

## GROUP 3

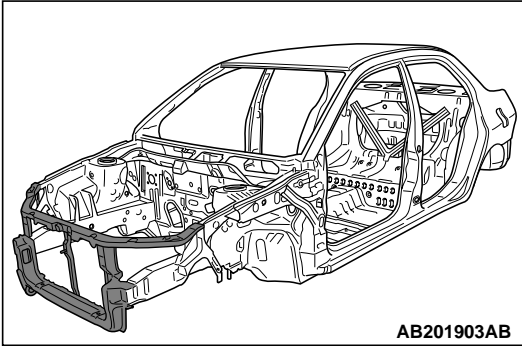
# WELDED PANEL REPLACEMENT


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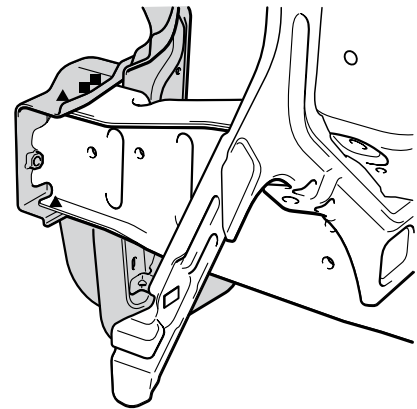
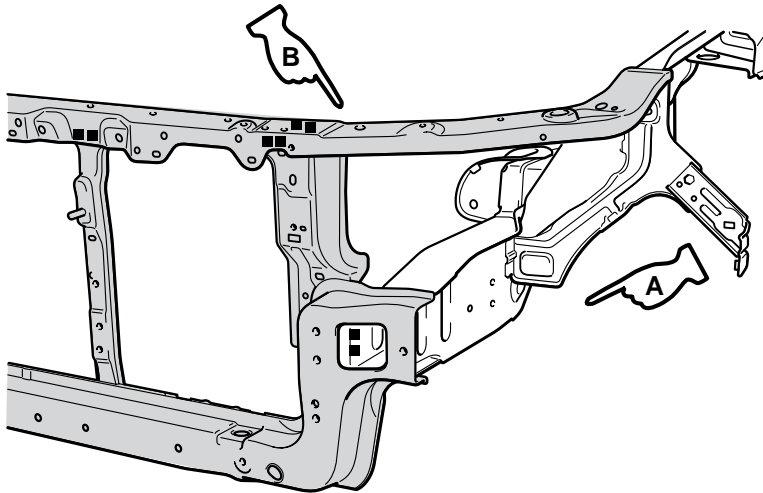
# HEADLAMP SUPPORT

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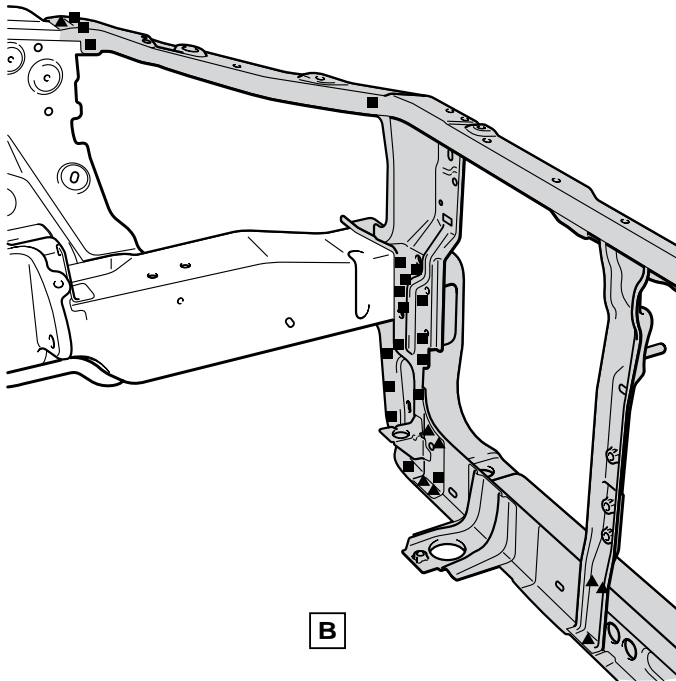


SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
#####	MIG arc welding (continuous)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply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

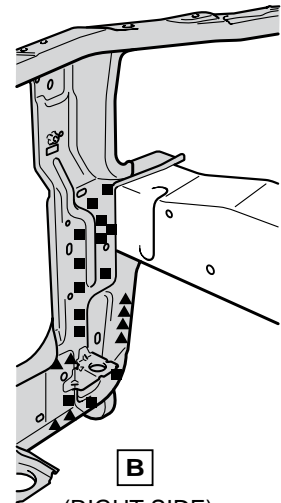
## REPAIR WELDS



A

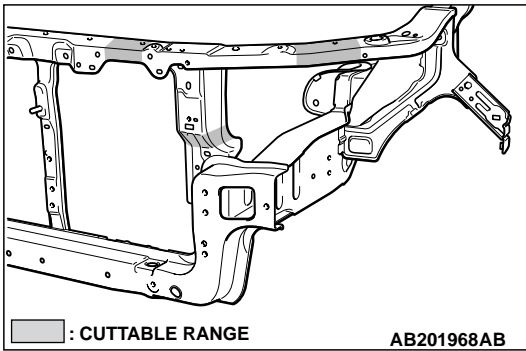


B



(RIGHT SIDE)

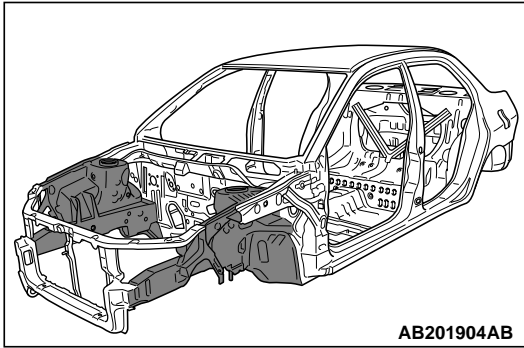
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*NOTE: Partial replacement is okay depending on the range of damage.*

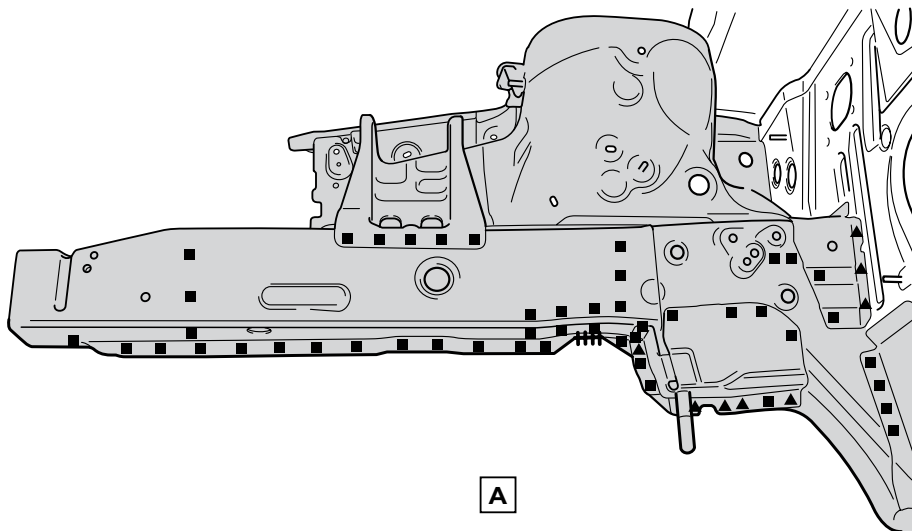
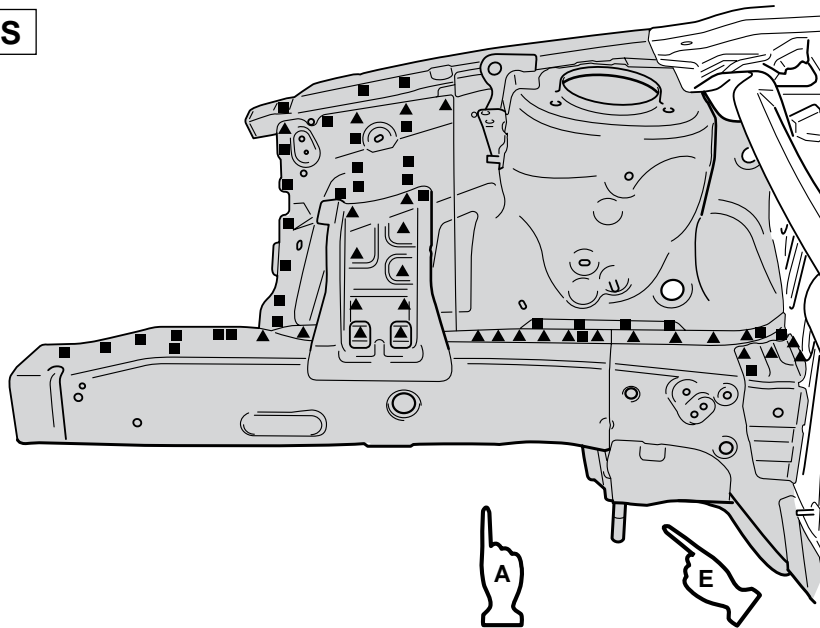
# FENDER SHIELD

M4030004000095



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)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

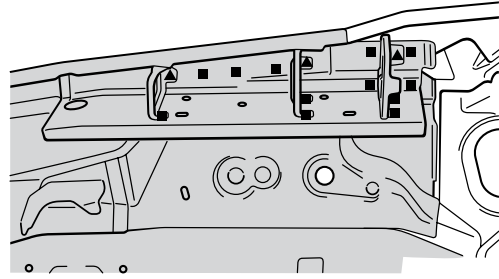
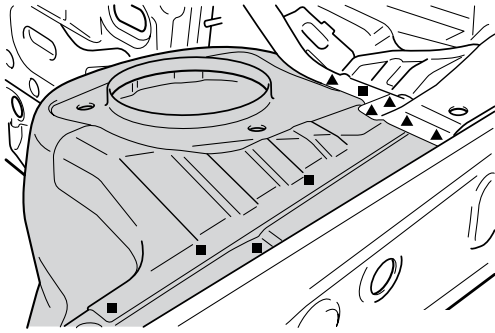
## REPAIR WELDS



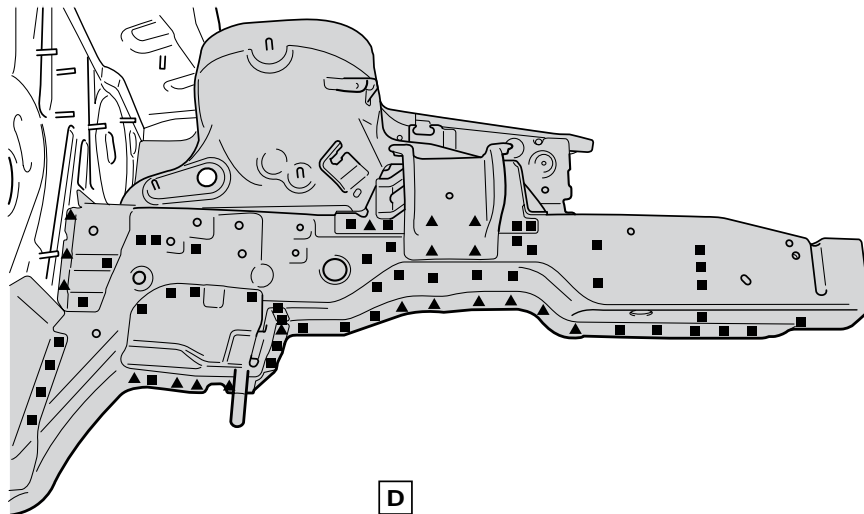
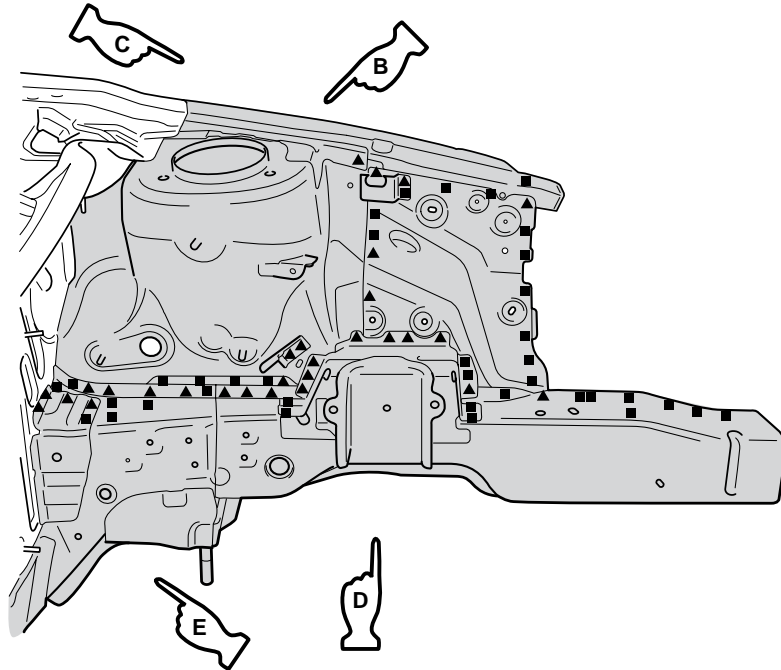
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**NOTE:**

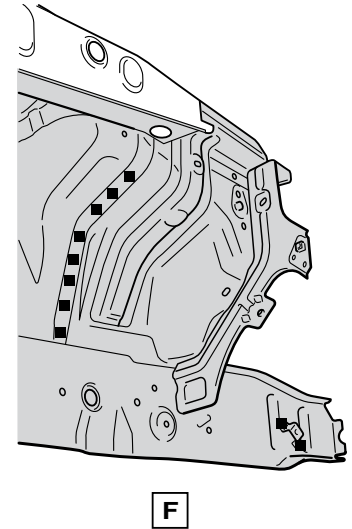
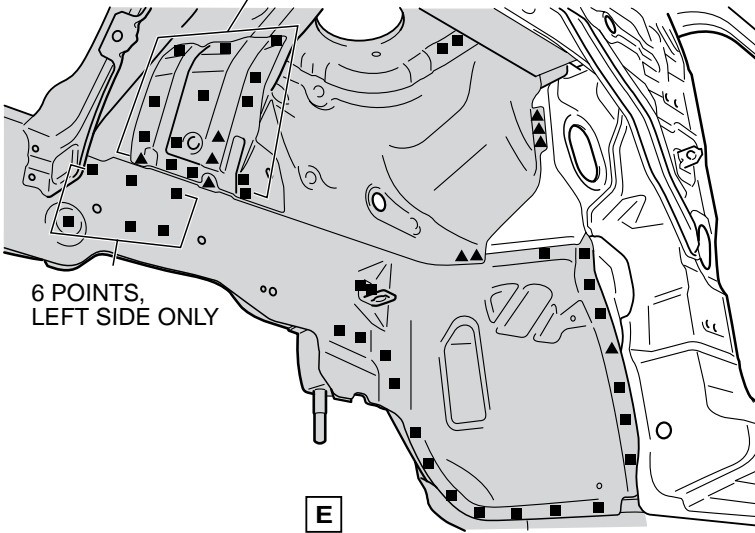
- Refer to the Headlamp Support Section on [P.3-2](#) for the welding point with headlamp support.
- Refer to the Front Pillar Section on [P.3-10](#) for the welding points with the upper frame extension outer.



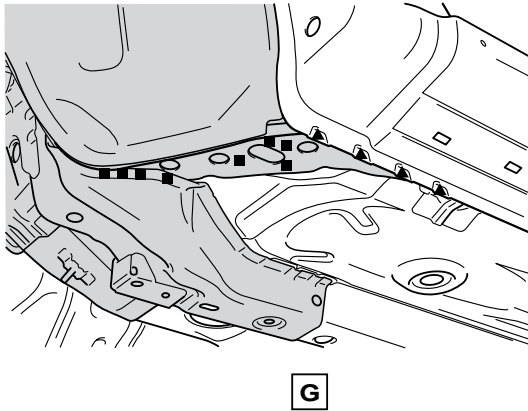
(WITH THE UPPER FRAME EXTENSION OUTER REMOVED)



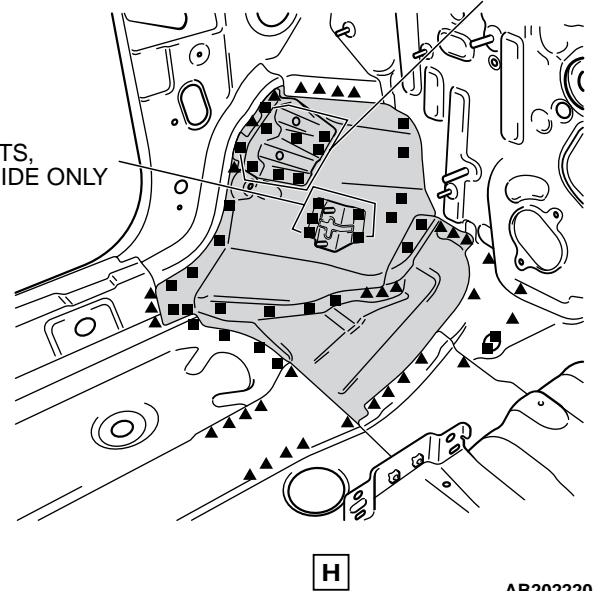
17 POINTS, LEFT SIDE ONLY



9 POINTS, LEFT SIDE ONLY



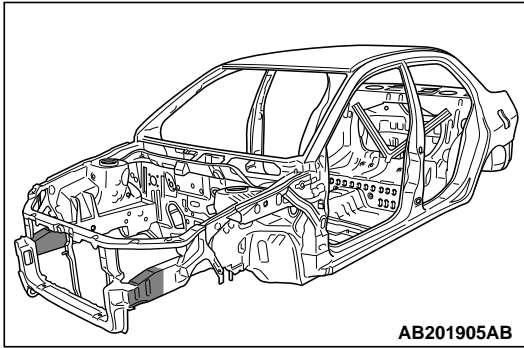
5 POINTS, LEFT SIDE ONLY



NOTES

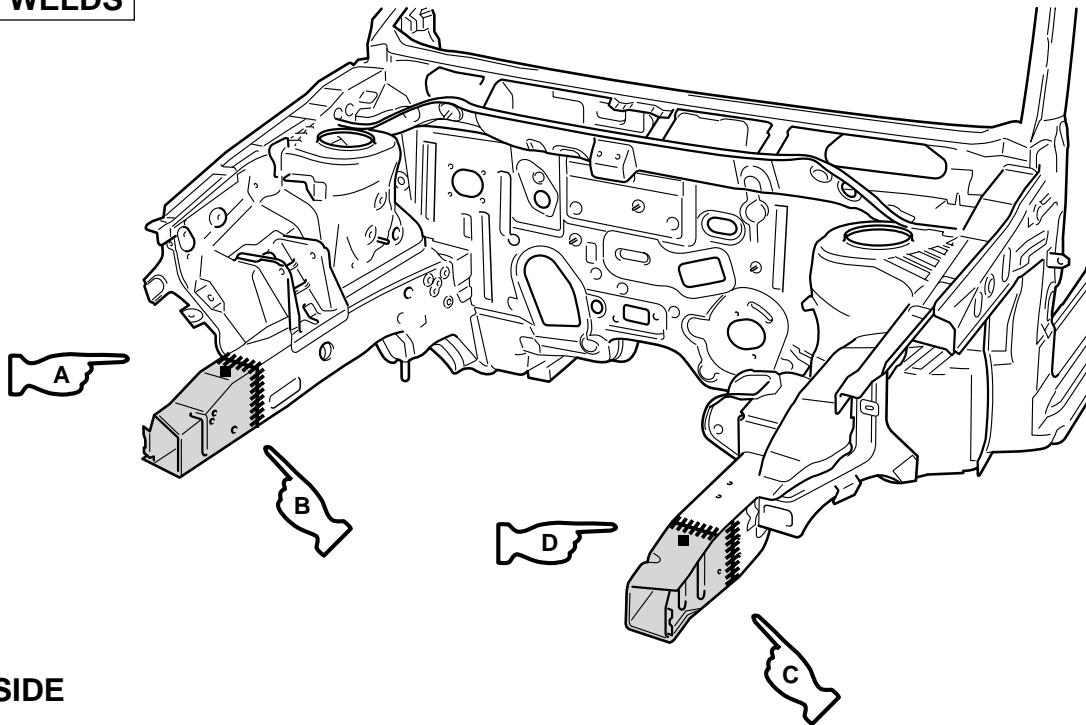
# FRONT SIDEMEMBER (PARTIAL REPLACEMENT)

M4030000100045

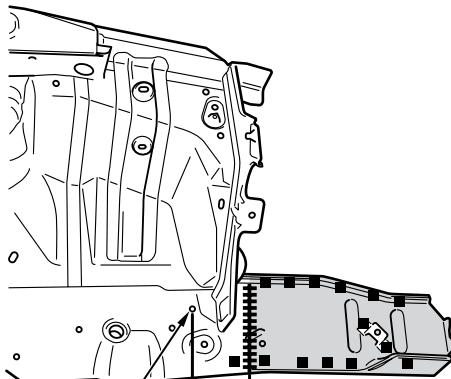


SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
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	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

## REPAIR WELDS



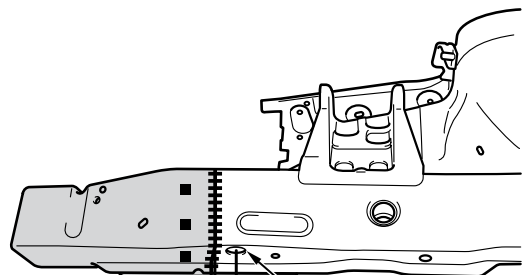
## RIGHT SIDE



CENTER OF SPLASH SHIELD MOUNTING HOLE

83 mm (3.27 in)

A



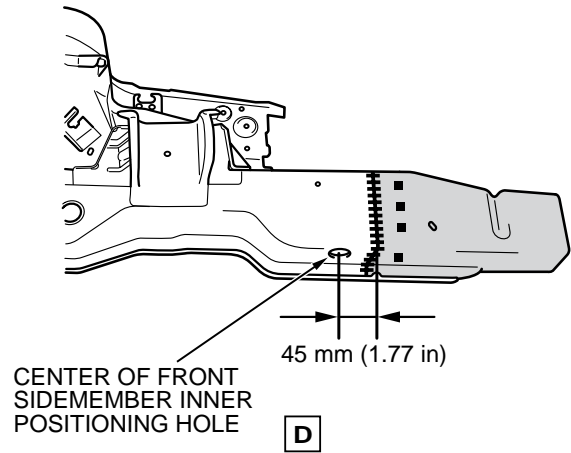
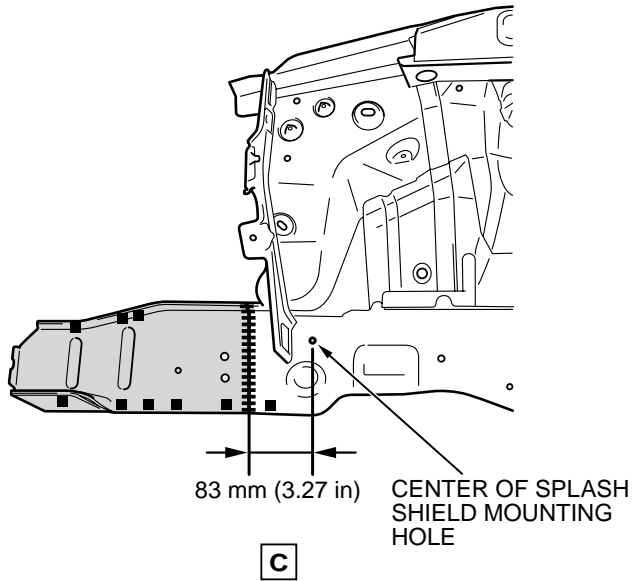
45 mm (1.77 in)

B

CENTER OF FRONT SIDEMEMBER INNER POSITIONING HOLE



LEFT SIDE



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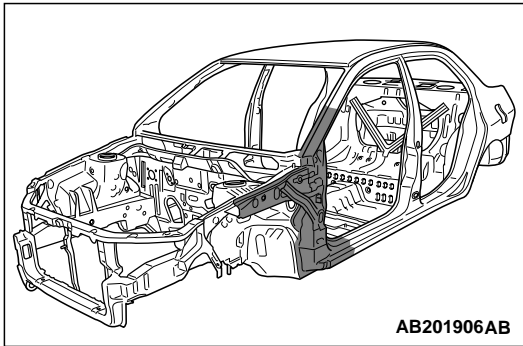
*NOTE: Refer to the Headlamp Support Section on P.3-2 for the welding point with headlamp support.*


**NOTE ON REPAIR WORK**

**REMOVAL**

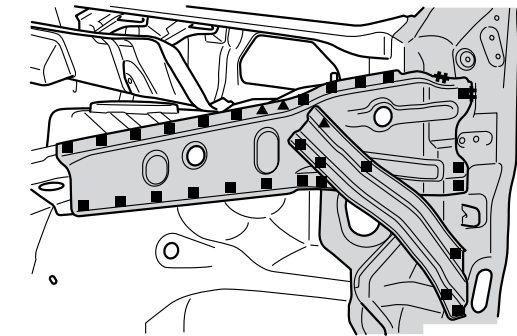
1. Reuse the parts other than the sidemember outer and sidemember inner.

FRONT PILLAR

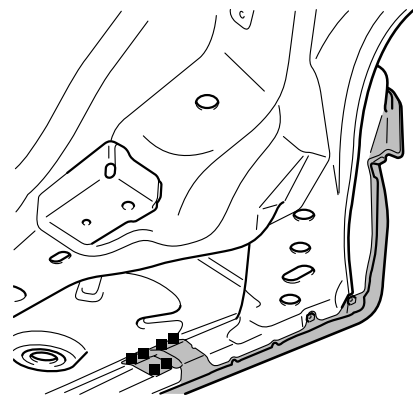


SYMBOL	OPERATION DESCRIPTION
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○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

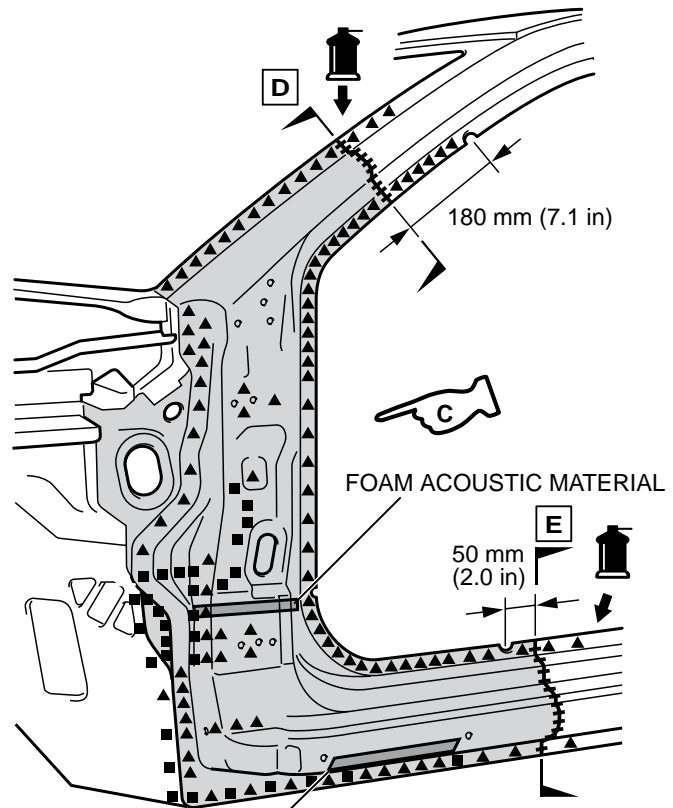
REPAIR WELDS



A



B



(WITH THE UPPER FRAME  
EXTENSION OUTER REMOVED)

HIGH RIGIDITY  
FOAM MATERIAL

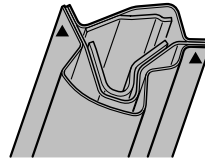
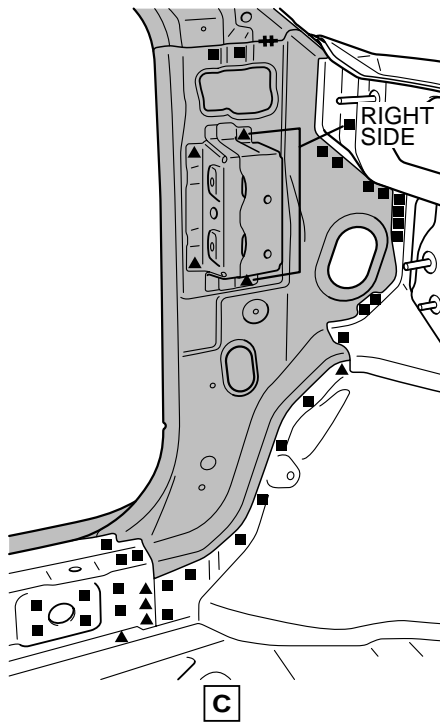
FOAM ACOUSTIC MATERIAL

50 mm  
(2.0 in)

180 mm (7.1 in)

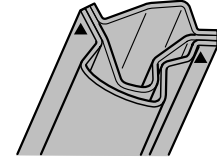
**CAUTION**

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



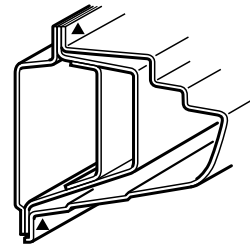
D

<VEHICLES WITH STANDARD ROOF>



D

<VEHICLES WITH SUNROOF>



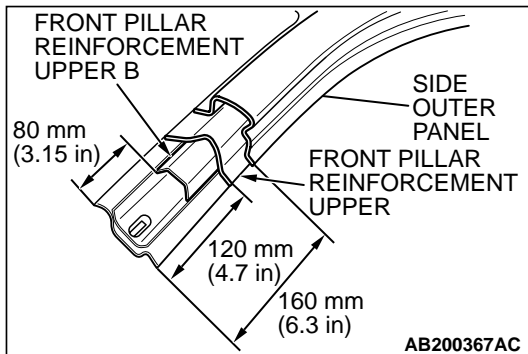
E

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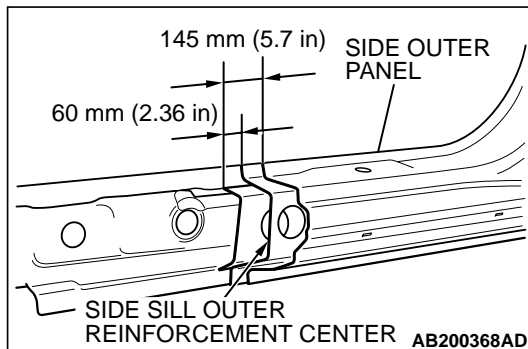
**NOTE ON REPAIR WORK**

**INSTALLATION <Vehicles with standard roof>**

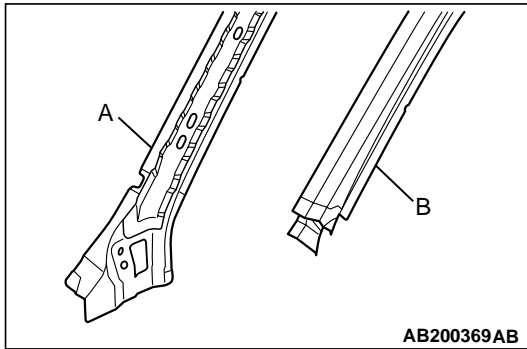
1. To reinforce the strength of the front pillar cut area, cut the side outer panel 160 mm (6.3 in) above the front pillar cut area, 120 mm (4.7 in) above the front pillar reinforcement upper and 80 mm (3.15 in) above the front pillar reinforcement upper B.
2. To reinforce the strength in the side sill cut area, cut the side outer panel 145 mm (5.7 in) behind the side sill cut area, then cut the side sill outer reinforcement center 60 mm (2.36 in) behind the side sill cut area.



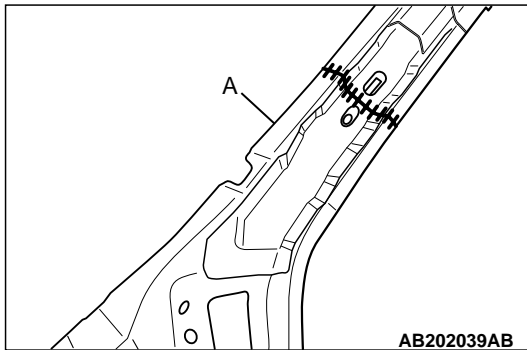
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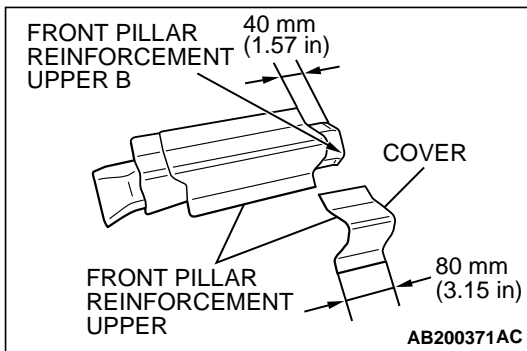
AB200368AD



3. Divide the new front pillar inner upper parts into A (front pillar inner reinforcement and front pillar inner upper) and B (front pillar reinforcement upper and front pillar reinforcement upper B).



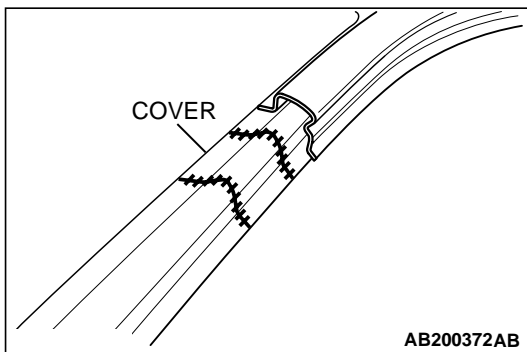
4. When assembling Part A, weld the areas shown in the figure of the instructions from the outside and inside.



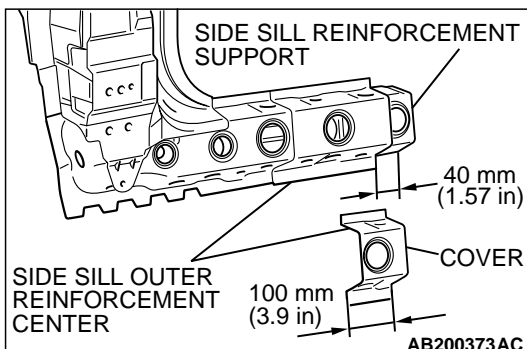
**CAUTION**

**Weld and repair the front pillar reinforcement upper B if it is damaged.**

5. Cut Part B in alignment with the front pillar reinforcement upper on the body-side. Next, cut only the front pillar reinforcement upper 80 mm (3.15 in) from the cut area to create a cover, then cut the front pillar reinforcement upper B 40 mm (1.57 in) above the front pillar reinforcement upper cut area.



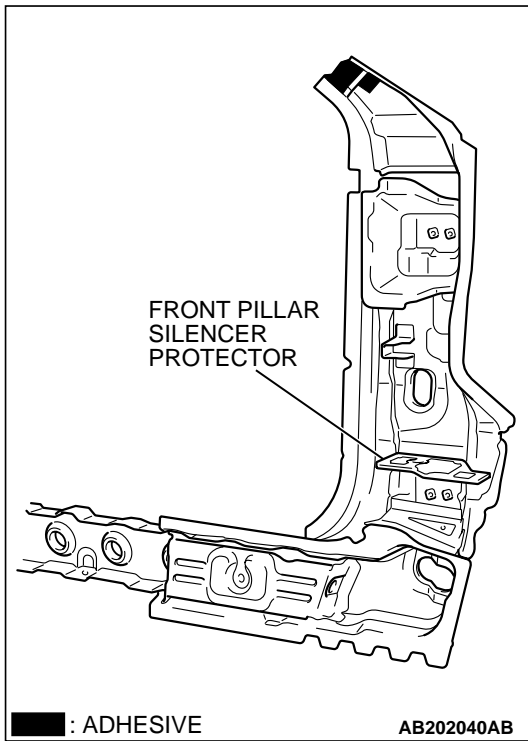
6. To assemble Part B, weld the front pillar reinforcement upper B then weld the cover of the front pillar reinforcement upper.



**CAUTION**

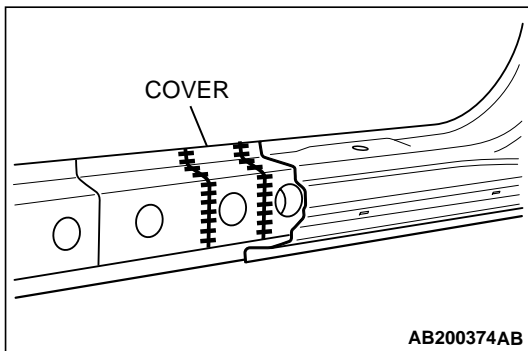
**Weld and repair if the side sill reinforcement support is damaged.**

7. Remove the side outer panel from the new front pillar outer parts. Cut the front pillar outer by aligning it with the side sill outer reinforcement center on the body-side. Next, cut only the side sill outer reinforcement center 100 mm (3.9 in) forward from the cut area to create a cover, then cut the side sill reinforcement support 40 mm (1.57 in) behind the cut area of the side sill outer reinforcement center.

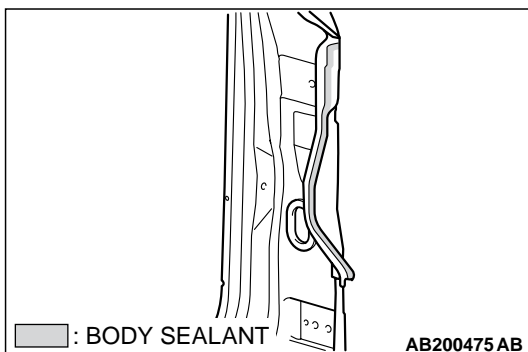


8. When assembling a new front pillar outer parts, apply a front pillar silencer protector in advance, bury the clearance with butyl tape then apply structural adhesives in the areas shown in the figure of the instructions.

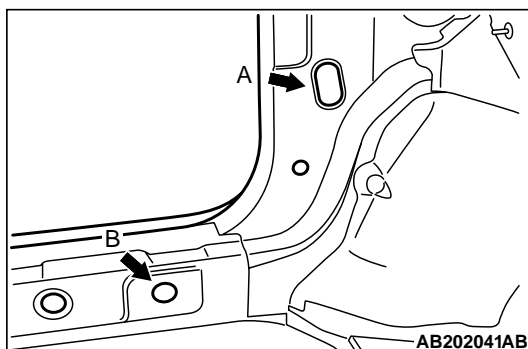
ADHESIVE	TYPE	BRAND
	Epoxyayresin adhesive	3M™ Part No.8115 or equivalent



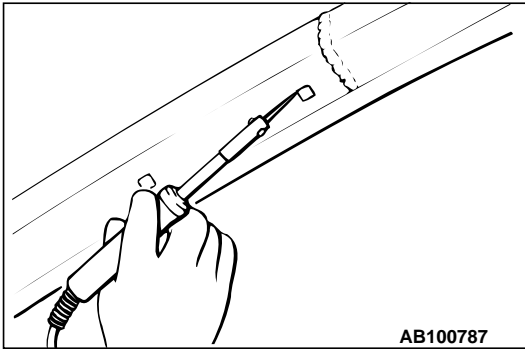
9. Weld the side sill reinforcement support then weld the cover of the side sill outer reinforcement center.



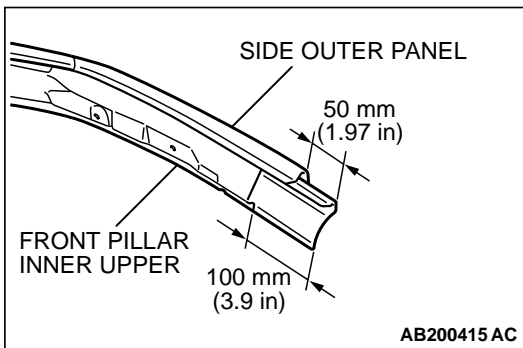
10. Apply in advance body sealant in the areas shown in the figure of the instructions when assembling the side outer panel.



11. Assemble the side outer panel, then bolt and tape the hole and flange with aluminum tape and fill the hole with foam materials as shown in the figure of the instructions.  
FOAM (Hole A): 3M™ ULTRAPRO Panel foam-Yellow  
FOAM (Hole B): 3M™ Super panel filler

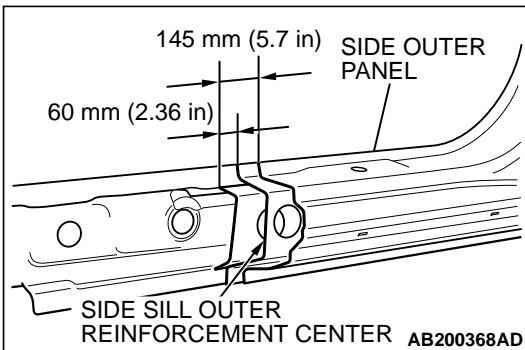


12. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with foam materials.

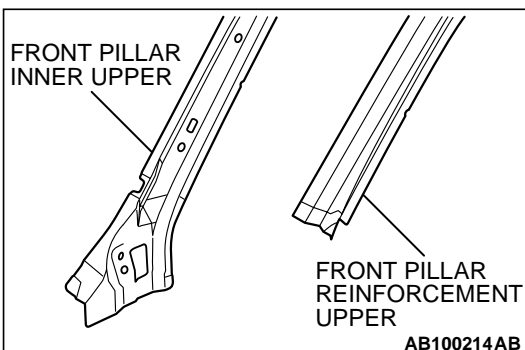


**INSTALLATION <Vehicles with sunroof>**

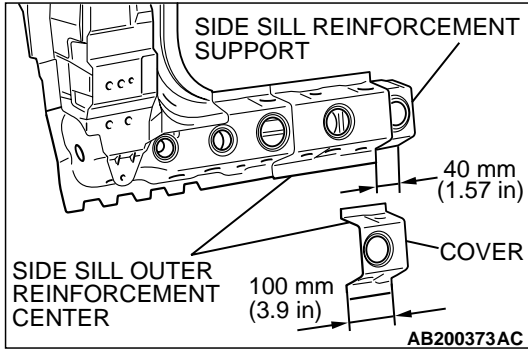
1. To reinforce the strength of the front pillar cut area, cut the side outer panel 50mm (1.97 in) above the front pillar cut area, 100mm (3.9 in) above the front pillar inner upper.



2. To reinforce the strength in the side sill cut area, cut the side outer panel 145 mm (5.7 in) behind the side sill cut area, then cut the side sill outer reinforcement center 60 mm (2.36 in) behind the side sill cut area.



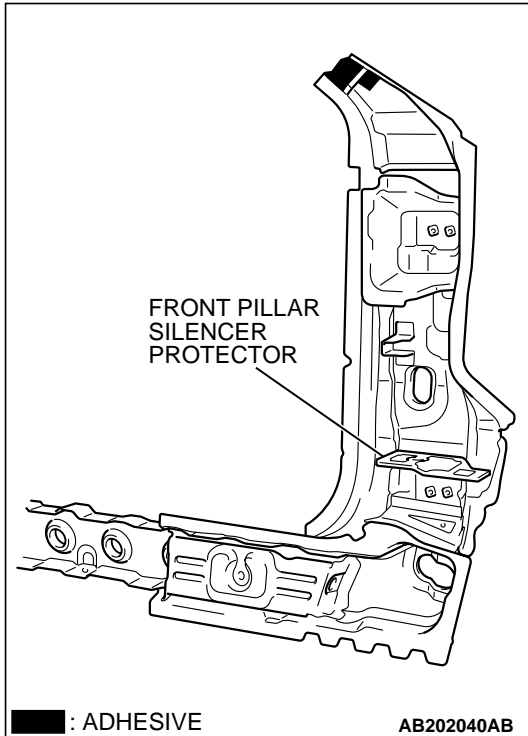
3. Divide the new front pillar inner upper parts into the front pillar inner upper and the front pillar reinforcement upper.



**⚠ CAUTION**

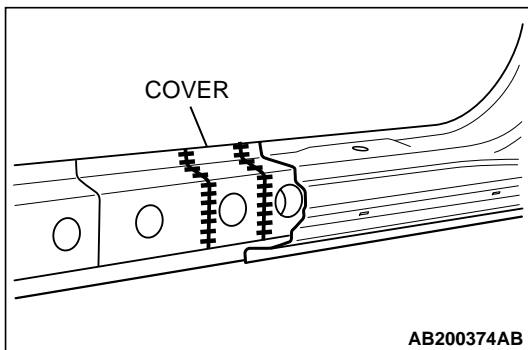
**Weld and repair if the side sill reinforcement support is damaged.**

4. Remove the side outer panel from the new front pillar outer parts. Cut the front pillar outer by aligning it with the side sill outer reinforcement center on the body-side. Next, cut only the side sill outer reinforcement center 100 mm (3.9 in) forward from the cut area to create a cover, then cut the side sill reinforcement support 40 mm (1.57 in) behind the cut area of the side sill outer reinforcement center.

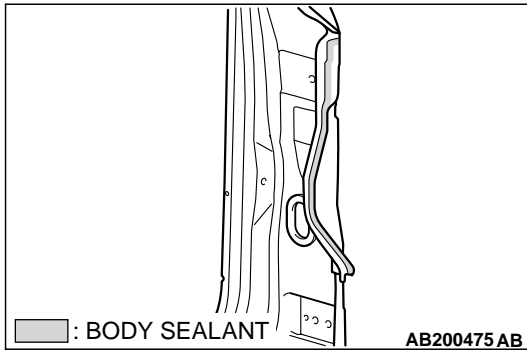


5. When assembling a new front pillar outer parts, apply a front pillar silencer protector in advance, bury the clearance with butyl tape then apply structural adhesives in the areas shown in the figure of the instructions.

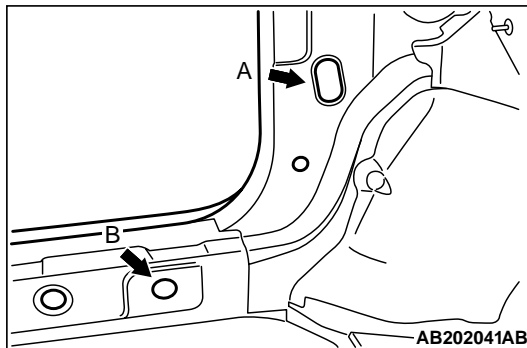
ADHESIVE	TYPE	BRAND
	Epoxyayresin adhesive	3M™ Part No.8115 or equivalent



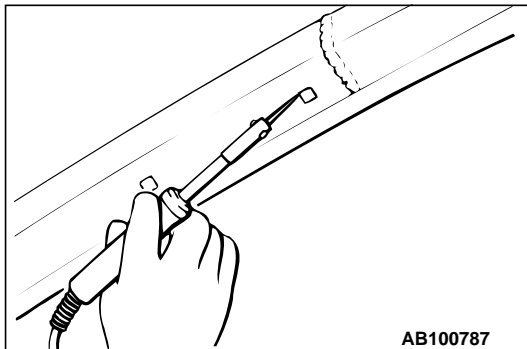
6. Weld the side sill reinforcement support then weld the cover of the side sill outer reinforcement center.



7. Apply in advance body sealant in the areas shown in the figure of the instructions when assembling the side outer panel.



8. Assemble the side outer panel, then bolt and tape the hole and flange with aluminum tape and fill the hole with foam materials as shown in the figure of the instructions.  
FOAM (Hole A): 3M™ ULTRAPRO Panel foam-Yellow  
FOAM (Hole B): 3M™ Super panel filler

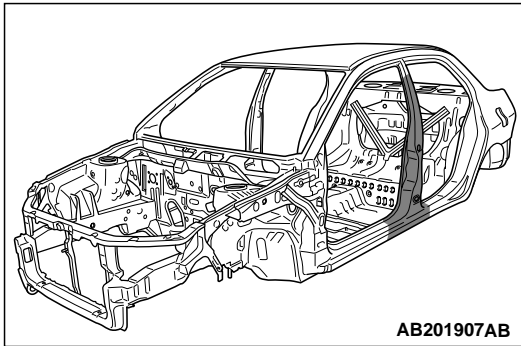


9. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with foam materials.



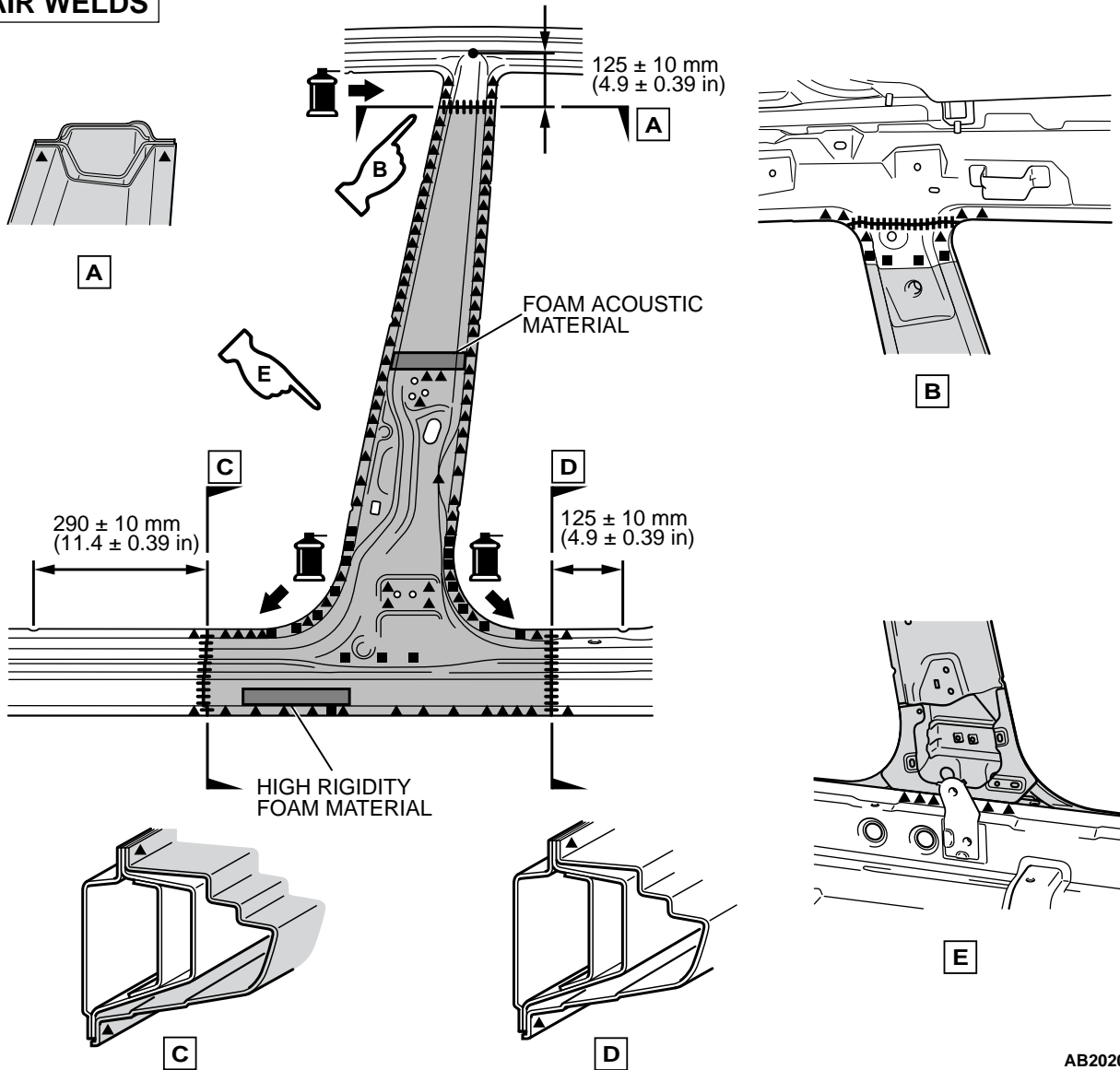
CENTER PILLAR

M4030006000091



SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
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#####	MIG arc welding (continuous)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



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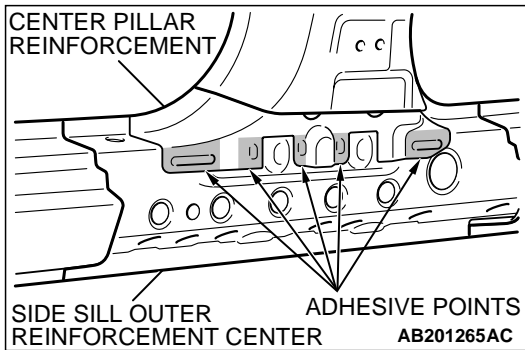
**CAUTION**

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

### NOTE ON REPAIR WORK

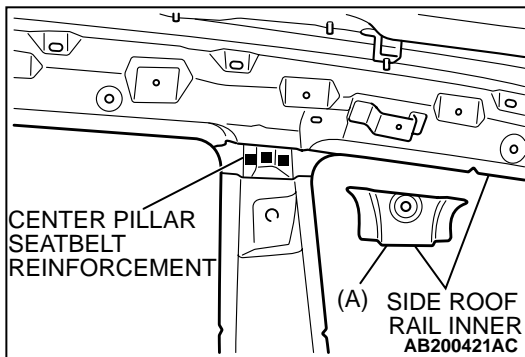
#### REMOVAL

1. Since the center pillar reinforcement and side sill outer reinforcement center of the side sill is adhered together, cut the side outer panel in a place where the reinforcement joint is visible, as shown in the figure of the instructions, to remove the center pillar reinforcement.



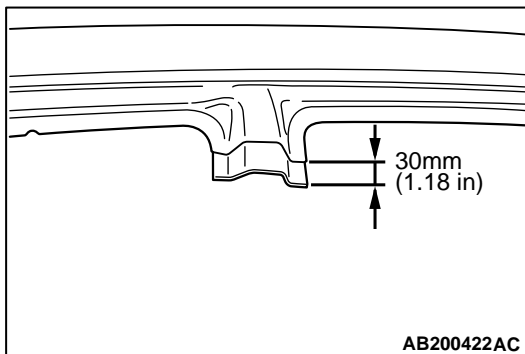
2. To detach the welding of the center pillar seatbelt reinforcement and center pillar reinforcement, cut the lower part of the side roof rail inner as shown in the figure of the instructions.

*NOTE: Hold the side roof rail inner (A) that was cut since it will be re-used.*



#### INSTALLATION

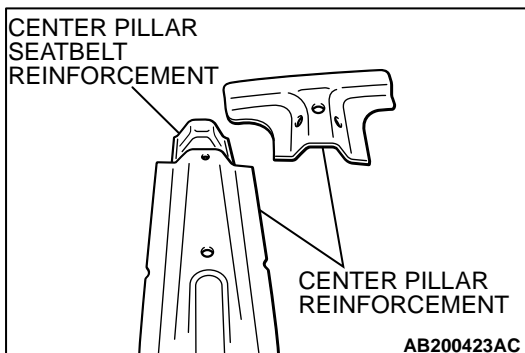
1. Remove the side outer panel and side sill outer reinforcement center from the new parts.
2. To reinforce the strength of the center pillar upper area that was cut, cut the side outer panel 30mm (1.18 in) above the cut area of the center pillar top part. Cut the new part in the same area.

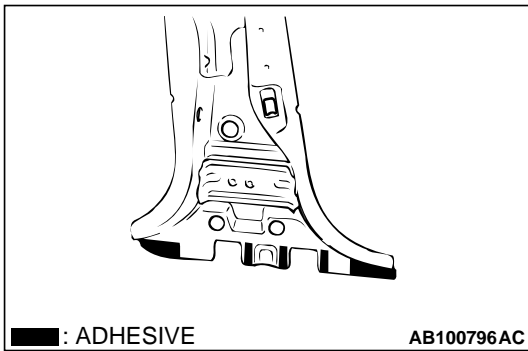


#### **⚠ CAUTION**

**Weld and repair if the center pillar seatbelt reinforcement is damaged.**

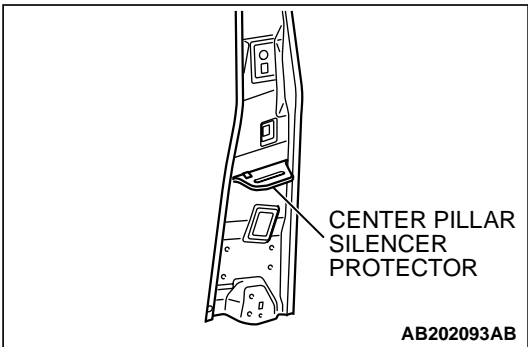
3. Cut only the center pillar reinforcement, aligned with the body-side, of the new center pillar reinforcement parts so the center pillar seatbelt reinforcement is not damaged.



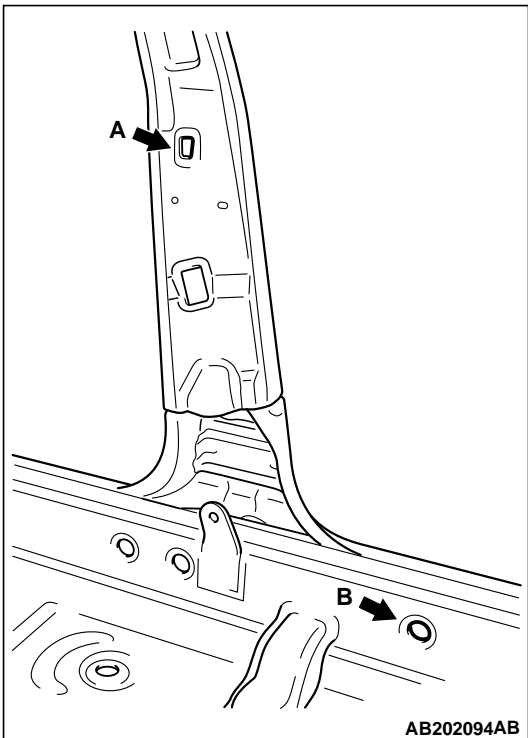


4. When assembling the center pillar reinforcement, apply adhesives in the areas shown in the figure of the instructions.

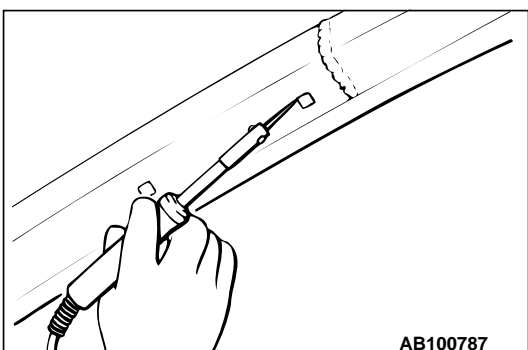
ADHESIVE	TYPE	BRAND
	Epoxyayresin adhesive	3M™ Part No.8115 or equivalent



5. When attaching the center pillar inner, attach the center pillar silencer protector to the center pillar inner, and seal the holes of the center pillar silencer protector with butyl tape.



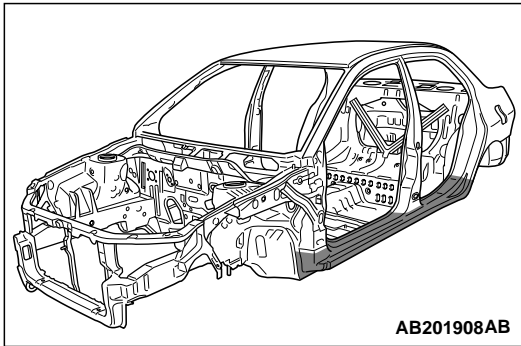
6. Assemble the side outer panel, then bolt and tape the hole and flange with aluminum tape and fill the hole with foam materials A and B as shown in the figure of the instructions.  
FOAM (Hole A): 3M™ ULTRAPRO Panel foam-Yellow  
FOAM (Hole B): 3M™ Super panel filler



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

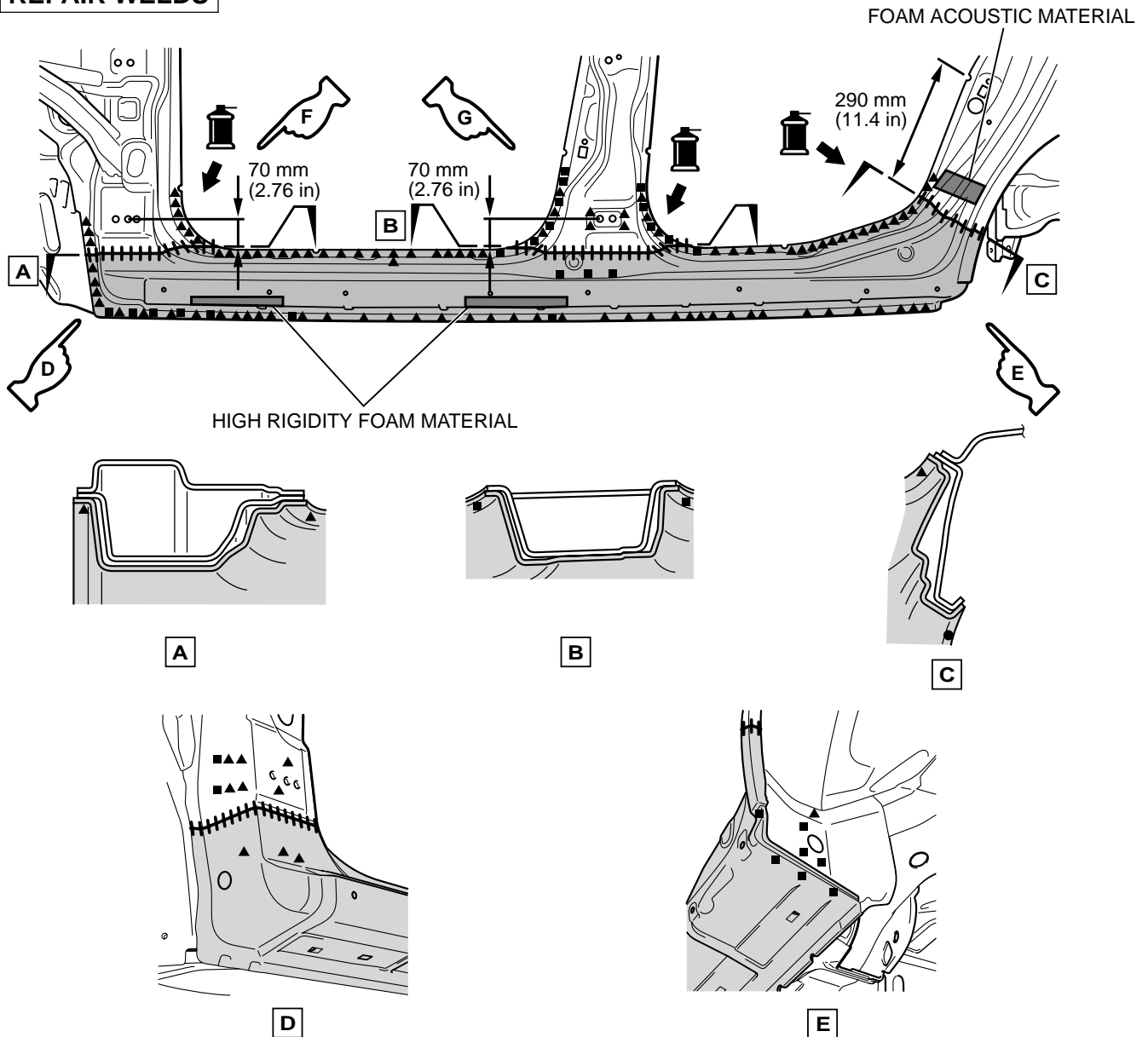
SIDE SILL

M4030007000102



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)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

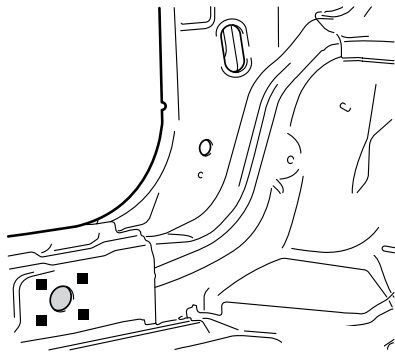
REPAIR WELDS



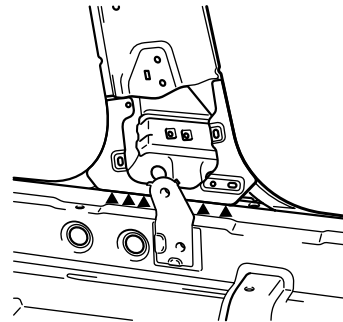
**CAUTION**

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

AB202323AB



F



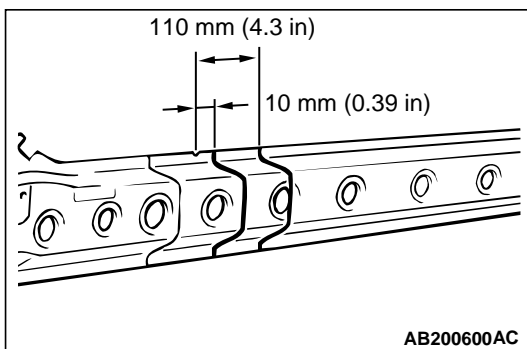
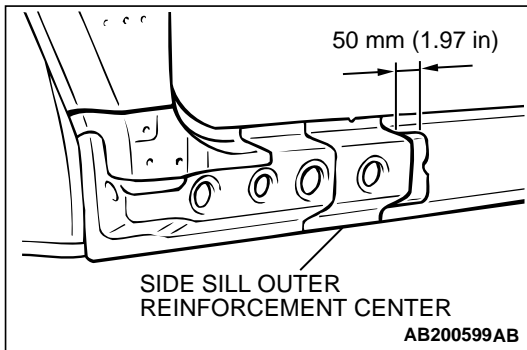
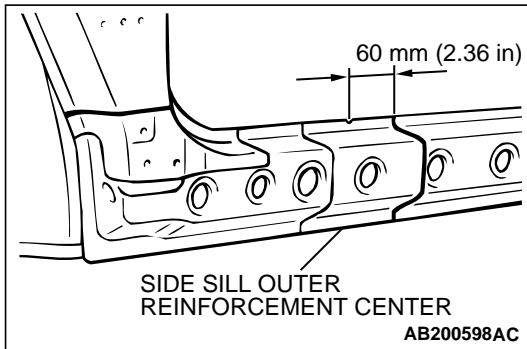
G

AB202327AB

### NOTE ON REPAIR WORK

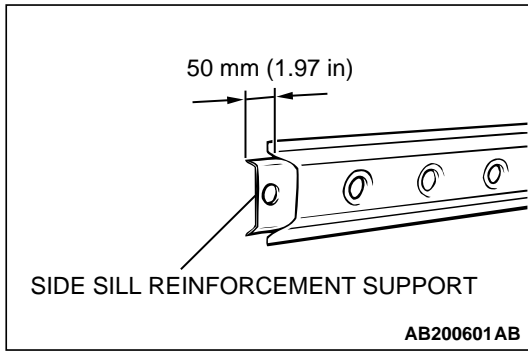
#### REMOVAL

To remove the side sill outer reinforcement, cut it 60mm (2.36 in) behind the cut-out part.

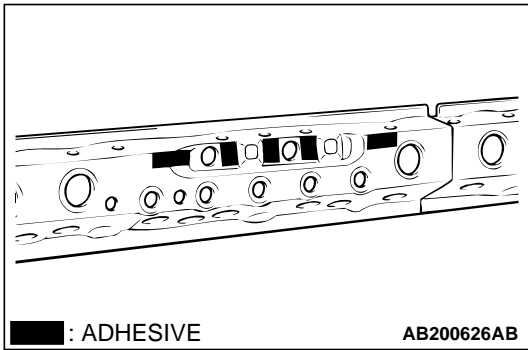


#### INSTALLATION

1. Cut only the side sill outer reinforcement center on the body-side, 50mm (1.97 in) forward of the cut area and then remove.
2. Cut only the side sill outer reinforcement center of the new side sill outer reinforcement parts from 110mm (4.3 in) behind the cut-out area, then cut from another 10mm (0.39 in) behind the cut-out area and remove. Re-use the parts removed.

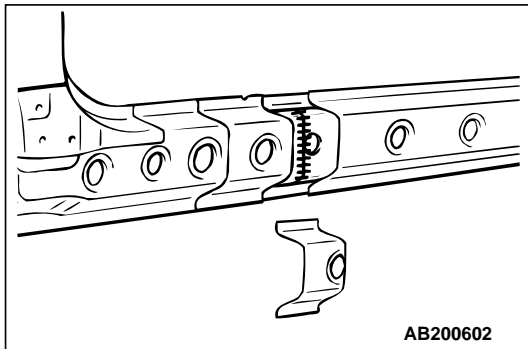


- Cut the side sill reinforcement support 50mm (1.97 in) forward of the cut area of the side sill outer reinforcement center.

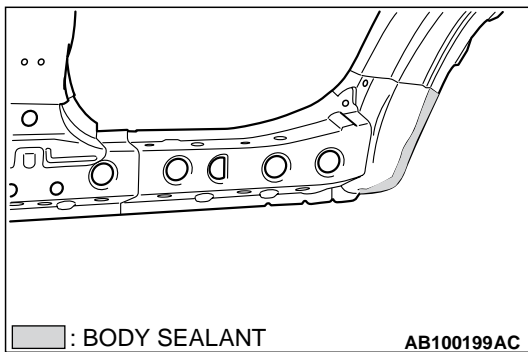


- Adhere in advance adhesives in the areas shown in the figure of the instructions when assembling the side sill outer reinforcement.

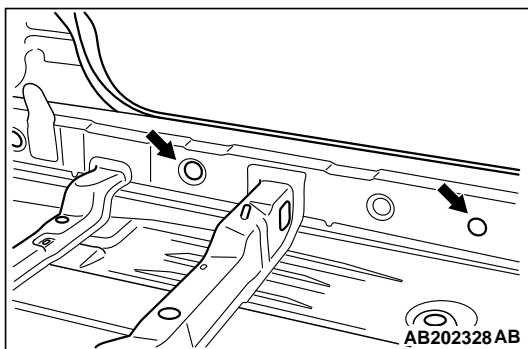
ADHESIVE	TYPE	BRAND
	Epoxyayresin adhesive	3M™ Part No.8115 or equivalent



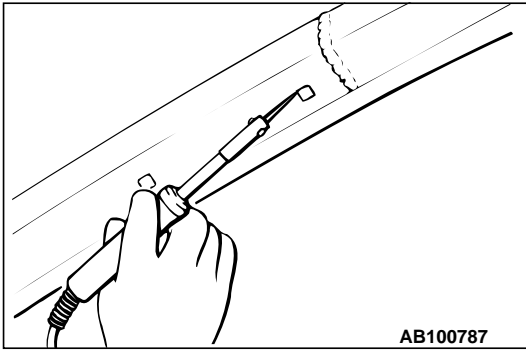
- After assembling the new parts to the body, weld the side sill reinforcement support, then weld the part cut from the side sill outer reinforcement center.



- Apply in advance body sealant in the areas shown in the figure of the instructions when assembling the side outer panel.

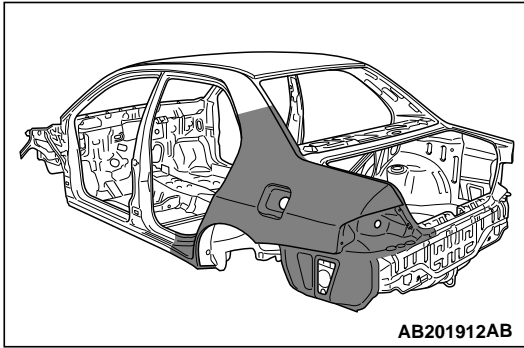


- Assemble the side outer panel, then bolt and tape the hole and flange with aluminum tape and fill the hole with foam materials as shown in the figure of the instructions.  
FOAM: 3M™ Super panel filler



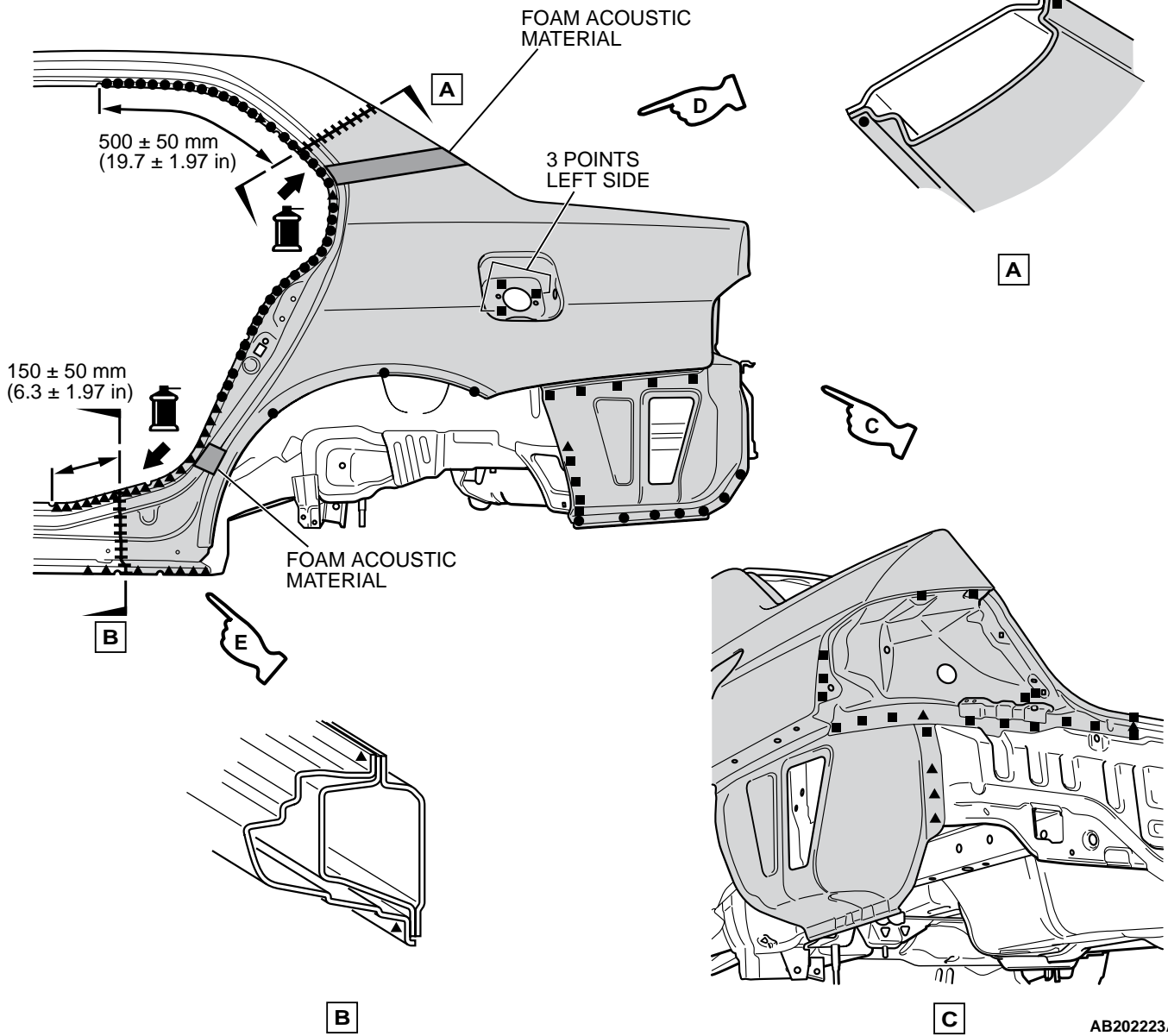
8. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape, then melt the foam materials with a soldering gun so a clip, etc. can thoroughly be inserted in the hole filled with foam materials.

# QUARTER OUTER



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)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

## REPAIR WELDS

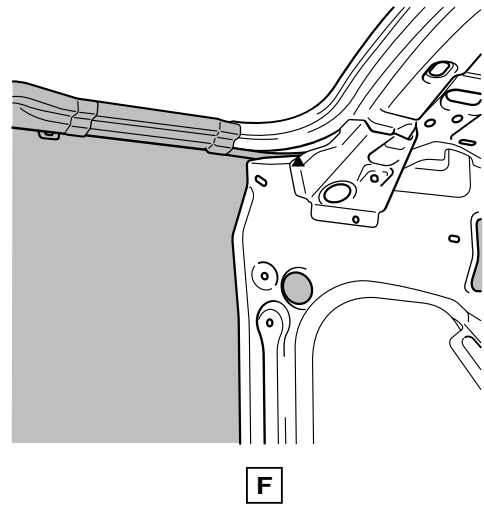
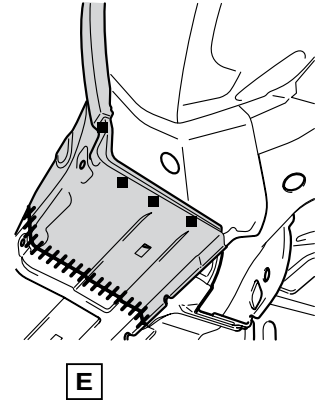
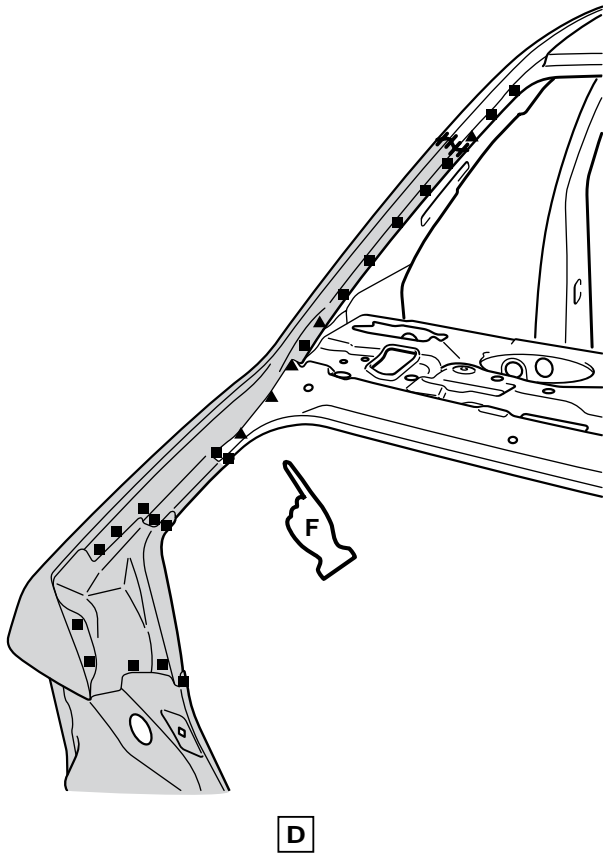


AB202223AB

### CAUTION

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



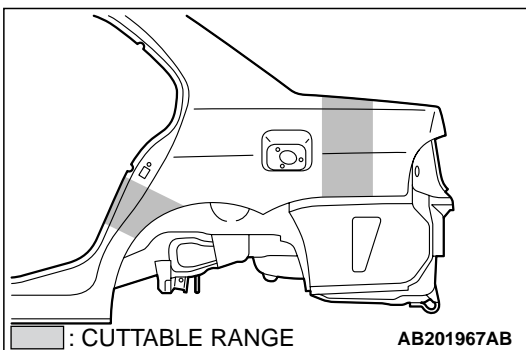


AB202224AB

**CAUTION**

**Avoid the fuel filler bracket (left side).**

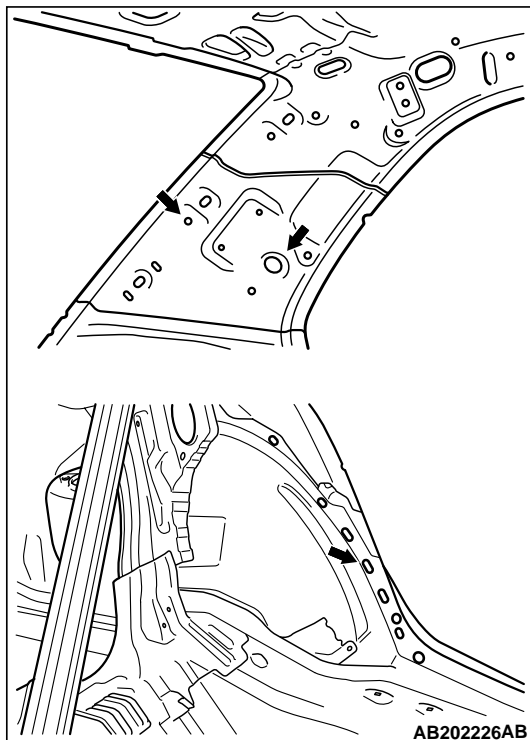
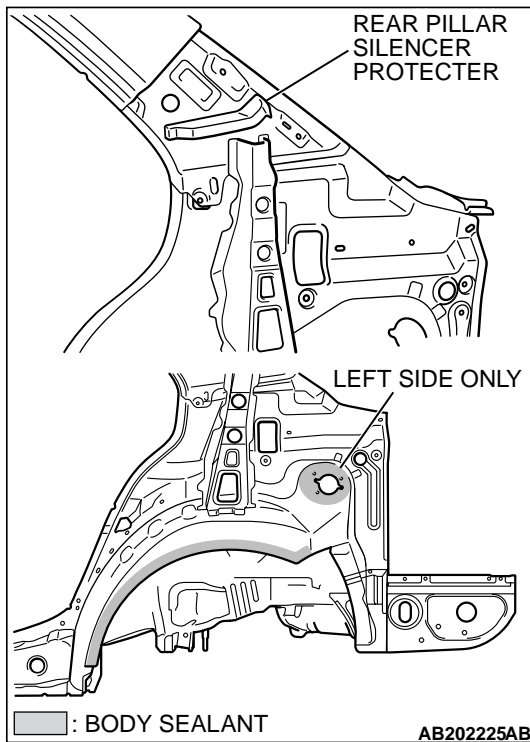
*NOTE: Parts replacement is advised. Depending on the damaged range.*



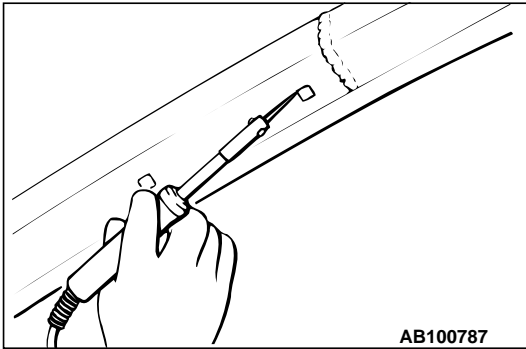
## NOTE ON REPAIR WORK

## INSTALLATION

1. Attach the rear pillar silencer protector, and fill the gaps with butyl tape. When attaching the quarter outer, apply sealant to the areas indicated in the illustration.



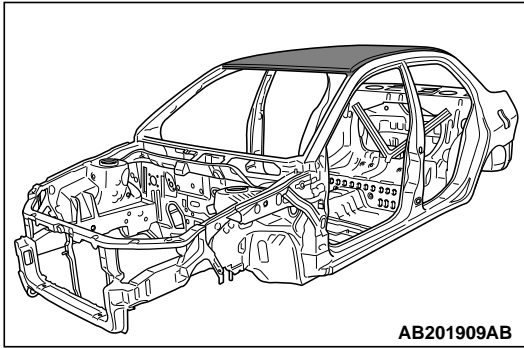
2. Assemble the quarter outer panel, bolt and tape the hole and flange with aluminum tape, then fill the hole with foam materials as shown in the figure of the instructions.  
FOAM: 3M™ ULTRAPRO Panel foam-Yellow



3. Wait 2 hours after filling the foam materials to remove the bolt and aluminum tape. Then melt the foam materials with a soldering gun so a clip, etc. can thoroughly be inserted in the hole that was clogged with foam materials, to bore open the hole.

ROOF

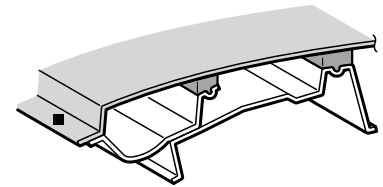
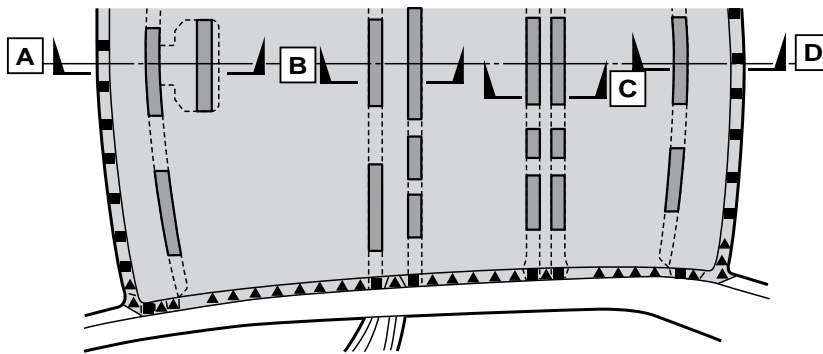
M4030011000097



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)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

STANDARD ROOF

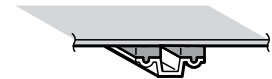
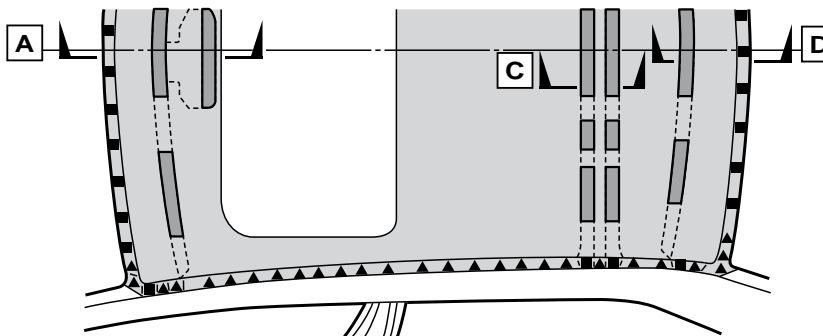


A

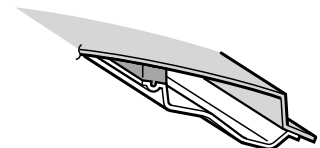


B

SUN ROOF



C



D

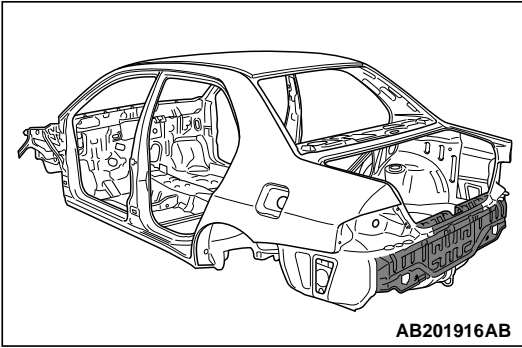
: ADHESIVE


AB202227AB

ADHESIVE	TYPE	BRAND
	Urethane body sealer	3M™ Part No. 8542 or equivalent

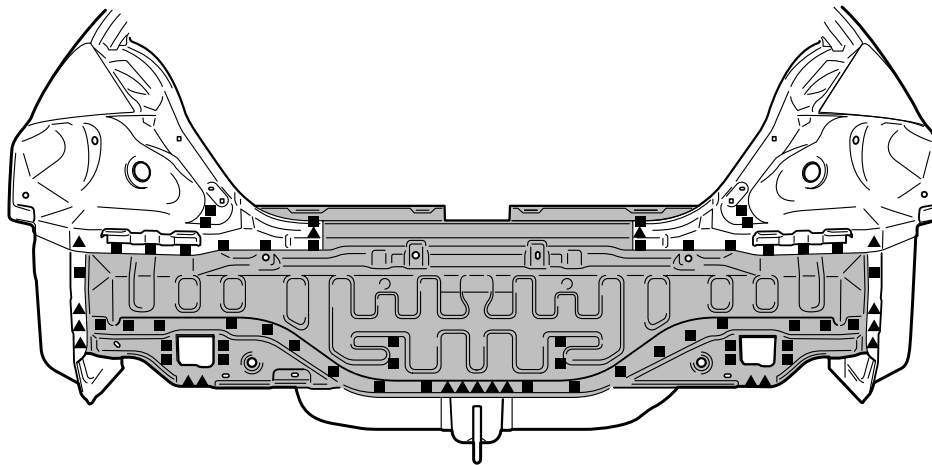
REAR END PANEL

M4030009000067



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 application locations (Use access holes to apply liberally to butt-welded joints.)

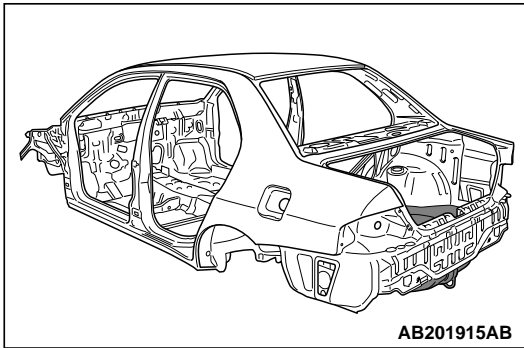
REPAIR WELDS




AB201910AB

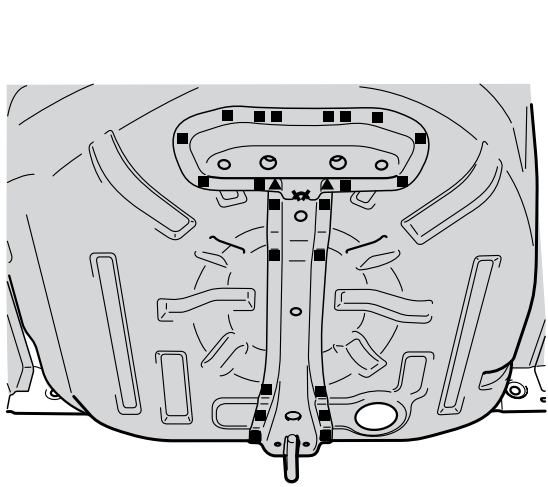
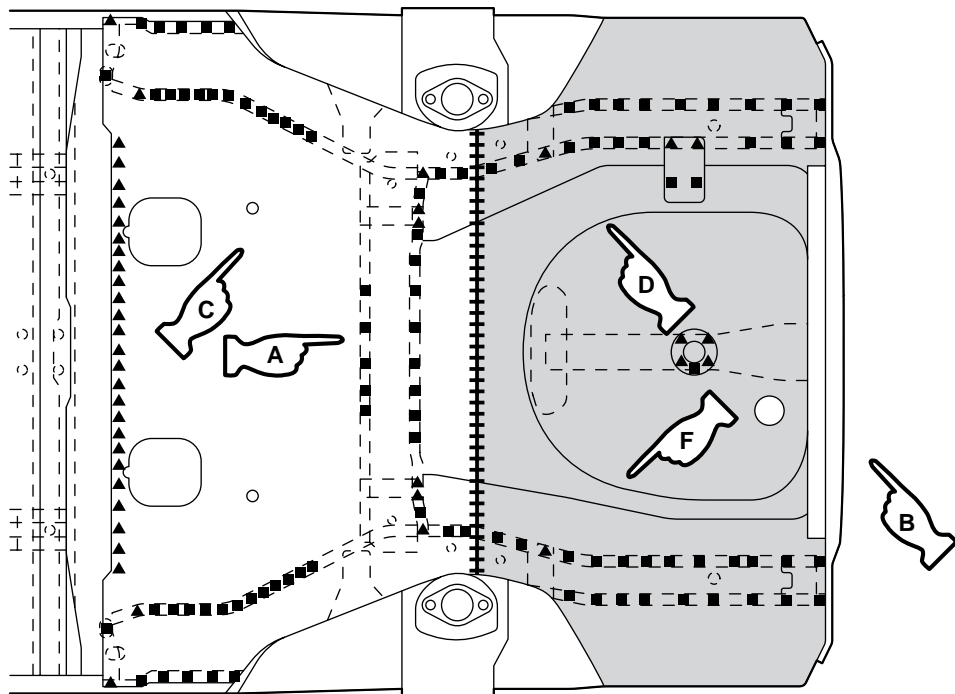
# REAR FLOOR

M403001000094

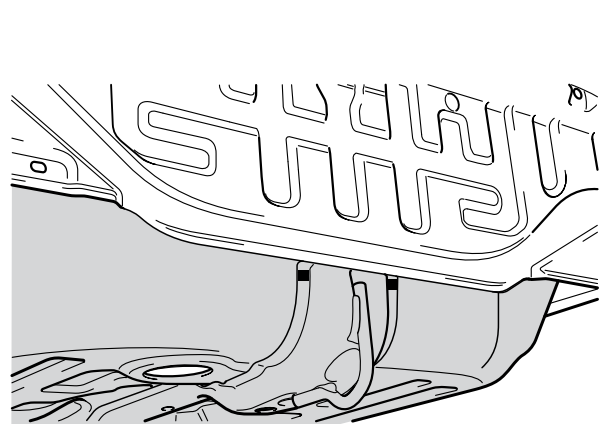


SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
#####	MIG arc welding (continuous)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply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

## REPAIR WELDS



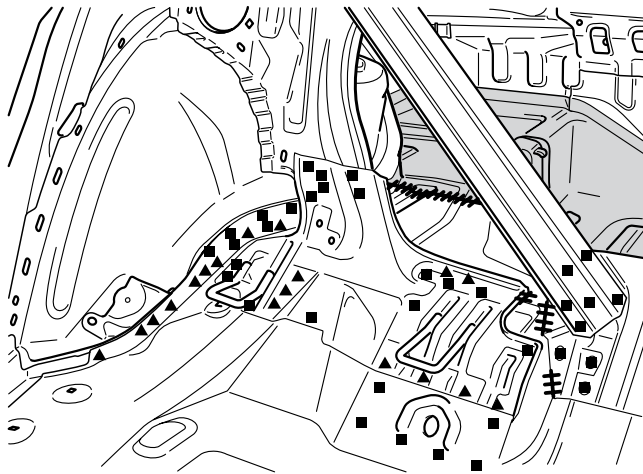
A



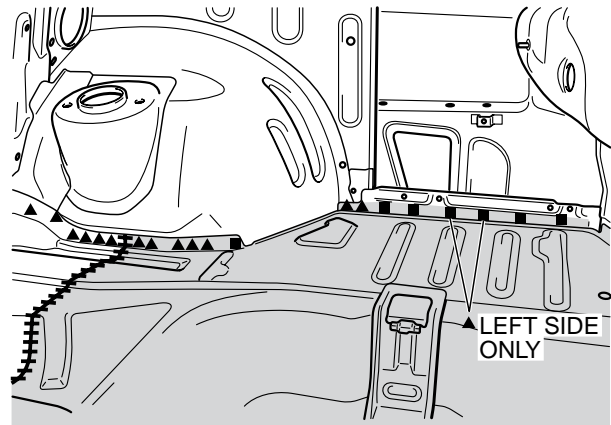
B

AB202228AB

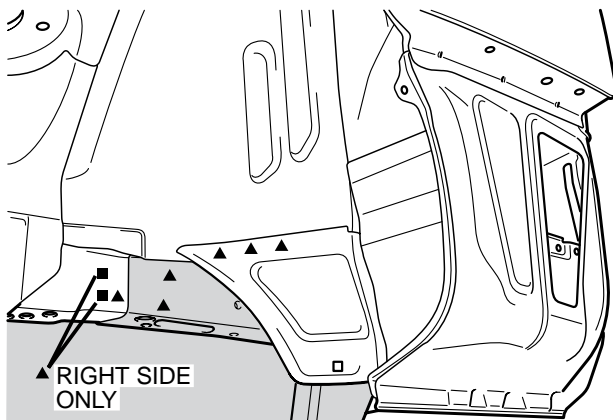
NOTE: Refer to the Rear End Panel Section on P.3- member.  
29 for the welding points with the rear end cross-



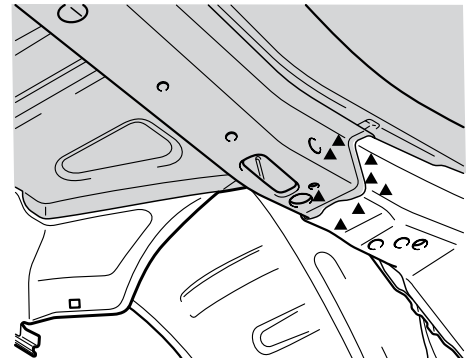
C



D



E



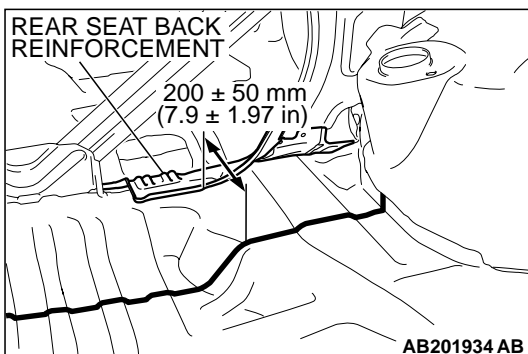
F

AB202229AB

**NOTE ON REPAIR WORK**

**REMOVAL**

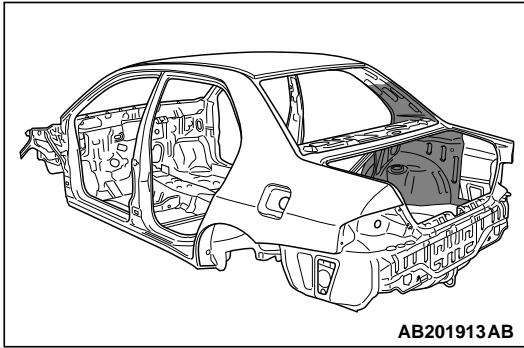
Cut the rear floor pan  $200 \pm 50$  mm ( $7.9 \pm 1.97$  in) from the back of the rear seat back reinforcement as shown in the illustration.



AB201934 AB

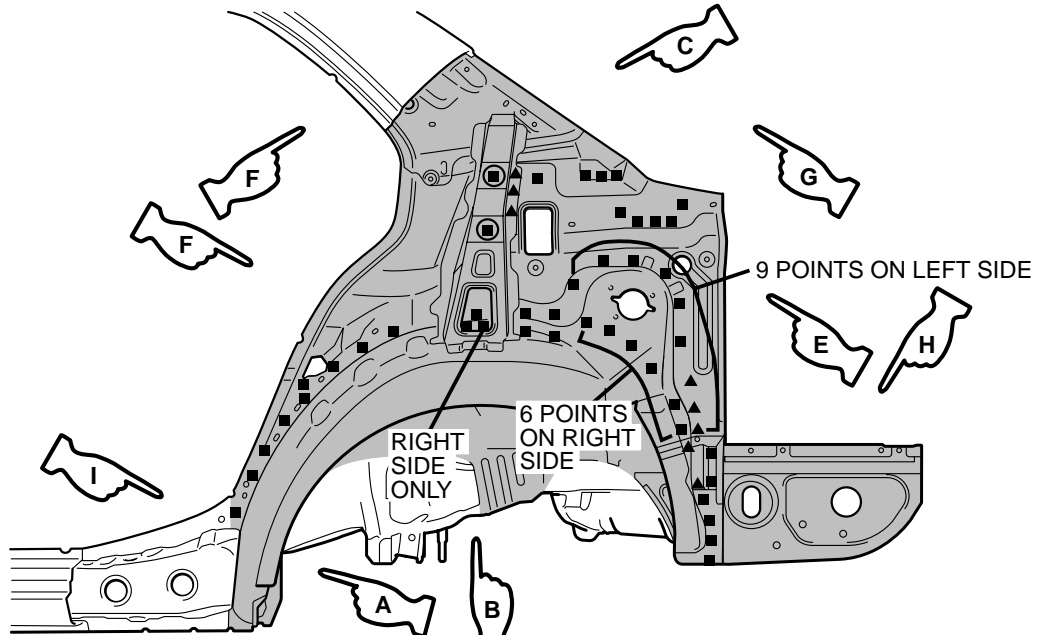
QUARTER INNER

M4030012000090

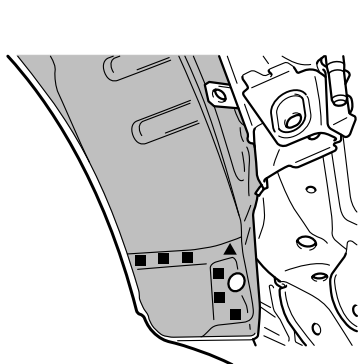


SYMBOL	OPERATION DESCRIPTION
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
++++	MIG spot welding
#####	MIG arc welding (continuous)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply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

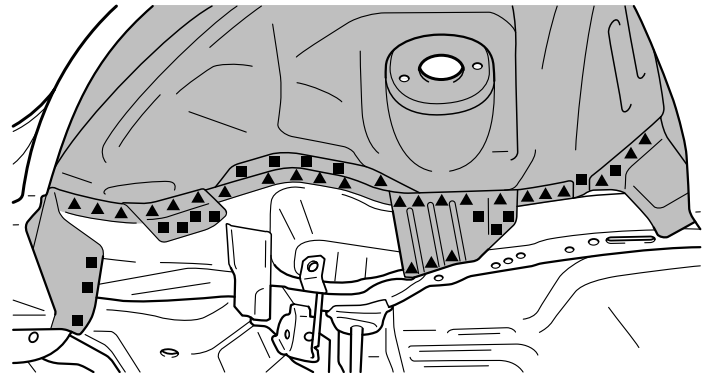
REPAIR WELDS



(WITH THE QUARTER OUTER REMOVED)



A

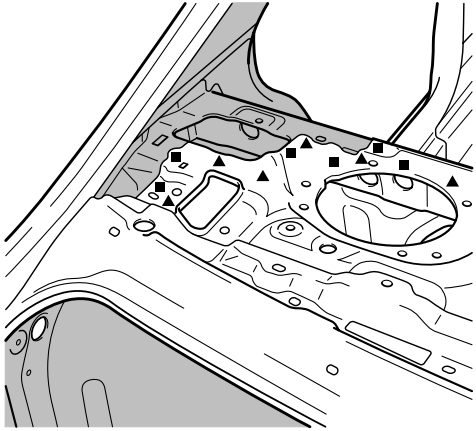


B

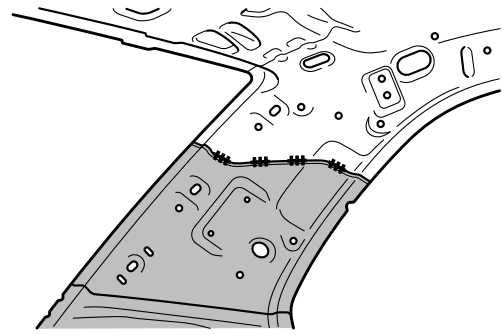
AB202230AB

NOTE: Refer to the Quarter Outer Section on P.3-24 for the welding points with the quarter outer.

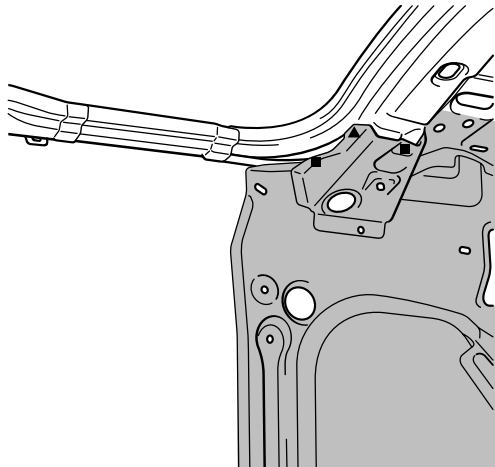




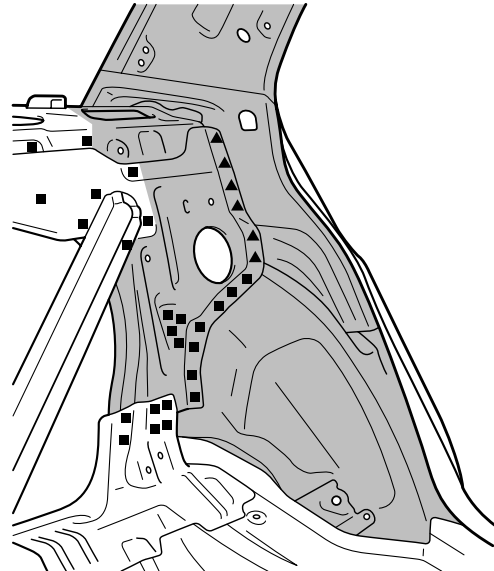
C



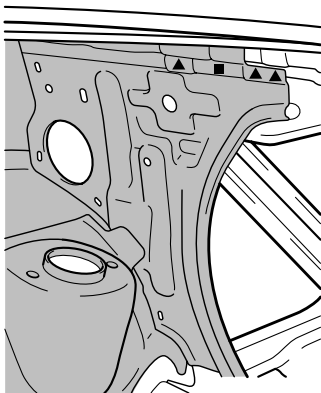
D



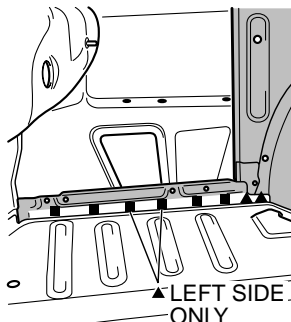
E



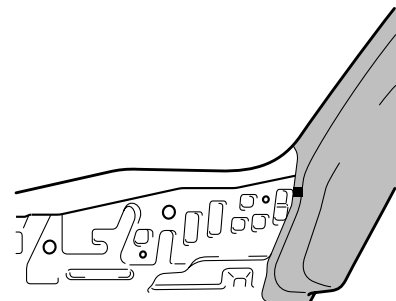
F



G



H

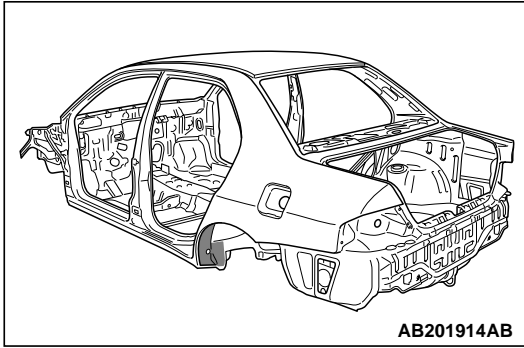


I

(WITH THE SIDE SILL OUTER REINFORCEMENT  
REAR REMOVED)

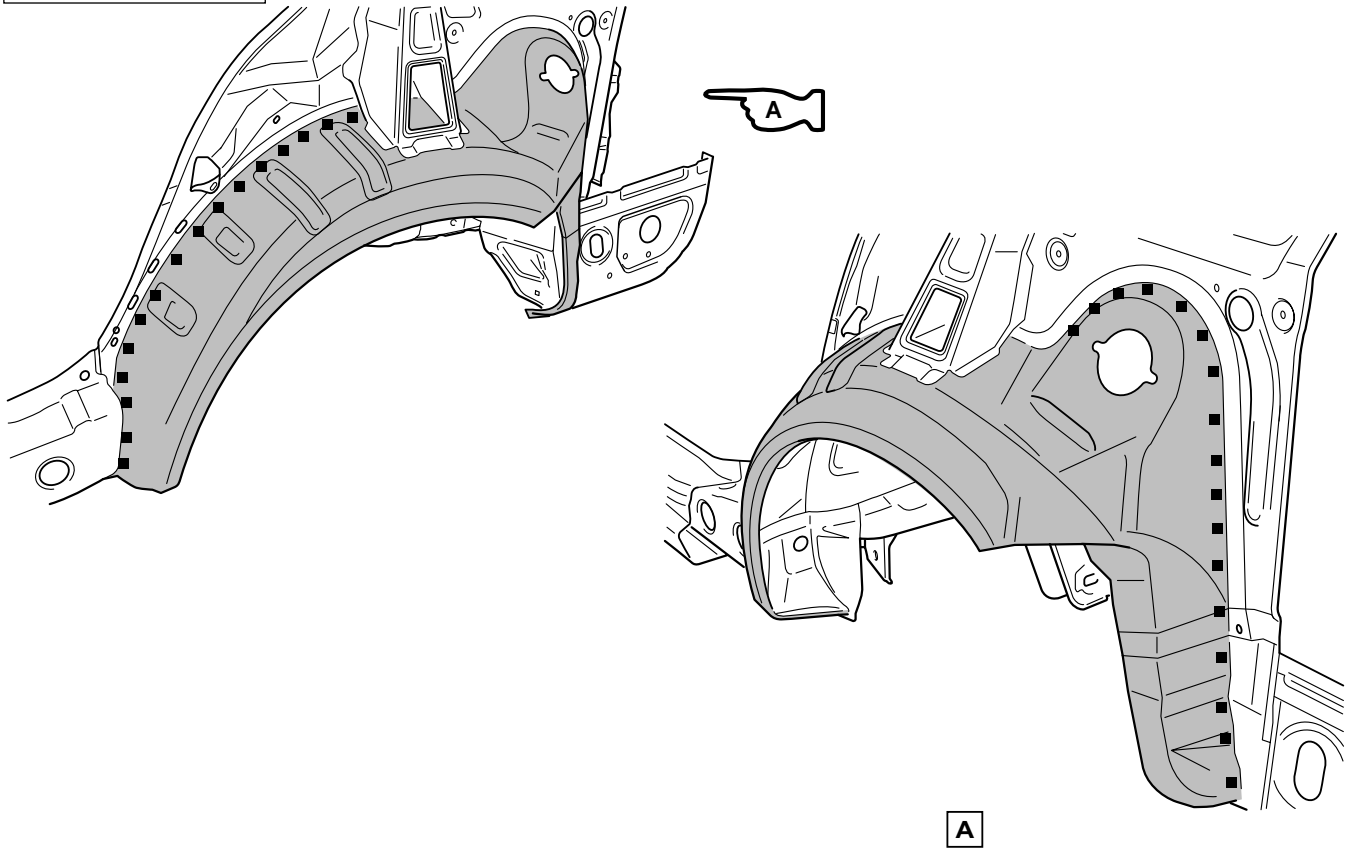
# QUARTER INNER (PARTIAL REPLACEMENT)

M4030000200031



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)
○○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

**REPAIR WELDS**



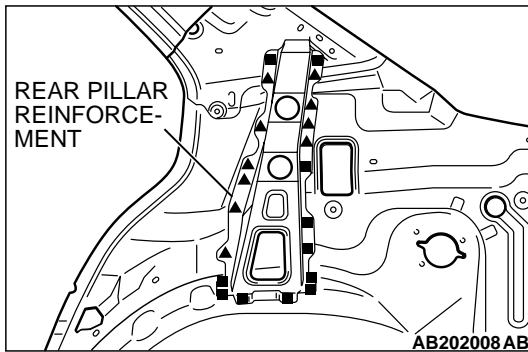
AB202232AB

**NOTE:** Refer to the Quarter Outer Section on [P.3-24](#) for the welding points with the quarter outer.

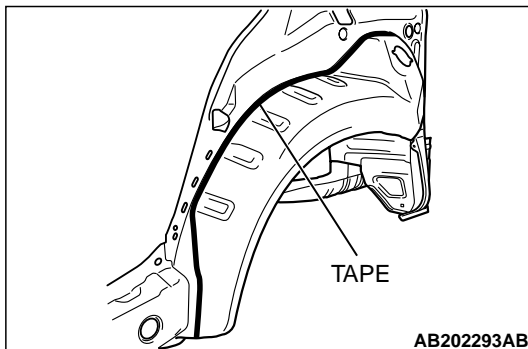
### NOTE ON REPAIR WORK

#### REMOVAL

1. Since there is a rear pillar reinforcement in the quarter inner panel cut area, remove the rear pillar reinforcement.

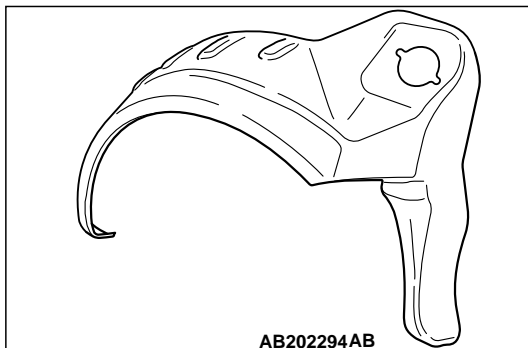


2. Adhere tape along the wheel arch of the quarter inner panel as shown in the figure of the instructions, use the tape as a guide so about 20mm (0.79 in) of the flange remains, then cut and remove.

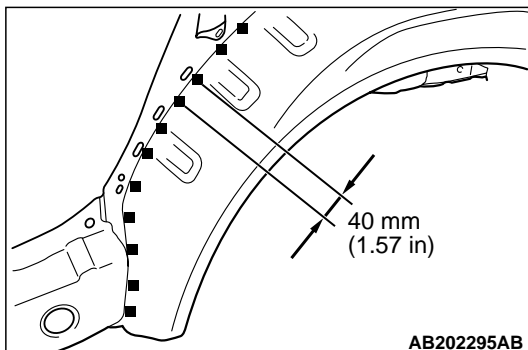


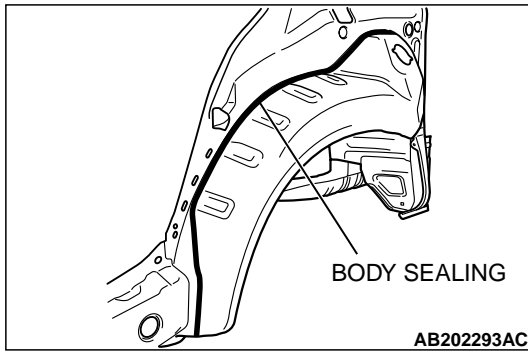
#### INSTALLATION

1. For the new quarter inner panel, cut the wheel arch end area 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 40mm (1.57 in).

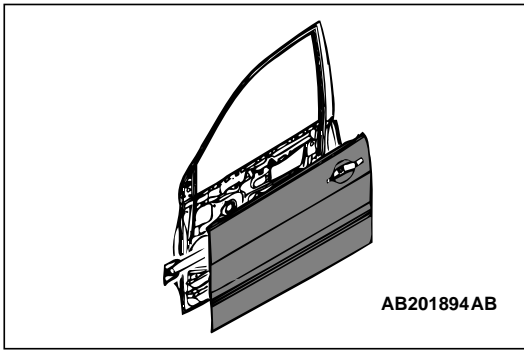




3. Weld the quarter inner panel then apply a body sealing in the area shown in the figure of the instructions.

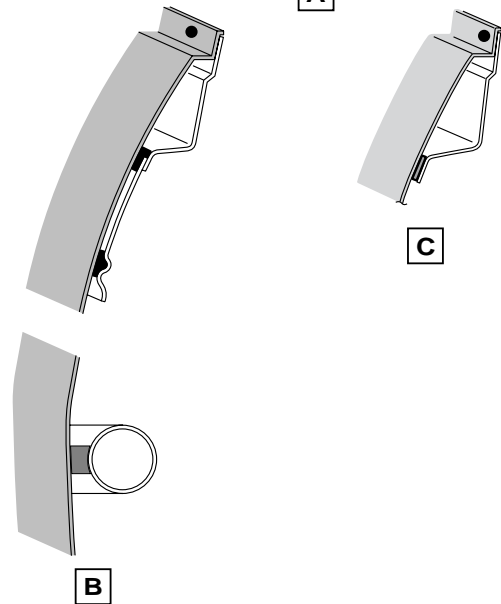
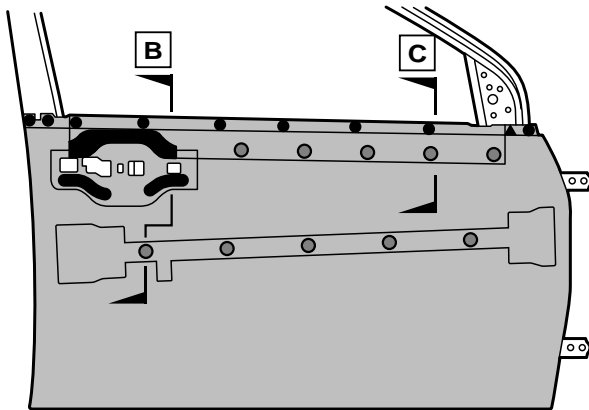
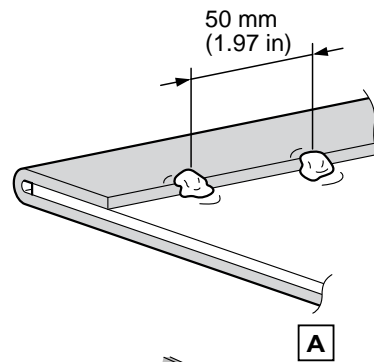
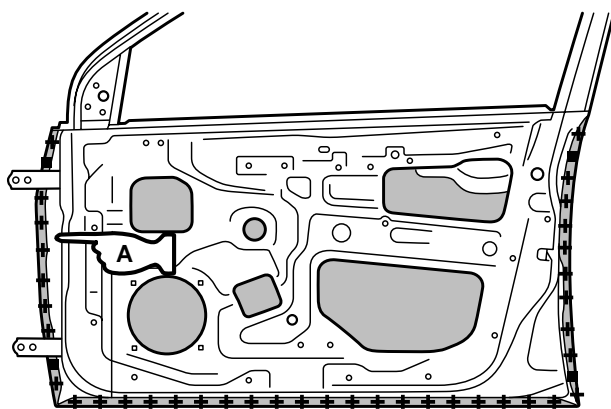
# FRONT DOOR OUTER PANEL

M4030013000093



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)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

## REPAIR WELDS



■ : ADHESIVE 1  
■ : ADHESIVE 2

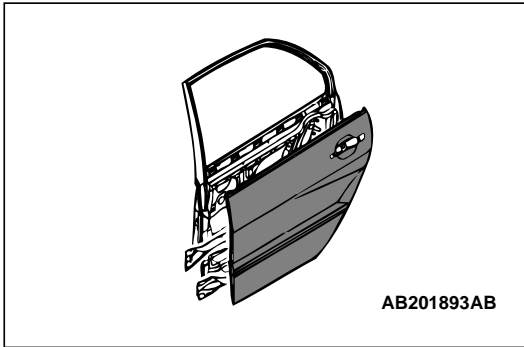
AB202233AB

ADHESIVE	TYPE	BRAND
adhesive 1	Urethane body sealer	3M™ Part No. 8542 or equivalent
adhesive 2	Epoxyayresin adhesive	3M™ Part No. 8115 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 in).

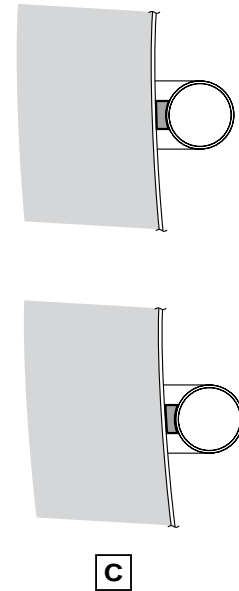
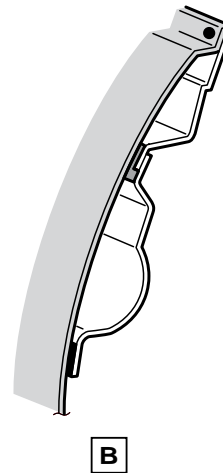
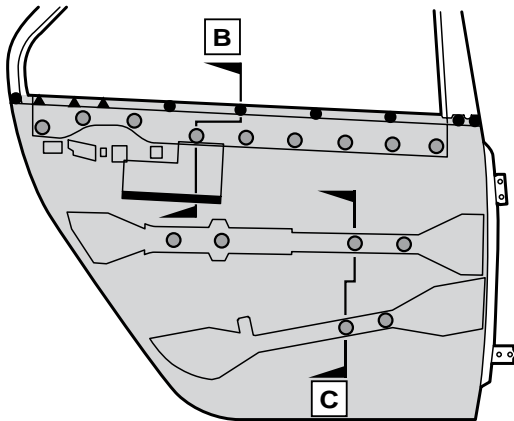
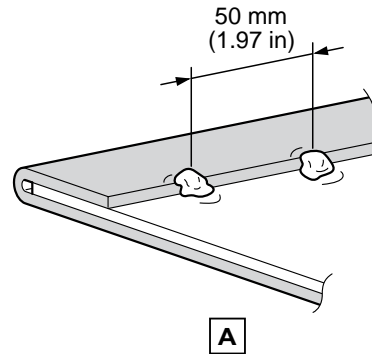
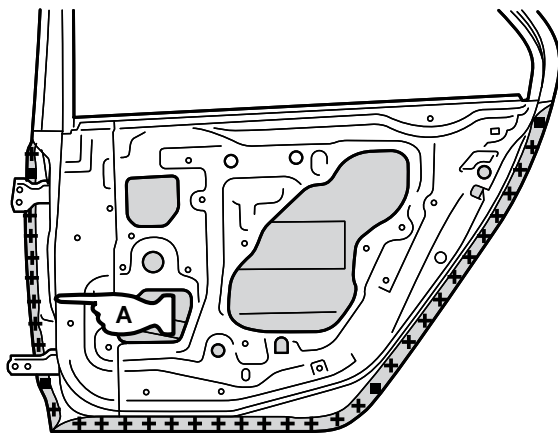
# REAR DOOR OUTER PANEL

M4030014000096



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)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

## REPAIR WELDS



■ : ADHESIVE 1  
■ : ADHESIVE 2

AB202234AB

ADHESIVE	TYPE	BRAND
adhesive 1	Urethane body sealer	3M™ Part No. 8542 or equivalent
adhesive 2	Epoxyayresin adhesive	3M™ Part No. 8115 or equivalent

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

## ALUMINUM PANEL

### ALUMINUM PANEL CHARACTERISTICS

M4030000500010

#### 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.

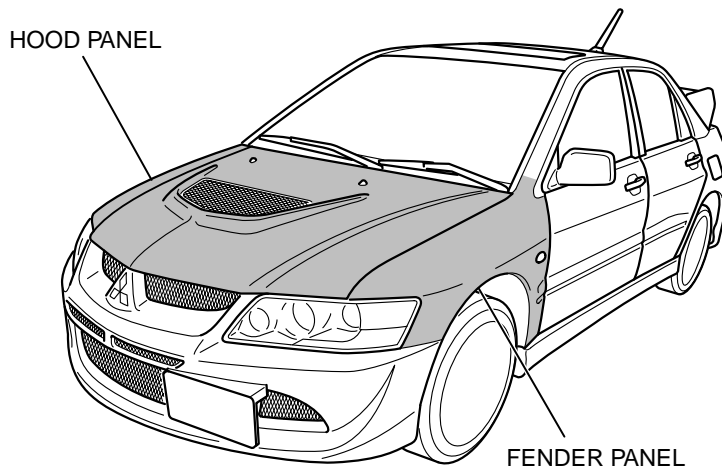
#### Advantage of aluminum panel

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

### ALUMINUM PANEL LOCATIONS

M4030000600017



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## ALUMINUM PANEL REPAIR

M4030000700014

### Items to be noted when working on sheet metal

1. Main differences of sheet metal work

WORK DESCRIPTION	ALUMINUM 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
MIG welding	Possible by a welding machine for aluminum and argon gas	Possible by a general welding machine and CO <sub>2</sub> gas

2. If strong impact is given under low temperature, its strength becomes low and may be cracked.
3. The springback is large due to high elastic modules.
4. The thermal effect is large due to high heat conductivity.
5. If excessively heated, the strength will be deteriorated. Further heating will cause melting without discoloration. [Appropriate heating temperature is approximately 250°C (482°F)]

MATERIAL	MELTING TEMPERATURE
ALUMINUM	475 to 660 °C (887 to 1220 °F)
STEEL SHEET	1500 to 2500 °C (2732 to 4532 °F)

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, its surface will exfoliate and cause loading of the disk sander.
8. Because the disk sander with the loading will damage the aluminum panel, replace it with a new one as soon as possible.
9. General tools and sanding tools shall not be shared for both aluminum and steel panels. (Iron powder remaining on the surface may cause electric corrosion with a different type of metal.)
10. During MIG welding, protect things in perimeter because the spatters are hard to see, and spread father than expected.



### Correction of uneven surface

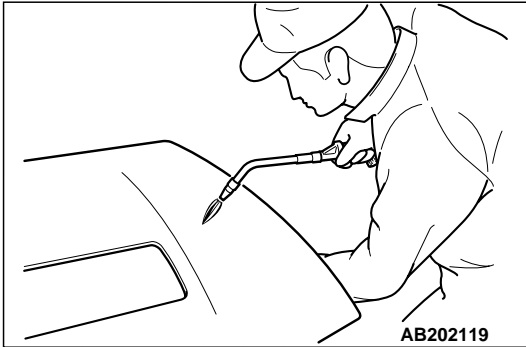
Basically, the same as the steel panel. Work with consideration of characteristics of the aluminum panel.

1. Correction of metal sheet:

**⚠ CAUTION**

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

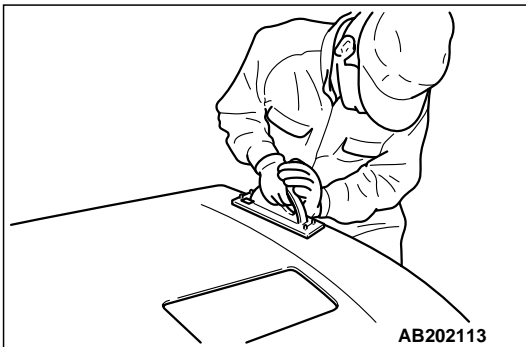
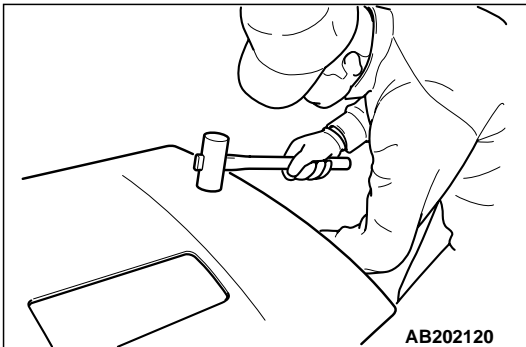
(1) Heat with the burner.



**⚠ CAUTION**

Try to prevent stretch and hardening, and not to leave any hammer dent.

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

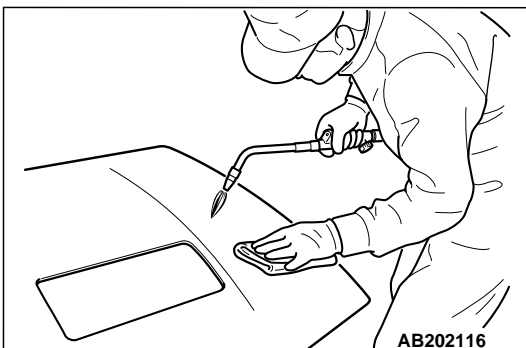


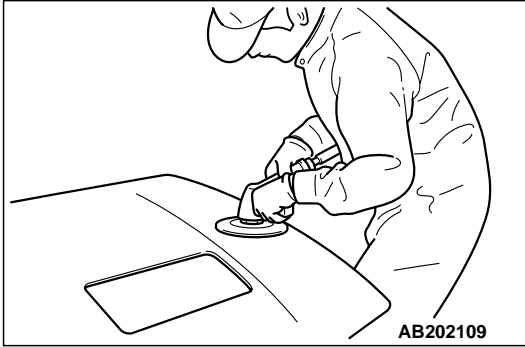
2. Distortion check: Grind the surface with 80 to 120-grit sandpaper and then check for distortion.

**⚠ CAUTION**

- The surface shall be heated to approximately 250°C (482°F) when correcting distortion.
- Care must be taken when heating the panel because it can melt without discoloration.
- Cover the perimeter area with a wet rag or the like to prevent temperature increase and distortion.
- Do not use a draw hammer designed for steel sheets because it may cause the panel crack.

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





**⚠ CAUTION**

Aluminum plates are softer than steel sheets, therefore select an appropriate abrasive to prevent the surface from deep scratch.

4. Sanding: Grind the surface by a disk sander or a double-action sander.
  - Disk sander: 100 to 120 grit
  - Double-action sander: 150 to 180 grit

### Correction of cuts and cracks

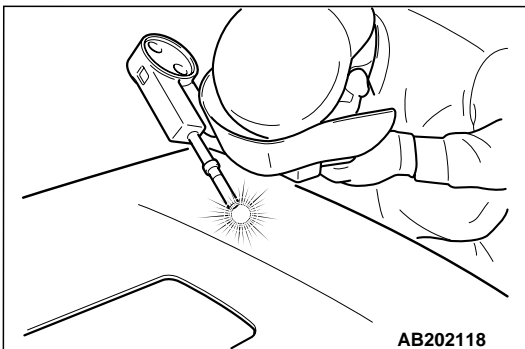
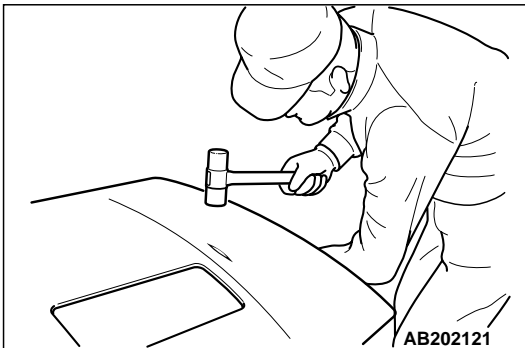
For steel panel, MIG welding with CO<sub>2</sub> is used to correct cuts, cracks, or holes, however, for aluminum panel, use MIG or TIG welding with argon gas (inert gas) as shielding gas.

### MIG welding

**⚠ CAUTION**

- Caution for excessive stretch or damage of the panel.
- Minimize the gap of the butt joint.

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



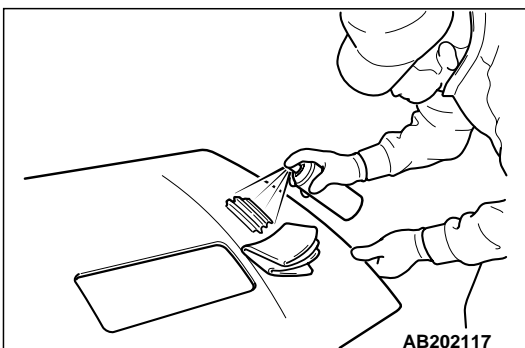
**⚠ CAUTION**

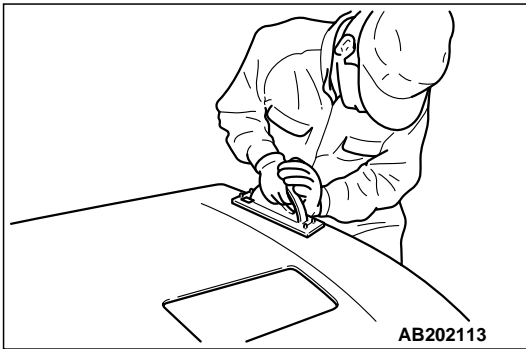
- To minimize distortion and meltdown, divide a welding area into several short segments, and weld one segment at a time.
  - Degrease the welding area by white gasoline or the like.
  - Remove the oxide coating on the welding area, including its back, with a stainless steel wire brush just before welding. Welding shall be started as soon as the oxide coating is removed.
2. Welding: Use a special welding machine for both aluminum panels or a welding machine for aluminum panels and steel sheets.

**⚠ CAUTION**

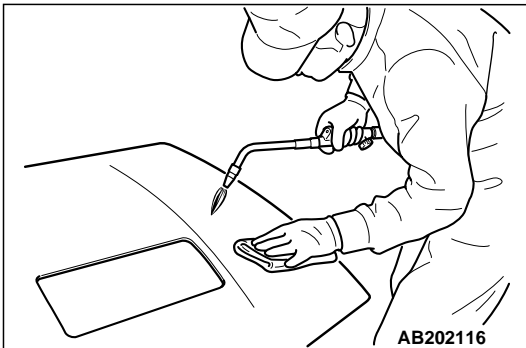
**Do not over-grind the base of the panel.**

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





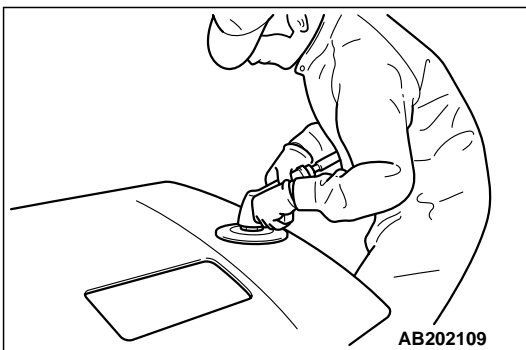
4. Check for distortion: Grind the surface with 80 to 120-grit sandpaper and then check for distortion.



**⚠ CAUTION**

- The surface shall be heated to approximately 250°C (482°F) when correcting distortion.
- Care must be taken when heating the panel because it can melt without discoloration.
- Cover the perimeter area with a wet rag or the like to prevent temperature increase and distortion.
- Do not use a draw hammer designed for steel sheets because it may cause the panel crack.

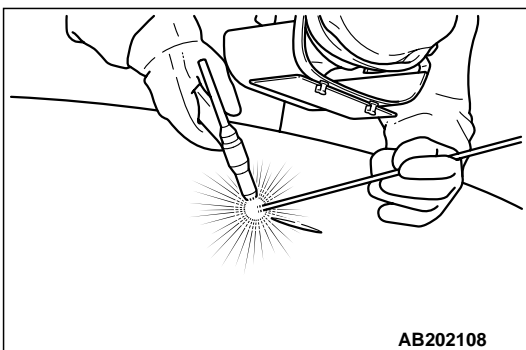
5. Straightening: Remove distortion by the draw correction procedure with a flattening hammer and a burner.



**⚠ 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.

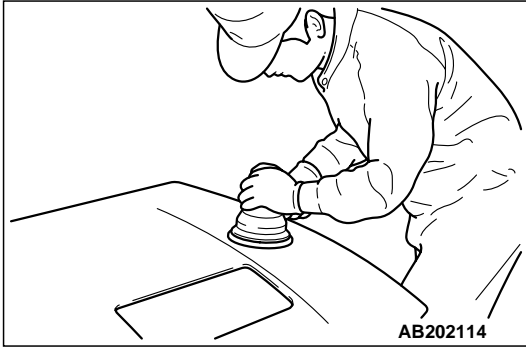
6. Finishing: Finish the surface with a 100 to 120-grit disk sander.



**TIG welding**

Welding procedure is the same as MIG welding, however, it uses a welding rod instead of electrode wire.

**Diameter of welding rod: 1.6 mm (0.063 in.)**



### 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.

**⚠ CAUTION**

**Do not apply a forced drying with temperature of 60°C (140°F) or higher.**

6. Apply putty for metal sheets, and dry it naturally.
7. Grind with a 180-grit sander.

### ALUMINUM PANEL PAINT

M4030000800011

#### Painting in production line

Same as painting for normal steel sheets.

#### Repair painting

Always follow the notice because aluminum panels do not have as good paint adhesion as normal steel sheets. The following is a general paint procedure:

*NOTE: Refer to paint manufacturers' paint specifications for details.*

**⚠ CAUTION**

**Avoid hasty grinding and minimize grinding heat.**

1. Remove old paint film.
2. Clean and degrease the painted surface.

**⚠ CAUTION**

**Apply 2-liquid type epoxy primer to the base of the aluminum panel.**

3. Apply wash primer to the painted surface.

**⚠ CAUTION**

**Do not apply a forced drying with temperature of 60°C (140°F) or higher.**

4. Allow the painted surface to dry.
5. Apply primer surfacer to the painted surface.

**⚠ CAUTION**

**Do not apply a forced drying with temperature of 60°C (140°F) or higher.**

6. Allow the painted surface to dry.
7. Allow the painted surface to dry.
8. Clean and degrease the painted surface.
9. Apply top coating.

**⚠ CAUTION**

**Do not apply a forced drying with temperature of 60°C (140°F) or higher.**

10. Allow the painted surface to dry.