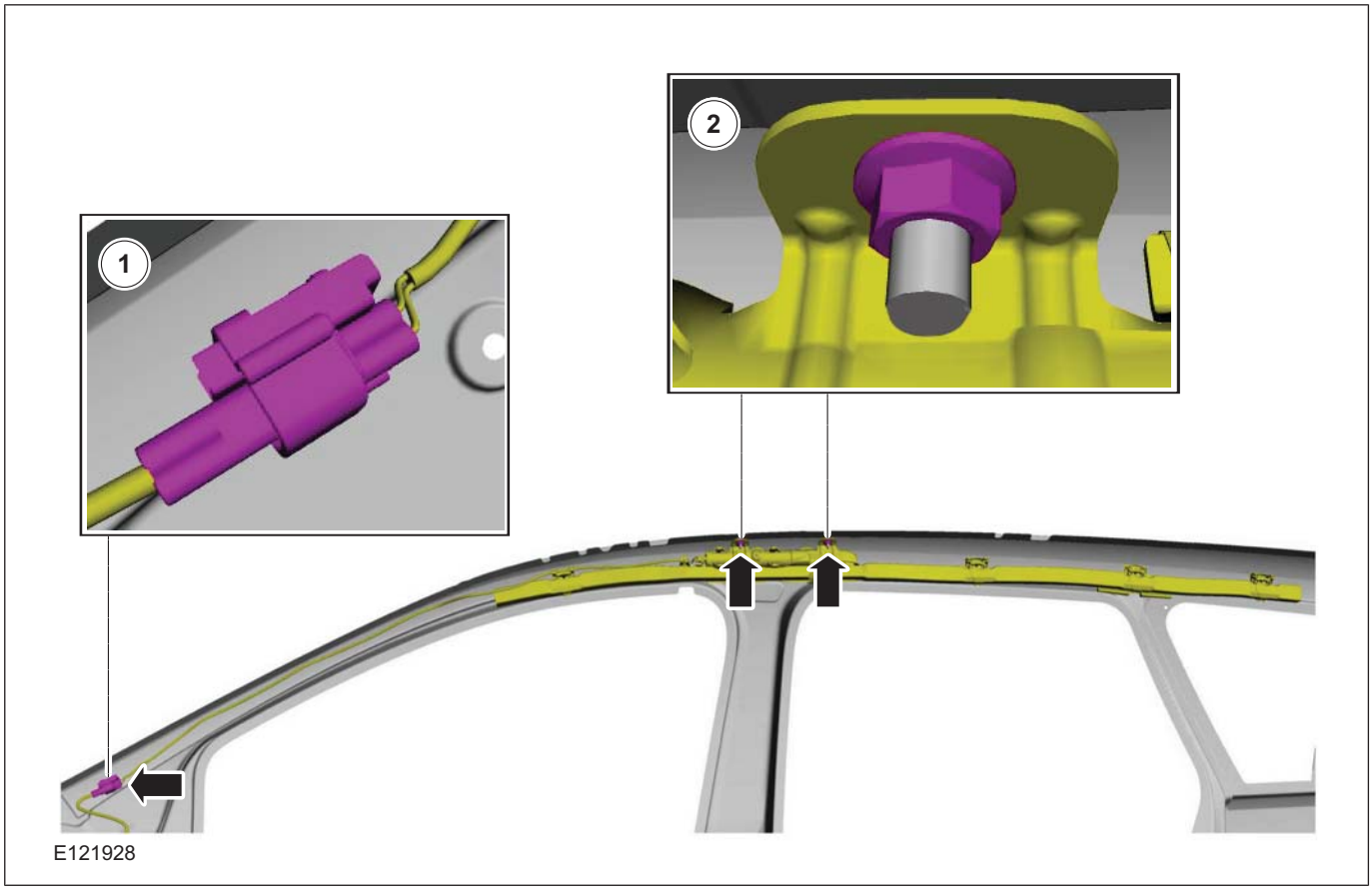
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Supplemental Restraint System (SRS) Health and Safety Precautions (100-00 General Information, Description and Operation).
2. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
3. Refer to: Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
   Refer to: Headliner - 3-Door, Vehicles Without: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
   Refer to: Headliner - 5-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
   Refer to: Headliner - 5-Door, Vehicles Without: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
4. 



5. 

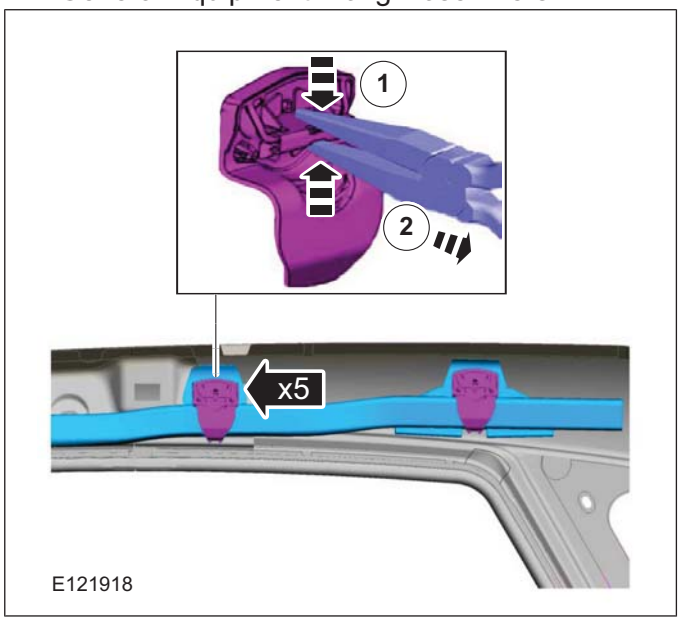
REMOVAL AND INSTALLATION



3-door

6.

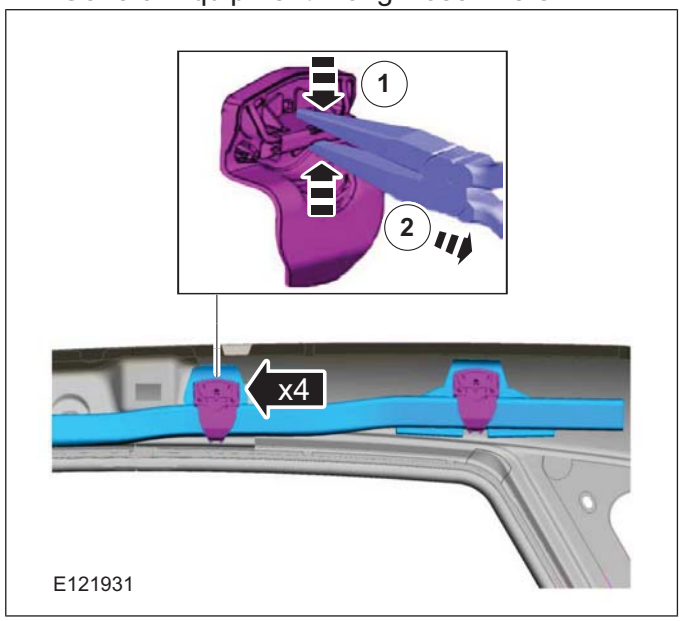
General Equipment: Long Nose Pliers



4-door, 5-door and wagon

7.

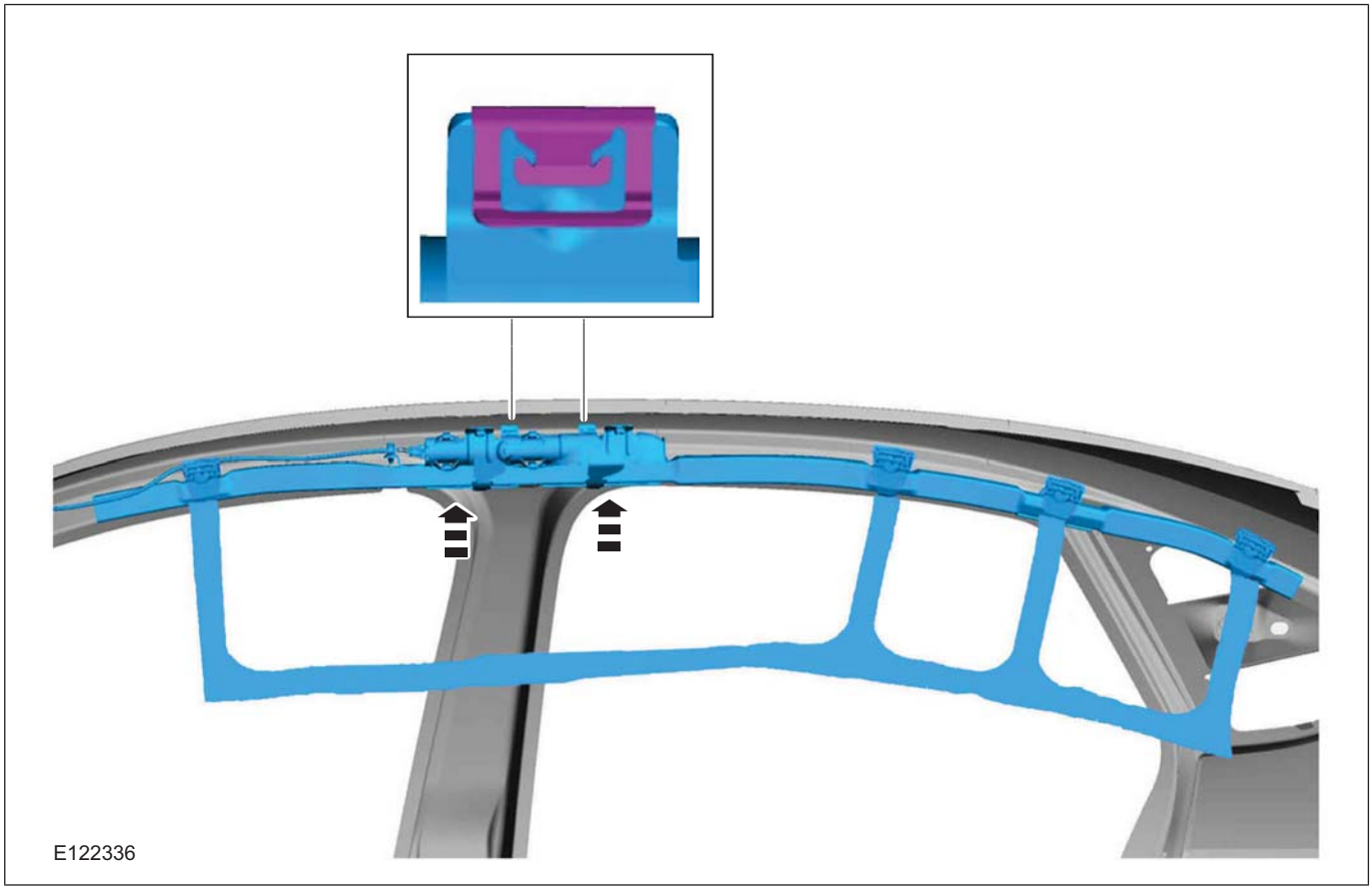
General Equipment: Long Nose Pliers



REMOVAL AND INSTALLATION

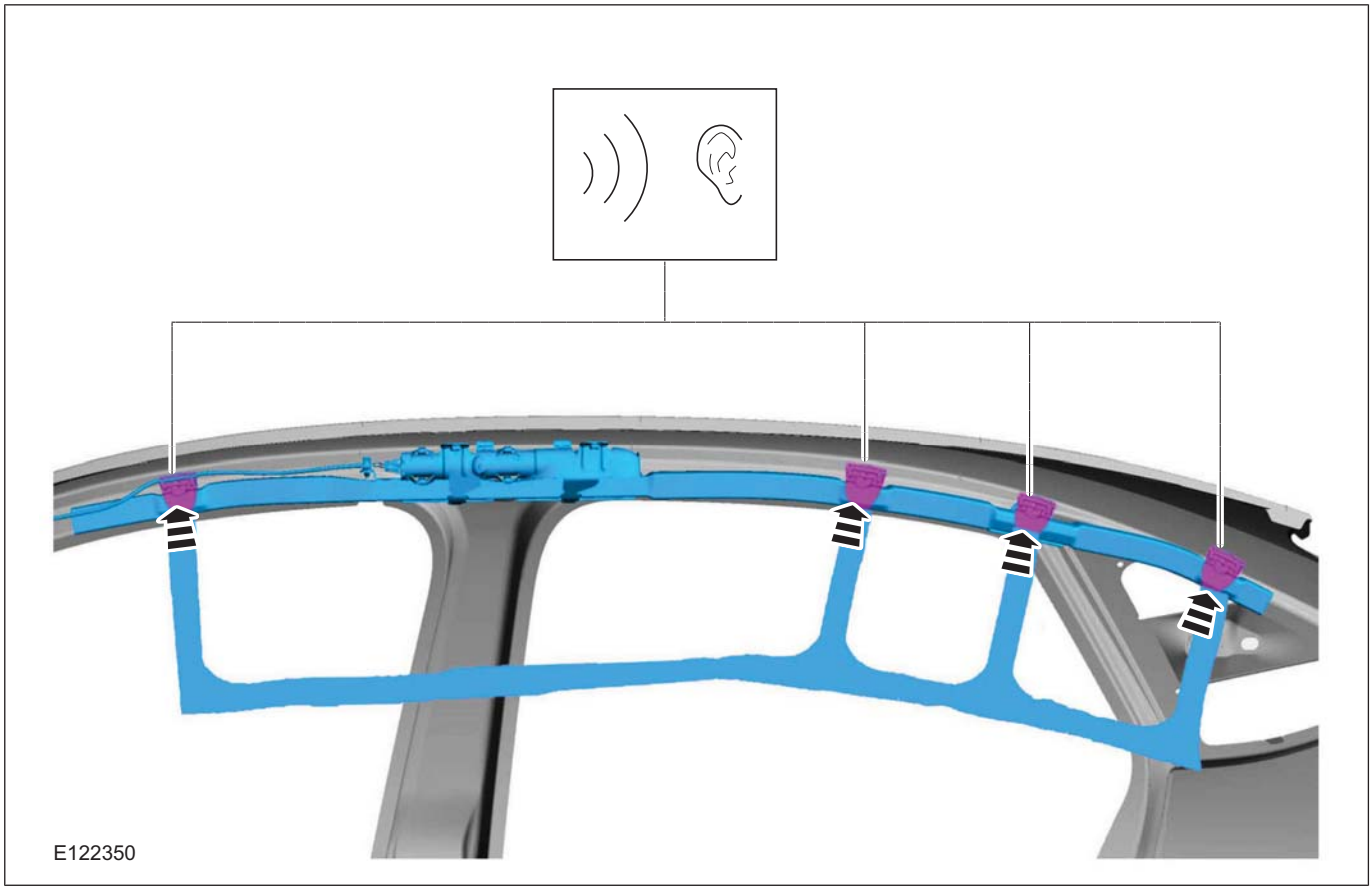
Installation

1.



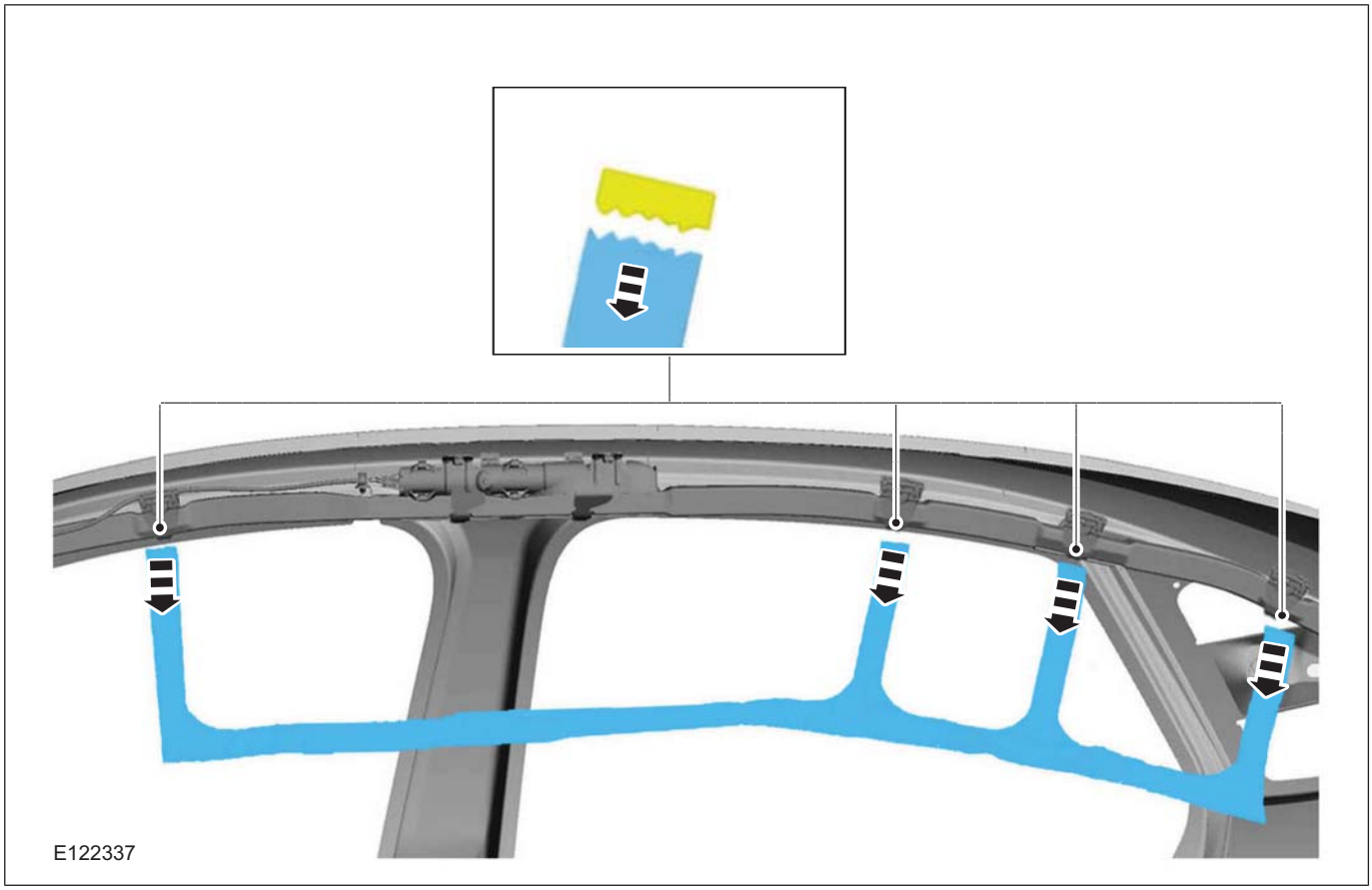
2.

REMOVAL AND INSTALLATION



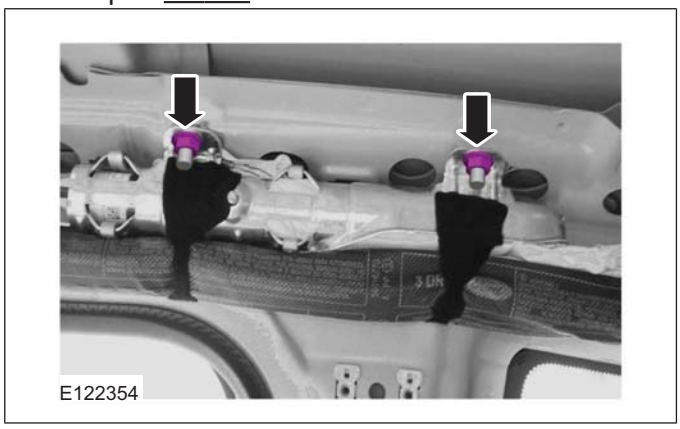
3. 

REMOVAL AND INSTALLATION

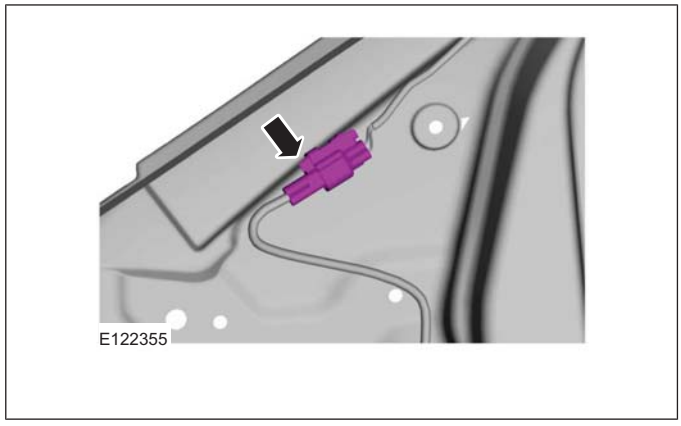


4. 

Torque: 10 Nm

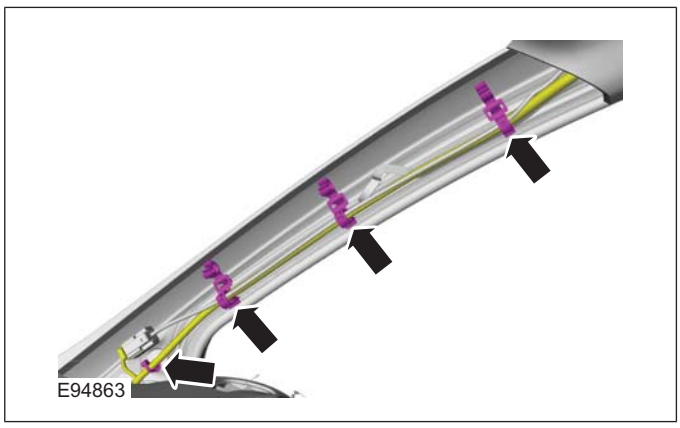


5. 



REMOVAL AND INSTALLATION

6. 



7. Refer to: Headliner - 3-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
   Refer to: Headliner - 3-Door, Vehicles Without: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
   Refer to: Headliner - 5-Door, Vehicles With: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
   Refer to: Headliner - 5-Door, Vehicles Without: Sliding Roof Opening Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

8. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

REMOVAL AND INSTALLATION

Clockspring

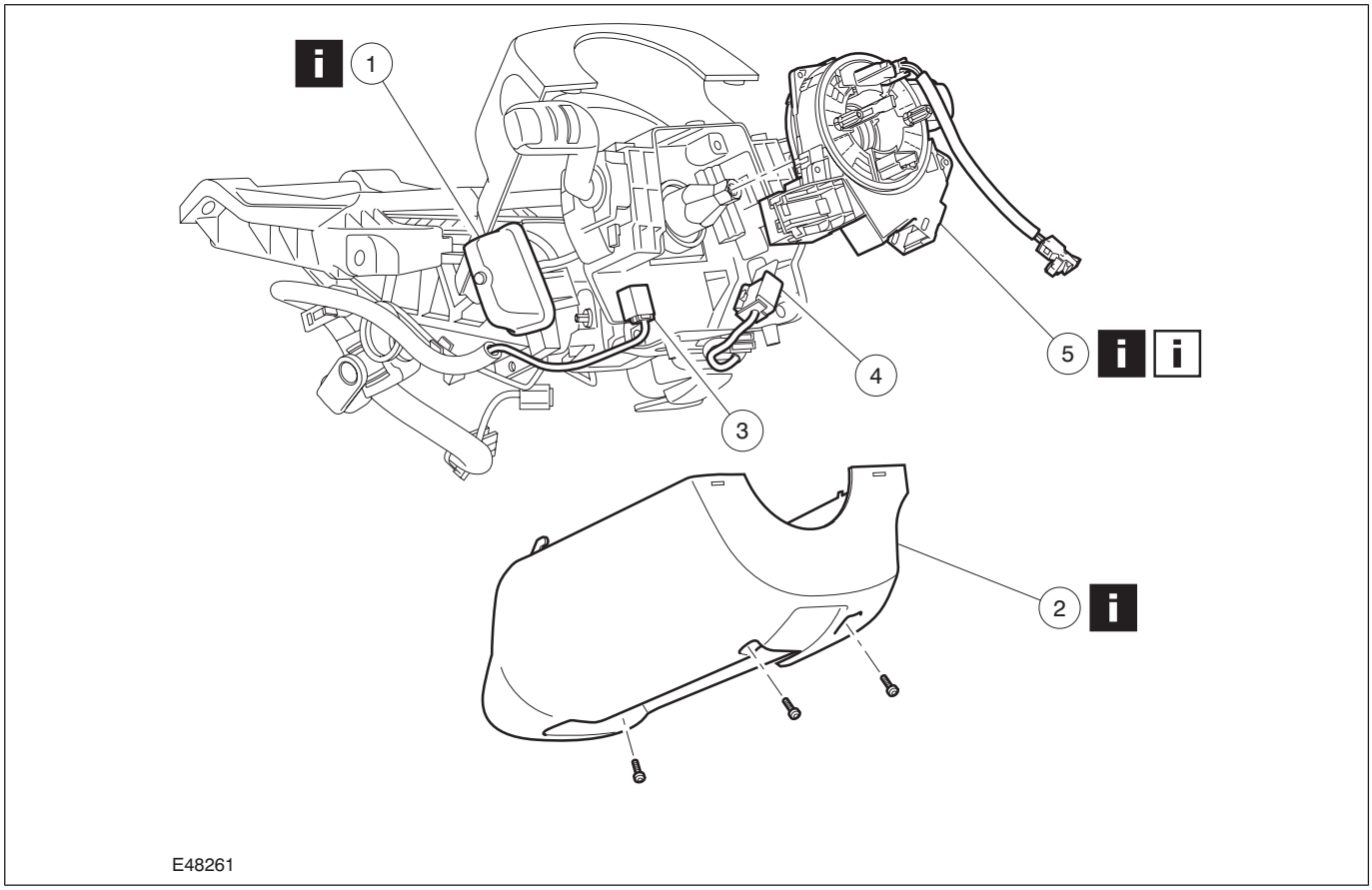
General Equipment

Worldwide diagnostic system (WDS)

1. **Remove the steering wheel.**

   For additional information, refer to: Steering Wheel (211-04 Steering Column, Removal and Installation).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Audio control switch (if equipped) See Removal Detail
2	Steering column lower shroud See Removal Detail
3	Steering wheel rotation sensor electrical connector (if equipped)
4	Clockspring electrical connector
5	Clockspring See Removal Detail See Installation Detail

All vehicles

3. **To install, reverse the removal procedure.**

Vehicles with stability assist

4. **WARNING: The electronic stability program must be re-configured. Failure to follow this instruction may result in personal injury.**

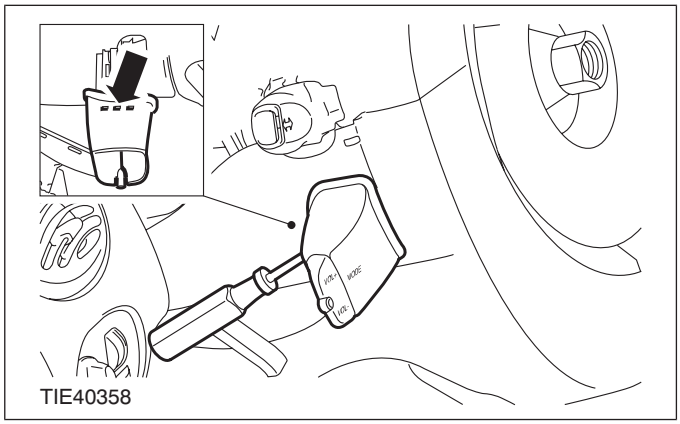
   Configure the stability assist program using WDS.

Removal Details

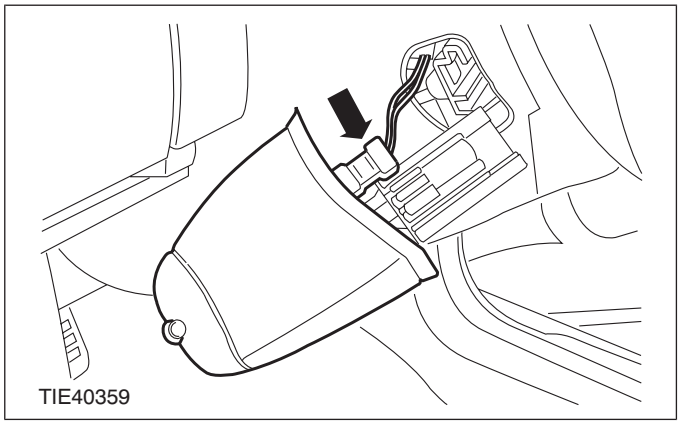
REMOVAL AND INSTALLATION

Item 1 Audio control switch (if equipped)

1. **Detach the audio control switch from the steering column lower shroud.**
   - Using a thin bladed screwdriver, release the locking tang.


TIE40358

2. **Remove the audio control switch.**
   - Disconnect the electrical connector.

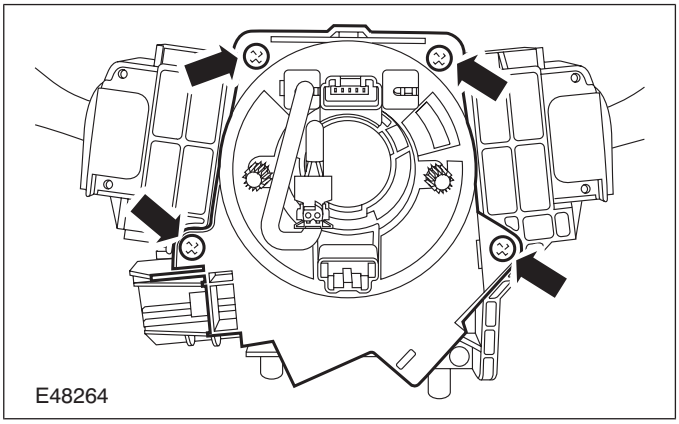

TIE40359

Item 2 Steering column lower shroud

1. **Release the steering column locking lever to aid the removal of the steering column lower shroud.**

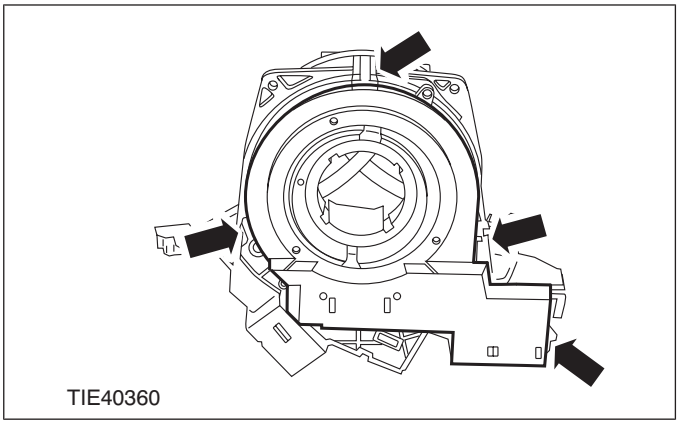
Item 5 Clockspring

1. **Remove the clockspring.**


E48264

2. **CAUTION: Make sure the clockspring to steering wheel rotation sensor retaining clips do not get damaged.**

   Remove the steering wheel rotation sensor (if equipped).
   - Release the locking tangs from the clockspring.


TIE40360

Installation Details

Item 5 Clockspring

WARNINGS:

If installing a new clockspring, do not remove the clockspring locking key at this stage. Failure to follow this instruction may result in personal injury.

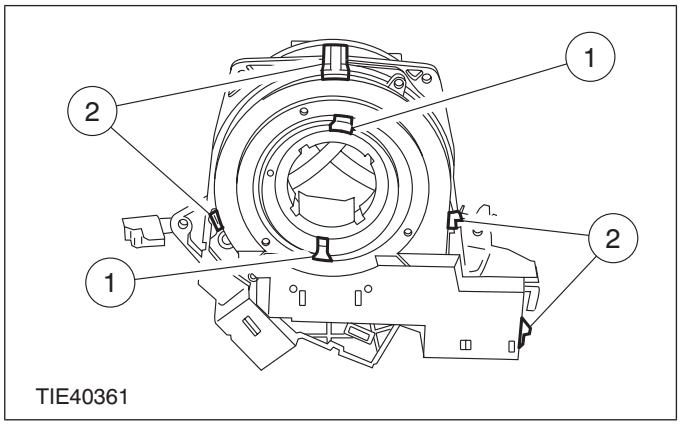
If installing the original clockspring, do not remove the tape securing the clockspring at this stage. Failure to follow this instruction may result in personal injury.

1. **CAUTION: Make sure the clockspring to steering wheel rotation sensor retaining clips do not get damaged.**

   Install the steering wheel rotation sensor (if equipped).
   1. Align the steering wheel rotation sensor locating tangs to the clockspring.

REMOVAL AND INSTALLATION

2. Make sure the retaining clips lock into position on the steering wheel rotation sensor.



TIE40361

2. **CAUTION: Make sure the road wheels are in the straight ahead position.**

NOTE: Make sure the turn signal lamp switch is in the off position.

Install the clockspring.

3. **WARNINGS:**

If there is a break between installing the clockspring and installing the steering wheel, or the vehicle is left unattended by the technician, the centralizing procedure MUST be carried out.

Incorrect centralization may result in premature component failure. If in doubt when centralizing the clockspring, repeat the centralizing procedure. Failure to follow this instruction may result in personal injury.

CAUTIONS:

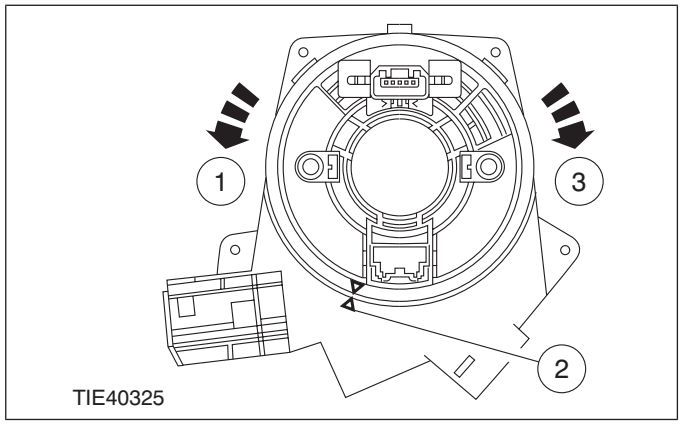
The clockspring must not be rotated more than three turns in a clockwise direction after the clockspring has been centralized.

Make sure the road wheels are in the straight ahead position.

When carrying out the clockspring centralizing procedure, the first turns must be in the couterclockwise direction.

Centralize the clockspring.

1. Turn the clockspring in a counterclockwise direction until a resistance is felt.
2. Turn the clockspring in a clockwise direction, until the arrow marked on the rotor of the clockspring aligns with the raised ‘V’ section on the outer cover of the clockspring at approximately the 195 degrees position.
3. Turn the clockspring in a clockwise direction three turns.



TIE40325

REMOVAL AND INSTALLATION

Rollover Protection Unit

Removal

WARNINGS:

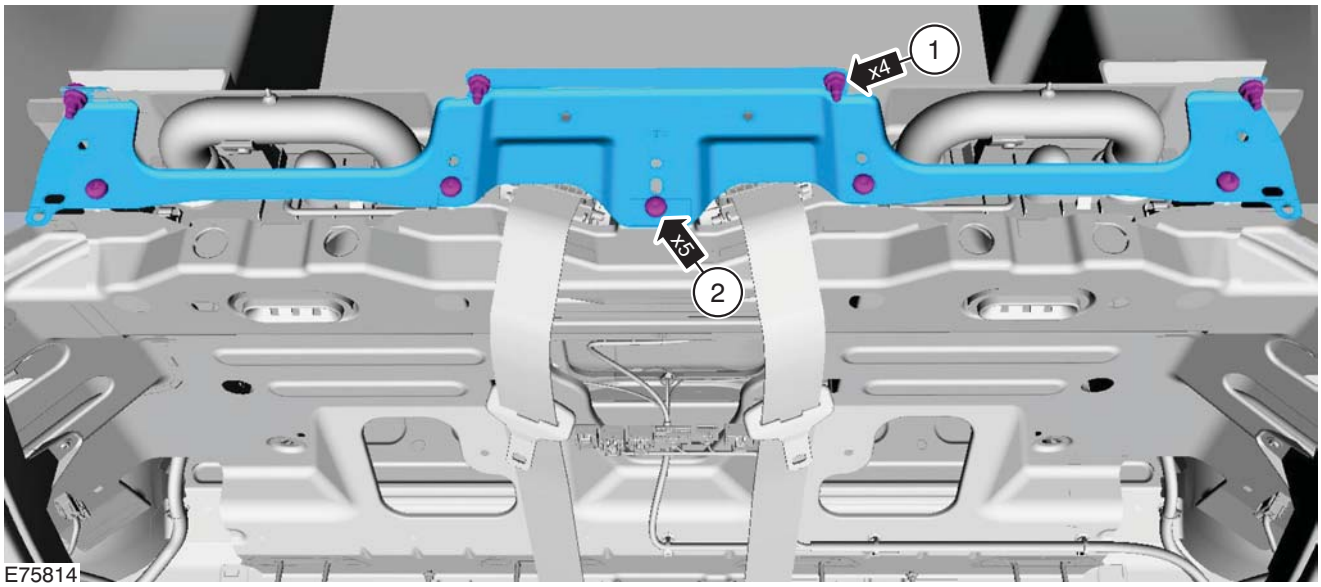
The supplemental restraint system (SRS) is active for a certain length of time after the power supply has been disconnected. Wait for a minimum of 3 minutes before disconnecting or removing any SRS components.

Wear safety goggles.

Do not probe supplemental restraint system (SRS) electrical connectors.

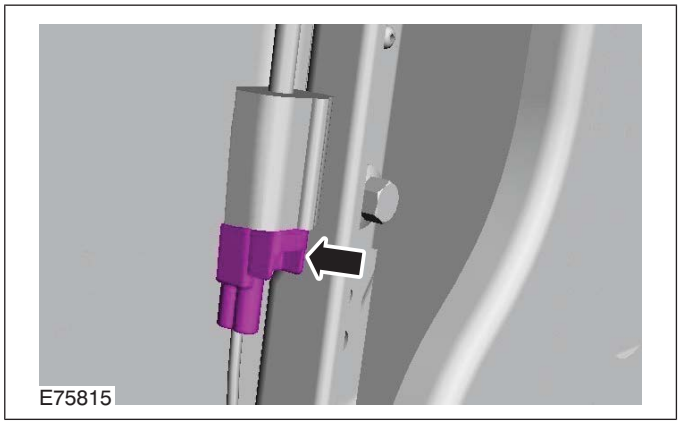
NOTE: Removal steps in this procedure may contain installation details.

1. Remove both rear quarter trim panels.
2. 1. Torque: 25 Nm
   2. Torque: 25 Nm

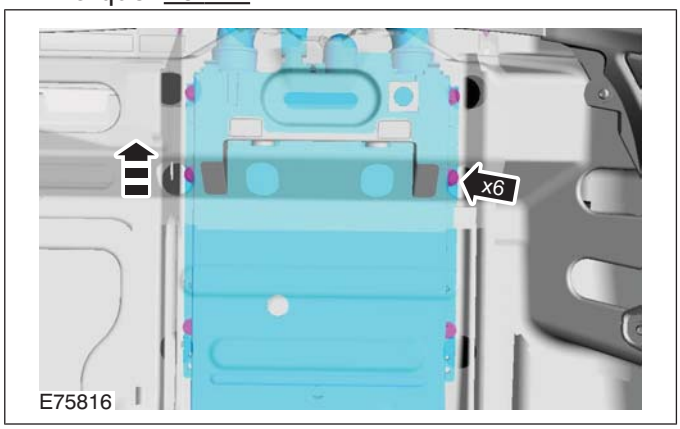


REMOVAL AND INSTALLATION

3.



4. Torque: 25 Nm



Installation

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION

Passenger Air Bag Deactivation (PAD) Switch

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.

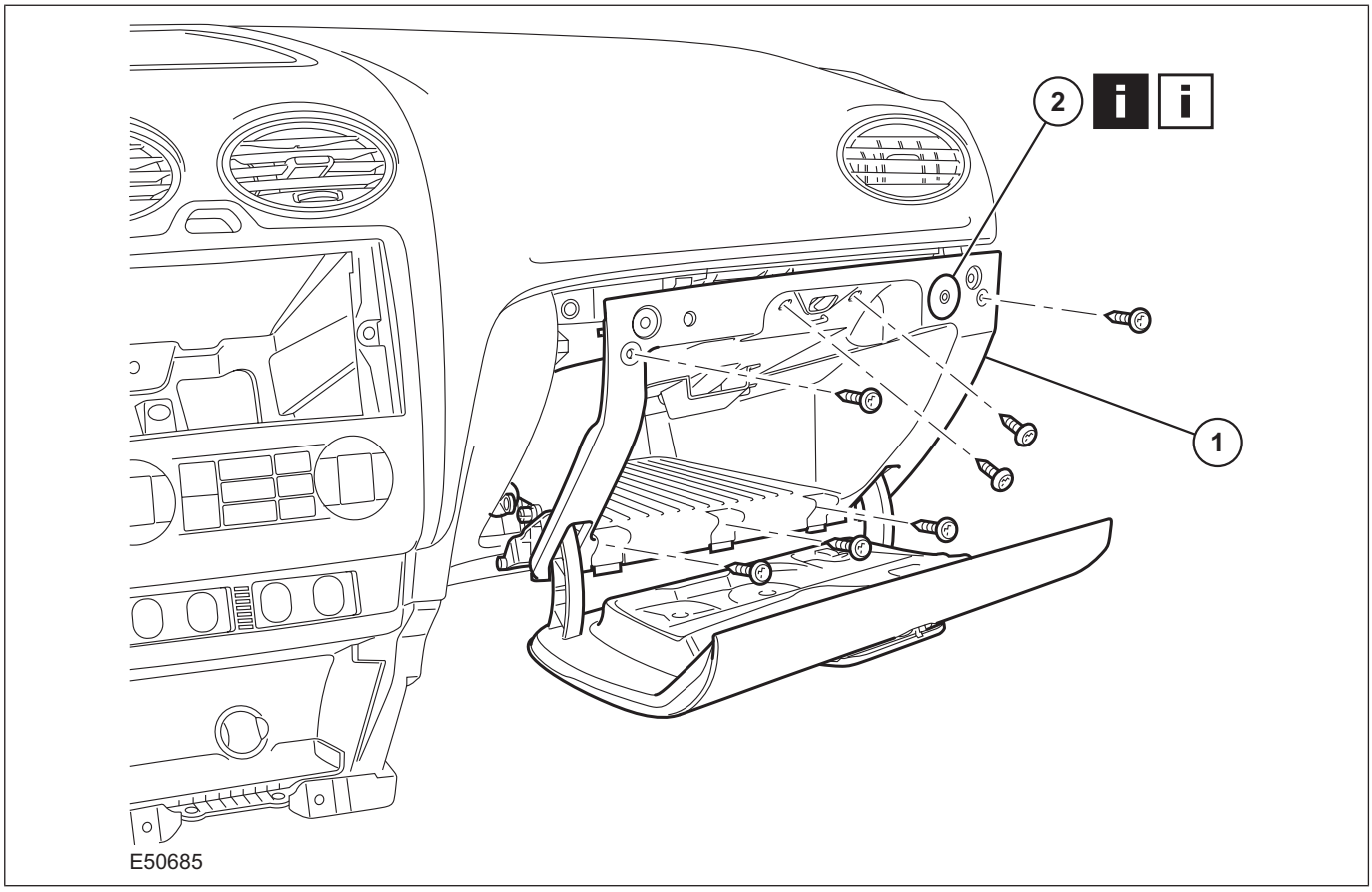
To minimize the possibility of premature deployment, do not use radio key code savers when working on the supplemental restraint system. Failure to follow this instruction may result in personal injury.

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.

1. **Disconnect the battery ground cable.**

   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Glove compartment
2	Passenger air bag deactivation (PAD) switch See Removal Detail See Installation Detail

All vehicles

3. **To install, reverse the removal procedure.**

Vehicles with global closing

4. **Initialize the door window motors.**

   For additional information, refer to: Door Window Motor Initialization (501-11 Glass,

REMOVAL AND INSTALLATION

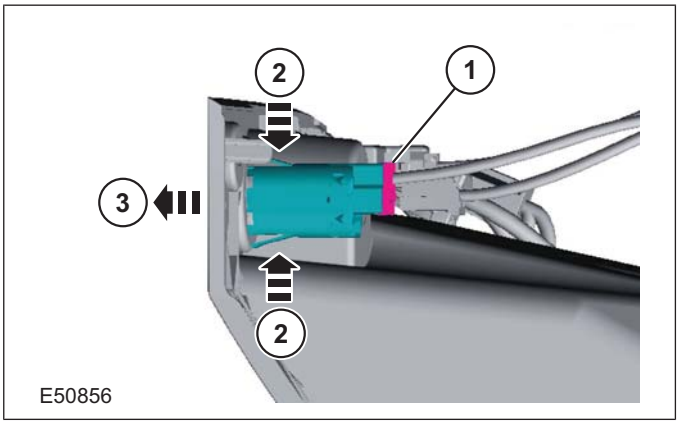
Frames and Mechanisms, General Procedures).

Removal Details

Item 2 Passenger air bag deactivation (PAD) switch

1. Remove the PAD switch.

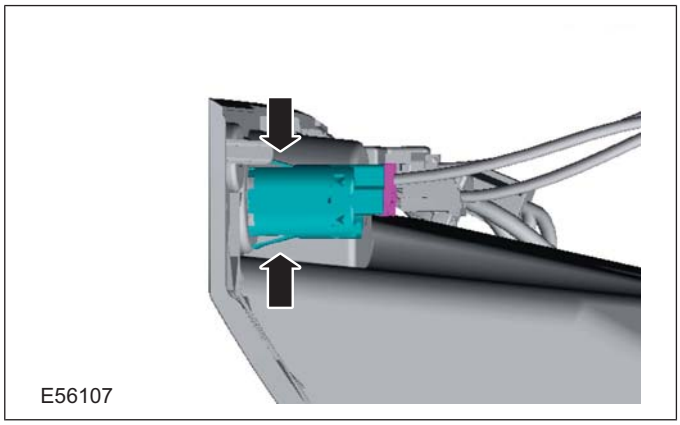
1. Disconnect the PAD switch electrical connector.
2. Depress the PAD switch locking tangs.
3. Pull the PAD switch out of the glove compartment.



Installation Details

Item 2 Passenger air bag deactivation (PAD) switch

1. Make sure that the PAD switch locking tangs are fully engaged in the glove compartment.



SECTION 501-25 Body Repairs - General Information

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Description	Finis Code	Specification
Underbody protection	5 030 492	-
Anti-corrosion wax	1 219 834	WSK-M7C89-A
Cavity wax	5 030 081	-
Profiled butyl seal	1 128 983	S-M3G4620-A
Weld primer	1 205 996	-
Clinched flange protection	1 136 479	WSK-M4G245-B
Seam sealing compound	1 205 817	WSS-M4G364-A
Body sealing compound	1 143 255	-
Metal adhesive kit	1 203 241	-
Windshield sealant	1 613 838	WSK-M4G329-A
Adhesive spoiler set	1 219 837	-

DESCRIPTION AND OPERATION

Description and Usage of Body Repair Literature

The purpose of this document is to give the vehicle body specialist a general overview of possible repair techniques for body repair on Ford vehicles. Likewise, information about materials and tools to be used is given.

No model-specific information is given. Such information is saved in the respective Ford Etis workshop manual. Supplementary or updated information can be found in the Technical Service Information.

Information on repair techniques, materials or tools, which are not necessary for body repair on Ford vehicles or which are not considered as conventionally in use, are not listed in this document.

Layout:

The general section is divided into the following subject areas:

- How to use the document, with information on the symbols used
- Health and safety information on using materials and tools
- Information on bodywork construction and materials used
- Workshop equipment and use of tools
- Damage Assessment and determining the extent of the repair area
- Explanation of possible repair techniques for body repair
- Possibilities of the repair or remedying leaks, noises

Training:

The Ford Service Organization offers basic and more in-depth training on much of the content of this document. You can obtain an overview of the entire training offering from the Ford Service Organisation or on the Internet at www.ford-training.de.

DESCRIPTION AND OPERATION

Symbols

Warnings and hazard notices

Warnings and hazard notices are shown in this literature by WARNING, CAUTION and NOTE indicators. These notices are always shown before a job step which can be associated with an immediate personal or material danger.

WARNING: This notice is used when failure to exactly follow the instructions given in this literature or failure to follow them at all may result in a hazard to persons and/or in persons being injured.

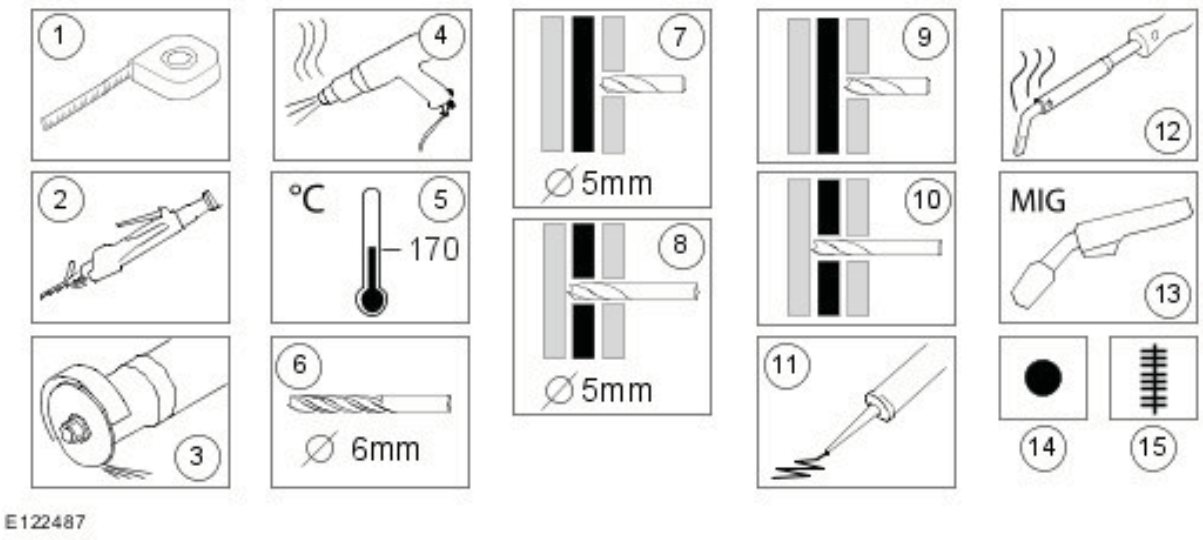
CAUTION: This notice is used when failure to exactly follow the instructions or test procedures given in this literature or failure to follow them at all may result in damage to the vehicle or to components.

NOTE: This notice is used when the operator should be made aware of special or extra information.

Symbols used

Symbols are used to graphically represent additional information about the operation, tool or materials. This information will not be shown separately again in the text.

The symbols used in this and other body repair manuals may be used alone as well as in combination in a diagram.



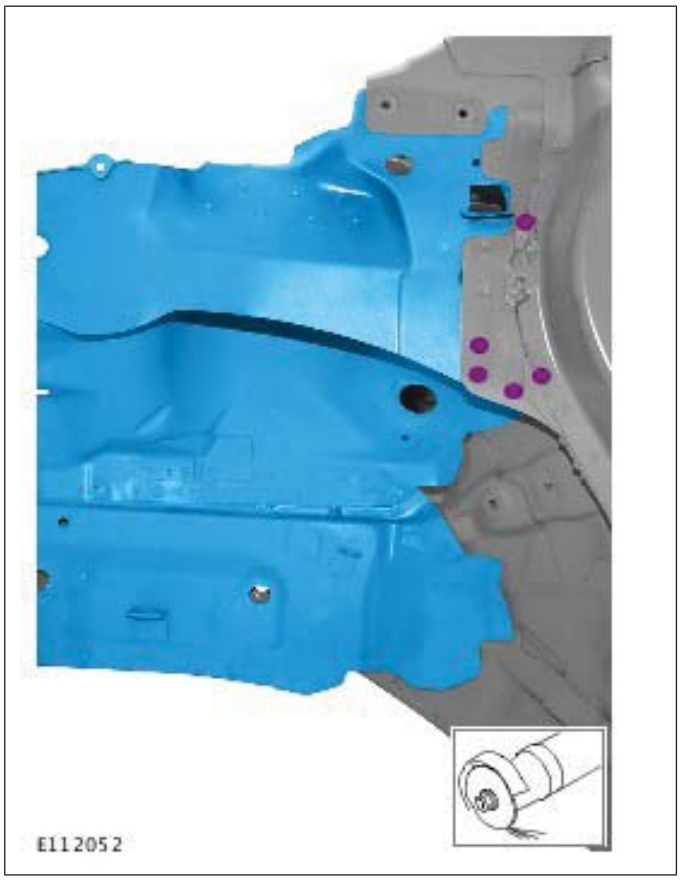
Description	Description
1	Measuring tape
2	Saw
3	Abrasive cutter
4	hot air blower
5	Temperature specification (170°C in this example)
6	Drill with 6mm diameter
7	Drill through one panel thickness with a 5 mm dia. drill

Description	Description
8	Drill through two panel thicknesses with a 5 mm dia. drill
9	Drill through one panel thickness
10	Drill through two panel thicknesses
11	Apply substance
12	Soldering iron
13	Metal-Inert Gas (MIG) weld
14	Resistance Spot Weld
15	Welded seam (full or intermittent seam)

DESCRIPTION AND OPERATION

Color coding

Different colors or shading can be used to depict special areas and components.



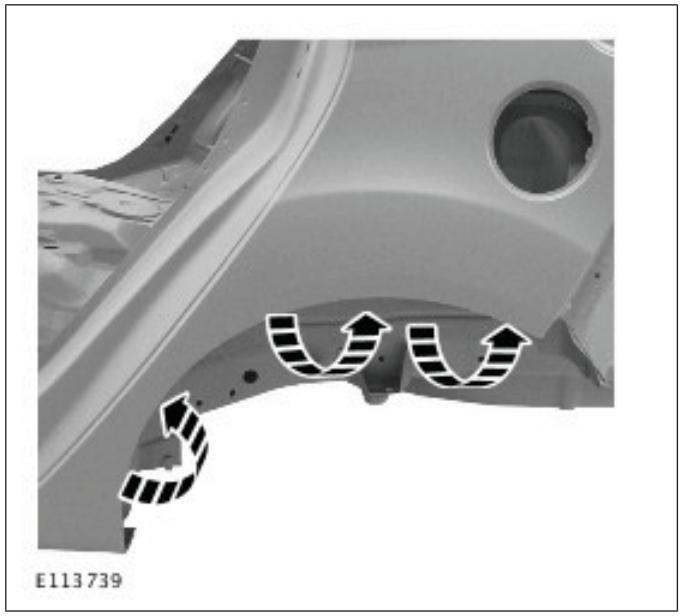
- Blue: Main component which will be removed or installed. Only actual movements will be shown in blue in the diagram.
- Magenta: Materials or fixings, e.g. spot welds or adhesives.

In an assembly operation, the colors show the sequence of removal steps.

- Green: First component or the first partial replacement section.
- Blue: Second component or the second partial replacement section.
- Brown: Third component or the third partial replacement section.

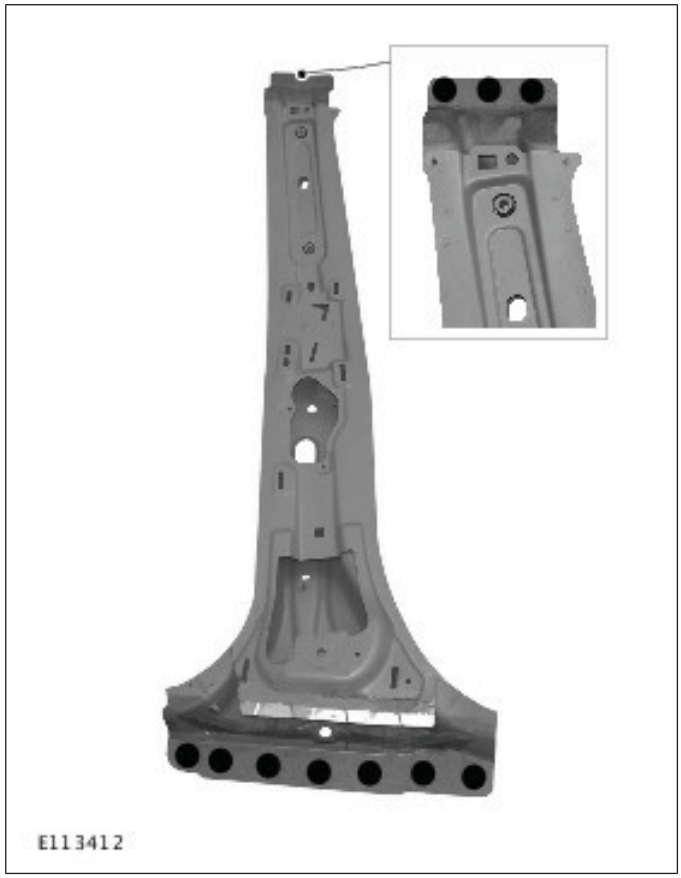
Movement arrows

Necessary work such as clinching flanges or moving lugs etc. will be represented by broken arrows.



Magnified and detailed views

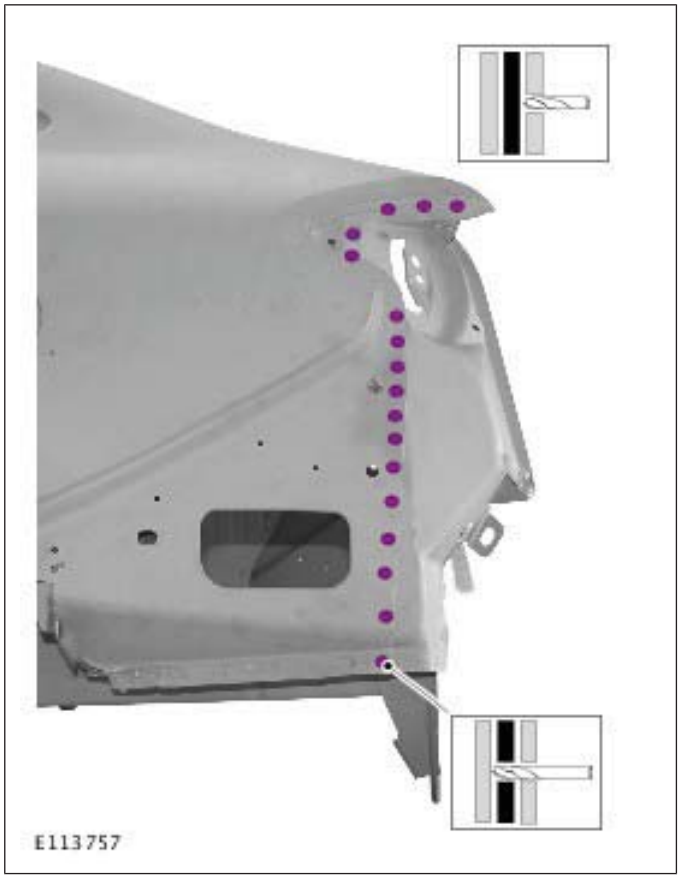
If a detail cannot be clearly seen in the illustration because of its size or location, it is shown enlarged in a separate window.



Position lines within a diagram

A position line is used to indicate a special position or a component. A spot weld which must be drilled out through two panel thicknesses is indicated here, different to all the others.

DESCRIPTION AND OPERATION



DESCRIPTION AND OPERATION

Health and Safety Precautions

General

Appropriate repair methods and their correct implementation are very important for both vehicle operating safety and personal safety.

WARNING: There is danger of injury through:

- High voltage when electrical welding.
  - Do not perform welding work in a damp environment or on a wet substrate. Use suitable insulation underneath.
- Flammable substances in the welding area.
  - Remove flammable substances from the danger area. Remove the fuel tank and, where required, those components which supply fuel.
  - Completely remove the battery before carrying out any welding in that area.
- Welding fumes, which are harmful to health.
  - Always ventilate the workplace well and use an extraction system.
- Welding spatter and UV radiation.
  - Wear protective clothing, gloves and welding mask or welding goggles.
- Pyrotechnic components.
  - Disconnect the battery negative clamp and cover the battery terminal. Remove any airbag components.

All the regulations governing Health and Safety at Work must be complied with during body repairs.

Personal protection

Welding gases and grinding dusts can be harmful to the health. For this reason, make sure that rooms are well ventilated and work using the welding fumes extraction system. Sealants, underbody protection and paint residues must not be burnt down with an unshielded flame, as this will produce gases which are damaging to health. A dedicated extraction system must always be used when welding or brazing.

When working with substances containing solvents, good ventilation must be provided, respiratory protection must be worn and an extraction system must be used.

Do not weld in damp areas, if necessary use an insulation mat. Welding and grinding work near the battery presents the danger of explosion. For this reason, it must be removed before the work is started.

Cutting, grinding and alignment work on metal panels can cause a noise level of 85 to 90 dB (A) or even more. For this reason, you must always wear ear defenders.

The various body areas are subject to very high forces during realignment work. Should any component suddenly become detached during this process, there is a very great danger of injury. For this reason, pulling chains and pulling shackles must be secured with arrester cables.

NOTE: Work on airbag systems may only be performed by persons who have a relevant certificate of competence.

Some special instructions must be followed when working on airbag systems:

- Always stand to the side of it when removing or installing an airbag.
- Always store an airbag or an airbag/steering wheel with the airbag side pointing upwards and in a safe place.
- Only install the airbag again when the vehicle is fully repaired and the complete electrical systems has been tested.
- Take into account the location of air curtains and shoulder airbags.

Protection of the vehicle

Protect affected areas from weld spatter and dust during all welding and grinding work on the vehicle. If metallic dust stays on the vehicle for some time, there is the likelihood of film rust formation. Grinding or sanding work produce tiny spots of damage to the paint surface, which may cause corrosion.

For this reason, make sure to:

- Use carbon fibre blankets to protect the vehicle body.
- Use covering film to protect the vehicle body from sanding dust and metal dust.
- Take appropriate measures to protect the interior equipment of the vehicle during any repair work.

DESCRIPTION AND OPERATION

In addition, take into account:

- Remove fuel supply components as necessary.
- Protect working areas which are in danger of catching fire with a fireproof blanket.
- The welding must not cause components of the air conditioning system to become heated.
- Removal of any attached components in the space adjoining the repair area.
- Use covering paper to protect the interior from grinding dust.
- Create a definite barrier between the work area and the interior by using a carbon fibre blanket.

Protective equipment

The following protective equipment must always be used:

- Protective helmet or welding mask.
- Ear defenders and breathing protection.
- Protective gloves and safety boots.
- Welding fume extraction.

Electronic components

Increased use of comfort and safety electronics in modern motor vehicles also requires the greatest attention to be paid during body work. Overvoltages produced during welding and in alignment work during bodyshell rectification may cause electronic systems to be damaged. In particular, the safety instructions for performing welding work on vehicles with airbag systems must be adhered to.

NOTE: After disconnecting the power supply and before performing further work, a wait time of up to 15 minutes must be maintained, depending on the vehicle. Work on airbag systems may only be performed by persons who have a relevant certificate of competence.

Pay attention to the following points:

- Disconnect the battery negative clamp and cover the battery terminal.
- Disconnect the electrical connector at the airbag control module.
- If welding is to be performed directly near a control module, it must be removed beforehand.
- Never connect the negative cable of the welder near an airbag or a control module.
- Connect the negative cable of the welder close to the location of the weld.

For additional information, refer to:

Side Air Curtain Module - Vehicles Built From: 22-06-2007 (501-20 Supplemental Restraint System, Removal and Installation),
Side Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation),
Driver Air Bag Module (501-20 Supplemental Restraint System, Removal and Installation),
Passenger Air Bag Module - Vehicles Built From: 04/2006 (501-20 Supplemental Restraint System, Removal and Installation),
Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) (501-20 Supplemental Restraint System, Diagnosis and Testing).

Liquefied gas vehicles

Alternative fuel vehicles often require special handling in the workshop area. Above all, assembly operations to some extent require particular knowledge when dealing with the special technology and the safety regulations.

NOTE: Only fully trained personnel are permitted to work on alternative fuel vehicles.

These special requirements must be understood and taken into account in the body shop as well.

CAUTION: Danger of fire and explosion. The safety instructions must always be followed when performing service work on fuel/gas systems. Failure to observe this instruction can lead to injury.

If the smell of liquefied petroleum gas (LPG) or compressed natural gas (CNG) is noticed in the workshop, instruct everyone present as follows:

- No smoking and extinguish all naked flames.
- Shut off all electrical and air powered equipment.
- Evacuate the area.
- Ventilate the area.
- Contact the fire control authorities.
- Move the vehicle to a dedicated, well ventilated area.

Alternative fuels require special handling:

- Handle them in a specially dedicated, well ventilated area, which is only accessible to authorized persons.
- Identify the designated area with new warning notices.

DESCRIPTION AND OPERATION

- If possible close the main shut-off valve and run the vehicle on alternative fuel until it switches automatically to petrol operation. Only then is it allowed to drive the vehicle into the workshop or service area.
- If possible do not allow any liquefied gas (LPG) to escape.
- The ambient temperatures must not exceed 40°C. For this reason the LPG and CNG fuel tanks must be removed on vehicles with LPG or CNG operation before using a drying oven to dry the paint where the temperature exceeds 40°C.

Avoid situations in which fuel from an LPG or CNG fuel tank can escape. These situations include:

- Extremely hot ambient temperatures.
- Parking near a heating device.
- Raising the vehicle near a ceiling heater.

Refrigerated conversion vehicles

Apart from the special materials used in building the structure of the refrigerated compartment, such vehicles have special energy and refrigeration systems which require special handling during repair.

CAUTIONS:

⚠ **Danger of injury. Work on the 230<SP>volt system of the refrigeration equipment must only be carried out by trained specialist personnel.**

⚠ **The refrigeration system is filled with refrigerant R134a. This can cause frostbite if it contacts the skin. Pay attention to the corresponding warning notices and instructions in the chapter Air Conditioning Systems.**

NOTE: Work on the refrigerant circuit may only be performed by persons who have a relevant certificate of competence.

Vehicles with a refrigerated compartment are often used to transport foodstuffs. For this reason, additional hygiene regulations must be complied with during repair work.

Aluminum and plastic are used to construct the two different types of compartment found on refrigerated vehicles.

The aluminum conversion is a very stable and technically perfect variant. However, against this the relatively high production costs and a lower payload must be taken into account, because of the weight of the aluminum conversion itself.

NOTE: Basic and in-depth training is offered on the following topics. You will find an overview of the complete range listed in the Training brochure published by the Ford Service Organization.

The plastic conversion has developed into a light, clean and economical alternative because of constant further development of materials and working techniques.

NOTE: The material combinations, the workmanship and the working methods must comply with the current food hygiene regulations. For this reason, service and repair work on the refrigerated conversion may only be performed by authorized and specially trained technicians.

Refrigerated compartment constructions are often made using both materials. The floor pan is made of structured, slip-proof aluminum panels and the wall and ceiling cladding is made of smooth surfaced plastic elements.

⚠ **CAUTION: PUR hard foam is flammable. If PUR hard foam is overheated, it will burn on its own with a brilliant yellowish flame. It produces unpleasant choking and toxic fumes. Special measures must be taken when welding the vehicle body.**

Polyurethane wall and ceiling elements are manufactured using a sandwich principle. An insulating polyurethane core is coated with food grade ABS plastic on one side.

PUR hard foam does not decompose, is rot resistant and is odorless. These properties make it suitable for use as insulation.

Because of its closed cell structure, water uptake by PUR hard foam is for the most part only a problem at edges. Cut edges or other mechanically worked surfaces must however be sealed with the greatest care.

The conversion to a refrigerated vehicle is performed as made-to-order production. The large surfaces of the wall and ceiling cladding can be changed and are particularly easy to repair.

If access to the back of a body panel section is needed because of body straightening work, in some circumstances it is cheaper to perform a cut-out repair instead of removing an element.

The repair process is fully described in the Student Information booklet Refrigeration System Technology, Transit 2000.5 Freshline.

DESCRIPTION AND OPERATION

Environmental Regulations

Orderly and responsible waste management is not only very important for the protection of health and the environment, but it also has great importance where saving natural resources is concerned.

In body repair shops, since the introduction of the EU directives on the avoidance of vehicle waste and the promotion of return, re-use and recycling of vehicles and their components (2000/53/EU), more rigorous attention than before is also paid to avoidance and recycling of waste materials.

NOTE: The organization of disposal in the operation must comply with the country specific waste regulations:

In this respect, body repair shops must take into account and comply with the following requirements:

- Separate waste according to its recycling and disposal methods.
- Produce evidence for the correct transport and disposal of waste.

NOTE: The organization of disposal in the plant must comply with the requirements of the Waste Avoidance and Management Act.

The avoidance and recycling of waste must always take priority. However, despite all measures which may be taken, waste cannot be completely avoided.

NOTE: Useable waste which is not allowed in household rubbish, must be disposed of as special waste

All remaining waste must be treated as commercial waste and disposed of according to the local requirements.

Only applies to the EU:

The vehicle manufacturer is also under a legal obligation since the older vehicle legislation came into force throughout Europe in 2002.

This law covers the surrender, withdrawal and environmentally friendly disposal of older vehicles through the manufacturer.

The older vehicle legislation contains all the necessary information for the environmentally compatible disposal of older vehicles, starting with preliminary handling involving the removal of all operating fluids, deactivation of pyrotechnic components, elimination of pollutants and then further handling by dismantling components for re-use and recycling.

DESCRIPTION AND OPERATION

Body Construction

General

Under bodywork construction, a general distinction is made between monocoque and non-monocoque bodywork. The safety of the occupants is the main consideration for all types of bodywork construction. The front and rear sections are designed so that they absorb the energy of the impact via crumple zones. The use of modern design and manufacturing methods and the use of newly developed body panels (relating to their deformation and strength properties) mean that, despite the continuous weight-savings, all safety-related requirements made of the construction can be met.

Integral body-frame

In this method of construction, coverings, reinforcements, retaining panels and profiles are permanently joined together using a variety of joining techniques (gluing, spot welding, laser welding, soft soldering or brazing). The load-bearing function of the structure must always be achieved in each case.

There is no distinction made between components which are purely subject to bending/torsion or thrust loads and parts which perform sealing/covering functions (as in non-monocoque bodywork for example). In modern passenger vehicles, monocoque bodywork is very widespread and offers the advantages of a lightweight and low-cost construction.



The rigidity of the bodywork is achieved by a panel skin and panel cross-section with the largest possible profile and therefore the largest resisting torque (such as for instance the rocker panel). Swage lines in the outer area of the bodywork increase the stiffness and the natural vibration frequency, to prevent possible drumming noises.

The mounting points for ancillary components such as doors and wings are permanently built into the monocoque bodywork.

High rigidity of the bodywork is vitally important to keep the elastic deformations low at the joins to the ancillary components and to prevent noise when driving. Small gap dimensions are therefore

DESCRIPTION AND OPERATION

only possible on vehicles with very stiff bodywork. With high bodywork stiffness, the construction can exert an influence on the handling of the vehicle (e.g. on poor road surfaces).

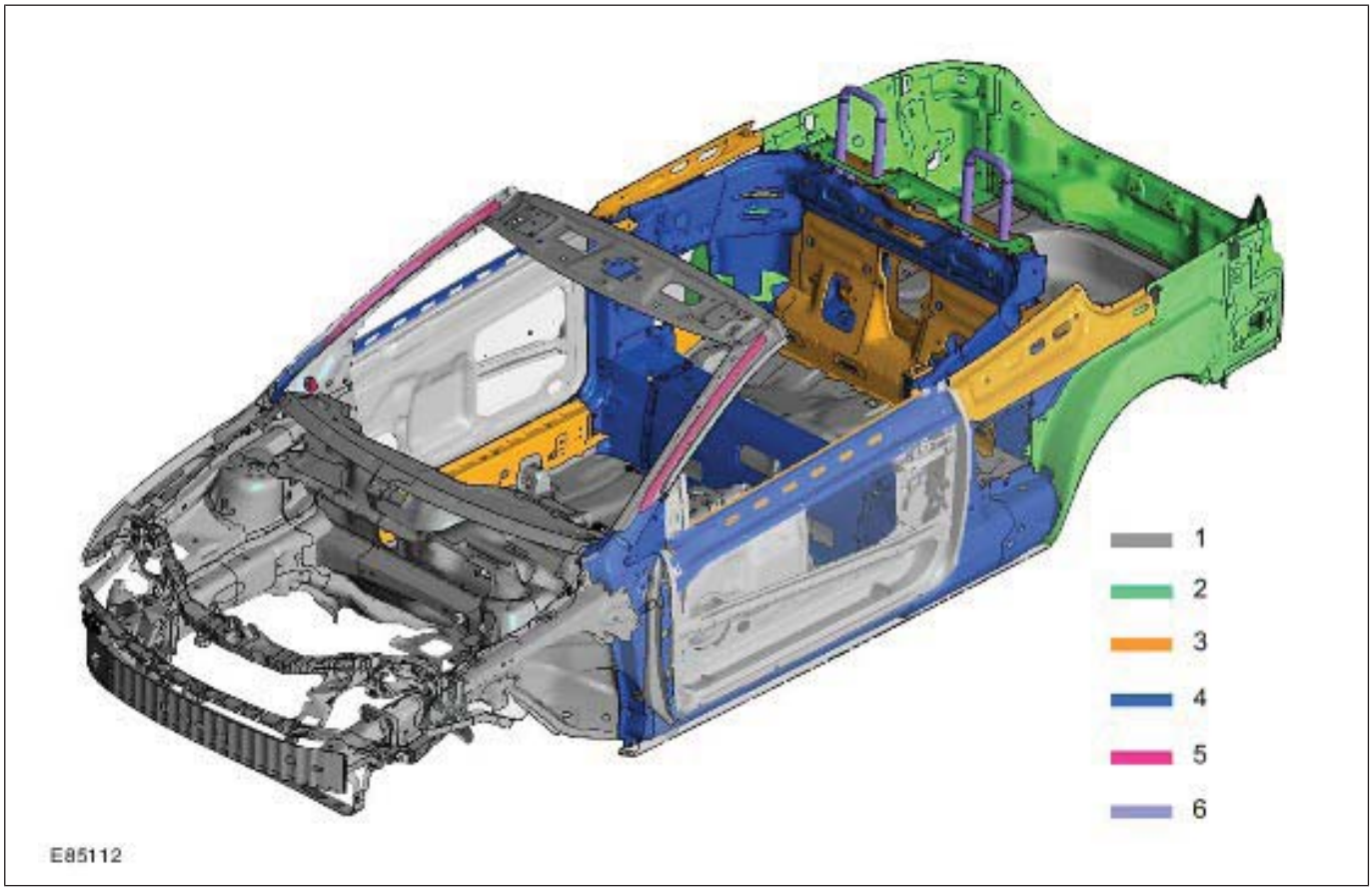
Advantages of monocoque bodywork:

- Weight reduction.
- Economical manufacturing technology.
- High torsional rigidity and high flexural strength.
- Defined deformation behavior at the front and rear.
- Maximum passive safety due to the strong passenger compartment

The protected passenger compartment with strong pillars, rocker panels and doors with integral side impact protection increase occupant protection. Opening of the doors is ensured, even if there is extreme deformation.

NOTE: Repair work must always be performed according to the established workshop literature. All the safety requirements must be guaranteed after any repair work has been performed !

Convertible



Description	Description
1	Body components adopted from the Focus 2004.75 (07/2004-)
2	Conventional bodywork construction steel
3	High-strength sheet steel
4	Super-high strength sheet steel

Description	Description
5	Maximum-strength sheet steel
6	Aluminium, can be subjected to high stresses

The body of a convertible differs from the principle of the integral body-frame of a saloon due to the lack of a roof construction. The body has a high

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degree of torsional stiffness. This is achieved by using high, super-high and maximum-strength sheet steel and body reinforcements in specifically-targeted areas.

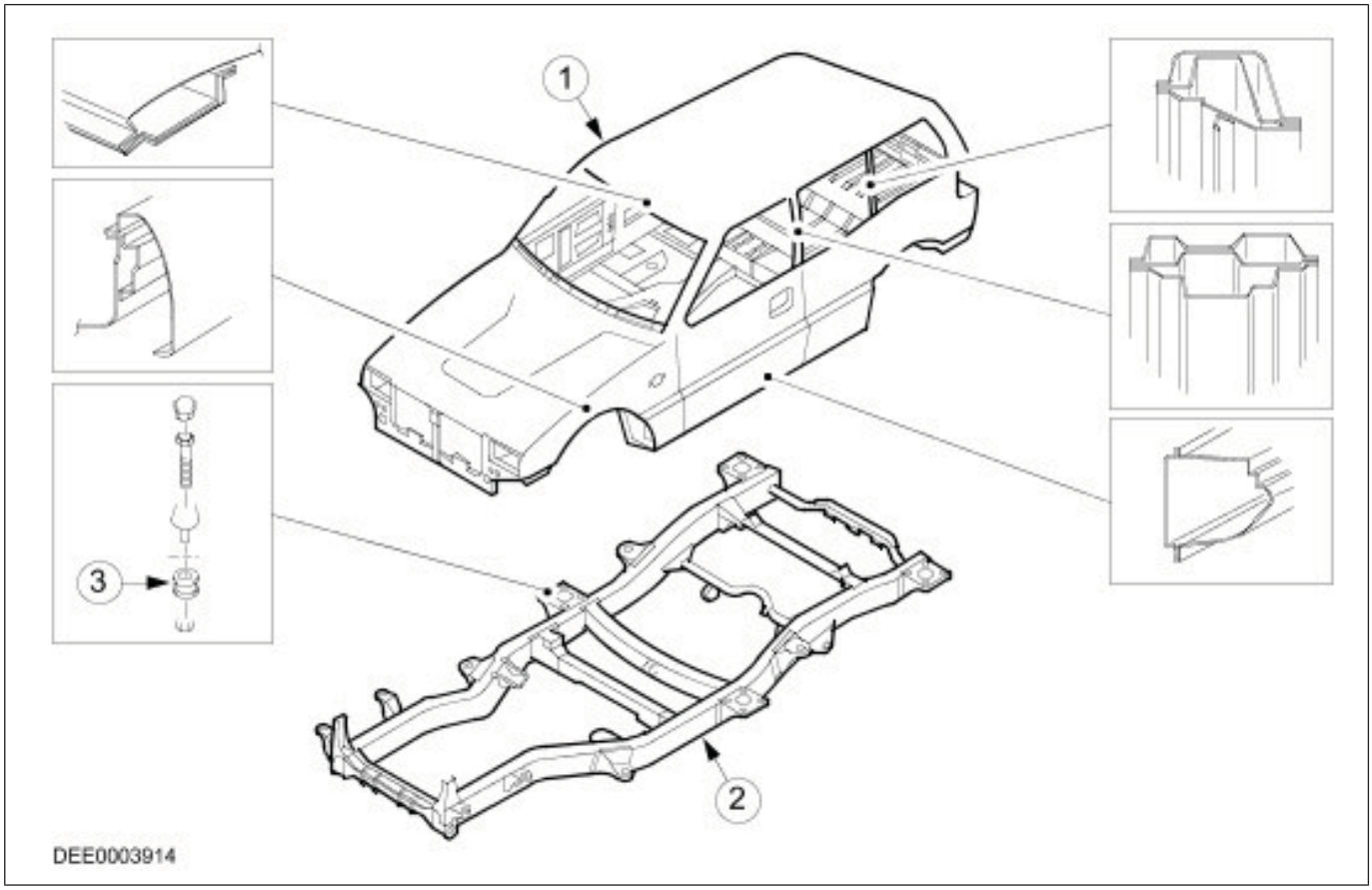
These reinforcements can be installed in the area of the doors (diagonal braces etc.) or on the underfloor. In contrast to the saloon (or other non-convertibles) with square-section side members (closed profile), these reinforcements have a profile which is open on the underside (U-section).

Special constructional changes within the bodywork structure:

- Reinforcing or increase in the thickness of the sheet steel in the pillar area.
- Reinforcing or increase in the thickness of the sheet steel in the floor pan structure (rocker panel area).
- Use of heavily structured reinforcing panels in the rocker panel and pillar area.
- In the area of the windshield frame and A-pillars, thick-walled reinforcing tubes are used (roll-over protection).
- Because there is no roof, the bridge construction principle cannot be used as it is on the saloon for example. Flexural and torsional rigidity must be ensured by other components.

Non-monocoque bodywork

Non-monocoque bodywork is built onto a frame or a chassis. Frames used for this have various construction forms, e.g. the ladder frame or tube frame. Non-monocoque bodywork is the original way of constructing vehicles.



Description	Description
1	Vehicle body.
2	Frame Assembly
3	Bolted connection

The ladder frame is still commonly used today for truck and off-road vehicles. The bodywork is placed on the frame or chassis. The total load which occurs while driving is transferred to the chassis.

More sporting vehicles can be built with non-monocoque bodywork, mostly using a lattice tube frame. Limitations in the design are accepted for the benefit of low weight. The outer skin here

DESCRIPTION AND OPERATION

is usually made of plastic or alloy. This type of construction is also common in touring car racing for instance.

Special features of non-monocoque bodywork construction:

- Partly large surface panels and high volume shaped parts.
- Thicker materials and greater reinforcements in the frame area.
- Floor pan as frame structure with high torsional rigidity and flexural strength.
- Side panels only make a small contribution to the overall stability of the body.

Instructions for repair:

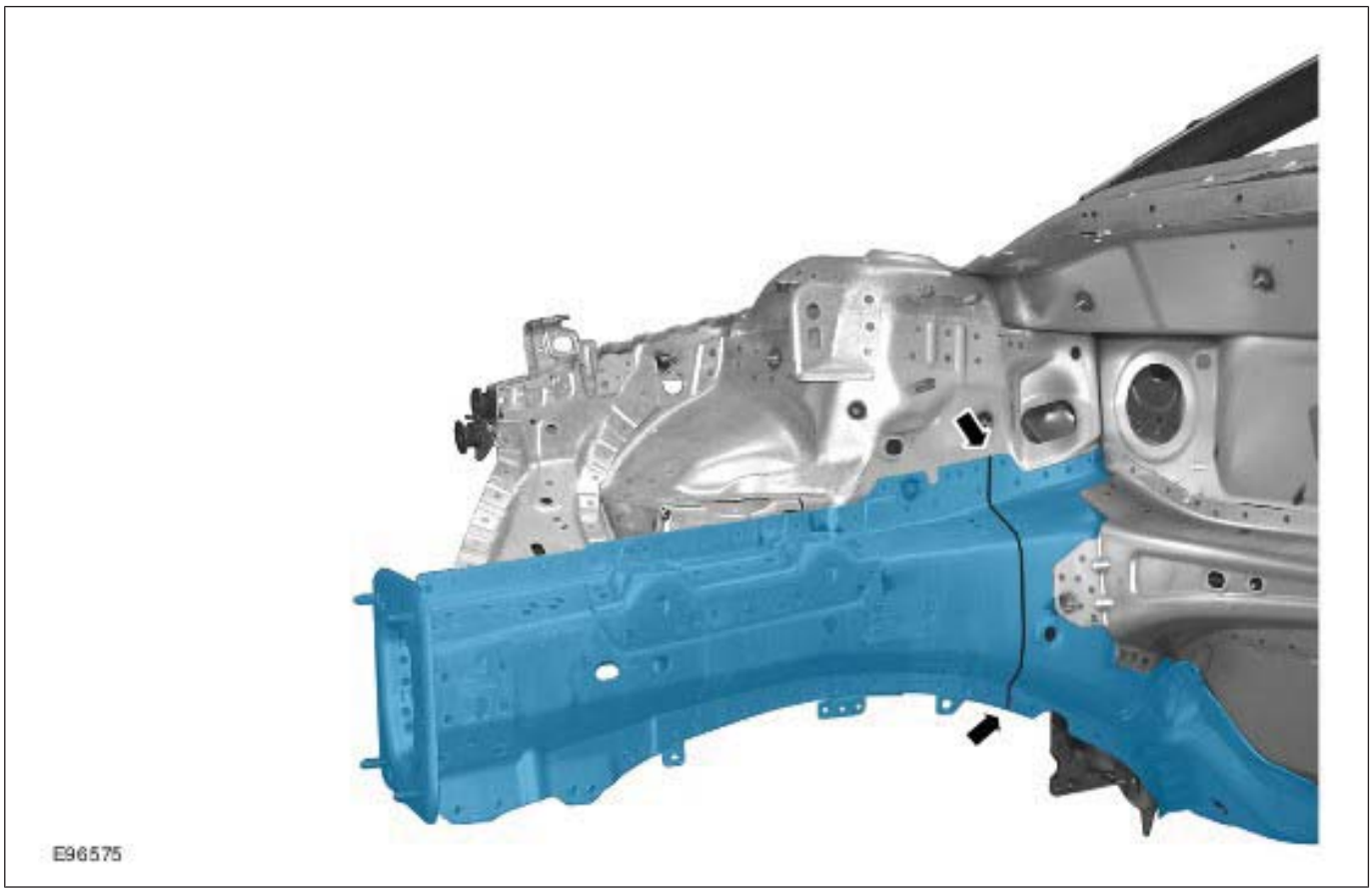
A different repair technique is necessary during repairs. A deformed frame structure requires high suction power during straightening repairs. Frequently, the body also has to be detached from the frame structure in order to carry out separate repair.

Due to the very stable frame structure, please note that the straightening behavior is completely different to that of a passenger vehicle. The frame and the attached body must be repaired independently of each other.

Further information can be found in the respective body repair manual.

Special points:

Tailored blanks



Blue: Tailored blank

Arrows: Laser weld seam

The term "tailored blanks" describes the connection of two different panel thicknesses and/or strengths in the bodywork carcass. This connection is done using laser weld seams. Cut locations exactly on the laser weld seams are not permitted, as at present no joining techniques are approved for use in repair procedures that would re-create joins of the same quality.

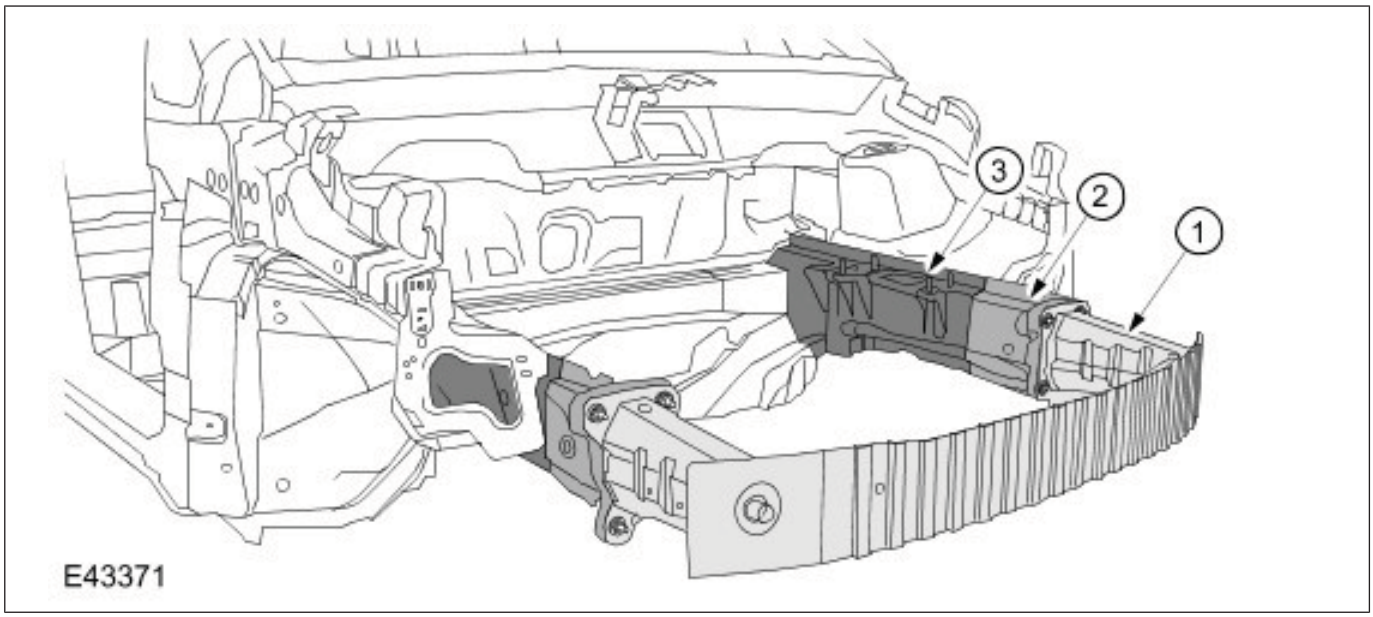
NOTE: No cutting, no welding and therefore no sectional repairs are permitted in the immediate area of the laser weld seams. The model specific requirements are documented in the respective Body Repair Manuals.

Typical application areas are:

DESCRIPTION AND OPERATION

- Side member
- Door inner reinforcement/door frames
- Wheelhouses
- Rocker panel inner reinforcement
- Roof rail inner reinforcement

Deformation behavior



Description	Description
1	Bolted crash element
2	Front side member
3	Rear side member

Different materials and design features lead to staged deformation of the front and rear of the vehicle in an accident.

The rear of the vehicle, like the front of the vehicle, has structures which protect the passenger cell through staged deformation in the event of an accident. The design layouts, however, are adapted to the requirements of the rear area.

Crash element:

At the front of the vehicle there is a crash element which is connected to the side member by threaded connections. This crash element can absorb light impacts of up to about 15 km/hr. Because of the threaded connections, the crash element can be changed very quickly.

NOTE: Deformed crash elements must not be straightened or repaired.

Heavier impacts which can no longer be absorbed by the crash element must be absorbed by the side members or the floor pan structure. Depending on the extent of the damage, a part or complete replacement can be performed on the side member.

DESCRIPTION AND OPERATION

Diagnosis and Damage Evaluation

Assessment of the extent of the damage includes visual inspection and dimensional inspection of the vehicle. In order to correctly determine the extent of the damage caused by an accident, in-depth technical knowledge, practical experience with the technical equipment and the testing and measuring devices is required.

Noticeable damage to the bodywork structure

Positive accidental damage assessment can only be achieved if the service technician is able to reconstruct the effect of an impact on the body structure.

For example:

If the impact occurs on the front left-hand side member, the right-hand side member will usually also have been damaged. Often the length of this side member will not have changed, but because of the rigid body design, it may have become deformed. This damage can be detected through the size of the gap between the door and fender or by measuring the vehicle.

In the case of more severe impacts, in which the front part of the vehicle cannot absorb all of the impact energy, the passenger cell is also used to absorb the energy. Here, the energy is transferred via the A pillar and distributed there. This results in deformations in the roof and the door sill.

NOTE: Because of existing damage to the bodywork structure, damage diagnosis on a vehicle lift may give extra incorrect diagnosis results.

NOTE: Training courses are offered on this subject. For an overview, please refer to the Ford Service Organisation's training course brochure.

If for instance the Ford Focus Coupé/Cabriolet is raised on a vehicle lift, the dead weight of the vehicle will cause the front end to drop by approx. 2 to 3 mm.

The altered door position is clearly recognizable by stiffness of the lock; the door moves upwards. This causes the lock pin to contact the guide element of the door lock.

It is possible to draw conclusions about the extent of the damage through a visual inspection of the external damage. In general, the following areas are to be checked during the visual inspection:

- Outer panel including seam seals for cracks or flakes in the paint caused by the accident.
- Size of the gap on doors and hoods for evenness.
- Freedom of movement of door and hood/tailgate locks.
- The vehicle roof for folds (gap measurement on vehicles with sunroof)
- Dotted flange in door section for deformation and cracked weld spots.
- The side members and crash components for crumpling and folding.
- Trunk floor and floor pan from above and below for crumpling.

No noticeable damage to the bodywork structure

In addition to external indicators such as flaking paintwork or cracks in the underbody protection, it is vital to check for damage to the body structure that is not visible from the outside (hidden body damage) during a damage assessment. Unless ancillary components are removed, it is often impossible to achieve accurate diagnosis of the underlying body parts.

NOTE: In order to determine the damage as accurately as possible, it may be necessary to remove ancillary components in the area of the damage.

Particular attention must be paid to the following components:

- The A, B and C pillars in the roof area.
- Floor pan.
- Rear ancillary components, such as bumper, lights, etc.
- Trunk floor, spare wheel cavity.
- Rear coverings, such as interior trim, carpet, etc.
- Lower rubber seals, e.g. in door area (welded flange).
- Area under the rear seat.
- Attachment points of transmission system, steering, engine, drive shafts, front and rear axles.
- Electrical components, e.g. the radio (damage through shaking or through voltage peaks).

DESCRIPTION AND OPERATION

Non-monocoque bodywork

The chassis and bodywork must always be checked during damage diagnosis on vehicles with non-monocoque bodywork.

It is also important here to inspect closely for damage the impact area and the areas absorbing forces.

With these vehicles, simple inspections can already give an indication of possible deformations.

In addition, you must check for the following for vehicles with frame structures:

- Cracks in the paint on the frame welds.
- Traces of deformation on frame components.
- Check attachment points (silent blocks) for position changes and damage.
- Changed position of rubber seals.
- Fit and function of the ancillary components.

DESCRIPTION AND OPERATION

Body Sheet Metal

Types of steel

Steel body panels are still the most important materials used in the fabrication of stressed skin vehicle bodies. In addition to the familiar types of steel, reinforced high-strength and also ultra-high-strength special steels are used in vehicle body construction.

Types of steels are classified by their properties of strength and elasticity.

- Normal strength steel has a minimum yield strength of up to about 210 N/mm².
- High strength steels have a minimum yield strength of about 150 to 600 N/mm².
- Ultra-high-strength steels have a minimum yield strength of about 400 to 1200 N/mm².

High-strength and ultra-high-strength steels are mostly installed in safety relevant locations (structural components). Among others, these are side members, pillars, roof frames.



Pos.	Used type of steel	Application range
1	Ultra High Strengh Steel (UHSS)	Impact carriers, Bumper carriers, Reinforcements ...
2	Extra High Strengh Steel (EHSS)	Frame side member, ...
3	Very High Strengh Steel (VHSS)	Wheel house, ...
4	High Strengh Steel (HSS)	Roof sticks, ...

Pos.	Used type of steel	Application range
5	Normal strength steels	Outer Panel, ...

Normal strength steels

Normal strength steels are most often used in body construction. They are relatively soft and are therefore particularly suitable for the deep drawing processes used in body manufacturing. As well as very good reshaping properties, the panels also have a relatively high rigidity.

DESCRIPTION AND OPERATION

High strength steel panels

The strength of the material and the nature of the surface can be changed as required by different engineering processes. In order to achieve suitable configuration and a good match between construction specifications and what is possible in production, a large range of high strength panels is available.

The range of the minimum yield strength is from 180 N/mm² to 460 N/mm². High strength thin steel panels usually have a surface finish. Electrolytic surface sealing is preferred. Within the group of high strength steels, various types of steel are used in body construction:

- **Micro-alloyed high strength steels** for very difficult drawn components such as fenders, the internal components of doors, hoods and luggage compartment lids or load bearing components such as sidemembers, crossmembers etc.
- **Bake-hardening steels** and **phosphorus alloyed steels** for external panel components with higher draw depth and subject to higher operational demands.
- **Isotropic materials** for flat shaped outer steel panels on doors, hoods, luggage compartment lids, roofs.

Ultra-high-strength steels

These steels are predominately used for body structural components which are relevant to safety. Despite the reduced thicknesses of the panels used, weight reduction is often achieved together with greater strength. As with high-strength steels, special types of steel are used in the ultra-high-strength steels group:

- **Complex phase steels** are used for door side impact carriers, bumper carriers and body components relevant to crashes. Besides high strength, they have good cold reshaping properties and are easily welded.
- **Dual phase steels** have the same properties as complex phase steels. Because of their high strengthening properties they are suitable for body reinforcements.
- **Residual austenite steels** and **martensite phase steels** have very high strength levels of up to 1200 N/mm² and are mostly used in body structures relevant to crashes.

Because of the use of such steels, some special points must be taken into account during body repair:

- Increased force required during straightening.
- Strong springback tendency during alignment work.
- Cutting tools have a shorter useful life.
- **NOTE:** High-strength and ultra-high-strength steel panels must not be heated during straightening work.

  Work without applying heat when carrying out straightening work. Losses of strength will occur at temperatures as low as 400°C. The basic working methods and the tools to be used are the same however.

Coated steel panels

In a similar way to high-strength steel panels, coated steel panels are finding more applications because of the better corrosion protection which they offer. There are basically two different process which are used to apply a zinc layer:

- Hot dip zinc coating (no longer used in vehicle construction).
- Electrolytic zinc plating.

The following points must be noted when welding:

NOTE: Welding fumes are harmful to health. Make certain that the workspace is well ventilated and use welding fume extraction.

- Zinc starts to melt at about 420°C.
- The zinc vaporizes at a temperature of about 900°C.
- The amount of heating determines the damage to the zinc coating, and therefore to the corrosion protection.
- **NOTE:** Coated panels have a higher electrical resistance, but this can be compensated for by increasing the welding current by 10 - 20% .

  Resistance spot welding is particularly suitable for welding zinc-coated panels, because no widespread warming occurs.
- With electrolytically zinc-plated panels there is no need for any special preparation because the zinc coating does not need to be removed.

DESCRIPTION AND OPERATION

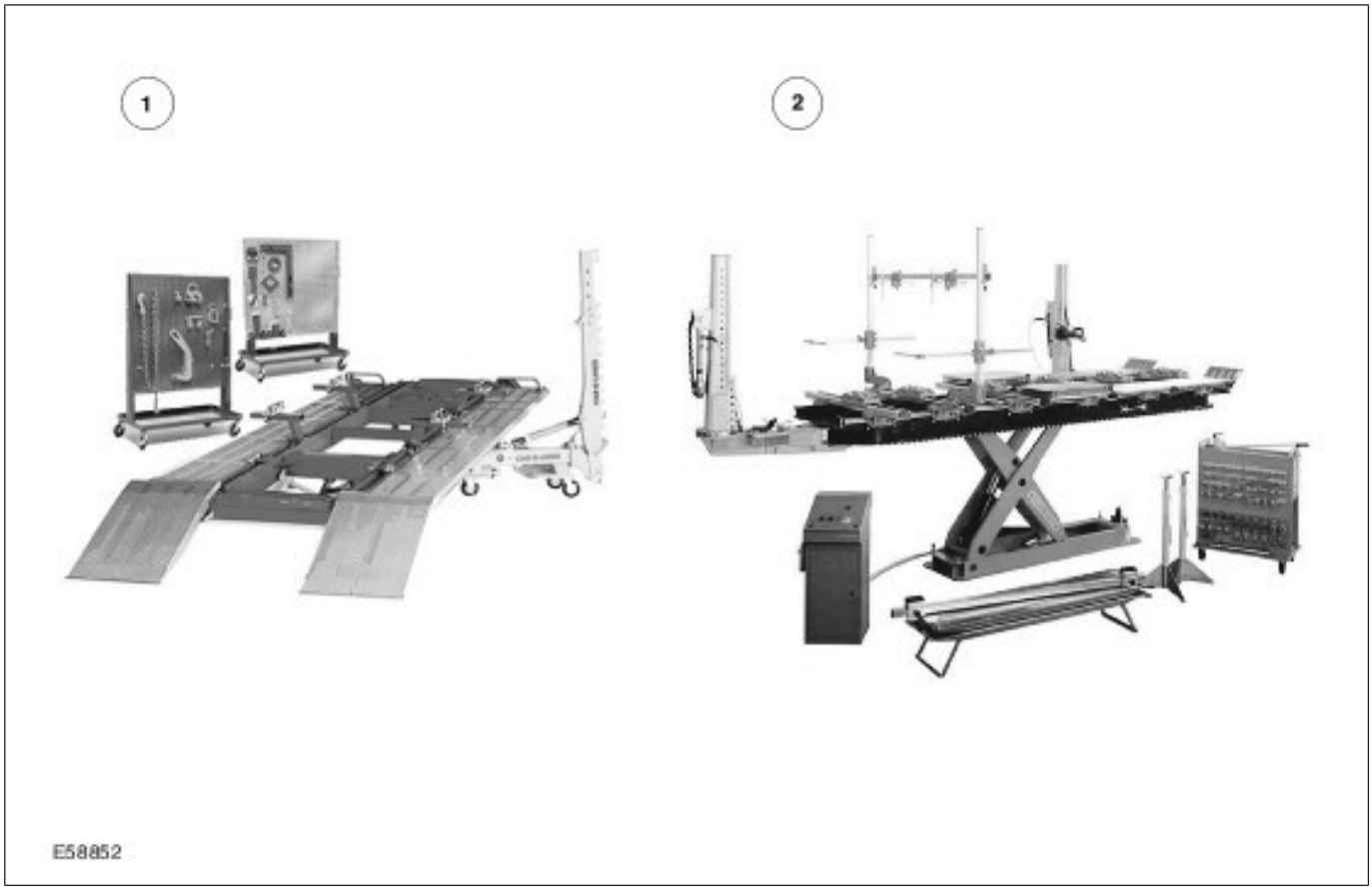
Tools and Equipment for Body Repairs

Alignment systems

NOTE: Please refer to the Ford Service Equipment Catalog for information on the body tools recommended by Ford.

Straightening and alignment repairs are often required to restore a vehicle body to its original shape after accident damage.

Universal aligning and measuring systems and universal alignment angle systems are suitable for this work.



Description	Description
1	Universal aligning and measuring system
2	Universal alignment angle system

Basically, the aligning and measuring system must satisfy the following requirements:

- Universally applicable to all types of passenger car. Can also be used on light commercial and off-road vehicles.
- Accepts the forces involved during straightening.
- High stability and mobility.
- Can accept all or part of the weight of the vehicle.
- Quick to set up.
- Simple to use.
  - Stationary design with drive-on ramp.
  - Height-adjustable aligning platform.
  - Universal gauge extensions with fast anchoring ability around the whole circumference of the aligning platform.
- Facility to test individual body measurement points, with or without aggregates being removed.

Alignment angle devices survey the vehicle at several points on the body. These are usually points which are also used in production. In addition, a recording over the rocker panels is possible. A measuring system is not needed, because the necessary body points are specified with gauges. For this purpose, vehicle specific or universal gauges are available.

DESCRIPTION AND OPERATION

Universal alignment systems consist of a vehicle mounting (universal clamps at the rocker panels) and a pulling device. In addition, a measuring system is required.

NOTE: Because universal clamps are used, the rocker panel area must be reworked for optical and corrosion protection reasons after the repair is completed.

Pay attention to the following points:

- Clean the attachment areas.
- Anchor the vehicle free of stress on the relevant system.
- Support the aggregates to take strain off the body.

Measuring systems

In order to exactly diagnose a damaged vehicle body, measuring systems are required. Depending on the measuring method, the systems vary in having mechanical, optical, acoustic and electronic measuring devices. In some cases, hybrid versions of particular systems are found.

NOTE: When working with each measuring system, the manufacturer's instructions provided in the description of the measuring equipment must be followed.

Basically, the measuring systems must meet the following requirements:

- Universally applicable to all types of passenger car. Also can be used on light commercial and off-road vehicles.
- Suitable for all accident damage.
- Fast capture of body measurement points in the underfloor and external areas.
- Data catalog to record all measurement points (length, width and height) both with and without the aggregates being installed.

NOTE: Basic and in-depth training is offered on the following topics. You will find an overview of the complete range of training offered in the Ford Service Organization training brochure.

Beam compass

The beam compass is a very practical and straightforward aid for measuring bodywork and especially floor assemblies. The beam compass can be used to detect dimensional variations across the length and the width by means of comparison measurements and diagonal measurements.

As a basic principal, body reference points should be chosen which are shown in the body frame measurement data sheet.

NOTE: To be able to determine difference in measurements, the same reference points must always be chosen on both sides. For this purpose the beam compass must be positioned symmetrically.

Comparison measurements can also be made on the outside of the body. Depending on the damage, left/right measurements (symmetry measurements) and diagonal measurements can be made using the beam compass, telescopic rod or a measuring tape.

Laser measuring systems

These systems use laser beams which are projected in one or more planes.



By the use of two parallel laser heads which can be turned, symmetrical points of a vehicle body can be tested and compared. Using the linear scales which are attached to the measuring points, the measurement data is read off with the aid of the projected laser beams.

The integral inclination gauge also allows differences in height to be quickly checked.

Mechanical measuring system

The use of mechanical measuring equipment is an easy and effective way to check a vehicle frame and chassis assembly quickly, exactly and reliably.

In many cases an assessment of the damage can be made with the help of this system, without the need for elaborate setting up.

DESCRIPTION AND OPERATION



Because of its self-centering mount, measurement can be carried out by one person.

Further advantages:

- Fast deployment.
- Simple to use.
- Can be extended using adapters, measuring probes and measuring tubes.

Measuring systems which are firmly mounted on an aligning platform require more work in setting them up. They are used to constantly check measurements during alignment work.

This type of mechanical measuring system has measuring scales and measuring slides in three measuring axes. So that the body can be measured, the vehicle is secured on the aligning platform base frame using four universal chassis clamps. The exact fixing points are given in each respective data sheet.

Ultrasonic and mechanical-electronic measuring systems

These measuring systems can be combined with all current aligning platforms. In addition these measuring systems can be used independently of an aligning platform by using a vehicle lift or suitable support stands.



Description	Description
1	Ultrasound measuring instrument
2	Mechanical-electronic measuring system

Acoustic or ultrasonic measuring systems use ultrasonic emitters and sensors to survey a body.

To do this, ultrasonic emitters are mounted on the vehicle using special attachments. During the measuring process the ultrasonic emitters constantly send out signals which are received by sensors (microphones) and then passed to a

DESCRIPTION AND OPERATION

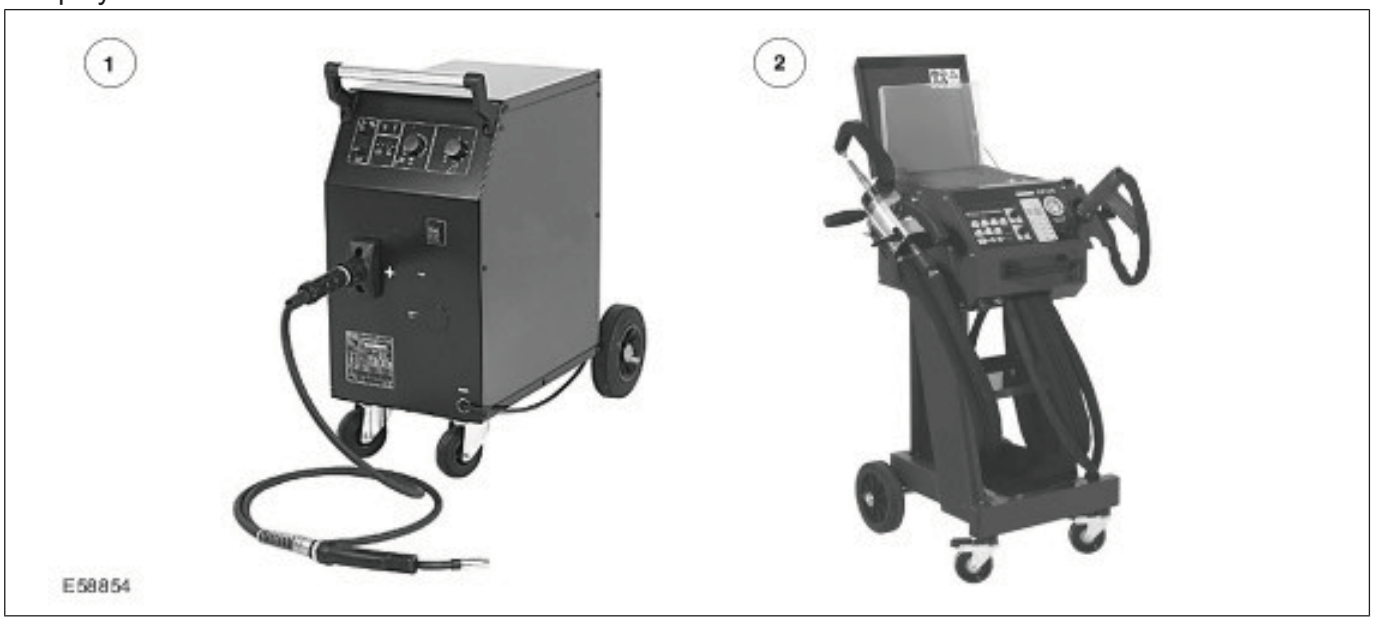
computer. The measurements are displayed on the computer screen and are compared with the required values supplied by the vehicle manufacturer.

The ways in which mechanical-electronic measuring systems can be used are similar to those of the acoustic measuring systems. They can also be set up on a suitable understructure, without an alignment jig. After this system has been arranged under the vehicle floor and adjusted to three undamaged vehicle measuring points, the measuring arm is brought up to the required measuring points and the readings compared with the reference values. The data is transmitted to a computer where it is evaluated and the results displayed on a screen.

Welding gear

As in the past, the dominant process in body construction is resistance welding, in particular spot welding. Depending on body type, up to 5000 spot welds are applied, either by welding robots or in the multi-point welding machine.

Resistance spot welding permits very high energy to be concentrated on a relatively small area of the workpiece in the shortest possible time and when high pressure is applied, a permanent joint is formed. During repairs the resistance spot welds used in production must be re-created accordingly.



Description	Description
1	MIG welding machine
2	Resistance spot welding machine

NOTE: If a suitably powerful welding machine is not available and multi-layer panel joints with a total thickness of over 3 mm need to be made, puddle welding must be used.

Although in principle, high and super high-strength panels are adequately or well suited to resistance spot welding, considerable problems may arise because of low welding power, especially where thicker panels or three layers of panel must be welded together in the workshop. In particular, older welding equipment does not have the latest welding technology nor welding power and therefore cannot reliably join panel thicknesses greater than 3 mm.

Equipment with inverter technology allows better spot weld quality because of a constant high welding current. In addition the high welding current makes shorter welding times possible and the electrodes therefore have a longer working life. Inverter welding is a further development of electrode welding.

Further advantages of the new inverter welding equipment are:

- good welding performance with constant quality, even with high switch-on times
- recognition of and compensation for disruptive factors: e.g. primer, adhesive, rust-prevention paint
- own and pre-set welding programs which can be saved and called up

DESCRIPTION AND OPERATION

- quality confirmation through logging of all important welding data
- fast changing of spot welding clamps or spot welding guns as required

The following functions can be controlled and monitored by programming the welding equipment:

- Control of the start conditions by resistance measurement (dirt, paint, bodywork adhesive, shunt circuit through the next spot weld).
- Ensuring the optimum welded connection.
- Checking the energy balance, resistance and quality.

In the case of resistance spot welded connections, faults in the weld are difficult to see from the outside. It is therefore absolutely vital to know the particular properties of the welding machine being used. A test weld with subsequent peeling test will provide information on the quality of the weld. The spot weld itself must not separate, it must tear away leaving a hole.

In the production of vehicle bodies, MIG welding plays a minor role as a joining technique. It is used for components subject to high demands, such as threaded plates for axle mountings, or at locations which cannot be spot welded for access reasons.

DESCRIPTION AND OPERATION

Establish Repair Method

General

Before starting accident repair work, make sure that the necessary spare parts and repair material are available.

Planning

NOTE: The body interconnection is to be maintained if possible. Repair is preferred to renewal of body components. Furthermore, check if it is possible to perform a partial repair.

During planning the following job steps must be observed and adhered to:

- Determine the repair method taking into account the information made available in ETIS.
- Work out which repair components will be needed and obtain them.
- Establish what disassembly work is needed.
- Check for specific features such as airbags, route of water drain hoses, electric cables and the location of NVH elements.
- Cut out the old parts (only when the new parts are waiting ready).
- Prepare the joint locations.
- Attach the new parts.
- Prepare the area of the repair for painting (grinding welded beads).
- Perform any solder work which is required at the repair location.

Chronological sequence of repair

NOTE: Refer to each vehicle specific chapter in the workshop literature for details on the individual points.

The actual sequence of repair can be divided into the following steps:

Job steps for the coachbuilder:

- Straightening
- Establish separating cuts and mark them.
  - Take into account the requirements given in the repair instructions.
  - Place the new part ready for use and include it in the repair plan.
- Separate and remove the old part.
  - Take into account the special features particular to the vehicle.
- Prepare the joint locations.
  - - Sand and align the weld flanges.
  - Apply corrosion protection measures.
  - Offer up the new part.
- Attach the new component.
- Rework the welded joints (grind welded seams).

DESCRIPTION AND OPERATION

Alignment Check

General

If there is concern that the body has been deformed, the body must be measured. Several measuring procedures and tools can be used for this purpose.

With simple measuring systems, it is possible in most cases to draw a conclusion about the extent of the damage through a quick measurement without time-consuming assembly work (straightening jig).

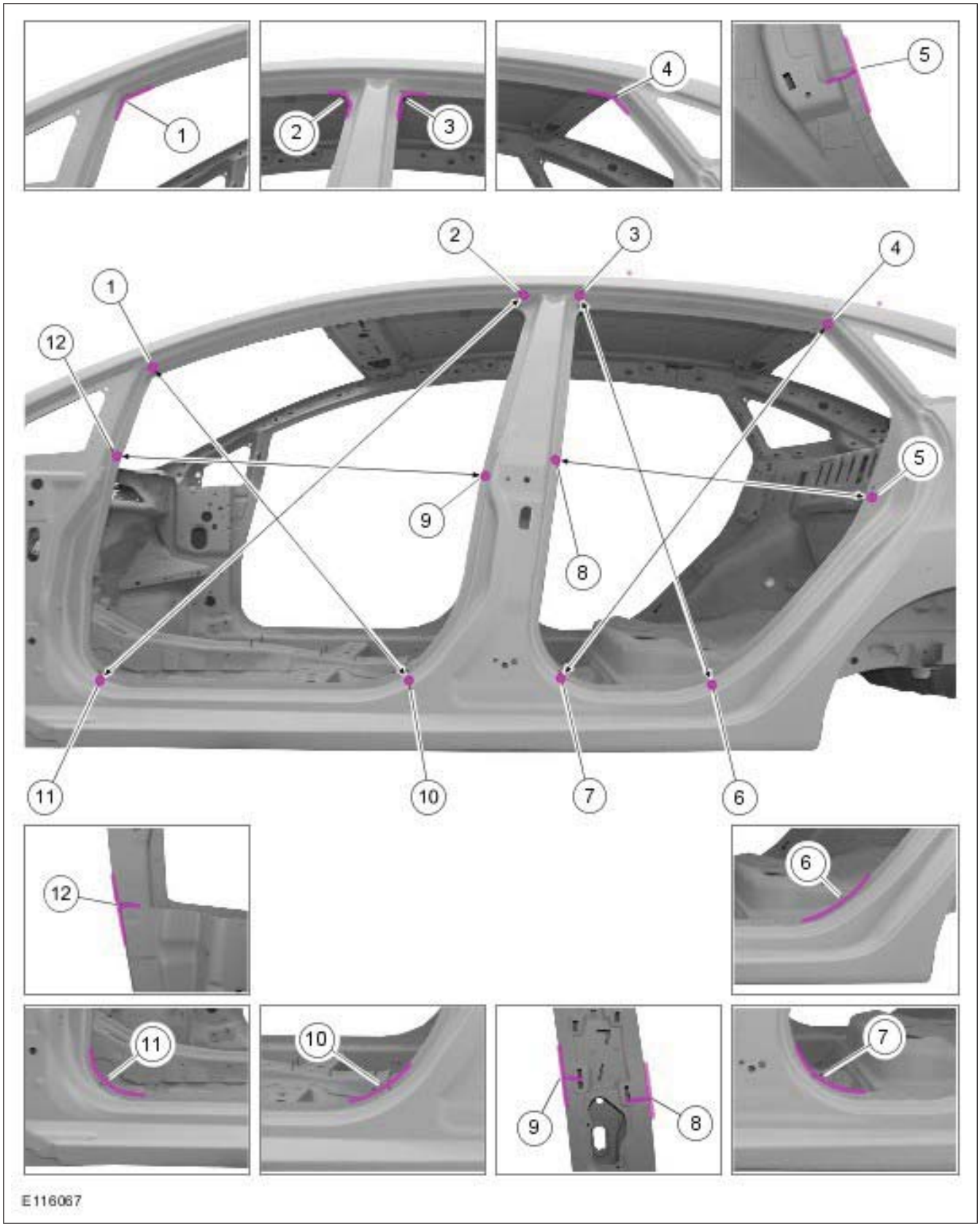
NOTE: For the floor pan and the exterior of the vehicle, measuring data is contained in the vehicle-specific repair instructions for each vehicle. Manufacturers of measuring and straightening jigs create data sheets for this purpose for each vehicle.

Data sheets with the body frame dimensions for body measurement are specified in the model-specific repair instructions in each case. Pay attention to the position of the measuring probes for each of the measurements given. A tolerance of ± 3 mm applies to all specified dimensions.

Measuring points that are specified in a curve are to be measured so that the greatest distance from the opposite measuring point is reflected. For exact determination of the measuring points, enlarged sections are shown.

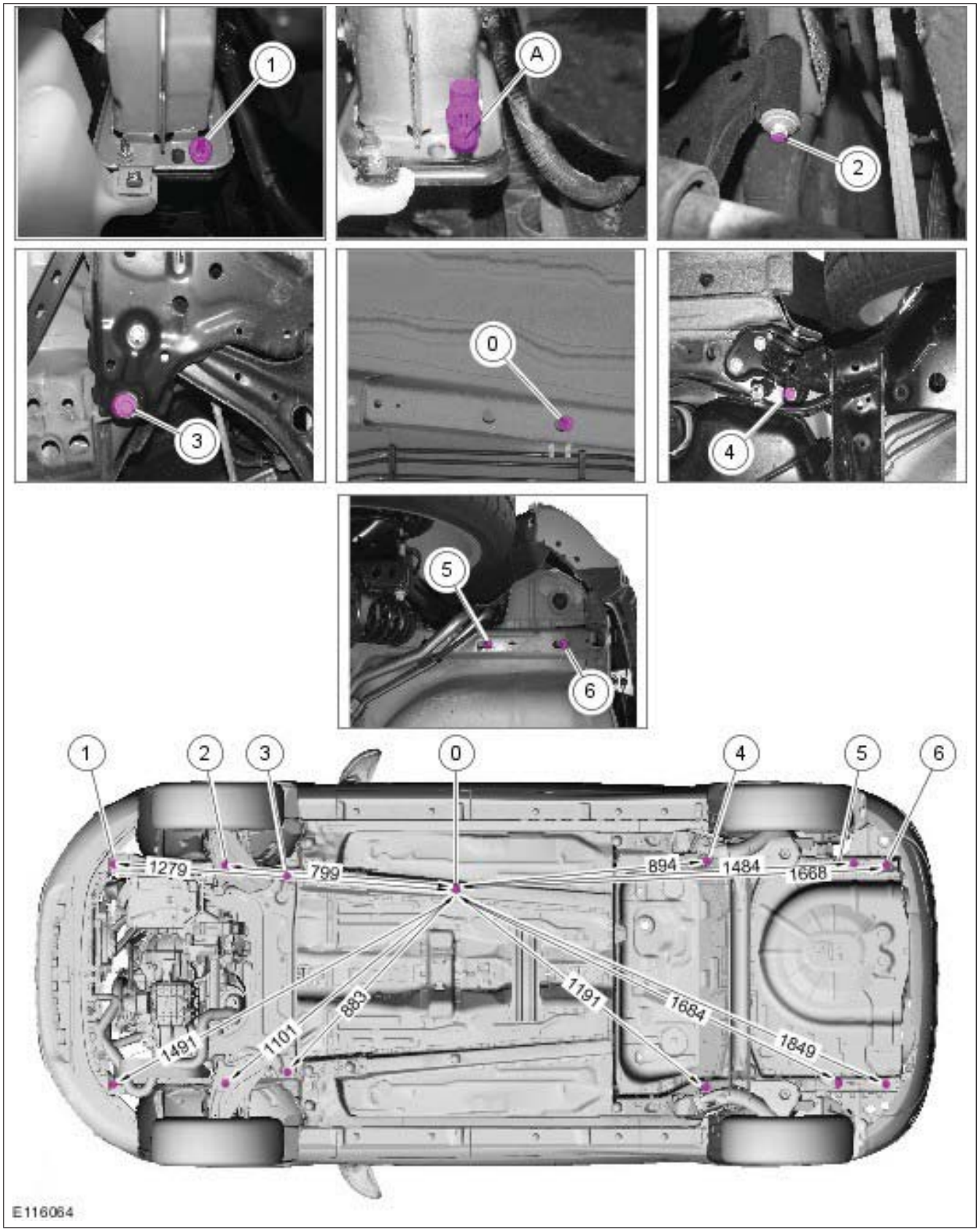
Example of measuring the vehicle superstructure

DESCRIPTION AND OPERATION



Example of measuring the floor pan

DESCRIPTION AND OPERATION



DESCRIPTION AND OPERATION

Straightening

General

Straightening repairs are often required to restore the original body shape. To do this, the vehicle must be placed on a straightening jig so that a pulling device can be used.

NOTE: Basic and advanced training courses are offered for the following contents. For an overview of all training courses offered, please refer to the Ford Service Organisation training course brochure.

Straightening is considered as the process of pulling out the deformed body parts, up to cutting out the parts that need replacing. If distorted components remain on the vehicle, then the term alignment work is used.

Body straightening requires practice and experience. Before starting body straightening, the exact direction of impact must be determined. The straightening force must be applied in the opposite direction to that of the impact. Only in this way can it be guaranteed that the original shape will be achieved again.

Note the following points during the process of body straightening:

- Secure the pulling unit with a safety cable.
- Do not remove bonded glass prior to straightening.
- Never apply heat during straightening.
- If necessary, open doors or hoods/lids/liftgates during straightening.
- Check dimensions and gaps continuously during straightening.
- High-strength steel panels have a stronger tendency to retain their deformed shape.
- During the straightening repairs, monitor the attachment of the pulling unit to the vehicle.
- Carry out the straightening work in several stages, never in one pulling process. This prevents the risk of overstretching and of joints tearing out.
- During individual straightening steps (under a pulling load), relieve tension by striking the deformed areas with an aluminum hammer while they are still under tension.

Special features of non-monocoque bodywork

Straightening is different to monocoque body construction because of separate straightening for bodywork and chassis.

If only the body is damaged in an accident, light straightening repairs can be carried out while still mounted on the chassis.

NOTE: With strong straightening forces, these bolted connections may be damaged (bodywork to chassis frame). Monitor the bolted connections continuously during the straightening work. Holding clamps or alignment angles must be attached directly to the chassis frame.

Straightening of chassis frames

NOTE: High-strength steels must not be heated.

If the body and chassis frame have to be straightened, they must first be separated from each other.

The following conditions must be met:

- The repair must be economically justified.
- The production quality and stability of a frame must be achieved again after carrying out the repair.
- In principle, the driving and operating safety of the vehicle is paramount.
- Cold straightening of deformed areas with sharp edged folds cannot be carried out.
- Straightening with the application of heat (welding torch) requires much experience and accurate knowledge of the behavior of steel panels when heated.
- The temperature and duration of application of the heat are to be considered in particular.
- Individual components of the frame, such as cross members, brackets, etc. can be replaced.

DESCRIPTION AND OPERATION

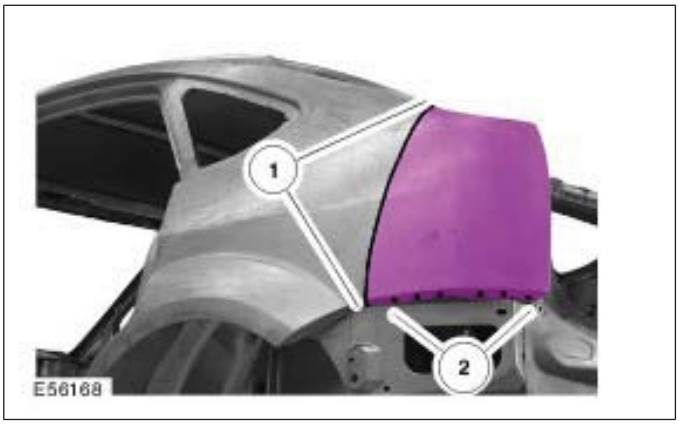
Complete Panel Replacement/Partial Replacement

NOTE: Basic and advanced training is offered for the following contents. For an overview of all training courses offered, please refer to the Ford Service Organisation's training course brochure.

Repairs always mean intervention in the body shell structure and thus also intervention in the vehicle's passive security system.

NOTE: From an economic perspective, the possibility of a partial replacement (sectional repair) must be considered when assessing an accident-damaged vehicle.

Partial Replacement



Item	Description
1	Join area
2	Original welding

Decision criteria

The following are always crucial for the decision:

- How economical the repair is.
- Retention of the original join.

In addition, Ford must have given its approval for a sectional replacement solution in the damaged area. For those partial replacements approved by the factory and described in the model-specific body workshop literature/technician's information, some spare parts (service parts) specially prepared for partial replacements are offered through the spare parts sales department.

Sectional replacement (sectional repair) means the replacement of a section of the body shell structure. Sectional repairs fulfill their purpose above all if the replacement of a complete part is too time-consuming and thus not economical. Approved sectional repairs are clearly defined in the model-specific body literature. These requirements must be complied with.

Depending on the damaged areas, further facts are to be taken into account when deciding for or against partial replacement:

- Severance cuts should be as short as possible.
- The effort for follow-on work on the connections must not be too great.
- It must be possible to reproduce the optical path of visible edges on door openings.
- Inner reinforcement panels must not limit the straightening work.
- Inner reinforcement profiles in the pillar areas must allow for separation.
- The Ford regulations for partial replacements on structural frame sections must be taken into account.
- The large surface welding seams at the connections must be restored.

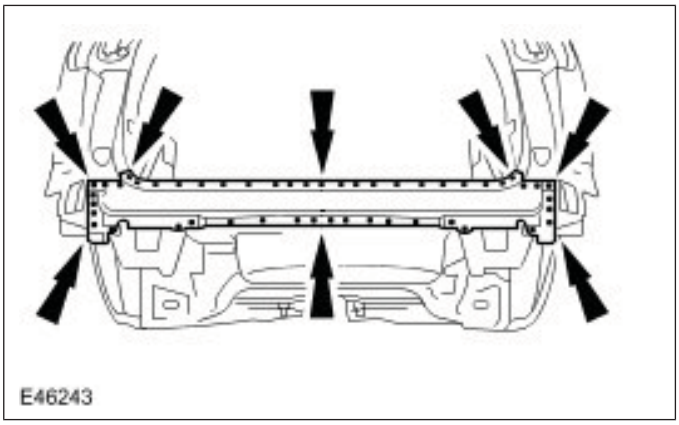
Advantages of a partial replacement

A partial replacement repair offers many advantages for a professional repair of accident damage:

- Repairs can be made both in the outer panel area (e.g. side frame) and in the inner areas (e.g. structural member, trunk floor).
- The repair can be limited to the actual damaged area.
- Reduction of repair costs, as aggregates and other components can usually remain in the vehicle.

Complete replacement

In a complete replacement, the original connections are largely reused.



DESCRIPTION AND OPERATION

A complete replacement is advantageous if the damaged body part can be detached from its original connections and a completely new part can be fitted without creating additional joints (e.g. liftgate).

A complete replacement is necessary if there is no sectional replacement solution.

DESCRIPTION AND OPERATION

Corrosion Prevention

The corrosion protection provided in production must be carefully maintained and reproduced during body repair work, in order to ensure the long-term warranty for Ford vehicles.

NOTE: Please take the notes in the model-specific repair descriptions into account. Please also note the manufacturer's instructions when handling the different anti-corrosion agents.

Only Ford original bodywork components and Ford approved repair materials are to be used for body repairs. The Ford logo is stamped onto every Ford original spare part.

Panel coatings and corrosion protection

Body steel panels are provided with a coating for corrosion protection purposes. The coating material is predominantly zinc in a variety of composition forms. Aluminum is also used to some extent. Basically, all types of steel sheet can be coated.

A variety of coating processes are used:

- Hot dip zinc coating (no longer used in vehicle construction).
- Electrolytic zinc plating.
- Organic coating.
- Hot dip aluminum coating.

NOTE: Welding fumes are harmful to health. Make certain that the workspace is well ventilated and use welding fume extraction.

The following points must be noted when welding:

- Zinc starts to melt at about 420°C.
- The zinc vaporizes at a temperature of about 900°C.
- The amount of heating determines the damage to the zinc coating, and therefore to the corrosion protection.
- Resistance spot welding is particularly suitable for welding zinc-coated panels, because no widespread warming occurs.
- With electrolytically zinc-plated panels there is no need for any special preparation because the zinc coating does not need to be removed.

NOTE: Coated panels have a higher electrical resistance, but this can be compensated for by increasing the welding current by 10 - 20% .

Corrosion protection measures during repair work

CAUTION: Always be extremely careful when handling solvents, sealants and adhesives. Some products contain substances harmful to health or give off harmful or poisonous vapors. Always follow the manufacturer's instructions. If there is any doubt as to whether a particular solvent is suitable, it must NOT be used.

All Ford bodywork components have a cathodic primer. Moreover, most parts are zinc-plated on one or both sides. If possible, these protective layers must not be damaged.

Before welding

Interior surfaces of new bodywork components which will no longer be accessible after installation must be painted beforehand. The welding flanges are treated with a special welding primer. The joint areas are not always accessible from inside later. Therefore, prepare these areas so that no soot is produced by burning paint during welding.

NOTE: In order to ensure that the corrosion protection produced in production is not destroyed, the working area must be kept as small as possible.

NOTE: Do not touch cleaned bare metal any more with the bare hands. The dampness of your hands will corrode the metal.

Procedure:

- Remove the primer or paint/zinc layer in the welding area using a tress wire brush to prevent the formation of soot from the paint.
- Thoroughly clean the welding area with a metal cleaning agent and rub dry.
- Coat the welding flange with welding primer on all sides and allow to dry.

NOTE: The welding primer must only be applied thinly to the spot welding area, to minimize spattering when welding.

After welding

During repair work, body panels are often heated at very high temperatures, which results in the destruction of the corrosion protection.

DESCRIPTION AND OPERATION

Reworking of the affected areas is therefore vital:

- Grind the welded seams flat and clean thoroughly with silicone remover. Dry with a lint-free cloth.
- If the join area is accessible from the inside, the transition area to the paint must be abraded for all types of join so that good adhesion of the primer is achieved later.
- If the join area is not accessible from the inside, the cleaning and sanding work is not done. For this reason, ensure that there is as little contamination as possible in the area of the repair. This allows the cavity wax applied later to penetrate the join area without hindrance.

NOTE: Only apply a small amount of panel cleaner to the cleaning cloth when cleaning the repair area. Make sure that no cleaner reaches the connecting flange, so that the welding primer is not washed away again.

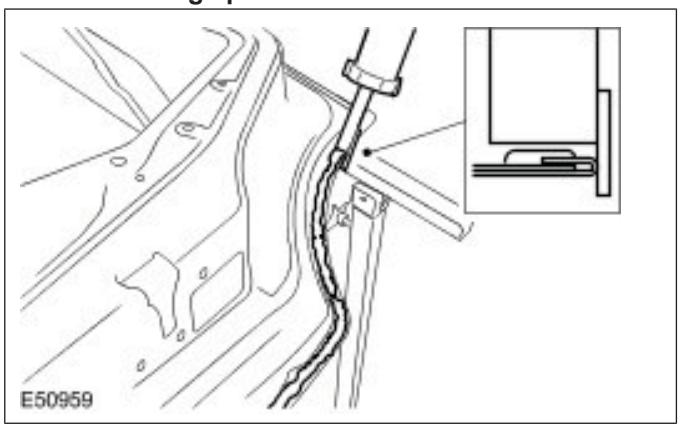
Priming after welding

Primer is applied to the welded flanges after cleaning. A check must also be made that the production corrosion protection is present in the area of the flanges. Any damage must also be re-primed.

Sealing work

Depending on the type of repair, the clinched flanges on the hood, doors, tailgate and trunk lid must be sealed with clinched flange sealer.

Clinched flange protection with flat nozzle



Clean the clinched flange area of the new component with silicone remover and dry with a lint-free cloth.

The sealant must be applied to the dry primed surface (i.e. dip priming as for delivery).

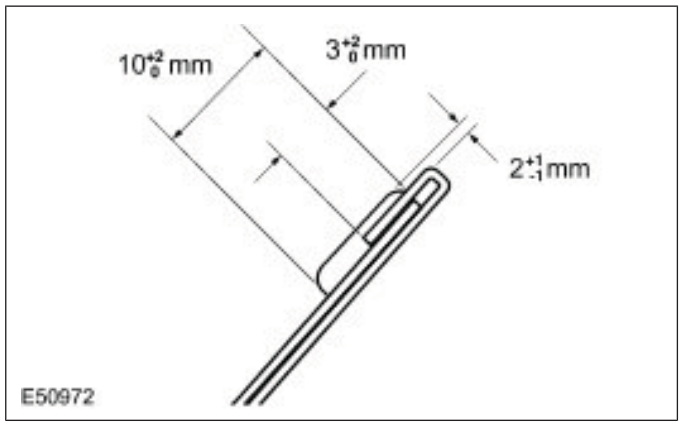
Apply clinched flange protection to the clinched flange using one of the flat nozzles supplied. The nozzle must be cut to the necessary width beforehand and the guide stop cut as required.

During application the clinched edge must be covered with an overlap of at least 3 mm. The beginnings, ends and edges or interruptions in the sealer bead need to be reworked by forming with a brush or a spatula, to ensure a 100% tight sealing of the flange.

The speed and angle of application are decisive for a good appearance and a bubble-free bead. Always apply the sealer with as few as possible interruptions to avoid sealer rework. Never use solvents or thinners as this will considerably slow down the hardening process of the sealer.

For an application thickness of 3 mm of the clinched flange sealer it is recommended to allow to dry over night at room temperature. A minimum hardening time of 5 hours is required anyhow before a 2-component primer can be applied.

Clinched flange protection applied to the correct width and thickness.



Underbody protection/stone chip protection

The underbody protection is used as corrosion protection and must also be applied such that it matches the original condition, from a visual perspective.

Two main application methods are used in production:

- The underbody protection is applied as a sprayable sealing compound.
- In the area around the structural members, the underbody protection is sprayed on and spread across a wide area.

DESCRIPTION AND OPERATION

Because of the coarse surface structure of the stone chip protection material, it is recommended to only perform a repair over the whole surface, if there is damage over visible areas. Otherwise there is the danger of serious irregularities on the surface.

The thickness and appearance of the underbody protection and stone chip protection must be matched to the original. Special spray guns are used to work the materials for this reason. A test spray must always be performed beforehand however, to determine the correct appearance and layer thickness.

Cavity protection

After painting work has been completed, a general check is made of the work that has been done. Before final reassembly of the vehicle, the cavity wax protection in the area of the repair must be renewed. Cavity wax protection must be performed carefully so that the quality of the repair conforms with Ford standards:

- Guide the cavity wax probe carefully in the area of the repair so that targeted corrosion protection is achieved.
- Pay special attention to edges and swage line on stepped joints, the wax must cover the inner edge areas.
- The cavity wax must flow along the stepped sheets so that the wax is drawn between them by capillary action.

A hole may be drilled in a suitable place for areas which are not accessible for the application of cavity wax. The diameter depends on the size of plugs available. When this is done it is vital to make sure that no drilling swarf remains in the cavity (rust will form if any remains). The edge of the hole must be treated with cavity wax. Finally close with a plug and seal with underseal.

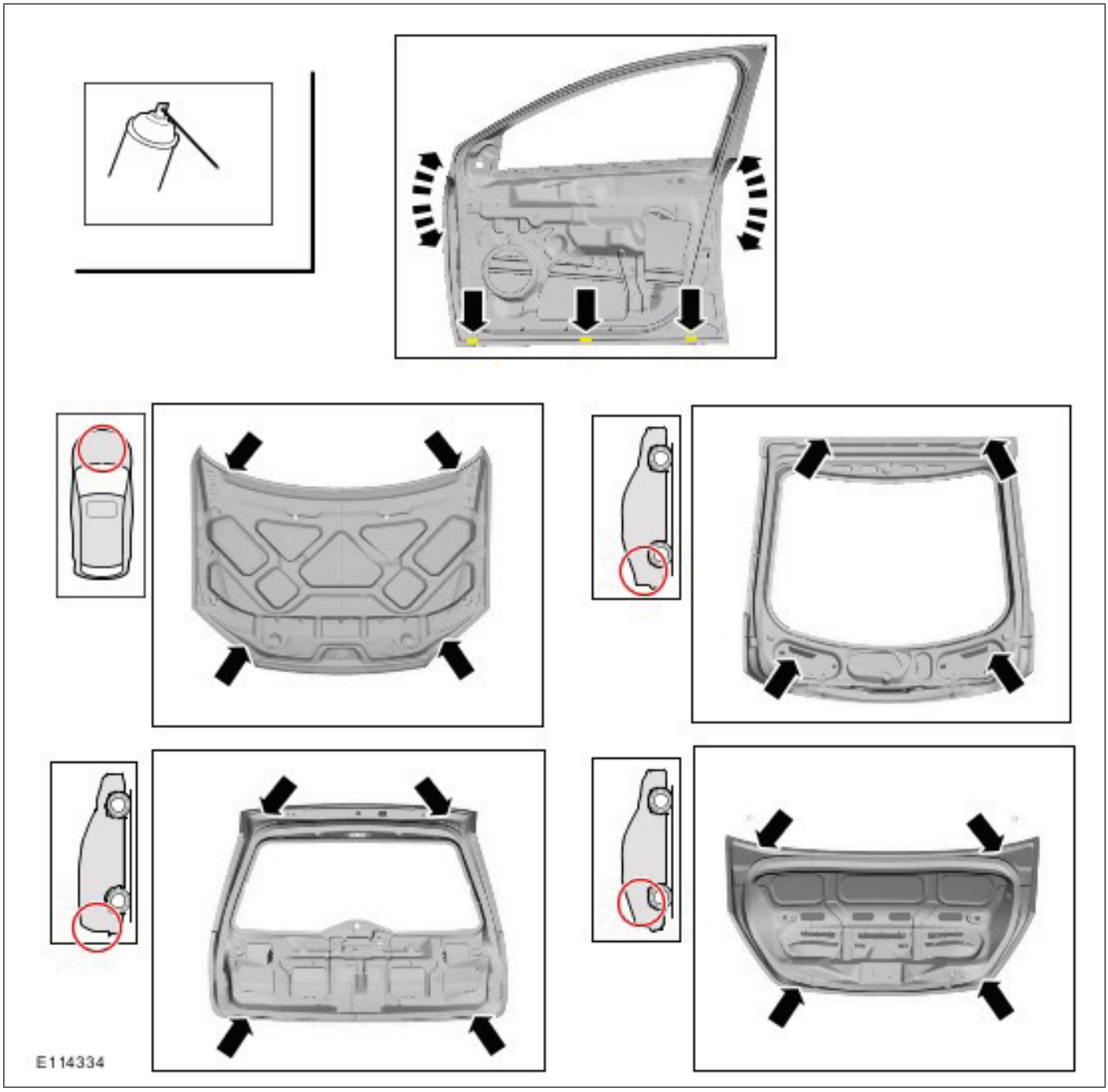
Only on components with clinched flange edges:

After painting, the inner clinched flange edge must be sealed as far as is possible with cavity wax. For this, the repaired component should be positioned upright and corrosion protection wax sprayed into the water drainage holes and/or the thread holes for the hinges in both directions (50 ml corresponds to about 20 seconds spraying time).

For doors, tilt and turn the component to spread the corrosion protection wax over the whole edge of the flange.

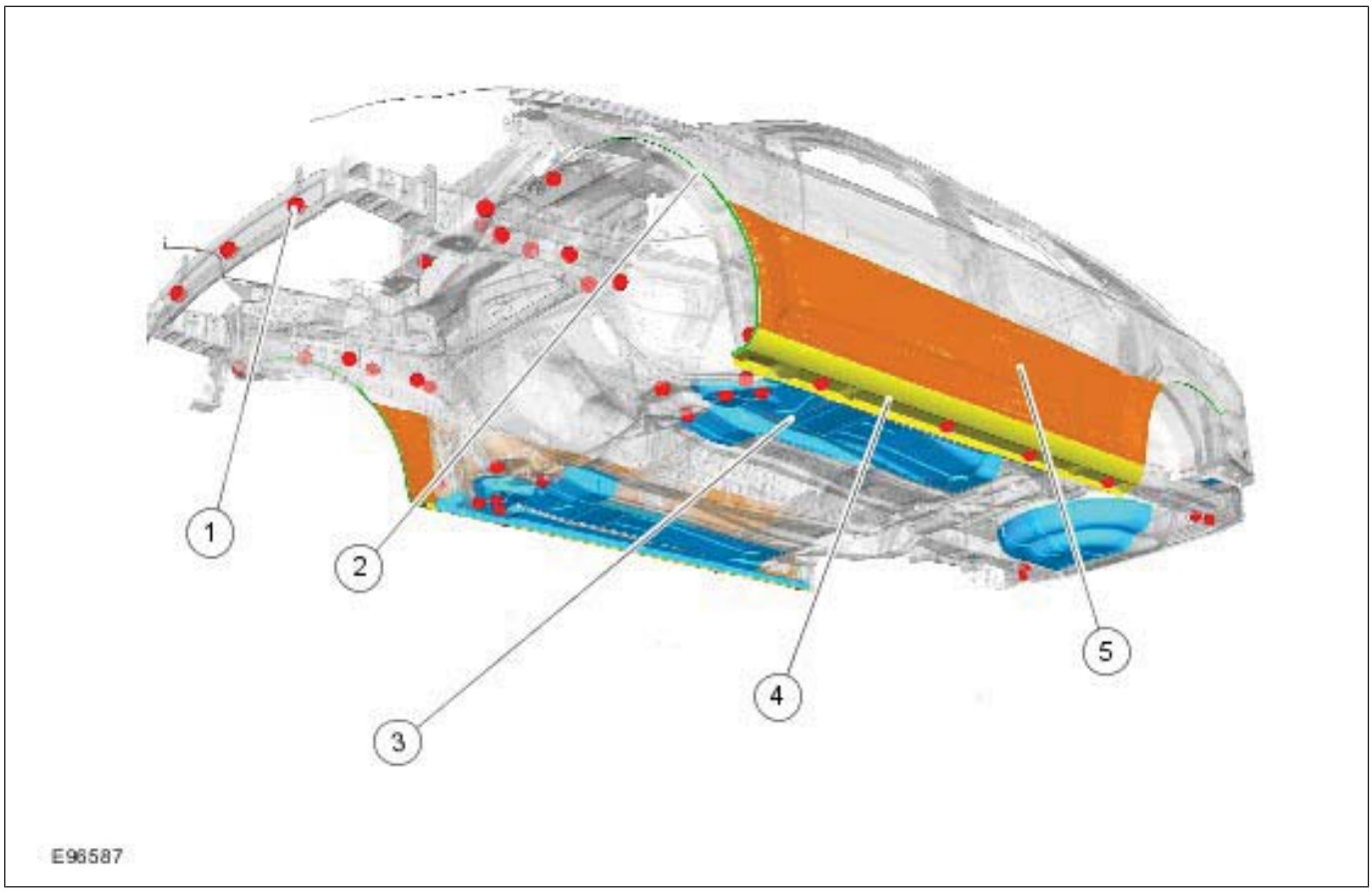
Wax application

DESCRIPTION AND OPERATION



DESCRIPTION AND OPERATION

Corrosion protection for the floor pan (example)



Item	Description
1	Injection points for cavity wax protection
2	PVC stone chip protection at the wheel arches
3	PVC underbody protection
4	PVC stone chip protection
5	PU primer

DESCRIPTION AND OPERATION

Corrosion Damage/Corrosion Repair

Modern vehicle bodies are protected from corrosion by elaborate measures. Multilayer coatings on the panel surface prevent direct contact between the metal and oxygen, and so protect it from corrosion.

In the long-term however, corrosion on a vehicle cannot be completely prevented.

NOTE: Basic and in-depth training is offered on the following topics. You will find an overview of the complete range of training in the Training Brochure issued by the Ford Service Organization.

What is corrosion?

Corrosion is destruction of a subsurface caused by chemical or electrochemical effects which operate from the outer surface.

If the protective layers become damaged, electrochemical conversion processes are initiated, which allow the metal to oxidize. This leads to the formation of corrosion.

The following factors lead to corrosion:

- Mechanical damage such as stone chips and scratches which penetrate through to the steel panel.
- Damp interiors.
- Unfavorable weather or environmental conditions, as may occur in areas with high humidity, high salt content in the air or serious air pollution due to aggressive gases and dusts.
- Insufficient corrosion protection after repairs.
- Lack of care by the vehicle owner of the painted and corrosion proofed surfaces or areas on the vehicle.

In order to maintain long-term corrosion protection, the vehicle must be checked at regular intervals.

In doing so, the follow areas must be inspected and any damage rectified:

- Damage to the paint surface cause by scratches or stone impact must be suitably rectified according to the specifications.
- Damage to the PVC underbody protection or the PU stone chip protection must be refinished.
- Damage to the PVC underbody protection or the PU stone chip protection must be refinished.
- Incomplete or damaged sealing at clinched flanges must be renewed.
- Check the cavity protection and renew it if incomplete.
- Poorly installed or damaged covers and stone chip protection fixtures must always be renewed.
- Check seals and seal carriers for wear and correct mounting. Any damaged seals must be renewed.
- All rubber grommets and blanking plugs must be present and correctly installed.
- A damp or wet floor inside the vehicle indicates that there are leaks in the bodywork. The interior must be dried out and the leaks must be completely rectified.

The corrosion formation can vary in extent.

With rust film or edge rust formation, the surface of the paint has small traces of corrosion present. The traces of corrosion can possibly be removed in such cases by polishing the paint surfaces. If this is not possible however, the traces of corrosion must be rectified by using a touch-up technique.

If the corrosion is just starting, with up to 1 mm rusting below (in the form of a dot or a line) the damage is rectified as follows:

- Clean the defective location.
- Mechanically remove the rusting which is starting below the surface.
- If the area is small, apply primer and allow it to dry, then use the paint pencil to touch up the area - if not, respray the damaged area.

If rust is already under the paint finish to the steel panel, then the whole paint finish in the affected area must be sanded away.

Furthermore, the existing traces of corrosion in the body panel must be carefully and completely removed.

Finally a new paint finish must be applied in this area. In the case of rusting through, the affected body panel is already completely destroyed. Such damage requires complete or at least partial replacement.

NOTE: : In the general section there are several chapters which present the techniques necessary for a professional corrosion repair.

The outcome of this is the following repair sequence:

- Remove the rusted-through part.
- Remove the remaining traces of corrosion.
- Offer up the new part.
- Prepare the joint areas.

DESCRIPTION AND OPERATION

- Weld the new part into place.
- Produce the corrosion protection.

For a professional repair it is essential to reproduce the corrosion protection during and after the repair.

DESCRIPTION AND OPERATION

Sealer, Underbody Protection Material and Adhesives

Sealants, adhesives, cavity wax and underbody protection materials are used during the various body repairs. In this area Ford offers a range of products which have been tested and matched to each other.

CAUTION: Always be extremely careful when handling solvents, sealants and adhesives. Some products contain substances harmful to health or give off harmful or poisonous vapors. Always follow the manufacturer's instructions. If there is any doubt as to whether a particular solvent is suitable, it must NOT be used.

Clinched flange protection

One-component adhesive/sealer which can be applied by brush or spraying, based on MS polymer, with a flat nozzle for application and with the following properties:

- Can be sanded
- Permanently elastic
- Non-corrosive
- Very good adhesion
- Rapid hardening and resistant to ageing
- Can be over-painted with almost all proprietary paints

Seam sealant T Anthracite

One-component sealer based on MS polymer, for sealing joints and seams, with the following properties:

- Silicon-free
- Solvent-free and low-odor
- suitable for gluing HVH elements into position in their respective body areas

Body sealant T beige

Sealer with the following properties:

- Stable
- Contains solvent
- Especially suitable for visible seams
- After hardening can be overpainted with two-pack paint

Underbody Coating

Underbody protection is necessary for permanently elastic corrosion protection of vehicle underbodies. It is very durable and has good resistance to abrasion,

Cavity wax

This touch-proof, transparent corrosion protection wax is used for the preservation of cavities and flange joints.

Anti-corrosion wax

Anti-corrosion wax is a coating material which can be applied in fine spray, forming a very thin and grease-like protective film, therefore offering very good corrosion protection.

2-component metal adhesive

For joining metal to metal and plastic to metal. The adhesive reduces droning noises and improves corrosion protection.

Windshield sealant

Solvent-containing, stable sealing material. The sealer is permanently elastic and does not form a skin on the surface.

1-component window glass adhesive kit

For direct glazing. The vehicle is ready to drive after 6 hours (passenger airbag). Prevents contact corrosion.

2-component window glass adhesive kit

For direct glazing. The vehicle is ready to drive after 1 hour (passenger airbag). The adhesive is not an electrical conductor and permits interference-free radio reception. Prevents contact corrosion. Using a 150ml additional cartridge, the adhesive can also be used for large windows or to produce a double seam of adhesive.

PU glass adhesive

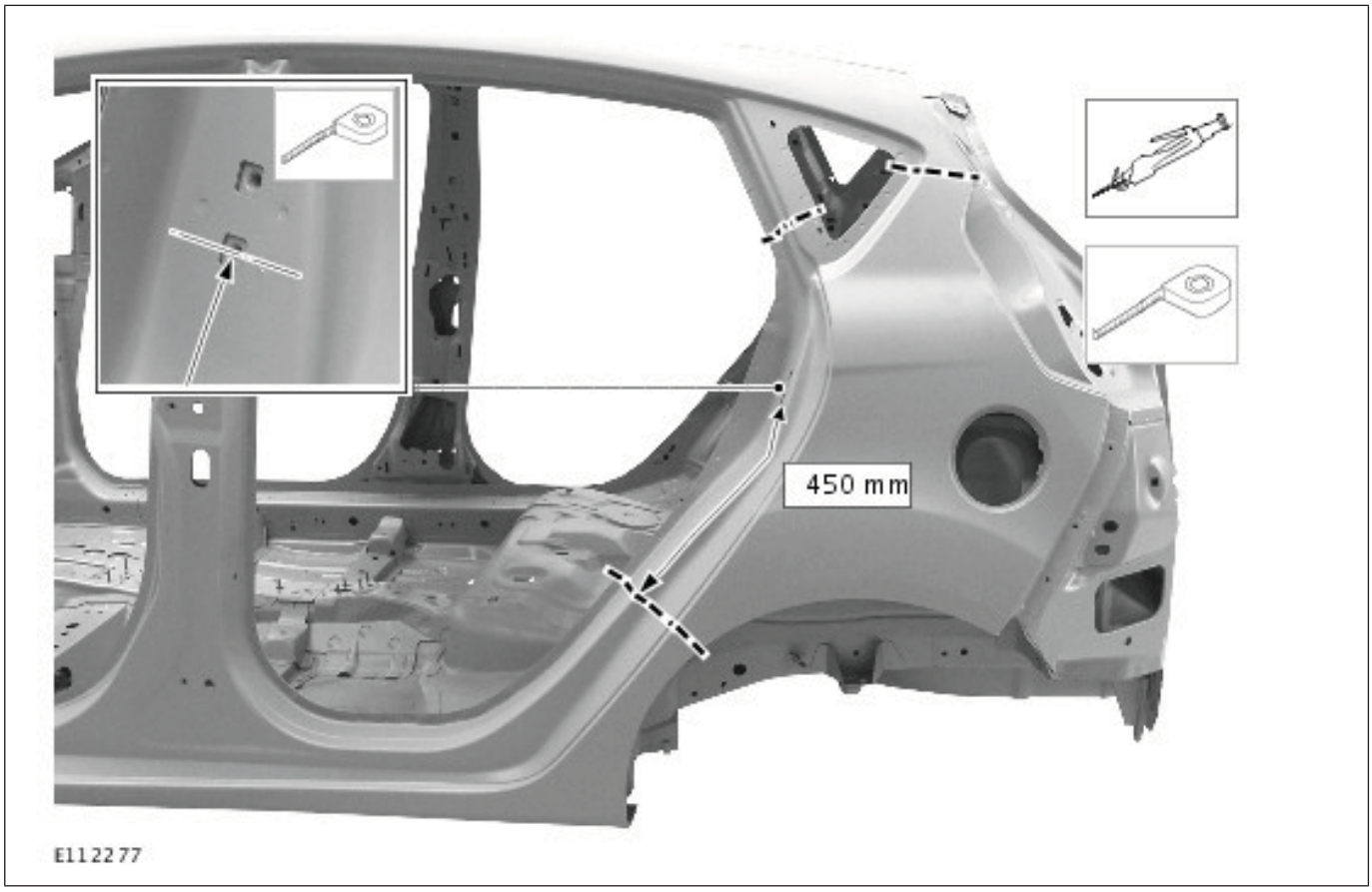
150ml additional/replacement cartridge for direct glazing using 2-component window adhesive kit. Suitable for double beads or larger windows. Also suitable for sealing NVH elements.

DESCRIPTION AND OPERATION

Cutting Technique

NOTE: Without exception, before starting work you must read the safety and warning instructions in the chapter "Safety Instructions". In addition, pay attention to the warning instructions of the particular equipment manufacturer.

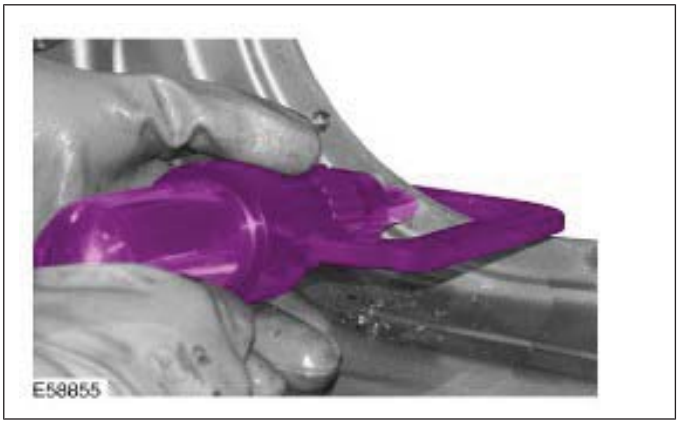
Possible cut lines (example)



NOTE: After all separation work, make certain that the metal swarf is completely removed from the vehicle body.

Depending on the separating tools used, there are some fundamental points to bear in mind:

- Only start the cutting work once the new part is to hand.
- Compare the new part with the old part for shape and size.
- The straightening work must be completed before any body components to be replaced are cut out.
- Before separation work is started, all welded connections which cannot be seen must be freed of underbody protection, sealant etc.



Spot weld milling tool

Resistance spot welds are separated using a spot weld drilling machine or a spot weld milling tool.

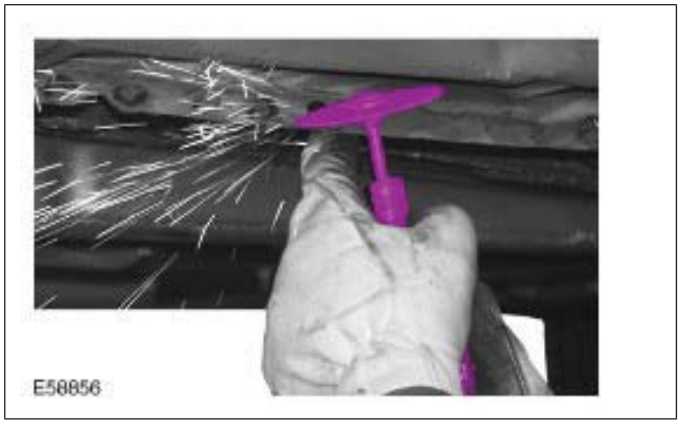
NOTE: Steplessly variable machines increase the working life of the cutting tool. Use of a suitable lubricant can increase this even further.

A spot weld milling tool usually has an adjustable depth stop and a safety fixing system. These prevent the machine from drilling too deep and the cutter from slipping while working.

DESCRIPTION AND OPERATION

Rod sander

Another option for separating resistance spot welds is to use the rod sander.



If spot welds and MIG welds are difficult to reach, a rod sander may offer an alternative.

Short stroke saw

The short stroke saw is suitable for separating vehicle body components and for making a separating cut for partial repairs.



NOTE: In order not to damage panels, wiring harnesses, hoses or similar components which lie behind, remove them beforehand as necessary.

The narrow design of the saw blade permits cutting in tight curves. Straight cuts require a relatively great deal of practice.

Orbital saw

Where use of the short stroke saw is difficult because of the body construction, the orbital saw can be used.



The cutting depth of the orbital saw can be set. This allows separating cuts to be made, despite panels or other components lying in danger behind. Straight cut lines can be more easily made using the orbital saw.

DESCRIPTION AND OPERATION

Panel Beating Technique and Smart Repairs

General

Smaller scale body repairs, where damaged panels do not need to be replaced, can often be carried out by realignment work. Whether the repair is economical however, often depends on the accessibility of the affected body area.

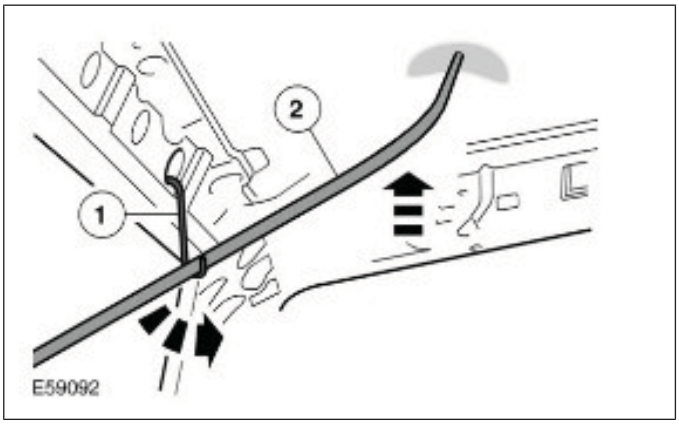
NOTE: Basic and in-depth training courses are offered on the topics which follow. An overview of the complete range of training offered is provided by the Ford Service Organization Training brochure.

During damage assessment, the following technical points must be taken into account:

- Small mild dents (without damage to the paint), which are in areas that make access from the inside possible, can be rectified using undamaged paint panel beating.
- If the inner side of the damaged area (with paint damage) can be accessed, then conventional panel beating techniques can be used.
- If the damaged area has no access from inside, then it can only be rectified using outside panel beating techniques.

Dent removal using special panel beating levers

NOTE: In the Undamaged Paint Dent Removal section, you will find more information on pressure techniques.



Description	Description
1	Deflection by a hook arrangement
2	Pressure tool

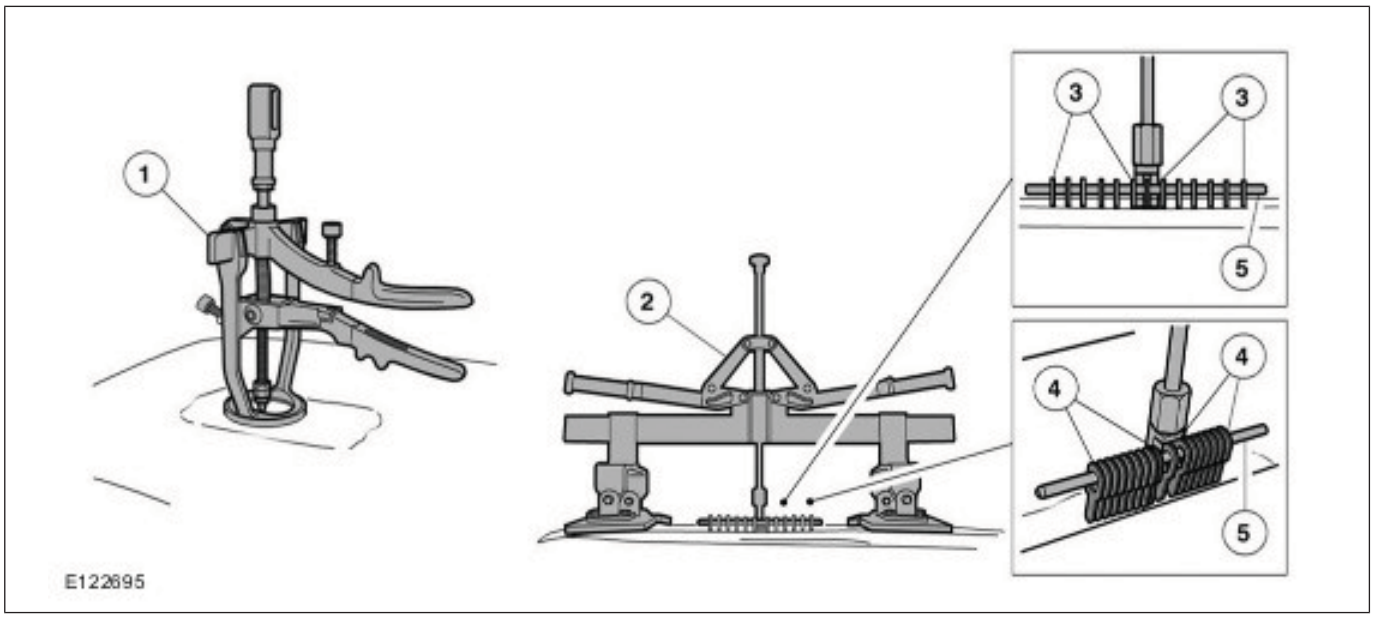
This panel beating technique with pressure is mainly used to rectify smaller dents as a result of hail impact, transportation or parking, without the paint being damaged.

Small dents are removed from the inside of the body panel by pushing them outwards in a mechanical process using panel beating levers.

Because of the great variety of shapes of these levers, it is possible to use this panel beating technique on almost all areas of the vehicle body.

DESCRIPTION AND OPERATION

Dynamic puller with counter bearing



Description	Description
1	Puller device for minor damage, with integral copper electrode
2	Puller device for more extensive damage
3	U-washers spot-welded in place
4	Puller bits spot-welded in place
5	Attachment for U-washers or puller bits

This method can be used to reshape dents or more extensive damage from the outside.

For minor damage, the copper electrode in the tool is secured onto the panel surface by spot-welding and the puller device is used to pull out the damage without jolting.

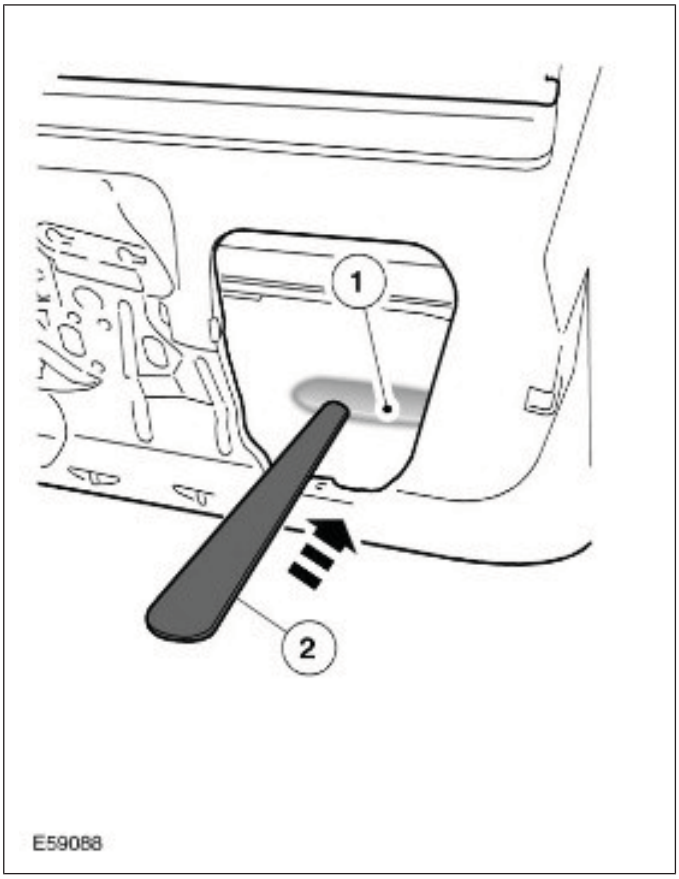
For more extensive damage, puller bits or U-washers (depending on the application area) are spot-welded to the panel surface and the area pulled out using the puller device.

Because of the versatile puller and the variable counter bearing, a wide variety of damage can be worked and rectified using this repair method.

Because of the mechanical lever operation, the variable counter bearing and the optimum controlled application of power, this external dent removal system allows dents in almost all vehicle body areas to be pulled out.

Hollow leveling (removing dent without a dolly)

Hollow leveling can only be used on areas which are accessible from the rear.



DESCRIPTION AND OPERATION

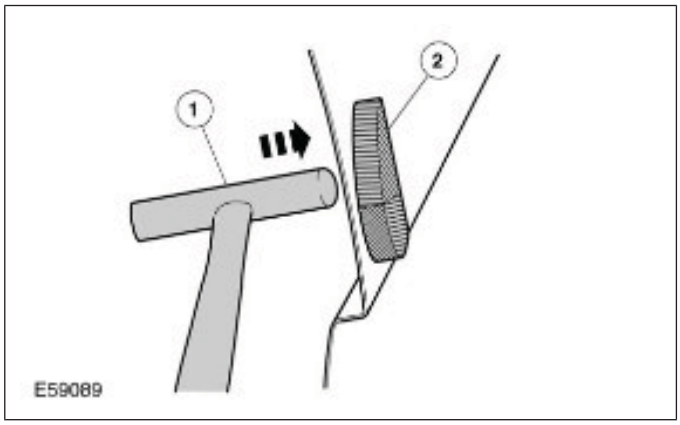
Description	Description
1	Center of dent
2	Spoon

During hollow leveling, the dent is removed from the inside a using suitable panel beating tool and applying knocking or pressing movements. High spots around the edge of the dent area are flattened with blows from the aluminum or wooden headed hammer.

The usual tools are for instance hammers of various designs, dollies, levering irons and various spoon irons. The correct choice of tool is made depending on the shape of the dent and the access which is possible.

Dent removal using hammer and dolly

Panel beating can only be performed using a hammer and dolly if access can be gained from the rear side.



Description	Description
1	Aluminum hammer
2	Box file

The purpose of the dolly in this case is to transfer the force of the impacts from the hammer to the steel panel which is in between. As this is done, the deformed body panel is smoothed (dressed) and the tension fields in the body panel are removed.

The favored tool for this repair process is the aluminum hammer and as opposite support the universal hand dolly. To rectify minor panel damage, the box file should be used as opposite support. Because of its serrated surface, the box file prevents normal stretching of the body panel which would otherwise occur.

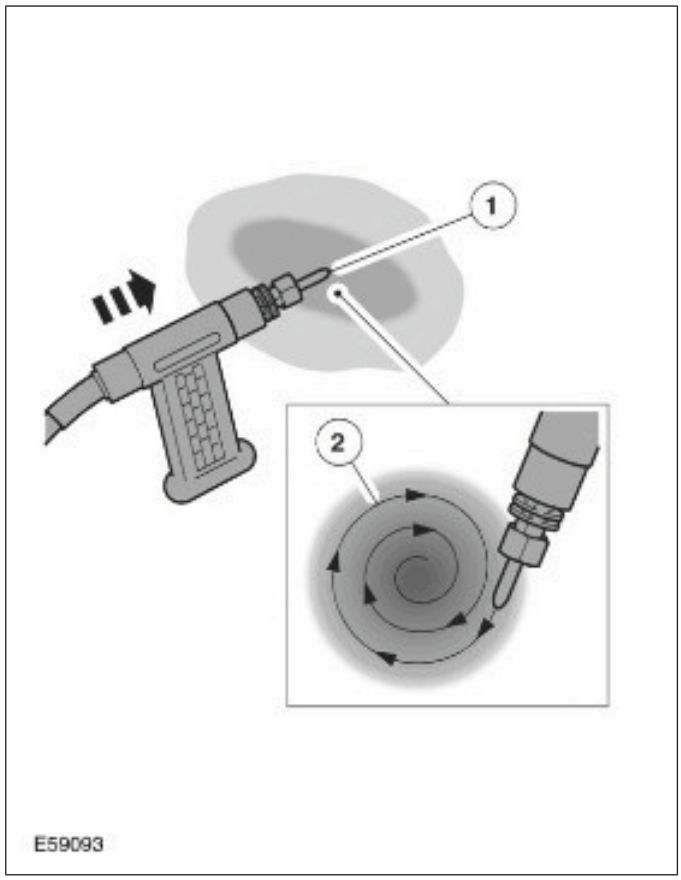
Heat-induced material shrinking

Material shrinking, also called settling in, can be performed in a variety of ways depending on the extent of the damage and the access to the repair area.

These repair processes differ depending on the type of heating and subsequent working of the heated surface. They sub-divide into two basic processes:

- Heating using a carbon electrode.
- Heating using the oxy-acetylene torch.

In the carbon electrode process the working is done exclusively by warming. In this case the access to the repair position is only from the outside.

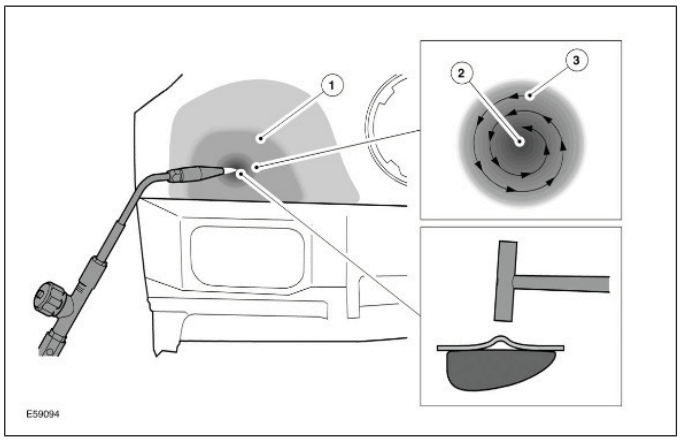


Description	Description
1	Carbon electrode
2	Spiral shaped heating pattern

DESCRIPTION AND OPERATION

If the damage is concentrated in a spot and is in the form of a more rigid raised area, then the carbon electrode must be replaced by a copper electrode. As heat is applied, slightly more pressure is applied to the raised area.

In the method using heating by the oxy-acetylene torch, material shrinking is achieved by a combination of heat and mechanical working of the damaged area.



Description	Description
1	Overstretched area
2	Point heating using the oxy-acetylene torch
3	Spiral shaped knocking back with dolly

The repair area must always be accessible from both sides, so that the heated area can be properly worked mechanically.

The combination of heating and mechanical working is very effective.

As soon as the warm point is established, hammering is immediately started using the aluminum hammer together with a suitable dolly on the inside of the repair surface, working in spiral movements towards the warm point. This causes material to build up in the center of the warmed area.

Lead loading

Despite good external panel beating techniques, it is not always possible to rectify every surface unevenness. For this reason, application of lead loading is an important part of panel beating.

CAUTION: Poisonous gases and dust can be produced when working solder. Use an extraction unit and, if required, a protective mask.

NOTE: Since 07/2003, lead compounds have been ruled out for production. Appropriate lead-free tin solders and pastes must also be used in the workshop.

Typical application areas:

- Body components with limited or no access from the rear.
- Body components with very narrow cross-section.
- Body components which are particularly exposed or which can move.
- Weld seams of partial repairs.
- Rocker panel areas, wheel arch edges, side panel areas.
- Doors, hood, luggage compartment lid.
- Swage lines and joint areas.

Tin has the following advantages:

- Excellent bonding on bare metal surfaces.
- Good moulding properties.
- Good properties for the production of shapes and contours.
- Permanent shape.
- Heat expansion is the same as steel.

To create a basis for the actual lead loading process, a lead loading paste is first applied to the panel. The paste is then heated and wiped away with a cloth. Now the tin can be applied and moulded with a brazing block.

After the repair site has cooled down, it is worked using for example the body plane until the surface is smooth and has no transitions.

DESCRIPTION AND OPERATION

Paintless Dent Removal

NOTE: Basic and in-depth training is offered on the following topics. You will find an overview of the complete range listed in the Training brochure published by the Ford Service Organization.

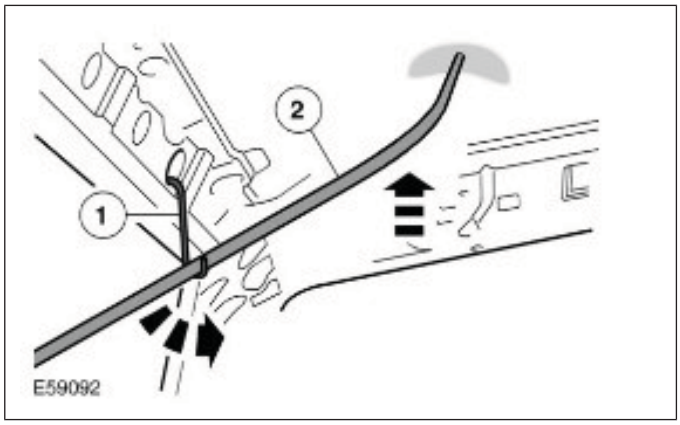
General

Application is restricted to body surfaces which are accessible from both sides. This repair technique is seldom feasible on double-skinned body components or closed body profiles. The same applies to edge areas, swage lines and seams on body components, which are very dimensionally stable.

The following characteristics must be present for a dent to be removed:

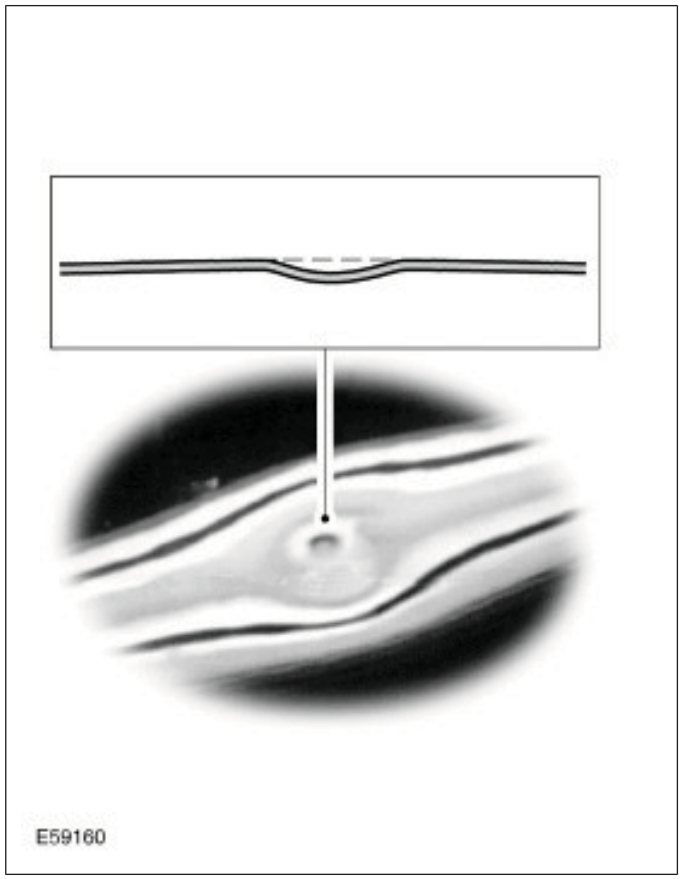
- The diameter must be no more than 50 mm.
- No material stretching in the centre of the dent.
- Repair area must be accessible

Furthermore, sufficient experience in the use of special tools and knowledge of materials are also requirements for a successful repair.



Item	Description
1	Deflection by a hook arrangement
2	Pressure tool

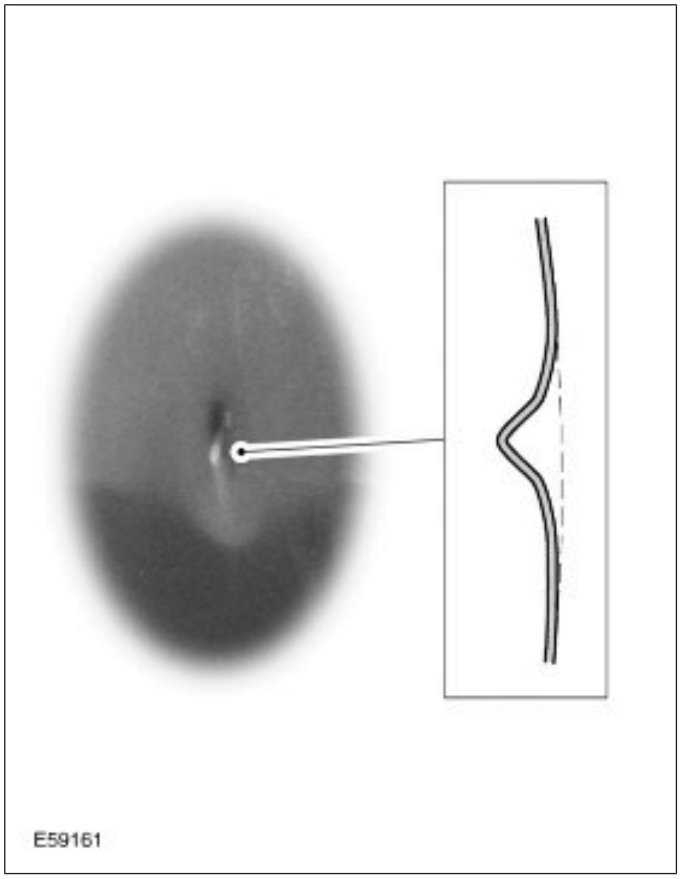
Mild dent



Satisfactory repair results are only possible on mild dents with little depth and small deformation radii. Therefore this repair method is particularly suitable for hail, parking and transportation damage.

Dent with material stretching

DESCRIPTION AND OPERATION



If strong and direct force during the damage process causes the material to stretch in the middle of a dent, then the result is a small and sharp edged dent. Such damage cannot be rectified without visible deformation.

Advantages of a planishing technique:

- Economical in time and materials
- The original paint is retained
- Environmentally friendly (no sanding or painting work)

While carrying out the repair, the following itemized repair route and process flow must be complied with:

1. Damage diagnosis
2. Repair preparations
3. Perform repair
4. Paint finishing, corrosion protection and quality control

In order to ensure corrosion protection, all inner areas of the repair must be treated afterwards. Where it is possible, the paint is repaired. In every case the inner area of the repair must be treated with cavity wax.

DESCRIPTION AND OPERATION

Joining Techniques

Welding

Before welding work is performed on a vehicle body, all safety measures for the protection of people, modules and electrical components must be observed.

NOTE: Before beginning the work, please refer to the safety instructions and warnings in the chapter Safety Instructions. Please also note the warnings of the respective equipment manufacturer.

Resistance spot welding and MIG welding are the most common techniques used in body construction. During repair work, the welded connection must be restored to be equivalent to the original.

Resistance spot welding.

NOTE: Before starting the work, please refer to the chapter on safety instructions.



In doing so, the repair welds must match the standard of those produced in production in number and diameter.

Preconditions for resistance spot welding:

- The panels to be welded overlap.
- The weld spot is accessible on both sides for the electrodes.
- The shape and alignment of the weld electrodes is correct.
- The resistance welding equipment is powerful enough to be able to reproduce the production spot weld diameter.

NOTE: The welding equipment settings and the adjustment of the individual parameters are to be made in accordance with the device manufacturer's specifications.

Well-prepared welding flanges are a prerequisite for a problem-free welded joint. This means:

- The welding flanges must lie perfectly flat to one another.
- The welding flanges must be clean and free of oil or grease on both sides.
- Welding primer (zinc-coated and conductive) must be applied as corrosion prevention.

DESCRIPTION AND OPERATION

Only in limited cases can welding errors in resistance spot weld joints be detected from the outside . Therefore, a test weld should be carried out before each repair weld. The peel test carried out after the welding gives information on the quality of the welding. The spot weld must not flake off.

MIG welding

Basically, three methods of MIG welding are used:

- Puddle weld.
- Continuous bead welding
- Intermittent bead welding

Fields of application

- Any joins that are MIG welded in production must also be replaced by MIG welds.
- Puddle welding may be used in certain cases, if there is insufficient access.
- If the overall panel thickness is greater than 3 mm, without correspondingly powerful spot welding equipment, puddle welding should be used.
- When dealing with any MIG brazed joints which are present, follow the vehicle-specific repair instructions.

NOTE: The increased application of heat during MIG welding destroys the corrosion protection layers over a much larger area than during resistance spot welding. For this reason, greater care must be taken when applying the corrosion protection afterwards.

Welding repairs can only be carried out properly if the equipment is set up correctly and all welding-related preparations are complied with accurately.

- Please note the instructions of the respective welding equipment manufacturer.
- The hose assembly must be untwisted.
- The core must be free from particles of wire debris.
- The gas and current nozzles must be free of slag and scale residue.
- Pay attention to the quality of the welding wire and the gas flow rate.
- Ensure that the joint surface is perfect.
- Prepare a bare metal joint surface.
- Maintain the correct gaps (root formation).
- Produce a test weld.

Plug Weld



DESCRIPTION AND OPERATION

Special features to note when puddle welding:

- The panels to be joined must lie perfectly flat to one another.
- The panel flanges must be treated with corrosion protection. The position of the weld must be bare.
- Prepare the holes depending on the thickness and number of the panels. The hole size should be 6-10 mm, or match the original weld spot.
- Start the welding procedure on the panel at the bottom so that the hole is filled completely.

Continuous bead welding

A welded joint with a full seam is suitable for joining highly profiled body parts. Pillar and sill areas are typical application areas.



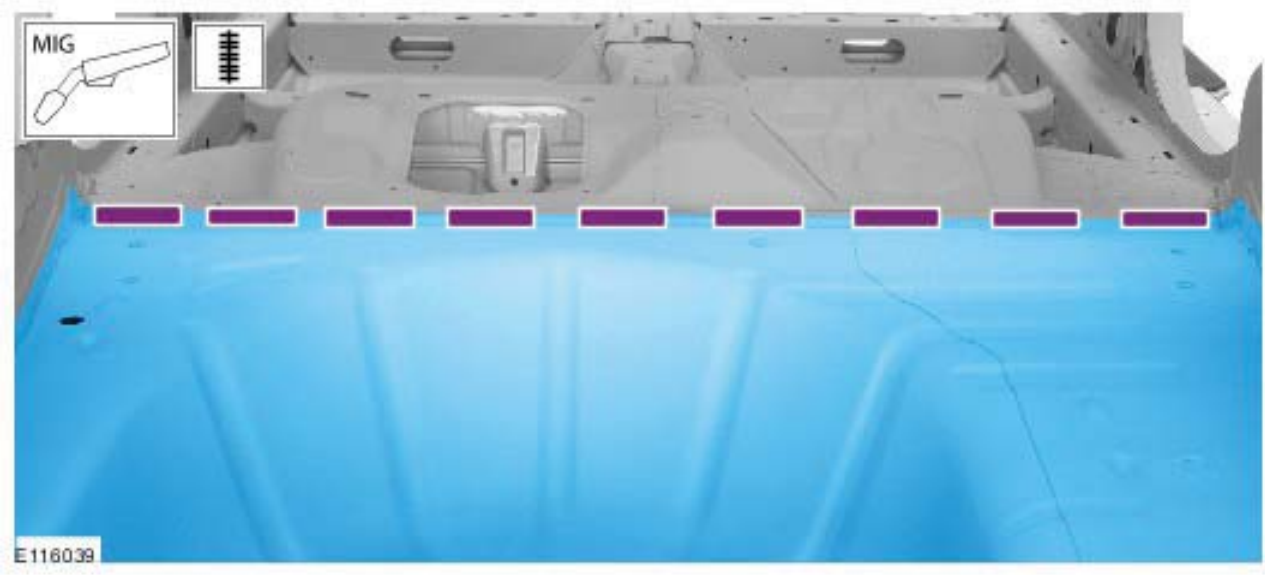
Special features to note during bead welding:

- Both parts of the panel must be bare on both sides over a width of 5 mm.
- Align the parts precisely with clamps.
- To prevent the panel from warping, tack longer joints before welding them.

Intermittent bead welding

Intermittent bead welding is used when the connecting flanges are stepped. This form of seam is mainly used on the external panel area for sectional repairs.

DESCRIPTION AND OPERATION

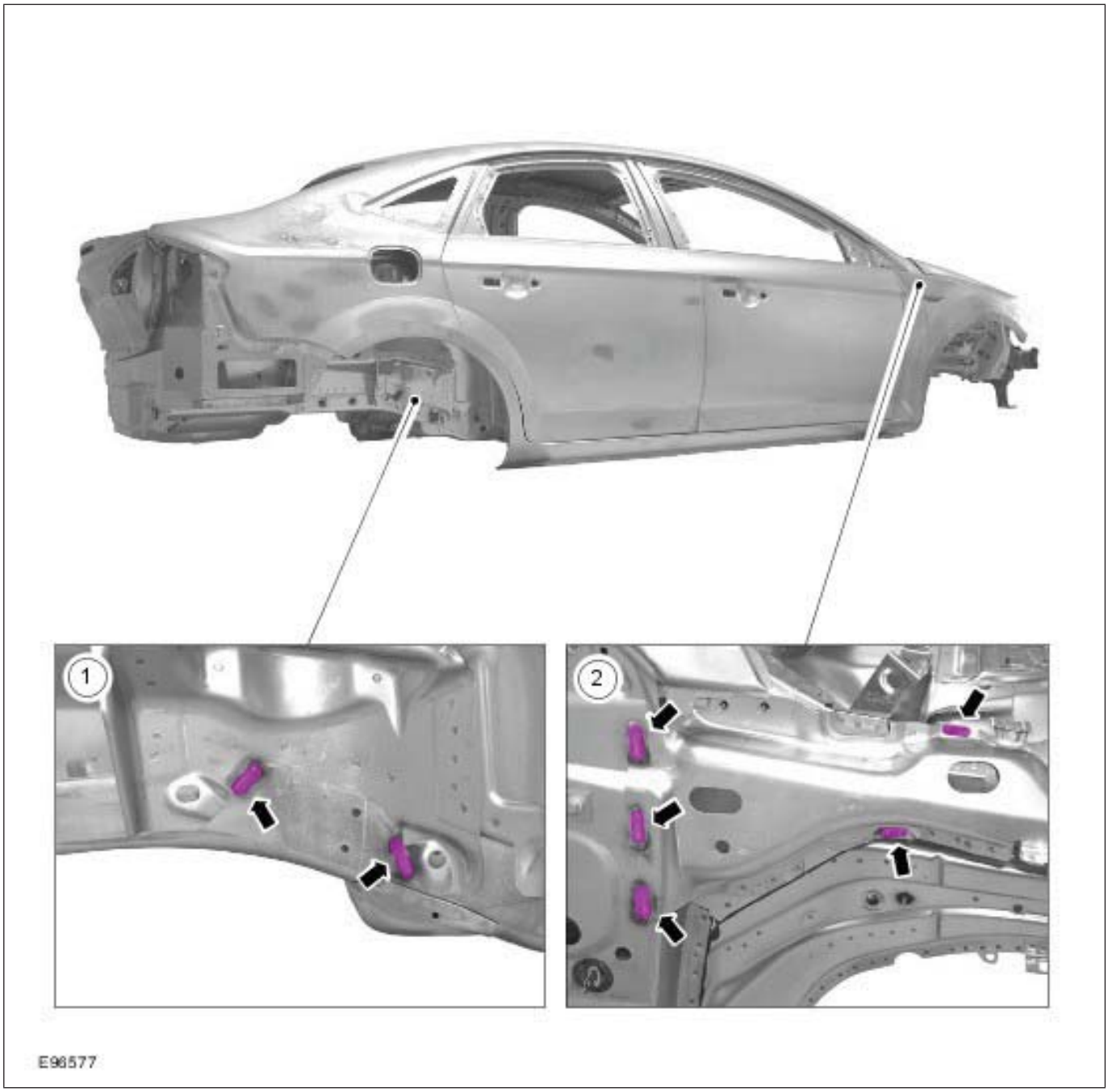


Special features to note when intermittent bead welding:

- Weld gap.
- Spot weld interval.
- Apply alternate tack welding across the entire length of the seam. This keeps warping to a minimum.

DESCRIPTION AND OPERATION

MIG brazes



Description	Description
1	Rear side member / wheelhouse reinforcement
2	Apron panel reinforcement / A-pillar

Metal Inert Gas (MIG) brazing is increasingly used in production for certain body areas.

In areas where resistance spot welding is not possible due to limited space or higher strength requirements, MIG welding was previously used.

Increasingly, these MIG welded seams are being replaced by MIG brazes. The temperature range used during MIG brazing is significantly lower. This keeps the damage to the anti-corrosion zinc layer on zinc-coated panels to a minimum.

This results in the following advantages of the MIG brazed seam:

DESCRIPTION AND OPERATION

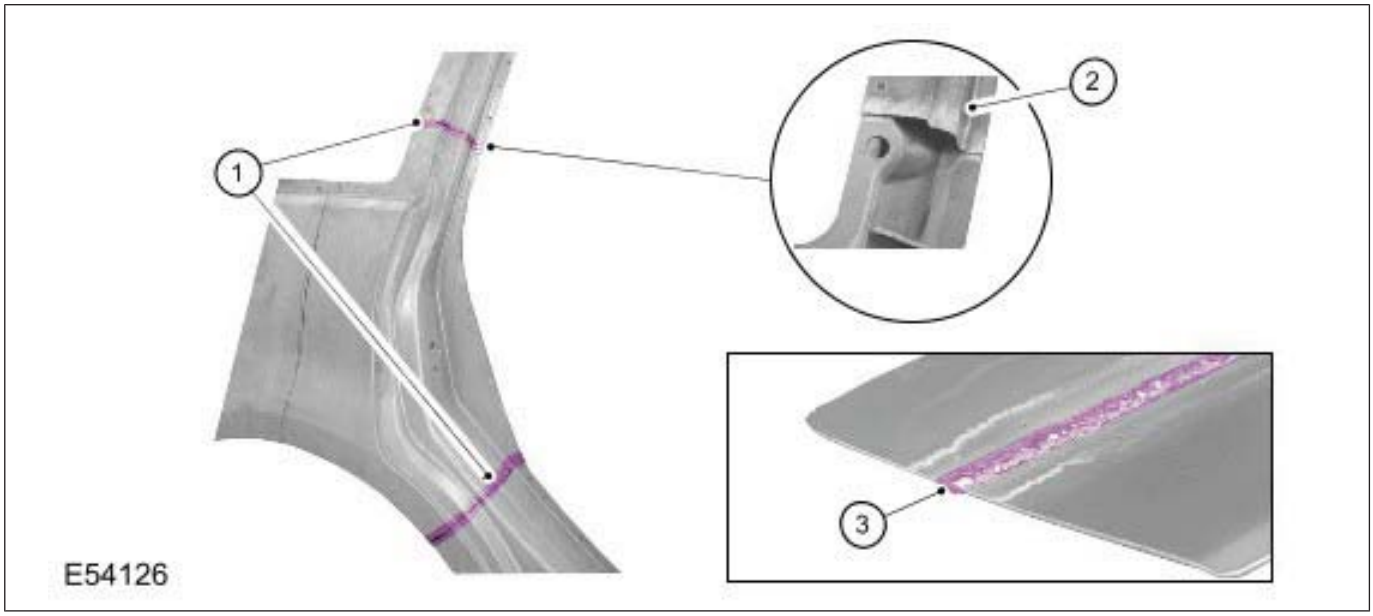
- No corrosion of the brazed seam.
- Low erosion of the zinc coating in the joining area.
- Low level of heating and thus little warping.
- Easy finishing of the brazed seam.
- Good for bridging gaps.

NOTE: MIG welds must not be carried out on or near existing MIG brazed seams as even the smallest amount of brazing solder can result in a reduction in the strength of the weld seam.

MIG brazing requires a new generation of welding equipment and training in the technique.

Joining techniques

Butt joints



Description	Description
1	Join areas
2	Profile
3	Full seam

The butt joint is a joining technique frequently used in body repairs. The butt joint is typically used for repairs in the pillar and rocker panel area.

Areas that are suitable for the use of the butt joint:

- short seam lengths.
- highly profiled structures.

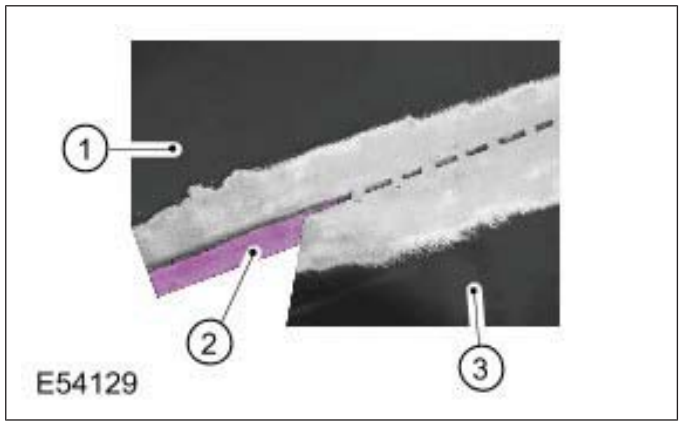
The edges of the panels to be joined are placed against each other and are joined with a full seam in whilst maintaining a required welding gap (welding gap same as panel thickness).

NOTE: The butt joint requires a high degree of accuracy and care when trimming and cutting. For correct execution of the welding, an exact, even welding gap must be maintained.

Preparation of the joint areas includes:

- Sanding the connection areas bare on both sides.
- Removal of the zinc layer in the welding area.
- Carrying out welding tests on an equivalent sample panel before the actual welding, if necessary.
- Tack welding in the join area: From the edges to the centre, then check the shape.
- Joining new and old parts with a full seam weld.

Joggled joint



DESCRIPTION AND OPERATION

Description	Description
1	Body part
2	Joggled area
3	New panel

The joggled joint variant is restricted to body areas with a good surface condition without beads/swage lines or profiles. A sectional replacement with a joggled joint is welded using a continuous seam. This procedure is used, for example, at the transition from the side panel to the rocker panel (3-door vehicles).

When cutting the new part, slight measuring tolerances are permitted, as these are covered by the joggled area.

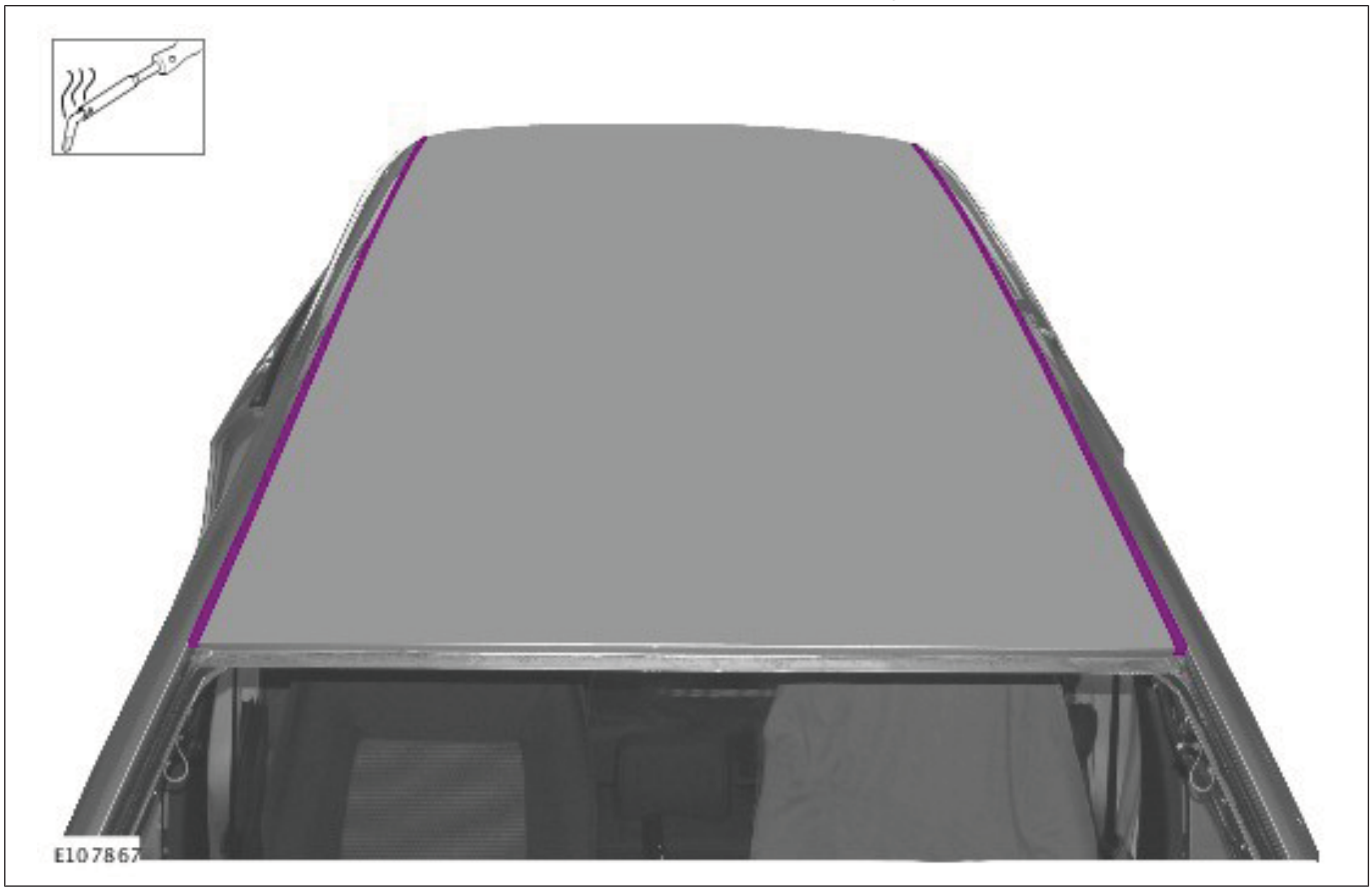
Preparation of the joint areas includes:

- Sanding the connection areas bare on both sides.
- Removal of the zinc layer in the welding area.
- Preparation of a joggled strip.
- Carrying out welding tests on an equivalent sample panel before the actual welding, if necessary.
- Joining the new and old panel with continuous seam welding.
- Lead loading the weld seam.

Soft soldering

WARNING: The roof repair may only be carried out in Ford-approved special workshops and only by specially trained personnel.

NOTE: The roof is secured to the side walls with laser soldered seams in production. When repairs are carried out, these laser-soldered seams must be replaced by soft-soldered seams.



WARNING: Poisonous gases and dust can be produced when working solder. Use an extraction unit and, if required, a protective mask.

NOTE: Ford offers basic and in-depth training on the following topics.

NOTE: Areas for soft soldered joints require careful preparation. It is extremely important that the joint

DESCRIPTION AND OPERATION

surfaces are exactly aligned and that a bare metal joint surface is prepared.

This means:

- Thorough cleaning of the surfaces to be brazed.
- Close contact of the panels at the brazing position.
- Use the soldering iron to warm the location of the seam to be joined.
- The liquid brazing material is drawn between the panels through capillary action.

Rivets

With riveting, two or more panels are joined together using a joining element (rivet). In body construction, pop rivets and punched rivets are used.

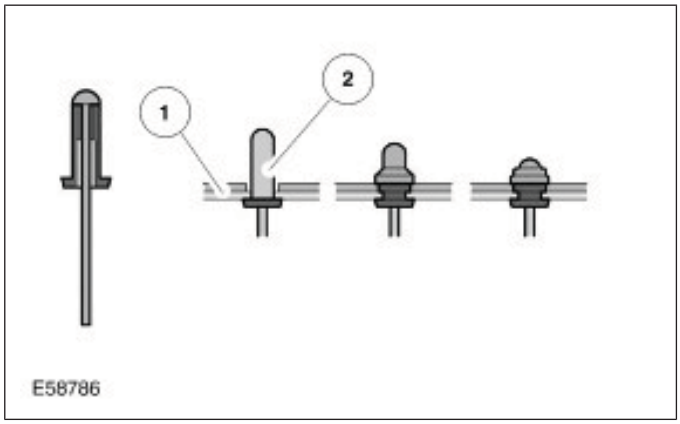
Advantages of riveted connections:

- Metallic and non-metallic materials can be joined together.
- Different thicknesses of materials can be used.
- The material does not have to be heated, and therefore does not warp.
- Low level of preparation required.

NOTE: For detailed instructions on the procedure, please refer to the equipment manufacturer's operating manual.

Disadvantage:

- During dismantling procedures, swarf/rivet remains can fall into inaccessible cavities, which can lead to rattling and rusting.



Description	Description
1	Panels
2	Pop rivet

Pop rivets are used if only one side of the panel is accessible. In this process, overlapping panels are drilled and connected with a pop rivet.

Pop rivets can be inserted pneumatically, hydraulically or manually with rivet guns.

Bonding



Description	Description
1	Butt joints
2	Bonded connection

Bonded connections are used more and more in modern body designs. Here, a distinction is made between bonds for stabilization purposes and bonds for adhesive strength. Bonds for stabilization purposes are found on clinched flanges and on cross beams in doors or on the roof.

WARNING: Risk of poisoning! Adhesive can be harmful to health. Ventilate rooms well and use breathing protection. Where possible, work with an extraction unit.

DESCRIPTION AND OPERATION

NOTE: Adhesives are chemical products and are subject to the safety regulations of the manufacturer.

Please refer to the specifications in the general part of the particular manual for information on the repair adhesive which is to be used.

Advantages of glued joints:

- They are air and watertight.
- High corrosion protection
- Different materials can be connected.
- Bonding can be combined with resistance spot welding.

NOTE: The quality of the bonded connection is largely dependent on the care taken during preparatory work. When gluing bodywork parts, follow the work instructions from the adhesive manufacturer.

Bonding and welding

On some vehicle models, (such as the Ford Ka), bonding is combined with resistance spot welding. This connection technique has the following advantages:

- Tight, anti-corrosion connection seam.
- High strength due to additional resistance weld spots.

Please note the following points during the repair work:

- Only use adhesive suitable for welding (conductive).
- Carry out resistance spot welding on the connection flanges before the adhesive hardening process.
- Carry out test welding with the adhesive applied.
- If MIG welding is carried out during a sectional repair on a connection flange with adhesive material, the adhesive material must be applied at a distance of approx. 10 mm from the weld spot.

Bonding and riveting

As with welding, bonding can also be combined with riveting. This connection technique has additional advantages. These are:

- Metallic and non-metallic materials can be joined together.
- Different thicknesses of materials can be used.
- The material does not have to be heated, and therefore does not warp.
- The rivet connection stabilizes the connected components during the adhesive hardening phase.

DESCRIPTION AND OPERATION

Plastic Repairs

General

The proportion of plastics used in vehicle construction continues to rise. Up to now damaged plastic components often had to be replaced. These days, plastic repairs are becoming more and more widely accepted because of the increasing cost of spare parts.

NOTE: Plastic adhesives are chemical products and are subject to the safety instructions of the manufacturer.

In repair work, the material properties of plastics are highly significant. There are two main groups:

- Thermoplastics.
- Thermosets.

NOTE: Elastomers make up a third group of plastics. These are not mentioned below because they have no plastics repair applications.

Thermoplastics

Heat causes thermoplastics (also called TP polymers) to transform from the solid state into the thermoelastic state and then into the thermoplastic state. When thermoplastics are cooled, they return to solid state.

Brief description	Plastic
ABS	Acrylonitrile butadiene styrene copolymer
PA	Polyamide
PC	Polycarbonate
PP	Polypropylene
PP/EPDM	Polypropylene/ethylene propylene diene copolymer
PC/PBT	Polycarbonate/polybutylene terephthalate
Hard PVC / soft PVC	Polyvinylchloride

Thermosets

Thermosets (also called TS polymers) are much harder and more brittle than thermoplastics. Their strength remains largely unchanged when they are heated. Thermosets are destroyed when heated above the critical temperature. Also, the original state will no longer be restored on cooling.

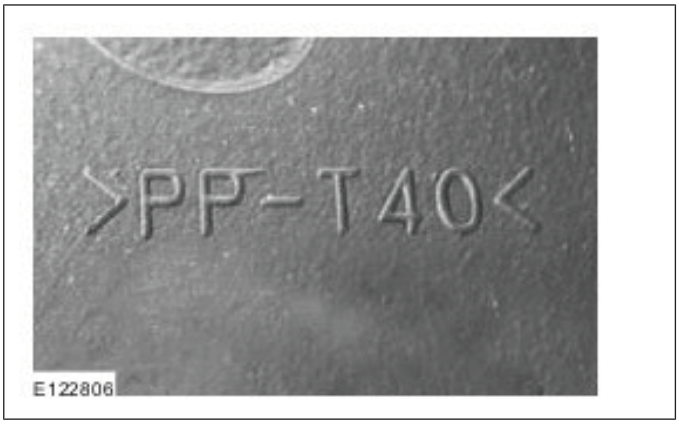
Brief description	Plastic
GRP	Glass reinforced plastic
PUR	Close-meshed cross-linked polyurethane
PUR	Wide-meshed cross-linked polyurethane

Plastic identification

Normally the appropriate identifier is marked on the plastic components used in vehicle construction.

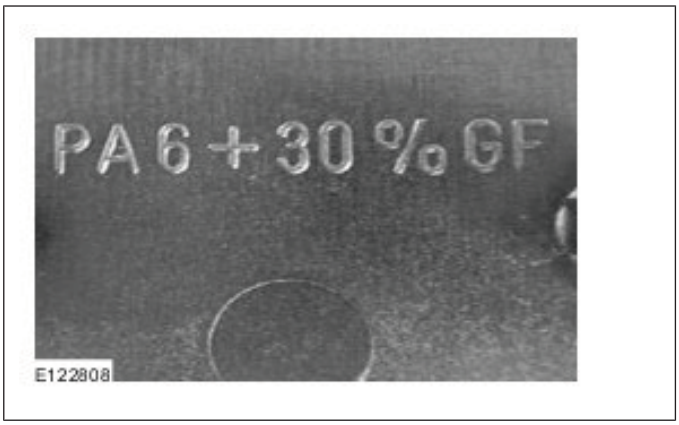
The capital letter sequences used for this are standardized in DIN EN ISO 1043-1 and DIN ISO 1629 (for rubber) and can be looked up in the tables which they contain. In addition the string of characters provides information about the exact mixture ratio and the proportion of certain fillers.

Examples of the identification of plastics



DESCRIPTION AND OPERATION





NOTE: The identification of the type of plastic is necessary for the plastic welding process in order to determine the correct welding rod (welding material) to use.

If an identifier is missing or cannot be made out, the following easy to perform tests will help:

Visual Inspection

Visual inspections mainly serve to identify PUR and GRP materials. Thermoplastic components are often painted and are therefore difficult to identify.

Identification characteristics:

- When PUR cracks or similar damage occurs, pores of foam can be seen.
- GRP can be recognized by the glass fiber structure on the inside.

Mechanical test:

The plastic group can be determined by a sound test:

- Degree of hardness - the higher-pitched the sound, the harder the plastic.
- Elasticity - the more muffled the sound, the higher the elasticity of the plastic.

Sanding test

In this a place is chosen which will not be visible later, and the finger belt sander is used to sand the plastic.

The plastic group can be determined using the pattern of the dust:

- Thermosets produce a white dust.
- Thermoplastics smear and do not produce dust.

Float test in water:

Take a small piece of plastic from the component to be repaired and test whether it floats on water (PP-EPDM, HD-PE, PP) or sinks (PVC/U, PVC/P, ABC, PC).

Nature of the surface

The surface of plastics can be categorized as rigid (PVC-U, PVC-P) and waxy (PP/EPDM, HD/PE, PP).

Adherence test using welding rod

Heat a welding rod that is identified with the type of material and the plastic component using the hot air gun. Press the welding rod onto the plastic component to be welded. When the welding rod cools down, if it remains stuck to the component or can only be removed with great difficulty, then it can be assumed that the two are made of the same plastic. When pulling away from PP/EPDM, HD/PE and PP, this can lead to strings.

CAUTION: Danger of poisoning! When burned, most plastics release vapors harmful to health. Ventilate the room well and use respiratory protection. Where possible work using an extraction system.

Burning test

Every plastic has a characteristic behavior and smell when burned. Using a knife, cut off a small piece from the component to be repaired, remove any dirt and paint residues and set light to the small chip. Now observe the burning behavior. Compare the color, type and smell of the smoke with the results from the following table.

Short description	Plastic recognition using a burning test
ABS	Blackish smoke, the material drips like a candle when burning and smells like wax.
PA	No smoke, draws filaments, smells like burnt horn.

DESCRIPTION AND OPERATION

Short description	Plastic recognition using a burning test
PC	Yellowish, sooty smoke. Smells sweetish.
PP	No smoke, the material drips like a candle when burning and smells like burnt oil.
PP/EDM	No smoke, the material drips like a candle when burning and smells like burnt oil.
PC/PBT	Hard and shiny, burns yellow, fluffy soot.
Hard PVC / soft PVC	Blackish smoke and acrid smell.

Safety instructions

In addition to the general safety instructions, the relevant regulations and accident prevention legislation must be observed.

NOTE: Without exception, before starting work you must read the safety and warning instructions in the chapter "Safety Instructions". In addition, pay attention to the warning instructions of the particular equipment manufacturer.

Information sheets, safety notices and guidelines for the processing of adhesives containing isocyanate, polyester resin, adhesives, solvent and thinners provide more details on their use.

The following instructions must always be followed:

- Polyester resin, adhesive, solvents and thinners are inflammable and must not be used near naked fire or flames.
- Sawing and grinding operations must only be carried out in rooms equipped with extraction systems.
- If no rooms with extraction systems are available, only use tools with extraction equipment.
- Protective equipment such as gloves, protective goggles, aprons and breathing masks are essential.

Because of the various compositions of plastics, repair work to plastic parts involves a variety of repair methods.

The following methods are used:

- Thermoplastic straightening.
- Plastic welding.
- Plastic adhesive bonding.
- Plastic lamination techniques.

Thermoplastic straightening

Damage to thermoplastics can be rectified by heating using the hot air gun (temperature about 100°C) while the deformation is pressed out until the shape is regained.

Plastic welding

Splits formed in plastic bumpers are typical possible plastic repairs.

NOTE: Do not carry out plastic welding in the area of fixed foam backing. The foam backing will usually be destroyed and the function of the component is then no longer guaranteed.

If repair using adhesive methods is not possible because of unfavorable conditions at the rear of the repair location, plastic welding is a possible repair process.

There are two methods of welding: hot air draw welding and hot air fanning welding.

Plastic welding set



Item	Description
1	Various welding rods
2	Scraper (heart-shaped)
3	Hot air blower (approx. 1500 W)
4	Clamps
5	Welding nozzles

In addition to the components listed, plastic welding requires tools already found in the workshop such as scrapers, sanders, face cutters etc.

DESCRIPTION AND OPERATION

As with all other welding processes, only certain material combinations can be joined together using plastic welding.

NOTE: Basic and in-depth training is offered on the following topics. You will find an overview of the complete range listed in the Training brochure published by the Ford Service Organization.

NOTE: The manufacturer's data must be taken into account when choosing welding materials and the correct temperature setting of the hot air gun.

Repair sequence during plastic welding:

- To prepare the location for welding, remove paint residues and sand the weld area.
- If parts of the material have been pushed in by an impact, the damaged area can be brought back to shape by heating.
- Drill out the ends of the split to stop it spreading further. Machine the location of the weld into a 90° V-shaped groove, to accept the welding rod.
- Lay the welding rod in the groove.
- Perform the welding. Hot air draw welding or hot air fanning welding.
- Rework the weld seam. After cooling, sand the raised weld seam.
- Clean the sanded repair surface using plastic cleaner. Apply plastic primer thinly to the repair surface and paint it.

Despite good preparation and the correct choice of welding materials, weld faults may occur.

The following points must be noted when welding plastic:

- Weld together like with like:
  - With very few exceptions, only the same materials can be welded together, e.g. PP with PP.
- Correct temperature:
  - The correct choice of temperature is important for the success of the repair. The plastic must be warmed until it plasticizes (dough-like, soft).

Guideline values for welding temperature:

Brief description	Plastic	Temperature
ABS	Acrylonitrile butadiene styrene copolymer	360°
PA	Polyamide	400°
PC	Polycarbonate	370°
PP	Polypropylene	280°
PP/EPDM	Polypropylene/ethylene propylene diene copolymer	280°
PUR	Polyurethane	300°
Hard PVC	Polyvinylchloride	340°
Soft PVC	Polyvinylchloride	370°

- Even pressure:
  - When rod welding, the pressure is applied by pressing on the welding rod.
- Steady speed:
  - To achieve a good weld, care must be taken that the working speed is steady.

Possible causes of weld faults:

- Deformation caused by overheating of the repair area or tensions in the material while welding the component.
- Plastic material too thin.
- Poor weld joint because the weld temperature was too low or the welding speed was too fast.
- Welding different materials together.
- Weld seam dropped because the split gap was too wide or the welding temperature was too high.

A good weld is recognized by a slightly raised, smooth and even weld bead on the surface of the component.

The weld bead must only be worked once it has fully cooled down.

Plastic adhesive bonding

Adhesive bonding of plastics has some advantages over welding methods:

- Within the group of thermoelastic plastics, all semi-rigid ancillary components (such as bumpers, front grilles, etc.) can be repaired without identification.
- A two-component polyurethane based adhesive is used for all thermoplastic parts.
- Reinforcement strips can be attached behind splits (split length up to max. 100mm) and

DESCRIPTION AND OPERATION

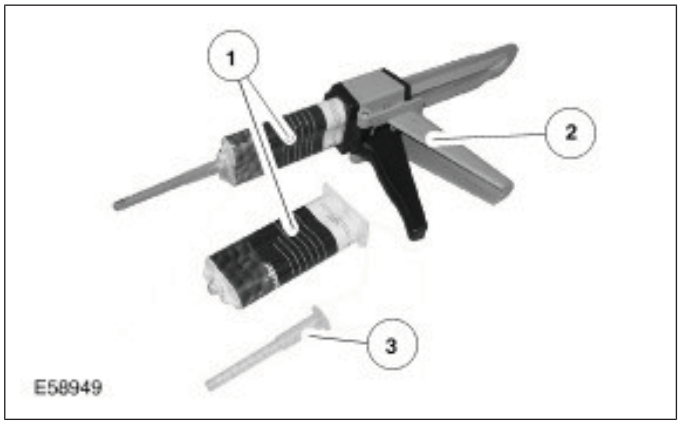
openings to ensure the original strength properties.

Tools and equipment also familiar from paint repairs can be used in making adhesive repairs to thermoplastic components.

Angle grinders and belt sanders can be used to grind out scratches and splits. Orbital sanders with extractors are used for fine sanding.

The infrared heater is used to provide fast and certain drying throughout.

Plastic adhesive set



Item	Description
1	2-component adhesive
2	Cartridge gun
3	Mixing tube

Apart from the components shown, other materials may be needed to bond plastics, depending on the repair position.

For large scale repairs, it may be necessary to insert reinforcement panel strips and reinforcement matting as fixing aids.

Repair sequence during plastic adhesive bonding:

NOTE: Follow the manufacturer's guidelines when using adhesives.

- Prepare the location of the bond. Remove paint residues and sand the area to be bonded. Drill out the ends of the split to stop it spreading further. Prepare the bond location into a V-shape and clean it with plastic cleaner.
- Apply the adhesive. The two-component adhesive is applied to the cleaned and primed repair location using a hand gun. Spread and smooth the adhesive using a flexible plastic spatula.
- Rework the bond location. After cooling, sand the raised adhesive. Clean the sanded repair surface using plastic cleaner. Apply plastic primer thinly to the repair surface. Apply paint.

GRP repairs

GRP material is hard and brittle in its strength properties. Because of these material properties, splits and openings often result in cases of serious damage.

The stability of GRP parts is impaired if the glass fiber reinforcement is cracked. The component must be replaced in cases of serious damage that affect the structure.

Minor damage (such as abrasion, splits up to 80mm, holes up to approx. 60mm diameter, etc.) can be repaired to a technically and visually perfect standard, provided that the damage does not occur in heavily used or hard-to-reach areas.

To ensure perfect repair results, observe the following points:

- The room temperature should be at least 15°C and the air should be as dry as possible.
- The repair location must be thoroughly dry and clean.
- Before the repair, the GRP part being repaired must be dried using an infrared heater or in a drying oven.
- In cases of large splits and fractures, the strength of the outer skin can be re-established by backing with a reinforcement material.

Tools and equipment from the paint shop can be used to carry out repairs to GRP parts. Angle grinders and belt sanders can be used to grind out scratches and splits. Orbital sanders with extractors are used for fine sanding.

GRP repair set



DESCRIPTION AND OPERATION

Item	Description
1	Polyester resin
2	Glass fiber mats
3	Hardener

Scissors, paintbrush and cleaning materials are other materials which will be needed to perform a GRP repair.

NOTE: Follow the manufacturer's instructions when using the repair materials.

The repair process for a GRP repair is as follows:

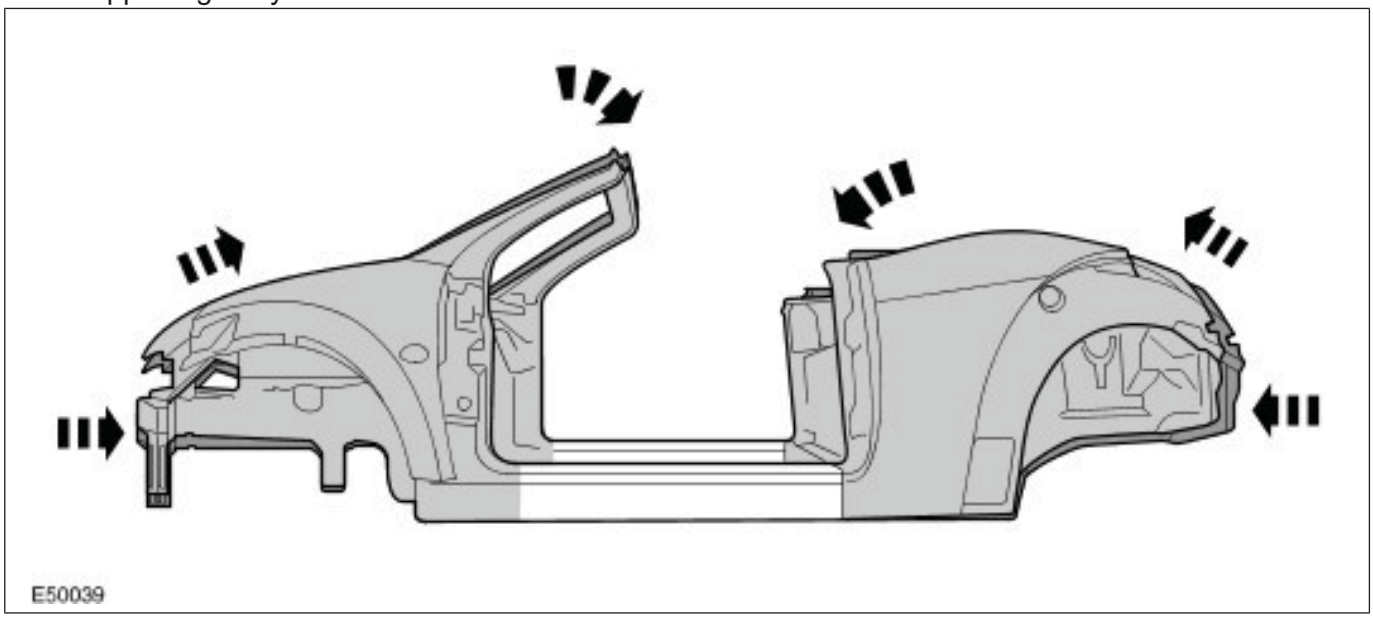
- Prepare the repair location. Remove paint residues and sand the repair area.
- Drill out the ends of the split to stop it spreading further.
- The repair location must be sanded by hand. If machine working is attempted, the resin will be heated so much that the surface structure will be changed. The result is inadequate adhesion.
- Perform the GRP repair. Apply polyester resin thinly to the repair location. Lay the glass fiber mat in place and apply polyester resin over it again.
- Rework the location of the repair. Sand away any polyester resin which stands proud after it has hardened.
- Clean the sanded repair surface using plastic cleaner. Apply plastic primer thinly to the repair surface and after it has dried apply the paint finish.

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Special Repair Techniques

Cabriolet vehicles

The body of a cabriolet vehicle is different to the self-supporting body of a saloon car because of the special roof construction (folding top). The stability requirements must therefore be ensured by construction changes within the body structure.



These are for instance:

- Longitudinal and torsional reinforcing components which compensate for the lack of the roof.
- Reinforcements to the floor assembly, particularly in the rocker panel area.
- Reinforcements in the pillar areas.
- High-strength and ultra-high-strength steel panels with single panel thicknesses of up to 2.5 mm, which in combination can become up to 6mm thick (e.g. reinforcements in the floor area, rocker panels).

If deformation to load carrying components occurs, the stability of the whole body shell can be adversely affected.

On a cabriolet, accident damage repair to the components mentioned above is considerably different in certain aspects compared with the usual repairs (closed body construction):

- A model specific alignment angle system must always be used during straightening and repair work, securing using clamps at the rocker panel area is not always adequate for the cabriolet.
- To avoid damage to the doors, they must always be open during straightening work. In the case of more severe damage, additional tension and compression spindles must be used to stabilize the door cut-outs (between the A- and B-pillars).
- In load bearing areas such as the rocker panels, side members and floor pan, increased straightening forces are necessary due to the additional reinforcements.
- **NOTE:** Additional information on welding can be found in the section Welding Equipment and Joining Techniques.

  High-power welding equipment for panel thicknesses in overall combination of up to 6 mm total material thickness.
- The fitting accuracy and longitudinal rigidity of the affected component is especially important to ensure that the doors, door windows and the roof fit and close correctly.

Liquefied gas vehicles

Alternative fuel vehicles often require special handling in the workshop area. Above all, assembly operations to some extent require particular

DESCRIPTION AND OPERATION

knowledge when dealing with the special technology and the safety regulations.

NOTE: Only fully trained personnel are permitted to work on alternative fuel vehicles.

These special requirements must be understood and taken into account in the body shop as well.

CAUTION: Danger of fire and explosion. The safety instructions must always be followed when performing service work on fuel/gas systems. Failure to follow these instructions may result in personal injury.

NOTE: You will find further information about working on liquefied gas vehicles in the section Health and Safety Information.

Refrigerated conversion vehicles

Apart from the special materials used in building the structure of the refrigerated compartment, such vehicles have special energy and refrigeration systems which require special handling during repair.

CAUTION: Danger of injury. Work on the 230<SP>volt system of the refrigeration equipment must only be carried out by trained specialist personnel.

NOTE: Work on the refrigerant circuit may only be performed by persons who have a relevant certificate of competence.

Vehicles with a refrigerated compartment are often used to transport foodstuffs. For this reason, additional hygiene regulations must be complied with during repair work.

Aluminum and plastic are used to construct the two different types of compartment found on refrigerated vehicles.

The aluminum conversion is a very stable and technically perfect variant. However, against this the relatively high production costs and a lower payload must be taken into account, because of the weight of the aluminum conversion itself.

NOTE: Basic and in-depth training is offered on the following topics. You will find an overview of the complete range listed in the Training brochure published by the Ford Service Organization.

The plastic conversion has developed into a light, clean and economical alternative because of constant further development of materials and working techniques.

NOTE: The material combinations, the workmanship and the working methods must comply with the current food hygiene regulations. For this reason, service and repair work on the refrigerated conversion may only be performed by authorized and specially trained technicians.

Refrigerated compartment constructions are often made using both materials. The floor pan is made of structured, slip-proof aluminum panels and the wall and ceiling cladding is made of smooth surfaced plastic elements.

CAUTION: PUR hard foam is flammable. If PUR hard foam is overheated, it will burn on its own with a brilliant yellowish flame. It produces unpleasant choking and toxic fumes. Special measures must be taken when welding the vehicle body.

Polyurethane wall and ceiling elements are manufactured using a sandwich principle. An insulating polyurethane core is coated with food grade ABS plastic on one side.

PUR hard foam does not decompose, is rot resistant and is odorless. These properties make it suitable for use as insulation.

Because of its closed cell structure, water uptake by PUR hard foam is for the most part only a problem at edges. Cut edges or other mechanically worked surfaces must however be sealed with the greatest care.

The conversion to a refrigerated vehicle is performed as made-to-order production. The large surfaces of the wall and ceiling cladding can be changed and are particularly easy to repair.

If access to the back of a body panel section is needed because of body straightening work, in some circumstances it is cheaper to perform a cut-out repair instead of removing an element.

The repair process is fully described in the Student Information booklet Refrigeration System Technology, Transit 2000.5 Freshline.

NOTE: You will find further information about working on vehicles with a refrigerated compartment in the section Health and Safety Information.

DESCRIPTION AND OPERATION

Impact of Insufficient Repair Quality

Body repairs usually require a significant level of intervention in the existing body shell structure. The corrosion protection, seals and NVH components are destroyed and must be replaced.

To prevent the vehicle quality from being reduced due to a poor quality repair, all repairs carried out in all repair sections must be inspected during and after the accident repair.

Simply checking the vehicle at the time of delivery is not sufficient to guarantee the repair quality. Rather, continuous checking of the work carried out is recommended.

NOTE: Logs of the acceptance of individual operations are a useful tool for quality assurance. A comprehensive final inspection can be carried out based on a final acceptance log.

In the process, the entire repair sequence must be split into meaningful sections, with the creation of check points to which particular attention must be paid.

The following are some possible sections:

- During and after body work.
- Final assembly, ancillary components, functional tests.
- Vehicle delivery.

NOTE: The following points offer an indication of possible test logs. They can be combined and supplemented differently, depending on the individual operating procedures.

During and after body work the following areas should be checked:

After completion of the body repairs, the following areas should be checked:

- Manufacturing inspection for functionality and originality in the accident area.
- Check snug fitting of metal panel parts (welding and screw connections).
- Check snug fitting of ancillary components (doors, hoods, glazing).
- Check surface condition of the welded seams.
- Check seals, blanking plugs, NVH components.
- Check corrosion prevention measures
- Check that the repair work is in the correct condition for painting.

Final assembly, ancillary components, functional tests

After final assembly, not only a visual inspection is required, but also the functionality of many components must be checked:

- Check repair area for originality.
- Check ancillary components for correct installation.
- Check precision fitting of all parts.
- Check that the doors and flaps are working correctly.
- Check that all mechanical parts, such as the window winder are working correctly.
- Check for leaks in the repair area.

Vehicle delivery

Vehicle delivery again offers the opportunity of checking the repair quality. In the process, the following points are to be checked again:

- Corrosion protection, sound damping matting and rubber seals.
- Check for traces of leftover paint.
- Check the cleanliness of the vehicle.
- Functional check of the mechanical and electrical components.
- Road test the vehicle.
- Check for noise, vibration and harshness (NVH).
- Check for wind noises.

After repair work on the body and vehicle, not only the visual restoration of the damaged vehicle, but also the functional restoration must be guaranteed.

Customers are making increasingly high demands of vehicles, particularly in terms of driving comfort. Customers find noise, vibrations and harshness (NVH) as well as squeaking and rattling annoying, particularly after repair work. It is therefore important that the condition of the vehicle at the time of production be restored after an accident repair.

After body repairs, the entire repair area must be checked for any water leaks. It is crucial that a leak test be carried out as part of the final inspection so that water leaks can be detected and eliminated even before delivery of the vehicle to the customer.

The requirements of the vehicle manufacturer are to be taken into consideration during all inspections. Only in this way can it be guaranteed

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that the vehicle quality is not reduced through insufficient repair quality.

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Water Leaks

Water leaks can occur after body repair work, but can also occur on new vehicles. The test methods described below allow the various causes to be identified. In all cases, a systematic and logical procedure is required to locate water leaks.

General

When searching for faults, it must be taken into account that water can enter the vehicle passenger compartment in various ways and circumstances. Therefore, it is sometimes not sufficient to perform a water test on a stationary vehicle.

Before beginning extensive checks, a thorough visual inspection must be carried out. The following points are to be taken into account in the process:

- Check the clearance and accurate fit of ancillary components such as the trunk lid and doors.
- Check for correct installation and possible damage to sealing elements such as blanking plugs, seals and rubber door seals.
- Check that the water runoff openings and pipes are free of obstructions

Test method

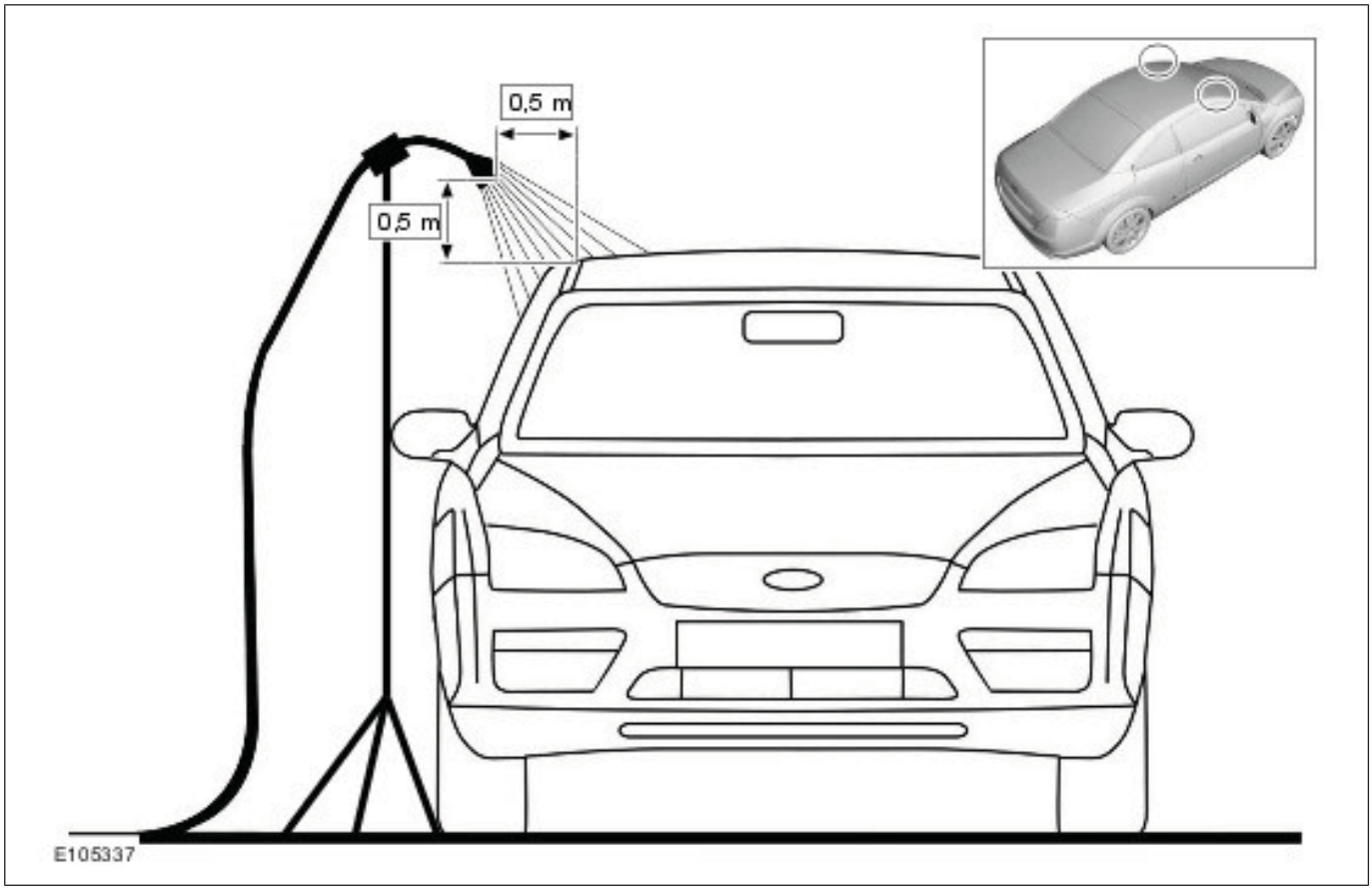
Water test

NOTE: Do not use a power washer. Use a normal garden hose with a spray nozzle or sprinkler head. Make certain that all windows and doors are completely closed.

Water leaks into the vehicle passenger compartment cannot usually be located immediately, as the water often spreads across a large area. For this reason, the passenger compartment must be dried before the leak tests. Any ancillary components that block the view must be removed. During the water test, the vehicle is sprayed or sprinkled with water at the suspected location of the leak. At the same time, a second person checks the passenger compartment for places where water enters the vehicle. Depending on the test and the vehicle, it may take some time before there is any sign of water entering the vehicle. We recommend laying blotting paper under the location being tested so that the water entry can be localized.

Example: Water test with sprinkler head (rain test)

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Car wash test

Certain leak problems only appear in a car wash or can only be simulated there. The concerned area of the passenger compartment should be inspected with a torch during the wash procedure.

Road Test

Some leaks only appear when the vehicle is moving. If no leaks are detected during the above-mentioned tests, road tests should be carried out on wet roads:

- At various speeds.
- On various road surfaces (asphalt to cobbles).
- With loaded or unloaded vehicle.
- Driving through puddles (splash water).

Test with UV lamp

A leak test can also be performed using a UV lamp and a special contrasting agent. The advantages of using contrast agent are:

- No need to dry out wet areas beforehand.
- The water entry and its subsequent path can be seen more clearly.
- No need to remove most ancillary components from the vehicle.

NOTE: The equipment manufacturer's instructions must be followed when using a UV lamp and contrast agent.

Procedure for using a UV lamp.

- Wet the test area with clear water from the outside.
- Prepare test liquid and apply it from the outside using a suitable water sprayer.
- Illuminate the relevant area from the inside using the UV lamp. The test liquid which enters will make the leak visible.

Chalk/powder test

This test checks the contact surfaces of seals on doors, hatches and lids.

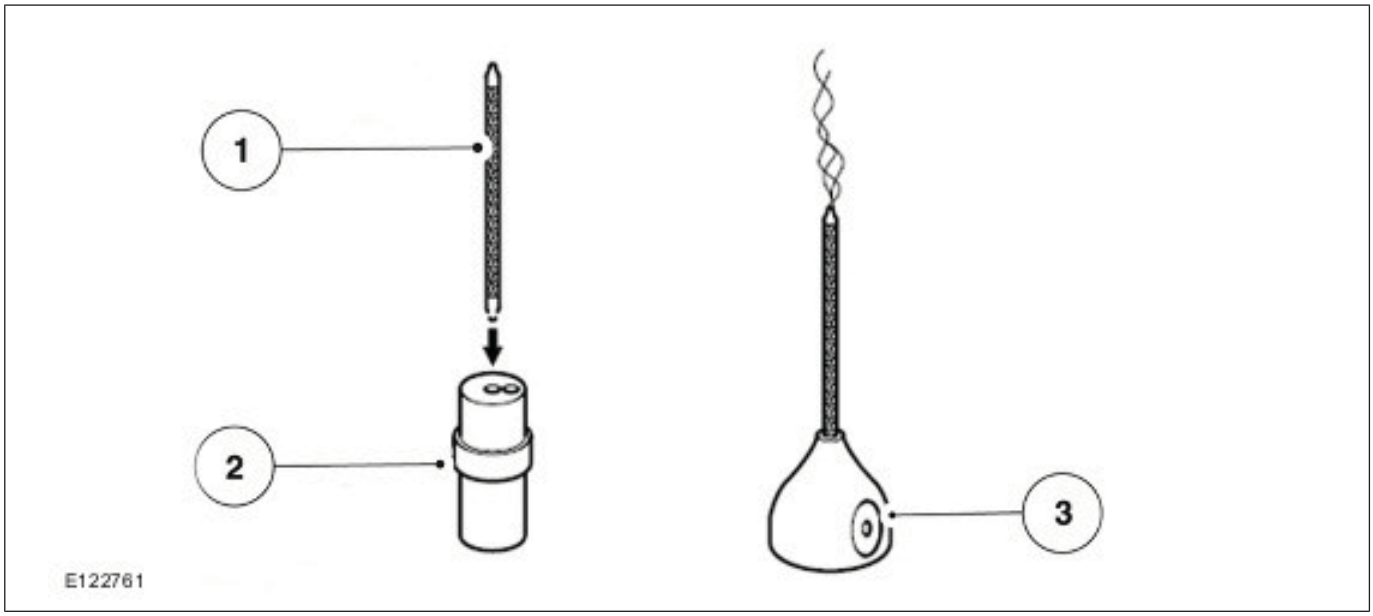
Process using a door seal as an example:

To do this, the door seal is coated with powder or brushed with chalk. A thin layer of grease is applied to the contact area of the seal. The door must then be slowly closed and reopened. The width and continuity of the imprint can now be checked on the seal.

DESCRIPTION AND OPERATION

Smoke test

Flow checking device



Description	Description
1	Test pipe
2	Test pipe opener
3	Puffer ball

Operating principle

The flow checking device is a set made up of a flow-testing pipe, a test pipe opener, puffer ball and closing-off caps for the pipe.

The test pipe contains a filling layer which is impregnated with fuming sulfuric acid. When air is blown through the pipe by the puffer ball, sulfuric acid is emitted as an aerosol in the form of a white smoke.

NOTE: Pay attention to the instructions for use and the safety directions issued by the manufacturer. The smoke test can only be performed in a draft-free environment.

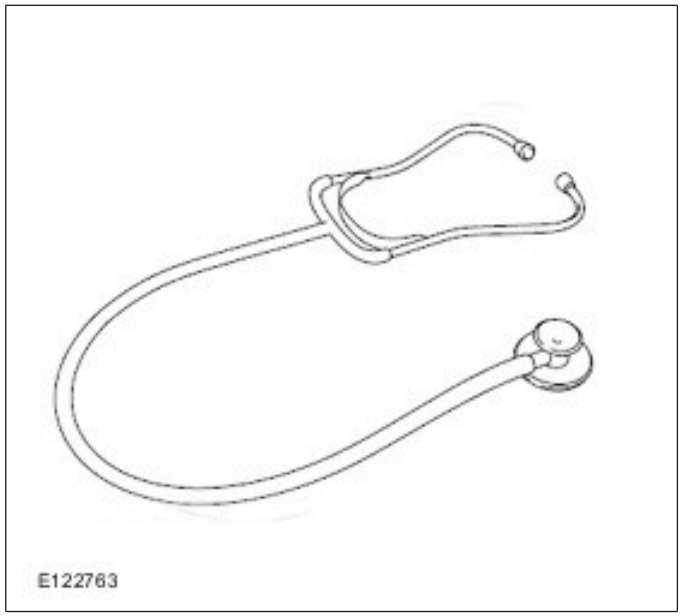
This test can be used to detect leaks visually. Procedure:

- Break off both tips of the pipe in the pipe opener, in exceptional cases in the top of the packaging.
- Insert the pipe into the puffer ball so there are no leaks.
- Close the hole in the puffer ball with your thumb and press the air contained in the ball through the pipe.
- Set the ventilation blower in the passenger compartment to the highest setting.
- Close all doors so that a slight overpressure can build up in the passenger compartment.
- Move the smoke pipe along the outside of the body to the areas to be checked.
- Leaks can be detected through the irregular movement of the smoke.

Stethoscope test

This procedure is very similar to the smoke test. Instead of the smoke pipe, move a stethoscope past the areas of the body that are at risk. Leaks can now be detected acoustically.

Stethoscope



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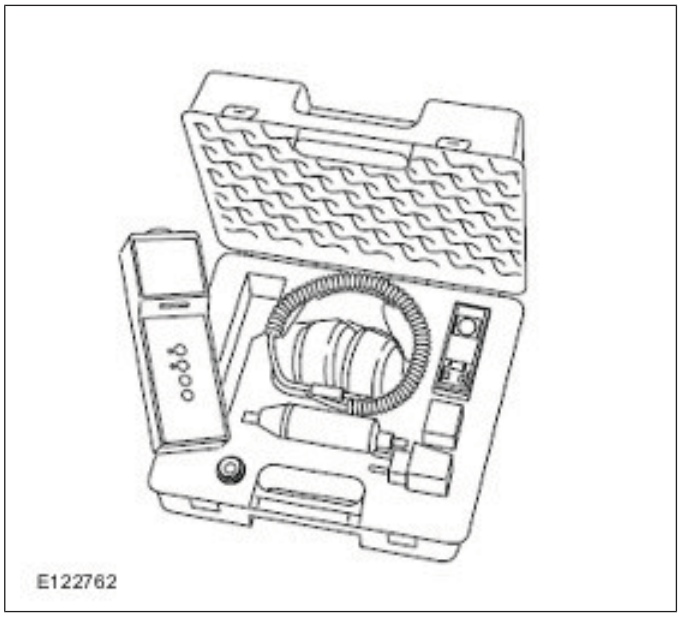
Ultrasonic detection

This test uses ultrasonic waves to locate the positions of leaks. When an ultrasonic transmitter is placed inside the vehicle, it sends out ultrasonic waves. A leak is located by running a detector along the suspected area. The position with the loudest reception of the escaping ultrasonic waves is the location of the leak.

Procedure:

- Place the ultrasonic transmitter in the vehicle.
- Completely close the vehicle.
- Search the exterior of the vehicle using the detector.
- The detector provides a simple indication of a leak.

Ultrasonic test device



Workflow for tracing water entry

Stage	Testing	Result	Action
1st	Ask customer for a detailed list of possible reasons for the water entry. Does this information allow the cause of the leak to be identified?	Yes	Dry out the vehicle and repair the damage. Perform a water test as a check (see test method).
		No	Step 2.
2nd	Perform an initial visual inspection on the vehicle. Look for signs of water entry. Can the cause of the leak be identified immediately?	Yes	Dry out vehicle. Repair damage. Perform a water test as a check (see test method).
		No	Step 3.
3rd	Is it possible that water is getting into the vehicle through a seal (door seal, trunk lid seal)?		Check the seal for damage. Check the creation of the seal using the chalk test (see test methods). Step 4.
		No	Step 5.
4th	Is the contact area for the seal adequate?	Yes	Step 5.
		No	Perform work as described under Areas with possible water leaks - Door seals. Dry out vehicle. Repair damage. Perform a water test as a check (see test method).
5th	Before starting any further work, use the VIN to look for model-specific information in eTIS. Perform Oasis query and check TSIs. Does this information allow the cause of the leak to be identified?	Yes	Dry out vehicle. Repair the damage using the information found. Perform a water test as a check (see test method).
		No	Step 6.

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Stage	Testing	Result	Action
6th	Establish the extent of the damage. To do this, expose wet areas. Remove parts. Investigate the suspected area for signs of water. Does an investigation of the suspected area allow the cause of the leak to be identified?	Yes	Dry out vehicle. Repair leak. Perform a water test as a check (see test method).
		No	Step 7.
7th	Check exterior areas (seals, seal welds). Check interior areas: Signs of water, plugs, seal welds. Can the cause of the leak be identified?	Yes	Dry out vehicle. Repair leak. Perform a water test as a check (see test method).
		No	Step 8.
8th	Perform water test or ultrasound test. Can the cause of the leak be found?	Yes	Dry out vehicle. Repair leak. Perform a water test as a check (see test method).
		No	The water entry may only occur under dynamic driving conditions. This requires intensive tests to be repeated with the corresponding climatic influences (rain).

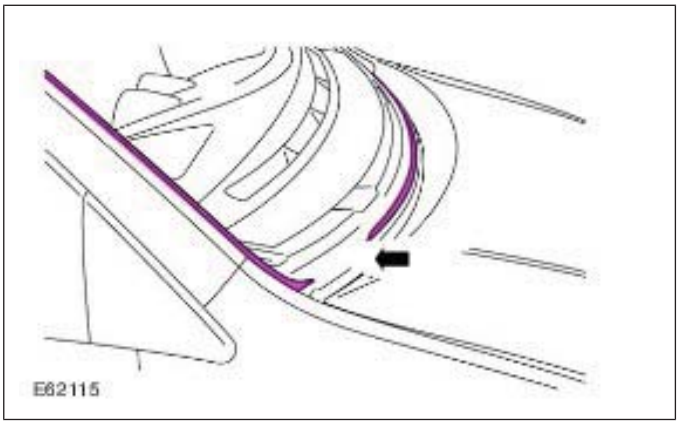
Possible complaints and corrective actions

NOTE: Water leaks and changed vehicle acoustics can have similar causes. For this reason, information from the Wind noise or Noise, vibrations, roughness chapters may be useful in identifying the fault.

An outline of the possible complaints due to water leaks is provided below. The causes of water leaks and the possible remedies are presented using selected examples. They are intended to provide troubleshooting tips and suggestions for the user but do not represent an exhaustive faults list.

Glued windows

A broken pasted seam can cause water to enter around the window. A broken pasted seam can be located using a water test or by carefully blowing compressed air onto the inside of the window seal.



Corrective action

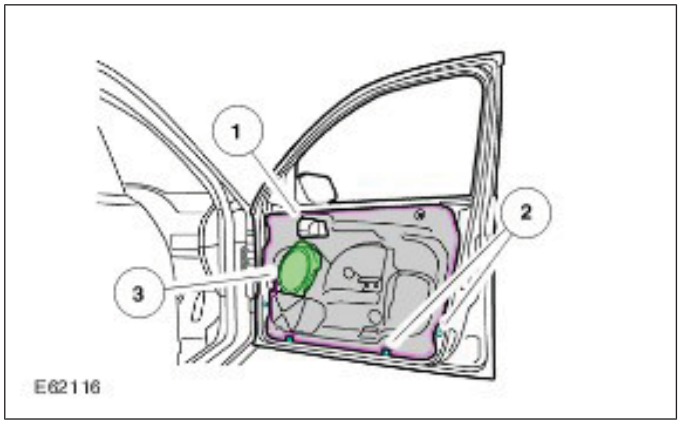
Broken adhesive seams **-Arrow-** can be sealed from inside using PU glass adhesive.

If this seal does not resolve the problem or the broken pasted seam is too extensive, it is necessary to remove the window and glue it back into place.

Door seals

If water appears at the bottom of the door, it is possible that the door seal behind the door trim is damaged. If the door is intact, water can enter through the window weatherstrip and flow out through gaps on the underside of the door. If the door seal adhesion is faulty or the door seal is damaged, water can get into the interior.

DESCRIPTION AND OPERATION



Description	Description
1	Seal/adhesion
2	Clips
3	Door speaker

Fastening bolts could be loose or clips incorrectly positioned on door modules.

Corrective action

Depending on the door seals used, different sealing methods can be used.

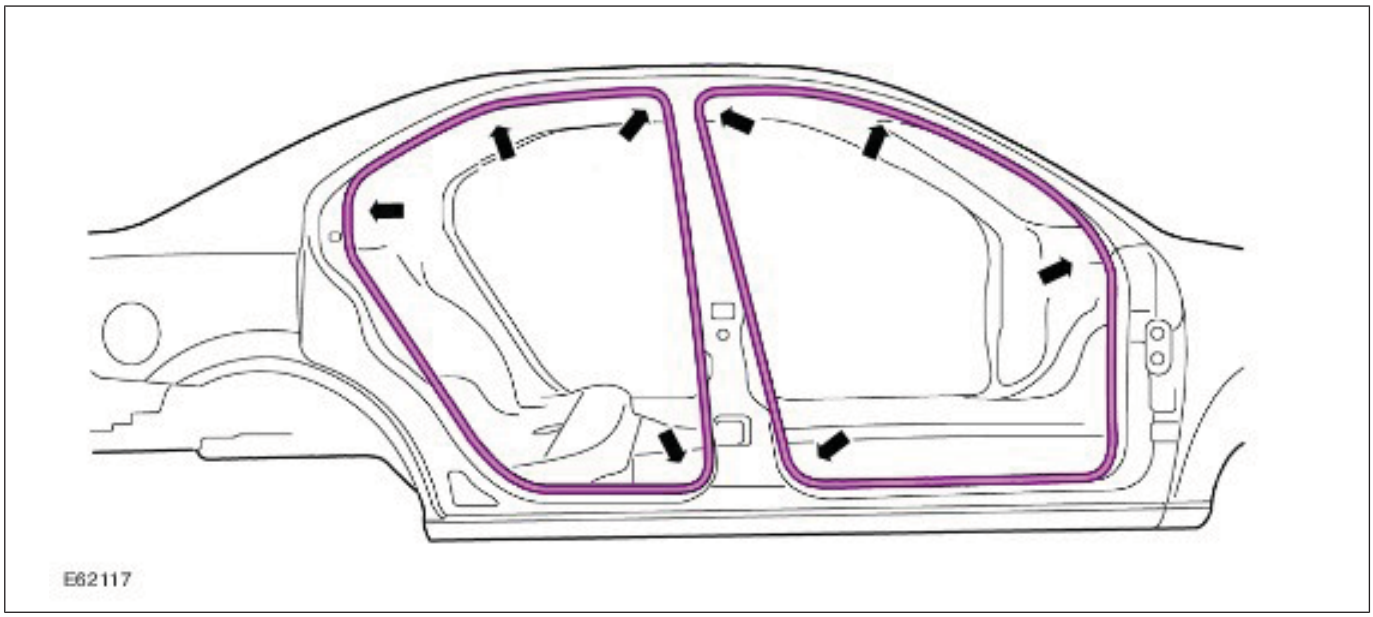
NOTE: The drainage holes on the underside of the door may not be blocked - if they are, clean them. Defective films and foam seals must be replaced.

Once the adhesive surfaces have been cleaned, plastic films must be stuck with double-sided adhesive tape or replaced.

Leaky foam seals are sealed with Butyl tape or replaced.

Plastic door modules are fitted with a weatherstrip, which cannot be replaced. Seal the leaky point with Butyl tape or replace the part.

Door weatherstrip



Leaks can be caused by badly fitted seals. In particular, areas with radii **-Arrow-** must be thoroughly checked.

Door seals can develop leaks due to:

- Damaged or expanded seals.
- Ageing.
- Insufficient contact pressure.
- Inadequate contact area for seal on body part.
- Uneven welded flange thickness because of several layers of body panels or production tolerances.
- Kinks.

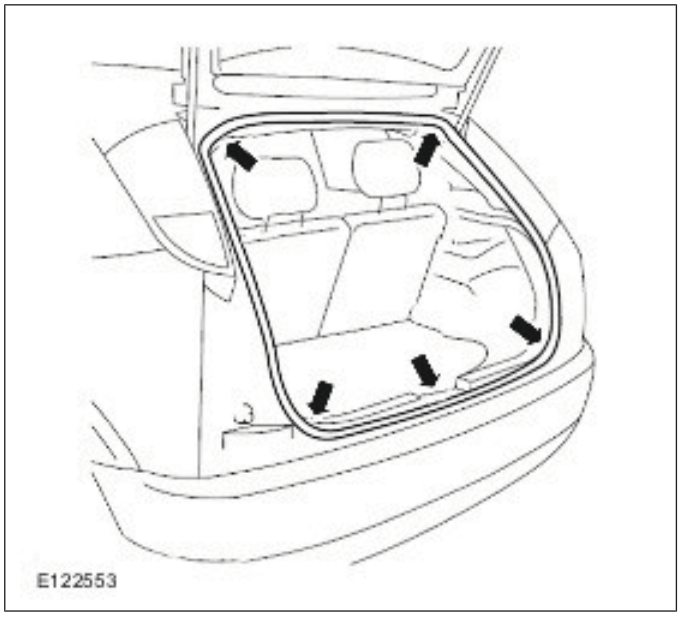
The contact pressure of a seal can be determined using a strip of paper. If a strip of paper trapped in the closed door can be pulled out easily, the contact pressure is too low.

To resolve

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- Replace damaged or aged seals. Prevent kinks.
- The contact pressure can be changed by adjusting the catch bolt or correcting the panel flange.
- Even out the uneven welded flange thicknesses. Properly repair any paint damage that occurs. If the bodywork flanges are very uneven, appropriate alignment work must be performed. Pay particular attention here to the new corrosion protection which needs to be applied afterwards.
- If water entry is caused by a spot weld (burr on the surface), this must be rectified and appropriate corrosion protection applied.

Tailgate sealing rubber

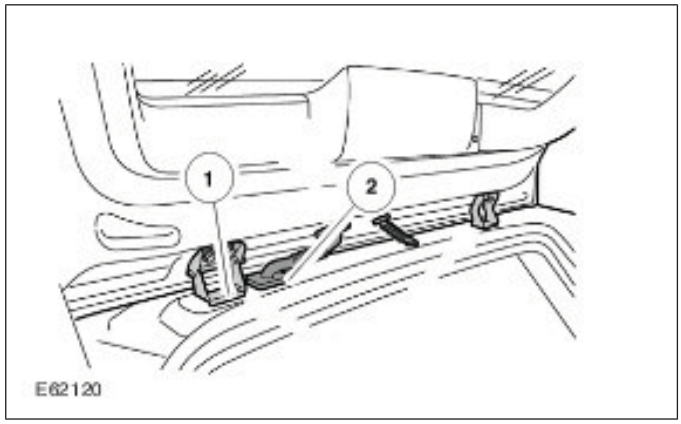


Leaks at the tailgate rubber seal have the same causes and remedial measures as for door rubber seals. Especially vulnerable areas -arrows- must be thoroughly checked.

Rubber grommets / plugs

Rubber grommets or plugs are fitted at numerous points on the body. They are frequently used as seals for cables, hoses or actuating links. Rubber plugs are frequently used for gaps caused during production.

Example: Possible problem locations in the tailgate area



Description	Description
1	Hinge seal
2	Cable duct

Leaks can be caused by badly fitted or damaged rubber grommets and plugs.

Damaged cable insulation can also cause leaks.

Where components are bolted on, water can enter if there are inadequate seals at the connection point.

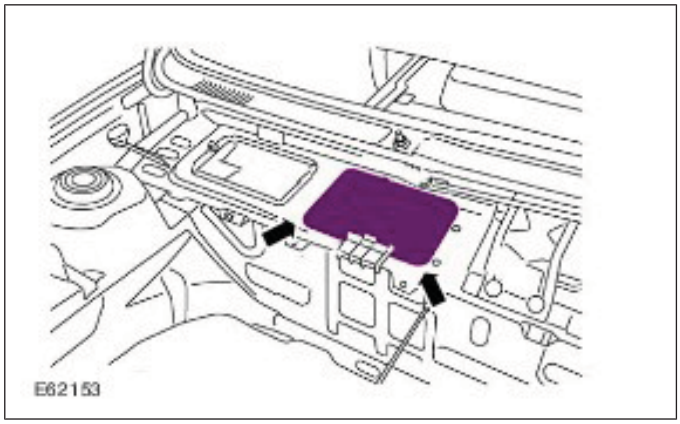
To resolve

- Correctly fit rubber grommets / plugs. During fitting, ensure that the sealing lips are not trapped and are applied properly.
- The contact area of the rubber grommets / plugs can also be sealed with PU sealing compound.
- Replace the damaged rubber grommets and repair the damaged cable insulation.
- Smooth the panel deformations in the contact area of the plugs.

Heater housing/ventilation

Loose butyl sealing strips, damaged sealing surfaces or a trapped carpet can cause leaks around the heater housing / ventilation **Arrow**. Badly positioned or badly fitted hoses can also be responsible for water entry. Water drains must not be blocked

DESCRIPTION AND OPERATION



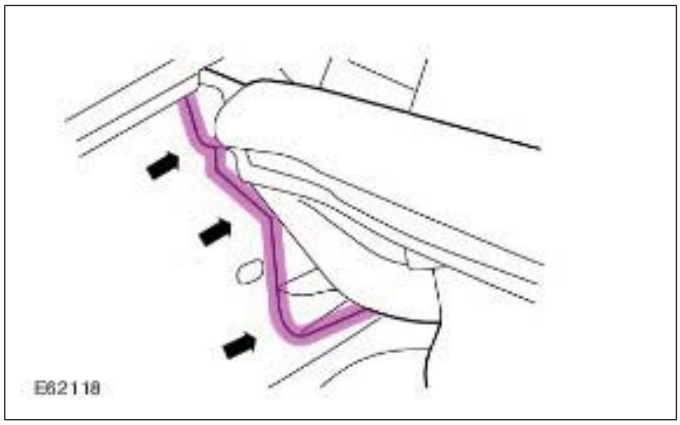
NOTE: A large quantity of water flows through the water tank. If there are leaks in this area, it is essential to ensure that the water drainage mechanisms function correctly. Drainage openings may not be blocked or stuck. Leaves and other dirt must be removed before troubleshooting.

Corrective action

Before the actual repair, make sure that the water drains are not blocked or stuck.

Remove the heater housing / ventilation and fit a new Butyl sealing strip. Damaged sealing surfaces must first be adjusted. A trapped carpet must be removed.

Seal welds



PU sealing beads are applied to welded or riveted connections **Arrows** to seal the interior of the vehicle. Incorrectly applied or damaged seal welds can allow moisture to penetrate into the interior of the vehicle. It is also possible that sealing beads whose shape and size appear to be intact actually have poor adhesion.

Corrective action

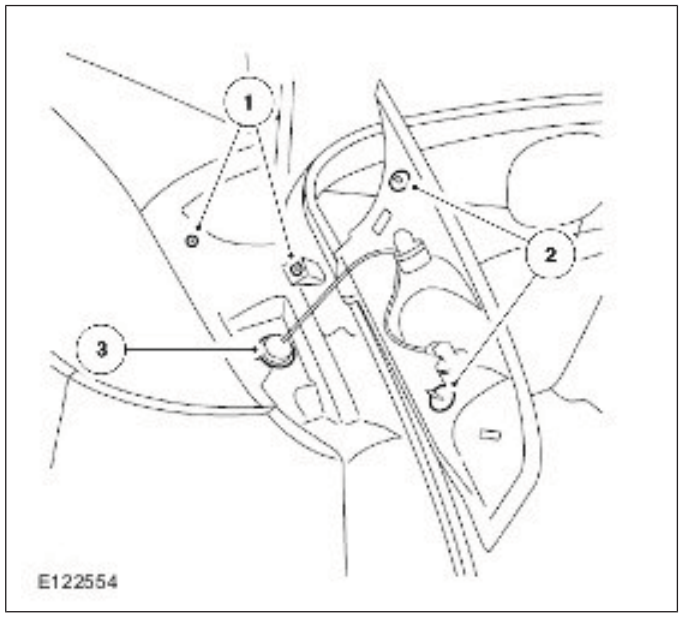
Incomplete seal welds must be supplemented with PU sealing compound. Damaged seal welds must be removed and re-applied properly. Make sure that any residual moisture is effectively removed before a new seal is applied.

Attached parts

The add-on parts include:

- Exterior mirros, handles, controls.
- Mouldings, roof mouldings, lettering.
- Roof aerial, roof rack or connections for roof rack systems.
- Bumper mountings.
- Injection nozzles, door contact switches, bump stop rubber.
- Control unit seals.
- Tail lamps.
- All kind of screwed connections (pedal block, door and tailgate hinges)

Example: Possible water entry points at the rear lamp



Description	Description
1	Clips
2	Gaskets.
3	Rubber grommet

Add-on body parts must be fitted with seals, grommets or sealing compound to prevent water entry. However, even when a sealing system is fitted, the screw thread may still cause leaks.

DESCRIPTION AND OPERATION

Corrective action

Seals must be tested and, if necessary, replaced. Check contact surface and adjust if necessary. Points sealed with sealing compound must be thoroughly cleaned and the seal replaced. Check grommets and replace if necessary. At all screwed connections, seal the thread with an appropriate sealing material.

DESCRIPTION AND OPERATION

Wind Noise

Wind noises as well as other general noises are dealt with under Noise, Vibration and Harshness (NVH).

NOTE: Basic and in-depth training is offered on the following topics. You will find an overview of the complete range of courses in the Training Brochure issued by the Ford Service Organization.

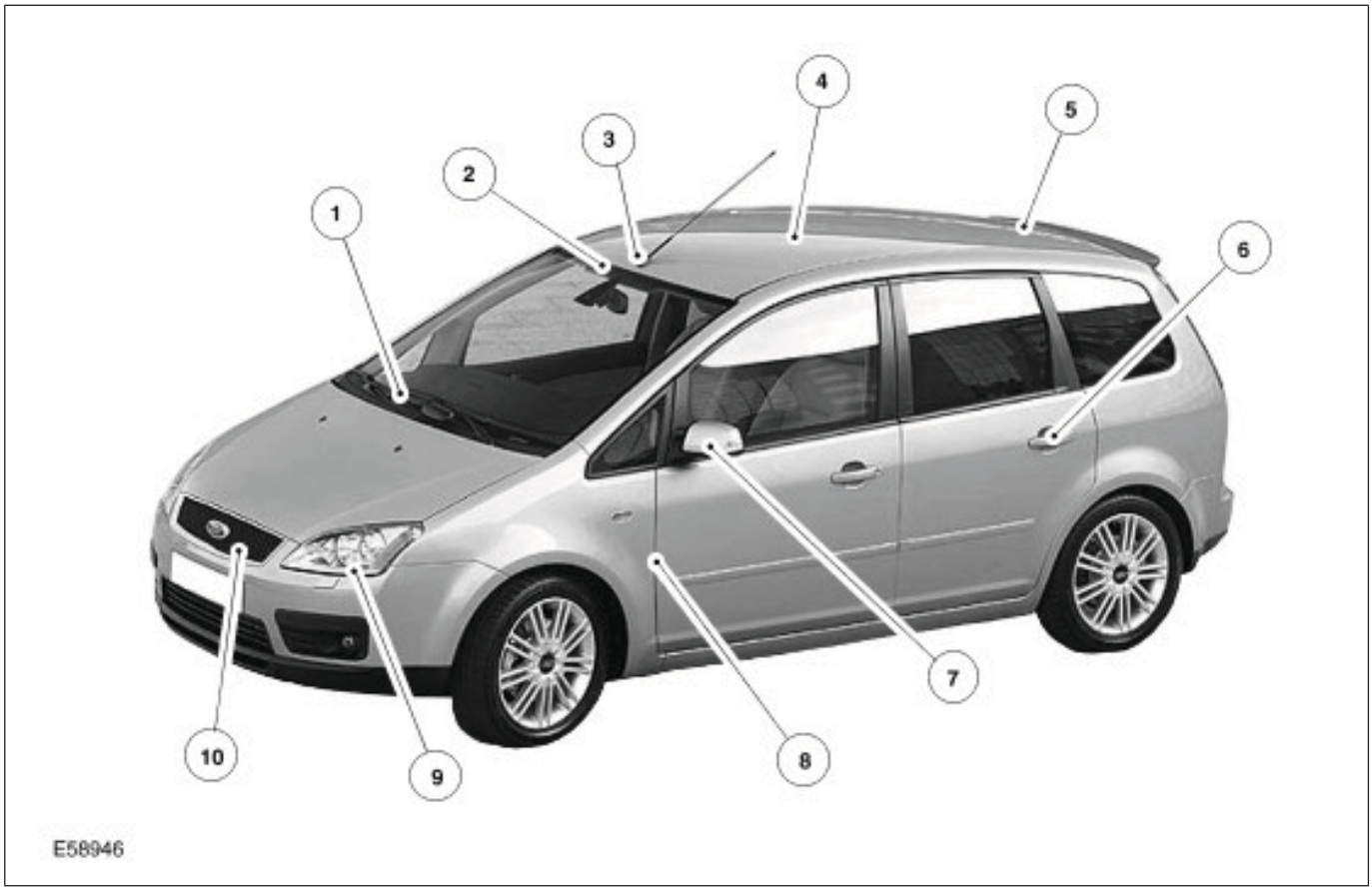
Due to the continuous reduction in drivetrain noises, wind noises have come to the fore in the vehicle and are perceived to a greater extent by the customer.

There are various causes of wind noises. They can be due to the design of the vehicle, or they can occur after a repair. They are mostly caused by poorly mounted components, which must be located and installed in the correct position.

General information

In order to carry out targeted diagnosis, it is important to know the basics of noise formation and sound transmission.

Potential areas of wind noises



Item	Description
1	Wiper arms
2	Windscreen seal
3	Antenna/antenna base
4	Sun roof/roof rail
5	Tailgate
6	Door handles
7	Exterior Rear View Mirror

Item	Description
8	Door seals
9	Headlamps
10	Radiator grille.

Noises are categorized according to their type and formation as follows:

"Normal" air flow noises:

Normal air flow noises are caused by air blowing against even, flat vehicle surfaces, such as the

DESCRIPTION AND OPERATION

roof, doors and side windows. When the vehicle is moving fast, air layers (turbulence) form, which cause variations in air pressure. These variations in air pressure spread in the form of sound waves and are transferred to the vehicle interior via the side windows and seals.

Noises caused by deviations in air flow and circulation around separate components:

If air flows over an edge on a vehicle, the air flow cannot follow the shape of the surface, but separates at the edge. Eddies are formed, which collapse again after a certain time or distance. The associated fluctuations in air pressure create a corresponding sound wave which is noticeable by for instance a rushing noise at the A-pillar or the outside mirror.

Turbulence and the associated radiation of noise can also occur at the vehicle underbody. Air circulation around small components and also flow through small gaps (e.g. the radiator grille) cause the rushing noise to change to a whistling, which rises and becomes louder as the vehicle speed increases.

Noises caused by vibrating seals:

Seals which do not make firm contact at the door or window area can be made to vibrate by pressure variations outside the vehicle, which in turn mean noise radiating into the interior of the vehicle.

Noises caused by air flowing out:

Noises caused by air flowing out are created by leaks at the vehicle interior sealing system, when stationary air mixes with flowing air. As a result, the noise increases as the speed of the air flowing out increases. Example: Letting air out of a tire.

Cavity noises:

Cavity noises are those created when the air volumes found in bodywork cavities are caused to vibrate by an opening located in the airflow. The frequency of the tone does not vary with the vehicle speed but depends on the volume of the cavity and the size of the opening. Example: Blowing across the top of a bottle.

Wind noises overview:

Workshop diagnosis

Assessment	Type of wind noises	Place of origin
Normal	"Normal" wind noises	Roof, side windows
Normal	Noises caused partly by changes in the direction of air flow and by air flow around separate components	A-pillars, outside mirrors, antennas
Serious	Noises caused by vibrating seals	Door gaps too large, door/ window seals not making firm contact
Serious	Air escape and air passage noises	Leaks in the bodywork/ sealing system
Serious	Cavity noises	Unsealed body-work cavities

Those noises listed under "Serious" indicate a possible source of the fault.

Workshop diagnosis

There are two ways that the level of noise in the vehicle interior can be reduced and the character of the noise can be improved through assessment and diagnosis in the service department:

- Reducing the intensity of the noise sources.
- Reducing the noise transfer routes.

Before carrying out repair work, a visual inspection of the vehicle must be carried out. The gaps in the doors, the sunroof and at all other body parts must be checked in particular.

When the doors are adjusted to fit exactly, development of wind noises at high speeds can often be eliminated (lifting of doors off the seals). Furthermore, the following points should be noted:

- The windows and doors must be fully closed.
- The air guides and air grilles must be correctly seated.
- All of the trim strips and plastic components must be firmly fixed down without gaps.
- All blanking plugs present.

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Test method

The test procedures given in the chapter Noise, Vibration and Harshness can also be used to diagnose wind noises.

Road tests

Wind noises can usually only be localized by road tests

NOTE: There should always be two people present during road tests to find noises. A driver who reconstructs the situation causing the noise, and a person to carry out the checks.

The following points should be taken into account for such road tests:

- Check that the tire pressure is correct.
- Remove non-standard ancillary components from the vehicle.
- Choose a dry, flat road with as little traffic as possible.
- Carry out the road test in all speed ranges. Use a high gear so that the engine noise is low.
- Do not perform a road test near any sound reflecting objects.

If it is difficult to detect the noise sources, the search can be made easier by masking potential areas.

Chalk/powder test

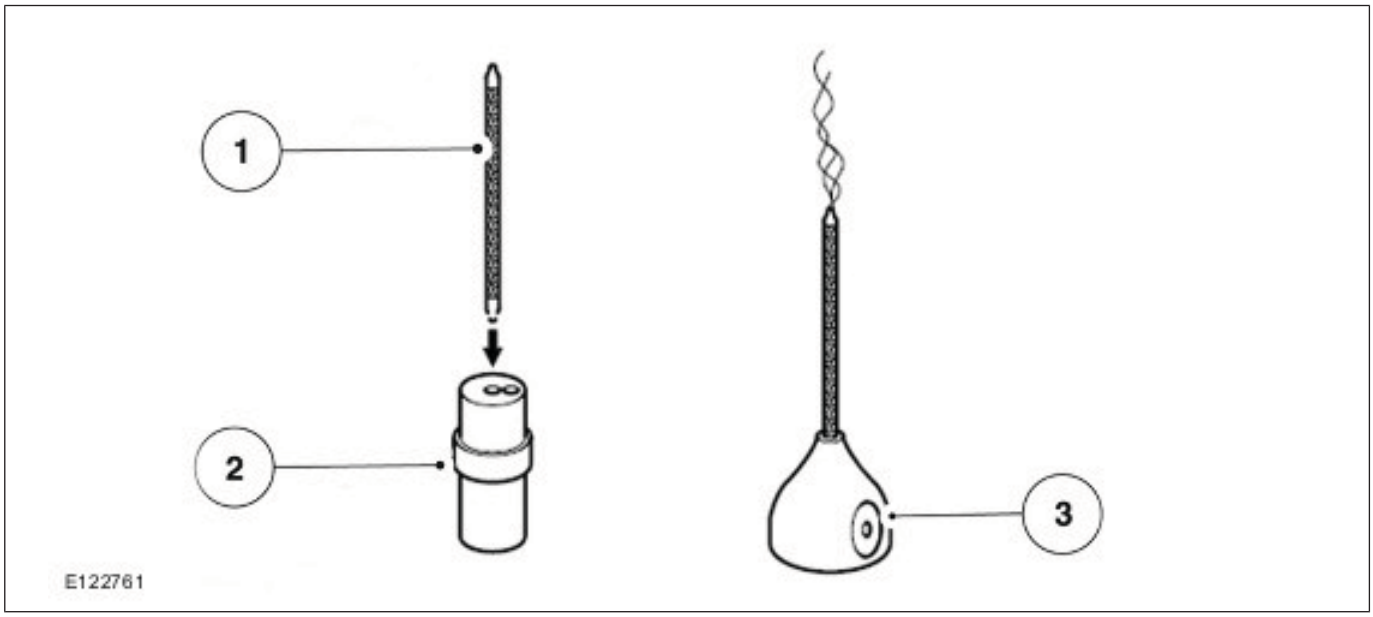
This test checks the contact surfaces of seals on doors, hatches and lids.

Process using a door seal as an example:

To do this, the door seal is coated with powder or brushed with chalk. A thin layer of grease is applied to the surface against which the seal makes contact. The door must then be slowly closed and reopened. The width and continuity of the imprint can now be checked on the seal.

Smoke test

Flow checking device



Item	Description
1	Test pipe
2	Test pipe opener
3	Puffer ball

Mode of operation:

The flow checking device is a set made up of a flow-testing pipe, a test pipe opener, puffer ball and closing-off caps for the pipe.

The test pipe contains a filling layer which is impregnated with fuming sulfuric acid. When air is blown through the pipe by the puffer ball, sulfuric acid aerosol is emitted in the form of a white smoke.

NOTE: Pay attention to the instructions for use and the safety directions issued by the manufacturer. The smoke test can only be performed in a draft-free environment.

This test can be used to detect leaks visually.

Procedure:

- Break off both tips of the pipe in the pipe opener, in exceptional cases in the top of the packaging.
- Insert the pipe into the puffer ball so there are no leaks.

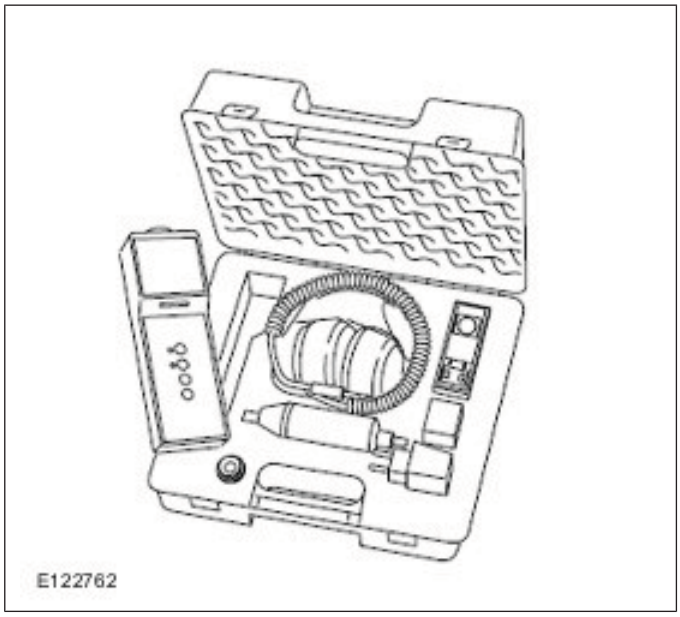
DESCRIPTION AND OPERATION

- Close the hole in the puffer ball with your thumb and press the air contained in the ball through the pipe.
- Set the ventilation blower in the passenger compartment to the highest setting.
- Close all doors so that a slight overpressure can build up in the passenger compartment.
- Move the smoke pipe along the outside of the body to the areas to be checked. Leaks can be detected through the irregular movement of the smoke.

Ultrasonic test

This test searches for leaks in the system of seals or rather acoustic bridges. When an ultrasonic transmitter is placed inside the vehicle, it sends out ultrasonic waves. A leak is located by running a detector along the suspected area. The position with the loudest reception of the escaping ultrasonic waves indicates places where noises occur.

Ultrasonic test device

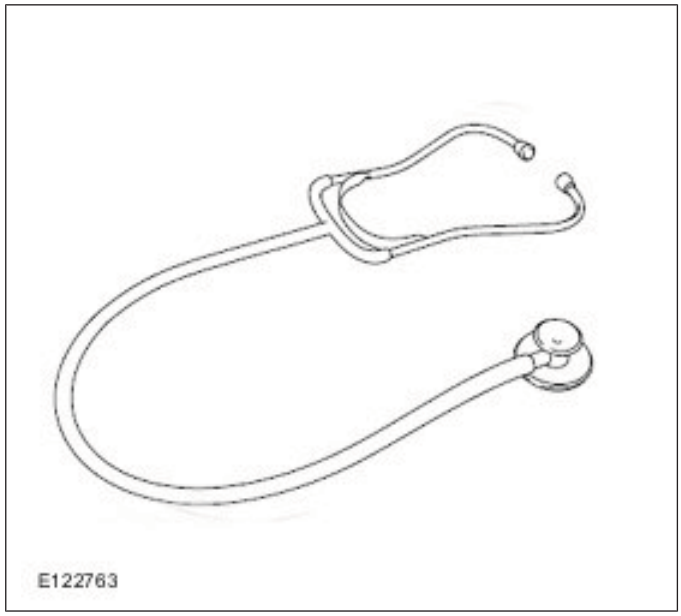


Procedure:

- Place the ultrasonic transmitter in the vehicle.
- Completely close the vehicle.
- Search the exterior of the vehicle using the detector.
- The detector provides a simple indication of a leak.

Stethoscope test

Stethoscope



Diagnosis

Wind noises often have similar causes as the general NVH noises. For instance, a windshield which is incorrectly bonded in position can cause normal driving noises to become more noticeable.

Asking the customer detailed questions and a road test together with the customer are the requirements for a targeted diagnosis.

NOTE: Take the customer concern seriously. But do not confirm that a noise is a problem until you are sure that it is something which is not normal for the vehicle series.

Possible questions:

- How long has the noise been there?
- Has any work been done on the vehicle?
- Where does the noise come from?
- In which driving situation does the noise appear?
- Is there any special situation in which the noise appears?

Remember that a noise is often more or less noticeable depending on where you are sitting in the vehicle.

DESCRIPTION AND OPERATION

Stage	to test	Result	Reference or Action
1st	Road test the vehicle with the customer. First let the customer drive to demonstrate the noise, before you drive the vehicle yourself. Check that the concern is justified. Is this a noise which gives cause for concern?	Yes	Step 2.
		No	Explain the noise and tell the customer what is causing it. Possibly offer a comparable vehicle for a road test.
2nd	Visually inspect the vehicle. Look for loose, damaged or missing components. Check that the vehicle is to standard production series specification. In particular, check for any aftermarket components which may have been installed. Depending on the type of noise, check the suspected area. Could a cause of the noise be found?	Yes	Eliminate the noise or carry out a repair as the case may be. Check whether the measures have been successful.
		No	Step 3.
3rd	Before starting any further work, use the VIN to look for model-specific information in eTIS. Perform Oasis query and check TSBs. Can a cause for the noise be determined based on the information available?	Yes	Take the action specified in the Oasis or TSB information. Check whether the measures have been successful.
		No	Step 4.
4th	Localize the noise. In doing so, check whether it is an unusual noise or if it is a usual driving noise that is more noticeable because of inadequate sealing. Is it an unusual noise?	Yes	Step 5.
		No	Step 7.
5th	Determine the source of the noise. Can the cause be determined?	Yes	Eliminate the noise or carry out a repair as the case may be. Check whether the measures have been successful.
		No	Step 6.
6th	Determine the path of the noise using the stethoscope. By way of a trial, mask the suspected area or components or remove them. Can the cause be determined?	Yes	Eliminate the noise or carry out a repair as the case may be. Check whether the measures have been successful.
		No	Step 7.

DESCRIPTION AND OPERATION

Stage	to test	Result	Reference or Action
7th	Check the vehicle for inadequate or damaged seals. The sealing of a vehicle can be checked using the stethoscope, the powder test, the smoke test and the ultrasonic detector. (See under test method.) Could a leak be detected?	Yes	Renew the seal or perform the appropriate repair as necessary. Check whether the measures have been successful.
		No	Step 8.
8th	Under certain circumstances there may be a constructional problem which is not yet known about. Record the problem in an Express Service Report and send it on by the usual method.		

Possible concerns with corrective measures

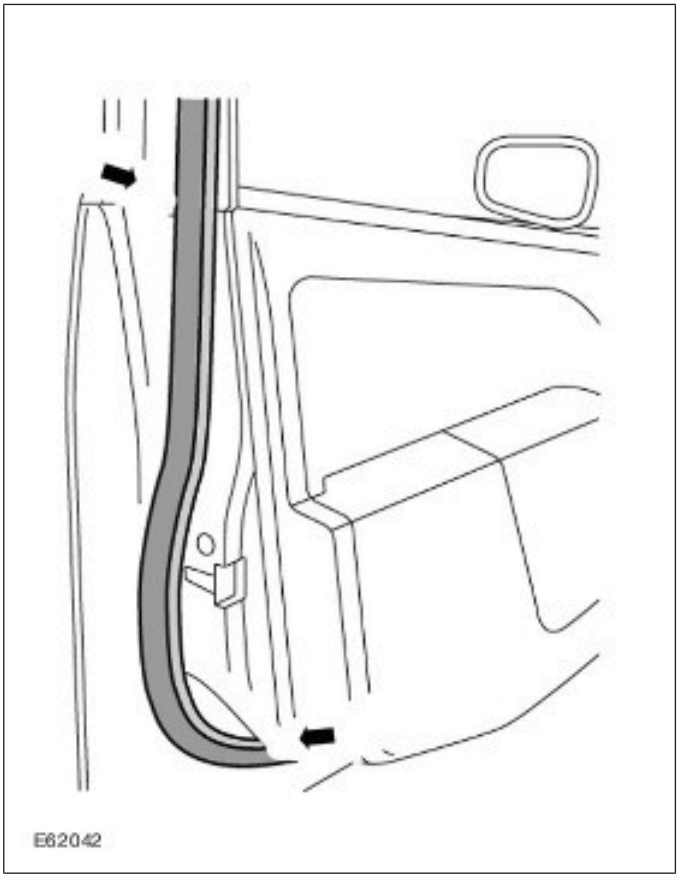
NOTE: Instructions on general noise are summarized separately in the Noise, Vibration and Harshness section. These can be useful when searching for the causes of wind noises.

There follows an outline of the possible concerns relating to wind noises. Selected examples are given showing the causes of wind noises and the ways in which they can be eliminated. They are intended to provide troubleshooting tips and suggestions for the user but do not represent an exhaustive faults list. The topics are subdivided by the different groups of components.

The test procedures described in the Noise, Vibration and Harshness section can be used when troubleshooting.

Seals

In general, seals are very important when eliminating wind noises. Special attention should always be paid here to the possible causes of wind noises.



Take the following points into account:

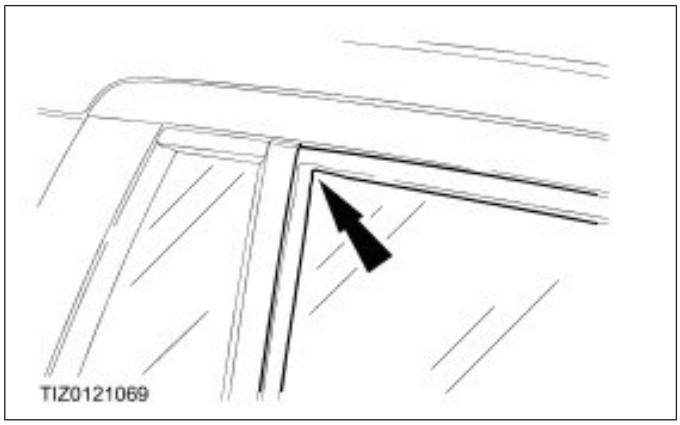
- Seals age, i.e. they become porous and with time they lose their original elasticity. If the vehicle is relatively old and there are already visible signs of distortion or damage to a seal, then it should be replaced.
- At high speeds the doors or hatches may lift slightly from the seal surfaces because of variations in air pressure. Wind noises are caused when the preload on the sealing surface is not sufficient. The preload depends on the installation position of the components, the elasticity of the seal and the location of the sealing flange.
- The contact surface of the seal must be sufficient. This can be checked using the chalk test. If the specifed width of the contact surface is not known, you must determine it on another component of identical construction.
- A bulging seal carrier indicates that the sheet metal of the retaining flange is uneven.

DESCRIPTION AND OPERATION

- Seals must be correctly installed. Special attention must be paid at corners **-arrow-** that the installation follows the contours.
- The seal must not show any kinks or folds or any other damage.
- Seals must seal all around their circumference. Gaps in seals result in openings which lead to an increased incidence of noise. In this respect, it is especially important to pay attention to the seals in the area of the windows.

Remedial Action

Renew older seals which no longer have adequate preload. Deformed or widened retaining flanges must be reworked and provided with a new seal.

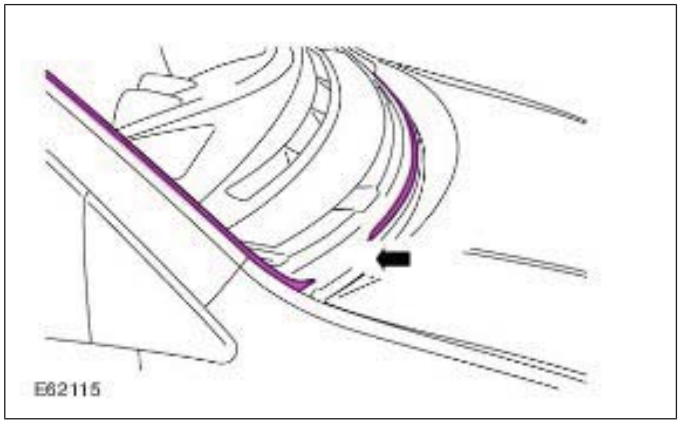


The corner areas **-arrow-** of a seal must be properly seated. In some circumstances, a butyl sealing strip must be affixed to support the sealing at a corner.

Bonded joints

Glass is usually installed today using a bonded joint. Gaps in the bonded joint can lead to noises in the vehicle interior. If there are noises which are believed to be associated with window glass, the following points should be checked:

Gap in window bonding



- The window must be bonded without any gaps **-arrow-**. Leaks can be found using the ultrasonic tester or compressed air carefully blown from inside onto the window glass bonding.
- The installed position of the window glass must be correct. It must not have been bonded into a position which is too low or offset to one side.
- The sealing or trim strips must fit tightly and the glass must be mounted so that it is fully enclosed. If a sealing or trim strip has not been applied with enough pressure, high air speeds can cause it to lift up. This can lead to wind noises at higher speeds. Apply masking tape to these areas for test purposes.

Corrective measures

Leaking areas of the window glass bonding material can be sealed using PU sealing compound. Pay special attention at the front windshield, that any breaks in the bonding are not too large. Otherwise the glass must be removed and bonded in place again.

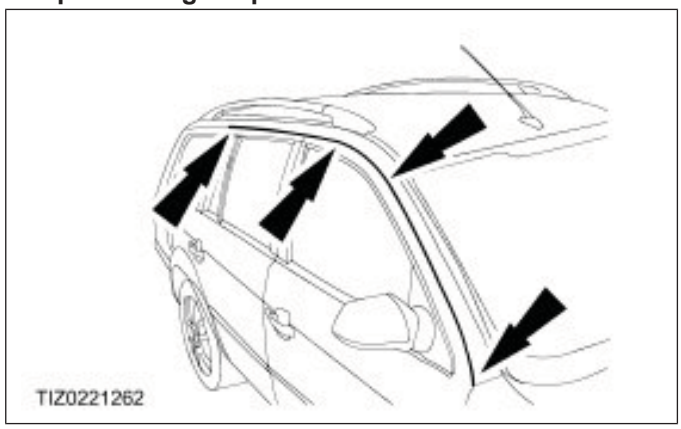
The installed location of a window glass cannot be corrected. It must be removed and bonded into place again.

Replace the trim strips or secure the lip seal using PU adhesive.

Gaps, edges

Door gaps and edges are places where air turbulence can form. This causes noises which can be perceived as troublesome.

Gaps and edges - problem areas



Doors, hood and tailgate can cause wind noises because of gaps **-arrow-** which are too large. If the components are not installed flush to the bodywork or the neighboring component, air break edges can arise, which in turn can create a wind noise.

DESCRIPTION AND OPERATION

The sun roof may be the cause of whistling noises in the roof area. The sun roof may be incorrectly adjusted or the seal on the sun roof may be damaged.

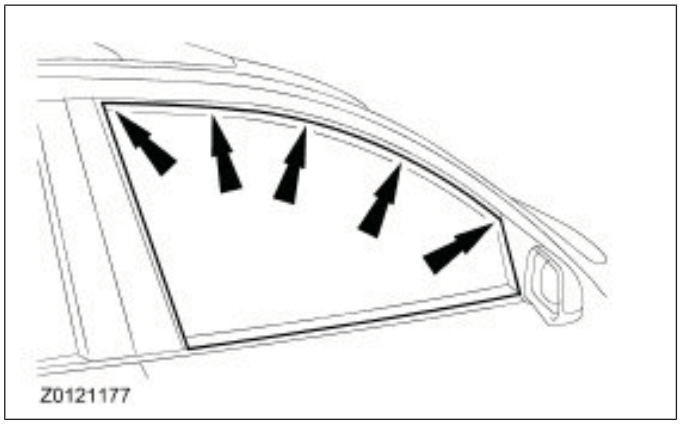
Noises from the door area could come from a window which does not fully close. Side guides (seals) can also be the cause of wind noises.

The covers of window frames can be incorrectly mounted or aligned. The quarter-lights in doors must also be checked for correct installation.

Corrective measures

Check the gaps and adjust them according to the specifications. If there are problems at the sun roof, correct the adjustment and if necessary replace the seals.

Problem area at side windows



Side windows which do not fully shut **-arrows-** must be adjusted. If the vehicle is equipped with electric window regulators, the remedy may be to perform the window regulator learning process again. In all cases, make certain that the glass enters far enough into the seal.

Ancillary Components

Components installed on the bodywork may cause noises when they are not correctly mounted.

When troubleshooting it may be helpful to remove the suspected component or, when this is not possible, to mask it off with suitable covering tape.

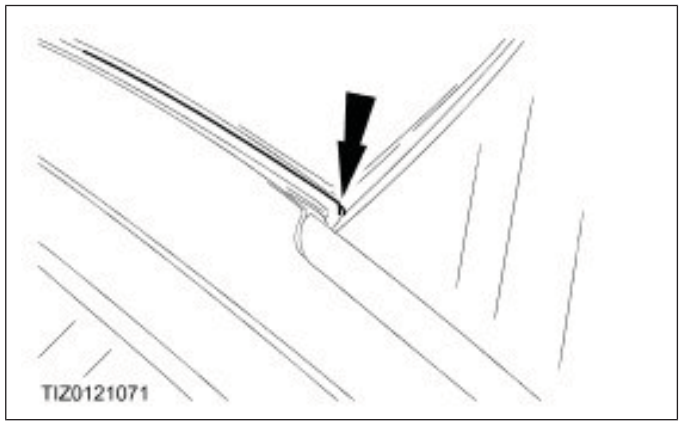
Roof moldings, roof rail, roof antennas

Moldings and roof moldings must touch the bodywork along their whole length without any gap. Check the end sections in particular. These must neither have any splits nor stand away from the bodywork.

Noises may come from the roof rail if the seal between it and the roof is not correctly installed or is cracked. Gaps at the mounting grooves of the carrier can also create wind noises.

The roof antenna and antenna foot seal must be correctly secured. The seal must lie completely on the roof and must not be damaged.

Roof moldings mounting



If the original mounting points of the roof moldings are in good condition, the fixing can be improved using silicone sealant -arrow- if necessary. Align or renew the seals of the roof rail. Reduce the clearances of the mounting grooves.

Corrective measures

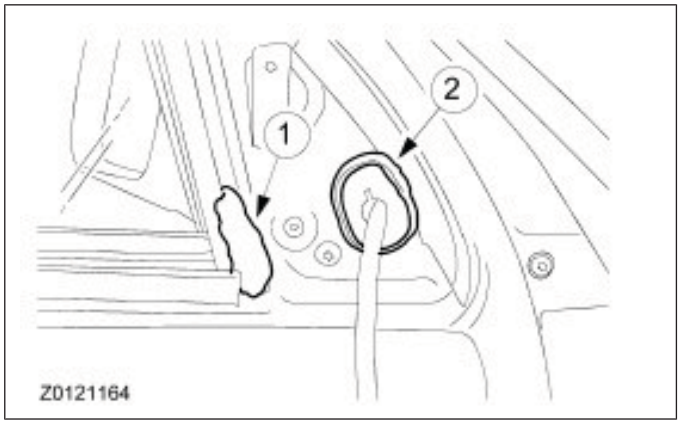
If the original mounting points of the roof moldings are in good condition, the fixing can be improved if necessary using silicone sealant **-arrow-**.

Exterior mirrors

Exterior mirrors or covers of exterior mirrors which are not correctly mounted cause noises. The cover must lie evenly on the component and must not lift during driving. There are ducts present on the doors for the electrical or mechanical adjusters for the exterior mirrors. If there are leaks, wind noises will be caused. Holes can also be present at the transition to other components.

Exterior mirror seals

DESCRIPTION AND OPERATION



There are ducts present on the doors for the electrical or mechanical adjusters for the exterior mirrors. If there are leaks, wind noises will be caused. Holes can also be present at the transition to other components.

Remedial Action

If there is inadequate sealing of the foam seals **-2-** they must be replaced or supplemented with suitable material. Transitions to other components can be sealed with butyl sealing compound **-1-**.

Moldings, covers, door handles, windshield wiper arms

Moldings and covers especially tend to cause wind noises because of their location. These components interrupt smooth bodywork surfaces and air turbulence therefore arises at the edges. If there are noise concerns in the area of the doors, check especially for gaps and projections. Moldings must not stand away from the bodywork or the door. There must not be any gaps or discontinuities at the location of joints.

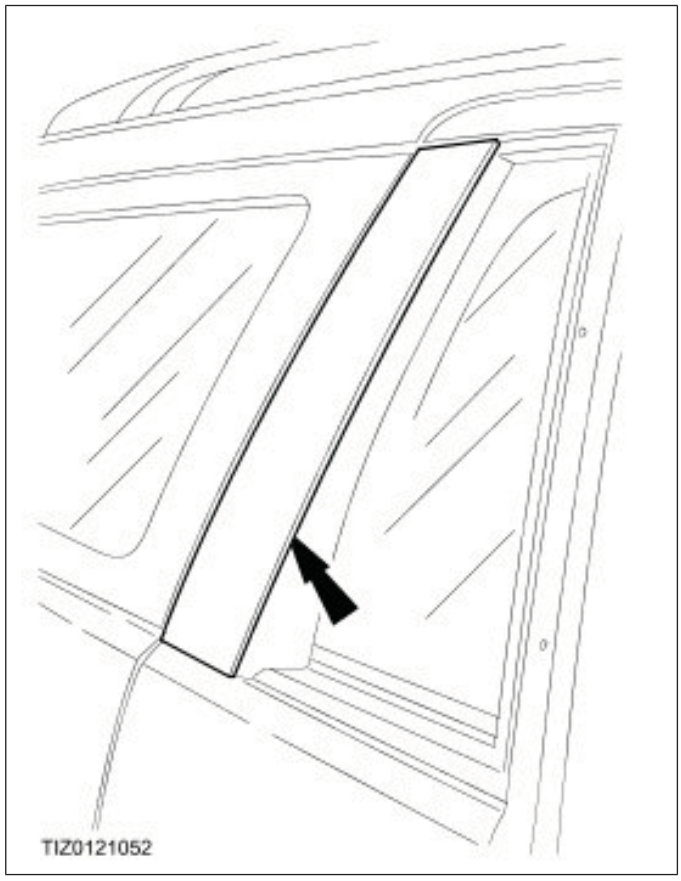
Incorrectly adjusted windshield wiper arms can cause wind noises. Especially if they are too far over the glass surface when in the rest position.

Wind noises in the transition area between the air cowl cover and the wing or the windshield can be caused by an incorrectly installed air cowl cover. At high air speeds the air cowl cover may lift and noises will then occur.

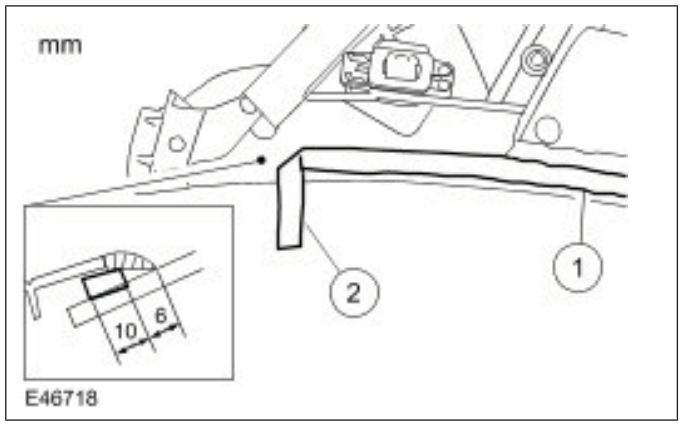
Because of their necessary mechanical features, door handles have a range of openings and edges which allow noise to be generated. The door handle can be masked off for testing purposes. If a reduction in wind noises is noticed, inadequate sealing may be the reason for the noises.

Remedial Action

Openings which are used to secure trim panels must be checked for leaks. Any leaks found can be rectified using butyl strips.



Loose or damaged outer trim on the pillars **-arrow-** must be secured or replaced.



A butyl sealing strip **-1-** can be laid underneath the cover in the transition area between the air cowl cover and the wing or windshield.

The sealing of the door handles must be renewed when required. In addition, noise absorbing material can be applied to the back of the door handles.

DESCRIPTION AND OPERATION

Noise, Vibration and Harshness

Noise, coming from the vehicle and which can be heard inside and outside the vehicle.

Vibrations, oscillations that are felt and noticeable inside the vehicle.

Harshness, noises which come from the vehicle and which can be heard, felt and noticed inside and outside the vehicle.

These terms are grouped together under the title Noise, Vibration, Harshness, or NVH for short.

The task of vehicle development and production is to ensure that noises caused by the vehicle do not disturb the driver and passengers. Moreover, the the external noises emitted by the vehicle must not exceed the thresholds set by law.

NOTE: Basic and advanced training courses are offered for the following contents. For an overview of all courses offered, please refer to the Ford Service Organisation's training course brochure.

Noise types and causes

Noises in and around the vehicle are assigned specific descriptions:

- Humming and droning are perceived as low tones.
- Buzzing and whirring are middle tones.
- Howling, whistling, squeaking are assigned to the high tones.

Low to middle tones are considered to be unpleasant. They are palpable and noticeable as oscillations and vibrations throughout the body. Loud howling and whistling is painful to the ears.

A noise usually consists of a superimposition of different tones which spread as oscillations.

Each of these oscillations has a specific oscillating time and can be measured in frequencies. The frequency describes the number of oscillations per second. The frequency unit is specified in Hertz (Hz).

The human ear can perceive frequencies between 20 and 20000 Hz.

Where the different notes come from in a vehicle:

- Low notes are mostly produced by the engine.
- Low tones can also be produced by the roadbed, particularly on rough surfaces. This is a form of droning which can be felt by the vehicle occupants as vibration or roughness.
- High tones however, which are experienced as howling or whistling noises, are often air currents (wind noises) or come from ancillary components such as the generator, power steering pump or drivebelt.
- There are also clattering noises which can occur when driving over an uneven road. These jerking noises are produced by, for example, the shock absorbers, chassis components or loose articles inside the vehicle.

Noises can already be contained where they occur or, if this is not possible, can be confined with suitable measures.

The basic procedures here are the damping of oscillating parts, the insulation of components or the absorption of the noises through appropriate materials.

Damping

If a damper is installed next to an oscillating mass, the characteristic of the damper will reduce the movement of this mass accordingly (e.g. bumper on chassis).

Damping affects the resonance of an object or system.

Isolation

In oscillation technology, the term isolation means decoupling (separation) of components and systems. An engine is mounted in sprung elements, so that as little oscillation as possible is passed to the vehicle.

In automotive technology, the isolation technique used is nearly always rubber mounting. Rubber has a large internal damping capacity. The elasticity of the rubber acts like a spring.

Absorption

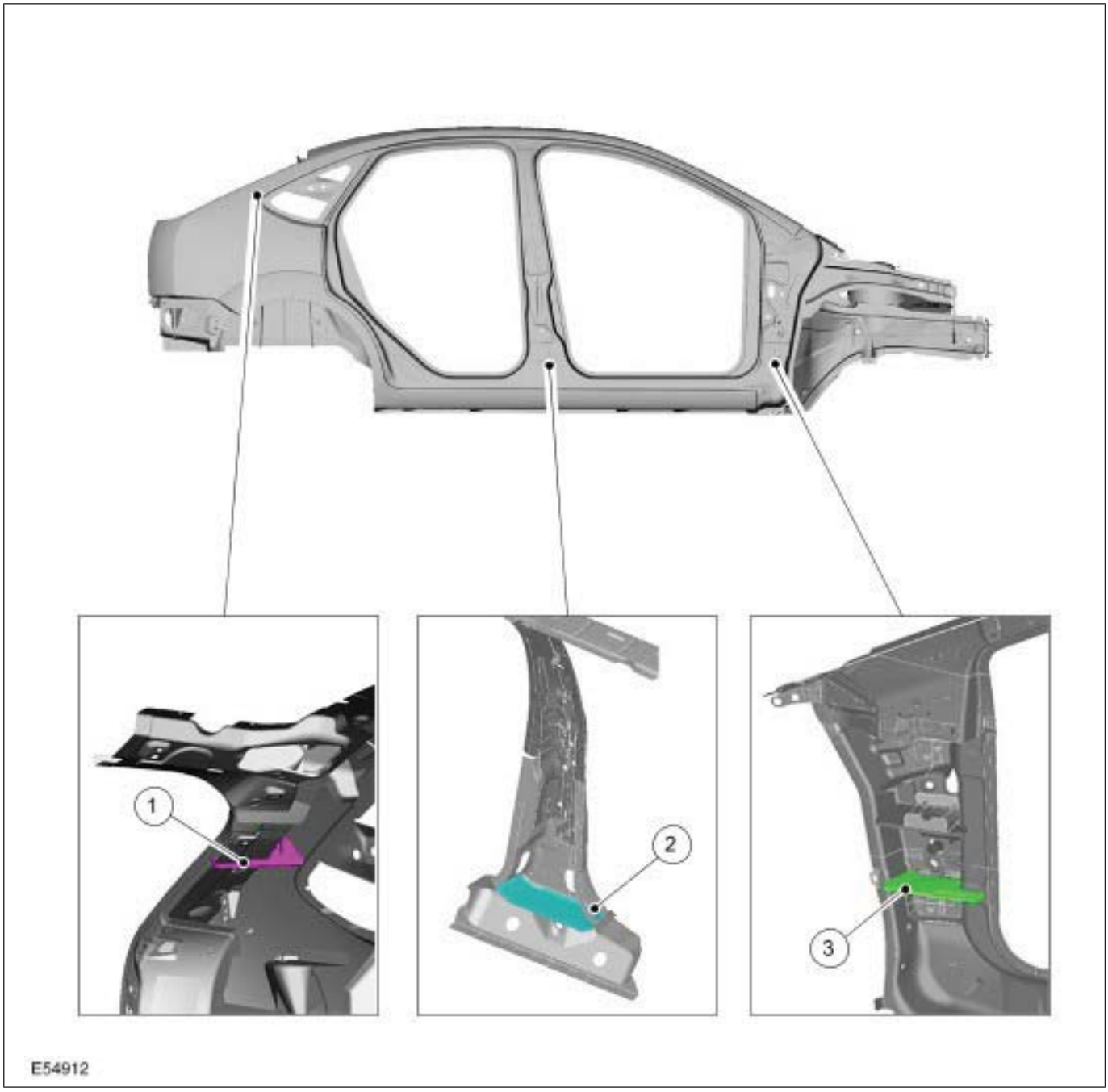
Sound waves are reflected from hard surfaces Through the use of absorption material, sound waves hit soft surfaces and are absorbed by them.

The composition and thickness of the material used plays an important role here. A soft surface, depending on its composition, absorbs the sound waves and reduces their energy.

NVH elements

NVH elements are installed to prevent airborne sound transfers to the passenger compartment in different body cavities.

DESCRIPTION AND OPERATION



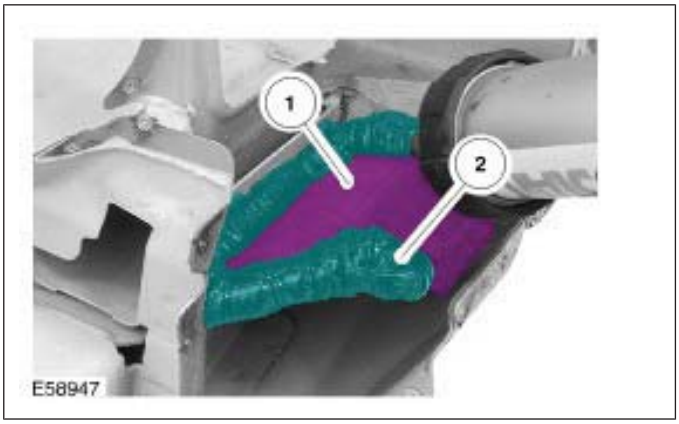
Item	Description
1	C-pillar area
2	B-pillar area
3	A-pillar area

On the Focus 2004.75 (07/2004-) these elements are located in the cavities of the A, B and C pillars. On the estate version, they are also located in the D pillars.

The NVH material consists of a carrier plate which has compressed isolation material at the edges. In the drying system of the painting equipment used in production, the body is heated to approx. 170° C. At this temperature the isolation material expands to seal the gap between the carrier plate and the bodywork.

NOTE: NVH elements must not be damaged during work on the vehicle body. NVH elements deformed through impact must always be replaced. PU adhesive must always be applied to the edges of new and reused NVH elements during repair work.

DESCRIPTION AND OPERATION



Item	Description
1	NVH element
2	PU adhesive

For the exact installation position of an NVH element, please refer to the vehicle-specific repair instructions.

If an NVH element is to be reused, the bonding on the body panel must be detached. To do this, the body panel must be heated in the area around the NVH element. The bonding can be detached at approx. 170° C. The damaged panel part can now be carefully dismantled.

Before installing the new panel part, a PU adhesive must be applied to the contact areas between the panel and the NVH element.

Test techniques, measuring devices

The shortest route to an accurate diagnosis results from:

- general information on the problem vehicle and a comparison test with a vehicle of the same construction, without NVH problems.
- vehicle history, including repair history and usage patterns.
- condition history, especially any relationship to repairs or sudden change.
- knowledge of probable causes.
- application of diagnosis procedures in which the vehicle is split into corresponding areas.

The diagnosis and correction of noise, vibration and harshness concerns requires:

- general information on the problem vehicle and a comparison test with a vehicle of the same construction, without NVH problems.
- vehicle history, including repair history and usage patterns.
- condition history, especially any relationship to repairs or sudden change.
- knowledge of probable causes.
- application of diagnosis procedures in which the vehicle is split into corresponding areas.

NOTE: The diagnosis of droning problems is one of the most difficult tasks in the NVH area. With the exception of installed components under stress, a certain diagnosis of droning problems (or boom) on customer vehicles makes great demands on the automotive technician. The performance of measuring equipment and their practice-orientated application can only be obtained through suitable instruction (NVH training). The successful use of these devices requires a great deal of experience on the part of the user.

The diagnosis and correction of noise, vibration and harshness concerns requires:

- a road or system test to determine the exact nature of the concern.

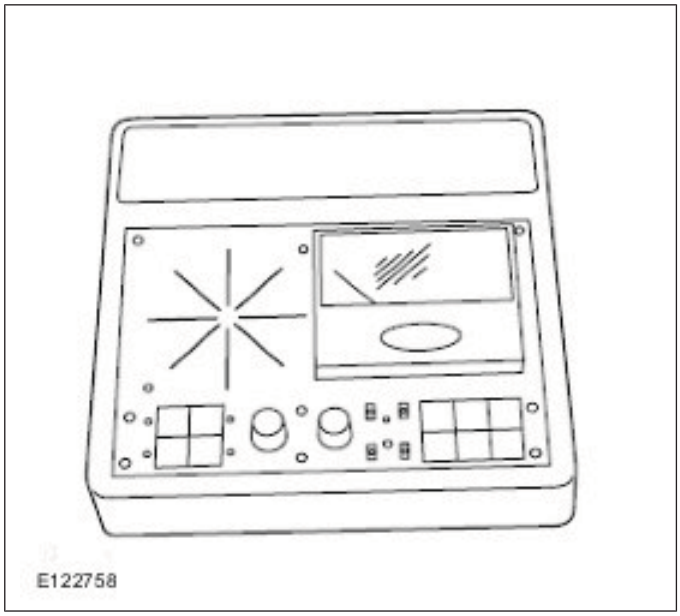
Analysis of possible causes:

- checking of the cause and elimination of the faults found.
- a road test or system test to make sure the concern has been corrected or brought back to within an acceptable range.
- It is often very difficult to locate noises that are audible in the passenger compartment based on the problem description provided by the customer and the road tests performed. The direction of the noise can be detected subjectively, but the source of the noise cannot be found.

NOTE: For a selection of simple test tools, see the wind noises section.

Electronic NVH tester

DESCRIPTION AND OPERATION



NOTE: Before using the NVH tester in the service, the service technician should take part in an NVH training course to ensure effective use of this device during the road test. A description of the function and application of the NVH tester is enclosed with the device.

The measuring device described below is used for diagnosis of the solid-borne sound and solid-borne sound transmission paths. The device is particularly suitable for medium and high frequency noise analyses. It principally enables noise diagnosis in the area of solid-borne sound and helps to identify solid-borne sound transmission routes.

In order to obtain a positive diagnosis of droning problems (low frequency noises) and their sources, you must have sufficient experience of how to use this measuring device.

The device works according to the following operating principle: Accelerometers (transmitters) are fitted on various vehicle components or body areas. The signals recorded here can be listened to one after the other on headphones or speakers via the different channels. Simultaneous illustration of several or all measuring channels (for comparison) is only possible visually on the display of the measuring device.

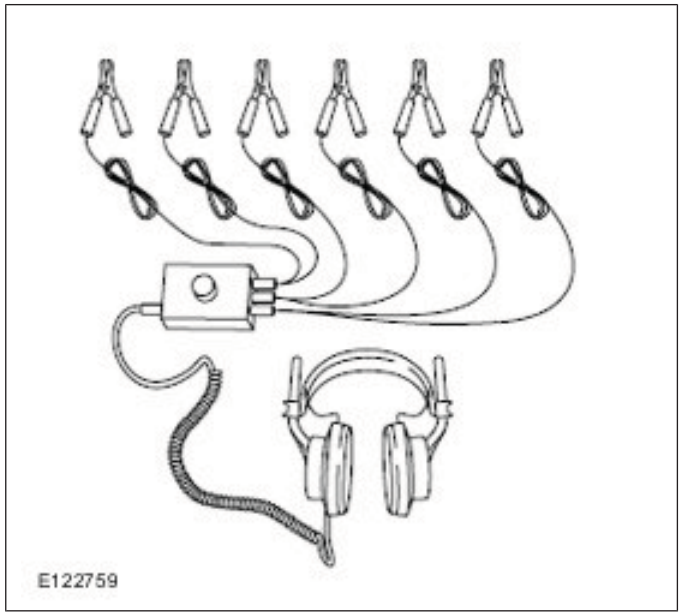
Layout and operation:

- The test device has six different channels for noise diagnosis.
- Each channel is marked in color on the terminal, cable and test device.
- The solid-borne sound recorded is transmitted to the test device or the headphones by the magnetic accelerometers (transmitters).
- There is an amplifier on the test device with which the signal strength and the corresponding channel can be set.
- Only the noises from a transmitter are transferred to the headphones.
- All connected cables can be visually illustrated individually or simultaneously on the display.
- The test device saves the recorded data.
- The recorded data can be imported to a PC and evaluated.

The NVH tester is equipped in addition with mobile magnetic sensors which are particularly suitable for the following noise tests:

- Internal noises at the dashboard
- Engine noise
- Electrical noises (sparking/voltage transmissions)
- Wind noises
- Vacuum - leaks

Chassis noise tester (chassis ear)



Used to diagnose solid-borne sound and its transmission routes. The device is particularly suitable for medium and high frequency noise analysis and principally enables noise diagnosis in the area of solid-borne sound and helps to identify solid-borne sound transmission routes.

In order to obtain a positive diagnosis of droning problems (low frequency noises) and their sources, you must have sufficient experience of how to use this measuring device.

Layout and operation:

DESCRIPTION AND OPERATION

The test device has six different channels for noise diagnosis. This means that six microphones equipped with clamps can be attached to different components on the vehicle. The emitted or transmitted solid-borne sound will be transferred from microphone to the headphones. There is an amplifier between the microphone and the headphones at which the signal strengths and the corresponding channel can be set.

Only the noises from one microphone are transferred to the headphones. Each channel is color-coded on the clamp, cable and amplifier.

NOTE: In order to be able to relate the positions of the different microphones during the test process, they are entered in a special test sheet according to their colors. Microphones, clamps and cables must be carefully routed and attached.

Test process (example for transmission noise):

- Attach microphones to various positions on the transmission or mountings. This first allows the source of the noise to be determined, and then the possible transfer routes.
- A road test can be performed after all the clamps have been attached to the vehicle and all the cables connected to the amplifier.
- Firstly, all the channels are switched through one after the other in neutral, to check the operation of the different channels as well as the noise level in neutral.
- During the road test, all channels are listened to in the different gears, engine speeds, vehicle speeds and loads. This procedural method permits unambiguous diagnosis of the cause of the noise and the route of the noise until it enters the bodywork structure.
- The characteristics of the noise which is the cause of the concern should match those of the noise which is heard. This means compare the sound.
- Depending on the input signal level, there may be a great deal of difference in the noise level in the individual channels.
- Always set the amplifier volume to zero before switching to another channel.
- In order to be able to make any comparisons, the volume settings of the different channels must be recorded on the test sheet.

SECTION 501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Anti-corrosion protection for body work

Description	Part number	Specification
Underbody protection	5 030 492	-
Cavity wax	5 030 081	-
Anti-corrosion wax	1 219 834	WSK-M7 C89 A
Clinched flange protection	1 136 479	WSK-M4 G245 B
Weld primer	1 205 996	-

DESCRIPTION AND OPERATION

Body and Frame

Introduction

The new Focus 2004.75 (07/2004-) is offered as a 3-, 4- or 5-door saloon and as a wagon.

Design features

Many of the body components (e.g. the floor pan) have been carried over from the Focus C-MAX 2003.75 (06/2003-). The model specific structure is made on this floor pan. The wagon is also based on this floor pan up to the C-pillars. The rear components of the floor pan, such as the luggage compartment floor panel, the sidemembers and the crossmember are specific to the wagon however.

The safety passenger cell corresponds to the structure of the Focus C-MAX 2003.75 (06/2003-).

At the front of the vehicle there is a steel plate crash element connected to the side member by threaded connections. This crash element can absorb light impacts of up to about 15 km/hr. Because of the threaded connections, the crash element can be changed very quickly.

NOTE: Deformed crash elements must not be straightened or repaired.

Heavier impacts which can no longer be absorbed by the crash element must be absorbed by the side members or the floor pan structure. Depending on the extent of the damage, the side members can be replaced in whole or in part (see subsection 501-27).

A steel cross member is also installed at the rear of the vehicle using threaded connections. This forms a connection between the ends of the two side members and therefore contributes to an increase in passive safety in the event of rear end impact. This bolted-on crossmember absorbs the impact energy of minor impacts and thus prevents deformation of the side members and therefore the body structure. The crash element can be changed very quickly because of the threaded connections.

More severe impacts at the rear are absorbed by the rear panel, side members and the luggage compartment floor panel. It is possible to only partially replace the side members and the luggage compartment floor panel (see subsection 501-30).

Laser weld seams

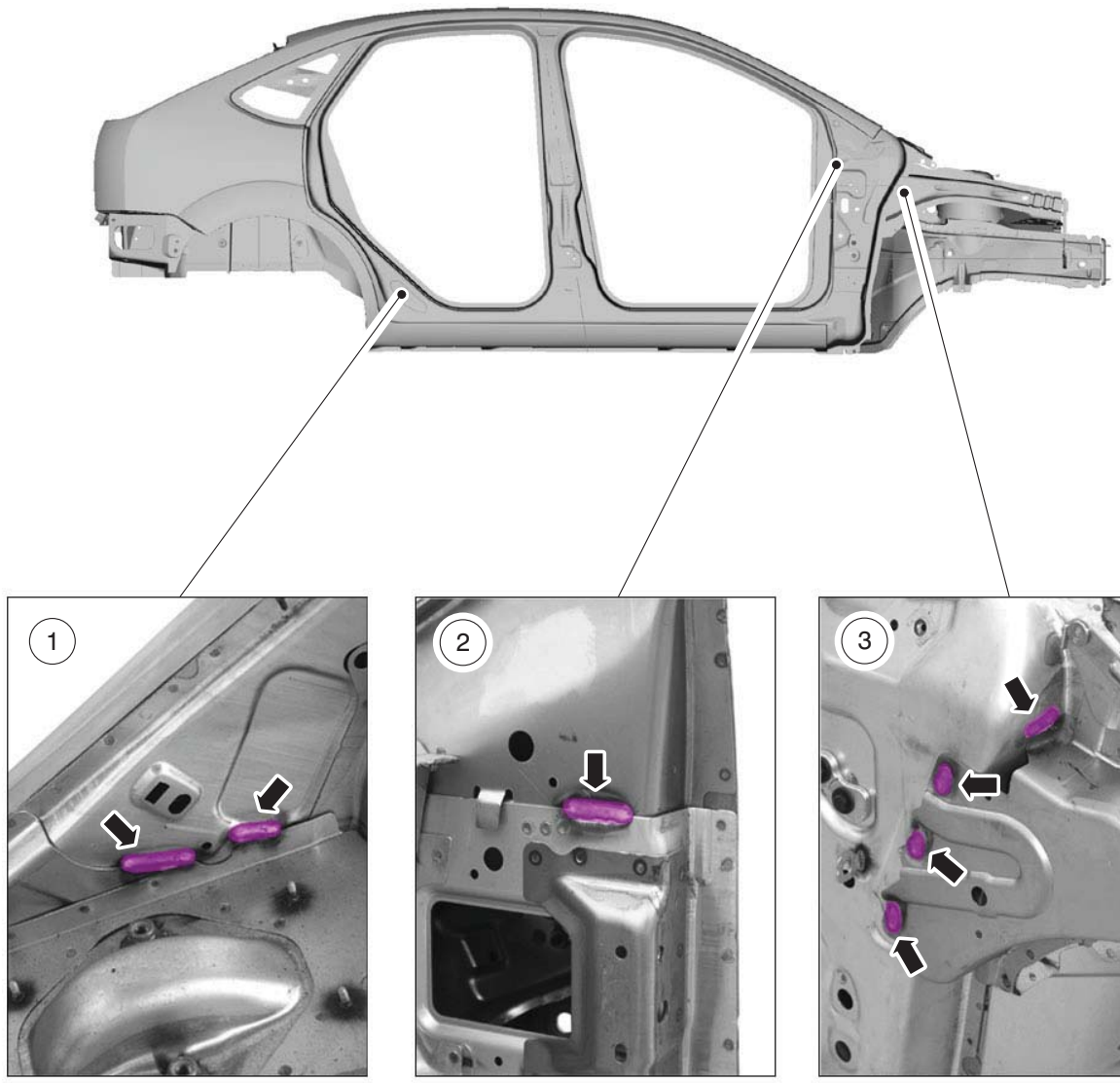
As on Focus C-MAX 2003.75 (06/2003-), there are laser weld seams on the front and rear side members.

NOTE: In the event of damage or repair work in these areas, the corresponding requirements is subsection 501-27 and 501-30 must be taken into account.

MIG brazed joints

MIG brazed joints are used on all model variants in the areas of the bulkhead reinforcement to A-pillar, A-pillar reinforcement to A-pillar inner panel and outer wheelhouse to door sill reinforcement.

DESCRIPTION AND OPERATION



E56064

MIG brazed areas

Item	Description
1	Outer wheelhouse / door sill reinforcement (inner)
2	A-pillar reinforcement / A-pillar inner panel (inner)
3	Bulkhead reinforcement / A-pillar (outer)

These MIG brazed joints must be replaced by MIG welds at another place if a repair is performed.

NOTE:

- These MIG welds must not be carried out on or near existing MIG brazed seams as even the smallest amount of brazing material can result in a reduction in the strength of the weld seams.
- When performing these repairs, the corresponding requirements is subsection 501-27, 501-29 and 501-30 must be observed.

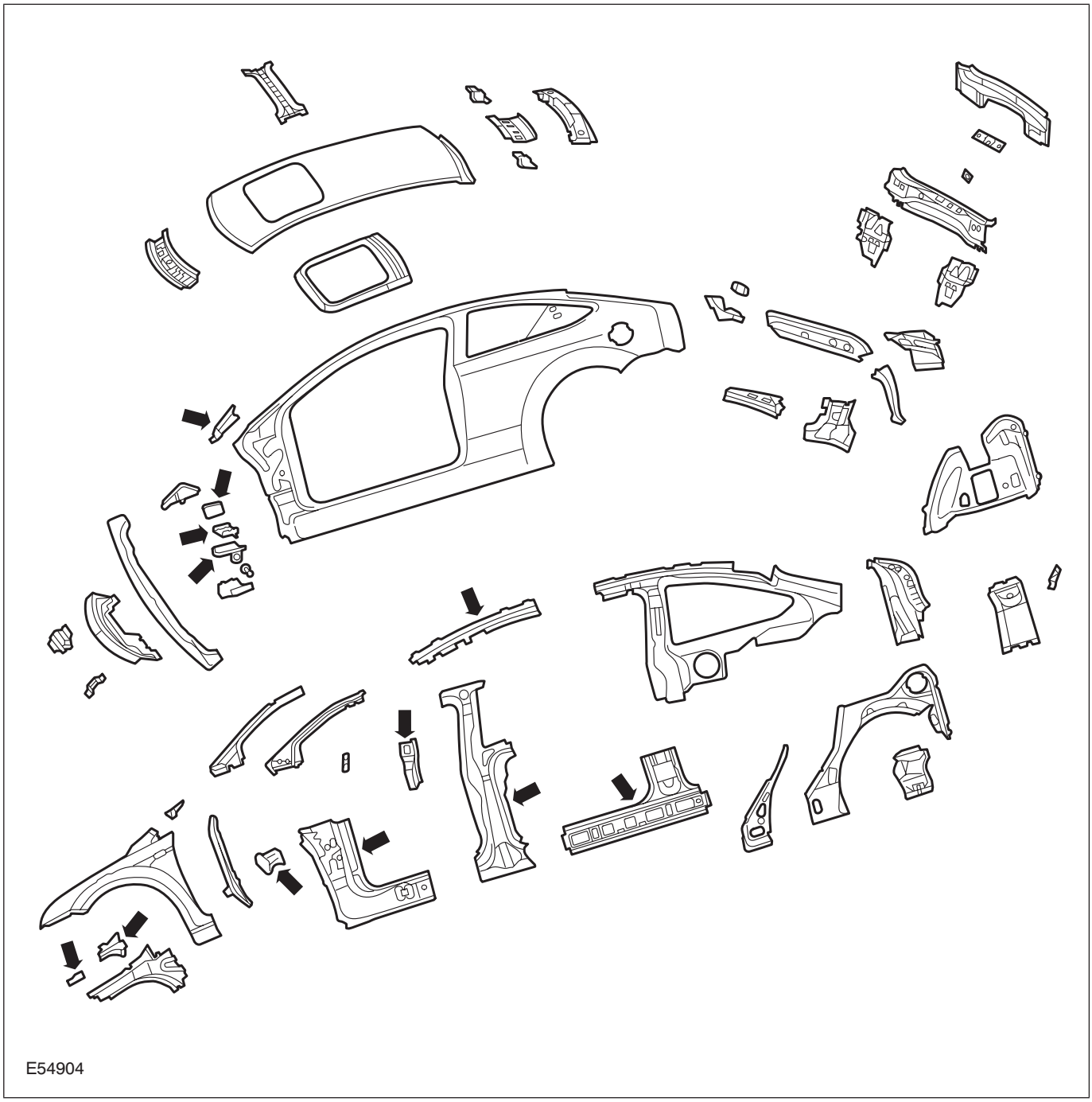
High-strength steel parts

High strength steel parts are used even more on the new Focus.

DESCRIPTION AND OPERATION

NOTE: The instructions for working on high strength steel panels given in subsection 501-25 must be followed during body repair work.

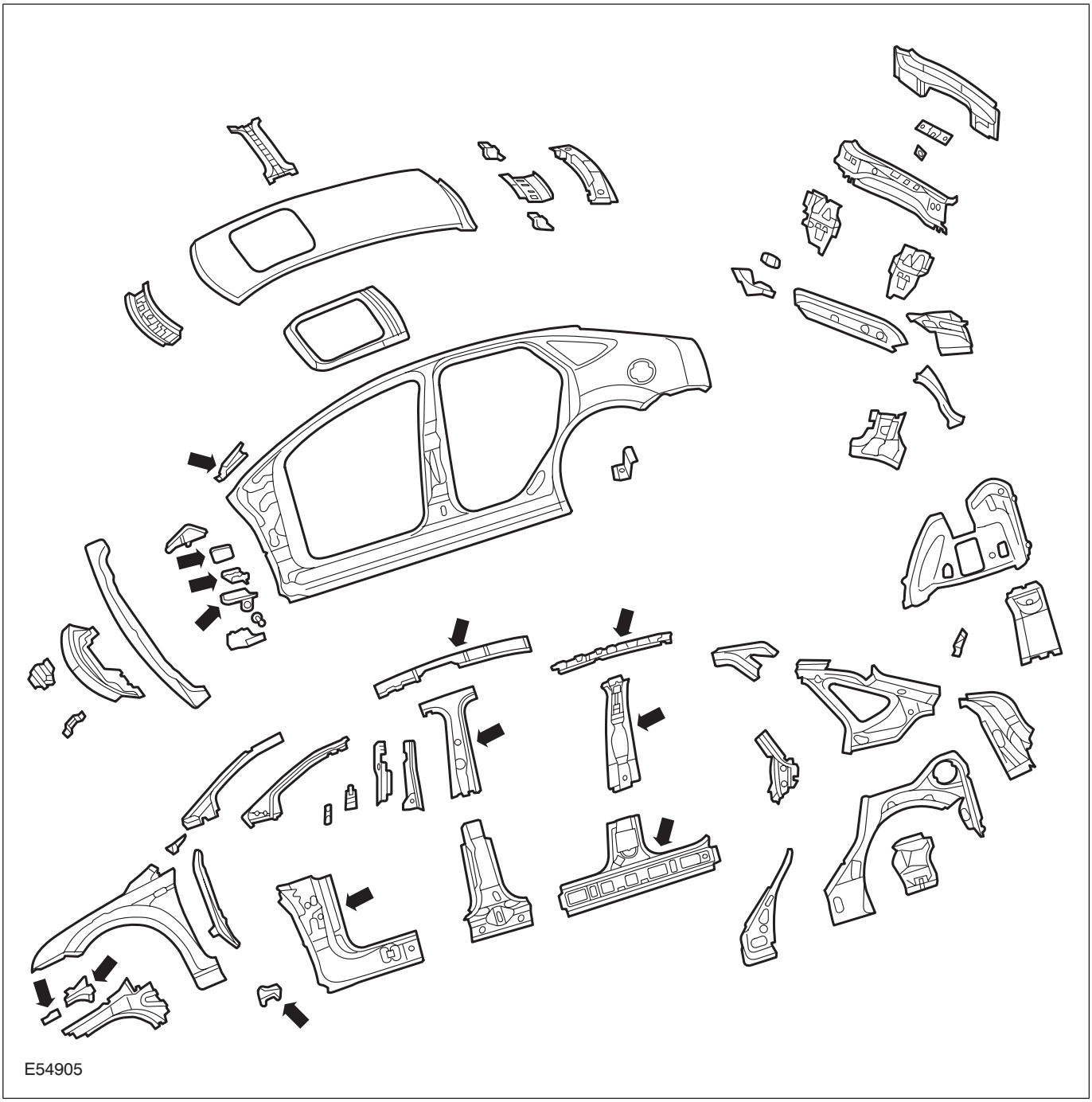
3-door variant - components overview, the high strength steel panels are marked with arrows.



DESCRIPTION AND OPERATION

4-door and 5-door variants - components overview, the high strength steel panels are marked with arrows.

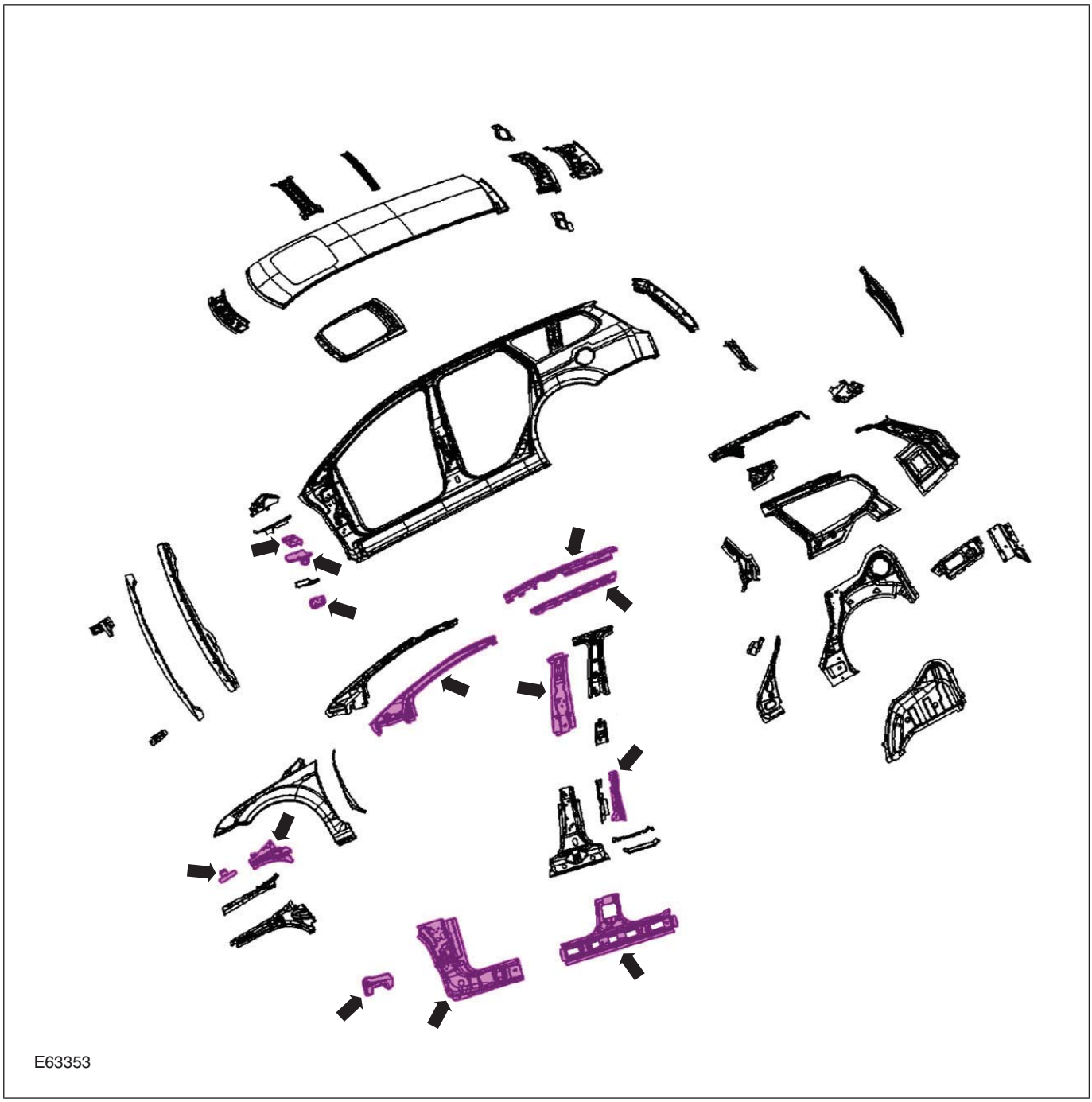
NOTE: Illustration E54905 shows the body panels of the 5-door variant. Because the 4-door and the 5-door variants are identical in design up to the B-pillars, the parts shown also apply for the 4-door variant.



E54905

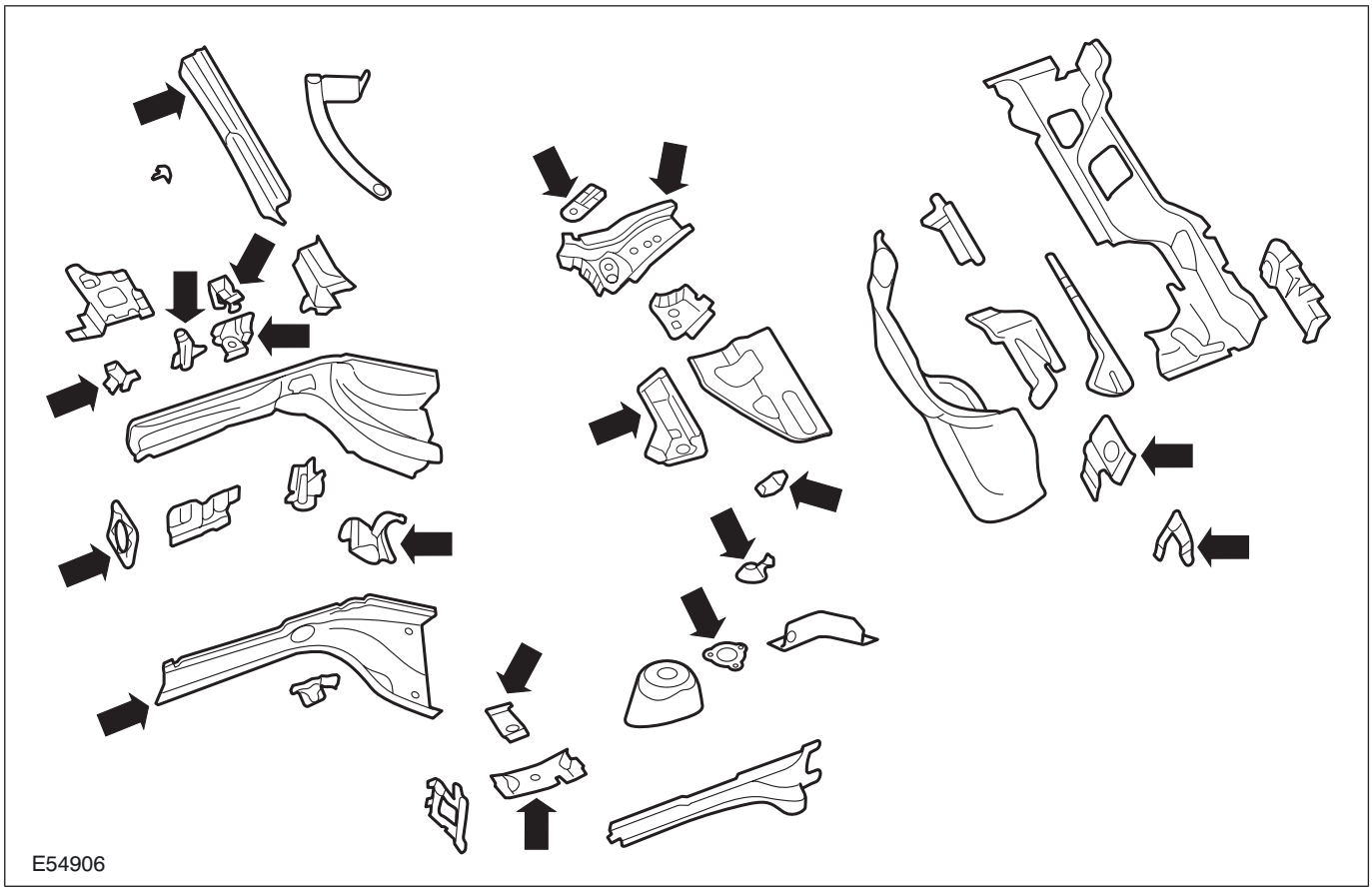
DESCRIPTION AND OPERATION

Wagon variant - components overview, the high strength steel panels are marked with arrows.



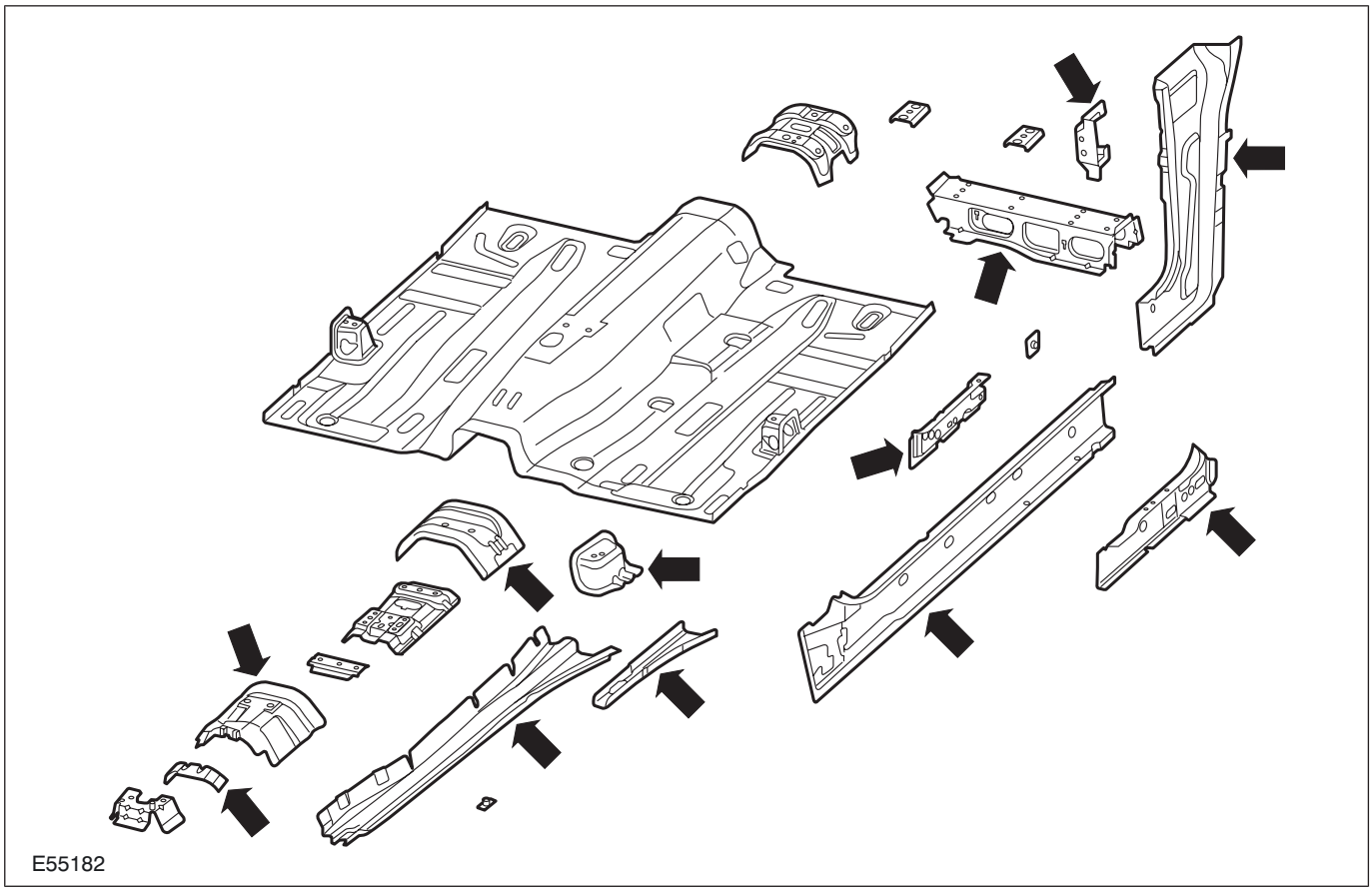
DESCRIPTION AND OPERATION

Front floor pan (all models) - components overview, the high strength steel panels are marked with arrows.



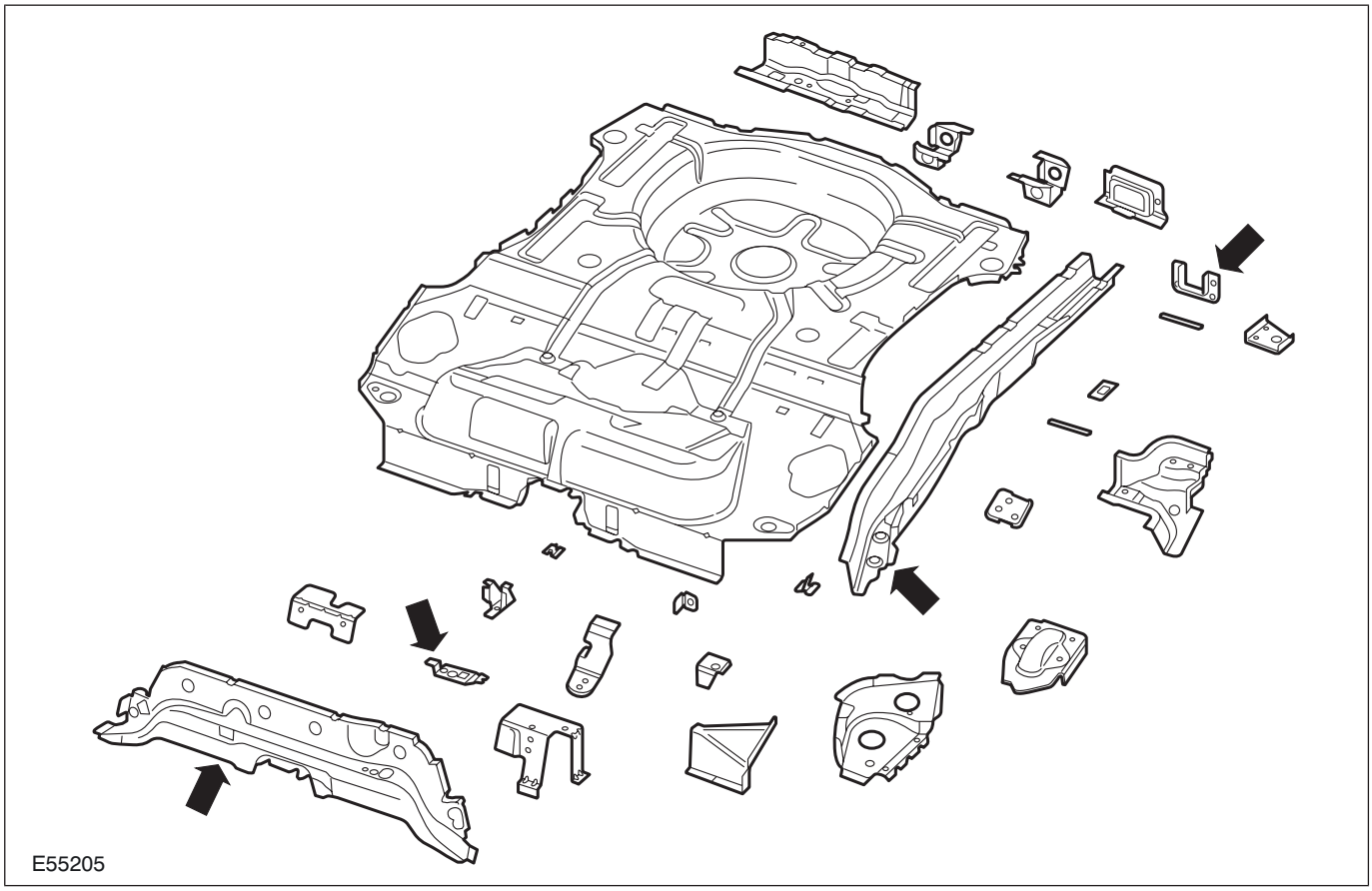
DESCRIPTION AND OPERATION

Middle floor pan (all models) - components overview, the high strength steel panels are marked with arrows.



DESCRIPTION AND OPERATION

Rear floor pan - 3-door, 4-door and 5-door variants - components overview, the high strength steel panels are marked with arrows.



DESCRIPTION AND OPERATION

Rear floor pan (wagon) - components overview, the high strength steel panels are marked with arrows.



Corrosion prevention measures

On the new Focus 2004.75 (07/2004-), all external and corrosion prone steel body panels are zinc plated on both sides.

The roof and some internal reinforcement panels on the floor pan and on the A-, B- and C-pillars are not zinc plated.

NOTE: The instructions for working on zinc plated steel panels given in subsection 501-25 must be followed during body repair work.

Further corrosion protection measures

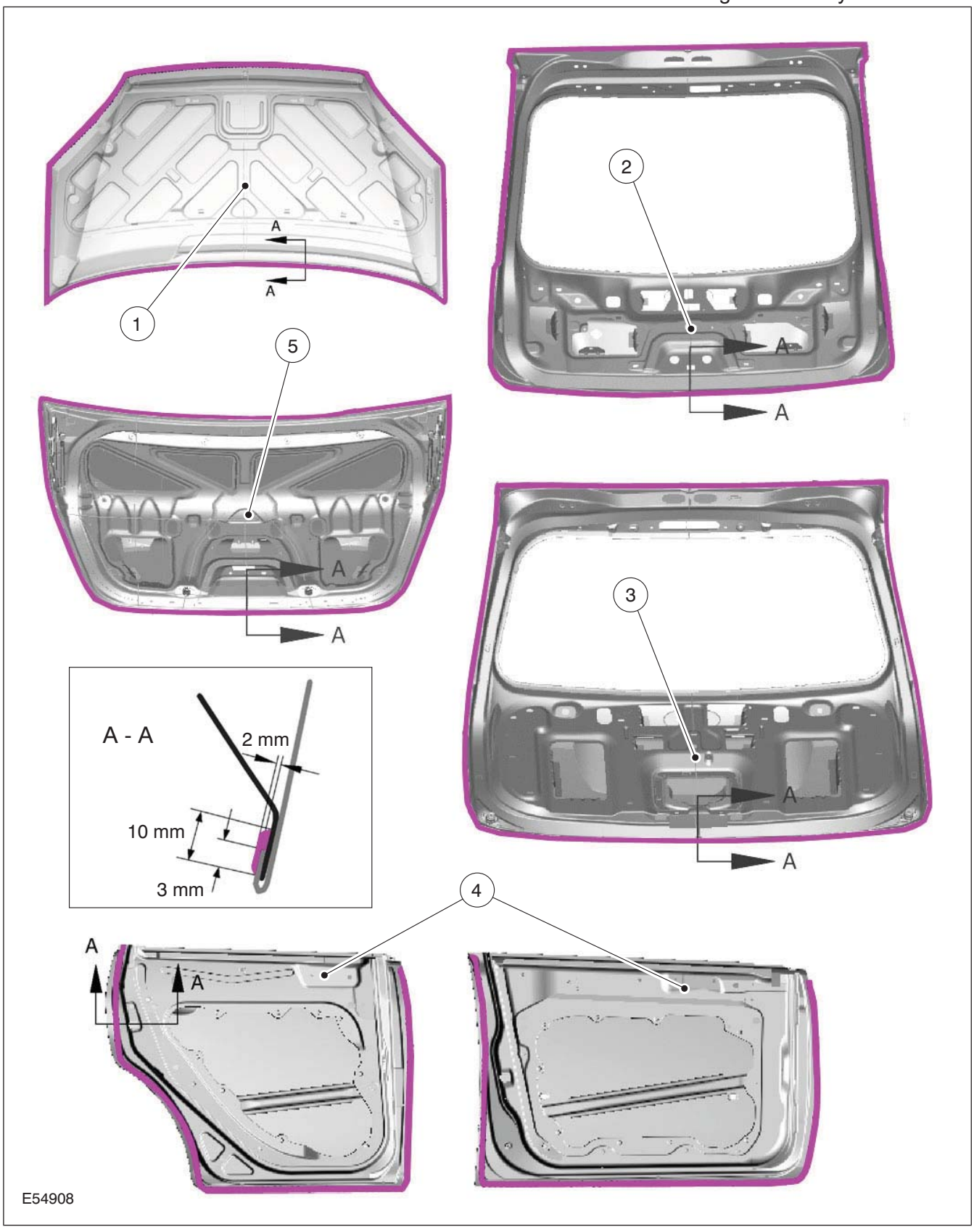
Hoods, doors, tailgates and luggage compartment lids supplied as replacement parts do not have clinched flange sealing. Sealant must be applied to the dip primer in the dealership before painting. In doing so, make certain that the cut edge of the external panel is covered by at least a 3 mm overlap of clinched flange protection. More than 5 hours drying time may be needed, depending on the thickness of application. Air drying overnight is therefore recommended.

DESCRIPTION AND OPERATION

NOTE: When body repairs are performed or if these components are renewed, this procedure must be observed.

Further corrosion protection measures are performed on the bodywork.

NOTE: The original corrosion protection must be re-created after working on the bodywork.

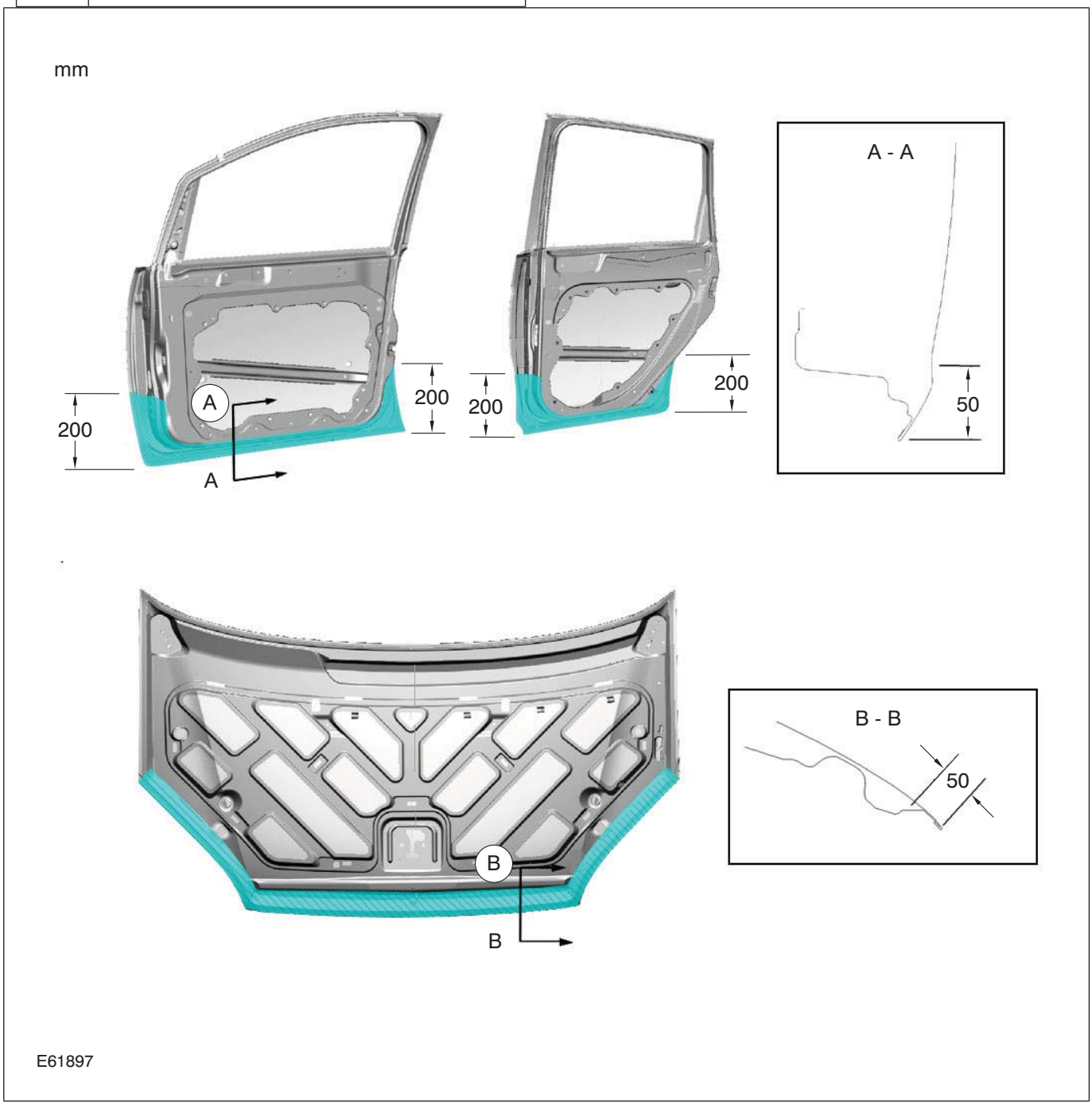


DESCRIPTION AND OPERATION

Clinched flange sealing

Item	Description
1	Hood
2	Luggage compartment lid, 3- and 5-door
3	Tailgate, wagon
4	Door front and rear

Item	Description
5	Luggage compartment lid, 4-door
A - A	Sectional view of the clinched flange sealing (minimum height and width indicated)

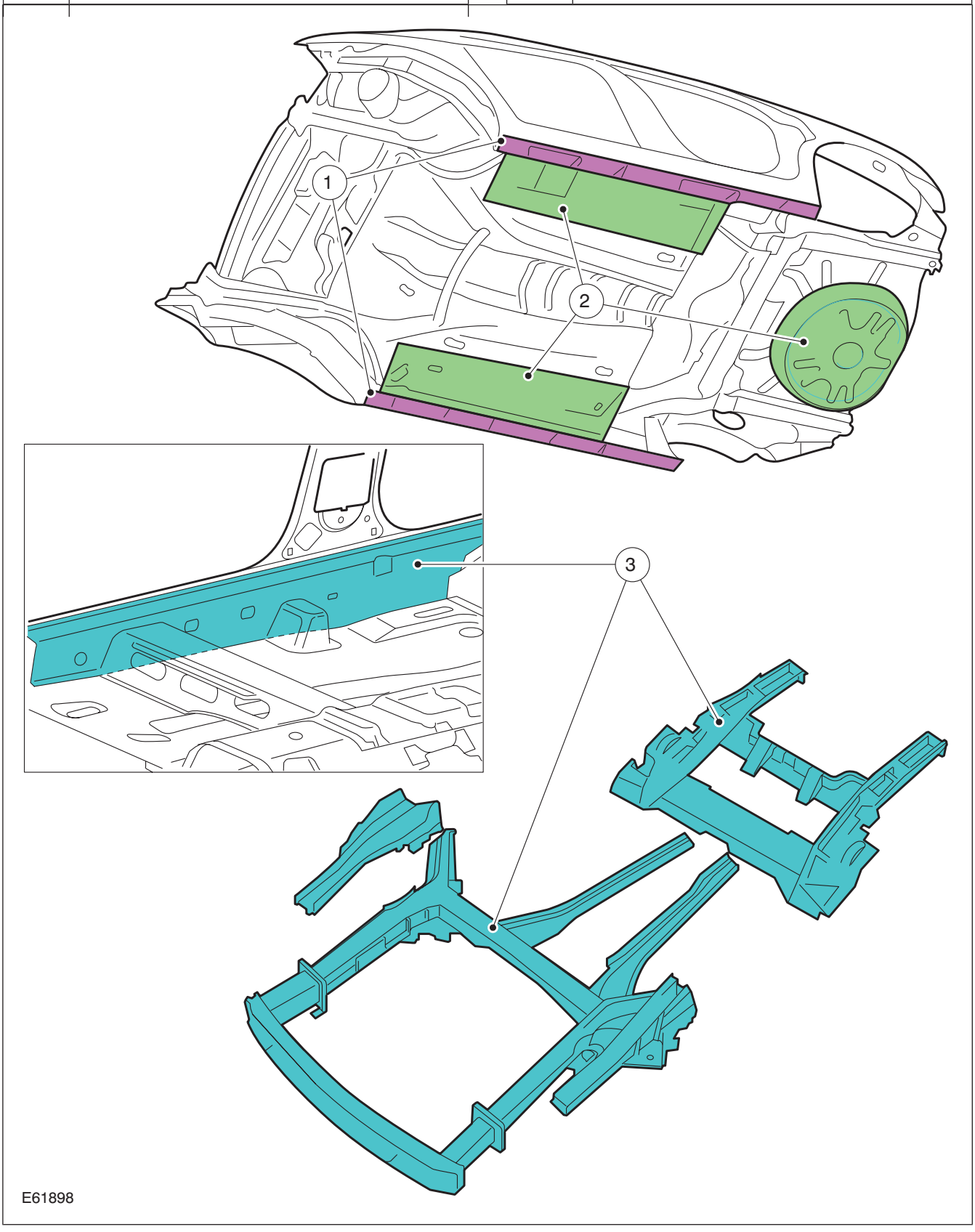


Cavity wax injection at the doors and engine hood

DESCRIPTION AND OPERATION

Item	Description
A - A	Sectional view of doors (application area indicated)

Item	Description
B - B	Sectional view of engine hood (application area indicated)



Corrosion protection at the floor pan

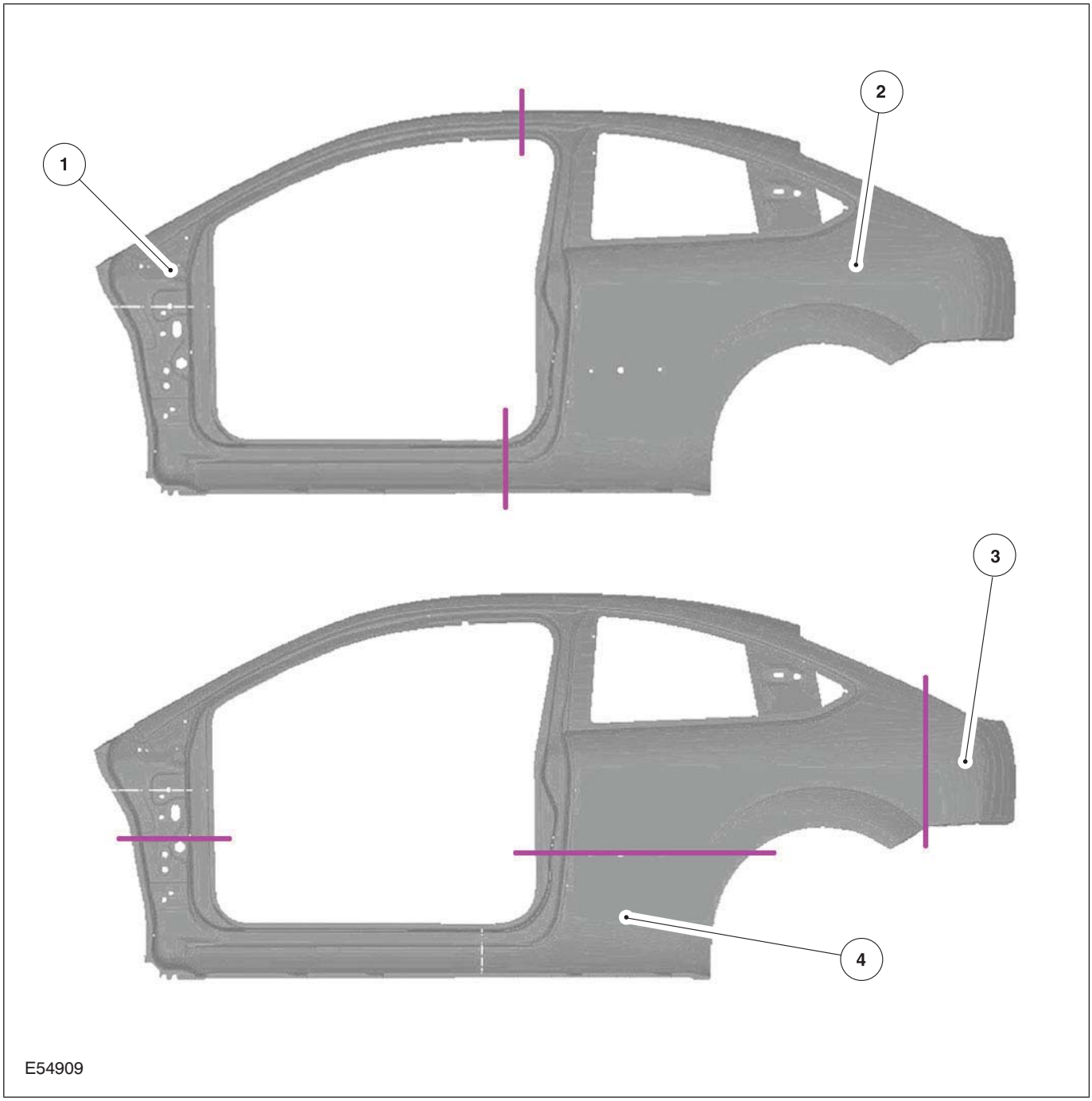
DESCRIPTION AND OPERATION

Item	Description
1	PU stone deflector
2	PVC underbody protection
3	Cavity wax injection

3-door component overview (side)

Sheet metal parts for partial replacement

Various service sheet metal parts are available for sectional replacement.

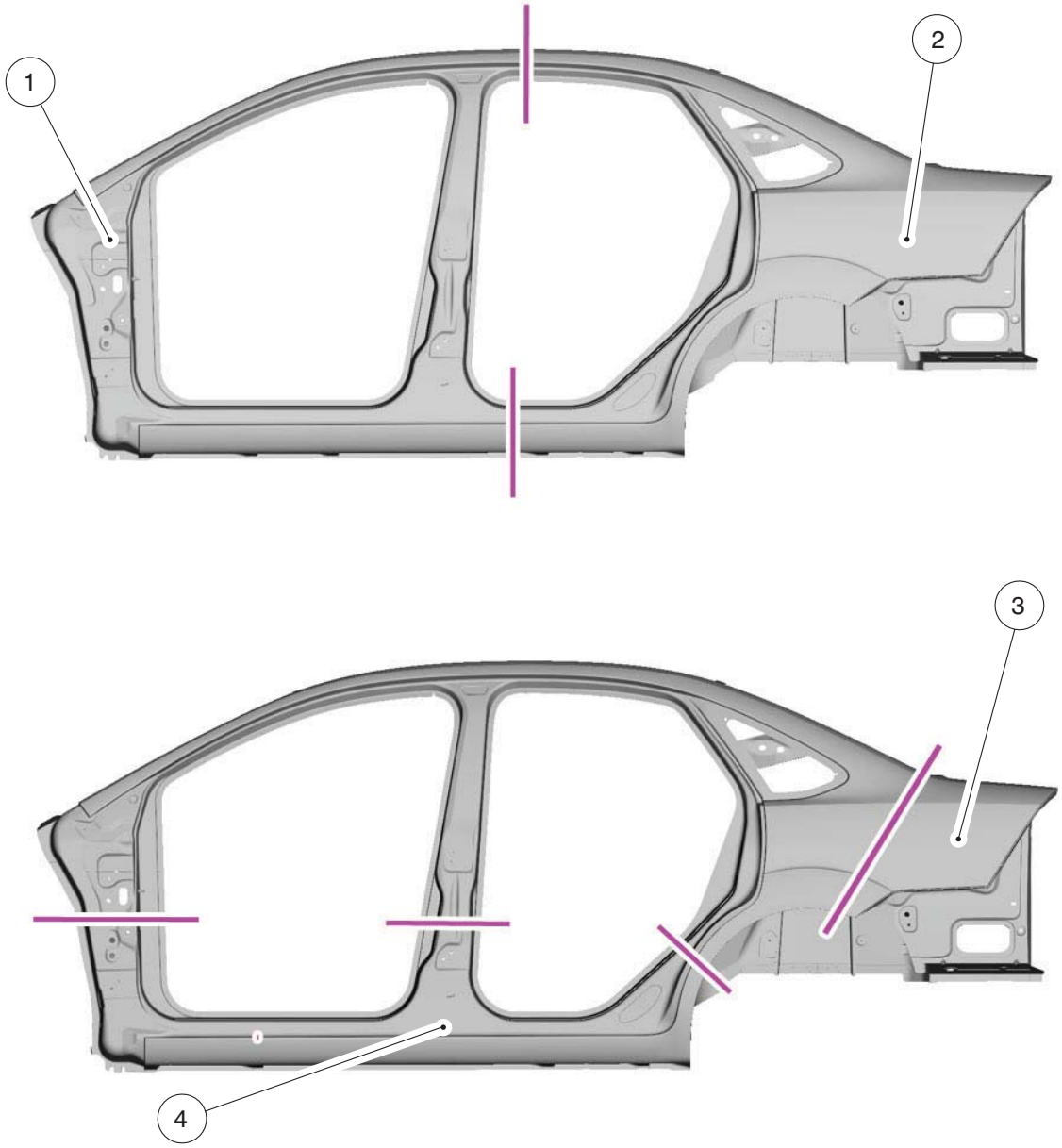


Item	Description
1	Front quarter panel
2	Rear quarter panel

Item	Description
3	Repair panel, rear quarter panel
4	Rocker panel

DESCRIPTION AND OPERATION

4-door component overview (side)

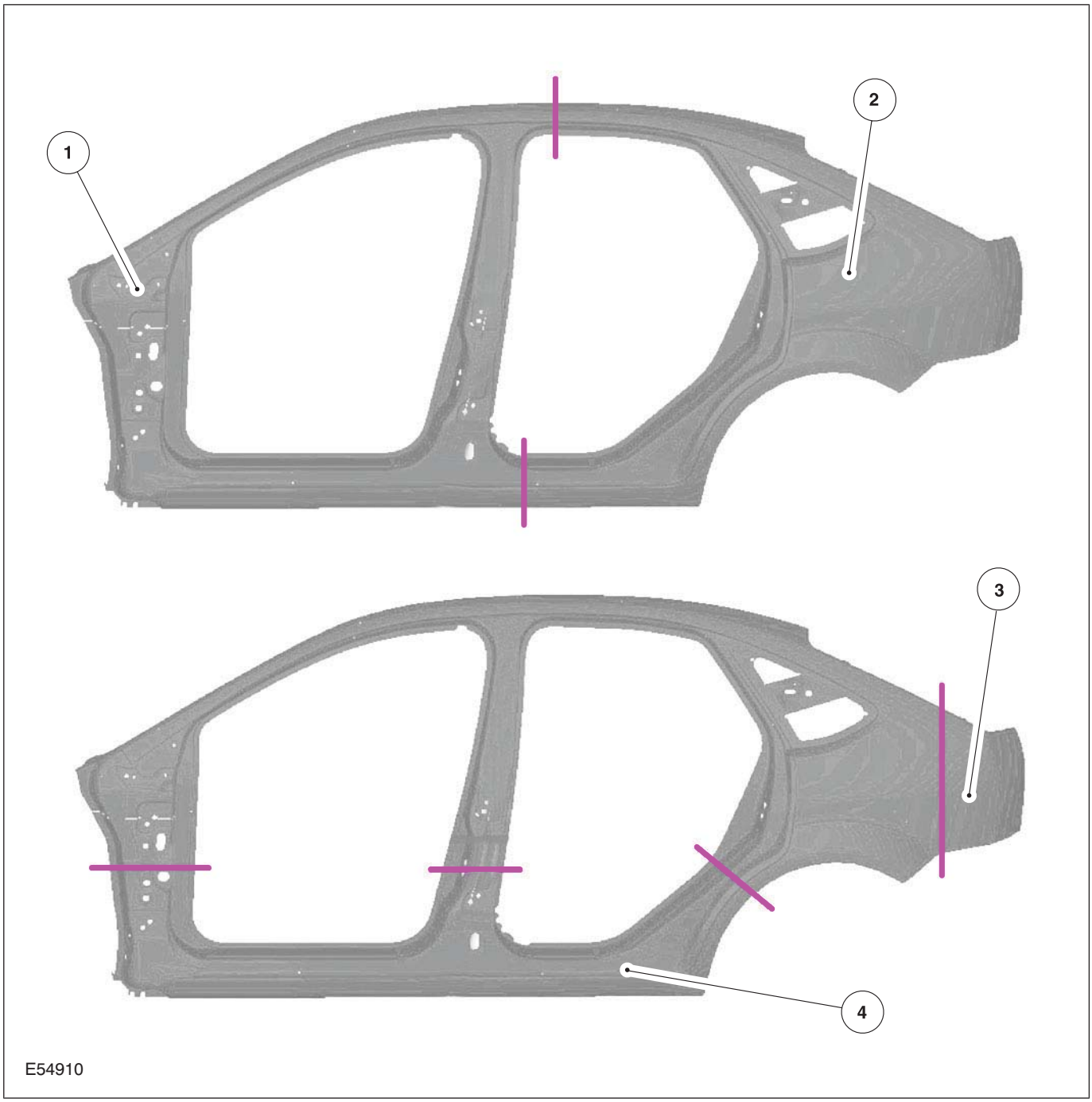


Item	Description
1	Front quarter panel
2	Rear quarter panel

Item	Description
3	Repair panel, rear quarter panel
4	Rocker panel

DESCRIPTION AND OPERATION

5-door component overview (side)

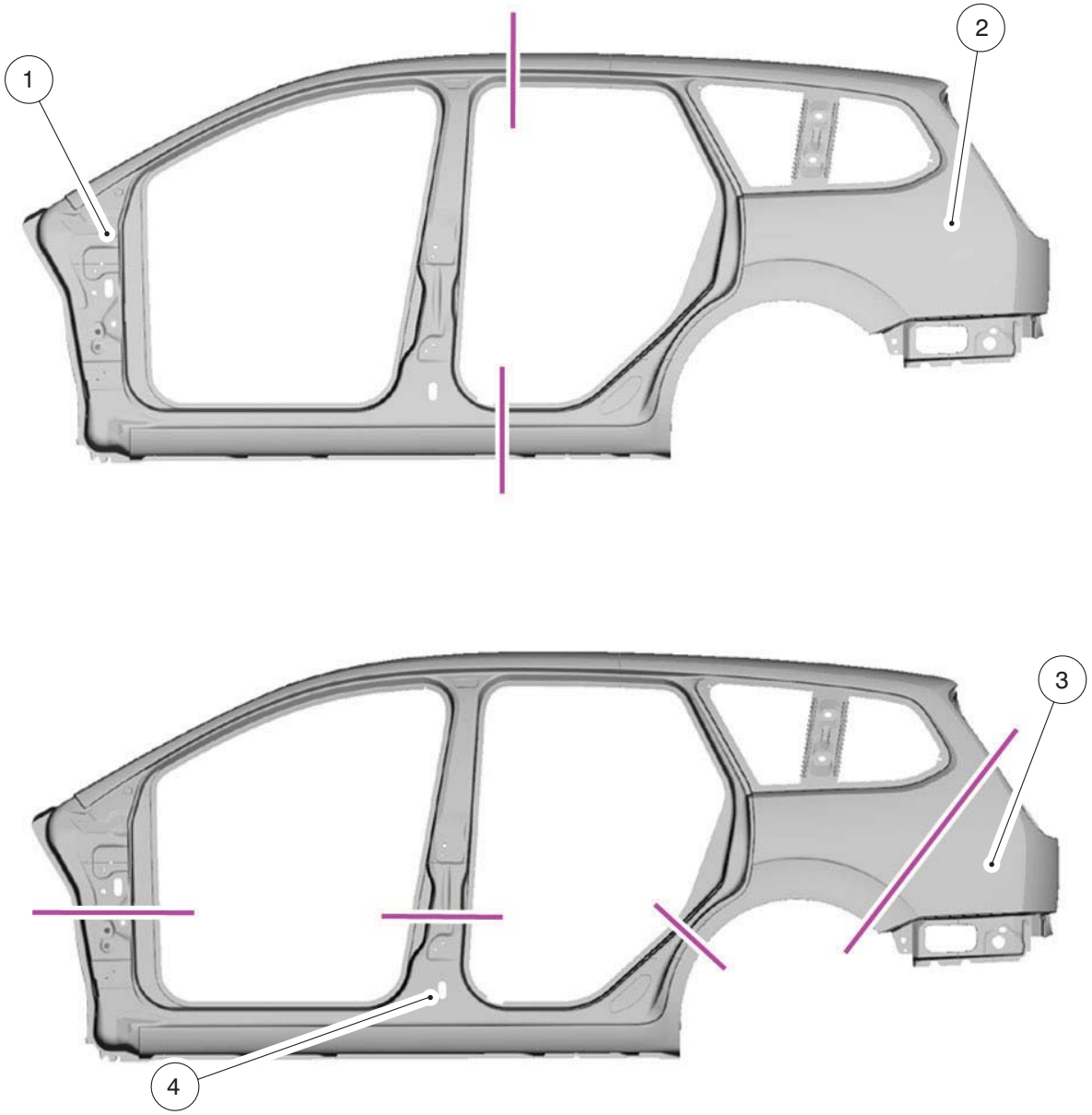


Item	Description
1	Front quarter panel
2	Rear quarter panel

Item	Description
3	Repair panel, rear quarter panel
4	Rocker panel

DESCRIPTION AND OPERATION

Wagon component overview (side)

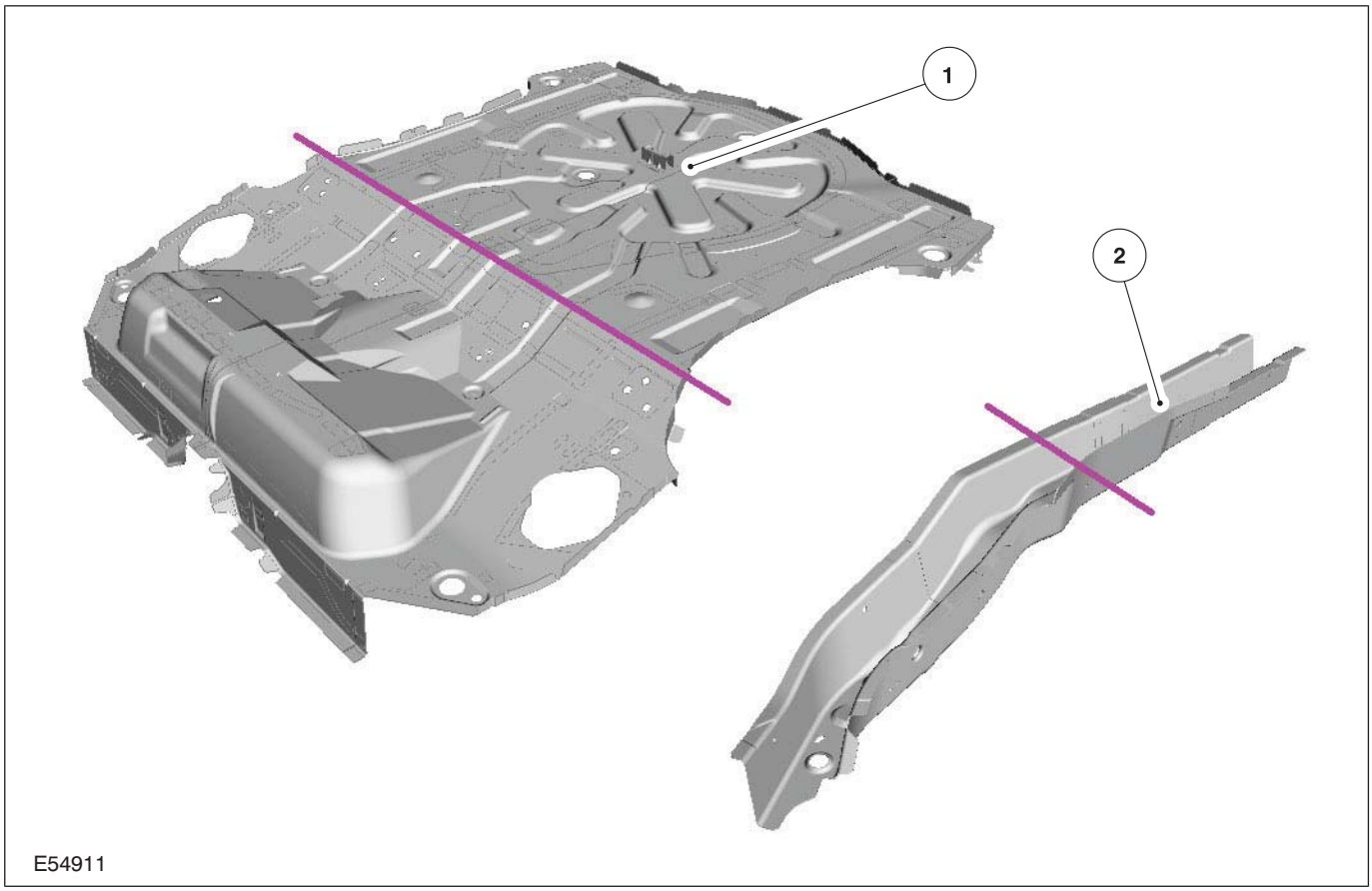


Item	Description
1	Front quarter panel
2	Rear quarter panel

Item	Description
3	Repair panel, rear quarter panel
4	Rocker panel

DESCRIPTION AND OPERATION

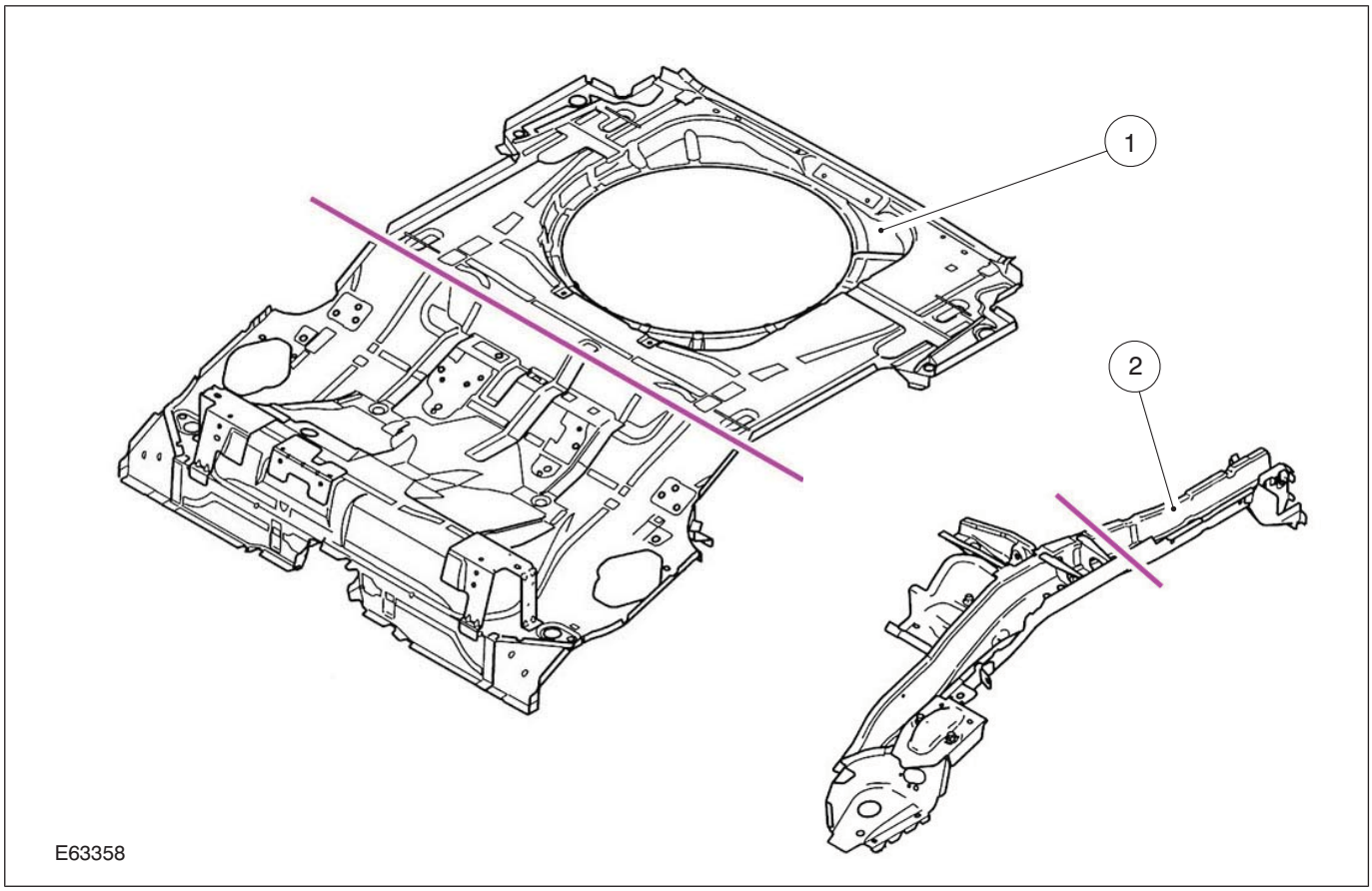
Component overview 3-, 4- and 5-door variants (rear floor pan)



Item	Description
1	Luggage compartment floor panel
2	Rear side member

DESCRIPTION AND OPERATION

Component overview, wagon (rear floor pan)



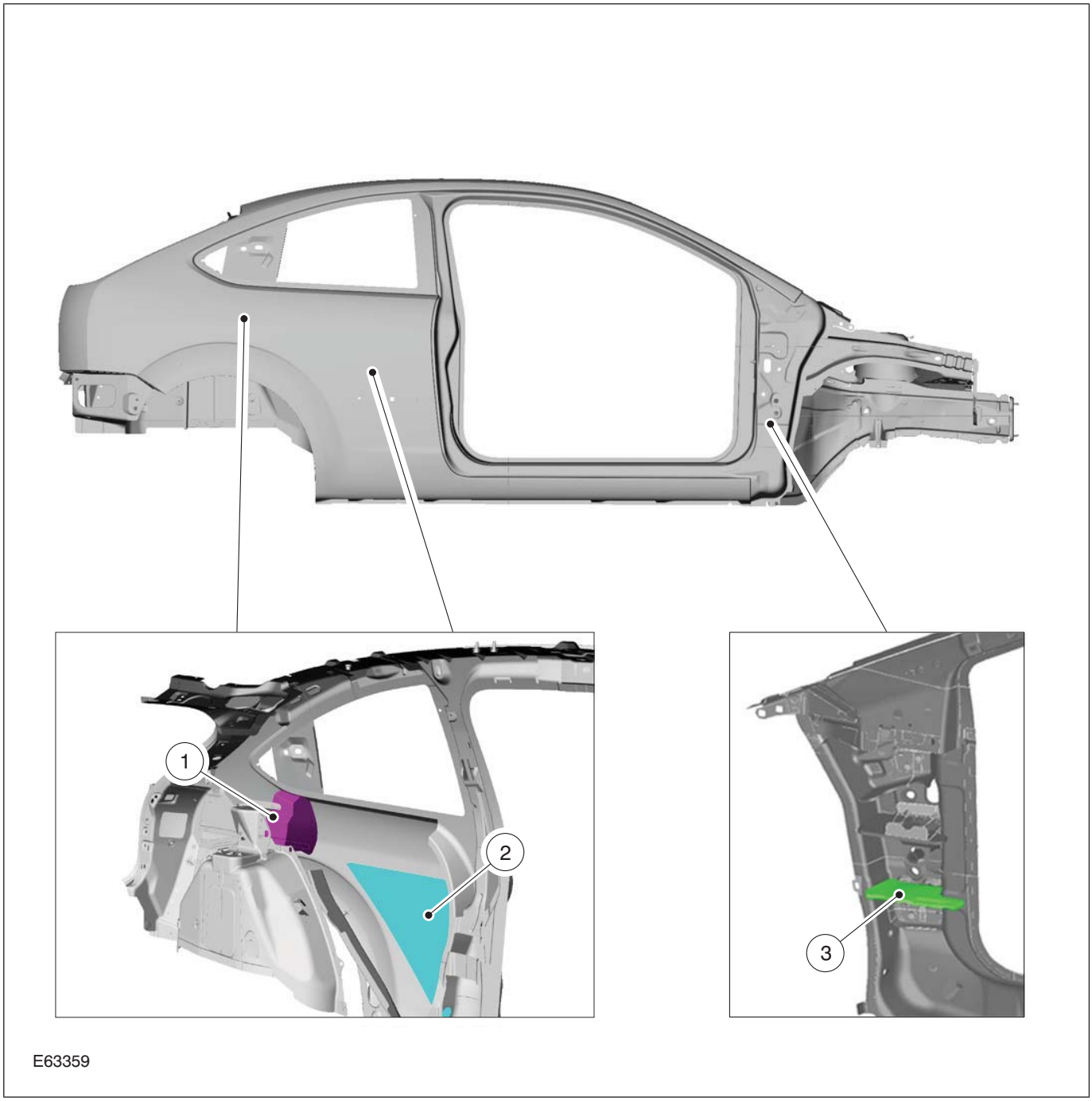
Item	Description
1	Luggage compartment floor panel
2	Rear side member

NVH elements

NVH elements are used in various body cavities to prevent the transfer of noise to the vehicle interior.

NOTE: NVH elements must not be damaged during work on the vehicle body. In the event of repair work in these areas, the corresponding requirements in subsections 501-27 to 501-30 must be taken into account. Deformed NVH elements must always be renewed.

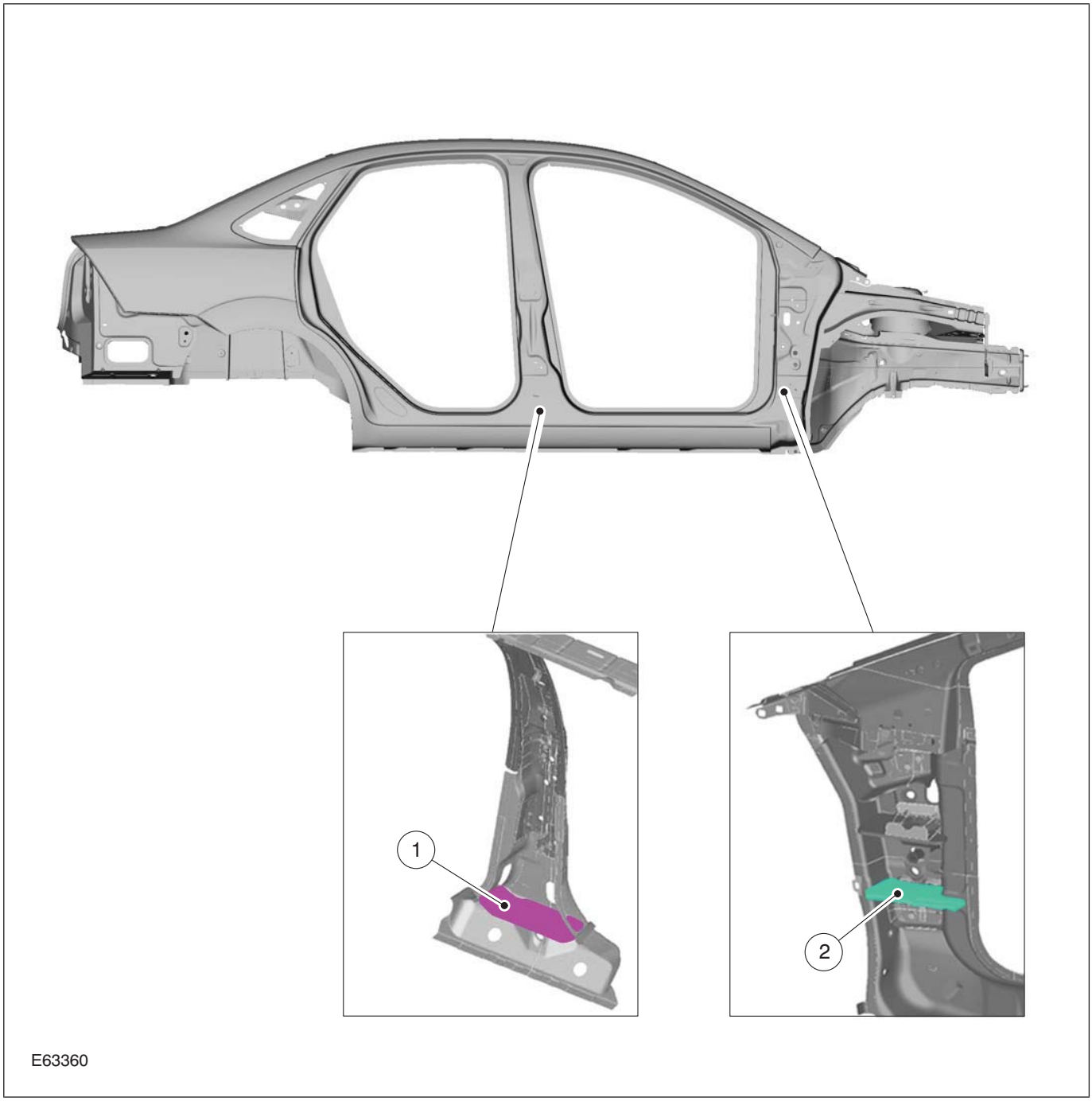
DESCRIPTION AND OPERATION



Installation positions on the 3-door (interior view)

Item	Description
1	Side panel / wheelhouse
2	Side panel (damping film)
3	A-pillar

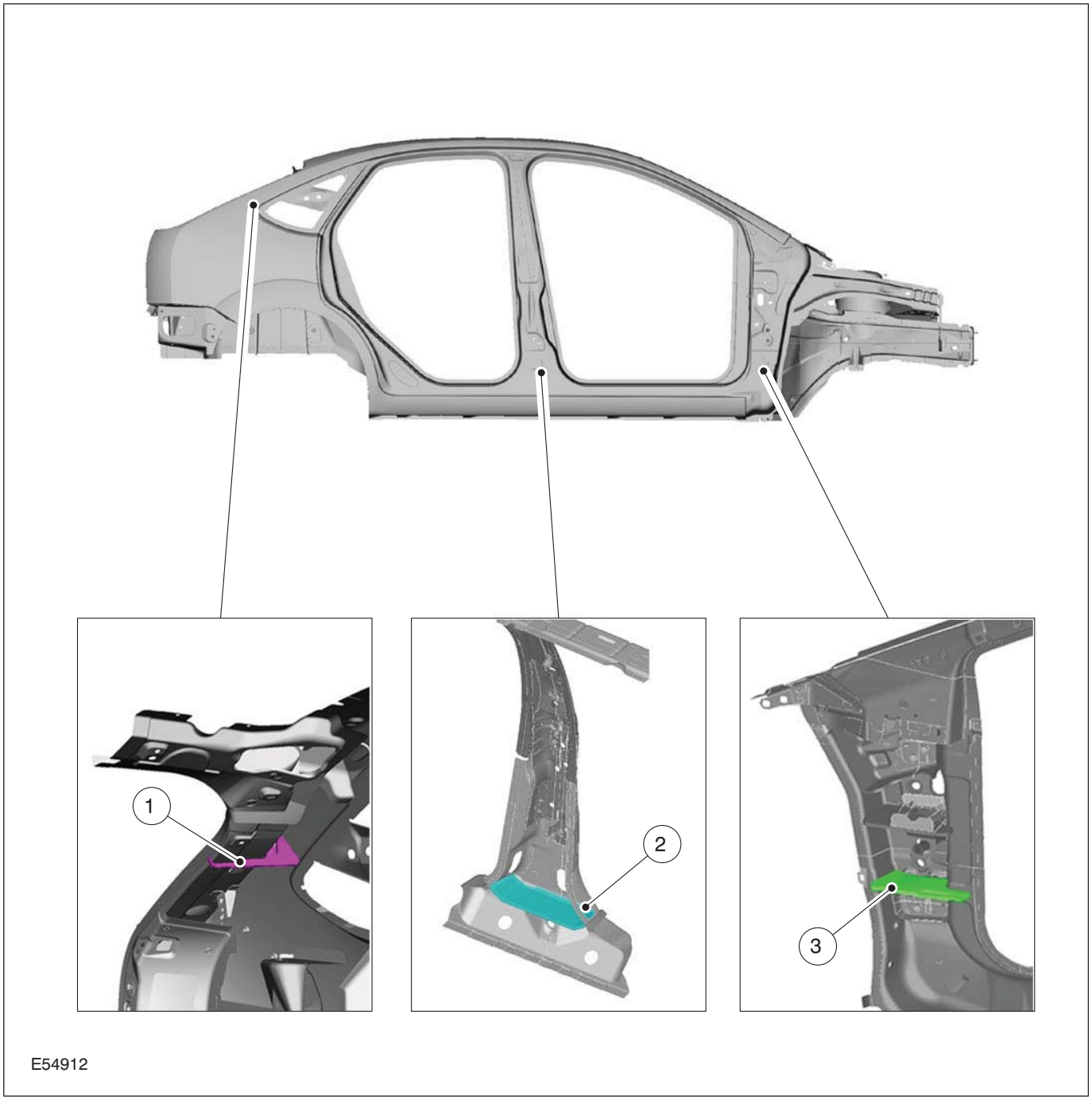
DESCRIPTION AND OPERATION



Installation positions on the 4-door (interior view)

Item	Description
1	B-pillar
2	A-pillar

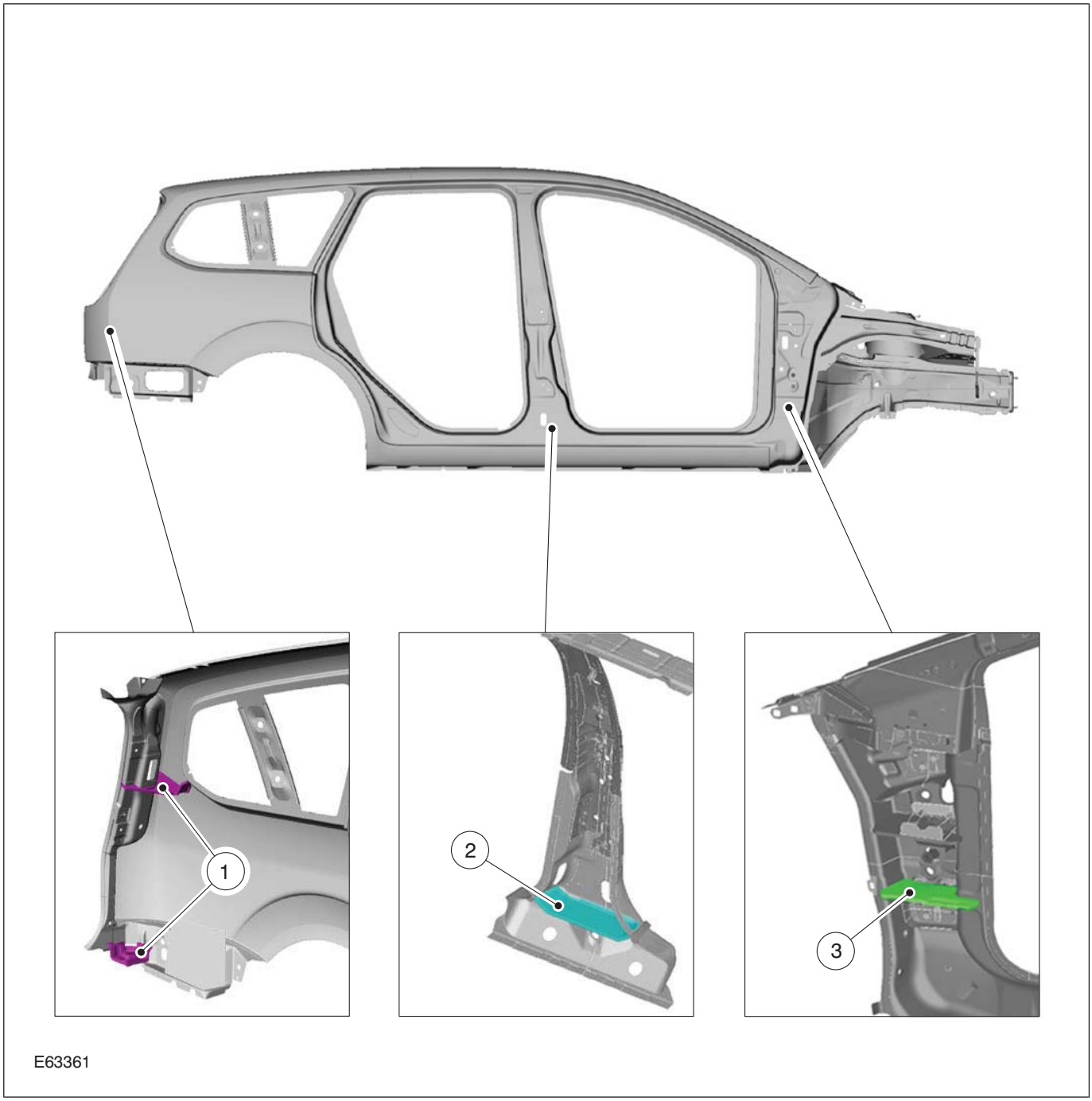
DESCRIPTION AND OPERATION



Installation positions on the 5-door (interior view)

Item	Description
1	D-pillar
2	B-pillar
3	A-pillar

DESCRIPTION AND OPERATION



Installation positions on the wagon (interior view)

Item	Description
1	D-pillar
2	B-pillar
3	A-pillar

DESCRIPTION AND OPERATION

Body and Frame — 2.5L Duratec-RS (VI5) – Overview

Introduction

With model year 2009.25, the Ford Focus range is being extended by a particularly high-performance sporty RS version (**R**acing **S**port).

The Ford Focus RS uses the 5-cylinder petrol engine familiar from the Focus ST. The designation for this power unit is: **2.5L Duratec-RS (VI5)**. The 2.5L Duratec-RS (VI5) has a power output of 224 kW (305 PS) and a torque of 440 Nm.

The 2.5L Duratec-RS (VI5) engine is supplied in conjunction with a modified 6-speed manual transaxle (M66). The differential installed up to now in the 6-speed manual transmission (M66) has been replaced with a Quaife(r) limited-slip differential with automatic torque distribution.

A further modification has been made to the structure of the front axle. Based on the McPherson strut and spring assembly layout, the front suspension is a new development: the so-called "Revo" axle. Together with a Quaife(r) limited-differential lock, it reduces the drive influences on the steering.

Focus RS



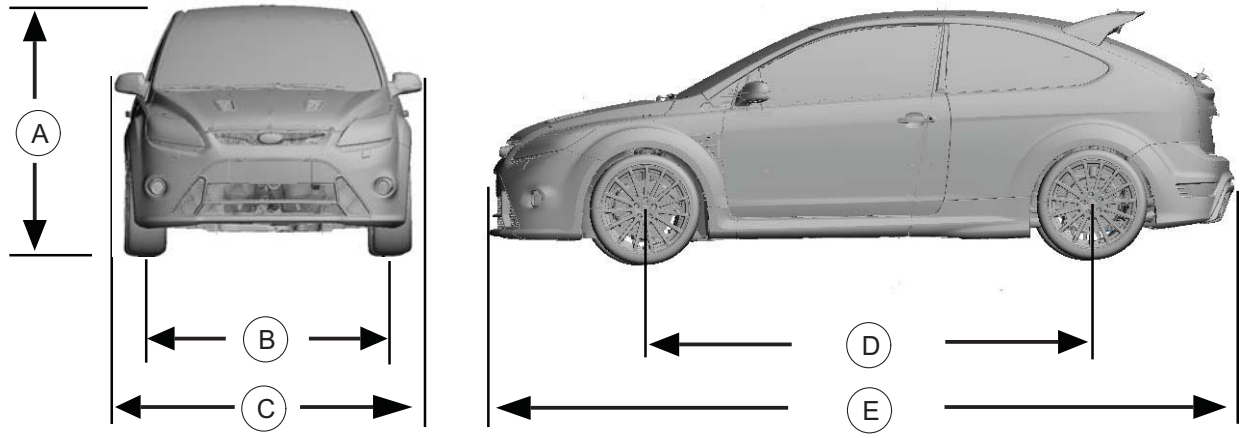
E112828

- Two-part rear spoiler with integrated LED (light emitting diode) stoplamp and rear window washer jet
- New color-coded front and rear bumpers
- Exterior mirror with integral turn signal lamp
- Side skirts
- RS lettering and trims
- All body ancillary components color-coded as standard

Body Version

- The Focus RS is available as a 3-door version

DESCRIPTION AND OPERATION

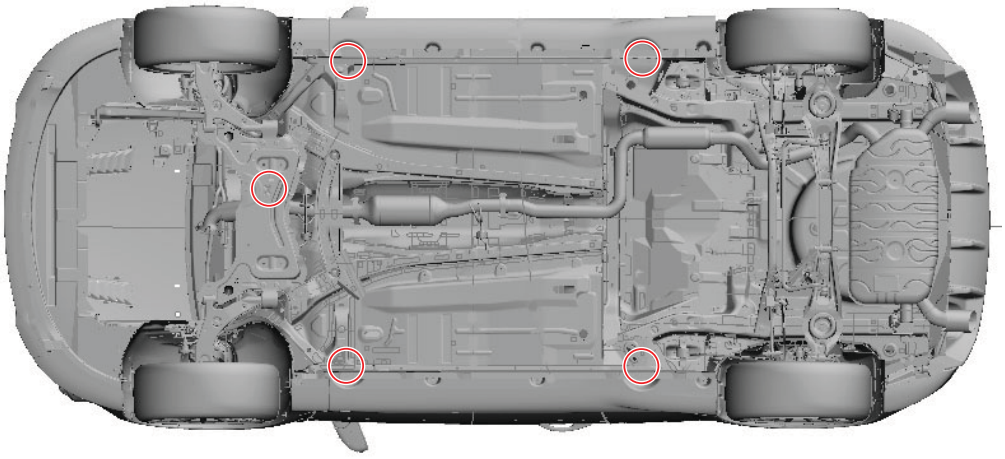


E112829

Item	Description
A	Height: 1476 mm
B	Track width, front: 1586 mm
B	Track width, rear: 1587 mm

Item	Description
C	Overall width: 2020 mm
D	Wheel base 2640 mm
E	Overall length: 4402 mm

Lifting Points



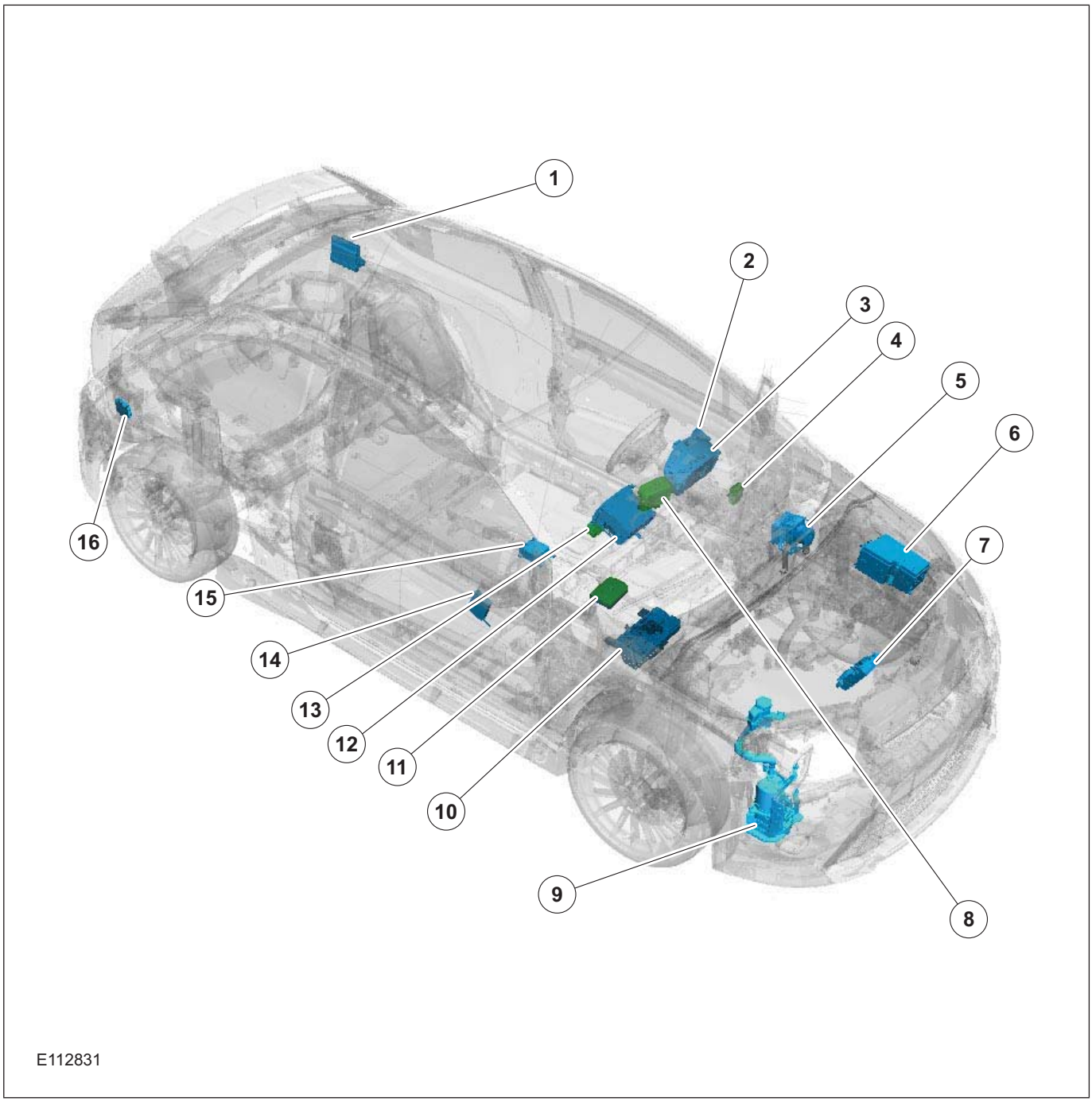
E112832

- The jacking points for raising the vehicle on a lifting platform are shown in the graphic.
- The vehicle must only be lifted at the marked position when lifting at the front axle using a jack. The vehicle must not be raised at the rear axle using a jack.

NOTE: In order to avoid damage to the side skirts when raising the vehicle with a lifting platform, the legs of the lifting platform must only be positioned at the marked positions.

DESCRIPTION AND OPERATION

Installation Position of Electrical Components



E112831

Item	Description
1	Keyless vehicle module
2	Driver door module
3	Instrument cluster
4	High intensity discharge headlamp module
5	ABS/stability assist module
6	BJB (battery junction box)
7	PCM (powertrain control module)

Item	Description
8	Supplementary instrument cluster
9	Electro-hydraulic power steering module
10	GEM (generic electronic module)
11	Bluetooth(r)/voice control module without handset holder
12	Audio unit/navigation system

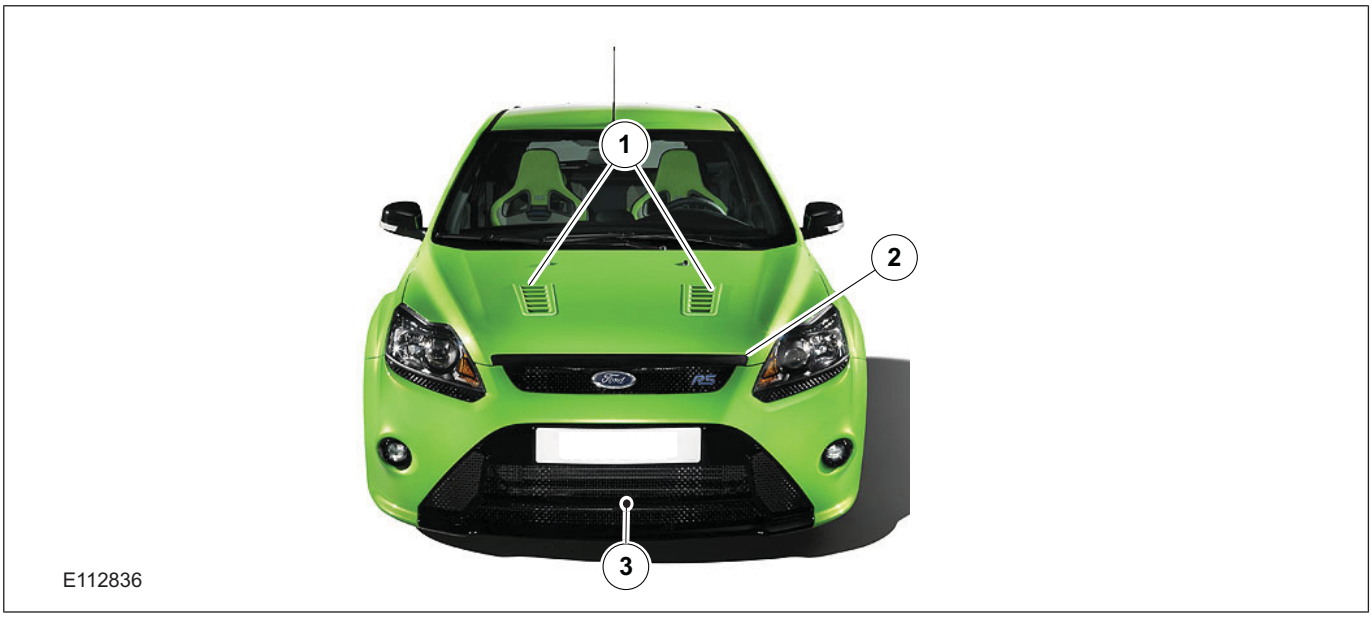
DESCRIPTION AND OPERATION

Item	Description
13	EATC (electronic automatic temperature control)
14	Passenger door module

Item	Description
15	RCM (restraints control module)
16	Parking aid

Body General Information

Front View



Item	Description
1	Ventilation slits
2	Finisher
3	Large trapezoidal air inlet

- The completely newly designed front bumper features a generously dimensioned, grille-covered air inlet in a trapezoidal shape with a high-gloss piano-black paint finish.
- The trim strip at the front edge of the hood provides a striking contrast and is also finished in piano-black.
- Two ventilation slits have been incorporated in the hood. These provided the engine with additional cooling.
- The wheel arches of the front and rear fenders have been enlarged in order to afford enough space for the 19-inch wheels and to allow for the increased track width.
- Triangular air vents with the RS emblem are integrated behind the front wheel arches.

DESCRIPTION AND OPERATION

Rear View



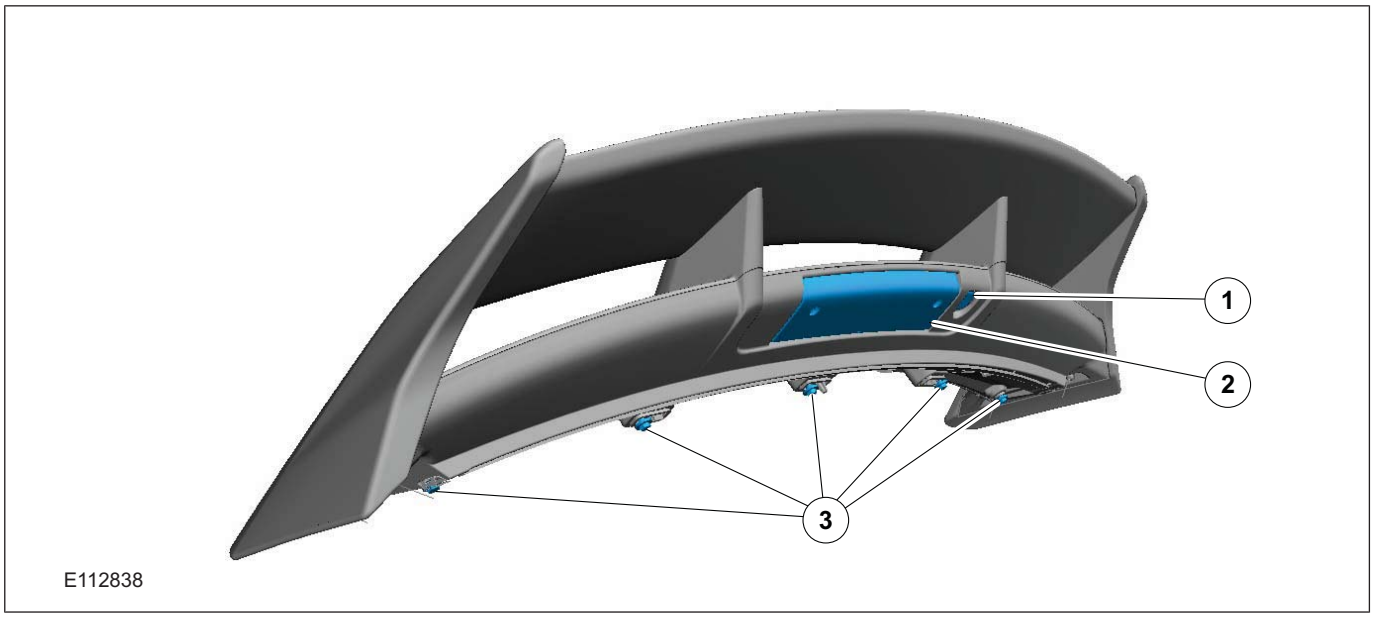
E112837

Item	Description
1	Split rear spoiler
2	High Mounted Stop Lamp Control
3	Diffuser plate

- In order to increase downforce, a diffuser has been integrated in the lower part of the rear, along with a split rear spoiler above the rear window.
- The diffuser is framed by two chrome-plated end pipes. Small vent openings on both sides of the rear apron further emphasize the width of the vehicle.
- The high-mounted stoplamp and the rear window washer nozzle are integrated in the split rear spoiler.

DESCRIPTION AND OPERATION

Rear Spoiler



Item	Description
1	Rear window washer nozzle
2	High Mounted Stop Lamp Control
3	Attachment bolts

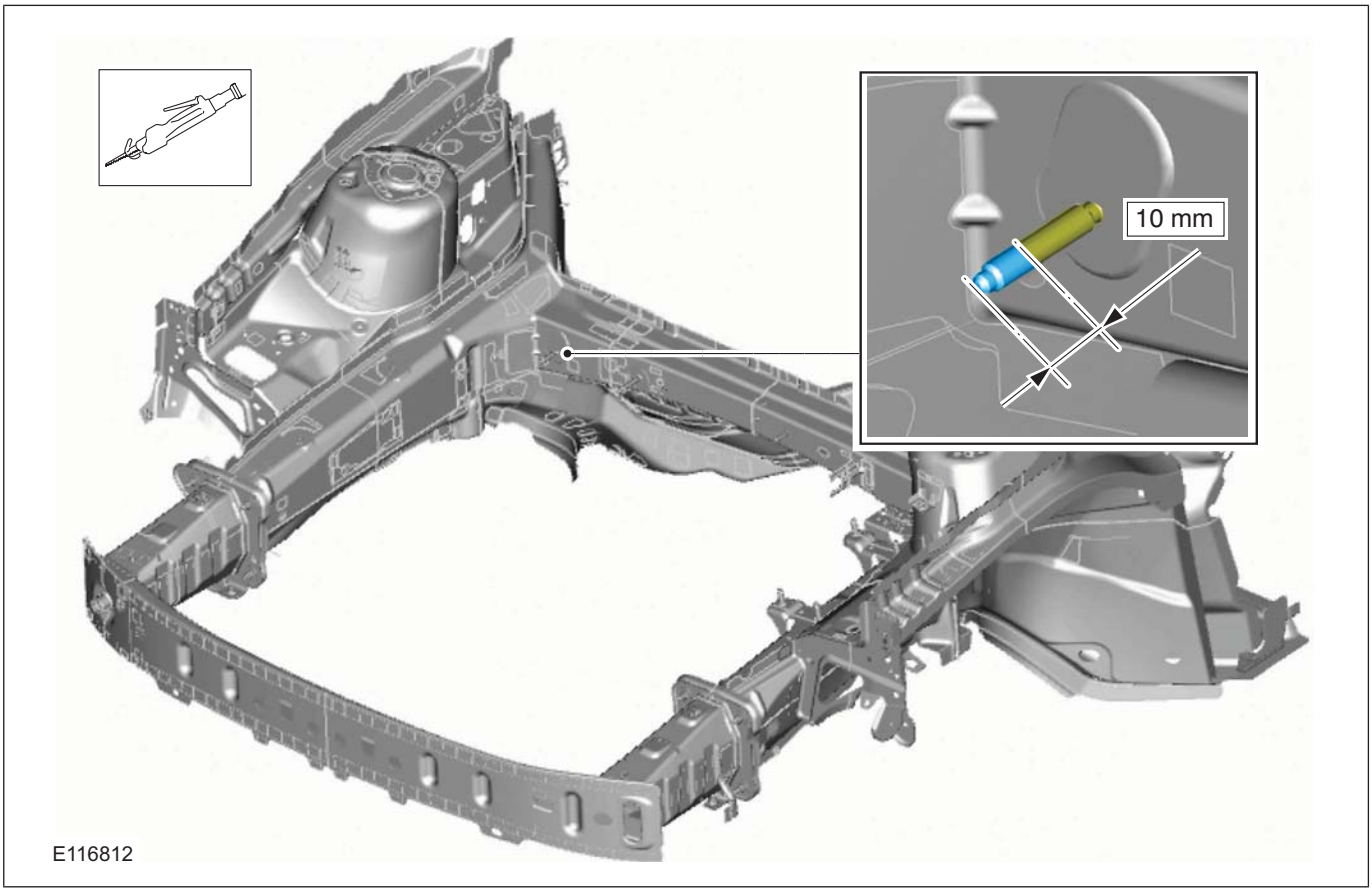
- The high-mounted stoplamp uses LEDs rather than conventional bulbs.

NOTE: The LEDs cannot be replaced individually. In event of failure the entire stoplamp needs to be replaced.

- The rear spoiler is attached to the tailgate with five bolts.

DESCRIPTION AND OPERATION

Body - Dash Cross Member



- The weld bolt on the dash cross member has to be shortened to get sufficient clearance to the turbo cooling hose and AC lines.

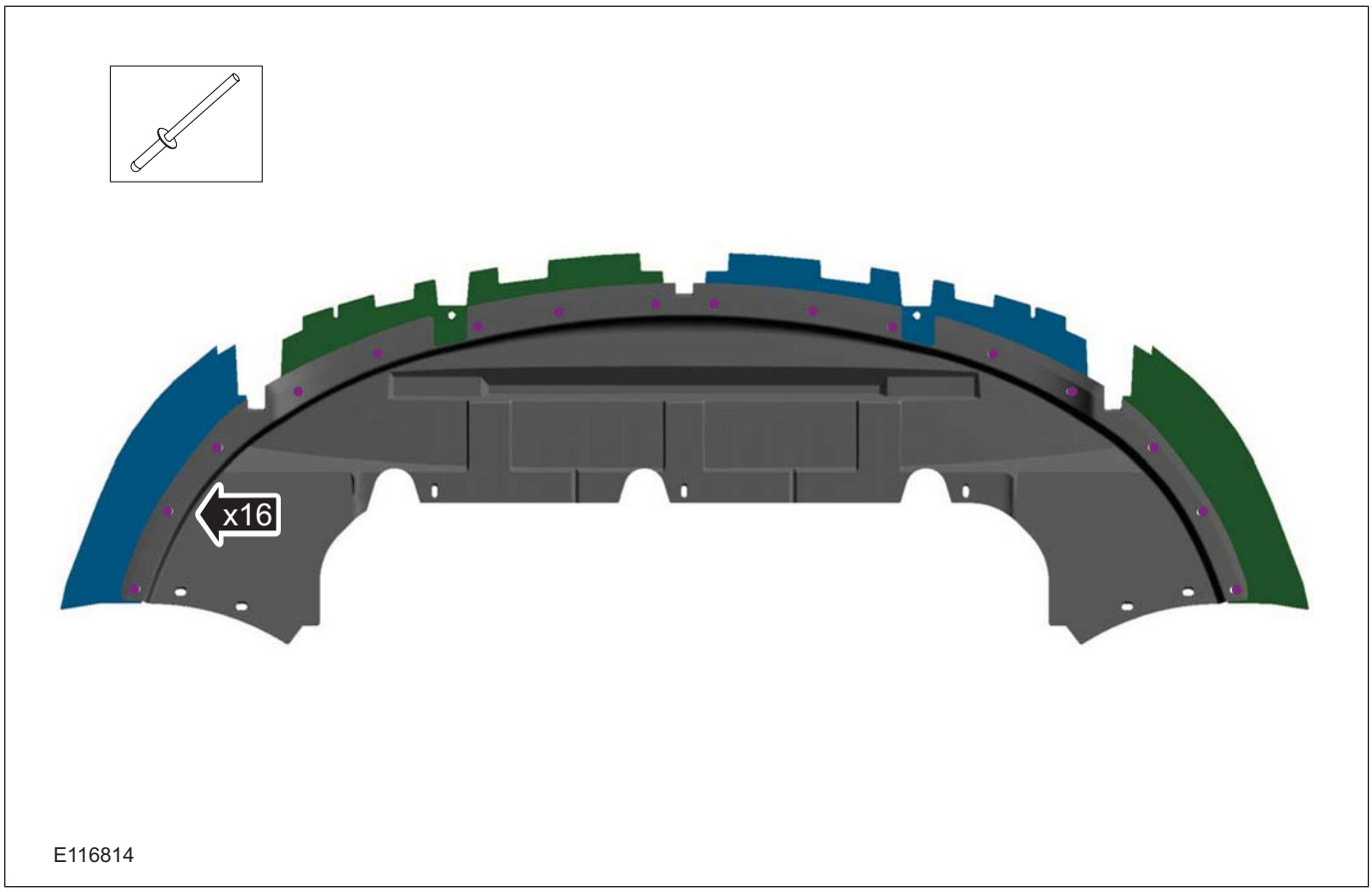
Body - Front Lower Deflector

- Due to the wider dimension of the RS bumper cover the lower deflector has to be extended.
- The 4 extensions are riveted to the standard ST deflector.

DESCRIPTION AND OPERATION

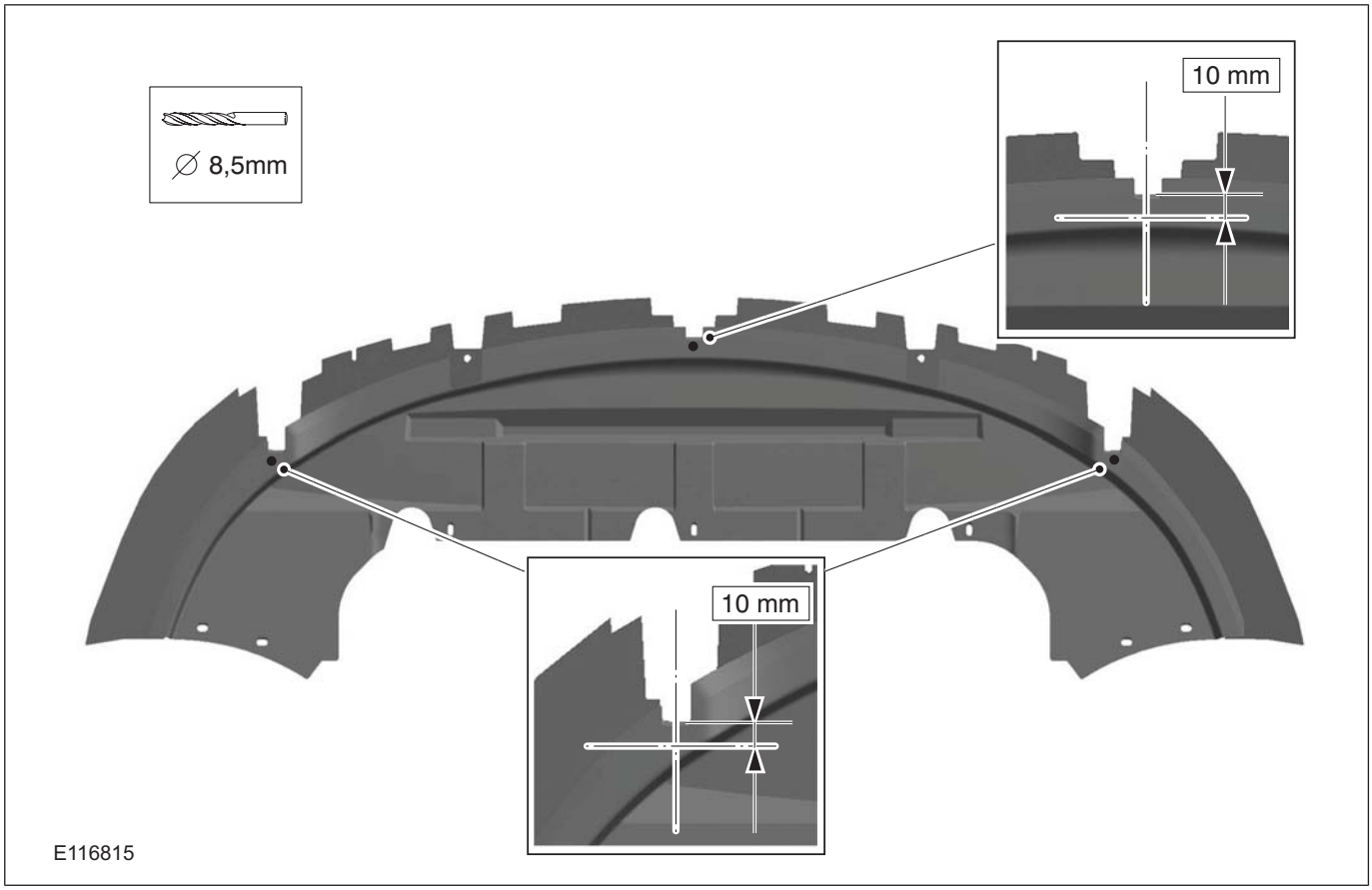


E116813



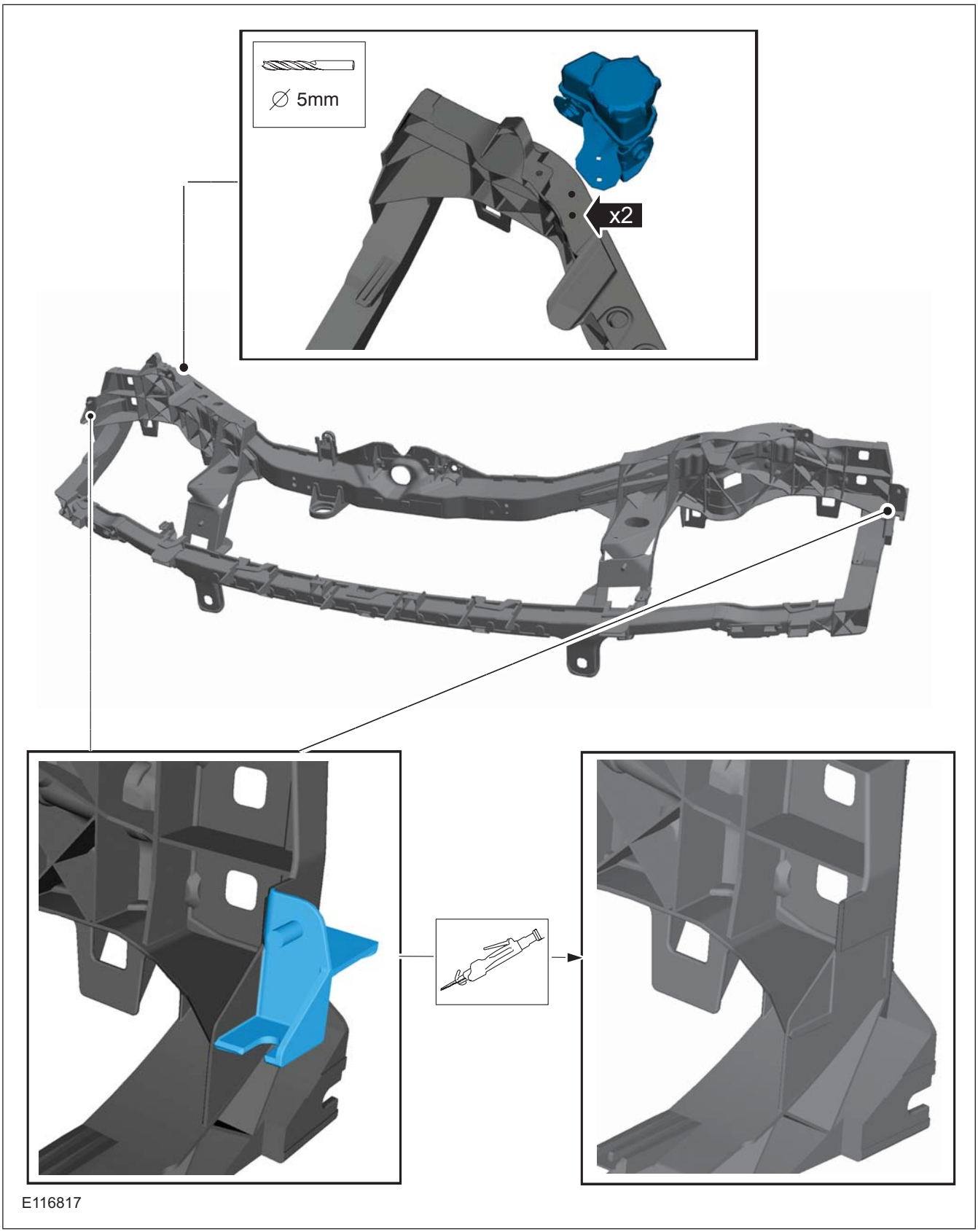
E116814

DESCRIPTION AND OPERATION



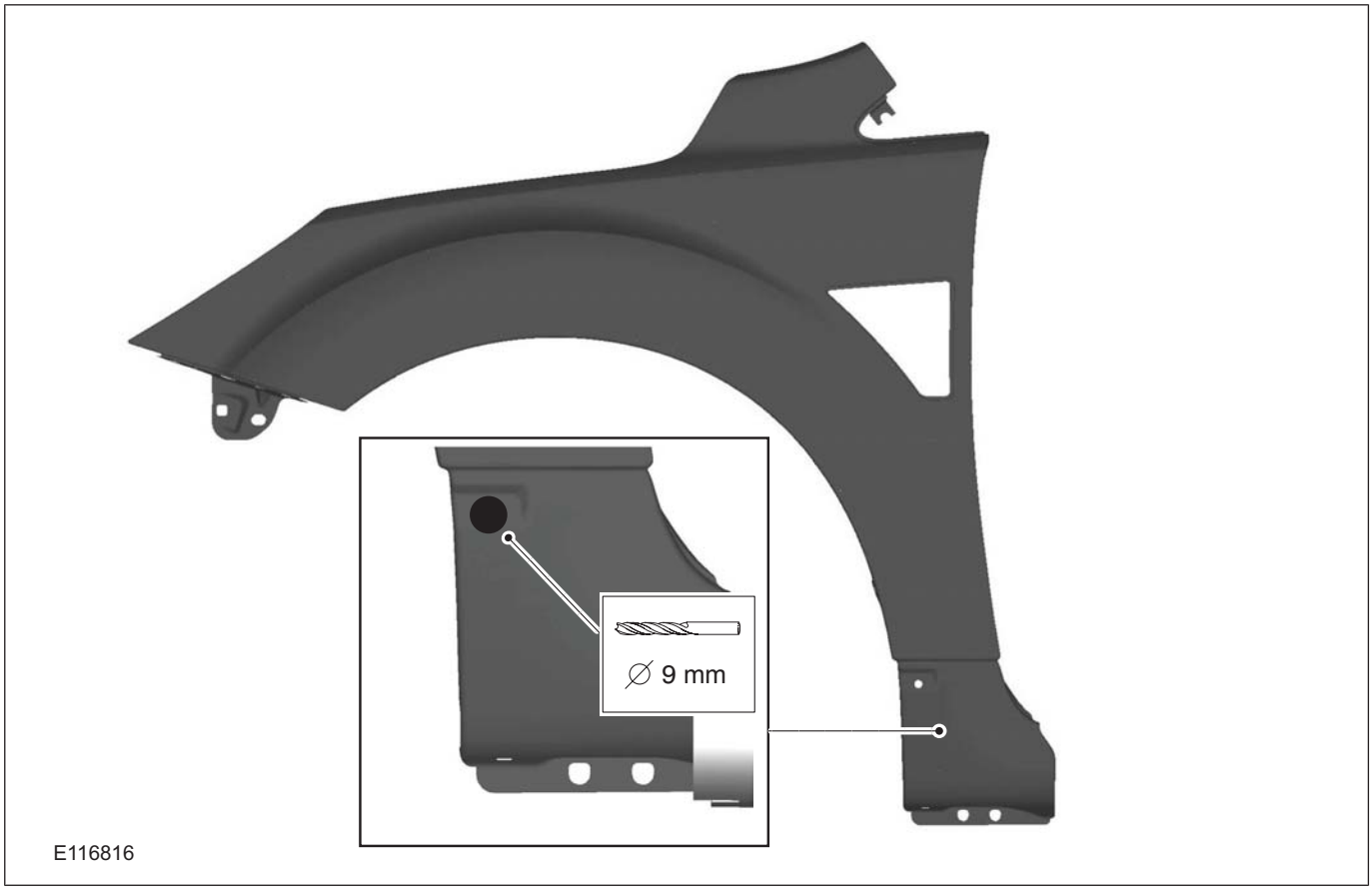
DESCRIPTION AND OPERATION

Body - Hood Latch Panel



Body - Front Fender

DESCRIPTION AND OPERATION



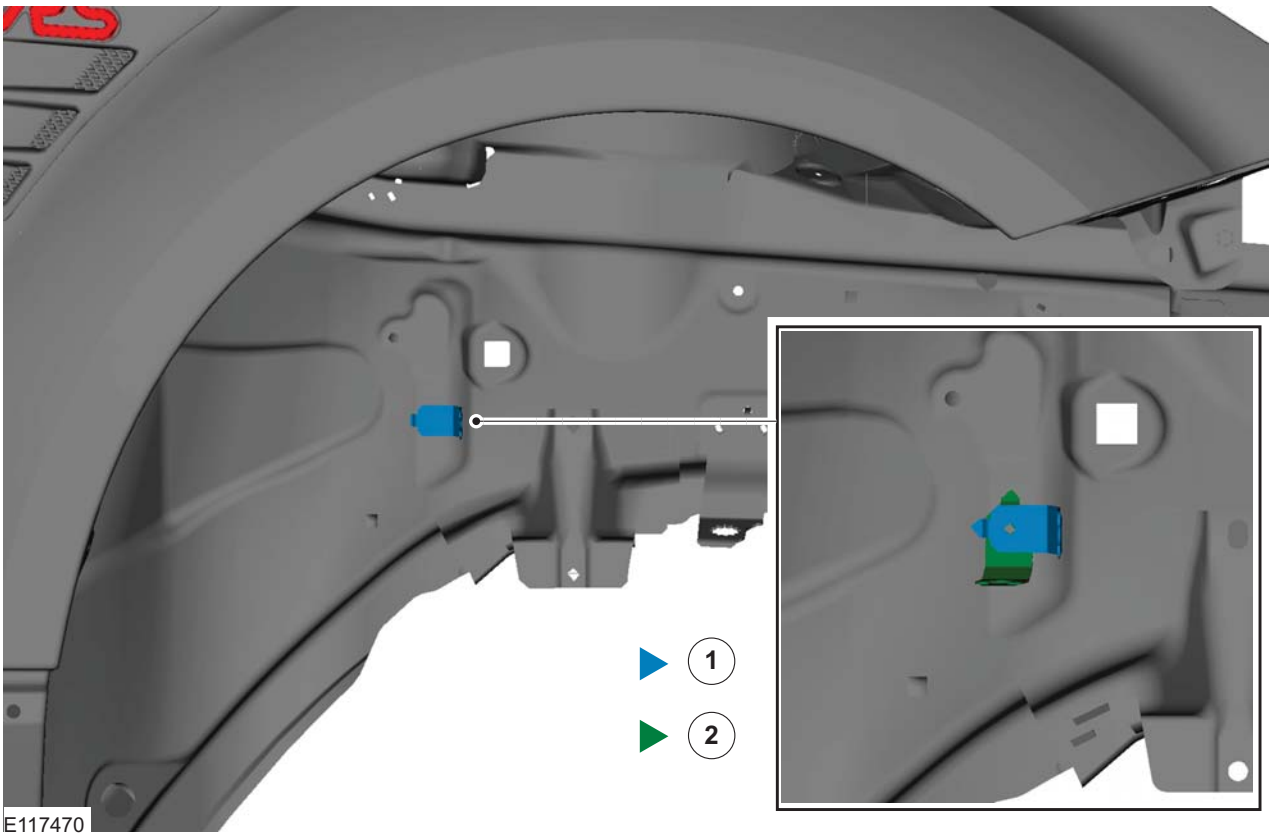
- One hole has to be drilled for side skirt fixing.

WARNING: Due to the possible speed of the Focus RS the side skirts on fender and rocker panel must be fixed with clips screws and tape! Do not cut any clips!

NOTE: Body side panels and parts for service will already contain the required side skirt fixing holes.

ABS Sensor Bracket

DESCRIPTION AND OPERATION



Item	Description
1	Focus RS
2	Focus

The ABS sensor bracket is riveted to the front side member. On Focus RS the bracket is mounted in driving direction.

WARNING: If the ABS sensor bracket is not mounted as shown, the ABS sensor cable could detach from bracket!

GENERAL PROCEDURES

Underbody Tolerance Check

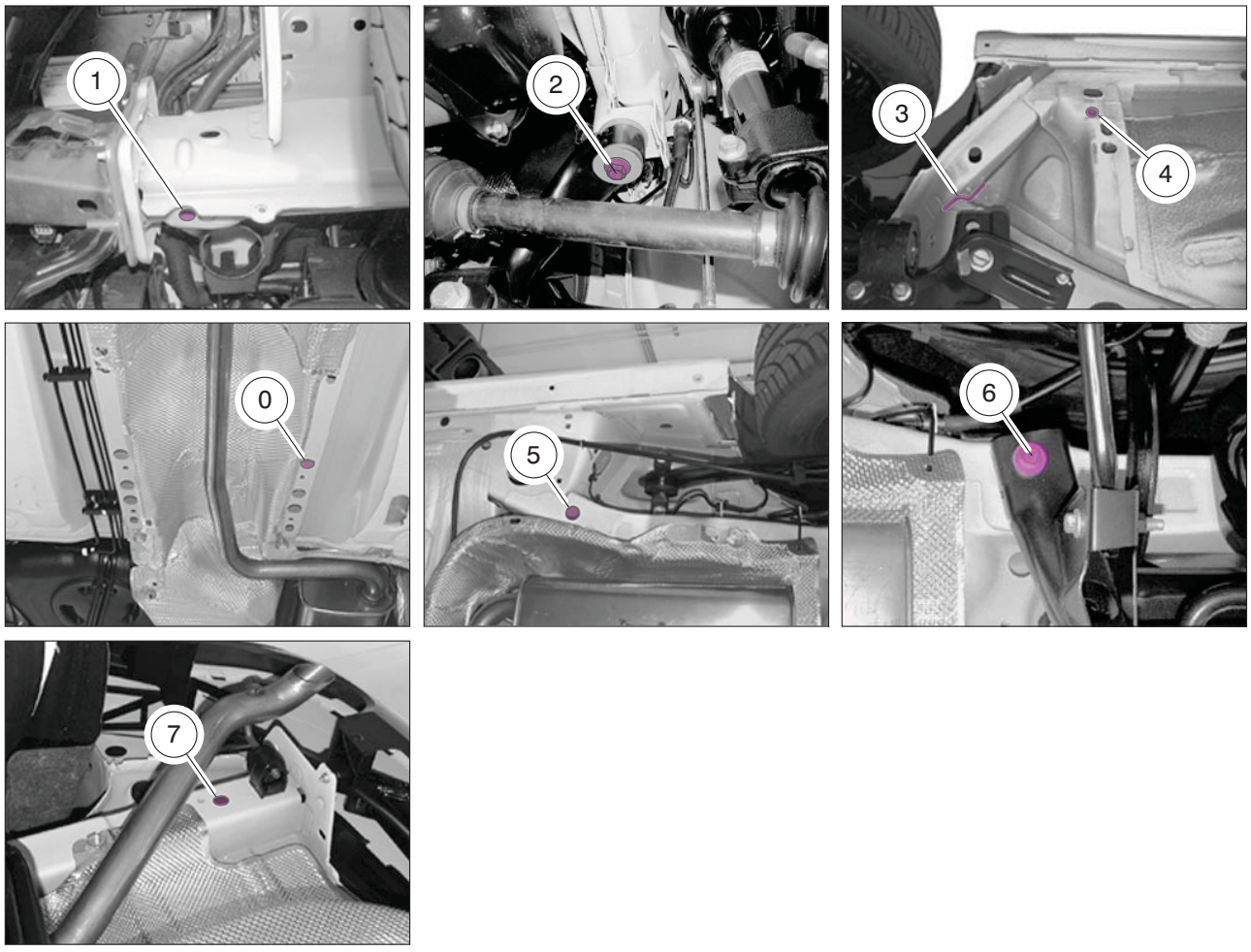
1. Body dimensions, 3-, 4- and 5-door (quick measurements using the Allvis system)

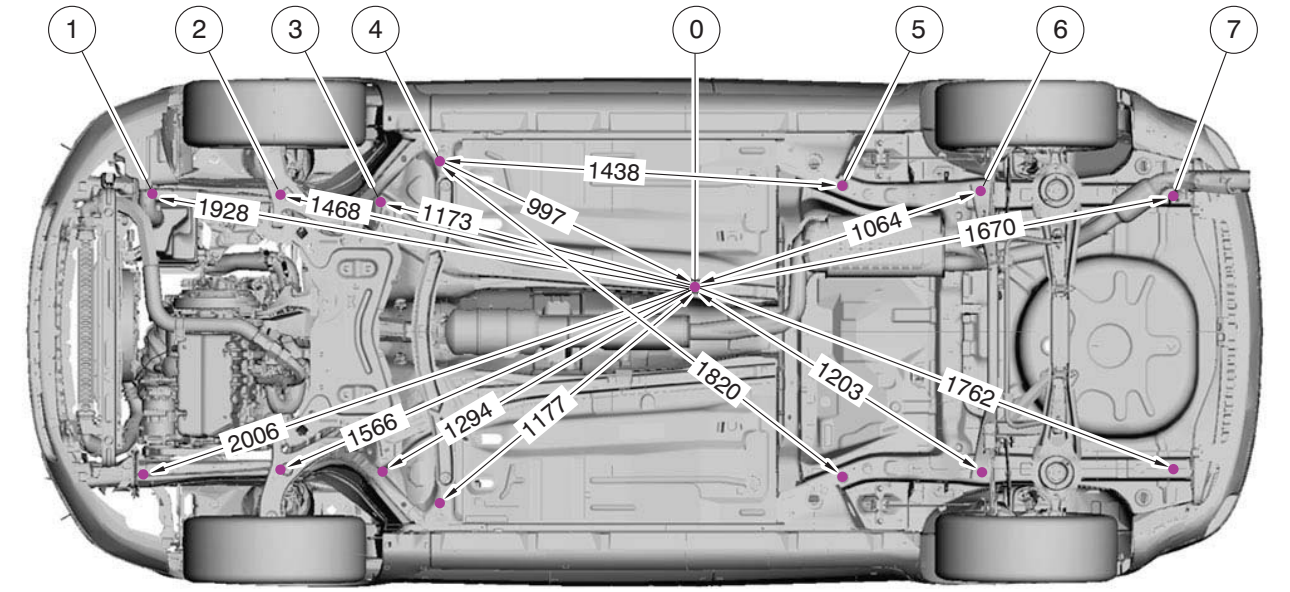
- All dimensions are measured from the middle of the hole or bolt head or from the edge of the panel, using the Allvis system, with component assemblies installed.
- A tolerance of ± 3 mm applies to all specified dimensions. All detailed illustrations correspond to the left-hand side of the vehicle.

Allvis specifications

Point of measurement	Adaptor	Height setting of the test probes
1	25 mm (probe)	350 mm
2	25 mm (probe)	240 mm
3	25 mm (probe)	160 mm
4	25 mm (probe)	110 mm
5	35 mm (probe)	50 mm
6	25 mm (probe)	240 mm
7	25 mm (probe)	310 mm

GENERAL PROCEDURES





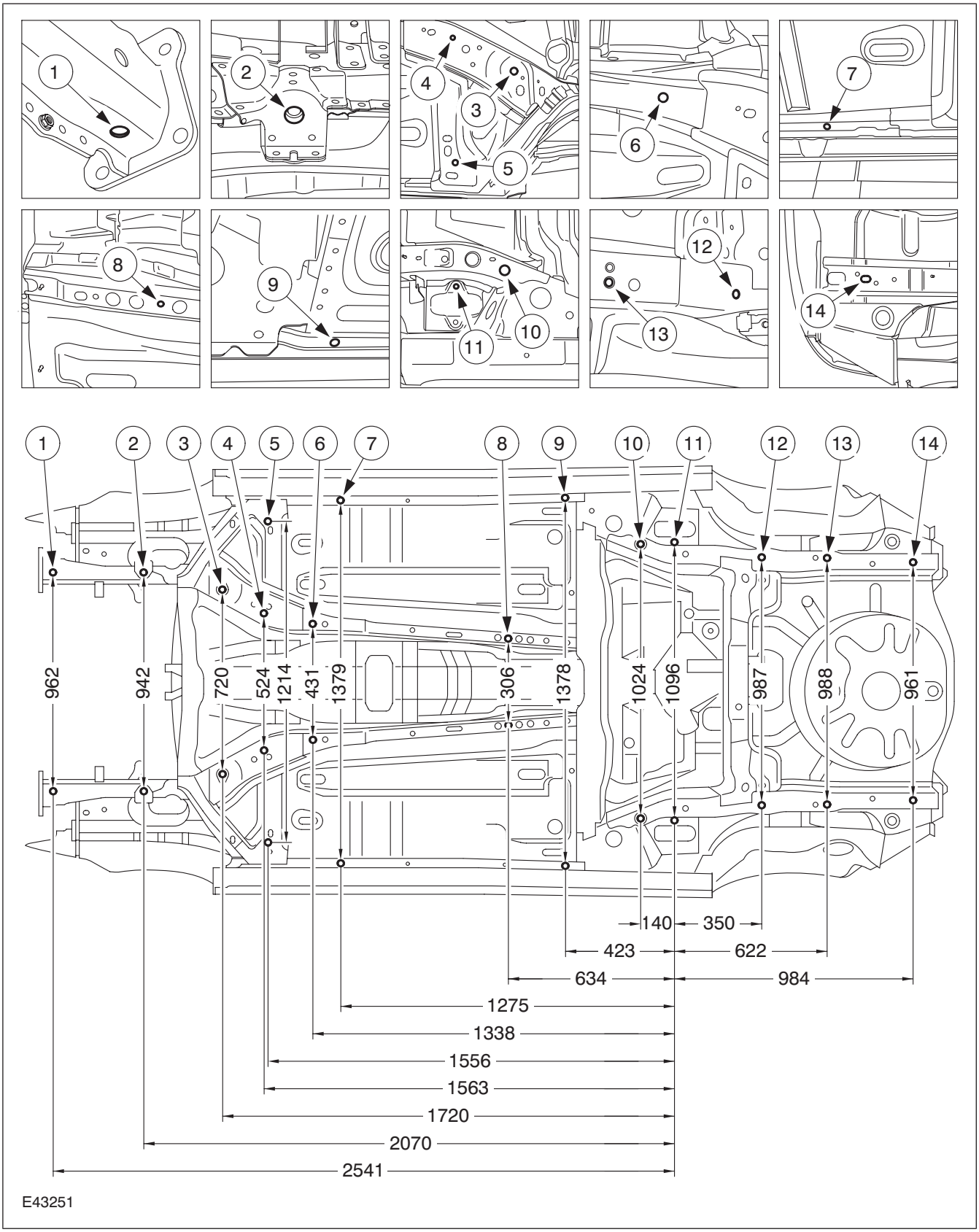
E55020

2. Body dimensions, 3-, 4- and 5-door

- All dimensions are measured starting from the centre of each hole, using an electronic measuring system and with the assemblies removed.
- A tolerance of ± 3 mm applies to all specified dimensions. All detailed illustrations

GENERAL PROCEDURES

correspond to the left-hand side of the vehicle.



3. Body dimensions, wagon (quick measurements using the Allvis system)

- All dimensions are measured from the middle of the hole or bolt head or from the edge of

GENERAL PROCEDURES

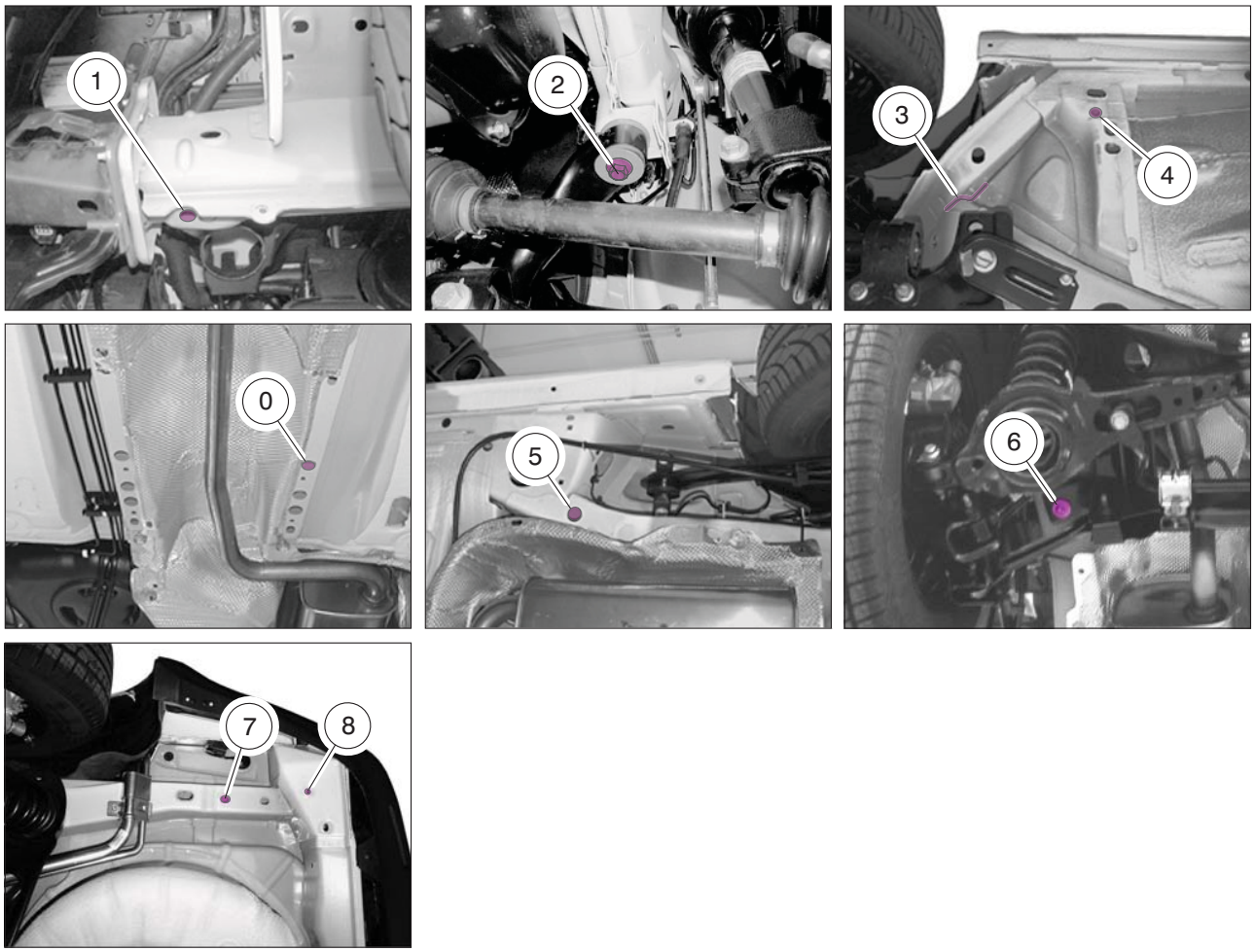
the panel, using the Allvis system, with component assemblies installed.

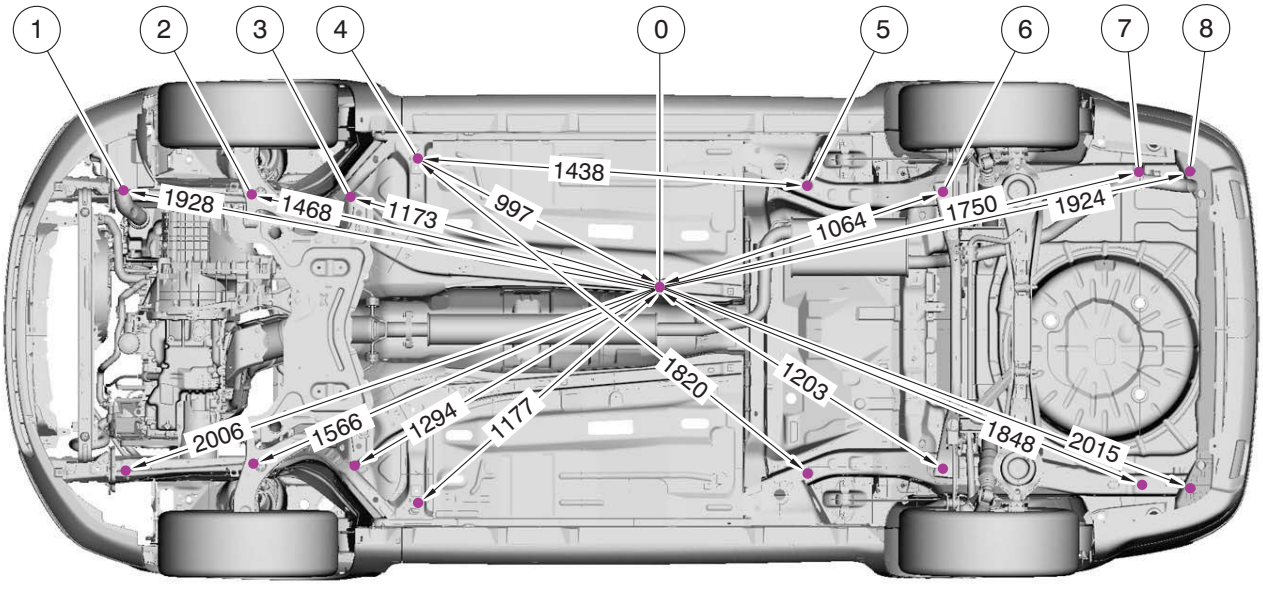
- A tolerance of ± 3 mm applies to all measurements given. All detailed illustrations correspond to the left-hand side of the vehicle.

Allvis specifications

Point of measurement	adapter	Height setting of the test probes
1	25 mm (probe)	350 mm
2	25 mm (probe)	240 mm
3	25 mm (probe)	160 mm
4	25 mm (probe)	110 mm
5	35 mm (probe)	50 mm
6	25 mm (probe)	260 mm
7	25 mm (probe)	400 mm
8	25 mm (probe)	400 mm

GENERAL PROCEDURES





E62636

4. **NOTE: The body dimensions of the front floor pan are the same as for the 3-, 4- and 5-door and can be taken from illustration E43251.**

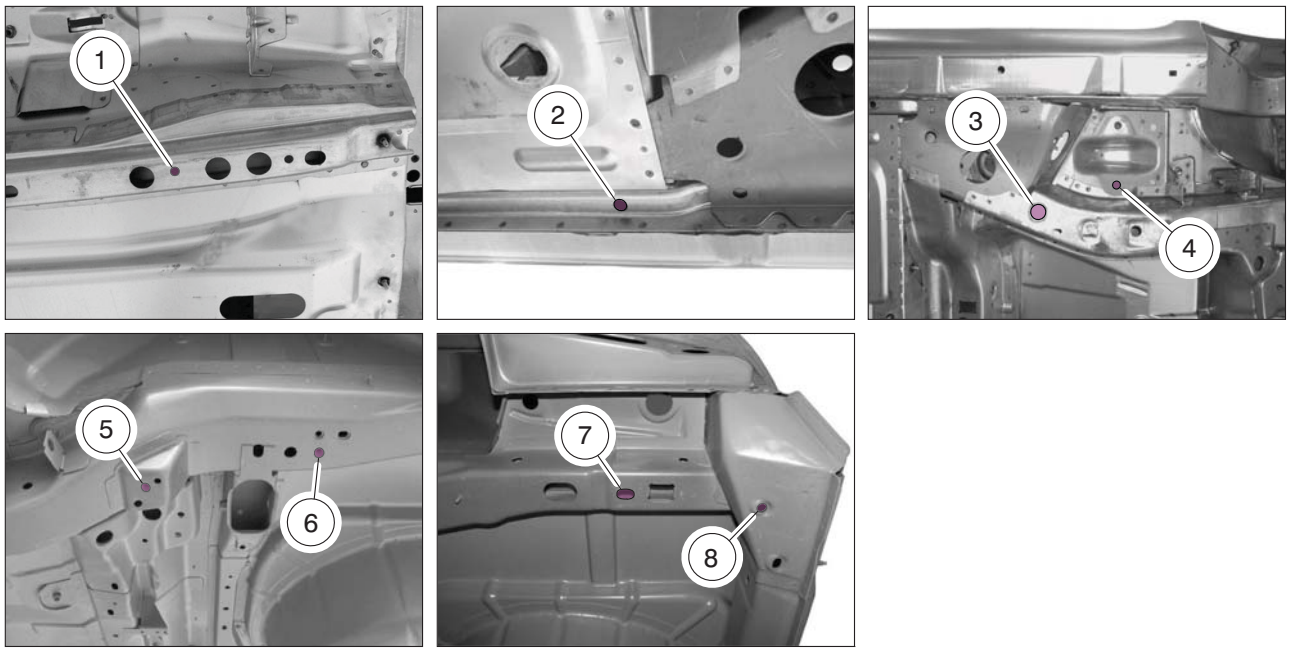
Body dimensions, wagon

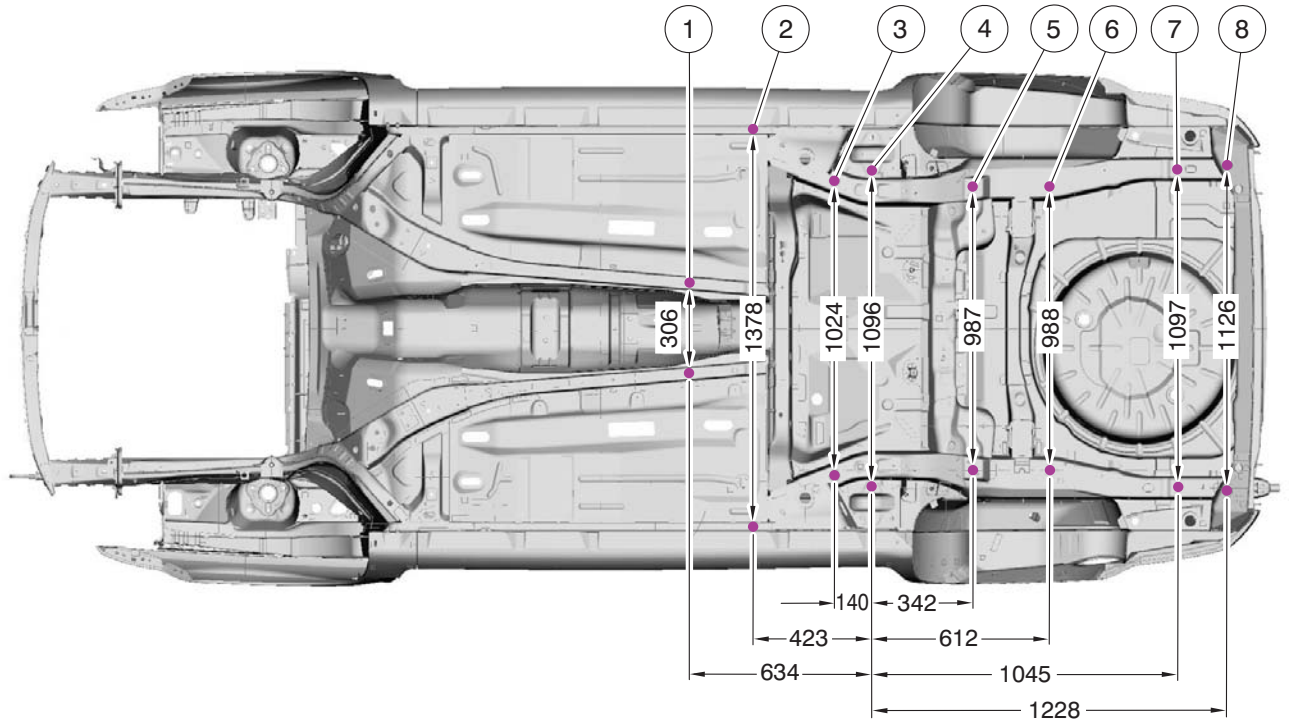
- All dimensions are measured starting from the centre of each hole, using an electronic

GENERAL PROCEDURES

measuring system and with the assemblies removed.

- A tolerance of ± 3 mm applies to all measurements given. All detailed illustrations correspond to the left-hand side of the vehicle.





E62637

GENERAL PROCEDURES

Frame Tolerance Check

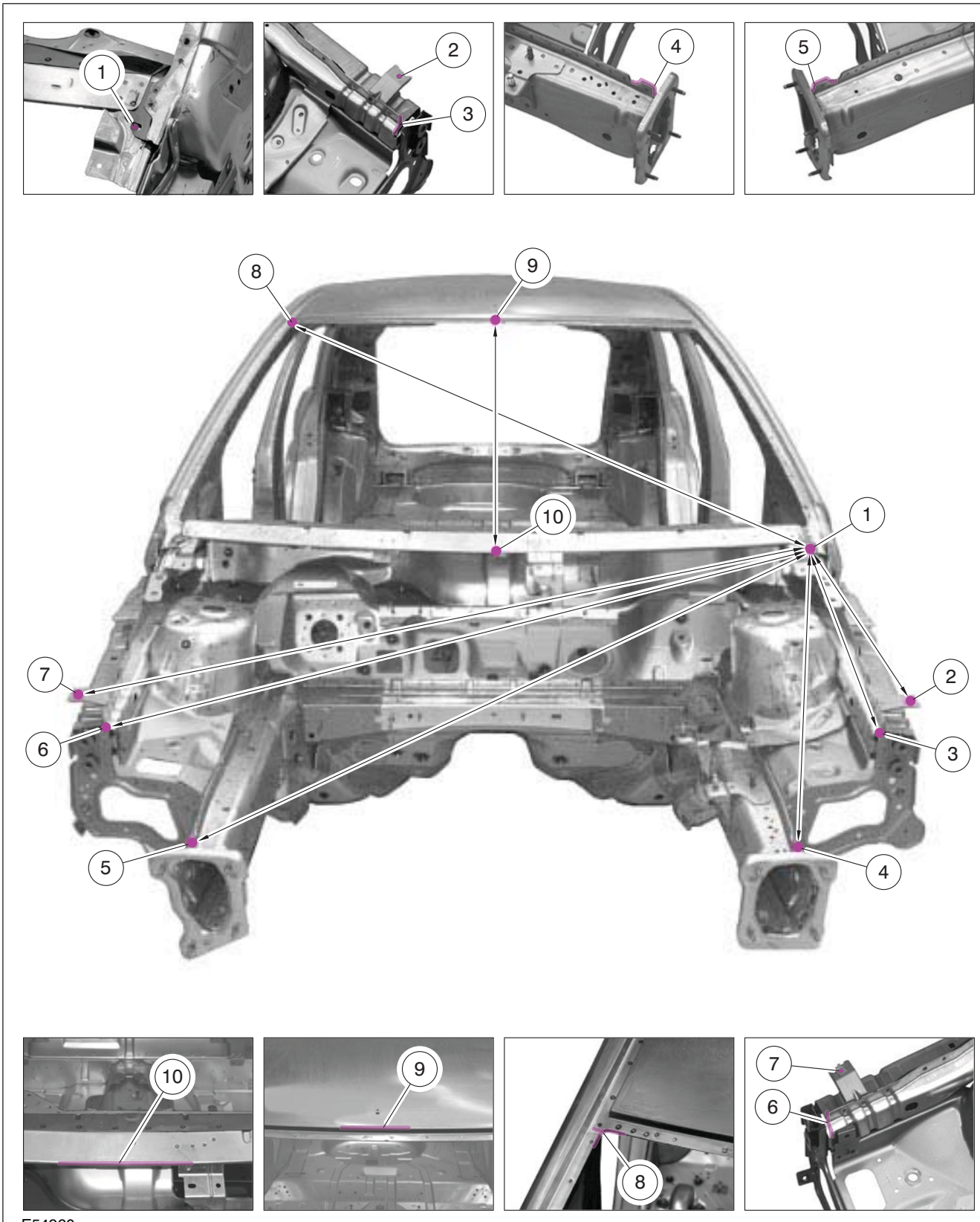
1. Front end body dimensions, all models

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the center of each hole or panel edge using a symmetrically adjusted beam trammel.

Measuring points and dimensions

1 - 2 = 530 mm	1 - 6 = 1496 mm
1 - 3 = 608 mm	1 - 7 = 1532 mm
1 - 4 = 786 mm	1 - 8 = 1556 mm
1 - 5 = 1426 mm	9 - 10 = 965 mm

GENERAL PROCEDURES



E54960

2. Body dimensions, side view (5-door version)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the edge of the steel panel using a symmetrically adjusted measuring gauge.
- Measuring points 1, 2, 3, 4, 6, 7, 10 and 11 are measured in the curve and represent the

GENERAL PROCEDURES

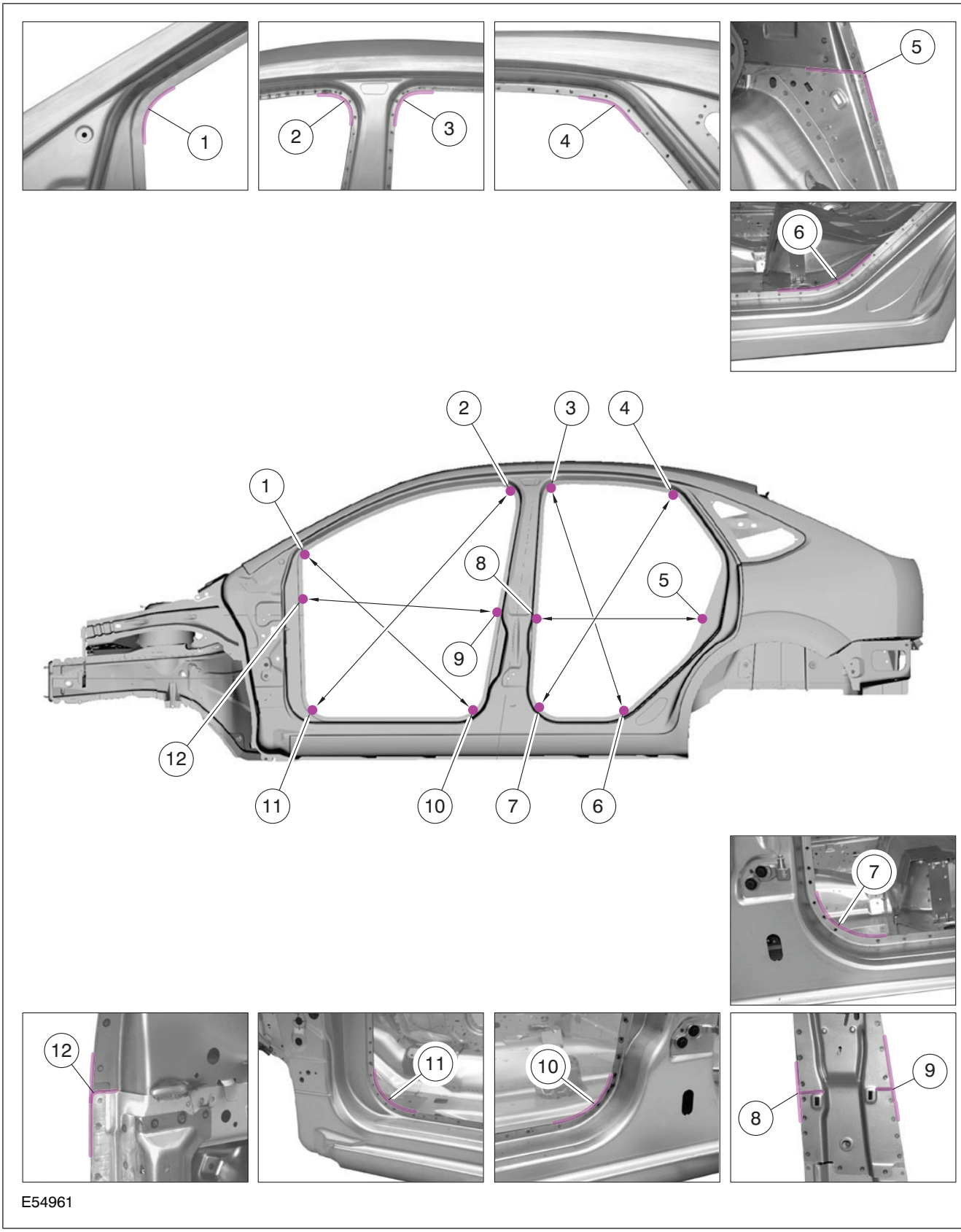
greatest distance to the measuring point opposite.

- The detail views of measuring points 5, 8, 9 and 12 are shown looking from the vehicle interior outwards.

Measuring points and dimensions

1 - 10 = 992 mm	4 - 7 = 1095 mm
2 - 11 = 1281 mm	5 - 8 = 711 mm
3 - 6 = 1025 mm	9 - 12 = 838 mm

GENERAL PROCEDURES



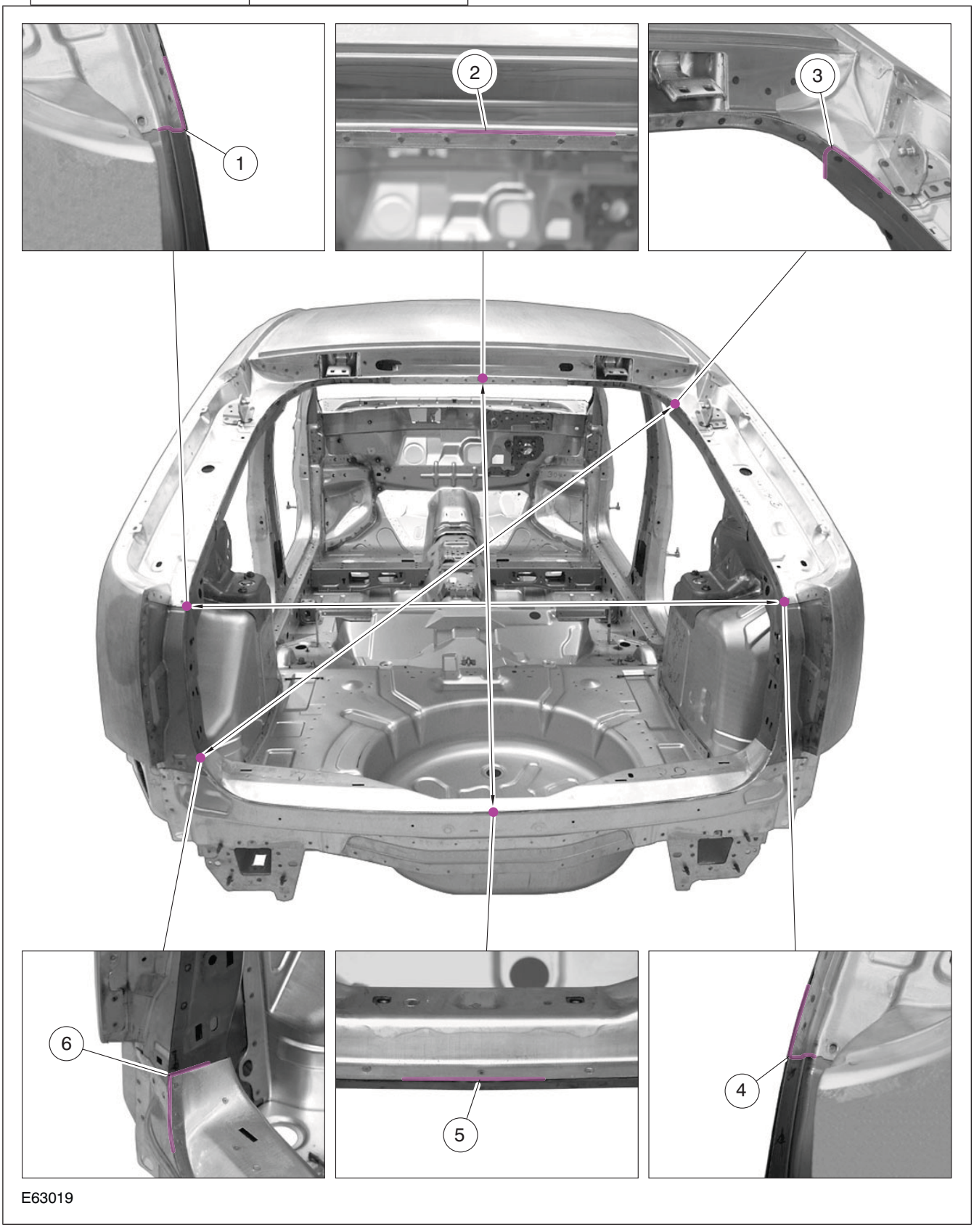
3. Body dimensions, rear (5-door version)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the center of the welded flange using a symmetrically adjusted measuring gauge.

GENERAL PROCEDURES

Measuring points and dimensions

1 - 4 = 1115 mm	3 - 6 = 1327 mm
2 - 5 = 996 mm	



4. Body dimensions, interior (5-door version)

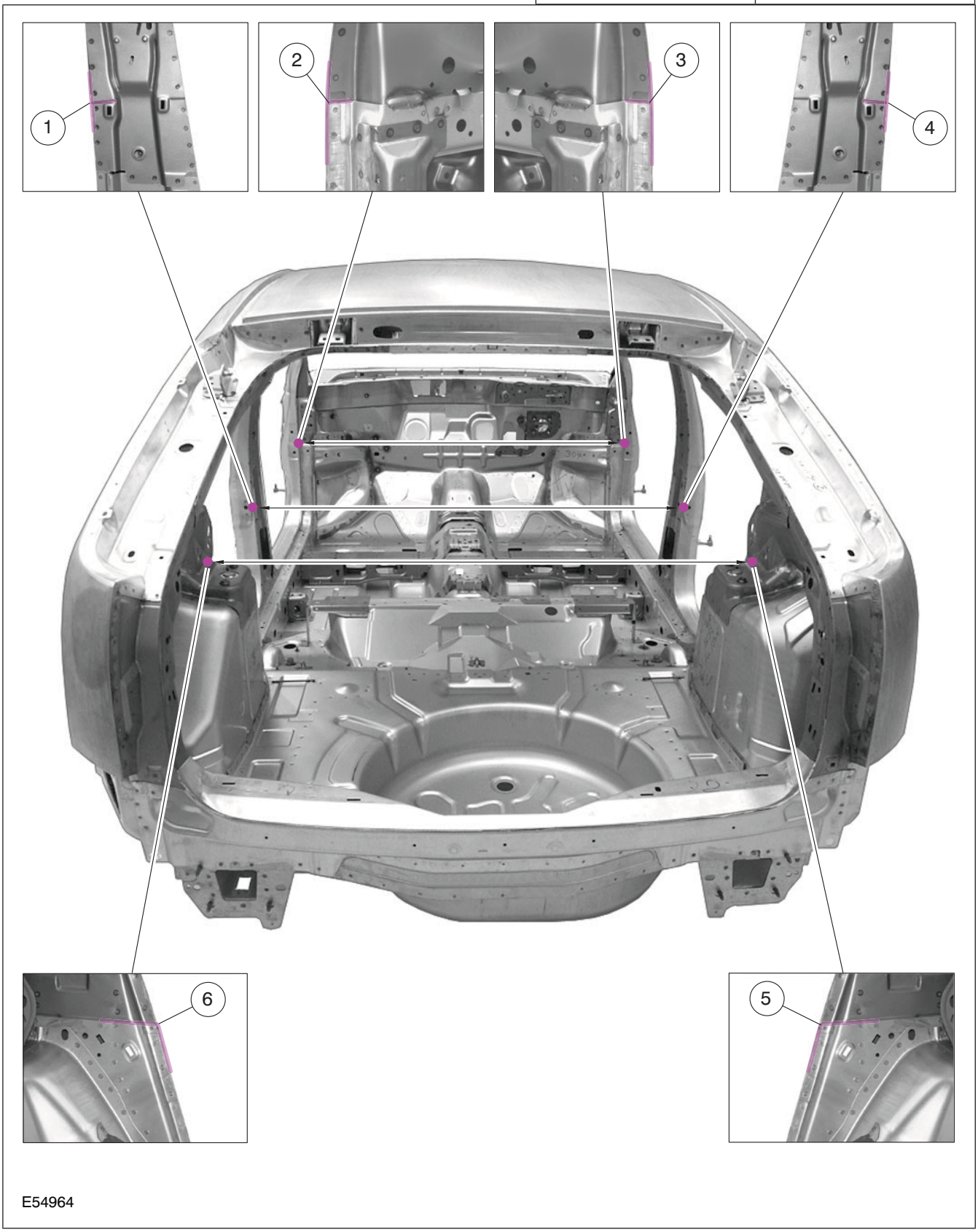
- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from

GENERAL PROCEDURES

the center of the welded flange using a symmetrically adjusted measuring gauge.

Measuring points and dimensions

1 - 4 = 1458 mm	5 - 6 = 1441 mm
2 - 3 = 1442 mm	



GENERAL PROCEDURES

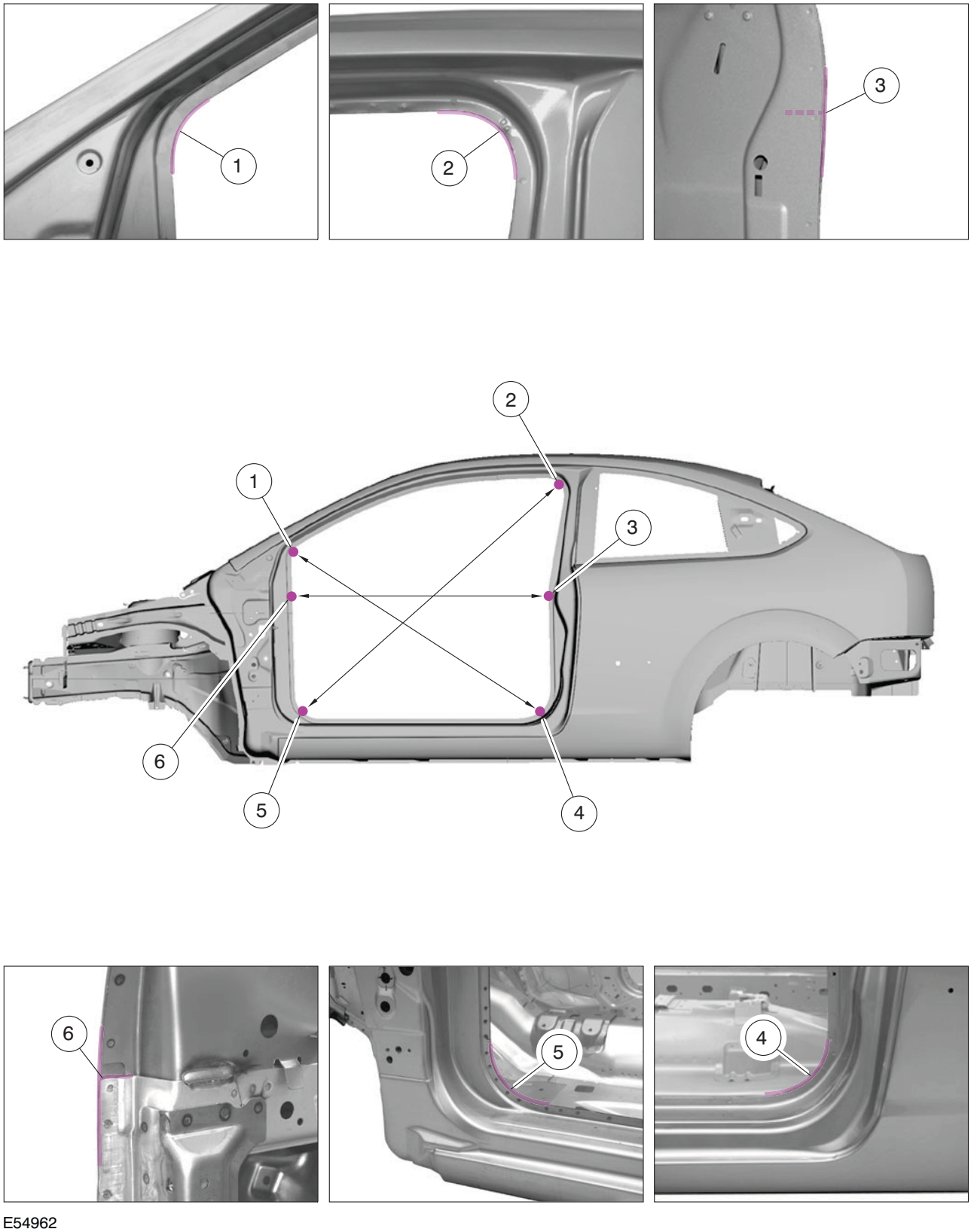
5. Body dimensions, side view (3-door version)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the edge of the steel panel using a symmetrically adjusted measuring gauge.
- Measuring points 1, 2, 4 and 5 are measured in the curve and represent the greatest distance to the measuring point opposite.
- The detail views of measuring points 3 and 6 are shown looking from the vehicle interior outwards.

Measuring points and dimensions

1 - 4 = 1234 mm	3 - 6 = 1068 mm
2 - 5 = 1439 mm	

GENERAL PROCEDURES



E54962

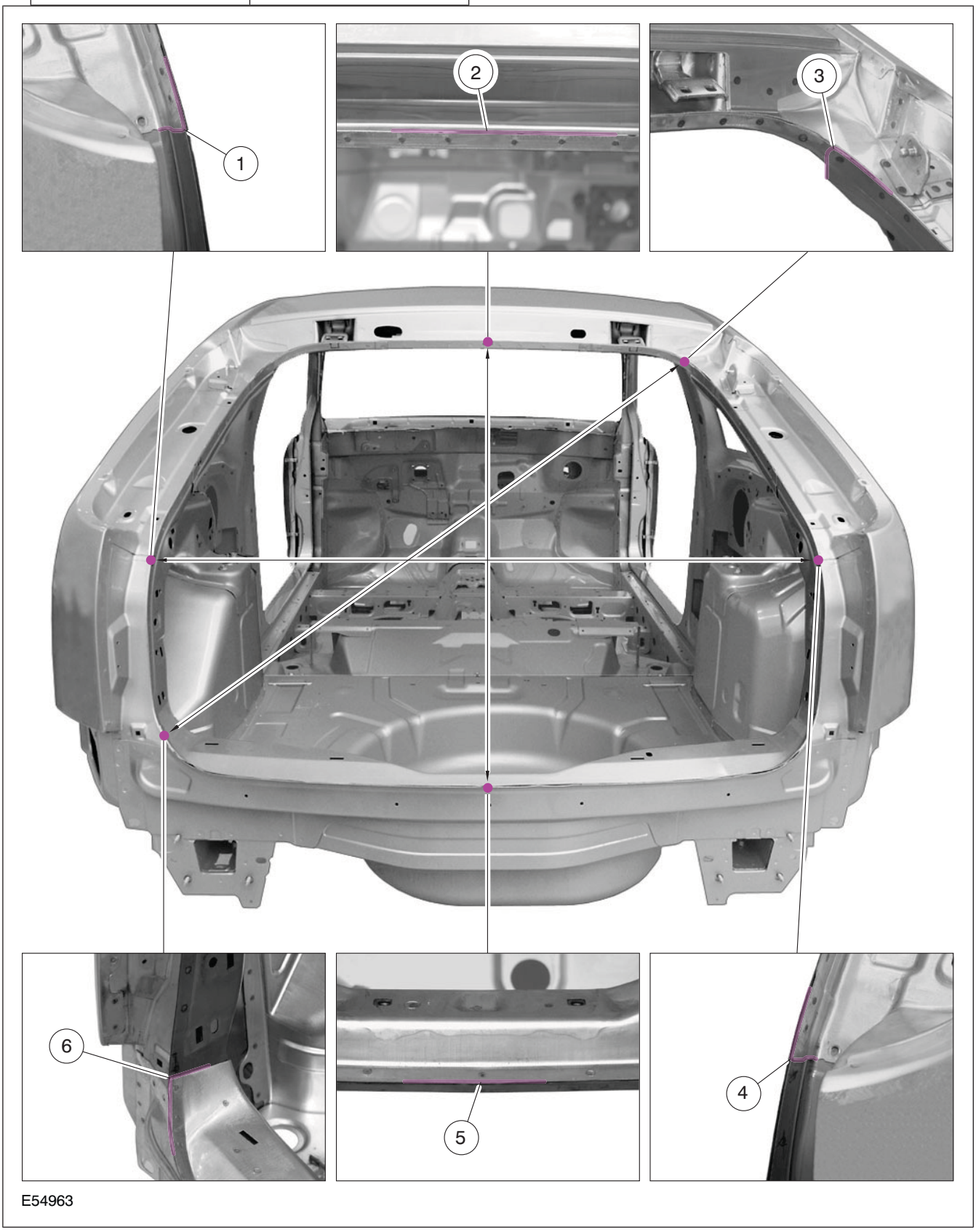
6. Body dimensions, rear (3-door version)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the center of the welded flange using a symmetrically adjusted measuring gauge.

GENERAL PROCEDURES

Measuring points and dimensions

1 - 4 = 1115 mm	3 - 6 = 1327 mm
2 - 5 = 996 mm	



7. Body dimensions, interior (3-door version)

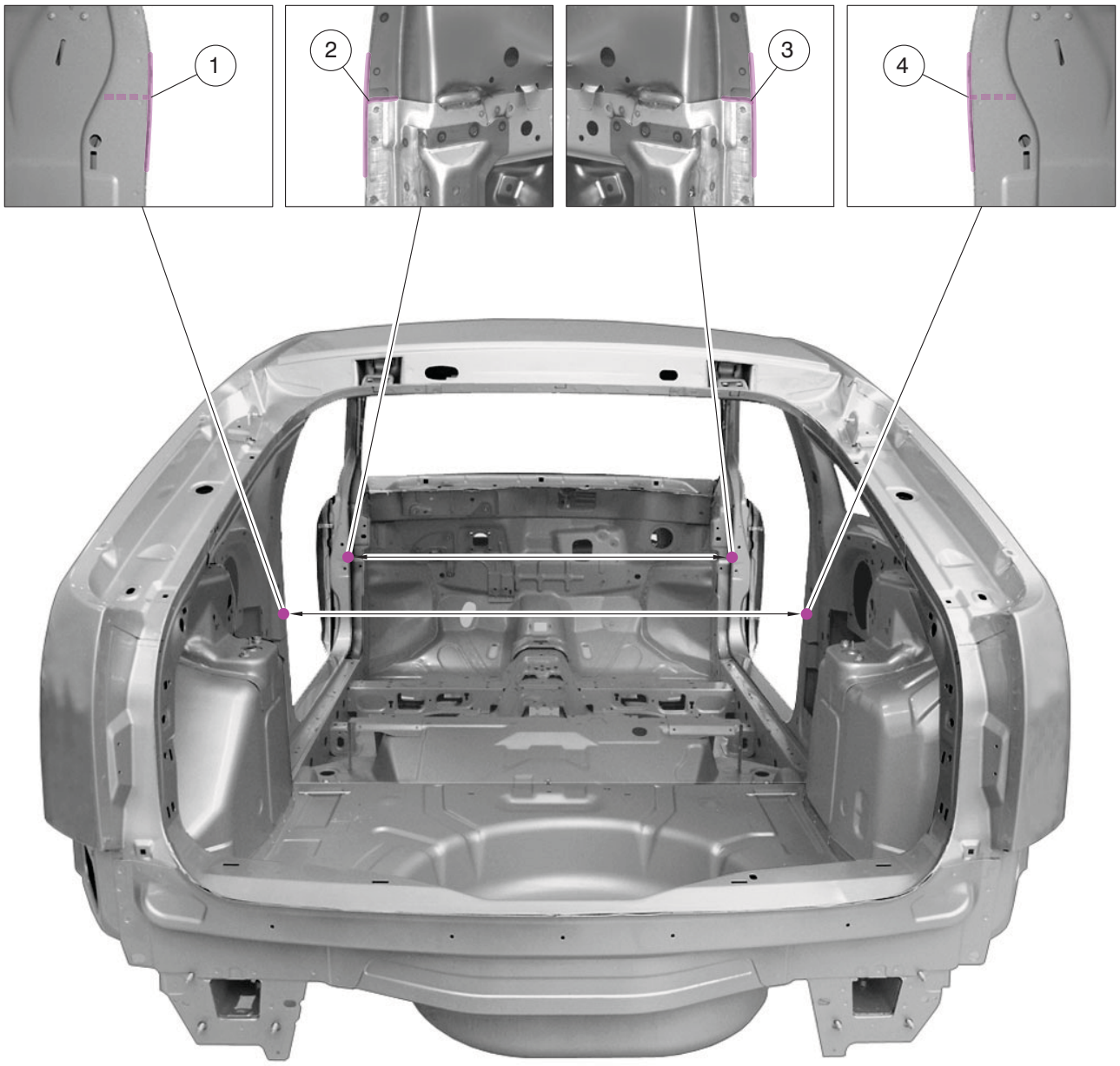
- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from

GENERAL PROCEDURES

the center of the welded flange using a symmetrically adjusted measuring gauge.

Measuring points and dimensions

1 - 4 = 1460 mm	2 - 3 = 1442 mm



E54965

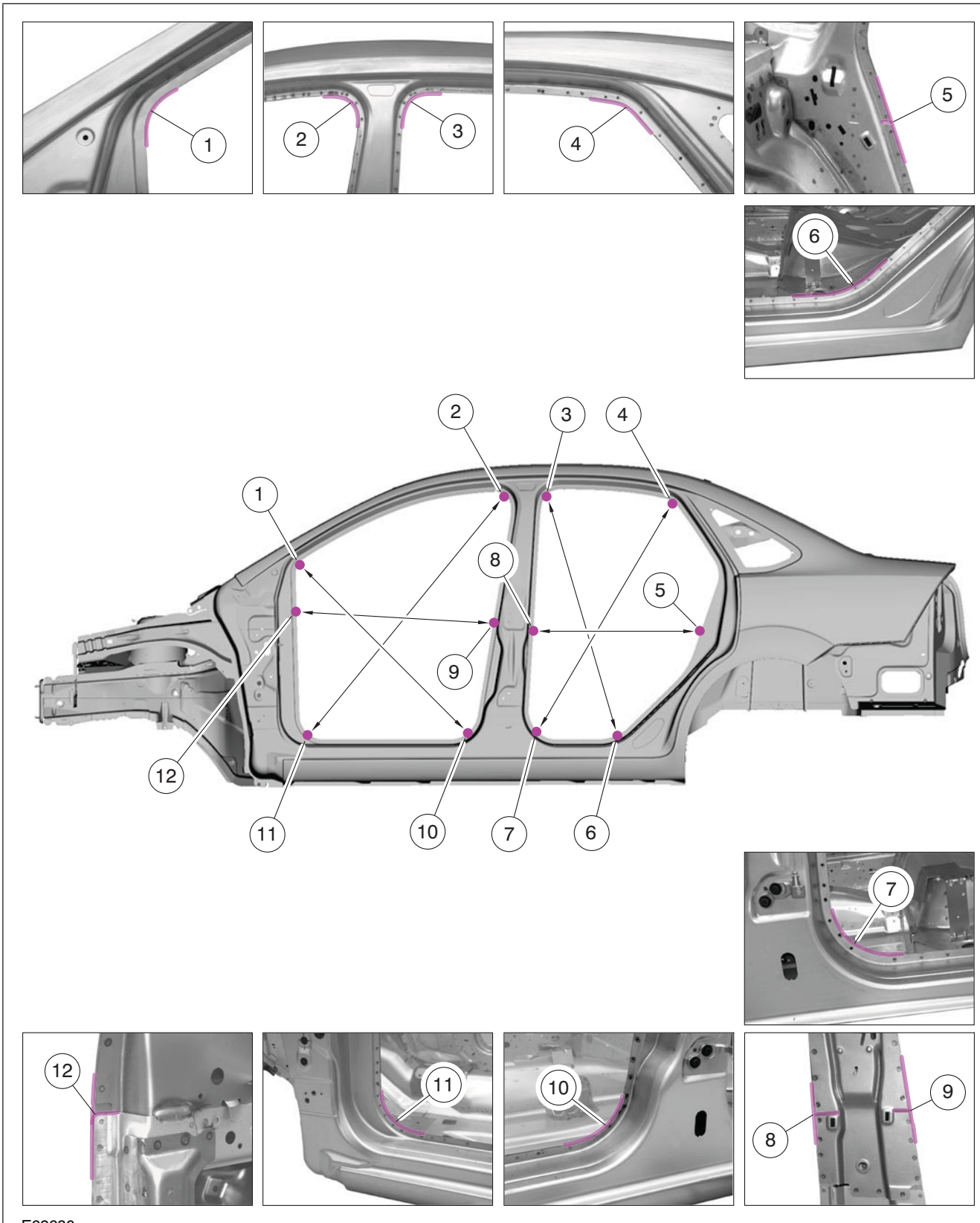
8. Body dimensions, side view (4-door version)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the edge of the steel panel using a symmetrically adjusted measuring gauge.
- Measuring points 1, 2, 3, 4, 6, 7, 10 and 11 are measured in the curve and represent the greatest distance to the measuring point opposite.
- The detail views of measuring points 5, 8, 9 and 12 are shown looking from the vehicle interior outwards.

Measuring points and dimensions

1 - 10 = 992 mm	4 - 7 = 1095 mm
2 - 11 = 1281 mm	5 - 8 = 711 mm
3 - 6 = 1025 mm	9 - 12 = 838 mm

GENERAL PROCEDURES



E62630

9. Body dimensions, rear (4-door version)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the center of the welded flange using a symmetrically adjusted measuring gauge.

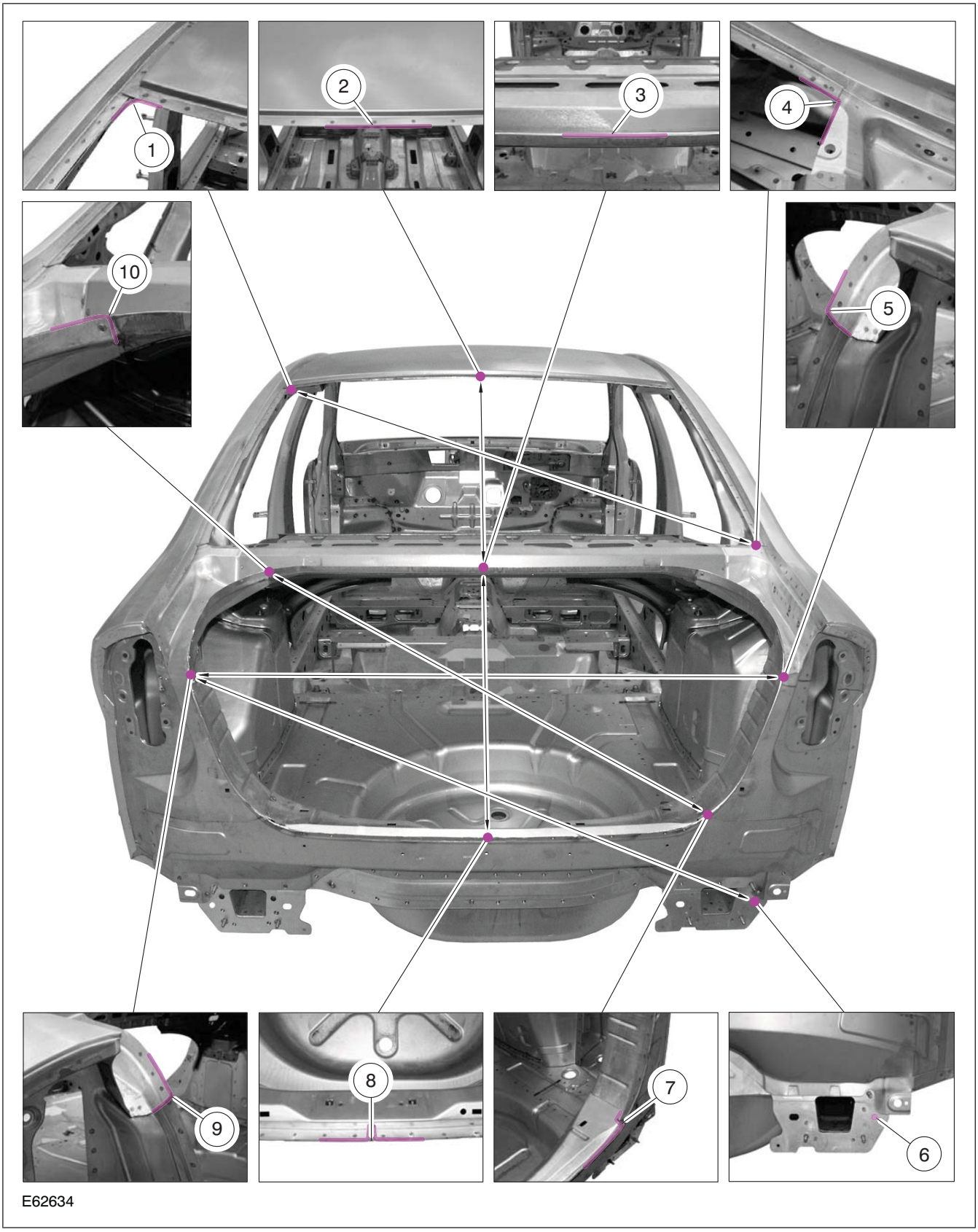
GENERAL PROCEDURES

- Measurement points 1 and 4 are measured in the curve and correspond to the largest distance to the opposite measurement point.
- Measurement point 6 is measured from the center of the hole.

Measuring points and dimensions

1 - 4 = 1324 mm	5 - 9 = 1043 mm
2 - 3 = 824 mm	6 - 9 = 1212 mm
3 - 8 = 512 mm	7 - 10 = 960 mm

GENERAL PROCEDURES



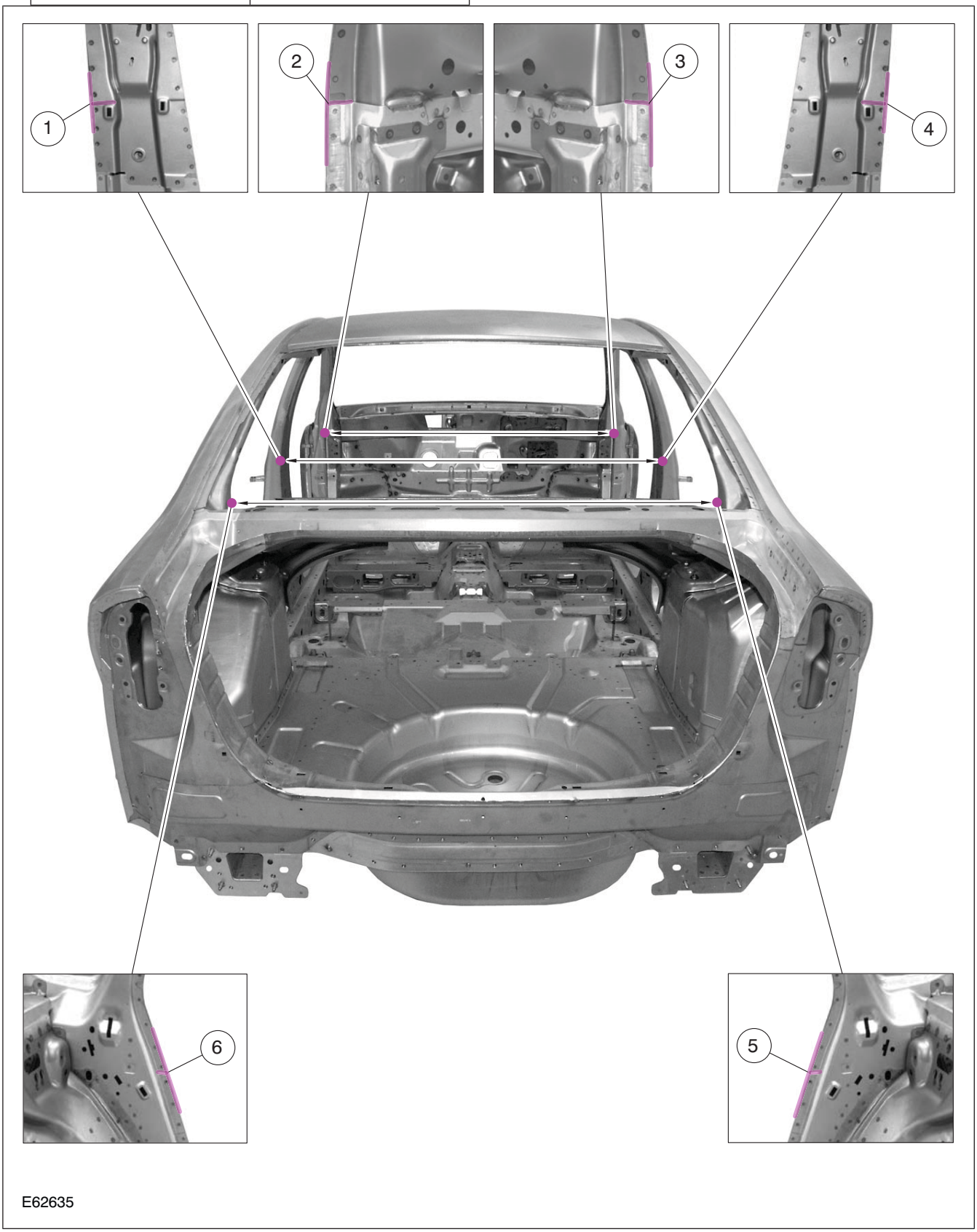
10. Body dimensions, interior (4-door version)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the center of the welded flange using a symmetrically adjusted measuring gauge.

GENERAL PROCEDURES

Measuring points and dimensions

1 - 4 = 1458 mm	5 - 6 = 1441 mm
2 - 3 = 1442 mm	



11. Body dimensions, side view (wagon)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from

GENERAL PROCEDURES

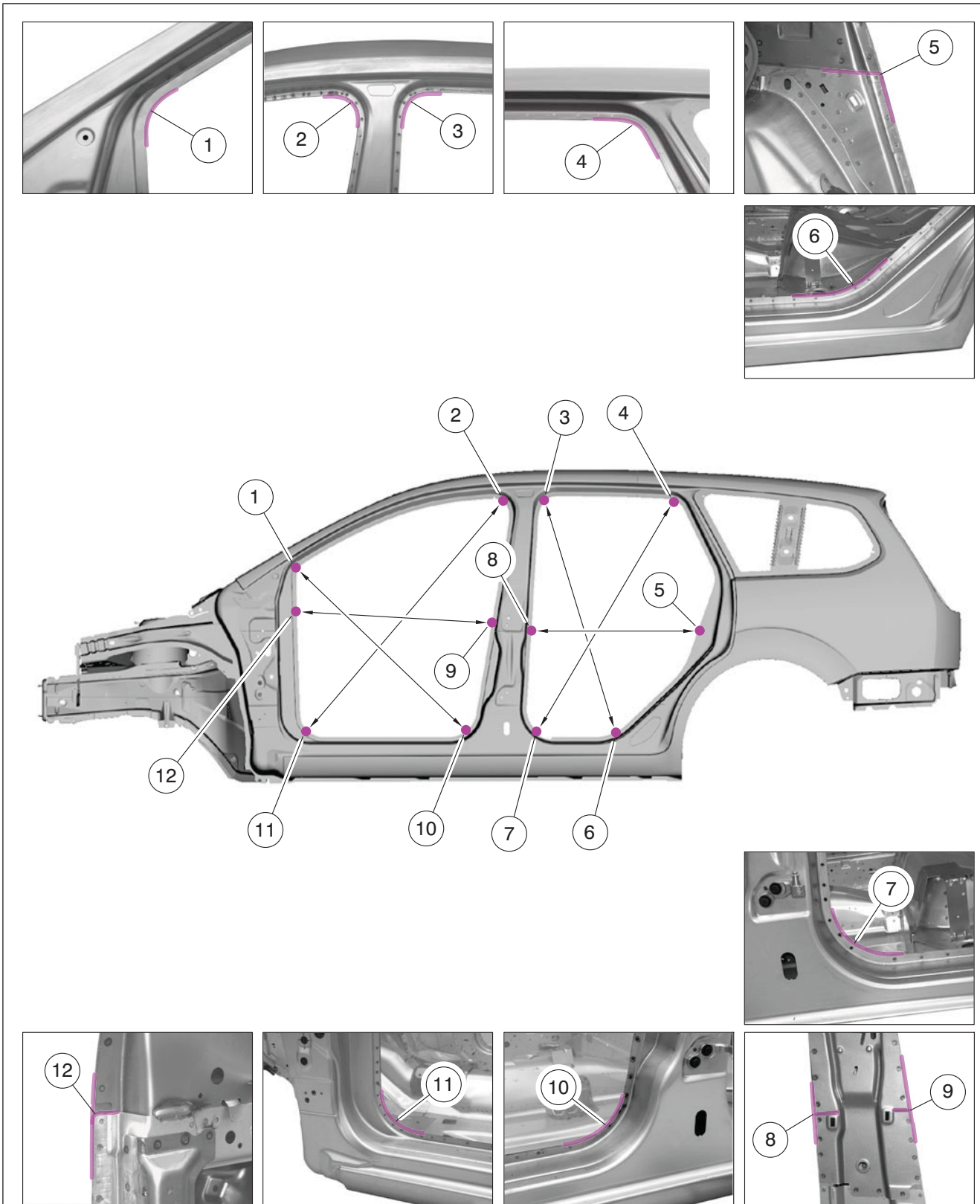
the edge of the steel panel using a symmetrically adjusted measuring gauge.

- Measuring points 1, 2, 3, 4, 6, 7, 10 and 11 are measured in the curve and represent the greatest distance to the measuring point opposite.
- The detail views of measuring points 5, 8, 9 and 12 are shown looking from the vehicle interior outwards.

Measuring points and dimensions

1 - 10 = 992 mm	4 - 7 = 1136 mm
2 - 11 = 1281 mm	5 - 8 = 711 mm
3 - 6 = 1025 mm	9 - 12 = 838 mm

GENERAL PROCEDURES



E62631

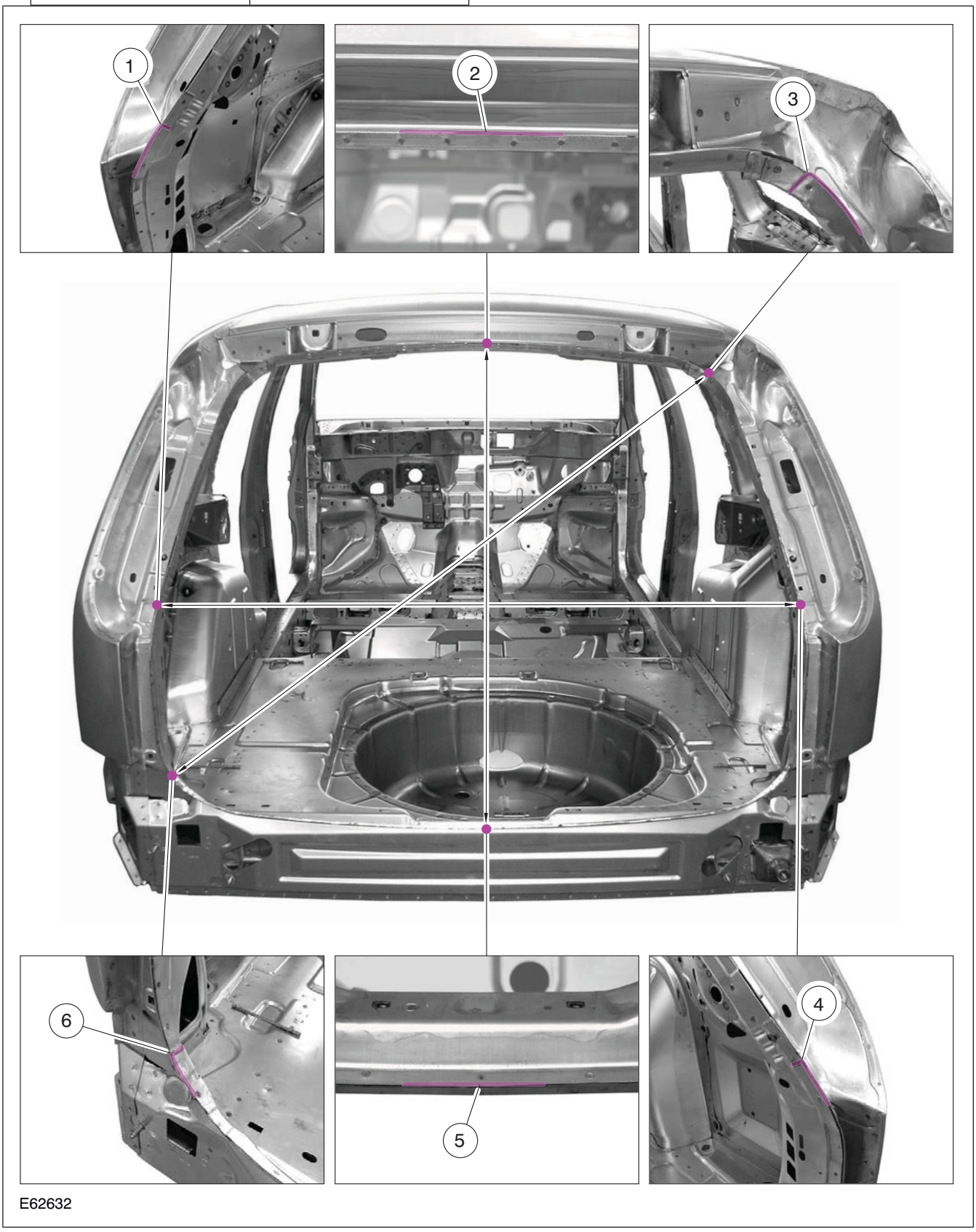
12. Body dimensions, rear (wagon)

- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from the center of the welded flange using a symmetrically adjusted measuring gauge.

GENERAL PROCEDURES

Measuring points and dimensions

1 - 4 = 1155 mm	3 - 6 = 1276 mm
2 - 5 = 906 mm	



E62632

13. Body dimensions, interior (wagon)

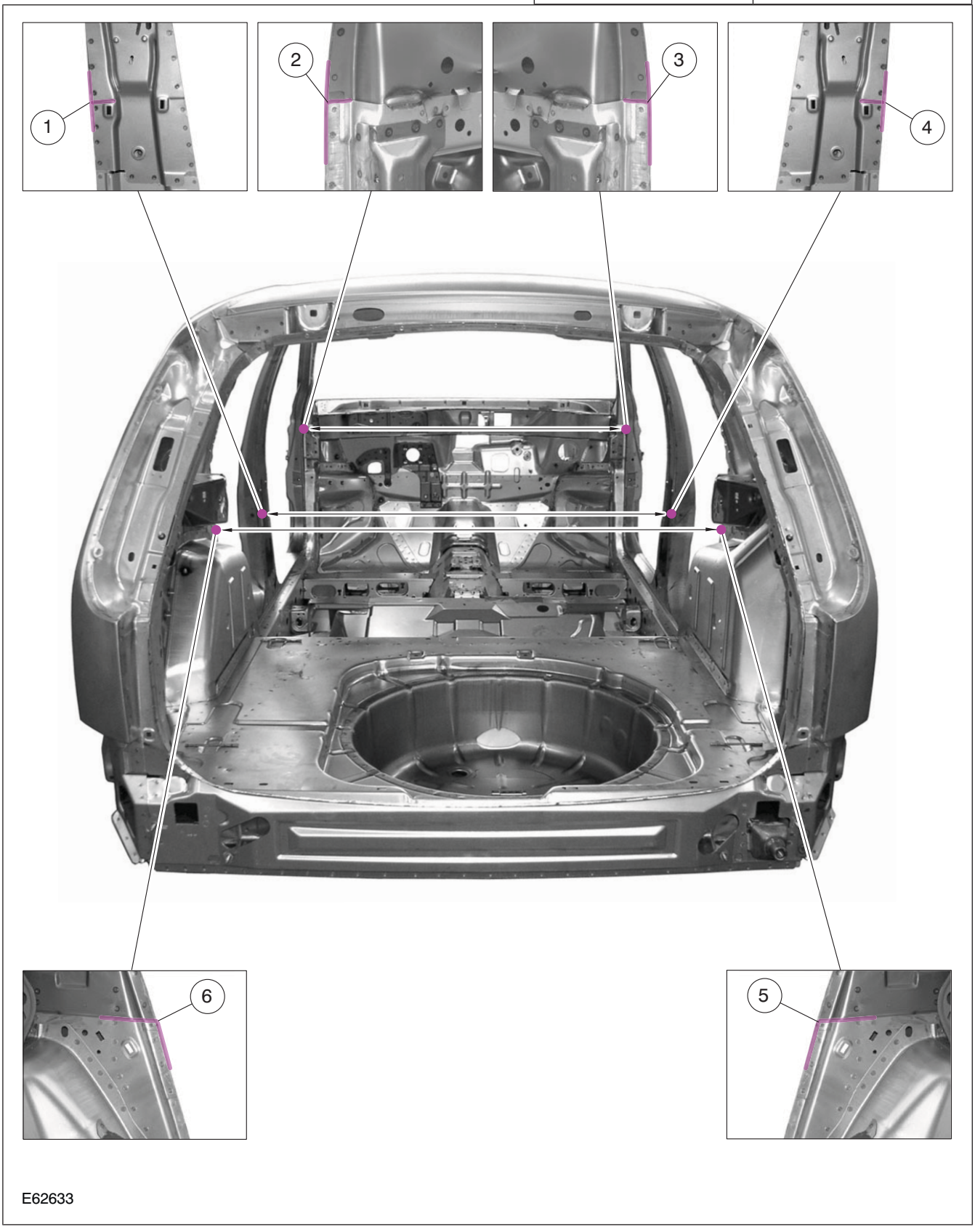
- All dimensions have a tolerance of ± 3 mm. All dimensions were determined starting from

GENERAL PROCEDURES

the center of the welded flange using a symmetrically adjusted measuring gauge.

Measuring points and dimensions

1 - 4 = 1458 mm	5 - 6 = 1441 mm
2 - 3 = 1442 mm	



SECTION 501-27 Front End Sheet Metal Repairs

VEHICLE APPLICATION: 2011.00 Focus

CONTENTS PAGE

REMOVAL AND INSTALLATION

Fender Apron Panel Section..... 501-27-2
Fender Apron Panel Reinforcement..... (44 277 4) 501-27-4
Front Side Member Section..... 501-27-6
Front Side Member and Fender Apron Panel LH..... 501-27-8

REMOVAL AND INSTALLATION

Fender Apron Panel Section

1. Replacement parts

- Apron panel section
- Front module bracket
- Inner apron panel reinforcement

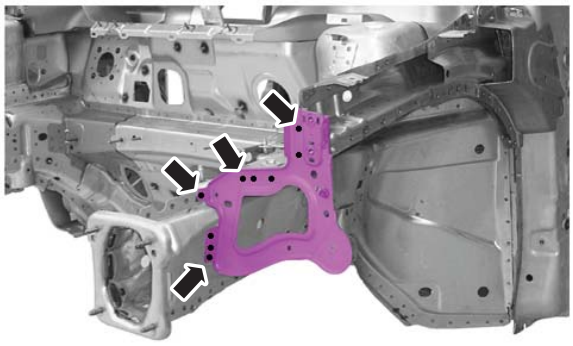
Removal

1. General information

- The apron panel reinforcement is already removed as a sectional replacement before repair work starts.
- Necessary removal work: Bonnet, wing, bumper, door, front module, headlamp and wheelhouse liner.

2. Front module bracket

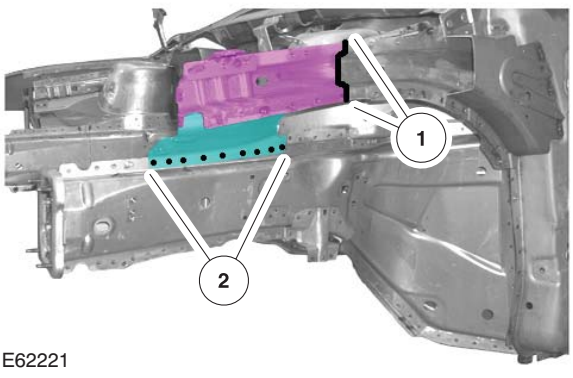
- Mill out the spot welds.



E62220

3. Apron panel and apron panel inner reinforcement

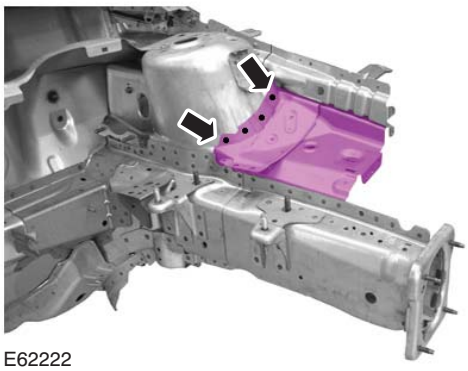
1. Separating cut.
2. Mill out the spot welds.



E62221

4. Apron panel

- Mill out the spot welds.



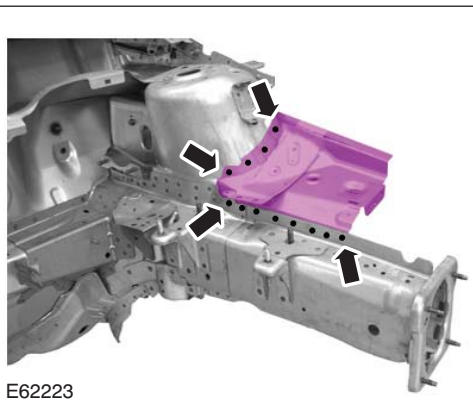
E62222

Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Apron panel

- Resistance spot weld.



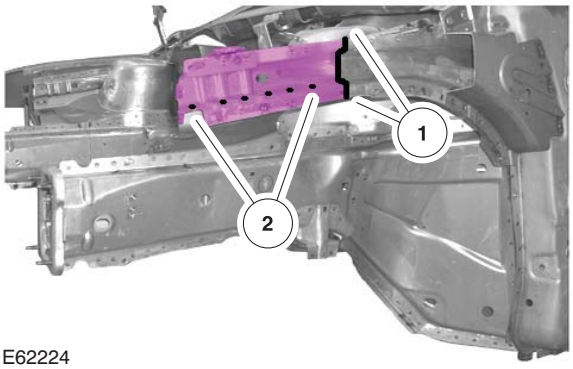
E62223

2. Apron panel and apron panel inner reinforcement

1. Continuous MIG weld seam.

REMOVAL AND INSTALLATION

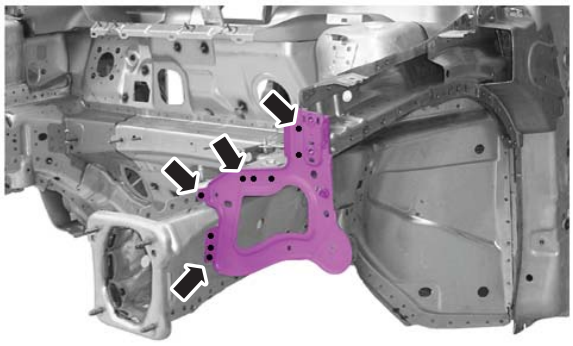
2. Resistance spot weld.



E62224

3. Front module bracket

- Resistance spot weld.


E62220

REMOVAL AND INSTALLATION

Fender Apron Panel Reinforcement(44 277 4)

1. Replacement Parts

- Fender panel reinforcement

Removal

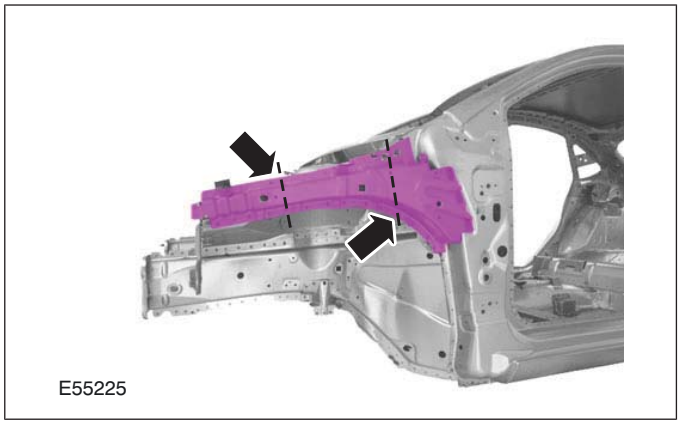
NOTE: Where possible, a partial replacement of the fender panel reinforcement is preferred to a complete replacement, as this can save a considerable amount of time on assembly work in the inner area of the A-pillar. The partial replacement options shown do not require the MIG brazed joints on the A-pillar to be detached.

1. General notes

- Necessary removal work: Bonnet, wing, bumper, door, front module, headlamp and wheelhouse liner.

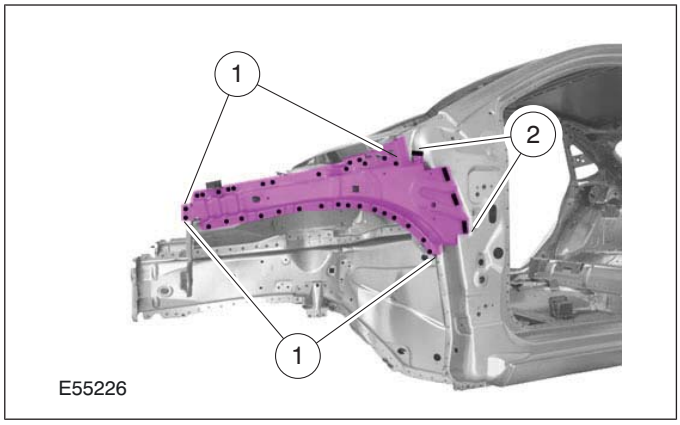
2. Fender panel reinforcement

- Cut locations for partial replacement.



3. Fender panel reinforcement

1. Mill out the spot welds.
2. Grind out the MIG brazed joints.

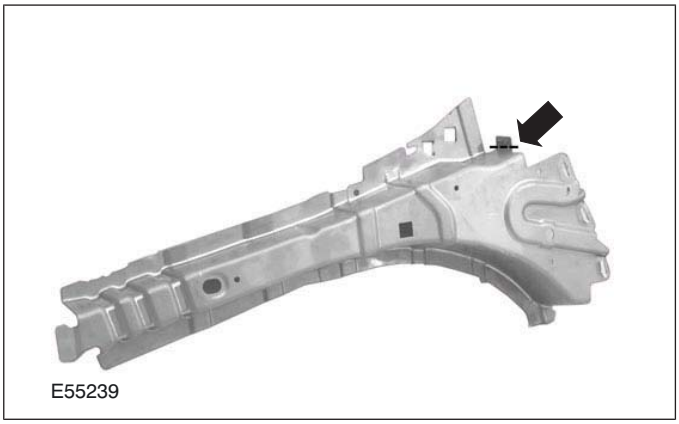


Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Prepare fender panel reinforcement

- Cut off the sheet metal tabs, leaving a residual flange of approx. 5 mm.

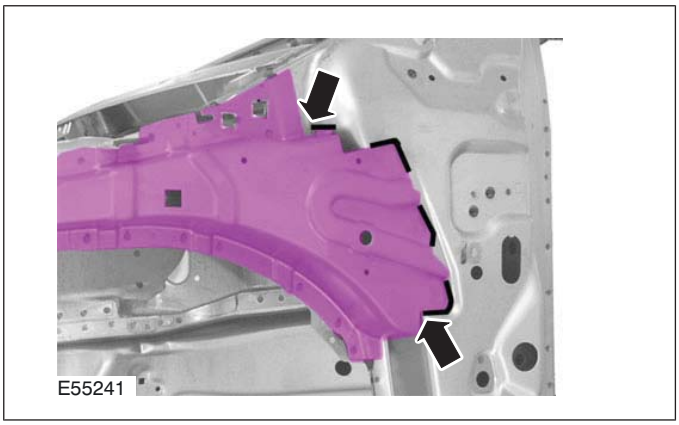


2. NOTE:

- When carrying out a repair, the MIG brazed joints made during vehicle production must be replaced by MIG weld joints in a different location (see diagram E55241).
- These MIG welds must not be carried out on or near existing MIG brazed seams as even the smallest amount of brazing solder can result in a reduction in the strength of the weld seam.

Fender panel reinforcement

- Continuous MIG seam weld.



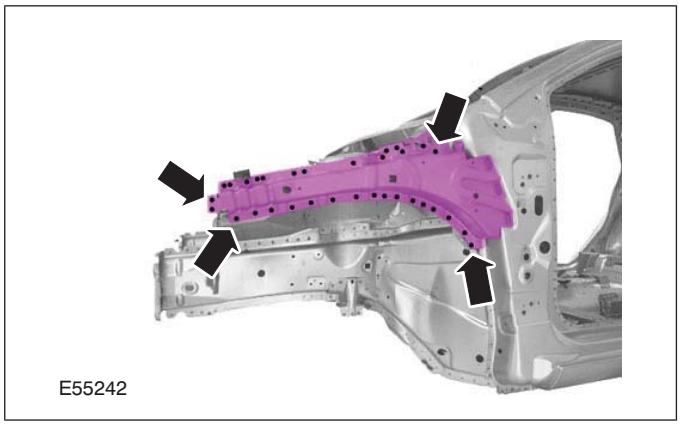
3. NOTE: After carrying out the repair carefully apply cavity seal. Also treat the areas of the original MIG brazed joints.

REMOVAL AND INSTALLATION

•

Fender panel reinforcement

- Resistance spot weld.



REMOVAL AND INSTALLATION

Front Side Member Section

General Equipment

Measurement or alignment angle system

1. Replacement Parts

- Outer side member
- Inner side member
- Crossmember retaining flange

Removal

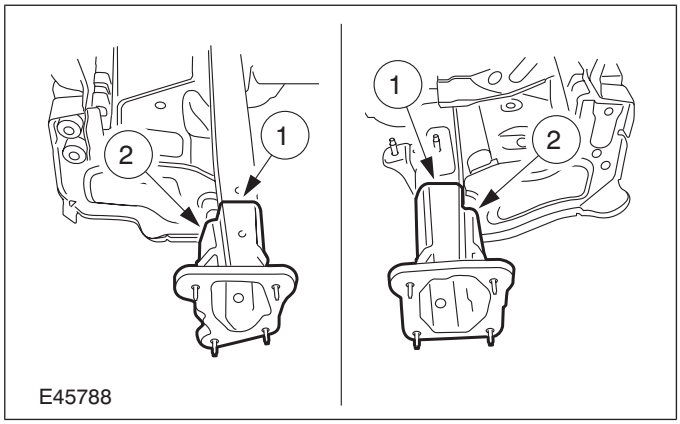
1. General Notes

- Required removal operations: Bumper, hood, fender, front module, headlamps and crossmember with crash elements.

NOTE: The cuts in the side member must be offset to one another.

2. Overview of cuts

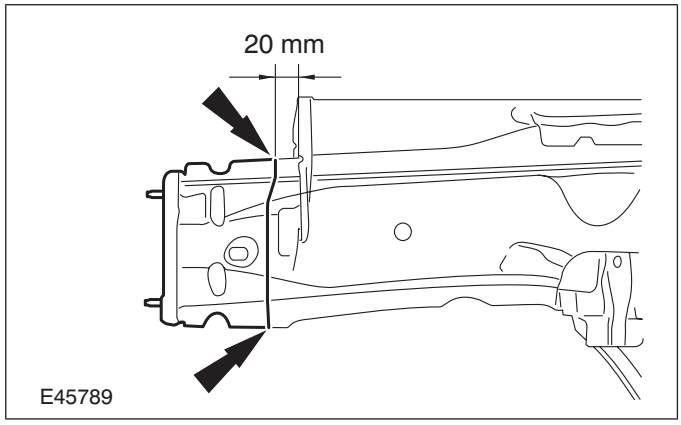
1. Inside of member.
2. Outside of member.



3. NOTE: Cut through the complete cross section of the side member using a large jigsaw. This is the final cut on the outside of the member.

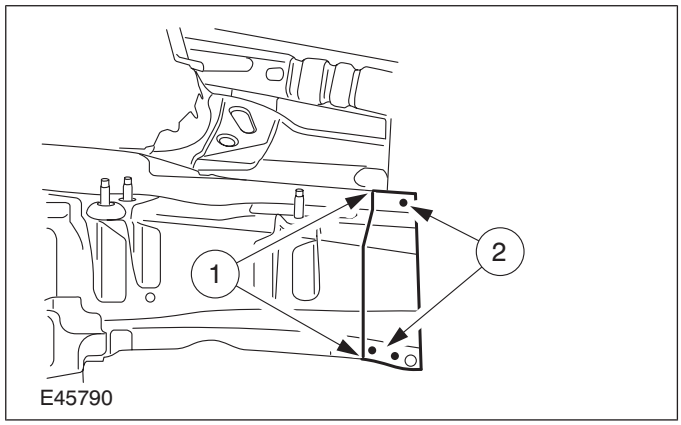
Outer side member

- Cut location.



4. Inner side member

1. Cut location.
2. Mill out the spot welds.

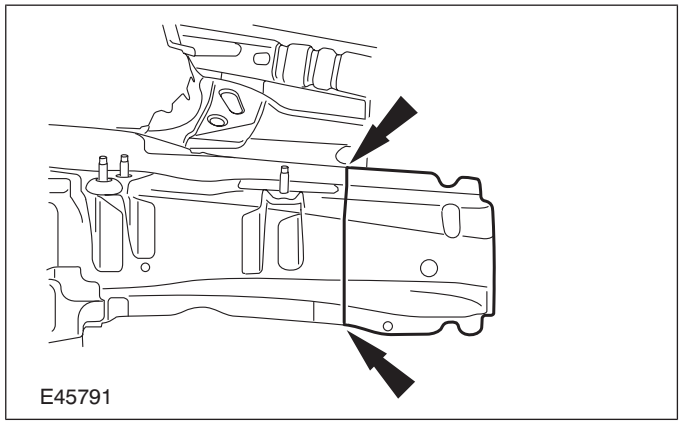


Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25A must be followed.

1. Inner side member

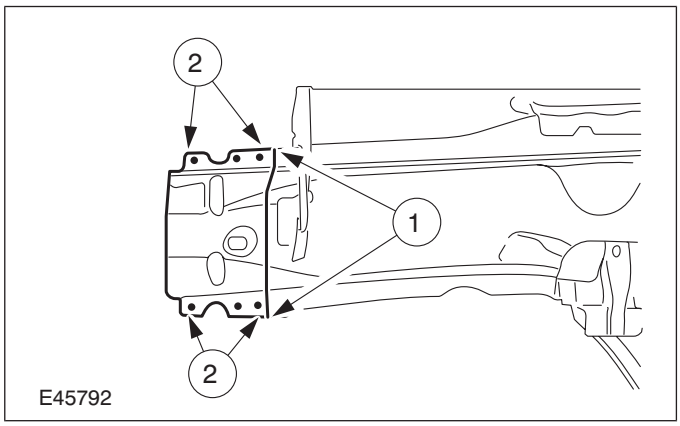
- Continuous MIG weld.



REMOVAL AND INSTALLATION

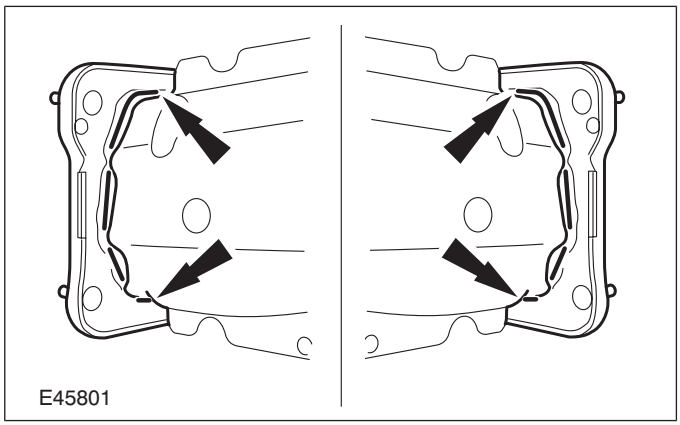
2. Outer side member

1. Continuous MIG weld.
2. Resistance spot weld.



3. Crossmember retaining flange

- Continuous MIG weld.



REMOVAL AND INSTALLATION

Front Side Member and Fender Apron Panel LH

General Equipment

Measurement and alignment angle system

1. Replacement parts

- Outer side member
- Inner side member
- Side member inner reinforcement
- Crossmember retaining flange
- Apron panel
- Inner apron panel reinforcement
- Front module bracket

Removal

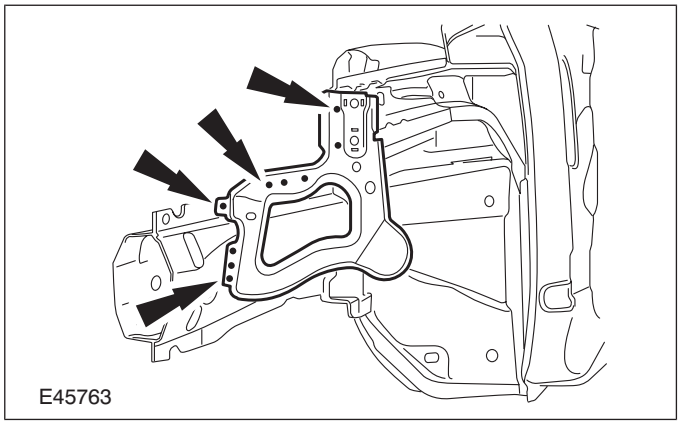
1. General information

- The apron panel reinforcement is already removed before commencing the repair.
- Necessary removal work: radiator, drive aggregates, crossmember with crash elements, crash padding and A-pillar trim.
- Move carpets and wiring out of the working area.

2. NOTE: The cross member retaining flange is already detached from the side member during removal work.

Front module bracket

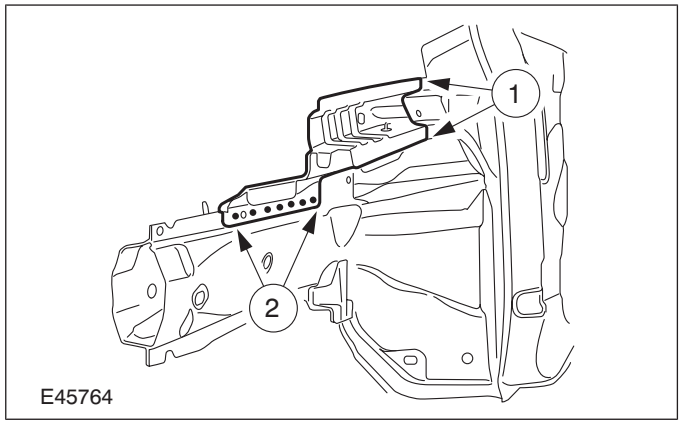
- Mill out the spot welds.



3. NOTE: After the rough separating cut both panel layers of the side member connection are accessible.

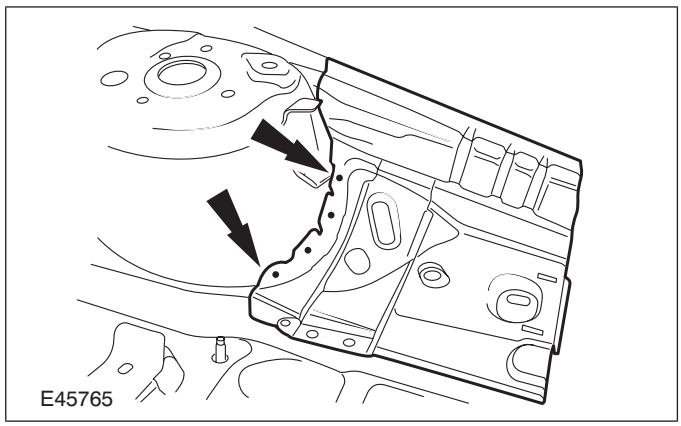
Inner apron panel reinforcement

1. Separating cut.
2. Mill out the spot welds (two panel thicknesses).



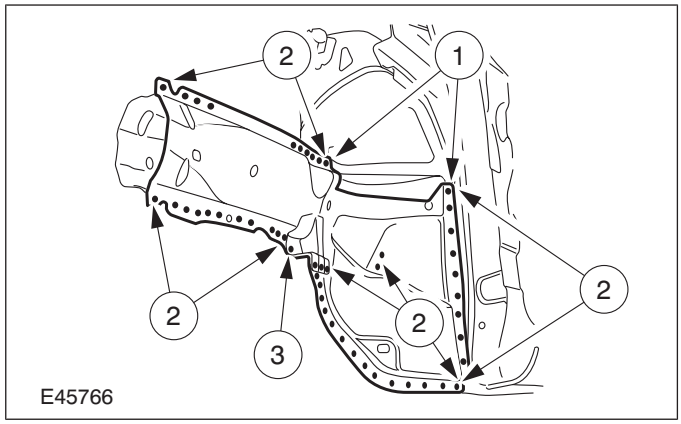
4. Apron panel

- Mill out the spot welds.



5. Outer side member

1. Rough separating cut.
2. Mill out the spot welds.
3. Grind out the weld seam.

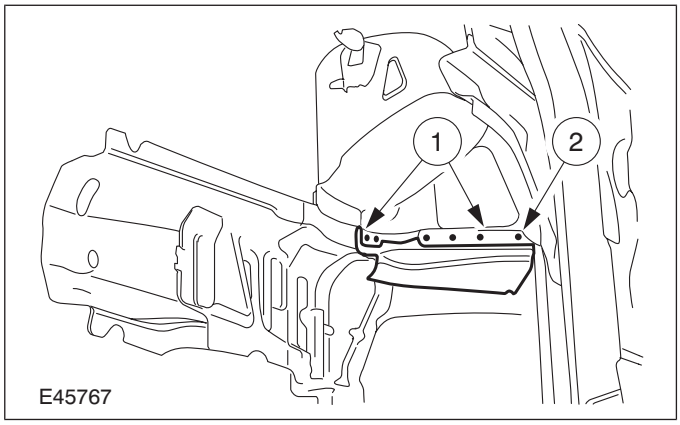


6. Outer side member (remainder)

1. Mill out the spot welds.

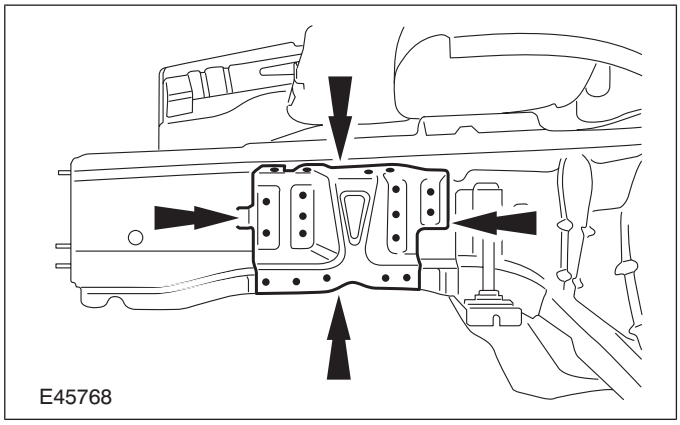
REMOVAL AND INSTALLATION

2. Mill out the spot welds (two panel thicknesses).



7. Side member inner reinforcement

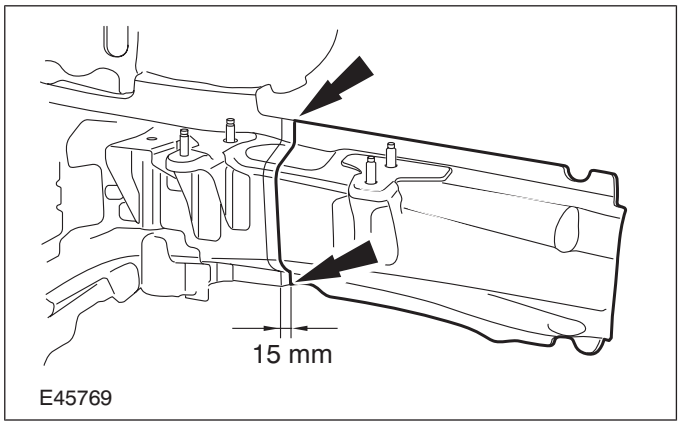
- Mill out the spot welds.



8. NOTE: Cut dimensions measured from the laser weld seam.

Inner side member

- Separating cut.



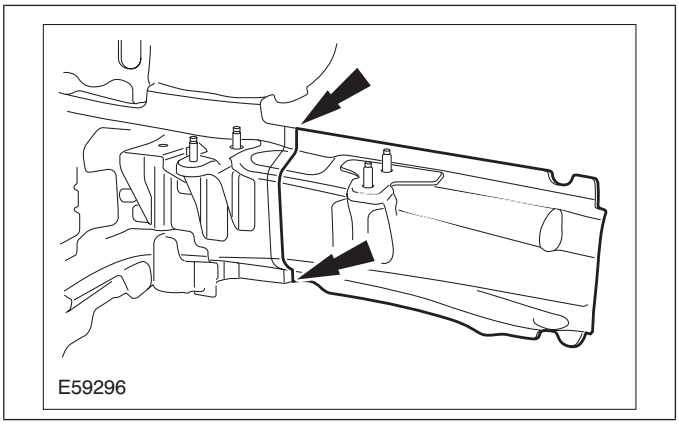
Installation

NOTE:

- Fit the inner and outer side members as well as the crossmember retaining flange using the alignment angle and fix in place.
- Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

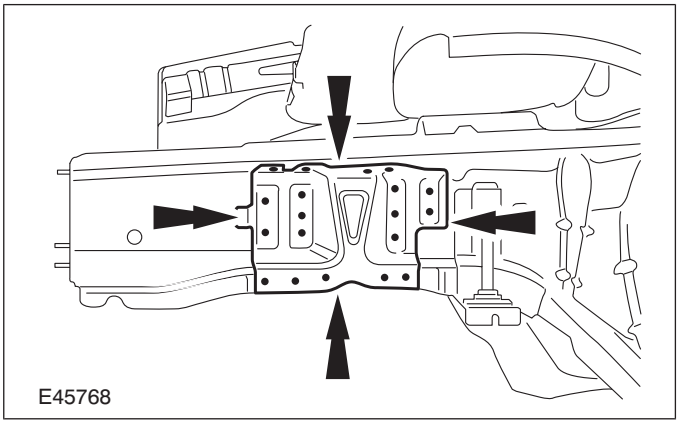
1. Inner side member

- Continuous MIG weld seam.



2. Side member inner reinforcement

- Offer up the new part and resistance spot weld it.

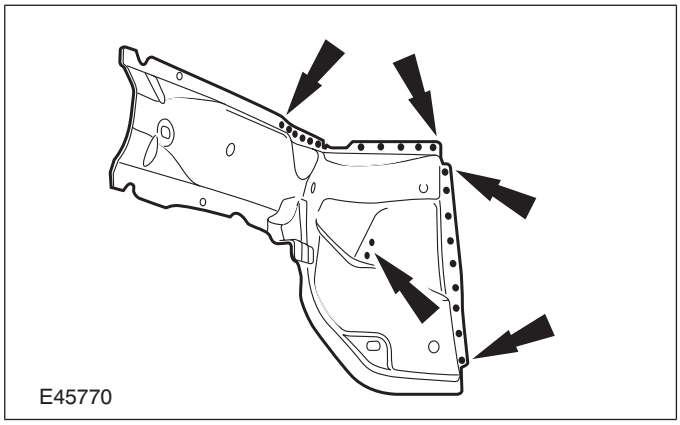


NOTE: Determine the position of the holes for puddle welding on the vehicle.

3. Outer side member

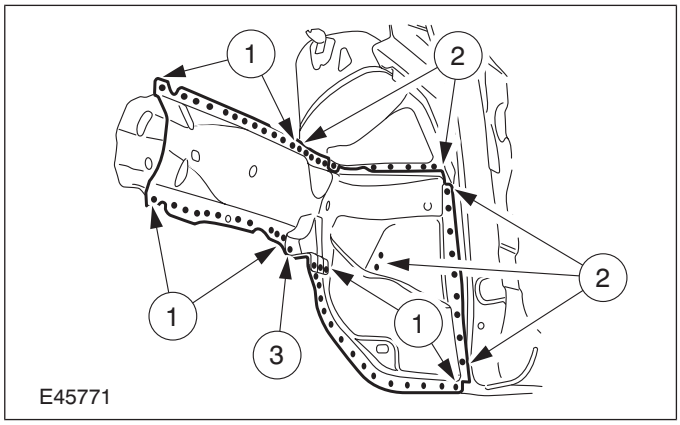
REMOVAL AND INSTALLATION

- Drill holes for puddle welding (diameter: 10 mm).



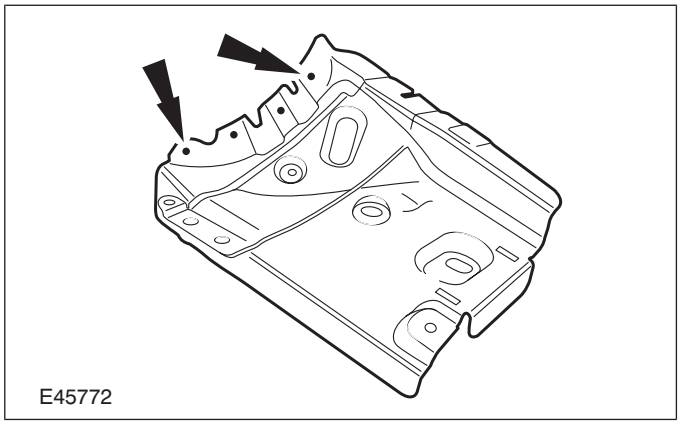
4. Outer side member

1. Resistance spot weld.
2. Puddle weld.
3. Continuous MIG weld seam.



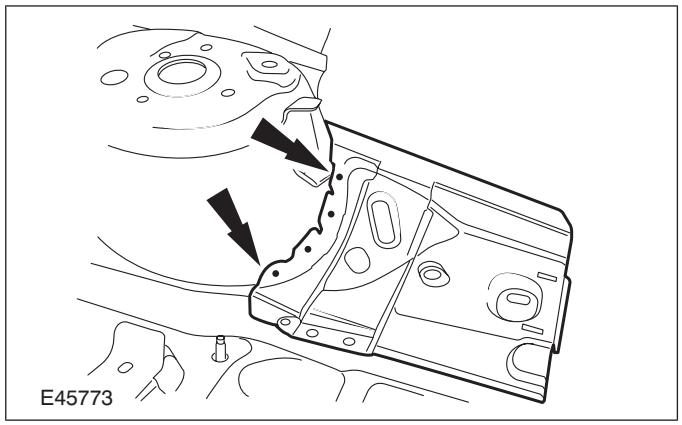
5. Apron panel

- Drill holes for puddle welding.



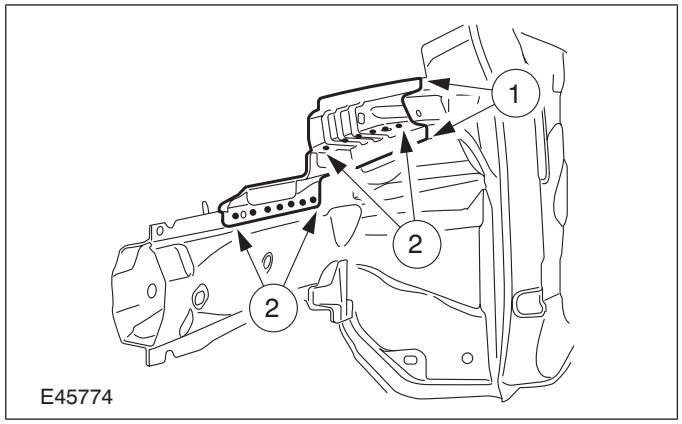
6. Apron panel

- Puddle weld.



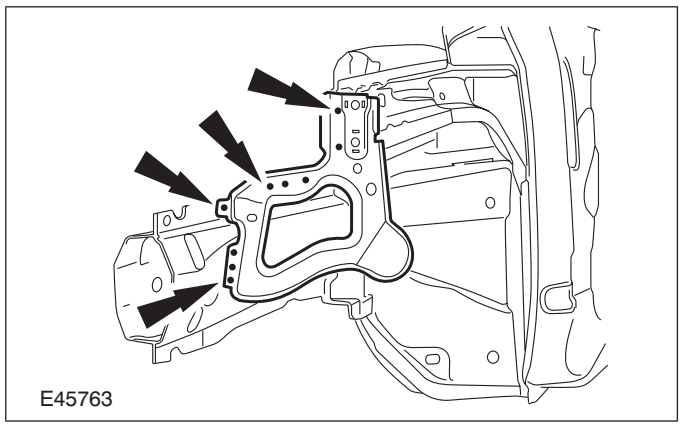
7. Inner apron panel reinforcement

1. Continuous MIG weld seam.
2. Resistance spot weld.



8. Front module bracket

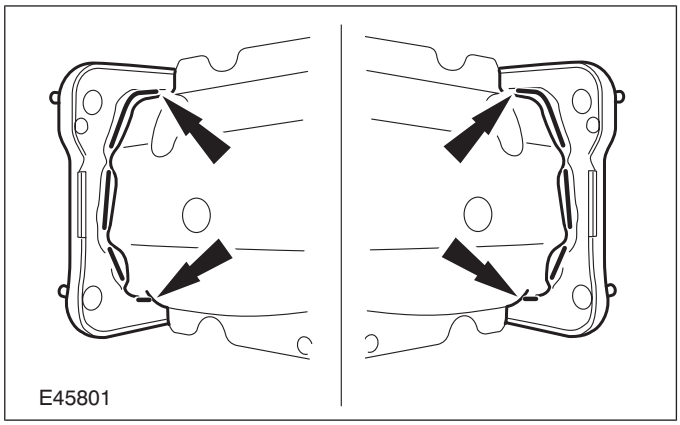
- Resistance spot weld.



9. Crossmember retaining flange

REMOVAL AND INSTALLATION

- Continuous MIG weld seam.



SECTION 501-28 Roof Sheet Metal Repairs

VEHICLE APPLICATION: 2011.00 Focus

CONTENTS PAGE

SPECIFICATIONS

Specifications..... 501-28-2

REMOVAL AND INSTALLATION

Roof Panel..... 501-28-3

SPECIFICATIONS

Lubricants, Sealers and Adhesives

	Part number	Specification
PU glass adhesive (150 ml)	1 102 109	WSK-M11 P57-A1

REMOVAL AND INSTALLATION

Roof Panel

1. Repair parts

- Roof panel
- Middle roof rail

Removal

1. General Notes

- Required removal operations: Windshield, side windows, tailgate, headliner, interior trim panels and rear lights.

2. NOTE:

- Release the screw fixings (4 off) at the sides on the middle roof rail.
- Warm the bonded areas of the roof panel from outside (front and rear roof crossmembers) before removal. The middle roof rail will be removed with the roof.

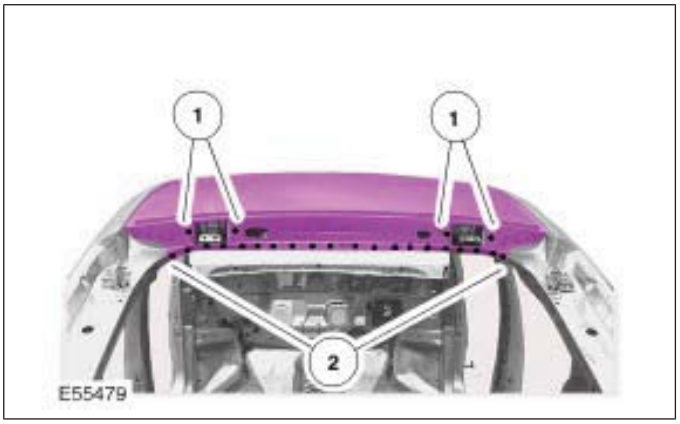
Roof

- Mill out the spot welds.



3. Rear roof panel

1. Mill out the spot welds.
2. Grind out the spot welds from the rear.



Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Roof panel rear

- Drill holes for puddle welding.

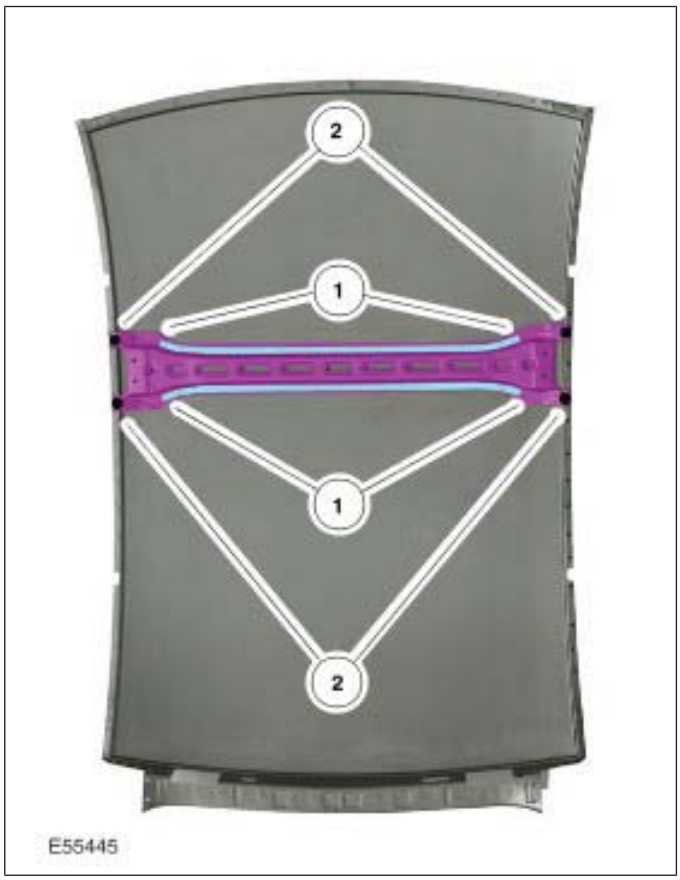


2. NOTE: Measure out the correct installation position of the roof rail on the vehicle.

REMOVAL AND INSTALLATION

Install the middle roof rail

1. Apply PU glass adhesive.
2. Resistance spot weld.



3. Prepare the bonded areas

- Apply PU glass adhesive.

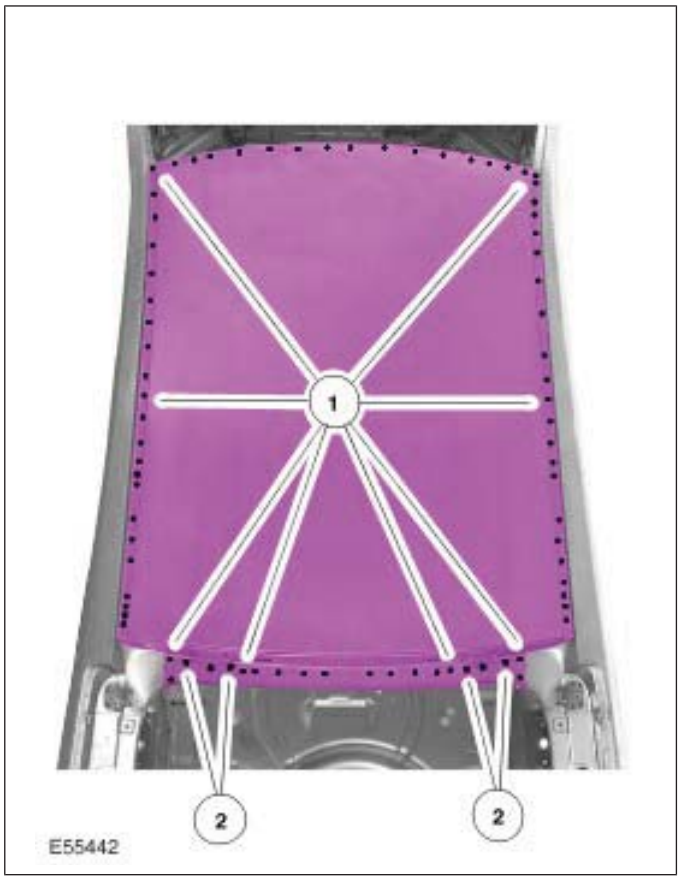


4. Offer up the roof panel and weld in place.

1. Resistance spot weld.

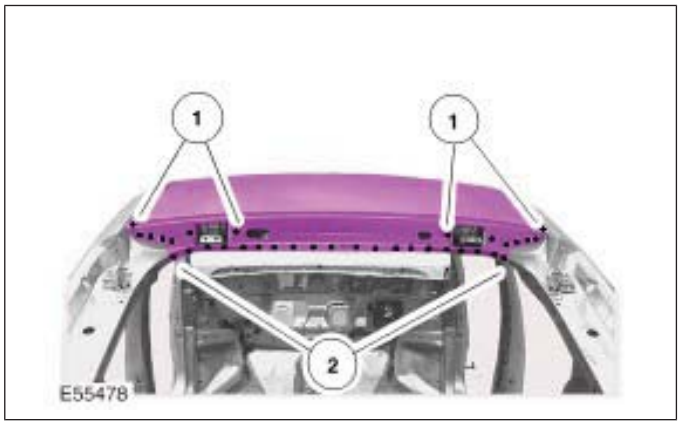
REMOVAL AND INSTALLATION

2. Puddle weld.



5. Weld the roof into place

1. Puddle weld.
2. Resistance spot weld.



SECTION 501-29 Side Panel Sheet Metal Repairs

VEHICLE APPLICATION: 2011.00 Focus

CONTENTS PAGE

SPECIFICATIONS

Specifications..... 501-29-2

REMOVAL AND INSTALLATION

Rocker Panel — 3-Door..... 501-29-3
Rocker Panel — 5-Door..... 501-29-4
A-Pillar Outer Panel Section and Reinforcement..... 501-29-6
B-Pillar and Reinforcement — 3-Door..... 501-29-10
B-Pillar and Reinforcement — 4-Door/5-Door/Wagon..... 501-29-13

SPECIFICATIONS

Lubricants, Sealers and Adhesives

	Part number	Specification
PU glass adhesive (150 ml)	1 102 109	WSK-M11 P57-A1
Metal adhesive kit - 2-component	1 203 241	WSK-M4 G200 A/B

REMOVAL AND INSTALLATION

Rocker Panel — 3-Door

1. Replacement parts

- Rocker panel

Removal

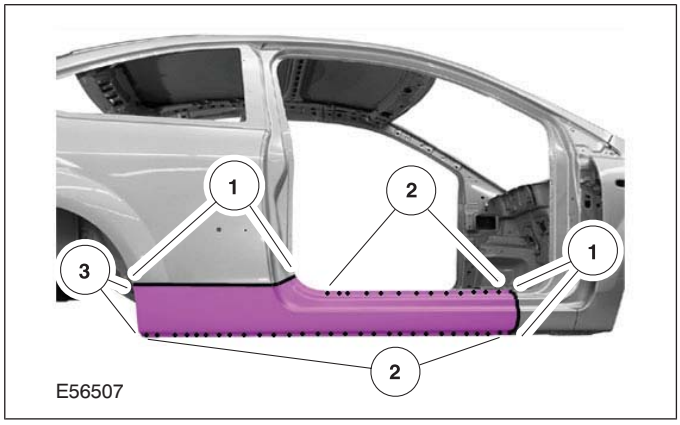
1. General notes

- Necessary removal work: doors, front and rear seats, rocker panel inner trim, A- and B-pillar inner trim.
- Fold back the carpets and move the wiring harness out of the working area.

2. NOTE: The cut locations may vary depending on the extent of the damage. When cutting the quarter panel (pos. 1) ensure there is a sufficient gap (min. 10 mm) from the horizontal edge of the panel so that a strip can be left for welding.

Rocker panel

1. Cut locations.
2. Mill out the spot welds.
3. Grind down one panel thickness at the wheel arch edge.



E56507

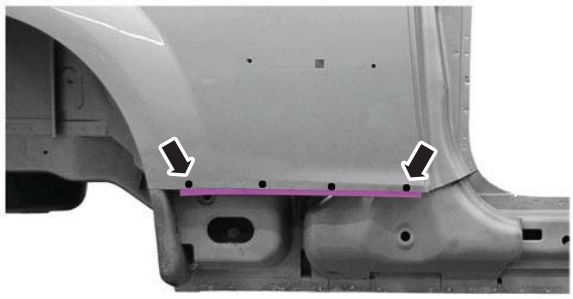
Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. NOTE: Remove the damping matting which is adhesive-bonded to the quarter panel. Before inserting the rocker panel offer up a panel strip to the quarter panel and insert. The panel strip can be cut from the remainder of the new part.

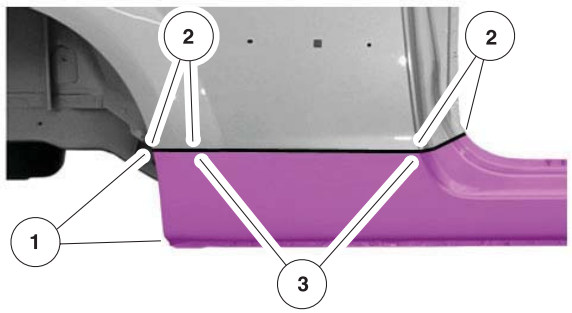
Panel strip

- Resistance spot weld (tack weld only).


E56508

2. Rocker panel

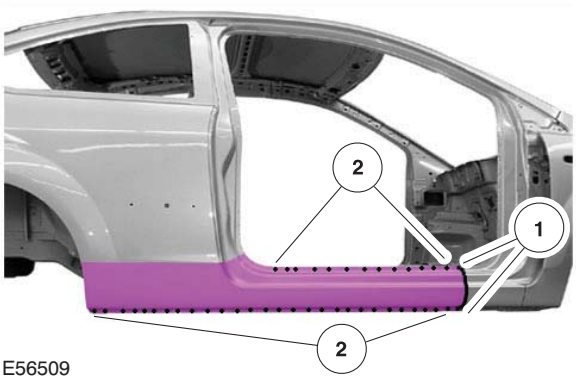
1. Apply two-component metal adhesive to the clinched flange.
2. Continuous MIG weld.
3. MIG intermittent weld seam.



E56521

3. Rocker panel

1. Continuous MIG weld.
2. Resistance spot weld.



E56509

REMOVAL AND INSTALLATION

Rocker Panel — 5-Door

1. Replacement Parts

- Rocker panel

Removal

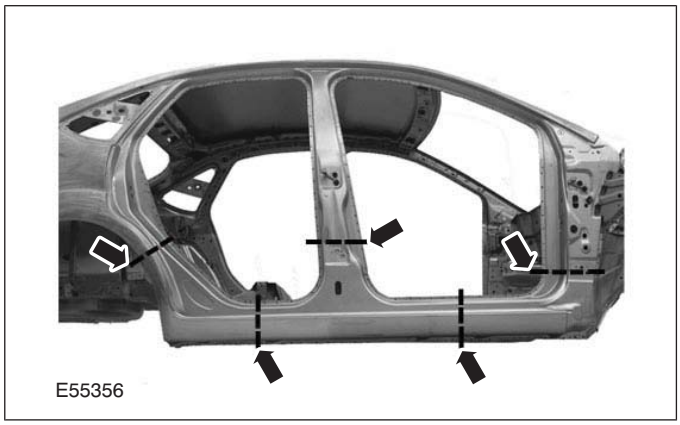
1. General notes

- Required removal operations: Doors, door hinges, front and rear seats, door sill inner trim, A- B- and C- pillar inner trim.
- Fold back the carpets and move the wiring harness out of the working area.

NOTE: The cut location may vary depending upon the extent of the damage. The repair shown describes a partial rear repair.

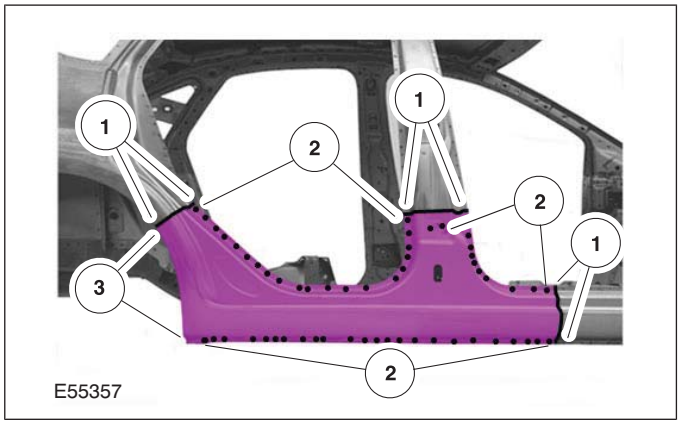
2. Rocker panel

- Cut locations.



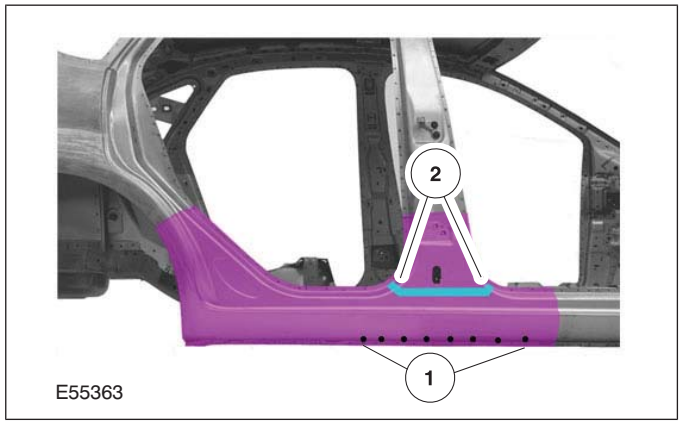
3. Rocker panel

1. Cut locations.
2. Grind out the spot welds.
3. Grind down one panel thickness at the wheel arch edge.



4. Rocker panel

1. Mill out the spot welds.
2. Heat the area (approx. 170°) and detach the NVH element.

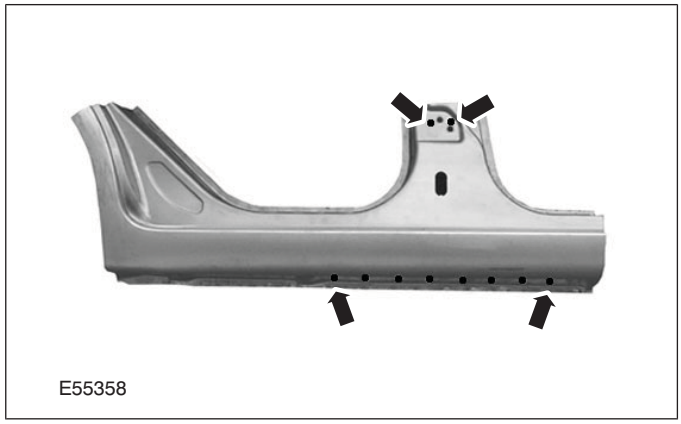


Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Rocker panel

- Drill holes for puddle welding.

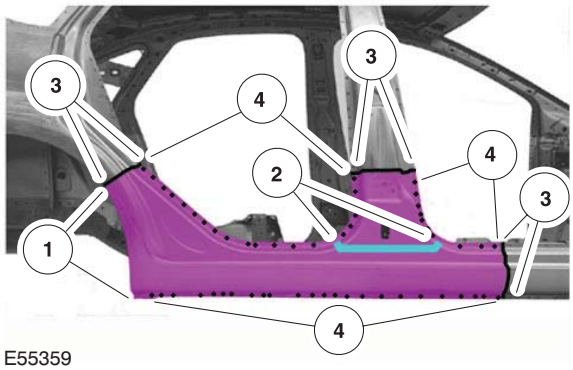


2. Rocker panel

1. Apply two-component metal adhesive to the clinched flange.
2. Apply PU glass adhesive to the NVH element.
3. Continuous MIG weld.

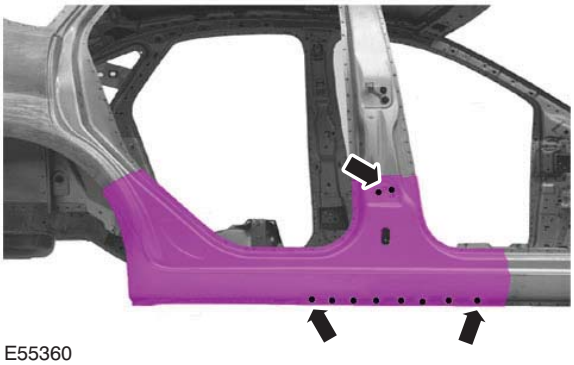
REMOVAL AND INSTALLATION

4. Resistance spot weld.



3. Rocker panel

- Puddle weld.



REMOVAL AND INSTALLATION

A-Pillar Outer Panel Section and Reinforcement

General Equipment

Measurement and alignment angle system

1. Replacement parts

- A-pillar outer panel
- A-pillar inner panel
- A-pillar reinforcement
- A-pillar/fender apron panel reinforcement

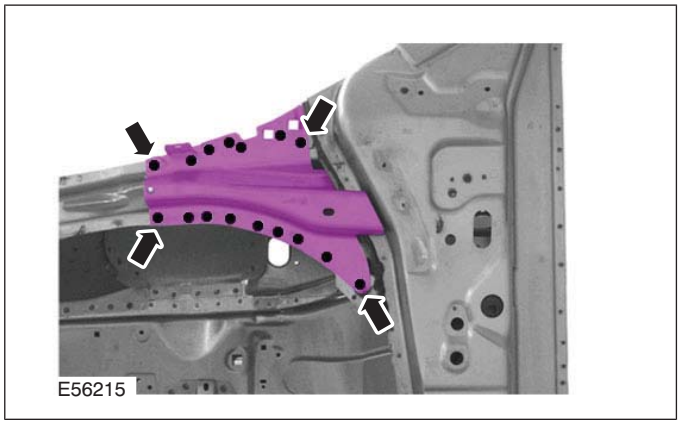
Removal

1. General notes

- The fender apron panel reinforcement is already removed before commencing the repair.
- Required removal operations: A-pillar trim panel, rocker panel trim and driver or passenger seat.
- Move the carpeting and the wiring away from the working area.

2. A-pillar/fender apron panel reinforcement

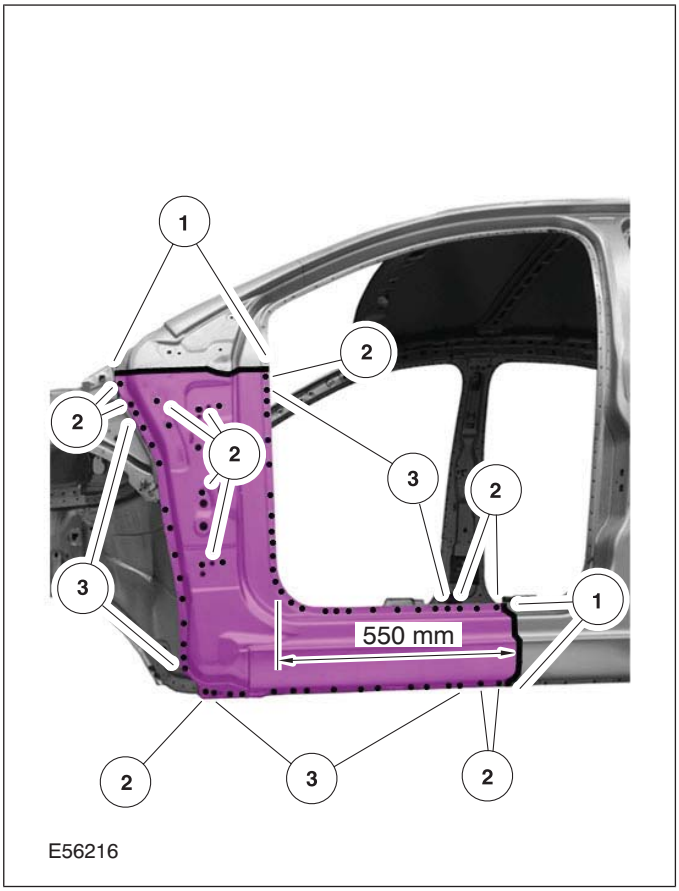
- Mill out the spot welds.



NOTE: To gain access to the front area of the B-pillar inner panel, the separating cut on the outer rocker panel must be made according to the specified dimensions (550 mm).

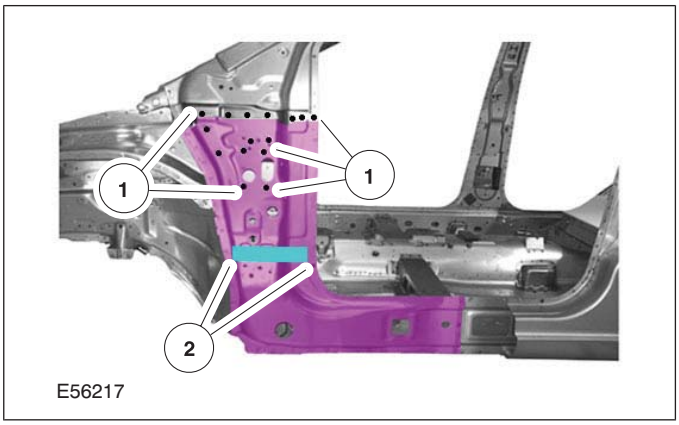
3. Outer A-pillar

1. Cut point.
2. Mill out the spot welds.
3. Mill out the spot welds (two panel thicknesses).



4. A-pillar reinforcement

1. Mill out the spot welds.
2. Heat the area (approx. 170°) and detach the NVH element.

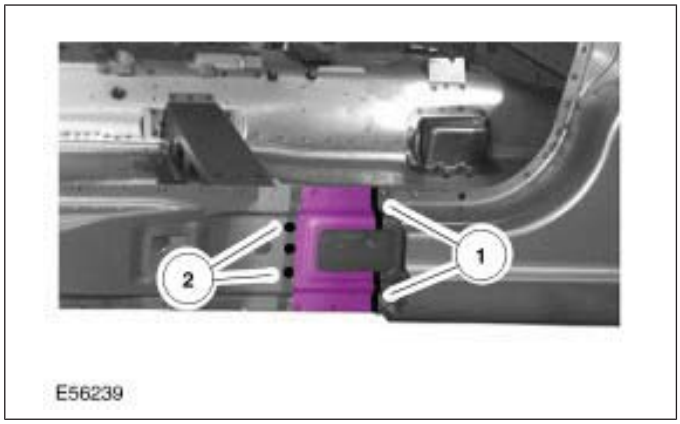


5. NOTE: To gain access to the original A-pillar inner panel join, the B-pillar inner panel must be cut at the front and removed. The part cut away will be re-used for the installation.

B-pillar inner panel

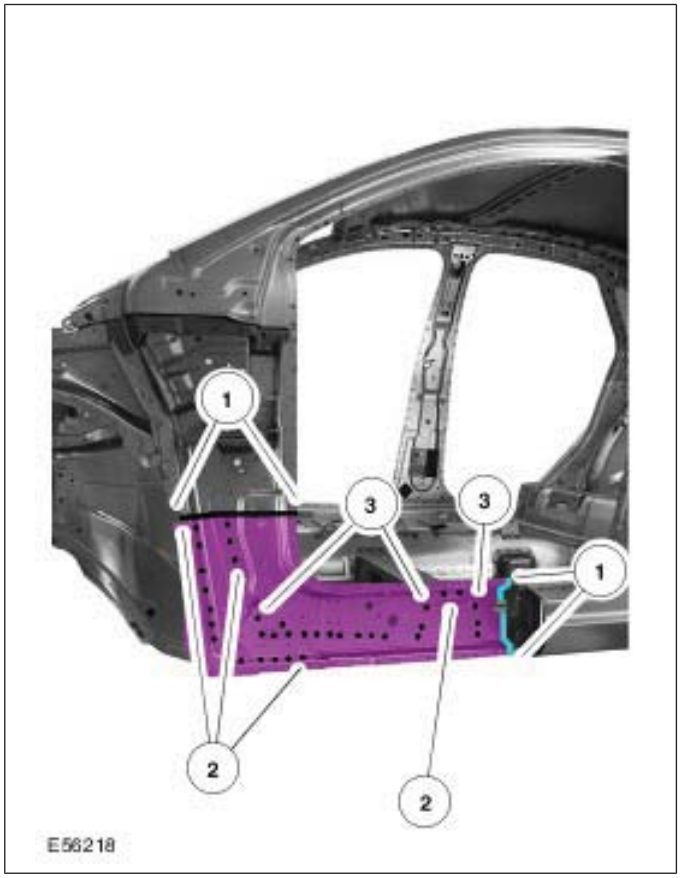
REMOVAL AND INSTALLATION

1. Cut point.
2. Mill out the spot welds.



6. Inner A-pillar

1. Cut point.
2. Mill out the spot welds.
3. Mill out the spot welds (two panel thicknesses).

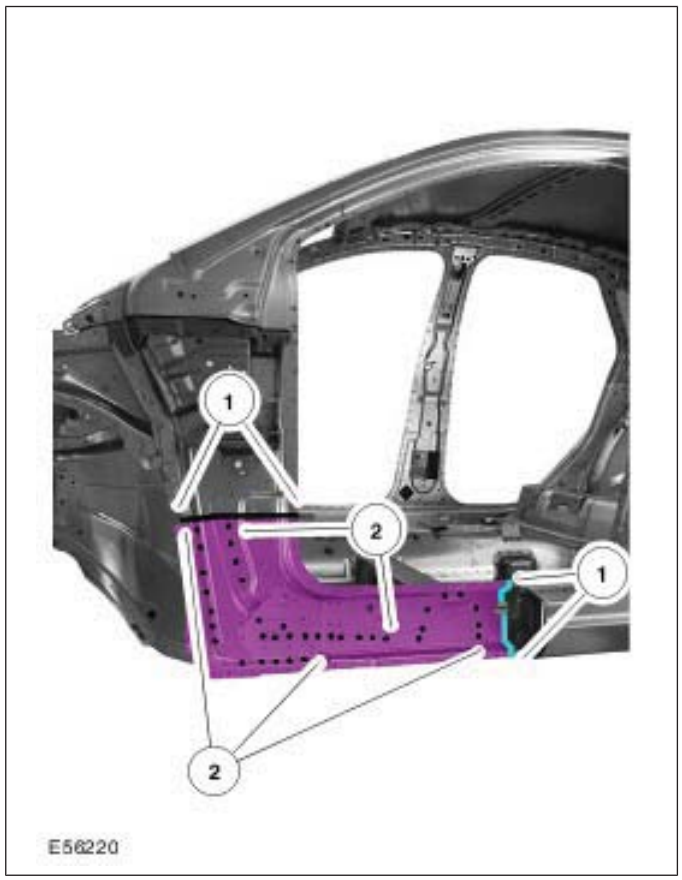


Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

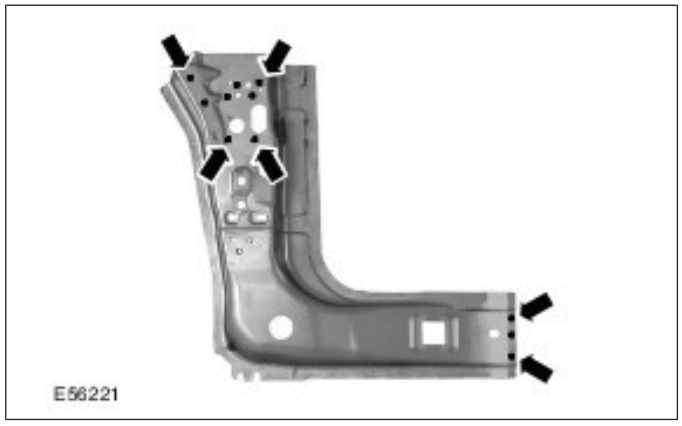
1. Inner A-pillar

1. Continuous MIG weld.
2. Resistance spot weld.



2. A-pillar reinforcement

- Drill holes for puddle welding (diameter: 10 mm).

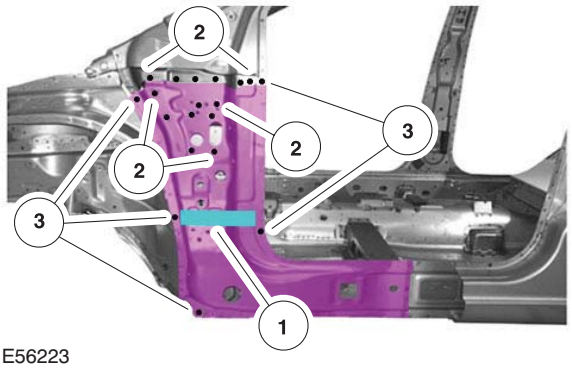


3. NOTE: Only tack-weld A-pillar reinforcement. The final weld joint is made with the outer A-pillar installed. The puddle weld areas (item 2) on the A-pillar reinforcement must be ground down, otherwise the outer A-pillar cannot be inserted correctly.

A-pillar reinforcement

REMOVAL AND INSTALLATION

1. Apply PU glass adhesive to the NVH element.
2. Puddle weld.
3. Resistance spot weld.



E56223

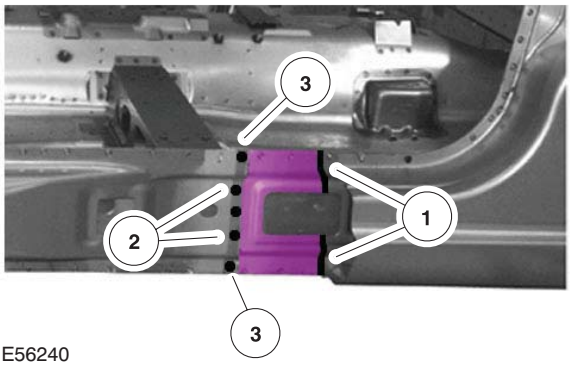
4. **NOTE: The puddle weld areas on the B-pillar inner panel must be ground down, otherwise it cannot be installed using resistance spot welding.**

   B-pillar inner panel

   - Puddle weld.

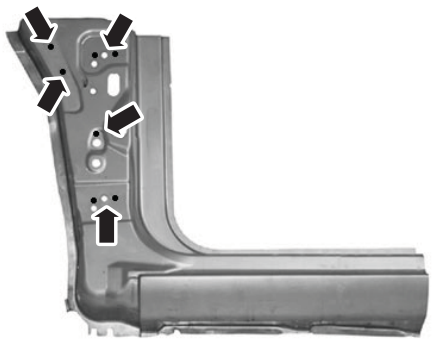

E56222

5. **B-pillar inner panel**
   1. Continuous MIG weld.
   2. Puddle weld.
   3. Resistance spot weld.



E56240

6. **Outer A-pillar**
   - Drill holes for puddle welding (diameter: 10 mm).


E56224

7. **Outer A-pillar**
   1. Continuous MIG weld.
   2. Puddle weld.
   3. Resistance spot weld.



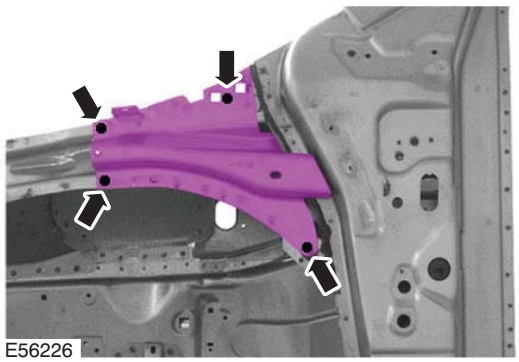
E56225

8. **NOTE: Only tack-weld A-pillar/fender apron panel reinforcement. The final welded joint is made with the fender panel reinforcement installed.**

   A-pillar/fender apron panel reinforcement

REMOVAL AND INSTALLATION

- Resistance spot weld.



REMOVAL AND INSTALLATION

B-Pillar and Reinforcement — 3-Door

General Equipment

Measurement and alignment angle system

1. Replacement parts

- B-pillar inner panel
- B-pillar reinforcement

Removal

1. General notes

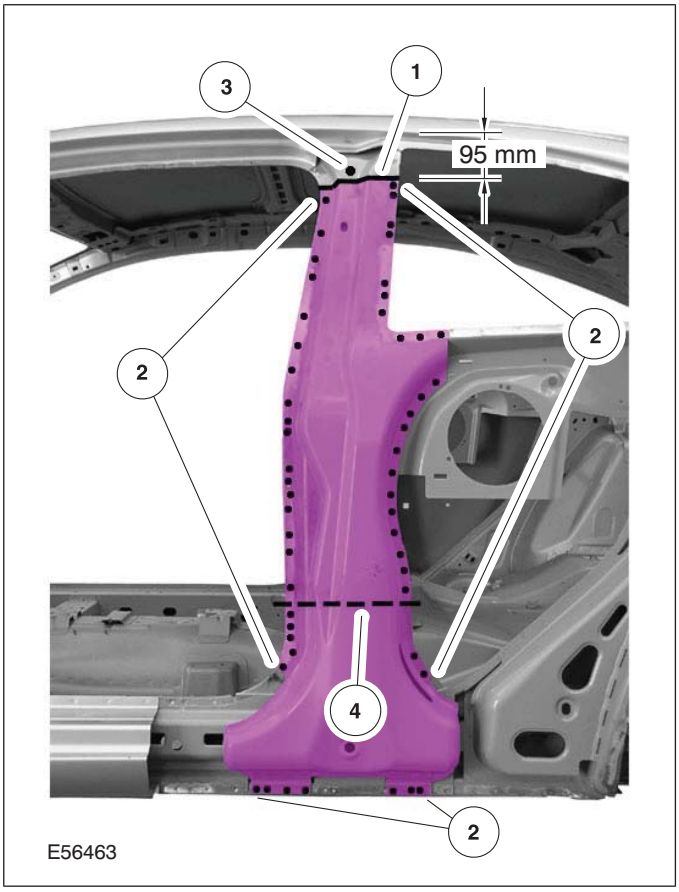
- Necessary removal work: Front door, B-pillar trim panel, rocker panel trim, headliner, front and rear seats.
- Fold back the carpets and move the wiring harness out of the working area.

2. NOTE: If the B-pillar inner panel is also being renewed, the cut on the upper B-pillar must be made according to dimensions. Depending on the damage, it is also possible to carry out a partial replacement of the B-pillar reinforcement.

B-pillar reinforcement

1. Cut point.
2. Mill out the spot welds.
3. Mill out the spot weld and drill out to 10 mm.

4. Cut location for partial replacement.

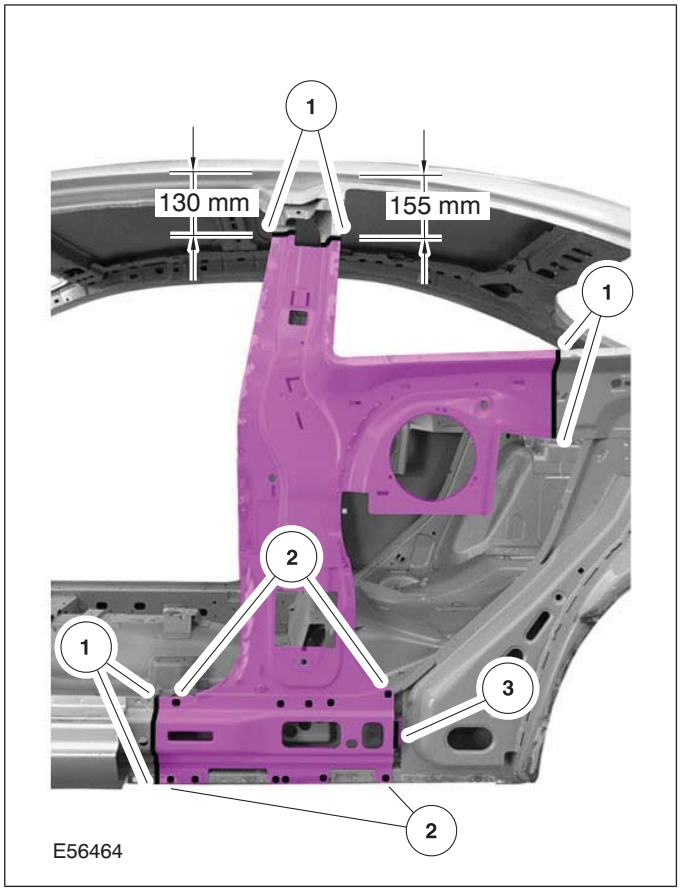


3. Inner B-pillar

1. Cut locations.
2. Mill out the spot welds.

REMOVAL AND INSTALLATION

3. Rough cut location.

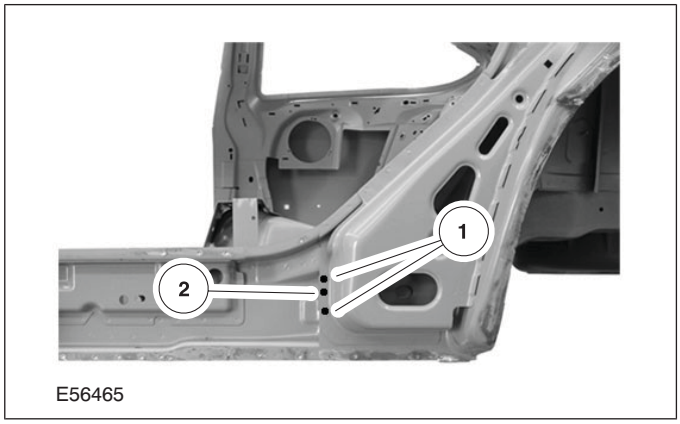


E56464

4. **NOTE: The spot welds at pos. 1 only join the rear panel layers.**

   Inner B-pillar

   1. Mill out the spot welds from the rear using the spherical milling cutter.
   2. Mill out the spot welds (three panel thicknesses).



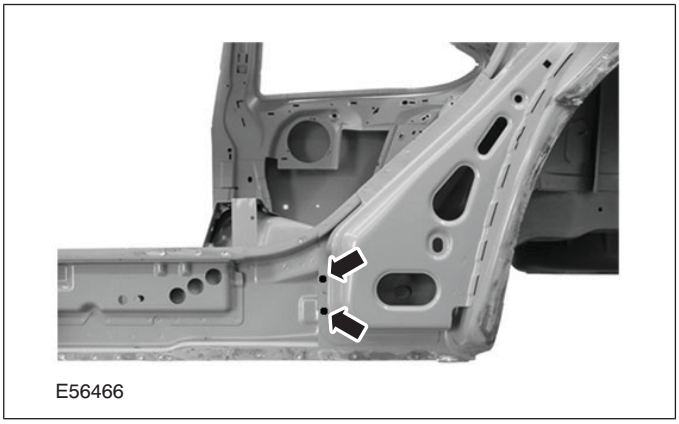
E56465

Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. **Inner B-pillar**

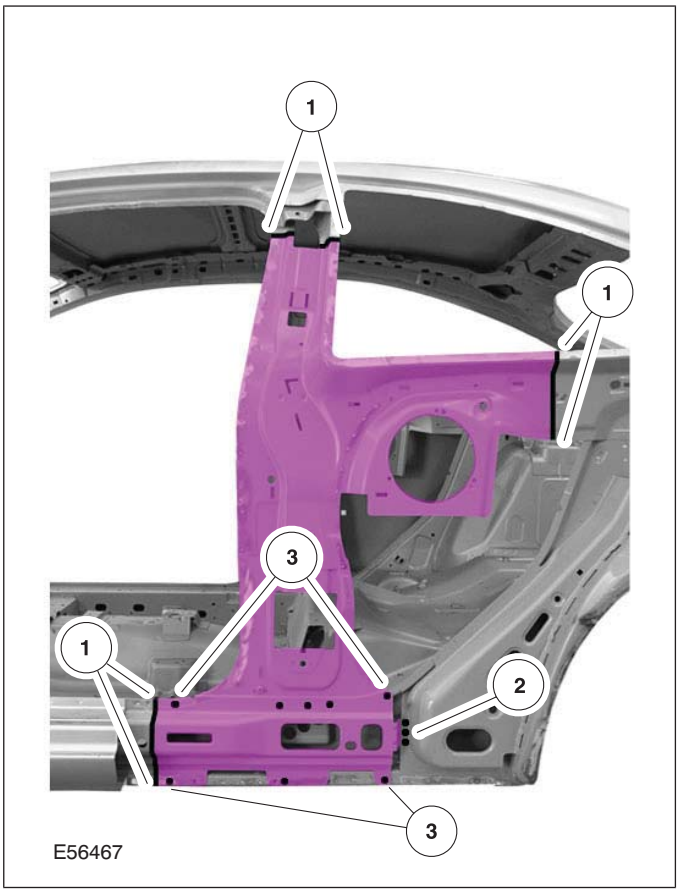
   - Drill holes for puddle welding (two panel thicknesses).


E56466

2. **NOTE: Only tack-weld the B-pillar inner panel to the lower rocker panel. The final weld joint is made with the B-pillar reinforcement and quarter panel installed.**

   Inner B-pillar

   1. Continuous MIG weld.
   2. Puddle weld.
   3. Resistance spot weld.



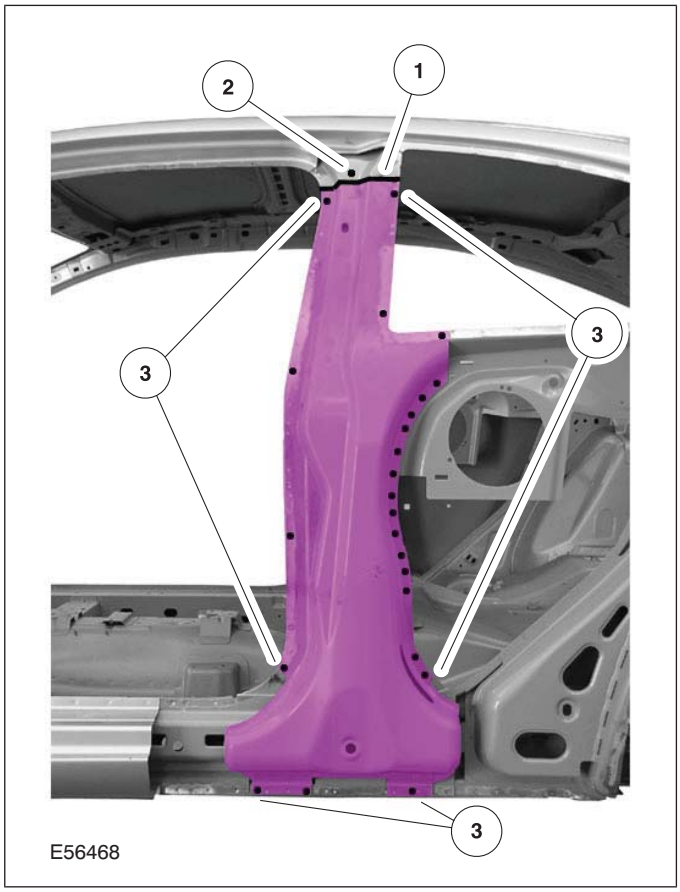
E56467

REMOVAL AND INSTALLATION

3. **NOTE: Only tack-weld the B-pillar reinforcement in the areas of the door and side window cut-out and the lower rocker panel. The final welded joint is made with the quarter panel installed.**

   B-pillar reinforcement

   1. Continuous MIG weld.
   2. Puddle weld.
   3. Resistance spot weld.



REMOVAL AND INSTALLATION

B-Pillar and Reinforcement — 4-Door/5-Door/Wagon

General Equipment

Measurement and alignment angle system

1. Replacement Parts

- B-pillar outer panel
- B-pillar inner panel
- B-pillar reinforcement

Removal

1. General notes

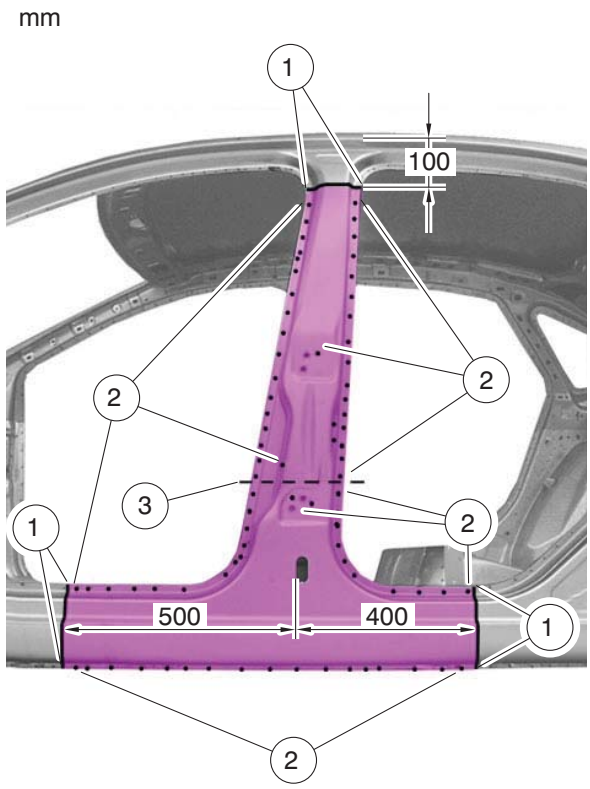
- Required removal operations: Front door, rear door, B-pillar trim panel, rocker panel trim, headliner, front and rear seats.
- Fold back the carpets and move the wiring harness out of the working area.

2. NOTE: If the B-pillar reinforcement is also to be renewed, the separating cuts on the door sill and the upper B-pillar must be made according to the specified dimensions. If only the lower part of the B-pillar outer panel is being renewed, the separating cut must be made above the lower door hinge mounting point.

Outer B-pillar

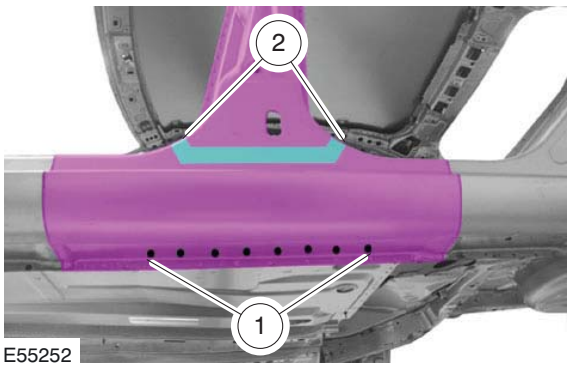
1. Cut locations.
2. Mill out the spot welds.

3. Separating cut for partial replacement.



3. Outer B-pillar

1. Mill out the spot welds.
2. Heat the area (approx. 170°) and detach the NVH element.

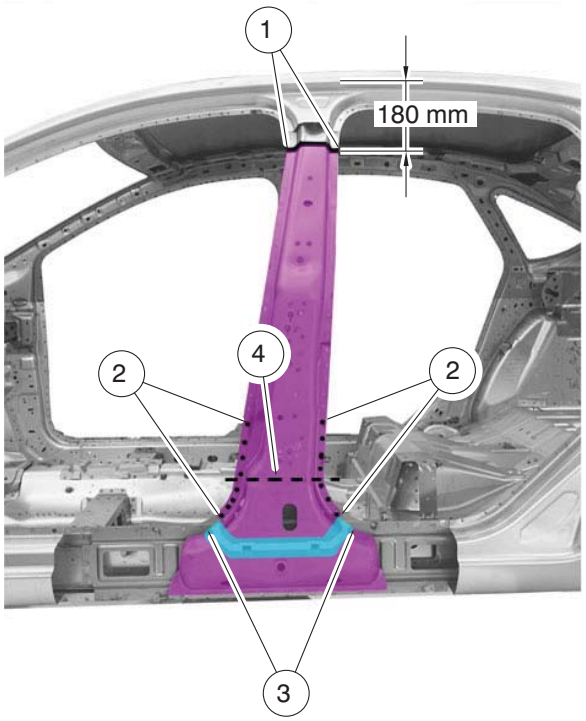


4. B-pillar reinforcement

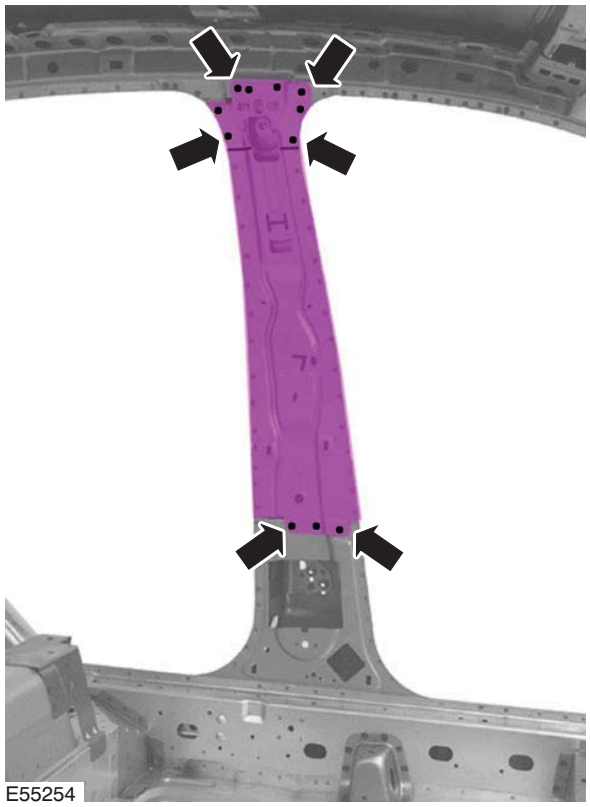
1. Cut point.
2. Mill out the spot welds.
3. Heat the area (approx. 170°) and detach the NVH element.

REMOVAL AND INSTALLATION

4. Separating cut for partial replacement.



- Mill out the spot welds.

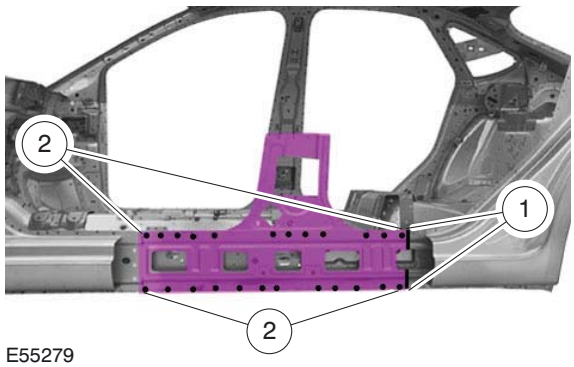


5. **NOTE: Remove the B-pillar reinforcement with B-pillar inner panel downwards.**

   B-pillar (inside view)

6. **Inner B-pillar**

   1. Cut point.
   2. Mill out the spot welds.



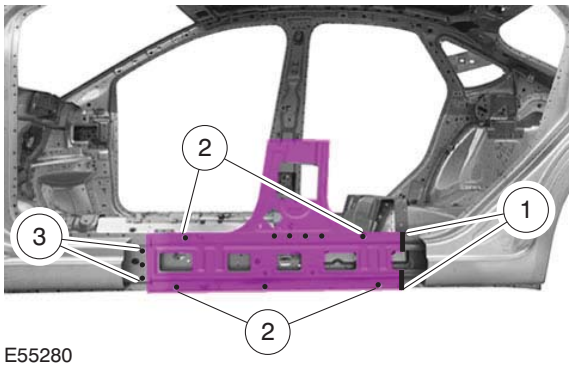
Installation

1. **Inner B-pillar**

   1. Continuous MIG weld.
   2. Resistance spot weld.

REMOVAL AND INSTALLATION

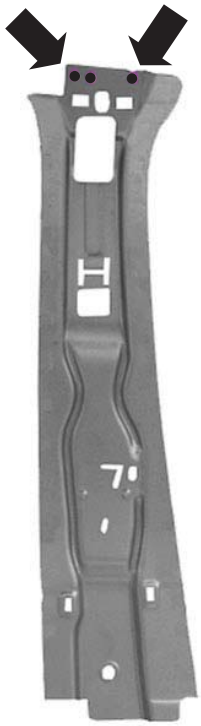
3. Puddle weld.



E55280

2. Inner B-pillar

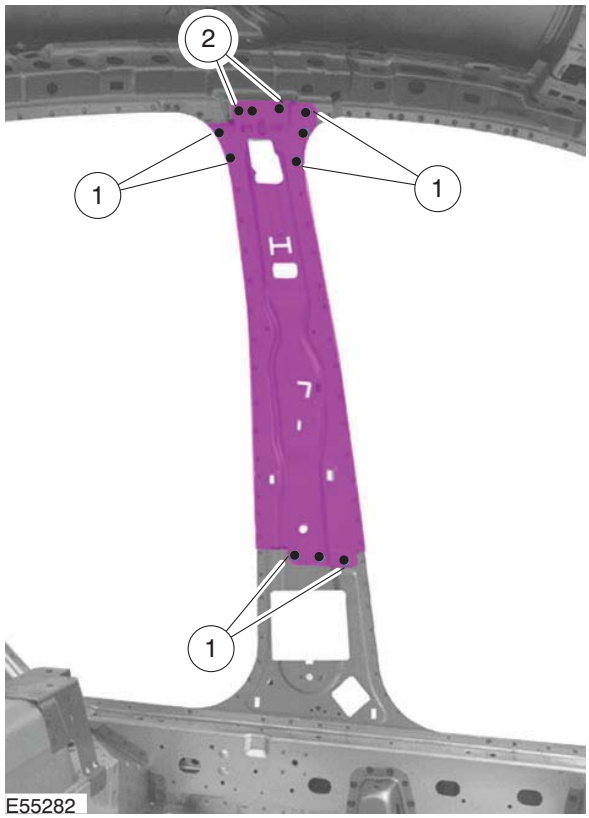
- Drill holes for puddle welding.


E55281

3. Inner B-pillar

1. Resistance spot weld.

2. Puddle weld.



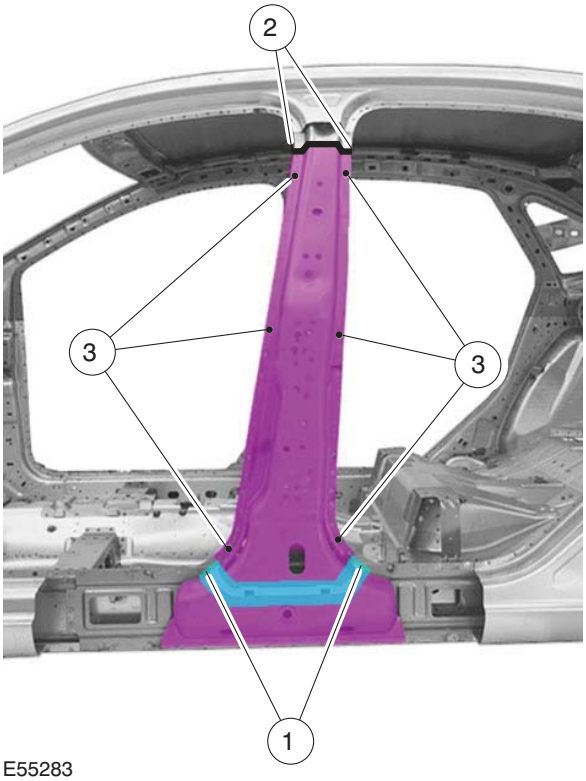
E55282

4. B-pillar reinforcement

1. Apply PU glass adhesive to the NVH element.
2. Continuous MIG weld.

REMOVAL AND INSTALLATION

3. Resistance spot weld (tack weld only).
   - Drill holes for puddle welding.



E55283


E55336

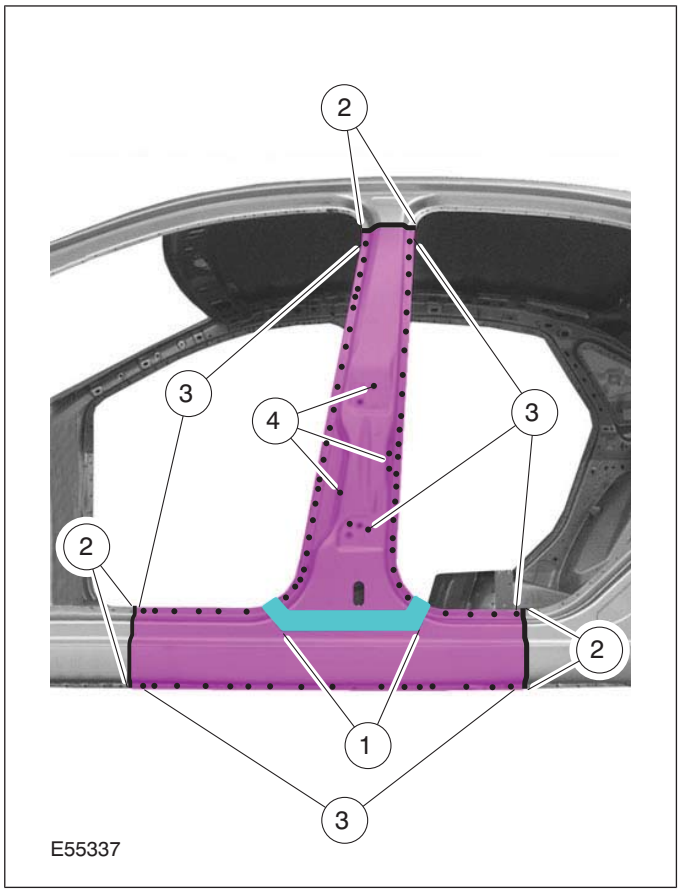
5. Outer B-pillar

6. Outer B-pillar

1. Apply PU glass adhesive to the NVH element.
2. Continuous MIG weld.
3. Resistance spot weld.

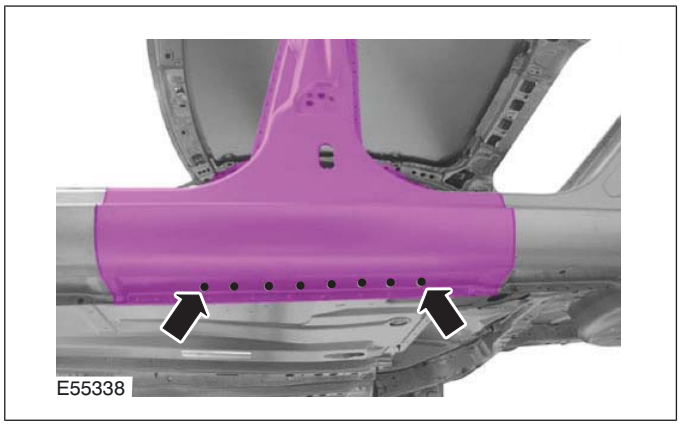
REMOVAL AND INSTALLATION

4. Puddle weld.



7. Outer B-pillar

- Puddle weld.



SECTION 501-30 Rear End Sheet Metal Repairs

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Lubricants, Sealers and Adhesives

	Part number	Specification
PU glass adhesive (150 ml)	1 102 109	WSK-M11 P57-A1
Metal adhesive kit - 2-component	1 203 241	WSK-M4 G200 A/B

SPECIFICATIONS

Lubricants, Sealers and Adhesives

	Part number	Specification
PU glass adhesive (150 ml)	1 102 109	WSK-M11 P57-A1
Metal adhesive kit - 2-component	1 203 241	WSK-M4 G200 A/B

REMOVAL AND INSTALLATION

Quarter Panel LH — 3-Door

1. Replacement parts

- Quarter panel

Removal

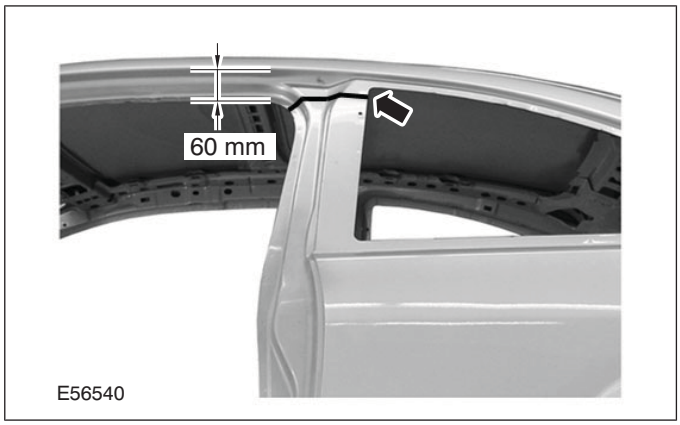
1. General notes

- Necessary removal work: door, weatherstrip, side window, rear seat, wheelhouse trim panel, rear lamp, rear bumper, quarter panel trim.
- Move the carpeting and the wiring away from the working area.
- Depending on the extent of the damage, the forced air extraction gusset should also be replaced.

2. NOTE: If the B-pillar is also being renewed, the cut in the area of the upper B-pillar must be made according to dimensions. Otherwise, this cut can be varied according to damage.

Quarter panel (B-pillar)

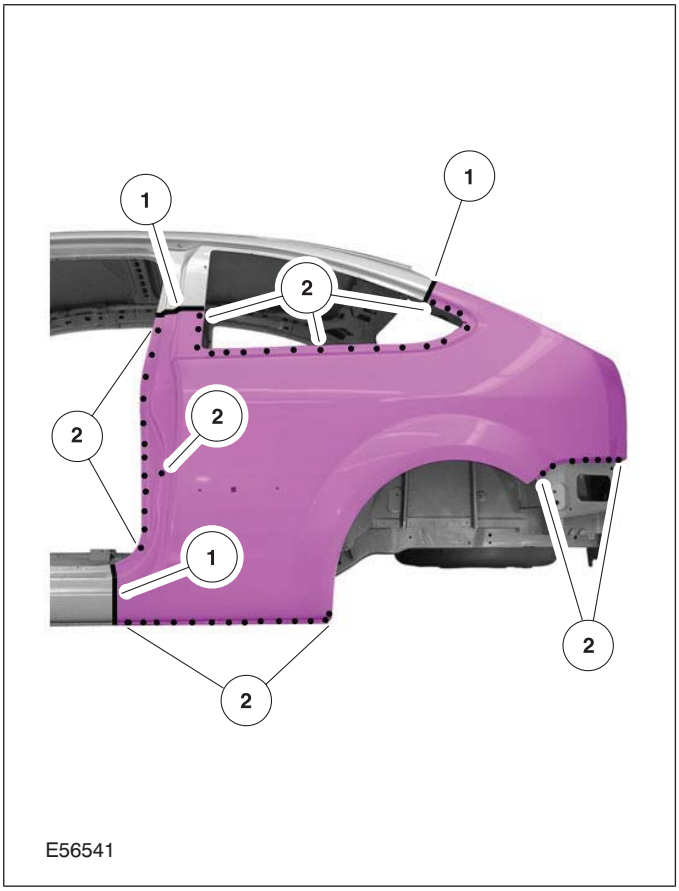
- Cut point.



3. NOTE: When making the cut on the rocker panel, bear in mind the length of the replacement part.

Quarter panel

1. Cut locations.
2. Mill out the spot welds.

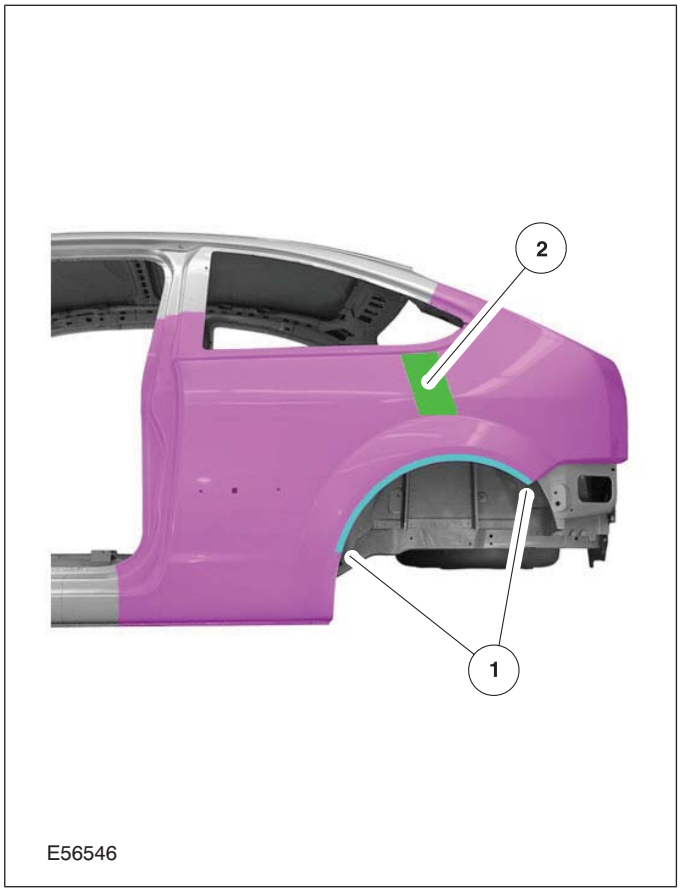


4. Quarter panel

1. Grind down one panel thickness at the wheel arch edge.

REMOVAL AND INSTALLATION

2. Heat the area (approx. 170°) and detach the NVH element.



5. Quarter panel

- Mill out the spot welds.

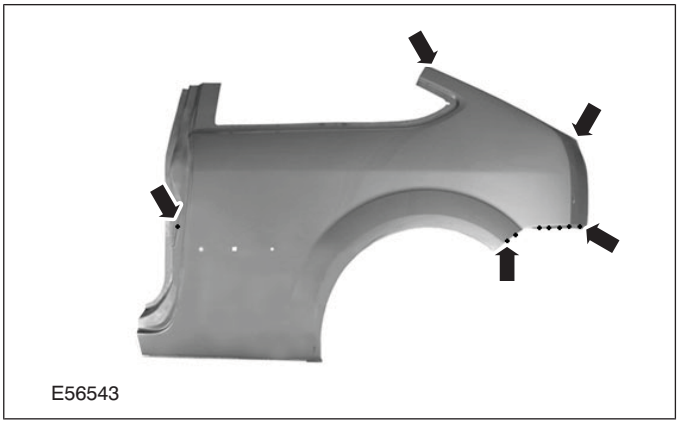


Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Quarter panel

- Drill holes for puddle welding.



2. NOTE: If the forced air extraction gusset is being replaced, it must be welded onto the quarter panel before installation of the quarter panel.

REMOVAL AND INSTALLATION

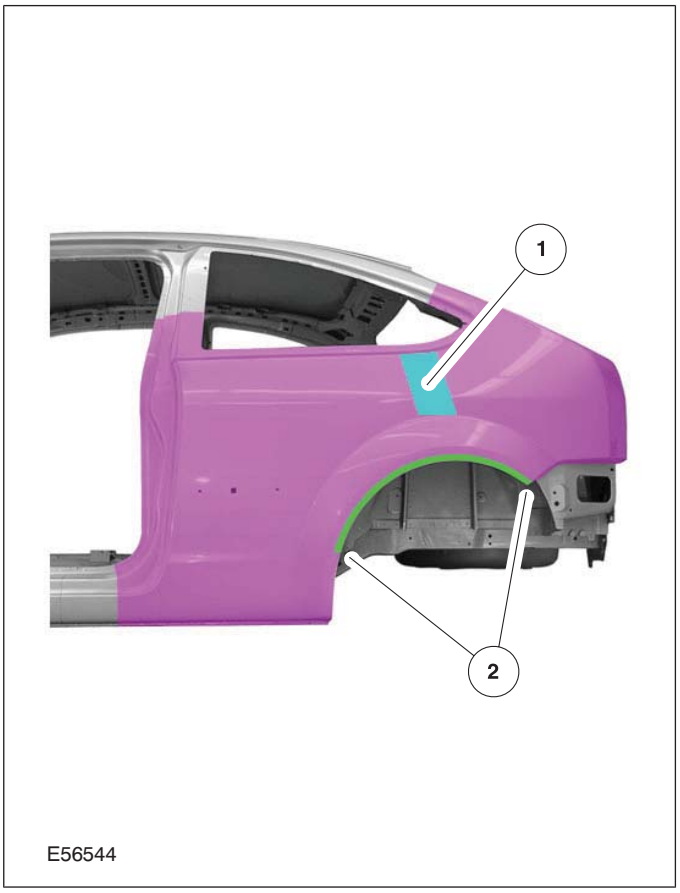
Forced air extraction gusset

- Resistance spot weld.



E55876

2. Apply two-component metal adhesive to the clinched flange and clinch the wheel arch flange.



E56544

3. Quarter panel

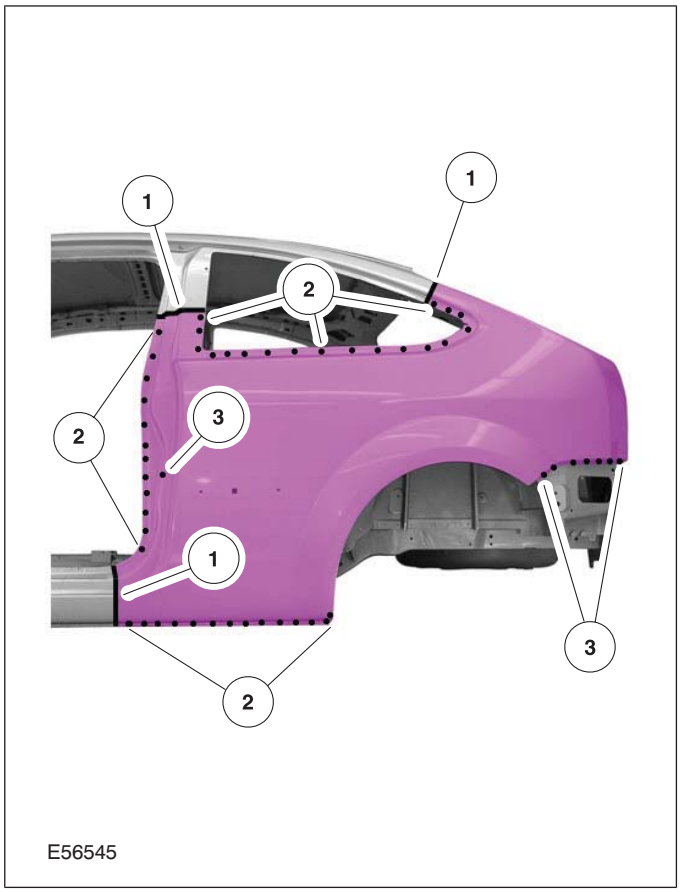
1. Apply PU glass adhesive to the NVH element.

4. Quarter panel

1. Continuous MIG weld.
2. Resistance spot weld.

REMOVAL AND INSTALLATION

3. Puddle weld.



- Puddle weld.



5. Quarter panel

REMOVAL AND INSTALLATION

Quarter Panel LH — 5-Door

1. Replacement Parts

- Quarter panel

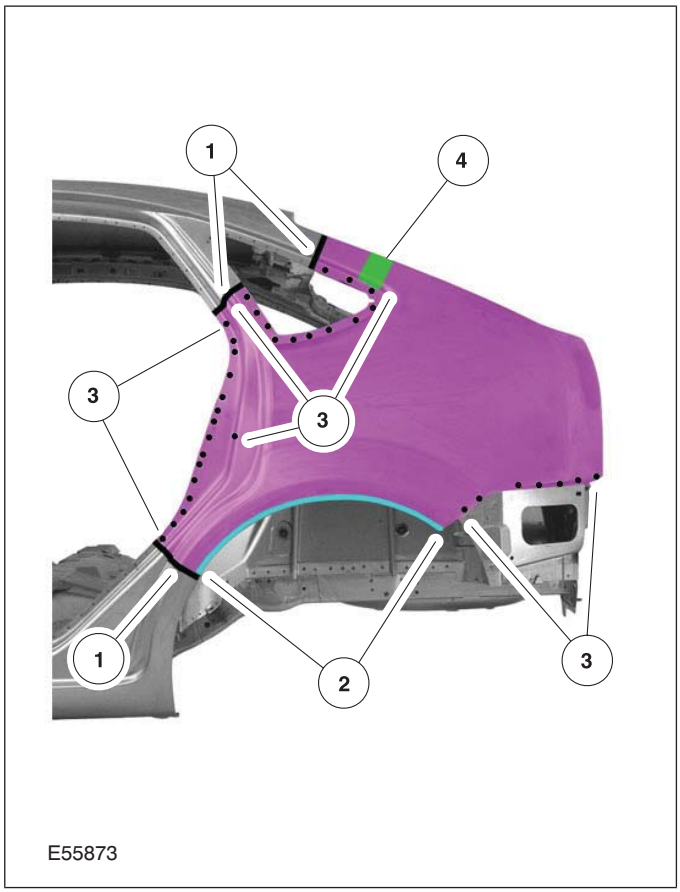
Removal

1. General notes

- Required removal operations: Rear door, weatherstrip, side window, rear seat, wheelhouse trim panel, rear lamp, rear bumper, quarter panel trim.
- Move the carpeting and the wiring away from the working area.
- Depending on the extent of the damage, the forced air extraction gusset should also be replaced.

2. Quarter panel

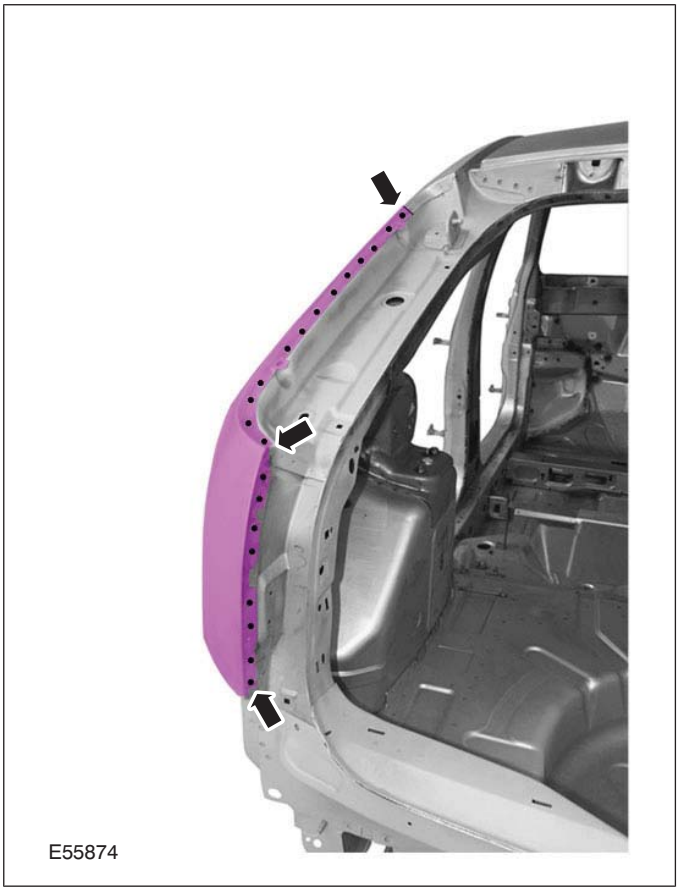
1. Cut locations.
2. Grind down one panel thickness at the wheel arch edge.
3. Mill out the spot welds.
4. Heat the areas (approx. 170°) and detach the NVH elements.



E55873

3. Quarter panel

- Mill out the spot welds.

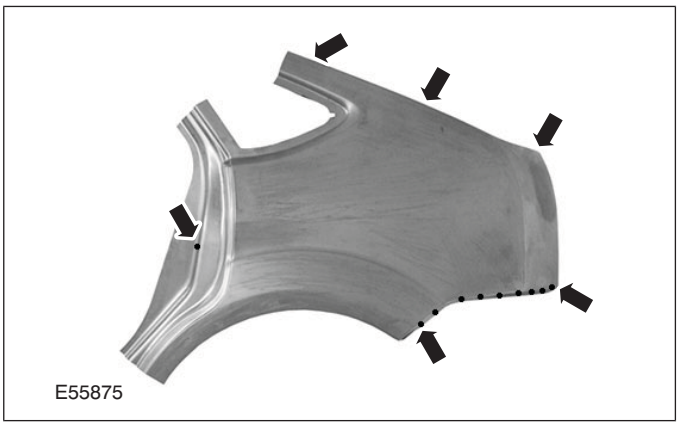

E55874

Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Quarter panel

- Drill holes for puddle welding.


E55875

2. NOTE: If the forced air extraction gusset is being replaced, it must be welded onto the

REMOVAL AND INSTALLATION

quarter panel before installation of the quarter panel.

Forced air extraction gusset

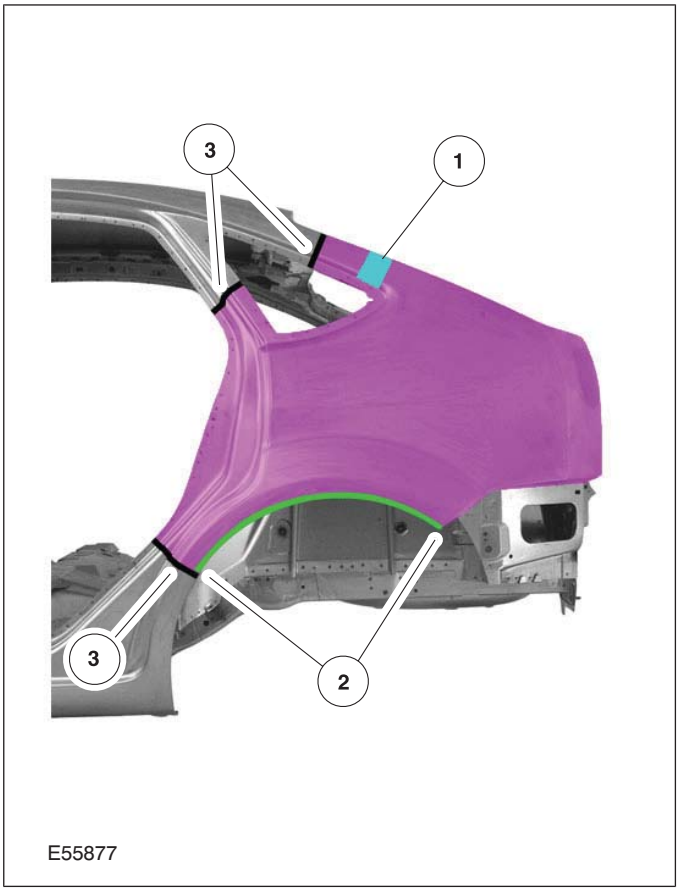
- Resistance spot weld.



E55876

3. Quarter panel

1. Apply PU glass adhesive to the NVH elements.
2. Apply two-component metal adhesive to the clinched flange and clinch the wheel arch flange.
3. Continuous MIG weld.



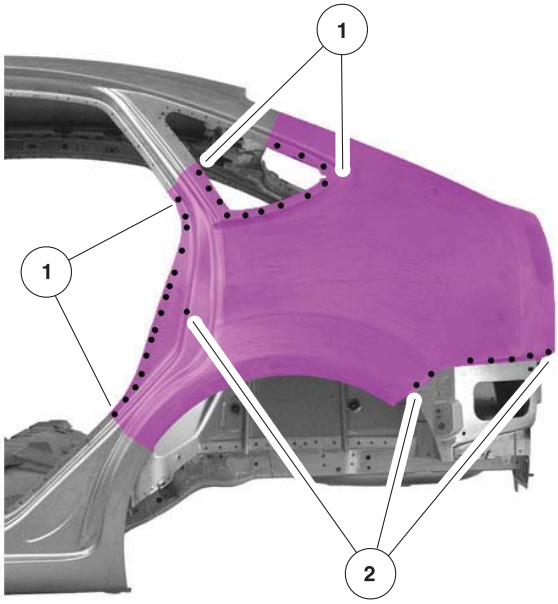
E55877

4. Quarter panel

1. Resistance spot weld.

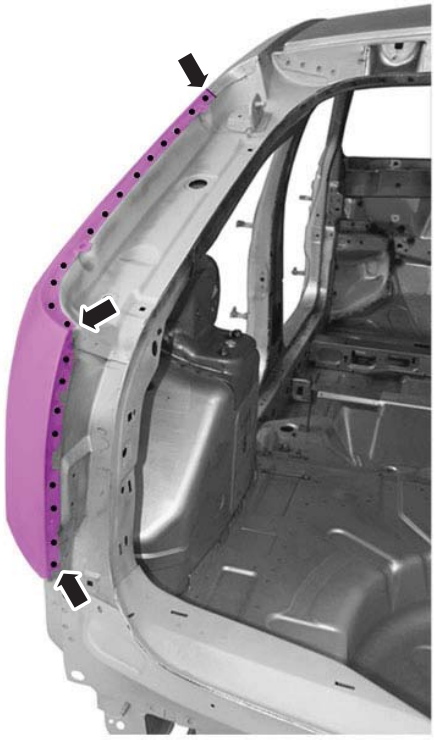
REMOVAL AND INSTALLATION

2. Puddle weld.



E55937

- Puddle weld.



E55878

5. Quarter panel

REMOVAL AND INSTALLATION

Quarter/Side Panel Rear Section LH — 3-Door/5-Door

1. Replacement Parts

- Repair panel, rear quarter panel

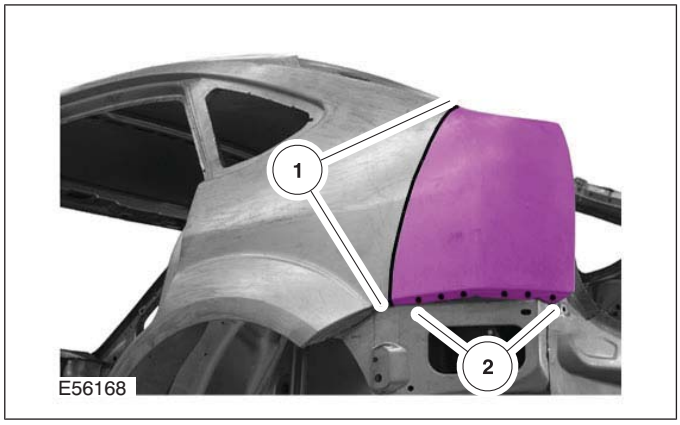
Removal

1. General notes

- Required removal operations: wheelhouse trim panel, rear lamp, rear bumper, quarter panel trim.
- Move the carpeting and the wiring away from the working area.
- Depending on the extent of the damage, the forced air extraction gusset should also be replaced.

2. Quarter panel

1. Cut point.
2. Mill out the spot welds.



3. Quarter panel

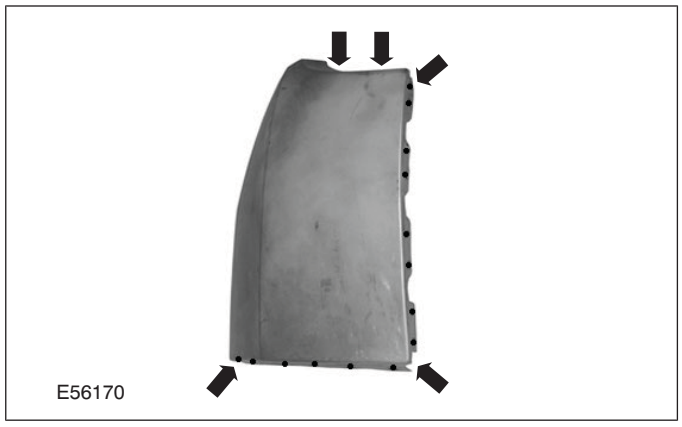
- Mill out the spot welds.



Installation

1. Quarter panel section

- Drill holes for puddle welding.

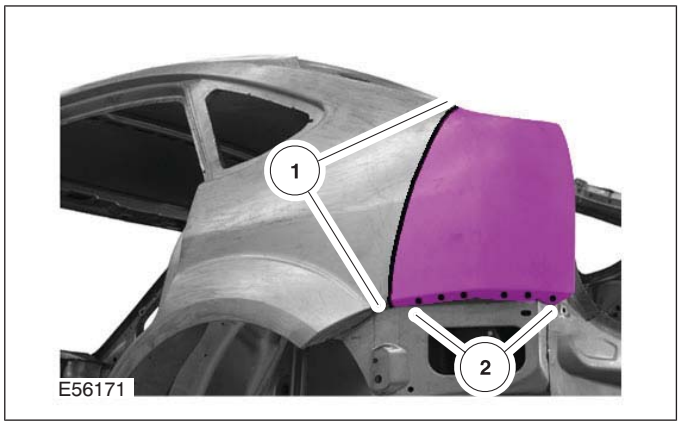


2. Quarter panel

1. Continuous MIG weld.

REMOVAL AND INSTALLATION

2. Puddle weld.



3. Quarter panel

- Puddle weld.



REMOVAL AND INSTALLATION

Water Drain Panel — 3-Door/5-Door

1. Replacement Parts

- Water drain panel

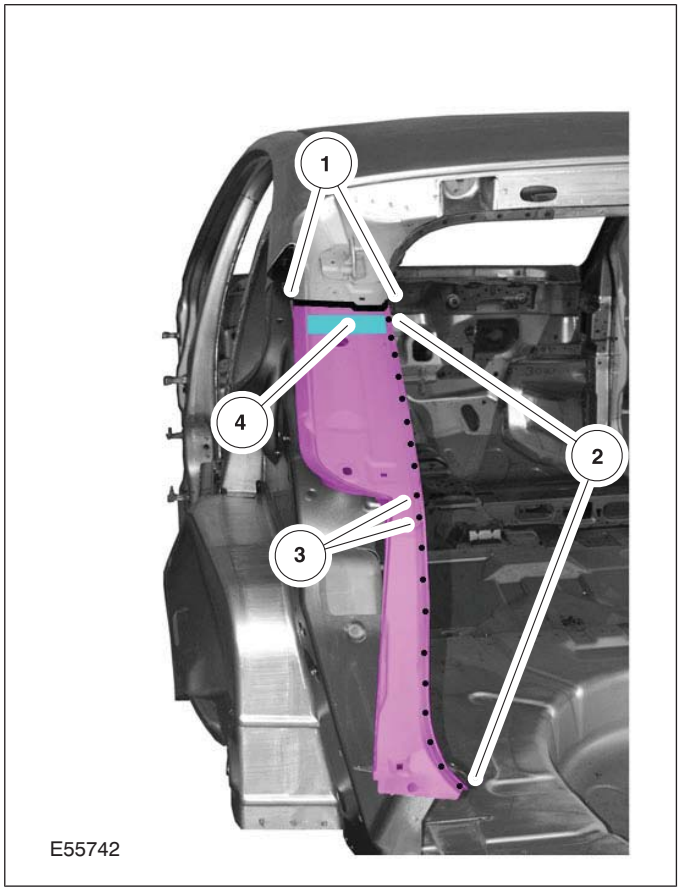
Removal

1. General Notes

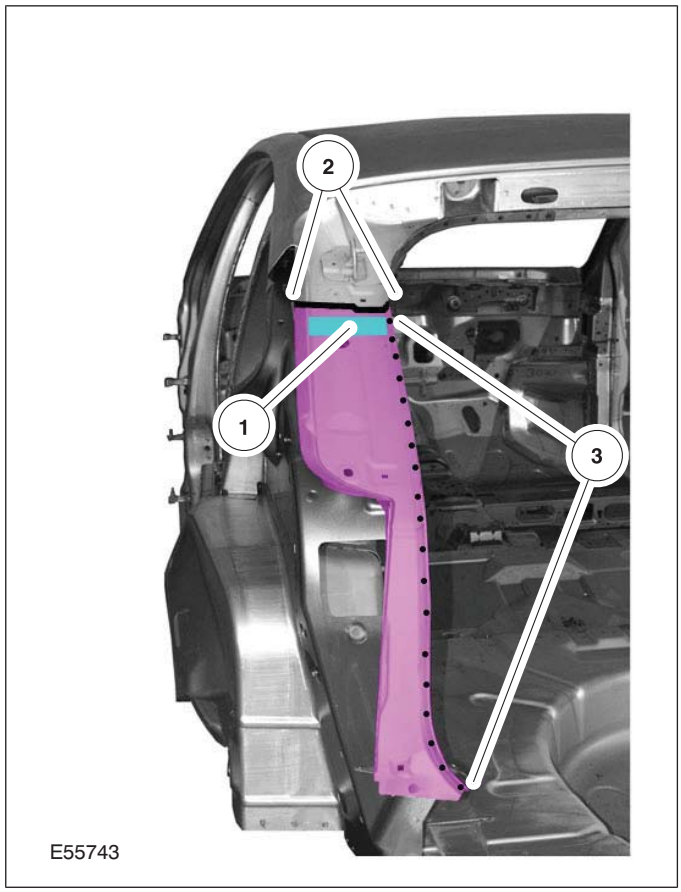
- Quarter panel and back panel are already removed before commencing the repair.
- Move carpets and wiring out of the working area.

2. Water drain panel

1. Cut location.
2. Grind out the spot welds.
3. Grind out the spot welds (two panel thicknesses).
4. Heat the area (approx. 170°) and detach the NVH element.



2. Continuous MIG weld.
3. Resistance spot weld.



Installation

1. Water drain panel

1. Apply PU glass adhesive to the NVH element.

REMOVAL AND INSTALLATION

Water Drain Panel Reinforcement

1. Replacement Parts

- Water drain panel reinforcement

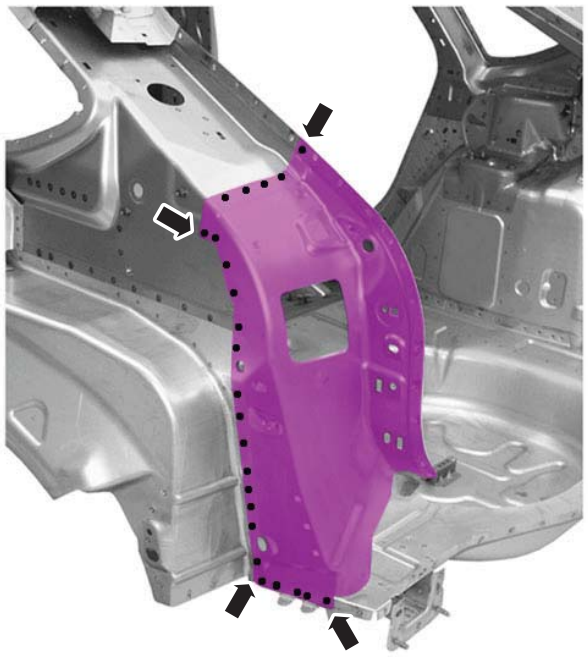
Removal

1. General Notes

- Quarter panel, back panel and water drain panel are already removed before commencing the repair.
- Move carpets and wiring out of the working area.

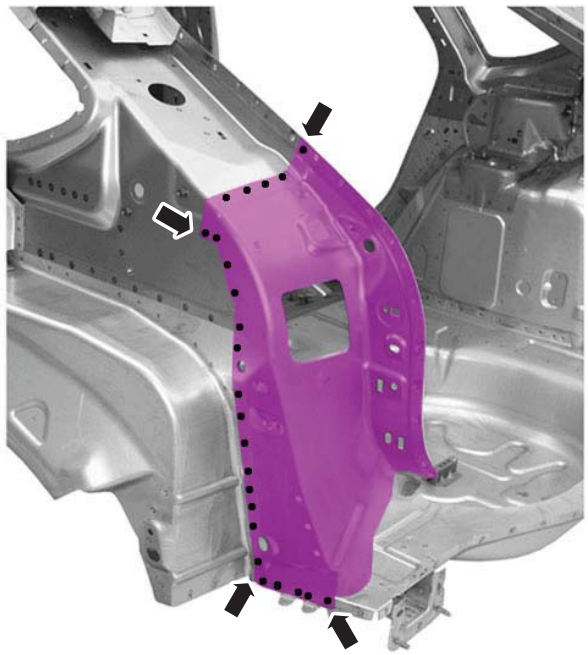
2. Water drain panel reinforcement

- Mill out the spot welds.



E55771

- Resistance spot weld.



E55772

Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Water drain panel reinforcement

REMOVAL AND INSTALLATION

Rear Wheelhouse Outer — 3-Door

General Equipment

Measurement and alignment angle system

1. Repair parts

- Outer rear wheelhouse
- C-pillar reinforcement

Removal

1. General Notes

- Back panel, quarter panel and boot water drain panel with reinforcement are already removed before commencing the repair.
- Move carpets and wiring out of the working area.

2. C-pillar reinforcement

- Mill out the spot welds.

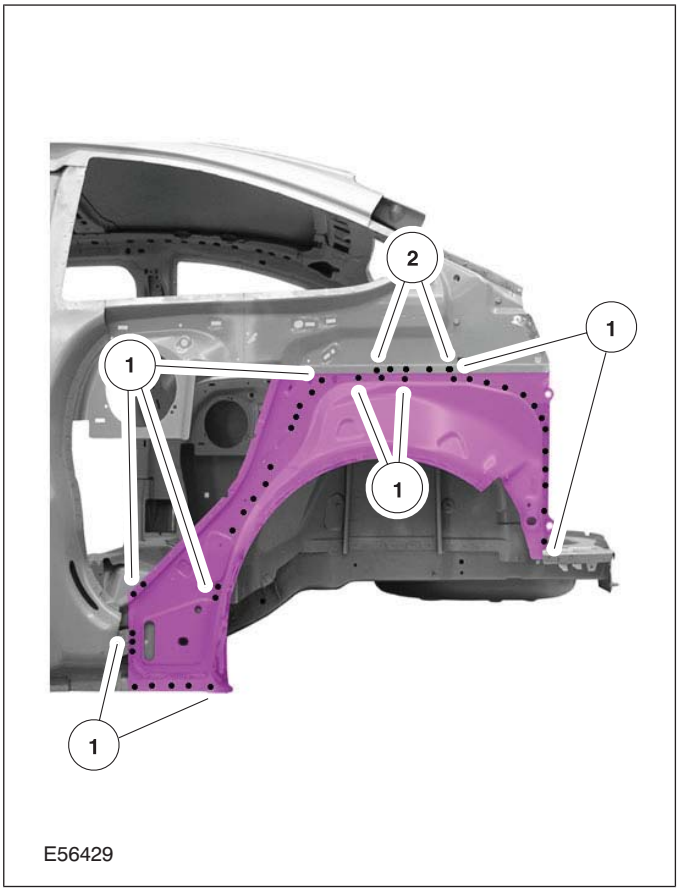


E56428

3. Outer rear wheelhouse

1. Mill out the spot welds.

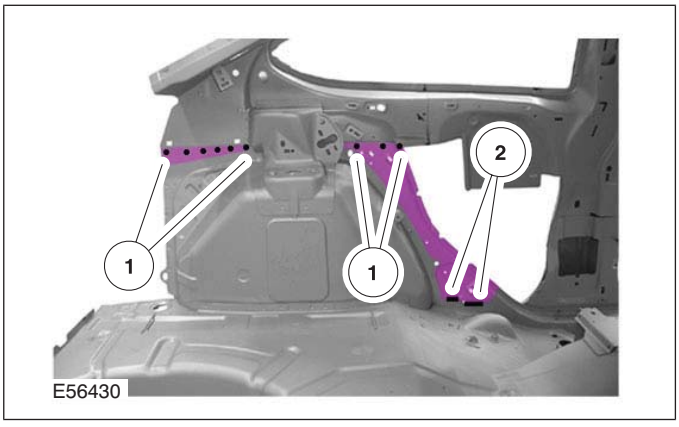
2. Mill out the spot welds (two panel thicknesses).



E56429

4. Inner rear wheelhouse

1. Mill out the spot welds.
2. Grind out the MIG-soldered joints.



E56430

5. NOTE:

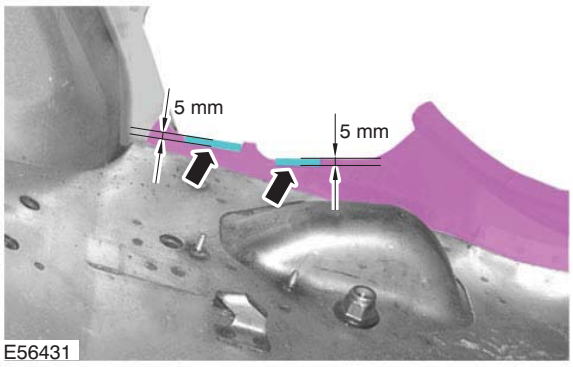
- In order to make a proper MIG welded joint, the MIG soldered areas must be ground back according to the specified dimensions (by approx. 5 mm).

REMOVAL AND INSTALLATION

- When grinding back, it must be ensured that all the residual traces of the MIG soldered joints are completely removed.

Inner rear wheelhouse (MIG-soldered areas)

- Grind back the MIG soldered areas.



Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Outer rear wheelhouse

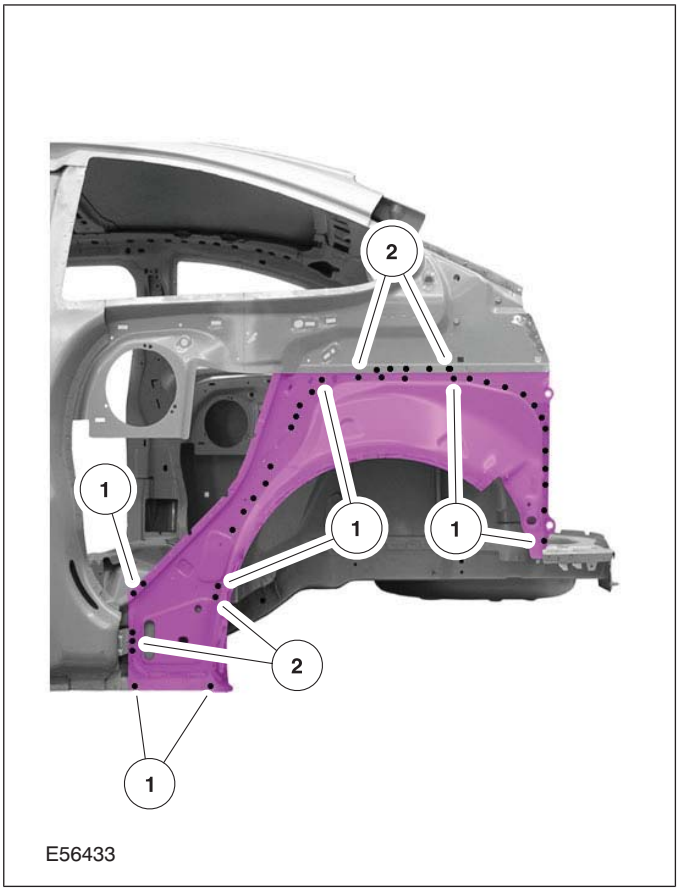
- Drill holes for puddle welding (diameter: 10 mm).



2. NOTE: Drill through one panel thickness at the upper area of outer rear wheelhouse (position 2) through the existing holes in the inner quarter panel before puddle welding.

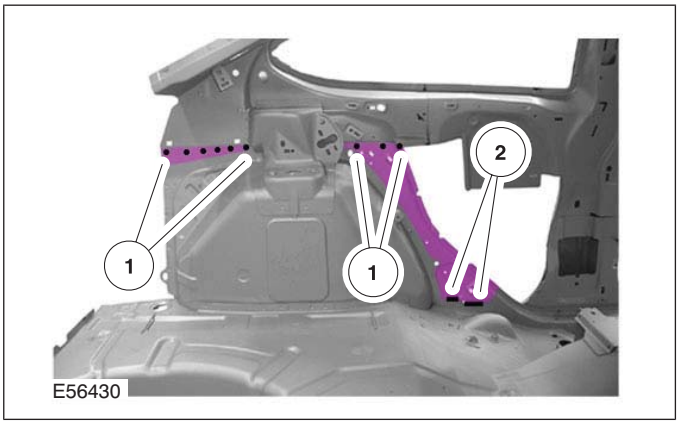
Outer rear wheelhouse

1. Resistance spot weld.
2. Puddle weld.



3. Inner rear wheelhouse

1. Resistance spot weld.
2. Continuous MIG weld.



4. C-pillar reinforcement

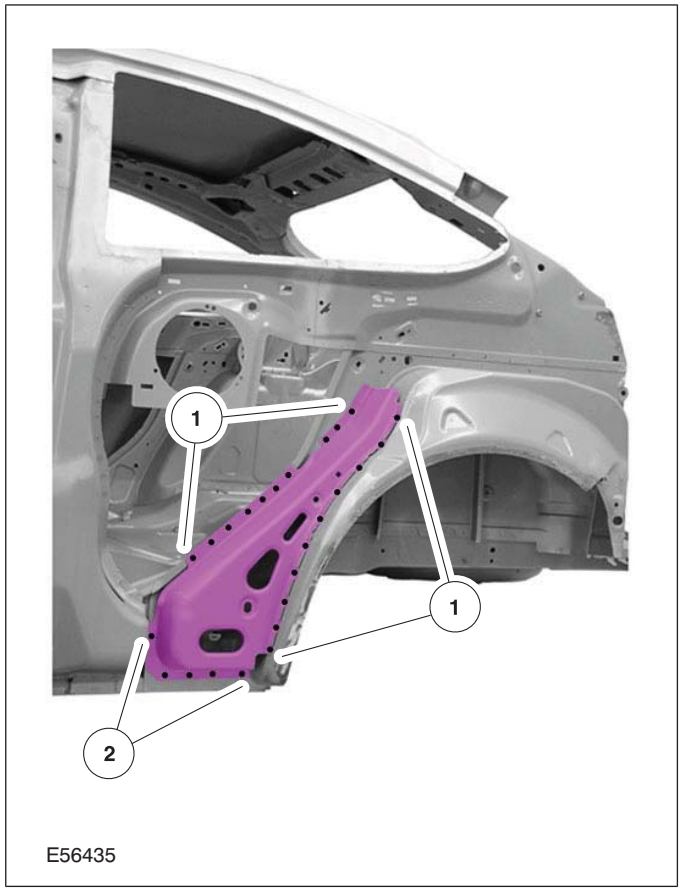
REMOVAL AND INSTALLATION

- Drill holes for puddle welding (diameter: 10 mm).



E56434

2. Puddle weld.



E56435

5. C-pillar reinforcement

1. Resistance spot weld.

REMOVAL AND INSTALLATION

Rear Wheelhouse Outer — 5-Door

General Equipment

Measurement and alignment angle system

1. Replacement Parts

- Outer rear wheelhouse
- C-pillar reinforcement

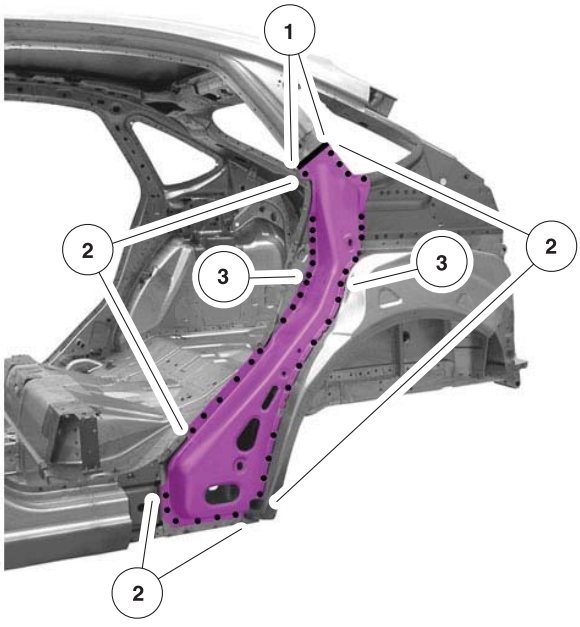
Removal

1. General Notes

- Back panel, quarter panel and water drain panel with reinforcement are already removed before commencing the repair.
- Move carpets and wiring out of the working area.

2. C-pillar reinforcement

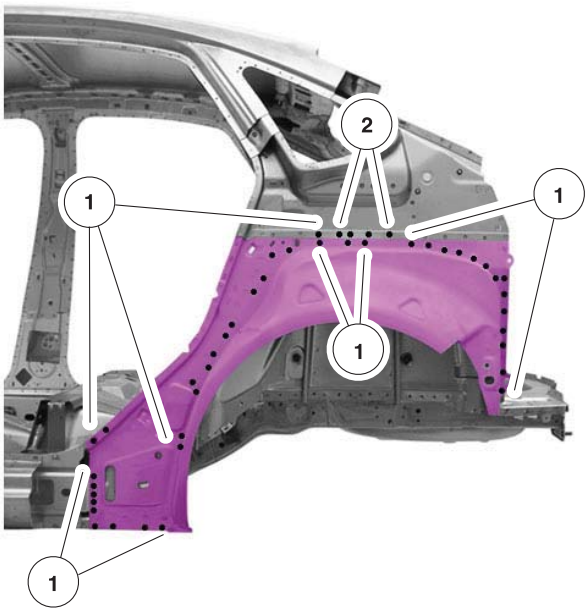
1. Cut location.
2. Mill out the spot welds.
3. Mill out the spot welds (two panel thicknesses).



E56022

3. Outer rear wheelhouse

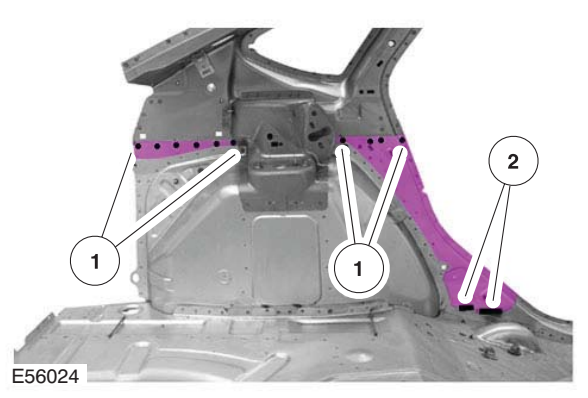
1. Mill out the spot welds.
2. Mill out the spot welds (two panel thicknesses).



E56023

4. Inner rear wheelhouse

1. Mill out the spot welds.
2. Grind out the MIG-soldered joints.



E56024

5. NOTE:

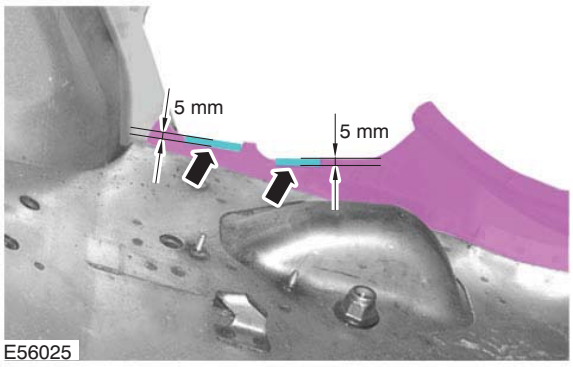
- In order to make a proper MIG welded joint, the MIG soldered areas must be ground back according to the specified dimensions (by approx. 5 mm).

REMOVAL AND INSTALLATION

- When grinding back, it must be ensured that all the residual traces of the MIG soldered joints are completely removed.

Inner rear wheelhouse (MIG-soldered areas)

- Grind back the MIG soldered areas.



Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

1. Outer rear wheelhouse

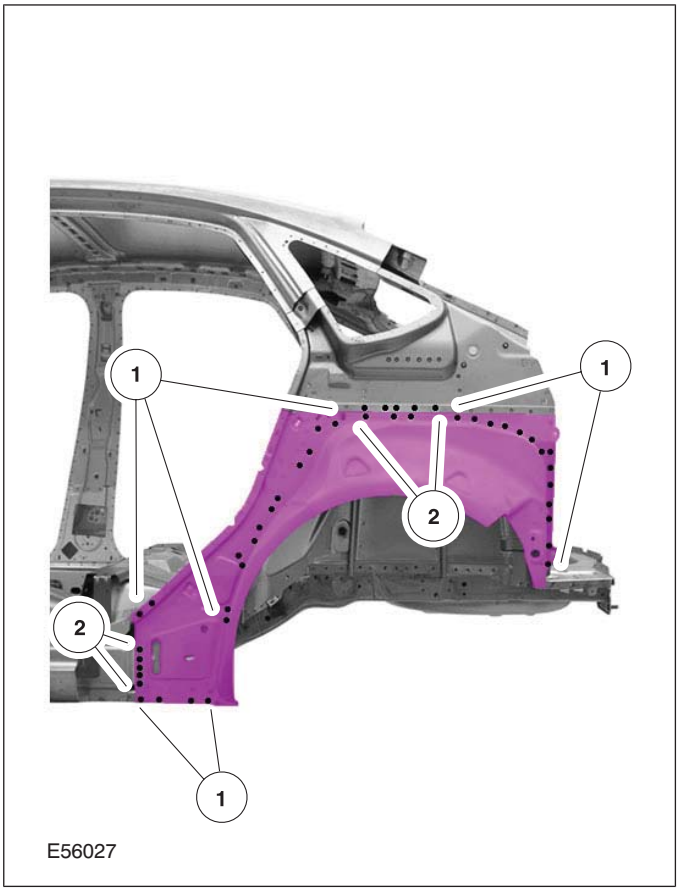
- Drill holes for puddle welding (diameter: 10 mm).



2. NOTE: Drill through one panel thickness at the upper area of outer rear wheelhouse (position 2) through the existing holes in the inner quarter panel before puddle welding.

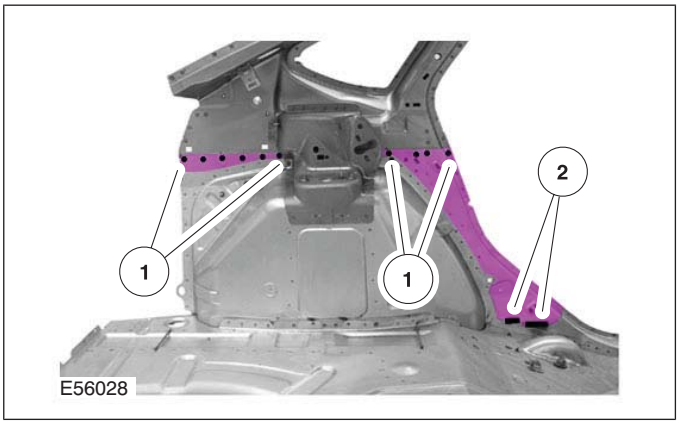
Outer rear wheelhouse

1. Resistance spot weld.
2. Puddle weld.



3. Inner rear wheelhouse

1. Resistance spot weld.
2. Continuous MIG weld.



4. C-pillar reinforcement

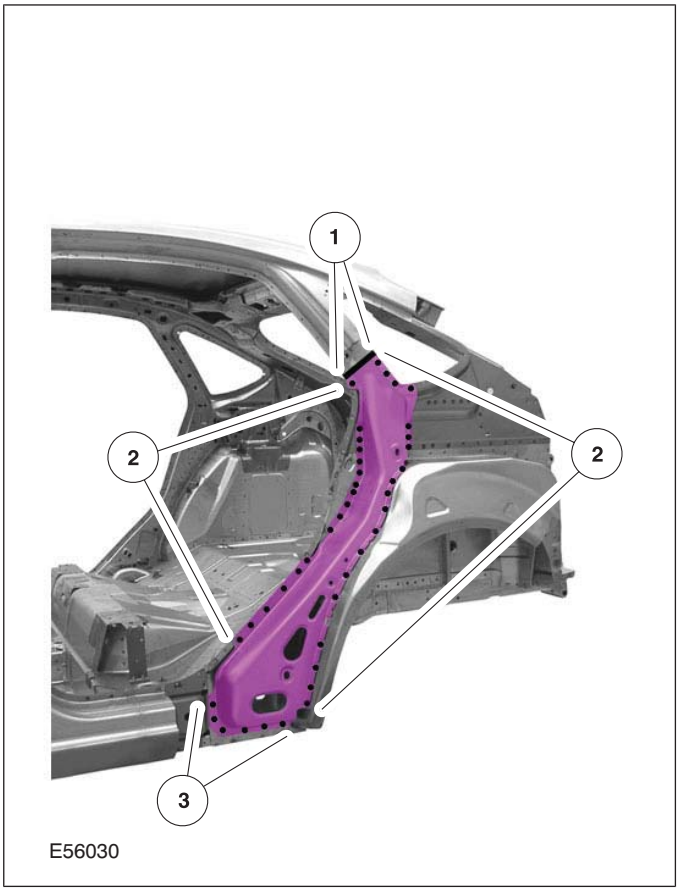
REMOVAL AND INSTALLATION

- Drill holes for puddle welding (diameter: 10 mm).



E56029

3. Puddle weld.



E56030

5. C-pillar reinforcement

1. Continuous MIG weld.
2. Resistance spot weld.

REMOVAL AND INSTALLATION

Back Panel — 3-Door/5-Door

1. Replacement Parts

- Back panel
- Rear crossmember
- Rear crossmember reinforcement
- Crossmember reinforcements/rear floor panel

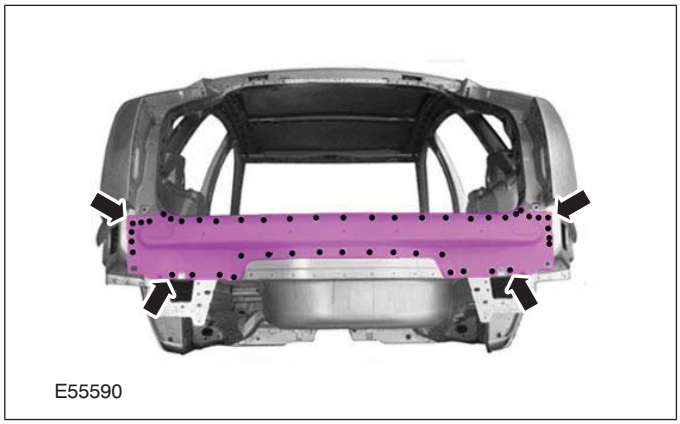
Removal

1. General Notes

- Required removal operations: Rear bumper, rear lamps, back panel inner trims and quarter panel trims.
- Move carpets and wiring out of the working area.

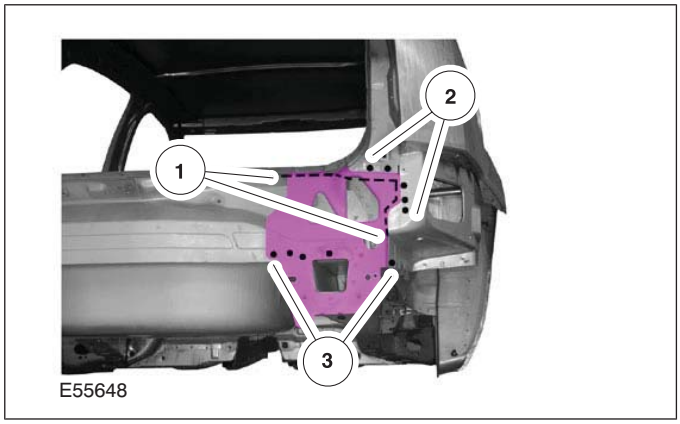
2. Back panel

- Mill out the spot welds.



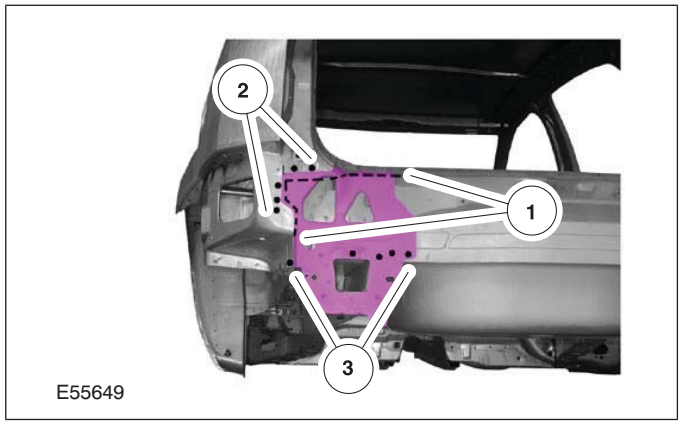
3. Crossmember reinforcement, rear right

1. Rough cut location.
2. Grind out the spot welds on the inside.
3. Mill out the spot welds (two panel thicknesses).



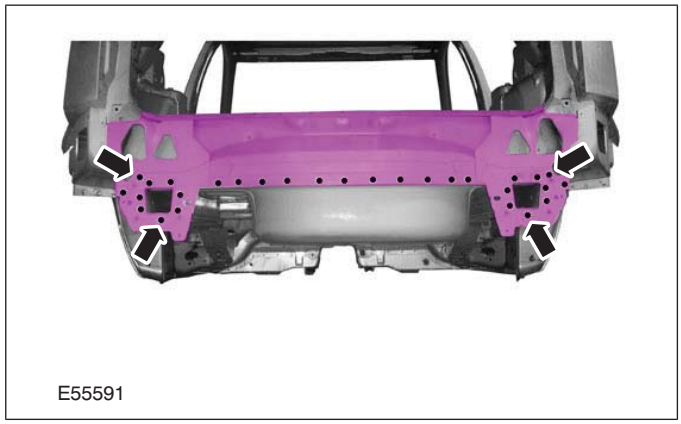
4. Crossmember reinforcement, rear left

1. Rough cut location.
2. Grind out the spot welds on the inside.
3. Mill out the spot welds (two panel thicknesses).



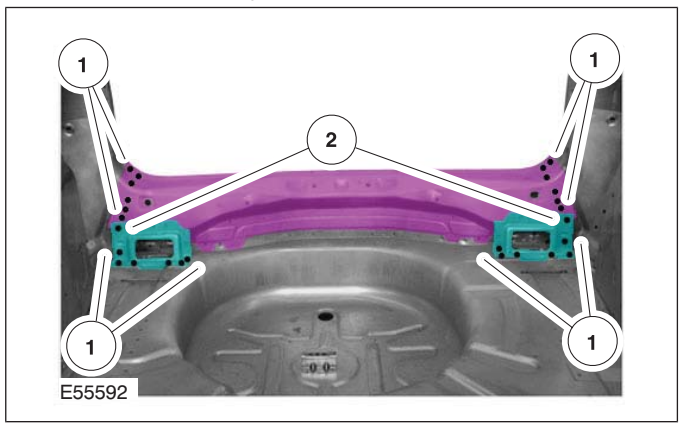
5. Rear crossmember

- Mill out the spot welds.



6. Rear crossmember

1. Grind out the spot welds.
2. Grind out the spot welds (two panel thicknesses).



REMOVAL AND INSTALLATION

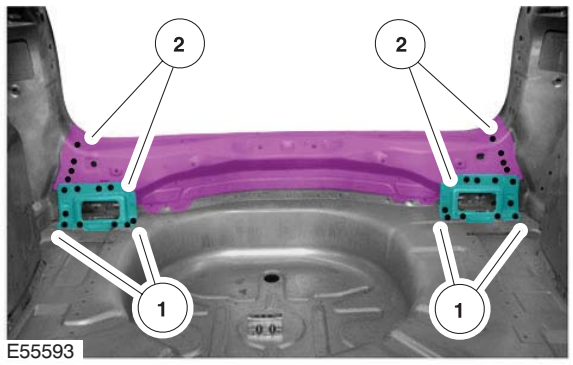
Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.

NOTE: First of all, offer up the crossmember reinforcements/rear floor panel and weld in place.

1. Rear crossmember

1. Resistance spot welding (crossmember reinforcements/rear floor panel)
2. Resistance spot welding (crossmember).



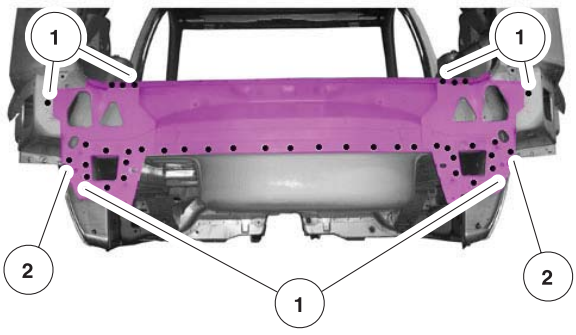
E55593

2. Rear crossmember reinforcement

1. Resistance spot weld.

   NOTE: Before puddle welding, drill though one panel thickness through the existing holes.

2. Puddle weld.



E55594

3. Back panel

- Resistance spot weld.


E55595

REMOVAL AND INSTALLATION

Rear Floor Panel

General Equipment

Measurement and alignment angle system

1. Replacement Parts

- Rear floor panel
- Spare wheel holder

Removal

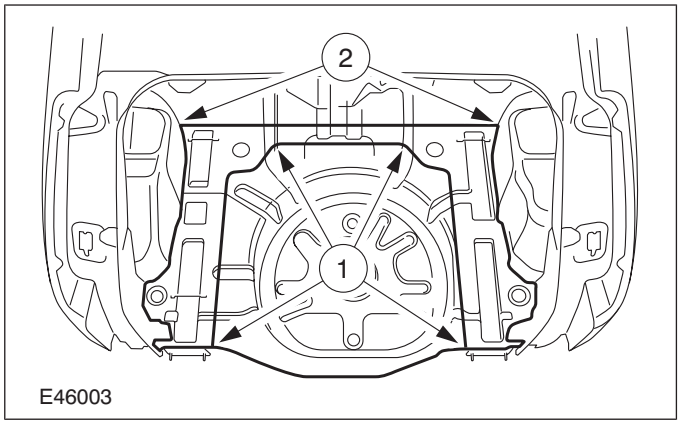
1. General Notes

- The back panel is already removed before repair work starts.
- Move carpets and wiring out of the working area.

2. NOTE: In order to facilitate access, the spare wheel well is cut out by means of a rough cut.

Rear floor panel

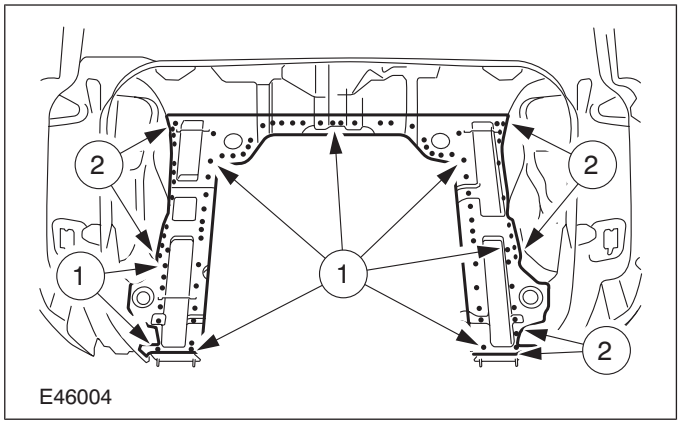
1. Rough cut location.
2. Front cut location.



E46003

3. Rear floor panel

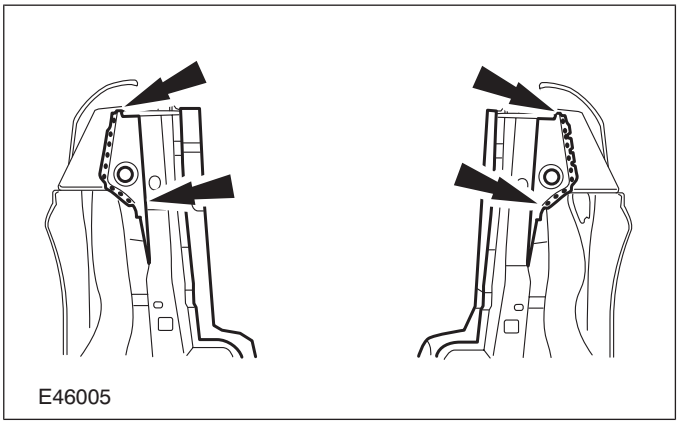
1. Mill out the spot welds.
2. Grind out the spot welds.



E46004

4. Rear floor panel (shown from below)

- Grind out the spot welds.

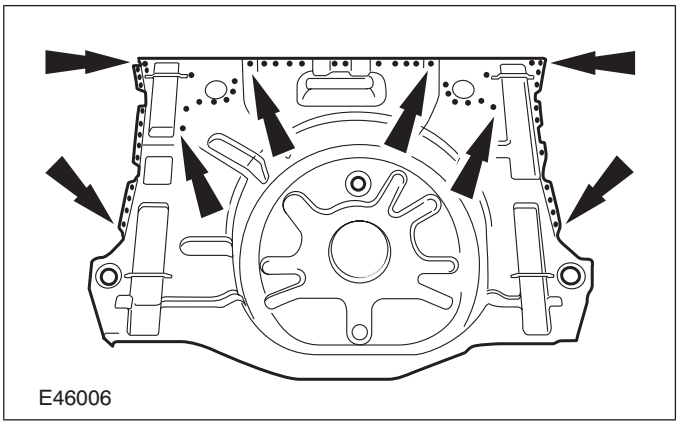

E46005

Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25A must be followed.

1. Rear floor panel

- Drill holes for puddle welding.


E46006

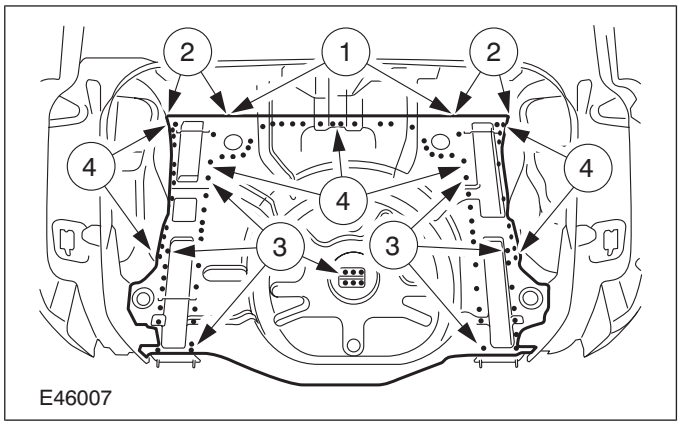
NOTE: The new part must overlap by approx. 10 mm at the front joint area. The new part is butted up at the flange areas (side member and belt reinforcement).

2. Rear floor panel

1. Intermittent MIG weld.
2. Continuous MIG weld (butt weld).
3. Resistance spot weld.

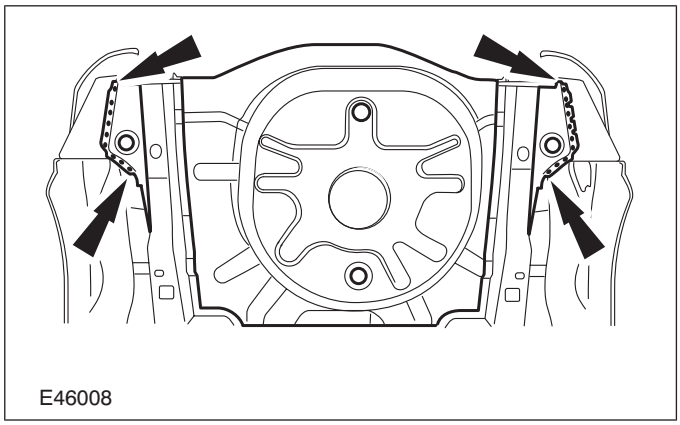
REMOVAL AND INSTALLATION

4. Puddle weld.



3. Rear floor panel (shown from below)

- Resistance spot weld.



REMOVAL AND INSTALLATION

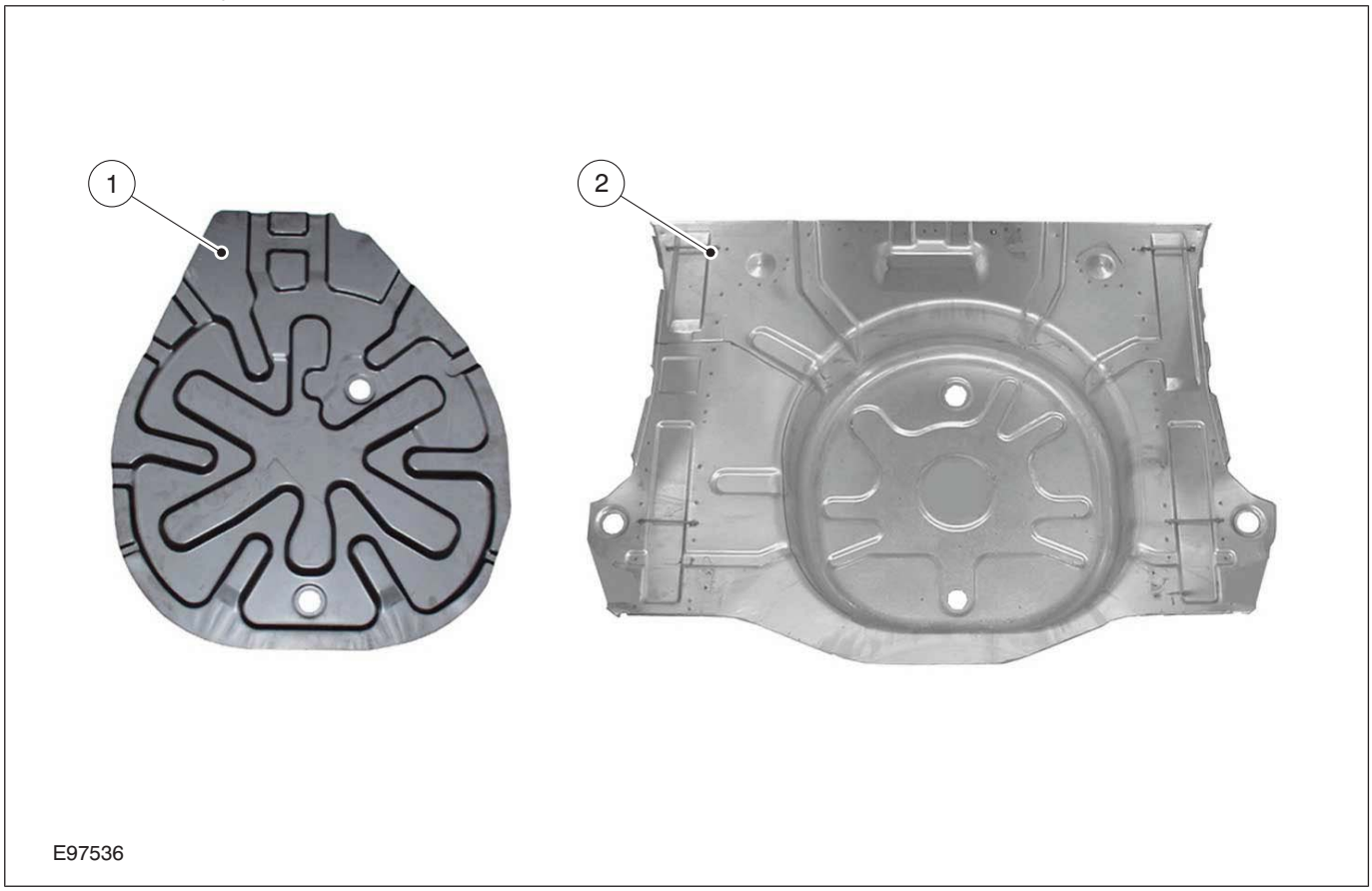
Rear Floor Panel — 2.5L Duratec-ST (VI5)

Removal

- The Focus 2004.75 (07/2004-) rear floor panel is equipped with a spare wheel well. Due to a different exhaust pipe routing this well has to be replaced by a gusset plate for the Focus 2.5L Duratec-ST.
- Replace the gusset plate before the rear floor panel will be installed into the vehicle.
- Remove and install of the rear floor panel is similar to Focus 2004.75 (07/2004-).

  Refer to: Rear Floor Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

1. • **Replacement parts:**
   - **1)** Gusset Plate 2.5L Duratec-ST
   - **2)** Rear Floor Panel (Repair Panel)

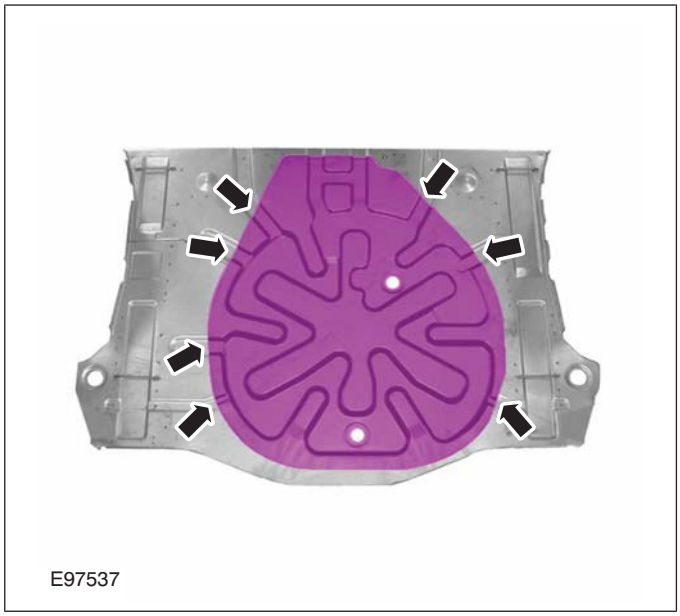


REMOVAL AND INSTALLATION

2. • **Necessary removal and installation work:**
   - Back Panel

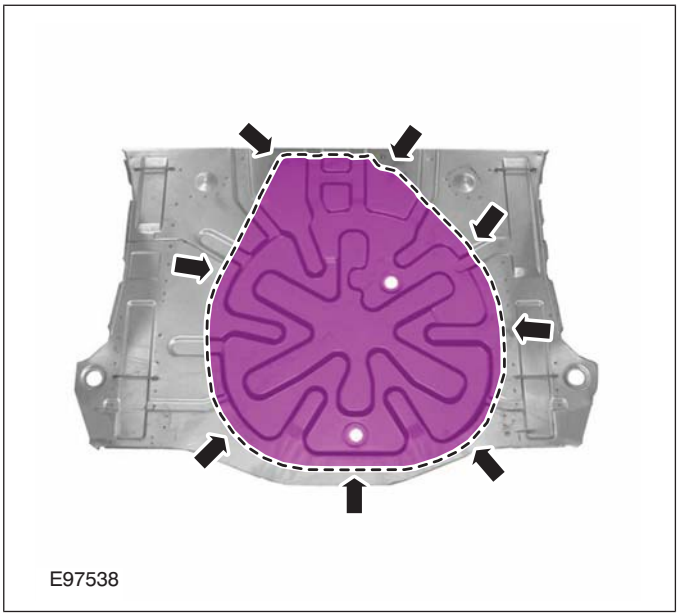
     Refer to: Back Panel - 3-Door/5-Door (501-30 Rear End Sheet Metal Repairs, Removal and Installation).
   - Rear Floor Panel

     Refer to: Rear Floor Panel (501-30 Rear End Sheet Metal Repairs, Removal and Installation).
   - Reposition the carpeting and the wiring harness away from the working area.
3. • **Gusset Plate**
   - Insert the gusset plate into the slots (arrows) of the rear floor panel with a positive locking.



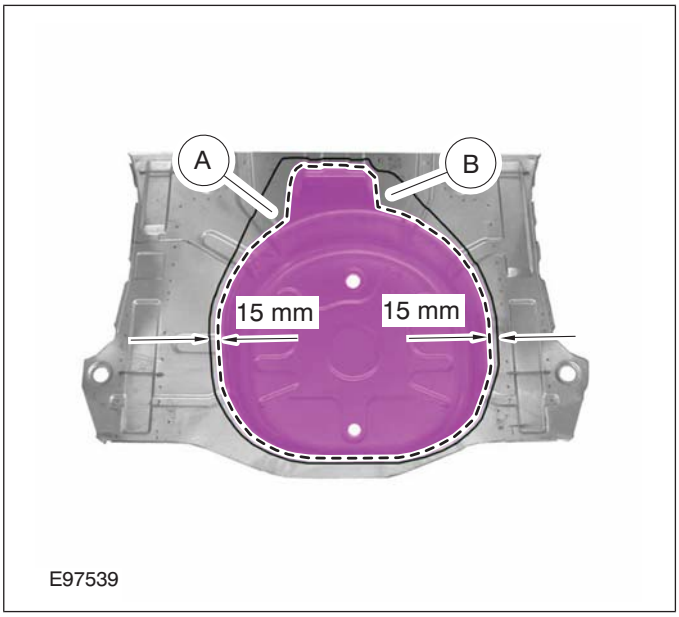
E97537

4. • **Gusset Plate**
   - Mark the outline of the gusset plate to the rear floor panel.
   - Take off the gusset plate.



E97538

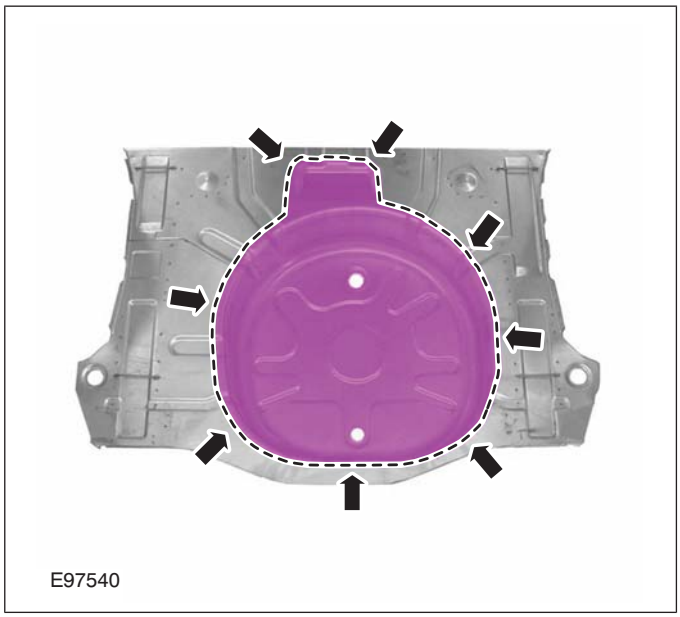
5. • **Mark Cutline**
   - **NOTE:** The cutline has to be marked with a displacement of 15 mm to the center. In areas A and B mark cutline along the recess with a greater displacement.
   - Mark the cutline.



E97539

REMOVAL AND INSTALLATION

6. • **Cut Rear Floor Panel**
   - Cut out the spare wheel well along the cutline.



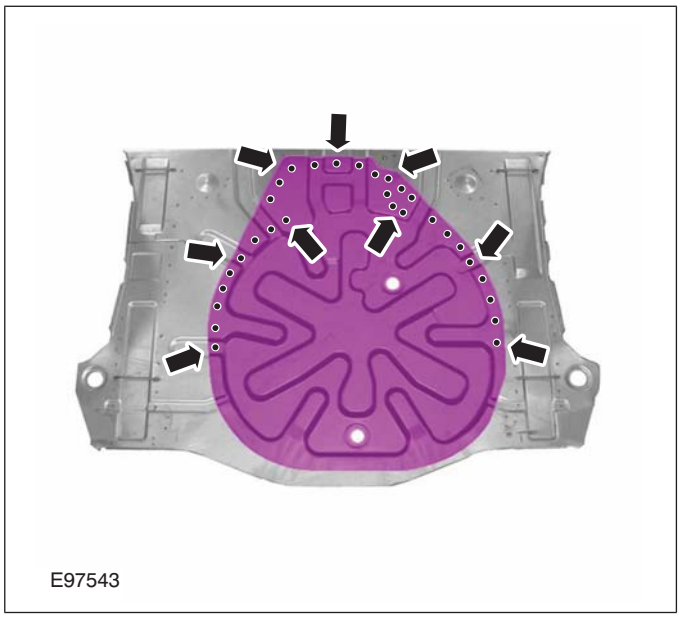
Installation

NOTE: Corrosion protection must be carefully maintained during this repair work.

Refer to: Corrosion Prevention (501-25 Body Repairs - General Information, Description and Operation).

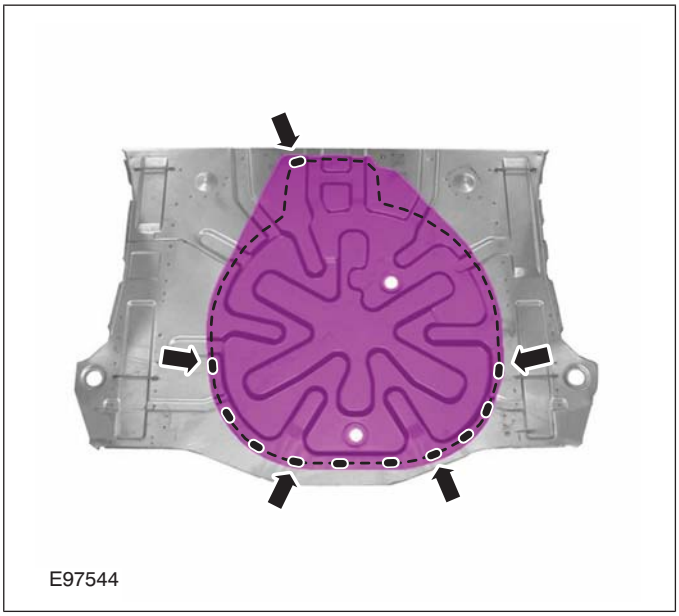
1. • **Weld Rear Floor Panel**
   - **NOTE:** Insert the gusset plate into the rear floor panel with a positive locking and locate with clamps.

     Resistance spot weld.



2. • **Weld Rear Floor Panel**
   - **NOTE:** MIG weld from underneath!

     Intermittant MIG weld seam (single seam length ca. 20mm)



3. • **Finishing and corrosion prevention**
   - Seal weld flanges on both sides with body sealing compound.

REMOVAL AND INSTALLATION

Rear Floor Panel Section

General Equipment

Measurement or alignment angle system

1. Replacement Parts

- Rear floor panel

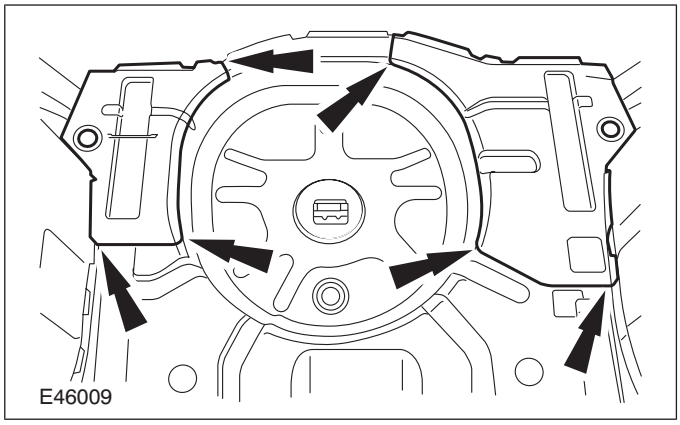
Removal

1. General Notes

- Back panel, quarter panel and water drain panel with reinforcement are already removed before commencing the repair.
- Move carpets and wiring out of the working area.

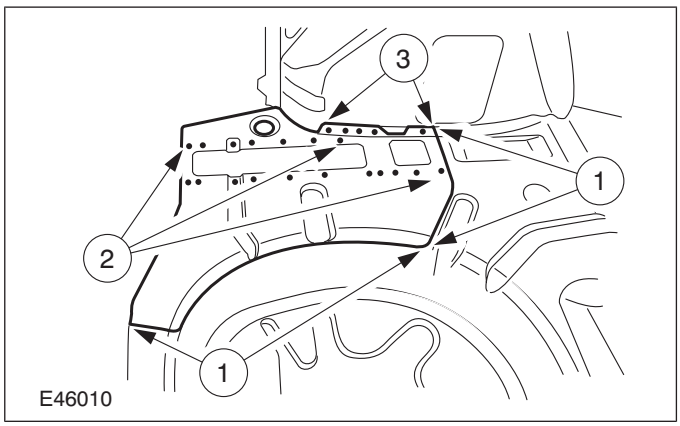
2. NOTE: Several sectional repairs may be necessary depending upon the extent of damage.

Overview of cut locations



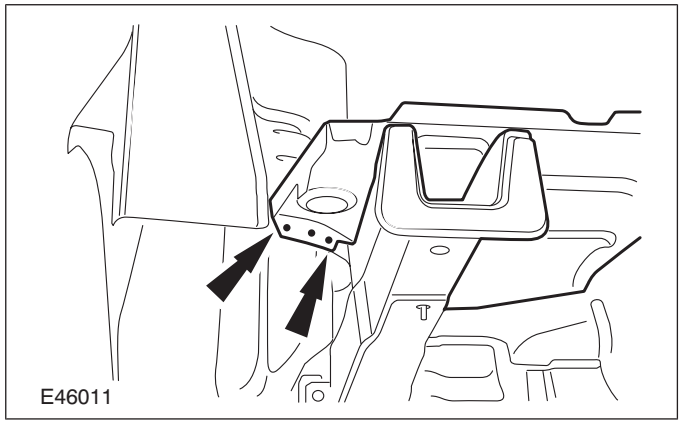
3. Rear floor panel

1. Cut location.
2. Mill out the spot welds.
3. Grind out the spot welds.



4. Rear floor panel

- Grind out the spot welds.

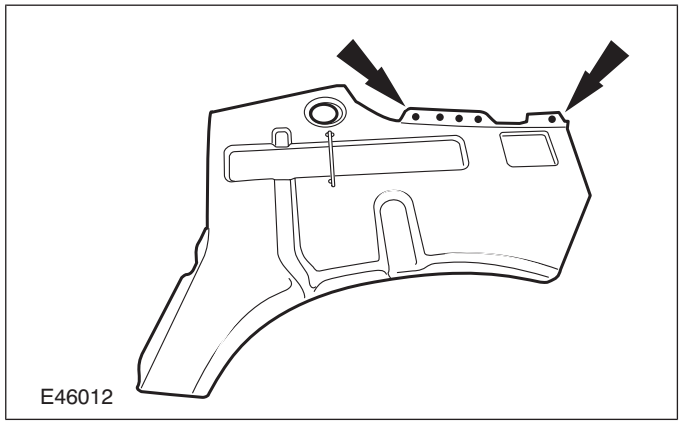


Installation

NOTE: Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25A must be followed.

1. Rear floor panel

- Drill holes for puddle welding.

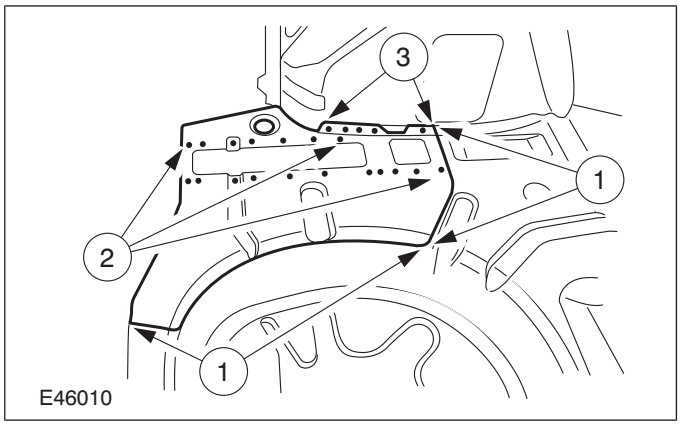


2. Rear floor panel

1. Continuous MIG weld.
2. Resistance spot weld.

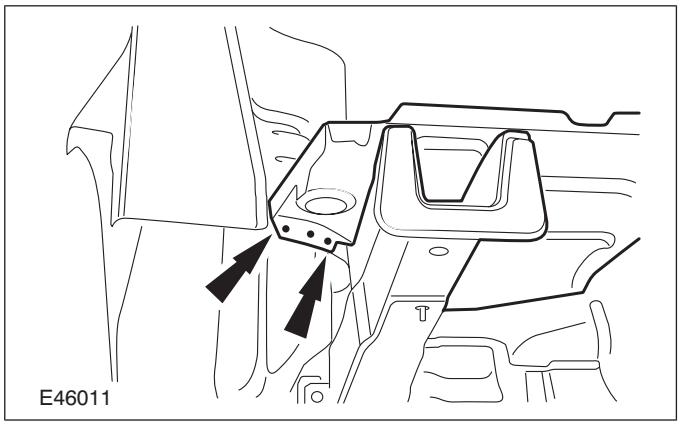
REMOVAL AND INSTALLATION

3. Puddle weld.



3. Rear floor panel

- Resistance spot weld.



REMOVAL AND INSTALLATION

Rear Side Member Section

General Equipment

Measurement or alignment angle system

1. Replacement Parts

- Side member sectional part
- Crossmember retaining flange

Removal

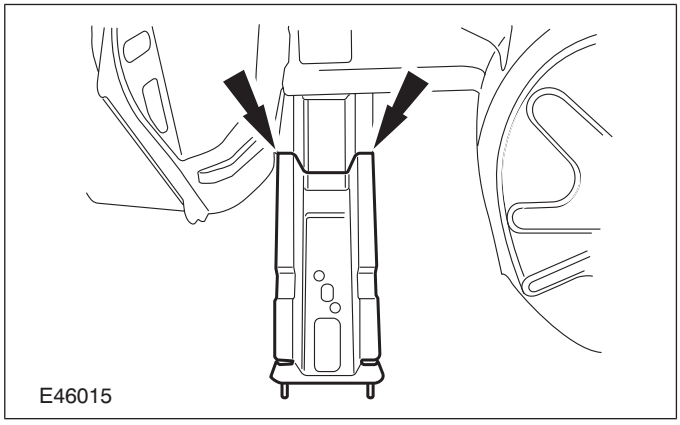
1. General Notes

- Rear floor panel, back panel and quarter panel are already removed before commencing the repair.

2. NOTE: The cut location may vary depending upon the extent of the damage.

Rear side member

- Cut location.

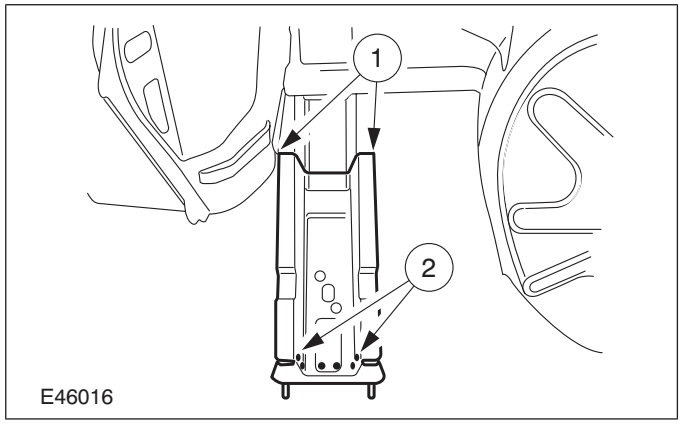


Installation

NOTE: Fit crossmember retaining flange using the alignment angle and fix in place. Insert and fit the side member.

1. Rear side member

1. Continuous MIG weld.
2. Resistance spot weld.



REMOVAL AND INSTALLATION

Luggage Compartment Bulkhead

General Equipment

Measurement and alignment angle system

1. Replacement parts

- Luggage compartment bulkhead
- Left luggage compartment bulkhead connecting piece
- Right luggage compartment bulkhead connecting piece

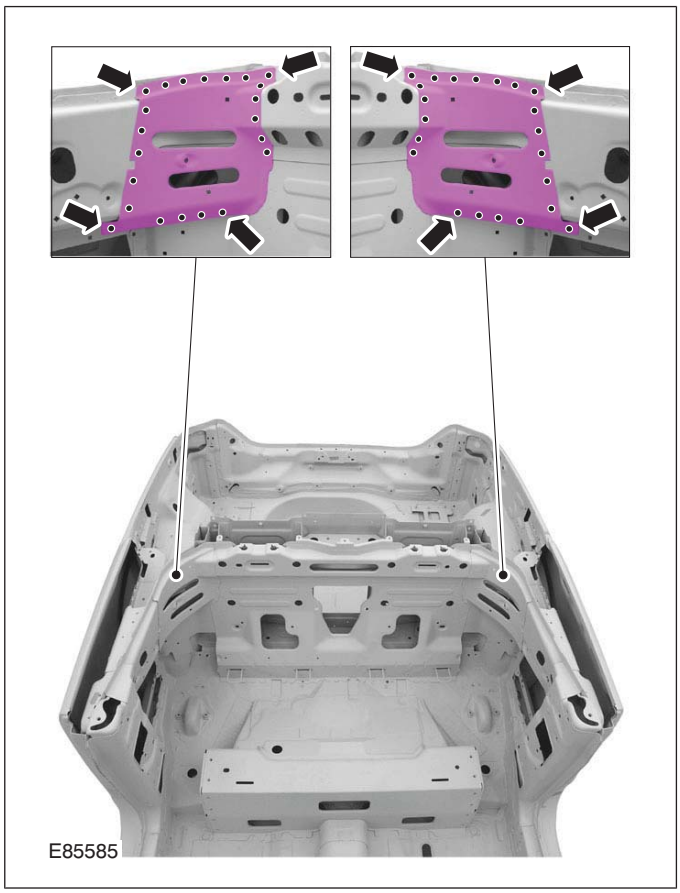
Removal

1. General:

- Necessary removal work: Cover, both roll protection units, doors, luggage compartment lid, B pillar trim, rear seat and back, driver and passenger seats.
- Reposition the carpeting and the wiring harness away from the working area.

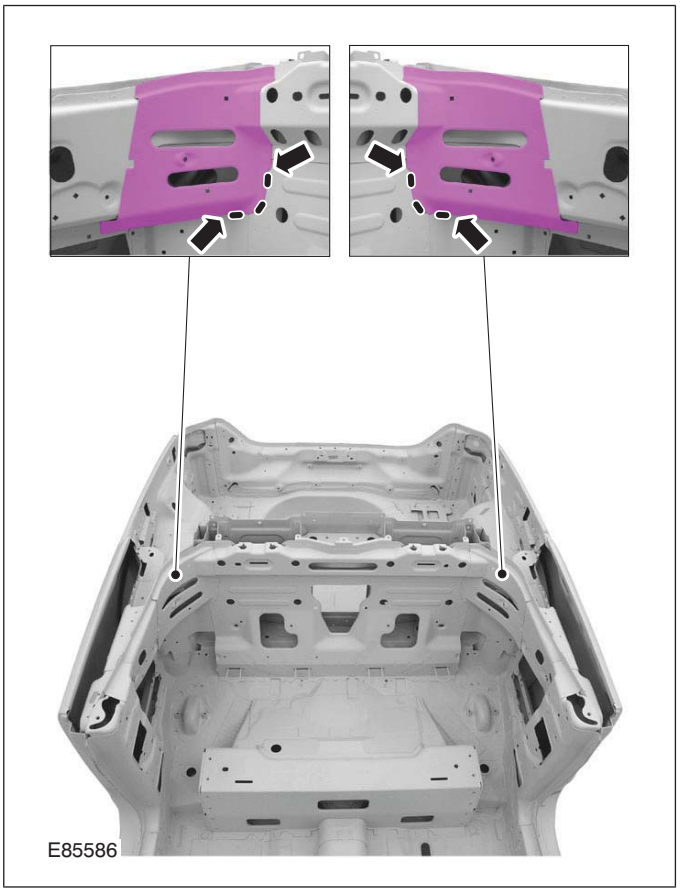
2. Luggage compartment bulkhead connecting pieces

- Mill out the spot welds.



3. Luggage compartment bulkhead connecting pieces

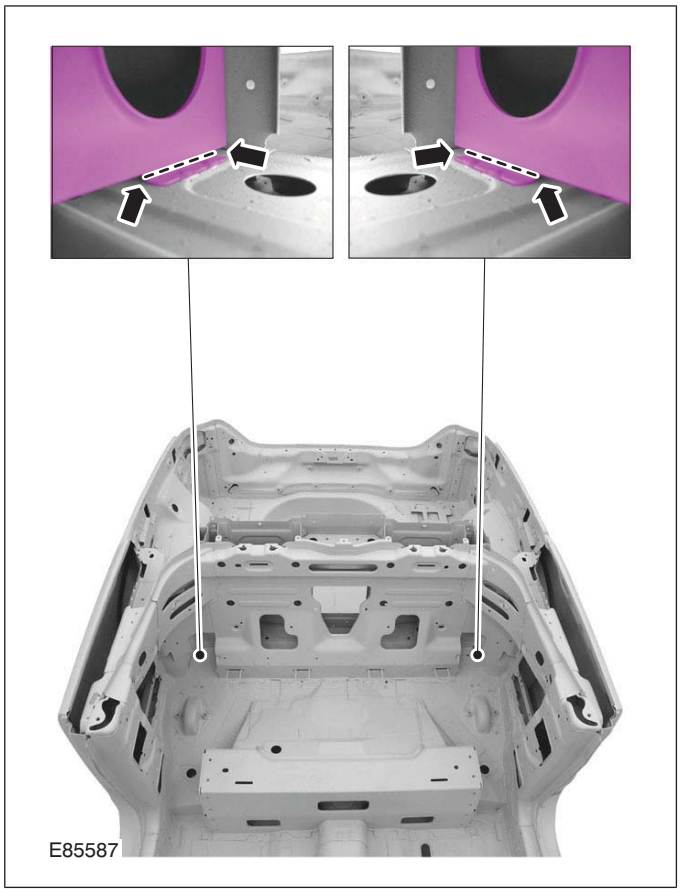
- Grind out the MIG weld seams.



4. Luggage compartment bulkhead

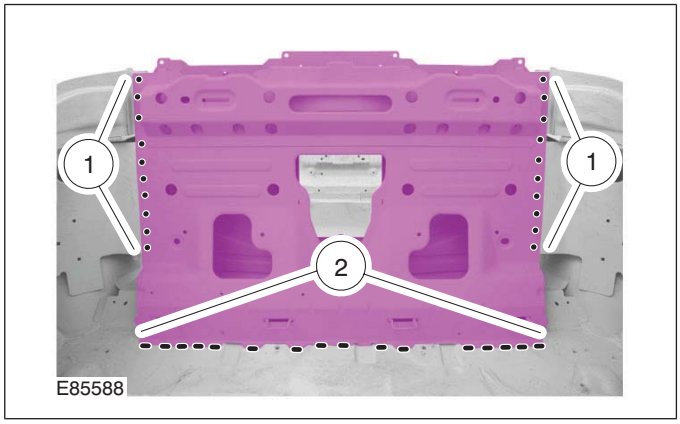
REMOVAL AND INSTALLATION

- Rough separating cuts.



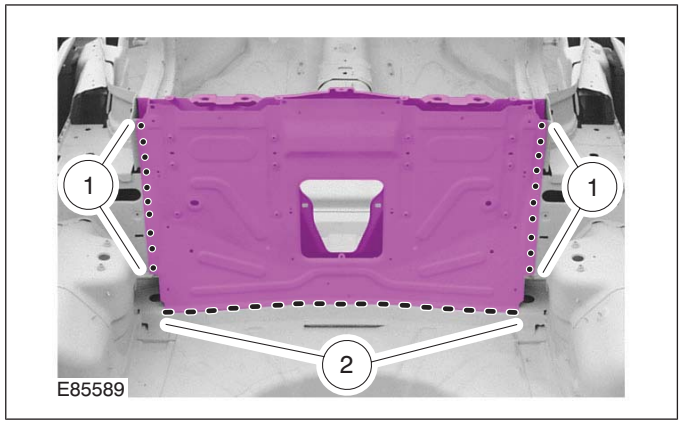
5. Luggage compartment bulkhead (view from front)

1. Mill out the spot welds.
2. Grind out the MIG weld seams.



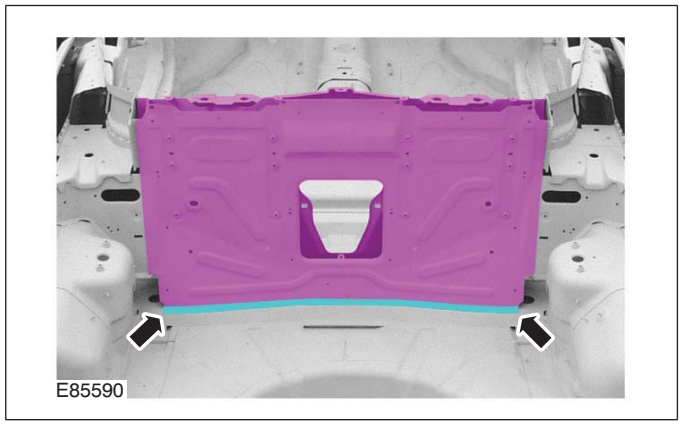
6. Luggage compartment bulkhead (view from rear)

1. Mill out the spot welds.
2. Grind out the MIG weld seams.



7. Luggage compartment bulkhead (view from rear)

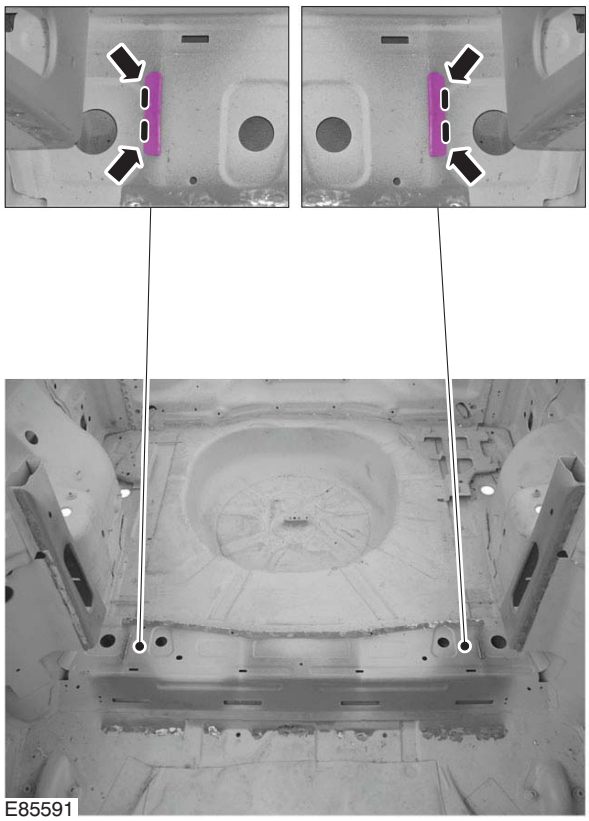
- Warm the adhesive application area (approx. 170° C).



8. Luggage compartment bulkhead remaining flanges

REMOVAL AND INSTALLATION

- Grind out the MIG weld seams.

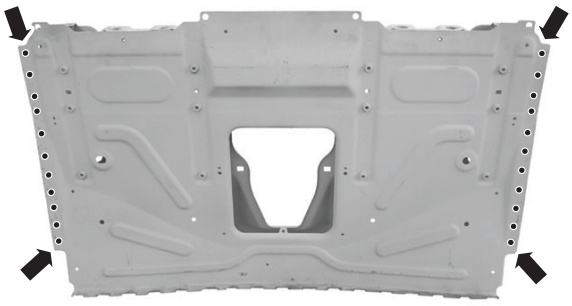


Installation

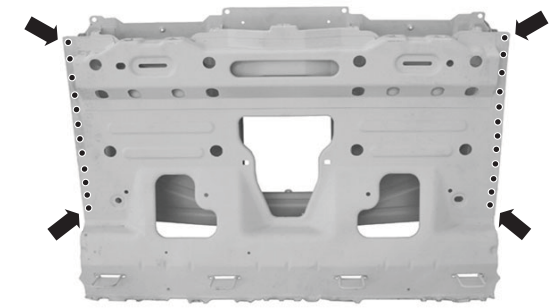
NOTE:

- Before resistance spot welding of body panels with a total panel thickness of 3 mm and greater, the welding equipment instructions contained in sub-section 501-25 must be followed.
- The new parts must be positioned accurately in order for the roof mechanism to work properly.

1. **Fit the new parts and fix with the alignment angle.**
2. **Luggage compartment bulkhead (view from rear)**
   - Drill holes for puddle welding (10 mm diameter).

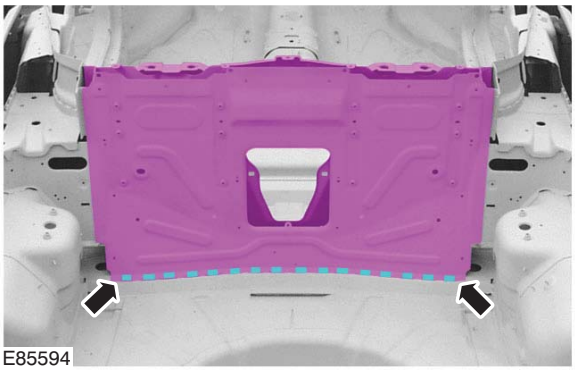


3. **Luggage compartment bulkhead (view from front)**
   - Drill holes for puddle welding (10 mm diameter).



4. **NOTE: Adhesive may only be applied thinly between the welding points (MIG welding areas) on the panel flange. Adhesive must not get into the welding areas.**

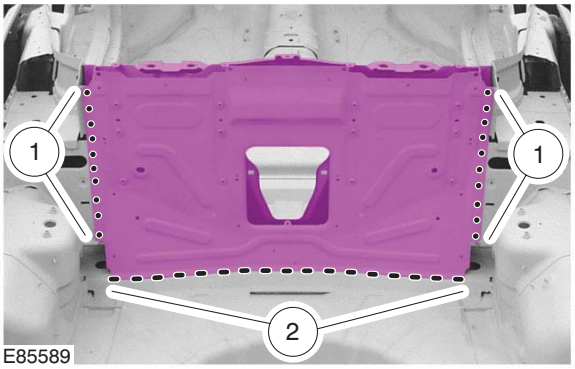
   Luggage compartment bulkhead (view from rear)
   - Before inserting the bulkhead, apply 2 K metal adhesive.



REMOVAL AND INSTALLATION

5. Luggage compartment bulkhead (view from rear)

1. Puddle weld.
2. Intermittent MIG weld.



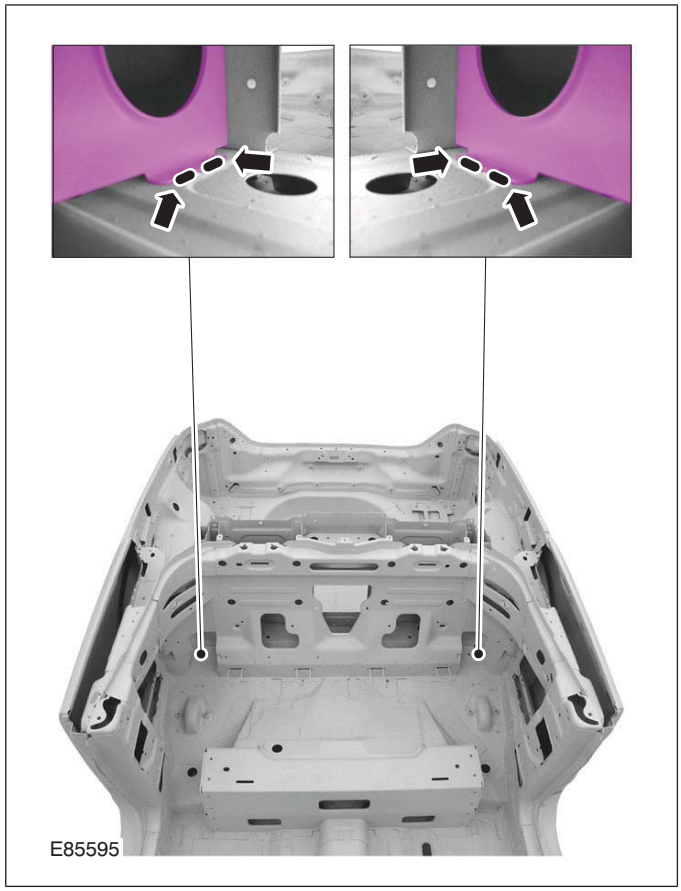
6. Luggage compartment bulkhead (view from front)

1. Puddle weld.
2. Intermittent MIG weld.



7. Luggage compartment bulkhead

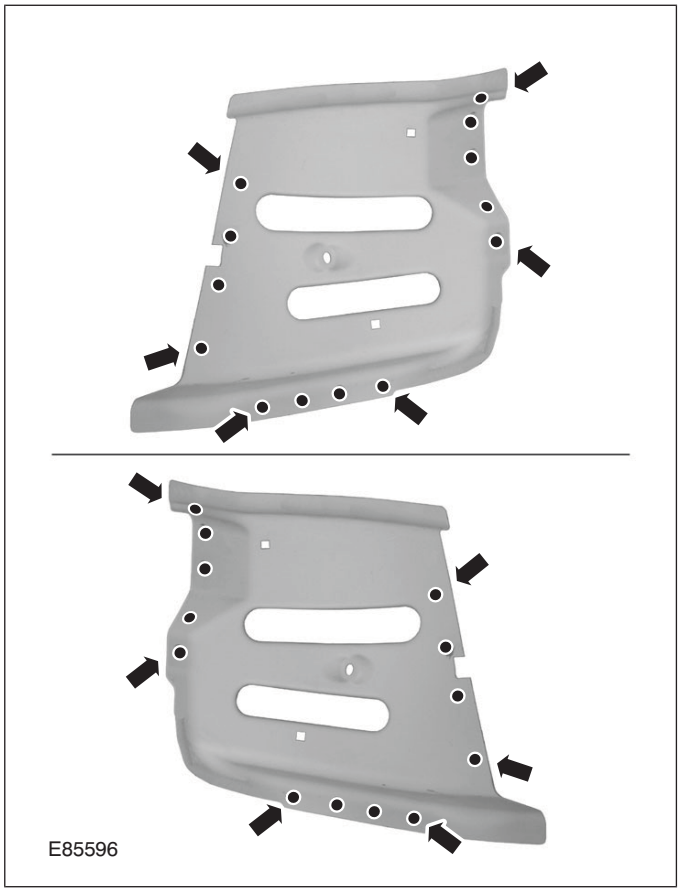
- Intermittent MIG weld.



8. Luggage compartment bulkhead connecting pieces (interior views)

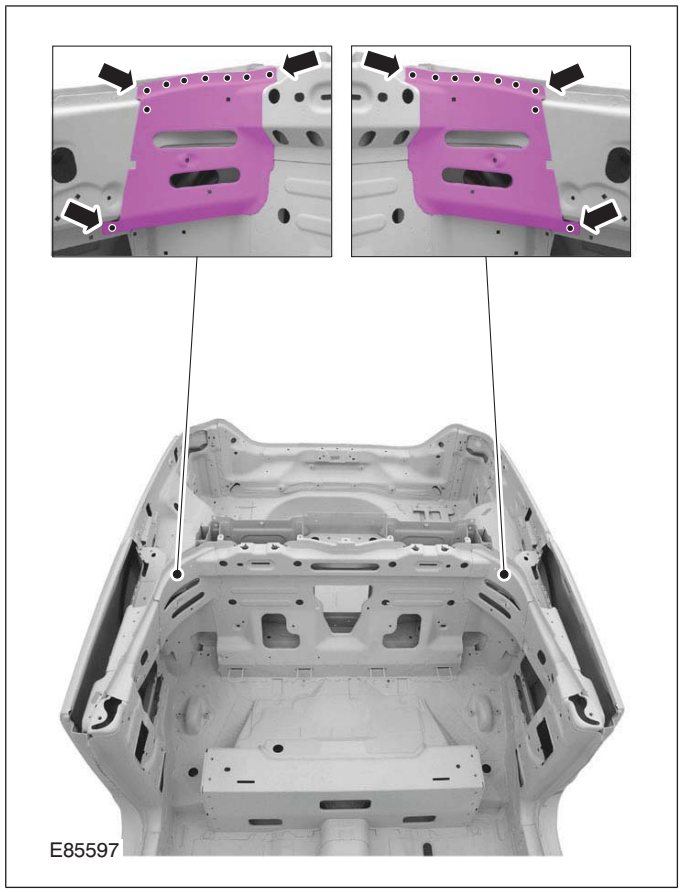
REMOVAL AND INSTALLATION

- Drill holes for puddle welding (10 mm diameter).



9. Luggage compartment bulkhead connecting pieces

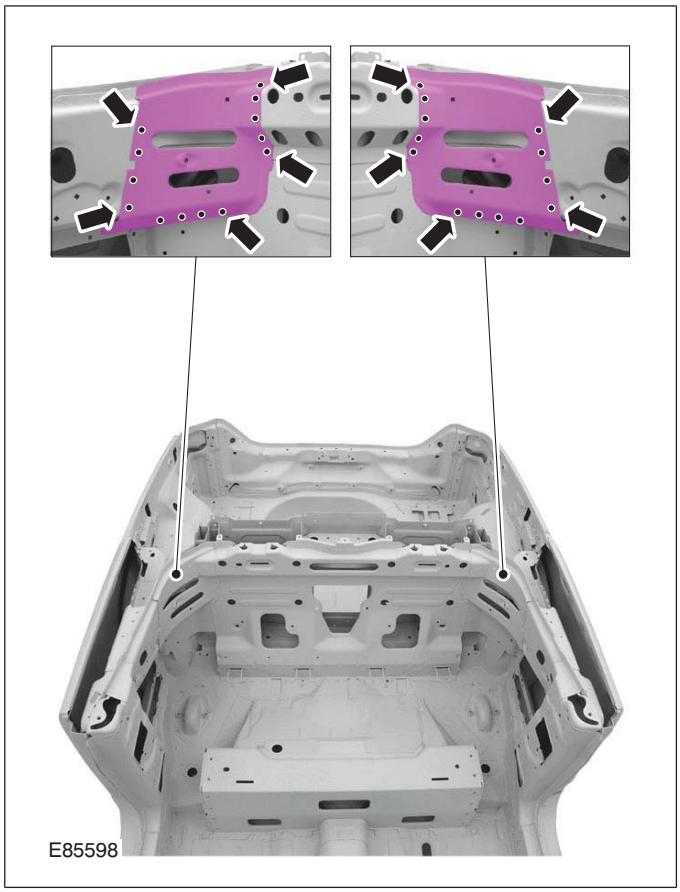
- Resistance spot weld.



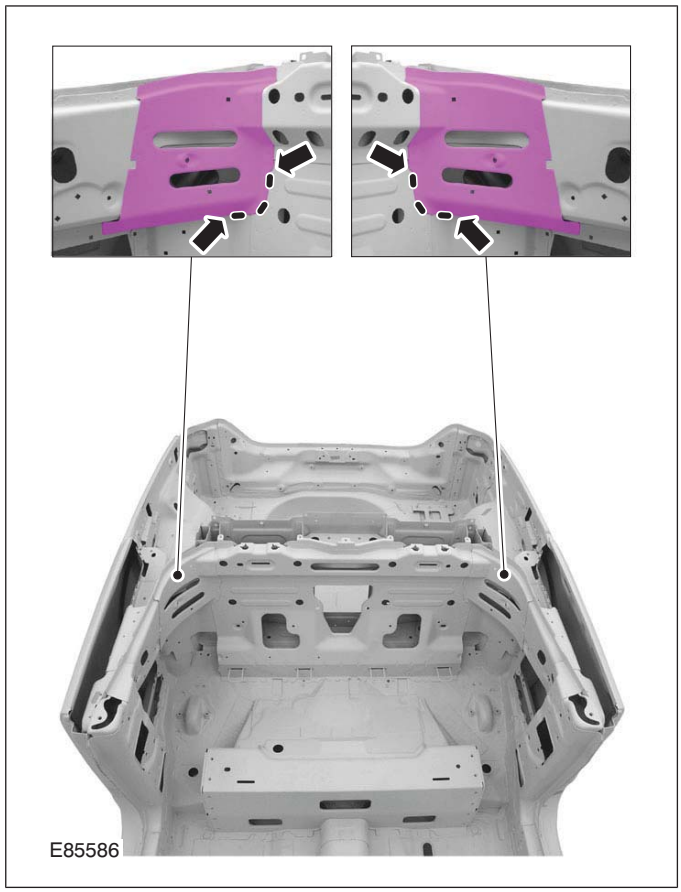
10. Luggage compartment bulkhead connecting pieces

REMOVAL AND INSTALLATION

- Puddle weld.



- Intermittent MIG weld.



11. Luggage compartment bulkhead connecting pieces

SECTION 501-36 Paint - General Information

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

Description	Finis Code	Specification
Underbody protection	5 030 492	-
Anti-corrosion wax	1 219 834	WSK-M7C89-A
Cavity wax	5 030 081	-
Profiled butyl seal	1 128 983	S-M3G4620-A
Weld primer	1 205 996	-
Clinched flange protection	1 136 479	WSK-M4G245-B
Seam sealing compound	1 205 817	WSS-M4G364-A
Body sealing compound	1 143 255	-
Because the supply of paint materials to the dealer workshops has been handed over to paint suppliers, the specifications for these materials are not given in the table.		

DESCRIPTION AND OPERATION

Description and Usage of Paint Literature

Vehicle paints are subject to severe demands caused by external influences. Moisture, air-borne deposits in the form of various chemicals and UV light constantly affect a paint surface. Furthermore, mechanical damage occurs through grit, stones and sand. Bird droppings, insect residues, pollen and tree sap also attack the paint surface.

The present literature not only informs the specialist about current repair painting techniques, but also provides tips and instructions on modern and economical repair processes.

High quality bodywork paints require the use of the most modern technologies and regular updating of the technician's knowledge of painting techniques, because of the constantly new developments in paint technology.

Information about different materials is listed under Specification.

Furthermore, information on the fundamental principles of repair painting and paint materials is provided in several chapters. The safety instructions indicate the possible health hazards and other sources of danger. There are also notes about tools and materials as well as on basic painting methods.

In the model specific repair instructions, only the most important repair steps or special features are referred to. Detailed information on the generally applicable painting procedures is given in this paint manual.

Direct supply of repair paints by Ford has been discontinued. There is however an agreement with many paint manufacturers, which ensures fast and problem-free supply to the dealer undertakings.

Paint suppliers:

- DuPont
- Glasurit
- PPG
- Sikkens
- Spies Hecker
- Standox

When using painting materials, it should be taken into account that the manufacturers have exactly matched their products between each other. In order to avoid quality defects, difficulties in working and losses in corrosion protection, these may not be substituted with other products.

NOTE: The Ford Service Organization organizes basic and more in-depth training on much of the content of this paint manual. As well as the practical part of the training, a further component is the Student Information document, which offers supplementary information in the form of a brochure.

During all work it must always be ensured that personal safety and the operational capability of the vehicle are not threatened by the choice of methods, tools and components.

The information given in the diagrams in the chapter "Paint Damage" is provided by the repair paint manufacturer.

DESCRIPTION AND OPERATION

Symbols

General

Various symbols, signs, instructions and illustrations are used in this literature. Warnings and cautions have different meanings and require different ways of proceeding. Diagrammatic representations are provided with instructional signs for improved clarity. These are briefly explained below:

WARNING: This caption is used when failure to follow instructions exactly or failure to follow them at all may result in a hazard to persons or in persons being injured.

CAUTION: This caption is used when incorrectly following the test procedures or instructions or failure to follow them at all could lead to damage to the vehicle or components.

NOTE: This caption is used when attention needs to be drawn to special or extra information.

When reading this handbook, you will come across the points WARNING, CAUTION AND NOTE. These instructions are always given immediately before the corresponding job steps.

Hazardous materials designations

Many accidents occur because of ignorance. In the area of personal health protection, it is particularly important to clearly emphasize sources of danger and their effects on human organs.

Only with knowledge of hazardous material designations can it be certain that the necessary precautions are taken when handling substances which are harmful to health.

NOTE: Pay attention to the manufacturer's data on the containers and given in the Safety Data Sheet.

DESCRIPTION AND OPERATION

Hazardous material symbols



Item	Description
1	Very poisonous, T+ (extremely toxic), small quantities can be fatal.
2	Poisonous, T (toxic), causes serious damage to health
3	Corrosive, C (corrosive), destroys living tissue.
4	Harmful to health, Xn (noxious).
5	Irritant, Xi (irritant), can cause inflammation.

Item	Description
6	Explosive
7	Highly flammable, F+ (extremely flammable), already flammable at temperatures below 0° C.
8	Flammable, F (flammable), forms a flammable mixture with air.
9	Oxidizing, O (oxidizing), reacts with combustible substances.

As well as the danger symbols, there is more comprehensive manufacturer's information to be

DESCRIPTION AND OPERATION

found on the containers and in the Safety Data Sheets, and you must pay attention to this information.

Instructions on measures to be taken for personal protection.

As well as the information about sources of danger, there are mandatory instructions which draw your attention to the personal protection measures to be taken.

Mandatory symbol

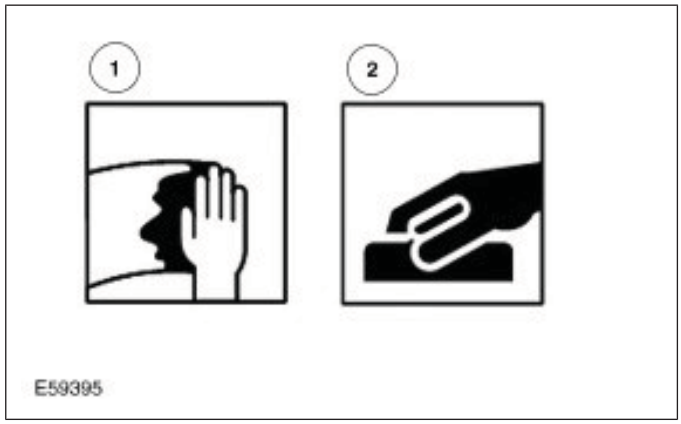


Item	Description
1	Breathing protection must be worn
2	Eye protection must be worn
3	Ear protection must be worn
4	Protective gloves must be worn
5	Protective footwear must be worn

Icons

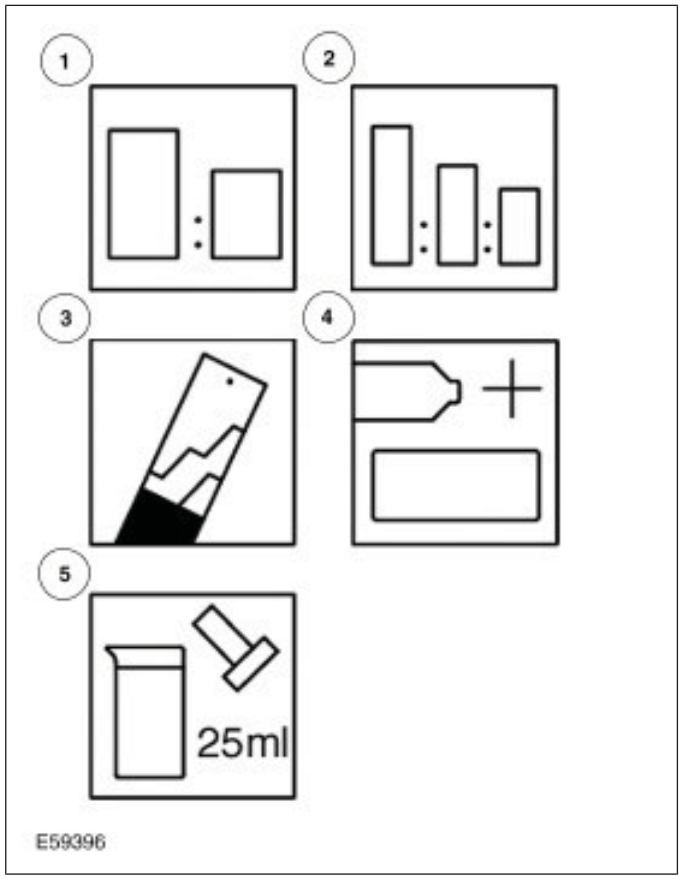
So that the necessary information for optimal handling is clear, unambiguous and can be quickly understood, the leading paint manufacturers have agreed a standard symbolic language. Language independent representations in the form of icons provide handling instructions which are supplemented with quantity or time information.

Pretreatment



Item	Description
1	Clean
2	Sand

Mix



Item	Description
1	2 component mixture
2	3 component mixture

DESCRIPTION AND OPERATION

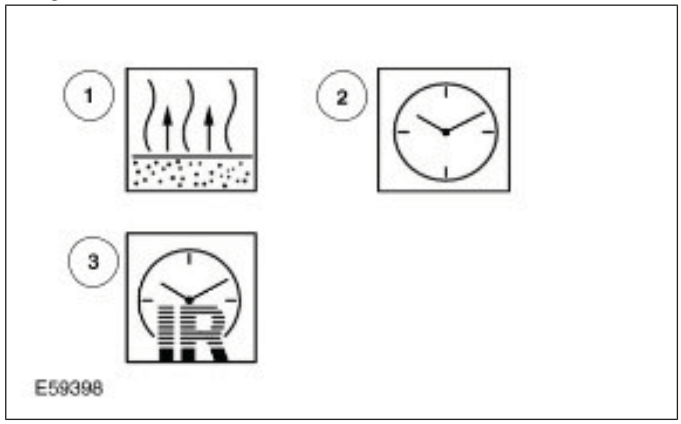
Item	Description
3	Use a measuring rod
4	Addition of hardener
5	Addition of additives

Process



Item	Description
1	Flow-beaker spray gun
2	Suction-beaker spray gun
3	Spray passes
4	Filler
5	Coat
6	Underbody protection spray gun

Dry



Item	Description
1	Ventilate
2	Drying time
3	Drying time with infra-red dryer

Further processing

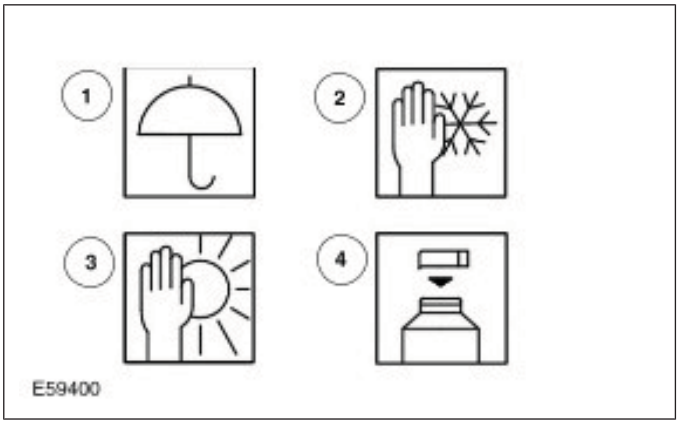


Item	Description
1	Hand abrade (wet)
2	Hand abrade (dry)
3	Eccentric sander (wet)
4	Eccentric sander (dry)

DESCRIPTION AND OPERATION

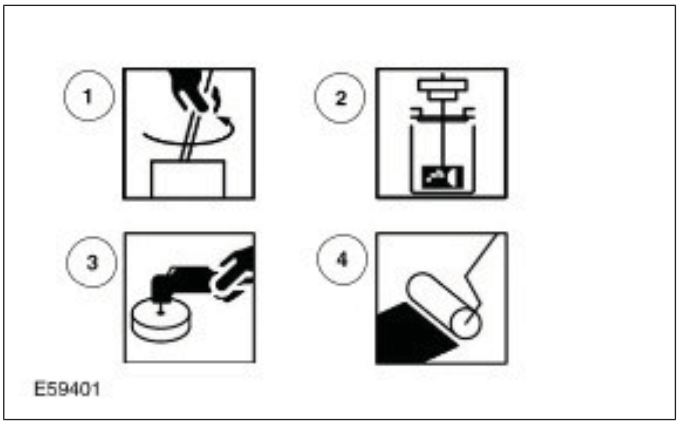
Item	Description
5	Oscillating sander (wet)
6	Oscillating sander (dry)

Store



Item	Description
1	Protect from moisture
2	Store in a frost-free environment
3	Store in a cool place
4	Close the container

Other



Item	Description
1	Stir by hand
2	Stir using a mixing machine
3	Polish
4	Roll

DESCRIPTION AND OPERATION

Health and Safety Precautions

General instructions for the paint shop and handling paint materials

Hazardous areas in repair paint shops:

- Danger from fires, explosions and hot surfaces.
- Dangers to health and safety from the effects of harmful substances because of their absorption through the skin and/or inhalation.
- Dangers caused by electricity, compressed air, power tools and noise.

WARNING: During painting work there is an increased danger of fire or explosion. Prevent any sparks being created. Fire, naked lights and smoking are forbidden.

Measures:

- Wear protective footwear made from anti-static material.
- Only use tools made of wood, brass or copper to clean stands and extraction ducts. Do not use tools made of steel.

Only fill or decant paint materials in a specially marked area.

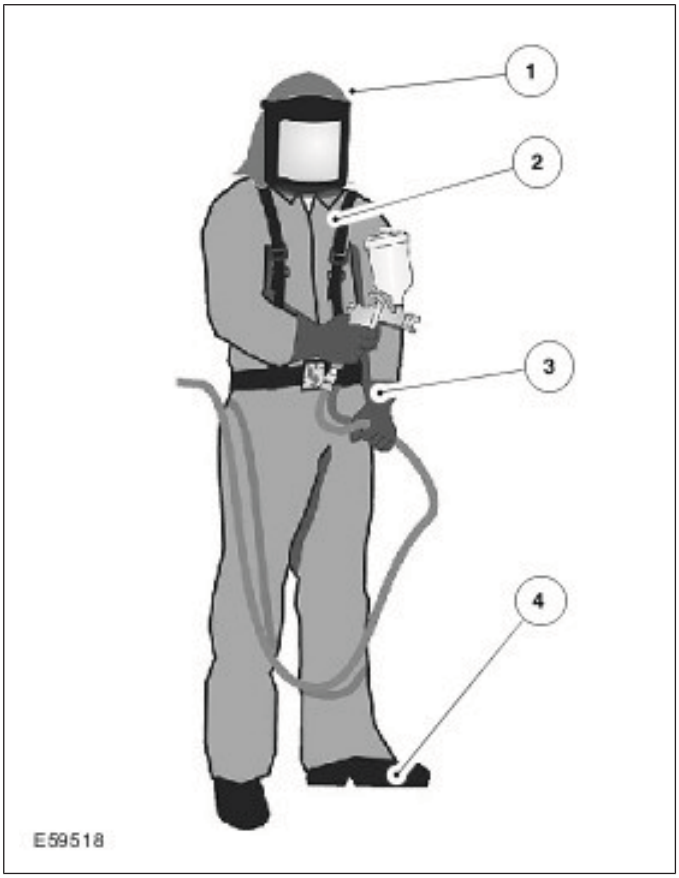
As well as these general instructions on the dangers in repair paint shops, all national and international regulations must be observed:

- Health and Safety at Work Act
- Ordinance on Hazardous Substances
- Technical Rules for Hazardous Substances
- Regulations for the Prevention of Industrial Accidents
- EU Directive on Hazardous Substances, 98/24/EU
- EU Directive on Noise, 2003/10/EU
- EU Directive on Volatile Organic Compounds (VOC), 1999/13/EU, 2001/81/EU, 2004/42/EU
- Safety instructions of equipment and tool manufacturers

Personal protection

Besides the body and limbs, several organs vital to life are in very particular danger. Because damage is mostly irreparable, special attention and comprehensive protection are necessary.

WARNING: Solvents cause damage to the health through inhalation. Splashes in the eyes or on the skin can cause bodily harm. When working with solvents, always use suitable means of protection.



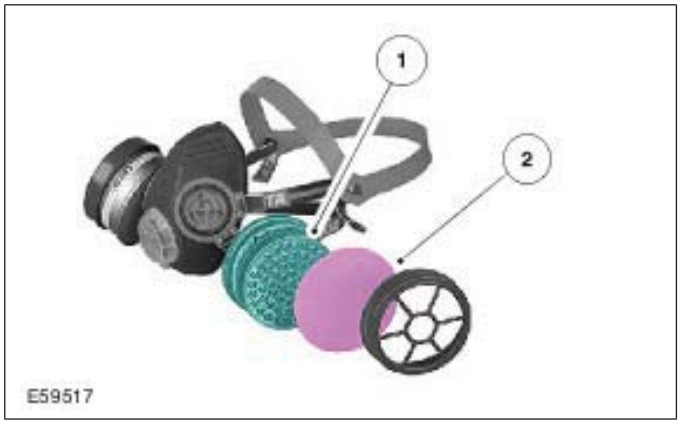
Item	Description
1	Protective hood with fresh air supply
2	Protective clothing
3	Protective gloves
4	Protective footwear

Breathing protection

During painting work and in the preparations for painting, gases, vapors, mists or dusts can appear in dangerous concentrations in the areas where fellow employees breath.

For short periods of work or minimal concentrations of hazardous substances, breathing protection devices with a combination filter are suitable as breathing protection equipment.

DESCRIPTION AND OPERATION



Item	Description
1	Activated charcoal filter
2	Coarse filter

For higher concentrations of harmful substances, breathing protection devices which are independent of the local atmosphere are suitable.

In these types of isolation systems, a compressed air hose carries natural air from the compressor line into the protective mask. During supply, the air undergoes pressure reduction, water removal, fine filtration and usually warming to natural breath temperature.

WARNING: Vapor or spray mist containing isocyanate as a paint base or hardener can cause toxic respiratory disease (conditions similar to asthma) leading to permanent damage, even when inhaled in the lowest concentrations.

Filter masks with wadding, sponge or colloid filters and also paper masks are all unsuitable for working with coating materials because they do not stop solvent vapors.

The instructions for use provided by the manufacturer must be observed when working with breathing protection equipment.

Skin protection

Spray painters who are subject to considerable exposure to coating materials must wear suitable protective work clothing (flame-proof and anti-static).

NOTE: Also, when working with water based materials, comprehensive skin protection must be worn, because these materials are very easily absorbed through the skin.

The protective clothing must be changed at the proper intervals. Items of clothing which are contaminated with coating materials can easily catch fire.

When selecting protective clothing, it must be taken into account that cloth containing a high proportion of easily melted plastic thread considerably increases the degree of burns injury (melted plastic on the skin!). This must also be taken into account in the choice of underwear.

For areas of skin which are not covered by protective clothing, suitable skin protection, skin cleaning and skin care agents must be used.

Eye protection

Working with portable hand sanding machines on which the tools move unguarded, at speed and with power is fundamentally dangerous.

Goggles must be worn not only when sanding, but also when working with paints and their additives. These contain substances which are harmful to the eyes. Damage ranging from irritation of the cornea to incurable illnesses are possible.

The protective goggles must be inert toward splashes of solvent, and fully enclose the areas at the side of the eyes on both sides. The best protection during spray painting is offered by full mask respirators or helmet respirators with a built-in visor.

Ear protection

Noise disturbance in repair paint shops caused by various sources is particularly high. Sanding and compressed air machines, paint cabin extractor fans (compressors) and extractor ducts in the work rooms are the causes of the high levels of noise.

WARNING: Avoid damage to your hearing! Wear ear protection.

Suitable ear protection is offered by ear plugs or ear defenders.

DESCRIPTION AND OPERATION

Environmental Regulations

Waste disposal in the repair paint shop

More than ever before, since the introduction of EU directives, rigorous attention is paid to the avoidance of waste materials and to recycling in repair paint shops. In this respect, repair paint shops must take into account and comply with the following requirements:

- Separate waste according to its recycling and disposal methods.
- Produce evidence for the correct transport and disposal of waste.

NOTE: The organization of disposal in the plant must comply with the requirements of the Waste Avoidance and Management Act: The avoidance and recycling of waste must always take priority.

However, despite all measures which may be taken, waste cannot be completely avoided.

NOTE: Waste which is not allowed in household rubbish, and which can no longer be utilized, must be disposed of as special waste.

Paint residues containing solvent, application residues, sanding dust, waste containing peroxides, solvents, soiled cleaning cloths and paint slurry all count as special waste. Each of these must be collected in a separate, sealed and suitably labeled metal container and properly disposed of using a specialist company.

Careful separation allows some waste to be usefully re-used.

- Empty metal containers can be sent for scrap instead of being disposed of as waste.
- Contaminated cleaning thinners can be separated by distillation.
- Packing material and masking paper can be added to the recycled paper collection.

Residues which cannot be used must be correctly disposed of.

All remaining waste must be treated as commercial waste and disposed of according to the local regulations.

The new VOC (Volatile Organic Compounds) solvent regulation

Keeping the air clean protects the environment and the population from the heath-damaging effects of air pollutants.

In certain atmospheric conditions, volatile organic compounds contribute to summer smog.

NOTE: For comprehensive information, please refer to the European VOC Directive, 1999/13/EU. Furthermore, the effective national regulations must be complied with.

The European VOC (Volatile Organic Compounds) Directive has controlled the limits for such compounds since August 2001. It applies to production coating companies and those which undertake repair painting of private and commercial vehicles.

Not least because of the VOC legislation, modern, low solvent and solvent-free lacquers and paints are finding greatly increased distribution across industry and the trade. Up to the year 2007, emissions from painting work will drop by at least 40%.

At the same time, the paint manufacturers guarantee for example that they will produce a ready-to-spray product consisting of base paint + hardener + thinners, with a permitted VOC level.

A company in business today can conform with the stipulated requirements by introducing water-based paints and using the other necessary products from the relevant paint manufacturers.

For more detailed information, please refer to the EU VOC Directive.

DESCRIPTION AND OPERATION

Factory Paint Application

General fundamentals of paint technology

Paint is a pigment-containing liquid which undergoes chemical and/or physical processes after it has been applied to a surface, so changing into a solid film covering.

Repair paint consists of binder, pigments, filler and solvent.

NOTE: Organic solvent is being replaced by solvent based on water.

Constituents of paint

- Binder
  - Mostly semi-fluid resins which bind together the other components of the paint when it dries.
  - Makes the paint durable.
  - Ensures good surface coverage.
- Pigments
  - Fine, colored powders, which give color to the paint.
  - Cover the components below (covering power).
- Additives
  - Additives give the paint special properties.
  - e.g. flow improver, softener, drying accelerator, thickener.
- Solvent
  - Thins the paint and allows it to flow more freely.
  - Evaporates during drying.

Painting process and corrosion protection.

In production, painting consists of individual steps which are optimally matched to each other.

Bodywork consists almost entirely of steel panels which have been pre-coated with zinc. The zinc layer is between 5-10 µm thick and acts as the first corrosion protection layer of the steel panel.

Production sequence:

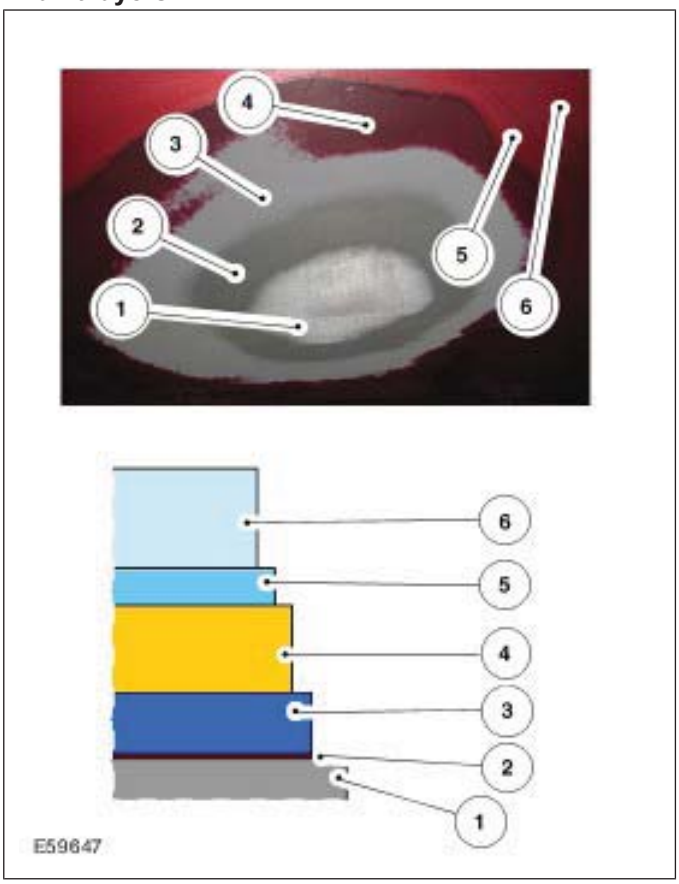
- Clean and de-grease
  - In the first step, the bare bodywork is initially dipped in a cleaning bath and cleaned with a degreasing solution.
- Phosphatising
  - The cleaned bodywork is dipped in a bath containing various phosphate salt solutions. This creates a crystalline metal-phosphate layer which offers the optimal prepared surface and also corrosion protection.
- CDP base
  - The cataphoretic dip paint (CDP) base acts as a further corrosion protection layer.
  - In this process the bodywork is completely immersed in a bath consisting of a paint and electrolyte solution.
  - By application of an electric voltage, an electric field is created.
  - Positively charged paint particles settle on the negatively charged bodywork and form a protective layer up to 20 µm thick.
  - Next the bodywork is placed in a dryer, where the CDP base is hardened at 180°C.
- Sealing, stone-chip protection
  - Edges, seams and but joints are sealer with a sealing compound.
  - Vulnerable areas are coated with stone-chip protection.
- Filler
  - Filler protects the body panels from stone impacts. Furthermore, any unevenness of the metal surface is flattened out, in order to create the most homogenous and fault-free undersurface possible.
  - Once the filler is dry, it serves as the base on which paint is applied.
- Top coat
  - The top coat is applied as a single layer or two layers of paint.
  - When working with two layer paint, in the first job step the initial colored base paint is applied. In the second job step, a clear lacquer is applied, giving the base paint shine and hardness.

DESCRIPTION AND OPERATION

The structure of an original paint finish

During construction of the original paint, a total surface thickness of between 120 and 130 µm is achieved. The thicknesses of the layers may vary however, because they are greater for horizontal surfaces than vertical ones.

Paint layers



Item	Description
1	Steel panel
2	Phosphate layer 2.9 g/m², corresponding to 2 µm.
3	Cathodic dip paint 30-35 µm
4	Filler 30-35 µm
5	Base paint 15-20 µm
6	Clear varnish 55 µm

Colored fillers applied in production

Filler which gives color is used in production. Its use makes the base paint and clear varnish unnecessary on certain vehicle interior surfaces (engine, doors).

Not every exterior paint has its own matching filler. It is more that the tones of the filler are color compatible, i.e. they have similar intensity to the top coat.

During repair painting the filler color tones must be used according to the manufacturer's instructions.

DESCRIPTION AND OPERATION

Paintwork Defects and Damage

Diagnosis and Damage Assessment

Paint concerns, regardless of their causes, are part of the everyday work in the paint shop. Correct damage assessment and determination of the cause are preconditions for a professional resolution of a paint concern.

Paint concerns can still occur through a variety of causes, despite improved paint materials and new spray methods.

NOTE: A first appraisal of the paint damage should be done before cleaning. External factors such as rust, droppings, incorrect or insufficient paint care can then be more easily detected.

Diagnosis is best done in daylight but not in direct sunlight. Exact evaluation can also be done under artificial light from special luminescent lamps.

Paint damage guide

The most important paint damage concerns which make a paint repair necessary are:

- Damage from biological paint contamination such as bird or insect droppings, tree resin and aphids.
- Chemical paint damage caused by industrial contaminants such as smoke, fuel, acids, oils.
- Mechanical damage caused by stone impact during operation, scratches in the car wash and parking.
- Damage caused by faults in treatment. Application defects such as paint runs or orange peel.
- Dirt inclusions in the paint layer, e.g. caused by dust in top coat or textile lint.
- Damage due to corrosion.

Before repair of such paint concerns, exact diagnosis must be performed to determine the cause exactly. On the spot diagnoses using simple aids and processes are often enough.

Diagnosis without disturbing the paint is done by:

- Optical inspection without visual aids, under suitable light conditions from a suitable angle and correct distance.
- Optical inspection with the help of a magnifying glass.
- pH paper.
- Measurement of the thickness using FE / NFE coating thickness meters for ferrous (FE) and non-ferrous metals and non-magnetic steel (NFE) - magnetic process on steel panels, eddy current process on non-metals.

A test method where the traces of testing can be easily removed again is the finger nail test. With suitable experience the existing hardness of the paint can be determined.

Test methods where the paint is partially destroyed are:

- Pencil hardness test.
- Adhesion test using adhesive tape.
- Lattice cut test process to check the strength of adhesion.

Under certain circumstances these test methods are not enough for a certain diagnosis. In this case, paint diagnosis under laboratory conditions must be performed.

Measuring and testing equipment for painted surfaces

Coating thickness measuring devices

Magnifying glass

pH paper (together with water)

Suitable photographic equipment with macro lens

Shine measuring equipment

Paint damage caused by environmental factors

- Bee droppings
- Bird droppings
- Insects
- Tree resin and sap
- Aphid secretions
- Tar spots
- Cement, plaster and slaked lime
- Rust film/deposits from industrial fallout
- Battery acid
- Brake fluid

DESCRIPTION AND OPERATION

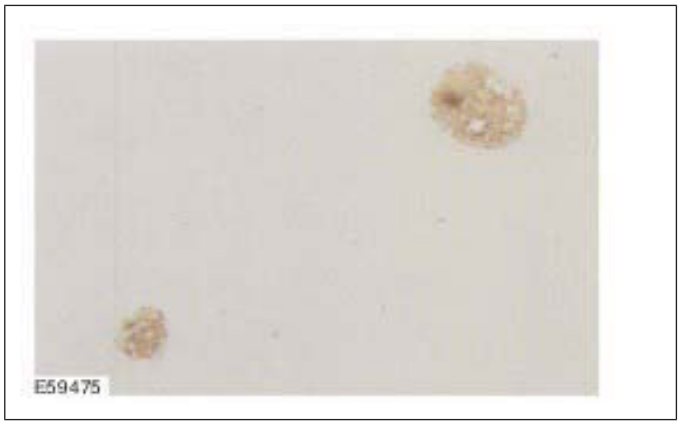
In all the cases of paint damage described below, if the damage is irreversible a new paint finish must be applied.

Paint damage cause by bee droppings

Bee droppings can be recognized on a paint surface through its yellow or brown color and sausage or drop-like shape with a diameter of 3-4 mm.

Cause/damage pattern:

- In combination with heat and high air humidity, bee droppings leave discolorations and cause paint decomposition.
- The paint can be destroyed down to the filler.



Repair of damage:

- If the damage is light, perform a polishing repair.

Paint damage caused by bird droppings

Bird dropping damage appears most often as matt, etched topcoat areas of various sizes. If left on the vehicle for a long time, crack formation and etching down to the filler will occur.

Cause/damage pattern:

- Bird droppings are particularly harmful in combination with heat and moisture. The urea (white part) has a very high salt content and is very aggressive.
- The intensity of the damage varies depending on the type, quantity, contact time and extent.
- Cracks, etching, marks up to dissolution of the top coat are the results.



Repair of damage:

- If the damage is light, perform a polishing repair.

Paint damage caused by insects

At insect impact locations on the hood, roof and bumper, small etched or etched through paint marks with partially visible spots of filler.

Cause/damage pattern:

- The top coat layer is destroyed in a short time by surface swelling and etching.
- Colliding insects stick to the paint surface. In combination with moisture and heat, because of the resulting acids the insect bodies sink into the paint top coat.
- The corrosion is G, C, U or O shaped and is only a few millimeters thick.



Repair of damage:

- Wash the vehicle, treat the affected area with insect remover. Clean the paint surface several times.
- Protect with hard wax.

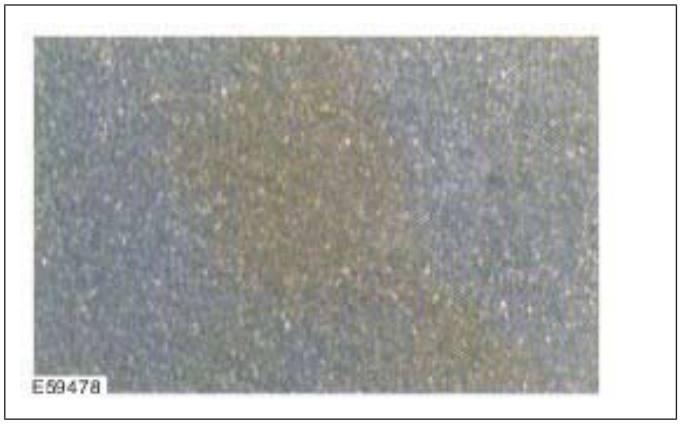
DESCRIPTION AND OPERATION

Paint damage caused by tree resin or sap

Small yellow-brown marks or drops on the horizontal parts of the vehicle. The drops melt in sunlight. Resin damage only occurs in the warm summer months.

Cause/damage pattern:

- Because of their chemical composition, tree resins combine with or adhere very well to paint top coats and cause them to swell. The higher the temperature, the more intensive is the chemical bonding between the resin and the paint topcoat surface.



Repair of damage:

- Soak several times using a cloth saturated with a petrol & paraffin mixture.

NOTE: After successful cleaning the top coat must be preserved.

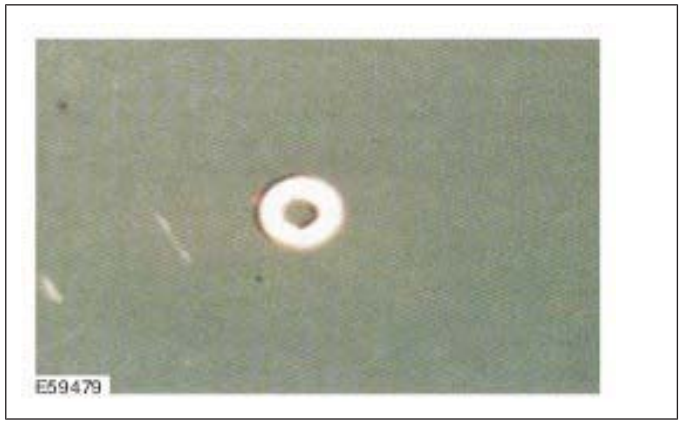
- Swellings can be removed by warming.

Paint damage from aphid secretions

Small, round, matt marks about 1 mm diameter and etching with small islands down to the filler. Fresh aphid excrement looks like small drops of honey.

Cause/damage pattern:

- Aphids produce a mixture of starch, leaf acid and sugar from sap in leaves. Under the effects of warming and moisture this can turn into alcohol.
- The round shape of the damage and the island of intact paint are typical.



Repair of damage:

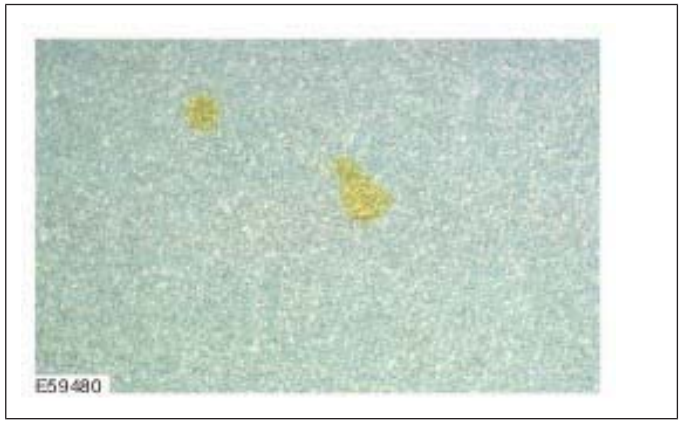
- Remove the excrement as soon as possible.
- Small single matt locations without etching can be repaired using a polishing repair.

Paint damage caused by tar spots

Yellow or dark marks.

Cause/damage pattern:

- Firmly stuck spots of tar which lead to discoloration of the surface. In some cases penetration through the clear lacquer into the top coat.



Repair of damage:

- Clean the paint surface with tar remover and polish.

Paint damage caused by cement, plaster and slaked lime

Damage appears as whitish matt marks on the top coat.

Cause/damage pattern:

- Corrosive alkaline compounds interacting with moisture.

DESCRIPTION AND OPERATION



Repair of damage:

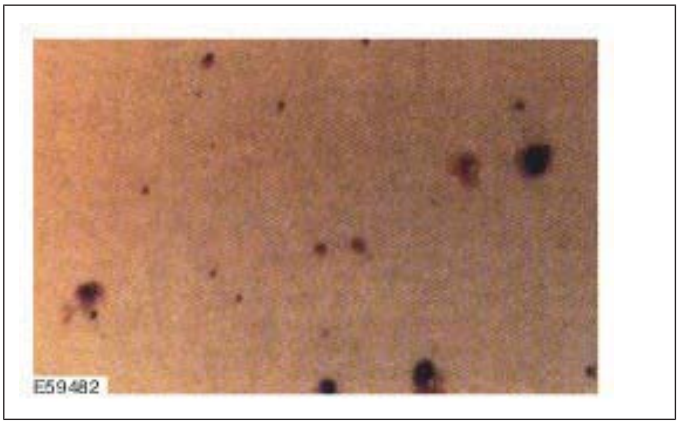
- Wash immediately if the contamination is fresh.
- If the contamination has dried on, dissolve and neutralise it with vinegar, then thoroughly wash off with water and rinse.
- Rectify mild damage using a polishing repair.

Rust film/deposits from industrial fallout

Small round marks, about 1 mm in size, in all shades from black, grey, blue to reddish, on the horizontal surfaces of the vehicle.

Cause/damage pattern:

- Deposits from oil fired systems and industrial plant, especially at high humidities and inversion weather conditions, cause damage to the paint top coat.
- As the activity time increases so called rust halos form. They spread as long as the deposits corrode.
- Industrial fallout containing iron will no longer be removable after a few days!



Repair of damage:

- Remove the dust using an industrial fallout remover and thoroughly wash.
- Polish the paint surface.

NOTE: Never try to remove the particles of industrial fallout by polishing or rubbing!

- Use cleaning dough.

Damage caused by battery acid.

Splashes of battery acid caused by carelessly topping up the battery.

WARNING: Batteries contain sulphuric acid. When working near the battery, or where there is battery acid on the vehicle body, protect the skin and eyes from contact with the acid. If battery acid contacts the skin or enters the eyes, flush the affected area immediately with water (flush for at least 15 minutes) and call a doctor without delay. If acid is swallowed, call a doctor immediately. Failure to follow these instructions may result in personal injury.

NOTE: High temperatures accelerate the attack on the top coat. At 50°C the top coat layer breaks down after about 15 minutes!

Cause/damage pattern:

- Etching of the paint layer to decomposition of the paint finish.



Repair of damage:

- Flush the acid splashes with plenty of water and neutralize with car washing liquid.
- If the contact time of the acid was short, perform a polishing repair.

Paint damage caused by brake fluid.

Careless handling of brake fluid. The glycols contained in the fluid cause swellings.

DESCRIPTION AND OPERATION

Cause/damage pattern:

- The temperature and contact time are critical. Splashes lead to loss of shine and lightening of color.



Repair of damage:

- Flush immediately with plenty of water.
- The swellings can often be made to recede completely by treatment with the radiant heater or in the paint drying oven at max. 60°C for about 1 hour.

Mechanical damage

Stone impact damage or mechanical damage

Mechanical damage caused by impact of stones or other hard objects and extending down to the metal panel lead very quickly to corrosion and rusting under the paint on the adjoining surface.

Cause/damage pattern:

- Paint damage caused from the outside, down to filler, primer or metal panel.



Repair of damage:

- Sand or blast out.
- Use anti-corrosion primer.
- Apply top coat.

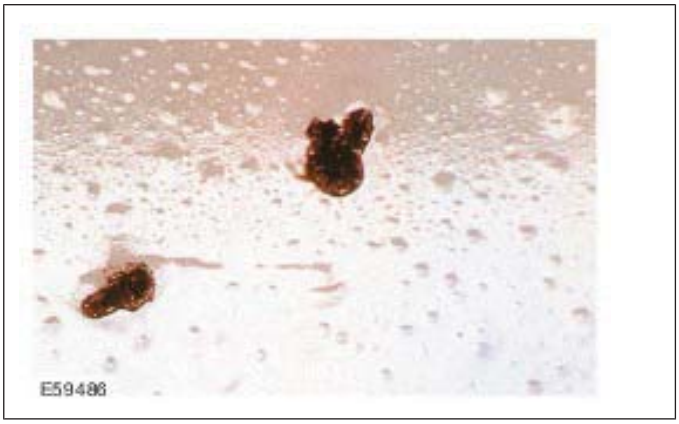
Damage due to corrosion

Blistering/rusting below

Air or water filled blister-shaped raised areas in the paint film.

Cause/damage pattern:

- Overpainting corroded steel panel.
- Condensation in the spray air.
- Sanding water not dried out or salt crystal residues.
- Road chippings and road winter grit containing salt.



Repair of damage:

- Sand the affected area of damage or the body component and re-create the paint finish.
- More severe and larger areas of rusting below must be repaired using the corresponding repair painting, Repair Level III or IV.

Damage caused by faults in treatment

- Craters
- Paint boils
- Adhesion defects
- Adhesion defects - clear lacquer
- Sanding scores
- Formation of stripes
- Peeling/blistering on plastic parts
- Blistering on polyester material
- Peroxide marks in metallic paints

DESCRIPTION AND OPERATION

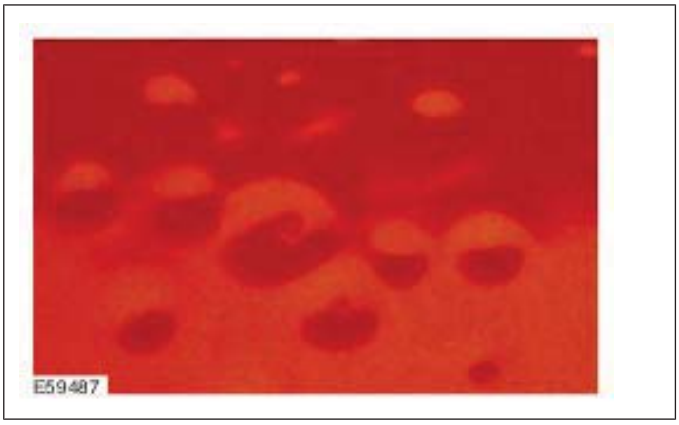
- Crack formation
- Shrinking back/zone edge marks
- Blistering
- Etching
- Paint wrinkles/puckering
- Cloud formation
- Spots/metallics
- Metamerism/color deviations
- Washing out
- Loss of gloss
- Covering ability/areas of thin paint
- Flow problems/orange peel
- Dirt embedded in metallic base paint
- Dirt embedded in top coat
- Water marks
- Paint runs
- Swirl marks

Craters

Crater-like single or extensively occurring depressions with raised edges, in top coat or the intermediate layers.

Cause/damage pattern:

- Substrate not adequately cleaned with silicone remover.
- Spray air contaminated by oil residues and water accumulations.
- Filter ceiling not adequate for requirements.
- Use of polishes, cleaning agents or sprays (e.g. interior sprays) containing silicone.
- Oil, wax, grease, silicone containing residues.
- Working clothes contaminated by materials containing silicone.



Repair of damage:

- Sand paint surface, clean with silicone remover and apply one thin spray pass. Let it begin to dry well, then apply several thin and dry sprayed passes.

Paint boils

Small, hard, closed or burst blisters in the paint top coat. They appear locally in groups or spread individually across the whole surface. Sanding opens up a larger cavity, under which the primer can often be seen.

Cause/damage pattern:

- Paint applied in layers which were too thick.
- Specified flash-off and drying times between coats were not adhered to.
- Specified working viscosity and spray pressure were not adhered to.
- Use of unsuitable hardener and thinner materials. (Solvent combinations in paint system not optimally matched).
- Poor booth conditions.



Repair of damage:

- Single boil blisters can be removed using polishing.
- After thorough drying, sand the top coat at the affected areas, clean with silicone remover and re-paint. Fill any fine pores still present with 2-component acrylic filler.
- On larger areas of damaged topcoat, sand completely away and apply new paint finish.

Adhesion defects

Whole coating detached from substrate or individual layers one from another. Sometimes

DESCRIPTION AND OPERATION

adhesion defects can only be noticed after an external influence such as stone impact.

Cause/damage pattern:

- Substrate not adequately prepared (rust, grease, moisture, sanding, cleaning).
- Unsuitable material used.
- Drying times, flash-off times too short.
- Base paint not sprayed wet-in-wet, instead the intermediate drying times were too long.
- Failure to intermediate sand.
- Condensation formed because of temperature fluctuations.
- Unprofessional preparation (especially on plastics).
- Overheated CDP/intermediate filler.



Repair of damage:

- Sand out the damage and recreate the paint finish. Create the paint finish strictly in accordance with the general technical information.

Adhesion defects in clear lacquer.

Clear lacquer detched from base paint.

Cause/damage pattern:

- Base paint layer too thick.
- Intermediate and final flash-off times of base paint too long.
- Incorrect mixture ratio clear lacquer/hardner.



Repair of damage:

- Refinish sanding and recreate the paint finish.

Sanding scores

Single or wide area clusters of scoring or sanding marks, often with raised edges. Noticeable on metallic paints as light-dark stripes.

Cause/damage pattern:

- Stopper sanded too coarsely.
- Filler sanded too coarsely.
- Filler not thoroughly dried bfore sanding.
- Old paint sanded too coarsely.
- Soft elastic substrates, e.g. TPA base, treated with thinners which was too aggressive and therefore etched.
- Top coat applied too thinly.



Repair of damage:

- If the damage pattern is minimal, after the top coat has dried fine sand the paint surface and refurbish by polishing.
- If the damage is great or on metallic paints, sand the paint surface or substrates and if necessary remove them, then cover the bare metal and re-paint.

DESCRIPTION AND OPERATION

Formation of stripes

Differing, stripe shaped color/effect formations in dark/light areas of a metallic paint finish.

Cause/damage pattern:

- Spray gun (nozzle) not perfect.
- Incorrect spray pressure.
- Thinners not suitable.
- Incorrect spray viscosity.
- Flash-off time too short.
- Unsuitable working temperature.



Repair of damage:

- Apply base paint evenly.
- Repair spray gun.
- After clear lacquer has thoroughly dried, sand surface and paint again.

Peeling/blistering on plastic parts

Paint adhesion insufficient between top coat and filler and/or primer layer. It often happens that the whole of the paint finish detaches from the plastic.

Cause/damage pattern:

- Plastic item not cleaned sufficiently, not or inadequately tempered.
- Unsuitable cleaning agent used.
- Unsuitable materials used.
- Moisture.
- Paint finish underbaked or overbaked.
- Poor or lack of intermediate sanding.



Repair of damage:

- Sand away faulty paint coats and re-apply paint finish.
- In extreme cases use a new part.

Blistering on polyester material

Color shade differences or marks in paintwork subsequently applied to previously unpainted plastic material.

Cause/damage pattern:

- Plastic material is not suitable for painting.
- Incorrect bonding agent.
- Paint used not solvent resistant.

Repair of damage:

- Repaint using suitable materials.
- Install unpainted new part (after consulting customer).

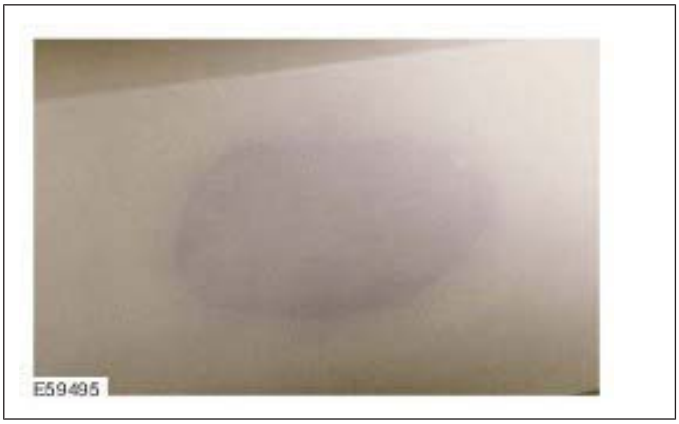
Peroxide marks in metallic paints

After longer period of drying, abnormal marks where the color shade varies.

Cause/damage pattern:

- Too much hardener added to polyester stopper (over 3% can cause this damage pattern).
- Polyester stopper not well enough mixed.

DESCRIPTION AND OPERATION



Repair of damage:

- Sand, fill with polyester or epoxide filler and re-paint.

Crack formation

Cracks of different lengths and depths running in all directions.

Cause/damage pattern:

- Layers too thick.
- Painted several times.
- Temperature fluctuations.
- Mechanical effects e.g. distortions.
- Substrate not thoroughly hardened.
- Old paint not completely dried out.
- No or insufficient hardener added.
- 2-component materials used on nitro or TPA.



Repair of damage:

- Sand away layers until sound substrate is reached and create new paint finish (prime, fill, apply topcoat).

Shrinking back/zone edge marks

Lifting or dropping in of edge zones (edges which accentuate themselves in the top coat), flow problems and loss of shine in top coat.

Cause/damage pattern:

- Old paintwork not rubbed down to a seamless transition.
- Stopper and filler on a viscoplastic base primer.
- Filler sanded and overpainted when not thoroughly hard.
- Previous materials overworked too early, substrate not sufficiently hardened.
- Primer applied in layers which were too thick, and not dried for long enough.
- Sanding paper too coarse.
- Top coat thinned too much.



Repair of damage:

- After hardening off the top coat, fine sand the surface and polish up, apply filler if necessary and paint once more.

Blistering

Small, spot-like, air-filled or water-filled blister shaped high-spots in the paint construction. Their dimensions can range from pin-head to pin-point size in a closed paint film. Arrangement and accumulation very variable. In the advanced stages, circular flaking of the paint from the substrate. These are neither boils nor corrosion.

Cause/damage pattern:

- Moisture absorption by substrate.
- Insufficient drying of the substrate after wet sanding (especially on polyester material).
- Humidity too high before painting; condensation formation because of temperature fluctuations.
- Pores/sink holes in substrate not sanded out.

DESCRIPTION AND OPERATION

- Polyester material not covered.
- Sweat from hands.
- Salts and minerals in sanding water.
- Spray air contaminated.



Repair of damage:

- Sand away damage, matt sand remainder of surface, clean with silicone remover, fill and re-paint.

Etching

The base paint is etched by the clear lacquer. This causes the aluminum pigments to change their alignments. The color of the etched base paint seems more grey than that of normal base paint. Result is that the surface structure of the clear lacquer becomes increasingly more matt.

Cause/damage pattern:

- Base painted too wet.
- No intermediate flash-off time.
- Layers too thick.



Repair of damage:

- Sand and re-paint.

Paint wrinkles/puckering

Lifting/puckering of the paint surface.

Cause/damage pattern:

- First paint not hardened through or can be etched.
- Areas of clear lacquer which were sanded through to base paint have not been not isolated with filler, or with unsuitable filler.
- Unsuitable substrate (e.g. spray can painting with TPA or nitro).
- Use of unsuitable primer, paint and thinner materials.
- Paint systems not matched to each other.
- In wet-in-wet process, specified flash-off times not adhered to.
- Synthetic resin top coat (alkyd resin) worked over too soon.



Repair of damage:

- After thorough drying, completely remove the top coat together with the attacked substrate at the affected areas and re-create a new paint finish.
- Before applying top coat, rub down the complete surface.

Cloud formation

Differing, blotchy color/effect formations in dark/light areas of a metallic paint finish.

Cause/damage pattern:

- Spray gun, spray nozzle, spray pressure not perfect.
- Varying spray viscosity, spraying method, flash-off times, spray booth temperature.
- Thinners not suitable.

DESCRIPTION AND OPERATION



Repair of damage:

- Droplet method before clear lacquer application.
- After clear lacquer has thoroughly dried, sand surface and re-paint.

Spots

Points rising up from the paint film.

Cause/damage pattern:

- Metallic base paint sprayed too dry, so that the metal particles could not incorporate into the paint. The clear lacquer could not cover these vertical standing particles because the spray air was too hot or the booth temperature was too high.



Repair of damage:

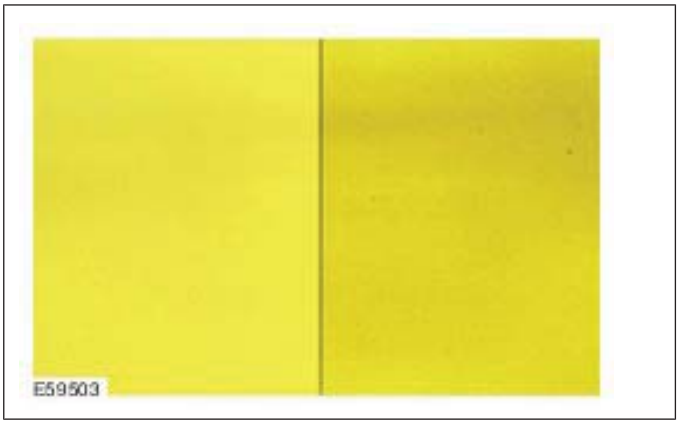
- After the paint surface has dried, lightly sand it with grade P800 sanding paper, clean with silicone remover and re-apply clear lacquer.

Metamerism/color deviations

Noticeable when identical color shades undergo a change of hue as the light source changes (daylight/artificial light). Different pigment composition between original and repair paint.

Cause/damage pattern:

- Use of paints with pigmentation which was not compatible with the standard, e.g. a green can be formulated from yellow and blue, or directly from green.
- Use of an unsuitable mixed or ready made paint to re-tone.



Repair of damage:

- Repaint using the correct paint.

Washing out

On paint which has been newly applied but not yet dried, the interaction of surface tension and very different specific gravities of the different pigments can lead to swirl-like turbulence which results in separation of the pigments.

Cause/damage pattern:

- Layer too thick, paint not stirred enough.



Repair of damage:

- Sand and re-paint.

Loss of gloss

Milky, dreary tarnishing of the paint with more or less even loss of gloss.

DESCRIPTION AND OPERATION

Cause/damage pattern:

- Cold with low air humidity.
- Heat with high air humidity.
- Substrate can be etched.
- Hardener fault or wrong hardener used.
- Paint thinned too much.
- Proportion of pigment too high because of poor stirring.
- Not optimum drying.



Repair of damage:

- After drying, remove the matt effect by polishing. If unsuccessful, rub down complete area and paint again.

Covering ability/areas of thin paint

Different color shades in the surface. The minimum layer thickness is not achieved here. The effects range from local minor shade variations through mottled spray zones to completely missing top coat.

Cause/damage pattern:

- No correct, uniform substrate (effect paint).
- On three-layer systems, wrong filler.
- Insufficient top coat application.



Repair of damage:

- Sand surface and recreate the paint finish.

Flow problems/orange peel

Surface structure bumpy, grained. The surface is similar to the peel of an orange.

Cause/damage pattern:

- Paint viscosity too high.
- Use of fast evaporating, highly volatile thinners.
- Booth temperature too high.
- Spray gun distance too great, too little material applied.
- Nozzle too large.
- Incorrect spray pressure.



Repair of damage:

- Small surfaces: fine sand and polish.
- Sand out the surface and recreate the paint finish.

Dirt embedded in metallic base paint.

Inclusions of contamination in metallic base paint, of different sizes and shapes (grains or lint).

Cause/damage pattern:

- Dust was not properly removed from the surface to be painted.
- Paint material not sieved.
- Function of the painting facilities not optimum.
- Filter contaminated.
- Wearing unsuitable clothing.

Repair of damage:

- Sand and repaint.

DESCRIPTION AND OPERATION

Dirt embedded in top coat

Inclusions of contamination in top coat or under paint layers, of different sizes and shapes (grains or lint). Optical adverse effect.

Cause/damage pattern:

- Dust was not properly removed from the surface to be painted.
- Paint material not sieved.
- Function of the painting facilities not optimum.
- Filter contaminated.
- Wearing unsuitable clothing.



Repair of damage:

- Single inclusions: after thorough hardening, sand out using 1200 - 1500 grade paper and repolish using a suitable silicone-free sanding or painting paste.
- Large area contamination: sand and repaint.

Water marks

Ring shaped marks appearing on the paint surface.

Cause/damage pattern:

- Evaporation of water droplets on freshly painted and not yet fully hardened paint finishes (mostly only found on horizontal surfaces).
- Layer too thick.
- Drying time too short.
- Hardening faults or hardener no longer useable.
- Use of unsuitable thinners.



Repair of damage:

- Rub down only slight marks with sanding paper grade P1000 - P1200 and then polish.
- For heavy marking, sand the surface matt, clean with silicone remover and repaint.

Paint runs

Wave-like paint run tracks in top coat or in an intermediate layer on vertical surfaces. Mostly in the area of swage lines, seams or openings (there they are paint runs, otherwise curtains).

Cause/damage pattern:

- Uneven paint application.
- The specified viscosity was not complied with.
- Use of unsuitable thinner materials.
- Air, material or room temperature too low.
- Layers too thick.
- Spray gun (nozzle) not perfect.



Repair of damage:

- After thorough drying, sand unevenness flat, if necessary leave to dry afterwards.
- Small areas of damage can be equalised using the paint plane, then sand, polish or repaint.

DESCRIPTION AND OPERATION

Swirl marks

Three dimensional appearance in the paint surface in the form of smears or blotches. This effect is intensified in direct sunlight.

Cause/damage pattern:

- Polishing using polishing machine on paint which has not yet hardened throughout.
- Polishing intervals too long or none at all.
- Pressure too high while polishing.
- Incorrect polishing material or polishing tool.



Repair of damage:

- Allow the paint to harden completely and then polish.
- If the damage is irreversible, rub down and apply new clear lacquer.

DESCRIPTION AND OPERATION

Tools and Equipment for Paint Repairs

General work equipment

In the repair paint shop there is a range of painting tools which make the work of the painter easier and improve the quality of the repair paintwork.

Among these are small tools which are used for the following work:

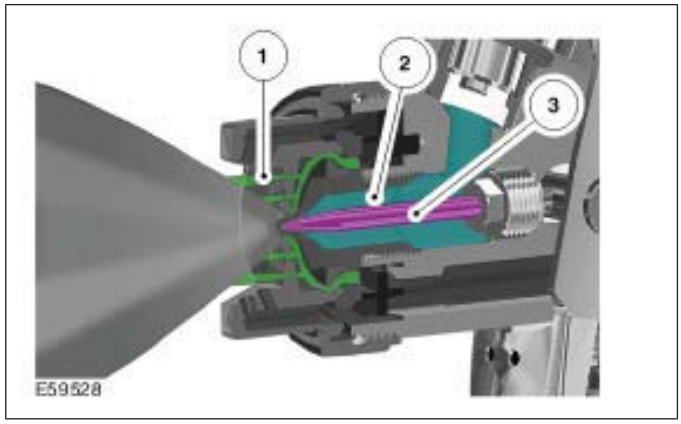
- **Measuring beakers** to measure and mix various paint materials.
- **Measuring rods** with which the required combination amounts of paint and primer filler are gauged and mixed.
- **Viscosity measuring beaker** with a calibrated opening of 4mm, used to set the correct paint viscosity.
- **Paint filter/paint sieve** for filtering foreign bodies out of mixed paint or primer. Care must be taken that the correct filter is used for each paint.
- **Color sample plates** onto which the mixed paint is applied, and the shade is then compared to that of the vehicle. Other aids which should help the painter to find the correct shade are **color sample cards** and **color panels**, which are offered by many paint manufacturers.
- **Dust bonding cloths** which are impregnated with a tacky resin and which pick up dust particles particularly well. A surface to be painted must be cleaned with a dust binding cloth immediately before paint is applied.
- **Compressed air guns** are used to remove sanding residues and to dry sanded surfaces.

Filler and spray guns

NOTE: Regular maintenance, cleaning after use and careful handling of all individual parts of the spray gun are essential for a high-quality paint finish.

The spray gun is the most important implement in the paint shop. Application of paint using the spray gun can produce a layer with absolutely constant thickness and a smooth paint surface.

Principle of operation



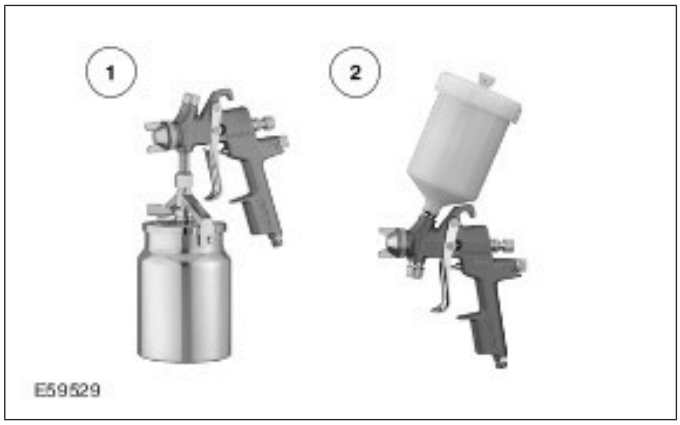
Item	Description
1	Air supply
2	Paint supply
3	Nozzle needle

Because of the construction design and with the aid of compressed air, a spray-ready paint mixture is dragged out of the container to the nozzle by the venturi effect, and is applied to the surface being worked.

When the trigger of the spray gun is pressed to the first pressure point, only the compressed air passage opens. If the trigger is pressed further, the nozzle needle displaces and the air stream drags paint with it at high speed. This produces a spray mist consisting of micro-droplets of paint.

DESCRIPTION AND OPERATION

Types of spray gun



Item	Description
1	Suction-beaker spray gun
2	Flow-beaker spray gun

In the flow-beaker spray gun, the paint container is mounted above the spray gun. On the suction-beaker spray gun, it is below.

Furthermore, spray guns are categorized by their air pressure requirement into high and low pressure guns.

High pressure guns have the disadvantage that they exhibit high consumption of energy and materials. The spray pressure they require is between 1 - 6 bar.

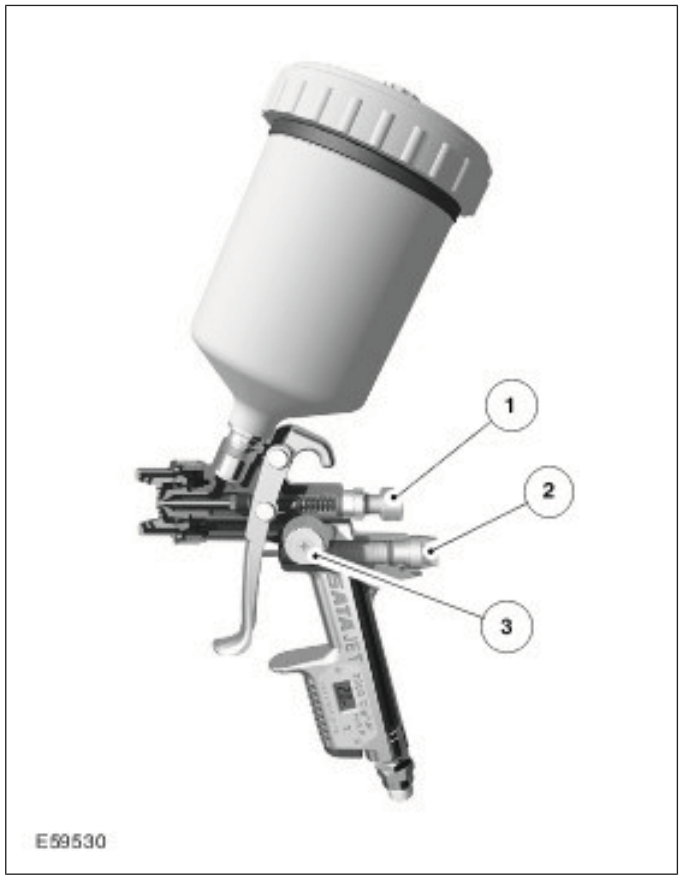
Because of the high air pressure and the large amount of air needed, the result is a powerful paint mist formation (paint transfer rate approx. 35%).

Current practice is mainly to work with reduced mist spray systems (RP and HVLP systems).

Reduced pressure (RP) guns are optimized high pressure guns which have an input pressure at the gun of approx. 2.5 bar and an atomization pressure at the air cap of 1 - 2 bar. In practice this spray technology is preferred for spraying clear lacquer because of the finer atomization.

Low pressure guns have the advantage that they exhibit minimal paint mist formation and because of this the paint transfer rate rises to approx. 65%. The spray pressure required in this case is between 1 - 5 bar. Nozzle sizes from 1 - 2.2 mm can be used.

HVLP spray guns



Item	Description
1	Quantity control
2	Working pressure control
3	Spray pattern control

The high volume low pressure (HVLP) spray gun is a high performance spray gun which forms a soft, fine and homogenous spray pattern. The atomization pressure at the air cap is 0.7 bar when the input pressure at the gun is 2.0 bar.

The low atomization pressure of 0.7 bar together with greatly reduced spray mist provide high material ejection. The low nozzle internal pressure minimizes rebound of the paint droplets from the object and thus the proportion of overspray.

This spray technology has a very high application efficiency. By matching the size of the nozzle, the HVLP spray gun can be used for all repair painting materials.

HVLP spray guns are often used in practice for the application of water based paints.

Mini spray guns are often used for small, localized touching-up work. Use of HVLP spray technology and nozzle sizes of 0.3 - 1.2 mm permits very fine

DESCRIPTION AND OPERATION

work, so that the area of the repair can be kept as small as possible.

In order to ensure that a spray gun operates efficiently for a long time, careful cleaning is absolutely vital after use.

NOTE: During cleaning you must distinguish between water based and solvent based materials.

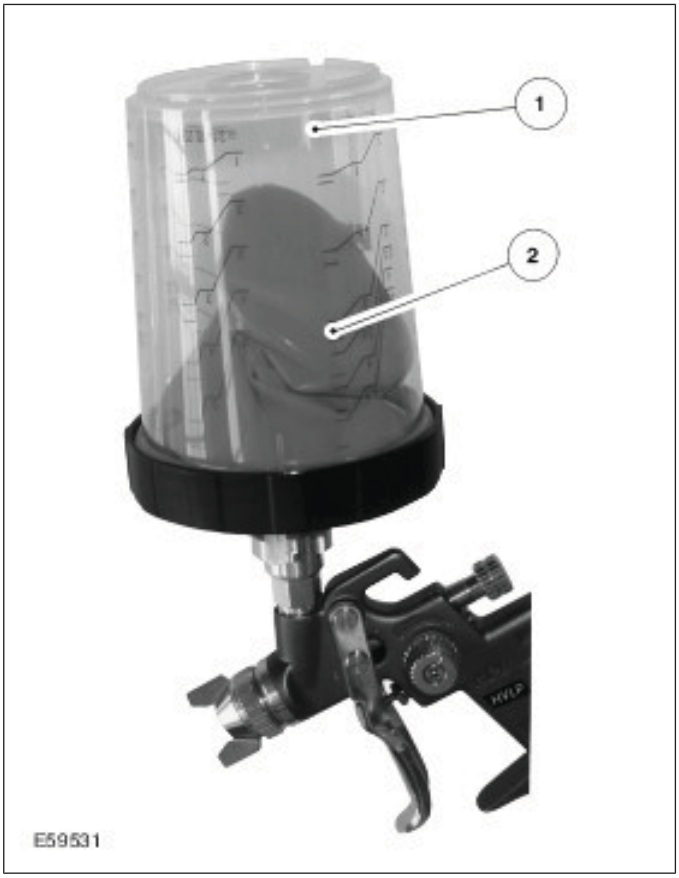
Cleaning by hand:

- Empty the paint beaker immediately after use.
- Flush the gun with cleaner.
- Clean it inside and outside with a brush.
- Dismantle the gun to clean it thoroughly.
- Clean the air cap using a suitable brush.
- Use nozzle cleaning needles to clean bores and nozzles.

A spray gun washing machine is recommended if the painting work is highly intensive.

New types of paint processing systems are replacing the conventional mixing beaker, filter and spray gun flow beaker. This reduces the amount of solvent required for cleaning and the amount of routine waste which remains.

Paint preparation system (PPS)



Item	Description
1	Beaker
2	Color bag

With this system, which is suitable for both suction and flow beaker spray guns, only one beaker is required for mixing and painting.

A bag is inserted in the beaker, in which paint can be mixed, processed and stored after use or completely disposed of.

The small quantity of paint remaining in the gun is removed using a minimum quantity of solvent from the pipette bottle.

The amount of cleaner used is reduced because only the spray gun needs to be cleaned.

Hand and machine sanding tools

Sanding is used to prepare a surface for application of a paint layer, enabling it to adhere well. Sanding materials have a great influence on the quality of a repair paint finish. The correct sanding medium must therefore be chosen for every material.

DESCRIPTION AND OPERATION

During sanding, material is mechanically removed from a surface.

In the paint shop, carborundum or silicon carbide abrasive on a substrate of paper or cloth are the most common sanding materials used.

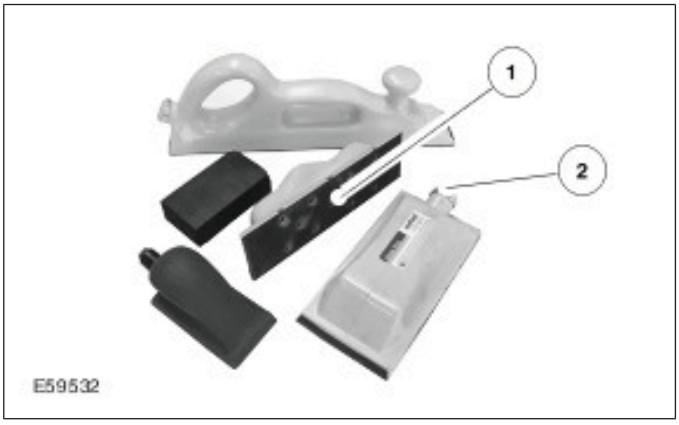
Carborundum is a very hard mineral consisting mostly of aluminum oxide. During use carborundum becomes blunt and wears away.

Silicon carbide has a very high degree of hardness, but is more brittle than carborundum. When silicon carbide is used, the mineral grains break. New long and pointed profiles are formed.

Use of the correct sanding paper depends on the application, the substrates and the tools used. The following table can be used as a guideline, but the recommendations of the supplier of the auxiliary materials and additive materials must be followed.

Application	Working area	Grade	Sanding system
Body work, corrosion damage	Equalizing paint system transition	to P150	Orbital sander, dry
			Hand sanding, dry
Stopper	Rough sand	P80 - P150	Orbital sander, dry
	Fine sand	P240 - P320	Orbital sander, dry
			Hand sanding, dry
Spray stopper	Rough sand	P120 - P180	Orbital sander, dry
	Fine sand	P240 - P320	Orbital sander, dry
			Hand sanding, dry
Filler sanding work	Filler fine sand	P400 - P500	Orbital sander, dry
		P800 - P1200	Hand sand, wet
Top coat	Old paint	P400 - P500	Orbital sand, dry
		P800 - P1200	Hand sand, wet
	Touch-up paint surfaces	P1000 - P2000	Hand sand, wet
Paint damage	Sanding out faults	P2000 - P3000	Hand sand, wet

Soft Pads are recommended for manual refinishing of contours, curves and difficult to reach areas. On a Soft Pad the abrasive is found on a coarse structured fleece. Because of this, it is very flexible, does not kink and does not slip in the hand. This enables a fine and even finish to be achieved.



Item	Description
1	Extraction bores
2	Connection for extraction equipment

Notes on working with sanding tools:

DESCRIPTION AND OPERATION

- Tools with a rigid backing pad do not adjust to fit the surface. They are used for flat surfaces.
- Tools with a flexible backing pad are used for fine sanding of a surface because they adjust to the shape of the surface.
- Build up an even working pressure over the sanding surface.
- Keep the sanding paper tight on the tool (use self-gripping systems).
- Align the extraction holes in the sanding paper with the holes in the tool.
- Guide the tool flat over the surface to be worked. Do not tilt it.

Hand sanding can be carried out dry but also wet. Wet and dry paper with particle size P 80 to P 1200 is used for this in the paint field.

Ways of sanding

Sanding tools are driven either by electricity or compressed air.



Item	Description
1	Sanding machine
2	Polishing machine
3	Orbital sander

The disadvantage of electrically driven machines is that their own weight is high compared with pneumatic systems. They also become warm during work. They do not however need any special operating equipment for their energy supply.

Sanding machines are categorized by their type of sanding movement.

Rotational sanders

On these machines the sanding paper turns.

- Advantage:
  - Ideal for heavy sanding work.
  - Fast and aggressive sanding possible.
- Disadvantage:
  - Large amount of heat developed.
  - Difficulty sanding flat surfaces.
- Application:
  - Removal of old paint layers.
  - Preparation of panel for stopper.
  - Removal of rust.

Oscillating sander

On these machines the sanding paper oscillates. The backing pad is rectangular.

- Advantage:
  - Large sanding surface.
  - Ideal for large and flat surfaces.
- Disadvantage:
  - Hardly useable on rounded surfaces.
  - Flexible backing pad not possible.
  - Vibrations because of the poor support of the backing pad.
- Application:
  - Sanding of polyester stopper.
  - Sanding processes on flat surfaces.

Orbital sander

On these machines the sanding paper turns and oscillates.

- Advantage:
  - Easy to handle and good sanding power.
  - Minimal heat development.
- Disadvantage:
  - Not suitable for sanding stopper on flat surfaces.
  - Smooth guidance important, otherwise sanding marks will occur.
- Application:
  - Sanding of paint layers.
  - Well suited for final preparation of a primer.

NOTE: Comply with the manufacturer's recommendations when setting the orbital sander.

DESCRIPTION AND OPERATION

On the orbital sander, stroke settings of approx. 3 mm for fine sanding work and approx. 5 - 7 mm for coarse sanding work have been established.

Polishing and finishing tools

The term polishing in the context of paint repairs means the elimination of paint flaws and high shine polishing of neighboring parts.

During polishing the fine sanded surface is returned to a high shine using a special abrasive polish.

Before the actual polishing, all flaws in the paint surface must be removed and the following working procedures must be adhered to:

- Thoroughly clean the vehicle.
- Remove spray mist from all surfaces.
- Sand out and polish particle inclusions.
- Sand down paint runs and polish them out.
- Examine the exactness of the color match in daylight.
- Remove masking edges.
- Remove sanding water, sanding dust and polish residues.

After the polishing process the results must be tested using a special test spray.

Infrared drying technology

The drying process in a painting/drying cabin occurs through heat conductance (convection). When an infrared dryer is used, the drying process is through heat radiation.



The infrared rays penetrate the air and the paint layer without warming them. Because the infrared rays are reflected from the steel panel, the paint coat is warmed from the inside outwards.

Advantages of infrared drying:

- The drying process occurs from the inside to the outside.
- The drying time is shorter than for warm air systems.
- Because the infrared dryer consists of several cassettes which can be switched on independently, the drying area can be optimally controlled.

Independent of the manufacturer's instructions, pay attention to the following:

- Flash-off time of the paint before switching on the infrared dryer.
- Distance between the infrared dryer and the surface.
- Duration of the irradiation.

The most common use of the infrared dryer is to dry stopper and primers. The wait time between the job steps is shortened without having to use the painting/drying cabin.

The painting/drying cabin can then be used exclusively for application and drying of topcoat.

There are two types of infrared dryer:

- Infrared dryer with short wavelength radiation.
- Infrared dryer with medium wavelength radiation.

As an indication, the following drying times are listed for some materials (at 80 cm distance):

NOTE: Observe the material manufacturer's and supplier's specifications.

- Polyester stopper 2 minutes.
- Spray stopper 2 to 7 minutes.
- Water based primer-filler 7 to 9 minutes.
- Primer 3 to 8 minutes.
- Top coat 7 to 10 minutes.

Air dryers

The air dryer is suitable in places where drying needs to be done, but without great outlay (painting/drying cabin or infrared dryer).

DESCRIPTION AND OPERATION



NOTE: Air from the compressor is often too cold for effective drying.

Air dryers use the venturi effect to blow the warm ambient air over the paint surface in a gentle air flow.

Paint mixing system

Because of the many different color variants, it is now seldom possible to store all color shades as ready-made mixtures.

For this reason, vehicle manufacturers make the mixture proportions of their paints available as color codes. The required color shade can be obtained from the paint mixing system using this color code.

All the color components are combined according to their proportions by weight using a precise computer scales to produce a finished color shade.

Painting cabin

The air requirement in a painting cabin is large. The outside air which is drawn in must be passed through filtering and warming equipment. This particularly applies during colder times of the year and especially for combined types of building where the painting cabin is also used as a drying cabin.

It is primarily used to keep the air free of dust. At the same time, explosive solvent-air mixture concentrations are prevented

NOTE: Vacuum will lead to contamination of the newly applied paint. The outside air flows through door gaps, wall joints and other openings and as it does so, brings dust deposits with it.

The air supply quantity depends on the size of the painting space and the quantity of extracted air. Enough air must be supplied to cause positive pressure in the painting space. An air extraction : air supply ratio of about 1 : 1.05 is sufficient.

The filters should have a dust-removal grade of not less than 99.8% and must always be kept clean.

It is especially important that the air supply does not cause strong air currents in the painting cabin. If not, the following problems could occur:

- Paint contamination cause by paint mist, which persists in air eddies and gradually falls on the fresh paintwork.
- Flow problems in the paint because of the high speed of the air, causing the paint to thicken very quickly on the surface.
- Loss of gloss and wrinkle formation because the surface dries too fast.
- Painter disturbance while working.

In modern paint cabins the air supply is provided from the complete surface of the ceiling. The air speed should be 0.3 m/sec (measured in the unrestricted cross-section of the spray cabin). At the same time, the air in the cabin should change about 350 times per hour.

Air extraction is best achieved through extraction channels in the floor of the painting cabin.

NOTE: Refer to the manufacturer's specifications for the operating instructions, safety instructions and notes on the maintenance of a paint cabin.

Smooth walls in the paint cabin should prevent dust deposits. Regular cleaning is necessary however.

Special easily washed adhesive-bonding paint can be applied to the walls to protect the cabin from paint mist.

DESCRIPTION AND OPERATION

Refinishing Materials

The manufacturer's instructions must always be followed when dealing with all materials! The information given in the following text is data which is independent of the manufacturer, and it should only be used as an indication.

Stopper materials

- 1-component nitro-combination stopper
- 2-component polyester stopper
- 2-component plastic stopper

Use suitable primer to protect from corrosion areas which have been sanded bare before applying stopper.

1-component nitro-combination stopper

Nitro-combination stopper has mostly been superseded by 2-component polyester stopper.

Fast drying fine stopper for the smoothing of irregularities.

The working properties of 1-component nitro-combination stopper can be improved by the addition of nitro thinners.

Drying time increases with thickness of the layer.

Application	1-component nitro-combination stopper
Layer thickness	Max. 80 µm
Drying time	up to 2 hours at 20°C
Sand	P240 - P400

2-component polyester general stopper

CAUTIONS:

Do not exceed the quantity of hardener specified by the manufacturer, excess peroxide can cause staining of the paint top coat.

Mix the stopper base and the hardener well to avoid a marble-like effect.

Check that the manufacturer permits use on the substrate to which it will be applied.

2-component polyester stopper is available in coarse and fine grades. The coarse stopper can be used for very uneven areas and surfaces and fine stopper or spray stopper should be applied afterwards.

Application	2-component polyester coarse stopper
Use	Rough equalization of unevenness
Hardener quantity	approx. 3 - 5%
Working time	approx. 4 - 6 minutes
Drying	20°C approx. 12 minutes
	Short wavelength infrared approx. 4 minutes
	Medium wavelength infrared approx. 5 - 10 minutes
Sanding tool	Eccentric, sanding disk by hand
Grade	P80 - P150

Application	2-component polyester fine stopper
Use	Equalization of unevenness
Hardener quantity	approx. 3 - 5%
Working time	approx. 4 - 6 minutes
Drying	20°C approx. 12 minutes
	Short wavelength infrared approx. 4 minutes
	Medium wavelength infrared approx. 5 - 10 minutes
Sanding tool	Eccentric, sanding disk by hand
Grade	P80 - P240

Application	2-component polyester glass fiber stopper
Use	Equalization of unevenness; blending in of vehicle extensions; repair of GRP components
Hardener quantity	approx. 3 - 5%

DESCRIPTION AND OPERATION

Application	2-component polyester glass fiber stopper
Working time	approx. 4 - 6 minutes
Drying	20°C approx. 12 minutes
	Short wavelength infrared approx. 4 minutes
	Medium wavelength infrared approx. 5 - 10 minutes
Sanding tool	Eccentric, sanding disk by hand
Grade	P80 - P150

2-component polyester fine stopper should always be applied after 2-component polyester glass fiber stopper.

Application	2-component polyester spray stopper
Use	Equalization of unevenness
Hardener quantity	approx. 3 - 5%
Working time	approx. 25 - 30 minutes
Layer thickness	200 µm or 4 - 8 spray passes
Drying	20°C approx. 3 hours
	Short wavelength infrared approx. 10 minutes
	Medium wavelength infrared approx. 15 - 20 minutes
Sanding tool	Eccentric, sanding disk by hand
Grade	P80 - P150; fine sand - P280

Application	2-component plastic stopper for flexible thermoplastic
Use	Equalization of scratches or unevenness
Hardener quantity	approx. 3 - 5%
Working time	approx. 25 - 30 minutes
Drying	20°C approx. 15 - 30 minutes

Application	2-component plastic stopper for flexible thermoplastic
	60°C approx. 15 min
	(Short wavelength infrared approx. 8 minutes)*
	(Medium wavelength infrared approx. 8-10 minutes)*
Sanding tool	Eccentric, sanding disk by hand
Grade	P80 - P150; fine sand - P280

***Infrared drying may adversely affect adhesion, therefore check the manufacturer's instructions.**

Plastic stopper has a very great tendency to shrink back, so that the edge of the stopper repair becomes visible.

Plastic stoppers are flexible and universally applicable on all types of plastic (except for pure PE and PP, these are plastics which cannot be painted). The manufacturer's instructions must be very exactly followed in order that no adhesion problems occur. A special plastic etch primer is specified for some materials.

Primers

Application	1-component primer
Use	Isolation of bare sanded areas.
Spray gun	HVLP 1.3 mm
Spray pressure	2.0 bar
Drying	20°C approx. 15 - 20 minutes
	60°C approx. 10 min
Coat application	Wet on wet, no intermediate sanding

Application	2-component primer
Use	Corrosion protection and bonding agent (steel sheet, zinc coated steel sheet, aluminum)

DESCRIPTION AND OPERATION

Application	2-component primer
Spray gun	HVLP 1.3 mm
Spray pressure	2.0 bar
Drying	20°C approx. 15 - 20 minutes
	60°C approx. 10 min
Coat application	Wet on wet, no intermediate sanding

HS primer filler and HS tinted filler

Note:

- Primer filler is available as 1-component and 2-component water based and solvent based forms.
- 1-component products are only suitable for isolation of sanded through bare areas and new painting.
- Water based products are also used for the skinning of thermoplastics and substrates which are sensitive to solvents.
- Tinted fillers can be individually matched to the top coat color and therefore find uses in effect paints and paints with poor covering power.
- Use dry sand or wet sand filler according to application in order to avoid unnecessary sanding work.
- On critical substrates the use of epoxy resin base filler is recommended in order to avoid adhesion problems.

Application	HS primer filler and HS tinted filler
Use	Equalization of unevenness, edge zones, sanding scores
Spray gun	HVLP 1.6 - 1.9 mm
Spray pressure	2.0 bar
Layer thickness	50 - 70 µm to 150 µm possible
Drying	20°C approx. 2.5 hours
	(60°C approx. 25 min)*
	(Short wavelength infrared approx. 8 minutes)*

Application	HS primer filler and HS tinted filler
	(Medium wavelength infrared approx. 10-15 minutes)*
Coat application	Wet on wet, no intermediate sanding

***In order to avoid boiling out, drying should be performed slowly.**

Paint

The base and the clear lacquer must be matched to one another.

Application	Water based paint
Use	Two layer metallic effect paint and Uni-paint finishes
Spray viscosity	At 20°C 18 - 20 s
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 bar
Layer thickness	15 - 20 µm
Drying	20°C approx. 2.5 hours
	60°C approx. 25 min
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes
Coat application	Wet on wet
Ventilation time	approx. 5 minutes

The base paint must be dried matt before the clear lacquer is applied.

Application	2-component HS clear lacquer
Use	Gloss providing protective coat for base coat substrate
Spray viscosity	At 20°C 18 - 20 s
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 bar
Layer thickness	50 - 70 µm

DESCRIPTION AND OPERATION

Application	2-component HS clear lacquer
Drying	20°C approx. 10 hours
	60°C approx. 30 min
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

Application	2K HS Uni top coat
Use	Color and gloss providing paint layer
Spray viscosity	At 20°C 20 - 22 s
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 bar - 3.0 bar
Layer thickness	50 - 70 µm
Drying	20°C approx. 8 hours
	60°C approx. 30 min
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 -15 minutes

DESCRIPTION AND OPERATION

Additional Materials

The manufacturer's instructions must always be followed when dealing with any materials!
The information given in the following text is data which is independent of the manufacturer, and it should only used as an indication.

Adhesive sealants

Adhesive sealants are permanently elastic, long-lived, can be painted and accept filler.

Application: Sealing of visible and normal seams.

Can be over-painted with 2-component paint, primer and fillers after having dried throughout.

Contamination can be removed using cleaner and thinner.

1-component PUR adhesive sealant

Note:

- Hardens using oxygen from the air. For that reason, it must only be stripped after it has completely dried through.

2-component MS polymer adhesive sealant

2-component MS polymer adhesive sealant is free of isocyanate, solvent and silicones and can be spot-welded.

MS polymer adhesive sealant

Can be over painted with water-based paints.

Suitable for spraying and brushing to obtain a composition true to the original.

MS polymer adhesive sealant is free of isocyanate, solvent and silicones and can be spot-welded.

Underbody protection

Underbody protection products are immune to abrasion, permanently elastic, adhere well and are suitable for a true to original texture.

Underbody protection based on solvent

Application:

- Underbody protection for visible areas.

Properties:

- Can be over-painted, also with 2-component paint.
- Can be colored with a proportion of up to 40% paint.

Note:

- Contamination can be removed using cleaner and thinner.

Water based underbody protection

Can be over-painted with water based paint.

Can be colored with water based paint.

Contamination can be removed using water.

Application	Water based underbody protection
Use	**Underbody protection** for visible areas
Spray viscosity	ready to use
Spray gun	Suction beaker HVLP gun 3 - 4 mm
Spray pressure	4 - 6 bar
Layer thickness	500 - 1000 µm
Drying	approx. 6 hours at 20°C
	approx. 45 - 60 minutes at 60°C
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

Application	Water based underbody protection
Use	**Isolation primer** for peroxide marks, bloomed old paintwork and thermo-plastics.

DESCRIPTION AND OPERATION

Application	Water based underbody protection
Spray viscosity	Thin as necessary with distilled water
Spray gun	HVLP gun 1.9 mm
Spray pressure	2.0 - 3.0 bar
Layer thickness	40 - 50 µm
Drying	approx. 2 hours at 20°C
	approx. 30 minutes at 60°C
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

Paint additives

Application	Sanding test color
Use	To test sanding results
Spray gun	HVLP 1.7 - 1.9 mm
Spray pressure	2.0 bar
Layer thickness	Spray drifted

Application	Fixer additive
Use	Converts solid top coat into two layer solid; multi-color painting
Spray viscosity	18 - 20 secs at 20°C
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 - 3.0 bar
Layer thickness	max. 30 µm
Coat application	Wet on wet
Ventilation time	approx. 15 - 30 minutes

Maintain maximum layer thickness without fail.

Must always next be overpainted with clear lacquer.

Application	Drying accelerator
Use	Accelerates drying with only minimal reduction in working life
Working life	approx. 5 hours at 20°C

Application	Drying accelerator
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 bar
Layer thickness	50 - 70 µm
Drying	approx. 6 hours at 20°C
	approx. 25 minutes at 60°C
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

Cannot be used in all paints, read the manufacturer's instructions.

Particularly suitable for partial painting.

Application	Elastifier additive in primer material
Use	Elastifies the complete paint structure on plastics.
Addition	Up to 25%
Spray gun	HVLP 1.7 - 1.9 mm
Spray pressure	2.0 - 3.0 bar
Layer thickness	50 µm
Drying	approx. 4 hours at 20°C
	approx. 40 minutes at 60°C
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

Application	Elastifier additive in top coat
Use	Elastifies the complete paint structure on plastics.
Addition	Up to 25%
Spray gun	HVLP 1.7 - 1.9 mm
Spray pressure	2.0 - 3.0 bar
Layer thickness	50 - 60 µm

DESCRIPTION AND OPERATION

Application	Elastifier additive in top coat
Drying	approx. 16 hours at 20°C
	approx. 45 minutes at 60°C
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

Application	Matting additive in solid paint
Use	Elastifies the complete paint structure on plastics.
Semi-gloss addition	Up to 25% in the paint without hardener and thinner
Silk gloss addition	Up to 35% in the paint without hardener and thinner
Silk matt addition	Up to 45% in the paint without hardener and thinner
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 - 3.0 bar
Layer thickness	50 - 70 µm
Drying	approx. 8 hours at 20°C
	approx. 30 minutes at 60°C
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

CAUTION: Do not dry using infrared.

Application	Matting additive in clear lacquer
Use	Elastifies the complete paint structure on plastics.
Semi-gloss addition	Up to 25% in the paint without hardener and thinner
Silk gloss addition	Up to 35% in the paint without hardener and thinner
Silk matt addition	Up to 45% in the paint without hardener and thinner
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 - 3.0 bar
Layer thickness	50 - 70 µm
Drying	approx. 8 hours at 20°C
	approx. 30 minutes at 60°C

Note:

- When mixing, first put in the matting additive, then the hardener and thinners.
- Stir immediately after adding the matting additive.
- Do not store after addition of the matting additive, storage will change the degree of gloss.
- Also suitable for use on plastics without addition of elastifier additive.

Application	Matting paste
Use	Matts, elasticizes and gives structure to solid paint and clear lacquer during painting of bumpers or hard plastic.
Addition	1:1 or 2:1 depending on manufacturer in solid paint without hardener or thinners.
Spray gun	HVLP 1.2 - 1.3 mm
Spray pressure	2.0 - 3.0 bar
Layer thickness	50 - 70 µm
Drying	approx. 6 - 10 hours at 20°C
	approx. 30 minutes at 60°C

DESCRIPTION AND OPERATION

Application	Matting paste
	Short wavelength infrared approx. 8 minutes
	Medium wavelength infrared approx. 10 - 15 minutes

Note:

- **The paint must not be filtered.**

Application	Anti-silicone additive
Use	Prevents silicone craters
Addition	2% to maximum 5%

Note:

- Only add away from the paint cabin and immediately remove contaminated cloths.
- If anti-silicone additive is used in the first coat, then it must be used in the following coats, and in at least the same proportions.

Additive materials

Variety of adhesive tapes

For profile, fine and large area masking work.

Properties:

- Withstands heat.
- Withstands water-based paint.
- Accepts paint.
- Easily removed without leaving adhesive residues.

Masking film.

For masking of large areas on vehicles.

Properties:

- Accepts 2-component and water-based paints.
- Withstands heat.
- Withstands water spray and condensation.
- Withstands solvent.
- Easily cut.
- Environmentally friendly and can be recycled.

Polishing materials.

Polishing means microfine sanding. For this reason, polishes must only contain abrasives, and no silicones.

During polishing repair, a good shine is achieved through the step-by-step use of polishes, starting with a highly abrasive polish and ending with a polish having very slight abrasive action.

Polishes are available in graduations from coarse to fine.

Abrasives

Please refer to the "Tools" chapter for information on abrasives.

DESCRIPTION AND OPERATION

Paint Repairs

General information

There is a great difference between painting in production and repair painting.

In production, only the bodyshell is painted, it has no trim, upholstery or assemblies. Because of this, other paints, tools and processing techniques can be used.

In contrast to that used in production, paint used in the workshop must dry at low temperatures. Plastics and the vehicle electronics must not be subjected to temperatures greater than 70°C.

The painting process in the case of repair work consists of two phases:

- Pre-treatment of the surface for corrosion protection and the smoothing of irregularities.
- Top coat application.

The precondition for a professional paint finish on a vehicle is the permanently maintained cleanliness of work spaces, tools and equipment,

Original materials must be worked according to the manufacturer's instructions, so that no problems arise in the processing nor during drying.

The room temperature must be 20 - 25°C and the humidity must be low. Temperatures which are too low or too high can lead to porosity, poor flow and boiling. High humidity leads to paint damage such as tarnishing of the paint film (matt film), adhesion problems and craters.

Pre-treatment of the surface

Perfect preparation of the subsurface is the precondition for a brilliant paintwork result. Faults in the preliminary stages delay completion and cause unnecessary extra work. The working steps described here demonstrate how important it is to follow these instructions step by step.

NOTE: Thorough cleaning of the vehicle and especially of the area being repaired is particularly important because of the danger of contamination of the paint.

Clean the area of the damage



Clean the damaged surface thoroughly, to allow the extent of the damage to be seen. Use silicone remover to produce a grease-free surface.

NOTE: The treated surface must be rubbed with a clean dry cloth before the solvent evaporates, otherwise there will be no cleaning effect.

Effective de-greasing is important not only before the application of paint, but also before all sanding stages, for two reasons:

- During sanding of grease contaminated surfaces, globules may form with the sanding dust. Sanding marks will occur and the sanding medium quickly becomes unuseable.
- Oil and grease are embedded by the action of the abrasive particles, and are then very difficult to remove.

Establish the area of damage and the repair stages. In doing so, establish how much disassembly work must be undertaken. Perform a color test at this stage.

Mask off the area of the repair ready for preparatory work.

Sand out the damage location



DESCRIPTION AND OPERATION

When sanding, produce smooth transitions from the painted area to the bare metal.

Use an eccentric sander and P80 or P120 abrasive sheets. Finish off sanding with P150 or P180. The remaining adhering sanding dust must be completely removed.

Cleaning, de-greasing



Use silicone remover to thoroughly clean the surface in order to remove grease residues, sweat from the hands and other contamination.

NOTE: Use a solvent test to establish whether the old paint can be etched. Apply 2-component thinners to the damaged area using a clean cloth and rub lightly for about 1 minute. If the subsurfaces can be etched away, special pre-treatment is necessary. See "Tips and Tricks"

Apply primer filler



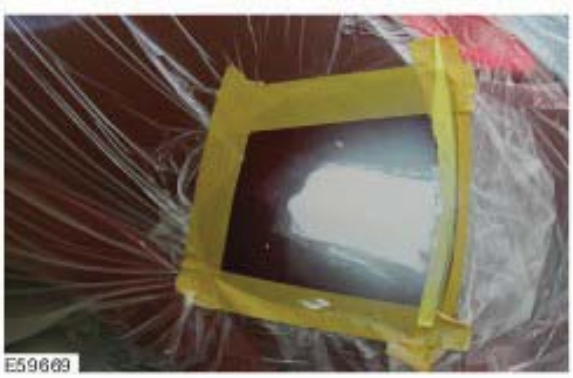
Before applying stopper, apply primer to the sanded and bare surface.

Allow the primer to dry and then lightly sand by hand using P220 - P400 dry.

NOTE: Most stopper can be applied directly to bare metal. But application of a primer filler provides better corrosion protection.

NOTE: Avoid sanding through to the bare metal. Points which are sanded through must be retreated with primer filler.

Stopper application



Pre-sand the hardened stopper using an eccentric sander and P80 dry, then final-sand using P120 - P140 dry. Clean the sanded surface using silicone remover.

Apply 2-component stopper to the filled surface. The stopper compound must only be applied thinly.

NOTE: Use of a testing powder is recommended so that the sanding process can be more easily checked.

Apply filler



Filler can now be applied to the dried repair area. Choose the correctly toned filler according to the manufacturer's instructions.

NOTE: Alternatively, filler with the correct tone can be mixed with the aid of colour matching cards.

DESCRIPTION AND OPERATION

Sand the filler.



The working area is expanded by applying new masking. This makes it possible to even out the transition from the damage area to the vehicle paintwork.

NOTE: The primer filler must be carefully sanded. Faults in the primer filler layer will be visible in the top coat.

The sanding process consists of two stages. Coarse sanding levels out the surface of the filler primer. Fine sanding ensures the necessary surface structure which allows the top coat to adhere well and cover sanding marks.

Sand the filler using the eccentric sander and P400 - P500 used dry. Clean the sanded filler finished surface using silicone remover.

The painted area is matted using a fine matting sponge, and then thoroughly cleaned.

Surface ready for paint



The surface which has been repaired and then prepared according to the manufacturer's instructions is now ready for basic paint application.

Top coat application

It is important for a good paint result that the recommended process data is adhered to, i.e. mixture proportions, layer thickness, viscosity, drying time etc.

First of all the work area is carefully masked ready for paint application. The correct adhesive materials and techniques must be used so that no hard transitions and edges are created during painting.

NOTE: The chapter "Tips and Tricks" gives in-depth information on masking work.

Thoroughly check the surface once more and rub-off with a dust-bonding cloth.

NOTE: Once more check the paint material and that the spray gun is correctly adjusted before applying the paint.

Paint application



The base paint is applied in two or three steps. First of all only the repair area is painted with the first paint application.

Flash off



Allow the paint application to flash off until the surface has a matt appearance. So that the transition to the original paint is optimally created, the next paint application is applied to a wider area.

After the base paint has dried for the specified time, the clear lacquer is applied. Next the transitions to the original paintwork are treated with fade-out

DESCRIPTION AND OPERATION

remover. This removes the spray mist and forms an ideal paint surface.

Repair stages for repair painting

The required time and material data is divided into four painting levels for calculations concerning repair painting. Proceed according to these divisions for every calculation.

Level 1 - Painting of new components

On new components, all inner surfaces, seams and edges which will no longer be seen after assembly must be primed and pre-painted.

NOTE: The cathodic dip primer must not be sanded away. Cleaning with silicone remover or light sanding of the primer is all that is required.

Job steps:

- Wash off, prime and pre-paint inner surfaces, seams and edges which cannot be reached at all or only partly after the component is installed.
- Sand new component with P280 - P320 or a fine sanding pad.
- Clean subsurface with silicone remover.
- Carry out masking work (when painting an installed component).
- Apply one spray run of filler, dry.
- Sand the filler. P1200 wet or P500 dry.
- Clean filler application with silicone remover.

Then the prepared surface can be painted with solid or 2-component paint.

If the new part has mild transport damage, this must be rectified beforehand.

To do so, add the following steps:

- Grind out the scratch.
- Finely sand the surrounding surfaces.
- Use a steel cleaning agent to thoroughly clean and then rub dry.
- Apply corrosion protection primer to the bare areas.

Level II - Top surface painting (color tone matching)

Complete bodywork surfaces which are to be painted without the need to apply stopper belong to this group. In addition, surfaces with faults in the top coat surface which cannot be removed by polishing.

The following faults are included:

- Loss of gloss.
- Sanding scores.
- Heavy paint runs.
- Large dust and dirt inclusions.

The scope of the work is as follows:

- Sand the surface.
- Sand out paint damage and faults.
- Treatment of small areas which have been sanded through.
- Masking work (when painting an installed component).
- Apply top coat according to the painting process (one or several coat process).
- Dry the top coat and perform finishing work.

Level III - Repair painting with stopper applied to up to 50% of the surface.

If in addition to painting, work with stopper application must be performed, then the repair levels III or IV must be used.

In repair level III, apart from painting the complete bodywork surface, partial stopper work is carried out on up to 50% of the surface to be painted. The necessary primer and filler work are also included.

The following damage must be rectified in this level:

- Slight panel unevenness.
- Damage due to corrosion.
- Dented body surfaces.
- Weld locations.
- Deep scores or scratches.

The scope of the work is as follows:

- Fine sand pre-treated bodywork surfaces (e.g. lead-loaded areas).
- Sand out existing damage.
- Perform all necessary masking operations on the vehicle.
- Apply primer.
- Partial stopper application on up to 50% of the surface to be painted (two to a maximum of three stopper applications).
- Fill the repair area.
- Apply stone chip protection (when present in production).
- Apply top coat according to the painting process (one or several coat process).
- Dry the top coat and perform finishing work.

DESCRIPTION AND OPERATION

Level IV - Repair painting with stopper applied to more than 50% of the surface.

In repair level IV, apart from painting the complete bodywork surface, partial stopper work is carried out on more than 50% of the surface to be painted. The necessary primer and filler work are also included.

The following damage must be rectified in this level:

- Damage due to hail.
- More extensive stone chip damage.
- Extensively dented body panels.
- Sectional repairs with large weld seams.
- Surfaces with severe corrosion damage.

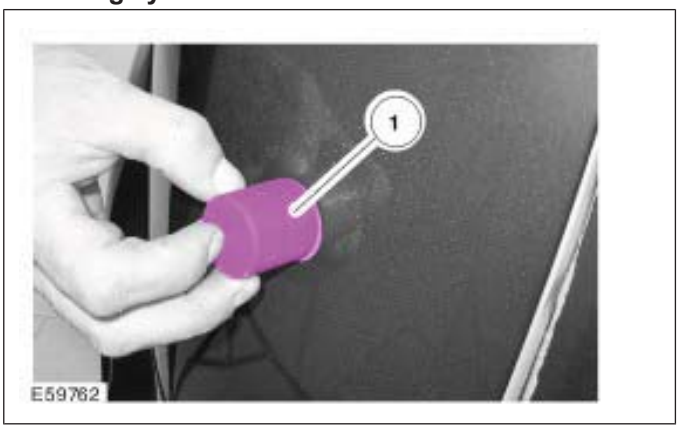
The scope of the work is different to level III because of the partial application of stopper to more than 50% of the area to be painted. In addition, more extensive sanding work is usually required.

Polish

In order to achieve faultless quality, it is sometimes necessary afterwards to polish a newly painted surface.

Even after the most careful painting, it sometimes happens that dirt inclusions and paint runs occur in work with top coat or clear lacquer. Before polishing, such paint faults must be removed with the sanding cylinder ("Finiball") and hand sanding or eccentric sander in a wet sanding process.

Sanding cylinder



The special sanding compound **-1-** (sanding bloom) for the sanding cylinder is self-adhering and available in grades from P1000 to P2500.

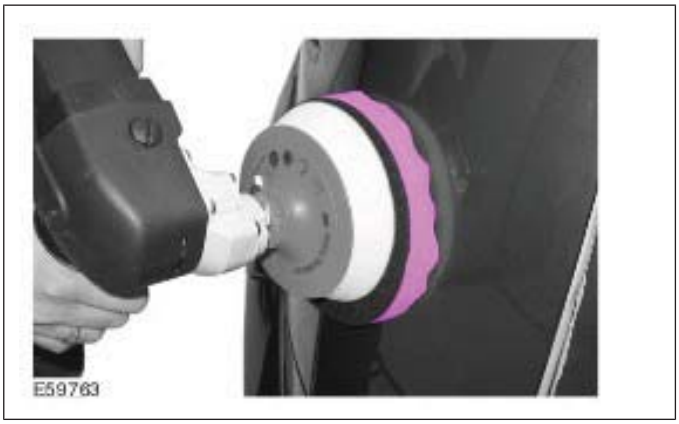
- P1000 - P1500 for pre-sanding of runs and large imperfections in the paint.
- P1500 - P3000 for subsequent sanding of runs and sanding out of dust inclusions.

A small eccentric sander can be used for more extensive working areas. When doing so, first of all put the eccentric sander in place and then switch it on, so that the danger of sanding through on edge is reduced.

Finally polish the sanded area to a high gloss with suitable polish. To this end the various manufacturers recommend materials and process techniques which are specially suited to their products.

NOTE: The polishing is to be done in the same way as that used to remove swirl marks.

Polish



NOTE: Before using the nap sponge for the first time and after any long pauses in working, dampen the nap sponge with polish.

Job steps:

- Clean and degrease the area to be polished using silicone remover.
- Apply the polish to the polishing disc and spread it.
- Place the polishing machine down flat on the area to be polished and before switching it on, gently distribute the polish over the underlying surface.
- Polish out the location for 10 - 15 seconds with the edge, working with a criss-cross motion.
- Subsequently polish the location for about 10 seconds with the machine laid down flat.
- Wash off and clean the polished location using the professional polishing cloth and then clean the polished surface.
- It is absolutely vital to carry out a visual check after finishing the polishing procedure. If any swirl marks are not completely removed by the first polishing procedure, then process must be repeated.

DESCRIPTION AND OPERATION

Aids

Cleaning putty

Cleaning putty allows deposits on the paint surface to be removed easily and gently. The following paint faults can be removed using cleaning putty:

- Metal deposits and iron dust.
- Paint or color mist.
- Tree resin and tar.
- Insect residues.

The surface to be worked must be thoroughly cleaned before the cleaning putty can be applied. Then the surface is sprayed with soapy water. Now the cleaning putty can be slid over the surface until all unevenness is removed.

DESCRIPTION AND OPERATION

Painting Plastic Parts

General

Although these days plastics can be produced in all colors and with a matt or gloss surface, painting is often necessary.

NOTE: Manufacturer's limitations concerning the feasibility of painting certain components must always be observed.

Reasons in favor of applying paint to plastic are:

- Individual coloring, matching the body paint.
- More gloss and color brilliance through painting.
- Removal of production imperfections.
- Protection from atmospheric exposure.

Nowadays painting plastic presents no problems because the materials are known and matched to the paint. In order that the painter can use the correct painting materials, the type of plastic must first be correctly determined.

To allow this, plastics are marked on the rear in accordance with the recommendations of the Association of Vehicle Manufacturers.

Once the type of plastic is determined it is an easy matter to assign special paint recommendations, matched to that particular plastic. Unmarked plastics require knowledge of materials so that a correct choice of paint materials can be made and the component can be reliably painted.

Plastic groups

Thermoplastics

When warmed these undergo a reversible transformation into a plastic deformable state and once cooled they maintain their shape. They consist of string-like (linear) or only slightly branched molecular chains.

Thermosets

Thermosets are hard and have the form of a close-meshed network in all directions. They do not undergo plastic deformation, are especially resistant to chemicals, are difficult to swell and are insoluble. At normal temperatures they are hard to brittle. At first the material does not undergo any change when heated, but when it reaches a critical point, the thermoset is totally destroyed.

Elastomers

Elastomers are characterized by high elasticity over a wide temperature range. They have properties like rubber or a sponge and after compression or distension they return to their original state.

Types of plastic

The plastics used in the automotive area:

- ABS - Acrylonitrile butadiene styrene (polymer)
- PA - Polyamide
- PC - Polycarbonate
- PE - Polyethylene
- PP - Polypropylene
- PP/EPDM - Polypropylene/ethylene propylene diene copolymer
- PC/PBT - Polycarbonate/Polybutylene terephthalate
- PBT/PC - Polybutylene terephthalate/Polycarbonate
- PUR - Polyurethane
- GRP - Glass reinforced plastic

NOTE: PE and PP are plastics which cannot be painted, or can only be painted using special techniques.

As well as the pure plastics, so-called 'blends' are also used. This means combinations of different plastics. If we were dealing with metals they would be called alloys.

Plastic identification

Normally the identifier is marked on the plastic components used in vehicle construction.

One method to determine the plastic group is the sanding test. In this a place is chosen which will not be visible later, and the finger belt sander is used to sand the plastic.

The plastic group can be determined using the pattern left by the sanding and the dust:

- Thermosets produce a white dust.
- Thermoplastics smear and do not produce dust.

The plastic group can be determined by a sound test:

DESCRIPTION AND OPERATION

- Degree of hardness - the higher-pitched the sound, the harder the plastic.
- Elasticity - the more muffled the sound, the higher the elasticity of the plastic.

Cleaning plastic

Plastic components are manufactured using complicated moulds and presses or other highly engineered tools, mostly using an injection moulding process or reactive injection moulding process.

In order to be able to remove the component from a particular tool, a separating agent is used, which in some cases adheres very strongly to the plastic.

This separating agent on the plastic components must be completely removed before any surface coating is applied.

Warm storage (tempering) before actual cleaning brings the following advantages:

- The separating agent sweats out of the plastic.
- Tensions in the plastic are released.
- Air inclusions can be recognized and removed.

Intensively clean the item several times using a pad and fresh cleaning agent.

NOTE: A single wipe, even with cleaning agent, is not usually sufficient in most cases. Clean textured components with the aid of a soft brush.

After cleaning, it is absolutely vital that cleaning agent absorbed by the plastic should be expelled by tempering again. If the ventilation is good and the room temperature is about 20°C the solvent can be evaporated away by overnight storage.

Painting new components

It is absolutely vital that the substrate of an unpainted new component is free of separating agent. Paint can only be applied directly to very few plastics. The plastic must first be identified exactly and then worked with a repair system which is matched to the type of plastic. In most cases a plastic etch primer must be applied as adhesion base to all plastics which can be painted.

NOTE: Plastics have a tendency to become electrostatically charged. This can easily cause contamination during painting. Special antistatic cleaning cloths prevent electrostatic charging.

Work process for thermoplastics:

- Thoroughly clean the surface.
- Temper the plastic.
- Afterwards clean with antistatic cleaner or antistatic cloths.
- Apply the bonding agent.
- Apply elastic filler. After it has dried, sand and clean.
- Apply one coat Uni-paint with elasticizer additive. For two layer painting the elasticizer additive is in the clear lacquer.

NOTE: Follow the paint manufacturer's guidelines during all work.

Work process for thermosets:

- As a rule, thermosets can be handled in the same way as normal body components.

Work process for PUR soft foam:

- The work process is the same as for thermoplastic.
- Instead of using bonding agent, a filler wash is applied to close the pores of the PUR soft foam.

The primer which has been applied to a primed new component can vary greatly. If no manufacturer's data is available, the composition and suitability for further working must be tested.

Painted components with an already ascertained and intact paint coat present no problems for possible repainting. After sanding and careful cleaning with plastic cleaner or thinners, painting can be done directly.

Unknown primer

When dealing with unknown substrates it is important to carry out an adhesion test on the existing paint before any repainting is attempted. First of all a mechanical test must be carried out, for instance using a lattice cut and tear-off band. If the adhesion of the old paint is not acceptable, it must be mechanically removed and new paint finish applied.

If the adhesion is acceptable, then an etch test is performed using 2-component thinners. If no etching can be detected in this test, application of the the paint finish can be started directly. Otherwise the old paint must be removed and a new paint finish created.

With the help of universal or special plastic primers and with only a few materials complementary to those previously present anyway, the painter can now apply a long-lasting paint finish to all popular vehicle attachments made of plastic.

DESCRIPTION AND OPERATION

Paint faults on plastic substrates

NOTE: Paint faults are fully described in the chapter Paint Defects and Damage.

The most common paint faults which can occur when painting plastic components and the methods of repair are briefly described.

Discoloration

Cause/damage pattern:
- Plastic material is not suitable for painting.
- Incorrect bonding agent.
- Paint used not solvent resistant.

Repair of damage:
- Repaint using suitable materials.
- Install a new unpainted component.

Softening

Cause/damage pattern:
- Substrate not carefully cleaned.
- Air humidity too high or working temperature too low.
- Drying time incorrect (too short).
- Materials for substrate not correctly matched to each other or not mixed correctly.

Repair of damage:
- Dry out, sand, re-isolate and paint.
- Sand away faulty paint coats and re-apply paint finish.

Paint damage caused by detachment, poor adhesion

Cause/damage pattern:
- Insufficient paint adhesion between top coat and filler. The whole of the paint finish detaches from the plastic.
- Plastic not cleaned sufficiently, not or inadequately tempered.
- Unsuitable cleaning agent or materials used.
- Poor or lack of intermediate sanding.
- Paint finish underbaked or overbaked.

Repair of damage:
- Sand away faulty paint coats and re-apply paint finish.

Paint damage caused by blisters, craters, sink holes

Cause/damage pattern:
- Painting on PUR plastic which was not painted in production.
- Surface of the plastic material too porous.
- Flash-off time not adhered to.
- Drying temperature too high.
- Moisture in plastic material.
- Layers too thick.

Repair of damage:
- Clean the damaged area, sand, re-isolate and paint.
- Remove the paint layers and re-paint.

Crack formation

Cause/damage pattern:
- Overexpansion of painted PUR plastic components.
- Use of unsuitable paint materials.
- Paint materials not suited to each other or incorrect mixture ratio.

Repair of damage:
- It is not possible to repair overexpanded PUR plastic components.
- On other plastics, sand away damaged layers, isolate and repaint.

DESCRIPTION AND OPERATION

Spot Repairs

General

In general, partial surface painting at a point is called a spot repair. Using this technique, minor paint damage can be resolved economically and to time.

Advantage of this method

Because this application remains confined to the area of the damage, it is often unnecessary to remove components or color match against neighboring components. The material used is very much reduced because only a part of the repair area is coated.

Practical application areas

Only occasionally can satisfactory results be achieved in the centre of larger surfaces and/or on difficult colors. In addition, unprofessional application may cause tear-off edges to appear in clear lacquer. Only certain application areas are recommended.

NOTE: The final decision on whether to spot repair or paint the component must be made by an expert.

Application areas:

- 2-layer paint.
- Depending on the damage zone, paint damage up to a diameter of 3.5 cm or a length of 10 cm.
- Scratches.
- Clear lacquer application up to an area of DIN A4 max.
- Smaller areas which are optically broken up by other components such as trim strip, tail lights, swage lines and edges.
- Boundary zones and edge areas of larger components.

The best application areas have proven to be optical break lines such as corners, narrow surfaces, fenders and wheel arches.



Because of their locations, the violet colored areas are the most suitable for spot repair painting. The turquoise areas are only marginally suitable and the rest of the areas are not suitable for spot repairs.

DESCRIPTION AND OPERATION

Repair process

Perfect preparation of the subsurface is the precondition for a brilliant paintwork result. Faults in the preliminary stages delay completion and cause unnecessary extra work. The working steps described here demonstrate how important it is to follow these instructions step by step.

Illustration of damage



A typical case for spot repair is a small stone chip on the fender.

Cleaning



First of all the component is thoroughly cleaned using silicone remover and refurbished using abrading and polishing paste. This re-creates the original degree of shine and ensures exact color matching on the touch-up surface.

Sand out



Sand out the damaged location using P180 - P320. Only small sanding blocks and small sanding machines must be used, so that the area of the repair remains as small as possible.

Sanding is completed by rubbing down the surrounding surface with a fine sanding pad or P1000 paper. Remove sanding residues and clean the repair area with silicone remover. The peripheral zone must then be masked for application of the filler.

NOTE: The size of the repair area must be kept as small as possible (maximum size DIN A4).

Filling



The filler layer is applied in stages. First of all, filler is only applied to the location which has been sanded away. After a wait time for flashing off, the second coat is applied so that it spreads over onto the existing paintwork.

The filler must be dried according to the instructions of the material supplier.

DESCRIPTION AND OPERATION

Rubbing down



The repair location is now rubbed down with P400 - P500 and the bordering surface with P2000 - P4000. Remove sanding residues and clean the repair area with silicone remover.

Paint



Before painting, clean the area for the final time using a dust-bonding cloth. Then apply the basic paint in thin layers using a spray gun until enough coverage is achieved.

After drying, apply clear lacquer in 1 or 2 coats (depending on product). In doing so, spray so that only the newly applied basic paint is completely covered. Finally a touch-up thinners is sprayed over the edge of the clear lacquer to dissolve the clear lacquer spray mist.

Dry



Now dry the clear lacquer according to the manufacturer's instructions using an infrared gun.

Polish



Polish the component using a polisher and polish and check the polished area for any swirl marks which may be present. Polish away any swirl marks which are present.

Dirt inclusions

Sand out



Minor damage can be removed with a small sanding machine or preferably with an eccentric sander with P1500 - P2000. Very fine spray mist

DESCRIPTION AND OPERATION

can be removed using P2000 - P4000 paper and a larger eccentric sander.

DESCRIPTION AND OPERATION

Corrosion Prevention

General

Although corrosion protection measures and painting processes in production have reached a very high technical standard and will be continuously developed further, in the long term corrosion on a vehicle cannot be totally avoided. Further demands are therefore made of the paint specialist besides his knowledge of normal repainting of vehicles which have been repaired after an accident, in addition specialist knowledge is required for assessing and rectifying damage due to corrosion.

During repair painting, take care over the maintenance and re-creation of the corrosion protection applied in production, in view of the long-term warranty on Ford vehicles. Only those repair materials which are approved by Ford may be used for body repair work and repair painting.

For detailed information on corrosion protection measures during body repairs, please refer to chapter 501-25.

Furthermore, information on corrosion protection measures is repeated in individual chapters of the paint manual.

In particular, pay attention that the layer thicknesses specified in production are maintained. The complete system of solid one-layer on galvanized steel panels must equal at least 90 µm and the total system of two-layer on galvanized steel panels must equal at least 105 µm.

It is important that sealing operations, as far as they are necessary, should be undertaken after the application of the paint to specification, in order to ensure the best corrosion protection. All components which form hollow cavities such as pillars, rails, side components etc. must be provided with a coating of cavity protection wax.

Causes of corrosion

Corrosion of steel is an electrochemical process during which the steel combines with oxygen. The following factors lead to corrosion:

- Acidic compounds contained in the air, such as carbonic acid and sulphur dioxide, combined with oxygen from the air and/or water. Salts such as sodium chloride used as road salt accelerate the corrosion process.
- Mechanical damage such as stone chips and scratches which penetrate through to the steel panel.
- Lack of care by the vehicle owner of the painted and corrosion proofed surfaces or areas on the vehicle.
- Unfavorable weather or environmental conditions, as may occur in areas with high humidity, high salt content in the air or serious air pollution due to aggressive gases and dusts.

In the case of mechanical damage, formation of rust can often be seen, beginning to spread into the painted surface from a point (stone chip) or from a line (scratch). If these faults are not professionally rectified in good time, the result is rusting through from the outside to the inside. Rusting penetration from the inside to the outside occurs when for instance the cavity protection was inadequate.

Operations after painting

NOTE: The manufacturer's instructions must be followed when working with the various corrosion protection materials.

- After painting, treat all cavities in the repair area with cavity protection wax. In doing so, pay particular attention to the weld seams. In dead-end applications with a panel insert, the cavity protection wax must be applied so that it also reaches the area of the panel insert.
- Seals which were applied in production and not over painted must be reapplied. Seals protect vulnerable parts of the bodywork, keep moisture away, reduce wind and road noise and dampen vibrations.
- Apply transparent wax.

Definition of the degree of rust

In workshop practice, in order to be able to carry out a consistent and objective evaluation of the scope of the damage, a degree of rust on the scale of 1 to 5 is determined by the DIN 53 210 standard. The main criterion here is the extent to which rust exists under the paint structure. It is determined in millimeters (mm).

DESCRIPTION AND OPERATION

Underlying rust grade: R1 < 1 mm

Corrosion starting with up to 1 mm of rust underlying (in the form of a spot or a line).

The damage can be rectified by cleaning the defective location and mechanically removing the underlying rust. For a small extent, apply a primer using a brush and allow it to dry. Touch-up the location with a paint pen or provide a new paint coating.

Underlying rust grade R2 < 1 - 2 mm

Advanced corrosion with up to 2 mm underlying rust.

Rectifying the damage:

- Clean the defective location.
- Remove the underlying rust mechanically down to the paintwork carrier.
- Apply 1-component filler and then 2-component "Vario" filler.
- Provide the damage location with new paint coat on visible outer surfaces. Only locally touch-up areas which are not optically conspicuous.

Underlying rust grade R3 < 2 - 4 mm

More advanced corrosion with up to 4 mm underlying rust. The damage must be rectified in the same way as for R2. A permanent cure of this type of damage pattern is still just possible

Underlying rust grade R4 < 4 - 5 mm

Notably advanced corrosion with up to 5 mm underlying rust. The damage must be rectified in the same way as for R2. If it is found that for whole areas this is only possible with a great deal of work, or is not possible at all, then a new component must be used.

Underlying rust grade R5 > 5 mm

Extreme corrosion, with more than 5mm underlying rust (panels, flanges or load-bearing components partially rusted or rusted through).

Such damage can no longer be repaired because in many cases the constructional strength of the component can no longer be produced. The risk in making a repair is too great. Install a new component and paint it.

DESCRIPTION AND OPERATION

Color Identification and Chromatics

Basic color theory

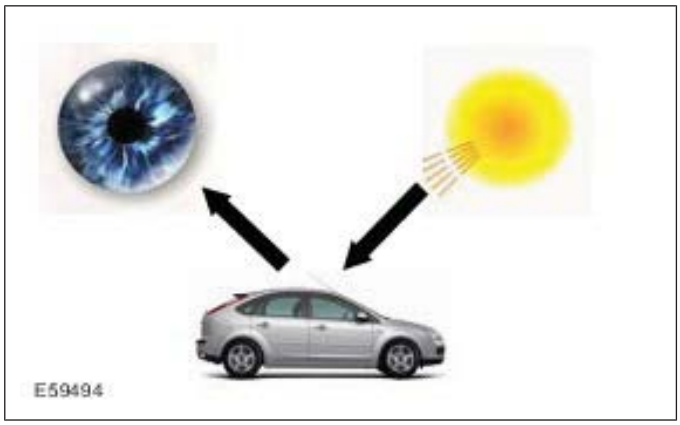
In order to achieve optically perfect painting results it is vital to understand the physical principles of the origin of color impression.

Color

Color itself is a sensory perception.

This perception arises through the combined effect of the following components:

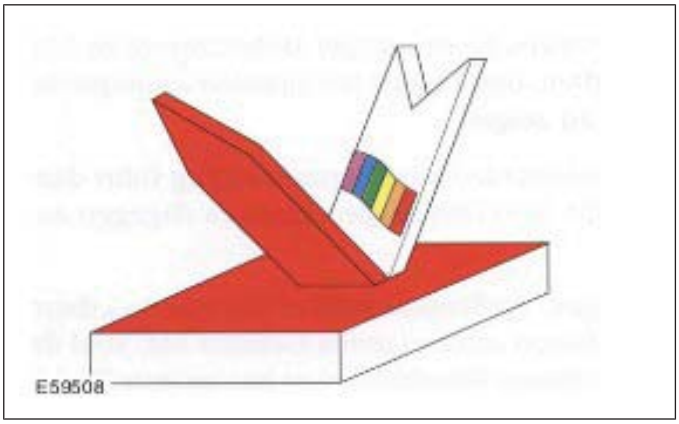
- Light (sunlight or artificial light irradiates the object).
- Surface of the object (reflection from the object of certain constituent parts of the light).
- Eye (perception of the reflections from the object).



Because the sensory impression of color is produced by all three of these components, it is dependent on the type, quality and function of the individual components. Practical examples make this clear:

- If a particular article is subjected to artificial light, then it gives a different impression of color to that which it gives in sunlight.
- An object with uniform color but different surface textures appears to have different colors (grained or ungrained dashboard).
- A person with perception disorder (colorblindness) cannot recognize certain colors or distinguish between them e.g. red-green weakness).

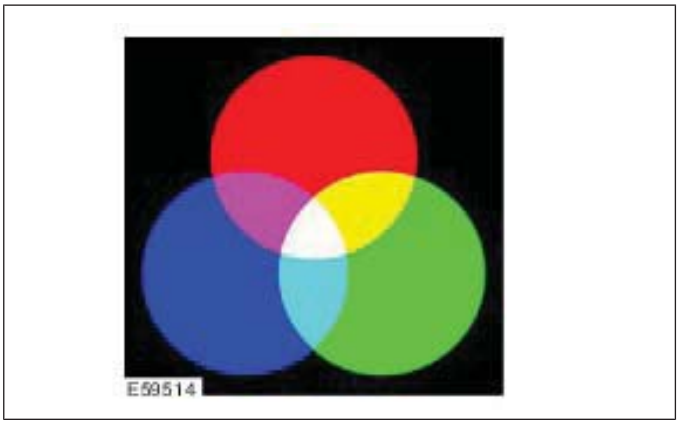
In turn the type of color is determined by the light absorption ability of an object. Light shines with all color components (spectral colors) onto an object, certain components of the light are absorbed (taken in) and other components are reflected (sent on). The components which are reflected produce the specific color impression.



The colors as we see them are the result of a combination of reflected colors from the spectrum. Physically speaking, these are electromagnetic waves with different wavelengths (and frequencies). The healthy human eye can recognize wavelengths between 0.36 µm (violet) and 0.78 µm (red).

If all the perceptible wavelengths of the spectrum impinge on the human eye at the same time, the impression of white light is produced.

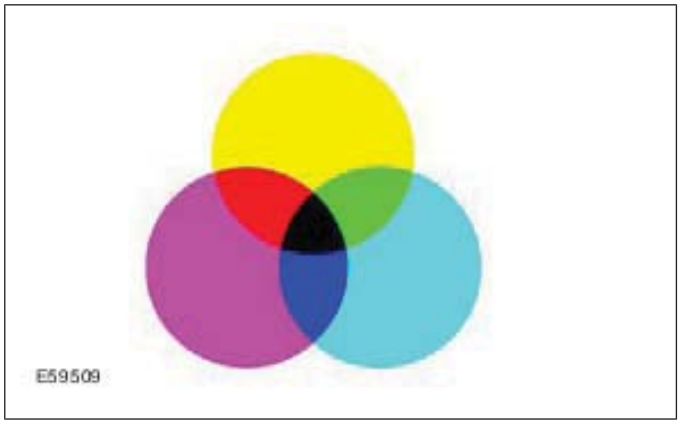
Additive and subtractive color mixing



Additive color mixing is the combination of light from different sources to give white. Different intensities of the additive primary colors red, green and blue allow millions of different colors to be represented (RGB colors).

Additive color mixing is always therefore used when light should enter the eye directly (without reflection off an object). Such as in the case of computer monitors or overhead beamers.

DESCRIPTION AND OPERATION



Subtractive color mixing means mixing the primary colors cyan, magenta and yellow to form a desired color (CMY colors).

Subtractive color mixing is used when light should enter the eye of an observer after reflection from an object. Such as happens with painting or in printing.

Oswald color circle



The Oswald color circle is based on subtractive color mixing, and enables the behavior of paints when they are mixed together to be represented.

Colors lying opposite each other are complementary colors and should not be mixed together as this will produce a dull (i.e. grey) shade. If green is added to red, the red becomes greyer, not greener.

Color shades which are side by side are partner colors and produce a mixed color shade. For instance, mixing red and blue produces a pure violet.

In addition, black and/or white may be necessary to produce a particular color shade.

- White makes the color shade lighter.
- Black makes the color shade darker.
- With black and white the color shade becomes more dreary or greyer.

Metamerism

Metamerism is the name of the effect which occurs when two colors appear identical in a particular light (e.g. artificial light), but the colors appear different under another light source (e.g. daylight).

The cause is the fact that the human brain, aided by the eyes, does not evaluate the wavelength, instead it evaluates the spectral intensity of the reflected light.

It is for this reason that color matching in practice must only ever be performed in daylight, or under special artificial light which is based on daylight.

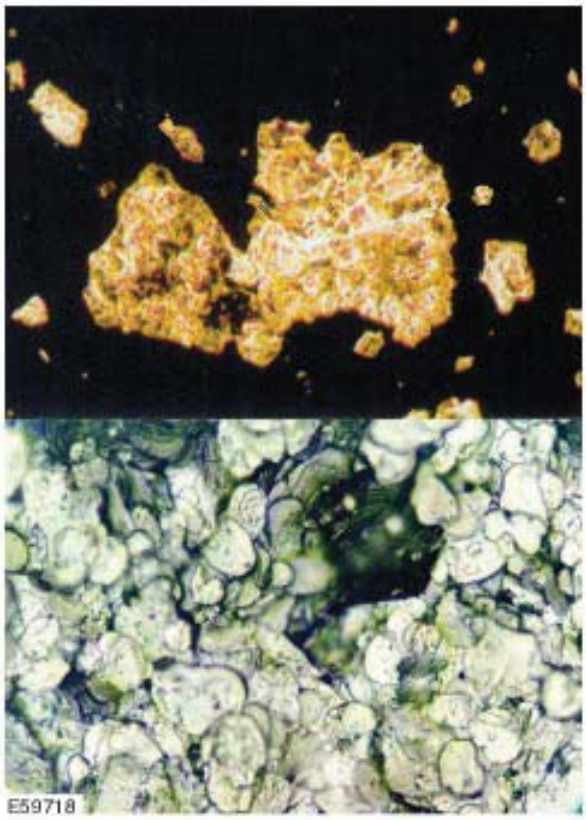
Metallic and pearl pigments

Colored paints achieve their color effect by the addition of pigments. Pigments are colored, solid, very fine organic and inorganic particles which are insoluble in the binding material.

Metallic pigments

Aluminum platelets are added as pigment to form metallic paint.

DESCRIPTION AND OPERATION



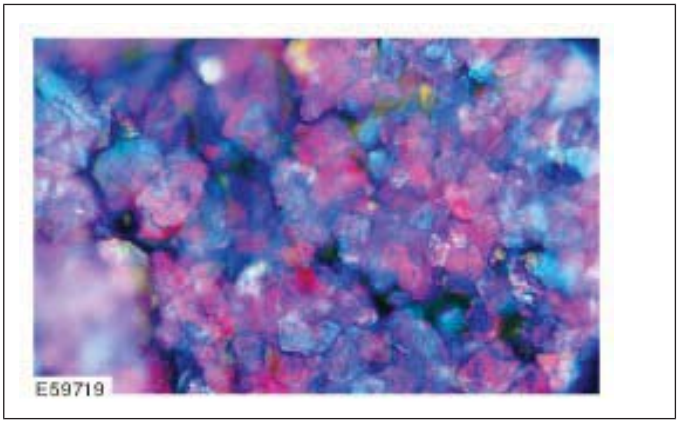
Depending on the size and shape of the aluminum platelets, different metallic effects can be achieved:

- Cornflake aluminum (1) causes very strong dispersion because of rough edges, low brilliance, very low flop and produces grey-silver shades.
- Dollar aluminum (2) causes hardly any dispersion because of the smooth surface, high brilliance, produces very light, almost white silver shades.

With metallic paints however, only a light-dark light reflection effect occurs.

Colored metallic paints are produced by the extra addition of color pigments to the metallic paint.

Pearl pigments



The basis of pearl pigments is formed by mica, which is metallized with a silver or gold layer.

Depending on the angles of light and observation, the mica platelets reflect different proportions of light. Because of this, the color of the paint appears to the observer to change.

Pearl pigments produce a colored and light-dark reflected light effect.

Color codes and their determination on Ford vehicles

It is necessary to determine the correct color shade of the original paintwork in order to perform a professional and perfect paint repair.

The original paint color shade can be found by:

- Inspection of the vehicle type plate with the color code stamped on it.
  - Later design
  - Earlier design
- Color shade catalog or color shade system of the manufacturer.
- The bare bodyshell plate with color designation.

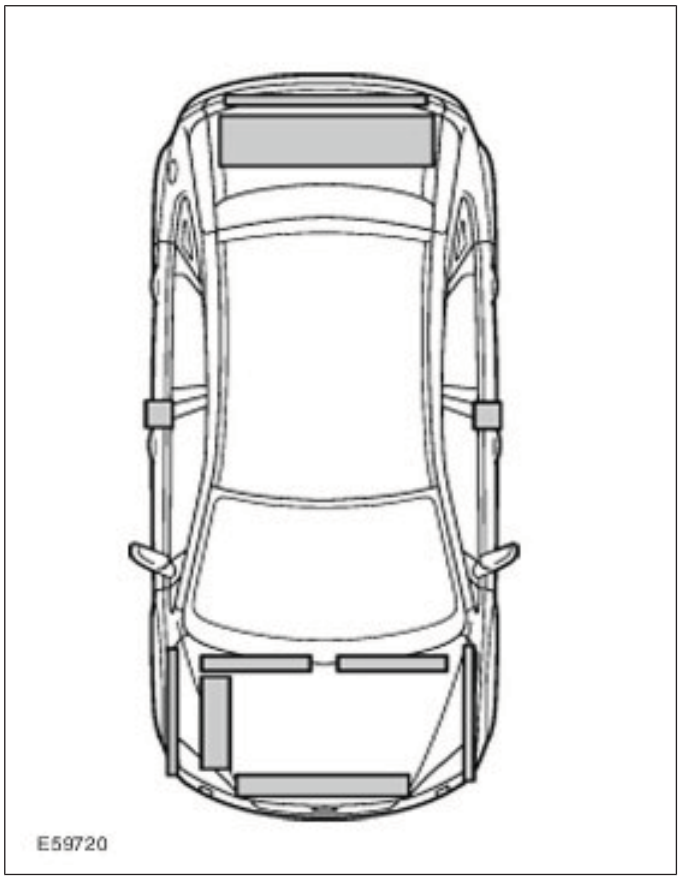
Type plate

Type plate - location on Ford vehicles:

- Right-hand B-pillar - door rebate
- Left-hand B-pillar - door rebate
- Hood lock panel
- Left-hand vertical edge of inner front wing
- Right-hand vertical edge of inner front wing
- Right-hand engine compartment side member
- Left-hand bulkhead
- Right-hand bulkhead

DESCRIPTION AND OPERATION

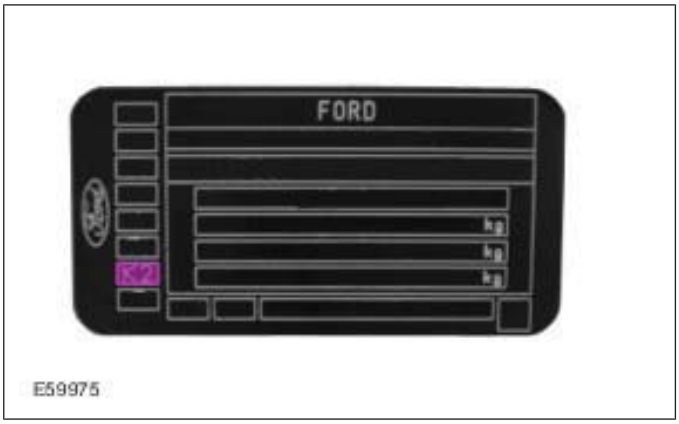
- Luggage compartment interior
- Inner rear panel - luggage compartment



The type plate gives the color code in the last row.



On the newer type plates, the color code is given in the left-hand column, at the penultimate position.



Color shade catalog or color shade system of the repair paint manufacturer.

The repair paint manufacturers offer a variety of possible systems for the determining the production color shade of motor vehicles. There are electronic systems, color card systems and manuals for the determination of color shades.

DESCRIPTION AND OPERATION

Most repair paint manufacturers use the following systems:

- A tabular system based on the following parameters:
  - Color code
  - Make
  - Model
  - Build year
  - Color or color name
  - Ancillary codes
- A system with color cards based on the following parameters:
  - Make
  - Color shade
  - Build year

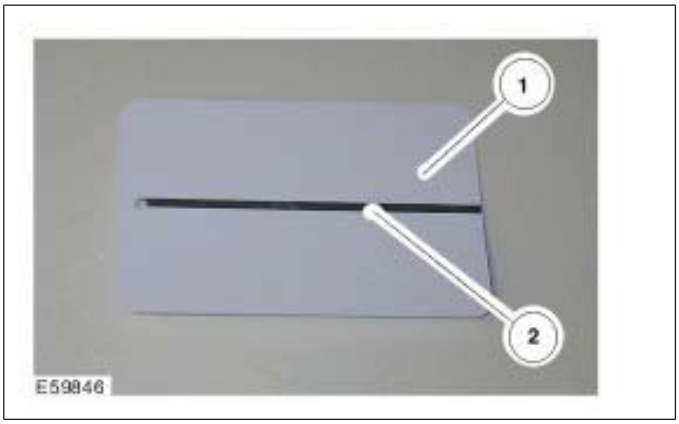


Because of the many parameters used, in a tabular system the color shade can also be determined by the lack of a parameter.

When using the color cards, emphasis is placed on matching of the original color shade with the color shade samples. For this reason this method is very helpful when the other parameters are not available.

Comparison of the results of both methods increases the certainty of using the correct original color shade and its formulation.

Additional certainty can be achieved during color shade determination by making a color sample plate. Here it is however important to apply the complete paint structure with base paint and clear lacquer onto a sample plate (1) in order to carry out a color shade and color coverage test.



The color shade comparison is done by comparing the vehicle paintwork with the sample plate (1). The color coverage test is possible by using the black test stripe (2): If the test stripe (2) is still visible after test painting of the sample plate (1), the coverage is not good enough.

By using this determination of the original color shade, the formulation and information on any very slight fine adjustments which may be necessary can be established.

Bare bodyshell plate

The bare bodyshell plate is located:

- On the hood lock panel.
- Near the type plate.

The color name is stamped on in the last row.



DESCRIPTION AND OPERATION

Matching tinted filler to the color code

NOTE: Color samples must always be made from the same materials as the subsequent repair painting. Perform color shade matching in the fully hardened state, in natural light or under suitable artificial light.

Various tinted fillers are used during factory painting. In order to achieve the exact color shade of the factory applied paint, attention should be paid that the correctly matched fillers are used.



The repair paint manufacturers offer suitable precolored primers. The use of filler color cards allows the matching color shade to be determined.

DESCRIPTION AND OPERATION

Tips and Tricks

Comparing paint structures

It may happen that an area remains visible, especially when the area of the repair is small. The reason for this is the structural variation in the paint surface at the repair location compared with the original paint finish. The original paint finish has a slight orange peel effect while the repair areas is extremely smooth.

This effect can be reduced by fine sanding using P3000 of the area around the repair location and then polishing.

Etching substrate

If the substrate can be etched during the solvent test, suitable preparation must be done.

Job steps:

NOTE: Follow the manufacturer specific instructions.

- Sand the damaged area extensively using an eccentric sander and P80 or P120 abrasive sheets. Finish off sanding with P150 or P180.
- Remove the sanding dust and clean the area of the damage using silicone remover.
- Apply polyester stopper to the bare panel and to the damaged area.
- Sand the dried polyester stopper to an even surface using P80 - P150. Finish sanding using P180 - P240. If required apply more stopper, again only on the bare panel.
- Wet sand the residual old paint finish using P600 - P800. Transitions with P400 - P600. Clean with silicone remover.
- Prime bare metal areas with acid primer.
- After the acid primer has been left exposed to the air for the correct evaporation time, apply 2-component primer filler in thin layers over the complete repair area, leaving enough air exposure time in between coats.
- After the filler has dried, sand wet with P800 or sand dry with P400. Sanded through areas must be covered again with 2-component Nonstop filler primer.

Another possible method of preventing etching of the substrate is to use waterbased primer and filler materials.

Masking the vehicle

Masking and covering work are among the most important preparations required to achieve a high quality paint finish. Paint application onto neighboring components, paint mist and sharp paint transitions are quality faults. For this reason it is extremely important to take special care and to use suitable masking materials.

NOTE: When water based paints are used, all materials must be stable towards water.

Plan the masking work:

- Determine the sequence of masking work. Sometimes after masking film has been applied, it is difficult or impossible to reach certain areas.
- Prepare the masking material.
- Start with small difficult areas.

Pay special attention to the areas of profiled seals, edges, openings and paint transitions.

Masking tape

Masking tape is available in various widths for special application areas. In practice however, a wide tape has proved best for almost all areas, also taking into account the time required for masking work.

NOTE: Use of differing masking materials is often much more time-consuming.

Advantages

- Good coverage. Narrower tapes must often be applied in several layers.
- More resistant to tearing.
- Wide tapes can be applied deep into joints and therefore protect from paint mist and contamination.
- Removal is often easier.

Masking film

Transparent plastic film has become accepted as a practical method to mask large areas of a whole vehicle. It can quickly and easily be applied to the vehicle from the roll.

DESCRIPTION AND OPERATION

NOTE: Only mask the vehicle when it is dry. Moisture under the film can lead to matt paint in the drying process.

Using masking film

- Clean the vehicle before masking it.
- Pull the film over the vehicle. Because of the static charge, the film lies on the vehicle like a second skin.
- Cut out the repair area using the film knife and then mask it.

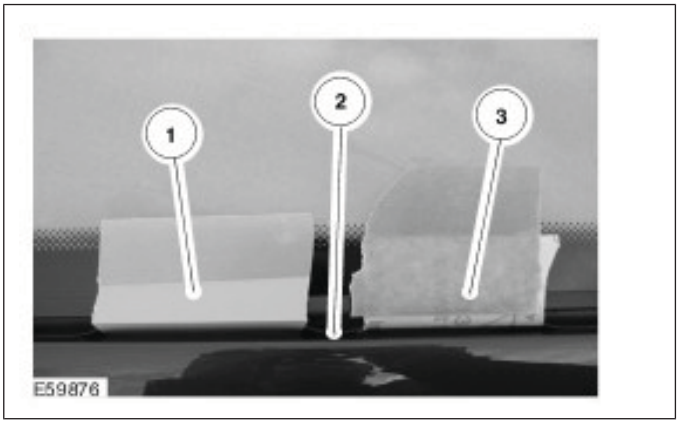
Other ways of masking a vehicle are:

- Masking using masking paper.
- Painting cloth (mostly used during filling work).

Profiled seals

If it is not possible to remove a profiled seal, then it must be masked in such a way that no edges can form due to paint accumulation.

To do this, the seal is lifted slightly and masked. The following techniques are possible:



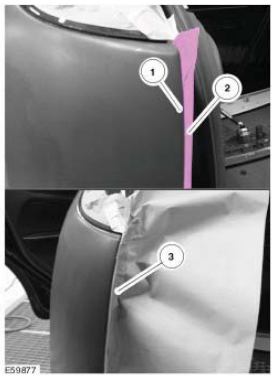
Item	Description
1	Masking tape with plastic strips
2	Sealing lip
3	Sandpaper with masking tape

- Laying a string or cord under the seal. Suitable for soft and elastic seal lips.
- Special masking tape with plastic strips for hard seal lips.
- Instead of using plastic strips, fine sandpaper cut into strips can be inserted and secured using normal masking tape.
- If the seal can be easily displaced, normal masking tape can also be used.

Edges/openings

Smooth paint transitions can be produced by positioning adhesive tapes.

NOTE: Pull the adhesive tapes away immediately after the paint has been applied and check the paint transitions.



Item	Description
1	Vehicle edge
2	Adhesive surface
3	Masking paper

Possible variations

- At edges apply one strip of masking tape half on the area not to be painted and mask using a second strip.
- On surfaces, two masking strips can be attached, each affixed by half their adhesive surface. The adhesive strip which arises is then applied with one half on the edge of the area to be painted. The other half is aligned and fixed in addition in the curves.
- Affix masking paper on one side over the area to be painted. Double back the masking paper and secure it.
- Affix round profiled foam at the edge of the area to be painted using masking tape.

Foam strips are suitable for affixing to openings such as door gaps.

DESCRIPTION AND OPERATION



NOTE: Choose a suitable profile diameter. A profile which is too thick will protrude from the opening, one which is too thin will leave a gap.

Clean the door opening well and affix the matching shape.

Color shade problems

If a vehicle color shade is taken from a vehicle on a hot summer day and the mixed color applied, this may cause color shade problems. Some colors change so much at higher temperatures that it can lead to an incorrect result. Red color shades are particularly prone to this shade behavior.

This means that color determination should always be done on the bodywork when it is at about the same temperature as the later working temperature will be. The best temperature of the item is between 15° and 25° C.

Isopropanol and water

Painted surfaces are very easily cleaned using a mixture of 70% water and 30% isopropanol (can be obtained through a laboratory supplies specialist or a pharmacist).

Temperature reduction spray

If finishing work must be performed on touched-up surfaces and newly painted plastic parts, problems may arise. The paint and the transitions are not yet fully hardened.

NOTE: When working with the polishing machine, make certain that each operating run lasts no longer than about 5 - 10 seconds, in order to prevent the paint becoming warm.

Even so, in order to be able to polish over transitions, temperature reduction spray must be applied to the surface. The transition area is then alternately sprayed and polished until a perfect transition surface is achieved.

Paint faults on soft plastic components where elasticizer additive has been used in painting must be wet sanded using grade P2000 - P2500 paper.

In doing this the sanding location and the surroundings are sprayed with temperature reduction spray and the paint faults sanded out by hand. Afterwards the location is polished as described above.

Paint plane

Dirt inclusions and paint runs can be removed with the sanding cylinder ("Finiball") and hand sanding or eccentric sander in a wet sanding process.

Another practical tool for removal of paint faults which lie proud of the surface is the paint plane.

NOTE: Guide the tool carefully with the minimum of force. It must not tilt, otherwise more serious damage may easily be caused.



This tool allows paint faults to be carefully removed in shavings. Afterwards the surface must be polished using suitable materials.

Shading

Even when all the rules, steps and corresponding instructions have been followed concerning possible shades, it may happen that the mixed color shade does not exactly match the vehicle color.

In these cases, shading must be done. Because there is no fixed formula for this, experience and a trained eye are important. Some rules must be followed for shading.

NOTE: Self-made color sample plates of the current colors are very helpful for determining the

DESCRIPTION AND OPERATION

color shade. Refer to the chapter Color Determination and Color Theory.

- When shading, if possible only use the paint mixture that is also allotted in the color shade formula.
- Observe the rules concerning contrary colors (complementary colors) and partner colors according to the Oswald color circle.
- Complementary colors are not recommended during shading because they mutually inhibit and lead to muddy mixtures.

Sanding marks

In certain circumstances, the recommended sanding methods up to now are no longer suitable for light metallic color shades. Wet sanding with grade P1200 paper or a grey sanding pad can cause sanding scratches which can become very visible under certain lights.

In order to achieve an excellent paint result on difficult color shades, follow these working rules:

- Sand filler as before, rub down area to be painted with 3M ultra fine matting sponge and 3M matting gel.
- Sand filler as before, rub down area to be painted with soaked 3M wet sand paper P1500 - P2000.
- Sand filler as before, rub down area to be painted with 3M 260 L P1000 eccentric (Interface Pad).

Improving touch-up work

During application of special effect base paints, the effect particles align themselves exactly parallel to the surface in the paint layer while it is still liquid. This means a particular thickness of the paint layer is required.

Because during painting the layer thickness in the transition zones reduces from normal to zero, the effect particles can no longer align themselves. This leads to lighter, darker or cloudy zones.

If 1-component clear lacquer is sprayed before the base coat, this effect is prevented. An optically perfect transition will result.

SECTION 502-00 Uni-Body, Subframe and Mounting System

VEHICLE APPLICATION: 2011.00 Focus

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SPECIFICATIONS

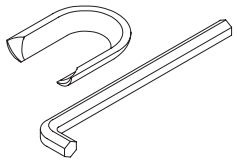
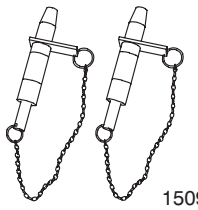
Torque Specifications

Item	Nm	lb-ft	lb-in
Catalytic converter to rear muffler flange retaining nuts - Vehicles with diesel engine	51	38	-
Catalytic converter to rear muffler flange retaining nuts - All except vehicles with diesel engine	48	35	-
Engine support insulator retaining bolts	80	59	-
Stabilizer bar clamp retaining bolts	48	35	-
Lower arm rear clamp retaining bolts	115	85	-
Lower arm front retaining bolt	175	129	-
Front axle crossmember bracket retaining bolts	70	52	-
Front axle crossmember front retaining bolts	115	85	-
Front axle crossmember rear retaining bolts	275	203	-
Steering gear mounting bolts	90	66	-
Lower arm ball joint retaining nut	70	52	-
Stabilizer bar to stabilizer bar link retaining nut	48	35	-
Headlamp leveling front sensor bracket retaining bolt	8	-	71
Rear axle crossmember retaining bolts	125	92	-
Rear lower arm to wheel knuckle retaining bolt	115	85	-
Upper arm retaining bolts	115	85	-
Front lower arm retaining bolts	115	85	-
Stabilizer bar link to rear lower arm retaining nut - Vehicles with solid stabilizer bar link	25	18	-
Stabilizer bar link to rear lower arm retaining nut - Vehicles with ball joint stabilizer bar link	48	35	-
Fuel additive tank retaining screws	8	-	71
Rear lower arm adjustment cam nut	90	66	-

REMOVAL AND INSTALLATION

Front Axle Crossmember

Special Tool(s)

 E42949	Protector, Ball Joint Gaiter 204-349
 15097A	Alignment Pins, Subframe 205-316 (15-097A)

General Equipment

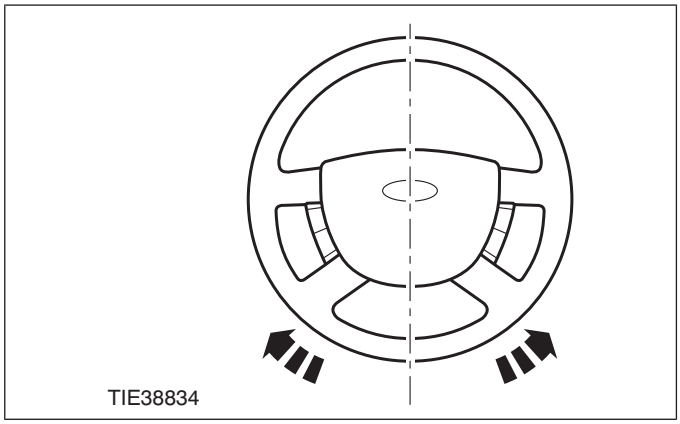
Ball joint separator
Securing strap
Transmission jack

CAUTION: Make sure the strut and spring assembly does not move in a forwards or rearwards direction, to prevent damage to the top mount center cup.

All vehicles

1. **NOTE: Make sure the road wheels are in the straight ahead position.**

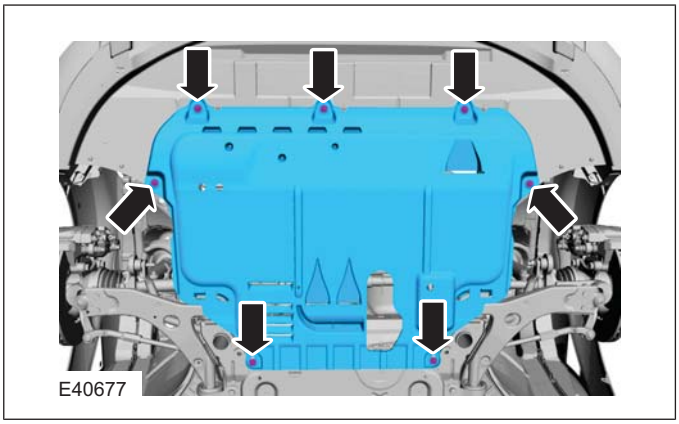
   Centralize the steering wheel and lock it in position.



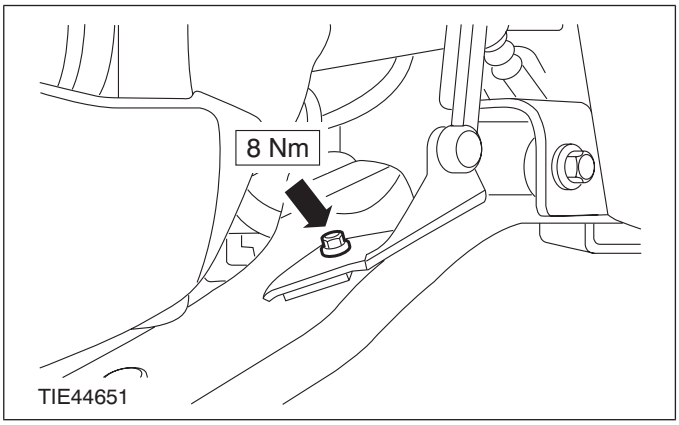
2. **Remove the front wheels and tires.**

   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3. **Remove the engine undershield.**

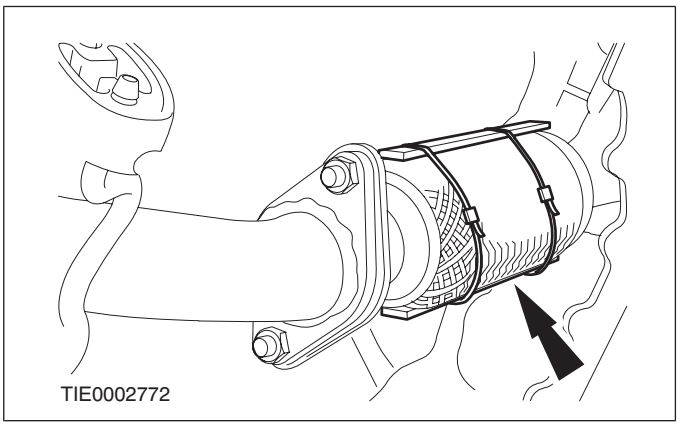


4. **Detach the headlamp leveling front sensor bracket from the right-hand lower arm and secure it to one side (if equipped).**



5. **CAUTION: Over bending of the exhaust flexible pipe may cause damage resulting in failure.**

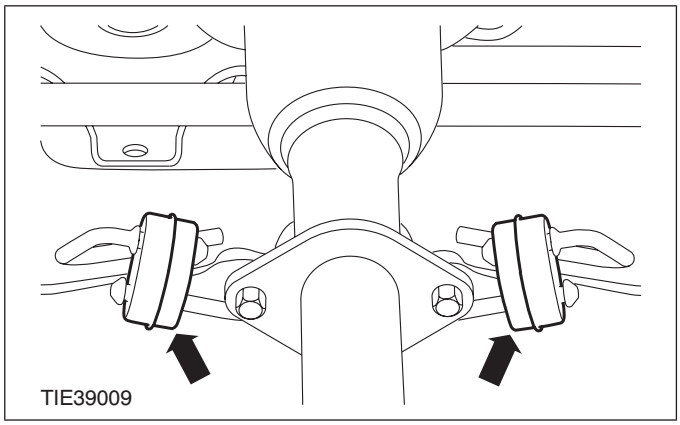
   Support the exhaust flexible pipe with a suitable support wrap or a suitable splint.



REMOVAL AND INSTALLATION

6. **⚠CAUTION: Take care when removing the exhaust hanger insulators to prevent damage.**

   Detach the exhaust flexible pipe from the front axle crossmember exhaust hanger insulators.

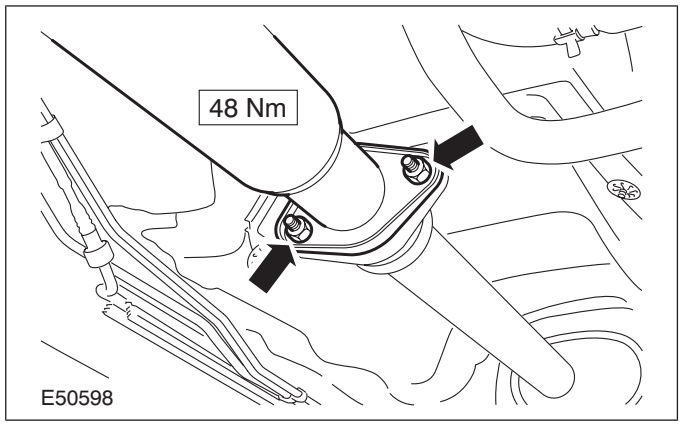


All except vehicles with diesel engine

7. **⚠CAUTION: Using suitable cable ties, support the rear muffler and exhaust tailpipe assembly to prevent damage to the exhaust hanger insulators.**

   Detach the exhaust flexible pipe from the rear muffler flange.

   - Discard the gasket and nuts.

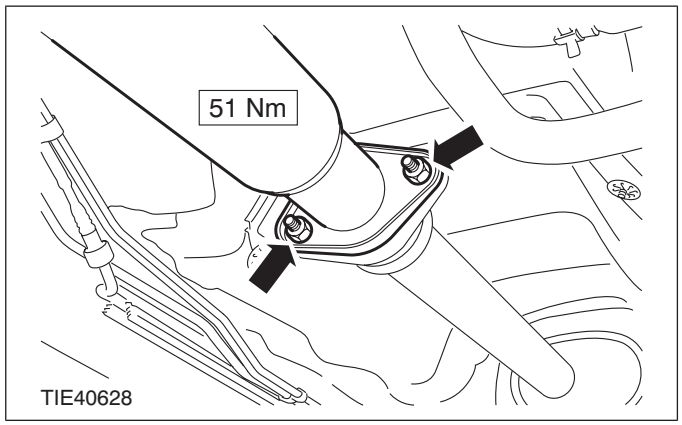


Vehicles with diesel engine

8. **⚠CAUTION: Using suitable cable ties, support the rear muffler and exhaust tailpipe assembly to prevent damage to the exhaust hanger insulators.**

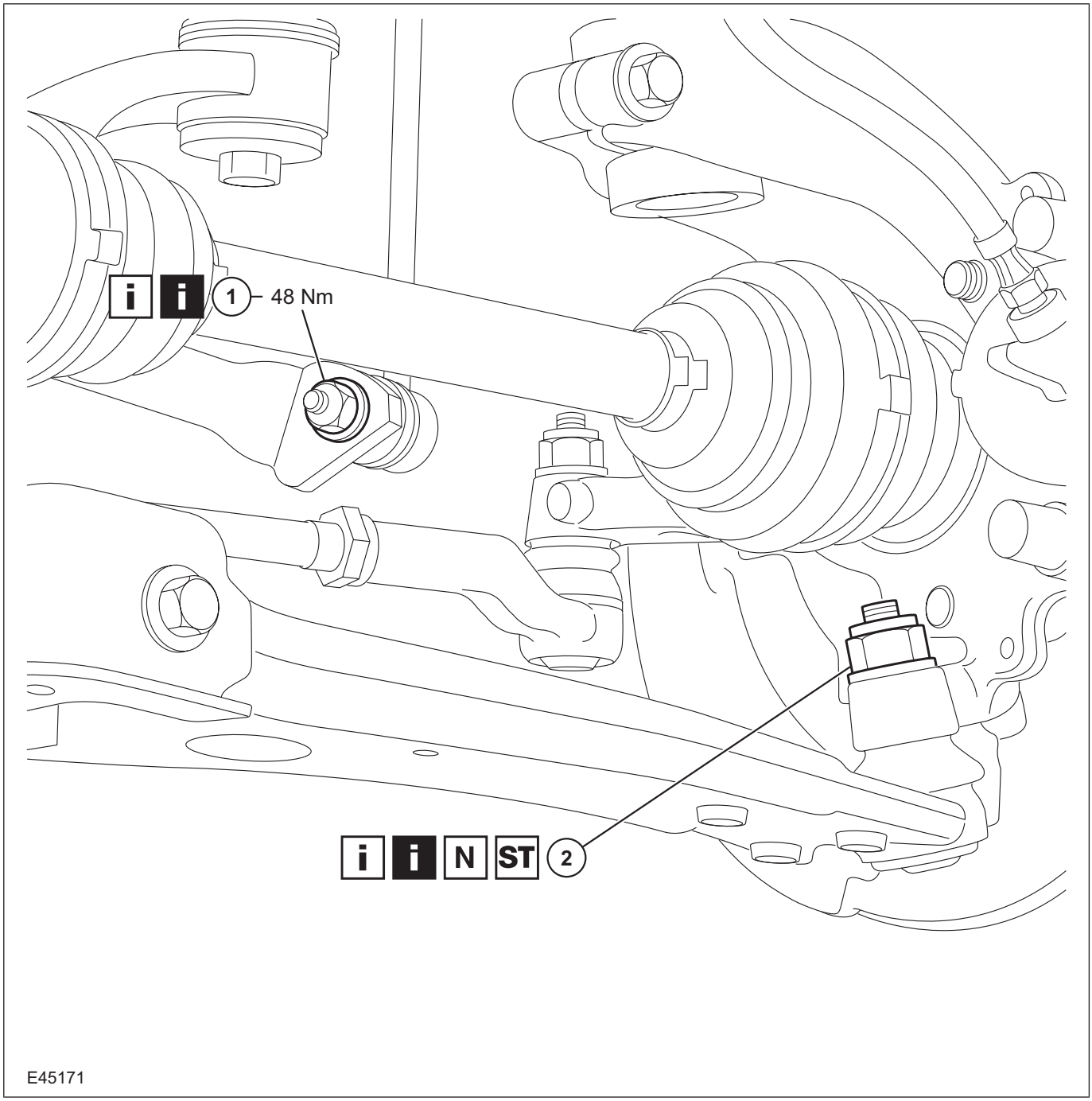
   Detach the exhaust flexible pipe from the rear muffler flange (2.0L Duratorq-TDCi (DW) Diesel shown).

   - Discard the gasket and nuts.



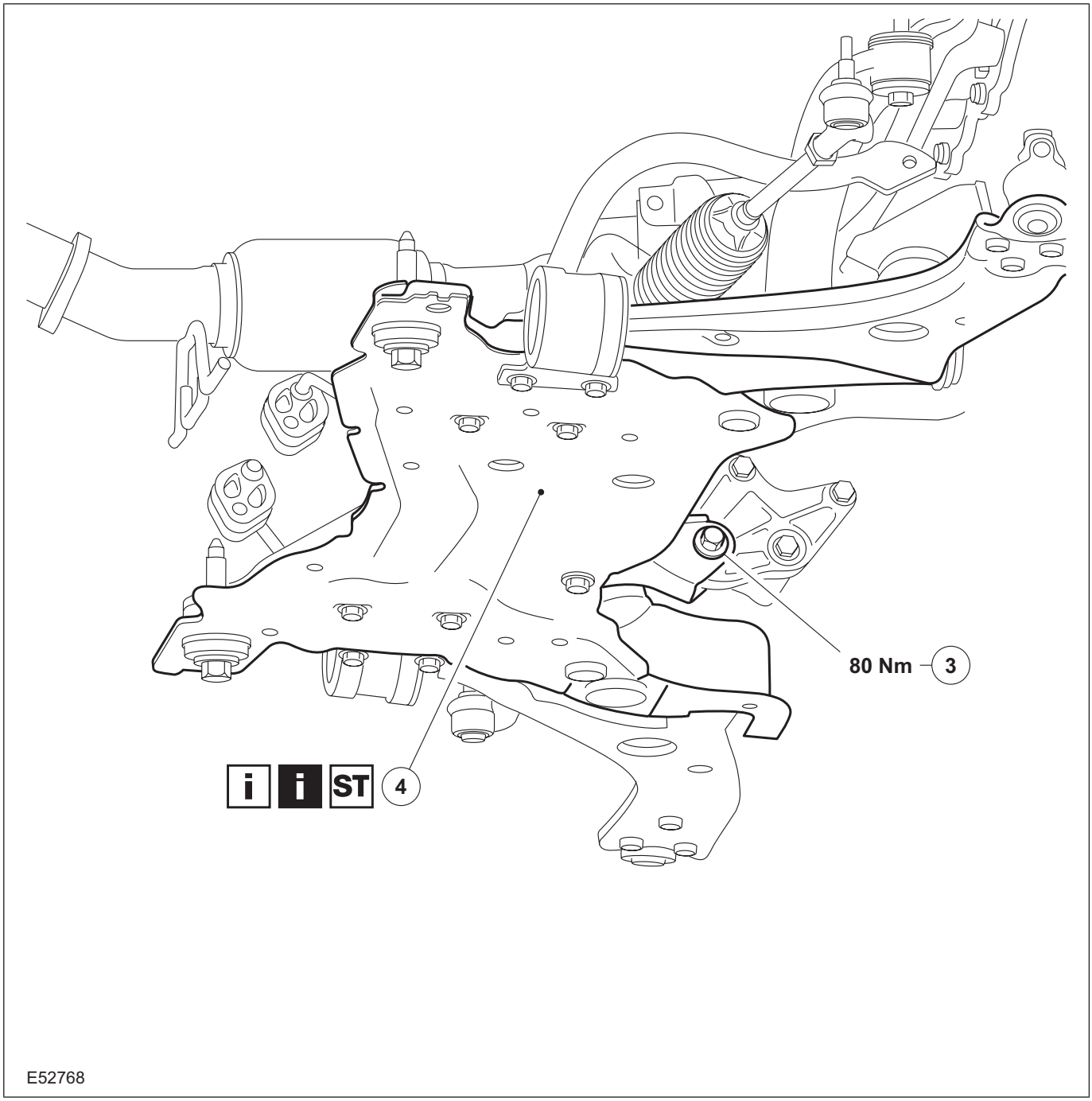
9. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



Item	Description
1	Stabilizer bar link retaining nut See Removal Detail See Installation Detail
2	Lower arm ball joint retaining nut See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
3	Engine support insulator front retaining bolt
4	Front axle crossmember See Removal Detail See Installation Detail

10. To install, reverse the removal procedure.

11. Check the toe setting and adjust as necessary.

    For additional information, refer to:
    Specifications (204-00 Suspension System - General Information, Specifications)
    / Front Toe Adjustment (204-00 Suspension System - General Information, General Procedures).

Removal Details

REMOVAL AND INSTALLATION

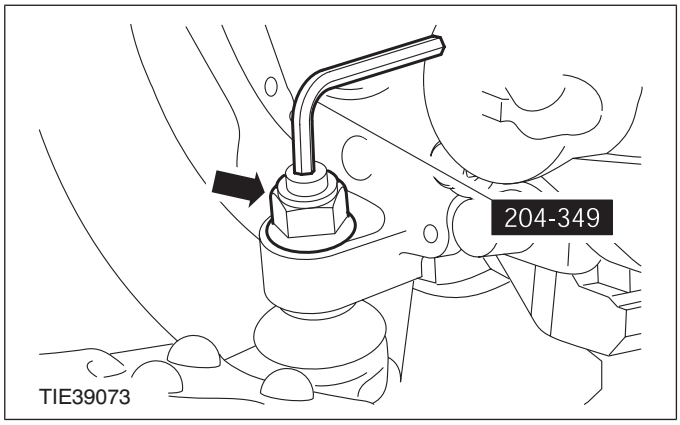
Item 1 Stabilizer bar link retaining nut

1. **NOTE: Use a 5 mm Allen key to prevent the ball joint stud from rotating.**

   Detach the stabilizer bar link from the stabilizer bar on both sides.

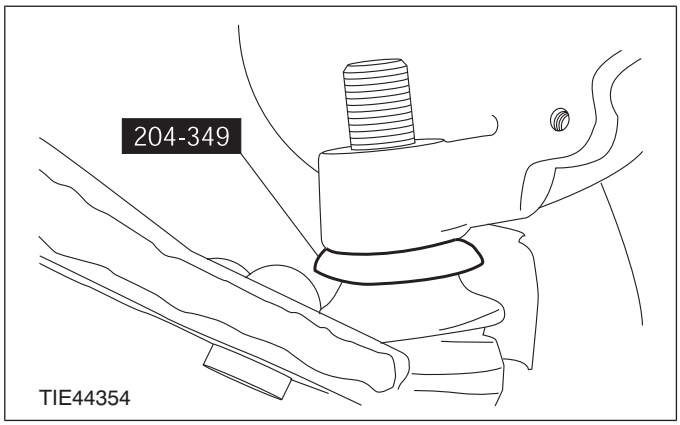
Item 2 Lower arm ball joint retaining nut

1. **Using the special tool to prevent the ball joint rotating, remove the lower arm ball joint retaining nut on both sides.**
   - Discard the lower arm ball joint retaining nut.

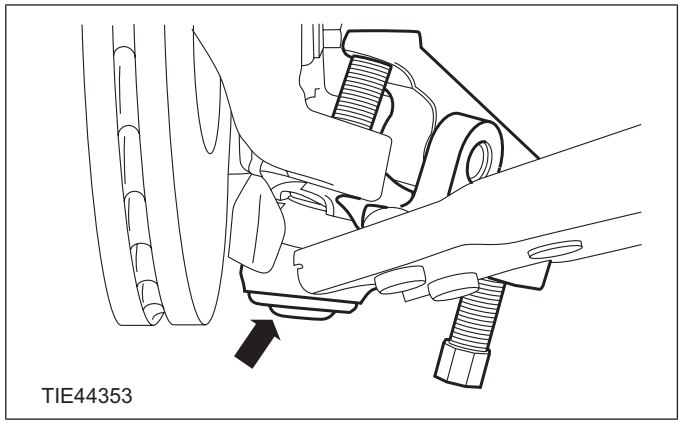


2. **⚠CAUTION: Make sure the special tool is installed with the curved surface facing upwards to prevent damage to the ball joint seal.**

   Install the special tool.

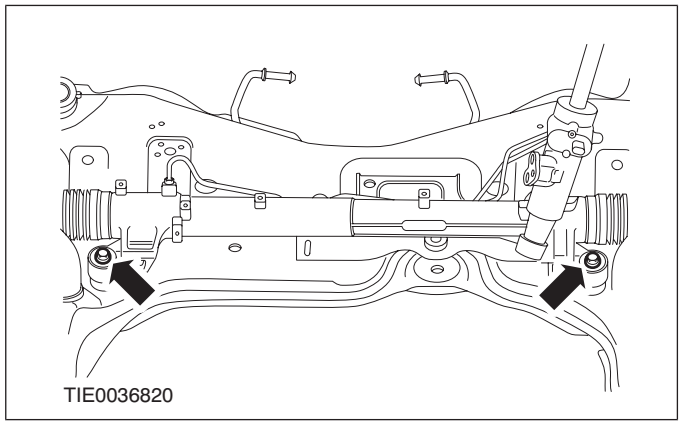


3. **Using a suitable ball joint separator, detach the lower arm from the wheel knuckle on both sides.**

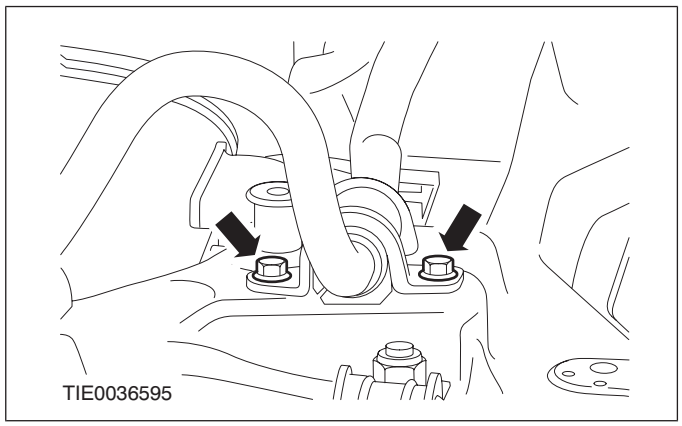


Item 4 Front axle crossmember

1. **Detach the steering gear from the front axle crossmember.**
   - Using cable ties, support the steering gear.



2. **Loosen the stabilizer bar retaining bolts on both sides.**



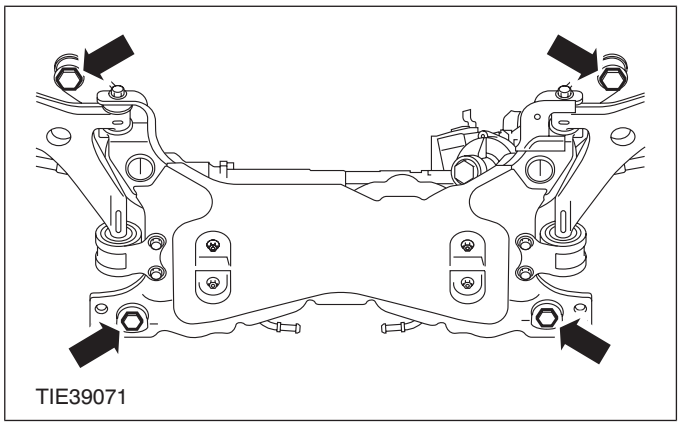
3. **Using a transmission jack and a wooden block, support the front axle crossmember, stabilizer bar and lower arm assembly.**

REMOVAL AND INSTALLATION

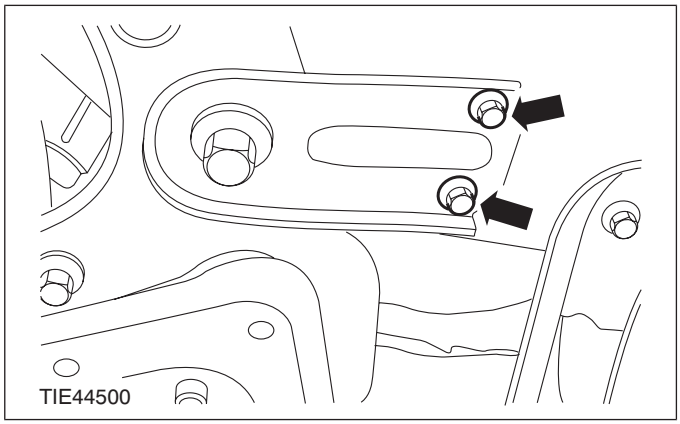
4. **WARNING: Make sure the front axle crossmember is secured to the transmission jack. Failure to follow this instruction may result in personal injury.**

   Using a suitable securing strap, secure the front axle crossmember, stabilizer bar and lower arm assembly to the transmission jack.

5. **Remove the front axle crossmember retaining bolts (transmission jack shown removed for clarity).**

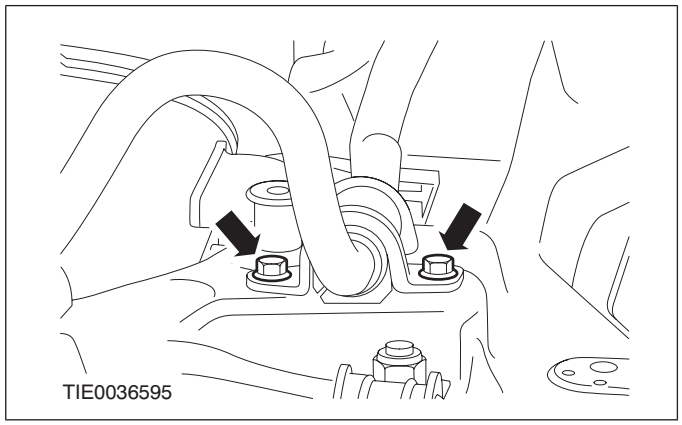

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6. **Remove the front axle crossmember bracket retaining bolts on both sides.**


TIE44500

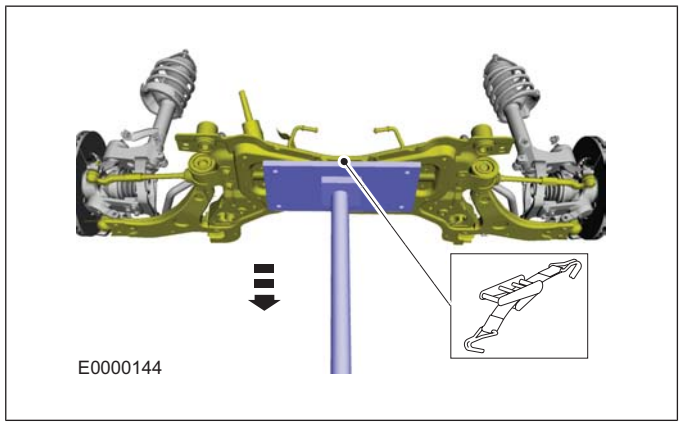
7. **Lower the front axle crossmember, stabilizer bar and lower arm assembly approximately 50 mm.**

8. **Remove the stabilizer bar retaining bolts on both sides.**


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9. **NOTE: When lowering the front axle crossmember, stabilizer bar and lower arm assembly, make sure the stabilizer bar is clear of the steering gear.**

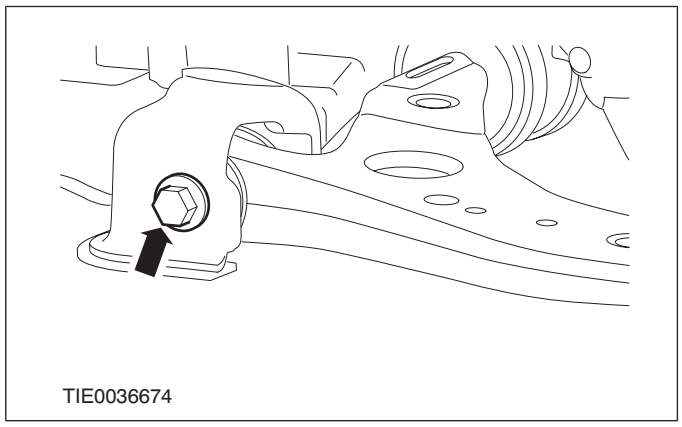
   Remove the front axle crossmember, stabilizer bar and lower arm assembly.


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10. **Remove the stabilizer bar.**

11. **NOTE: If installing a new front axle crossmember, remove the lower arms.**

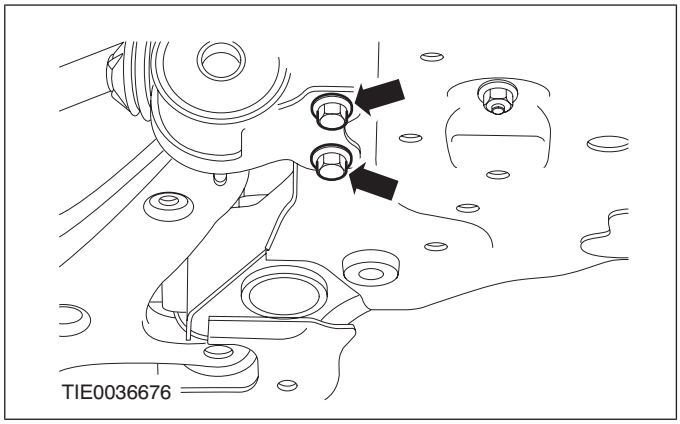
    Remove the lower arm front retaining bolt on both sides.


TIE0036674

REMOVAL AND INSTALLATION

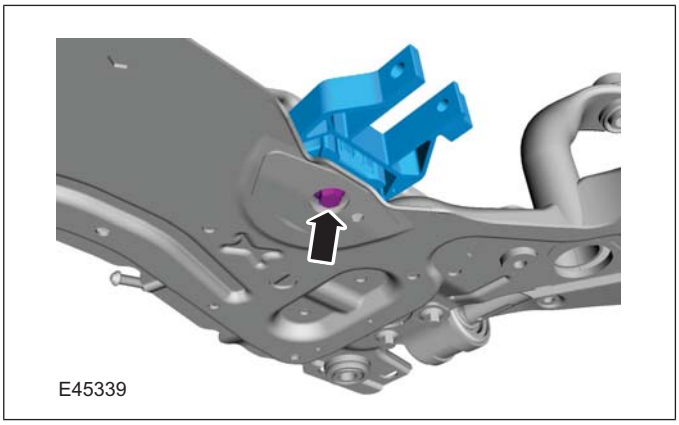
12. **NOTE: If installing a new front axle crossmember, remove the lower arms.**

    Remove the lower arm on both sides.



13. **NOTE: If installing a new front axle crossmember, remove the engine support insulator.**

    Remove the engine support insulator.

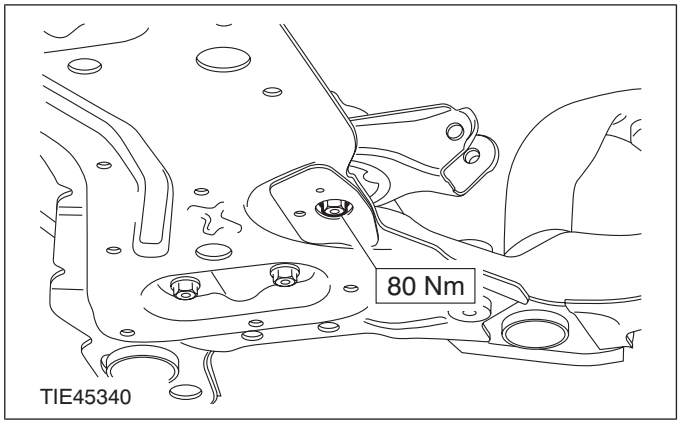


Installation Details

Item 4 Front axle crossmember

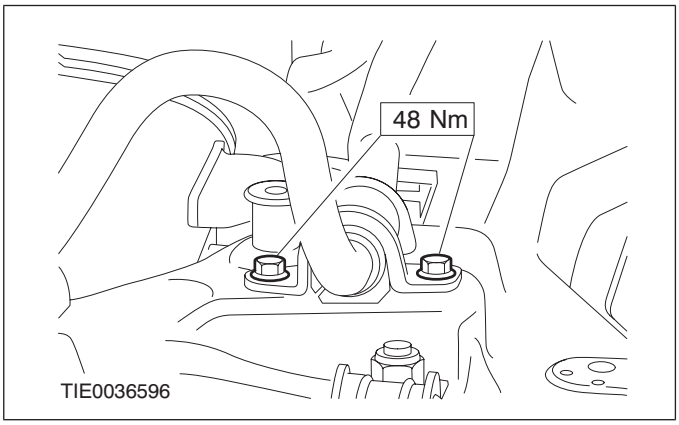
1. **NOTE: If installing a new front axle crossmember, install the engine support insulator.**

   Install the engine support insulator.



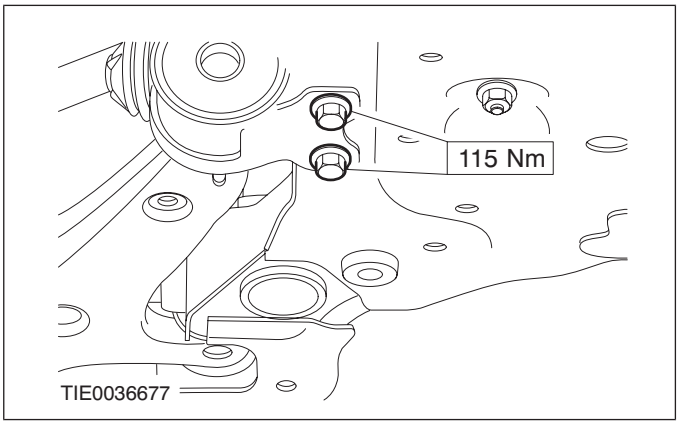
2. **Install the stabilizer bar.**

- Install the stabilizer bar clamp retaining bolts on both sides.



3. **NOTE: If installing a new front axle crossmember, install the lower arms.**

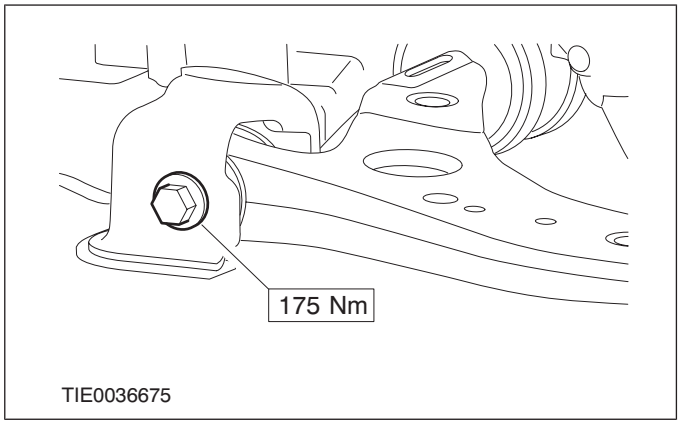
   Install the lower arm rear clamp retaining bolts on both sides.



REMOVAL AND INSTALLATION

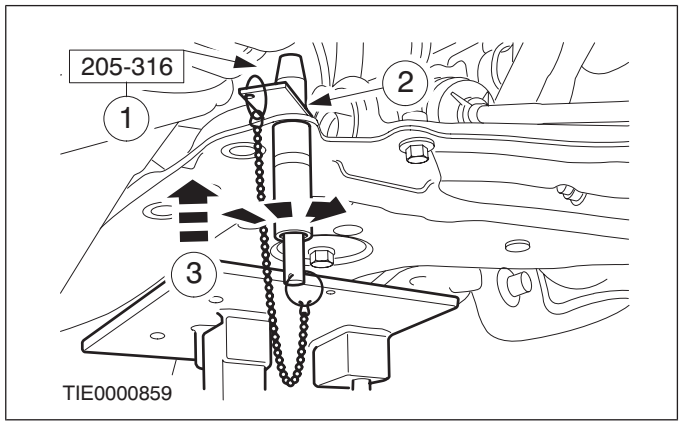
4. **NOTE: If installing a new front axle crossmember, install the lower arms.**

   Install the lower arm on both sides.

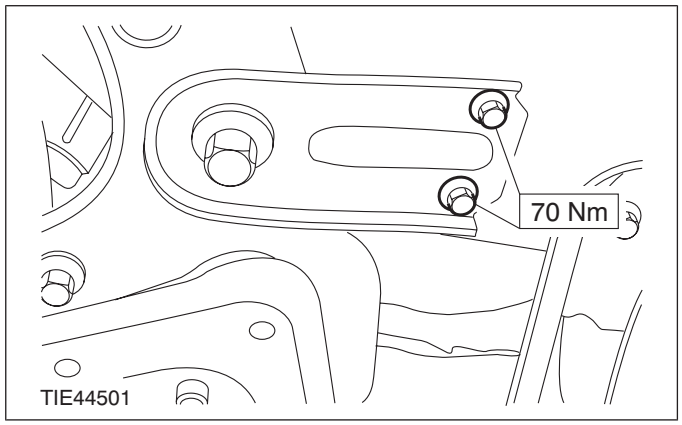


5. **Using a transmission jack and a wooden block, support the front axle crossmember, stabilizer bar and lower arm assembly.**
6. **WARNING: Make sure the front axle crossmember is secured to the transmission jack. Failure to follow this instruction may result in personal injury.**

   Using a suitable securing strap secure the front axle crossmember, stabilizer bar and lower arm assembly to the transmission jack.
7. **Using the transmission jack, position and raise the front axle crossmember until the front axle crossmember is approximately 100 mm from the body.**
8. **Using the transmission jack and the special tool, position and align the front axle crossmember.**
   1. Insert the alignment pins through the front axle crossmember alignment holes.
   2. Slide the locking plates into the groove of the special tool and tighten the alignment pin sleeve.
   3. Raise the front axle crossmember engaging the alignment pins into the chassis aligning holes.

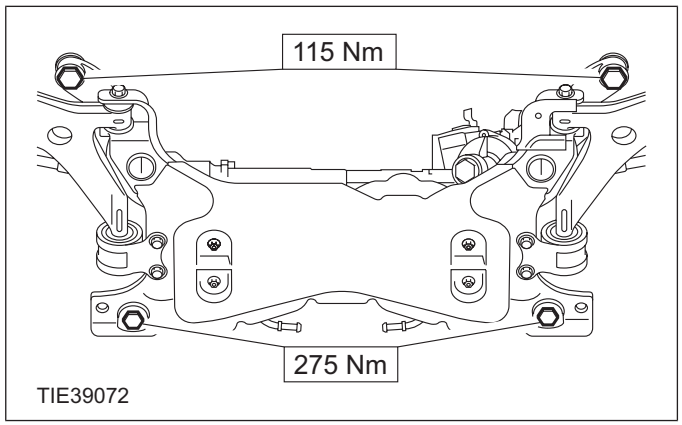


9. **Install the front axle crossmember bracket retaining bolts on both sides.**



10. **CAUTION: Make sure the front axle crossmember does not move while tightening the front axle crossmember retaining bolts.**

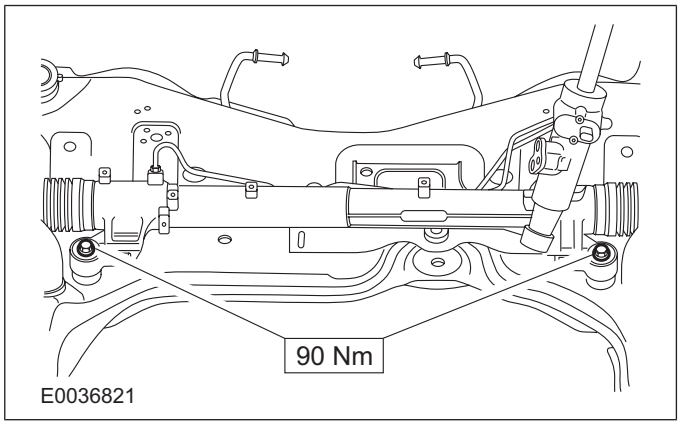
    Install the front axle crossmember retaining bolts (transmission jack shown removed for clarity).



11. **Remove the securing strap.**

REMOVAL AND INSTALLATION

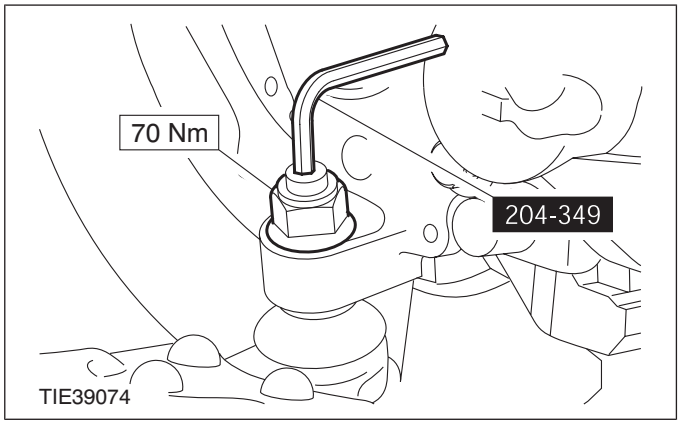
12. **Lower and remove the transmission jack and the wooden block.**
13. **Attach the steering gear to the front axle crossmember.**
    - Remove the cable ties.



Item 2 Lower arm ball joint retaining nut

1. **WARNING: Install a new lower arm ball joint retaining nut. Failure to follow this instruction may result in personal injury.**

   Using the special tool to prevent the ball joint from rotating, install the lower arm ball joint retaining nut on both sides.



Item 1 Stabilizer bar link retaining nut

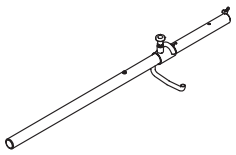
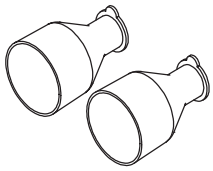
1. **NOTE: Use a 5 mm Allen key to prevent the ball joint stud from rotating.**

   Attach the stabilizer bar link to the stabilizer bar on both sides.

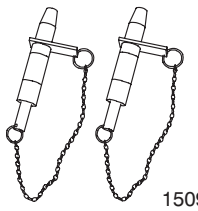
REMOVAL AND INSTALLATION

Front Axle Crossmember — 2.5L Duratec-RS (224kW/305PS) - VI5

Special Tool(s)

 E63772	204-605 Separator, Lower Arm Ball Joint
 E75372	204-609 Protection Cap, Ball Joint Gaiter

Special Tool(s)

 15097A	205-316A Alignment Pins, Subframe

General Equipment

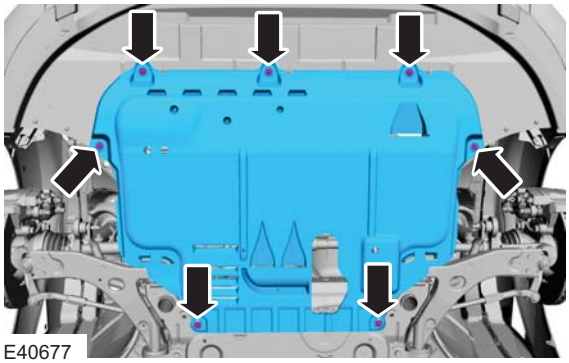
Cable Ties
Retaining Strap
Transmission Jack

Removal

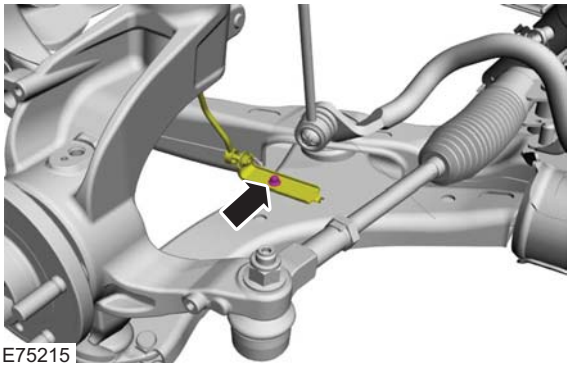
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

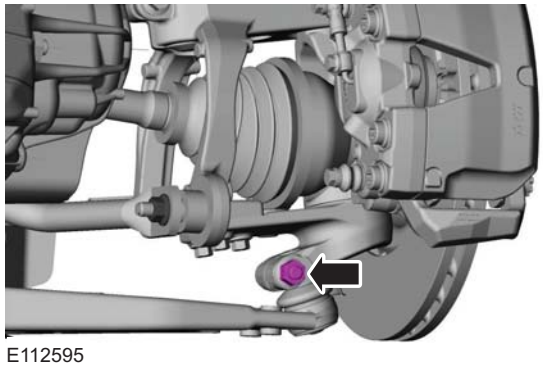
2.


E40677

3. If equipped.
   Torque: 11 Nm


E75215

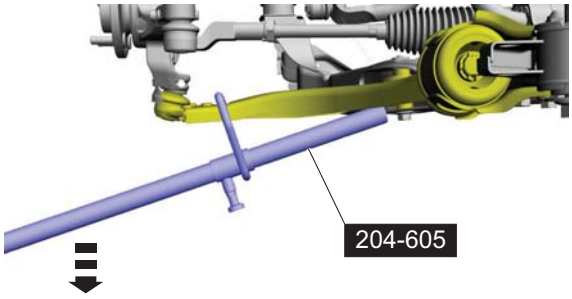
4. On both sides.
   Torque: 83 Nm


E112595

REMOVAL AND INSTALLATION

5. On both sides.

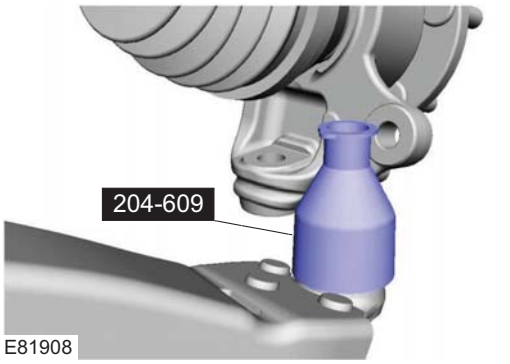
Special Tool(s): 204-605



E97732

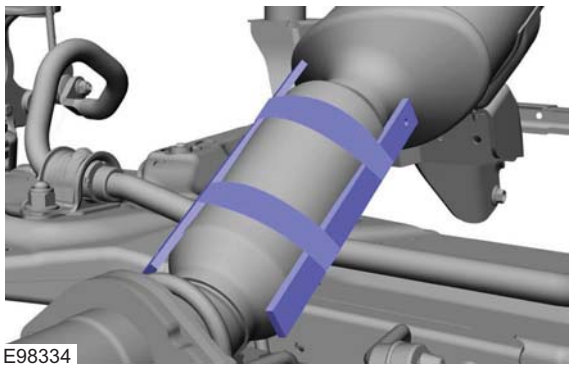
6. On both sides.

Special Tool(s): 204-609



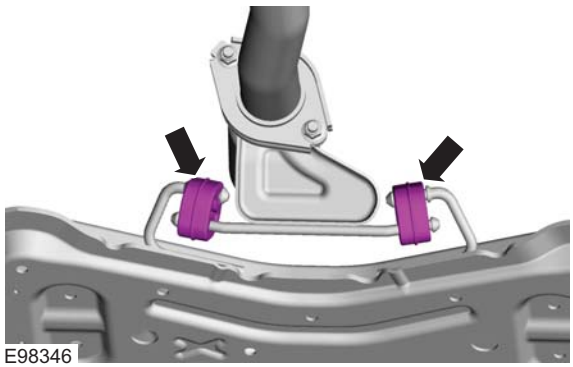
E81908

7. ⚠ **CAUTION: Make sure that the exhaust flexible pipe is not forcibly bent.**



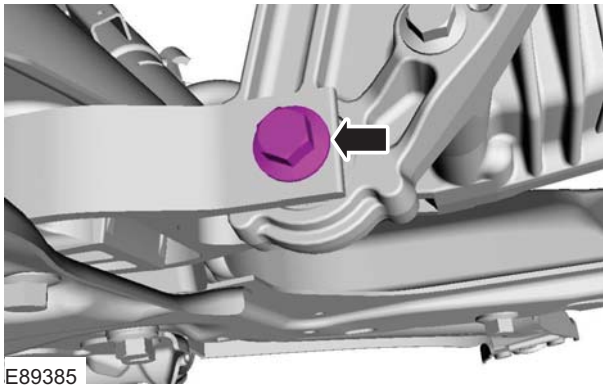
E98334

8.



E98346

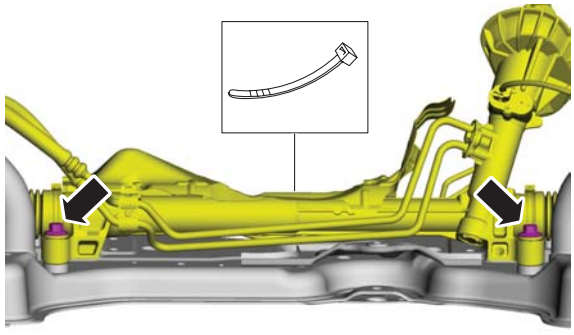
9. 1. Torque:
- Stage 1: 35 Nm
- Stage 2: Loosen: 360°
- Stage 3: 85 Nm



E89385

10. General Equipment: Cable Ties

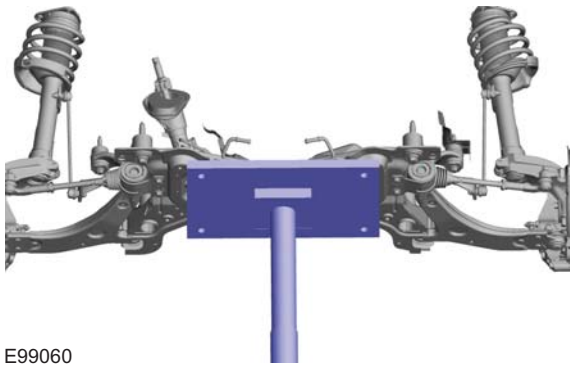
Torque:
- Stage 1: 40 Nm
- Stage 2: 60°



E98557

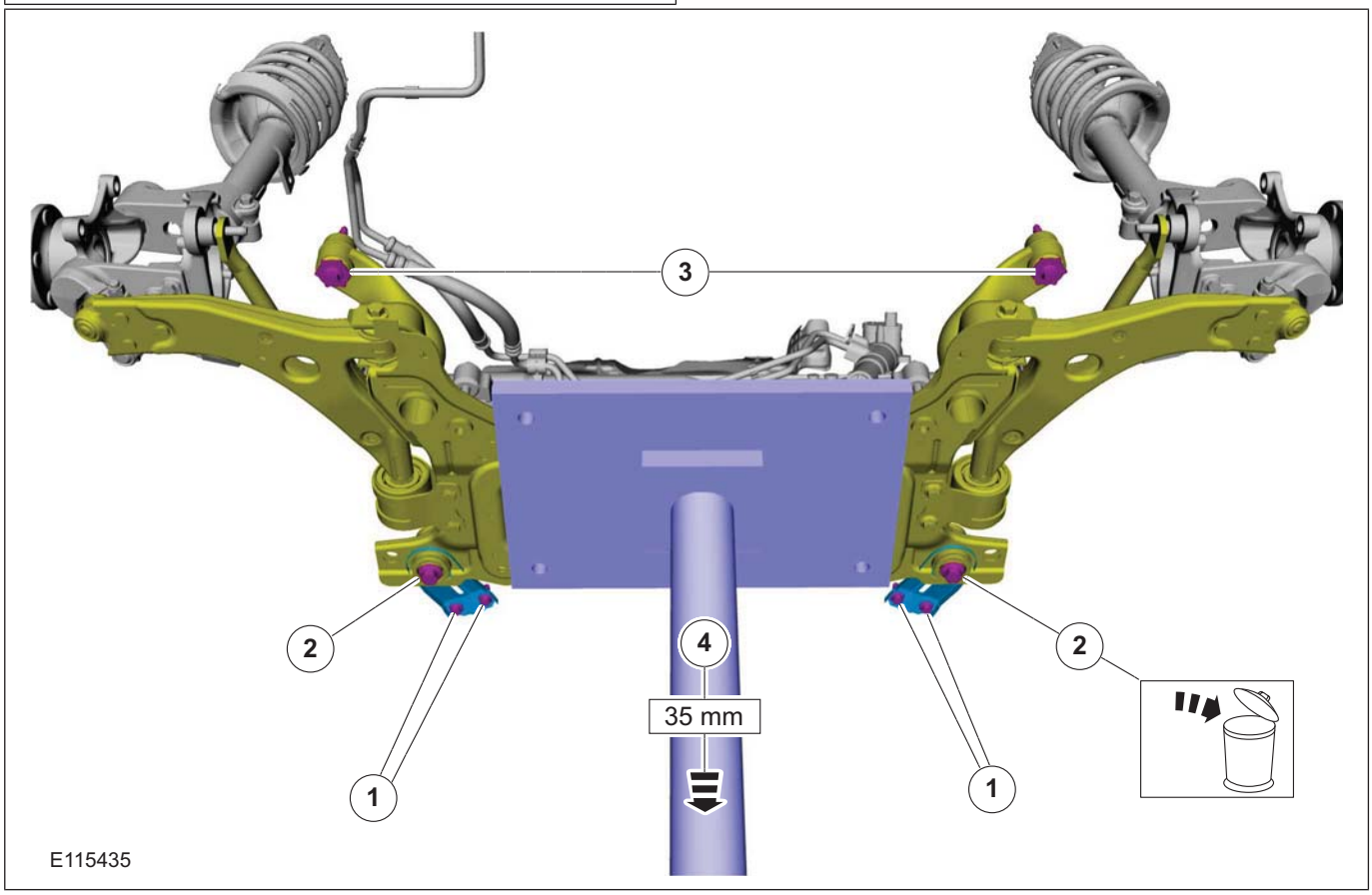
REMOVAL AND INSTALLATION

11. General Equipment: Transmission Jack



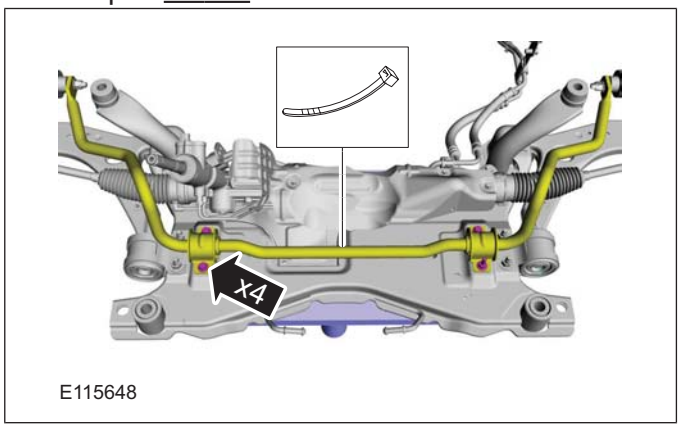
12 Remove the following items:

1. Torque: 70 Nm
2. Torque:
   - Stage 1: 140 Nm
   - Stage 2: 180°
3. Torque: 125 Nm



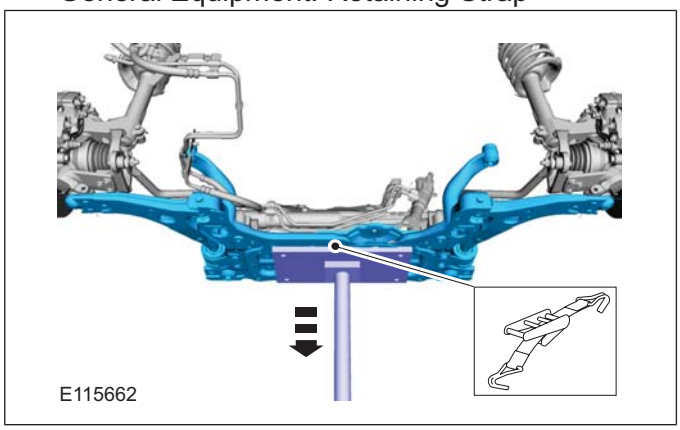
REMOVAL AND INSTALLATION

13. General Equipment: Cable Ties
    Torque: 48 Nm



14. ⚠ **CAUTION: Make sure that the wiring harness does not catch.**

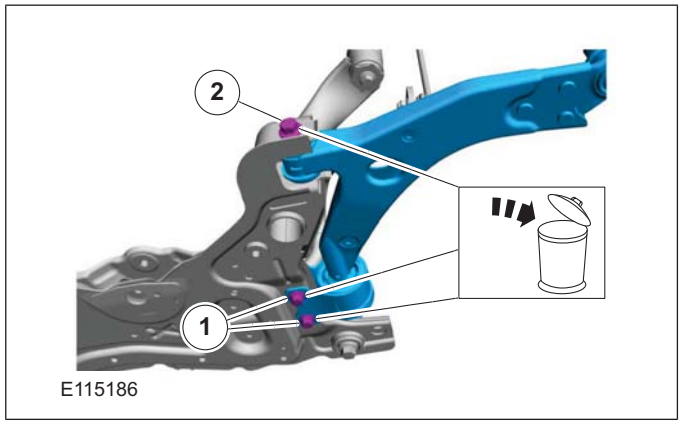
    General Equipment: Retaining Strap



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

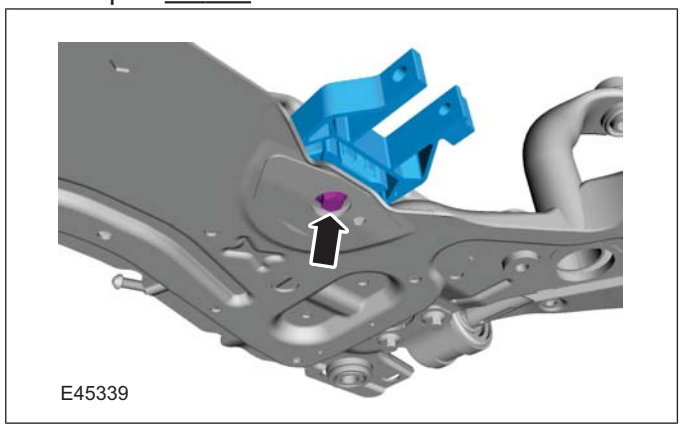
15. 1. On both sides.
    Torque:
    - Stage 1: 100 Nm
    - Stage 2: Loosen: 90°
    - Stage 3: 125 Nm

    2. Torque: 125 Nm



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

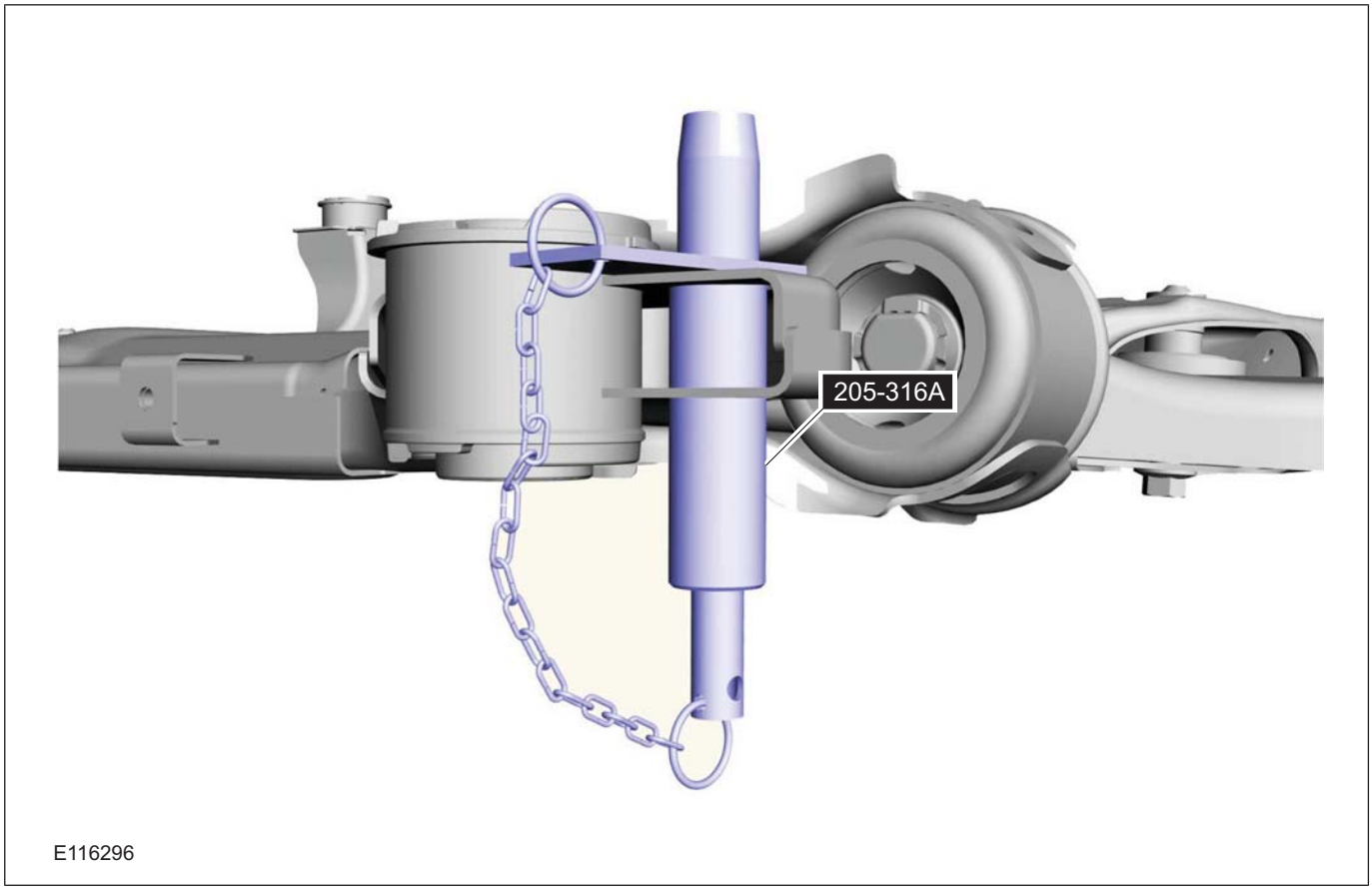
16. Torque: 80 Nm



Installation

1. To install, reverse the removal procedure.
2. Special Tool(s): 205-316A

REMOVAL AND INSTALLATION

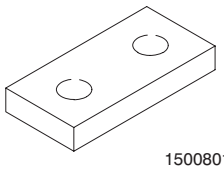
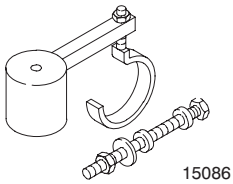
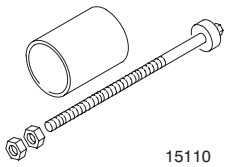
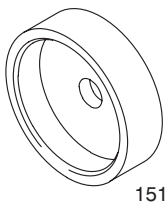
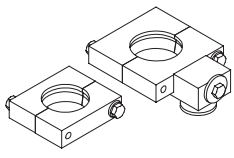


3. Refer to: Front Toe Adjustment (204-00 Suspension System - General Information, General Procedures).

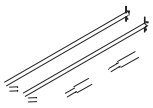
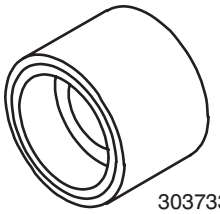
REMOVAL AND INSTALLATION

Front Axle Crossmember Front Bushing

Special Tool(s)

 1500801	Adapter for 205-044 205-044-01
 15086	Remover/Installer, Pivot Bushing 205-297
 15110	Remover/Installer, Pivot Bushing 205-342
 1511002	Adapter for 205-342 205-342-02
 E51254	Remover/Installer, Subframe Bush 205-810 Comprises 205-810-01, 205-810-02

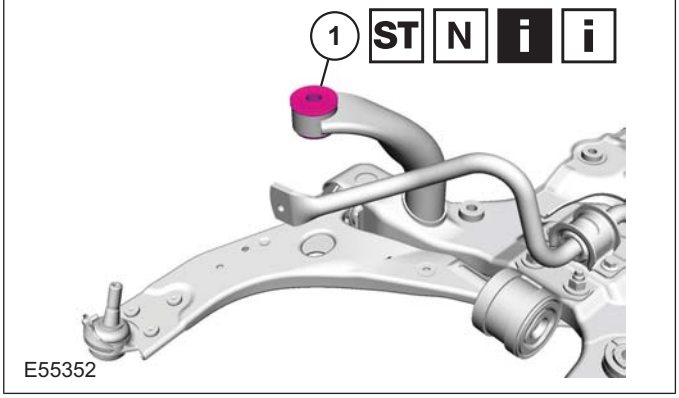
Special Tool(s)

 30329013	Adapter for 303-290A 303-290-13
 303733	Installer, Crankshaft Front Seal 303-733

1. **Remove the front axle crossmember.**

   For additional information, refer to: Front Axle Crossmember (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

2. **Remove the components in the order indicated in the following illustration(s) and table(s).**



Item	Description
1	Front axle crossmember front bushing See Removal Detail See Installation Detail

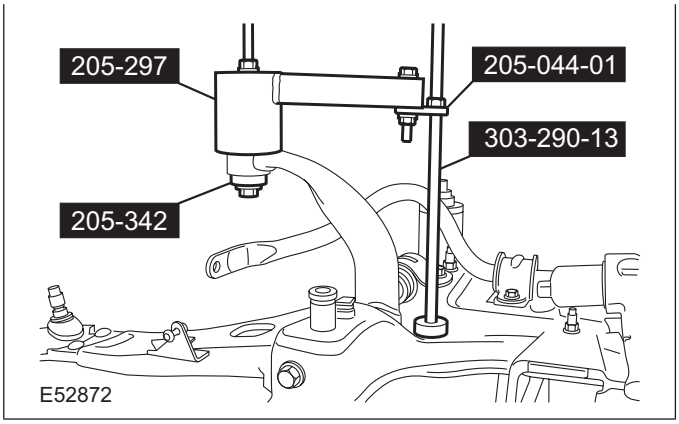
3. **To install, reverse the removal procedure.**

Removal Details

REMOVAL AND INSTALLATION

Item 1 Front axle crossmember front bushing

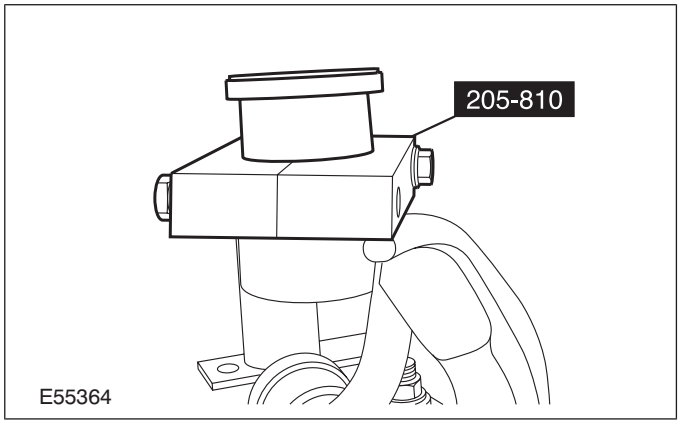
1. Using the special tools, remove the front axle crossmember front bushing.



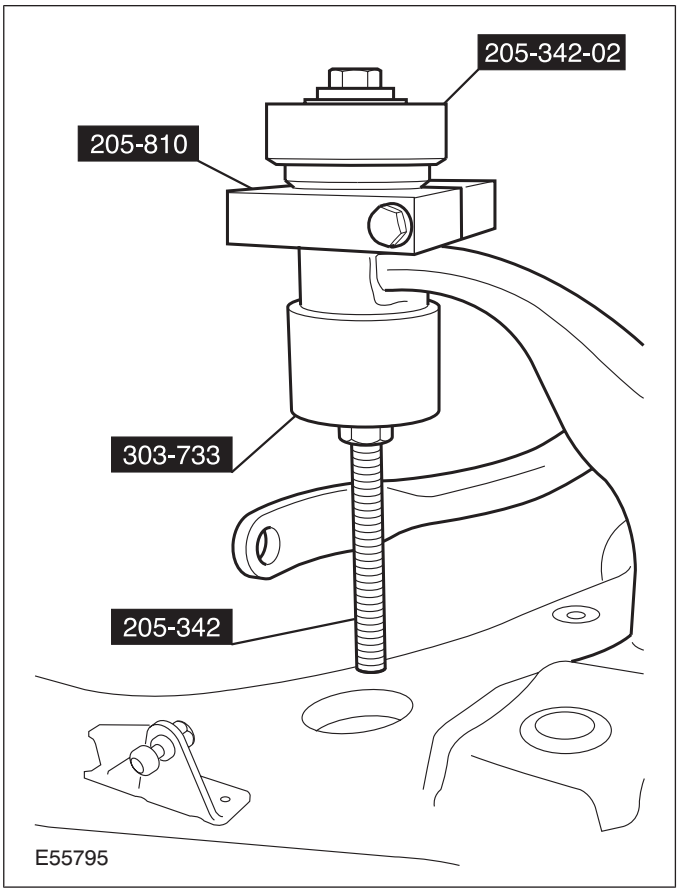
Installation Details

Item 1 Front axle crossmember front bushing

1. Clean the front axle crossmember front bushing housing.
2. Using the special tool, attach the front axle crossmember front bushing to the front axle crossmember.

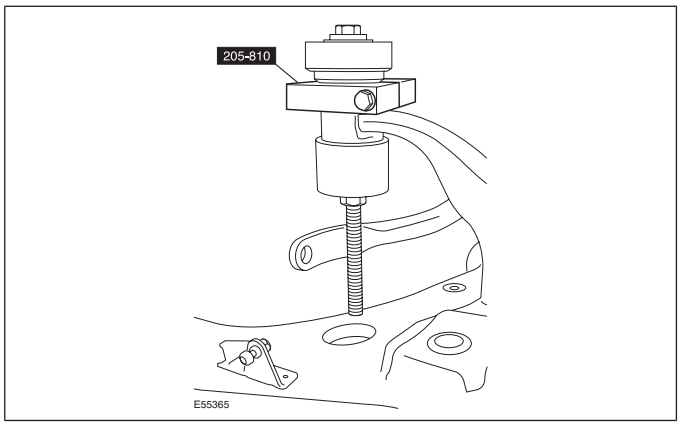


3. Using the special tools, press the front axle crossmember front bushing in approximately 10 mm.

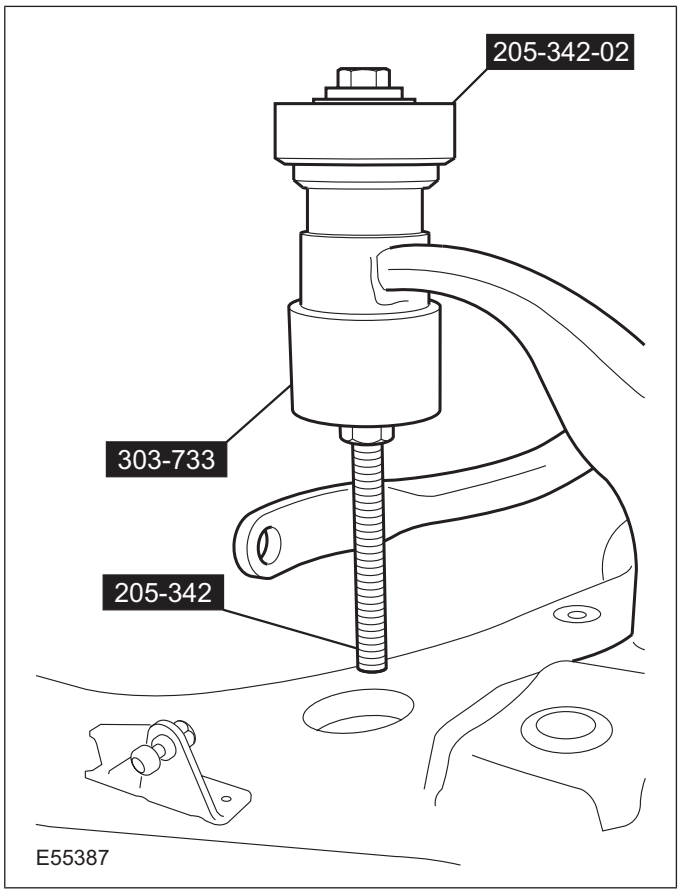


REMOVAL AND INSTALLATION

4. Remove the special tool.



5. Using the special tools, install the front axle crossmember front bushing.

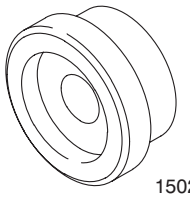
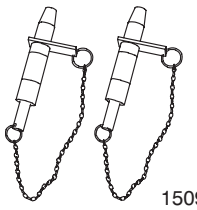
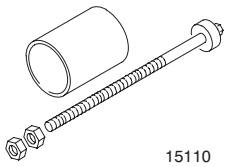
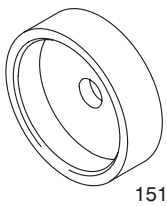
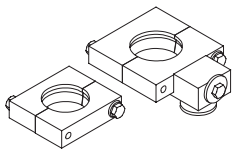


6. Remove the special tools.

REMOVAL AND INSTALLATION

Front Axle Crossmember Rear Bushing

Special Tool(s)

 1502651	Adapter for 205-071 (Thrust Pad) 205-071-02
 15097A	Alignment Pins, Subframe 205-316 (15-097A)
 15110	Remover/Installer, Pivot Bushing 205-342
 1511002	Adapter for 205-342 205-342-02
 E51254	Remover/Installer, Subframe Bush 205-810 Comprises 205-810-01, 205-810-02

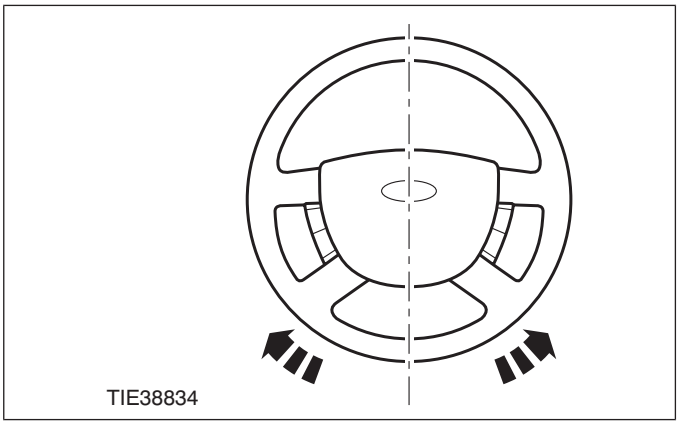
General Equipment

Transmission jack
Securing strap

All vehicles

1. **NOTE: Make sure that the road wheels are in the straight ahead position.**

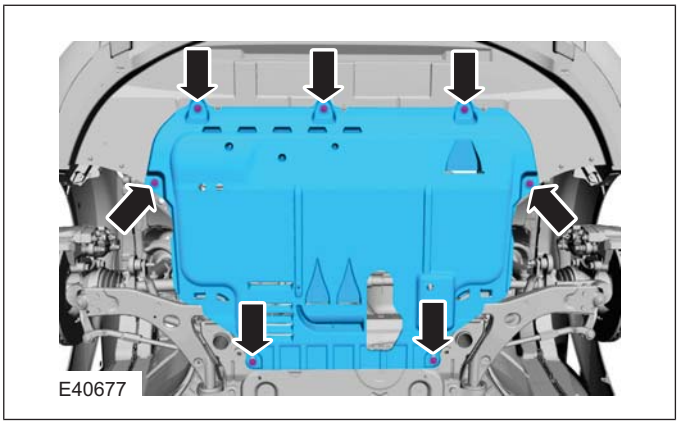
   Centralize the steering wheel and lock it in position.



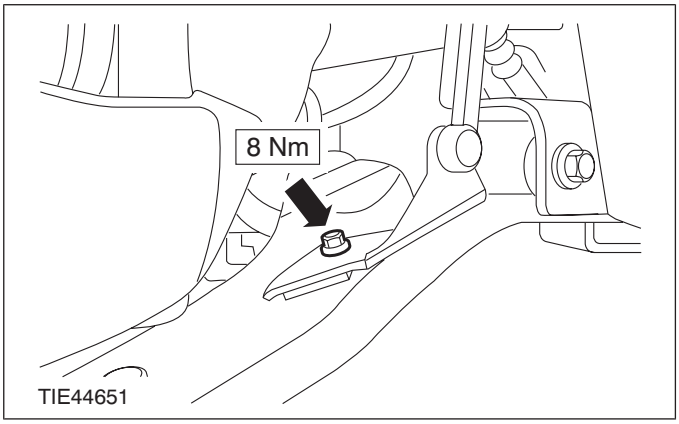
2. **Remove the front wheels and tires.**

   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3. **Remove the engine undershield.**



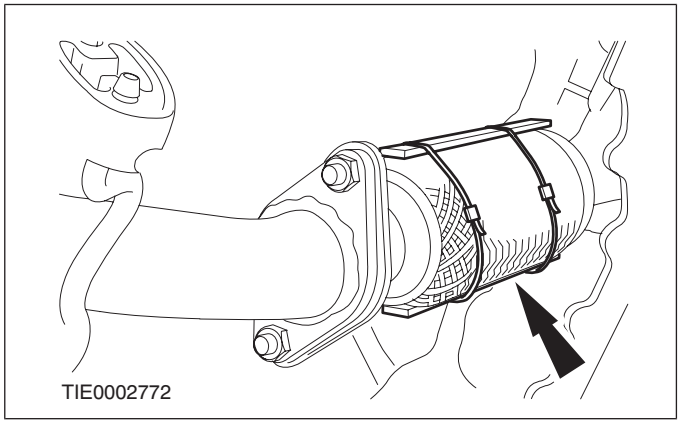
4. **Detach the headlamp leveling front sensor bracket from the right-hand lower arm and secure it to one side (if equipped).**



REMOVAL AND INSTALLATION

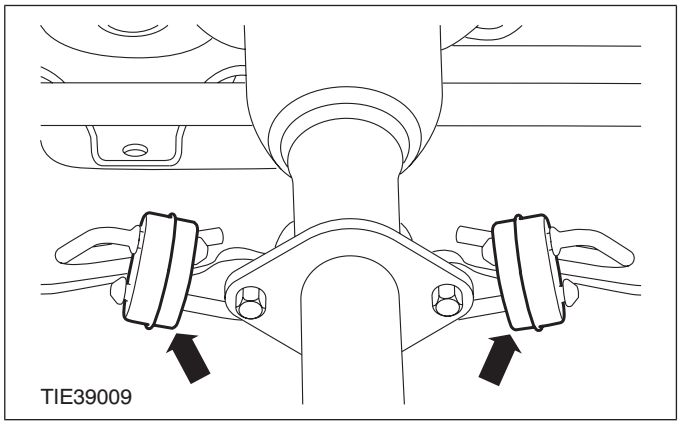
5. **CAUTION: Over bending of the exhaust flexible pipe may cause damage resulting in failure.**

   Support the exhaust flexible pipe with a suitable support wrap or a suitable splint.



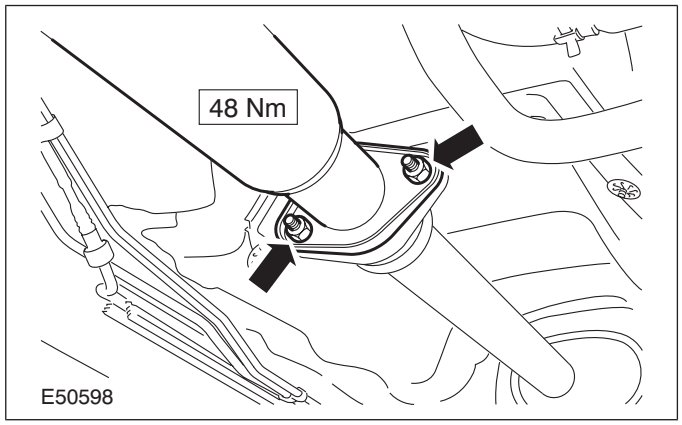
6. **CAUTION: Take care when removing the exhaust hanger insulators to prevent damage.**

   Detach the exhaust flexible pipe from the exhaust hanger insulators.



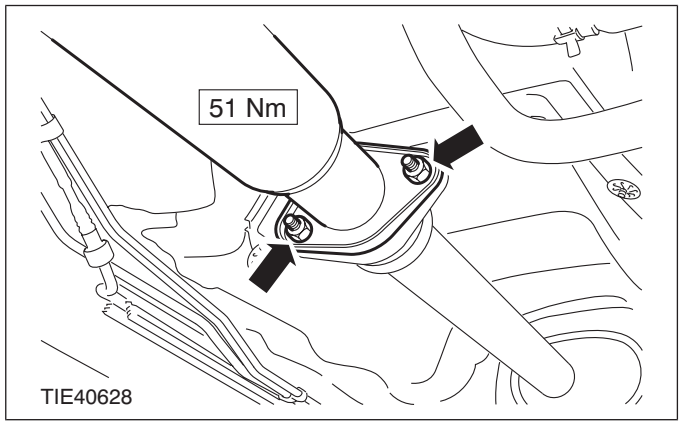
All except vehicles with diesel engine

7. **Detach the catalytic converter from the muffler and tailpipe assembly.**
   - Discard the catalytic converter to muffler and tailpipe assembly gasket and nuts.



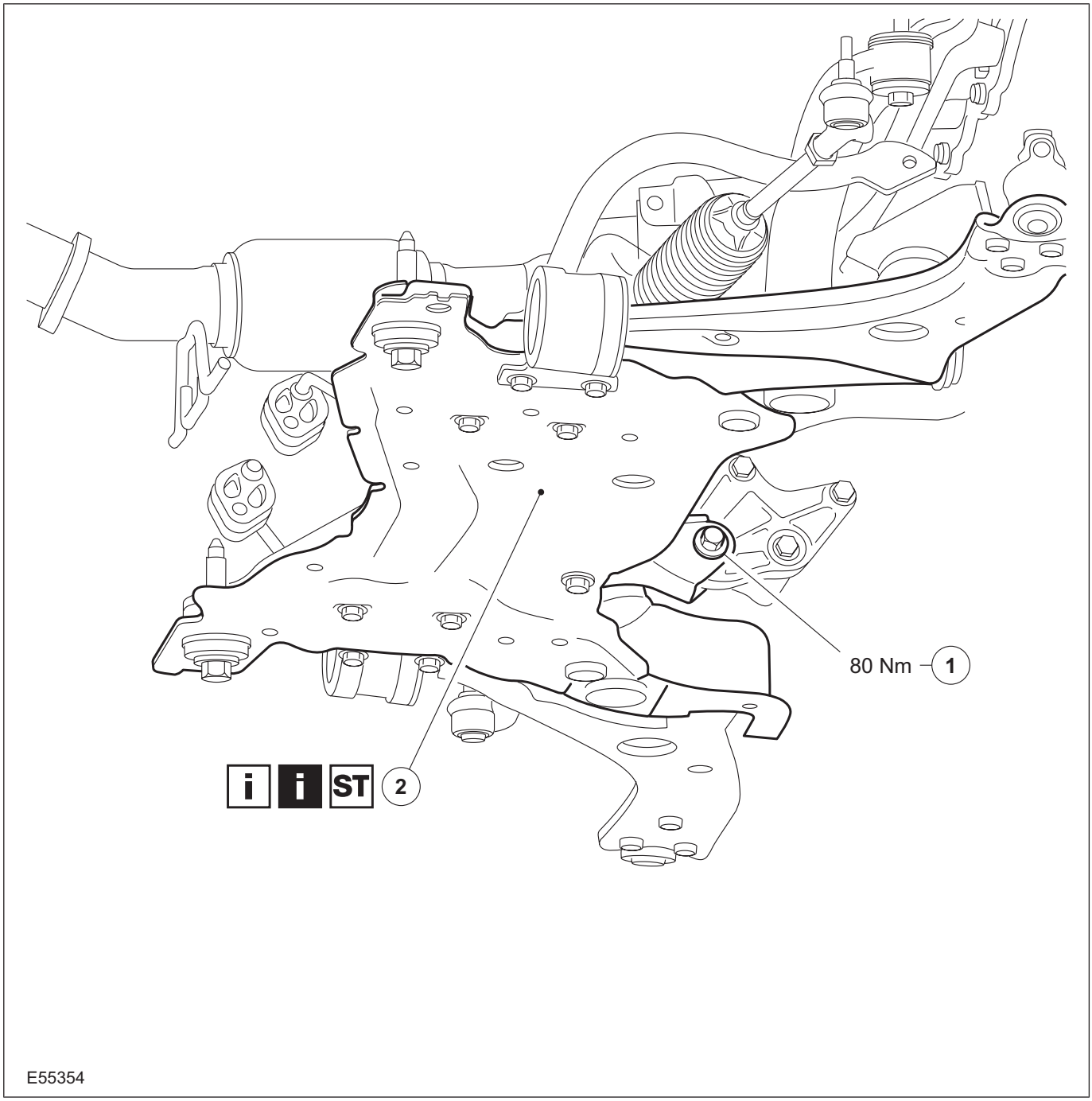
Vehicles with diesel engine

8. **Detach the catalytic converter from the muffler and tailpipe assembly.**
   - Discard the catalytic converter to muffler and tailpipe assembly sealing ring and nuts.



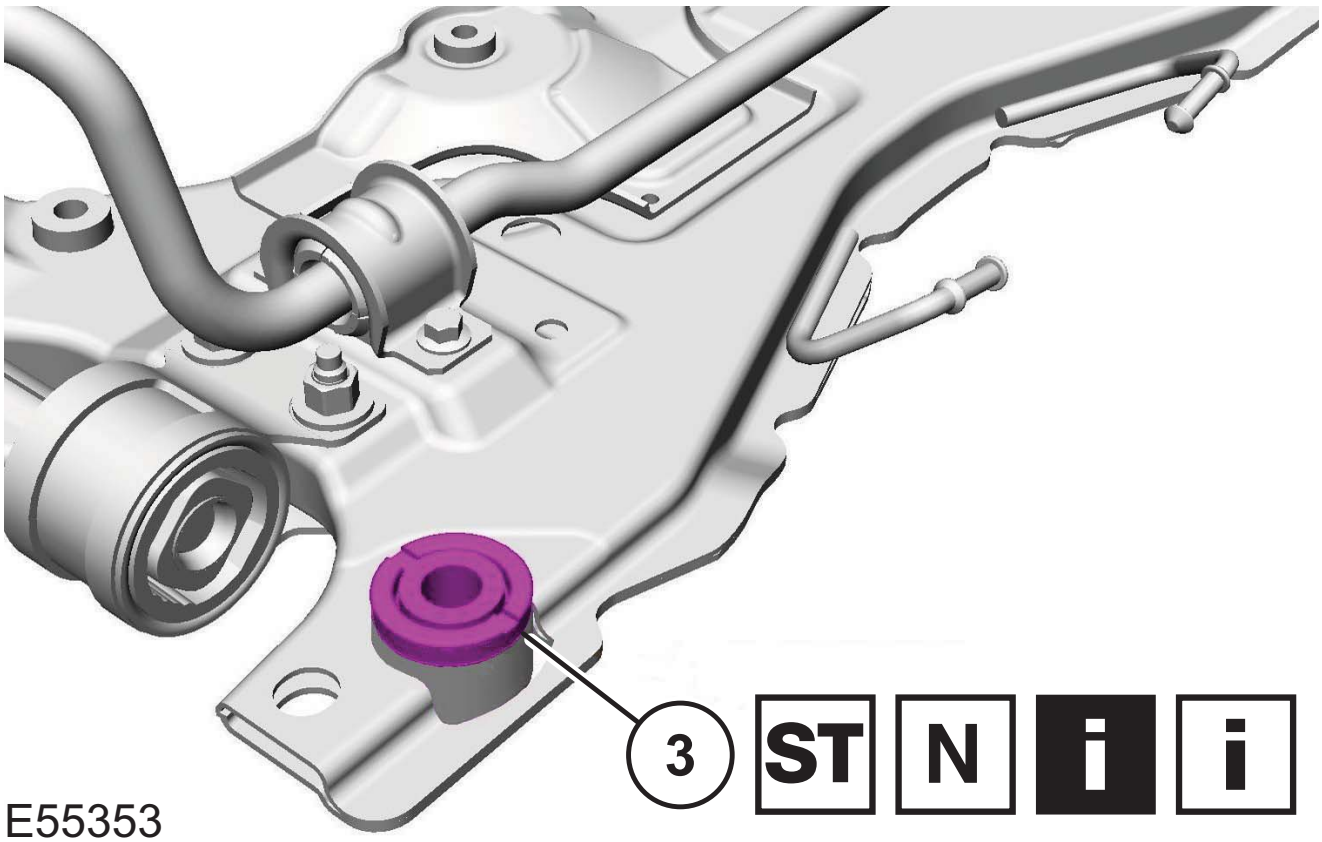
9. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



Item	Description
1	Engine support insulator front retaining bolt
2	Front axle crossmember See Removal Detail See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
3	Front axle crossmember rear bushing See Removal Detail See Installation Detail

10. To install, reverse the removal procedure.

11. Check the toe setting and adjust as necessary. For additional information, refer to: (204-00 Suspension System - General Information)

    Specifications (Specifications),
    Front Toe Adjustment (General Procedures).

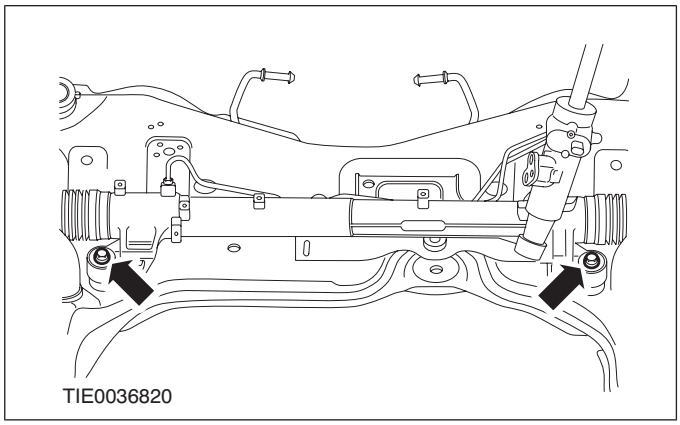
Removal Details

REMOVAL AND INSTALLATION

Item 2 Front axle crossmember

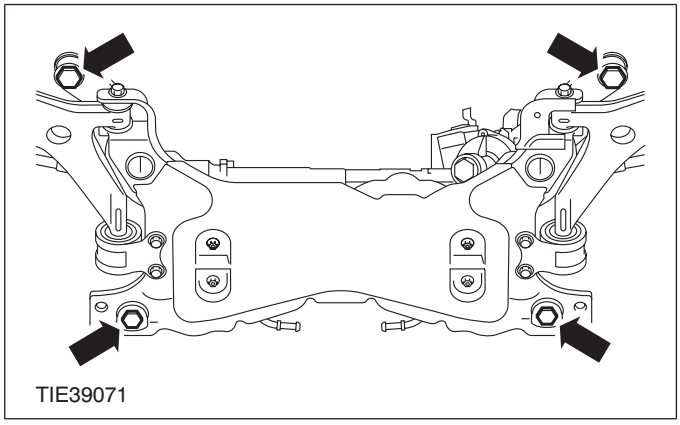
NOTE: The front axle crossmember is lowered to gain access to the front axle crossmember rear bushings.

1. **Detach the steering gear from the front axle crossmember.**
   - Using cable ties, support the steering gear.

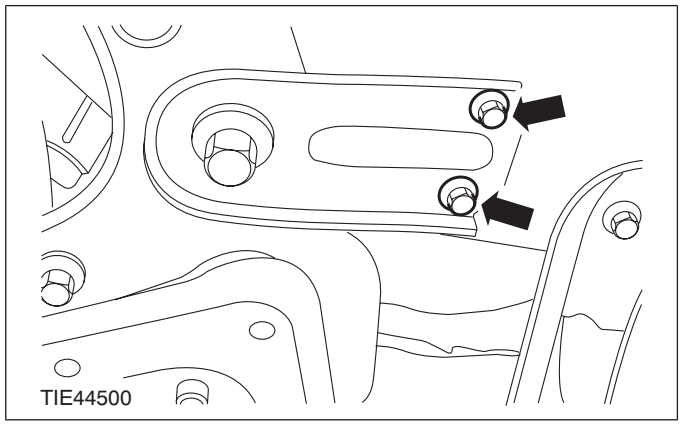


2. **Using a transmission jack and a wooden block, support the front axle crossmember, stabilizer bar and lower arm assembly.**
3. **WARNING: Make sure that the front axle crossmember is secured to the transmission jack. Failure to follow this instruction may result in personal injury.**

   Using a suitable securing strap, secure the front axle crossmember, stabilizer bar and lower arm assembly to the transmission jack.
4. **Remove the front axle crossmember retaining bolts (transmission jack shown removed for clarity).**



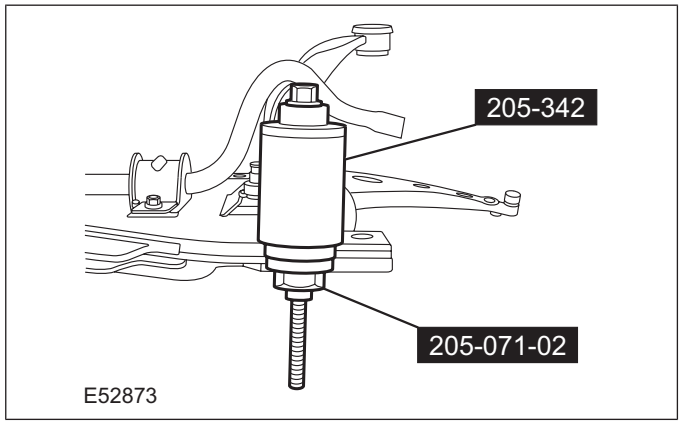
5. **Remove the front axle crossmember bracket retaining bolts on both sides.**



6. **Lower the front axle crossmember, stabilizer bar and lower arm assembly to gain access to the front axle crossmember rear bushings.**

Item 3 Front axle crossmember rear bushing

1. **Using the special tools, remove the front axle crossmember rear bushing.**

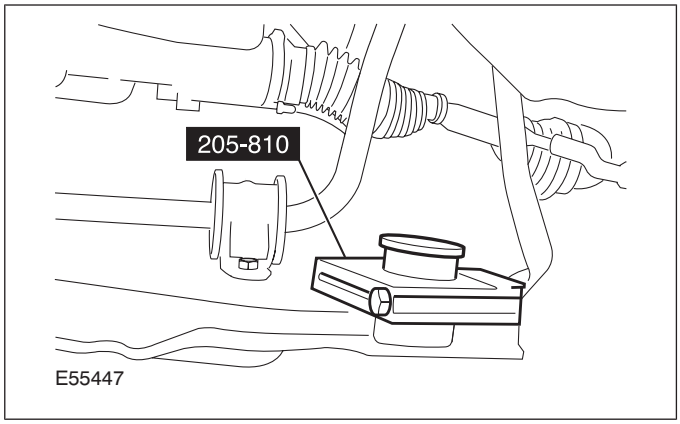


Installation Details

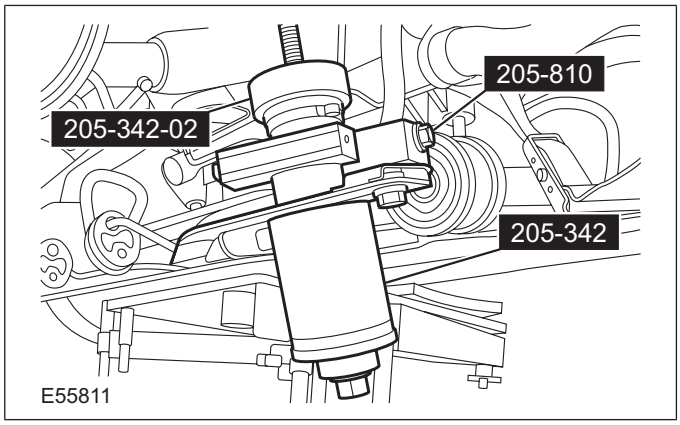
REMOVAL AND INSTALLATION

Item 3 Front axle crossmember rear bushing

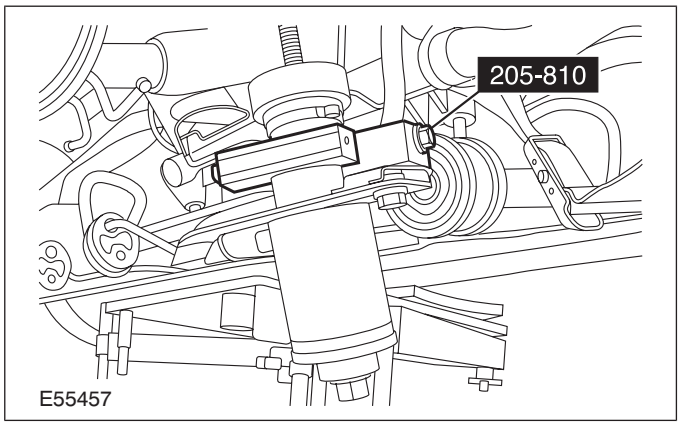
1. Clean the front axle crossmember rear bushing housing.
2. Using the special tool, attach the front axle crossmember rear bushing to the front axle crossmember.



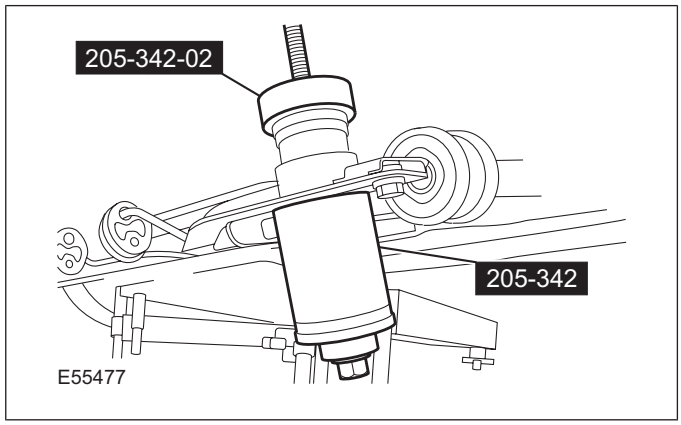
3. Using the special tools, press the front axle crossmember rear bushing in approximately 10 mm.



4. Remove the special tool.



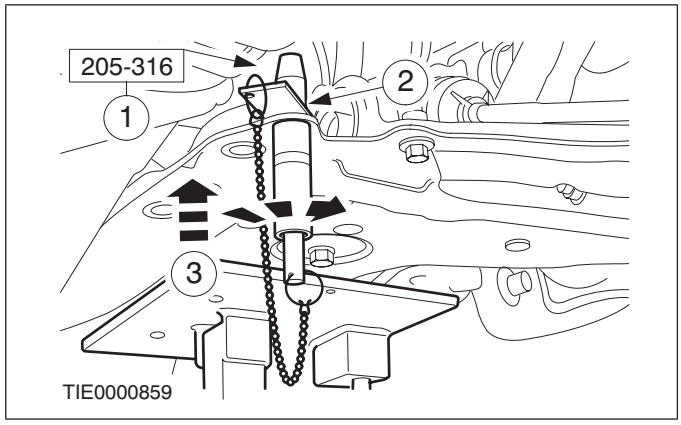
5. Using the special tools, install the front axle crossmember rear bushing.



6. Remove the special tools.

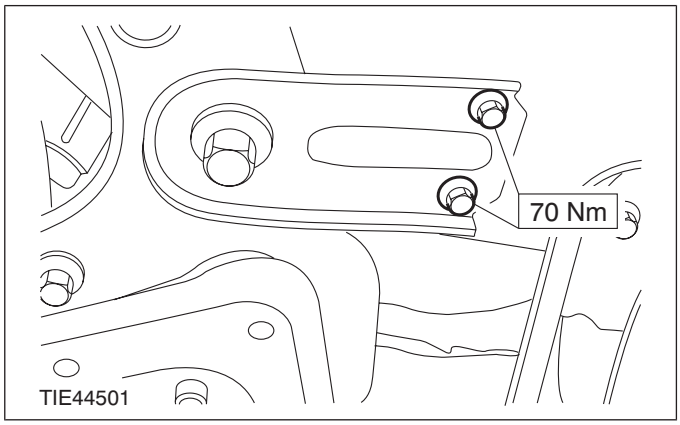
Item 2 Front axle crossmember

1. Using the transmission jack and the special tool, position and align the front axle crossmember.
   1. Insert the special tool through the front axle crossmember alignment holes.
   2. Slide the locking plates into the groove of the special tool and tighten the special tool sleeve.
   3. Raise the front axle crossmember engaging the special tool into the chassis alignment holes.



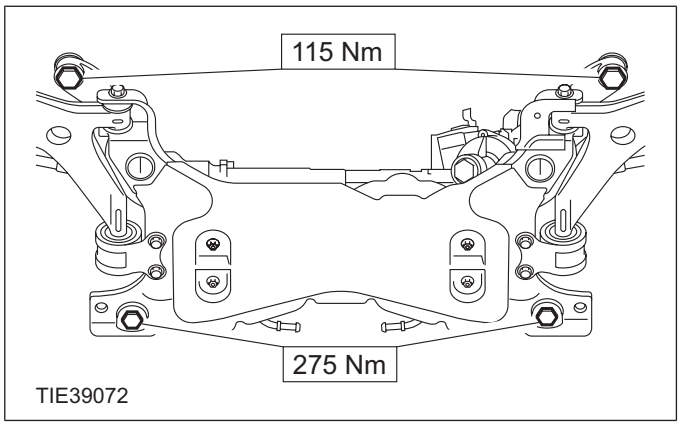
REMOVAL AND INSTALLATION

2. **Install the front axle crossmember bracket retaining bolts on both sides.**



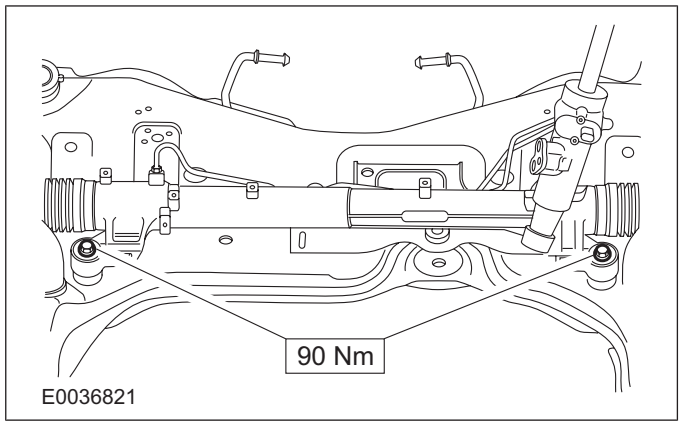
3. **CAUTION: Make sure that the front axle crossmember does not move while tightening the front axle crossmember retaining bolts.**

   Install the front axle crossmember retaining bolts (transmission jack shown removed for clarity).



4. **Remove the special tool.**
5. **Remove the securing strap.**
6. **Lower and remove the transmission jack and the wooden block.**
7. **Attach the steering gear to the front axle crossmember.**

- Remove the cable ties.



REMOVAL AND INSTALLATION

Rear Axle Crossmember — Vehicles With: Solid Stabilizer Bar Link, Vehicles Without: Fuel Additive Tank

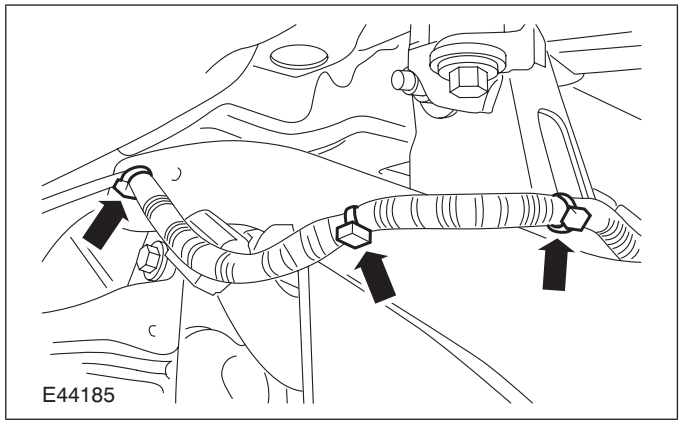
General Equipment

Securing strap
Transmission jacks

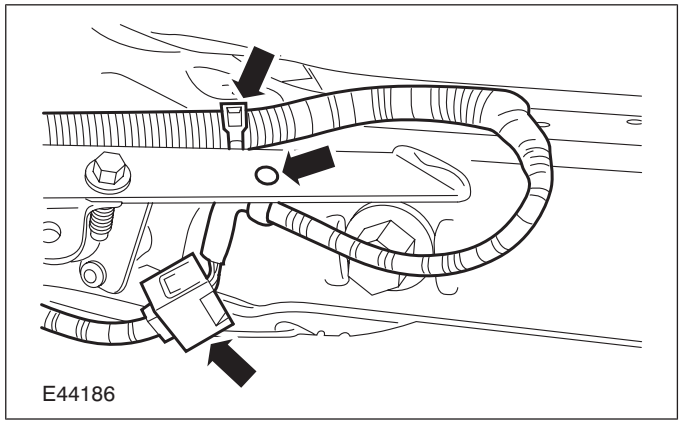
1. **Remove the spring on both sides.**
2. **Remove the evaporative emission canister (if equipped).**
3. **Remove the headlamp leveling rear sensor (if equipped).**

   For additional information, refer to: Headlamp Leveling Rear Sensor (417-01 Exterior Lighting, Removal and Installation).

4. **Detach the headlamp leveling sensor wiring harness from the rear axle crossmember (if equipped).**

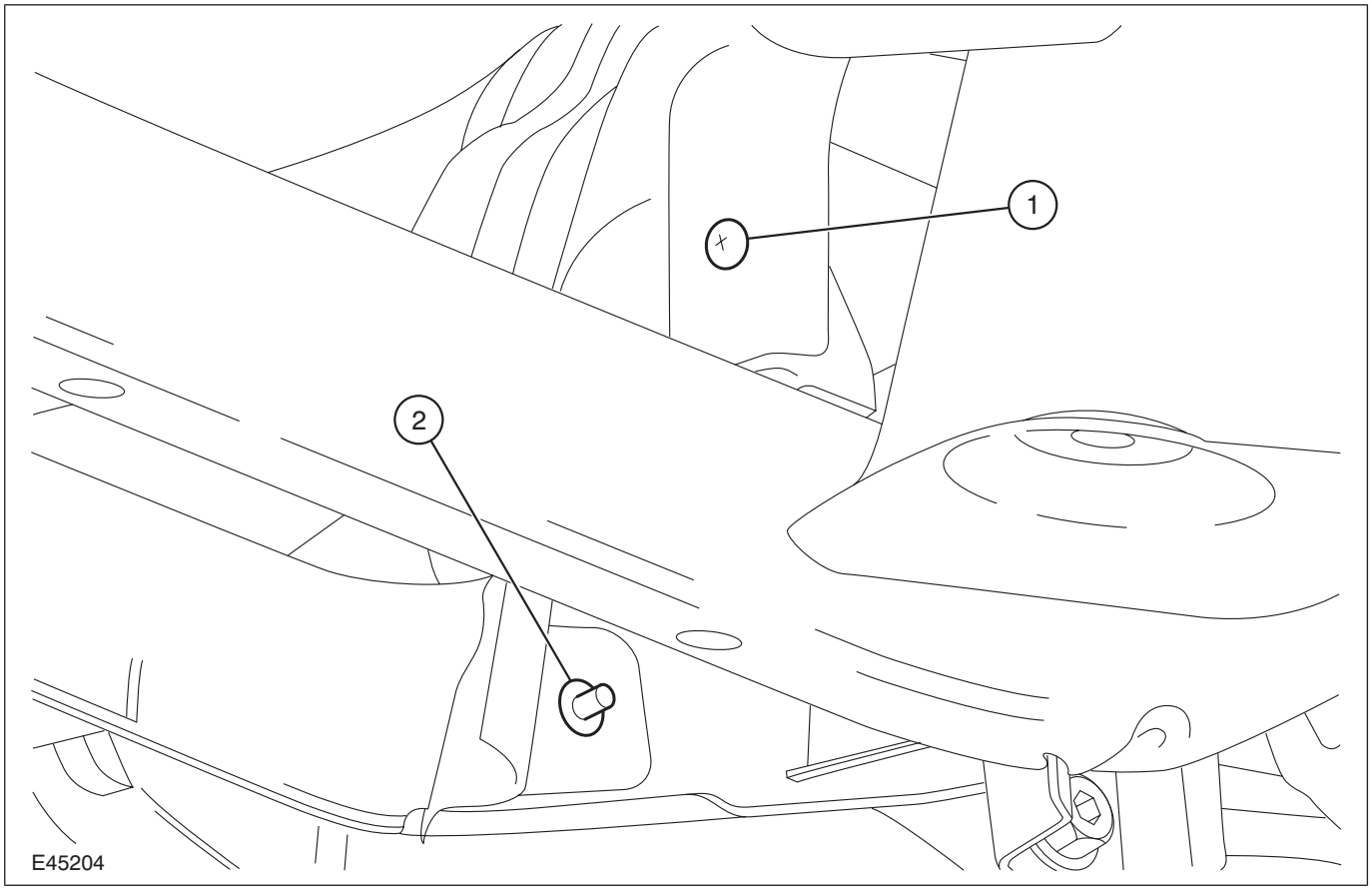


5. **Detach the headlamp leveling sensor wiring harness from the rear axle crossmember and disconnect the electrical connector (if equipped).**



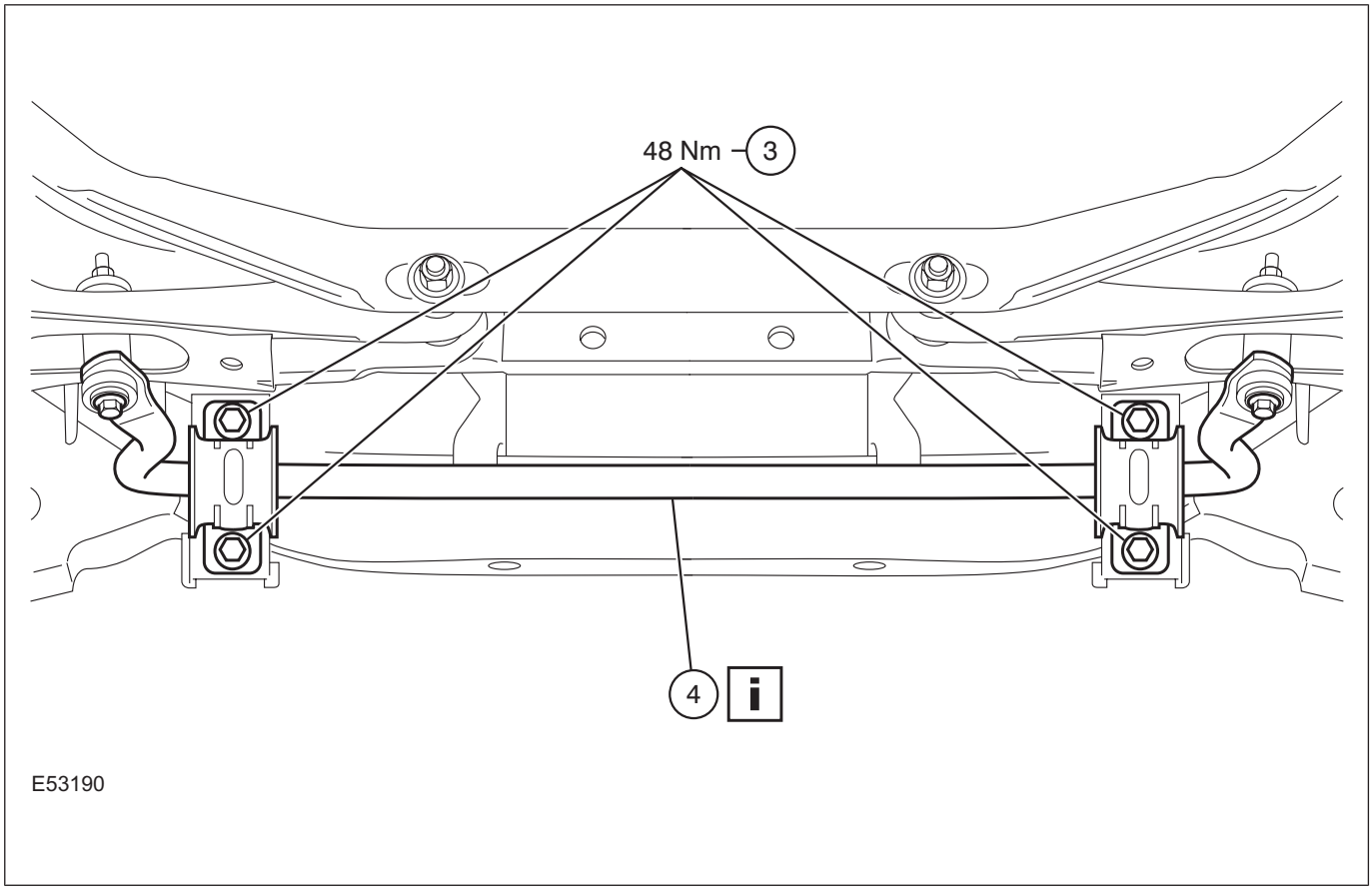
6. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



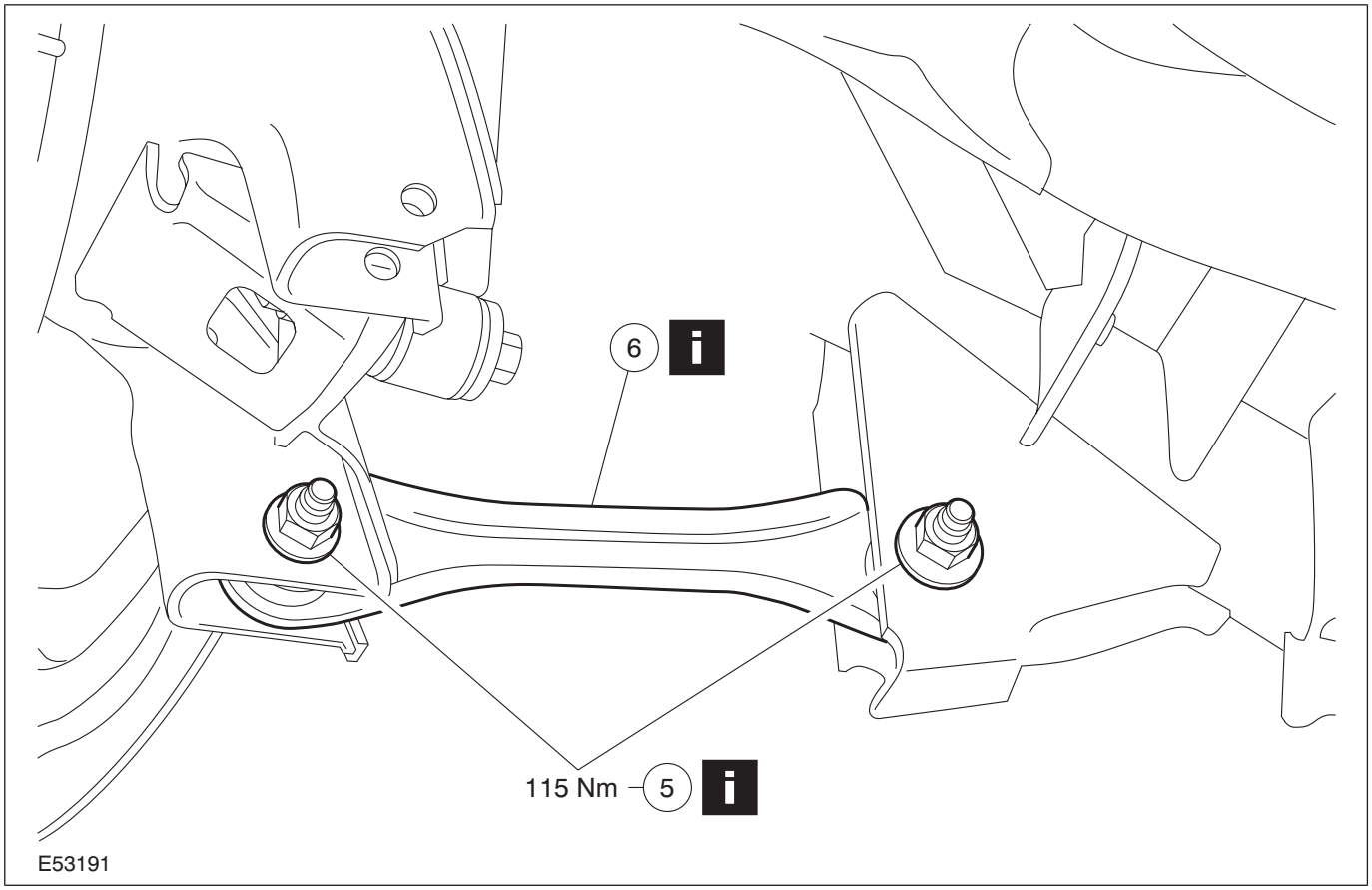
Item	Description
1	Evaporative emission canister heat shield to rear axle crossmember stud (if equipped)
2	Evaporative emission canister heat shield to rear axle crossmember retaining bolt (if equipped)

REMOVAL AND INSTALLATION



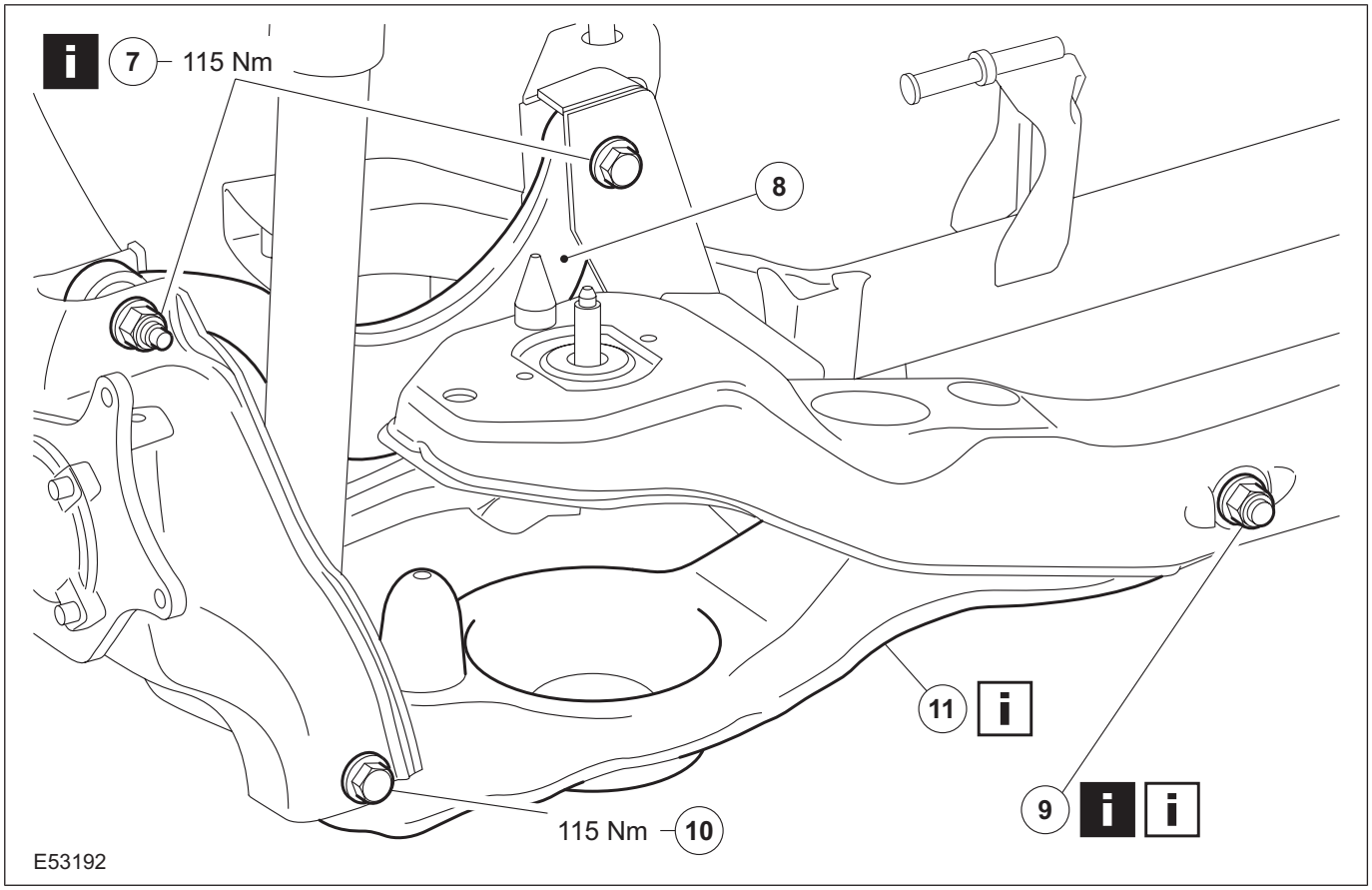
Item	Description
3	Stabilizer bar clamp retaining bolts
4	Stabilizer bar See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
5	Front lower arm retaining bolts See Removal Detail
6	Front lower arm See Removal Detail

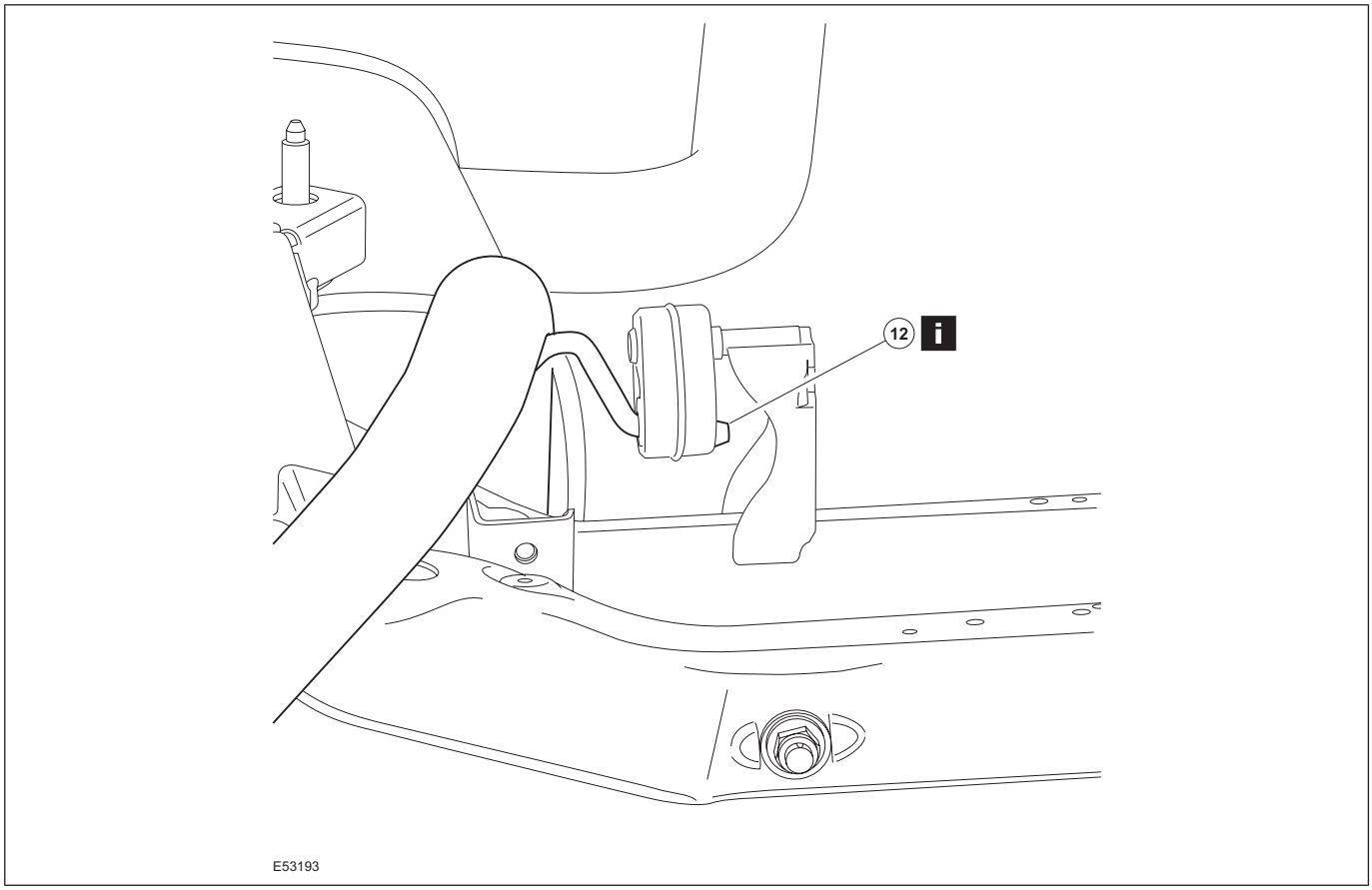
REMOVAL AND INSTALLATION



Item	Description
7	Upper arm retaining bolts See Removal Detail
8	Upper arm
9	Rear lower arm adjustment cam nut See Removal Detail See Installation Detail

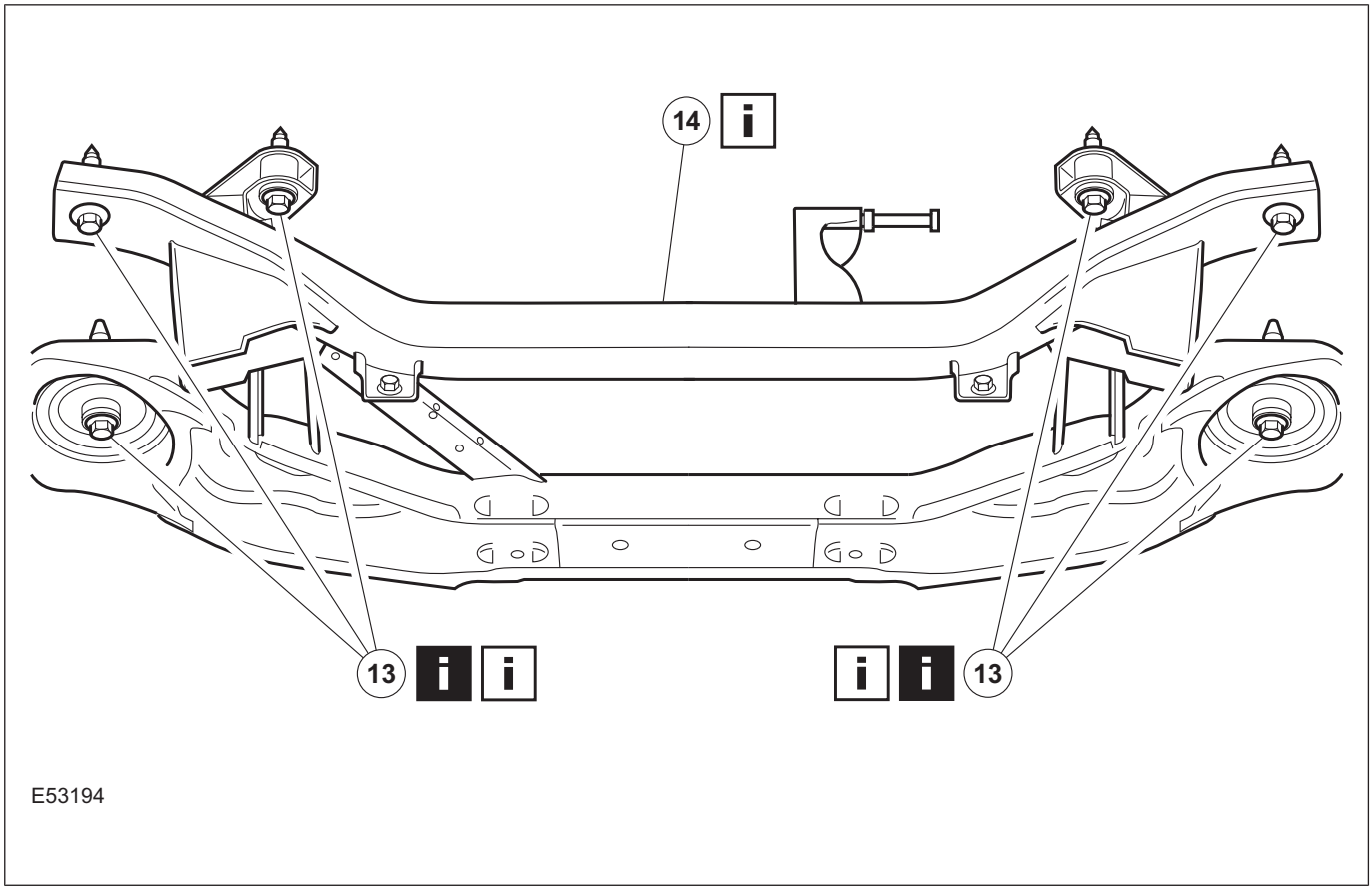
Item	Description
10	Rear lower arm to wheel knuckle retaining bolt
11	Rear lower arm See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
12	Exhaust hanger insulator See Removal Detail

REMOVAL AND INSTALLATION

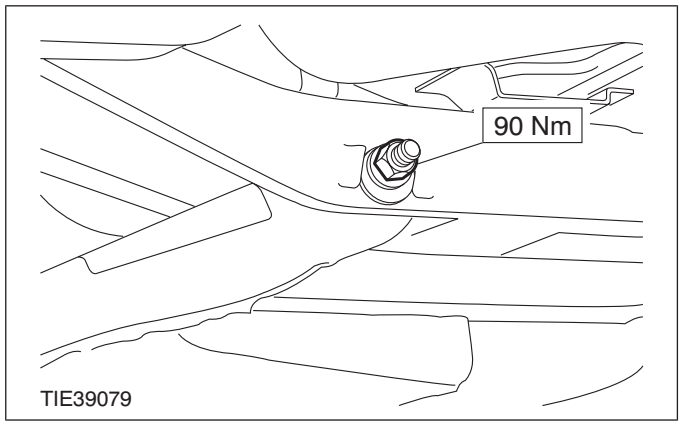


Item	Description
13	Rear axle crossmember retaining bolts See Removal Detail See Installation Detail
14	Rear axle crossmember See Installation Detail

7. **To install, reverse the removal procedure.**
8. **Check the toe setting and adjust as necessary. For additional information, refer to: (204-00 Suspension System - General Information)**

   Specifications (Specifications),
   Rear Toe Adjustment (General Procedures).
9. **NOTE: Final tightening of the rear lower arm adjustment cam nut must be carried out when the vehicle weight is on the road wheels.**

   Tighten the rear lower arm adjustment cam nut on both sides.

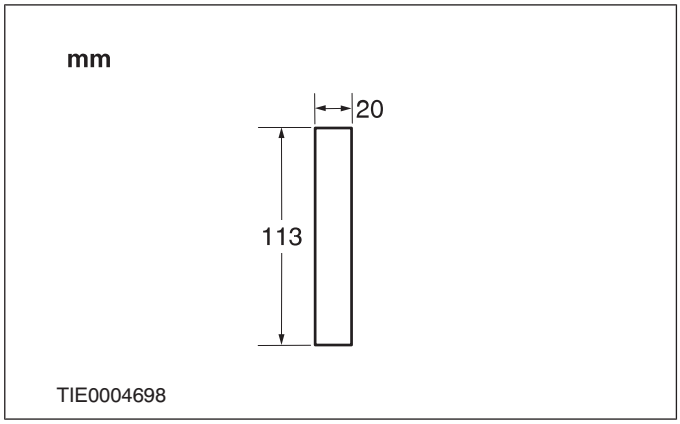


Removal Details

REMOVAL AND INSTALLATION

Item 5 Front lower arm retaining bolts

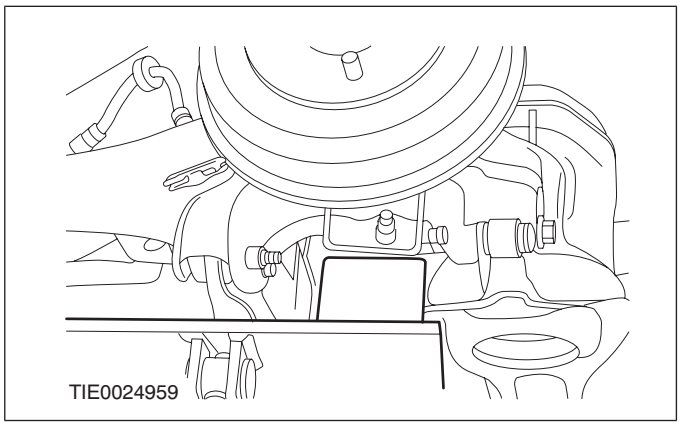
1. Fabricate two 20 mm wide by 113 mm long spacers.



2. CAUTION: Both sides of the suspension must be set to the design height setting.

Using two transmission jacks and wooden blocks, raise the suspension to the design height setting on both sides.

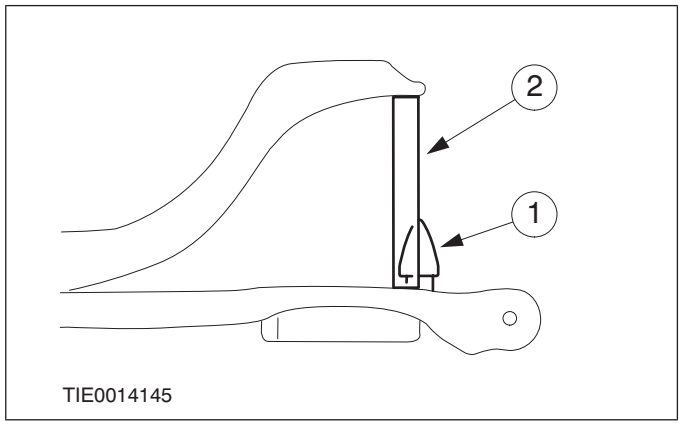
- Position the transmission jack and the wooden block as shown.



3. NOTE: The spacer must be positioned exactly as shown.

Install the spacer on both sides.

1. Remove the bump stop.
2. Install the spacer between the rear lower arm and the rear axle crossmember making sure that the spacer is in a vertical plane.



Item 6 Front lower arm

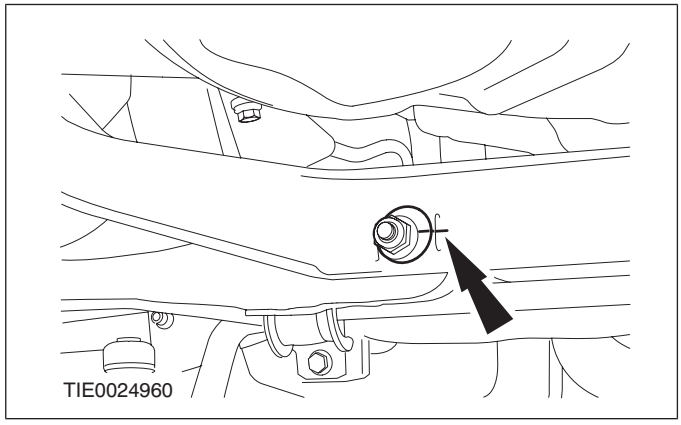
CAUTION: The front lower arms are marked FRONT. Make a note of the position of the front lower arms to aid installation.

Item 7 Upper arm retaining bolts

NOTE: Make a note of the position of the upper arms to aid installation.

Item 9 Rear lower arm adjustment cam nut

1. Mark the position of the rear lower arm adjustment cam to the rear axle crossmember on both sides.



Item 12 Exhaust hanger insulator

NOTE: Support the exhaust muffler and tailpipe assembly.

Item 13 Rear axle crossmember retaining bolts

1. Using a transmission jack, support the rear axle crossmember.

REMOVAL AND INSTALLATION

2. **WARNING: Make sure that the rear axle crossmember is secured to the transmission jack. Failure to follow this instruction may result in personal injury.**

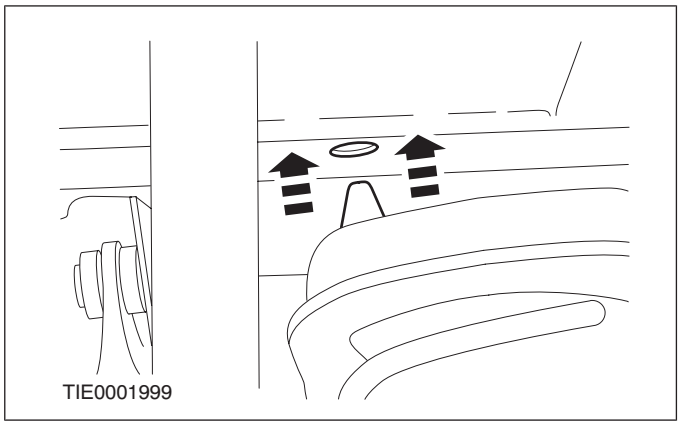
   Using a securing strap, secure the rear axle crossmember to the transmission jack.

Installation Details

Item 14 Rear axle crossmember

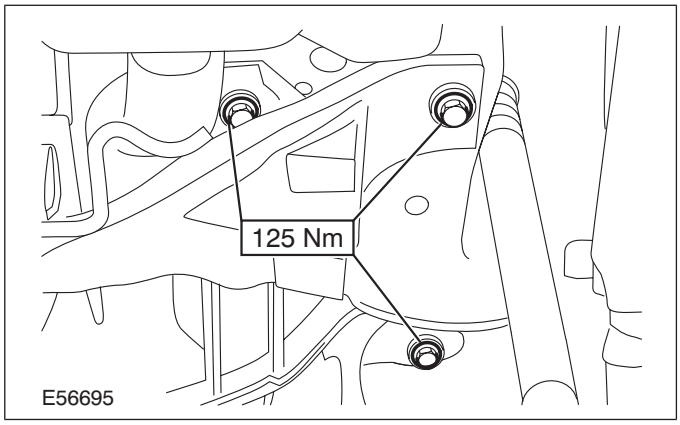
1. **Using a transmission jack, support the rear axle crossmember.**
2. **WARNING: Make sure that the rear axle crossmember is secured to the transmission jack. Failure to follow this instruction may result in personal injury.**

   Using a securing strap, secure the rear axle crossmember to the transmission jack.
3. **Locate the rear axle crossmember.**



Item 13 Rear axle crossmember retaining bolts

1. **Install the rear axle crossmember retaining bolts on both sides.**



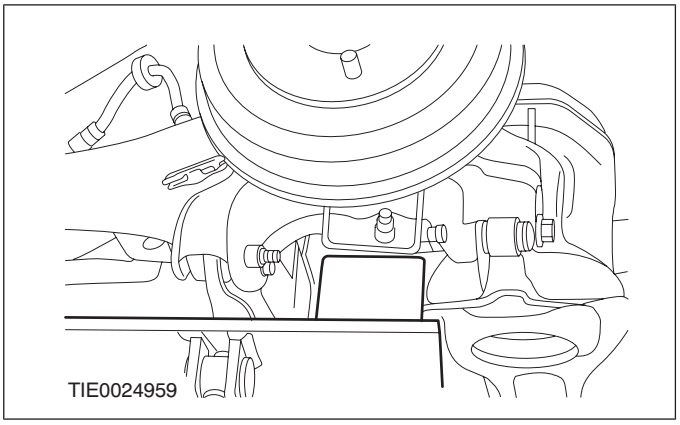
2. **Remove the securing strap.**
3. **Lower and remove the transmission jack.**

Item 11 Rear lower arm

1. **CAUTION: Both sides of the suspension must be set to the design height setting.**

   Using two transmission jacks and wooden blocks, raise the suspension to the design height setting on both sides.

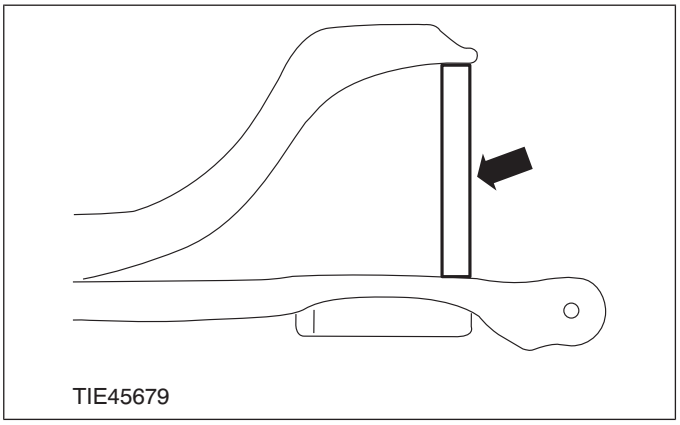
   - Position the transmission jack and the wooden block as shown.



2. **NOTE: The spacer must be positioned exactly as shown.**

   Install the spacer on both sides.

   - Install the spacer between the rear lower arm and the rear axle crossmember making sure that the spacer is in a vertical plane.



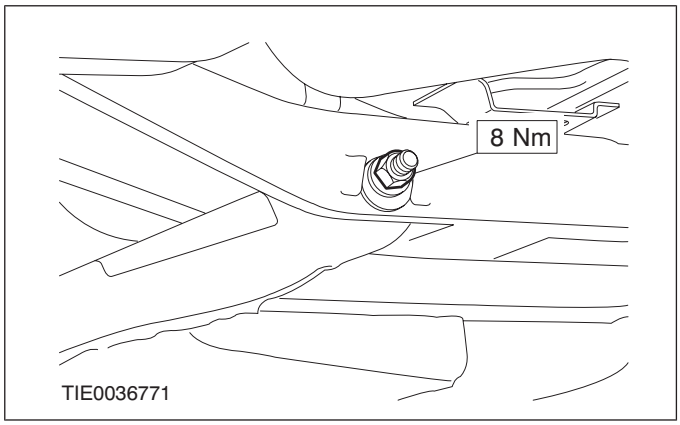
REMOVAL AND INSTALLATION

Item 9 Rear lower arm adjustment cam nut

1. **NOTE: Do not fully tighten the rear lower arm adjustment cam nut at this stage.**

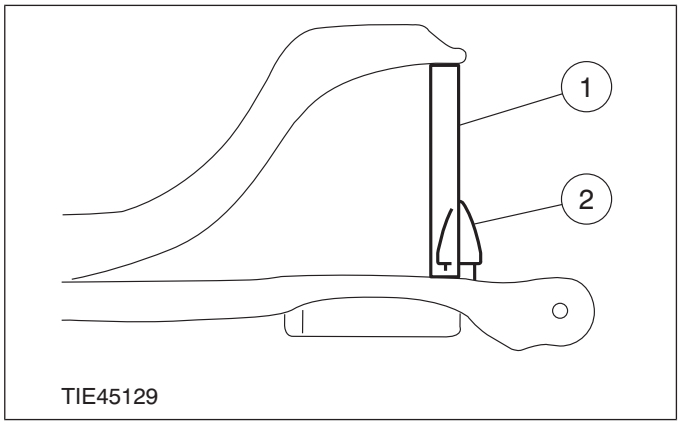
NOTE: Align the mark on the rear lower arm adjustment cam to the mark on the rear axle crossmember.

Install the rear lower arm adjustment cam nut on both sides.



Item 4 Stabilizer bar

1. **Lower the suspension from the design height setting on both sides.**
   1. Remove the spacer.
   2. Install the bump stop.



2. **Position the stabilizer bar.**

REMOVAL AND INSTALLATION

Rear Axle Crossmember — Vehicles With: Ball Joint Stabilizer Bar Link, Vehicles Without: Fuel Additive Tank

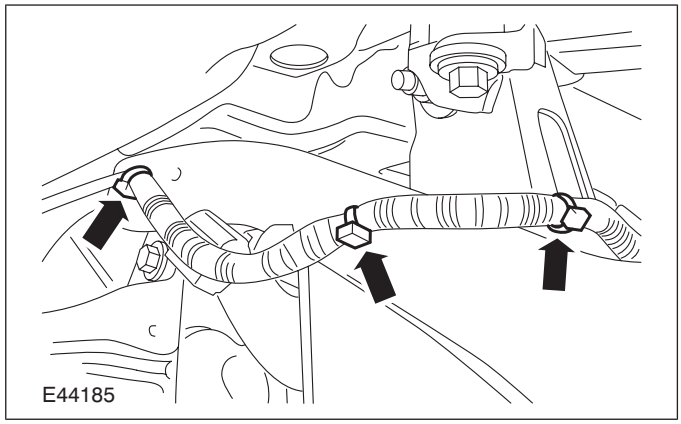
General Equipment

Securing strap
Transmission jacks

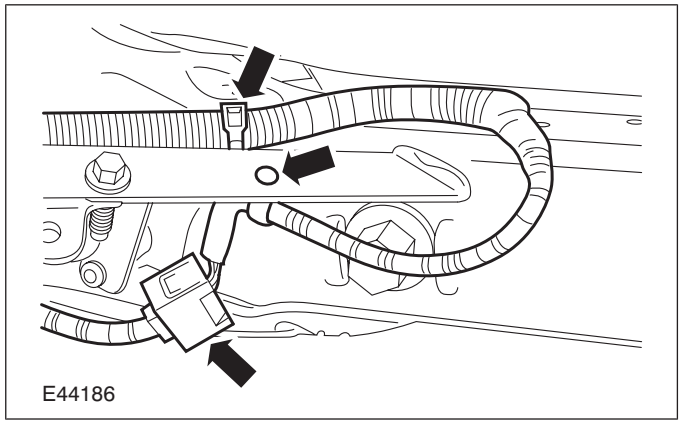
1. **Remove the spring on both sides.**
2. **Remove the evaporative emission canister (if equipped).**
3. **Remove the headlamp leveling rear sensor (if equipped).**

   For additional information, refer to: Headlamp Leveling Rear Sensor (417-01 Exterior Lighting, Removal and Installation).

4. **Detach the headlamp leveling sensor wiring harness from the rear axle crossmember (if equipped).**

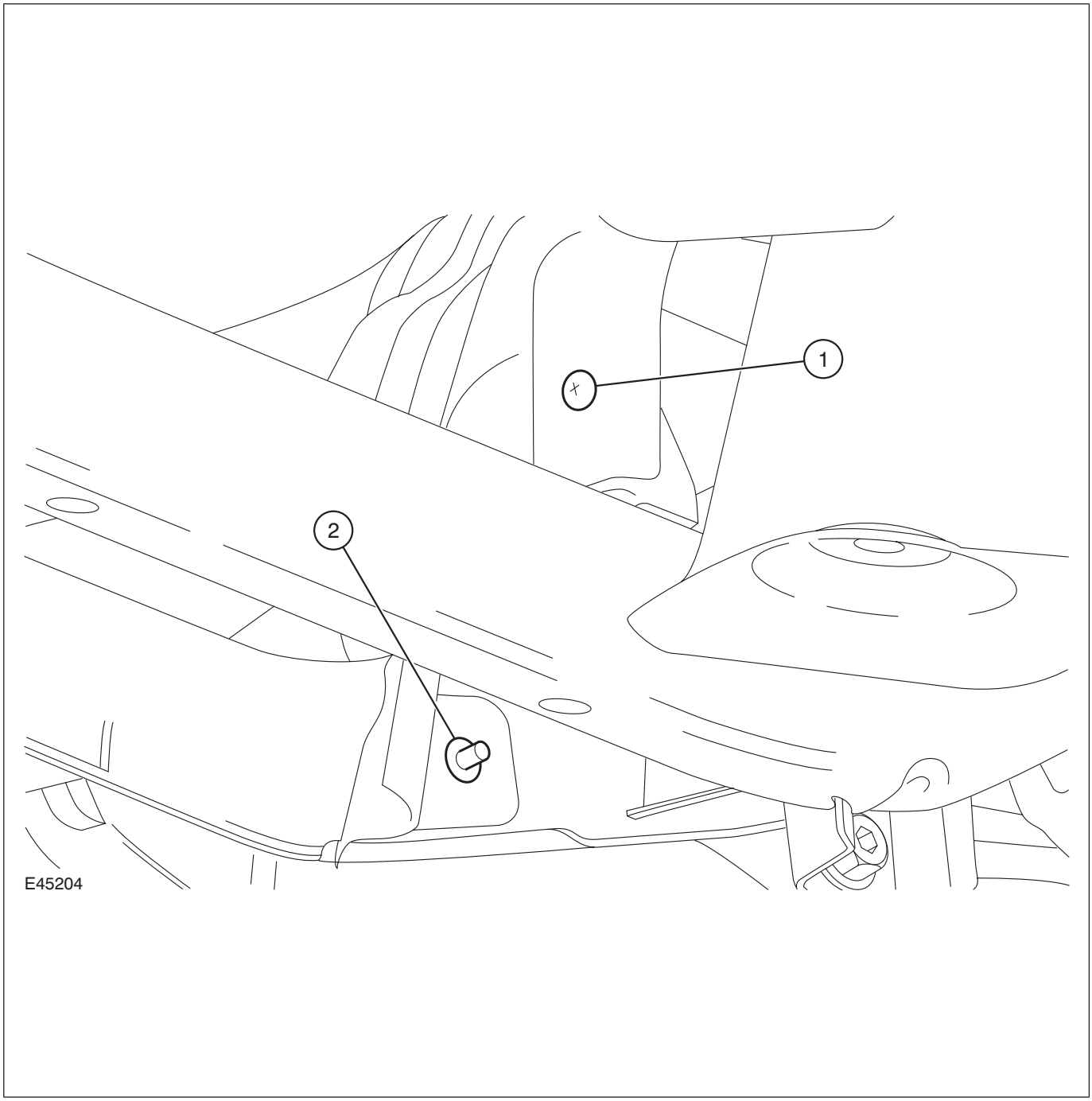

E44185

5. **Detach the headlamp leveling sensor wiring harness from the rear axle crossmember and disconnect the electrical connector (if equipped).**


E44186

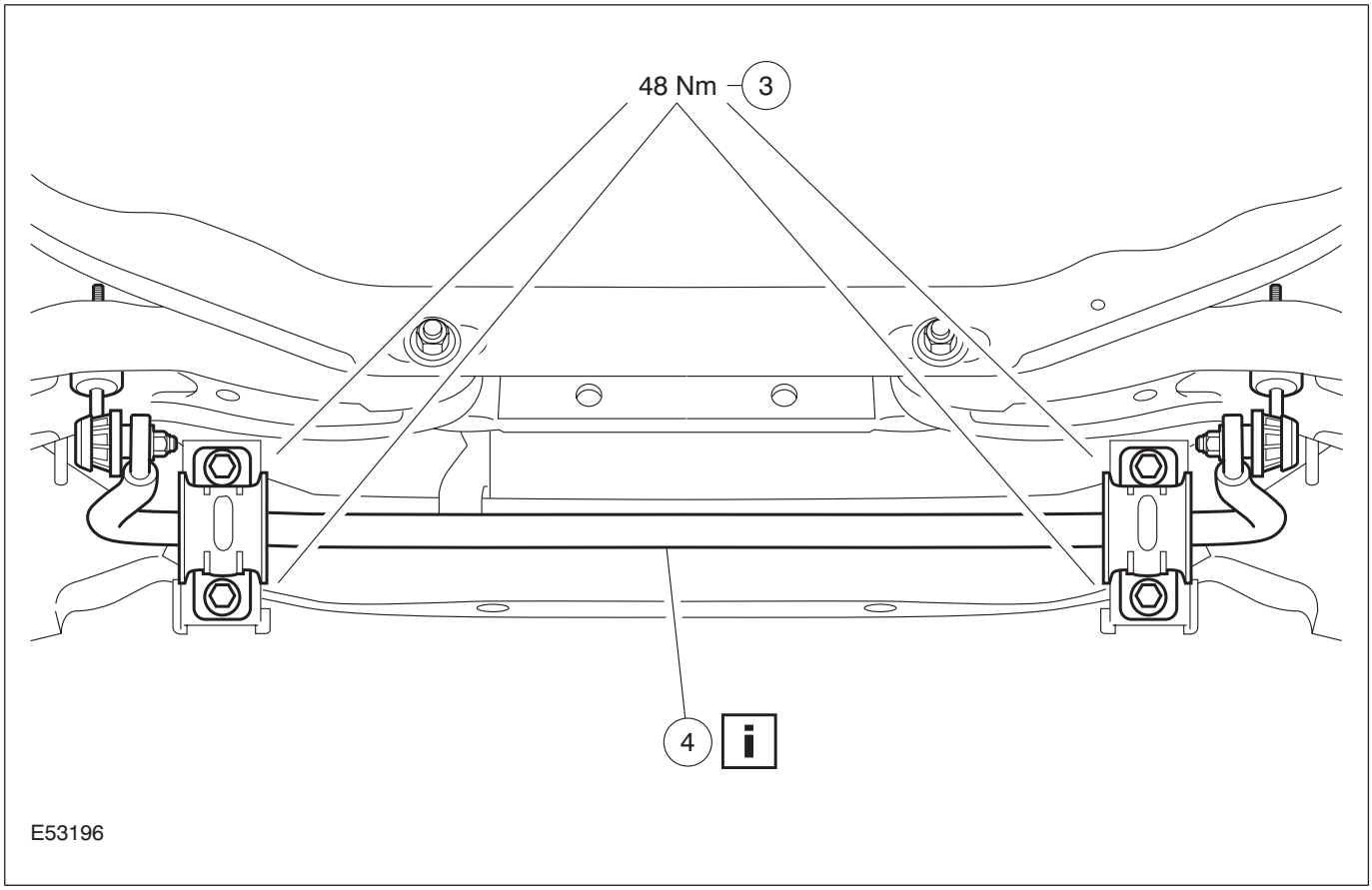
6. **Remove the components in the order indicated in the following illustration(s) and table(s).**

REMOVAL AND INSTALLATION



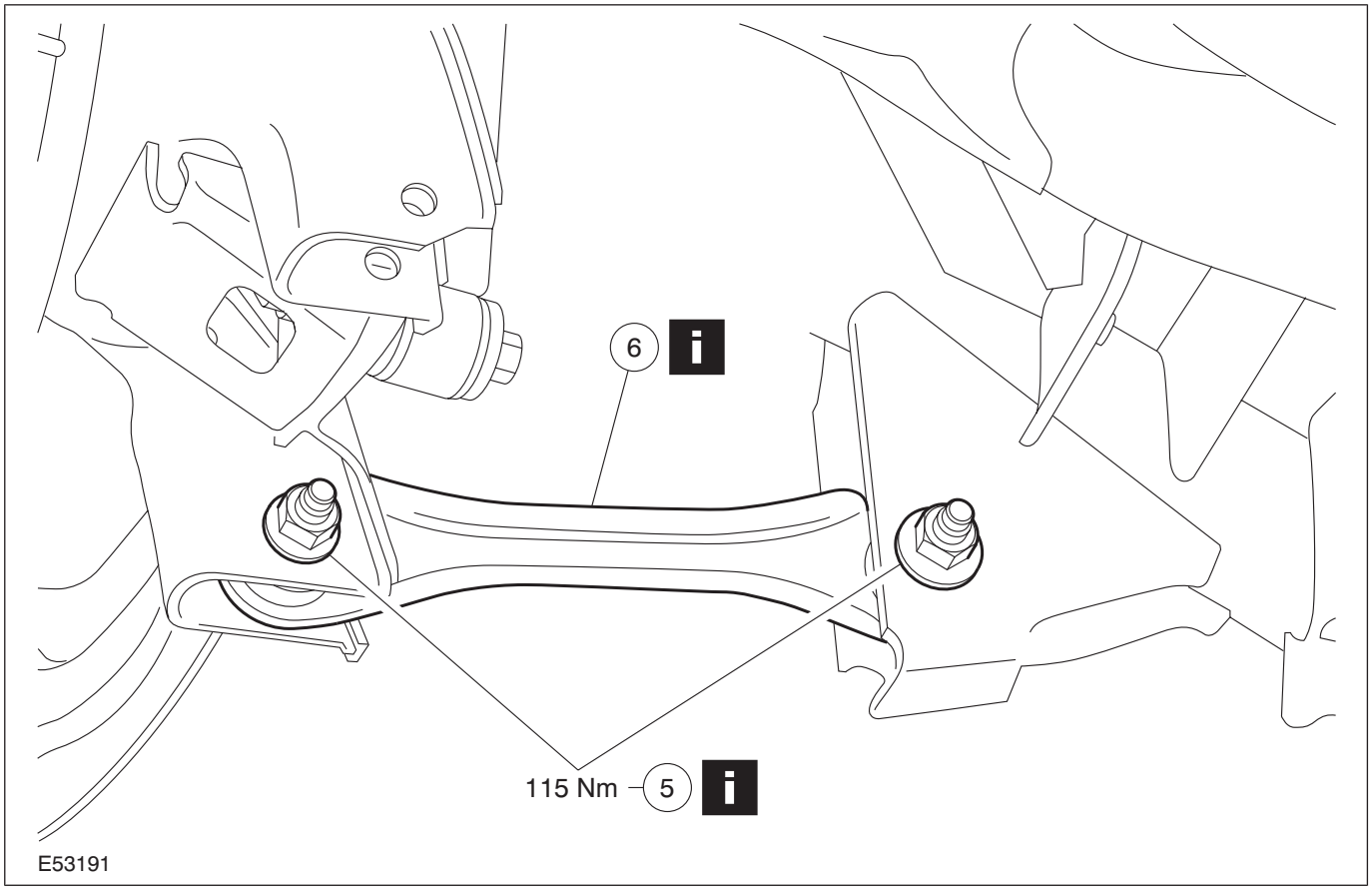
Item	Description
1	Evaporative emission canister heat shield to rear axle crossmember stud (if equipped)
2	Evaporative emission canister heat shield to rear axle crossmember retaining bolt (if equipped)

REMOVAL AND INSTALLATION



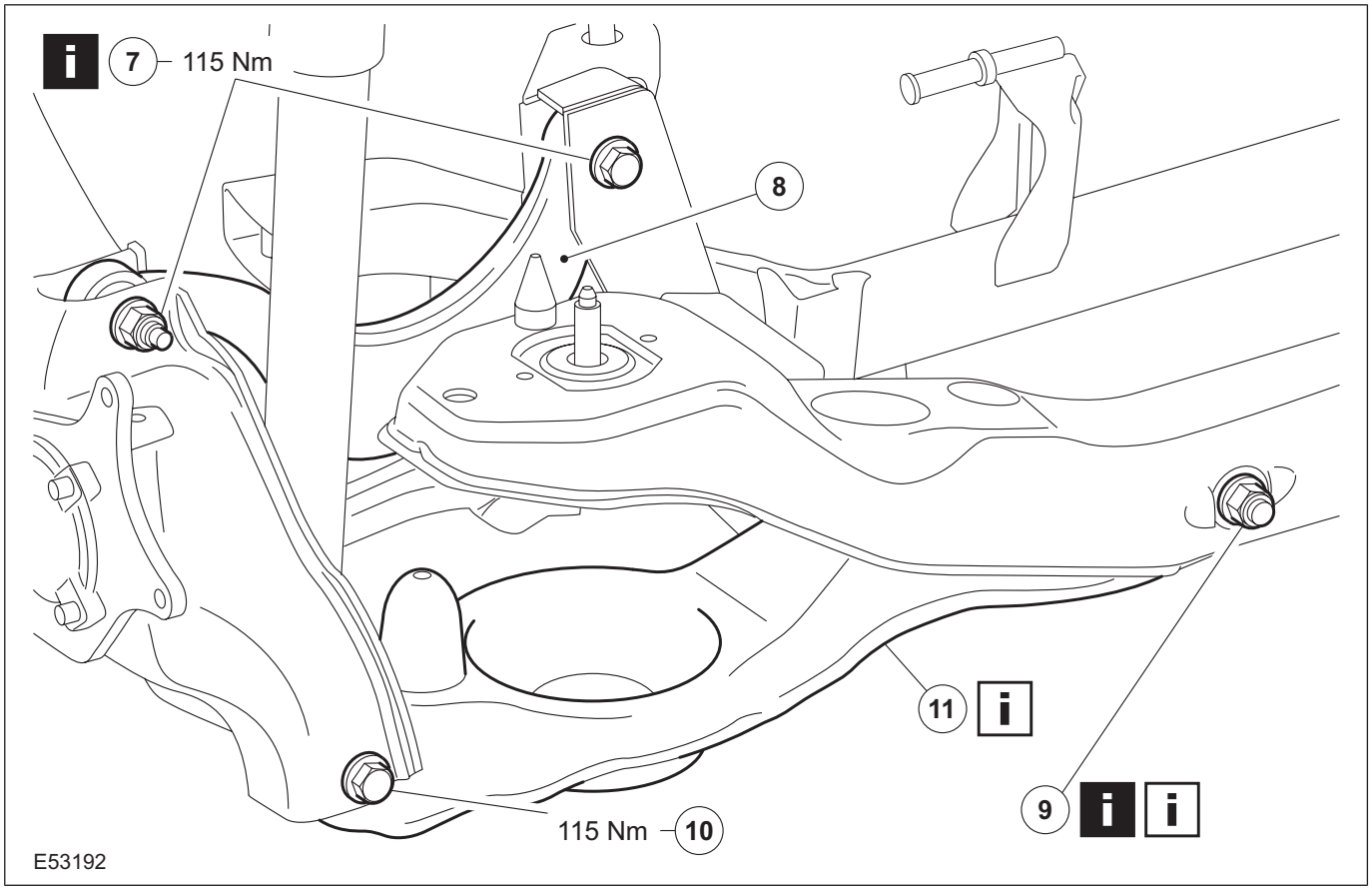
Item	Description
3	Stabilizer bar clamp retaining bolts
4	Stabilizer bar See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
5	Front lower arm retaining bolts See Removal Detail
6	Front lower arm See Removal Detail

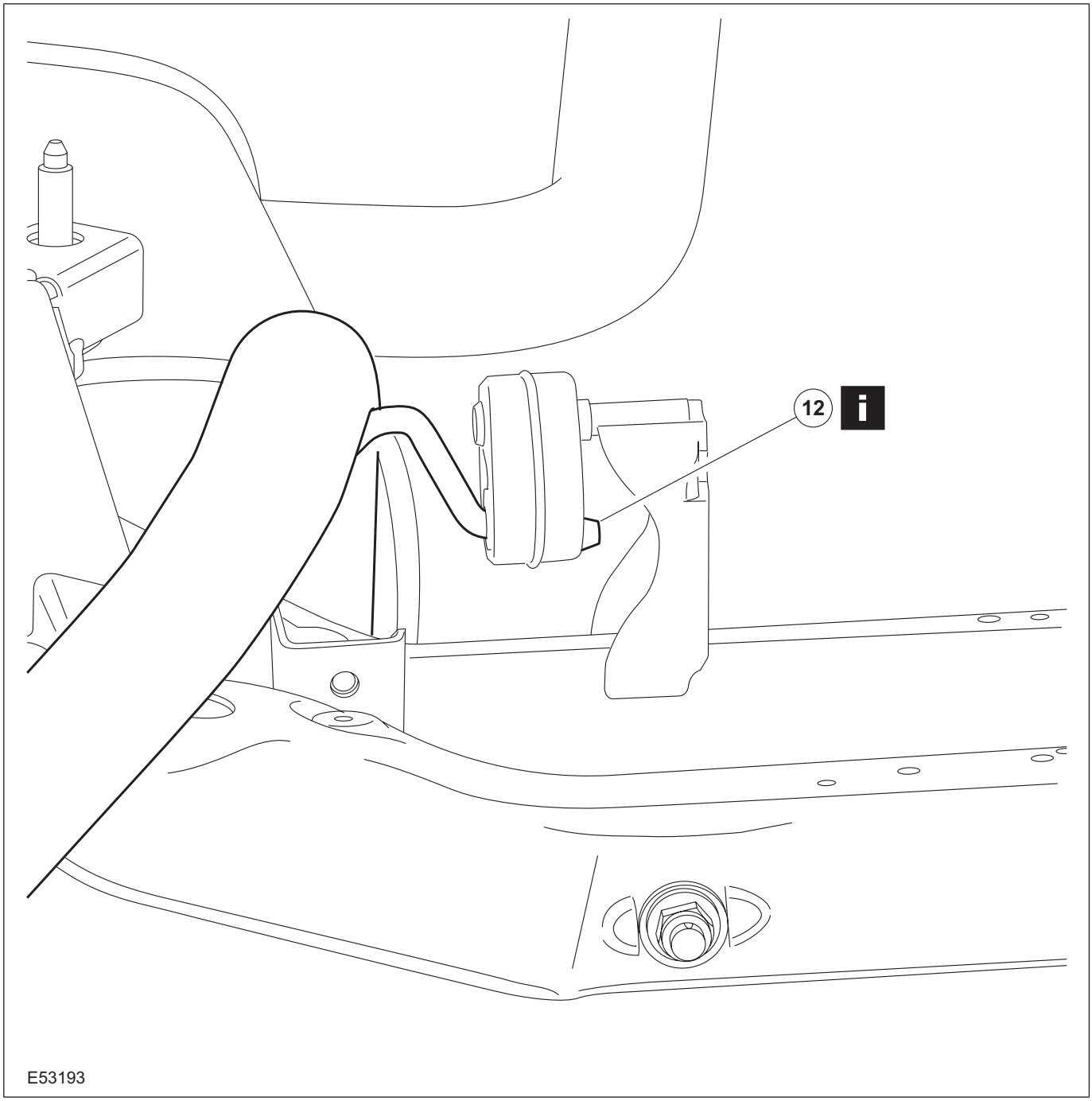
REMOVAL AND INSTALLATION



Item	Description
7	Upper arm retaining bolts See Removal Detail
8	Upper arm
9	Rear lower arm adjustment cam nut See Removal Detail See Installation Detail

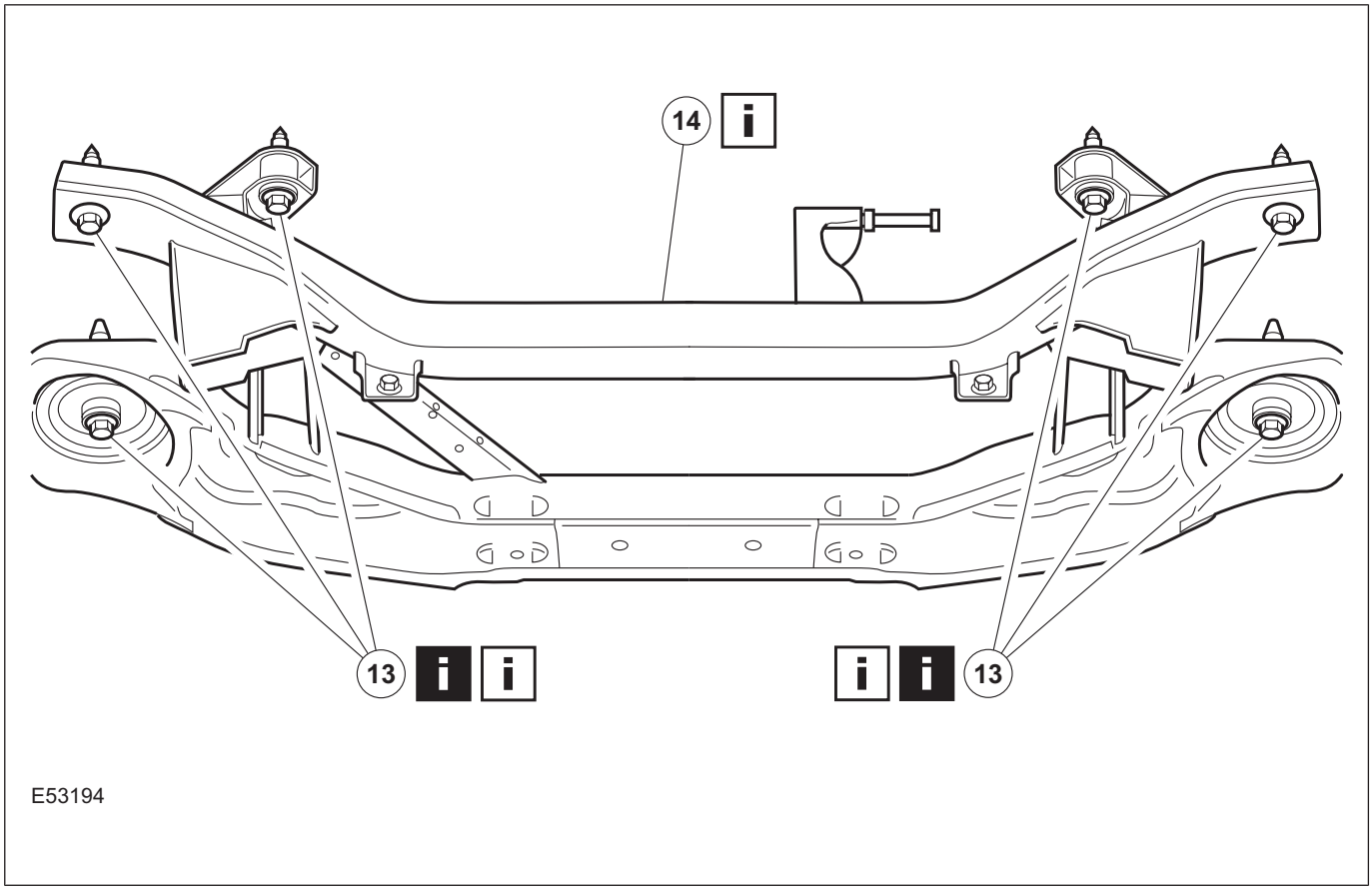
Item	Description
10	Rear lower arm to wheel knuckle retaining bolt
11	Rear lower arm See Installation Detail

REMOVAL AND INSTALLATION



Item	Description
12	Exhaust hanger insulator See Removal Detail

REMOVAL AND INSTALLATION

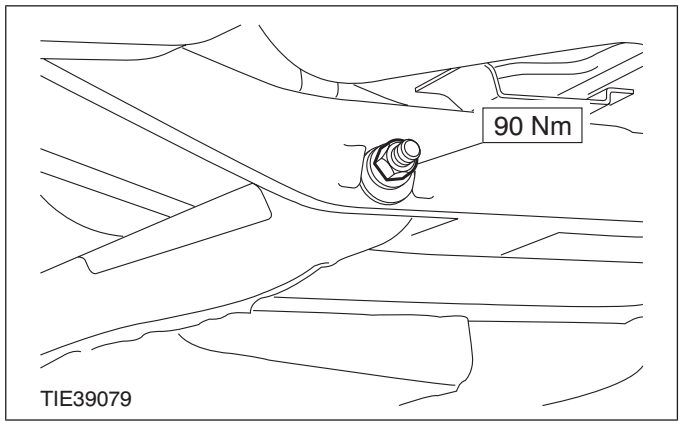


Item	Description
13	Rear axle crossmember retaining bolts See Removal Detail See Installation Detail
14	Rear axle crossmember See Installation Detail

7. **To install, reverse the removal procedure.**
8. **Check the toe setting and adjust as necessary. For additional information, refer to: (204-00 Suspension System - General Information)**

   Specifications (Specifications),
   Rear Toe Adjustment (General Procedures).
9. **NOTE: Final tightening of the rear lower arm adjustment cam nut must be carried out when the vehicle weight is on the road wheels.**

   Tighten the rear lower arm adjustment cam nut on both sides.

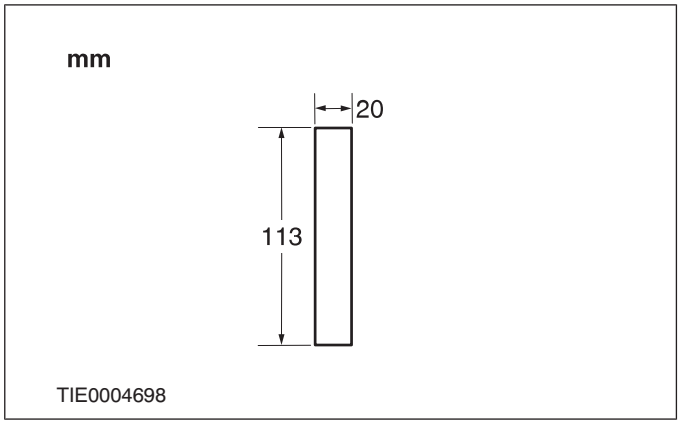


Removal Details

REMOVAL AND INSTALLATION

Item 5 Front lower arm retaining bolts

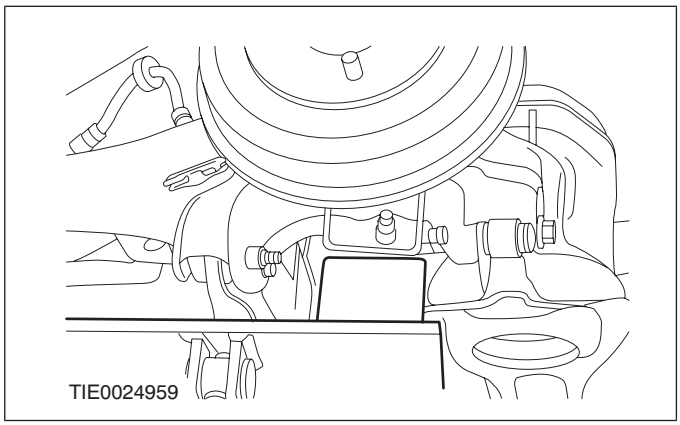
1. **Fabricate two 20 mm wide by 113 mm long spacers.**



2. **CAUTION: Both sides of the suspension must be set to the design height setting.**

   Using two transmission jacks and wooden blocks, raise the suspension to the design height setting on both sides.

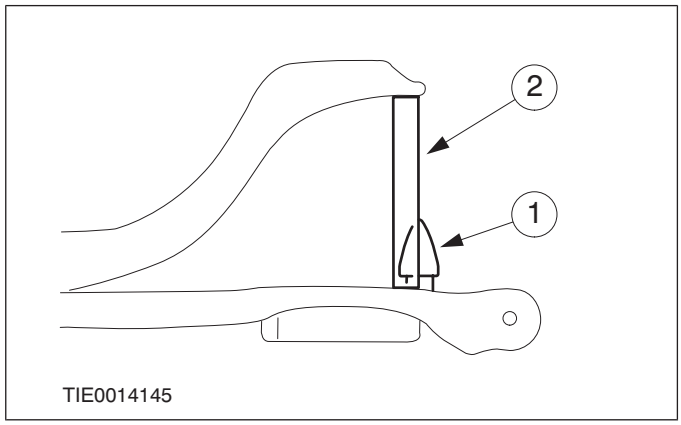
   - Position the transmission jack and the wooden block as shown.



3. **NOTE: The spacer must be positioned exactly as shown.**

   Install the spacer on both sides.

   1. Remove the bump stop.
   2. Install the spacer between the rear lower arm and the rear axle crossmember making sure that the spacer is in a vertical plane.



Item 6 Front lower arm

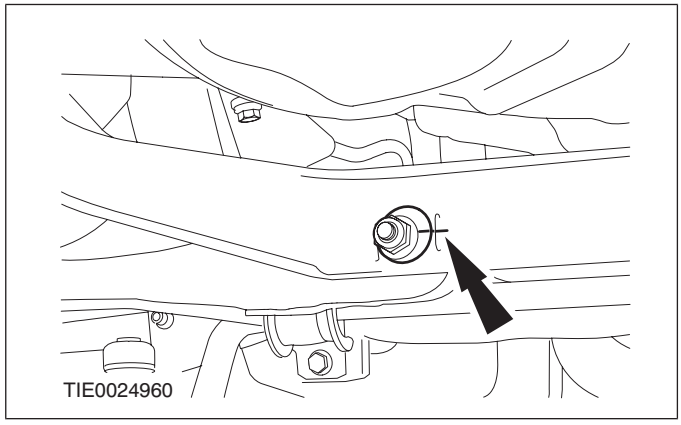
CAUTION: The front lower arms are marked FRONT. Make a note of the position of the front lower arms to aid installation.

Item 7 Upper arm retaining bolts

NOTE: Make a note of the position of the upper arms to aid installation.

Item 9 Rear lower arm adjustment cam nut

1. **Mark the position of the rear lower arm adjustment cam to the rear axle crossmember on both sides.**



Item 12 Exhaust hanger insulator

NOTE: Support the exhaust muffler and tailpipe assembly.

Item 13 Rear axle crossmember retaining bolts

1. **Using a transmission jack, support the rear axle crossmember.**

REMOVAL AND INSTALLATION

2. **WARNING: Make sure that the rear axle crossmember is secured to the transmission jack. Failure to follow this instruction may result in personal injury.**

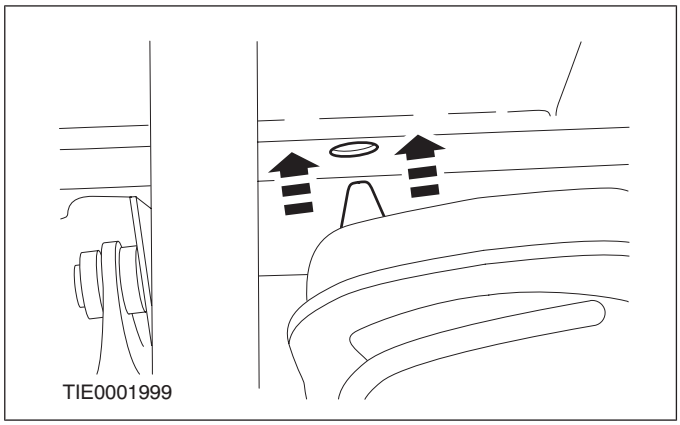
   Using a securing strap, secure the rear axle crossmember to the transmission jack.

Installation Details

Item 14 Rear axle crossmember

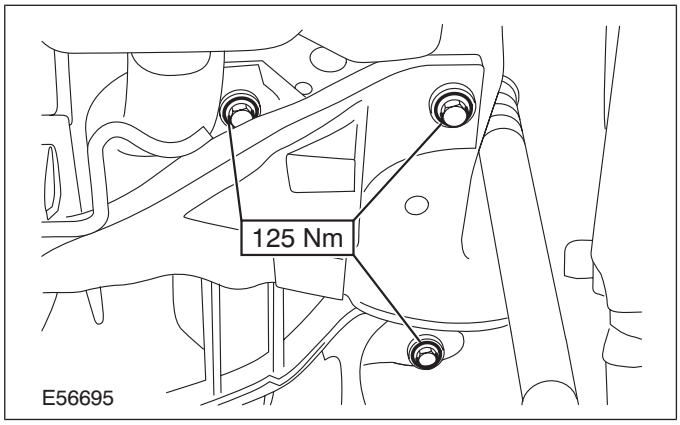
1. **Using a transmission jack, support the rear axle crossmember.**
2. **WARNING: Make sure that the rear axle crossmember is secured to the transmission jack. Failure to follow this instruction may result in personal injury.**

   Using a securing strap, secure the rear axle crossmember to the transmission jack.
3. **Locate the rear axle crossmember.**



Item 13 Rear axle crossmember retaining bolts

1. **Install the rear axle crossmember retaining bolts on both sides.**



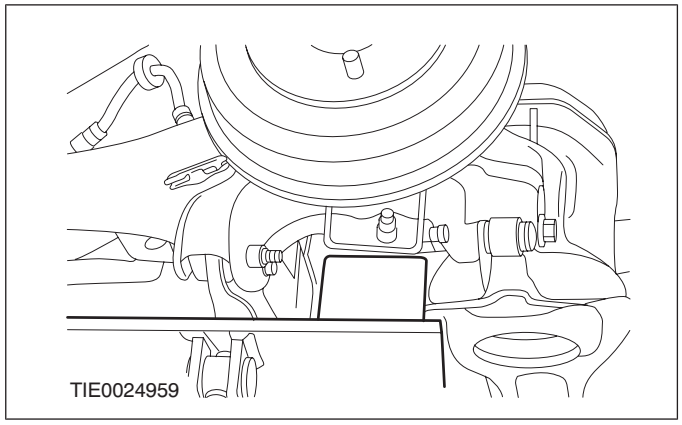
2. **Remove the securing strap.**
3. **Lower and remove the transmission jack.**

Item 11 Rear lower arm

1. **CAUTION: Both sides of the suspension must be set to the design height setting.**

   Using two transmission jacks and wooden blocks, raise the suspension to the design height setting on both sides.

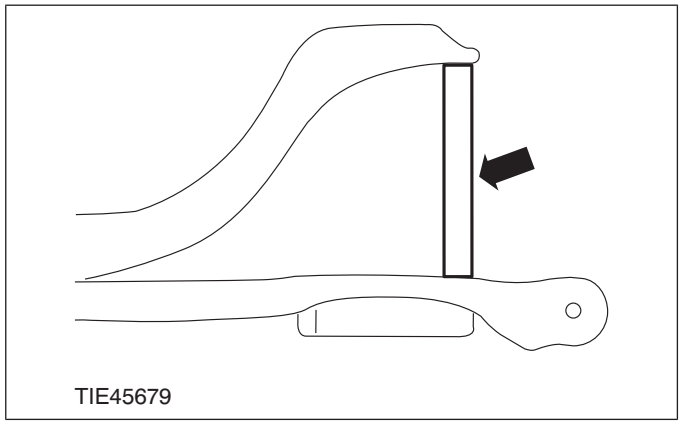
   - Position the transmission jack and the wooden block as shown.



2. **NOTE: The spacer must be positioned exactly as shown.**

   Install the spacer on both sides.

   - Install the spacer between the rear lower arm and the rear axle crossmember making sure that the spacer is in a vertical plane.



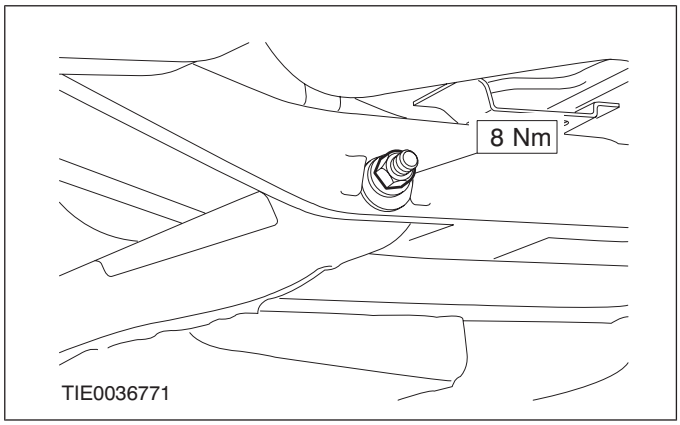
REMOVAL AND INSTALLATION

Item 9 Rear lower arm adjustment cam nut

1. **NOTE: Do not fully tighten the rear lower arm adjustment cam nut at this stage.**

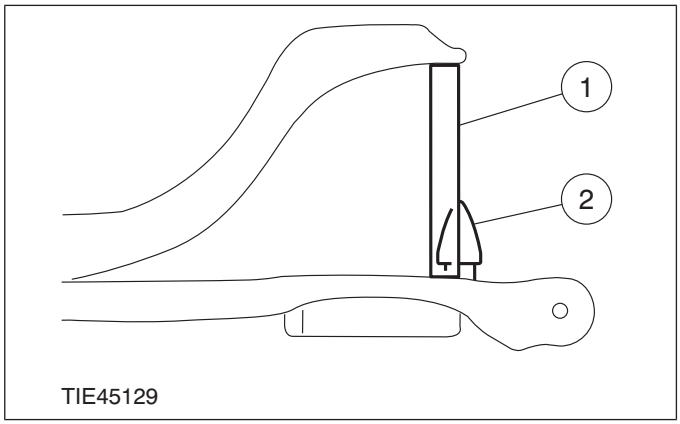
NOTE: Align the mark on the rear lower arm adjustment cam to the mark on the rear axle crossmember.

Install the rear lower arm adjustment cam nut on both sides.



Item 4 Stabilizer bar

1. **Lower the suspension from the design height setting on both sides.**
   1. Remove the spacer.
   2. Install the bump stop.



2. **Position the stabilizer bar.**