

# CERATO

## Body shop Manual

### CONTENTS

#### FOREWORD

This Body Shop Manual illustrates body structures and service procedures for the CERATO.

This manual illustrates the replacement of major body panels, plastic parts, body dimensions, sealing treatment etc., in a systematic manner which is necessary for effective and lasting body repairs. You are encouraged to become familiar with this manual and understand each section in order to perform proper repair procedures. Keep this manual in a convenient location so that it is readily available.

All information in this manual including specifications, data and illustrations is made based on the vehicles built at the time the manual was printed.

Information regarding the removal/replacement of components not specifically covered in this manual can be found in the CERATO Service Manual. Information regarding electrical harness routing/ connections, etc. can be found in the CERATO Electrical Troubleshooting Manual.

The descriptions and specifications contained in this manual were in effect at the time this manual was approved for printing. Kia Motors Corporation reserves the right to discontinue models at any time, or change specifications or design without notice and without incurring obligation.

**Kia Motors Corporation  
SEOUL, KOREA**

#### CAUTION :

Severe engine and transaxle damage may result from the use of poor quality fuels and lubricants that do not meet Kia specifications. You must always use high quality fuels and lubricants that meet the specifications described on the specification section in the relevant group of the Workshop Manual.

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Printed in Korea, April 2004  
Pub. No. : A2FB-EG44A (English)

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Title	Group
GENERAL INFORMATION	00
BODY STRUCTURE	11
REPLACING BODY PANELS	21
BODY DIMENSIONS	31
WATERPROOFING AND RUSTPROOFING	41
BODY MODIFICATION TOOLS	51
PLASTIC PARTS	61




## IMPORTANT SAFETY NOTICE

Proper service methods and repair procedures are essential for safe, reliable operation of all motor vehicles as well as personal safety of the operator. The service procedures and descriptions in this body shop manual provide general directions for a service and repair.

Procedure, techniques, tools, and parts for service including the skill of the technician vary. It is impossible to provide advice or caution as to each case in this manual.

Accordingly, anyone who intends to use a replacement part, service procedure, or tool, which is not recommended by the vehicle manufacturer, must first assure thoroughly that neither their personal safety nor the safe operation of the vehicle will be first jeopardized by the replacement part, service procedure, or tool they select.

### IN THIS MANUAL

-  **WARNING :** Remind you to be especially careful in those areas where carelessness can cause personal injury.
-  **CAUTION :** To prevent you from making errors that could damage the vehicle as well as personal injury.
-  **NOTE :** Gives you added information that will help you complete a particular procedure.

The following list contains some general WARNINGS that you should follow while working on a vehicle.

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires you to be under the vehicle.
- Make sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on the vehicle. If you have an automatic transaxle, set in park unless instructed otherwise for a specific operation
- Place supporters against the front and rear surfaces of the tires to help prevent the vehicle from moving
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide poisoning.
- Keep yourself and your clothing away from moving parts when the engine is running, especially the drive belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
- Do not smoke while working on a vehicle.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle.
- When it is necessary to work under the hood, keep hands and other objects clear of the radiator fan blades! Your vehicle may be equipped with a cooling fan that may turn on, even though the ignition switch is in the OFF position. For this reason care should be taken to ensure that the radiator fan electric motor is completely disconnected when working under the hood and the engine is not running.

## General information

### Fundamental procedures

Vehicle protection .....	00- 1
A word about safety .....	00- 1
Welding procedures .....	00- 1
Body frame straightener .....	00- 2
Electrical procedures .....	00- 2

00

### For best results

Disassembly .....	00- 3
Preparation of assembly .....	00- 5
Assembly .....	00- 6
Rustproof treatment after assembly .....	00- 7

Vehicle lift (2-Support type) & safety stand positions ..... 00- 8

Jack and safety stand positions ..... 00- 8

Towing .....00- 9

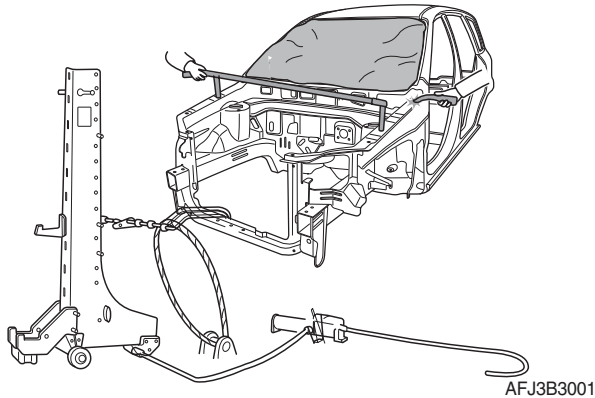
### Body colors and major specifications

Kia color codes .....	00- 10
Paint manufacture codes .....	00- 10

## Fundamental procedures

### Vehicle protection

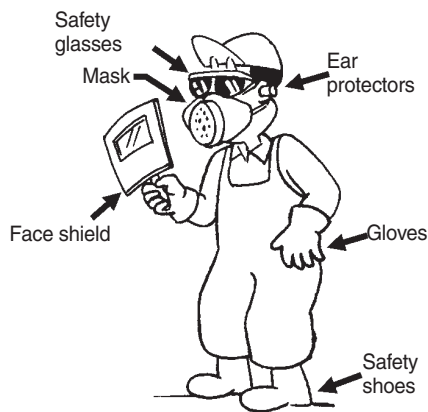
1. Cover the seats before performing any procedure to keep them from getting dirty.
2. Cover all glasses, seats and mats with a heat resistant cover when welding.



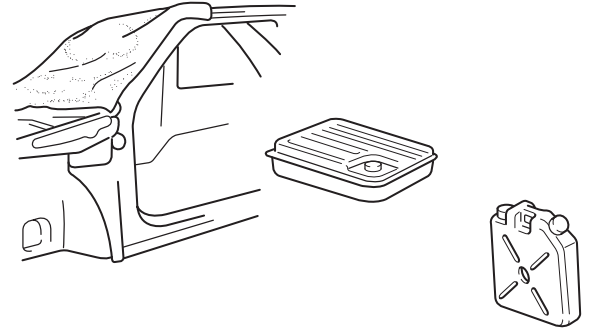
3. Protect moldings, garnishes and ornaments.

### A word about safety

1. Wear the appropriate safety equipment that is necessary for the procedure being performed.



2. When welding or performing other procedures that require the use of an open flame near the fuel tank, disconnect and remove the tank and fuel pipe, and cap the pipe to prevent fuel leakage.



### Welding procedures

Observe the following tips when welding.

1. Wear appropriate eye protection.
2. Carefully follow the manufacturers operating instructions for the welding machine you are using.
3. Do not weld, smoke or allow open flames around volatile chemicals, cleaners or solvents or in any area where they have just been used.

00-2 General information

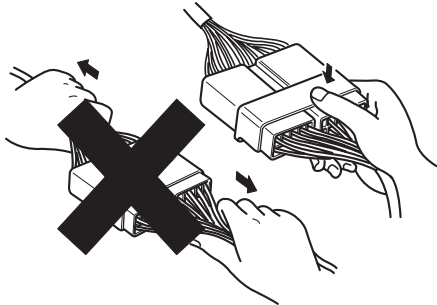
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## Body frame straightener

When using a frame straightener, do not enter the area where the body is being straightened by the chain.

## Electrical procedures

1. Disconnect the negative battery terminal.
2. Do not pull on wires when disconnecting electrical connectors. Be careful to hold the connector itself when disconnecting it.
3. Insert the connector until it “clicks” when connecting the connector.
4. Handle all electrical components with care.



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## For best results

### Disassembly

#### Measuring dimensions before beginning

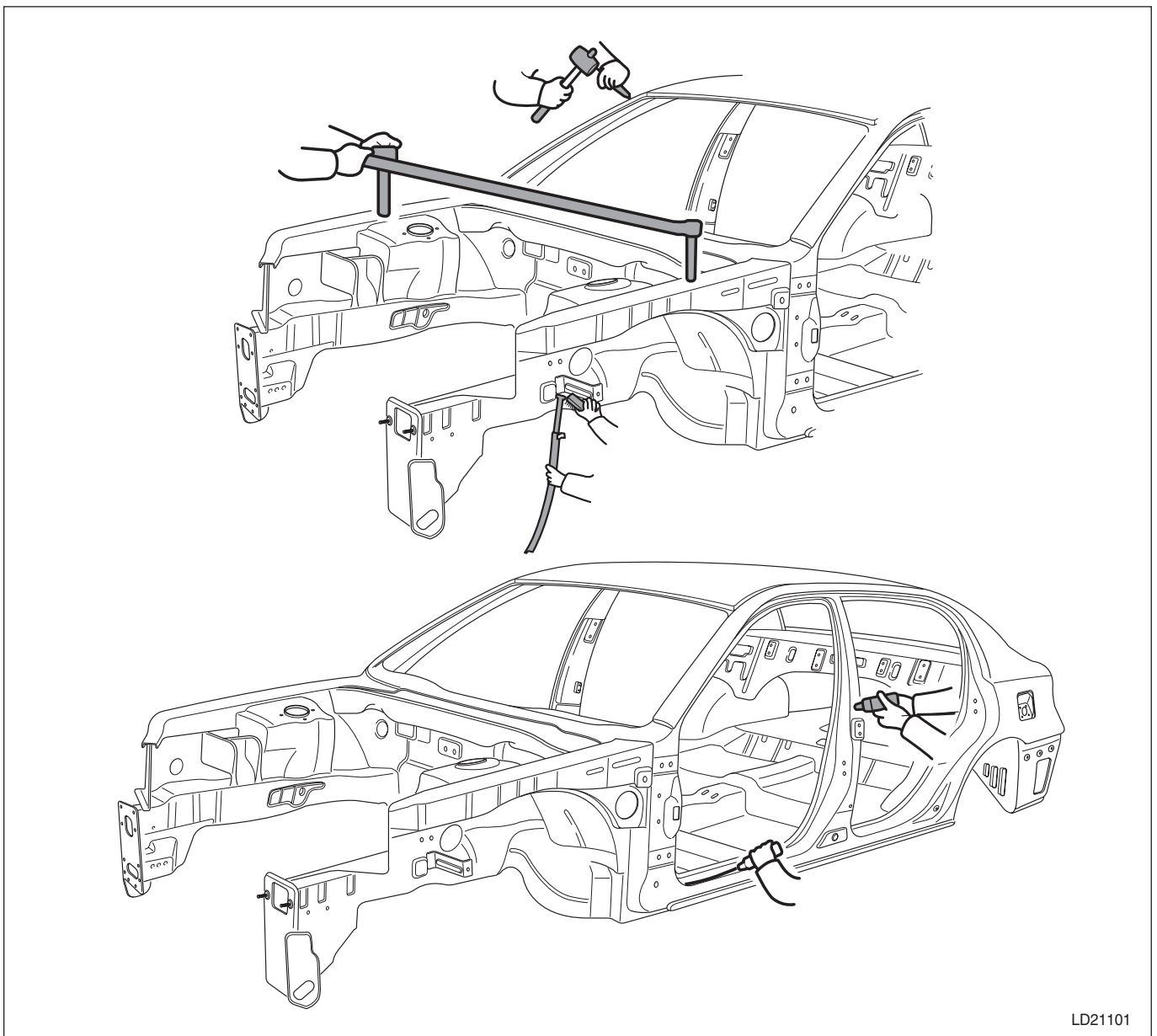
Measure the dimensions of the damaged area according to the body dimension drawings before disassembling and repairing. Adjust dimensions with body frame adjuster if deformed.

#### Selecting cutting area

Select a cutting area that is easily accessible and that is prone to the least amount of distortion when welding. Select an area that would allow the new part to overlap repair area by 1.2~2.0 in (30~50 mm).

#### Protecting body from damage

Secure the body with clamps and jacks to prevent damage to the body when working on it.



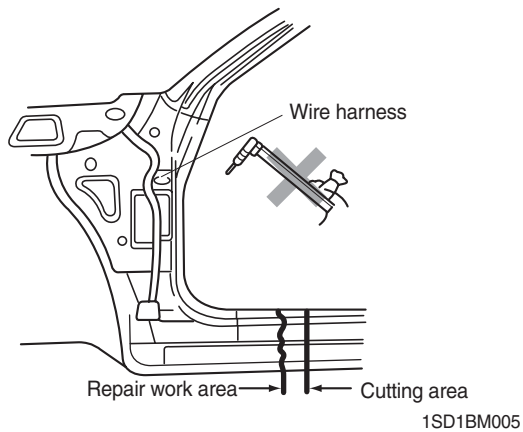
LD21101

## 00-4 General information

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### Disassembling related parts

Use caution when removing body molding and trim from the area to be worked. Apply masking tape where needed to prevent damage to the part being removed or to the vehicle body. Before starting repairs, check if pipes, hoses or electrical components are present near damaged area.



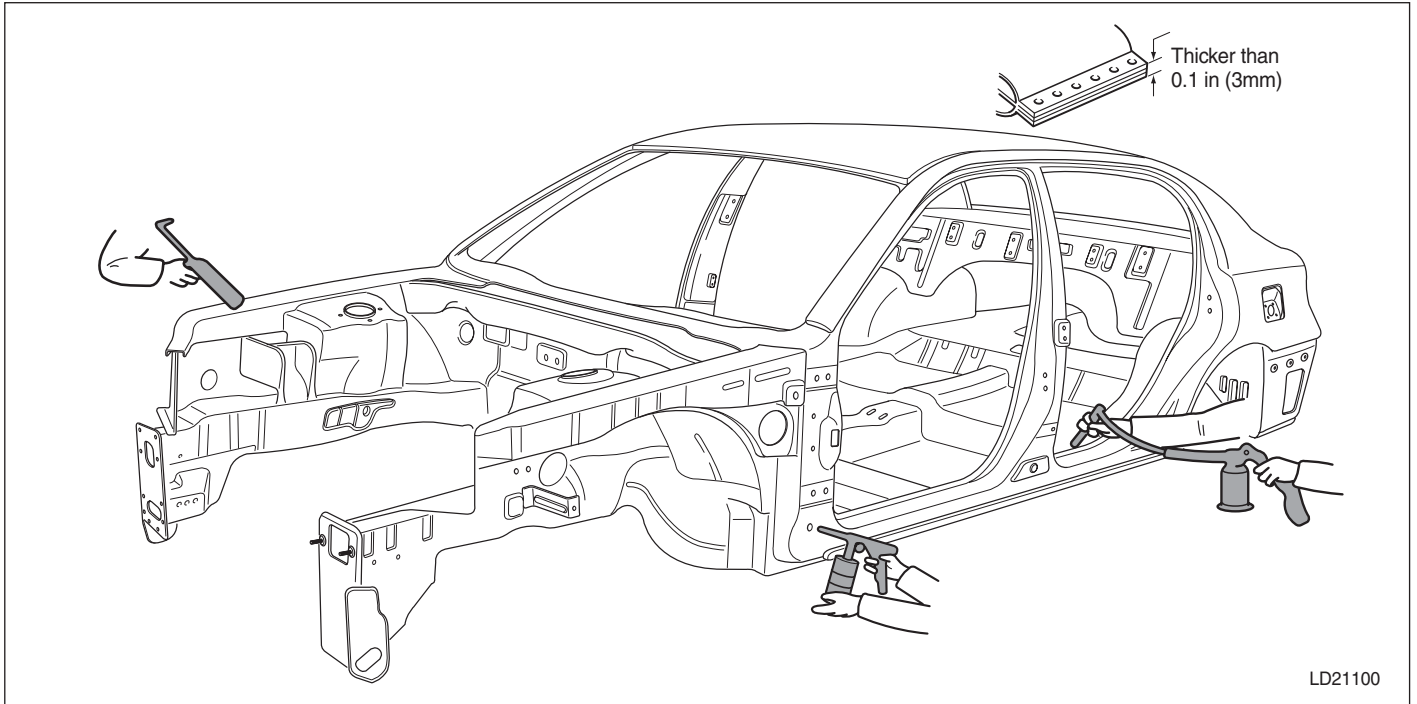
## Preparation of assembly

### Applying spot sealer

Remove paint from the surface of new parts and body to be spot welded, and apply spot sealer for rustproofing.

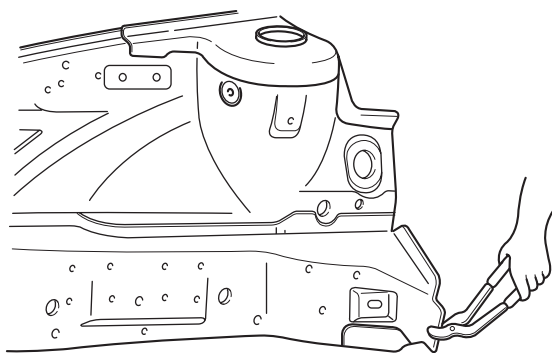
### Selecting a welding method

If the thickness of the area to be welded with the panels overlapped is greater than 0.1 in (3 mm), do plug welding using a carbon arc welding machine.



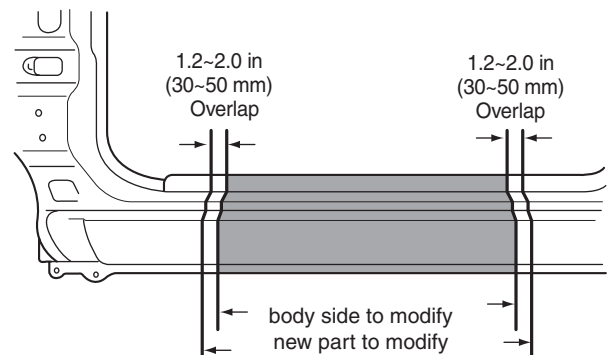
### Machining holes for plug welding

Drill a hole of approximately 0.2~0.24 in (5~6 mm) in diameter in those areas which are not suitable for spot welding.



### Adjusting a new part

The new part should be cut larger than the repair area, overlapping the repair area by 1.2~2.0 in (30~50 mm).



00-6 General information

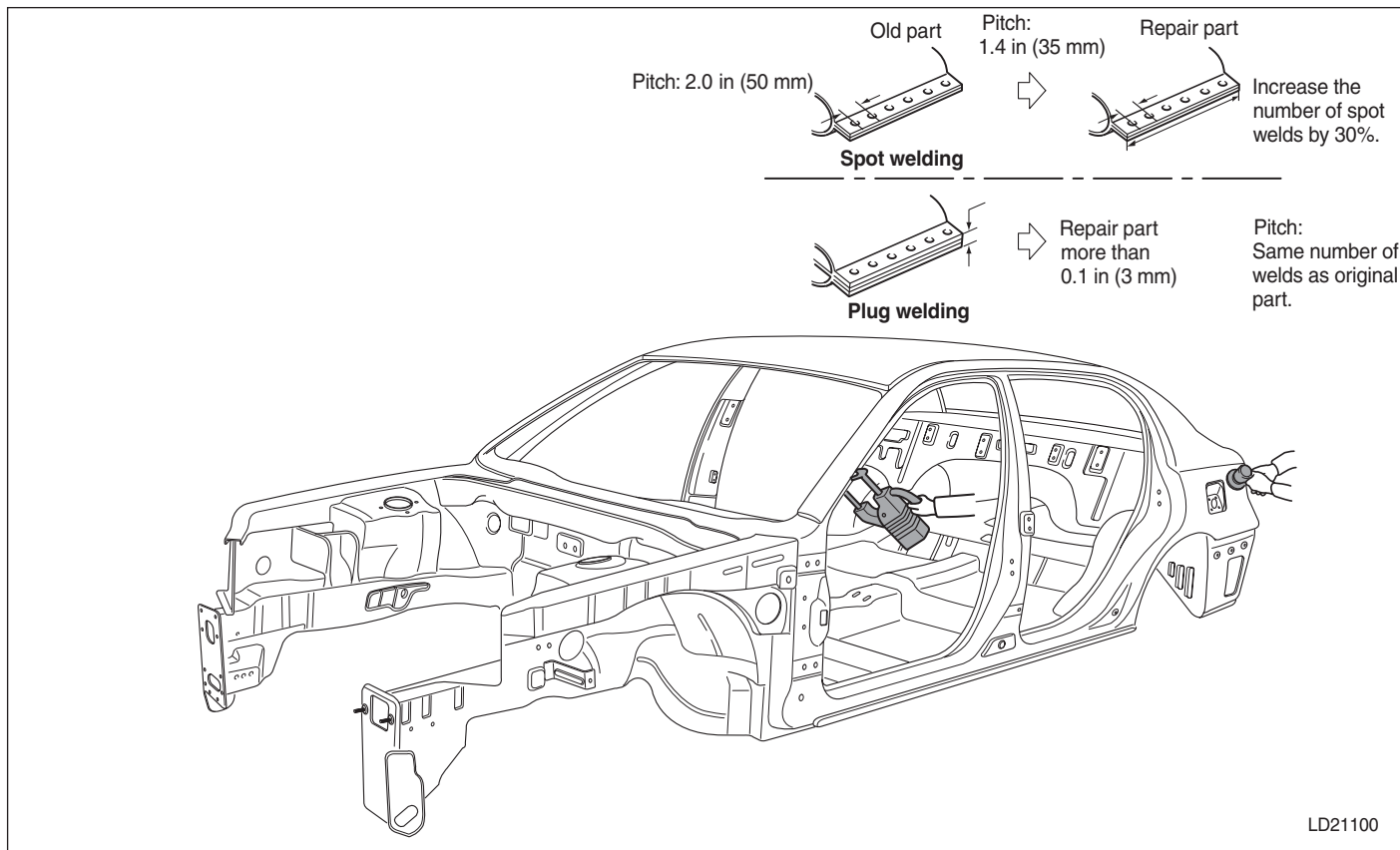
## Assembly

### Measuring dimensions before welding

When assembling a new part, assemble it according to the body dimensions given in Section 31, and start welding after checking the gaps with nearby parts.

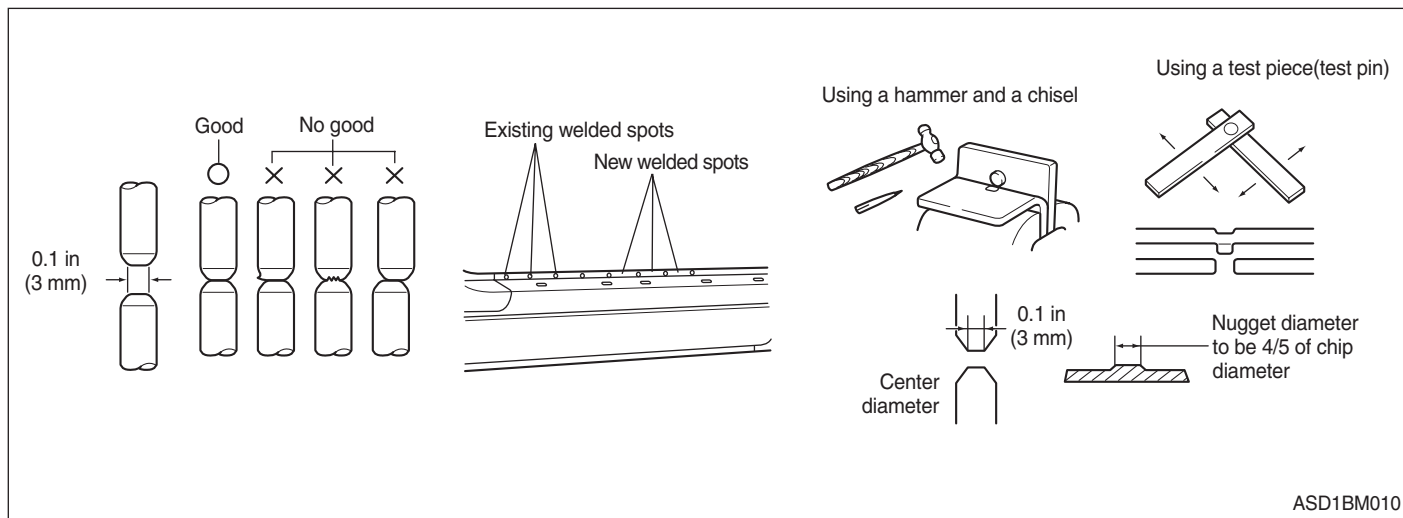
### Caution when welding

The number of welding points should be determined based on the criteria below:



### Caution when spot welding

- The tip of the spot welding machine should be maintained to a minimum of 0.1 in (3 mm) because it greatly affects welding strength. When possible, spot welding should be done between the existing spot welded points.
- Before and after spot welding, weld a test piece (test pin) of the same material as the body panel, and check the welding strength.



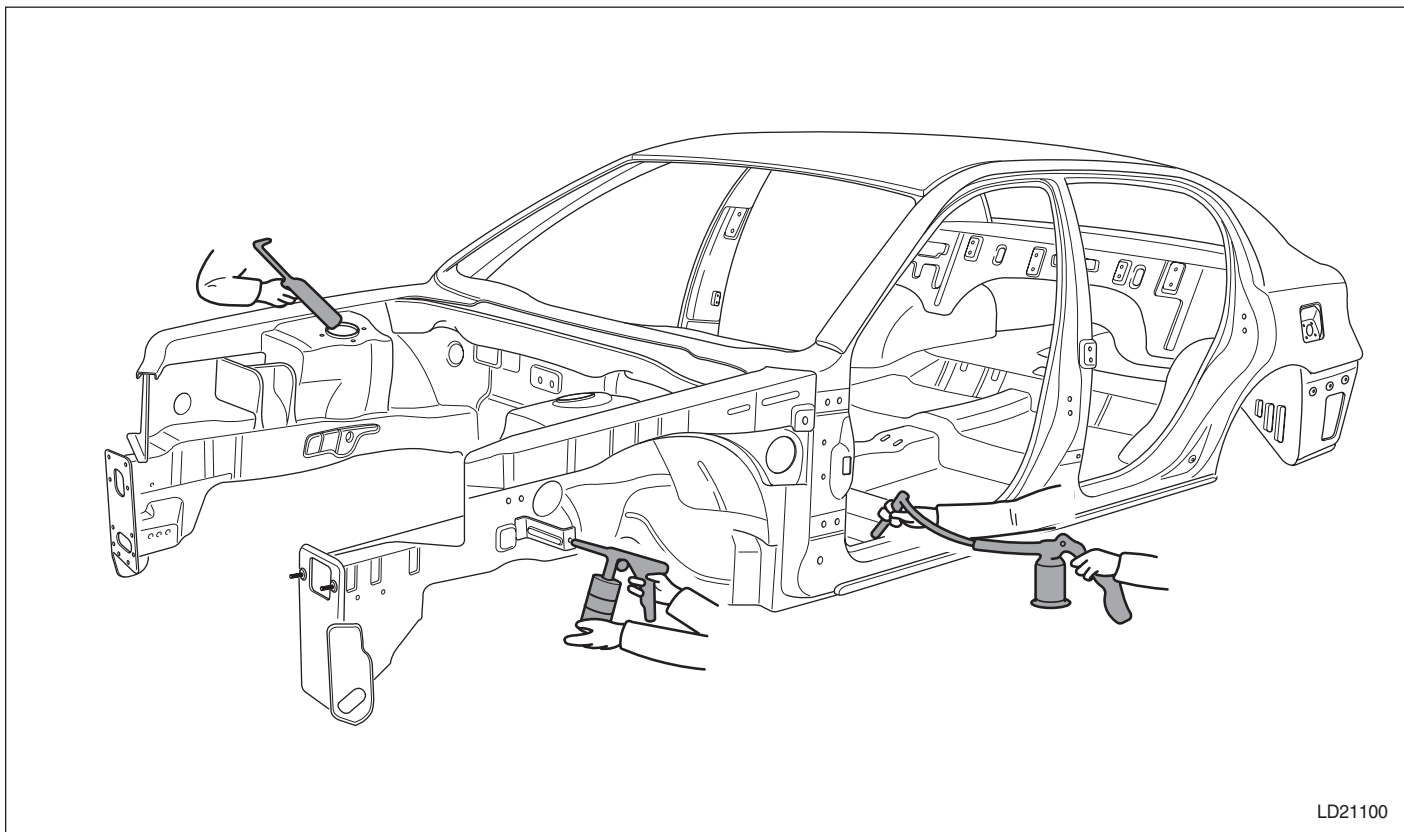
## Rustproof treatment after assembly

### Body sealing

Apply body sealer where necessary.

### Applying rustproof material

Apply rustproofing material(wax, oil, etc.) behind welded area.



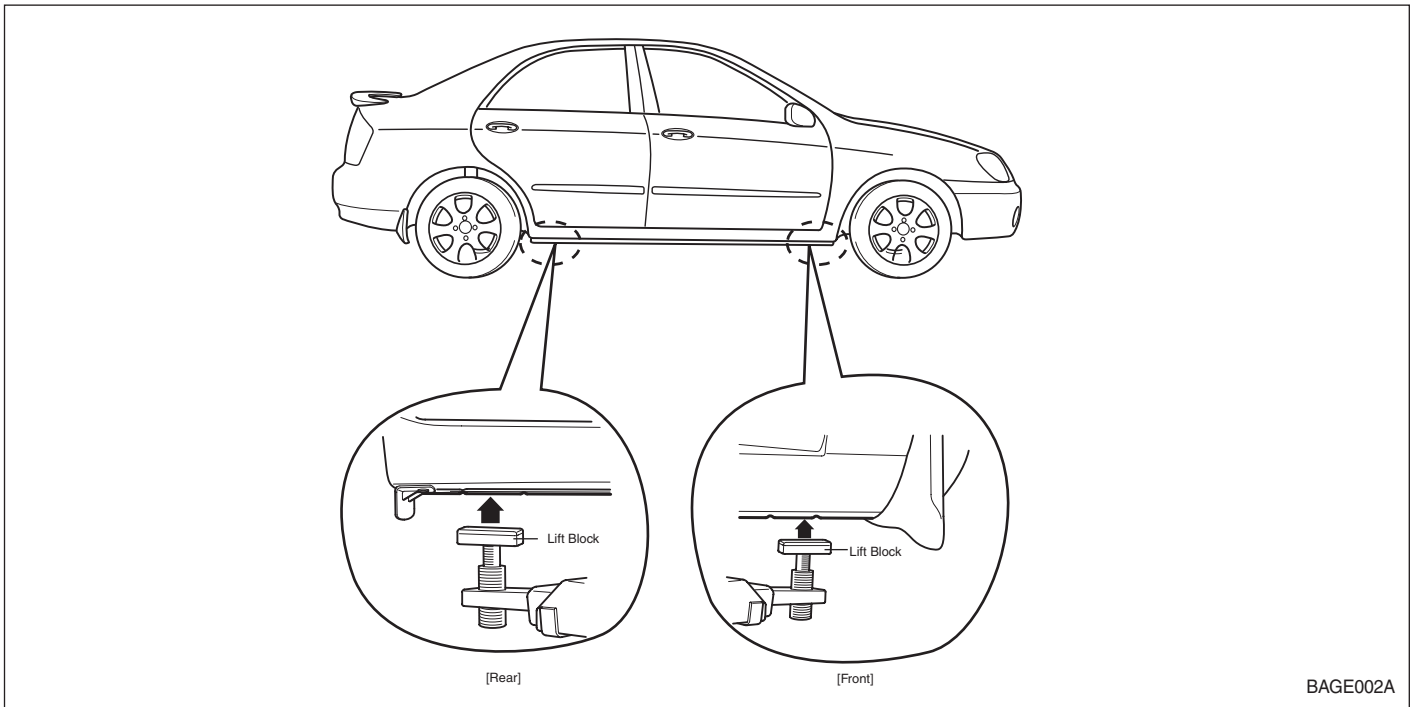
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### Applying undercoat

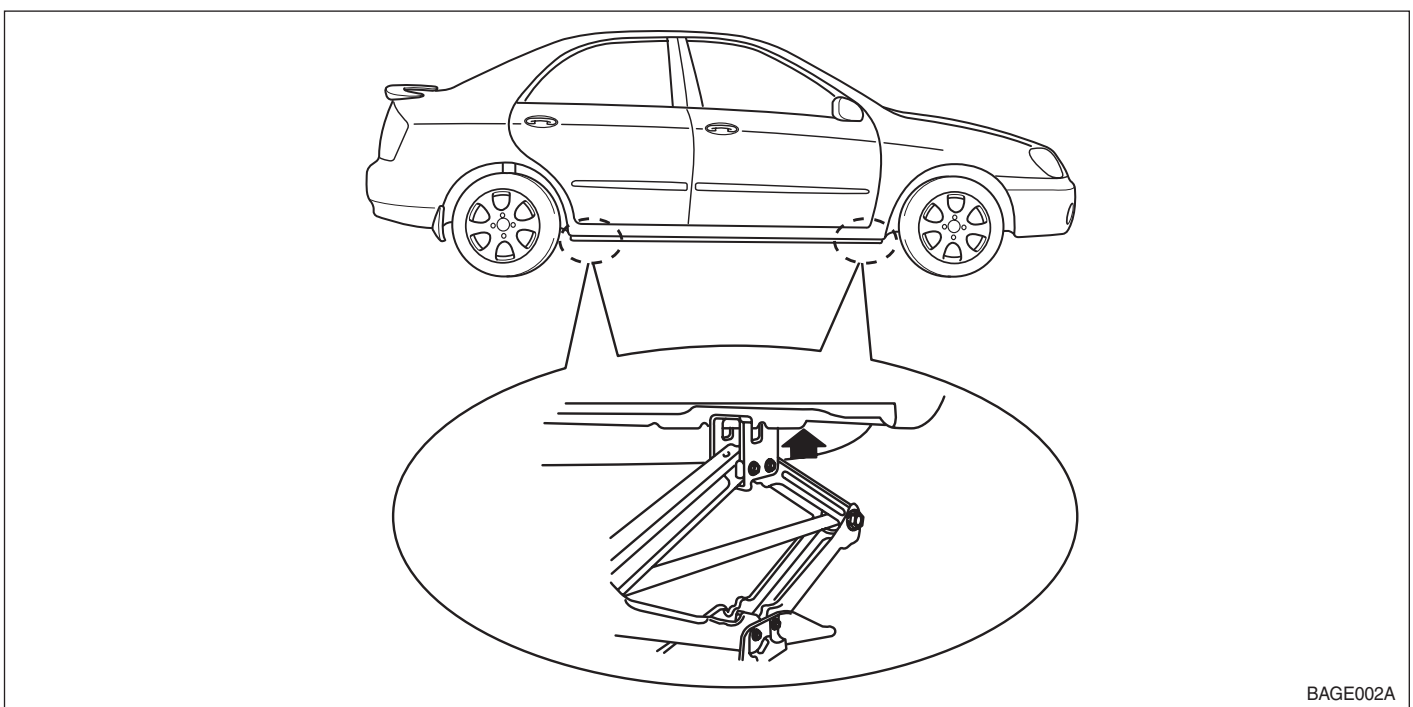
Apply undercoat on the body where necessary.

## Vehicle Lift (2-Support Type) And Safety Stand Positions

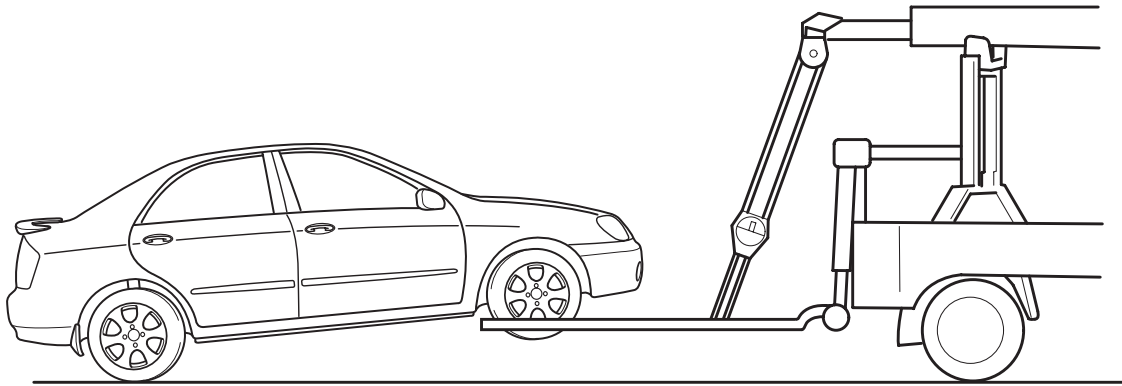
1. Place the lift blocks under the support points as shown in the illustration
2. Raise the hoist a few inches and rock the vehicle to be sure it is firmly supported.
3. Raise the hoist to full height to inspect the lift points for secure support.



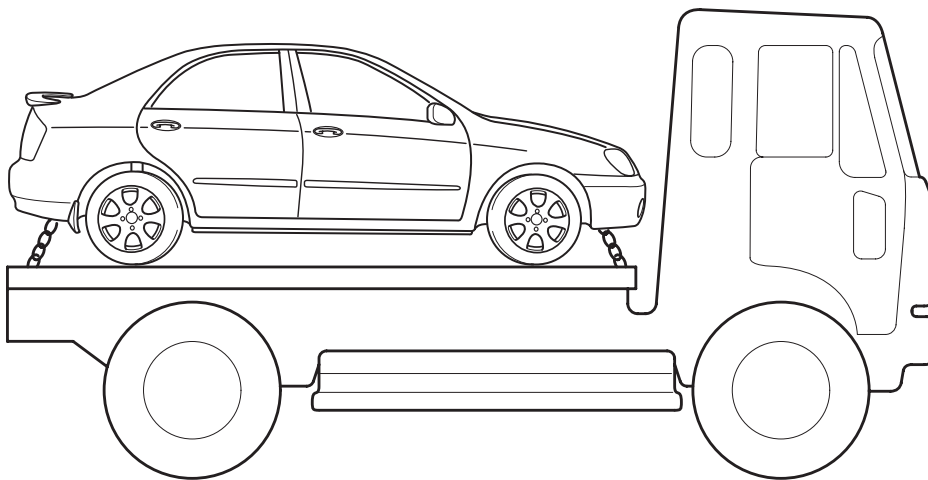
## Jack Support Positions



## Towing



[Wheel lift]



[Flat - bed]

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If emergency towing is necessary, we recommend having it done by an authorized KIA dealer or a commercial tow-truck service.

Proper lifting and towing procedures are necessary to prevent damage to the vehicle.

It is recommended that your vehicle be towed with a wheel lift or flat-bed equipment.

Do not tow with a slingbelt.

Our company has not approved a slingbelt towing procedure.

## Body colors and major specifications

### Kia color codes

Kia code	Paint color
6C	Clear Silver
L1	Ice Blue
S5	Brownish Dark Grey
G5	Champagne Red
R1	Radiant Red
4Y	Sand Beige
UD	Clear White
EB	Ebony Black
VR	Classic Red
1C	Imperial Blue

### Paint manufacture codes

Kia code	Color name	Dupont	Spies Hecker	Standex	BASF	Akzo Nobel	PPG
6C	Clear Silver	X1135	746556	6C	6C	KIA9809	6C
L1	Ice Blue	X0751	88019	L1	L1	KIA9810	L1
S5	Brownish Dark Grey	X1133	746274	S5	S5	KIA9812	S5
G5	Champagne Red	X1136	746275	G5	G5	KIA9622	G5
R1	Radiant Red	X1134	746276	R1	R1	KIA9811	R1
4Y	Sand Beige	X0752	742284	4Y	4Y	KIA9808	4Y
UD	Clear White	F2756	15689	UD	UD	KIA4004	UD
EB	Ebony Black	F0193	35992	EB	EB	KIA4002	EB
VR	Classic Red	F4190	86158	VR	VR	KIA3002	VR
1C	Imperial Blue	P6782	88019	1C	1C	KIA9532	1C

## Body structure

### Body composition

Body shell .....	11- 1
Body service holes .....	11- 1

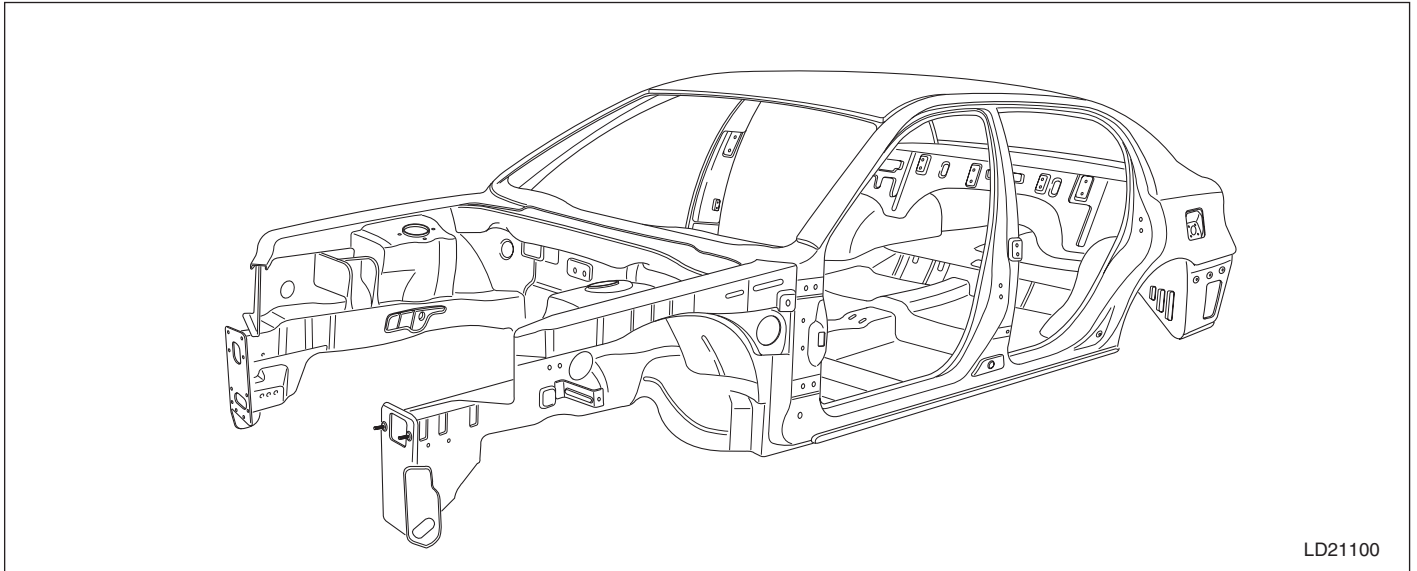
### High tension steel sheet used area

Radiator support panel .....	11- 2
Fender apron panel.....	11- 3
Cowl & Dash panel .....	11- 4
Floor panel .....	11- 5
<b>Side body panel</b>	
4 Door .....	11- 6
5 Door .....	11- 7
<b>Roof panel</b>	
4 Door .....	11- 8
5 Door .....	11- 9
<b>Fender &amp; Hood panel</b> .....	11-10
<b>Back panel</b>	
4 Door (Trunk lid) .....	11-11
5 Door (Tail gate) .....	11-12
<b>Front door &amp; Rear door</b>	
4 Door .....	11-13
5 Door .....	11-14

## Body composition

### Body shell

The body consists of the body shell, frame and cross members, etc, welded together. This provides safety, durability, noise protection, rustproofing and vibration proofing of the vehicle.

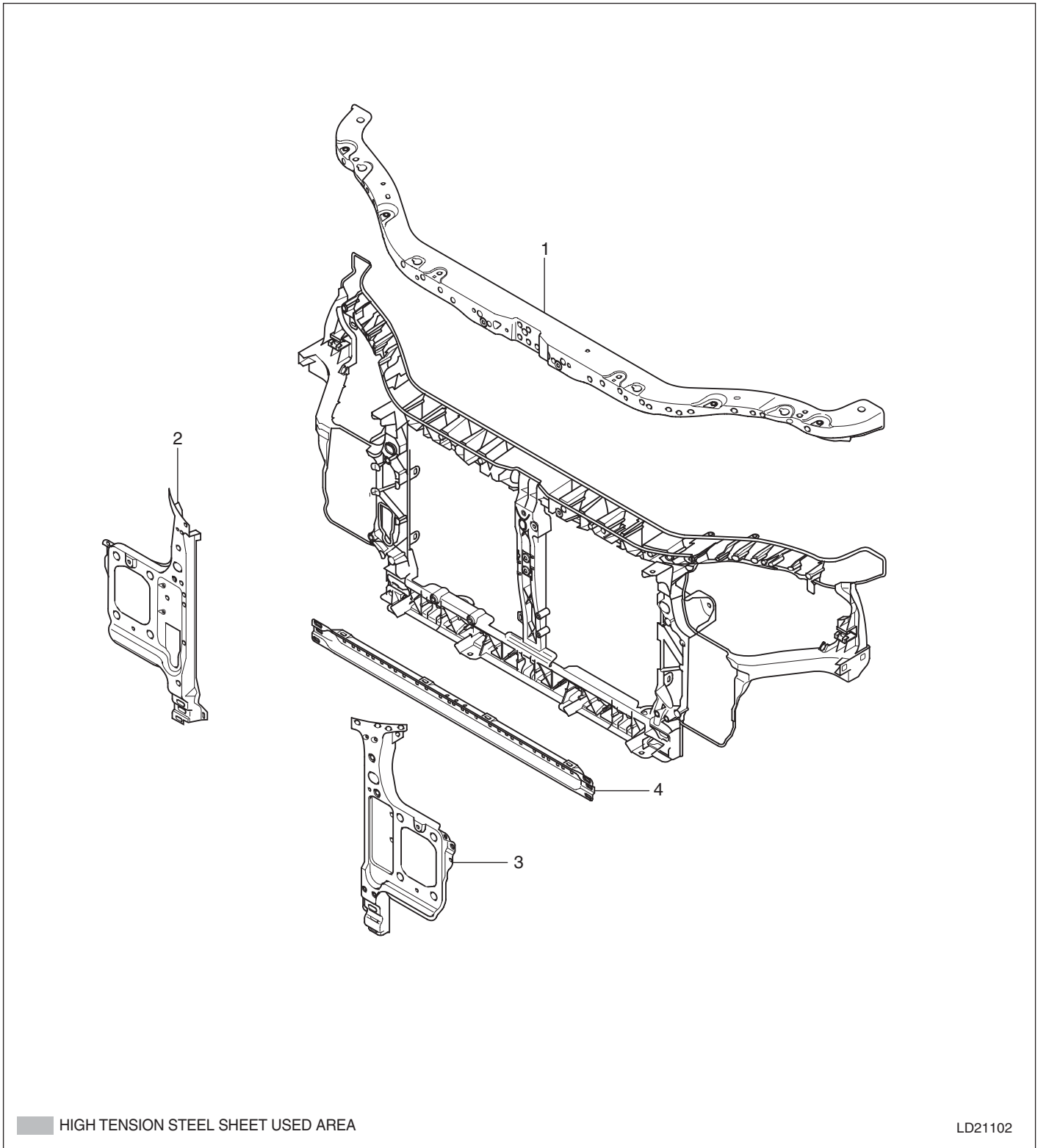


### Body service holes

Body service holes are provided in the inner panel to improve serviceability of the body.



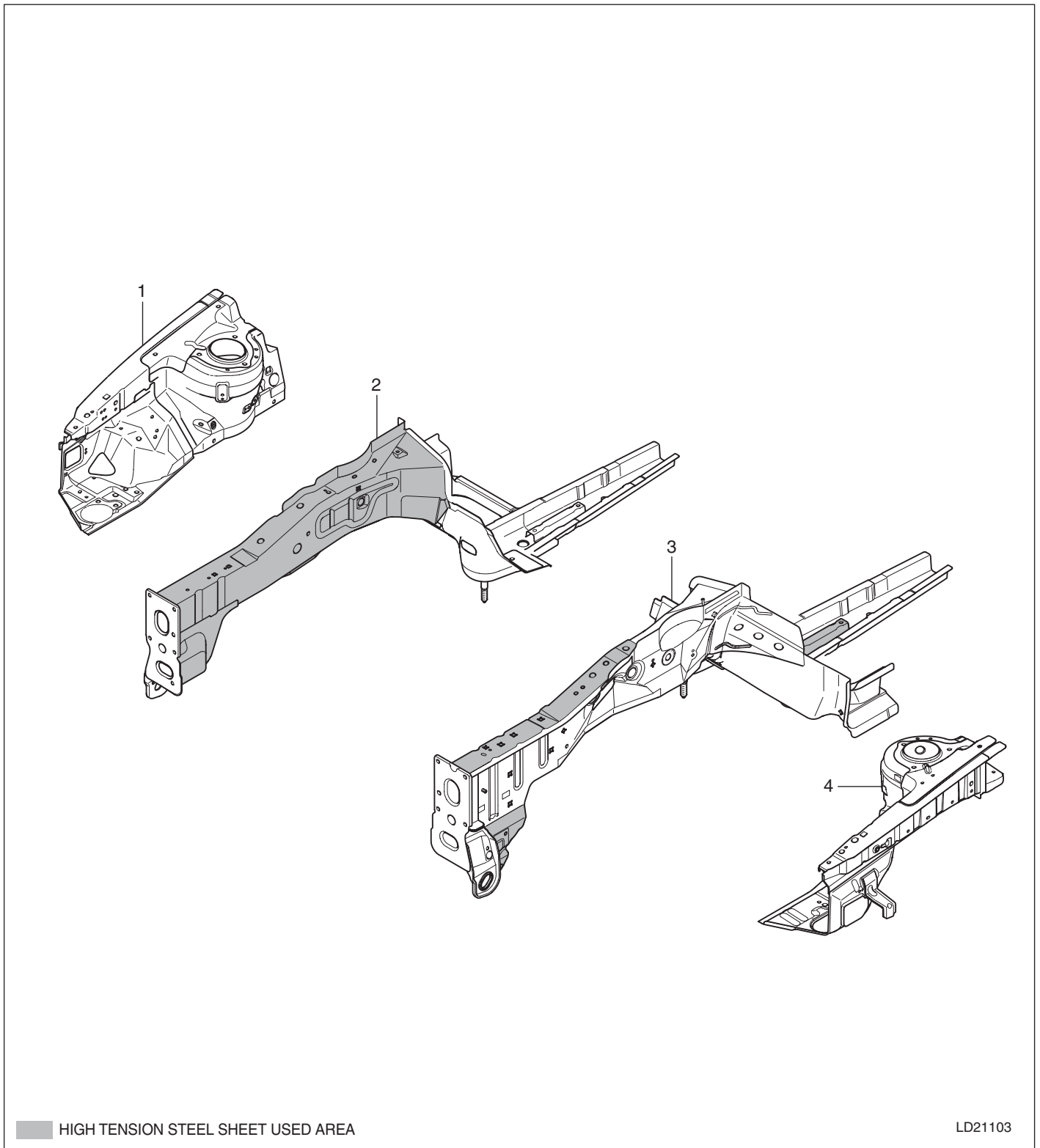
## High tension steel sheet used area Radiator support panel



- (1) Radiator support upper complete member assembly
- (2) Headlamp support RH panel assembly

- (3) Headlamp support LH panel assembly
- (4) Shroud lower member assembly

## Fender apron panel

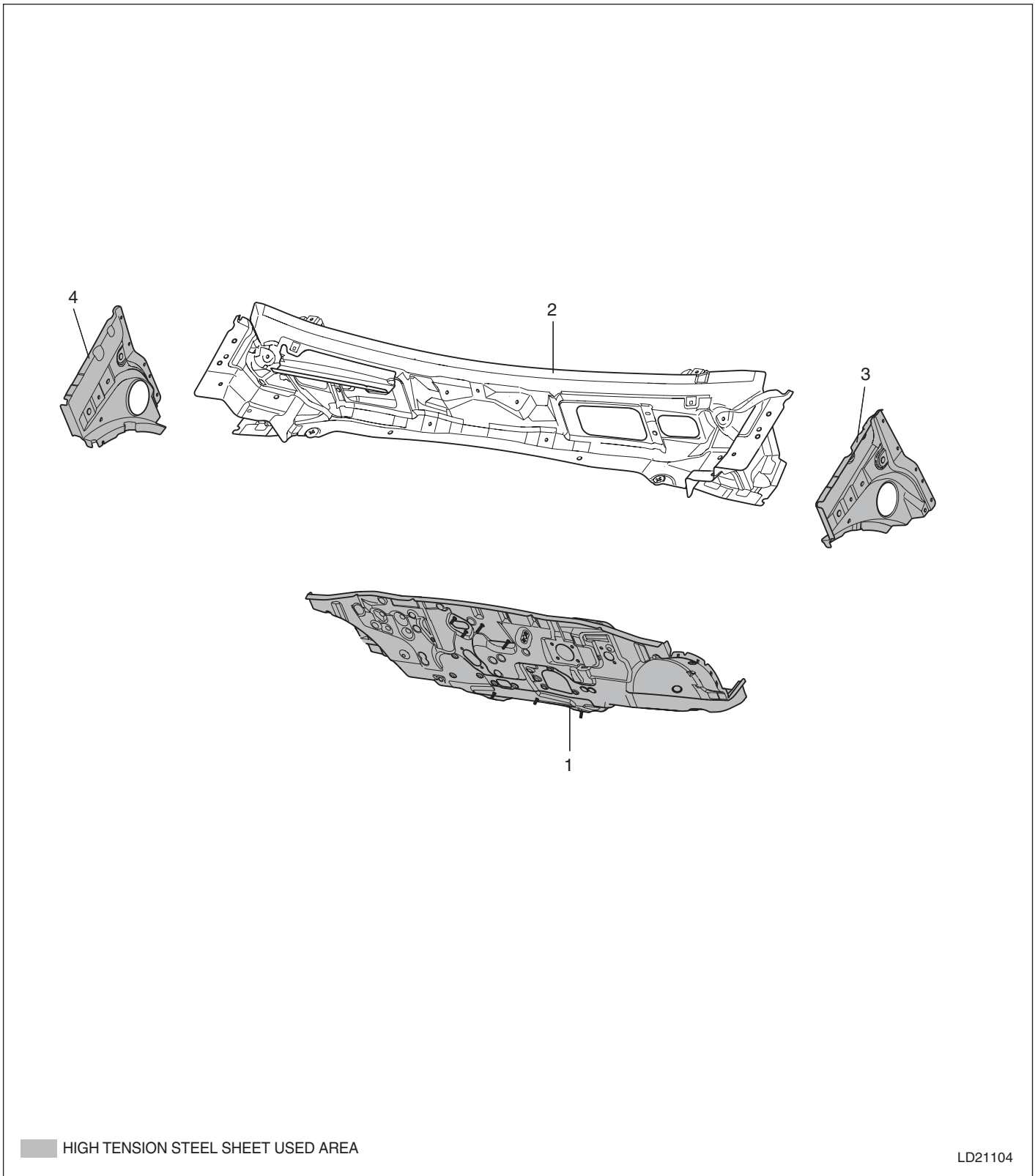


- (1) Fender apron RH panel assembly
- (2) Front side RH member assembly

- (3) Fender apron LH panel assembly
- (4) Front side LH member assembly

11-4 Body structure

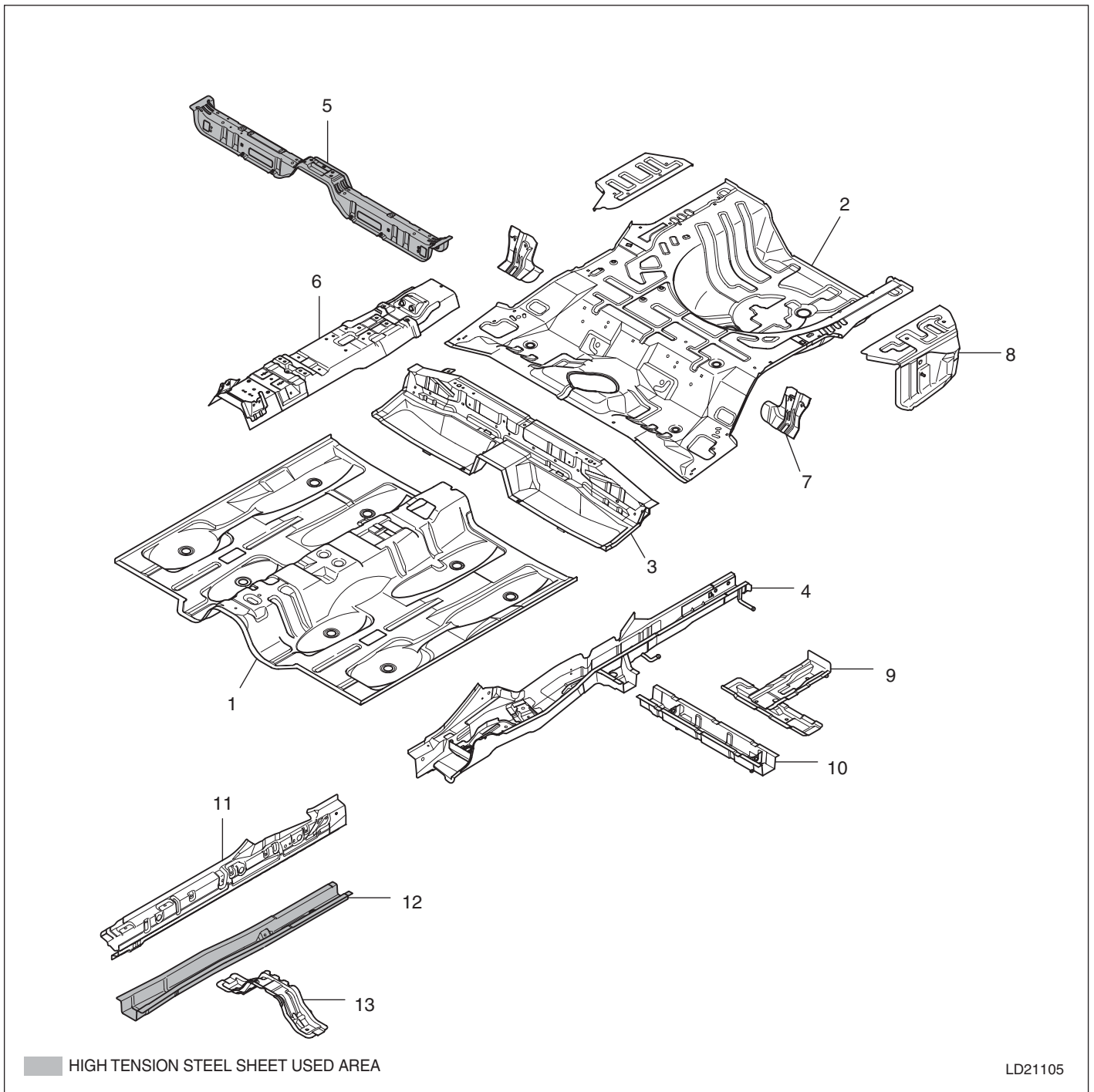
Cowl & Dash panel



- (1) Dash complete panel assembly
- (2) Cowl complete panel assembly

- (3) Cowl side outer LH panel assembly
- (4) Cowl side outer RH panel assembly

## Floor panel

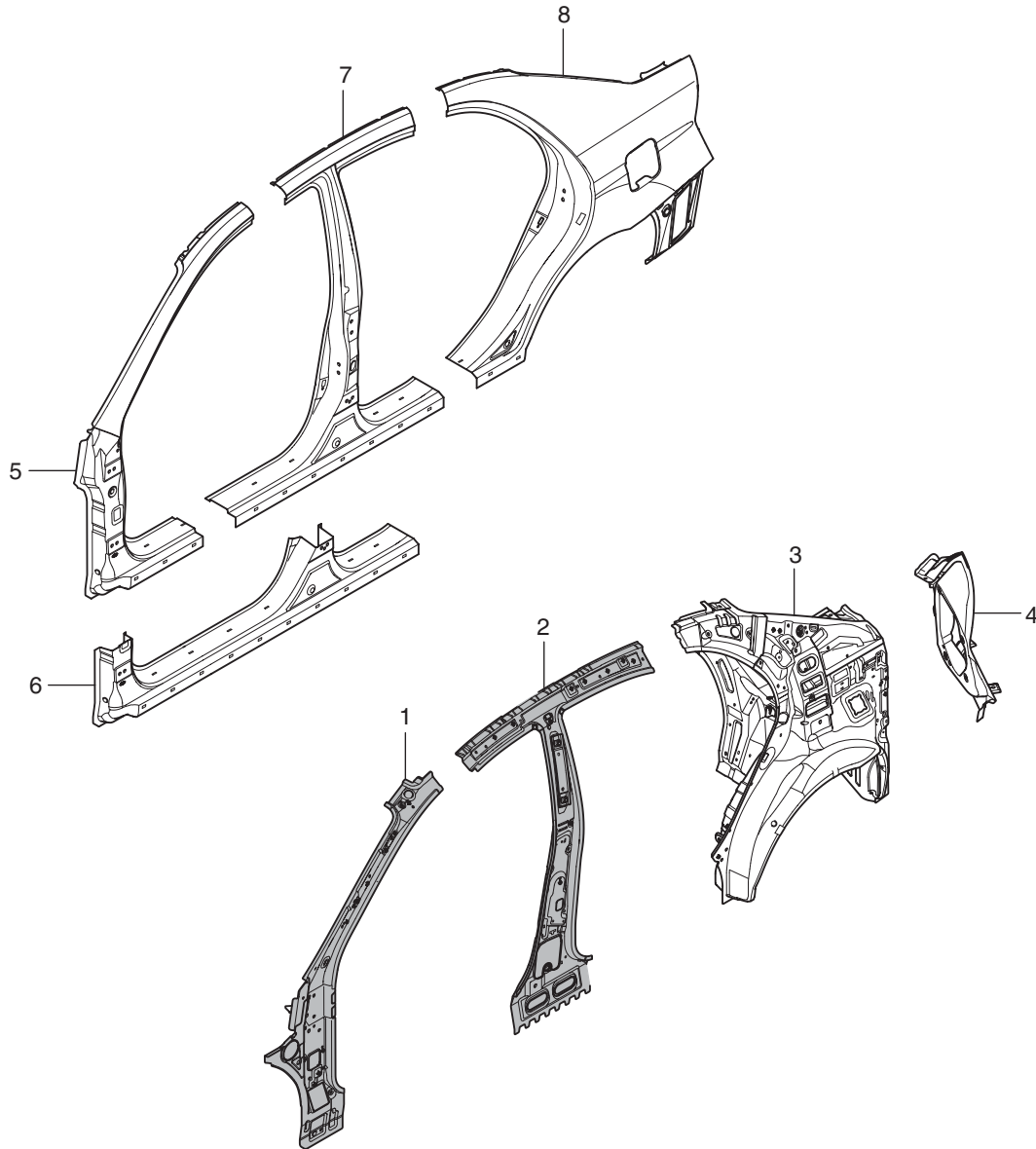


LD21105

- (1) Center floor panel assembly
- (2) Rear floor panel assembly
- (3) Center floor side member rear extension assembly
- (4) Rear floor side LH member assembly
- (5) Front seat crossmember assembly
- (6) Center floor reinforcement assembly
- (7) Package tray side lower gusset
- (8) Rear floor side LH panel assembly
- (9) Rear jack up cross reinforcement assembly
- (10) Rear floor center crossmember assembly
- (11) Side sill inner panel assembly
- (12) Center floor side member assembly
- (13) Muffler hanger mounting front bracket assembly

11-6 Body Structure

Side body panel (4Door)

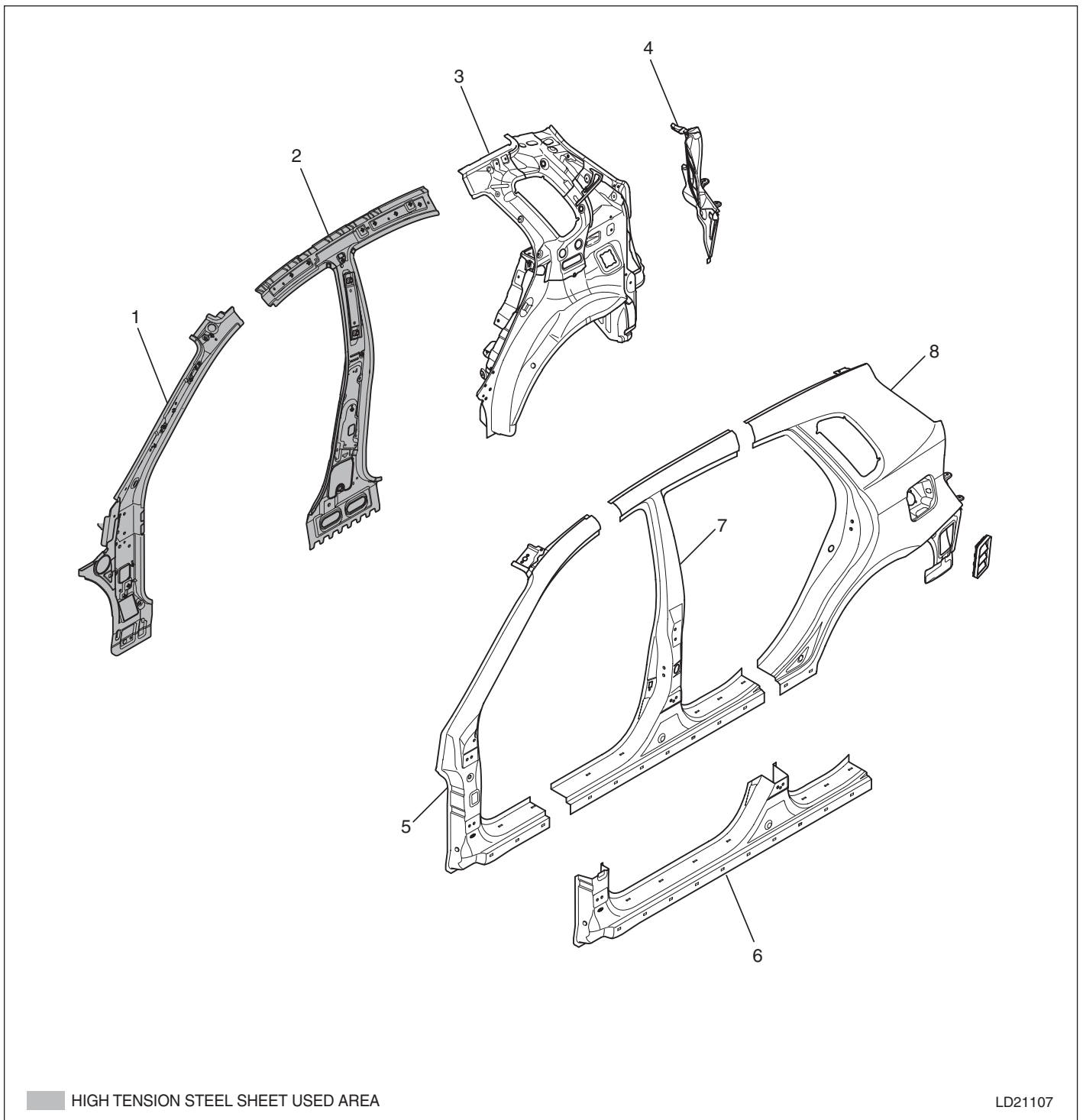


■ HIGH TENSION STEEL SHEET USED AREA

LD21106

- (1) Front inner pillar assembly
- (2) Center inner pillar assembly
- (3) Quarter inner & Wheel house complete panel assembly
- (4) Combination lamp housing panel complete
- (5) Pillar outer panel assembly
- (6) Side sill outer panel assembly
- (7) Center pillar outer panel assembly
- (8) Quarter outer panel assembly

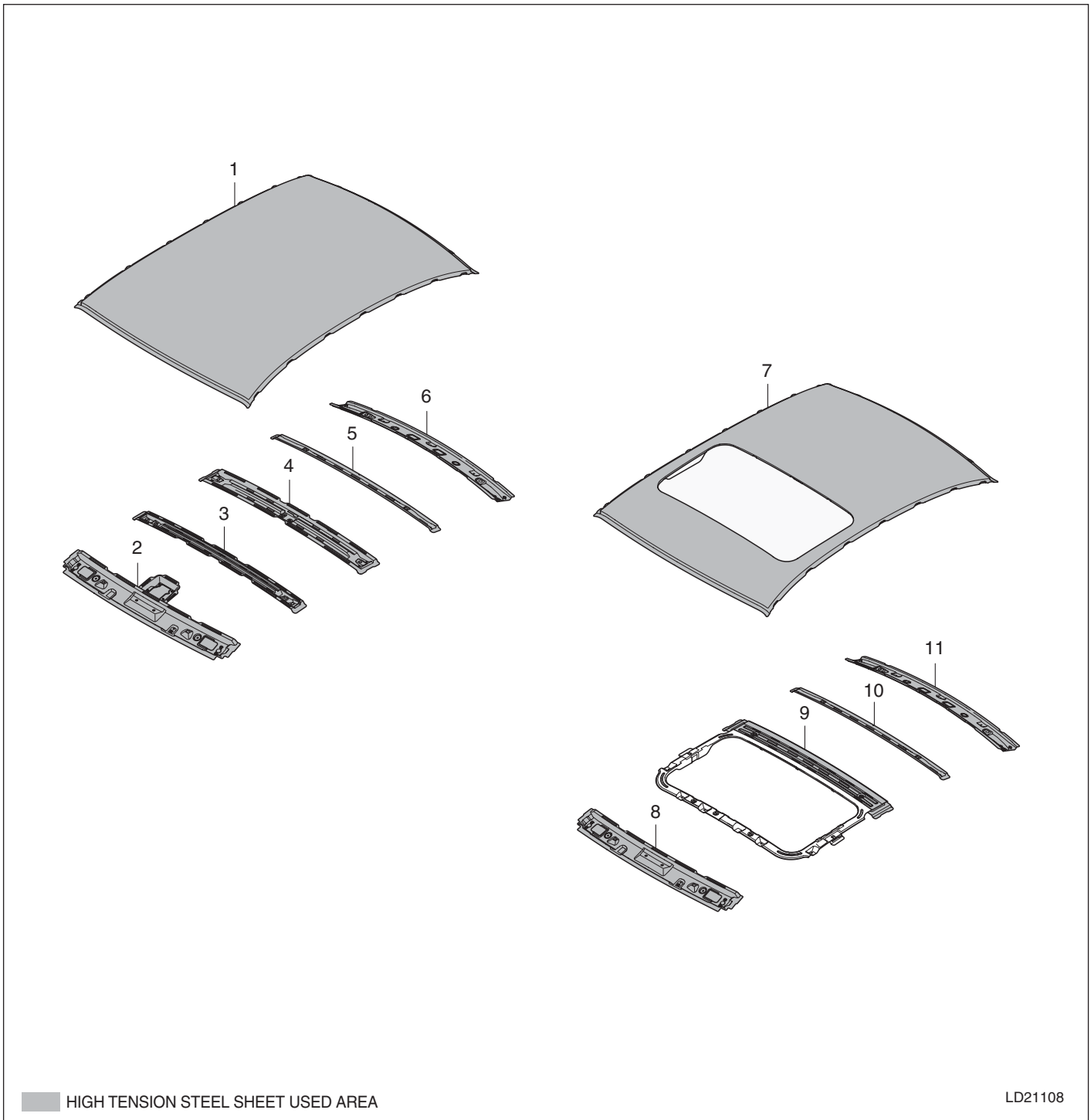
## Side body panel (5Door)



- (1) Front inner pillar assembly
- (2) Center inner pillar assembly
- (3) Quarter inner & Wheel house complete panel assembly
- (4) Combination lamp housing panel complete
- (5) Pillar outer panel assembly
- (6) Side sill outer panel assembly
- (7) Center pillar outer panel assembly
- (8) Quarter outer panel assembly

11-8 Body Structure

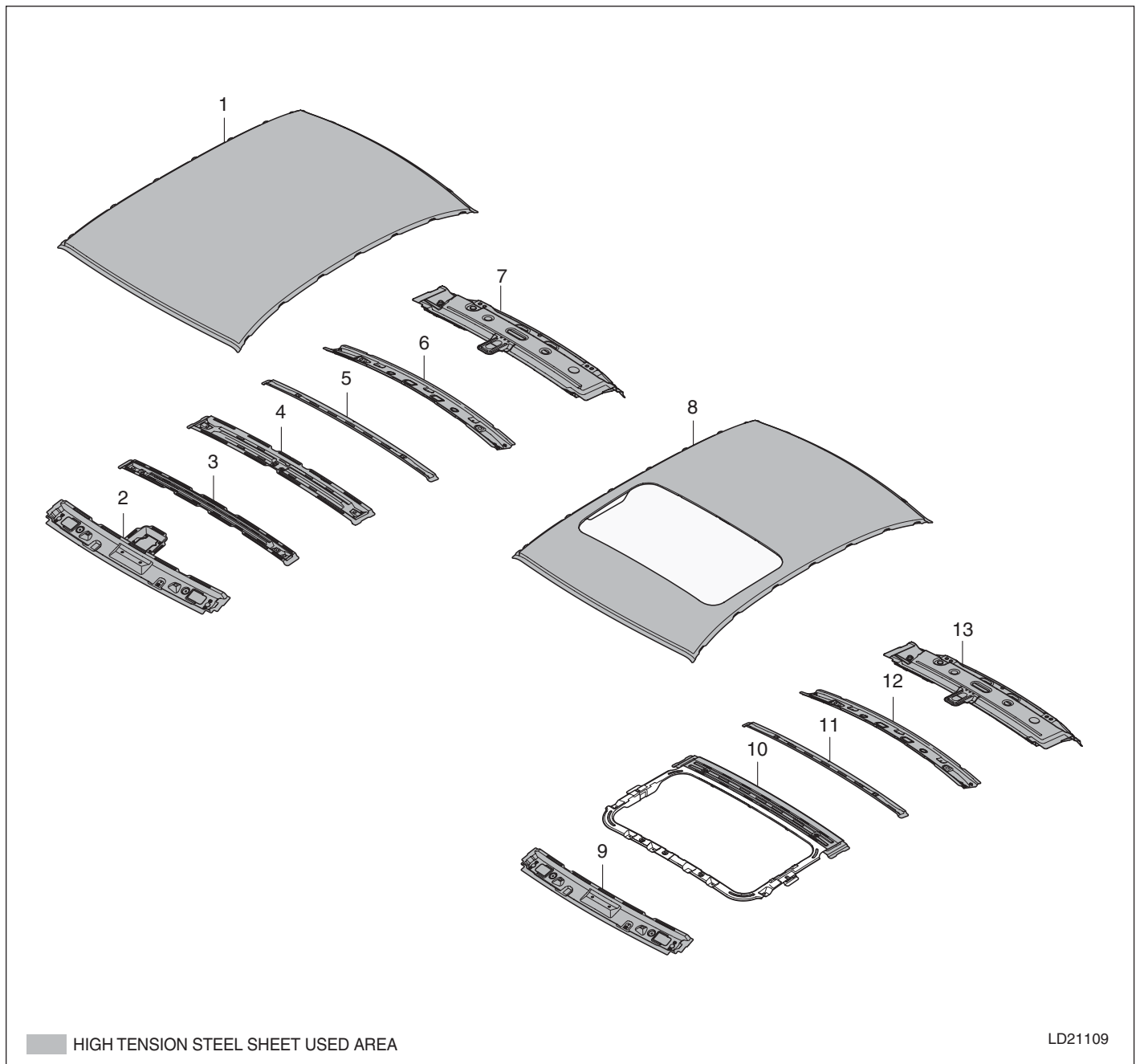
Roof panel (4Door)



- (1) Roof panel
- (2) Roof front rail assembly
- (3) Roof center No. 1 rail
- (4) Roof center No. 2 rail
- (5) Roof center No. 3 rail
- (6) Roof rear rail assembly

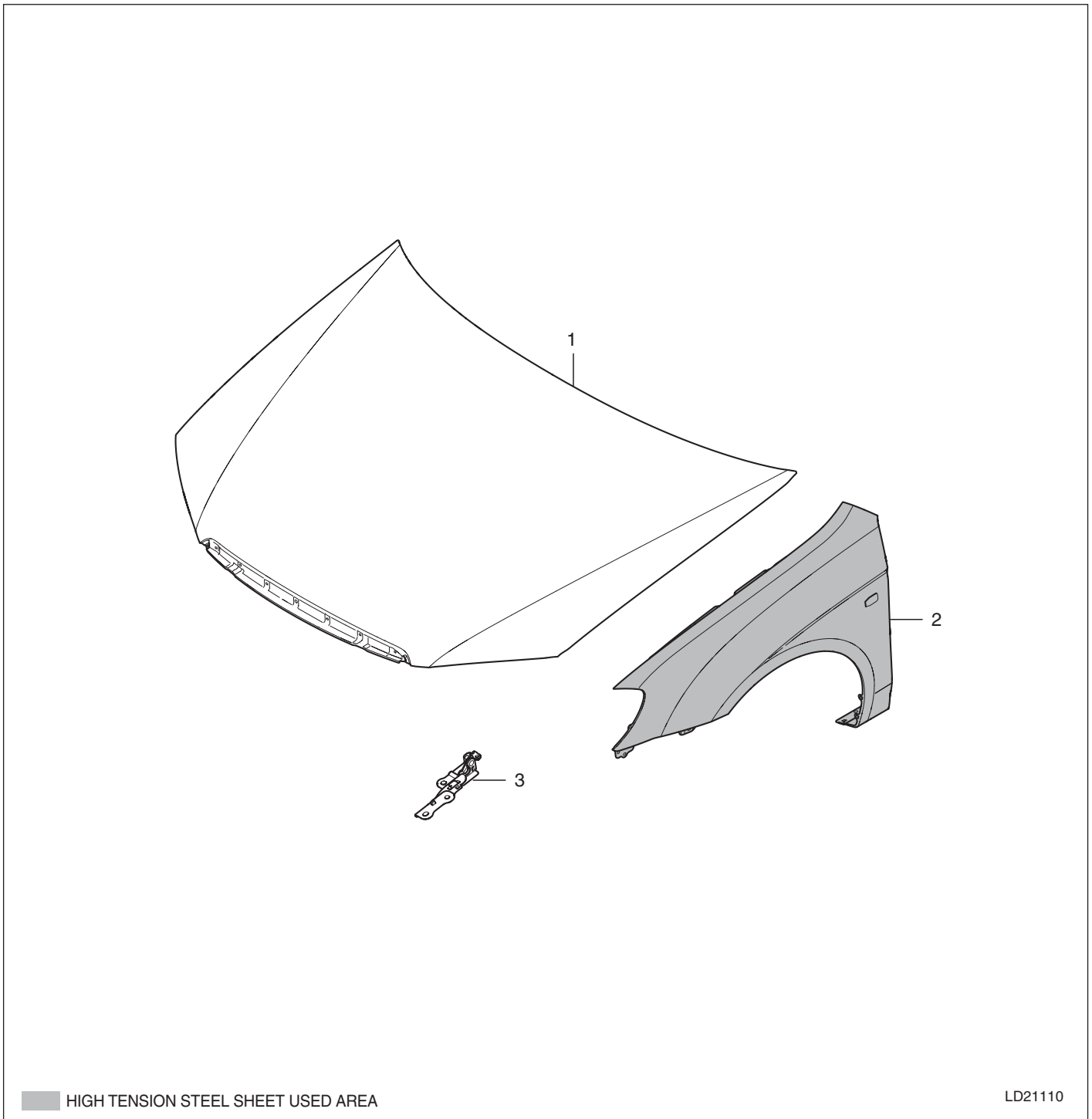
- (7) Roof panel
- (8) Roof front rail assembly
- (9) Sunroof reinforcement ring assembly
- (10) Roof center No. 3 rail
- (11) Roof rear rail assembly

## Roof panel (5Door)



- (1) Roof panel
- (2) Roof front rail assembly
- (3) Roof center No. 1 rail
- (4) Roof center No. 2 rail
- (5) Roof center No. 3 rail
- (6) Roof center No. 4 rail
- (7) Roof rear rail assembly
- (8) Roof panel
- (9) Roof front rail assembly
- (10) Sunroof reinforcement ring assembly
- (11) Roof center No. 3 rail
- (12) Roof center No. 4 rail
- (13) Roof rear rail assembly

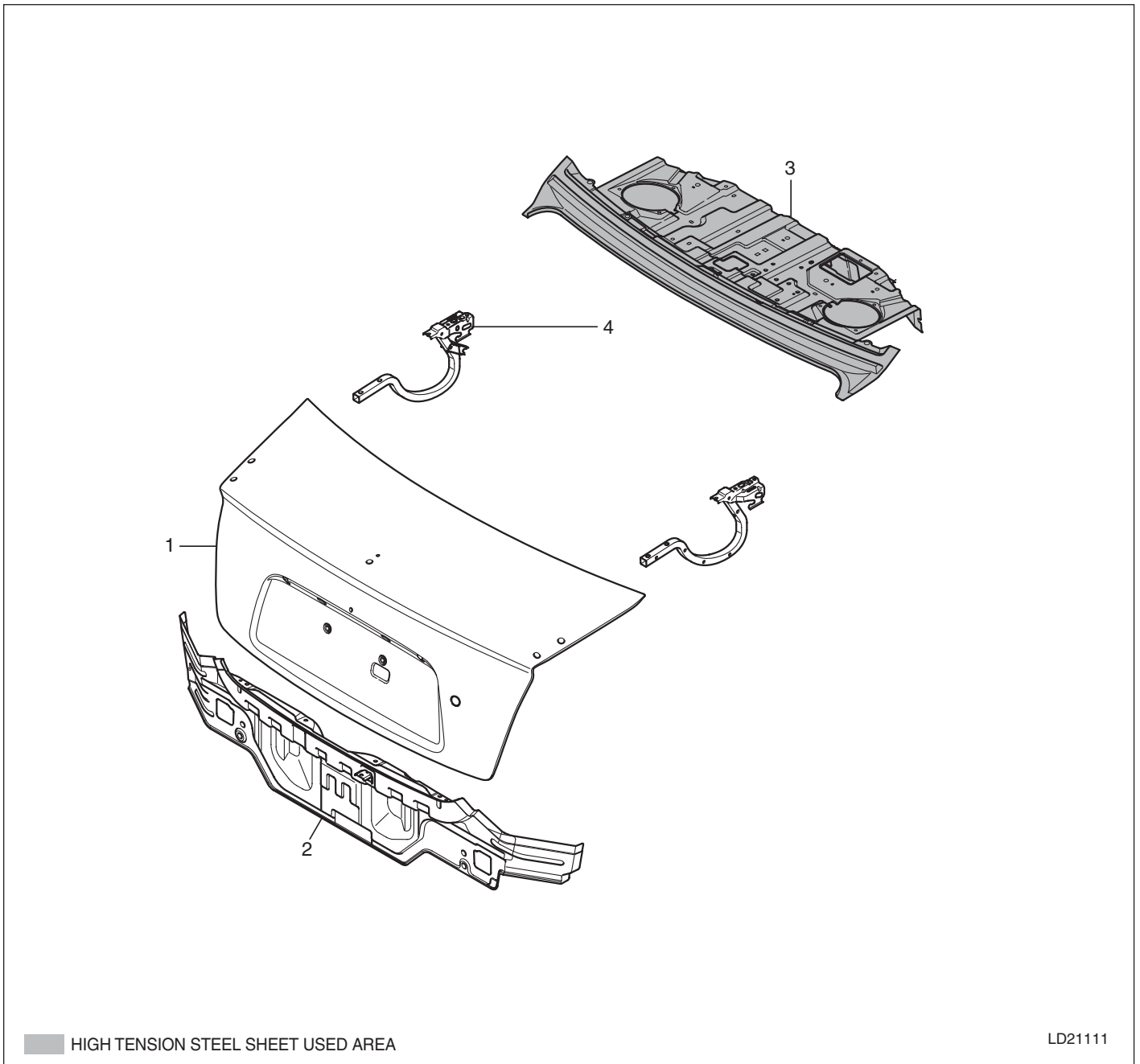
## Fender & Hood panel



- (1) Hood panel assembly
- (3) Hood hinge assembly

- (2) Fender panel assembly

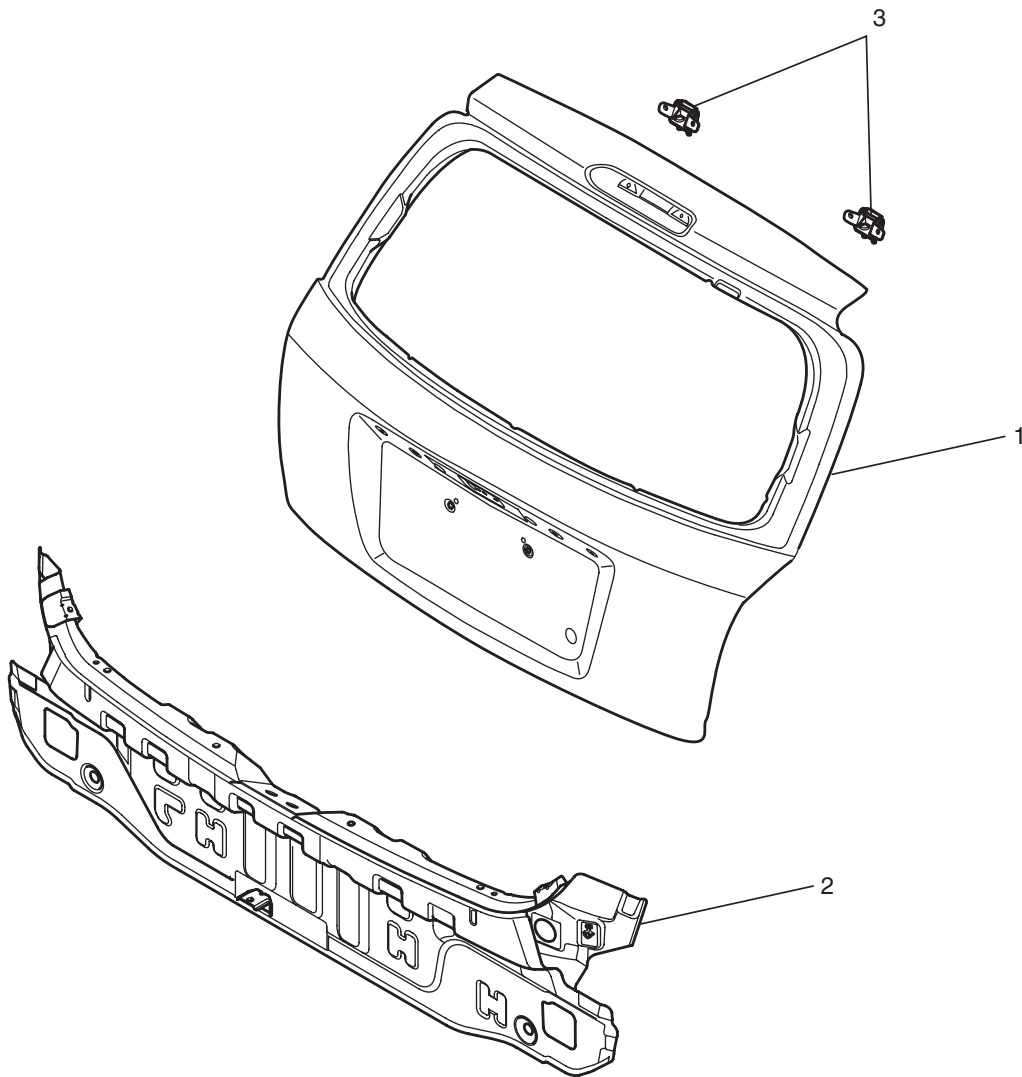
## Trunk lid & Back panel (4Door)



- (1) Trunk lid panel assembly
- (2) Back panel assembly

- (3) Rear package tray panel assembly
- (4) Trunk lid hinge assembly

Tail gate & Back panel (5Door)

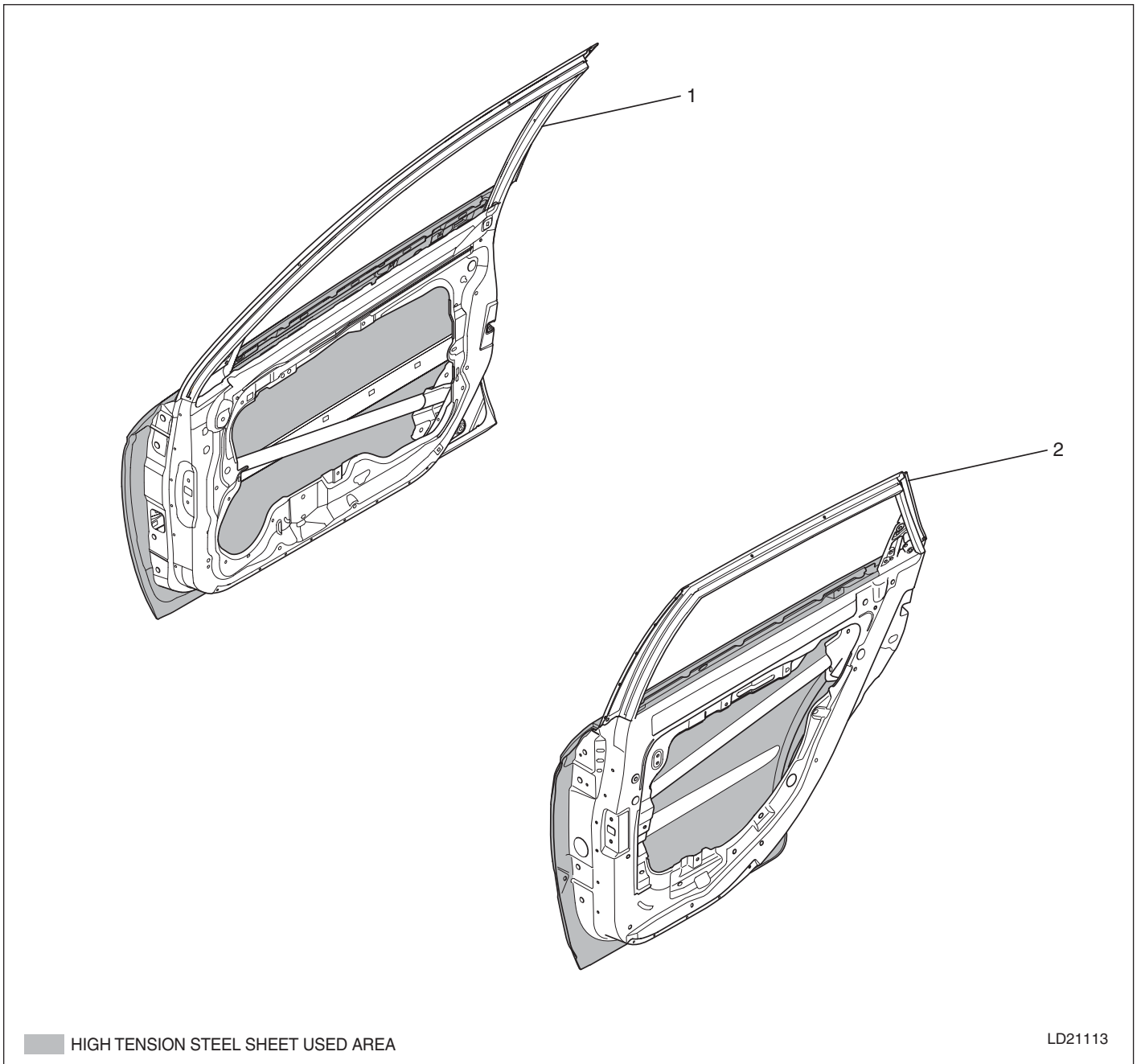


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- (1) Tail gate panel assembly
- (3) Tail gate hinge assembly

- (2) Back panel assembly

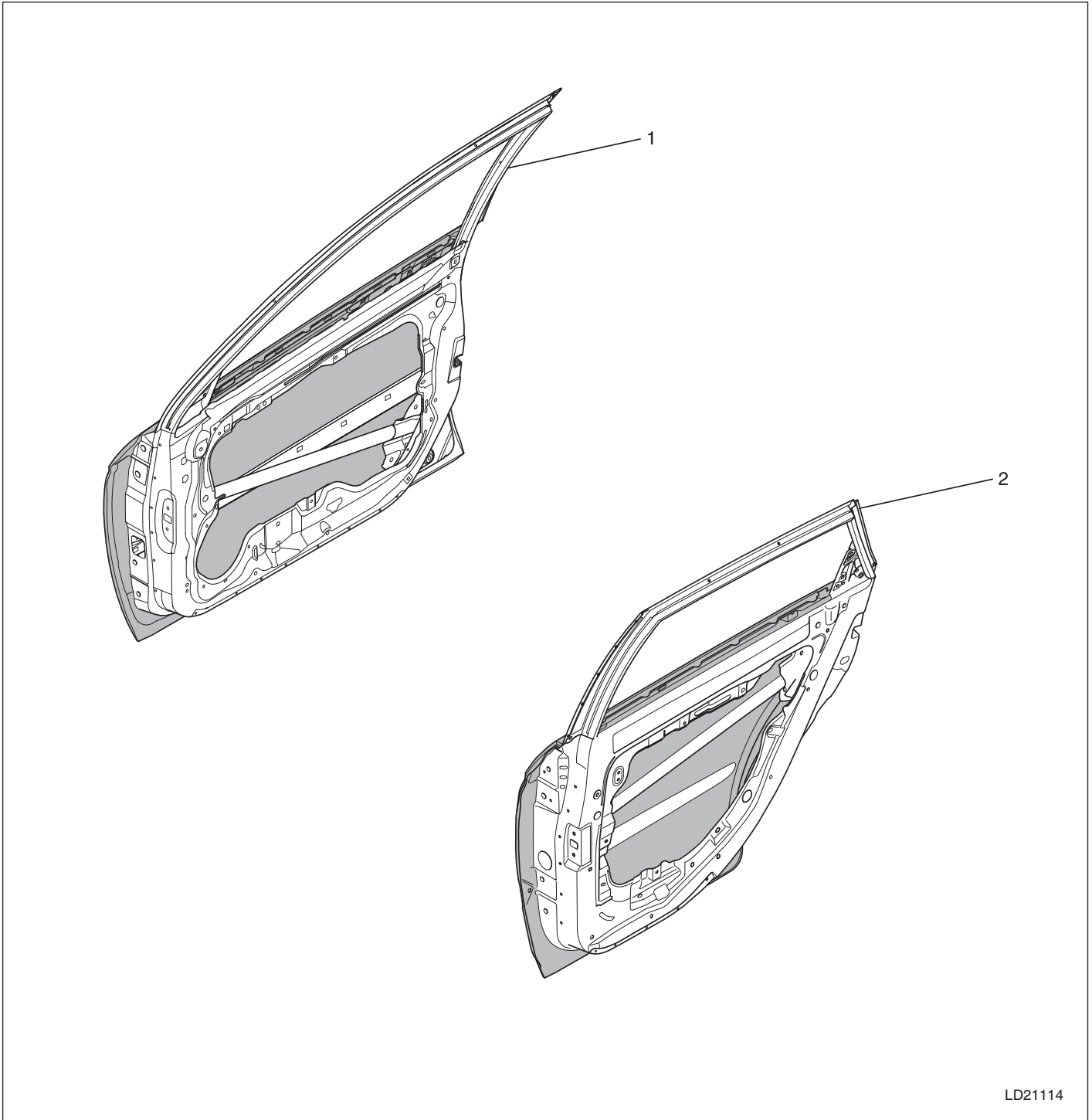
## Front door & Rear door panel (4Door)



(1) Front door panel assembly

(2) Rear door panel assembly

Front door & Rear door panel (5Door)



LD21114

(1) Front door panel assembly

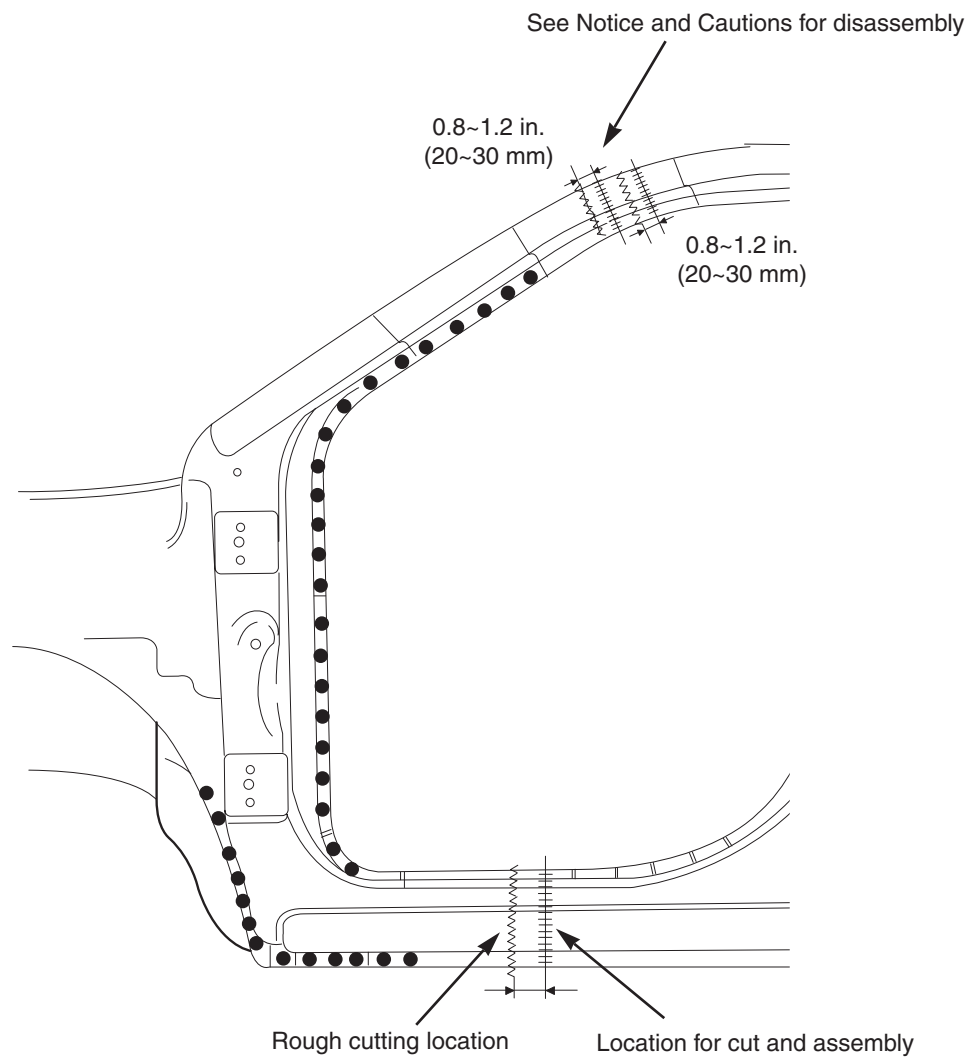
(2) Rear door panel assembly

## Replacing body panels

<b>Replacing body panels</b>	
Codes for disassembling and assembling body panels .....	21- 1
<b>Notes when welding body</b>	
Disassembling spot welded area .....	21- 2
Assembling a new body frame .....	21- 4
Determining a welding method .....	21- 4
Spot welding .....	21- 4
Carbon arc welding .....	21- 5
Replacing body panel .....	21- 6
Fender apron panel assembly .....	21-11
Cowl panel assembly .....	21-14
Dash panel assembly .....	21-16
Center floor panel assembly .....	21-18
Rear floor panel assembly(4Door) .....	21-20
Rear floor panel assembly(5Door) .....	21-22
Side panel assembly(4Door) .....	21-25
Side panel assembly(5Door) .....	21-31
Side sill panel assembly .....	21-37
Roof panel assembly (4Door) .....	21-38
Roof panel assembly (5Door) .....	21-40
Rear package tray panel assembly (Only 4Door) .....	21-42
Wheel house panel assembly .....	21-44
Back panel assembly (4Door) .....	21-45
Back panel assembly (5Door) .....	21-47

## Replacing body panels

### Codes for disassembling and assembling body panels

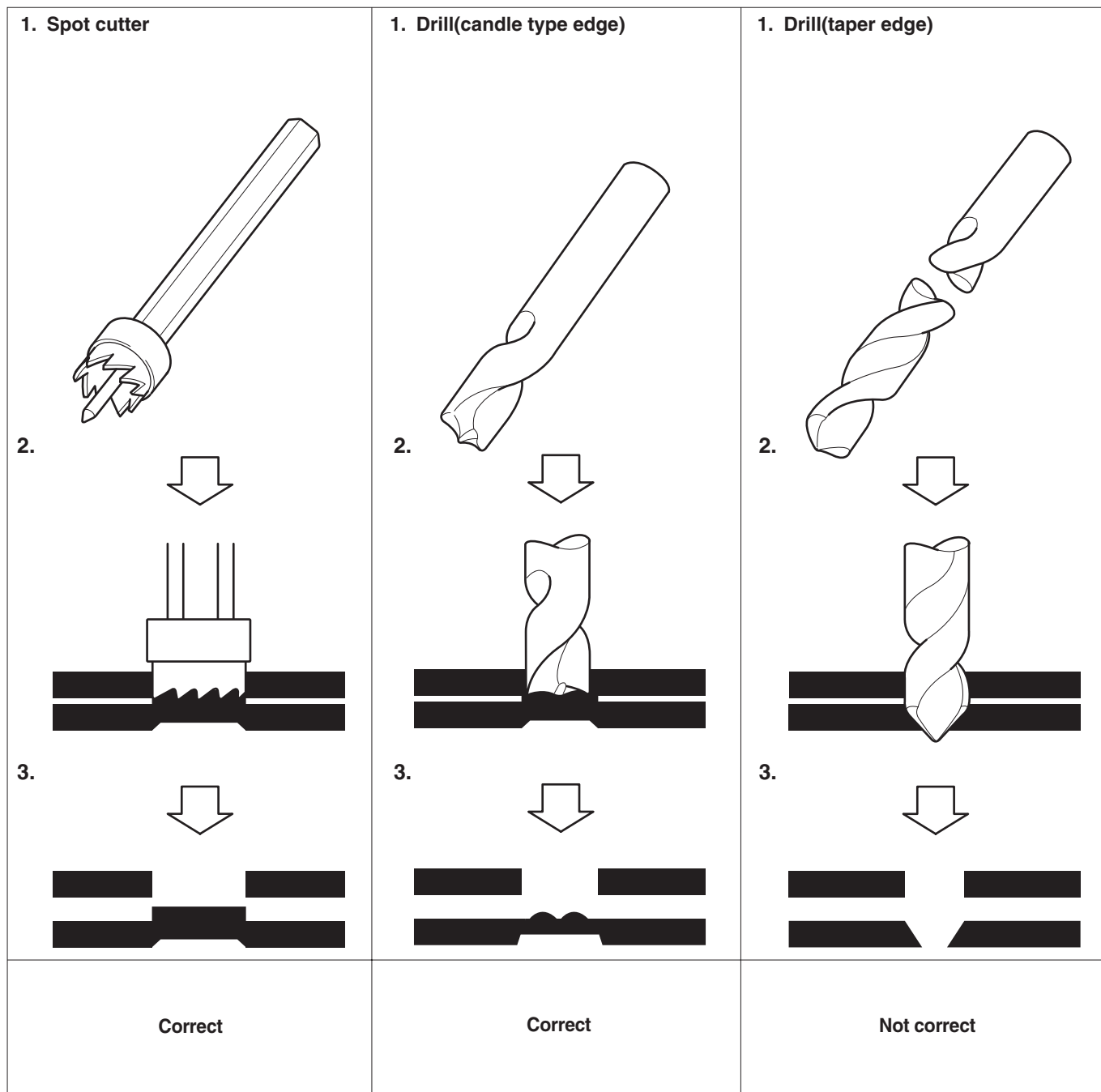


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21-2 Replacing body panels

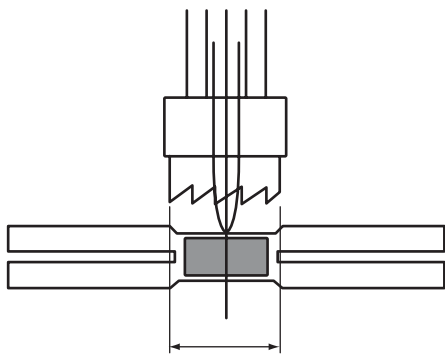
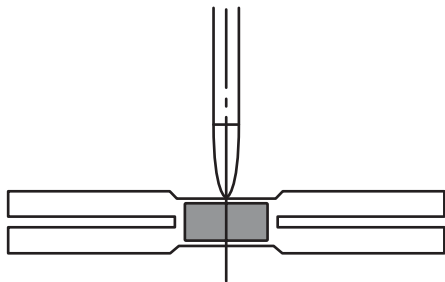
## Notes when welding body Disassembling spot welded area

Most body parts are spot welded. In order to disassemble the damaged area, it is best to disassemble the spot welded area from the body frame using a spot cutter or candle type edge drill bit. Do not use a drill bit with a tapered edge. Center punch middle of spot weld to insure the entire spot weld will be removed.



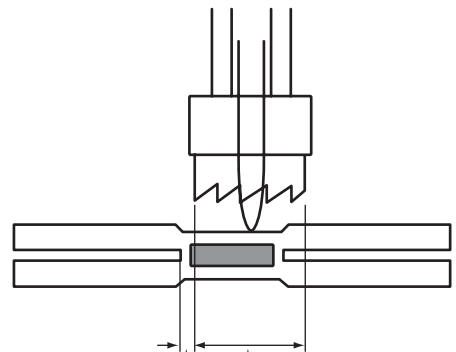
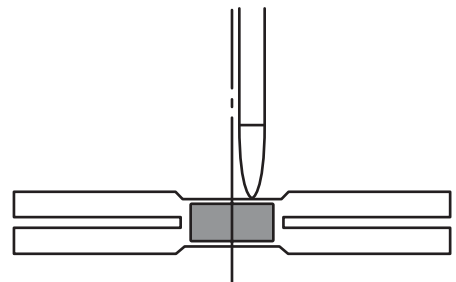
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Center punch the middle(nugget) of the spot weld.



Spot welded area can be removed from the body frame.

Otherwise,



This part will not be cut.

This part will be cut.



Spot welded area cannot be removed from the body frame.

## 21-4 Replacing body panels

### Assembling a new body frame

The efficiency of the transmission and load distribution are determined by many complicated factors such as thickness of plate, shape and size of a cross section, damage of parts, variance of joints, welding method, and/or welding locations. Therefore, a new part should be fitted to the body frame using the proper procedures to avoid reducing the strength of the body.

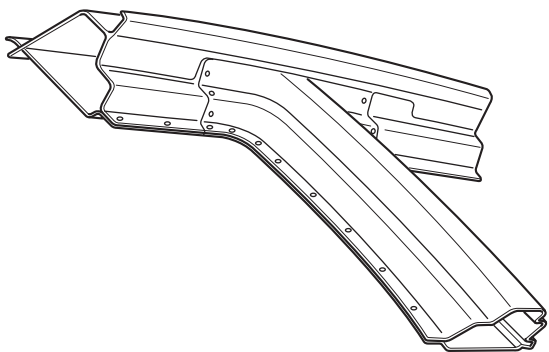
### Determining a welding method

It is extremely important that appropriate welding methods, which don't reduce the original strength and durability of the body be used when making repairs. Try to use either spot welding or carbon arc(plug) welding. Do not braze any body components other than the ones brazed at the factory. Do not use an oxy-acetylene torch for welding.

Welding	Symbol	Details
Spot welding	●	The most reliable welding method (provides high efficiency and quality of assembled part.)
Carbon arc welding (Plug welding)	■	Use when spot welding cannot be done or spot welding is not necessary.
Oxygen-acetylene welding	✕	Not used

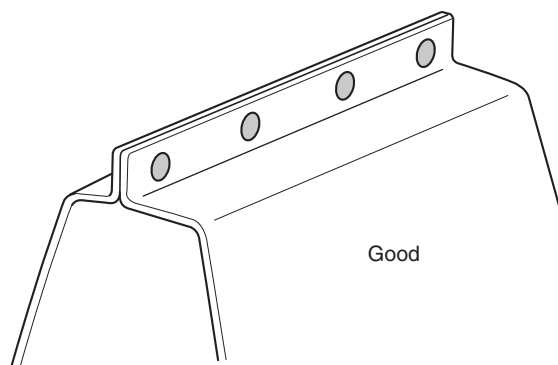
### Spot welding

1. Commercial spot welding machines do not perform as well as the machines used in the manufacturing process. When spot welding, increase the number of spot welds by 30%(1.3 times the original number of welds).



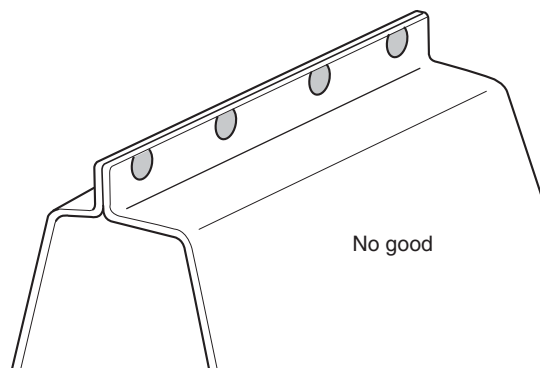
A3EB3253

2. When spot welding, weld in the middle of the joint.



A3EB3254

- Spot welding on the edge of the joint will reduce welding strength.

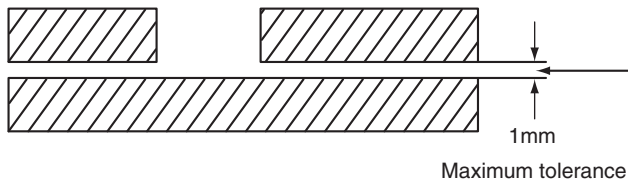


A3EB3255

## Carbon arc welding

In areas where spot welding is not suitable, do plug welding using a carbon arc welding machine.

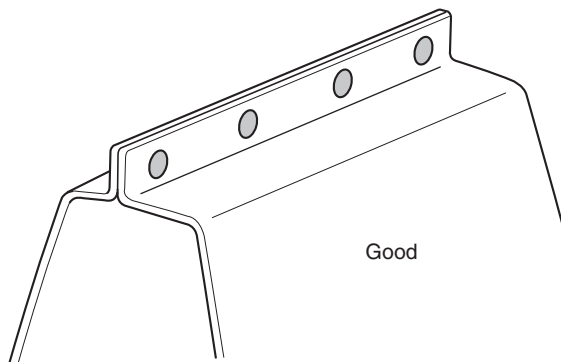
1. Clamp the parts to be welded together tightly. Do not exceed 1 mm of space between parts. A tolerance greater than 1 mm will reduce the strength of the welded area.



A3EB3256

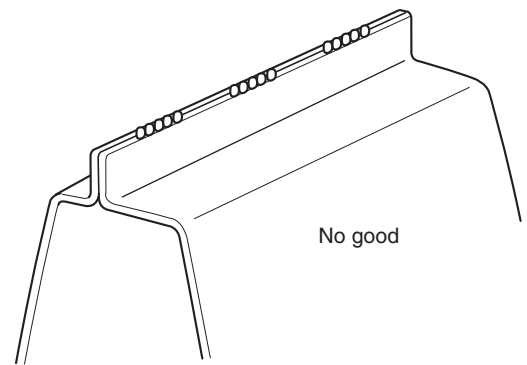
2. Weld in the middle of the flange joint.

- a) Drill a hole 5~6 mm on one side of the flange only, and weld within the hole.



A3EB3254

- b) Do not weld on the edge of the flange joint.



A3EB3257

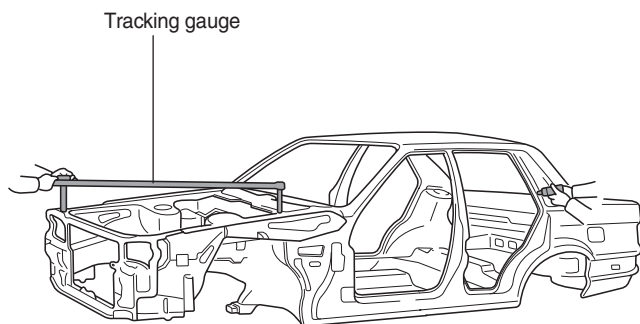
## 21-6 Replacing body panels

### Replacing body panel

#### Disassembly

##### 1. Body measurement

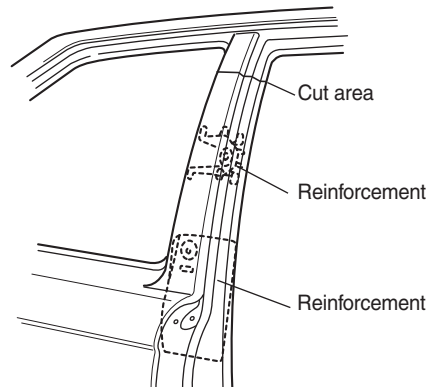
- Before disassembling, measure the damaged area according to the dimensions supplied in Body Dimension, Section 31. If deformation is present, use a frame straightener to adjust.
- When disassembling a panel, apply clamps to prevent damage of each part, and support the lower end of the frame to prevent deformation during the procedure.



A3EB3261

##### 2. Cut and welding point selection

Cutting, if necessary, should not be done in a reinforcement area. Select an area which will result in the least amount of deformation after welding.

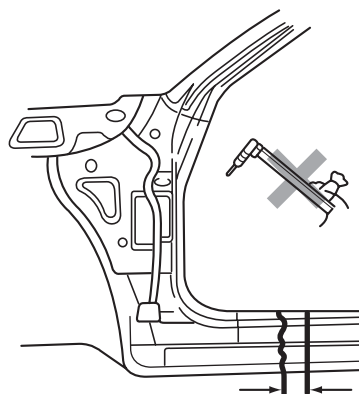


A3EB3258

##### 3. Cutting rough area for replacement part

Cutting should be done according to the following steps to make disassembly easy:

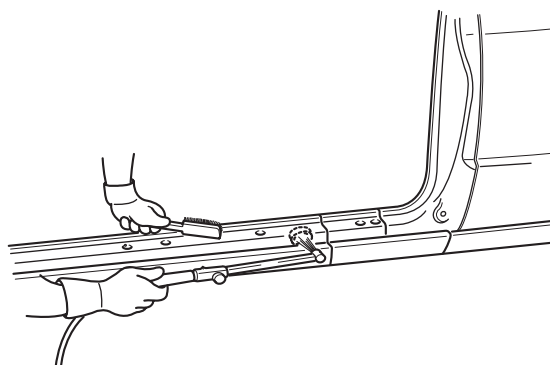
- Use care when cutting an area close to a pipe or wiring harness.
- Cut an area leaving 30~50 mm of tolerance.



ASD1BM005

##### 4. Removing paint from an area to be spot welded

Using a torch and wire brush, remove paint completely before beginning welding.

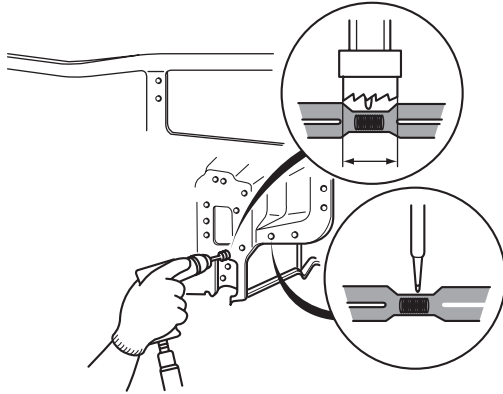


1SD1BM014

**5. Determine a cutting method**

**a) Cutting a spot welded area**

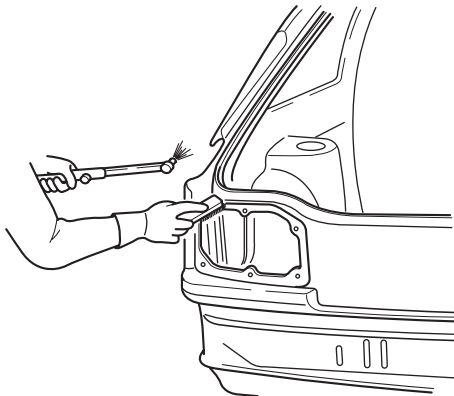
Make a hole in the middle of spot welded area with a punch, disassemble welded area using a spot cutter and remove using a chisel.



1SD1BM015

**b) Removing brazed area**

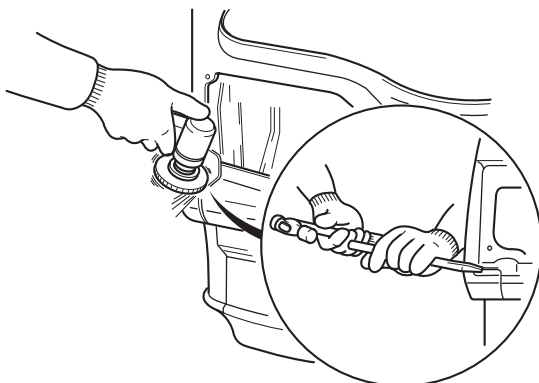
Disassemble using a torch and wire brush, and remove with a chisel.



1SD1BM016

**c) Removing arc welded area**

Remove plug welded area using a disk grinder and disassemble with a chisel.

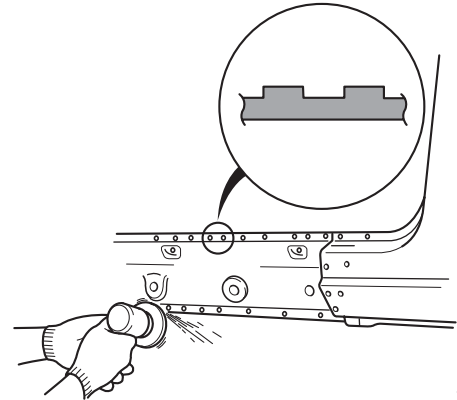


1SD1BM017

**Preparation for assembly**

**1. Spot weld finish**

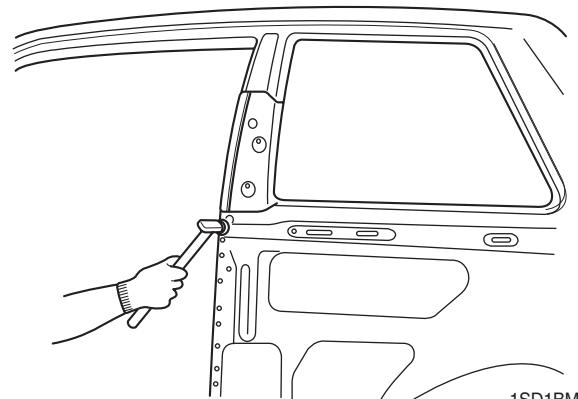
Use a disk grinder or similar tool to finish spot weld mark. Do not grind more than it is necessary to smooth surface.



1SD1BM018

**2. Panel preparation**

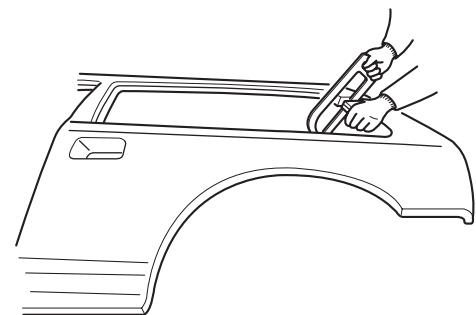
Repair any bent or uneven areas with a hammer to improve the assembly process.



1SD1BM019

**3. Cutting a rough area for a new part**

When rough cutting an area for a new part, leave a tolerance of 30~50 mm.

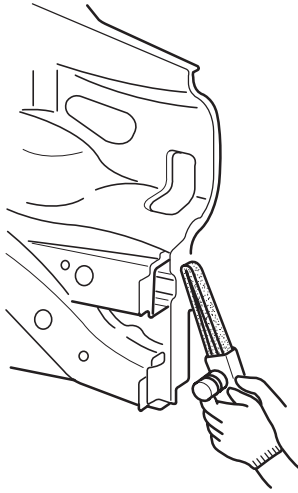


1SD1BM020

## 21-8 Replacing body panels

### 4. Preparation for spot welding

Remove paint on spot welded area and on the area overlapped by the new part using a belt sander or similar tool.



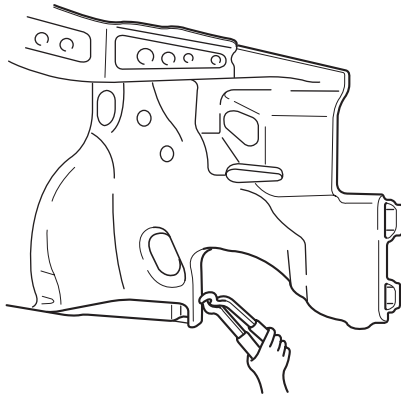
1SD1BM021

### 5. Drilling a hole for plug welding

If the thickness of the part to be welded is less than 3 mm, drill a 5~6 mm diameter hole. If the thickness of the part to be welded is greater than 3 mm, drill a hole using a 7 mm diameter drill.

#### \* Notice

- Do not spot weld where thickness is greater than 3 mm.

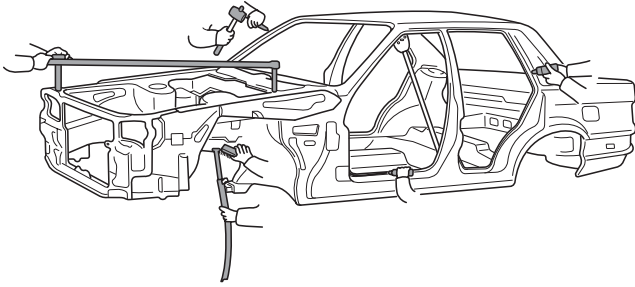


1SD1BM022

## Assembly

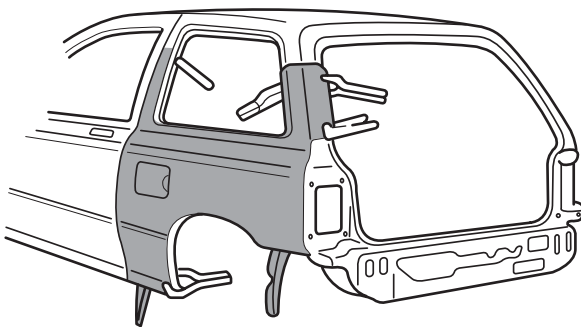
### 1. Checking welding and fitting in advance

- a) When assembling a new part, measure the dimensions of each part according to the body dimensions given in Section 31, and set part to the reference dimensions.



1SD1BM02004

- b) Prior to final welding, check the fit of all related parts.



1SD1BM023

### 2. Selecting number of welding points

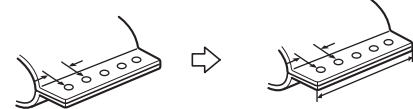
**Spot welding :** Multiply the original number of factory welds by 1.3 times

**Plug welding :** Same number as original number of factory welds

#### \* Notice

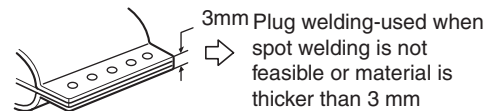
- Plug welding should be done using a carbon arc welding machine.
- Brazing should be done only on areas that were originally brazed at the factory.

Initial welding pitch:50 mm      Welding after repair pitch:35 mm



Spot welding:initial number of welds x1.3

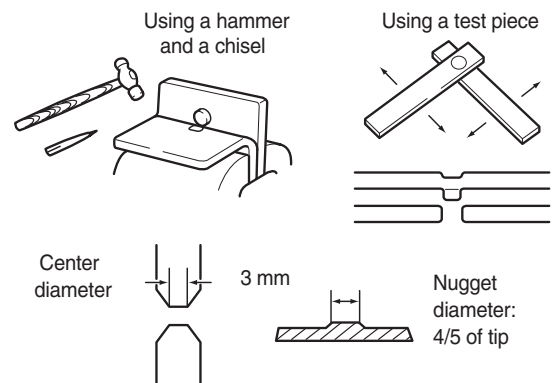
Welding points-same number as original number of factory welds.



A3EB3259

### 3. Caution when spot welding

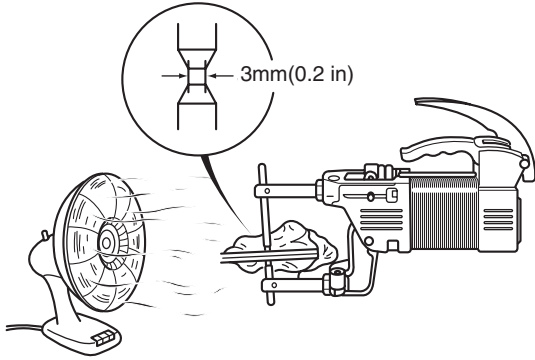
- a) Do a test welding on a piece of material of the same type and thickness as the part to be welded and proceed if test weld is good.
- b) Before spot welding, check if welding debris, oil or paint is present on the area where surfaces meet. Clean or sand as necessary.



A3EB3260

## 21-10 Replacing body panels

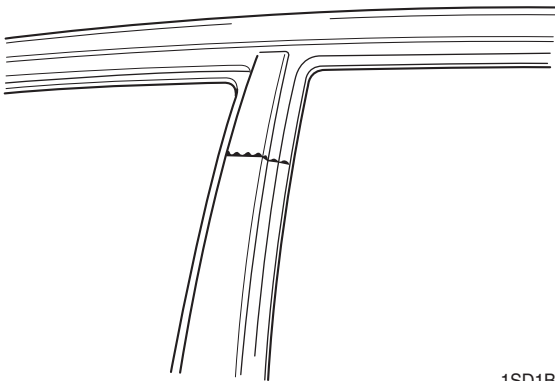
- c) The tip of the spot welding machine should be maintained to a minimum tolerance of 3 mm. Also let area cool after 5 or 6 welds to minimize problems caused by excessive heat.



1SD1BM026

### 4. Cutting and welding an assembled area

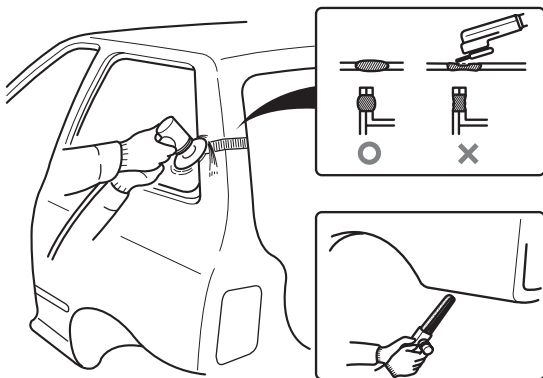
To align a roof panel and a center pillar together for butt welding, temporarily fasten a steel flange to the roof panel and then apply the new center pillar panel. Remove the flange when final welding is done.



1SD1BM027

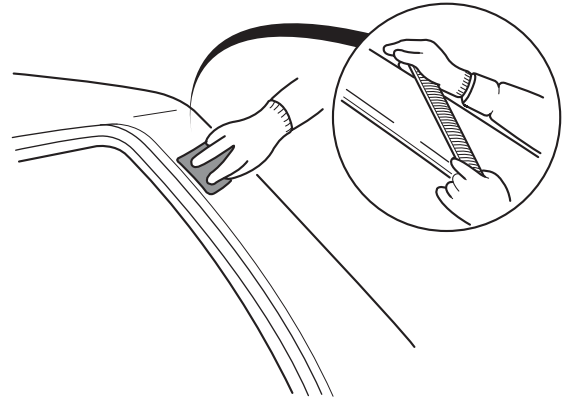
### 5. Finishing after welding

- a) Grind any areas that were plug welded or butt welded using a disk grinder. Grind carefully to avoid removing too much material. This degrades the strength of the weld.



1SD1BM028

- b) Finish areas that have been brazed by applying body filler then smooth the area with a flexible file and sander.



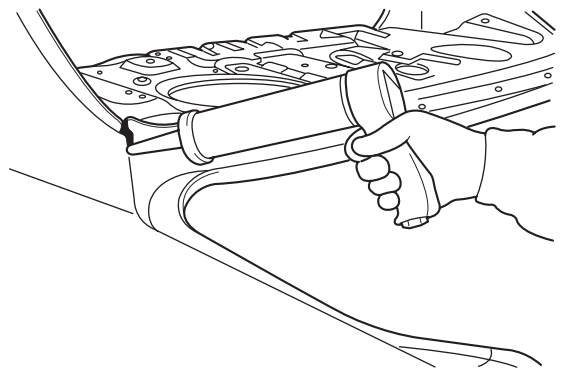
1SD1BM029

### 6. Applying anti-rust agent and body sealer

After coating the surface with anti-rust agent, apply body sealer where necessary.

#### \* Notice

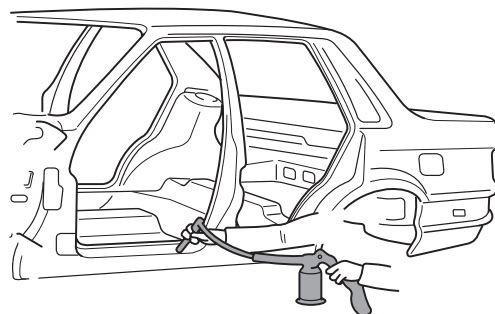
- Apply body sealer before assembly.



1SD1BM030

### 7. Anti-rust treatment

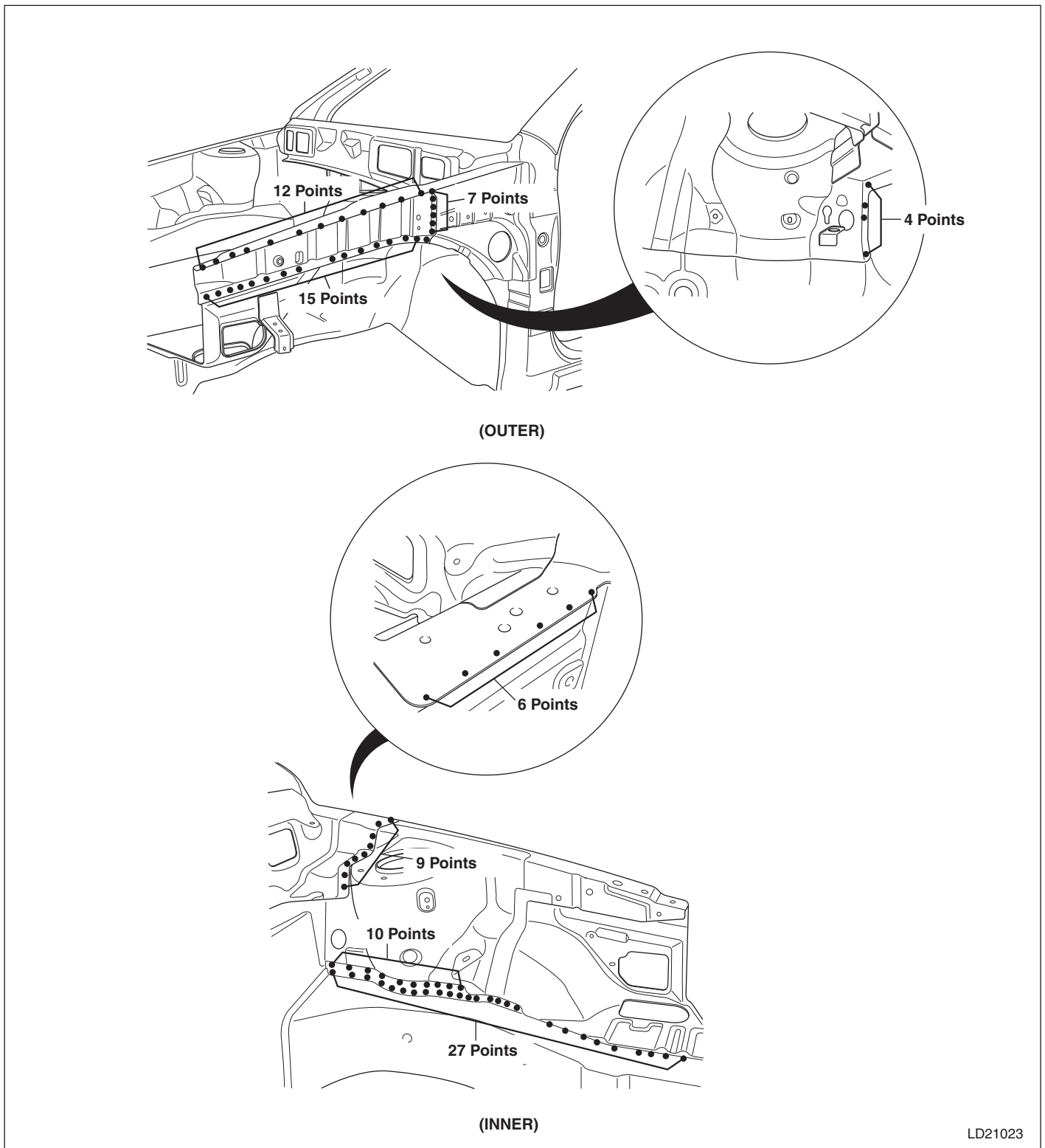
Apply anti-rust agent to inside of doors and sills by spraying through access holes provided.



A3EB3261

## Fender apron panel assembly

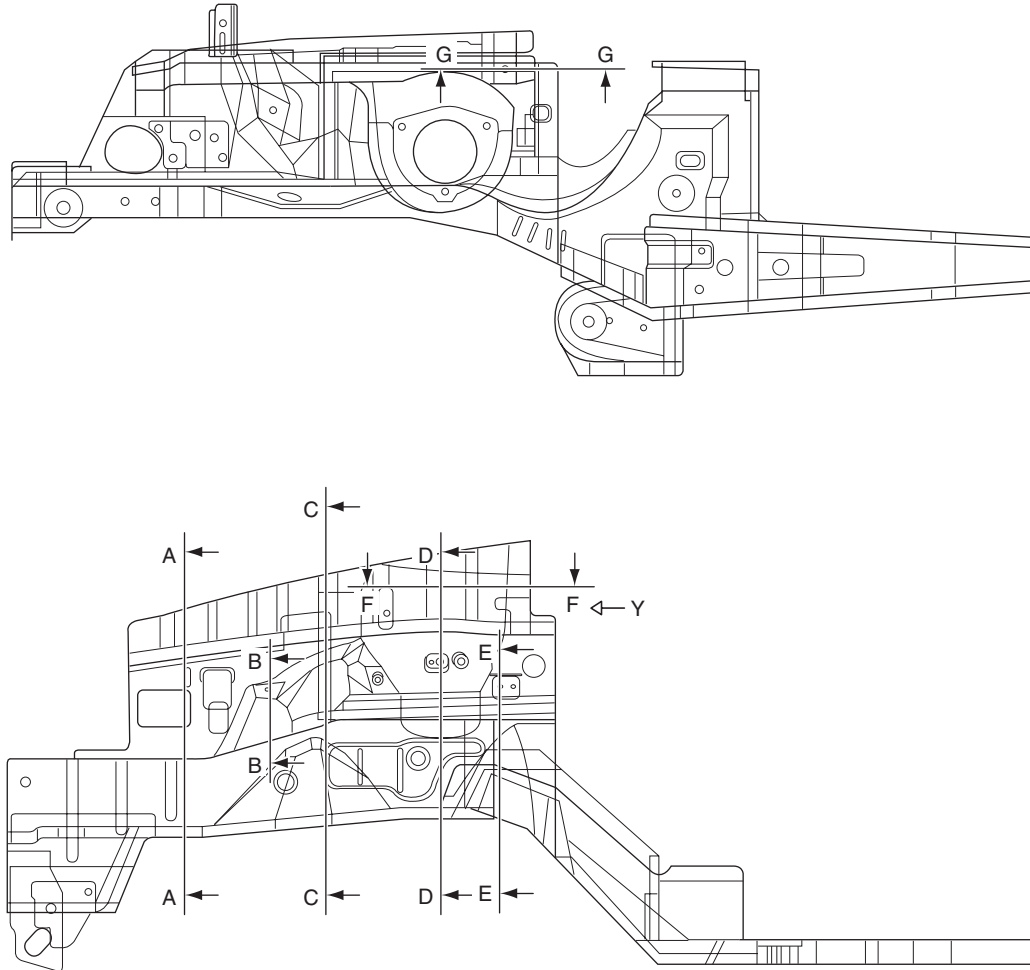
### Welding part



LD21023

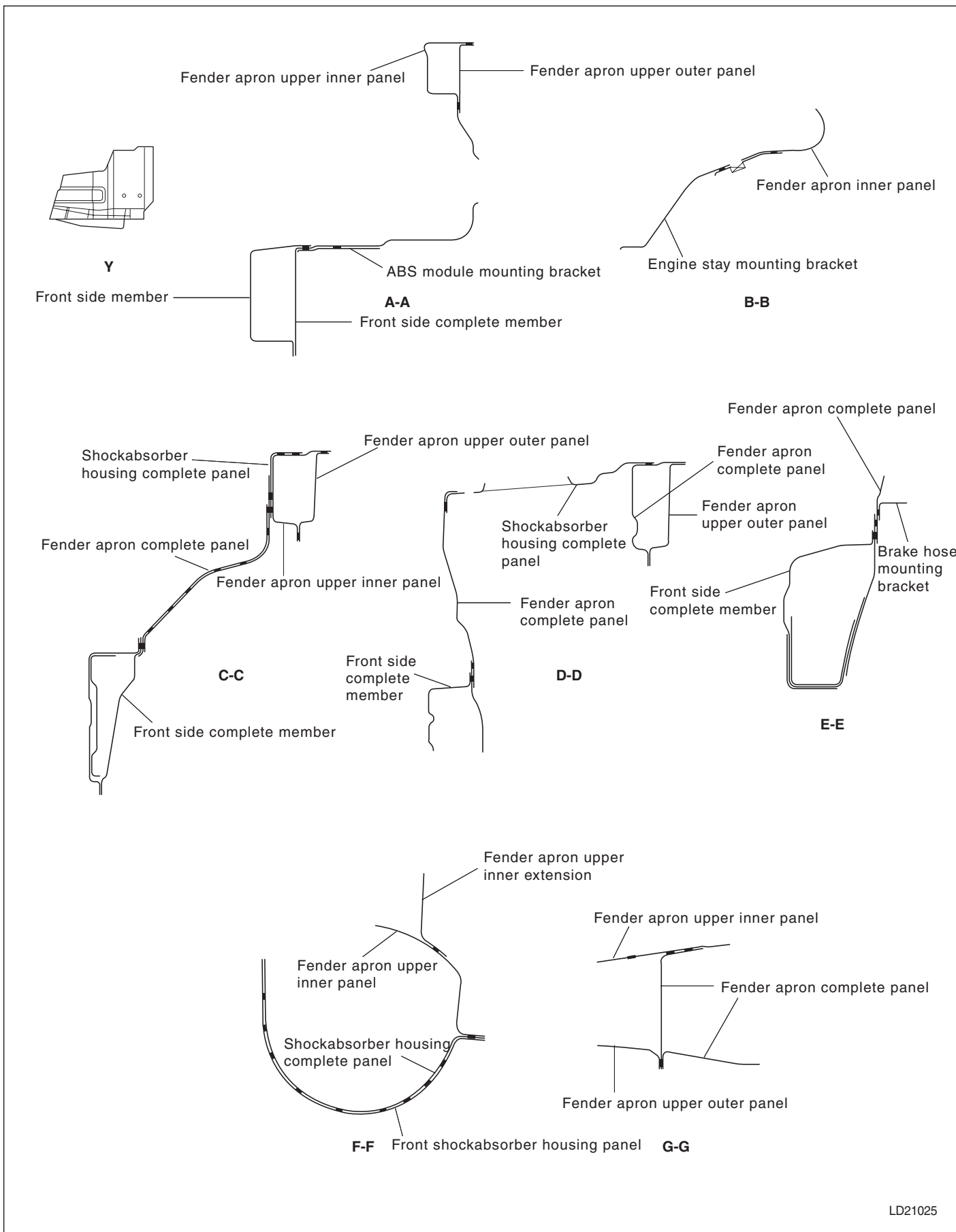
21-12 Replacing body panels

Section



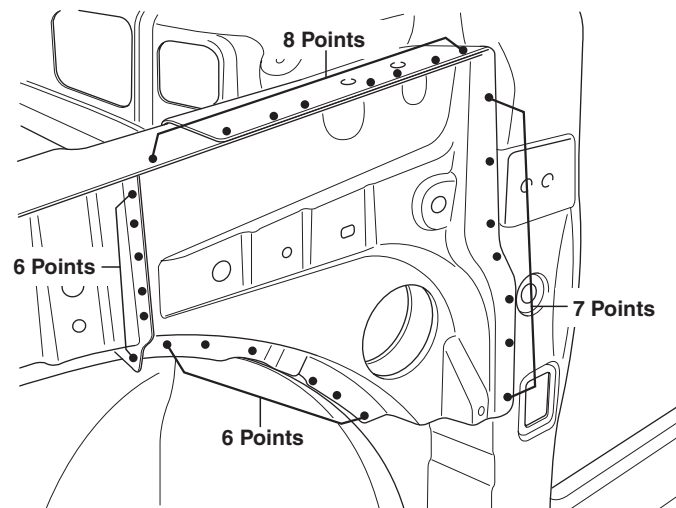
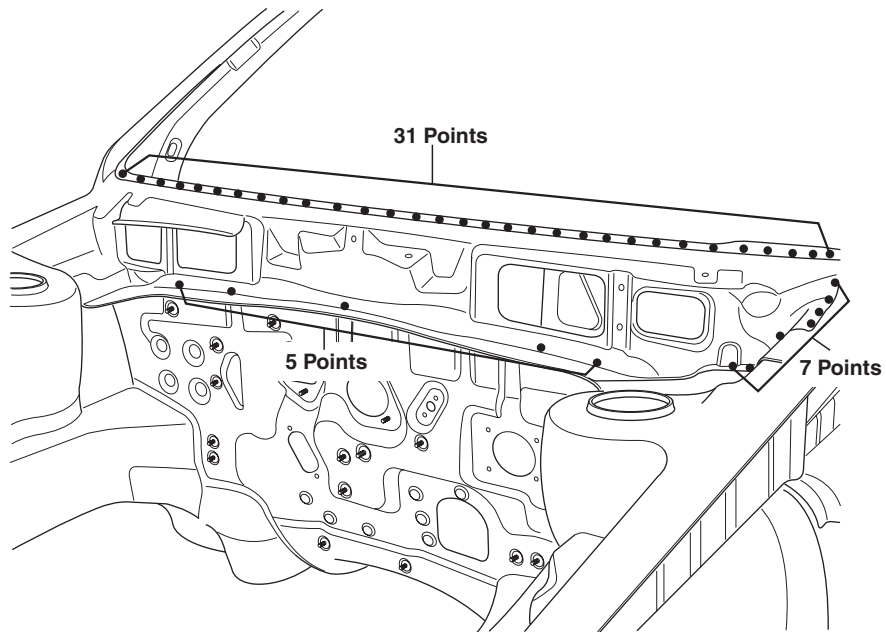
LD21024

Part section



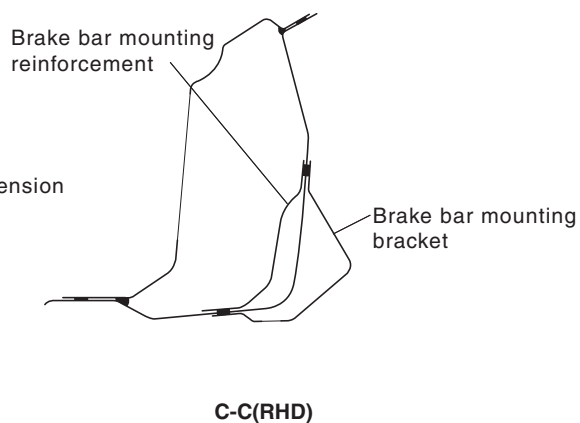
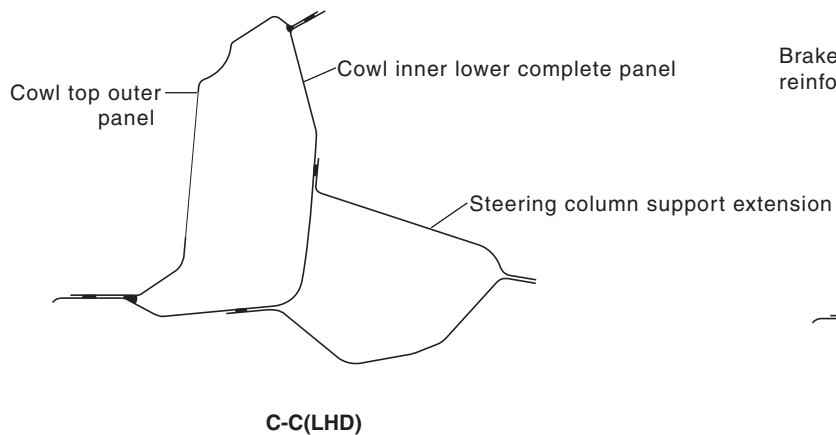
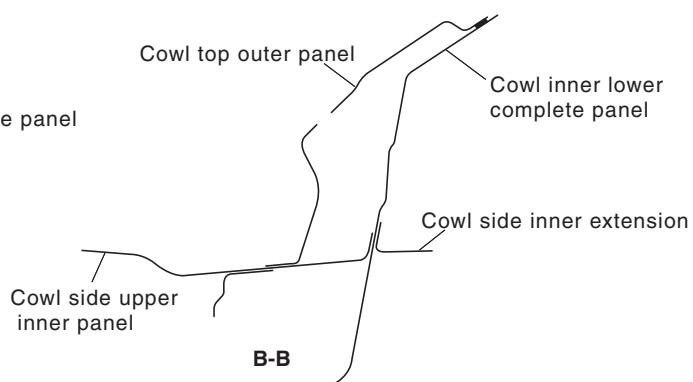
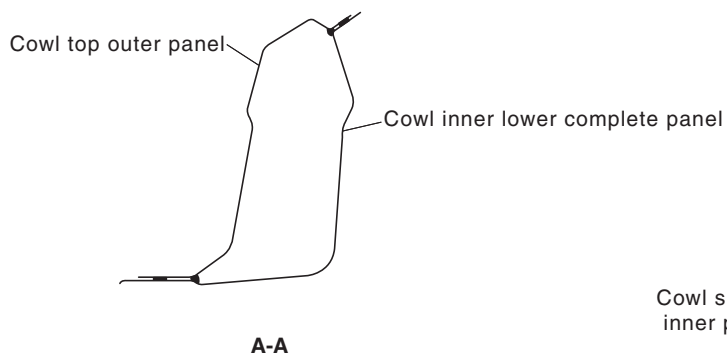
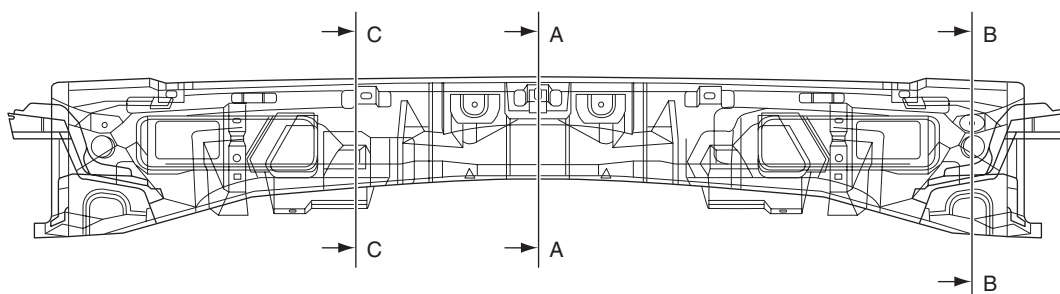
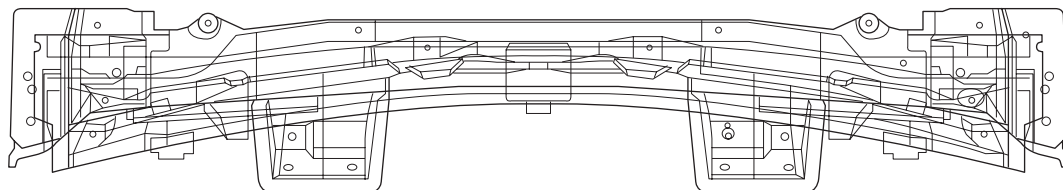
LD21025

## Cowl panel assembly Welding part



LD21026

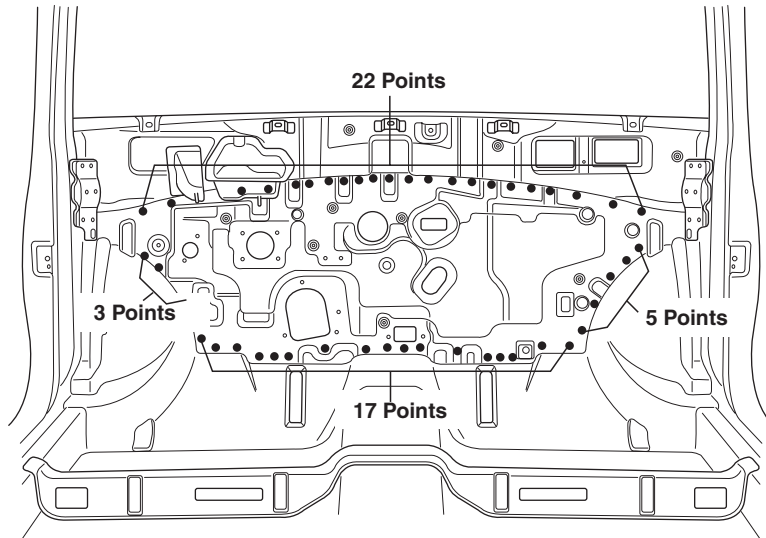
Section



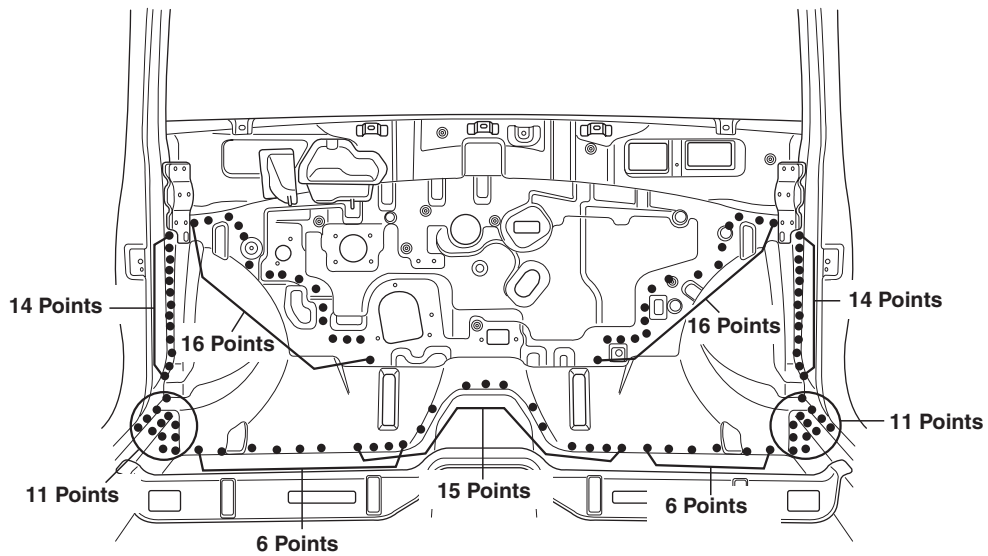
LD21027/LD21028

# Dash panel assembly

## Welding part

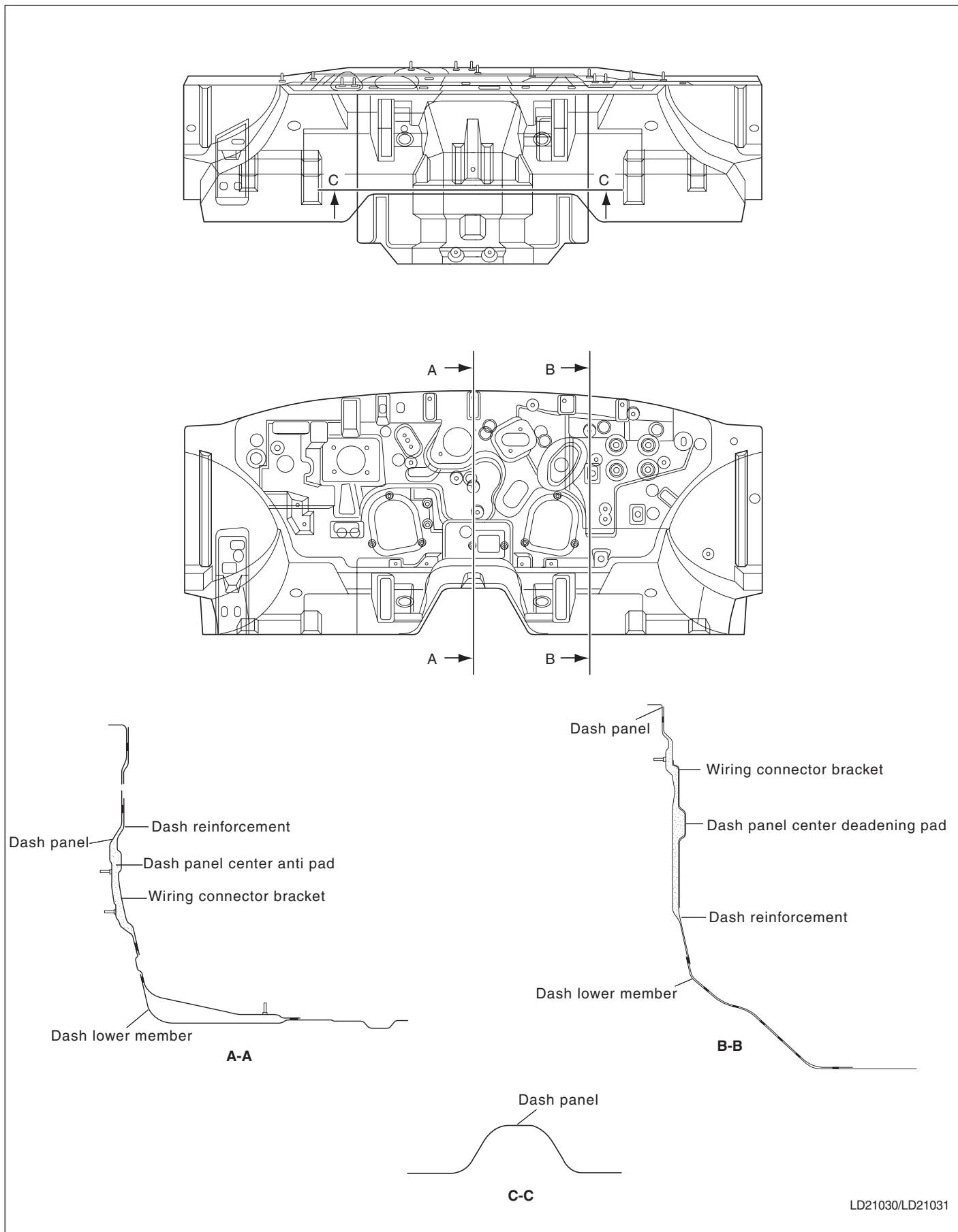


<UPPER>



<LOWER>

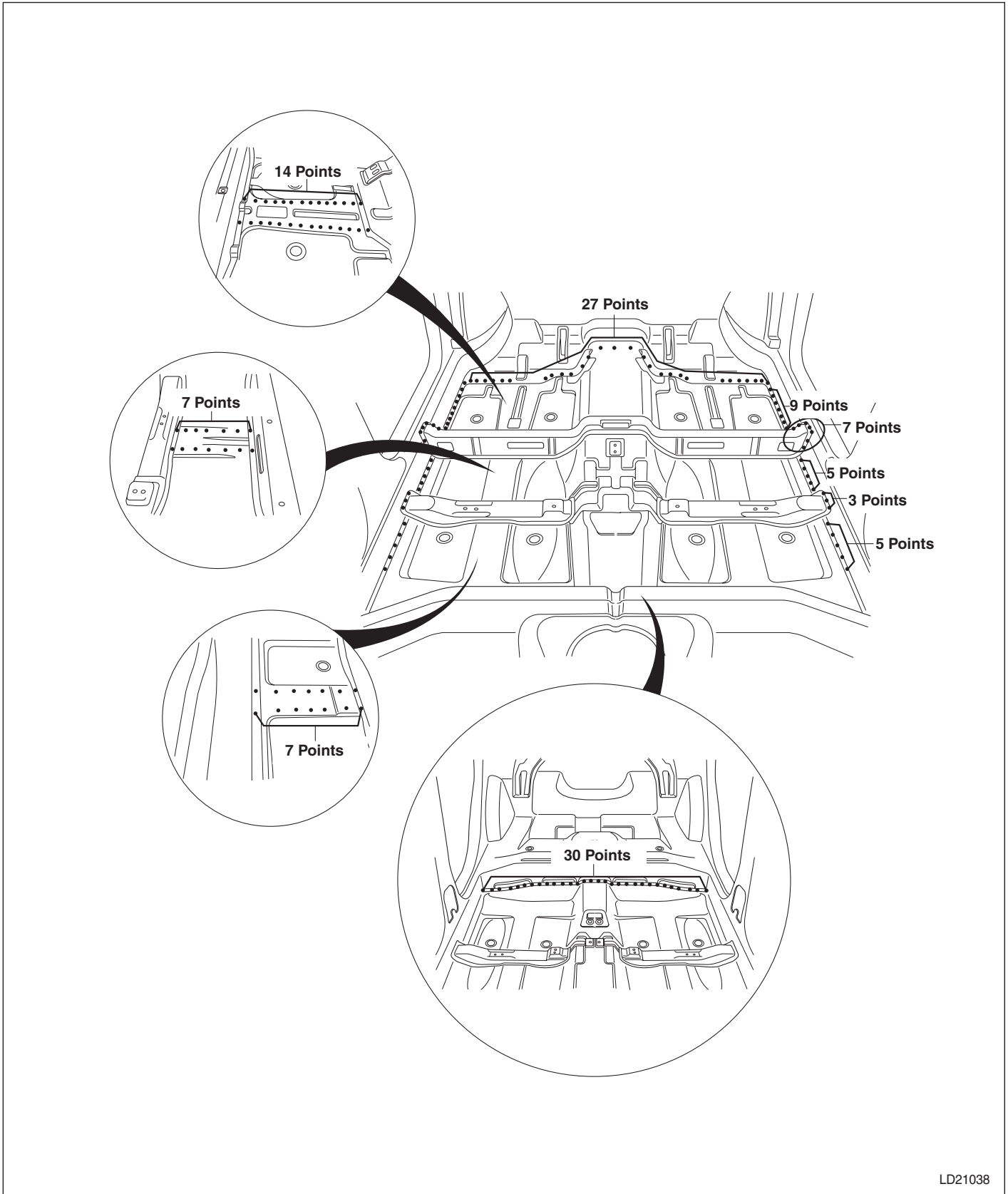
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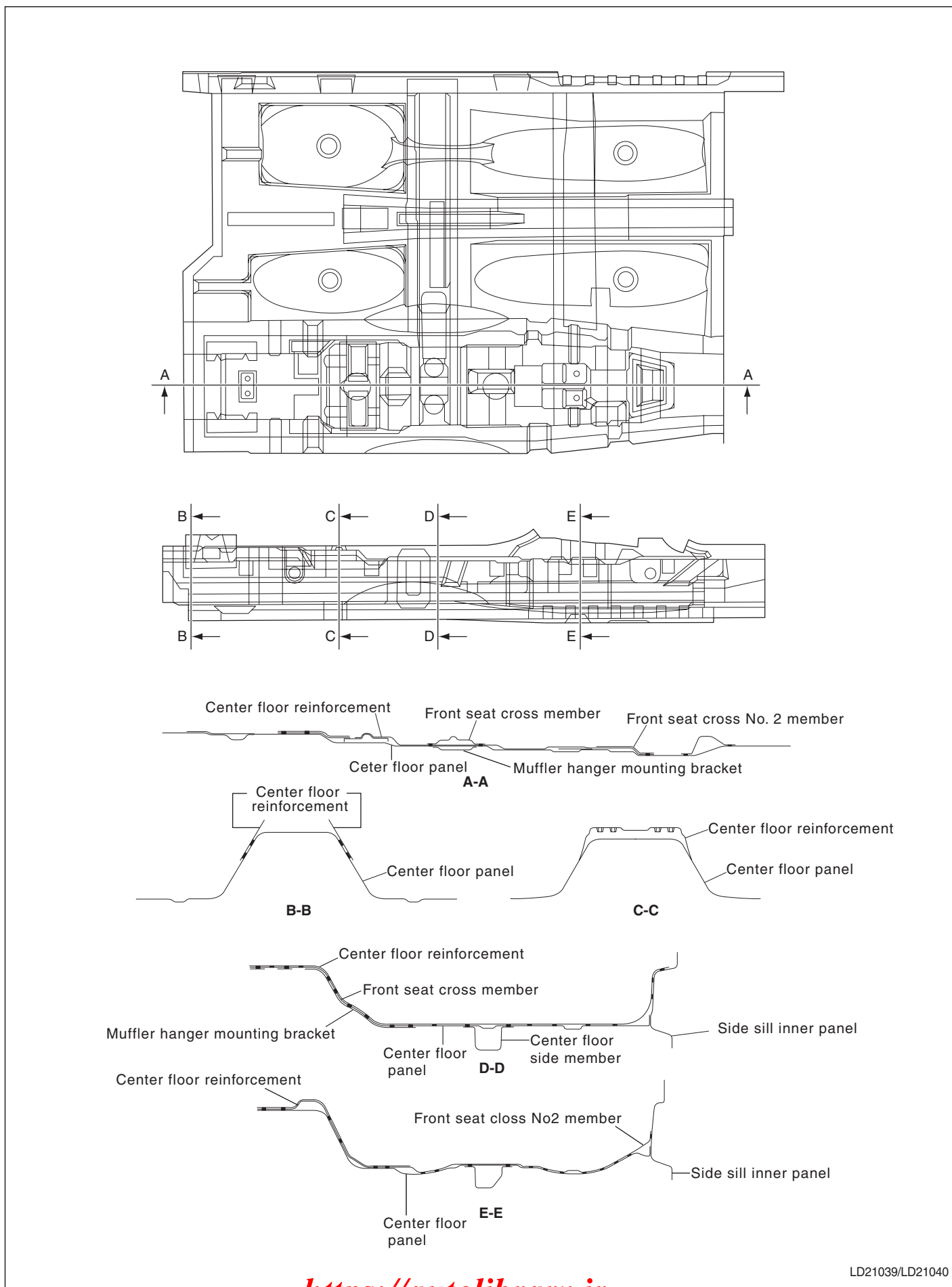
LD21030/LD21031

# Floor panel assembly

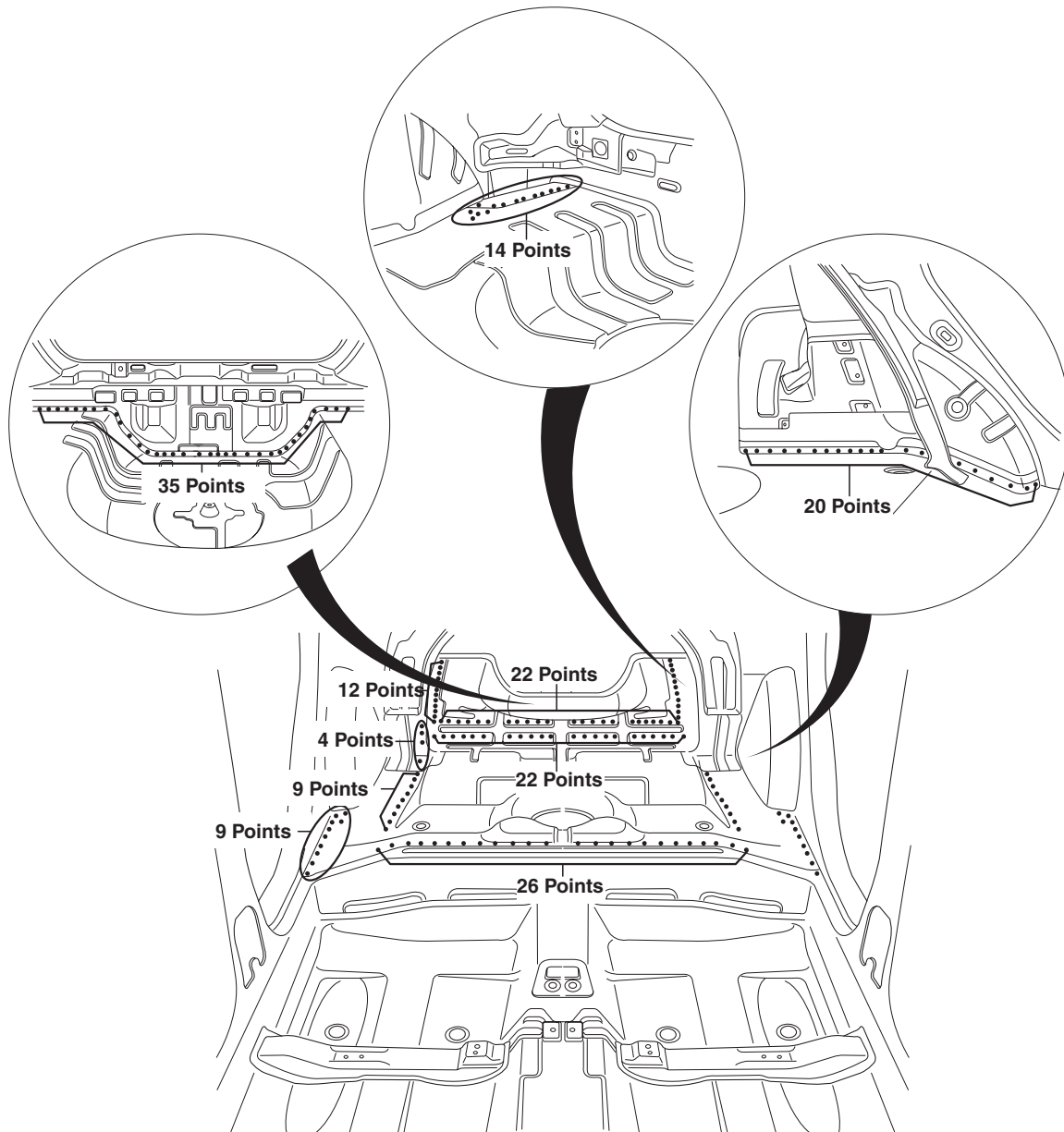
## Welding part



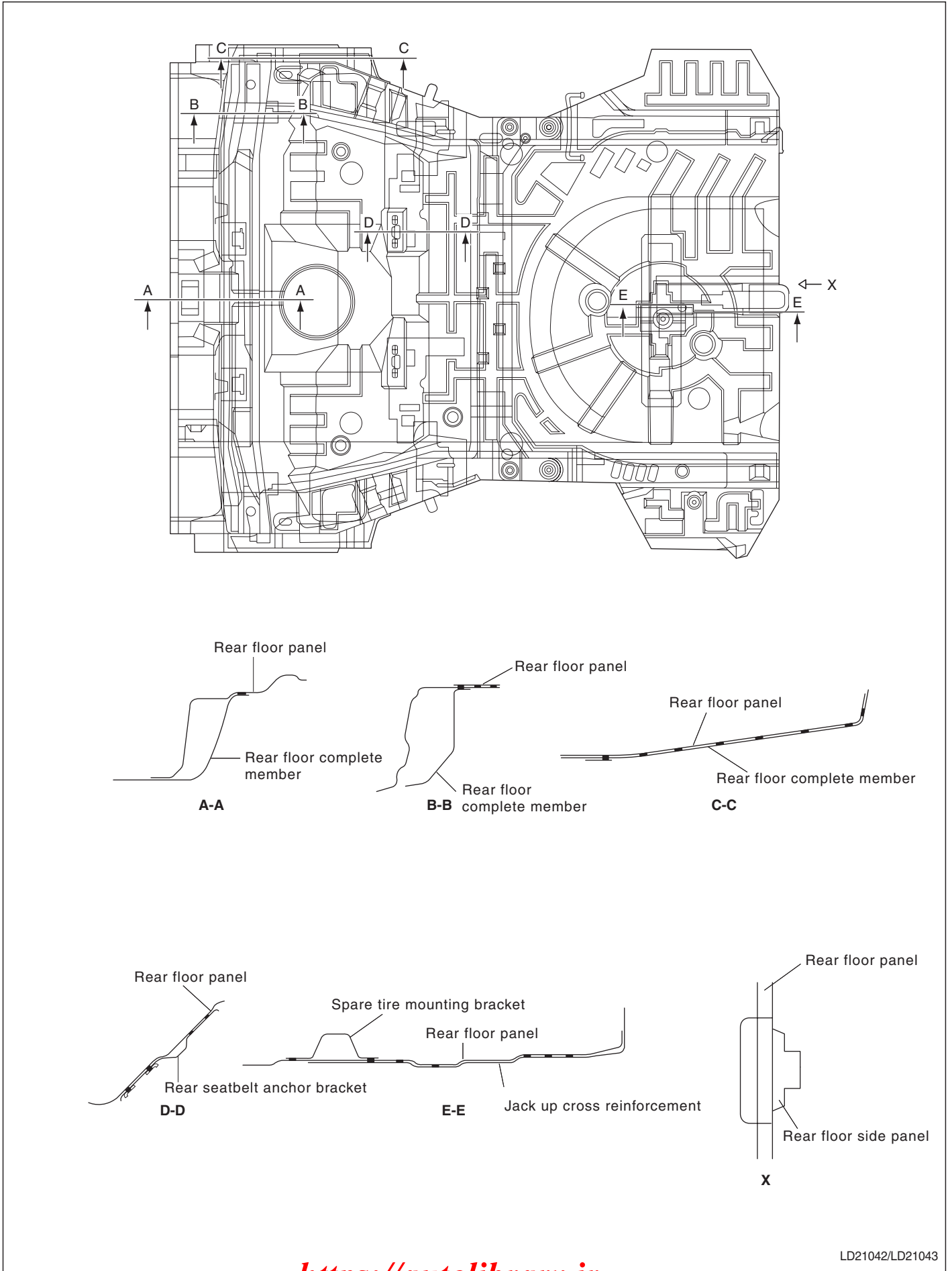
Section



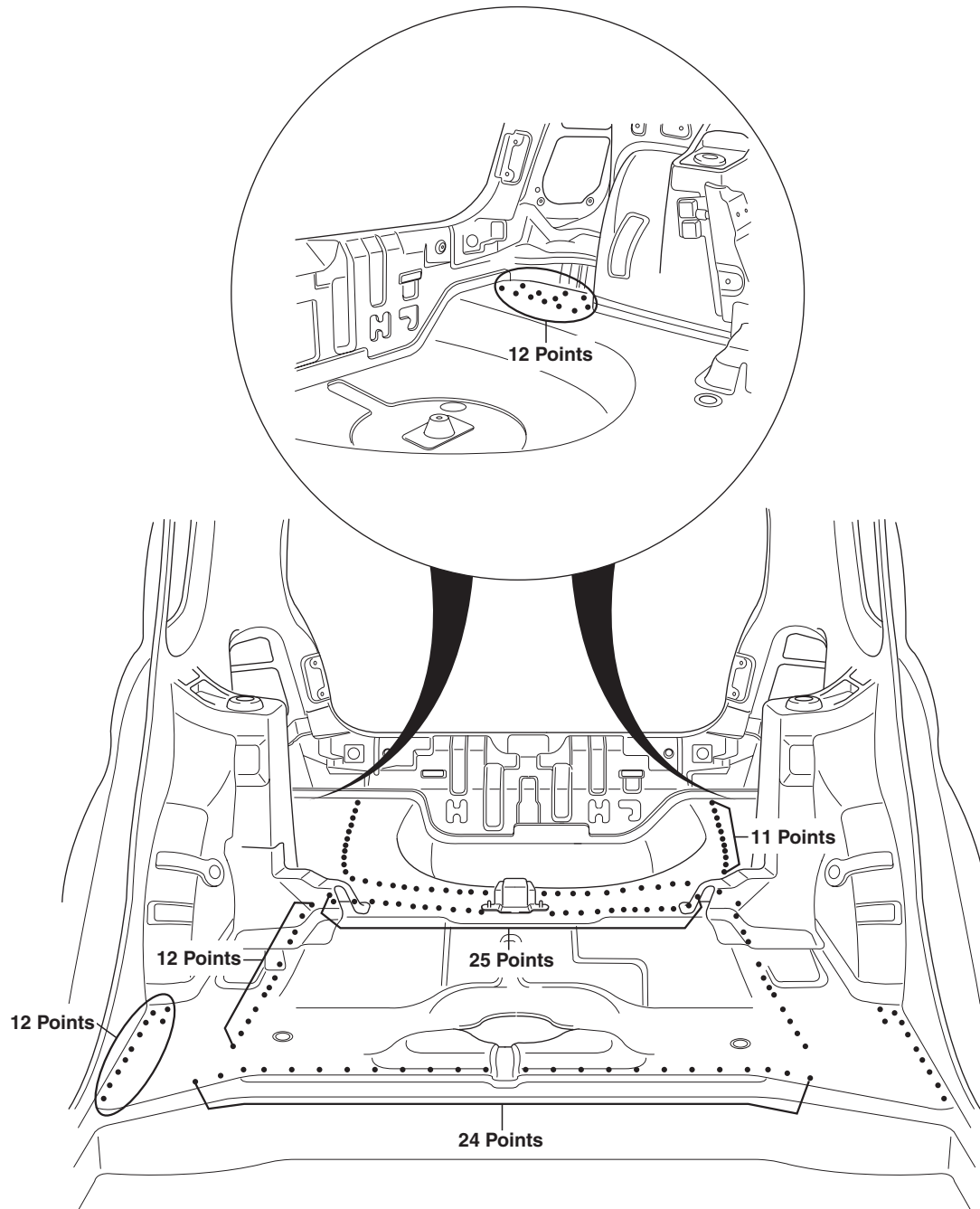
## Rear floor panel (4Door)



Section

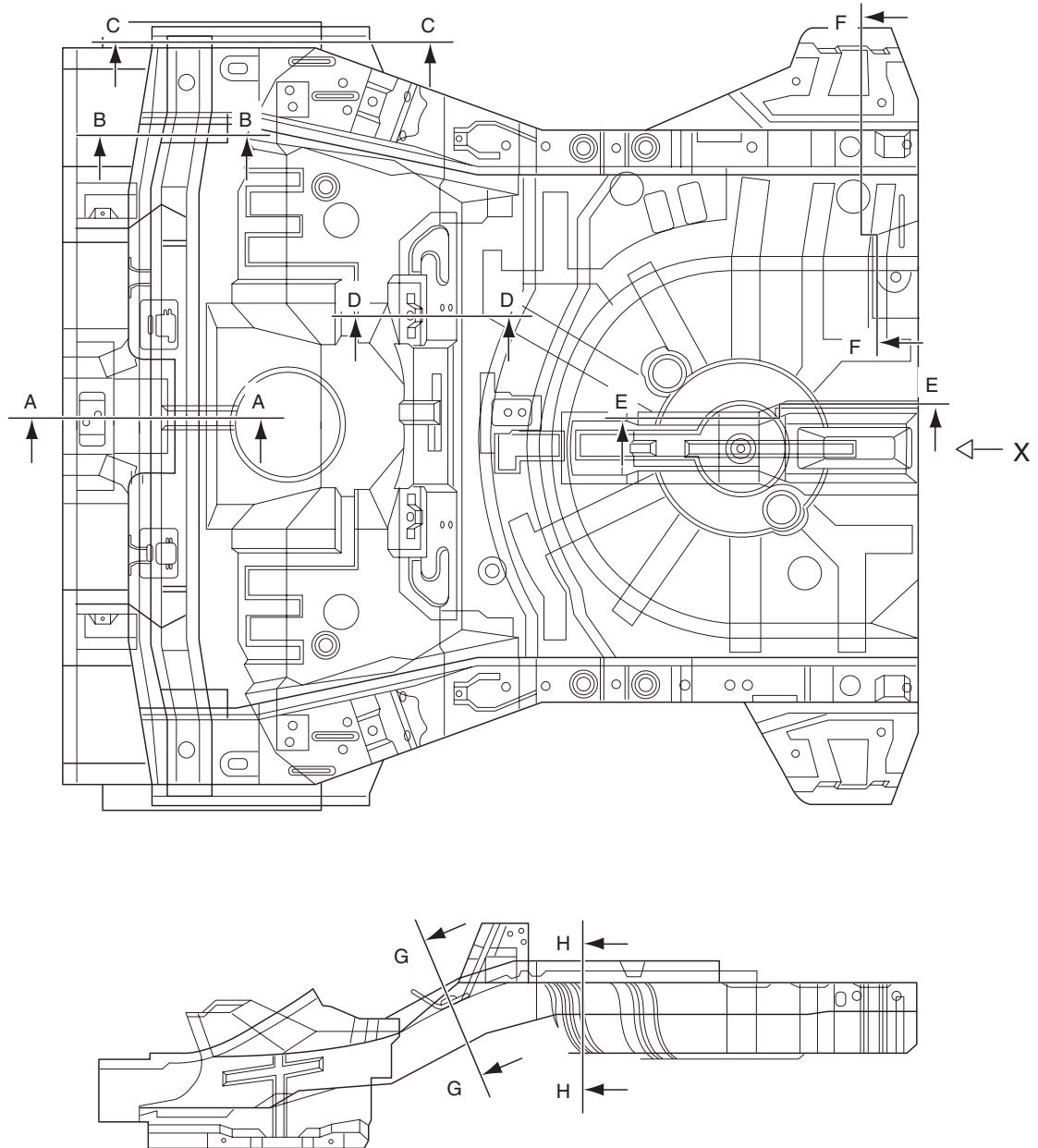


## Rear floor panel (5Door)



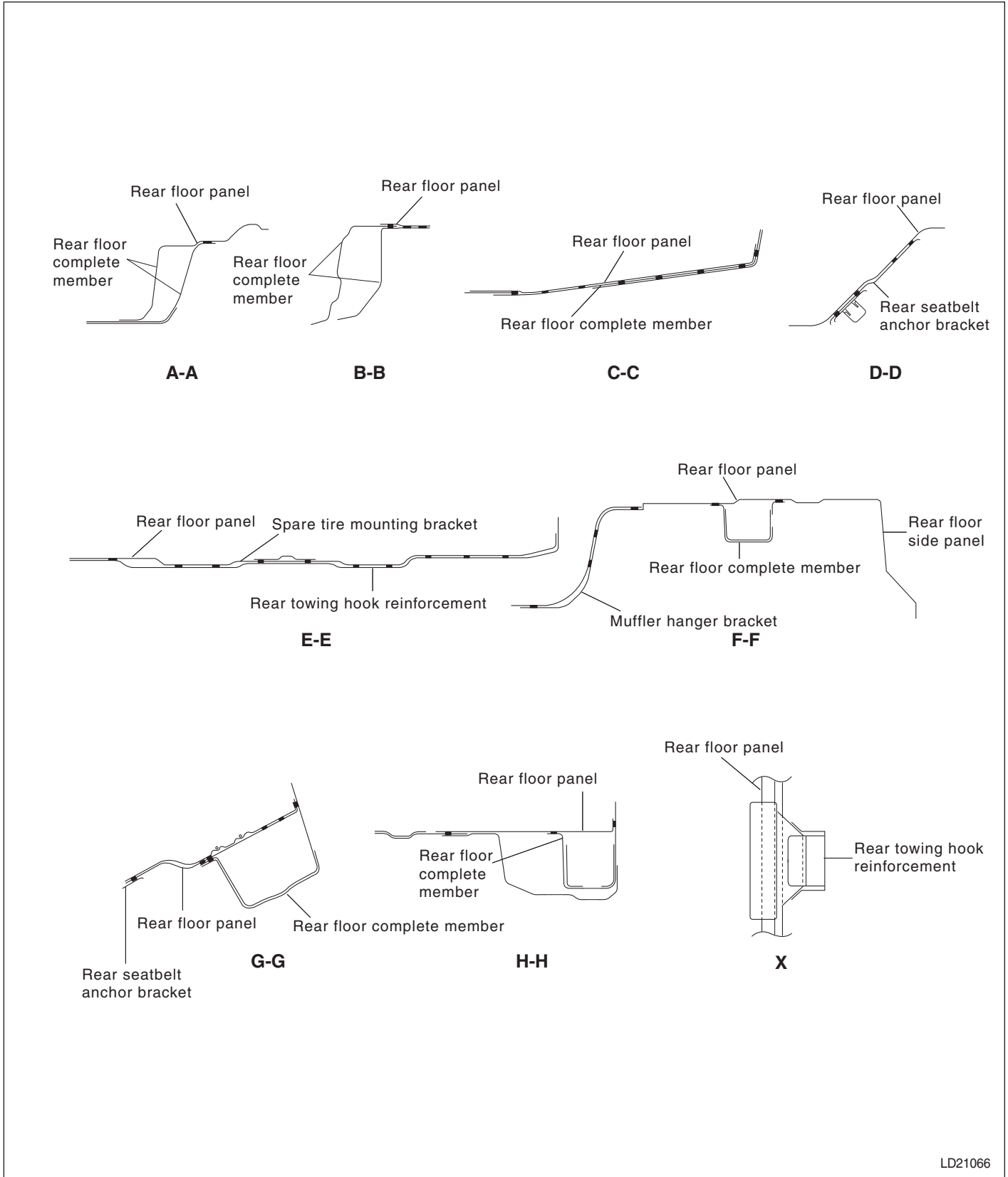
LD21064

Section



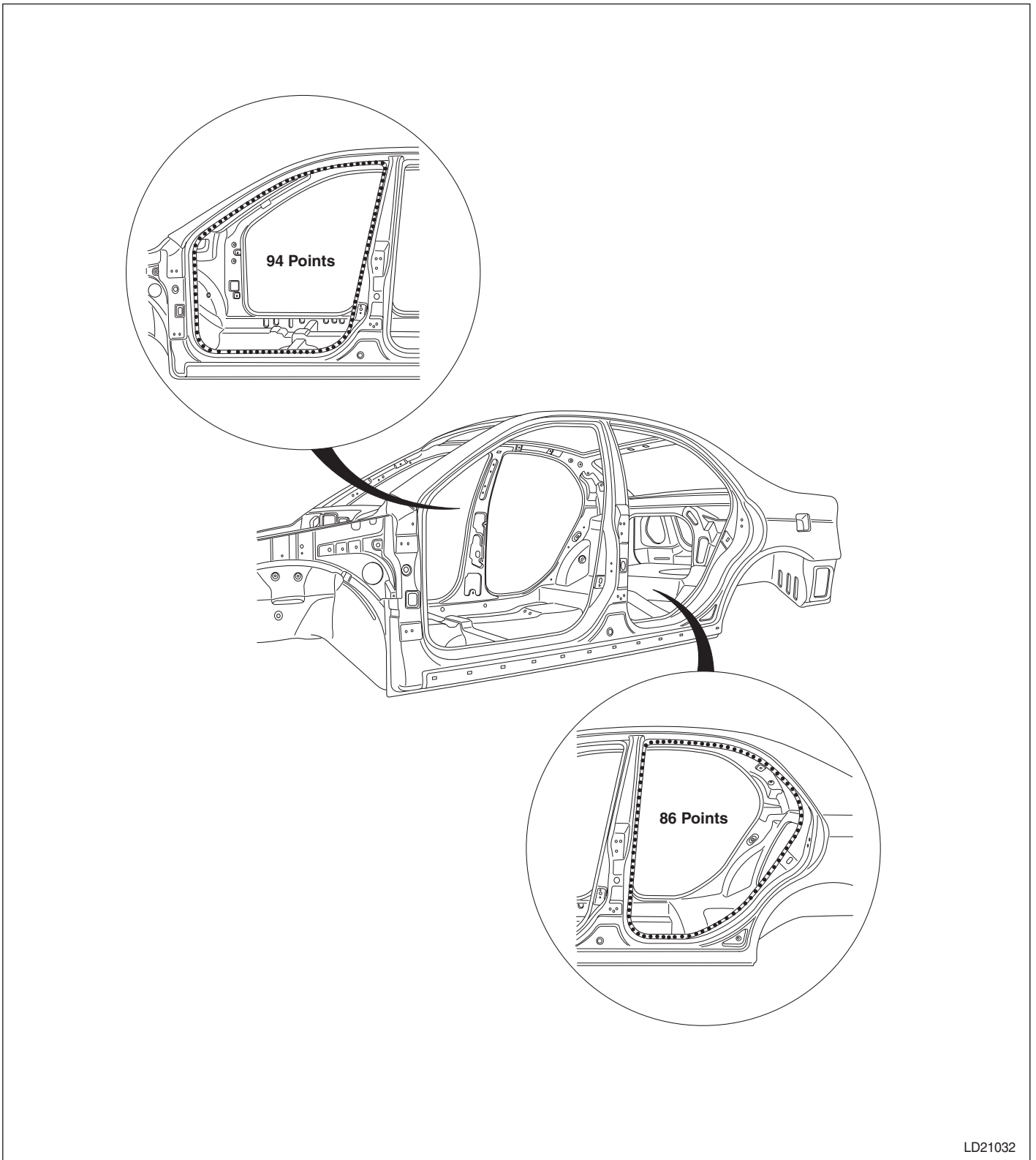
21-24 Replacing body panels

Part section



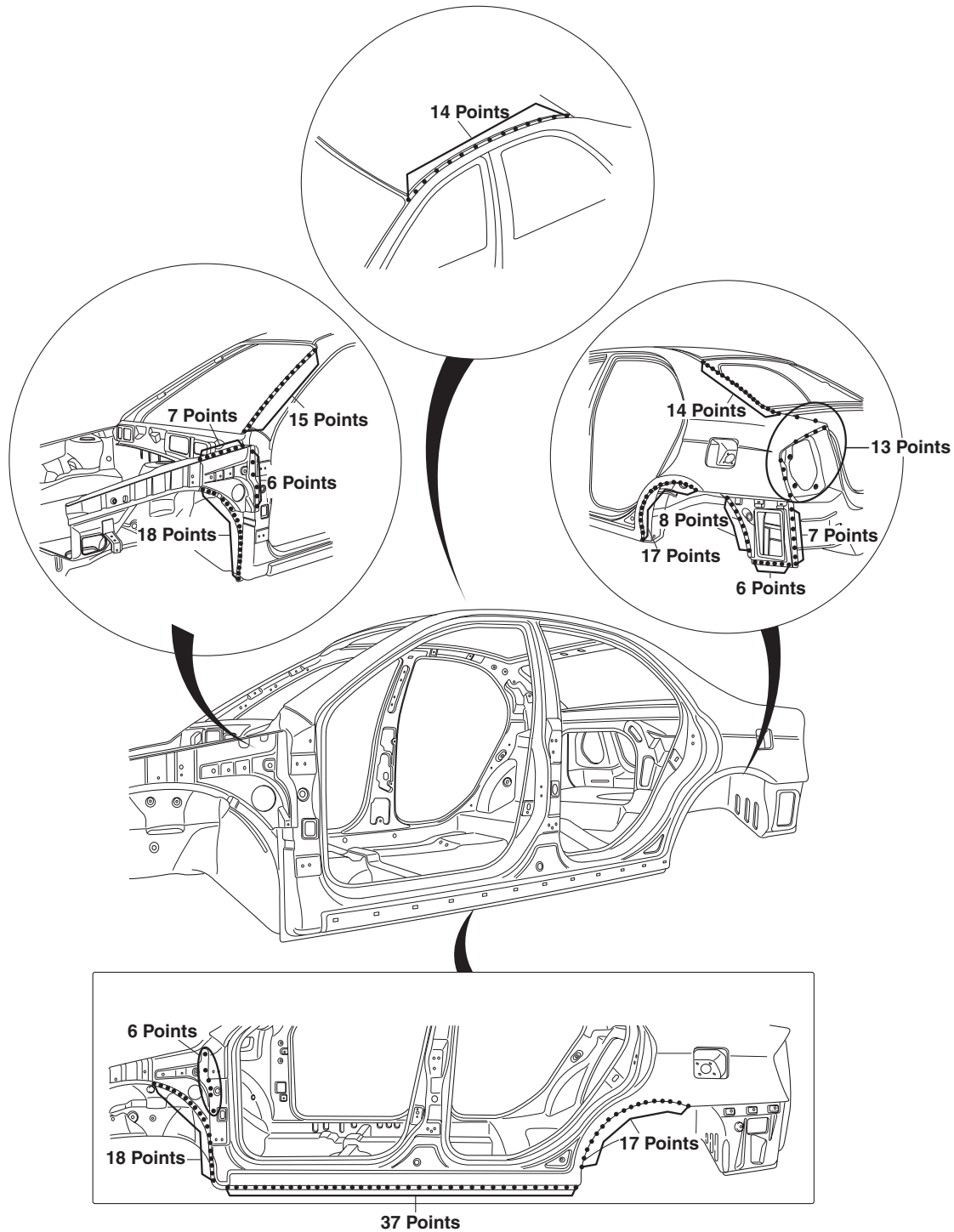
LD21066

## Side panel assembly (4Door) Welding part 1

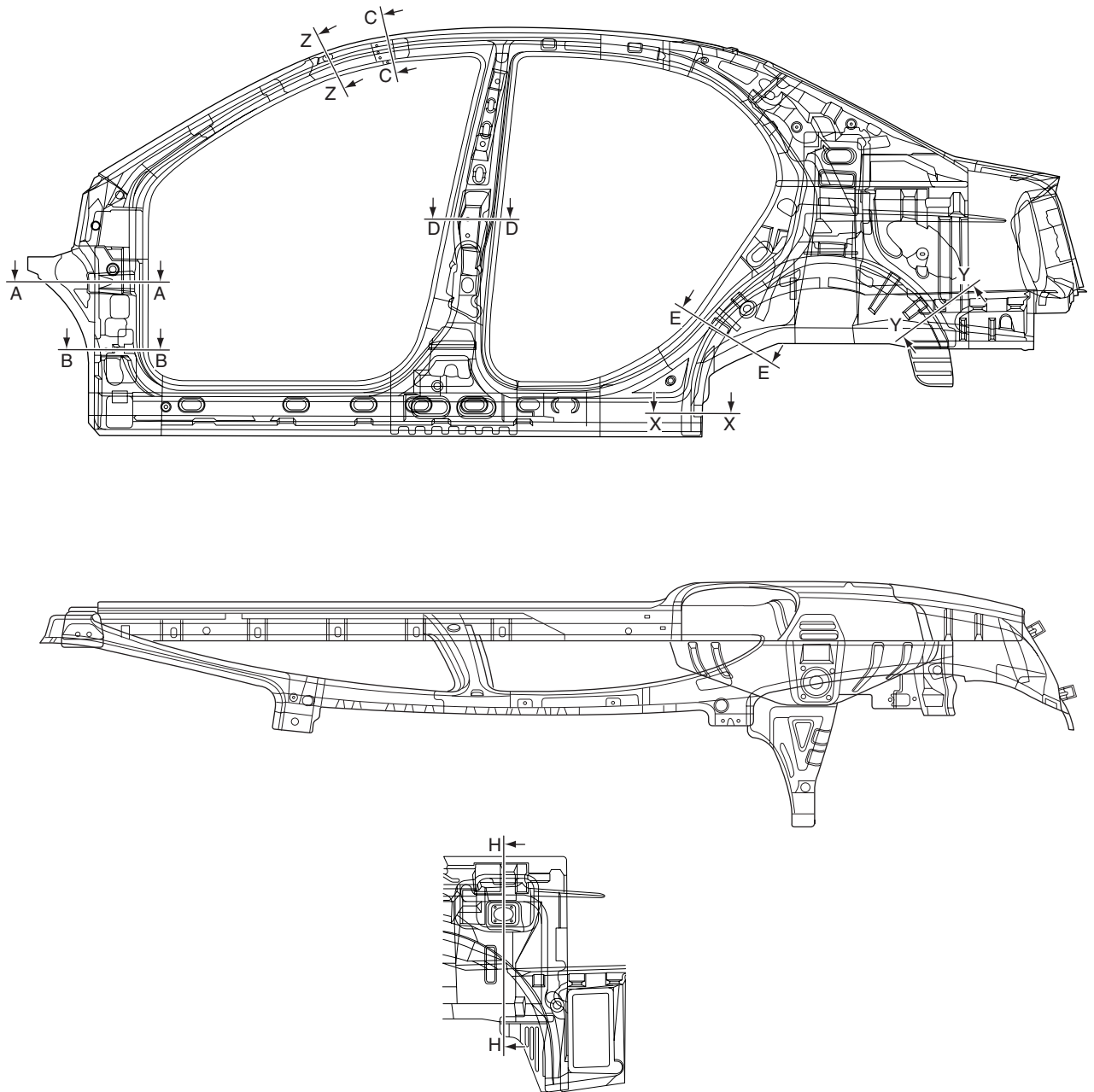


LD21032

## Welding part 2



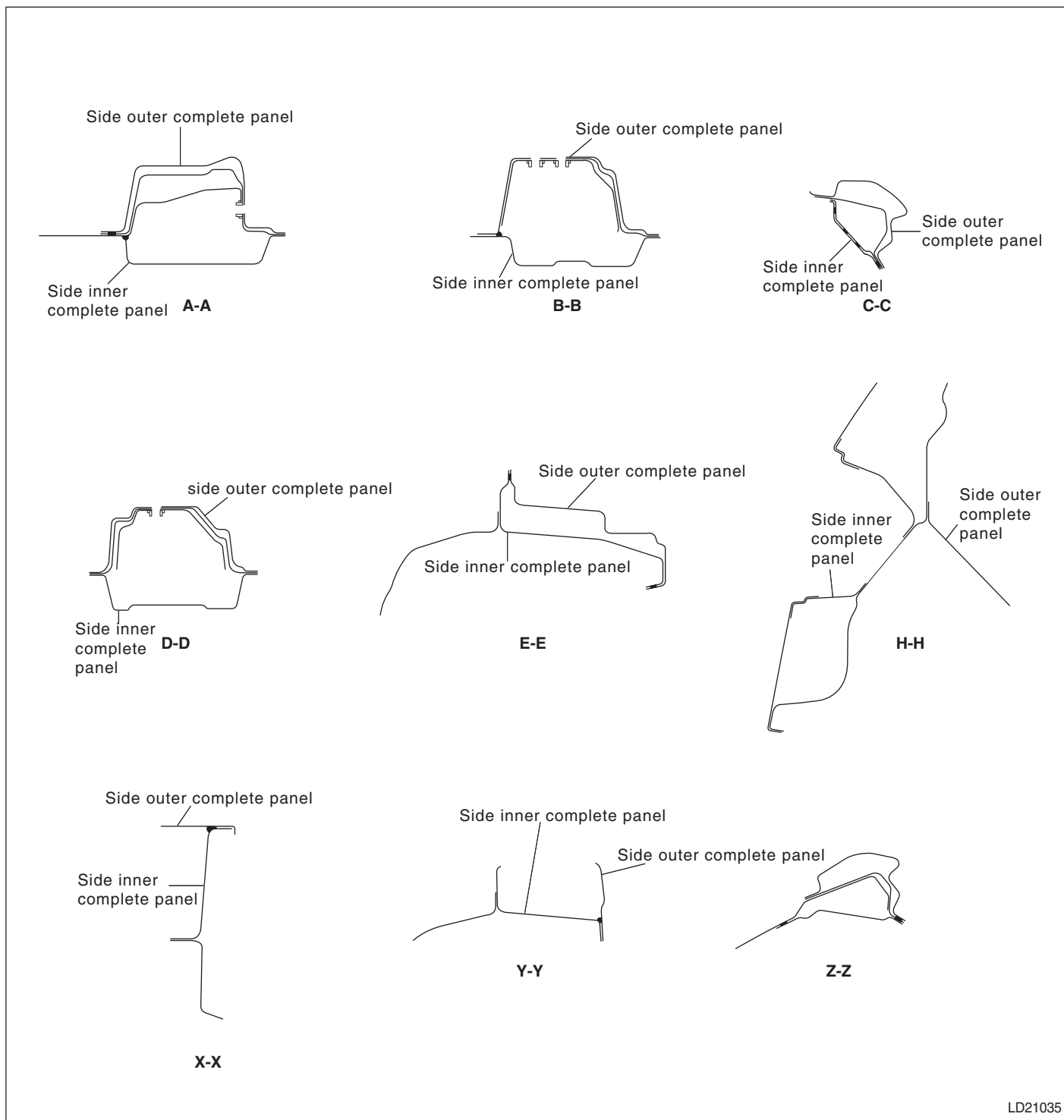
Side (inner) panel section



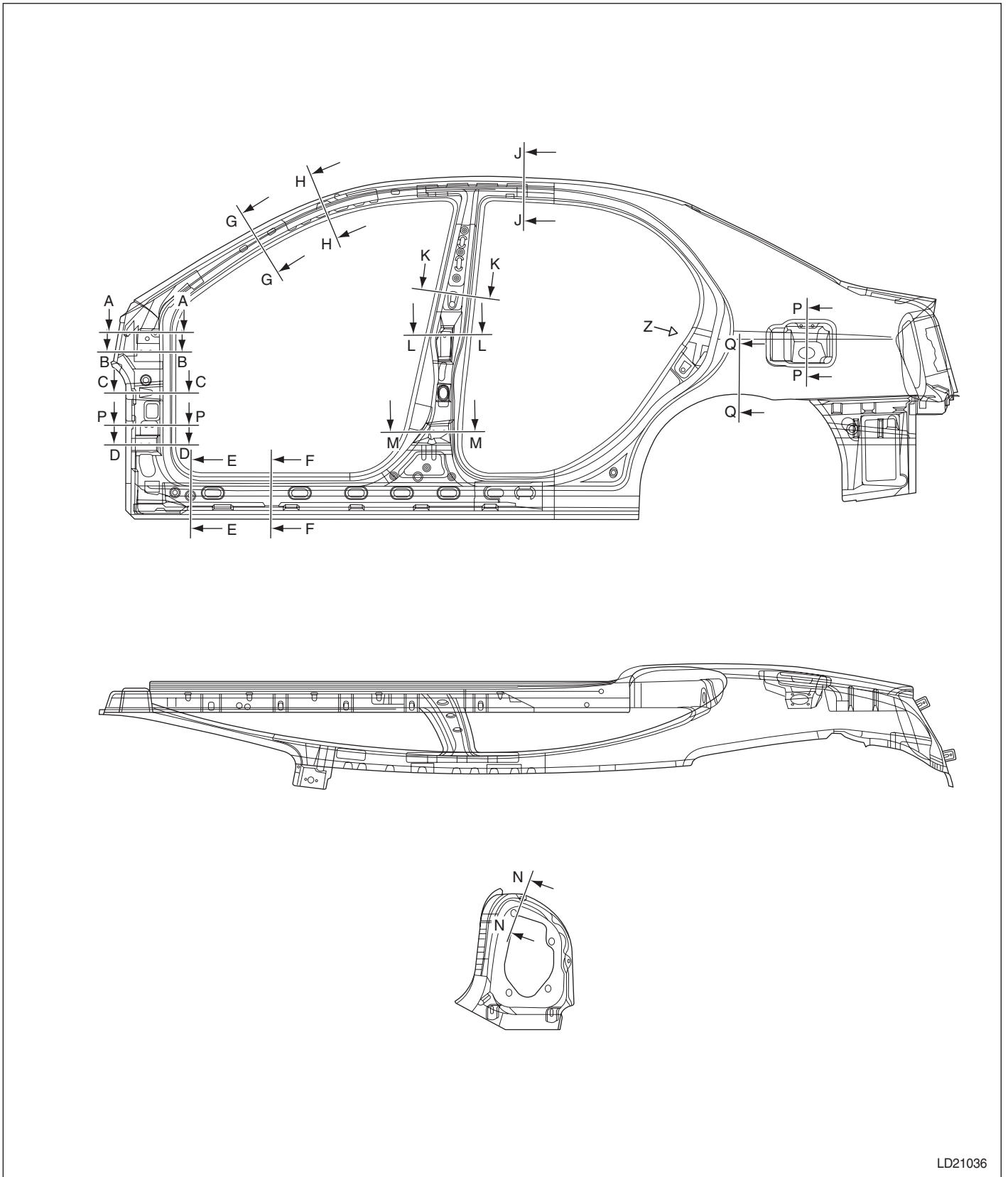
LD21034

21-28 Replacing body panels

Side (inner) panel part section



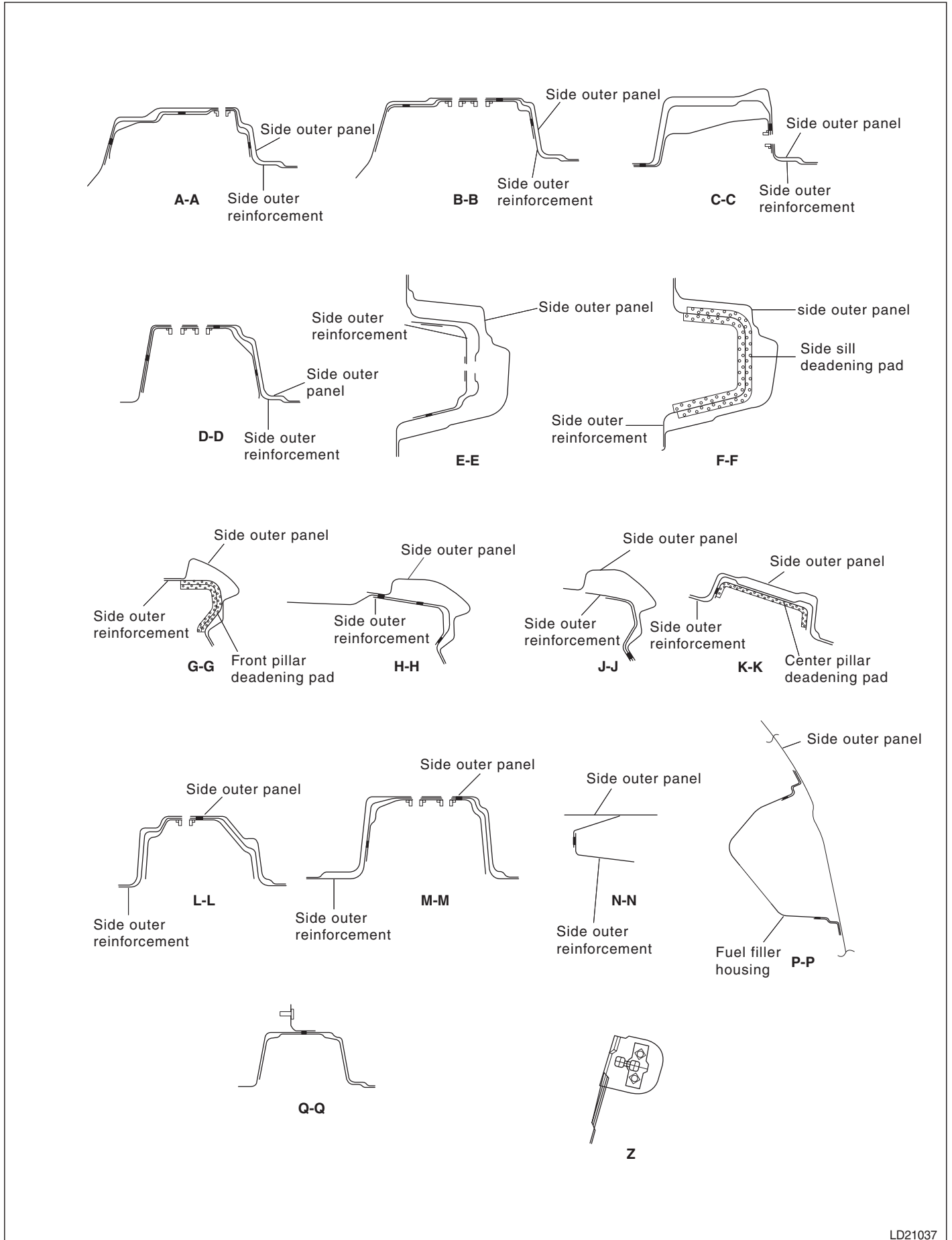
### Side (outer) panel section



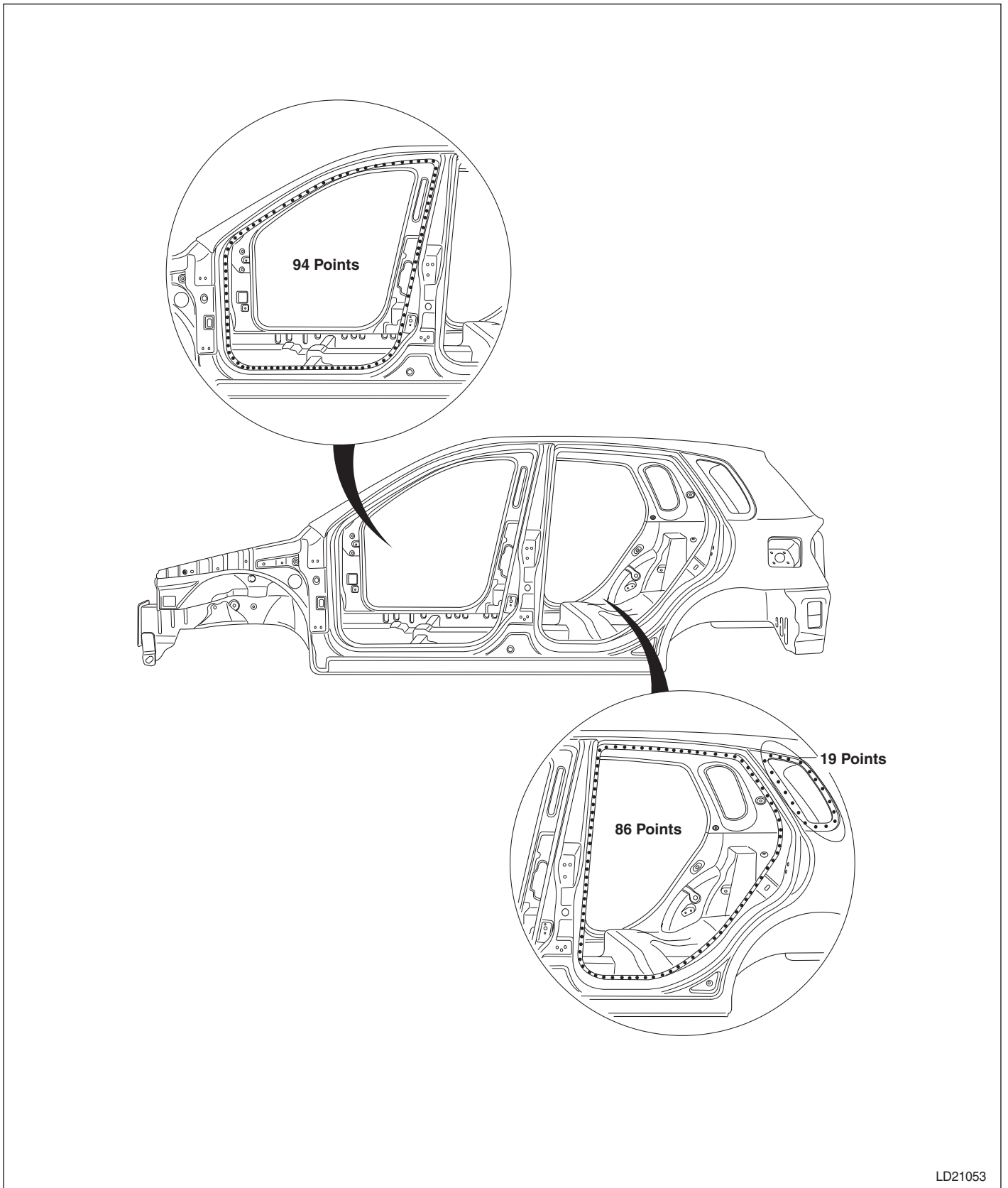
LD21036

21-30 Replacing body panels

Side (outer) panel part section

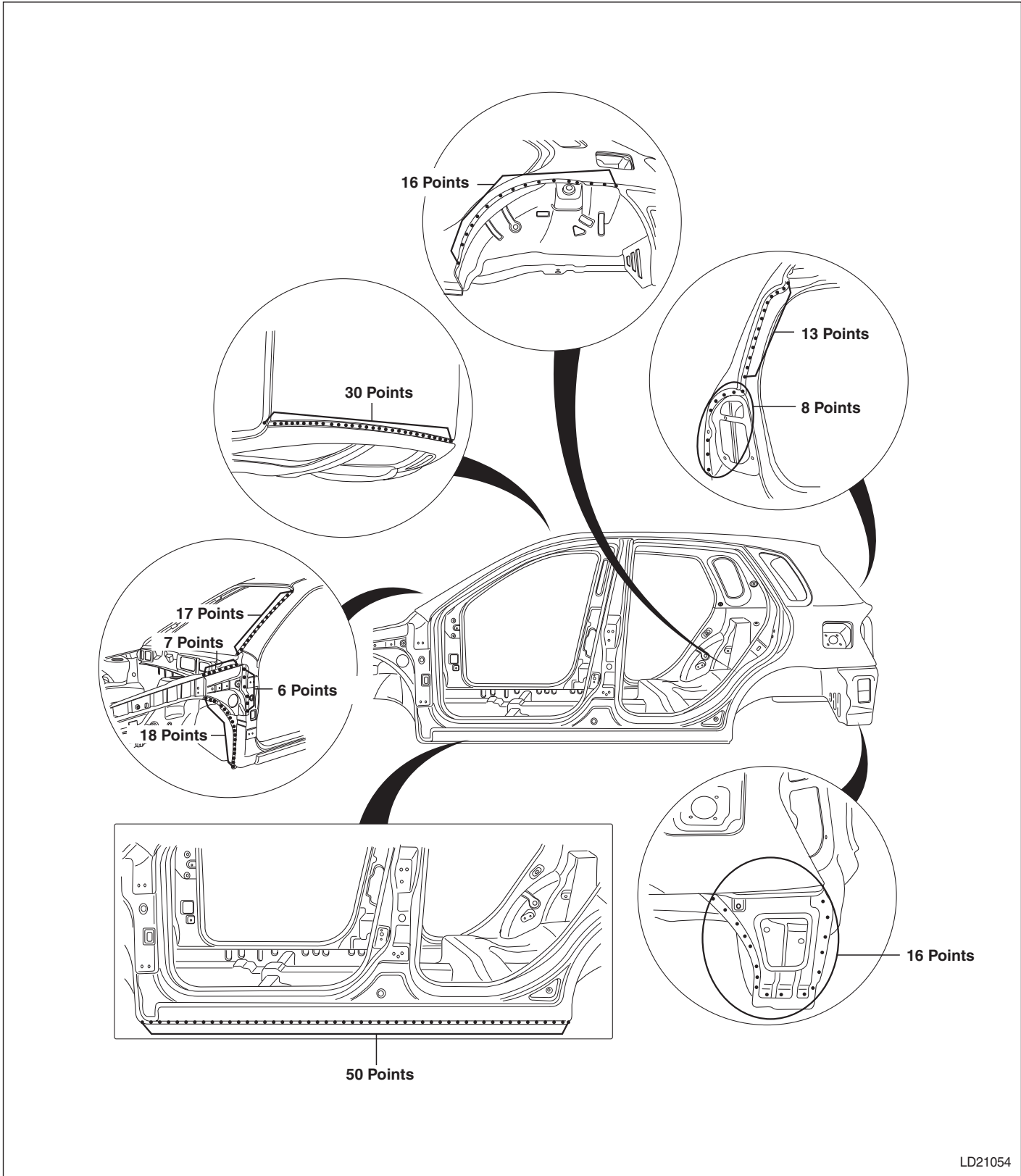


## Side panel assembly (5Door) Welding part 1

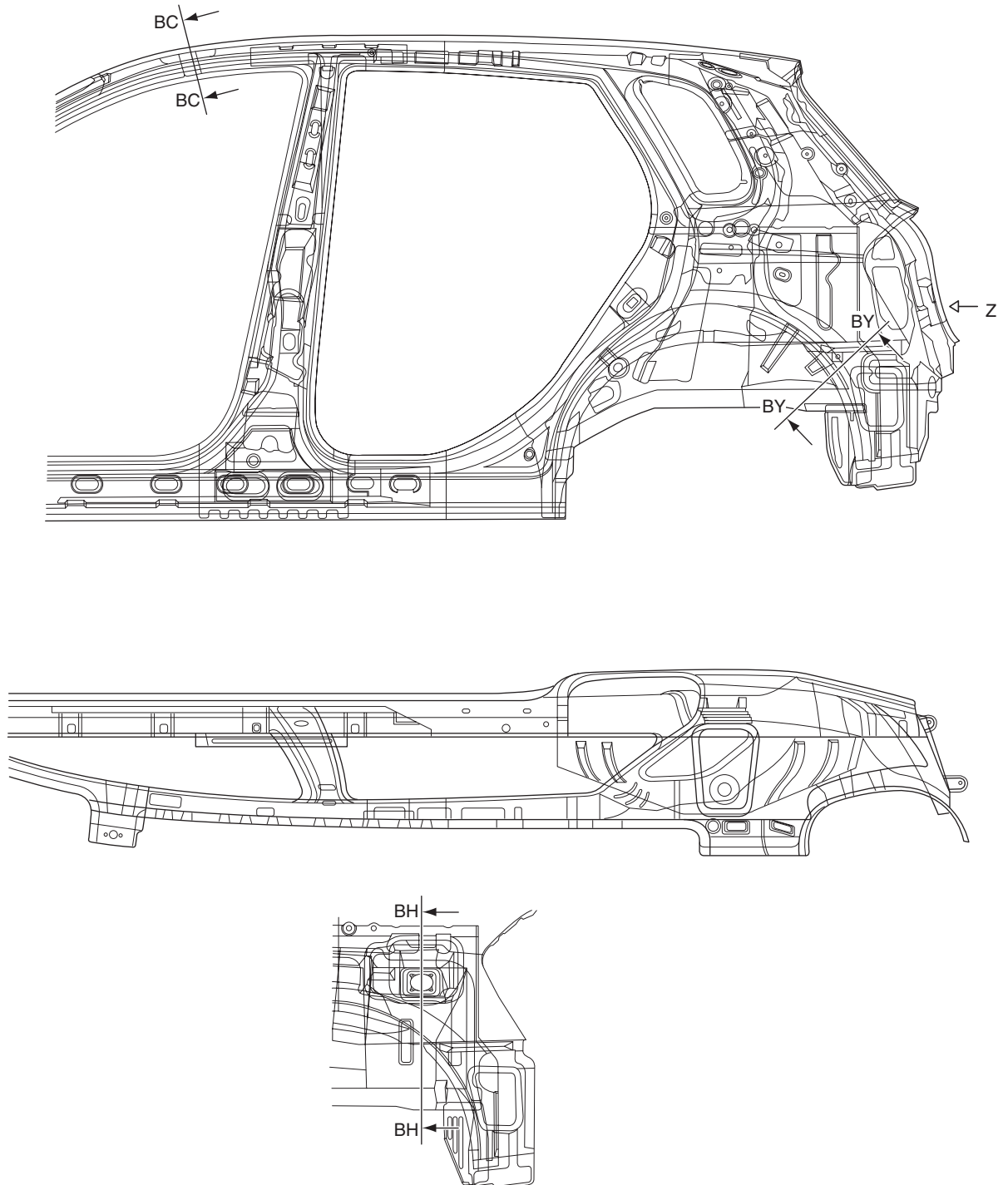


LD21053

Welding part 2



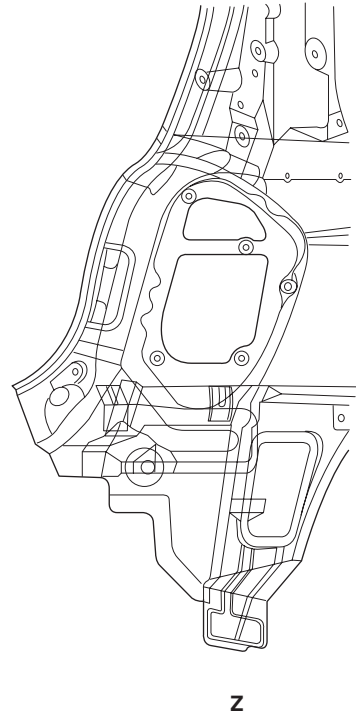
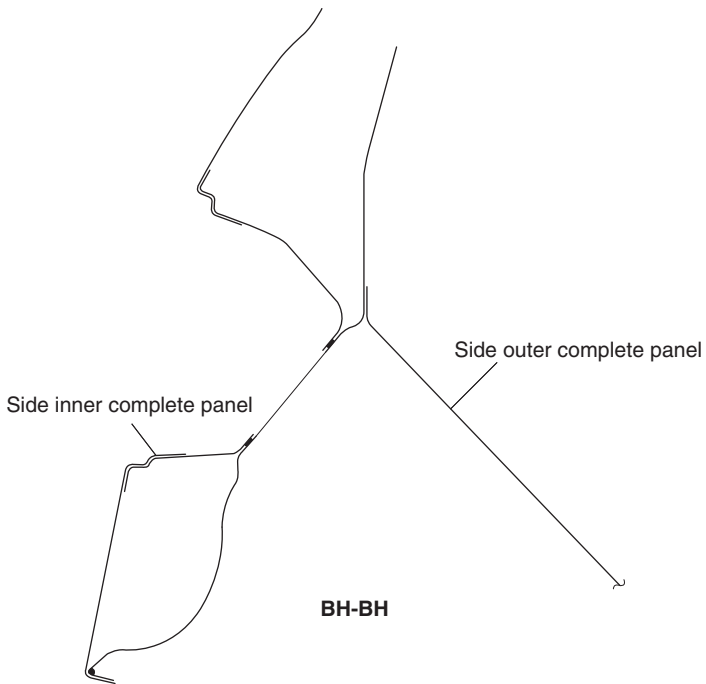
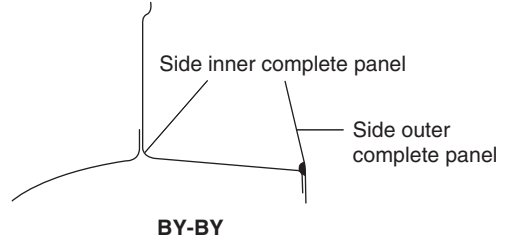
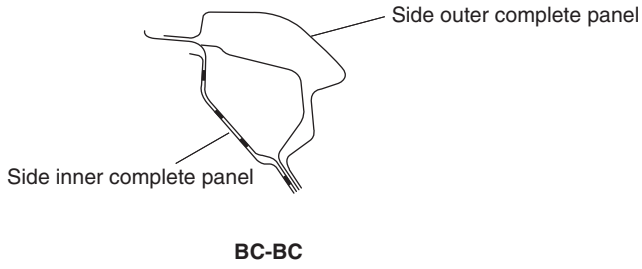
### Side (inner) panel section



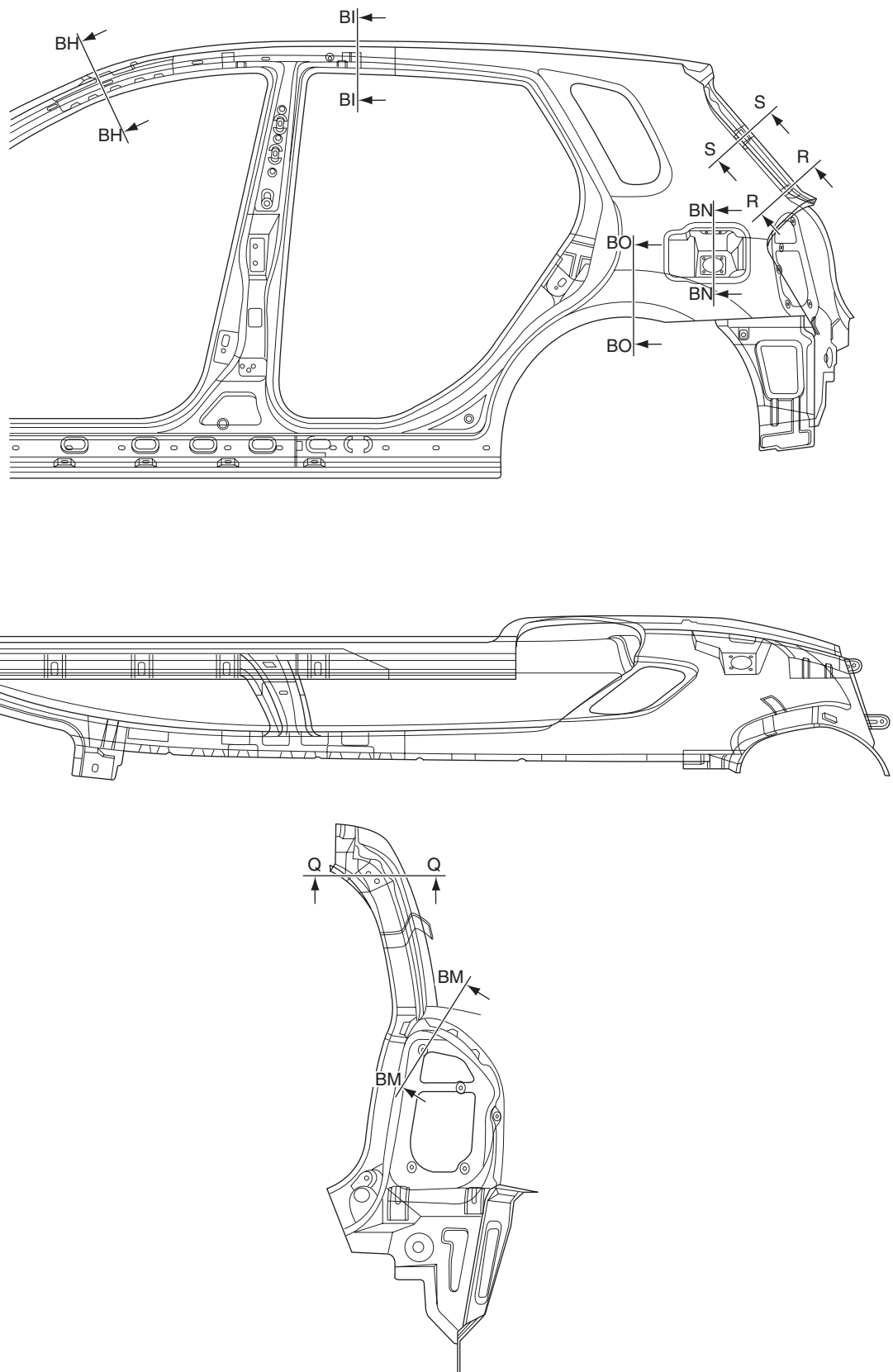
LD21055

21-34 Replacing body panels

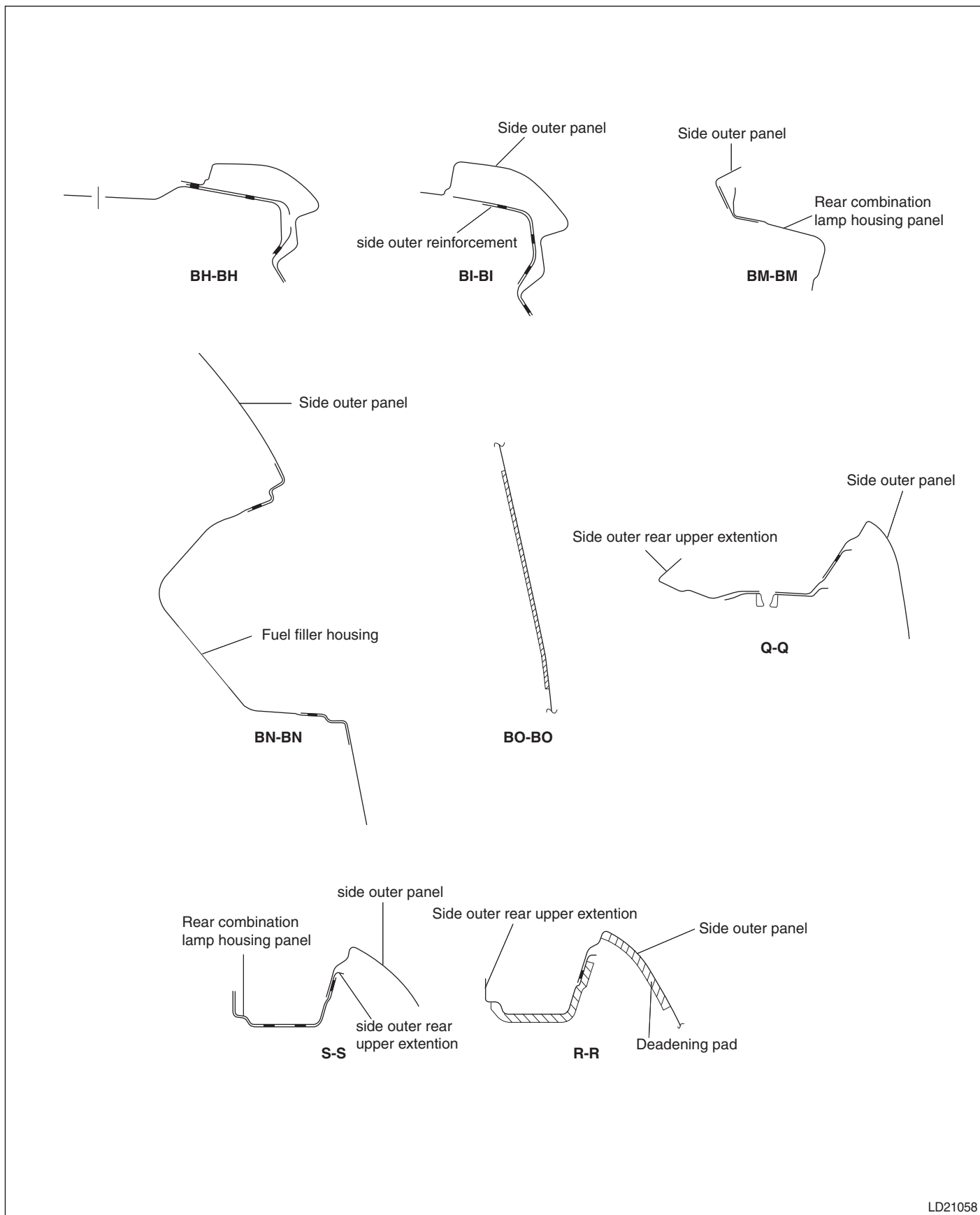
Side (inner) panel part section



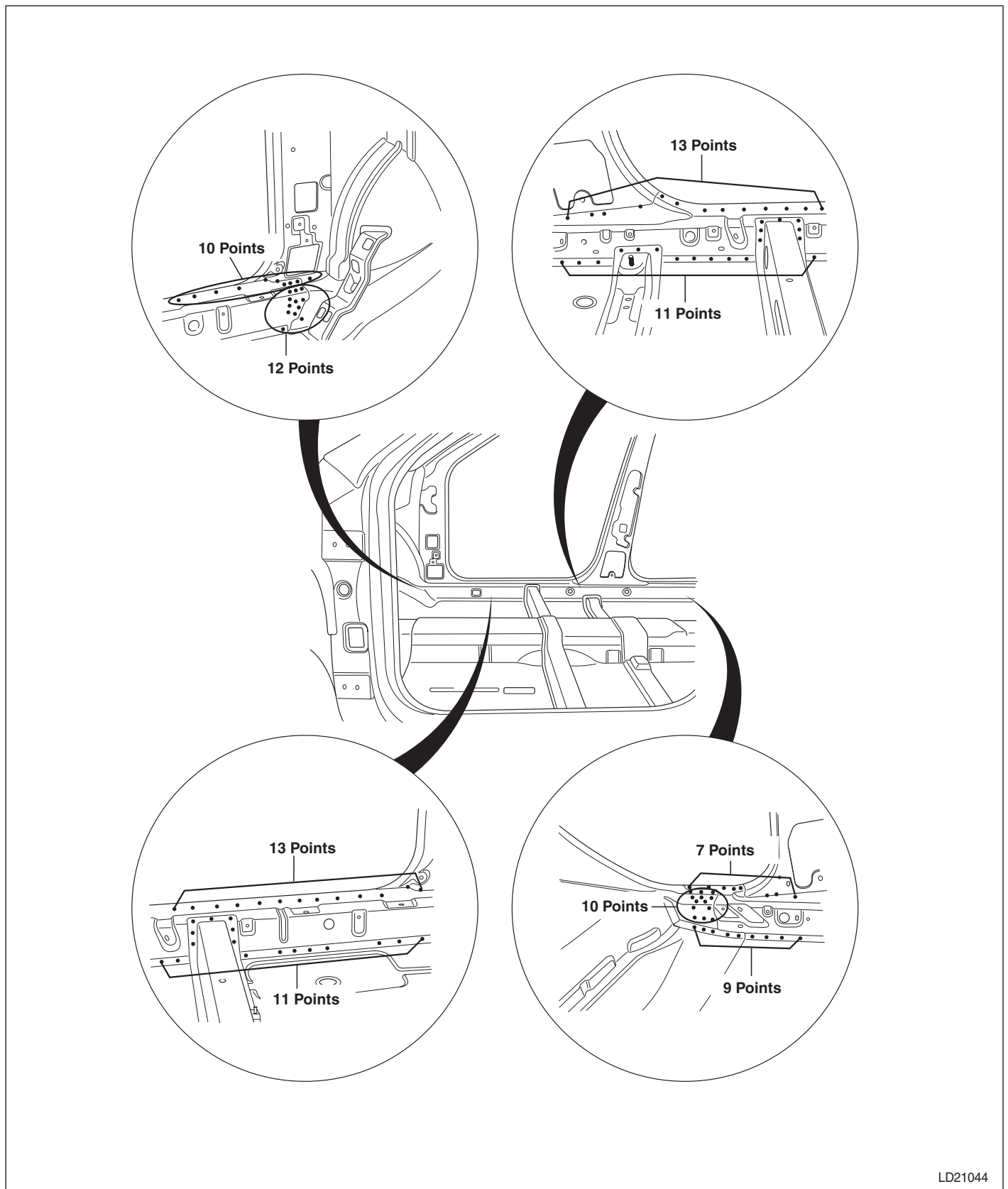
Side (outer) panel section



### Side (outer) panel part section



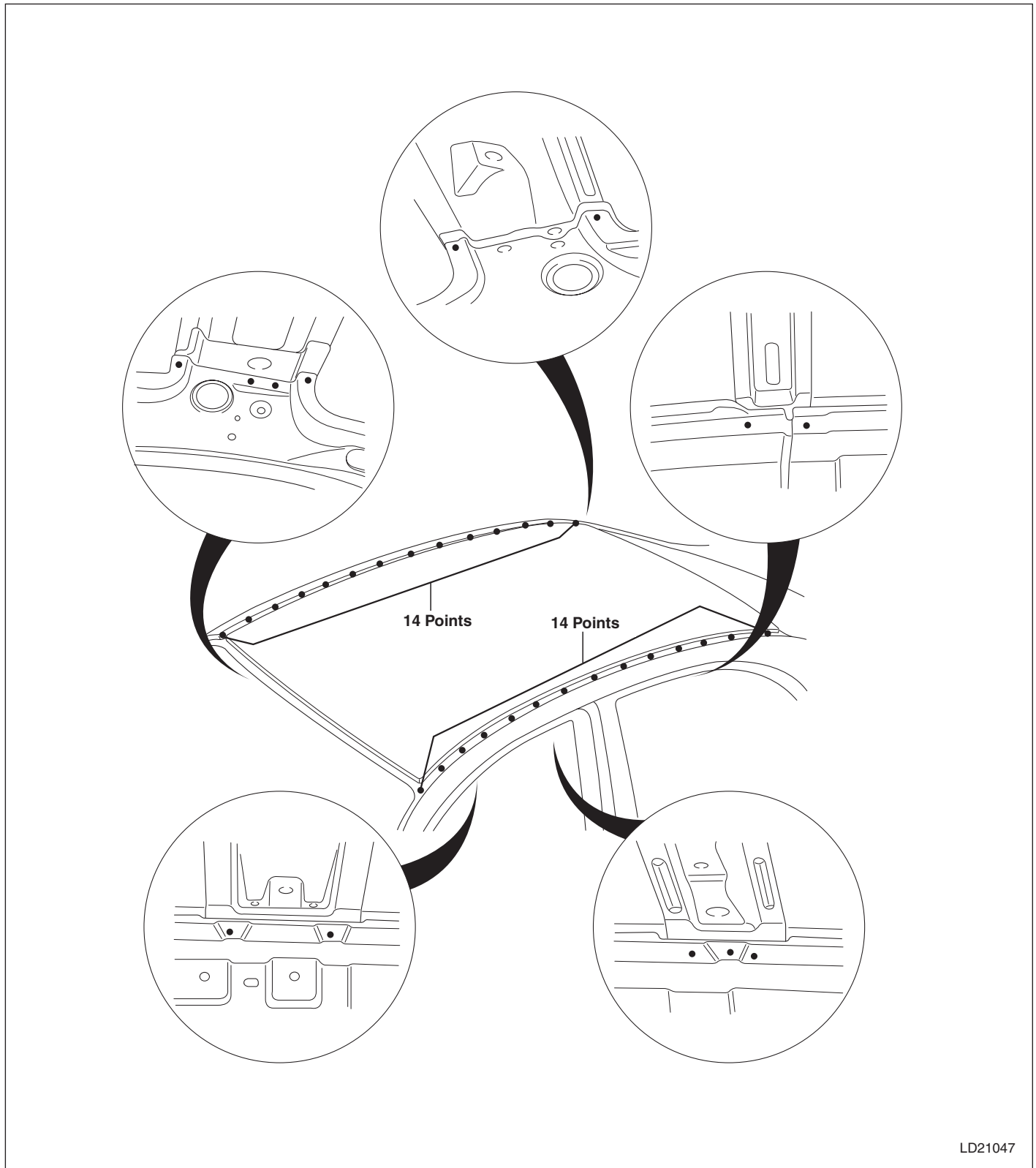
## Side sill panel assembly Welding part



LD21044

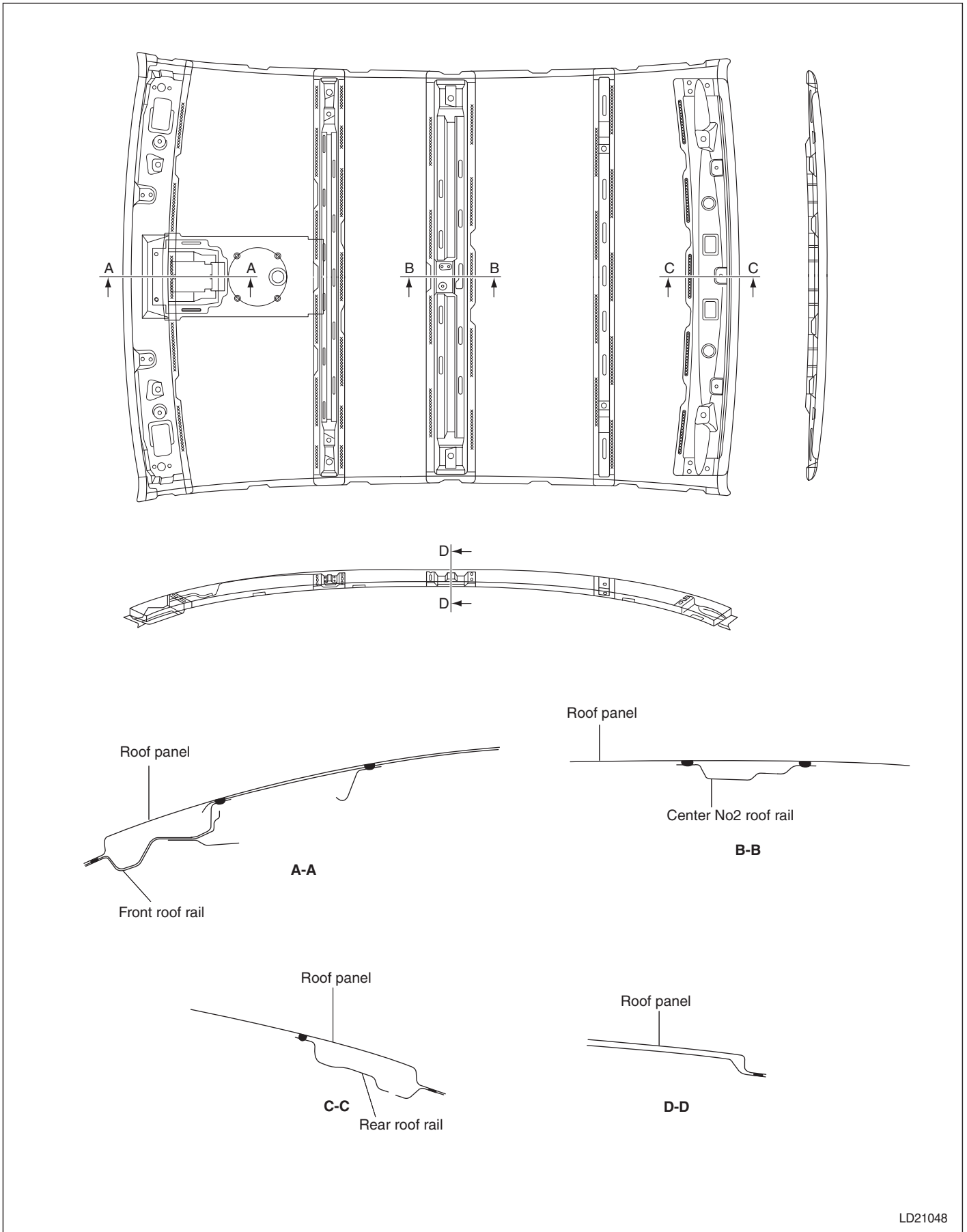
## Roof panel assembly (4Door)

### Welding part



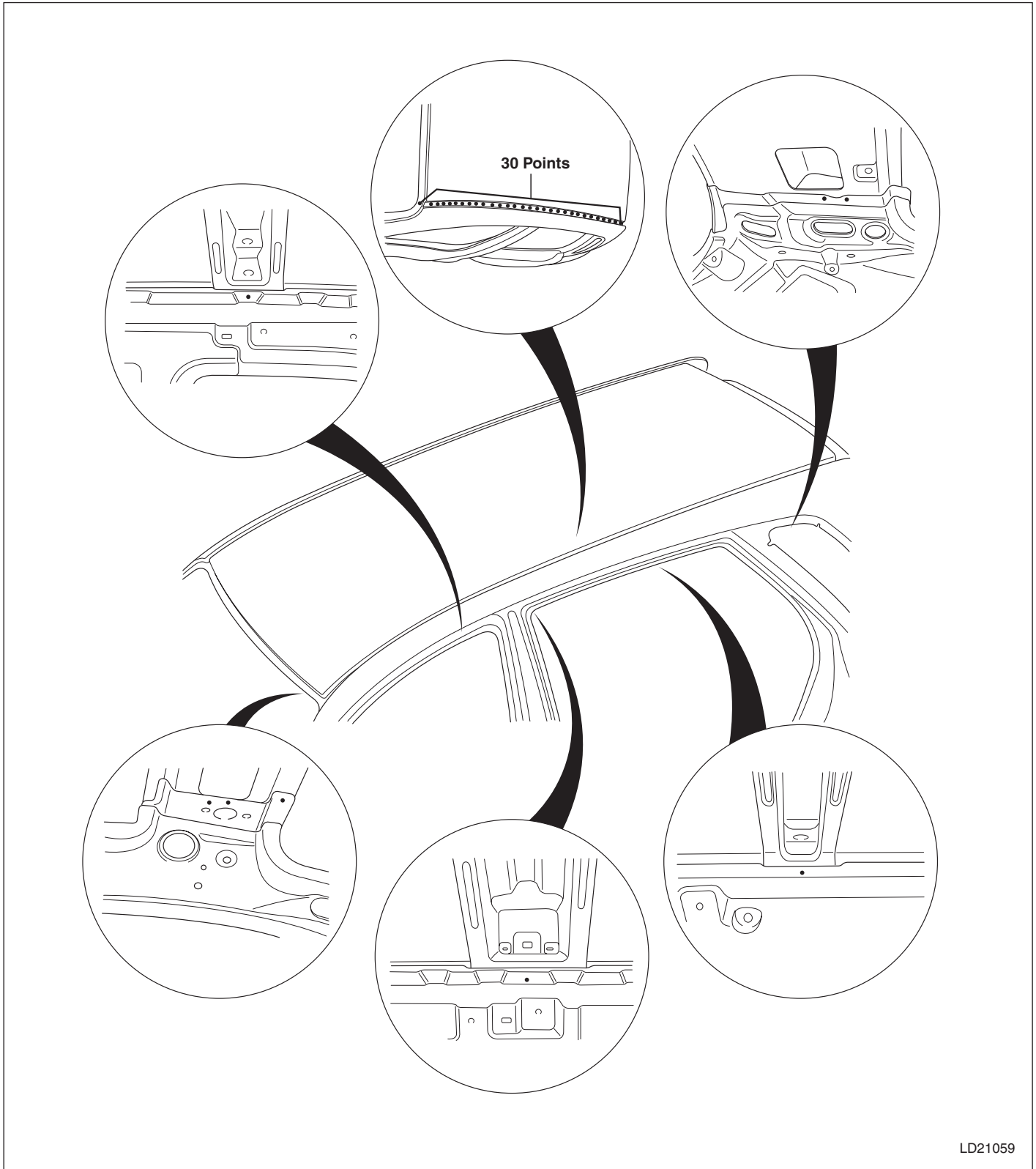
LD21047

Section



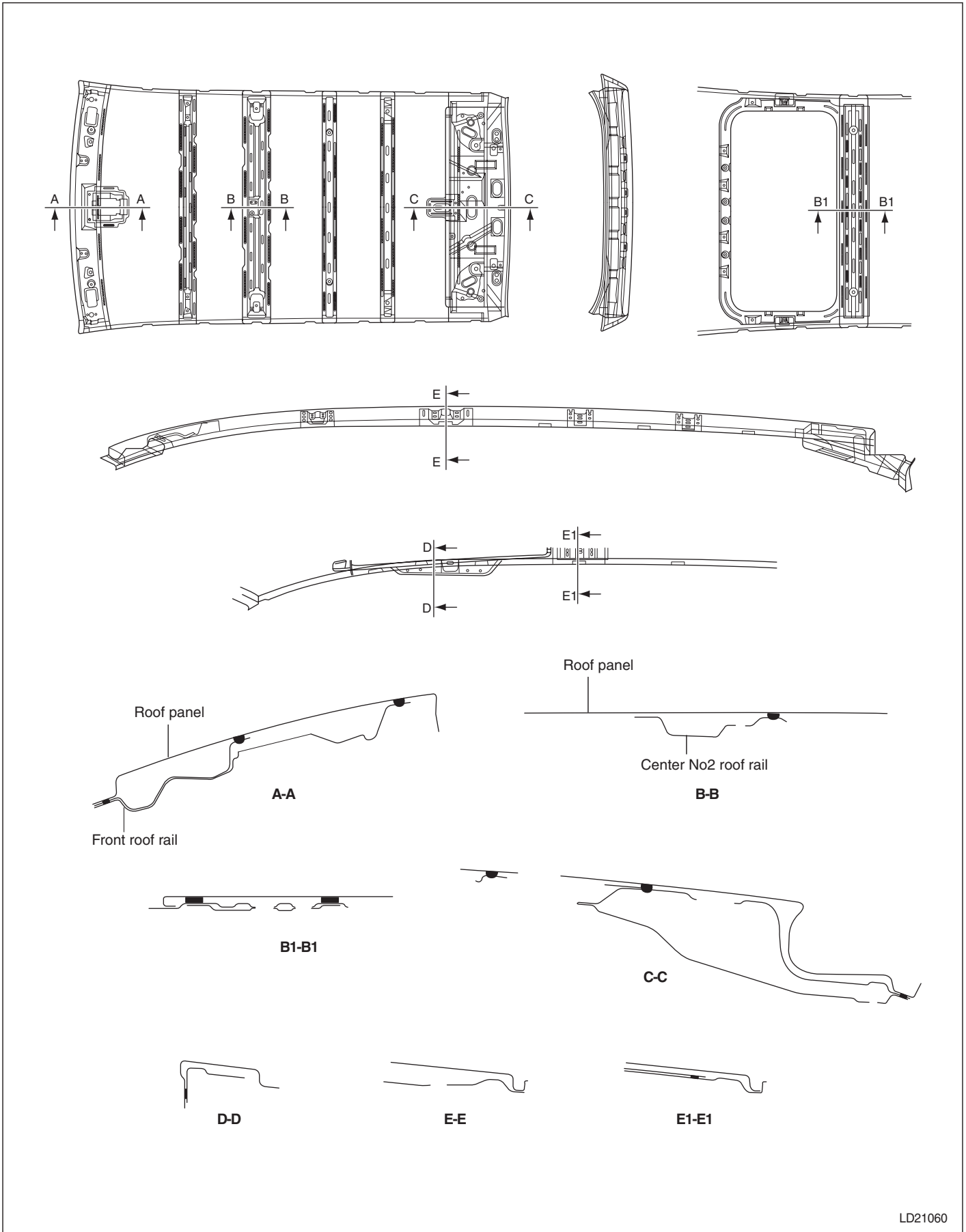
## Roof panel assembly (5Door)

### Welding part



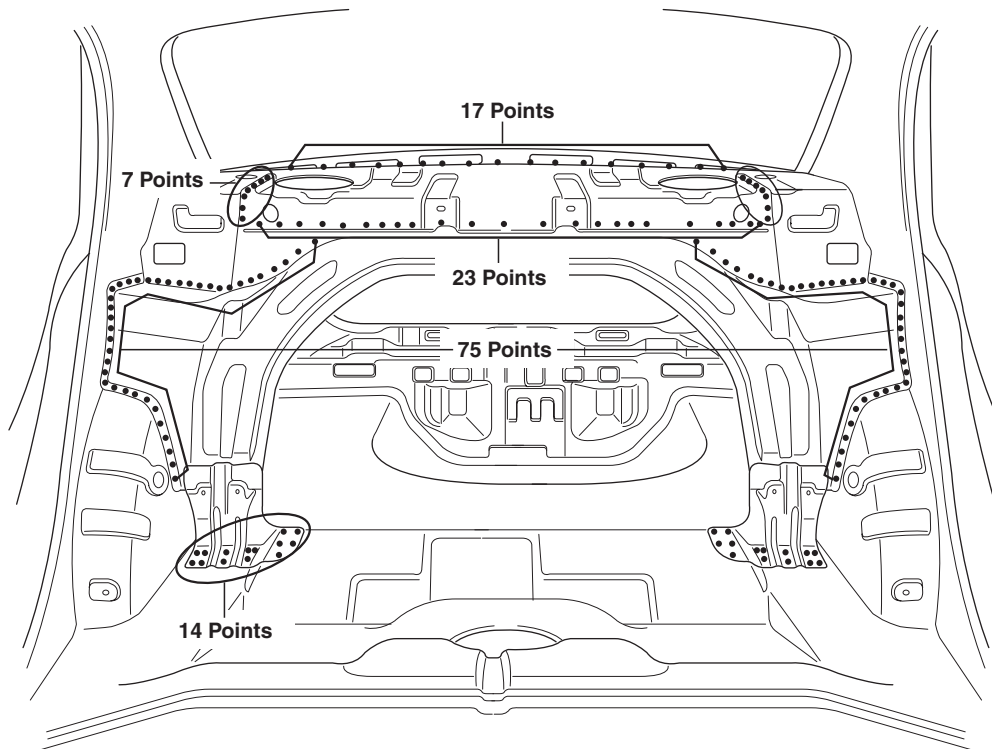
LD21059

Section

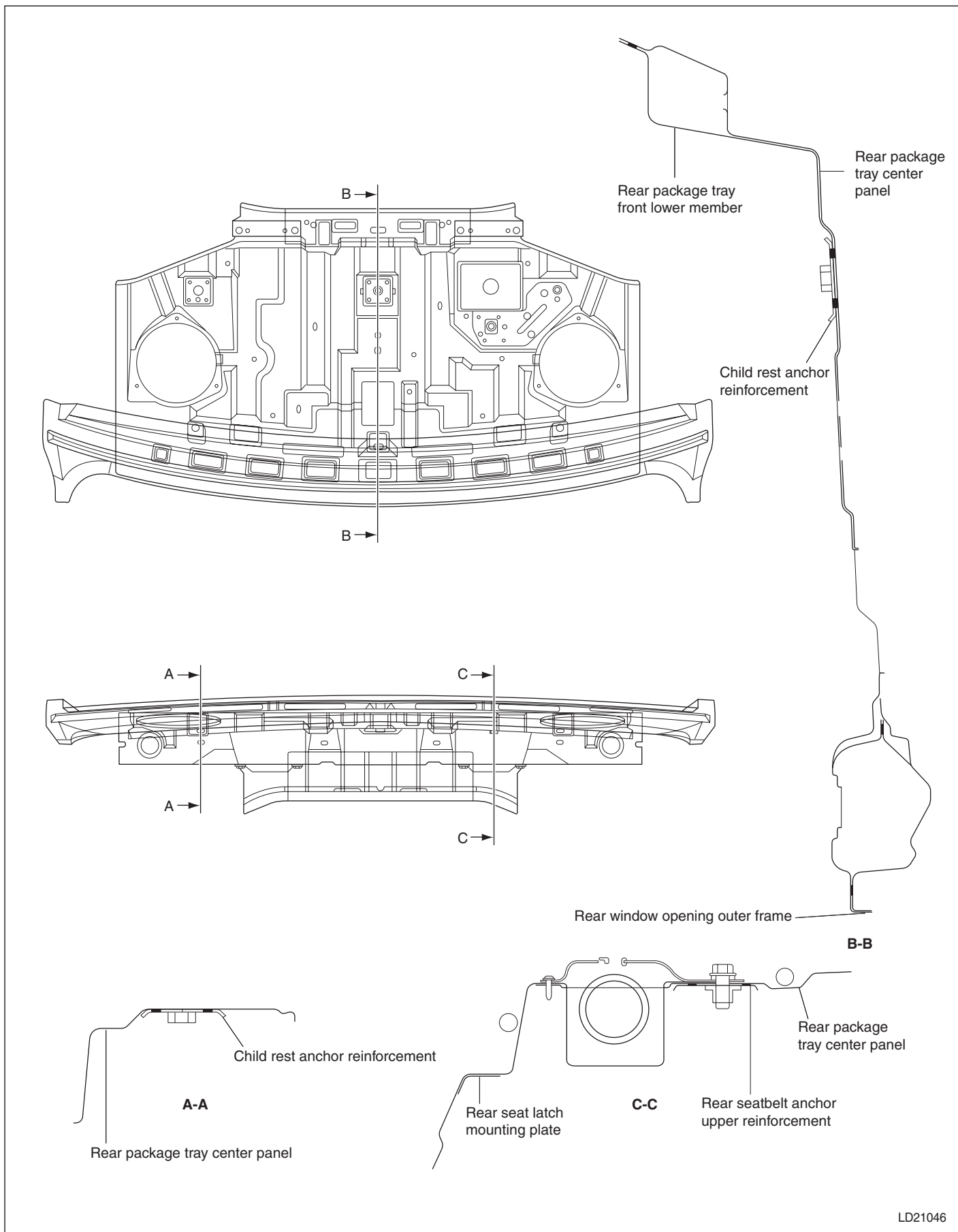


## Rear package tray panel (only 4Door)

### Welding part

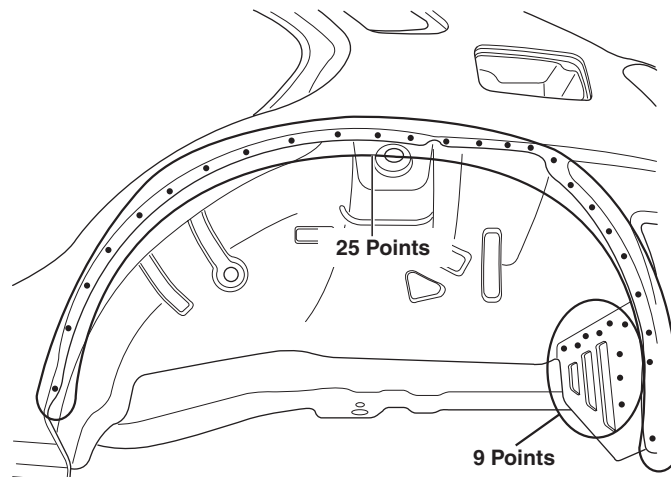
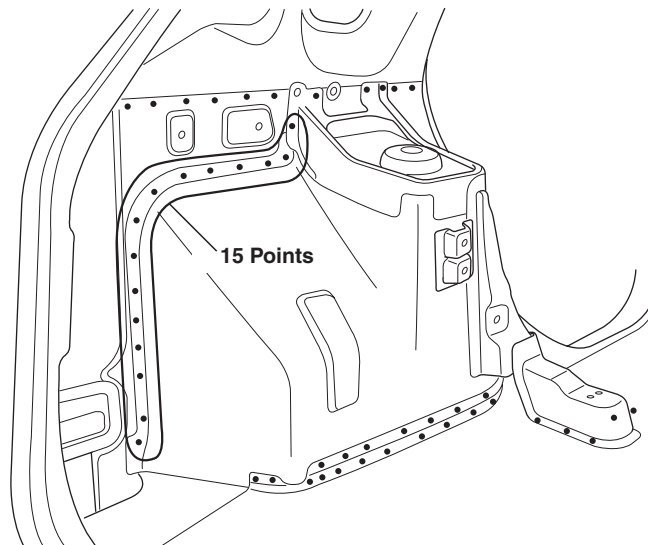
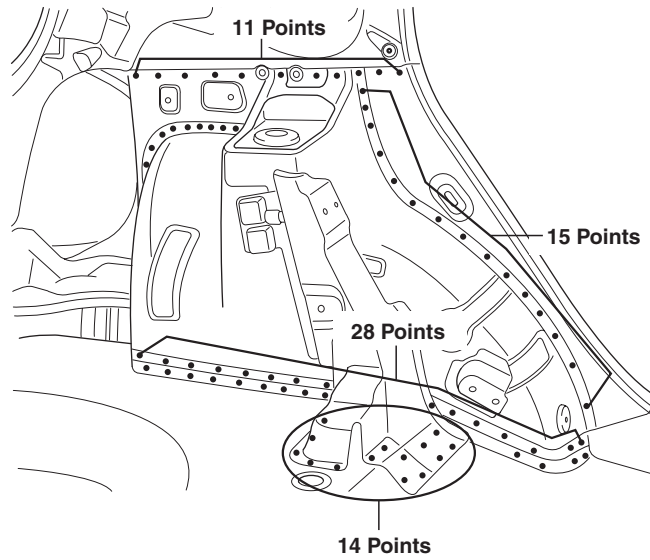


Section

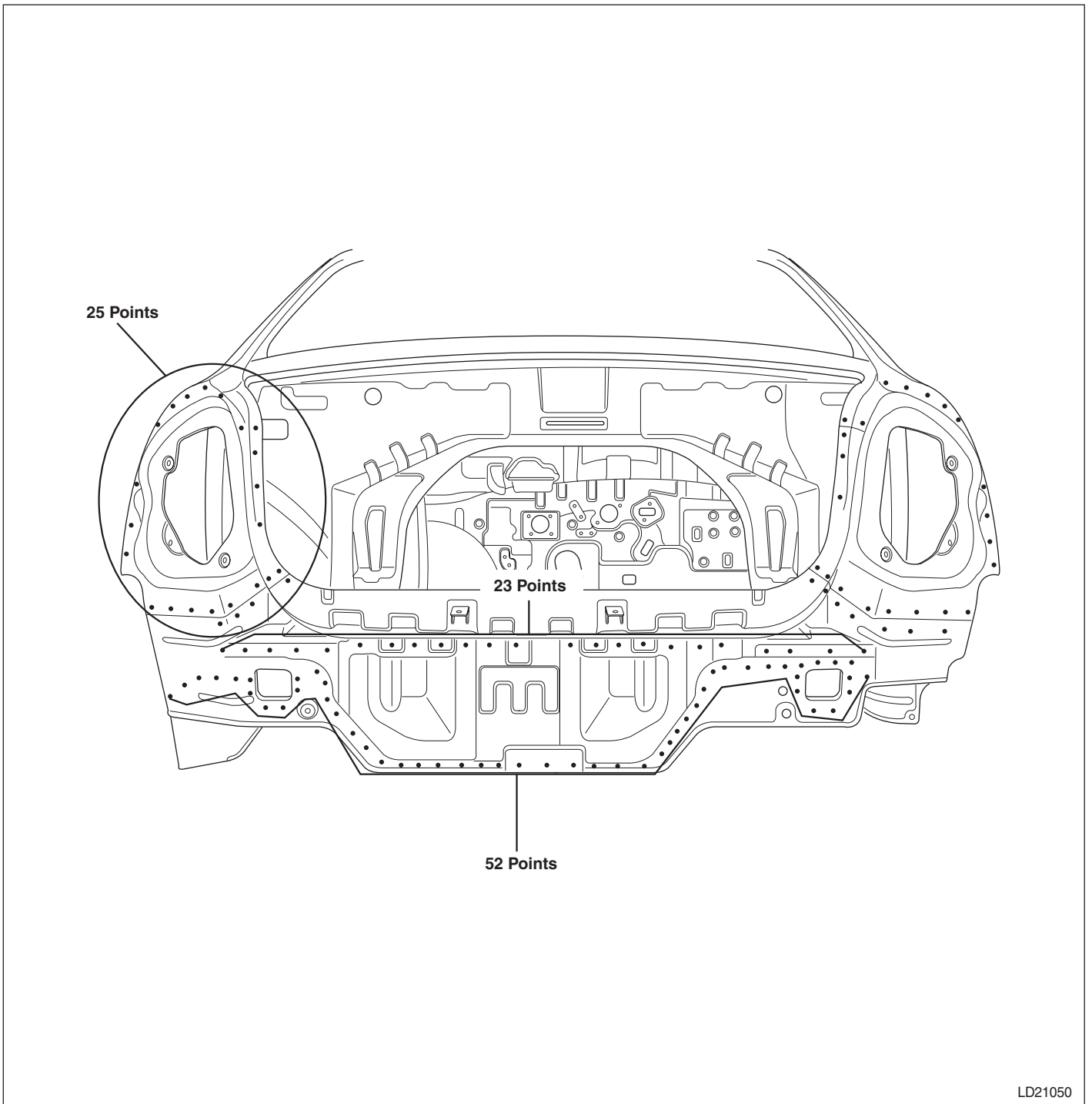


## Wheel house panel assembly

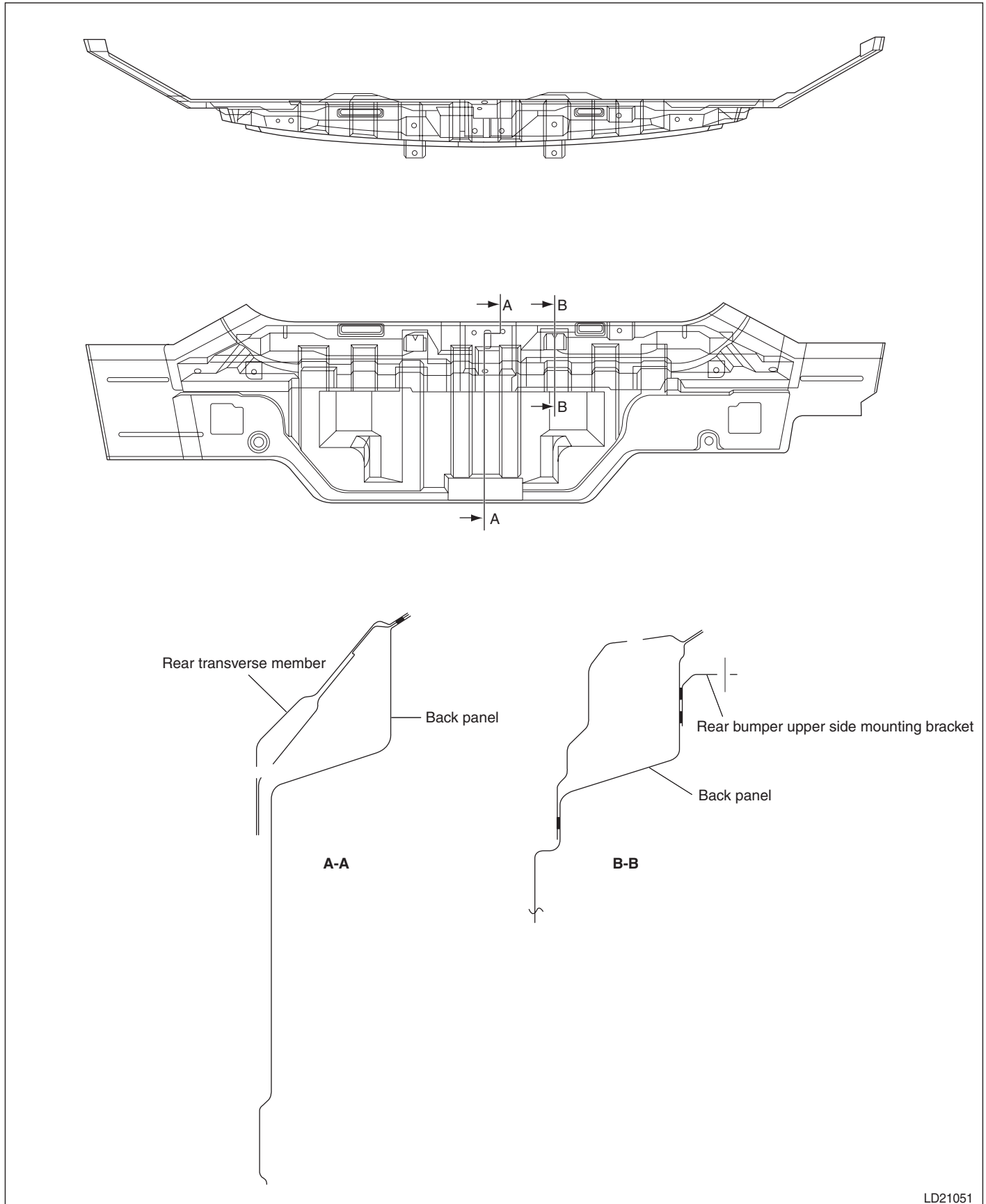
### Welding part



## Back panel assembly (4Door) Welding part



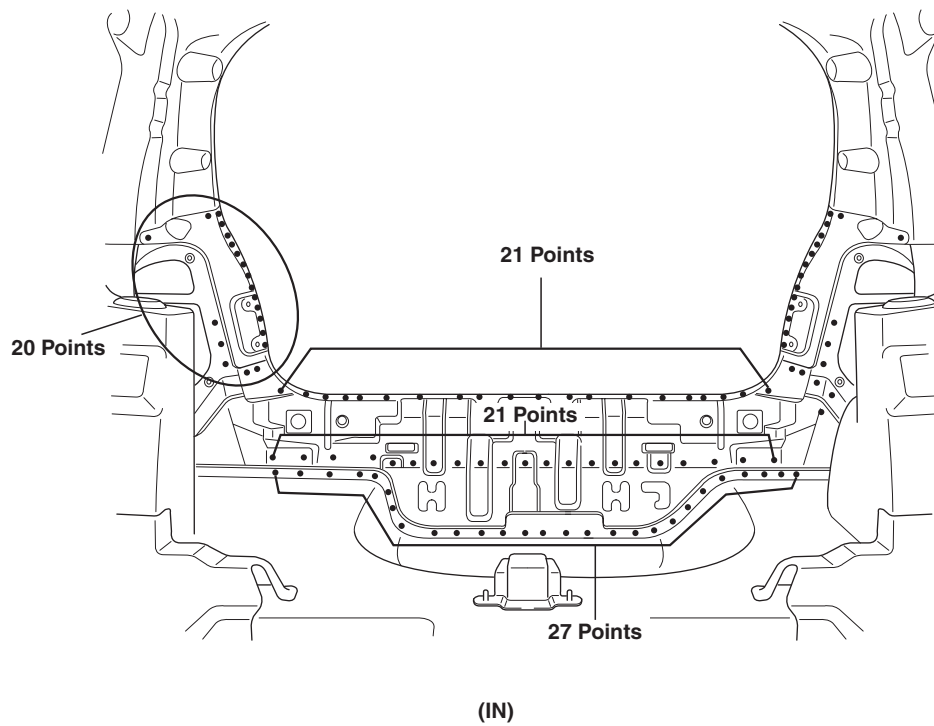
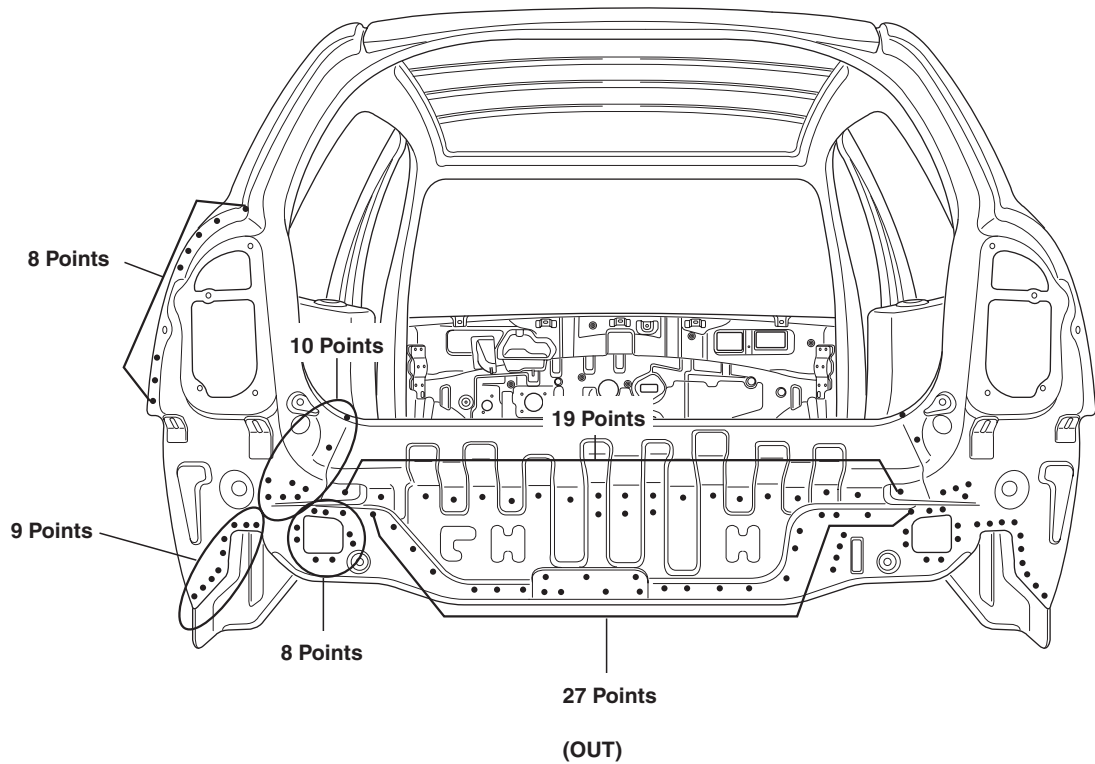
## Section



LD21051

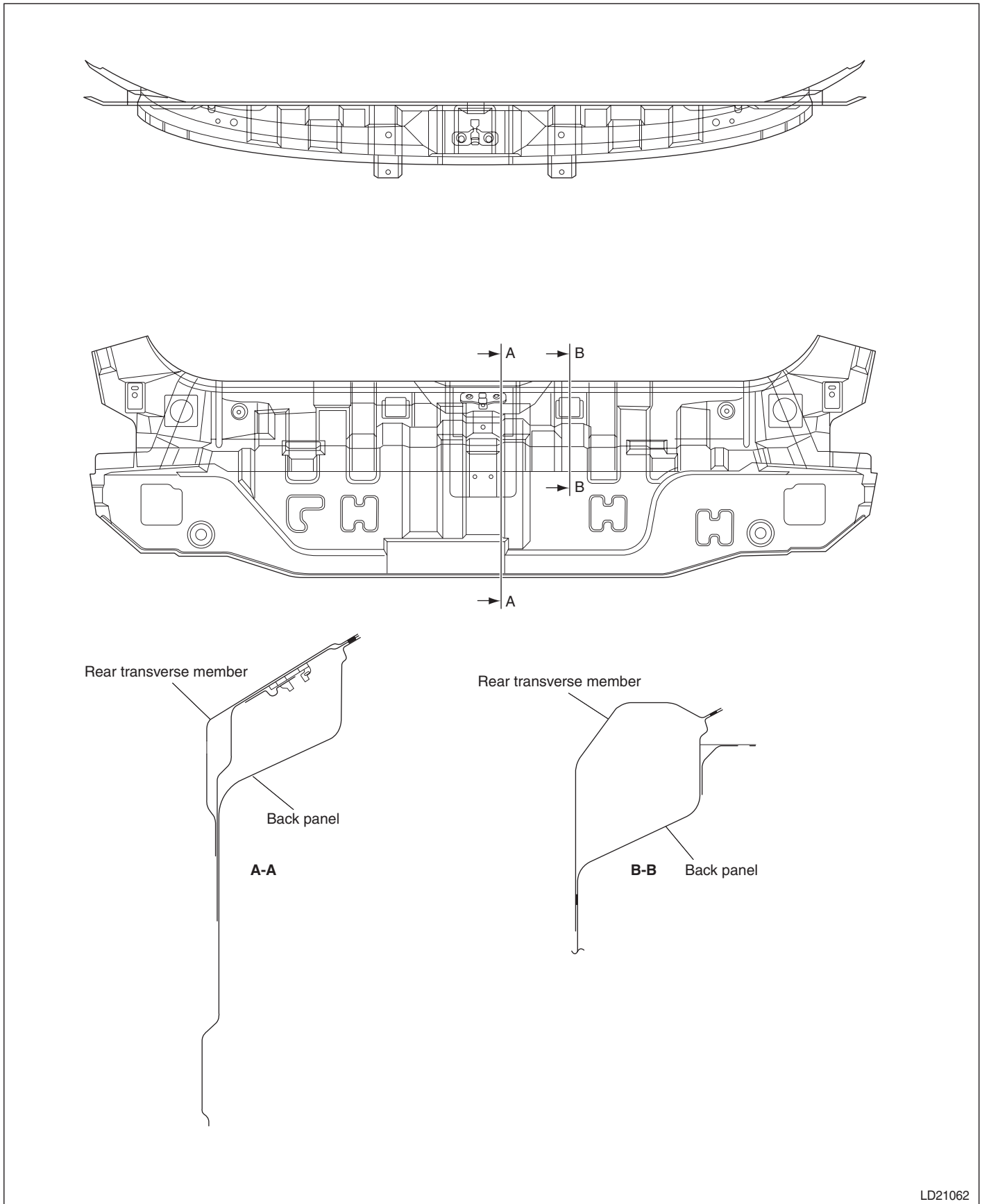
# Back panel assembly (5Door)

## Welding part



21-48 Replacing body panels

Section



LD21062

## Body dimensions

### Body dimensions

<b>Body dimension indications</b> .....	31- 1
Projected dimensions .....	31 - 1
Straight-line dimensions .....	31- 1

### 4Door

<b>Front body</b> .....	31- 2
<b>Side frame</b> .....	31- 4
<b>Interior A</b> .....	31- 6
<b>Interior B</b> .....	31- 8
<b>Interior C</b> .....	31-10
<b>Rear body</b> .....	31-12
<b>Under body</b>	
Projected dimensions .....	31-14
Straight-line dimensions .....	31-16

### 5Door

<b>Front body</b> .....	31-18
<b>Side frame</b> .....	31-20
<b>Interior A</b> .....	31-22
<b>Interior B</b> .....	31-24
<b>Interior C</b> .....	31-26
<b>Rear body</b> .....	31-28
<b>Under body</b>	
Projected dimensions .....	31-30
Straight-line dimensions .....	31-32

## Body dimensions

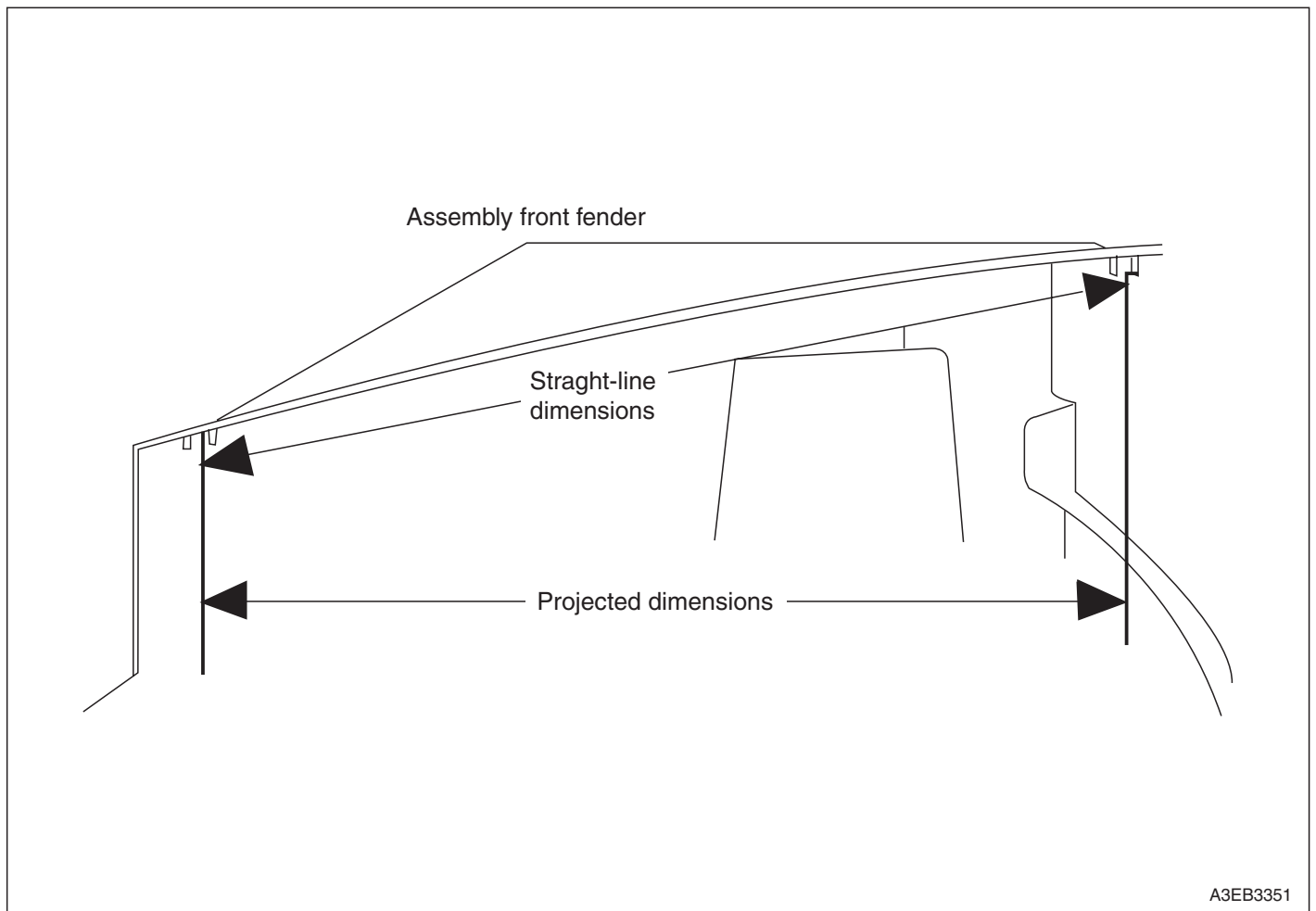
### Body dimension indication

#### Projected dimensions

The projected dimension indicates a dimension from a reference point on the body. (Height may be different in some cases)

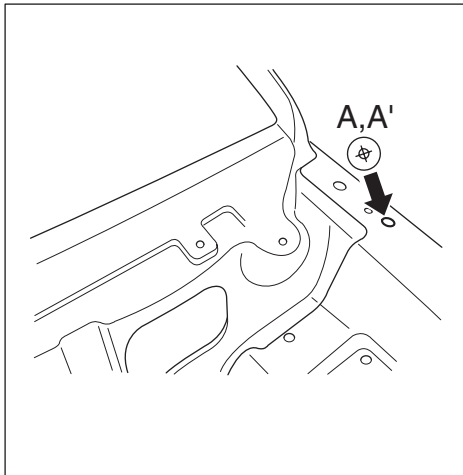
#### Straight-line dimensions (Actual measured dimensions)

The straight-line dimension indicates an actual measured dimension between the measurement reference points.



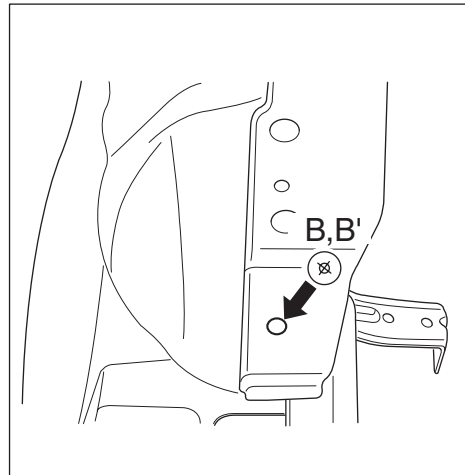
31-2 Body dimensions

Front body straight-line dimensions (4Door)



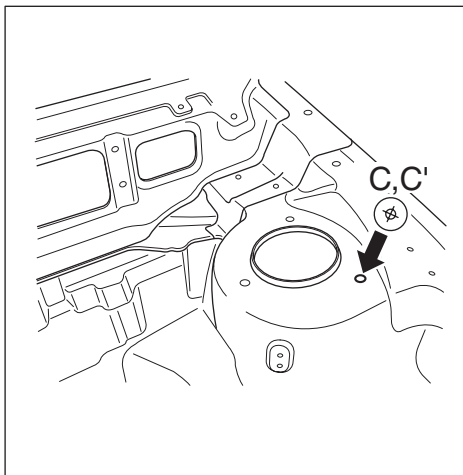
Hood hinge mounting hole

ø12



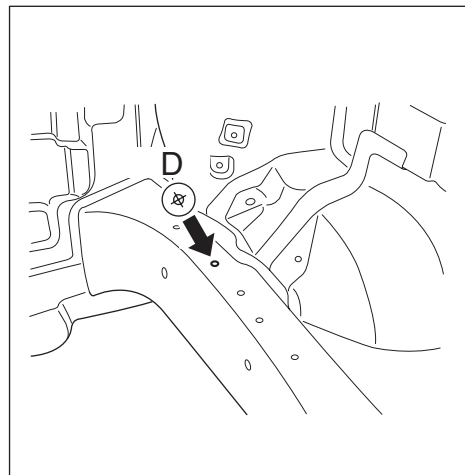
Front fender mounting hole

ø6.6



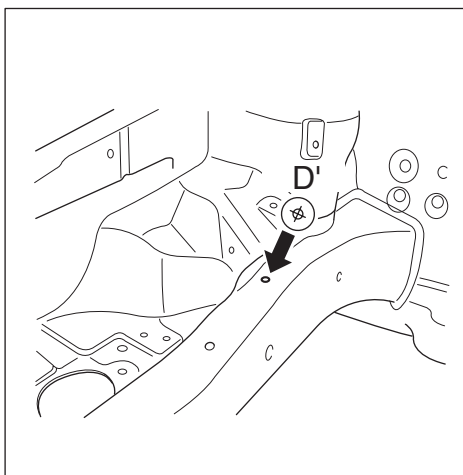
Front suspension mounting hole

ø11



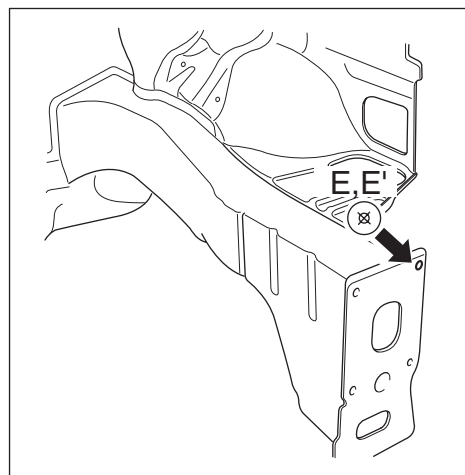
Transmission mounting hole

ø14



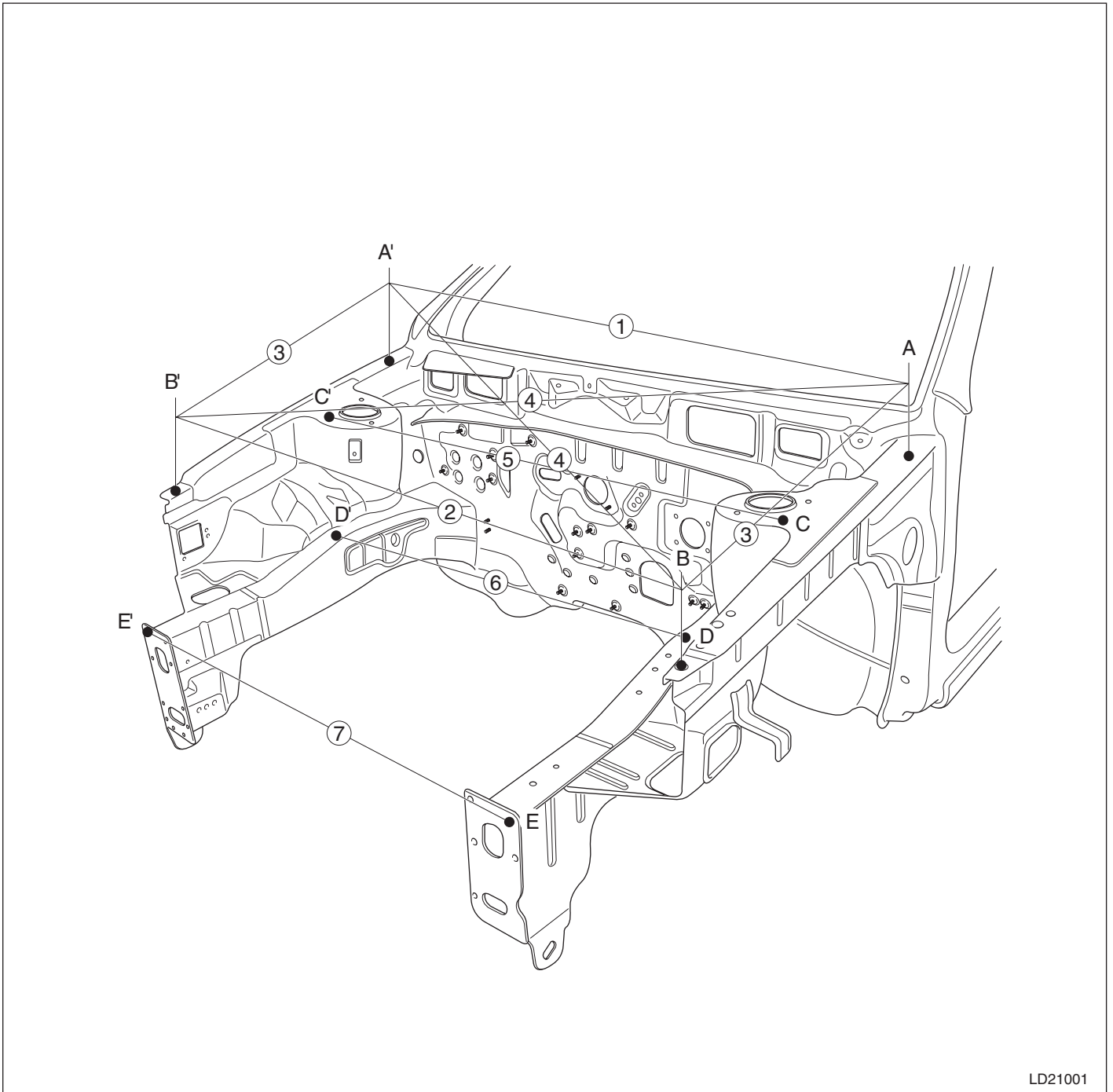
Engine bracket mounting hole

ø16



Carrier mounting hole

ø9

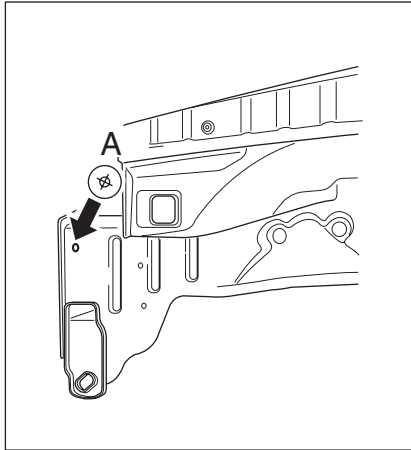


LD21001

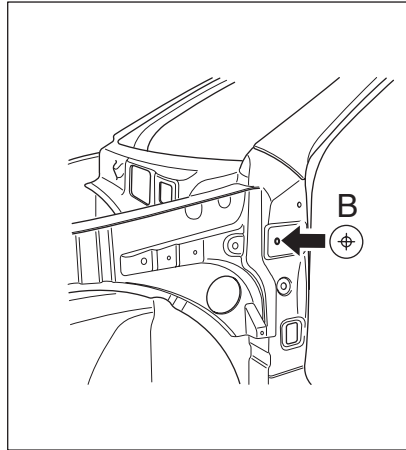
Measurement point	①	②	③	④	⑤	⑥	⑦		
Dimension (mm)	1480	1370	645	1563	1216	984	1064		

31-4 Body dimensions

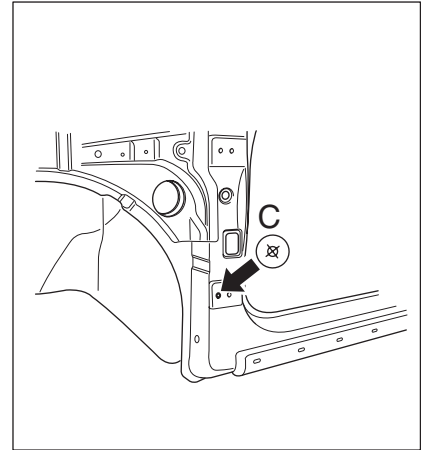
Side body straight-line dimensions (4Door)



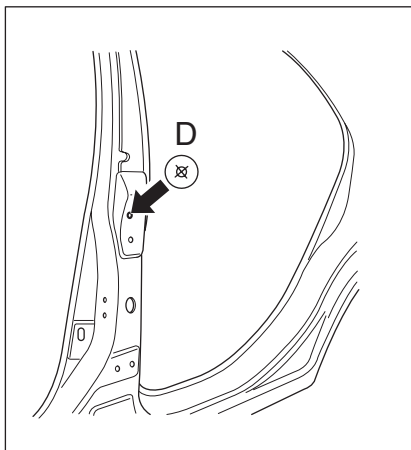
Front side outer member hole  $\varnothing 16$



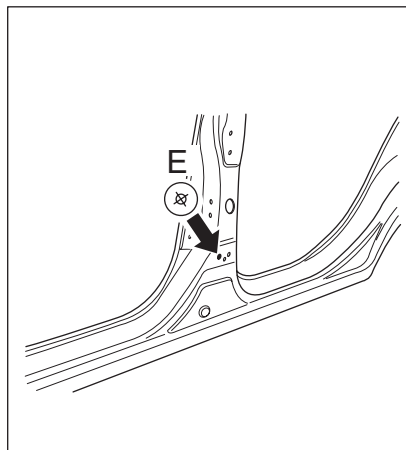
Front door upper hinge mounting hole  $\varnothing 11$



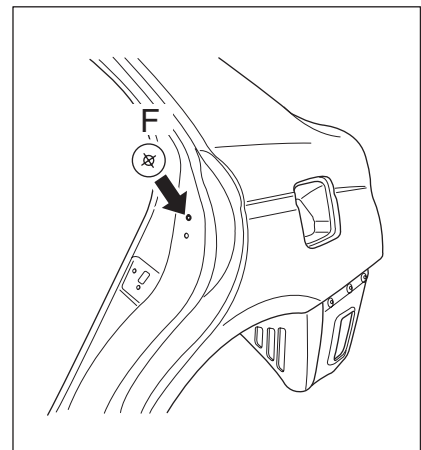
Front door lower hinge mounting hole  $\varnothing 11$



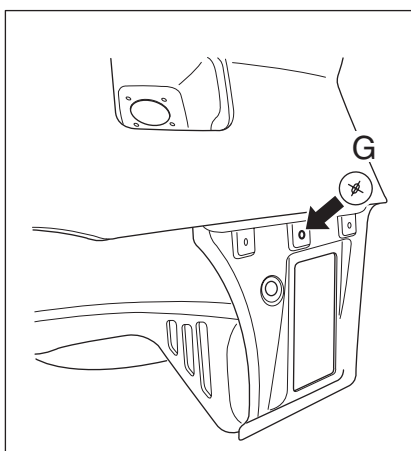
Rear door upper hinge mounting hole  $\varnothing 11$



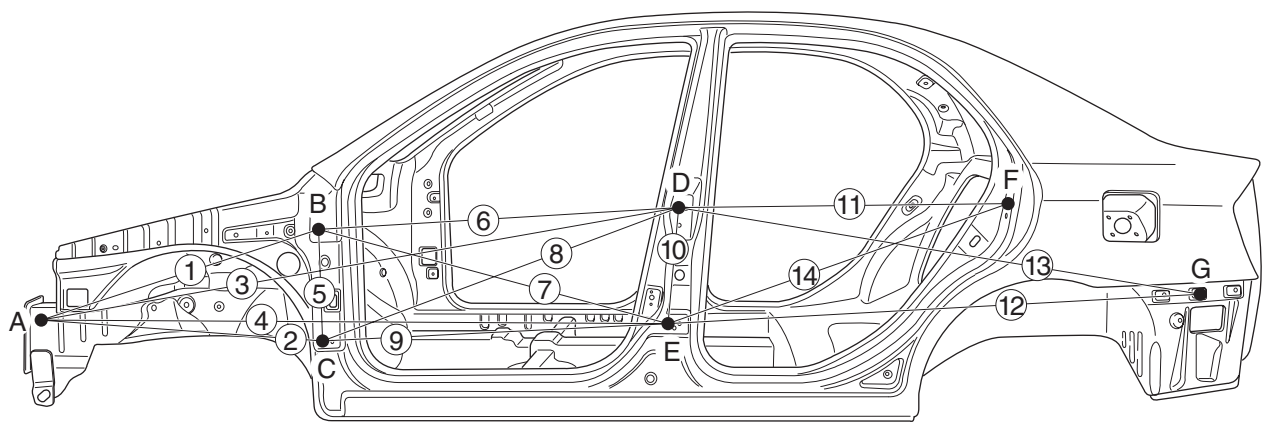
Rear door lower hinge mounting hole  $\varnothing 11$



Rear door striker mounting hole  $\varnothing 11.5$



Rear bumper mounting hole 10x6.5

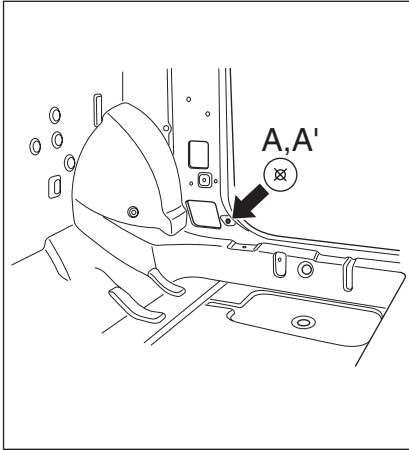


LD21003

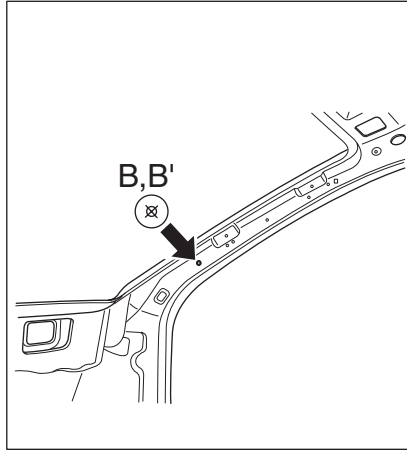
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	1141	1104	2215	2153	336	1101	1104	1168	1066
Measurement point	⑩	⑪	⑫	⑬	⑭				
Dimension (mm)	347	983	1595	1577	1077				

31-6 Body dimensions

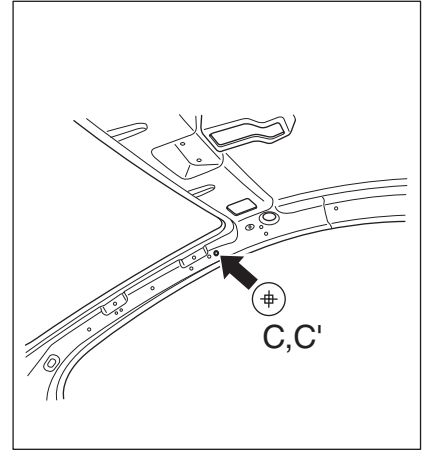
Interior A straight-line dimensions (4Door)



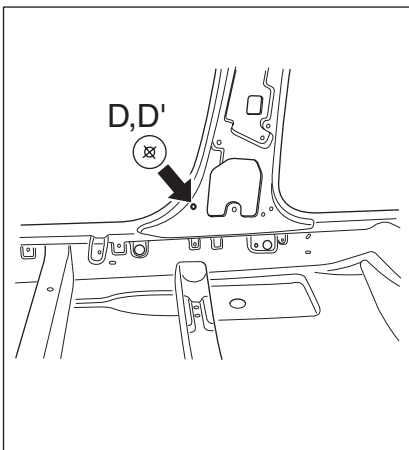
Cowl side lower trim mounting hole  $\varnothing 8.4$



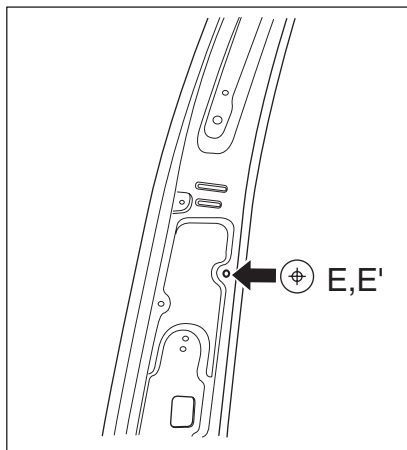
Front pillar trim mounting hole  $\varnothing 8.4$



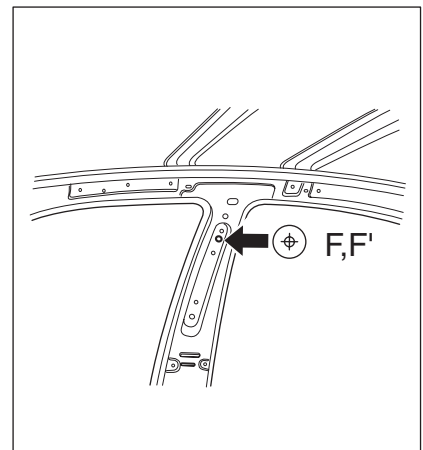
Front pillar trim mounting hole  $\square 8.5 \times 8.5$



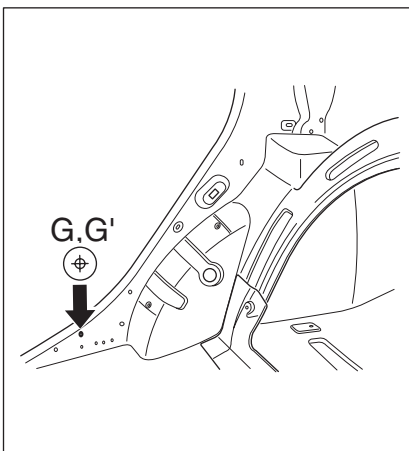
Center pillar lower trim mounting hole  $\varnothing 8.5$



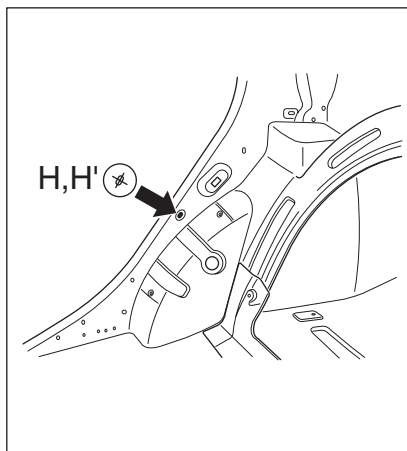
Center pillar upper trim mounting hole  $\varnothing 8.5$



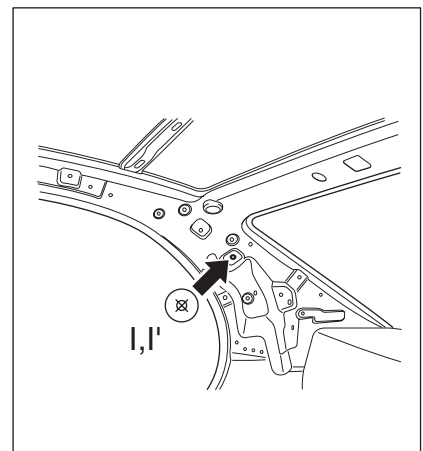
Seat belt adjuster mounting hole  $\varnothing 15$



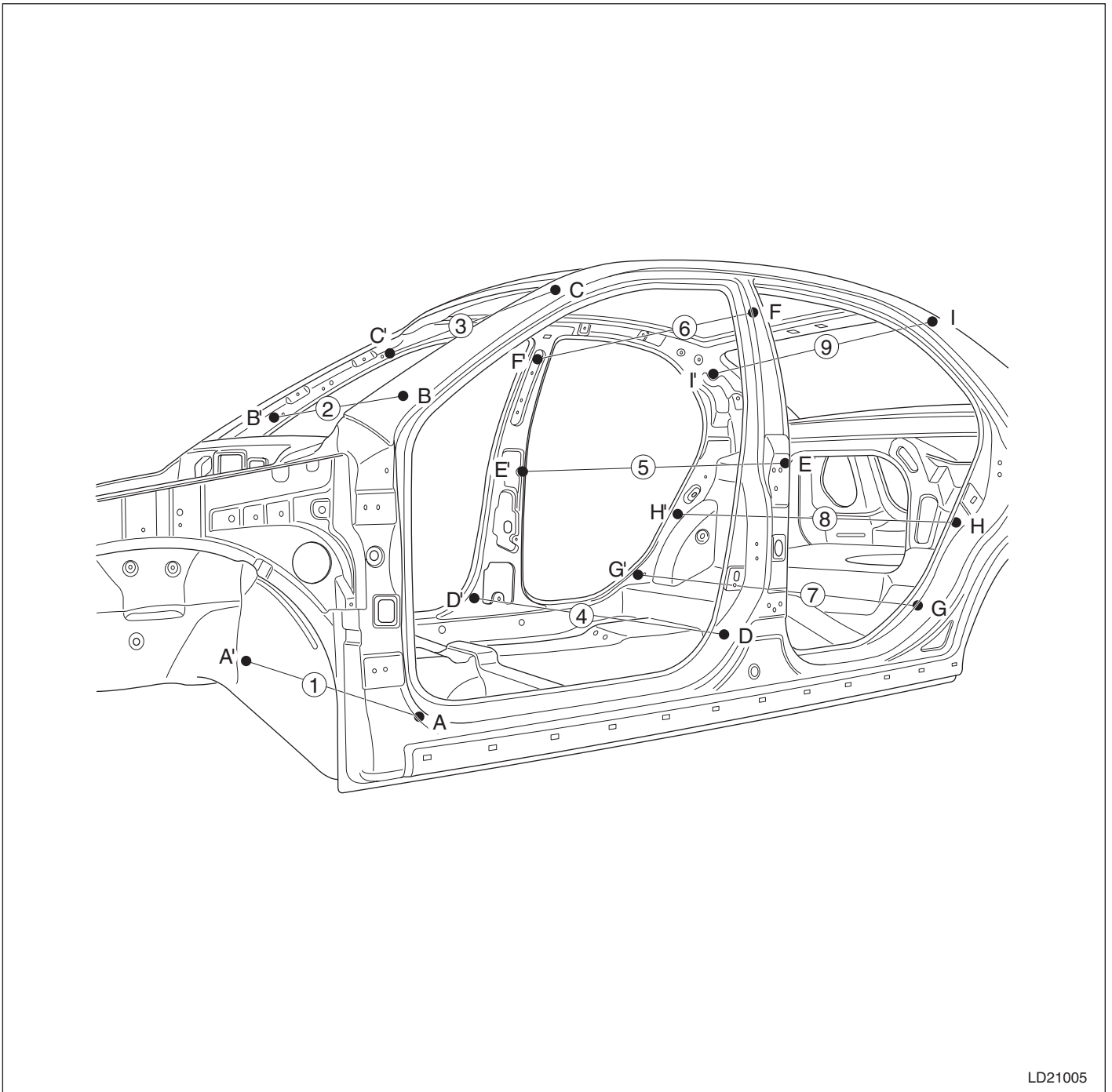
Wheel house inner panel hole  $\varnothing 10$



Wiring mounting hole  $17.3 \times 26$



Rear pillar trim mounting hole  $\varnothing 6.6$

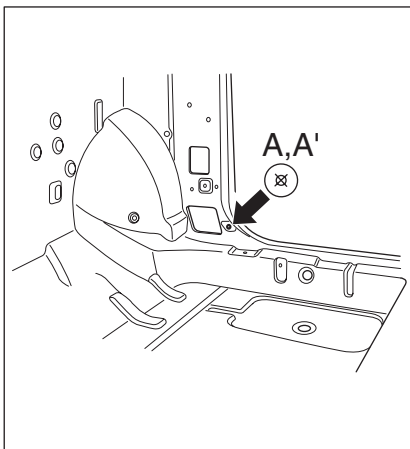


LD21005

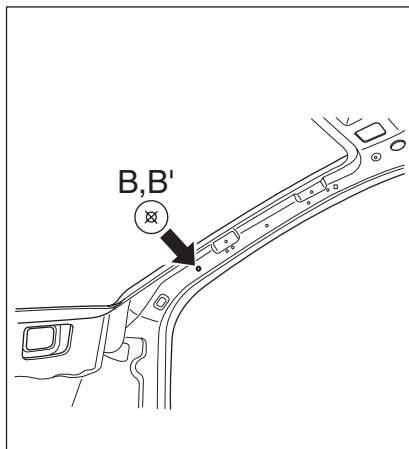
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	1398	1320	1152	1358	1361	1186	1397	1377	1144

31-8 Body dimensions

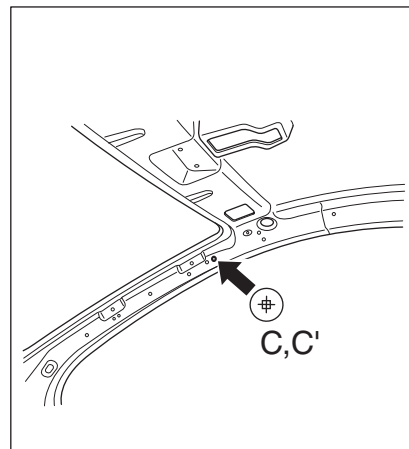
Interior B straight-line dimensions (4Door)



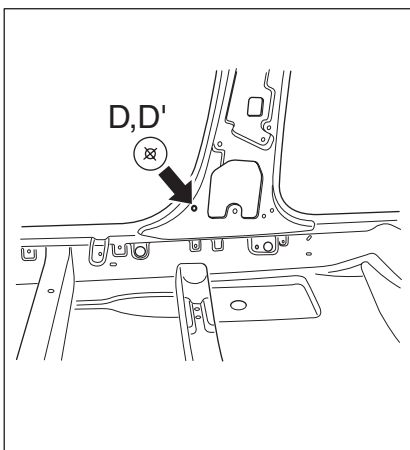
Cowl side lower trim mounting hole  $\varnothing 8.4$



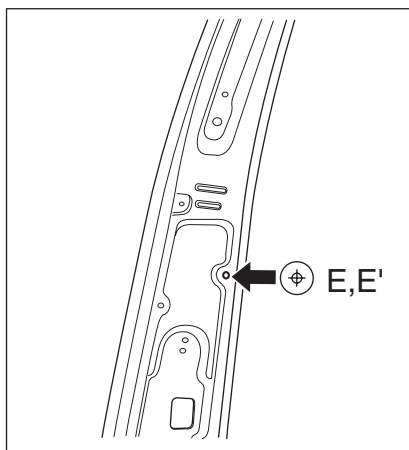
Front pillar trim mounting hole  $\varnothing 8.4$



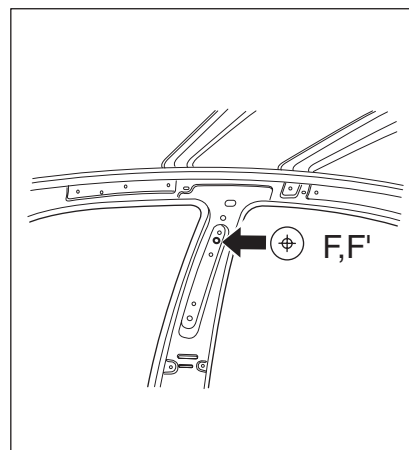
Front pillar trim mounting hole  $\square 8.5 \times 8.5$



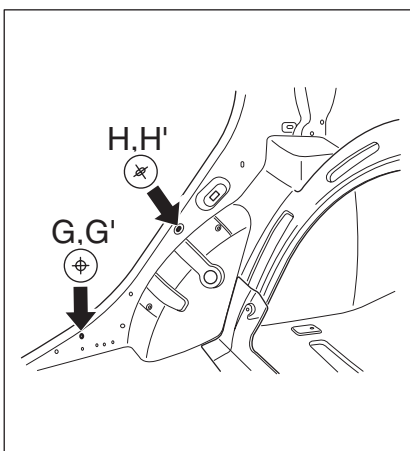
Center pillar lower trim mounting hole  $\varnothing 8.5$



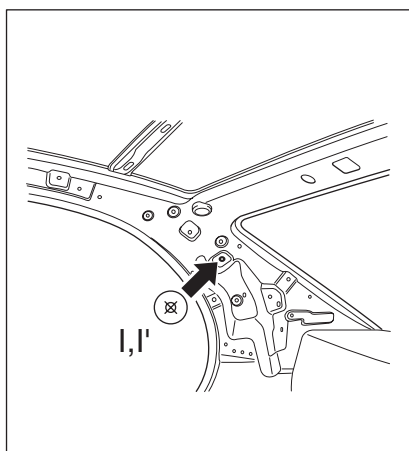
Center pillar upper trim mounting hole  $\varnothing 8.5$



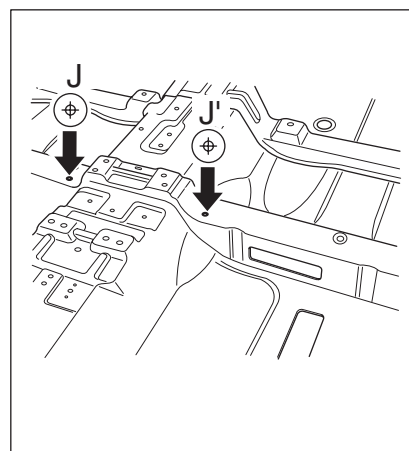
Seat belt adjuster mounting hole  $\varnothing 15$



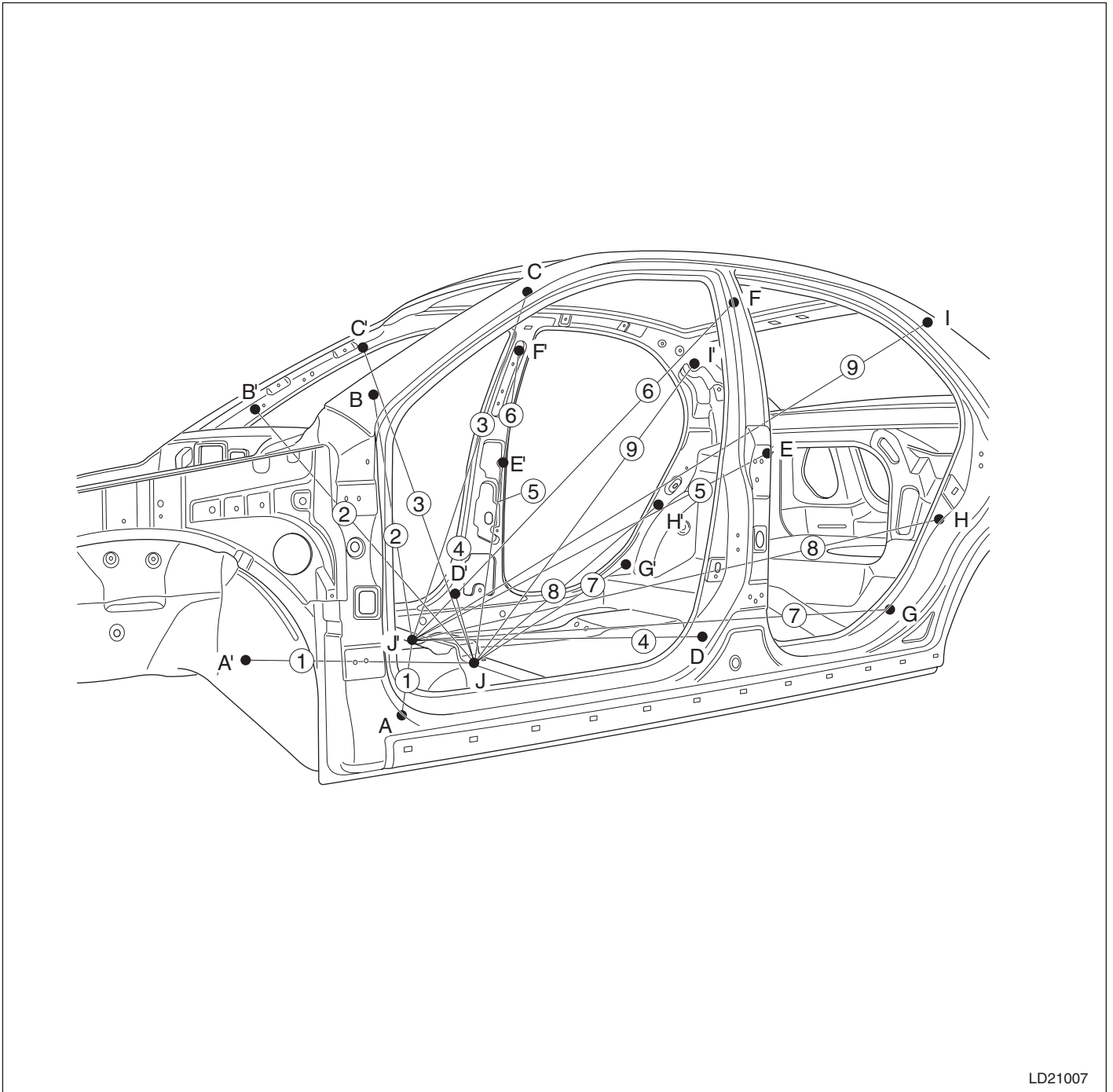
G : Wheel house inner panel hole  $\varnothing 10$   
H : Wiring mounting hole 17.3X26



Rear pillar trim mounting hole  $\varnothing 6.6$



Front seat track mounting hole  $\varnothing 11$

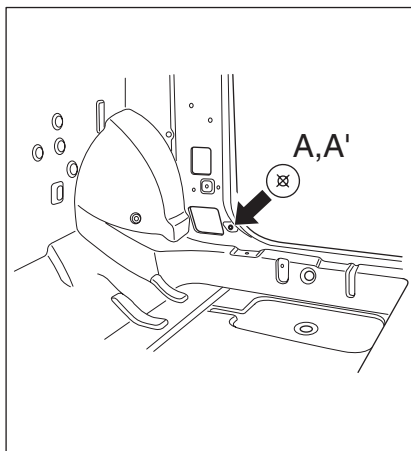


LD21007

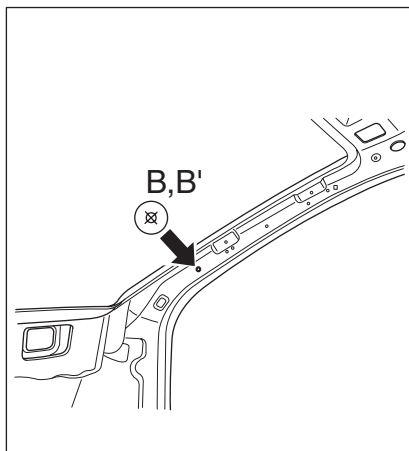
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	975	1171	1203	907	1150	1359	1463	1693	1852

31-10 Body dimensions

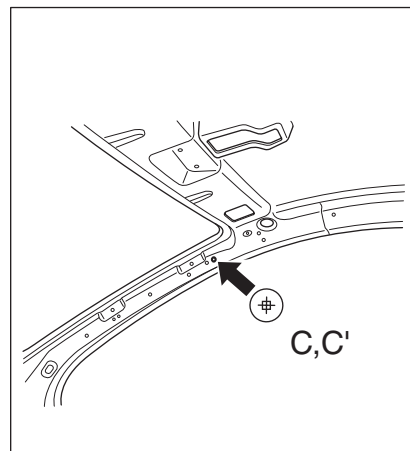
Interior C straight-line dimensions (4Door)



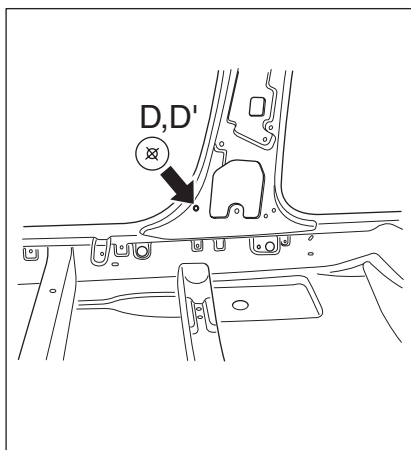
Cowl side lower trim mounting hole  $\varnothing 8.4$



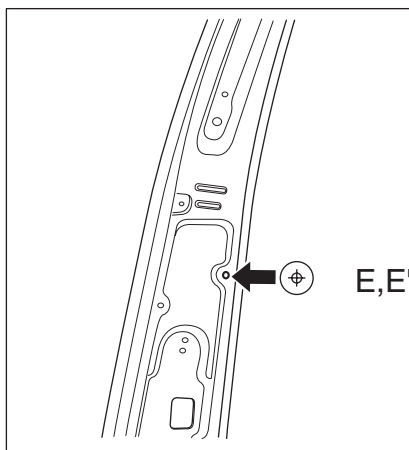
Front pillar trim mounting hole  $\varnothing 8.4$



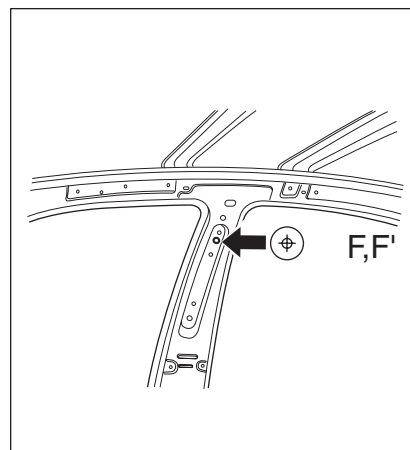
Front pillar trim mounting hole  $\square 8.5 \times 8.5$



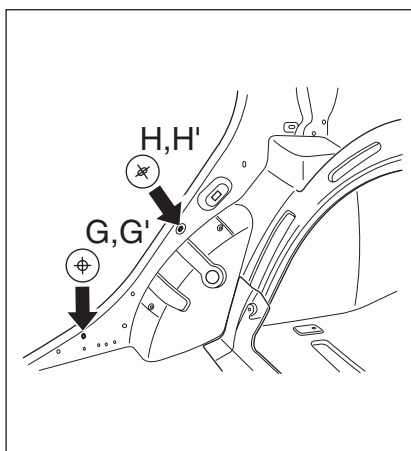
Center pillar lower trim mounting hole  $\varnothing 8.5$



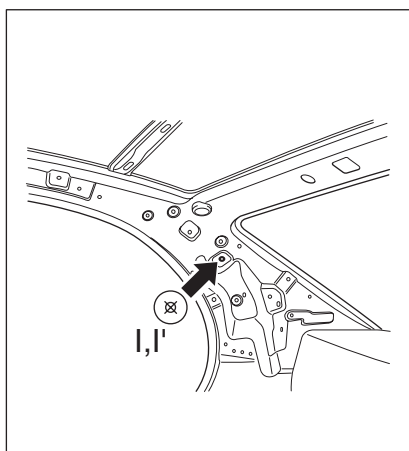
Center pillar upper trim mounting hole  $\varnothing 8.5$



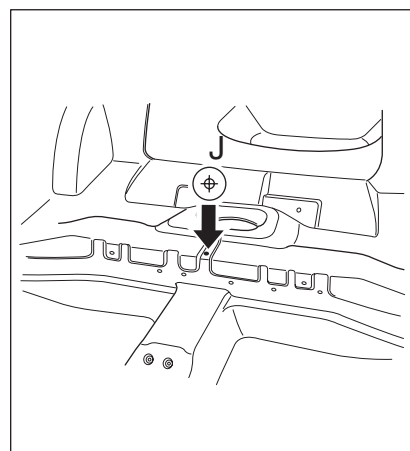
Seat belt adjuster mounting hole  $\varnothing 15$



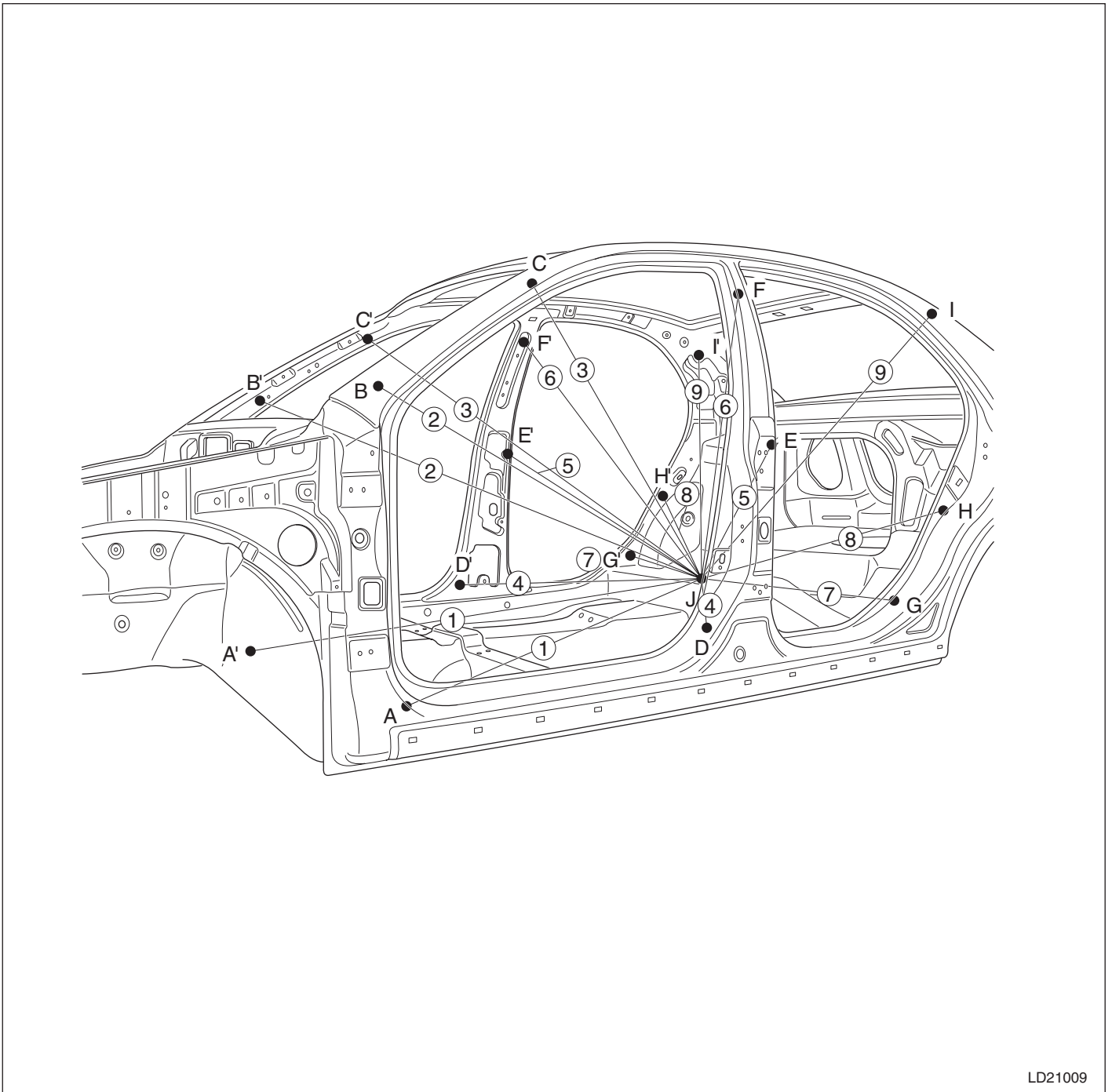
G : Wheel house inner panel hole  $\varnothing 10$   
H : Wiring mounting hole  $17.3 \times 26$



Rear pillar trim mounting hole  $\varnothing 6.6$



Wiring mounting hole  $7 \times 12$

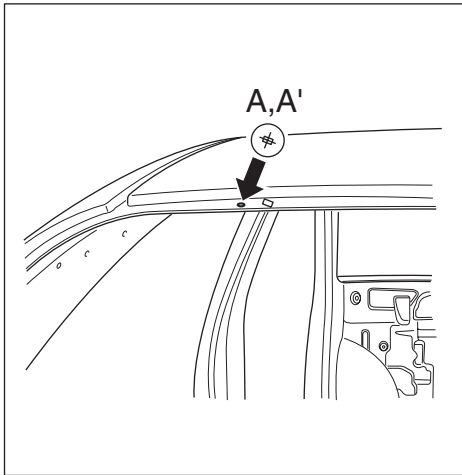


LD21009

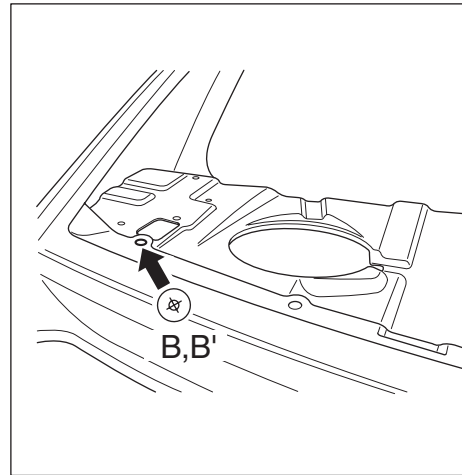
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	1502	1538	1347	839	837	1071	774	942	1154

31-12 Body dimensions

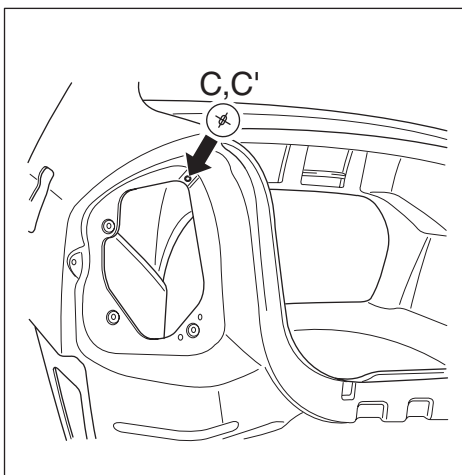
Rear body straight-line dimensions (4Door)



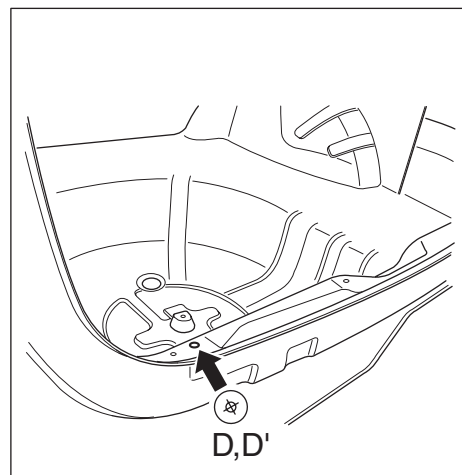
Fixing rear glass mounting hole  $\square$  8X14



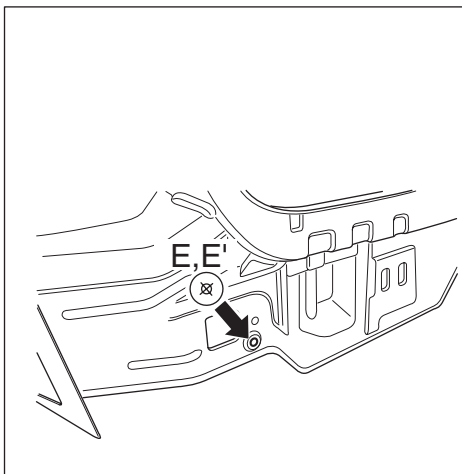
Rear package tray panel hole  $\circ$  12



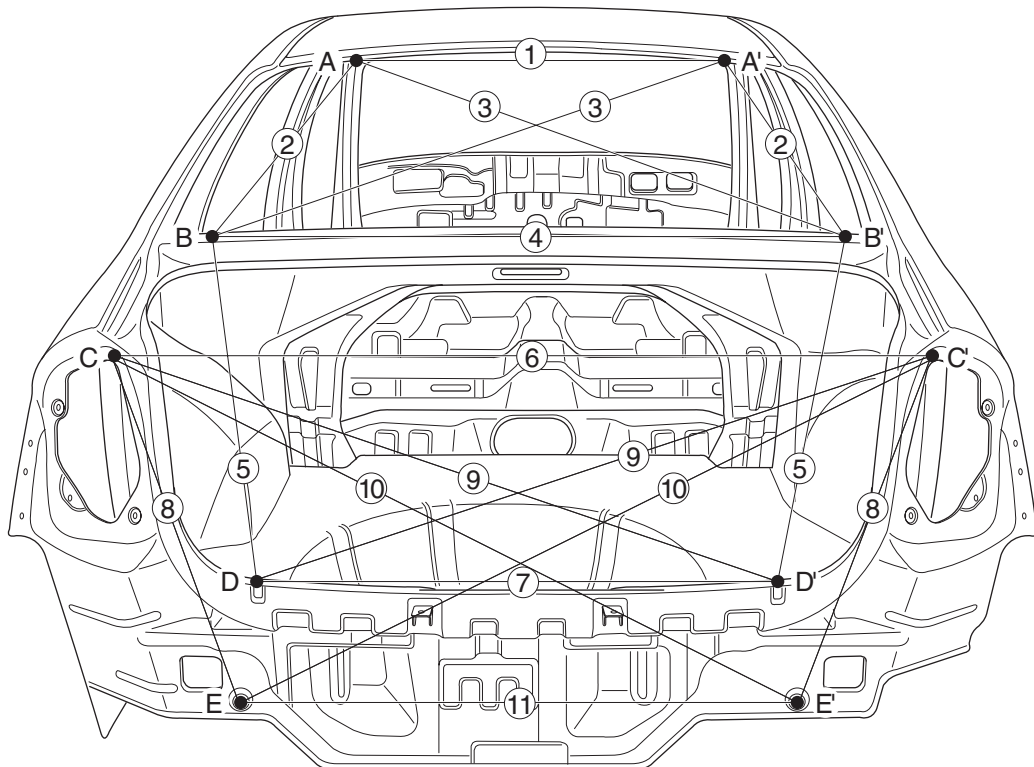
Rear combination lamp mounting hole 5.2X7



Transverse trim mounting hole  $\circ$  8.5



Rear end panel hole  $\circ$  16



LD21011

Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	700	584	904	680	595	1202	720	549	1015
Measurement point	⑩	⑪							
Dimension (mm)	1141	832							

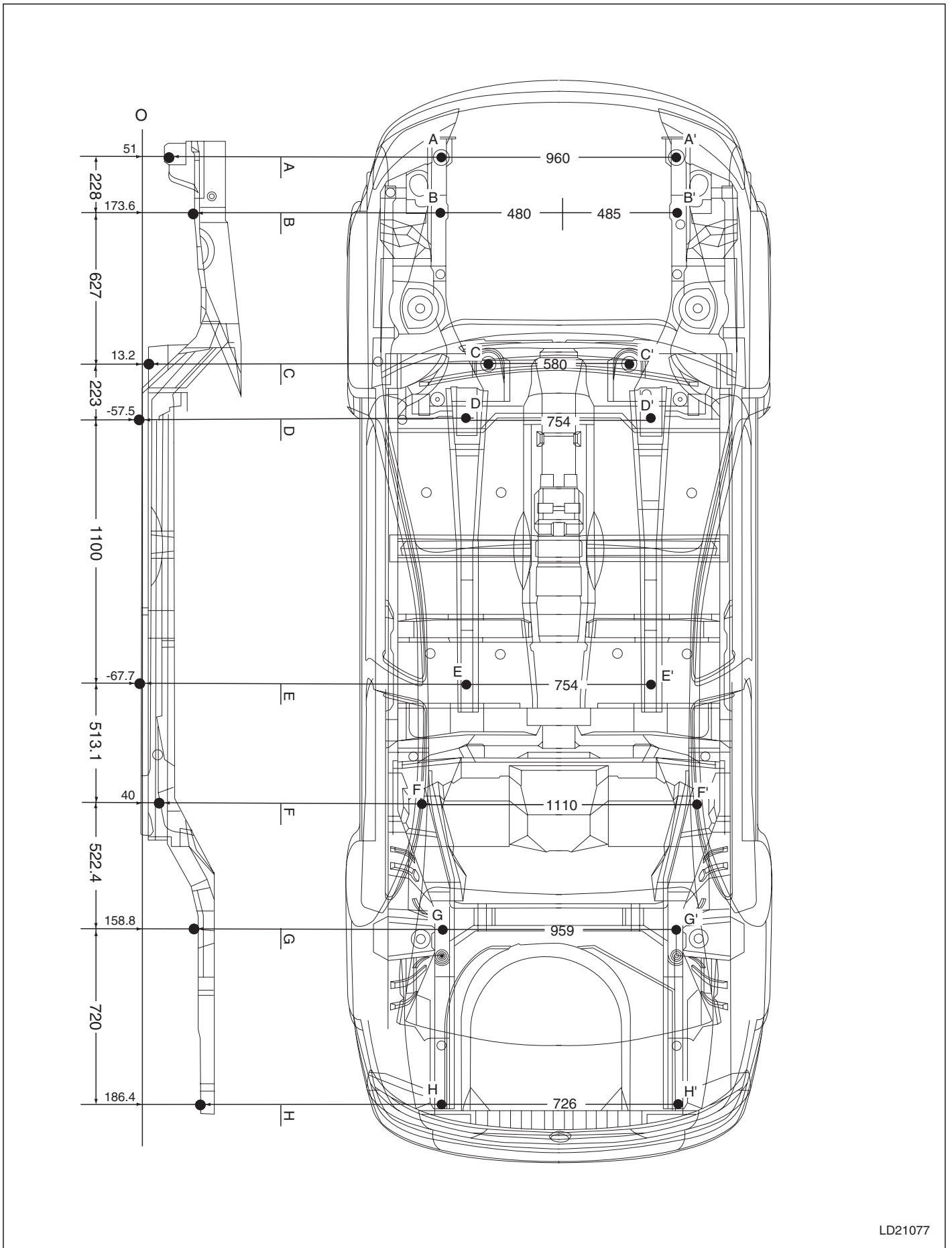
31-14 Body dimensions

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**Under body dimensions (4Door)**

**Projected dimensions**

Measurement point	Description	Hole size
A	Front side inner member mounting hole	ø24
B	Front side inner member hole	ø25
C	Sub frame rear mounting hole	ø20
D	Front side rear lower member hole	ø25
E	Rear floor side member hole	ø27
F	Rear floor side member trailing arm mounting hole	ø13
G	Rear center member hole	ø14
H	Rear bumper mounting hole	ø17

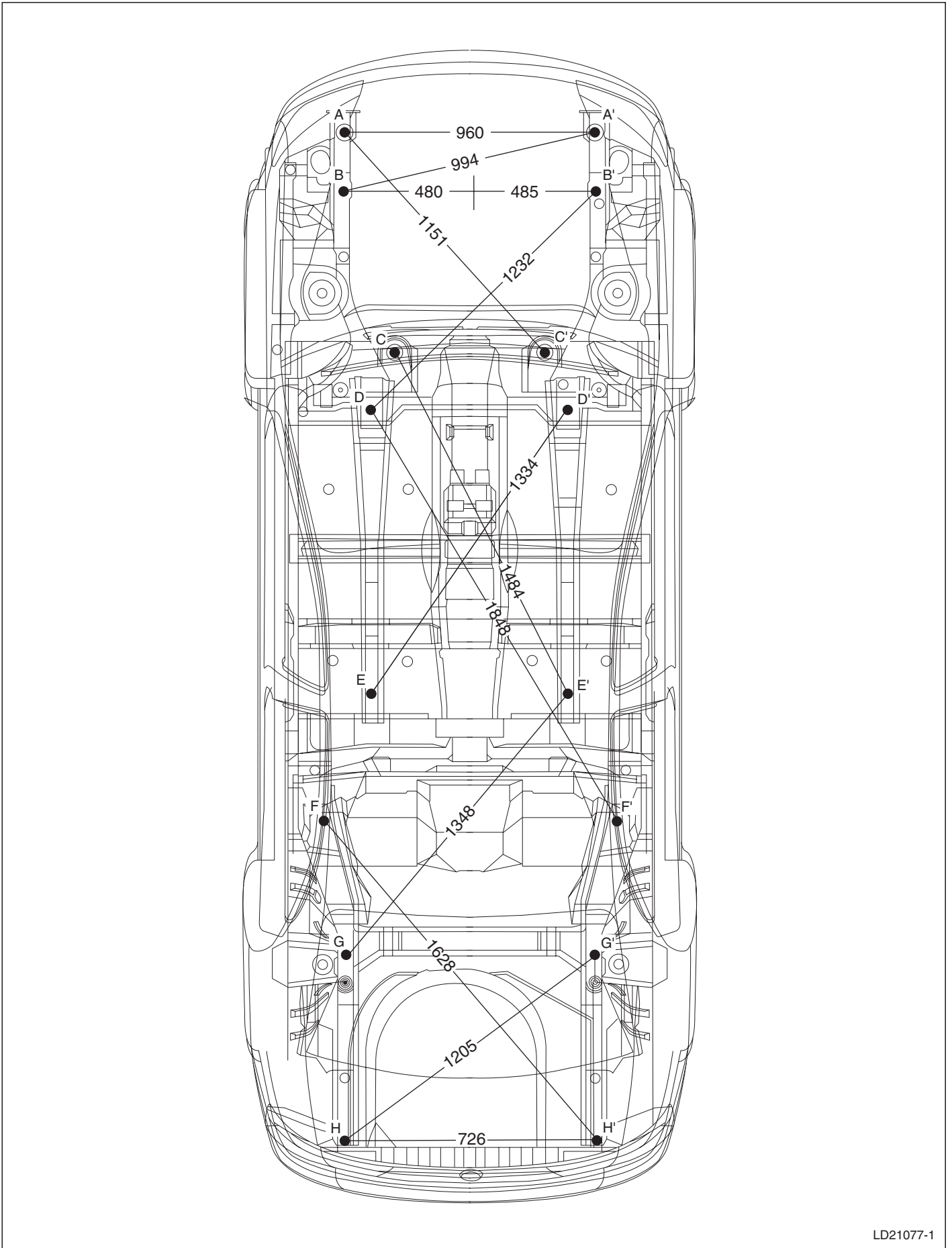


**31-16 Body dimensions**

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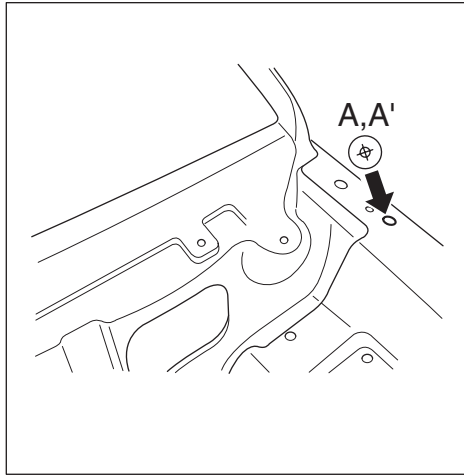
**Straight-line dimensions (4Door)**

Measurement point	Description	Hole size
A	Front side inner member mounting hole	ø24
B	Front side inner member hole	ø25
C	Sub frame rear mounting hole	ø20
D	Front side rear lower member hole	ø25
E	Rear floor side member hole	ø27
F	Rear floor side member trailing arm mounting hole	ø13
G	Rear center member hole	ø14
H	Rear bumper mounting hole	ø17



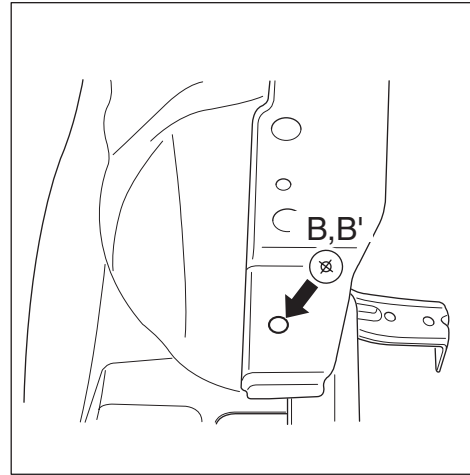
31-18 Body dimensions

Front body straight-line dimensions (5Door)



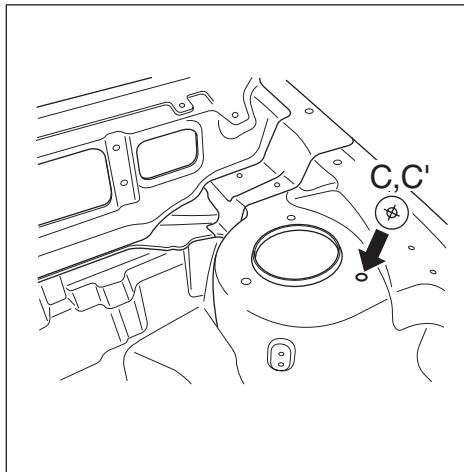
Hood hinge mounting hole

ø12



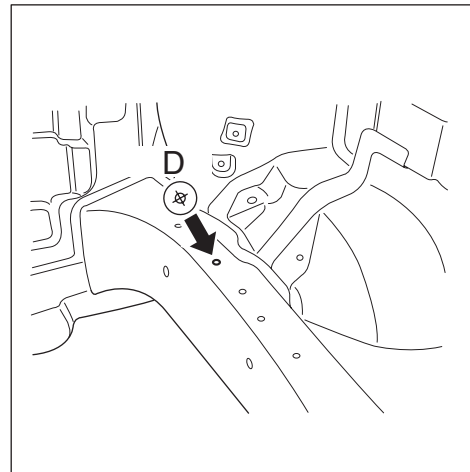
Front fender mounting hole

ø6.6



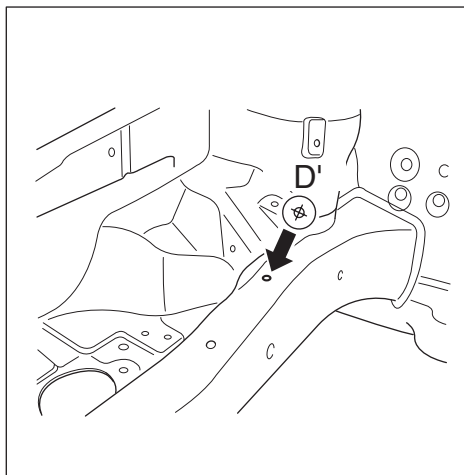
Front suspension mounting hole

ø11



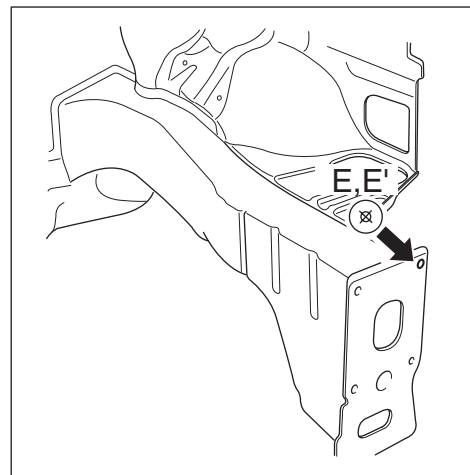
Transmission mounting hole

ø14



Engine bracket mounting hole

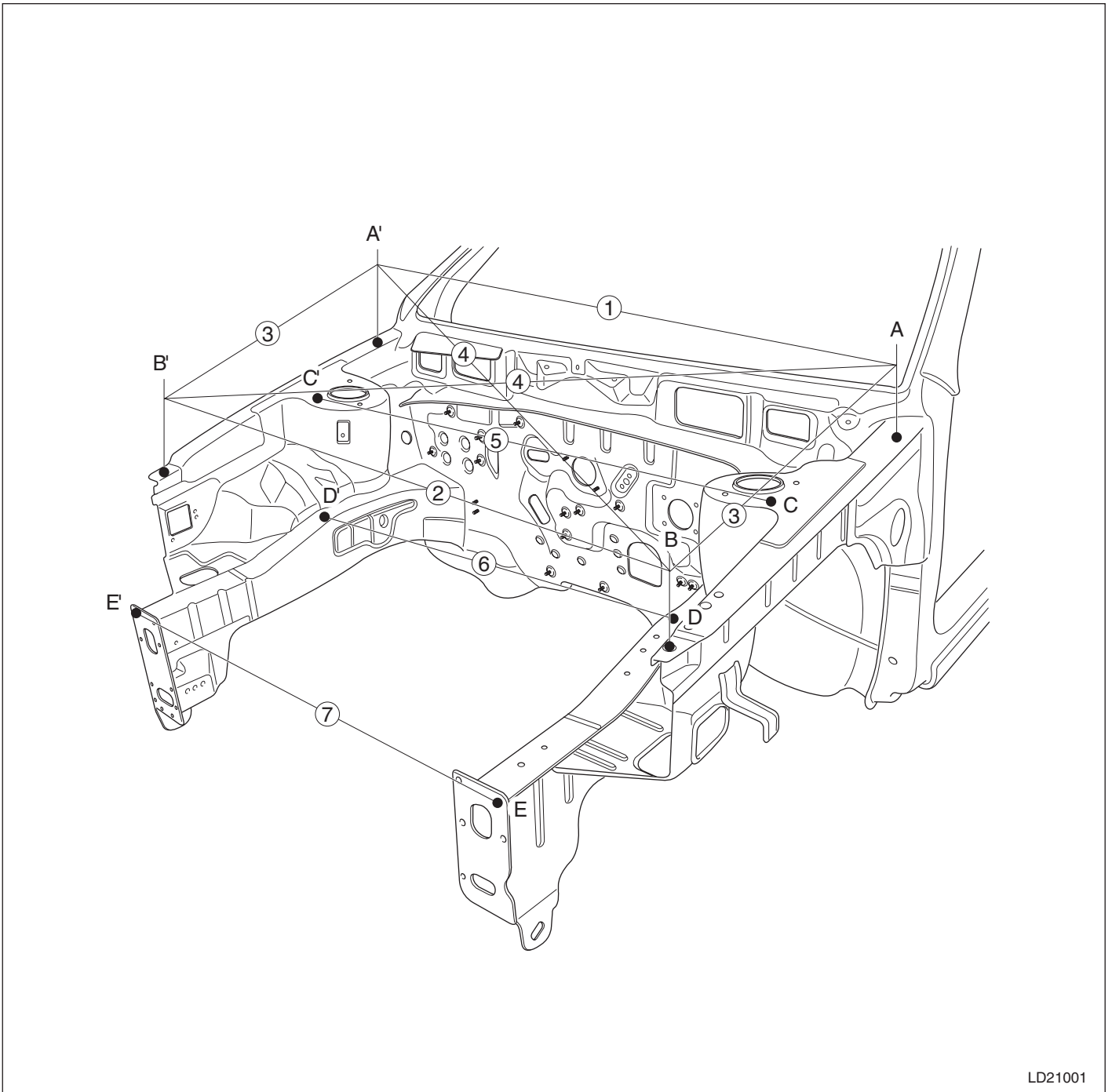
ø16



Carrier mounting hole

ø9

LD21002

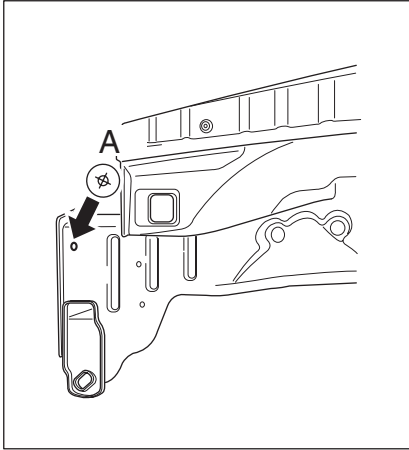


LD21001

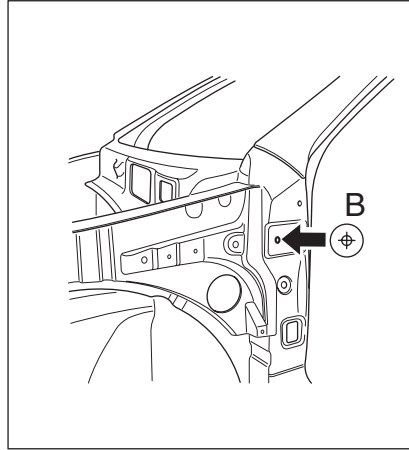
Measurement point	①	②	③	④	⑤	⑥	⑦		
Dimension (mm)	1480	1370	645	1563	1216	984	1064		

31-20 Body dimensions

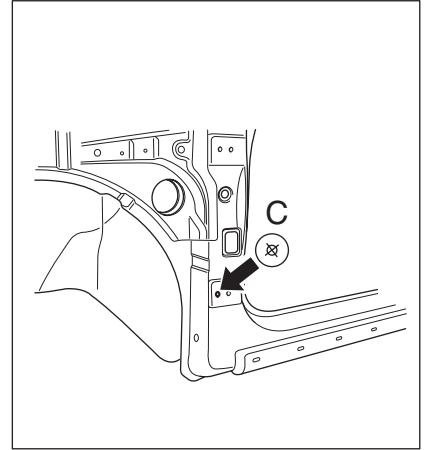
Side body straight-line dimensions (5Door)



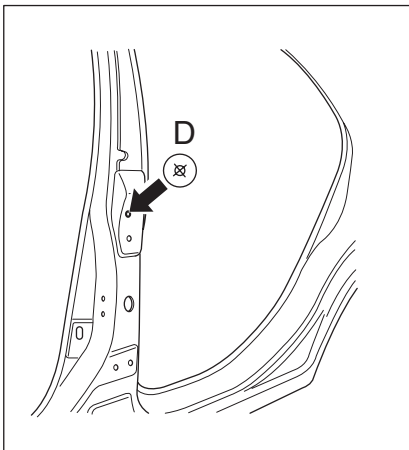
Front side outer member hole       $\varnothing 16$



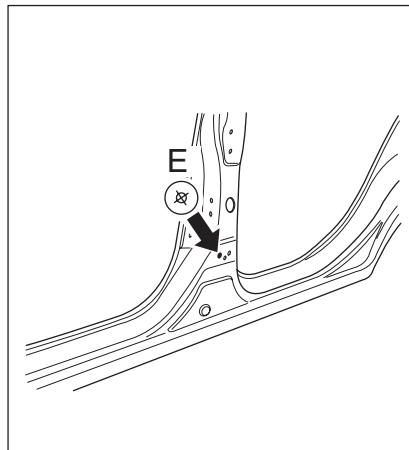
Front door upper hinge mounting hole       $\varnothing 11$



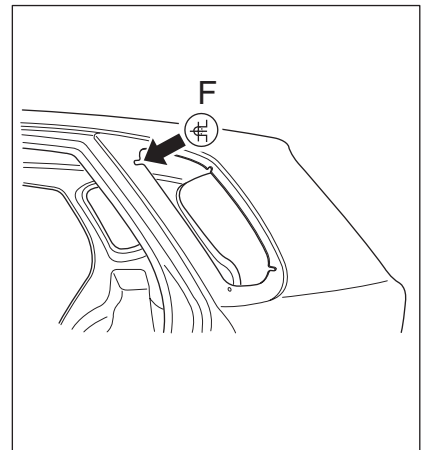
Front door lower hinge mounting hole       $\varnothing 11$



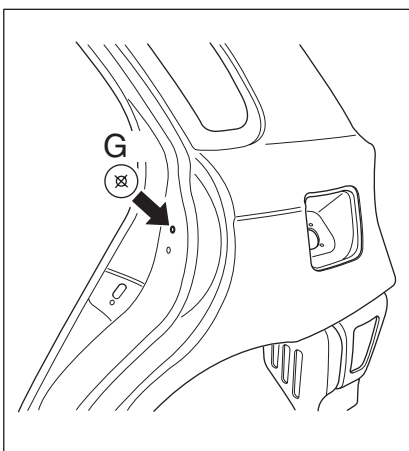
Rear door upper hinge mounting hole       $\varnothing 11$



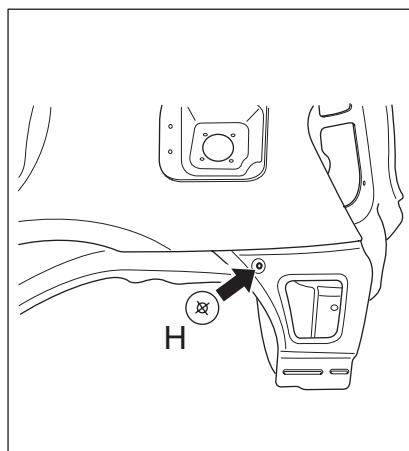
Rear door lower hinge mounting hole       $\varnothing 11$



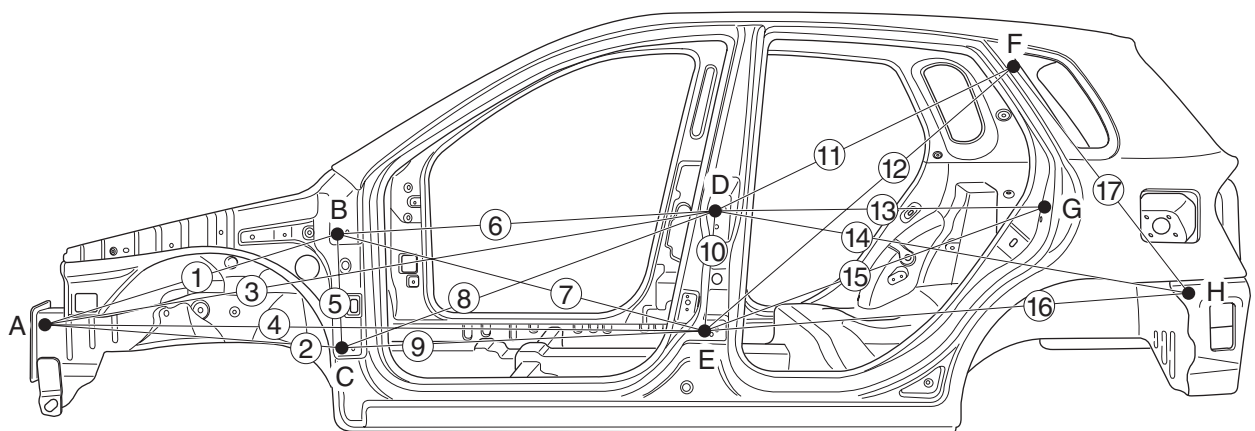
Quarter glass stopper hole       $\varnothing 6.2$



Rear door striker mounting hole       $\varnothing 11.5$



Rear bumper mounting hole       $\varnothing 10$

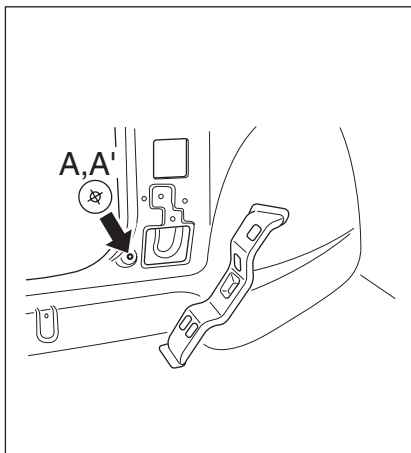


LD21013

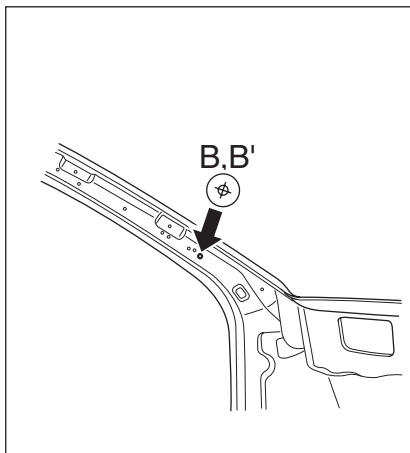
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	1141	1104	2215	2153	336	1101	1104	1168	1066
Measurement point	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	
Dimension (mm)	347	1043	1264	983	1441	1077	1456	903	

31-22 Body dimensions

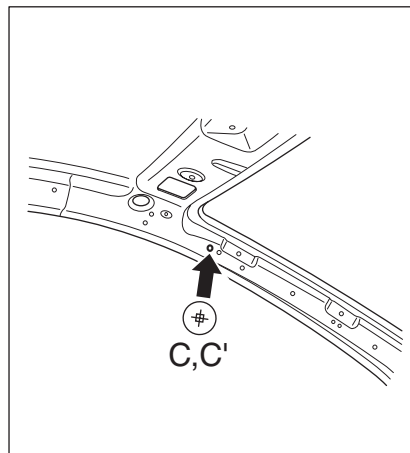
Interior A straight-line dimensions (5Door)



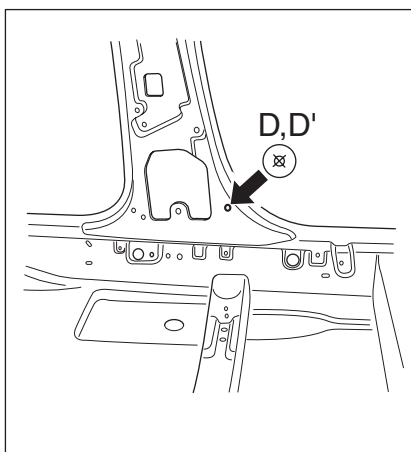
Cowl side lower trim mounting hole  $\varnothing 8.4$



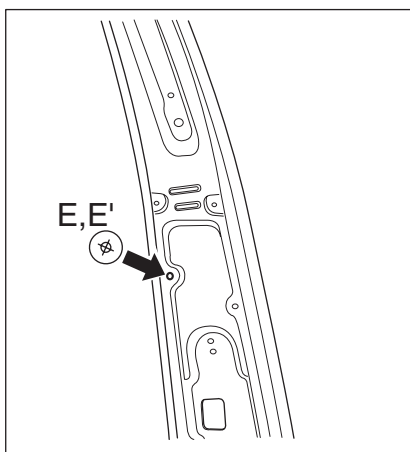
Front pillar trim mounting hole  $\varnothing 8.5$



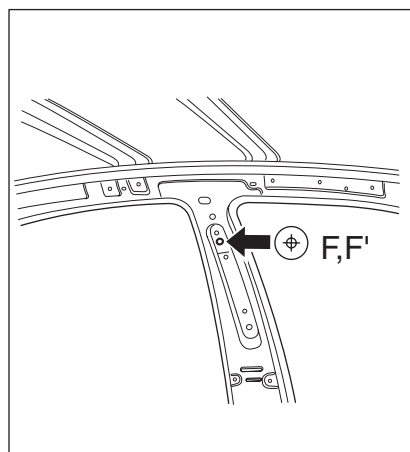
Front pillar trim mounting hole  $\square 8.5 \times 8.5$



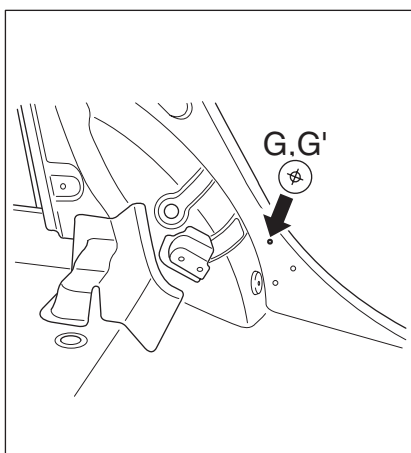
Center pillar lower trim mounting hole  $\varnothing 8.5$



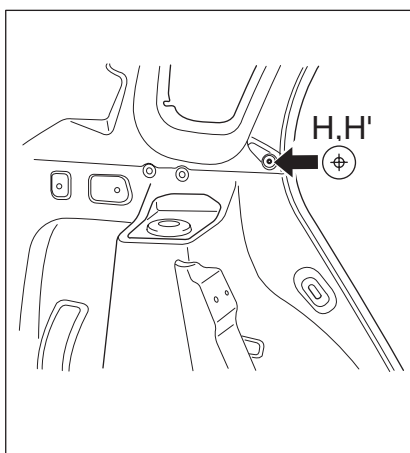
Center pillar upper trim mounting hole  $\varnothing 8.5$



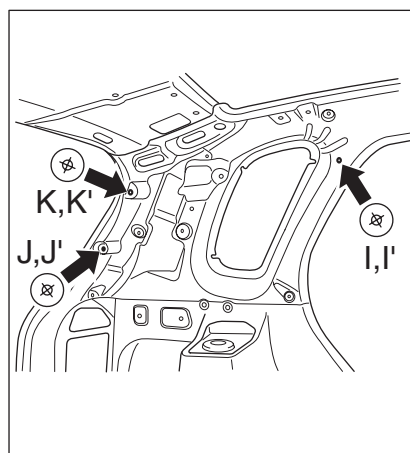
Seat belt adjuster mounting hole  $\varnothing 15$



Wheel house inner panel hole  $\varnothing 10$

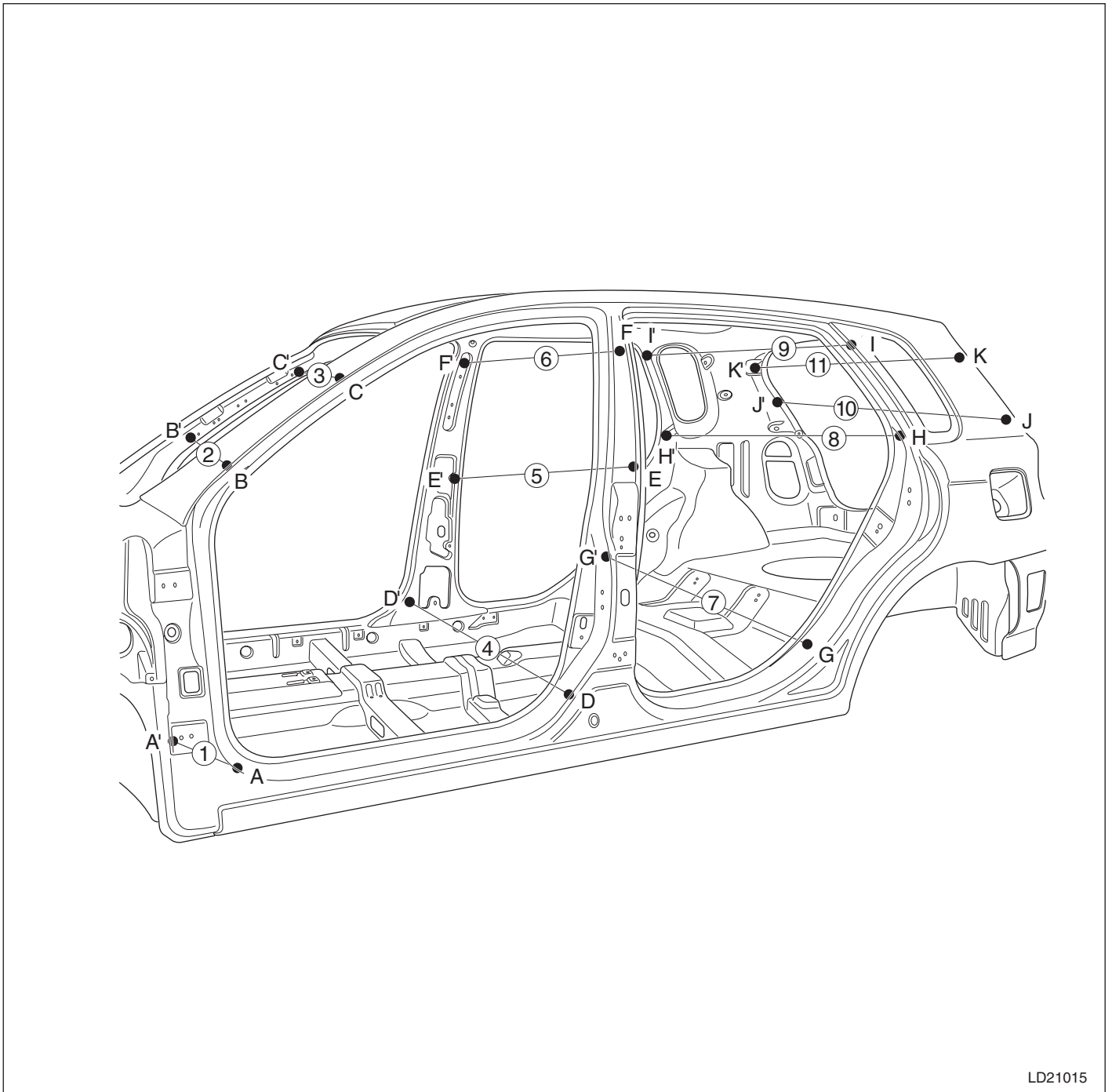


Rear pillar trim mounting hole  $\varnothing 6.6$



I : Rear pillar trim mounting hole  $\varnothing 6.6$   
J : Rear pillar trim mounting hole  $\varnothing 8.5$   
K : Rear pillar trim mounting hole  $\varnothing 8.5$

LD21016

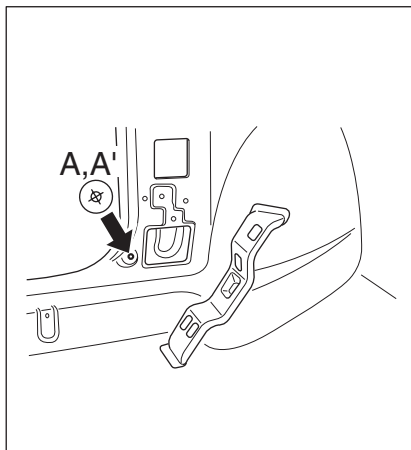


LD21015

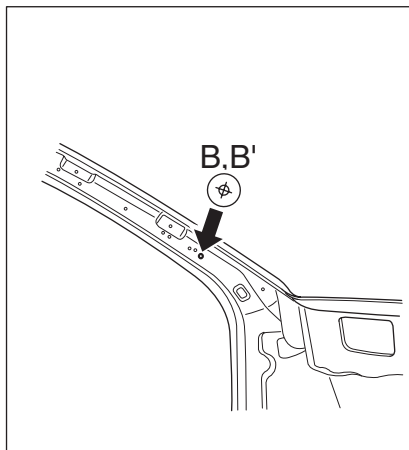
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	1398	1320	1152	1358	1361	1186	1397	1364	1138
Measurement point	⑩	⑪							
Dimension (mm)	1123	1014							

31-24 Body dimensions

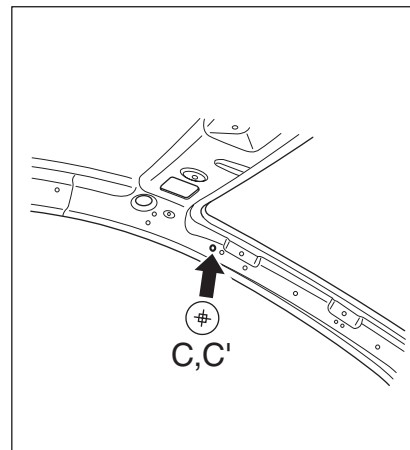
Interior B straight-line dimensions (5Door)



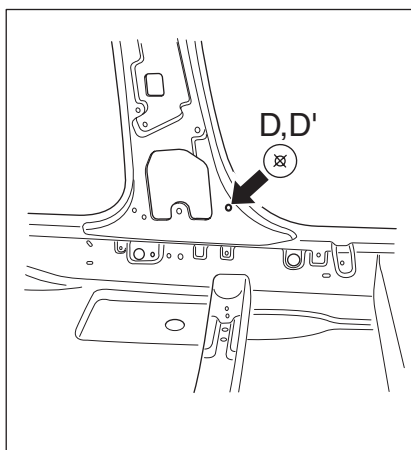
Cowl side lower trim mounting hole  $\varnothing 8.4$



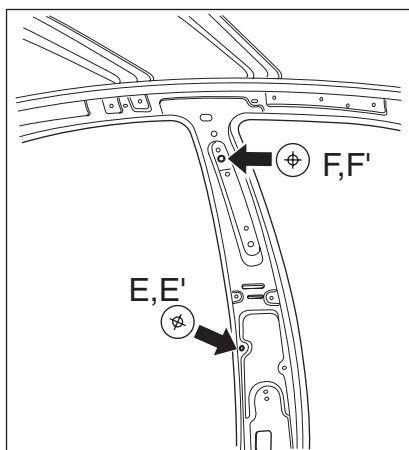
Front pillar trim mounting hole  $\varnothing 8.5$



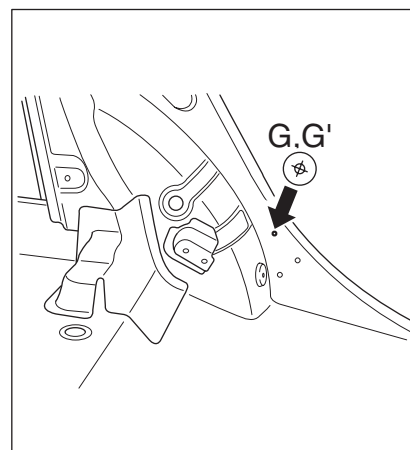
Front pillar trim mounting hole  $\square 8.5 \times 8.5$



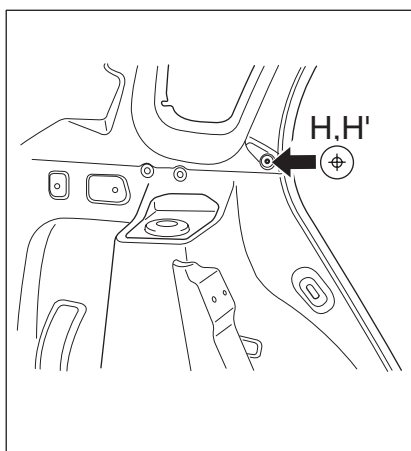
Center pillar lower trim mounting hole  $\varnothing 8.5$



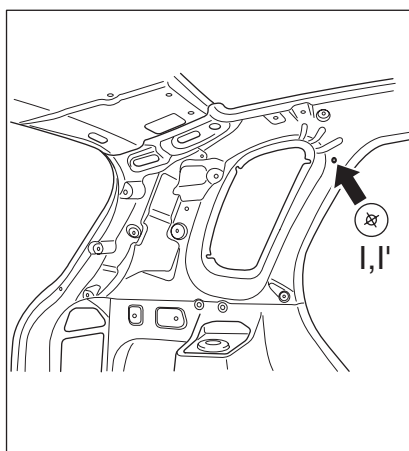
E : Center pillar upper trim mounting hole  $\varnothing 8.5$   
F : Seat belt adjuster mounting hole  $\varnothing 15$



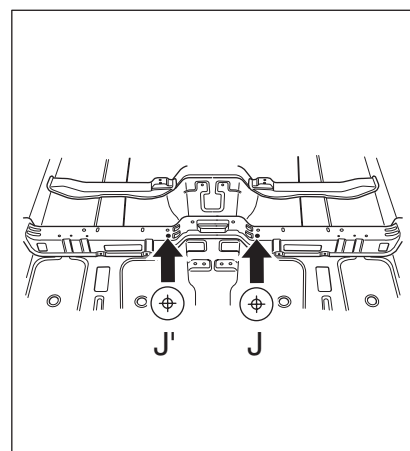
Wheel house inner panel hole  $\varnothing 10$



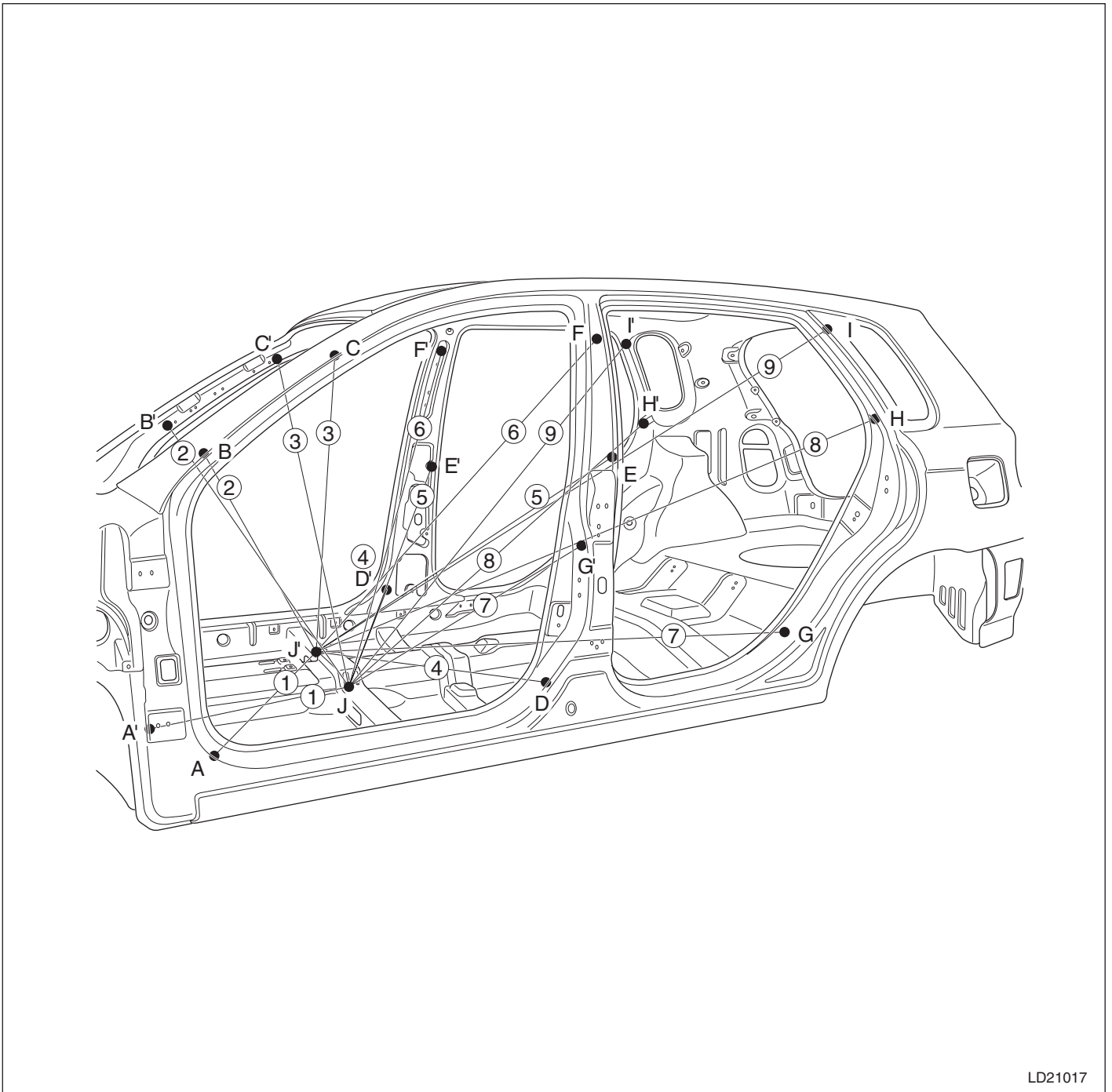
Rear pillar trim mounting hole  $\varnothing 6.6$



Rear pillar trim mounting hole  $\varnothing 6.6$



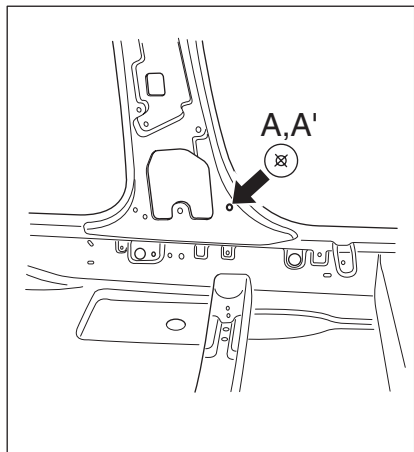
Front seat track mounting hole  $\varnothing 11$



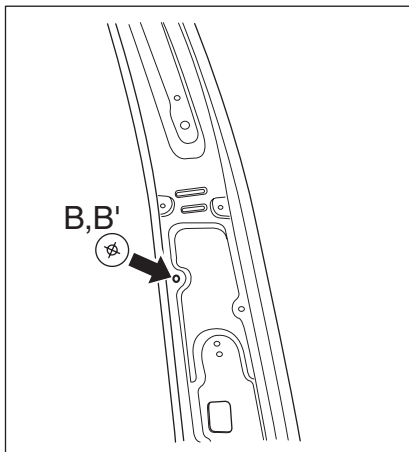
LD21017

Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	975	1171	1203	907	1150	1359	1463	1831	1823

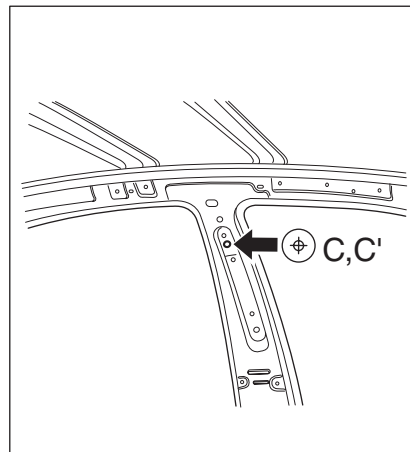
### Interior C straight-line dimensions (5Door)



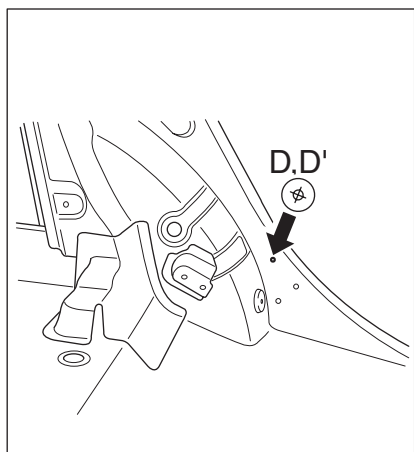
Cowl side lower trim mounting hole  $\varnothing 8.5$



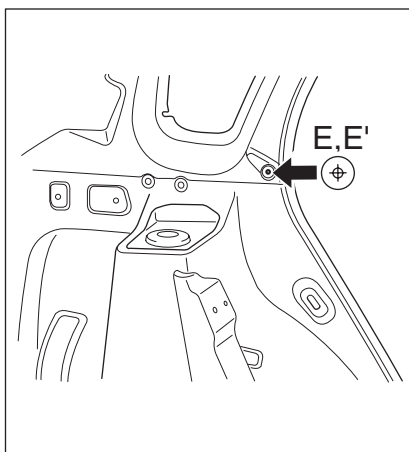
Center pillar trim mounting hole  $\varnothing 8.5$



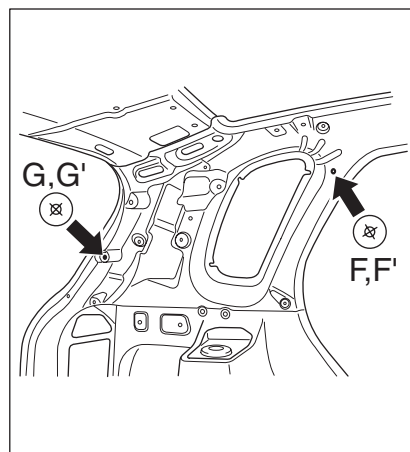
Seat belt adjustor mounting hole  $\varnothing 15$



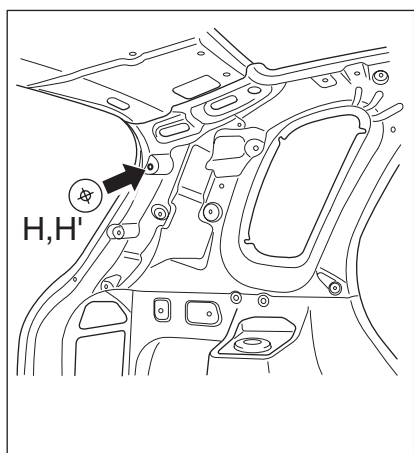
Wheel house inner panel hole  $\varnothing 10$



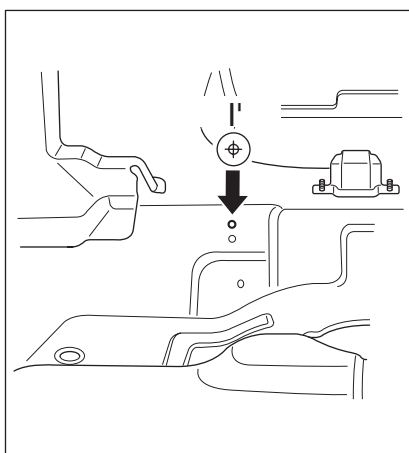
Rear pillar trim mounting hole  $\varnothing 6.6$



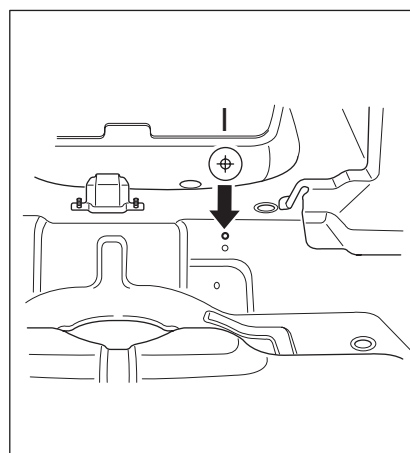
F : Rear pillar upper trim mounting hole  $\varnothing 10$   
G : Rear pillar upper trim mounting hole  $\varnothing 8.5$



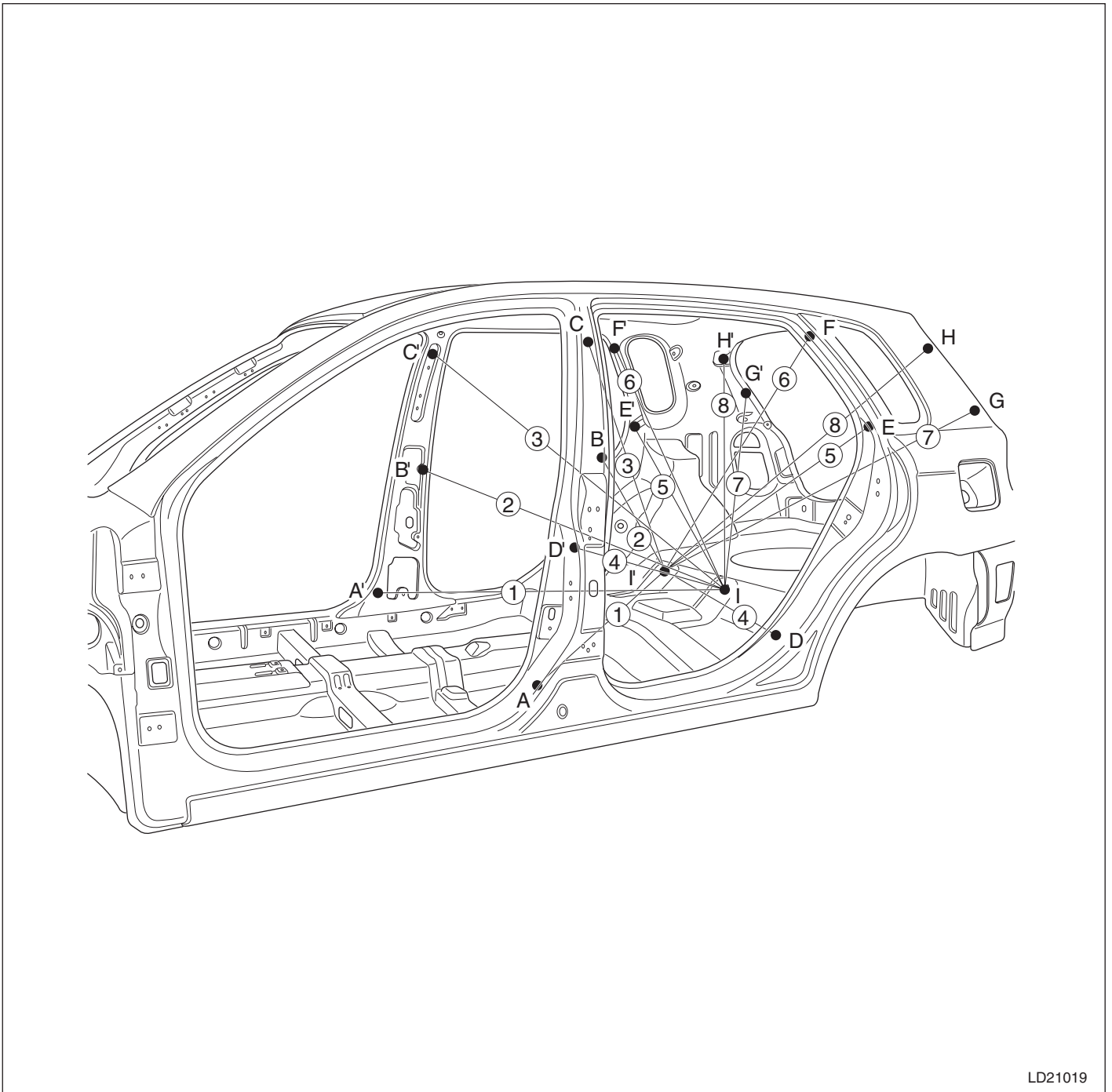
Rear pillar upper trim mounting hole  $\varnothing 8.5$



Child seat mounting hloe  $\varnothing 9$



Child seat mounting hole  $\varnothing 9$

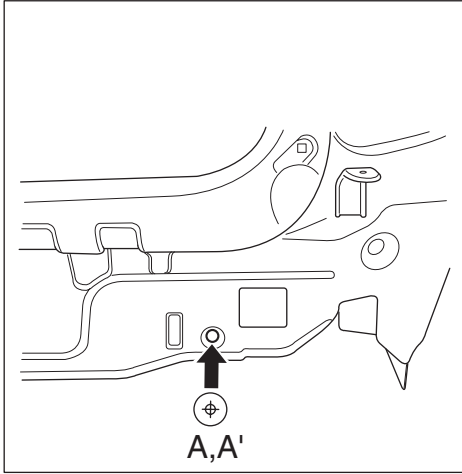


LD21019

Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	
Dimension (mm)	1321	1234	1354	909	1021	1120	1149	1143	

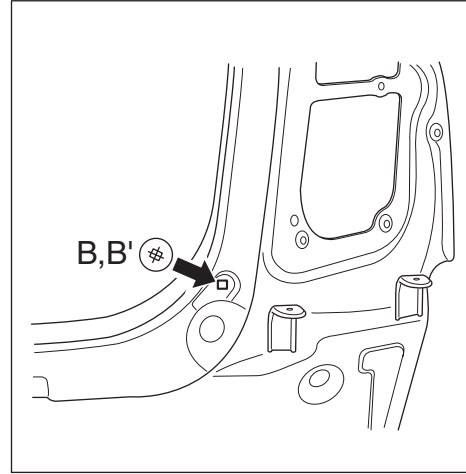
31-28 Body dimensions

Rear body straight-line dimensions (5Door)



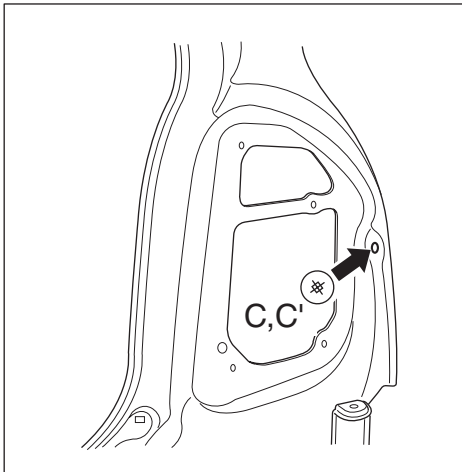
Rear end panel hole

ø16



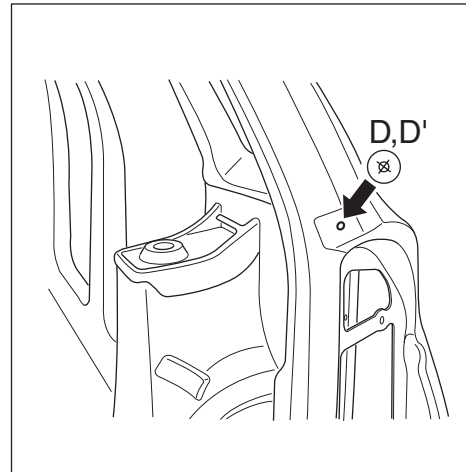
Bumper mounting hole

□ 8.5X8.5



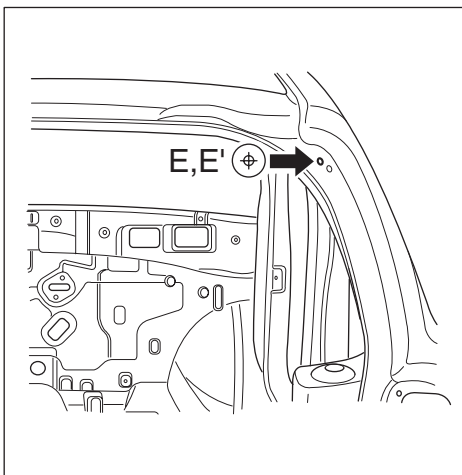
Rear combination lamp mounting hole

□ 14X17



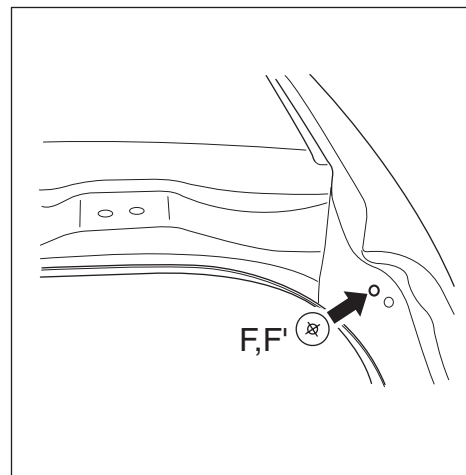
Wedge mounting hole

ø6.6



Gas lifter mounting hole

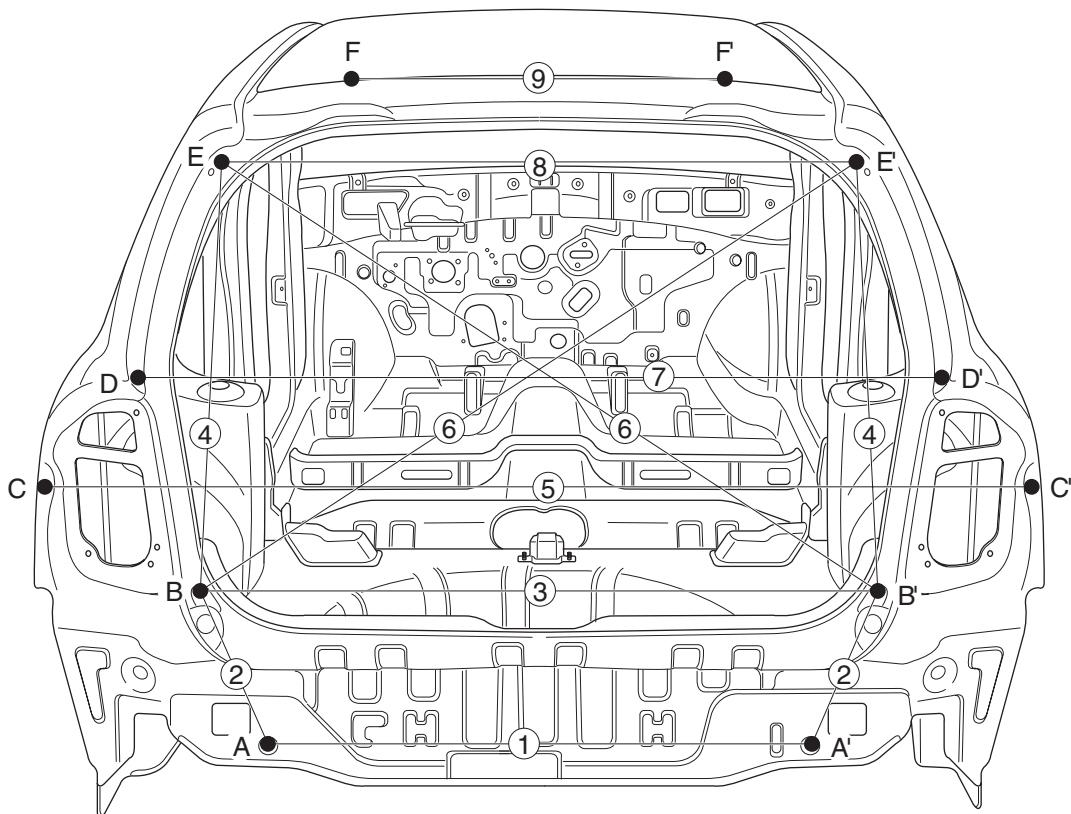
ø10



Tail gate mounting hole

ø12

LD21022



LD21021

Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	842	235	1010	766	1558	1279	1216	1040	575

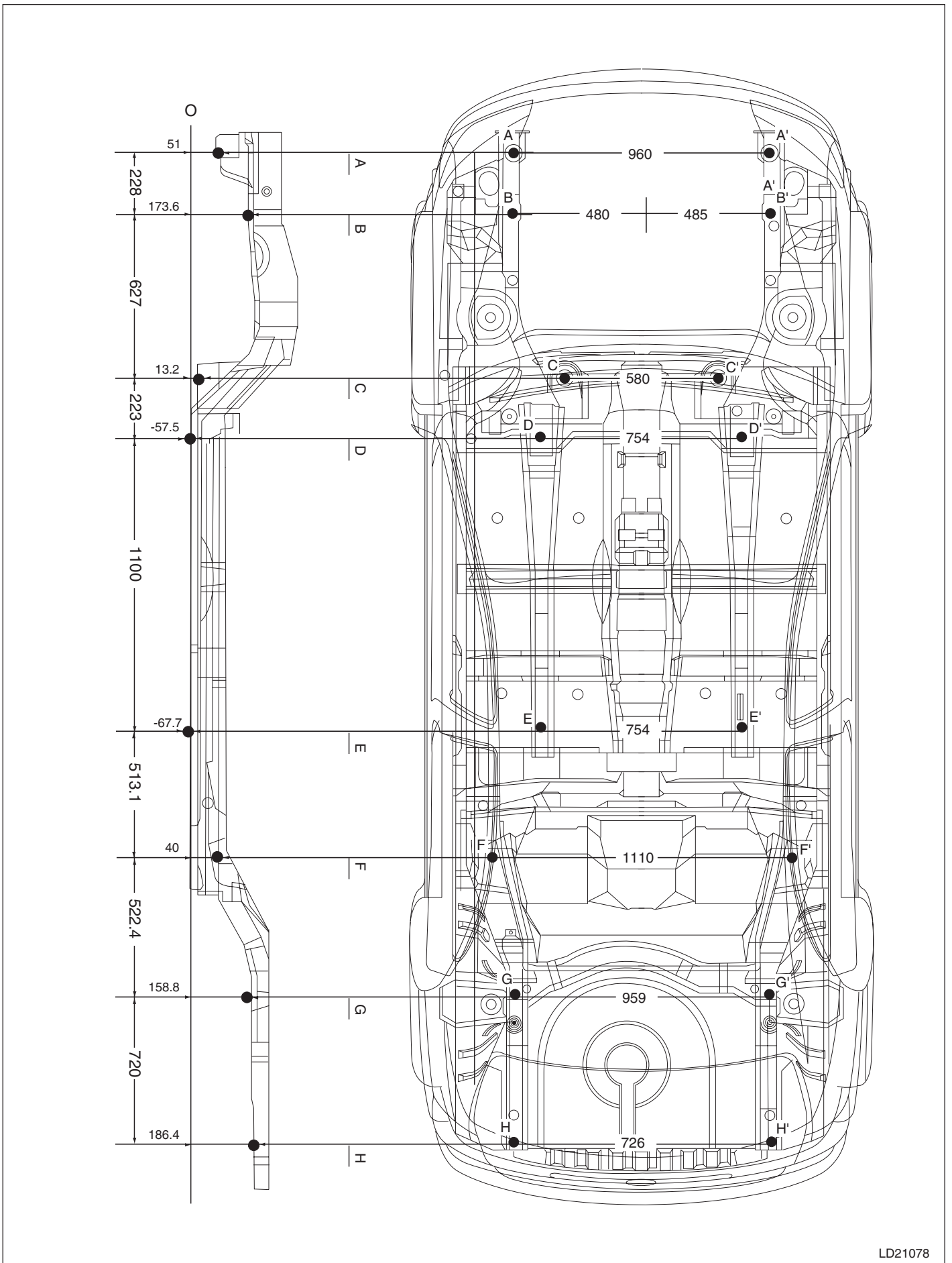
31-30 Body dimensions

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**Under body dimensions (5Door)**

**Projected dimensions**

Measurement point	Description	Hole size
A	Front side inner member mounting hole	ø24
B	Front side inner member hole	ø25
C	Sub frame rear mounting hole	ø20
D	Front side rear lower member hole	ø25
E	Rear floor side member hole	ø27
F	Rear floor side member trailing arm mounting hole	ø13
G	Rear center member hole	ø14
H	Rear bumper mounting hole	ø17

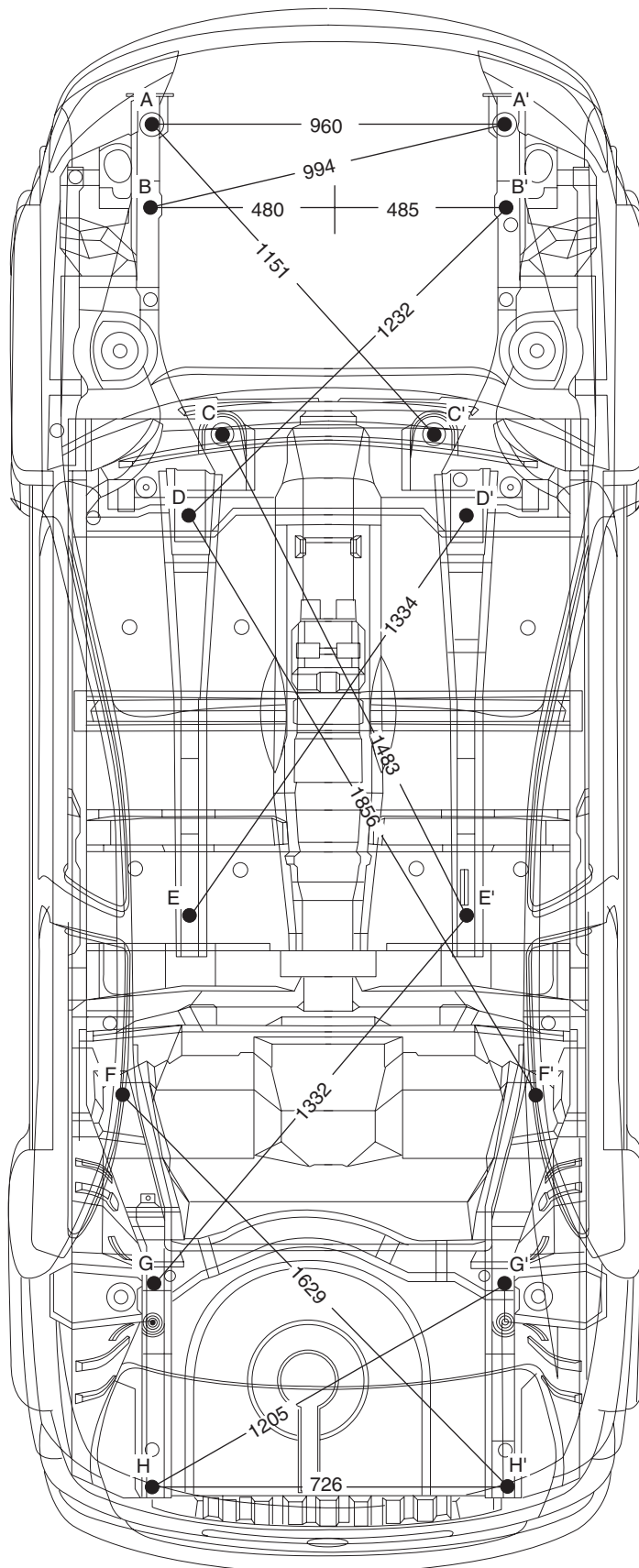


**31-32 Body dimensions**

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**Straight-line dimensions (5Door)**

Measurement point	Description	Hole size
A	Front side inner member mounting hole	ø24
B	Front side inner member hole	ø25
C	Sub frame rear mounting hole	ø20
D	Front side rear lower member hole	ø25
E	Rear floor side member hole	ø27
F	Rear floor side member trailing arm mounting hole	ø13
G	Rear center member hole	ø14
H	Rear bumper mounting hole	ø17



## Waterproof and rustproof

### Body sealing

#### 4 Door

Floor body .....	41- 1
Door .....	41- 4
Trunk lid / Hood .....	41- 5

#### 5 Door

Rear floor body .....	41- 6
Door .....	41- 9
Tail gate / Hood .....	41-10

Under coating.....	41- 11
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### Applying rustproofing material

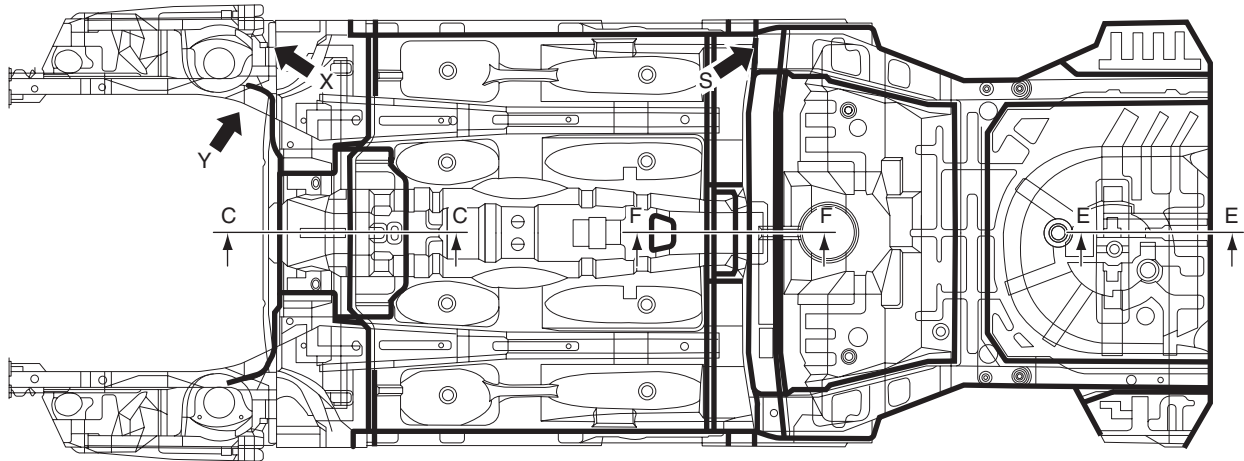
Body part .....	41-14
Door .....	41-16
Hood / Tail gate / Trunk lid .....	41-17

Applying urethane .....	41-19
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## Body sealing

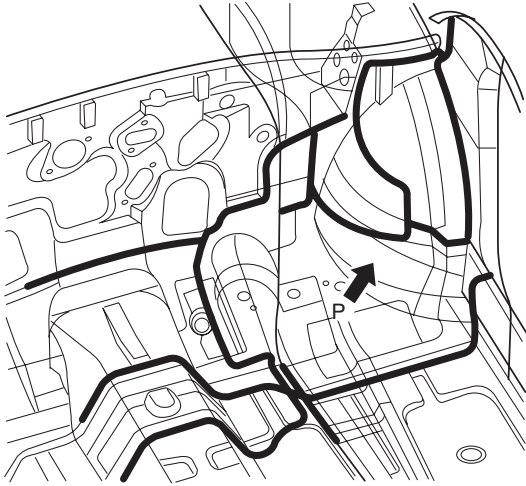
To waterproof and rustproof the vehicle, apply sealer on assembled area of the body panel and on any areas in contact with the body, such as doors(inner/outer), hood(inner/outer), and trunk lid(inner/outer), tail gate(inner/outer).

### Floor body (4Door)

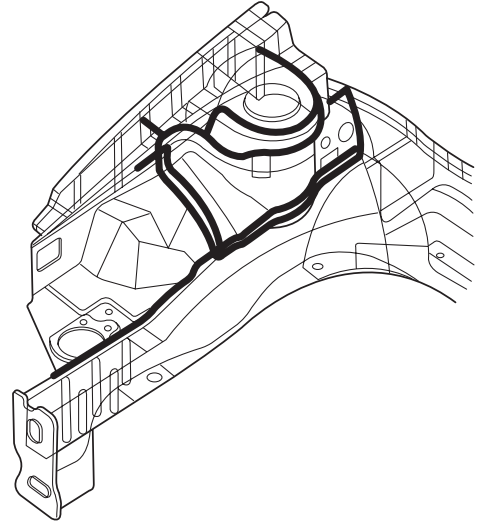


LD21067

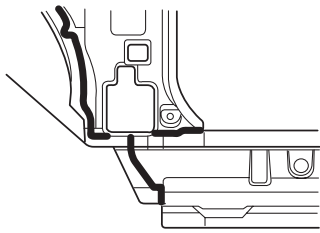
41-2 Waterproofing and rustproofing



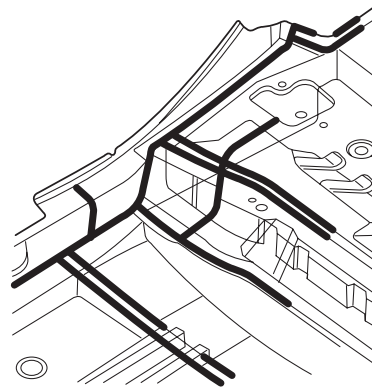
VIEW "X"



VIEW "Y"



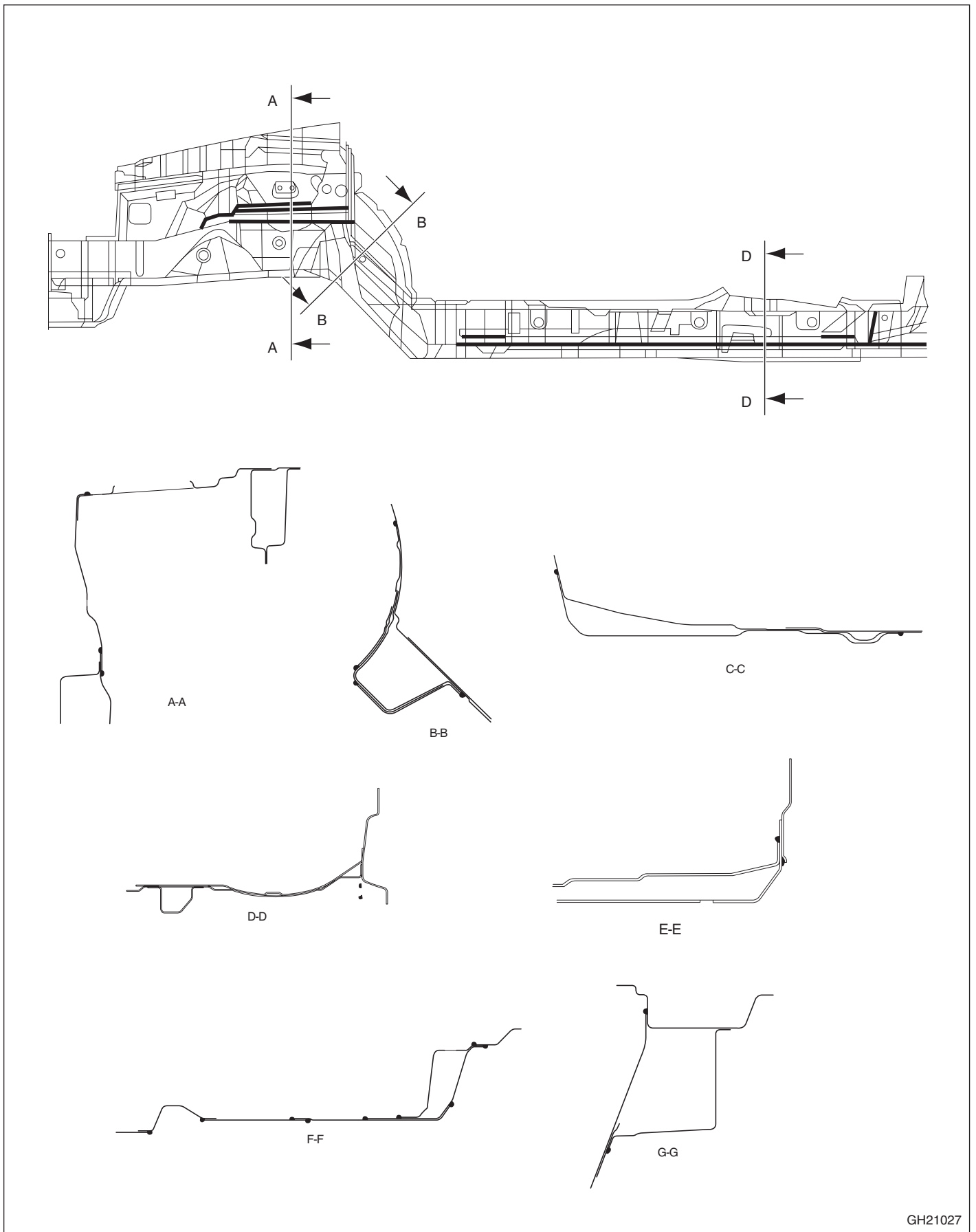
VIEW "P"



VIEW "S"

LD21068

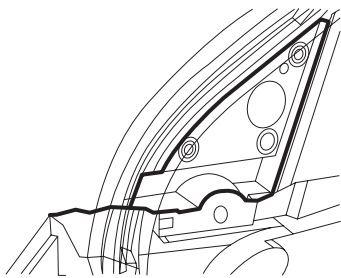
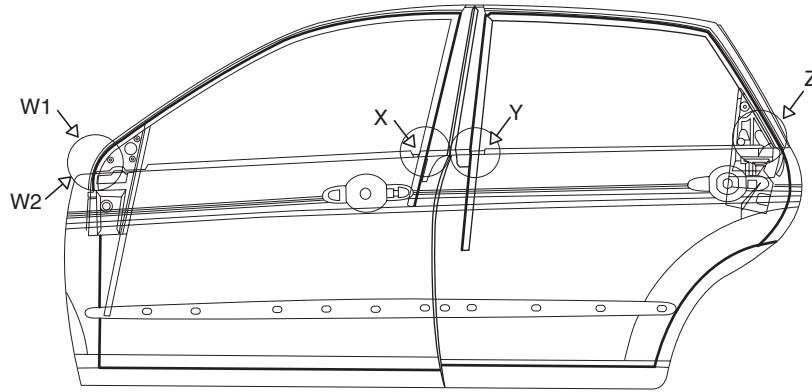
### Body (Center)



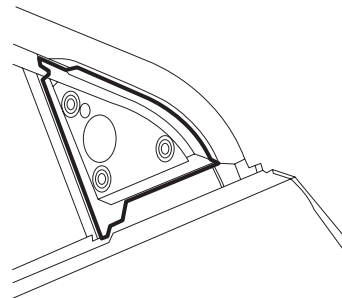
GH21027

41-4 Waterproofing and rustproofing

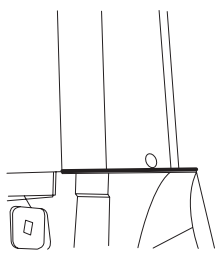
Door (4Door)



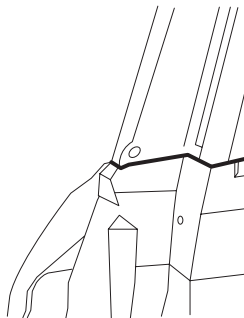
W1



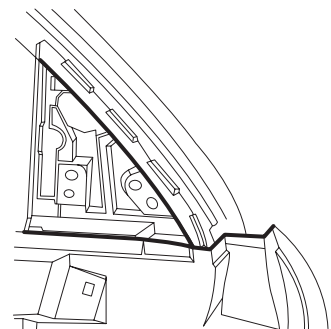
W2



X

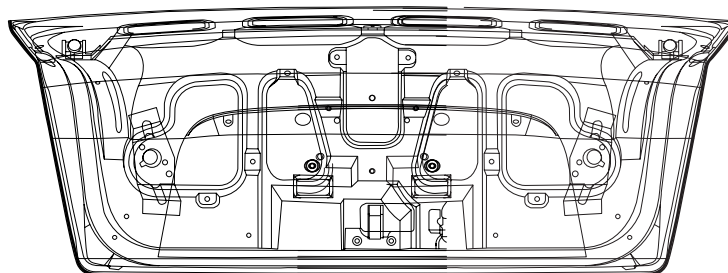
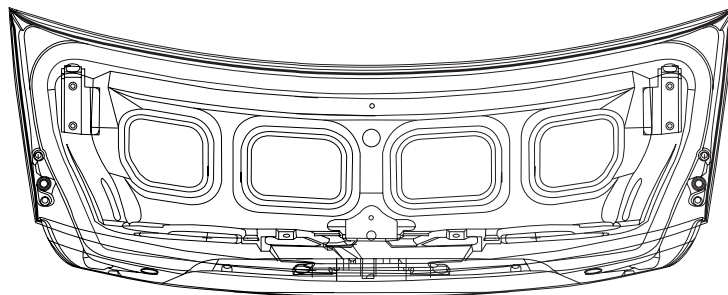
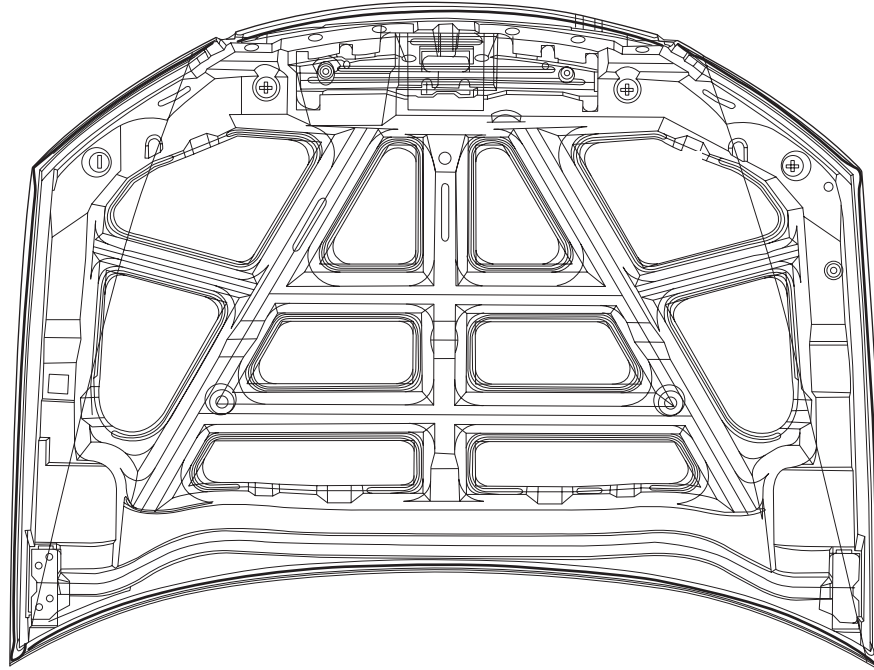


Y



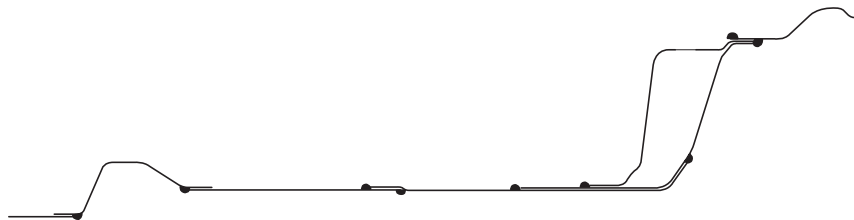
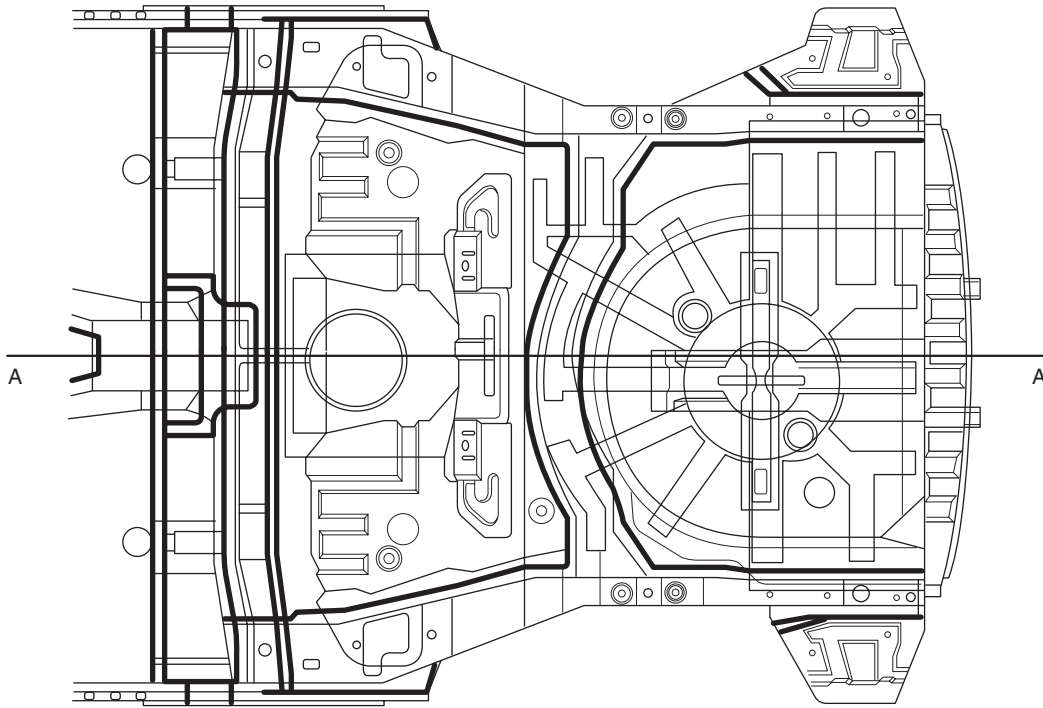
Z

Trunk lid / Hood (4Door)



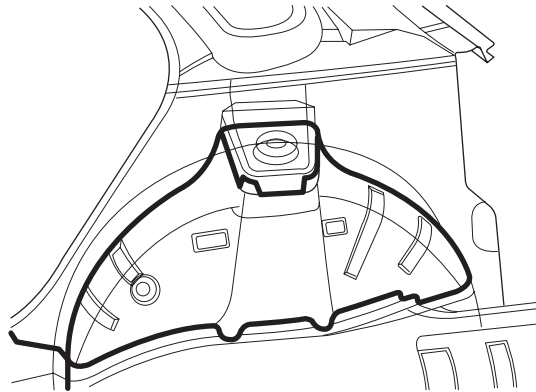
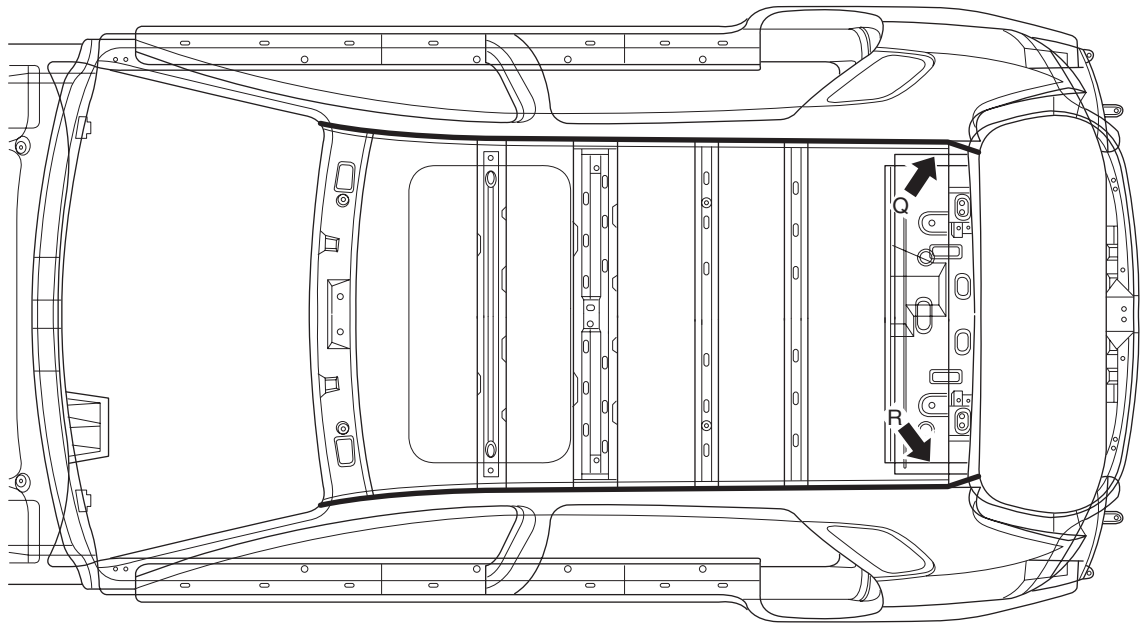
41-6 Waterproofing and rustproofing

Rear floor body (5Door)

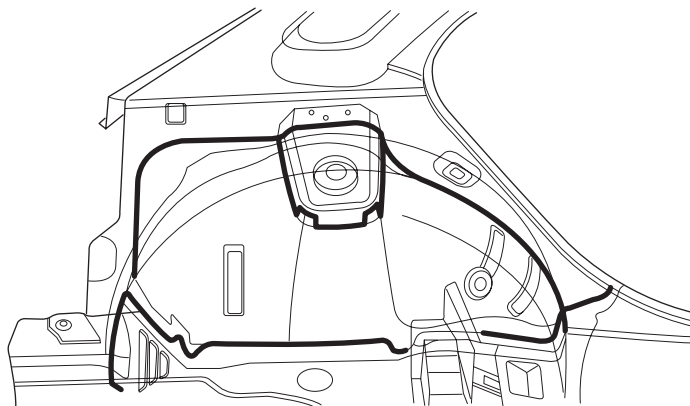


A-A

LD21072



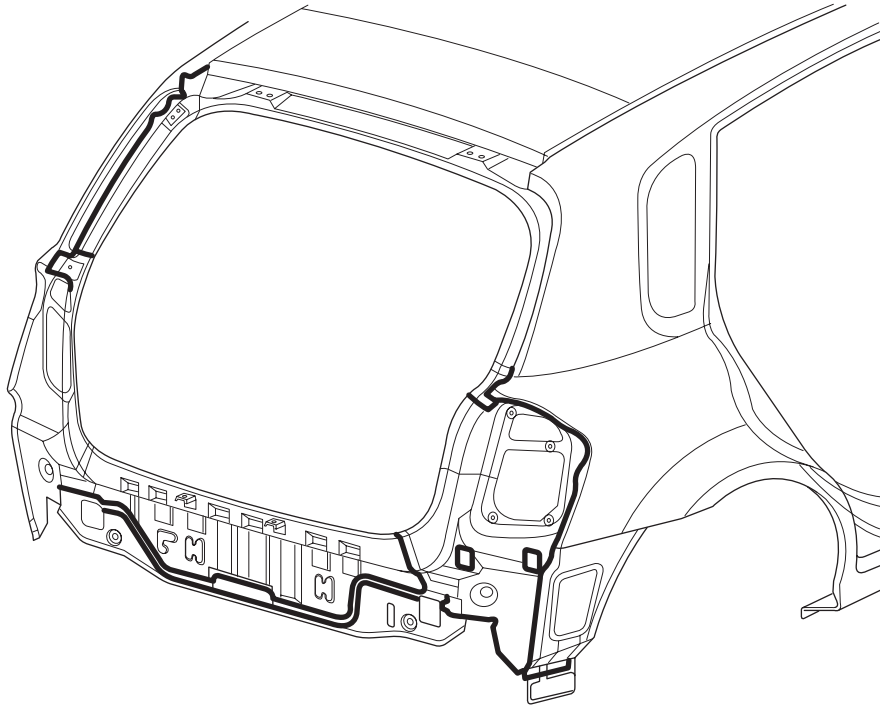
VIEW "R"



VIEW "Q"

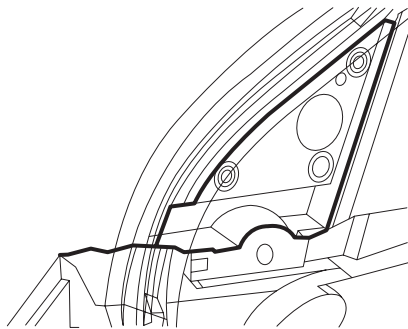
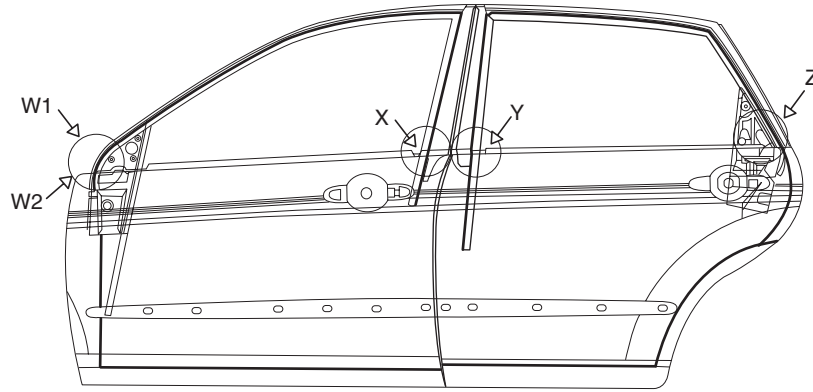
41-8 Waterproofing and rustproofing

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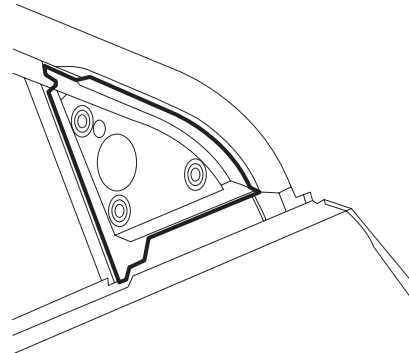


LD21074

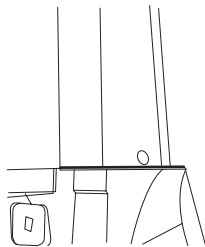
Door (5Door)



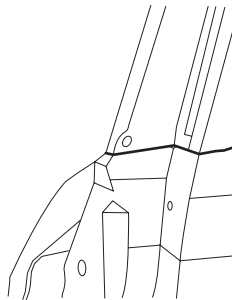
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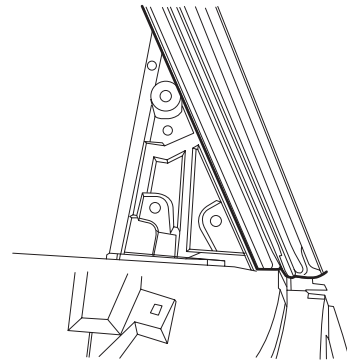
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X



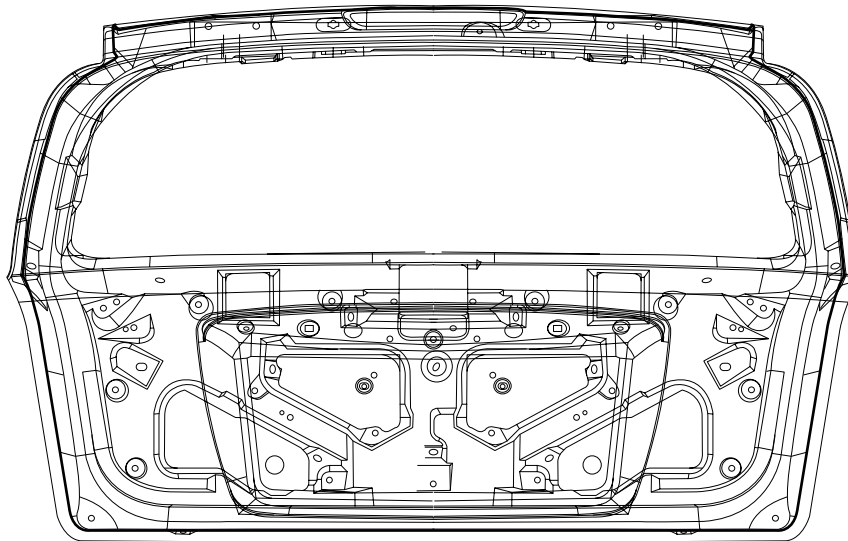
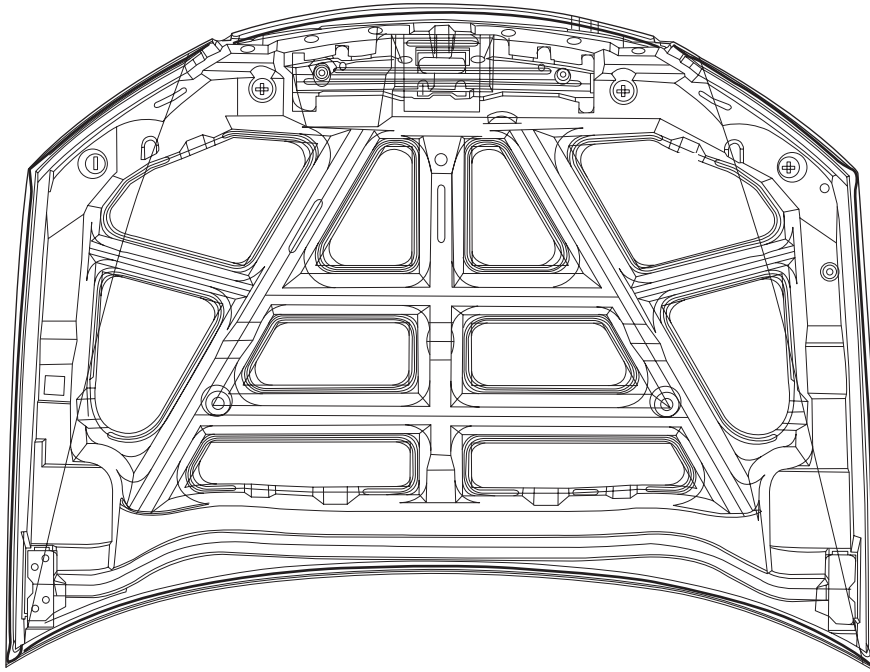
Y



Z

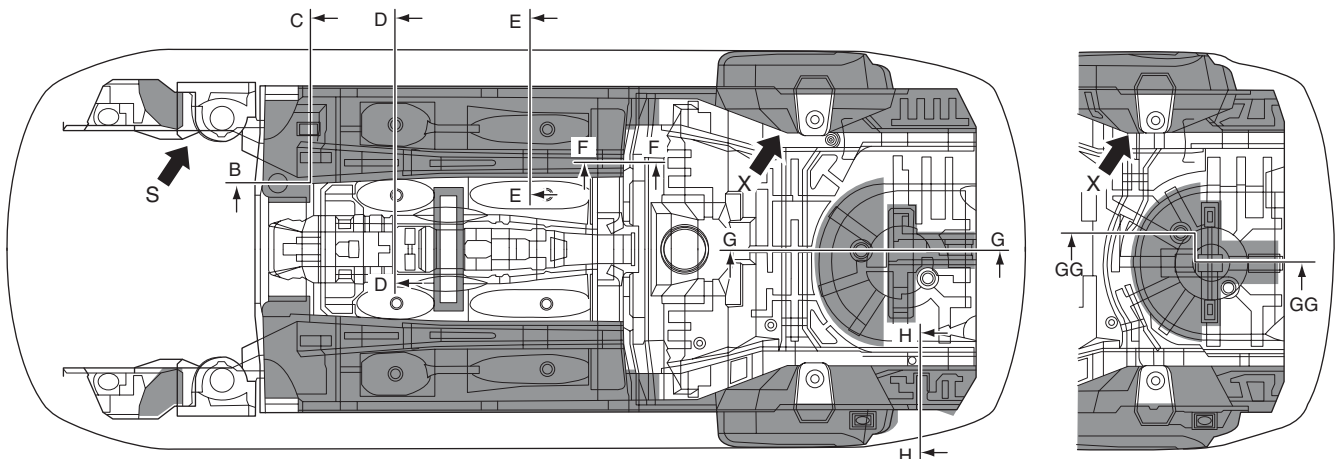
41-10 Waterproofing and rustproofing

Tail gate / Hood (5Door)



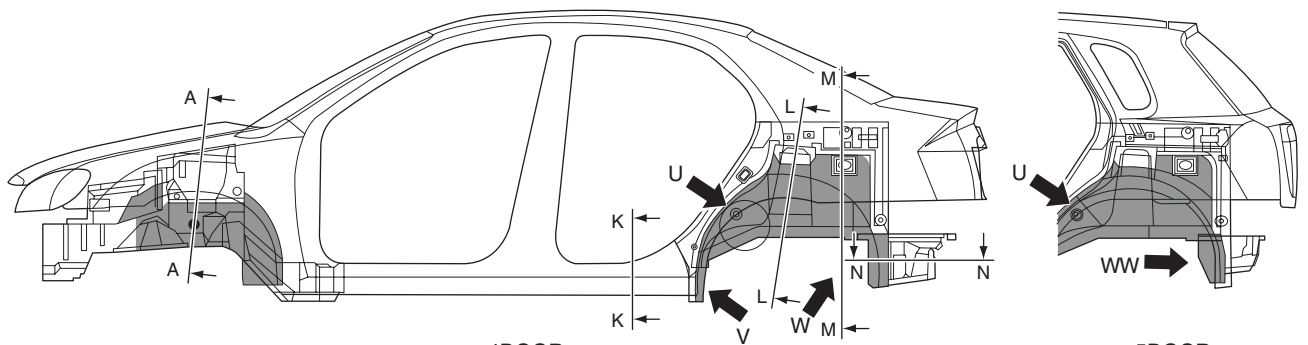
LD21076

## Under coating



4DOOR

5DOOR

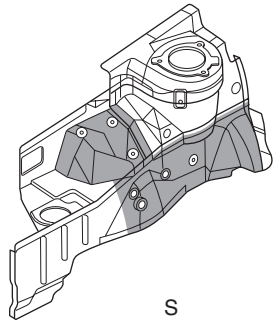


4DOOR

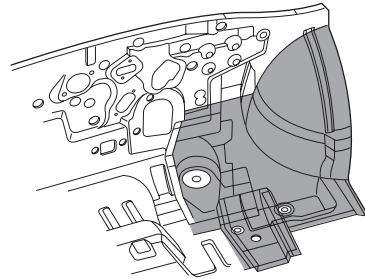
5DOOR

41-12 Waterproofing and rustproofing

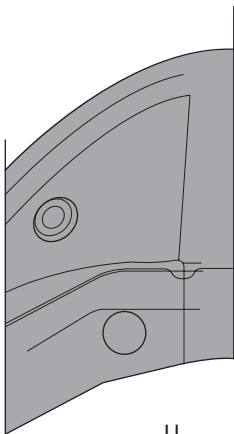
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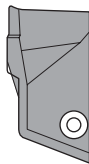
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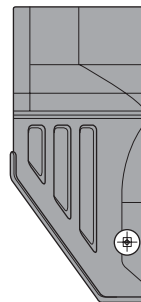
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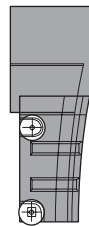
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V

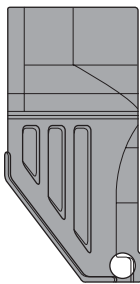


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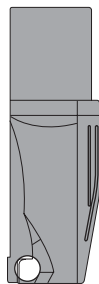
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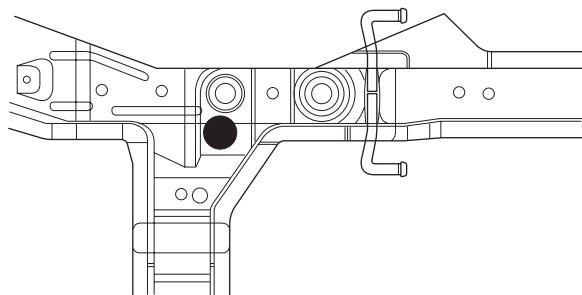


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WW

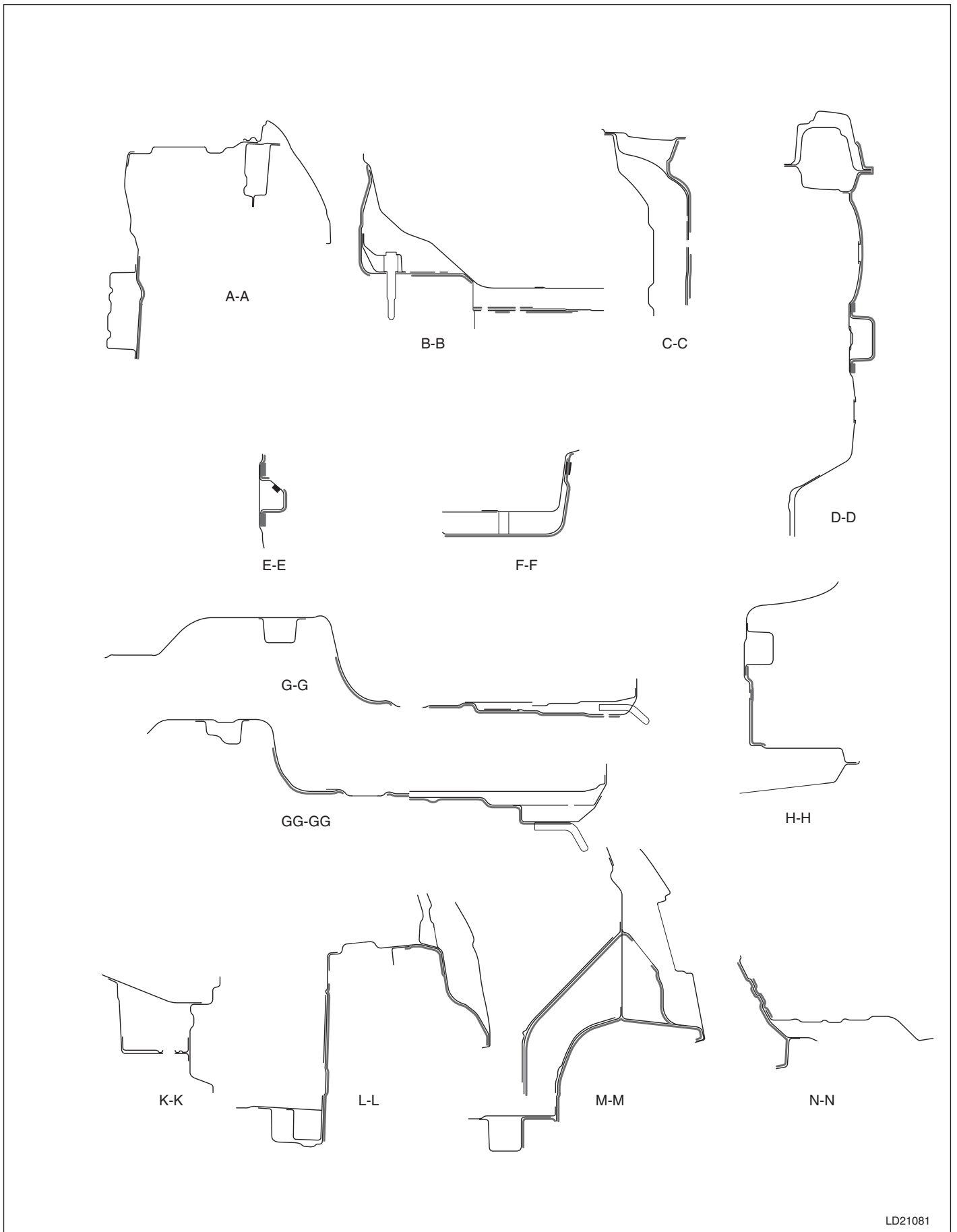


(RHD)



X

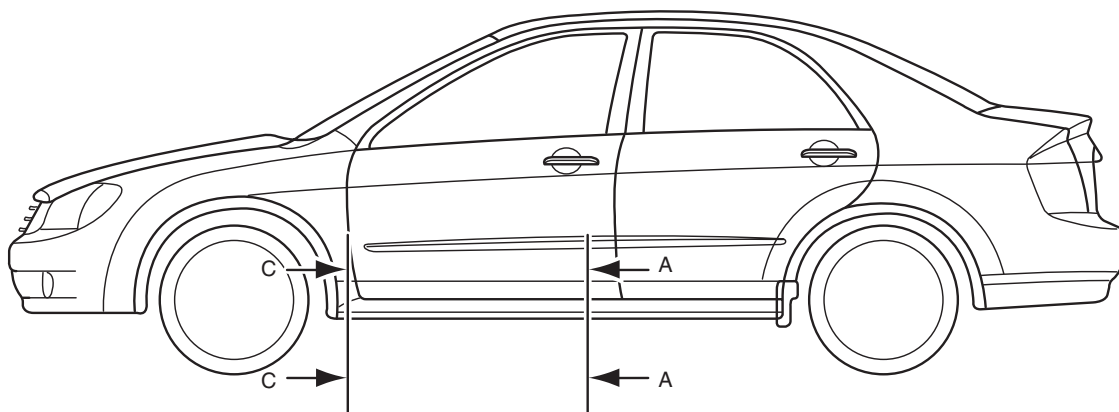
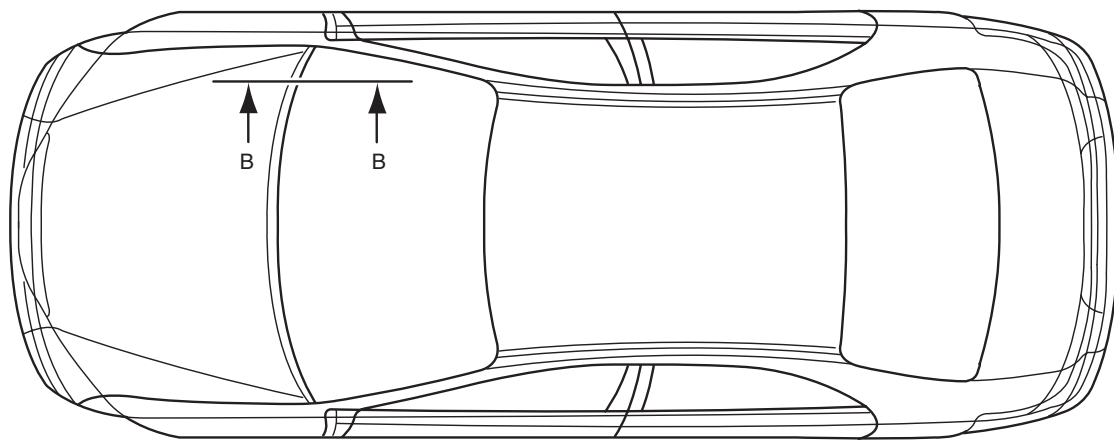
Part section



LD21081

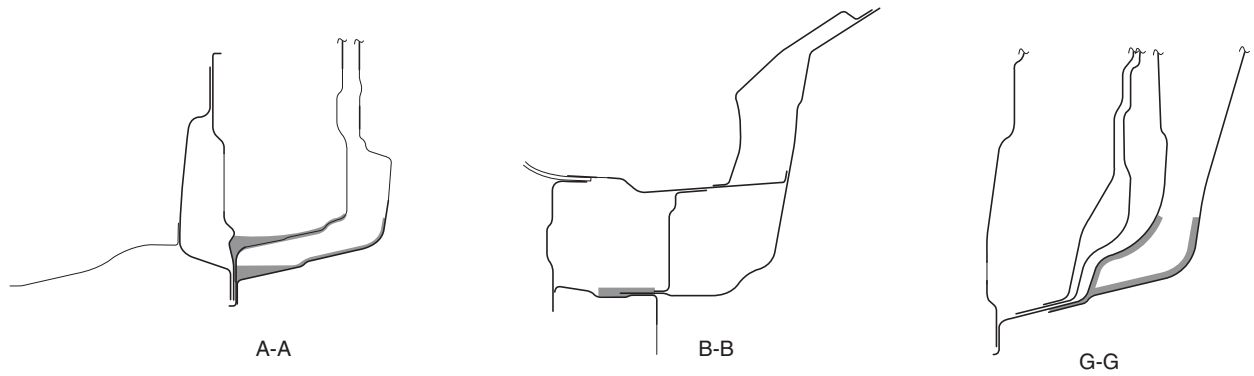
## Applying rustproofing material

### Body



LD21082

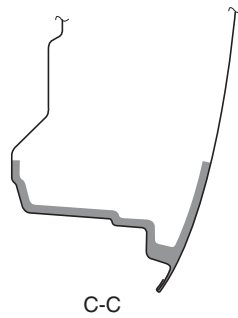
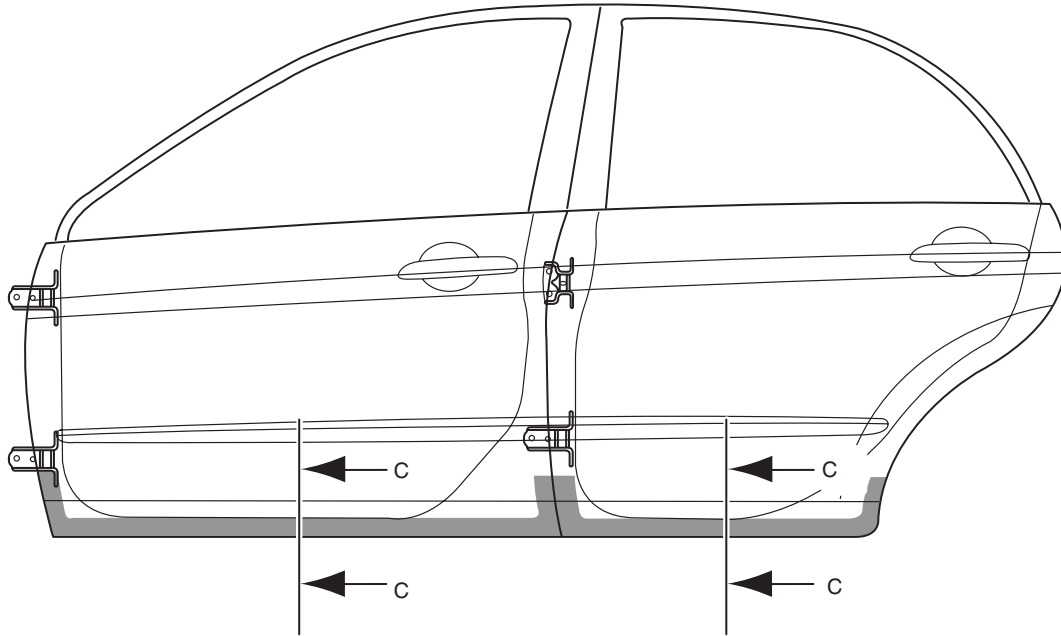
Section



LD21083

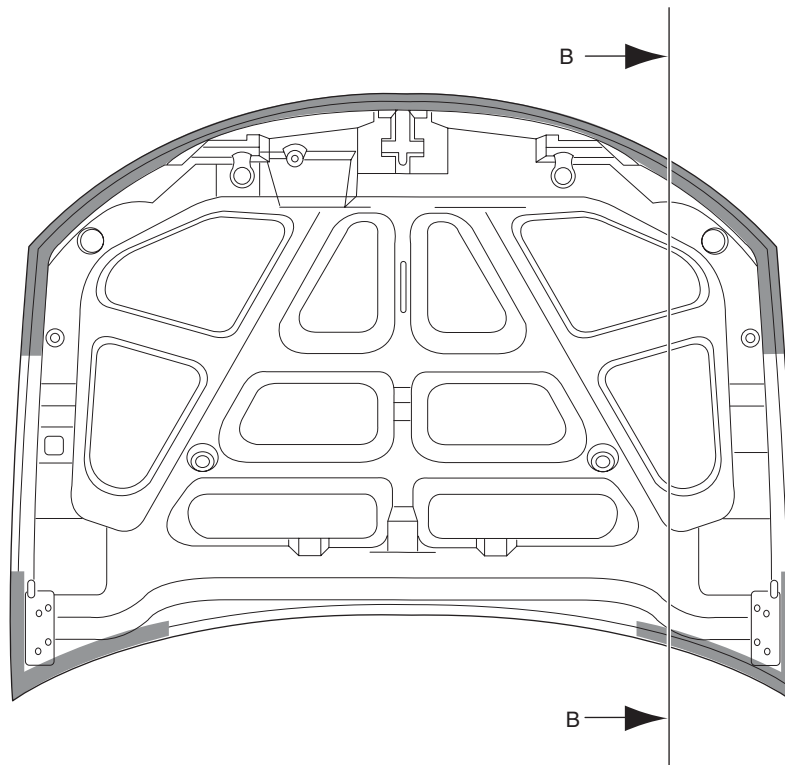
41-16 Waterproofing and rustproofing

Door

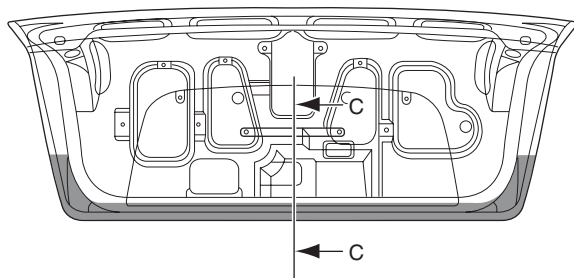


LD21084

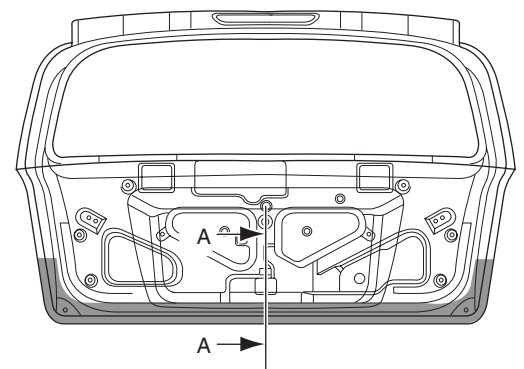
### Hood / Trunk lid / Tail gate



( Hood )



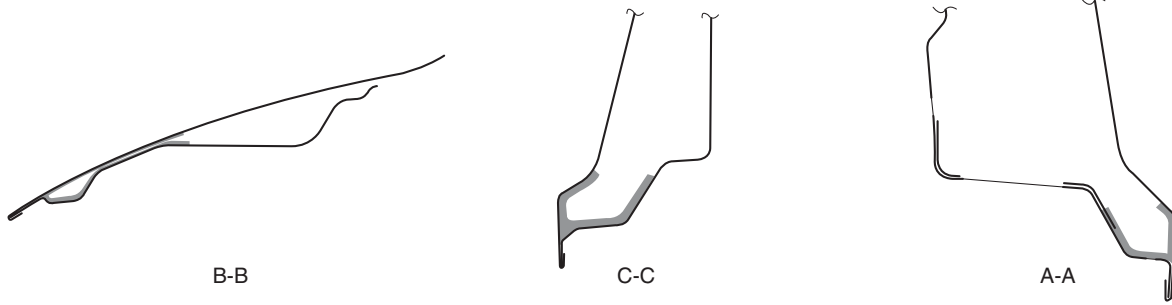
( Trunk lid )



( Tail gate )

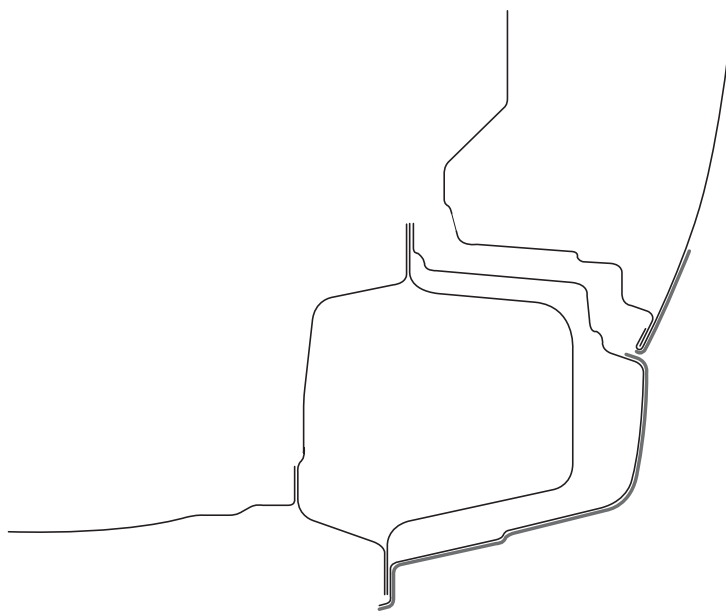
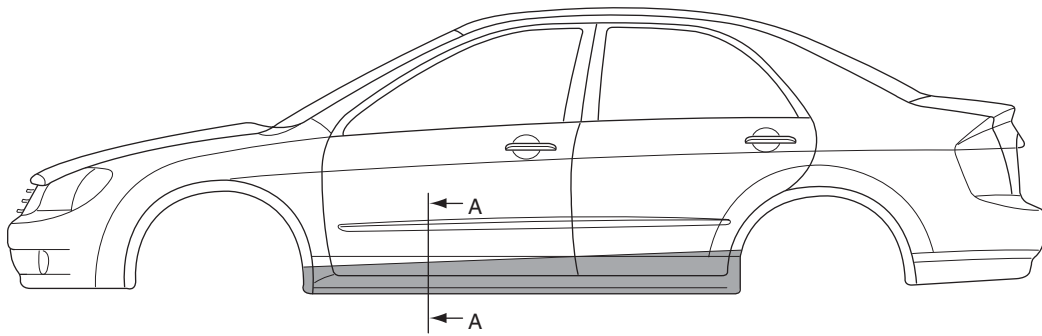
LD21085

Part section



LD21086

## Applying urethane



A-A

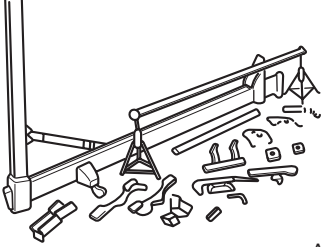
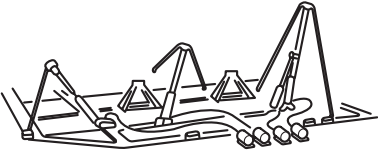
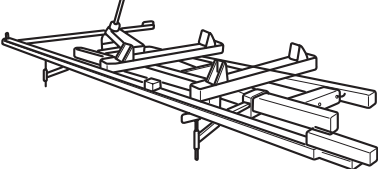
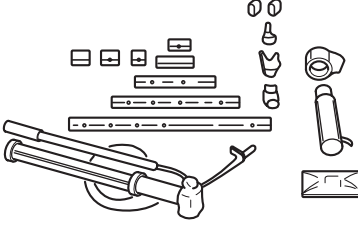
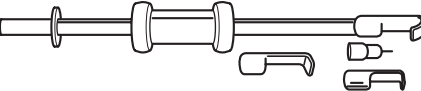
LD21087

## Body modification tools

<b>Body modification tools</b>	
Modification tools .....	51- 1
Cut and disassembly tools .....	51- 2
Assembly tools .....	51- 3
Measurement tools .....	51- 3
Welding machine .....	51- 4
Buffing and grinding tools .....	51- 5
Handheld tools .....	51- 7
Repair tools set .....	51- 8


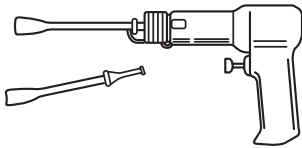
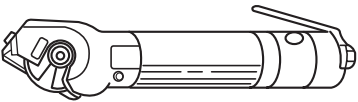
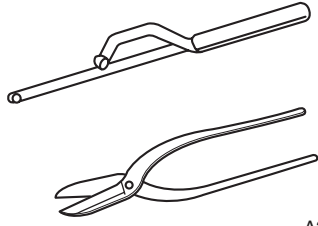
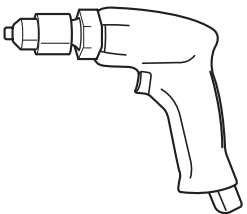
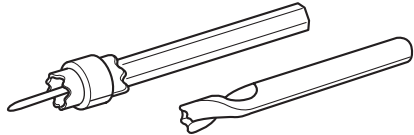
## Body modification tools

### Modification tools

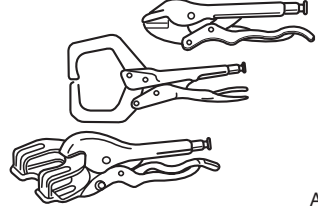
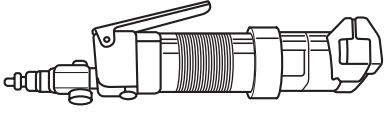
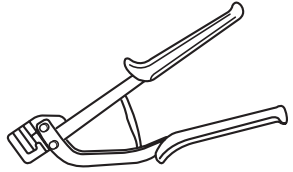
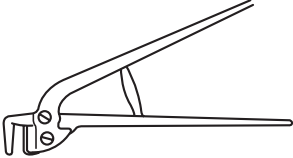
Name	Used for	Figure
<b>Frame straightener</b>	Modify twisted or bent body	 <p>A3EB3501</p>
		 <p>A3EB3502</p>
		 <p>A3EB3503</p>
<b>Port power</b>	Push out, stretch, pull in damaged area	 <p>A3EB3504</p>
<b>Body puller</b>	Stretch damaged area	 <p>A3EB3505</p>

51-2 Body modification tools

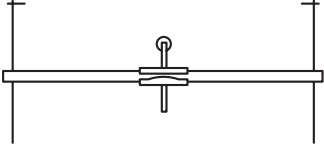
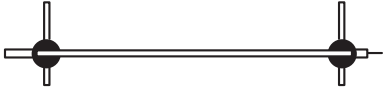
**Cut and disassembly tools**

Name	Used for	Figure
Air saw	Cut a panel	 <p>A3EB3506</p>
Air chisel	Cut or bend a panel, cut and disassemble spot welded area	 <p>A3EB3507</p>
Rotary cutter	Cut a panel	 <p>A3EB3508</p>
Hand saw and metal scissors	Cut a panel	 <p>A3EB3509</p>
Air drill	Fix a spot cutter or drill to cut or disassemble spot welding area, to finish a hole.	 <p>A3EB3510</p>
Spot cutter	Cut and disassemble spot welded area	 <p>A3EB3511</p>

### Assembly tools


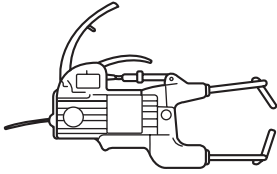

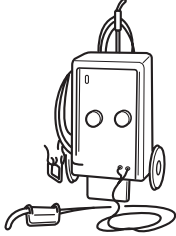
Name	Used for	Figure
Vice pliers	Fix a panel or area to weld	 A3EB3512
Air bench	Finish contact area of flange and finish a hole for plug welding	 A3EB3513
Quick bench	Finish a hole for plug welding	 A3EB3514
Flanging tool	Finish contact area of flange	 A3EB3515

### Measurement tools

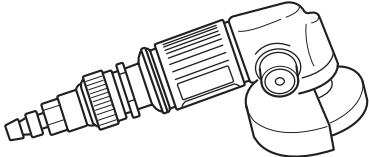
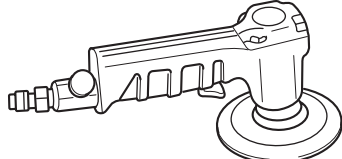
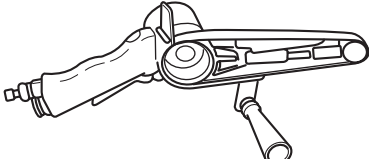
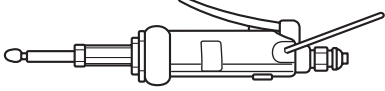
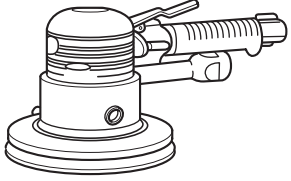
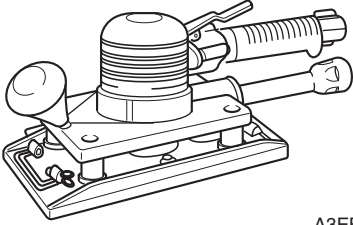
Name	Used for	Figure
Centering gauge	Measure distortion of body and frame	 A3EB3516
Tracking gauge	Measure body and frame	 A3EB3517

51-4 Body modification tools

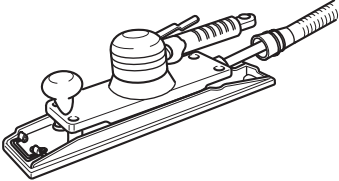
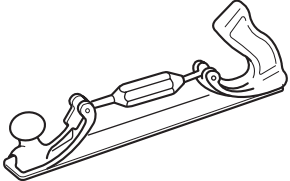
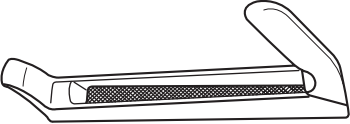
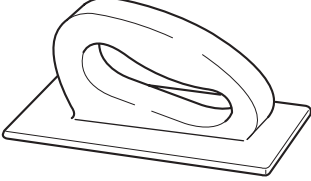
**Welding machine**

Name	Used for	Figure
<b>Gas welding machine</b>	Cut a panel	 A3EB3518
<b>Spot welding machine</b>	Weld a panel	 A3EB3519
<b>Carbon arc welding machine</b>	Weld a panel	 A3EB3520
<b>Stud welding machine</b>	Stretch a panel, weld a stud bolt to fix front window mold clip	 A3EB3521

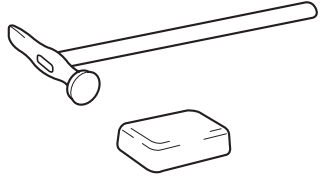
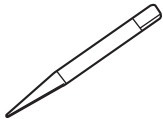
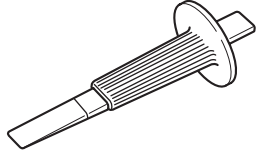
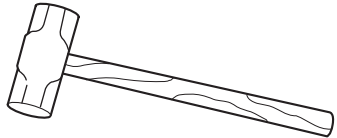
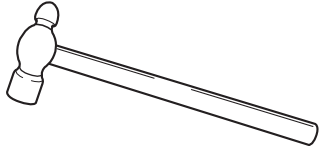
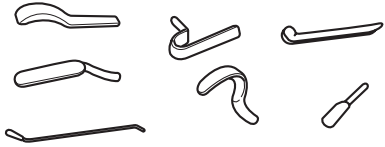
### Buffing and grinding tools

Name	Used for	Figure
Disk grinder	Buff	 A3EB3522
Disk sander	Buff	 A3EB3523
Belt sander	Buff paints	 A3EB3524
Small sized grinder	Buff paints or smooth finishing	 A3EB3525
Double action sander	Grind rough area of puttee assembled area	 A3EB3526
Orbital sander(short)	Grind rough area of puttee assembled area	 A3EB3527

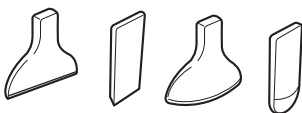

51-6 Body modification tools

Name	Used for	Figure
<b>Orbital sander(long)</b>	Used for puttee grinding of wide area	 A3EB3528
<b>Flexible file</b>	Grind touch up area, uneven area of a panel	 A3EB3529
<b>Surform tool</b>	Buff rough area of puttee area	 A3EB3530
<b>Hand file</b>	Grind body puttee, pulley, finish puttee	 A3EB3531


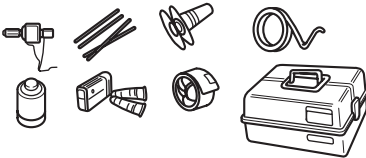
### Handheld tools

Name	Used for	Figure
<b>Body hammer and dolly</b>	-	 A3EB3532
<b>Center punch</b>	Punch a hole in the middle of a spot welding area	 A3EB3533
<b>Plane chisel</b>	Cut and disassemble a panel	 A3EB3534
<b>Weight hammer</b>	Used when greater force is required	 A3EB3535
<b>Bowl pin hammer</b>	Used when smaller force is required	 A3EB3536
<b>Spoon</b>	Used for an area where not reached by hand	 A3EB3537

**51-8 Body modification tools**

Name	Used for	Figure
<b>Body chisel</b>	Bend rough body line damaged or sheet metal etc.	 A3EB3538
<b>Wire brush</b>	Remove paints, rust, slag on welded area which are hard to recognize	 A3EB3539

**Repair tools set**

Name	Used for	Figure
<b>Window tool set</b>	Repair window collar	 A3EB3540
<b>Repair tool set for plastics</b>	Repair plastic parts	 A3EB3541

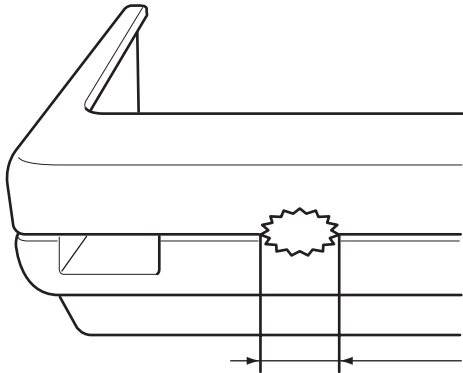
## Plastic parts

Polypropylene (PP) bumper repairability .....	61- 1
Bumper repair procedure .....	61- 2
Repair method for PP bumper .....	61- 3

## Polypropylene(PP) bumper repairability

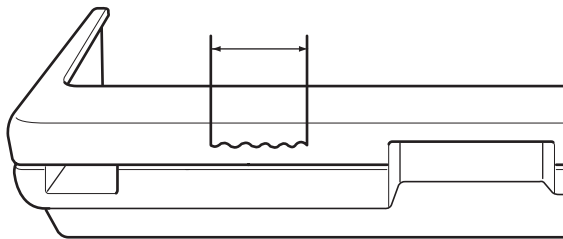
The three types of damaged bumpers shown below can be repaired. Because of cost and quality considerations, bumpers with more damage may be repaired, but replacing the bumper is encouraged.

1. If a hole on a bumper is less than 2 in.(50 mm).



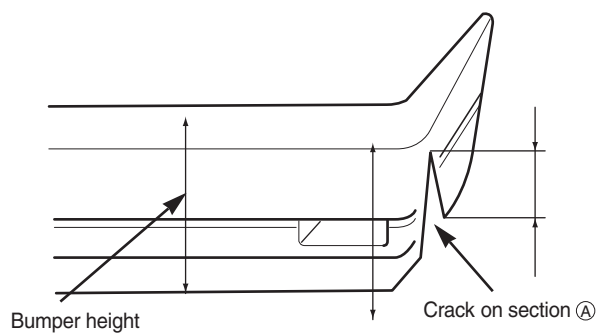
A3EB3601

2. If a crack on a bumper is less than 4 in.(100 mm).



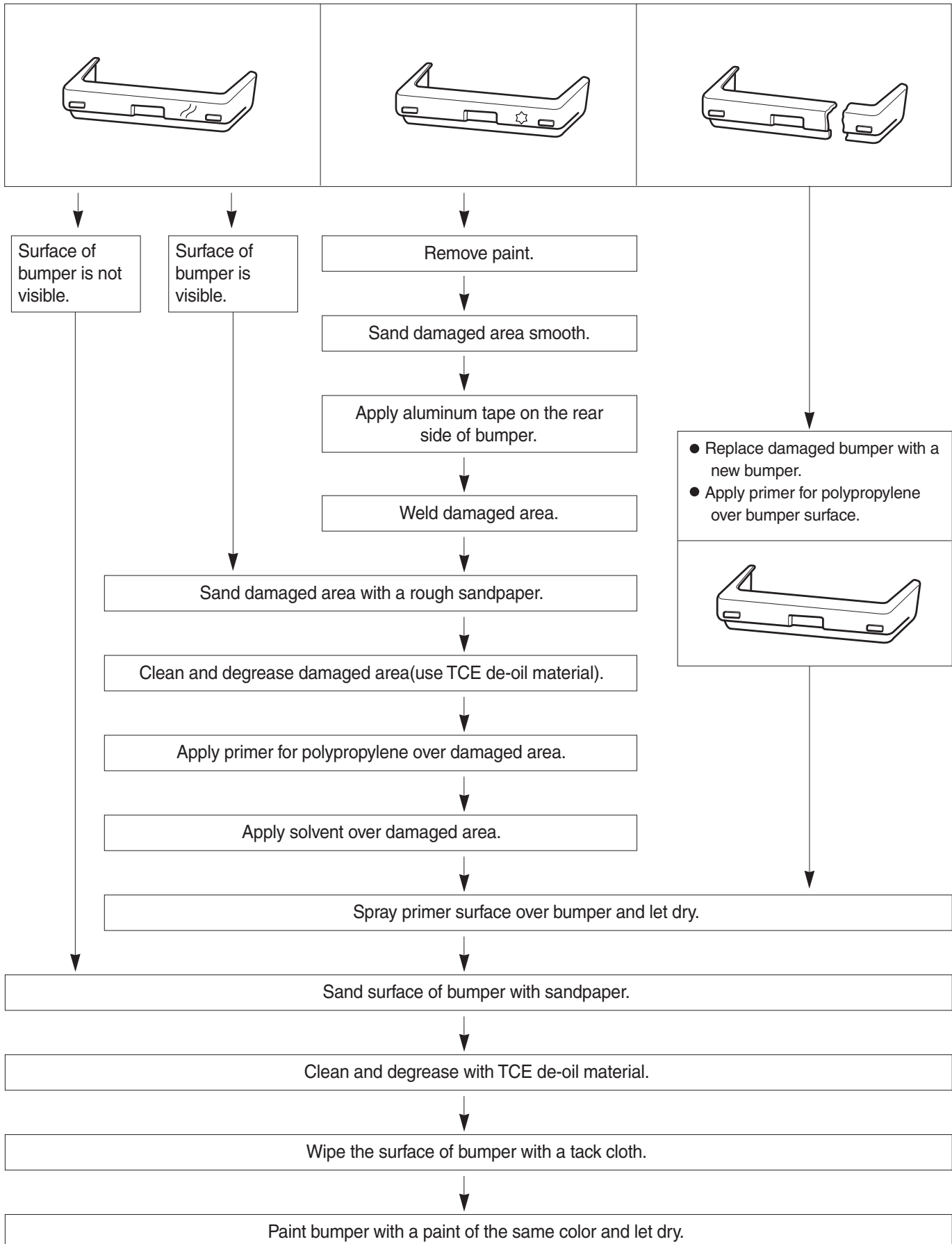
A3EB3602

3. If a crack on bumper section (A) is less than 4 in.(100 mm) (less than half of the bumper height).



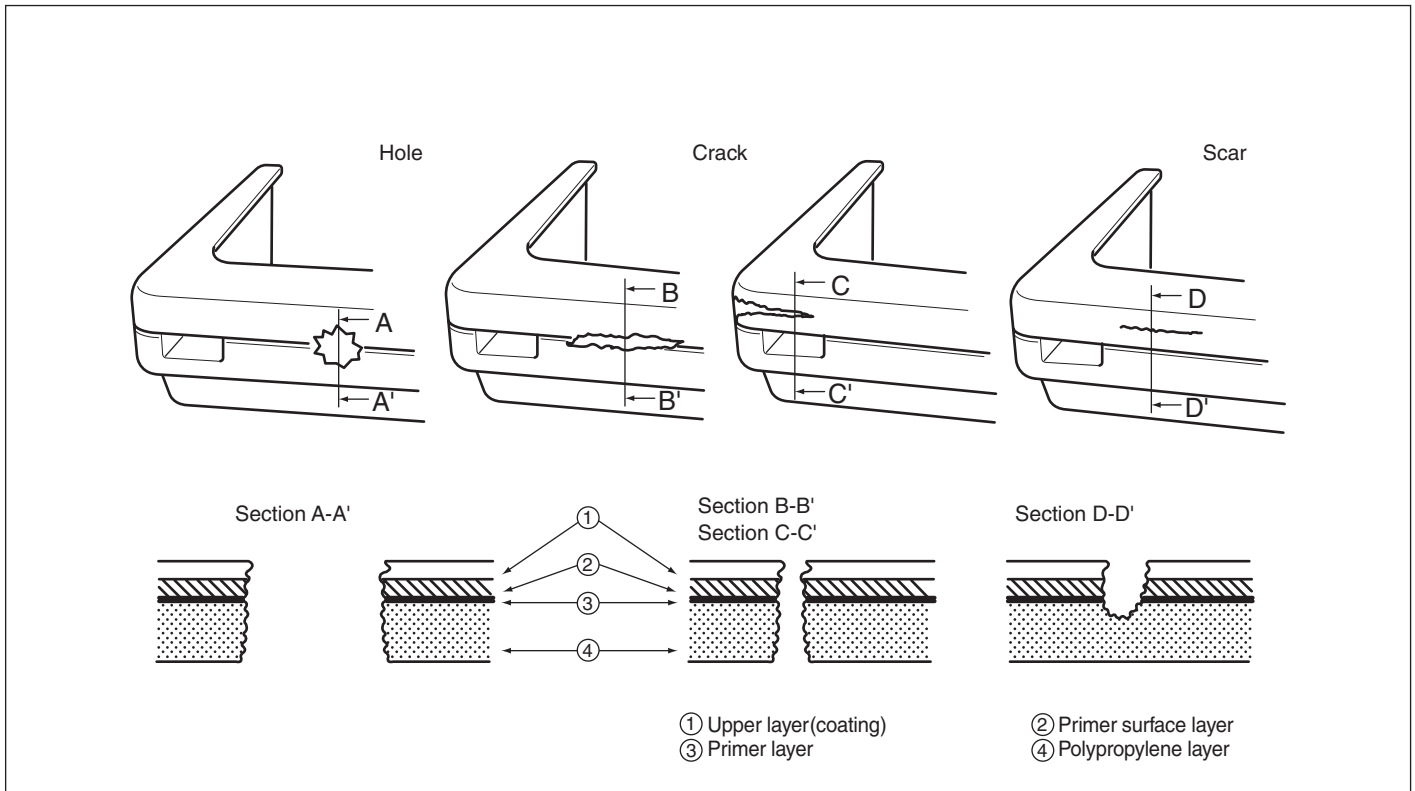
A3EB3603

## Bumper repair procedure

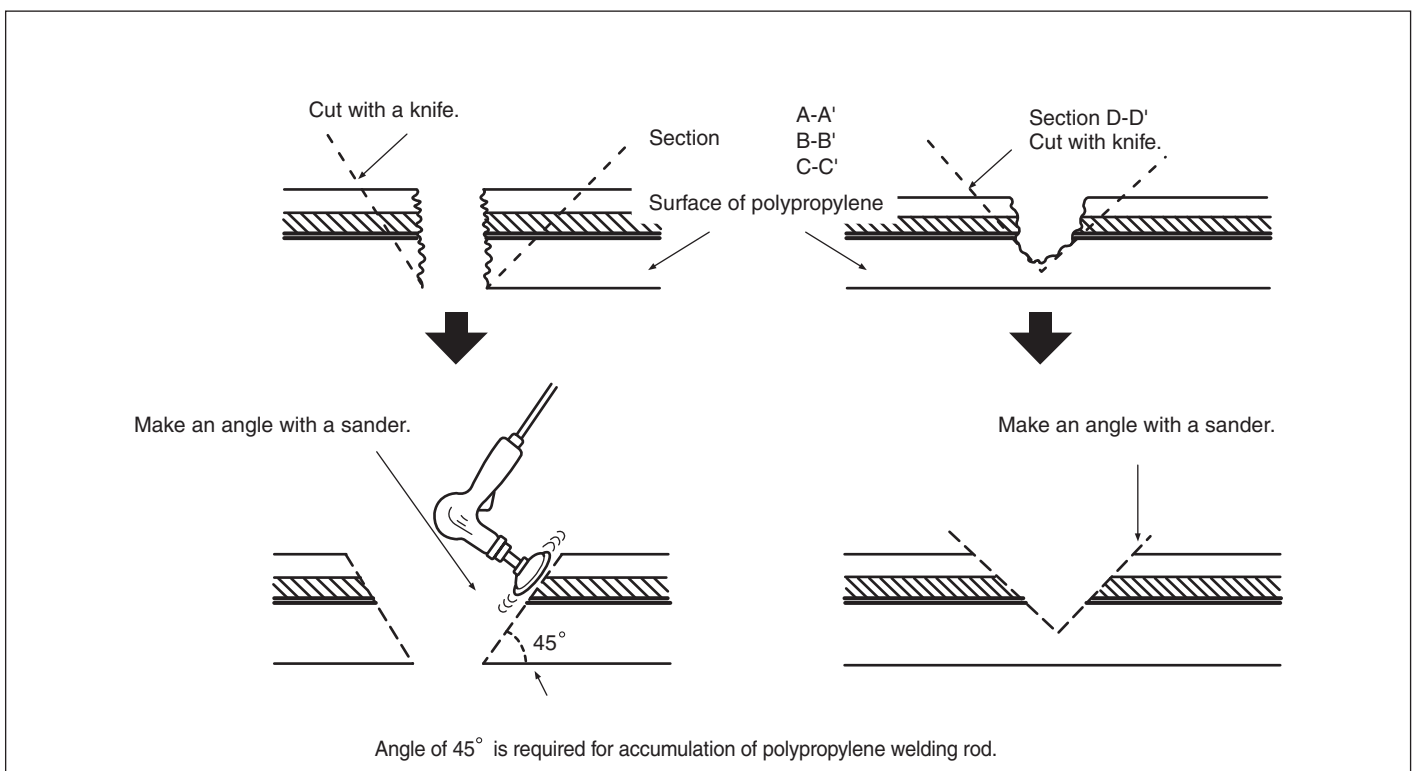


## Repair method for PP bumper

Damage to the bumper that reaches the surface of the polypropylene cannot be fixed just by painting. Use the repair methods shown below to repair damage that reaches the surface of the polypropylene.



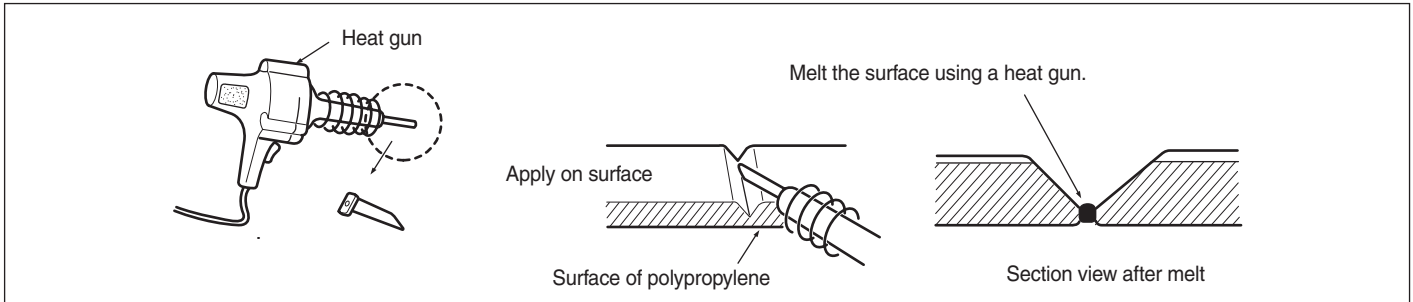
1. Rough cut the damaged area 45° using a knife and then sand the angle smooth.



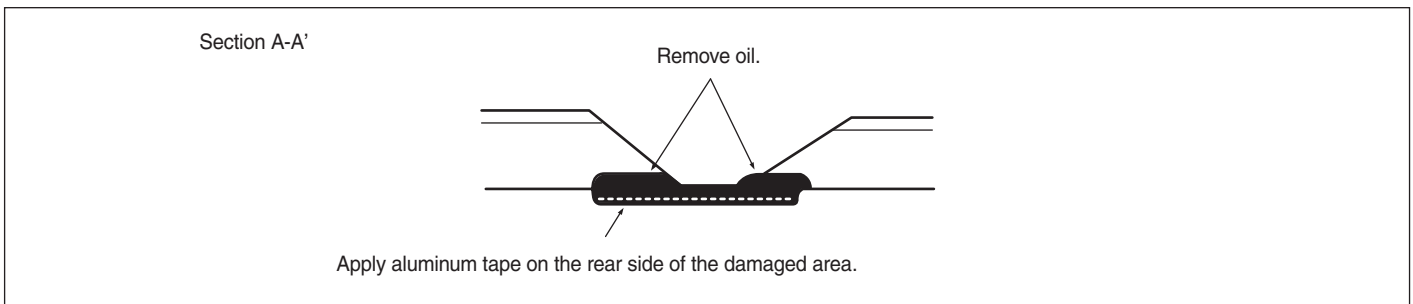
## 61-4 Plastic parts

### 2. Welding damaged area

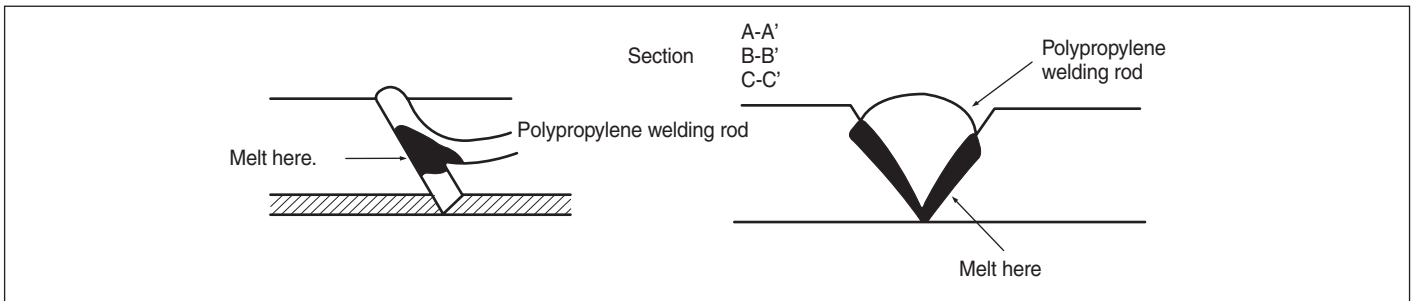
a) To repair cracked area, melt the area using a heat gun and attachment.



b) To repair a hole, remove oil from the damaged area and apply aluminum tape to the rear side of the damaged area.

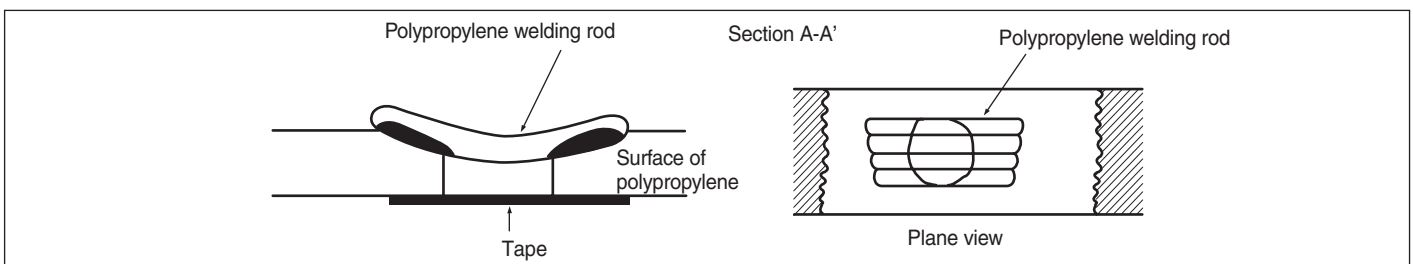


### 3. Melt polypropylene welding rod using a heat gun and fill in the cracked area.

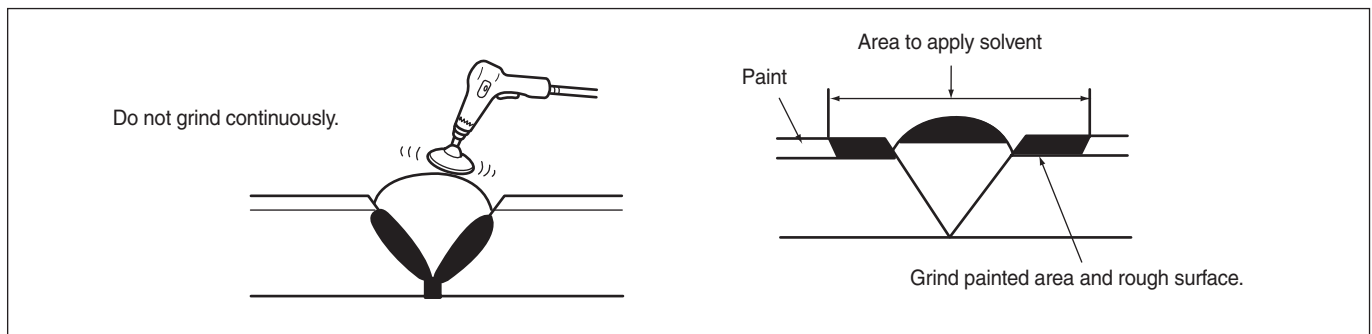


#### \* Notice

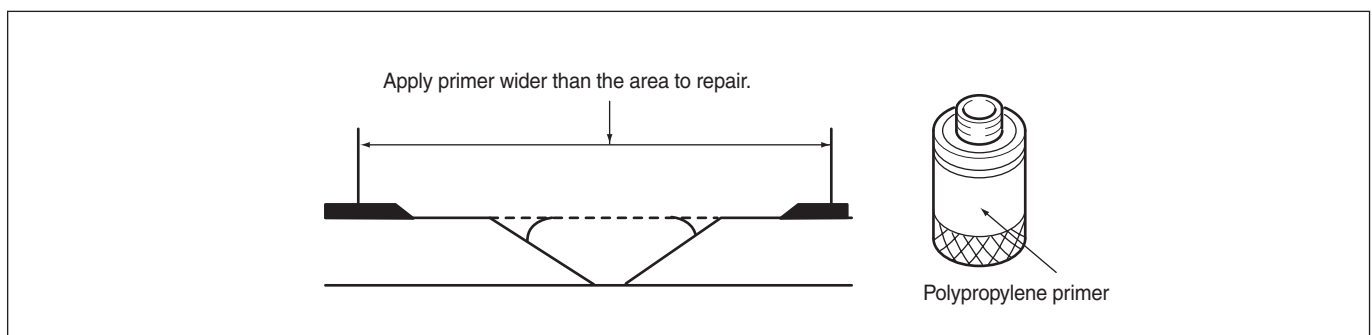
- Heat and melt the area indicated.
- Melt the welding rod carefully so that it does not over-melt. If the welding rod over-melts like jelly, the welding strength will deteriorate.
- Use the heat gun 0.4~0.8 in. (10~20 mm) away from the repair area to be welded.
- Welding rod should not move until the welded area is cooled.



4. Grind polypropylene surface carefully. It melts easily due to the heat generated by friction. If melted, remove that area. Also, grind the area where solvent is to be applied.



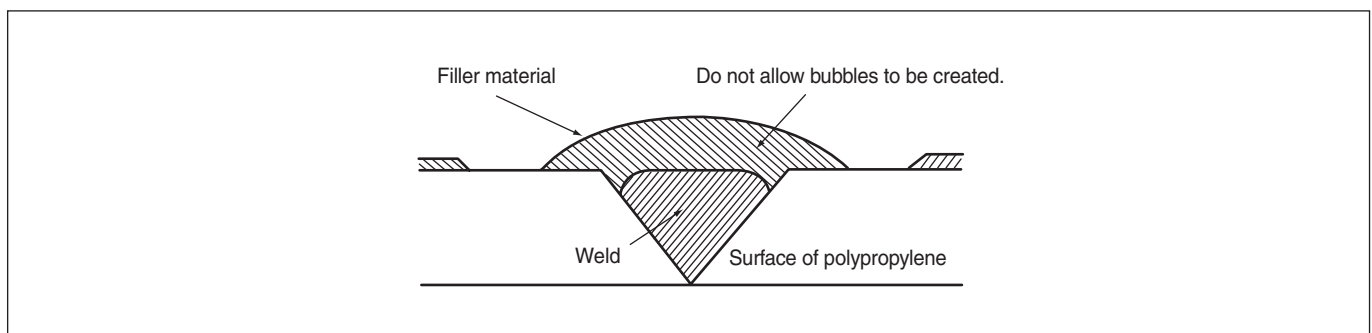
5. Apply polypropylene primer evenly with a brush over an area wider than the area to be repaired. Dry it at 20°C(68°F) for more than 10 minutes.



6. Mix main filler material and hardener at a ratio depending on paint specifications. Mix filler material and apply over the damaged area.

**\* Notice**

- Mix main filler material and hardener so that no bubbles are made.
- Work immediately after mixing filler material because the filler material hardens quickly (in about 5 minutes).
- Dry it at 20°C(68°F) for about 30 minutes before sanding.



- Filler material consists of two types of epoxy. When the filler material hardens, you will have a desirable finish with flexibility like polypropylene.
- Use only filler material designed for use on polypropylene bumpers.

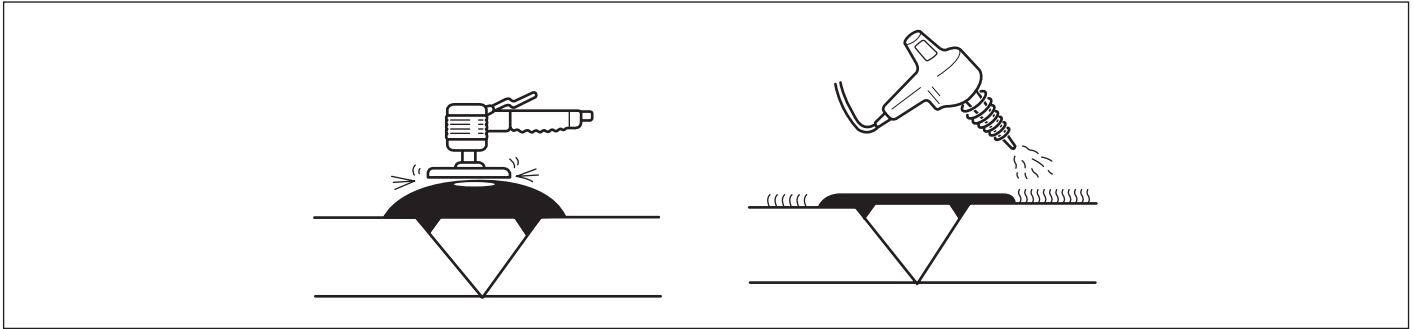
## 61-6 Plastic parts

7. Sand the damaged area with sandpaper using #180~#240 grit paper.

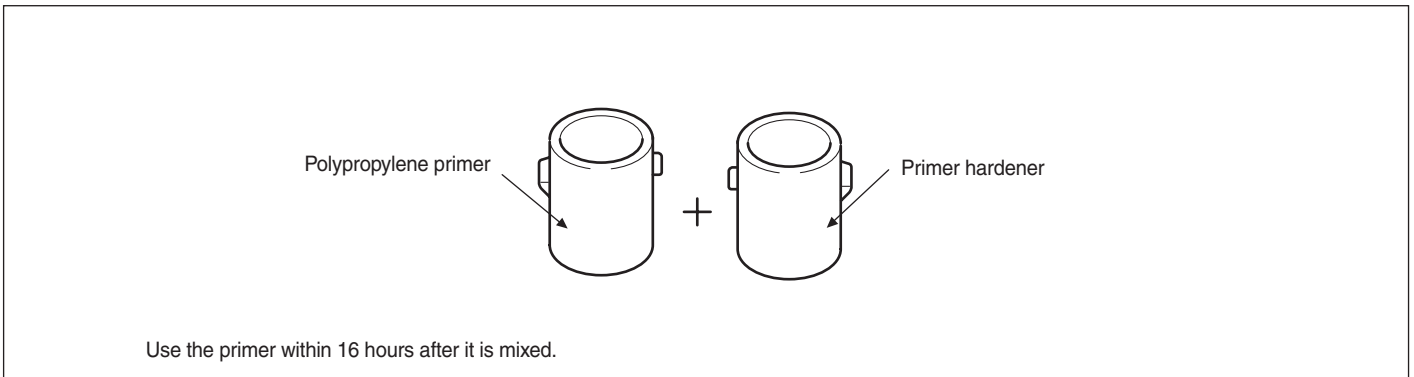
**\* Notice**

- The surface will not be even if excessive force is applied during sanding.
- If there is fuzz in the damaged area, heat it a little bit with a heater gun and melt it.

8. Degrease the painted surface.



9. Mix polypropylene primer and hardener at a ratio depending on paint specifications. Spray polypropylene primer on the surface of the damaged area and the bumper.



10. Apply polypropylene primer.

**\* Notice**

- Use only water to clean after applying polypropylene primer. Solvent, if used, will melt the primer.

11. Lightly sand the sprayed area using a primer surfacer, and finish the surface of the bumper with a sandpaper(#400~#600).

The polypropylene surface should not be exposed.(Either wet sanding or dry sanding is all right.)

12. Use agent(TCE(Tri Chloro Ethane) degreasing material) to remove any grease or oil, and wipe the finished surface of the bumper quickly with a clean cloth.

**\* Notice**

- *The painting method for the polypropylene bumper is the same used to paint the urethane bumper.*
- *Therefore, use urethane primer only on urethane bumpers and polypropylene primer on polypropylene bumpers.*

14. Air dry at 20°C(68°F) for about 8 hours, or dry in 60°C(140°F) for about 2 hours.

(Since drying time varies according to the type of paint used, follow paint manufacturers directions for drying times.)

**\* Notice**

- *Air dry if possible. Forced drying may create air bubbles on the top layer.*