

0

Honda CR-V Body Repair

[Introduction.....](#) 0-2

[Table of Contents.....](#) 0-3

[Index.....](#) 0-7

1

General Info

2

Preparation
of Work

3

*Replacement

4

Body
Dimensional
Drawings

5

Rust
Prevention

6

Paints

Introduction

How to use this manual

This manual covers the repairs of 2002 CR-V that have been involved in an accident, and it describes the work related to the replacement of damaged body parts.

Please read through these instructions and familiarize yourself with them before actually using this manual.

NOTE: Refer to the 2002 CR-V Shop Manual, P/N. 62S9A00 for specifications, wire harness locations, safety stand support points, etc.

Special Information



WARNING



You CAN be KILLED or SERIOUSLY HURT if you don't follow instructions.



CAUTION



You CAN be HURT if you don't follow instructions.

NOTE: Gives helpful information.



CAUTION



Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. Please note that this manual does contain warnings and cautions against some specific service methods which could cause PERSONAL INJURY, damage a vehicle, or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by Honda, might be done or of the possible hazardous consequences of each conceivable way, nor could Honda investigate all such ways. Anyone using service procedures or tools, whether or not recommended by Honda, must satisfy himself thoroughly that neither personal safety or vehicle safety will be jeopardized.

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Sections with an * include SRS components; special caution is required when servicing

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Table of Contents

Honda CR-V Body Repair

Table of Contents	0-3
Index	0-7

General Information

Supplemental Restraint System (SRS)	1-2
SRS Component Replacement / Inspection After Deployment	1-3
Identification Number Locations	1-4
Lift and Support Points	1-5
Frame Hoist	1-5
Safety Stands	1-5
Floor Jack	1-5
Body Specifications / Wheel Alignment	1-6
Exterior Parts Removal / Installation	1-7
Tailgate Compartment Parts Removal / Installation	1-8
Body Construction	1-9
Door and Bumper Reinforcement Beams	1-10
Zinc-plated Steel Plate Repair	1-11
Color Chart Paint Specifications	1-12
Types and Materials of Exterior Plastic Parts	1-14

Preparation of Work

Outline of Body Repair	2-2
General Safety Precaution	2-3
Accurate Inspection of Damaged Parts (Visual)	2-4
Description	2-4
Measurement	2-5
Reshaping	2-6
Correction of the Damaged Area	2-6
Replacement	2-7
Removal	2-7
Installation	2-8
Rust Prevention / Paint	2-10
Installation and Inspection	2-11
Repair Tools	2-12
Measurement Equipment	2-12
Protective Tools	2-12

Introduction

Processing Tools	2-13
Cutting Tools	2-13
Shaping Tools	2-14
Fixing Tools	2-15
Welders	2-16
Sanding Tools	2-16
Welding Methods	2-17
Spot Welding	2-17
Carbon Dioxide Arc Welder (MIG Arc Weld)	2-19
Gas Welding	2-20

Replacement

Front Bulkhead	3-2
Mass Production Body Welding Diagram	3-2
Removal	3-3
Installation	3-3
Front Wheelhouse / Damper Housing	3-4
Mass Production Body Welding Diagram	3-4
Removal	3-5
Installation	3-7
Front Side Frame / Outrigger	3-9
Mass Production Body Welding Diagram	3-9
Removal	3-10
Installation	3-12
Front Pillar Outer Panel	3-14
Mass Production Body Welding Diagram	3-14
Removal	3-15
Installation	3-16
Side Sill Outer Panel	3-17
Mass Production Body Welding Diagram	3-17
Removal	3-18
Installation	3-19
Roof Panel	3-20
Mass Production Body Welding Diagram	3-20
Removal	3-21
Installation	3-22
Rear Side Outer Panel	3-23
Mass Production body Welding Diagram	3-23
Removal	3-25
Installation	3-27
Rear Panel	3-29
Mass Production Body Welding Diagram	3-29
Removal	3-30
Installation	3-31
Rear Floor / Rear Floor Cross-member	3-32

Mass Production Body Welding Diagram	3-32
Removal.....	3-33
Installation.....	3-34

Body Dimensional Drawings

Upper Body Measuring Dimensions	4-2
Engine Compartment.....	4-2
Engine / Transmission Mount Positions.....	4-3
Passenger's Compartment	4-3
Rear Panel / Rear Pillar Gutter Positions	4-4
Tailgate Hinge Mount Position.....	4-4
Opening Repair Chart.....	4-5
Under Body Measuring Dimensions	4-6
Engine Compartment and Front Floor Under View.....	4-6
Middle and Rear Floor Under View.....	4-7
Frame Repair Chart	4-8
Top View.....	4-8
Side View.....	4-10

Rust Prevention

Cross Section of Body and Sealants	5-2
General	5-2
Engine Compartment, Front Wheelhouse, and Damper Housing	5-3
Dashboard Upper, Dashboard Lower, and Roof Panel	5-4
Front Floor and Rear Floor	5-5
Rear Side Outer Panel, and Rear Panel.....	5-6
Under Floor, and Rear Wheelhouse	5-7
Soft Chipping Guard Primer Coat	5-8
General	5-8
Coating Diagram.....	5-9
Rust-preventive Treatments	5-10
General	5-10
Undercoating Diagram.....	5-11
Area to be Covered by Anti-rust Agents	5-12
Materials and Tools	5-13

Paints

General Safety Precaution	6-2
Body Paint	6-3
General	6-3
Refinishing Processes	6-4
Preprocessing of Painting.....	6-5
Treatment of Metal Surface	6-6
Undercoating	6-7
Intermediate Coating	6-8

Introduction

- Top Coating 6-9
- 3-coat Pearl (White Pearl) Paint 6-11**
 - Coating Procedures 6-11
 - Painting Repair (Gradation) 6-12
- Plastic Parts Paint 6-15**
 - Features of Plastic Material 6-15
 - Use of the Repair Material (reference)..... 6-17
 - Refinishing Processes 6-18
 - Preprocessing of Painting 6-19
 - Undercoating..... 6-19
 - Intermediate Coating..... 6-21
 - Top Coating 6-22
- Glossary 6-23**

Index

B

Body Construction	1-9
--------------------------------	------------

Body Repair

Frame Repair Chart	4-8
General Safety Precaution	2-3
Inspection of Damaged Part	2-4
Installation and Inspection	2-11
Opening Repair Chart	4-5
Procedures	2-2
Replacement of the Damaged Area	2-7
Reshaping of the Damaged Area	2-6
Tools	2-12
Welding Methods	2-17
Zinc-plated Steel Plate	1-11

Body Replacement

Front Bulkhead	3-2
Front Pillar Outer Panel	3-14
Front Side Frame / Outrigger	3-9
Front Wheelhouse / Damper Housing	3-4
Rear Floor / Rear Floor Cross-member	3-32
Rear Panel	3-29
Rear Side Outer Panel	3-23
Roof Panel	3-20
Side Sill Outer Panel	3-17

Body Specifications	1-
----------------------------------	-----------

D

Dimensional Drawings

Under Body	4-
Upper Body	4-

E

Exterior Parts

Installation	1-
Removal	1-

Exterior Plastic Parts

Materials	1-
Types	1-

I

Identification Numbers

Locations	1-
-----------------	----

Introduction

L

Lift and Support Points

Floor Jack	1-
Frame Hoist	1-
Safety Stands	1-

P

Paint

Body	6-
Color Chart	1-
General Safety Precautions	6-
Glossary	6-
Plastic Parts	6-

R

Reinforcement Beams

Bumper	1-
Door	1-

Rust Prevention

Cross Sections of Body	5-
Materials	5-
Primer Coat	5-
Sealants	5-
Tools	5-
Treatments	5-

S

Supplemental Restraint System (SRS)	1-
---	----

W

Wheel Alignment

Front	1-
Rear	1-

1

1 General Information

General Information

Supplemental Restraint System (SRS).....	1-2
SRS Component Replacement / Inspection After Deployment	1-3
Identification Number Locations	1-4
Lift and Support Points	1-5
Body Specifications / Wheel Alignment	1-6
Exterior Parts Removal / Installation	1-7
Tailgate Compartment Parts Removal / Installation	1-8
Body Construction	1-9
Door and Bumper Reinforcement Beams	1-10
Zinc-plated Steel Plate Repair	1-11
Color Chart Paint Specifications	1-12
Types and Materials of Exterior Plastic Parts	1-14

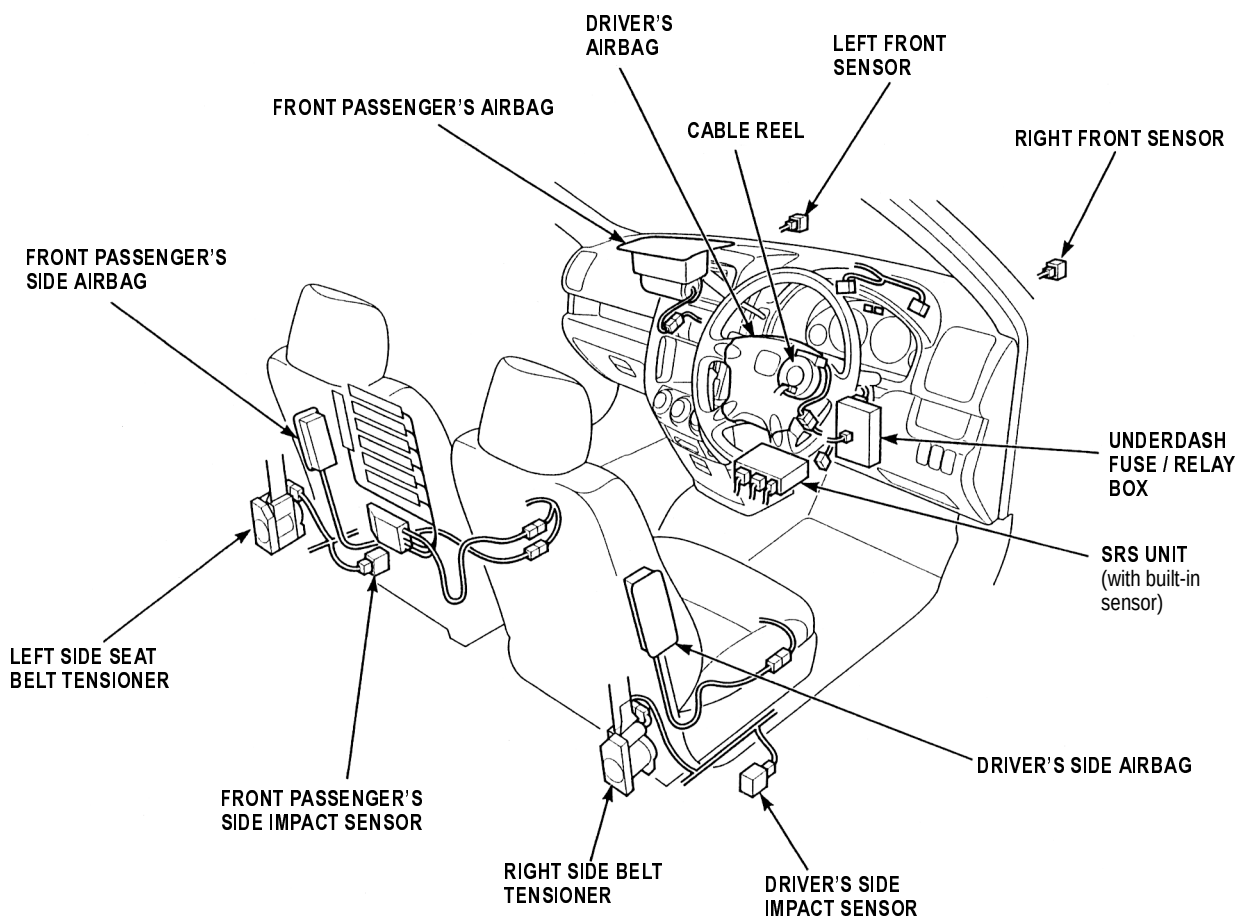
General Information

Supplemental Restraint System (SRS)

This model has an SRS which includes a driver's airbag in the steering wheel hub, a passenger's airbag in the dashboard above the glove box, seat belt tensioners in the front seat belt retractors, and side airbags in the front seat-backs. The SRS unit is separate from the airbag assembly and has built-in sensors. The following precautions should be observed when performing sheet metal work, paint work, and repair work around the locations of the SRS components.

1. The SRS unit (including the safing sensor and the impact sensor) is located under the dashboard and the side impact sensors are located in each side sill. The front impact sensors are located behind the right and left ends of the front bumper. Avoid any strong impact with a hammer or other tools when repairing the front side frame, the lower part of the dashboard, and the side sill. Do not apply heat to these areas with a torch, etc.
2. Take extra care when painting or doing body work in the area below the centre pillar. Do not expose the seat belt retractor and tensioner to heat guns, welding, or spraying equipment.
3. SRS electrical wiring harness and connectors are identified with yellow color coding. Care should be taken not to damage the harness when repairing this area.
4. Do not apply heat of more than 100°C (212°F) when drying painted surfaces anywhere around the locations of SRS components.
5. If strong impact or high temperature needs to be applied to the areas around the locations of SRS components, remove the components before performing the repair work.
6. If any of the SRS related components are damaged or deformed, be sure to replace them.

NOTE: Refer to the Restraints section of the Shop Manual for after-deployment procedures and removal and replacement of SRS related components.



SRS Component Replacement / Inspection After Deployment

NOTE: Before doing any SRS repairs, use the PGM Tester SRS menu method to check for DTCs; refer to the DTC Troubleshooting Index for the less obvious deployed parts (seat belt tensioners, OPDS Sensor, side airbag sensors, etc.)

After a collision where the seat belt tensions deployed, replace these items:

- Seat belt tensioners
- Seat belt buckle tensioners
- SRS unit
- Front sensors

After a collision where the frontal airbag(s) deployed, replace these items:

- SRS unit
- Deployed airbag(s)
- Seat belt tensioners
- Seat belt buckle tensioners
- Front sensors

After a collision where the side airbag(s) deployed, replace these items:

- SRS unit
- Deployed side airbag(s)
- Side impact sensor(s) for side(s) deployed

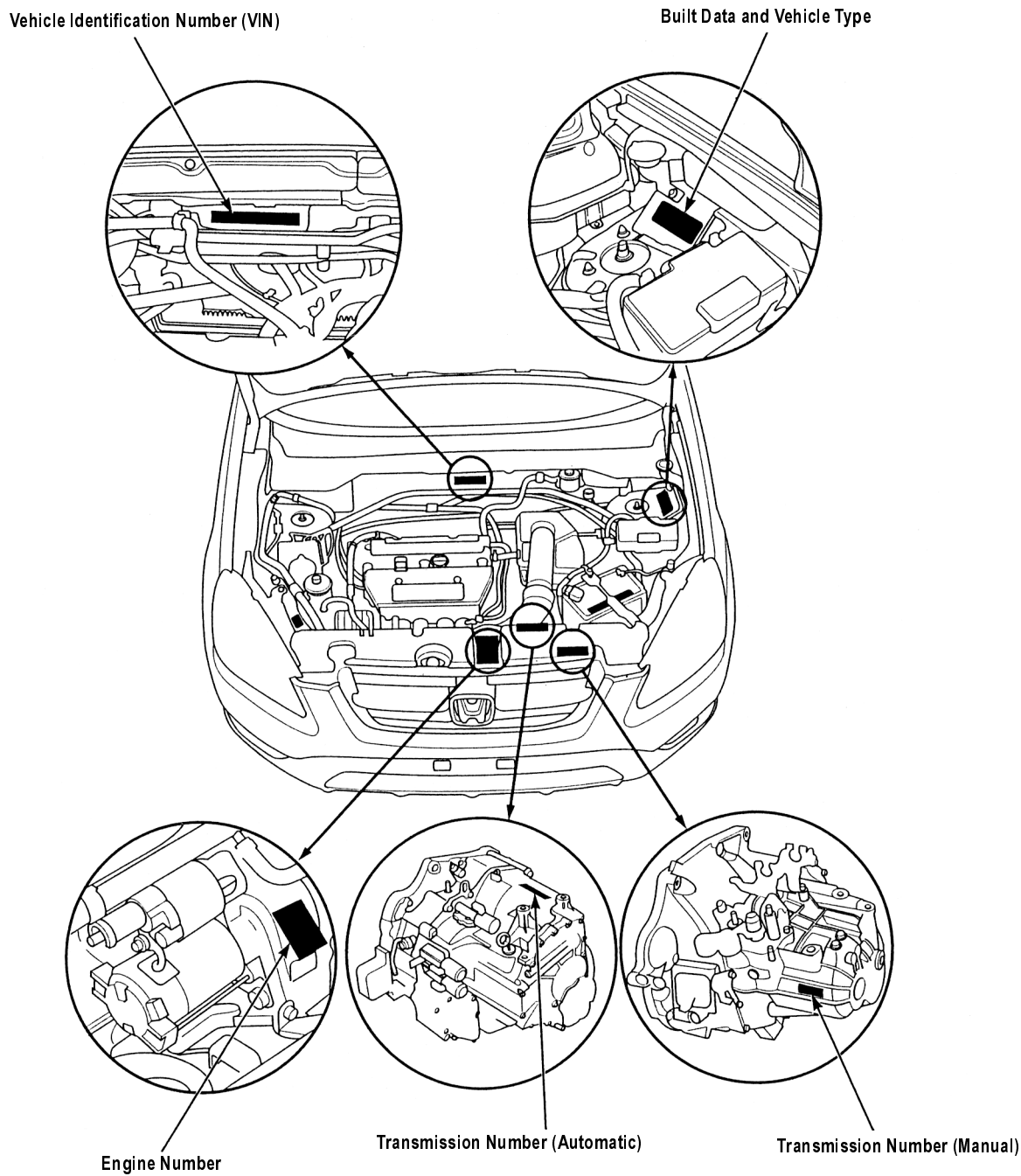
During the repair process, inspect these areas:

- Inspect all the SRS wire harnesses. Replace, don't repair, any damaged harnesses.
- Inspect the cable reel for heat damage. If there is any damage, replace the cable reel.

After the vehicle is completely repaired, turn the ignition switch on. If the SRS indicator comes on for about 6 seconds and then goes off, the SRS airbag system is OK. If the indicator does not function properly, use the PGM Tester SRS Menu Method to read the DTC(s). If this doesn't retrieve any codes, use the Tester's SCS menu method. If the SCS method doesn't work, you may need to install a known-good SRS unit to read the DTC(s). If you still cannot retrieve a code, go to SRS Indicator Circuit Troubleshooting.

General Information

Identification Number Locations

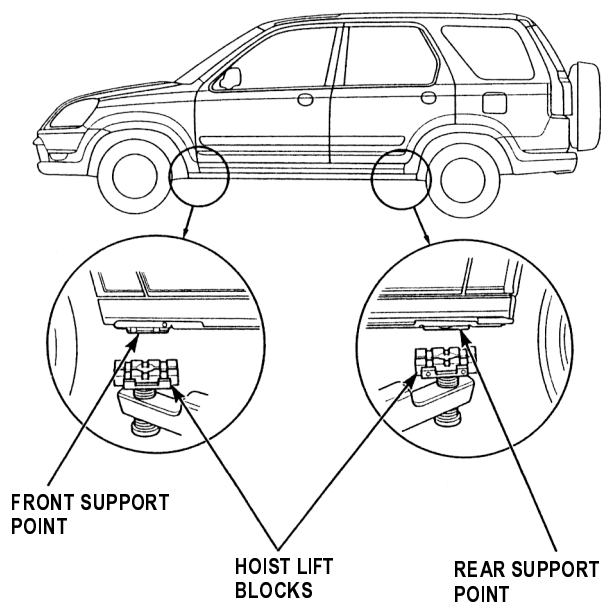


Lift and Support Points

NOTE: If you are going to remove heavy components such as suspension or the fuel tank from the rear of the vehicle, first support the front of the vehicle with tall safety stands. When substantial weight is removed from the rear of the vehicle, the centre of gravity can change and cause the vehicle to tip forward on the hoist.

Frame Hoist

1. Position the hoist lift blocks, or safety stands, under the vehicle's front support points and rear support points.



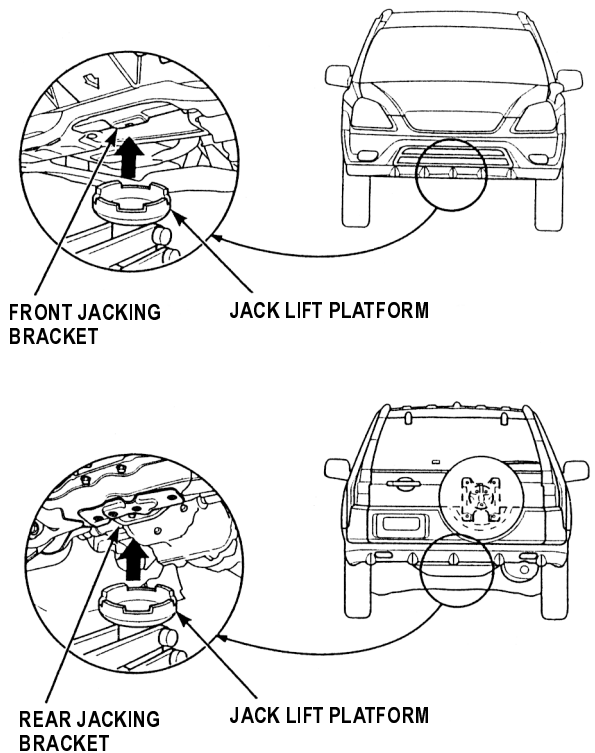
2. Raise the hoist a few inches, and rock the vehicle gently to be sure it is firmly supported.
3. Raise the hoist to full height, and inspect the lift points for solid contact with the lift blocks.

Safety Stands

To support the vehicle on safety stands, use the same support points as for a frame hoist. Always use safety stands when working on or under any vehicle that is supported only by a jack.

Floor Jack

1. Set the parking brake.
2. Block the wheels that are not being lifted.
3. When lifting the rear of the vehicle, put the gearshift lever in reverse, or the automatic transmission in [P] position.
4. Position the floor jack under the front jacking bracket or rear jacking bracket, center the jacking bracket in the jack lift platform, and jack up the vehicle high enough to fit the safety stands under it.

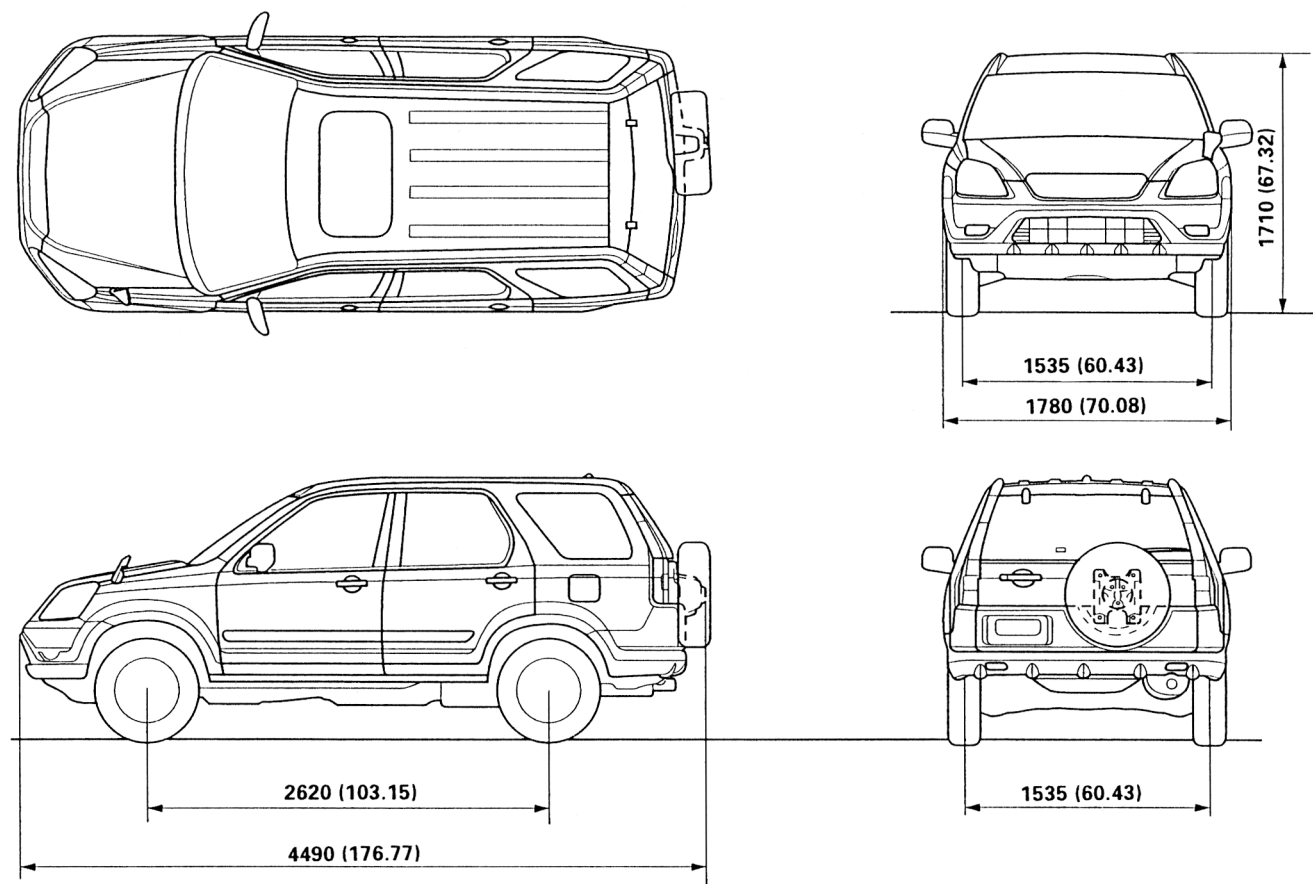


5. Position the safety stands under the support points and adjust them so the vehicle will level.
6. Lower the vehicle onto the stands.

General Information

Body Specifications / Wheel Alignment

Unit: mm (in.)



Front Wheel Alignment		
Camber	0°00' ± 1°	
Caster	2°10' ± 1°	
Total toe	0 ± 3 (0 ± 0.12)	
Wheel turning angle	in	37°00' ± 2°
	out	31°30' (Reference)

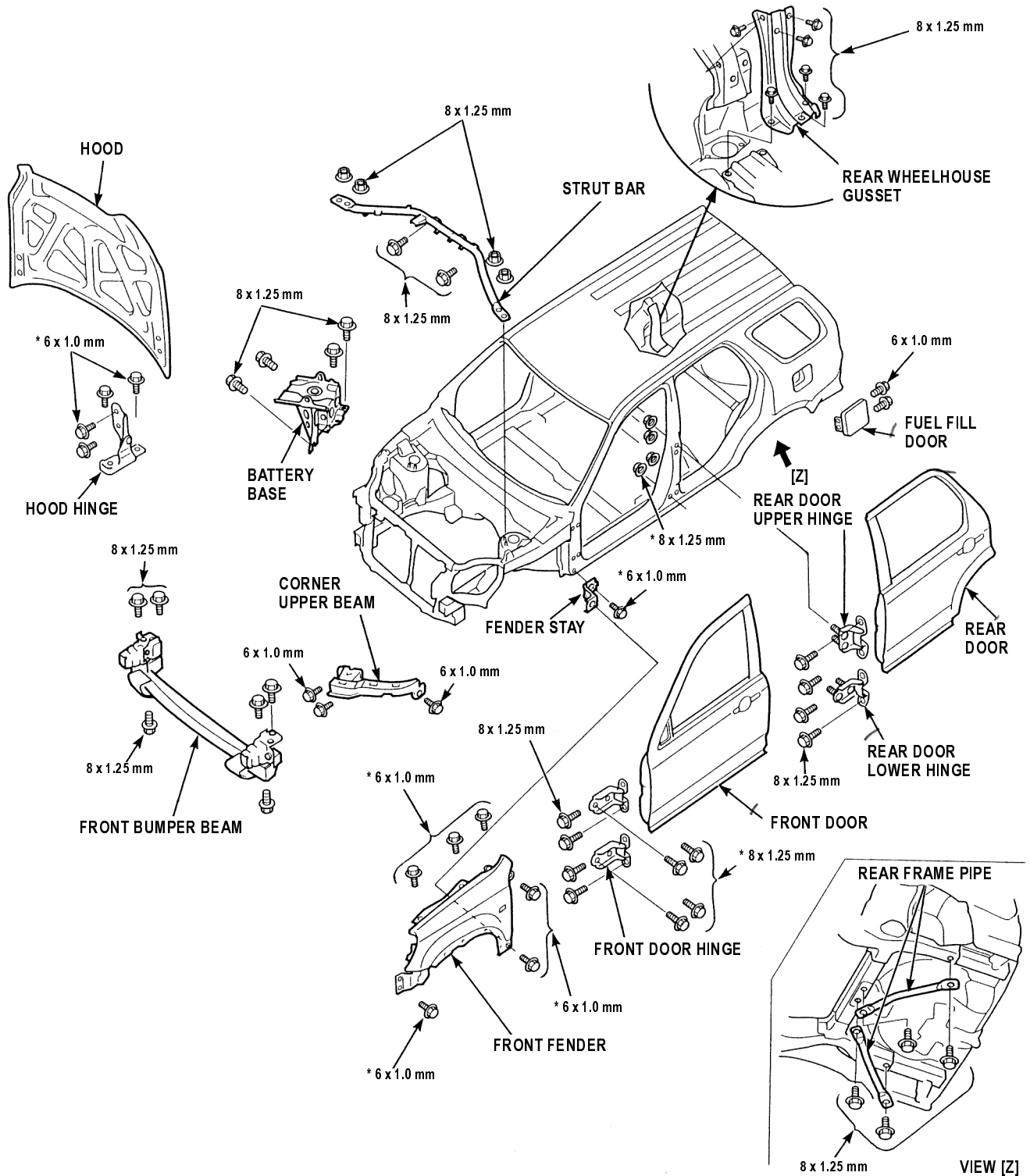
Rear Wheel Alignment		
Camber	-1°00' ± 1° ± 45'	
Total toe	IN (2 (+2/-1)) (0.08 (+0.08/-0.04))	

Exterior Parts Removal / Installation

NOTE: To adjust the alignment of the hood, the doors, and the tailgate, refer to the CR-V Shop Manual.

Mounting bolts/nuts torque:

- 6 x 1.0 mm: 9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)
- * 6 x 1.0 mm: 18 N·m (1.8 kgf·m, 13 lbf·ft)
- 8 x 1.25 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)
- * 8 x 1.25 mm: 29 N·m (3.0 kgf·m, 22 lbf·ft)



General Information

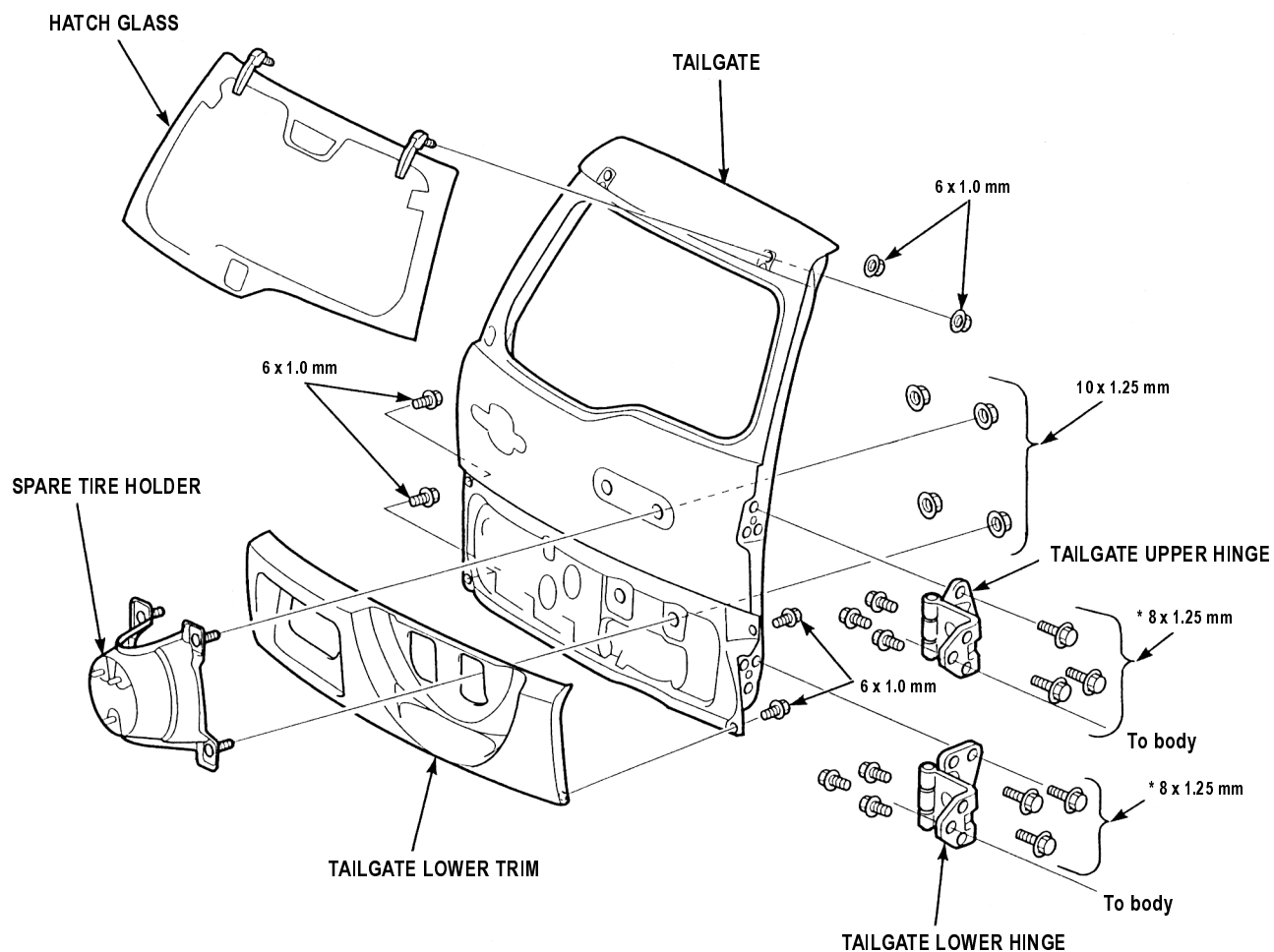
Tailgate Compartment Parts Removal / Installation

Mounting bolts/nuts torque:

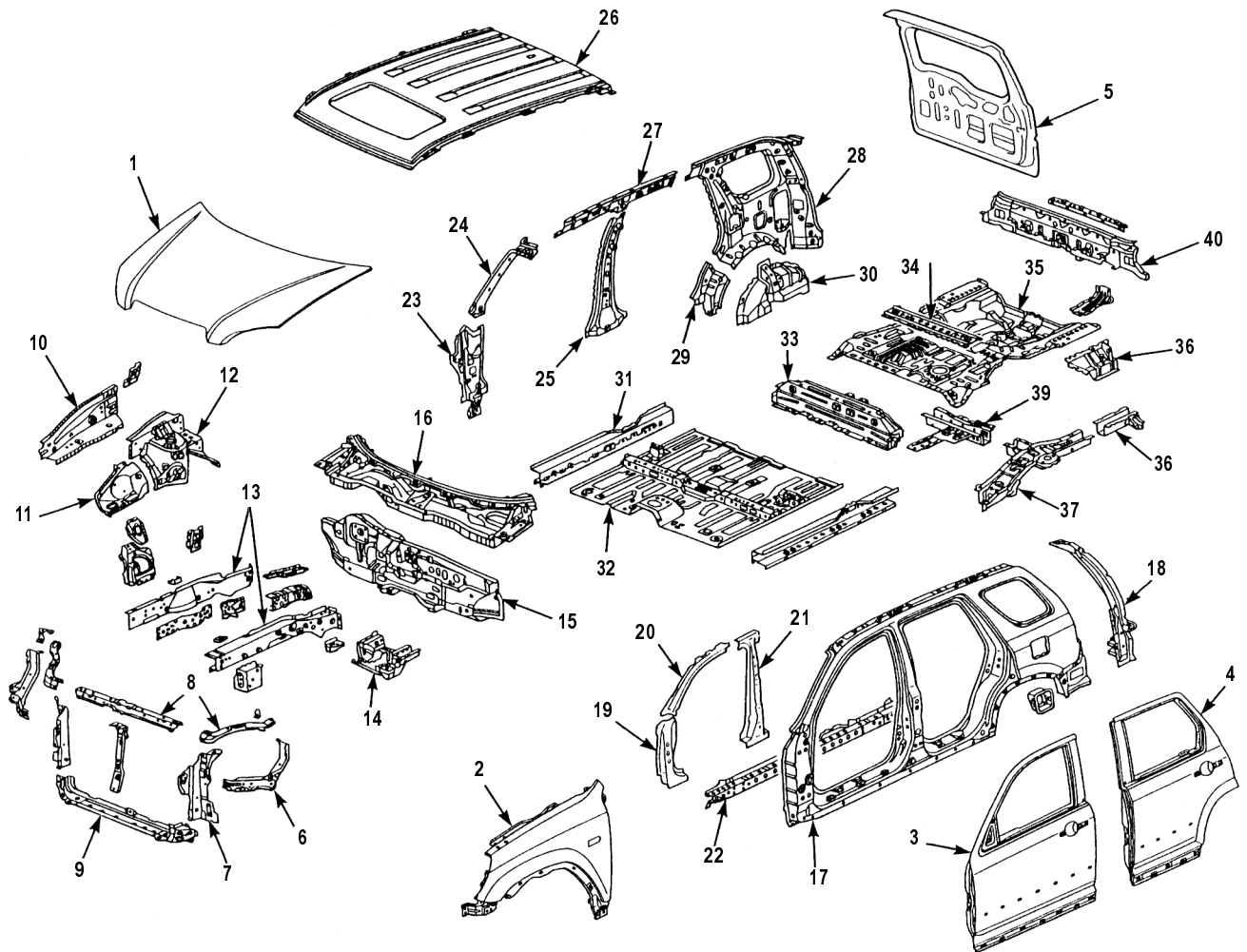
6 x 1.0mm: 9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

* 8 x 1.25 mm: 29 N·m (3.0 kgf·m, 22 lbf·ft)

10 x 1.25 mm: 28 N·m, 28 lbf·ft)



Body Construction



Sp: Steel plate Hss: High strength steel plate Zn: Zinc-plating

No.	Part Name	No.	Part Name
1	Hood (Hss, Zn)	22	Side Sill Reinforcement (Hss, Zn)
2	Front Fender (Sp, Zn)	23	Front Pillar Inner Lower (Hss, Zn)
3	Front Door (Hss, Zn)	24	Front Pillar Inner Upper (Hss)
4	Rear Door (Hss, Zn)	25	Center Inner Pillar (Hss)
5	Tailgate (Sp, Zn)	26	Roof Panel (Sp)
6	Bulkhead Side (Sp, Zn)	27	Roof Side Rail (Hss)
7	Bulkhead Side Stay (Sp, Zn)	28	Rear Inner Panel (Sp, Zn)
8	Bulkhead Upper Center Frame/Side Frame (Sp, Zn)	29	Wheel Arch Extension (Sp, Zn)
9	Front Lower Cross-member (Hss, Zn)	30	Rear Wheelhouse (Sp, Zn)
10	Wheelhouse Upper Member (Sp)	31	Inside Sill (Hss, Zn)
11	Front Wheelhouse (Sp, Zn)	32	Front Floor (Sp, Zn)
12	Damper Housing (Sp, Zn)	33	Middle Floor Cross-member (Hss, Zn)
13	Front Side Frame (Hss, Zn)	34	Rear Floor Upper Cross-member (Sp)
14	Side Frame Extension Rear/Front Side Outrigger (Hss, Zn)	35	Rear Floor (Sp, Zn)
15	Dashboard Lower (Sp, Zn)	36	Rear Floor Extension (Sp, Zn)
16	Dashboard Upper (Sp, Zn)	37	Rear Frame A (Sp, Zn)
17	Outer Panel (Sp, Zn)	38	Rear Frame B (Hss, Zn)
18	Rear Pillar Gutter (Sp, Zn)	39	Rear Floor Cross-member (Sp, Zn)
19	Front Pillar Lower Stiffener (Sp)	40	Rear Panel (Sp, Zn)
20	Front Pillar Upper Stiffener (Hss)		
21	Center Pillar Stiffener (Sp)		

General Information

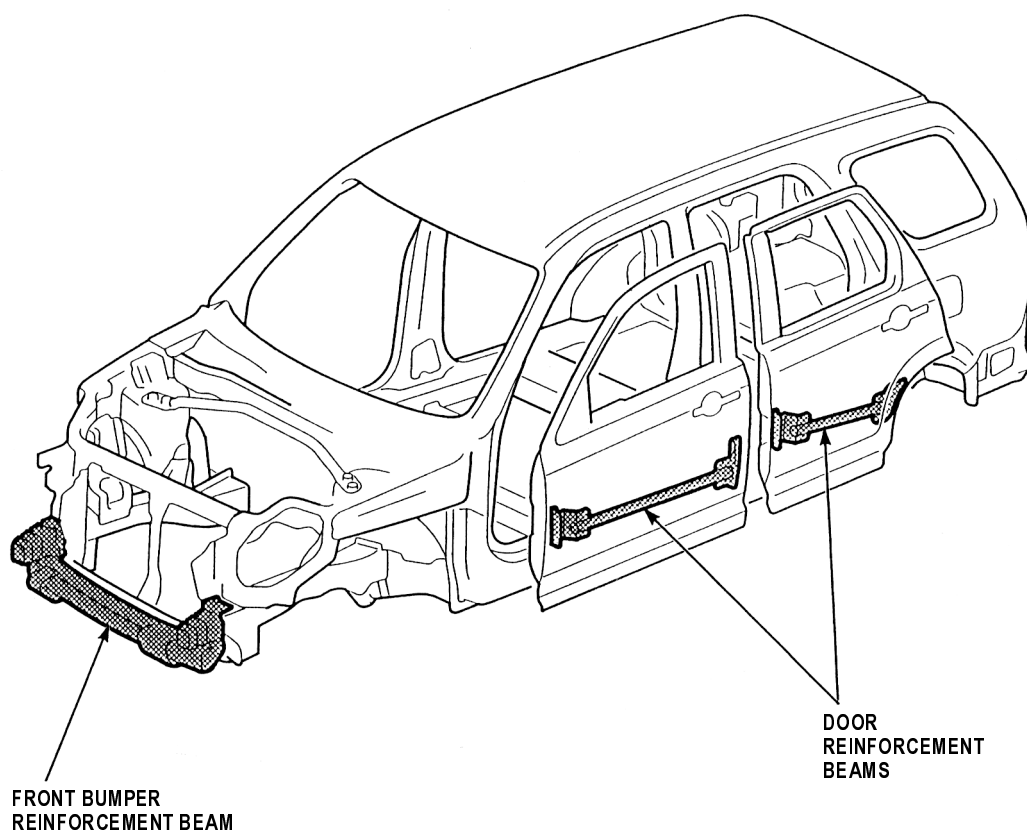
Door and Bumper Reinforcement Beams

Door and bumper reinforcement beams used on Honda vehicles are made from a metal equivalent to High Strength Steel (Hss).

If HSS is heated, the strength of the steel will be reduced. If HSS is damaged, as in a vehicle accident, where the door and bumper reinforcement beams are bent, the beams may crack if an attempt is made to straighten them.

For this reason, door and bumper reinforcement beams should NEVER be repaired; they should be replaced if they are damaged.

NOTE: If a door beam is damaged, the whole door panel assembly should be replaced.



Zinc-plated Steel Plate Repair

The zinc-plated steel plate used in some panels of the CR-V requires different repair techniques than ordinary steel plate. Refer to "Body Construction" ([see page 1-9](#)) for the location of the zinc-plated panels.



1. Before spot welding the zinc-plated steel plate, remove the paint from both sides of the flange to be welded. Apply sealer to the flange after welding.



WARNING



To prevent eye injury, wear goggles or safety glasses whenever sanding, cutting, or grinding.

NOTE: Seal the sanded surfaces thoroughly to prevent rust.

2. The electric continuity properties of zinc-plated steel plate is different from ordinary steel plate. When spot welding, increase the current by 10-20%, or increase the resistance welding time. Also increase the number of weld spots by 10-20%.

NOTE: The MIG welding procedures for zinc-plated steel plate are the same as for ordinary steel plate.

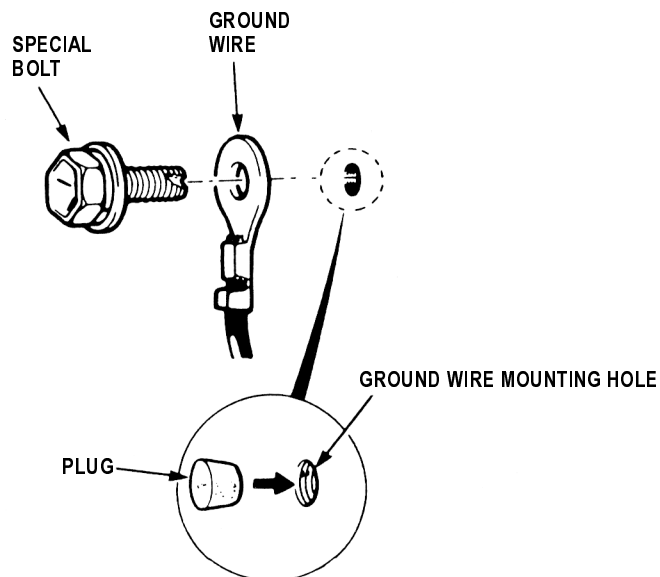


WARNING



To prevent eye injury and burns when welding, wear an approved welding helmet, gloves and safety shoes.

3. Before applying putty or body filler to the zinc-plated steel plate, sand the zinc plating thoroughly to promote adhesion and to prevent blistering.
NOTE: Use only epoxy-based putties and fillers on zinc-plated steel plate, following the manufacturer's specifications.
4. When performing paint work, protect the ground wire and ground wire mounting hole threads with a bolt or a plug.



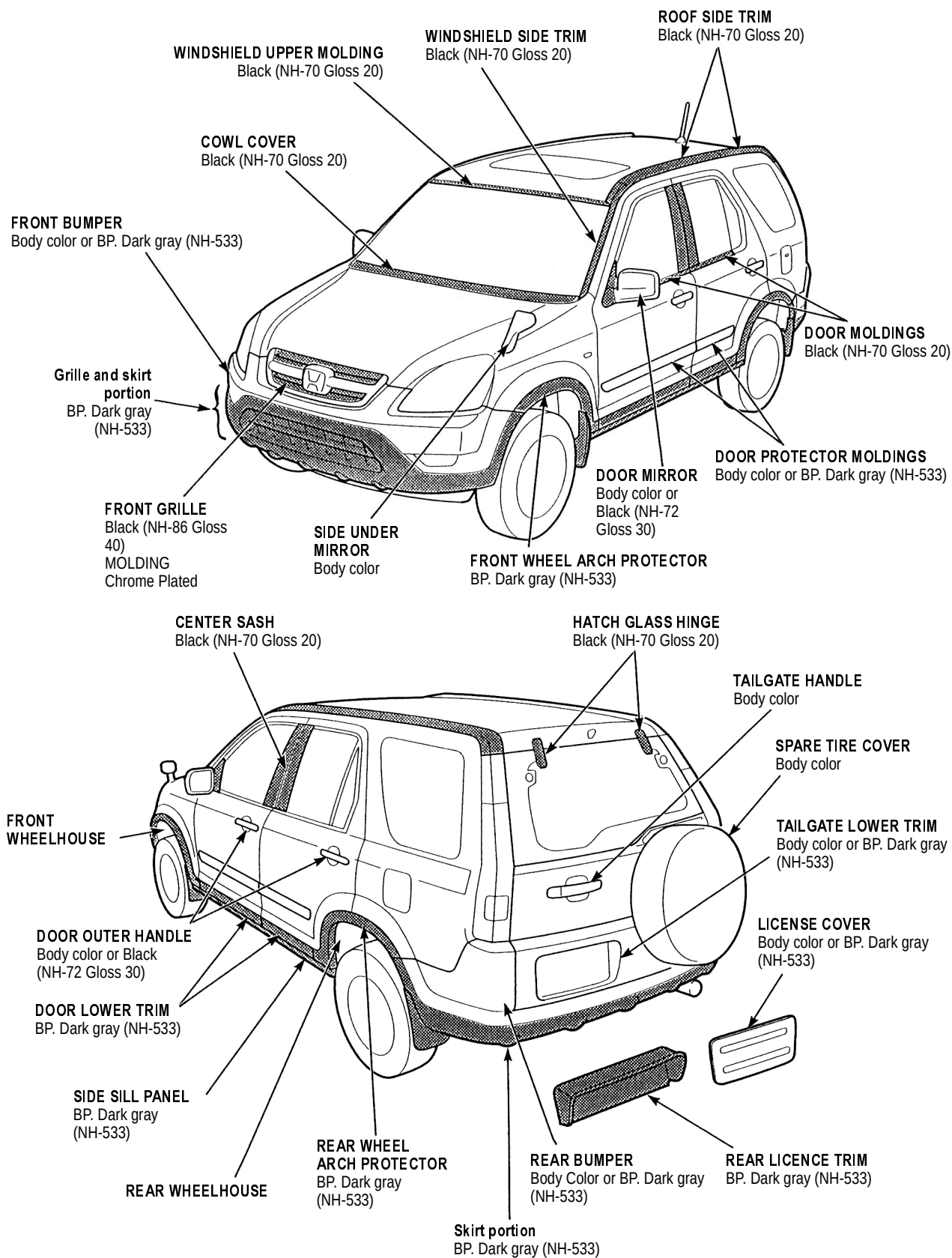
General Information

Color Chart Paint Specifications

P.: Pearl Paint / M.: Metallic Paint

		NH-578 Taffeta white	NH-623M Satin Silver M.	NH-624P Premium White P.	B-92P Nighthawk Black P.	B-96P Eternal Blue P.	G-95P Clover Green P.	YR-535M Mojave Mist M.	R-517P Chianti Red P.	B-508M Zircon Blue M.	B-94 Midnight Blue	R-81 Mirano Red	B-512M Magnetic Blue M.	R-507P Fire Pepper P.	YR-525M Titanium M.	RP-31M Signet Silver M.
KE	SE/SE-E	O	O		O	O	O	O	O		O	O	O			
KE	LS	O	O		O	O	O	O	O		O	O	O			
	ES	O	O		O	O	O	O	O		O	O	O			
KS	ES	O	O		O	O	O	O	O		O	O	O			
KH	BASE	O	O	O		O	O	O	O							
KK	LX/EX		O	O			O	O	O	O						
	OP (LEATHER)		O	O			O	O	O	O						
KM	RVSI		O	O	O		O	O		O						
KN	RV1/RVSI		O	O	O		O	O	O	O						
KQ	RV1/RVSI	O	O		O	O	O	O	O	O						
KT	BASE		O	O	O		O	O	O	O						
KU	RV1/ RV1-H	O	O			O	O	O	O							
	RVSI/ RVSI-H	O	O	O	O		O	O		O						
KW	BASE	O	O		O	O	O	O	O	O						
KY	RV1/RVSI		O	O	O		O	O	O	O						
KR	LS/ES	O	O		O	O	O	O	O		O	O	O			
KP	RV1/RVSI		O	O	O		O	O	O	O						
KZ	RV1/RVSI	O	O		O	O				O				O	O	O

Note: Apply NH-86 black (Gloss 40) to the visible surfaces of the rear tie down hook, front bumper beam, front and rear wheelhouse after repairing and painting (except vehicles painted with B-92P, G95P and B-94)

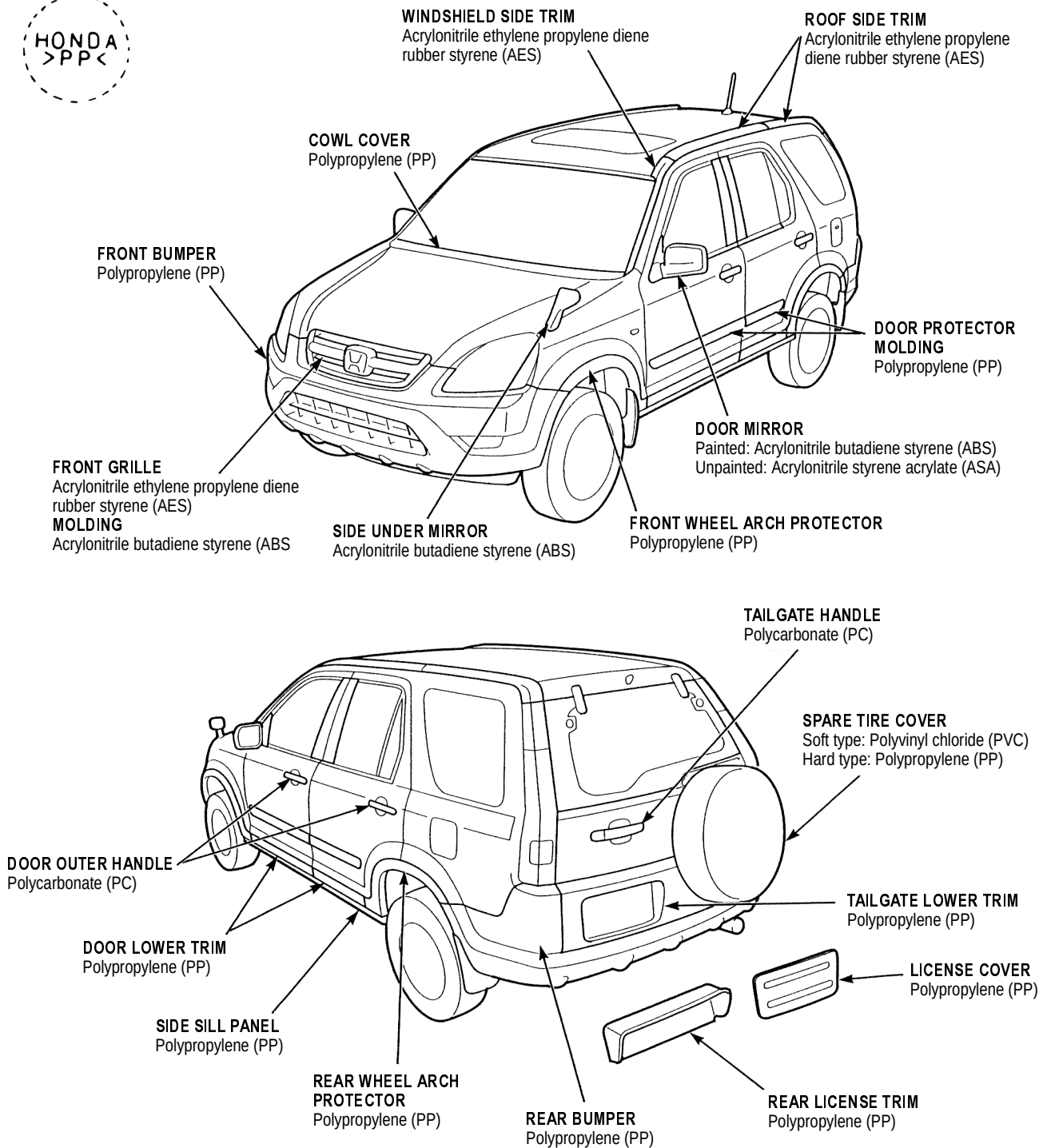


General Information

Types and Materials of Exterior Plastic Parts

NOTE: A standard symbol is stamped on the underside of each resin part to show the type of material used.

Example:



2

Preparation of Work

Outline of Body Repair..... 2-2

General Safety Precaution..... 2-3

Accurate Inspection of Damaged Parts (Visual)..... 2-4

Reshaping 2-6

Replacement 2-7

Installation and Inspection2-11

Repair Tools 2-12

Welding Methods 2-17

2

Preparation of Work

Preparation of Work

Outline of Body Repair

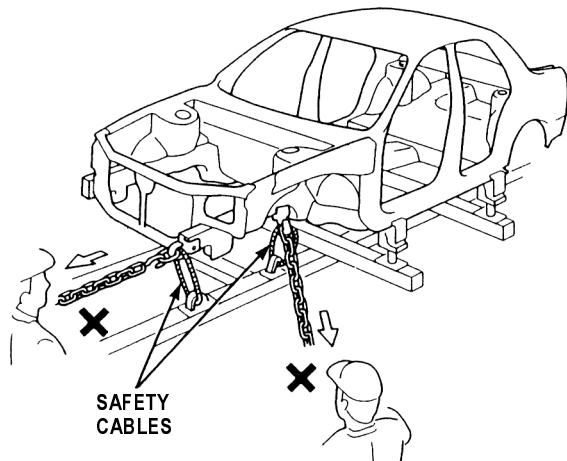
The contents described in this section are the basic processes of repair procedures needed to cut and replace welded parts. Reshape the light damage to the outer panel with patty after corrections by the washer, welder, hammer and dolly.

The table below shows information for this model.

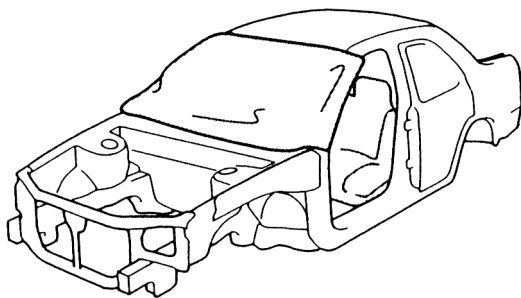
Processes	Repair Procedures	Information	Reference
	• Accurate inspection of Damaged Parts. (Visual) • Measurement	• Wheelbase • Wheel Alignment • Body Dimensional Drawings	(see section 1) (see section 1) (see section 4)
Reshape	1. Remove any related parts. 2. Attach the frame straightener to the body. 3. Pull out and straighten the damaged areas. 4. Check the original position.	• Body Dimensional Drawings	Shop Manual (see section 1) (see section 4)
Replacement	1. Cut off and separate the damaged area. 2. Straighten any related part. 3. Check the repair part installation and alignment with the body. 4. Clean and degrease to the welded surfaces. 5. Weld in the repair part. 6. Finish the welded areas.	• Mass Production Body Welding Diagram • Removal • Body Dimensional Drawings • Installation	(see section 3) (see section 3) (see section 4) (see section 3)
Rust Prevention	1. Apply the sealer. 2. Apply the undercoating. 3. Apply anti-rust agent to the inside of the outer panel and frames.	• Cross Section of Body and Sealants. • Soft Chipping Guard Primer Coating Diagram • PVC Coating Diagram • Area to be Covered by Antirust Agents	(see section 5)
Paint	Apply the paint.		(see section 6)
Installation and Inspection	1. Adjust the hood, door, tailgate. 2. Measure the wheel alignment. 3. Clean the body. 4. Install related parts.		Shop Manual

General Safety Precaution

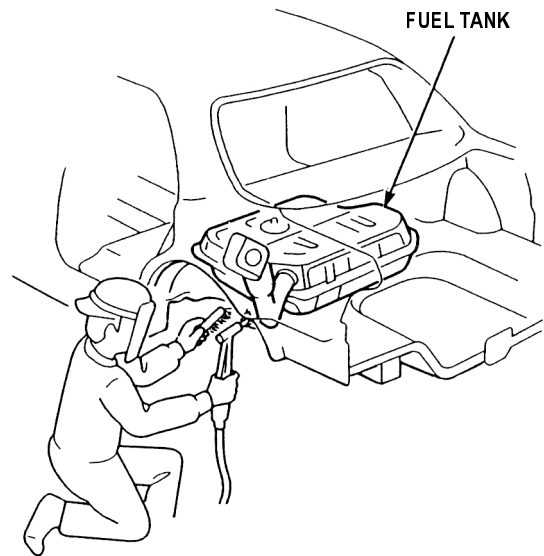
- Disconnect the battery to reduce the possibility of damage caused by electrical shorts.
- Check for fuel leaks and repair as necessary.
- Use standard safety equipment when spraying paint, welding, cutting, sanding, or grinding (see page 2-12).
- Always attach a safety cable when using a hydraulic ram or a frame straightening table; do not stand in direct line of the chains used on such equipment.



- Cover the exterior parts and the interior parts with a fireproof cover and protect the vehicle when welding.
- Do not damage the passenger compartment parts when you heat the undercoat of the welded flange with a torch.

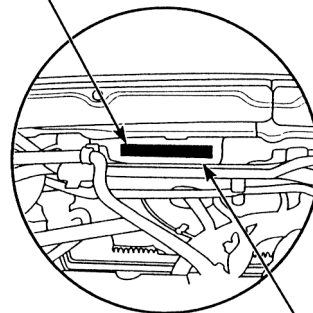


- Remove the fuel tank and/or fuel lines if welding equipment is to be used near the fuel system.



- The vehicle identification number is stamped on the dashboard upper panel and is registered with local authorities. If the dashboard upper panel must be replaced because of damage, check with local authorities first.

VEHICLE IDENTIFICATION
NUMBER (VIN)



DASHBOARD UPPER

Preparation of Work

Accurate Inspection of Damaged Parts (Visual)

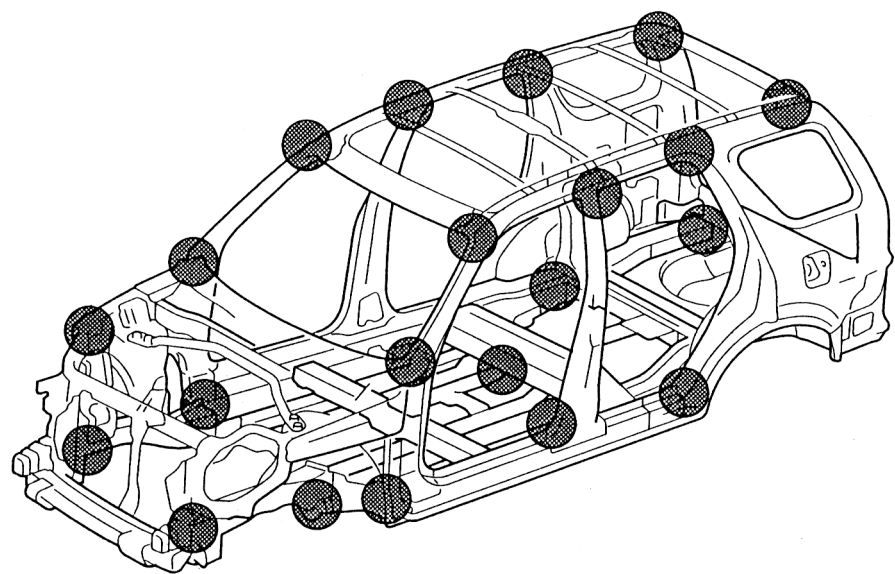
Description

Most monocoque bodies are composed as a single unit by welding together pressed parts made of steel plates, which come in a variety of different shapes and sizes. Each part is responsible for displaying a certain strength and durability in order that it may play its role in meeting the functions of the body.

Damage to the exterior of the body can be visually inspected, but where there has been external impact, it is necessary to inspect the extent of the damage. In some cases, the deformation may have spread beyond the actual areas that were in the collision so the deformation must be closely inspected.

Distortion to the vehicle, bends, inclines and gaps between parts should be thoroughly checked. Also, check for paint peeling at welded areas, corners and the sealing coat.

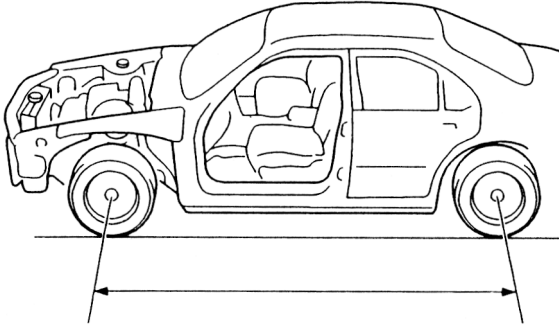
 : Carefully checked.



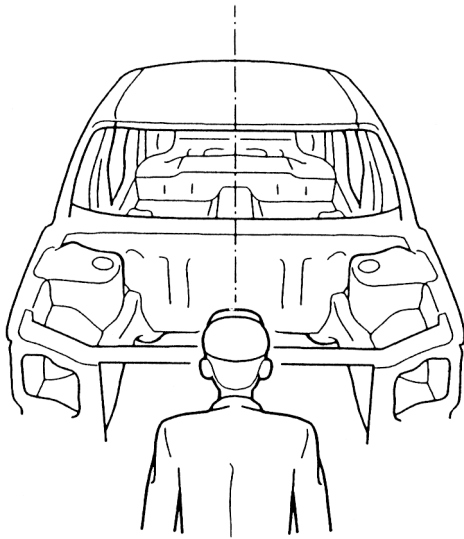
Measurement

Whenever possible, make judgements and conclusions based on measurements.

- Measure the wheel alignment to prevent uneven tyre wear or incorrect steering wheel alignment.
- If there are any deviations, use a tram-tracking gauge and measure the body parts.

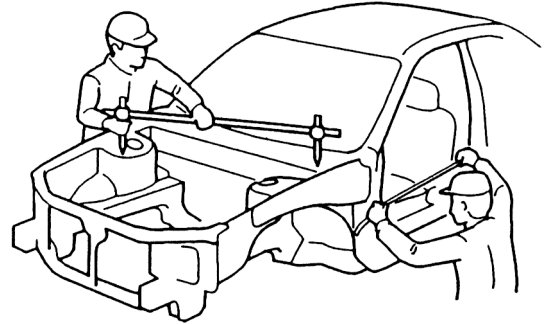


- If there is any twisting to the body, measure with a frame centering gauge.

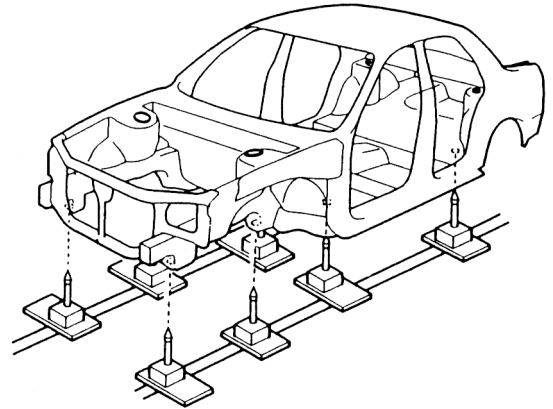


- To measure body dimensions, use a universal tram gauge and convex tool.

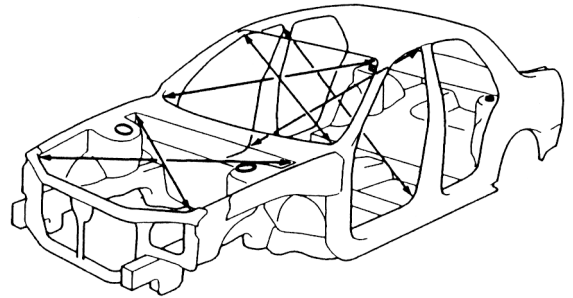
Body Measuring Dimension/Opening Repair Chart:



Frame Repair Chart:



Diagonal measurement:

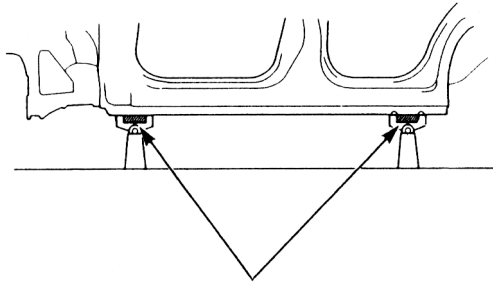


Preparation of Work

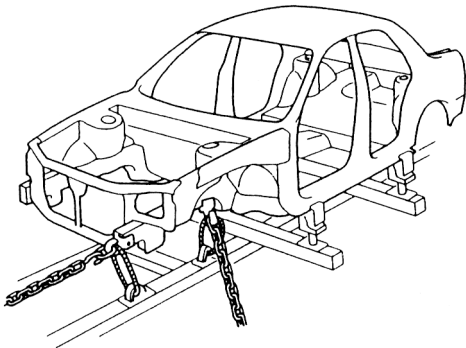
Reshaping

Correction of the Damaged Area

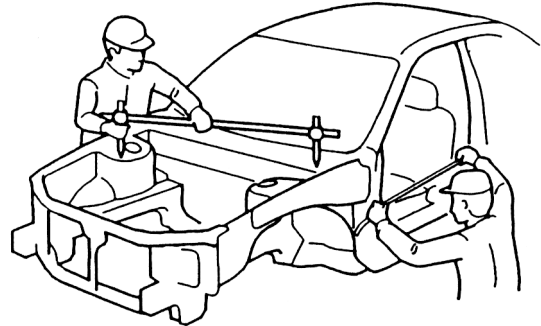
1. Remove any related parts.
NOTE: See the Shop Manual.
2. Connect the frame straightener to the vehicle body.
 - The side sill is flangeless to allow reshaping by pulling it out.
 - Use the horizontal pinch welds for anchoring the vehicle.



3. Pull out and straighten damaged areas.
Apply load to the damaged section and pull on it until the section is almost restored to its original shape. Do not pull out more than necessary.



4. Check that the part of the body is more or less restored to its original shapes. Check the original positions using the body dimensional drawings.



Replacement

Removal

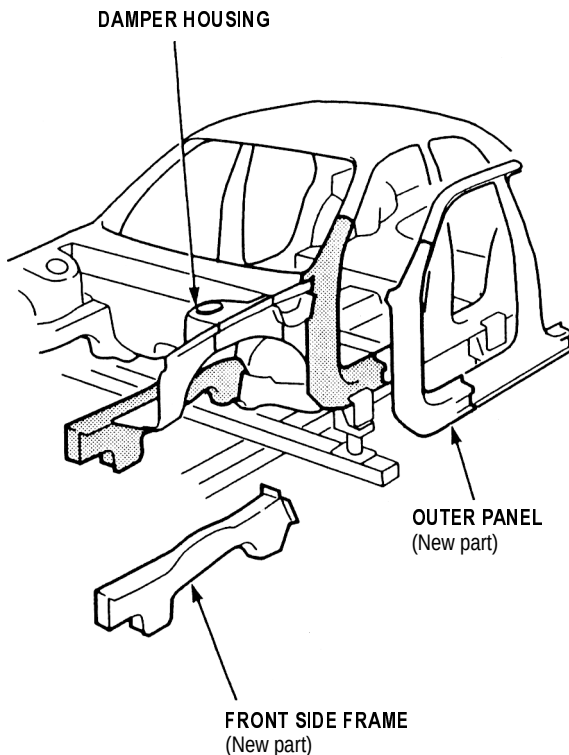
1. Decide whether to replace all the affected parts or whether to cut the weld joint parts and replace them.

NOTE: When cutting the parts off, take special care that you do not damage adjacent parts on the vehicle.

Setting Condition for Replacement Parts Joint Sections:

- Make sure that you can perform straightening work after welding.
- Make sure that the locations will not be susceptible to distortion caused by other parts.
- Make sure that there are few removable parts and that the location allows for safe welding.
- Make sure that the joints are short and that paint repair can be performed easily.
- Make sure that locations are such that the joints can be finished in a way that will not affect the outward appearance.
- Make sure that the locations do not hinder the removing and attaching of parts.

Parts which influence wheel alignment such as damper housing and the side frames must be examined using the frame repair charts.



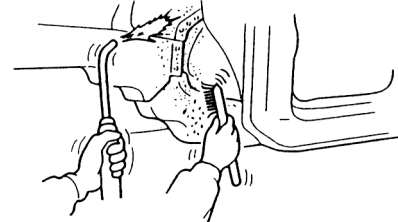
2. Peel off the undercoat.



CAUTION



Be careful not to burn the fittings inside the passenger compartment when heating.



3. Remove the damaged parts.



WARNING

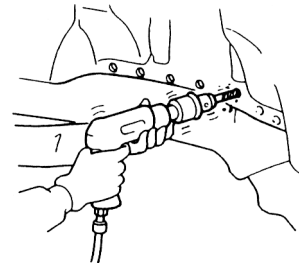


To prevent eye injury, wear goggles or safety glasses whenever sanding, cutting or grinding.

- Center punch around the spot weld imprints on the welded flange and drill holes using the spot cutter.

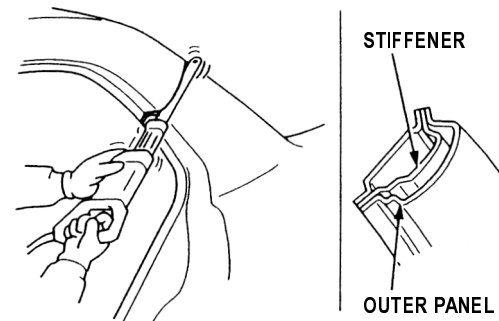
NOTE: Make a drill hole so that the installation of the repair parts may become easy.

- Remove the MIG weld flange with a disc sander.
- Pry off the welded flange with a chisel.



- Cut off the outer panel with an airsaw.

NOTE: Be careful not to cut the inner section.



(cont'd)

Preparation of Work

Replacement (cont'd)

Installation

1. Straighten any damaged parts.



WARNING



To prevent eye injury and burns when welding, wear an approved welding helmet, gloves and safety shoes.

- Fill any holes by MIG welding and even out with a hammer and dolly.

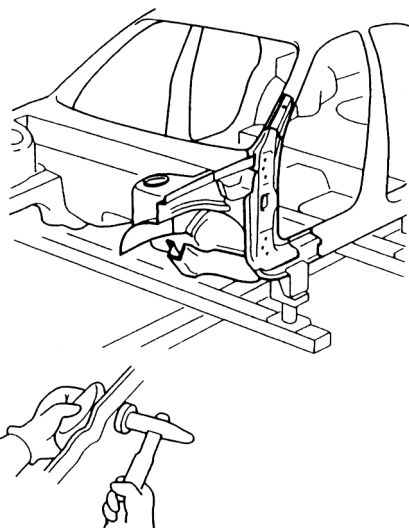


WARNING



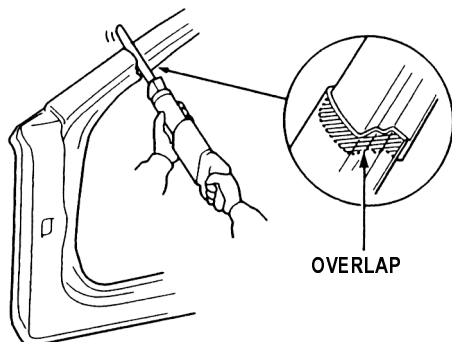
To prevent eye injury, wear goggles or safety glasses whenever sanding, cutting or grinding.

- Level and finish the burns on the welding flanges with a disc sander or belt sander.

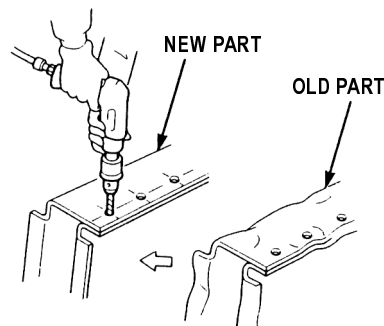


2. Preparations of new parts.

- Cut the new outer panel so it will overlap by 20~30 mm (0.8~1.2 in.) to the panel of the body side.



- The part where new parts cannot weld the spot welding make holes for the plug welding.
- Make holes to the size which corresponds to the thickness of the welded plate (see page 2-19).
- The position and the point by which holes are made, refer to the old parts or Mass Production Body Welding Diagram (see section 3).



3. Apply rust prevention processing on welded surface.



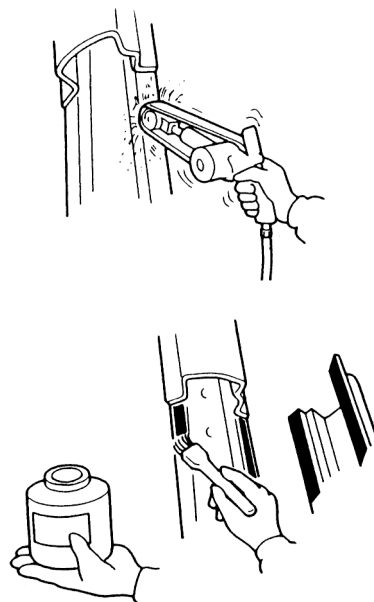
WARNING



To prevent eye injury, wear goggles or safety glasses whenever sanding.

- Remove the undercoat from both sides of the areas to be spot welded with a sander to expose the steel plate.
- Apply the spot sealer to the welding surface of the new parts and body side.

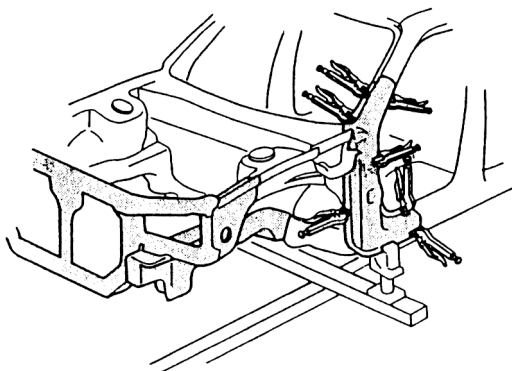
NOTE: Spread the spot sealer coat on the welding surface so that there are no bare areas.



4. Check the tack weld of the new parts.
 - Clamp the new part and check the position of it using the body dimensional drawings (see [section 4](#)).
 - Tack weld the clamped section.

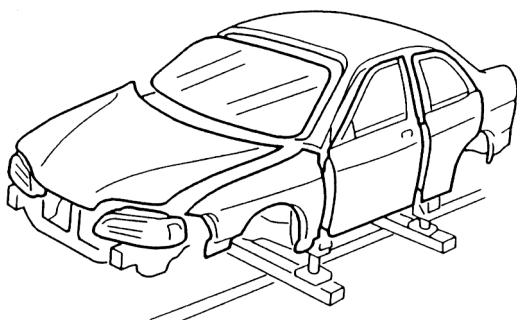
⚠
WARNING
⚠

To prevent eye injury and burns when welding, wear an approved welding helmet, gloves and safety shoes.



5. Check the alignment of the exterior body parts.
 - Temporarily install the exterior body parts, windshield and rear window glass, and check for differences in level and clearances.

NOTE: Check the fit of the front fender, door and the rear fender and make sure the body lines flow smoothly.



6. Main weld the repaired parts.
 - Use proper welding methods (see [page 2-17](#), [page 2-18](#), [page 2-19](#), [page 2-20](#)).

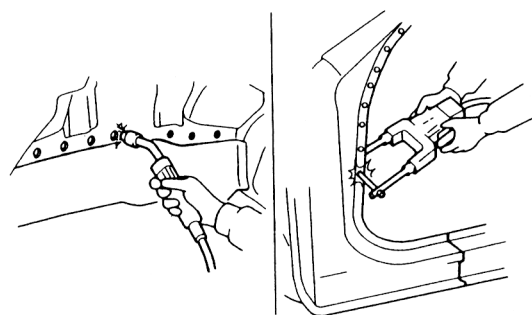
⚠
WARNING
⚠

To prevent eye injury and burns when welding, wear an approved welding helmet, gloves and safety shoes.

- Make 20% to 30% more spot welds than there were holes drilled.
- A new welding position should avoid an old position as much as possible.

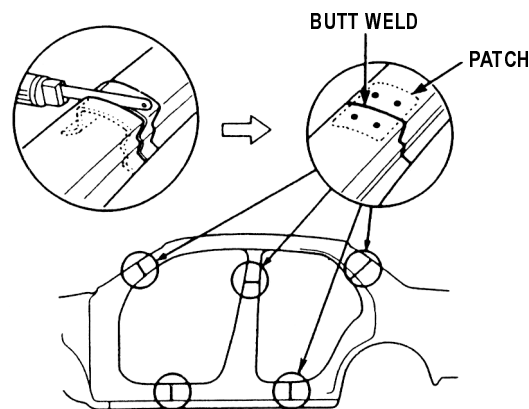
NOTE: If there is not room for spot welds, compensate by using MIG welds.

- The electric continuity property of zinc-plated steel plate is different from ordinary steel plate. When spot welding, increase the current by 10~20%, or increase the resistance welding line.



- Butt weld the front pillar, centre pillar, rear pillar and the wheel arch cut sections of the repaired outer panel.

NOTE: Attach the patches at the cut sections of the outer panel and plug weld them.



(cont'd)

Preparation of Work

Replacement (cont'd)

Installation (cont'd)

7. Finishing the welded areas.
 - Level the MIG welded areas with a disc sander.



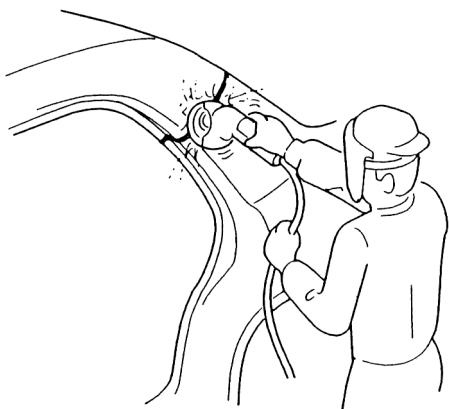
WARNING



To prevent eye injury, wear goggles or safety glasses whenever sanding, cutting or grinding

NOTE: Take care not to grind excessively.

- Even out high areas with a hammer. Be careful not to deform them.
- Smooth out welded door and tailgate areas and window opening flanges with a hammer and dolly.
- Fill the deformed area and smooth out the welded areas with body filler.



Rust Prevention / Paint

1. Applying the sealer. Seal the overlapped areas of the outer panel, and the welded surfaces of the new parts. Seal gaps completely.
2. Applying the paint.



WARNING

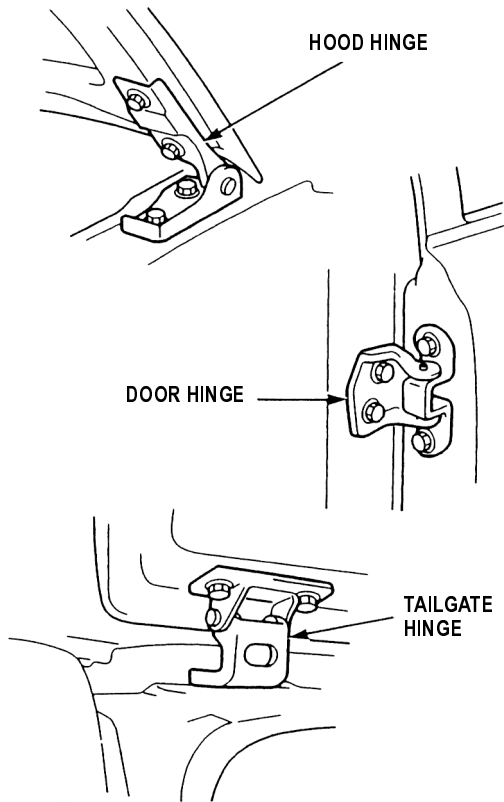


- Ventilate when spraying paint. Most paint contains substances that are harmful if inhaled or swallowed. Read the paint label before opening the paint container.
- Avoid contact with skin. Wear an approved respirator, gloves, eye protection and appropriate clothing when painting.
- Paint is flammable. Store it in a safe place, and keep it away from sparks, flames or cigarettes.

3. Apply undercoat to the wheelhouse and under-floor.
4. Apply the anti-rust agent to the inside of the outer panel and welded areas.

Installation and Inspection

1. Check the clearance of the door, hood, tailgate, and adjust if necessary.
Check the operation of the parts and make sure the doors lock securely.
2. Apply the sealer to the hinges of the hood, door, and tailgate.



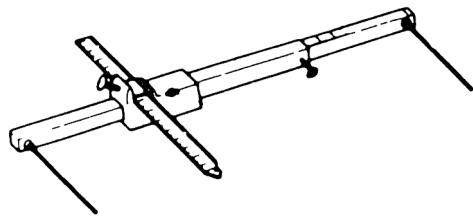
3. Adjust the wheel alignment.
4. Check the windows for water leaks.
5. Clean the passenger compartments.

Preparation of Work

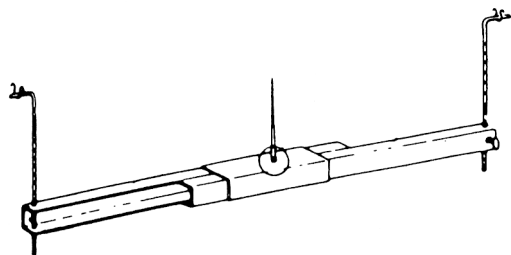
Repair Tools

Measurement Equipment

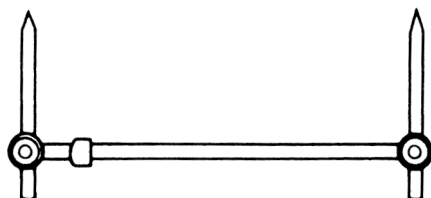
TRAM TRACKING GAUGE



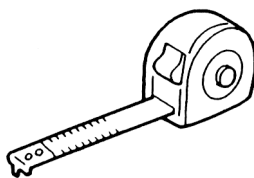
FRAME CENTERING GAUGE



UNIVERSAL TRAM GAUGE



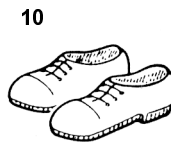
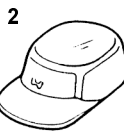
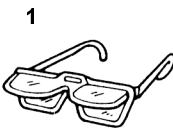
CONVEX TOOL



Protective Tools

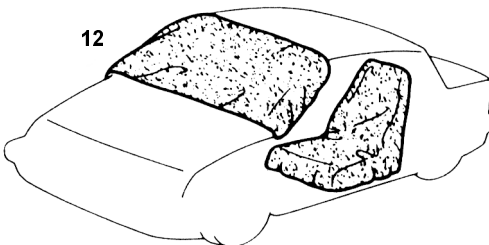
OPERATOR:

- | | |
|------------------------------|--------------------|
| 1 Protective goggles | 7 Protective apron |
| 2 Cap | 8 Welding glove |
| 3 Ear plugs | 9 Foot protector |
| 4 Shield for eyes | 10 Safety shoes |
| 5 Overalls with long sleeves | 11 Work glove |
| 6 Dust-proof mask | 12 Splatter guard |



VEHICLE BODY:

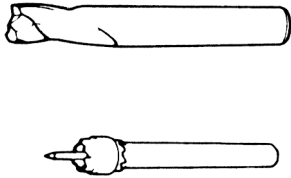
Heat-resistant protective cover



Processing Tools

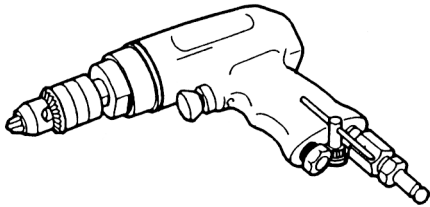
SPOT CUTTER

Install the spot cutter in the air drill, and drill a hole at the spot weld nugget and the plug to make the hole.



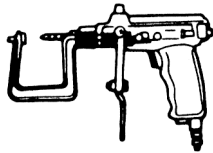
AIR DRILL

The rotation speed can be adjusted and an adequate hole opening can work.



PRESSURE DRILL

The depth of the hole can be adjusted and only necessary plate thickness can puncture.



CENTER PUNCH

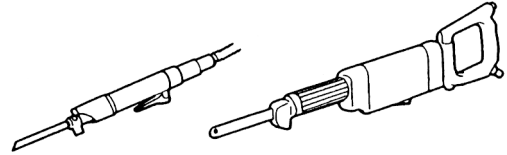
When an accurate hole opening is necessary.



Cutting Tools

AIRSAW

Cut the outer panel.



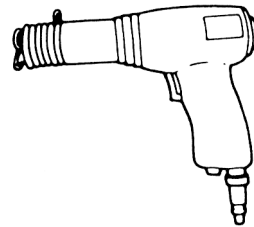
AIR CHUCK GRINDER

Detaching the MIG welding part and the panel can be cut by installing cut grinding wheel in air chuck grinder.

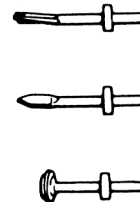


AIR IMPACT CUTTER

Cut the outer panel roughly.

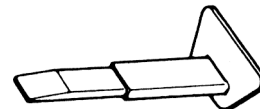


CHISEL SET



SPOT WELD CUTTER

Pry off the spot welded flange.



HAND NIBBLER



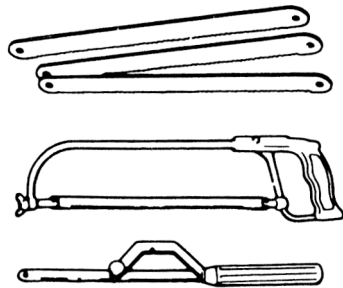
(cont'd)

Preparation of Work

Repair Tools (cont'd)

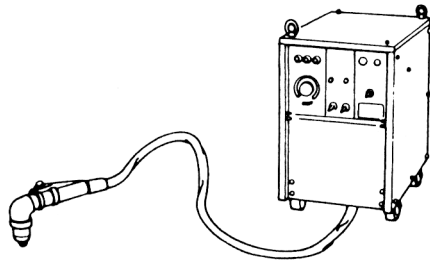
Cutting tools (cont'd)

HANDSAW

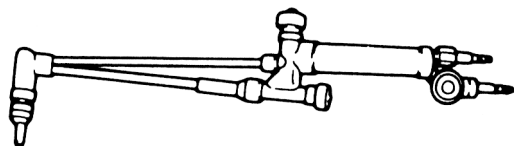


PLASMA CUTTER

Cut the thick plate.

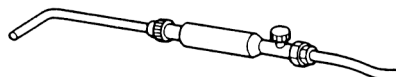


GAS CUTTER



ACETYLENE BURNER

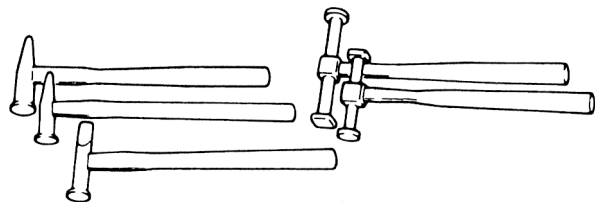
Peel off the undercoat.



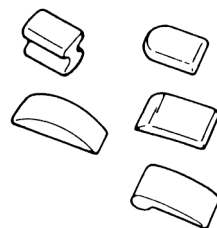
Shaping Tools

Skin Panel Shaping:

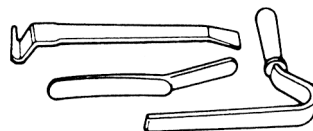
HAMMERS



DOLLIES



SPOONS



CHISEL

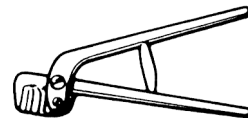


SNIPS/SHEARS



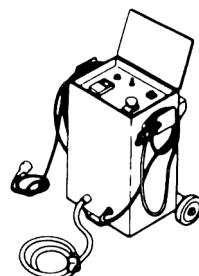
FLANGE TOOLS

Edge preparation.

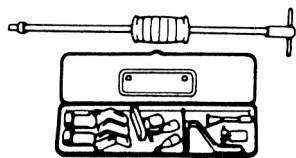


Body and Frame Shaping:

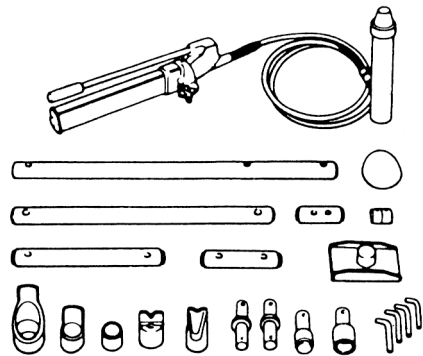
WASHER WELDER



SLIDE HAMMER



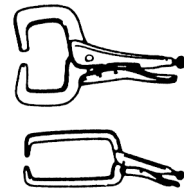
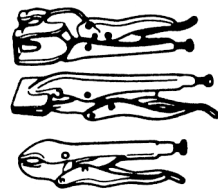
BODY JACK



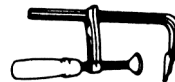
FRAME CORRECTOR

Fixing Tools

VICE-GRIPS



SCREW CLAMP



SCREW VICES



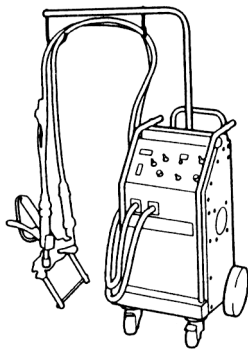
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Preparation of Work

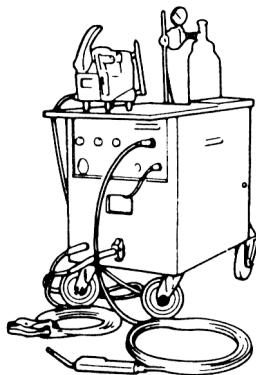
Repair Tools (cont'd)

Welders

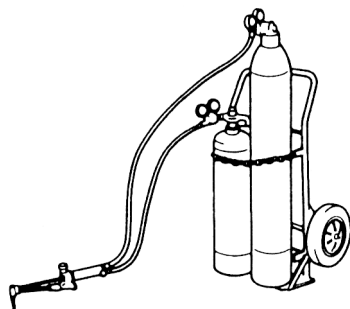
SPOT WELDER



MIG WELDER



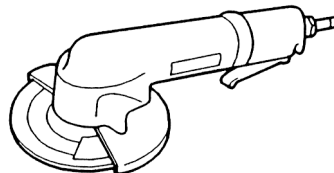
GAS WELDER



Sanding Tools

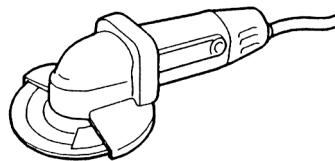
DISC GRINDER

Grinding of welded flange.



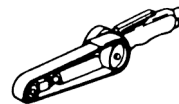
DISC SANDER

Sand off the paint film and use to finish the welded flange.



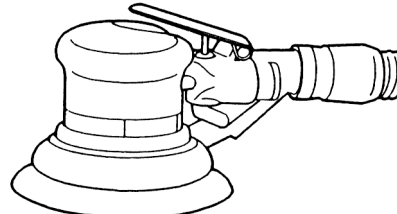
BELT SANDER

Finish off narrow welded flange.



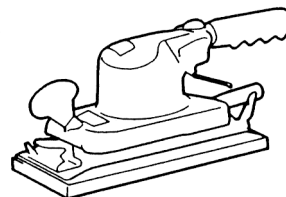
DOUBLE ACTION SANDER

Featheredge and finish of putty.



LONG ORBITAL SANDER

Sanding putty within the wide range and finish.

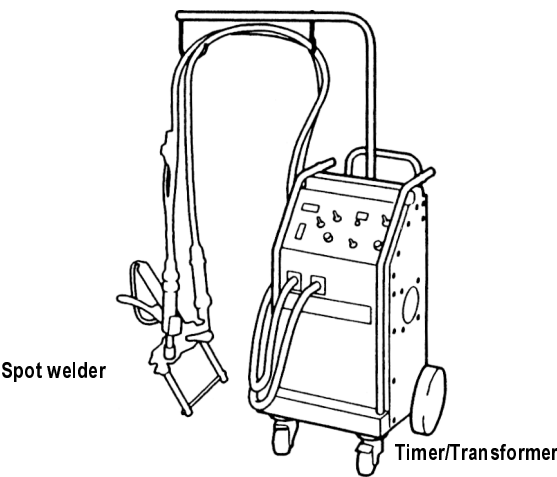


Welding Methods

Spot Welding

Spot welding is also known as resistance spot welding, and it is the most suitable method of welding for vehicles. It has 3 main features: the welding can be performed instantaneously, it has minimal effect on the source material and it has a minimum affect on distortion to the absolute minimum. However, please remember to remove all paint and other impurities from the surface of the material you intend to weld for reliable results.

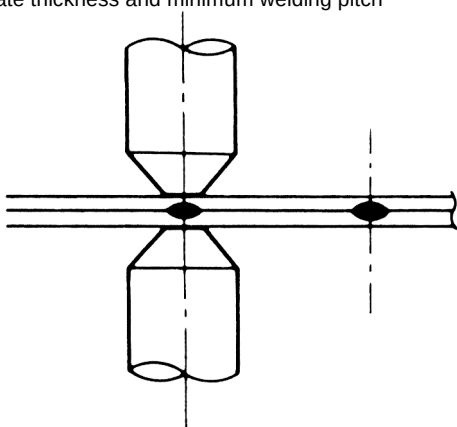
Welders



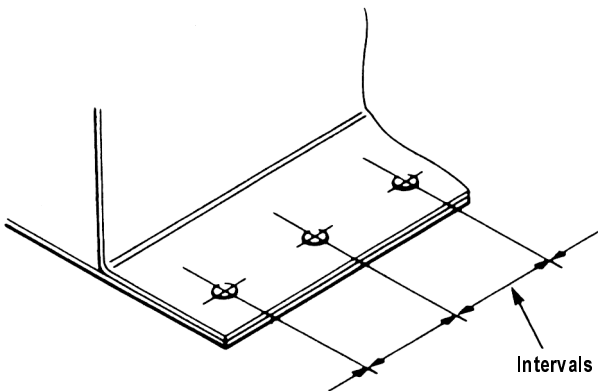
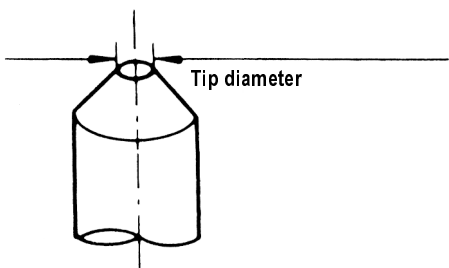
Welding Conditions:

When performing spot welding, make sure that you conform to the following conditions: use the correct current, conductivity time, welding pressure, holding time and shutdown time recommended for the spot welder. Please bear in mind the following points when welding :

- Plate thickness and minimum welding pitch



NOTE: If the welding intervals are too short, branching may occur, making it impossible to maintain the desired soldering state.
Plate thickness and tip diameter.



Unit: mm (in.)

Plate thickness	0.6 (0.02)	0.9 (0.04)	1.2 (0.05)	1.6 (0.06)
Minimum intervals	11 (0.43)	16 (0.63)	20 (0.79)	24 (0.94)

Unit: mm (in.)

Plate thickness	0.8 (0.03)	0.9 (0.04)	1.2 (0.05)	1.6 (0.06)
Tip diameter	45 (0.12)	5.0 (0.2)	5.5 (0.22)	6.0 (0.24)

(cont'd)

Preparation of Work

Welding Methods (cont'd)

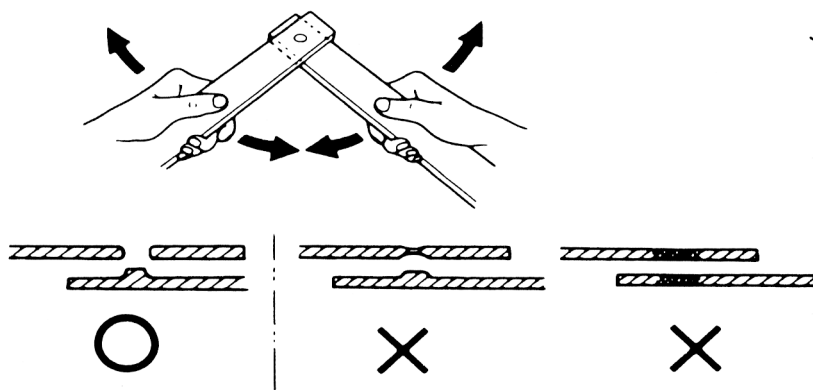
Spot Welding (cont'd)

Welding Strength Test

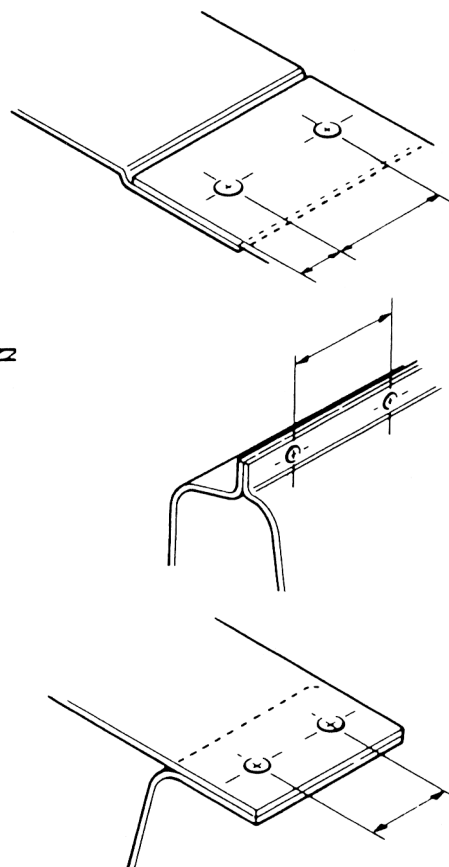
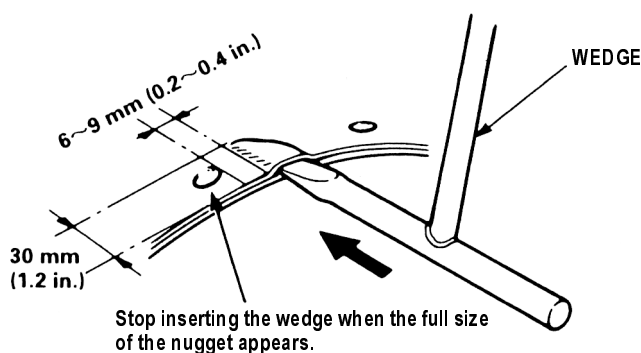
Even if you perform the welding according to the proper conditions, the strength of the welded sections may fluctuate due to drops in the voltage and other factors. The quality of the welding cannot be evaluated unless the welded sections are destroyed.

Provide yourself with a steel plate of the same thickness and conduct a destruction test.

- If holes appear in the steel plates, this means that the welding is of standard strength.



- Drive a wedge between 2 panels near the nugget. If the welded parts do not come apart and the diameter of the nugget is more than 3 mm (0.1 in.), the welding should be satisfactory.



NOTE:

It is difficult to perform spot welding in the following circumstances:

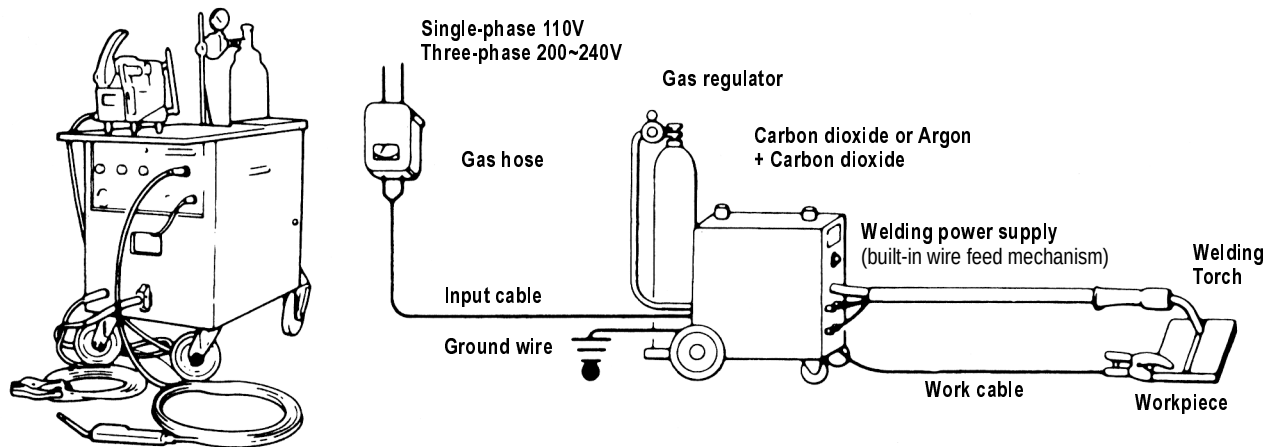
- When it is not possible to remove any rust or paint attached to the welding surfaces.
- When the tip of the spot welder cannot be inserted into the welding section.
- When the welding surfaces can be seen from the outside and welding will impair the exterior appearance.

In all these cases, the gas welding method should be employed. Moreover, if it is not possible to perform spot welding because of space restrictions, plug welding using on the arc welding method may be performed instead. For plug welding, the sections to be welded must be close together.

Carbon Dioxide Arc Welder (MIG Arc Weld)

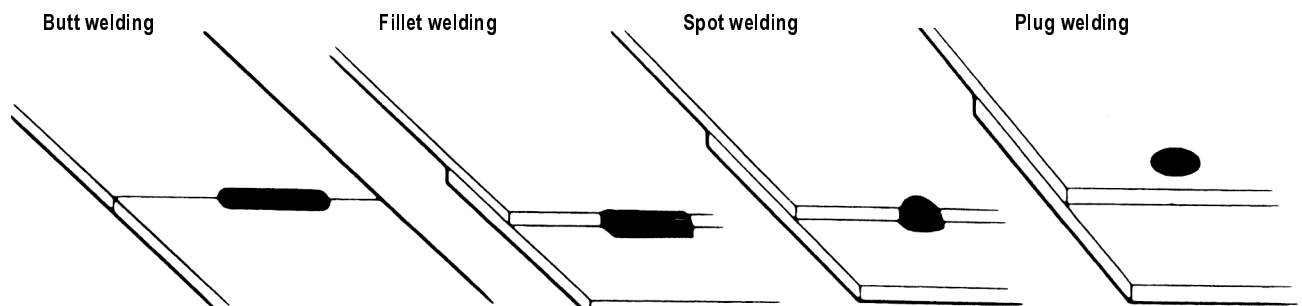
This welding process uses inexpensive carbon dioxide instead of expensive inert gases as a shielding means. Consumable metal electrodes are employed. It has a wide range of applications, including butt welding of a thin plate, fillet welding, plug welding and MIG spot welding. In terms of the weld strength, it is also highly stable.

Welders:



CAUTION: Disconnect the negative battery cable before arc welding.

Welding Methods:



Plug Welding Conditions:

Plate thickness and weld holes

Unit: mm (in.)

Plate thickness	~ 1.0 (0.04)	1.0 (0.04) ~ 1.5 (0.06)	1.5 (0.06) ~
Weld hole diameter	5 (0.2)	6.5 (0.26)	8 (0.3)

(cont'd)

Preparation of Work

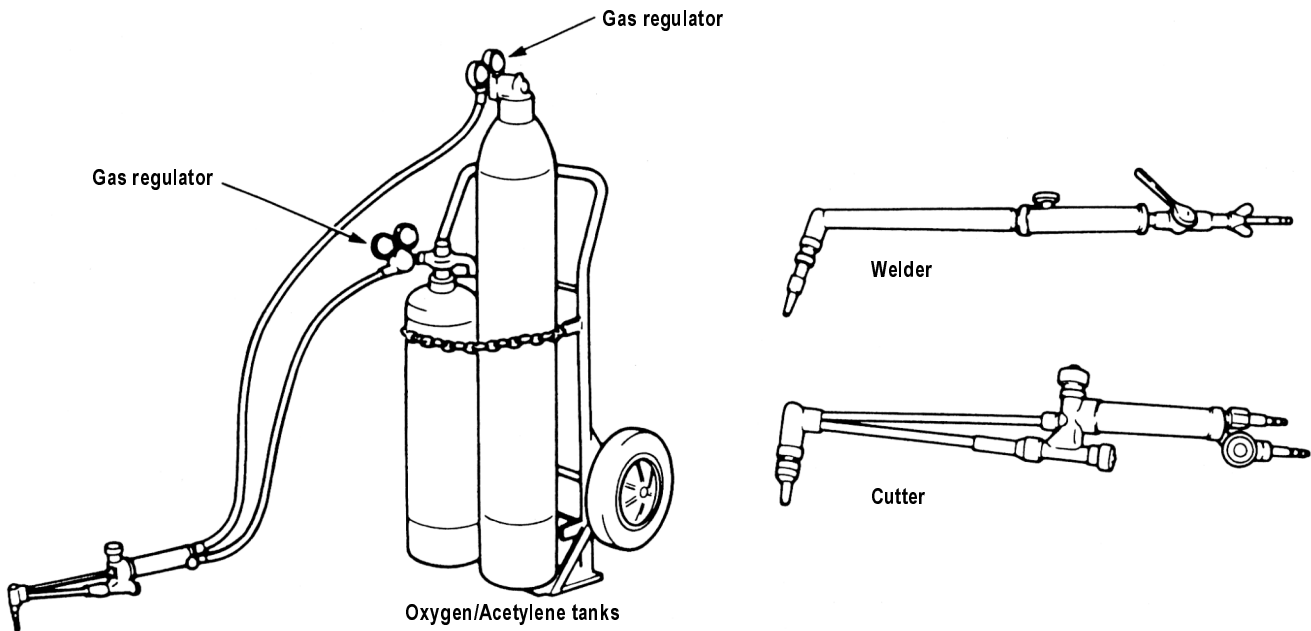
Welding Methods (cont'd)

Gas Welding

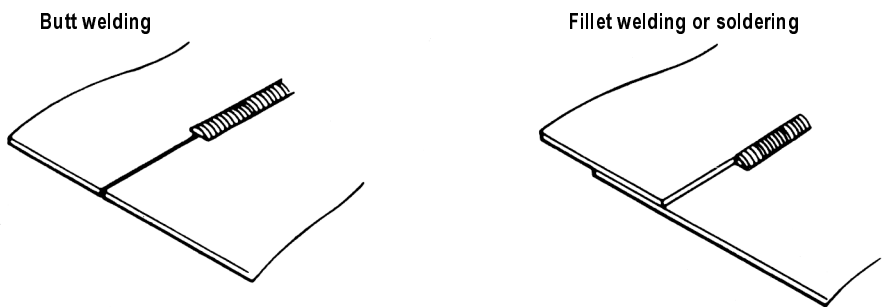
Gas welding is indispensable for body repair because of the broad range of its applications to join the body panels, cut the materials that construct the body, apply heat to reform panels and also because it is easy to get hold of the tools.

However, this method requires experience.

Welders:



Welding Methods:



3

Replacement

(*) Front Bulkhead	3-2
(*) Front Wheelhouse / Damper Housing	3-4
(*) Front Side Frame / Outrigger.....	3-9
(*) Front Pillar Outer Panel.....	3-14
(*) Side Sill Outer Panel.....	3-17
Roof Panel.....	3-20
Rear Side Outer Panel.....	3-23
Rear Panel	3-29
Rear Floor / Rear Floor Cross-member	3-32

3 Replacement

Items marked with and an asterisk (*) include SRS components; special caution is required when servicing.

The symbols in the mass production body welding diagrams and in the replacement illustrations carry the following meanings:

(Mass Production Body Welding Diagram)

- ✱ : Spot welding
- ▽ : MIG welding
- ✕ : 2-plate welding
- ⊗ : 3-plate welding
- ⊠ : 4-plate welding
- P= : Spot welding pitch
- L= : MIG welding length
Unit: mm (in.)
- () : The number of spot welds.

(Replacement Illustration)

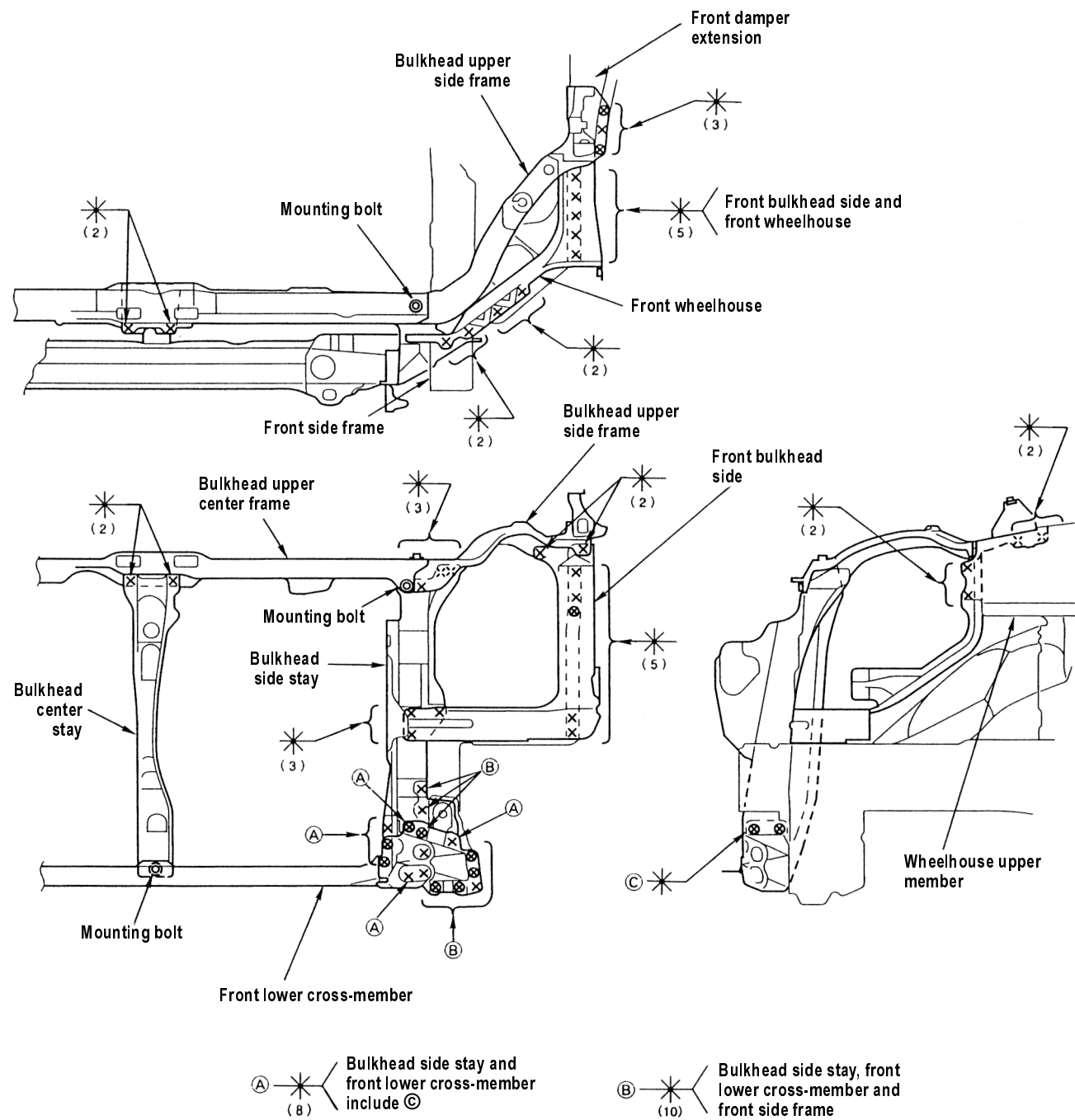
- X : Spot welding
- : MIG welding

NOTE: The welding symbols in the illustrations don't show exact welding locations. For exact welding locations, refer to the mass production body welding diagrams.

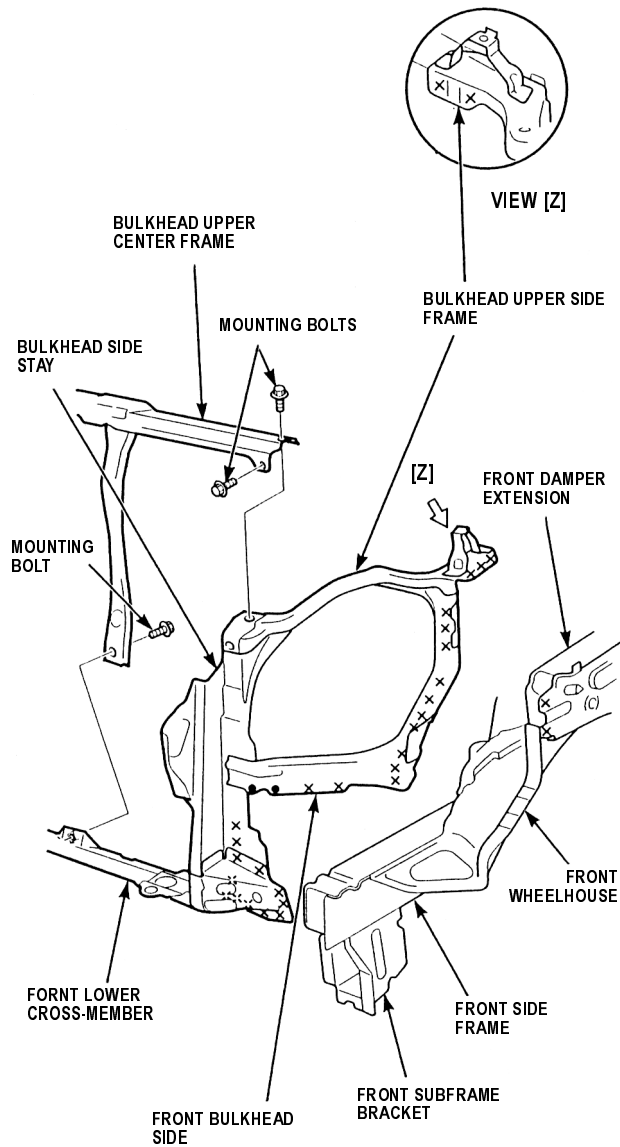
Replacement

Front Bulkhead

Mass Production Body Welding Diagram

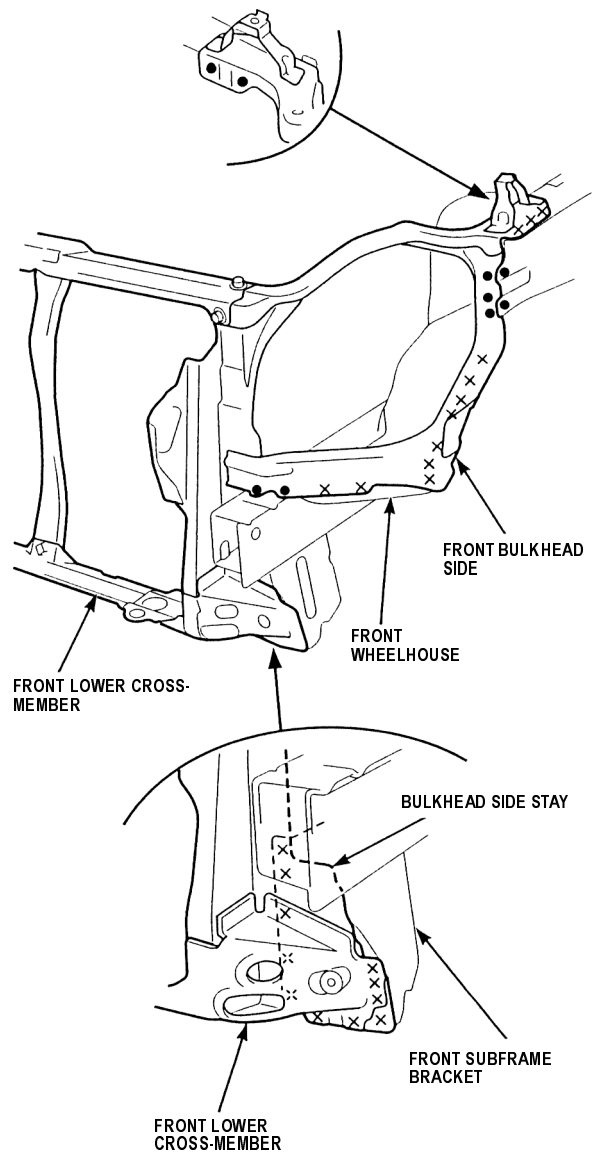


Removal



Installation

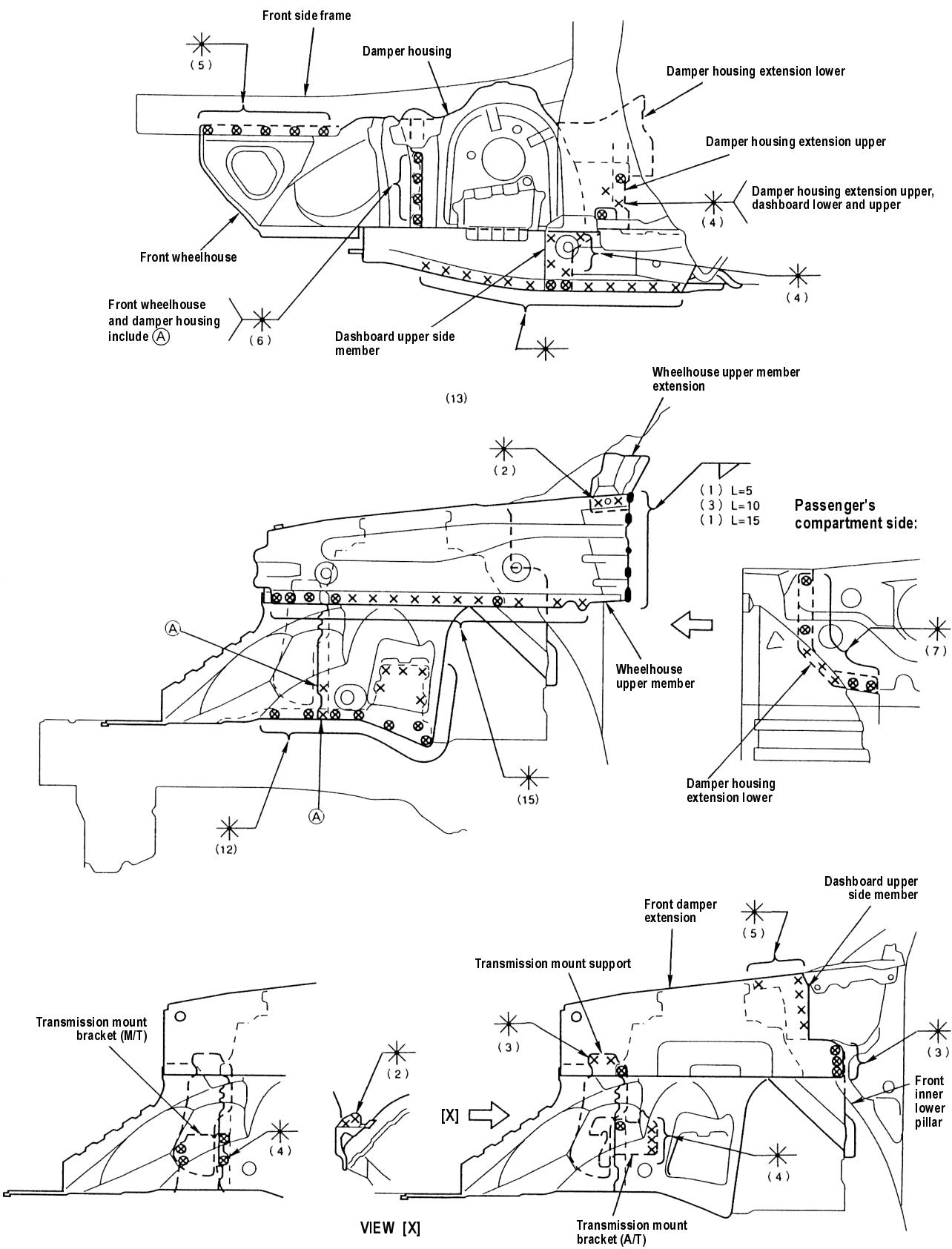
1. Set the new front bulkhead and wheelhouse upper extension into position, and measure the front compartment diagonally. Check the body dimensions (see section 4).
2. Tack weld the clamped position.
3. Temporarily install the hood, front fender, headlight, and front bumper and check for differences in level and clearance.
4. Do the main welding.



Replacement

Front Wheelhouse / Damper Housing

Mass Production Body Welding Diagram



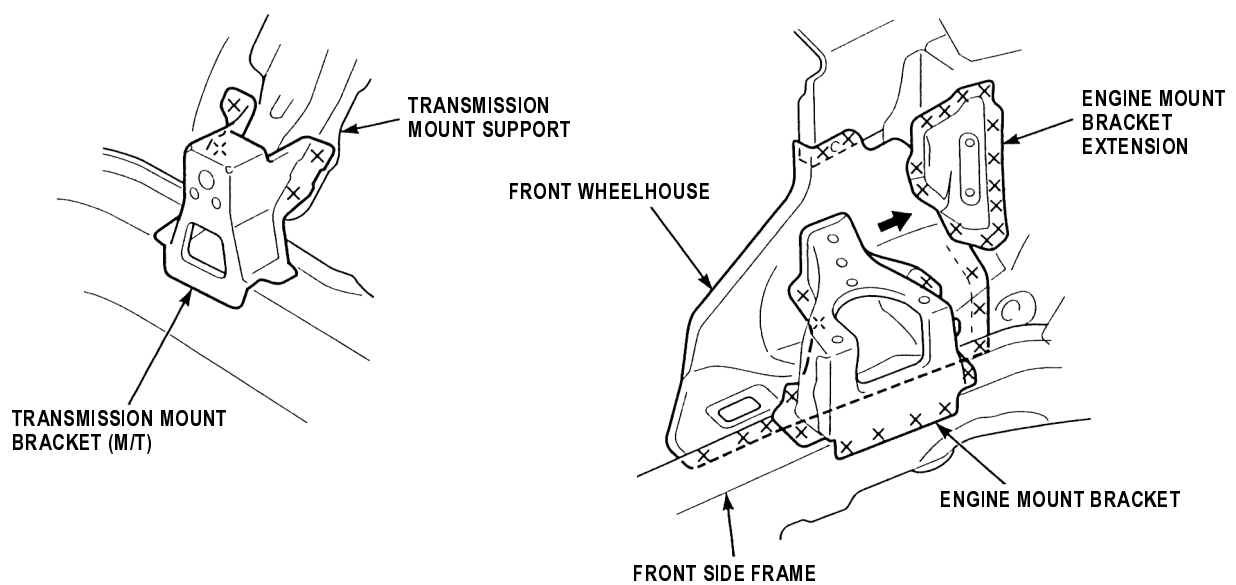
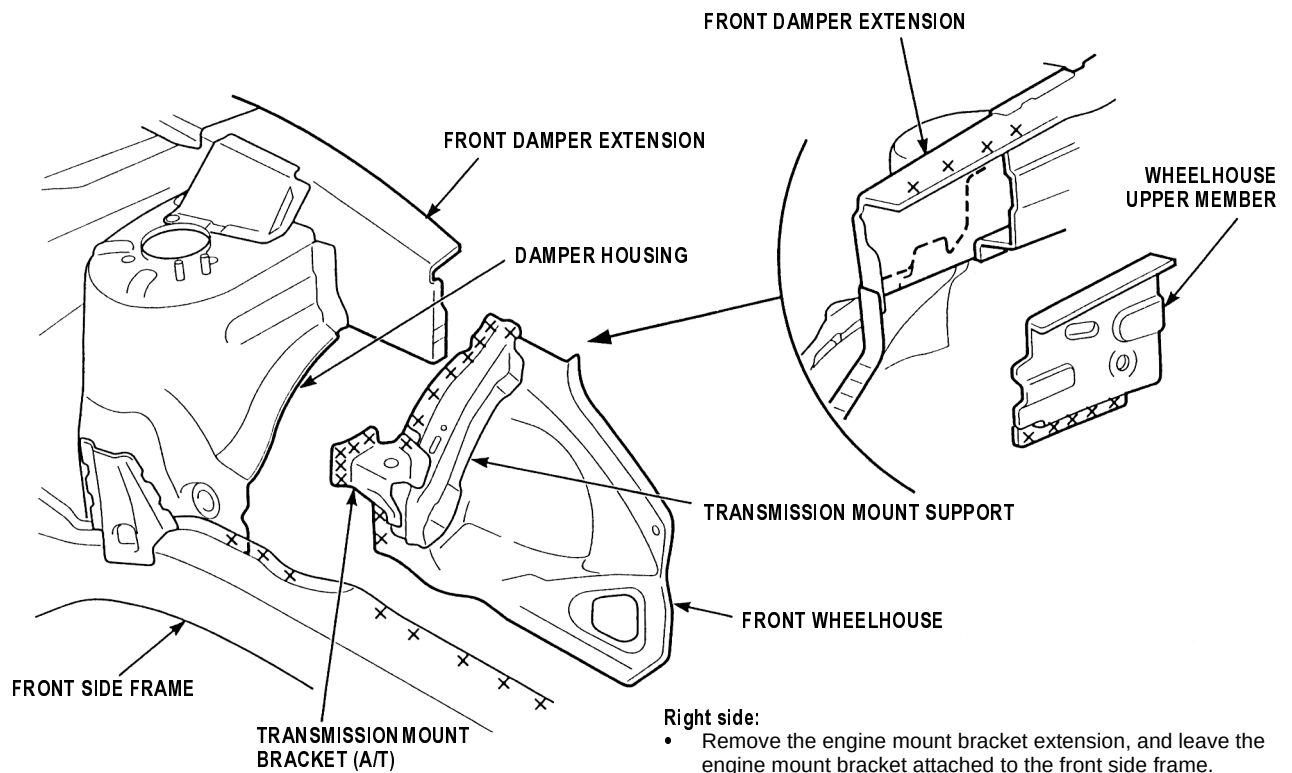
Removal

- Cut and remove the wheelhouse upper member, and replace the front wheelhouse.

- When removing the front wheelhouse

M/T: Leave the transmission mount bracket attached to the front side frame.

A/T: When replacing the front wheelhouse, support the wheelhouse and transmission mount bracket as an assembly.



(cont'd)

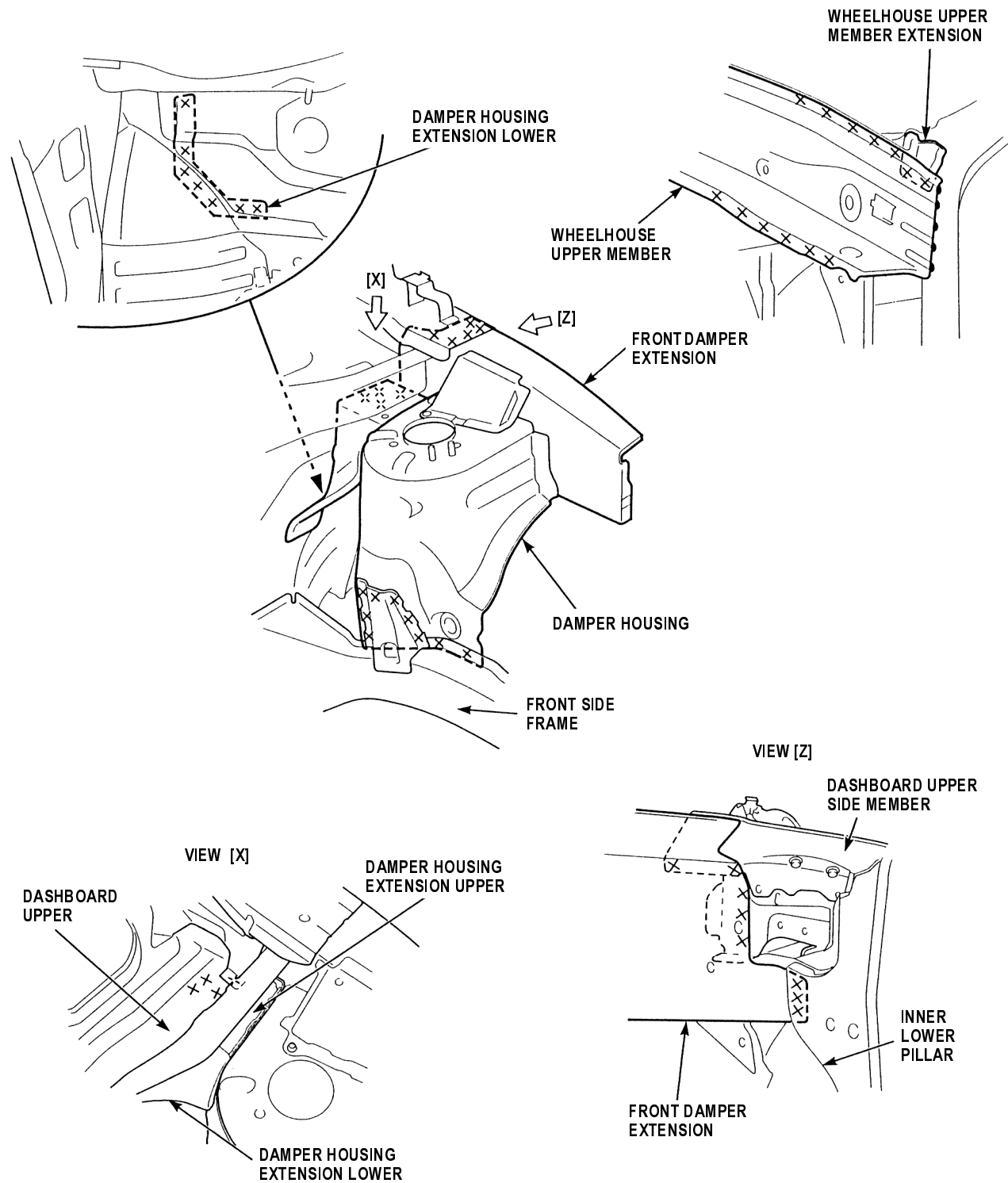
Replacement

Front Wheelhouse / Damper Housing (cont'd)

Removal (cont'd)

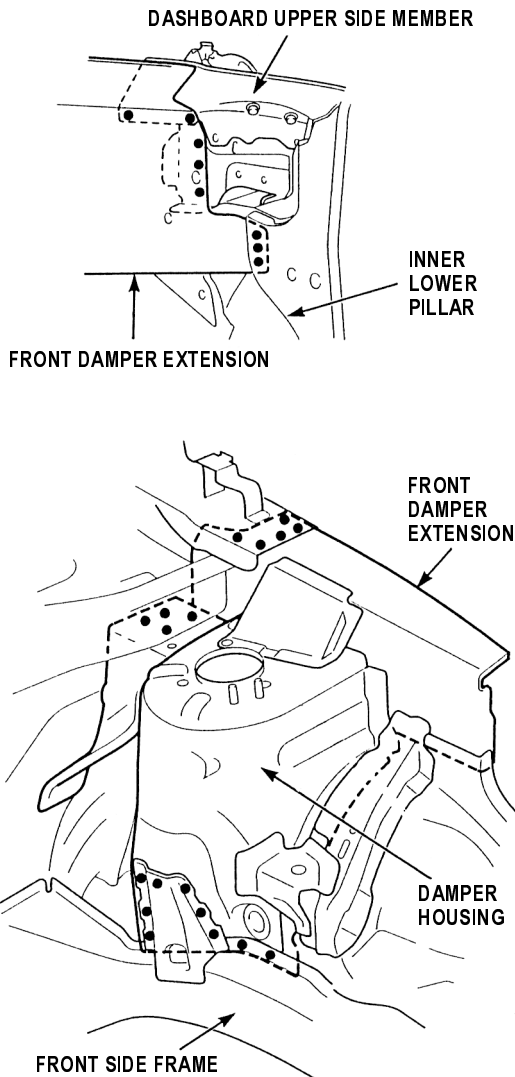
- Check the damper housing position, and check for damage.
- If necessary, remove the Wheelhouse upper member, and replace the front damper extension, damper housing, and damper housing extension as an assembly.

Passenger's compartment side:

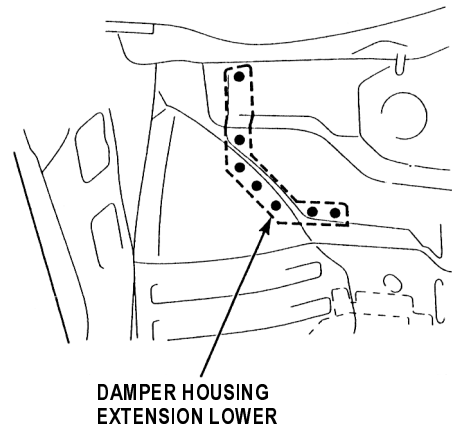


Installation

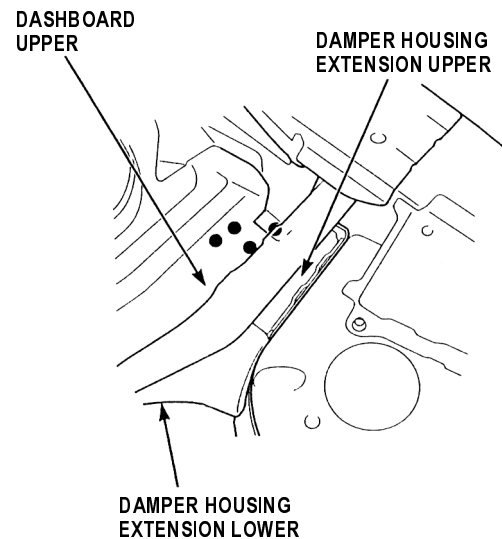
1. Set the new damper housing assembly, front wheelhouse, and front bulkhead into position, and measure the front compartment diagonally.
2. Check the body dimensions (see section 4).
3. Tack weld the clamped position.
4. Temporarily install the front subframe, and check the front side frame position.
5. Temporarily install the hood, front fender, headlight, and front bumper, and check for differences in level and clearance. Make sure the body lines flow smoothly.
6. Do the main welding.
 - Weld the damper housing and front side frame.
 - Weld the front damper extension and dashboard upper side member.



- From the passenger's compartment side, plug weld the holes in the dashboard lower, and damper housing extension lower.



- From the dashboard upper side, plug weld the holes in the damper housing extension upper.



(cont'd)

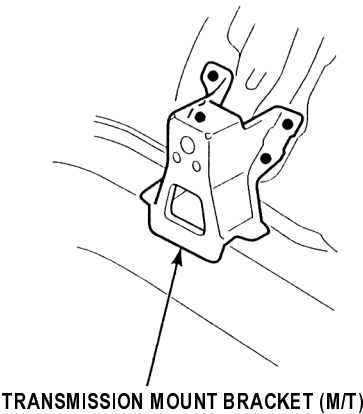
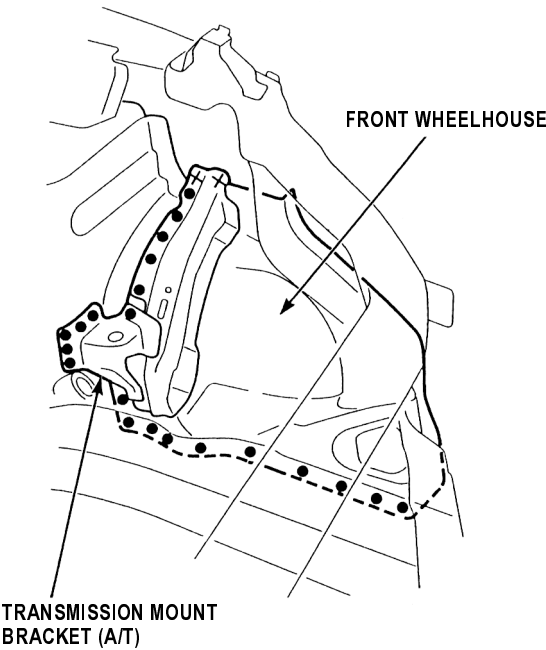
Replacement

Front Wheelhouse / Damper Housing (cont'd)

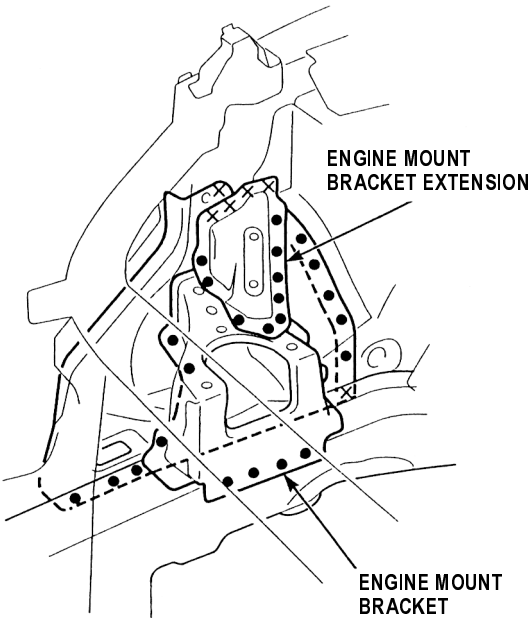
Installation (cont'd)

- Weld the front wheelhouse, damper housing, and front side frame.

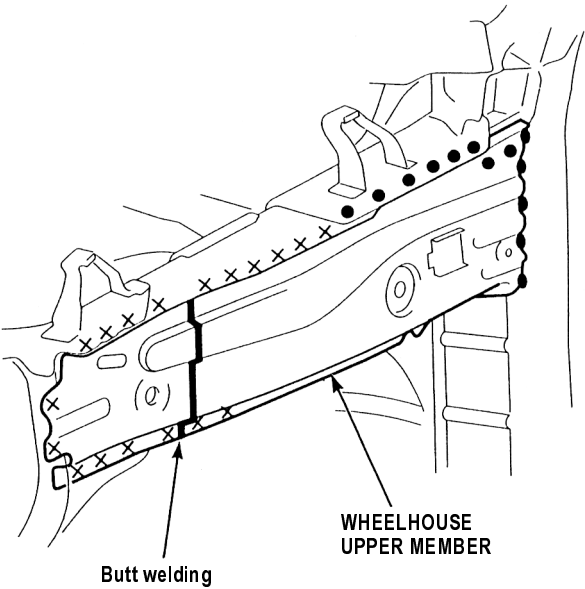
Left side:



Right side:



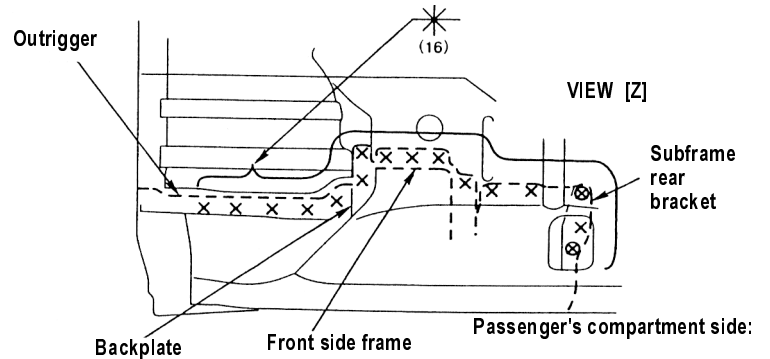
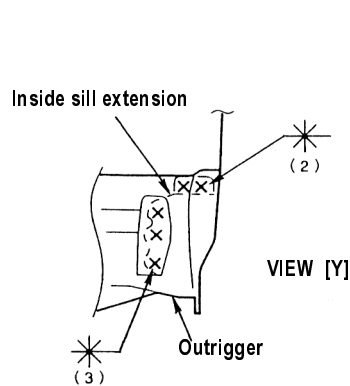
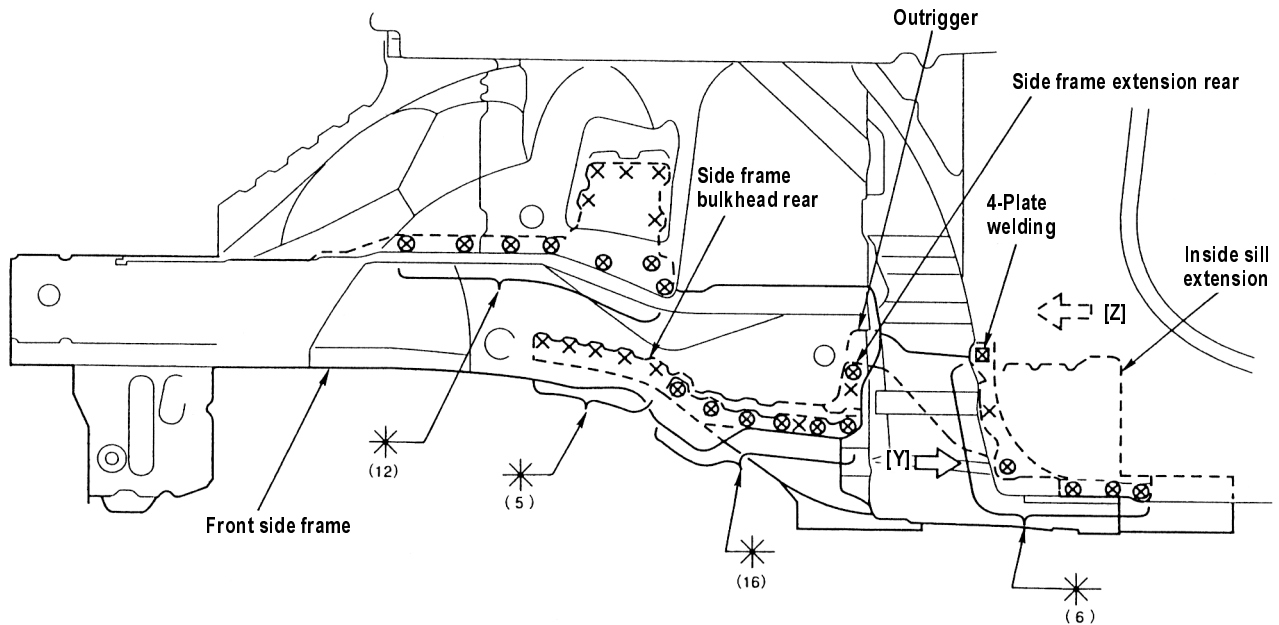
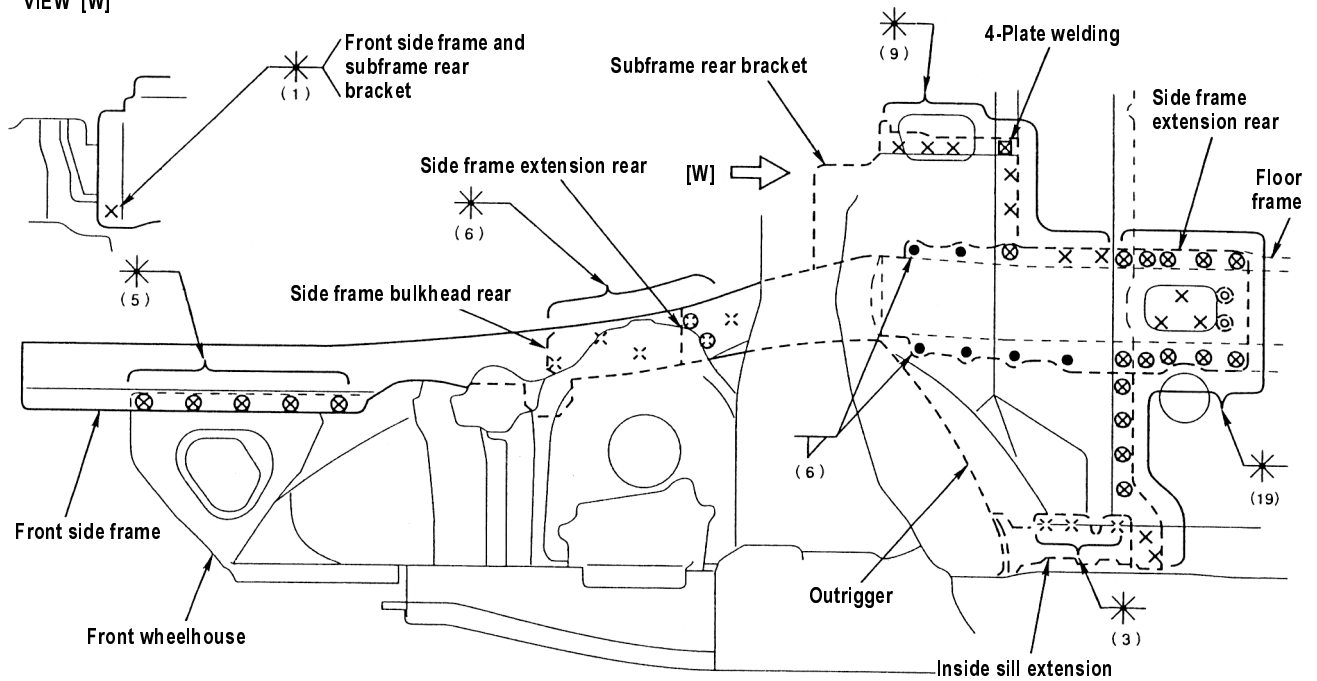
- Weld the wheelhouse upper member.



Front Side Frame / Outrigger

Mass Production Body Welding Diagram

VIEW [W]

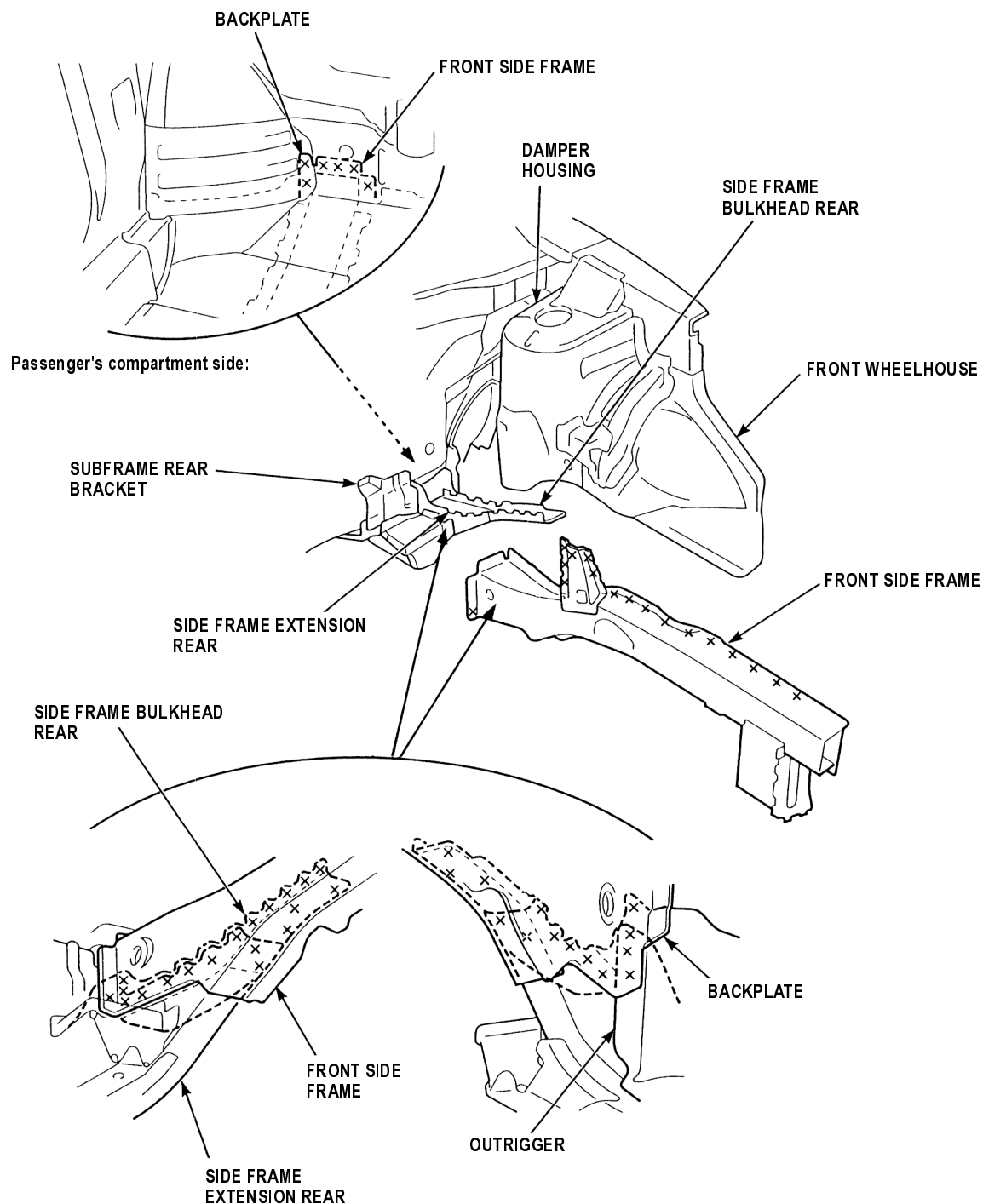


Replacement

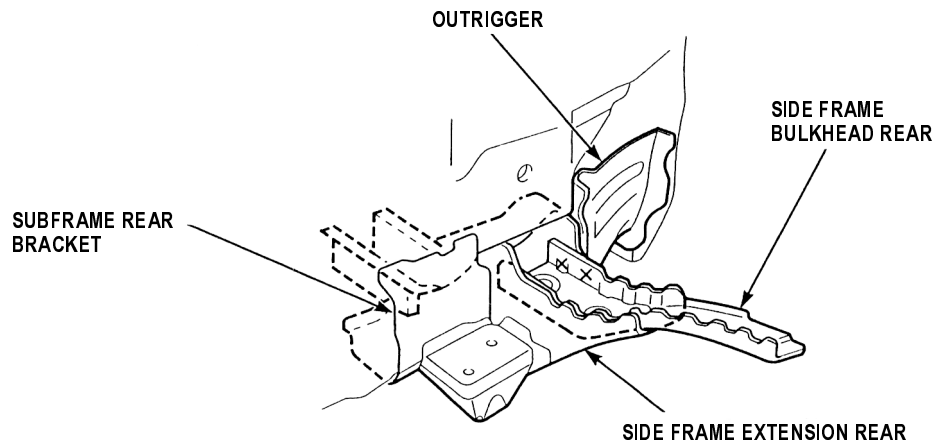
Front Side Frame / Outrigger (cont'd)

Removal

- When removing the front side frame, leave the side frame extension rear and side frame bulkhead rear attached to the dashboard lower.



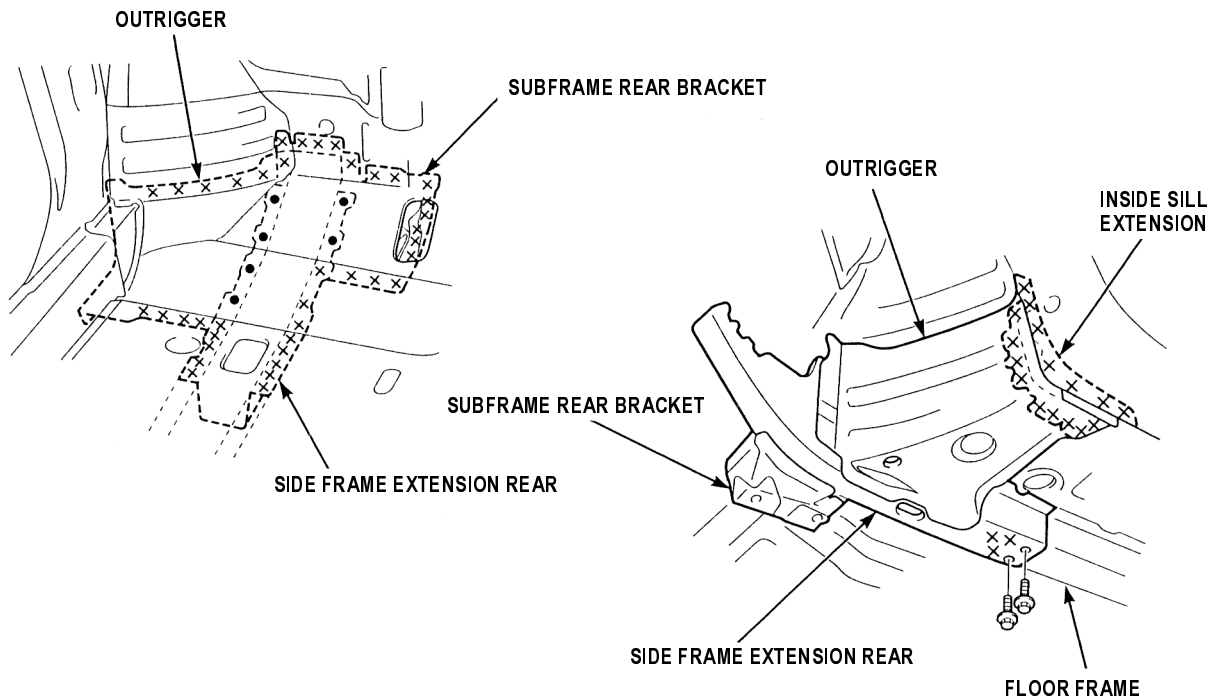
- Check the side frame bulkhead rear position, and check for damage. If necessary replace it.



- If necessary, replace the side frame extension rear, outrigger, and subframe rear bracket as an assembly.

NOTE: When removing the outrigger, leave the inside sill extension attached to the inside sill, if possible.

Passenger's compartment side:

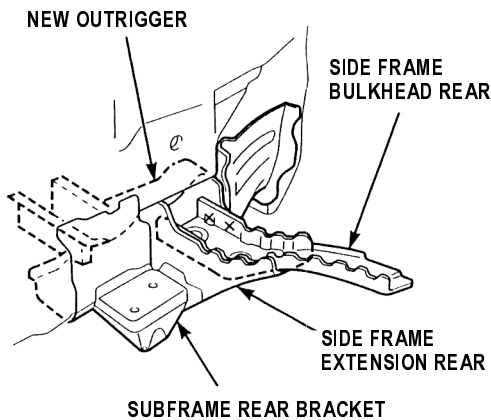


Replacement

Front Side Frame / Outrigger (cont'd)

Installation

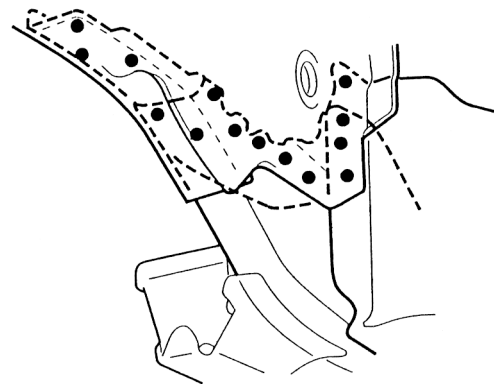
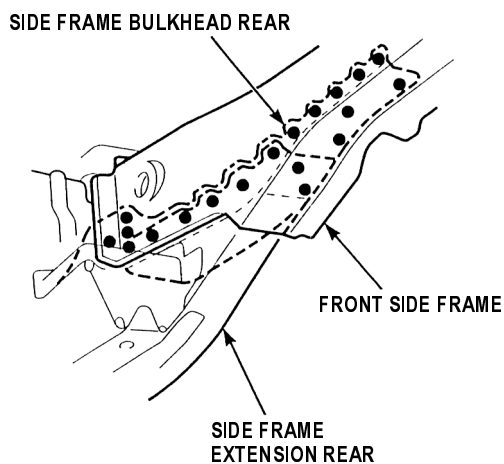
1. Set the new outrigger and tack weld the new side frame bulkhead rear to the side frame extension rear.



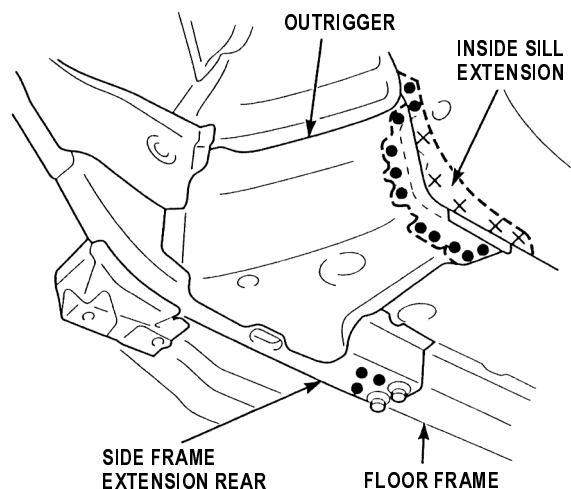
2. Set the new front side frame, and front bulkhead into position, and measure the front compartment diagonally.
Check the body dimensions ([see section 4](#)).
3. Tack weld the clamped position.
4. Temporarily install the front subframe, and check the front side frame position.
5. Temporarily install the hood, front fender, headlight, and front bumper, and check for differences in level and clearance.

Make sure the body lines flow smoothly.

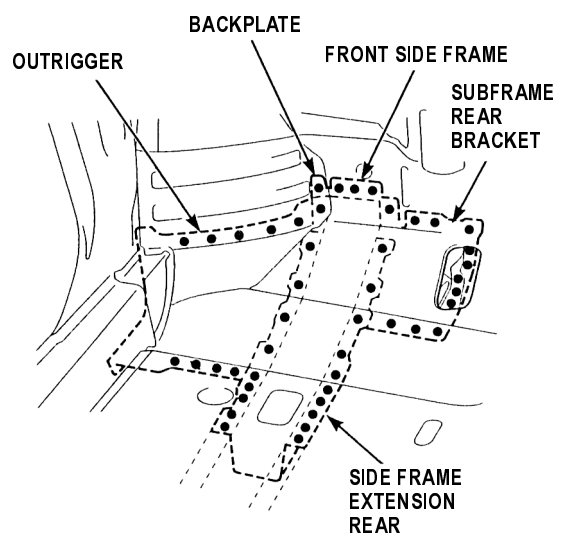
6. Do the main welding.
 - Plug weld the side frame extension rear, side frame bulkhead rear, and front side frame.



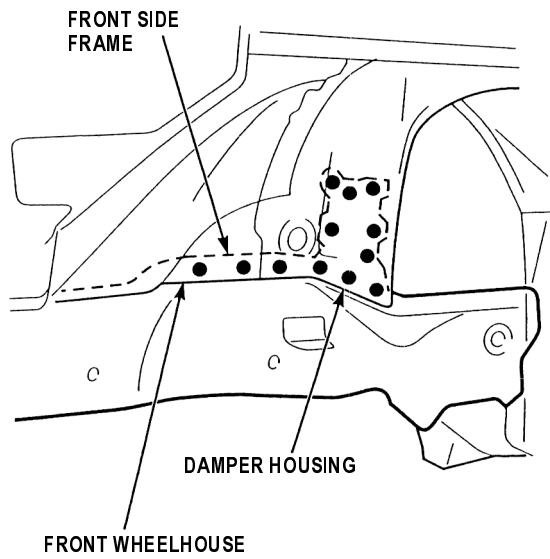
- Plug weld the inside sill extension and floor frame.



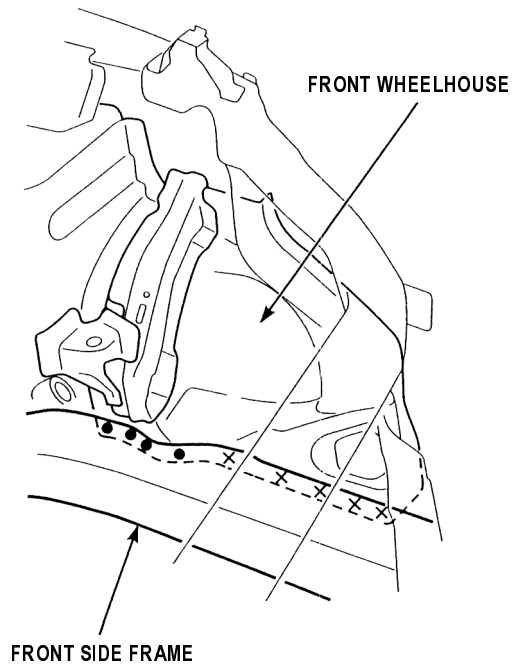
- From the passenger compartment, plug weld the dashboard lower and front floor.



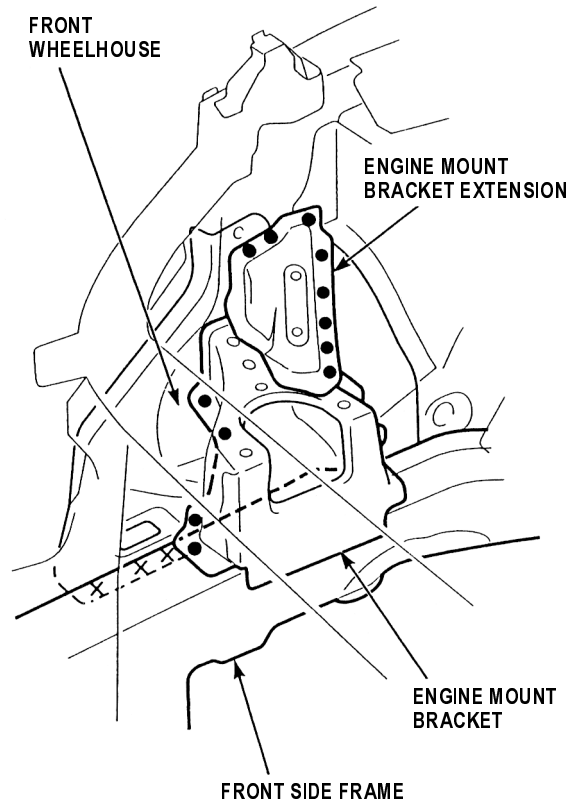
- Weld the damper housing, front wheelhouse, and front side frame.



Left side:



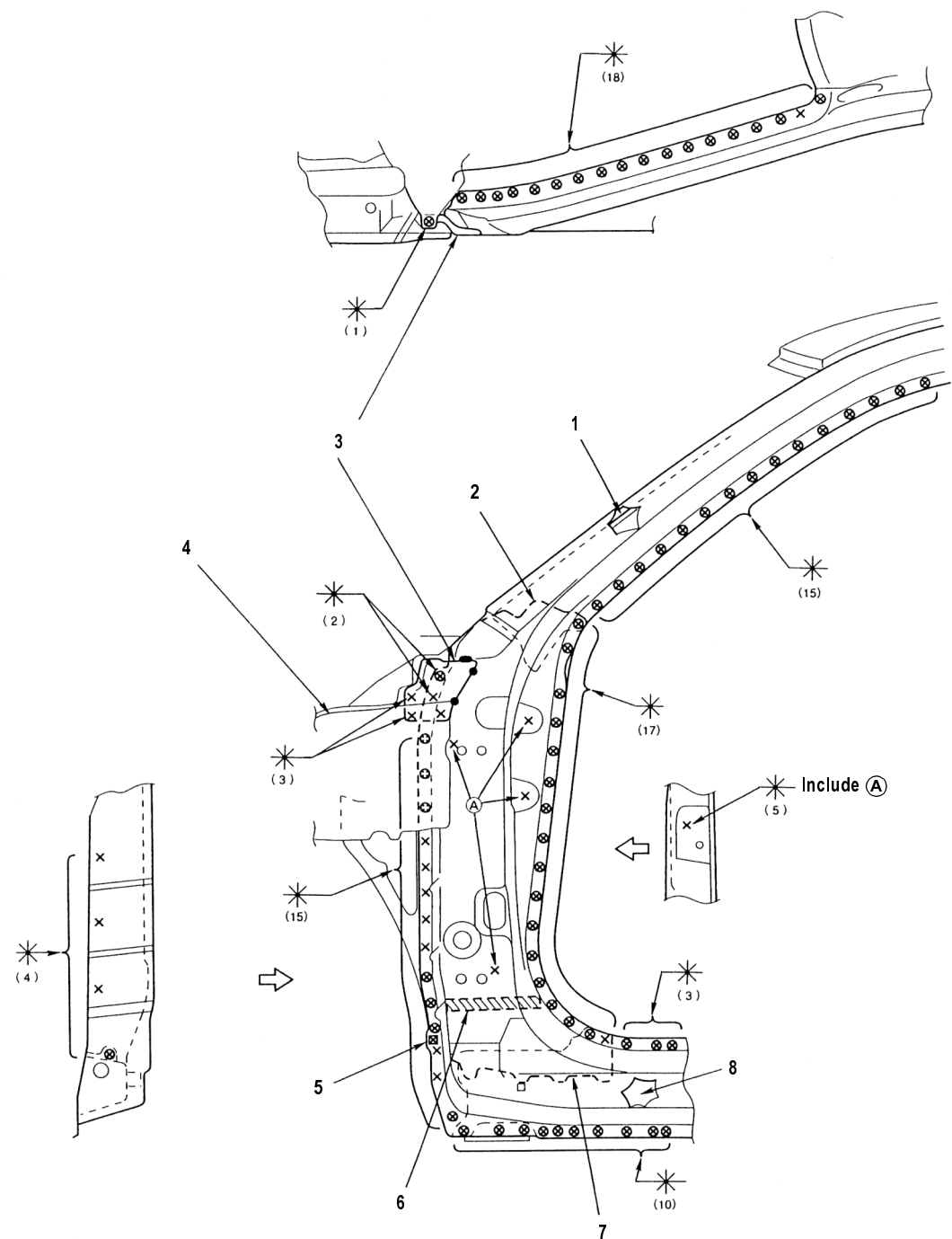
Right side:



Replacement

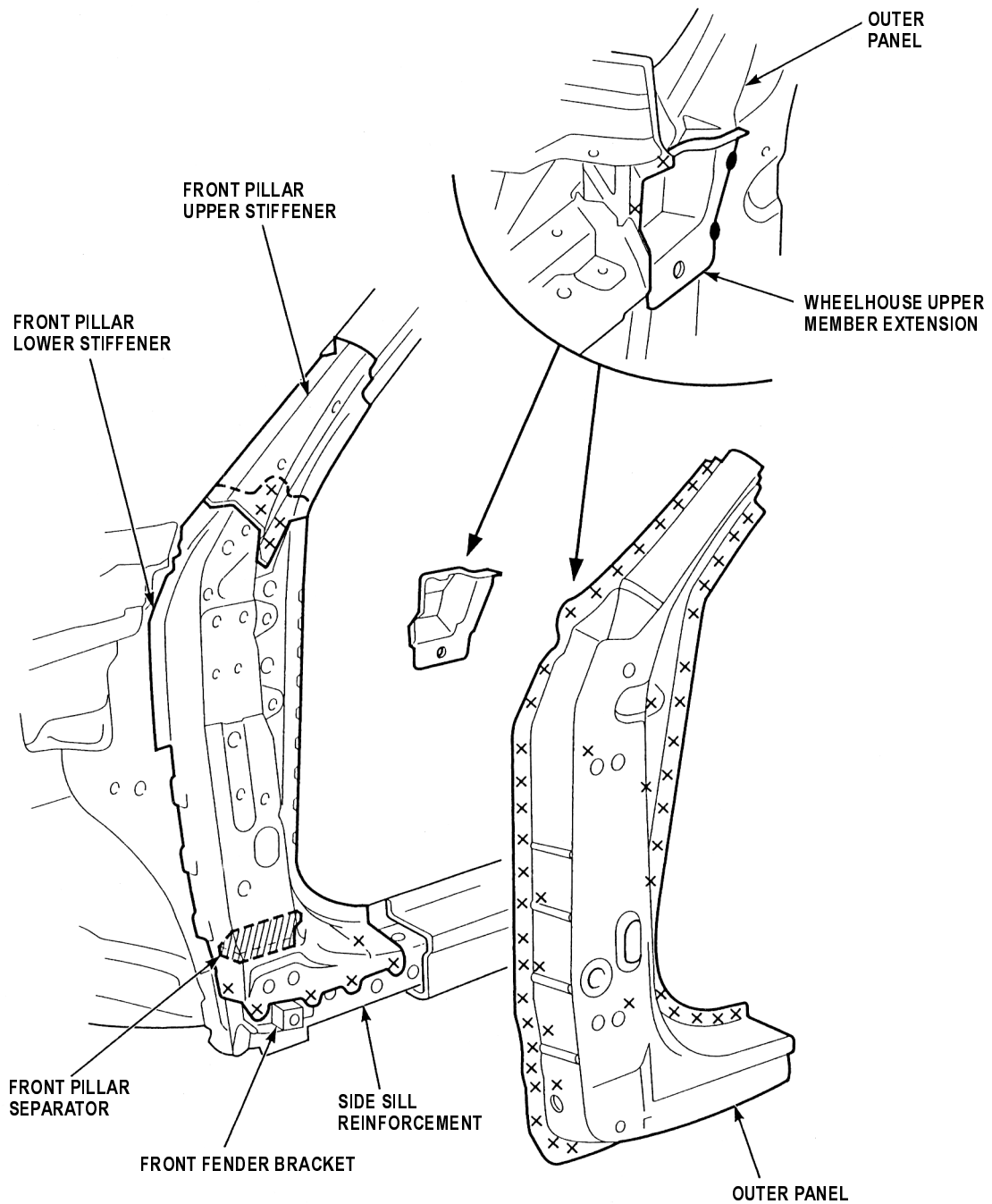
Front Pillar Outer Panel

Mass Production Body Welding Diagram



Removal

- Remove the wheelhouse upper member extension, and cut and pry off the front pillar outer panel, and if necessary replace the front fender bracket.
- Check the front pillar lower stiffener position, and check for damage. Replace it if necessary.
- When replacing the front pillar lower stiffener, remove the front pillar separator, and glue the insulator at the separator mounted position.
- If necessary, replace the front fender bracket.



Replacement

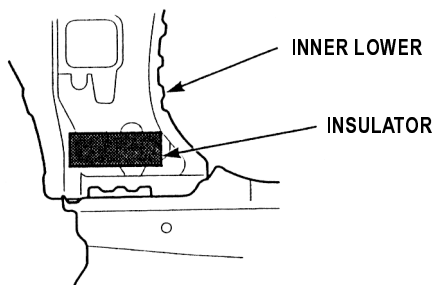
Front Pillar Outer Panel (cont'd)

Installation

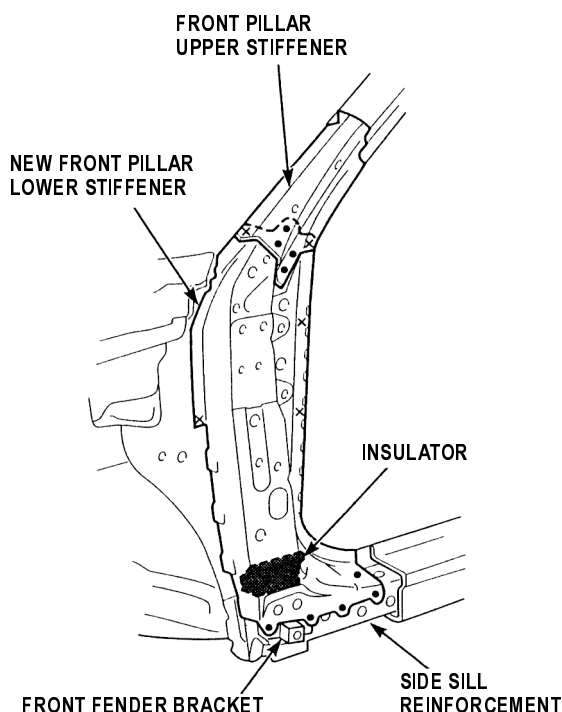
1. Glue the insulator to the inner lower as shown.

Insulator: P/N. 74416-SF1-000

Adhesive: Cemedine 366, or equivalent



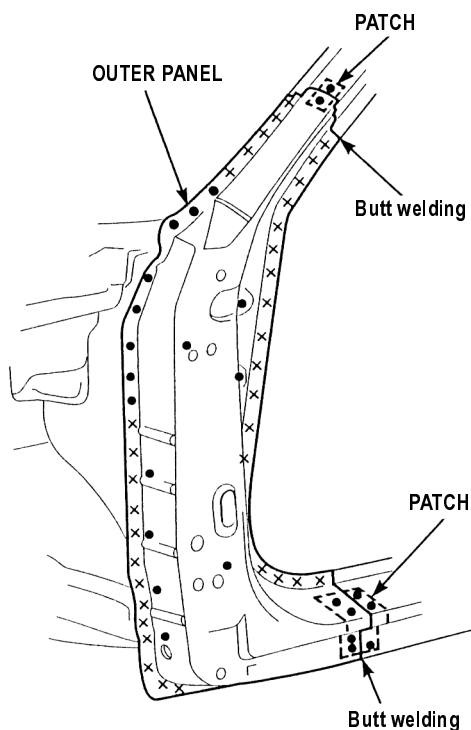
2. Set the new front pillar lower stiffener and front fender bracket into position, and tack weld the clamped position.
3. Cut the repair part (outer panel), and set it into position. Clamp the repair part, and check the body dimensions ([see section 4](#)).
4. Temporarily install the windshield, windshield side trim, door, hood, and front fender, and check for differences in level and clearance. Make sure the body lines flow smoothly.
5. Remove the repair part, and weld the front pillar lower stiffener, upper stiffener, and side sill reinforcement.



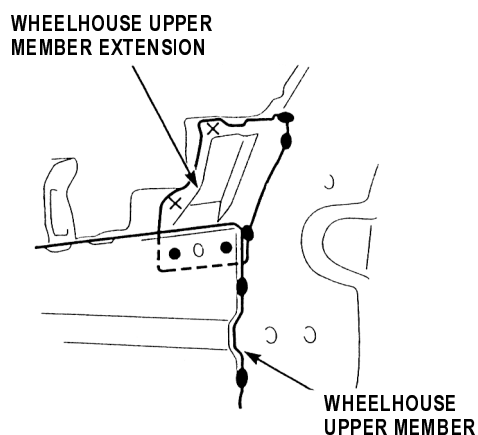
6. Clamp the repair part, and recheck the clearance and alignment of the door, front fender, and windshield.

7. Do the main welding.

- Attach a patch at the cut section of the front pillar and side sill outer panel, and plug weld them.

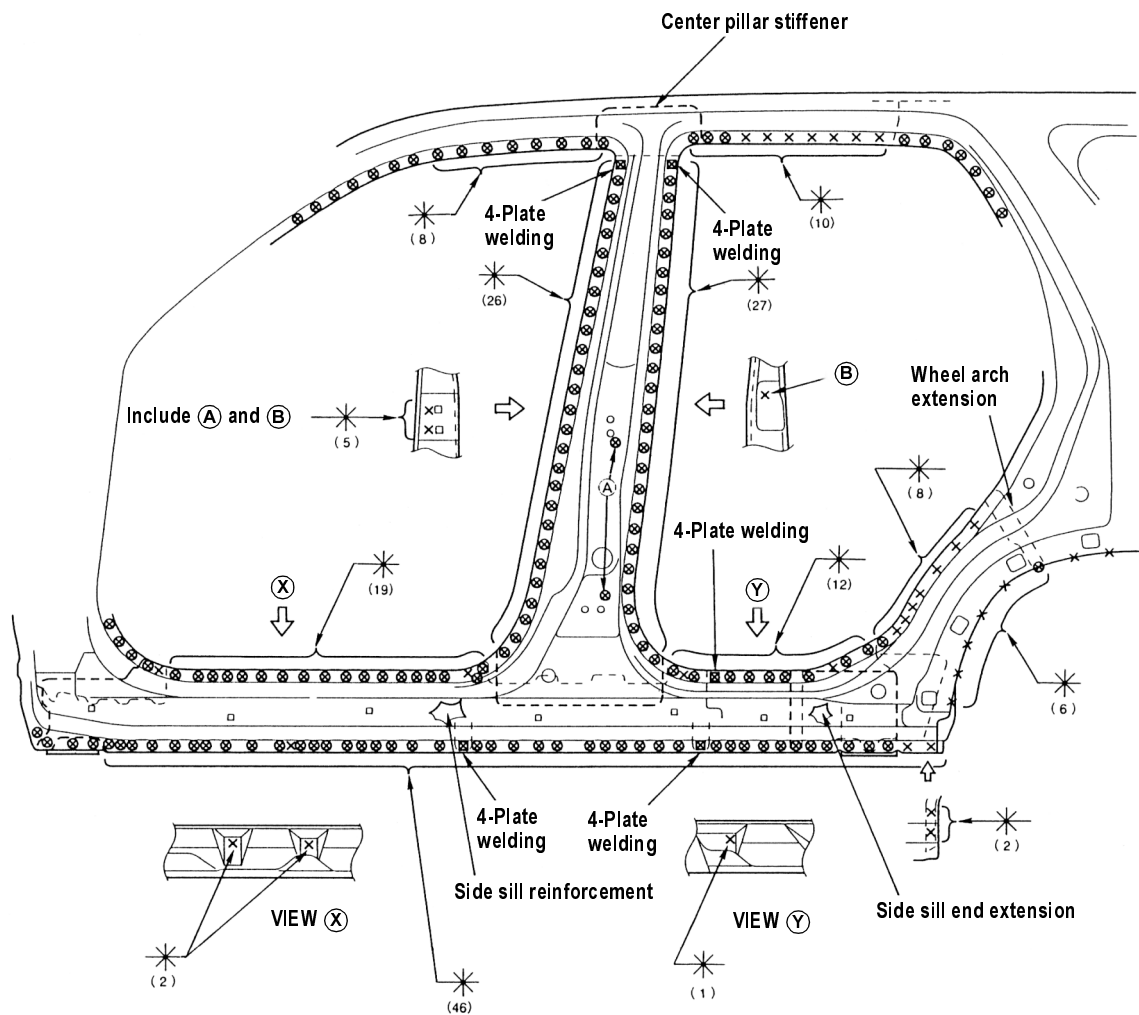


8. Weld the wheelhouse upper member extension and upper member.



Side Sill Outer Panel

Mass Production Body Welding Diagram



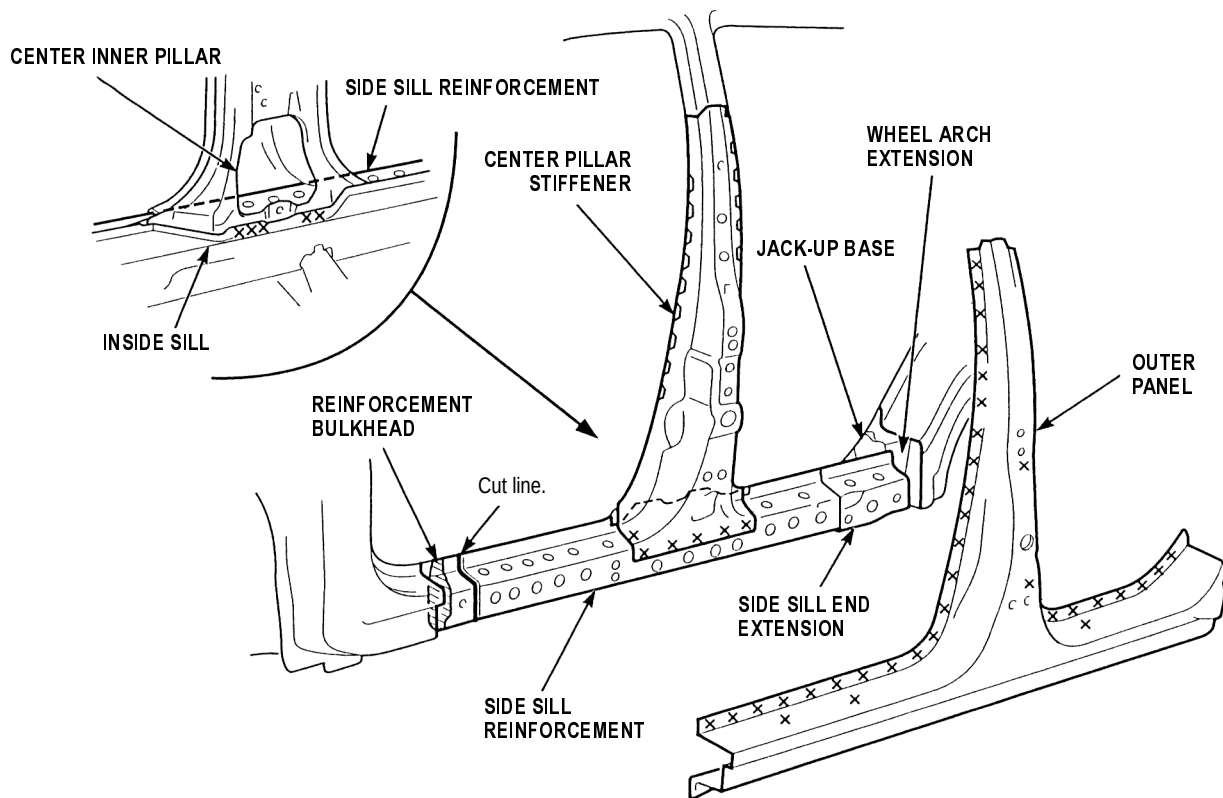
Replacement

Side Sill Outer Panel (cont'd)

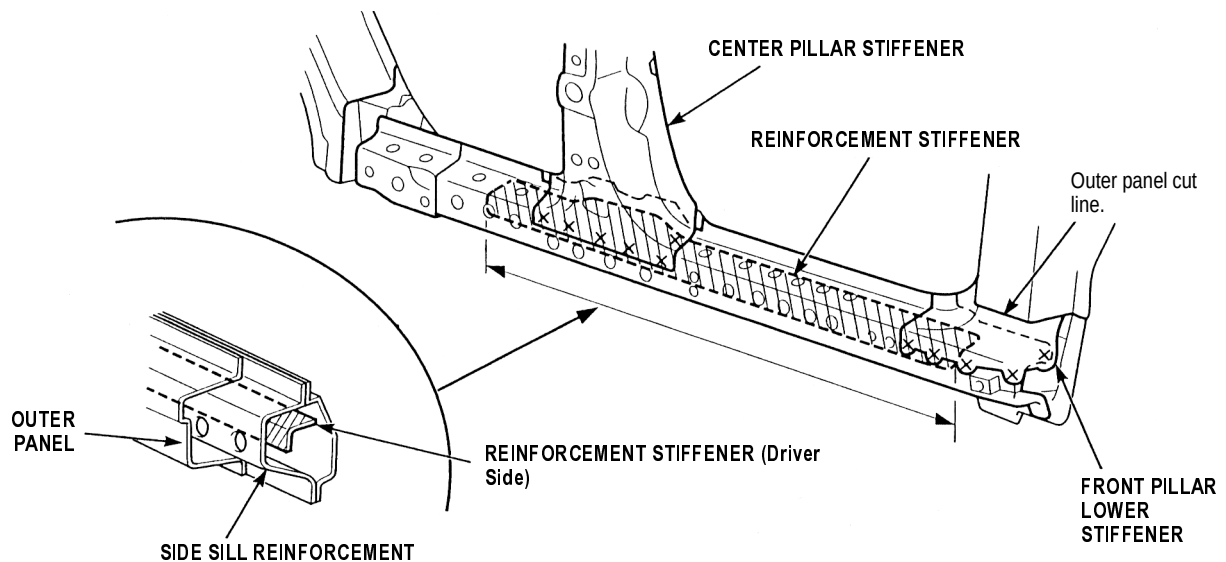
Removal

- Cut and pry off the side sill outer panel.
- Check the center pillar stiffener lower and side sill reinforcement position, and check for damage. If necessary, replace the side sill reinforcement.
- Replace the drivers side sill reinforcement as an assembly because of the way the stiffener is attached inside the side sill reinforcement.

Passenger's side:



Driver's side:

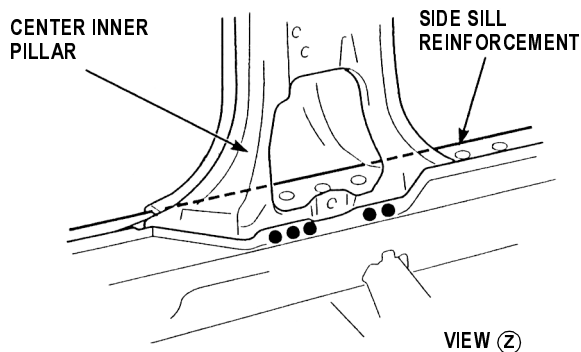
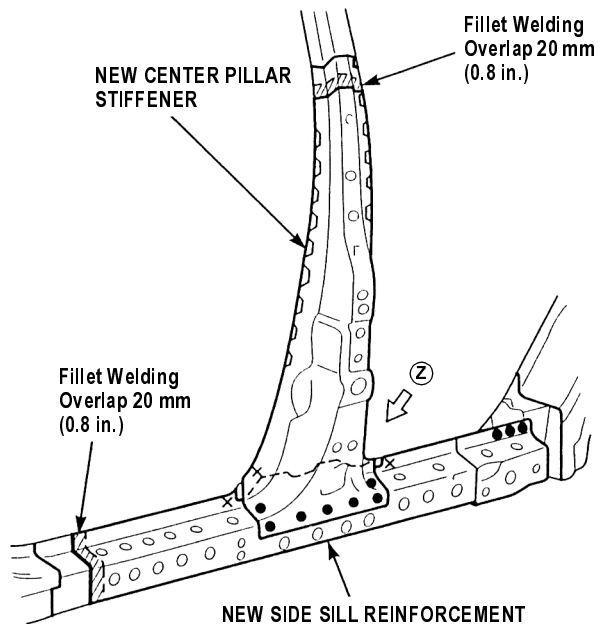


Installation

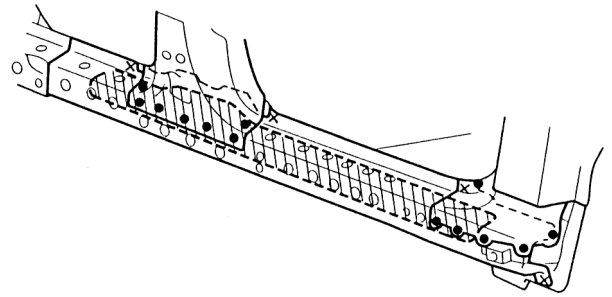
1. Cut and set the new center pillar stiffener and side sill reinforcement into position, and tack weld the clamped position.
2. Cut the repair part (outer panel), and set it into position. Clamp the repair part, and check the body dimensions (see section 4).
3. Temporarily install the door and front fender, then check for differences in level and clearance. Make sure the body lines flow smoothly.
4. Remove the repair part, and weld the center pillar stiffener, side sill reinforcement.

Passenger's side:

When replacing the side sill reinforcement, cut the new side sill reinforcement so it overlaps the body side reinforcement by 20 mm (0.8 in.), and fillet weld it.

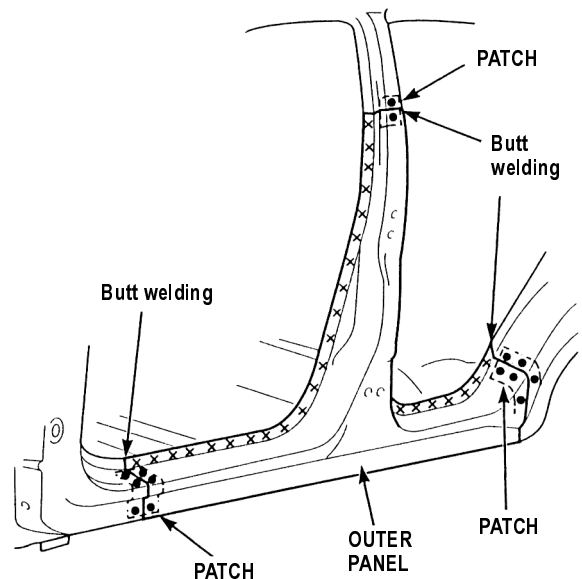


Driver's side:

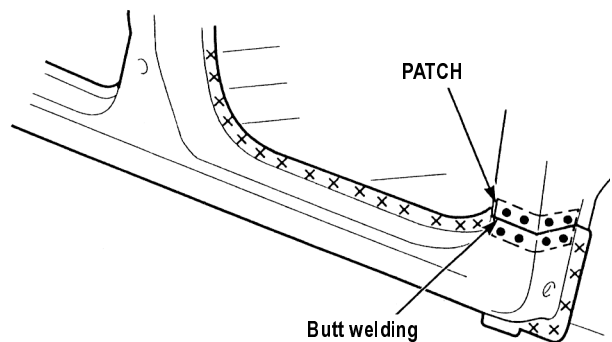


5. Clamp the repair part, and recheck the clearance and alignment of the door and front fender. Check the operation of the door.
6. Do the main welding. Make sure to attach the patch at the cut section of the front pillar, side sill, center pillar, and wheel arch, and plug weld them.

Passenger's side:



Driver's side:

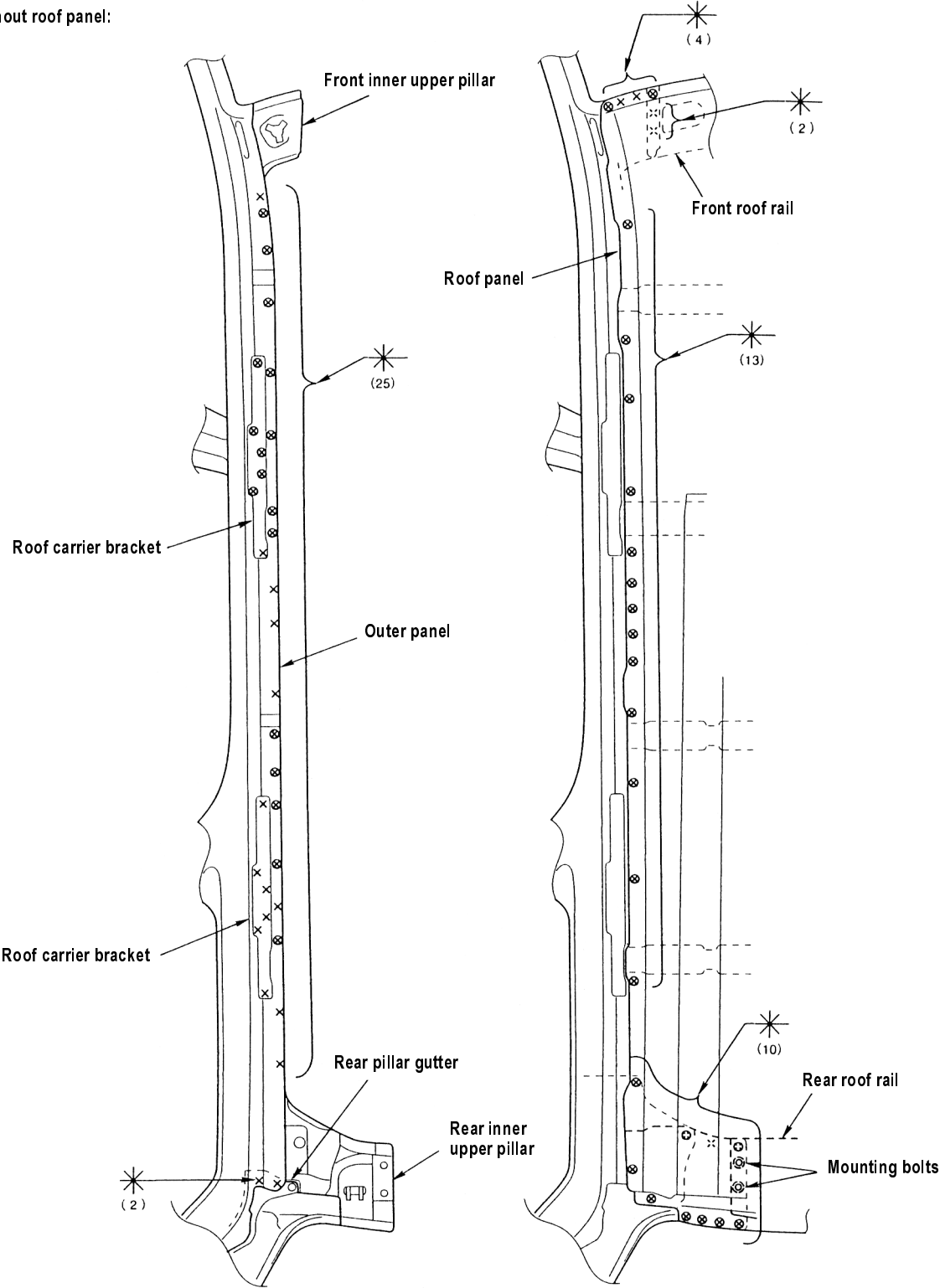


Replacement

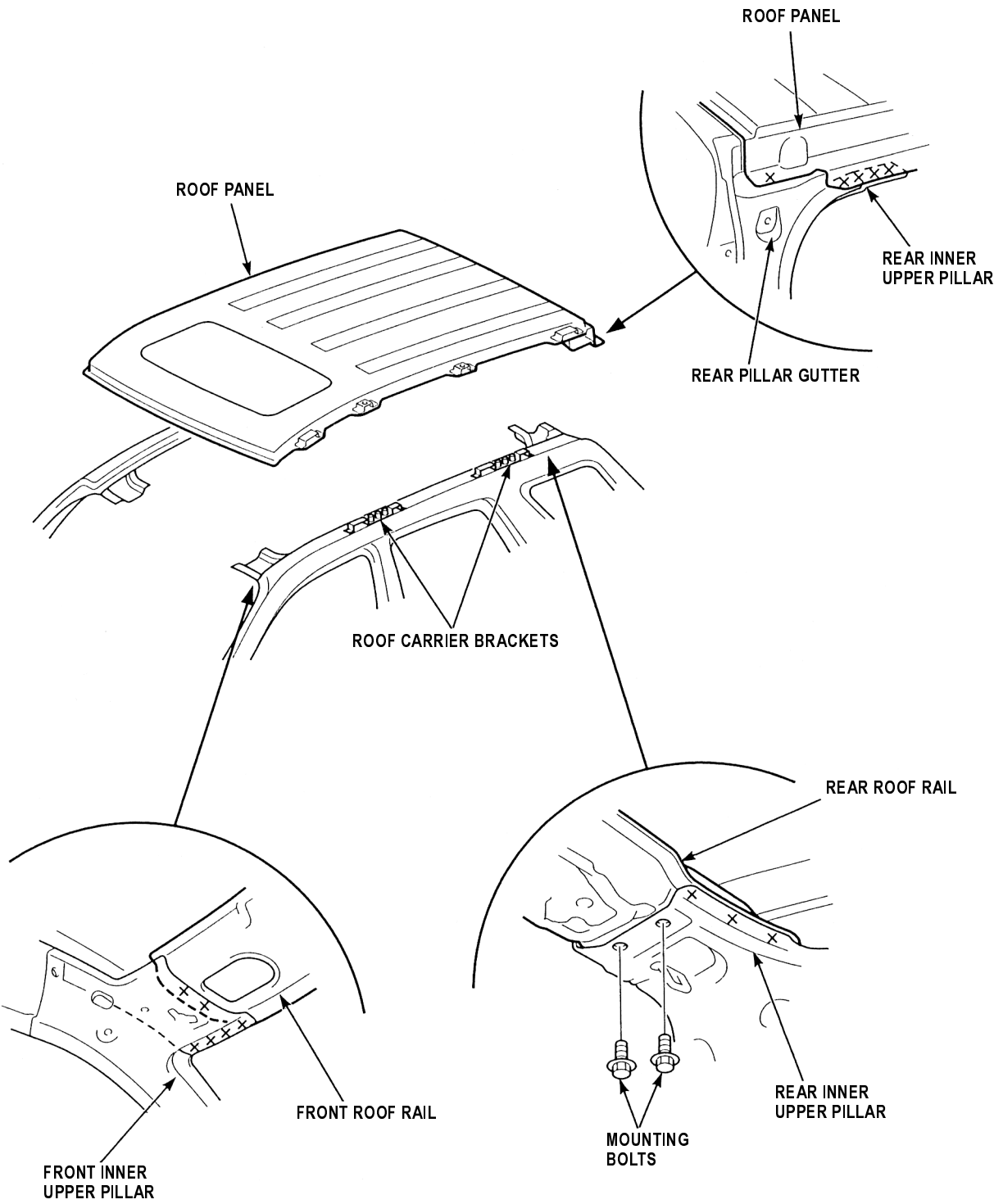
Roof Panel

Mass Production Body Welding Diagram

Without roof panel:



Removal

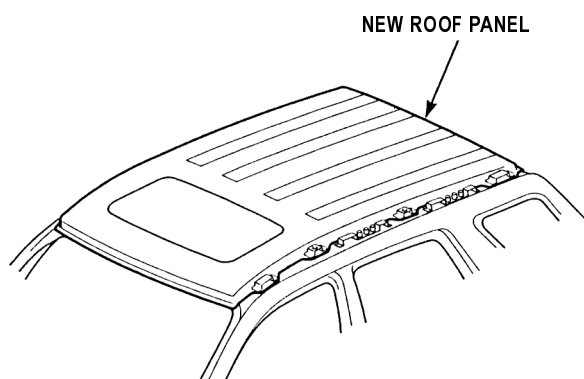


Replacement

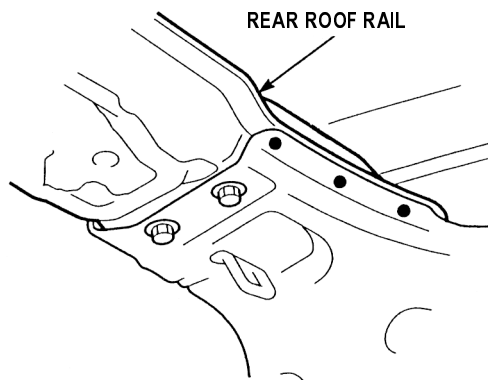
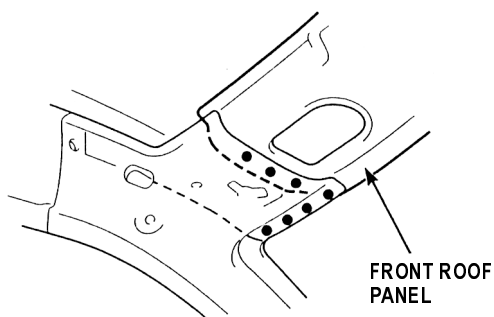
Roof Panel (cont'd)

Installation

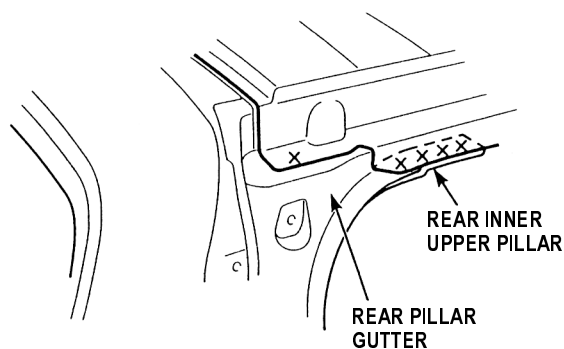
1. Set the new roof panel into position and clamp it. Check the body dimensions ([see section 4](#)).
2. Install the rear mounting bolts, and tack weld the roof panel.
3. Temporarily install the windshield, windshield side trim, roof side trim, door, and tailgate, and check for differences in level and clearance. Check the operation of the tailgate.
4. Do the main welding.



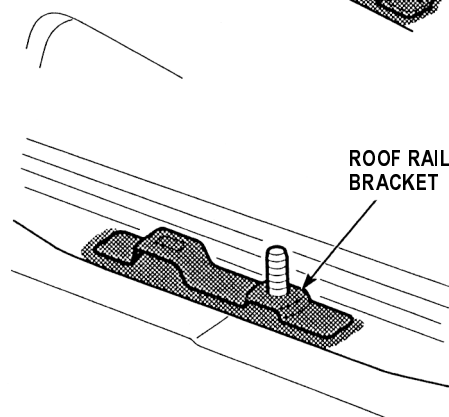
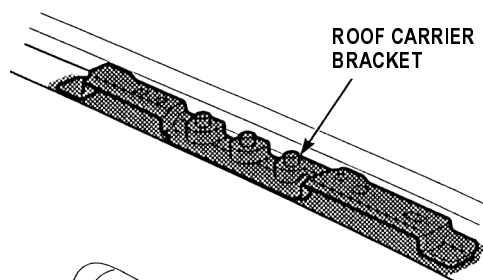
5. From inside the vehicle, plug weld the front and rear roof rails.



6. Weld the roof panel, rear pillar gutter, and rear inner upper pillar.



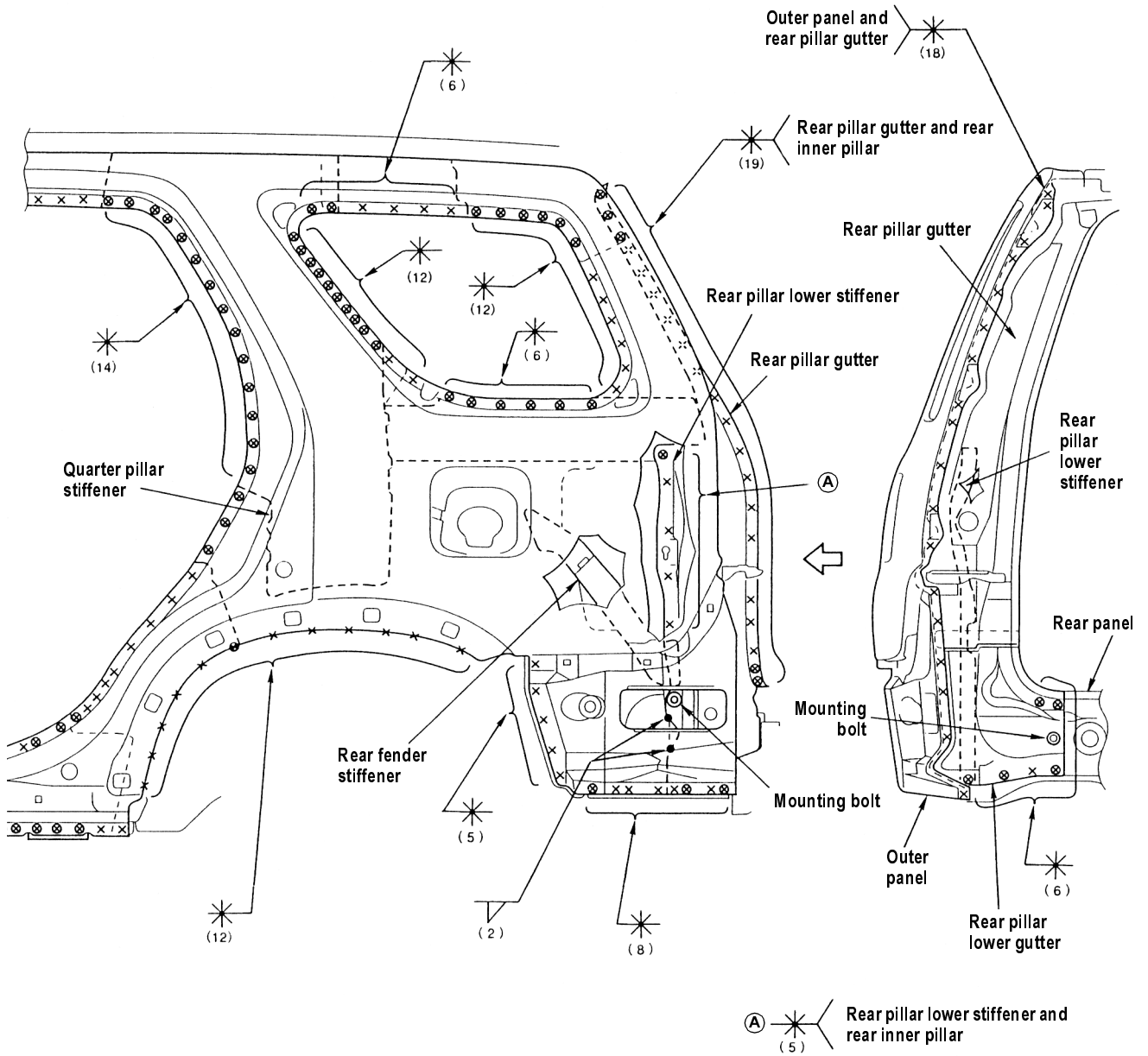
7. Apply anti-rust agent to the roof carrier brackets and roof rail brackets.



Rear Side Outer Panel

Mass Production body Welding Diagram

Left side:



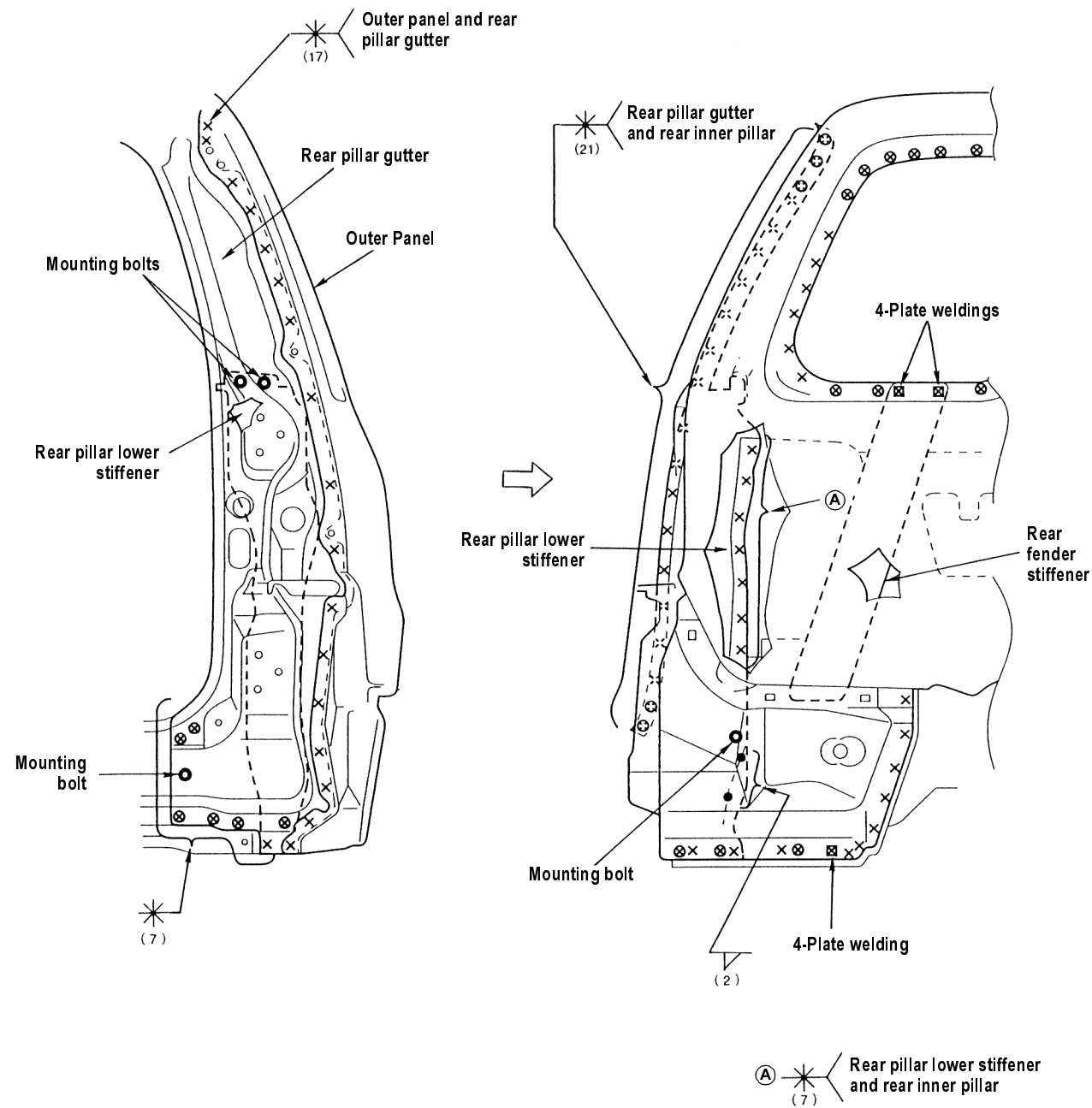
(cont'd)

Replacement

Rear Side Outer Panel (cont'd)

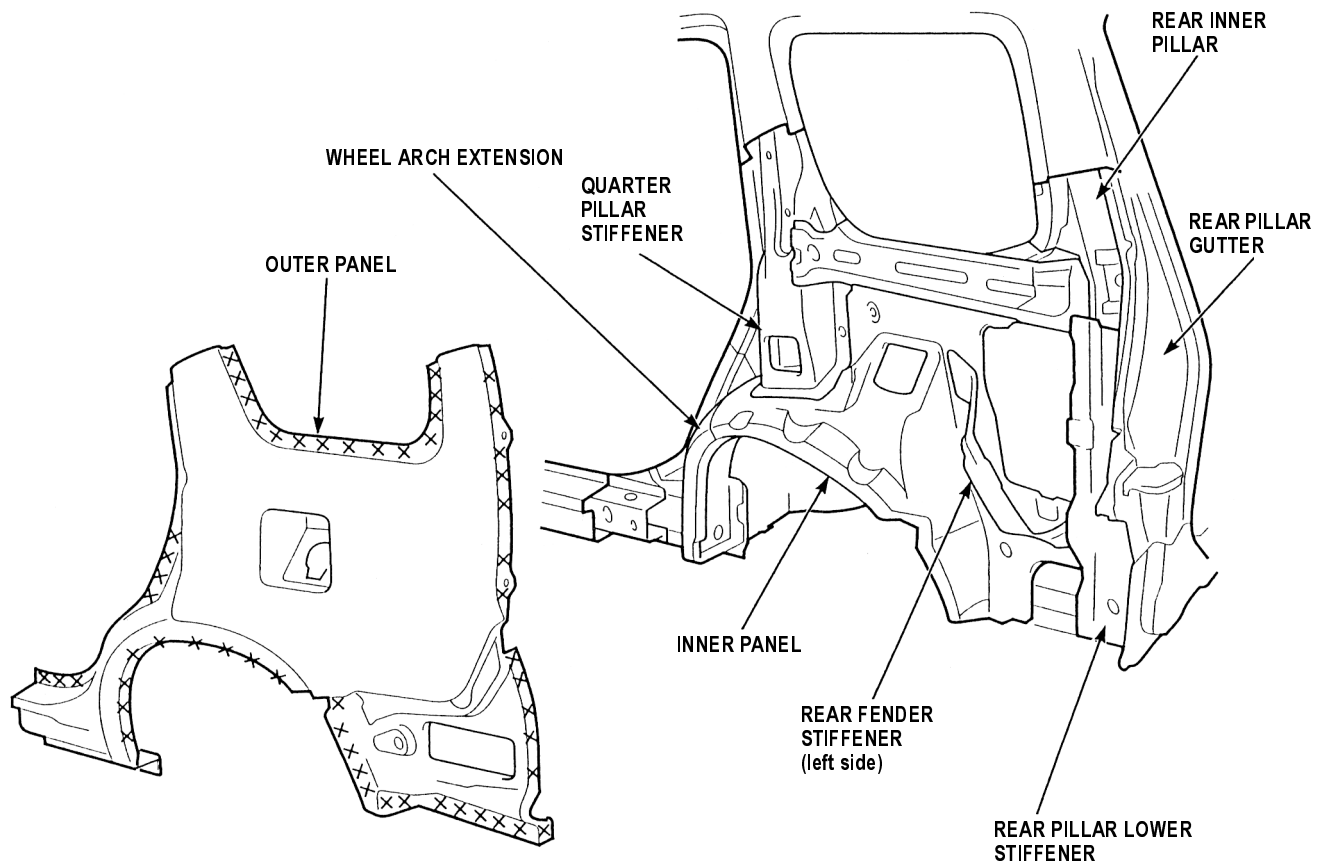
Mass Production Body Welding Diagram (cont'd)

Right side:
NOTE: The left side is symmetrical.



Removal

- Cut and pry off the rear side outer panel, and if necessary replace the rear fender stiffener.



(cont'd)

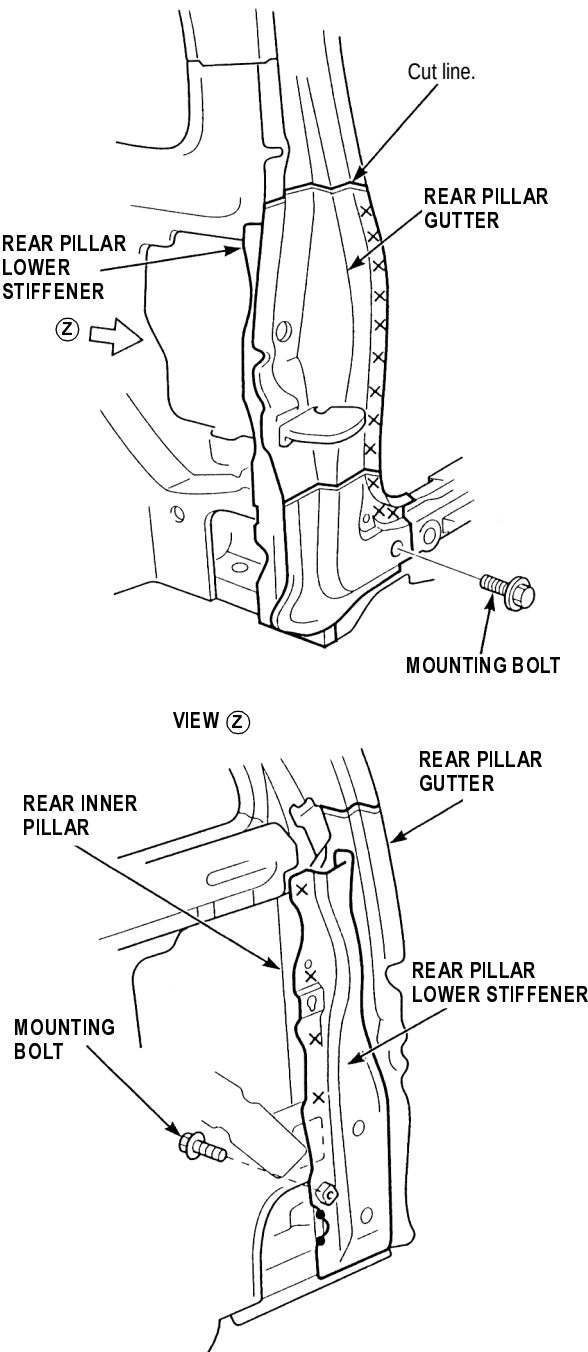
Replacement

Rear Side Outer Panel (cont'd)

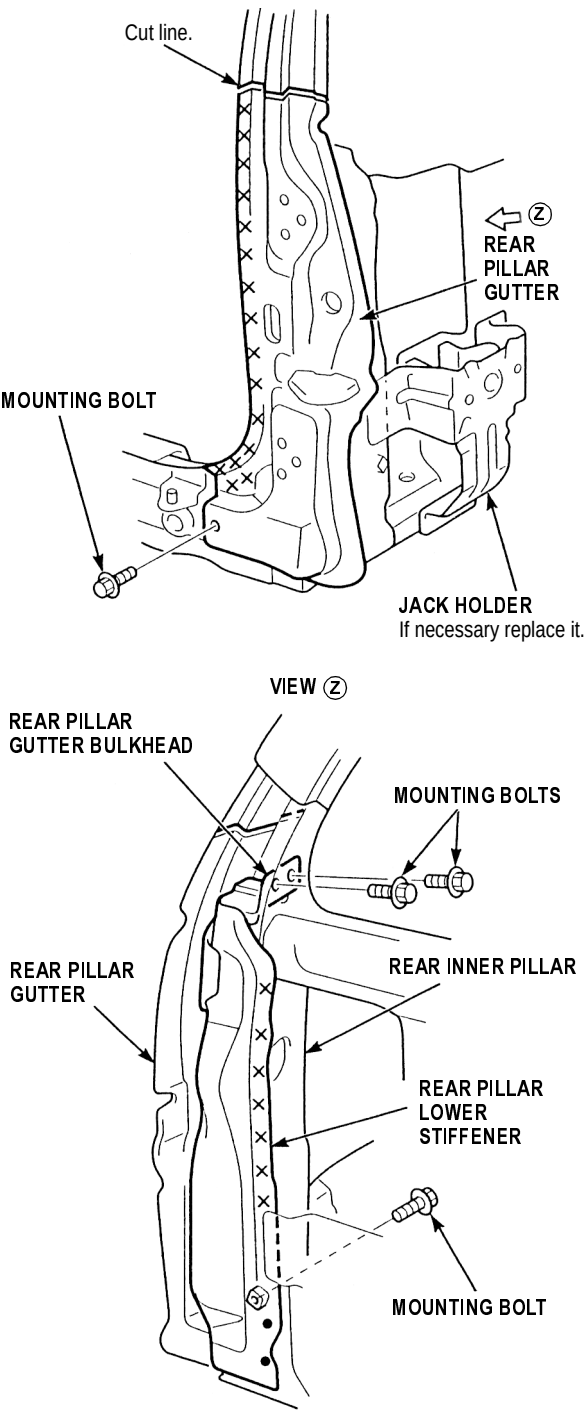
Removal (cont'd)

- Check the rear pillar gutter and rear pillar lower stiffener position, and check for damage.
- If necessary, cut the rear pillar gutter, and replace the rear pillar gutter and rear pillar lower stiffener as an assembly.

Left side:



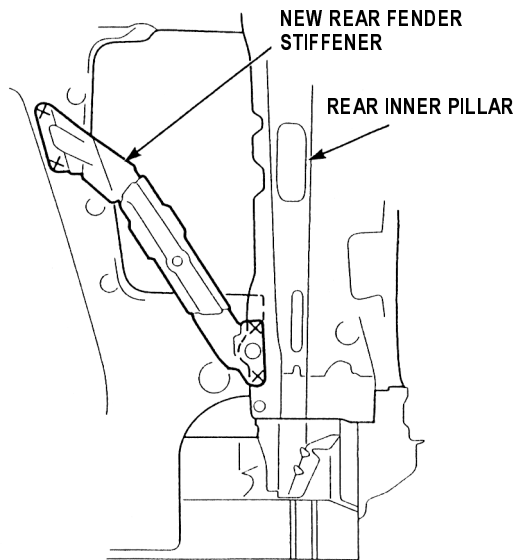
Right side:



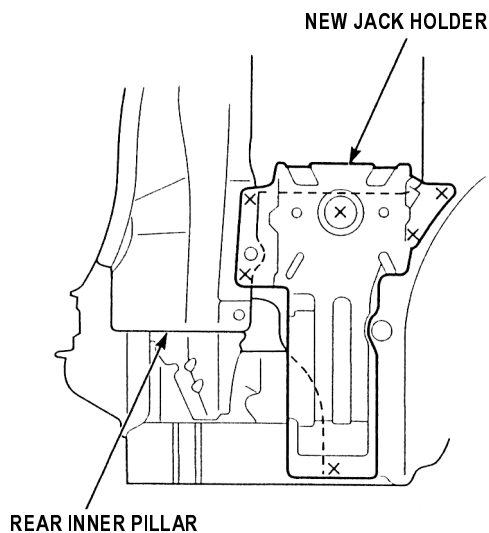
Installation

1. Check the position of the inner panel and rear inner pillar, and weld the new rear fender stiffener or new jack holder.

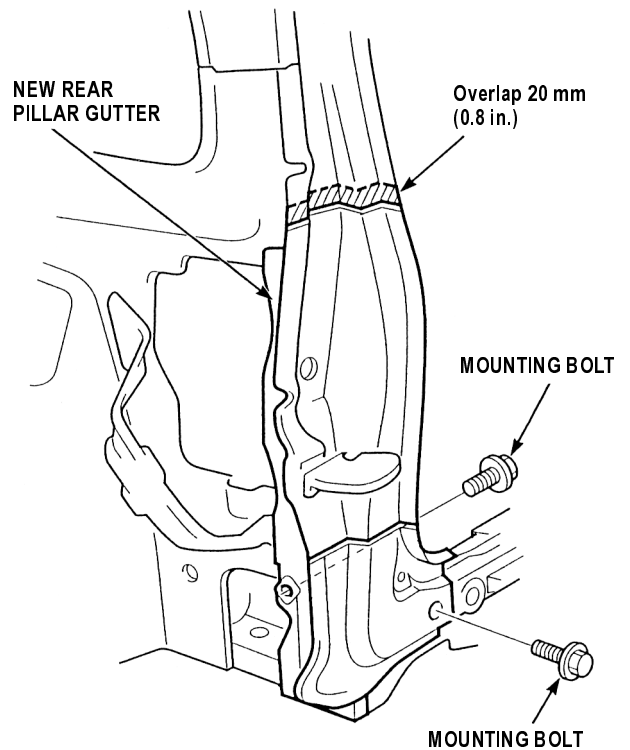
Left side:



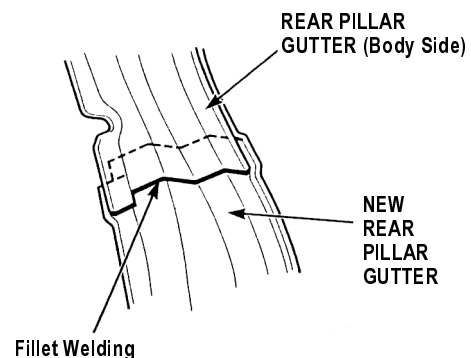
Right side:



2. Cut the new rear pillar gutter, and set it into position and install the mounting bolts.



3. Check the body dimensions (see section 4), and tack weld the rear pillar gutter.
4. Cut the repair part (outer panel), and set it into position.
5. Temporarily install the door, tailgate, taillight, and rear bumper, and check for differences in level and clearance. Make sure the body lines flow smoothly. Check the operation of the door and tailgate.
6. Remove the outer panel, and weld the new rear pillar gutter.



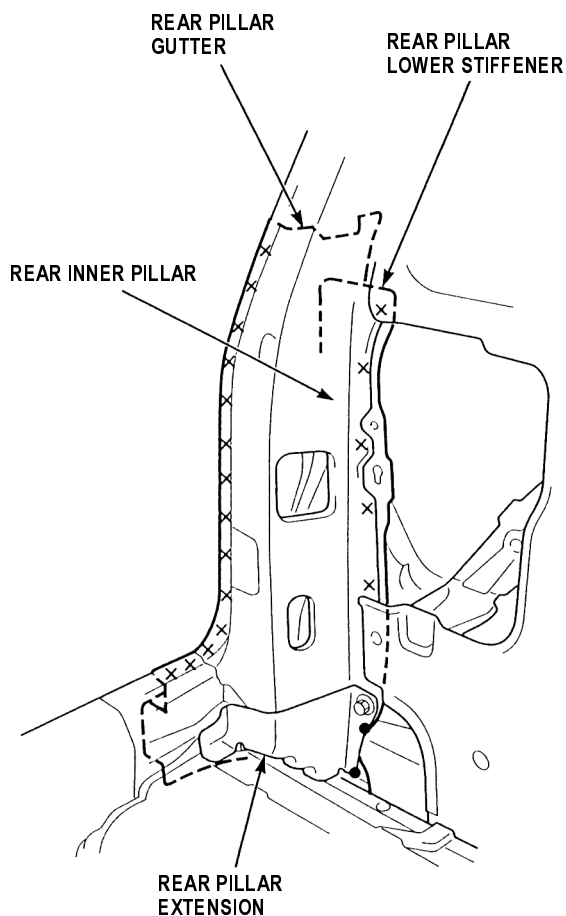
(cont'd)

Replacement

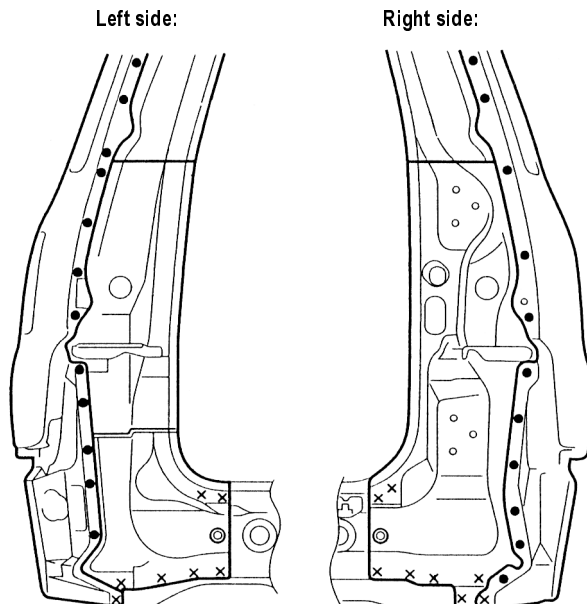
Rear Side Outer Panel (cont'd)

Installation (cont'd)

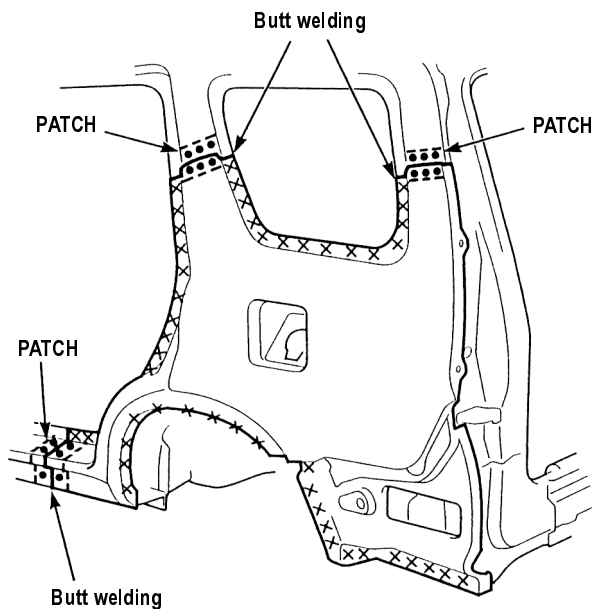
7. Clamp the new outer panel, and recheck the clearance and alignment of the tailgate and door.
8. Do the main welding.
 - Weld the rear pillar lower stiffener and rear pillar gutter.



- Weld the outer panel and rear pillar gutter.

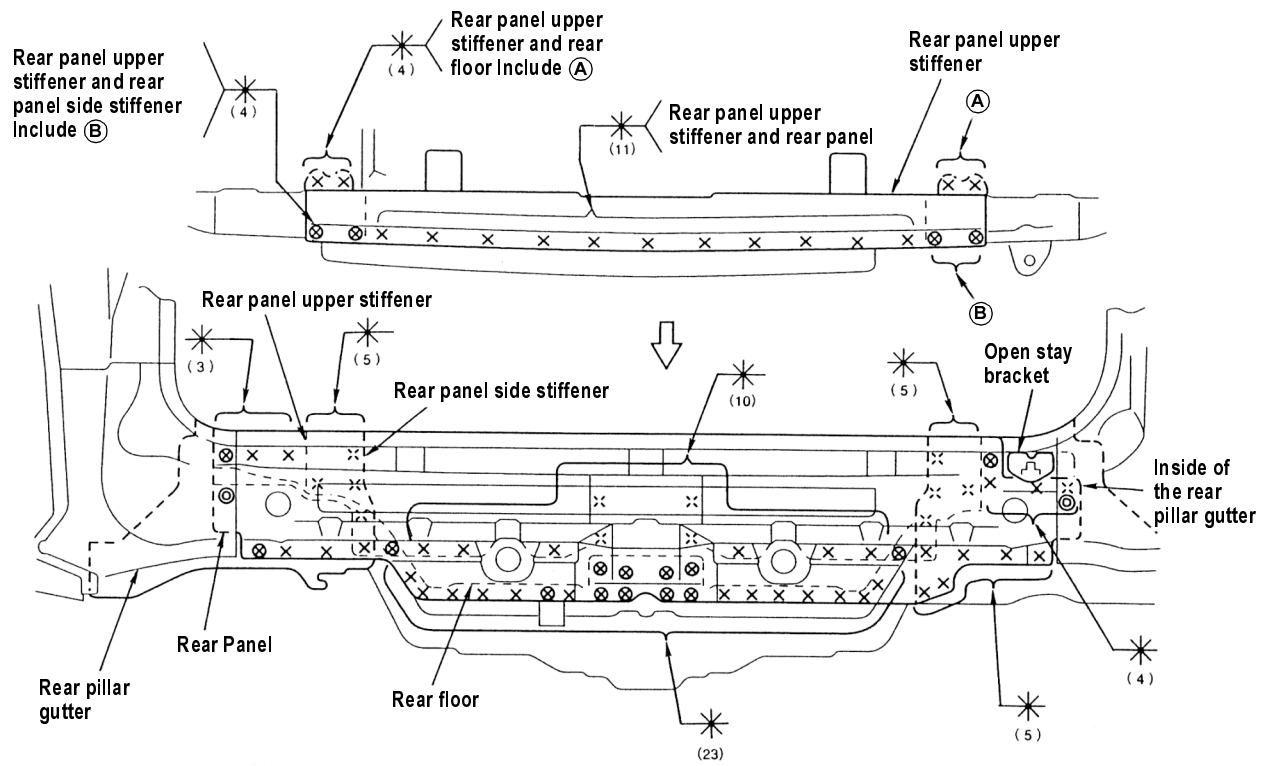


- Attach a patch at the cut section of the quarter pillar, rear pillar, side sill and plug weld them.

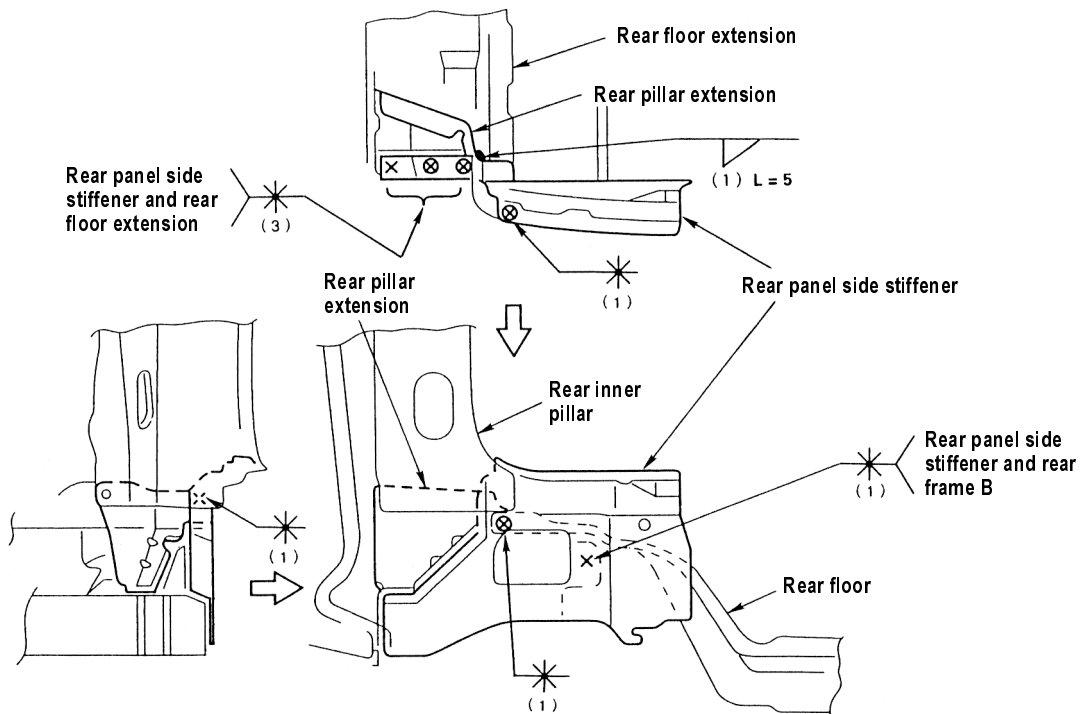


Rear Panel

Mass Production Body Welding Diagram



Rear Pillar Gutter and Rear Panel removed:

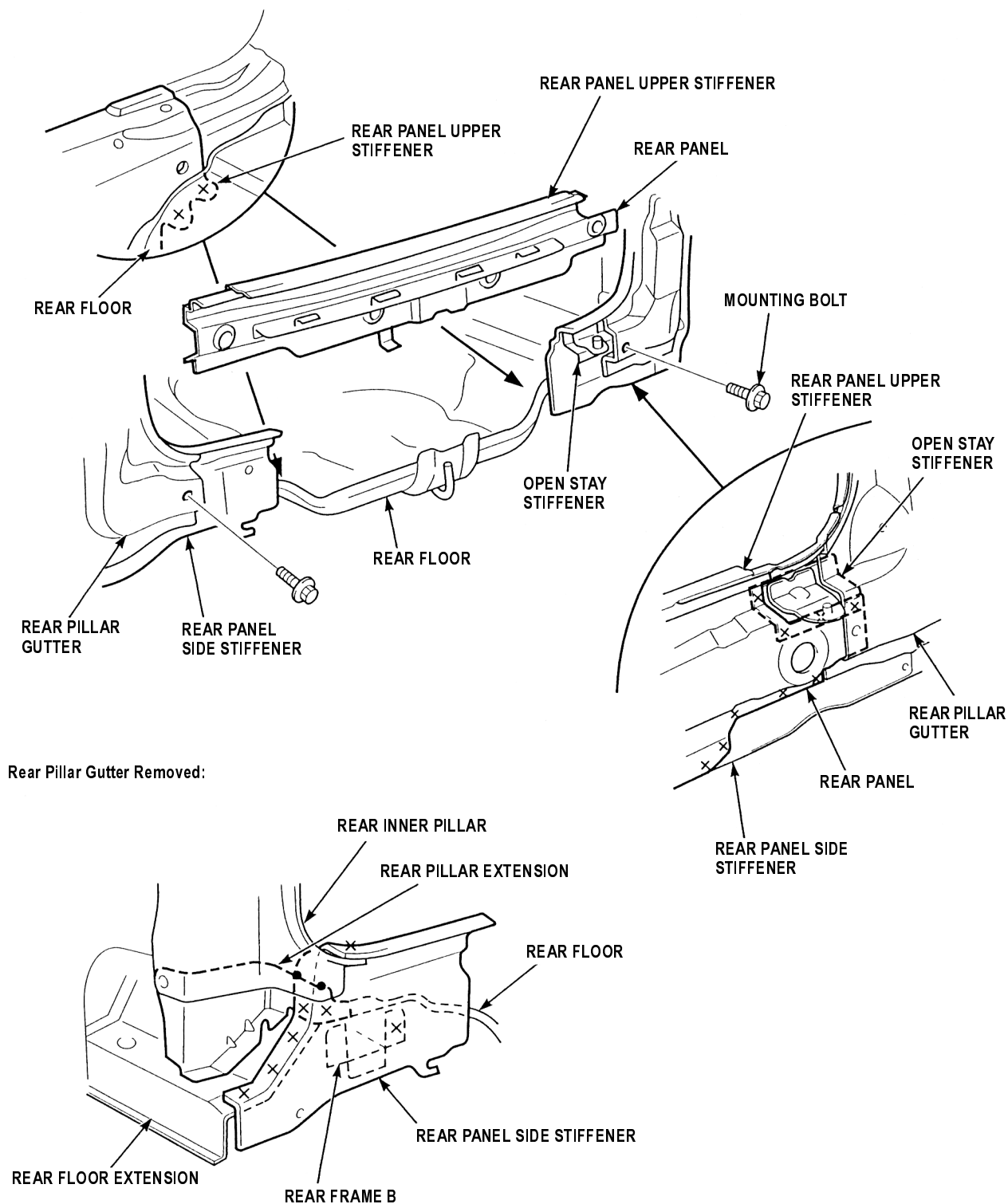


Replacement

Rear Panel (cont'd)

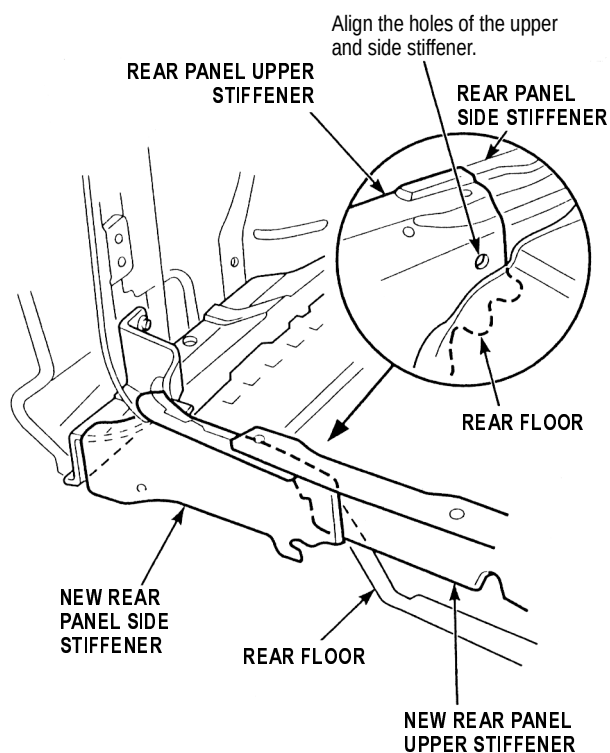
Removal

- Remove the mounting bolts, and cut off the rear panel upper stiffener and rear panel.
- Check the rear panel side stiffener position, and check for damage.
- If necessary, cut and remove the rear pillar gutter and rear pillar lower stiffener, then replace the rear panel side stiffener.

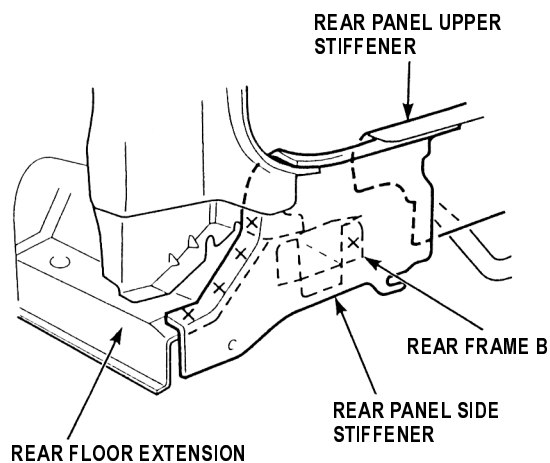


Installation

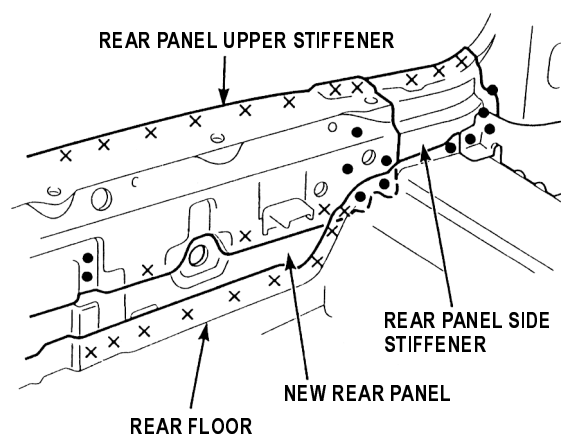
1. Check the position of the rear inner pillar, by installing the new rear panel upper stiffener and rear panel side stiffener into place.



2. Check the body dimensions (see section 4). Weld the rear panel side stiffener, rear floor extension and rear frame B, and tack weld the rear panel upper stiffener.

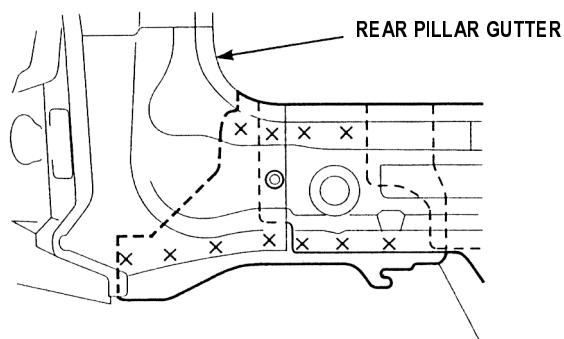


3. Set the new rear panel and new rear pillar gutter into place, then check the body dimensions (see section 4). Tack weld the new parts.
4. Temporarily install the tailgate, taillight, rear bumper, and check for differences in level and clearance. Check the operation of the tailgate.
5. Do the main welding.

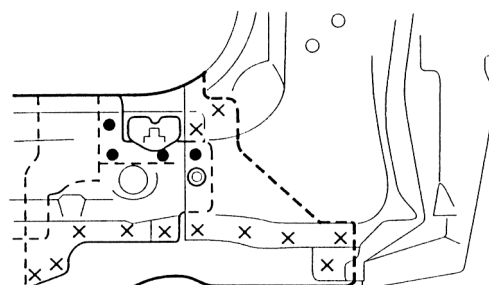


6. Weld the rear pillar gutter (see page 3-28).

Left side:



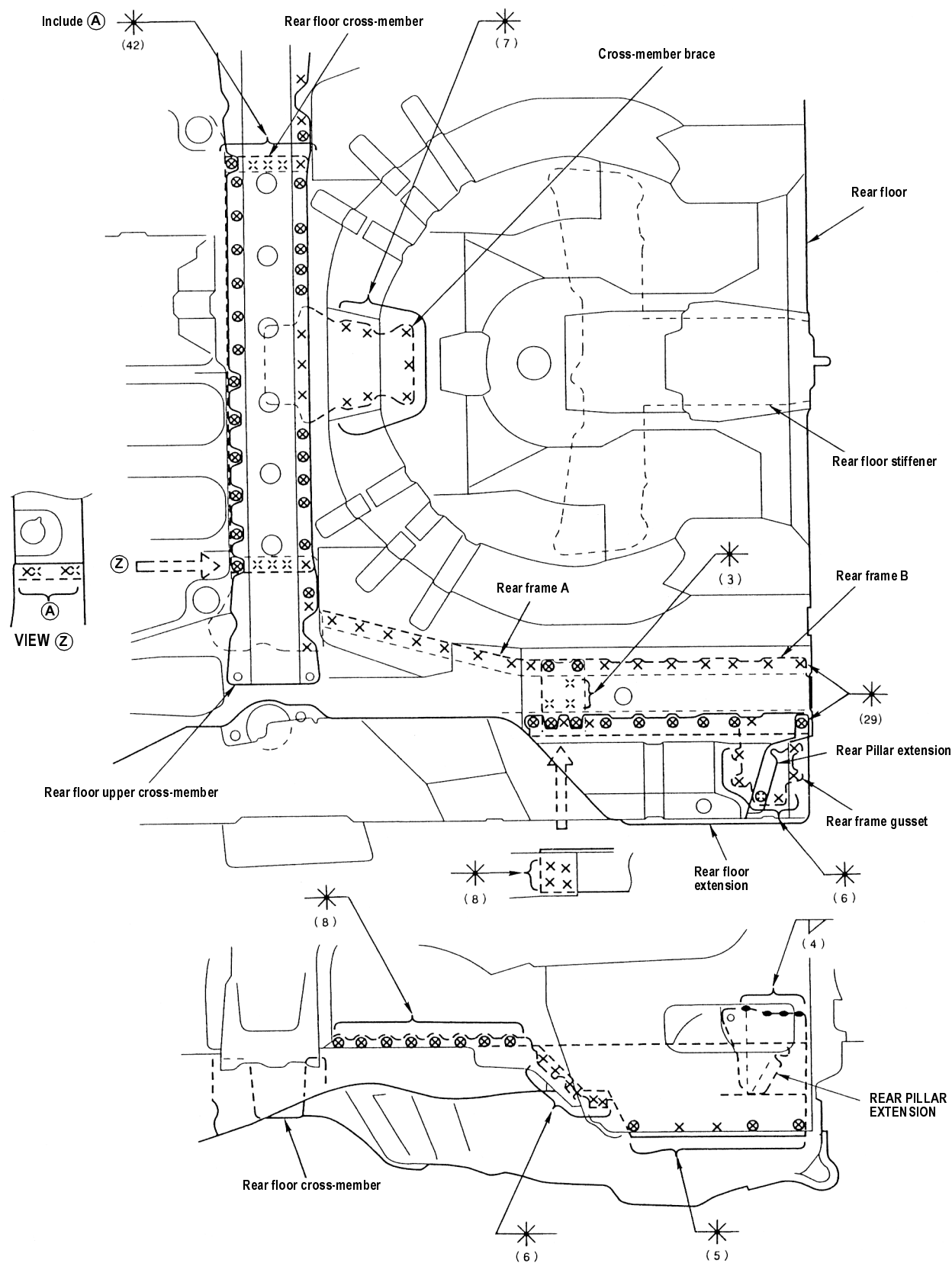
Right side:



Replacement

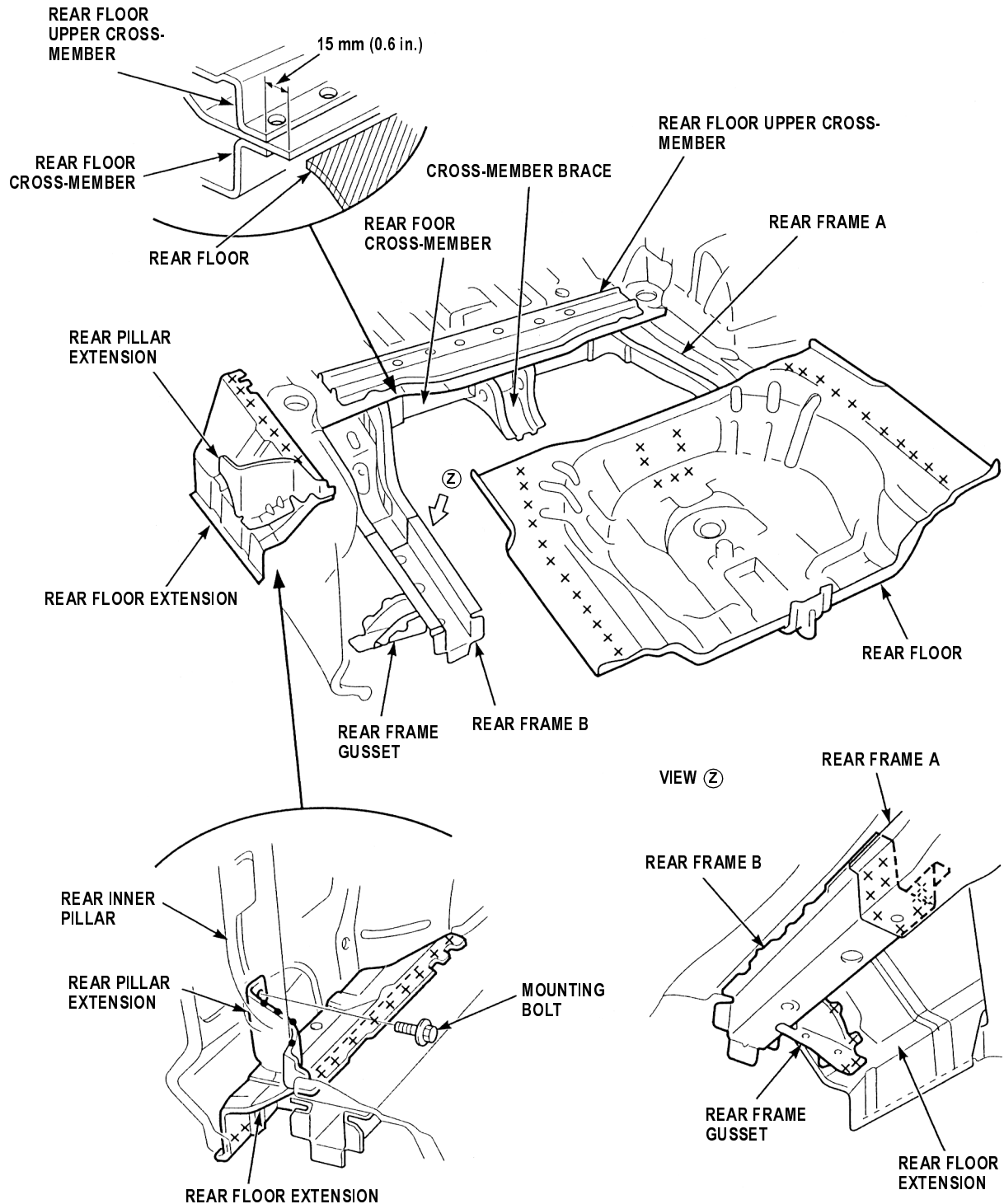
Rear Floor / Rear Floor Cross-member

Mass Production Body Welding Diagram



Removal

- Remove the rear floor extension, and cut the rear floor 15 mm (0.6 in.) from the welded flange for the rear floor upper cross-member.
- If necessary, replace the rear frame B.
- Check the rear floor cross-member position, and check for damage. If necessary replace it.

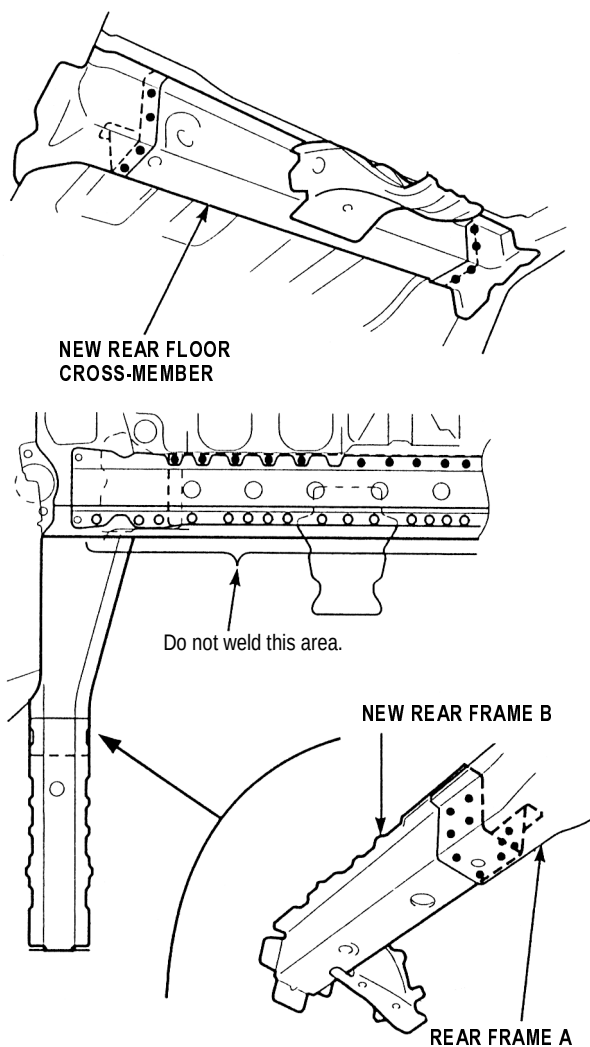


Replacement

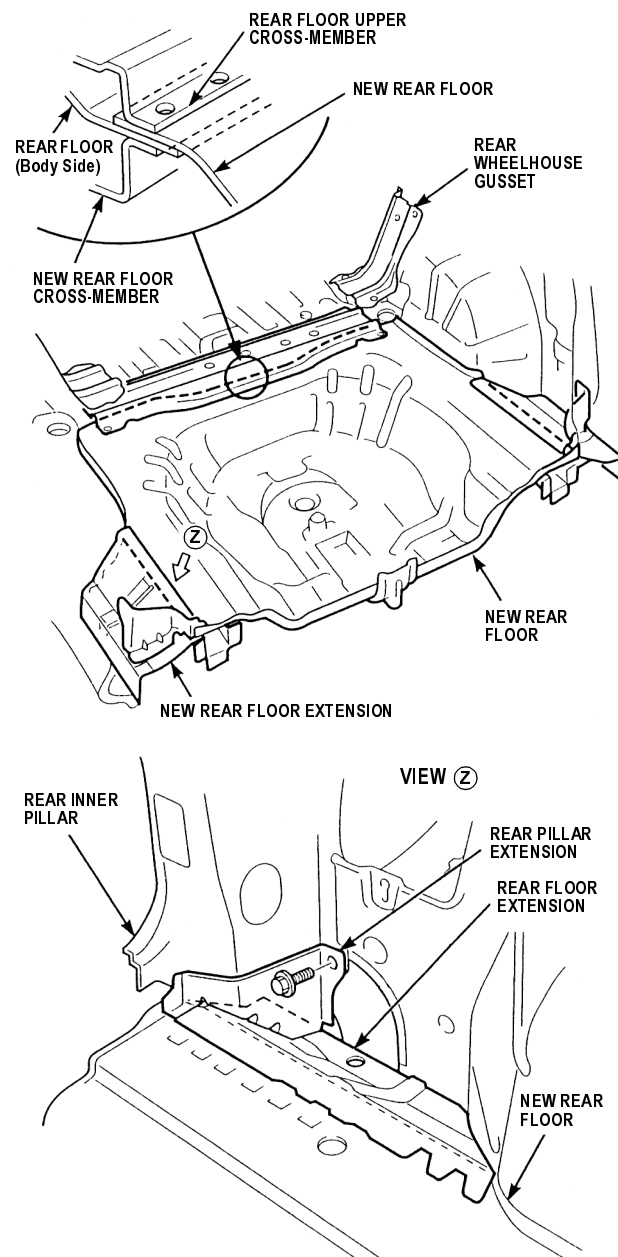
Rear Floor / Rear Floor Cross-member (cont'd)

Installation

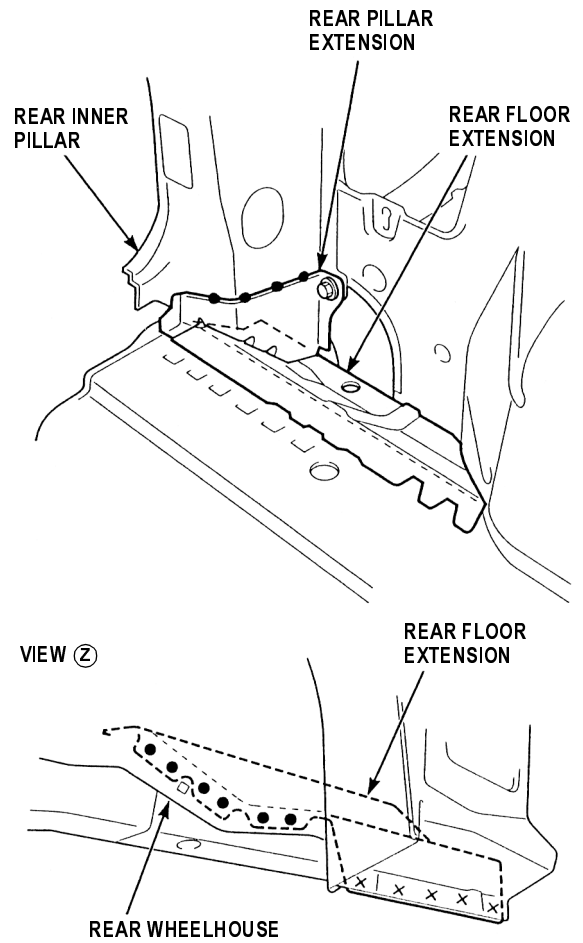
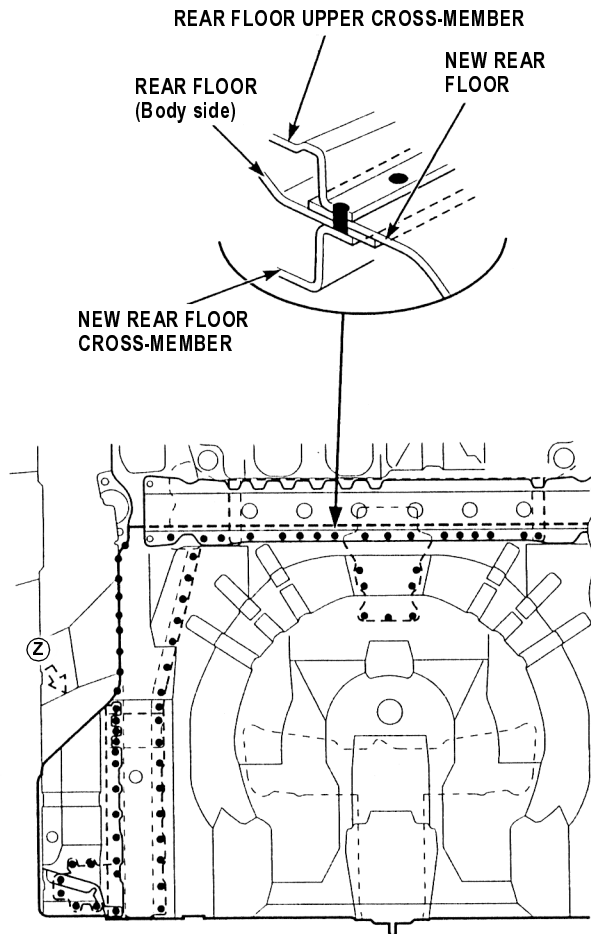
1. Set the new rear floor cross-member and rear frame B, into position. Check the body dimensions (see section 4).
2. Tack weld the rear cross-member and rear frame B.
3. Check the rear floor cross-member, rear frame A and B in its correct position with rear suspension, then weld them into place.



4. Set the new rear floor into position, and align it with the body.
Cut the new rear floor so it overlaps the body side floor by about 40 mm (1.6 in.).
Insert the new rear floor between the rear floor upper cross-member and rear floor (body side).
Install the rear wheelhouse gusset, and check the position.
5. Install the new rear floor extension.



6. Clamp the rear panel and the rear pillar gutter together, then check the body dimensions (see section 4).
7. Do the main welding.



4

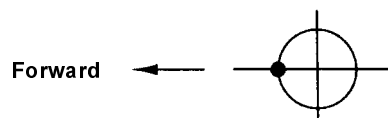
Body Dimensional Drawings

Upper Body Measuring Dimensions	4-2
Engine Compartment	4-2
Engine / Transmission Mount Positions	4-3
Passenger's Compartment.....	4-3
Rear Panel / Rear Pillar Gutter Positions.....	4-4
Tailgate Hinge Mount Position.....	4-4
Opening Repair Chart	4-5
Under Body Measuring Dimensions	4-6
Engine Compartment and Front Floor Under View	4-6
Middle and Rear Floor Under View	4-7
Frame Repair Chart	4-8
Top View.....	4-8
Side View	4-10

4

Body Dimensional Drawings

NOTE: Measuring dimensions show the distance between the forward or upper edge of positioning bosses and/or holes shown in the detail sketches. Measuring point (Black dots)



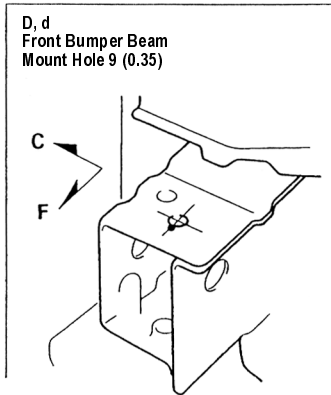
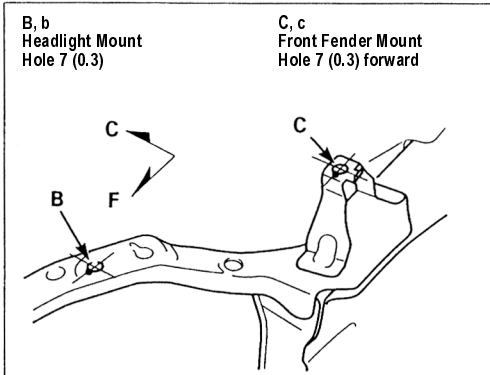
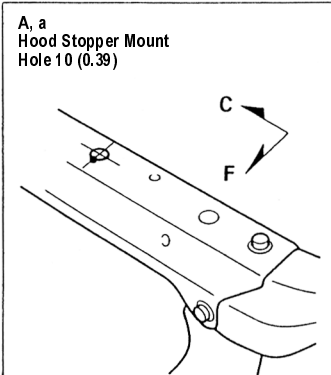
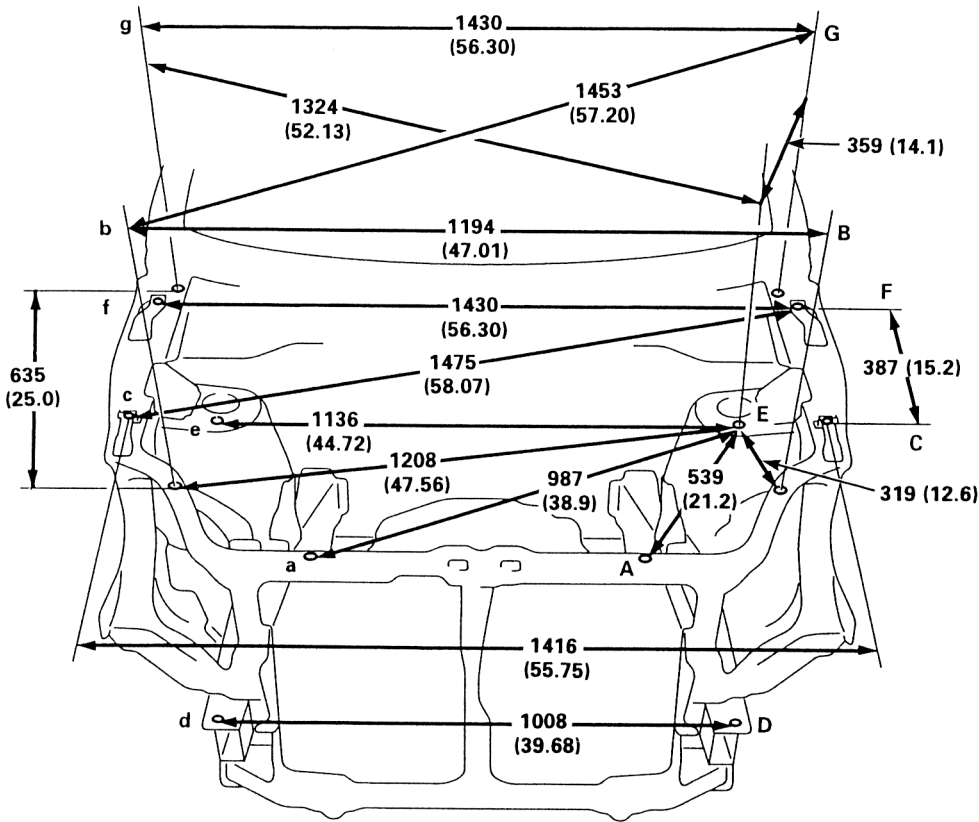
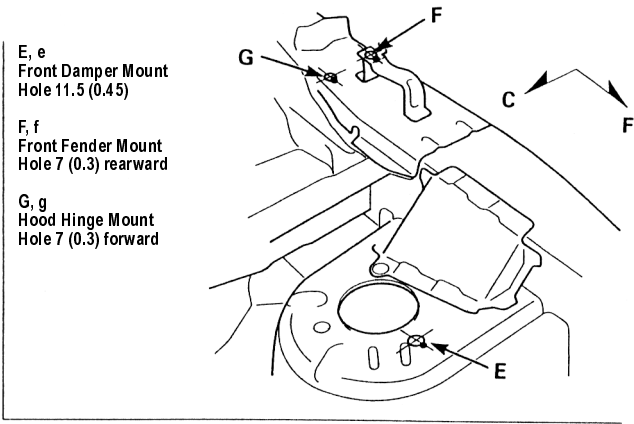
F: Forward
C: Center

Body Dimensional Drawings

Upper Body Measuring Dimensions

Engine Compartment

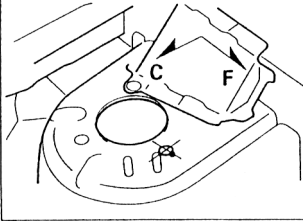
Unit: mm (in.)



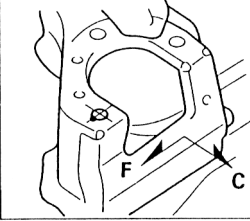
Engine / Transmission Mount Positions

Unit: mm (in.)

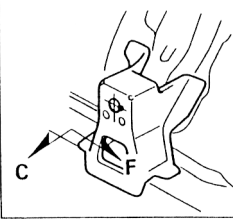
E, e
Front Damper Mount
Hole 11.5 (0.45)



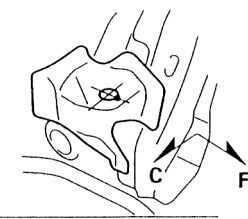
H
Engine Bracket Mount
Hole 13 (0.51) forward



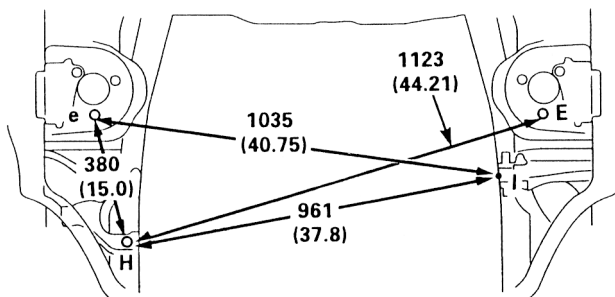
I
M/T Transmission Bracket
Mount Hole 13 (0.51)



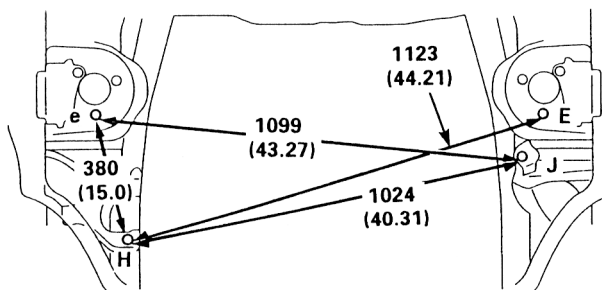
J
A/T Transmission Bracket Mount
Hole 13 (0.51)



M/T:



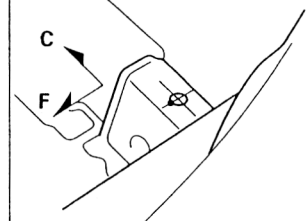
A/T:



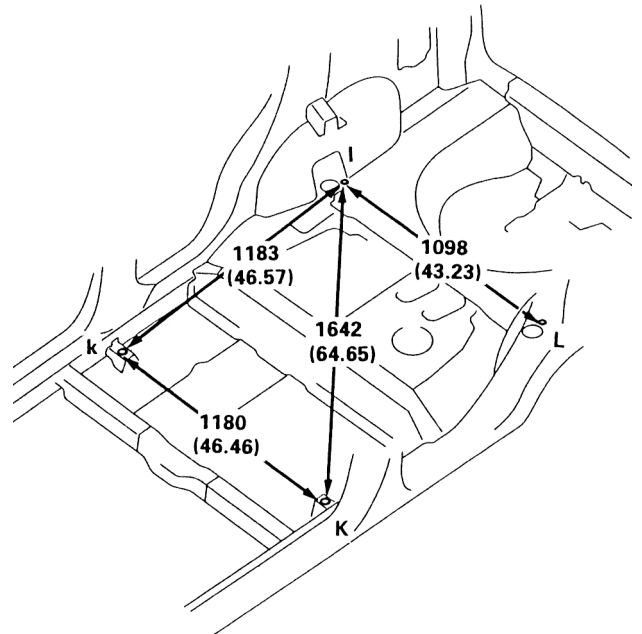
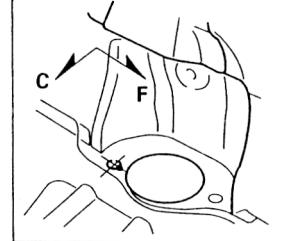
Passenger's Compartment

Unit: mm (in.)

K, k
Front Seat Outer Bracket Rear
Point 11 (0.43)



L, l
Rear Damper Mount Hole 11.5 (0.45)

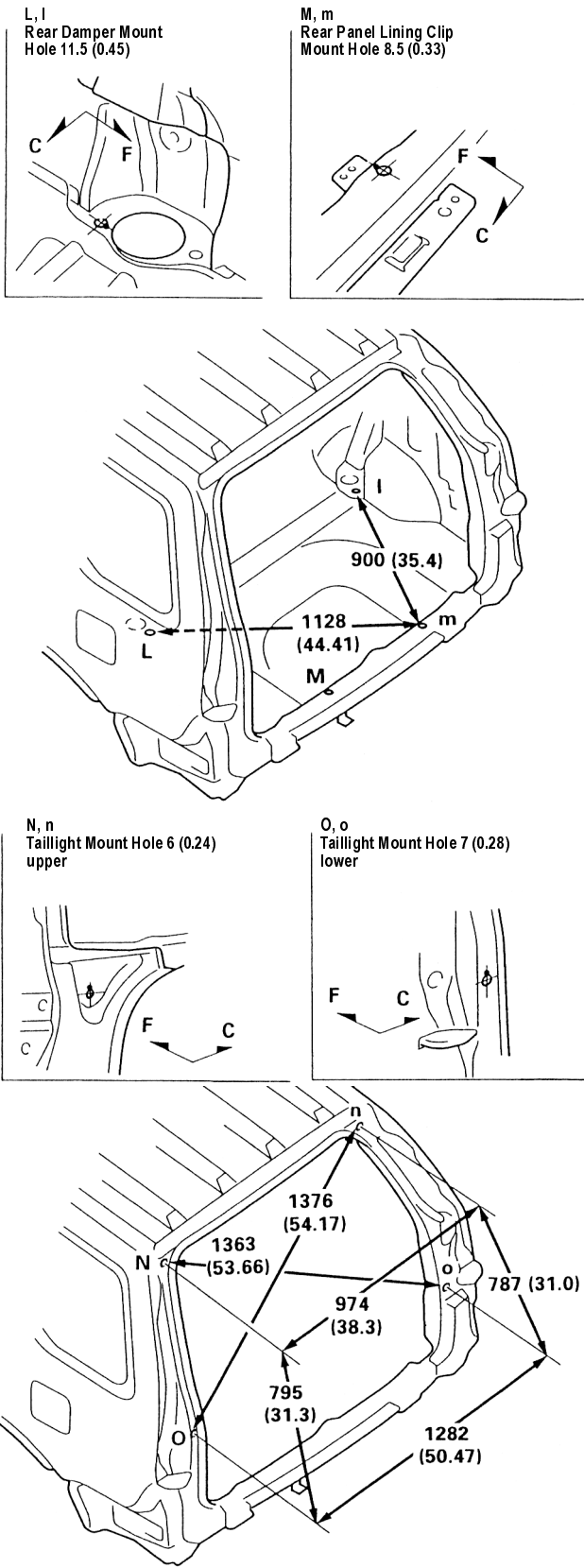


Body Dimensional Drawings

Upper Body Measuring Dimensions (cont'd)

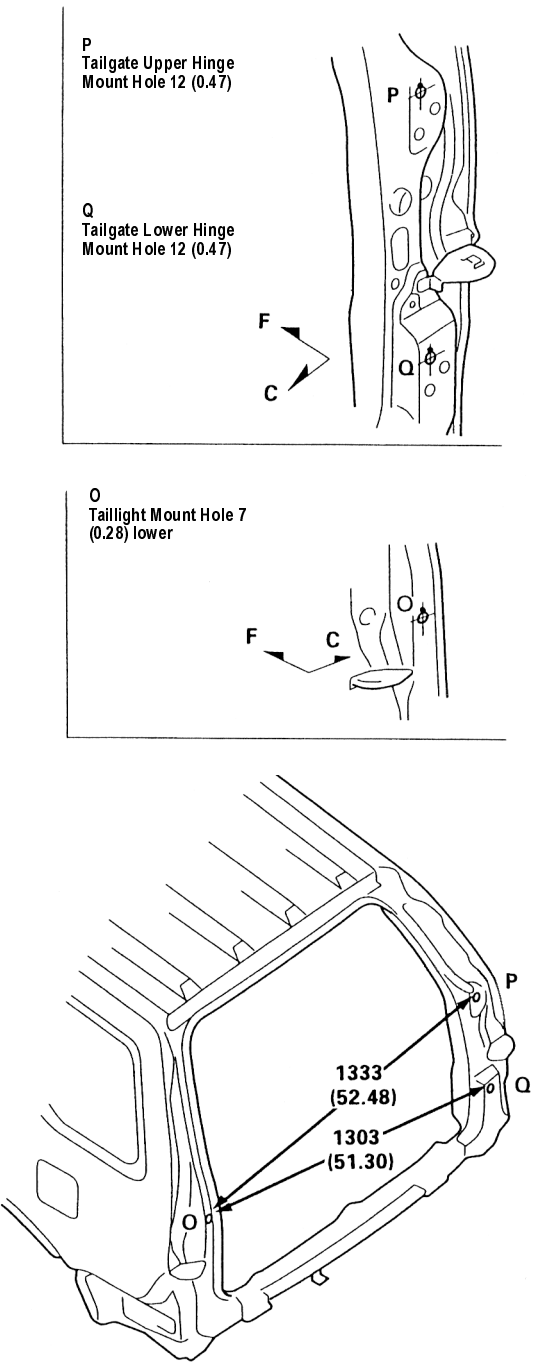
Rear Panel / Rear Pillar Gutter Positions

Unit: mm (in.)



Tailgate Hinge Mount Position

Unit: mm (in.)

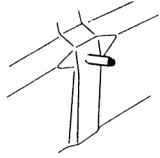


Opening Repair Chart

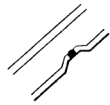
Unit: mm (in.)

Door and Windshield Opening:

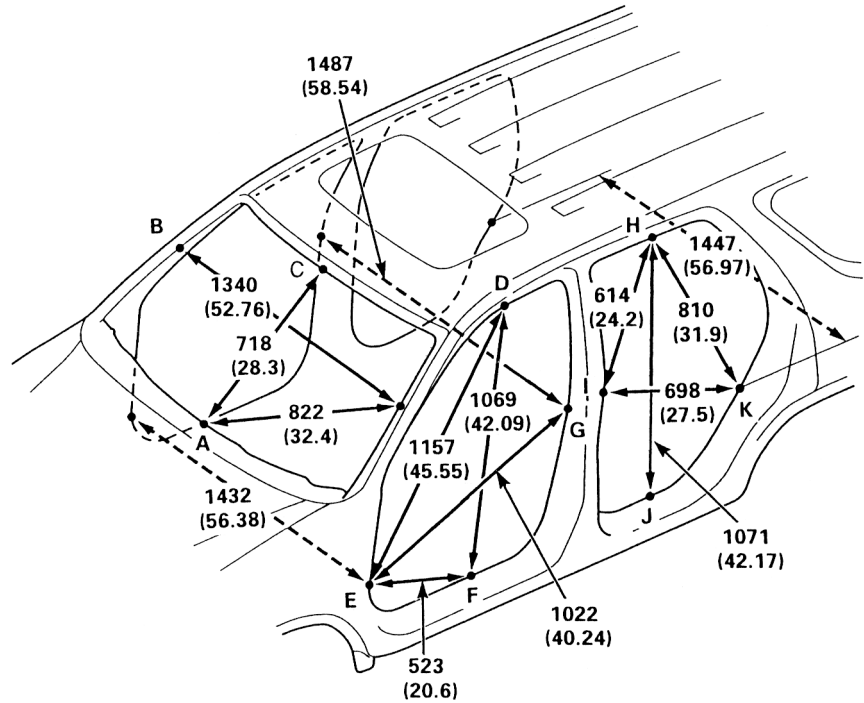
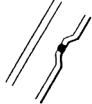
A, a
Windshield lower
dashboard guide pin



B, C
Outer panel
windshield opening flange
notch
(3 places)

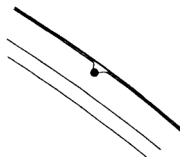


D, E, F, G
H, I, J, K
Outer panel door
opening flange notch
(16 places)

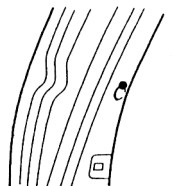


Tailgate Opening:

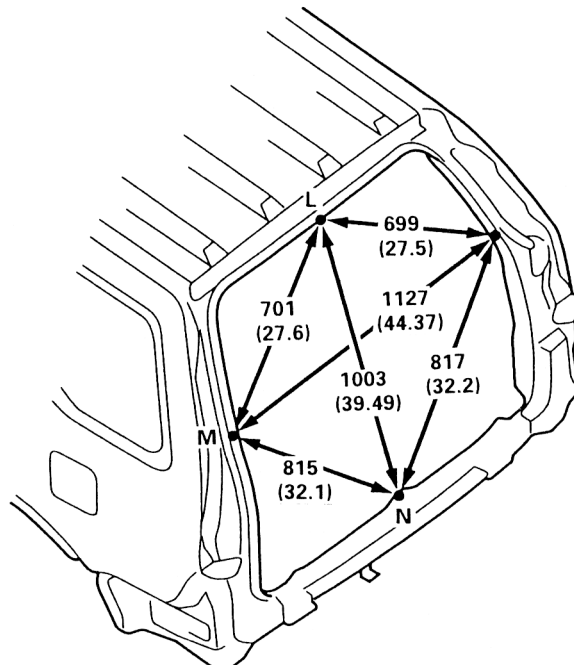
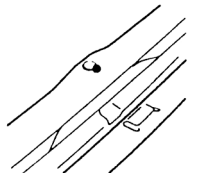
L
Rear roof upper rail
flange notch



M
Rear pillar trim clip
mount hole
(2 places)



N
Rear panel lining
clip mount hole

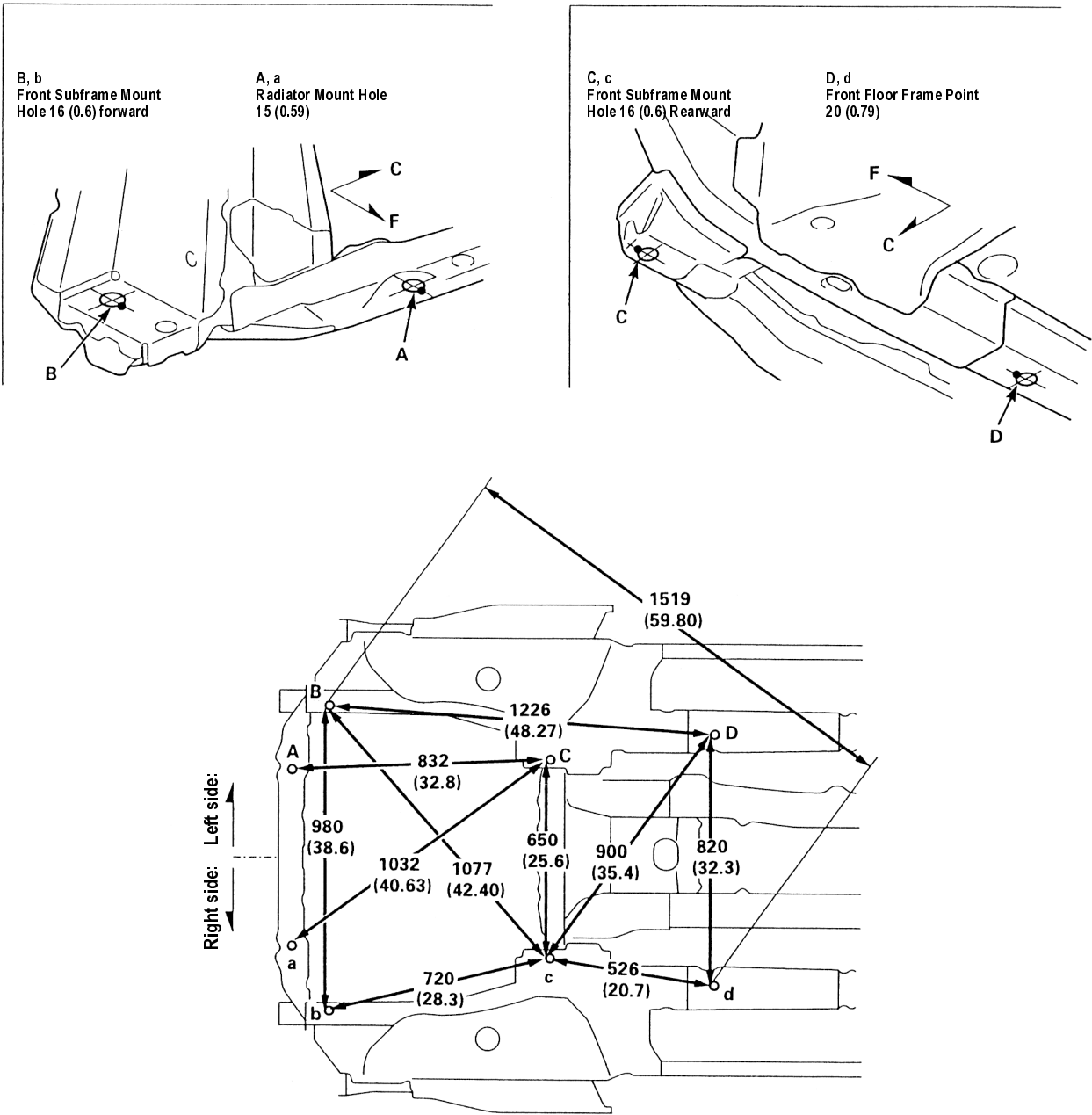


Body Dimensional Drawings

Under Body Measuring Dimensions

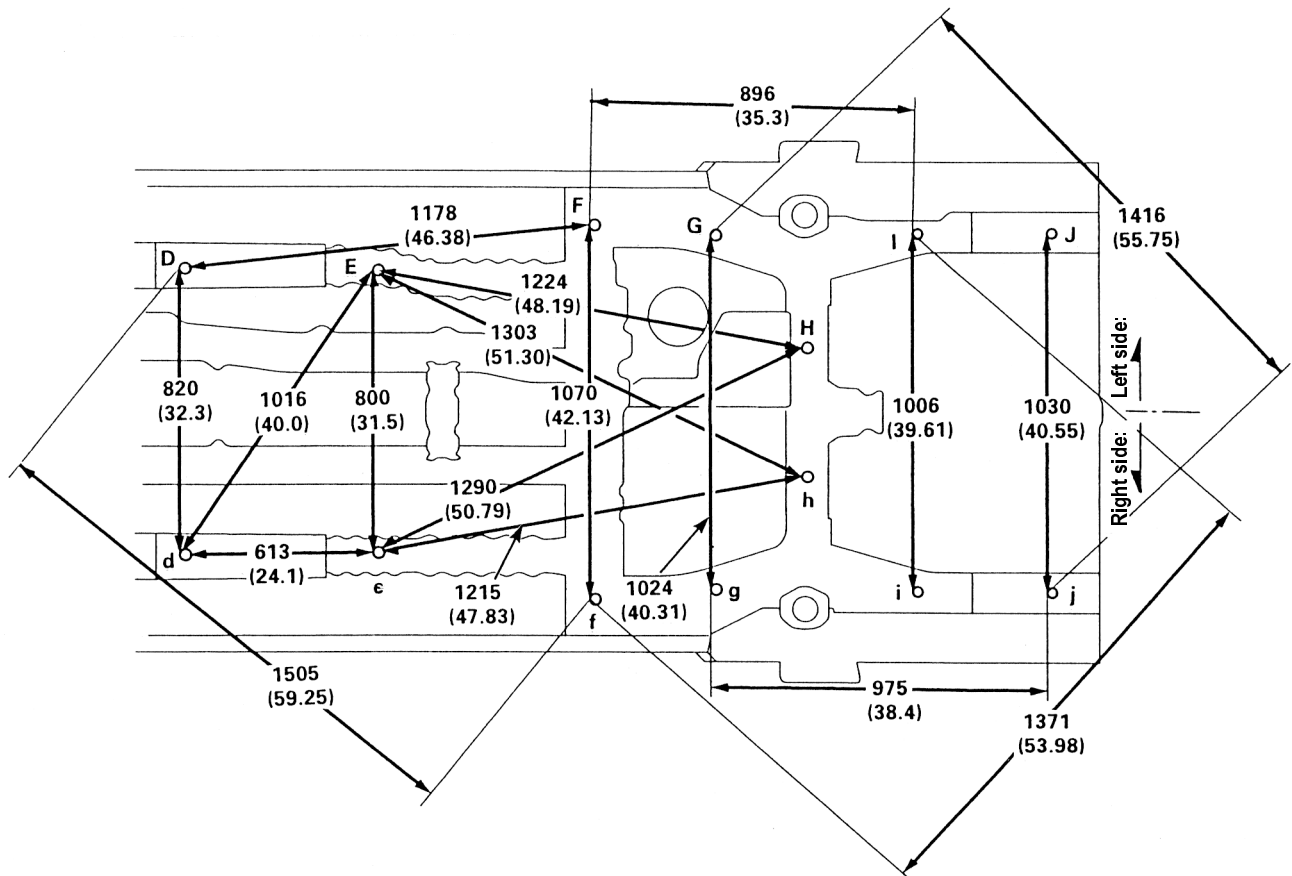
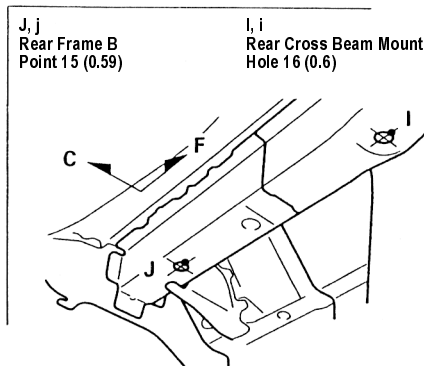
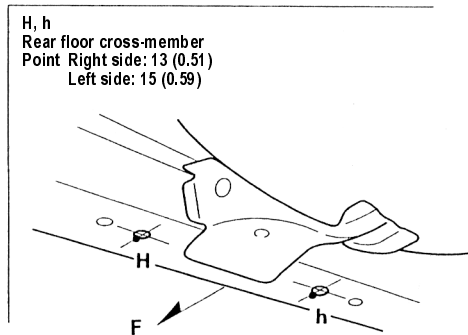
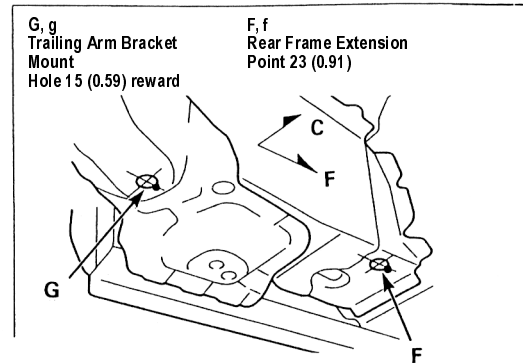
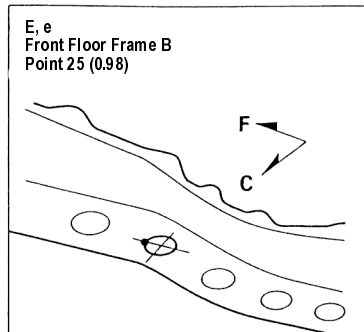
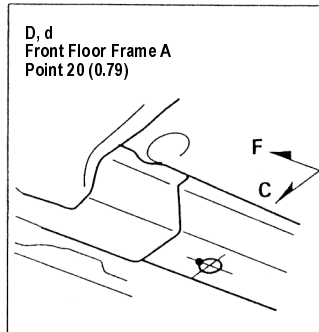
Engine Compartment and Front Floor Under View

Unit: mm (in.)



Middle and Rear Floor Under View

Unit: mm (in.)



Body Dimensional Drawings

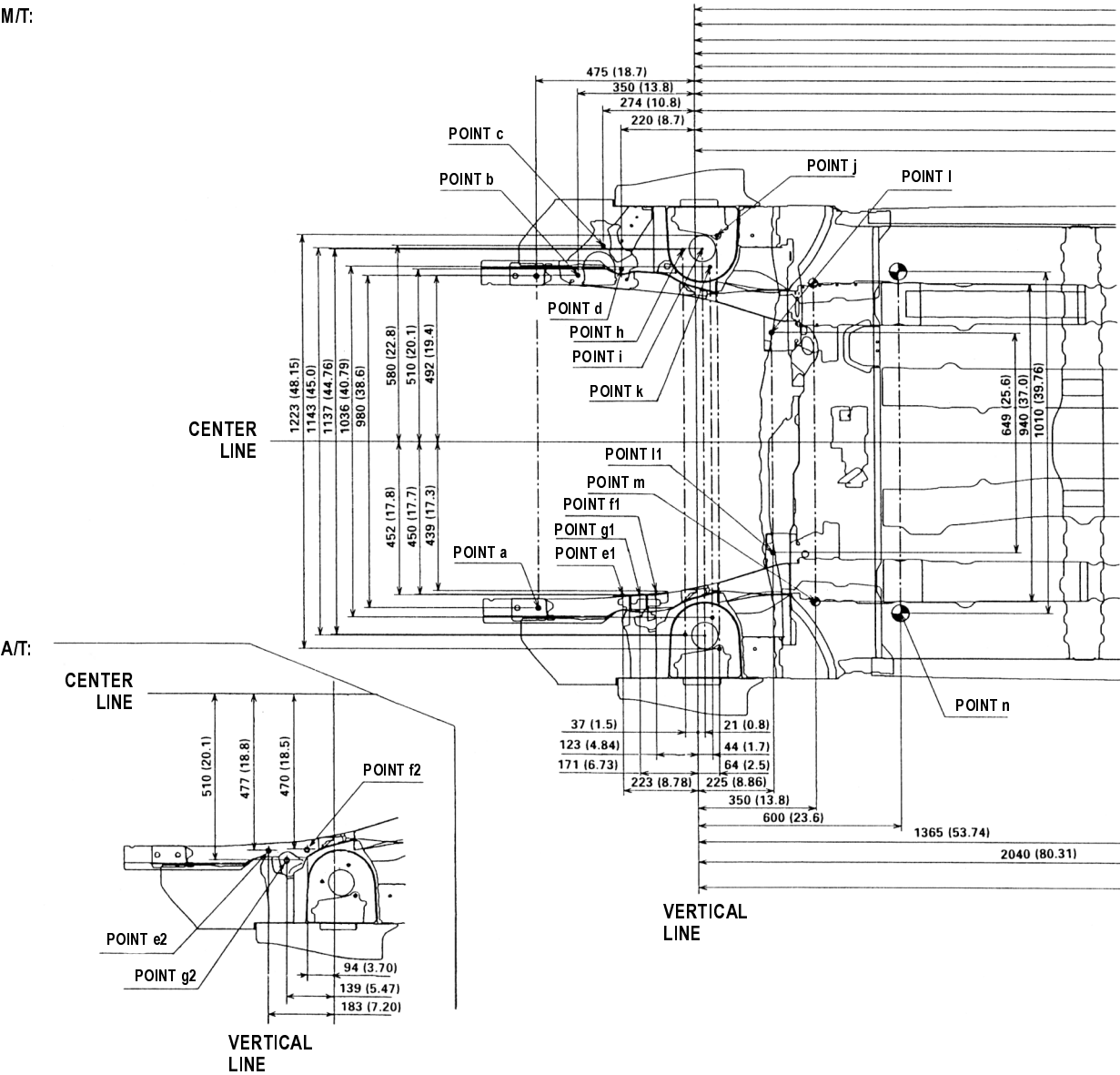
Frame Repair Chart

Top View

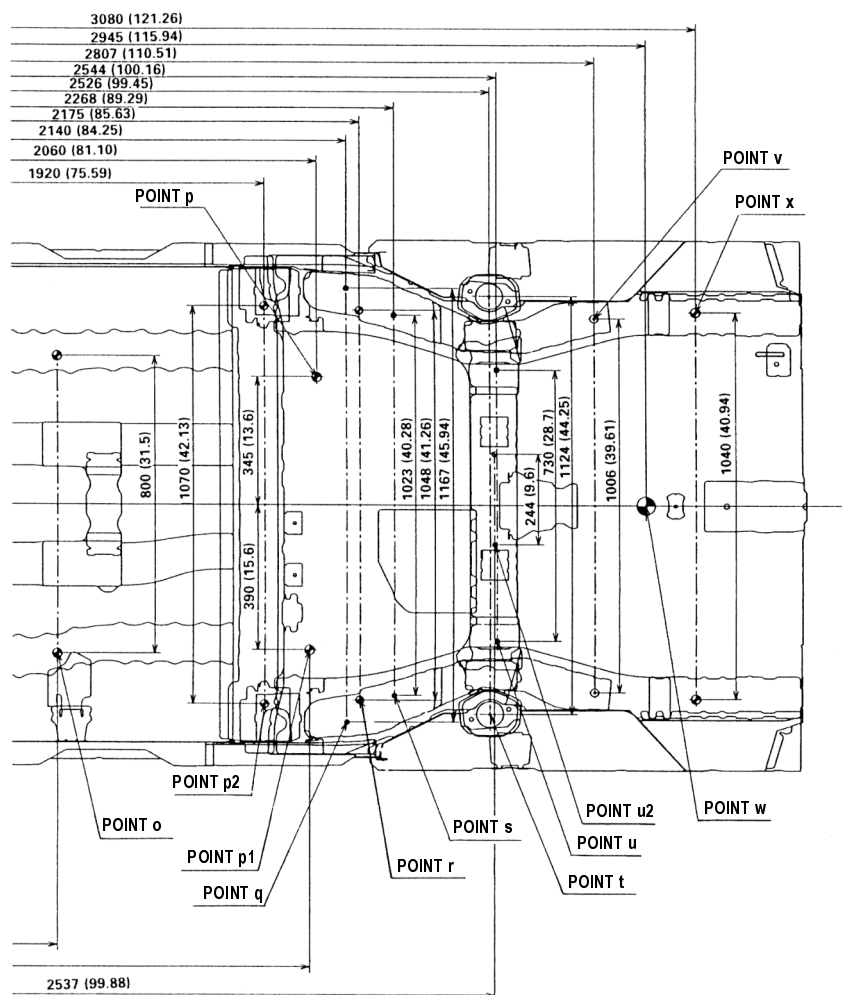
Unit: mm (in.)
Ø : Inner diameter

- | | | | |
|----|--|----|--|
| a | For subframe Ø 16 (0.63) | g2 | For A/T transmission mount Ø 13 (0.51) |
| b | For engine mount Ø 13 (0.51) | h | For damper mount Ø 11.5 (0.45) |
| c | For engine mount Ø 13 (0.51) | i | For damper center Ø 78 (3.07) |
| d | For engine mount Ø 13 (0.51) | j | For damper mount Ø 11.5 (0.45) |
| e1 | For M/T transmission mount Ø 13 (0.51) | k | For damper mount Ø 11.5 (0.45) |
| e2 | For A/T transmission mount Ø 13 (0.51) | l | For subframe Ø 16 (0.63) |
| f1 | For M/T transmission mount Ø 13 (0.51) | l1 | For subframe Ø 16 (0.63) |
| f2 | For A/T transmission mount Ø 13 (0.51) | m | Locating hole Ø 27.4 (1.08) |
| g1 | For M/T transmission mount Ø 13 (0.51) | n | Locating hole Ø 50 (1.97) |

M/T:

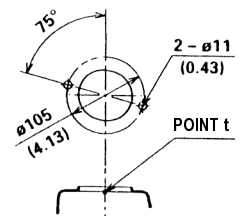
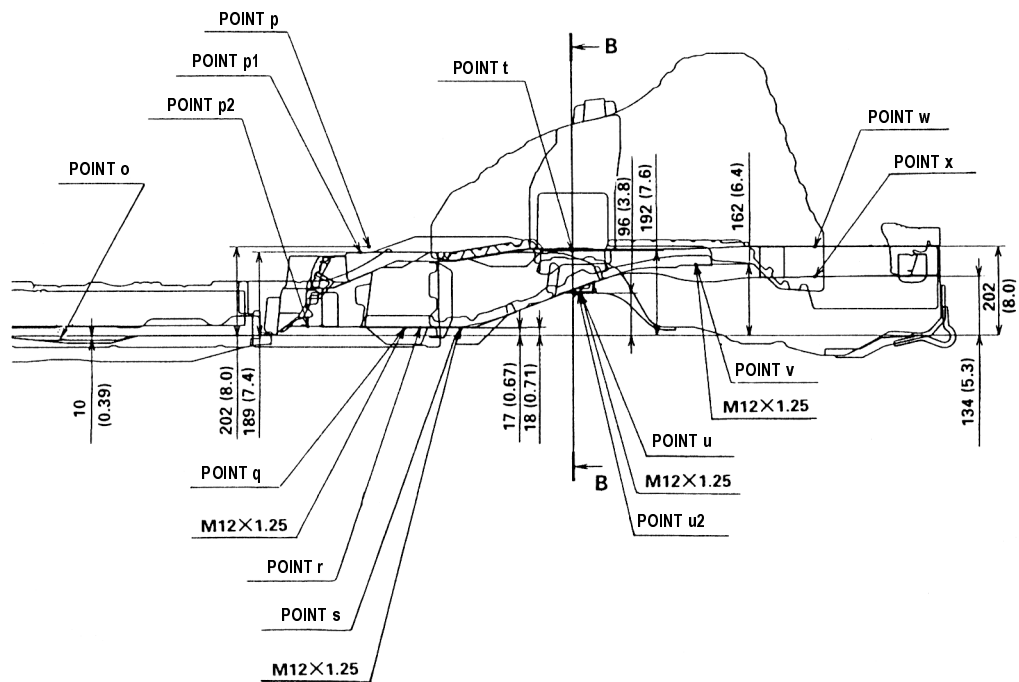


- | | | | |
|----|------------------------------|----|--|
| p | Locating hole Ø 25 (0.98) | t | Rear damper center Ø 68 (2.68) |
| p | Locating hole Ø 25 (0.98) | u | For rear cross beam Ø 15 (0.59) |
| p1 | Locating hole Ø 25 (0.98) | u2 | Locating hole Right side: Ø 13 (0.51)/Left side: Ø 15 (0.59) |
| p2 | Locating hole Ø 23 (0.91) | v | For rear cross beam Ø 15 (0.59) |
| q | For trailing arm Ø 14 (0.55) | w | Locating hole Ø 50 (1.97) |
| r | Locating hole Ø 20 (0.79) | x | Locating hole Ø 25 (0.98) |
| s | For trailing arm Ø 14 (0.55) | | |



4-10

p	Locating hole Ø 25 (0.98)	t	Rear damper center Ø 68 (2.68)
p	Locating hole Ø 25 (0.98)	u	For rear cross beam Ø 15 (0.59)
p1	Locating hole Ø 25 (0.98)	u2	Locating hole Right side: Ø 13 (0.51)/Left side: Ø 15 (0.59)
p2	Locating hole Ø 23 (0.91)	v	For rear cross beam Ø 15 (0.59)
q	For trailing arm Ø 14 (0.55)	w	Locating hole Ø 50 (1.97)
r	Locating hole Ø 20 (0.79)	x	Locating hole Ø 25 (0.98)
s	For trailing arm Ø 14 (0.55)		



SECTION BB

5

Rust Prevention

Cross Section of Body and Sealants	5-2
General	5-2
Engine Compartment, Front Wheelhouse, and Damper Housing	5-3
Dashboard Upper, Dashboard Lower, and Roof Panel	5-4
Front Floor and Rear Floor	5-5
Rear Side Outer Panel, and Rear Panel	5-6
Under Floor, and Rear Wheelhouse	5-7
Soft Chipping Guard Primer Coat	5-8
General	5-8
Coating Diagram	5-9
Rust-preventive Treatments	5-10
General	5-10
Undercoating Diagram	5-11
Area to be Covered by Anti-rust Agents	5-12
Materials and Tools	5-13

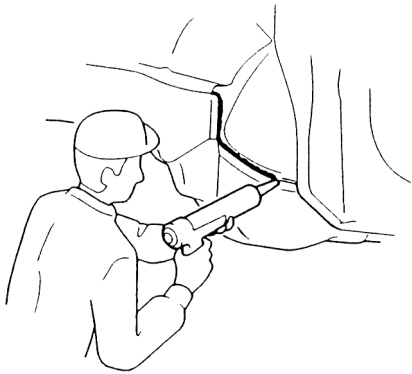
Rust Prevention

Cross Section of Body and Sealants

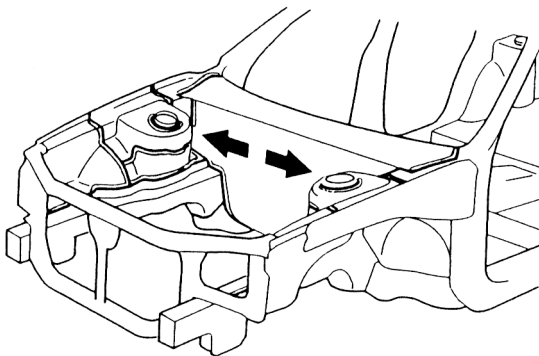
General

Note: Follow the sealer manufacturer's instructions.

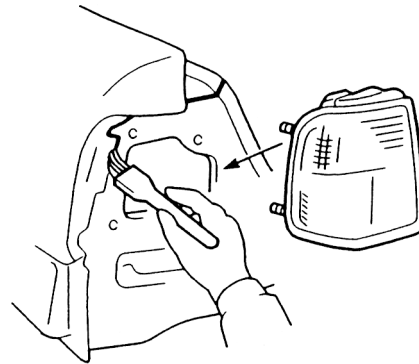
1. Clean the areas to be sealed with the was and grease remover.
2. Wipe off any excess spot sealer with thinner. After the primer is sprayed, sealer will fill to the area where spot sealer was wiped off.
3. Make sure you can see the sealant when the sealed part is in its proper location. Refer to the [page 5-3](#) through [page 5-7](#) of this manual.



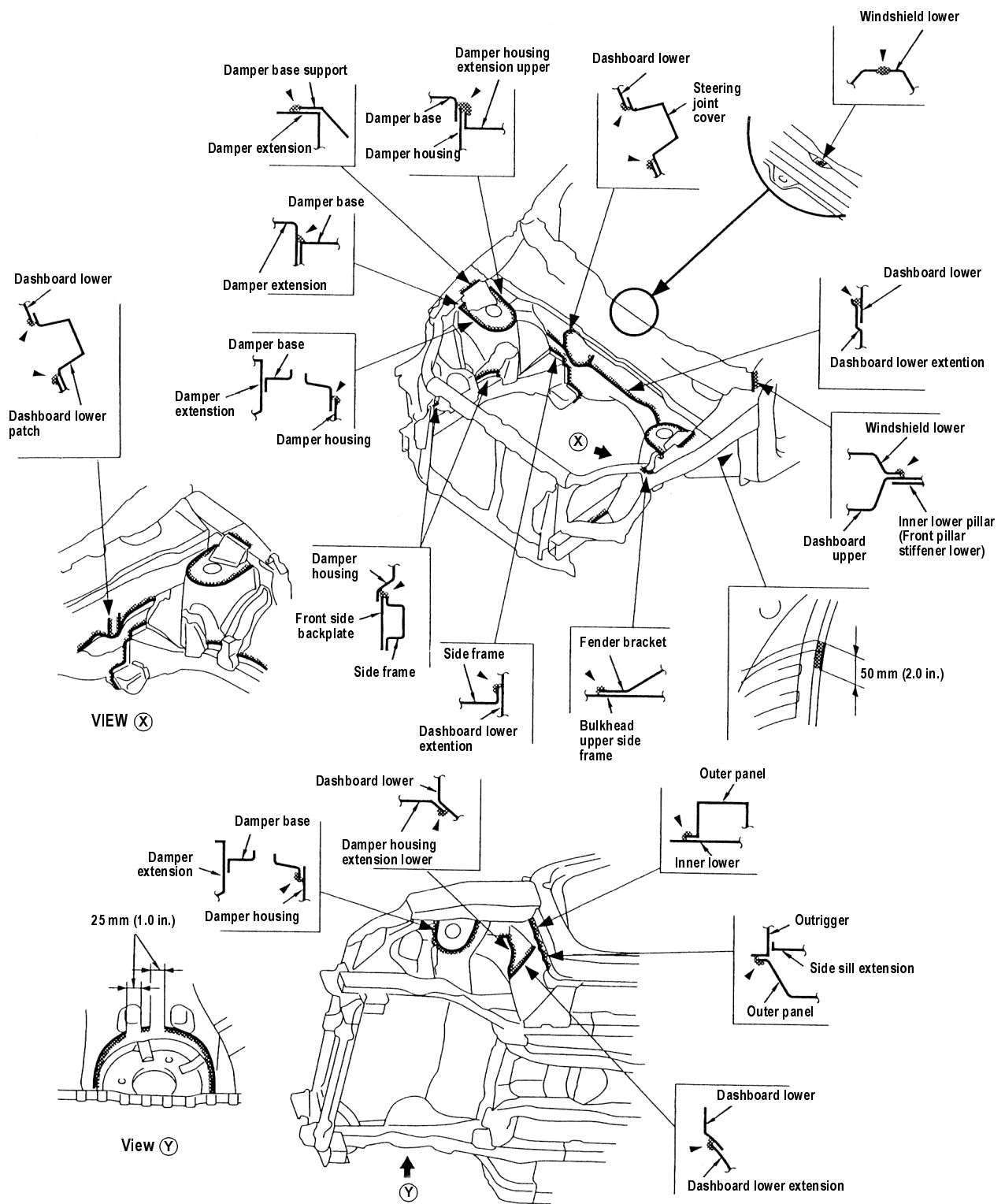
4. Finish sealing the engine compartment, the door opening, and the hatch gutter. Wipe off the excess sealer.



5. Apply sealer on any area that replacement part will cover. Smooth the sealer with a brush if necessary.



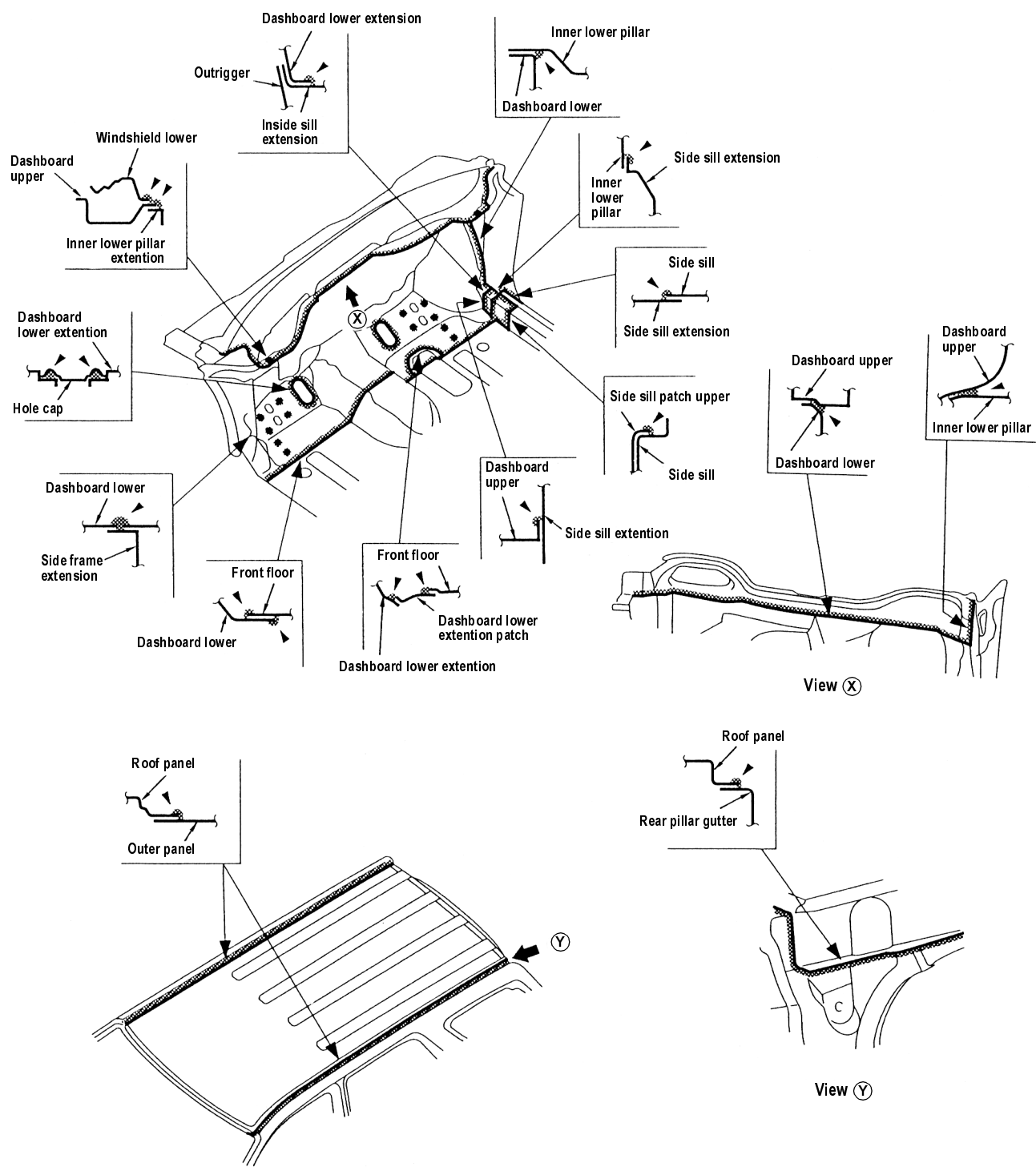
Engine Compartment, Front Wheelhouse, and Damper Housing



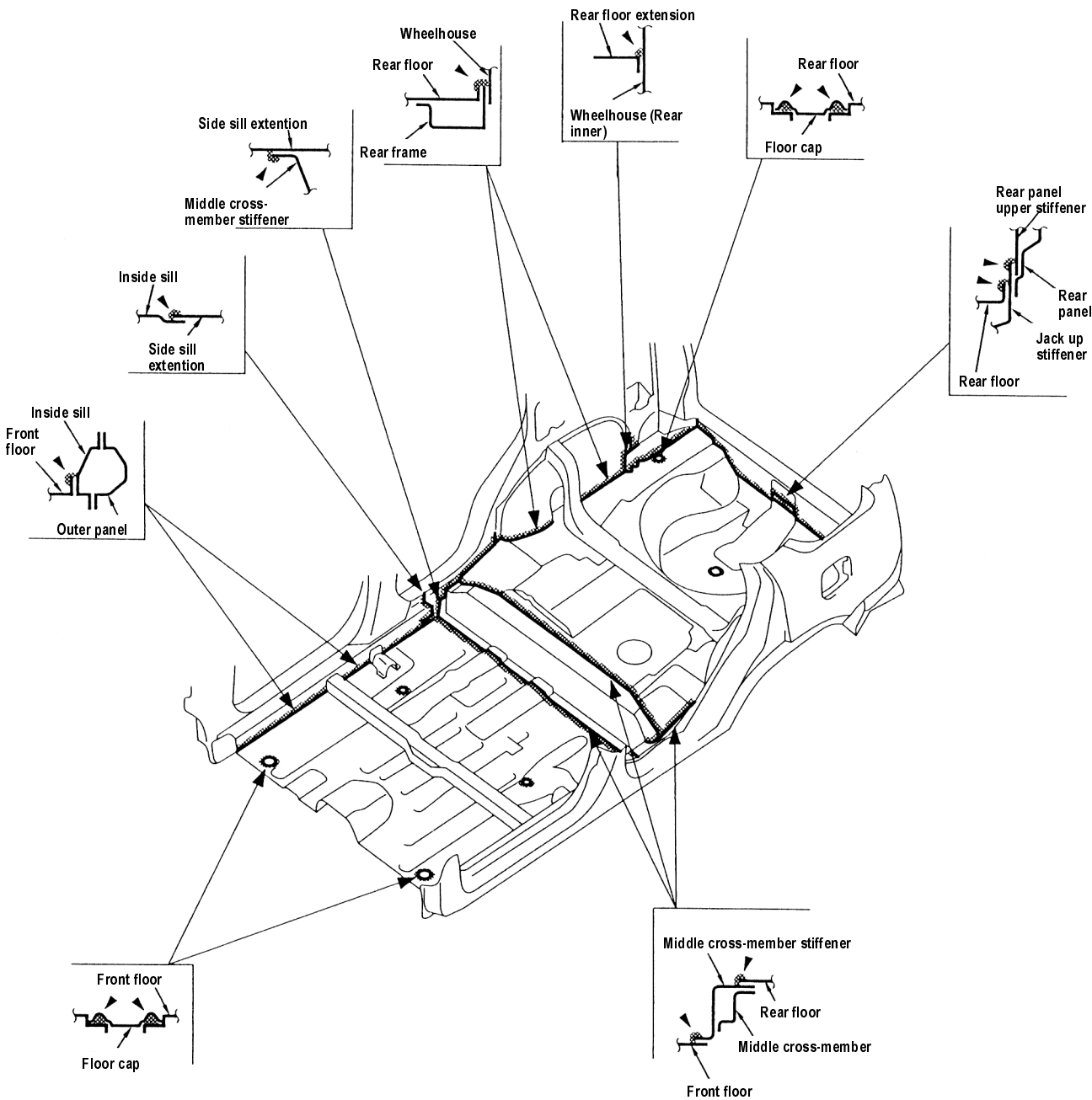
Rust Prevention

Cross Section of Body and Sealants (cont'd)

Dashboard Upper, Dashboard Lower, and Roof Panel



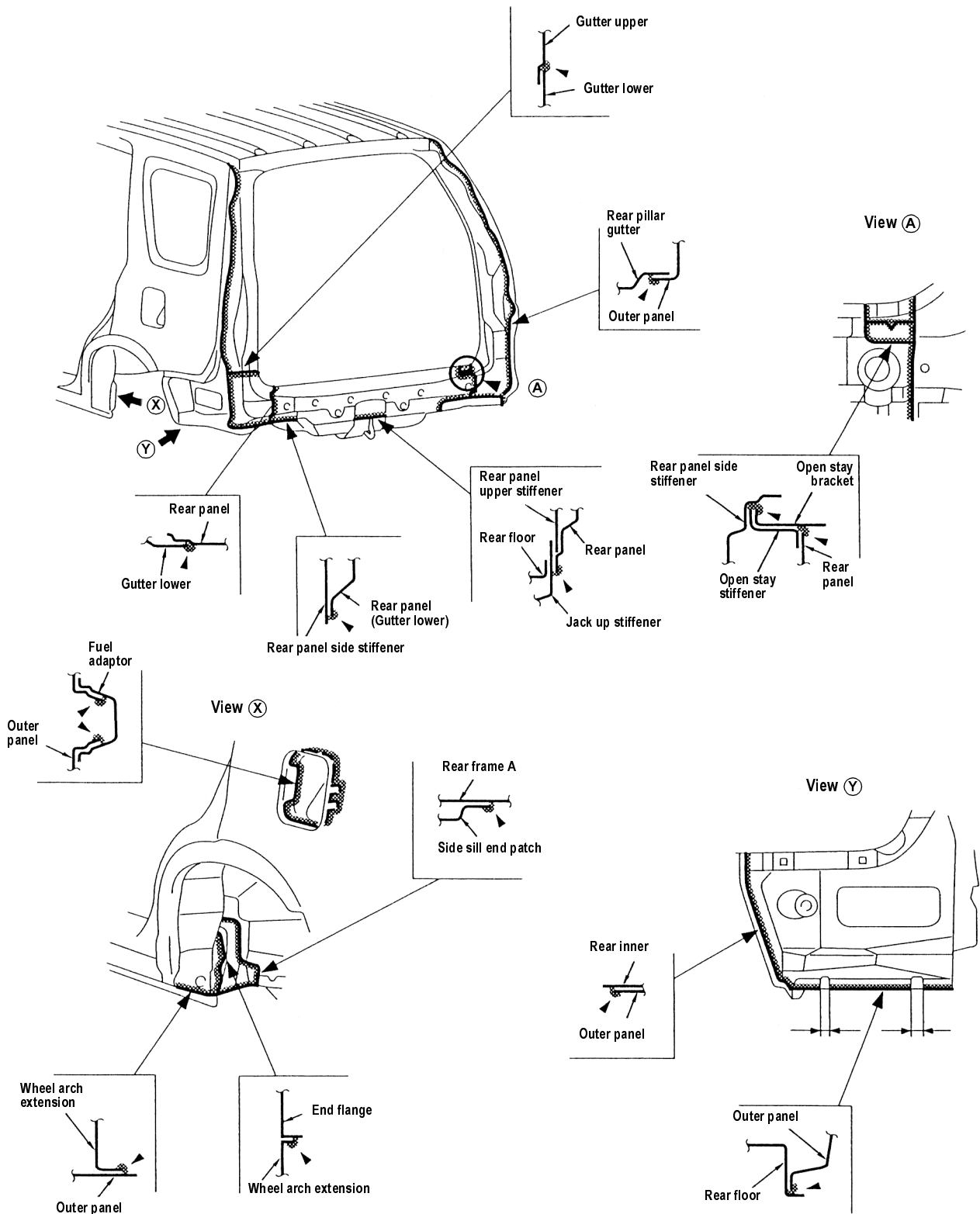
Front Floor and Rear Floor



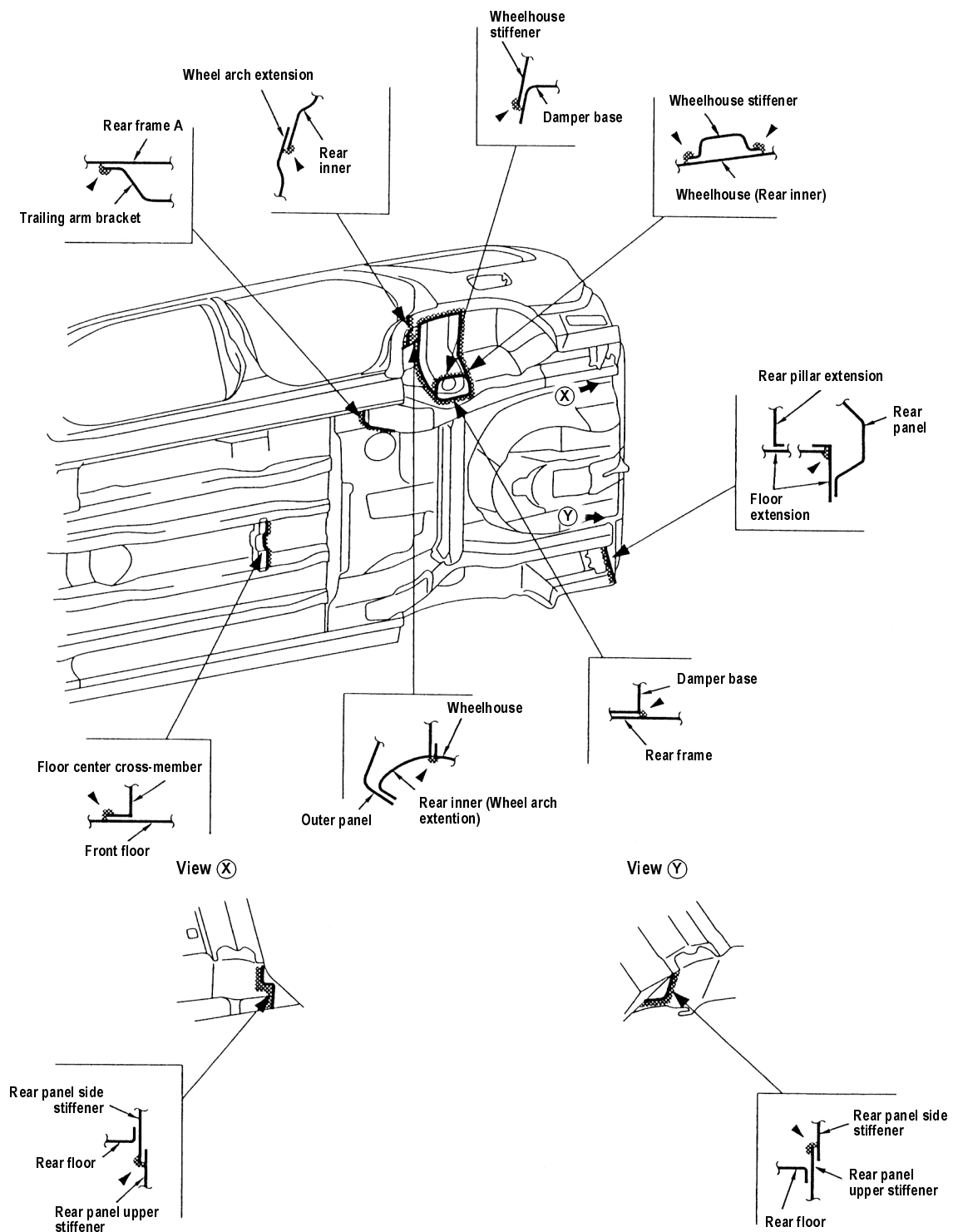
Rust Prevention

Cross Section of Body and Sealants (cont'd)

Rear Side Outer Panel, and Rear Panel



Under Floor, and Rear Wheelhouse



Rust Prevention

Soft Chipping Guard Primer Coat

General

The removal of paint and undercoating by stone chips immediately exposes metal to the atmosphere, causing it to oxidize. The thickness of this oxidation increases if the process continues unchecked. The soft chipping guard primer protects against damage due to the impact of such objects.

Sectional View of Paint Coats:

Top coat
Intermediate coat + Chipping guard primer
Electrodeposition of primer
Base metal

- The soft chipping guard primer coat is applied over the E.D. (Electrostatically Deposited) primer. It is followed by guide coating and top coating.
- The soft chipping guard primer produces a smooth surface when dry. It should be sprayed so the thickness of the protective film is 20 microns.

Basis Rules for Repairing a Soft Chipping Guard Primer Coat:

- Soft chipping guard primer coat is then applied to the most susceptible area (see page 5-9).
- Spray the primer surface (2-part urethane primer surfacer) on the soft chipping guard primer coating areas when you replaced parts using soft chipping guard primer coat.

⚠

WARNING

⚠

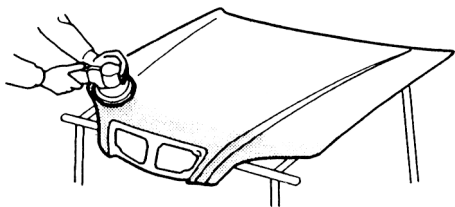
- Wear goggles or safety glasses to prevent eye injury.
- Ventilate when spraying undercoat.

1. Sanding the replacement part.

NOTE:

- Do not oversand the edges or corners of the part.
- Do not expose base metal.

Use a double action sander and #400 disc sandpaper.



2. Air blowing / degreasing

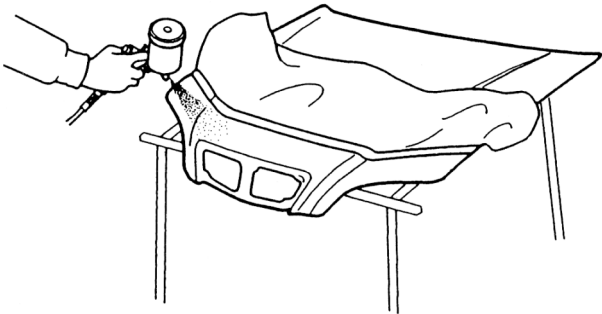
Use alcohol, and wax and grease remover.

3. Masking

Use masking tape and paper.

4. Spraying primer surfacer

- Sprayer about 4 to 5 coats to get 20 microns of thickness. One coat deposits about 5 to 7 microns.
 - Do not try to cover the surface with one heavy coat. Apply several thin coats is recommended.
- Use a 2-part urethane primer surface and a spray gun.
 - Mix the primer surfacer with the additive and solvent, and in the correct ratio.
 - Follow the primer surfacer manufacturer's instructions.



5. Drying

After spraying primer surfacer, allow 7 to 10 minutes of drying time, then force dry it with infrared lamps or an industrial dryer.

6. Polishing

Check the primer surfacer has drier thoroughly, then sand the primer surfacer.

Use a double action sander and #400~#600 disc sandpaper.

7. Intermediate coating and top coating

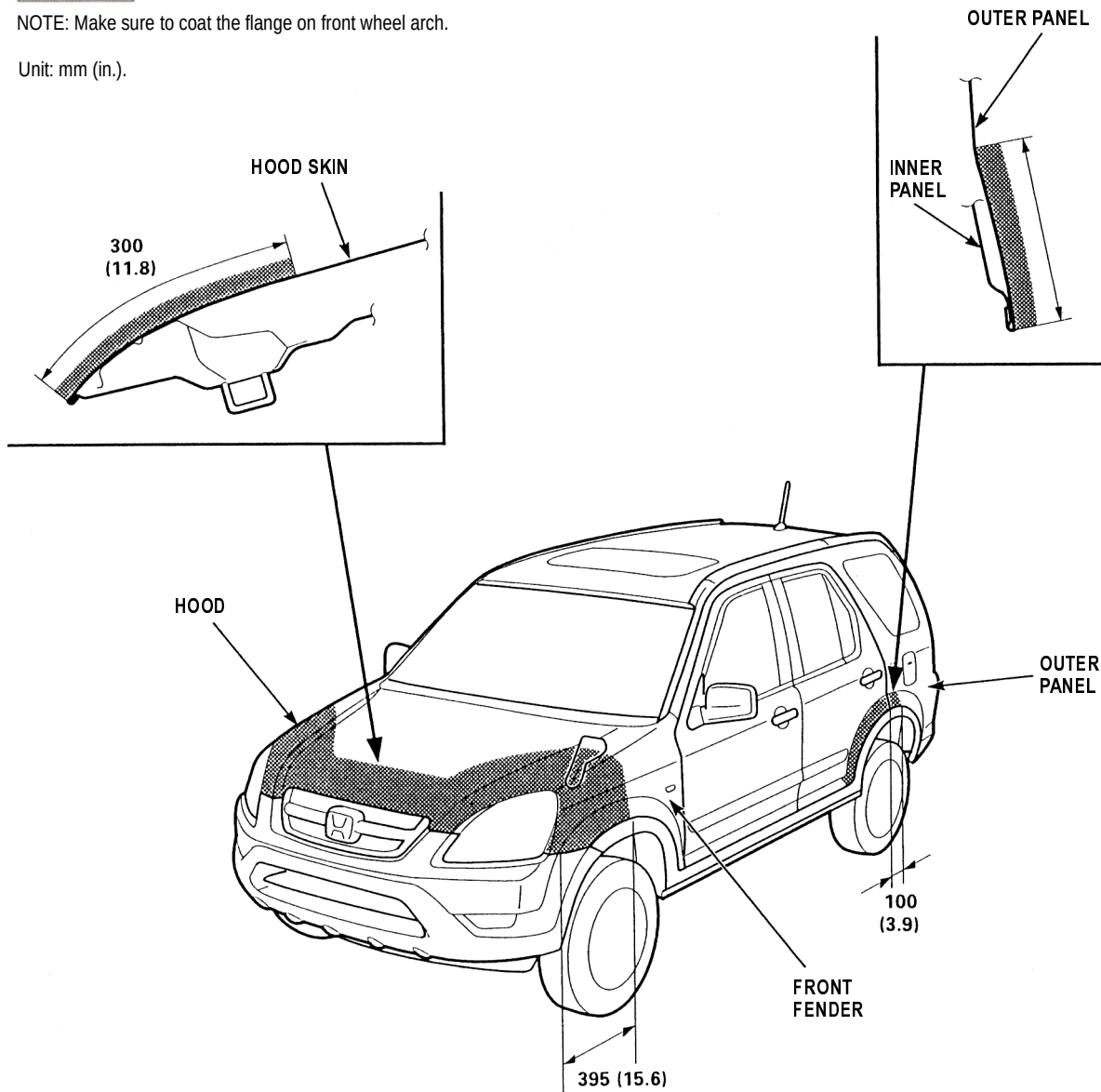
Refer to page 6-8 through page 6-10 of this manual for the painting procedure.

Coating Diagram

 Indicates chipping guard primer coating area.

NOTE: Make sure to coat the flange on front wheel arch.

Unit: mm (in.).



Rust Prevention

Rust-preventive Treatments

General

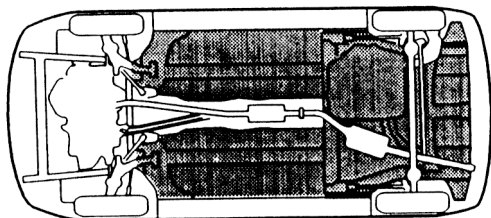
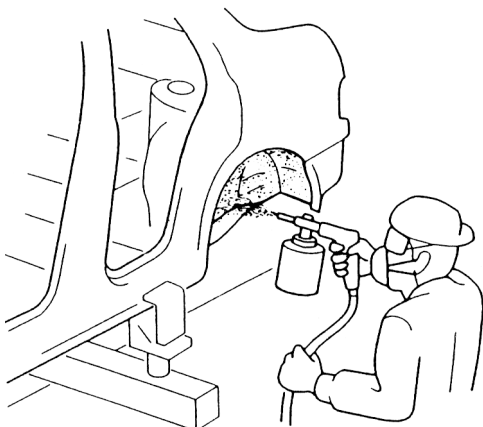
Undercoat:

**WARNING**

- Wear goggles or safety glasses to prevent eye injury.
- Ventilate when spraying undercoat.

NOTE:

- Mask the exhaust system, oxygen sensors, and suspension mount areas to prevent them from the undercoat overspray.
 - Follow the undercoating manufacturer's instructions.
1. Clean the body with wax and grease remover before the undercoat is sprayed.
 2. Apply the undercoat to the front wheelhouse, rear wheelhouse, and undersides of the front floor and rear floor ([see page 5-11](#)).
 3. Coat the bottom of the fuel tank.



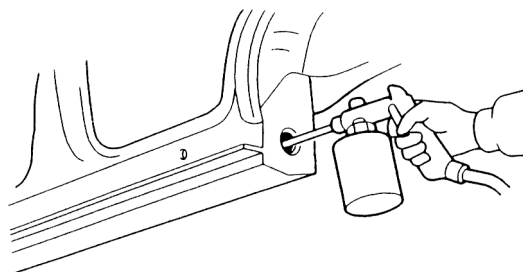
Anti-rust Agents:

**WARNING**

- Anti-rust agents contain substances that are harmful if you breathe or swallow them, or get them on your skin. Wear coveralls, gloves, eye protection, and an approved respirator while using such agents.
- Ventilate when spraying an anti-rust agent since it contains a small amount of organic solvent. Keep sparks, flames and cigarettes away.

NOTE:

- Do not spray an anti-rust agent on the brake system, components, exhaust system components and its related parts, emission control devices in the engine compartment, ball joint covers, the fuel strainer, and exterior and interior parts.
 - Wipe the excess agent with a clean rag dampened with light oil.
 - Follow the anti-rust agent manufacturer's instructions.
1. Before applying an anti-rust agent, thoroughly clean the area to be coated with a steam cleaner, etc., and let it dry. Waxoyl may be applied to wet surface.
 2. Apply anti-rust agent from the installation hole and the access hole of parts in the outer panel and the frame ([see page 5-12](#)). Spray the anti-rust agent sufficiently until the excess amount oozes out when filling the side sill.



Undercoating Diagram

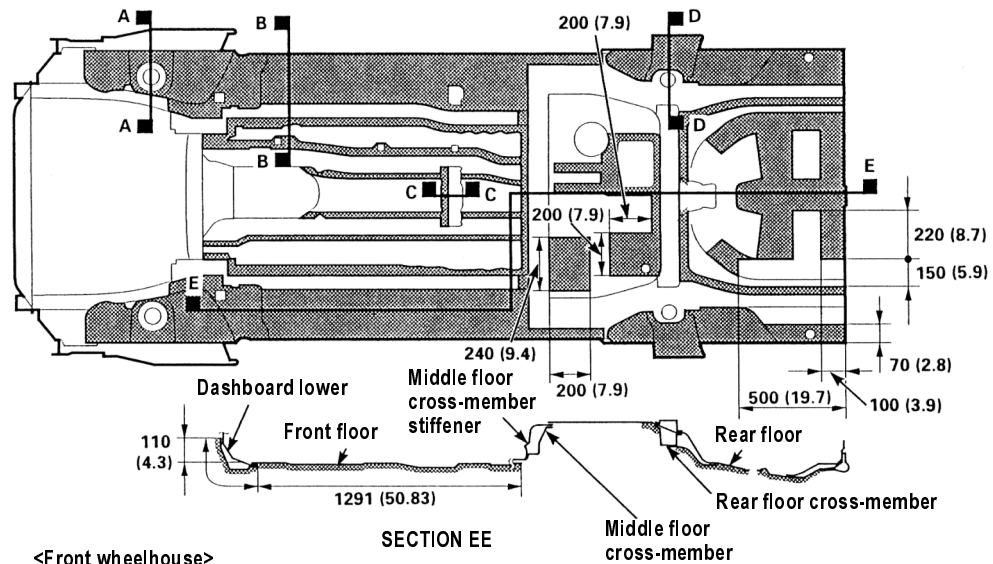
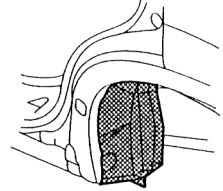
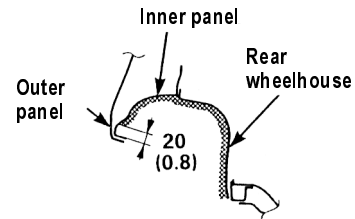
 Indicates PVC coating area.

NOTE:

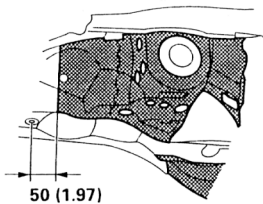
- Coating thickness: 0.4 mm (0.016 in.) MIN.
- Front wheelhouse, rear wheelhouse, and dashboard lower coating thickness 0.5 mm (0.02 in.).

SECTION DD

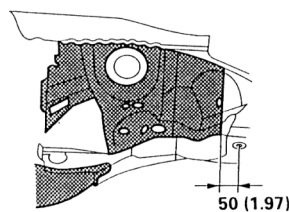
Unit: mm (in.)



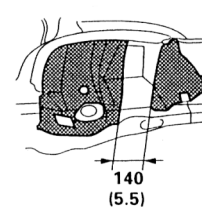
<Front wheelhouse>
Left side:



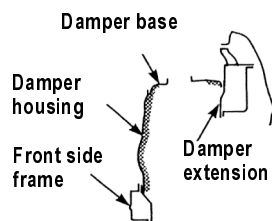
<Front wheelhouse>
Right side:



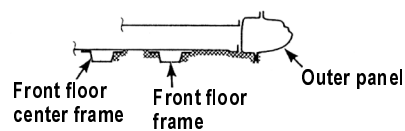
<Rear wheelhouse>



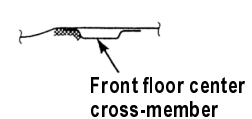
SECTION AA



SECTION BB



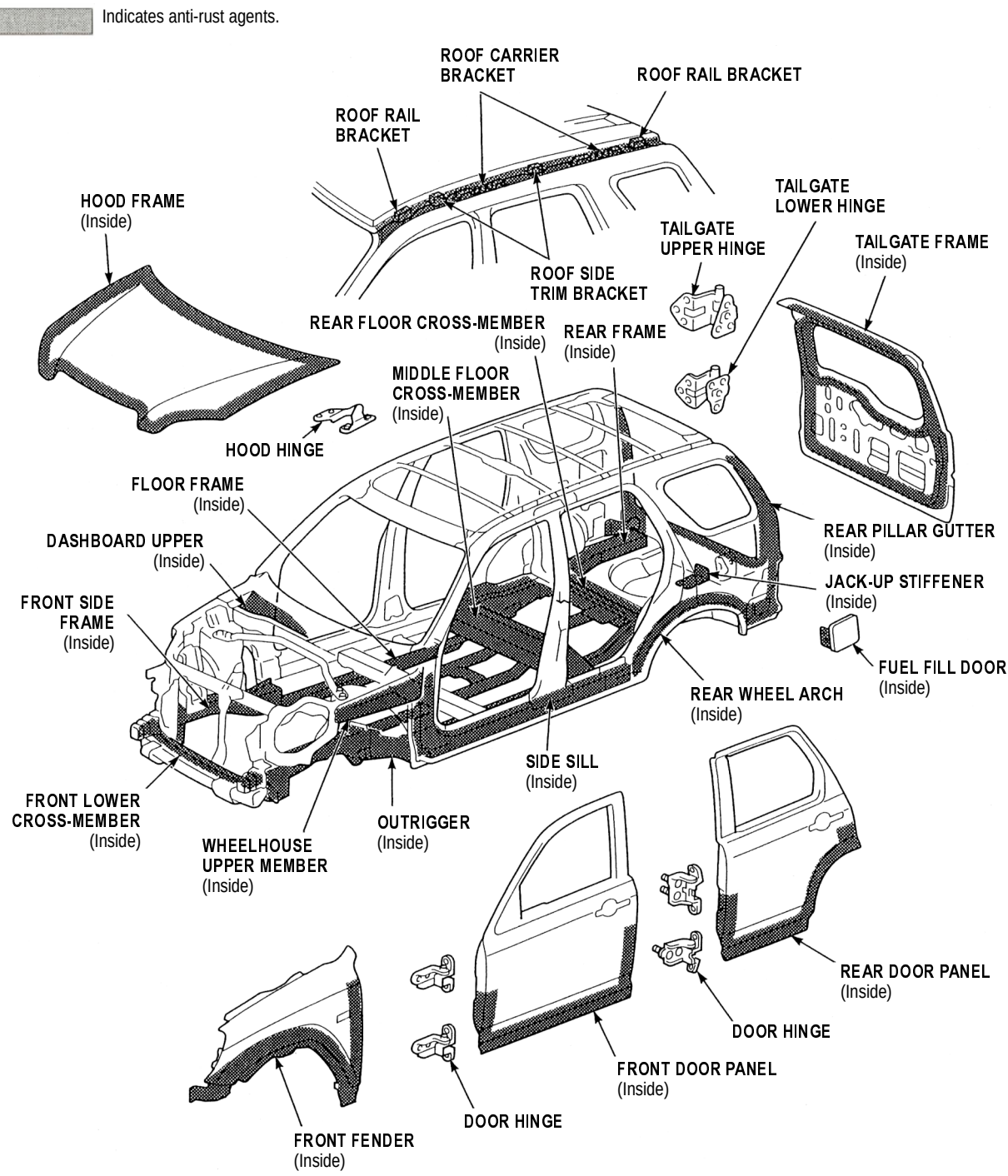
SECTION CC



Rust Prevention

Rust-preventive Treatments (cont'd)

Area to be Covered by Anti-rust Agents



Materials and Tools

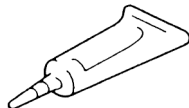
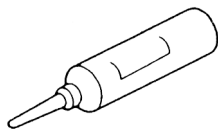
SEALER

Use urethane sealer.

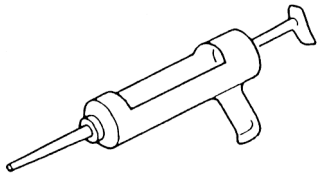
- 3M #08892 (internal)
 - 3M #08893 (external)
- or equivalents.

TOOLS

- Cartridge type
- Tube type



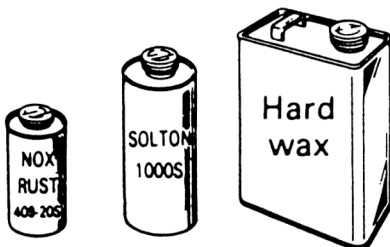
- Sealing gun



UNDERCOAT

To be applied to under-floor and wheelhouse.

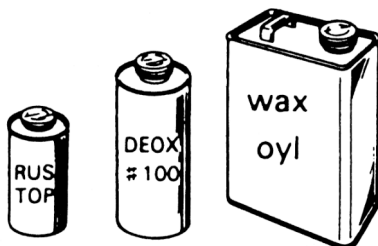
- Nox-rust 409-20S
 - Solton 1000S
- or equivalent



ANTI-RUST AGENT

To be applied to weld joints inside the body panel.

- Rustop
 - Deox #100
 - Waxoyl
- or equivalent.

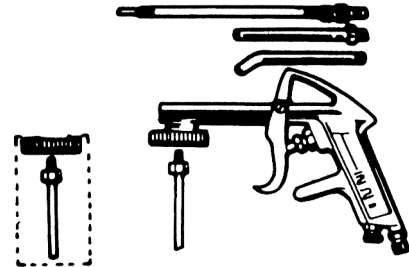


SPRAY GUNS

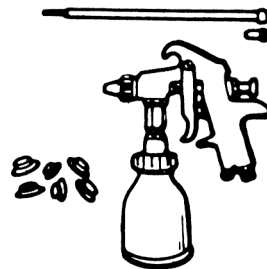
Use the correct gun for the agent being used.

Use of a pressure type spray gun is recommended when work involves a considerable number of vehicles.

- For nox-rust 409-20S / solton 1000S



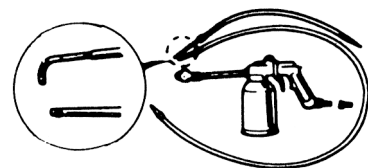
- For rustop



- For deox #100



- For waxoyl



6

Paints

General Safety Precaution	6-2
Body Paint	6-3
General	6-3
Refinishing Processes	6-4
Preprocessing of Painting	6-5
Treatment of Metal Surface	6-6
Undercoating	6-7
Intermediate Coating	6-8
Top Coating	6-9
3-coat Pearl (White Pearl) Paint	6-11
Coating Procedures	6-11
Painting Repair (Gradation)	6-12
Plastic Parts Paint	6-15
Features of Plastic Material	6-15
Use of the Repair Material (reference)	6-17
Refinishing Processes	6-18
Preprocessing of Painting	6-19
Undercoating	6-19
Intermediate Coating	6-21
Top Coating	6-22
Glossary	6-23

Paints

General Safety Precaution

- Most paints contain substances that are harmful if inhaled or swallowed.
- The following precautions are important items in order to maintain safe painting work.

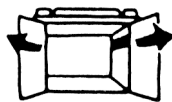
1. Wear an approved respirator, eye protection when painting.



2. Wear approved gloves, appropriate clothing when painting. Avoid contact with skin.



3. Spray paint only in a well ventilated area.



4. Read the paint label before opening the container. Cover spilled paint with sand, or wipe it up at once.



5. If paint gets in your mouth or your skin, rinse or wash thoroughly with water. If paint gets in your eyes, flush with water and get prompt medical attention.



6. After the painting work is finished, wash face and gargle with water.



7. Paint is flammable. Store it in a safe place, and keep it away from sparks, flames, or cigarette.

Body Paint

General

The 3-coat-3-bake (3C-3B) paint finishes give the CR-V a deep gloss and stunning finish. This manual provides information on paint defect, repair, and refinishing. Throughout, the objective is to explain in a simple yet comprehensive manner the basic items you should know about paint repairs. Select the correct material for the defect and repaint or refinish in the correct manner as described in this manual.



WARNING



- Most paints contain substances that are harmful if inhaled or swallowed. Read the paint label before opening the container.
- Spray paint only in a well ventilated area.
- Cover spilled paint with sand, or wipe it up at once.
- Wear an approved respirator, gloves, eye protection, and appropriate clothing when painting. Avoid contact with skin.
- If paint gets in your mouth or on your skin, rinse or wash thoroughly with water. If paint gets in your eyes, flush with water and get prompt medical attention.
- Paint is flammable. Store it in a safe place, and keep it away from sparks, flames, or cigarettes.

Basic Rules for Repairing a Paint Finish

To repair paint damage, always use the 2-part acylic urethane paints designated; polish and bake each of the three coats, as in production, to maintain the original film thickness, and to assure the same quality as the original finish.

Outline of Factory Painting Process:



Features in Each Work Process

1. Pretreatment and Electrodeposition

In the pretreatment process, the entire body is degreased, cleaned, and coated with zinc phosphate by dipping. After the body has been cleaned with pure water, it is placed in an electrolytic bath of soluble primer (Cationic Electrodeposition).

This produces a thorough corrosion inhibiting coating on the inner surface and corners of the body, pillars, sills, and panel joints.

Chipping primer is then applied to the most susceptibles areas ([see page 5-9](#)).

2. Intermediate coat

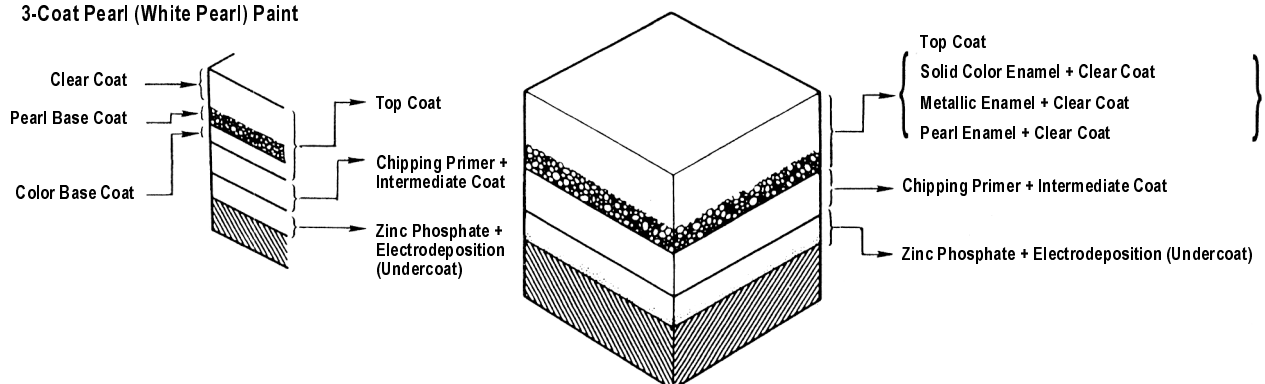
The intermediate coat is applied to the prepared surface for further protection against damage.

3. Top Coat

Enamel paint and either polyester or acrylic resin paint are used in the top coat for higher solidity, smoothness, brightness, and weather resistance.

Sectional View of Paint Coats:

3-Coat Pearl (White Pearl) Paint



Paints

Body Paint (cont'd)

Refinishing Processes

Paint damage can appear in any form. Before making a repair, check the damaged area carefully, and determine the best procedure for repairing the damage. The following shows you refinishing methods for various types of paint damage or defects.

Processes	Procedures	Damage			Replacement Parts	
		To metal surface	To undercoat / intermediate coats	To top coat	Welded part	Single part
1. Preprocessing of painting	- Featheredging - Preparation of metal surface - Air blowing / degreasing	X			X	
2. Treatment of Metal Surface	- Filling / drying..... - Polishing - Air blowing / decreasing	 (1) X			X	
3. Undercoating	- Masking - Spraying primer surfacer - Drying - Polishing - Air blowing / degreasing	X	X		X	
4. Intermediate Coating	- Masking - Spraying top coat enamel or Spraying color base (3-coat pearl paint) - Drying - Polishing - Air blowing / degreasing	X	X		X	X
5. Top Coating	- Masking - Spraying top coat ename / clear coat or Spraying color base + pearl base + top coat clear (3-coat pearl paint) - Drying - Polishing / buffing	X	X	X	X	X

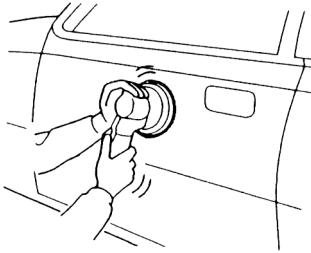
(1) = Indicates the best method depending on the degree of damage.

Preprocessing of Painting

1. Featheredging

NOTE:

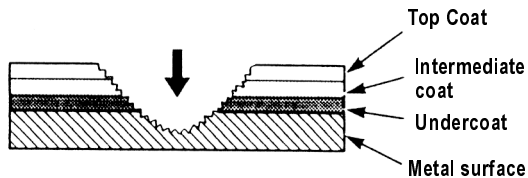
- The paint film damaged area should be sanded flat and smooth.
- If this is not done correctly the end results will not be acceptable.



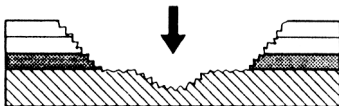
Damage to metal surface:

- Sand the damaged area flat and smooth.

Use the disc sander and #60~#80 disc paper.

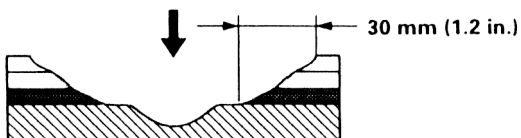


Use the double action sander and #60~#80 disc paper.



- Sand the area larger than the damaged area.

Use the double action sander and #180~#240 disc paper.



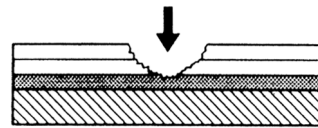
- If a double action sander is not available, use a rubber pad and wet or dry sandpaper.

Use the flexible block and #280, #340, #400, #600 sandpaper.

Damage to undercoat, intermediate coat and top coat:

- Sand the damage area flat and smooth

Use the double action sander and #180~#240~#320 disc paper.



2. Preparation of metal surface

- Remove all corrosion from the damaged area.

Use a product that removes corrosion.



3. Air blowing / degreasing

Use alcohol, wax, and grease remover.

Body Paint (cont'd)

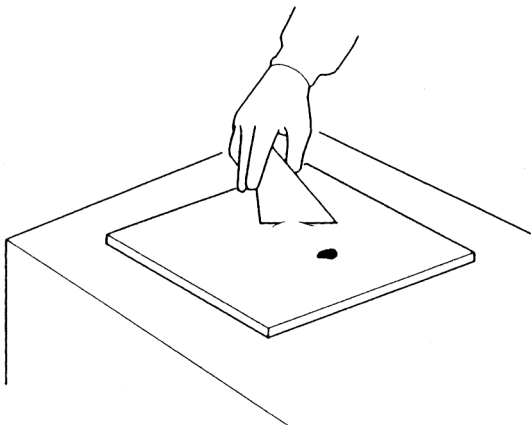
Treatment of Metal Surface

1. Filling / drying

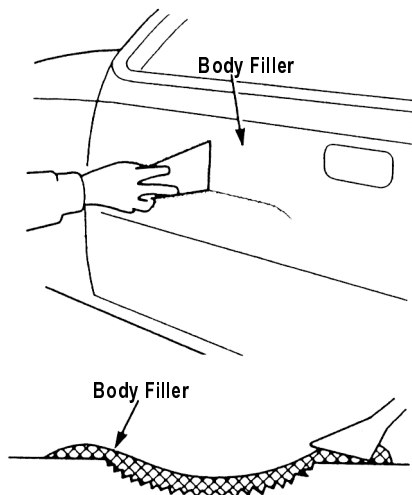
Small cracks or pinholes in the sheet metal should be repaired with a body filler and sanded flat and smooth.

- Use the 2-part polyester resin putty.
- Mix the putty with the hardener in the correct ratio.
- Follow the body filler manufacturer's instructions.

- Mix the body filler and hardener quickly.



- Apply the body filler in several thin coats, without air bubbles.
- Do not try to cover the surface with one heavy coat.
- Apply the body filler over the damaged area with a putty knife using light pressure.



- After applying the body filler, allow 5 to 6 minutes of normal drying time, then force dry it with infrared lamps or other industrial dryer at 122°F (0°C)~140°F (60°C).

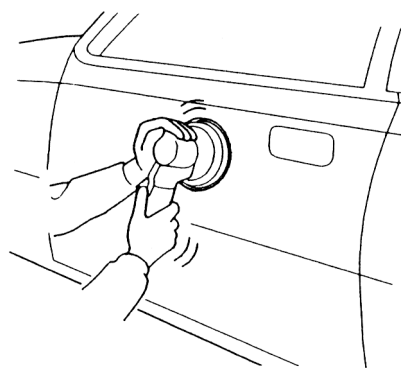
NOTE: Follow the body filler manufacturer's instructions for drying time.

2. Polishing

The body filler is dry a white mark appears when the surface is scratched with your finger nail.

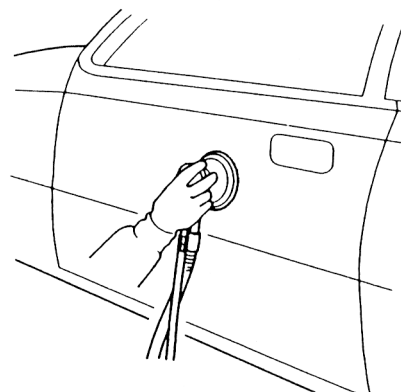
1 Thoroughly sand the body filler surface

Use the double action sander and #80-#120 disc paper



2 Sand the surface evenly, particularly the area that was filled.

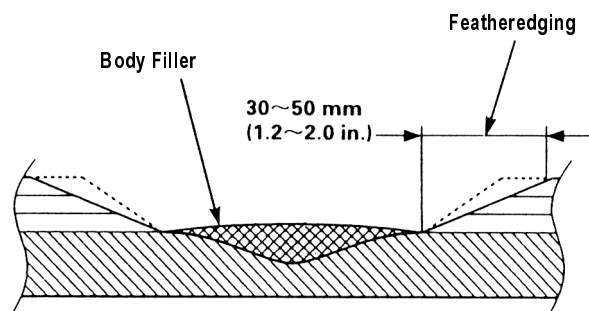
Use the flexible block and #120-#180 sandpaper.



3 Featheredge the paint coat.

Sand the body filler surface until the proper dimension are met.

Use the double action sander and #240~#320~#400 disc papers.



4. Air blowing / degreasing

Use the alcohol, wax and grease remover.

Also clean and degrease the surfaces where masking tape will be attached.

Undercoating

1. Masking

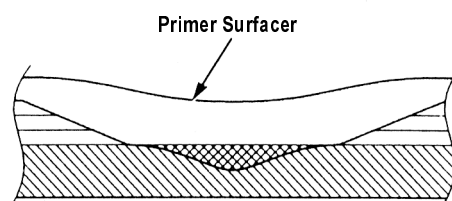
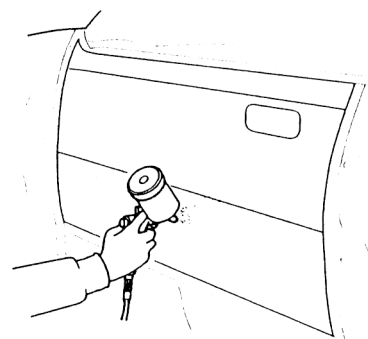
Mask the area surrounding the damage to prevent over spray from the primer surfacer.

Use the masking tape and paper.

2. Spraying the primer surfacer

- Spray the primer surfacer over a wider area than the body filler and the exposed surface of the paint film.
- Spray 2 to 3 coats to get 30 microns of thickness.

- Use the 2-part urethane primer surfacer and a spray gun.
- Mix the primer surfacer with the additive and solvent, and in the correct ratio.
- Follow the primer surfacer manufacturer's instructions.



3. Drying

After spraying primer surfacer, allow for 5 to 10 minutes of normal drying time, then force dry it with infrared lamps or other industrial dryer.

NOTE: Follow the primer surfacer manufacturer's instruction for drying time.

(cont'd)

Paints

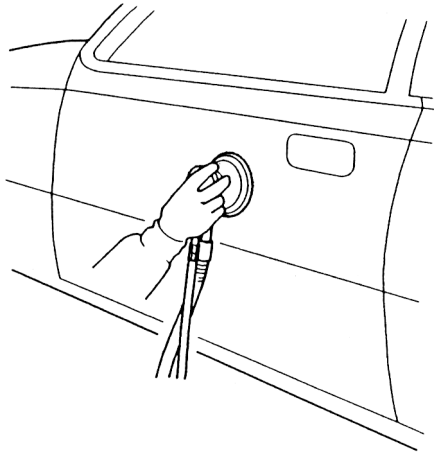
Body Paint (cont'd)

Undercoating (cont'd)

4. Polishing

Check that the primer surfacer has dried thoroughly, then sand the primer surfacer.

Use the double action sander and #320~#400~#600 disc papers.



5. Air blowing / degreasing

Use the alcohol, wax and grease remover.

Also clean and degrease the surfaces where the masking tape will be attached.

Intermediate Coating

1. Masking

Mask the area surrounding the damage to prevent over spray from the intermediate coat.

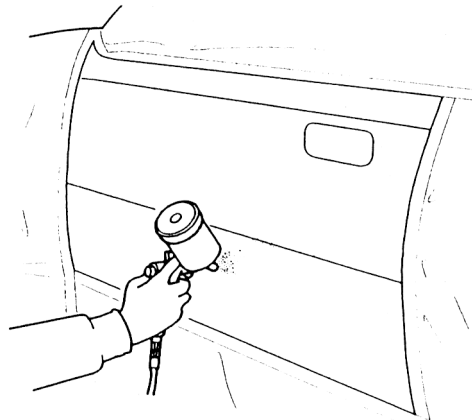
Use masking tape and paper.

2. Spraying top coat enamel

Spray the top coat enamel over the surface until the primer surfacer is fully covered.

NOTE: For the 3-coat pearl paint, spray the color base over the surface.

- Use the 2-part polyester urethane top coat enamel and a spray gun.
- Mix the top coat enamel with the additive and solvent, and in the correct ratio.
- Follow the top coat manufacturer's instructions.



3. Drying

After spraying top coat enamel or color base (3-coat pearl paint), allow for 5 to 10 minutes of normal drying time, then force dry it with infrared lamps or other industrial dryer.

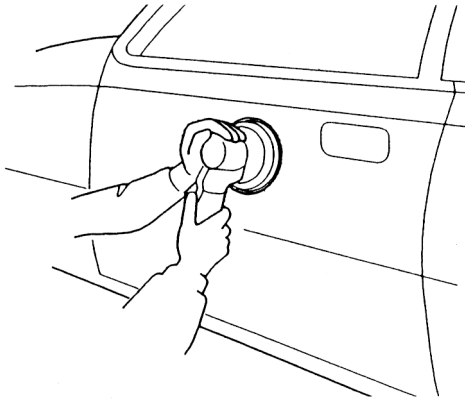
NOTE: Follow the top coat manufacturer's instruction for drying time.

4. Polishing

Check that the top coat enamel has dried thoroughly, then sand the top coat enamel.

Use the double action sander and #600~#800 disc papers.

NOTE: Be careful not to polish down to the primer surfacer.



When the painting repair (gradation) is almost done, polish the area that will be top coated.

Use the #2000 sandpaper and compound.

5. Air blowing / degreasing

Use alcohol, wax, and grease remover.

Also clean and degrease surfaces where the masking tape will be attached.

NOTE: See [page 6-11](#) and [page 6-12](#) for the painting repair (gradation) of the 3-coat pearl paint.

Top Coating

1. Masking

Mask the area surrounding the damage to prevent over spray from the top coat.

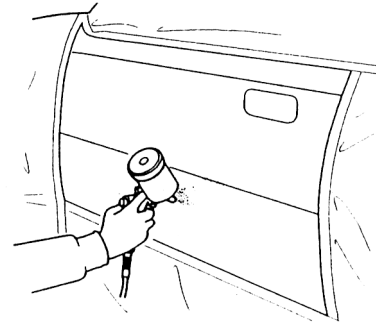
Use masking tape and paper.

2. Spraying top coat enamel / clear coat

Spray 2 to 3 double coat until the intermediate coat is fully covered.

NOTE: See [page 6-11](#) and [page 6-12](#) for the painting repair (gradation) of the 3-coat pearl paint.

- Use the 2-part polyester urethane top coat enamel and spray gun.
- Mix the top coat enamel with the additive and solvent, and in the correct ratio.
- Follow the top coat manufacturer's instructions.



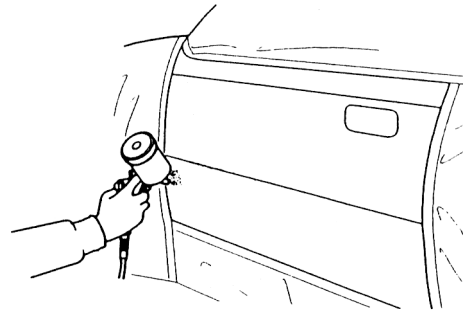
Drying

After spraying the top coat enamel, allow it to air dry, then force dry it with infrared lamps or other industrial dryer.

NOTE: Follow the top coat manufacturer's instructions for drying time.

Spraying clear coat

Spray the top coat clear evenly over the surface of the top coat enamel. Do not try to cover the surface with one heavy coat.



(cont'd)

Paints

Body Paint (cont'd)

Top Coating (cont'd)

Drying

After spraying the clear coat, allow it to dry for 10 minutes, then force dry it with infrared lamps or other industrial dryer.

NOTE: Follow the top coat manufacturer's instructions for drying times.

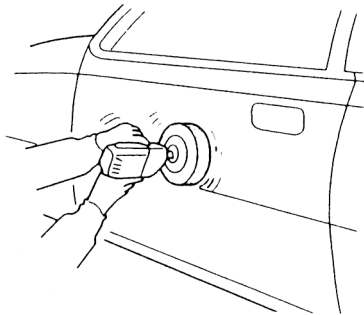
3. Polishing / buffing

Check that the clear coat has dried thoroughly.

The clear coat is cooled.

- 1 Any adhesion or roughness on the top coat should be wet sanded and repaired.

Use the #1200~#2000 and crystal block.



- 2 Polish any roughness caused by sanding.

NOTE: Clean the top coat surface frequently so you don't damage the clear coat with the polishing particles.

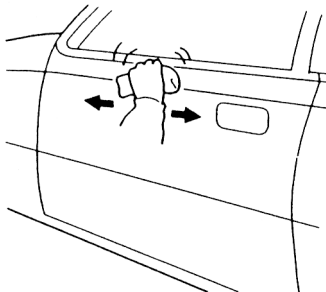
Use a buffing towel, buffing wool, and compound.

- 3 Finishes up with buffing.

NOTE:

- Do not use a power buffer.
- Don't polish too much; use light hand pressure.

Use the buffing sponge, fine compound, very fine compound, then ultra fine compound.



- After buffing, remove the masking paper and tape, and thoroughly wash the entire vehicle.

3-coat Pearl (White Pearl) Paint

Coating Procedures

Refer to [page 6-5](#), [page 6-6](#), [page 6-7](#) and [page 6-8](#) for the previous procedures from the intermediate coat.

1. Spraying color base.

Spray the color-matched color base over the surface until the primer surface is fully covered.

- Use the acrylic urethane color base.
- On pearl paint: the color of the color base will determine the final color of the paint repair.

2. Drying

After spraying color base, allow for 5 to 10 minutes of normal drying time, then force dry it with infrared lamps or other industrial dryer.

NOTE: Follow the color base manufacturer's instruction for drying time.

3. Polishing

Check that the color base has dried thoroughly, then dry or wet sand the color base.

Use the flexible block and #600, #800, #1000 sandpapers.

NOTE: Be careful not to polish down to the primer surfacer.

When the painting repair (gradation) is almost done, polish the area that will be top coated.

Use the #2000 sandpaper and compound.

4. Air blowing / degreasing

Use alcohol, wax, and grease remover.

Also clean and degrease the surfaces where the masking tape will be attached.

5. Masking

- Remove all existing masking tape, then mask with new ones.
- Mask the area surrounding the damage sufficiently to prevent overspray. It is also a good practice to use a vinyl cover to protect other areas.

- Use a heat-resistant masking tape where it is attached directly to body.
- Use brown paper or masking roll paper.

NOTE: Protect the plastic parts with aluminum foil under the brown paper or masking paper to prevent damage to due to heat during baking.

6. Air blowing

Thoroughly clean the interior, and spray water over the floor. Be careful about blowing dust and dirt.

Use the alcohol, wax, and tack cloth.

7. Spraying color base/pearl base/clear coat spray the color-matched color base over the prepared surface.

Use the acrylic urethane color base and a spray gun.

Spray the color-matched pearl base 2~3 double coat over the surface until the color base is fully covered.

Use the acrylic urethane pearl base and a spray gun.

Spraying clear coat

Spray the top coat clear evenly over the surface of the pearl base. Do not try to cover the surface with one heavy coat.

8. Drying

After spraying the clear coat, allow it to dry for 10 minutes, then force dry it with infrared lamps or other industrial dryer.

NOTE: Follow the paint manufacturer's instructions for drying times.

(cont'd)

Paints

3-coat Pearl (White Pearl) Paint (cont'd)

Coating Procedures (cont'd)

9. Polishing / buffing

Check the clear coat has dried thoroughly.

The clear coat is cooled.

- 1 Any adhesion or roughness on the top coat Should be wet sand and repaired.

Use the #2000 and crystal block.

- 2 Polish all roughness caused by sanding.

NOTE : Clear the top coat surface frequently so you don't damage the clear coat with the polishing particles.

Use a buffing towel, buffing wool, and compound.

- 3 Finishes up with buffing.

NOTE:

- Do not use a power buffer.
- Don't polish too much; use light hand pressure.

Use the buffing sponge, fine compound, very fine compound, then Wtra fine compound

- 4 After buffing, remove the masking paper and tape, and thoroughly wash the entire vehicle.

Painting Repair (Gradation)

Repair of 3-coat pearl paint coat requires different procedure from that of metallic paint coats.

Determination of color:

1. Sand the damaged paint coat until the intermediate coat appears.

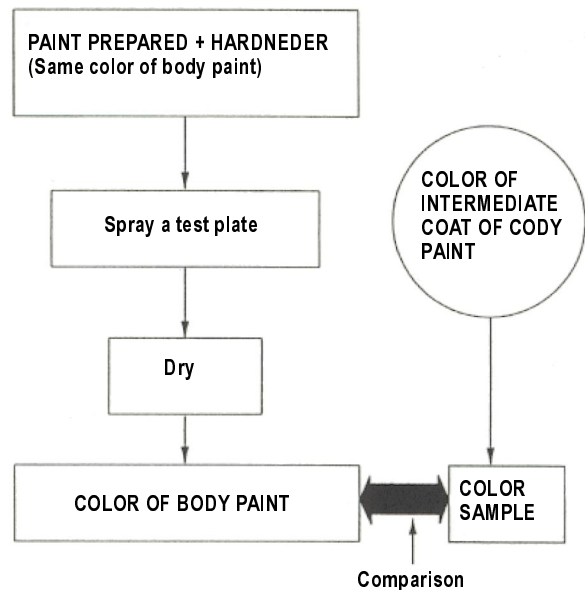
Use the #800~#1000 sandpaper.

2. Polish the exposed paint coat, then compare is color with the color sample provided.

Use the ultra fine compound.

3. Prepare a paint based on the color sample selected according to the instructions.

4. After preparing, check that the paint prepared matches the color sample selected in step 2 above.



NOTE : On pearl paint, the color of the intermediate coat will determine the final color of the paint repair.

Mixing (Reference):

The prepared paint should be mixed with thinner and hardner as follows.

Following example: 2-part polyester urethane paint

PAINT (A) (Color base)

Thinner with hardner function	100 ~ 130 %
Prepared paint	100

PAINT (B) (Pearl base)

Thinner with hardner function	100 ~ 130 %
Top coat (pearl base)	100

The above paints and materials or their equivalents should be used.

NOTE: Follow the paint manufacturer's instructions when mixing the paint and other materials.

Refinishing procedures:**WARNING**

- Ventilate when spraying paint. Most paint contains substances that are harmful if inhaled or swallowed. Read the paint label before opening paint container.
- Avoid contact with skin. Wear an approved respirator, gloves, eye protection and appropriate clothing when painting.
- Paint is flammable. Store in a safe place, and keep it away from sparks, flames or cigarettes.

1. To prepare the first coat (paint ©) add a 1 part of paint (A) to 1 part of paint (B) and stir well.

PAINT © =		PAINT (A)	PAINT (B)
		1	: 1

2. Pour the mixture through a filter, then spray 2-3 light coats over the damaged surface.

NOTE: Spray the mixture until the intermediate coat is thoroughly covered.

3. Prepare paint (D) for gradation by mixing 1 part of paint © with 19 parts of the paint (B). Stir the mixture well.

PAINT (D) =		PAINT ©	PAINT (B)
		1	: 19

4. Pour the mixture through a filter, then spray 2-3 light coats the filtered mixture over paint ©, starting at the center, then working toward the edge.

NOTE:

- Check that the painted coat matches the color of the body paint while spraying.
- Application of the mixture will determine the final color of the paint repair. Do not spray the mixture excessively as this may alter the final color of the repair.

(cont'd)

Paints

3-coat Pearl (White Pearl) Paint (cont'd)

Painting Repair (Gradation) (cont'd)

5. Prepare paint ⑤ of top coat by mixing 1 part of the pearl base with 1 part of the paint ④. Stir the mixture well.

PAINT ⑤ =

Pearl base	PAINT ④
1	: 19

6. Apply 1-2 light coats of paint ⑤ over the repaired surface.
7. For the final top coat, add 0 ~ 20% thinner to a 5 : 1 mixture of the clear paint and hardener.

CLEAR PAINT	HARDENER	+	THINNER 0 ~ 20%
5	: 1		

8. Spray 2-3 light final top coats over the damaged area.
9. Apply the clear coat gradation around the final top coat.

Plastic Parts Paint

Features of Plastic Material

- Check each of the plastic parts of solvent resistance and heat resistance temperatures before you do any repair work.
- Select the repair material according to materials of the plastic parts.

Standard Symbol	Name	Heat Resistance Temperature °C (°F)	Solvent Resistance	Note
AAS	Acrylonitrile acrylic styrene	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	An organic solvent such as gasoline is not recommended. An aroma product is not recommended.
ABS	Acrylonitrile butadiene styrene	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	An organic solvent such as gasoline is not recommended. An aroma product is not recommended.
AES	Acrylonitrile ethylene styrene	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	An organic solvent such as gasoline is not recommended. An aroma product is not recommended.
A/EPDM/S	Acrylonitrile / ethylene propylene diene rubber / styrene	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	An organic solvent such as gasoline is not recommended. An aroma product is not recommended.
ASA	Acrylonitrile styrene acrylate	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	An organic solvent such as gasoline is not recommended. An aroma product is not recommended.
CAB	Cellulose acetate butylate	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	An organic solvent such as gasoline is not recommended. An aroma product is not recommended.
E/VAC	Ethylene-vinyl acetate	80 (176)	A small amount of alcohol and gasoline are acceptable for a short time. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended.
PA	Polyamide plastics	80 (176)	Alcohol and gasoline are acceptable.	Battery acid (sulfuric acid) is not recommended.
PBT	Polybutylene terephthalate	160 (320)	Alcohol and gasoline are acceptable.	Solvent is not recommended.
PC	Polycarbonate	120 (248)	A small amount of alcohol is acceptable for a short time.	Brake fluid, and wax and grease remover not recommended
PE	Polyethylene	80 (176)	Alcohol and gasoline are acceptable.	Solvent is not recommended.
PF	Phenol form aldehyde	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended.
PMMA	Polymethyl methacrylate	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended. Wash remover off with water thoroughly.
POM	Polyoxymethylene polyacetal	100 (212)	Alcohol and gasoline are acceptable.	Solvent is not recommended.

(cont'd)

Paints

Plastic Parts Paint (cont'd)

Features of Plastic Material (cont'd)

Standard Symbol	Name	Heat Resistance Temperature °C (°F)	Solvent Resistance	Note
PP	Polypropylene	80 (176)	Alcohol and gasoline are acceptable.	Solvent is not recommended.
PPO (PPE)	Polyphenylene oxide	100 (212)	A small amount of alcohol is acceptable for a short time.	Soaking with an organic solvent such as gasoline and alcohol is not recommended.
PS	Polystyrene	60 (140)	A small amount of alcohol is acceptable for a short time.	Soaking with an organic solvent such as gasoline and alcohol is not recommended.
PUR	Polyurethane	80 (176)	A small amount of alcohol is acceptable for a short time. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended.
PVC	Polyvinyl chloride	80 (176)	A small amount of alcohol and gasoline are acceptable for a short time. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended.
SAN	Styrene acrylonitrile	80 (176)	Wiping alcohol off in a short time can be allowed.	Soaking with an organic solvent such as gasoline and alcohol is not recommended.
SMC	Sheet molding compound	180 (356)	Alcohol and gasoline are acceptable	Solvent is not recommended.
TPE	Thermoplastic polyester elastomer	80 (176)	Alcohol is acceptable and wiping gasoline for a short time can be allowed. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended. Wash remover off with water thoroughly.
TPS	Thermoplastic styrene elastomer	80 (176)	A small amount of alcohol and gasoline are acceptable for a short time. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended. Wash remover off with water thoroughly.
TPO	Thermoplastic olefin / elastomer	80 (176)	Alcohol is acceptable and wiping gasoline for a short time can be allowed. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended. Wash remover off with water thoroughly.
TPU	Thermoplastic / urethane / elastomer	80 (176)	A small amount of alcohol and gasoline are acceptable for a short time. (Degreasing)	Soaking with an organic solvent such as gasoline and alcohol is not recommended. Wash remover off with water thoroughly.
UP	Polyester	110 (230)	Alcohol and gasoline are acceptable.	Alkali is not recommended.

Use of the Repair Material (reference)

NOTE: Follow the materials manufacturer's instructions.

The use of a special polyester putty for PP bumper is described here:

1. Filler

Mixing Ratio :

Putty	Hardener
100	2 to 3



Hardening starts immediately after mixing.
Available time: 6 to 9 minutes / 20°C (68°F)



Almost hard: 15 minutes



Completely hard: More than 30 minutes

Drying Time:

Air dry 20°C (68°F)	3 hours
Force dry 60°C (140°F)	30 minutes

2. Sanding filler

Spray bumper primer ([see page 6-19](#)) on the area where the PP material was used.

3. Primer surfacer

The primer surfacer is used to protect the PP resin surface and fill cavities of flaws before the intermediate coat and top coat.

Use the 2-component type primer surfacer (grey).

Mixing Ratio:

Primer Surfacer	Hardener
10	1



30~60% is diluted with thinner.

4. Intermediate coat and top coat

Use the 2-part polyester urethane top coat.
Top coat is also used for an intermediate coat.

Mixing Ratio:

NOTE: Be sure to mix the correct amount of the hardener and softener.

Top coat	Softener
10	1



Top coat + Softener	Hardener
10	1



30~60% is diluted with thinner.

NOTE: Use a spray gun to apply the paint. Do not use a brush.

Drying time:

Air dry 20°C (68°F)	6~10 minutes Touching by the finger.
Almost hard	12~14 hours
Completely hard	96 hours

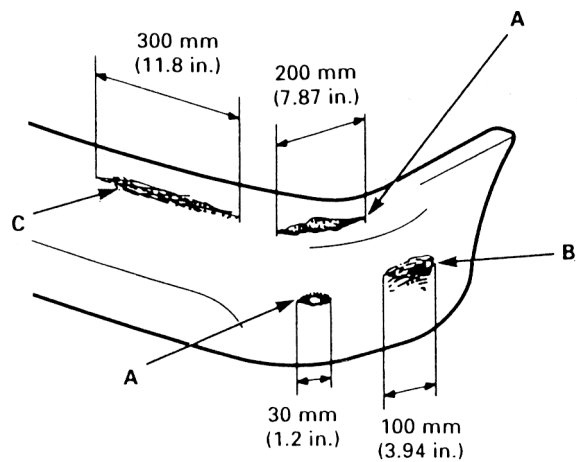
Force dry the intermediate coat and top coat.

NOTE: Mix only an amount that can be used before it hardens.

Plastic Parts Paint (cont'd)

Refinishing Processes

- The following shows refinishing methods to various types of paint damage or defects.
- Be careful not to deform and damage the parts when force drying.



- A: Hole / Deep Gouge
B: Deep Abrasion about 3 mm (0.12 in.).
C: Shallow Scratch about 1 mm (0.04 in.).

Processes	Procedures	PP		Other Plastics		
		Damage		Damage		
		A / B	C	B		C
				ABS/PC	Nylon/ Polyester	
1. Prepare for painting	• Sanding • Air blowing / degreasing	X	X	X	X	X
2. Undercoating	• Spraying primer	X			X	
	• Drying	X			X	
	• Filling / Sanding	X		X	X	
	• Air blowing / degreasing	X		X	X	
	• Spraying primer surface	X	X	X	X	X
	• Drying	X	X	X	X	X
	• Sanding	X	X	X	X	X
	• Air blowing / degreasing	X	X	X	X	X
3. Intermediate Coating	• Masking • Spraying top coat enamel • Drying • Polishing • Air blowing / degreasing	X	X			
4. Top Coating	• Masking • Spraying top coat enamel/clear coat • Drying • Polishing / Buffing	X	X	X	X	X

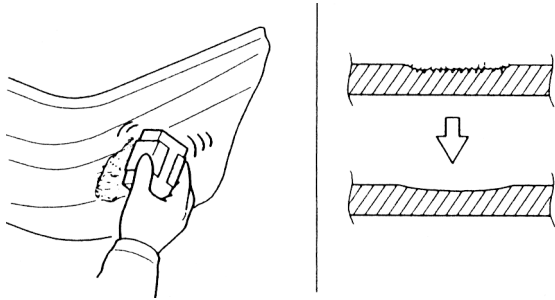
Preprocessing of Painting

1. Sanding

Sand the damage area flat and smooth.

Shallow Scratch:

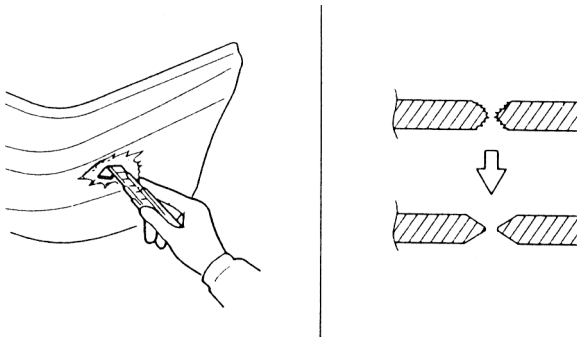
Use a flexible block and #240~#400~#600 sandpaper



Hole / Deep Gouge:

Cut out and make any torn or burred area flat.

Use a knife, flexible block and #180~#240 sandpapers.



2. Air blowing / degreasing

Clean the damaged area thoroughly.

Use alcohol, and wax and grease remover.

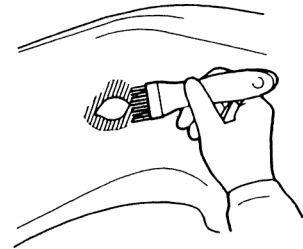
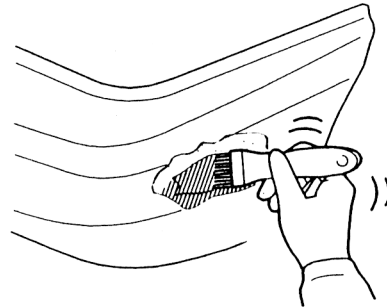
Undercoating

1. Spraying primer

Primer is used to fill cavities in the putty and primer surfacer.

- Spray primer on the exposed area.
- Spray the 2 to 3 coats of primer on 2 to 3 coats over the area you applied putty.
- Apply primer to the back of the bumper if the damage is a tear or hole.

- Bumper primer
- Warm the primer if the ambient temperature is below 50°F (10°C).
- Follow the bumper primer manufacturer's instructions.
- Use a spray gun and a brush.



Drying

NOTE: Take care not to let the heat lamp deform the bumper during the drying process.

Dry the bumper primer thoroughly with an infrared dryer or other suitable method.

Drying Time:

Air dry 20°C (68°F)	20 minutes
Force dry 60°C (140°F)	10 minutes

(cont'd)

Plastic Parts Paint (cont'd)

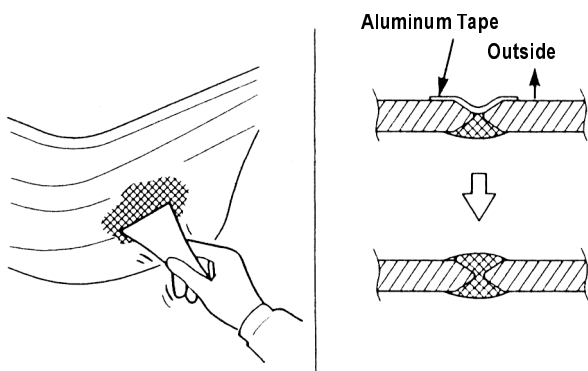
Undercoating (cont'd)

2. Filling / Sanding

Apply putty to repair any holes or deep gouges.

- Apply the putty on the damaged area in 2 to 3 steps.
- Glue aluminium tape on the outside of the bumper, and apply putty from the other side of the bumper.
- Remove the aluminium tape after the putty dries, apply putty from the outside, and fill the hole.

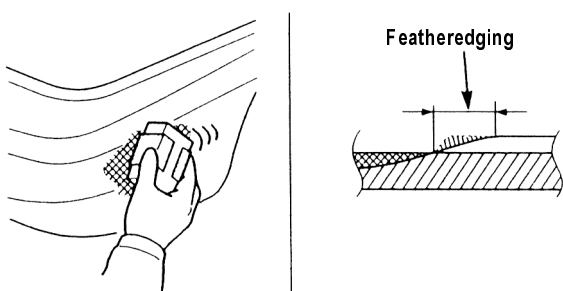
Use a special polyester putty (Reference) and a putty knife.



3. Sanding

Sand the surface evenly, particularly at the area where the PP material and putty meet.

Use a flexible block and #240~#400~#600 sandpaper.



4. Air blowing / degreasing

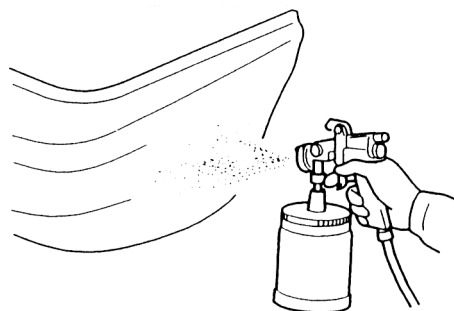
Use alcohol, a tack cloth, and wax and grease remover.

5. Spraying primer surfacer

NOTE: Spray the bumper primer (see page 5-13) on the area where the PP material was exposed and around the putty.

- Spray the primer surface wider than the putty and painted surfaces of bumper primer.
- Spray 2 to 3 coats to get 20 to 30 microns of thickness.

- Use the 2-component type primer surface (gray) and a spray gun.
- Follow the materials manufacturer's instructions.



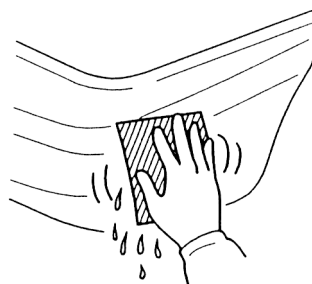
Drying

NOTE: Take care not to let the heat lamp deform the bumper during the drying process.

6. Sanding

After drying, wet sand the area of the intermediate coat.

Use the #600 sandpaper.
NOTE: Do not use #600 or less.



7. Air blowing / degreasing

Use alcohol, a tack cloth, and wax and grease remover.

Also clean and degrease the surfaces where the masking tape will be attached.

Intermediate Coating

NOTE: You must do this procedure on the PP parts of the bumper and side sill panel.

1. Masking

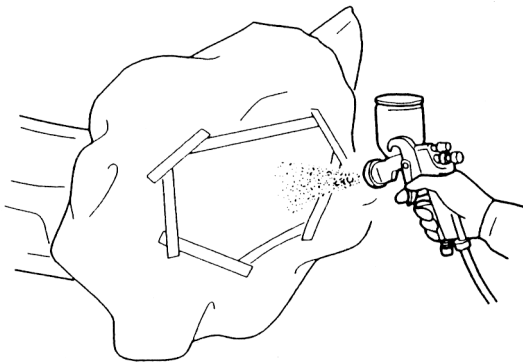
Mask the area surrounding the damage to protect it from the intermediate coat overspray.

Use masking tape and paper.

2. Spraying the top coat enamel

- Spray the top coat enamel over the surface until the primer surfacer is fully covered.
- Spray 2 to 3 coats to get 15 to 25 microns of thickness.

- Use the 2-part polyester urethane top coat enamel and a spray gun.
- Mix the top coat enamel with the additive and solvent in the correct ratio.
- Follow the top coat manufacturer's instructions.



Drying

NOTE: Take care not to let the heat lamp deform the bumper during the drying process.

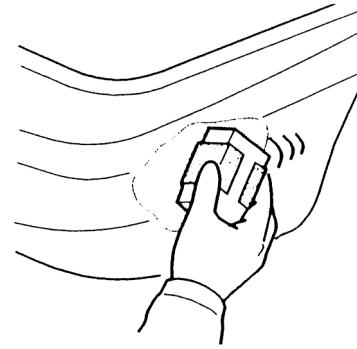
After spraying top coat enamel, allow for 5 to 10 minutes of normal drying, then force dry it with infrared lamps or other industrial dryer.

3. Polishing

Check the top coat enamel has dried thoroughly, then sand the top coat enamel.

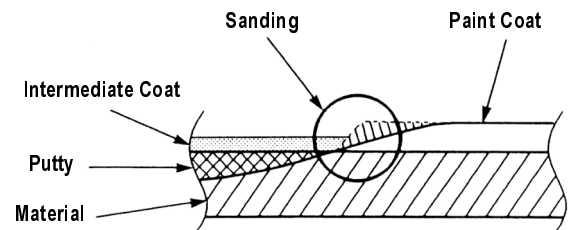
Use a flexible block and #600~#800~#1000 sandpaper.

NOTE: Be careful not to sand down to the primer surfacer.



When the painting repair is almost complete, polish the top coat.

Use a flexible block and #1500 sandpaper and compound.



4. Air blowing / degreasing

Use alcohol, a tack cloth, and wax and grease remover.

Clean and degrease the surfaces where the masking tape will be attached.

Plastic Parts Paint (cont'd)

Top Coating

1. Masking

Mask the area surrounding the damage to protect it from the top coat overspray.

Use masking tape and paper.

2. Spraying top coat enamel /clear coat

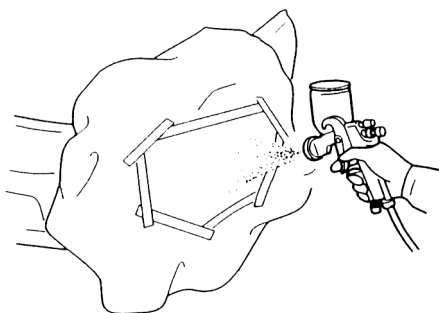
Spray 2 to 3 coats in double coat until the intermediate coat is fully covered.

NOTE:

- Do not cover the surface with one heavy coat.
- Apply several thin coats.

- Use the 2-part polyester urethane top coat enamel and a spray gun.
- Mix the top coat enamel with the additive and solvent in the correct ratio.
- Follow the top coat manufacturer's instructions.

After spraying the top coat enamel, allow for 5 to 10 minutes drying time before you spray the clear coat.



Drying

NOTE: Take care not to let the heat lamp deform the bumper during the drying process.

After spraying the clear coat, allow for 5 to 10 minutes drying time before you force dry it with infrared lamps or other industrial dryer.

3. Polishing / buffing

- Check that the clear coat has dried thoroughly.
- Wet sand to remove any imperfections.

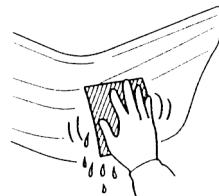
Use a flexible block, soap, and #2000 sandpaper.

- Using a buffer and compound, remove any polishing marks made from the sandpaper.

Use a buffing sponge, and buffing wool and compounds.

Finish up with buffing:

- 1 Wet sands with #2000 sandpaper and soapy water.



- 2 Remove moisture using compressed air.

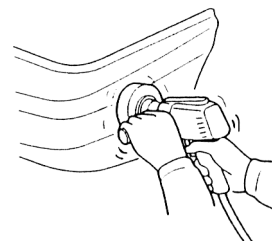
- 3 Finish using fine compound and very fine compound. Do not polish with a electric polisher.

NOTE: Polish lightly.



- 4 Check the finished area at an angle, and make sure there are no polishing marks.

- 5 Polish with ultra fine compound and a buffing sponge.



- 6 Wax the finished area.



Glossary

All paint	Painting of complete surface.
Compressed air	Use compressed air to blow away dust and debris.
Block paint	Painting a section only, such as a door.
Clear paint (clear coat)	Clear paint without dye (pigment).
Double coat	Application of two paint coats.
Dry coat	Paint which left the spray gun and dried partially before it reached the surface, thereby making the painted surface rough. Dry coating is caused by too little paint being fed, too high an air pressure, too much distance between the painted surface and the gun, or moving the gun too fast.
Dry film	Paint which has dried completely.
Dust coat	Paint is applied thinner than the dry coat. Painted surface becomes rough.
ED painting	Electrostatic discharge painting.
Enamel	Finishing paint pigmented with dye.
Featheredging	Smoothing out the edges of painted surface.
Flash off	Evaporation of the paint solvent. (Flash off time is the period between paint coat applications.)
Ford cup	A type of viscosity meter.
Gun stroke	Movement of the paint gun.
Hardener	Hardening agent of two-liquid type paint or fillers. Polycyanates and oxides are used for hardeners.
Heat-hardening acrylic resin paint	Composed of acrylic resin and meramine resin and hardener (forms a paint film) by baking.

(cont'd)

Paints

Glossary (cont'd)

Lacquer	A type of paint that uses cellulose nitrate or other chemicals and dries by evaporation of its solvent agent.
Meramine resin	Used as component for aminoalkyd resin paint and heat-hardening acrylic resin paint.
Metallic-base paint	Paint with aluminium powder for metallic tone.
Mist coat	Painting for fade-in sections. A small amount of paint may be dissolved with slow-evaporating thinner, or thinner alone may be applied with low pressure. 150-200kPa (1.5-2.0kgf/cm ² , 21.3-28.4 psi)
Mixing scale	Color mixing device.
Overlap	Blending of spray patterns.
Overspray	Spraying other than the area that needs painting.
Paddle	A tool to mix paint.
Paint dust	Dust of paint formed by spraying.
Paper dispenser	A paper posting device (masker) that combines tape and paper.
Scrapes	Traces of scratches.
Scuffing	Particles on the painted surface are lightly polished with fine emery paper (#600 or over).
Set (setting)	Evaporation time of solvent in the paint, before drying the layer forcefully or by baking. (May be considered the same as flash-off time).
Single coat	Application of paint in single layer.
Spot paint	Painting of small section, such as for touch-up.
Undercoat	Undercoat paint (such as primer and surface). May be applied to lower section of car for noise prevention and rustproofing.

Wet coat	Paint is applied with an excess of solvent, thereby producing a painted surface that is smooth, glossy and has a wet look.
Wet film	Paint which has not dried completely.
Wet on wet	Application of the next coat of paint before the previous layer has dried completely.
Wool bonnet	Wool grinder for compound polishing.

