

SPORTAGE

Body shop Manual

CONTENTS

FOREWORD

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

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 SPORTAGE Service Manual. Information regarding electrical harness routing/ connections, etc. can be found in the SPORTAGE 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 :

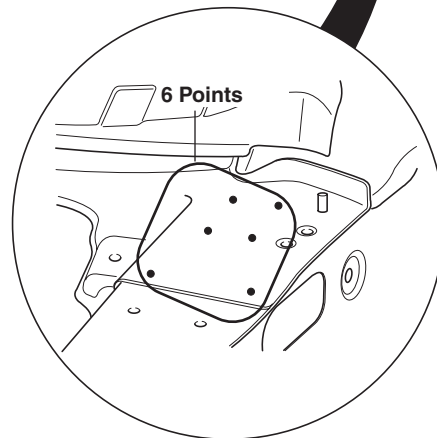
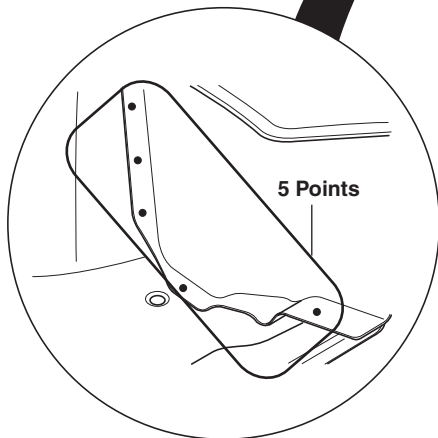
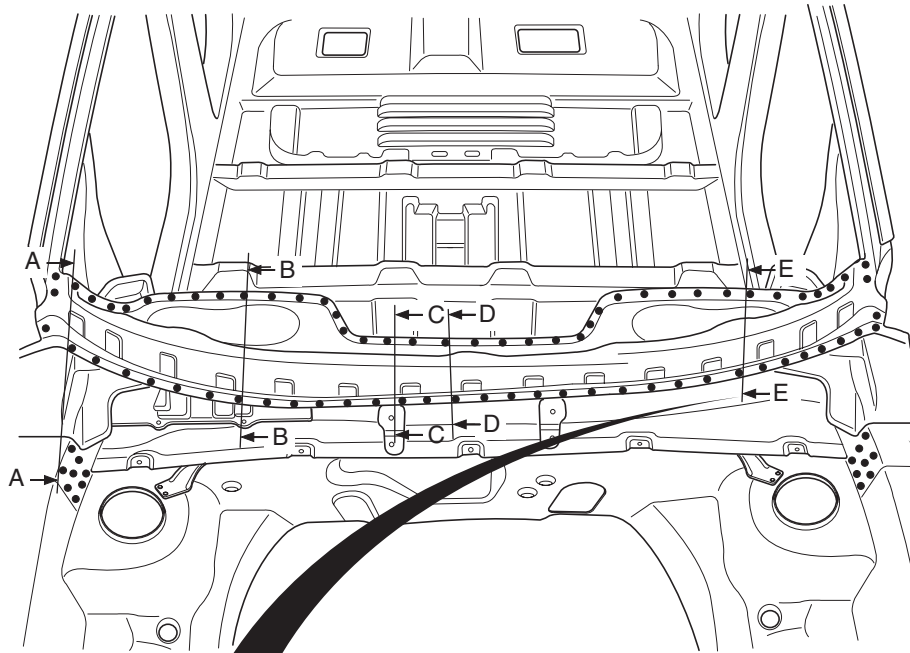
Severe engine and transaxle damage may result from the use of poor quality fuels and lubricants that do not meet Kia specifications. You must always use high quality fuels and lubricants that meet the specifications described on the specification section in the relevant group of the Workshop Manual.

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21-18 Replacing body panels



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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

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00

For best results

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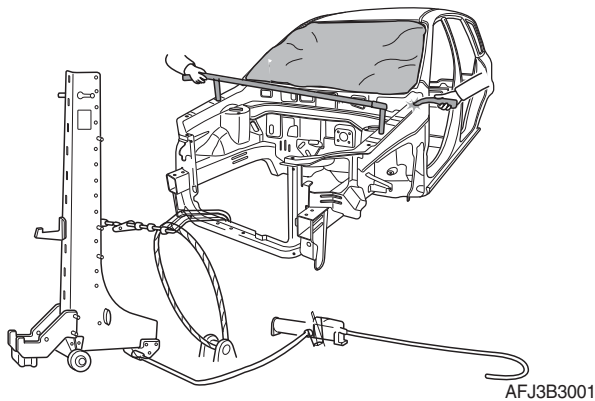
Body colors and major specifications

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Fundamental procedures

Vehicle protection

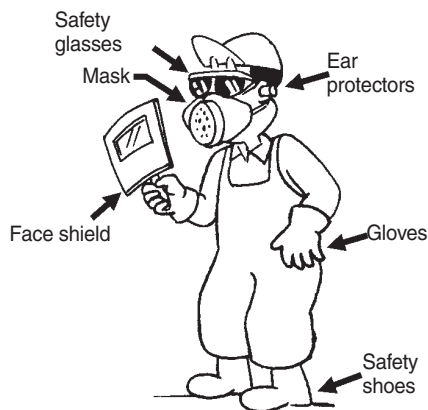
1. Cover the seats before performing any procedure to keep them from getting dirty.
2. Cover all glasses, seats and mats with a heat resistant cover when welding.



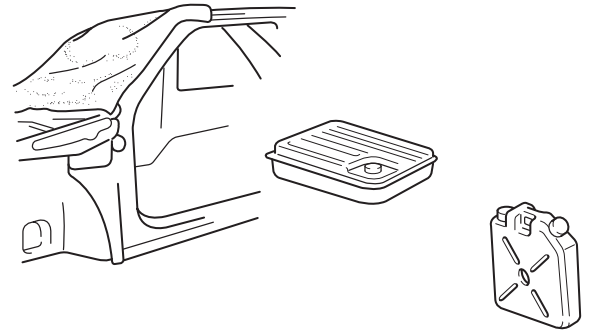
3. Protect moldings, garnishes and ornaments.

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.

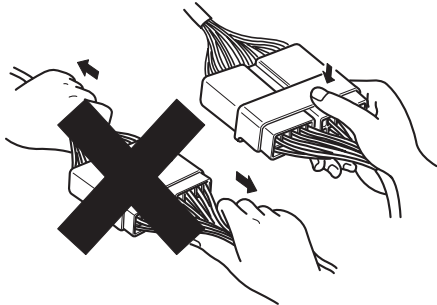
00-2 General information

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

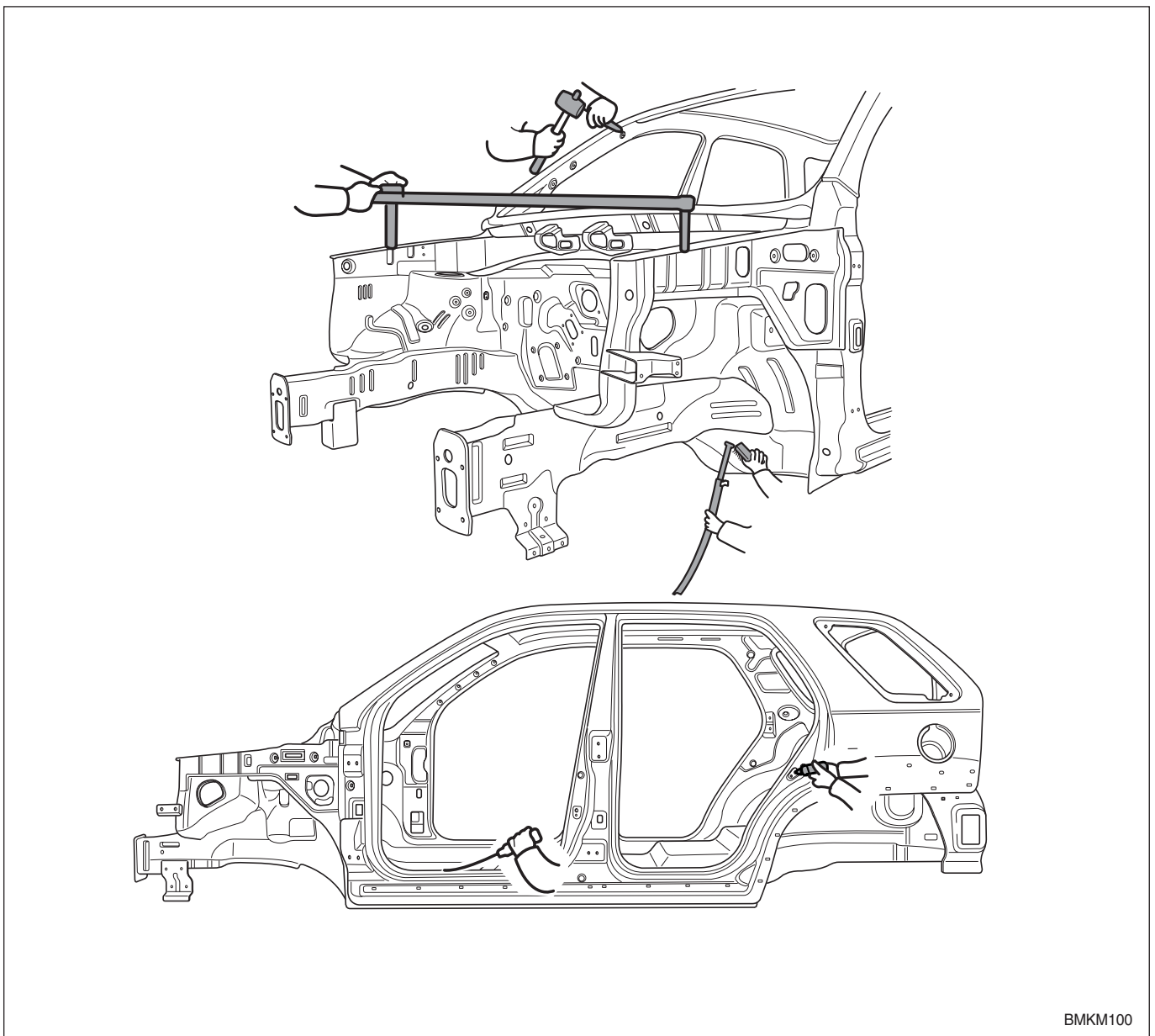
Measure the dimensions of the damaged area according to the body dimension drawings before disassembling and repairing. Adjust dimensions with body frame adjuster if deformed.

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.

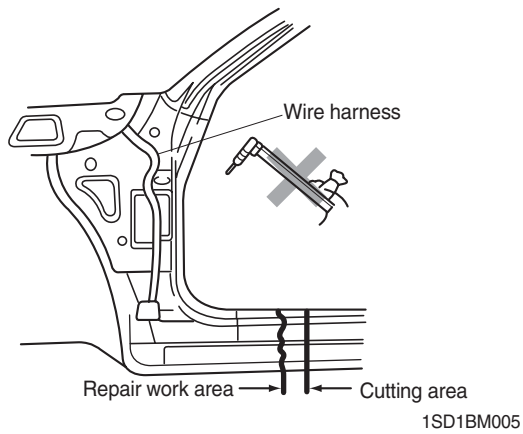


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00-4 General information

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.



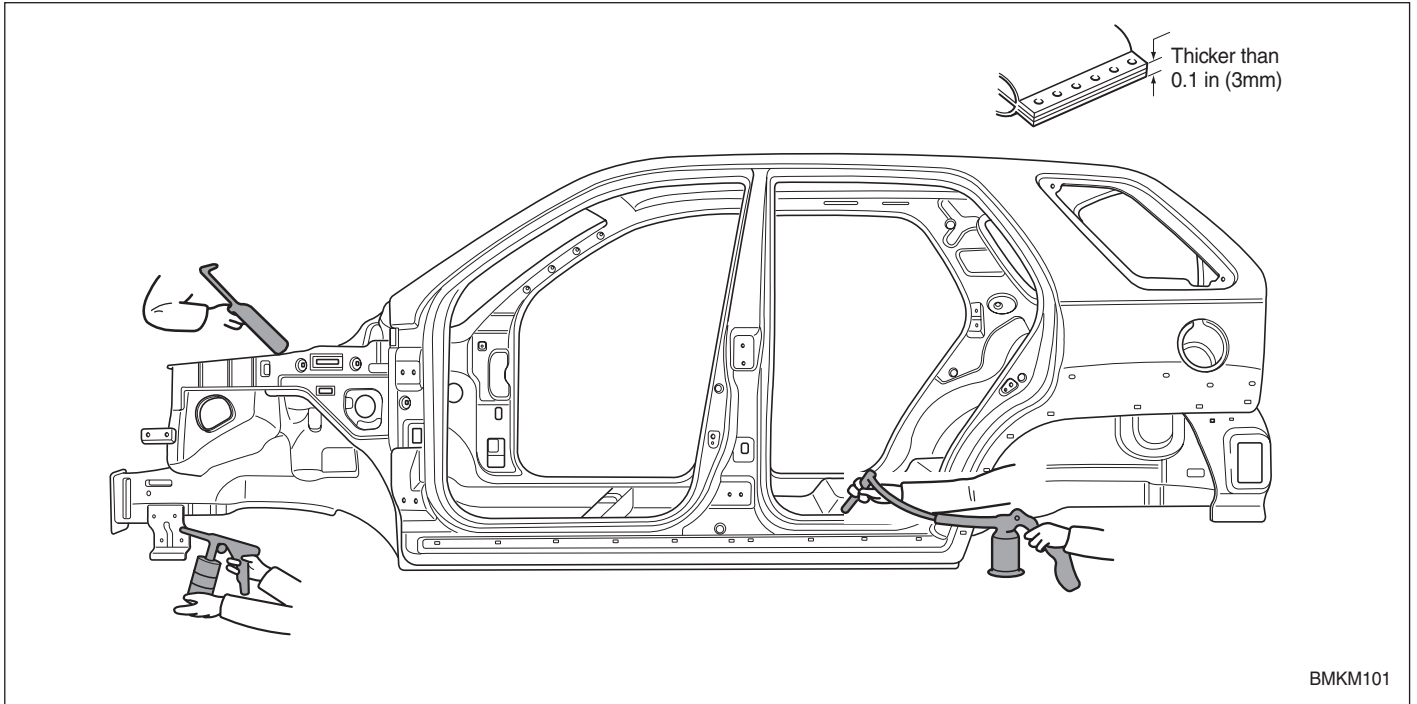
Preparation of assembly

Applying spot sealer

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

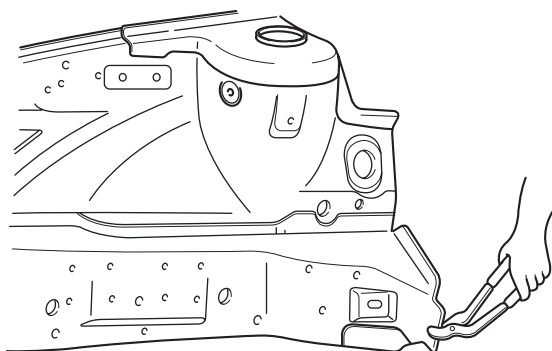
Selecting a welding method

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.



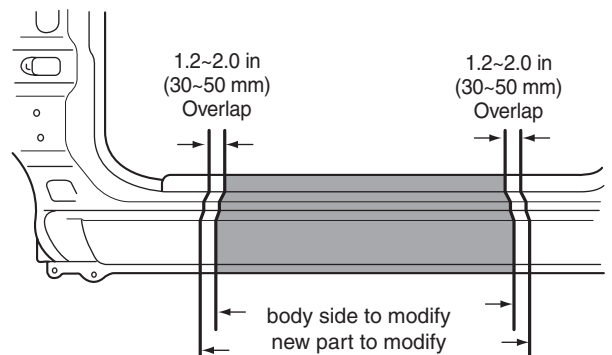
Machining holes for plug welding

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

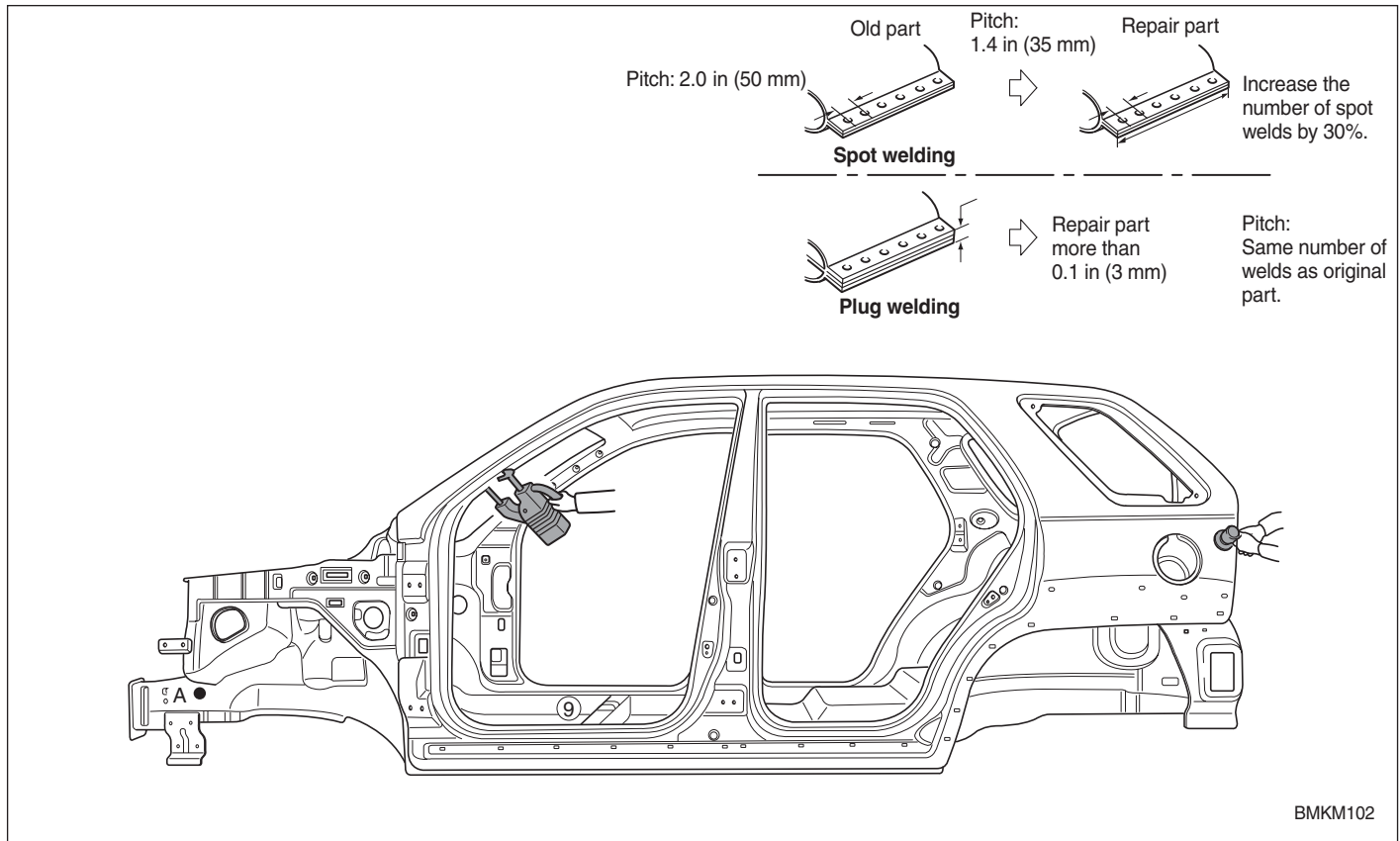
Assembly

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.

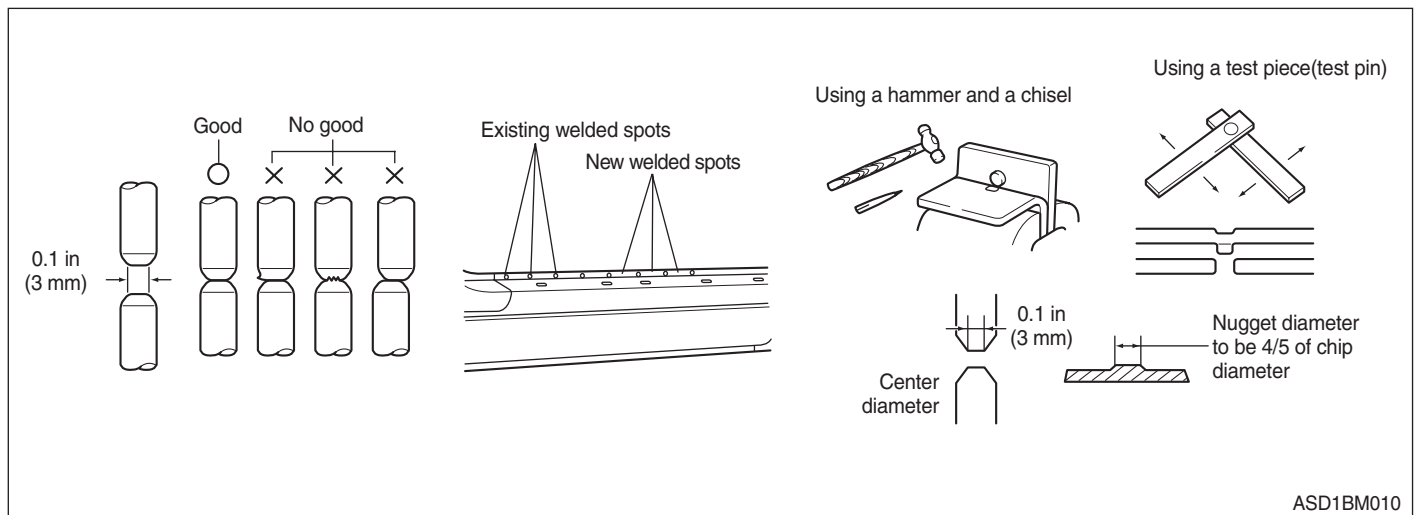
Caution when welding

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.



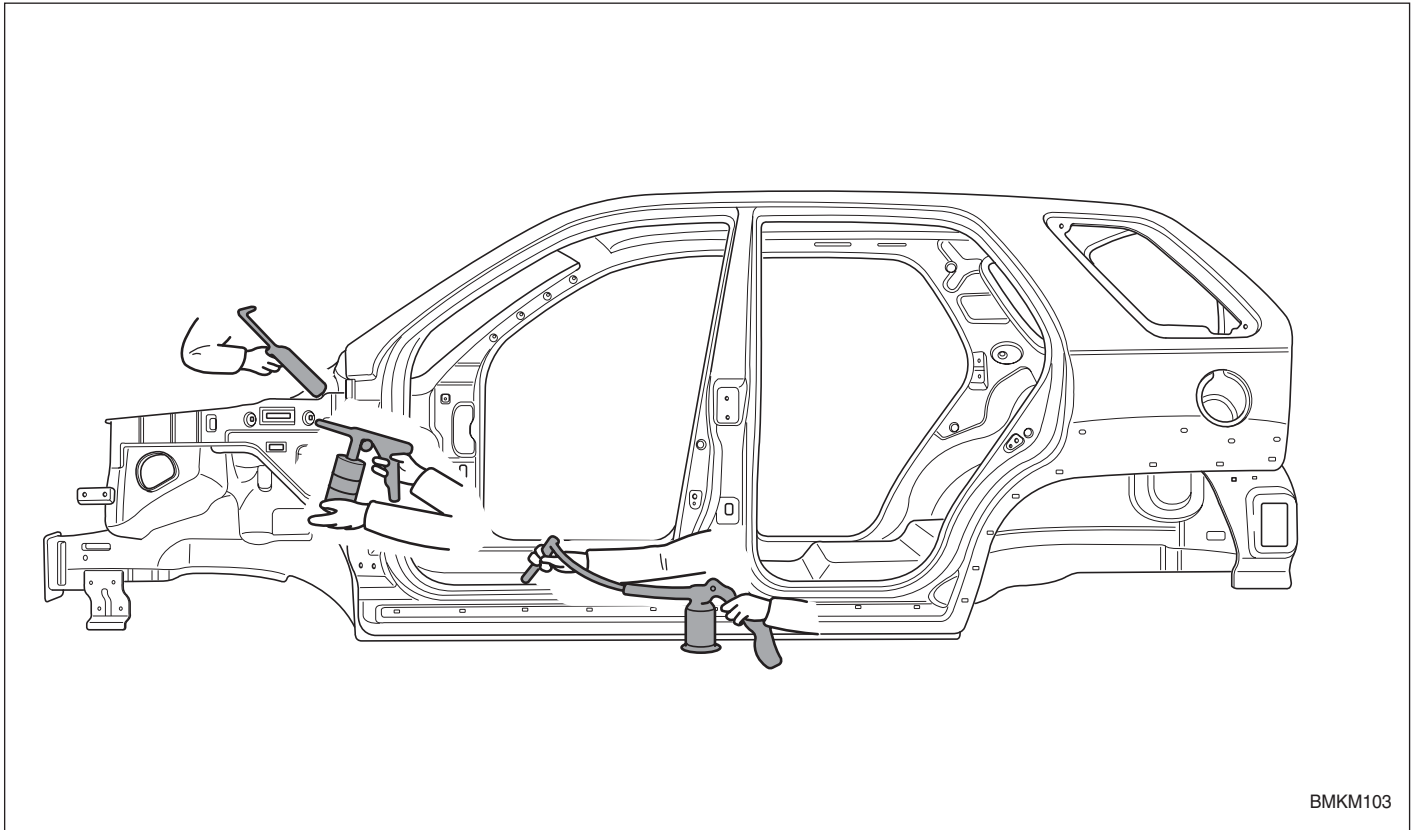
Rustproof treatment after assembly

Body sealing

Apply body sealer where necessary.

Applying rustproof material

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

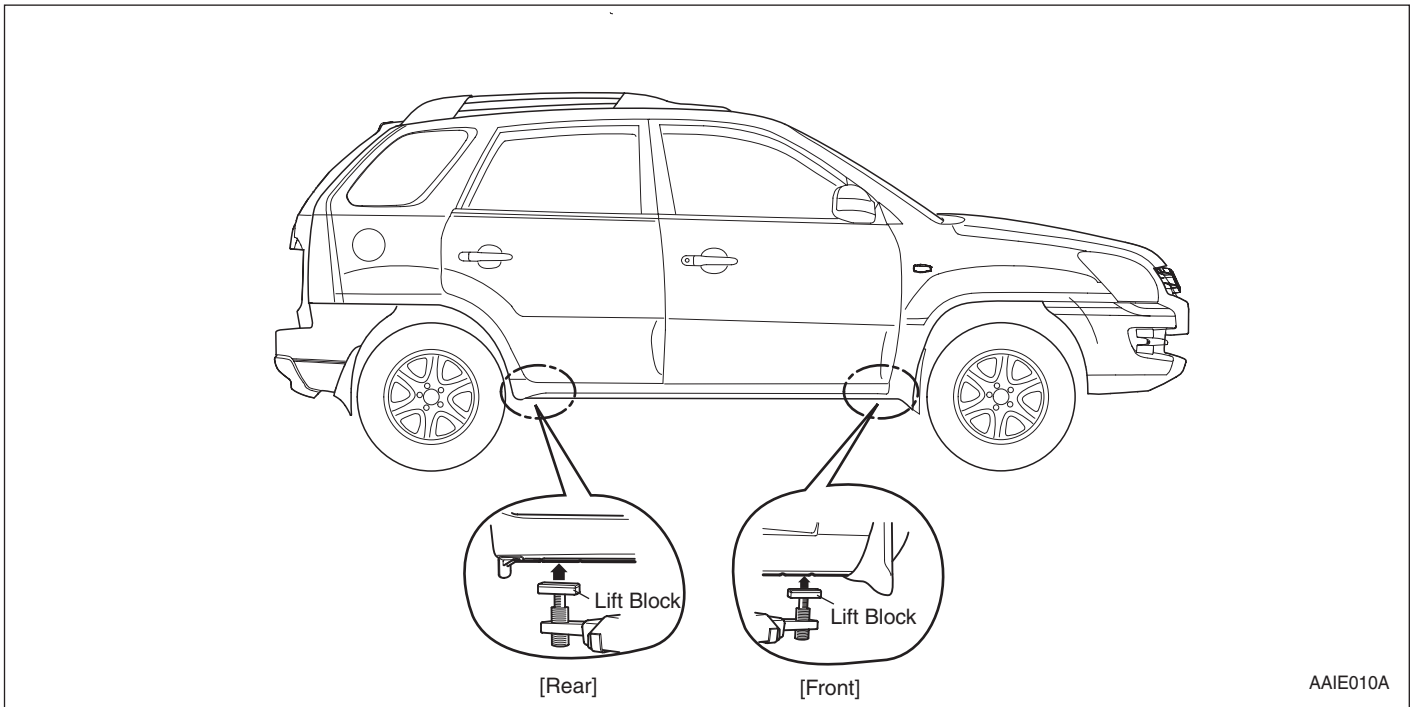


Applying undercoat

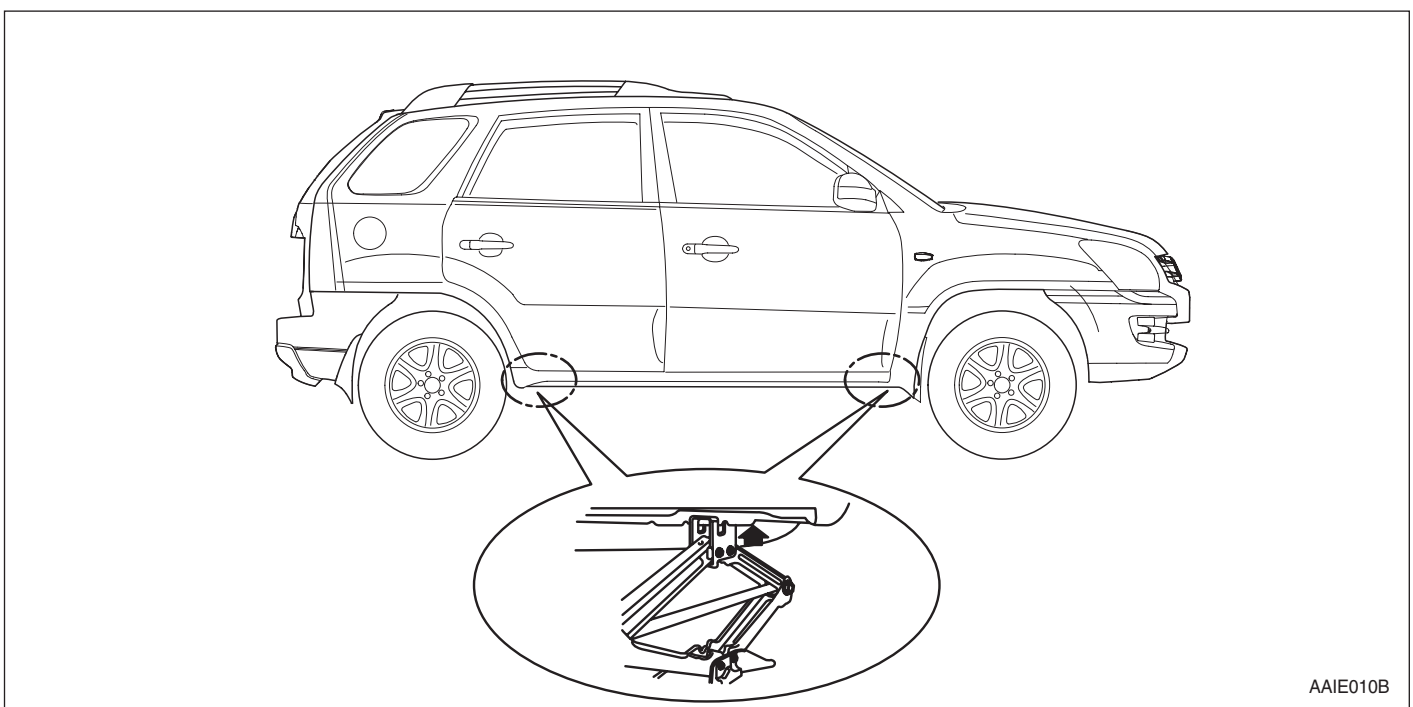
Apply undercoat on the body where necessary.

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.

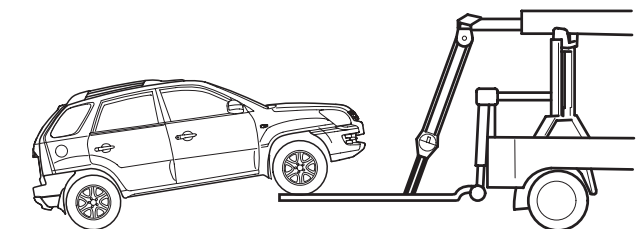


Jack Support Positions

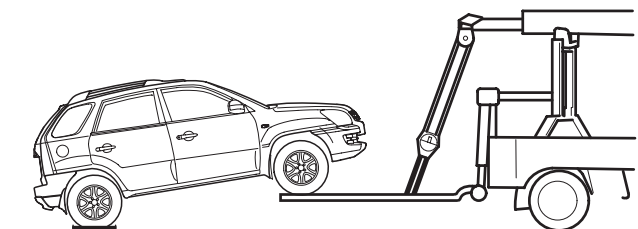


Towing

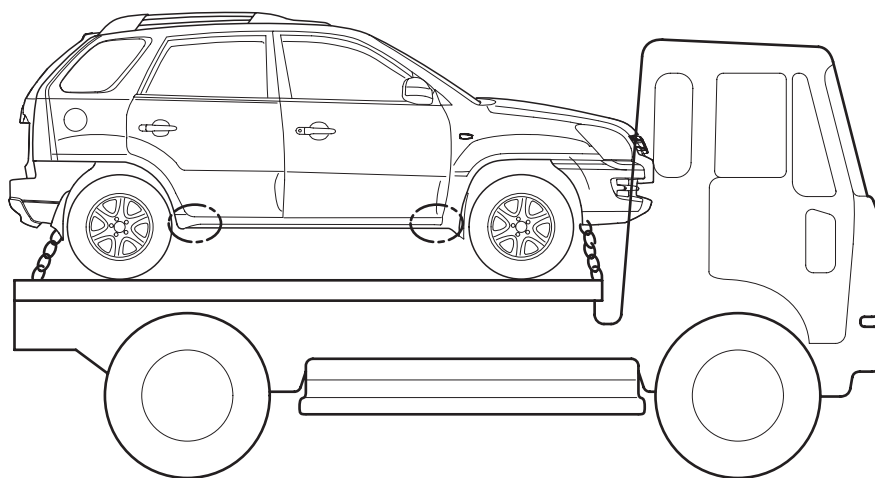
[2WD]



[4WD]



[Wheel lift]



[Flat - bed]

AAIE010C

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.

The use of wheel dollies or flatbed is recommended.

On 2WD vehicles, it is acceptable to tow truck and wheel dollies are not used, the front of the vehicle should always be lifted, not the rear.

On 4WD vehicles, your vehicle must be towed with a wheel lift and dollies or flatbed equipment with all the wheels off the ground.

When being towed by a commercial tow truck and wheel dollies are not used, the front of the vehicle should always be lifted, not the rear.

Body colors and major specifications

Kia color codes

Kia code	Paint color
6D	Smoky Brown
9P	Black Cherry
3P	Volcanic Red
K6	Smart Blue
1L	Vert Jade Pearl
9L	Natural Olive
Y3	Greenish Gold
S6	Satin Silver
S4	Grayish Silver
UD	Clear White

Paint manufacture codes

Kia code	Color name	Dupont	Spies Hecker	Standox	BASF	Akzo Nobel	PPG
6D	Smoky Brown	X1950	755710	6D	6D	KIA9816	6D
9P	Black Cherry	X1951	755711	9P	9P	KIA9410	9P
3P	Volcanic Red	X1952	755712	3P	3P	KIA9320	3P
K6	Smart Blue	X1953	755713	K6	K6	KIA9540	K6
1L	Vert Jade Pearl	X1954	755714	1L	1L	KIA9525	1L
9L	Natural Olive	X1955	755715	9L	9L	KIA9626	9L
Y3	Greenish Gold	X1956	755716	Y3	Y3	KIA9815	Y3
S6	Satin Silver	X1957	755717	S6	S6	KIA9739	S6
S4	Grayish Silver	X1958	755718	S4	S4	KIA9738	S4
UD	Clear White	F2756	755719	UD	UD	KIA4004	UD

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
Side body panel.....	11- 5
Center floor panel	11- 6
Rear floor panel	11- 7
Roof panel(Without sunroof)	11- 8
Roof panel (With sunroof)	11- 9
Fender panel & Hood panel & Tail gate panel	11-10
Door panel	11-11

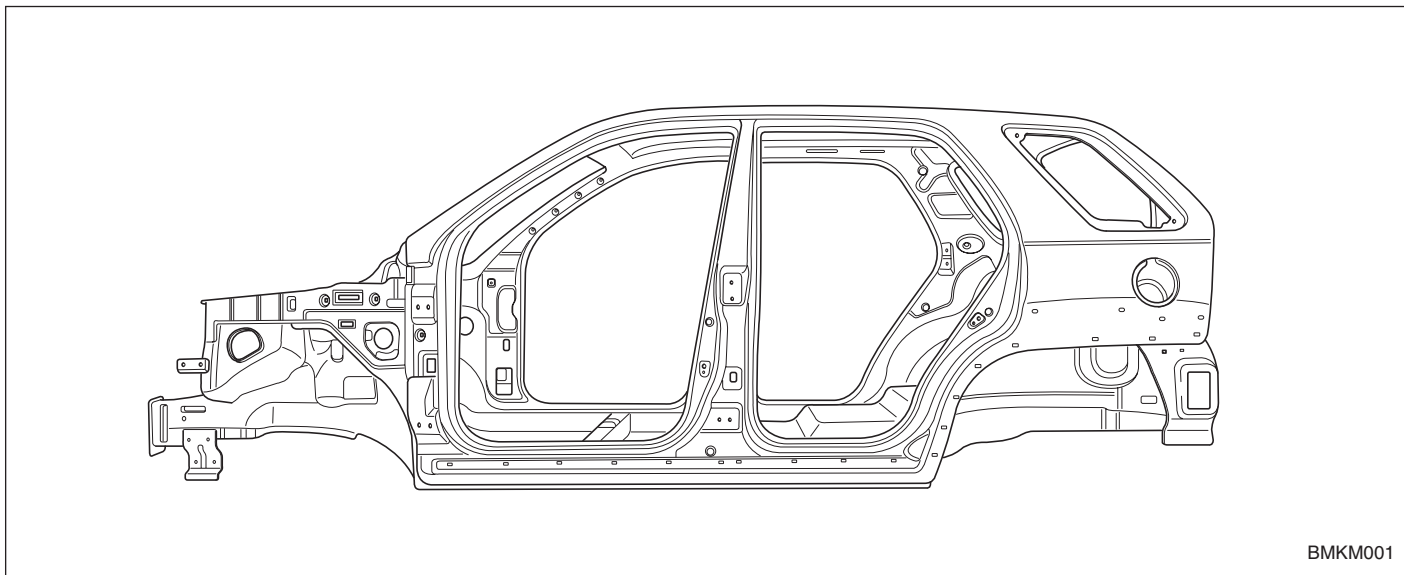
Zine-galvanized steel sheet used area

Radiator support panel	11-12
Fender apron panel.....	11-13
Cowl & Dash panel	11-14
Side body panel.....	11-15
Center floor panel	11-16
Rear floor panel	11-17
Roof panel(Without sunroof)	11-18
Roof panel (With sunroof)	11-19
Fender panel & Hood panel & Tail gate panel	11-20
Door panel	11-21

Body composition

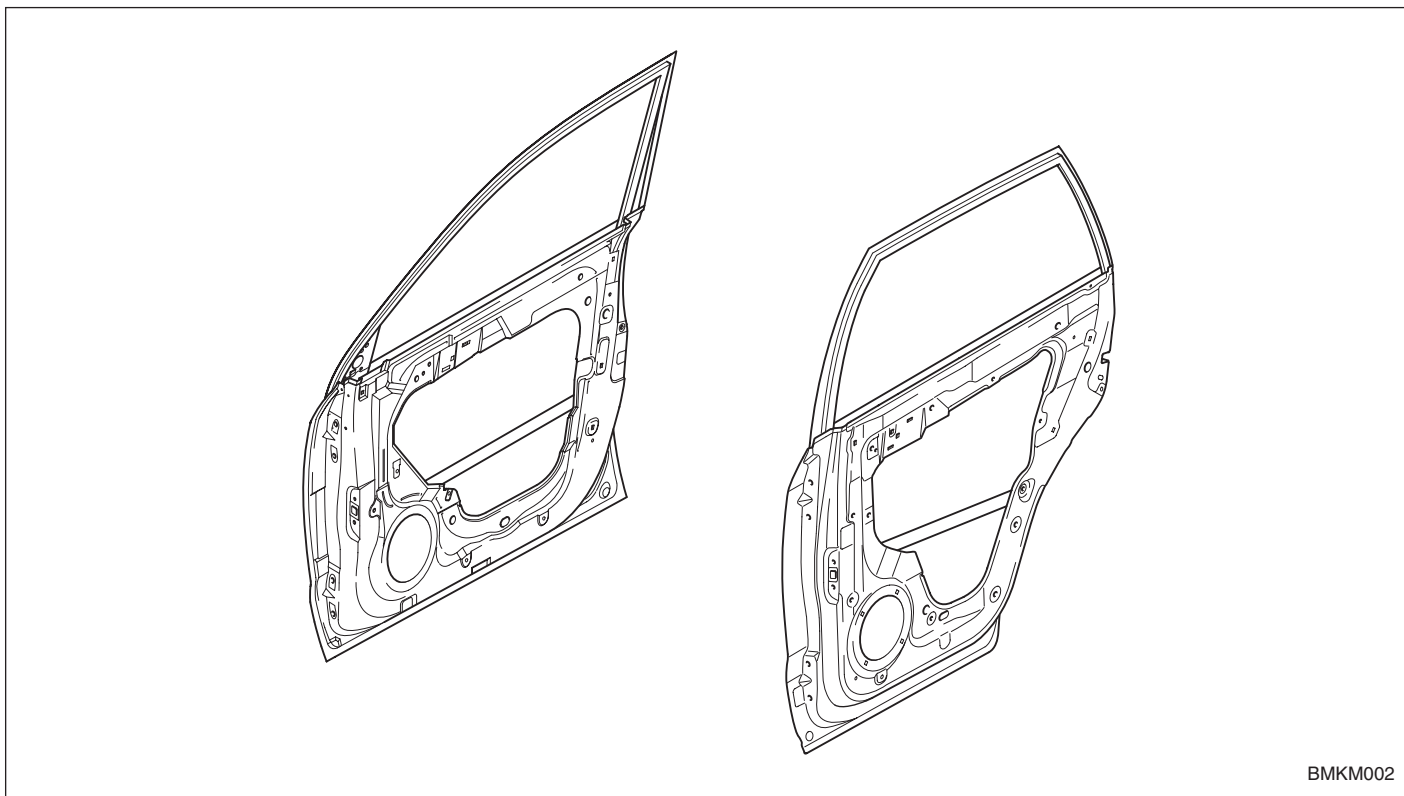
Body shell

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.

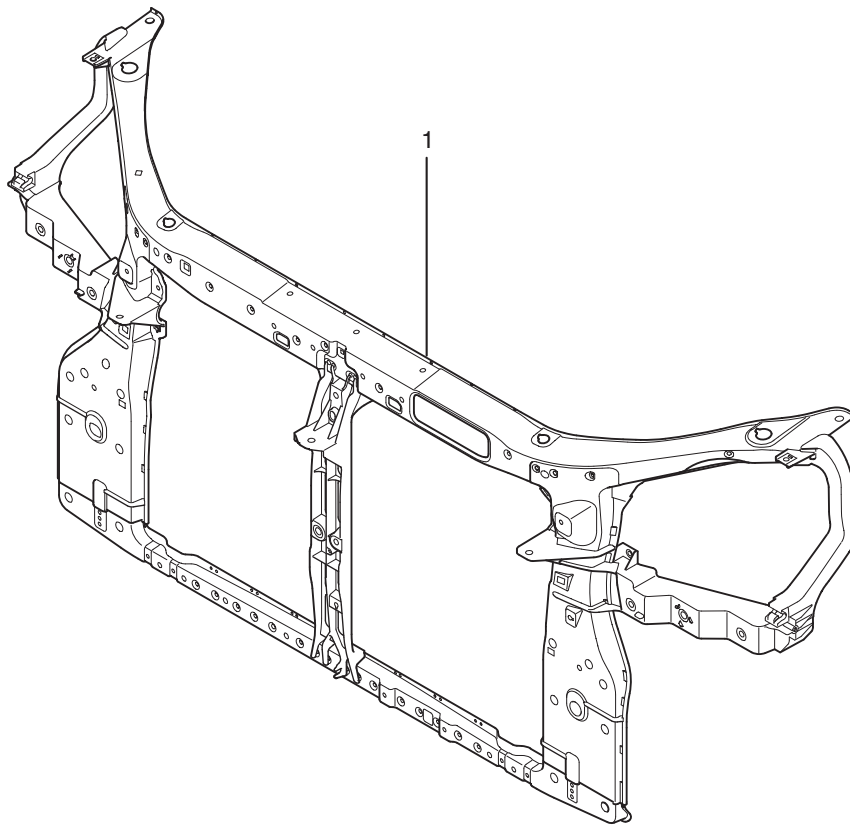


Body service holes

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



High tension steel sheet used area Radiator support panel

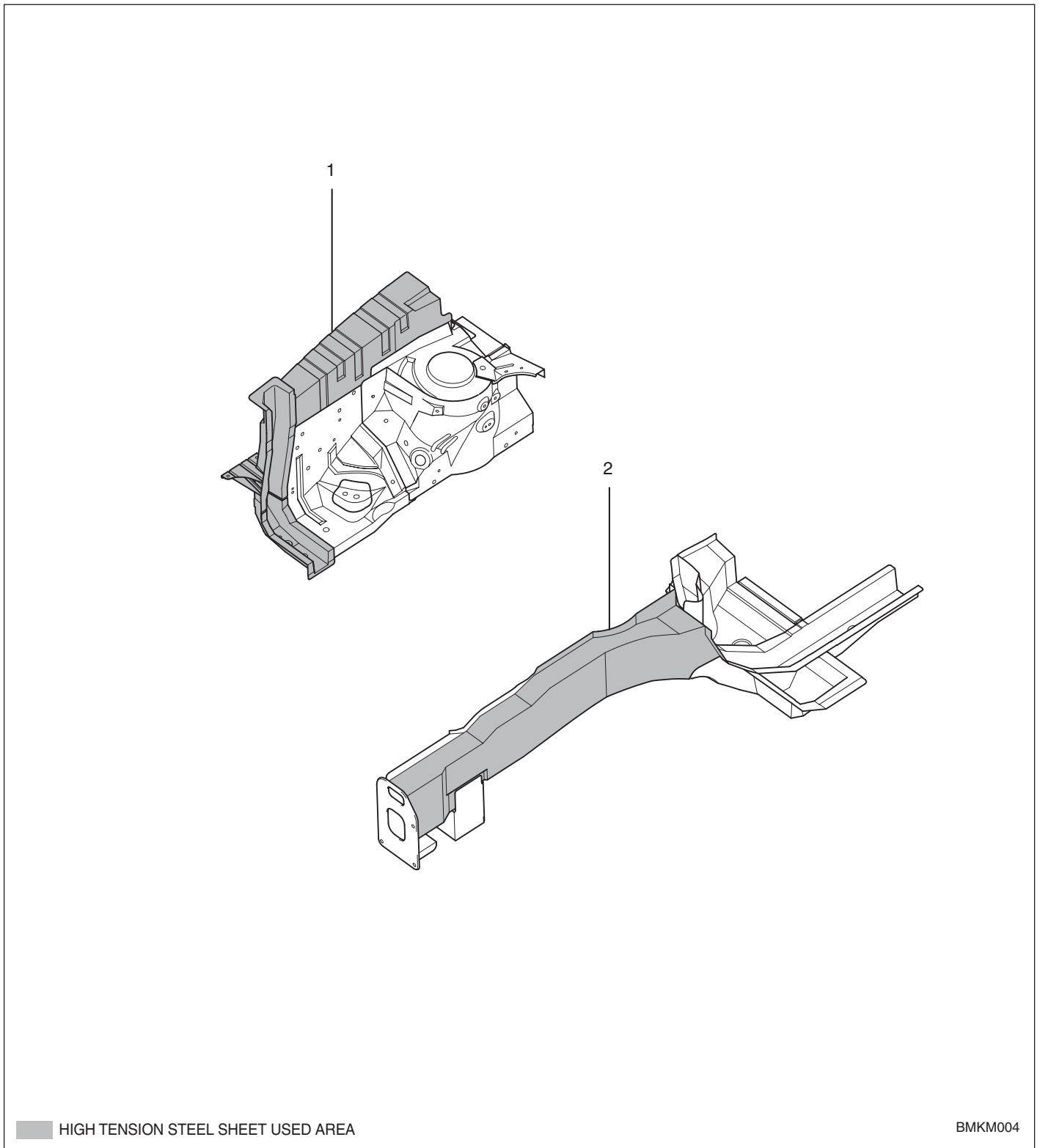


■ HIGH TENSION STEEL SHEET USED AREA

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(1) Radiator support panel complete

Fender apron panel

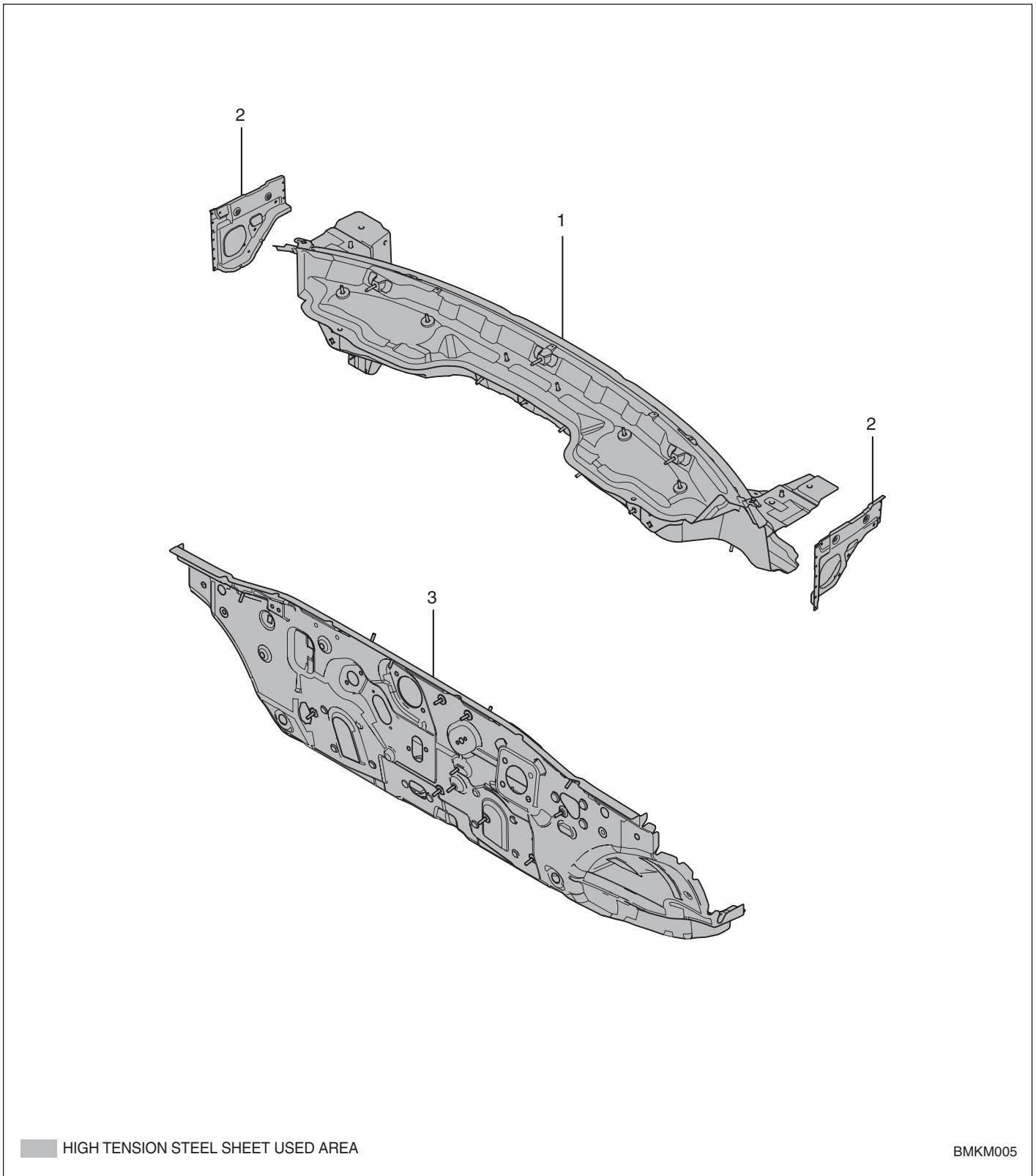


(1) Fender apron panel assembly

(2) Front side outer member assembly

BMKM004

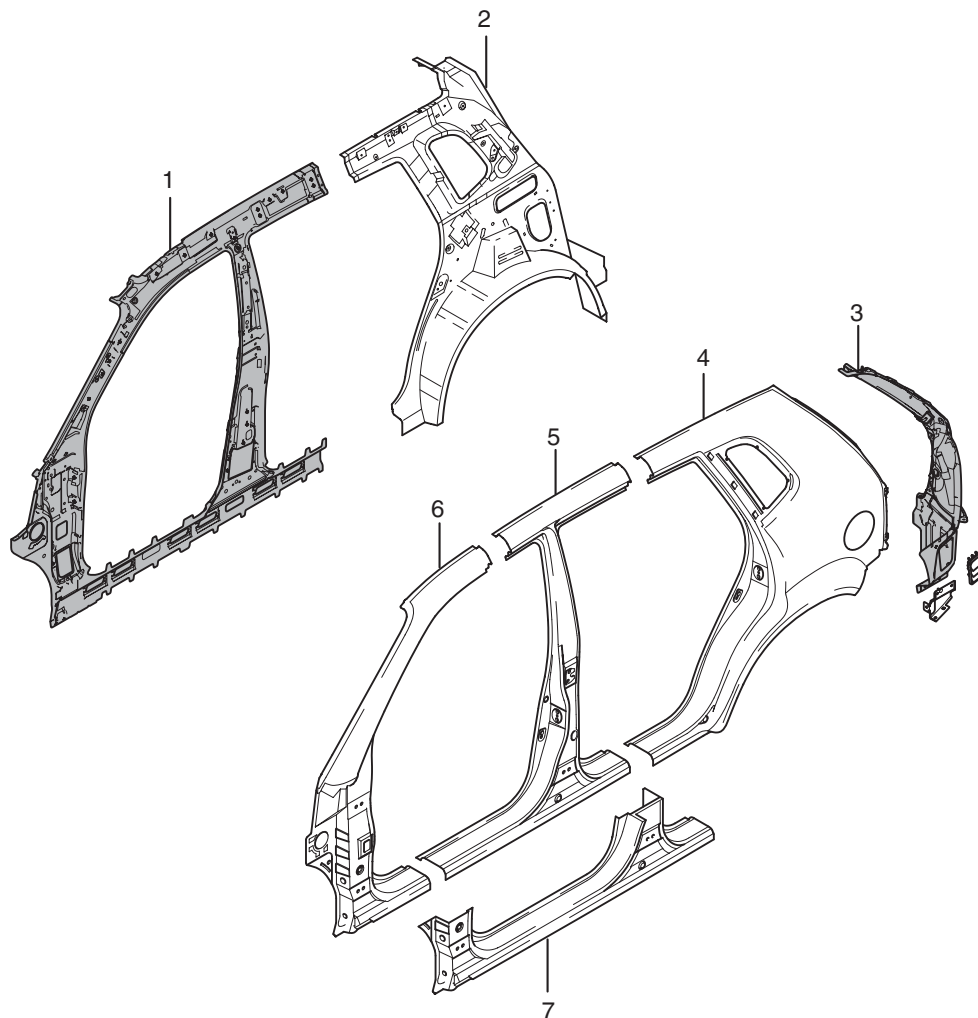
Cowl panel & Dash panel



- (1) Cowl panel complete
- (2) Cowl side outer panel

- (3) Dash panel complete

Side body panel

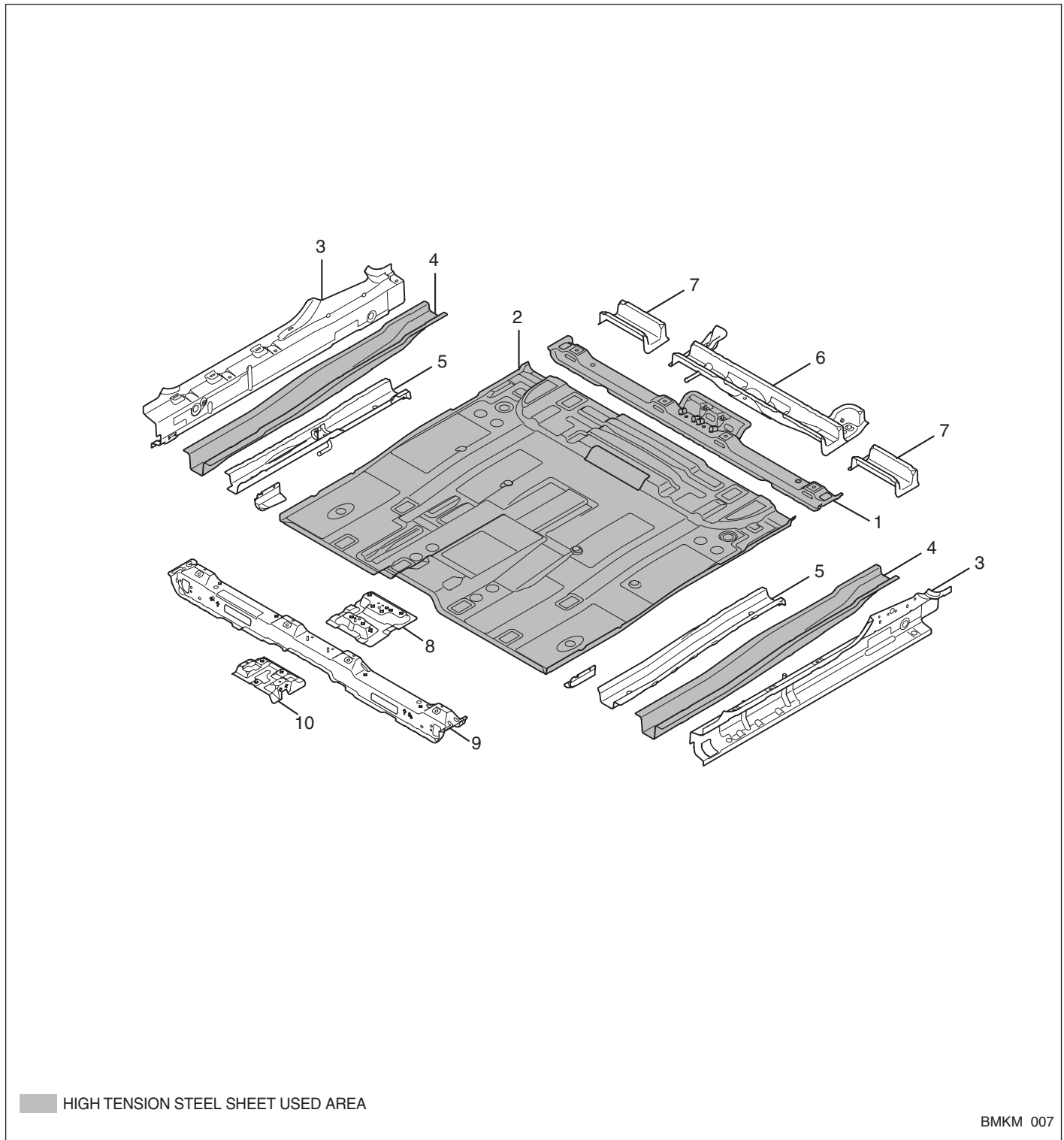


■ HIGH TENSION STEEL SHEET USED AREA

BMKM 006

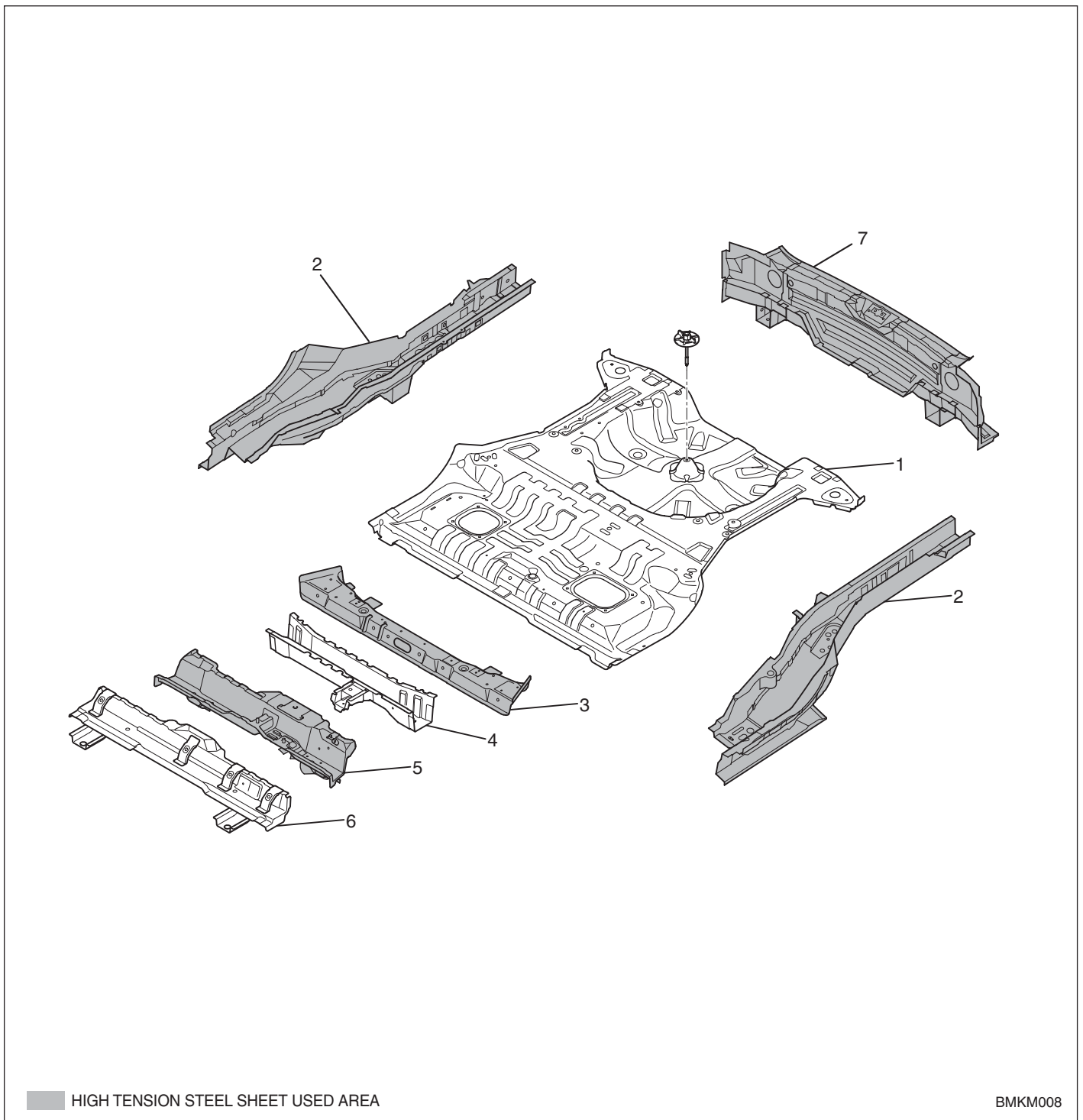
- (1) Front inner pillar assembly
- (2) Quarter inner panel assembly
- (3) Side outer rear extension assembly
- (4) Quarter outer panel assembly
- (5) Center outer pillar assembly
- (6) Pillar outer panel assembly
- (7) Side assembly outer panel

Center floor panel



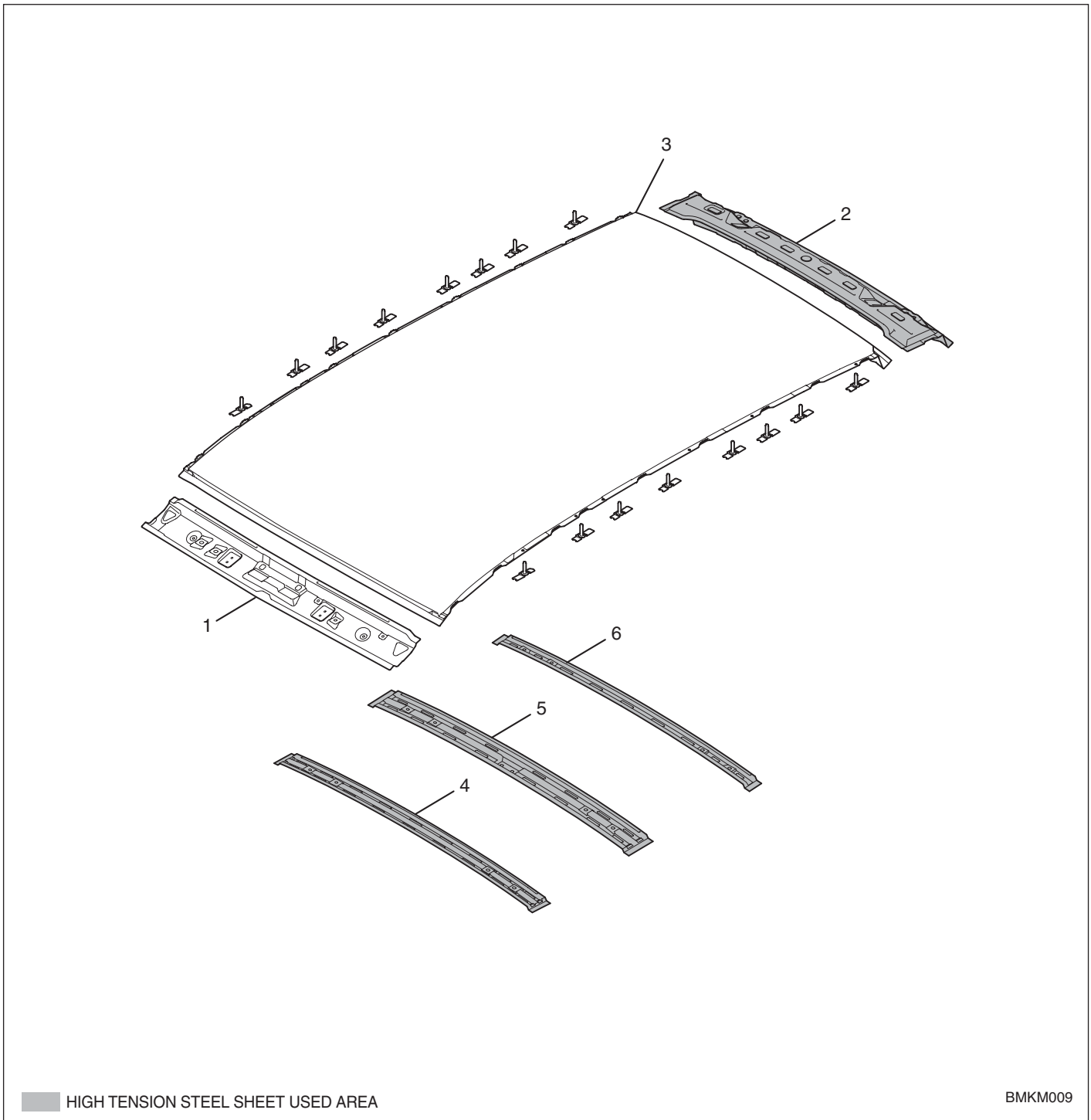
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|---|--|
| (1) Front seat cross rear member assembly | (6) Propeller shaft mounting bracket |
| (2) Center floor panel | (7) Skid plate mounting gusset |
| (3) Side sill inner panel assembly | (8) Parking brake lever reinforcement assembly |
| (4) Center floor side outer member assembly | (9) Front seat cross front member assembly |
| (5) Center floor side inner member assembly | (10) Center support bracket |

Rear floor panel



- (1) Rear floor panel
- (2) Rear floor side member assembly
- (3) Rear floor upper cross member assembly
- (4) Rear floor lower No.3 cross member assembly
- (5) Rear floor lower No.2 cross member assembly
- (6) Rear floor lower No.1 cross member assembly
- (7) Rear end cross member assembly

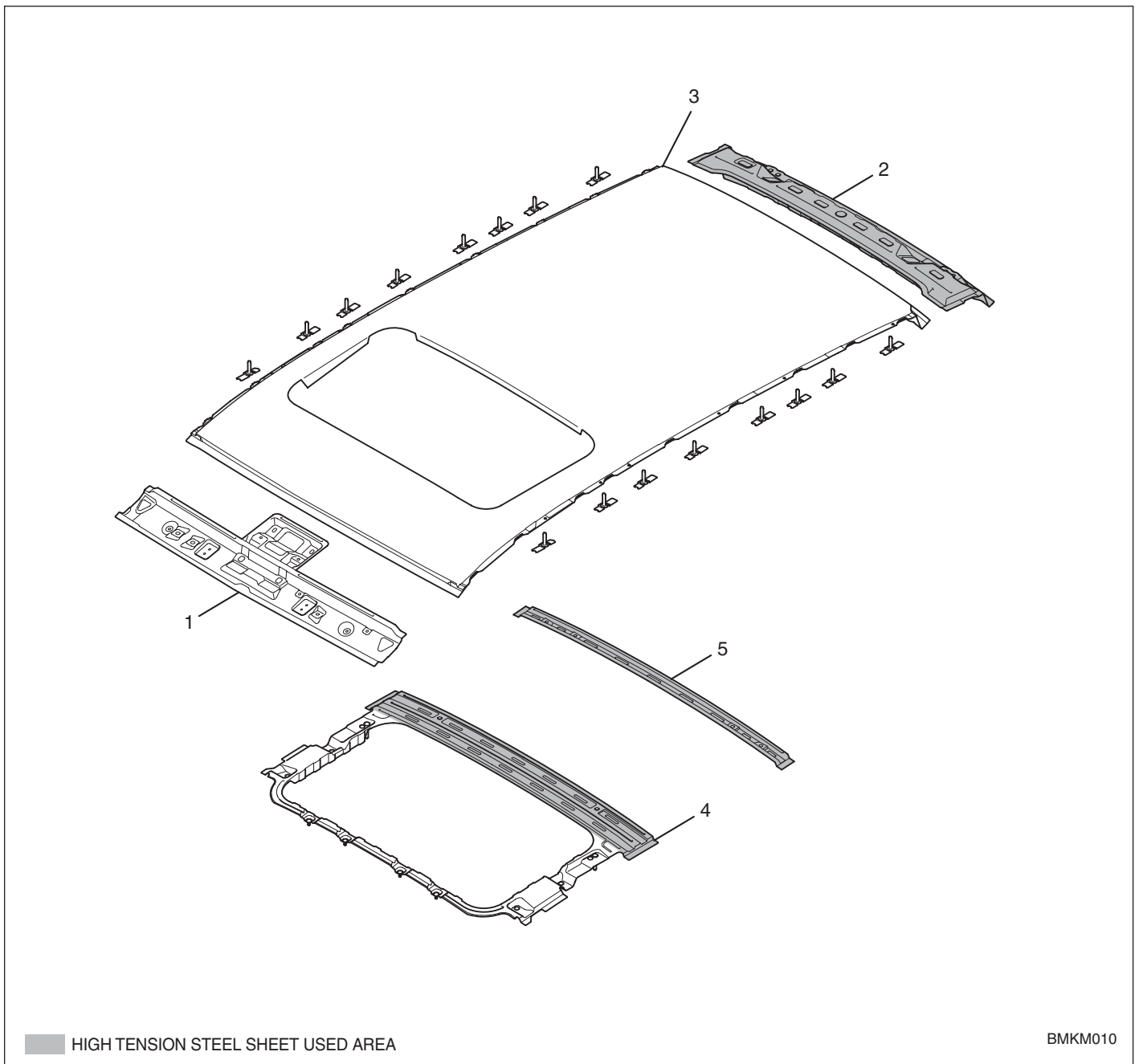
Roof panel (Without sunroof)



- (1) Roof front rail assembly
- (2) Roof rear rail assembly
- (3) Roof panel

- (4) Roof center No.1 rail
- (5) Roof center No.2 rail
- (6) Roof center No.3 rail

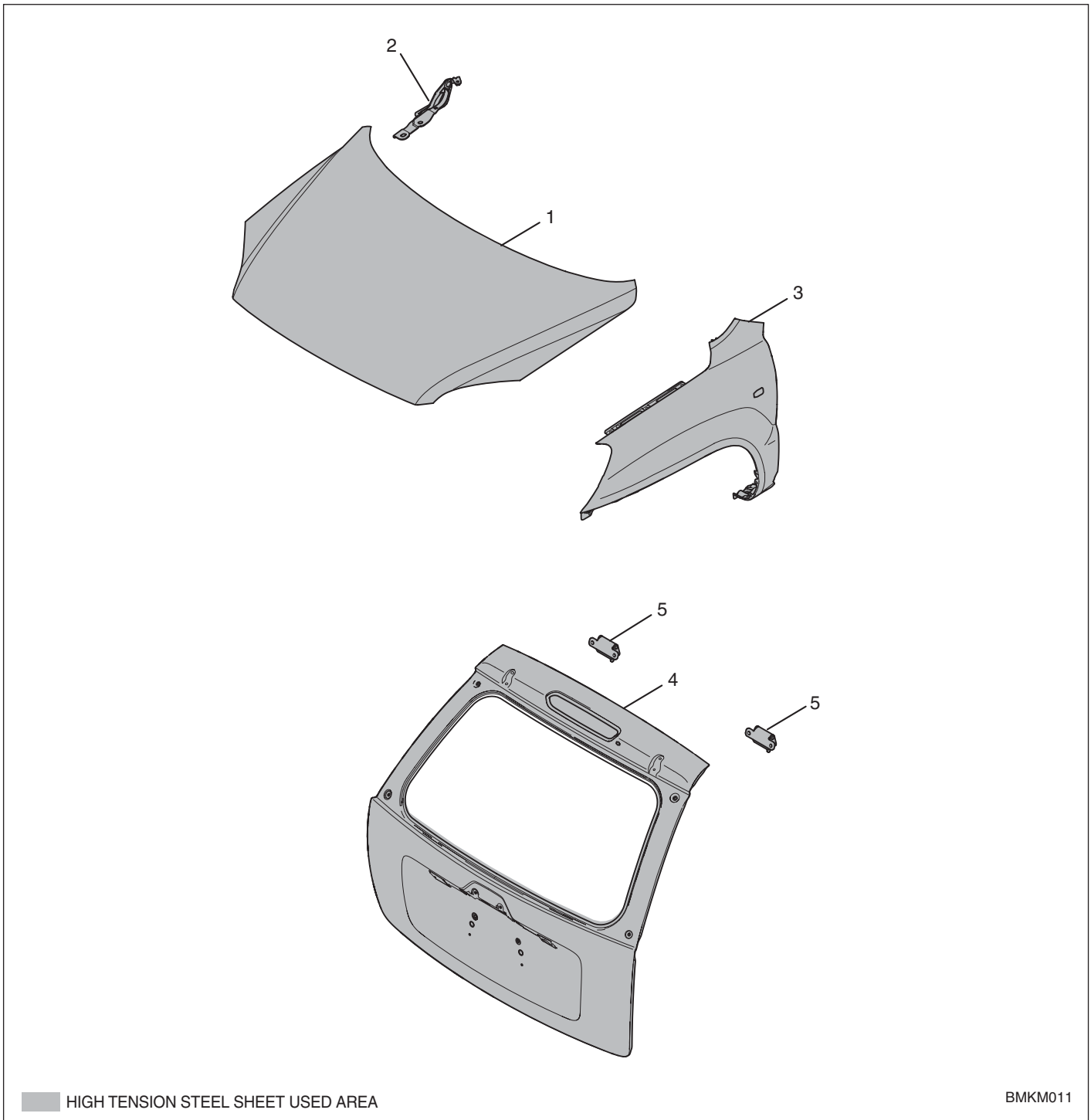
Roof panel (With sunroof)



- (1) Roof front rail assembly
- (2) Roof rear rail assembly
- (3) Roof panel

- (4) Sunroof reinforcement
- (5) Roof center No.3 rail

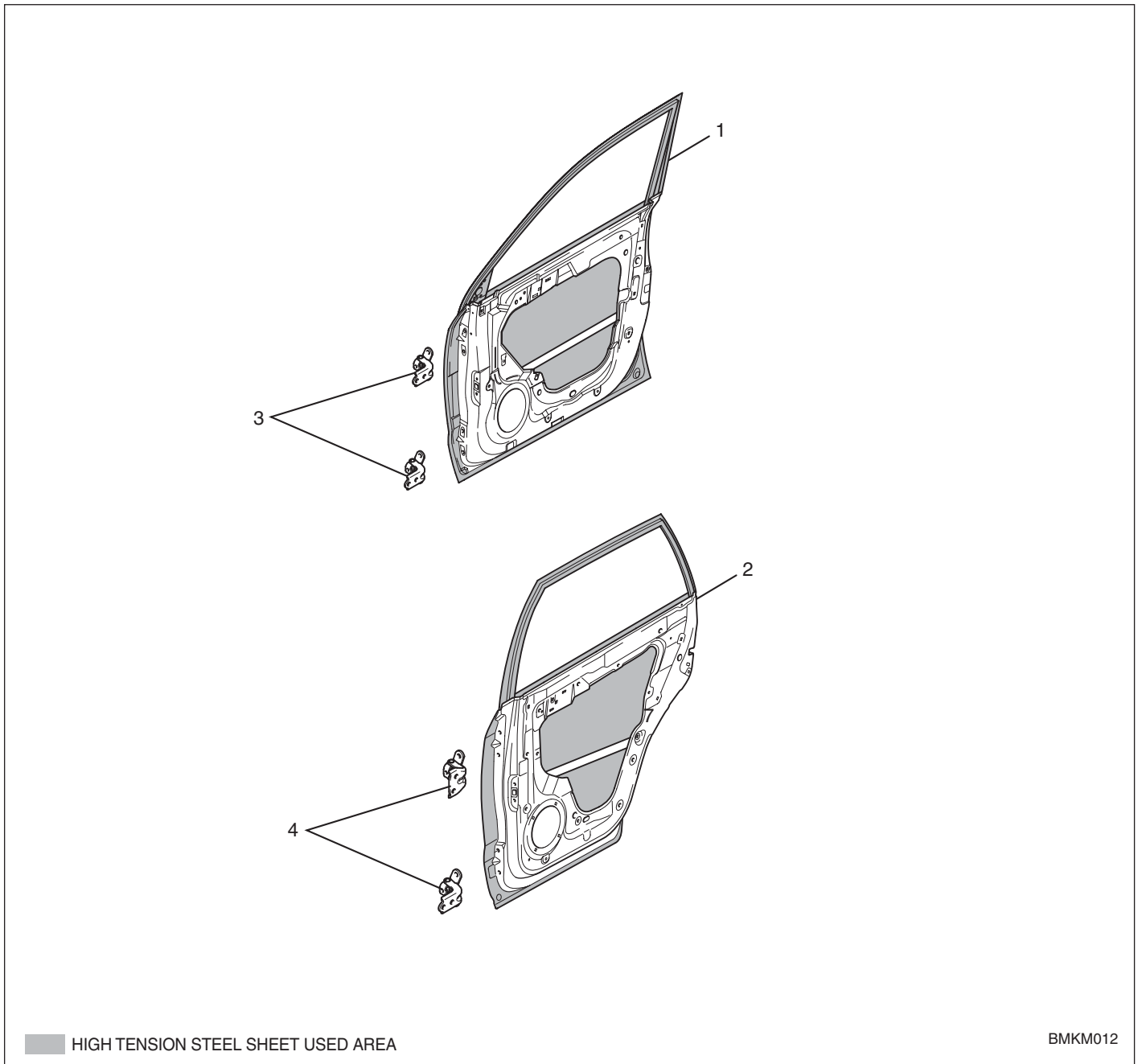
Fender panel & Hood panel & Tail gate panel



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

- (4) Tail gate panel assembly
- (5) Tail gate hinge assembly

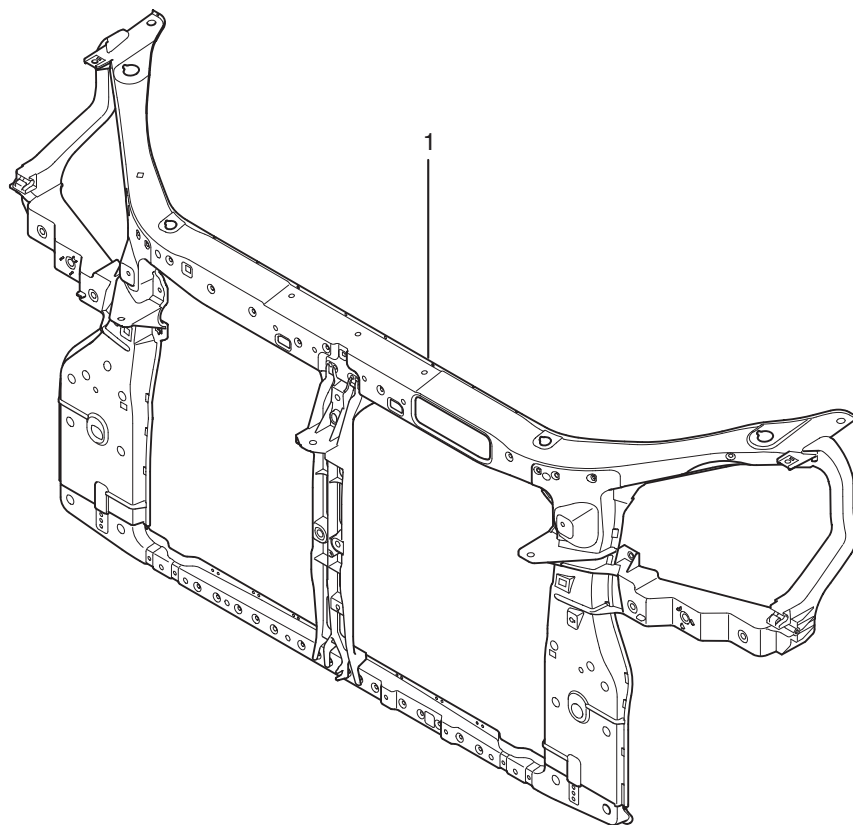
Door panel



- (1) Front door panel assembly
- (2) Rear door panel assembly

- (3) Front door hinge assembly
- (4) Rear door hinge assembly

Zinc-galvanized steel sheet used area Radiator support panel

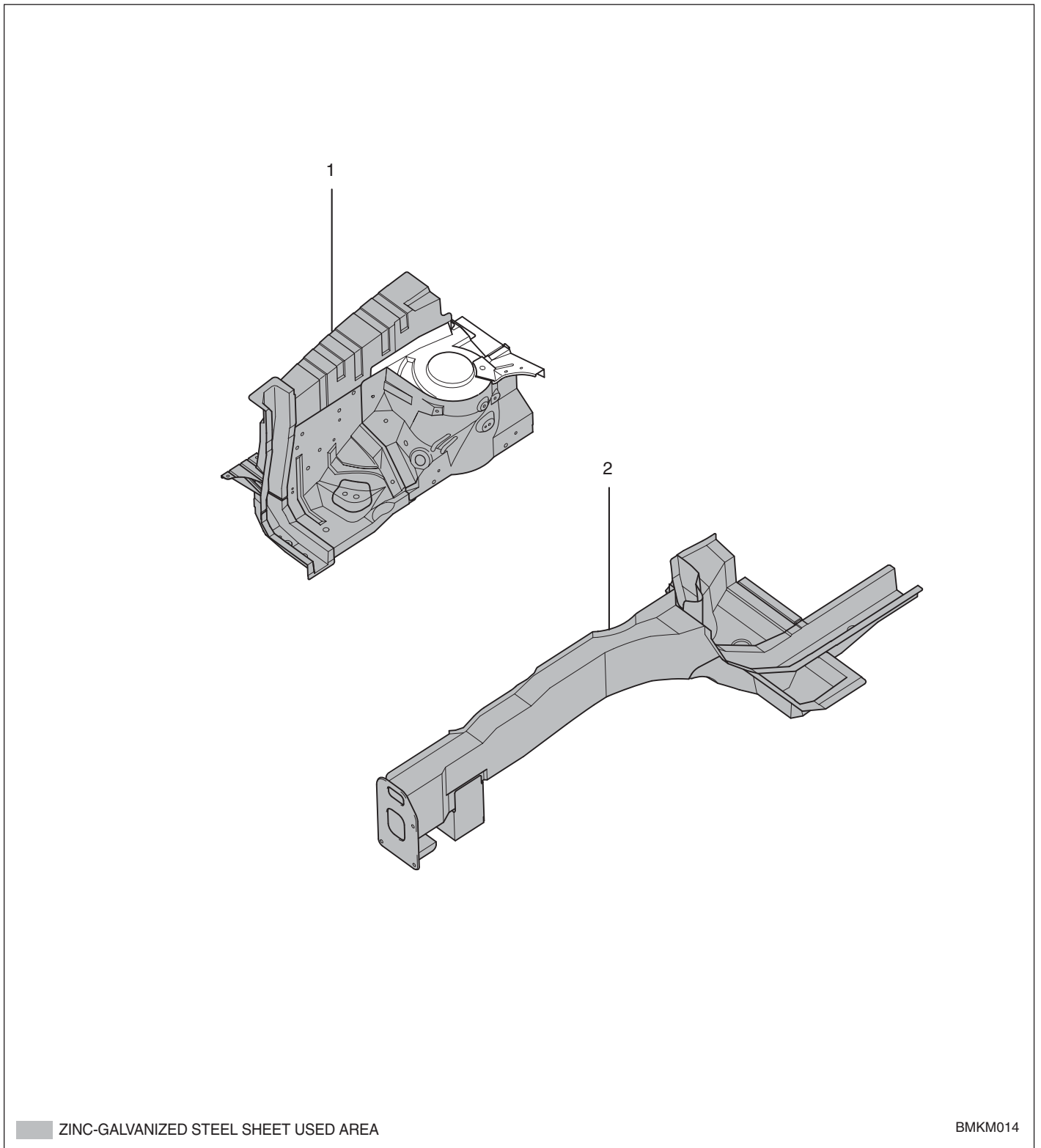


ZINC-GALVANIZED STEEL SHEET USED AREA

BMKM013

(1) Radiator support panel complete

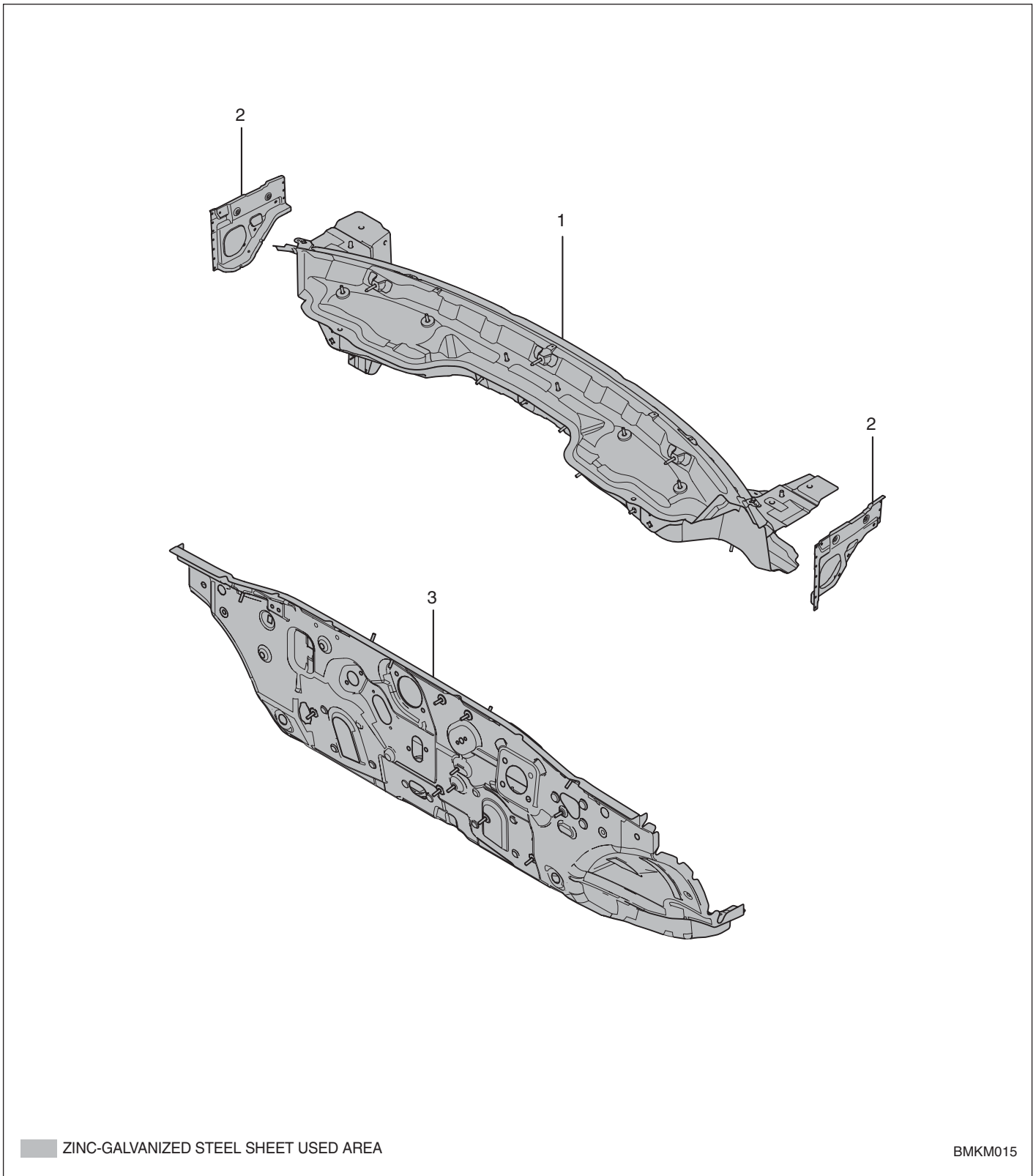
Fender apron panel



(1) Fender apron panel assembly

(2) Front side outer member assembly

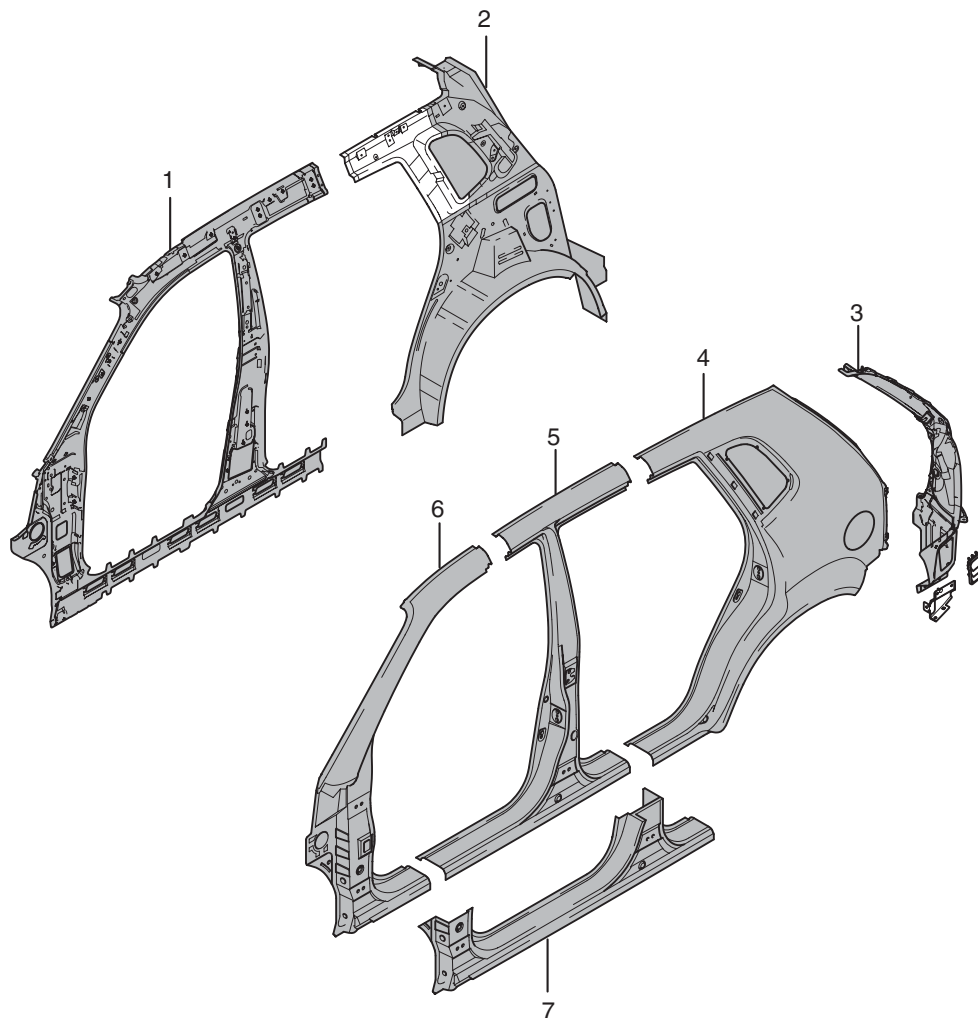
Cowl panel & Dash panel



- (1) Cowl panel complete
- (2) Cowl side outer panel

- (3) Dash panel complete

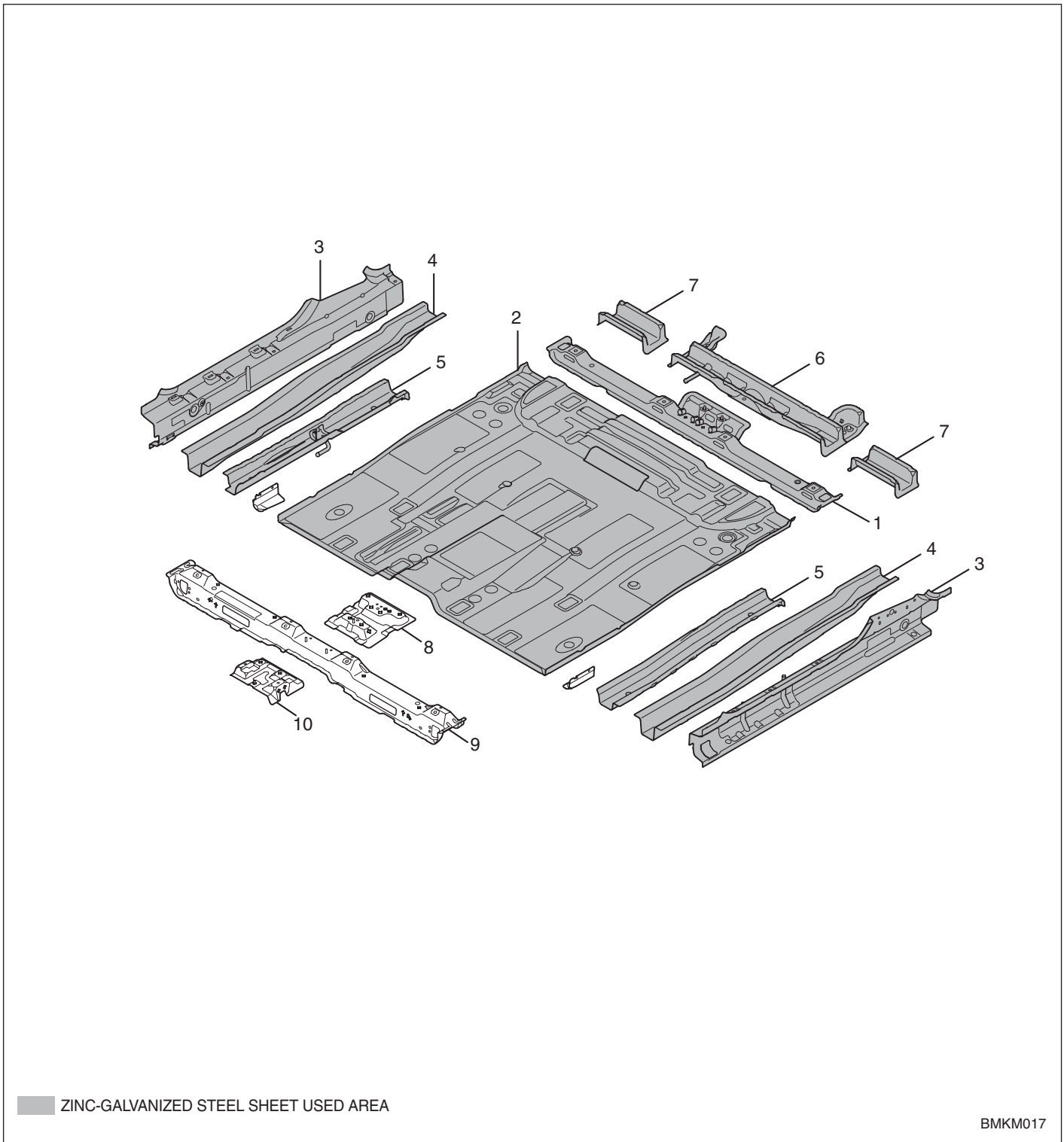
Side body panel



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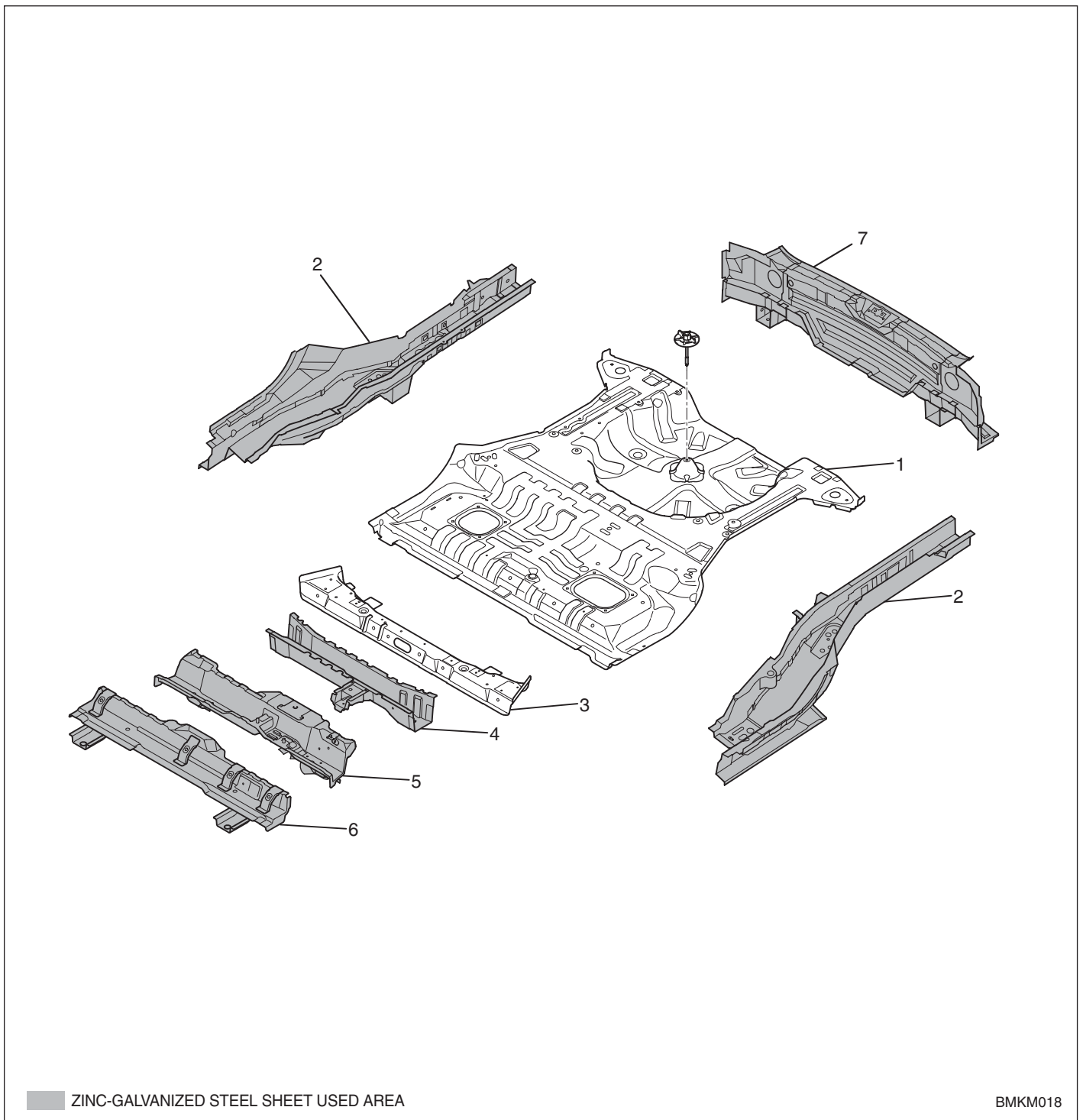
- (1) Front inner pillar assembly
- (2) Quarter inner panel assembly
- (3) Side outer rear extension assembly
- (4) Quarter outer panel assembly
- (5) Center outer pillar assembly
- (6) Pillar outer panel assembly
- (7) Side assembly outer panel

Center floor panel



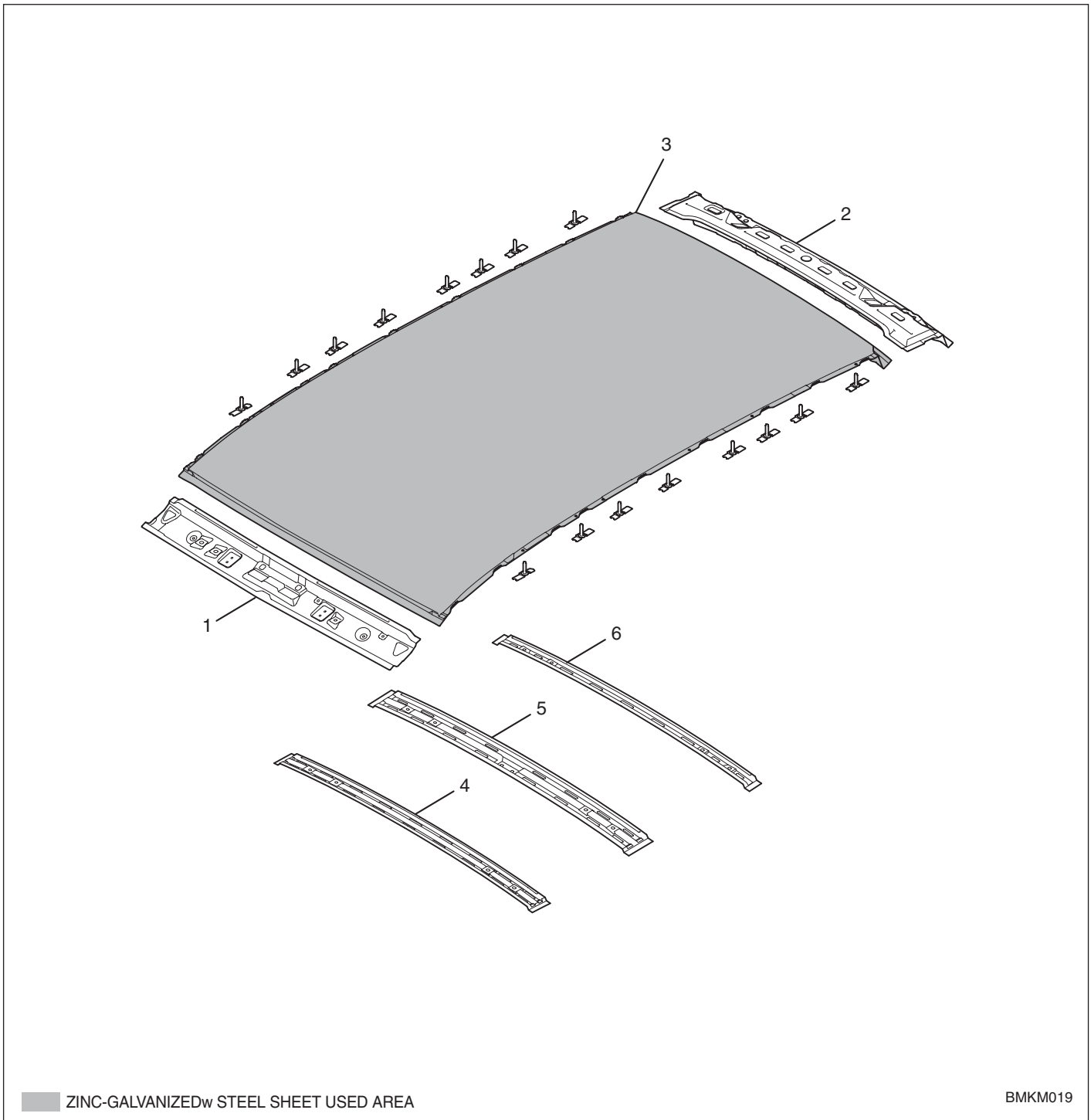
- | | |
|---|--|
| (1) Front seat cross rear member assembly | (6) Propeller shaft mounting bracket |
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| (3) Side sill inner panel assembly | (8) Parking brake lever reinforcement assembly |
| (4) Center floor side outer member assembly | (9) Front seat cross front member assembly |
| (5) Center floor side inner member assembly | (10) Center support bracket |

Rear floor panel



- (1) Rear floor panel
- (2) Rear floor side member assembly
- (3) Rear floor upper cross member assembly
- (4) Rear floor lower No.3 cross member assembly
- (5) Rear floor lower No.2 cross member assembly
- (6) Rear floor lower No.1 cross member assembly.
- (7) Rear end cross member assembly

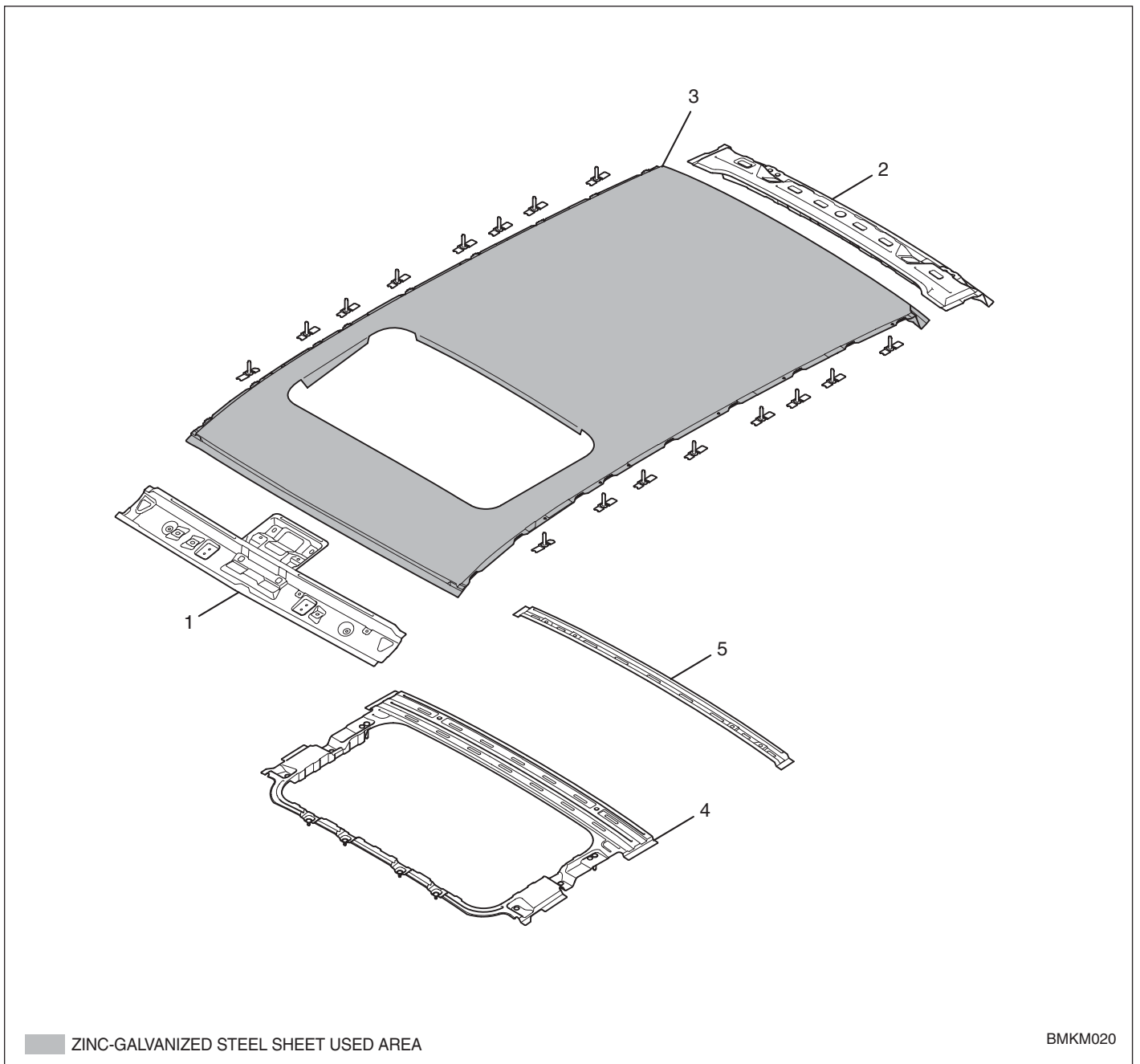
Roof panel (Without sunroof)



- (1) Roof front rail assembly
- (2) Roof rear rail assembly
- (3) Roof panel

- (4) Roof center No.1 rail
- (5) Roof center No.2 rail
- (6) Roof center No.3 rail

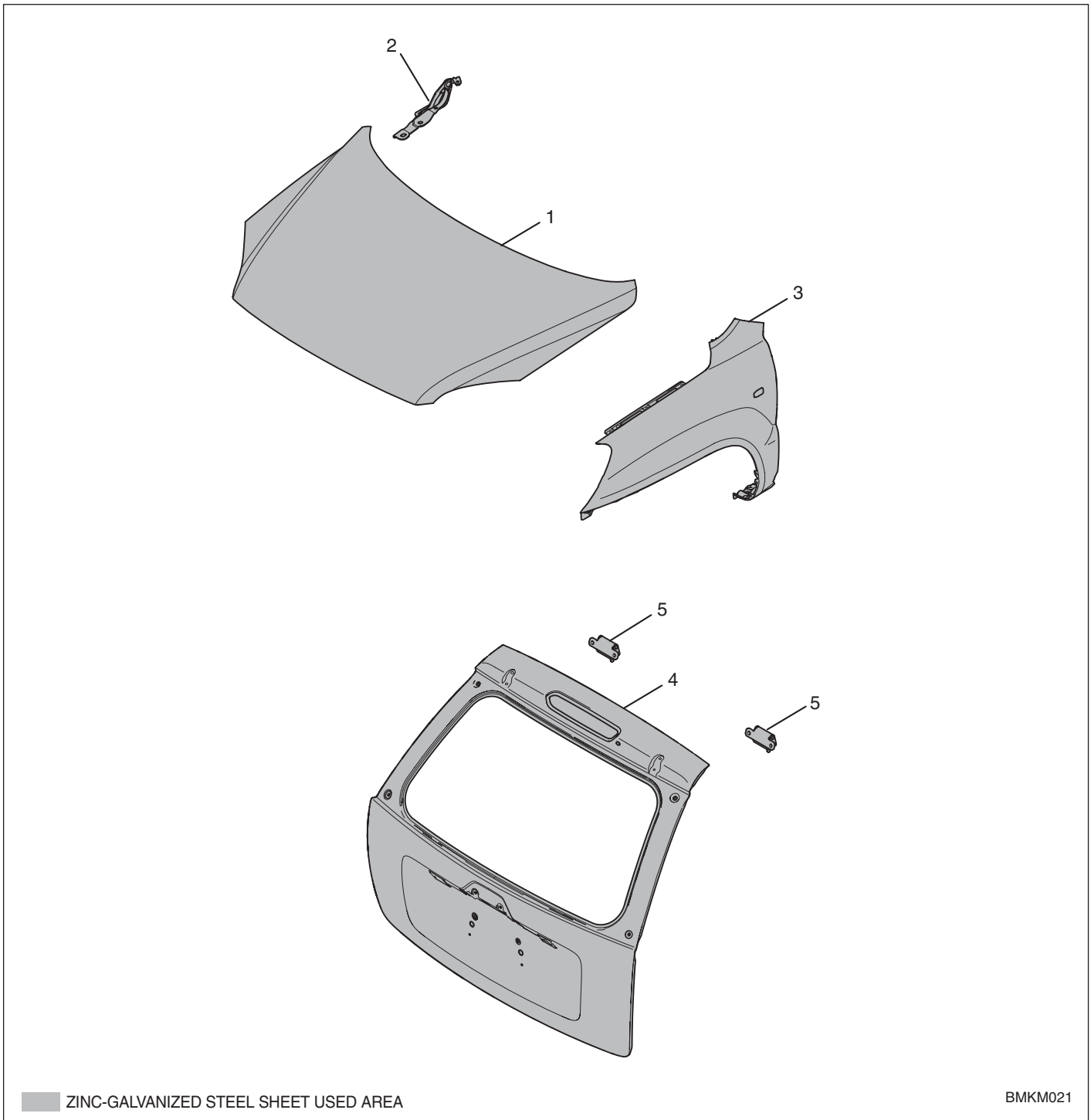
Roof panel (With sunroof)



- (1) Roof front rail assembly
- (2) Roof rear rail assembly
- (3) Roof panel

- (4) Sunroof reinforcement
- (5) Roof center No.3 rail

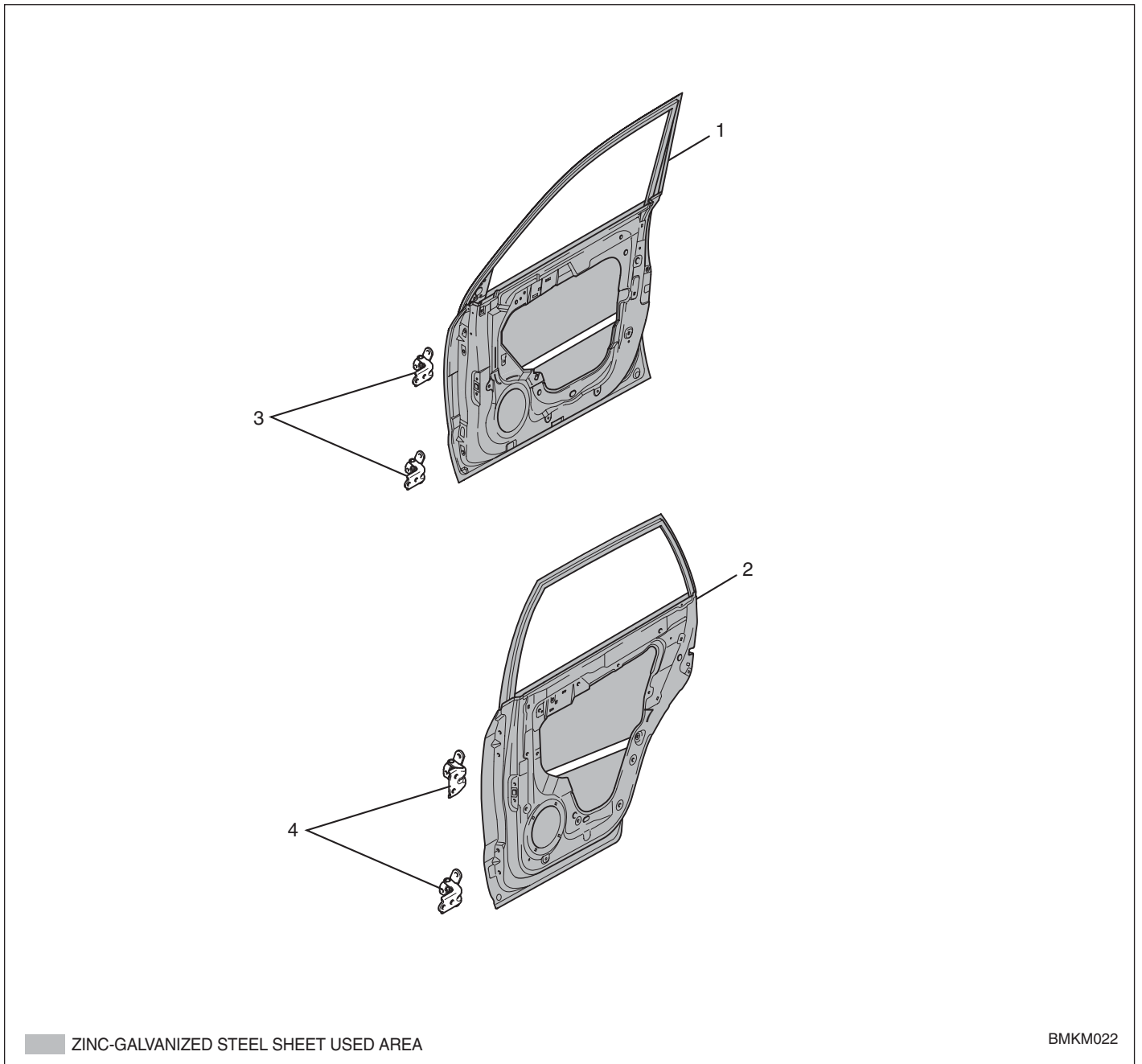
Fender panel & Hood panel & Tail gate panel



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

- (4) Tail gate panel assembly
- (5) Tail gate hinge assembly

Door panel



- (1) Front door panel assembly
- (2) Rear door panel assembly

- (3) Front door hinge assembly
- (4) Rear door hinge assembly

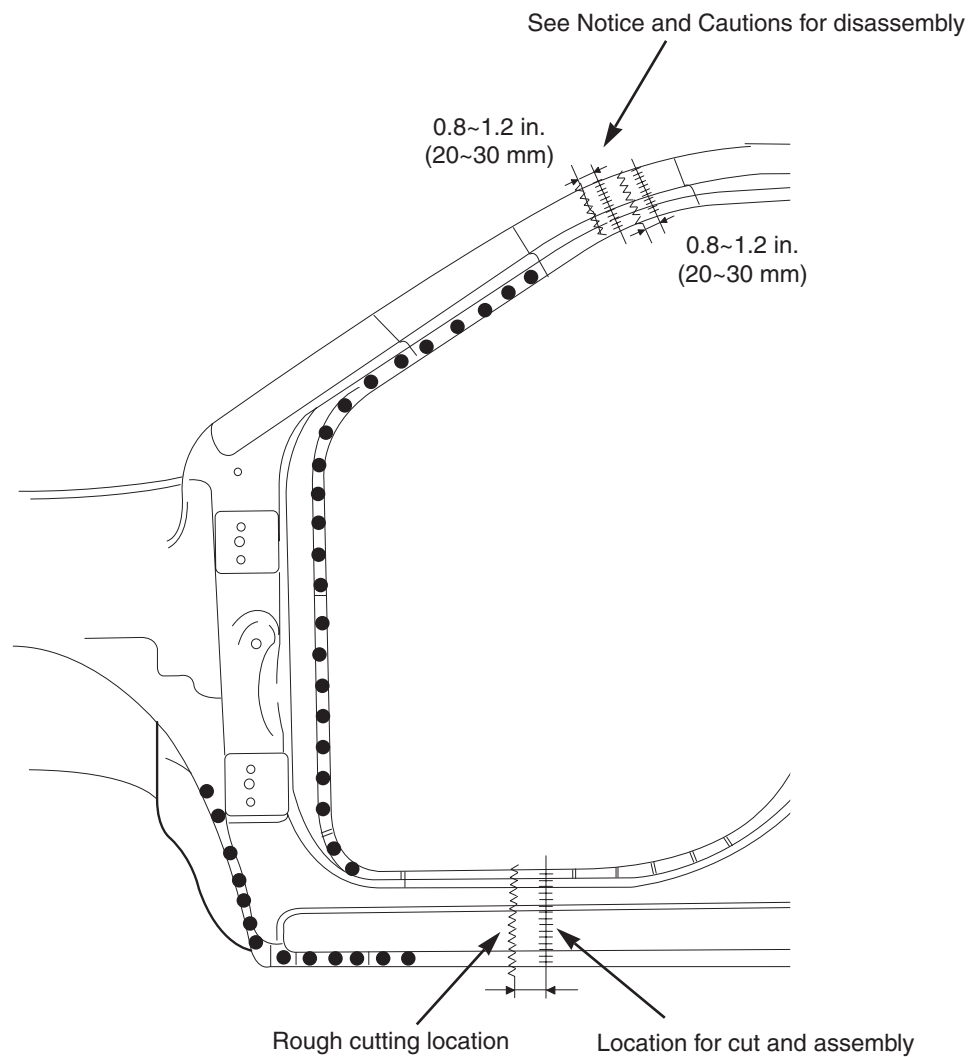
BMKM022

Replacing body panels

Replacing body panels	
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Replacing body panels

Codes for disassembling and assembling body panels

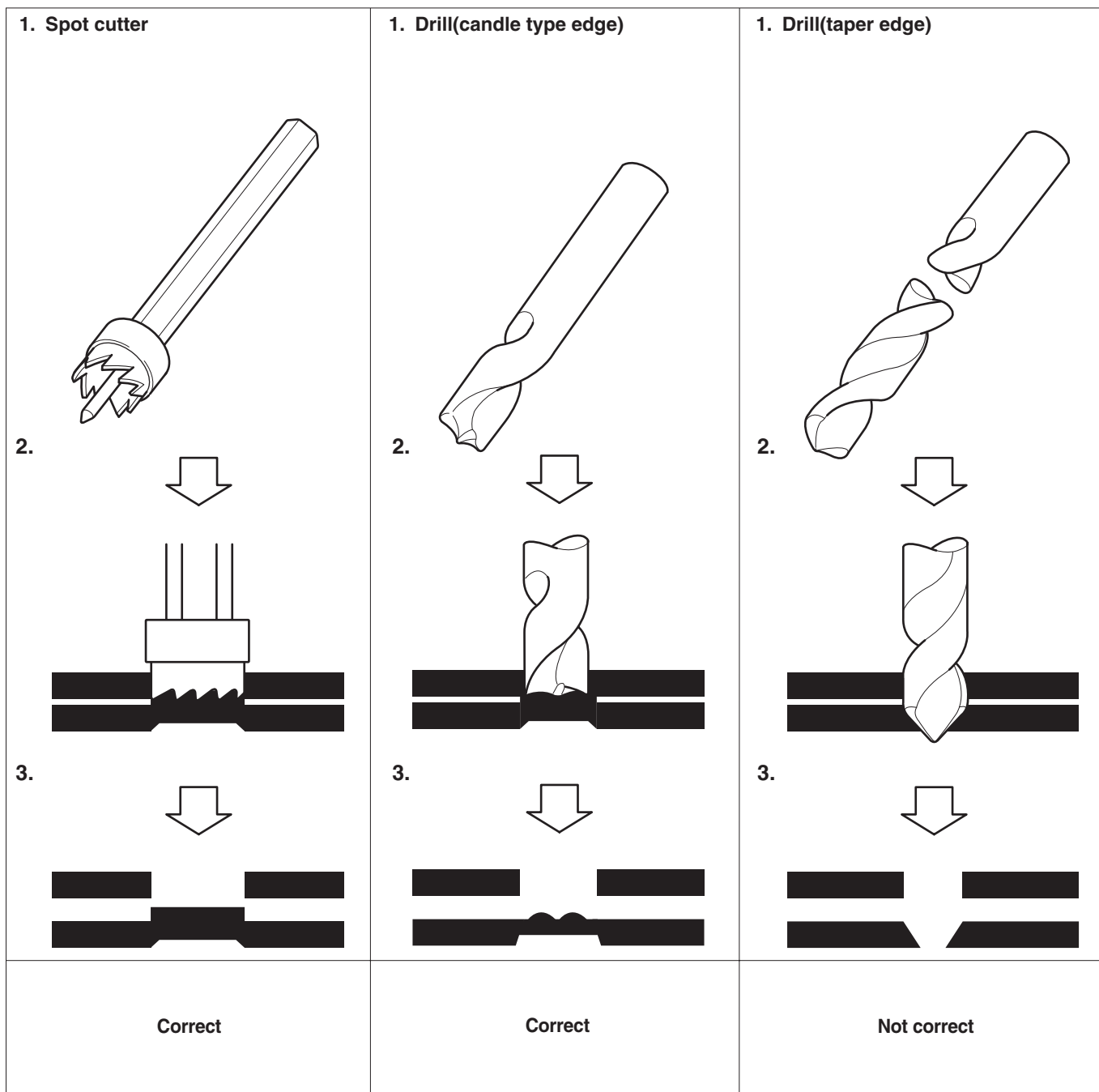


ARS1BD040A

21-2 Replacing body panels

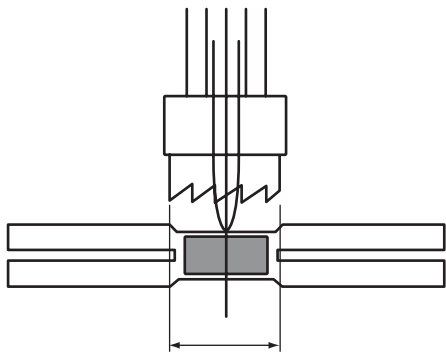
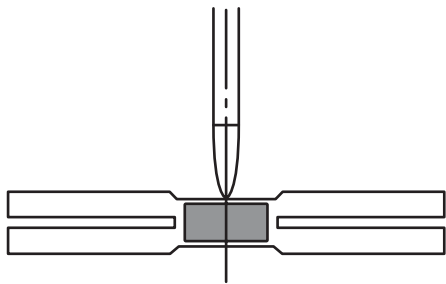
Notes when welding body Disassembling spot welded area

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.



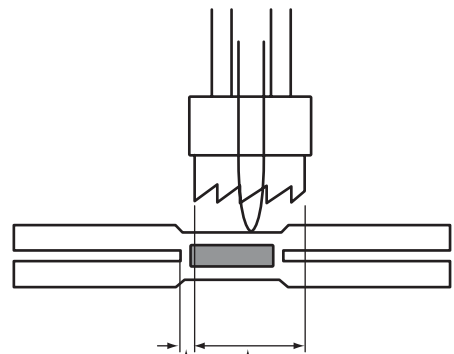
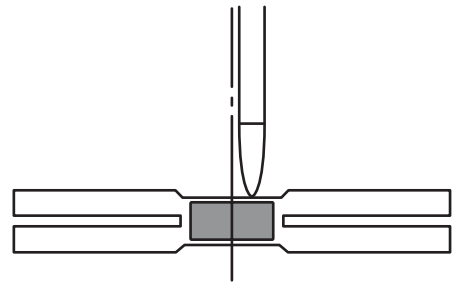
A3EB3251

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.

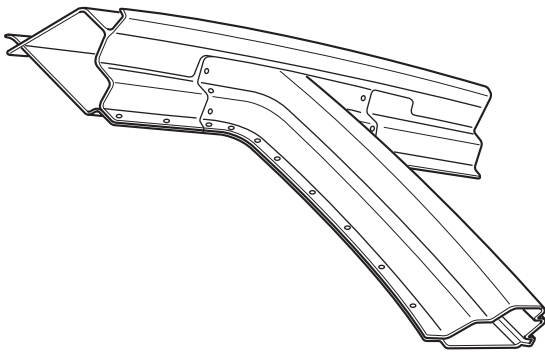
Determining a welding method

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

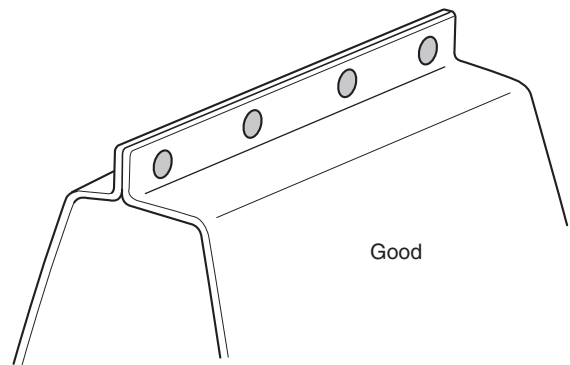
Spot welding

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).



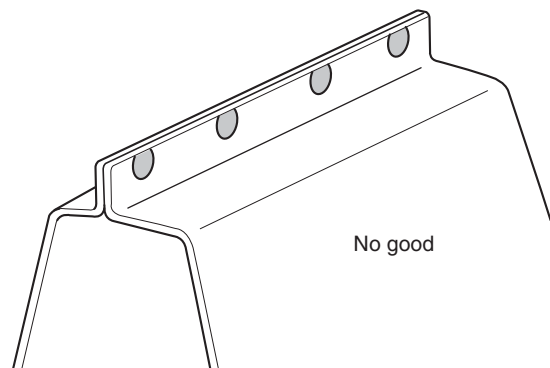
A3EB3253

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



A3EB3254

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

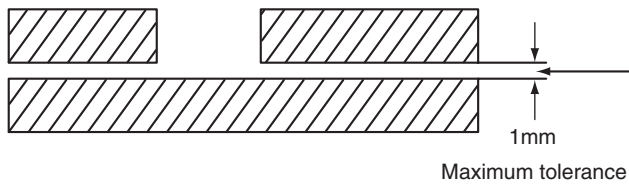


A3EB3255

Carbon arc welding

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

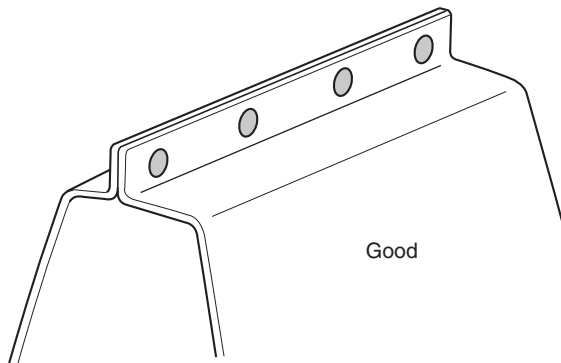
1. Clamp the parts to be welded together tightly. Do not exceed 1 mm of space between parts. A tolerance greater than 1 mm will reduce the strength of the welded area.



A3EB3256

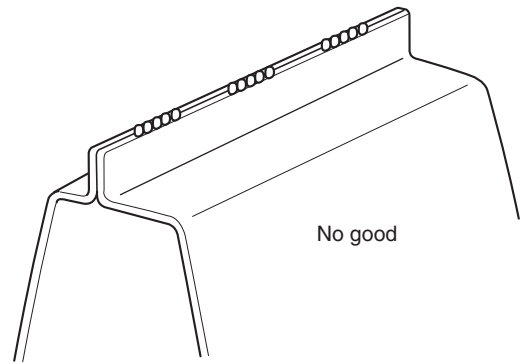
2. Weld in the middle of the flange joint.

- 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

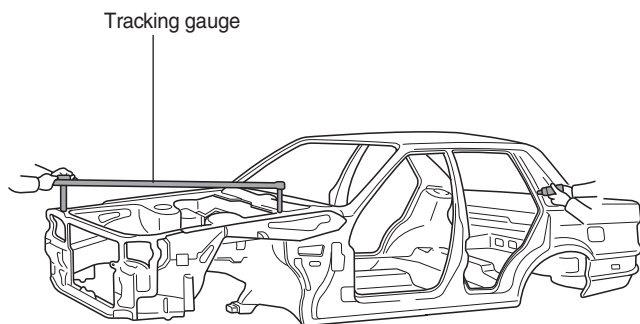
21-6 Replacing body panels

Replacing body panel

Disassembly

1. Body measurement

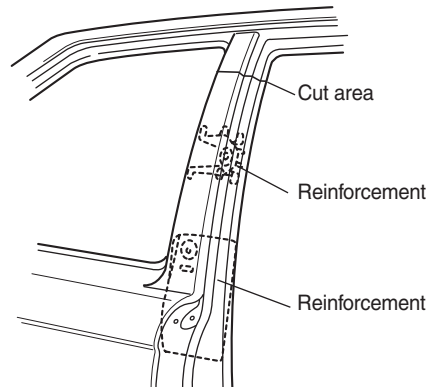
- Before disassembling, measure the damaged area according to the dimensions supplied in Body Dimension, Section 31. If deformation is present, use a frame straightener to adjust.
- When disassembling a panel, apply clamps to prevent damage of each part, and support the lower end of the frame to prevent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

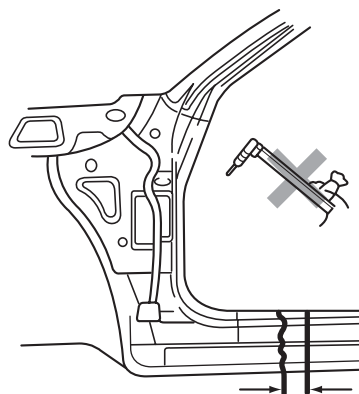


A3EB3258

3. Cutting rough area for replacement part

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

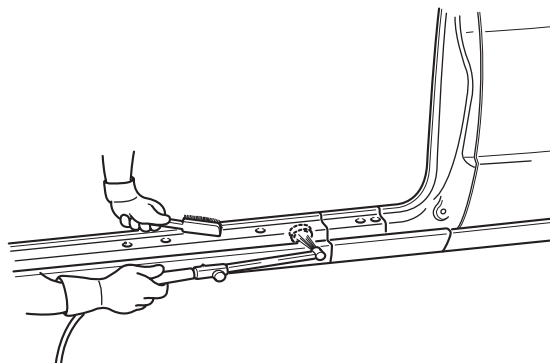
- Use care when cutting an area close to a pipe or wiring harness.
- Cut an area leaving 30~50 mm of tolerance.



ASD1BM005

4. Removing paint from an area to be spot welded

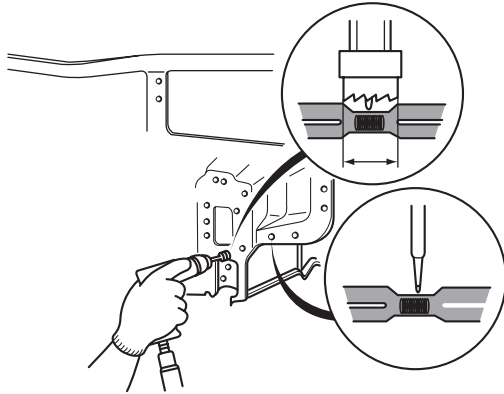
Using a torch and wire brush, remove paint completely before beginning welding.



5. Determine a cutting method

a) Cutting a spot welded area

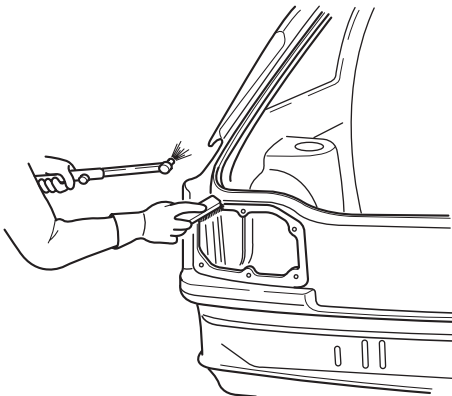
Make a hole in the middle of spot welded area with a punch, disassemble welded area using a spot cutter and remove using a chisel.



1SD1BM015

b) Removing brazed area

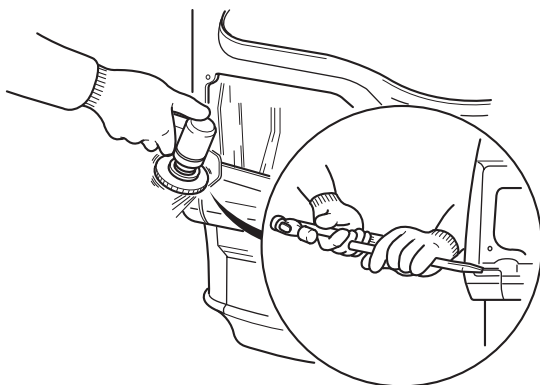
Disassemble using a torch and wire brush, and remove with a chisel.



1SD1BM016

c) Removing arc welded area

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

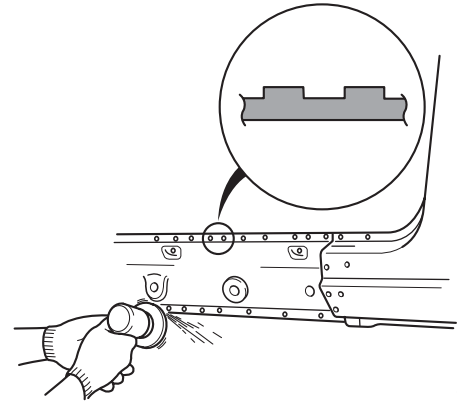


1SD1BM017

Preparation for assembly

1. Spot weld finish

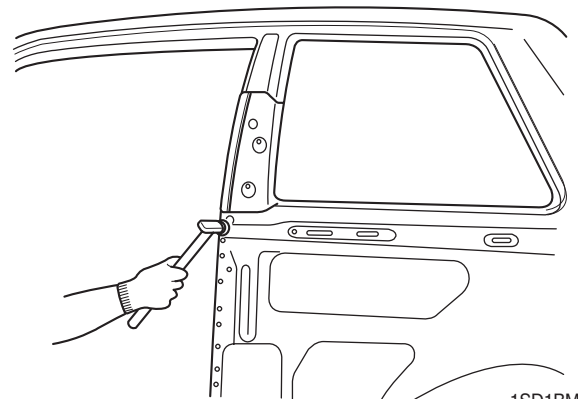
Use a disk grinder or similar tool to finish spot weld mark. Do not grind more than is necessary to smooth surface.



1SD1BM018

2. Panel preparation

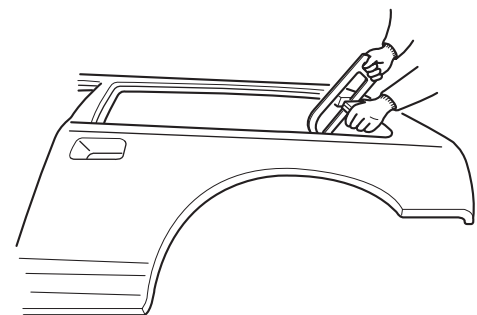
Repair any bent or uneven areas with a hammer to improve the assembly process.



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.

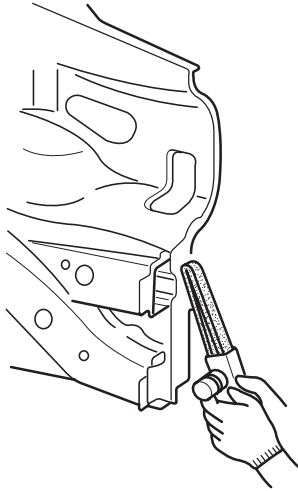


1SD1BM020

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.



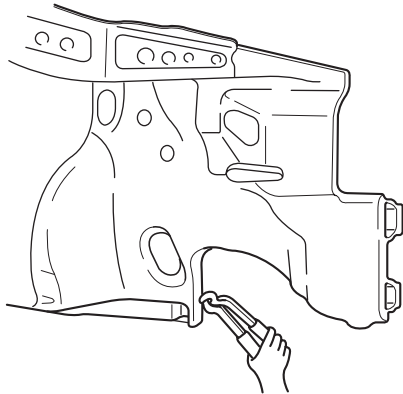
1SD1BM021

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.

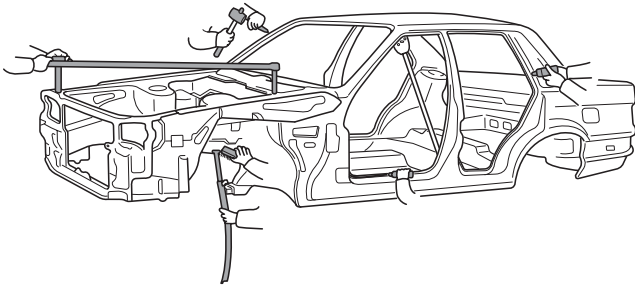


1SD1BM022

Assembly

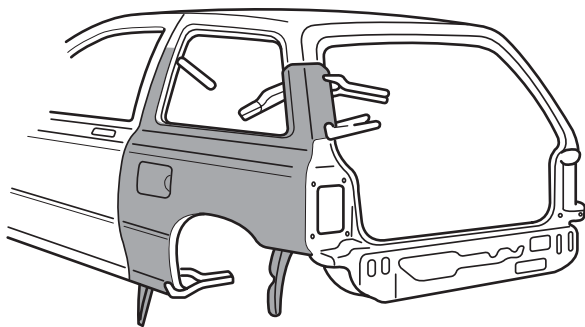
1. Checking welding and fitting in advance

- 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

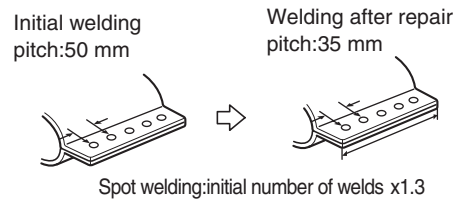
2. Selecting number of welding points

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

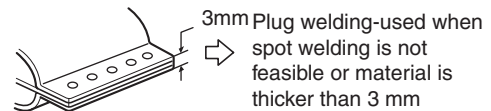
Plug welding : Same number as original number of factory welds

* 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.



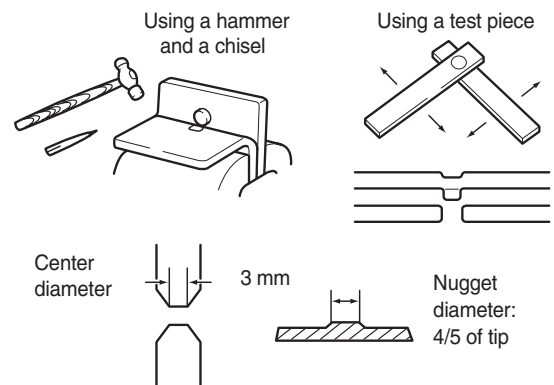
Welding points-same number as original number of factory welds.



A3EB3259

3. Caution when spot welding

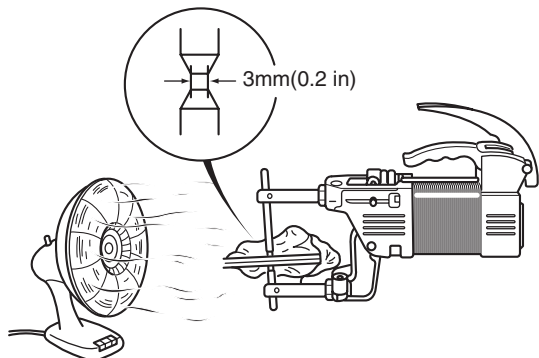
- a) Do a test welding on a piece of material of the same type and thickness as the part to be welded and proceed if test weld is good.
- b) Before spot welding, check if welding debris, oil or paint is present on the area where surfaces meet. Clean or sand as necessary.



A3EB3260

21-10 Replacing body panels

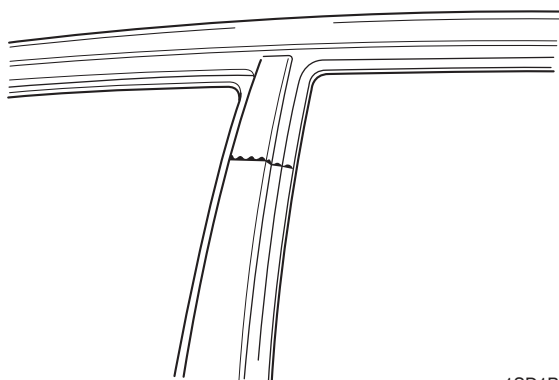
- c) The tip of the spot welding machine should be maintained to a minimum tolerance of 3 mm. Also let area cool after 5 or 6 welds to minimize problems caused by excessive heat.



1SD1BM026

4. Cutting and welding an assembled area

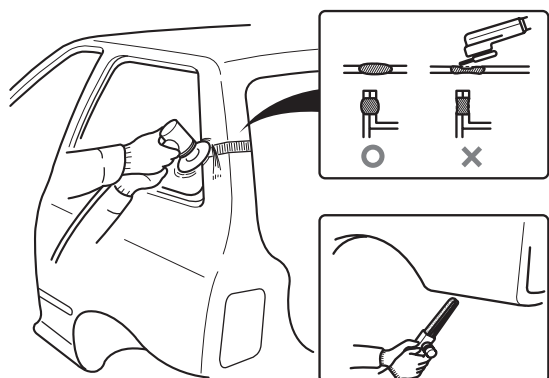
To align a roof panel and a center pillar together for butt welding, temporarily fasten a steel flange to the roof panel and then apply the new center pillar panel. Remove the flange when final welding is done.



1SD1BM027

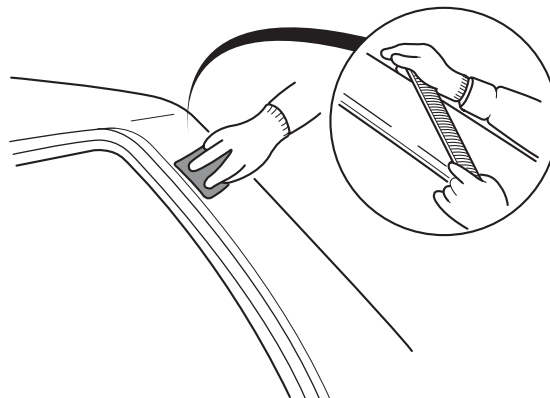
5. Finishing after welding

- 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.



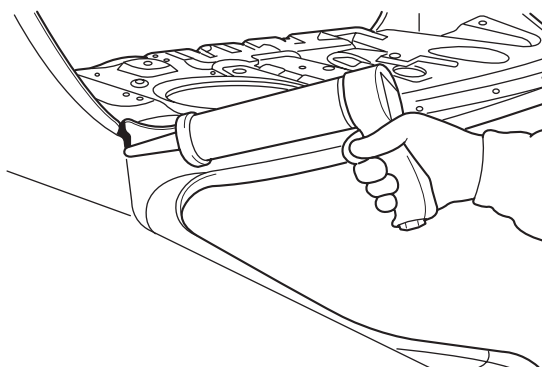
1SD1BM029

6. Applying anti-rust agent and body sealer

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

* Notice

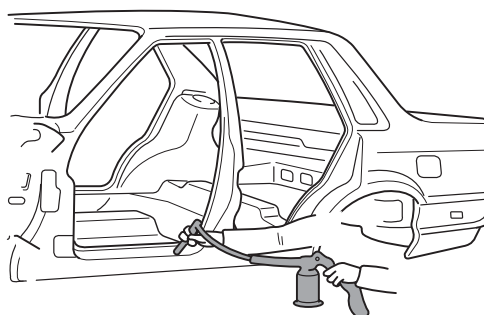
- Apply body sealer before assembly.



1SD1BM030

7. Anti-rust treatment

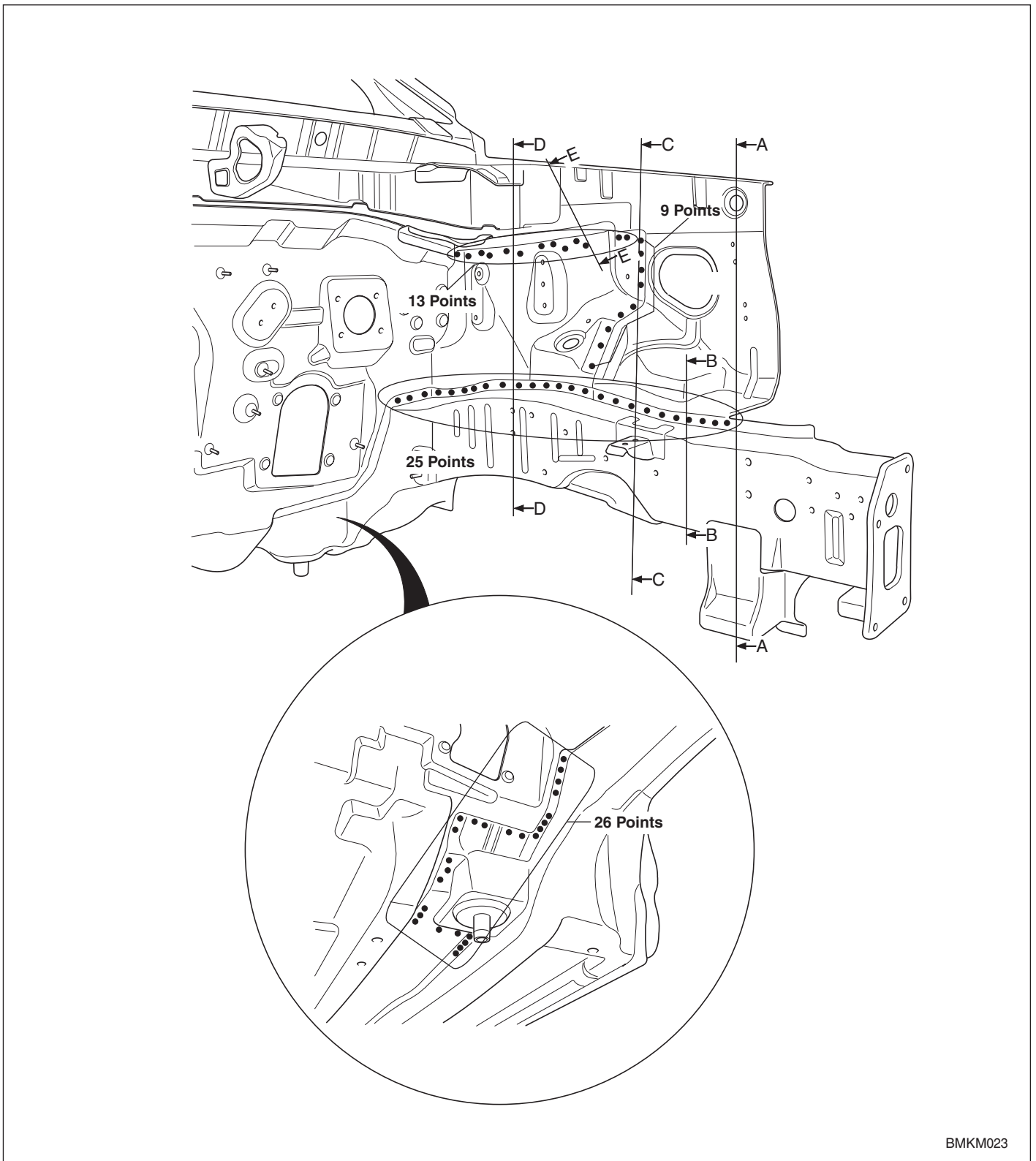
Apply anti-rust agent to inside of doors and sills by spraying through access holes provided.



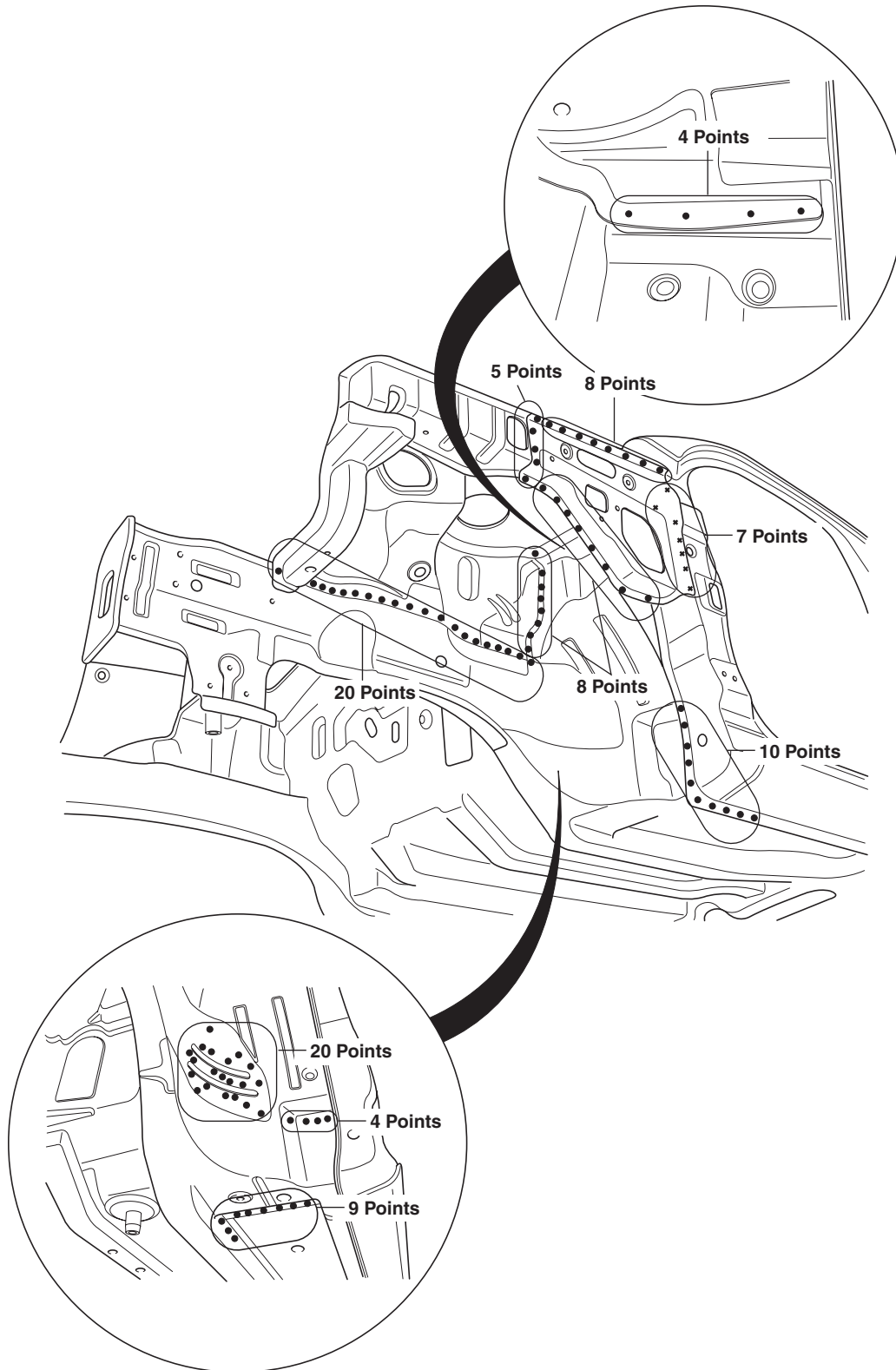
A3EB3261

Fender apron panel assembly

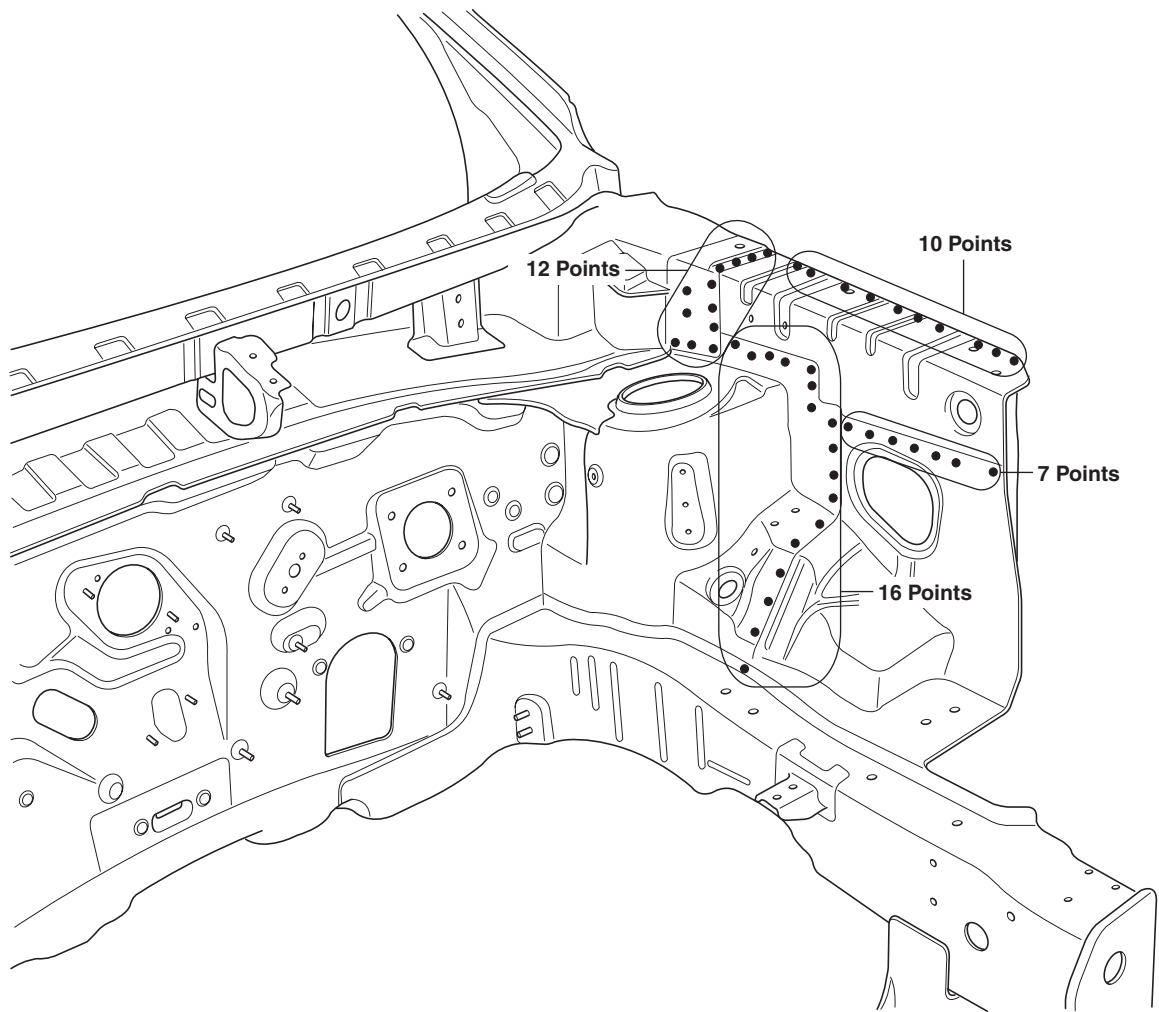
Welding part



21-12 Replacing body panels



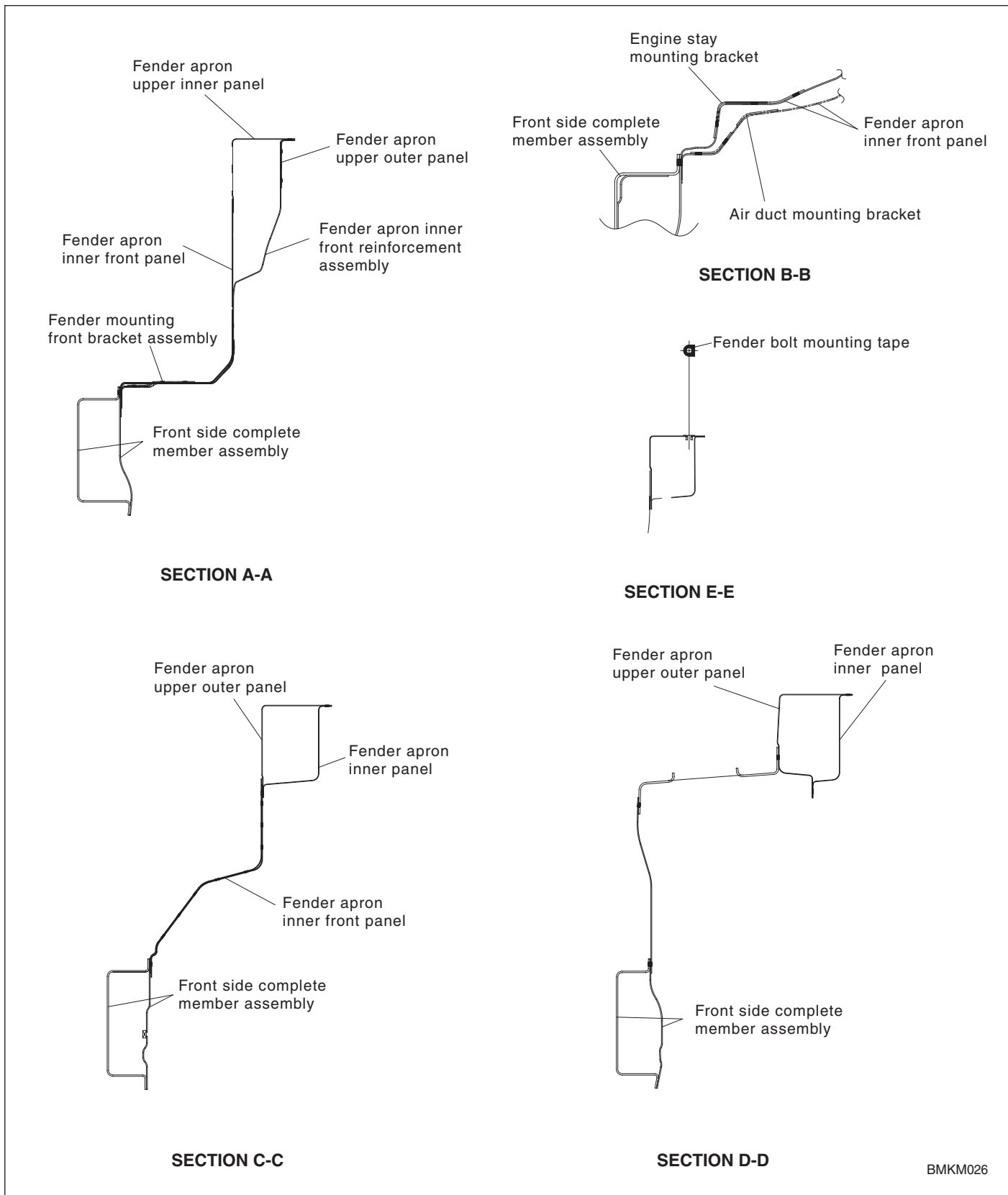
BMKM024



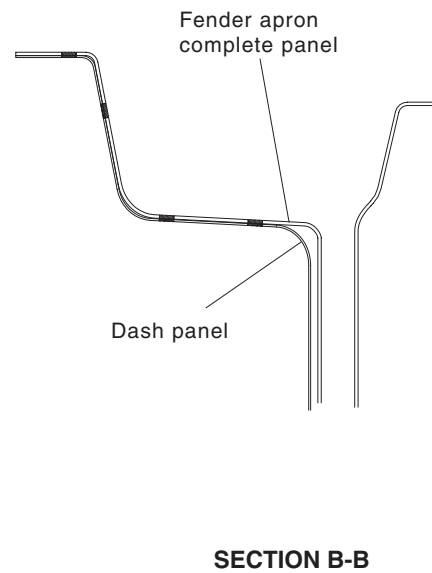
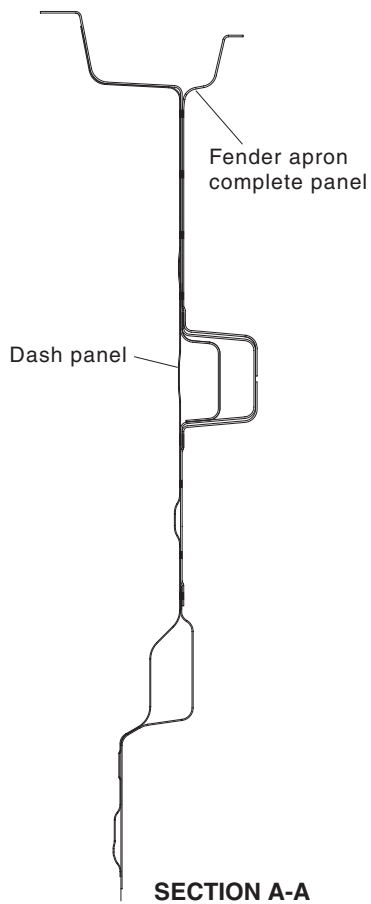
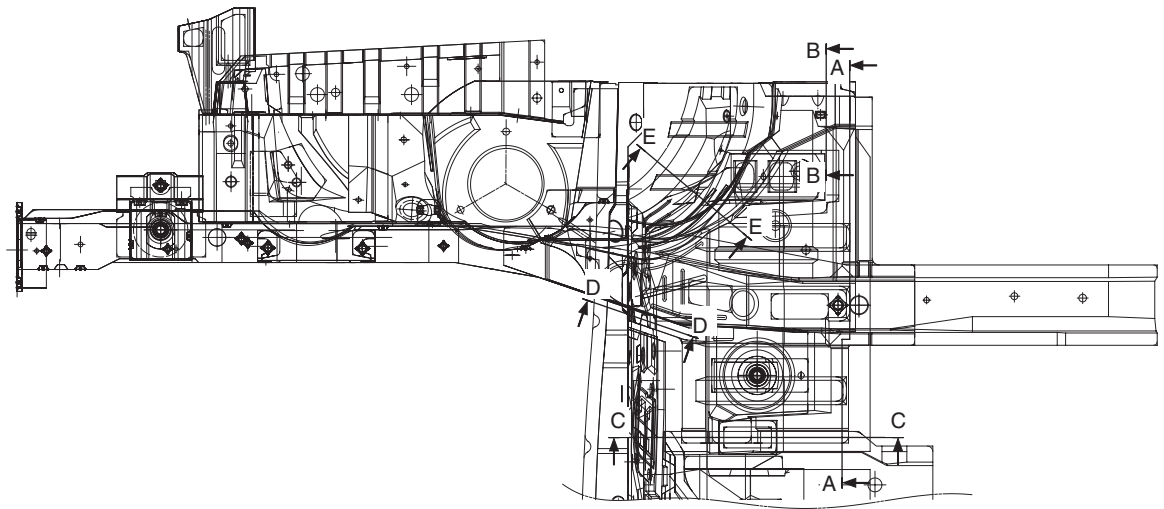
BMKM025

21-14 Replacing body panels

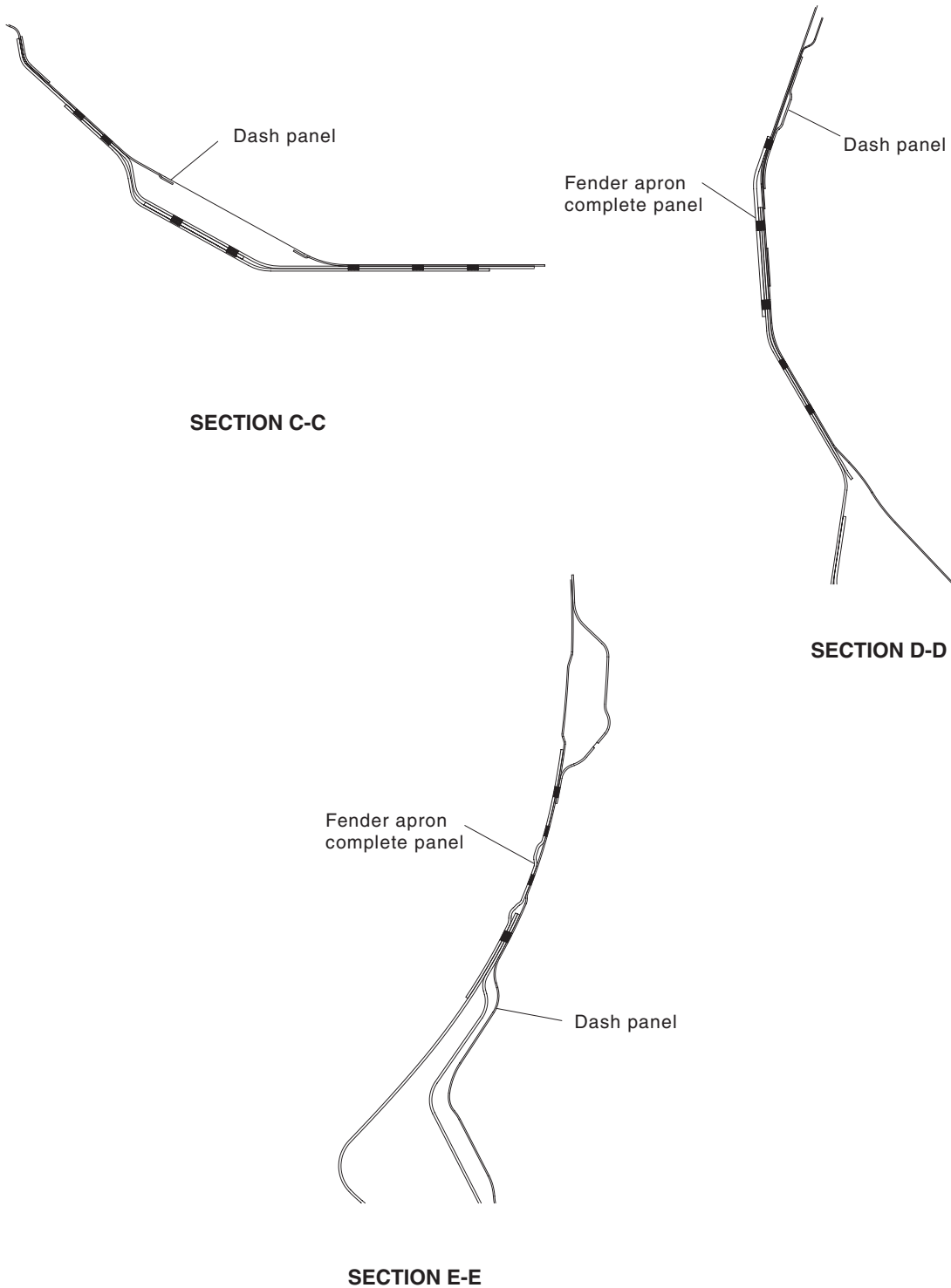
Setion



BMKM026



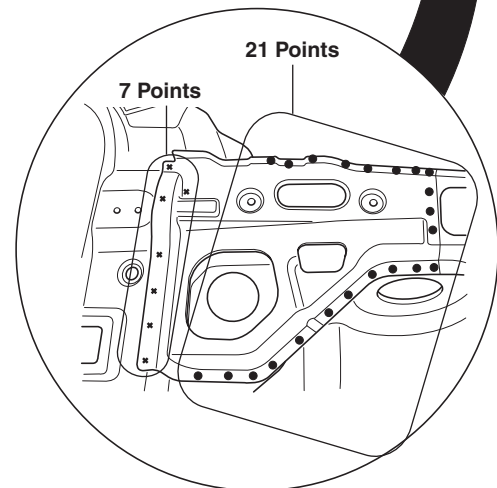
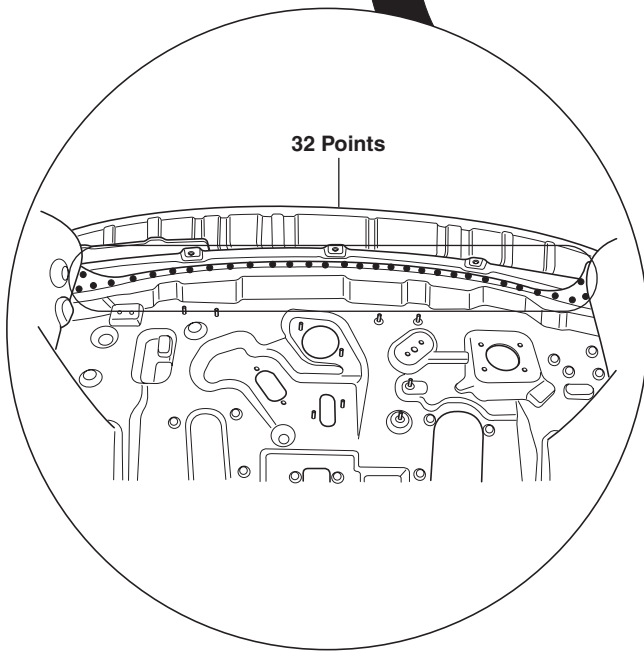
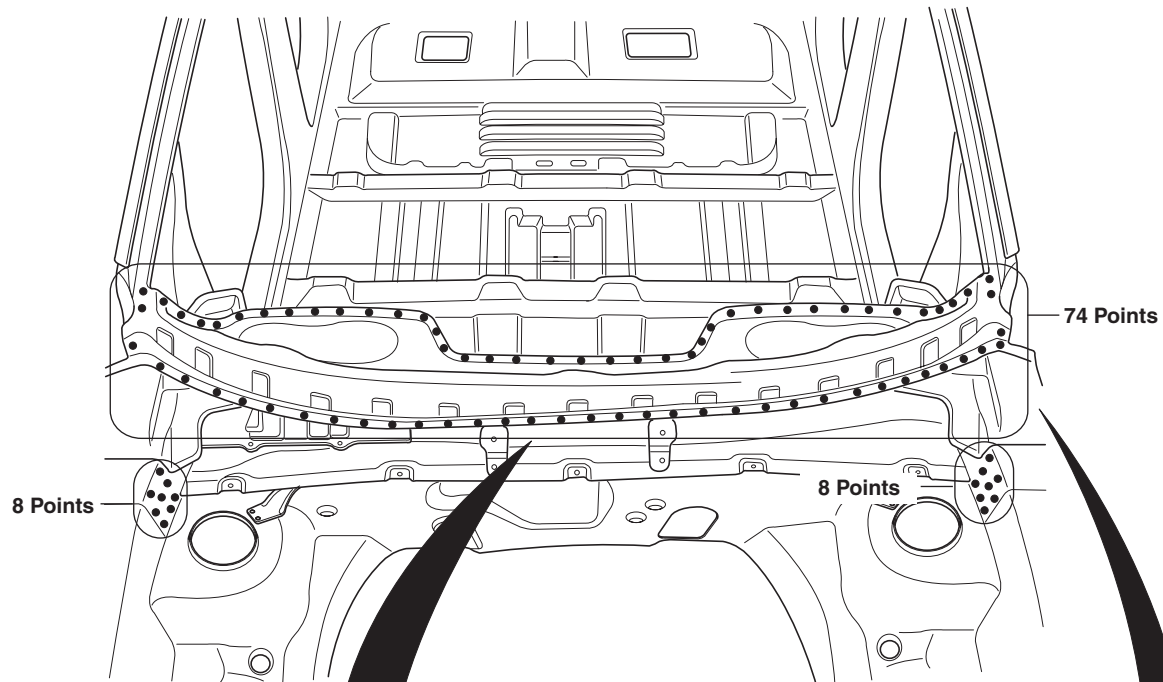
21-16 Replacing body panels



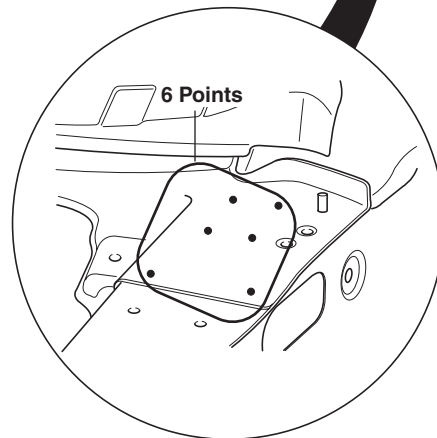
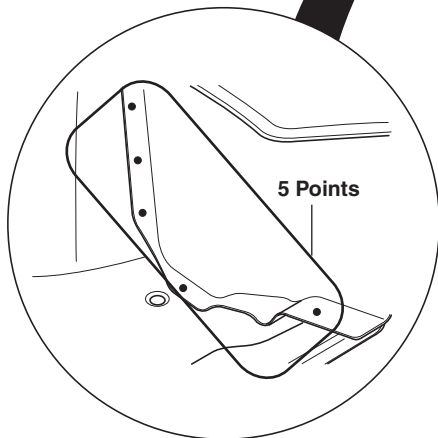
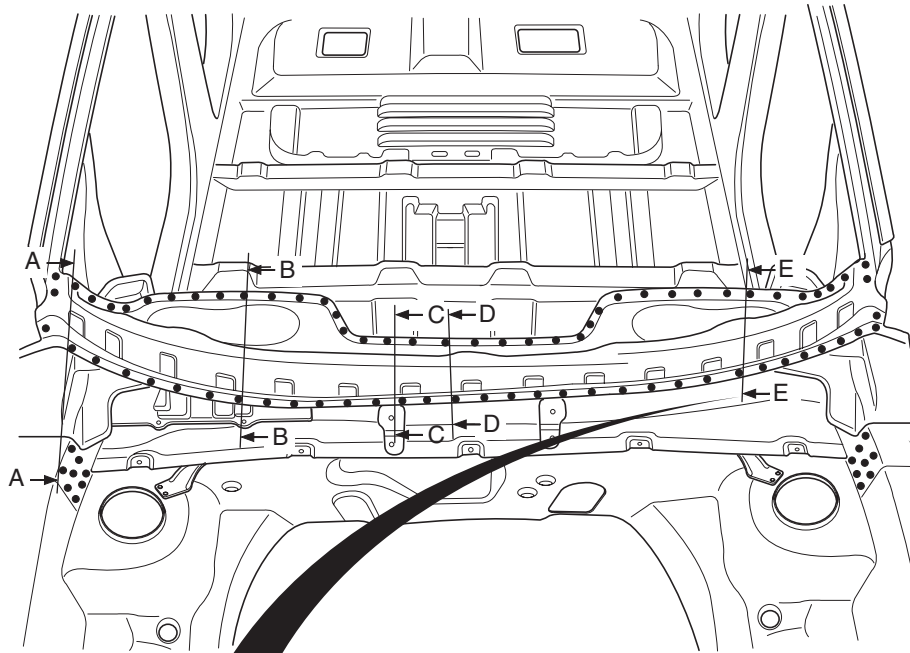
BMKM028

Cowl panel assembly

Welding part

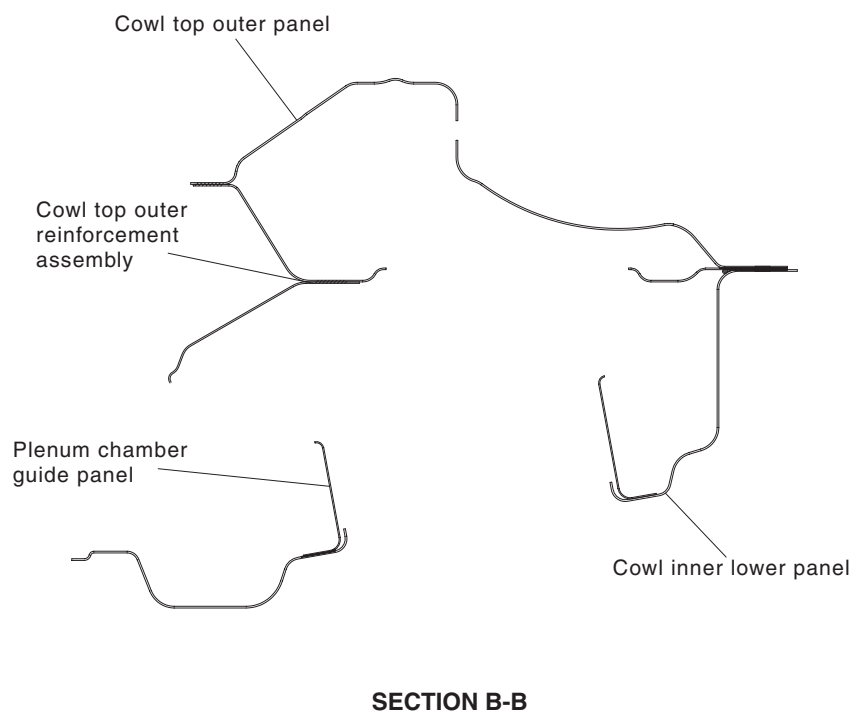
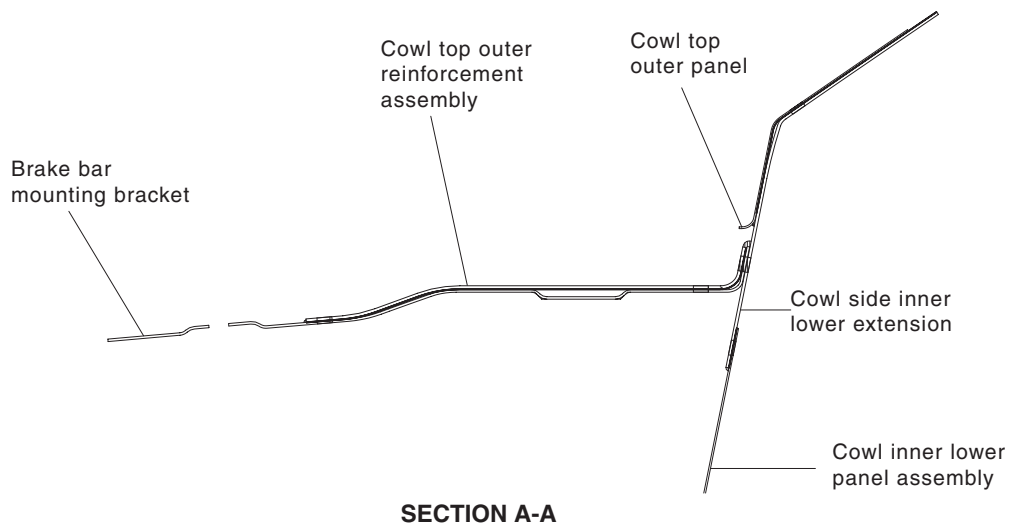


21-18 Replacing body panels



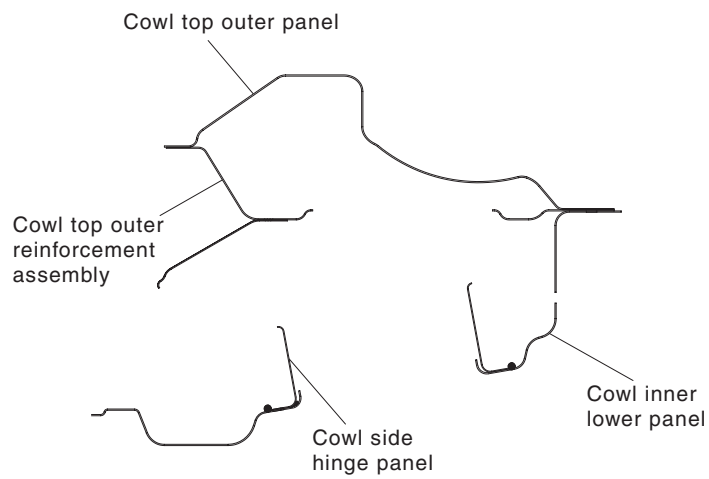
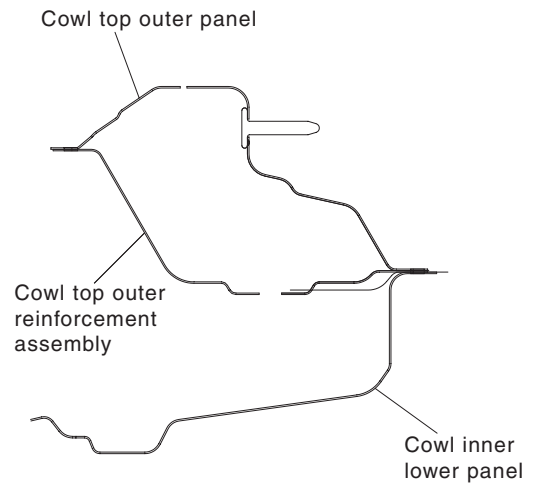
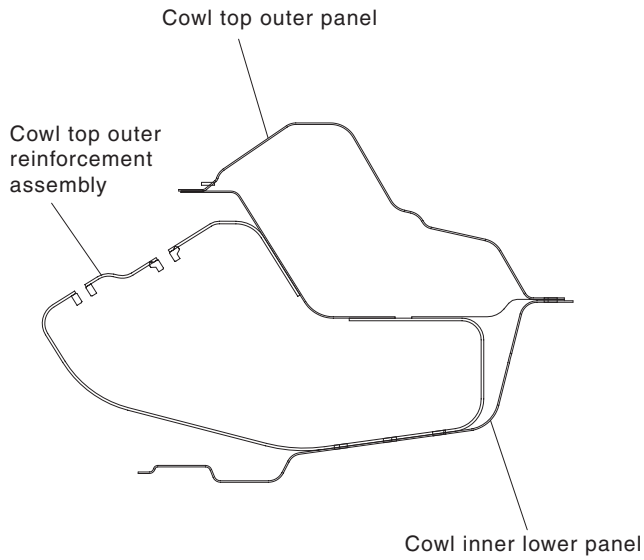
BMKM030

Section

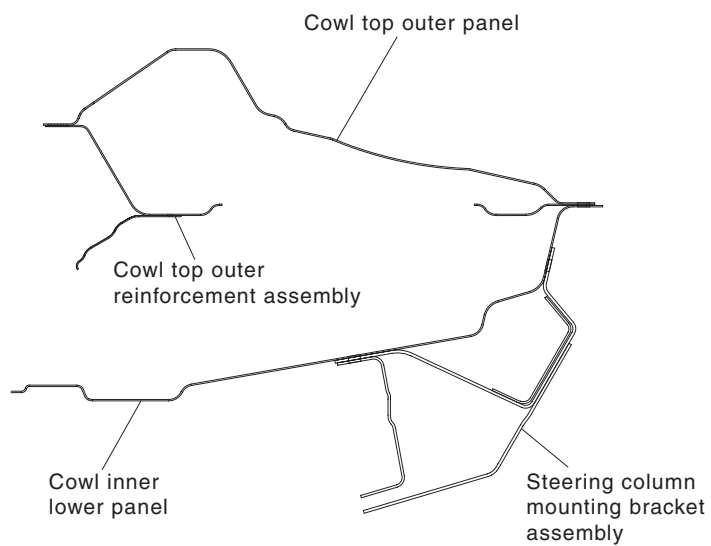
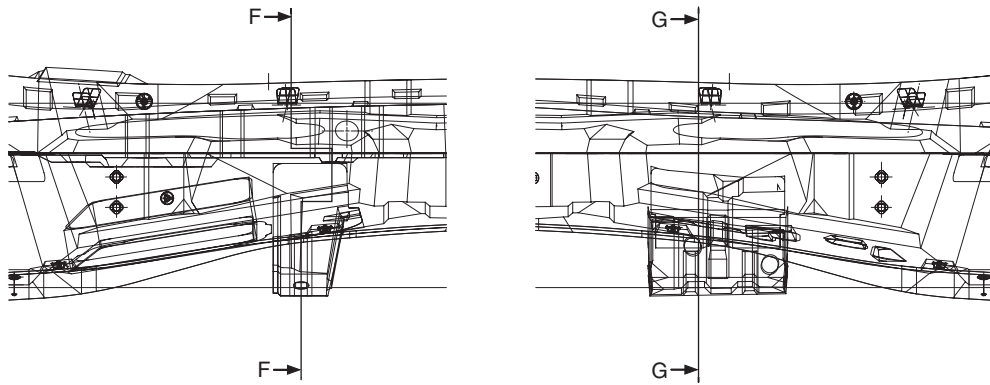


BMKM031

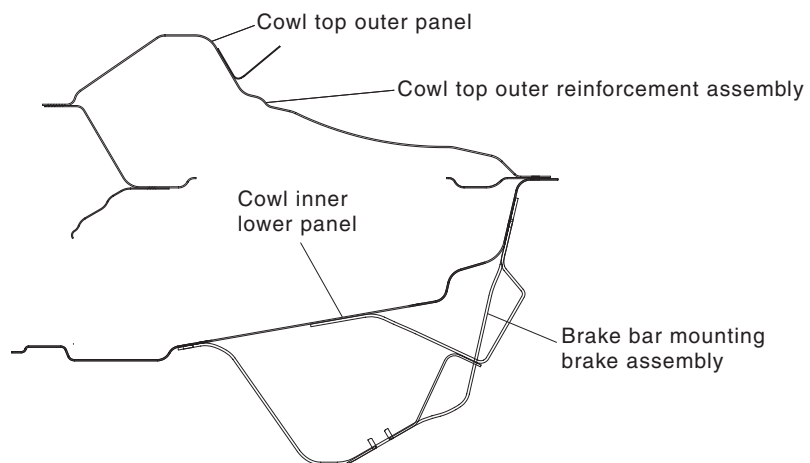
21-20 Replacing body panels



BMKM032



SECTION G-G

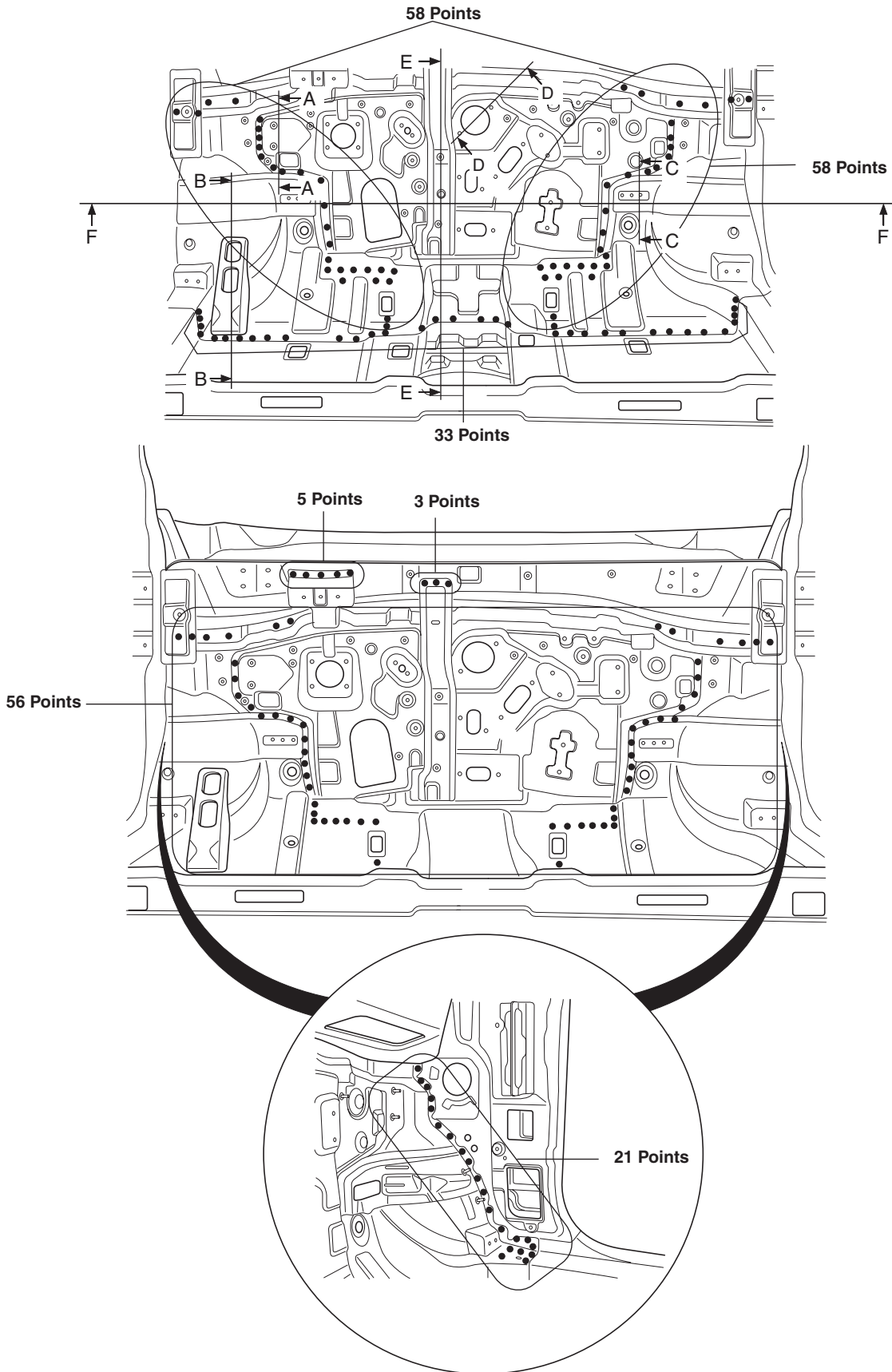


SECTION F-F

BMKM033

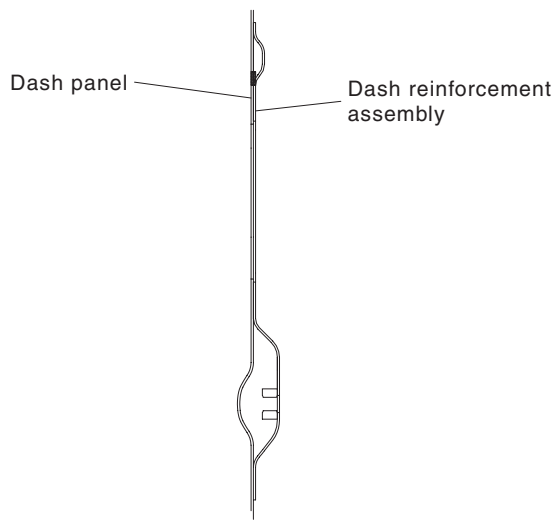
21-22 Replacing body panels

Dash panel assembly
Welding part

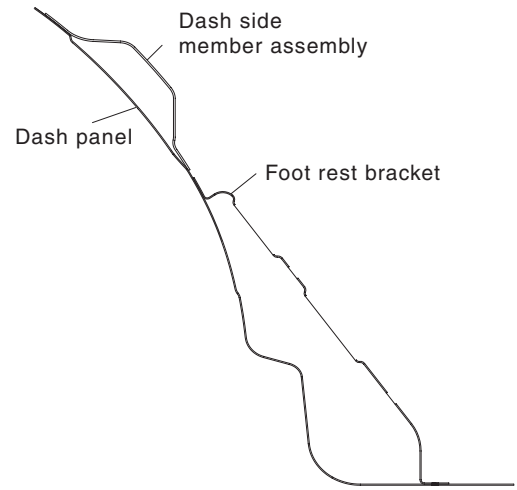


BMKM034

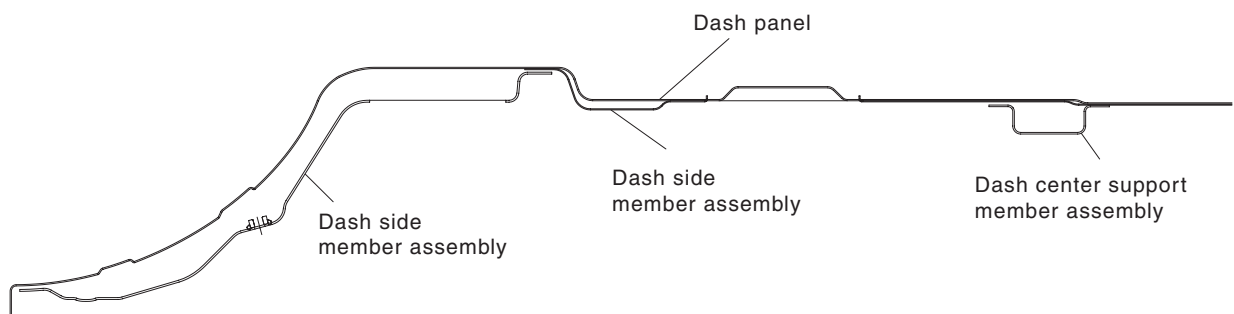
Section



SECTION A-A



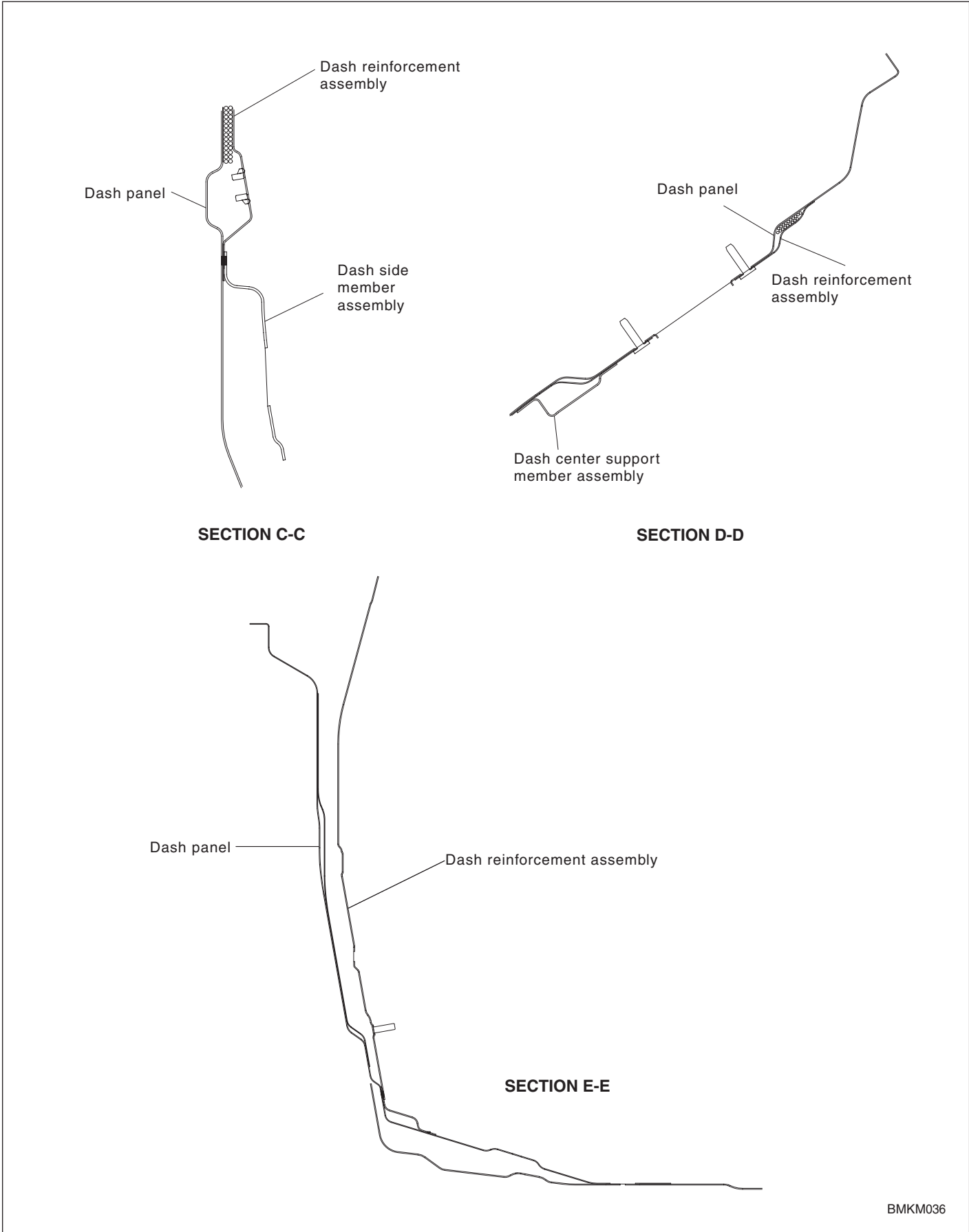
SECTION B-B



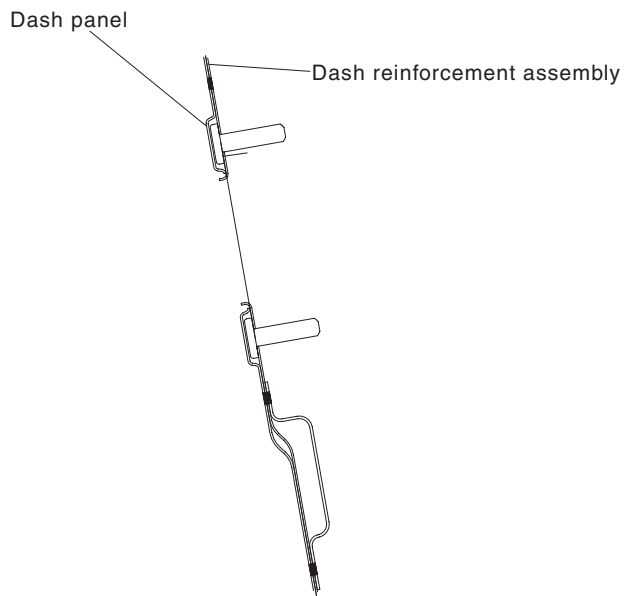
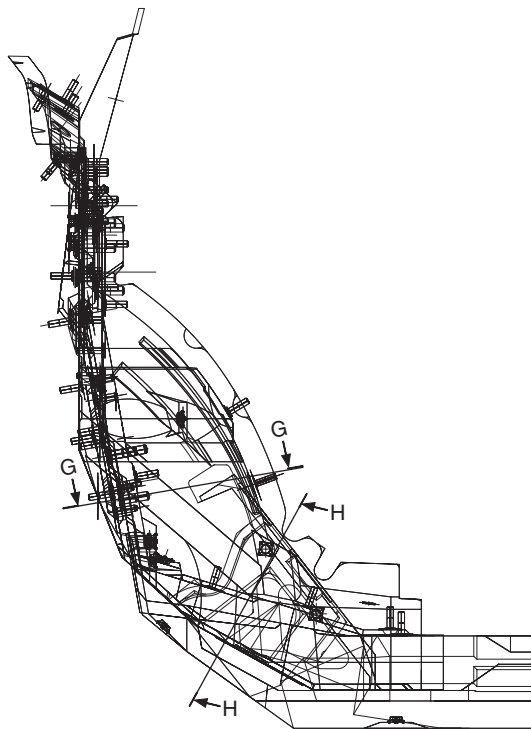
SECTION F-F

BMKM035

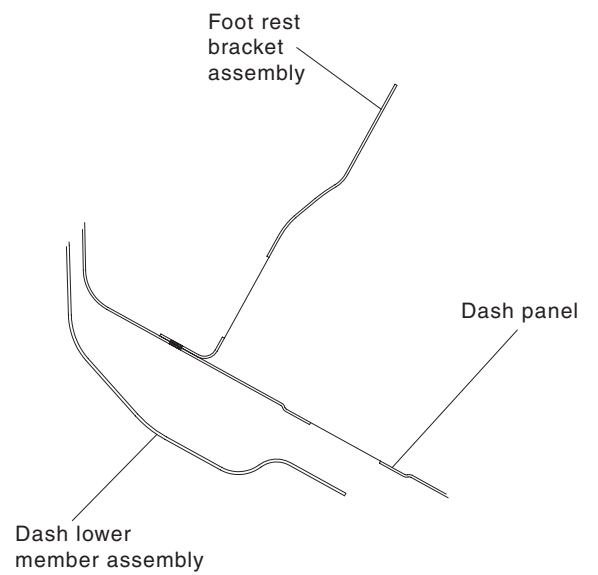
21-24 Replacing body panels



BMKM036



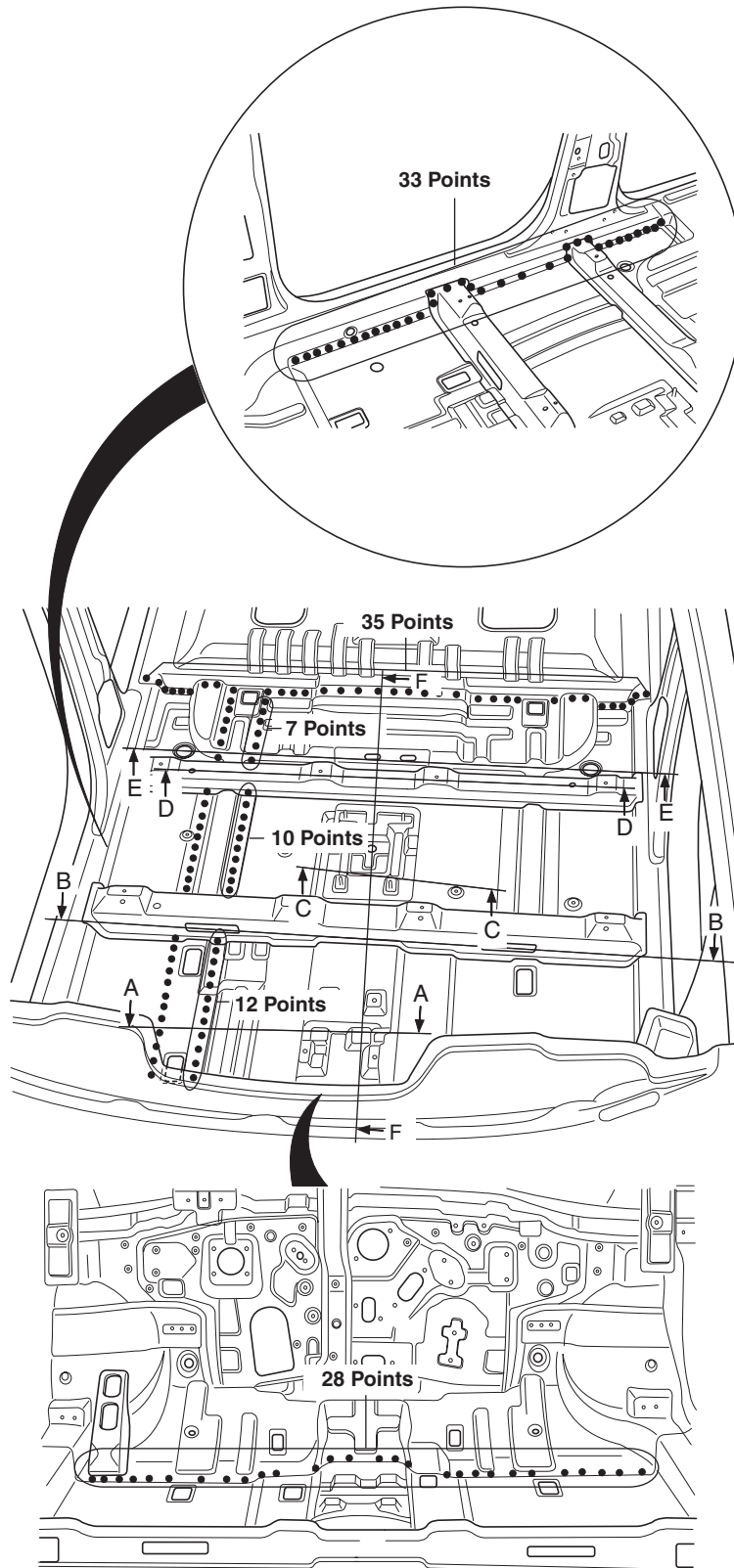
SECTION G-G



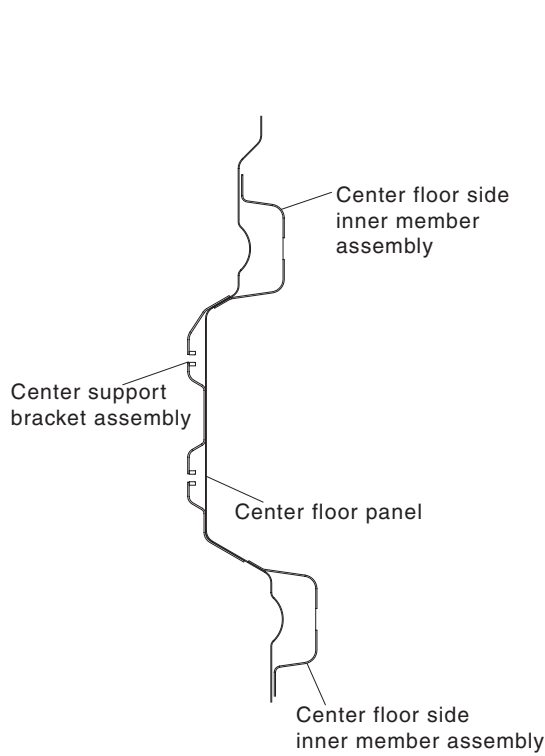
SECTION H-H

BMKM037

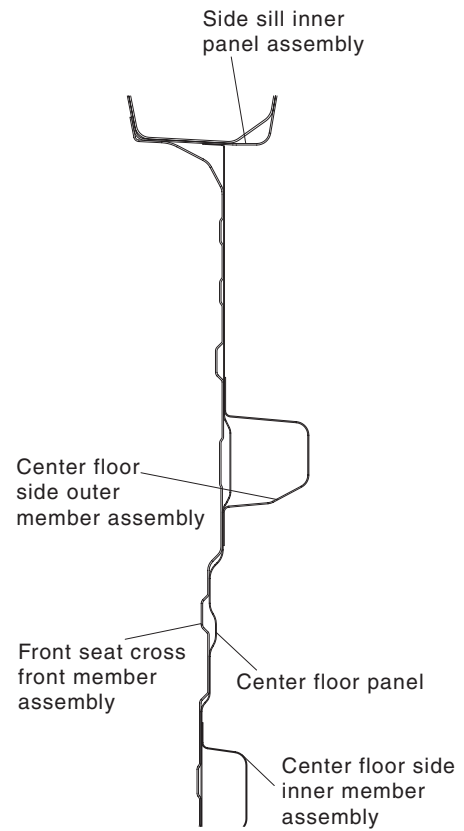
Center floor panel assembly Welding part



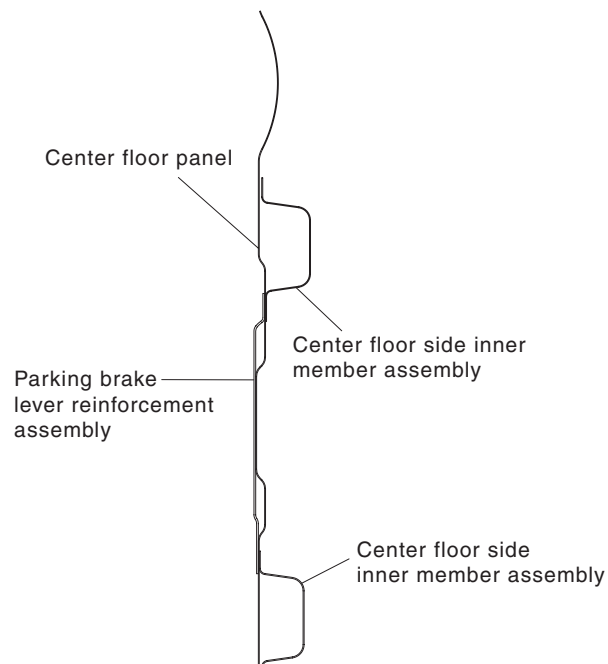
Section



SECTION A-A



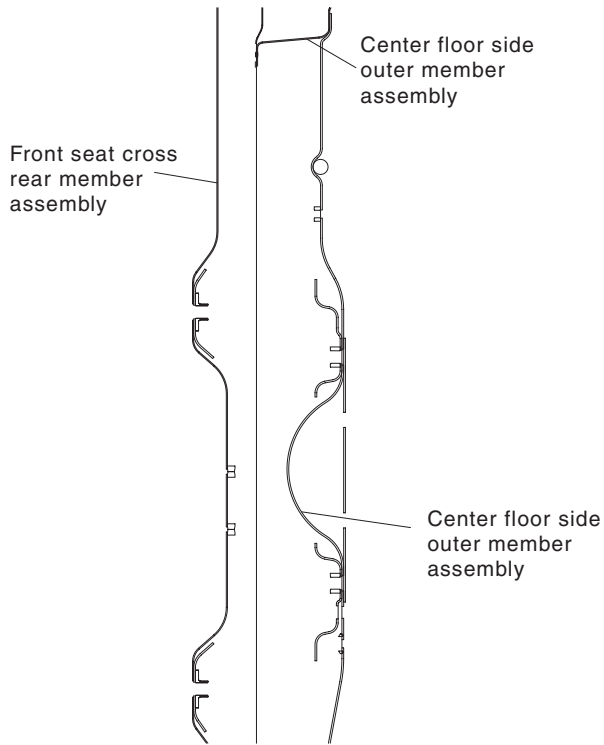
SECTION B-B



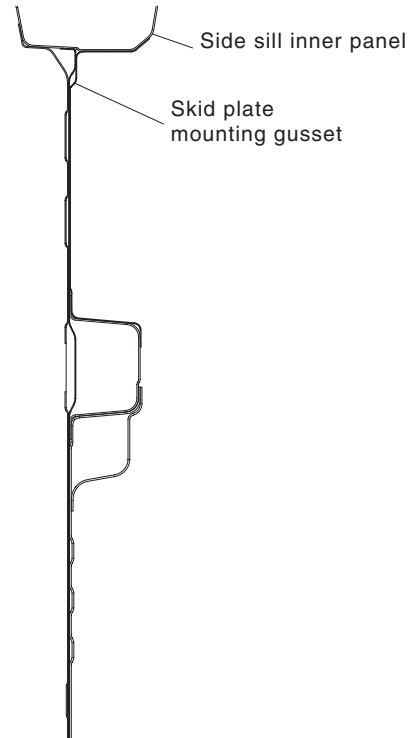
SECTION C-C

BMKM039

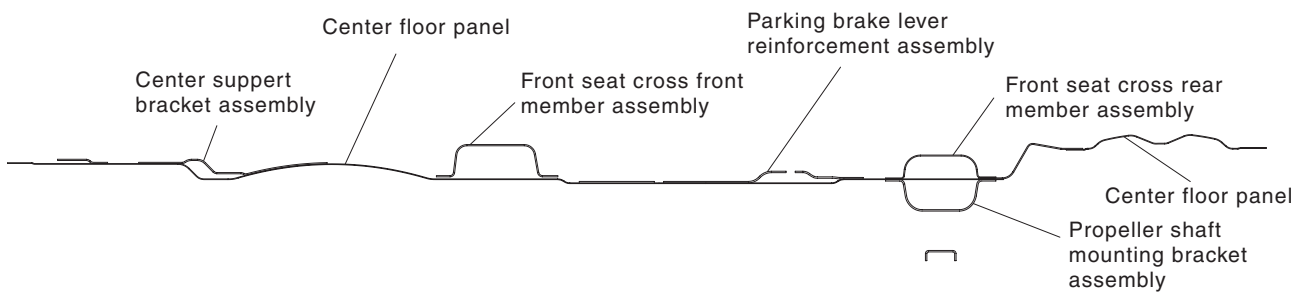
21-28 Replacing body panels



SECTION D-D



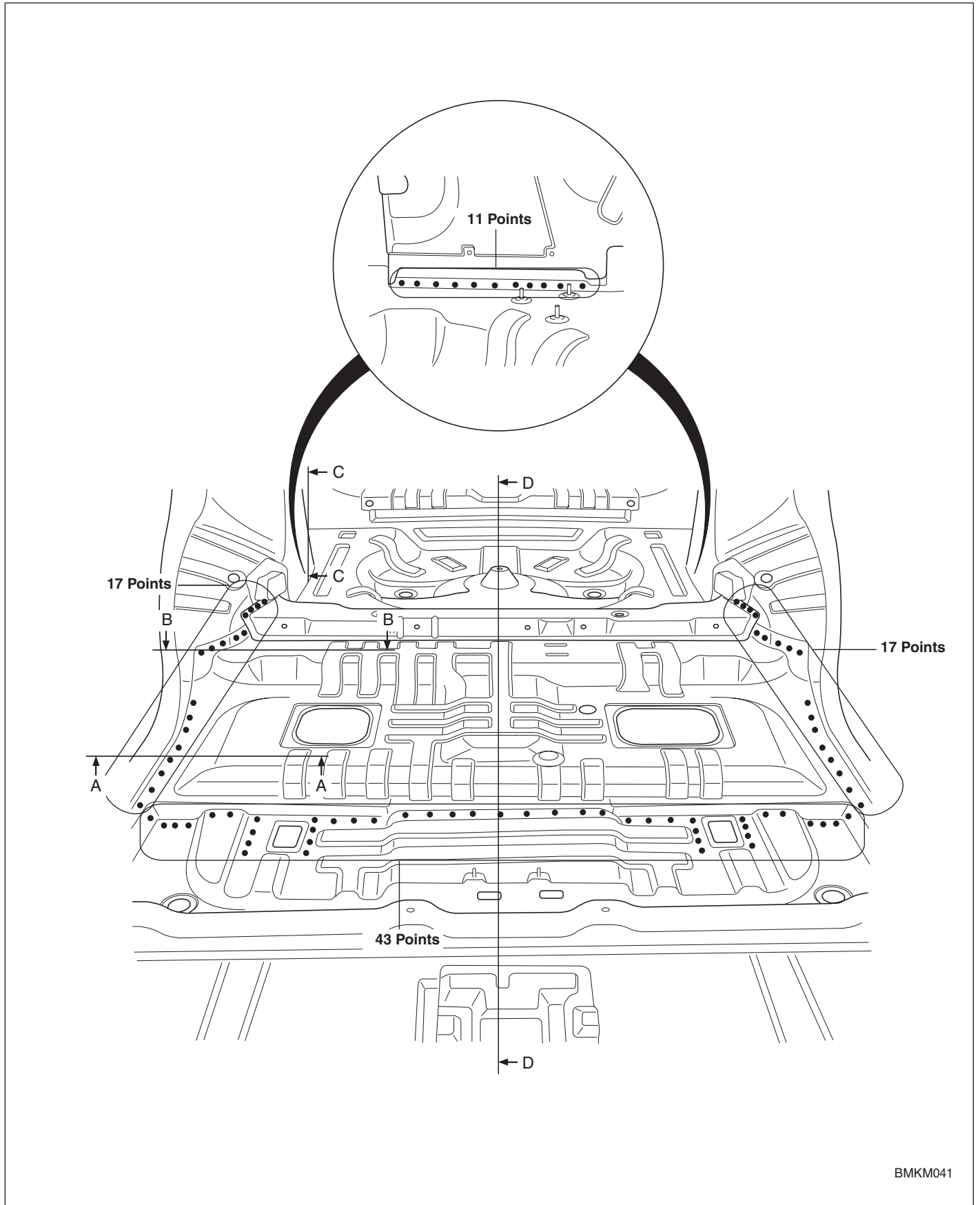
SECTION E-E



SECTION F-F

BMKM040

Rear floor panel assembly Welding part



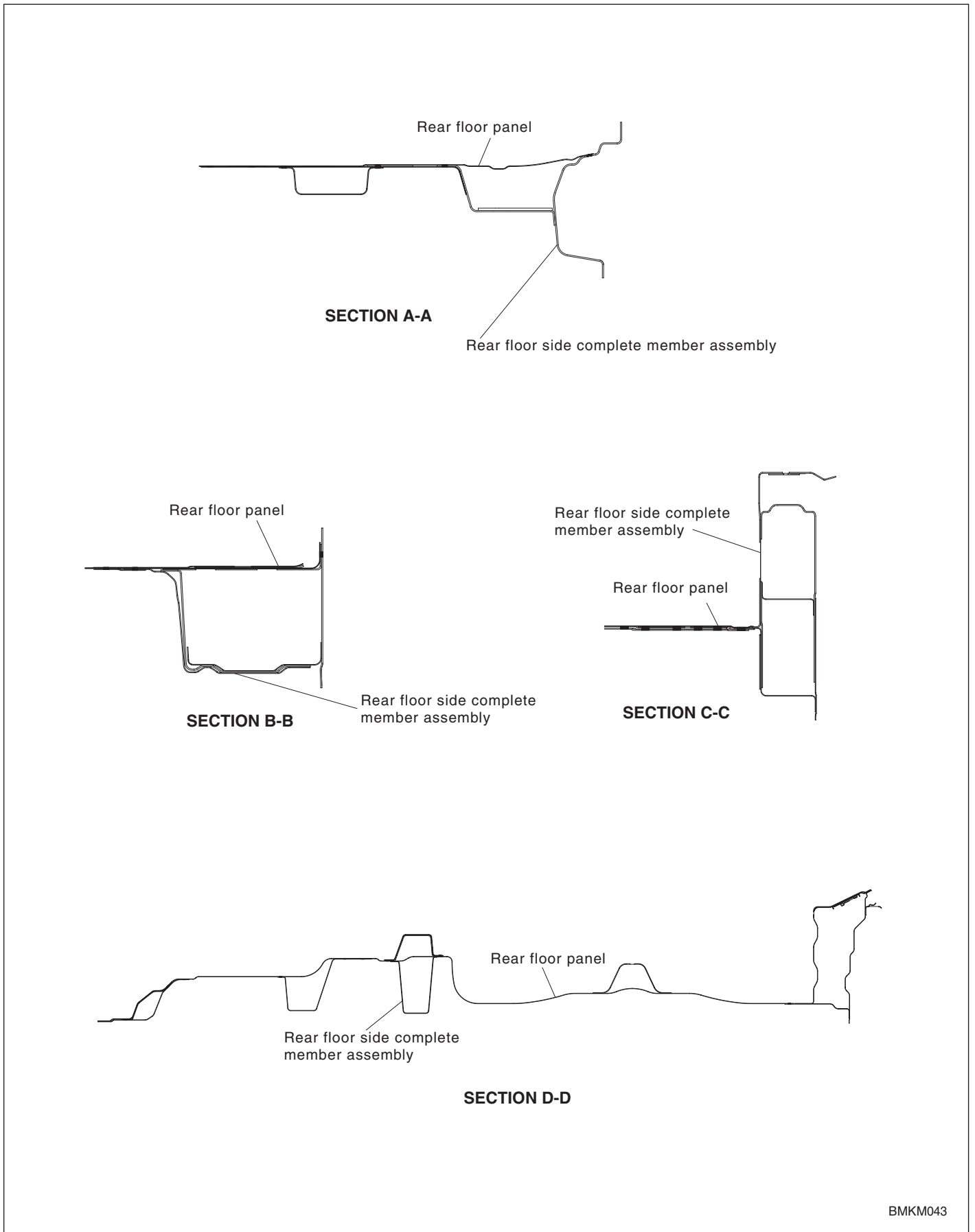
BMKM041

21-30 Replacing body panels



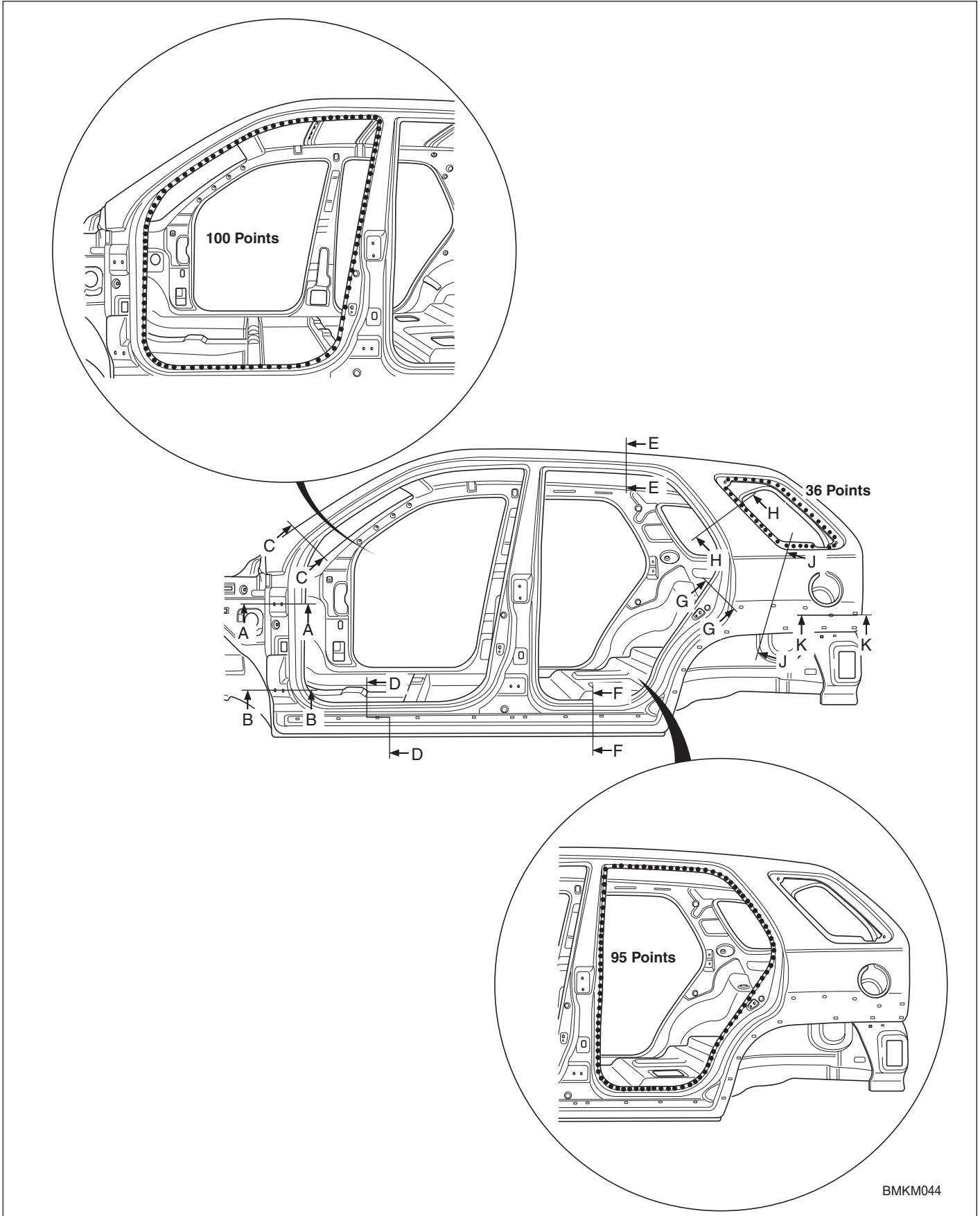
BMKM042

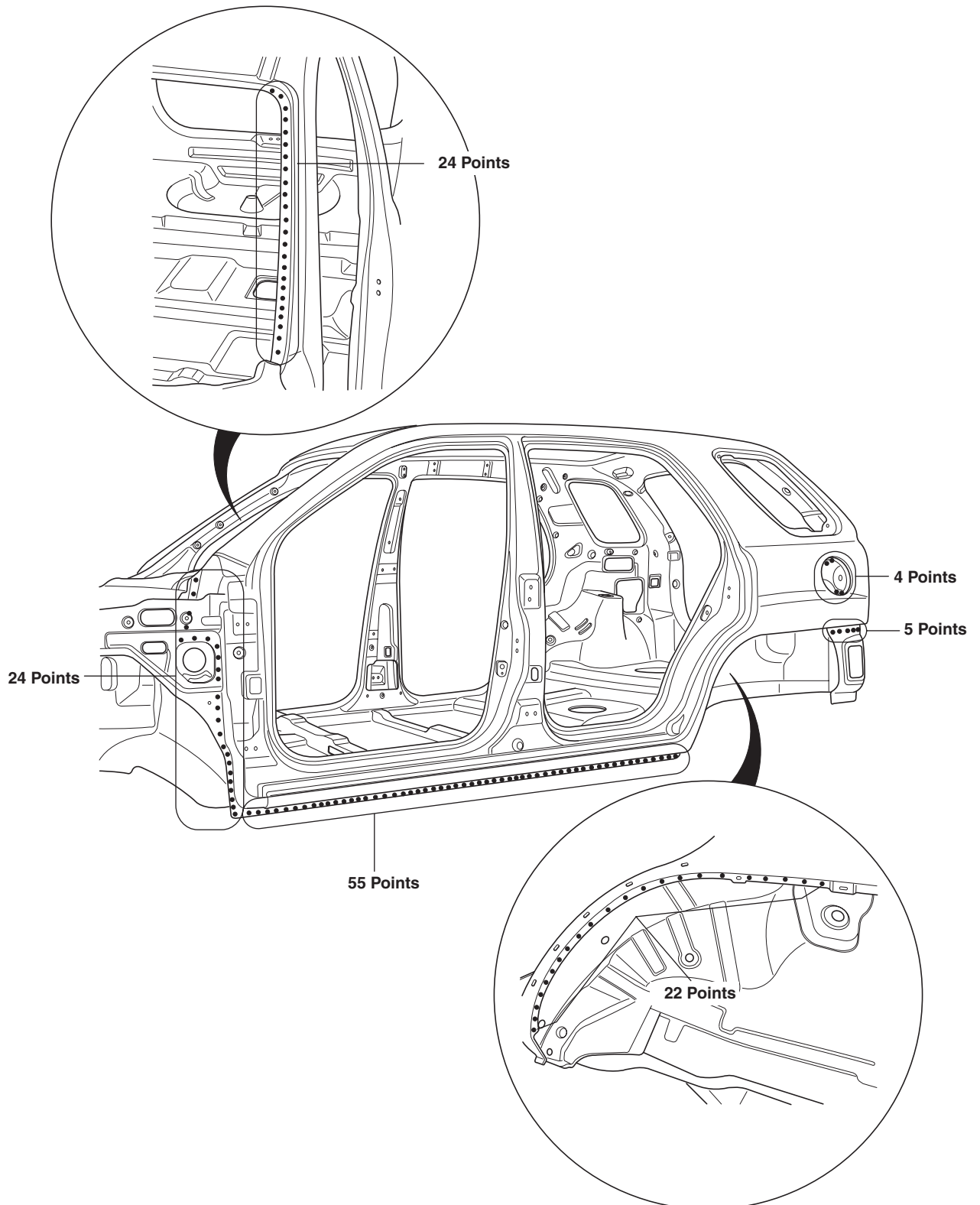
Section



21-32 Replacing body panels

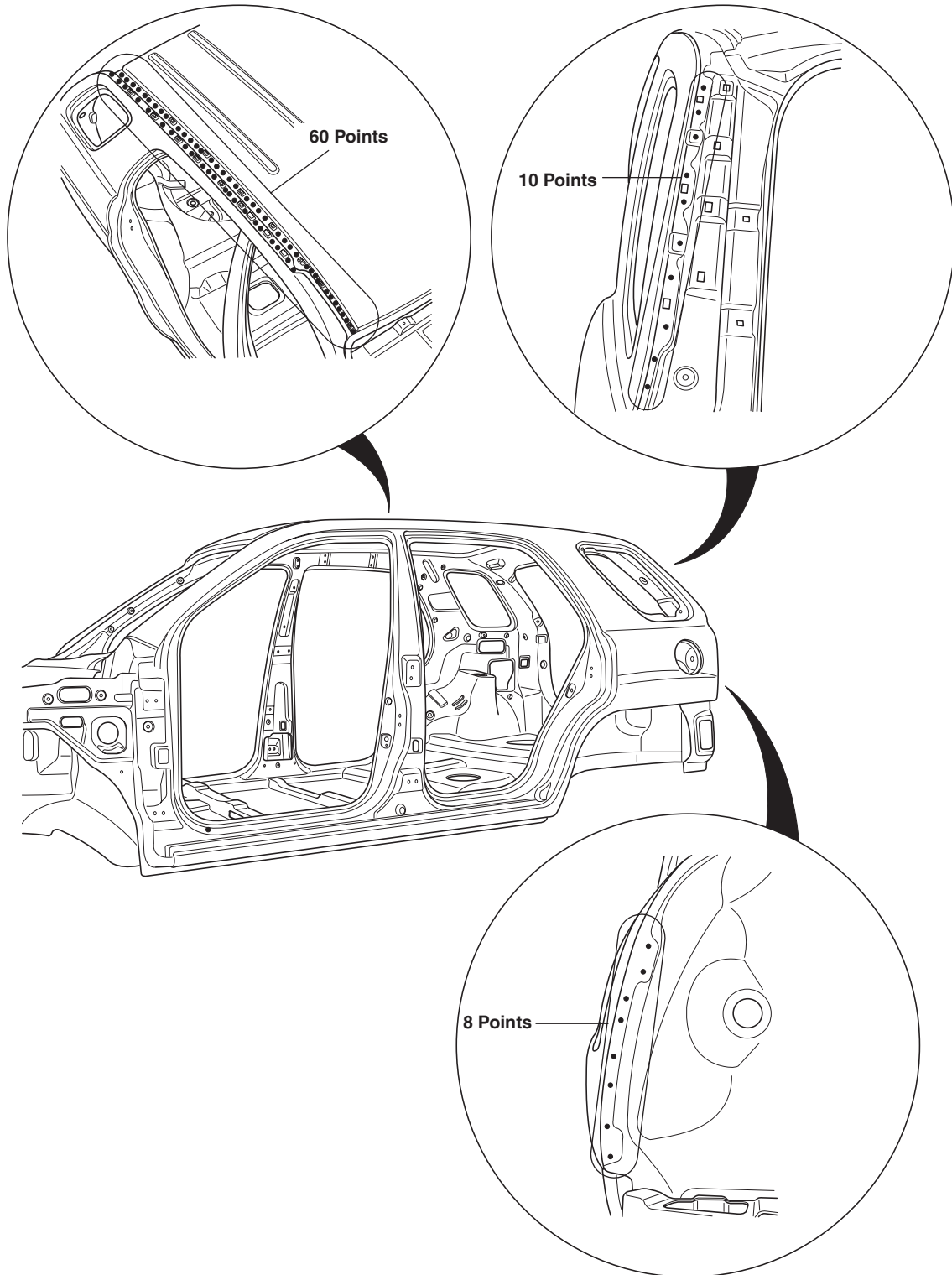
Side panel assembly
Welding part





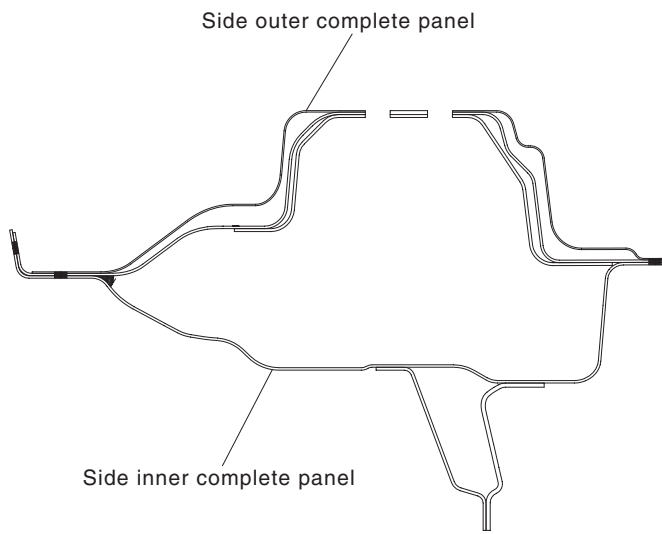
BMKM045

21-34 Replacing body panels

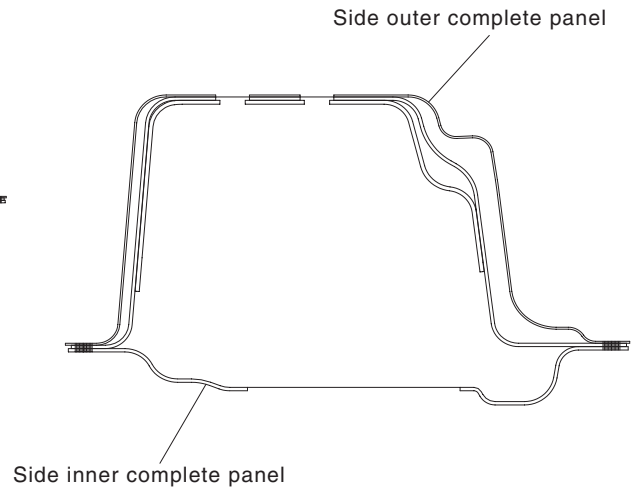


BMKM046

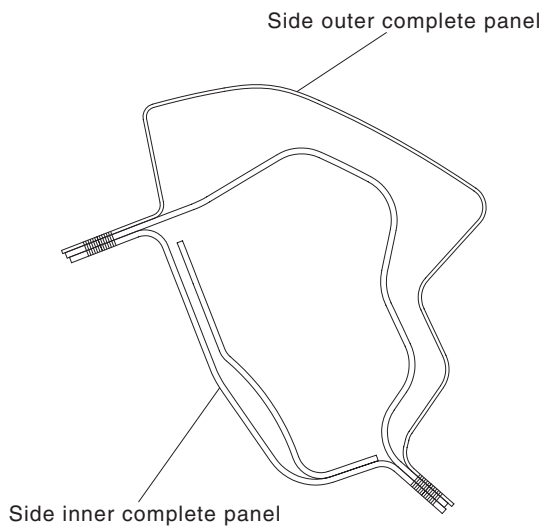
Section



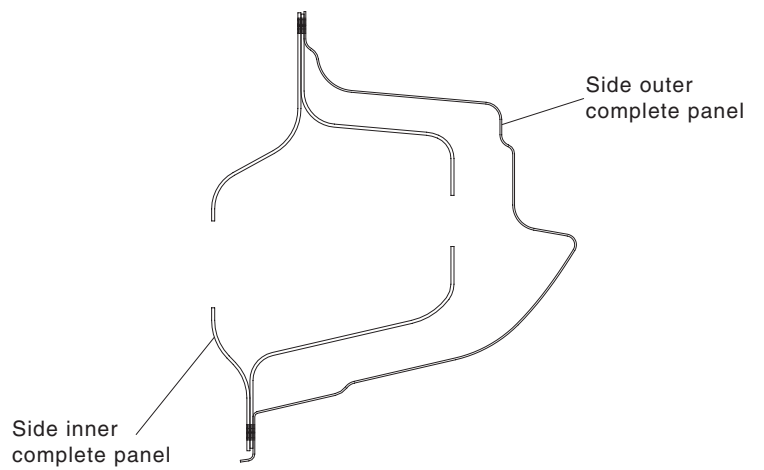
SECTION A-A



SECTION B-B



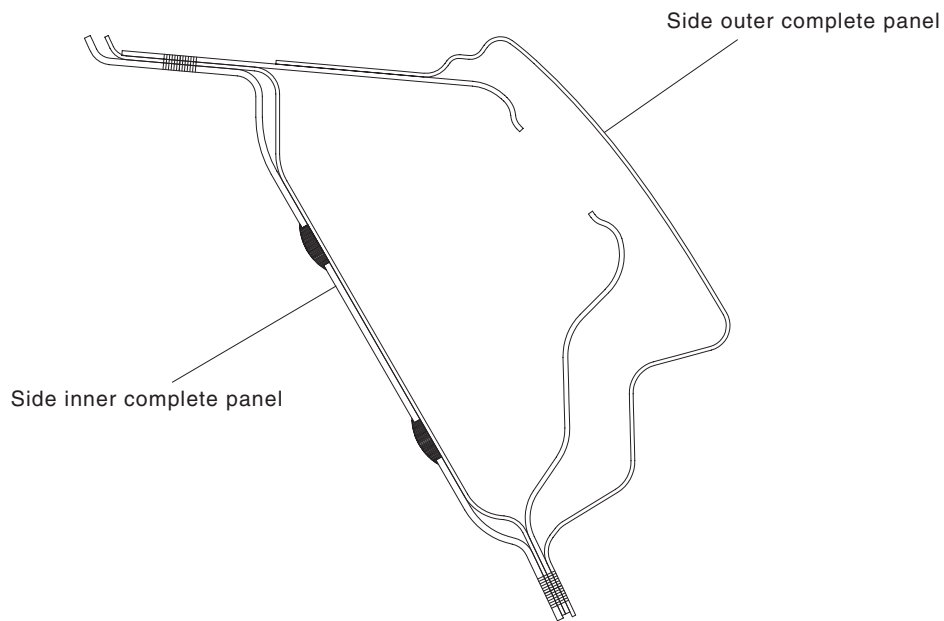
SECTION C-C



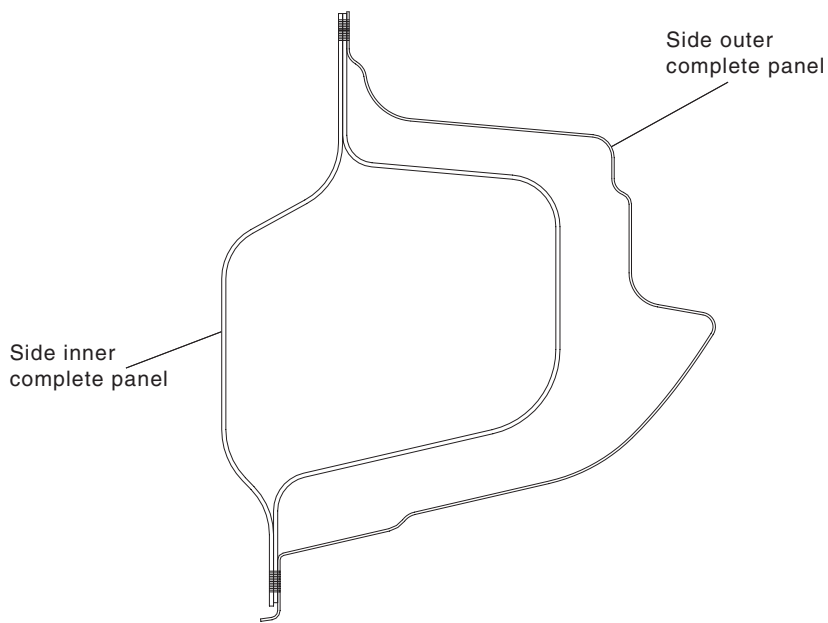
SECTION D-D

BMKM047

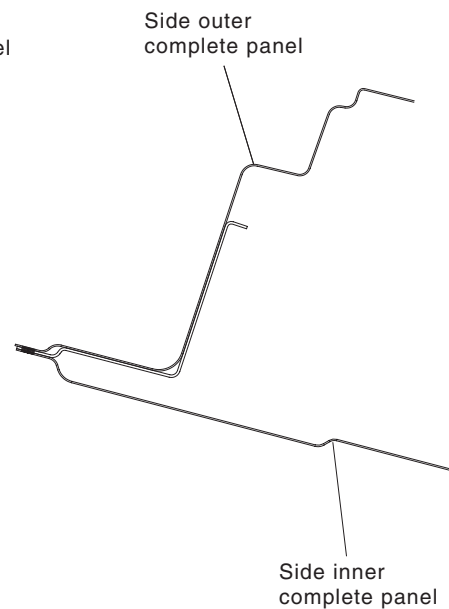
21-36 Replacing body panels



SECTION E-E

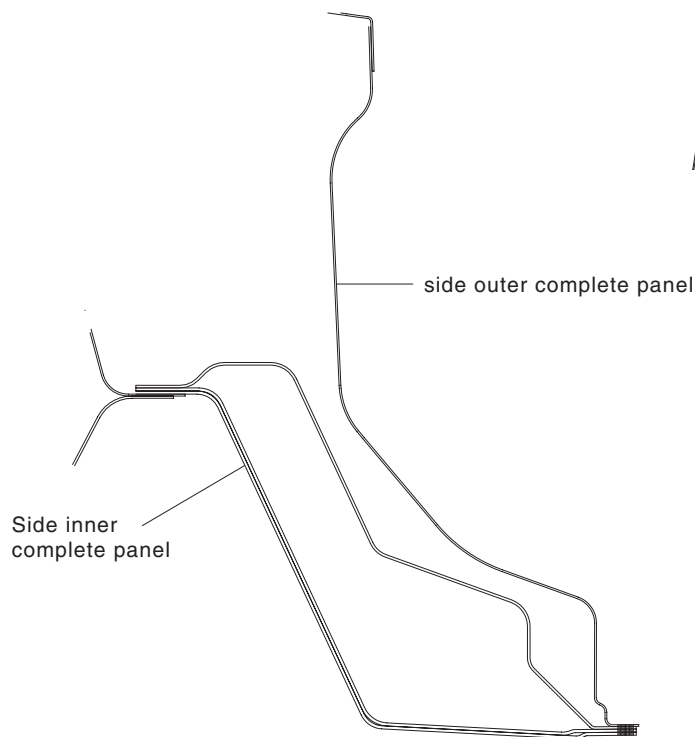
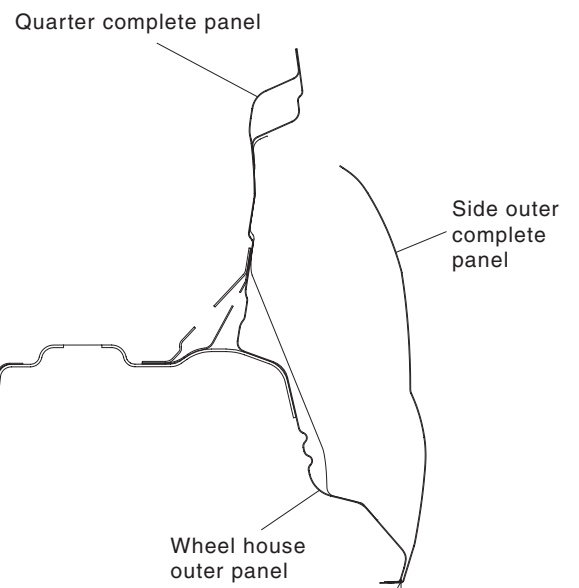
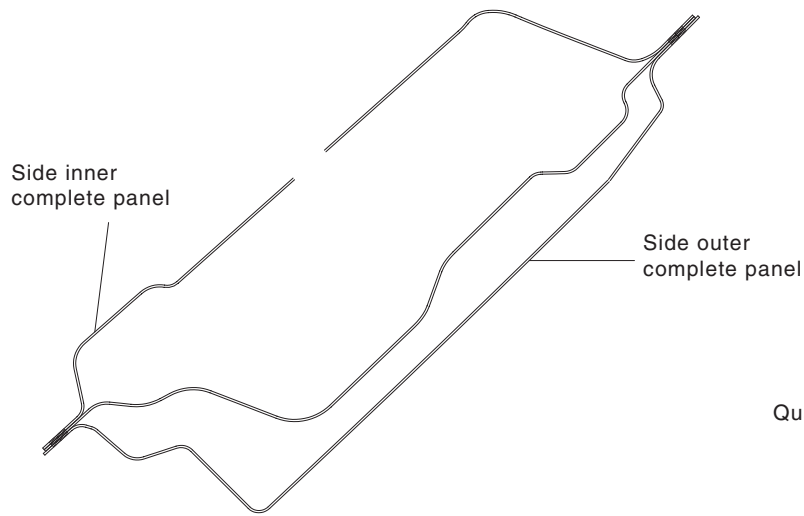


SECTION F-F

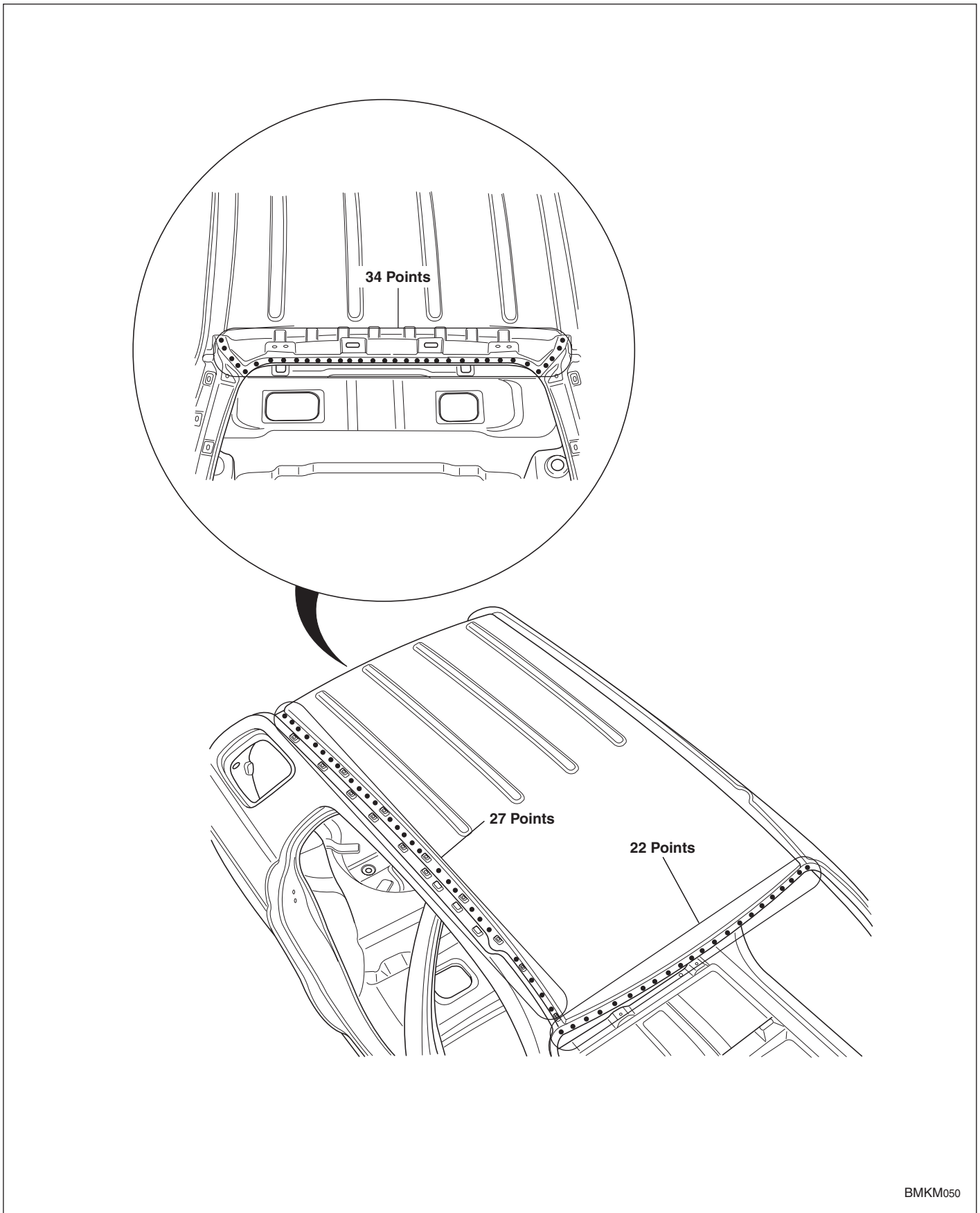


SECTION G-G

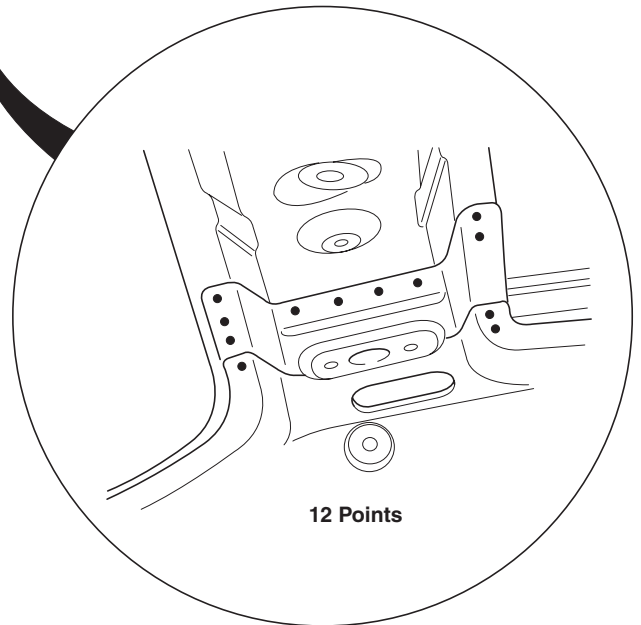
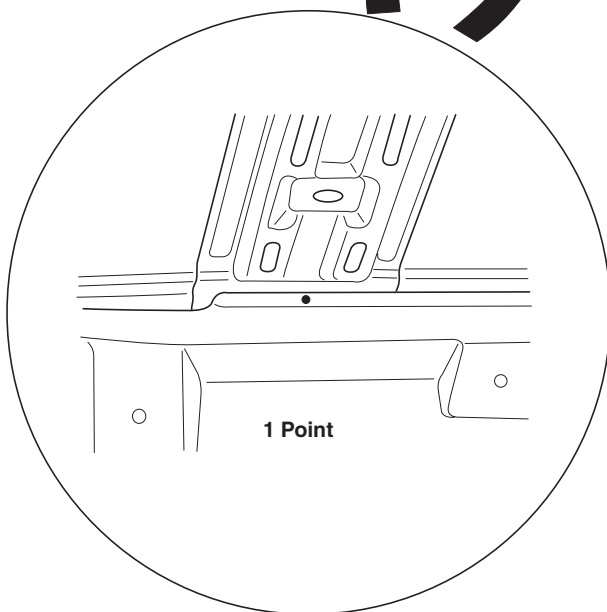
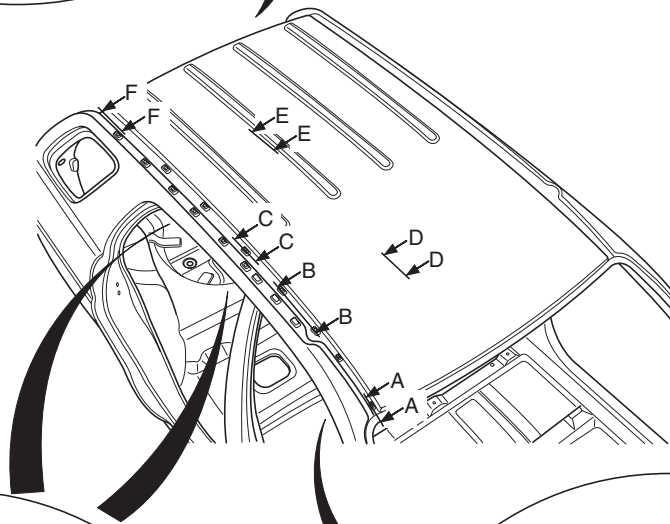
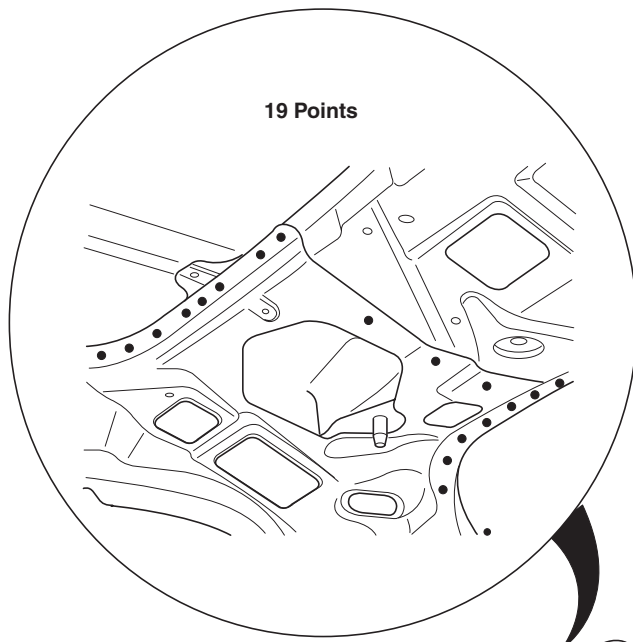
BMKM048



Roof panel assembly welding part

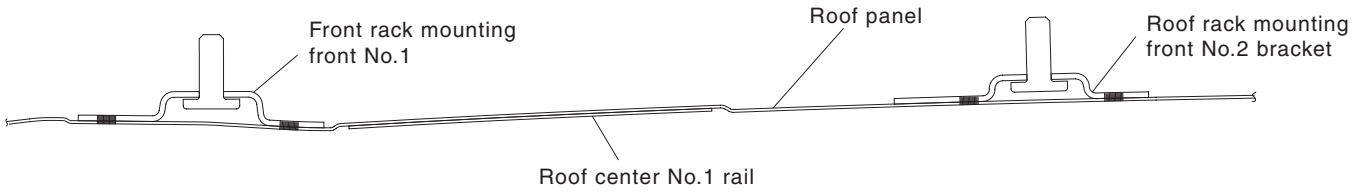


BMKM050

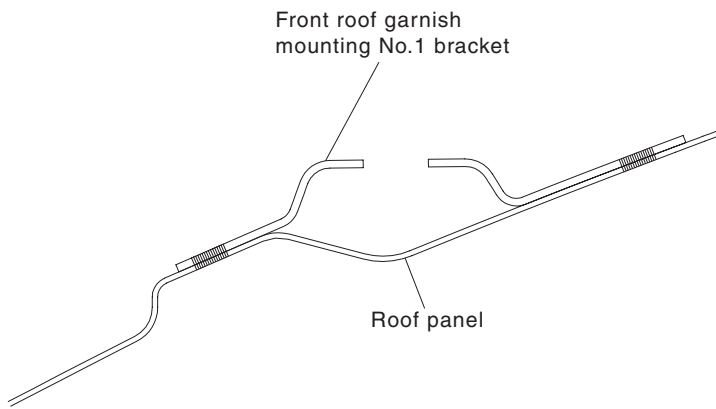


21-40 Replacing body panels

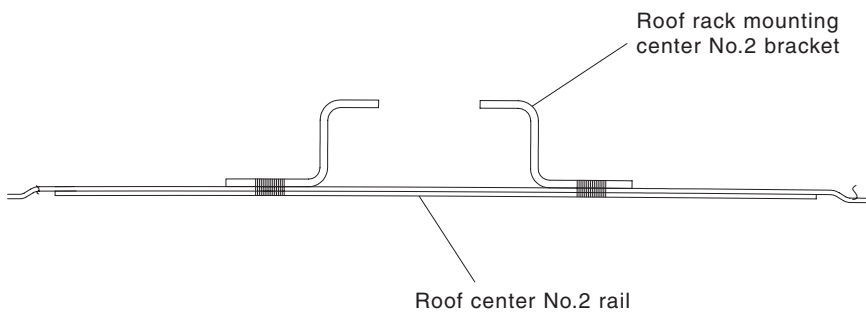
Section



SECTION B-B

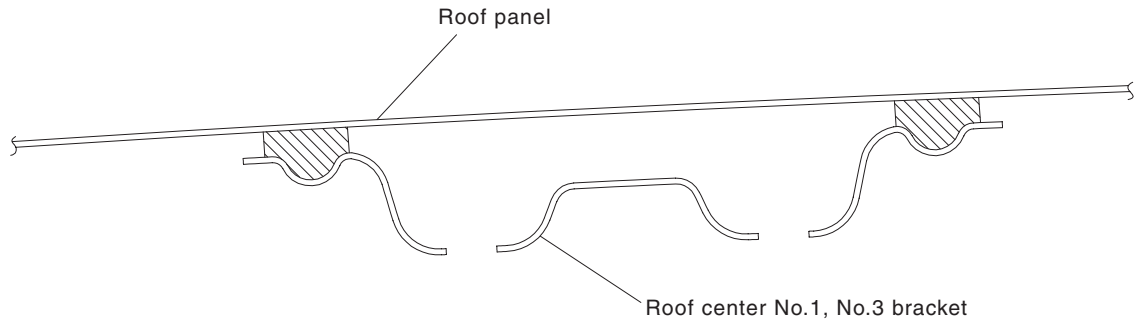


SECTION A-A

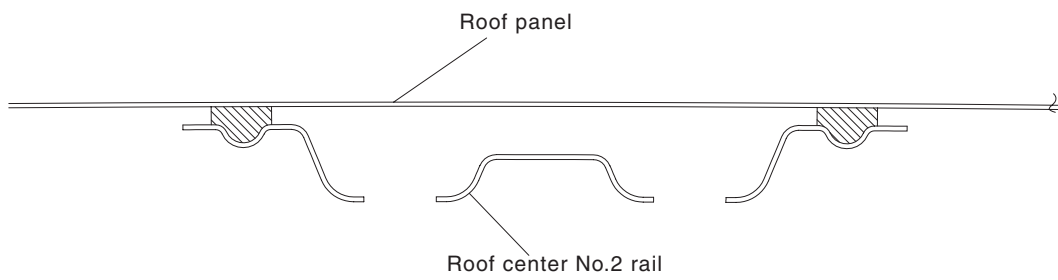


SECTION C-C

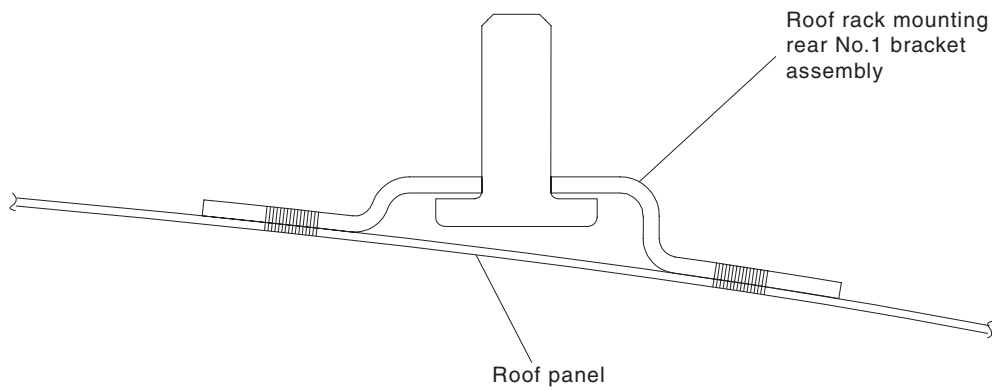
BMKM052



SECTION D-D

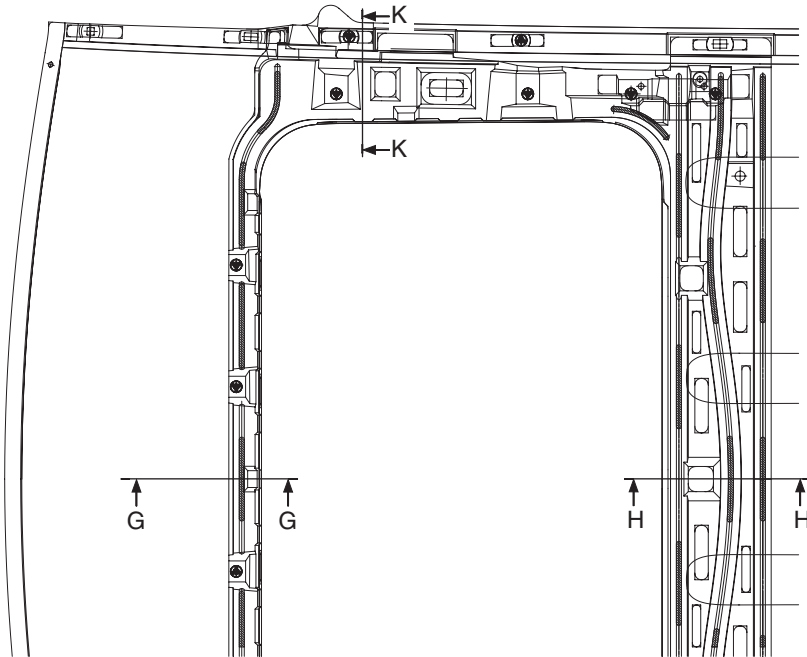


SECTION E-E

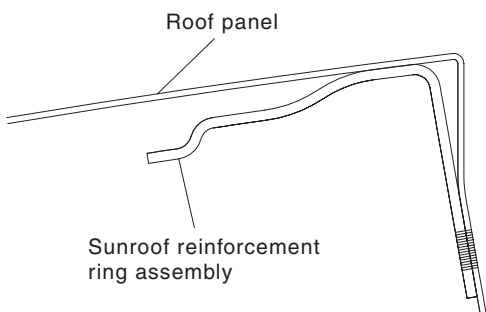


SECTION F-F

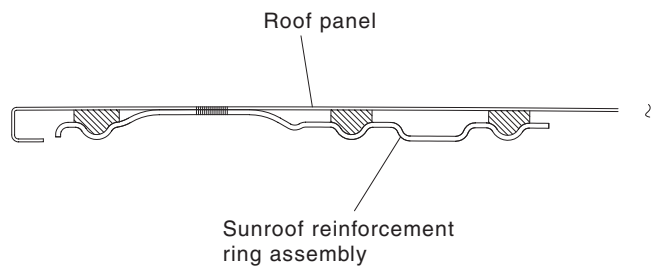
21-42 Replacing body panels



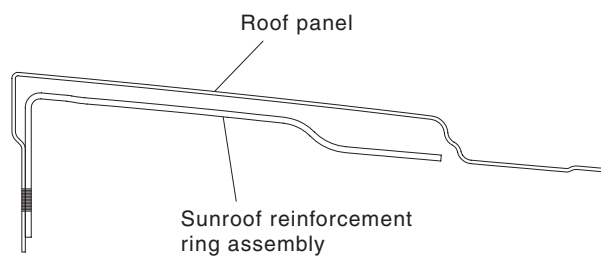
WITH SUNROOF



SECTION G-G



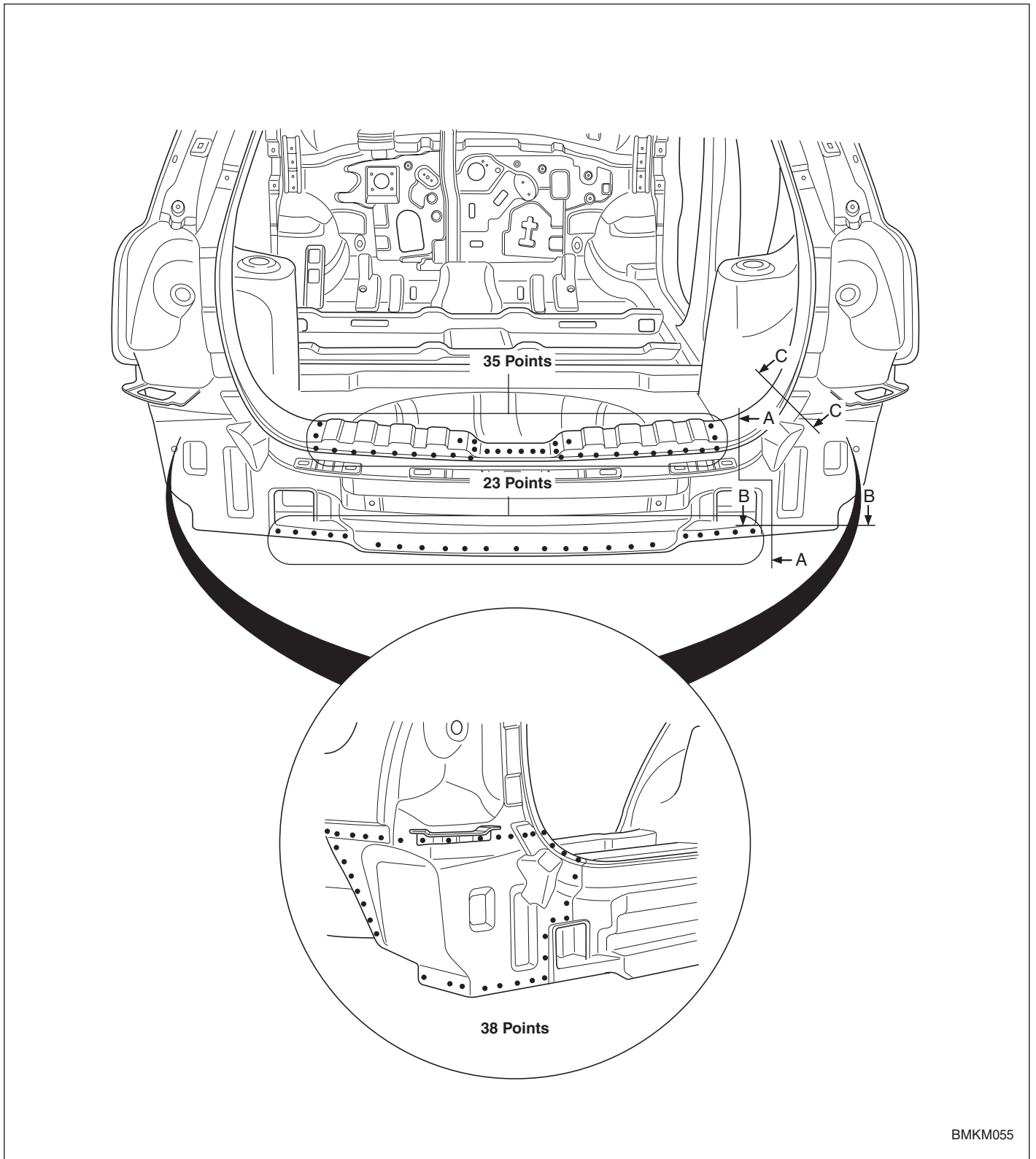
SECTION H-H



SECTION K-K

BMKM054

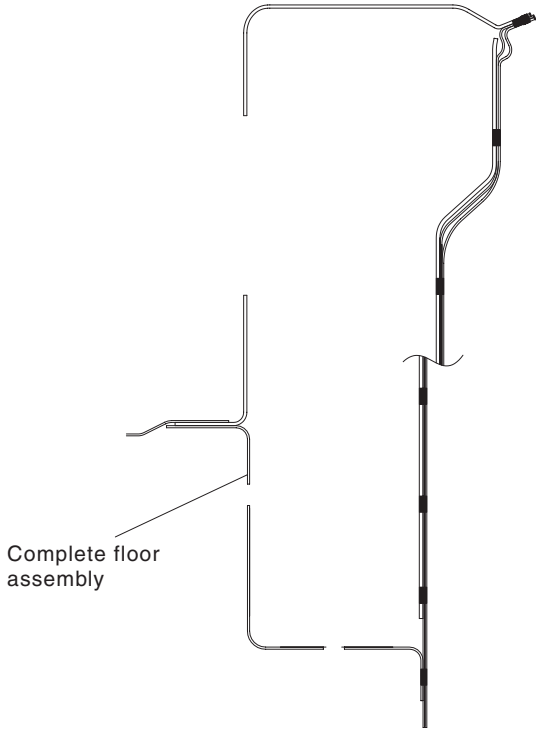
Back panel assembly
Welding part



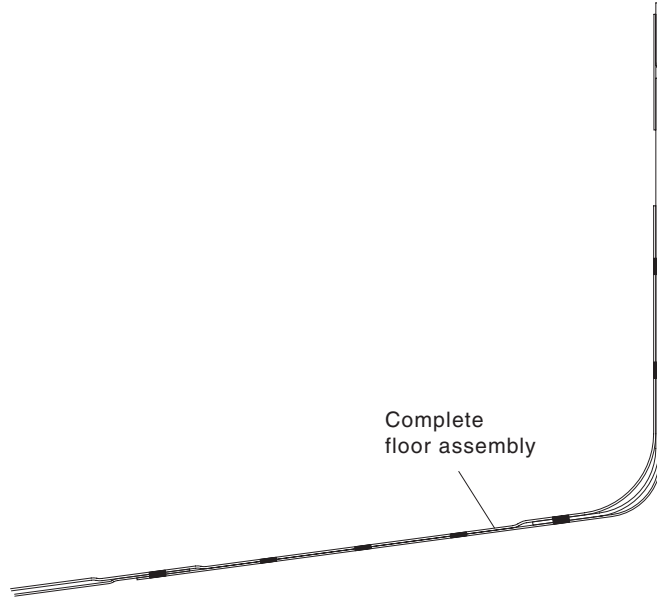
BMKM055

21-44 Replacing body panels

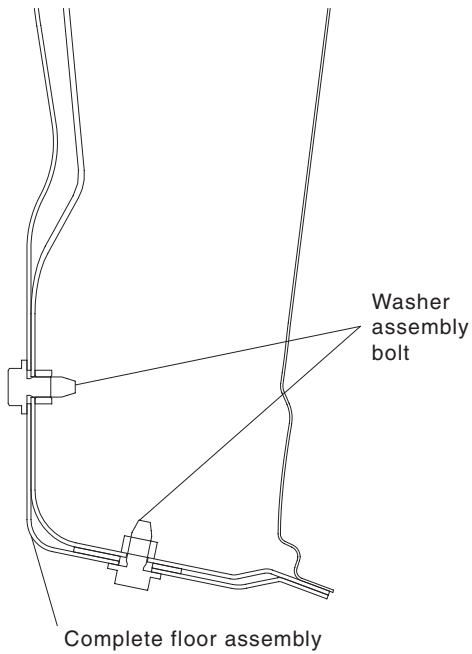
Section



SECTION A-A



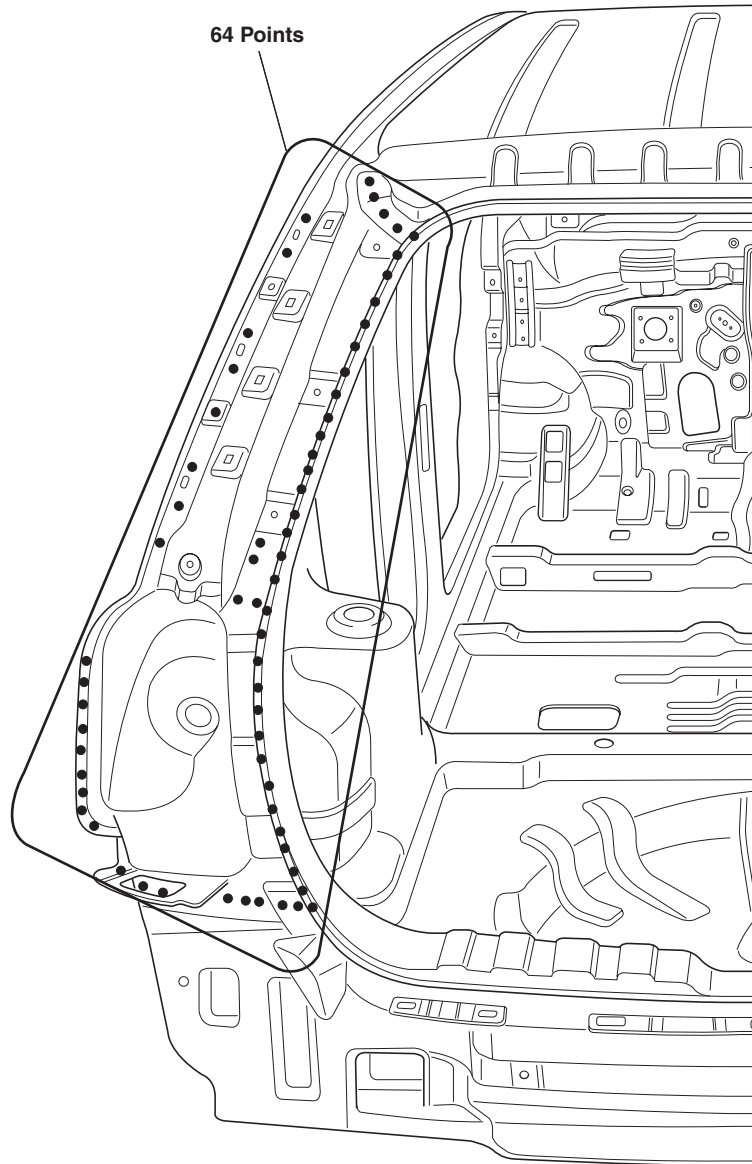
SECTION B-B



SECTION C-C

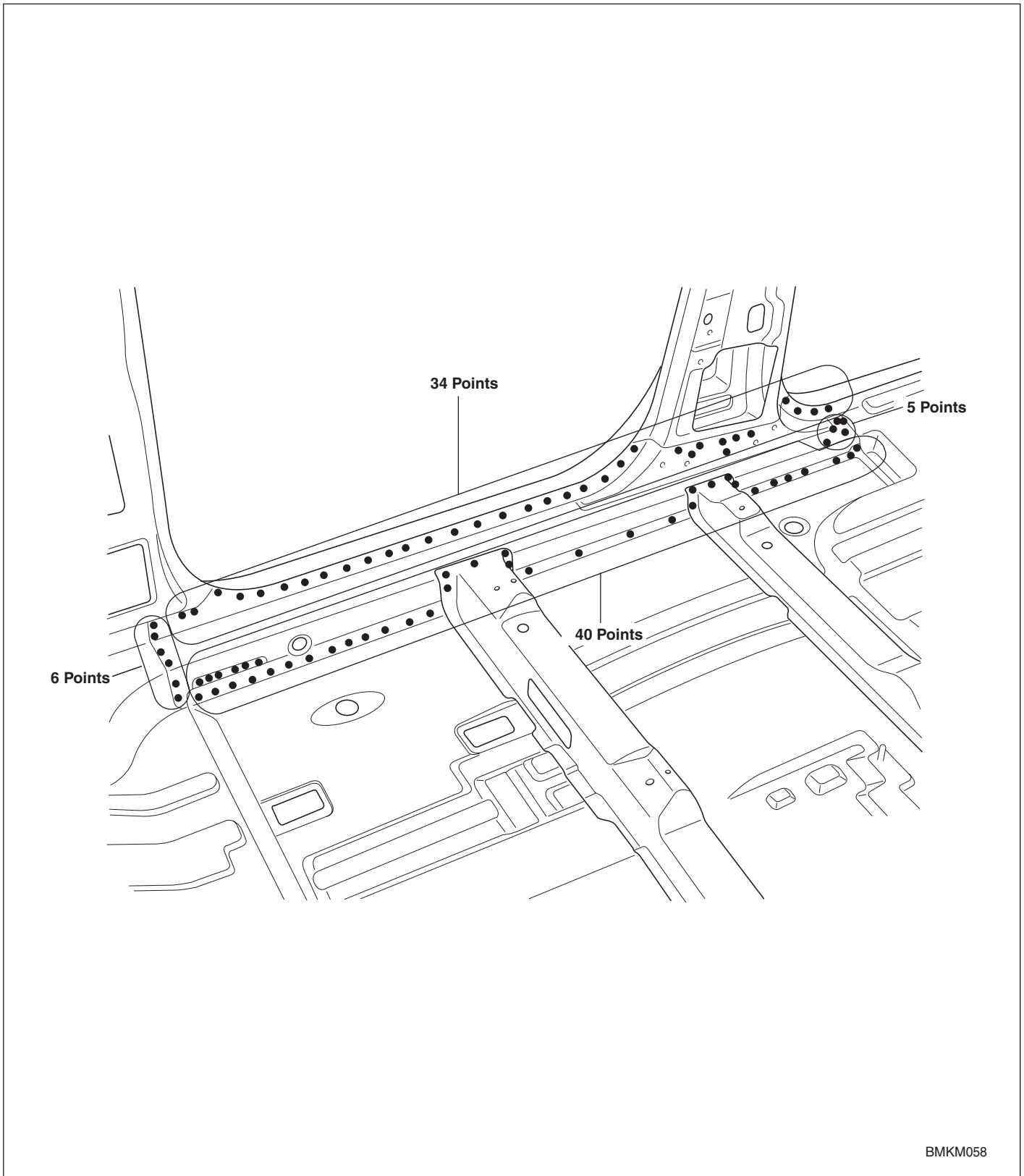
Quarter outer rear panel assembly

Welding part



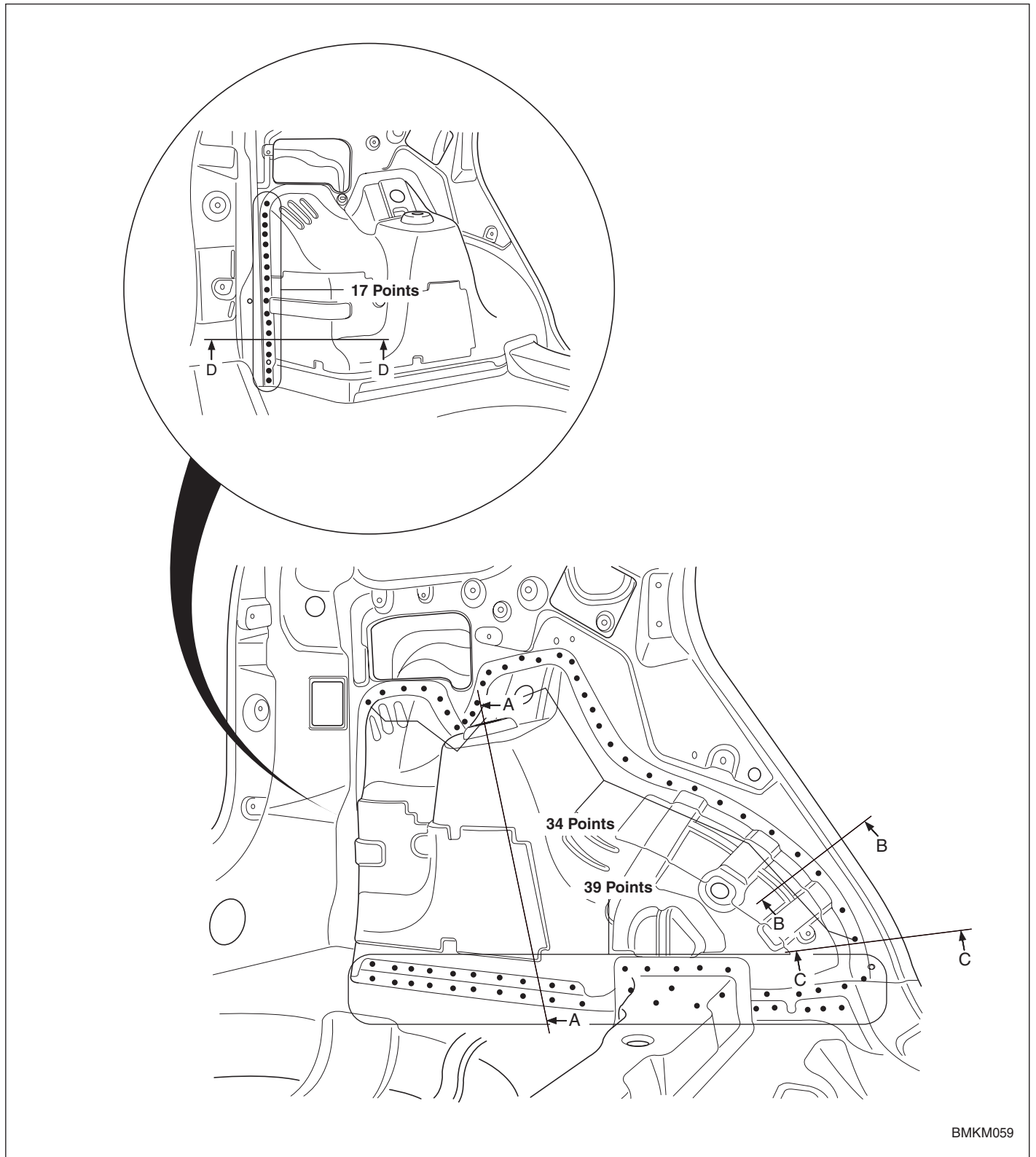
BMKM057

Side sill panel assembly Welding part

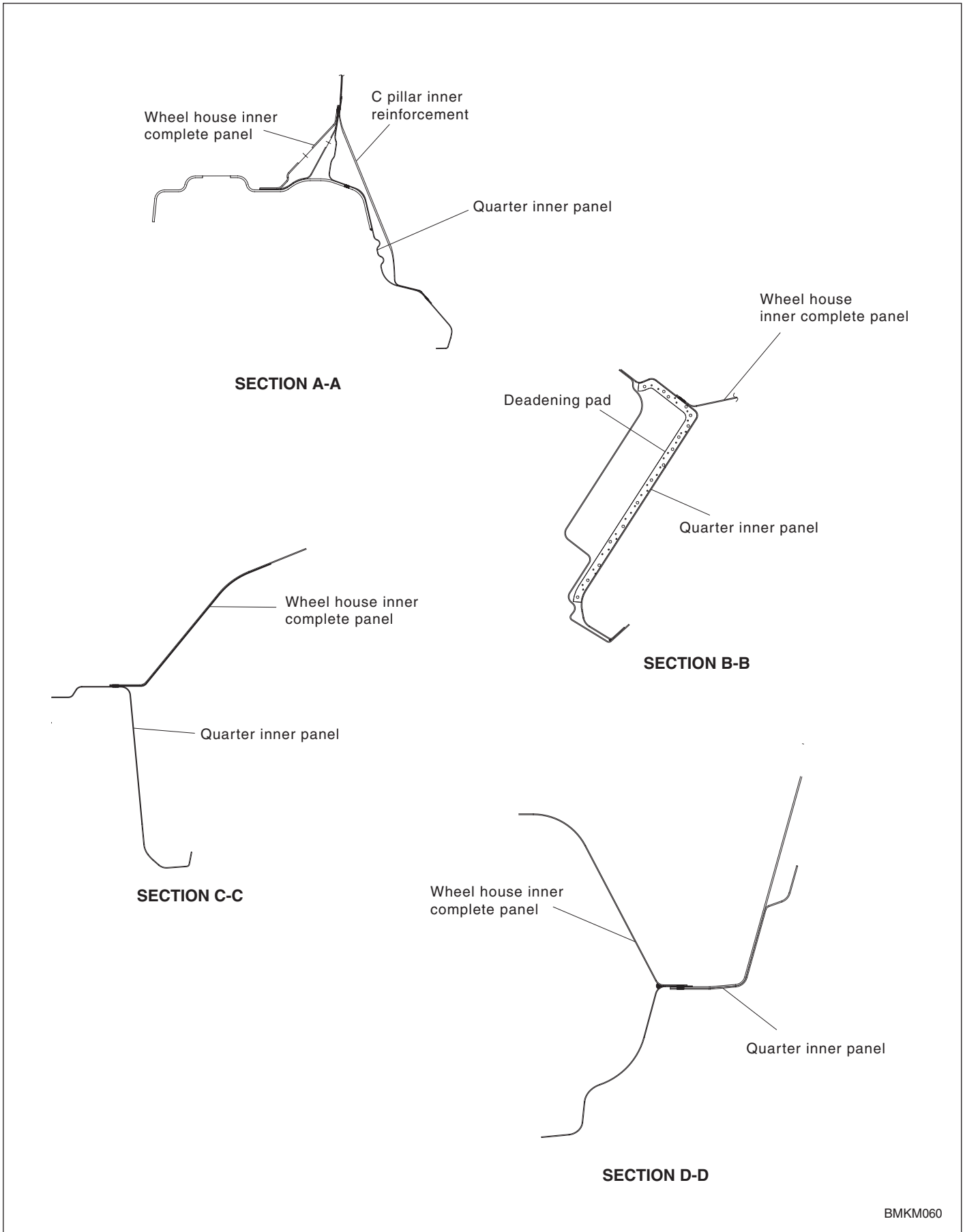


Wheel house panel assembly

Welding part



Section



Body dimensions

Body dimensions

Body dimension indications	31- 1
Projected dimensions	31 - 1
Straight-line dimensions	31- 1
Front body	31- 2
Side frame panel	31- 4
Interior A	31- 6
Interior B	31- 8
Interior C	31-10
Rear body	31-12
Under body	
Projected dimensions	31-14
Straight-line dimensions	31-16

Body dimensions

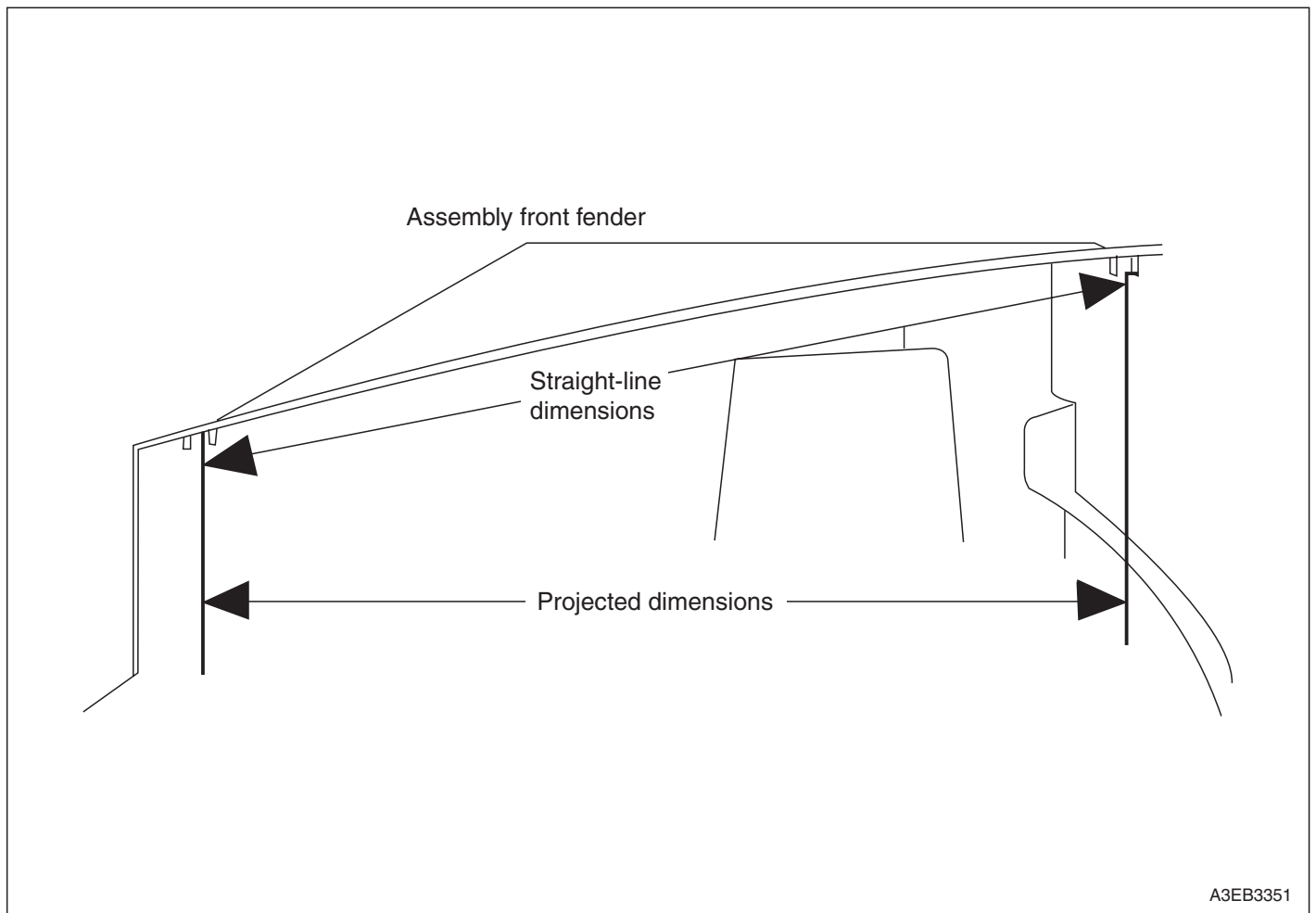
Body dimension indication

Projected dimensions

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

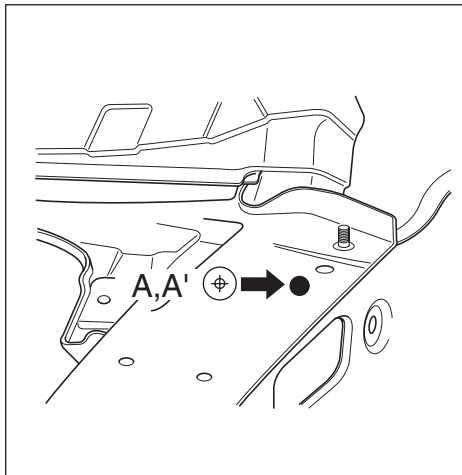
Straight-line dimensions (Actual measured dimensions)

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



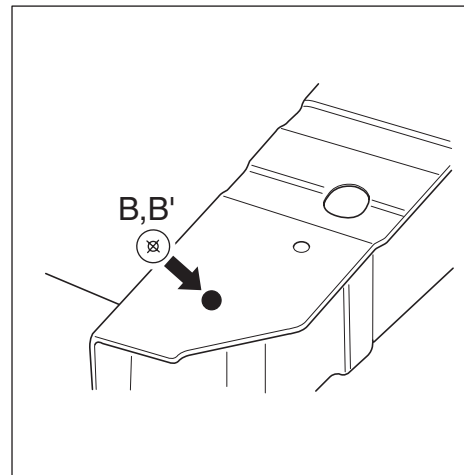
31-2 Body dimensions

Front body straight - line dimensions



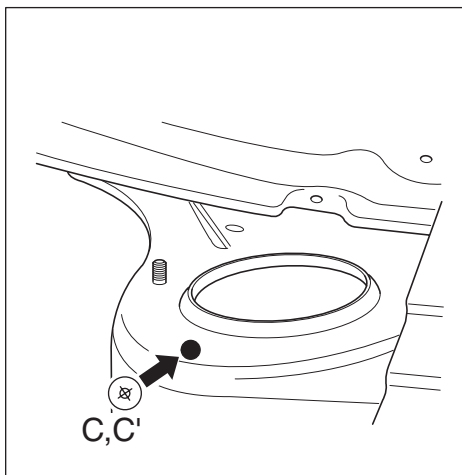
Hood hinge mounting hole

ø12



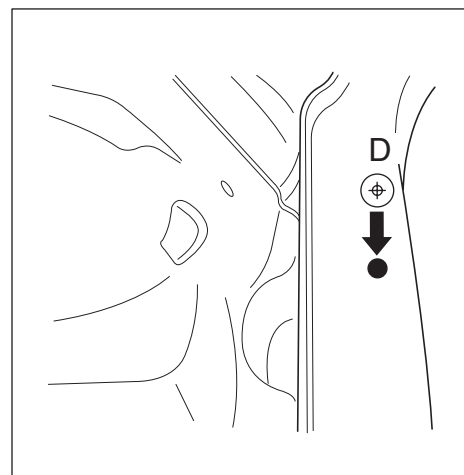
Radiator support mounting hole

ø9



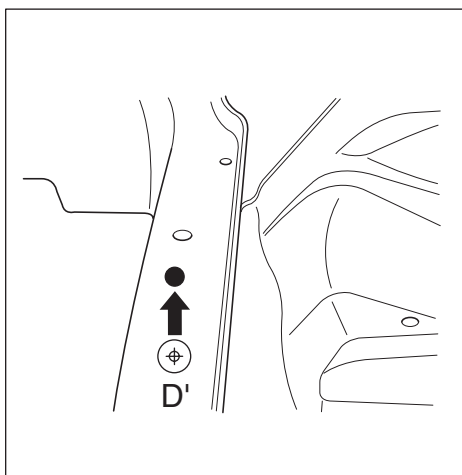
Front suspension mounting hole

ø11



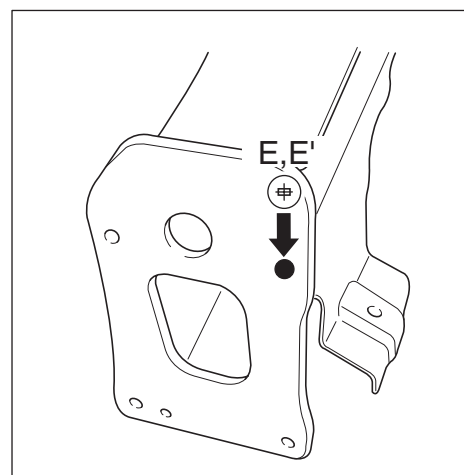
Engine bracket mounting hole

ø14



Transmission bracket mounting hole

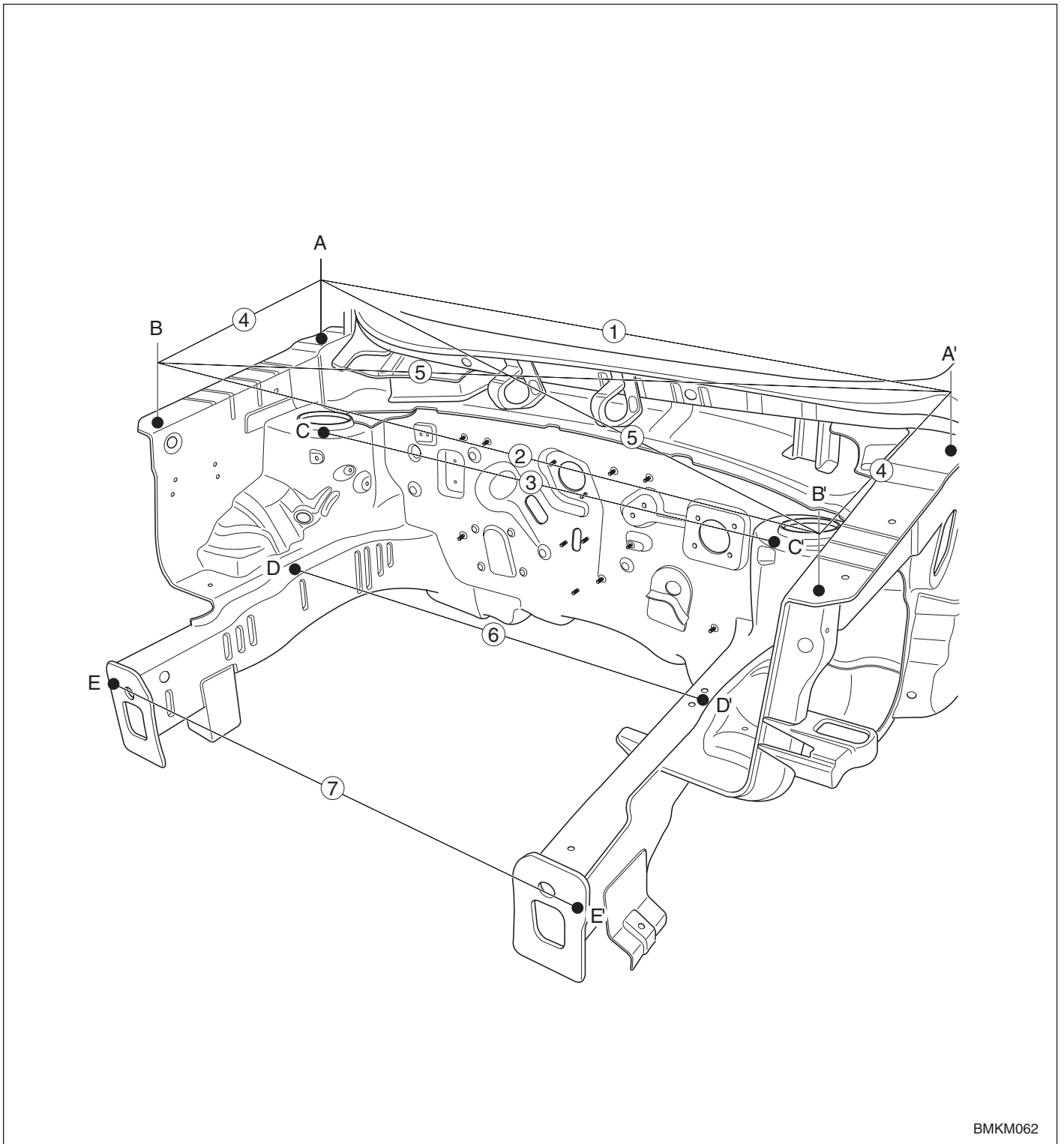
ø14



Radiator support guide mounting hole

30X28

BMKM061

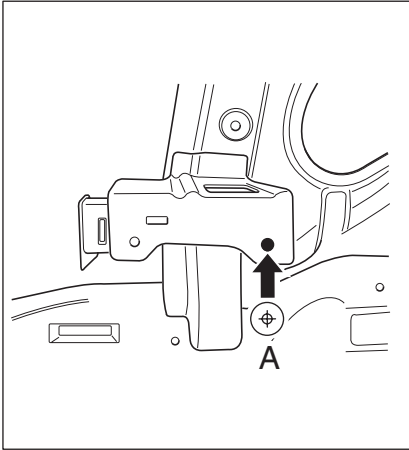


BMKM062

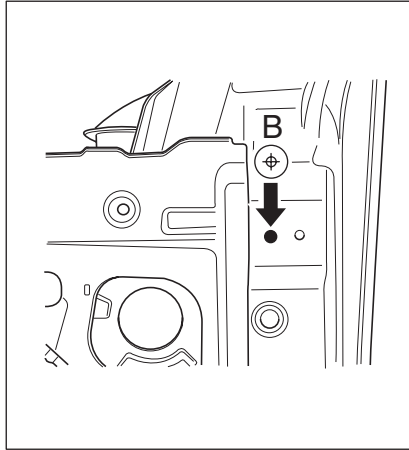
Measurement point	①	②	③	④	⑤	⑥	⑦		
Dimension (mm)	1526	1426	1079	570	1581	973	964		

31-4 Body dimensions

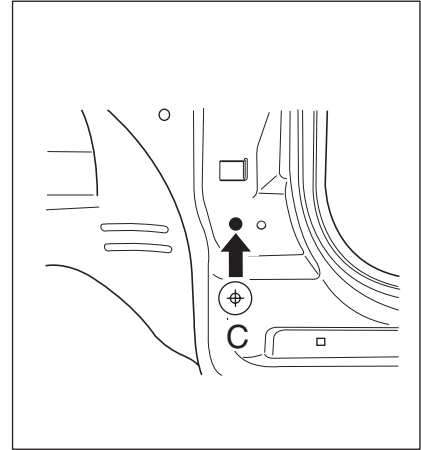
Side frame straight - line dimensions



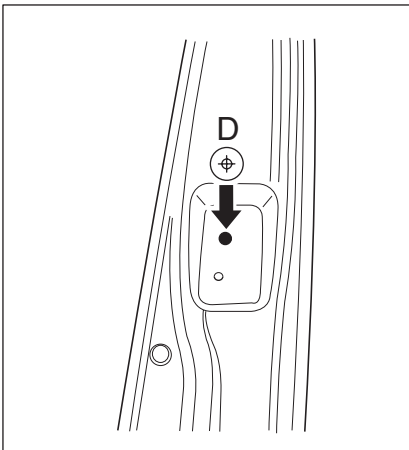
Fender mounting hole $\varnothing 6$



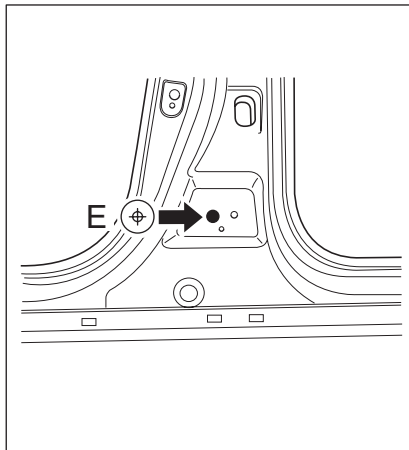
Front door upper hinge mounting hole $\varnothing 12$



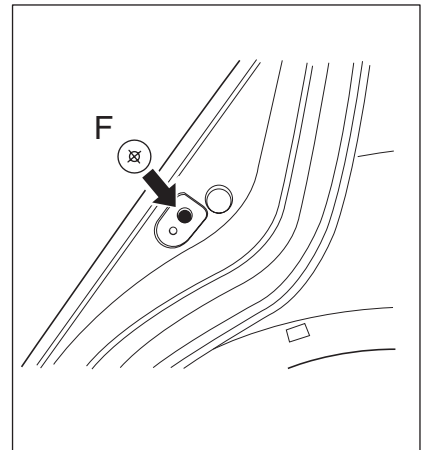
Front door lower hinge mounting hole $\varnothing 12$



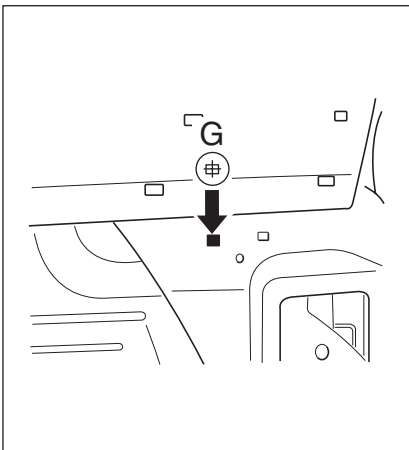
Rear door upper hinge mounting hole $\varnothing 11$



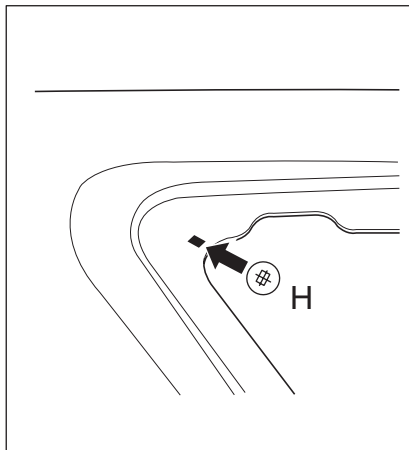
Rear door lower hinge mounting hole $\varnothing 11$



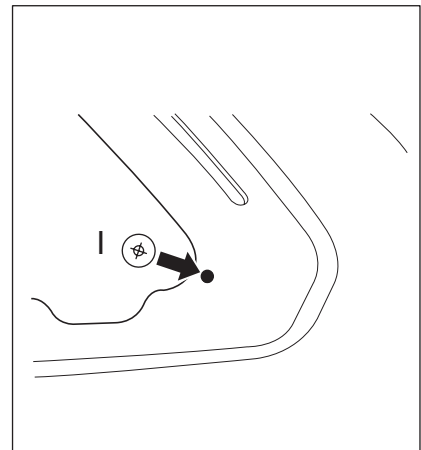
Rear door switch mounting hole $\varnothing 17$



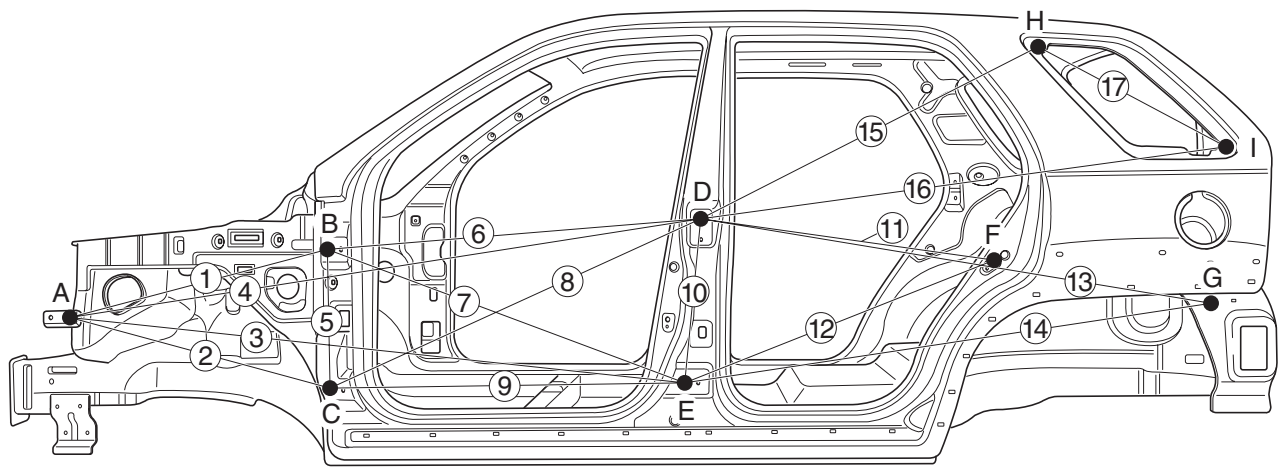
Rear bumper mounting hole 8X8



Quarter glass mounting hole 5.2X10



Quarter glass mounting hole $\varnothing 5.2$

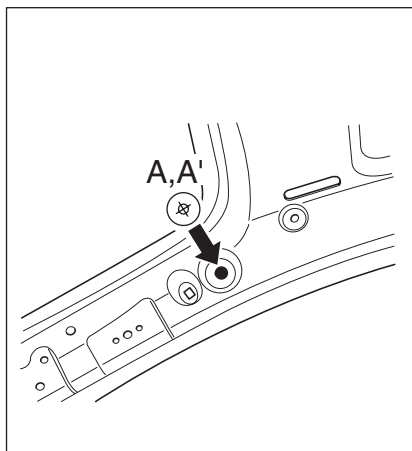


BMKM064

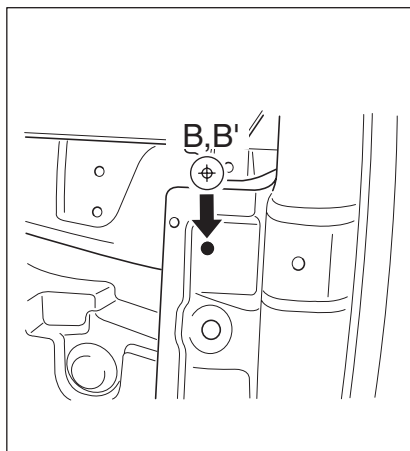
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	890	889	1913	1965	404	1083	1109	1179	1038
Measurement point	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	
Dimension (mm)	461	867	956	1495	1531	1165	1548	588	

31-6 Body dimensions

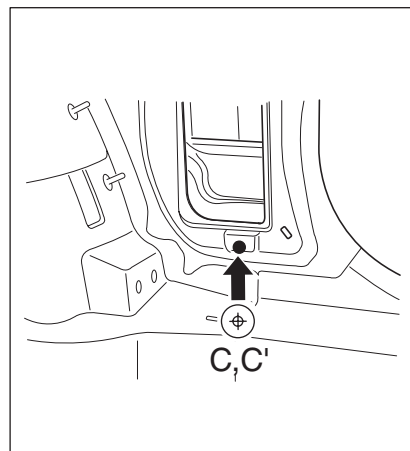
Interior A straight - line dimensions



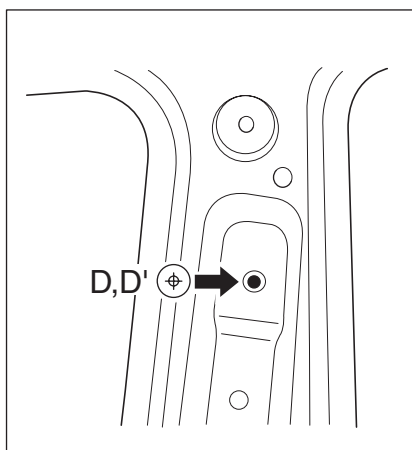
A pillar trim mounting hole $\varnothing 8.5$



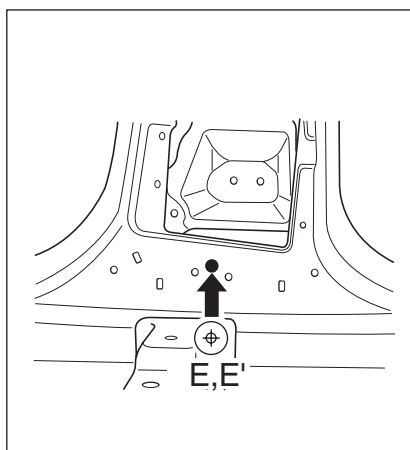
Cowl crossbar mounting hole $\varnothing 9$



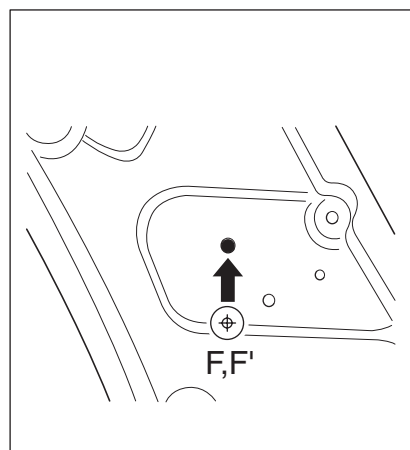
A pillar lower trim mounting hole $\varnothing 8.5$



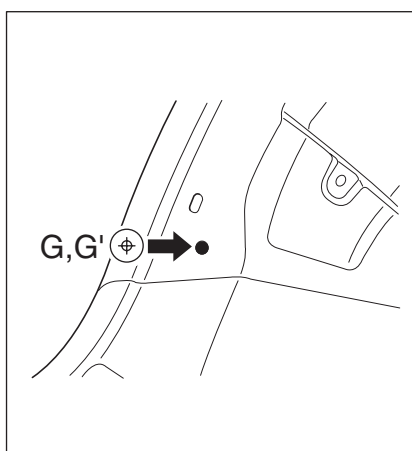
Front seatbelt upper mounting hole $\varnothing 15$



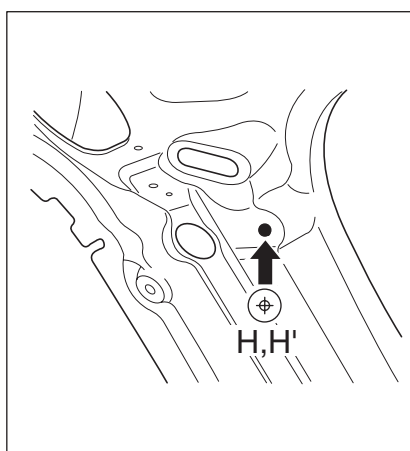
Front seatbelt lower mounting hole $\varnothing 15$



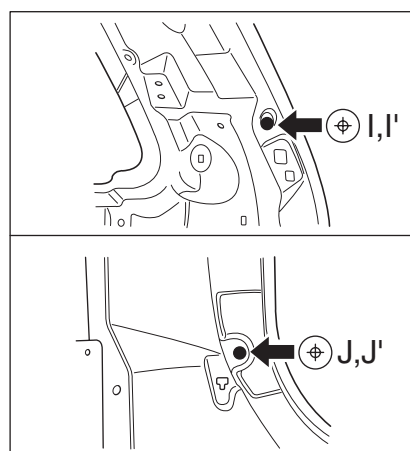
Rear seatbelt mounting hole $\varnothing 15$



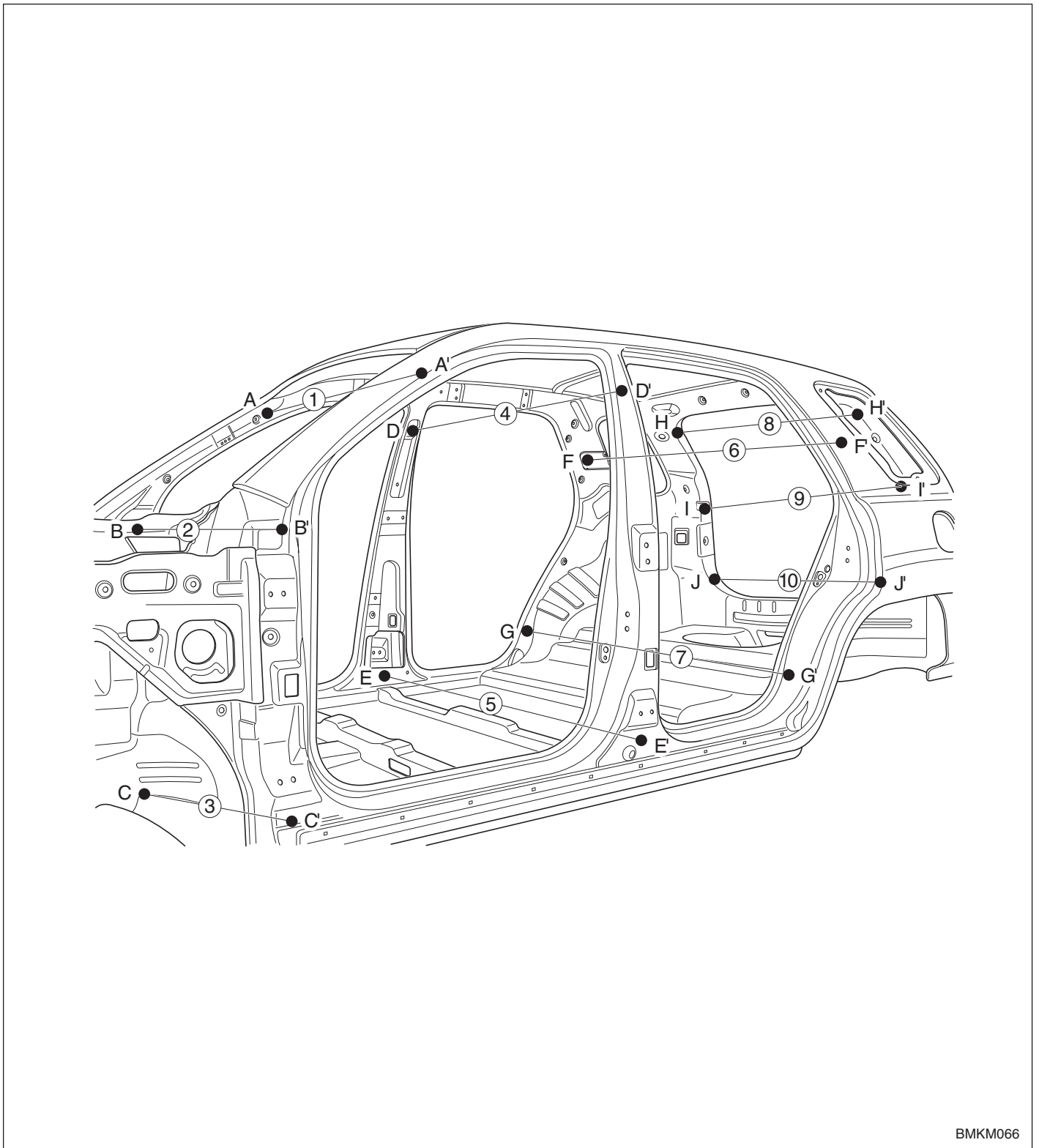
Quarter lower trim mounting hole $\varnothing 12$



D pillar trim mounting hole $\varnothing 8.5$



I : Side trim mounting hole $\varnothing 8$
J : Side trim mounting hole $\varnothing 8.5$

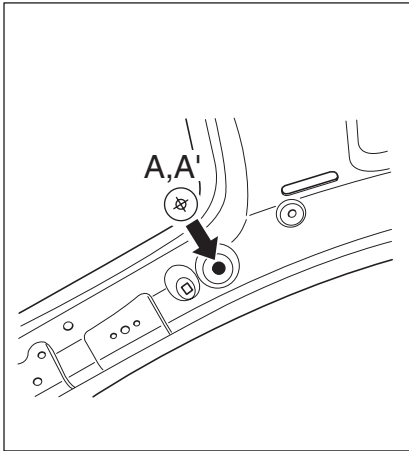


BMKM066

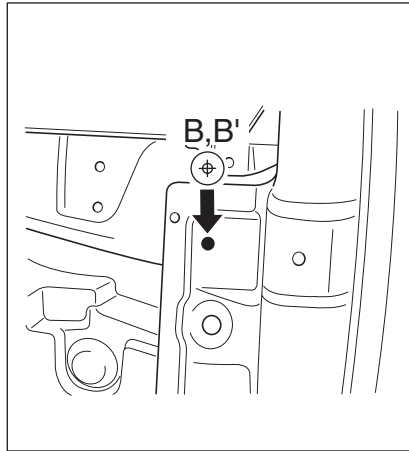
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	1186	1262	1408	1248	1388	1271	1427	1003	1076
Measurement point	⑩								
Dimension (mm)	1194								

31-8 Body dimensions

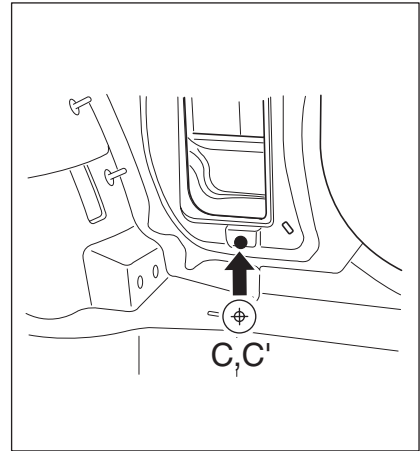
Interior B straight - line dimensions



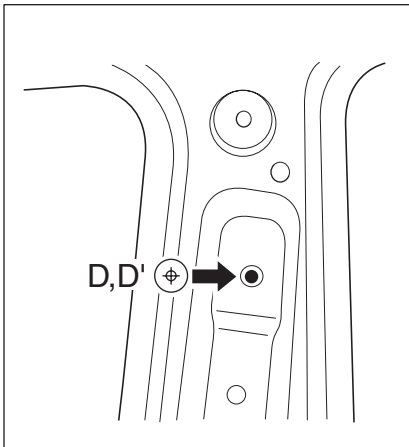
A pillar trim mounting hole $\varnothing 8.5$



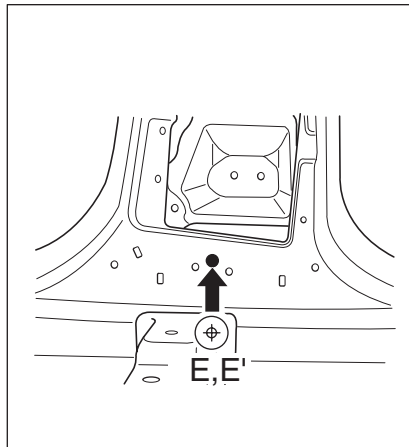
Cowl crossbar mounting hole $\varnothing 9$



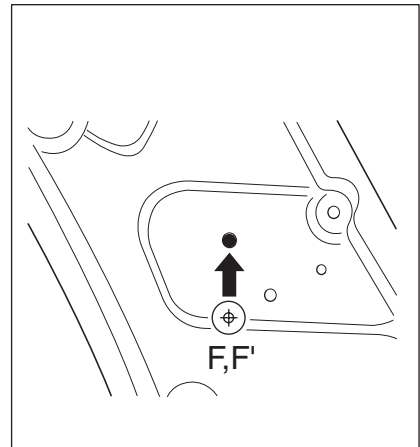
A pillar lower trim mounting hole $\varnothing 8.5$



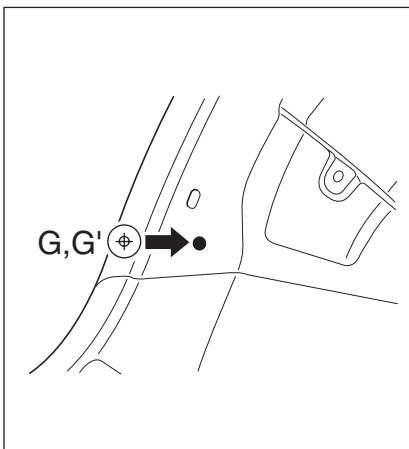
Front seatbelt upper mounting hole $\varnothing 15$



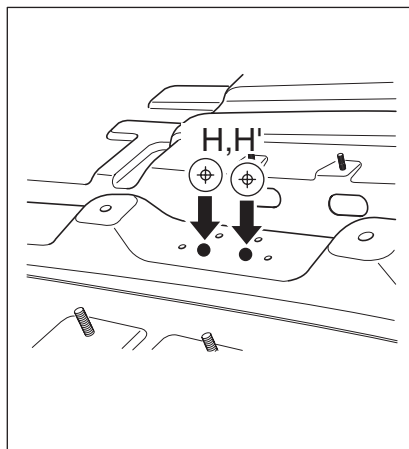
Front seatbelt lower mounting hole $\varnothing 15$



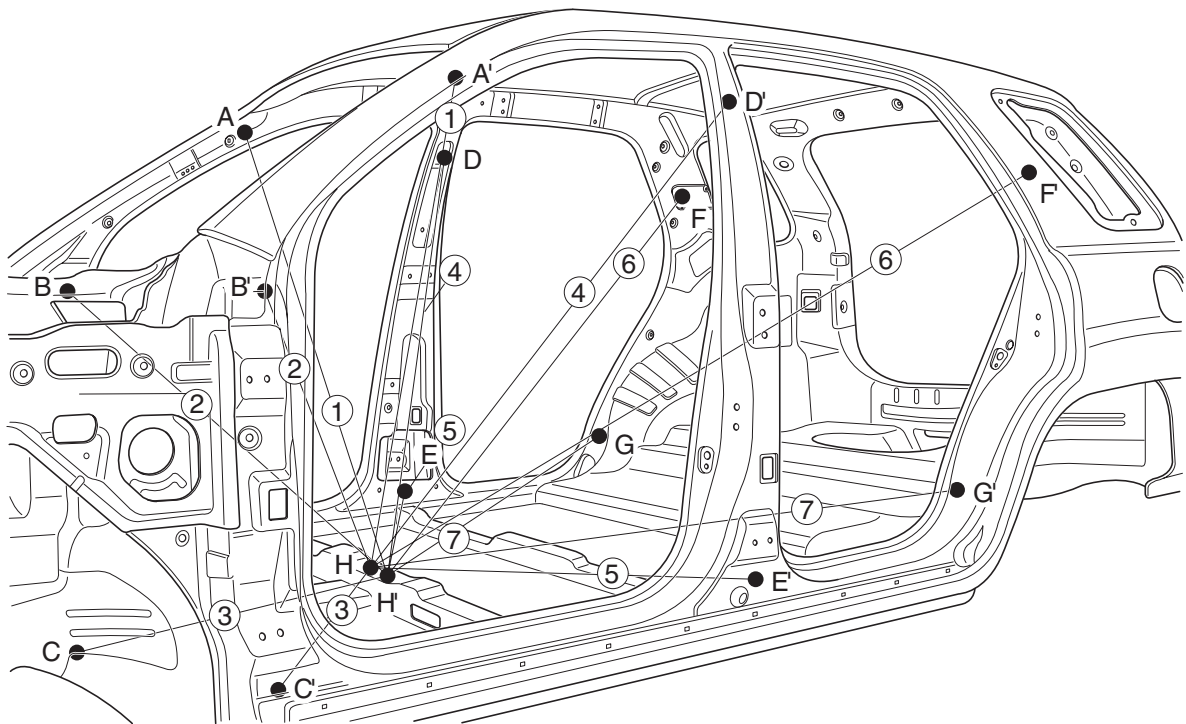
Rear seatbelt mounting hole $\varnothing 15$



Quarter lower trim mounting hole $\varnothing 12$



Parking cable bracket mounting hole $\varnothing 9$

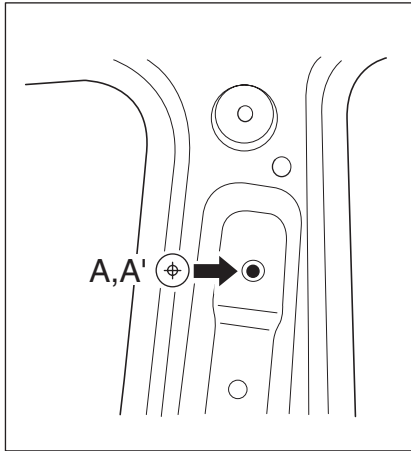


BMKM068

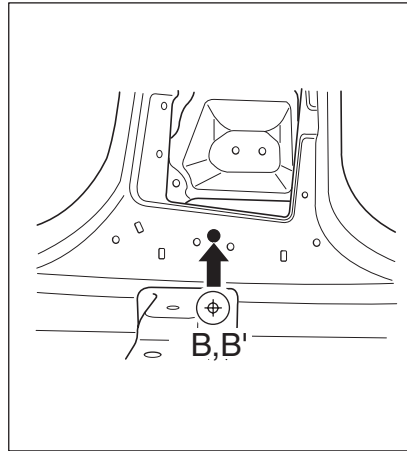
Measurement point	①	②	③	④	⑤	⑥	⑦		
Dimension (mm)	1327	1270	1190	1232	721	1575	1082		

31-10 Body dimensions

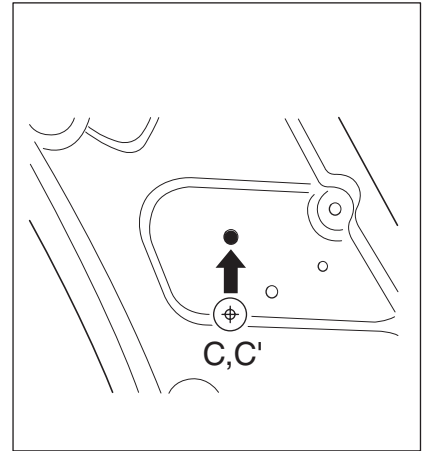
Interior C straight - line dimensions



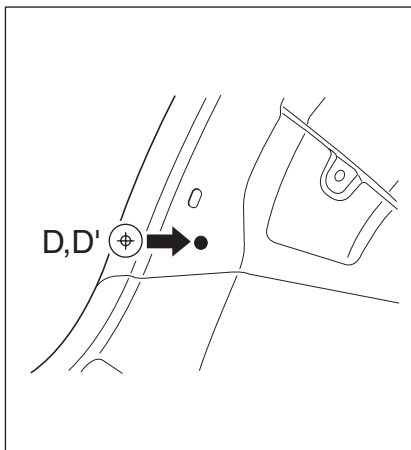
Front seatbelt upper mounting hole $\varnothing 15$



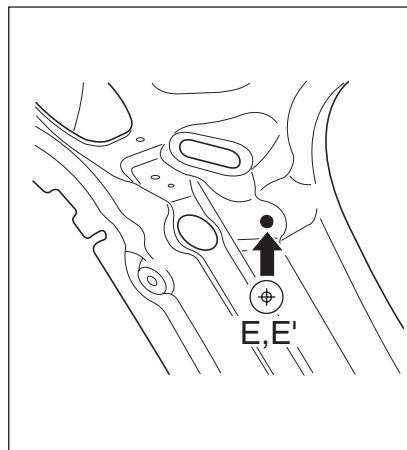
Front seatbelt lower mounting hole $\varnothing 15$



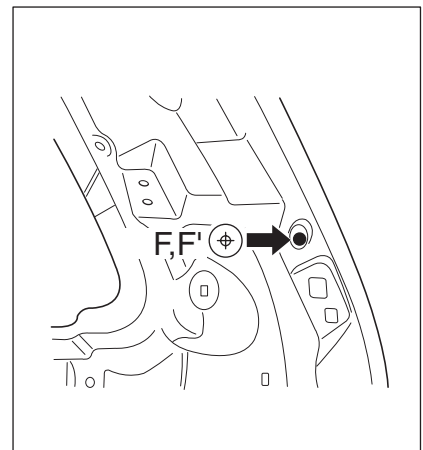
Rear seatbelt mounting hole $\varnothing 15$



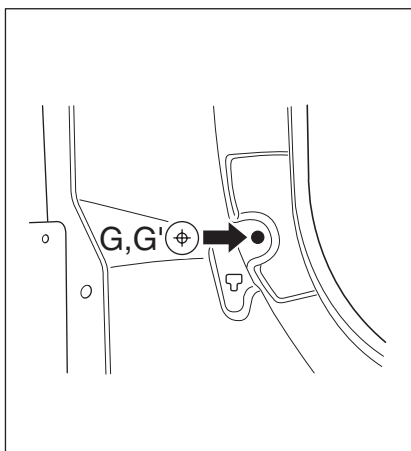
Quarter lower trim mounting hole $\varnothing 12$



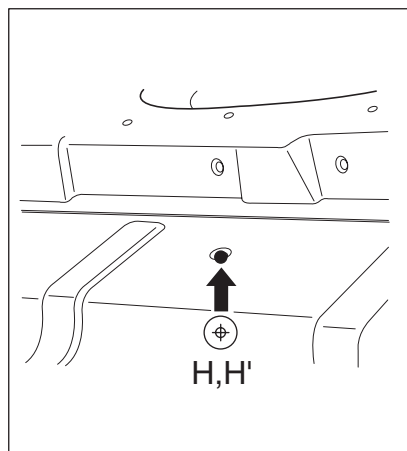
D pillar trim mounting hole $\varnothing 8.5$



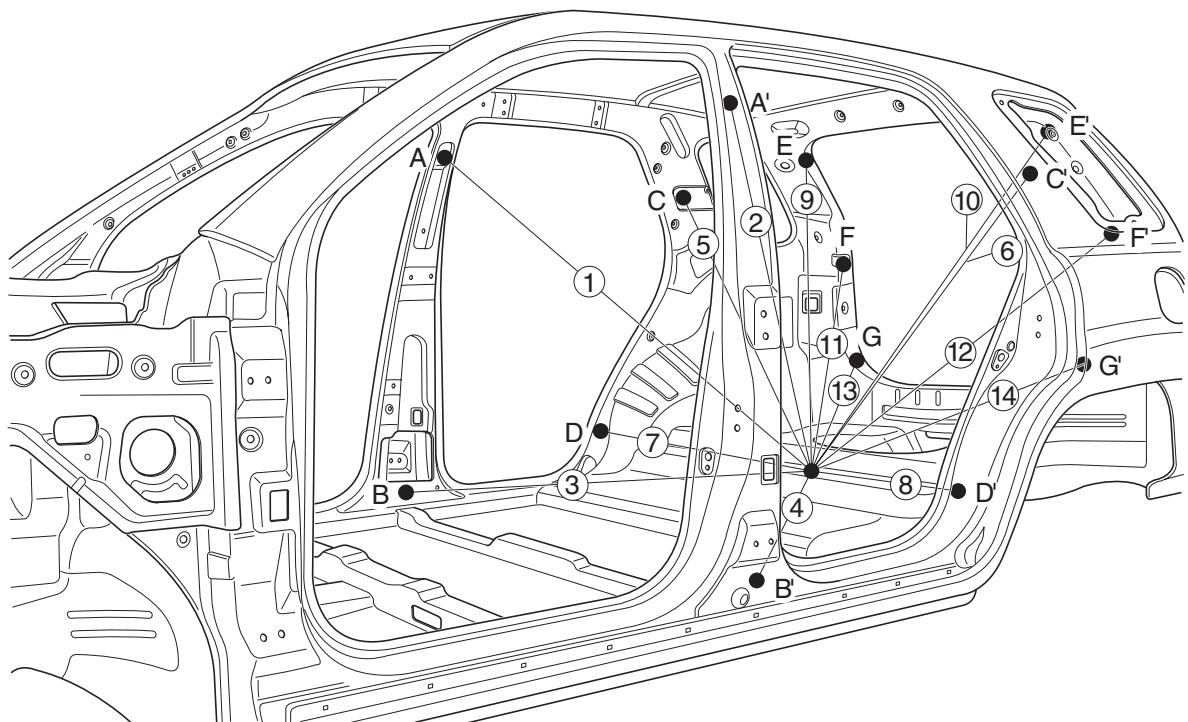
side trim mounting hole $\varnothing 8$



Side trim mounting hole $\varnothing 8.5$



Seatbelt mounting hole $\varnothing 18$

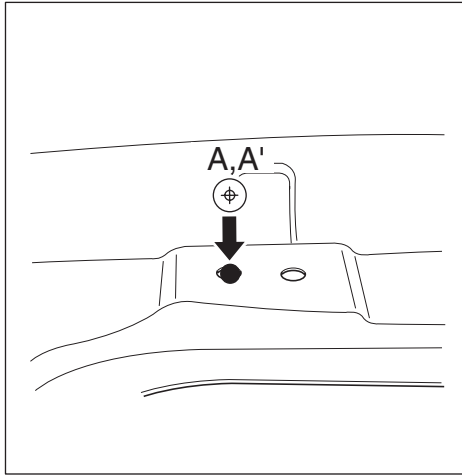


BMKM070

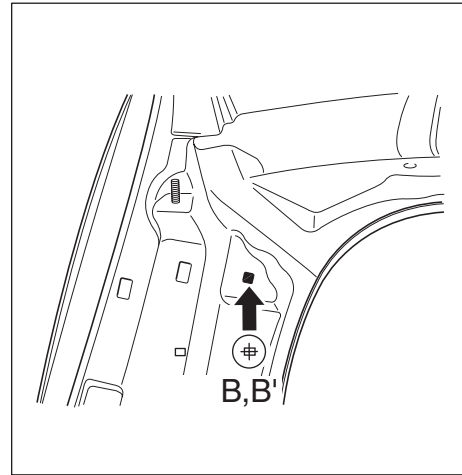
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	1364	1250	1151	998	1139	997	839	603	1249
Measurement point	⑩	⑪	⑫	⑬	⑭				
Dimension (mm)	1150	1271	1166	1228	1107				

31-12 Body dimensions

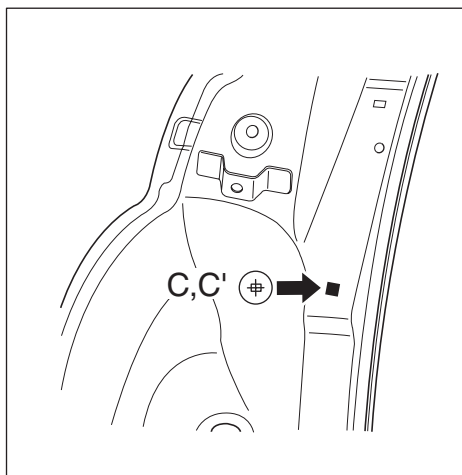
Rear body straight - line dimensions



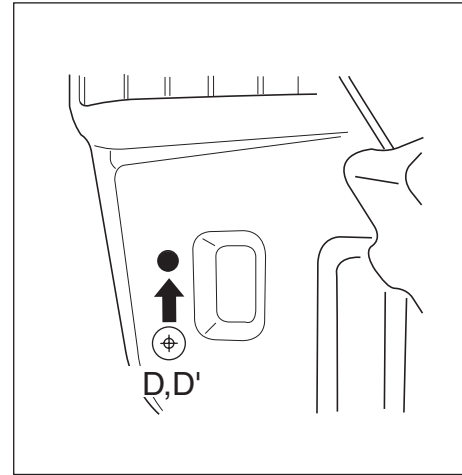
Tail gate hinge mounting hole $\varnothing 12$



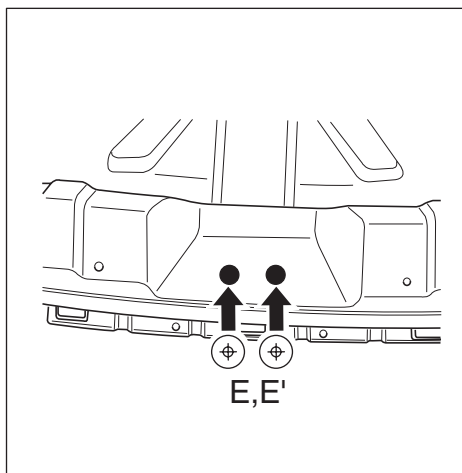
Roof rack molding mounting hole 8.5X8.5



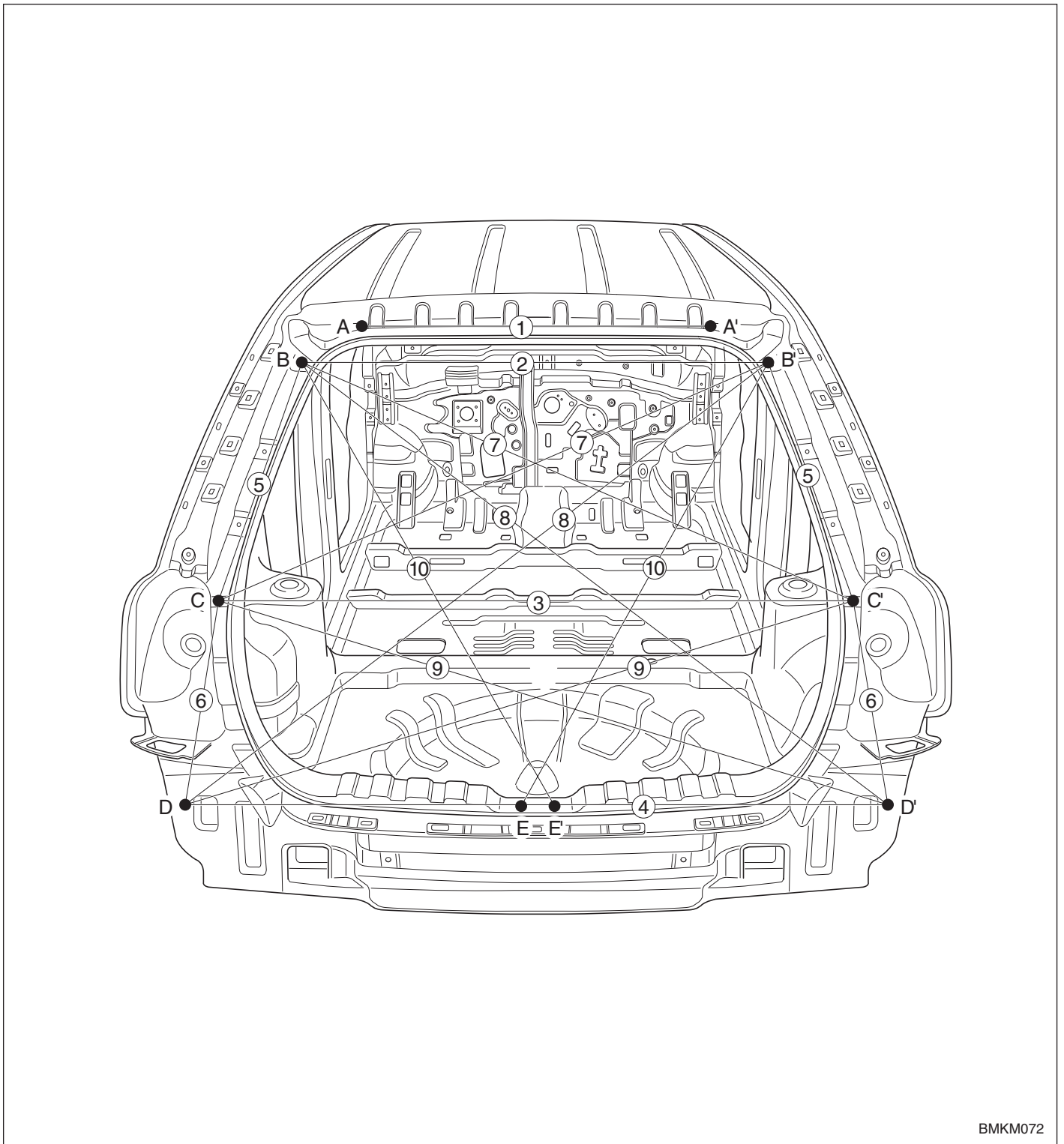
Combination lamp rear mounting hole 8.5X8.5



Sunroof drain hole $\varnothing 15.3$



Tail gate striker mounting hole $\varnothing 16$



BMKM072

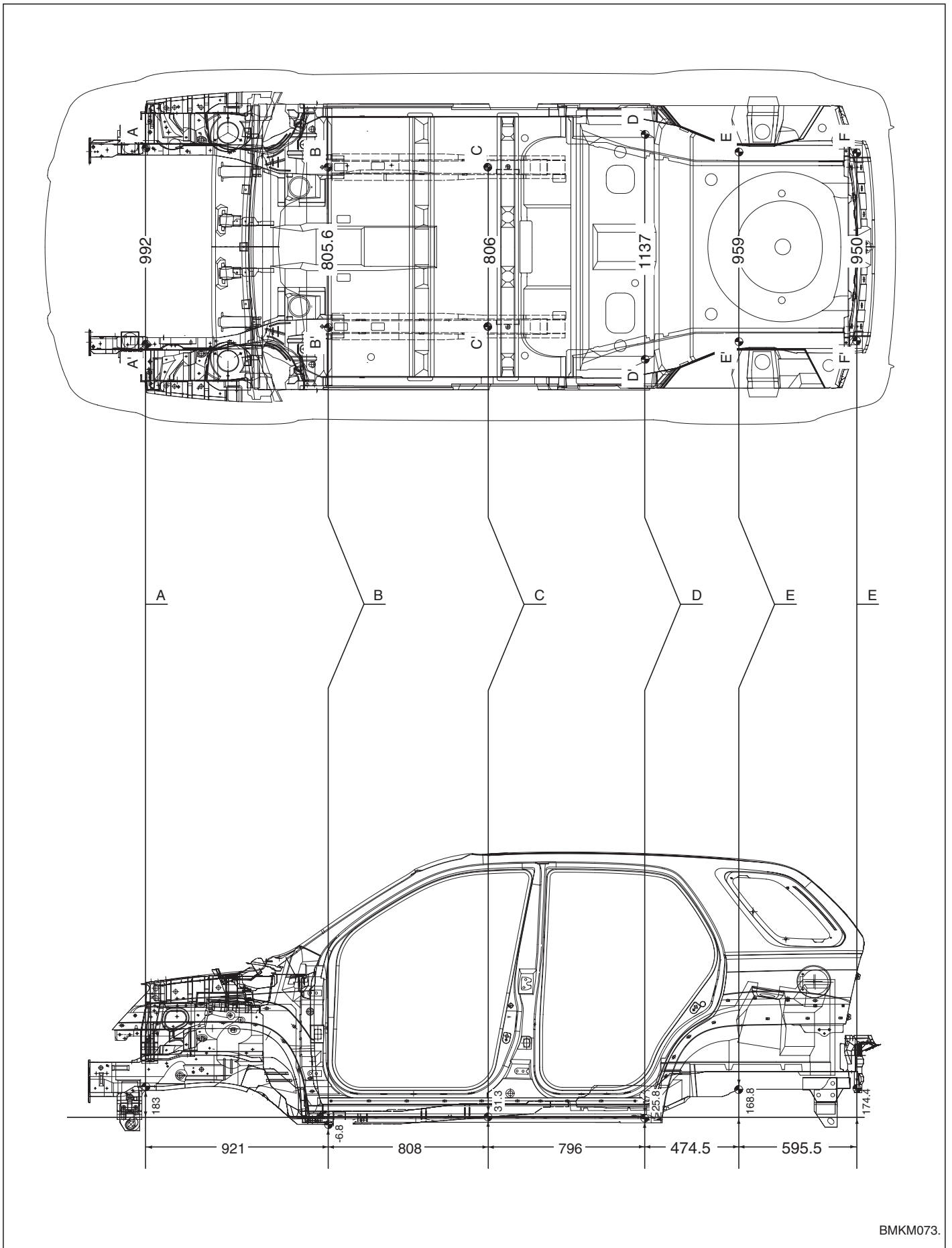
Measurement point	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Dimension (mm)	710	994	1230	1460	535	474	1229	1536	1421
Measurement point	⑩								
Dimension (mm)	1050								

31-14 Body dimensions

Under body dimensions

Projected dimensions

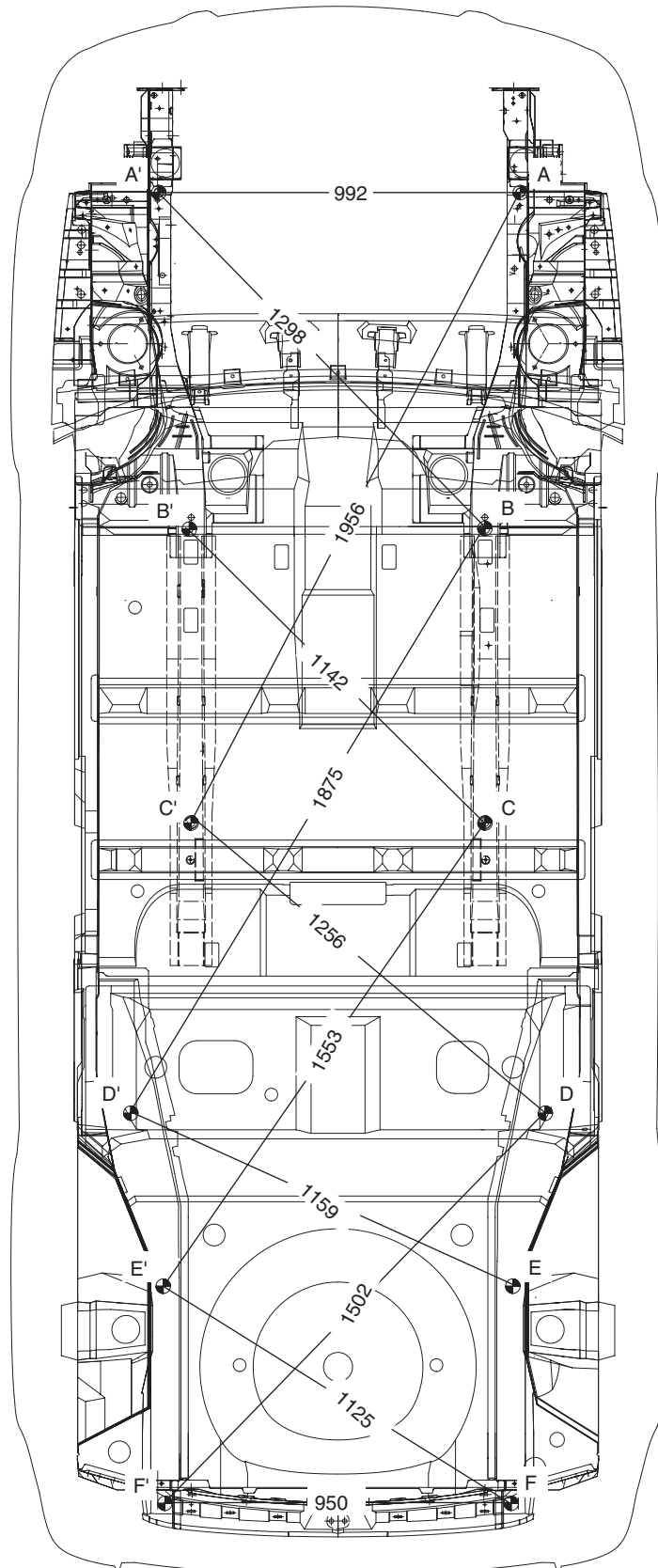
Measurement point	Description	Hole size
A	Front side inner member hole	ø25
B	Front side inner member hole	ø25
C	Center side member hole	ø20
D	Rear floor side member trailing arm mounting hole	ø16
E	2WD cross bar mounting hole	ø17
F	Back beam mounting hole	ø17



31-16 Body dimensions

Straight-line dimensions

Measurement point	Description	Hole size
A	Front side inner member hole	ø25
B	Front side inner member hole	ø25
C	Center side member hole	ø20
D	Rear floor side member trailing arm mounting hole	ø16
E	2WD cross bar mounting hole	ø17
F	Back beam mounting hole	ø17



Waterproof and rustproof

Sealing

Body	41- 1
Door	41- 5
Hood	41- 8
Tail gate	41-10

Under coating.....	41-11
--------------------	-------

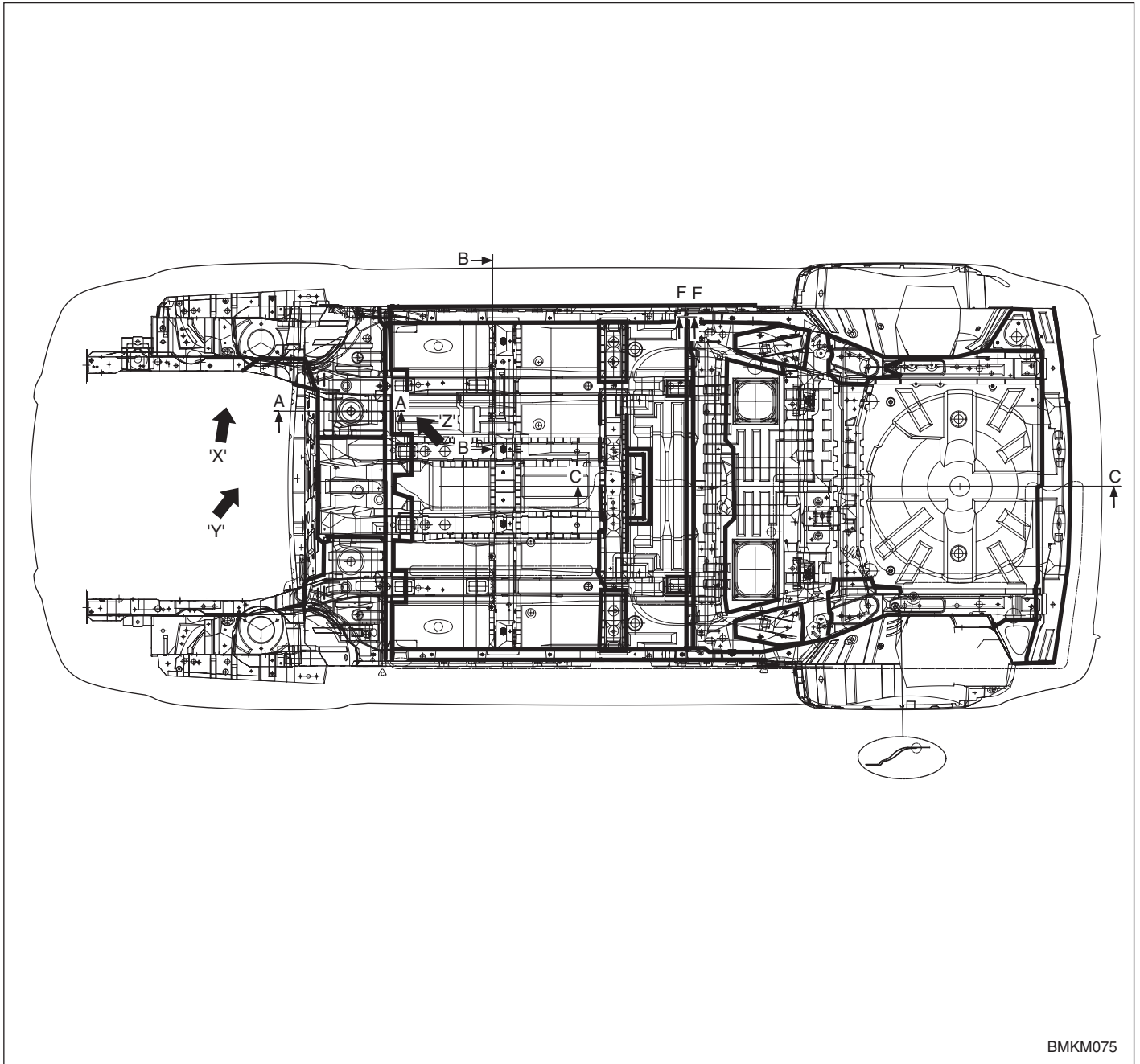
Applying rustproofing material

Body	41-15
Door	41-18
Hood	41-19
Tail gate	41-20

Sealing

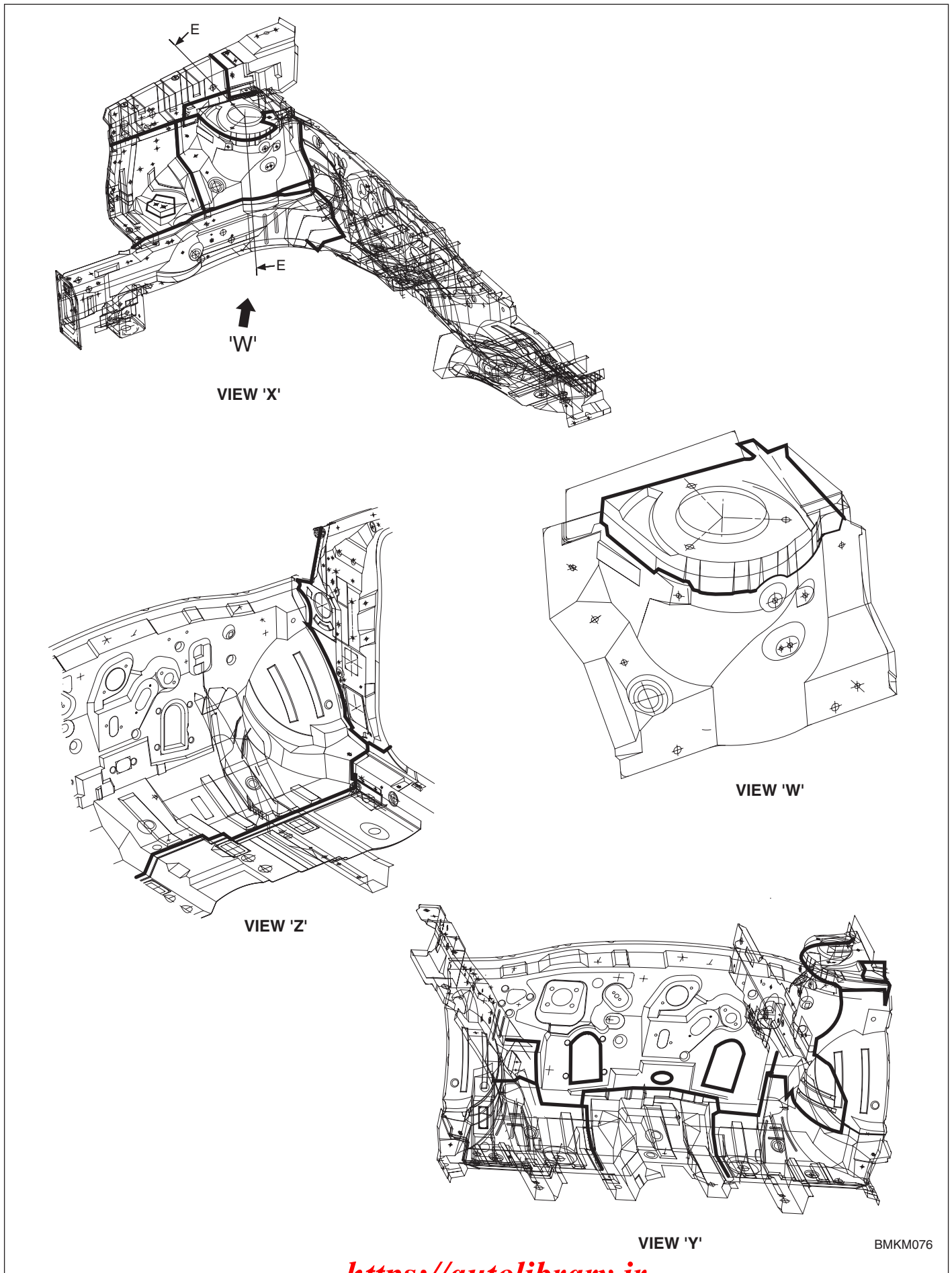
To waterproof and rustproof the vehicle, apply sealer on assembled area of the body panel and on any areas in contact with the body, such as doors(inner/outer), hood(inner/outer), and tail gate(inner/outer).

Body (Floor)

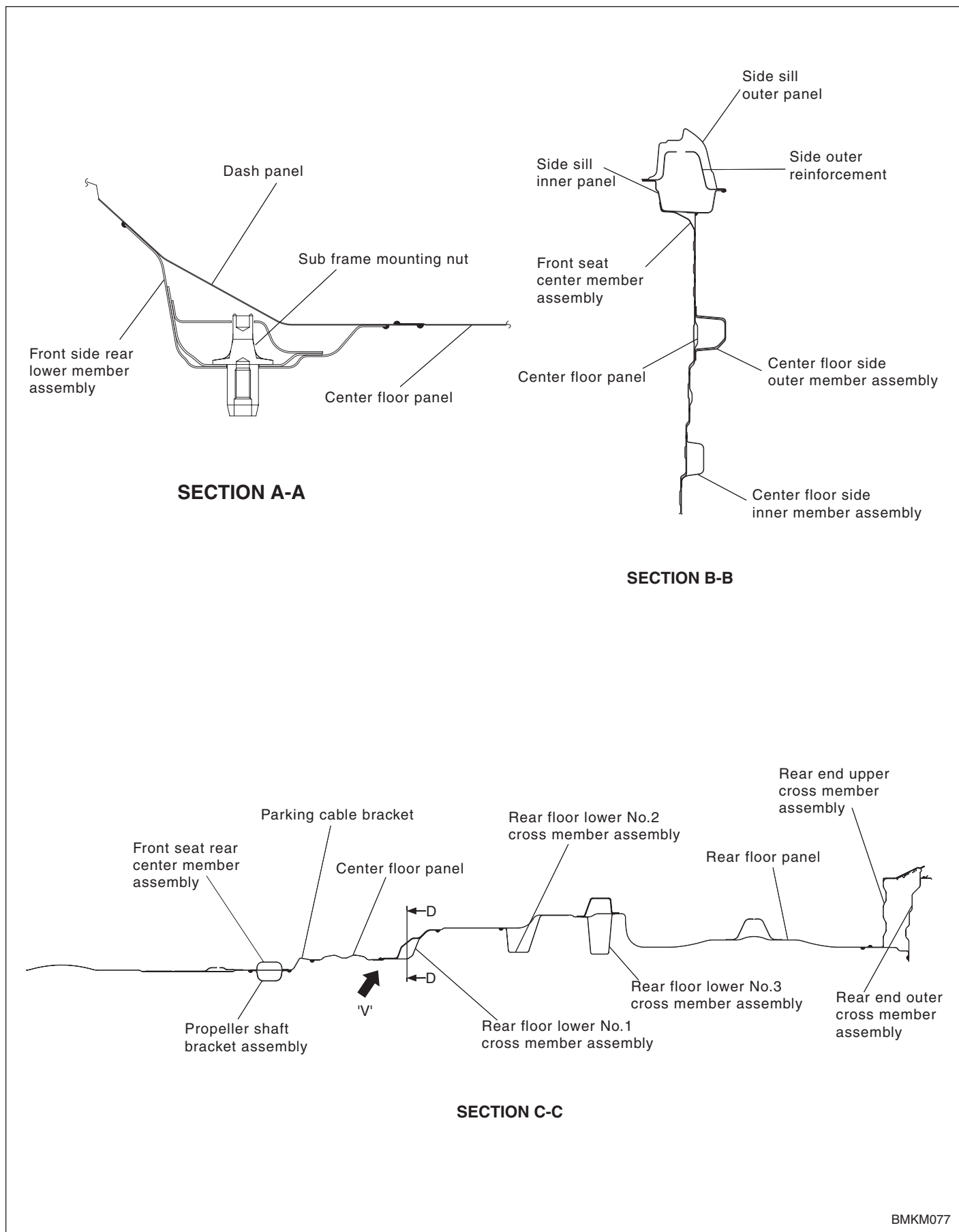


41-2 Waterproofing and rustproofing

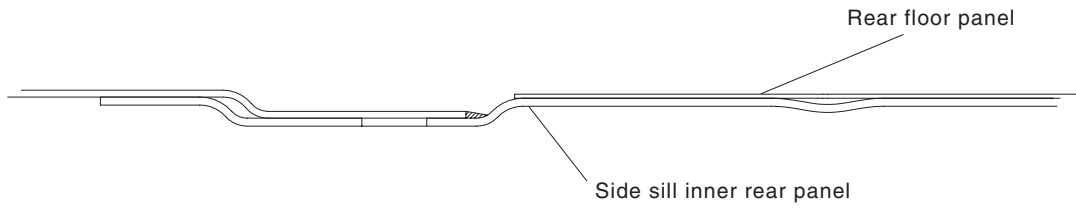
View



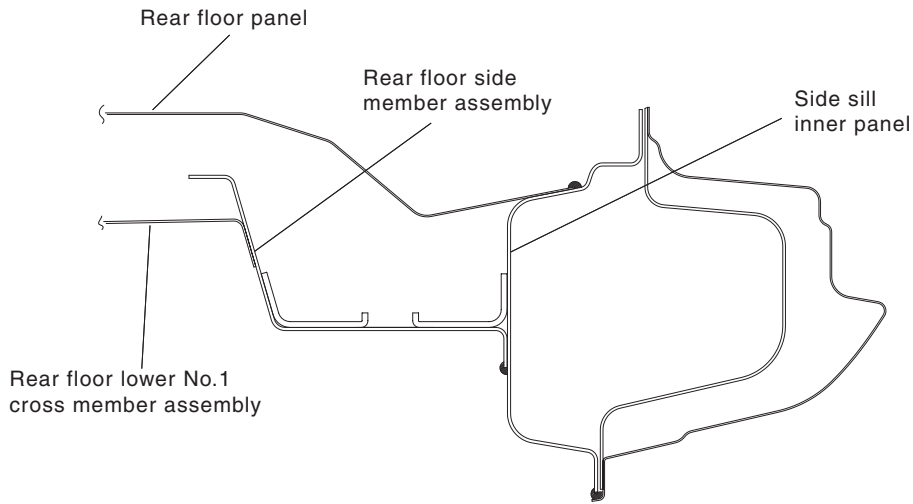
Section



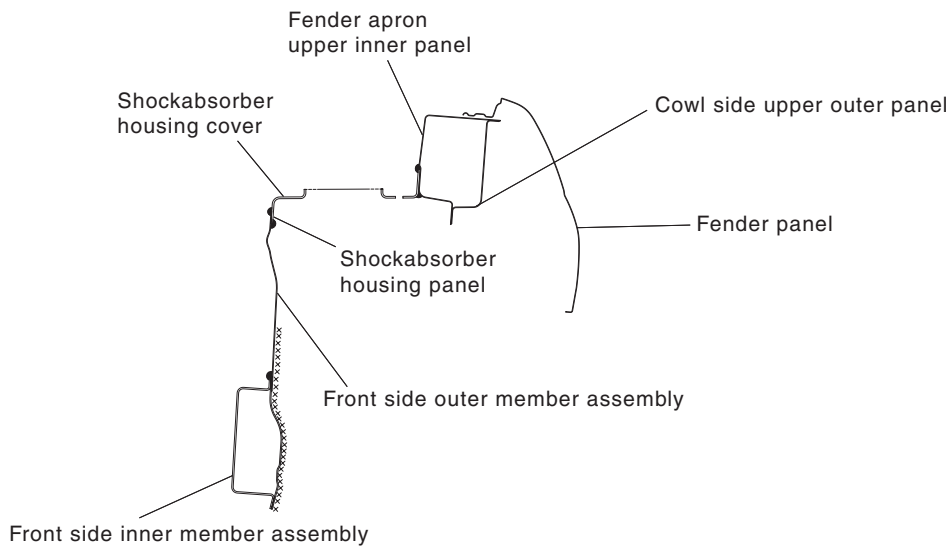
41-4 Waterproofing and rustproofing



SECTION F-F

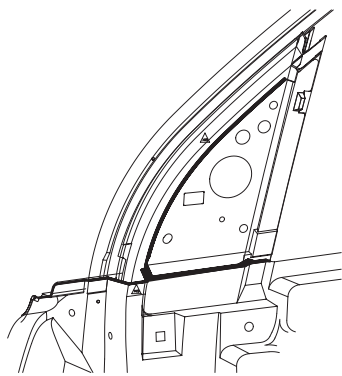
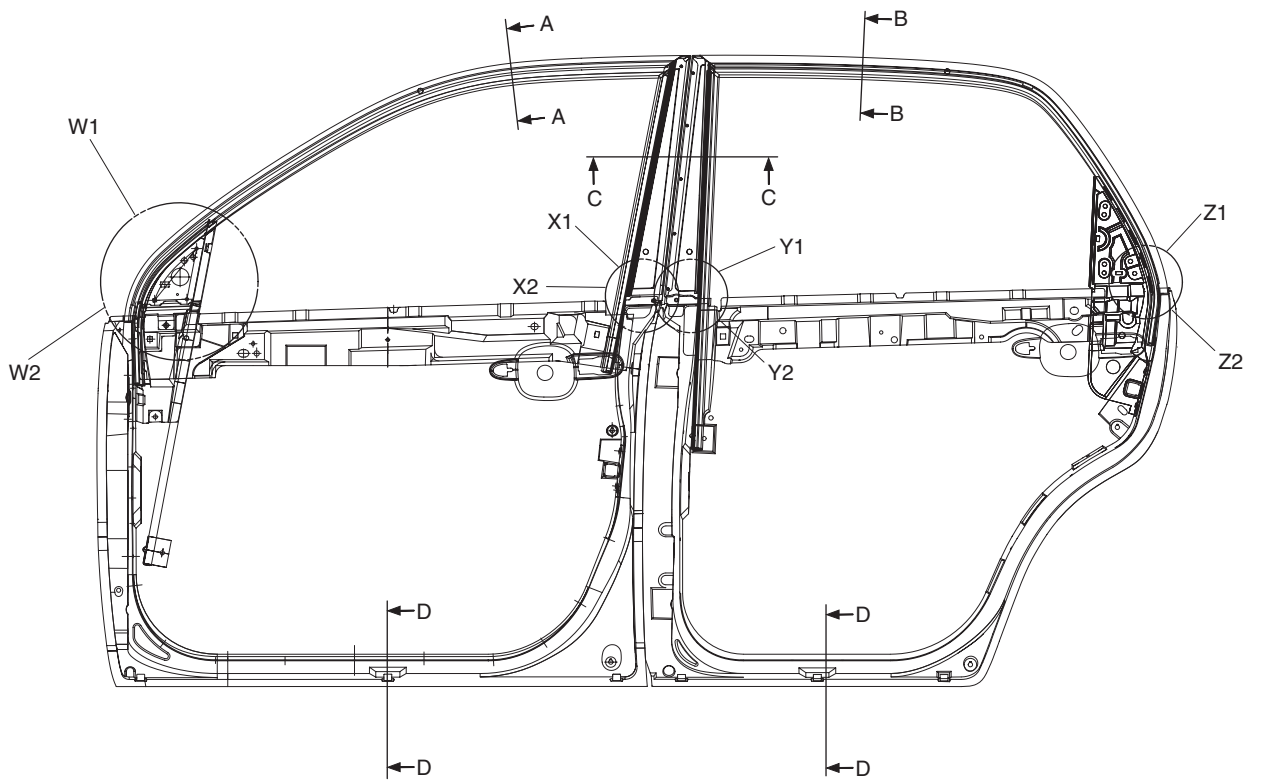


SECTION D-D

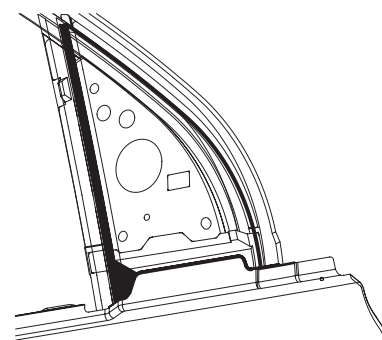


SECTION E-E

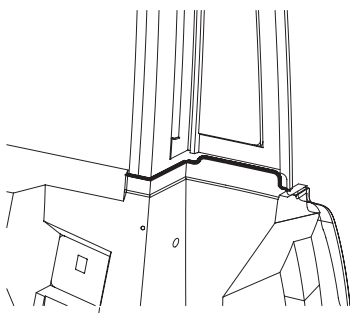
Door



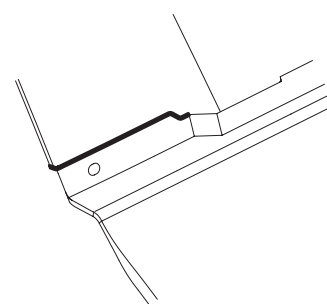
**W1
(INNER)**



**W2
(OUTER)**



**X1
(OUTER)**

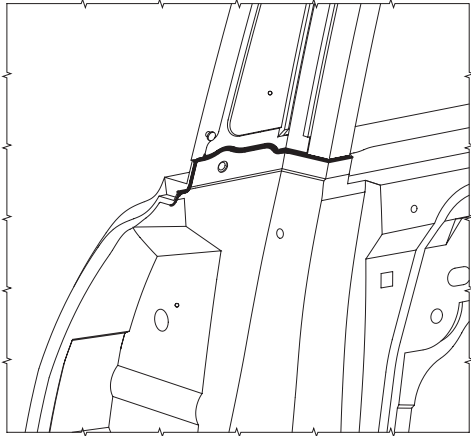


**X2
(OUTER)**

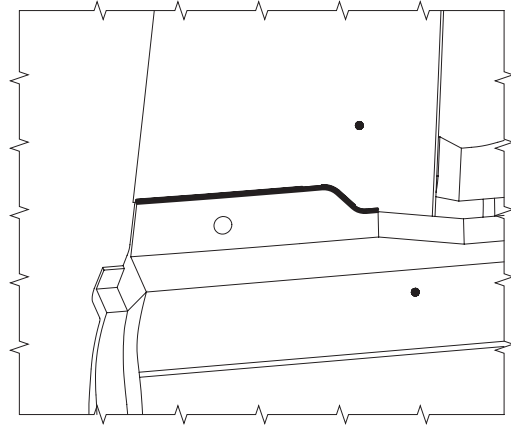
BMKM079

41-6 Waterproofing and rustproofing

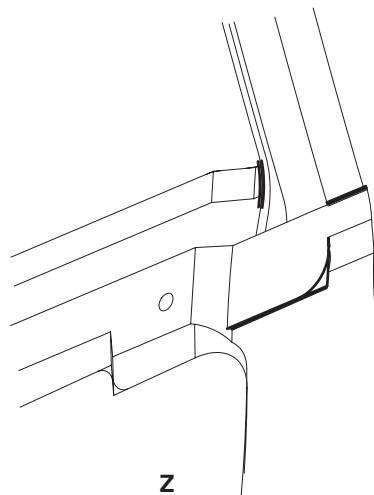
View



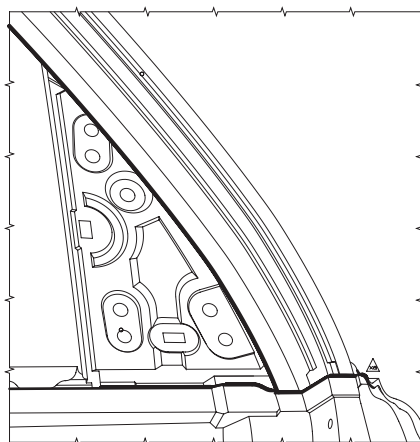
Y1
(INNER)



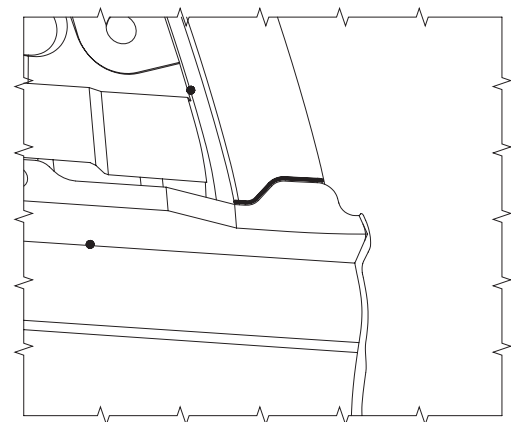
Y2
(OUTER)



Z



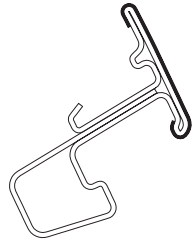
Z1
(INNER)



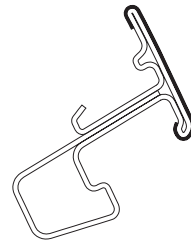
Z2
(OUTER)

BMKM080

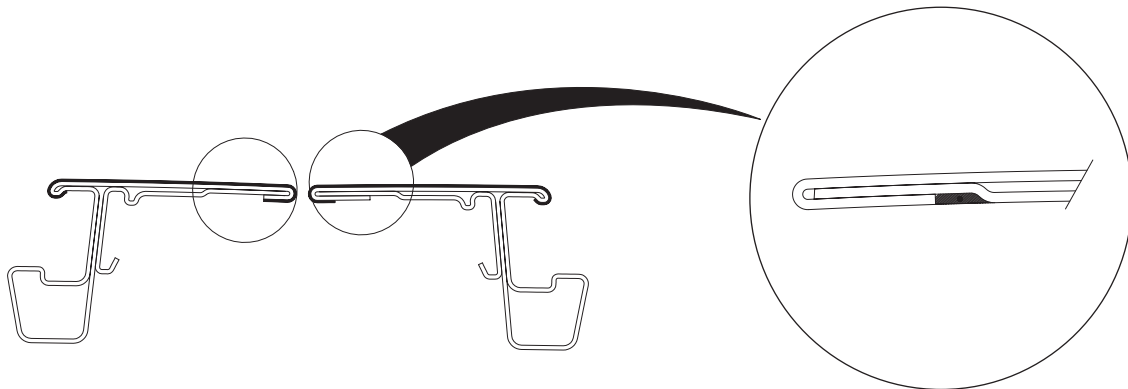
Section



SECTION A-A



SECTION B-B



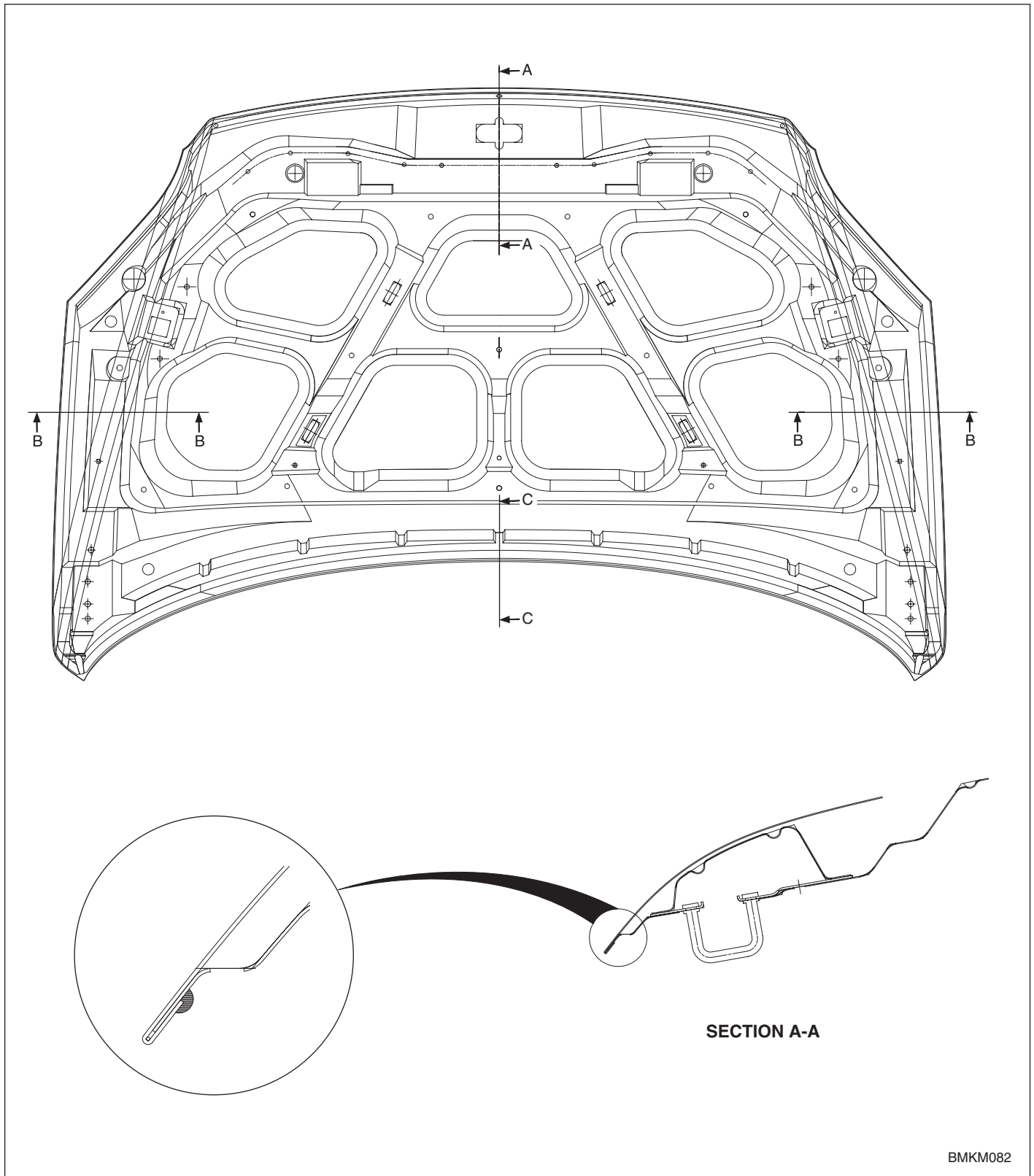
SECTION C-C



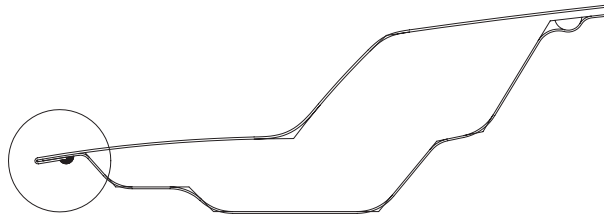
SECTION D-D

41-8 Waterproofing and rustproofing

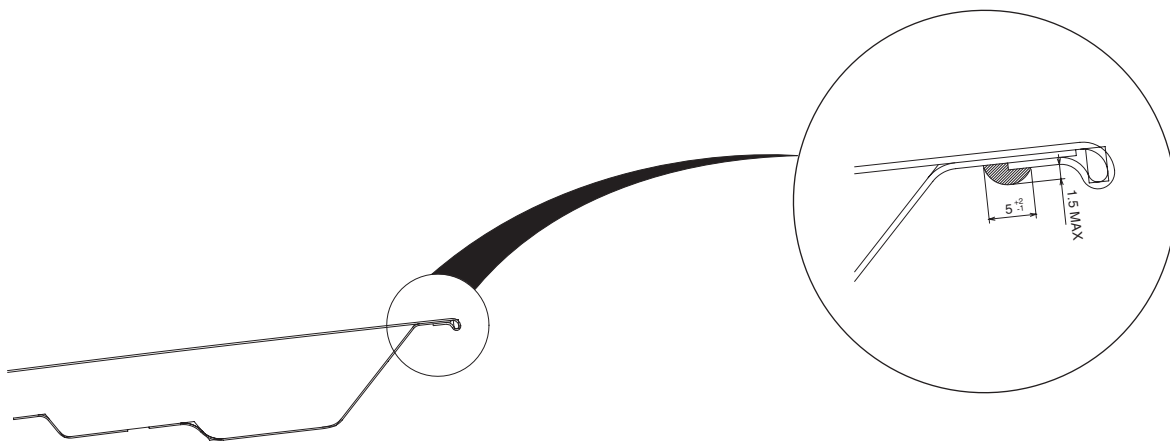
Hood



Section



SECTION B-B



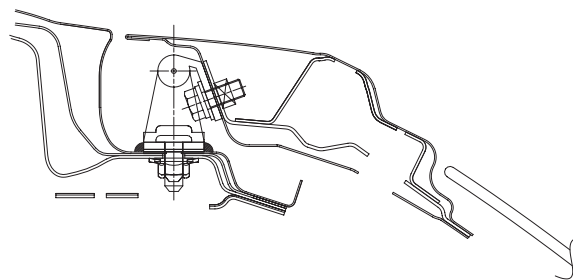
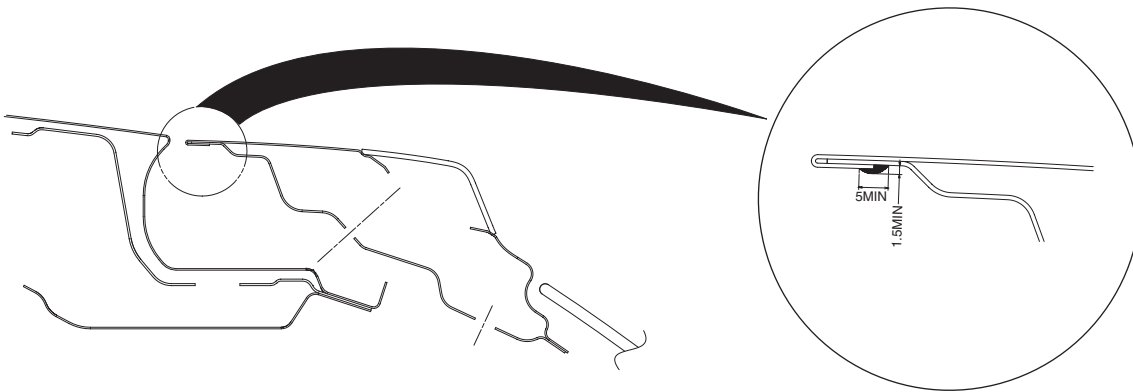
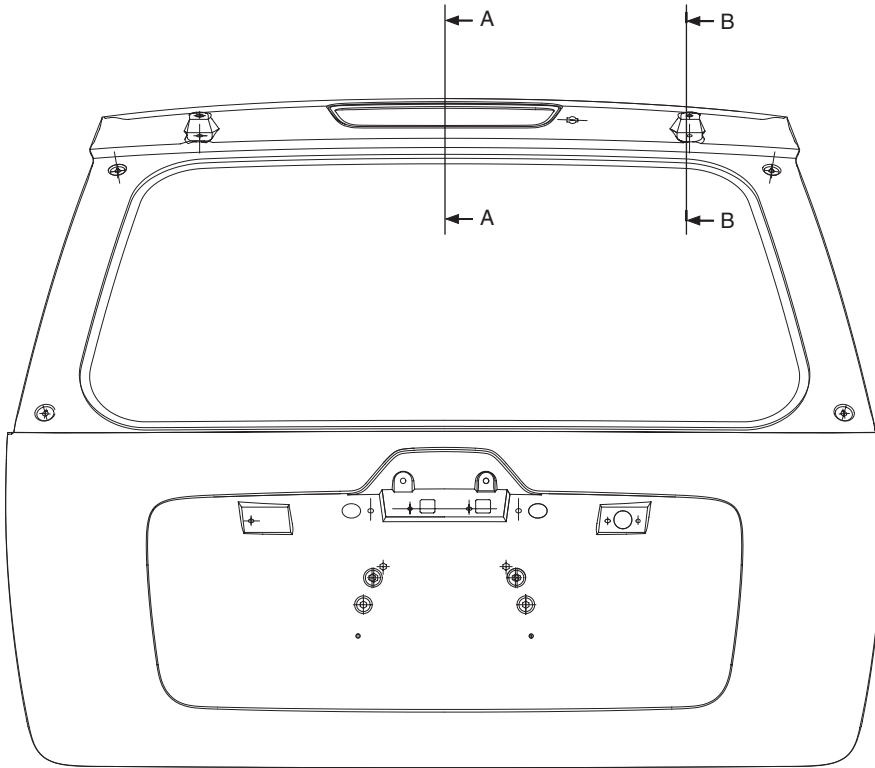
SECTION C-C

(mm)

BMKM083

41-10 Waterproofing and rustproofing

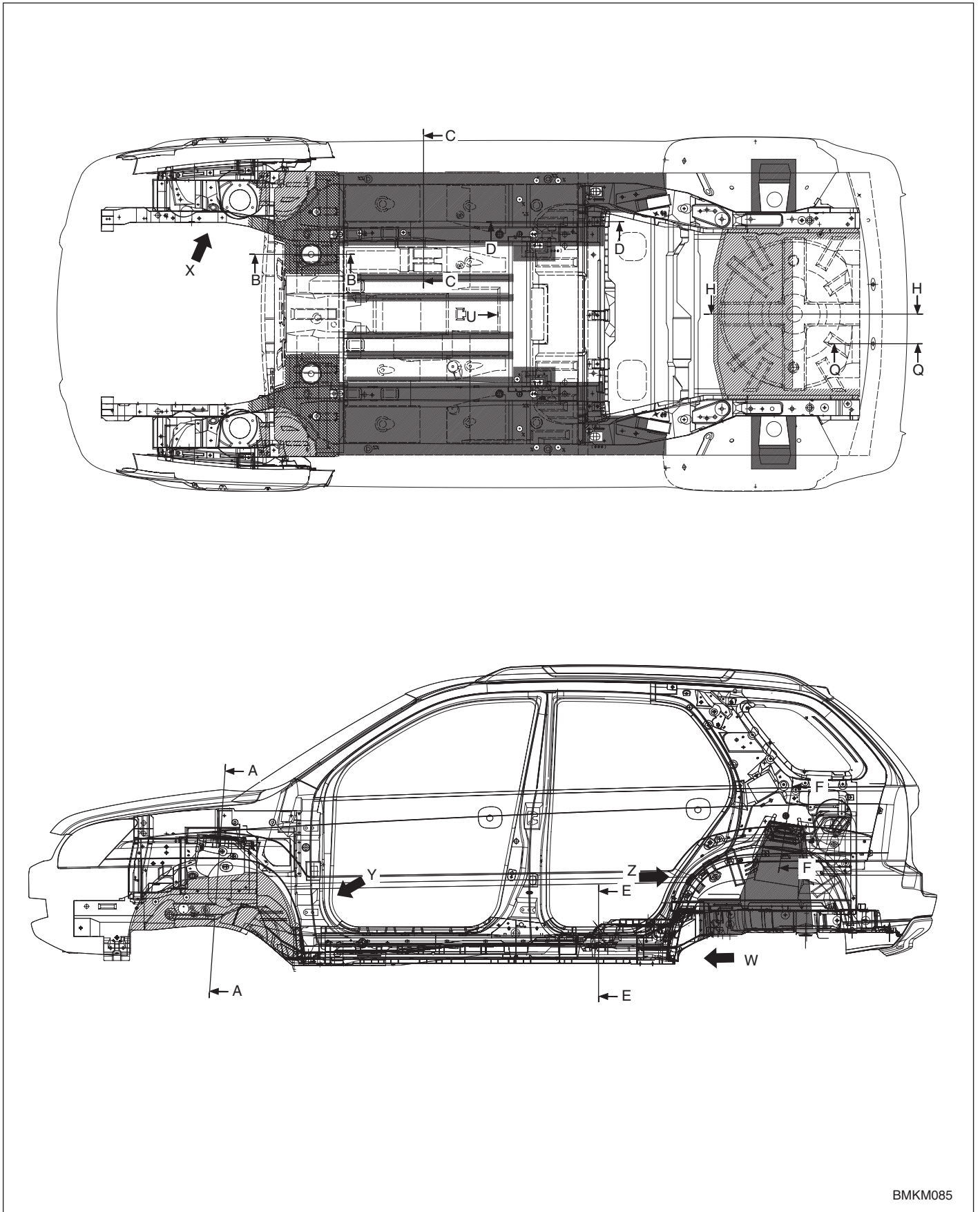
Tail gate



(mm)

BMKM084

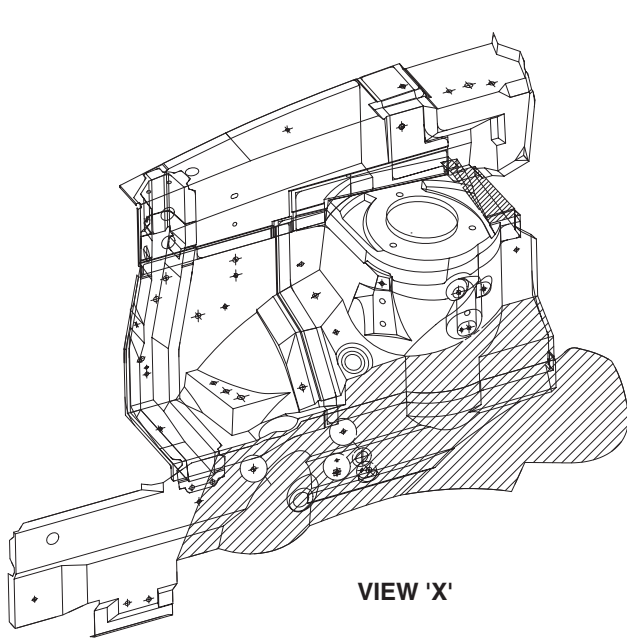
Under coating



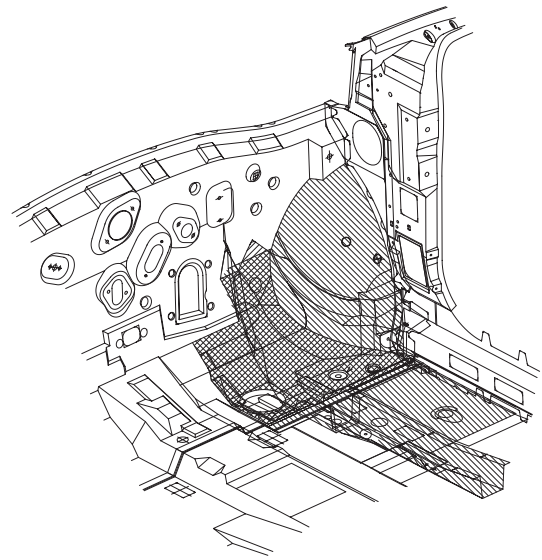
BMKM085

41-12 Waterproofing and rustproofing

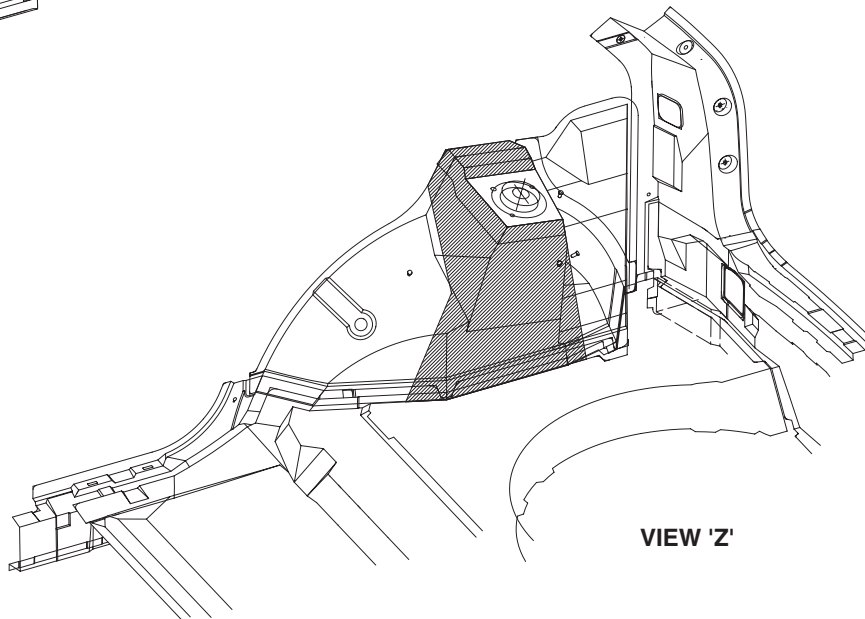
View



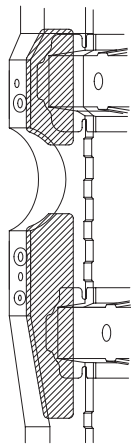
VIEW 'X'



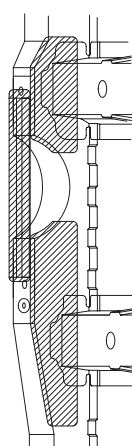
VIEW 'Y'



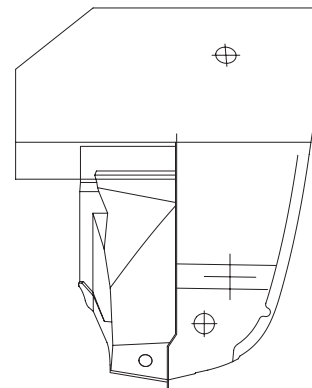
VIEW 'Z'



VIEW 'U'(4WD)

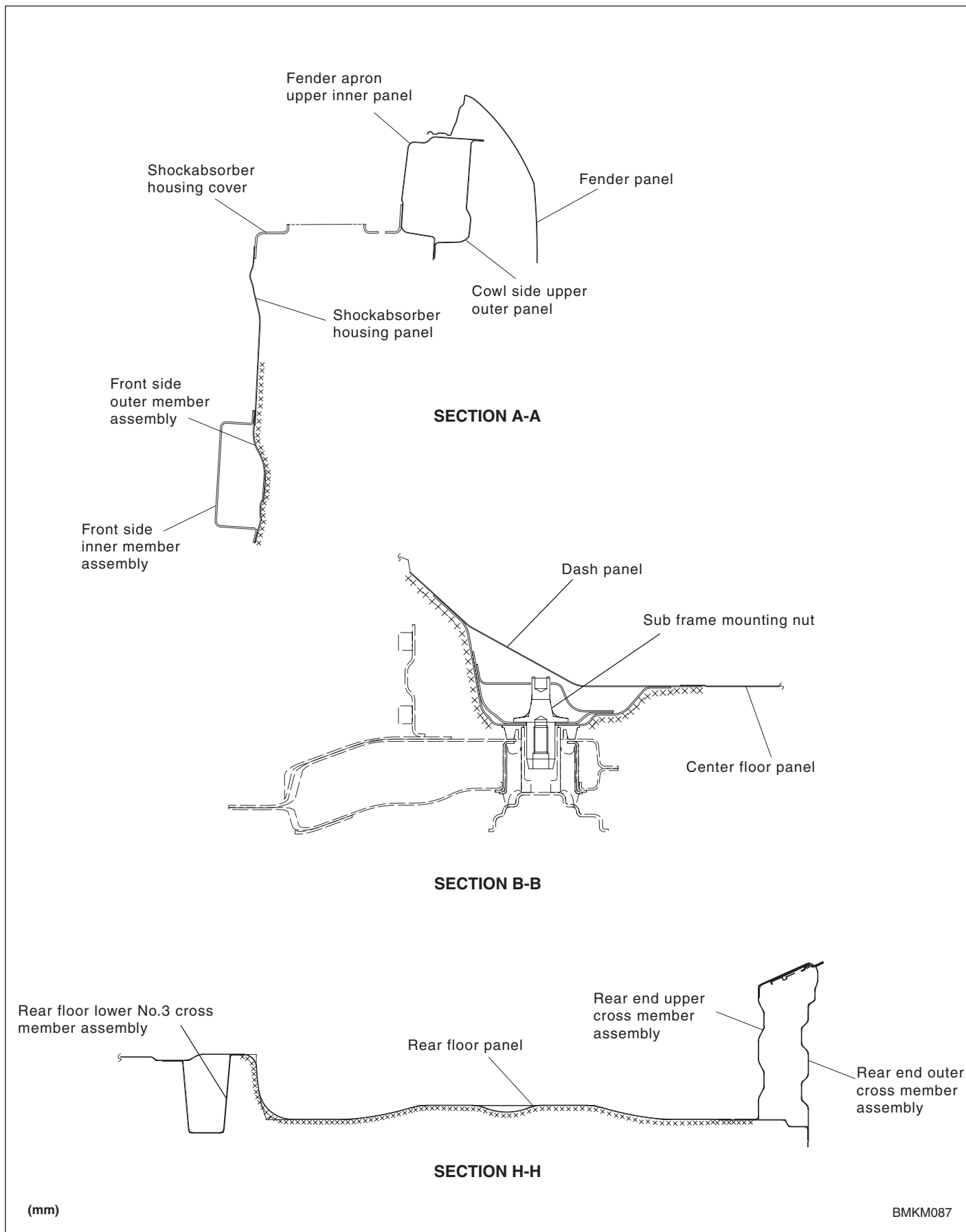


VIEW 'U'(2WD)

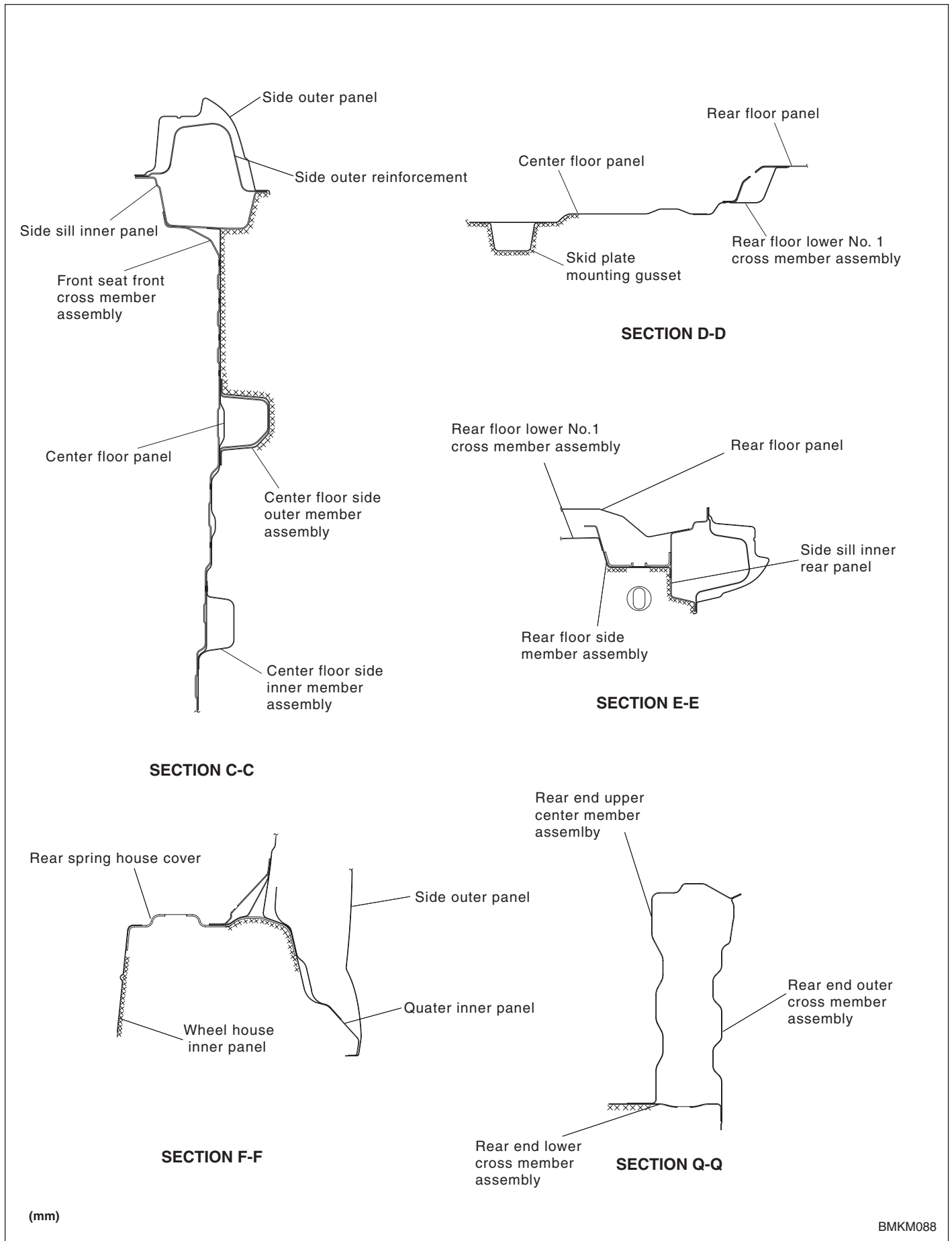


VIEW 'W'

Section

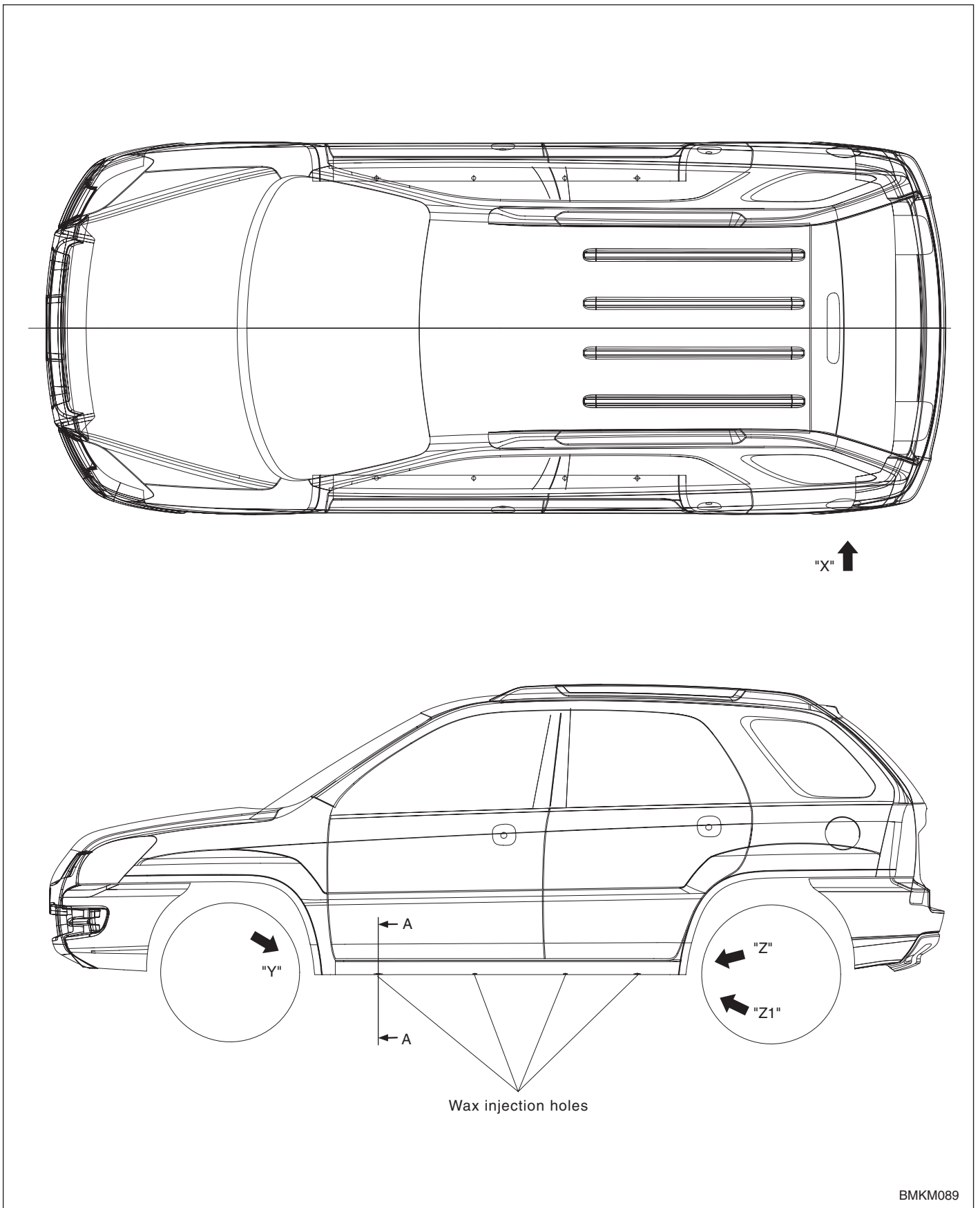


41-14 Waterproofing and rustproofing



BMKM088

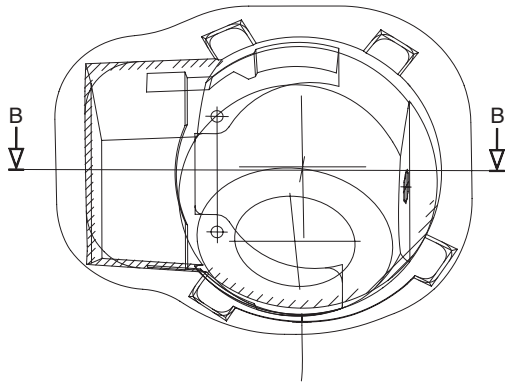
Applying rustproofing material Body



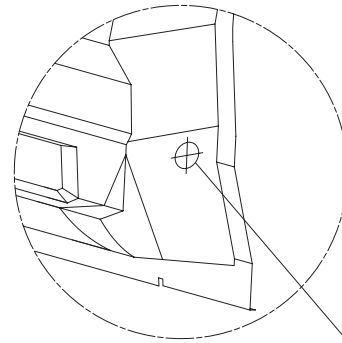
BMKM089

41-16 Waterproofing and rustproofing

View

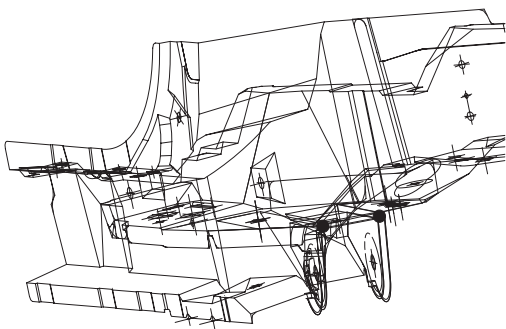


VIEW "X"

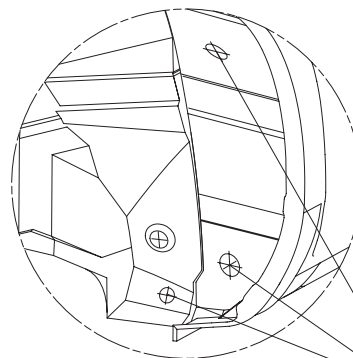


Wax injection hole
($\varnothing 20$)

VIEW "Y"



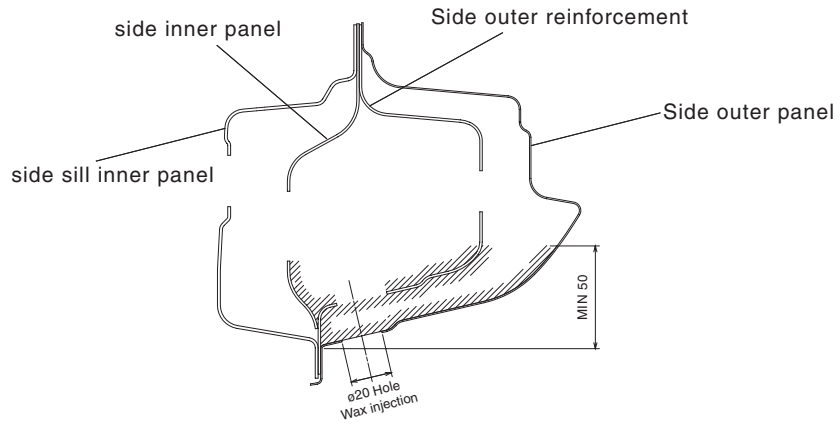
VIEW "Z1"



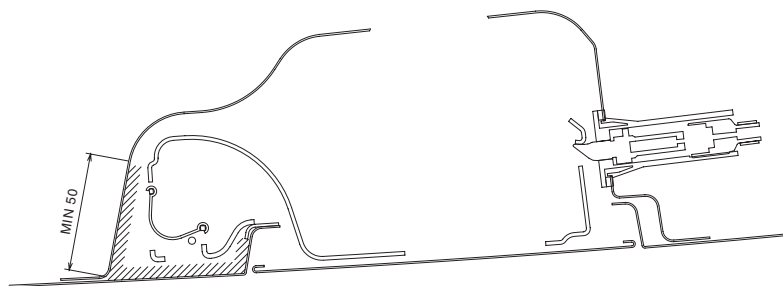
Wax injection holes
($\varnothing 25$)

VIEW "Z"

Section



SECTION A-A



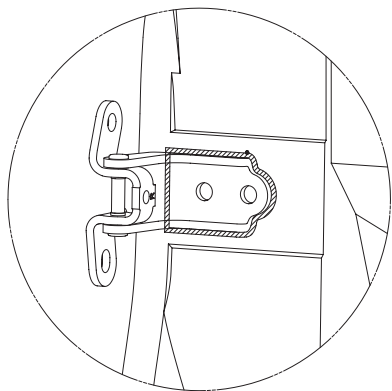
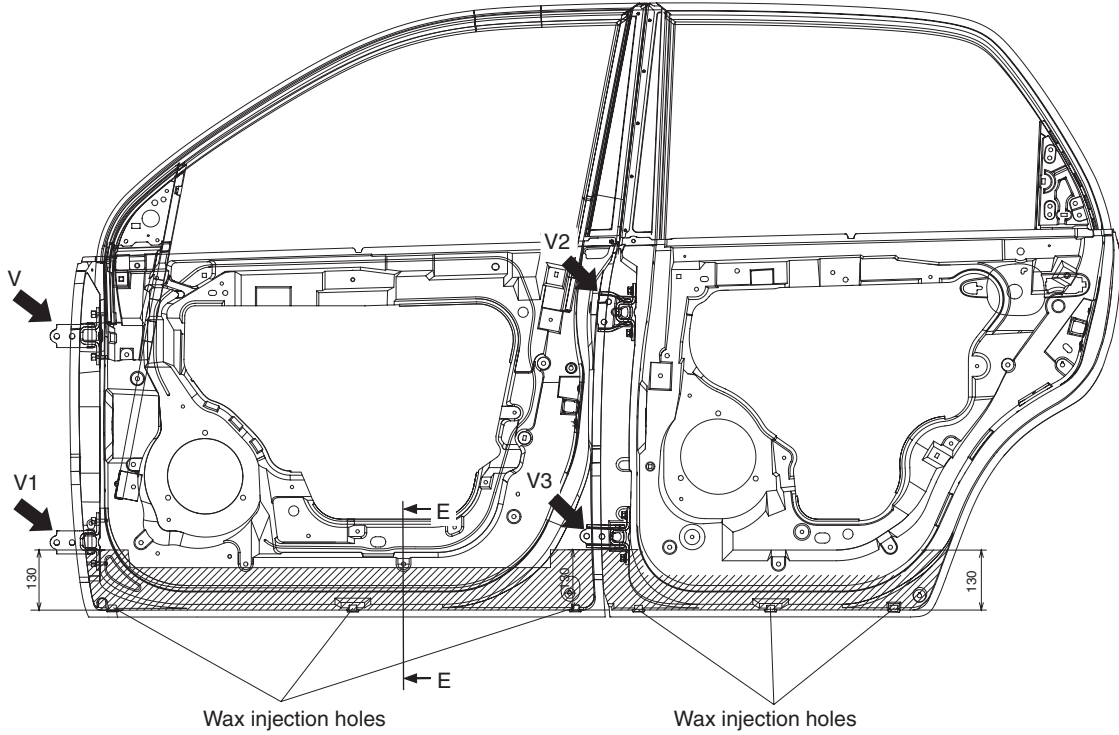
SECTION B-B

(mm)

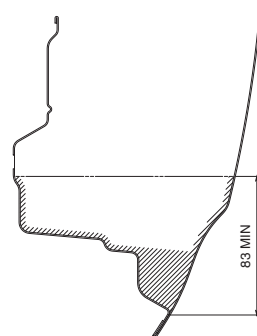
BMKM091

41-18 Waterproofing and rustproofing

Door



VIEW "V" "V1" "V2" "V3"

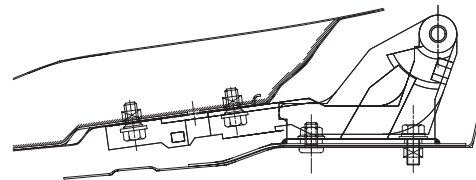
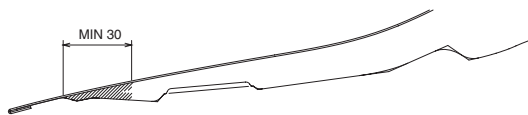
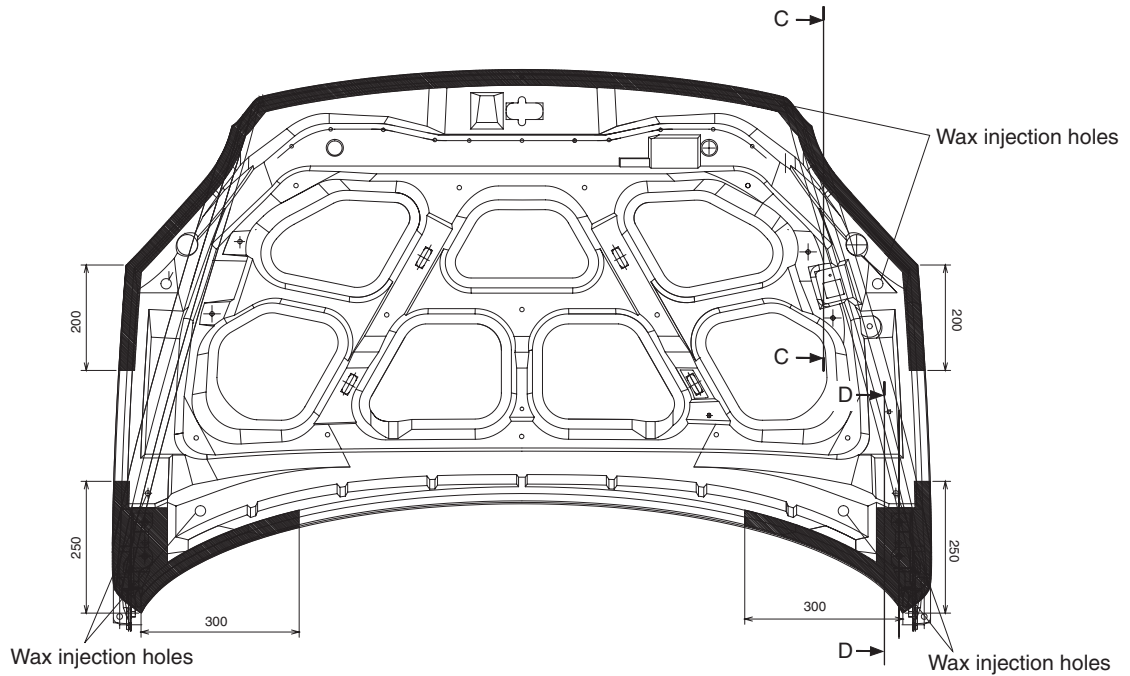


SECTION E-E

(mm)

BMKM092

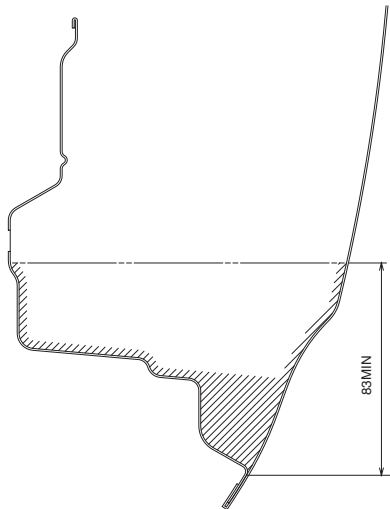
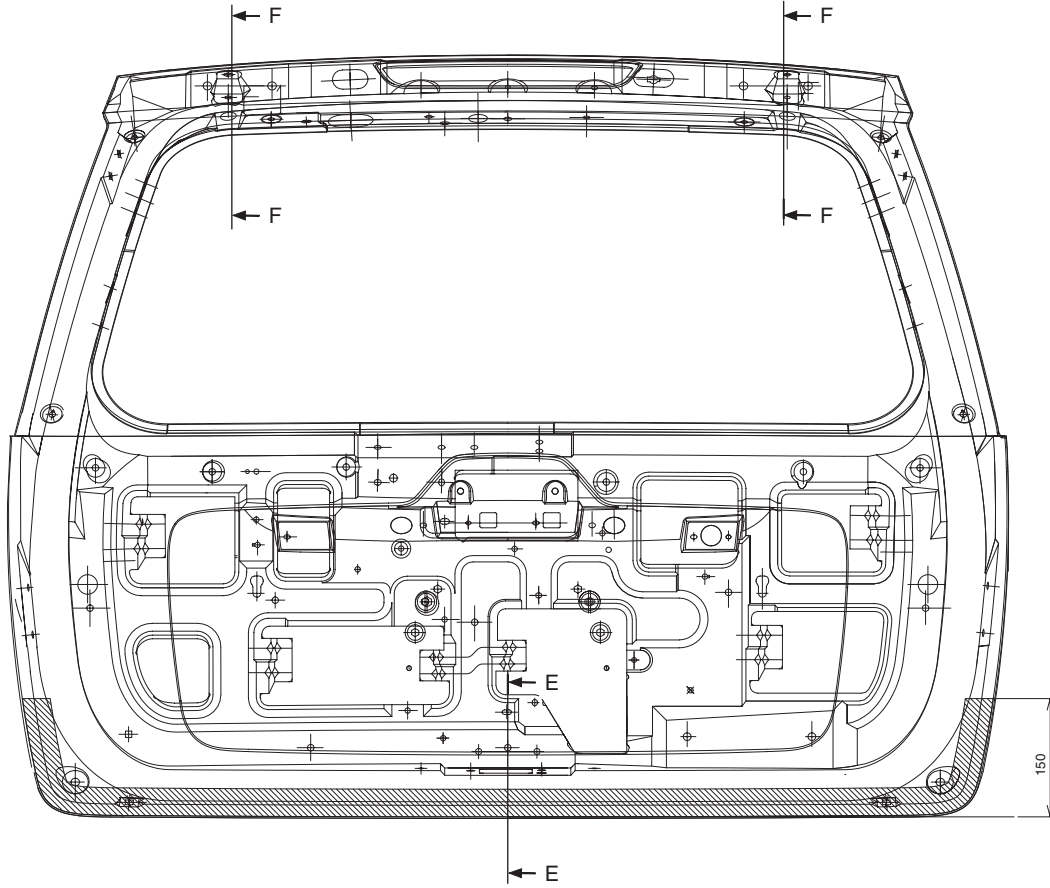
Hood



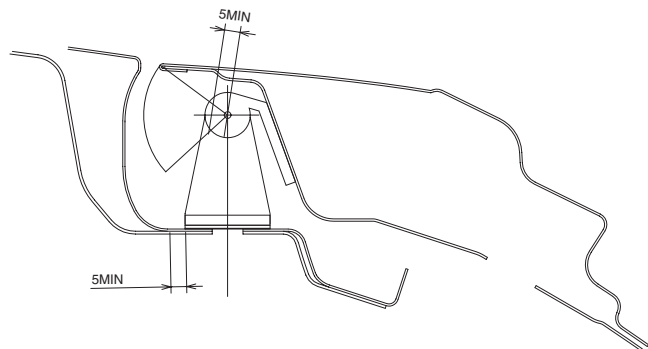
(mm)

BMKM093

Tail gate



SECTION E-E



SECTION F-F

(mm)

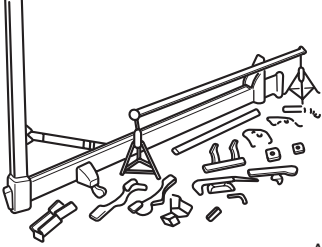
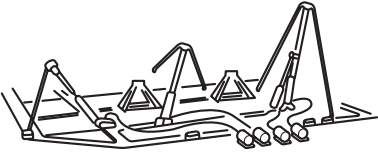
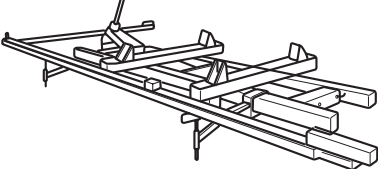
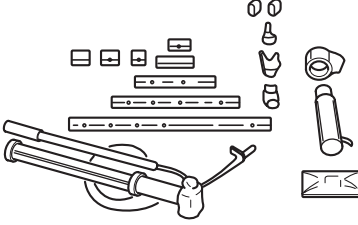
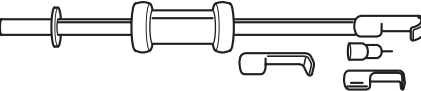
BMKM094

Body modification tools

Body modification tools	
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


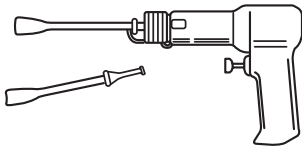
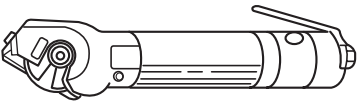
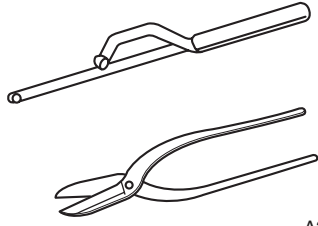
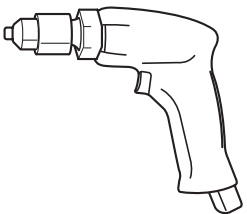
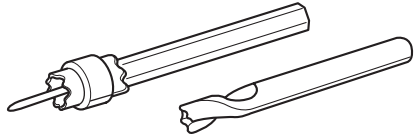
Body modification tools

Modification tools

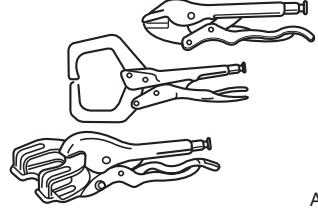
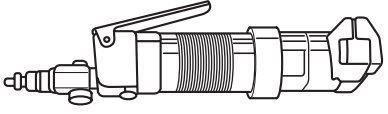
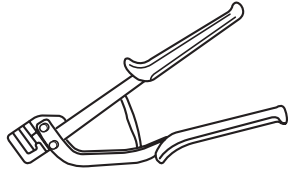
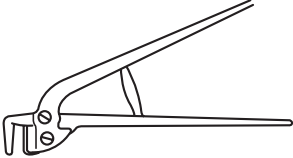
Name	Used for	Figure
Frame straightener	Modify twisted or bent body	 <p>A3EB3501</p>
		 <p>A3EB3502</p>
		 <p>A3EB3503</p>
Port power	Push out, stretch, pull in damaged area	 <p>A3EB3504</p>
Body puller	Stretch damaged area	 <p>A3EB3505</p>

51-2 Body modification tools

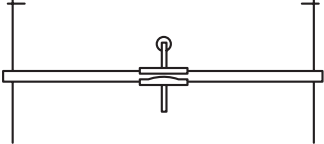
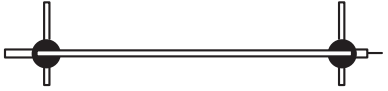
Cut and disassembly tools

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

Assembly tools


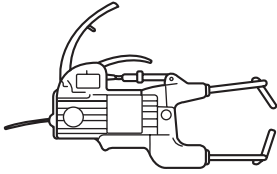

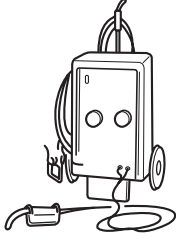
Name	Used for	Figure
Vice pliers	Fix a panel or area to weld	 A3EB3512
Air bench	Finish contact area of flange and finish a hole for plug welding	 A3EB3513
Quick bench	Finish a hole for plug welding	 A3EB3514
Flanging tool	Finish contact area of flange	 A3EB3515

Measurement tools

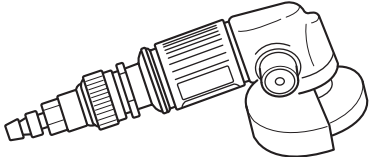
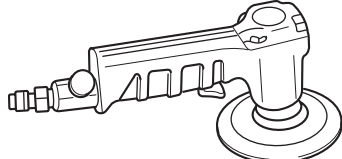
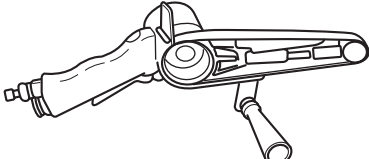
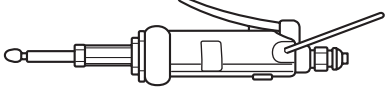
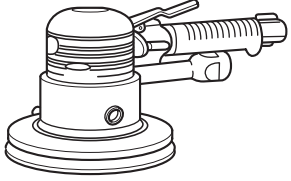
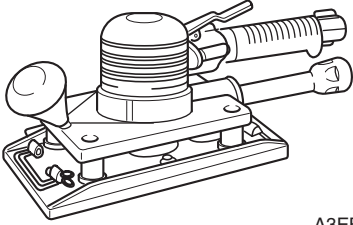
Name	Used for	Figure
Centering gauge	Measure distortion of body and frame	 A3EB3516
Tracking gauge	Measure body and frame	 A3EB3517

51-4 Body modification tools

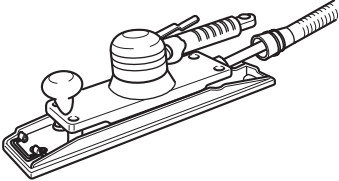
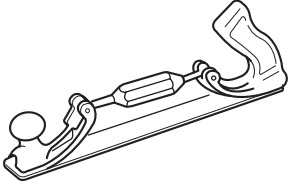
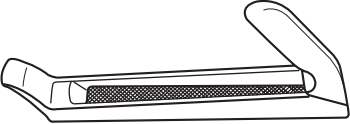
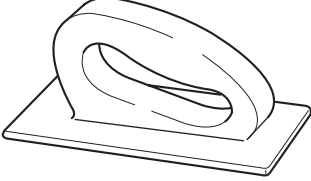
Welding machine

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

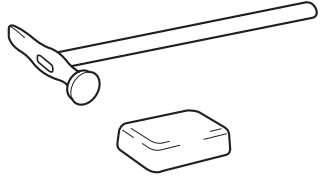
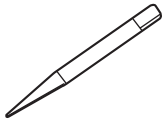
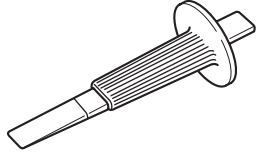
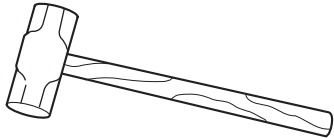
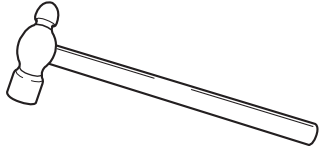
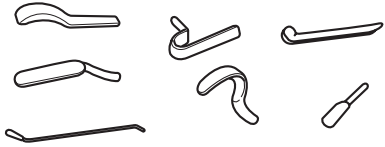
Buffing and grinding tools

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

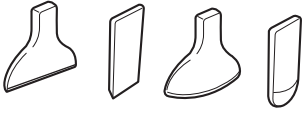
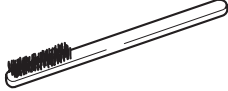
51-6 Body modification tools

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

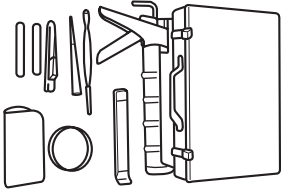
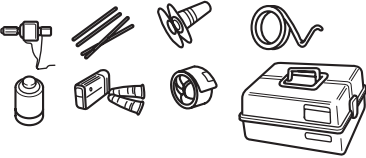
Handheld tools

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

51-8 Body modification tools

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

Repair tools set

Name	Used for	Figure
Window tool set	Repair window collar	 A3EB3540
Repair tool set for plastics	Repair plastic parts	 A3EB3541

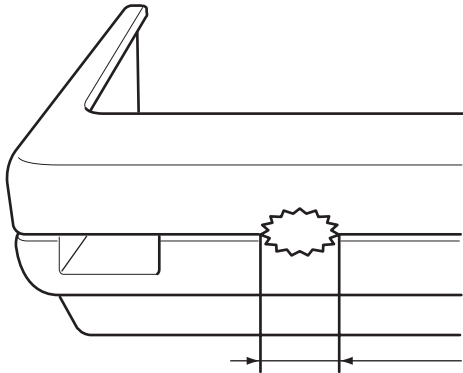
Plastic parts

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

Polypropylene(PP) bumper repairability

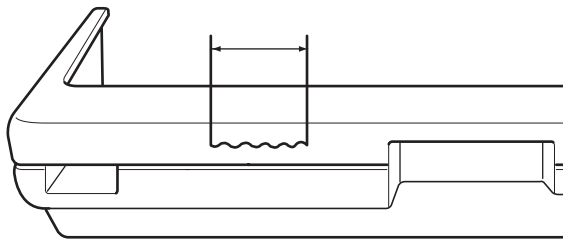
The three types of damaged bumpers shown below can be repaired. Because of cost and quality considerations, bumpers with more damage may be repaired, but replacing the bumper is encouraged.

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



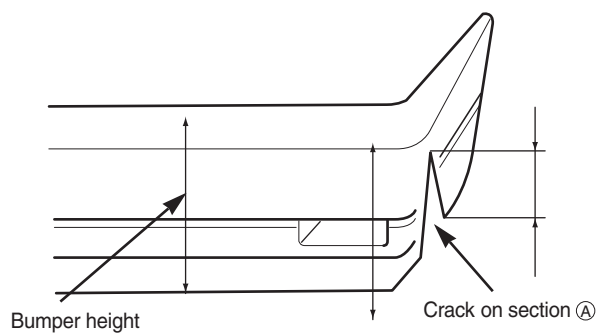
A3EB3601

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



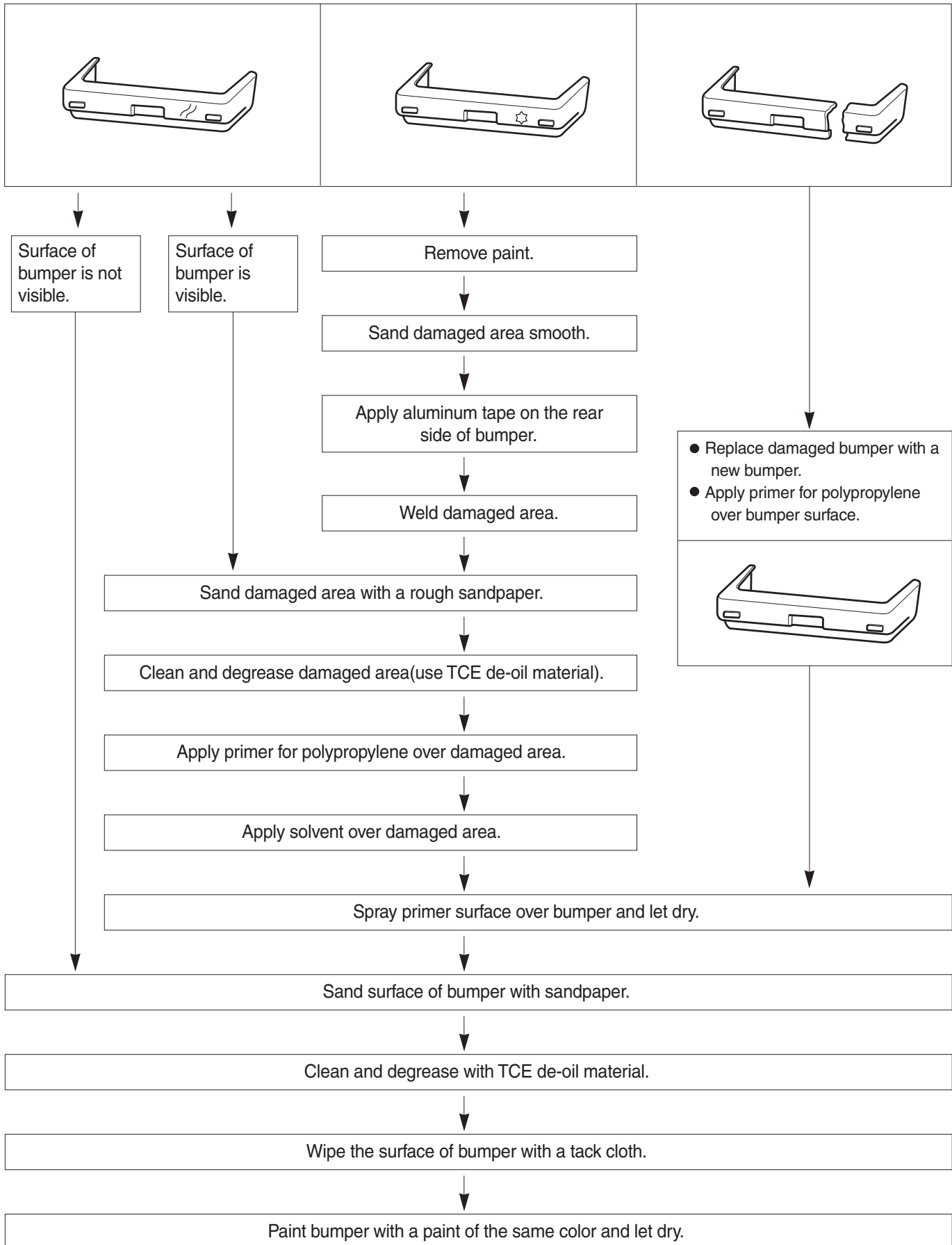
A3EB3602

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



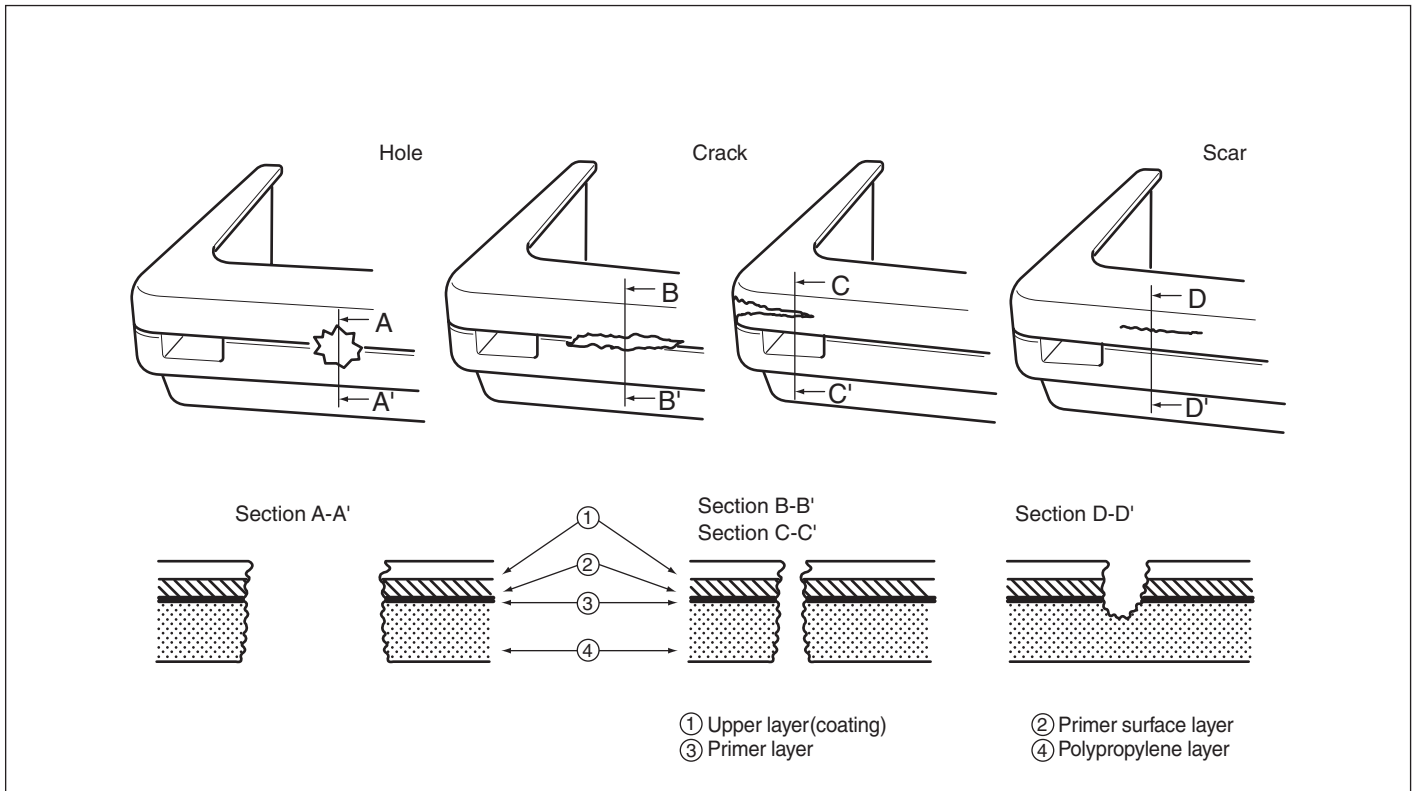
A3EB3603

Bumper repair procedure

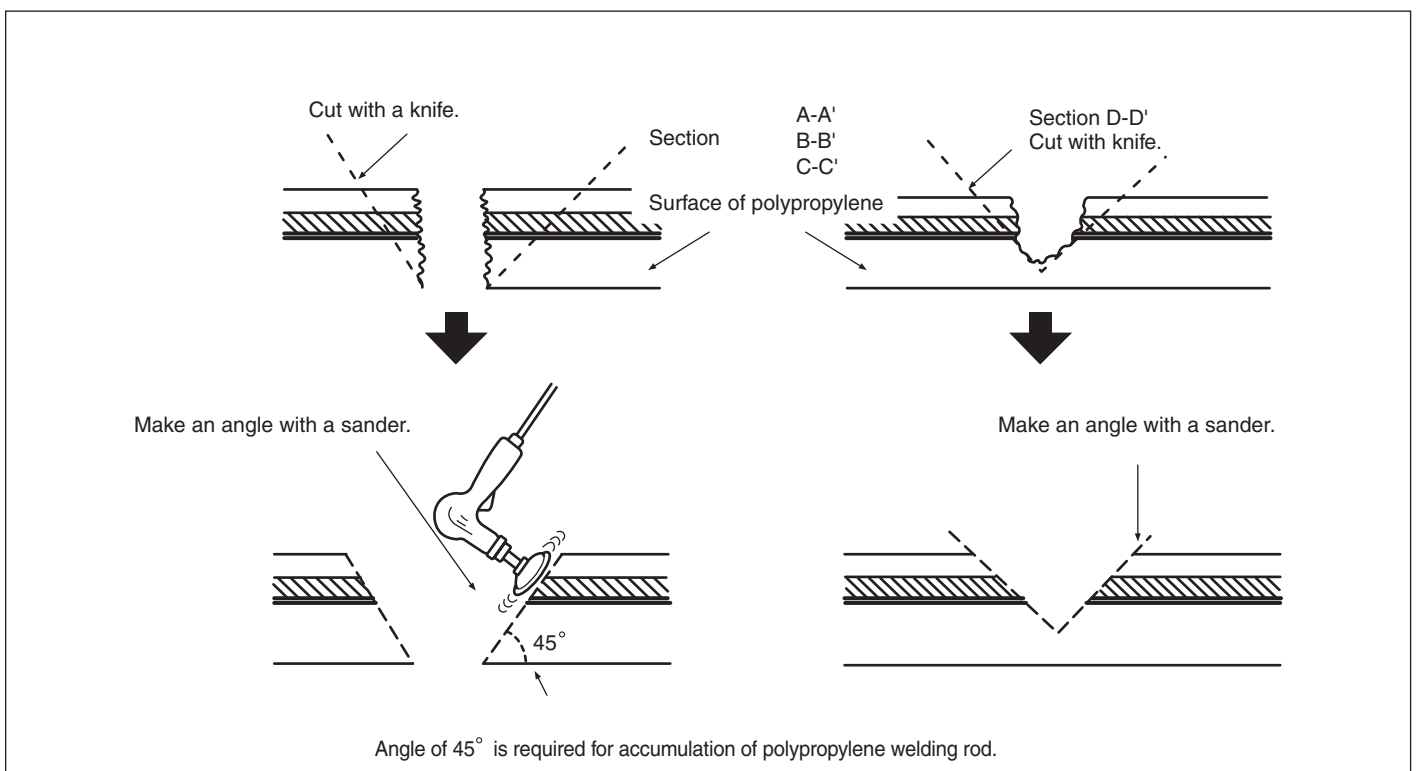


Repair method for PP bumper

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.



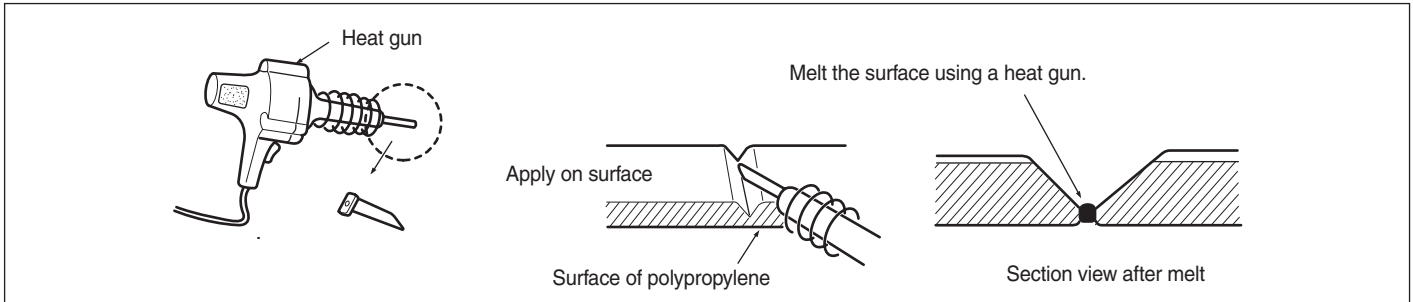
1. Rough cut the damaged area 45° using a knife and then sand the angle smooth.



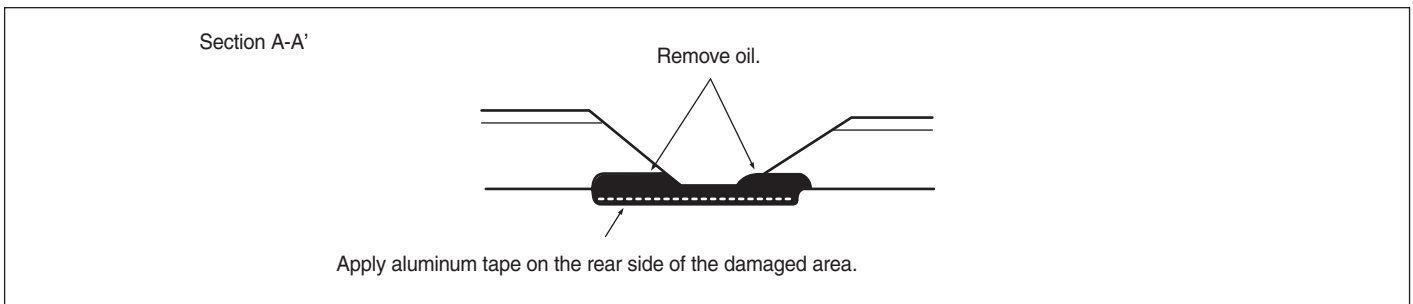
61-4 Plastic parts

2. Welding damaged area

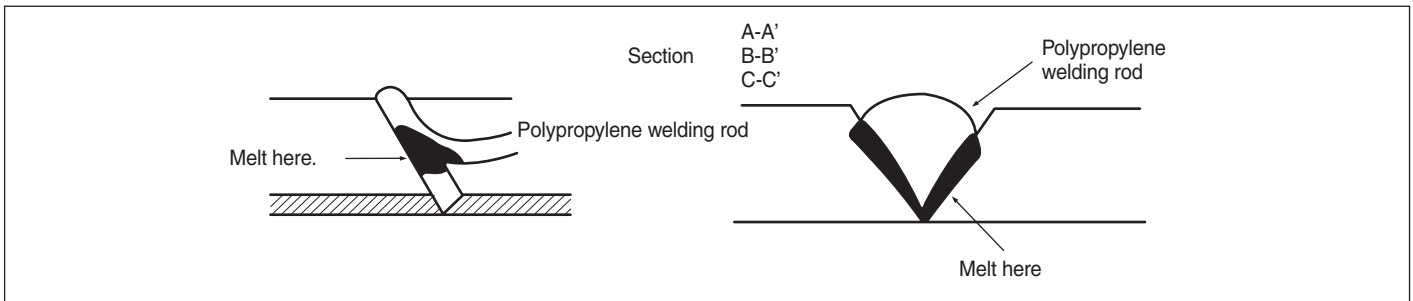
a) To repair cracked area, melt the area using a heat gun and attachment.



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

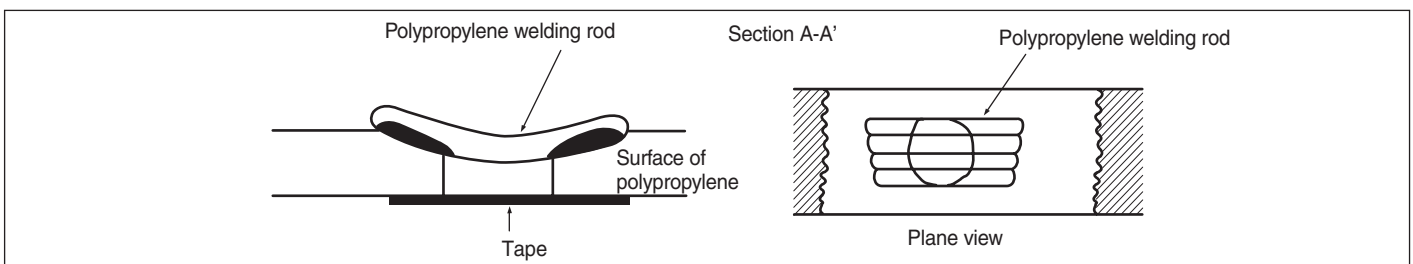


3. Melt polypropylene welding rod using a heat gun and fill in the cracked area.

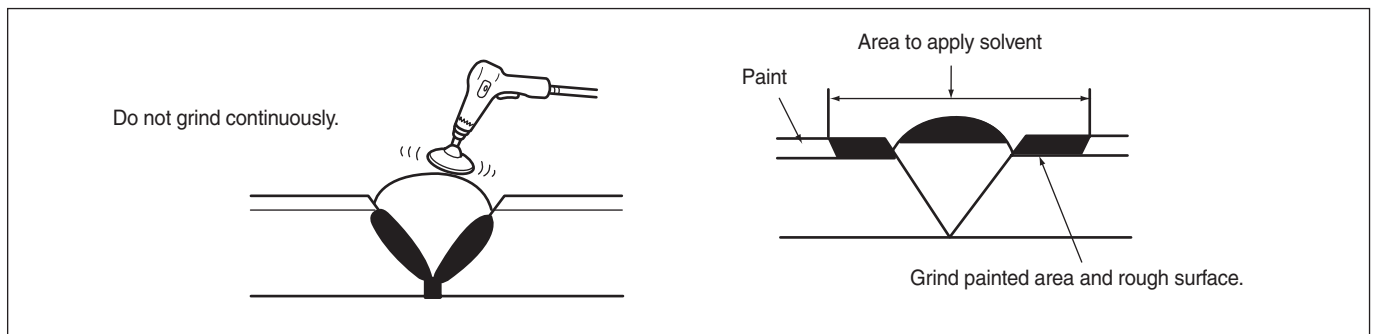


* Notice

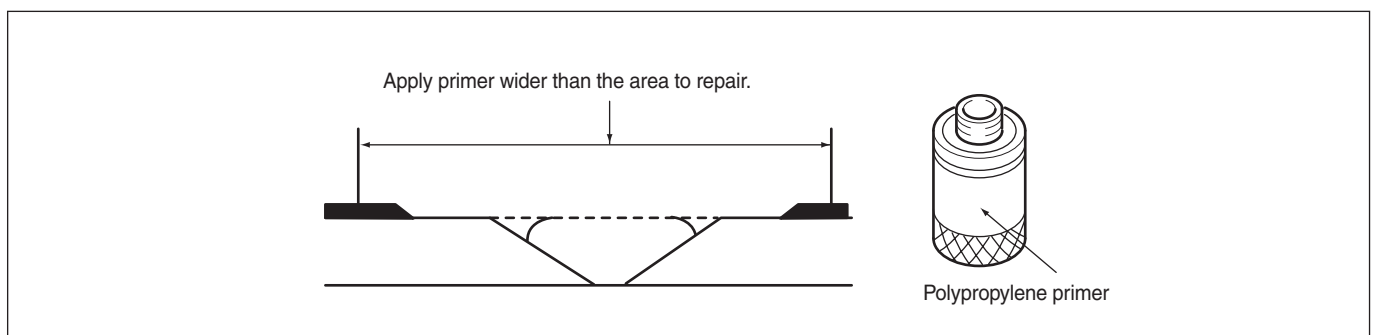
- Heat and melt the area indicated.
- Melt the welding rod carefully so that it does not over-melt. If the welding rod over-melts like jelly, the welding strength will deteriorate.
- Use the heat gun 0.4~0.8 in. (10~20 mm) away from the repair area to be welded.
- Welding rod should not move until the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



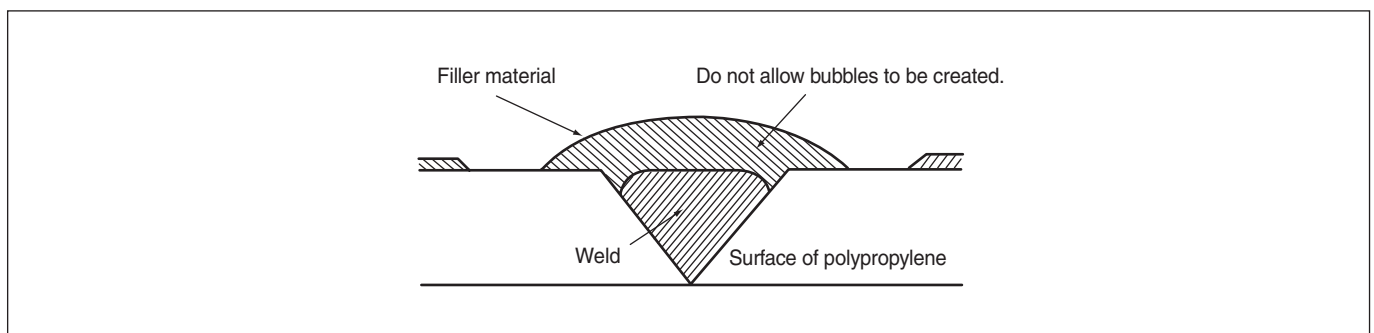
5. Apply polypropylene primer evenly with a brush over an area wider than the area to be repaired. Dry it at 20°C(68°F) for more than 10 minutes.



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.

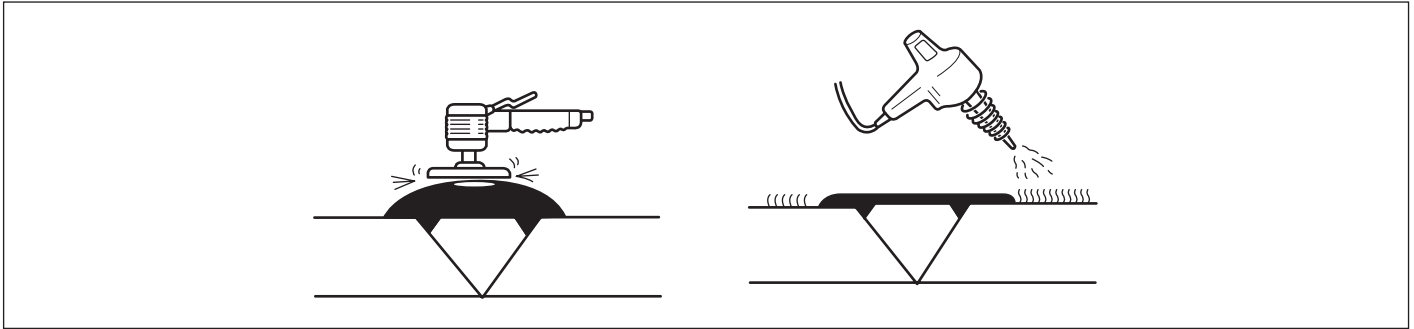
61-6 Plastic parts

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

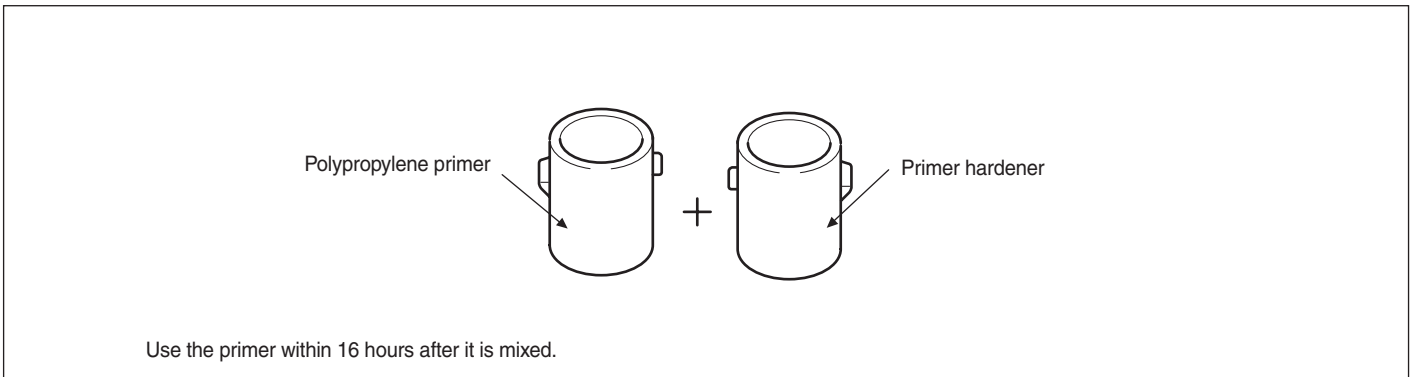
*** Notice**

- 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.*