

GROUP 3

WELDED PANEL REPLACEMENT

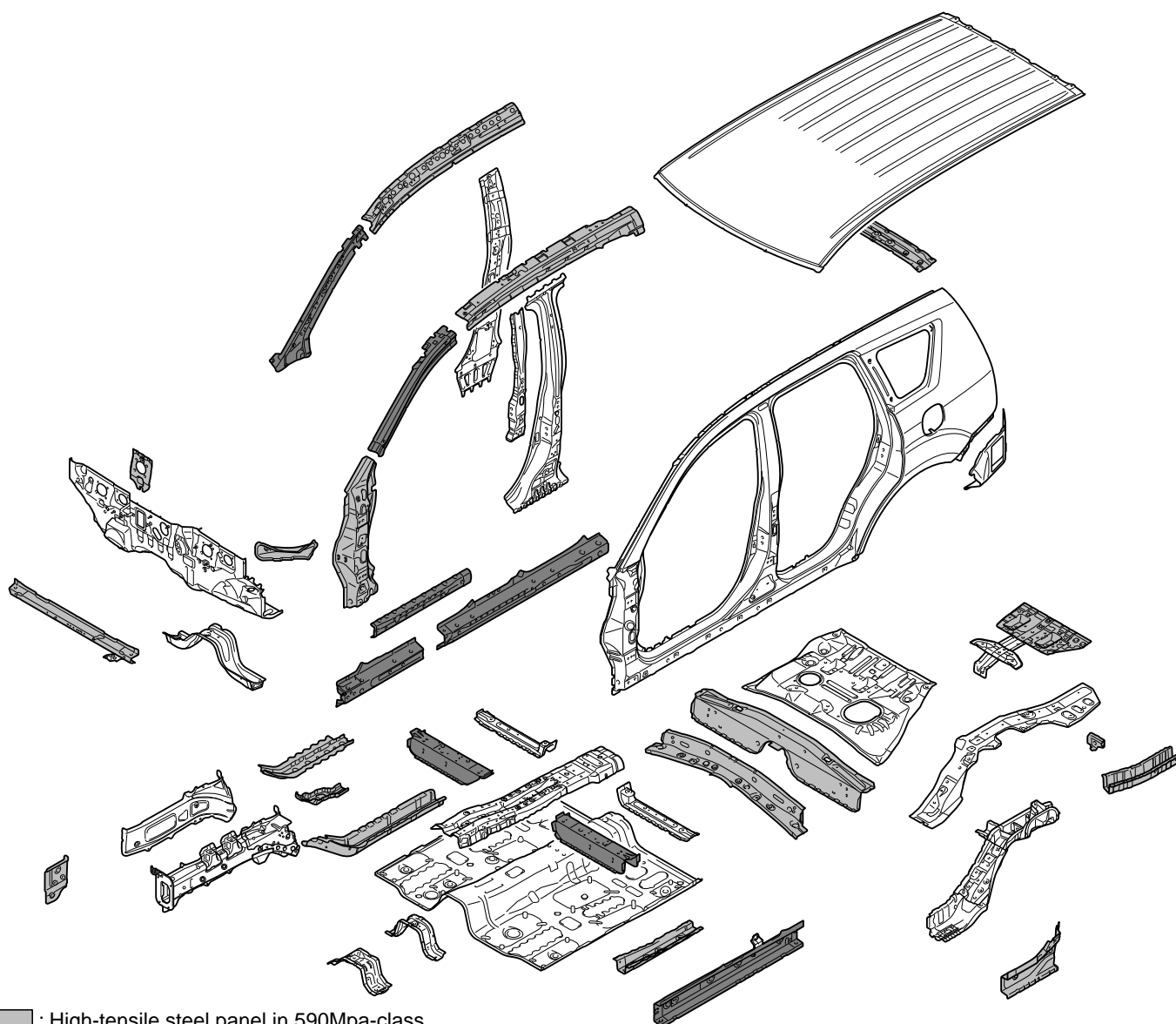
CONTENTS

ULTRA HIGH STRENGTH STEEL PLATE	3-2	QUARTER INNER (PARTIAL REPLACEMENT)	3-40
FRONT END CROSSMEMBER.....	3-3	FRONT DOOR OUTER PANEL (WELDED TYPE)	3-43
FENDER SHIELD.....	3-4	FRONT DOOR OUTER PANEL (ADHESION TYPE).....	3-45
FRONT SIDEMEMBER (PARTIAL REPLACEMENT).....	3-8	REAR DOOR OUTER PANEL (WELDED TYPE)	3-46
FRONT PILLAR.....	3-10	REAR DOOR OUTER PANEL (ADHESION TYPE).....	3-48
FRONT PILLAR (PARTIAL REPLACEMENT)	3-14	ALUMINUM PANEL.....	3-49
CENTER PILLAR.....	3-17	ALUMINUM PANEL CHARACTERISTICS. .	3-49
SIDE SILL.....	3-20	ALUMINUM PANEL LOCATIONS.....	3-50
QUARTER OUTER.....	3-23	ALUMINUM PANEL REPAIR.....	3-50
ROOF (ALUMINUM ROOF).....	3-26	ALUMINUM PANEL PAINT.....	3-56
REAR END CROSSMEMBER.....	3-31		
REAR FLOOR.....	3-34		
QUARTER INNER.....	3-36		

ULTRA HIGH STRENGTH STEEL PLATE

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ULTRA HIGH STRENGTH STEEL PLATE APPLICATION



■ : High-tensile steel panel in 590Mpa-class
 ■ : Ultra-high-tensile steel panel in 980MPa-class

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ADVANTAGES OF ULTRA HIGH STRENGTH STEEL PLATE

The ultra high strength steel plate has the following advantages as compared with conventional high strength steel plate.

- It has tensile strength approximately 1.7 times higher than the conventional high strength steel sheet.
- It has a higher yielding point and yielding ratio (yielding point/tensile strength).

These advantages allow thinner and lighter plates and better fuel efficiency than the high strength steel plate.

PRECAUTION UPON MAINTENANCE OF ULTRA HIGH STRENGTH STEEL PLATE

- Use a spot cutter for ultra high strength steel plate to ensure that the spot-welded area is cut off.
- For the part in which the ultra high strength steel plate is used, do not repair it by cutting and bonding to avoid the reduction in strength by heat. Instead, replace the whole assembly including the part.

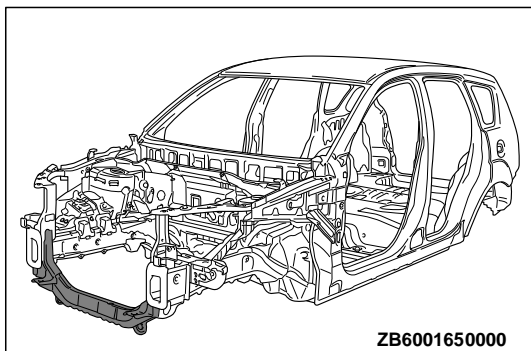
▪ Be careful with rough extending work, because the ultra high strength steel plate has higher tensile strength and a higher yielding point than high strength steel plate and general steel plate. Careless work will cause symptom such as over-pulling and springback. Do not extend it completely


at a time. Do it gradually while removing the distortion by sheet metal processing with a hammer.

▪ Plug welding of $\Phi 8$ mm (0.31 inches) diameter plug for repair ensures the strength equivalent to spot welding for 2 steel sheets. For 3 sheets, weld 2 sheets each time instead of welding from one side to give sufficient welding strength.

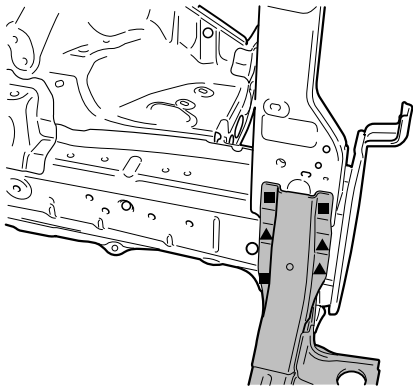
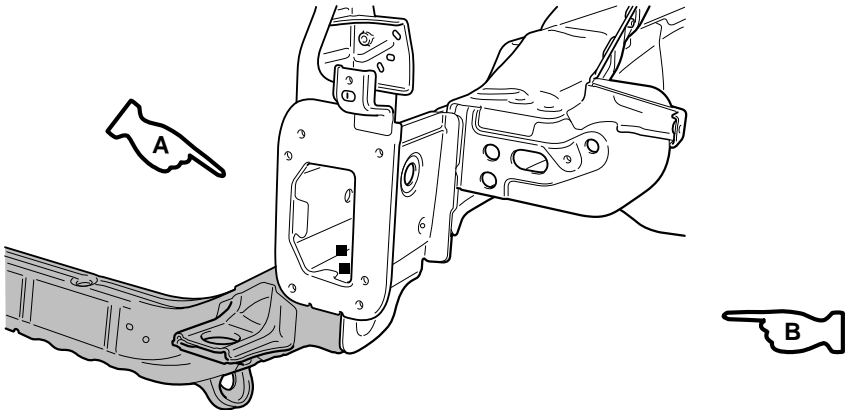
FRONT END CROSSMEMBER

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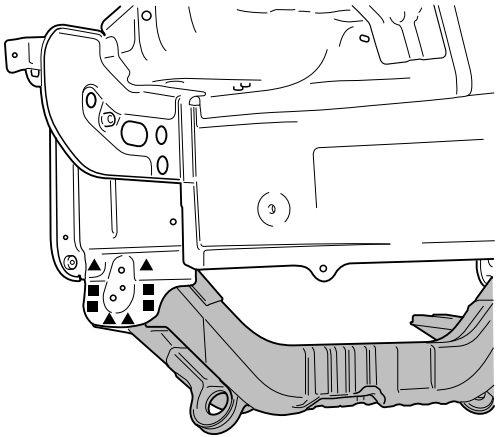


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
+++++	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



A

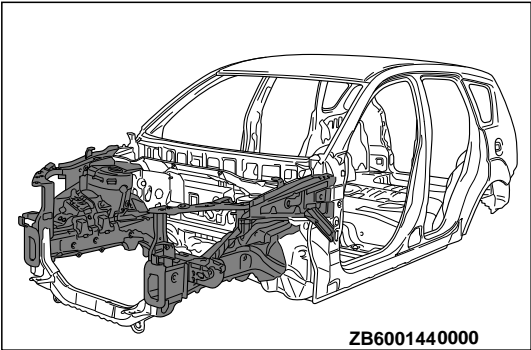


B


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FENDER SHIELD

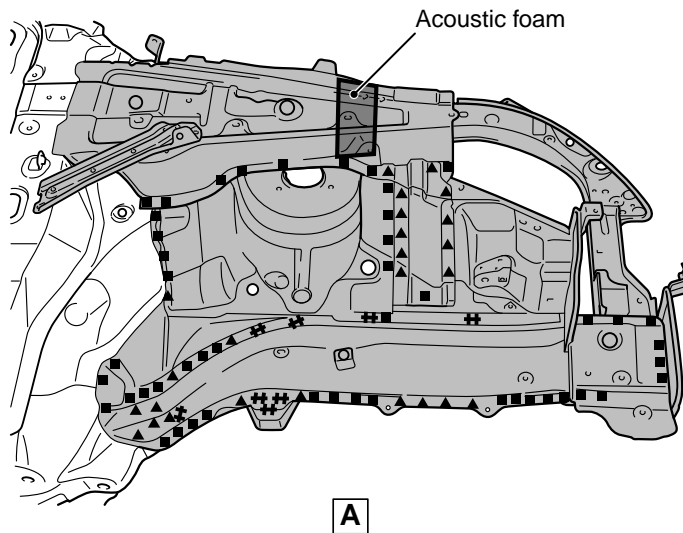
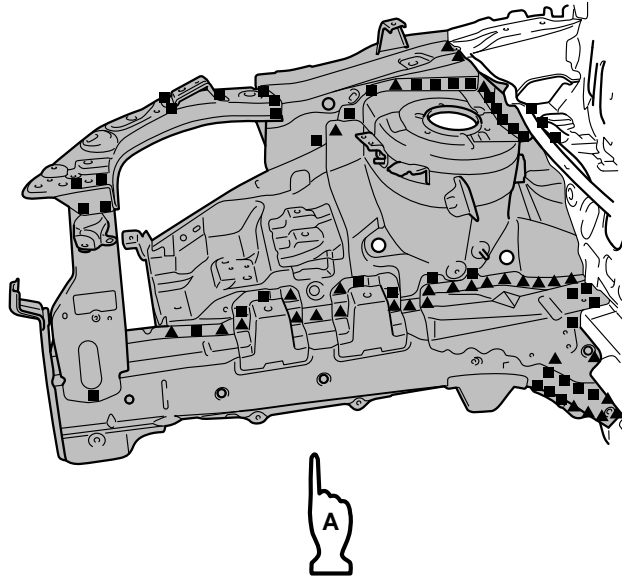
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Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
ooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

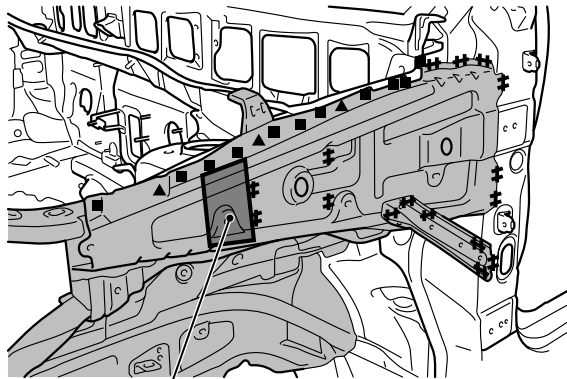


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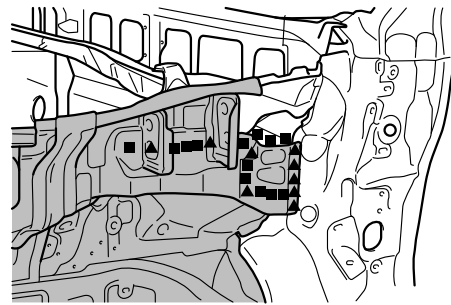
NOTE: Refer to the Front End Crossmember section on P.3-3for the welding point with front end crossmember.

CAUTION

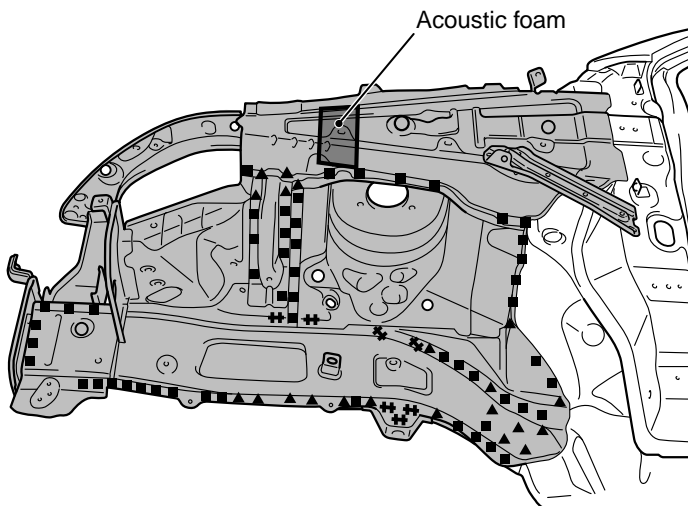
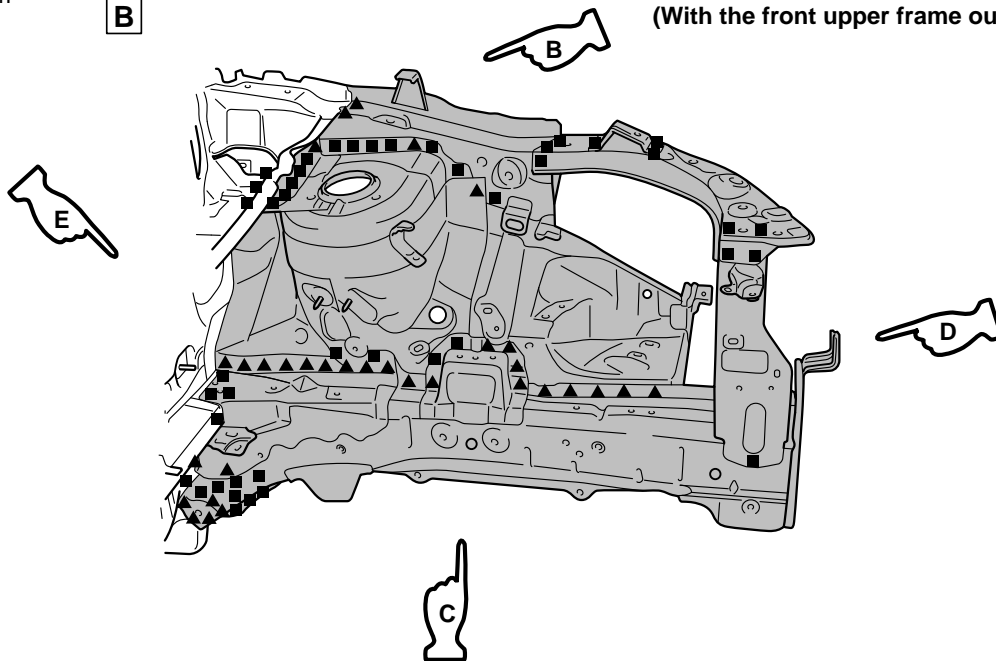
When repairing the area using foam materials do not use firing tools since the foaming materials may burn.

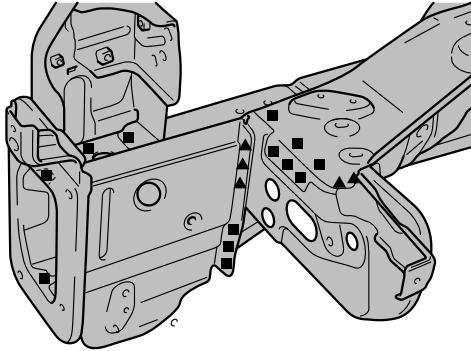
WELDED PANEL REPLACEMENT
FENDER SHIELD

Acoustic foam

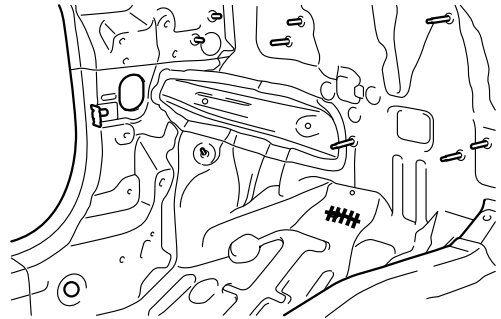
B**B**

(With the front upper frame outer removed)

**C**

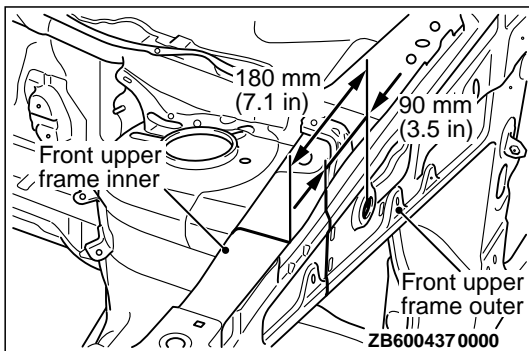


D



E

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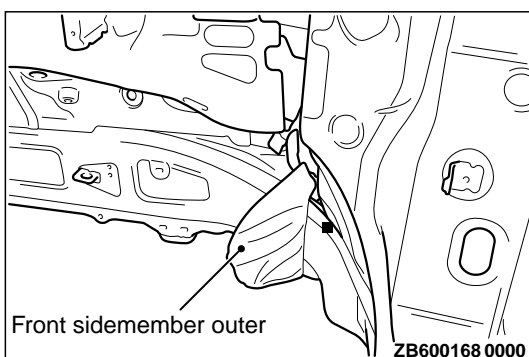


NOTE: Partial replacement of the front upper frame is possible depending on the range of damage. For partial replacement, cut the front upper frame outer at 90 mm (3.5 inches) forward of the vehicle from its positioning hole, and front upper frame inner at 180 mm (7.1 inches).

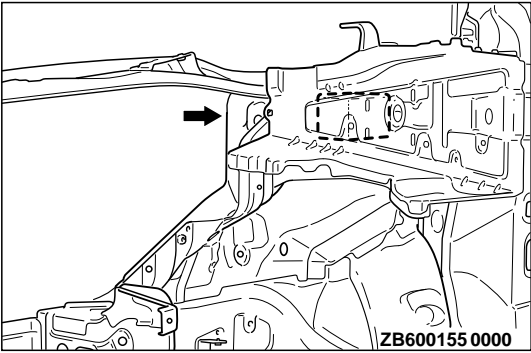
NOTE ON REPAIR WORK

REMOVAL

1. Turn up the front sidemember outer as shown to cut off the welded point between the front sidemember rear bulkhead and the front sidemember brace lower.



WELDED PANEL REPLACEMENT
FRONT SIDEMEMBER (PARTIAL REPLACEMENT)

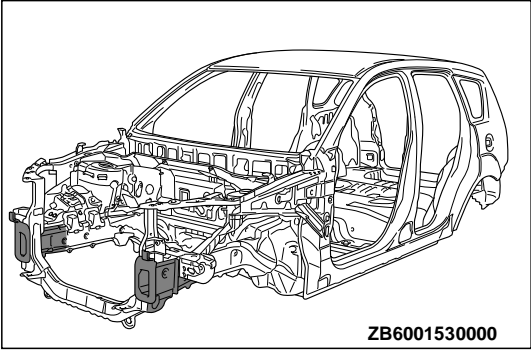



INSTALLATION

1. After installation of the upper frame outer, press in sponge from the hole up to the dotted line shown in the figure as a temporary measure to fill the inside of the upper frame outer.

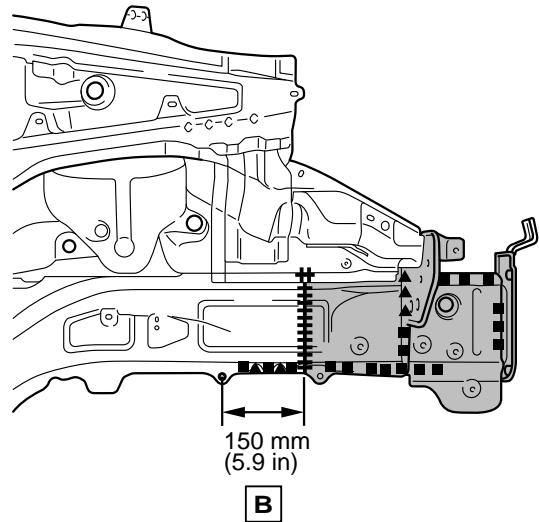
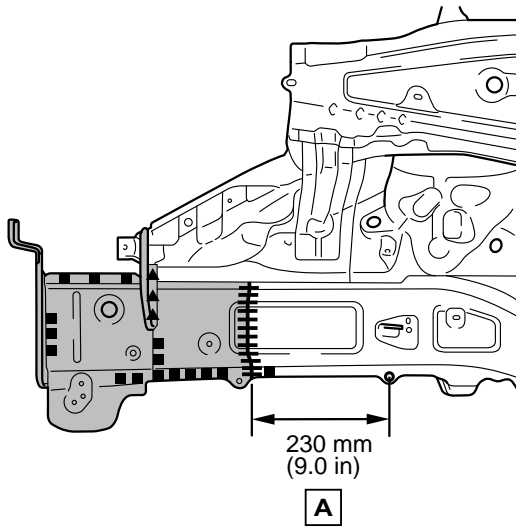
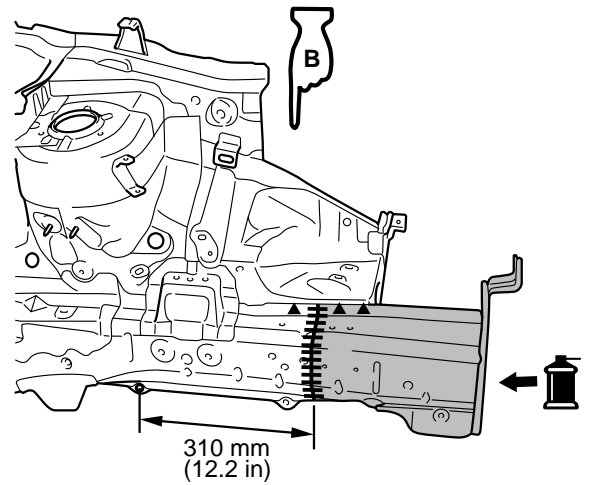
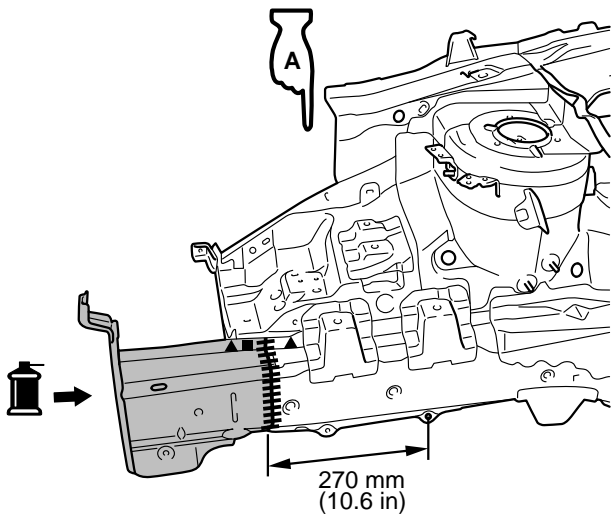
FRONT SIDEMEMBER (PARTIAL REPLACEMENT)

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● ● ● ●	Spot welding
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#####	MIG arc welding (continuous)
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	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



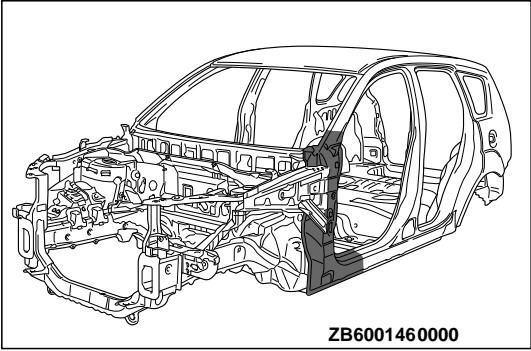
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NOTE:

- *Refer to the Front End Crossmember section on P. 3-3 for the welding point with front end crossmember.
- *Refer to the Fender Shield section on P.3-4 for the welding points with the fender shield.

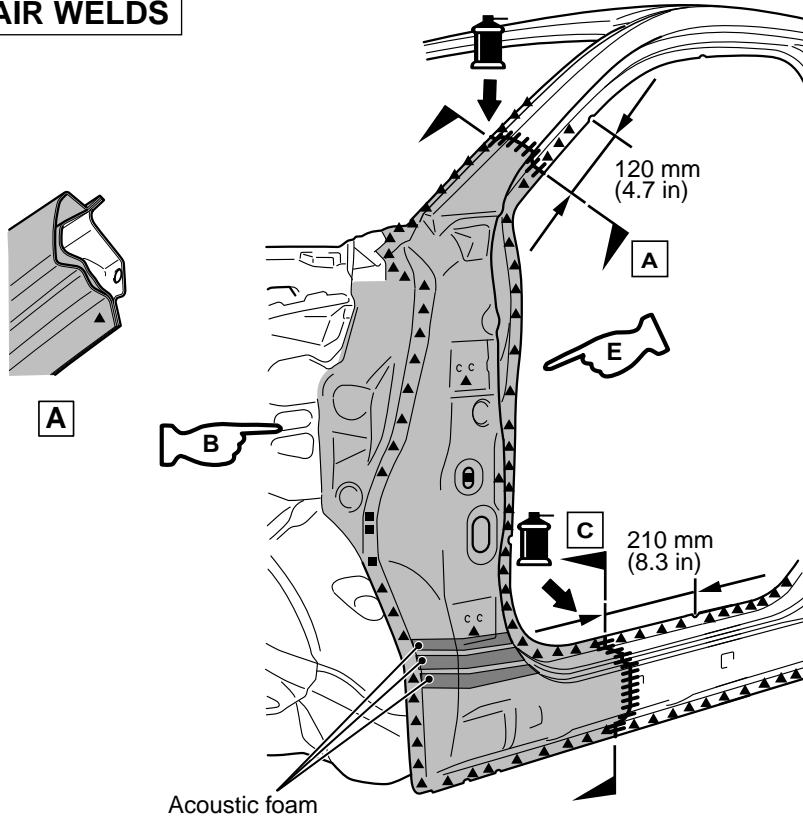
FRONT PILLAR

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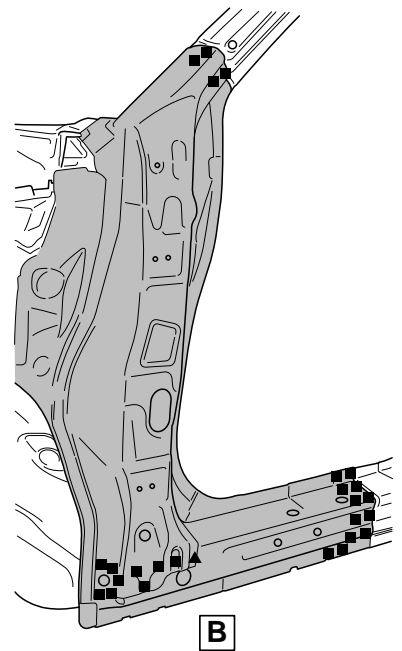


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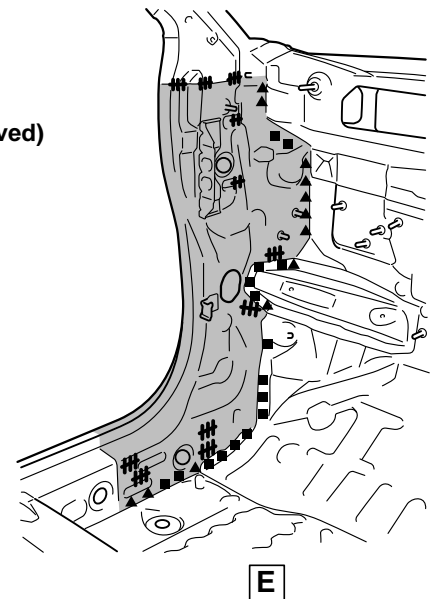
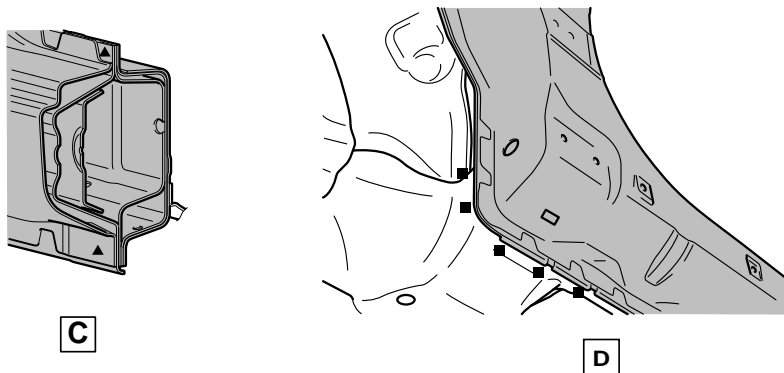
REPAIR WELDS



(With the front upper frame outer removed)



(With the side outer panel removed)



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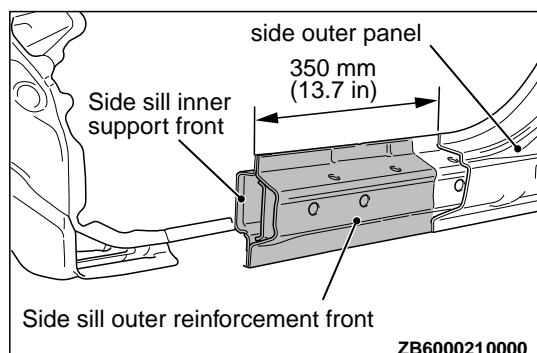
NOTE: For the welding points of upper frame outer and upper pillar-to-front pillar brace, refer to P.3-4Fender Shield.

CAUTION

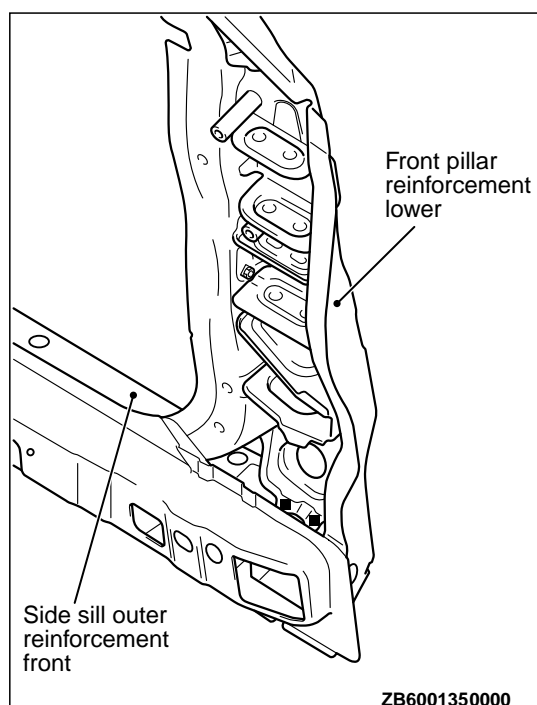
When repairing the area using foam materials do not use firing tools since the foaming materials may burn.

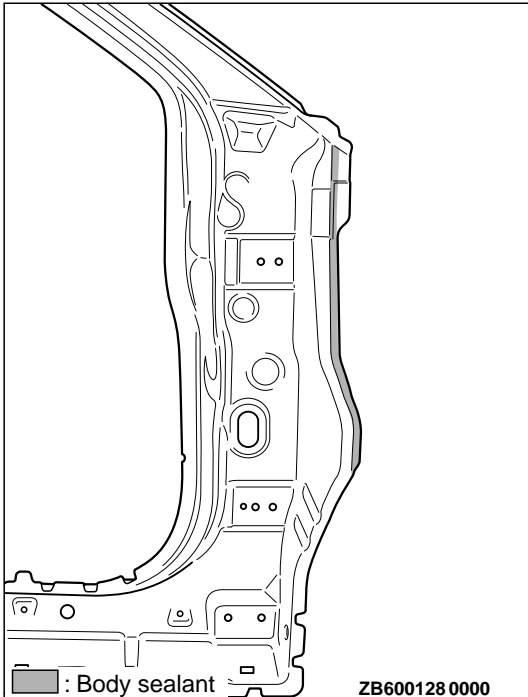
NOTE ON REPAIR WORK**REMOVAL**

Because partial replacement of the side sill outer reinforcement front is impossible, remove the side sill outer reinforcement front on the body side. Cut and remove the side outer panel at 350 mm (13.7 inches) behind the side sill cutting section.

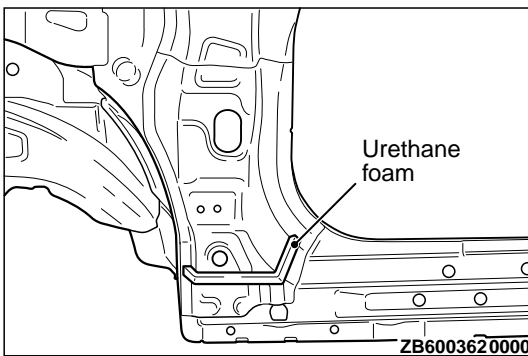
**INSTALLATION**

1. When installing the side sill outer reinforcement front and front pillar reinforcement lower, weld them in advance as shown in the figure.

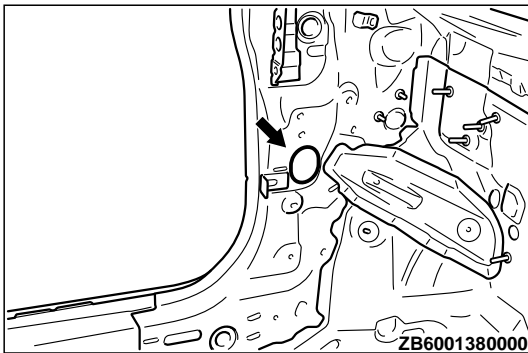




2. When installing the front pillar outer, apply body sealant as shown in the figure.



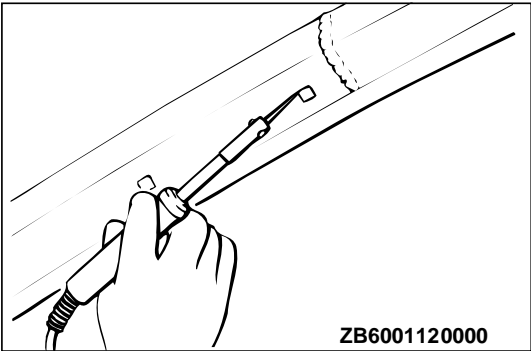
3. When installing the new front pillar outer, affix urethane foam as shown in the figure as a temporary measure to fill the inside of the front pillar.



4. After installing the front pillar outer, seal the hole and flange with bolt and aluminum tape, and then fill the hole with foam materials as shown in the figure.

Foam: 3M™ AAD ULTRAPRO Panel foam-Yellow

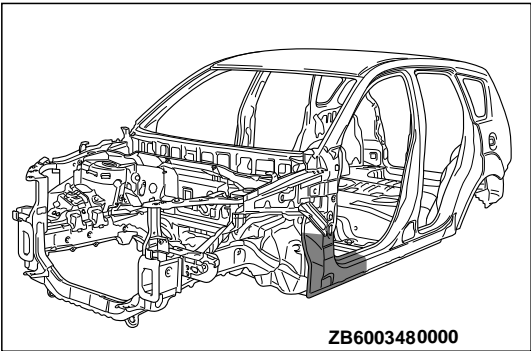
WELDED PANEL REPLACEMENT
FRONT PILLAR (PARTIAL REPLACEMENT)




5. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun to ensure that a clip, etc. can be inserted in the hole filled with foam materials.

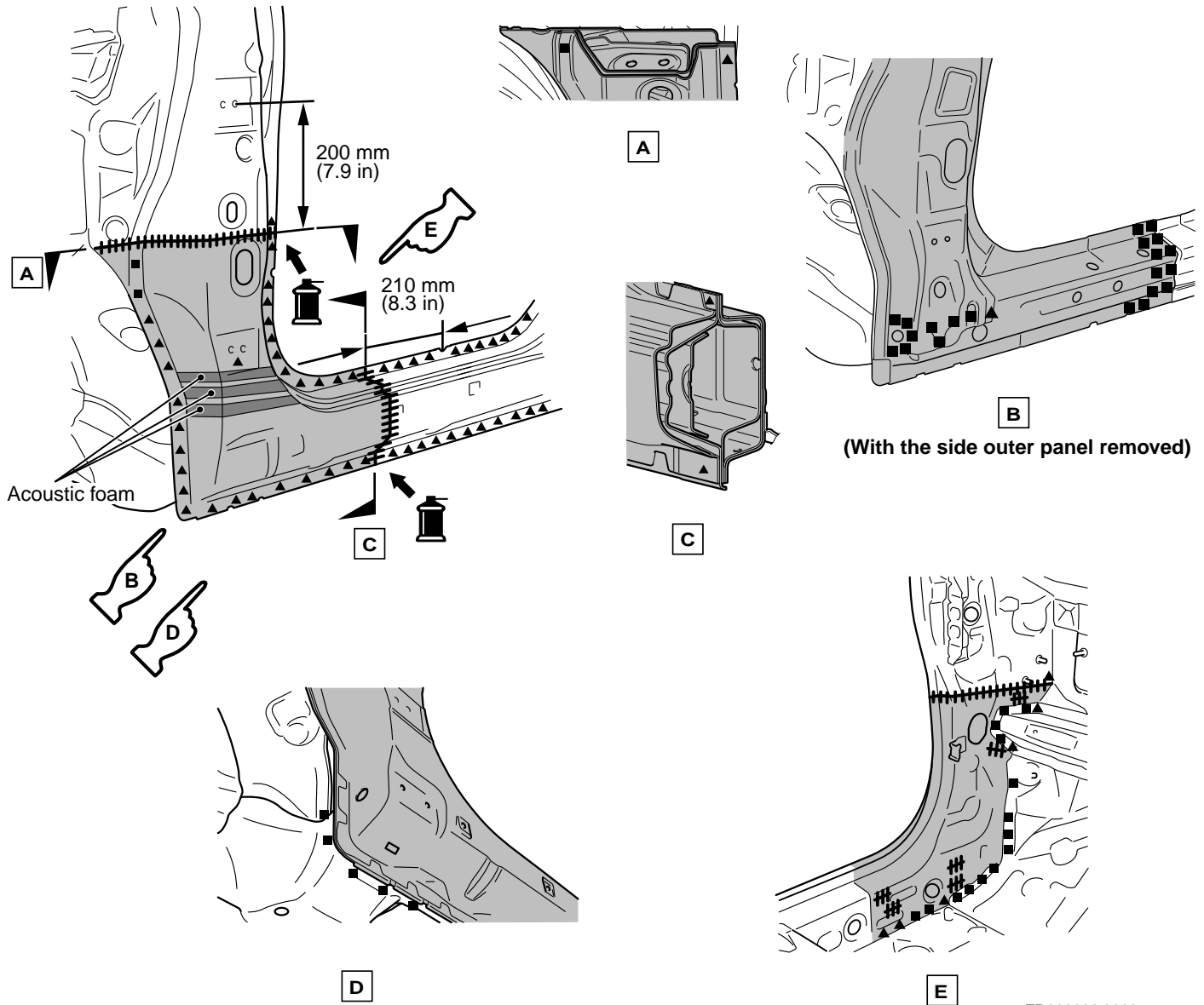
FRONT PILLAR (PARTIAL REPLACEMENT)

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Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
#####	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



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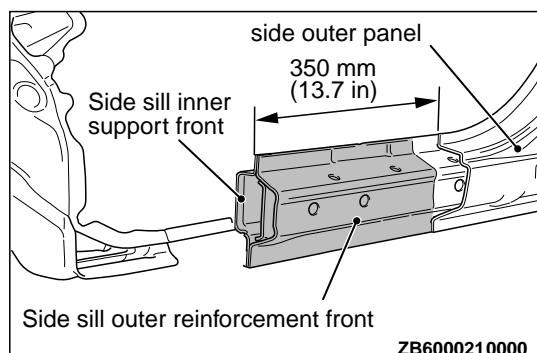
CAUTION

When repairing the area using foam materials do not use firing tools since the foaming materials may burn.

NOTE ON REPAIR WORK

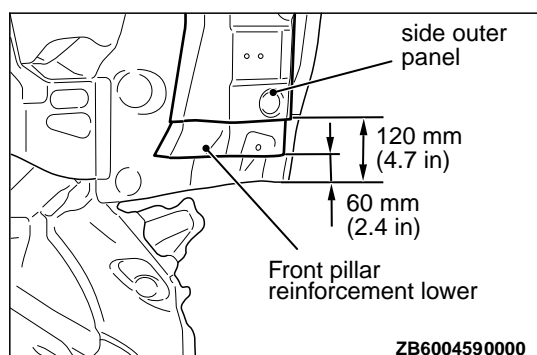
REMOVAL

Because partial replacement of the side sill outer reinforcement front is impossible, remove the side sill outer reinforcement front on the body side. Cut and remove the side outer panel at 350 mm (13.7 inches) behind the side sill cutting section.

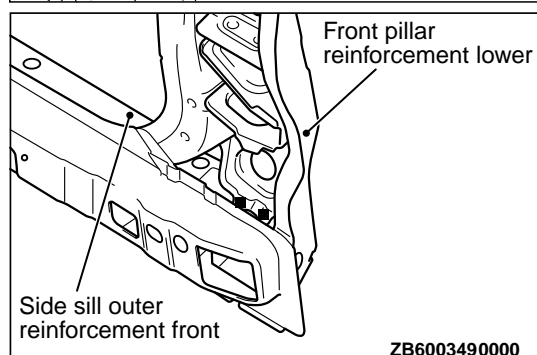


INSTALLATION

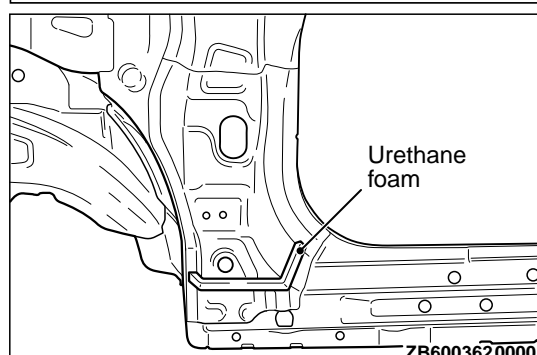
1. To assure the strength of the front pillar cutting section, cut the front pillar reinforcement lower 60 mm (2.4 inches) upward from the front pillar cutting section, and the side outer panel at 120 mm (4.7 inches) upward.

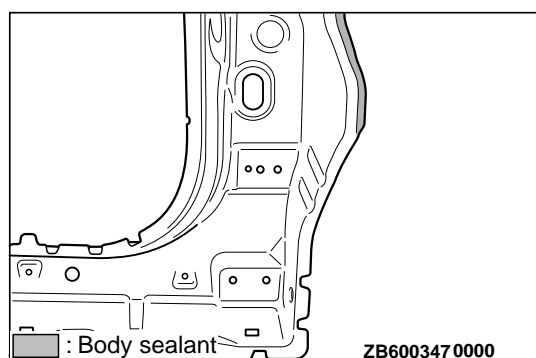


2. When installing the side sill outer reinforcement front and front pillar reinforcement lower, weld them in advance as shown in the figure.

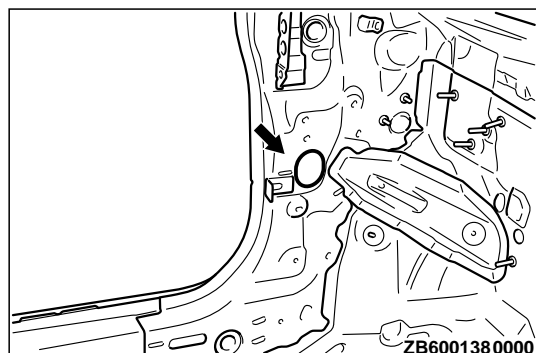


3. When installing the new front pillar outer, affix urethane foam as shown in the figure as a temporary measure to fill the inside of the front pillar.



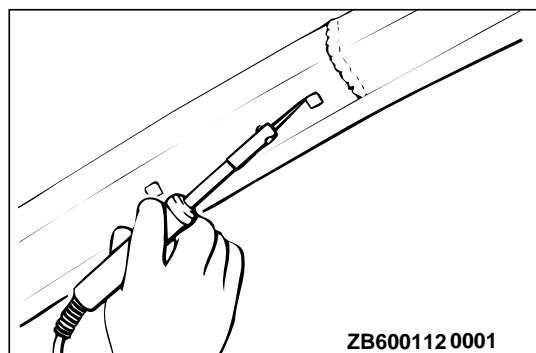


4. When installing the front pillar outer, apply body sealant as shown in the figure.



5. After installing the front pillar outer, seal the hole and flange with bolt and aluminum tape, and then fill the hole with foam materials as shown in the figure.

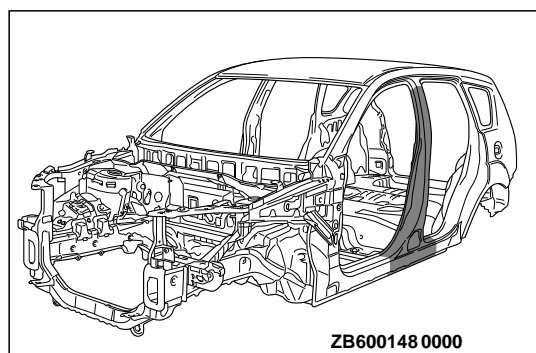
Foam : 3M™ AAD ULTRAPRO Panel foam-Yellow




6. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun to ensure that a clip, etc. can be inserted in the hole filled with foam materials

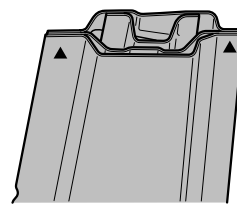
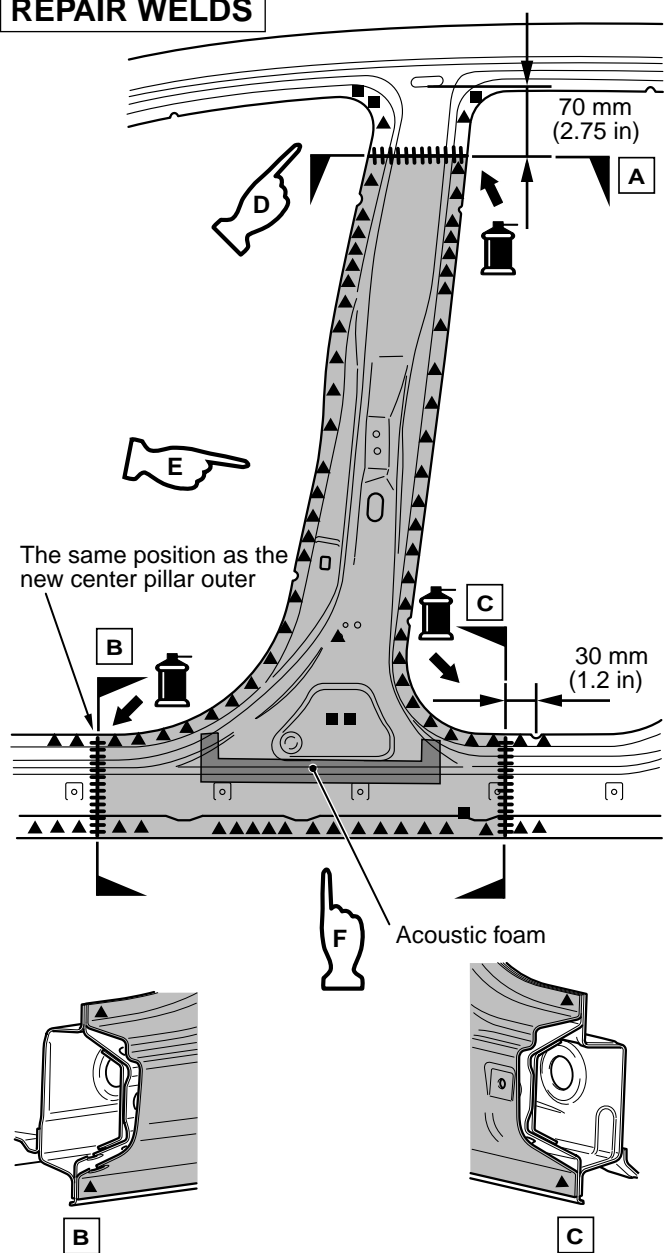
CENTER PILLAR

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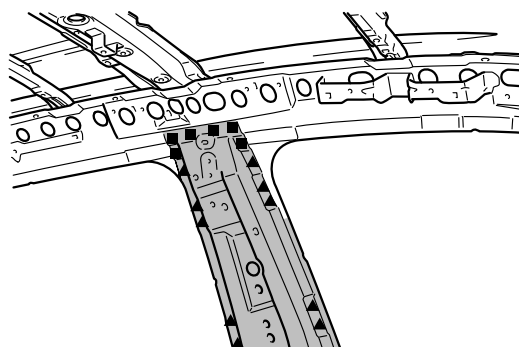


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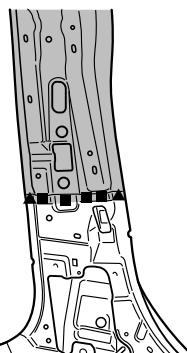
REPAIR WELDS



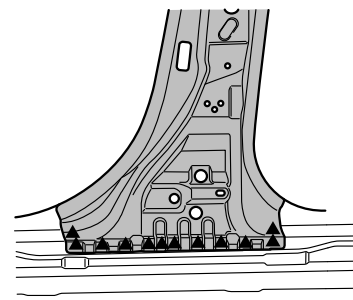
A



D



E



F

(With the side outer panel removed)

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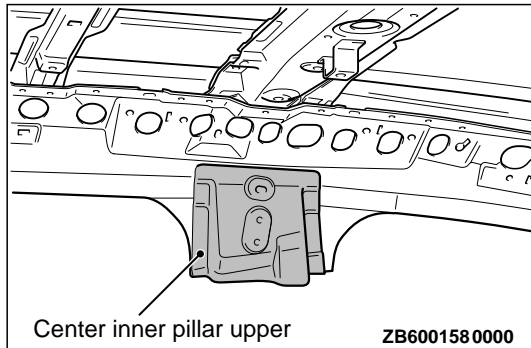
CAUTION

When repairing the area using foam materials do not use firing tools since the foaming materials may burn.

NOTE ON REPAIR WORK

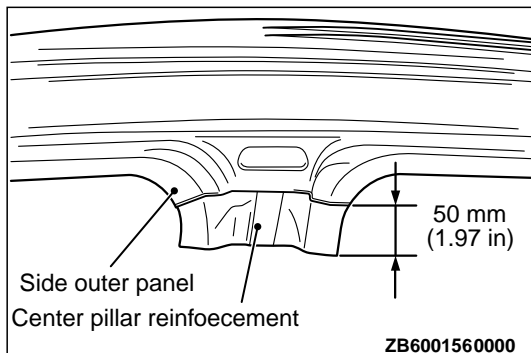
REMOVAL

After cutting the center pillar inner from the side outer panel, remove the center pillar inner upper remaining on the body.



INSTALLATION

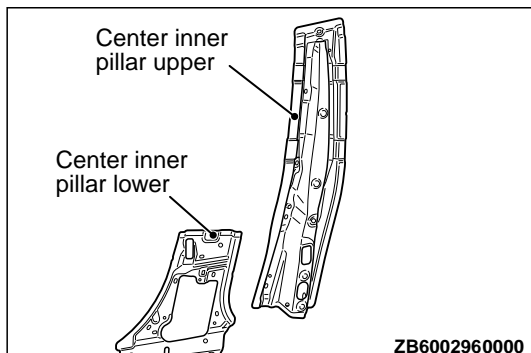
1. To reinforce the strength of the center pillar cut-off area, cut off the side outer panel 50 mm (1.97 inches) above the cut-off position.



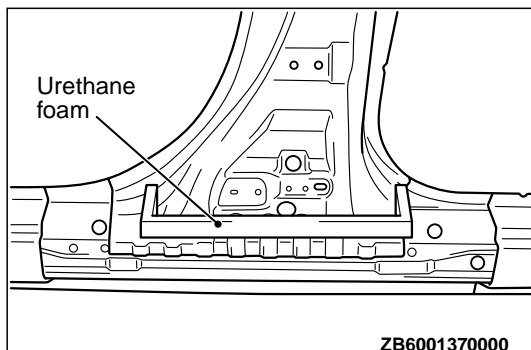
CAUTION

Weld and repair if the side sill reinforcement front is damaged.

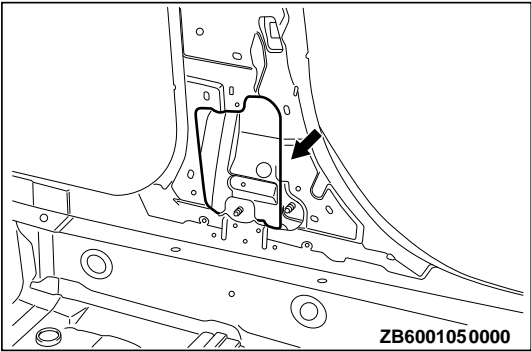
2. Remove the center inner pillar upper and center inner pillar lower from a new center pillar inner.



3. When installing the new center pillar outer, affix urethane foam as shown in the figure as a temporary measure to fill the inside of the center pillar.

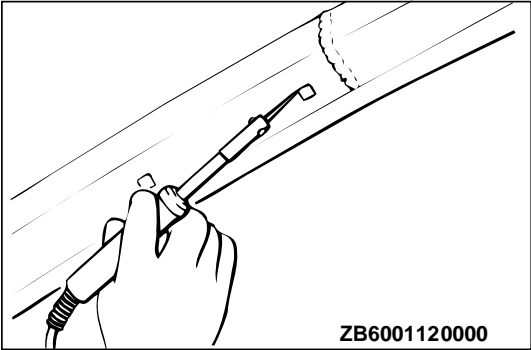


WELDED PANEL REPLACEMENT
SIDE SILL



4. After installing the new center pillar reinforcement, seal the hole and flange with bolt and aluminum tape, and then fill the hole with foam materials as shown in the figure.

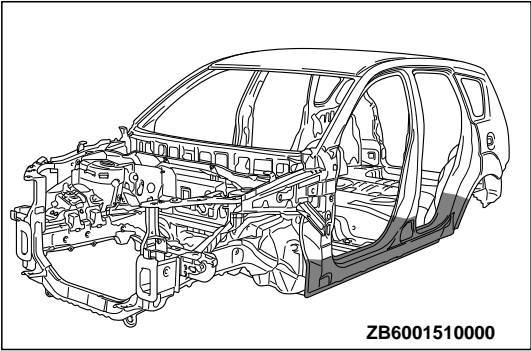
Foam : 3M™ AAD ULTRAPRO Panel foam-Yellow




5. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun to ensure that a clip, etc. can be inserted in the hole filled with foam materials.

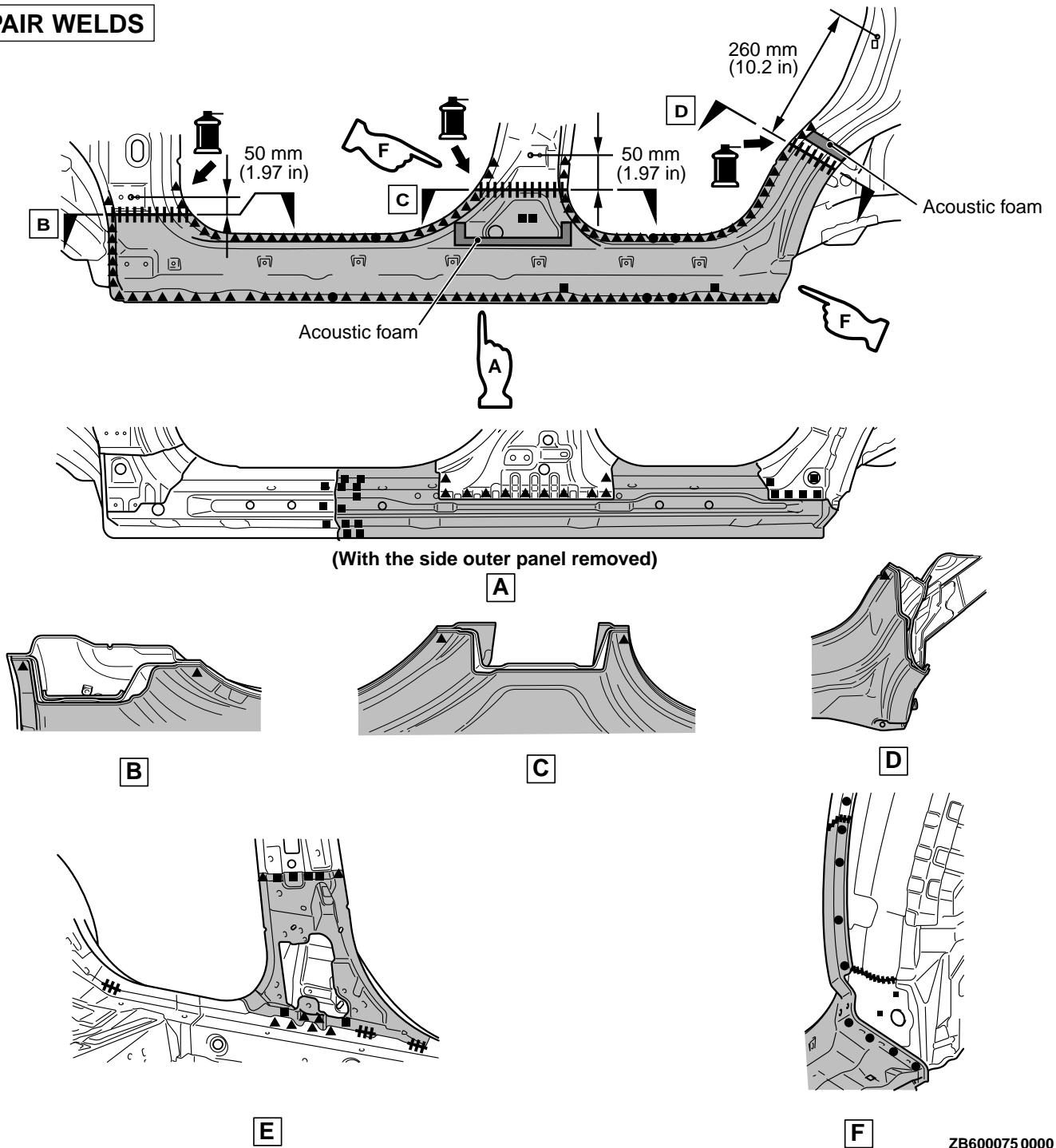
SIDE SILL

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REPAIR WELDS



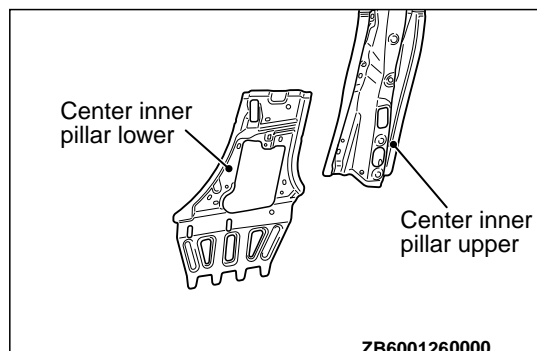
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CAUTION

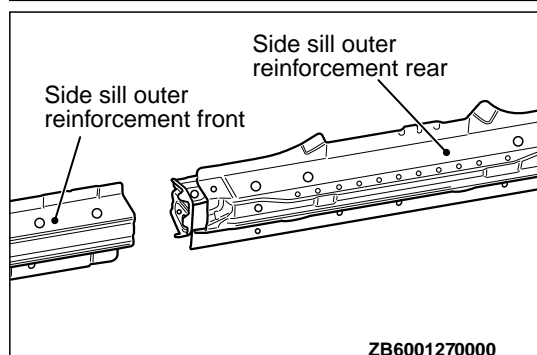
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NOTE ON REPAIR WORK**INSTALLATION**

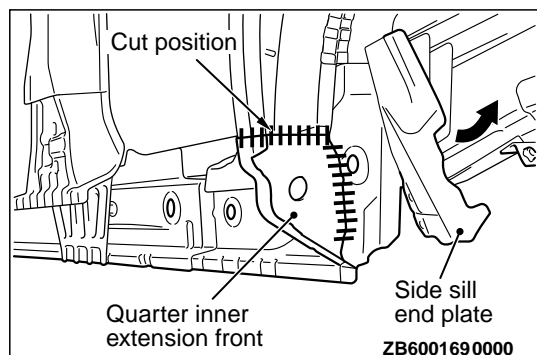
1. Remove the center inner pillar upper and center inner pillar lower from a new center pillar inner.



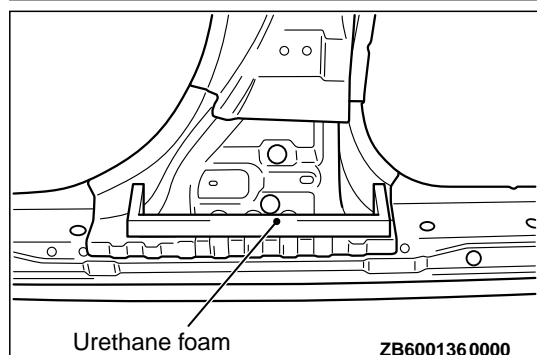
2. Remove the side sill outer reinforcement front and side sill outer reinforcement rear from a new side sill reinforcement.

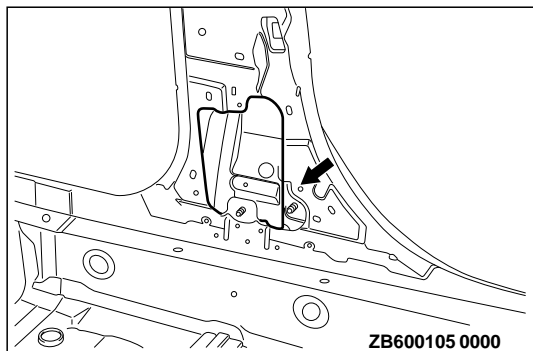


3. When installing a new side sill outer reinforcement rear, lift the side sill end plate up to the point shown in the figure, cut the quarter inner extension front at a position shown in the figure, and remove it. Install the side sill outer reinforcement rear, and next install and weld the quarter inner extension front.



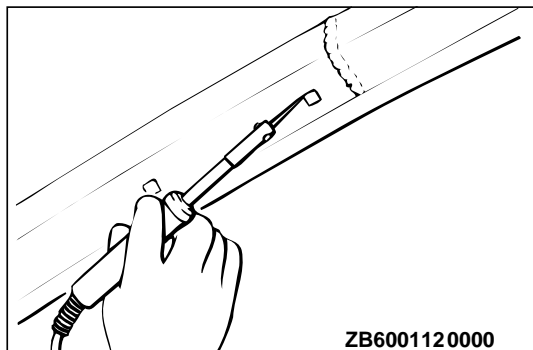
4. When installing the new floor side sill outer, affix urethane foam as shown in the figure as a temporary measure to fill the inside of the center pillar.





5. After installing the new floor side sill outer, seal the hole and flange with bolt and aluminum tape, and then fill the hole with foam materials as shown in the figure.

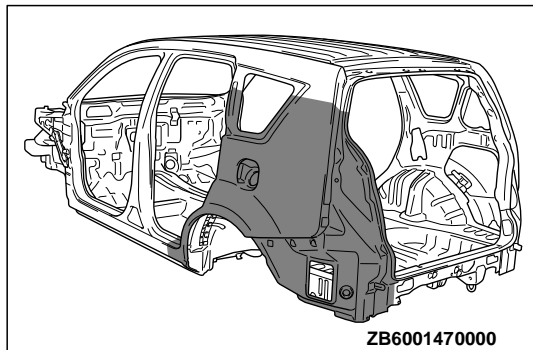
Foam: 3M™ AAD ULTRAPRO Panel foam-Yellow




6. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun to ensure that a clip, etc. can be inserted in the hole filled with foam materials.

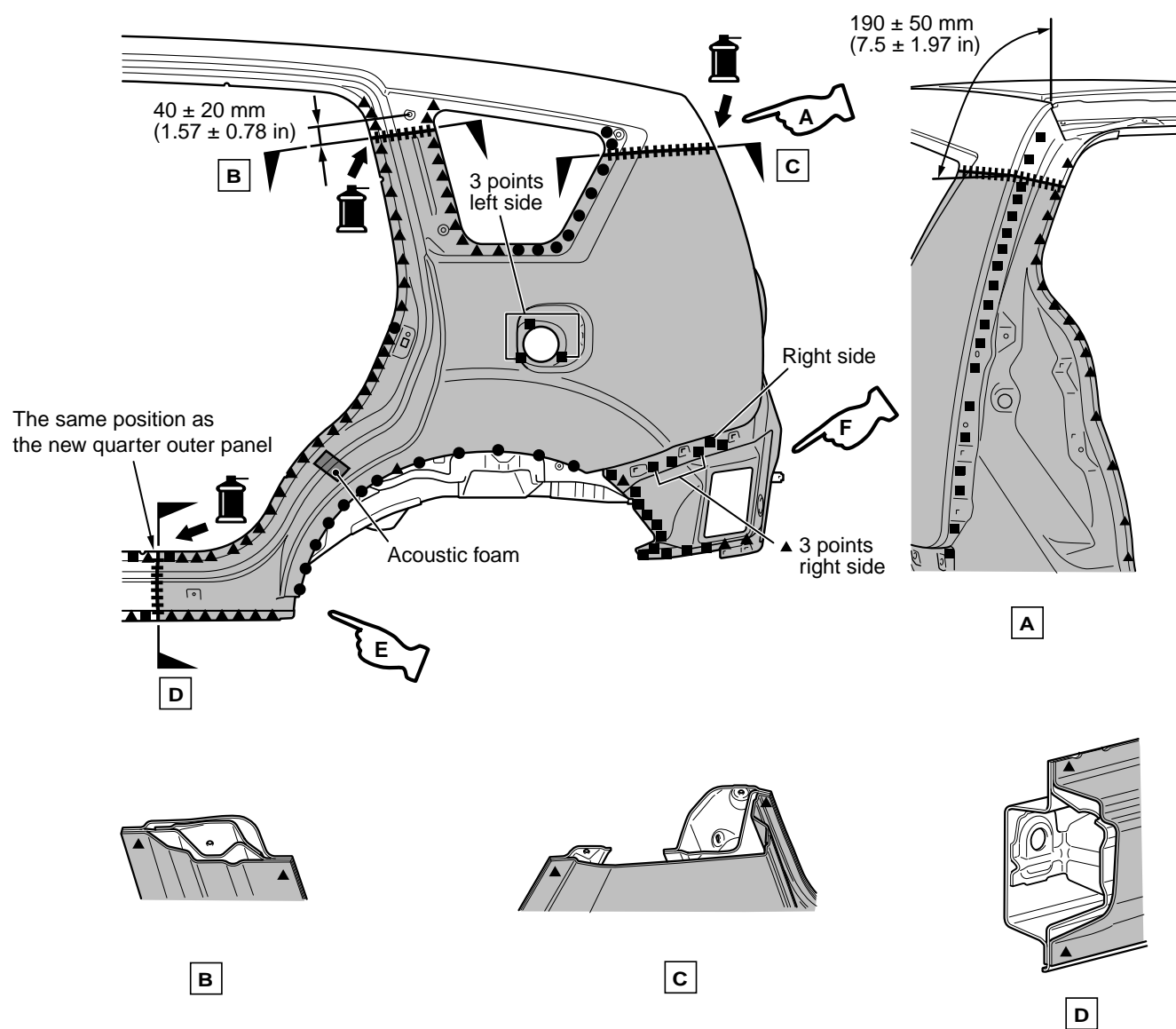
QUARTER OUTER

M40300000080USA0000010000



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
++++	MIG spot welding
	MIG arc welding (continuous)
ooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

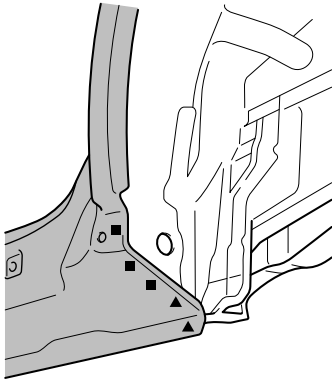
REPAIR WELDS



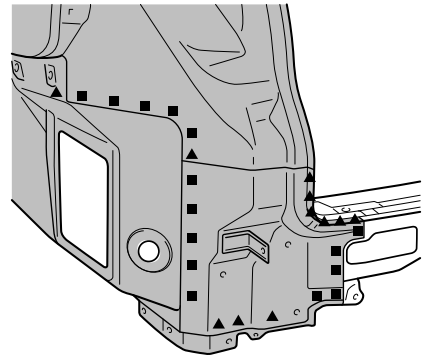
ZB6000760000

CAUTION

When repairing the area using foam materials do not use firing tools since the foaming materials may burn.



E



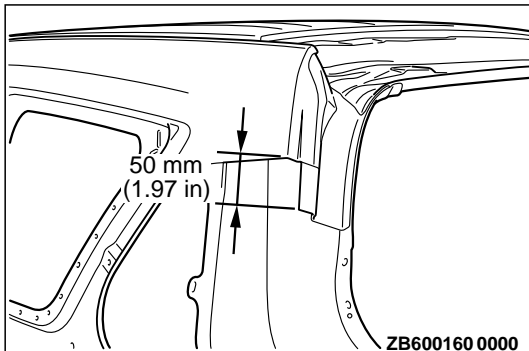
F

ZB600685 0000

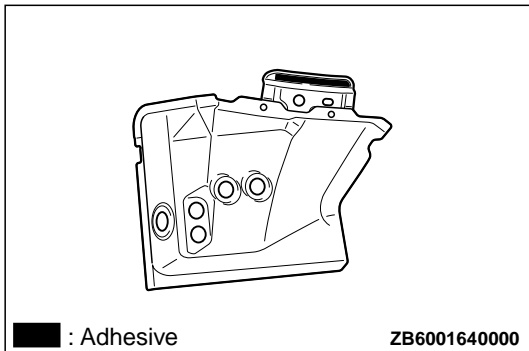
NOTE ON REPAIR WORK

INSTALLATION

1. To reinforce the strength of the rear gate pillar cut-off area, cut off the side outer panel 50 mm (1.97 inches) above the cut-off position.



ZB600160 0000



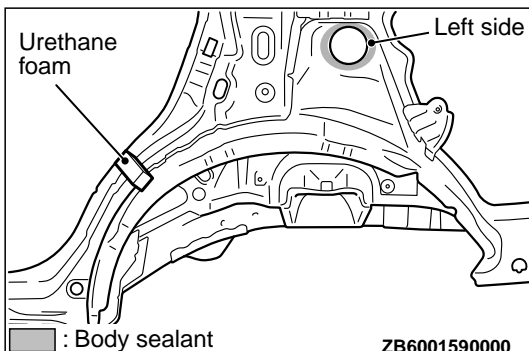
■ : Adhesive

ZB600164 0000

2. When assembling the new quarter outer extension lower, apply in advance the body sealant to the area shown in the figure. (Right side only)

Adhesive : Epoxyayresin adhesive

Brand : 3M™ AAD Part No.8115 or equivalent

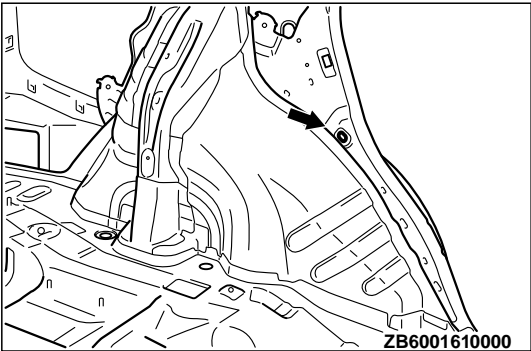


■ : Body sealant

ZB600159 0000

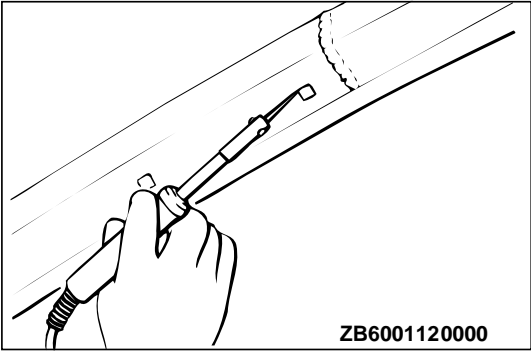
3. When assembling the new rear quarter outer panel, apply in advance the body sealant to the area shown in the figure. Affix urethane foam so that it fills the wheel arch inside to prevent the foam material from dripping.

WELDED PANEL REPLACEMENT
ROOF (ALUMINUM ROOF)



4. After installing the rear quarter outer panel, seal the hole and flange with bolt and aluminum tape, and then fill the hole with foam materials from the hole as shown in the figure.

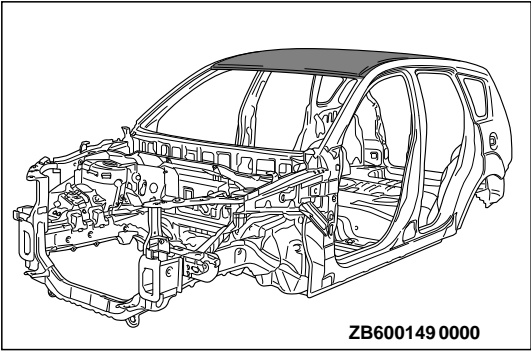
Foam : 3M™ AAD ULTRAPRO Panel foam-Yellow




5. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun to ensure that a clip, etc. can be inserted in the hole filled with foam materials.

ROOF (ALUMINUM ROOF)

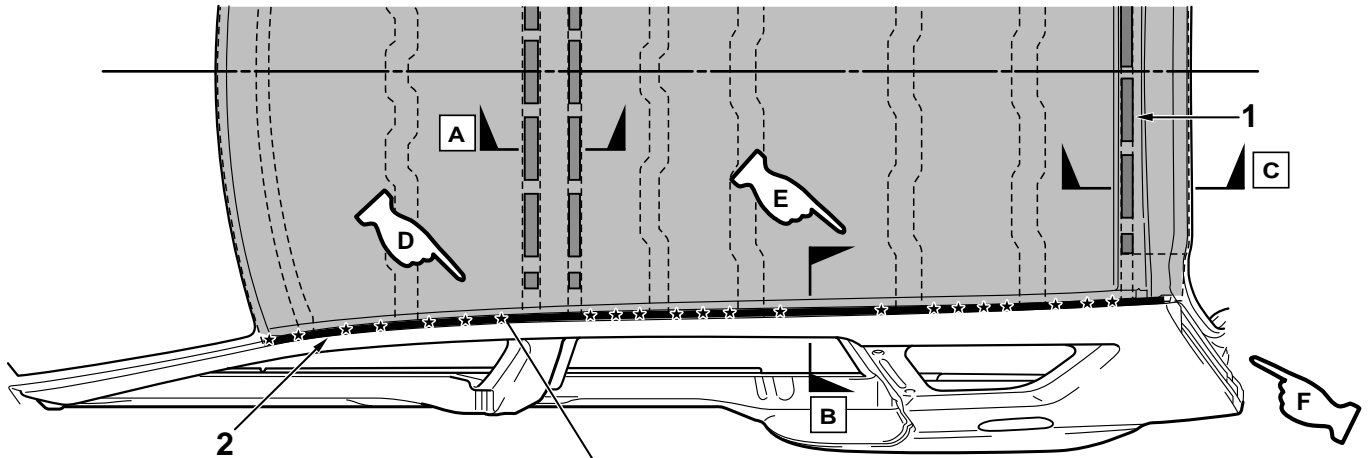
M40300000153USA0000010000



Symbol	Operation description
● ● ● ●	Spot weldin g
■ ■ ▲ ▲	MIG plug welding (■ : indicates t wo panels to be welde d ▲ : indicates three panels to be welde d)
+ + + +	MIG spot weldin g
	MIG arc welding (conti nuous)
★ ★ ★ ★	Rivet
	Anti-corrosion agent application locations (Use access holes to apply libe rally to butt-welded joint s.)

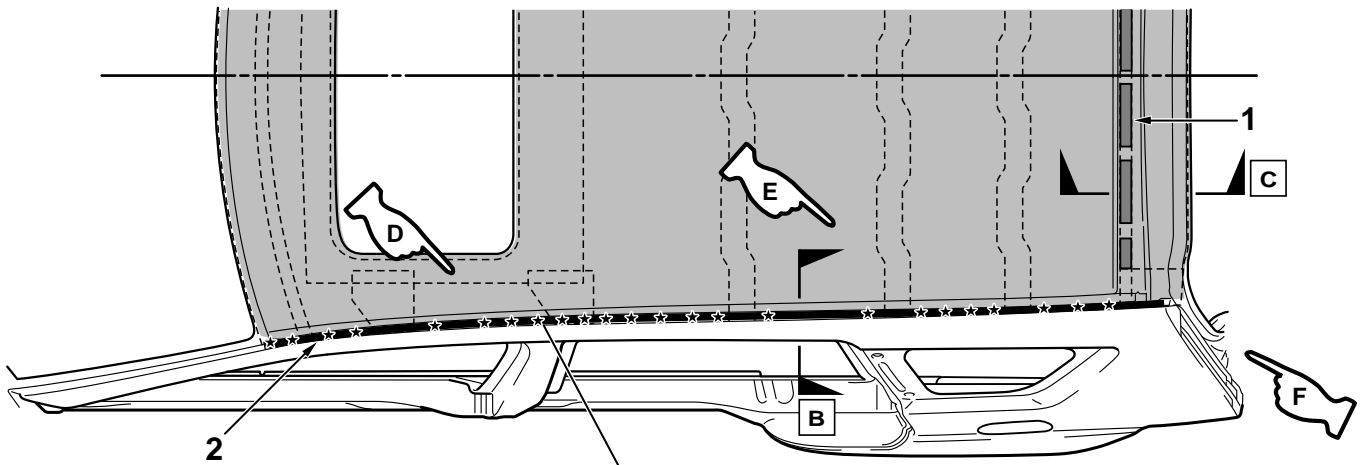
REPAIR WELDS

Vehicles without sunroof



Vehicles with roof rail

Vehicles with sunroof



Vehicles with roof rail

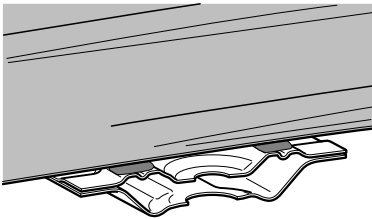
1 : Adhesive 1

2 : Adhesive 2

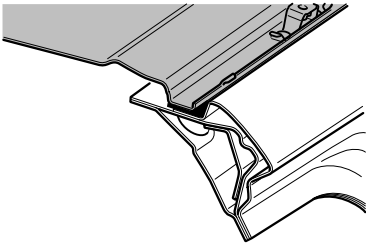
ZB600077 0000

*Adhesive 1: Urethane body sealer
Brand: 3M™ AAD Part No.8542 or
equivalent

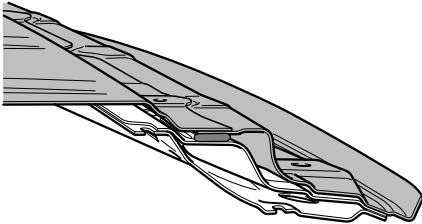
*Adhesive 2: Epoxyayresin adhesive
Brand: 3M™ AAD Part No.8115 or
equivalent



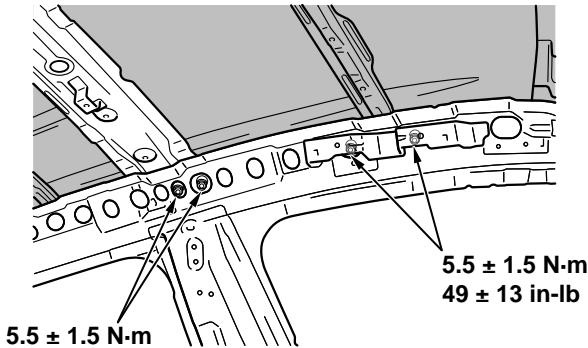
A



B

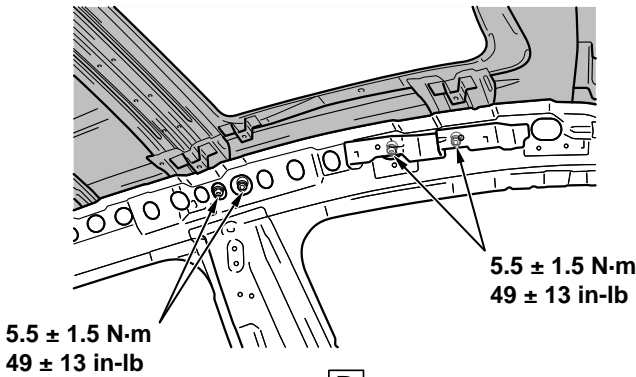


C



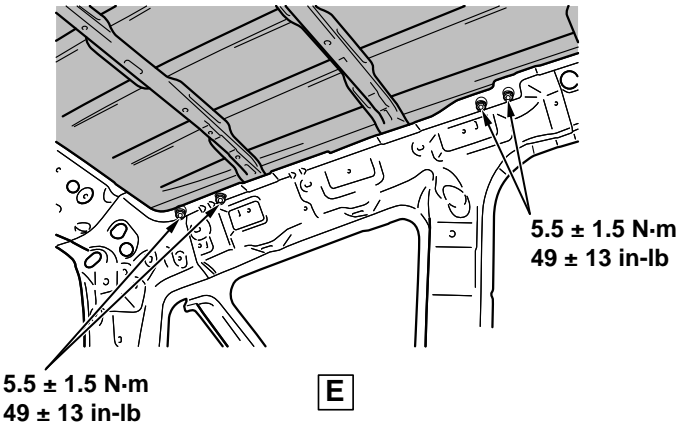
D

(Vehicles without sunroof)

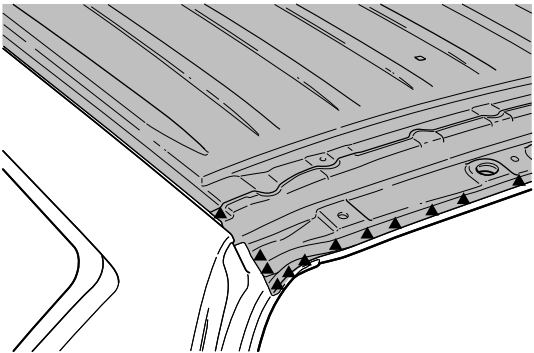


D

(Vehicles with sunroof)



E

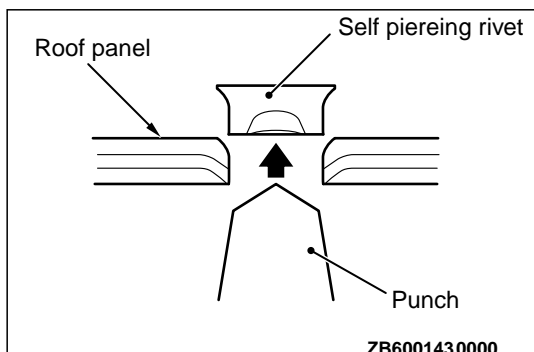
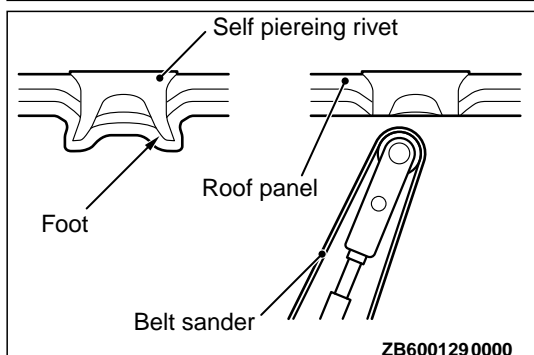
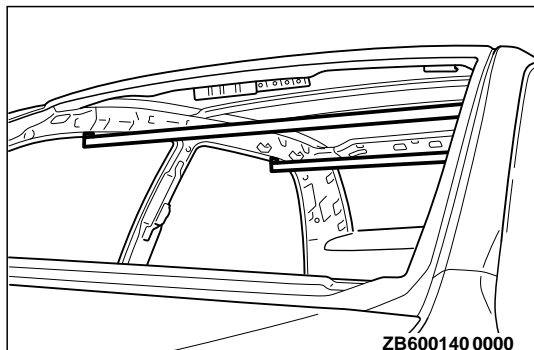


F

NOTE ON REPAIR WORK

REMOVAL

1. Place supporting bars in the vehicle to prevent the side panels from expanding or tilting when removing the roof panel assembly.
2. Grind the self piercing rivet foot with a belt sander [belt width of 10 mm (0.39 inch)] or the like.
3. Remove the self piercing rivet by striking it up at the bottom with a punch or the like to disconnect it from the side structure.



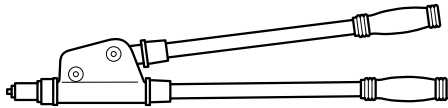
INSTALLATION

1. Temporarily install the new roof panel to the body and drill holes at riveting positions with a drill [5 mm (0.19 inch) in diameter].
2. Remove the roof, remove burrs at the drilled holes, and clean the body.
3. Apply structural adhesive to the body, and install the roof.

Adhesive: Epoxyayresin adhesive

Brand: 3M™ AAD Part No.8115 or equivalent

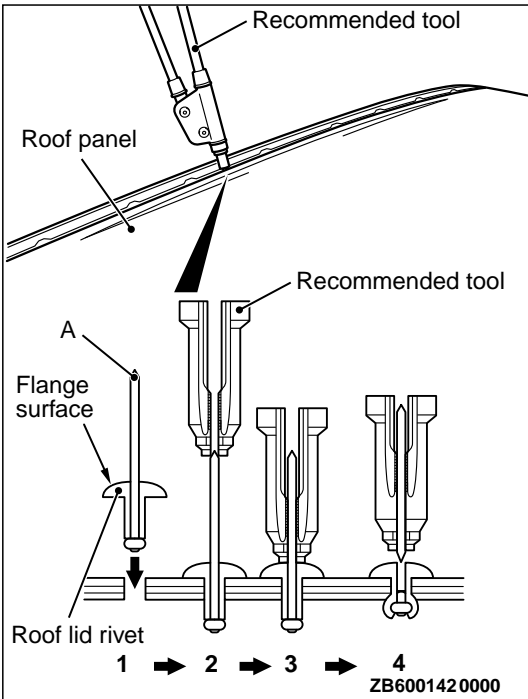
Recommended tool
 Rivet diameter 4.8 mm (0.18 in)



ZB600154 0000

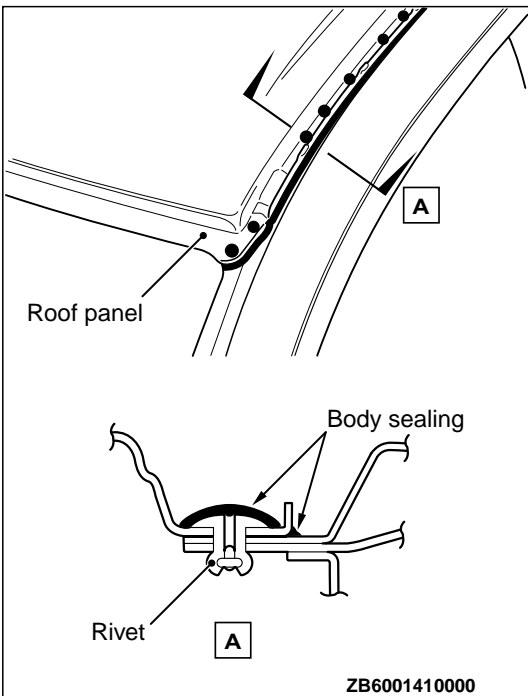
4. Use the recommended tool to tighten the roof lid rivet by the following procedure.

- (1) Insert the rivets into the roof.
- (2) Mount the recommended tool on the A-section of the rivet.
- (3) Operate the tool's handle while pushing the flange surface of the rivet by the recommended tool.
- (4) Part A of the rivet is cut and the rivet is tightened.



ZB600142 0000

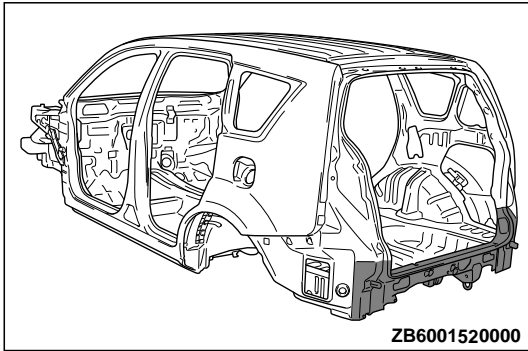
5. After the adhesive is dried, remove the excessive residues and apply body sealant to the whole rivets and the roof edge in order to prevent water leakage.




ZB600141 0000

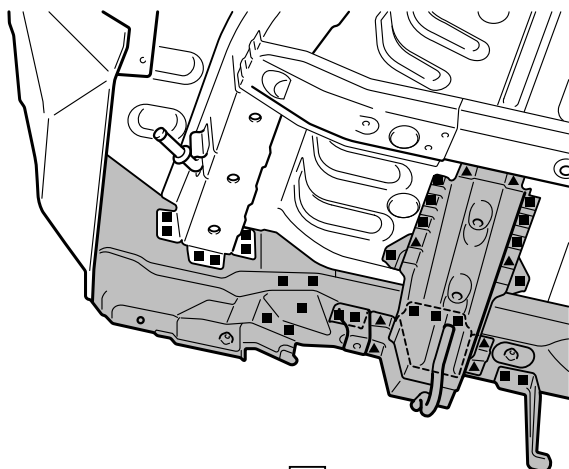
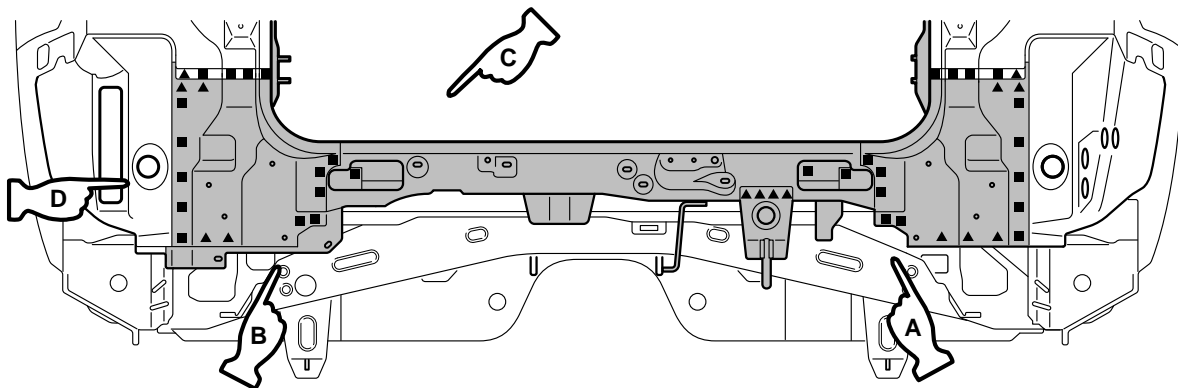
REAR END CROSSMEMBER

M40300000150USA0000010000

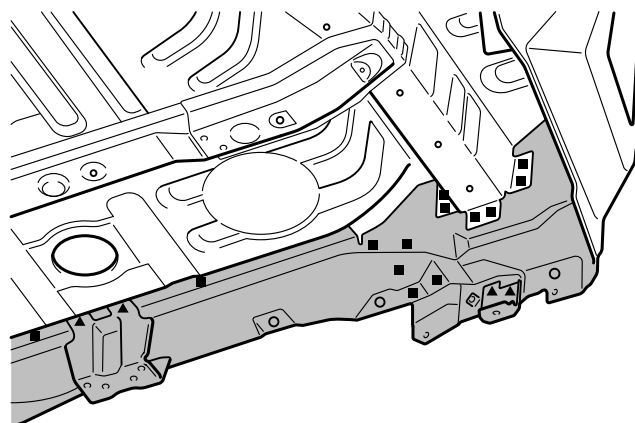


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
++++	MIG spot welding
+++++	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

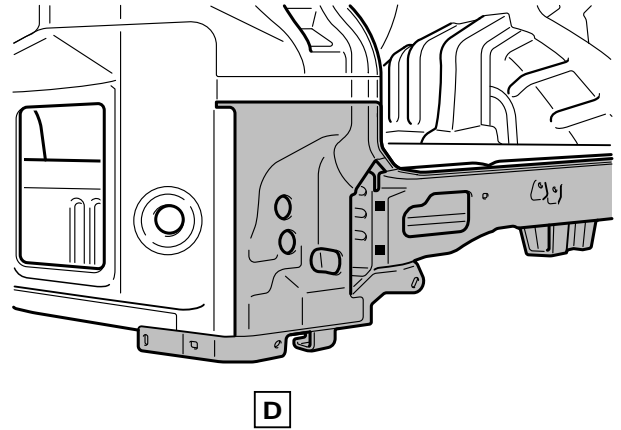
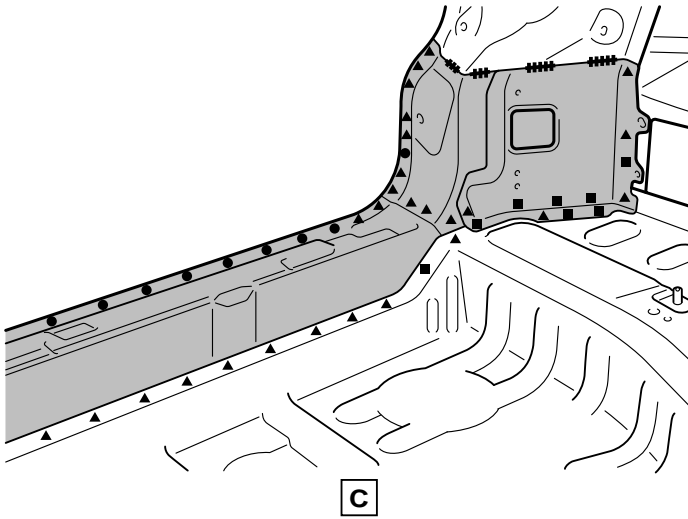
REPAIR WELDS



A



B



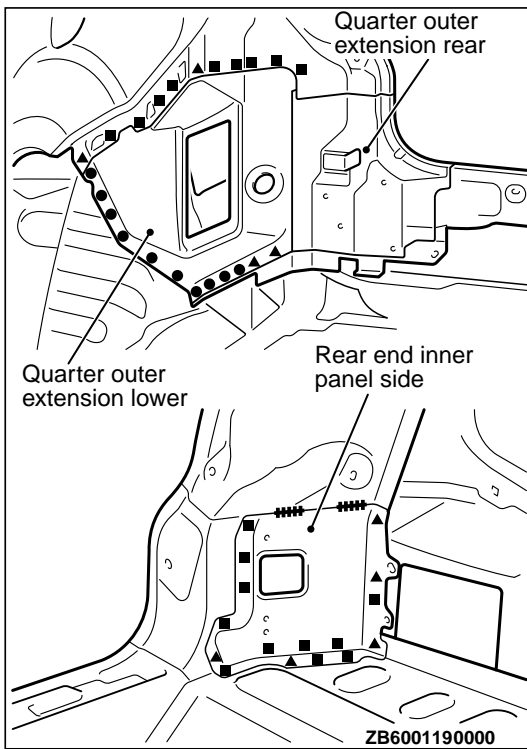
(With the quarter outer extension rear removed)

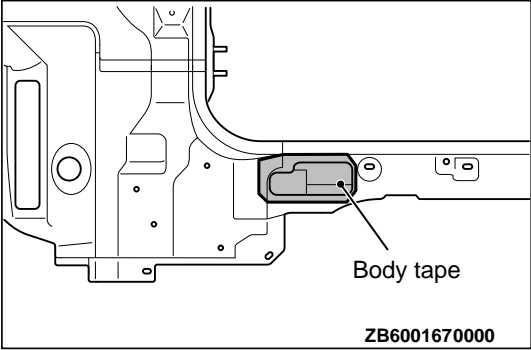
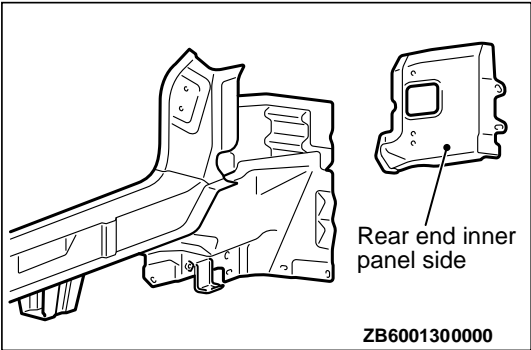
ZB6002970000

NOTE ON REPAIR WORK

REMOVAL

When removing the rear end crossmember, remove the quarter outer extension rear, quarter outer extension lower, and rear end inner panel side.



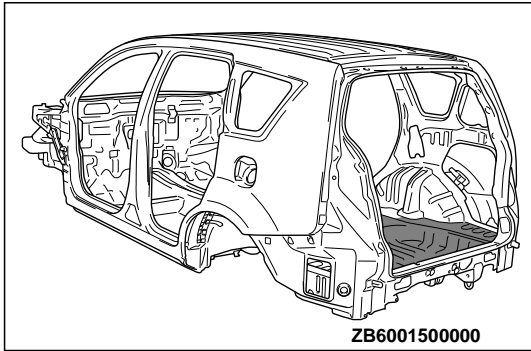



INSTALLATION

1. Remove the rear end inner panel side from the new rear end crossmember.
2. After the installation of the rear end crossmember, seal both the holes of the rear end crossmember with body tape to prevent intrusion of exhaust gas.

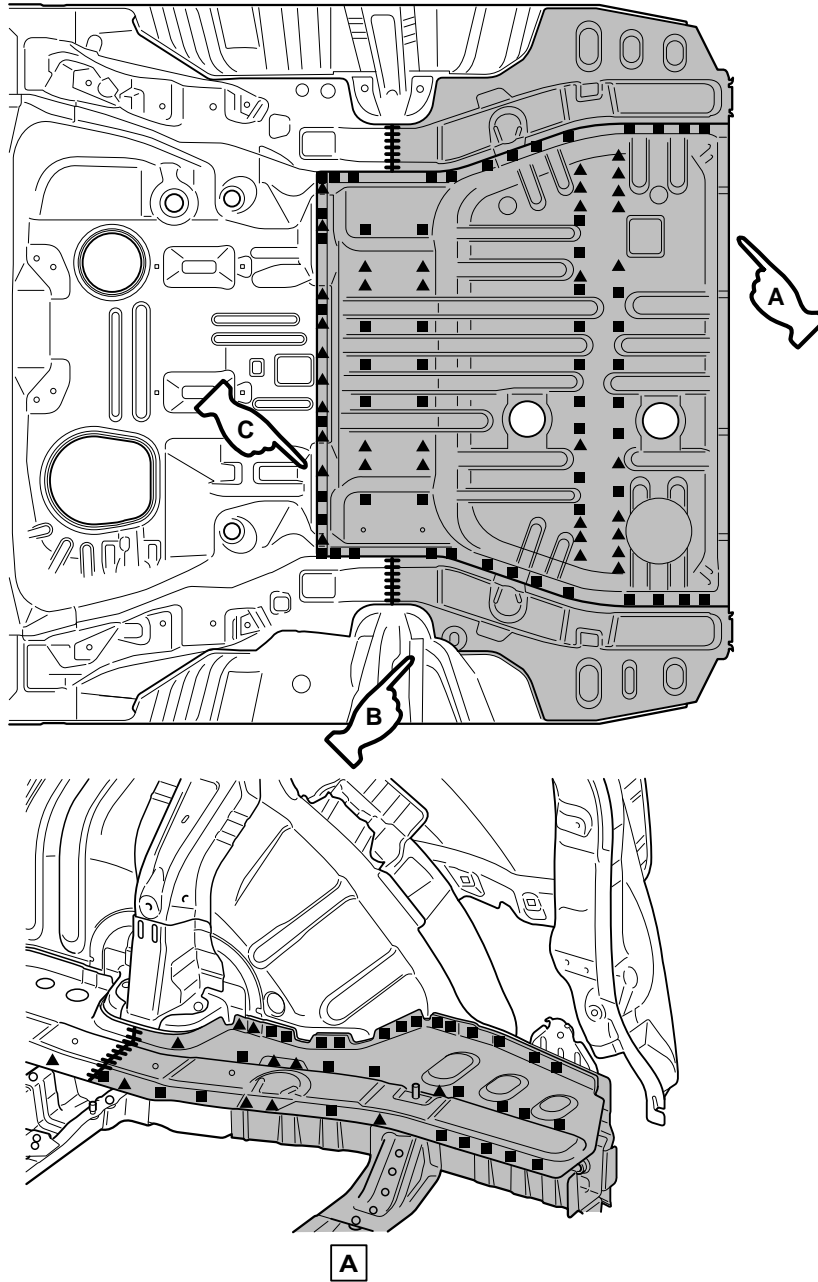
REAR FLOOR

M40300000100USA0000010000



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
ooooooo	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

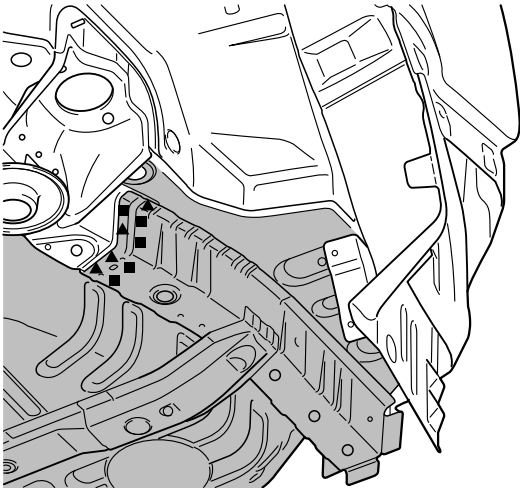
REPAIR WELDS



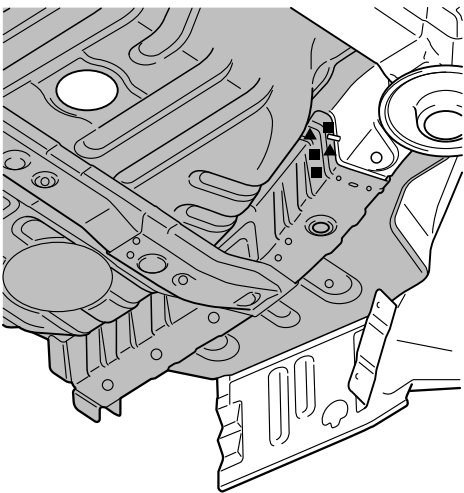
(With the rear floor pan removed)

ZB600080000

NOTE: Refer to the Rear End Crossmember Section on P.3-31 for the welding points with the rear end crossmember.



B



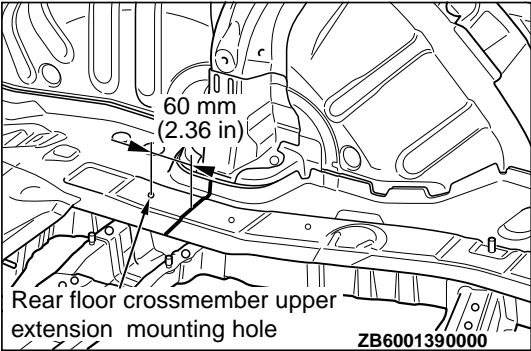
C

ZB6000790000

NOTE ON REPAIR WORK

REMOVAL

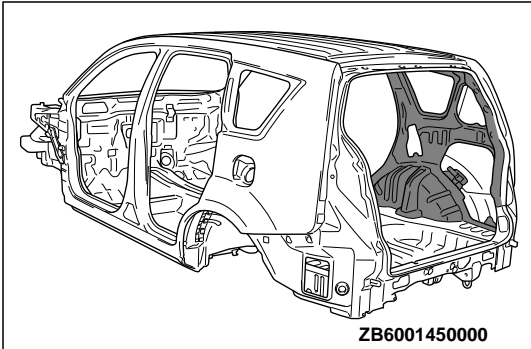
When removing the rear floor side member upper, cut at 60 mm (2.36 inches) behind the rear floor crossmember upper extension mounting hole shown in the figure.




ZB6001390000

QUARTER INNER

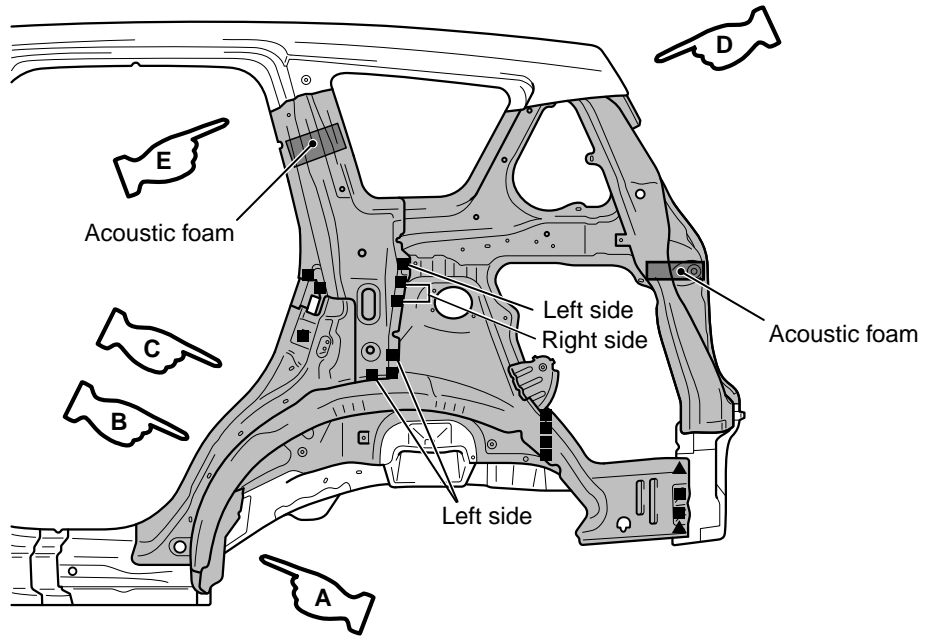
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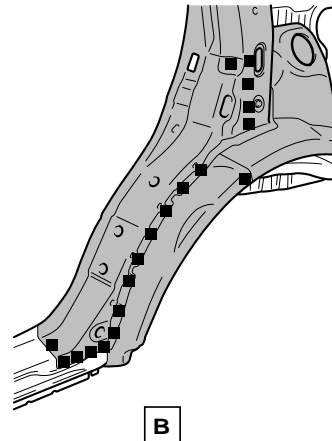
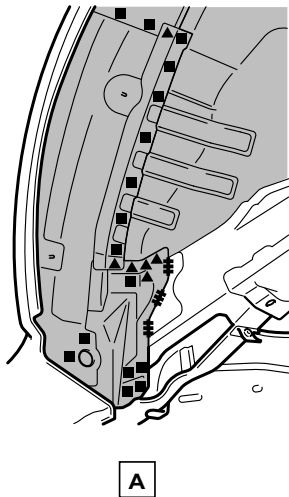
ZB6001450000

Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
ooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



(With the side outer panel removed)



(With the side outer panel removed)

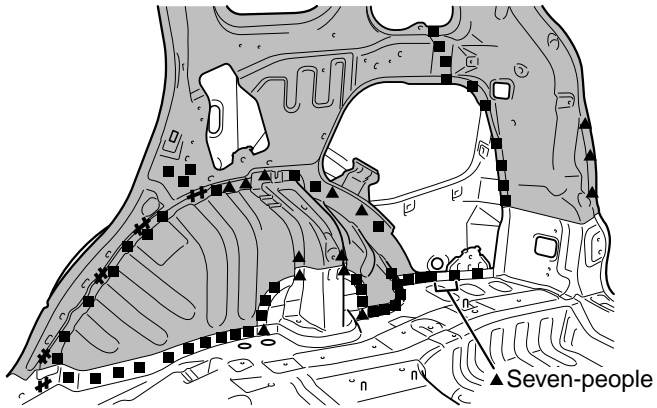
ZB6000810000

CAUTION

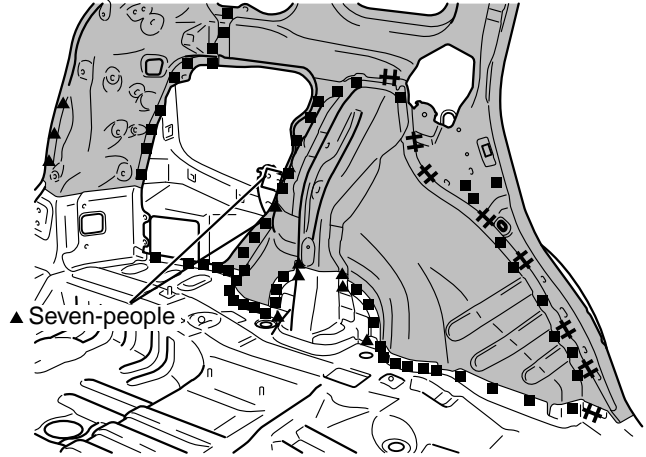
When repairing the area using foam materials do not use firing tools since the foaming materials may burn.

NOTE:

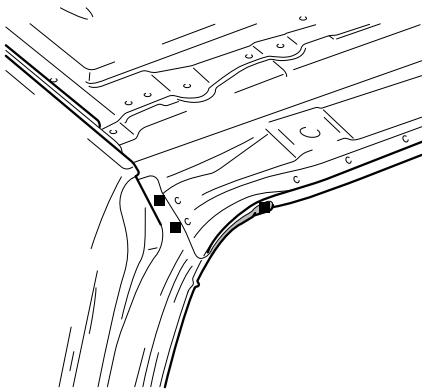
- *Refer to the Quarter Outer section on P.3-23 for the welding point with quarter outer.
- *Refer to the Roof section on P.3-26 for the welding points and riveting points with the roof.

WELDED PANEL REPLACEMENT
QUARTER INNER

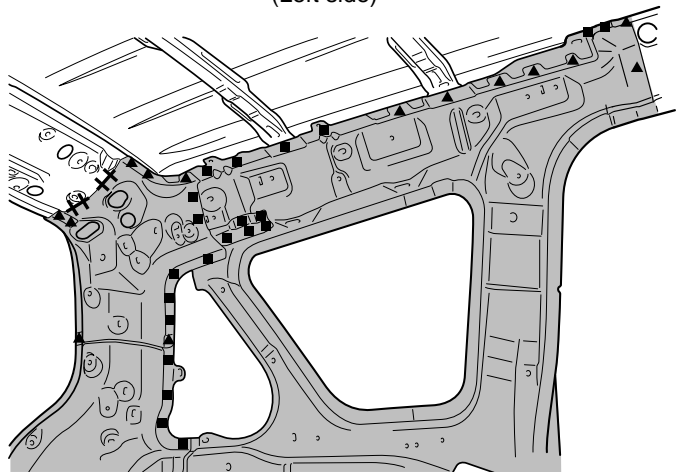
C
(Right side)



C
(Left side)



D

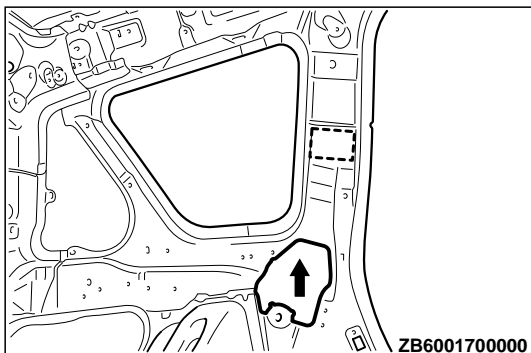
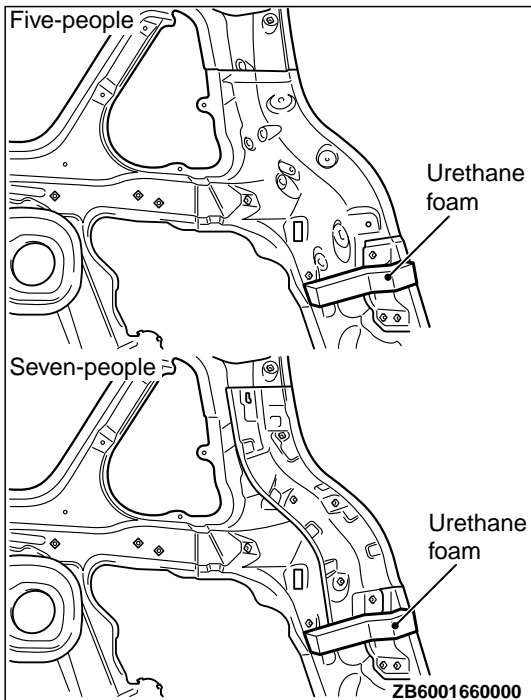


E

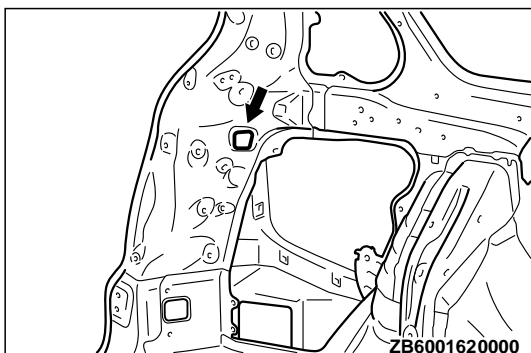
NOTE ON REPAIR WORK

INSTALLATION

1. When installing the new gate pillar reinforcement, affix urethane foam so that it fills the gate pillar bottom to prevent the foam material from dripping.



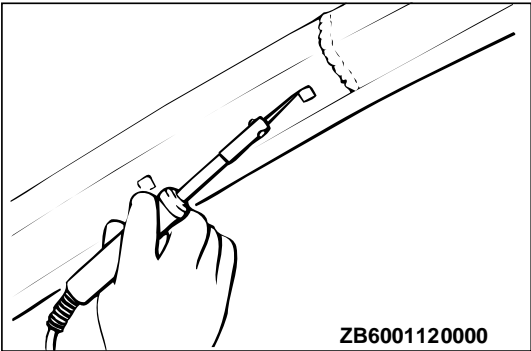
2. Because foam materials cannot be filled into the rear pillar inside after the installation of the quarter inner panel, press in sponge as a temporary measure to fill the rear pillar inside from the hole to the dotted line shown in the figure.



3. After installing the gate pillar reinforcement, seal the hole and flange with bolt and aluminum tape, and then fill the hole with foam materials from the hole as shown in the figure.

Foam: 3M™ AAD ULTRAPRO Panel foam-Yellow

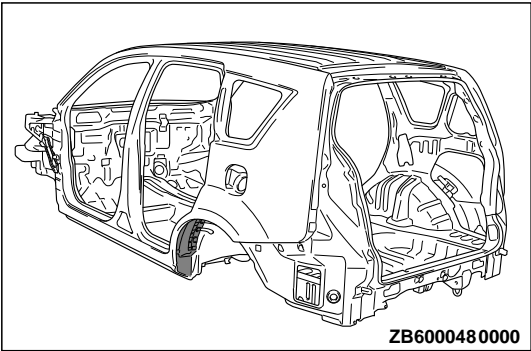
WELDED PANEL REPLACEMENT
QUARTER INNER (PARTIAL REPLACEMENT)




4. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun to ensure that a clip, etc. can be inserted in the hole filled with foam materials.

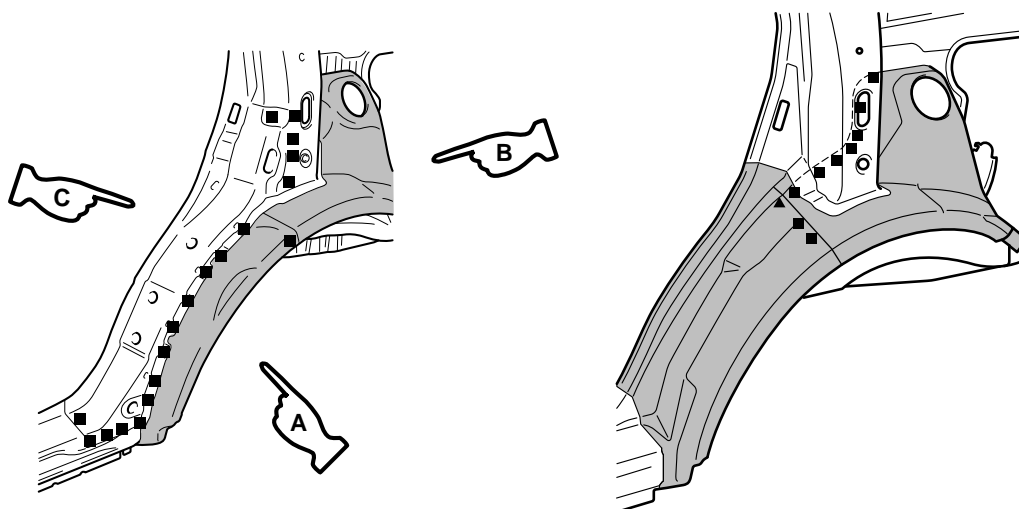
QUARTER INNER (PARTIAL REPLACEMENT)

M40300000002USA0000010000

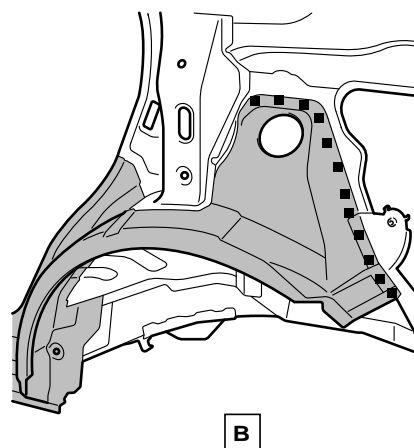
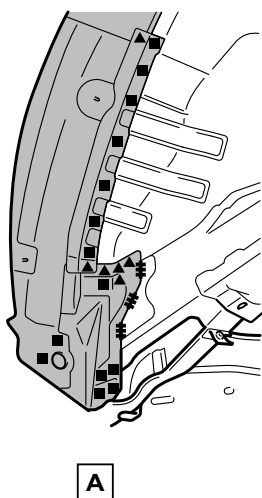


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
#####	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



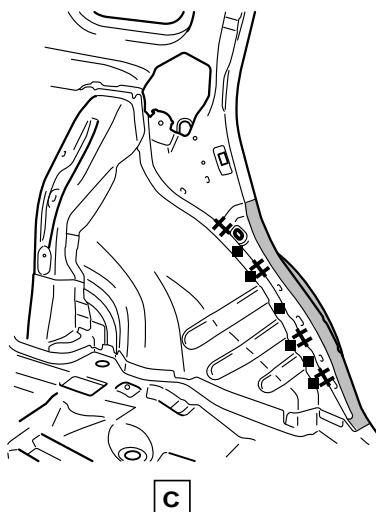
(With the rear pillar reinforcement lower removed)



(With the rear pillar reinforcement lower removed)

ZB600294 0000

NOTE: Refer to the Quarter Outer section on P.3-23 for the welding points with the quarter outer.



ZB600969 0000

NOTE ON REPAIR WORK

REMOVAL

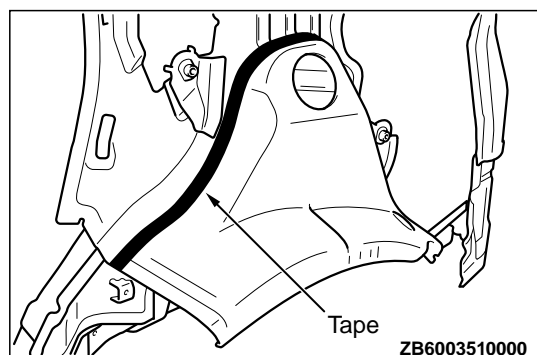
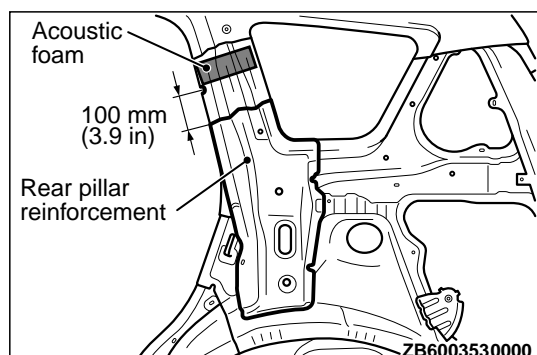
⚠ CAUTION

When repairing the area using foam materials do not use firing tools since the foam materials may burn.

1. When removing the quarter inner extension front, remove the rear pillar reinforcement lower in advance and cut the rear pillar reinforcement at 100 mm (3.9 inches) below the positioning notch. The cut area of the quarter inner panel is clogged by the rear pillar reinforcement. Therefore, cut and remove the rear pillar reinforcement 100 mm (3.9 inches) below the positioning notch.

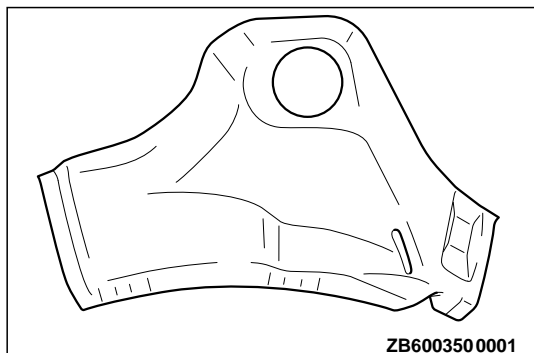
NOTE: Refer to the Quarter Inner section on P. 3-36 for the welding points with the rear pillar reinforcement.

2. Adhere tape along the wheel arch of the quarter inner panel as shown in the figure of the instructions, use the tape as a guide so about 20 mm (0.79 inches) of the flange remains, then cut and remove.

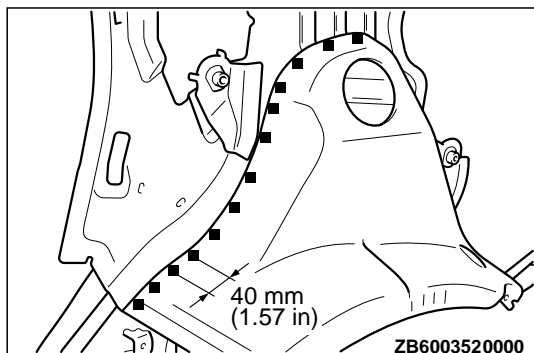


INSTALLATION

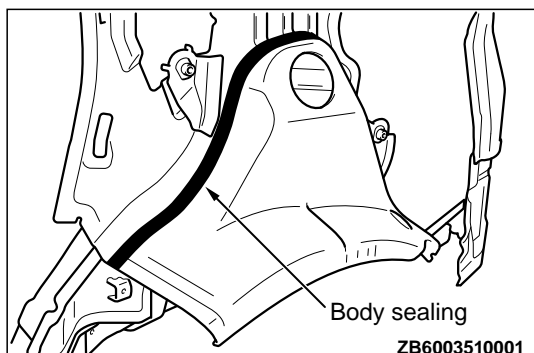
1. For the new quarter inner panel, cut the wheel arch end are so that it overlaps with the flange on the body-side.



2. Overlap, assemble and weld the quarter inner panel with the body-side flange. Weld at a pitch of 40 mm (1.57 inches).

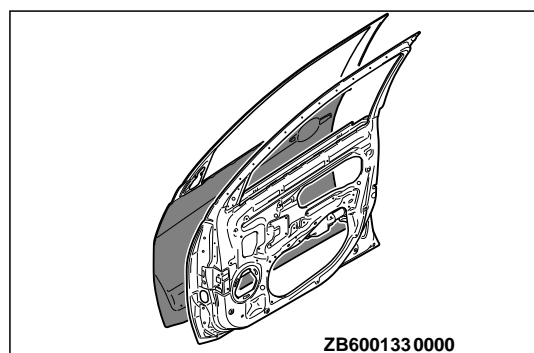


3. Weld the quarter inner panel then apply a body sealing in the area shown in the figure of the instructions.



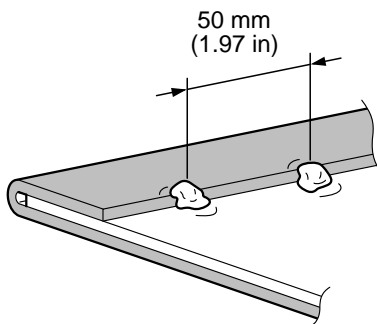
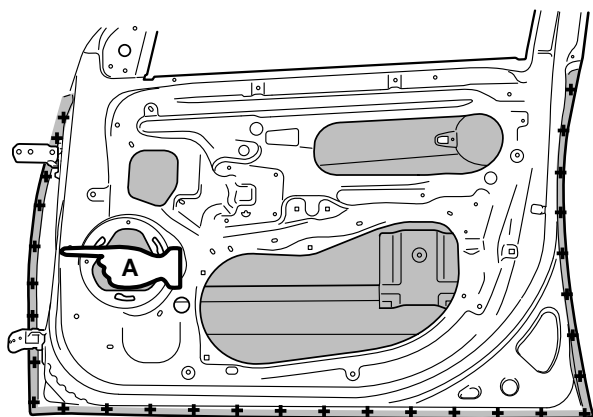
FRONT DOOR OUTER PANEL (WELDED TYPE)

M40300000154USA0000010000

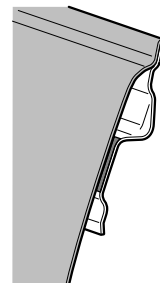


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
+++++	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

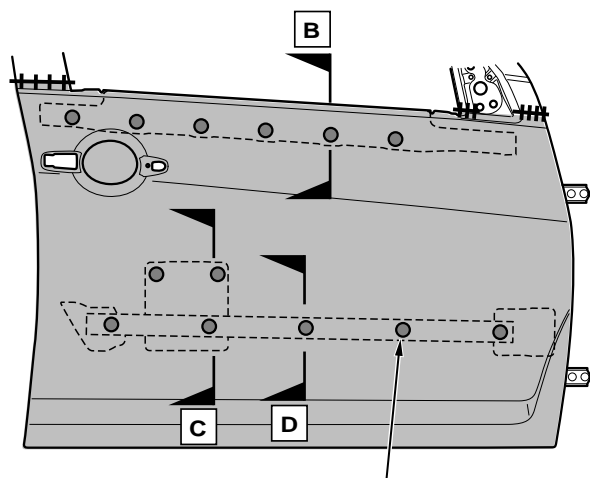
REPAIR WELDS



A

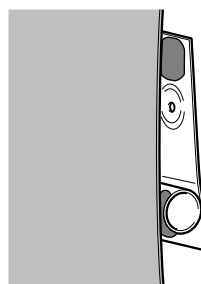


B

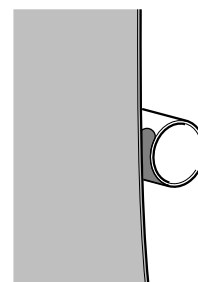


■ : Adhesive

Adhesive application point



C



D

ZB6000820000

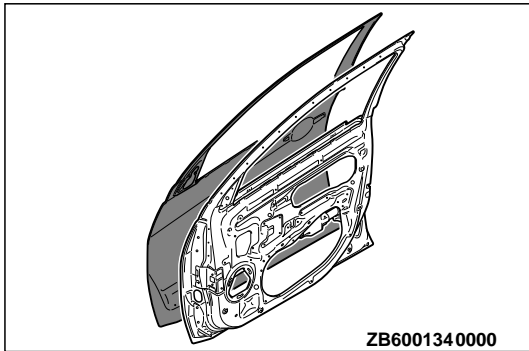
Adhesive : Urethane body sealer

Brand : 3M™ AAD Part No.8542 or equivalent

NOTE: After hemming the front door outer panel, MIG spot weld the flange overlap section at a pitch of 50 mm (1.97 inches).

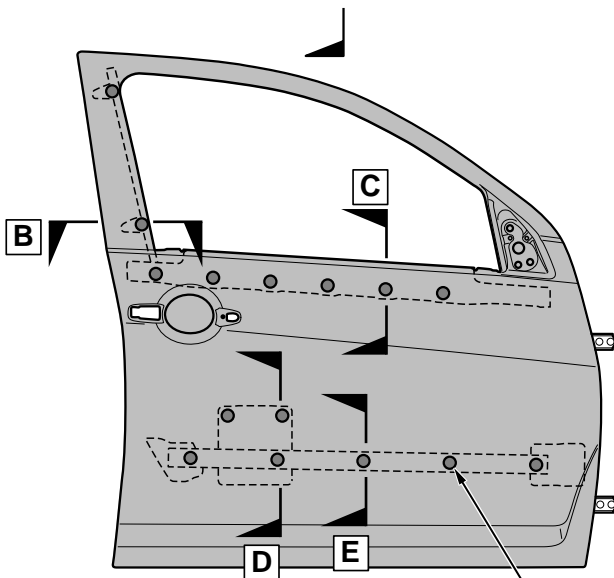
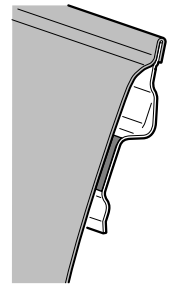
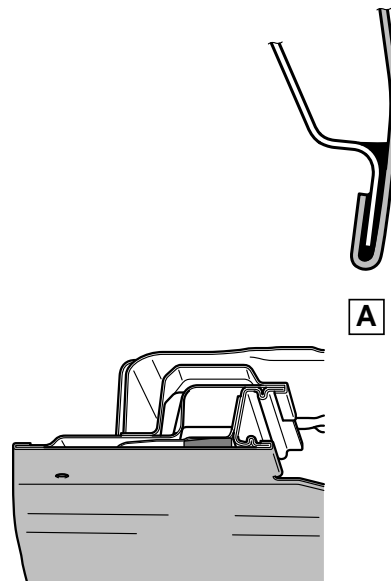
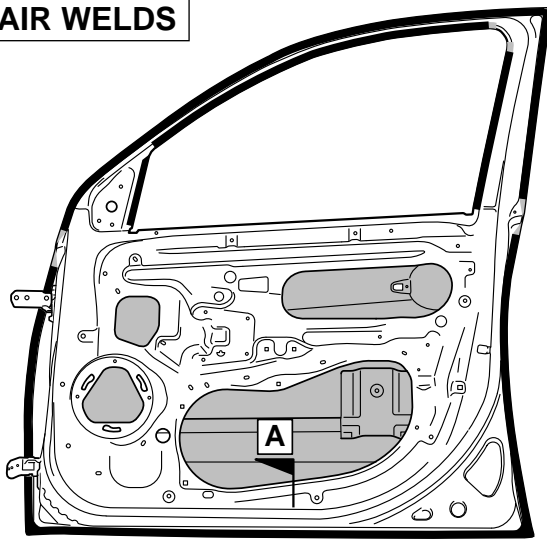
FRONT DOOR OUTER PANEL (ADHESION TYPE)

M40300000155USA0000010000



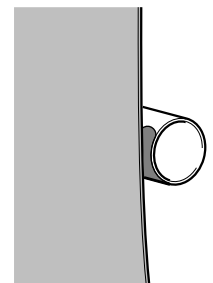
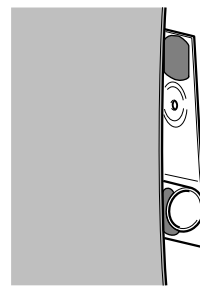
Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded, ▲: indicates three panels to be welded)
++++	MIG spot welding
	MIG arc welding (continuous)
ooooooo	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



■ : Adhesive 1
■ : Adhesive 2

Adhesive application point



ZB6000830000

•Adhesive 1: Urethane body sealer

Brand: 3M™ AAD Part No.8542 or equivalent

WELDED PANEL REPLACEMENT
REAR DOOR OUTER PANEL (WELDED TYPE)

*Adhesive 2: Epoxyayresin adhesive

Brand: 3M™ AAD Part No.8115 or equivalent

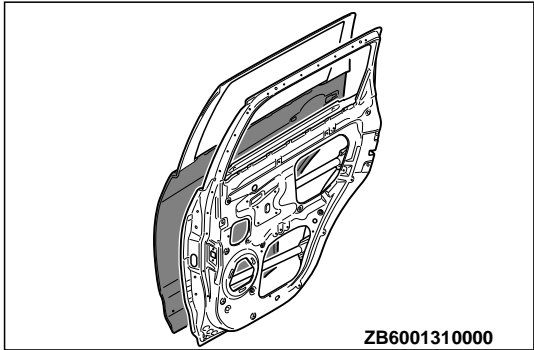
NOTE ON REPAIR WORK


INSTALLATION

- 1. When installing the front door outer panel, grind and remove the paint from the bonded surface of the outer panel to ensure the bonding strength. After the removal, degrease it.
- 2. Install the outer panel and hem it. Wipe off the excessive adhesive and finish it.

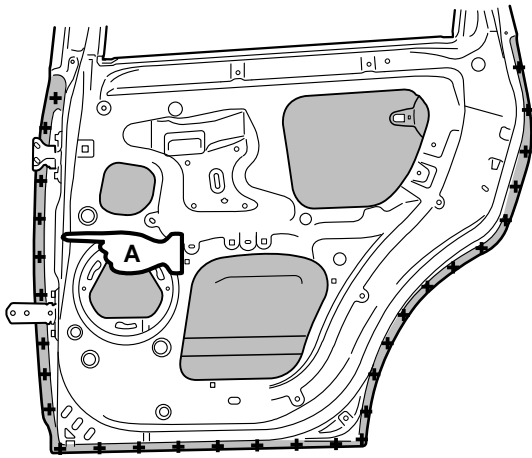
REAR DOOR OUTER PANEL (WELDED TYPE)

M40300000156USA0000010000

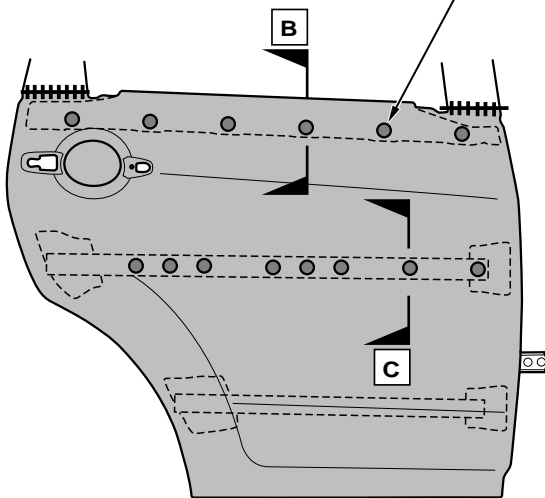


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
#####	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

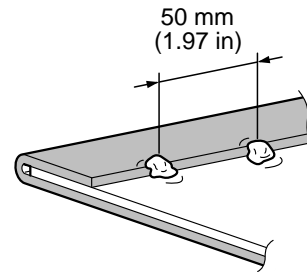


Adhesive application point

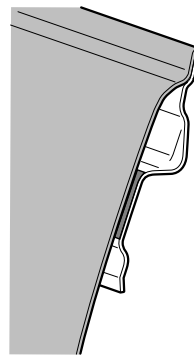


■ : Adhesive

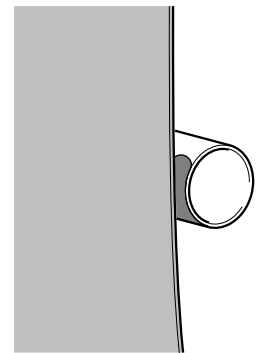
Adhesive : Urethane body sealer



A



B



C

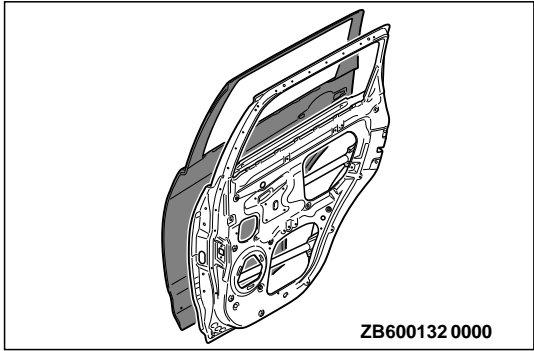
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Brand: 3M™ AAD Part No.8542 or equivalent

NOTE: After hemming the front door outer panel, MIG spot weld the flange overlap section at a pitch of 50 mm (1.97 inches).

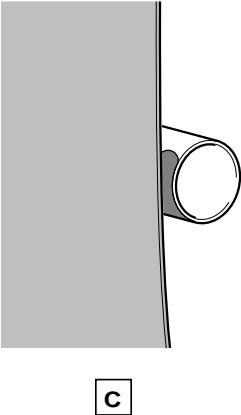
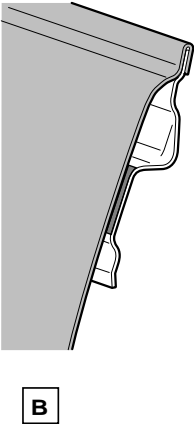
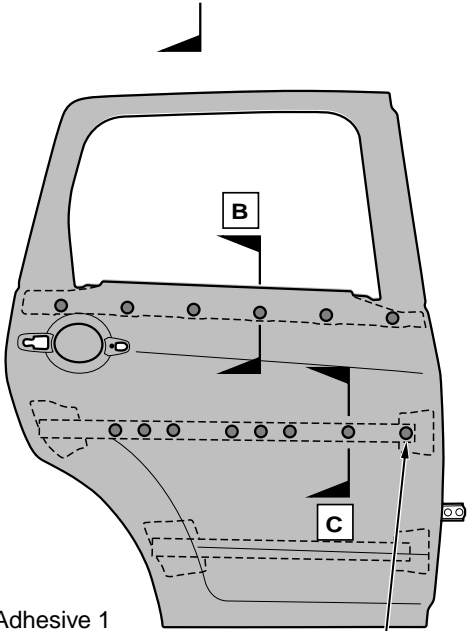
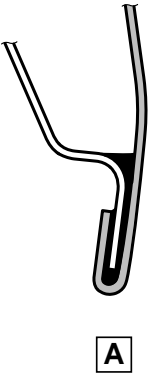
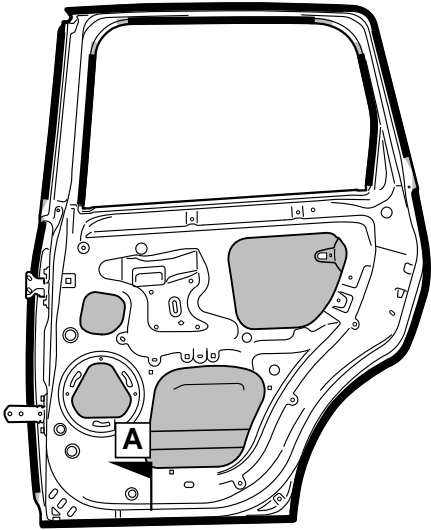
REAR DOOR OUTER PANEL (ADHESION TYPE)

M40300000157USA0000010000



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■ indicates two panels to be welded ▲ indicates three panels to be welded)
+ + + +	MIG spot welding
+++++	MIG arc welding (continuous)
oooooooo	Braze welding
	Anti-corrosion agent applications locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



■ : Adhesive 1
■ : Adhesive 2

Adhesive application point

*Adhesive 1: Urethane body sealer

ZB6000850000

Brand : 3M™ AAD Part No.8542 or
equivalent

*Adhesive 2: Epoxyayresin adhesive

Brand : 3M™ AAD Part No.8115 or
equivalent

NOTE ON REPAIR WORK

INSTALLATION

1. When installing the rear door outer panel, grind and remove the paint, etc. from the bonded surface of the outer panel to ensure the bonding strength. After the removal, degrease it.
2. Install the outer panel and hem it. Wipe off the excessive adhesive and finish it.

ALUMINUM PANEL

ALUMINUM PANEL CHARACTERISTICS

Description of aluminum panel

A new aluminum panel with higher strength and better workability has been developed by adding a small amount of metallic elements, including magnesium (Mg), copper (Cu) and silicon (Si), to aluminum. This type of aluminum material has equivalent strength to cold rolled steel sheets.

Advantage of aluminum panel

1. Lighter: The specific gravity of aluminum is 2.7, which is only one third of general steel panel (7.9). However, it requires 1.4 times in thickness to obtain

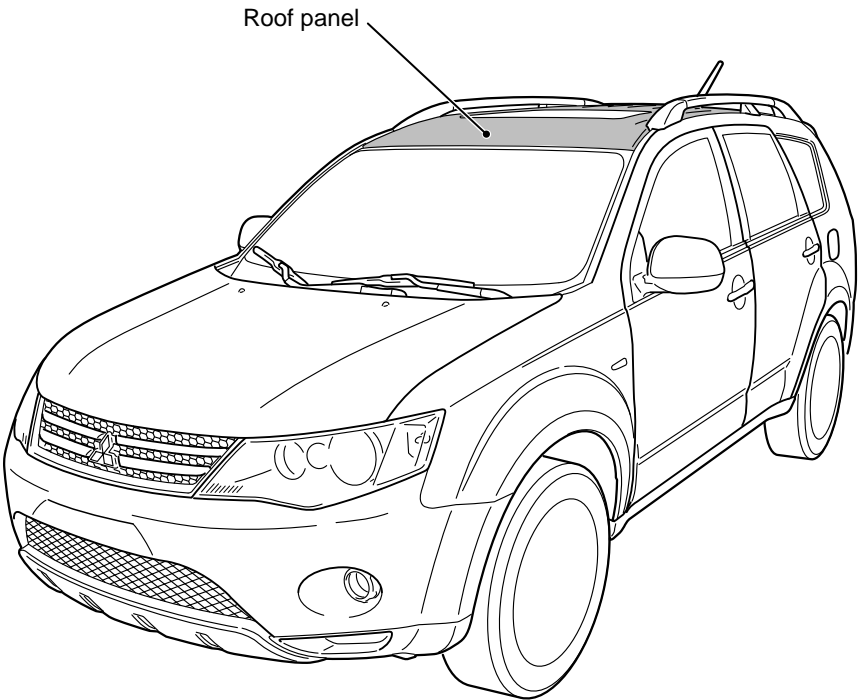
the same rigidity as the steel panel, resulting in one half in weight.

2. More durable: Aluminum has the property of creating oxide coating on its surface when it contacts with the air. This coating prevents it from being corroded.
3. More heat-conductive: The heat conductivity of aluminum is twice as high as that of iron. This means that aluminum absorbs and disperses heat more quickly, which results in prompt change of its temperature.
4. More electric-conductive
5. Non-magnetic substance

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ALUMINUM PANEL LOCATIONS

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ZB600163 0000

Application	Thickness
Roof panel	1.3 mm (0.05 inches)

ALUMINUM PANEL REPAIR

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Precautions upon sheet metal processing
1. Major difference in processing between sheet metal and steel sheet (On the basis of general body shop)

Work description	Aluminum alloy panel	Steel sheet
Hammering	Mallet or plastic hammer	Sheet metal hammer
Washer welding	Not possible	Possible
Gas welding	Not good workability but possible	Possible
Spot welding	Not possible	Possible

Work description	Aluminum alloy panel	Steel sheet
MIG welding	Possible by a welding machine for aluminum and argon gas	Possible by a general welding machine and CO ₂ gas

2. If strong impact is given under low temperature, its strength becomes low and cracking occurs.
3. The springback (returning force to the original condition) is large due to high elastic modules.
4. The thermal effect is large due to high heat conductivity.
5. When excessively heated, its strength will be deteriorated. When heated additionally, it will be melted without discolouration. [The heating temperature is approximately 250°C (482°F)].

Material	Melting point
Aluminum	475 to 660 °C (887 to 1220 °F) <varying with the alloy content>
Steel sheet	1500 to 2500 °C (2732 to 4532 °F)

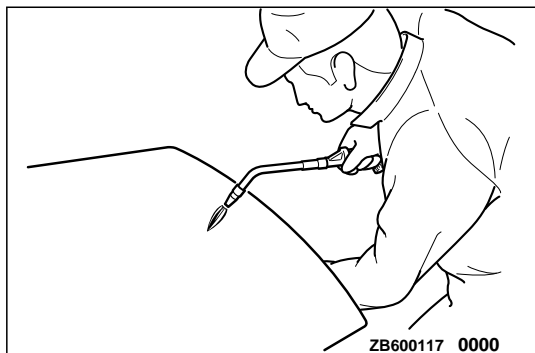
⚠ CAUTION

Weld and repair it if the side sill reinforcement front is damaged.

6. Because the material is soft, choose an abrasive carefully. Wear a dustproof mask and safety glasses, because ground particle is light and tends to float in the air.
7. If a disk sander is strongly pressed against the aluminum plate, friction heat is generated, resulting in exfoliation of the aluminum alloy and clogging of the disk sander with the exfoliated particles.
8. Because the clogged disk sander will damage the aluminum alloy panel, replace it with a new one as soon as possible.
9. General tools and sanding tools shall not be shared for both aluminum alloy and steel panels. (Iron powder remaining on the surface may cause electric corrosion with a different type of metal).
10. During MIG welding, protect the vicinity because the spatters are hard to see and spread father than expected.

Correction of uneven surface

Basically, the same as the steel panel. However, give a consideration to the aluminum alloy characteristics.



1. Repair of sheet metal
 - (1) Heat with a burner.

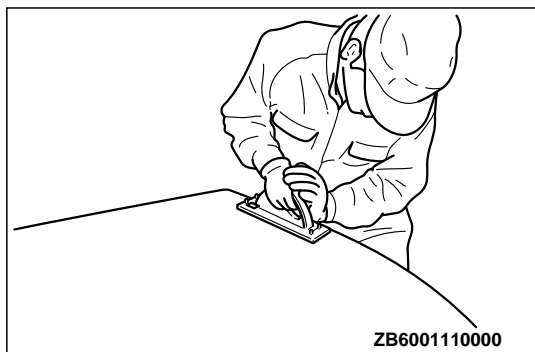
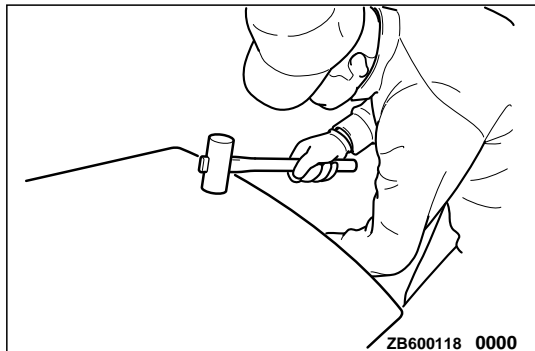
⚠ CAUTION

- Heat-up the panel until you feel heat with a keplar work glove on the reverse side of the panel.
- Keep moving the burner evenly to prevent heat from concentrating in one point.

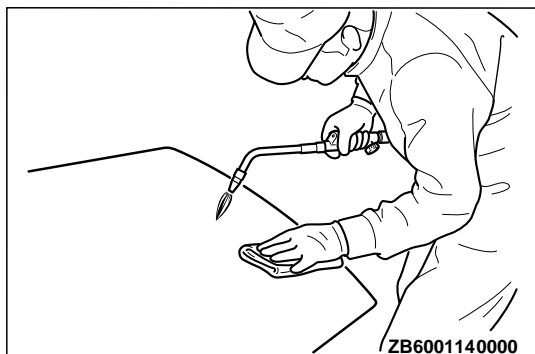
- (2) Because hammering may stretch the panel, use a mallet or plastic hammer.

⚠ CAUTION

Minimize the stretch and hardening, and give no hammer dent.



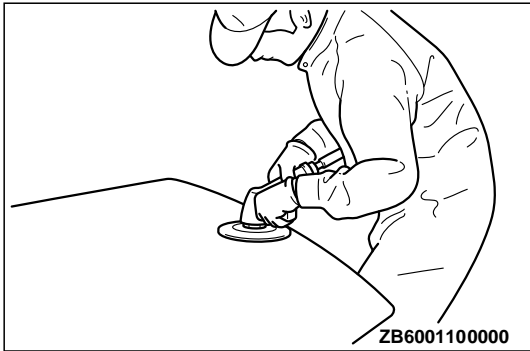
2. Distortion check: Grind the surface with #80 to #120-grit sandpaper and then check for distortion.



3. Straightening: Remove distortion by the draw correction procedure with a flattening hammer and a burner.

⚠ CAUTION

- The heating temperature should be approximately 250° C (482°F).
- Pay particular attention to heating, because it is melted without discolouration by heat.
- Cover the vicinity of the area to be heated with a wet rag or the like to prevent temperature rise and influence of heat (distortion).
- Do not use a draw hammer for steel sheets because it may cause the panel crack.



4. Sanding: Grind the surface with a disk sander or a double-action sander.

- Disk sander: #100 to #120

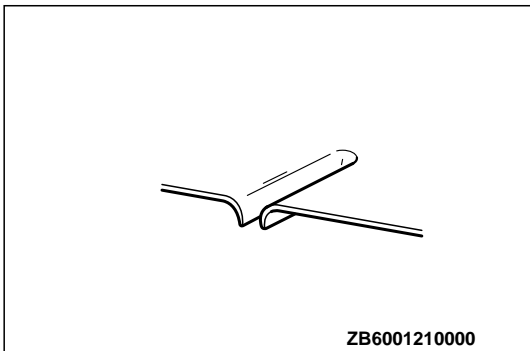
- Double-action sander: #150 to #180

⚠ CAUTION

Aluminum plates are softer than steel sheets, therefore select an appropriate abrasive to prevent the surface from deeply scratched. The heating temperature should be approximately 250°C (482°F).

Correction of cuts and cracks

If cuts, cracks, or holes occur in a steel sheet panel, MIG welding with CO₂ is used for repair. However, for an aluminum panel, use MIG or TIG welding with argon gas (inert gas) as shielding gas for repair.



DEGREE OF DISTORTION CAUSED BY WELDING

Gas welding (a large amount of distortion) TIG welding MIG welding (a small amount of welding). This manual explains the operation procedure of MIG welding which causes a small amount of distortion by welding heat.

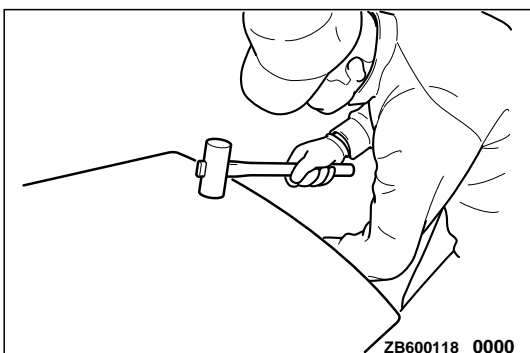
Operation procedure of MIG welding

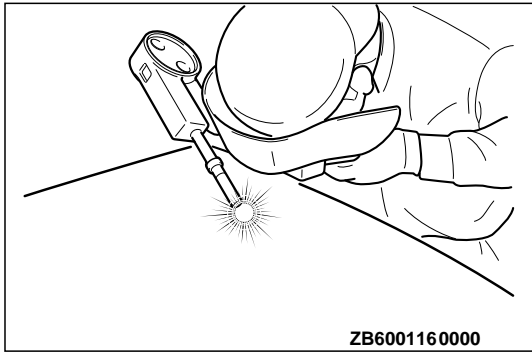
⚠ CAUTION

- Be careful to avoid excessive stretch of or damage to the panel.

- Minimize the gap of the butt joint.

1. Correct the damaged area by hammering lightly while heating it. If any area is stretched by hammering, grind it off with a pneumatic saw.





⚠ CAUTION

To minimize distortion and meltdown, divide a welding area into several short segments, and weld one segment at a time.

2. Welding: Use an aluminum dedicated welding machine or a shared welding machine for aluminum and steel sheet for the operation.

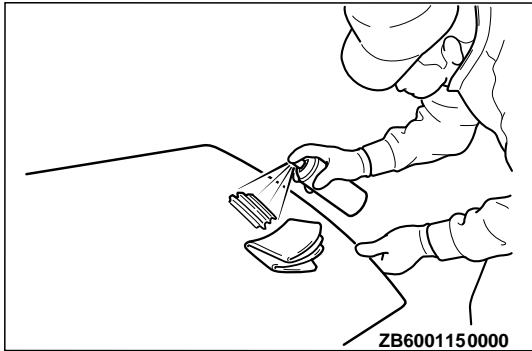
Wire diameter: 0.8 or 1.0 mm (0.031 or 0.039 inches)

- (1) Degrease the welding area by white gasoline or the like.
- (2) Remove the oxide coat from the welding area, including its back, with a stainless steel wire brush just before welding. Welding shall be started as soon as the oxide coat is removed.

⚠ CAUTION

Do not over-grind the base of the panel.

3. Refinish the welding area by a 100-grit disk sander, and then check for any faulty welding by the visible dye penetrate testing.



4. Check for distortion: Grind the surface with #80 to #120-grit sandpaper and then check for distortion.

⚠ CAUTION

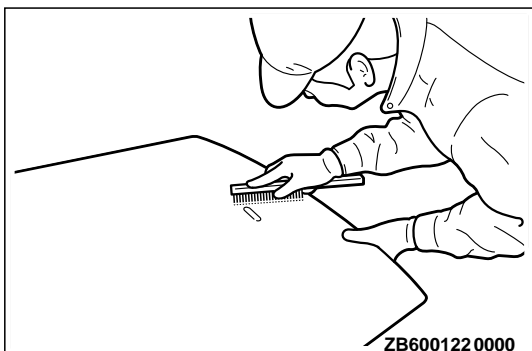
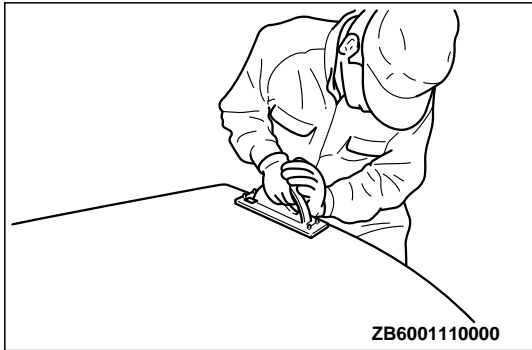
- The heating temperature should be approximately 250°C (482°F).
- Pay particular attention to heating, because it is melted without discolouration by heat.
- Cover the vicinity of the area to be heated with a wet rag or the like to prevent temperature rise and influence of heat (distortion).
- Do not use a draw hammer for steel sheets because it may cause the panel crack.

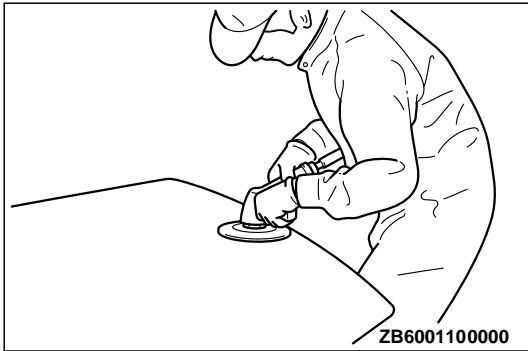
5. Remove distortion by the draw correction procedure with a flattening hammer and a burner.

⚠ CAUTION

Remove any spark spot or carbon residue on the surface by a stainless steel wire brush, because they will cause improper painting in the following process.

6. Finishing: Finish it with a 100-to 120-grit disc sander.





Other welding

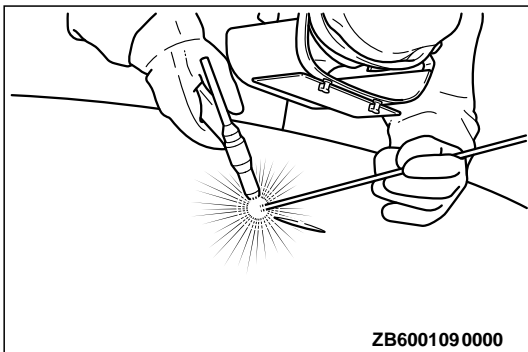
TIG WELDING

1. This welding is conducted by the same arc welding method as for MIG welding, however, it uses a welding rod instead of electrode wire.

Wire diameter: 1.6 mm (0.063 inches).

CAUTION

- Be careful to avoid excessive stretch of or damage to the panel.
- Minimize the gap of the butt joint.



GAS WELDING (OXIDE - ACETYLENE)

If gas welding is allowed, the welding can be conducted using a welding rod and flux (oxide coat remover). However, before the welding work, do sufficient practice to avoid distortion by welding heat or poor welding.

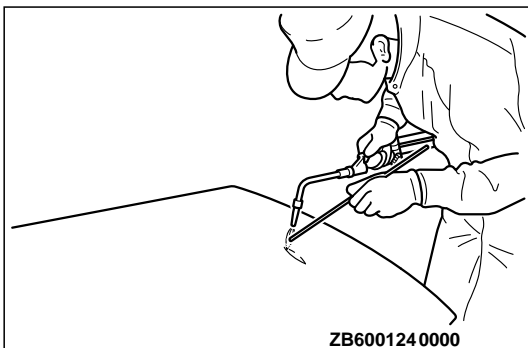
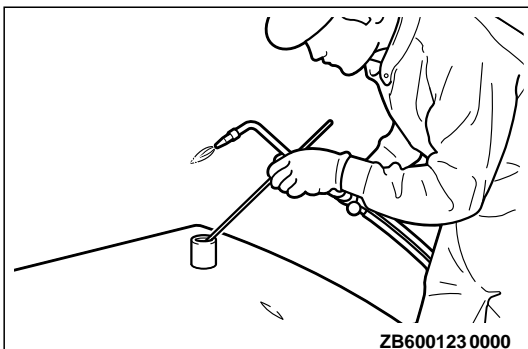
Wire diameter: 1.6 mm (0.063 inches).

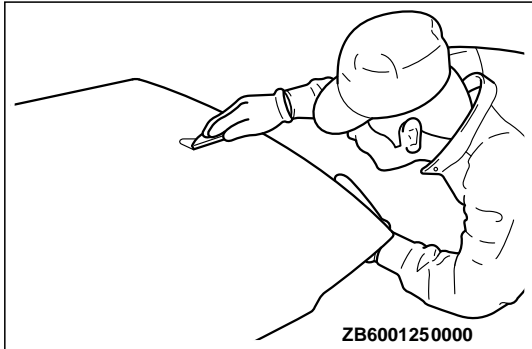
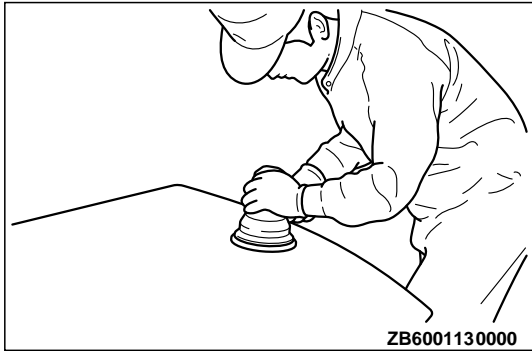
1. Heat the welding rod and bond the flux to it.

CAUTION

Keep the welding surface as horizontal as possible, because the melted welding rod flows readily.

2. While melting the flux with the burner to remove the oxide coat, conduct the welding.
3. Remove the flux residue from the panel with a stainless steel wire brush.





Finish with putty

1. Grind the putty-applied area with a 150-to 180-grit double-action sander.
2. Degrease and clean the putty-applied area.
3. Apply 2-liquid type epoxy primer or a pretreatment agent for aluminum.
4. Grind with a 180-grit double-action sander for cutting action.
5. Degrease and clean the putty-applied area.
6. Apply putty for metal sheets, and dry it naturally.

CAUTION

Do not dry it forcibly at 60°C (140°F) or higher.

7. Grind with a 180-grit sander.

ALUMINUM PANEL PAINT

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Painting in production line

Same as painting for normal steel sheets.

Precautions upon sheet metal processing

CAUTION

- Avoid hasty grinding and minimize grinding heat.
- Do not dry it forcibly at higher than 60°C (140°F).

1. Peel-off of paint film
2. Cleaning and degreasing

CAUTION

Apply 2-liquid type epoxy primer or a pretreatment agent for aluminum to the aluminum base surface.

3. Application of wash primer
4. Drying <60°C (140°F) or lower>
5. Application of primer surfacer
6. Drying <60°C (140°F) or lower>
7. Grinding
8. Cleaning and degreasing
9. Finish coating
10. Drying <60°C (140°F) or lower>

NOTE:

• Refer to paint manufacturers' paint specifications for details.

**The procedure is almost the same as the repair painting procedure of anti-corrosion steel panel.*

MEMO