Published: Feb 14, 2006

Body Repairs

General Information

Body shells are of rivetted, bolted and welded construction and are bolted to the chassis frame.

It is essential that design dimensions and strength are restored in accident rectification. It is important that neither structural weakness nor excessive local stiffness are introduced into the vehicle during body or chassis repair.

Repairs usually involve a combination of operations ranging from straightening procedures to renewal of either individual panels or panel assemblies. The repairer will determine the repair method and this decision will take into account a balance of economics between labour and material costs and the availability of repair facilities in both equipment and skills. It may also involve considerations of vehicles down-time, replacement vehicle availability and repair turn-around time.

It is expected that a repairer will select the best and most economic repair method possible, making use of the facilities available. The instructions given are intended to assist a skilled body repairer by expanding approved procedures for panel replacement with the objective of restoring the vehicle to a safe running condition and effecting a repair which is visually acceptable and which, even to the experienced eye, does not advertise the fact that it has been damaged.

This does not necessarily mean that the repaired vehicle will be identical in all respects with original factory build. Repair facilities cannot always duplicate methods of construction used during production.

The panel repairs shown in this section are all based on a 110 Station Wagon. Therefore all illustrations and text relate only to this model. Although certain areas of the vehicle, such as the front end, are relevant to all models.

Operations covered in this Manual do not include reference to testing the vehicle after repair. It is essential that work is inspected and suspension geometry checked after completion and if necessary a road test of the vehicle is carried out, particularly where safety related items are concerned.

Where major units have been disconnected or removed, it is necessary to ensure that fluid levels are checked and topped up when necessary. It is also necessary to ensure that the repaired vehicle is in a roadworthy condition in respect of tyre pressures, lights, washer fluid etc.

Body repairs often involve the removal of mechanical and electrical units as well as associated wiring. Where this is necessary use the relevant section in this manual.

Taking into consideration the differences in body styles, steering and suspension systems as well as engine and suspension layouts, the location of the following components as applicable to a particular vehicle is critical:

- Front suspension upper damper mountings
- Front suspension or sub frame mountings
- Engine mountings on RH and LH chassis longitudinals
- Rear suspension upper damper mountings
- Rear suspension mountings or lower pivots
- Steering rack mountings

Additional points which can be used to check alignment and assembly are:

- Inner holes in cross member - side - main floor
- Holes in valance front assembly
- Body to chassis mounting holes
- Holes in rear floor
- Holes in rear lower panels or extension rear floor
- Fuel tank mountings

Apertures for windscreen, backlight, bonnet and doors can be checked by offering up an undamaged component as a gauge and also by measuring known dimensions. For additional information, refer to Body and Frame (501-26)

Straightening

Whenever possible, chassis structural members should be cold straightened under tension. Do not attempt to straighten with a single pull, but rework the damaged area using a series of pulls, releasing tension between each stage and using the opportunity to check alignment.

Body jig

Unless damage is limited to cosmetic panels, all repair work to body members must be carried out on a body jig, to ensure that impact damage has not spread into more remote parts of the body structure. Mounting on a jig will also ensure that the straightening and panel replacement procedures do not cause further distortion. If original dimensions cannot be satisfactorily restored by these methods, damaged structural members should be replaced. Damaged areas should be cut away using a high speed saw, NOT an oxy-acetylene torch.

As a rule, body dimensions are symmetrical about the centre line. A good initial check for distortion is therefore to measure diagonally and to investigate apparent differences in dimensions.

Inspection

Every accident produces individual differences in damage. Each repair is influenced by the extent of the damage and by the facilities and equipment available for its rectification.

Most accident damage can be visually inspected and the approximate extent of the damage assessed. Sometimes deformation will extend beyond the area of direct damage, and the severity of this must be accurately established so that steps may be taken to restore critical body components to their original dimensions.

An initial check of critical dimensions can be carried out by means of drop checks or (preferably) trammels. Gauges are available which will check accurately for body twist. Where repairs necessitate renewal of a critical body component it is recommended that a body jig is used.

ELECTRONIC CONTROL UNITS (ECU's)

The ECU's fitted to Defender vehicles make it advisable to follow suitable precautions prior to carrying out welding repair operations. All ECU's must be disconnected before any welding operations take place. Harsh conditions of heat and vibration may be generated during these operations which could cause damage to the units.

PAINT PROCEDURES

Replacement Panels

Service panels are supplied with a cathodic primer coating as part of the panel protection, and in compliance with the vehicle's Corrosion Warranty where applicable. DO NOT remove this primer before paint refinishing. In the event of localised surface damage or imperfections, ensure that the minimum of primer is removed during rectification work for effective repair.

Rectify damage by panel beating or straightening. To remove corrosion or paint runs on outer surfaces, abrade primer coat in the affected area as necessary using the following procedure:

- Clean the panel using a solvent wipe.
- Treat exposed areas of metal with an etch phosphate process.
- Re-treat the affected area using either a separate acid-etch primer and two-pack surfacer, or an integrated etch primer/filler.

Bolted Panels

Before fitting bolt-on panels, ensure that all mating and adjacent surfaces on the vehicle and replacement panel are free from damage and distortion. Rectify if necessary as described in this section, and apply preformed strip sealer where specified.

Welded Panels

- Remove primer from the immediate vicinity of new and existing panel flanges, cleaning to bright metal finish.
- On joints to be spot welded, apply weld-through zinc rich primer to joint faces of both flanges. Make spot welds while primer is still wet or according to the manufacturer's instructions.
- Dress accessible weld seams.
- Clean panel using solvent wipe.
- Treat bare metal with an etch phosphate process.
- Re-treat repaired areas.
- It is not satisfactory to use weld-through, zinc rich primers in conjunction with MIG welding.

Sectioned Panels

When replacing part or sectioned panels, the basic procedure is the same as for welded panels described above, with the following variations:

1. Remove primer from both new and existing joint faces, cleaning to a bright metal finish.

2. Where an overlap joint with the existing panel is to be spot welded, apply weld-through, zinc rich primer to both joint faces and spot weld while the primer is still wet or according to the manufacturer's instructions.

3. MIG weld joints where applicable.

4. Clean the panel with a solvent wipe.

5. Treat bare metal areas using an etch phosphate process.

6. Re-prime affected areas as necessary as for rectifying transit damage. See this section.

7. Treat the inner faces of lap or butt joints with a suitable cavity wax. See Sealing and Corrosion Protection.

Clinch Panels (eg Door skins etc.)

1. Abrade primer on new and existing panel joint faces, and clean using a solvent wipe.

2. Apply metal-to-metal adhesive where applicable.

3. Where joints are to be spot welded, apply suitable weld-through, zinc rich primer to weld areas.

4. Where joints are to be MIG welded, apply zinc rich primer in adjacent areas but leave the welded area untreated.

5. To retain the panel whilst clinching the flanges, tack spot weld or plug weld as appropriate.

6. Clean the panel with a solvent wipe.

7. Treat bare metal areas with a suitable etch phosphate process.

8. Re-prime affected areas as necessary as for rectifying transit damage. See this section.

9.Replacement doors, bonnets and tailgates must be treated with a suitable seam sealer on clinched seams, following the primer coat.

Paint Refinishing

1. Seal all accessible exterior and interior seams with an approved seam sealer. Certain joints such as sill lower flange seams must be left unsealed.

2. Apply a suitable anti-chip primer where specified.

3. Apply a two-pack paint refinishing system.

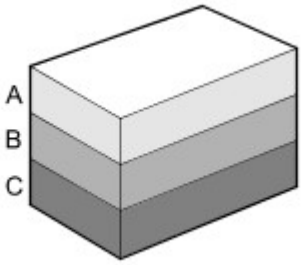
4. Repair any damage to underbody sealers either at this stage or before paint operations.

Paint Repairs

Before carrying out paintwork repairs, the vehicle must be thoroughly cleaned using either a steam cleaner or high-pressure washer.

Wash locally repaired areas using a mild water-mixable detergent and wipe them clean with solvent, immediately prior to paint application.

Abrade damaged paintwork where bare metal has been exposed until the metal is clean and extends beyond the area of immediate damage. Treat the bare metal with an etch phosphate to remove all traces of rust and provide a key for new paint coats. Re-treat the affected area using either a separate acid-etch primer and two-pack surfacer or an integrated etch primer/filler, and follow with a two-pack paint system. Those surfaces not receiving paint must be treated with a cavity wax following paint operations.



M772108B

Item	Part Number	Description
A		Two-pack top coat
B		Two-pack primer filler and etch primer
C		Etch phosphate

GENERAL WELDING PRECAUTIONS

The following pages show the procedures to follow when using welding for repairs. No resistance spot welds have been used in any of the repairs.

The aluminium alloy used on all Defender models is a combination of aluminium and magnesium. When converting a MIG welder for use on aluminium it is essential the following components are changed. The materials shown in brackets are the correct materials to use:

When carrying out welding operations the following criteria must be observed:

M772122

Item	Part Number	Description
A		MIG Plug welds
B		MIG seam weld

Seat Belt Anchorages

Seat belt anchorages are safety critical. When making repairs in these areas it is essential to follow design specifications.

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 seatbelt anchorage is not disturbed.

WARNING: Body parts incorporating seat belt anchorages MUST be renewed completely if damaged beyond repair, as the welds in these areas are safety critical and cannot be disturbed.

All welds within 250mm (9.9in.) of seat belt anchorages must be carefully checked for weld quality, including spacing of spot welds. A crack detection process must be carried out in these areas.

PANEL REPLACEMENT PROCEDURE

General

This information is designed to explain the basic panel removal and replacement method. This standard method may vary slightly from one vehicle to another. The main criterion in removal and replacement of body panels is that Land Rover's original standard is maintained as far as possible.

All repair processes and procedures shown relate to Aluminium panels.

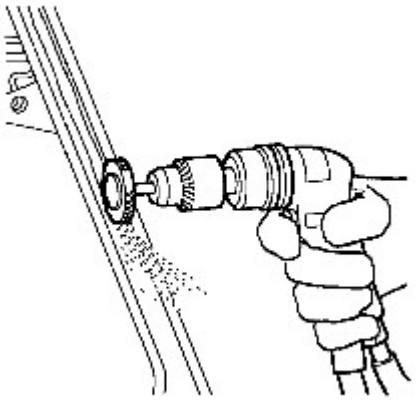
Remove Panel

WARNING: Ensure breathing mask and protective glasses are worn during operations where Aluminium particles are removed.

CAUTION: Never use a sanding disc that has previously been used on steel, as iron deposits could be left on the surface of the Aluminium.

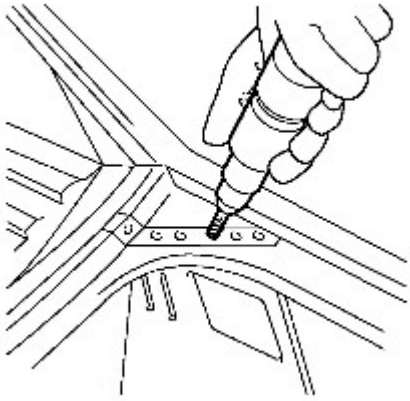
NOTE:

In wheel arch areas it may be necessary to soften underbody coating using a hot air gun, prior to exposing spot welds.



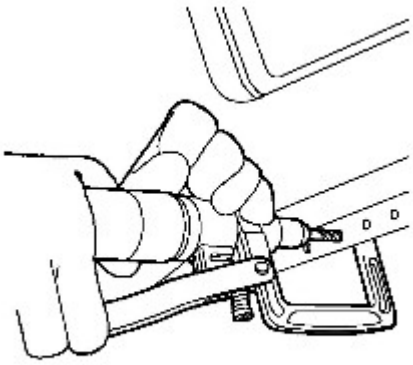
77M1357

1. Expose resistance spot welds. For those spot welds which are not obviously visible, use a rotary drum sander or wire brush fitted to an air drill, or alternatively a hand held wire brush.



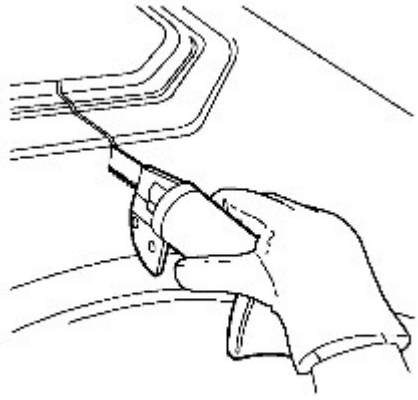
77M1358

2. Cut out welds using a cobalt drill.



77M1359

3. Alternatively, use a clamp-type spot weld remover.

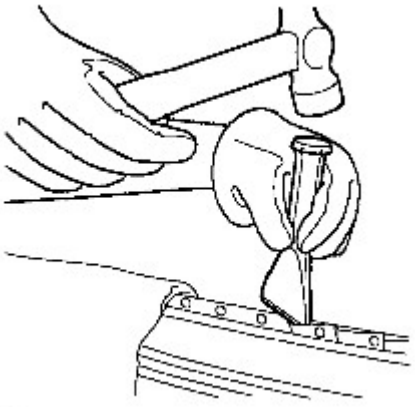


77M1360

4. Cut away the bulk of the panel as necessary using an air saw.

NOTE:

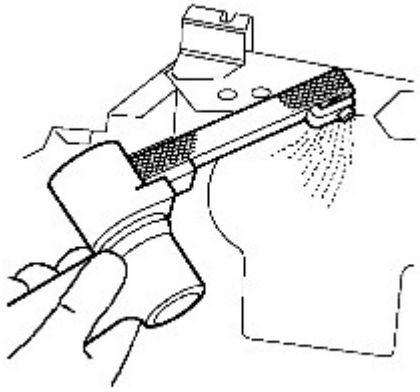
On certain panel joints MIG welds and braze should be removed using a sander where possible, before cutting out the panel bulk.



77M1361

5. Separate the spot welded joints and remove panel remnants using hammer, bolster chisel and pincers.

Prepare old surfaces



77M1362

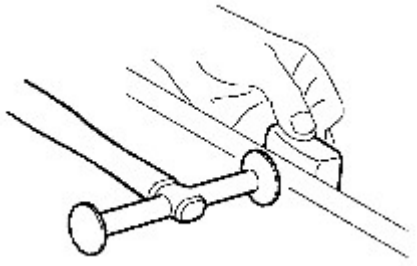
6. Clean all panel joint edges to a bright smooth finish, using a belt type sander.

WARNING: Care must be taken to avoid excessive heat build up which may be caused by this equipment.

CAUTION: Where significant straightening is required, heat must be applied to the area to avoid stretching the Aluminium. All tools used for working with Aluminium must be kept separate from those used on steel.

NOTE:

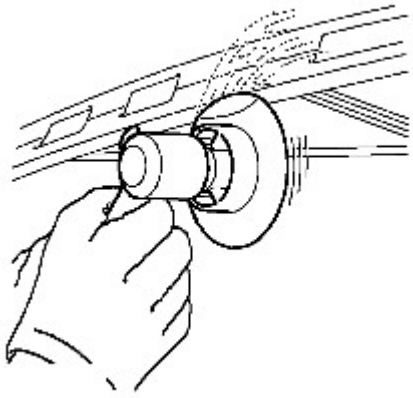
Prior to sanding, remove remaining sealant using a hot air gun to minimise the risk of toxic fumes caused by generated heat.



M771720

7. Straighten existing joint edges using shaping block and hammer.

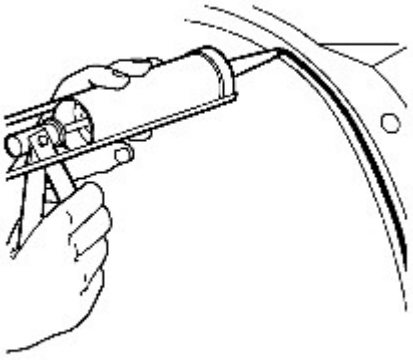
Prepare new surfaces



77M1366

8. Prepare new panel joint edges for welding by sanding to a bright finish,. This must include inner as well as outer face.

9. Drill holes in new panel, in the equivalent spot weld positions.



77M1368

10. Apply adhesive sealant to panel joint surfaces.

CAUTION: Do not use Petroleum Spirit, Alcohol or Paint Thinners to clean mating faces.

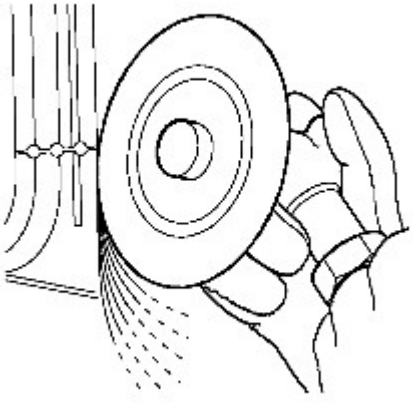
11. All mating faces that have sealant applied to them must be cleaned using a suitable solvent. The majority of aluminium sealants have a primer/pre-treatment included with them.

Offer up and align

Offer up new panel and align with associated panels. Clamp into position using welding clamps or Mole grips. Where a joggle or brace joint is being adopted, make a set in the original panel joint edge or insert a brace behind the joint.

NOTE:

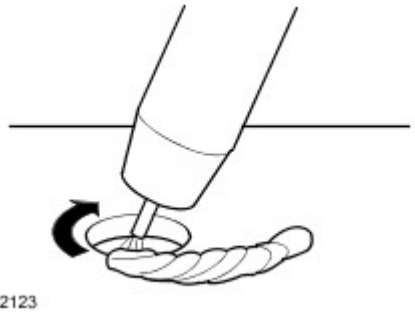
In cases where access for welding clamps is difficult, it may be necessary to use tack welds.



77M1373

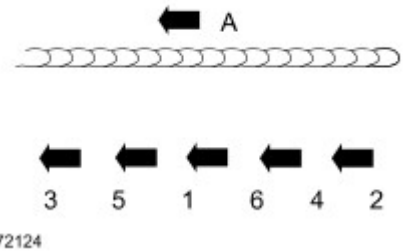
12. Dress MIG tack welds using a sander with 36 grit disc or a belt type sander where access is limited.

Welding



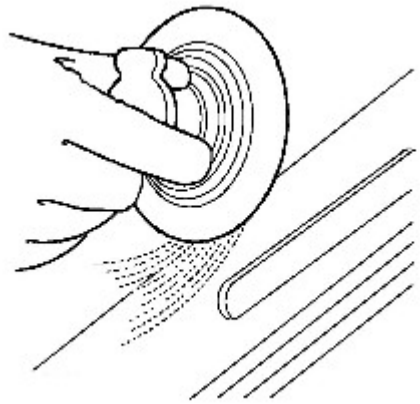
M772123

13. When plug welding, begin weld approximately 15 mm (0.6 in) from hole. This will allow the weld area to be preheated which will enhance weld penetration. It will also allow the operator to see more easily where penetration takes place. Fill hole with weld by moving in a circular direction around the hole.



M772124

14. When MIG seam welding, do not carry out lengthy operations. Divide the welds into short operations, this will reduce the chances of overheating the work piece which in turn will avoid distortion and strain.



77M1376

CAUTION: Only use a Stainless Steel wire brush for Aluminium.

15. Dress all welds using a sander with 36 grit disc or a belt type sander and/or wire brush.

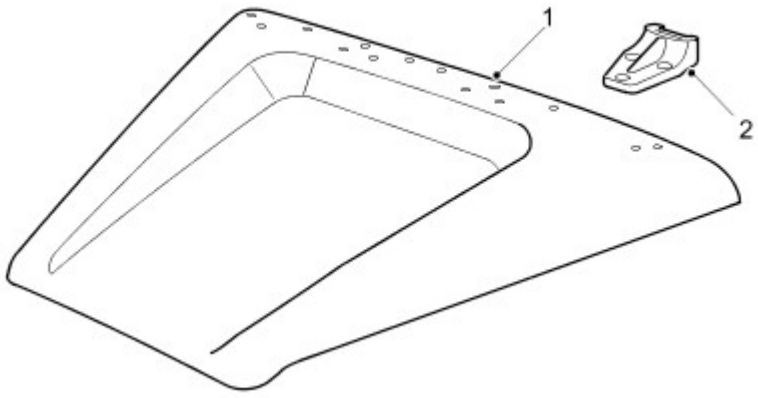
Body Trim

The panel repair operations itemise body trim components which must be removed for access during each repair

Because of the unpredictable nature of accident damage, the items listed make no allowance for any difficulties which may be found in removal and only apply to an undamaged vehicle. No allowance is made for any difficulties which may be found during panel removal. Damaged body trim items must be renewed as necessary following body repairs.

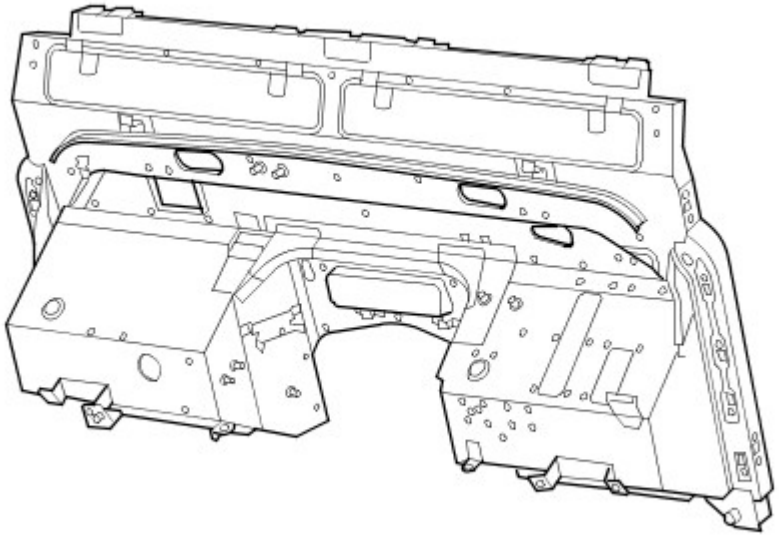
SERVICEABLE PANELS

Front end panels



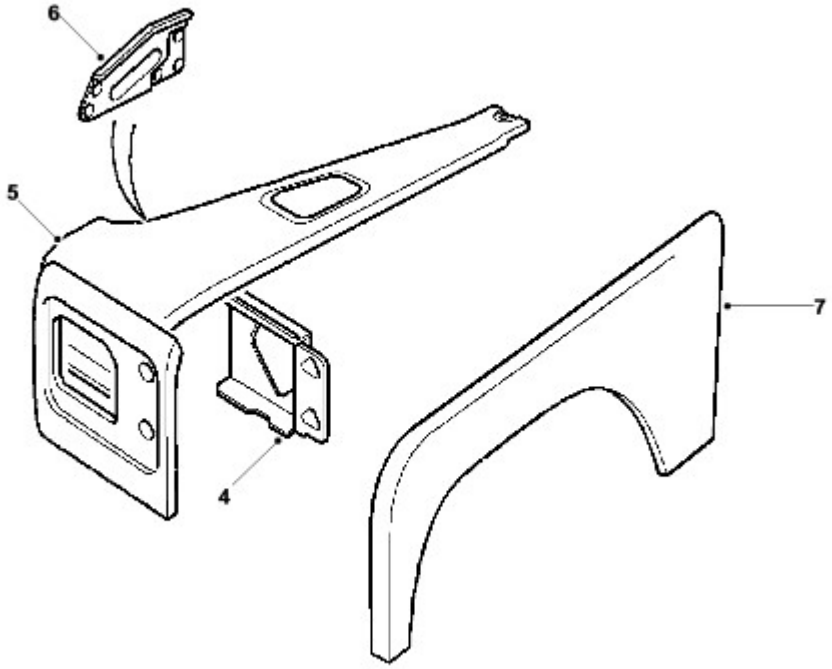
M772097A

Item	Part Number	Description
1.		Hood
2.		Hinges



M772076A

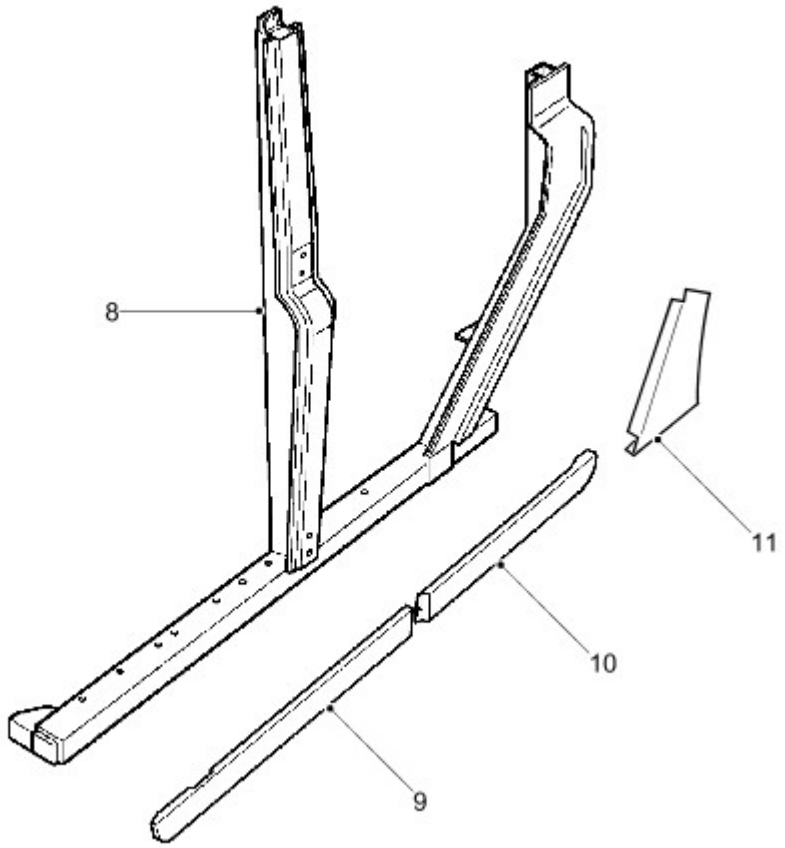
Item	Part Number	Description
3.		Bulkhead



M772095C

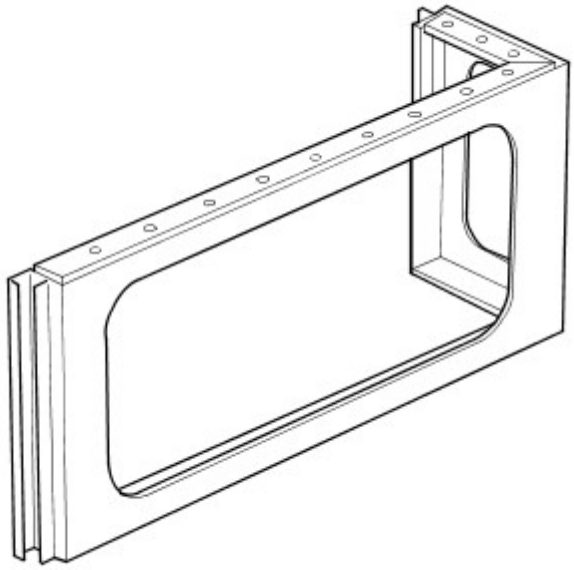
Item	Part Number	Description
4.		Headlamp mounting panel - inner
5.		Fender upper assembly
6.		Headlamp reinforcement panel
7.		Fender lower

Body side panels



M772110B

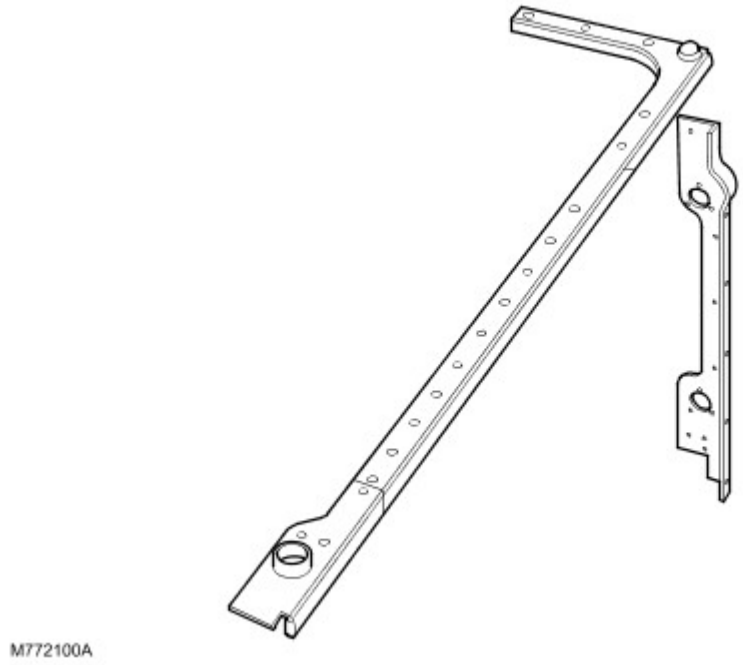
Item	Part Number	Description
8.		'B/C' and 'D' post assembly
9.		Rocker panel - front
10.		Rocker panel - rear
11.		Dogleg - lower panel



M772104A

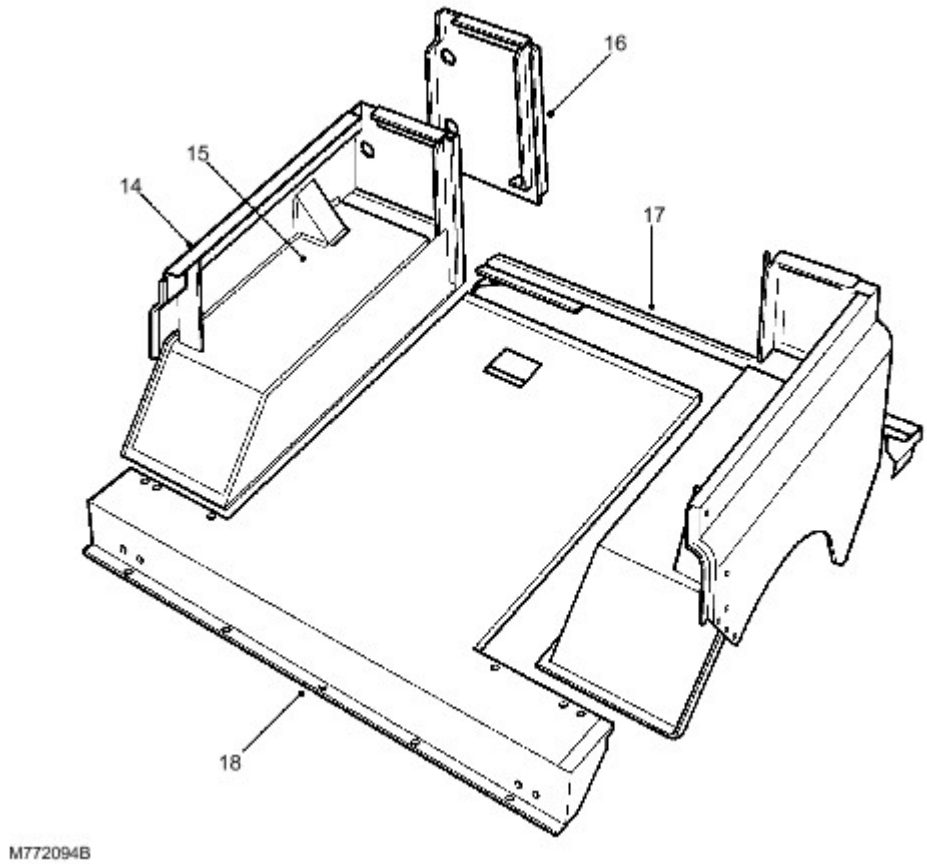
Item	Part Number	Description

12.		Body side rear - upper



Item	Part Number	Description
13.		Body side cappings

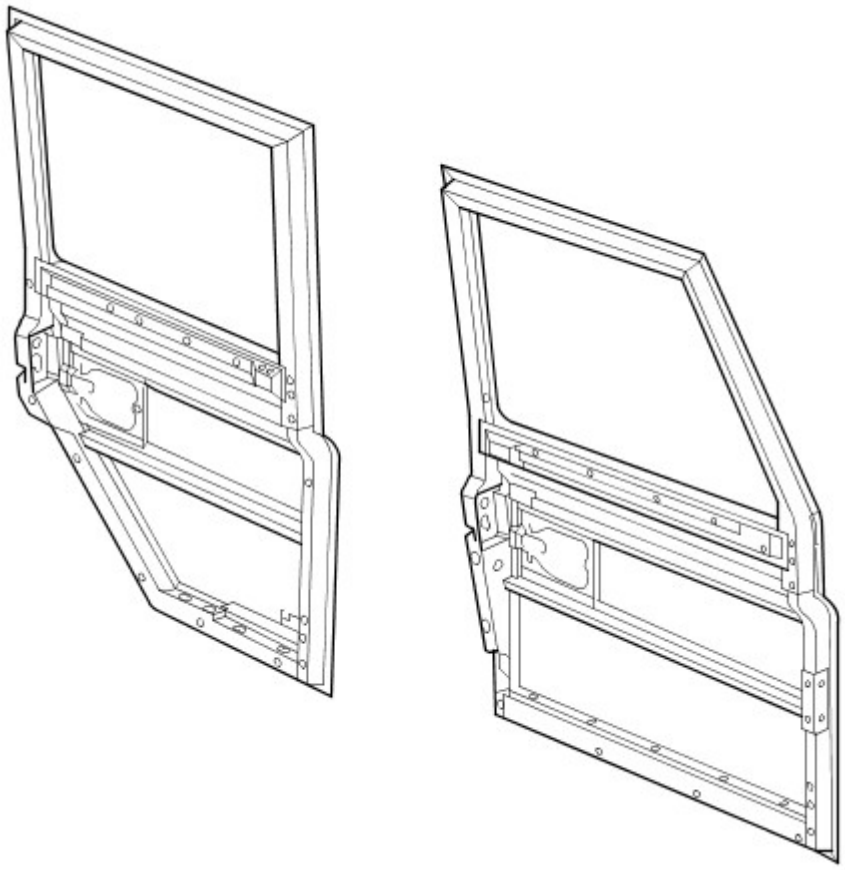
Rear end panels



Item	Part Number	Description
14.		Body side panel - lower
15.		Body side panel - lower - assembly
16.		Rear lamp panel
17.		Rear panel
18.		Rear floor

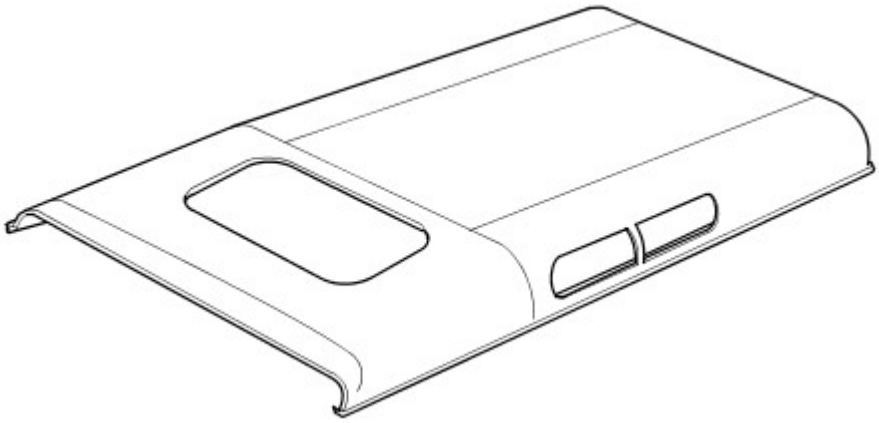
NOTE:

From 2002 Model year, the taildoor skin is one panel.



M772077A

Item	Part Number	Description
19.		Door assemblies



M772092A

Item	Part Number	Description
20.		Roof