Front End Body Panels -

Description	Nm	lb-ft	lb-in
Air deflector retaining nuts	7	-	62
Air deflector retaining bolts	7	-	62
Engine rear undershield retaining bolts	7	-	62
Secondary bulkhead left-hand panel retaining bolts	5	-	44
Secondary bulkhead right-hand panel retaining bolts	5	-	44

Front End Body Panels - Air Deflector Removal and Installation

Removal

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

Raise and support the vehicle.

- x2 x2 x4 E93801
- Installation

2. NOTE: Note the fitted position of the washers.

Torque: 7 Nm

Front End Body Panels - Cowl Vent Screen

Removal and Installation

Removal

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

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

1. For additional information, refer to: <u>Windshield Wiper Pivot Arm (501-16</u> Wipers and Washers, Removal and Installation).



2.

3.







Installation

5.

Front End Body Panels - Engine Rear Undershield Removal and Installation

Removal



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



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

Raise and support the vehicle.



2. Torque: 7 Nm

Installation

Front End Body Panels - Fender Splash Shield

Removal and Installation

Removal



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



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

Raise and support the vehicle.

З.

2. Refer to: <u>Wheel and Tire (</u>204-04 Wheels and Tires, Removal and Installation).



Installation

Front End Body Panels - Hood

Removal and Installation

Removal



 NOTE: The hood is manufactured from aluminium. The hood is serviced as a separate bolt-on panel.

2. WARNING: The hood and its associated components form part of the pedestrian protection system, it is essential that any repair or replacement operations do not affect the safe working of the system.

For additional information relating to the pedestrian safety system please see the following: For additional information, refer to: <u>Pedestrian Protection System</u> (501-20C Pedestrian Protection System, Description and Operation).

 For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).





E102846

4. NOTE: This step requires the aid of another technician.

Release the clips and disconnect the struts and remove the retaining nuts.

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

Remove the hood pad.



E102847



7. Remove the hood strikers.

6. Remove the hood safety hook.

Installation

1. NOTES:





This step requires the aid of another technician.

Offer up the panel and loosely install the hood hinge retaining nuts.

- 2. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.
- 3. Tighten the hood hinge retaining nuts to 17 Nm and connect the struts and secure with the clips.



4. Loosely install both hood strikers.

- 5. Gently close the hood so that the strikers are aligned to the latches.
- 6. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.
- 7. Tighten the hood striker nuts to 17 Nm.



8. Install the hood safety hook.• Tighten to 17 Nm.

E102847



9. Install the hood pad.

2.

Front End Body Panels - Radiator Splash Shield Removal and Installation

Removal

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

E93528

Installation

Front End Body Panels - Secondary Bulkhead Center Panel

2.

Removal and Installation

Removal

1. Refer to: <u>Cowl Vent Screen (</u>501-02 Front End Body Panels, Removal and Installation).





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

Installation

Front End Body Panels - Secondary Bulkhead Panel LH TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol Removal and Installation

Removal



All vehicles

1. Refer to: <u>Secondary Bulkhead Center Panel</u> (501-02 Front End Body Panels, Removal and Installation).



- 2.
- Torque: <u>25 Nm</u>

Right-hand drive vehicles



З.

Left-hand drive vehicles

4.



Vehicles with 5.0L

All vehicles

6.

5.



• Torque: <u>7 Nm</u>



• *Torque:* <u>5 Nm</u>





E112438

Installation

Removal



All vehicles

1. Refer to: Secondary Bulkhead Center Panel (501-02 Front End Body Panels, Removal and Installation).



2. Torque: <u>25 Nm</u>

Right-hand drive vehicles



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

Left-hand drive vehicles

4.





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

Vehicles with 5.0L

6. Refer to: Air Cleaner RH (303-12G, Removal and Installation).

Vehicles with diesel engine



All vehicles

8.



7.



Installation

Body Closures - Front Door

Removal and Installation

<image><image><image><image><image><image><image>

Removal

1. NOTE: The front door is manufactured from mild steel, it contains a side impact reinforcement manufactured from boron steel.

The front door is serviced as a separate bolt-on panel.

- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- 3. NOTE: If the procedure includes removal of the front door components, the battery can remain connected to aid their removal and disconnected afterwards.

Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

4. NOTE: For new front door installation, this step may be carried out later in the removal procedure.

Disconnect the front door wiring harness, accessed behind the grommet on the A-pillar.

5. NOTE: For new front door installation, this step may be carried out later in the removal procedure.

Release the front door check strap from the body.

6. NOTE: This step is for removing the fully trimmed front door for access only, for installing a new front door, continue to removal step 7.

Remove the front door upper and lower hinge pivot bolts and lift the front door to remove.



- Remove the front door window regulator and motor. For additional information, refer to: <u>Front Door Window Regulator and</u> <u>Motor</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- Remove the exterior mirror.
 For additional information, refer to: <u>Exterior Mirror</u> (501-09 Rear View Mirrors, Removal and Installation).
- Remove the front door latch.
 For additional information, refer to: <u>Front Door Latch (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).</u>
- 10. Remove the front door outer window frame mouldings.
- 11. Remove the front door weatherstrips.
- 12. Remove the front door wiring harness.
- 13. Remove the front door impact absorbers.
- 14. Remove the front door check strap.
- 15. Remove the front door glass run felt.

16. Remove any miscellaneous front door clips, grommets and blanking covers.



17. ONOTE: If new hinges are being installed, install the complete hinges to the A-pillar. To align the hinges at the A-pillar it will be necessary to remove the front fender.

Remove the upper and lower front door hinge fixing bolts and remove the front door.

Installation

1. NOTE: If the front door has been removed for access only, it can be installed back on to its upper and lower hinge pivots and secured with the upper and lower hinge pivot bolts.

Offer up the front door and loosely install the front door hinge bolts.

- 2. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.
- 3. Tighten the front door hinge bolts to 30 Nm.
- 4. When correctly aligned and with the front door hinge bolts tightened, the new front door can be removed at its upper and lower hinge pivot bolts for refinishing.



5. NOTE: Install the front door upper frame weatherstrip prior to installing the front door.

The installation of associated panels and components is the reversal of

Tighten the front door upper and lower hinge pivot bolts to 30 Nm.

Body Closures - Fuel Filler Door Removal and Installation

Removal

CAUTION: Do not align the bowl using the hinge arm.

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

1.





E111792

Installation

- CAUTION: Protect the surrounding paintwork to avoid 2. damage.
 - Release the clip.

Body Closures - Fuel Filler Door Assembly Removal and Installation

Removal

CAUTION: Do not align the bowl using the hinge arm.

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



3.

4.

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

Raise and support the vehicle.

2. Refer to: Fuel Tank Filler Pipe (310-01, Removal and Installation).









CAUTION: Protect the surrounding paintwork to avoid damage.

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

• Release the clip.

E112083 6.

Installation

Body Closures - Luggage Compartment Lid

Removal and Installation

Removal



1. NOTE: The luggage compartment lid is manufactured from mild steel.

The luggage compartment lid is serviced as a separate bolt-on panel, less its hinges.

- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 4. Remove the loadspace trim panel RH. For additional information, refer to: <u>Loadspace Trim Panel RH</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
 - 5. Disconnect the luggage compartment lid wiring harness.



Construct the step requires the aid of another technician.
 Remove the luggage compartment lid.



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

Remove the luggage compartment lid moulding. For additional information, refer to: <u>Luggage Compartment Lid Moulding</u> (501-08 Exterior Trim and Ornamentation, Removal and Installation).

- Remove the luggage compartment lid latch actuator. For additional information, refer to: <u>Luggage Compartment Lid Latch</u> <u>Actuator</u> (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).
- Remove both rear fog lamps. For additional information, refer to: <u>Rear Fog Lamp (417-01 Exterior Lighting</u>, Removal and Installation).
- 10. Remove both luggage compartment lid buffers.
- 11. Remove the luggage compartment lid wiring harness. For additional information, refer to: <u>Luggage Compartment Lid Wiring</u> <u>Harness</u> (418-02 Wiring Harnesses, Removal and Installation).
- 12. **O**NOTE: Where it is not practical to re-use the luggage compartment lid badges, they should be renewed, therefore removal is not required.

Remove the luggage compartment lid badges.

Installation

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

Offer up the panel and loosely install the luggage compartment lid hinge retaining nuts.



- 2. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 3. Tighten the luggage compartment lid hinge retaining nuts to 25 Nm.
- 4. The installation of associated panels and components is the reversal of removal procedure.

Body Closures - Rear Door

Removal and Installation

Removal



1. NOTE: The rear door is manufactured from mild steel, it contains a side impact reinforcement manufactured from boron steel.

The rear door is serviced as a separate bolt-on panel.

 For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

3. NOTE: If the procedure includes removal of the rear door components, the battery can remain connected to aid their removal and disconnected afterwards.

Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

4. NOTE: For new rear door installation, this step may be carried out later in the removal procedure.

Disconnect the rear door wiring harness, accessed behind the grommet on the B-pillar.

5. NOTE: For new rear door installation, this step may be carried out later in the removal procedure.

Release the rear door check strap from the body.

6. NOTE: This step is for removing the fully trimmed rear door for access only, for installing a new front door, continue to removal step 7.

Remove the rear door upper and lower hinge pivot bolts and lift the rear door to remove.



- Remove the rear door fixed window glass. For additional information, refer to: <u>Rear Door Fixed Window Glass</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- Remove the rear door latch.
 For additional information, refer to: <u>Rear Door Latch</u> (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).
- 9. Remove the rear door outer window frame mouldings.
- 10. Remove the rear door weatherstrips.
- 11. Remove the rear door wiring harness.
- 12. Remove the rear door impact absorbers.
- 13. Remove the rear door check strap.
- 14. Remove the rear door glass run felt.
- 15. Remove any miscellaneous rear door clips, grommets and blanking covers.



16. NOTE: If new hinges are being fitted, install the complete hinges to the B-pillar.

Remove the upper and lower rear door hinge bolts and remove the rear door.

Installation

1. NOTE: If the rear door has been removed for access only, it can be installed back on to its upper and lower hinge pivots and secured with the upper and lower hinge pivot bolts.

Offer up the rear door and loosely install the rear door hinge bolts.

- 2. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.
- 3. Tighten the rear door hinge bolts to 30 Nm.
- 4. When correctly aligned and with the rear door hinge bolts tightened, the new rear door can be removed at its upper and lower hinge pivot bolts for refinishing.



- 5. The installation of associated panels and components is the reversal of removal procedure.Tighten the rear door upper and lower hinge pivot bolts to 30 Nm.

Interior Trim and Ornamentation -

Description	Nm	lb-ft	lb-in
Front Safety belt shoulder height adjuster retaining bolt	25	19	-
Rear safety belt lower retaining bolt	40	30	-

Interior Trim and Ornamentation - A-Pillar Trim Panel

Removal and Installation

Removal



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

1.

2.







3. *Torque: <u>6 Nm</u>*


Installation

1. To install, reverse the removal procedure.

Interior Trim and Ornamentation - B-Pillar Lower Trim Panel

Removal and Installation

Removal

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

- 1. Refer to: <u>Front Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 2. Refer to: <u>Rear Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).

З.





4. CAUTION: Make sure that the clips are correctly located.

Installation

Interior Trim and Ornamentation - B-Pillar Upper Trim Panel

Removal and Installation

Removal



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

1. Refer to: <u>B-Pillar Lower Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



З.





4. *Torque:* <u>40 Nm</u>



E98933



7. *Torque: <u>6 Nm</u>*





E98935





10. WARNING: Failure to follow this instruction may cause damage to the vehicle.

CAUTION: Make sure the locating dowels are installed correctly.

11. CAUTION: Make sure that these components are installed to the noted removal position.

Interior Trim and Ornamentation - C-Pillar Lower Trim Panel

Removal and Installation

Removal

 Δ_{NO}

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

1. Refer to: <u>C-Pillar Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).





E98909









E98921



6. *Torque:* <u>40 Nm</u>

7. CAUTIONS:

Note the fitted position of the component prior to removal.

Make sure that these components are installed to the noted removal position.

Torque: <u>9 Nm</u>





Installation

Interior Trim and Ornamentation - C-Pillar Trim Panel

Removal and Installation

Removal

 Δ_{NC}

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

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



2. CAUTIONS:

Note the fitted position of the component prior to removal.

Make sure that the clips are correctly located.



З.

4. *Torque:* <u>40 Nm</u>







m x2 E166344

6. CAUTIONS:

Make sure the locating dowels are installed correctly.

A Make sure that the clips are correctly located.

Torque: <u>6 Nm</u>

7. CAUTIONS:

Note the fitted position of the component prior to removal.



Make sure that the clips are correctly located.

8. CAUTIONS:



Note the fitted position of the component prior to removal.



Make sure that the clips are correctly located.





9. CAUTION: Note the fitted position of the component prior to removal.

Installation

Interior Trim and Ornamentation - Cowl Side Trim Panel

Removal and Installation

Removal

1. Refer to: <u>Front Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



E95489



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

- З.
- LH side only: Remove the hood release lever.



Installation

4. ANOTE: Left-hand shown, right-hand similar.

Published: 11-May-2011 Interior Trim and Ornamentation - Engine Cover V8 5.0L Petrol/V8 S/C 5.0L Petrol

Removal and Installation

Removal





- E134600

Installation

1. To install, reverse the removal procedure.

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

Interior Trim and Ornamentation - Front Door Trim Panel Removal and Installation

Removal



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







E94751



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



6.

7.









Installation

Interior Trim and Ornamentation - Front Scuff Plate Trim Panel

Removal and Installation

Removal



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



1. CAUTIONS:

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

Make sure that the component is correctly located on the locating dowels.

Installation

Interior Trim and Ornamentation - Instrument Panel Speaker Grille

Removal and Installation

Removal

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

1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).



2. CAUTIONS:

A protect the surrounding trim to avoid damage.

A Make sure that the clips are correctly located.

З.





4. CAUTION: Make sure that the component is correctly located on the locating dowels.

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

Torque: 2 Nm

Instollation



Interior Trim and Ornamentation - Headliner

Removal and Installation

Removal

 $\Delta_{\rm NC}$

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

- 1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: Interior Rear View Mirror (501-09 Rear View Mirrors, Removal and Installation).
- 3. Refer to: <u>Overhead Console</u> (501-12 Instrument Panel and Console, Removal and Installation).
- 4.

5.

Remove both sun visors.

Refer to: <u>Sun Visor</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).

- - Remove both A-pillar trim panels.

Refer to: <u>A-Pillar Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 6.
- Remove both B-pillar upper trim panels.

Refer to: <u>B-Pillar Upper Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 7.
- Remove both C-pillar trim panels.

Refer to: <u>C-Pillar Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 8.
- Remove both front seats.

Refer to: Front Seat (501-10 Seating, Removal and Installation).

9. Refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).









- 10. *Torque:* <u>2 Nm</u>
- 11.



Vehicles with roof opening panel



14. NOTES:

Note the different lengths of screws.

Make sure that the component is installed to the position noted on removal.

Torque: <u>2 Nm</u>

Vehicles without roof opening panel



15. NOTES:

Note the different lengths of screws.

Make sure that the component is installed to the position noted on removal.

Torque: 2 Nm

All vehicles









WARNING: This step requires the aid of another 19. technician.

CAUTIONS:

Note the fitted position of the component prior to removal.

Make sure that these components are installed to the noted removal position.



E99923



20. CAUTION: Note the fitted position of the component prior to removal.

NOTE: Make sure that the component is installed to the position noted on removal.

E99924



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

Installation

Interior Trim and Ornamentation - Loadspace Scuff Plate Trim Panel

1.

2.

Removal and Installation

Removal



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





Installation

Interior Trim and Ornamentation - Loadspace Trim Panel

Removal and Installation

Removal



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



1.



2.





Installation

• Repeat the above procedure for the other side.

Interior Trim and Ornamentation - Loadspace Trim Panel LH

Removal and Installation

Removal

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

- 1. Refer to: <u>Loadspace Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 2. Refer to: <u>Loadspace Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).

З.

4.





Installation

Interior Trim and Ornamentation - Loadspace Trim Panel RH

Removal and Installation

Removal

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

- 1. Refer to: <u>Loadspace Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 2. Refer to: <u>Loadspace Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).







4. ANOTE: LH illustration shown, RH is similar.

Installation
Interior Trim and Ornamentation - Luggage Compartment Lid Trim Panel Removal and Installation

1.

2.

Removal



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



3 2 1101

E93012



Installation



Interior Trim and Ornamentation - Parcel Shelf

Removal and Installation

Removal

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

- 1. Refer to: <u>C-Pillar Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
 - 2. Torque: <u>12 Nm</u>



E98908



E98909







6. $\Delta_{NOTE:}$ The procedure must be carried out on both sides of the seat.



7. Δ NOTE: The procedure must be carried out on both sides of the seat.

Torque: <u>6 Nm</u>

E98914





10. NOTE: On installation, use a suitable tool to make sure that the parcel shelf is located underneath the rear window blind.



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

12.













Installation

1. To install, reverse the removal procedure.

Interior Trim and Ornamentation - Rear Door Trim Panel Removal and Installation

Removal



E93359

x10

E93360

2.

1.





5.





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











E93422



Installation

1. To install, reverse the removal procedure.

Interior Trim and Ornamentation - Rear Scuff Plate Trim Panel

Removal and Installation

Removal



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



Installation

1. CAUTIONS:

1. To install, reverse the removal procedure.

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



Make sure that the clips are correctly located.

Interior Trim and Ornamentation - Sun Visor

Removal and Installation

Removal





- 1. CAUTION: Take extra care not to damage the edges of the component.



2. TORQUE: 2 Nm



Installation

1. To install, reverse the removal procedure.

Interior Trim and Ornamentation - Sun Visor Vanity Mirror

Removal and Installation

General Equipment

Interior trim remover

Removal

1. Using a suitable tool, release the retaining clips and remove the sun visor vanity mirror from the sun visor.

General Equipment: Interior trim remover



E150926

Installation







E150927



1. CAUTION: Do not use excessive force to install the component.

Press firmly against the areas indicated until an audible click is heard.

Exterior Trim and Ornamentation -

Description	Nm	lb-ft	lb-in
Luggage compartment lid moulding retaining nuts	3	-	26

Exterior Trim and Ornamentation - Radiator Grille

Removal and Installation

Removal

- 1. Refer to: <u>Front Bumper Cover</u> (501-19 Bumpers, Removal and Installation).
 - 2.





3. ONOTE: Note the fitted position of the locating pegs.

Installation

1. To install, reverse the removal procedure.

Exterior Trim and Ornamentation - Luggage Compartment Lid Moulding

Removal and Installation

Removal

 Δ_{NO}

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

1. Refer to: Luggage Compartment Lid Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).





3. *Torque:* <u>3 Nm</u>











E93080

Installation

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

6.

Exterior Trim and Ornamentation - Front Fender Moulding

Removal and Installation

Removal



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



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

NOTE: Using a screwdriver, carefully release the moulding at the position illustrated.



2. CAUTION: Make sure that the clips are correctly located.

NOTES:

Using a thin plastic trim tool, carefully detach the clips in order shown.

Linstall clip number 5 when installing the front fender moulding

E139690

Installation

1. To install, reverse the removal procedure.

Exterior Trim and Ornamentation - Rocker Panel Moulding

Removal and Installation

Removal

CAUTIONS:



Protect the surrounding paintwork to avoid damage.



LH illustration shown, RH is similar.

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

1

WARNING: Make sure to support the vehicle with axle stands. Raise and support the vehicle.





E164338









E164341





E164339

Installation

6. ANOTE: If equipped

1. To install, reverse the removal procedure.

Rear View Mirrors -

Torque Specifications				
Description	Nm	lb-ft	lb-in	
Exterior mirror retaining nuts	8	—	71	
Exterior mirror motor retaining screws	1	—	9	

Rear View Mirrors - Rear View Mirrors - Component Location

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



E96175

Item	Description
1	Passenger door mirror
2	Passenger door control module
3	Interior mirror
4	Drivers door control module
5	Mirror control switch
6	Drivers door mirror

Rear View Mirrors - Rear View Mirrors - Overview

Description and Operation

Overview

The exterior mirrors incorporate the following:

- Blind spot monitoring indicator
- Auto dimming function
- Turn signal indicators
- Approach lamps
- Exterior temperature sensor
- Heated mirror function
- Reverse dipping function

Movement of the door mirrors is controlled from a switch pack located on the drivers door. The switch pack contains 2 non-latching mirror select buttons labeled 'L' and 'R' and a 4-way mirror movement switch. Door mirror movement commands are transmitted to the driver's door module over the LIN (local interconnect network) bus. The drivers door module transmits any mirror movement commands to the passenger door module over the medium speed CAN (controller area network) bus.

Movement of the door mirrors is carried out by the respective door module. The door modules provide supply and ground paths to the mirror motors and monitor mirror position via potentiometers located in the mirror housings.

Both exterior door mirrors and the interior mirror feature an auto dimming function. The interior rear view mirror contains one forward and one reward facing light sensor. The light sensors control the auto dimming feature of the interior mirror to reduce glare from the headlights of following vehicles.

When auto-dimming of the interior mirror is required, a supply is provided by the interior mirror to both door mirrors to initiate the door mirror auto-dimming sequence.

Blind spot monitoring function alerts the driver to a vehicle located in the vehicle blind spot. A warning indicator is located in each exterior mirror towards the outer edge.

Refer to: <u>Blindspot Monitoring System</u> (413-09 Warning Devices, Description and Operation).

Rear View Mirrors - Rear View Mirrors - System Operation and Component Description Description and Operation

Control Diagram

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



Item	Description
1	RJB (rear junction box)
2	RH (right-hand) door module
3	RH door mirror
4	LH (left-hand)side door mirror
5	Interior mirror
6	Battery

7	CJB (central junction box)
8	LH door module
9	Exterior mirror control switches

System Operation

The rear view mirrors comprise an interior mirror mounted to the windshield, and an exterior mirror mounted on each front door cheater. The types of mirrors and associated operating functions installed depend on the specification and trim level of the vehicle.

Interior Mirrors

The interior rear view mirror is provided as a manual dimming or an electrically operated automatic dimming type.

The manual dimming mirror comprises a prismatic glass housed within a surrounding case that is attached with a ball joint connector to the mirror stem. Manual dimming of the mirror is achieved using the lever mounted on the underside of the mirror body. Operating the lever will tilt the mirror head from the 'day' position to the 'night' position.

The automatic dimming mirror comprises an electro-chromatic glass housed within a surrounding case that is attached with a ball joint connector to the mirror stem. The mirror stem incorporates an 8-pin electrical connector that is connected to the roof panel wiring harness. The wiring harness provides hardwired and a LIN connection to the CJB.

Light sensors are mounted on the front and rear of the mirror surround case. The sensors control the automatic dimming feature to reduce glare from the headlights of following vehicles.

The automatic dimming function is permanently active when the ignition is in power mode 4 (Accessory) and power mode 6 (Ignition). The forward facing light sensor monitors the ambient light level at the front of the vehicle; the rearward facing light sensor monitors the light level coming from the rear of the vehicle. When light from the rear of the vehicle exceeds the ambient light level from the front of the vehicle, the automatic dimming circuit darkens the interior mirror surface.

Automatic dimming is inhibited when reverse gear is selected to provide the driver with maximum vision. On vehicles with automatic transmission, the reverse gear signal is provided by the TCM (transmission control module) via the high speed CAN bus to the CJB. The CJB then provides a power feed to the mirror. On vehicles with manual transmission, the reverse gear signal is provided by a transmission switch that is hardwired to the CJB.

Exterior Mirrors

Electrically operated and heated exterior mirrors are installed as standard. Depending on the specification and trim level of the vehicle, the following options are available:

- · Power fold (switch pack operated feature) and auto fold (remote handset operated feature)
- Memory recall
- Reverse gear mirror dip
- Mirror heating
- Exterior mirror lamps.

The power fold/auto fold feature is available only when power fold mirrors are installed to the vehicle.

The mirrors can be configured to automatically fold when the vehicle is locked and unfold when unlocked. This feature can be enabled or disabled via the Vehicle settings area of the touch screen:

- Select 'Settings' from the touch screen Home menu.
 Select 'Security/Vehicle'
 Select 'Windows/Mirrors'

- Select Power Fold 'On' or 'Off' as appropriate.

The pasenger side mirror can be configured to automatically dip when reverse gear is selected. This feature can be enabled or disabled via the Vehicle settings area of the touch screen:

- · Select 'Settings' from the touch screen Home menu.
- Select ' Security/Vehicle'
 Select 'Windows/Mirrors'
- Select Reverse dip 'On' or 'Off' as appropriate.

The LH door mirror incorporates an ambient air temperature sensor that is hardwired to the ECM (engine control module). The ECM is connected to the CJB and other control modules via the high speed CAN bus. The sensor provides information to the ECM that is then transmitted on the medium speed CAN bus for use by other control modules. On vehicles installed with a high-line instrument cluster, the CJB transmits the temperature signal to the instrument cluster that provides a display of the ambient temperature to the driver.

The exterior mirror lamps are controlled by the interior lighting function.

The door mirrors are controlled using a switch pack located on the driver's door. The switch pack contains 2 non-latching mirror select switches labeled 'L' and 'R' and a 4-way directional joystick. The switch pack is connected to the driver door control module via the LIN bus. The driver and front passenger door control modules are connected via the medium speed CAN bus. A hardwired connection between each door control module and the corresponding door mirror, provides the supply and ground paths for the mirror motors.

Each exterior door mirror incorporates 2 motors to control horizontal (left/right) and vertical (up/down) adjustments.

On vehicles installed with a driver's power operated memory seat and memory exterior mirrors, a potentiometer is incorporated within each mirror motor and is used to provide information regarding the actual motor positions. The current position and memory positions of each door mirror motor are maintained and stored within the corresponding door control module.

The memory exterior mirror positions are also monitored and stored within door control module memory when the reverse gear mirror dip function is used.

When reverse gear is selected, the door control module stores the current mirror positions and will then dip the passenger mirror glass to a default dip position. While reverse gear is selected it is possible to store a preferred dipped mirror position by adjusting the driver/passenger mirror glass to the desired position via the mirror switch pack. When the desired position is achieved using the switch, the new dip positions will be automatically stored by the door control module when reverse gear is de-selected. Therefore when reverse gear is re-selected, the dip position recalled by the door control module will be the new reverse gear mirror dip stored position. When reverse gear is deselected the mirror glass will automatically move to the previous stored position prior to reverse gear selection.

If the driver selects a memory recall function using the memory seat switch pack, the driver's memory seat and exterior memory mirrors are moved to a stored memory position.

Exterior mirrors with the power fold/auto fold feature incorporate a motor located in the hinge of each exterior mirror arm. Operation of the power fold feature is achieved using the exterior mirror switch pack. Operation of the auto fold feature is achieved using the remote handset.

The power fold function is active when the ignition is in power mode 6 (Ignition).

Both exterior mirrors will power fold when the mirror switch pack 'L' and 'R' switches are pressed together. Pressing the switches again will unfold the mirrors.

When the instrument cluster is configured for the auto fold feature, the mirrors will fold in when the remote handset lock button is pressed. The mirrors will unfold when the vehicle is unlocked using the remote handset unlock button.

NOTE: If the mirrors are folded in using the mirror switch pack (power fold) and the vehicle is then locked, subsequent unlocking of the vehicle will not unfold the mirrors.

When the remote handset unlock button is operated, the <u>CJB</u> recognizes the remote handset for that vehicle and acknowledges the request. The door control modules are connected directly to the AJB (auxiliary junction box) for power supply to the exterior mirror folding motors.

When the vehicle is locked the door control modules reverse the polarity of the mirror fold motor, power and ground connections to operate the mirrors in the opposite direction.

Exterior mirror heating is provided with heater elements bonded to the back of the mirror glass. Power supply for the mirror heating elements is provided by the corresponding driver or passenger door control module via the <u>RJB</u>. The door control modules receive a power supply from the <u>RJB</u>, and are both connected on the medium speed <u>CAN</u> bus to the ATC (automatic temperature control) module. A ground terminal from each door control module completes the circuit. The <u>ATC</u> module automatically controls the mirror heating function whenever the ignition is in power mode 4 (Accessory) and power mode 6 (Ignition).

Operation of the exterior mirror heaters is fully automatic and not controllable by the driver. Exterior mirror heater operation is determined by ambient air temperature and windshield wiper status. When ambient air temperature reaches a pre-determined level, the <u>ATC</u> module broadcasts an exterior mirror heating request to the door modules over the medium speed <u>CAN</u> bus. On receipt of this message, the door modules provide feed and ground connections to both exterior mirror heater elements.

The mirror heating is controlled in two phases, the initial heating phase and a second PWM (pulse width modulation) controlled phase. In the first phase the heater elements in the mirrors are permanently powered for a pre-determined length of time. This length of time varies with the ambient temperature. During the second <u>PWM</u> phase, the heater elements are turned on and off every 30 seconds. The amount of time the exterior mirror heaters are operational increases if the windshield wipers are switched on. This ensures the mirrors remain mist free in damp and wet conditions, where there is an increased risk of misting.

Rear View Mirrors - Rear View Mirrors

Diagnosis and Testing

Principles of Operation

For a detailed description of the rear view mirrors and systems, refer to the relevant Description and Operation sections in the workshop manual. REFER to: (501-09 Rear View Mirrors)

Rear View Mirrors (Description and Operation), Rear View Mirrors (Description and Operation), Rear View Mirrors (Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

- 1. Verify the customer concern.
- 2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Mechanical	Electrical
Exterior rear view mirror glass	 Fuse(s) Relay(s) Wiring Harness 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, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC Index

CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTES:

If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the DMM leads into account.



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



nspect connectors for signs of water ingress, and pins for damage and/or corrosion.

If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

When carrying out repair/diagnosis of the system, on removal of the front or rear bumper inspect the sensor connectors to ensure they were correctly latched and check fly leads for signs of chaffing or trapped wires.

DTC Description	Possible Cause	Action
B116311 Left Mirror Heater Output		Refer to the electrical circuit diagrams and test left mirror heater control circuit for short to ground
B116315 Left Mirror Heater Output	 Left mirror heater control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test left mirror heater control circuit for short to power, open circuit
B116411 Right Mirror Heater Output	 Right mirror heater control circuit - short to ground 	Refer to the electrical circuit diagrams and test right mirror heater control circuit for short to ground
B116415 Right Mirror Heater Output	 Right mirror heater control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test right mirror heater control circuit for short to power, open circuit
B11F711 Passenger Folding Mirror Motor	 Passenger folding mirror motor control circuit - short to ground 	Refer to the electrical circuit diagrams and check passenger folding mirror motor control circuit for short to ground
B11F715 Passenger Folding Mirror Motor	 Passenger folding mirror motor control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check passenger folding mirror motor control circuit for short to power, open circuit
B1C0911 Driver Left/Right Mirror Motor Circuit	 Driver left/right mirror motor control circuit - short to ground 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test driver left/right mirror motor control circuit for short to ground
B1C0915 Driver Left/Right Mirror Motor Circuit	 Driver left/right mirror motor control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test driver left/right mirror motor control circuit for short to power, open circuit
B1C1011 Driver Up/Down Mirror Motor Circuit	 Driver up/down mirror motor control circuit - short to ground 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test driver up/down mirror motor control circuit for short to ground
B1C1015 Driver Up/Down Mirror Motor Circuit	 Driver up/down mirror motor control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test driver up/down mirror motor control circuit for short to power, open circuit
B1C1111 Passenger Left/Right Mirror Motor Circuit	 Passenger left/right mirror motor control circuit - short to ground 	Refer to the electrical circuit diagrams and test passenger left/right mirror motor control circuit for short to ground
B1C1115 Passenger Left/Right Mirror Motor Circuit	 Passenger left/right mirror motor control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test passenger left/right mirror motor control circuit for short to power, open circuit
B1C1211 Passenger Up/Down Mirror Motor Circuit	 Passenger up/down mirror motor control circuit - short to ground 	Refer to the electrical circuit diagrams and test passenger up/down mirror motor control circuit for short to ground
B1C1215 Passenger Up/Down Mirror Motor Circuit	 Passenger up/down mirror motor control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test passenger up/down mirror motor control circuit for short to power, open circuit
B1C1311 Driver Up/Down Mirror Motor Feedback Circuit	 Driver up/down mirror motor feedback circuit - short to ground 	Refer to the electrical circuit diagrams and test driver up/down mirror motor feedback circuit for short to ground

DTC	Description	Possible Cause	Action
B1C1315	Driver Up/Down Mirror Motor Feedback Circuit		Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test driver up/down mirror motor feedback circuit for short to power, open circuit
B1C1411	Driver Left/Right Mirror Motor Feedback Circuit	 Driver left/right mirror motor feedback circuit - short to ground 	Refer to the electrical circuit diagrams and test driver left/right mirror motor feedback circuit for short to ground
B1C1415	Driver Left/Right Mirror Motor Feedback Circuit	 Driver left/right mirror motor feedback circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test driver left/right mirror motor feedback circuit for short to power, open circuit
B1C1511	Passenger Up/Down Mirror Motor Feedback Circuit	 Passenger up/down mirror motor feedback circuit - short to ground 	Refer to the electrical circuit diagrams and test passenger up/down mirror motor feedback circuit for short to ground
B1C1515	Passenger Up/Down Mirror Motor Feedback Circuit	 Passenger up/down mirror motor feedback circuit - short to power, open circuit 	Refer to the electrical circuit diagrams and test passenger up/down mirror motor feedback circuit for short to power, open circuit
B1C1611	Passenger Left/Right Mirror Motor Feedback Circuit	 Passenger left/right mirror motor feedback circuit - short to ground 	Refer to the electrical circuit diagrams and test passenger left/right mirror motor feedback circuit for short to ground
B1C1615	Passenger Left/Right Mirror Motor Feedback Circuit	 Passenger left/right mirror motor feedback circuit - short to power, open circuit 	Refer to the electrical circuit diagrams and test passenger left/right mirror motor feedback circuit for short to power, open circuit
Rear View Mirrors - Exterior Mirror

Removal and Installation

Removal



1. Δ NOTE: Left-hand shown, right-hand similar.

E94765

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



3. ANOTE: Left-hand shown, right-hand similar.



E76992



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

4. ANOTE: Left-hand shown, right-hand similar.

Installation

1. To install, reverse the removal procedure.

0

Rear View Mirrors - Exterior Mirror Cover

Removal and Installation

Removal

NOTES:



Removal steps in this procedure may contain installation details.

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

1. Refer to: <u>Exterior Mirror Glass</u> (501-09 Rear View Mirrors, Removal and Installation).



2. ONOTE: Note the fitted position of the locating pegs.

Installation

1. To install, reverse the removal procedure.

Rear View Mirrors - Exterior Mirror Glass

Removal and Installation

Removal

NOTES:



Removal steps in this procedure may contain installation details.

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

1.

2.





Installation

 ANOTE: Note the fitted position of the locating pegs. To install, reverse the removal procedure.

Rear View Mirrors - Exterior Mirror Motor

Removal and Installation

Removal

NOTES:



Removal steps in this procedure may contain installation details.

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

1. Refer to: <u>Exterior Mirror Glass</u> (501-09 Rear View Mirrors, Removal and Installation).







Installation

1. To install, reverse the removal procedure.

Rear View Mirrors - Interior Rear View Mirror

Removal and Installation

Removal



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





1. CAUTIONS:



Take extra care not to damage the clips.





2.





Installation



1. To install, reverse the removal procedure.

Seating -

Description	N	m lb-ft	lb-in
Front seat backrest retaining bolts	35	26	-
Front seat safety belt anchor retaining bolts	40	30	-
Front seat retaining bolts	47	35	-
Front safety belt buckle retaining bolt	40	30	-
Rear seat backrest retaining bolts	17	13	-
Side air bag module retaining nuts	7	-	62

Seating - Seats - Component Location

COMPONENT LOCATION - MOVEMENT



Item	Description
Note:	16-way LH (left-hand) driver's seat shown.
1	Seat height motor
2	Head restraint motor
3	Lumbar support motor
4	Lumbar support air cells
5	Seat squab recline motor
6	Seat switch pack
7	Seat slide motor
8	Seat cushion tilt motor
9	Seat cushion extension motor



Item	Description
Note:	Heated front seat shown
1	Squab heater element
2	Cushion heater element



Item	Description
Note:	Heated and cooled front seat shown
1	Squab liner
2	Squab climate module
3	Squab inlet duct
4	Squab blower
5	Cushion climate module
6	Cushion inlet duct
7	Cushion blower
8	Cushion liner
9	Front seat climate control module

Seating - Seats - Overview

Description and Operation

OVERVIEW

Leather Seat Covers

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

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

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

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

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

NOTES:

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

Creasing and wrinkling does not represent a manufacturing defect.

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

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

General

A number of front seating options are available. An 8-way electrically adjustable driver's seat is complemented by an 8-way electrically adjustable passenger seat. A 10-way electrically adjustable driver's seat is complemented by an 10-way electrically adjustable front passenger seat. A 16-way electrically adjustable driver's seat is complemented by a 12-way electrically adjustable front passenger seat.

On non-memory seats, the operation of the seats is controlled directly from the driver's seat switchpack. On memory seats, the operation of the seat motors is controlled by a seat control module which is located on the underside of the driver's seat frame.

The driver's seat is fitted with a seat position sensor which is located on the seat rail. The sensor is used by the RCM (restraints control module) to determine the seat position and adjust the inflation time of the airbag deployment accordingly. Refer to: <u>Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)</u> (501-20B Supplemental Restraint System, Description and Operation).

Seating - Seats - System Operation and Component Description

Control Diagram

CONTROL DIAGRAM - MOVEMENT - MEMORY SEATS



Item	Description
Note:	A = Hardwired; O = LIN (local interconnect network)
1	Battery
2	BJB (battery junction box)
3	Seat switch pack
4	Lumbar support solenoids
5	Lumbar support motor
6	Seat memory switches
7	Squab recline motor

8	Driver's seat module
9	Head restraint motor
10	Cushion tilt motor
11	Cushion extension motor
12	Seat slide motor
13	Seat height motor
14	CJB (central junction box)



Description			
A = Hardwired; N = Medium speed CAN (controller area network) bus; P = MOST ring			
Battery			
BJB			
ATC (automatic temperature control) module			
RJB (rear junction box)			
Touch Screen Display (TSD)			
Information and Entertainment module			

7	Front seat climate control module
8	Passenger seat squab climate module
9	Drivers seat cushion climate module
10	Passenger seat cushion climate module
11	Drivers seat squab climate module
12	Passenger seat cushion heater element
13	Passenger seat squab heater element
14	Drivers seat cushion heater element
15	Drivers seat squab heater element
16	CJB

System Operation

HEATED SEATS - OPERATION

Heated Front Seats

The TSD receives a fused power supply from the <u>RJB</u>. One of the 3 seat heat temperature selections made by the driver or passenger using the TSD soft keys are passed from the TSD on the MOST ring to the Information and Entertainment module. The information and entertainment module processes the information and transmits the request on the medium speed <u>CAN</u> bus to the <u>ATC</u> module.

The cushion heaters have a thermal sensor which supplies a feed back signal back to the <u>CJB</u>. The squab heater elements do not have a thermal sensor and are maintained at the same temperature as the seat cushion elements.

The <u>ATC</u> module reacts to the driver request information received from the information and entertainment module and requests the <u>CJB</u> to activate the seat heaters. The <u>CJB</u> measures the returned temperature signals from the thermal sensors and relays the temperature signals back to the <u>ATC</u> module. The <u>ATC</u> module then uses the measured seat element temperatures to provide closed-loop control of the heater elements to maintain the temperature at one the 3 heat ranges selected.



Heated and Cooled Front Seats

The TSD receives a fused power supply from the <u>RJB</u>. Selections made by the driver using the TSD soft keys are passed from the TSD on the MOST ring to the Information and Entertainment module. The information and entertainment module processes the information and transmits the request on the medium speed <u>CAN</u> bus to the front seat climate control module. The front seat climate control module is located beneath the RH (right-hand) front seat, on the floor cross member.

The front seat climate control module receives its power supplies from the <u>CJB</u>. Heating and cooling requests are generated using the soft buttons on the TSD. These requests are transmitted to the information and entertainment module over the MOST ring. The Information and Entertainment module forwards these requests to the front seat climate control module over the medium speed <u>CAN</u> bus.

The front seat climate control module supplies power to the two climate modules in each seat. The temperature sensor in each climate module is monitored by the front seat climate control module which uses the temperature information to control the Peltier cells accordingly and also the blower fans to distribute the heated or cooled air.

NOTE: To prevent excessive battery discharge, the heated and cooled front seats will only operate when the engine is running.

Electric Driver's Seat Adjustment - Non-Memory Seats

The <u>CJB</u> supplies 3 power supplies to the driver's seat switchpack. The fused supplies provide power for the seat height and squab recline, the seat slide and seat tilt and the lumbar adjustment respectively. The <u>CJB</u> only provides the power to the driver's seat switch pack when the ignition is on (power mode 6).

For the seat movement motors, when the applicable switch is operated, the power is supplied to the applicable side of the motor and the ground path is completed to operate the motor in the required direction. To move the motor in the opposite direction the polarity is reversed.

For the lumbar adjustment, when the switch is operated in the inflate position, power is supplied to the pump motor to inflate the lumbar support. When the switch is operated in the opposite direction, the power energizes a solenoid which in turn opens a valve to deflate the lumbar support.

Electric Passenger Seat Adjustment (8, 10 and 12 way)

The <u>CJB</u> supplies 3 power supplies to the passenger seat switchpack. The fused supplies provide power for the seat height and squab recline, the seat slide and seat tilt and the head restraint and lumbar adjustment respectively. The <u>CJB</u> only provides the power to the passenger seat switch pack when the ignition is on (power mode 6).

For the seat movement and head restraint motors, when the applicable switch is operated, the power is supplied to the applicable side of the motor and the ground path is completed to operate the motor in the required direction. To move the

motor in the opposite direction the polarity is reversed.

For the lumbar adjustment, when the switch is operated in the inflate position, power is supplied to the pump motor to inflate the lumbar support. When the switch is operated in the opposite direction, the power energizes a solenoid which in turn opens a valve to deflate the lumbar support.

Electric Driver's Seat Adjustment - Memory Seats (10 and 16 way)

The <u>CJB</u> supplies 3 power supplies to the driver's seat module and one supply to the driver's seat switch pack. The fused supplies provide power for the movement motors in addition to the driver's seat switch pack. Power is only supplied to the driver's seat module and the driver's seat switch pack when the ignition is on (power mode 6).

The driver's seat switch pack is connected to the driver's seat module by a <u>LIN</u> bus for the seat movement switches. Any selection for seat movement generates a message which is passed via the <u>LIN</u> to the driver's seat module. The seat module processes the request and operates the applicable seat function as required using the power supplies from the <u>CJB</u>.

Each seat motor contains a Hall position sensor. The sensor sends a feedback signal to the driver's seat module. The signal is used for memory store and memory recall functions.

The lumbar adjustment switch on the driver's seat switch pack is wired direct to the lumbar pump and solenoids. The switch, when moved to the inflate position for either the upper or lower inflatable cushion cell, provides a power supply to the lumbar pump and simultaneously activates the applicable inflate solenoid valve. When the switch is released the pump stops and the solenoid valve closes trapping the air in the inflatable cushion. When the switch is moved to the deflate position for either the upper or lower inflatable deflate solenoid valve which opens to allow the air in the cushion to escape. When the switch is released, the valve is closed and the remaining air in the cushion is retained.

Component Description

FRONT SEATS - DESCRIPTION

The table below highlights the features available for each seating option.

Seat Type	Non-Heated	Heated	Heated and Cooled	Lumbar Support	Memory
8-way	Yes	Optional	No	2-way	No
10-way	Yes	Optional	Optional	2-way	Optional (Driver's seat only)
12-way	No	No	Yes	4-way	No
16-way	No	No	Yes	4-way	Yes (Driver's seat only)

Seat Heating

The 3-stage heated front seats feature 2 heater elements located in the seat cushion and a single heater element located in the seat squab. Operation of the heated front seats is controlled by the <u>ATC</u> module via the TSD, information and entertainment control module and the <u>CJB</u> module on vehicles with heated seats. On vehicles with heated and cooled seats the operation is controlled by the TSD, information and entertainment control module and the front seat climate control module.

The heated and cooled front seats each contain 2 climate modules; one in the cushion, one in the squab. The climate modules contain 'Peltier' cells which are able to deliver heating and cooling based on a voltage provided by the front seat climate control module. Each climate module also contains a fan, which blows air over the Peltier cells to distribute heated or cooled air via liners in the seat cushion and squab. The fan is also controlled by the front seat climate control module. The TSD allows the driver and passenger to select 3 ranges of heated or cooled ventilation; off, minimum and intermediate. Also, using the selections on the TSD, the driver and passenger can select between full seat ventilation or squab backrest ventilation only.

Vehicles fitted with the 3-stage heated front seat option also feature a heated steering wheel. Refer to: <u>Steering Column Switches</u> (211-05 Steering Column Switches, Description and Operation).

Electric Seat Adjustment

Lumbar Support

On 8, 10 and 12 way seats, a 2 way lumbar support is provided which allows the lumbar inflatable cushion to be inflated or deflated as required. On 16 way seats, a 4 way lumbar support is fitted which comprises two separate cushion cells. The upper and lower cells can be inflated or deflated individually allowing greater comfort adjustment for the driver and passenger.

The lumbar support comprises an inflatable cushion located in the seat squab, a pump and solenoids. The pump is activated when the applicable seat switch is moved to the inflate position, inflating the cell(s) in the inflatable cushion. On 8 and 10 way seats, a single solenoid operated valve allows the inflatable cushion to be deflated. On 12 and 16 way seats, 4 solenoid valves control the inflation and deflation of the upper and lower inflatable cushion cells, allowing each cell to be adjusted individually.

Seat Motors

The head restraint motor is located in the upper section of each seat squab and is accessible by removal of the seat back. The motor moves a cradle which is driven in a vertical motion by a rack and pinion arrangement. The cradle has the two head restraint stems attached to it and therefore raises and lowers the head restraint as the motor moves the cradle. The motor contains a Hall sensor which supplies positional information to the driver's seat module.

The seat slide motor is an integral component of the seat frame. The motor drives on a gear on a worm drive lead screw which is integral with the floor rail. The lead screw has a stop at each end to limit the fore and aft seat movement.

The tilt motor is located below the seat. The tilt motor drives a gear on a lead screw to raise the front of the seat cushion. The motor contains a Hall sensor which supplies positional information to the driver's seat module.

The cushion extend motor is located below the seat. The motor drives a gear on a lead screw which extends or retracts the front of the seat cushion. The motor contains a Hall sensor which supplies positional information to the driver's seat module.

The height motor is located below the seat. The height motor drives a gear on a lead screw. The lead screw moves a lever mechanism which raises or lowers the seat cushion. The motor contains a Hall sensor which supplies positional information to the driver's seat module.

The squab recline motor is located in the seat back rest. The recline motor rotates a shaft which is connected the seat squab frame and raises or lowers the back rest position. The motor contains a Hall sensor which supplies positional information to the driver's seat module.

DRIVER'S SEAT MODULE

A memory store switch is located in the lower part of the driver's door. The switch communicates with the driver's eat module via the <u>LIN</u> bus in the driver's seat switch pack. The memory store switch has two buttons; 1 and 2 to allow two separate memory positions to be stored and 'set' button with integral LED (light emitting diode). The seat, door mirror and steering column motors have position sensors which provide feedback to driver's seat module.

Once the driver's seat, steering column and exterior mirrors have been adjusted, the vehicle is able to memorize these settings for future use by using the following procedure:

- Push the memory 'SET' button, the <u>LED</u> in the switch will illuminate
- Press the memory button 1 or 2 to memorize the current settings. The <u>LED</u> will extinguish, and a chime will sound to confirm that the settings have been memorized. If the ignition is on, power mode 6, the message center will display a confirmation message.

The positions can be recalled by pressing the applicable button 1 or 2.

Stall Detection

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

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

If the motor movement has stopped due to loss of sensor feedback, either stall or sensor failure, then that motor may be activated again, to move past the stall position, by re-selecting the appropriate switch and pressing for longer than 2 seconds. This allows control of the motor to be maintained if sensor feedback is lost.

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

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

Initialization

When a replacement driver's seat module is fitted, it should be calibrated a Jaguar approved diagnostic system so that the module can learn the seats absolute position.

Battery Monitor

If the battery voltage drops below 10.5 Volts, then the driver's seat module ignores all requests for a memory recall until the battery voltage has reached 11.5 Volts. This will conserve as much power in the vehicle battery as possible to enable engine cranking.

REAR SEATS - DESCRIPTION

The rear seat features a single piece cushion and a 60/40 split squab. Two latches are secured to the rear bulkhead by a pair of M8 bolts to retain the seat squabs in the upright position. The latches can be released to fold down the individual cushions by pulling a cable release located below the rear window parcel shelf in the luggage compartment.

ISOFIX fastening points are attached to the vehicle floor to provide secure fastening for compatible child seats.

A centrally mounted center arm rest can be folded down from the 60% squab. The arm rest contains two drinks holders.

Seating - Seat Cover Inspection

Description and Operation

Leather Seat Covers

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

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

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

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

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

Seat Cover Replacement

Rest of World Vehicles

Reference should be made to the list of documents below before any seat cover is replaced in Jaguar Land Rover warranty.

- Global Warranty Policy and Procedure Manual on TOPIx.
- Leather Seat Cover Finessing Process on the Excellence Academy.
- Seat Smoothing Procedure in the workshop manual.

All seat covers that are replaced should be done using all available TOPIx guides. Any damage that has been done to other components during the seat cover replacement process will not be paid under warranty.

NAS vehicles

Reference should be made to the list of documents below before any seat cover is replaced in Jaguar Land Rover warranty.

- Warranty Policy and Procedure Manual.
- Leather Seat Cover Finessing Process on the Excellence Academy.
- Seat Smoothing Procedure in the workshop manual.

All seat covers that are replaced should be done using all available TOPIx guides. Any damage that has been done to other components during the seat cover replacement process will not be paid under warranty.

Leather Seat Covers Manufacturing Defect Guidelines

Examples of Damage to Seat Cover

Below are some examples of damage that would not be accepted under the terms of the Jaguar Land Rover warranty agreement. Please note: these are examples only and do not represent all warrantable/non warrantable customer concerns.

The examples below show damage such as cuts, tears and puncture holes. These types of damage would not be accepted under the terms of the Jaguar Land Rover warranty agreement (unless the seat cover damage was noted on the Pre Delivery Inspection).





The examples below show damage such as scratches, scrapes, snags and indentation marks. These types of damage would not be accepted under the terms of the Jaguar Land Rover warranty agreement (unless the seat cover damage was noted on the Pre Delivery Inspection).





The examples below show damage such as pen marks and visual surface burns. These types of damage would not be accepted under the terms of the Jaguar Land Rover warranty agreement (unless the seat cover damage was noted on the Pre Delivery Inspection).





Examples of Natural Characteristics of Leather

Below are some examples of the natural characteristics of leather which will mature with use and ageing. These examples of the natural charcteristics of leather are not manufacturing defects. Improvements in the seat cover can be achieved by following the smoothing process.

The examples below show the natural characteristics of leather on the front seat cushion. These types of natural characteristics of leather would not be accepted under the terms of the Jaguar Land Rover warranty agreement.







The examples below show the natural c:harad:eristics of leather on the front seat back and squab bolsters, These types of natural characteristics of leather would not be accepted under the terms of the Jaguar Land Rover warranty agreement.



El67181

The examples below show the natural charaderistics of leather on the rear seat. These types of natural charaderistics of leather would not be aa:epted under the terms of the Jaguar Land Rover warranty agreement.





El67182

Examples of Soiling, Stains and Incorrect Cleaning

Below are some examples of soiling, stains and incorrect cleaning that would not be accepted under the terms of the Jaguar Land Rover warranty agreement. Please note: these are examples only and do not represent all warrantable/non warrantable customer concerns.

The example below shows soiling on the seat cover. This type of soiling would not be accepted under the terms of the Jaguar Land Rover warranty agreement.



E167183

The examples below show staining on the seat cover. These type of staining would not be accepted under the terms of the Jaguar Land Rover warranty agreement.





The example below shows incorrect cleaning on the seat cover. This type of incorrect cleaning would not be accepted under the terms of the Jaguar Land Rover warranty agreement.



Examples of Excessive Wear

Below are some examples of excessive wear on the seat covers that is often caused by studs, zips and buckles. This would not be accepted under the terms of the Jaguar Land Rover warranty agreement. Please note: these are examples only and do not represent all warrantable/non warrantable customer concerns.

The examples below show excessive wear on the seat covers, when studs, zips and buckles are in contact with the seat cover while entering and exiting the vehicle. These types of wear would not be accepted under the terms of the Jaguar Land Rover warranty agreement.



Seat Cover Replacement

Below are some examples of issues on the seat covers after they have been replaced. This would not be accepted under the terms of the Jaguar Land Rover warranty agreement. Please note: these are examples only and do not represent all warrantable/non warrantable customer concerns.

The example below shows excessive wrinkling or looseness due to incorrect fitment of the front seat covers. These types of incorrect fitment would not be accepted under the terms of the Jaguar Land Rover warranty agreement.





E167187

The example below shows excessive wrinkling or looseness due to incorrect fitment of the rear seat covers. This type of incorrect fitment would not be accepted under the terms of the Jaguar Land Rover warranty agreement.



Seating - Seats

Diagnosis and Testing

Principle of Operation

For a detailed description of the seats and seat operation, refer to the relevant Description and Operation section in the workshop manual. REFER to: (501-10 Seating)

Seats (Description and Operation), Seats (Description and Operation), Seats (Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

NOTE: Prior to carrying out any diagnosis, ensure the vehicle battery is in a good serviceable condition, refer to the battery care manual.

- 1. Verify the customer concern.
- 2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Mechanical	Electrical
Security, condition and correct installation of seat components and fixings	 Fuses Harnesses for damage/corrosion Electrical connectors Damaged/corroded pins

- 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 concern and refer to the Symptom Chart, alternatively, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.
- 5. Check DDW for open campaigns. Refer to the corresponding bulletins and SSM's which may be valid for the specific customer complaint and carry out the recommendations as needed.

Symptom Chart

Symptom	Possible Cause	Action
No seat movement from switch pack (including no memory recall)	 Seat module has gone into sleep mode Seat switch pack LIN, power or ground circuit - open circuit Seat switch pack LIN circuit - short to power, ground 	Set ignition ON. Re-check seat function from switch pack. Check for DTC B1A9887 and refer to DTC Index. Check for DTC B1A9888 and refer to DTC Index
No seat movement or lumbar movement from switch pack (including no memory recall)	 NOTE: Seat module does not control the seat lumbar function Seat switch pack power or ground supply circuits - open circuit 	Refer to the electrical circuit diagrams and check seat switch pack power and ground supply circuits for open circuit
Seat movement and lumbar movement from switch pack is ok, however, no recall from memory switch pack	 Seat switch pack to memory switch pack circuits - short, open circuit 	NOTE: Memory switch pack is separate switch hardwired to seat adjust switch Refer to the electrical circuit diagrams and check seat switch pack to memory switch pack circuits for short,

Symptom	Possible Cause	Action
		open circuit
Seat movement and memory recall works correctly however seat lumbar is not working correctly	NOTE: Seat module does not control the seat lumbar function	Refer to the electrical circuit diagrams and check seat movement switch to lumbar circuits for short, open circuit
	 Seat movement switch to lumbar circuits - short, open circuit 	
Seat movement from switch pack occurs in delayed inch mode (seat axis moves short distance when switch pressed for longer than 2 seconds and then stops). This behaviour could occur on any seat axis (slide, height, squab, tilt, headrest or cushion) when requested	 Motor Hall sensor on affected axis is not connected or not receiving expected signals 	Check for DTCs, B1B8731, B1B9131, B1B8931, B1B9331, B106331, B106431. If present then check Hall sensor feedback circuits between seat motor and seat module and also check Hall sensor ground circuits for affected axis. These DTCs are only logged if the axis is attempted to be moved in both directions. When hall sensor connection issue fixed press switch on affected axis for longer than 2 seconds. By keeping the switch pressed the axis movement should now operate for the duration of switch-press. Re-calibrate affected seat
Seat movement from switch pack occurs in inch mode. When seat axis movement is requested from the seat switch pack the requested seat axis moves a short distance then stops (does not include lumbar). This behaviour will occur on ALL seat axis (slide, height, squab, tilt headrest and cushion) when requested. MS CAN communication not possible	• MS CAN fault	Carry out CAN network integrity test using manufacturer approved diagnostic system
Seat movement from switch pack occurs in inch mode. When seat axis movement is requested from the seat switch pack the requested seat axis moves a short distance then stops (does not include lumbar). This behaviour will occur on ALL seat axis (slide, height, squab, tilt headrest and cushion) when requested. MS CAN communication not possible	 Seat module is disconnected from the CAN Bus 	Check for Instrument Cluster DTC U020800 'Lost Communication With Seat Module'. If this DTC is present, refer to the electrical circuit diagrams and check seat module power and ground supplies for short, open circuit. Carry out CAN network integrity tests using the manufacturer approved diagnostic system
Seat movement from switch pack occurs in inch mode. When seat axis movement is requested from the seat switch pack the requested seat axis moves a short distance then stops (does not include lumbar). This behaviour will occur on ALL seat axis (slide, height, squab, tilt headrest and cushion) when requested. MS CAN communication not possible	 Instrument cluster is disconnected from the CAN Bus 	Check for seat module DTC U015500 'Lost Communication With Instrument Cluster'. If this DTC is present, refer to the electrical circuit diagrams and check instrument cluster power and ground supplies for short, open circuit. Carry out CAN network integrity tests using the manufacturer approved diagnostic system
Seat movement from switch pack occurs in inch mode. When seat axis movement is requested from the seat switch pack the requested seat axis moves a short distance then stops (does not include lumbar). This behaviour will occur on ALL seat axis (slide, height, squab, tilt headrest and cushion) when requested. MS CAN communication not possible	 Driver Door Module is disconnected from the CAN Bus 	Check for seat module DTC U019900 'Lost Communication With Driver Door Module'. If this DTC is present, refer to the electrical circuit diagrams and check driver door module power and ground supplies for short, open circuit. Carry out CAN network integrity tests using the manufacturer approved diagnostic system
Seat movement from switch pack occurs in inch mode. When seat axis movement is requested from the seat switch pack the requested seat axis moves a short distance then stops (does not include lumbar). This behaviour will occur on ALL seat axis (slide, height, squab, tilt headrest and cushion) when requested. MS CAN communication not possible	 Rear Junction Box (RJB) is disconnected from the CAN Bus 	Check for seat module DTC U014200 'Lost Communication With RJB'. If this DTC is present, refer to the electrical circuit diagrams and check RJB power and ground supplies for short, open circuit. Carry out CAN network integrity tests using the manufacturer approved diagnostic system
Seat movement from switch pack occurs in inch mode. When seat axis movement is requested from the seat switch pack the requested seat axis moves a short distance then stops (does not include lumbar). This behaviour will occur on ALL seat axis (slide, height, squab, tilt headrest and cushion) when requested. MS CAN communication not possible	 Central Junction Box (CJB) is disconnected from the CAN Bus 	Refer to the electrical circuit diagrams and check CJB power and ground supplies for short, open circuit. Carry out CAN network integrity tests using the manufacturer approved diagnostic system

Symptom	Possible Cause	Action
NOTE: Electric passenger seat can always be activated – there is no passenger seat module installed to this vehicle	 Seat module is in manufacturing mode 	NOTE: A new module is NOT required to be installed, only the module replacement routine needs to be performed. This will set the PID required to disable manufacturing mode
Seat module does not go to sleep. Seat movement is always active from driver seat switch pack		Seat module needs to be configured for customer mode. Check for DTC U1A4C68 'Build/End of Line mode Active'. If this DTC is present then configure for customer mode by running 'New Seat Module Replacement' application for the affected seat using the manufacturer approved diagnostic system
Front seat fore/aft movement not functioning	 Carry out the pinpoint test associated to this Symptom 	GO to Pinpoint Test <u>A.</u>
Front seat excessive fore/aft free play	 Carry out the pinpoint test associated to this Symptom 	GO to Pinpoint Test <u>B.</u>
Front seat fore/aft movement noisy	 Carry out the pinpoint test associated to this Symptom 	GO to Pinpoint Test <u>C.</u>
Front seat height, tilt and/or seat extension motor movement not functioning	 Carry out the pinpoint test associated to this Symptom 	GO to Pinpoint Test <u>D.</u>
Front seat height, tilt and/or extension movement noisy	 Carry out the pinpoint test associated to this Symptom 	GO to Pinpoint Test <u>E.</u>

DTC Index

CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTES:

If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

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

Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DIVEISE	at Module Description	Possible Cause	Action
	Seat Cushion		Carry out any pinpoint tests associated with this DTC
	Extension Motor Output	 Driver seat cushion extension motor circuit - short to ground 	using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat cushion extension motor circuit for short to ground
B105F15	Seat Cushion Extension Motor Output	 Driver seat cushion extension motor circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat cushion extension motor circuit for short to power, open circuit
B106011	Seat Headrest Motor Output	 Driver seat headrest motor circuit short to ground 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat headrest motor circuit for short to ground
B106015	Seat Headrest Motor Output	 Driver seat headrest motor circuit short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat headrest motor circuit for short to power, open circuit
B106331	Seat Cushion Extension Motor Speed/Position Sensor	 Harness/connector problem No signal from sensor Sensor/motor malfunction 	 Check the seat wiring harness/connectors for security/integrity Refer to the electrical circuit diagrams and check the seat cushion motor sensor circuit. Repair circuit as required. Clear DTC and retest
B106431	Seat Headrest Motor Speed/Position Sensor	 Harness/connector problem No signal from sensor Sensor/motor malfunction 	 Check the seat wiring harness/connectors for security/integrity Refer to the electrical circuit diagrams and check the seat headrest motor sensor circuit. Repair circuit as required. Clear DTC and retest
B106524	Cushion extend switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and cushion extend circuit for short to ground
B106624	Cushion retract switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and cushion retract circuit for short to ground
B106D24	Headrest up switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and headrest up circuit for short to ground
	Headrest down switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and headrest down circuit for short to ground
B1A9883	LIN Bus Circuit #1	Value of signal protection calculation incorrect	Check LIN network for interference/EMC related issues
	LIN Bus Circuit #1	LIN bus Header error	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check LIN network for interference/EMC related issues
B1A9887	LIN Bus Circuit #1	 Slave node communication missing. LIN bus circuit - short to ground, power, open circuit (ECU Types 7 & 8) 	Refer to electrical circuit diagrams and test LIN Bus between seat switch pack and control module for short to ground, power, open circuit, check power and ground supplies to switch pack
B1A9888	LIN Bus Circuit #1	• Bus off	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to electrical circuit diagrams and test LIN Bus between seat switch pack and control module for short to ground or power
	Seat Height Motor Relay	Driver seat parallel height motor circuit - short to ground	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat parallel height motor circuit for short to ground
	Seat Height Motor Relay	 Driver seat parallel height motor circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat parallel height motor circuit for short to power, open circuit

DTC	Description	Possible Cause	Action
B1B8731	Seat Height Motor Speed/Position Sensor	 Harness/connector problem No signal from sensor Sensor/motor malfunction 	 Check the seat wiring harness/connectors for security/integrity Refer to the electrical circuit diagrams and check the seat height motor sensor circuit. Repair circuit as required. Clear DTC and retest
	Seat Slide Motor Relay	Driver seat slide motor circuit - short to ground	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat slide motor circuit for short to ground
	Seat Slide Motor Relay	Driver seat slide motor circuit - short to power, open circuit	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat slide motor circuit for short to power, open circuit
B1B8931	Seat Slide Motor Speed/Position Sensor	 Harness/connector problem No signal from sensor Sensor/motor malfunction 	 Check the seat wiring harness/connectors for security/integrity Refer to the electrical circuit diagrams and check the seat slide motor speed sensor circuit. Repair circuit as required. Clear DTC and retest
	Seat Tilt Motor Relay	Driver seat tilt motor circuit - short to ground	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat tilt motor circuit for short to ground
	Seat Tilt Motor Relay	Driver seat tilt motor circuit - short to power, open circuit	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat tilt motor circuit for short to power, open circuit
B1B9131	Seat Tilt Motor Speed/Position Sensor	 Harness/connector problem No signal from sensor Sensor/motor malfunction 	 Check the seat wiring harness/connectors for security/integrity Refer to the electrical circuit diagrams and check the seat tilt motor speed sensor circuit. Repair circuit as required. Clear DTC and retest
	Seat Recline Motor Relay	Driver seat recline motor circuit - short to ground	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat recline motor circuit for short to ground
	Seat Recline Motor Relay	• Driver seat recline motor circuit - short to power, open circuit	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check driver seat recline motor circuit for short to power, open circuit
B1B9331	Seat Recline Motor Speed/Position Sensor	 Harness/connector problem No signal from sensor Sensor/motor malfunction 	 Check the seat wiring harness/connectors for security/integrity Refer to the electrical circuit diagrams and check the seat recline motor speed sensor circuit. Repair circuit as required. Clear DTC and retest
B1B9424	Seat Height Up Switch	• Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and seat height up circuit for short to ground
B1B9524	Seat Height Down Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and seat height down circuit for short to ground
B1B9624	Seat Slide Forward Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and seat slide forward circuit for short to ground
B1B9724	Seat Slide Backward Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and seat slide backward circuit for short to ground
	Seat Tilt Up Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and seat tilt up circuit for short to ground
B1B9924	Seat Tilt Down Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and seat tilt down circuit for short to ground

DTC	Description	Possible Cause	Action
B1C0024	Seat Recline Up Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and seat recline up circuit for short to ground
B1C0124	Seat Recline Down Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit and check seat recline down circuit for short to ground
B1C0224	Memory Store Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit
B1C0324	Memory #1 Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit
B1C0424	Memory #2 Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit
B1C0524	Memory #3 Switch	Signal stuck high	Check for a stuck switch. Refer to the electrical circuit diagrams and check driver seat switch pack to seat module LIN circuit for short, open circuit
U001088	Medium speed Can communication Bus	• Bus off	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check CAN network to climate controlled seat module for short, open circuit
U014000	Lost communication with CJB	Lost communication with CJB	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check CJB for related DTCs and refer to the relevant DTC Index
U014200	Lost communication with RJB	Lost communication with RJB	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check RJB for related DTCs and refer to the relevant DTC Index
U015500	Lost communications with instrument cluster	Lost communications with instrument cluster	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check CAN network to climate controlled seat module and instrument cluster for short, open circuit
U019900	Lost communication with Driver Door Module (DDM)	Lost communication with DDM	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
U030000	Internal control module software incompatibility	 Invalid configuration message is received 	Re-configure the RJB using the manufacturer approved diagnostic system. Clear the DTC and retest. If the DTC is still logged suspect the DSM/PSM, refer to the new module installation note at the top of the DTC Index
	CAN Initialisation failure	Internal electronic failure	Install a new DSM, refer to the new module installation note at the top of the DTC Index
U1A4C68	Build/end of line mode active	 Manufacturing mode has not been removed 	Place DSM in to customer mode using manufacturer approved diagnostic system
U300049	Control module	Internal electronic failure	Install a new DSM, refer to the new module installation note at the top of the DTC Index
U300055	Stored vehicle configuration data does not match	 Incorrect car configuration data received 	Re-configure the RJB using the manufacturer approved diagnostic system. Clear DTC and re-test. If the DTC remains suspect the DSM, refer to the new module installation note at the top of the DTC Index
U300087	Control Module	• Missing message	Re-configure the RJB using the manufacturer approved diagnostic system. Check DSM for DTCs and refer to the DTC Index. Check CAN network integrity using the manufacturer approved diagnostic system
U300146	Control module improper shutdown	Calibration/parameter memory failure	Check for DTCs that could indicate power failure to the module and refer to the DTC Index
U300281	Vehicle Identification Number (VIN)	 Vehicle/component mis-match. Corrupt VIN data being transmitted, module previously installed to other vehicle 	Install original module, check for DTCs and refer to relevant DTC Index
U300316	Battery Voltage	Circuit voltage below threshold	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system

DTC	Description	Possible Cause	Action
U300317	Battery Voltage		Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system

Pinpoint Tests

ΡΙΝΡΟΙΝΤ ΤΕ	EST A : FRONT SEAT FORE/AFT MOVEMENT NO	T FUNCTIONING
TEST CONDITIONS		SULTS/ACTIONS
A1: CHECK FOR	R FRONT SEAT FORWARD-REARWARD SEAT MOTOR	OPERATION
	WARNING: Before work is carried out, make the a additional information, refer to Standard Workshop Prac	
	1 Set ignition status to 'ON'.	
	of the motor operating.	ard-rearward seat motor switch and listen for evidence
	Does the motor operate? Yes	
	No $\frac{GO \text{ to } A2}{GO \text{ to } A3}$.	
A2: CHECK FRC	DNT SEAT FORWARD-REARWARD SEAT MOTOR DRIV	VE BAR
	1 Check front seat drive bar for correct installation a	
	Is the front seat drive bar correctly installed and in a set Yes	erviceable condition?
		ovement. Remove seat to allow for further investigation
	Correctly install front seat forward-rearward seat n	notor drive bar, or replace if required.
A3: CHECK FRO	ONT SEAT FORWARD-REARWARD SEAT MOTOR	· ·
WARNING: accordingly.	: When carrying out the following steps, stand clear of a	all moving parts and ensure link harness is routed
	1 Set ignition status to 'OFF'.	
	2 Disconnect front seat forward-rearward seat motor	° connector.
	the link harness is connected, the seat will remain in the from the motor. To confirm the motor operation, swap t the seat should travel in the opposite direction.	o the limit of travel along the relevant axis, and when he same position. If this is the case, a jolt may be felt he link harness to alternate motor pin connections and supply, connect power and ground to forward-rearward
,	Battery positive terminal	Battery negative terminal
	forward-rearward seat motor pin 1	forward-rearward seat motor pin 2
	Does the motor operate? Yes	
	Using manufacturer approved diagnostic system, check for related Diagnostic Trouble Codes (DTCs) and carry out the repair operations specified. Alternatively, refer to the electrical circuit diagrams and check front seat forward-rearward seat motor circuits.	
	No Replace front seat forward-rearward seat motor. Re	efer to relevant section of workshop manual.
PINPOINT TE	EST B : FRONT SEAT EXCESSIVE FORWARD-RE	ARWARD FREE PLAY
TEST		SULTS/ACTIONS
CONDITIONS B1: CHECK FRO	> DNT SEAT FOR EXCESSIVE FORWARD-REARWARD FF	REE PLAY
	WARNING: Before work is carried out, make the additional information, refer to Standard Workshop Pr	
	1 Check all accessible front seat frame fixings are	installed and to the correct torque.
	Are all accessible front seat frame fixings installed ar Yes	
	No GO to B2.	

Install and tighten all accessible front seat frame fixings to correct torque and re-check for excessive free play.
B2: COMPAR	E THE FRONT SEAT FORWARD-REARWARD FREE PLAY AGAINST A SIMILAR SEAT
	1 Compare the front seat forward-rearward free play against a similar seat.
	Is the front seat forward-rearward free play excessive when compared to a similar seat?
	Yes
	<u>GO to B3</u> .
	No
	The front seat frame is operating correctly. Submit Electronic Product Quality Report (EPQR) with any
	further query.
B3: CHECK R	EMAINING FRONT SEAT FRAME FIXINGS
	1 Remove front seat and/or any seat covers/trim to allow access to check remaining front seat frame fixings are all installed and to the correct torque.
	Are all remaining front seat frame fixings installed and to the correct torque?
	Yes
	Replace front seat frame. Refer to the relevant section of the workshop manual.
	No
	Install and tighten all remaining front seat frame fixings to correct torque and re-check for excessive free play.

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	I RONT SEAT FORWARD-REARWARD MOVEMENT NOISE TO OTHER FRONT SEAT
	Δ
	WARNING: Before work is carried out, make the air bag supplemental restraint system safe. For
	additional information, refer to Standard Workshop Practices section of workshop manual.
	1 Compare the front seat forward-rearward movement noise to other front seat.
	Is the front seat forward-rearward movement noise excessive when compared to other front seat?
	Yes
	<u>GO to C2</u> . No
	<u>GO to C3</u> .
2: COMPARE F	RONT SEAT FORWARD-REARWARD MOVEMENT NOISE TO FRONT SEAT IN OTHER VEHICLE
	1 Compare the front seat forward-rearward movement noise to front seat in other vehicle.
	Is the front seat forward-rearward movement noise excessive when compared to front seat in other vehicle? Yes
	<u>GO to C3.</u>
	No
	The front seat frame is operating correctly. Submit Electronic Product Quality Report (EPQR) with any
	further query. DEBRIS OBSTRUCTING SEAT MOVEMENT
5. CHECK I OK	1 Check for debris obstructing seat movement.
	Is the front seat forward-rearward movement obstructed by debris?
	Yes
	Remove obstruction and re-check for noisy forward-rearward seat movement.
	GO to C4.
4: RE-ALIGN F	RONT SEAT FRAME
	1 Loosen front seat frame fixings.
	2 Set ignition status to 'ON'.
	3 Using the front seat switch pack drive the front seat fully forward then fully rearward.
	Tighten front seat frame fixings to the correct torque.
	5 Re-check for noisy seat movement.
	Is the front seat forward-rearward movement still noisy? Yes
	<u>GO to C5.</u>
	No
	The front seat frame is now operating correctly. IT SEAT FORWARD-REARWARD SEAT MOTOR DRIVE BAR
5: CHECK FRUI	Check front seat drive bar for correct installation and condition.
	Is the front seat drive bar correctly installed and in a serviceable condition?
	Yes
	Replace front seat forward-rearward seat motor. Refer to relevant section of workshop manual.
	No

PINPOINT TEST D : FRONT SEAT HEIGHT, TILT AND/OR SEAT EXTENSION MOTOR MOVEMENT NOT FUNCTIONING

TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
D1: CHECK FRC	NT SEAT HEIGHT, TILT OR EXTENSION MOTOR

WARNINGS:		
Before work is carried out, make the Standard Workshop Practices section of w		system safe. For additional information, refer to
When carrying out the following ste	ps, stand clear of all moving par	ts and ensure link harness is routed accordingly.
1 Set ignition status to	o ' OFF'.	
2 Disconnect front sea	t height, tilt or extension motor	connector.
the link harness is conne from the motor. To confiru the seat should travel in	cted, the seat will remain in the m the motor operation, swap the the opposite direction.	he limit of travel along the relevant axis, and when same position. If this is the case, a jolt may be felt link harness to alternate motor pin connections and upply, connect power and ground to relevant motor.
	ositive terminal	Battery negative terminal
motor pin 1		otor pin 2
	approved diagnostic system, che operations specified. Alternative	eck for related Diagnostic Trouble Codes (DTCs) and ly, refer to the electrical circuit diagrams and check

Replace the relevant motor. Refer to relevant section of workshop manual.

PINPOINT TES	T E : FRONT SEAT HEIGHT, TILT AND/OR EXTENSION MOVEMENT NOISY
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: COMPARE TH	IE HEIGHT, TILT OR EXTENSION MOVEMENT NOISE WITH THE OTHER FRONT SEAT
	WARNING: Before work is carried out, make the air bag supplemental restraint system safe. For additional information, refer to Standard Workshop Practices section of workshop manual.
	1 Compare the front seat movement noise to other front seat.
	Is the front seat height, tilt or extension movement noise excessive when compared to other front seat? Yes GO to E2. No GO to E3.
E2: COMPARE FR	ONT SEAT HEIGHT, TILT OR EXTENSION MOVEMENT NOISE TO FRONT SEAT IN OTHER VEHICLE
	1 Compare the front seat height, tilt or extension movement noise to front seat in other vehicle.
	Is the front seat height, tilt or extension movement noise excessive when compared to front seat in other vehicle? Yes <u>GO to E3</u> . No
	The front seat frame is operating correctly. Submit Electronic Product Quality Report (EPQR) with any further query.
E3: CHECK FOR I	DEBRIS OBSTRUCTING SEAT MOVEMENT
	1 Check for debris obstructing seat movement.
	Is the front seat height, tilt or extension movement obstructed by debris?
	Yes Remove obstruction and re-check for noisy height, tilt or extension seat movement. No GO to E4.
E4. CHECK FOR I	HEIGHT, TILT OR EXTENSION MOVEMENT MECHANISM LUBRICATION
	 Check and apply manufacturer approved lubrication to seat height, tilt or extension movement mechanism and re-test for noise.
	Is the front seat height, tilt or extension noise still apparent? Yes
	Replace the relevant motor. Refer to relevant section of workshop manual. No The front seat height, tilt or extension motor is operating correctly.

Seating - Heater Mats

Diagnosis and Testing

Principles of Operation

Heated seats incorporate heater elements in the cushion and the backrest of the seat. Each cushion heater element has a thermal sensor, which supplies a feedback temperature signal to the related seat heater module. The backrest heater elements do not have a thermal sensor, and are regulated at the same temperature as the cushion heater elements.

For a detailed description of the seat heater mat, refer to the relevant Description and Operation section in the workshop manual. REFER to: (501-10)

Seats (Description and Operation), Seats (Description and Operation), Seats (Description and Operation).

Inspection and Verification

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

Visual inspection

Mechanical	Electrical				
 Seat heater switches condition and installation 	 Fuses Harnesses and connectors Seat heater module Seat heater switches Seat heater mat 				

- 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4. If the cause is not visually evident, check for Diagnostic Trouble Codes (DTC's) and refer to the DTC Index.

NOTES:



If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the warranty policy and procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

Λ

Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

\triangle

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

Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

	If DTC:	s are rec	orded and,	after p	performing	the	pinpoint	tests,	a fault	is not	present,	an inte	ermittent	concern	may be the
caus	se. Alway	ys check	for loose of	connect	tions and o	orro	ded term	ninals.							



DTC Index

For a complete list of all diagnostic trouble codes that could be logged on this vehicle, please refer to section 100-00. REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Seat Module (Driver/Passenger/Rear Left/Rear Right) (100-00, Description and Operation) / Diagnostic Trouble Code (DTC) Index - DTC: Seat Climate Control Medule (SCCM) (100-00, Description and Operation)

Diagnostic Trouble Code (DTC) Index - DTC: Seat Climate Control Module (SCCM) (100-00, Description and Operation).

NOTE: To ensure an accurate resistance reading, calibrated test equipment **must be** used

			Left Han	nd Drive	Right Ha	nd Drive	Minimum Resistance	Maximum Resistance
Vehicle / Year	Cushion / Backrest	Heater Mat / NTC Resistor	Passenger Side Connector / Pin	Driver Side Connector / Pin	Passenger Side Connector / Pin	Driver Side Connector / Pin	Ohms At	Ohms At 20°C ±10°C
XK 2010	Cushion	Heater mat	PS002/1 and PS002/4	DS002/1 and DS002/4	PS002/1 and PS002/4	DS002/1 and DS002/4	1,2	1,6
			PS002/2 and PS002/3	DS002/2 and DS002/3	PS002/2 and PS002/3	DS002/2 and DS002/3	4 000	10 000
	Backrest		PS003/1 and PS003/2	DS003/1 and DS003/2	PS003/1 and PS003/2	DS003/1 and DS003/2	0,35	0,47
XF	Cushion	Heater mat	C3HS07A/1 and C3HS07A/4	C3HS02A/1 and C3HS02A/4	C3HS07A/1 and C3HS07A/4	C3HS02A/1 and C3HS02A/4	1,23	1,64
		NTC resistor	C3HS07A/2 and C3HS07A/3	C3HS02A/2 and C3HS02A/3	C3HS07A/2 and C3HS07A/3	C3HS02A/2 and C3HS02A/3	4 000	10 000
	Backrest	Heater mat	C3HS06A/1 and C3HS06A/2	C3HS01A/1 and C3HS01A/2	C3HS06A/1 and C3HS06A/2	C3HS01A/1 and C3HS01A/2	0,82	1,09
XJ 2008	Cushion	Heater mat	SP14-1 and SP14-4	SD14-1 and SD14-4	SP14-1 and SP14-4	SD14-1 and SD14-4	1,28	1,71
		NTC resistor	SP14-2 and SP14-3	SD14-2 and SD14-3	SP14-2 and SP14-3	SD14-2 and SD14-3	4 000	10 000
	Backrest	Heater mat	SP15-1 and SP15-2	SD15-1 and SD15-2	SP15-1 and SP15-2	SD15-1 and SD15-2	0,88	1,17
XJ 2010 onwards -	Cushion	Heater mat	C3HS07/1 and C3HS07/4	C3HS02/1 and C3HS02/4	C3HS07/1 and C3HS07/4	C3HS02/1 and C3HS02/4	0,99	1,32
Front		NTC resistor	C3HS07/2 and C3HS07/3	C3HS02/2 and C3HS02/3	C3HS07/2 and C3HS07/3	C3HS02/2 and C3HS02/3	4 000	10 000
	Backrest	Heater mat	C3HS06/1 and C3HS06/2	C3HS01/1 and C3HS01/2	C3HS06/1 and C3HS06/2	C3HS01/1 and C3HS01/2	0,67	0,90
XJ 2010 onwards -	Cushion	Heater mat	C3HS78/1 and C3HS78/4	C3HS76/1 and C3HS76/4	C3HS76/1 and C3HS76/4		0,99	1,32
Rear		NTC resistor	C3HS78/2 and C3HS78/3		C3HS76/2 and C3HS76/3	C3HS78/2 and C3HS78/3	4 000	10 000
	Backrest	Heater mat	C3HS79/1 and C3HS79/4	C3HS77/1 and C3HS77/4	C3HS77/1 and C3HS77/4		1,0	1,3

PINPOINT TEST A : SEAT HEATER MAT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
1: CHECK FOR	DTC'S
	1 Where possible use the manufacturer approved diagnostic system to review any logged seat heater mat DTC's
	Were any seat heater mat DTC's logged? Yes
	Carry out the help text action for any logged DTC's. Clear the DTC and retest. If DTC's return follow the tests listed below GO to A2.
	No GO to A2.
12: MANUAL CH	ECK
\wedge	I check should be carried out by someone familiar with correct seat heat operation
	I check should be carried out by someone familiar with correct seat heat operation ver the seat should be hot to touch
	 rer the seat should be hot to touch If required operate the vehicle air conditioning on full for 10 minutes to reduce the in vehicle ambient
	 1 If required operate the vehicle air conditioning on full for 10 minutes to reduce the in vehicle ambient temperature 2 Operate the seat heater on full power Does the seat heater operate correctly?
	 Per the seat should be hot to touch If required operate the vehicle air conditioning on full for 10 minutes to reduce the in vehicle ambient temperature Operate the seat heater on full power Does the seat heater operate correctly? Yes
The manua	 1 If required operate the vehicle air conditioning on full for 10 minutes to reduce the in vehicle ambient temperature 2 Operate the seat heater on full power Does the seat heater operate correctly?

A3: SHORT CIRCUIT TO GROUND

1	Refer to the electrical circuit diagrams and the seat heater mat application chart (see above) to identify the connector
2	
3	
	e either of the circuits short circuit to ground?
Y	Repair the circuit or replace the seat heater mat as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component. Clear any stored DTC's and retest
	GO to A4.
A4: CIRCUIT CON	
1	Refer to the electrical circuit diagrams and check the seat heater mat (heater circuit) for circuit continuity
	bes the seat heater mat heater circuit pass the continuity test?
	<u>GO to A5</u> .
N	Repair the circuit or replace the seat heater mat as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component. Clear any stored DTC's and retest
A5: POWER CONS	UMPTION
	at heater power supply cycles on and off dependant on the seat and cabin temperature and may only onds in 30 seconds
1	Reconnect the connector
	Operate the vehicle air conditioning on full for 10 minutes to reduce the in vehicle ambient temperature
3	Refer to the electrical circuit diagrams and check the seat heater mat (heater circuit) using a current clamp
4	•
5	
6	Amps) Examples (12 volts / 0.5 ohms =24 amps) (12 volts / 1 ohms = 12 amps) (12 volts / 2 ohms = 6 amps)
-	bes the seat heater mat consume the correct level of current?
Y	es Clear any stored DTC's and retest. If operation correct, no further action required
	GO to A6.
A6: RESISTANCE	CHECK
NOTES:	
	ultimeter used is calibrated and a resistance reading of 0 ohms is shown when the test leads are connected ly subtract any resistance shown from the result
△ The seat hea	ter mat circuits should be checked at the seat heater module connector
A Refer to the e connected in series	electrical circuit diagrams and to confirm the total resistance of the circuit the cushion and backrest are
1	Refer to the electrical circuit diagrams and the seat heater mat application chart (see above) to identify the terminals
2	Disconnect the connector
3	Using a multimeter, carry out a resistance check of the seat heater mat heater circuit and the NTC resistor circuit. Record the results
4	
	e the results within specification at the given ambient temperature? (tolerance +/- 0.5 Ohms)
	Reconnect the connector. Clear any stored DTC's and retest. If customer concern or DTC's return refer to electrical circuit diagrams and investigate the power and ground supply circuits
N (Replace the seat heater mat as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component. Clear any stored DTC's and retest

Seating - Seats Vehicles With: Climate Controlled Seats

Diagnosis and Testing

Principle of Operation

For a detailed description of the seating systems and operation, refer to the relevant description and operation section of the workshop manual. REFER to: (501-10 Seating)

Seats (Description and Operation), Seats (Description and Operation), Seats (Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle

NOTES:

If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component

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

LIF DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals

The DTC index containing an actions list is for guidance only any reference to "check and install new blower unit" should only be carried out following failure confirmation using the pin out diagnostics and/or the over temperature and fluid/air leak diagnostics contained below. The recording of a DTC does NOT signify a permanently failed unit

The climate system functions in a manner that means any detected error state either intermittent or permanent will shut down the complete seat climate system until the next ignition cycle, this does not mean that both climate units within the one seat have failed. This shut down is design intent to protect the system to ensure that the fault detected does not damage the units, it is possible that both units are functioning correctly and that the fault lies elsewhere within the system. The following process can be carried out without removing either the seats or the climate units from the vehicle and should correctly identify any failed units, this should ensure that only failed units are changed under warranty. Any units exhibiting the correct reading as per process below, should NOT be changed under warranty. If all units have a correct reading then re-confirm customer symptom, if customer symptom is still present then carry out further system checks

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

Visual Inspection Mechanical Electrical · Seat heater switch condition and installation Battery condition and state of charge • Fuses Harnesses and connectors Seat heater switch(es) ٠ Seat heater elements • Seat module(s) Ignition switch ٠ Battery junction box • Central junction box LIN circuit

- 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
- 4. If the cause is not visually evident, carry out normal dealer warranty process, perform on-demand self test, check for DTCs and refer to the relevant DTC index
- 5. Allow 30 mins since the last seat/cooled operation prior to carrying out pin testing detailed below in the section "Connector and Pin Information"

- 6. Locate climate seat module, (refer to Electrical Information Electrical Reference Library, contained in TOPIx) for guidance on how to gain access to the connector(s)
- 7. Locate and disconnect relevant connector prior to pin test
- Using ohm-meter to probe each heat/cooled unit pins (at rear of connector), reading should achieve no greater than 10 ohms after 1 minute (initial fluctuations in readings may occur using ohm-meter, post 1 minute readings will have stabilized)

Connector and Pin Information

X250 (All Mode	X250 (All Model Years)								
Terminal ID	1	2	3	4	7	8	9	10	
Climate Seat Unit Location	Right Cushion	Right Cushion		Right Backrest	Left Cushion	Left Cushion	Left Backrest	Left Backrest	
Wiring Colour - Left Hand Drive Vehicles	GY-BU - Grey/Blue	BU - Blue	BU-BN - Blue/Brown	WH - White		BU-OG - Blue/Orange	GY-VT - Grey/Violet	WH-VT - White/Violet	
Wiring Colour - Right Hand Drive Vehicles				WH-VT - White/Violet	GY-BU - Grey/Blue	BU - Blue	BU-BN - Blue/Brown	WH - White	

- 1. If any unit reads greater than 10 ohms, replace only that defective unit
- 2. If all units read less than 10 ohms but faults are still suspected, do not replace any units. Refer to step 4 below
- 3. As a final check, when a faulty unit has been identified strip the seat to access unit connector, REFER to: Seats (501-10, Removal & Installation) and re-check ohm reading to confirm greater than 10 ohms prior to removing unit
- 4. In cases where the above diagnostic routine does NOT identify a failed unit, please refer to "Over Temperature and Fluid/Air Leak Diagnostics" below. Also check for any live technical service bulletins referring to the seat climate system

Seat Climate Control Module/Seat Climate Assembly - Further Diagnostics

In the event of suspected climate seat faults use the pinpoint tests detailed below

Connector Checks

First, check the integrity of the three seat climate control module harness connectors:

- 1. Disconnect each connector
- 2. Inspect each connector for cracks and breaks, replace as required
- 3. Check the integrity of connector terminals for bent terminals, backed-out or badly crimped wires. Rectify as required
- 4. Reconnect all connectors and retest. If seat climate functions are still faulty, note any DTCs that have been logged by the seat climate control module(s) and refer to the table and pinpoint tests below:

DTC Logged	Pinpoint Test Required
NOTE: Where DTCs are marked in bold, this means that there are two possible diagnostic processes that may be applied to resolve these faults. Check the listings below to reference an alternative set of pinpoint tests for these DTCs	GO to Pinpoint Test <u>A.</u>
 B10B9-13 Blower Control - Circuit open B10B9- 4B Blower Control - Over temperature B1157- 13 Blower Control B - Circuit open B1157-4B Blower Control B - Over temperature B120E-4B Right Thermal Electric Device Control - Over temperature B1224-4B Left Thermal Electric Device Control - Over temperature B122A-11 Right Seat Cushion Blower Speed Sensor - Circuit short to ground B122B-11 Right Seat Back Blower Speed Sensor - Circuit short to battery B122B-12 Right Seat Back Blower Speed Sensor - Circuit short to battery B122C-11 Left Seat Cushion Blower Speed Sensor - Circuit short to ground B122C-11 Left Seat Cushion Blower Speed Sensor - Circuit short to battery B122C-11 Left Seat Back Blower Speed Sensor - Circuit short to battery B122D-11 Left Seat Back Blower Speed Sensor - Circuit short to battery B122D-12 Left Seat Back Blower Speed Sensor - Circuit short to battery 	
NOTE: Where DTCs are marked in bold, this means that there are two possible diagnostic processes that may be applied to resolve these faults. Check the listings below to reference an alternative set of pinpoint tests for these DTCs	GO to Pinpoint Test <u>B.</u>
B120E-13 Right Thermal Electric Device Control - Circuit open	

DTC Logged	Pinpoint Test Required
 B120E-19 Right Thermal Electric Device Control - Circuit current above threshold B1223-13 Right Seat Cushion Temperature Sensor - Circuit open B1224-13 Left Thermal Electric Device Control - Circuit open B1224-19 Left Thermal Electric Device Control - Circuit current above threshold B1225-13 Right Seat Back Temperature Sensor - Circuit open B1229-13 Left Seat Back Temperature Sensor - Circuit open B1235-13 Left Seat Cushion Temperature Sensor - Circuit open 	
 B120F-98 Left Seat Cushion - Component or system over temperature B122E-98 Right Seat Cushion - Component or system over temperature B122F-98 Right Seat Back - Component or system over temperature B1230-98 Left Seat Back - Component or system over temperature B1231-7A Right Seat - Fluid leak or seal failure B1232-7A Left Seat - Fluid leak or seal failure 	GO to Pinpoint Test <u>C.</u>
NOTE: Where DTCs are marked in bold, this means that there are two possible diagnostic processes that may be applied to resolve these faults. Check the listings above to reference an alternative set of pinpoint tests for these DTCs	GO to Pinpoint Test <u>D.</u>
 B120E-4B Right Thermal Electric Device Control - Over temperature B120E-13 Right Thermal Electric Device Control - Circuit open B120E-19 Right Thermal Electric Device Control - Circuit current above threshold B1223-13 Right Seat Cushion Temperature Sensor - Circuit open B1224-4B Left Thermal Electric Device Control - Over temperature B1224-13 Left Thermal Electric Device Control - Circuit open B1224-19 Left Thermal Electric Device Control - Circuit open B1224-19 Left Thermal Electric Device Control - Circuit open B1225-13 Right Seat Back Temperature Sensor - Circuit open B1229-13 Left Seat Back Temperature Sensor - Circuit open B1235-13 Left Seat Cushion Temperature Sensor - Circuit open 	

B1235-13 Left Seat Cushion Temperature Sensor - Circuit open PINPOINT TEST A : CLIMATE SEATS ASSEMBLY - BLOWER DIAGNOSTICS

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS		
1: CLIMATE SEA	ATS ASSEMBLY - BLOWER SPEED CONTROL CIRCUIT RESISTANCE CHECKS AT SEAT TO VEHICLE		
	1 Uncouple connector C3HS03C from the seat climate control module		
	2 Check the resistance of the climate seats blower speed control circuits at connector C3HS03C		
	 For right-side seat cushion blower, check resistance at pins 3 and 7 		
	 For right-side seat backrest blower, check resistance at pins 4 and 7 		
	 For left-side seat cushion blower, check resistance at pins 11 and 15 		
	 For left-side seat backrest blower, check resistance at pins 12 and 15 		
	Is the resistance between 290 and 420 kilo-ohms? Yes		
	No circuit faults present. No further action		
	No GO to A2.		
2: CLIMATE SEA	TS ASSEMBLY - BLOWER POWER CIRCUIT RESISTANCE CHECKS AT SEAT CLIMATE ASSEMBLY		
	1 Locate the appropriate seat backrest/seat cushion climate assembly connector		
	2 Disconnect connector		
	Check the integrity of connector terminals for bent terminals, backed-out or badly crimped wires. Rectif as required		
	Check the resistance of the climate seats blower power circuits at the climate assembly connector, pins 2 and 4		
	Is the resistance between 290 and 420 kilo-ohms? Yes		
	GO to A3.		
	No Replace the seat climate assembly		
3: CLIMATE SEA	TS ASSEMBLY - BLOWER SPEED CONTROL CIRCUIT RESISTANCE CHECKS AT SEAT CLIMATE		
SSEMBLI CONN	 Check the resistance of the climate seats blower control circuits at the climate assembly connector, pins 4 and 7 		

Is the resistance between 290 and 420 kilo-ohms? Yes

No internal circuit faults present. Check for circuit faults in wiring harness between seat climate control module and climate seat assembly and replace as required No

Replace the seat climate assembly

TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
1: CLIMATE SE	1 Uncouple connector C3HS03B from the seat climate control module
	 Check the resistance of the climate seats TED sensor circuits at connector C3HS03B
	For right-side seat cushion TED sensor circuits, check resistance at pins 2 and 3
	 For right-side seat backrest TED sensor circuits, check resistance at pins 4 and 5
	 For left-side seat cushion TED sensor circuits, check resistance at pins 7 and 8
	• For left-side seat backrest TED sensor circuits, check resistance at pins 9 and 10
	Is the resistance between 0.9 and 1.1 kilo-ohms? (Note: these values are based on an ambient temperature of 22°C/72°F)
	Yes No circuit faults present. No further action
	No
2: CLIMATE SE	<u>GO to B2</u> . ATS ASSEMBLY - TED SENSOR CIRCUIT RESISTANCE CHECKS AT SEAT CLIMATE ASSEMBLY
ONNECTOR	
	 Locate the appropriate seat backrest/seat cushion climate assembly connector Disconnect connector
	 Check the integrity of connector terminals for bent terminals, backed-out or badly crimped wires. Rectify as required
	4 Check the resistance of the climate seats TED sensor circuits at the climate assembly connector, pins 5 and 8 (Green and Green wires)
	Is the resistance between 0.9 and 1.1 kilo-ohms? (Note: these values are based on an ambient temperature of 22°C/72°F) Yes
	<u>GO to B3</u> .
	No Replace the seat climate assembly
	ATS ASSEMBLY - TED SUPPLY CIRCUIT OPEN CIRCUIT CHECKS AT SEAT CLIMATE ASSEMBLY
ONNECTOR	1 Check the TED supply circuits at the climate assembly connector, pins 1 and 3 (Blue and Yellow wires)
	for open circuit faults
	Is an open-circuit fault present? Yes
	Replace the seat climate assembly
	No No internal circuit faults present. Check for circuit faults in wiring harness between seat climate control
	module and climate seat assembly and replace as required
INPOINT TES	T C : CLIMATE SEATS ASSEMBLY - BLOWER AND DUCTING DIAGNOSTICS
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
1: CLIMATE SEA	ATS ASSEMBLY - BLOWER SPEED CONTROL CIRCUIT RESISTANCE CHECKS AT SEAT TO VEHICLE
	1 Uncouple connector C3HS03C from the seat climate control module
	2 Check the resistance of the climate seats blower speed control circuits at connector C3HS03C
	 For right-side seat cushion blower, check resistance at pins 3 and 7
	 For right-side seat backrest blower, check resistance at pins 4 and 7
	For left-side seat cushion blower, check resistance at pins 11 and 15
	 For left-side seat backrest blower, check resistance at pins 12 and 15
	Is the resistance between 290 and 420 kilo-ohms?
	No.
	Yes No circuit faults present. No further action

	1 Locate the appropriate seat backrest/seat cushion climate assembly connector
	2 Disconnect connector
-	3 Check the integrity of connector terminals for bent terminals, backed-out or badly crimped wires. Rectify
	as required
	4 Check the resistance of the climate seats blower circuits at the climate assembly connector, pins 2 and 4 (Violet and Black wires)
	Is the resistance between 290 and 420 kilo-ohms?
	Yes GO to C3.
	No
	Replace the seat climate assembly
C3: CLIMA ⁻ CONNECTO	TE SEATS ASSEMBLY - BLOWER CONTROL CIRCUIT RESISTANCE CHECKS AT SEAT CLIMATE ASSEMBLY OR
	1 Check the resistance of the climate seats blower control circuits at the climate assembly connector, pins 4 and 7 (Black and Purple wires)
	Is the resistance between 290 and 420 kilo-ohms?
	Yes
	No internal circuit faults present. Check for circuit faults in wiring harness between seat climate control module and climate seat assembly and replace as required. If no harness faults are found, GO to C4.
	No
	Replace the seat climate assembly
C4: CLIMA	TE SEATS ASSEMBLY - BLOWER DUCTING INSPECTION
	1 Check that the ducting is securely attached to the blower and thermal electric device
	2 Check the ducting for holes, cuts or tears
	Is the ducting undamaged and securely attached to the blower and thermal electric device?
	Yes
	<u>GO to C5</u> . No
	Replace the seat climate assembly
C5: CLIMA	TE SEATS ASSEMBLY - EXHAUST AIRFLOW CHECKS
	1 Check for blockages or restrictions at the thermal electric device exhaust vent
	Are blockages or restrictions present?
	Yes
	Rectify as required
	No
	<u>GO to C6.</u>
CO: CLIMA	TE SEATS ASSEMBLY - BLOWER AIRFLOW CHECKS
	1 Check for blockages or restrictions at the blower air intake
	2 Check that the blower fan movement is not restricted
	Are there any air intake blockages or restrictions to the blower fan movement? Yes
	Recurv as required
	Rectify as required No

PINPOINT TEST D : CLIMATE SEATS ASSEMBLY - THERMAL ELECTRIC DEVICE (TED) AND DUCTING DIAGNOSTICS

TEST CONDITIONS			
D1: CLIMATE SE	ATS ASSEMBLY - TED SENSOR CIRCUIT RESISTANCE CHECKS AT SEAT TO VEHICLE CONNECTOR		
1 Uncouple connector C3HS03B from the seat climate control module			
	2 Check the resistance of the climate seats TED sensor circuits at connector C3HS03B		
	• For right-side seat cushion TED sensor circuits, check resistance at pins 2 and 3		
	• For right-side seat backrest TED sensor circuits, check resistance at pins 4 and 5		
	• For left-side seat cushion TED sensor circuits, check resistance at pins 7 and 8		
• For left-side seat backrest TED sensor circuits, check resistance at pins 9 and 10			
	Is the resistance between 0.9 and 1.1 kilo-ohms? (Note: these values are based on an ambient temperature of 22°C/72°F) Yes		
	No circuit faults present. No further action		
D2: CLIMATE SE CONNECTOR	<u>GO to D2</u> . ATS ASSEMBLY - TED SENSOR CIRCUIT RESISTANCE CHECKS AT SEAT CLIMATE ASSEMBLY		
	1 Locate the appropriate seat backrest/seat cushion climate assembly connector		
	2 Disconnect connector		
	3 Check the integrity of connector terminals for bent terminals, backed-out or badly crimped wires. Rectify as required		

	4 Check the resistance of the climate seats TED sensor circuits at the climate assembly connector, pins 5
	and 8 (Green and Green wires)
	Is the resistance between 0.9 and 1.1 kilo-ohms? (Note: these values are based on an ambient temperature
	of 22°C/72°F) Yes
	GO to D3.
	Replace the seat climate assembly
3: CLIM	ATE SEATS ASSEMBLY - TED SUPPLY CIRCUIT OPEN CIRCUIT CHECKS AT SEAT CLIMATE ASSEMBLY
ONNEC	1 Check the TED supply circuits at the climate assembly connector, pins 1 and 3 (Blue and Yellow wires)
	for open circuit faults
	Is an open-circuit fault present?
	Yes
	Replace the seat climate assembly No
	No internal circuit faults present. Check for circuit faults in wiring harness between seat climate control
	module and climate seat assembly and replace as required. If no harness faults are found, <u>GO to D4</u> .
4: CLIM	ATE SEATS ASSEMBLY - TED DUCTING INSPECTION
	1 Check that the ducting is securely attached to the blower and thermal electric device
	2 Check the ducting for holes, cuts or tears
	Is the ducting undamaged and securely attached to the blower and thermal electric device?
	Yes
	GO to D5.
	No
E. CI TM	Replace the seat climate assembly
5: CLIM	ATE SEATS ASSEMBLY - EXHAUST AIRFLOW CHECKS
	1 Check for blockages or restrictions at the thermal electric device exhaust vent
	Are blockages or restrictions present? Yes
	Rectify as required
	No
	GO to D6.
06: CLIM	ATE SEATS ASSEMBLY - BLOWER AIRFLOW CHECKS
	1 Check for blockages or restrictions at the blower air intake
	2 Check that the blower fan movement is not restricted
	Are there any air intake blockages or restrictions to the blower fan movement?
	Yes
	Rectify as required
	No
	No further action

Over Temperature and Fluid/Air Leak Diagnostics

Check For Air Flow Specific DTCs	Diagnostic Guidance Notes
 B120F-98 B122E-98 B122F-98 B1230-98 B1231-7A B1232-7A 	 Once the diagnostic process detailed above has been carried out and it has been identified that there has not been a failure of any of the climate units, then refer back to the relevant climate system DTC codes that have been recorded DTC codes listed that end in 7A or 98 indicate a possible air leak or air flow restriction within the system In these circumstances, starting with the seat base check all ducting connections for correct engagement and inspect ducting for signs of damage which could result in an air leak (for connection issues re-connect and test system). Only in the event of finding damage to the ducting of one of the units should the unit be replaced. Note that only the specific unit should be replaced Due to the design function of the system, both climate units in any one seat operate integrally. Therefore, if an issue is detected in one of the units then both units are shut down to protect the system until next ignition cycle. Under these circumstances, only replace the damaged unit and DO NOT replace both units

DTC Index

NOTES:

Alf the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

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

Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

Climate Controlled Seat Module

DTC	Description	Possible Causes	Action
	Blower Control - Circuit open	 Connectors disconnected or connector pin damage Seat blower left circuit - Open circuit Blower motor assembly - Short circuit to ground Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_FANS_RTN, Circuit reference LH_FANS_PWR - For open circuit. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B10B9-4B	Blower Control - Over temperature	 Mechanical restriction in blower motor assembly Seat blower left circuit - Short circuit to ground Blower motor assembly - Short circuit to ground Front seat climate control module failure 	 Check for mechanical restriction or debris in seat blower Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_FANS_RTN, Circuit reference LH_FANS_PWR - For short circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1157-13	Blower Control "B" - Circuit open	 Connectors disconnected or connector pin damage Seat blower right circuit - Open circuit Blower motor assembly - Open circuit Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_FANS_RTN, Circuit reference RH_FANS_PWR - For open circuit. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1157-4B	Blower Control "B" - Over temperature	 Mechanical restriction in blower motor assembly Seat blower right circuit - Short circuit to ground Blower motor assembly - Short circuit to ground Front seat climate control module failure 	 Check for mechanical restriction or debris in seat blower Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_FANS_RTN, Circuit reference RH_FANS_PWR - For short circuit to ground. Repair

DTC	Description	Possible Causes	Action
			 circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
	Right Thermal Electric Device Control - Circuit open	 Connectors disconnected or connector pin damage Seat backrest thermal electric device right circuit Open circuit Seat cushion thermal electric device right circuit Open circuit Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_SEAT_BACK_TED+, Circuit reference RH_SEAT_BACK_TED+, Circuit reference RH_SEAT_BACK_TED+, Circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_CUSHION_TED+, Circuit reference RH_CUSHION_TED+, Circuit reference RH_CUSHION_TED+, Circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B120E-19	Right Thermal Electric Device Control - Circuit current above threshold	 Seat backrest thermal electric device right circuit Short circuit to ground Seat cushion thermal electric device right circuit Short circuit to ground Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_SEAT_BACK_TED+, Circuit reference RH_SEAT_BACK_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_CUSHION_TED+, Circuit reference RH_CUSHION_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B120E-4B	Right Thermal Electric Device Control - Over temperature	 Restriction in thermal electric device air path Seat backrest thermal electric device right circuit Short circuit to ground Seat cushion thermal electric device right circuit Short circuit to ground Front seat climate control module failure 	 Check for blockage or restriction in thermal electric device air path Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_SEAT_BACK_TED+, Circuit reference RH_SEAT_BACK_TED+, Circuit to ground. Repair circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_CUSHION_TED+, Circuit reference RH_CUSHION_TED+, Circuit reference RH_CUSHION_TED+, Circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B120F-98	Left Seat Cushion - Component or system over temperature	 Blocked or restricted thermal electric device fan exhaust vent Restricted thermal electric device fan movement 	 Check for blockage or restriction in thermal electric device fan exhaust vent Check for restricted thermal electric device fan movement Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint

DTC	Description	Possible Causes	Action
			tests associated with this DTC using the manufacturer approved diagnostic system
B1223-13	Right Seat Cushion Temperature Sensor - Circuit open	 Connectors disconnected or connector pin damage Seat cushion temperature sensor right circuit - Open circuit Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_CUSHION_SENSOR, Circuit reference RH_CUSHION_SENSOR, Circuit reference RH_CUSHION_SENSOR_RTN - For open circuit. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1224-13	ELeft Thermal Electric Device Control - Circuit open	 Connectors disconnected or connector pin damage Seat backrest thermal electric device left circuit - Open circuit Seat cushion thermal electric device left circuit - Open circuit Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_TED+, Circuit reference LH_SEAT_BACK_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_CUSHION_TED+, Circuit reference LH_CUSHION_TED+, Circuit reference LH_CUSHION_TED+, Circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1224-19	Left Thermal Electric Device Control - Circuit current above threshold	 Seat backrest thermal electric device left circuit - Short circuit to ground Seat cushion thermal electric device left circuit - Short circuit to ground Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_TED+, Circuit reference LH_SEAT_BACK_TED+, Circuit to ground. Repair circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_CUSHION_TED+, Circuit reference LH_CUSHION_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1224-4E	Left Thermal Electric Device Control - Over temperature	 Restriction in thermal electric device air path Seat backrest thermal electric device left circuit - Short circuit to ground Seat cushion thermal electric device left circuit - Short circuit to ground Front seat climate control module failure 	 Check for blockage or restriction in thermal electric device air path Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_TED+, Circuit reference LH_SEAT_BACK_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_CUSHION_TED+, Circuit reference LH_CUSHION_TED+, Circuit reference LH_CUSHION_TED For short circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer

DTC	Description	Possible Causes	Action
			approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
	Right Seat Back Temperature Sensor - Circuit open	 Connectors disconnected or connector pin damage Seat backrest temperature sensor right circuit - Open circuit Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_SEAT_BACK_SENSOR, Circuit reference RH_SEAT_BACK_SENSOR_RTN - For open circuit. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
	Left Seat Back Temperature Sensor - Circuit open	 Connectors disconnected or connector pin damage Seat backrest temperature sensor left circuit - Open circuit Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_SENSOR, Circuit reference LH_SEAT_BACK_SENSOR_RTN - For open circuit. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
	Right Seat Cushion Blower Speed Sensor - Circuit short to ground	 Seat cushion blower speed right circuit - Short circuit to ground Blower motor assembly - Short circuit to ground Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_CUSHION_FAN_SPEED - For short circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
	Right Seat Cushion Blower Speed Sensor - Circuit short to battery	 Seat cushion blower speed right circuit - Short circuit to power Blower motor assembly - Short circuit to power Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_CUSHION_FAN_SPEED - For short circuit to power. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
	Right Seat Back Blower Speed Sensor - Circuit short to ground	 Seat backrest blower speed right circuit - Short circuit to ground Blower motor assembly - Short circuit to ground Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_SEAT_BACK_FAN_SPEED - For short circuit to ground. Repair circuit as required, clear

DTC	Description	Possible Causes	Action
			 DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B122B-12	Right Seat Back Blower Speed Sensor - Circuit short to battery	 Seat backrest blower speed right circuit - Short circuit to power Blower motor assembly - Short circuit to power Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference RH_SEAT_BACK_FAN_SPEED - For short circuit to power. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B122C-11	Left Seat Cushion Blower Speed Sensor - Circuit short to ground	 Seat cushion blower speed left circuit - Short circuit to ground Blower motor assembly - Short circuit to ground Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_CUSHION_FAN_SPEED - For short circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B122C-12	Left Seat Cushion Blower Speed Sensor - Circuit short to battery	 Seat cushion blower speed left circuit - Short circuit to power Blower motor assembly - Short circuit to power Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_CUSHION_FAN_SPEED - For short circuit to power. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B122D-11	Left Seat Back Blower Speed Sensor - Circuit short to ground	 Seat backrest blower speed left circuit - Short circuit to ground Blower motor assembly - Short circuit to ground Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_FAN_SPEED - For short circuit to ground. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B122D-12	Left Seat Back Blower Speed Sensor - Circuit short to battery	 Seat backrest blower speed left circuit - Short circuit to power Blower motor assembly - Short circuit to power Front seat climate control module failure 	 Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_SEAT_BACK_FAN_SPEED - For short circuit to power. Repair circuit as required, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint

DTC	Description	Possible Causes	Action
			tests associated with this DTC using the manufacturer approved diagnostic system
B122E-98	Right Seat Cushion - Component or system over temperature	 Blocked or restricted thermal electric device fan exhaust vent Restricted thermal electric device fan movement 	 Check for blockage or restriction in thermal electric device fan exhaust vent Check for restricted thermal electric device fan movement Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B122F-98	Right Seat Back - Component or system over temperature	 Blocked or restricted thermal electric device fan exhaust vent Restricted thermal electric device fan movement 	 Check for blockage or restriction in thermal electric device fan exhaust vent Check for restricted thermal electric device fan movement Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1230-98	Left Seat Back - Component or system over temperature	 Blocked or restricted thermal electric device fan exhaust vent Restricted thermal electric device fan movement 	 Check for blockage or restriction in thermal electric device fan exhaust vent Check for restricted thermal electric device fan movement Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1231-7A	Right Seat - Fluid leak or seal failure	 Seat backrest assembly - Air path leaking Seat cushion assembly - Air path leaking Seat assembly damaged 	 Check for blockage or restriction in seat backrest/seat cushion thermal electric device fan ducts Check seat backrest/seat cushion thermal electric device fan exhaust vent is clear Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1232-7A	Left Seat - Fluid leak or seal failure	 Seat backrest assembly - Air path leaking Seat cushion assembly - Air path leaking Seat assembly damaged 	 Check for blockage or restriction in seat backrest/seat cushion thermal electric device fan ducts Check seat backrest/seat cushion thermal electric device fan exhaust vent is clear Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B1235-13	Left Seat Cushion Temperature Sensor - Circuit open	 Connectors disconnected or connector pin damage Seat cushion temperature sensor left circuit - Open circuit Front seat climate control module failure 	 Check for any disconnected connectors or damaged connector pins Carry out on demand self test using manufacturer approved diagnostic system to confirm the fault is present Refer to the electrical circuit diagrams and check the front seat climate control module - Circuit reference LH_CUSHION_SENSOR, Circuit reference LH_CUSHION_SENSOR, Circuit reference LH_CUSHION_SENSOR, clear DTC and retest Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Alternatively, carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system

DTC	Description	Possible Causes	Action
U0010-88	Medium Speed CAN Communication Bus - Bus off	 Medium speed CAN communication - Bus off 	 Refer to the electrical circuit diagrams and check the power and ground connections to the module Using the manufacturer approved diagnostic system, complete a CAN network integrity test Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification
	Lost Communication With Body Control Module - No sub type information	Lost communication with central junction box	NOTE: This DTC may be stored even though no fault condition is present and should be ignored unless the customer has reported a climate seat concern. Clear the DTC and retest. Verify the customer concern prior to diagnosis
			 Refer to the electrical circuit diagrams and check the power and ground connections to the module Using the manufacturer approved diagnostic system, complete a CAN network integrity test Refer to the electrical circuit diagrams and check the CAN network between the front seat climate control module and central junction box Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification
	Lost Communication With Body Control Module "B" - No sub type information	• Lost communication with rear junction box	 Refer to the electrical circuit diagrams and check the power and ground connections to the module Using the manufacturer approved diagnostic system, complete a CAN network integrity test Refer to the electrical circuit diagrams and check the CAN network between the front seat climate control module and rear junction box Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification
U0155-00	Lost Communication With Instrument Panel Cluster (IPC) Control Module - No sub type information	Lost communication with instrument cluster	 Refer to the electrical circuit diagrams and check the power and ground connections to the module Using the manufacturer approved diagnostic system, complete a CAN network integrity test Refer to the electrical circuit diagrams and check the CAN network between the front seat climate control module and instrument cluster Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification
U0156-00	Lost Communication With Information Center "A" - No sub type information	Lost communication with rear seat entertainment control module	 Refer to the electrical circuit diagrams and check the power and ground connections to the module Using the manufacturer approved diagnostic system, complete a CAN network integrity test Refer to the electrical circuit diagrams and check the CAN network between the front seat climate control module and rear seat entertainment control module Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification
	Internal Control Module Software Incompatibility - No sub type information	 Software stored in front seat climate control module is not compatible with master configuration 	 Check the front seat climate control module is configured correctly Reconfigure the front seat climate control module using the manufacturer approved diagnostic system. Clear the DTC and retest the system Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification
U0401-00	Invalid Data Received From ECM/PCM - No sub type information	• The engine control module has transmitted engine speed quality factor CAN signal at a specific value for a greater than expected time period	 Check the engine control module for related DTCs and refer to the relevant DTC index On software levels previous to 8X23-14B663-AE clear the DTC and take no further action if the system is operating correctly

DTC	Description	Possible Causes	Action
U2101-00	Control module Configuration Incompatible - No sub type information	 Compatible central car configuration file not received by front seat climate control module 	 Using the manufacturer approved diagnostic system check and update the car configuration file as required. Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification. Clear the DTC and retest
U3000-04	Control Module - System internal failures	 Front seat climate control module - Internal failure 	Check and install new front seat climate control module as required. Carry out on demand self test using manufacturer approved diagnostic system to confirm rectification
U3003-62	Battery Voltage - Signal compare failure	 Wiring harness fault Battery internal failure Charging system fault 	 Refer to the electrical circuit diagrams and check the power and ground connections to the front seat climate control module and the central junction box Refer to the battery care manual and verify that the vehicle battery is fully charged and serviceable before continuing with further diagnostic tests Check the vehicle charging system

Seating - Seat Smoothing General Procedures

Check
WARNINGS:
Make sure that the steamer is in the OFF position before connecting or disconnecting from the electrical outlet.
Do not use another high wattage device on the same electrical circuit.
If the use of an extension cord is absolutely necessary, the cord must be rated at a minimum of 10 amps.
To avoid the risk of electrical shock, check the condition of the power cord and the steamer before use.
Make sure that the steamer is disconnected from the electrical outlet before filling or emptying the water reservoir.
The steamer must only be used and placed on its stand on a stable surface.
To prevent injury such as burns, take care whilst using the steamer. Avoid coming into contact with the hot surface of the steamer and do not direct steam toward any persons.
The steamer must ALWAYS be switched off when not in use or left unattended.
Do not allow the power cord to come into contact with the hot surface of the steamer.
CAUTIONS:
Protect the surrounding paintwork to avoid damage.
Protect the paintwork during this operation.
Do not use any additives in the steamer. Damage to the steamer or the seat cover can result if used.
$\Delta_{ m NOTE:}$ Some variation in the illustrations may occur, but the essential information is always correct.

1. CAUTIONS:

 \square Steam the leather cushions evenly and progressively. Do not use excessive force.

Take care not to damage the leather whilst steaming into the corners.

Do not hold the steamer in one place for longer than 10 seconds, as this will burn the leather and damage the covers.





E166054

Seating - Front Seat Removal and Installation

Removal

1. Make the air bag supplemental restraint system (SRS) safe. For additional information, refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).





Position the front seat fully forwards.

· Lower the front seat head restraint to the fully lowered position.



3. ONTE: Right-hand shown, left-hand similar. Remove the safety belt lower anchor trim panel.



4. NOTE: Right-hand shown, left-hand similar. Release the safety belt lower anchor from the front seat.



5. NOTES:

Left-hand shown, right-hand similar.

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

Remove the 2 rear bolts from the front seat.

6. Position the front seat fully rearwards.



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

Remove the 2 front bolts from the front seat.

- 8. Reposition the front seat to the central position.
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).



10. Disconnect the front seat harness electrical connectors.Tilt the front seat rearwards to aid disconnecting the front seat electrical connectors.



11. NOTES:

Make sure no damage is caused to the vehicle trim when removing the front seat.



Remove the front seat.

Installation

To install, reverse the removal procedure.
 TORQUE: 47 Nm



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

TORQUE: 47 Nm





 NOTE: Right-hand shown, left-hand similar. TORQUE: 40 Nm

Seating - Front Seat Backrest

Removal and Installation

Removal

- 1. Make the air bag supplemental restraint system (SRS) safe. For additional information, refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).



WARNING:

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

CAUTION: Take extra care when handling the component.

Remove the front seat backrest assembly.



E101228

- Remove the front seat backrest cover.
 For additional information, refer to: <u>Front Seat Backrest Cover</u> (501-10 Seating, Removal and Installation).
- 6. Remove the backrest halo panel.
 - Release the 5 wiring harness clips.



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

- Remove the lumbar assembly. For additional information, refer to: <u>Lumbar Assembly</u> (501-10 Seating, Removal and Installation).
- Remove the front seat head restraint motor. For additional information, refer to: <u>Front Seat Head Restraint Motor</u> (501-10 Seating, Removal and Installation).

Installation



To install, reverse the removal procedure.
 TORQUE: 35 Nm

2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Seating - Front Seat Backrest Cover

Removal and Installation

Removal

- 1. Make the air bag supplemental restraint system (SRS) safe. For additional information, refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).
- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- Remove the side air bag module. For additional information, refer to: <u>Side Air Bag Module (501-20B</u> Supplemental Restraint System, Removal and Installation).



4. ONOTE: If equipped.

Reposition the front seat backrest thermo-electric device.



5. ONOTE: If equipped.

Release the front seat backrest thermo-electric device duct



6. ONOTE: If equipped

Remove the front seat backrest thermo-electric device retaining screws.





Remove the front seat backrest thermo-electric device. • Disconnect the electrical connector.

- 8. Remove the front seat head restraint.
- Remove the front seat head restraint motor. For additional information, refer to: <u>Front Seat Head Restraint Motor</u> (501-10 Seating, Removal and Installation).
 - 10. **ONOTE:** Some variation in the illustrations may occur, but the essential information is always correct.

Using a suitable tool, remove the front seat head restraint guide sleeves.





E101146



11. Remove the front seat backrest cushion and cover from the front seat frame.

VUJ0005431



12. Remove and discard the hog rings.Remove the 22 hog rings.



13. Remove the front seat backrest cover.



Installation

Make sure that new hog rings are installed.

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.

To install, reverse the removal procedure.



Seating - Front Seat Bolster Removal and Installation

Removal

NOTES:

Removal steps in this procedure may contain installation details.

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

3.

- 1. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: Front Seat Backrest Cover (501-10 Seating, Removal and Installation).





Installation

WARNING: The procedure must be carried out on both 4. sides of the seat.



Seating - Front Seat Bolster Pump Removal and Installation

Removal

NOTES:



Removal steps in this procedure may contain installation details.

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

3.

- 1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: Front Seat Backrest Cover (501-10 Seating, Removal and Installation).



Installation

1. To install, reverse the removal procedure.

Seating - Front Seat Cushion Cover Removal and Installation

Removal

1. Refer to: Front Safety Belt Buckle (501-20A Safety Belt System, Removal and Installation).

2.

З.







E101226



5.

6.

4.



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

CAUTION: Take extra care when handling the component.

Torque: <u>35 Nm</u>



E101228



9.

8.







12.




Installation

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Seating - Front Seat Track Motor Removal and Installation

Removal

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

2. Remove the front seat.

4.

Refer to: Front Seat (501-10 Seating, Removal and Installation).



E101405





E101655

Installation

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Seating - Lumbar Assembly Removal and Installation

Removal

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

2. Refer to: Front Seat Backrest Cover (501-10 Seating, Removal and Installation).



4.



E101065

Installation

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Seating - Memory Seat Position Switch Removal and Installation

Removal

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

2.





Installation

1. To install, reverse the removal procedure.

Seating - Seat Base

Removal and Installation

Removal

WARNINGS:



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



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

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



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



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



A

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.

NOTES:

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

Removal steps in this procedure may contain installation details.

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

- 2. Refer to: Front Seat (501-10 Seating, Removal and Installation).
- 3. Refer to: <u>Front Safety Belt Buckle</u> (501-20A Safety Belt System, Removal and Installation).
- 4. Refer to: Front Seat Cushion Cover (501-10 Seating, Removal and Installation).

6.



E128198



E128197







CAUTION: Make sure that new bolts are installed.
Torque: <u>35 Nm</u>

E128209

Installation

1. To install, reverse the removal procedure.

Seating - Rear Seat Backrest Cover Removal and Installation

Removal

- 1. Remove the rear seat cushion.
 - For additional information, refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).
 - 2. Release both the rear seat back rest catches.



E98909



3. Fold down the rear seat backrest.





4. Remove the rear seat head restraint(s).• Lower both rear seats.

5. NOTES:

The procedure must be carried out on both sides of the seat.

Left-hand shown, right-hand similar.

Remove both rear seat bolsters.





6. CAUTION: Make sure no damage is caused to the vehicle trim when removing the rear seat.

With assistance, remove the rear seat backrest.

• Both rear seat backrests need to be in an upright position but not latched for access to retaining bolts.

7. Release the backrest cover.• Release all 4 sides.

8. Remove the rear seat backrest hinge(s).



- E49510
- 9. Remove the rear armrest retaining screw covers.



- 12. Release the rear seat backrest cover from the armrest aperture.Release the 3 plastic retaining strips from the securing clips.
- 13. Remove the cappings from the rear head restraint retaining posts.Release the rear backrest cover over the head restraint posts.
- 14. Remove the rear seat backrest cushion and cover from the rear seat backrest.

15. Remove and discard the hog rings.

- Remove the 36 hog rings securing the rear 60% seat backrest cover to the backrest seat cushion.
- Remove the 26 hog rings securing the rear 40% seat backrest cover to the backrest seat cushion.

16. Remove the rear seat backrest cover.

Installation

1. NOTES:





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.

To install, reverse the removal procedure.

Seating - Rear Seat Cushion Removal and Installation

Removal



- 1. Detach the rear seat cushion.
 - Release the rear seat cushion retaining clips.
 - Detach the rear seat cushion.

- 2. Remove the rear seat cushion.
 - Guide the safety belt buckles through the rear seat cushion aperture.
 - Remove the rear seat cushion.



Installation

1. To install, reverse the removal procedure.

Seating - Front Seat Height Adjustment Motor

Removal and Installation

Removal

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

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

2. Disconnect the battery ground cable.

Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

3. Remove the front seat.

4.

Refer to: Front Seat (501-10 Seating, Removal and Installation).



Eutrate



E101226

E101227

8.



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

CAUTION: Take extra care when handling the component.

Torque: <u>35 Nm</u>



E101228



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

Torque: <u>35 Nm</u>



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



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

- E 10096
- 13. **ONOTE:** Some variation in the illustrations may occur, but the essential information is always correct.

Installation

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Seating - Front Seat Control Switch Removal and Installation

Removal

1. Refer to: Front Seat (501-10 Seating, Removal and Installation).

2.



8-219 x2 E132695

З.







5.

Installation



1.



• Remove and discard the retaining clips.



E132692



- 2. Install new clips.
- 3.



7. Refer to: Front Seat (501-10 Seating, Removal and Installation).

Seating - Front Seat Head Restraint Motor

Removal and Installation

Removal

- 1. For additional information, refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).
- 2. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 3. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- 4. For additional information, refer to: <u>Front Safety Belt Buckle (501-20A</u> Safety Belt System, Removal and Installation).





6.









E99892



9. • Remove and discard the retaining clips.





Installation

1.





E132358



2. CAUTION: Support the head restraint motor assembly while pushing down on the head restraint, you should hear two audible clicks to secure the head restraint to the motor assembly. Failure to do follow this instruction may result in failure of the component.





- E132319
- 5. Install new clips.



6. Install the front seat backrest cover.







- 11. For additional information, refer to: Front Safety Belt Buckle (501-20A Safety Belt System, Removal and Installation).
- 12. For additional information, refer to: Front Seat (501-10 Seating, Removal and Installation).
- 13. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

Seating - Rear Seat Bolster Removal and Installation

Removal



E98909



1.



Installation

1. To install, reverse the removal procedure.

Seating - Front Seat Backrest Cover Trim Panel Removal and Installation

Removal

E101225

1. Refer to: Front Seat (501-10 Seating, Removal and Installation).

2.





4.





Installation



1. Install new clips.


 E13221

2. Install the front seat back rest cover trim panel.





5.



7. Refer to: Front Seat (501-10 Seating, Removal and Installation).

Glass, Frames and Mechanisms -

Torque Specifications				
Description	Nm	lb-ft	lb-in	
Front door window glass regulator retaining screws to BIW	7	-	62	
Front door window glass regulator motor retaining screw to panel	2	-	18	
Rear door window glass regulator retaining screws to BIW	7	-	62	
Rear door window glass regulator motor retaining screw to panel	2	-	18	
Rear door glass run retaining nuts	4	-	35	

-

Glass, Frames and Mechanisms - Glass, Frames and Mechanisms Component Location Description and Operation

Component Location



E94978

Item	Description
1	Window regulator motor – front passenger
2	Window control switch - front passenger
3	Door module – front passenger
4	Window control switch – RH (right-hand) rear passenger
5	Window regulator motor – RH rear passenger
6	Door module – RH rear passenger
7	Window regulator motor – LH (left-hand) rear passenger
8	Door module – LH rear passenger

9	Window control switch – LH rear passenger
10	Door module – driver's door
11	Window control switches - driver's door
12	Window regulator motor – driver's door

Glass, Frames and Mechanisms - Glass, Frames and Mechanisms - Overview

Description and Operation

Overview

The windshield is manufactured from laminated green-tinted glass with two variants of windshield being available: standard and heated.

The rear window is manufactured from toughened green-tinted glass. The heated rear window grid-wire and antennas are incorporated in the rear window. There are two variants of rear window dependent on the TV antenna specification.

The door windows are manufactured from green-tinted toughened glass. The driver and passenger windows are electrically operated; the rear glass sections in the rear doors are fixed units. Door windows can be operated individually, or by the driver's window control switch. An anti-trap function is included that stops the window's travel when an obstacle is detected in the in the window's path.

Glass, Frames and Mechanisms - Glass, Frames and Mechanisms - System **Operation and Component Description** Description and Operation

Control Diagram

NOTE: A = Hardwired; N = Medium speed CAN; O = LIN bus



Item	Description
1	Battery
2	Megafuse (250 amp)
3	CJB (central junction box)
4	RJB (rear junction box)
5	Window control switches - driver's door
6	Door module – driver's door

7	Window regulator motor – driver's door
8	Door module – LH (left-hand) rear passenger
9	Window control switch - LH rear passenger
10	Window regulator motor – LH rear passenger
11	Door module – front passenger
12	Window control switches - front passenger
13	Window regulator motor – front passenger
14	Door module – RH (right-hand) rear passenger
15	Window control switch - RH rear passenger
16	Window regulator motor – RH rear passenger

System Operation

Door Windows

All windows can be operated individually, or by the **driver's** window control switch. The operation of the windows is proportional to the switch activation. All windows can be controlled **by 'one touch'** in an upward or downward direction. When the **'one touch'** operation is activated in the upwards direction **'pinch protection'** is enabled. If a pinch condition is detected the window will automatically stop and travel downwards to a pre-determined position.

When the rear window **'one touch'** operation is activated in the downward direction, the window will drop a limited way down. This is the comfort setting to achieve optimum noise levels when vehicle is in motion with rear windows open. Further **'one touch'** operation will drop the window all the way down. (Only applies to vehicles post VIN R99740) The **'one touch'** operation to activate the upward direction will fully close the window.

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

End of travel shut off

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

Anti-trap

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

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

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

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

Component Description

Windshield

The windshield, manufactured from 5mm laminated green-tinted glass is positioned to the vehicle's body by two locator pins, one in each top corner of the windshield. This allows for centralizing movement of the windshield across the car upon fitment. The base of the windshield carries a leaf-screen retainer. The windshield is bonded and sealed to the vehicle body aperture using Polyurethane (PU) adhesive. The windshield finisher is a three-sided extruded flip, taped onto the inner surface of the glass; this helps to centralize the glass in the aperture.

Two variants of windshield are available:

- standard, and
- heated.
 - Refer to: Control Components (412-01 Climate Control, Description and Operation).

Interior Mirror and Rain Sensor

The interior mirror and rain sensor mounting positions are located at the top of the windshield. Refer to: <u>Wipers and Washers</u> (501-16 Wipers and Washers, Description and Operation).

Rear Window

The rear window, manufactured from toughened 4mm green-tinted glass, is positioned to the vehicle's body by two locator pins, one in each top corner of the windshield. This allows for the centralizing movement of the windshield across the car upon fitment. The window is bonded and sealed to the vehicle body aperture using PU adhesive. The window finisher is a three-sided extruded flip, taped onto the inner surface of the glass; this helps to centralize the glass in the aperture.

The heated rear window grid wire and antennas are incorporated in the rear window. There are two derivatives of rear window dependant on the TV antenna specification.

Refer to: Video System (415-01, Description and Operation).

Door Windows

The door windows are manufactured from 4.85mm green-tinted toughened glass. The driver and passenger windows are electrically operated, and are raised and lowered by a cable mechanism; the rear glass sections in the rear doors are fixed units.

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

Glass, Frames and Mechanisms - Glass, Frames and Mechanisms

Diagnosis and Testing

Principle of Operation

For a detailed description of the glass, frames and mechanisms, refer to the relevant Description and Operation section in the workshop manual. REFER to: (501-11 Glass, Frames and Mechanisms)

<u>Glass, Frames and Mechanisms</u> (Description and Operation), <u>Glass, Frames and Mechanisms</u> (Description and Operation), <u>Glass, Frames and Mechanisms</u> (Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

- 1. Verify the customer concern by operating the system
- 2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

Mechanical	Electrical
Window glassDoor window regulatorWindow seals	 Fuse(s) Door window regulator motor Loose or corroded electrical connector(s) Switch 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 concern is not visually evident, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC index

Window Regulator Diagnostic

This diagnostic procedure is to be carried out if the door window either: closes to the top, then reopens (Bounce back); does not **fully close** to the top of the door frame; the **one touch** function is disabled

TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
A1: DOOR WIN	DOW - SEAL CONDITION / FOREIGN MATERIAL
\wedge	
	heck that the door window seal is free from foreign material and has no sign of damage and is not worn in the
door channels	
	1 Carry out visual inspection for:
	Foreign material
	Obstruction
	Signs of damage or wear to door window seal
	Is the door window seal free from foreign material, damage and wear? Yes
	GO to A2.
	No
	Remove any foreign material or were necessary install new door window seal. Test the system for correct operation
A2: DOOR WIN	DOW - SEAL INSTALLATION
\wedge	
NOTE: To c	heck that the door window seal is installed correctly
	1 Check that the door window seal is installed correctly, ensure that it is fully installed into the corner areas
	Is the door window seal installed correctly?
	GO to A3.

1		Correctly install the door window seal. Test the system for correct operation
A3: DOOR W	/INDOW	- SECURITY
\wedge		
NOTE:	lo check	the door window is secure
	1	Check if the door window is installed correctly and secured to the door window regulator
	ls t Ye :	the door window correctly installed and secure?
	i e	GO to A4.
	No	
		Adjust the door window referring to the door window installation process REFER to: (501-11 Glass, Frames and Mechanisms)
		Front Door Window Glass (Removal and Installation),
		Rear Door Window Glass (Removal and Installation).
		Test the system for correct operation - RESET PROCEDURE
A4: DOOR W		Disconnect vehicle battery, wait for a minimum of 2 minutes, then reconnect the battery
	2	For vehicles pre-VIN S08680 , the latest version of the diagnostic software must be loaded. SDD must
	4	be loaded with SDD DVD126_V6.03 and Calibration File 77 (or later)
	3	For vehicles pre-VIN R54858, replace the front door window regulator motor, REFER to: Front Door Window Regulator and Motor (501-11 Glass, Frames and Mechanisms, Removal
		and Installation).
	4	With the vehicle engine running, initialize the door window regulator motors, REFER to: <u>Door Window Motor Initialization (</u> 501-11 Glass, Frames and Mechanisms, General
		Procedures).
	5	Cycle the window 20 times, using the 'one-touch' function to open and close the window
	6	NOTE: The door window regulator motor may thermally cut out after too many operations, if this occurs wait 30 seconds before continuing
	ls (door window closing correctly and the One-touch function operational?
	Ye	
	No	No further action requires
		Replace the front door window regulator motor
		REFER to: Door Window Regulator Motor (501-11 Glass, Frames and Mechanisms, Removal and
		Installation). , or rear door window regulator motor
		REFER to: Rear Door Window Regulator and Motor (501-11 Glass, Frames and Mechanisms, Removal and
		Installation).
		Test the system for correct operation

Manual Sunblind Initialization Routine

Where a sunblind module has been replaced, there is an initialization routine available on the diagnostic tool. This requires a new module to be initially installed in the fully down position and running of the "Initialize Specified Function/Feature" diagnostic routine on the manufacturer approved diagnostic tool. Alternatively, the sunblind may be initialized manually by following the procedures described below:

- 1. Raise the sunblind to top (fully retracted) position
- 2. Press and hold the door window 'down' switch for 15 seconds (the sunblind will go down and will then be in initialization mode)
- 3. Release door window drop switch and press door window 'down' switch again to drive blind fully into lower block
- 4. Activate window switch 'up' until the sunblind reaches the top (fully retracted) position and release switch
- 5. The sunblind is now initialized and should have 'one-touch' functionality

DTC Index

For a complete list of all diagnostic trouble codes that could be logged on this vehicle, please refer to Section 100-00. REFER to: Driver Door Module (DDM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing).

Glass, Frames and Mechanisms - Fixed Window Glass

Diagnosis and Testing

Principles of Operation

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

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

NOTES:

If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.

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

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

- 1. Verify the customer concern
- 2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

Electrical

- Physical damage to the windshield
- 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
- 4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index
- 5. Check DDW for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and carry out the recommendations as required

Warranty Repairs

NOTES:

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

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

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

Symptom Chart

Symptom	Possible Causes	Action
Scratches		
	 Debris trapped under a wiper blade 	 GO to Pinpoint Test <u>A.</u>

Symptom	Possible Causes	Action
	Foreign object damageFouling by trim	
Chips	Foreign object damage	• GO to Pinpoint Test <u>B.</u>
Cracks	Foreign object damageImpact damage during assembly	• GO to Pinpoint Test <u>C.</u>
Delamination	Manufacturing defect	• GO to Pinpoint Test <u>D.</u>

Pinpoint Tests

PINPOINT TEST A : SCRATCH TESTS	
DETAILS/RESULTS/ACTIONS	
usually be regular in shape, following the line of the object that caused it.	
1 Probe using the tip of a pencil to identify a groove in the windshield surface.	
s there a groove?	
fes	
Windshield scratched. <u>GO to A2</u> .	
Defect not valid.	
1 Check for trim, body panels, or foreign objects that may have caused the scratch.	
Was the scratch caused by a foreign object?	
Yes	
The damage is not due to a defect or an assembly error.	
No Rectify as appropriate.	

PINPOINT TEST B : CHIP TESTS

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
1: CHIP TEST 1	
\wedge	
NOTE: Impact damag	e may cause a crack to form.
1	Assess the damage by probing with the tip of a pencil.
1:	s the damaged area rough (indicating a breach of the windshield surface)?
Y	/es
	Damage caused by the impact of a foreign object. Not a manufacturing defect.
	lo
	Install a new windshield.

PINPOINT TEST C : CRACK TESTS

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS	
: CRACK TEST 1		
	\land	
	NOTE: A crack will be detectable as a step in the glass.	
	1 Confirm the presence of a crack by probing with the tip of a pencil.	
	Is the windshield cracked?	
	Yes	
	Windshield cracked. <u>GO to C2</u> . No	
	Windshield not cracked. GO to Pinpoint Test A.	
: CRACK TEST 2		
~		
NOTE: Multiple cracks	will radiate out from the source.	
	1 Assess the source of the crack by probing with the tip of a pencil.	
	Is there evidence of impact damage being the source of the crack?	
	Yes	
	GO to Pinpoint Test <u>B.</u> No	
	•	

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
ELAMINATION TEST 1	
	1 Visually assess the windshield for delamination.
	Have the glass laminates separated?
	Yes Install a new windshield.
	No
	No further action.

DTC Index

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

Glass, Frames and Mechanisms - Door Window Motor Initialization

General Procedures

NOTES:

Make sure that the vehicle battery is fully charged before carrying out this procedure.

After the battery has been disconnected or a new window regulator and motor or door module has been installed, it is necessary to initialize each door window motor separately to operate the **one-touch** and anti-trap function.

In addition to this manual procedure, the approved diagnostic tool can also be used to initialize the door window motor.

- 1. Start the engine.
- 2. Operate the window control switch until the door window glass is in the fully closed position, continue to operate the window control switch for a further two seconds.
- 3. Release the window control switch.
- 4. Operate the window control switch in the closed position and continue to operate the window control switch for a further two seconds.
- 5. Operate the window control switch until the door window glass is in the fully open position (**one-touch** down).
- 6. NOTES:

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

(one-touch up), repeat the complete procedure.

Operate the window control switch once to the close position.

If multiple attempts have failed to initialize the door window motor, refer the diagnosis and testing procedure.

For additional information, refer to: <u>Glass, Frames and</u>

Mechanisms (501-11 Glass, Frames and Mechanisms, Diagnosis and Testing).

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

Glass, Frames and Mechanisms - Driver Door Window Control Switch Removal and Installation

Removal

1. For additional information, refer to: <u>Front Door Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).

2.



З.



Installation

1. To install, reverse the removal procedure.

Glass, Frames and Mechanisms - Front Door Window Glass Removal and Installation

Removal







2.

З.

Installation

1. To install, reverse the removal procedure.



Published: 11-May-2011

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

Special Tool(s) Door glass release lever 501-114 501-114 E54200

Removal



1. ONOTE: Left-hand shown, right-hand similar.



E94765



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



- 3. WARNING: Do not allow the glass to drop.
 - NOTE: Left-hand shown, right-hand similar.

4. For additional information, refer to: <u>Front Door Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



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

6. • TORQUE: 7 Nm



Installation



1. To install, reverse the removal procedure.

Glass, Frames and Mechanisms - Rear Door Fixed Window Glass Removal and Installation

Removal



1. Lower the rear door window glass.

2. Remove the rear door trim panel.

Refer to: <u>Rear Door Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).











4.

5.

6.









E100239







E94927

Installation

- 1. To install, reverse the removal procedure.
- 2. Tighten the Torx screws securing the fixed window glass after alignment of the bright external trim.

Glass, Frames and Mechanisms - Rear Door Window Glass

Removal and Installation

Removal

- 1. Refer to: <u>Rear Door Fixed Window Glass</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- 2. Refer to: <u>Rear Door Window Regulator and Motor (</u>501-11 Glass, Frames and Mechanisms, Removal and Installation).





Installation

1. To install, reverse the removal procedure.

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

Removal and Installation

Removal

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

1. Remove the rear door speaker.

Refer to: <u>Rear Door Speaker (</u>415-01A Information and Entertainment System, Removal and Installation).





E93421

Installation

3. A WARNING: Do not allow the glass to drop.

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

Torque: 7 Nm

Glass, Frames and Mechanisms - Rear Window Glass

Removal and Installation

Removal

CAUTIONS:



Always protect paintwork and glass when removing exterior components.



Always protect the interior components when removing body glass.

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

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

1. Refer to: <u>C-Pillar Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).



- 2.
- Remove the polyurethane (PU) adhesive cap and heat the PU adhesive for a minimum of 30 minutes.



E107523





Installation



4. CAUTIONS:



 Δ Protect the surrounding components.

A Protect the surrounding paintwork to avoid damage.

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

1. CAUTIONS:

Make sure that the mating faces are clean and free of foreign material.

Correct preparation of body apertures **"post painting"** to ensure satisfactory glass adhesion, must be carried out in line with industry practise.

• Prepare the window glass, window glass flange and trimmed PU adhesive in accordance with the instructions included with the PU adhesive kit.



2. CAUTION: Touching the adhesive surface will impair rebonding.







- 4. CAUTION: Make sure that no excess sealant residue is evident.

 - If water is used as a means for the leak check, then allow sealant to dry before testing.
 Spray water around the windshield glass, mark any area that leaks. Dry the windshield glass and sealant before applying additional sealant.



E107523

6. Refer to: <u>C-Pillar Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).

Glass, Frames and Mechanisms - Windshield Glass

Removal and Installation

Removal

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

- 1. Refer to: <u>Cowl Vent Screen</u> (501-02 Front End Body Panels, Removal and Installation).
- 2. Refer to: <u>A-Pillar Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).
- 3. Refer to: <u>Rain Sensor</u> (501-16 Wipers and Washers, Removal and Installation).



• Remove the polyurethane (PU) adhesive cap and heat the PU adhesive for a minimum of 30 minutes.









Installation

6. CAUTIONS:



Protect the surrounding components.

Protect the surrounding paintwork to avoid damage.

7. A WARNING: This step requires the aid of another technician.

1. CAUTIONS:

Make sure that the mating faces are clean and free of foreign material.

Correct preparation of body apertures **"post painting"** to ensure satisfactory glass adhesion, must be carried out in line with industry practise.

• Prepare the window glass, window glass flange and trimmed PU adhesive in accordance with the instructions included with the PU adhesive kit.









2.

CAUTION: Touching the adhesive surface will impair rebonding.

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

CAUTIONS:



Make sure that the component is correctly located on the locating dowels.



Make sure that equal pressure is applied to the full length of the component.

• If the ambient temperature falls below 10 degrees C, apply warm air (25 degrees C) continuously for 15 minutes.

CAUTION: Make sure that no excess sealant residue is 4. 🦾 evident

- If water is used as a means for the leak check, then
- If water is used as a means for the leak check, therallow sealant to dry before testing.
 Spray water around the windshield glass, mark any area that leaks. Dry the windshield glass and sealant before applying additional sealant.
- 6. Refer to: <u>Rain Sensor</u> (501-16 Wipers and Washers, Removal and Installation).
- 7. Refer to: <u>A-Pillar Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 8. Refer to: <u>Cowl Vent Screen</u> (501-02 Front End Body Panels, Removal and Installation).

Glass, Frames and Mechanisms - Door Window Regulator Motor Removal and Installation

Removal

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



2. ONOTE: Right-hand shown, left-hand similar.



3. ONOTE: Components removed for clarity.





4. NOTES:

Make sure the door window glass is in the fully closed position.

Components removed for clarity.

• Apply suitable adhesive tape to the door window glass and over the door frame, to prevent the door window glass from damage.

5. CAUTION: Make sure the drum remains in position. Use a suitable flat blade screwdriver to secure the drum while seperating the motor.

Installation



• *Torque:* <u>5 Nm</u>



2. CAUTIONS:

Install all the bolts finger tight before final tightening.

<u>/!</u> Care must be taken not to damage the outer door panel.

- Install the retaining bolt 1 to the witness mark on Install the feta the body.
 Torque:
 <u>1.9 Nm</u>
 <u>5 Nm</u>



3. ANOTE: Components removed for clarity.



- 4. ONOTE: Right-hand shown, left-hand similar.
 - Torque: <u>1.5 Nm</u>

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

Instrument Panel and Console -

Description	Nm	lb-ft	lb-in
Instrument panel retaining bolts	20	15	-
Floor console retaining nuts	5	-	44
Instrument panel support brackets retaining bolts	9	-	80
Instrument panel support brackets retaining nuts	9	-	80

Published: 11-May-2011 Instrument Panel and Console - Instrument Panel - Component Location Description and Operation

COMPONENT LOCATION



E129713

Item	Description
1	Cross car beam
2	Glovebox switch
3	Energy absorbing brackets (2 off)

Instrument Panel and Console - Instrument Panel - Overview

Description and Operation

OVERVIEW

The instrument panel incorporates a magnesium cross car beam. North American Specification (NAS) vehicles also feature a pair of energy absorbing brackets. The energy absorbing brackets are mounted behind the driver's side of the instrument panel. Each is secured to the cross car beam by 2 screws.

The cross car beam acts as a support and provides mounting points for the instrument panel top pad. The instrument panel top pad supports various other system components. These include ducting, vents and registers for the climate control system and the passenger airbag. For additional information, refer to:

Air Distribution and Filtering (412-01 Climate Control, Description and Operation),

Safety Belt System (501-20A Safety Belt System, Description and Operation),

Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) (501-20B Supplemental Restraint System, Description and Operation),

Pedestrian Protection System (501-20C Pedestrian Protection System, Description and Operation).

Instrument Panel and Console - Instrument Panel - System Operation and Component Description

Description and Operation

System Operation

GLOVEBOX SWITCH OPERATION

The CJB (central junction box) provides a battery voltage supply to the switch via the delayed power off relay. When the glovebox switch is pressed, the voltage signal is passed to the \underline{CJB} . If the correct conditions exist then the \underline{CJB} then provides a power supply to operate the glovebox latch to unlock the glovebox.

The glove box opening is inhibited by the \underline{CJB} if the anti-theft alarm system is armed and if valet mode is selected using the Touch Screen Display (TSD). The \underline{CJB} detects the voltage signal from the switch but will not operate the glovebox latch if other condition exists.

Component Description

GLOVEBOX SWITCH DESCRIPTION

The conventional glove box switch is located behind the instrument panel veneer. The round button of the switch is visible through an aperture in the veneer.

Two screws hold the switch in position behind the veneer. The veneer panel has two bosses which the screws are threaded into.

Instrument Panel and Console - Floor Console

Removal and Installation

Removal

 Δ NG

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

- 1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: <u>Floor Console Cup Holder</u> (501-12 Instrument Panel and Console, Removal and Installation).



3. CAUTIONS:

Protect the surrounding trim to avoid damage.

Cover fiber optic cable connectors to minimize dust ingress and avoid bending the cables in a radius of less than 30 mm.





4. *Torque:* <u>9 Nm</u>

6. *Torque: <u>6 Nm</u>*









8. *Torque: <u>6 Nm</u>*



Installation

1. To install, reverse the removal procedure.

Instrument Panel and Console - Floor Console Cup Holder

Removal and Installation

Removal

 Δ_{NC}

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

- 1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: <u>Floor Console Double Cup Holder</u> (501-12 Instrument Panel and Console, Removal and Installation).

З.





E94856

4. CAUTION: Take extra care not to damage the component.

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

1. NOTE: Make sure that the veneer trim panel is correctly installed and secured.

To install, reverse the removal procedure.

Instrument Panel and Console - Floor Console Double Cup Holder

Removal and Installation

Removal

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

- 1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: <u>Transmission Control Switch (TCS)</u> (307-05A Automatic Transmission/Transaxle External Controls V6 3.0L Petrol, Removal and Installation).



E94845



5.

З.

6. Open the floor console single cup holder.



 Carefully release the front edge of the floor console double cup holder from under the rear edge of the floor console single cup holder.









E94849

Installation

1. $\Delta_{NOTE: Make sure that the veneer trim panel is correctly installed and secured.$

To install, reverse the removal procedure.

Instrument Panel and Console - Floor Console Side Trim Panel

Removal and Installation

Removal

NOTES:

LHD right-hand floor console side trim panel shown, LHD left-hand and both RHD floor console side trim panels are similar.

Removal steps in this procedure may contain installation details.

1. Recline the front seats and move to the rear most position.





2. NOTE: When removing the component, some of the clips may remain attached. These clips should be removed and returned to their original positions in the instrument panel.

3.







6.





ANOTE: When removing the component, some of the clips may remain attached. These clips should be removed and returned to their original positions in the center console.







10. $\Delta_{NOTE: Do not disassemble further if the component is removed for access only.$



Installation

1. ANOTE: Make sure that the veneer trim panel is correctly installed and secured.

To install, reverse the removal procedure.

Instrument Panel and Console - Glove Compartment

Removal and Installation

Removal

 Δ N

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

2.

1. Refer to: <u>Passenger Side Register (</u>412-01 Climate Control, Removal and Installation).





- 3. CAUTION: Fixings must be started by hand to avoid damaging threads.
 - Upper 3 bolts.
 - Lower 3 bolts.

Torque: <u>9 Nm</u>





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





¥3 E96851

Installation

6. Using a screwdriver, carefully release the latch and open the glove compartment.

7.

Instrument Panel and Console - Instrument Panel Console

Removal and Installation

Special Tool(s)

N#1 0028	303-1496
1 . 1 .	Heater Hose Removal Tool
- / / /	
F1	
1	
E116457	
1511551653	

Removal

CAUTIONS:



Inspect the seals, replace if damaged.



Inspect the O-rings, replace if damaged.

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

All vehicles

1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).



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

Raise and support the vehicle.

Vehicles with supercharger

 Refer to: <u>Cooling System Draining</u>, <u>Filling and Bleeding - V8 S/C 5.0L</u> <u>Petrol</u> (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, General Procedures).

Vehicles without supercharger

4. Refer to: <u>Cooling System Draining</u>, <u>Filling and Bleeding - V8 5.0L Petrol</u> (303-03C Engine Cooling - V8 5.0L Petrol/V8 S/C 5.0L Petrol, General Procedures).

Vehicles with diesel engine

5. Refer to: <u>Cooling System Draining, Filling and Bleeding</u> (303-03A Engine Cooling - TDV6 3.0L Diesel, General Procedures).

All vehicles

- 6. Refer to: <u>Air Conditioning (A/C) System Recovery, Evacuation and</u> <u>Charging (412-00 Climate Control System - General Information, General Procedures).</u>
- 7. Refer to: <u>Secondary Bulkhead Center Panel</u> (501-02 Front End Body Panels, Removal and Installation).

- 8. Refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).
- 9. Refer to: <u>Glove Compartment</u> (501-12 Instrument Panel and Console, Removal and Installation).
- 10. Refer to: <u>Instrument Panel Lower Trim Panel</u> (501-12 Instrument Panel and Console, Removal and Installation).
- 11. Refer to: <u>A-Pillar Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 12. Refer to: <u>Cowl Side Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 13. Refer to: <u>Steering Wheel</u> (211-04 Steering Column, Removal and Installation).



14. CAUTION: Be prepared to collect escaping coolant. *Special Tool(s):* <u>303-1496</u>







E100875

15. CAUTION: Be prepared to collect escaping coolant.Special Tool(s): <u>303-1496</u>

16. CAUTION: Take care not to damage the O-ring seals during installation.

Torque: <u>9 Nm</u>

17. Torque: <u>4 Nm</u>



18.





19. Torque: <u>30 Nm</u>



Left-hand drive vehicles



21. *Torque:* <u>4 Nm</u>

All vehicles





23. *Torque:* <u>12 Nm</u>













27. *Torque:* <u>20 Nm</u>

28. *Torque:* <u>20 Nm</u>



Installation

29. CAUTIONS:

Be prepared to collect escaping coolant.



A Protect the surrounding paintwork to avoid damage.



A Protect the surrounding trim to avoid damage.

1. To install, reverse the removal procedure.

Instrument Panel and Console - Instrument Panel Lower Trim Panel

Removal and Installation

Removal



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



E95489

2.



4. Fully extend and lower the steering column for access.





5.




- 7. 🕰 CAUTION: Fixings must be started by hand to avoid damaging threads.
 - Upper 3 bolts.

• Lower 3 bolts.

Torque: <u>9 Nm</u>



E96830



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



E96832



E96833

Installation

11.

Instrument Panel and Console - Overhead Console

Removal and Installation

Removal



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







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

CAUTION: Take extra care not to damage the edges of the component.

2.









• Take precautions to avoid any electrostatic charging, which could damage this comopnent.

5.

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



<image><image><image>

7.

8.

Installation



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

To install, reverse the removal procedure.

Handles, Locks, Latches and Entry Systems -

Description	Nm	lb-ft	lb-in
Front and rear door latch retaining screw	7	-	62
Front and Rear exterior door handle / Door lock captive retaining screw	4	-	36
Front and Rear Exterior Door handle seperate retaining screw	3	-	28
Front and Rear Door striker retaining screw	25	18	-
Interior Door handle retaining Screw	1.3	-	11.5
Hood latch Reataining screw	10	8	-
Hood Striker Retaining screw	22	17	-
Trunk Latch Retaining screw	20	15	-
Trunk Striker Retaining screw	22	17	-
Trunk Lock Retaining screw	3	-	28

Handles, Locks, Latches and Entry Systems - Handles, Locks, Latches and Entry Systems - Component Location Description and Operation

Locks and Latches



E94965

Item	Description
1	RH (right-hand) front door handles, latch and motor
2	RH rear door handles, latch and motor
3	Fuel filler door and motor
4	Luggage compartment emergency key barrel
5	Luggage compartment latch and motor
6	LH (left-hand) rear door handles, latch and motor
7	Door emergency key barrel - LH front door only
8	LH front door handles, latch and motor

9 Engine-compartme	nt-lid r	release-le	ever an	d cable
--------------------	----------	------------	---------	---------

10 Engine-compartment-lid strike	partment	Engine-compartment-lid s	triker
----------------------------------	----------	--------------------------	--------

11 Engine-compartment-lid safety hook and guide Central Locking and Keyless Vehicle Locking



E94967

Item	Description
1	CJB (central junction box)
2	Keyless vehicle, RH front door antenna * - integral to the handle
3	Keyless vehicle, RH rear door antenna * - integral to the handle
4	Central locking radio frequency receiver
5	RJB (rear junction box)
6	Keyless vehicle, luggage compartment antenna *
7	Keyless vehicle module
8	Keyless vehicle, LH rear door antenna * - integral to the handle
	Keyless vehicle, LH front door antenna * – integral to the handle Comments:
(* Only	with passive entry option fitted)

Handles, Locks, Latches and Entry Systems - Handles, Locks, Latches and Entry Systems - Overview

Description and Operation

The hinged panels are secured with latches and strikers. A remotely operated central locking system controls the locking and unlocking of the door and luggage compartment latches. A radio frequency Smart Key allows the vehicle to be locked and unlocked by pressing the appropriate handset buttons. Two levels of central locking system are available:

- remote central locking, and an
- optional passive entry system.

The remote central locking system, provides locking and unlocking of the vehicle from inside and outside of the vehicle. The system is operated using buttons on the Smart Key, which transmits radio frequency signals to the central locking radio frequency receiver.

On vehicles fitted with the optional passive entry system, the vehicle can be unlocked without the use of a key or pressing buttons on the Smart Key. The Smart Key operates the passive entry system.

Handles, Locks, Latches and Entry Systems - Handles, Locks, Latches and Entry Systems - System Operation and Component Description

Control Diagram



Item	Description
Note:	A = Hardwired; N = Medium speed CAN (controller area network); O = LIN (local interconnect network) bus
1	Battery
2	Megafuse (250 A)
3	RJB (rear junction box)
4	Door module - front passenger
5	Door ajar switch - front passenger
6	Door latch - front passenger

7	Door module - RH (right-hand) rear passenger
8	Door latch - RH rear passenger
9	Door ajar switch - RH rear passenger
10	Door latch - LH (left-hand) rear passenger
11	Door ajar switch - LH rear passenger
12	Door module - LH rear passenger
13	Door ajar switch - driver door
14	Door latch - driver door
15	Door module - driver door
16	CJB (central junction box)
17	Central-locking radio-frequency receiver
18	Keyless vehicle module

Luggage Compartment Lid and Fuel Filler Door Locking



Item	Description
Note:	A = Hardwired; N = Medium speed CAN
1	Battery
2	Megafuse (250 A)
3	RJB
4	Locking motor - fuel door
5	Keylesss vehicle module
6	Emergency key barrel - luggage compartment
7	Release latch - luggage compartment lid
8	Ajar switch - luggage compartment lid
9	Fascia switch - luggage compartment lid
10	Instrument cluster
11	СЈВ

Passive Entry System



Item	Description
Note:	A = Hardwired; N = Medium speed CAN
1	Battery
2	Megafuse (250 A)
3	СЛВ
4	Radio frequency receiver
5	Keylesss vehicle module
6	Door handle, lock/unlock switch and antenna - front passenger
7	Door latch, fast latch - front passenger
8	Door latch, fast latch - <u>RH</u> rear passenger
9	Door handle, lock/unlock switch and antenna - RH rear passenger
10	Door latch, fast latch - LH rear passenger
11	Door handle, lock/unlock switch and antenna - LH rear passenger
12	Door latch, fast latch - driver door
13	Door handle, lock/unlock switch and antenna - driver door

System Operation

The hinged panels are secured with latches and strikers. A remotely operated central locking system controls the locking and unlocking of the door and luggage compartment latches. A radio frequency Smart Key allows the vehicle to be locked and unlocked by pressing the appropriate handset buttons. Two levels of central locking system are available: remote central locking and an optional passive entry system.

The passive entry and associated passive start system allows the driver to unlock and start the vehicle without using a vehicle key in a door-lock or ignition switch. The passive entry system is an optional fitment while the passive start system is a standard fitment on all vehicles. The passive start system is combined with the passive anti-theft immobilization system. Refer to: <u>Anti-Theft - Passive (</u>419-01B Anti-Theft - Passive, Description and Operation).

Emergency access to the vehicle is provided by two concealed key barrels: one located in the front left-hand door handle and one located on the underside of the luggage compartment lid finisher. An emergency, removable key blade is fitted into the Smart Key.

Operation of either key barrel unlocks the vehicle but does not disarm the alarm system. The key barrels in the door and luggage compartment lid are concealed by a plastic cover which can be removed by inserting the blade of the emergency key into a slot in the cover.

Locking and unlocking conditions using the emergency key in the door key barrel:

- If the alarm is not armed the vehicle can be centrally unlocked.
- If the alarm is armed the door only can be opened and the alarm will be triggered.
- The vehicle cannot be double locked or the alarm system armed using the emergency key.

The vehicle can be centrally locked and unlocked from inside using the interior handle release levers on the front doors only. Central locking and unlocking can also be performed using lock and unlock buttons on the vehicle's fascia. The driver can select locking options, single point entry or drive away locking for example, from a menu available on the touch screen.

Central Locking – Radio Frequency Remote System

The radio frequency central locking system, provides locking and unlocking of the vehicle from inside and outside of the vehicle. The system is operated using buttons on the Smart Key, which transmits radio frequency signals to the central locking radio frequency receiver.

The system provides additional security by double-locking the doors from outside the vehicle if the lock button, on the Smart Key, is pressed twice within 3 seconds; this function is not applicable in North American Specification (NAS) and Japanese markets.

Additional buttons on the Smart Key provide for the convenience operation of the luggage compartment lid release, headlamp delay and panic alarm functions. A global open or close feature is also available in certain markets using the lock/unlock buttons.

Passive Entry

On vehicles fitted with the optional passive entry system, the vehicle can be unlocked without the use of a key blade or pressing buttons on the Smart Key. The Smart Key operates the passive entry system in addition to the passive start system. Refer to: <u>Anti-Theft - Passive</u> (419-01B Anti-Theft - Passive, Description and Operation).

The passive entry system is controlled by the keyless vehicle module and five low frequency antennas. One antenna located in each door handle and one antenna located behind the rear bumper cover.

When a vehicle door handle is pulled to the first five-percent of its travel and the Smart Key is within one meter of the handle; the Smart Key receives the low-frequency signal transmitted from the keyless vehicle module. The Smart Key responds with a radio frequency transmission of its authorization code. The radio frequency signal is received by the central locking radio-frequency receiver and passed to the keyless vehicle module which checks and approves the code as valid. Once the handle is

pulled to eighty percent of its travel the keyless vehicle module then drives the fast latch directly to allow the door to be opened. The keyless vehicle module also transmits an unlock request to the <u>CJB</u>. The CJB then passes an unlock request to the door modules.

Locking of the vehicle is performed by pressing one of the buttons located on each exterior door handle, with the Smart Key within a one meter range of the vehicle. When the door handle button is pressed, the keyless vehicle module transmits a low-frequency signal via the low-frequency handle antenna to the Smart Key. The Smart Key transmits a radio frequency signal which is verified by the keyless vehicle module and allows the doors to be locked or double locked and the alarm system to be armed.

To double lock the vehicle, the button on the exterior door handle must be pressed twice within three seconds, with the Smart Key within one meter range of the vehicle.

If a door, engine-compartment lid or the luggage compartment lid is ajar when an attempt to lock the vehicle is made, an error tone is emitted and no locking action will occur.

Refer to: Anti-Theft - Active (419-01A Anti-Theft - Active, Description and Operation).

Component Description

Engine Compartment Lid Latches

Two engine-compartment lid latches are located on the front crossmember. An engine-compartment lid release lever is located below the instrument panel on the left-hand 'A' pillar and is connected with a cable to the latches. An engine-compartment lid ajar switch is integrated in the engine-compartment lid latch.

Door Latches

The door latches are located at the rear of each door and engage with a striker on the adjacent pillar. Each door latch motor assembly contains micro-switches for lock, unlock and door ajar. Motors provide for the central door locking and the double locking feature. The electrical control for the door latch components is provided by the CJB and RJB via the driver's and passenger door modules.

The interior door handles are connected by a cable to the latch release mechanisms. The interior door handles also incorporate a locking facility to allow the doors to be locked from inside the vehicle when all the doors are closed. If a door is ajar the locking feature is inhibited.

Luggage Compartment Lid Latch

The luggage compartment latch is attached to the bottom of the lid. The latch can be released electrically by pressing the interior release button located on the outboard side of driver's lower knee bolster; a release button is also provided on the Smart Key. There is also a release switch on the underside of the luggage compartment lid finisher.

On NAS vehicles an emergency release cable is attached to the latch. This allows the latch to be manually opened by pulling a handle located in the luggage compartment lid interior trim.

Fuel Filler Door

The fuel filler door is electrically locked by a motor located on the fuel door housing. The fuel door is locked when the vehicle is locked and alarmed. The fuel door can be opened when the vehicle is unlocked or locked:

- via an interior handle,
- via drive-a-way locking,
- via the lock switch on the fascia,
- via the external door key barrel.

Handles, Locks, Latches and Entry Systems - Locks, Latches and Entry

Systems

Diagnosis and Testing

Principle of Operation

For a detailed description of the locks, latches and entry systems and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: Handles, Locks, Latches and Entry Systems (501-14, Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle

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

- 1. Verify the customer concern, to be sure the correct issue is investigated
- 2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

Mechanical	Electrical
 Incorrectly aligned door(s), hood or tailgate Fuel filler door lock actuator Hood release handle Hood latch(es) Exterior door handle(s) Interior door handle(s) Cable(s) Tailgate release switch Rear window release switch 	 Fuses Wiring harness Wiring connector(s) Door lock actuator(s) Remote transmitter (key-fob or smart key) Central locking switches Controller Area Network (CAN) circuits Radio frequency (RF) receiver Central junction box (CJB) Loose or corroded connections

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4. If the cause is not visually evident verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index

Symptom Chart

NOTE: Complete the diagnostic steps below to confirm any concern prior to replacing any component

Symptom	Possible Causes	Action
The message center indicates that the hood, the luggage compartment is open when it appears to be closed	Incorrect striker alignment/adjustment	Check/adjust the strikers as necessary Check for DTCs indication on along
Vehicle indicates a miss-lock when the hood, luggage compartment appear to be closed	 Ajar switch circuit short circuit to ground Ajar switch failure 	 Check for DTCs indicating an ajar switch fault. Refer to the DTC index
Fuel flap does not lock/unlock	 Fuel flap cable detached from body Fuel flap actuator detached from mounting bracket Fuel flap actuator disconnected Fuel flap actuator failure 	 Check the condition and installation of the fuel flap cable Check the security of the fuel flap actuator and bracket Check the security of the actuator electrical connector Check for DTCs indicating a fuel flap actuator fault. Refer to the DTC index
Door(s) will not unlatch/open when using outside door handle	 Exterior door handle condition/installation Exterior release cable disconnected from exterior door handle or door latch 	 Check the exterior door handle condition and installation Check the condition and security of the exterior release cable Single door will not open from the

Symptom	Possible Causes	Action
		outside (but opens from the inside) GO to Pinpoint Test <u>A.</u>
Door(s) will not unlatch/open when using inside door handle	 Child lock(s) engaged Interior door handle condition/installation Interior release cable disconnected from interior door handle or door latch 	 Check that the child locks are disengaged Check the interior door handle condition and installation Check the condition and security of the interior release cable Single Door Will Not Open From The Inside (but opens from the outside) GO to Pinpoint Test <u>B.</u>
Door(s) will not lock/unlock from key fob, key or internal lock switch	 Wiring harness/connectors Central junction box (CJB) Door lock switch Cable fault 	 Check for relevant stored DTCs Once any DTC related faults have been rectified continue with the diagnostic steps below No lock / unlock function from key-fob GO to Pinpoint Test <u>C.</u>
Door ajar or miss lock signal at message centre when door(s) are closed or alarm triggering	 Wiring harness Instrument cluster Incorrect striker alignment/adjustment Ajar switch circuit short circuit to ground Ajar switch failure 	 Latch Mounted Door Ajar Switch Test GO to Pinpoint Test <u>D.</u>

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: Communications Network (418-00, Diagnosis and Testing) / Locks, Latches and Entry Systems - DTC: With (501-14, Diagnosis and Testing).

Pinpoint Test

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	I Remove the door trim panel as necessary
15103010	
	2 Confirm the exterior door release cable is correctly installed to the exterior door handle
	Is the cable correctly installed? Yes GO to A2.



	2	Remove the door trim panel as necessary
E150685		
	3	Confirm the interior door release cable is correctly installed to the interior door handle
	ls t Yes	
	No	<u>GO to B2</u> . Connect the door release cable correctly. If the cable is
		damaged, install a new door release cable. Test the system for normal operation
B2: CHECK THE INTERIOR DOOR HANDLE RELEASE CO		ECTION TO THE DOOR LATCH
E150686	1	Confirm the interior door handle release connection to the door latch is installed correctly
	ls t Yes	he interior door handle release cable installed correctly?
	No	GO to Pinpoint Test <u>C.</u>
		Connect the door release cable correctly. If the cable is damaged, install a new door release cable. Test the system for normal operation
PINPOINT TEST C : DOOR LATCHING AND LOCKI	NG	FUNCTION TEST

TEST CONDITIONS DETAILS/RESULTS/ACTIONS C1: HARNESS CONNECTION

NOTE: Test as a single component to ensure that the door latch is not replaced unnecessarily, when another component may be at fault



	Is there momentary power (for approx 8 seconds) between terminals 5 and 7 left side and 5 and 7 right side when unlocking the vehicle via the key-fob or smart key? Yes The vehicle electrical system is unlocking correctly, providing the signal to the latch <u>GO to C4</u> . No
	Refer to the electrical circuit diagrams and investigate why vehicle electrical system is not providing signals to the latch. Using the manufacturer approved diagnostic system check for logged DTCs to localize the fault
C4: PHYSICAL TEST 1	
	1 Remove latch module from door
	2 Inspect latch module for any visual damage
	3 With the latch in hand, connect the electrical connector(s) to connect door latch to door harness
	NOTE: THE LATCH IS NOW READY TO TEST
	4 Close all vehicle doors except the door being investigated
	NOTES:
	Figure 1 - Unlatched position shown
	Figure 3 - Fully latched position shown
	 Test will not work if latch is only in first safety latch position Rotate latch claw (using a small screw driver or similar), to the fully latched position (figure 3)
3 E139349	

T150668	Confirm that the latch interior release lever is in the unlocked position as shown
Titota	Storte: Locked position shown ■ Press the lock button on the key-fob or smart key
C5: PHYSICAL TEST 2	Does the latch interior release lever move from the unlocked position to the locked position? Yes GO to C5. No If this is a repeat test and the vehicle electrical test section has been completed and confirmed that vehicle is working correctly, then replace the door latch. If replacing latch as part of a warranty claim, please quote reference code LKINOP in the technician comments section of the warranty claim

E150678	NOTE: Unlocked position shown With the latch in the locked state (i.e. the latch interior release lever is in the locked position), press the key-fob or smart key unlock button Does the latch interior release lever move from the locked position.
C6: PHYSICAL TEST 3	Does the latch interior release lever move from the locked position to the unlocked position? Yes GO to C6. No If this is a repeat test and the vehicle electrical test section has been completed and confirmed that vehicle is working correctly, then replace the door latch. If replacing latch as part of a warranty claim, please quote reference code LKINOP in the technician comments section of the warranty claim
CO.PHYSICAL TESTS	 NOTE: Fully latched position shown With the latch in its unlocked state, push the latch exterior release lever against its return spring, whilst simultaneously applying a light pressure to release the latch claw using a small screw driver or similar
C7: PHYSICAL TEST 4	Does the latch claw release? Yes <u>GO to C7</u> . No Repeat tests C5 and C6 to confirm the fault <u>GO to C5</u> . If the repeat test has confirmed that the exterior release lever will not release the claw on an unlocked latch replace the door latch. If replacing latch as part of a warranty claim, please quote reference code EXTINOP in the technician comments section of the warranty claim



tisoeea	Confirm that the latch interior release lever is in the unlocked position as shown
Table 1	Whilst the latch is still in its unlocked state, push the latch interior release lever against its return spring, whilst simultaneously applying a light pressure to release the latch claw using a small screw driver or similar
	Does the latch claw release? Yes Latch has passed all tests to confirm its correct function. DO NOT REPLACE LATCH as part of any attempts to resolve any locking functionality issues
	No Repeat test <u>GO to C7</u> . If repeat test has confirmed that the interior release lever will not release the claw when the latch is in the unlocked state, then replace the latch. If replacing latch as part of a warranty claim, please quote reference code INTINOP in the technician comments section of the warranty claim

PINPOINT TEST D : LATCH MOUNTED DOOR AJAR SWITCH TEST

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: TEST 4 DOOR LATCH	
NOTES:	
^	

f a customer is complaining of issues relating to a door ajar signal e.g. door latch **won't** lock, or alarm system triggering (indicated via **DTC's)**, there may be several components that generate the fault, including

- Body wiring harness / connectors
- Door wiring harness / connectors
- Alarm control module
- Central junction box (CJB)
- Door Latch ajar switch

To investigate the functioning of the door ajar switch contained within the door latch, to prove or eliminate the door latch mounted door ajar switch as the root cause, follow the process below. This will prevent the unnecessary replacement of a correctly functioning door latch



No	
Release latch claw and repeat test from step 4 to confirm result. If this is a repeat test and you are sure that the ajar switch does not provide continuity when fully latched. Replac the latch. If replacing latch as part of a warranty claim, pleas guote reference code AJARINOP in the technician comments	se
section of the warranty claim	

Published: Handles, Locks, Latches and Entry Systems - Door Lock Cylinder Cover Removal and Installation

Removal



E114844





2.

1. CAUTION: Make sure that excessive force is not used. Failure to follow this instruction may result in damage to the vehicle.



Installation



1. CAUTION: Make sure that the door lock cylinder cover is pushed firmly in the sequence shown to install all 3 clips, and that the door lock cylinder cover is securely attached to the vehicle. Failure to follow this instruction may result in damage to the vehicle.

E112448

Handles, Locks, Latches and Entry Systems - Exterior Front Door Handle

Removal and Installation

Removal

 Δ NG

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



1. **ONOTE:** Remove the screw sufficiently, only to release the component.

Torque: <u>4 Nm</u>



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



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



4.



Installation





To install, reverse the removal procedure.

Handles, Locks, Latches and Entry Systems - Exterior Luggage Compartment Lid Release Switch

Removal and Installation

Removal

All vehicles

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

1. Refer to: <u>Luggage Compartment Lid Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).





3. *Torque:* <u>3 Nm</u>





4.

Vehicles with parking aid

5.



All vehicles





E93080

Installation

1. To install, reverse the removal procedure.

Handles, Locks, Latches and Entry Systems - Exterior Rear Door Handle

Removal and Installation

Removal

 Δ NG

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



1. NOTE: Remove the screw sufficiently, only to release the component.

Torque: <u>4 Nm</u>



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


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



4.



Installation



1. CAUTION: Make sure that the wiring harnesses are correctly located.

To install, reverse the removal procedure.

Handles, Locks, Latches and Entry Systems - Front Door Latch

Removal and Installation

Removal

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



Refer to: <u>Exterior Front Door Handle</u> (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

3. Refer to: <u>Front Door Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



4. ONOTE: Right-hand shown, left-hand similar.





6. ONOTE: Left-hand shown, right-hand similar.



NOTE: Right-hand shown, left-hand similar.
 Torque: <u>3 Nm</u>

5. ONOTE: Left-hand shown, right-hand similar.

Torque: <u>7 Nm</u>



8. ONTE: Right-hand shown, left-hand similar.

Torque: 7 Nm

9. ONOTE: Left-hand shown, right-hand similar.





E94888



NOTE: Do not disassemble further if the component is removed for access only. 10. 🧲



11. Δ NOTE: Note the position of the wiring harness.





13.





14.



Installation

1. To install, reverse the removal procedure.

Published Handles, Locks, Latches and Entry Systems - Front Door Lock Cylinder Removal and Installation

1.

Removal



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





E101264



2. (NOTE: Remove the screw sufficiently, only to release the component.

Torque: <u>4 Nm</u>



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

E101265

Installation

1. To install, reverse the removal procedure.

Handles, Locks, Latches and Entry Systems - Interior Front Door Handle Removal and Installation

Removal

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





Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011 Handles, Locks, Latches and Entry Systems - Luggage Compartment Lid Latch Actuator

Removal and Installation

Removal

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

1. Refer to: <u>Luggage Compartment Lid Lock Cylinder (</u>501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).



Installation

1. To install, reverse the removal procedure.

2. Torque: <u>20 Nm</u>

Published: 11-May-2011 Handles, Locks, Latches and Entry Systems - Luggage Compartment Lid Lock **Cylinder** Removal and Installation

Removal

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

1. Refer to: <u>Luggage Compartment Lid Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).









3. Torque: 3.2 Nm



Installation

1. To install, reverse the removal procedure.

Handles, Locks, Latches and Entry Systems - Rear Door Latch

Removal and Installation

Removal

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

1. Remove the rear door window regulator and motor.

Refer to: <u>Rear Door Window Regulator and Motor</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).

2. Remove the rear door exterior handle.

Refer to: <u>Exterior Rear Door Handle</u> (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).



3. *Torque:* <u>3 Nm</u>

233377



4.



6.



5. *Torque: <u>7 Nm</u>*





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

E93582

7. CAUTION: Note of the routing of the wiring harnesses.



10.



E93584



Drill out the rivet.Release the clip.



E93586



Installation

1. CAUTION: Make sure that the wiring harnesses are correctly located.

12. CAUTION: Note of the routing of the wiring harnesses.

To install, reverse the removal procedure.

Wipers and Washers -

Torque Specifications			
Description	Nm	lb-ft	lb-in
Wiper arm retaining nuts	22	16.2	194.7
Wiper linkage bolts / screws	11	8.1	97.4

Public Wipers and Washers - Wipers and Washers - Component Location Description and Operation - Component Location

COMPONENT LOCATION



E93344

Item	Description		
1	Washer reservoir		
2	Wiper motor and linkage assembly		
3	Wiper/washer switch - RH (right-hand) steering column multifunction switch		
4	Rain/light sensor		
5	CJB (central junction box)		
6	Headlamp washer jets (2 off)		

Wipers and Washers - Wipers and Washers - Overview

Description and Operation

OVERVIEW

The wipers and washers comprise a windshield wiper system with a conventional wiper linkage and 2 wiper blades and a windshield washer with jets located on the wiper arms. A headlamp powerwash is available on certain models.

The front wipers have 4 operational states:

- Flick wipe
- Auto
- Slow wipe
- Fast wipe.

Operation of the windshield wipers and washers and the headlamp powerwash is controlled by the CJB (central junction box) in response to driver inputs and signals from the rain/light sensor. The instrument cluster monitors the condition of the wiper/washer control switch and transmits driver requests to the CJB over the medium speed CAN (controller area network) bus.

The 'Auto' function requires an input from the rain sensor. The rain sensor is mounted on the inner surface of the windshield and transmits an infra-red signal to determine the amount of water on the outer surface of the windshield. A value is then transmitted to the <u>CJB</u> over the LIN (local interconnect network) bus.

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Wipers and Washers - Wipers and Washers - System Operation and **Component Description** Description and Operation

Control Diagram

NOTE: \mathbf{A} = Hardwired; \mathbf{N} = Medium speed CAN (controller area network) bus; \mathbf{O} = LIN (local interconnect network) bus



Item	Description
1	Battery
2	EJB (engine junction box)
3	Wiper motor
4	Headlamp washer pump
5	Rain/Light sensor
6	Washer reservoir fluid level switch

7	Windshield washer pump
8	Wiper/Washer switch - RH (right-hand) steering column multifunction switch
9	Instrument cluster
10	CJB (central junction box)
11	BJB (battery junction box)

System Operation

WINDSHIELD WIPERS

Operation of the wipers and washers is controlled by the <u>CJB</u> in response to driver inputs from the wiper control switch and signals from the rain/light sensor. The instrument cluster monitors the condition of the wiper/washer control switch and transmits driver requests to the <u>CJB</u> over the medium speed <u>CAN</u> bus.

The wiper control switch is connected via hardwired connections to the instrument cluster. The instrument cluster outputs on 4 wires a reference voltage to the wash/wipe switch, the auto wiper switch, the wiper switch and the flick wipe switch. All the switches are connected to the instrument cluster on a common ground. Each switch function is connected to ground via a resistor or series of resistors and the instrument cluster monitors the ground signal and determines which function has been selected. The instrument cluster then outputs the appropriate message on the medium speed <u>CAN</u> bus to the <u>CJB</u> which responds to the requested wiper function. The <u>CJB</u> then activates the appropriate function either directly or via relays in the <u>EJB</u> for the wipers and headlamp powerwashers.

Speed Dependent Mode

When the wipers are operating, a vehicle speed signal received by the CJB on the high speed CAN bus is used to operate a speed dependent mode. If the wipers are in fast wipe and the vehicle speed decreases to below 2 km/h (1.2 mph), the wipers will reduce to the normal wipe speed. When the vehicle speed increases to above 8 km/h (5 mph) the fast wiper speed selection is restored. If slow speed is selected and the vehicle speed drops below 2km/h (1.2 mph), the wipers will operate in the intermittent mode. When the vehicle speed increases to above 8 km/h (5 mph) the slow wiper speed selection is restored – this feature is configurable by the dealer using the approved Jaguar diagnostic system.

Wiper Motor

The wiper motor is controlled by the \underline{CJB} . The \underline{CJB} is connected to a wiper motor normal/fast relay in the \underline{EJB} on 2 wires. The \underline{CJB} is also connected to a wiper run/park relay, also located in the \underline{EJB} .

Driver requests are received by the <u>CJB</u> which energizes the wiper motor normal/fast relay in the appropriate mode (normal or fast wipe) and also energizes the run/park relay in the run mode by providing a ground for the relay coils. When wiper operation is deselected by the driver, the <u>CJB</u> monitors a park switch which is integral with the wiper motor. On receipt of a signal from the park switch, the <u>CJB</u> de-energises the run/park relay, removing the power supply through the normal/fast relay, stopping the wipers in the park position on the windshield.

The wiper motor is a DC (direct current) motor which drives a gear wheel via a worm drive attached to the motor spindle. The motor has 3 sets of brushes with one brush connected to ground. When the normal/fast relay is energized in the normal position, a power feed is supplied to the brush directly opposite the ground brush and operates the motor at slow speed. When the relay is energized in the fast position, a power feed is connected to the second motor brush, which is offset from the ground brush and operates the motor at the fast speed. With power supplied through the offset brush, the current flows through fewer motor coil windings. This results in a lower resistance to current flow to the ground brush and produces a higher motor rotational speed.

WINDSHIELD WASHERS

The windshield washers are controlled by the <u>CJB</u>. A driver request for washer operation, via the wiper control switch, is passed to the instrument cluster on the <u>LIN</u> bus. The instrument cluster passes the message to the <u>CJB</u> on the medium speed <u>CAN</u> bus.

The <u>CJB</u> energizes the windshield washer pump during the up stroke of the first 2 wash/wipe cycles. This ensures that wiper fluid is pushed to the sides of the windshield and eliminates the trail of fluid which can occur if the fluid is pushed to the bottom of the windshield. The wipers will continue for 3 more cycles, followed after a delay of 4 seconds, by a single dry wipe.

NOTE: The dry wipe feature is configurable using an approved Jaguar diagnostic system.

The operation of the washer pump on the wiper up stroke only is configurable using an approved Jaguar diagnostic system.

The washer button can be pressed and held and the wipers will operate continuously for up to 10 seconds. After this period when the button is released, the wipers will continue for 3 more cycles, followed after a delay, by a single dry wipe. After this period washing will be inhibited, the wipers will continue for 3 more cycles, followed after a delay, by a single dry wipe. Reactivating the switch will recommence the wash/wipe cycle.

RESERVOIR LEVEL SWITCH

The level switch is connected directly to the \underline{CJB} . The switch is operated by a float which closes contacts within the switch when the fluid level falls to below the switch level. When the contacts are closed a ground path is completed from the \underline{CJB} through the switch. This is sensed by the \underline{CJB} which issues a message to the instrument cluster which displays a low fluid level warning.

HEADLAMP POWERWASHERS

The headlamp powerwash is activated when the driver requests windshield washer operation. The <u>CJB</u> receives the driver request via a <u>CAN</u> bus message from the instrument cluster. The <u>CJB</u> then checks for an exterior lights active signal and that a low washer fluid level signal is not present.

The <u>CJB</u> outputs a control voltage to a headlamp powerwash pump relay located in the <u>EJB</u>. The relay is energized by the <u>CJB</u> for a pre-determined period to allow the headlamp telescopic washers to operate.

The <u>CJB</u> monitors the driver washer requests and only operates the headlamp powerwash on every fourth request for windshield washer operation, provided that 10 minutes have elapsed since the last headlamp powerwash operation. The powerwash sequence is reset when the headlamps or the ignition is switched off.

 $\Delta_{NOTE:}$ If a low fluid reservoir level is present the <u>CJB prohibits headlamp powerwash</u>.

RAIN/LIGHT SENSOR

On receiving a request for automatic windshield wiper operation, the <u>CJB</u> interprets <u>LIN</u> bus messages received from the rain sensor. The rain sensor provides <u>LIN</u> bus messages with values ranging from 0 to 7.

A signal value of 0 is interpreted by the <u>CJB</u> as the windshield is dry. A signal value from 1 to 5 is interpreted by the <u>CJB</u> as a small amount of water hitting the windshield. In this instance, the <u>CJB</u> initiates a slow wipe. A signal value of 7 is interpreted by the <u>CJB</u> as a large amount of water hitting the windshield. In this instance, the <u>CJB</u> initiates a fast wipe.

NOTES:

The CJB will only change a fast wipe routine to a slow wipe routine if the rain sensor value is lower than 7.

A = Clean and dry windshield; B = Wet and dirty windshield



E43326

Item	Description			
1	Windshield outer surface			
2	Optical element			
3	Transmitter diodes (100% light transmitted)			
4	Rain sensor			

5	Receiver diodes (100% light received)			
6	Vater droplets/film			
7	Receiver diodes (less than 100% light received)			
8	Lost light			

Component Description

WINDSHIELD WIPER MOTOR AND LINKAGE

NOTE: LHD (left-hand drive) wiper linkage shown



E96944

Item	Description			
1	Quick release wiper blade attachment			
2	H wiper arm			
3	Wiper blade (2 off)			
4	LH (left-hand) wiper arm			
5	Wiper arm cap (2 off)			
6	Nut (2 off)			
7	Niper linkage location hole (hidden)			
8	Pivot housing (2 off)			
9	Screw and washer (2 off)			
10	Wiper motor			

The wiper linkage and motor assembly differs between LHD and RHD (right-hand drive) models. The wiper linkage and motor assembly is not available as separate service components. If the wiper linkage and motor assembly is replaced, it is important that alignment is made to marks on the windshield and the fixings are tightened in the correct order.

The wiper linkage and motor assembly is attached to the vehicle body with screws and washers at each end. The screws are located in rubber bushes in the linkage assembly which isolate the linkage from the vehicle body. A rubber grommet is located behind the motor and engages on a spigot on the vehicle body to locate the linkage.

The linkage assembly comprises a main tube with a pivot housing located at each end. The motor assembly is attached to the tube by a clamp plate and 4 screws. The motor output shaft is fitted with a crank. A link rod is connected to the motor crank

and is connected at the opposite end to the <u>LH</u> pivot housing via a crank. The <u>LH</u> pivot housing crank is fitted with a second link rod which is connected directly to the crank on the <u>RH</u> pivot housing.

The motor crank converts rotary motion from the motor output shaft into linear movement of the link rods. The cranks connected to each pivot housing, convert the linear motion of the link rods back to rotary motion of the pivot housings. This rotary motion is passed to the wiper arms and blades causing the blades to wipe an arc across the windshield.

Each wiper arm is located on a taper spline on the respective pivot housing. A nut is screwed on the end of the pivot housing shaft and positively secures the wiper arm on the taper spline.

The wiper blades are attached to the wiper arms with a quick release fittings. The blades are of the flat blade type. These blades have an integral spring along their full length which curves the blade to match the windshield and provides even blade to windshield contact pressure along the entire length of the blade.

WASHER RESERVOIR





E96945

Item	Description
1	Scrivet
2	Windshield washer feed pipe to washer jets
3	Reservoir cap
4	Reservoir filler neck
5	Captive nut (2 off)
6	Headlamp powerwash feed pipe to telescopic washer jets
7	Screw and washer (2 off)
8	Grommet
9	Washer fluid level sensor
10	Windshield washer pump
11	Headlamp washer pump
12	Location spigot

The washer reservoir is located in the <u>RH</u> wheel arch. The reservoir is a plastic moulding and is secured in the wheel arch with 2 screws and washers and a scrivet. A level sensor is located in the reservoir and is connected to the <u>CJB</u>. The reservoir is fitted with a washer pump which supplies pressurized washer fluid to the windshield washer jets mounted on the wiper arms.

A vehicle fitted with optional headlamp washers is fitted with a larger reservoir and an additional pump for the headlamp washers. The larger reservoir is identifiable by a letter 'B' moulded on the casing and has a capacity of 5.5 liters. Reservoirs moulded with the letter 'A' are for use on vehicles with windshield washers only and have a capacity of 4.4 liters.

A filler cap is located at the top of the reservoir and is accessible from the engine compartment.

The pumps are located in rubber sealing grommets in holes in the reservoir and secured with clips. The pump fluid hoses have quick release connectors which mate with the pumps. The fluid level sensor is a push fit into a sealing grommet in one side of the reservoir body.

HEADLAMP POWERWASHERS (if fitted)



E96949

Item	Description			
1	owerwash trim cap			
2	asher jets			
3	elf-tapping screws (2 off)			
4	Pressure feed from powerwash pump			
5	Telescopic arm			

On vehicles with headlamp powerwash, each headlamp assembly is fitted with a headlamp powerwasher. The powerwasher is located on the underside of the headlamp assembly. The powerwasher is located in a clip at the front of the headlamp and secured with 2 self tapping screws to the headlamp body.

The powerwasher is a telescopic unit which extends forwards from the headlamp assembly under washer fluid pressure supplied by the headlamp powerwash pump. When the pump pressure decreases the powerwasher is automatically retracted back into the housing. The outer end of the powerwasher is fitted with a trim which blends the powerwasher into the headlamp when it is not operating. The powerwasher has two washer jets which direct washer fluid under high pressure onto the headlamp lens when the powerwasher is extended.

RAIN/LIGHT SENSOR



E84141

The rain/light sensor is located at the upper edge of the windshield, behind the interior rear view mirror. Contact between the rain sensor and windscreen is provided via a silicon pad which is compressed during the assembly process by two locking retaining clips either side of the sensor.

The rain/light sensor unit attaches to the windshield via two clips, which latch onto formed tags on the windshield bracket.

The sensor provides information to the <u>CJB</u> for the optimum wiper operation for the prevailing conditions to maintain the shield in a clear condition at all times. The rain/light sensor is an optical unit, which operates on an infrared waveband. The sensor uses the principle of the laws of reflection on interfacing surfaces between materials with differing refraction properties.

The rain/light sensor is connected to the <u>CJB</u> via a <u>LIN</u> bus. The sensor also receives a hardwired power and ground from the <u>CJB</u>. The 'auto' wipers are activated when the column stalk is moved to position 1 (first position from off in the upward direction). The sensitivity of the sensor can be adjusted by rotating the sensitivity collar on the wiper column stalk in the clockwise or counterclockwise direction. Clockwise rotation will decrease sensitivity, while counterclockwise adjustment will increase sensitivity. An increase in sensitivity adjustment results in a single wipe of the front wiper motor.

NOTE: The rain sensor also contains a light sensor. The light sensor is used to control operation of the automatic headlamps function. Refer to: Exterior Lighting (417-01 Exterior Lighting, Description and Operation).

WIPER CONTROL SWITCH

The wiper control switch is located on the <u>RH</u> steering column multifunction switch. The switch allows selection of the following functions:

- Slow wipe
- Fast wipe
- Auto
- Flick wipe
- Windshield wash and headlamp powerwash (if fitted).

All wiper functions are connected to the instrument cluster by a resistor or series of resistors within the switch. The instrument cluster uses the returned current to determine the selected function.

WIPER SERVICE POSITION

The wiper service position allows the wipers to be parked in a position to allow easy access to the wiper blades for replacement. The service position is initiated by pulling the <u>RH</u> steering column multifunction switch towards the steering wheel and pressing the start/stop button to switch on the ignition. The wipers will move and stop in a vertical position on the windshield. The <u>RH</u> steering column multifunction switch can be released and the ignition switched off. The service position is terminated at the next ignition on cycle and the wipers return to their normal park position.

Wipers and Washers - Wipers and Washers

Diagnosis and Testing

Principle of Operation

For a detailed description of the wipers and washers, refer to the relevant Description and Operation sections in the workshop manual. REFER to: (501-16 Wipers and Washers)

Wipers and Washers (Description and Operation), Wipers and Washers (Description and Operation), Wipers and Washers (Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

- 1. Verify the customer concern.
- 2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Mechanical	Electrical
 Wiper blade(s) Wiper pivot arm shaft Washer reservoir Hose(s) Washer jet(s) 	 Fuse(s) Wiring harness Electrical connector(s) Washer pump(s) Wiper motor

- 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4. If the cause is not visually evident, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC Index

CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTES:

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If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

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

Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Cause	Action
	Wiper On/Off Relay	Wiper On/Off relay control	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical

DTC	Description	Possible Cause	Action
		circuit - short to power	circuit diagrams and check wiper On/Off relay control circuit for short to power
B109514	Wiper On/Off Relay	 Wiper On/Off relay control circuit - short to ground, open circuit 	Refer to the electrical circuit diagrams and check wiper On/Off relay control circuit for short to ground, open circuit
	Wiper High/Low Relay	 Wiper Fast/Slow relay control circuit - short to power 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check wiper Fast/Slow relay control circuit for short to power
	Wiper High/Low Relay	 Wiper Fast/Slow relay control circuit - short to ground, open circuit 	Refer to the electrical circuit diagrams and check wiper Fast/Slow relay control circuit for short to ground, open circuit
B10AD09	Rain Sensor	Component failures	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Suspect the rain/light sensor, check and install a new sensor as required
B10AD11	Rain Sensor	Rain/light sensor power circuit - short to ground	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check rain/light sensor power circuit for short to ground
B10AD96	Rain Sensor	Component internal failure	Suspect the rain/light sensor, check and install a new sensor as required
B117712	Screenwash Level Switch	 Screenwash level switch signal circuit - short to power 	Refer to the electrical circuit diagrams and check screenwash level switch signal circuit for short to power
	Front Wiper Park Position Switch	 Windshield wiper motor park switch signal circuit - open circuit 	Refer to the electrical circuit diagrams and check windshield wiper motor park switch signal circuit for open circuit
B1C4523	Front Wiper Park Position Switch	Signal stuck low	Refer to the electrical circuit diagrams and check front wiper park position switch input circuit for short, open circuit
B1C7812	Powerwash Relay	Powerwash relay control circuit - short to power	Refer to the electrical circuit diagrams and check powerwash relay control circuit for short to power
B1C7814	Powerwash Relay	 Powerwash relay control circuit - short to ground, open circuit 	Refer to the electrical circuit diagrams and check powerwash relay control circuit for short to ground, open circuit
B1C7911	Front Washer Pump	Screenwash pump control circuit - short to ground	Refer to the electrical circuit diagrams and check screenwash pump control circuit for short to ground
B1C7913	Front Washer Pump	 Screenwash pump control circuit - open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check screenwash pump control circuit for open circuit

Wipers and Washers - Headlamp Washer Jet Removal and Installation

Removal

1. Refer to: <u>Headlamp Assembly (</u>417-01 Exterior Lighting, Removal and Installation).

2.



E99977



Installation

1. To install, reverse the removal procedure.

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

3. ONTE: Left-hand shown, right-hand similar.

Wipers and Washers - Headlamp Washer Pump Removal and Installation

1.

Removal



2. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).



3. CAUTION: Be prepared to collect escaping fluids.







5. CAUTION: Be prepared to collect escaping fluids.

6.



7. CAUTION: Take extra care not to damage the seal.

E100151

Installation

 CAUTION: The seals are to be reused unless damaged. To install, reverse the removal procedure.

Wipers and Washers - Rain Sensor Removal and Installation

Removal

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

1. Refer to: Interior Rear View Mirror (501-09 Rear View Mirrors, Removal and Installation).



E99897



E99898

Installation



1. CAUTIONS:

2.

3.

Make sure that the component is secured in the retainer.

Make sure that the clips are correctly located.

To install, reverse the removal procedure.

Wipers and Washers - Windshield Washer Reservoir Removal and Installation

1.

Removal



2. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).



3. CAUTION: Be prepared to collect escaping fluids.






5. CAUTION: Be prepared to collect escaping fluids.

6.



Installation

 CAUTION: The seals are to be reused unless damaged. To install, reverse the removal procedure.

Wipers and Washers - Windshield Wiper Motor

Removal and Installation

Removal

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

- 1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: <u>Cowl Vent Screen</u> (501-02 Front End Body Panels, Removal and Installation).



3. CAUTION: Tighten the bolts in the sequence shown.

NOTE: LHD illustration shown, RHD is similar.



4. ANOTE: LHD illustration shown, RHD is similar.



5. ONOTE: LHD illustration shown, RHD is similar.



Installation

6. CAUTION: Make sure that the component is correctly located on the locating dowels.



1. To install, reverse the removal procedure.

Wipers and Washers - Windshield Wiper Pivot Arm

Removal and Installation

Removal



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



Installation

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



1. Install the wiper blade.

1.



2. CAUTION: Align the wiper blades onto the centre of the windshield circle mark.

NOTE: After the wiper pivot arm nuts have been tightened to the correct torque value, lift the wiper pivot arm from the windshield and return to the windshield. Make sure that wiper blades are not positioned below any point of the windshield circle mark.



• Torque: 22.1lm

3.

Wipers and Washers - Windshield Washer Pump Removal and Installation

Removal

1. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).







3. CAUTION: Be prepared to collect escaping fluids.



Installation

4. CAUTION: Take extra care not to damage the seal.



Roof Opening Panel -

Torque	Specifications
iuque	opecifications

Description	Nm	lb-ft	lb-in
Roof opening panel frame retaining bolts	9		80
Roof opening panel motor retaining bolts	4		35
Roof opening panel glass retaining screws	4	_	35

Roof Opening Panel - Roof Opening Panel - Component Location Description and Operation

Component Location



E94547

Item	Description
1	CJB (central junction box)
2	Roof opening panel, rocker switch
3	Rear window sunblind, switch
4	Roof opening panel, motor
5	Roof opening panel, control module
6	Roof opening panel
7	Rear window sunblind
8	Rear window sunblind, motor assembly
9	Drain tubes (4 off)
10	ABS (anti-lock brake system) module

Roof Opening Panel - Roof Opening Panel - Overview

Description and Operation

Overview

The roof opening panel is operated through a two-way rocker switch located in the roof console. A motor, attached to the front of the roof-opening-panel frame, drives the glass panel to the tilt, open or closed positions using a pair of steel cables.

Tilt

With the roof opening panel closed, a press and release on the front of the rocker switch, tilts the rear of the panel upwards. If the switch is pressed again before the full tilt position is reached, the panel stops at the chosen position.

Fully open

With the roof opening panel closed, a press and release on the rear of the rocker switch, moves the panel to the fully open position automatically. It can be stopped at any point by pressing the button again.

Close

- From the fully open position, press and release the front of the switch. The panel will return to the closed position automatically.
- From the tilted position, press and release the rear of the switch. The panel will return to the closed position automatically.

Anti-trap

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

Roof opening sunblind

A sunblind integrated into the roof-opening-panel frame, is operated manually and can be opened or closed when the roof opening panel is in either the tilted or closed position. When the roof opening panel opens (slides rearwards) the sunblind automatically slides rearwards and cannot be pulled forward until the roof opening panel is in a forward position.

Rear window sunblind

The rear window sunblind is operated through a switch in the roof console.

Roof Opening Panel - Roof Opening Panel - System Operation and **Component Description** Description and Operation



E100459

Item	Description
1	Battery
2	Megafuse (250 A)
3	Rear window sunblind, switch
4	Rear window sunblind, motor
5	ABS (anti-lock brake system) module
6	Roof opening panel, control module
7	Roof opening panel, rocker switch
8	CJB (central junction box)

A

System Operation

Roof opening panel

Operation of the roof opening panel is controlled by the roof opening panel control module, which is integral with the motor. The control module receives inputs from the CJB, which provides an 'open' or 'close' signal for remote handset operation, and an 'enable' signal when the vehicle enters power mode 6.

The control module also receives a vehicle speed signal from the ABS module. The vehicle speed signal is used by the control module to calibrate the anti-trap feature.

If the battery is disconnected, or the power supply is interrupted while the roof opening panel is in a partially open position, the motor and control module will need to be calibrated to restore full functionality. To recalibrate:

- 1. Switch ignition on.
- 2. Press the front of the switch, so the roof opening panel is the tilt position, and then release the switch.
- 3. Press the front of the switch and hold for thirty seconds.
- 4. After thirty seconds the roof opening panel will begin to move. Keep the front of the switch pressed until the roof opening panel has fully opened and then closed.
- 5. Once the open/close cycle has completed and the roof opening panel has stopped moving, release the switch.
- 6. The roof opening panel can now be operated as normal.

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

Rear window sunblind

The powered rear window sublind is operated through a switch in the roof console. Power to the sublind motor is provided by a pair of relays located in the CJB when the vehicle enters power mode 4. The sublind motor is located beneath the rear parcel shelf and is supplied as a sealed unit with the sublind mechanism.

If the battery is disconnected or a replacement sunblind is fitted, the motor will require re-calibrating. To re-calibrate the motor the sunblind should be powered through two-full cycles of movement.

Component Description

Roof opening panel, motor

The roof opening panel motor has a worm drive which drives a gear in the cast housing attached to the end of the motor. The gear has a small pinion gear attached to the outer part of its spindle. The pinion engages with two cables to form a rack and pinion drive. Rotation of the motor turns the pinion which in turn drives the cables in the required direction.

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

The motor contains a micro-switch and Hall effect sensor. Signals received from these components enable the control module to calculate the exact position of the roof opening panel. The Hall effect sensor is also responsible for the operation of the anti-trap function.

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

Roof opening panel, control module

The roof opening panel control module is integrated within the motor. The control module receives inputs from the CJB, which provides an 'open' or 'close' signal for remote handset operation, and an 'enable' signal when the vehicle enters power mode 6.

The control module also contains the algorithm for the anti-trap system and receives a vehicle speed signal from the ABS module. The vehicle speed signal is used by the control module to calibrate the anti-trap feature.

Roof Opening Panel - Roof Opening Panel

Diagnosis and Testing

Principle of Operation

For a detailed description of the roof opening panel, refer to the relevant Description and Operation sections in the workshop manual. REFER to: (501-17 Roof Opening Panel)

Roof Opening Panel (Description and Operation), Roof Opening Panel (Description and Operation), Roof Opening Panel (Description and Operation).

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

- 1. Verify the customer concern.
- 2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Mechanical	Electrical
 Roof opening panel Helixed drive cables Switch Control unit/motor 	 Fuses/relays (refer to electrical guide) Wiring harness Correct engagement of electrical connectors Loose or corroded connections

- 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4. If the cause is not visually evident, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC Index

CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTES:

If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give extra information read by the manufacturer-approved diagnostic system).

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places and with a current calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

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

If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Cause	Action
B10F211	Sunroof Control		Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check sunroof enable signal circuit for short to ground
B10F212	Sunroof Control	 Sunroof enable signal circuit - short to power 	Refer to the electrical circuit diagrams and check sunroof enable signal circuit for short to power

DTC	Description	Possible Cause	Action
B10F213	Sunroof Control	 Sunroof enable signal circuit - open circuit 	Refer to the electrical circuit diagrams and check sunroof enable signal circuit for open circuit
B113D12	Sunroof Global Open/Close Control	 Roof opening panel global open/close control circuit - short to power 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check roof opening panel global open/close control circuit for short to power
B113D14	Sunroof Global Open/Close Control	 Roof opening panel global open/close control circuit - short to ground, open circuit 	Refer to the electrical circuit diagrams and check roof opening panel global open/close control circuit for short to ground, open circuit

Roof Opening Panel - Roof Opening Panel Alignment

General Procedures



1. With the roof opening panel closed, check the alignment of the glass to the roof panel. The glass should be central in its aperture. Profile of sunroof to body should be flush or up to 1.0 mm (0.40") low all round.

2. Open the roof opening panel blind.



3. Release the cover.

• Repeat the above procedure for the other side.

4. Loosen the 4 roof opening panel Torx screws.



5. Align the roof opening panel.• TORQUE: 4 Nm

6. Install the cover.

- Repeat the above procedure for the other side.
- 7. Close the roof opening panel blind.

Roof Opening Panel - Motor Synchronization

General Procedures

. $\Delta_{\text{NOTE: If a new component is installed.}}$

Press and hold the front of the switch, hold down untill the roof opening panel has completed a full open/close cycle.

The roof opening panel is now synchronized.

2. \square NOTE: If the removed component is re-installed.

Press and hold the the front of the switch, the roof opening panel will move to the tilt postion. Release the switch then press and hold the front of the switch, then the roof opening panel will move slightly more after 20 seconds.

• The roof opening panel is now un-synchronized.

3. \triangle NOTE: If the removed component is re-installed.

Press and hold the front of the switch, hold down untill the roof opening panel has completed a full open/close cycle.

- This action must be done within 2-3 seconds of the last action.
- The roof opening panel is now synchronized.

Roof Opening Panel - Roof Opening Panel Front Drain Hose

Removal and Installation

Removal

1. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).





- 3. Refer to: <u>Cowl Side Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).
- 4. Refer to: <u>Headliner</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).







Installation

1. To install, reverse the removal procedure.

Roof Opening Panel - Roof Opening Panel Frame

Removal and Installation

Removal

 Δ_{NC}

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

- 1. Refer to: <u>Motor Synchronization (</u>501-17 Roof Opening Panel, General Procedures).
- 2. Refer to: <u>Headliner (501-05 Interior Trim and Ornamentation</u>, Removal and Installation).
- 3. Refer to: <u>Roof Opening Panel Glass</u> (501-17 Roof Opening Panel, Removal and Installation).

4.

5.









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

 \square NOTE: Note the fitted position of the spacers.

Torque: <u>8 Nm</u>

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

Torque: <u>4 Nm</u>

8.





Installation

1. CAUTION: Make sure that the component is correctly located on the locating dowels.

ANOTE: Replace the spacers to the fitted position.

To install, reverse the removal procedure.

Roof Opening Panel - Roof Opening Panel Glass Removal and Installation

Removal



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

1.

2.







E100591



- E59078
- 4. **ONOTE:** Right-hand shown, left-hand similar. **Torque:** <u>4 Nm</u>

Installation

1. To install, reverse the removal procedure.

Roof Opening Panel - Roof Opening Panel Motor

Removal and Installation

Removal

 $\Delta_{\rm NC}$

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

- 1. Refer to: <u>Overhead Console</u> (501-12 Instrument Panel and Console, Removal and Installation).
 - 2. *Torque:* <u>4 Nm</u>



Installation

1. To install, reverse the removal procedure.

Roof Opening Panel - Roof Opening Panel Rear Drain Hose

Removal and Installation

Removal

- 1. Refer to: <u>Loadspace Trim Panel RH (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).
- 2. Refer to: <u>Headliner (501-05 Interior Trim and Ornamentation</u>, Removal and Installation).







4. $\Delta_{\text{NOTE: RH illustration shown, LH is similar.}}$



5. Δ NOTE: RH illustration shown, LH is similar.



Installation

1. To install, reverse the removal procedure.

6. ONOTE: RH illustration shown, LH is similar.

Roof Opening Panel - Roof Opening Panel Weatherstrip

Removal and Installation

Removal

1. Refer to: <u>Roof Opening Panel Glass</u> (501-17 Roof Opening Panel, Removal and Installation).



2. ANOTE: Make sure that this component is installed to the noted removal position.

Installation

1. To install, reverse the removal procedure.

Bumpers -

Description			lb-in
Radiator splash shield outer retaining bolts	3	-	26
Radiator splash shield inner retaining bolts	7	-	62
Radiator splash shield inner retaining screws	2	-	18
Front bumper cover retaining bolts	2	-	18
Rear bumper cover retaining bolts	7	-	62
Rear bumper retaining bolts	25	18	-

Bumpers - Front Bumper

Removal and Installation

E102842

Removal

1. The front bumper is serviced as a separate bolt-on panel.

2. The front bumper is replaced in conjunction with:Front bumper cover



3. WARNING: The hood and its associated components form part of the pedestrian protection system, it is essential that any repair or replacement operations do not affect the safe working of the system.

For additional information relating to the pedestrian safety system please see the following: For additional information, refer to: <u>Pedestrian Protection System</u> (501-20C Pedestrian Protection System, Description and Operation).

- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the front bumper cover. For additional information, refer to: <u>Front Bumper Cover (501-19</u> Bumpers, Removal and Installation).
- 7. Release and position the front bumper wiring harness and the hood release cable to one side.



8. NOTE: Observe the different head sizes of the bolts. Remove the front bumper.

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

Remove the horns.

For additional information, refer to: Horn (413-06 Horn, Removal and Installation).

Installation

1. Offer up the panel. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



- 2. Install the front bumper. Tighten to 25Nm.

3. The installation of associated panels and components is the reversal of removal procedure.

Bumpers - Front Bumper Cover Removal and Installation

Removal



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



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

Raise and support the vehicle.



2. Torque: <u>3 Nm</u>



3. Torque: Retaining screws <u>2 Nm</u> Retaining bolts <u>7 Nm</u>





5. CNNOTE: This step requires the aid of another technician.

4. *Torque: <u>2 Nm</u>*





7. ONOTE: This step requires the aid of another technician.

6. \triangle NOTE: On both sides.

Installation

Bumpers - Front Bumper Cover Insert Removal and Installation

Removal

1. Refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).





E100064



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



E100065

Installation

1. To install, reverse the removal procedure.

Bumpers - Rear Bumper Cover Removal and Installation

Removal

NOTE: Removal steps may contain installation details.

1. Remove the rear lamp assemblies.

Refer to: <u>Rear Lamp Assembly</u> (417-01 Exterior Lighting, Removal and Installation).



2. Torque: <u>7 Nm</u>



3.




Installation

1. To install, reverse the removal procedure.

4.

5.

Bumpers - Rear Bumper Removal and Installation

Removal

l

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

1. Refer to: <u>Rear Bumper Cover</u> (501-19 Bumpers, Removal and Installation).



3.

2.



4. *Torque:* <u>25 Nm</u>



E93464

Installation

1. To install, reverse the removal procedure.

Safety Belt System -

Description	Nm	lb-ft	lb-in
Front safety belt retractor to seat track retaining bolt	40	30	-
Front safety belt retractor retaining bolt	40	30	-
Front safety belt D loop retaining bolt	40	30	-
ront safety belt buckle retaining bolt	40	30	-
ront safety belt shoulder height adjuster retaining bolts	25	18	-
Rear centre safety belt retractor retaining bolts	40	30	-
Rear safety belt long end retaining bolts	40	30	-
Rear safety belt D loop retaining bolt	40	30	-
Rear safety belt long end retaining bolt	40	30	-
Rear safety belt buckle retaining bolts	40	30	-

Safety Belt System - Safety Belt System - Component Location Description and Operation





E93457

Item	Description
1	Belt tension sensor - if fitted
2	RH (right-hand) front safety belt retractor
3	RH front safety belt
4	RH rear safety belt
5	RH rear safety belt retractor
6	Child seat tethers (3 off)
7	Center rear safety belt retractor
8	LH (left-hand) rear safety belt retractor

9	LH rear safety belt buckle
10	RH rear and center safety belt buckles
11	LH front safety belt
12	LH front safety belt retractor
13	LH front safety belt buckle and pre-tensioner
14	RH front safety belt buckle and pre-tensioner

Safety Belt System - Safety Belt System - Overview

Description and Operation

Authoring Template

OVERVIEW

A three point safety belt is fitted to all seating positions. Each safety belt retractor incorporates an emergency locking feature. The emergency locking retractor incorporates 2 mechanical inertia devices. One inertia device activates if the safety belt is subjected to a sharp pull. The second inertia device activates if the vehicle is subject to a sudden deceleration or is on a severe incline.

North American Specification (NAS) safety belt retractors also include an automatic locking feature. The Automatic Locking Retractor (ALR) is fitted to all passenger seating positions and allows the safety belt to be tensioned to aid the safe fitment of child or booster seats. For additional information, refer to the Owners Handbook.

NAS vehicles are also fitted with a belt tension sensor on the front passenger seat. The belt tension sensor is incorporated into the seat belt lower anchorage and is attached to the seat frame by an M10 Torx head bolt. The belt tension sensor forms part of the SRS (supplemental restraint system) occupancy detection and classification feature.

The center rear safety belt features a mini-buckle lower anchorage. The mini-buckle is disengaged by inserting a suitable tool into the small aperture on the front face of the housing.

To aid the fitment of child seats, 3 tethers are located on the rear parcel shelf. Each tether is attached to the parcel shelf with an M10 Torx head bolt.

A safety belt warning indicator is located in the instrument cluster to remind front seat passengers to fasten their safety belts. The warning indicator will illuminate if the safety belt of an occupied front seat is not fastened. Refer to: Instrument Cluster (413-01, Description and Operation).

Safety Belt System - Safety Belt System - System Operation and Component **Description** Description and Operation

System Operation

Refer to: <u>Safety Belt System</u> (501-20A Safety Belt System, Description and Operation).

Safety Belt System - Safety Belt System

Diagnosis and Testing

Principle of Operation

For a detailed description of the seatbelt system and operation, refer to the relevant description and operation section of the workshop manual REFER to: (501-20A Safety Belt System)

<u>Safety Belt System</u> (Description and Operation), <u>Safety Belt System</u> (Description and Operation), <u>Safety Belt System</u> (Description and Operation).

Safety Information

WARNINGS:

To avoid accidental deployment the back-up power supply must be depleted before beginning any work on the SRS system or its components. Failure to follow this instruction may result in personal injury

Do not use a multimeter to probe an SRS module. It is possible for the power from the multimeter battery to trigger the activation of the module. Failure to follow this instruction may result in personal injury

NOTE: Do not to use a cellular phone or to have a cellular phone in close proximity when working on the SRS system or components

Power supply depletion

Before beginning any work on the SRS system or related components:

- 1. Remove the ignition key
- 2. Disconnect the battery leads, ground first
- 3. Wait 2 minutes for the power circuit to discharge

There are comprehensive instructions on the correct procedures for SRS system repairs, refer to the relevant section of the workshop manual

Inspection and Verification

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle

NOTE: Check and rectify basic faults before beginning diagnostic routines including pinpoint tests

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

Mechanical	Electrical
 Check for the installation of non-standard accessories which may affect or obstruct the function of the seatbelt system Frayed or damaged webbing Missing or damaged button stop Pretensioner(s) Buckles/Stalks 	 Fuses Wiring harness fault Correct engagement of electrical connectors Loose or corroded connections Warning lamp bulb(s) Impact sensor(s) Buckle sensor(s) Pretensioner(s) Belt tension sensor(s) Restraints control module

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4. If the cause is not visually evident, carry out the test methods described below, alternatively check for diagnostic trouble codes and refer to the relevant diagnostic trouble code index

For a complete list of all diagnostic trouble codes that could be logged on this vehicle, please refer to section 100-00. REFER to: <u>Supplemental Restraint System (SRS) Health and Safety Precautions</u> (100-00 General Information, Description and Operation) /

Diagnostic Trouble Code (DTC) Index - DTC: Restraints Control Module (RCM) (100-00, Description and Operation).

Symptom Chart for Seatbelt Rows 1, 2

Possible Causes	Action
 Backlock effect in action (webbing retracted quickly and came to sudden stop) Seatbelt retractor not installed correctly Automatic locking retractor activated (clicking – during retraction only) 	 GO to Pinpoint Test <u>A.</u> GO to Pinpoint Test <u>F.</u> See the automatic locking retractor description below
 Seatbelt webbing trapped in seat Seatbelt retractor webbing guide loose Twist in webbing Interference in webbing routing D-loop not rotating correctly 	 GO to Pinpoint Test B. GO to Pinpoint Test C. GO to Pinpoint Test D. GO to Pinpoint Test E. GO to Pinpoint Test G.
Seatbelt retractor not installed correctly	• GO to Pinpoint Test <u>F.</u>
 Seatbelt retractor webbing guide loose Twist in seatbelt webbing Interference in webbing routing Seatbelt retractor not installed correctly D-loop not rotating correctly Foreign object/debris 	 GO to Pinpoint Test <u>C.</u> GO to Pinpoint Test <u>D.</u> GO to Pinpoint Test <u>E.</u> GO to Pinpoint Test <u>F.</u> GO to Pinpoint Test <u>G.</u> GO to Pinpoint Test <u>E.</u>
 Seatbelt retractor webbing guide loose Twist in seatbelt webbing D-loop not rotating correctly Interference in webbing routing Foreign object/debris 	 GO to Pinpoint Test <u>C.</u> GO to Pinpoint Test <u>D.</u> GO to Pinpoint Test <u>G.</u> GO to Pinpoint Test <u>E.</u> GO to Pinpoint Test <u>E.</u>
 Backlock effect-in action (webbing retracted quickly and came to sudden stop) Seatbelt retractor not installed correctly Seatbelt retractor webbing guide loose Twist in seatbelt webbing D-loop not rotating correctly Interference in webbing routing Foreign object/debris Automatic locking retractor activated (clicking – during retraction only) 	 GO to Pinpoint Test A. GO to Pinpoint Test F. GO to Pinpoint Test C. GO to Pinpoint Test D. GO to Pinpoint Test G. GO to Pinpoint Test E. GO to Pinpoint Test E. See the automatic locking retractor description below
 Automatic locking retractor activated (clicking- during retraction only) Interference in webbing routing (rubbing) 	 GO to Pinpoint Test <u>B.</u> GO to Pinpoint Test <u>E.</u>
Foreign object/debris	CAUTION: Do not insert any objects or tools into the buckle head
	 Backlock effect in action (webbing retracted quickly and came to sudden stop) Seatbelt retractor not installed correctly Automatic locking retractor activated (clicking - during retraction only) Seatbelt webbing trapped in seat Seatbelt retractor webbing guide loose Twist in webbing Interference in webbing routing D-loop not rotating correctly Seatbelt retractor webbing guide loose Twist in seatbelt webbing Interference in webbing routing Seatbelt retractor not installed correctly Seatbelt retractor webbing guide loose Twist in seatbelt webbing Interference in webbing routing Seatbelt retractor not installed correctly D-loop not rotating correctly D-loop not rotating correctly Foreign object/debris Seatbelt retractor webbing guide loose Twist in seatbelt webbing D-loop not rotating correctly Foreign object/debris Seatbelt retractor webbing guide loose Twist in seatbelt webbing D-loop not rotating correctly Interference in webbing routing Foreign object/debris Backlock effect-in action (webbing retracted quickly and came to sudden stop) Seatbelt retractor webbing guide loose Twist in seatbelt webbing D-loop not rotating correctly Interference in webbing routing Foreign object/debris Backlock effect-in action (webbing retracted quickly and came to sudden stop) Seatbelt retractor webbing routing Foreign object/debris Automatic locking retractor activated (clicking - during retraction only) Automatic locking retractor activated (clicking - during retraction only) Interference in webbing routing (rubbing) Interference in webbing routing Foreign object/debris

Inertia Reel Seatbelts

The vehicle is equipped with (two row one) and (three row two) inertia reel seatbelts

These seatbelts are "dual sensitive" which means that they have:

Car sense system - A vehicle motion sensor, which locks the seatbelt webbing under braking, cornering, on steep hills and in adverse camber conditions, when parked on a steep incline or driveway or two wheels on a high curb
 Web sense system - A webbing motion sensor, which locks when the seatbelt webbing is extracted suddenly

The seatbelts in the following positions are equipped with an automatic locking retractor function:

Carline	Market	Seat position	Automatic Locking Retractor Installed	From Model Year
XK (X150)	All	Driver	No	2007
XK (X150)	ROW	Passenger	No	2007
K (X150)	US	Passenger	Yes	2007
KK (X150)	ROW	Row 2	Yes	2007
(K (X150)	US	Row 2	Yes	2007
(F (X250)	All	Driver	No	2009
(F (X250)	ROW	Passenger	No	2009
(F (X250)	US	Passenger	Yes	2009
(F (X250)	ROW	Row 2	No	2009
(F (X250)	US	Row 2	Yes	2009
(J (X351)	All	Driver	No	2010
(J (X351)	ROW	Passenger	No	2010
(J (X351)	US	Passenger	Yes	2010
(J (X351)	ROW	Row 2	No	2010
(J (X351)	US	Row 2	Yes	2010

The automatic locking retractor function is a feature to secure a child seat or heavy load to the seat

Activation	Deactivation
NOTE: When automatic locking retractor is activated, no further webbing can be drawn from the seatbelt retractor, prior to disengagement of the automatic locking. This can be mistaken as a jammed seatbelt retractor Activated by total extraction of the webbing	Automatic locking retractor is deactivated by allowing the webbing to retract until the clicking stops (close to park position)
When activated the automatic locking retractor is identified by a clicking noise during webbing retraction	When deactivated the automatic locking retractor seatbelt changes state, from a static seatbelt to an automatic seatbelt

Seatbelt Locking Test

With the vehicle stationary and on level ground take firm hold of the seatbelt webbing (on the tongue side of the upper seatbelt anchor) and withdraw sharply, **the retractor should lock**. Preventing further webbing release **(repeat this test 3 times)**. Any seatbelt retractor which fails to lock **must not be used** and a **new seatbelt must be installed**.

DTC Index

For a list of diagnostic trouble codes that could be logged on this vehicle, please refer to Section 100-00 or for removal and installation/description and operation see Section 501-20.

Diagnostic Guide Inertia Reel Seatbelts

PINPOINT TEST A : BACKLOCK

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS		
A1: BACKLOCK			
	1 Visually inspect the condition of the suspect seatbelt		
	2 Draw a maximum of 20mm of the webbing from the seatbelt retractor with moderate force. Then release the webbing		
	3 Check for correct operation twice		
	Does the webbing move freely then retract correctly?		
	Yes No further action required No For first row seatbelt GO to Pinpoint Test C. For second and third row seatbelts GO to Pinpoint Test B.		

PINPOINT TEST B : WEBBING-TRAPPED IN SEAT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: WEBBING-TR	RAPPED IN SEAT
	1 Visually inspect the condition of the suspect seatbelt
	2 Lift the seat base or release the seat backrest as required
	3 Free the trapped webbing, allow the webbing to retract Note: If the automatic locking retractor is activated, allow the webbing to retract until the clicking stops
	4 Check for correct operation twice
	Does the webbing move freely then retract correctly? Yes No further action required No GO to Pinpoint Test C.

PINPOINT TEST C : SEATBELT RETRACTOR-WEBBING GUIDE LOOSE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: SEATBELT RI	ETRACTOR-WEBBING GUIDE LOOSE
	1 Refer to 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point) and seatbelt retractor
	2 Check the webbing is not trapped or twisted and is centrally located on the seatbelt retractor spindle
	3 Attempt to withdraw the webbing from the seatbelt retractor NOTE: If the seatbelt webbing is jammed, the automatic locking retractor could be engaged
	4 To release the automatic locking retractor, manually wind the webbing onto the spindle until the automatic locking retractor deactivates (clicking stops)
	5 Fully extract webbing
	6 Confirm webbing guide location is correct, Confirm the fixing lugs are correctly located in the retractor frame
	7 Allow webbing to retract
	8 Check for correct operation twice
	Does the webbing move freely then retract correctly?
	Yes
	Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required No GO to Pinpoint Test D.

PINPOINT TEST D : TWIST IN WEBBING TEST DETAILS/RESULTS/ACTIONS CONDITIONS D1: TWIST IN WEBBING Refer to section 501-20 removal and installation section of the workshop manual, remove any trim 1 panels required to expose the D loop (anchor point) 2 Twist the webbing back the correct way in the loop 3 Pass the twist through the pillar loop or escutcheon as required 4 Check for correct operation twice Does the webbing move freely then retract correctly? Yes Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required No GO to Pinpoint Test E

PINPOINT TEST E : INTERFERENCE-WEBBING ROUTING DETAILS/RESULTS/ACTIONS TEST CONDITIONS E1: INTERFERENCE-WEBBING ROUTING Refer to the 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point) 1 2 Remove obstructions and foreign objects ensure the webbing does not catch or rub 3 Confirm the seatbelt does not contact the wiring harness 4 Check for correct operation twice Does the webbing move freely then retract correctly? Yes Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required No GO to Pinpoint Test F.

PINPOINT TEST F : SEATBELT RETRACTOR-INCORRECT INSTALLATION

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
1: SEATBELT RE	TRACTOR-INCORRECT INSTALLATION
	1 Refer to the 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point) and the seatbelt retractor
	2 Refer to the 501-20 removal and installation section of the workshop manual, correctly reinstall the seatbelt retractor ensure that the locating "T bar" and "anti rotation pins" are correctly located
	3 Check for correct operation twice
	Does the webbing move freely then retract correctly? Yes
	Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required No
	GO to Pinpoint Test <u>G.</u>

PINPOINT TEST G : D-LOOP NOT ROTATING CORRECTLY

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G1: D-LOOP NO	T ROTATING CORRECTLY
	1 Refer to the 501-20 removal and installation section of the workshop manual, remove any trim panels required to expose the D loop (anchor point) and the seatbelt retractor
	2 Ensure there are no obstructions and the webbing does not catch or rub, the D loop (anchor point) rotates correctly and if installed the confirm the height adjuster operates correctly
	3 Check for correct operation twice
	Does the webbing move freely then retract correctly? Yes
	Refer to the 501-20 removal and installation section of the workshop manual, reinstall any trim panels, ensure there are no obstructions and the webbing does not catch or rub. No further action required No
	Replace as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component

PINPOINT TEST H : SEATBELT BUCKLE – NOT LATCHING/JAMMED

TEST CONDITIONS				
H1: SEATBELT BU	CKLE – NOT LATCHING/JAMMED			
CAUTION: Do	not insert any objects or tools into the buckle head			
	1 Visually inspect the buckle head for evidence of damage. If damaged replace as required			
	2 Depress the buckle release (red button) and (Using a torch) carry out visual inspection for any evidence of debris/material or foreign objects in the buckle head			
	3 If required remove the pretensioner from the vehicle. Remove the seat. Remove the pretensioner from the seat frame			
	4 Do not insert any objects or tools buckle head With the buckle removed invert and attempt to shake out any debris			
	5 Attempt to latch the tongue in the buckle			
	Does the seat belt buckle operate correctly Yes			
	Reinstall any components, no further action required			
	No Replace the pretensioner, REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Restraints Control Module (RCM) (100-00 General Information, Description and Operation), <u>Rear Safety Belt Buckle (</u> 501-20A Safety Belt System, Removal and Installation).			

Safety Belt System - Front Safety Belt Buckle Removal and Installation

Removal

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

- 1. Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).
- 2. Refer to: Front Seat (501-10 Seating, Removal and Installation).

CAUTION: Discard the bolt.



3.

Torque: 35 Nm

Installation



Safety Belt System - Front Safety Belt Retractor Removal and Installation

Removal



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

1.



- E98938
- 2. NOTE: Right-hand shown, left-hand similar. Torque: 40 Nm

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

3. Refer to: <u>B-Pillar Upper Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).





5. *Torque:* <u>40 Nm</u>

4.

E99277



6. *Torque: <u>40 Nm</u>*

Installation

CAUTION: Fixings must be started by hand to avoid damaging threads.

To install, reverse the removal procedure.

Safety Belt System - Rear Center Safety Belt Retractor Removal and Installation

Removal

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

1. Refer to: Parcel Shelf (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. Torque: <u>40 Nm</u>

Installation

1. To install, reverse the removal procedure.

Safety Belt System - Rear Safety Belt Buckle Removal and Installation

Removal



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

1.



E98891

Installation

1. To install, reverse the removal procedure.

2. Torque: <u>40 Nm</u>

Safety Belt System - Rear Safety Belt Retractor Removal and Installation

Removal

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

1. Refer to: <u>C-Pillar Lower Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. Torque: <u>40 Nm</u>

E98926

Installation

1. To install, reverse the removal procedure.

З.

Safety Belt System - Safety Belt Shoulder Height Adjuster Removal and Installation

Removal



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

1. Refer to: <u>B-Pillar Upper Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. Torque: 40 Nm

3. Torque: <u>25 Nm</u>



E99733

Installation

1. To install, reverse the removal procedure.

Supplemental Restraint System -

Description	Nm	Lb/Ft	Lb/In
Passenger air bag module retaining nuts	6	-	55
Passenger air bag earth lead retaining bolt	9	-	80
Restraints control module (RCM) retaining nuts	10	-	89
Side air curtain module inflator retaining bolts	9	-	80
Side air curtain module tether straps retaining bolts	9	-	80
Side air bag module retaining nuts	7	-	62
Side impact sensor retaining bolt	10	-	89
Front crash sensor retaining bolt	10	-	89
Clock spring retaining screws	5	-	44

Supplemental Restraint System - Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) - Component Location Description and Operation

COMPONENT LOCATION SHEET 1 OF 2



Item	Description
1	LH (left-hand) curtain airbag
2	Front passenger airbag
3	RH (right-hand) curtain airbag
4	Passenger thorax airbag
5	Front passenger seat safety belt pretensioner
6	RCM (restraints control module)
7	Driver's seat safety belt pretensioner
8	Driver's thorax airbag
9	Driver's airbag

COMPONENT LOCATION SHEET 2 OF 2



E137153

Item	Description
1	Occupant classification system pressure pad (NAS only)
2	Safety belt tension sensor (NAS only)
3	Occupant detection system pad (all, except NAS)
4	Occupant classification system control module (NAS only)
5	RH side impact sensor (pressure sensor)
6	RH rear impact sensor
7	LH rear impact sensor
8	Passenger airbag deactivation LED (light emitting diode)
9	Driver's seat position sensor
10	LH side impact sensor (pressure sensor)
11	Instrument cluster
12	LH front impact sensor
13	RH front impact sensor

Supplemental Restraint System - Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) - Overview

Description and Operation

OVERVIEW

WARNING: All pyrotechnic devices are dangerous. Before performing any procedures on any pyrotechnic device, read all information contained within the Standard Workshop Practices section of this manual.

Refer to: Standard Workshop Practices (100-00 General Information, Description and Operation).

The SRS (supplemental restraint system) provides additional protection for the vehicle occupants in certain impact conditions. The system is controlled by the RCM (restraints control module), which is mounted beneath the floor console. The system includes twin stage drivers and front passenger airbags.

The <u>RCM</u> receives inputs from various sensors around the vehicle and determines which, if any, airbags should be deployed.

The <u>SRS</u> features an occupant detection system. The occupant detection system comprises a mat fitted inside the front passenger seat. By monitoring the condition of the mat, the <u>RCM</u> can determine if the front passenger seat is occupied. It uses this information to determine which airbags to deploy in the event of an impact. This information is also used to illuminate the safety belt instrument cluster warning lamp if the front passenger seat is occupied and the safety belt is not engaged.

North American Specification (NAS) vehicles also feature an occupant classification system. The occupant classification system comprises a control module, pressure pad and safety belt tension sensor. The system can determine the size and weight of the front seat passenger. This information is transmitted to the <u>RCM</u> over the high speed CAN (controller area network) bus. The <u>RCM</u> uses this information to help determine which airbags to deploy in the event of an impact.

Supplemental Restraint System - Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) - System Operation and Component Description

Description and Operation

Control Diagram

NOTE: **A** = Hardwired; **D** = High speed CAN (controller area network) bus



E142749

Item	Description
1	Battery
2	BJB (battery junction box)
3	RJB (rear junction box)
4	Occupant classification system control module (NAS only)
5	Safety belt tension sensor (NAS only)

6	Occupant classification system pressure pad (NAS only)
7	Passenger airbag deactivation LED (light emitting diode)
8	Instrument cluster
9	Occupant detection system pad (all, except NAS)
10	Driver's seat position sensor
11	Front passenger seat safety belt pretensioner
12	Driver's seat safety belt pretensioner
13	LH (left-hand) front impact sensor
14	RH (right-hand) front impact sensor
15	RH rear impact sensor
16	RH side impact sensor
17	LH rear impact sensor
18	LH side impact sensor
19	RCM (restraints control module)



Item	Description
1	Battery
2	BJB
3	RJB
4	Front passenger airbag
5	Clockspring
6	Driver's airbag
7	Front passenger seat safety belt switch
8	Driver's seat safety belt switch
9	LH curtain airbag
10	Driver's seat thorax airbag
11	Front passenger seat thorax airbag
12	RH curtain airbag
13	RCM

System Operation

System Operation

In a collision, the sudden deceleration or acceleration is measured by the impact sensors and the accelerometers in the restraints control module. The restraints control module evaluates the readings to determine the impact point on the vehicle and whether the deceleration/acceleration readings exceed the limits for firing any of the airbags, pretensioners, and battery disconnect unit. During a collision, the restraints control module only fires the airbags and pretensioners if the safing function confirms that the data from the impact sensor(s) indicates an impact limit has been exceeded.

The <u>RCM</u> incorporates the following impact thresholds to cater for different accident scenarios:

- Front impact, pretensioners
- Front impact, driver and passenger airbags stage 1, belt unfastened
- Front impact, driver and passenger airbags stage 1, belt fastened
- Front impact, driver and passenger airbags stage 2, belt unfastened
- Front impact, driver and passenger airbags stage 2, belt fastened
- Rear impact
- Driver side impact
- Passenger side impact.

The front impact thresholds increase in severity from pretensioners to driver and passenger airbag stage 2, belt fastened (refer to list above).

Firing Strategies

The safety belt pretensioners are fired when the pretensioner impact limit is exceeded. The <u>RCM</u> only fires the pretensioners if the related safety belt is fastened.

The driver and passenger airbags are only fired in a frontal impact. If an impact exceeds a stage 1 limit, but is less than the corresponding stage 2 limit, only one inflator in each airbag is fired (stage 2 is still fired for disposal after a delay of 100ms). If an impact exceeds the stage 2 limit, the two inflators in each airbag are fired simultaneously.

The passenger airbag is disabled unless the front passenger seat is occupied by a large person (NAS only), or the passenger airbag deactivation switch is on (all except NAS & AUS).

The stage 2 inflator of the driver airbag is disabled if the driver seat is forward of the switching point of the seat position sensor.

If there is a fault with a safety belt buckle sensor, the <u>RCM</u> assumes the related safety belt is fastened for the pretensioner firing strategy and unfastened for the driver and passenger airbag firing strategies. If there is a fault with the occupant classification sensor, the <u>RCM</u> disables the passenger airbag. If there is a fault with the passenger airbag deactivation switch, the <u>RCM</u> disables the passenger airbag.

If a side impact limit is exceeded, the <u>RCM</u> fires the side airbag and the side head airbag on that side of the vehicle. If the side impact limit on the front passenger side of the vehicle is exceeded, the <u>RCM</u> also evaluates the input from the occupant classification sensor, and fires the side airbag only if the front passenger seat is occupied by a large person (NAS only).

If multiple impacts occur during a crash event, after responding to the primary impact the <u>RCM</u> will output the appropriate fire signals in response to any further impacts if unfired units are available.

Front and Rear Impact Firing Strategy (All Except NAS)

Safety Belt Status		Strategy		
Driver	Passenger	Applicable Pretensioner	Driver airbag	Passenger airbag
Fastened	-	Fired at pretensioner threshold	Fired at belt fastened threshold	-
Unfastened	-	Not fired	Fired at belt unfastened threshold	-
-	Fastened	Fired at pretensioner threshold	-	Fired at belt fastened threshold
-	Unfastened	Not fired	-	Fired at belt unfastened threshold

Front and Rear Impact Firing Strategy (NAS Only)

Safety Belt Status		Passenger Seat	Strategy			
Driver	Passenger		Applicable Pretensioner	Driver airbag	Passenger airbag	
Fastened	-	-	Fired at pretensioner threshold	Fired at belt fastened threshold	-	
Unfastened	-	-	Not fired	Fired at belt unfastened threshold	-	
-	Fastened	Occupied allow	Fired at pretensioner threshold	-	Fired at belt fastened threshold	
-	Fastened	Unoccupied inhibit/empty	Fired at pretensioner threshold	-	Not fired	
	Unfastened	Occupied allow	Not fired	-	Fired at belt unfastened threshold	
		Unoccupied inhibit/empty	Not fired	-	Not fired	

The battery disconnect unit is fired:

- At driver and passenger airbag belt fastened threshold in a frontal impact
- At the driver and passenger side impact threshold in a side impact
- At the rear impact threshold in a rear impact.

Crash Signal

When the <u>RCM</u> outputs any of the fire signals it also outputs a crash signal to the <u>RJB</u> and the <u>ECM</u> (engine control module) on the high speed <u>CAN</u>. The crash signal is also hardwired to the <u>ECM</u> and the <u>RJB</u>. The instrument cluster picks up the crash signal from the high speed <u>CAN</u> and gateways it to the LCM (lighting control module). On receipt of the crash signal, the <u>RJB</u> goes into a crash mode and the <u>ECM</u> cuts the power supply to the fuel pump relay. In the crash mode, the <u>RJB</u>:

- Activates all of the unlock signals of the vehicle locking system, even if the vehicle is already unlocked.
- Ignores all locking/superlocking inputs until it receives an unlock input, when it returns the locking system to normal operation.
- Activates the interior lamps. The interior lamps remain on permanently until they are manually switched off at the lamp unit, or the <u>RJB</u> crash mode is switched off and they return to normal operation.
- Disables the rear window child lock input until the crash mode is switched off.
- Sends a crash message to the LCM, to activate the hazard flashers. The hazard flashers remain on until cancelled by the hazard warning switch or the crash mode is switched off.

The <u>RJB</u> crash mode is switched off by a valid locking and unlocking cycle of the locking system.

Component Description

Restraints Control Module



E142834

The <u>RCM</u> is installed on the top of the transmission tunnel, in line with the B pillars, and controls operation of the <u>SRS</u> (supplemental restraint system). The main functions of the <u>RCM</u> include:

- Crash detection and recording
- airbag and pre-tensioner firing
- Self-test and system monitoring, with status indication via the airbag warning lamp and non-volatile storage of fault information.

The <u>RCM</u> determines which elements of the <u>SRS</u> are to be deployed by using two internal areas:

- Crash severity evaluation
- Deployment handler.

Crash severity evaluation evaluates crash severity by using data from the <u>RCM</u> internal accelerometer, the front crash sensor and the safety belt buckle sensor. Based on this data, the <u>RCM</u> decides which level of airbag module deployment is required and forwards the information to the second area, the deployment handler.

The deployment handler evaluates the status of the seat track position sensor and safety belt buckle sensors before a decision is made about which restraints should finally be deployed.

Data from the side crash sensors is used by the <u>RCM</u> in conjunction with acceleration data from the <u>RCM</u> internal accelerometer to make a deployment decision. The <u>RCM</u> processes the acceleration data and subject to an impact being of high enough severity, decides whether the side airbag module should be deployed.

On board testing of the airbag modules, front safety belt pretensioner firing circuits, warning indicator circuits and module status (the crash and side impact sensors perform basic self-tests) is performed by the <u>RCM</u> together with the storing of fault codes.

The <u>RCM</u> drives the <u>SRS</u> indicator on the instrument pack via a <u>CAN</u> signal. If the warning lamp fails, a fault code is recorded and a warning tone is sounded in place of the lamp if a further fault occurs. It also provides a temporary back-up power supply to operate the airbag modules in the event that in crash conditions, the battery supply is lost. In the event of a crash, it records certain data which can be accessed via the diagnostic connector.

A safing sensor in the <u>RCM</u> provides confirmation of an impact to verify if airbag and pretensioner activation is necessary. A roll-over sensor monitors the lateral attitude of the vehicle. Various firing strategies are employed by the <u>RCM</u> to ensure that during an accident only the appropriate airbags and pretensioners are fired. The firing strategy used also depends on the inputs from the safety belt switches and the occupant monitoring system.

An energy reserve in the <u>RCM</u> ensures there is always a minimum of 150 milliseconds of stored energy available if the power supply from the ignition switch is disrupted during a crash. The stored energy is sufficient to produce firing signals for the driver airbag, the passenger airbag and the safety belt pretensioners.

When the ignition is switched on, the <u>RCM</u> performs a self-test and then performs cyclical monitoring of the system. If a fault is detected the <u>RCM</u> stores a related fault code and illuminates the airbag warning indicator. The faults can be retrieved by the recommended Jaguar diagnostic tool over the <u>CAN</u> bus. If a fault that could cause a false fire signal is detected, the <u>RCM</u> disables the respective firing circuit, and keeps it disabled during a crash event.

Clock Spring



E98177

The clockspring is installed on the steering column to provide the electrical interface between the fixed wiring harness of the steering column and the components that rotate with the steering wheel, i.e. the driver airbag, the horn and the steering wheel switch packs.

The clockspring consists of a plastic cassette which incorporates an outer cover fixed to the steering column and an inner rotor which turns with the steering wheel. Four securing lugs attach the cover to the multifunction switch on the steering column. The rotor is keyed to the steering wheel by a drive peg. A lug on the underside of the rotor operates the self-cancelling feature of the turn signal indicator switch. A ribbon lead, threaded on rollers in the rotor, links two connectors on the cover to two connectors on the rotor. Link leads for the driver airbag are installed in one of the connectors on the rotor.

To prevent damage to the ribbon lead, both the steering and the clockspring must be centralized when removing and installing the clockspring or the steering wheel. The clockspring is centralized when the drive peg is at six o'clock and 50 - 100% of a yellow wheel is visible in the viewing window.

Replacement clocksprings are fitted with a stopper, which locks the cover to the rotor, in the central position. The stopper must be broken off when the replacement clockspring is installed.

Drivers Airbag Module



E98175

The driver airbag module is controlled by the <u>RCM</u> which chooses between single or dual stage deployment, depending on the occupant position and the crash severity. To reduce the risk of an airbag module induced injury to a driver that is positioned close to the steering wheel, the airbag module deploys radially. It has a non-azide propellant that reduces particulates and effluents. It consists of a two stage inflator with separate chambers for the two inflation stages, each being independently activated by the <u>RCM</u>. It has two electrical connectors that are color coded and mechanically keyed to the respective connector on the inflator.

Passenger Airbag Module



E98176

The passenger airbag module is controlled by the <u>RCM</u> which chooses between single or dual stage deployment, depending on the occupant status and the crash severity. It consists of a two stage inflator with two airbag electrical connectors to accommodate the two stage inflation.

The heated gas inflator consists of a high-pressure mix of clean air and hydrogen gas, triggered by two separate ignition squibs. It produces a controlled generation of clean gas to rapidly fill the airbag. It is classified as a stored flammable gas (not as an explosive) and as such, has less restrictive storage and transportation requirements. It produces a very clean burn and almost no particulates and is almost free of any toxins, making disposal or recycling much easier.

Side Air Curtains



Side air curtains protect against head injuries in a side impact, while also helping to ensure unrestrained occupants are not ejected through open or broken windows during a rollover event.

A single inflator mounted behind the rear seat unfurls the curtain and fills five separate chambers to provide head protection cushions for occupants in side-impact and roll-over events. Steel ramps guarantee the curtain does not snag on the interior trim as it unfurls, while tethers at the front and rear of the curtain ensure the curtain is held taut.

The side air curtain deflation characteristics are deliberately slow to ensure it remains inflated throughout the duration of a vehicle rollover event.

Airbag - Side (Passenger/Driver) Module



E98181

A side airbag is attached to the outside of each front seat backrest frame, under the backrest cover.

The side airbags are handed, and each consist of a molded plastic case which contains the folded airbag and the inflator. A

cable connects the igniter of the inflator to a connector in the main seat harness connector block located under the front edge of the seat cushion.

When the airbag deploys it forces the front edge of the molded plastic case apart and splits open the backrest cover.

The side airbags use compressed argon as the inflation medium. The inflated volume of each side airbag is 12 liters (0.42 ft3).

Impact/Pressure Sensors

Impact Sensor



E98182

Pressure Sensor



E142839

Impact sensors are installed in the front and both sides of the vehicle. The use of multiple impact sensors provides shorter airbag trigger times, through faster detection of lateral and longitudinal acceleration, and improves detection accuracy.

There are two front impact sensors attached to the inner side of the upper front crossmember.

There are four side impact/pressure sensors located in the passenger compartment, as follows:

- One on each side mounted in the front door panels (pressure sensors)
- One on each side attached to the body by the rear wheel arch.

Each impact sensor incorporates an accelerometer and a microchip powered by a feed from the <u>RCM</u>. The power feed also provides the interface connection through which the side impact sensor communicates with the <u>RCM</u> using serial data messages. Acceleration is evaluated by the microchip and transmitted to the restraints control module, which then makes the decision on whether or not to activate the airbags and pretensioners.

When the ignition is switched on, the <u>RCM</u> supplies power to the impact sensors, which perform a self-test. After satisfactory self tests the impact sensors continually output 'digital acceleration' messages to the restraints control module. If a fault is detected the relevant impact sensor sends a fault message, instead of the digital acceleration message, to the restraints control module. The <u>RCM</u> then stores a related fault code and illuminates the airbag warning indicator. Faults can be retrieved by the Jaguar approved diagnostic system from the <u>RCM</u> via the high speed <u>CAN</u> bus connection.

Seat Position Sensor

The seat position sensor allows the <u>RCM</u> to detect when the driver seat is forward of a given point on the seat track. The seat position sensor consists of a Hall effect sensor attached to the driver seat frame. While the ignition is on, the <u>RCM</u> supplies the sensor with power, and monitors the return current. When the seat frame moves forwards, the sensor moves over the edge of the seat track, which changes the reluctance of the sensor. The change of current is detected by the <u>RCM</u> and used as a switching point. The switching point is when the center of the sensor is 3 ± 4 mm from the leading edge of the seat track.

When the driver seat is forward of the switching point, the <u>RCM</u> increases the time delay between firing the two stages of the inflator in the driver airbag. When the driver seat is rearward of the switching point, the <u>RCM</u> uses the normal time delay between firing the two stages.

Safety Belt Sensor

A safety belt switch is installed in the buckle of each front safety belt to provide the <u>RCM</u> with a status signal of the related safety belt(s). When the safety belt is unfastened the switch outputs a low current to the <u>RCM</u>. When the safety belt is fastened the switch outputs a high current to the <u>RCM</u>.

Pretensioners



E98174

Item	Description
1	Front seat safety belt switch
2	Front seat safety belt pretensioner
3	Electrical connector

The pretensioners are used to tighten the front safety belts during a collision to ensure the occupants are securely held in their seats. A pretensioner is integrated into each front safety belt buckle and attached to a bracket on the inboard side of the seat.

Each pretensioner has a tube containing propellant and a piston. The piston is attached to a steel cable, the opposite end of which is attached to the safety belt buckle. A squib in the base of the tube provides an ignition source when triggered by a fire signal from the <u>RCM</u>.

On receipt of a fire signal from the <u>RCM</u>, the squib ignites the propellant. The propellant produces nitrogen gas that rapidly expands to drive the piston along the tube, pulling the cable and drawing the buckle downwards.

Airbag Warning Indicator



The airbag warning indicator consists of a red LED behind a SRS graphic in the instrument cluster.

Operation of the airbag warning indicator is controlled by a high speed <u>CAN</u> bus message from the <u>RCM</u> to the instrument cluster. The <u>RCM</u> sends the signal to illuminate the airbag warning indicator if a fault is detected, and for approximately 6 seconds during the bulb check at the beginning of each ignition cycle.

Occupant Monitoring

There are two types of occupant monitoring:

- In all markets except NAS & Australia, vehicles have an occupant detection sensor
- In NAS markets, vehicles have an occupant classification system

For markets which have an occupant detection sensor, this has no interface with the restraints system and only provides the belt reminder function.

For markets that have an occupant classification system, this provides the <u>RCM</u> with the occupancy status of the front passenger seat. The restraints control module uses this and the seat buckle status in the evaluation of the firing strategy for the passenger front airbag, side airbag, and pretensioner.

Safety Belt Sensors

The buckle of each front safety belt incorporates a Hall effect sensor that provides a safety belt status signal to the <u>RCM</u>. The <u>RCM</u> broadcasts the status of the two front safety belts on the high speed <u>CAN</u> bus for use by the instrument cluster. In the event of a front impact the <u>RCM</u> will deploy the pretensioners provided the safety belt buckles are fastened. The safety belt buckle pretensioners have a lower deployment threshold than that required by the airbags. Hence it is possible during a minor collision, which exceeds the deployment threshold and will deploy only the safety belt buckle pretensioners.

Passenger Airbag Deactivation Indicator

Passenger Airbag Deactivation Warning Lamp



E98223

The passenger airbag deactivation indicator is installed on the center switch pack of the instrument panel. When appropriate, the indicator illuminates to advise front seat occupants that the passenger airbag is disabled. Operation of the indicator is controlled by the RCM. The RCM illuminates the indicator when:

- There is a fault with the passenger airbag firing circuit(s).
- The passenger airbag is deactivated with the passenger airbag deactivation switch (where fitted).
- Required by passenger seat occupant monitoring (see below).

Passenger Airbag Deactivation Switch (All Except NAS)

The passenger airbag deactivation switch provides a method of manually disabling the passenger airbag. The switch is installed in the front passenger end of the instrument panel and operated by the ignition key.

When the passenger airbag deactivation switch is operated, it changes a ground connection between two pins in the connectors of the <u>RCM</u>. When the passenger airbag deactivation switch is selected to OFF, the <u>RCM</u> disables the passenger airbag and, if the front passenger seat is occupied, illuminates the passenger airbag deactivation indicator.

Occupant Detection System

There are two types of occupant monitoring:

- In all markets except NAS & Australia, vehicles have an occupant detection sensor
- In NAS markets, vehicles have an occupant classification system

For markets which have an occupant detection sensor, this has no interface with the restraints system and only provides the belt reminder function.

For markets that have an occupant classification system, this provides the <u>RCM</u> with the occupancy status of the front passenger seat. The <u>RCM</u> uses this and the seat buckle status in the evaluation of the firing strategy for the passenger front airbag, side airbag, and pretensioner.

The occupant classification system can determine if the front passenger seat is unoccupied, occupied by a small person, or occupied by a large person. The occupant classification system consists of:

- A pressure pad, installed under the cushion of the front passenger seat, which is connected to a pressure sensor
- A safety belt tension sensor, integrated into the anchor point of the front passenger safety belt
- An occupant classification module, installed under the front passenger seat.

The pressure pad is a silicone filled bladder. Any load on the pressure pad is detected by the pressure sensor.

The safety belt tension sensor is a strain gauge that measures the load applied by the safety belt anchor to the anchor bolt. The sensor is located in the lower safety belt anchor point.
SAFETY BELT TENSION SENSOR (NAS only)



The occupant classification module supplies a reference voltage to the pressure sensor and the safety belt tension sensor and, from the returned signals, measures the loads acting on the pressure pad and the safety belt tension sensor. The load measurement from the safety belt tension sensor is used to produce a correction factor for the load measurement from the pressure pad. The tightness of the safety belt affects the load acting on the pressure pad, so without the correction factor the occupant classification module cannot derive an accurate occupancy status.

The occupant classification module translates the load readings into a seat occupancy status and transmits the result to the <u>RCM</u>, on a dedicated high speed <u>CAN</u> bus link. The occupant classification module incorporates two load limits for the seat cushion: When the load exceeds the lower limit, but is less than the upper limit, the occupant is classified as small; when the upper limit is exceeded, the occupant is classified as large.

Supplemental Restraint System - Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)

Diagnosis and Testing

Principle of Operation

For a detailed description of the supplemental restraints system and operation, refer to the relevant Description and Operation section in the workshop manual. REFER to: (501-20B Supplemental Restraint System)

<u>Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)</u> (Description and Operation), <u>Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)</u> (Description and Operation), <u>Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)</u> (Description and Operation).

Inspection and Verification

WARNING: TO AVOID ACCIDENTAL DEPLOYMENT AND POSSIBLE PERSONAL INJURY, THE BACKUP POWER SUPPLY MUST BE DEPLETED BEFORE REPAIRING OR REPLACING ANY AIR BAG SUPPLEMENTAL RESTRAINT SYSTEM (SRS) COMPONENTS. TO DEPLETE THE BACKUP POWER SUPPLY ENERGY, DISCONNECT THE BATTERY GROUND CABLE AND WAIT ONE MINUTE. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN PERSONAL INJURY.

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

NOTE: Given the legal implications of a restraints system failure, harness repairs to Air Bag module circuits are not acceptable. Where the text refers to "REPAIR the circuit", this will normally mean the replacement of a harness.

- 1. Verify the customer concern.
- 2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Electrical

- Battery condition, state of charge
- Make sure all electrical connector(s) are engaged correctly on the air bag circuits
- Wiring harness
- Air bag module(s)
- Make sure the restraints control module (RCM) is correctly installed
- Fuse(s)
- Sensor(s)
- Pretensioner(s)
- Warning lamp bulb(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, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: <u>Diagnostic Trouble Code (DTC) Index - DTC: Restraints Control Module (RCM)</u> (100-00 General Information, Description and Operation).

Supplemental Restraint System - Air Bag Disposal

General Procedures

Deployed Air Bag

1. A WARNING: Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. Failure to follow this instruction may result in personal injury.

Deployed air bag modules are to be disposed of as special waste and must comply with local environmental requirements, if in doubt, contact Authority for disposal requirements.

2. NOTE: The storage, transportation, disposal, and/or recycling of air bag module components must be carried out in accordance with all applicable federal, state and local regulations including, but not limited to, those governing building and fire codes, environmental protection, occupational health and safety, and transportation.

Modules removed and deployed by Jaguar service are to be returned to the importer for disposal.

Undeployed Air Bag — Inoperative

1. WARNING: Carry a live air bag module with the air bag and trim cover or deployment door pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow this instruction may result in personal injury.

NOTE: All inoperative air bag modules have been placed on the Mandatory Return List. All discolored or damaged air bag modules must be treated the same as any inoperative live air bag being returned. Failure to follow this instruction may result in personal injury.

Remove the inoperative driver air bag module or passenger air bag module. For additional information <u>Driver Air Bag Module</u> or <u>Passenger</u> <u>Air Bag Module</u> in this section.

Undeployed Air Bag — Scrapped Vehicle

1. WARNINGS:

Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module. Failure to follow this instruction may result in personal injury.

Carry a live air bag module with the air bag and trim cover or deployment door pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow this instruction may result in personal injury.

Remote deployment is to be carried out outdoors with all personnel at least 6.1 meters (20 feet) away to ensure personal safety. Due to the loud report which occurs when the air bag is deployed, hearing protection is required. Failure to follow this instruction may result in personal injury.

Remote Deployment



Equipment required: Universal deployment tool-Part N° 418-135 and 12V Battery.

- 2. The deployment procedure should be carried out outdoors away from other personnel.
- 3. Remove any loose debris from around air bag. Make sure that no flammable liquids are present.
- 4. Disconnect the battery ground and positive cables.
- 5. Disconnect the relevant air bag module electrical connector.
- 6. Connect the appropriate adaptor lead to the restraint device.
- 7. Connect the deployment lead to the adaptor lead. Pass wire of the deployment tool through window, close all doors, leave window with lead for deployment tool open.



8. WARNING: Before proceeding, make sure precautions have been taken to warn personnel of a possible loud noise upon activation. Do not allow anybody to approach closer to restraint device than six meters. Failure to follow this instruction may result in personal injury.

Move as far from restraint device as possible and connect the tool clips to a 12V vehicle battery.



9. WARNING: Do not handle the deployed device immediately after activation - it may be hot. Allow the unit to cool for at least 20 minutes. Cooling modules should be continuously monitored to make sure heat does not create a fire with spilled liquids or other debris. Failure to follow this instruction may result in personal injury.

Deploy the module by depressing both switches on the tool. If activation does not occur, disconnect battery from tool and seek advise from Jaguar Engineering and wait for further instructions.

- 10. Repeat procedure for all air bags in vehicle.
- 11. The vehicle is now to be scrapped in the normal manner with modules installed.

Disposal of live air bag modules for all air bags, using tyres

- Equipment required: Deployment tool 418-S135, Battery (12V), Safety goggles to BS2092 grade 2, Rubber gloves to PrEN 374 class 2, Ear protectors that have been measured to BS.EN 24869, Particulate respirator to EN 149 grade FFP2S
- 2. The deployment procedure should be carried out outdoors, away from other personnel.
- 3. Stack four scrap tyres, securing together with heavy gauge wire or cable.

while disconnected from any electrical power source, connect deployment harness and place air bag adaptor portion under tyre stack, ready for connection to air bag.



4. WARNING: Power must not be connected during this step. Failure to follow this instruction may result in personal injury.

CAUTION: Make sure the connector is not in contact with the inflator or it will be damaged during the test.

Connect air bag to air bag connector, make sure the locking sleeve is fully engaged. position the air bag with the cover facing upwards.

- 5. Make sure battery connections of deployment harness are ten meters away from the tyre stack
- 6. Remove any loose from around the air bag. Make sure that no flammable liquids are present.



7. WARNING: Before proceeding, make sure precautions have been taken to warn personnel of a possible loud noise upon activation. Do not allow anybody to approach closer to restraint device than six meters. Failure to follow this instruction may result in personal injury.

Move as far from restraint device as possible and connect the tool clips to a 12V vehicle battery.



8. WARNING: Do not handle the deployed device immediately after activation - it may be hot. Allow the unit to cool for at least 20 minutes. Cooling modules should be continuously monitored to make sure heat does not create a fire with spilled liquids or other debris. Failure to follow this instruction may result in personal injury.

Deploy the module by depressing both switches on the tool. If activation does not occur, disconnect battery from tool and seek advise from Jaguar Engineering and wait for further instructions.

- Allow the air bag to cool for at least 20 minutes. Cooling modules should be continuously monitored to make sure heat generated a fire with spilled liquids or other debris.
- 10. Remove the air bag from the tyre stack and seal in a plastic bag, ready for disposal.
- 11. In the event of any problems or queries arising from this procedure, contact Jaguar Engineering.

Supplemental Restraint System - B-Pillar Side Impact Sensor

Removal and Installation

Removal

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

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).



2. WARNING: To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any air bag supplementary restraints system (SRS) components. To deplete the backup power supply energy, disconnect the battery ground cable and wait for one minute. Failure to follow this instruction may result in personal injury.

Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

3. Refer to: <u>B-Pillar Lower Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



4. *Torque:* <u>12 Nm</u>

Installation

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Supplemental Restraint System - Clockspring

Removal and Installation

Special Tool(s)

	211-326 Locking Tool, Clockspring
A	
E43628	

Removal

WARNINGS:

Always wear safety glasses when repairing an air bag supplemental restraint system (SRS) vehicle and when handling an air bag module.

Carry a live air bag module with the air bag and trim cover pointed away from your body. This will reduce the risk of injury in the event of an accidental deployment. Failure to follow this instruction may result in personal injury.

Do not set a live air bag module down with the trim cover face down. Failure to follow this instruction may result in personal injury.

After deployment, the air bag surface can contain deposits of sodium hydroxide, a product of the gas generant combustion that is irritating to the skin. Wash your hands with soap and water afterwards. Failure to follow this instruction may result in personal injury.

Never probe the connectors on the air bag module. Doing so may result in air bag deployment, which may result in personal injury. Failure to follow this instruction may result in personal injury.



Air bag modules with discolored or damaged trim covers must be replaced, not repainted.



Vehicle sensor orientation is critical for correct system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. If damaged, replace the sensor whether or not the air bag is deployed.



To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any air bag supplemental restraint system (SRS) components. To deplete the backup power supply energy, disconnect the battery ground cable and wait one minute. Failure to follow this instruction may result in personal injury.

CAUTION: Make sure the wheels are in the straight-ahead position. Failure to follow this instruction may result in damage to the component.

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

1. Make the SRS system safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

2. CAUTIONS:



 $^{
m \Delta}$ Make sure that special tool 211-326 is installed to the clockspring.



Refer to: <u>Steering Wheel</u> (211-04 Steering Column, Removal and Installation).



3. CAUTION: Failing to install the special tool to the clockspring may result in damage to the vehicle.

Special Tool(s): 211-326





E 96483





6. CAUTION: Failing to install the special tool to the clockspring may result in damage to the vehicle.

Torque: <u>6 Nm</u>



7. CAUTION: Make sure no damage is occured to the electrical connectors. Failure to follow this instruction may result in damage to the vehicle.



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



9. Remove the special tool from the clockspring.

Special Tool(s): 211-326



Installation



1. CAUTIONS:

Make sure that special tool 211-326 is installed to the clockspring.

Make sure that the arrow on the cassette is centered and pointing vertically (make sure that the steering wheel has remained in the 12 o'clock position and that it has not been turned by +/- 360 degrees) prior to the steering wheel installation. On removal of the special tool, keep the clockspring cables taught to prevent the cassette moving from the set position. Failure to follow this instruction may result in damage to the component.



Make sure that the road wheels are in the straight ahead position, failure to follow this instruction may result in damage to the vehicle.

To install, reverse the removal procedure.

Supplemental Restraint System - C-Pillar Side Impact Sensor

Removal and Installation

Removal

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

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).



2. WARNING: To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any air bag supplementary restraints system (SRS) components. To deplete the backup power supply energy, disconnect the battery ground cable and wait for one minute. Failure to follow this instruction may result in personal injury.

Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

3. Refer to: Rear Seat Bolster (501-10 Seating, Removal and Installation).



4. *Torque:* <u>12 Nm</u>

Installation

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Supplemental Restraint System - Crash Sensor

Removal and Installation

Removal

 $\Delta_{\rm NC}$

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

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).



2. WARNING: To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any air bag supplementary restraints system (SRS) components. To deplete the backup power supply energy, disconnect the battery ground cable and wait for one minute. Failure to follow this instruction may result in personal injury.

Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).



Installation

3. Torque: <u>10 Nm</u>

- 1. Install is the reverse of removal.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Supplemental Restraint System - Driver Air Bag Module

Removal and Installation

Special Tool(s)

501-120 Remover, Driver Air Bag	

Removal

WARNING: Refer to: Supplemental Restraint System (SRS) Health and Safety Precautions (100-00, Description and Operation).

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

1. Refer to: Battery Disconnect and Connect (414-01, General Procedures).



2. NOTES:

Gentle pressure applied to the air bag towards the instrument panel aids release.

Driver air bag module installation can be confirmed by hearing 2 audible clicks, 1 for each clip.

Special Tool(s): 501-120





Installation

1. To install, reverse the removal procedure.

3.

Supplemental Restraint System - Occupant Classification Sensor

Removal and Installation

Removal

WARNINGS:



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



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





To minimize the possibility of 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.



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 discoloured or damaged air bag module trim covers or instrument panel. Install a new component. Failure to follow this instruction may result in personal injury.

CAUTIONS:

The front passenger seat occupant classification sensor is available only as a service kit. No attempt should be made to replace individual components. Failure to follow this instruction may result in personal injury.

Check for correct operation of the front seat after completion of the procedure to make sure that the wiring harness has not become trapped or stretched.

NOTES:



Note the routing of the seat harness.

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

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

- 2. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 3. Refer to: Front Seat Backrest Cover (501-10 Seating, Removal and Installation).



E117245



E117246



An audible click is heard when the clips are fully latched.











x2 E117250

8.





11.

10. NOTE: Note the position of the wiring harnesses to aid installation.



E117253





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

13. **ONOTE:** Note the position of the wiring harnesses to aid installation.



15.







E117258



E117261

19. WARNING: Do not probe supplemental restraint system (SRS) electrical connectors.



Installation



E117244





- CAUTION: The front passenger seat occupant classification sensor is available only as a service kit. No attempt should be made to replace individual components. Failure to follow this instruction may result in personal injury.







2. NOTES:

Make sure that new hog rings are installed.

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.

3.



E117248



5.

6.







E117253

8. ANOTE: Make sure that the harness is routed to the position noted on removal.



E117258





11. NOTE: Make sure that the harness is routed to the position noted on removal.

E117254

10. *Torque:* <u>4 Nm</u>



12. CAUTION: Make sure that the wiring harness is routed above the drive bar as shown, to avoid damage to the wiring harness during movement of the front seat.



13. NOTES:

An audible click is heard when the clips are fully latched.

Make sure the electrical connector is securely connected.



14. Torque: <u>1.3 Nm</u>

E117245



16.





17. Torque: <u>9 Nm</u>



WARNING: Do not probe supplemental restraint system (SRS) electrical connectors. 18.

19.



E117260



- - 21. Refer to: Front Seat Backrest Cover (501-10 Seating, Removal and Installation).
 - 22. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

Supplemental Restraint System - Passenger Air Bag Module

Removal and Installation

Special Tool(s)

	211-326
25	Locking Tool, Clockspring
1 AND AND	
Alexa	
A 83	
1. No. 1. N. 1.	
E43628	
<u> </u>	

Removal

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

- 1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Refer to: <u>Steering Wheel</u> (211-04 Steering Column, Removal and Installation).
- 3. Refer to: <u>Driver Side Register</u> (412-01 Climate Control, Removal and Installation).
- 4. Refer to: Information and Entertainment Display (415-01A Information and Entertainment System, Removal and Installation).
- 5. Refer to: Instrument Panel Speaker (415-01A Information and Entertainment System, Removal and Installation).
- 6. Refer to: <u>A-Pillar Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 7. Refer to: <u>Audio and Climate Control Assembly (</u>415-01A Information and Entertainment System, Removal and Installation).



E100689











E96005



12. CAUTION: Take extra care not to damage the instrument cluster face.

13. Special Tool(s): <u>211-326</u>





14.





16. *Torque: <u>6 Nm</u>*

17.




Torque: M8 <u>2.5 Nm</u> T27 <u>9 Nm</u>

20.









Torque: M8 <u>2.5 Nm</u> T27 <u>9 Nm</u>



E96830





25. *Torque:* <u>20 Nm</u>



26. Torque: <u>20 Nm</u>

27. *Torque: <u>20 Nm</u>*







28. *Torque:* <u>20 Nm</u>







Installation

1. To install, reverse the removal procedure.

32. *Torque:* <u>6 Nm</u>

Supplemental Restraint System - Restraints Control Module (RCM)

Removal and Installation

Removal

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

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).



2. WARNING: To avoid accidental deployment and possible personal injury, the backup power supply must be depleted before repairing or replacing any air bag supplementary restraints system (SRS) components. To deplete the backup power supply energy, disconnect the battery ground cable and wait for one minute. Failure to follow this instruction may result in personal injury.

Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).



 4.









6. *Torque:* <u>6 Nm</u>

7.

8. NOTES:

If the SRS component is to be replaced, the bar code of the new unit must be recorded.

The RCM will record and store impact data. The module must be replaced when three records are noted.

Torque: <u>10 Nm</u>

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Supplemental Restraint System - Side Air Bag Module

Removal and Installation

Removal

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

- 1. Make the air bag supplemental restraint system (SRS) safe. For additional information, refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
 - 4. Remove the front seat backrest lower rear cover.





5. Remove the front seat hinge cover.





7. Release the front seat backrest cover.



E139058



 WARNING: The SRS electrical connectors are unique. DO NOT force, or attempt to connect electrical connectors to the wrong sockets.

Disconnect the side air bag module electrical connector.





E139062

9. Release the retaining strap.

10. TORQUE: 7 Nm

11. Release the locking tab.



E139059



12. Remove the side air bag module.

E139060

Installation

- 1. To install, reverse the removal procedure.
- 2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Supplemental Restraint System - Side Air Curtain Module

Removal and Installation

Removal



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

All vehicles

1. Make the air bag supplemental restraint system (SRS) safe.

Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

- 2. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 3. Refer to: Interior Rear View Mirror (501-09 Rear View Mirrors, Removal and Installation).
- 4. Refer to: <u>Overhead Console</u> (501-12 Instrument Panel and Console, Removal and Installation).
- 5. Refer to: <u>Sun Visor</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 6. Refer to: <u>A-Pillar Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 7. Refer to: <u>B-Pillar Upper Trim Panel (</u>501-05 Interior Trim and Ornamentation, Removal and Installation).
- 8. Refer to: <u>C-Pillar Lower Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).



9. Torque: <u>2 Nm</u>



E99917





E100343

Vehicles with roof opening panel

13. NOTES:



Note the different lengths of screws.

Make sure that the component is installed to the position noted on removal.

Torque: <u>2 Nm</u>

Vehicles without roof opening panel

14. NOTES:



Note the different lengths of screws.

Make sure that the component is installed to the position noted on removal.

Torque: <u>2 Nm</u>

All vehicles









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

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



19. CAUTION: Note the fitted position of the component prior to removal.

NOTE: Make sure that the component is installed to the position noted on removal.

E99924



E114287



20. CAUTIONS:

Make sure that the clips are correctly located.

Note the fitted position of the component prior to removal.

NOTES:



Make sure that this component is installed to the noted removal position.

Federal vehicles only.

Torque: 9 Nm

21. WARNING: The SRS electrical connectors are unique. DO NOT force, or attempt to connect electrical connectors to the wrong sockets.

CAUTION: Note the fitted position of the component prior to removal.

NOTES:





Torque: 9 Nm

Installation

CAUTION: Make sure that the component is correctly located on the locating pegs.

To install, reverse the removal procedure.

2. If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Pedestrian Protection System - Pedestrian Protection System - Component

Location Description and Operation



Item	Description
1	RH (right-hand) hood actuator
2	Pedestrian protection system control module
3	LH (left-hand) hood actuator
4	LH accelerometer
5	RH accelerometer

Pedestrian Protection System - Pedestrian Protection System

Description and Operation

OVERVIEW

WARNING: All pyrotechnic devices are dangerous. Before performing any procedures on any pyrotechnic device, read all information contained within the Standard Workshop Practices section of this manual. Refer to: <u>Standard Workshop Practices</u> (100-00 General Information, Description and Operation).

The pedestrian protection system is designed to mitigate injuries in a pedestrian collision with the vehicle. It does this by utilizing a pair of pyrotechnic actuators to lift the hood away from the engine, creating a cushioned impact between the pedestrian and the vehicle.

The pedestrian protection system also includes passive protection integrated into the bumper system and bonnet structure.

WARNING: Do not fit any non-Jaguar approved accessories to the vehicle.

NOTE: The pedestrian protection system operates independently from the SRS (supplemental restraint system).

Pedestrian Protection System - Pedestrian Protection System Operation and Component Description Description and Operation

Control Diagram NOTE: A = Hardwired; **D** = High speed CAN (controller area network) bus; N = Medium speed <u>CAN</u> bus 1 2 10 3 9 4 8 5 (7) 6 A. D N = E93611

Item	Description
1	Battery
2	CJB (central junction box)
3	Instrument cluster
4	LH (left-hand) hood actuator
5	RH (right-hand) hood actuator
6	Pedestrian protection system control module

7	RH accelerometer
8	LH accelerometer
9	RJB (rear junction box)
10	BJB (battery junction box)

System Operation

The pedestrian protection system is operational when the vehicle is traveling at speeds between approximately 20 km/h (12.4 mph) and 45 km/h (28 mph). A vehicle speed signal is received by the pedestrian protection system control module over the high speed <u>CAN</u> bus.

The system is able to determine if contact is made with a pedestrian or another object, such as a traffic cone, using signals from accelerometers mounted behind the front bumper. When the system determines contact is made with a pedestrian it fires the actuators to lift the rear of the hood approximately 130 mm within 35 ms of the 'fire' signal.

When an impact condition is registered, the pedestrian protection system control module outputs an impact signal on the high speed <u>CAN</u> bus. This signal is used by the <u>RJB</u> to initiate the hazard warning lamps. If this occurs, the hazard warning lamp switch is disabled for the remainder of the current ignition cycle.

If the pedestrian protection system control module detects a fault with the system, it outputs a message on the high speed <u>CAN</u> bus to the instrument cluster message center. On receipt of this, the message center will display the message 'CHECK PEDESTRIAN SYSTEM'.

The pedestrian protection system control module also stores the VIN (vehicle identification number). If a new control module is fitted to the vehicle the Jaguar approved diagnostic tool must be used to program the unit with the vehicles <u>VIN</u>.

When the vehicle is delivered from the factory the pedestrian protection system is in a 'safe' plant mode. Normal operating mode should be activated using the Jaguar approved diagnostic tool during the Pre-Delivery Inspection (PDI) prior to delivery to the customer. For additional information, refer to the PDI manual.

If any damage is caused to the front of the vehicle, be it cosmetic or structural, repairs must be carried out in line with the processes contained in the workshop manual. Failure to carry out the correct repair process could compromise operation of the pedestrian protection system. Refer to GTR for the latest information.

The vehicle must be left for 1 minute after disconnecting the battery before any work can be carried out on the pedestrian protection system.

Failure Mode Detection

In service, if any fault is detected, or any part of the system is recognized as not being present, the message center displays the warning 'Check Pedestrian System'.

The bonnet deployment actuators are non-serviceable components, and if they must be replaced due to a fault, or due to having been deployed, or following any other accident, their barcode labels must be read and recorded in the service database against the vehicle VIN for security purposes.

After deployment of the pedestrian protection system, the vehicle must be stopped as soon as it is safe to do so. The hazard warning lamps will be activated and can only be switched off by pressing the engine START/STOP button to turn the engine off and on again. A warning message 'CHECK PEDESTRIAN SYSTEM' will appear on the message center and the vehicle should be transported to the nearest dealer/authorised repairer. The vehicle must not be driven when the bonnet has been deployed.

NOTE: If the warning message 'CHECK PEDESTRIAN SYSTEM' appears in the message center when the bonnet has not been deployed, the vehicle should be taken to the nearest dealer/authorised repairer immediately. It can be driven.

If any significant damage occurs to the front bumper it should be inspected by a dealer/authorised repairer as soon as possible.

Component Description

CONTROL MODULE

The control module is mounted below the hood release lever behind the side trim in the left hand front footwell.

The deployment signal is received from the pedestrian protection system control module. The second-generation system adopted for XF is all-new to Jaguar and, although similar, differs from that introduced on XK by having an accelerometer-based sensing system rather than a contact-sensing system. The accelerometer-based system is supplied by Bosch. Mounted very close to the skin of the bumper, it examines the characteristics of vibration waves caused by impact. Its response time is quicker, because it does not rely on the front of the bumper being loaded. It uses the 'saved' time to make more complex decisions, and so has fewer error states. The speed of vehicle and the length of the bonnet define the time available to get the bonnet into its deployed and stabilized position. It is possible, therefore, to create a time-line counting back from the predicted moment of head impact to the time when the deployment signals need to be sent. That in turn defines a time from first contact to decision time.

HOOD ACTUATORS



The hood actuators are pyrotechnic air bags. The hood actuators are located just forward of the hood latches on either side of the hood. The actuators comprise a pyrotechnic device to raise the hood, a secondary hood latch mechanism and a tether sleeve. Once fired a locking device mounted on top of the actuator couples with the secondary hood latch before the airbag inflates to raise the hood. This ensures that the hood can only deploy to a pre-determined height (approximately 130 mm). As the hood actuator is fired two prongs located in the secondary latch housing are moved out of their retaining clamp. The prongs are spring loaded to grip the secondary hood latch striker securing it to the actuator tether cone. Hood Actuator and Secondary Latch.

They are mounted to brackets in the secondary bulkhead and interface to reinforced areas on the lower surface of the bonnet.

Engine Compartment Lid

The two-piece engine compartment lid is in aluminum and the inner panel has a hexagonal panel structure, which allows energy from a pedestrian head impact to be absorbed effectively across the full area of the bonnet. It also has sufficient strength in the rear cross-beam to accept the forces from the actuators and maintain a stable condition.

When deployed, front bonnet latch acts as the pivot point and the rear hinges allow a controlled degree of upward movement before retaining the bonnet at the end of its deployment, thus limiting its total upward travel and stabilizing its position.

Δ NOTE: A = Non-deployed hinge; B = Deployed hinge



E95115

Item	Description	
1	Firing pin	
2	abilizing link	
3	Engine compartment lid leaf	
4	Intermediate leaf	
5	Body leaf	

The hinge system incorporates a number of leaves. This includes a leaf attached to the body, an intermediate leaf and a leaf attached to the hood. During normal operation the hinge opens and closes using the hood and intermediate leaves. These are attached together by a firing pin. When the actuators are fired the firing pins fail. This allows the hood and intermediate leaves to separate and deploy the hood upwards. When the hood deploys the hood latches act as temporary hinges.

NOTE: The hinges deform during the deployment process and will need to be replaced.

Pedestrian Protection System - Pedestrian Protection System

Diagnosis and Testing

Principles of Operation

For a detailed description of the Pedestrian Protection System, refer to the relevant Description and Operation section in the workshop manual.

REFER to: <u>Pedestrian Protection System</u> (501-20C Pedestrian Protection System, Description and Operation) / <u>Pedestrian Protection System</u> (501-20C Pedestrian Protection System, Description and Operation) / <u>Pedestrian Protection System</u> (501-20C Pedestrian Protection System, Description and Operation).

Inspection and Verification

WARNINGS:

TO AVOID ACCIDENTAL DEPLOYMENT AND POSSIBLE PERSONAL INJURY, THE BACKUP POWER SUPPLY MUST BE DEPLETED BEFORE REPAIRING OR REPLACING ANY PEDESTRIAN PROTECTION SYSTEM COMPONENTS. TO DEPLETE THE BACKUP POWER SUPPLY ENERGY, DISCONNECT THE BATTERY GROUND CABLE AND WAIT TWO MINUTES. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN PERSONAL INJURY.

Do not use a multimeter to probe the pedestrian protection system actuators. It is possible for the power from the multimeter battery to trigger the activation of the actuator. Failure to follow this instruction may result in personal injury.

CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

NOTES:

If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.

Δ_{c}

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

It is advisable not to use a cellular phone or to have a cellular phone in close proximity when working on the pedestrian protection system or components

Given the legal implications of a restraints system failure, harness repairs to pedestrian protection system circuits are not acceptable. Where the text refers to "REPAIR the circuit", this will normally mean the replacement of a harness.

After 5 hood deployment events, a new Pedestrian Protection System Control Module (PPSCM) and wiring harness must be installed.

- 1. Verify the customer concern
- 2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

Mechanical	Electrical
HoodHood hingeHood deployment controls	 Fuses Wiring harnesses and connectors Pedestrian Protection System Control Module (PPSCM) Impact sensors Hood deployment controls

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

Diagnostic Trouble Codes (DTCs) and refer to the DTC Index

5. Check DDW for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and carry out the recommendations as required

Symptom Chart

Symptom	Message	Possible Causes	Action
Hood deployed	CHECK PEDESTRIAN SYSTEM	 Low speed collision with pedestrian or other object 	WARNING: The vehicle must not be driven if the hood has been deployed.
			Δ NOTE: Repairs due to a collision are not warrantable.
			• Check the vehicle for collision damage. Repair as necessary
Hood not deployed	CHECK PEDESTRIAN SYSTEM	 Pedestrian protection system fault 	 NOTE: The vehicle may be driven if a pedestrian protection system fault is present but the hood has not been deployed. Check the vehicle for collision damage. Repair as necessary.
			Using the manufacturer approved diagnostic system, check the pedestrian protection system control module for related DTCs and refer to the relevant DTC index

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: <u>Diagnostic Trouble Code (DTC) Index - DTC: Pedestrian Protection System Control Module (PPSCM)</u> (100-00 General Information, Description and Operation).

Pedestrian Protection System - Pedestrian Impact Sensor

Removal and Installation

Removal



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

- 1. Refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).
 - 2. Torque: <u>3 Nm</u>



Installation

1. To install, reverse the removal procedure.

Pedestrian Protection System - Pedestrian Protection Hood Actuator LH

Removal and Installation

Removal

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

1. Disconnect the battery ground cable.

3. Torque: <u>8 Nm</u>

Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

2. Remove the cowl vent screen.

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

Installation

1. Install is the reverse of removal.



Pedestrian Protection System - Pedestrian Protection Hood Actuator RH

Removal and Installation

Removal

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

1. Disconnect the battery ground cable.

Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

2. Remove the cowl vent screen.

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



MOTE: Left-hand shown, right-hand similar.
 Torque: <u>8 Nm</u>

Installation

1. Install is the reverse of removal.

Pedestrian Protection System - Pedestrian Protection Module

Removal and Installation

Removal

 Δ NG

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

1. Refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).



3.





Installation

1. To install, reverse the removal procedure.

4. *Torque:* <u>10 Nm</u>

Part Number Body Repairs - General Information - Body Repairs

General Information

Introduction

The body plays a significant role in the increasing trend of ever more rapidly changing model variants. The different customer groups are strongly influenced by the design and shape of the body. At the same time the stability of the body plays the most important part in ensuring passenger and driver safety. Lightweight construction, alternative materials, composite materials, plastics and appropriate joining processes are all design features that characterise modern Jaguar vehicle bodies.

In terms of manufacturing technology, modern safety cell bodies can be produced almost without any problems. Jaguar guarantee high quality standards by ensuring that mechanical strength properties are tried and tested in numerous computer simulations, crash tests, by testing materials and by employing sophisticated manufacturing technologies. In the event of repairs it is vital that the production quality standards are upheld. This requires a well-equipped workshop, and places particular emphasis on the qualifications of the workshop technicians. Up-to-date knowledge of current manufacturing technologies and continuous training on new repair methods and techniques are vital for high-quality body repairs. The model-specific repair manuals and the general repair techniques provide valuable support when undertaking body repairs.

Always follow the repair instructions published in this manual. Failure to observe this instruction can result in serious impairment of vehicle safety. All specified safety requirements must be met after the work has been carried out.

Vehicle design

The body

The XF adopts the latest generation steels, especially in the upper body – including high carbon steels, dual-phase, hot-formed boron steels, and bake-hardened steels to form a vertical safety 'ring' around the occupant cell. As well as combining strength with lightness, these steels improve corrosion resistance, by making best use of zinc and improving e-coat paint flow – and new thinking means that in spite of their strength, the XF's A and B-pillars are impressively slim, to the benefit of both visibility and accessibility. Similarly, the lower sills are the first component on any Jaguar to use incredibly strong, dual-phase DP600 steel.

The safety of the driver and the passengers is paramount for every body design. There are two key safety aspects in the body:

- Safety passenger cell
- Crumple zones

Safety passenger cell

- Stable pillars, rocker panel and door profiles.
- Side impact protection in the doors.
- Doors are designed to open even in the event of extreme deformation.

Crumple zone

- Dynamic absorption of deforming forces.
- Protection of the passenger cell.


E128055

Item	Part Number	Description
1		Bodyshell
High Strongth Stools		

High Strength Steels

Most modern vehicles are constructed from a number of different steels, partly to obtain an optimised body (collision, safety, rigidity, fuel economy, etc).

Steels are divided into several groups according to their tensile and yield strength, that is to say the force necessary to bring about plastic deformation of the material.

Yield Summary

Yield is the strength at which the metal changes from elastic to plastic in behaviour, the point of no return.

Tensile Summary

Tensile strength is the breaking strength of a material when subjected to a tensile (stretching) force, the point of no return.

Dual Phase (DP) steel falls into both the very high strength steel (VHSS) and extra high strength steel (EHSS) classifications, dependant on grade of DP.

Steel Type	Yield Strength	
Mild steel (MS)	Maximum yield point up to 180 MPa	
High strength steel (HSS)	Steel with a yield point up to 280 MPa	
VHSS	Steel with a yield point up to 380 MPa	
EHSS	Steel with a yield point up to 800 MPa	
Ultra high strength steel (UHSS)	Steel with a yield point greater than 800 MPa	
Wolding Ultra High Strongth Stool		

Welding Ultra High Strength Steel

UHSS requires welding equipment which can achieve the following equipment settings.

Spot Welding

Information to follow.

MIG Brazing

When mig-brazing use the following type of welder meeting the specifications shown: Fronius Trans Plus Synergic 2700 4 R/Z/AL MIG Welder, with CuSi3 (DIN 1733) 1.0mm filler wire with setting parameters 4, which is 92 Amps, Wire feed 4.6 m/min. Shielding gas L1 = pure Argon (DIN 439).

Steels used in body structure - Body closures



Item	Type of Steel
MS1+Z	Mild steel with zinc
IF220+Z	Interstitial free steel - 220 MPa with zinc
MS2+Z	Mild steel with zinc

Item	Type of Steel
Boron	Boron steel
MS3+Z	Mild steel with zinc
5754NG+ALPT+ALS	5000 Series aluminium alloy
MS4+Z	Mild steel with zinc
5182+ALL	5000 Series aluminium alloy
BH180+Z	Bake hardened steel - 180 MPa with zinc
6111 T4+ALL	6000 Series aluminium alloy
BH220+Z	Bake hardened steel - 220 MPa with zinc



Item	Type of Steel
MS1-4	Mild steel
BH300	Bake hardened steel - 300 MPa

Steels used in body structure - Front end panels



E128475

Item	Type of Steel
MS1+4	Mild steel
HSLA340	High strength low alloy steel - 340 MPa
HSLA350	High strength low alloy steel - 350 MPa
HI ST BAR	High strength steel bar

Steels used in body structure - Side panels



Item	Type of Steel
MS1-4	Mild steel
	Bake hardened steel - 300 MPa
HSLA300	High strength low alloy steel - 300 MPa
DP450	Dual phase steel - 600 MPa
HSLA340	High strength low alloy steel - 340 MPa

Type of Steel
Dual phase steel - 600 MPa
High strength low alloy steel - 380 MPa
Boron
Bake hardened steel - 220 MPa

Steels used in body structure - Rear end panels



Item	Type of Steel
MS1-4	Mild steel
HSLA380	High strength low alloy steel - 380 MPa
HSLA300	High strength low alloy steel - 300 MPa
HI ST BAR	High strength steel bar
HSLA340	High strength low alloy steel - 340 MPa
Other	Other
HSLA350	High strength low alloy steel - 350 MPa

Steels used in body structure - Floor panels



Item	Type of Steel
MS1-4	Mild steel
HSLA380	High strength low alloy steel - 380 MPa
HSLA340	High strength low alloy steel - 340 MPa
BH260	Bake hardened steel - 260 MPa
HSLA350	High strength low alloy steel - 350 MPa

Item	Type of Steel
Other	Other

NOTES:

When installing the A-pillar outer panel, the rocker panel and B-pillar outer panel, or the roof panel, they must be slot brazed where they adjoin the A-pillar reinforcement upper.

The size of the slots are to be 20mm x 8mm and 30mm apart. Slots should be installed in accordance with this spacing. Where this is not possible, due to the indents in the panel, the slot should be made in the location of the original spot weld.

Rocker panel and b-pillar outer panel





Item	Description
1	Drill 2 x 8mm holes to form basis of slot
2	Mill out to form 20mm x 8mm slot
3	Slots spaced at 30mm intervals

A-pillar outer panel



Item	Description
1	Drill 2 x 8mm holes to form basis of slot
2	Mill out to form 20mm x 8mm slot
3	Slots spaced at 30mm intervals

Roof panel





E102826

Item	Description
1	Drill 2 x 8mm holes to form basis of slot
2	Mill out to form 20mm x 8mm slot
3	Slots spaced at 30mm intervals
^	

NOTE: Mig brazing is carried out at a temperature of 650°C to 950°C. To avoid degradation of the ultra high strength steel material properties, the temperature must be below 950°C.

Mig braze the slot(s) using a Fronius Trans Plus Synergic 2700 4 R/Z/AL MIG Welder, with CuSi3 (DIN 1733) 1.0mm filler wire with setting parameters 4, which is 92 Amps, Wire feed 4.6 m/min. Shielding gas L1 = pure Argon (DIN 439).

Dress the surface of the weld cap (brazed slot) with 60/80 grit belt sanders.

Accident damage and diagnosis

General notes

Exact diagnosis of the extent of the damage enables proper repair planning. All body repairs must be carried out in accordance with the guidelines in this Body Repair Manual. The stability and strength properties of the body must be taken into account during body repairs. The body has exact defined deformation patterns that must not be affected by any repair work. For instance, the crumple zones absorb the bulk of the impact energy. If any unprofessional repair techniques or methods are used in these areas then this can pose a fundamental threat to vehicle safety.

Hidden damage

As well as looking at external indicators like flaked off paint, it is vital to check for hidden body damage or deformation that is not visible from the outside. Large attached parts like bumpers and inner fenders often need to be removed to allow accurate assessment of damage to underlying body parts.

Gap dimensions

Gap dimensions offer another alternative for diagnosis by visual inspection. If any changes or misaligned edges are apparent, then this usually indicates that the dimensions of the affected part are incorrect.

Changes in gap dimension



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Item	Description
1	Gap too wide
2	Gap too small

Impact effects on the body



NOTE: Vehicle components like drive shafts and trailer attachments transfer forces. If a vehicle is subjected to a rear impact then all connected body parts and mechanical components (e.g. transmission mountings) should be thoroughly checked. Electronic components should be checked to make sure that they still operate correctly.

Furthermore it is possible to deduce the overall extent of damage from the direction and magnitude of the impact forces. This does however require extensive body-specific knowledge.

If, for instance, an impact occurs at the front left-hand side member, then the right-hand side member is usually also affected as a result of the rigid body-shell design (crossmember). Often the length of this side member will not have changed, but because of the rigid body-shell design it may have moved from its original position (often only by a very small amount). If any deviations are present this can usually be detected by checking the gap dimensions between door and fender or by checking for changes in dimension.

In the case of more severe impacts, the front part of the body cannot absorb all of the impact energy, and the passenger cell is also deformed. Here the impact energy is transferred via the side member to the A-pillar (see diagram). This results in deformations in the area of the roof and the door rocker panel.

The body reacts quite differently to side impacts where there is hardly any crumple zone. As the passenger cell is extremely stable, there are comparatively few local deformations at the site of the impact. However, the impact forces are transferred to the entire vehicle floor, which often results in so-called "banana damage", where the vehicle is bent into a banana shape.

Impact energy is transferred via the side member to the A-pillar



E128762

Item	Description
1	Deformation area - roof rail
2	Deformation area - roof
3	Deformation area - door rocker panel

Body measurements

Measuring options

- Comparison measurements can also be made on the outside of the body. Depending on the damage, comparison measurements and diagonal measurements can be carried out using compass, telescopic rod, tape measure or ruler.
- ONOTE: The same reference points must be chosen on both sides when checking for changed dimensions (e.g. bores, edges, beads/swage lines etc).

All of the important external body dimensions are listed in Tolerance Checks. For additional information, refer to: <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Measurements with a measuring/straightening jig.
- A measuring/straightening jig is required for accurate measurements of the body. The measuring systems are categorised by their means of operation:
- Mechanical measuring system.
- Optical measuring system.

Quick and accurate measuring results can be obtained using computerised measuring systems.

A minimum of three intact measuring points on the body are required for measurements of length, width and height dimensions.

In some cases this may mean making the measuring points accessible. All of these measuring systems can be used to make body measurements, provided all the equipment is available.

Planning a repair

The following decisions have to be made before the repairs are started:

- Does the vehicle need to be put on a straightening jig, or can it be straightened by other means?
- · Does the body need to be measured?
- Do aggregates like engine or axles need to be removed?



Which body parts need to be renewed?

Which body parts can be repaired?

Obtaining spare parts

The availability of spare parts often determines how easily the body repairs can be carried out. The following procedure is recommended:

- Obtain all the data for the vehicle, including type, vehicle identification number, trim code, engine identification letters, initial registration etc.
- Establish all of the metal parts that need to be renewed.
- Establish all of the attached parts that need to be renewed, including small parts like rivets, clips etc.

Straightening repairs

WARNING: The use of heat when pulling to straighten body panels, (such as side members), is not recommended. Longitudinal pulling, (hot or cold), is also not recommended. A small amount of side to side pull is permissible, (cold).

When any type of pulling or straightening operation is performed it is important to observe for any movement in adjacent panels.

A panel must retain its strength and integrity, if there is any doubt the panel must be renewed.

Straightening repairs are often required to restore the body to its original shape after an accident. This can be done with:

Alignment jigs. Universal straightening and measuring jigs. Welding jig system.

The following points must be followed to Make sure that the repairs are carried out professionally and that all the dimensions are correct after the repairs have been carried out.

- Structure:
 - The repair sequence depends on the individual repair plan (taking any necessary disassembly work into account).
 - Clean the attachment areas.
 - Anchor the vehicle free of stress on the relevant system.
 - Support the aggregates to take strain off the body.
 - Decide on at least three measuring/mounting points that are undamaged and as far apart as possible (for basic adjustment).
 - Check the dimensions of the measuring/mounting points.



NOTE: Check dimensions and gaps continuously during straightening.

- A body is always straightened in the opposite direction to that of the impact. Always carry out straightening repairs with the complete body shell assembled (do not cut out any parts beforehand). Carry out the straightening work in several stages. This prevents the risk of over stretching or of welded joints tearing out. During the individual straightening steps, relieve tension by striking with an aluminium hammer while the part is subjected to a tensile load (in the area of pre-determined folding points, dents, welded joins etc.).
- Special features:
 - Ultra high strength steel cannot be straightened due to its brittleness and must always be replaced.

Cutting out body parts

Depending on how the parts are joined/connected, different tools are suitable for cutting/separating body parts.

Spot-weld mill



NOTES:

All other parts like interior equipment, window glass etc. must be protected against flying sparks.

Make sure that the milling depth is set correctly to prevent the remaining flange from being weakened.

Rod sander



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NOTE: Wear protective clothing. Protect any vulnerable body or glass areas against flying sparks. Remove explosive materials from the vicinity.

Any spot welds that are inaccessible for the spot-weld mill (diameter > 8 mm) should be ground out using a rod sander. The same applies to MIG spot welds or seams.

Short stroke saw



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Body saws are particularly versatile and are therefore very suitable for making severance cuts on body parts.

Reciprocating saw



In addition to the short stroke saw, the reciprocating saw can be used. With this, it is possible to make narrow and straight cuts to an exact depth.

Carrying out the repairs

Butt joint



NOTE: The severance cut should always be kept as short as possible on sectional replacement. Only cut at the severance lines shown in the repair chapters.

Do not make any cuts near reinforcements or pre-determined folding lines.



NOTE: Do not use a welding torch to remove paint residue (the heat could cause the metal to deform).

- Reshape the adjoining surface of any dented body parts that are to remain on the vehicle using a hammer and a counterhold (Make sure that the old part matches the shape of the new part). Grind off left over spot welds or seams with an angle grinder.
- Cut the new parts to shape.
- If necessary punch or drill holes for mig plug welding.
- Grind all joining flanges to bare metal on both sides. Do not use an angle grinder for this purpose (this could weaken the metal and damage the zinc layer). Suitable tools: rotating wire brush, belt sander or plastic disc.
 Apply welding primer liberally to all weld flanges.
- The primer must be well stirred before use.



Fit the new part.

- It must be Make sured that the new part fits exactly to the specified dimensions. Suitable equipment:
 - Alignment jig.
 - Universal measuring system.
 - Jig system.
 - Ruler or tape measure.
 - Compass.
 - Frame dimensions can be found in the model-specific repair manuals.

NOTE: Any attached body parts that require accurate alignment and fitting must be incorporated in this step; for instance bumpers, seals, headlamps, rear lamps and lock assembly components. If this is not done carefully it may result in water leaks, wind noises and substantial follow-on work.

Make sure that edges line up with adjacent parts and check that gaps are consistent (compare left and right-hand sides). Make sure that the shape of the vehicle is retained.

Secure the new part

NOTE: The need for subsequent follow-on work can be significantly reduced if aligning and tack-welding are carried out with due care.

Depending on accessibility the following methods for securing are available:

- Grip pliers (set of).
- Screw clamp (set of).
- Self-tapping screws.
- Tack welds.

Use a staking tool or a screwdriver to Make sure that the edges of sectional replacements of profiled parts line up. The edge is then tack welded to Make sure that it lines up.

Aligning and tack weld



Item	Description
1	Tack welds
2	Using a screwdriver to align

Longer joins are usually tack welded to prevent the panel from warping. It is important to carry out the tack welds in the correct sequence (see diagram).

Weld in the new part following the instructions in the repair manual.

Correct tack welding sequence



Follow on repairs/corrosion protection

• This step basically covers the following work:

NOTE: See corrosion protection section for cavity wax application areas.

- Grinding welded seams.
- Priming any bare metal.

- Sealing welded seams.
- Applying underbody protection.
- Sticking damping matting in place.
- Filling cavities with cavity wax.
- Cavity wax (after painting).

Panel Beating

Fundamentals of panel beating

Before carrying out any sectional replacements or complete replacements of body panels, always check carefully whether the damaged panel(s) can be rectified by panel beating. Panel beating is usually the easiest and most economical method of repairing a damaged panel.

Examples of applications of different panel beating techniques:

Aluminium hammer and mallet.

- Advantage: Low risk of over-stretching the panel.
- Used for repairs of small dents on panels that are accessible from both sides.
- These two panel beating tools are usually used for "finishing repairs".

Fine straightening with an aluminium hammer and a universal dolly



Sliding hammer

- If the damaged panel is only accessible from the outside, use a sliding hammer to pull it back into shape. The discs or studs needed to mount the sliding hammer are welded onto the bare surface. Dents in the panel can be flattened out using controlled application of the sliding hammer.

Heat-treatment of panels

It is usually inevitable that some parts of the body panels show excess material as a result of mechanical strain. If there are any areas of excess material this will cause localised instabilities due to differences in tension. These localised instabilities can be stabilised by applying heat-treatment techniques.

NOTE: This does not apply to high-strength low alloy steel, ultra high strength steel and aluminium.

Rule: Flattening panels by heat-treatment reduces the amount of excess material by more than they were originally stretched.

Different heat-treatment techniques.

NOTE: Different heat-treatment techniques are used depending on the amount of excess material.

Flattening using a flame.

- A welding torch is used if the material excess extends over a larger area (torch size 0.5 1.0 mm). Use a soft flame.
- The surface of the metal is briefly spot-heated and then immediately cooled with a wet sponge.
- Requirement: Ability to handle a welding torch safely and knowledge of annealing colours of steel.
- Advantage: No damage to the surface of the metal.

Flattening using a flame, supported by hammer and counterhold.

NOTE: The flattening effect is increased by speeding up the heating and cooling stages.

- If the material excess is concentrated, then the flattening effect can be increased after heating by carefully using an aluminium or wooden hammer.
- Requirement: Ability to recognise material tension by feeling the surface that is to be flattened.
- Flattening using a carbon electrode. - If panel areas are only accessible from one side, or the panel is only slightly destabilised, then the preferred method is flattening using a carbon electrode.
 - Requirement: Bare metal surface.

- Disadvantage: Scarring and hardening of the surface. Flattening using a copper electrode.

- Small, sharp dents that face outwards can be worked on with a copper electrode.

Flattening using a flame and body files.

NOTE: When applied correctly, this method can be used with all the attached parts still in place (roof headlining, wiring harnesses etc.).

- Small, soft dents (only slight stretching): Working at the edges of the dent in an inward spiral pattern, the dent is heated with an oxyacetylene torch (torch size 1 2 mm, excess gas flame) to approx. 250° C.
- Working rapidly with a body file extracts heat from the edge area until the dent is flattened. Preferably alternate between two files. This increases the amount of heat that can be extracted.

Safety measures

The electronic control modules (ECM) fitted to vehicles make it advisable to follow suitable precautions prior to carrying out welding repair operations. Harsh conditions of heat and vibration may be generated during these operations which could cause damage to the modules. In particular, it is essential to follow the appropriate precautions when disconnecting or removing the airbag RCM.

Do not allow electronic modules or lines to come into contact with the ground connection or the welding electrode. Seat belt anchorages are a safety critical. When making repairs in these areas, it is essential to follow design specifications. Note that extra strength low alloy steel may be used for seat belt anchorages. Where possible, the original production assembly should be used, complete with its seat belt anchorages, or the cut line should be so arranged that the original seat belt anchorage is not disturbed.

All welds within 250mm (9.842) of seat belt anchorages must be carefully checked for weld quality, including spacing of spot welds.

Remove the battery before carrying out welding work in its vicinity.

Utmost care must be taken when welding near the fuel tank or other components that contain fuel. If the tank filler neck or a fuel line must be detached to allow access for welding work, then the fuel tank must be drained and removed. Never weld, on components of a filled air conditioning system. The same applies if there is a risk of the air conditioning system heating up.

Connect the ground connection of the electrical welder directly to the part that is to be welded. Make sure that there are no electrically insulating parts between the ground connection and the welding point.

Adjacent vehicle parts and adjacent vehicles must be shielded against flying sparks and heat.

Pedestrian protection system

The pedestrian protection system is designed to mitigate injuries in a pedestrian collision with the vehicle. It does this by utilizing a pair of pyrotechnic actuators to lift the hood away from the engine, creating a cushioned impact between the pedestrian and the vehicle. It is essential that any repair or replacement operations do not affect the safe working of the system.

For additional information, refer to: <u>Pedestrian Protection System</u> (501-20C Pedestrian Protection System, Description and Operation).

Resistance spot welding

Where resistance spot welds have been used in production, they must be reproduced with new spot welds in replacement where possible. All such reproduction spot welds should be spaced 25 to 30mm apart.

Setting up the equipment and co-ordinating the welding parameters.

Equipment:

- Follow the equipment manufacturer's instructions for the equipment settings.
- Select the correct electrode arms (as short as possible).
- Align the electrode arms and tips exactly.
- Electrode tips should be convex (rough shaping with a file, fine shaping with a sanding block).

Body:

- Make sure that the flanges to be joined lie perfectly flat to one another.
- Prepare a bare metal joint surface (inside and outside).

Notes on technique/method:

- Carry out a test weld on a sample piece of the material coated in welding paste.

- If any metal parts are located between the electrode arms then there will be a loss of induction and therefore power (adjust current setting).
- The power needs to be adjusted for high-strength low alloy steel.
- Repeated welding on old welding points often leads to poor quality welds.
- Keep the electrode tips as near as possible to an angle of 90° to the contact surface.
- Keep the pressure on the electrodes for a short period after finishing the weld.
- The electrodes work best if their shape is convex. Clean the contact surface of the electrodes regularly.

Resistance spot welding panels where the total thickness is 3 mm or more

For all repairs to modern Jaguar vehicles, spot-welding equipment should be suitable for reliable welding of zinc-plated, high-strength and high-tensile steels in three or more layers, up to 5 mm total thickness. If these requirements are not fulfilled, plug welding must be used for safety reasons. The electrical specifications (current, resistance, heat) of the spot-welding equipment have different validity, depending upon the type of equipment. Therefore, it is essential that the manufacturer's instructions are observed with regard to the actual welding performance.

MIG/MAG welding

Setting up the equipment and co-ordinating the welding parameters.

Any joins that are MIG/MAG welded in production must also be MIG/MAG welded during repairs. Also during repairs, some resistance spot welds need to be replaced by plug welds.

If access is difficult, or if a suitably powerful spot welder (see above) for total panel thicknesses of 3 mm or more is not available, resistance spot welding must be partially replaced by plug welding during repairs. In this case, the increased time needed and the correspondingly more demanding corrosion protection requirements, must be taken into account.

Welding repairs can only be carried out properly if the equipment is set up correctly and all the welding parameters are co-ordinated.

Equipment:

- Set up the equipment as directed by the manufacturer.
- The hoses must be untwisted.
- The core must be free of abraded rod particles.
- The gas and current nozzles must be free of slag and scale residue.
- Pay attention to the quality of the welding rod and the throughput of gas.
- Body:
 - Make sure that the joint surface is perfect.
 - Prepare a bare metal joint surface.
 - Maintain the correct gaps (formation of roots).
- Notes on technique/method:

NOTES:

The increased application of heat during MIG welding destroys the welding primer/zinc layer over a much larger area than during resistance spot welding, as a result of which much more care needs to be taken when applying anti-corrosion protection afterwards.

test weld should always be carried out to make sure that the welded joint is not just a surface connection.

- Attach the ground cable right next to the welding point (Make sure that good contact is made).
- During plug welding start welding on the lower panel to Make sure adequate penetration.

Plug welding



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Item	Description	
1	Welding direction: circular pattern working from the inside outwards	
2	Welding starting point: centre of hole on lower panel	

Bonded glazing

- The windscreen, side and rear windows are bonded directly onto the window frames on the body and liftgate.
- The windows are bonded primarily for reasons of adhesive strength. Bonded glazing provides additional torsional stiffness to the body.

Adhesive bonding of bonded windows



DEE0003938

Item	Description
1	Rubber strip
2	Window frame
3	Adhesive
4	Window glass

Removing and installing bonded windows

Safety measures

The following safety measures must always be followed to prevent personal injury:

- Wear protective gloves and arm protection.
- Wear protective goggles.

Preparations

Before cutting out a bonded window, undo and remove any attached parts in the cutting area that are at risk, e.g. trim panels and decorative strips, as well as all electrical connections. Mask any painted areas that are adjacent to the window.

Cut off any surplus adhesive, as this makes it easier to cut out the window.

Secure vertical windows against dropping out.

Cutting out the window

Cut into the adhesive bead at easily accessible points using the cutting tool. Carefully guide the cutting tool around the window, cutting through the adhesive bead. Avoid touching the window frame and the body flange. Use cup suction tools to lift the cut-out window out of the window aperture.

General preparations for bonding

Follow the manufacturer's instructions.

Cut back the remaining adhesive bead on the metal flange to a residual height of about 1mm. Do not touch or clean the cut surface afterwards.

Carefully rectify any paint damage (apply primer and top coat).

Renew the window stops as necessary.

Bonding the window glass

Apply an even bead of adhesive to the window or to the body flange. Insert the window glass into the window aperture and centre it (2 technicians required). Check the gaps.

NOTE: Open the windows and doors while the window is left to dry and do not move the vehicle (slamming doors creates excess pressure which could cause the window to become loose).

Use adhesive tape to prevent the window from falling out or slipping.

Finishing operations

Reconnect all electrical connections and check that the components operate correctly. Install the attached parts and check that the fit is accurate and secure. - Carry out a visual inspection to Make sure that the gaps and joints are even. Thoroughly clean the window glass.

Protective equipment and safety at work

Various safety measures and legal requirements must be met when carrying out repairs. All regulations relating to health and safety at work must be followed.

The following safety precautions must be observed to prevent the risk of personal injury:

- Protective overalls
- Safety hood (face protection).
- Welding shield.
- Safety gloves.Safety shoes.
- Extraction unit for welding fumes.

Welding should always be carried out in well ventilated areas. A fire extinguisher must also always be within reach.

General body repair safety measures

Extraction unit



Sealing compound, underbody protection etc. must not be burned off with a naked flame. This would produce toxic gases. If for instance PVC is burned, then gases containing hydrochloric acid are produced. For this reason a suitable extraction unit should always be used when performing grinding, welding or soldering work.

Always Make sure good ventilation when working with materials that contain solvents, wear breathing equipment and use an extraction unit.

Ear defenders should always be worn when cutting, grinding or straightening metal, as the noise levels can reach or even exceed 85 - 90 dB(A)

Take care not to look directly into any laser measuring systems, for instance used to measure the under body. When removing components from a vehicle mounted on a lifting ramp, watch out for a shift in its centre-of-gravity. When first placing the vehicle on the ramp, take into account that it may need to be secured against tipping over. Chains and chain clamps must be secured with safety ropes during straightening work.

Safety rope



Part Number Body Repairs - Corrosion Protection - Corrosion Protection

Description and Operation

General

The corrosion protection provided in production must be carefully maintained and/or reproduced during and after body repair work. It is only then that the long-term warranty against penetrative corrosion damage can be assured.

Only Jaguar original bodywork components and Jaguar approved repair materials, (sealer, paint etc.), are to be used for bodywork repairs.

Jaguar Original Parts



E117239

All Jaguar bodywork components have a cathodic base coating. Individual bodywork components are zinc plated on one or both sides, (in different areas depending on vehicle model).

Together with elastic paint coating, this guarantees an optimum, highly resistant protection against corrosion caused by the impact of small objects such as gravel.

NOTE: If possible, the individual protective layers, (zinc, cathodic base coat), on Jaguar bodywork components must not be damaged or destroyed by sanding or other mechanical operations.

If hairline cracks at "bodywork connection areas" appear after reshaping work, (e.g. at door hinges), it must be ensured that the corrosion protection provided in production is recreated. The complete paint covering must be re-created if necessary. The same applies to reshaping work on heavily profiled bodywork components, (e.g. floor pan). Renew or touch-up the paint coating, sealing beads and underbody protection as necessary.

After repair, any interior surfaces which are no longer visible or accessible must be primed before cavity wax is applied. To be certain of an even coating on inner surfaces, careful application of spray, (twice, with drying time in-between), must be carried out throughout the whole cavity.

If bodywork panels are strongly heated during repair work, this will invariably result in damage to or even destruction of the applied corrosion protection material. The effectiveness of the cavity protection material is reduced if heating occurs. Reworking of the affected areas is therefore vital.

Welded areas should be made good before corrosion protection is applied.

The corrosion protection measures to be taken when bodywork components are renewed are described on the following pages.

Corrosion Protection of New Components

All new components must be inspected for transport or storage damage such as scratches or dents. The following operations may be necessary, depending on the extent of damage:

Undamaged New Component

- Do not grind the cathodic primer.
- Thoroughly clean with silicone remover and rub dry.

Slightly Damaged New Component

- Sand out scratches.
- Finely sand the surrounding surface.
- Thoroughly clean with silicone remover and rub dry.
- Apply corrosion protection primer to bare areas.

Damaged New Components (bumps and dents)

• Beat out the dented area and sand down to bare metal.

- Apply polyester filler (only onto bare metal).
- Apply filler.
- · Lightly sand the whole component.
- Thoroughly clean with silicone remover and rub dry.
- Apply corrosion protection primer to bare areas.

The clinched flanges on the hood, doors, tailgate and liftgate must be sealed with clinched flange sealer, if this is not already applied.

Weld Components

Use a stripping disc to remove the cathodic primer on the inside and outside of the area to be welded. The stripped area should be kept as small as possible, retaining as much of the cathodic primer as possible, taking care not to damage the zinc coating.

Apply Welding Primer



\wedge

NOTE: The welding primer must be stirred well or shaken before application.

Clean the repair area thoroughly, (silicone remover).

Apply welding primer evenly to all weld flanges, (old and new components).

NOTE: The welding primer must be allowed to dry before welding is carried out.

All weld beads must be ground down after all welding is completed, taking care not to weaken the material.

Any unevenness at the joint must be made good.

If necessary, spot weld missing weld studs into position.

The vehicle must be completely cleaned of sanding dust and metal swarf because of the danger of corrosion.

Clean and prime all internal areas and those to be sealed.

NOTE: The primer must be dry before sealing mastic or underbody protection is applied. Do not use thinners when applying sealing mastic, (the mastic will not dry).

Partial Renewal

The procedure to follow when partially renewing components is the same as described in the section "Welded Components".

The main difference when components are partially, rather than completely renewed, concerns the preparation of butt or lap joints.

When bodywork components are cut through, attention must be paid to the adequate removal of the paint and zinc coatings on inner areas. This specially applies to areas which are difficult to access internally. It is important for the weld quality that the inner area is bare metal. Zinc and paint residues in the weld area burn and cause serious hole formation during welding.

If the zinc layer and the paint coating are not removed, the zinc and paint will burn during welding. The soot produced prevents satisfactory cavity protection.

Procedure

The paint layer must be removed for a width of 30 mm from the line of the weld using a rotating tress wire brush. This operation must be carried out on both the new and the old parts of the bodywork. Depending on the bodywork component, a 10 mm width of the underlying zinc layer must also be removed along the weld line.

NOTE: A flat scraper or a wire brush can be used instead of the rotating brush if the cavity is small. Do not use an angle grinder, which would weaken the structure.

Application of Cavity Wax Protection on a Rocker Panel After Partial Repair



E117241

Item	Description
1	Weld bead
2	Spray head
3	Distance maintainer
4	Spray gun

Classification of the different corrosion protection measures for dent removal

Corrosion Protection Method	Exterior Surfaces	Accessible Inner Surfaces	Inaccessible Inner Surfaces
Painting	Х	Х	
Cavity protection			Х

Classification of Different Corrosion Protection Measures for Installation of New Components

Corrosion Protection Method	Weld Flanges Before Welding in Place (contact surfaces)	All Bare Sanded Areas	Weld Flange Area Accessible	Weld Flange Area Not Accessible	
Welding primer	X				
Painting		Х	Х		
Clinched flange protection			Х		
Cavity protection				Х	

Body Sealing Materials





E56018

Item	Description	
1	Between Panels - Bolted	
2	Panel Edge Bolted	
3	Between Panels - spot welded	
4	Panel edges - spot welded	
5	Between panels - bonded	
6	Panel edges - bonded	
7	Clinch joints - type A	
8	Clinch joints - type B	
9	Clinch joints - type C	
10	Gaps between panels - type A	
11	Gaps between panels - type B	
12	Lap joint	

Description - Usage	Supplier	Product Number
Sealing	-	-
Polyurethane cartridge extruded seam sealer - grey - this is not a weld through product	3M	08684
Polyurethane cartridge extruded seam sealer - white - this is not a weld through product	3M	08689
Polyurethane cartridge extruded seam sealer - black - this is not a weld through product Polyurethane sachet 310ml - grey - this is not a weld through product	3M 3M	08694 08782
Polyurethane sachet 310ml - white - this is not a weld through product	3M	08787
Polyurethane sachet 310ml - black - this is not a weld through product	3M	08789
Polyurethane sachet 600ml - grey - this is not a weld through product	3M	08783
Polyurethane sachet 600ml - white - this is not a weld through product	3M	08788
Polyurethane sachet 600ml - black - this is not a weld through product	3M	08793
Sprayable seam sealer 2K polyurethane 150ml - grey	3M	08823
Sprayable seam sealer 2K polyurethane 250ml - grey	3M	08800
Sprayable seam sealer MS polymer grey	3M	08851
Super seam sealer can - grey Super seam sealer - brush	3M 3M	08537 08540
Butyl cartridge highly flexible for joints greater than 3mm - grey	3M	08645
Terostat 9100 (1K PUR) adhesive sealant	-	153.65B
Terostat 9100 (1K PUR) adhesive sealant		112.72C
Terostat 9100 (1K PUR) adhesive sealant		129.19S
Terostat 9200 (1K PUR) adhesive sealant - black	Teroson	120.20Q
Terostat 9200 (1K PUR) adhesive sealant - black		120.25W
Terolan light vehicle body sealant		128.60D
Terostat 9320 sprayable seam sealant - grey		139.15A
Terostat 9320 sprayable seam sealant - black		139.16B
Terostat 9320 sprayable seam sealant - ochre		139.17C
Terolan special sealant brushable Terostat II sprayable sealant band		179.70H 193.00D
Terostat VII round profile plastic sealing band		193.00D 112.46Z
Terostat IX putty		157.86J
MS Polymer Sealing	-	-
MS Polymer caulkable sealer - white	3M	0855
Terostat 9120 (MS Polymer) adhesive sealant - white	Teroson	102.78X
Terostat 9120 (MS Polymer) adhesive sealant - black	Teroson	113.23H
Terostat 9120 (MS Polymer) adhesive sealant - black	Teroson	104.41R
Seam Sealing Light	-	-
Drip Chek clear	3M	08401
Drip Chek heavy Silicone Sealant	3M	08531
Terostat 9140 silicone sealant - transparent	- Teroson	- 140.08B
Terostat 9140 silicone sealant - black		140.04X
Body Caulking	-	-
Body caulking	3M	08568
Structural Adhesive	-	-
Two component epoxy adhesive	3M	08122
Manual applicator gun	3M	08190
Panel Bonding Adhesive	-	-
Panel bonding adhesive + (nozzle 08193)	3M	08115
Requires manual applicator gun + nozzle Tape and Film	ЗM	08117
Acrylic tape PT1100 double sided - 6mm x 40m	- 3M	- 80318
Acrylic tape PT1100 double sided - 9mm x 20m	3M	80319
Acrylic tape PT1100 double sided 12mm x 20m	3M	80320
Acrylic tape PT1100 double sided 19mm x 20m	3M	80322
Acrylic tape PT1100 double sided 25mm x 20m	3M	80323
Polyolefin adhesion promoter	3M	05917
Abrasion resistance film	3M	08210
Abrasion resistance film	ЗM	08219
Sealing Tape and Primer	-	-
Terotape seam sealing tape 8mm x 6mm		8164590
Taratana saam saaling tana 10mm y 14mm		8164600 8164610
Terotape seam sealing tape 10mm x 16mm Terotape primer 420ml	16102011	-
Terotape primer 420ml	_	-
Terotape primer 420ml Cavity Wax	-	08861
Terotape primer 420ml Cavity Wax Body shultz coatings - black - 1L can	- 3M	08861 08877
Terotape primer 420ml Cavity Wax	-	08861 08877 08909
Terotape primer 420ml Cavity Wax Body shultz coatings - black - 1L can Body shultz coatings - black - 500ml aerosol	- 3M 3M	08877
Terotape primer 420ml Cavity Wax Body shultz coatings - black - 1L can Body shultz coatings - black - 500ml aerosol Inner cavity wax aerosol (transparent) Inner cavity wax aerosol (amber) Inner cavity wax 1L can (amber)	- 3M 3M 3M 3M 3M 3M	08877 08909 08901 08911
Terotape primer 420ml Cavity Wax Body shultz coatings - black - 1L can Body shultz coatings - black - 500ml aerosol Inner cavity wax aerosol (transparent) Inner cavity wax aerosol (amber) Inner cavity wax 1L can (amber) Inner cavity wax 1L can (transparent)	- 3M 3M 3M 3M 3M 3M 3M	08877 08909 08901 08911 08919
Terotape primer 420ml Cavity Wax Body shultz coatings - black - 1L can Body shultz coatings - black - 500ml aerosol Inner cavity wax aerosol (transparent) Inner cavity wax aerosol (amber) Inner cavity wax 1L can (amber)	- 3M 3M 3M 3M 3M 3M 3M 3M	08877 08909 08901 08911

Description - Usage	Supplier	Product Number
Terotex HV 200 extra spray - 1L can		176.48
Terotex HV 200 extra spray - 10L tin		179.40A
Terotex HV 200 extra spray - 60L barrel	Teroson	170.96J
Terotex HV 400 1L can		169.65Q
Terotex HV 400 10L tin		169.76C
Terotex HV 400 60L barrel	Teroson	169.85M
Teroson cavity spray 500ml aerosol	Teroson	155.71A
Underbody Wax	-	-
Terotex wax black 1L can	Teroson	114.59F
Protective wax	Teroson	122.730
Underbody Coating	-	-
Bodyguard stonechip coating (textured) can - black	3M	08868
Bodyguard stonechip coating (textured) can - white	3M	08878
Bodyguard stonechip coating (textured) can - grey	3M	08879
Bodyguard stonechip coating (flat) can - black	3M	08158
Bodyguard stonechip coating (flat) can - grey	3M	08159
Anti chip coating smooth - grey	3M	08886
Terotex record black 1L can	Teroson	122.48N
Terotex record light 1L can	Teroson	165.53S
Terotex anti chip compound light (UBC) 1L can		191.08V
Terotex anti chip compound black (UBĆ) 1L can	Teroson	191.32V
Trim Adhesive	-	-
Auto adhesive - aerosol - clear (trim)	3M	08080
Auto adhesive - brushable - clear (trím)	3M	08150
Contact adhesive - aerosol - amber	3M	08090
Corrosion Protection	-	-
Zinc spray	3M	09113
Zinc spray	Teroson	158.18T
Anti Corrosive Agent	-	-
Terotex HV 350 1L can	Teroson	141.78L
Terotex HV 350 10L can	Teroson	160.02T
Terotex HV 350 60L barrel	Teroson	160.01S
Sound Deadening	-	-
Sound deadening sheets	3M	08840
Terodem SP 100 alu	Teroson	190.33
Terodem SP 200	Teroson	190.55M
Terodem SP 300 50 x 50	Teroson	145.28R
Terodem SP 300 100 x 50	Teroson	134.29X
Flexible Part Repair	-	-
Flexible part repair material (FPRM)	3M	05900
Adhesives / Thread Locking	-	-
Lock N Seal 243 thread locking	Loctite	13701
Lock N Seal 243 thread locking	Loctite	14131
Lock N Seal 243 thread locking	Loctite	25684
Stud N Bearing fit 271	Loctite	13704
Stud N Bearing fit 271	Loctite	14130
Stud N Bearing fit 271	Loctite	25685
Pipe sealant 577	Loctite	16604
Pipe sealant 577	Loctite	25689
Pipe sealant 55	Loctite	31899
Gasket	-	-
Multi gasket	Loctite	25688
Silicone copper	Loctite	19245
Silicone copper	Loctite	82046
Silicone 596 black	Loctite	19242
Silicone 596 black	Loctite	59875
3020 gasket adhesive	Loctite	31458
NVH Baffle	-	-
Sikabaffle 278	SIKA	

Approved Service Material Supplier - Contact Details

ЗM

- 3M United Kingdom PLC
 3M Centre
 Cain Road

- Bracknell
- Berkshire
 RG12 8HT
- Telephone (01344) 858000www.3m.com

Cooper Pegler

- Burgess Hill
- Sussex
- RH 15 9LA
- Telephone (014446) 42526

Sika Ltd

- Watchmead
- Welwyn Garden City
- Hertfordshire
- AL7 1BQ
- Telephone (01707) 394444www.sika.co.uk
- SATA Spray Equipment
 - Minden Industrial equipment
 - 16 Greyfriars Road
 - Moreton Hall
 - Bury St Edmunds
 - Suffolk
 - IP32 7DX
 - Telephone (01284) 760791
 - www.sata.com

Henkel Loctite Adhesives Limited

- Technologies House
- Wood Lane End
- Hemel Hempstead
- Hertfordshire
- HP2 4RQ
- Telephone (01442) 278000
- www.loctite.co.uk

Teroson

- Henkel Ltd
- Apollo Court
- 2 Bishops Square Business Park
- Hatfield
- Hertfordshire
- AL10 9EY
- Telephone (01707) 635000
- www.henkel.co.uk

Underbody sealer

Under floor areas and the front part of the spare wheel well are treated with a plastisol PVC underbody sealer. This material is not suitable for re-treatment. When repairing areas of underbody sealer, strip the factory-applied underbody sealer back to a suitable break point. Ensure that a clean metal surface is exposed and that the edge of the existing adheres soundly to the panel.

Apply new underbody sealer between primer and surface paint operations. Apply seam sealer as necessary before application of underbody sealer. Ensure that blanking plugs and grommets in the floor pan (except those used for wax injection) are fitted before underbody sealer application. Refit any heat-fusible plugs which have been disturbed in repair with the aid of a hot air blower, or replace with rubber grommets

CAUTION: Ensure that suspension units, wheels, tires, power unit, drive shafts, exhaust and brakes, (including all mounting points), are shielded prior to application of fresh underbody sealer.

Area of Underbody Sealer Application - Floor Pan (Front)



Area of Underbody Sealer Application - Spare Wheel Well and Rear Side Member



Precautions During Body Repairs and Handling

Take care when handling the vehicle in the workshop. Underbody sealers, seam sealers, underbody wax and body panels may be damaged if the vehicle is carelessly lifted.

Proprietary Anti-corrosion Treatments

The application of proprietary anti corrosion treatments in addition to the factory-applied treatment could invalidate the corrosion warranty and should be discouraged. This does not apply to approved, compatible, preservative waxes which may be applied on top of existing coatings.

Fitting Approved Accessories

When fitting accessories ensure that the vehicle corrosion protection is not affected, either by breaking the protective coating or by introducing a moisture trap.

Do not screw self-tapping screws directly into body panels. Fit suitable plastic inserts to the panel beforehand. Always ensure that the edges of holes drilled into panels, chassis members and other body parts are protected with a suitable zinc rich or acid etch primer, and follow with a protective wax coating brushed onto the surrounding area.

Do not attach painted metal surfaces of any accessory directly to the vehicle's bodywork unless suitably protected. Where

metal surfaces are bolted together always interpose a suitable interface material such as weldable zinc rich primer, extruded strip, or zinc tape.

Steam Cleaning

Due to the high pressure/temperature generated by steam cleaning equipment, there is a risk that certain adhesives and corrosion prevention material may become softened or liquified.

Take care not to allow the steam jet to dwell on one area, and keep the nozzle at least 300mm from the panel surface.



Inspection During Maintenance Servicing

It is a requirement of the corrosion warranty that the vehicle is inspected for corrosion by a Jaguar Authorised Repairer during a routine service, to ensure that the factory-applied protection remains effective.

Rectify any bodywork damage or evidence of corrosion found during inspection as soon as is practicable, both to minimise the extent of the damage and to ensure the long term effectiveness of the factory-applied corrosion prevention treatment.

Underbody Protection Repairs

Whenever body repairs have been carried out, ensure that full sealing and corrosion protection treatments are reinstated. This applies both to the damaged areas and also to areas where protection has been indirectly impaired, as a result either of accident damage or repair operations.

Remove corrosion protection from the damaged areas before straightening or panel beating. This applies in particular to panels coated with wax, PVC underbody sealer, sound deadening pads etc.

CAUTION: Do not use oxy-acetylene to remove corrosion prevention material. Large volumes of fumes and gases are liberated by these materials when they burn.

The most common method of removal is by means of a hot air blower with an integral scraper. High temperatures can be generated with this equipment which may cause fumes. Take care during its use.

Structural Adhesive

CAUTION: When separating a joint with metal to metal adhesive, it is important to avoid distortion. Heat gradually until the bond weakens sufficiently to permit panel separation - do not apply excessive heat.

NOTE: When spot welding through metal to metal adhesive, take particular care to adjust the equipment setting to ensure a suitable weld.

Metal to metal adhesive is applied to critical joint areas during factory assembly. The material used is a high temperature, heat cured, nitrile phenolic which serves to bond two metal surfaces and also to seal the joint against ingress of dust, moisture and fumes. This material is not suitable for service use and, during repair, should be substituted by an approved structural adhesive. For panel specific information and to identify the areas of structural adhesive application in repair, refer to the relevant sheet metal removal and installation procedure.

Expanding Foam Acoustic Seals

Expanding foam acoustic seals are used in various closed-sections of the body to improve vehicle refinement. The seals are installed during the vehicle body manufacture and expand during the paint process up to ten times original size, thus locking them into position. They are located such that they prevent noise accentuation along a section and reflect air borne noise away from the cabin.

The seals have spilt functionality depending on location. The seals located at the base of the body pillars have a primary function of preventing water ingress when wading. Their secondary function is to prevent noise and dust ingress.

The seal around the fuel filler has a primary function of preventing both fuel and water ingress. With a secondary function of preventing noise and dust ingress.

The remaining seals primary function is to prevent noise accentuation along a section and reflect air borne noise away from the cabin.

Another advantage of the seals is that they marginally increase the overall stiffness of the body and its structural performance in case of a crash.

The seals are manufactured from an expandible polymer.

Replacing Expanding Foam Acoustic Seals

As paint oven temperatures used in a repair workshop are significantly lower than those that are used during manufacture of the vehicle, (the temperatures are not sufficient to expand the foam), a different process is required to replicate the foam in repair.

If a repair disturbs the expanding foam acoustic seal it must be reinstated. If access allows, (whether a new seal is fitted or the original is reused), acoustic foam should be injected after paint refinishing. If access is not possible, or it is not practical to apply expanding foam due to the nature of the repair, a suitable flexible PU sealer should be applied around the seal and the corresponding body panel/s prior to assembly. In all cases the application of foam / sealer should form a seal between the expanding foam acoustic seal and any adjacent panelwork.

Expanding Foam Acoustic Seals - A-pillar, (inner panel)



Expanding Foam Acoustic Seals - A-pillar, (reinforcement)



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Expanding Foam Acoustic Seals - A-pillar, (upper)



Expanding Foam Acoustic Seals - B-pillar, (reinforcement)





Expanding Foam Acoustic Seals - Quarter Panel, (fuel filler)



Expanding Foam Acoustic Seals - Quarter Panel, (inner reinforcement)



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Expanding Foam Acoustic Seals - Quarter Panel, (fuel filler)


Seam Sealer

A heat cured, PVC based sealant is applied to specific joint seams during factory assembly. This material is not suitable for service use and during repair and should be substituted by an approved seam sealer.

NOTE: Where seams are inaccessible following the reassembly or fitting of components, ensure that a paste-type seam sealer is applied to such seams. Certain seams also become inaccessible after the completion of panel repairs. In such instances apply seam sealer and paint before final assembly.

Apply seam sealers after the application of primer and before the application of top coat. The sealer must form a continuous bead, with the profile of the bead dependent on the type of seam. If the seam sealer is applied with a brush take particular care to maintain the required coverage of the seam.

Ensure that all accessible repair seams are sealed following a repair. Damage to a vehicle often flexes areas of the body remote from the impact. As a result the seam sealer in these areas may be disturbed by subsequent straightening and repair operations. Check all seams in the vicinity of the area undergoing repair for evidence of cracked seam sealer, then clean out as required and apply fresh seam sealer using the following procedure:

- Clean the affected seam and re-treat any exposed metal areas with a suitable etch phosphate primer.
- Treat affected area with an etch-acid primer.
- Apply appropriate seam sealer as necessary.
- apply appropriate colour coat (and under body sealer as applicable).

Provided access is adequate, apply seam sealer to both sides of a repair joint. Where access is limited to one side only, (e.g. box section), treat the affected box member with cavity wax.

Cavity Wax

After repairs, always re-treat these areas with an approved cavity wax. In addition, treat all interior surfaces which have been disturbed during repairs whether they have been treated in production or not. This includes all box members, cavities and door interiors.

Before wax injection, ensure that the cavity to be treated is free from any contamination or foreign matter. Where necessary, clear out any debris.

Ensure that cavity wax is applied after the final paint process and before refitting any trim components.

During application ensure that the wax covers all flanges and seam areas and that it is adequately applied to all repaired areas of both new and existing panels.

It should be noted that new panel assemblies and complete body shells are supplied without wax injection treatment. Ensure that such treatment is carried out after repairs.

Effective cavity wax protection is vital. Always observe the following points:

- Complete all paint refinish operations before wax application.
- Check the spray pattern of injection equipment.
- Mask all areas not to be waxed.
- Remove body fixings, such as seat belt retractors, if contamination is at all likely.
- Move door glasses to fully closed position before treating door interiors.
- Treat body areas normally covered by trim before refitting items.
- Check that body and door drain holes are clear after the protective wax has dried.
- Keep all equipment clean, especially wax injection nozzles.

Part Number Body Repairs - Water Leaks - Water Leaks

Description and Operation

General

If water leaks occur after bodywork repairs, the cause can be established using the checks described below. A systematic and logical procedure is required to locate water leaks. Before beginning extensive checks, a thorough visual inspection must be carried out.

- Visual Inspection
 - The following characteristics may indicate existing leaks:
 - Check the clearance and accurate fit of ancillary components such as the hood, tailgate, liftgate, doors, and so on.
 - Check for correct fit and possible damage to sealing elements such as blanking plugs, rubber door seals, and so on.
 - Check water drain holes for unhindered flow.
- Various tests can be used to provide further information on possible leaks:
 - Water test
 - Washer test
 - Road test
 - Chalk (powder) test

Practical execution of tests and checks

Water test

NOTE: Never aim a jet of water directly at a rubber seal.

Carry out the water test with a second person present (in the passenger compartment). Use variable washer nozzles (concentrated water jet to fine spray mist). Start in the lower section and spray the whole area, working upwards in stages.

Washer test

Further tests can be carried out in the washer system. Some leaks originate here, or only occur here.

The relevant passenger compartment should be checked using a torch during the wash procedure.

Road test

If no leaks are located during the tests above, road tests should be carried out on wet roads. Road tests under various conditions:

- At various speeds.
- On various road surfaces (asphalt to cobbles).
- With loaded or unloaded vehicle.
- Driving through puddles (splash water).

Chalk test (powder test)

In this test, the clamping load and the bearing surface of the seal are checked. Performing the test:

- Dust the door seal with powder or coat with chalk.
- Coat the bearing surface of the seal with a thin film of Vaseline.
- Slowly close the door and open it again.
- Check the width and continuity of the imprint on the door seal.

Other test equipment

Other equipment such as stethoscopes, UV lamps, special mirrors or ultrasound measuring instruments can be used to locate leaks.

Rectifying the leak using recommended tools, auxiliary equipment and materials

Tools and auxiliary equipment:

- Dry, absorbent cloths
- Variable washer nozzle
- Torch, fluorescent tube
- Mirror
- Compressed air
- Seal lip installer
- Wet/dry vacuum cleaner
- Sealing compound compressor
- Remover for interior trim
- Cutter blade or pocket knife
- Wedge (wood or plastic)
- Hot air blower
- Special mirror for concealed leaks

- Air flow checker
- Sealing compound (tape and plastic compound)
- Multi-purpose sticker
- Clinched flange sealer
- Window sealing compound
- Water shield (PVC)
 Double-sided adhesive tape for water shield
- Methylated spirit (available from trade outlets)
- PU adhesive
- Silicone remover
- Tar remover

Water leaks according to mileage or running time

Increasing mileage has an effect on the problem of leaks in a vehicle. Possible influencing factors are:

Servicing and maintenance of seals:

- No maintenance, lack of maintenance or incorrect maintenance

- Using an incorrect agent
- Damaged seals:

- As a result of aging, wear or incorrect handling/assembly.

- Heavy soiling of the vehicle:
 - Heavy soiling of a vehicle can seriously impair the function of water drainage channels in particular, and also of rubber seals.
- Age-related factors:
 - Environmental factors
 - UV radiation
 - Extreme climatic conditions
- Corrosion can have a serious impact on bodywork, in particular as a result of:
 - Lightly or heavily rusted seal carriers
 - Rusted body seal welds
 - Perforation corrosion

Water leaks after body repairs

If a vehicle develops a leak after body repairs, the following points must be taken into consideration in particular:

The correct seating of ancillary components and their seals must be checked.

The correct alignment of doors/tailgate and liftgate must be checked. The associated seals must not be damaged and must be installed correctly.

Check that panel seams are correctly sealed.

The correct seating of rubber grommets must be checked.

Directly-glazed windows must have correct and complete bonding.

Water drainage system

If a vehicle develops water leaks, then areas into which water is routed or drained should be checked first.



Item	Description
1	Water drainage, front
2	Water drainage, side and rear
3	Roof drainage
4	Engine compartment drainage

Water leaks, diagnosis and corrective action: Front passenger compartment

Windscreen

Diagnosis:

- Ingress of water into A-pillar area or instrument cluster area and rocker panel area.

Cause:

- Breaks in adhesive beads

Corrective action:

- The breaks in adhesive beads can be located from inside by using compressed air. The leak can be identified from outside by the escaping air.

The second test method is by means of a water test. The outer trims must be raised carefully using a plastic wedge. The leak should be located from inside by a second assistant.

Side windows

In the case of side windows, the same problems can arise as for a windscreen. The same corrective actions must therefore be used.

Door seal

Diagnosis:

- Water ingress in the lower part of the interior door trim or in the rocker panel area.

Cause:

- The water shield fitted behind the interior door trim exists to drain off water that has entered the door via the drainage holes, either downwards or outwards. If the water shield seal is damaged or has been fitted incorrectly, then water can get into the passenger compartment.
- In addition to this, the drainage holes can become clogged with leaves, dirt or excess cavity protection agents.
- Water gathers in the door and ingresses into the passenger compartment. - Check water shield for damage or correct fitting.
- If the water shield needs to be re-bonded, then approved seam sealer should be used.
- Before the water shield is installed, the drainage holes must be checked for unhindered flow.

Door seals

Diagnosis:

- Ingress of water into the rocker panel area

Cause:

- Insufficient clamping load between seal and door.

Corrective action:

NOTE: When adjusting the clamping load, the profile alignment of the relevant components must always be taken into consideration.

NOTE: Do not realign the flange too far in the direction of the door, as this can reduce the bearing surface of the seal to the door.

- Check clamping load:
- The easiest way to check the clamping load of a seal to the respective bearing surface is by means of a paper strip test. This consists of trapping strips of paper at various points between the door and the seal, and fully closing the door. If it is possible to pull out the paper with no great resistance, then the clamping load is too low.
- Adjust the clamping load:
- The clamping load is normally adjusted using the striker. When doing so, the edge alignment from the door to the side panel, or from the front door to the rear door must be taken into account.
- Another setting method is to realign the panel flange for the seal mounting. The clamping load is increased by moving the flange towards the door.
- Check the bearing surface:
- Apply chalk evenly to the surface of the seal. Evenly coat the bearing surface of the door with Vaseline.
- Close the door fully, the lock must engage. Open the door. The imprint of the chalk (bearing surface) can be
- identified in the film of Vaseline.
- The bearing surface should be at least 5mm across at all points.

Other causes:

- The door seal must completely seal the door where it meets the bodywork.
- Water can ingress directly or indirectly into the interior of the vehicle if the seal is damaged at any point.

Corrective action:

- A damaged or worn door seal must always be renewed in full.
- When renewing the seal, the following must be taken into account:
- Always fit the seal first in the area of the narrow radii (corner points).
- Next, secure the seal to the flange evenly by tapping lightly with a rubber hammer. The installed seal must not be kinked at any point.

NOTE: The prescribed length of a seal must not be shortened.

Other cause:

- The door seal is attached to the welded flange all the way round. If this welded flange is uneven or damaged at any point (usually in areas with small radii) then this point could be subject to leaks.
- A stretched seal carrier can also cause a leak.
- In both cases, water gets into the vehicle interior under the seal carrier.

Corrective action:

- Align the deformed welded flange using a hammer and anvil block, prevent and, if necessary, repair any paint damage.

Sliding roof/tilting roof

Diagnosis:

- Ingress of water at sliding roof aperture

Cause:

- The sliding roof/tilting roof is installed in a water trap. The water drains off via the water trap, water drain holes and drain hoses. The drain hoses lead downwards on both sides via the A-pillar and B-pillar.
- The drain holes or drain hoses can become clogged with leaves, dirt, underbody protection and so on.

Corrective action:

NOTE: In the case of a sliding or tilting roof, the external rubber seal and the lock actuator or latch mechanism must be checked first of all.

- Check the water trap for leaks.
- Check the drain hoses for leaks and for correct connection to the water trap.
- Check the drainage system for unhindered flow, and blow out with compressed air if necessary.
- Check the external seal and the correct adjustment of the sliding roof.

Liftgate

Diagnosis:

- Ingress of water into rear headlining area and luggage area.

Cause:

- The leak problems of the tailgate and liftgate correspond to those of the doors.
- In addition to this, the area to be sealed is much bigger. The routing holes for cables and hoses must also be sealed
- The rubber grommets for the routing holes must be checked for damage and correct seating (fully unhooked). - The mounting points of the liftgate hinges may leak.

- Corrective action:
 - Check the rubber grommets and renew if necessary.
 - Check the hinge mounting points, and re-seal with sealing compound if necessary.

Forced air extraction

Diagnosis:

- Ingress of water into side luggage compartment area

- Cause: - The forced air extraction for the vehicle interior is located in the guarter panel lower extension.
 - The rubber flap of the forced air extraction must be able to move freely.

Corrective action:

- Remove the forced air extraction.
- Check the seal area between the bodywork and housing, as well as the rubber flap.
- Renew seal if necessary.

Rear window

Diagnosis:

- Ingress of water into the luggage compartment area

- Cause: - Rear window leaking.
 - Check for leak in the same way as for leaking windscreen.

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Description and Operation

Front End Body Dimensions

NOTES:



Dimensions shown to holes, are always taken from/to the hole centre. They are also always to the body panel surface, not to the top of bolts or components.



Item	From	То	Dimension
А	Headlamp RH inboard fixing hole	Front fender LH forward fixing hole	510.5
В	Transmission LH mounting, forward stud	Engine RH mounting, forward fixing hole	987.2
С	Transmission LH mounting, rear stud	Engine RH mounting, forward fixing hole	1091



Item	From	То	Dimension
A	Front fender RH, rear fixing hole	Front fender LH, rear fixing hole	1549.6
В	Front fender RH, centre fixing hole	Front fender LH, centre fixing hole	1518.1
С	RH Headlamp top inboard fixing hole	LH Headlamp top inboard fixing hole	771





Item	From	То	Dimension
A	Instrument panel carrier RH top fixing hole	Instrument panel carrier LH top fixing hole	1416
В	Instrument panel carrier RH bottom fixing hole	Instrument panel carrier LH bottom fixing hole	1416

Side Panel Dimensions



Item	From	То	Dimension
A	Front door top hinge, top fixing hole	Rear door top hinge, top fixing hole	1129.4
В	Front door top hinge, top fixing hole	Rear door bottom hinge, top fixing hole	1133.8
С	Front door bottom hinge, top fixing hole	Rear door top hinge, top fixing hole	1206.7
D	Front door bottom hinge, top fixing hole	Rear door bottom hinge, top fixing hole	1122.4



Item	From	То	Dimension
E	Rear door top hinge, top fixing hole	Rear door striker, top fixing hole	844.4
F	Rear door bottom hinge, top fixing hole	Rear door striker, top fixing hole	884.7



Item	From	То	Dimension
А	Front seat belt retractor fixing hole	Front seat belt anchorage fixing hole	1684.37

Rear End Body Dimensions



Item	From	То	Dimension
А	RH Rear lamp location hole	LH Rear lamp location hole	1501.8
В	RH Rear lamp top fixing hole	LH Rear lamp top fixing hole	1109.6
С	Rear bumper RH outboard top fixing stud	Rear bumper LH outboard top fixing stud	1024.7

Under Body Dimensions



Item	From	То	Dimension
A	Front subframe front fixing hole	Front subframe rear fixing hole	510.5
В	Front subframe RH rear fixing hole	Front subframe LH rear fixing hole	821
С	Front subframe RH front fixing hole	Front subframe LH front fixing hole	860
D	Front subframe front fixing hole	Front subframe rear fixing hole	983.4



Item	From	То	Dimension
E	Front subframe front fixing hole	Rear subframe rear fixing hole	3608.5
F	Front subframe front fixing hole	Rear subframe front fixing hole	3035.8
G	Front subframe front fixing hole	Rear towing eye rear fixing hole	4138.1



Item	From	То	Dimension
Н	Rear subframe LH rear fixing hole	Rear towing eye rear fixing hole	1011.8
I	Rear subframe RH rear fixing hole	Rear towing eye rear fixing hole	560.8
J	Front subframe front fixing hole	Rear towing eye rear fixing hole	1015.3
К	Rear subframe front fixing hole	Rear towing eye rear fixing hole	1103.6
L	Rear subframe RH rear fixing hole	Rear subframe LH front fixing hole	1139
Μ	Rear subframe RH front fixing hole	Rear subframe LH front fixing hole	908.9

Gap and Profile measurements

The following information is to be used as a guide to assist the technician in installing exterior body panels and trim items so as to achieve a correctly aligned and cosmetically acceptable vehicle.





Section	Description	Gap	Profile
A-A	Hood to front bumper cover	4.0 ± 2.0	N/A
B-B	Hood to headlamp	4.0 ± 2.0	2.0 ± 2.0
C-C	Hood to front fender	3.5 ± 1.0	0.5 ± 0.5
D-D	Front fender to headlamp	2.0 ± 1.0	N/A
E-E	Front fender to front bumper cover	0.0 ± 0.5	0.5 ± 0.7



Section	Description	Gap	Profile
A-A	Front bumper cover to headlamp	3.0 ± 2.0	N/A
B-B	A-pillar to hood	3.0 ± 1.3	-1.0 ± 0.9
C-C	Front fender to front bumper cover	0.0 ± 0.5	0.5 ± 0.7
D-D	Front door to front fender	3.65 ± 1.0	-0.5 ± 1.0
E-E	A-pillar to windshield	4.0 ± 1.0	N/A









Section	Description	Gap	Profile
A-A	Rocker panel finisher to front door	4.0 ± 1.5	N/A
B-B	Windshield to roof panel	4.0 ± 1.1	N/A
C-C	Front door to rear door	3.65 ± 1.0	-0.5 ± 1.0

Section	Description	Gap	Profile
D-D	Front door to rear door at waist	3.65 ± 1.0	0.0 ± 1.0
E-E	Front door to rear door upper	3.65 ± 1.0	0.0 ± 1.0
F-F	Front door to roof	11.7 ± 1.6	N/A











Section	Description	Gap	Profile
A-A	Rear door to quarter panel	3.65 ± 1.0	0.00 ± 1.0

Section	Description	Gap	Profile
B-B	Rear door to quarter panel upper	7.9 ± 1.5	N/A
C-C	Rocker panel finisher to rear door	4.0 ± 1.5	N/A
D-D	Rear door to roof panel	7.9 ± 1.5	N/A















Section	Description	Gap	Profile
A-A	Luggage compartment lid to rear window glass	6.0 ± 1.5	N/A

Section	Description	Gap	Profile
B-B	Rear lamp to rear bumper cover	2.0 ± 0.9	-2.0 ± 1.5
C-C	Rear lamp to rear quarter upper	2.0 ± 0.9	-2.0 ± 1.5
D-D	Luggage compartment lid to rear bumper cover	6.0 ± 1.7	N/A
E-E	Luggage compartment lid to quarter panel	3.5 ± 1.1	0.5 ± 0.5
F-F	Rear lamp to rear bumper cover	2.0 ± 0.8	-2.0 ± 1.8

Front End Sheet Metal Repairs - Front End Sheet Metal Description and Operation

Front end service panels



IOTE: The illustration may indicate either hand of the service panel, the opposite hand will be similar.

Item	Description
1	Front bumper cover
2	Front bumper
3	Front fender
4	Hood
5	Hood hinge
6	Hood latch panel
7	Hood latch panel mounting bracket
8	Front fender support bracket
9	Fender apron panel front extension
10	Fender mounting plate
11	Hood strut mounting bracket
12	Front wheelhouse section
13	Front bumper mounting
14	Front side member
15	Front side member section
16	Front side member closing panel
17	Front side member closing panel section
18	Front side member & suspension top mount assembly
19	Fender apron panel
20	Fender apron panel front section
21	Fender apron panel closing panel

Time schedules, front end

The following information shows the total time taken to replace single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim, (MET), items, plus paint times based on Metallic Clear Over Base Paint, (blends to adjacent panels are not included).

The times shown were generated by Thatcham, (the Motor Insurance Repair Research Centre), and are to be used as a guide only.

Single panel times

Panel Description	Hours
Hood	7.4
Front bumper cover	7.8
Front fender L/H	8.9
Front Fender R/H	9.1
Hood latch panel	6.6
Instrument panel console remove and install	5.3
Engine and suspension assembly remove and install	9.3

Combination panel replacement times

The following panel combination times show the total time to remove/install body panels, MET items and paint times based on Metallic Clear Over Base Paint process, (blends to adjacent panels are not included).

Combination panel times

Panel Description	Hours
Hood	
Hood hinge L/H and R/H	
Front bumper cover	
Front bumper	
Front fender	
Hood latch panel	
Hood latch panel mounting bracket	
Front fender support bracket	
Total Time	L/H 23.5 R/H 23.6

Combination panel times

Panel Description	Hours
Hood	
Hood hinge L/H and R/H	
Front bumper cover	
Front bumper	
Front fender L/H and R/H	
Hood latch panel	
Hood latch panel mounting bracket L/H and R/H	
Front fender support bracket L/H and R/H	
Total Time	26.8

Combination panel times

Panel Description	Hours
Hood	
Hood hinge L/H and R/H	
Front bumper cover	
Front bumper	
Front fender	
Hood latch panel	
Front fender support bracket	
Fender apron panel	
Fender apron panel closing panel	
Front side member & suspension top mount assembly	
Fender mounting plate	
Front fender lower mounting	
Engine and suspension assembly remove and install	
Instrument panel console remove and install	
Total Time	L/H 44.3
	R/H 44.5

Combination panel times

Panel Description	Hours
Hood	
Hood hinge L/H and R/H	
Front bumper cover	
Front bumper	
Front fender L/H and R/H	
Hood latch panel	
Front fender support bracket L/H and R/H	
Fender apron panel L/H and R/H	
Fender apron panel closing panel L/H and R/H	
Front side member & suspension top mount assembly L/H and R/H	
Fender mounting plate L/H and R/H	
Front fender lower mounting L/H and R/H	
Engine and suspension assembly remove and install	
Instrument panel console remove and install	
Total Time	57.6

Combination panel times

Panel Description	Hours
Hood	
Hood hinge L/H and R/H	
Front bumper cover	
Front bumper	
Front fender	
Hood latch panel	
Front fender support bracket	
Front bumper mounting	
Front side member section	
Front side member closing panel section	
Total Time	L/H 28.0
	R/H 28.1

Combination panel times

Panel Description	Hours
Hood	
Hood hinge L/H and R/H	
Front bumper cover	
Front bumper	
Front fender	
Hood latch panel	
Front fender support bracket	
Front fender support bracket mounting	
Front fender lower mounting	
Front bumper mounting	
Front side member	
Front side member closing panel	
Front wheelhouse section	
Engine and suspension assembly remove and install	
Total Time	L/H 37.6 R/H 37.4

Front End Sheet Metal Repairs - Fender Apron Closing Panel Front Section

Removal and Installation



 \triangle

1. NOTE: The fender apron closing panel front section is manufactured from mild steel.

The fender apron closing panel front section is cut from the fender apron panel closing service panel.

- 2. The fender apron closing panel front section is replaced in conjunction with:
 - Front bumper cover
 - Hood
 - Front fender
 - Hood latch panel
 - Fender apron panel front extension
 - Fender apron panel front section
- 3. For additional information relating to this repair procedure please see the following:

For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

 Remove the fender apron panel front section. For additional information, refer to: <u>Fender Apron Panel Front Section</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).

with the fender apron panel front section.

6. NOTE: Make sure the section is cut to cater for the extent of damage and to allow a minimum 50mm staggered joint

Cut the front section from the fender apron panel closing

5. Disconnect the generator electrical connectors.

service panel.







7. CAUTION: Care should be taken not to cut through into adjacent panels.

Using the new panel for reference and allowing for an overlap, cut the old panel at the points indicated.



8. NOTE: To avoid unnecessary MAG plug welding on installation, spot welds must be drilled from underneath where this is possible.

Drill out the spot welds.

9. Separate the joints and remove the old panel.



CAUTION: Care should be taken not to cut through 1. into adjacent panels.

Offer up, align and clamp the new panel into position, overlapping the old panel remnant. Cut through the new panel, partially cutting the old panel, at the points where the MAG butt joint is to be made.

- 2. Remove the new panel.
- 3. Cut and remove the old panel remnants.

Prepare the old and new panel joint surfaces.

4. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.

Installation

5. Tack weld the butt joint.



6. NO

NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.

- 7. Dress the tack welds.
 - 8. MAG weld the butt joint.



9. Dress all welded joints.

1. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Fender Apron Panel

Removal and Installation

E107734

- Removal
 - 1. NOTE: The fender apron panel is manufactured from mild steel.

The fender apron panel is serviced as a separate weld-on panel.

- 2. The fender apron panel is replaced in conjunction with:
 - Front bumper cover
 - Front fender
 - Fender apron panel closing panel
 - Hood
 - Hood hinge
 - Hood strut mounting bracket
 - Fender mounting plate
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) /

Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation) /

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the hood.
 For additional information, refer to: <u>Hood</u> (501-02 Front End Body Panels, Removal and Installation).
- 5. Remove the hood hinge.
- Remove the fender apron panel closing panel. For additional information, refer to: <u>Fender Apron Panel Closing Panel</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 7. Disconnect the generator electrical connectors.
- Remove the windshield wiper motor and linkage. For additional information, refer to: <u>Windshield Wiper Motor</u> (501-16 Wipers and Washers, Removal and Installation).
- Remove the ECM (engine control module). For additional information, refer to: Engine Control Module (ECM) (303-14A, Removal and Installation) / <u>Engine Control Module (ECM)</u> (303-14B Electronic Engine Controls - V6 3.0L Petrol, Removal and Installation) / Engine Control Module (ECM) (303-14C, Removal and Installation).



10. NOTE: If the hood strut mounting bracket is to be replaced, it is not necessary to remove it.

Drill out the spot welds to remove the hood strut mounting bracket.



11. ONOTE: If the fender mounting plate is damaged it is not necessary to remove it from the fender apron panel.

Drill out the spot welds to release the fender mounting plate.



12. NOTE: If the fender mounting plate is undamaged it can be reused by releasing it from the fender apron panel, leaving it attached to the suspension top mount. Drill out from underneath to allow spot welds to be used in installation.

Drill out the spot welds, from underneath, to release the fender mounting plate.

 13. ONOTE: Use a belt sander where there is no access to drill. Drill out the spot welds.



14. Separate the joints and remove the old panel.

Installation



1. Drill holes in the new panel ready for MAG plug welding.

2. Prepare the old and new panel joint surfaces.



- 3. NOTE: If the hood strut mounting bracket is to be replaced, it must be spot welded to the fender apron panel prior to installation. If it is to be reused it should be MAG plug welded to the fender apron panel after installation.

Install the new hood strut mounting bracket.

 Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



5. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.



6. Offer up, align and clamp the new fender mounting plate into position, if correct, proceed to next step, if not rectify and recheck before proceeding.



7.



8.



9.



Spot weld the new fender mounting plate into position.

If the original fender mounting plate is being reused, spot weld as indicated.

MAG Plug weld.

Offer up, align and clamp the hood strut mounting bracket into position and MAG plug weld.

10.

- 11. Dress all welded joints.
- 12. The installation of associated panels and components is the reversal of removal procedure.Tighten the hood hinge to 25 Nm.

Front End Sheet Metal Repairs - Fender Apron Panel Closing Panel

Removal and Installation

E 107771

2. The fender apron panel closing panel is replaced in conjunction with:

separate weld-on panel.

The fender apron panel closing panel is serviced as a

- Front bumper cover
- Front fender
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the front fender. For additional information, refer to: <u>Front Fender</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 5. Disconnect the generator electrical connectors.
- Remove the pedestrian protection hood actuator. For additional information, refer to: <u>Pedestrian Protection Hood Actuator</u> <u>LH</u> (501-20C Pedestrian Protection System, Removal and Installation) / <u>Pedestrian Protection Hood Actuator RH</u> (501-20C Pedestrian Protection System, Removal and Installation).
- Remove the secondary bulkhead panel. For additional information, refer to: <u>Secondary Bulkhead Panel LH - 3.0L</u> <u>NA V6 - AJ27</u> (501-02 Front End Body Panels, Removal and Installation) / <u>Secondary Bulkhead Panel RH - 3.0L NA V6 - AJ27</u> (501-02 Front End Body Panels, Removal and Installation).
- 8. Remove the pedestrian protection actuator bracket.
- 9. Release and position the fuse box to one side.
- 10. Release and position the wiring harness to one side.



Removal


NOTE: Spot welds must be drilled from underneath, this will make sure the new panel can be spot welded on 11. installation. Use a belt sander where there is no access to drill.

Drill out the spot welds.

12. Separate the joints and remove the old panel.

Installation

1. Drill holes in the new panel ready for MAG plug welding.



E107773

- 2. Prepare the old and new panel joint surfaces.
- 3. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



4. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.



5. MAG Plug weld.



- 6. Dress all welded joints.
- 7. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Fender Apron Panel Front Extension

Removal and Installation

Removal

1. NOTE: The fender apron panel front extensions are manufactured from mild steel.

The right-hand and left-hand fender apron panel front extensions are serviced bolted on the hood latch panel. On the vehicle they are welded to the fender apron panels and inner wheelhouse.



- 2. The fender apron panel front extension is replaced in conjunction with: 1. Front bumper cover
 - 2. Front bumper
 - 3. Hood latch panel
 - 4. Front fender
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) /

Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation) /

<u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the hood latch panel. For additional information, refer to: <u>Hood Latch Panel</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- Remove the front fender.
 For additional information, refer to: <u>Front Fender</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 6. Disconnect the generator electrical connectors.
- 7. If the left-hand fender apron panel front extension is to be repaired,

E 103205

8. Drill out the spot welds.

9. Separate the joints and remove the old panel.

Installation

1. NOTE: If only one new fender apron panel front extension is to be fitted, remove the other side from the service panel and discard.

Offer up the new hood latch service panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



2. With the new panel offered up and aligned, drill 3 holes, in the areas indicated, ready for MAG plug welding.

- 3. Remove the new hood latch service panel.
- 4. Prepare the old and new panel joint surfaces.
- 5. Offer up the new hood latch service panel, align and clamp into position.

6. MAG Plug weld.



- 7. Remove the hood latch panel in readiness for the paint refinishing process.
- 8. Dress all welded joints.
- 9. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Fender Apron Panel Front Section

Removal

Removal and Installation

Ε107776

1. NOTE: The fender apron panel front section is manufactured from mild steel.

The fender apron panel front section is cut from the fender apron service panel.

- 2. The fender apron panel front section is replaced in conjunction with:
 - Front bumper cover
 - Hood
 - Front fender
 - Hood latch panel
 - Fender apron panel front extension
 - Fender apron closing panel front section
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u>

(100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

4. NOTE: Make sure the fender apron closing panel front section is cut to allow a minimum 50mm staggered joint with the fender apron panel front section.

Remove the fender apron closing panel front section. For additional information, refer to: <u>Fender Apron Closing Panel Front</u> <u>Section</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).

5. Disconnect the generator electrical connectors.



6. NOTE: The section is cut as indicated to allow access to dress the MAG butt weld.

Cut the old panel at the point indicated.

7. Drill out spot welds.



- 8. Separate the joints and remove the old panel.
 - 9. Cut the new front section from the fender apron panel service panel at the point indicated.



Installation



1. Offer up, align and clamp the new panel into position overlapping the old panel remnant. Cut along the edge of the old panel, through the new panel where the MAG butt joint is to be made.

- 2. Remove the new panel.
- 3. Prepare the old and new panel joint surfaces.
- Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 5. Tack weld the butt joint.



6. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.

7. Dress the tack welds.

8. MAG weld the butt joint.



- 9. Dress all welded joints.
- 10. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Front Bumper Mounting

Removal and Installation

Removal



E 108360

1. NOTE: The front bumper mounting is manufactured from High Strength Low Alloy steel, 350MPa, (HSLA350).

The front bumper mounting is serviced as a separate weld-on panel, it is also serviced on the front side member & suspension top mount assembly.

- 2. The front bumper mounting is replaced in conjunction with:
 - Front bumper cover
 - Front bumper
 - Hood latch panel
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the hood latch panel. For additional information, refer to: <u>Hood Latch Panel</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 5. Disconnect the generator electrical connectors.







7. Separate the joints and remove the old panel.

Installation

1. NOTE: Remove the caged nuts for the front bumper fixings, to allow for preparation.

Prepare the old and new panel joint surfaces.

2. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



3. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.

E 108361

- 4. Dress all welded joints.
- 5. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Front Fender

Removal

Removal and Installation

E102992

1. NOTE: The front fender is manufactured from mild steel.

The front fender is serviced as a separate bolt-on panel.

- 2. The front fender is replaced in conjunction with: 1. Front bumper cover
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the front bumper cover. For additional information, refer to: <u>Front Bumper Cover</u> (501-19 Bumpers, Removal and Installation).
- Remove the fender splash shield. For additional information, refer to: <u>Fender Splash Shield</u> (501-02 Front End Body Panels, Removal and Installation).
- If the right-hand front fender is to be repaired, remove the windshield washer reservoir.
 For additional information, refer to: <u>Windshield Washer Reservoir</u> (501-16 Wipers and Washers, Removal and Installation).
- Remove the headlamp assembly.
 For additional information, refer to: <u>Headlamp Assembly</u> (417-01 Exterior Lighting, Removal and Installation).
- 9. Remove the rocker panel outer moulding.
- 10. Remove the front fender.



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

Remove the front fender moulding.

Installation

- 1. Offer up the new panel. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- Install the front fender.
 Tighten to 10 Nm.



3. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Front Fender Support Bracket

Removal and Installation

Removal



1. NOTE: The front fender support bracket is manufactured from mild steel.

The front fender support bracket is serviced as a separate weld-on panel.

E112646

- 2. The front fender support bracket is replaced in conjunction with:
 - Front bumper cover
 - Front fender
 - Hood latch panel
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the hood latch panel. For additional information, refer to: <u>Hood Latch Panel</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 5. Disconnect the generator electrical connectors.
- 6. If the left-hand front fender support bracket is to be repaired, remove the air conditioning (A/C) pipe.
- 7. Release and position the front fender support bracket wiring harness to one side.



E 112648

8. NOTE: If the front fender lower mounting is undamaged it should be retained for reuse.

Remove the front fender lower mounting retaining bolt.

9. ONTE: Use a belt sander where there is no access to drill.

Drill out the spot welds.

10. Separate the joints and remove the old panel.

Installation

- 1. Prepare the old and new panel joint surfaces.
- 2. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



3. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible spot welds should be installed adjacent to the original.

Spot weld.



4. Offer up the front fender lower mounting and loosely install its fixing bolt. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.

- 5. Tighten the front fender lower mounting fixing bolt.Tighten to 10 Nm.
- 6. Dress all welded joints.
- 7. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Front Side Member

Removal and Installation

Removal



1. NOTE: The front side member is manufactured from High Strength Low Alloy Steel, 350MPa, (HSLA350).

The front side member is serviced as a separate weld-on panel, which includes the hood latch panel mounting bracket. This method is to install a "long" section of the service panel.

E111823

- 2. In this procedure, make sure that the vehicle is correctly aligned, it must be placed on an approved alignment jig.
- 3. The front side member is replaced in conjunction with:
 - Front bumper cover
 - Front bumper
 - Front bumper mounting
 - Hood
 - Hood latch panel
 - Front fender support bracket
 - Front fender support bracket mounting
 - Front wheelhouse section
 - Front side member closing panel
 - Engine, transmission / transaxle, front subframe and front suspension, as an assembly
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- 5. Remove the hood.

For additional information, refer to: <u>Hood</u> (501-02 Front End Body Panels, Removal and Installation).

- Remove the front wheelhouse section. For additional information, refer to: <u>Front Wheelhouse Section</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- Remove the engine, transmission / transaxle, front subframe and front suspension, as an assembly.
 For additional information, refer to: Engine (303-01A, Removal) / Engine (303-01B Engine - V6 3.0L Petrol, Removal) / Engine (303-01D, Removal) / Engine (303-01E, Removal) / Transmission - 2.7L Diesel (307-01, Removal) / Transmission - 2.7L Diesel (307-01B Automatic Transmission/Transaxle - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal) /

Transmission (307-01A Automatic Transmission/Transaxle - V6 3.0L Petrol, Removal) / Transmission - 4.2L (307-01, Removal) / Transmission - V8 5.0L Petrol/V8 S/C 5.0L Petrol (307-01B Automatic Transmission/Transaxle - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal) / Front Shock Absorber (204-01 Front Suspension, Removal and Installation) / Front Subframe - 2.7L Diesel (502-00, Removal and Installation) / Front Subframe - V6 3.0L Petrol (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation) / Front Subframe - 4.2L, Vehicles Without: Supercharger (502-00, Removal and Installation) / Front Subframe - 4.2L, Vehicles With: Supercharger (502-00, Removal and Installation).

- Remove the pedestrian protection hood actuator. For additional information, refer to: <u>Pedestrian Protection Hood Actuator</u> <u>LH</u> (501-20C Pedestrian Protection System, Removal and Installation) / <u>Pedestrian Protection Hood Actuator RH</u> (501-20C Pedestrian Protection System, Removal and Installation).
- If the drivers side front side member and suspension top mount is to be repaired, remove the brake master cylinder and reservoir. For additional information, refer to: <u>Brake Master Cylinder</u> (206-06 Hydraulic Brake Actuation, Removal and Installation) / <u>Brake Fluid Reservoir</u> (206-06 Hydraulic Brake Actuation, Removal and Installation).
- 10. If the left-hand front side member and suspension top mount assembly is to be repaired, remove the fuel supply and return lines.
- 11. Release and position the front side member wiring harness to one side.
- 12. Remove any remaining miscellaneous components from the repair area.



E117044

13. NOTE: Retain the front fender support bracket mounting if it is to be reused. If the front fender support bracket mounting is to be renewed, it is not necessary to remove or retain it.

Drill out the spot welds to remove the front fender support bracket mounting.



14. Remove the bulk of the damaged panels by cutting through the front side member and the front side member closing panel as indicated.

E117045





Cut the front side member closing panel as indicated.

16. Drill out the spot welds from the front side member closing panel as indicated.



17. ANOTE: Retain the front side member closing panel remnant as it will be used as a template.

Separate the joints and remove the front side member closing panel remnant.



18. **C**NOTE: Care should be taken not to cut through into the front side member inner lower reinforcement.

Mark out the position where the front side member MAG butt joint is to be made and cut through the panel at this point as indicated.

19. **ONOTE:** Where possible spot welds must be drilled out as indicated, to allow the new panel to be spot welded on installation.

Drill out the spot welds as indicated.





20. **O**NOTE: Retain the bolts for refitment on installation. Remove the retaining bolts as indicated.

21. ANOTE: Retain the front side member remnant as it will be used as a template.

Separate the joints and remove the front side member remnant.

Installation



1. Drill out one spot weld, separate and cut a template from the rear of the front side member remnant as indicated.



2. **ONOTE:** Dress the panel joint surfaces of the template to allow a good fit.

Offer up, align and clamp the template into position on the new side member service panel. Cut along the edge of the template, through the new panel, as indicated, where the MAG butt joint is to be made.



3. Cut a template from the rear of the front side member closing panel remnant as indicated.

E117053



4. ANOTE: Dress the panel joint surfaces of the template to allow a good fit.

Offer up, align and clamp the front side member closing panel remnant into position on the new side member closing panel service panel. Cut along the edge of the template, through the new panel, as indicated, where the MAG butt joint is to be made.

- 5. Prepare the panel joint surfaces of the old and new front side member.
- 6. Offer up the new front side member and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



7. Install the retaining bolts.• Tighten to XXNm.

- 8. Tack MAG weld the front side member butt joint.
- 9. Dress the front side member MAG tack welds.





11. MAG plug weld.



12. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



- 13. Dress all welded joints.
- 14. Apply a zinc rich primer to any bare metal surfaces at this stage.
 - 15. Drill holes in the new side member closing panel ready for MAG plug welding.



E 117058

- 16. Prepare the panel joint surfaces of the old and new front side member closing panel.
- 17. Offer up the new front side member closing panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 18. Tack MAG weld the front side member closing panel butt joint.
- 19. Dress the front side member closing panel MAG tack welds.

20. MAG weld the front side member closing panel butt joint.



21. MAG plug weld.



E 117060

22. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



- 23. Dress all welded joints.
- 24. NOTE: If a new front fender support bracket mounting is to be installed, drill 3 holes ready for MAG plug welding.

Prepare the panel joint surfaces of the front fender support bracket mounting and the front side member closing panel.

25. Offer up the front fender support bracket mounting and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



26. MAG plug weld.

E117044

- Install the front bumper mounting. For additional information, refer to: <u>Front Bumper Mounting</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 29. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.
- 30. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Front Side Member and Suspension Top Mount Assembly

Removal and Installation

Removal

1. NOTE: The front side member and suspension top mount assembly is, an assembly of panels, manufactured from High Strength Low Alloy Steel, 350MPa, (HSLA350) and mild steel.

The front side member and suspension top mount assembly is serviced as a separate weld-on panel. The assembly includes, the front bumper mounting, hood latch support panel, front side member, front side member closing panel, front wheelhouse section, front fender support bracket mounting, suspension top mount and the inner apron and wheelhouse panels



E112841

- 2. In this procedure, to make sure that the vehicle is correctly aligned, it must be placed on an approved alignment jig.
- 3. The front side member and suspension top mount assembly is replaced in conjunction with:
 - Front bumper cover
 - Front bumper
 - Front fender
 - Hood
 - Hood hinge
 - Hood latch panel
 - Front fender support bracket
 - Fender apron panel front extension
 - Fender apron panel closing panel
 - Fender apron panel
 - · Hood strut mounting bracket

- Fender mounting plate
- Instrument panel console
- Engine, transmission / transaxle, front subframe and front suspension, as an assembly
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the fender apron panel front extension.
 For additional information, refer to: <u>Fender Apron Panel Front Extension</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- Remove the front fender support bracket.
 For additional information, refer to: <u>Front Fender Support Bracket</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- Remove the fender apron panel. For additional information, refer to: <u>Fender Apron Panel</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).

8. Remove the engine, transmission / transaxle, front subframe and front suspension, as an assembly. For additional information, refer to: Engine (303-01A, Removal) / Engine (303-01B Engine - V6 3.0L Petrol, Removal) / Engine (303-01D, Removal) / Engine (303-01E, Removal) / Transmission - 2.7L Diesel (307-01, Removal) / Transmission - TDV6 3.0L Diesel (307-01B Automatic Transmission/Transaxle - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal) / Transmission (307-01A Automatic Transmission/Transaxle - V6 3.0L Petrol, Removal) / Transmission - 4.2L (307-01, Removal) / <u>Transmission - V8 5.0L Petrol/V8 S/C 5.0L Petrol (</u>307-01B Automatic Transmission/Transaxle - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal) / Front Shock Absorber (204-01 Front Suspension, Removal and Installation) / Front Subframe - 2.7L Diesel (502-00, Removal and Installation) / Front Subframe - V6 3.0L Petrol (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation) / Front Subframe - 4.2L, Vehicles Without: Supercharger (502-00, Removal and Installation) / Front Subframe - 4.2L, Vehicles With: Supercharger (502-00, Removal and Installation).

- Remove the pedestrian protection hood actuator. For additional information, refer to: <u>Pedestrian Protection Hood Actuator</u> <u>LH</u> (501-20C Pedestrian Protection System, Removal and Installation) / <u>Pedestrian Protection Hood Actuator RH</u> (501-20C Pedestrian Protection System, Removal and Installation).
- If the drivers side front side member and suspension top mount is to be repaired, remove the brake master cylinder and reservoir. For additional information, refer to: <u>Brake Master Cylinder (</u>206-06 Hydraulic Brake Actuation, Removal and Installation) / <u>Brake Fluid Reservoir (</u>206-06 Hydraulic Brake Actuation, Removal and Installation).
- 11. If the drivers side front side member and suspension top mount is to be repaired, remove the brake booster.

For additional information, refer to: <u>Brake Booster</u> (206-07 Power Brake Actuation, Removal and Installation).

- 12. Remove the left-hand and right-hand front seats. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- 13. Remove the heater core and evaporator core housing. For additional information, refer to: <u>Heater Core and Evaporator Core</u> <u>Housing</u> (412-01 Climate Control, Removal and Installation).
- Remove the front safety belt retractor. For additional information, refer to: <u>Front Safety Belt Retractor</u> (501-20A Safety Belt System, Removal and Installation).
- 15. Remove the B-pillar side impact sensor. For additional information, refer to: <u>B-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 16. Remove the left-hand and right-hand front floor covering.
- 17. Remove the rear floor covering.
- 18. If the left-hand front side member and suspension top mount assembly is to be repaired, remove the left-hand rear foot well duct.
- 19. If the right-hand front side member and suspension top mount assembly is to be repaired, remove the right-hand rear foot well duct.
- 20. If the drivers side front side member and suspension top mount is being repaired, remove the pedal box.
- 21. Release and position the insulating material at the inner bulkhead to one side.
- 22. Release and position the inner bulkhead and floor panel wiring harness to one side.
- Drain the fuel tank.
 For additional information, refer to: <u>Fuel Tank Draining</u> (310-00 Fuel System General Information, General Procedures).
- 24. If the left-hand front side member and suspension top mount assembly is to be repaired, remove the left-hand under shield.
- 25. If the right-hand front side member and suspension top mount assembly is to be repaired, remove the right-hand under shield.
- 26. If the left-hand front side member and suspension top mount assembly is to be repaired, remove the fuel supply and return pipes.
- 27. For diesel engine vehicles only, if the left-hand front side member and suspension top mount assembly is to be repaired, remove the fuel cooler.
- 28. If the right-hand front side member and suspension top mount assembly is to be repaired, release and position the underfloor wiring harness to

one side.

- 29. If the right-hand front side member and suspension top mount assembly is to be repaired, remove the front to rear brake pipes.
- 30. Remove the exhaust heat shields.
- 31. Release and position the front side member and suspension top mount wiring harness to one side.
- 32. Remove any remaining miscellaneous components from the repair area as necessary.





34. NOTES:



Use a belt sander where there is no access to drill. The three spot welds at the rocker panel should be drilled from outside and right through, to allow MAG plug welding on installation

Drill out the spot welds as indicated.





35. ANOTE: The removal of the bulkhead reinforcement is required to gain access to drill out two spot welds.

Remove the bulkhead reinforcement panel, by performing a saw cut at the points as indicated.





38. Drill out the spot welds as indicated.



39. ANOTE: The spot welds indicated should be drilled from inside the engine compartment, to allow spot welding on installation.

Drill out the spot welds as indicated.

37. Drill out the spot welds as indicated.



40. NOTES:

Remove the NVH (noise, vibration and harshness) sound deadening material to expose the spot welds.

The spot welds indicated should be drilled from inside and right through, to allow MAG plug welding on installation.

Drill out the spot welds as indicated.

41. CAUTION: This step requires the aid of another technician as the removed panel will be heavy.

Separate the joints and remove the old panel.

Installation

 Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



2. NOTE: To avoid overlapping MAG plug welds, the original removal holes must be marked so that they can be avoided when drilling the adjacent MAG plug holes.

Mark the position of the drilled holes as indicated, on the new panel.

3. Remove the new panel.


E 112855



4. NOTE: Holes should be drilled avoiding the areas previously marked.

Drill holes in the new panel ready for MAG plug welding.

- 5. Prepare the old and new panel joint surfaces.
 - 6. NOTE: On installation, a MAG run replaces two spot welds which cannot be MAG plugged due to restricted access.

Prepare the old and new panel joint surfaces at the point indicated, where the MAG run is to be performed.

 Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



8. MAG plug weld at the points indicated.



10. MAG plug weld at the points indicated.



11. MAG plug weld at the points indicated.





12. MAG plug weld at the points indicated.

13. NOTE: A MAG weld run replaces the original two spot welds as there is no access to install spot welds or MAG plug welds in this area. The MAG weld run should be performed avoiding the area of adhesive.

Perform a MAG weld run, of approx 30mm as indicated.





14. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.

- 15. Dress all welded joints.
- 16. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.



17. Install the NVH sound deadening material in the areas indicated.

18. $\Delta_{\text{NOTE: Make sure all underbody joints are fully sealed following this repair procedure.}$

The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Front Side Member Closing Panel

Removal and Installation

Removal

 NOTE: The front side member closing panel is manufactured from High Strength Low Alloy Steel, 350MPa, (HSLA350).

The front side member closing panel is serviced as a separate weld-on panel.



E111830

- 2. In this procedure, to ensure the vehicle is correctly aligned, it must be placed on an approved alignment jig.
- 3. The front side member closing panel is replaced in conjunction with:
 Front bumper cover
 - Front bumper
 - Front bumper mounting
 - Hood
 - Hood latch panel
 - Front fender support bracket
 - Front fender support bracket mounting
 - Front wheelhouse section
 - Front side member
 - Engine, transmission / transaxle, front subframe and front suspension, as an assembly
- 4. For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- 5. NOTE: This procedure assumes that if the front side member closing panel is damaged, the front side member will also be damaged. Therefore, the replacement procedure for the front side member closing panel is combined within the front side member procedure.

Remove the front side member. For additional information, refer to: <u>Front Side Member</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).

Installation

1. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Front Side Member Closing Panel Section

Removal and Installation

Removal

 NOTE: The front side member closing panel section is manufactured from High Strength Low Alloy Steel, 350MPa, (HSLA350).

The front side member closing panel section is cut from the front side member closing panel service panel.

E111830

- 2. In this procedure, to make sure that the vehicle is correctly aligned, it must be placed on an approved alignment jig.
- 3. The front side member closing panel section is replaced in conjunction with:
 - Front bumper cover
 - Front bumper
 - Front bumper mounting
 - HoodHood latch panel
 - Front side member section
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) /

Body Repairs (501-25A Body Repairs - General Information, Description and Operation) /

Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation) / Body and Frame (501-26 Body Repairs - Vehicle Specific Information and

Tolerance Checks, Description and Operation).

5. NOTE: This procedure assumes that if the front side member closing panel section is damaged, the front side member section will also be damaged. Therefore the removal procedure for the front side member closing panel section is combined within the front side member section procedure.

Remove the front side member section.

For additional information, refer to: <u>Front Side Member Section (501-27</u> Front End Sheet Metal Repairs, Removal and Installation).

Installation

1. The installation of associated panels and components is the reversal of removal procedure.



Front End Sheet Metal Repairs - Front Side Member Section

Removal

Removal and Installation

1. NOTE: The front side member section is manufactured from High Strength Low Alloy Steel, 350MPa, (HSLA350).

The front side member section is cut from the front side member service panel, which includes the hood latch panel mounting bracket.

E111823

- 2. In this procedure, to make sure that the vehicle is correctly aligned, it must be placed on an approved alignment jig.
- 3. NOTE: This procedure assumes that the front side member closing panel section is damaged. Therefore, the procedure combines the repair of the front side member section and the front side member closing panel section.

The front side member section is replaced in conjunction with:

- Front bumper cover
- Front bumper
- Front bumper mounting
- Hood
- Hood latch panel
- Front side member closing panel section
 For additional information, refer to: Front Side Member Closing Panel Section (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the hood.
 For additional information, refer to: <u>Hood</u> (501-02 Front End Body Panels, Removal and Installation).
- 6. Remove the front bumper mounting. For additional information, refer to: <u>Front Bumper Mounting</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 7. Disconnect the generator electrical connectors.



E111825

8. NOTE: Removal of the hood latch panel mounting bracket is required to enable the section cut line to be marked out and performed on the front side member.

Drill out the spot welds and remove the hood latch panel mounting bracket.

9. ONOTE: The measurements shown allow the section to be performed, avoiding the inner reinforcements and allowing for a minimum 50mm staggered joint with the front side member closing panel section.

Mark out the position where the front side member section MAG butt joint is to be made. Cut through the front side member at this point, also cutting through the front side member closing panel as indicated.





Mark out the position where the front side member closing panel section MAG butt joint is to be made. Cut through the front side member closing panel at this point as indicated.





11. Drill out the spot welds from the front side member closing panel remnant.

12. Separate the joints and remove the front side member closing panel remnant.

Installation



1. NOTE: Removal of the hood latch panel mounting bracket is required to enable the section cut line to be marked out and performed on the front side member. Retain the hood latch panel mounting bracket as it will be reused.

Drill out the spot welds and remove the hood latch panel mounting bracket from the side member service panel.

2. Mark out the position on the front side member service panel, where the section MAG butt joint is to be made and cut the panel at this point as indicated.



E111828



3. Mark out the position on the front side member closing panel service panel, where the section MAG butt joint is to be made and cut the panel at this point as indicated.

4. Prepare the panel joint surfaces of the old and new front side member and front side member closing panel sections.

- 5. Offer up the new front side member section and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 6. Tack MAG weld the front side member section butt joint.
- 7. Dress the front side member section MAG tack welds.





- 9. Dress the front side member section MAG butt joint.
- 10. Apply a zinc rich primer to any bare metal surfaces at this stage.
- 11. Offer up the new front side member closing panel section and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 12. Tack MAG weld the front side member closing panel section butt joint.
- 13. Dress the front side member closing panel section MAG tack welds.



14. MAG weld the front side member closing panel section butt joint.



15. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld the front side member closing panel section to the front side member.

E111834

16. Dress the spot welds and the front side member closing panel section MAG butt joint.



E111906



- 18. Prepare the panel joint surfaces of the new hood latch panel mounting bracket and the corresponding joints on the front side member section.
 - 19. MAG plug weld the hood latch panel mounting bracket to the front side member section.

- 20. Dress the hood latch panel mounting bracket MAG plug welds.
- 21. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.
- 22. The installation of associated panels and components is the reversal of removal procedure.

17. Drill holes in the new hood latch panel mounting bracket ready for MAG plug welding.

Front End Sheet Metal Repairs - Front Wheelhouse Section

Removal

Removal and Installation



1. NOTES:

 $igtaclus_{ ext{The left hand service panel is illustrated.}}$

The front wheelhouse section is manufactured from mild steel.

The front wheelhouse section is serviced as a separate weld-on panel, the left-hand is serviced less the weld-on air cleaner mounting bracket. It is also serviced on the front side member and suspension top mount assembly, the left-hand assembly includes the air cleaner mounting bracket.

- 2. The front wheelhouse section is replaced in conjunction with:
 - Front bumper cover
 - Front fender
 - Hood latch panel
 - Front fender support bracket
- 3. For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u>

(100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection,

Description and Operation) /

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the front fender support bracket. For additional information, refer to: <u>Front Fender Support Bracket</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 5. Disconnect the generator electrical connectors.

6. Drill out the spot welds.



7. NOTE: If the left-hand front wheelhouse section is to be repaired, retain the old panel if the air cleaner mounting bracket is to be reused.

Separate the joints and remove the old panel.

 If the left-hand front wheelhouse section is to be repaired, drill out the spot welds for the air cleaner mounting bracket from underneath so that it can be reused.



E 111997

9. NOTE: If undamaged, the air cleaner mounting bracket should be retained for installation on the new panel.

Separate and remove the air cleaner mounting bracket.

Installation



E111998

1. NOTE: If adjacent panels are being repaired and access allows, spot welds should be installed where possible.

Drill holes in the new panel ready for MAG plug welding.

- 2. Prepare the old and new panel joint surfaces.
- 3. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



4. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.



5. NOTE: If adjacent panels are being repaired and access allows, spot welds should be installed where possible.

MAG plug weld.

- 6. Prepare the panel joint surfaces of the air cleaner mounting bracket.
- 7. Offer up the air cleaner mounting bracket and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
 - 8. Spot weld the air cleaner mounting bracket.



- 9. Dress all welded joints.
- 10. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Hood Latch Panel

Removal and Installation

Removal

1. Δ NOTE: The hood latch panel is manufactured from mild steel.

The hood latch panel is serviced as a separate bolt-on panel and includes the left-hand and right-hand fender apron panel front extensions. These are removed and discarded unless damaged.



E102951

- 2. The hood latch panel is replaced in conjunction with:
 - 1. Front bumper cover
 - 2. Front bumper



 WARNING: The hood latch panel and its associated components form part of the pedestrian protection system, it is essential that any repair or replacement operations do not affect the safe working of the system.

For additional information relating to the pedestrian safety system please see the following: For additional information, refer to: <u>Pedestrian Protection System</u> (501-20C Pedestrian Protection System, Description and Operation).

 For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

 Remove the front bumper. For additional information, refer to: <u>Front Bumper</u> (501-19 Bumpers, Removal and Installation).

- Remove both headlamp assemblies. For additional information, refer to: <u>Headlamp Assembly</u> (417-01 Exterior Lighting, Removal and Installation).
- Remove the condenser core. For additional information, refer to: Condenser Core - 2.7L Diesel (412-03, Removal and Installation) / <u>Condenser Core - V6.3.0L Petrol</u> (412-03 Air Conditioning, Removal and Installation) / Condenser Core - 4.2L, Vehicles Without: Supercharger (412-03, Removal and Installation) / Condenser Core - 4.2L, Vehicles With: Supercharger (412-03, Removal and Installation).
- Remove the radiator. For additional information, refer to: Radiator (303-03A, Removal and Installation) / Radiator (303-03B Engine Cooling - V6 3.0L Petrol, Removal and Installation) / Radiator - Vehicles With: Supercharger (303-03C, Removal and Installation) / Radiator - Vehicles Without: Supercharger (303-03C, Removal and Installation).
- 9. Remove the both hood latch panel braces.
- 10. Remove the cooling fan upper shroud.
- Remove both crash sensors.
 For additional information, refer to: <u>Crash Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 12. Remove the both hood latches.
- 13. Remove the hood safety hook guide.
- 14. Remove both hood latch panel buffers.
- 15. Release and lay aside the hood latch panel wiring harness.
- 16. Remove the old panel.



Installation

- 1. Offer up the new panel. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 2. Install the hood latch panel.Tighten to 10 Nm.



3. The installation of associated panels and components is the reversal of removal procedure.

Front End Sheet Metal Repairs - Hood Latch Panel Mounting Bracket

Removal

Removal and Installation



 NOTE: The hood latch panel mounting bracket is manufactured from mild steel.

The hood latch panel mounting bracket is serviced as a separate weld-on panel.

- 2. The hood latch panel mounting bracket is replaced in conjunction with:
 - Front bumper cover
 - Front bumper
 - Hood
 - Hood latch panel
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) /

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the hood latch panel. For additional information, refer to: <u>Hood Latch Panel</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- Remove the hood. For additional information, refer to: <u>Hood</u> (501-02 Front End Body Panels, Removal and Installation).



6. $\Delta_{\text{drill.}}$ NOTE: Use a belt sander where there is no access to

Drill out the spot welds.

7. Separate the joints and remove the old panel.

Installation

1. Drill holes in the new panel ready for MAG plug welding.



- 2. Prepare the old and new panel joint surfaces.
- Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



4. MAG plug weld.

- 5. Dress all welded joints.
- 6. The installation of associated panels and components is the reversal of removal procedure.

Roof Sheet Metal Repairs - Roof

Description and Operation

Roof service panels



Item	Description
1	Roof panel with sliding roof
2	Roof panel without sliding roof

Time schedules, roof panels

The following information shows the total time taken to install single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim, (MET), items, plus paint times based on Metallic Clear Over Base Paint, (blends for adjacent panels are not included).

The times shown were generated by Thatcham, (the Motor Insurance Repair Research Centre), and are to be used as a guide only.

Single panel times

Panel Description	Hours
Roof panel without sliding roof	18.6

Roof Sheet Metal Repairs - Roof Panel Vehicles With: Sliding Roof Opening Panel

Removal and Installation

Removal

1. NOTE: The roof panel is manufactured from mild steel. The

roof panel is serviced as a separate weld-on panel.



E102825

- 2. The roof panel is replaced in conjunction with:
 - Headliner
 - Windshield
 - Rear window glass
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove both front seats. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).

- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 6. Disconnect the generator electrical connectors.
- 7. Remove the windshield glass. For additional information, refer to: <u>Windshield Glass</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- 8. Remove the rear window glass. For additional information, refer to: <u>Rear Window Glass</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- 9. Remove the roof opening panel frame. For additional information, refer to: <u>Roof Opening Panel Frame (</u>501-17 Roof Opening Panel, Removal and Installation).
- 10. Remove the driver and passenger side front scuff plate trim panels. For additional information, refer to: <u>Front Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 11. Remove the driver and passenger side rear scuff plate trim panels. For additional information, refer to: <u>Rear Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 12. Remove the driver and passenger side air curtain modules. For additional information, refer to: <u>Side Air Curtain Module</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 13. Remove the rear seat backrest.
- 14. Remove the driver and passenger side rear safety belt retractors. For additional information, refer to: <u>Rear Safety Belt Retractor</u> (501-20A Safety Belt System, Removal and Installation).
- Remove the rear center safety belt retractor. For additional information, refer to: <u>Rear Center Safety Belt Retractor</u> (501-20A Safety Belt System, Removal and Installation).
- 16. Remove the driver and passenger side RF filters.
- 17. Remove the diversity antenna module.
- Remove the antenna. For additional information, refer to: <u>Navigation System Antenna</u> (419-07 Navigation System, Removal and Installation).
- 19. Release and position the roof wiring harnesses to one side
- 20. Position the roof opening panel front and rear drain hoses to one side.
- 21. Remove the driver and passenger side roof mouldings.
- 22. Drill out the spot welds.



23. Separate the joints and remove the old panel.

Installation

1. NOTE: The slots should be made so that the new roof panel can be brazed to the A-Pillar outer and inner.

Cut 2 slots in the new roof panel.





- 2. Prepare the old and new panel joint surfaces.
- 3. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 4. Remove the new panel.
- 5. NOTE: Make sure the adhesive is kept away from the area of MIG brazed slots.

Apply adhesive to the areas indicated.



- 6. Offer up the new panel and clamp into position.
- 7. Spot weld.





8. MIG braze the slots.

9. Remove any excess adhesive and dress all welded/brazed joints.



10. Make sure the external areas around the MIG brazed slots are sealed as part of the paint preparation process as this cannot be performed satisfactorily during panel replacement.

11. Install NVH (noise, vibration and harshness) sound deadening pads.



12. The installation of associated panels and components is the reversal of removal procedure.

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Roof Sheet Metal Repairs - Roof Panel Vehicles Without: Sliding Roof Opening Panel

Removal and Installation

Removal

1. NOTE: The roof panel is manufactured from mild steel. The

roof panel is serviced as a separate weld-on panel.



- 2. The roof panel is replaced in conjunction with:
 - Headliner
 - Windshield
 - Rear window glass
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove both front seats. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).

- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 6. Disconnect the generator electrical connectors.
- 7. Remove the windshield glass. For additional information, refer to: <u>Windshield Glass</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- 8. Remove the rear window glass. For additional information, refer to: <u>Rear Window Glass</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- 9. Remove the headliner. For additional information, refer to: <u>Headliner</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 10. Remove the driver and passenger side front scuff plate trim panels. For additional information, refer to: <u>Front Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 11. Remove the driver and passenger side rear scuff plate trim panels. For additional information, refer to: <u>Rear Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 12. Remove the driver and passenger side air curtain modules. For additional information, refer to: <u>Side Air Curtain Module</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 13. Remove the rear seat backrest.
- Remove the driver and passenger side rear safety belt retractors. For additional information, refer to: <u>Rear Safety Belt Retractor</u> (501-20A Safety Belt System, Removal and Installation).
- Remove the rear center safety belt retractor. For additional information, refer to: <u>Rear Center Safety Belt Retractor</u> (501-20A Safety Belt System, Removal and Installation).
- 16. Remove the driver and passenger side RF filters.
- 17. Remove the diversity antenna module.
- Remove the antenna. For additional information, refer to: <u>Navigation System Antenna</u> (419-07 Navigation System, Removal and Installation).
- 19. Release and position the roof wiring harnesses to one side
- 20. Remove the driver and passenger side roof mouldings.
- 21. Drill out the spot welds.



22. Separate the joints and remove the old panel.

Installation

1. NOTE: The slots should be made so that the new roof panel can be brazed to the A-Pillar outer and inner.

Cut 2 slots in the new roof panel.





- 2. Prepare the old and new panel joint surfaces.
- Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.
- 4. Remove the new panel.
- 5. NOTE: Make sure the adhesive is kept away from the area of MIG brazed slots.

Apply adhesive to the areas indicated.


- 6. Offer up the new panel and clamp into position.
- 7. Spot weld.





8. MIG braze the slots.

9. Remove any excess adhesive and dress all welded / brazed joints.



10. Make sure the external areas around the MIG brazed slots are sealed as part of the paint preparation process as this cannot be performed satisfactorily during panel replacement.

11. Install the NVH (noise, vibration and harshness) sound deadening pads.



12. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Side Panel Sheet Metal Description and Operation

Side service panels



OTE: The illustration may indicate either hand of the service panel, the opposite hand will be similar.

Item	Description	
1	Front fender	
2	Front door	
3	Rear door	
4	Front door skin panel	
5	Rear door skin panel	
6	Quarter panel	
7	Rocker panel	
8	Rocker panel front section (cut from rocker panel)	
9	Rocker panel rear section (cut from rocker panel)	
10	Rocker panel inner reinforcement	
11	Rocker panel and b-pillar outer panel	
12	B-pillar reinforcement	
13	B-pillar inner panel	
14	A-pillar outer panel	
15	A-pillar reinforcement	
16	Fender apron panel	
17	Fender apron panel closing panel	

Time schedules, side panels

The following information shows the total time taken to install single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim, (MET), items, plus paint times based on Metallic Clear Over Base Paint, (blends to adjacent panels are not included).

The times shown were generated by Thatcham, (the Motor Insurance Repair Research Centre), and are to be used as a guide only.

Panel Description	Hours
Front fender L/H	8.9
Front fender R/H	9.1
Front door	8.8
Rear door	8.7
Front door skin panel	11.1
Rear door skin panel	10.8
Quarter panel L/H	23.2
Quarter panel R/H	24.2
Rocker panel L/H	19.6
Rocker panel R/H	19.9
Rocker panel front section L/H	18.5
Rocker panel front section R/H	18.8
Rocker panel rear section L/H	16.7
Rocker panel rear section R/H	16.8
Windshield glass remove and install	2.2
Rear window glass remove and install	1.7
Headliner remove and install	3.3
nstrument panel console remove and install	5.3

Combination panel replacement times

The following panel combination times show the total time to remove/install body panels, MET items and paint times based on Metallic Clear Over Base Paint process, (blends to adjacent panels are not included).

Combination panel times

Panel Description	Hours
Front fender	
Front door	
Total Time	L/H 12.7
	R/H 12.9

Combination panel times

Panel Description	Hours
Rear door	
Quarter panel	
Rear window glass remove and install	
Headliner remove and install	
Total Time	L/H 29.0
	R/H 30.00

Combination panel times

Panel Description	Hours
Front door	
Rear door	
Rocker panel and b-pillar outer panel	
B-pillar reinforcement	
B-pillar inner panel	
Headliner remove and install	
Total Time	L/H 39.0 R/H 39.0

Combination panel times

Panel Description	Hours
Front fender	
Front door	
Rear door	
Quarter panel	
Rear window glass remove and install	
Headliner remove and install	
Total Time	L/H 36.2
	R/H 37.4

Combination panel times

Panel Description	Hours
Front fender	
Front door	
A-pillar outer panel	
A-pillar reinforcement	
Fender apron panel	
Fender apron panel closing panel	
Windshield glass remove and install	
Instrument panel console remove and install	
Headliner remove and install	
Total Time	L/H 46.4 R/H 46.6

Side Panel Sheet Metal Repairs - A-Pillar Outer Panel

Removal

Removal and Installation

1. NOTE: The A-pillar outer panel is manufactured from mild steel.

The A-pillar outer panel is serviced as a separate weld-on panel. It is not serviced with its riv-nuts for the fender fixings or NVH (noise, vibration and harshness) components.

2. NOTE: The A-pillar outer panel is spot welded to the A-pillar reinforcement upper, which is boron steel. In repair, spot welds are replaced with MIG braze and MIG braze slots in these areas.

In this procedure the upper butt joint is best performed as low as possible due to the work involved in the area of MIG slot braze. If damage dictates, it is permissible to make the section higher up the pillar.

- 3. The A-pillar outer panel is replaced in conjunction with:
 - 1. Front bumper cover
 - 2. Front fender
 - 3. Hood
 - 4. Front door
 - 5. Headliner
 - 6. Instrument panel console
 - 7. Windshield glass

For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) /

Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation) / Body and Frame (501-26 Body Repairs - Vehicle Specific Information and

Tolerance Checks, Description and Operation).

- 5. Disconnect the generator electrical connectors.
- 6. Remove the instrument panel console. For additional information, refer to: <u>Instrument Panel Console</u> (501-12 Instrument Panel and Console, Removal and Installation).

E 108452

- Remove the headliner. For additional information, refer to: <u>Headliner</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 8. Remove the windshield glass. For additional information, refer to: <u>Windshield Glass</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- Remove the pedestrian protection hood actuator. For additional information, refer to: <u>Pedestrian Protection Hood Actuator</u> <u>LH</u> (501-20C Pedestrian Protection System, Removal and Installation) / <u>Pedestrian Protection Hood Actuator RH</u> (501-20C Pedestrian Protection System, Removal and Installation).
- 10. Release and position the floor covering to one side.
- 11. Release and position the bulkhead insulating material to one side.
- 12. Release and position the inner rocker panel wiring harness to one side.
- Remove the wheel and tire.
 For additional information, refer to: <u>Wheel and Tire</u> (204-04 Wheels and Tires, Removal and Installation).
- 14. Remove the underfloor splash shield.
- 15. If the right-hand A-pillar outer panel is to be repaired, release and position the underfloor wiring harness to one side.
- Remove the front fender. For additional information, refer to: <u>Front Fender</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 17. Remove the front door. For additional information, refer to: <u>Front Door</u> (501-03 Body Closures, Removal and Installation).
- 18. Remove the upper and lower front door hinges.
- Remove the hood.
 For additional information, refer to: <u>Hood</u> (501-02 Front End Body Panels, Removal and Installation).
- 20. Remove the hood hinge.







21. **O**NOTE: If a new fender apron panel closing panel is to be fitted the section will not be required.

Drill out the spot welds and cut a section from the fender apron panel closing panel, to allow access to the A-pillar joints as indicated.

22. CAUTION: Care should be taken not to cut through into the inner panels.

NOTES:



In this procedure the upper butt joint is best performed as low as possible due to the work involved in the area of MIG braze slots. If damage dictates, it is permissible to perform the butt joint higher up the pillar.

Observe the increased pitch required for the MIG braze slots in this area.

Using the new panel for reference and allowing for an overlap, cut the old panel at the point indicated. Make sure that the location of the upper butt joint is calculated to allow for the installation of the MIG braze slots.



E 108455



23. Using the new panel for reference and allowing for an overlap, cut the old panel at the point indicated, where the lower butt joint is to be made.

24. A drill bit suitable for drilling boron should be used on the upper spot welds, as indicated.

Drill out the spot welds.

25. Separate the joints and remove the old panel, also releasing the NVH components.

Installation



E 108457



2. Install the riv-nuts into the new rocker panel front section as indicated.

1. Trim the excess from the upper part of the service panel.

E102807



3. CAUTION: Care should be taken not to cut through into the inner panels.

NOTE: Temporarily install the front door and hinges to aid alignment.

Offer up, align and clamp the new panel into position, overlapping the old panel remnant. Cut through the new panel, partially cutting the old panel at the points where the butt joints are to be made.

4. Remove the front door and hinges and the new A-pillar outer panel.

5. Cut and remove the old panel remnants.



E 108459





6. NOTE: Ensure the MAG plug holes are performed away from the adhesive bond path.

Drill holes in the new panel ready for MAG plug welding.

7. MIG braze slots in this area.

Cut slots in the new panel ready for MIG braze slots.

8. NOTE: If necessary, renew the NVH components.

Prepare the old and new panel joint surfaces, including the NVH components.

- Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 10. Remove the new A-pillar outer panel.



11. NOTE: Make sure the adhesive does not encroach into the area of the MAG plug welds as it will contaminate the weld (any unsealed areas must be sealed following the repair).

Apply adhesive to the area as indicated.

E 108461



E 108462

12. Apply sealer adhesive to the NVH components as indicated.

- 13. Offer up the new A-pillar outer panel, align and clamp into position.
- 14. Tack MIG braze the upper butt joint.
- 15. Tack MAG weld the lower butt joint.



NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original. 16. **C**

Spot weld.



17. MAG plug weld.



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19. Dress the tack welds/braze.



20. MIG braze the upper butt joint.

18. MIG Braze the slots.

E 108466

- E108467
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21. MAG weld the lower butt joint.

- 22. Prepare the old and new panel joint surfaces of the fender apron panel closing panel section.
- 23. $\Delta_{NOTE:}$ If a new fender apron panel closing panel is to be fitted the section will not be required.

Tack MAG weld the fender apron panel closing panel section.



24. MAG plug weld and MAG weld the fender apron panel closing panel section.

25. Dress all welded/brazed joints.





Apply expanding foam into the A-pillar as indicated.

- 27. Make sure that any open or exposed panel joints are suitably sealed following this procedure.
- 28. The installation of associated panels and components is the reversal of removal procedure.
 Tighten the hood hinge bolts to 17 Nm.
 Tighten the upper and lower front door hinges to 30 Nm.

Side Panel Sheet Metal Repairs - A-Pillar Reinforcement

Removal and Installation



Removal

1. NOTE: The A-pillar reinforcement is manufactured from Bake Hardened Steel, 300MPa, (BH300). It contains reinforcements manufactured from High Strength Low Alloy Steel, 340MPa (HSLA340).

The A-pillar reinforcement panel is serviced as a separate weld-on panel. It is not serviced with its NVH (noise, vibration and harshness) components.

2. NOTE: The A-pillar reinforcement is spot welded to the A-pillar reinforcement upper, which is boron steel. In repair spot welds are replaced with MIG braze slots in this area.

The A-pillar reinforcement is replaced in conjunction with:

- 1. Front bumper cover
- 2. Front fender
- 3. Hood
- 4. Hood hinge
- 5. Front door
- 6. Front door hinges
- 7. Fender apron panel closing panel
- 8. A-pillar outer panel
- 9. Fender apron panel
- 10. Headliner
- Instrument panel console
 Windshield glass

3. For additional information relating to this repair procedure please see the following: For additional information, refer to: Health and Safety Precautions

(100-00 General Information, Description and Operation) / Body Repairs (501-25A Body Repairs - General Information, Description and Operation) / Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation) / Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- 4. Disconnect the generator electrical connectors.
- 5. Remove the fender apron panel. For additional information, refer to: Fender Apron Panel (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 6. Remove the A-pillar outer panel. For additional information, refer to: A-Pillar Outer Panel (501-29 Side

E111836

Panel Sheet Metal Repairs, Removal and Installation).

- Remove the side air curtain module. For additional information, refer to: <u>Side Air Curtain Module (</u>501-20B Supplemental Restraint System, Removal and Installation).
- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- 9. Remove the floor covering.
- If the passenger side A-pillar reinforcement is to be repaired, remove the heater core and evaporator core housing.
 For additional information, refer to: <u>Heater Core and Evaporator Core</u> <u>Housing</u> (412-01 Climate Control, Removal and Installation).
- If the right-hand A-pillar reinforcement is to be repaired, remove the central junction box.
 For additional information, refer to: <u>Central Junction Box (CJB)</u> (418-00 Module Communications Network, Removal and Installation).
- 12. If the drivers side A-pillar reinforcement is to be repaired, remove the pedal box.
- 13. Release and lay aside the insulating material at the inner bulkhead.
- 14. Release and position aside the inner bulkhead and floor panel wiring harness.



15. **ONOTE:** The NVH components may have already been removed on the outer panel.

Remove the upper and lower NVH components and if undamaged retain for reuse.

E111837





17. Remove the bolts as indicated and retain for reuse.

16. Remove an area of adhesive above the upper front door hinge mounting point to expose hidden spot welds.





E111841



18. **ONOTE:** A drill bit suitable for drilling boron should be used on the boron spot welds.

Drill out the boron spot welds as indicated.

19. A drill bit suitable for drilling Dual Phase Steel, 600MPa, (DP600) should be used.

Drill out the spot welds as indicated.

20. From inside the vehicle, drill out the spot welds as indicated.





21. Cut a window in the old panel, above the front door lower hinge reinforcement, to enable access to the spot welds as indicated.

22. NOTE: The spot welds indicated should be drilled right through, to enable MAG plug welding and a MIG braze slot on installation. The MIG braze slot is required as the original panel is MIG brazed in this area.

Drill out the spot welds as indicated.



E111844



23. Drill out the spot welds as indicated.

24. ANOTE: Care should be taken not to cause damage to remaining panels when separating joints containing adhesive.

Separate the joints and remove the old panel, observing the areas of NVH component and adhesive as indicated.

Installation

 Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



2. With the new panel in position, mark the position of MAG plug welds as indicated.

3. Remove the new panel.



4. NOTE: In the area of the windshield wiper motor linkage mounting, there may not be access to spot weld. In this case, MAG plug welding is acceptable in this area.

Drill holes in the new panel ready for MAG plug welding.

E111847





5. Cut slots in the new panel as indicated.

6. ONOTE: The MIG braze slot is required as the original panel is MIG brazed in this area.

Cut an elongated slot between the two drill outs in the A-pillar inner panel as indicated, ready for MIG brazing.

- 7. Prepare the old and new panel joint surfaces.
- 8. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 9. Remove the new panel.



10. ANOTE: Make sure the adhesive does not encroach into the areas of the MAG plug welds as it will contaminate the weld.

Apply adhesive to the area as indicated.



11. Apply adhesive to the area as indicated.

E111852



- 13. Offer up, align and clamp the new panel into position.
 - 14. Install the bolts as indicated.Tighten to 25 Nm.



12. Apply sealer adhesive to the NVH components as indicated.



15. **C**NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.

E111854



16. MAG plug weld.





18. MIG braze the elongated slot as indicated.

- 19. Dress all welded/brazed joints and remove any excess adhesive.
- 20. make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.

17. MIG Braze the slots.



E111837



21. Install the upper and lower NVH components as indicated.

22. When installing the A-pillar outer panel, the spot welded joint of the A-pillar reinforcement containing adhesive, should be spot welded in the same locations to allow a satisfactory weld.

23. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - B-Pillar Inner Panel

Removal and Installation

Removal



E112942

1. NOTE: The B-pillar inner panel is manufactured from mild steel.

The B-pillar inner panel is cut from the bodyside inner front section service panel.

- 2. The B-pillar inner panel is replaced in conjunction with:
 - Front door
 - Rear door
 - Rocker panel and B-pillar outer panel
 - B-pillar reinforcement
 - Rocker panel inner reinforcement
 - Headliner

 For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

 Remove the rocker panel inner reinforcement. For additional information, refer to: <u>Rocker Panel Inner Reinforcement</u> (501-29 Side Panel Sheet Metal Repairs, Removal and Installation).





6. Cut the old panel at the point

5. Cut the old panel at the point indicated.

E112947

indicated.



7. Drill out the spot welds.

8. NOTE: Care should be taken when separating and removing the old panel as it will be used as a template.

Carefully separate the joints and remove the old panel.

Installation

1. Cut a template from the old panel as indicated.



E112948

overlap, cut the new panel at the point indicated.



6. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



7. Cut the new and old panels at the point indicated, where the lower MAG butt joint is to be made.

5. Drill holes in the new panel ready for MAG plug welding.

E 112953

- 8. Remove the new B-pillar inner panel.
- 9. Prepare the old and new panel joint surfaces.





Apply weld through adhesive to the area as indicated.

- 11. Offer up the new panel and clamp into position.
- 12. Tack MAG weld the butt joints.

13. Spot weld.



14. Dress the tack welds.



E 112949



- 16. MAG weld the upper butt joint.

15. MAG plug weld.



- 18. Dress all welded joints.
- 19. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of other panels.
- 20. Make sure the joint between the B-pillar inner panel and the rocker panel inner panel is sealed following the completion of the B-pillar procedures.

17. MAG weld the lower butt joint.

21. The installation of associated panels and components is the reversal of removal procedure.
Side Panel Sheet Metal Repairs - B-Pillar Reinforcement

Removal and Installation

Removal

E107191

1. NOTE: The B-pillar reinforcement is manufactured from Dual Phase Steel, 450MPa, (DP450). It contains an internal boron reinforcement.

The B-pillar reinforcement panel is serviced as a separate weld-on panel. It is not serviced with its NVH (noise, vibration and harshness) components.

2. NOTE: The B-pillar reinforcement is spot welded to the cant rail reinforcement which is boron steel. In repair spot welds are replaced with MIG braze slots in these areas.

The b-pillar reinforcement is replaced in conjunction with:

- 1. Front door
- 2. Rear door
- 3. Rocker panel and B-pillar outer panel
- 4. Headliner
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the rocker panel and B-pillar outer panel. For additional information, refer to: <u>Rocker Panel and B-Pillar Outer</u> <u>Panel</u> (501-29 Side Panel Sheet Metal Repairs, Removal and Installation).

5. Cut the old panel at the point indicated.



NOTE: A drill bit suitable for drilling boron should be used on the 6. boron spot welds.

Drill out the spot welds.



E107193

7. NOTE: Care should be taken when separating and removing the old panel as it will be used as a template. Care should also be taken in the area of the NVH components.

Carefully separate the joints and remove the old panel.

Installation

1. Cut a template from the old panel, the cut should be made approx 10mm below the hole as indicated.



NOTE: Dress the panel joint surfaces of the template to ensure a good fit. 2.

Offer up, align and clamp the template into position on the new B-pillar reinforcement panel. Cut along the edge of the template, through the new panel, at the point indicated, where the MAG butt joint is to be made.

E107195

3. Remove the template from the new panel.





5. Cut slots in the new panel ready for MIG braze slots.



E107197

6. \triangle NOTE: If necessary, renew the NVH components.

Prepare the old and new panel joint surfaces, including the NVH components.

- 7. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 8. Remove the new B-pillar reinforcement panel.

4. Drill holes in the new panel ready for MAG plug welding.



9. Apply sealer adhesive to the NVH components, as indicated.

- 10. Offer up the new panel and clamp into position.
- 11. Tack MAG weld the upper butt joint.
- 12. Install a tack MAG weld between the B-pillar reinforcement and the rocker panel inner reinforcement to secure the panel in position, to enable a final alignment check prior to welding.
- 13. ANOTE: Temporarily install the rocker panel and B-pillar outer panel and the front and rear doors and hinges to aid alignment.

Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.

- 14. Remove the front and rear doors and hinges and the rocker panel and B-pillar outer panel.
- 15. Dress the tack welds.



16. MAG plug weld.

E107199

17. MAG weld the upper butt joint.



18. MIG Braze the slots.



- 19. Dress all welded/brazed joints.
- 20. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.
- 21. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Front Door Skin Panel

Removal

Removal and Installation

1. NOTE: The front door skin panel is manufactured from bake hardened steel, (220 MPa), plus zinc.

The front door skin panel is serviced as a separate panel.

- The front door skin panel is replaced in conjunction with:
 Front door
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the front door window regulator and motor. For additional information, refer to: <u>Front Door Window Regulator and</u> <u>Motor</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the exterior mirror. For additional information, refer to: <u>Exterior Mirror</u> (501-09 Rear View Mirrors, Removal and Installation).
- Remove the front door latch. For additional information, refer to: <u>Front Door Latch</u> (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).
- 8. Remove the front door outer window frame mouldings.
- 9. Remove the front door weatherstrips.

- 10. Remove the front door wiring harness.
- 11. Remove the front door impact absorbers.
- 12. Remove the front door glass run felt.
- 13. Disconnect the front door wiring harness, accessed behind the grommet on the A-pillar.
- 14. Remove the screw and release the front door check strap from the body.
- 15. Remove the front door.





16. Abrade the areas of folded flange on the old front door skin panel.

- 17. Separate the adhesive and remove the bulk of the old panel.
- 18. Separate and remove the old panel remnants from the front door frame.

Installation

- 1. Prepare the old and new panel joint surfaces.
- 2. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 3. Remove the new panel.
 - 4. Apply adhesive to the areas of folded flange as indicated.









- 6. Offer up the new panel, align and clamp into position.
 - 7. Fold the flange of the front door skin panel, over the front door frame as indicated.

5. Apply adhesive to the impact beam/reinforcements as indicated.



8. NOTE: There is access to apply the expanding foam sealer with the front door skin panel fitted to the front door frame.

Apply expanding foam sealer to the area indicated.

- 9. Remove any excess adhesive or expanding foam sealer.
- 10. Dress the folded flange joints.
- 11. Install the front door.Tighten to 30 Nm.



12. Check alignment, if correct, proceed to next step, if not rectify before proceeding.



13. Install the NVH (noise, vibration and harshness) components.

14. **O**NOTE: Install the front door upper frame weatherstrip prior to installing the front door.

The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Rear Door Skin Panel

Removal and Installation

- Removal
 - 1. NOTE: The rear door skin panel is manufactured from bake hardened steel, (220 MPa), plus zinc

The rear door skin panel is serviced as a separate panel.

- The rear door skin panel is replaced in conjunction with:
 Rear door
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the rear door window regulator and motor. For additional information, refer to: <u>Rear Door Window Regulator and</u> <u>Motor</u> (501-11 Glass, Frames and Mechanisms, Removal and Installation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the rear door latch. For additional information, refer to: <u>Rear Door Latch (</u>501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).
- 7. Remove the rear door outer window frame mouldings.
- 8. Remove the rear door weatherstrips.
- 9. Remove the rear door wiring harness.

- 10. Remove the rear door impact absorbers.
- 11. Remove the rear door glass run felt.
- 12. Disconnect the rear door wiring harness, accessed behind the grommet on the B-pillar.
- 13. Remove the screw and release the rear door check strap from the body.
- 14. Remove the rear door.





15. Abrade the areas of folded flange on the old rear door skin panel.

- 16. Separate the adhesive and remove the bulk of the old panel.
- 17. Separate and remove the old panel remnants from the rear door frame.

Installation

- 1. Prepare the old and new panel joint surfaces.
- 2. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 3. Remove the new panel.
 - 4. Apply adhesive to the areas of folded flange as indicated.







- 6. Offer up the new panel, align and clamp into position.
 - 7. Fold the flange of the rear door skin panel, over the rear door frame as indicated.

- 8. Remove any excess adhesive.
- 9. Dress the folded flange joints.
- 10. Install the rear door.Tighten to 30 Nm.

5. Apply adhesive to the impact beam/reinforcements as indicated.



11. Check alignment, if correct, proceed to next step, if not rectify before proceeding.



12. Install the NVH (noise, vibration and harshness) components.

13. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Rocker Panel

Removal and Installation

Removal

1. NOTE: The rocker panel is manufactured from mild steel.

The rocker panel is serviced as a separate weld-on panel. It is not serviced with its riv-nuts for the fender fixings, or NVH (noise, vibration and harshness) components.



- 2. The rocker panel is replaced in conjunction with:
 - 1. Front fender
 - 2. Front door
 - 3. Rear door
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- 5. Disconnect the generator electrical connectors.
- Remove the rear seat cushion.
 For additional information, refer to: <u>Rear Seat Cushion</u> (501-10 Seating, Removal and Installation).
- 7. Remove the front and rear door weatherstrips.

- Remove the cowl side trim panel. For additional information, refer to: <u>Cowl Side Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- Remove the front safety belt retractor. For additional information, refer to: <u>Front Safety Belt Retractor (</u>501-20A Safety Belt System, Removal and Installation).
- Remove the B-pillar side impact sensor. For additional information, refer to: <u>B-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 11. Remove the C-pillar side impact sensor. For additional information, refer to: <u>C-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 12. Release and position the floor covering to one side.
- 13. Release and position the inner rocker panel wiring harness to one side.
- 14. Remove the rear wheel and tire. For additional information, refer to: <u>Wheel and Tire</u> (204-04 Wheels and Tires, Removal and Installation).



15. Remove the rear fender splash shield.

- 16. Remove the rocker panel outer moulding.
- 17. Remove the underfloor splash shield.
- 18. If the right-hand rocker panel is to be repaired, release and position the underfloor wiring harness to one side.
- Remove the front fender.
 For additional information, refer to: <u>Front Fender</u> (501-27 Front End Sheet Metal Repairs, Removal and Installation).
- 20. Remove the front door.

For additional information, refer to: <u>Front Door</u> (501-03 Body Closures, Removal and Installation).

 Remove the rear door.
 For additional information, refer to: <u>Rear Door</u> (501-03 Body Closures, Removal and Installation).

22. CAUTION: Care should be taken not to cut through into the inner panels.

Using the new panel for reference and allowing for an overlap, cut the old panel at the points indicated.



E102795

23. Drill out the spot welds.



24. Separate the joints and remove the bulk of the old panel.

Installation



1. Install the riv-nuts into the new rocker panel as indicated.

E102797

2. CAUTION: Care should be taken not to cut through into the inner panels.

Offer up, align and clamp the new panel into position, overlapping the old panel remnant. Cut through the new panel, partially cutting the old panel at the points where the MAG butt joints are to be made.



- 3. Remove the new panel.
- 4. Cut and remove the old panel remnants.
- 5. Drill holes in the new panel ready for MAG plug welding.



6. ONOTE: If necessary renew the NVH components.

Prepare the old and new panel joint surfaces, including the NVH components.

7. NOTE: Temporarily install the front and rear doors and front fender to aid alignment.

Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.

- 8. Remove the front and rear doors, front fender and the new rocker panel.
- 9. NOTE: Make sure the adhesive does not encroach into the area of the butt joint as it will contaminate the weld (any unsealed areas must be sealed following the repair).

Apply adhesive to the area as indicated.



10. Apply sealer adhesive to the NVH components as indicated.



- 11. Offer up the new rocker panel, align and clamp into position.
- 12. Tack weld the butt joints.

13. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



14. MAG plug weld.



- 15. Dress the tack welds.
- 16. MAG weld the butt joints.



17. Dress all welded joints.



 The joint between the rocker panel and A-pillar must be sealed following the repair as indicated.

E102812

19. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Rocker Panel and B-Pillar Outer Panel

Removal and Installation

Removal

1. NOTE: The rocker panel and B-pillar outer panel is manufactured from mild steel.

The rocker panel and B-pillar outer panel is serviced as a separate weld-on panel. It is not serviced with its NVH (noise, vibration and harshness) components.



E104782

2. NOTE: The rocker panel and B-pillar outer panel is spot welded to the cant rail reinforcement which is boron steel. In repair spot welds are replaced with MIG braze and MIG braze slots in these areas.

The rocker panel and B-pillar outer panel is replaced in conjunction with: 1. Front door

- 2. Rear door
- 3. B-pillar reinforcement
- 4. Headliner

 For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- 5. Disconnect the generator electrical connectors.
- 6. Remove the right-hand and left-hand front scuff plate trim panels. For additional information, refer to: <u>Front Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 7. Remove the front and rear door weatherstrips.
- 8. Remove the right-hand and left-hand rear scuff plate trim panels. For additional information, refer to: <u>Rear Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- Remove the headliner. For additional information, refer to: <u>Headliner</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 10. Remove the side air curtain module. For additional information, refer to: <u>Side Air Curtain Module (</u>501-20B Supplemental Restraint System, Removal and Installation).
- Remove the rear seat cushion. For additional information, refer to: <u>Rear Seat Cushion</u> (501-10 Seating, Removal and Installation).
- 12. Remove the rear seat backrest.
- 13. Release and position the roof wiring harness to one side.
- 14. Remove the roof moulding.
- 15. Remove the cowl side trim panel. For additional information, refer to: <u>Cowl Side Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- Remove the front safety belt retractor.
 For additional information, refer to: <u>Front Safety Belt Retractor</u> (501-20A Safety Belt System, Removal and Installation).
- 17. Remove the B-pillar side impact sensor. For additional information, refer to: <u>B-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- Remove the C-pillar side impact sensor. For additional information, refer to: <u>C-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 19. Release and position the floor covering to one side.
- 20. Release and position the inner rocker panel wiring harness to one side.
- 21. Remove the rear wheel and tire. For additional information, refer to: <u>Wheel and Tire (</u>204-04 Wheels and



22. ANOTE: Right-hand shown, left-hand similar. Remove the rear fender splash shield.

- 23. Remove the rocker panel outer moulding.
- 24. Remove the underfloor splash shield.
- 25. If the right-hand rocker panel is to be repaired, release and position the underfloor wiring harness to one side.
- 26. Remove the front door. For additional information, refer to: <u>Front Door</u> (501-03 Body Closures, Removal and Installation).
- 27. Remove the rear door. For additional information, refer to: <u>Rear Door (</u>501-03 Body Closures, Removal and Installation).
- 28. Remove the rear door upper and lower hinges from the B-pillar.





29. Measure and mark out a section on the B-pillar upper, on the vehicle as indicated.

30. CAUTION: Care should be taken not to cut through into the inner panels.

NOTE: A drill bit suitable for drilling boron should be used on the 4 upper boron spot welds.

Cut the section of the B-pillar upper at the points indicated and drill out the spot welds.

31. Show the section as it will be used as a template.

Carefully separate the section of the B-pillar upper and remove.



Offer up, align and clamp the template into position on the new rocker panel and B-pillar outer panel. Cut around the edge of the template, through the new rocker panel and B-pillar outer panel at the points indicated, where the MIG brazed butt joint is to be made.



33. Remove the template from the new panel.

34. NOTE: This procedure shows the rocker panel part of the rocker panel and B-pillar outer panel being installed to its service condition. The rocker panel lower butt joints could be performed closer to the B-pillar, dependent on the extent of the damage.

Using the new panel for reference and allowing for an overlap, cut the old panel at the points indicated.



35. Drill out the spot welds.



36. Separate the joints and remove the bulk of the old panel.

Installation

1. CAUTION: Care should be taken not to cut through into the inner panels.

NOTE: Temporarily install the front door and the rear door and hinges, to aid alignment.

Offer up, align and clamp the new panel into position, overlapping the old panel remnant. Cut through the new panel, partially cutting the old panel at the points where the MAG butt joints are to be made.



- 2. Remove the front door and the rear door and hinges and the new rocker panel and B-pillar outer panel.
- 3. Cut and remove the old panel remnants.
- 4. Drill holes in the new panel ready for MAG plug welding.







5. Cut slots in the new panel ready for MIG braze slots.

6. ONOTE: If necessary, renew the NVH component.

Prepare the old and new panel joint surfaces, including the NVH component.

7. NOTE: Temporarily install the front door and the rear door and hinges, to aid alignment.

Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.

8. Remove the front door and the rear door and hinges and the new rocker panel and B-pillar outer panel.



E104790

9. NOTE: Make sure the adhesive does not encroach into the area of the butt joint as it will contaminate the weld (any unsealed areas must be sealed following the repair).

Apply adhesive to the area as indicated.

10. Apply sealer adhesive to the NVH component as indicated.


- 11. Offer up the new rocker panel and B-pillar outer panel, align and clamp into position.
- 12. Tack MIG braze the upper butt joint.
- 13. Tack MAG weld the lower butt joints.
- 14. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



15. MAG plug weld.



E104795



17. Dress the tack welds/braze.



18. MIG braze the upper butt joint.

19. MAG weld the lower butt joints.

16. MIG Braze the slots.



- 20. Dress all welded/brazed joints.
- 21. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Rocker Panel Front Section

Removal and Installation

Removal

1. NOTE: The rocker panel front section is manufactured from mild steel.

The rocker panel front section is cut from the rocker panel service panel. It is not serviced with its riv-nuts for the fender fixings, or NVH (noise, vibration and harshness) components.



- 2. The rocker panel front section is replaced in conjunction with:
 - 1. Front fender
 - 2. Front door
 - 3. Rear door
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Rody and Crame</u> (501-26 Rody Repairs - Vehicle Specific Information and Context - State - Stat

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- 5. Disconnect the generator electrical connectors.
- Remove the rear seat cushion. For additional information, refer to: <u>Rear Seat Cushion</u> (501-10 Seating, Removal and Installation).
- 7. Remove the front and rear door weatherstrips.

- Remove the cowl side trim panel. For additional information, refer to: <u>Cowl Side Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- Remove the front safety belt retractor. For additional information, refer to: <u>Front Safety Belt Retractor</u> (501-20A Safety Belt System, Removal and Installation).
- Remove the B-pillar side impact sensor. For additional information, refer to: <u>B-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 11. Remove the C-pillar side impact sensor. For additional information, refer to: <u>C-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 12. Release and position the floor covering to one side.
- 13. Release and position the inner rocker panel wiring harness to one side.
- 14. Remove the rocker panel outer moulding.
- 15. Remove the underfloor splash shield.
- 16. If the right-hand rocker panel front section is to be repaired, release and position the underfloor wiring harness to one side.
- 17. Remove the front fender. For additional information, refer to: <u>Front Fender (</u>501-27 Front End Sheet Metal Repairs, Removal and Installation).
- Remove the front door.
 For additional information, refer to: <u>Front Door</u> (501-03 Body Closures, Removal and Installation).
- 19. Remove the rear door. For additional information, refer to: <u>Rear Door</u> (501-03 Body Closures, Removal and Installation).
- 20. Cut the new rocker panel front section from the new rocker panel service panel.



21. CAUTION: Care should be taken not to cut through into the inner panels.

Using the new panel for reference and allowing for an overlap, cut the old panel at the points indicated.



22. Drill out the spot welds.



23. Separate the joints and remove the bulk of the old panel.

Installation



1. Install the riv-nuts into the new rocker panel front section as indicated.

E102807

CAUTION: Care should be taken not to cut through into the inner panels.

Offer up, align and clamp the new panel into position, overlapping the old panel remnant. Cut through the new panel, partially cutting the old panel, at the points where the MAG butt joints are to be made.



E102809

- 3. Remove the new panel.
- 4. Cut and remove the old panel remnants.
- 5. Drill holes in the new panel ready for MAG plug welding.



6. $\Delta_{\text{NOTE: If necessary renew the NVH components.}}$

Prepare the old and new panel joint surfaces, including the NVH components.

7. NOTE: Temporarily install the front and rear doors and front fender to aid alignment.

Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.

- 8. Remove the front and rear doors, front fender and the new rocker panel front section.
- 9. Apply sealer adhesive to the NVH components as indicated.



E102811

- 10. Offer up the new rocker panel front section, align and clamp into position.
- 11. Tack weld the butt joints.
- 12. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



13. MAG plug weld.



14. Dress the tack welds.

15. MAG weld the butt joints.



16. Dress all welded joints.



E102812

17. The joint between the rocker panel and A-pillar must be sealed following the repair as indicated.

18. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Rocker Panel Inner Reinforcement

Removal and Installation

Removal

1. NOTE: The rocker panel inner reinforcement is manufactured from Dual Phase Steel, 600MPa, (DP600).

The rocker panel inner reinforcement is serviced as a separate weld-on panel. This procedure defines the rocker panel inner reinforcement to be sectioned to enable fitment of the B-pillar inner panel.



- 2. The rocker panel inner reinforcement is replaced in conjunction with: 1. Front door
 - 2. Rear door
 - 3. Rocker panel and B-pillar outer panel
 - 4. B-pillar reinforcement
 - 5. Headliner
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u>

(100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the B-pillar reinforcement. For additional information, refer to: <u>B-Pillar Reinforcement</u> (501-29 Side Panel Sheet Metal Repairs, Removal and Installation).
- 5. NOTE: When replaced in association with other inner and outer panel sections, make sure there is always a minimum 50mm staggered joint between every section.

Cut the old panel at the point indicated.



6. NOTES:

A drill bit suitable for drilling DP600 should be used.

There are spot welds located under the adhesive residue left by the removal of the B-pillar reinforcement.

Drill out the spot welds.



7. Using a belt sander, release the rocker panel inner reinforcement from the MAG welds at the points indicated.



8. Separate the joints and remove the old panel.

Installation

1. Cut a short section from the front end of the old panel, to be used as a template.



2. NOTE: Dress the panel joint surfaces of the template to ensure a good fit.

Offer up, align and clamp the template into position on the new rocker panel inner reinforcement. Cut along the edge of the template, through the new panel, at the point indicated, where the MAG butt joint is to be made.



- 3. Remove the template from the new panel.
- 4. Drill holes in the new panel ready for MAG plug welding.



- 5. Prepare the old and new panel joint surfaces.
- 6. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 7. Remove the new rocker panel inner reinforcement.
- 8. NOTE: Make sure the adhesive does not encroach into the areas of the MAG plug welds or butt joint as it will contaminate the weld.

Apply adhesive to the area, as indicated.



9. Apply adhesive to the area, as indicated.



- 10. Offer up the new panel, align and clamp into position.
- 11. MAG tack weld the butt joint.

12. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



13. MAG plug weld.



E107670

- 14. Dress the tack welds.
- 15. MAG weld the butt joint.



- 16. Dress all welded joints.
- 17. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.
- 18. The installation of associated panels and components is the reversal of removal procedure.

Side Panel Sheet Metal Repairs - Rocker Panel Rear Section

Removal and Installation

Removal

1. NOTE: The rocker panel rear section is manufactured from mild steel.

The rocker panel rear section is cut from the rocker panel service panel. It is not serviced with its NVH (noise, vibration and harshness) components.



- 2. The rocker panel rear section is replaced in conjunction with: 1. Front door
 - 2. Rear door
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the front seat. For additional information, refer to: <u>Front Seat</u> (501-10 Seating, Removal and Installation).
- 5. Disconnect the generator electrical connectors.
- Remove the rear seat cushion. For additional information, refer to: <u>Rear Seat Cushion</u> (501-10 Seating, Removal and Installation).
- 7. Remove the front and rear door weatherstrips.

- Remove the cowl side trim panel. For additional information, refer to: <u>Cowl Side Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- Remove the front safety belt retractor. For additional information, refer to: <u>Front Safety Belt Retractor (</u>501-20A Safety Belt System, Removal and Installation).
- Remove the B-pillar side impact sensor. For additional information, refer to: <u>B-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 11. Remove the C-pillar side impact sensor. For additional information, refer to: <u>C-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 12. Release and position the floor covering to one side.
- 13. Release and position the inner rocker panel wiring harness to one side.
- 14. Remove the rear wheel and tire. For additional information, refer to: <u>Wheel and Tire</u> (204-04 Wheels and Tires, Removal and Installation).



15. Remove the rear fender splash shield.

- 16. Remove the rocker panel outer moulding.
- 17. Remove the underfloor splash shield.
- 18. If the right-hand rocker panel rear section is to be repaired, release and position the underfloor wiring harness to one side.
- Remove the front door.
 For additional information, refer to: <u>Front Door</u> (501-03 Body Closures, Removal and Installation).
- 20. Remove the rear door.

For additional information, refer to: <u>Rear Door</u> (501-03 Body Closures, Removal and Installation).

21. Cut the new rocker panel rear section from the new rocker panel service panel.



22. CAUTION: Care should be taken not to cut through into the inner panels.

Using the new panel for reference and allowing for an overlap, cut the old panel at the points indicated.



23. Drill out the spot welds.



24. Separate the joints and remove the bulk of the old panel.

Installation



Offer up, align and clamp the new panel into position, overlapping the old panel remnant. Cut through the new panel, partially cutting the old panel, at the points where the MAG butt joints are to be made.



E102819

- 2. Remove the new panel.
- 3. Cut and remove the old panel remnants.
- 4. Drill holes in the new panel ready for MAG plug welding.



E102820

5. ONOTE: If necessary renew the NVH components.

Prepare the old and new panel joint surfaces, including the NVH components.

6. Δ NOTE: Temporarily install the front and rear doors to aid alignment.

Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.

- 7. Remove the front and rear doors and the new rocker panel rear section.
 - 8. NOTE: Make sure the adhesive does not encroach into the area of the butt joint as it will contaminate the weld (any unsealed areas must be sealed following the repair).

Apply adhesive to the area as indicated.



E102822



- 10. Offer up the new rocker panel rear section, align and clamp into position.
- 11. Tack weld the butt joints.
- 12. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



E102823

13. MAG plug weld.



14. Dress the tack welds.

15. MAG weld the butt joints.



- 16. Dress all welded joints.
- 17. The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Rear End Sheet Metal Description and Operation

Rear end service panels



OTE: The illustration may indicate either hand of the service panel, the opposite hand will be similar.

Item	Description
1	Luggage compartment lid
2	Rear bumper cover
3	Rear bumper
4	Back panel
5	Rear bumper mounting L/H
6	Rear bumper mounting R/H
7	Quarter panel
8	Quarter panel lower extension
9	Rear wheelhouse outer
10	Spare wheel well
11	Rear floor side extension
12	Rear side member section
13	Rear side member closing panel section

Time schedules, rear end

The following information shows the total time taken to replace single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim, (MET), items, plus paint times based on Metallic Clear Over Base Paint, (blends to adjacent panels are not included)

The times shown were generated by Thatcham, (the Motor Insurance Repair Research Centre), and are to be used as a guide only.

Single panel times

Panel Description	Hours
Luggage compartment lid	7.5
Rear bumper cover	6.6
Back panel	9.4
Quarter panel L/H	23.2
Quarter panel R/H	24.2
Headliner remove and install	3.3
Rear window glass remove and install	1.7
Rear subframe and rear suspension remove and install	5.2

Combination panel replacement times

The following panel combination times show the total time to remove/install body panels, MET items and paint times based on Metallic Clear Over Base Paint process, (blends to adjacent panels are not included).

Combination panel times

Panel Description	Hours
Luggage compartment lid	
Rear bumper cover	
Rear bumper	
Quarter panel	
Back panel	
Headliner remove and install	
Rear window glass remove and install	
Total Time	L/H 35.2 R/H 35.9

Combination panel times

Panel Description	Hours
Luggage compartment lid	
Rear bumper cover	
Rear bumper	
Quarter panel	
Back panel	
Rear wheelhouse outer	
Rear side member section	

Panel Description	Hours
Rear side member closing panel section	
Spare wheel well	
Rear floor side extension	
Rear subframe and rear suspension remove and install	
Headliner remove and install	
Rear window glass remove and install	
Total Time	L/H 54.0
	R/H 54.5

Combination panel times

Panel Description	Hours
Luggage compartment lid	
Rear bumper cover	
Rear bumper	
Quarter panel L/H and R/H	
Back panel	
Rear wheelhouse outer L/H and R/H	
Rear side member section L/H and R/H	
Rear side member closing panel section L/H and R/H	
Spare wheel well	
Rear floor side extension L/H and R/H	
Rear subframe and rear suspension remove and install	
Headliner remove and install	
Rear window glass remove and install	
Total Time	70.5

Panel Description	Hour
Luggage compartment lid	
Rear bumper cover	
Rear bumper	
Quarter panel	
Back panel	
Rear side member section	
Rear side member closing panel section	
Spare wheel well	
Rear floor side extension	
Rear subframe and rear suspension remove and install	
Headliner remove and install	
Rear window glass remove and install	
Total Time	L/H 50 R/H 50

Combination panel times	
Panel Description	Hours
Rear bumper cover	
Rear bumper	
Back panel	
Spare wheel well	
Rear subframe and rear suspension remove and install	
Total Time	26.8

Rear End Sheet Metal Repairs - Back Panel

Removal and Installation

Removal



E101451

1. NOTE: The back panel is manufactured from mild steel.

The back panel is serviced as a separate weld-on panel, it includes the back panel inner, right-hand and left-hand rear bumper mountings, it also includes its weld studs.

- 2. The back panel is replaced in conjunction with:
 - Rear bumper cover
 - Rear bumper
- For additional information relating to this repair procedure please see the following: <u>Health and Safety Precautions</u> / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- 4. Remove the rear bumper. For additional information, refer to: <u>Rear Bumper (</u>501-19 Bumpers, Removal and Installation).
- Remove the battery. For additional information, refer to: <u>Battery</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 6. Remove the battery tray.
- 7. Disconnect the generator electrical connectors.
- 8. Remove the loadspace left-hand trim panel. For additional information, refer to: <u>Loadspace Trim Panel LH</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 9. Remove any electrical components in the local area of repair to prevent damage.
- Remove the auxiliary junction box (AJB).
 For additional information, refer to: <u>Auxiliary Junction Box (AJB)</u> (418-00 Module Communications Network, Removal and Installation).
- 11. Release the external back panel wiring harness and pull through into the loadspace.

- 12. Remove the luggage compartment lid weatherstrip.
- 13. Remove the loadspace trim panel. For additional information, refer to: <u>Loadspace Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
 - 14. Remove the spare wheel and tire (if equipped).





15. Remove the subwoofer speaker (if equipped).

- 16. Release and position the back panel and loadspace wiring harness to one side.
- 17. Remove the luggage compartment latch striker.
- 18. Remove the right-hand and left-hand forced air extraction grilles.
- Remove the right-hand and left-hand muffler and tailpipe. For additional information, refer to: Muffler and Tailpipe (309-00A, Removal and Installation) / Muffler and Tailpipe (309-00B, Removal and Installation) / Muffler and Tailpipe (309-00C, Removal and Installation).
- 20. Remove the right-hand and left-hand muffler and tailpipe heatshield.



Drill out the spot welds.



E101452

22. Separate the joints and remove the old panel.

Installation

- 1. Prepare the old and new panel joint surfaces.
- 2. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 3. Remove the new panel.

4. Apply adhesive to the areas indicated.



E101454

- 5. Offer up the new panel and clamp into position.
- 6. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.



7. MAG Plug weld.


- 8. Dress all welded joints and remove any excess adhesive.
- 9. The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Quarter Panel

Removal and Installation

E101668

1. NOTE: The quarter panel is manufactured from mild steel.

The quarter panel is serviced as a separate weld-on panel, it includes the quarter panel lower extension, rear lamp mounting panel, rear lamp mounting panel insert, water drain panel and the door striker reinforcement. It is not serviced with its weld studs, or NVH (noise, vibration and harshness) components.

- 2. The quarter panel is replaced in conjunction with:
 - 1. Rear bumper

Removal

- 2. Rear bumper cover
- 3. Luggage compartment lid
- 4. Rear window glass
- 5. Headliner
- 3. For additional information relating to this repair procedure please see the following:

For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the rear wheel and tire. For additional information, refer to: <u>Wheel and Tire</u> (204-04 Wheels and Tires, Removal and Installation).
 - 5. Remove the rear fender splash shield.



- Remove the Rear Bumper. For additional information, refer to: <u>Rear Bumper</u> (501-19 Bumpers, Removal and Installation).
- Remove the battery. For additional information, refer to: <u>Battery</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 8. Disconnect the generator electrical connectors.
- If the left-hand rear quarter panel is to be repaired, remove the loadspace left-hand trim panel.
 For additional information, refer to: Loadspace Trim Panel LH (501-05 Interior Trim and Ornamentation, Removal and Installation).
- If the right-hand rear quarter panel is to be repaired, remove the auxiliary junction box (AJB).
 For additional information, refer to: <u>Auxiliary Junction Box (AJB)</u> (418-00 Module Communications Network, Removal and Installation).
- 11. Remove any electrical components in the local area of repair to prevent damage.
- Remove the rear muffler. For additional information, refer to: <u>Rear Muffler</u> (309-00C Exhaust System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation) / <u>Rear Muffler</u> (309-00C Exhaust System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation) / <u>Rear Muffler</u> (309-00C Exhaust System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).
- 13. Remove the exhaust muffler and tailpipe heatshield.
- 14. Remove the rear scuff plate trim panel. For additional information, refer to: <u>Rear Scuff Plate Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 15. Remove the loadspace trim panel. For additional information, refer to: <u>Loadspace Trim Panel</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 16. Remove the forced air extraction grille.
- 17. Release and lay aside the back panel and loadspace wiring harness.
- 18. Remove the luggage compartment lid weatherstrip.
- 19. Remove the rear bumper cover side retainer.
- 20. Remove the roof moulding.
- 21. Remove the headliner. For additional information, refer to: <u>Headliner</u> (501-05 Interior Trim and Ornamentation, Removal and Installation).
- 22. Remove the side air curtain module.

For additional information, refer to: <u>Side Air Curtain Module (501-20B</u> Supplemental Restraint System, Removal and Installation).

- 23. Remove the rear window glass.
- 24. Remove the audio unit antenna amplifier. For additional information, refer to: <u>Audio Unit Antenna Amplifier</u> (415-01A Information and Entertainment System, Removal and Installation).
- 25. If the left-hand rear quarter panel is to be repaired, remove the diversity antenna module.
- Remove the C-Pillar side impact sensor. For additional information, refer to: <u>C-Pillar Side Impact Sensor</u> (501-20B Supplemental Restraint System, Removal and Installation).
- 27. Remove the rear door striker.
- 28. Remove the luggage compartment lid.
- 29. If the right-hand rear quarter panel is to be repaired, drain the fuel tank. For additional information, refer to: <u>Fuel Tank Draining</u> (310-00 Fuel System - General Information, General Procedures).
- 30. If the right-hand rear quarter panel is to be repaired, remove the fuel filler door.
- If the right-hand rear quarter panel is to be repaired, remove the fuel tank filler pipe.
 For additional information, refer to: Fuel Tank Filler Pipe (310-01 Fuel Tank and Lines 3.0L, Removal and Installation) / Fuel Tank Filler Pipe (310-01 Fuel Tank and Lines 4.2L, Removal and Installation).



32. Remove the luggage compartment lid hinge.



33. **ONOTE:** The upper butt joint must be performed below the 4 metal thickness parts of the door and rear window apertures, (to enable spot welding back).

Cut the old panel at the points illustrated, allowing for overlap, ensuring the final cut is performed below the 4 metal thickness parts of the door and rear window aperture.



34. NOTE: This procedure assumes that the door striker reinforcement panel is undamaged. In this case, the original remains on the vehicle and the new door striker reinforcement panel is removed from the quarter panel service panel and discarded.

Drill out the spot weld.

35. ANOTE: Use a belt sander where there is no access to drill. Drill out the spot welds.





 Separate the joints and remove the old panel, also releasing the <u>NVH</u> components.



Installation

1. NOTE: This procedure assumes that the door striker reinforcement panel is undamaged. In this case, the original remains on the vehicle and the new door striker reinforcement panel is removed from the quarter panel service panel and discarded.

Remove the door striker reinforcement panel from the quarter panel service panel.



2. Trim the excess from the upper part of the service panel.

E101675

3. Prepare the old and new panel joint surfaces, including the NVH components.



4. NOTE: Temporarily install the luggage compartment lid and hinge to aid alignment.

Offer up, align and clamp into position, overlapping the old panel. Cut the new and old panels at the points where the MAG butt joints are to be made.

- 5. Remove the new panel, the luggage compartment lid and the old panel.
 - 6. Where applicable, drill holes in the new panel ready for MAG plug welding.



7. Apply adhesive to the areas indicated.



8. If necessary, renew the NVH components.



9. Apply sealer adhesive to the NVH components.



10. **ONOTE:** Temporarily install the luggage compartment lid and hinge to aid alignment.

Offer up the new panel, align and clamp into position.

11. Tack weld the butt joints.

12. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.







14. MAG plug weld the new panel to the door striker reinforcement panel.

15. Dress the tack welds.



16. MAG weld the butt joints.

17. NOTE: Stud dimensions: 6mm x 1.0mm thread, 20mm length. Prepare the new panel and install the weld studs as indicated.

13. MAG plug weld.



- 18. Dress all welded joints and remove any excess adhesive.
- 19. The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Quarter Panel Lower Extension

Removal and Installation

E101492

- Removal
 - 1. NOTE: The Quarter Panel Lower Extension is manufactured from mild steel.

The quarter panel lower extension is serviced as a separate weld-on panel, it is also serviced on the quarter panel. It is serviced without weld studs.

- 2. The quarter panel lower extension is replaced in conjunction with:
 - 1. Rear bumper cover
 - 2. Rear bumper
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Remove the battery. For additional information, refer to: <u>Battery</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 5. Disconnect the generator electrical connectors.
- 6. Remove any electrical components in the local area of repair to prevent damage.
- 7. Remove the Rear Bumper. For additional information, refer to: <u>Rear Bumper</u> (501-19 Bumpers, Removal and Installation).
- Remove the rear muffler.
 For additional information, refer to: <u>Rear Muffler</u> (309-00C Exhaust System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation) / <u>Rear Muffler</u> (309-00C Exhaust System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation) / <u>Rear Muffler</u> (309-00C Exhaust System - V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).
- 9. Remove the exhaust muffler and tailpipe heatshield.
- 10. Remove the forced air extraction grille.

- 11. Release and lay aside the back panel and loadspace wiring harness.
- 12. Remove the rear bumper cover side retainer.
- Remove the rear wheel and tire. For additional information, refer to: <u>Wheel and Tire</u> (204-04 Wheels and Tires, Removal and Installation).
 - 14. Remove the rear fender splash shield.





15. **O**NOTE: Where applicable spot welds must be drilled from the inside, this will enable the new panel to be spot welded on installation. Use a belt sander where there is no access to drill.

Drill out the spot welds.

E101493

16. Separate the joints and remove the old panel.

Installation

- 1. Prepare the old and new panel joint surfaces.
- Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 3. Remove the new panel.
 - 4. Apply adhesive to the areas indicated.



5. Offer up the new panel and clamp into position.



6. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.

7. MAG plug weld.



Stud dimensions: 6mm x 1.0mm thread, 20mm length.
 Prepare the new panel and install the weld studs as indicated.



- 9. Dress all welded joints and remove any excess adhesive.
- 10. The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Rear Bumper Mounting

Removal and Installation

E101457

Removal



1. NOTE: The rear bumper mounting is manufactured from mild steel.

The rear bumper mounting is serviced on the back panel and must be removed from this to carry out this procedure.

- 2. The rear bumper mounting is replaced in conjunction with:
 - Rear bumper cover
 - Rear bumper
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).
- Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- If the right-hand rear bumper mounting is to be repaired, remove the battery.
 For additional information, refer to: <u>Battery</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 6. If the right-hand rear bumper mounting is to be repaired, remove the battery tray.
- 7. Disconnect the generator electrical connectors.
- 8. Remove the rear bumper. For additional information, refer to: <u>Rear Bumper</u> (501-19 Bumpers, Removal and Installation).
- 9. Remove any electrical components in the local area of repair to prevent damage.
- If the right-hand rear bumper mounting is to be repaired, remove the auxiliary junction box (AJB).
 For additional information, refer to: <u>Auxiliary Junction Box (AJB)</u> (418-00 Module Communications Network, Removal and Installation).

- 11. Release the external back panel wiring harness and pull through into the loadspace.
- 12. Remove the luggage compartment lid weatherstrip.
 - 13. Remove the spare wheel and tire (if equipped).





14. Remove the subwoofer speaker (if equipped).

- 15. Release and position the back panel and loadspace wiring harness to one side.
- Remove the right-hand or left-hand muffler and tailpipe as necessary. For additional information, refer to: Muffler and Tailpipe (309-00A, Removal and Installation) / Muffler and Tailpipe (309-00B, Removal and Installation) / Muffler and Tailpipe (309-00C, Removal and Installation).
- 17. Remove the right-hand or left-hand muffler and tailpipe heatshield as necessary.



18. Drill out the spot welds.

19. Separate the joints and remove the old panel.

Installation

E101459

1. NOTE: Spot welds must be drilled from the inside, this will enable the new panel to be spot welded on installation.

Drill the rear bumper mounting off the back panel service panel.

- 2. Prepare the old and new panel joint surfaces.
- 3. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not, rectify and recheck before proceeding.



4. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld.

- 5. Dress all welded joints.
- 6. The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Rear Floor Side Extension

Removal and Installation



1. NOTE: The rear floor side extension is manufactured from mild steel.

The rear floor side extension is serviced as a separate weld-on panel. It is not serviced with its brackets or weld studs

- 2. The rear floor side extension is replaced in conjunction with:
 - Rear bumper cover
 - Rear bumper
 - Quarter panel
 - Back panel
 - Luggage compartment lid
 - Rear window glass
 - Headliner
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- Remove the quarter panel. For additional information, refer to: <u>Quarter Panel</u> (501-30 Rear End Sheet Metal Repairs, Removal and Installation).
- Remove the back panel. For additional information, refer to: <u>Back Panel</u> (501-30 Rear End Sheet Metal Repairs, Removal and Installation).
- 6. Disconnect the generator electrical connectors.
- 7. If the right-hand rear floor side extension is being repaired, release and lay aside the battery positive cable.



8. Δ NOTE: Use a belt sander where there is no access to drill.

Drill out the spot welds.

9. ONTE: Retain the old panel for reference to the weld stud location points.

Separate the joints and remove the old panel.



10. **ONOTE:** Drill out from underneath to allow spot welds to be used in installation. If undamaged, retain the mounting bracket for re-use on installation.

If the left-hand rear floor side extension is to be repaired, drill out the spot welds, from underneath and remove the mounting bracket.

11. NOTE: Drill out from underneath to allow spot welds to be used in installation. If undamaged, retain the AJB (auxiliary junction box) mounting bracket for re-use on installation.

If the right-hand rear floor side extension is to be repaired, drill out the spot welds, from underneath and remove the AJB mounting bracket.



Installation

1. Prepare the old and new panel joint surfaces.



2. NOTE: Stud dimensions: 6mm x 1mm thread, 20mm length.

If the left-hand rear floor side extension is to be repaired, using the old panel for reference, install the weld studs for the left-hand muffler and tailpipe heatshield as indicated.



3. ONTE: Stud dimensions: 6mm x 1mm thread, 20mm length.

If the right-hand rear floor side extension is to be repaired, using the old panel for reference, install the weld studs for the right-hand muffler and tailpipe heatshield as indicated.



4. ONOTE: Stud dimensions: 6mm x 1mm thread, 20mm length.

If the right-hand rear floor side extension is to be repaired, install the weld stud as indicated.

 Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



6. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.

- 7. If the left-hand rear floor side extension is to be repaired, prepare the panel joint surfaces of the mounting bracket.
- 8. If the left-hand rear floor side extension is to be repaired, offer up the mounting bracket and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



9. If the left-hand rear floor side extension is to be repaired, spot weld the mounting bracket as indicated.

- 10. If the right-hand rear floor side extension is to be repaired, prepare the panel joint surfaces of the AJB mounting bracket.
- 11. If the right-hand rear floor side extension is to be repaired, offer up the AJB mounting bracket and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.



12. If the right-hand rear floor side extension is to be repaired, spot weld the AJB mounting bracket as indicated.

- 13. Dress all welded joints.
- 14. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.

15. ANOTE: Make sure all underbody joints are fully sealed following this repair procedure.

The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Rear Side Member Closing Panel Section

Removal and Installation



1. NOTE: The rear side member closing panel section is manufactured from High Strength Low Alloy Steel, 350MPa, (HSLA350).

The rear side member closing panel section is cut from the rear side member closing panel service panel.

E111918

- 2. In this procedure, to make sure the vehicle is correctly aligned, it must be placed on an approved alignment jig.
- 3. The rear side member closing panel section is replaced in conjunction with:
 - Rear bumper cover
 - Rear bumper
 - Luggage compartment lid
 - Back panel
 - Spare wheel well
 - Towing eye bracket
 - Rear floor side extension
 - Rear side member section
 - · Rear subframe and rear suspension, as an assembly
- 4. For additional information relating to this repair procedure please see the following:

For additional information, refer to: Health and Safety Precautions (100-00 General Information, Description and Operation) / Body Repairs (501-25A Body Repairs - General Information, Description and Operation) / Corrosion Protection (501-25B Body Repairs - Corrosion Protection, Description and Operation) /

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

5. NOTE: This procedure assumes that if the rear side member closing panel section is damaged, the rear side member section will also be damaged. Therefore the replacement procedure for the rear side member closing panel section is combined within the rear side member section procedure.

Remove the rear side member section. For additional information, refer to: Rear Side Member Section (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

Installation

1. The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Rear Side Member Section

Removal and Installation



1. NOTE: The rear side member section is manufactured from High Strength Low Alloy Steel, 350MPa, (HSLA350).

The rear side member section is cut from the rear side member service panel.

E111917



 NOTE: The rear side member closing panel section is manufactured from High Strength Low Alloy Steel, 350MPa,

2. This procedure assumes that if the rear side member section is damaged, the rear side member closing panel section will also be damaged. Therefore this procedure combines the repair of the rear side member section and the rear side member closing panel section.

The rear side member closing panel section is cut from the rear side member closing panel service panel.

E111918

- 4. In this procedure, to make sure the vehicle is correctly aligned, it must be placed on an approved alignment jig.
- 5. The rear side member section is replaced in conjunction with:
 - Rear bumper cover
 - Rear bumper
 - Luggage compartment lid

(HSLA350).

- Back panel
- Spare wheel well
- Towing eye bracket
- Rear floor side extension
- · Rear side member closing panel section
- · Rear subframe and rear suspension, as an assembly
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u>

(100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

- 7. Disconnect the generator electrical connectors.
- Remove the luggage compartment lid. For additional information, refer to: <u>Luggage Compartment Lid</u> (501-03 Body Closures, Removal and Installation).
- Remove the spare wheel well.
 For additional information, refer to: <u>Spare Wheel Well</u> (501-30 Rear End Sheet Metal Repairs, Removal and Installation).
- Remove the rear floor side extension. For additional information, refer to: <u>Rear Floor Side Extension</u> (501-30 Rear End Sheet Metal Repairs, Removal and Installation).
- 11. Remove the rear muffler hanger bracket from the side member.



12. NOTE: The measurements shown allow the section to be performed, avoiding the inner reinforcements and allowing for a minimum 50mm staggered joint with the rear side member closing panel section. The measurement is taken from the edge of the hole in the rear side member, not the inner reinforcement.

Mark out the position where the rear side member section MAG butt joint is to be made. Cut through the rear side member at this point, also cutting through the rear side member closing panel as indicated.

E111919



13. CAUTION: Care should be taken not to cut through into the rear side member.

Mark out the position where the rear side member closing panel section MAG butt joint is to be made. Cut through the rear side member closing panel at this point as indicated.



14. Drill out the spot welds from the rear side member closing panel remnant.

15. Separate the joints and remove the rear side member closing panel remnant.

Installation



1. Mark out the position on the rear side member service panel, where the section MAG butt joint is to be made and cut the panel at this point as indicated.

E111922



2. Mark out the position on the rear side member closing panel service panel, where the section MAG butt joint is to be made and cut the panel at this point as indicated.

- 3. Prepare the panel joint surfaces of the old and new rear side member and rear side member closing panel sections.
- 4. Offer up the new rear side member section and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 5. Tack MAG weld the rear side member section butt joint.
- 6. Dress the rear side member section MAG tack welds.
 - 7. MAG weld the rear side member section butt joint.



- 8. Dress the rear side member section MAG butt joint.
- 9. Apply a zinc rich primer to any bare metal surfaces at this stage.
- 10. Offer up the new rear side member closing panel section and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 11. Tack MAG weld the rear side member closing panel section butt joint.
- 12. Dress the rear side member closing panel section MAG tack welds.
 - 13. MAG weld the rear side member closing panel section butt joint.



^{14.} Dress the rear side member section MAG tack welds.



15. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. Where there is adhesive in the original joint, spot welds should be installed through the original.

Spot weld the rear side member closing panel section to the rear side member as indicated.

- 16. Dress the spot welds.
- 17. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.
- 18. The installation of associated panels and components is the reversal of removal procedure.1. Tighten the rear muffler hanger bracket bolts to 25 Nm.

Rear End Sheet Metal Repairs - Rear Wheelhouse Outer

Removal and Installation



E 108371

1. NOTES:

Removal

The rear wheelhouse outer is manufactured from mild steel.

The illustration shows the right-hand service panel, the left-hand is similar but without the fuel filler aperture.

The rear wheelhouse outer is serviced as a separate weld-on panel.

- 2. The rear wheelhouse outer is replaced in conjunction with:
 - Rear bumper cover
 - Quarter Panel
 - Rocker panel (rear, dog leg, part as a minimum)
 - Rocker panel inner reinforcement section
 - Quarter panel inner reinforcement, (new service panel required to enable rear wheelhouse outer replacement)
 - Luggage Compartment Lid
 - Rear window glass
 - Headliner
- 3. For additional information relating to this repair procedure please see the following:

For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) / <u>Body and Frame</u> (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

4. Remove the quarter panel.

For additional information, refer to: <u>Quarter Panel</u> (501-30 Rear End Sheet Metal Repairs, Removal and Installation).



E108372

 Remove a section of rocker panel to allow access to the joints for removal of the rear wheelhouse outer. Using the rocker panel rear section procedure for reference, perform a section cut in a suitable position, dependant on the extent of damage. The section must be no less than that indicated.

For additional information, refer to: <u>Rocker Panel Rear</u> <u>Section</u> (501-29 Side Panel Sheet Metal Repairs, Removal and Installation).

- 6. Disconnect the generator electrical connectors.
- Remove the rear safety belt retractor. For additional information, refer to: <u>Rear Safety Belt Retractor (501-20A</u> Safety Belt System, Removal and Installation).
- 8. Disconnect, release the inner quarter panel wiring harness and position it to one side.
- 9. If the right-hand rear wheelhouse outer is being repaired, release the battery positive cable and position it to one side.
- 10. Release the inner quarter panel insulating material and position it to one side.







12. **ONOTE:** A new striker reinforcement panel is supplied on the quarter panel service panel.

Separate the joints, the adhesive and the NVH (noise, vibration and harshness) component and remove the striker reinforcement panel.

NOTE: Care should be taken when separating and removing the ECM (engine control module) mounting

If the right-hand rear wheelhouse outer is to be repaired, drill out the spot welds as indicated and remove the ECM mounting bracket. Retain for reuse on installation.

bracket if it is to be reused.



13.

E 108375



14. NOTE: It is necessary to section the quarter panel inner reinforcement at the point indicated, to make sure the integrity of the safety belt anchorage point. The right-hand panel is illustrated, the left-hand is similar.

Cut the quarter panel inner reinforcement, horizontally, approximately 90mm from the centre of the safety belt bolt anchorage point as indicated.



15. **C**NOTE: The right-hand panel is illustrated, the left-hand is similar although there are additional spot welds to drill out.

Drill out the spot welds from the quarter panel inner reinforcement section at the points indicated.


Separate the joints and remove the quarter panel inner reinforcement section.

- E 108376
- 17. Cut the rocker panel inner reinforcement at the point indicated.



18. Drill out the spot welds.



19. NOTE: Care should be taken, when releasing the MAG weld, as the rocker panel inner reinforcement section is to be reused.

Using a belt sander, release the rocker panel inner reinforcement from the MAG weld at the point indicated.

20. ANOTE: Care should be taken when separating and removing the rocker panel inner reinforcement section as it is to be reused.

Separate the joints and remove the rocker panel inner reinforcement section. Retain for reuse on installation.



21. NOTES:

Where it is possible, spot welds should be drilled from inside to enable them to be replicated on installation.

The quarter panel inner reinforcement section is removed for this procedure, the illustration shows it in place and is for reference only.

Drill out the spot welds.

E 108379

22. Separate the joints and remove the old panel.

Installation

- 1. Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
 - 2. With the new panel in position, mark the position of MAG plug welds as indicated.



E 108380

3. Remove the new panel.

4. Drill holes ready for MAG plug welding, including those previously marked.



5. Prepare the old and new panel joint surfaces.



Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original. 6.

Spot weld.

E108382

7. MAG Plug weld.



E 108383

- 8. Dress MAG plug welds.
- 9. If the right-hand rear wheelhouse outer is being repaired, prepare the panel joint surfaces of the ECM mounting bracket.
- 10. Offer up the ECM mounting bracket and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.





E 108384



12. **O**NOTE: It may be necessary to remove or bend the safety belt mounting part of the template to aid alignment. Retain the template as this will be used to form a backing plate.

Offer up, align and clamp the old quarter panel inner reinforcement, "template", into position on the inside of the new quarter panel inner reinforcement. Cut along the top edge of the template, through the new quarter panel inner reinforcement, at the point where the MAG butt joint is to be made. 13. Remove the template from the new quarter panel inner reinforcement.

from the template as indicated.

14. Cut and form a backing strip, a minimum of 40mm in width,

40 mm

E113244



15. NOTE: The backing strip should be positioned centrally so that it will fit equally between the original and the new quarter panel inner reinforcement sections, where the MAG butt weld is to be performed.

Offer up the backing strip to the original quarter panel inner reinforcement and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.

16. Remove the backing strip.

17. Drill holes in the original quarter panel inner reinforcement ready for MAG plug welding as indicated.



- 18. Prepare the panel joint surfaces of the new and the original quarter panel inner reinforcement and the backing strip.
- 19. Offer up the backing strip, align and clamp into position.



20. ONOTE: Do not dress the MAG plug welds.

MAG Plug weld the backing strip into position, as indicated.

- 21. Offer up the new quarter panel inner reinforcement and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 22. MAG tack weld the butt joint.
- 23. Dress the tack welds.



24. ANOTE: Do not dress the MAG butt weld. MAG weld the butt joint.



25. NOTES:

The right-hand panel is illustrated, the left-hand is similar although there are additional spot welds to install.

Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.

- 26. Prepare the old and new panel joint surfaces, ready for installation of the rocker panel inner reinforcement section.
- 27. Offer up the rocker panel inner reinforcement section and clamp into position. Check alignment, if correct, proceed to next step, if not rectify

and recheck before proceeding.

28. MAG tack weld the butt joint.

29. MAG plug weld.



30. Dress the tack welds.



31. MAG weld the butt joint.

32. NOTE: Do not dress the MAG welds at the quarter panel inner reinforcement.

Dress all welded joints.

33. Make sure any remaining areas of bare metal created during this procedure are treated with a zinc primer, prior to the installation of outer panels.



34. If the right-hand rear wheelhouse outer is being repaired, prepare the NVH component at the fuel filler aperture, apply sealer adhesive, and install as indicated.

E 108387



35. ANOTE: The NVH component at the striker reinforcement panel should be installed with the new quarter panel, sealer adhesive should be applied as the new quarter panel is installed.

Remove the NVH component from the old striker reinforcement panel, prepare, apply sealer adhesive and install on the new striker reinforcement panel on the quarter panel service panel.

E 108389



Apply adhesive to the new striker reinforcement panel on the new quarter panel.



E 108388

37. The installation of associated panels and components is the reversal of removal procedure.

Rear End Sheet Metal Repairs - Spare Wheel Well

Removal and Installation

Removal

1. Δ NOTE: The spare wheel well is manufactured from mild steel.

The spare wheel well is serviced as a separate weld-on panel, it is not serviced with the towing eye bracket, the spare wheel retaining bracket, or its weld studs.



E112677

- 2. The spare wheel well is replaced in conjunction with:
 - Rear bumper cover
 - Rear bumper Back
 - panel
 - Towing eye bracket
 - Rear subframe and rear suspension, as an assembly
- For additional information relating to this repair procedure please see the following: For additional information, refer to: <u>Health and Safety Precautions</u> (100-00 General Information, Description and Operation) / <u>Body Repairs</u> (501-25A Body Repairs - General Information, Description and Operation) / <u>Corrosion Protection</u> (501-25B Body Repairs - Corrosion Protection, Description and Operation) /

Body and Frame (501-26 Body Repairs - Vehicle Specific Information and Tolerance Checks, Description and Operation).

 Remove the back panel. For additional information, refer to: <u>Back Panel</u> (501-30 Rear End Sheet Metal Repairs, Removal and Installation).

- 5. Disconnect the generator electrical connectors.
- 6. Disconnect the battery positive cable and position it to one side.
- Remove the rear subframe and rear suspension, as an assembly. For additional information, refer to: <u>Rear Subframe - V6 3.0L Petrol</u> (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).
- Remove the fuel tank filler pipe. For additional information, refer to: Fuel Tank Filler Pipe (310-01B, Removal and Installation).
- 9. Release the left-hand and right-hand luggage floor wiring harnesses and position them to one side.
- 10. Make sure that the rear seats are covered to prevent any damage during this repair procedure.
- 11. **O**NOTE: If undamaged, the left-hand and right-hand rear bumper retaining brackets should be reinstalled.

Remove the left-hand and right-hand rear bumper retaining brackets.



12. Remove the bolts as indicated.



13. ONOTE: Remove the sealer to expose the spot welds.Drill out the spot welds.



14. NOTE: Retain the old panel for reference to the weld stud location points.

Separate the joints and remove the old panel.

15. ANOTE: Drill out from inside the spare wheel well to allow spot welds to be used in installation. If undamaged, retain the towing eye bracket for re-use on installation.

Drill out the spot welds and remove the towing eye bracket from the old panel.



NOTE: Drill out from underneath to allow spot welds to be used in installation. If undamaged, retain the spare wheel retaining bracket for re-use on installation. 16.

Drill out the spot welds and remove the spare wheel retaing bracket from the old panel.



17. ANOTE: Drill out from underneath to allow spot welds to be used in installation. If undamaged, retain the spare wheel well reinforcement plate for re-use on installation.

Drill out the spot welds and remove the spare wheel well reinforcement plate from the old panel.



Installation

1. NOTE: Stud dimensions: 6mm x 1mm thread, 20mm length.

Using the old panel for reference, mark up and prepare the new spare wheel well and install the weld studs for the left-hand muffler and tailpipe heatshield as indicated.



2. \triangle NOTE: Stud dimensions: 6mm x 1mm thread, 20mm length.

Using the old panel for reference, mark up and prepare the new spare wheel well and install the weld studs for the right-hand muffler and tailpipe heatshield as indicated.



3. Drill holes in the new panel ready for MAG plug welding.



- 4. Prepare the old and new panel joint surfaces.
- Offer up the new panel and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 6. Remove the new panel.
- 7. NOTE: Make sure that the adhesive does not encroach into the areas of the MAG plug welds as it will contaminate the weld.

Apply adhesive to the area as indicated.



E112687

- 8. Offer up, align and clamp the new panel into position.
- 9. Install the bolts as indicated.
 - Tighten to 25 Nm.



10. NOTE: Spot welds must be installed 5mm away from the originals and in the same quantities, whenever this is possible. Where this is not possible, spot welds should be installed adjacent to the original.

Spot weld.



11. MAG plug weld.



- 12. Prepare the panel joint surfaces of the spare wheel well reinforcement plate.
- 13. Offer up the spare wheel well reinforcement plate and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.

14. NOTE: If a new spare wheel well reinforcement plate is installed, two additional spot welds will be installed when the towing eye bracket is installed.

Spot weld the original spare wheel well reinforcement plate to the spare wheel well.



15. MAG plug welds are not required.

Drill through the two holes in the original spare wheel well reinforcement panel, through the spare wheel well, ready for MAG plug welding.



- 16. Prepare the panel joint surfaces of the towing eye bracket.
- 17. Offer up the towing eye bracket and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- ANOTE: If a new spare wheel well reinforcement plate is installed, the towing eye bracket can be fully spot welded. If the original spare wheel well reinforcement plate is installed, two MAG plug welds will be required.

Spot weld the towing eye bracket to the spare wheel well.



19. **O**NOTE: If a new spare wheel well reinforcement plate is installed, the towing eye bracket can be fully spot welded. If the original spare wheel well reinforcement plate is installed, two MAG plug welds will be required.

MAG plug weld the spare wheel well reinforcement plate through the spare wheel well into the towing eye bracket.



- 20. Prepare the panel joint surfaces of the spare wheel retaining bracket.
- 21. Offer up the spare wheel retaining bracket and clamp into position. Check alignment, if correct, proceed to next step, if not rectify and recheck before proceeding.
- 22. Spot weld the spare wheel retaining bracket to the spare wheel well.



- 23. Dress all welded joints.
- 24. Make sure that any remaining areas of bare metal created during this procedure are treated with a zinc primer prior to the installation of outer panels.
- 25. Install the left-hand and right-hand rear bumper retaining brackets.Tighten to 25 Nm.



26. Install the NVH (noise, vibration and harshness) sound deadening material as indicated.



27. An Antonia State and a state and a state of the state

The installation of associated panels and components is the reversal of removal procedure.