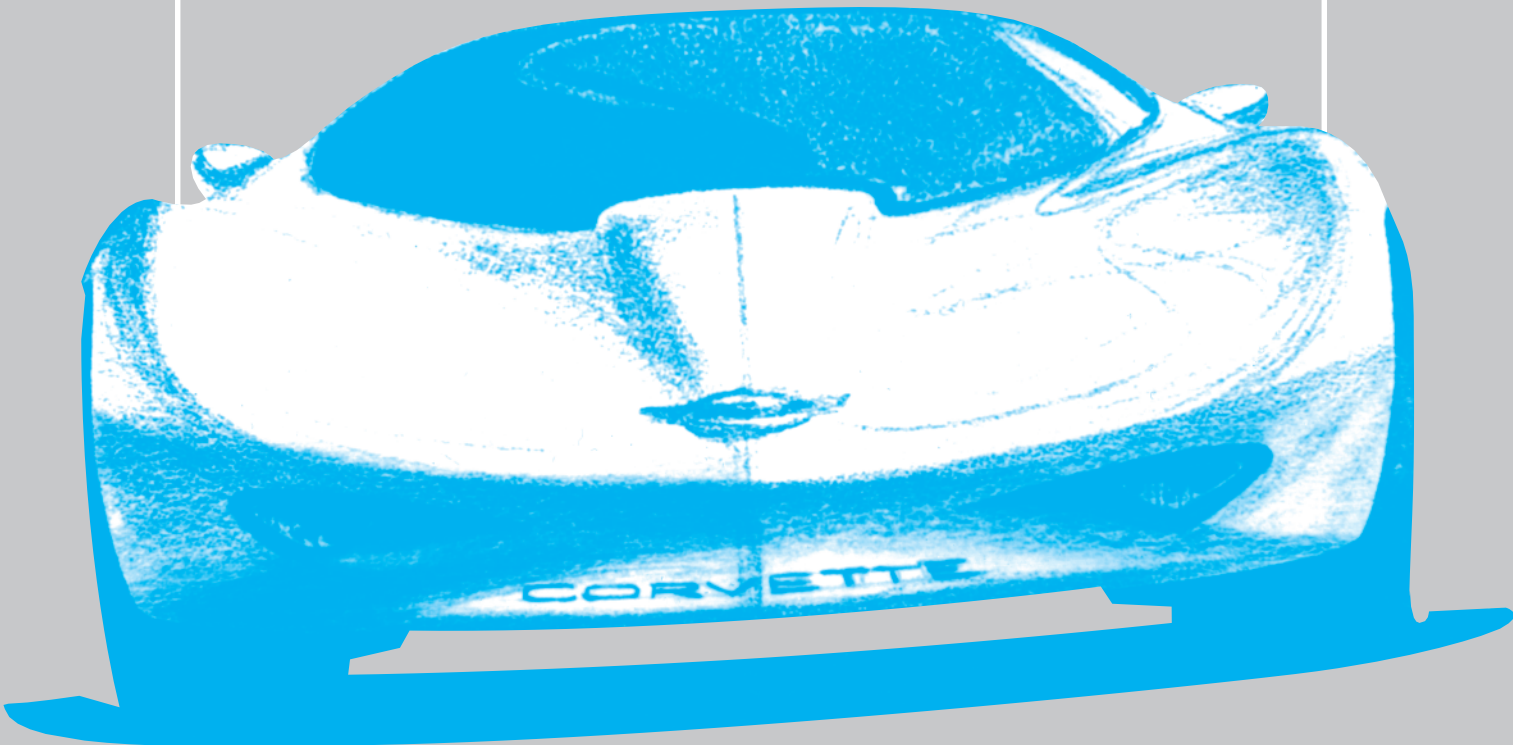


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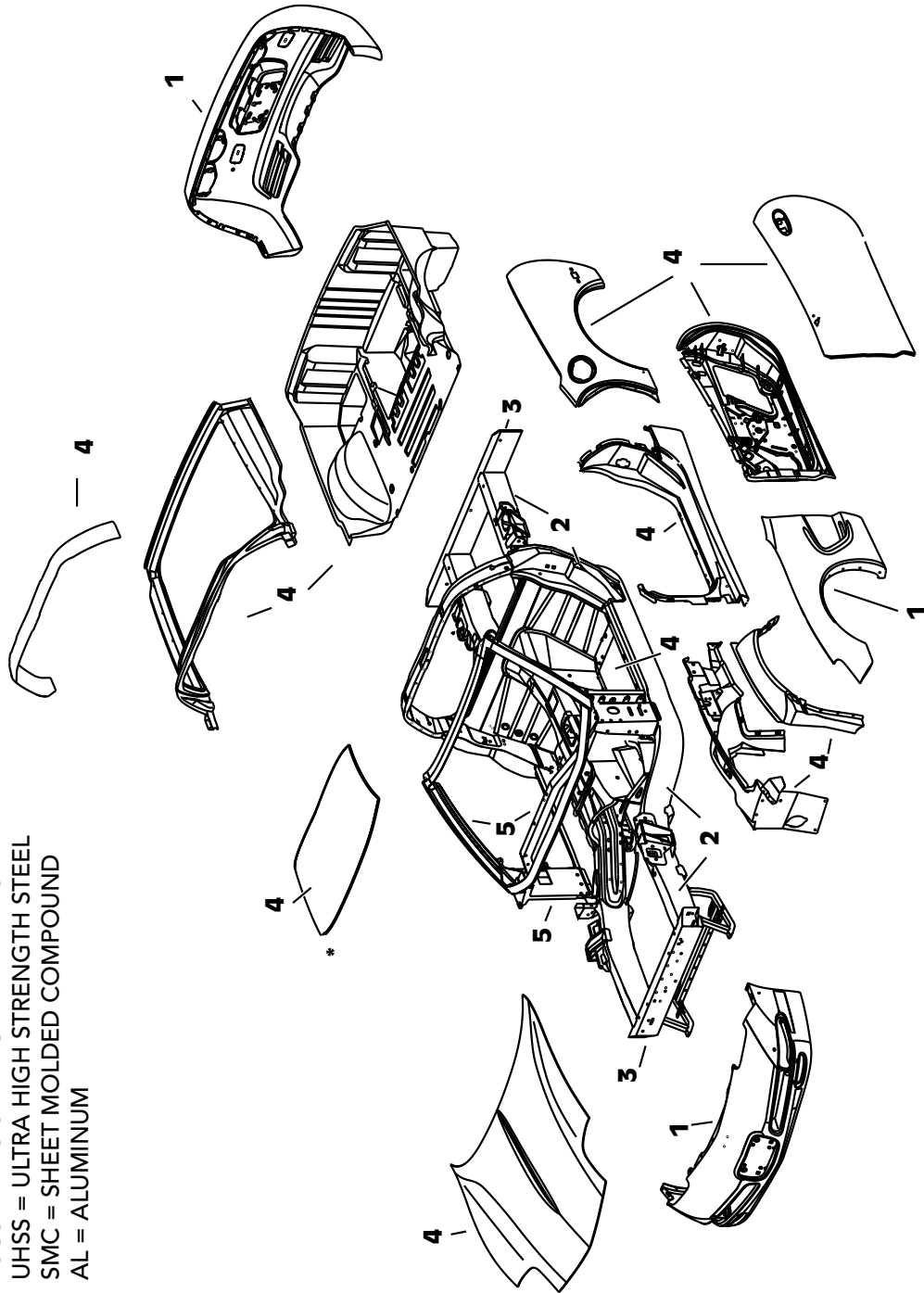
# Corvette

<b>Panel Identification .....</b>	<b>3-1</b>
<b>Front Bumper Impact Bar .....</b>	<b>3-2</b>
<b>Front Wheelhouse .....</b>	<b>3-4</b>
<b>Rail - Underbody Side Assembly .....</b>	<b>3-6</b>
<b>Front Side Door Opening Assembly .....</b>	<b>3-17</b>
<b>Windshield Frame Assembly .....</b>	<b>3-19</b>
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<b>Roof Bow Service .....</b>	<b>3-24</b>
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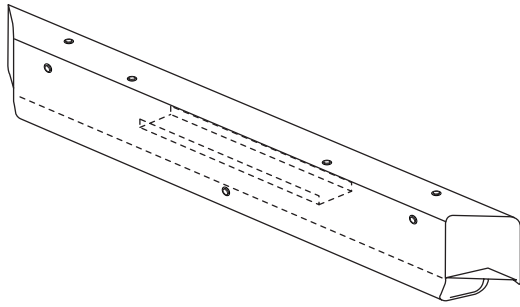
# Panel Identification

- 1 RRIM = REINFORCED REACTION INJECTION MOLDED
- 2 TSGS = TWO SIDED GALVANIZED STEEL
- 3 UHSS = ULTRA HIGH STRENGTH STEEL
- 4 SMC = SHEET MOLDED COMPOUND
- 5 AL = ALUMINUM

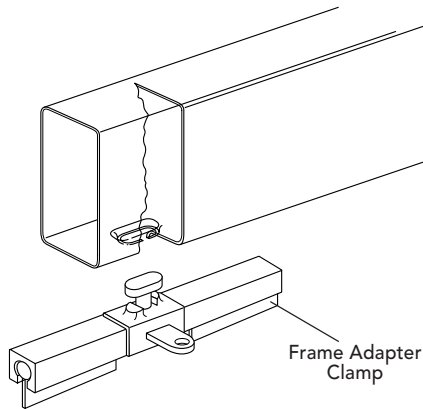


\* POLYCARBONATE = TRANSLUCENT TARGA TOP

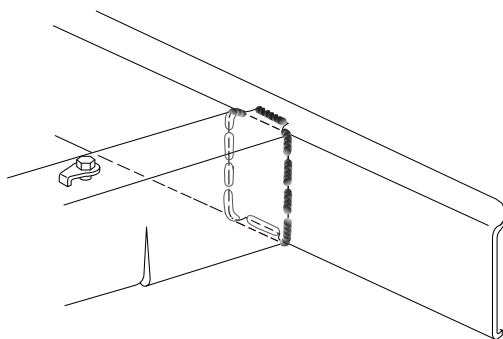
# Front Bumper Impact Bar



**Fig. 3.1 — Ultra High Strength Steel Beam**



**Fig. 3.2 — Adapter Clamp for Conventional Anchoring System**



**Fig. 3.3 — Note Location of Welds for Reinstallation**

The front impact bar (bumper beam) is made of Ultra-High Strength steel. The impact bar is MIG welded to the mild steel frame rails. The impact bar can be repaired if damage excludes kinks, or damage which would require the use of heat to straighten.

Replacing the bumper bar requires special procedures to access the welds attaching the bumper bar to the frame rails. This procedure was developed to facilitate this repair while maintaining the integrity of the bumper system. The front bumper impact bar as supplied for service includes riv-nuts pre-installed (Fig. 3.1) for component mounting: (SIR sensors, fog-lamps, energy absorber, etc.) Replacement riv-nuts are available from Kent Moore Tools (Riv-Nut Kit: P/N J42151-8MS), if needed.

## — REMOVE OR DISCONNECT —

- 1 Remove all panels and components to gain access to the impact bar. This includes the bumper cover, impact absorbers, and fog lamps.

**Notice:** To increase accessibility to the front impact bar, rotate the front brake ducts and manually raise the headlamps.

- 2 Visually inspect and restore as much of the damage as possible to specifications using three-dimensional measuring procedures.

**Notice:** Use Kent Moore Tools Frame Adapter Clamp (P/N J42058) to secure the vehicle if pulling and straightening is required (Fig. 3.2).

**Notice:** Be sure to protect vehicle components before cutting or grinding on the bumper impact bar or frame rails.

- 3 Remove or reposition wiring as necessary to avoid damage.
- 4 Cut the welds around the perimeter of the frame rail (fishmouth) ends (Fig. 3.3). Cut welds favoring the impact bar side of the joint. DO NOT cut into the frame rails.
- 5 Remove the damaged impact bar.
- 6 Extract pieces of the impact bar left attached to the rail ends (Fig. 3.4). Keep the perimeter and shape of the rail end (fishmouth) as original as possible.

— INSTALL OR CONNECT —

- 1 Straighten and deburr the rail ends as necessary to allow the service impact bar to fit properly.
- 2 Temporarily position the impact bar and scribe lines into the primer indicating where the welds will be made. Remove the primer from the areas to be MIG welded by sanding with 80-grit paper on a 'Dual-Action' sander (DA). Do Not use a grinder to remove the primer.
- 3 Prepare all bare metal surfaces and apply weld-through primer as necessary. Be sure to apply primer to the inside of the 'fishmouth' area also.

**Notice:** When installing the replacement bumper bar, weld the sides first in order to ensure uniform contact with the frame rails.

- 4 Position the bumper impact bar using three-dimensional measuring equipment and install per the original weld locations. Stitch weld around the 'fishmouth' joint. If no trace of the original welds are present, use Fig. 3.5 as a guide for welding the side rails to the impact bar. This weld pattern will create a solid weld joint with minimal heat distortion.
- 5 Clean and prepare all welded surfaces, use 3M's Scotch-Brite Clean-N-Strip Discs (disc PN 07460, mandrel P/N 07491) or equivalent. IMPORTANT: Prior to refinishing, refer to GM P/N 4901 M-D Refinish Manual for recommended products.
- 6 Apply approved anti-corrosion primer. Do not combine paint systems. Refer to paint manufacturer's recommendations.
- 7 Install all related panels and components.

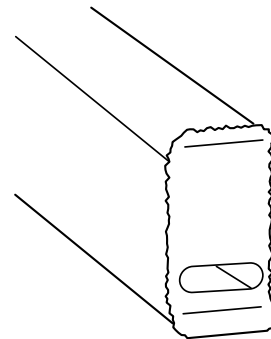


Fig. 3.4 — Remove Remaining Portion of Impact Bar in Frame Rail

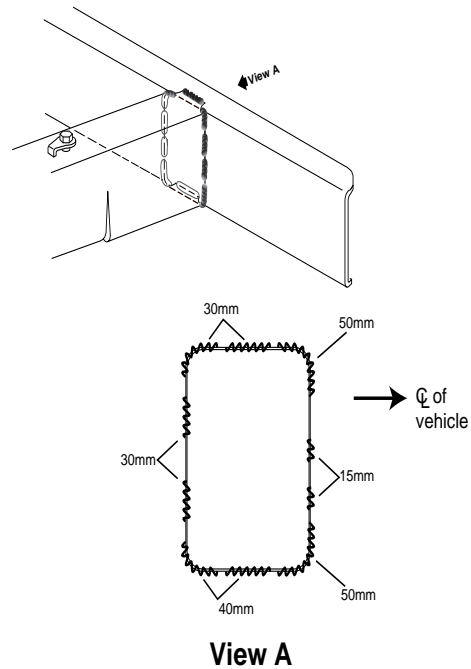
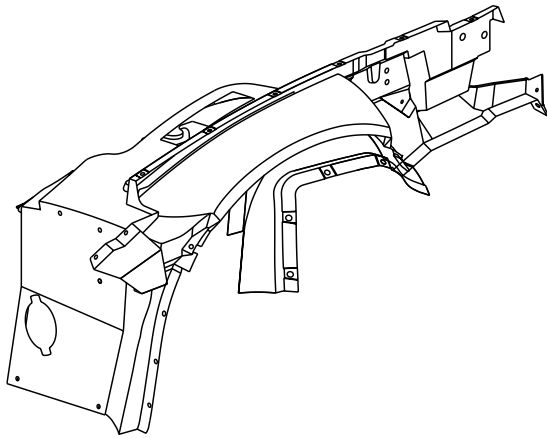
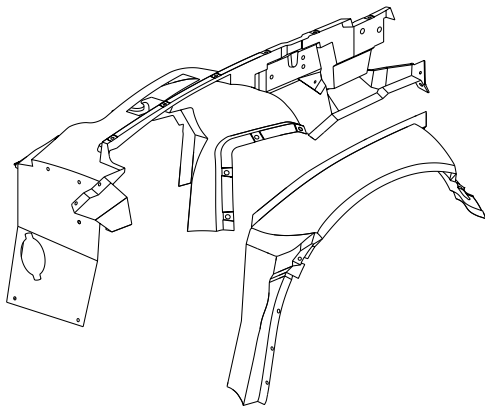


Fig. 3.5 — Weld Perimeter of Joint, as Indicated

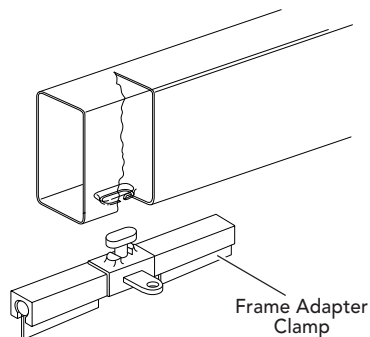
# Front wheelhouse



**Fig. 3.6 — Front Wheelhouse Service Assembly**



**Fig. 3.7 — Service Assembly Can Be Separated for Outer Wheelhouse Panel Replacement**



**Fig. 3.8 — Adapter Clamp for Anchoring System**

The wheelhouse consists of two pieces, an outer portion that rivets and bonds to a larger inner portion (Fig. 3.6). The wheelhouse is the inner mounting structure for the front fender.

The wheelhouse mounting surfaces vary from left to right. The left side (driver's side) has more bonded surface area than the right side, and is bonded to the cowl. Also, both sides bond and bolt to the front hinge pillar. The outer wheelhouse can be separated for partial installation (Fig. 3.7).

**Notice:** Do not replace any SMC body panels until the frame rails have been replaced or repaired, mounting SMC panels requires the rails to be positioned accurately.

— REMOVE OR DISCONNECT —

- 1 Remove all panels and components to gain access to the front wheelhouse. This may include removing front wheel, fender, fender splash panel, bumper cover, battery, and headlamp mounting brackets.
- 2 Visually inspect, if any damage to the frame rails or wheelhouse mounting areas exist, then restore as much of the damage as possible to specifications using three-dimensional measuring procedures.

**Notice:** Use Kent Moore Tools Frame Adapter Clamp (P/N J42058) to secure the vehicle if pulling and straightening is required (Fig. 3.8).

- 3 Relocate wiring as necessary to avoid damage.
- 4 Remove the four bracket bolts attaching the wheelhouse to the front hinge pillar (Fig. 3.9). Heat and pry to remove or dislodge adhesive beads attaching the wheelhouse to the vehicle, see Fig. 3.10. Remove the damaged wheelhouse.

— INSTALL OR CONNECT —

**Important:** Use US Chemical and Plastics 821014B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 9 minute working time and 1 hour cure time.

**Notice:** DO NOT adjust the fender by compromising the wheelhouse to rail gap. This gap must remain a nominal width to maintain the correct adhesive strength. The gap should be correct if the rails are properly located.

**Notice:** If possible, when prepping area for service part leave small portions of original adhesive in various places to act as shimming for wheelhouse spacing from frame rails. If original adhesive is not usable for shimming, use paint stir sticks, or equivalent, and shim according to body dimensions and body panel alignment.

1 Remove all remaining adhesive, and scuff all bonding surfaces to ensure proper adhesion. (Refer to SMC Repair Procedures.)

2 Clean and prepare all bonding surfaces as necessary. (Refer to SMC Repair Procedures.)

**Important:** Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.

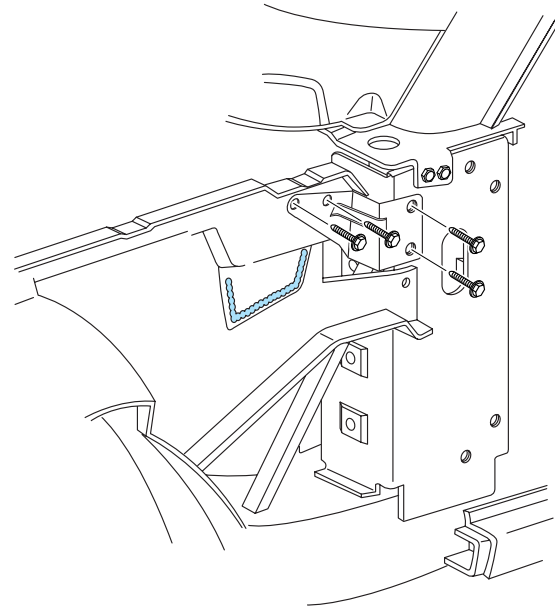
3 Apply approved anti-corrosion primer.

**Notice:** DO NOT top-coat any bonding surface.

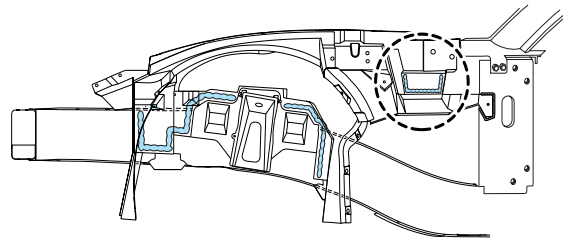
4 Temporarily attach the fender to the wheelhouse. Align the fender to door and hood by clamping the wheelhouse assembly into place. Scribe line on rail to locate wheelhouse.

5 Apply adhesive to the wheelhouse as shown in Fig. 3.11. Position front wheelhouse service part according to the scribe lines on the rail. Install the four bracket bolts which attach the wheelhouse to the front hinge pillar, and clamp the wheelhouse to the rail. Install headlamp mounting bracket. Trowel around perimeter of bonding area to remove excess adhesive and restore original appearance.

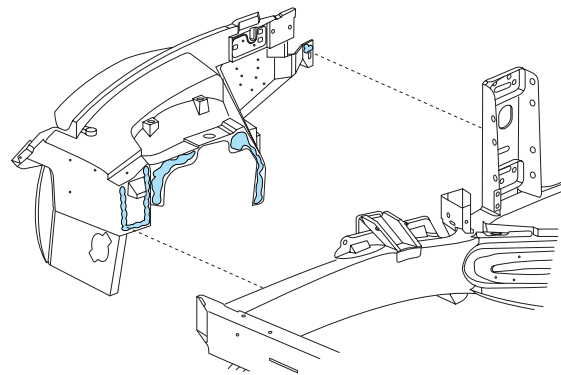
6 Install all related panels and components.



**Fig. 3.9 — Remove Bolts Attaching Brace to Hinge Pillar**



**Fig. 3.10 — Note Use of Additional Bond on Left Wheelhouse at Cowl**



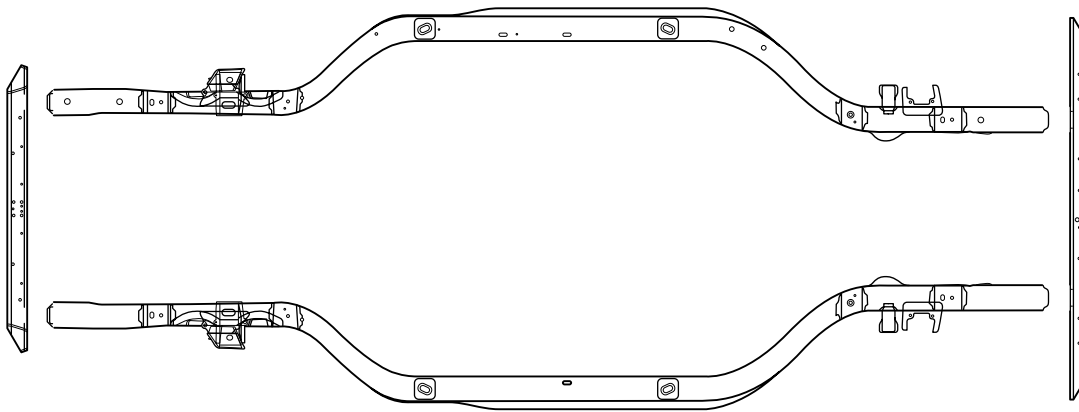
**Fig. 3.11 — Apply Adhesive to Service Part**

# Rail - Underbody Side Assembly

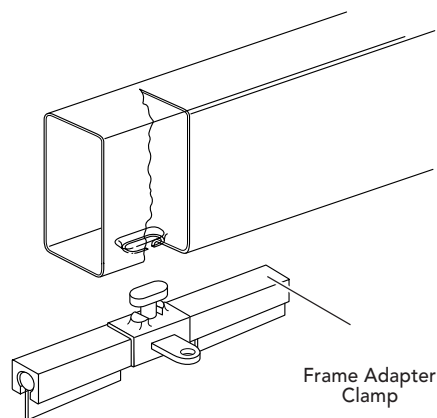
The Corvette frame rails are made from one piece mild steel tubes that are contoured into shape by hydroforming (Fig. 3.12). The frame rails play an integral part of the fit and finish of the vehicle and must be three dimensionally correct for exterior panels to fit properly. The one piece frame rails have 18x35 shipping slots that are used to secure a damaged vehicle to a bench for holding and dimensional straightening. Use Kent Moore tools frame adapter clamp J42058, to provide a downturned flange in the four torque box areas for universal holding equipment use.

**Notice:** Sectioning should only be performed in the recommended areas, failure to do so may compromise the structural integrity of the vehicle.

**Notice:** Use Kent Moore Tools Frame Adapter Clamp (P/N J42058) to secure the vehicle if pulling and straightening is required (Fig. 3.13).



**Fig. 3.12 — One-Piece Mild Steel Frame Rails**

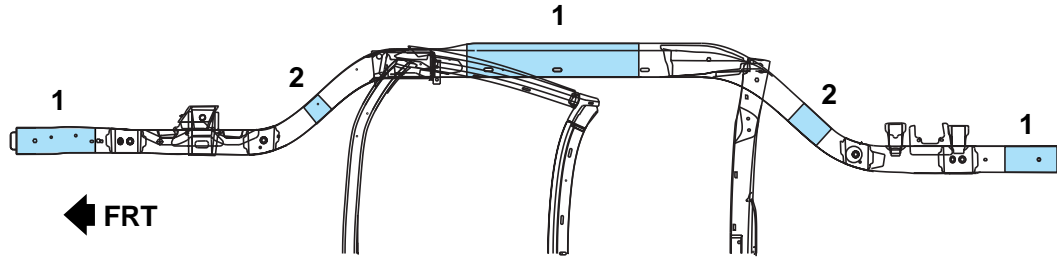


**Fig. 3.13 — Adapter Clamp for Conventional Anchoring System**

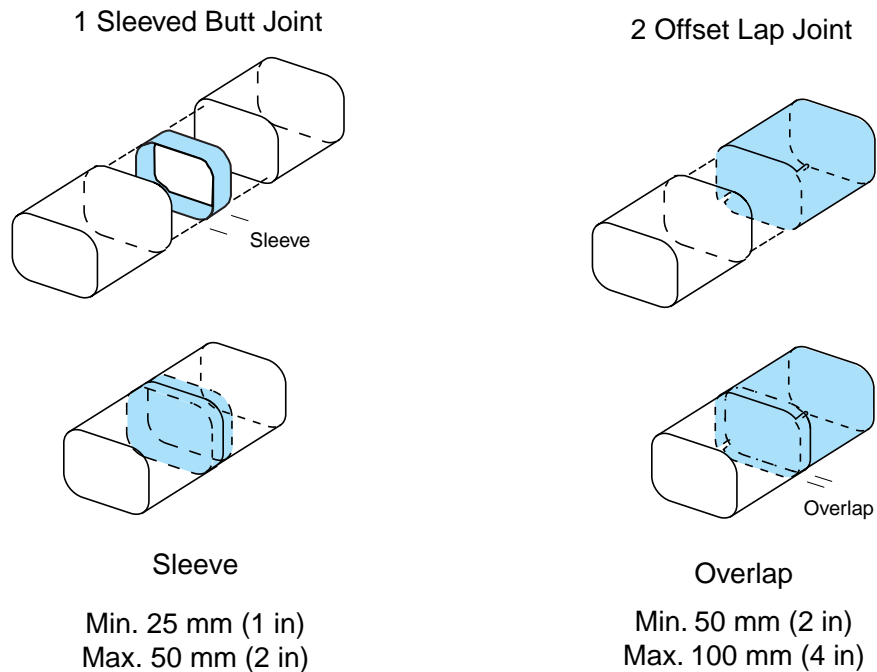
### Underbody Side Rail Sectioning

The two methods recommended for frame rail sectioning are the sleeved butt-joint and the offset lap-joint. The sleeved butt-joint sectioning procedure is recommended for the mid-rail and rail-end sectioning areas. The offset lap-joint sectioning procedure is recommended for the repairs front of dash and the repairs rear of seat back area (Fig's. 3.14 and 3.15).

**Notice:** Always perform the recommended sectioning method in the area recommended for that method.



**Fig. 3.14 — Section Rails Within the Shaded Areas**



**Fig. 3.15 — Use the Appropriate Sectioning Technique, as Indicated**



### Sleeved Butt-Joint Repair

There are some areas on the rails that are best repaired using the sleeved butt-joint method. Use 25 to 50mm of material to act as a backing plate when installing the sectioned service part (Fig. 3.16).

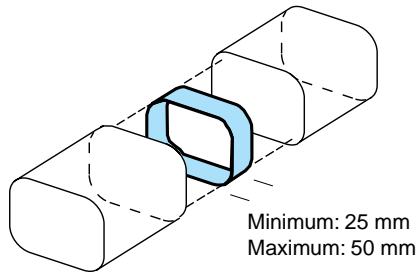


Fig. 3.16 — Sleeved Butt-Joint

**Notice:** Use the sleeved butt-joint only in the areas designated.

**Notice:** When determining the area to perform sectioning near a riv-nut hole (within the recommended areas), trim the sleeve back 3mm in the area for riv-nut clearance. The riv-nuts are designed to crimp to one metal thickness only.

- 1 Cut the service part to appropriate length (according to dimensions), to replace removed section of damaged rail.
- 2 From unused portion of service part; measure, mark, and cut 25 to 50mm of rail to be used as a sleeve (backing plate), at the sectioning joint.
- 3 Cut through each side of the sleeve to create four individual "L" shaped pieces that can be installed in the undamaged portion of the frame rail (Fig. 3.17).
- 4 Install the four pieces, one at a time, and trim them as necessary to provide a flush fit along the butt-joint surface. Tack-weld the sleeves into place.
- 5 Once the sleeves are in place, check the fit of the service part. Grind sleeve as necessary to allow for accurate alignment of the new part.  
**Notice:** Retain a gap of one and one half times the metal thickness at the butt-joint when attaching the service part to the vehicle.

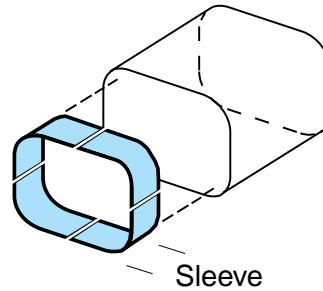


Fig. 3.17 — Cut Sleeve to Make L-Shaped Pieces

- 6 Temporarily remove service part and prep all bare metal surfaces with a suitable weld-through primer.
- 7 Stitch weld along the entire sectioning joint. Make 50mm (2inch) welds on all four sides of the rail. Re-check the rails for proper dimensions. Then go back and complete the stitch weld. This will create a solid joint with minimal heat distortion.
- 8 Clean and prepare all bonding surfaces as necessary. (Refer to SMC Repair Procedures.)  
**Important:** Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.
- 9 Apply approved anti-corrosion primer.  
**Notice:** DO NOT top-coat any bonding surface.

### Offset Lap Joint Repair

The offset lap-joint is used in areas that have extra internal bracing that won't allow the service part to fit properly with an internal sleeve. In these areas use the offset overlap method which will provide for some adjustment as well as allow for cut lines that may not be completely straight (Fig. 3.18).

**Notice:** Use the offset lap-joint only in the recommended areas.

- 1 Determine the location to perform the sectioning (be sure to stay within the recommended areas), and cut the damaged rail accordingly.
- 2 Cut any additional welds as necessary and remove the damaged portion of the frame rail.

3 Measure the service rail for sectioning, remember that the overlap of the service part and the original rail can be as large as 100mm (4 inches). This 100mm (4 inch) tolerance provides an area to install plug welds on the sides of the rail, as well as allow for adjustment during the installation process.

4 Mark the location and cut the service rail as square as possible.

5 Modify the portion of rail left on the vehicle to accept the service part. This is done by cutting 75mm (3 inch) slots in two opposite corners of the rail Fig. 3.19. Then slightly pry up the slots to accept the service part. The slots allow the service part to overlap the existing rail to form a lap surface for welding.

**Notice: Open the slots to create additional adjustment if necessary. Do not exceed 100mm (4 inch) overlap for offset lap-joint repairs.**

6 Drill three 8mm (5/16 inch) holes through each of the sides and two holes each in the top and bottom surface for plug welding, as in Fig. 3.20.

7 Install the modified service part to form the offset lap-joint. Align the service part using three dimensional measurements.

8 Plug weld along the overlap. Also, stitch weld along the entire sectioning joint. Make 50mm (2 inch) welds on all four sides of the rail. Re-check the rails for proper dimensions. Then go back and complete the stitch welds. This will create a solid joint with minimal heat distortion.

9 Clean and prepare welded surfaces, blend in exposed side of lap joint with Goodwrench Structural Bonding Epoxy (GM P/N 12345726), or an equivalent structural repair material. Apply as necessary to achieve original appearance.

**Important: Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.**

10 Apply approved anti-corrosion primer.

**Notice: DO NOT top-coat any bonding surface.**

11 Clean and prepare all bonding surfaces as necessary. (Refer to SMC Repair Procedures.)

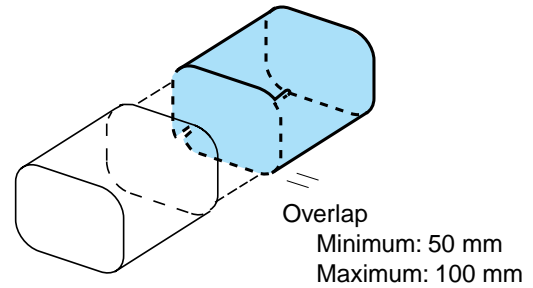


Fig. 3.18 — Offset Lap Joint

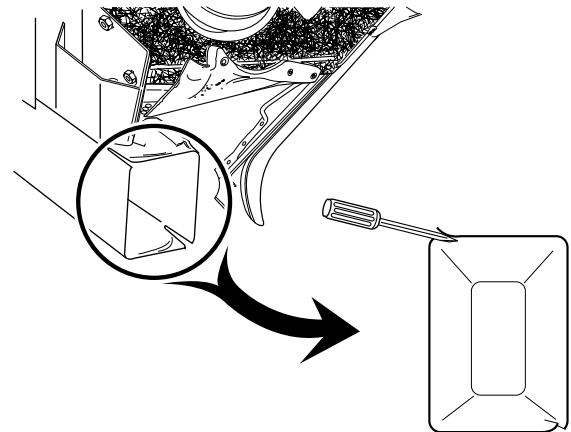


Fig. 3.19 — Modify Rail for Offset joint Repair

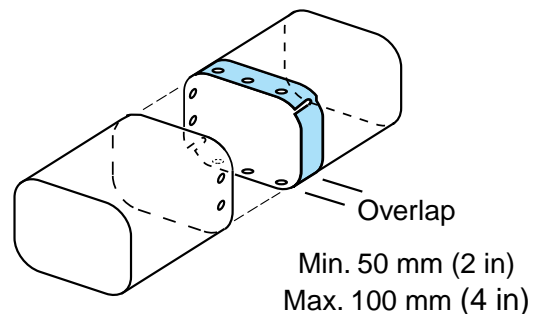


Fig. 3.20 —

## Underbody Side Rail Sectioning Locations

Service parts are available for replacing or repairing the frame rails, allowing the least time consuming and most cost effective location to be determined by the extent of the damage. Service information has been developed for sectioning the hydroformed rails, while maintaining the structural integrity of the vehicle. Forward or rearward halves are available separately, with suspension mounting brackets attached. A center section has been made available separately, also with brackets attached (Fig. 3.21). The entire rail is also available for service on a special order basis. Full rail replacement is recommended in the event the damage to the rail is not limited to available service parts.

## Front Rail-End Repair

When front frame rail-end is kinked or damaged beyond repair *forward of the front crossmember*. The service part must be cut from an underbody side rail assembly.

**Notice:** Use the sleeved butt-joint method to install front frame ends.

- 1 Remove all related panels and components, support powertrain and remove front crossmember bolts as necessary.  
**Notice:** When determining the area to perform the sectioning near a riv-nut hole (within the recommended areas), choose a location that centers the sleeve through the hole. This will ensure that riv-nut fasteners remain straight during installation.
- 2 Determine sectioning joint location within the recommended area (see *Sleeved Butt-Joint Method Repair Procedures*).
- 3 Perform sleeved butt-joint sectioning as required (see *Sleeved Butt-Joint Sectioning Procedures*).  
**Important:** Prior to refinishing, refer to *GM P/N 4901 Refinish Manual for recommended products*.
- 4 Apply anti-corrosion materials to all inner surfaces as necessary. Do not combine paint systems. Refer to paint manufacturer's recommendations.
- 5 After sectioning repairs are completed, attach panels and components as necessary.

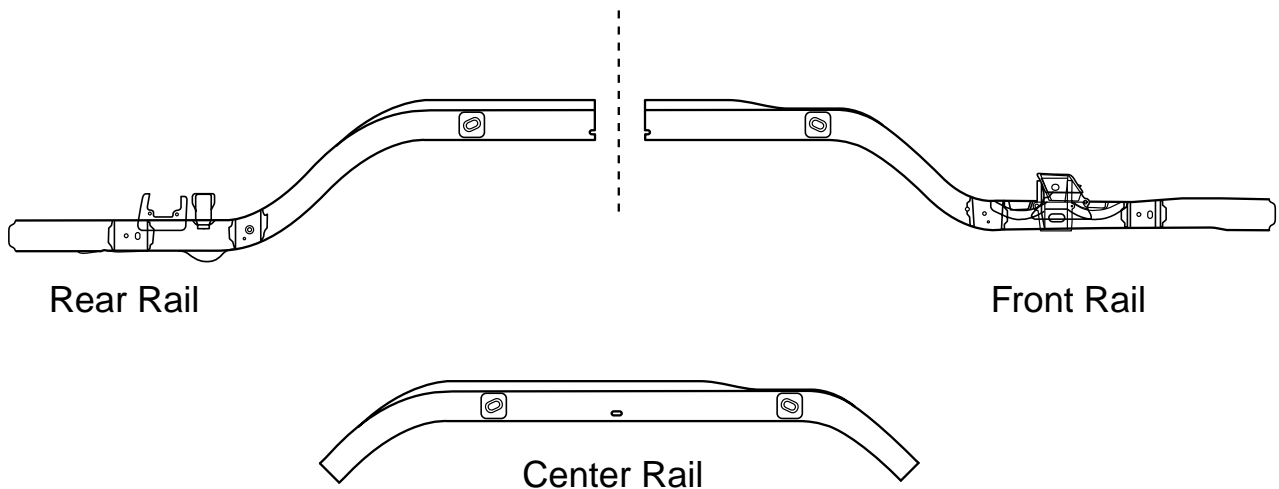


Fig. 3.21 — Frame Rail Service Parts

## Front Rail Repair

When damage to the frame rail is limited to the portion forward of the cowl, "front of dash." The front of dash sectioning area is exposed by modifying floor pan extension panels to access to all sides of the rail. This repair can be performed with the engine suspended in place.

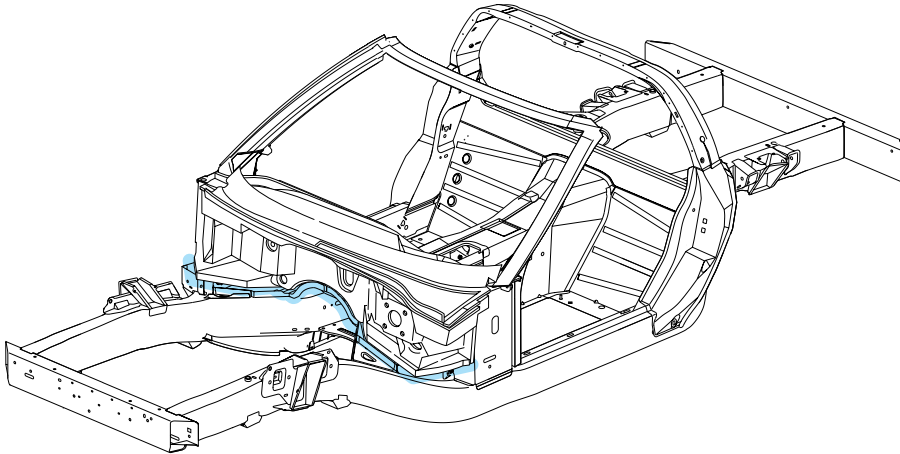
**Notice:** Check SMC front of dash panel for cracks or areas that may need to be re-sealed (Fig. 3.22). (Refer to SMC Repair Procedures.

**Notice:** Use the Offset Lap-Joint method to perform front rail repairs.

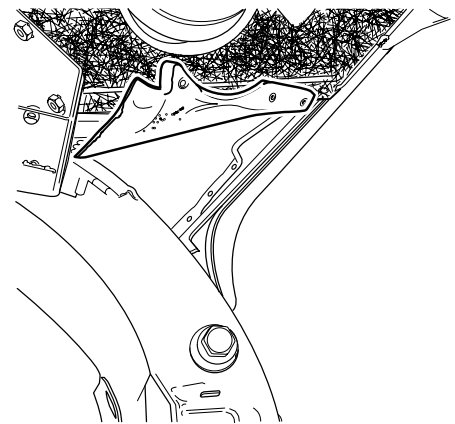
### — REMOVE OR DISCONNECT —

**Notice:** Save any and all brackets, mounting studs, and accessories for re-use as necessary.

- 1 Remove all related panels and components to provide access to the recommended sectioning area of rail.
- 2 Locate stitch welds and resistance welds that secure the upper floor pan extension panel to the rail and the tunnel brace.
- 3 Remove welds as necessary and pry up extension panel to expose rail (Fig. 3.23).
- 4 Apply 50mm (2 inch) tape to lower floorpan extension panel, (where SMC floor panel stops and floorpan extension begins) .



**Fig. 3.22 — Check Front of Dash Bonding Areas for Cracks**

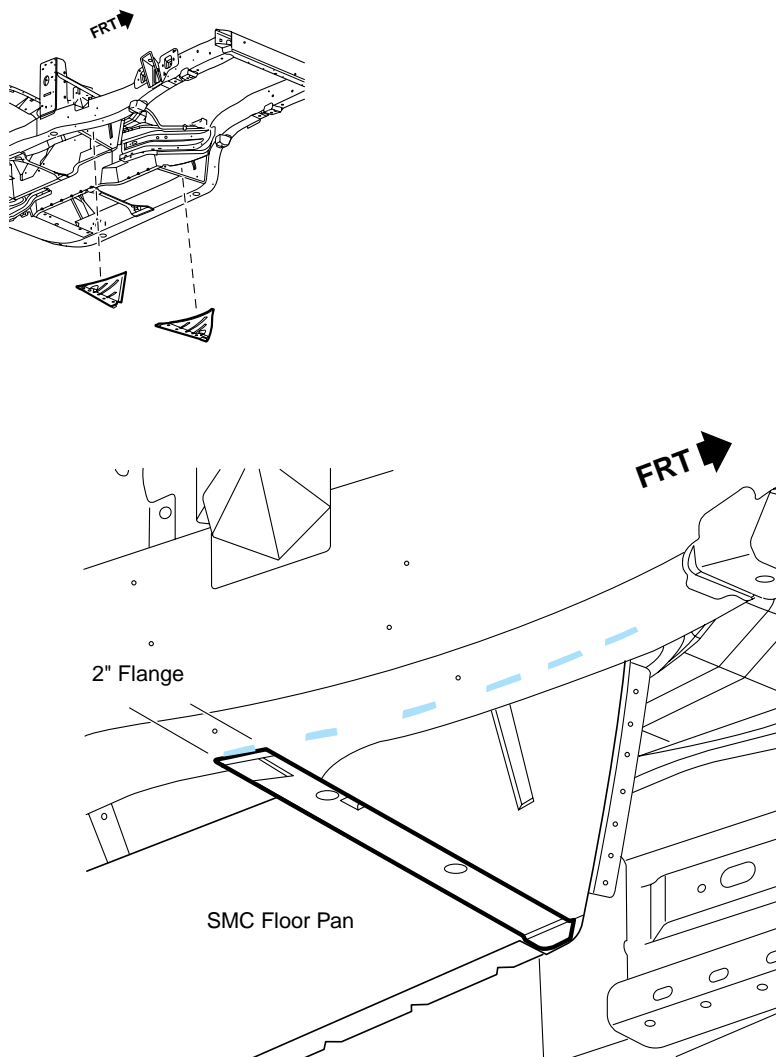


**Fig. 3.23 — Pry Up Extension Panel to Expose Rail for Sectioning**

## Rail-Underbody Side Assembly

**Important:** The lower floorpan extension panel is to be reinstalled two inches forward of the SMC floorpan. This will eliminate the potential to de-bond the floorpan when re-installing the floorpan extension panel (see Fig. 3.24 below).

- 5 Using a die grinder, cut along the forward edge of tape to create a 2" flange (Fig. 3.24). Cut stitch welds along the rail and drill out the resistance welds along the tunnel brace. Remove floorpan extension panel.
- 6 Determine the location to perform the sectioning (be sure to stay within the recommended areas), and cut the damaged rail accordingly. (See *Sleeved Butt-Joint Method Repair Procedures*)
- 7 Using a die grinder, cut through the stitch welds that attach the tunnel brace to the frame rail. Make cuts favoring the rail side of the welds.
- 8 Remove the damaged rail portion.
- 9 Clean and prepare all surfaces for assembly as necessary.
- 10 Perform offset lap-joint sectioning as required. (Refer to *Offset Lap-Joint Sectioning Procedures*.)



**Fig. 3.24 — Remove Majority of Lower Extension Panel to Access the Rail**

— INSTALL OR CONNECT —

- 1 Replace lower floorpan extension panel. Trim to fit and tuck the new panel inside of the 50mm (2 inch) flange created from the original extension.
- 2 Locate and align gauge holes, stitch weld to rail to duplicate factory welds, and plug weld to tunnel brace as necessary (Fig. 3.25).
- 3 Check front of dash and floor panel areas for cracked or broken bonding, and repair and reseal as necessary.
- 4 Apply anti-corrosion materials to all inner surfaces as necessary. Do not combine paint systems. Refer to paint manufacturer's recommendations.
- 5 After sectioning repairs are completed, attach panels and components as necessary.

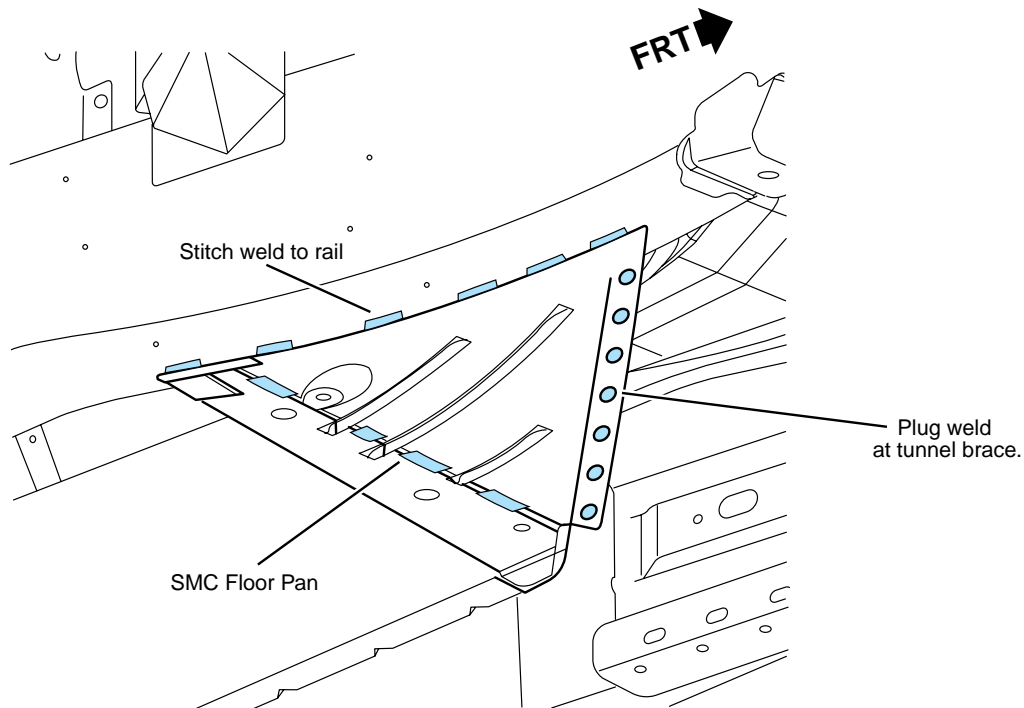
**Mid-Rail Repair**

When most of the front or rear half of the rail is damaged beyond repair, this sectioning procedure allows for the replacement of the damaged rail half.

**Notice:** Use the *Sleeved Butt-Joint* method to perform mid-rail repairs.

— REMOVE OR DISCONNECT —

- 1 Remove door side frame and the lock pillar extension panels. (Refer to *Door Side Frame Service Procedures*.)
- 2 Remove floor panel and lower floor panel extension at factory seams. (Refer to *Floor Panel Service Procedures*.)
- 3 Perform sleeved butt-joint sectioning as required. (Refer to *Sleeved Butt-Joint Sectioning Procedures*.)
- 4 Apply anti-corrosion materials to all inner surfaces as necessary. Do not combine paint systems. Refer to paint manufacturer's recommendations.



**Fig. 3.25 — Positioning and Replacement of Floor Extension**

## Rail-Underbody Side Assembly

### — INSTALL OR CONNECT —

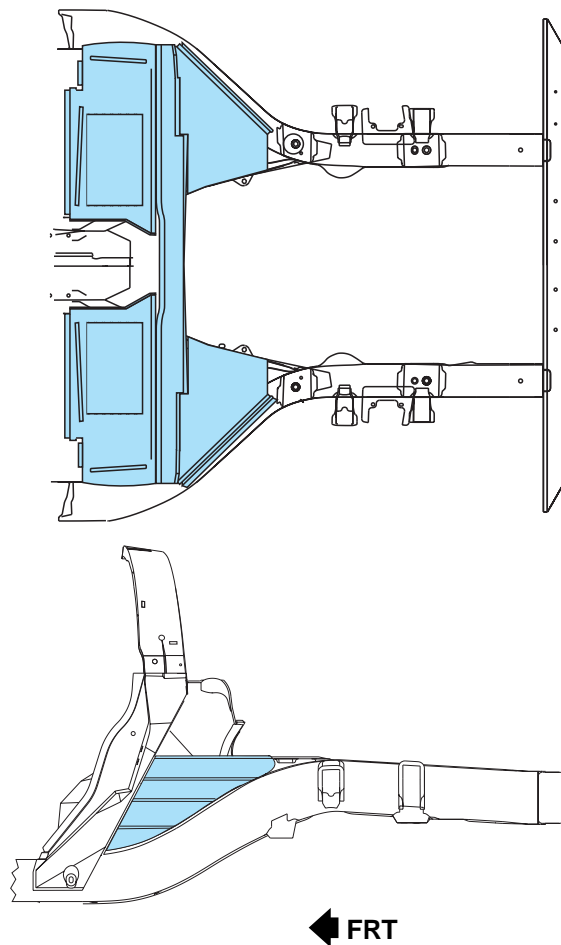
- 1 Replace door side frame and the lock pillar extension panels. (Refer to *Door Side Frame Service Procedures*.)
- 2 Replace floor panel and lower floor panel extension at factory seams. (Refer to *Floor Panel Service Procedures*.)
- 3 After sectioning repairs are completed, attach panels and components as necessary.

## Rear Rail Repair

When damage to the frame rail is limited to the portion rearward of the seat back area. The seat back sectioning area is exposed by modifying or removing close-out panels and tunnel braces for access to all sides of the rail. There are some high strength steel panels located in the rear of the vehicle which can be repaired if damage excludes kinks, or damage which would require the use of heat to straighten (Fig. 3.26).

**Notice:** Check front of dash panel, floor panels, and all other SMC for cracks or areas that may need to be repaired or resealed. (Refer to *SMC Repair Procedures*.)

**Notice:** Use the Offset Lap-Joint method to perform rear rail repairs.



**Fig. 3.26 — Shaded Areas Are High-Strength Steel**

— REMOVE OR DISCONNECT —

- 1 Remove related panels and components, including rear compartment panel. Also remove the fuel tank from the damaged side of the vehicle.

**Notice:** Save any and all brackets, mounting studs, and accessories for re-use as necessary.

- 2 The outer lock pillar extension panel must be removed to access the rail. Apply a piece of 25mm (1 inch) tape along the lock pillar (Fig. 3.27), and cut to create a weld flange for installing the new extension panel (Fig. 3.28).

**Caution:** Sound deadener foam in the lock pillar can be a fire hazard. Avoid welding to the lock striker pillar.

- 3 Using a die grinder, cut along the edge of tape line. Cut stitch welds along the rail and drill out the resistance welds along the tunnel brace. Remove lock pillar extension panel.
- 4 The upper extension panel for the fuel tank must be loosened and pried up for access to the rest of the rail for sectioning (Fig. 3.29). (Remove for replacement if damaged.)
- 5 Using a die grinder, cut through the stitch welds that attach the tunnel brace to the frame rail. (Make cuts favoring the rail side of the welds.)
- 6 Determine the location to perform the sectioning (be sure to stay within the recommended areas), and cut the damaged rail accordingly. (See *Offset Lap-Joint Method Repair Procedures*.)
- 7 Remove the damaged rail portion.
- 8 Clean and prepare all surfaces for assembly as necessary.
- 9 Perform offset lap-joint sectioning as required. (Refer to *Offset Lap-Joint Sectioning Procedures*.)

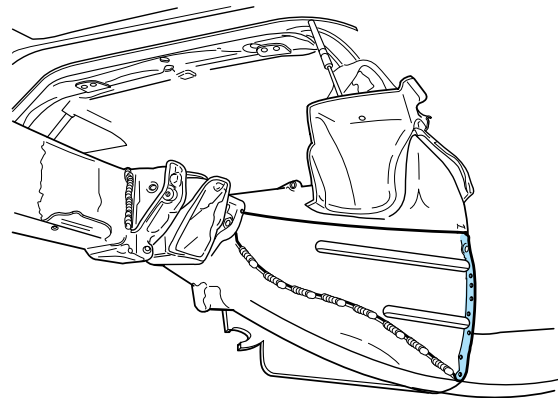


Fig. 3.27 — Apply Tape to Front Edge of Panel

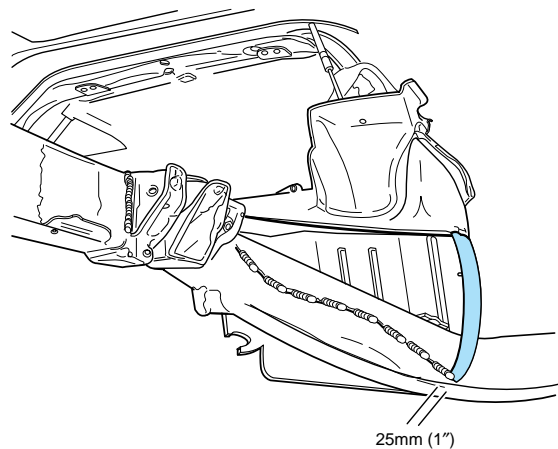


Fig. 3.28 — Cut Panel to Create 25mm (1") Flange

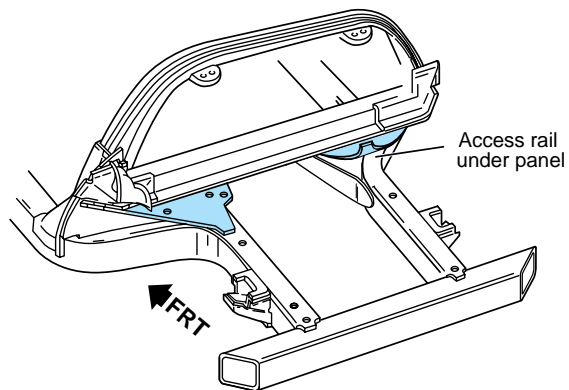


Fig. 3.29 — Pry Up Extension Panel for Rail Access



## Rail-Underbody Side Assembly

### — INSTALL OR CONNECT —

- 1 Stitch weld the tunnel brace to the frame rail, duplicate factory welds.
- 2 Attach upper extension panel, and weld (duplicate factory welds as much as possible). (Replace extension panel if heat is required to straighten.)
- 3 Trim new lock pillar extension panel to fit properly. Drill 8mm (5/16 inch) holes for plug welding along the edge which will overlap the flange created during removal (Fig. 3.30).
- 4 Install lock pillar extension in factory location and plug weld to original extension flange and to tunnel brace. Stitch weld lower edge in factory locations to the frame rail.
- 5 Apply anti-corrosion materials to all inner surfaces as necessary. Do not combine paint systems. Refer to paint manufacturer's recommendations.
- 6 After sectioning repairs are completed, attach panels and components as necessary.

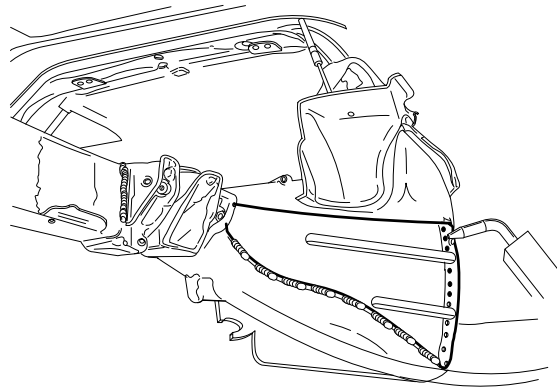
### Rear Rail-End Repair

When the rear rail-end is kinked or damaged beyond repair rearward of the rear crossmember. The service part must be cut from an underbody side rail assembly.

**Notice:** Use the sleeved butt joint method to install rear frame ends.

**Notice:** When determining the area to perform the sectioning near a riv-nut hole (within the recommended areas), choose a location that centers the sleeve through the hole. This will ensure that riv-nut fasteners remain straight during installation.

- 1 Determine sectioning joint location within the recommended area, (see *Sleeved Butt-Joint Method Repair Procedures*).
- 2 Perform sleeved butt-joint sectioning as required. (Refer to *Sleeved Butt-Joint Sectioning Procedures*.)
- 3 Apply anti-corrosion materials to all inner surfaces as necessary. Do not combine paint systems. Refer to paint manufacturer's recommendations.
- 4 After sectioning repairs are completed, attach panels and components as necessary.



**Fig. 3.30 — Plug Weld New Panel to 1" Flange Created During Removal**

### Full Rail Replacement

The left and right frame rails are available as complete rails for service. This repair procedure is recommended only in the event the extent of the damage to the rail exceeds the limits of partial rail replacement. The complete side rail is available on a special order basis.

Full rail replacement is accomplished by combining all of the sectioning location procedures as necessary to remove and install a complete underbody side rail. To allow flexibility, a full rail may be sectioned in any of the recommended sectioning locations as determined by the extent of damage to the vehicle.

When determining frame rail repair location and method, consider the following:

- Always straighten and locate rails prior to attempting any SMC repairs
- Always inspect SMC and adhesive bonds for cracks and breaks
- Always follow recommended repair procedures for any panels involved in servicing the frame rail
- Always follow material and equipment manufacturers' recommendations for materials and equipment used in any repair procedure
- Always follow repair procedures and recommendations to ensure that structural integrity and safety are restored to the vehicle

# Front Side Door Opening Assembly

The Sheet Moulded Compound (SMC) Side Door Opening assembly is a two panel assembly that bonds along the frame rail and up the front body hinge pillar. The service assembly (Fig. 3.31) can be disassembled at the riveted and bonded joint (Fig. 3.32) for individual panel replacement. If sectioning the side door opening assembly, use backing plates. (Refer to SMC Repair Procedures.)

## — REMOVE OR DISCONNECT —

- 1 Visually inspect, if any damage to the frame rails or wheelhouse mounting areas exist, then restore as much of the damage as possible to specifications using three-dimensional measuring procedures.

**Notice:** Use Kent Moore Tools Frame Adapter Clamp (P/N J42058) to secure the vehicle if pulling and straightening is required (Fig. 3.33).

**Notice:** The frame rails and bumper impact bars must be serviced as required, and returned to three-dimensional coordinates before any SMC repairs are attempted.

- 2 Remove all panels and components to gain access to door side frame. This may include the following components: quarter panel and quarter inner splash shield (NOTE: The door side frame can be removed if the quarter panel is loosened from it).

**Notice:** Use caution when removing the side door opening assembly in the area of the instrument panel. Overlapping interior trim components must be removed first to prevent damage.

- 3 Remove latch striker closeout cover and striker. Also, remove the trim screws that attach the side door frame panel to the rail. (NOTE: These screws must be re-installed to secure the service panel in place until the adhesive cures.)

**Notice:** Make sure the fuel inlet is sealed before proceeding with repair procedure.

- 4 Apply heat and pry to break bond along area indicated in Fig. 3.34. (NOTE: Use caution along the underside of the vehicle when applying heat not to de-bond the floor panels from the frame rail.)

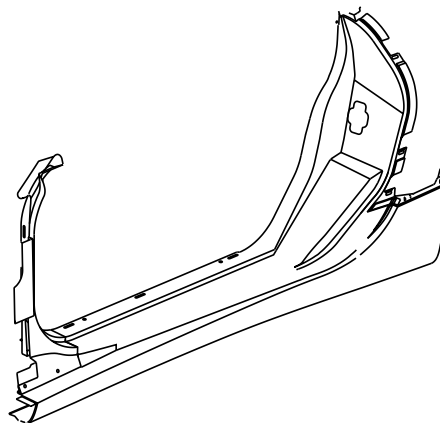


Fig. 3.31 — Side Door Opening Service Part

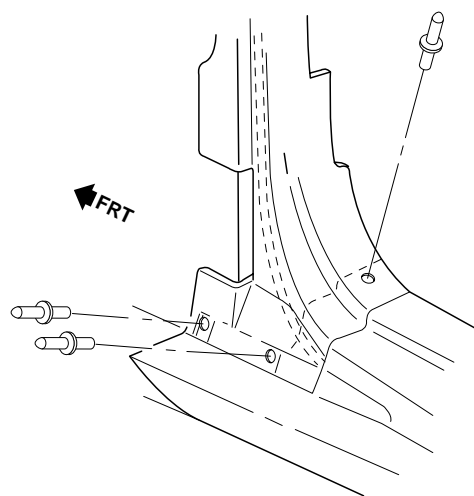


Fig. 3.32 — Service Part Can Be Separated at the Bonded and Riveted Joint

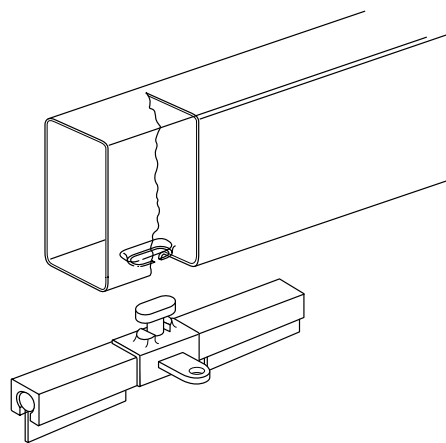


Fig. 3.33 — Adapter Clamp for Conventional Anchoring System

## Front Side Door Opening Assembly

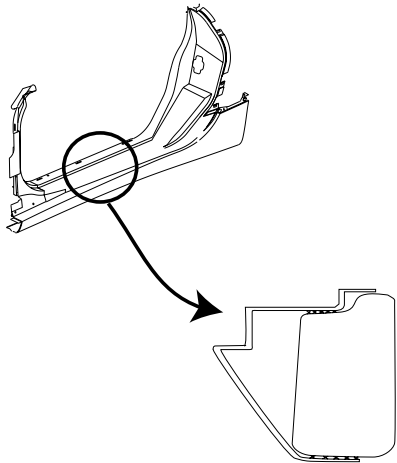


Fig. 3.34—

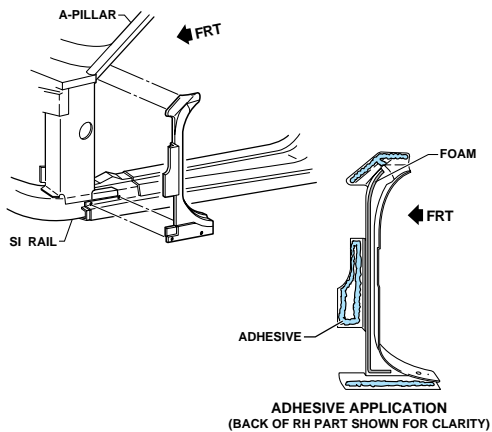


Fig. 3.35 —

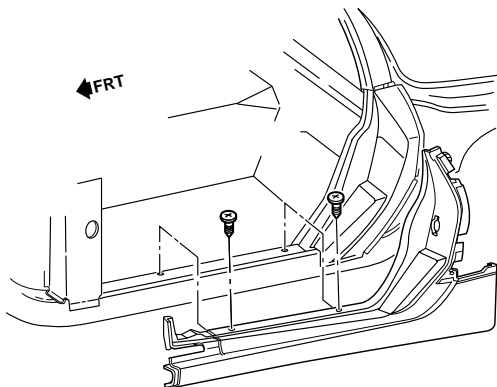


Fig. 3.36 — Install Screws to Secure Panel While Adhesive Cures. Also Apply Adhesive to the Lower Edge of Rocker to Bond at Bottom Side of Rail.

### — INSTALL OR CONNECT —

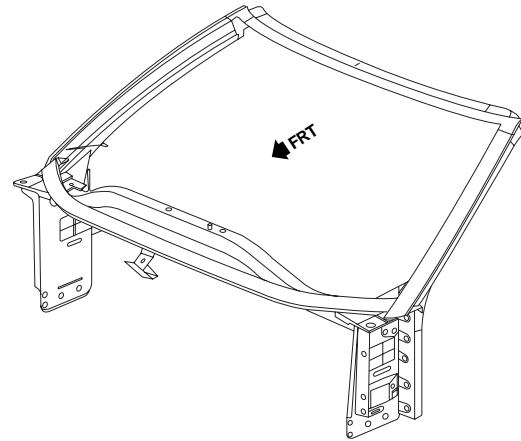
- 1 Remove all remaining adhesive, and scuff all bonding surfaces to ensure proper adhesion. (Refer to SMC Repair Procedures.)
- 2 Clean and prepare all bonding surfaces as necessary. (Refer to SMC Repair Procedures.)  
**Important: Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.**
- 3 Apply approved anti-corrosion primer.  
**Notice: DO NOT top-coat any bonding surface.**
- 4 Temporarily fit the side door opening assembly to ensure proper fit and alignment with adjacent panels.
- 5 The front body hinge pillar portion of the side door opening panel has a foam seal that must make contact with the front hinge pillar (Fig. 3.35).
- 6 Remove panel assembly and apply a consistent bead of adhesive, 10mm in diameter to the front body hinge pillar and top surface of rail and to all areas originally bonded, except for bottom side of rail. (This area is bonded after the side door opening assembly is installed.)  
**Important: Use US Chemical and Plastics 82007B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 30 minute working time and 2.5 to 3 hour cure time.**
- 7 Install assembly using original screws in factory locations. The screws are necessary to secure the service part until the adhesive cures (Fig. 3.36).
- 8 Apply adhesive to inner edge of rocker and clamp in place until adhesive cures. (NOTE: Standoffs in part must fit flush against bottom surface of rail). See Fig. 3.34.
- 9 Remove excess adhesive squeeze-out and allow to cure.  
**Important: Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.**
- 10 Apply approved anti-corrosion primer. Do not combine paint systems. Always refer to paint manufacturer's recommendations.
- 11 Install all related panels and components.

# Windshield Frame Assembly

The windshield frame is an assembly of extruded aluminum and cast aluminum components (Fig. 3.37). The windshield frame is a structural assembly, and if damaged, should not be repaired, complete replacement is recommended. An attempt to repair the windshield frame may compromise the structural integrity of the vehicle, and is NOT recommended.

The windshield frame assembly is bolted and bonded (with structural adhesive), to the front hinge pillars (Fig. 3.38). It is also braced to the *Tunnel* assembly by a bolted and bonded cross-car beam.

Replacement of the windshield frame assembly includes removal of the windshield, the instrument panel assembly, and the upper plenum.



**Fig. 3.37 — Aluminum Windshield Frame Service Part**

— REMOVE OR DISCONNECT —

- 1 Remove all panels and components to gain access to the windshield assembly. This may include removing front fenders, front wheelhouses, windshield, and instrument panel assembly.

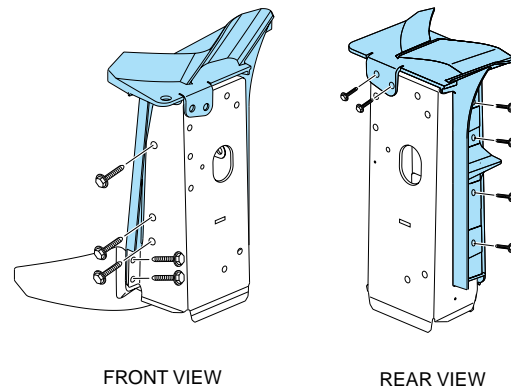
**Notice:** When replacing panels that involve servicing stationary glass, refer to *GM Service Bulletin no. 43-10-48* before performing any priming or refinishing.

- 2 Visually inspect, if any damage to the frame rails or wheelhouse mounting areas exist, then restore as much of the damage as possible to specifications using three-dimensional measuring procedures.

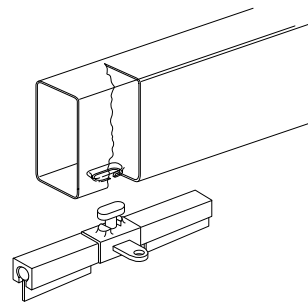
**Notice:** Use *Kent Moore Tools Frame Adapter Clamp (P/N J42058)* to secure the vehicle if pulling and straightening is required (Fig. 3.39).

**Notice:** The frame rails and bumper impact bars must be serviced as required, and returned to three-dimensional coordinates before any SMC repairs are attempted.

- 3 Remove and relocate wiring as necessary to avoid damage.

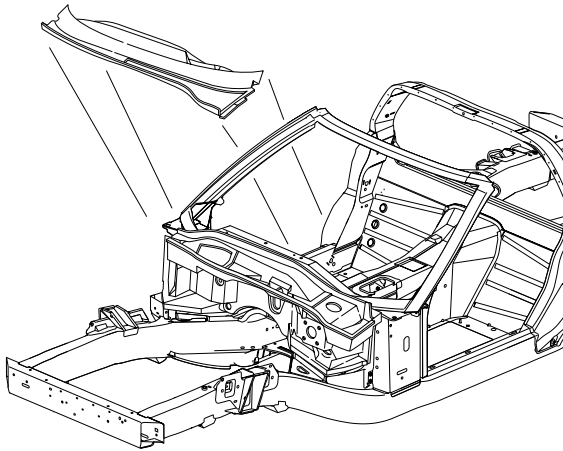


**Fig. 3.38 — Shaded Area Indicates Windshield Frame**



**Fig. 3.39 — Adapter Clamp for Conventional Anchoring System**

## Windshield Frame Assembly



**Fig. 3.40 — Remove Upper Plenum to Gain Access to Lower Plenum Bonding Areas**

- 4 Drill out the close-end rivets securing the upper plenum to the windshield frame. Apply heat to the upper plenum side of the bond area and pry up on the panel to remove it (Fig. 3.40).

**Notice:** Use care not to damage the plenums. If they are damaged during the removal process, they should be replaced.

- 5 With the upper plenum removed, the adhesive bonds attaching the windshield frame to the lower plenum can be accessed. Apply heat and pry as necessary to break the windshield frame loose from the lower plenum.
- 6 From inside the vehicle, remove all hardware attaching the instrument panel supports to the windshield frame assembly.
- 7 Remove bolts attaching cross-car brace, heat and break loose adhesive bonds and remove brace from vehicle.
- 8 Remove bolts attaching windshield frame to the front hinge pillars (see Fig. 3.38).
- 9 Heat and break loose adhesive bonds along front and rear edges of the front body hinge pillars. Remove damaged windshield frame.

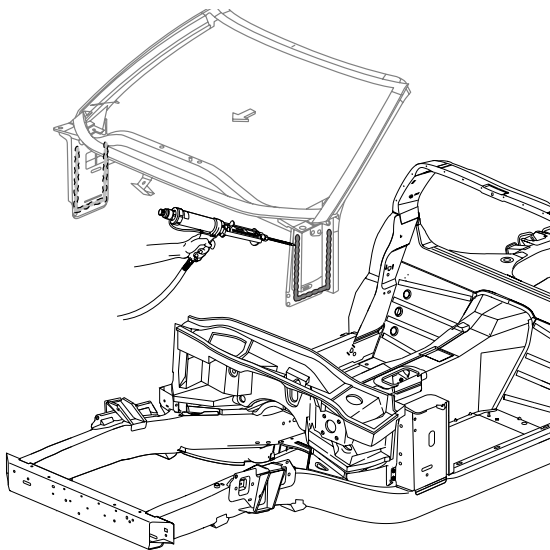
**Notice:** Use due care and caution when removing the windshield frame not to damage any internal components of the vehicle.

### — INSTALL OR CONNECT —

- 1 Remove all remaining adhesive, and scuff all bonding surfaces to ensure proper adhesion. (Refer to SMC Repair Procedures.)
- 2 Clean and prepare all bonding surfaces as necessary. (Refer to SMC Repair Procedures.)

**Important:** Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.

- 3 Apply approved anti-corrosion primer.  
**Notice:** DO NOT top-coat any bonding surface.
- 4 Apply adhesive to the bonding surfaces of the new windshield frame and install (Fig. 3.41). Bolt the windshield frame service part to the front pillars.
- 5 Apply adhesive to attach lower plenum to windshield frame, drill holes and use close-end rivets (GM P/N 9418420 or, equivalent) to hold plenum secure while adhesive cures.



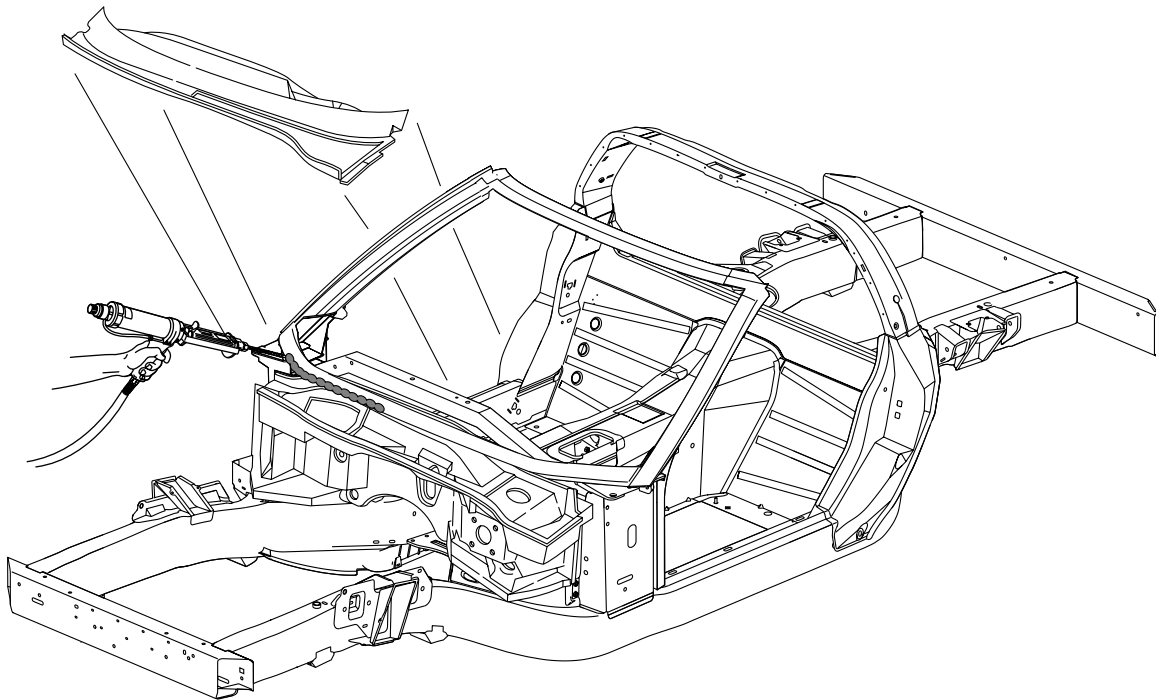
**Fig. 3.41 — Install Adhesive to Service Part**

**Important:** Use US Chemical and Plastics 82007B System 2000 Structural Adhesive, a PLOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 30 minute working time and 2.5 to 3 hour cure time.

- 6 Apply adhesive to the area that the cross-car brace bonds to the center tunnel assembly, and install brace and bolt into place.
- 7 Attach all instrument panel supports to the windshield frame assembly service part.
- 8 Apply adhesive to the upper plenum and install using close-end rivets in factory locations, to hold in place while adhesive cures (Fig. 3.42).

**Important:** Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.

- 9 Apply approved anti-corrosion primer. Do not combine paint systems. Always refer to paint manufacturer's recommendations.
- 10 Install all related panels and components.



**Fig. 3.42 — Install Adhesive to Windshield Frame for Upper Plenum Installation**

# Front Floor Panel

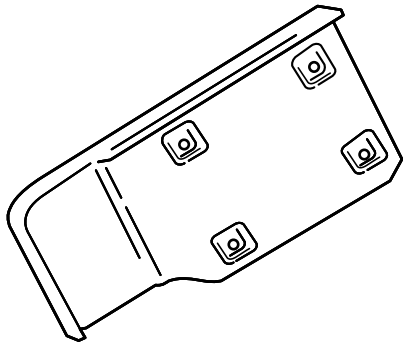


Fig. 3.43 — Floor Panel Service Part

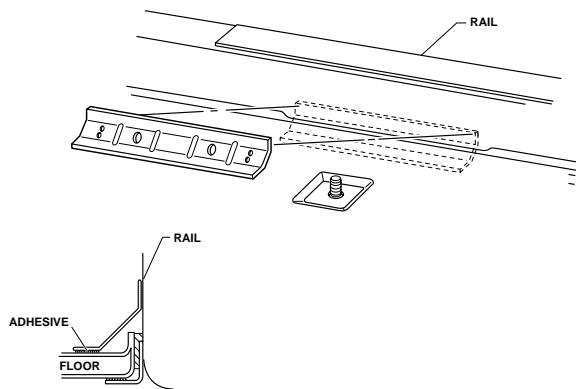


Fig. 3.44 — Remove Reinforcement

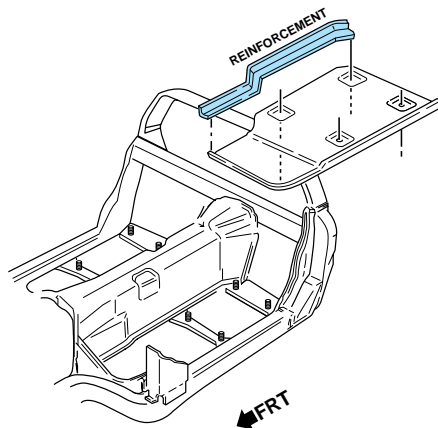


Fig. 3.45 — Reinforcement Bonded to Tunnel and Floor

The floor panel is serviced as separate left and right side components (Fig. 3.43). The panels are bonded around the outer edges and across the seat mounting braces. For repair other than full panel replacement see *SMC Repair Procedures*.

— REMOVE OR DISCONNECT —

- 1 Remove all panels and components to gain access to the floor panel. This will include removing seat and carpeting.

**Notice:** When servicing the right front floor panel, the bonded and bolted electrical component mounting brackets must be removed. Remove or reposition electrical components and wiring harness as necessary to avoid damage.

- 2 Visually inspect for damage to the frame rail and seat mounting brace, restore as much of the damage as possible to specifications using three-dimensional measuring procedures.
- 3 Remove the side reinforcement bonded to the floor panel and the frame rail (Fig. 3.44).
- 4 Remove the side reinforcement bonded to the floor panel and the tunnel area (Fig. 3.45). **NOTE:** Use care when removing the reinforcement, if damaged during the removal process replacement will be necessary.
- 5 Apply upward force and heat simultaneously to the floor panel as necessary to detach adhesive. Remove damaged floor panel.

**Important:** Save wiring harness clips (3 per side), for transfer to service floor panel.

— INSTALL OR CONNECT —

- 1 Remove all original adhesive using suitable tool. Scuff all bonding surfaces to ensure proper adhesion. (Refer to *SMC Repair Procedures*.)
- 2 Clean and prepare all bonding surfaces as necessary. (Refer to *SMC Repair Procedures*.)  
**Important:** Prior to refinishing, refer to *GM P/N 4901 Refinish Manual for recommended products*.
- 3 Apply approved anti-corrosion primer.  
**Notice:** DO NOT top-coat any bonding surface.

- 4 Temporarily position the service panel and check for proper fit, make sure the perimeter of the floor panel and the seat mount cross-brace fit flush. Remove service panel.
- 5 After primer is fully cured, apply adhesive to the mating flanges as necessary, (Keep adhesive away from seat studs to minimize squeeze out), and install service floor panel. Apply even pressure to all bonding surfaces to ensure the floor panel fits flush and level (Fig. 3.46).

**Important: Use US Chemical and Plastics 82014B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 9 minute working time and 1 hour cure time.**

- 6 Apply adhesive to the floor panel support bracket, and install to attach floor panel to tunnel as in Fig. 3.47. Apply adhesive to the floor panel brace and install as shown in Fig. 3.48. Screw the ends of the brace securely to the floor panel, apply pressure evenly for uniform adhesive 'wet-out' (Fig. 3.47). Apply adhesive to wiring harness clips (3), and install at the etched indicators on the service panel by pressing firmly into place.
- 7 Temporarily install the seat mounting nuts to 'wet-out' the adhesive at the cross brace. Smooth adhesive squeeze-out around perimeter of floor panel from underside of vehicle to form a consistent, leak-proof seal.
- 8 Apply constant firm pressure in the 'toe-pan' area until the adhesive is fully cured. After the adhesive is fully cured, remove the seat mounting nuts.
- 9 Finish and feather-edge the repair areas as necessary to resemble OEM.
- 10 Prime the body with suitable primer. Apply sealers and anti-corrosion materials as necessary.
- 11 Apply top-coat over all primed areas. Refer to paint manufacturer's recommendations. Do not combine paint systems.
- 12 Install all related panels and components.

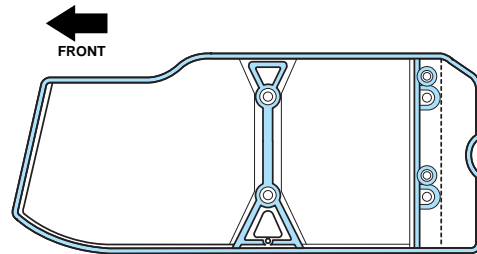


Fig. 3.46 — Shaded Area Represents Bond

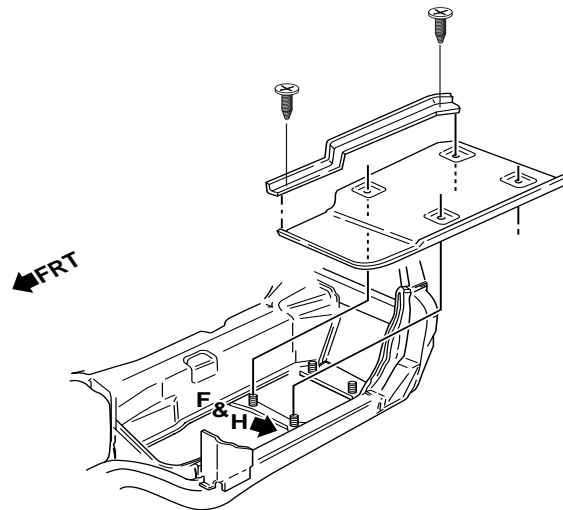


Fig. 3.47 — Trim Screws May Be Necessary to Secure Panel While Adhesive Cures

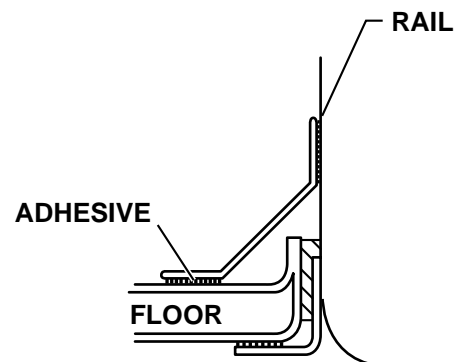
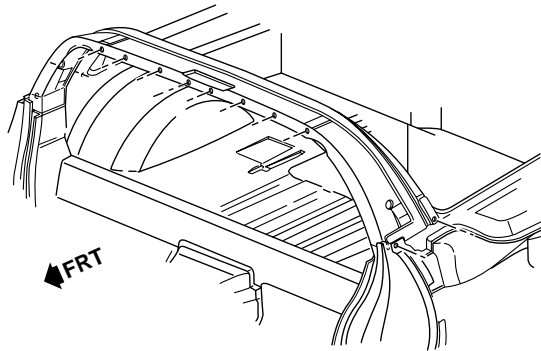


Fig. 3.48 — Cross Section of Floor and Rail Brace



# Roof Bow Service



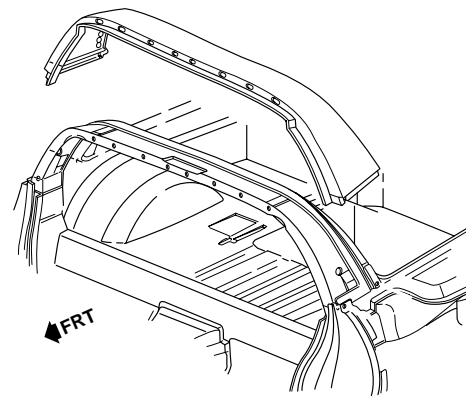
**Fig. 3.49 — Mild Steel Roof Bow**

The Roof Bow is made from a one piece mild steel tube that is shaped by hydroforming (Fig. 3.49). The roof bow is located and MIG welded to the inner and outer lock pillar panels. The roof bow should be three-dimensionally located and MIG welded at factory joints when replaced. Use 8mm (5/16 in) plug welds to replace resistance welds at the lock pillar inner panel.

The Roof Bow Cover is made of Sheet Moulded Compound (SMC), and is bonded to the Roof Bow with structural adhesive (Fig. 3.50). The Roof Bow Cover overlaps the Rear Compartment Panel Frame, which should be sectioned if the Roof Bow Cover is not damaged (*Refer to Rear Compartment Panel Frame Service Procedures*).

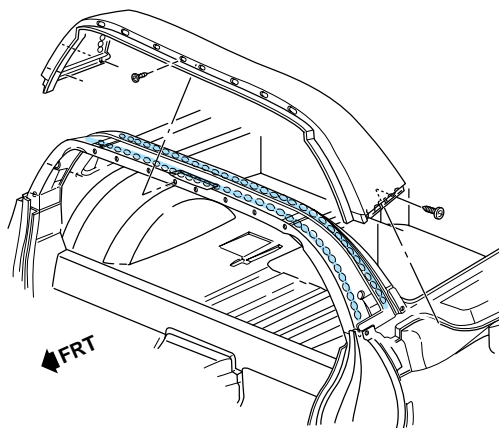
**Important: Use US Chemical and Plastics 82014B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 9 minute working time and 1 hour cure time.**

**Notice: Before permanent installation of either the Roof Bow or the Roof Bow Cover be sure to establish location for proper fit and finish of all adjacent panels.**



**Fig. 3.50 — SMC Roof Bow Cover**

Removal of the Roof Bow Cover requires the removal of the screws attaching the front and rear weatherstrips through the cover to the hydroformed roof bow (Fig. 3.51). Apply heat to the bonded area and break the adhesive to remove the Roof Bow Cover. (*Follow SMC Repair Procedures.*)



**Fig. 3.51 — Adhesive Bead Location**

# Rear Compartment Panel

The Rear Compartment Panel (tub) is made of Sheet Moulded Compound (SMC). The panel has many accessories that secure to it or pass through it. (The service part contains only those holes common to all body styles and options; it may require modifications to install all accessories for all models.) The rear compartment panel is bonded to the rear frame rails, the seatback area, and the rear impact bar. Sectioning may be performed if damage is limited to the rear portion of the rear compartment panel (Fig. 3.52).

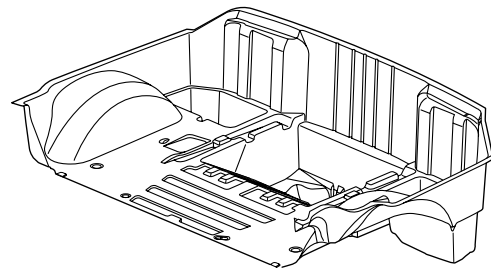


Fig. 3.52 Rear Compartment Panel Service Part

## Rear Compartment Panel Replacement

### — REMOVE OR DISCONNECT —

- 1 Visually inspect and restore as much of the damage as possible to specifications using three-dimensional measuring procedures.  
**Notice:** Use Kent Moore Tools Frame Adapter Clamp (P/N J42058) to secure the vehicle if pulling and straightening is required (Fig. 3.53).  
**Notice:** The frame rails and bumper impact bars must be serviced as required, and returned to three-dimensional coordinates before any SMC repairs are attempted.
- 2 Remove all panels, components, and interior trim located in the rear compartment. Also, both rear quarter panels, and Rear Compartment Frame Panel 'rear surround'.  
**Caution:** Make sure the fuel inlet is sealed before proceeding with repair procedure.  
**Notice:** Save any and all brackets, mounting studs, and accessories for transfer to the new rear compartment panel.
- 3 Remove six screws attaching the tub to the rails.
- 4 Apply heat to inside of tub along "bond" lines indicated by the scribe lines on the floor of the tub. Pry up on the tub at the adhesive joint until tub bond breaks loose (Fig. 3.54).  
**Notice:** The front edge of tub is also bonded across the seatback area and along the top of the rear impact bar. Detach bonds and remove as necessary.
- 5 Remove damaged rear compartment panel.

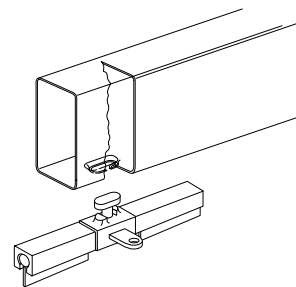


Fig. 3.53 — Adapter Clamp for Conventional Anchoring System

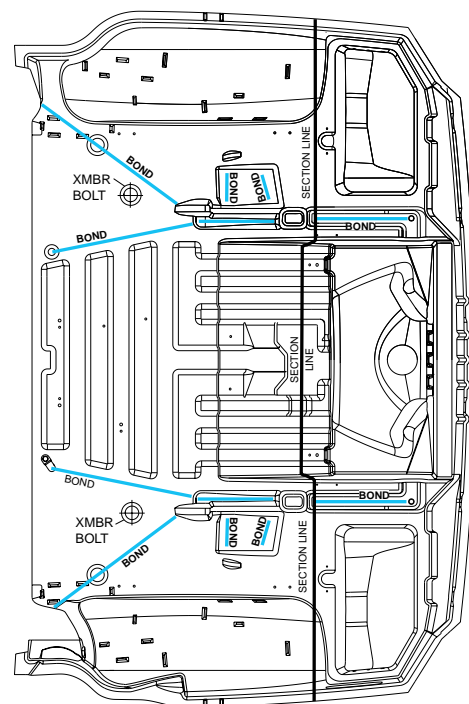
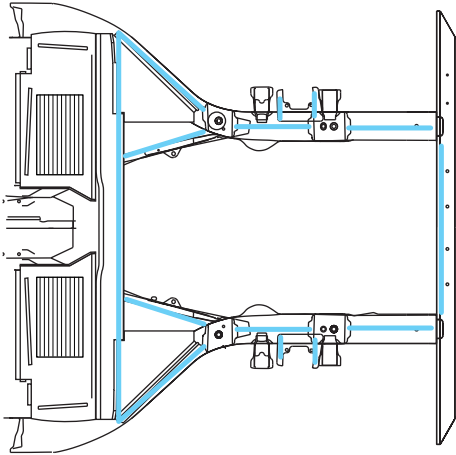
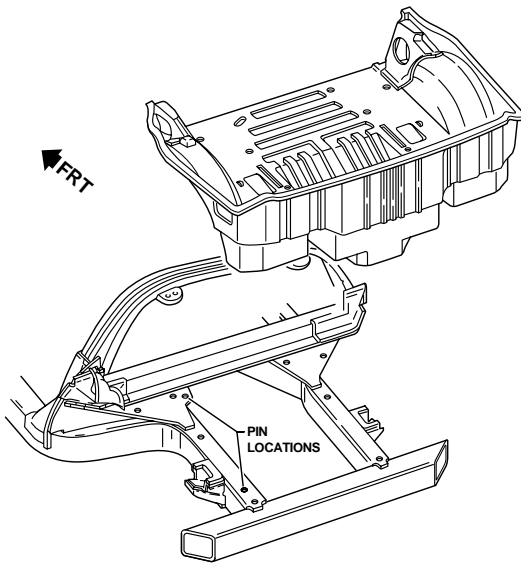


Fig. 3.54 — Scribed Lines and Text in All Compartment Panels

## Rear Compartment Panel



**Fig. 3.55 — Tub Bonding Locations on Frame Rails**



**Fig. 3.56 — Embossed Pins in Tub that Fit the Rail**

### — INSTALL OR CONNECT —

- 1 Remove all original adhesive using suitable tool. Scuff all bonding surfaces to ensure proper adhesion. (Refer to *SMC Repair Procedures*.)
- 2 Clean and prepare all bonding surfaces as necessary. (Refer to *SMC Repair Procedures*.)  
**Important: Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.**
- 3 Apply approved anti-corrosion primer.  
**Notice: Do not top-coat any bonding surface.**
- 4 Temporarily install the tub. The panel must fit flush with the surface of the rails and impact bar.
- 5 Apply a consistent bead of adhesive, 10mm in diameter to the rail surface as shown in Fig. 3.55. Apply adhesive to the backside of the lock pillars, as well as over the fuel filler neck.  
**Important: Use US Chemical and Plastics 82007B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 30 minute working time and 2.5 to 3 hour cure time.**
- 6 Install the tub orienting the frame locating pins per Fig. 3.56.  
**Notice: The rear compartment panel is positioned to the drivers side rail assembly using two dimples formed in the bottom surface of the tub (Fig. 3.56).**
- 7 Press down firmly on the entire tub to wet-out the adhesive. Use six close-end rivets (GM P/N 9418420, or equivalent), or the six screws removed in step 3, in areas indicated along the bond line to hold the tub to the rails while adhesive cures.  
**Notice: Use fasteners no longer than 20mm (3/4 inch) in length.**
- 8 Remove any excess adhesive squeeze-out as necessary.
- 9 Let adhesive cure according to adhesive manufacturer recommendations.
- 10 Install all related panels and components. (Refer to *Rear Compartment Panel Frame Installation procedures*.)

## Rear Compartment Panel Sectioning

The Rear Compartment Panel is manufactured with section lines to indicate the proper sectioning location of the service part (see Fig. 3.54). Check all the bonding areas of the Rear Compartment Panel (*tub*), if adhesive is cracked or broken loose from the rails or the 'tub', complete 'tub' replacement is recommended.

### — REMOVE OR DISCONNECT —

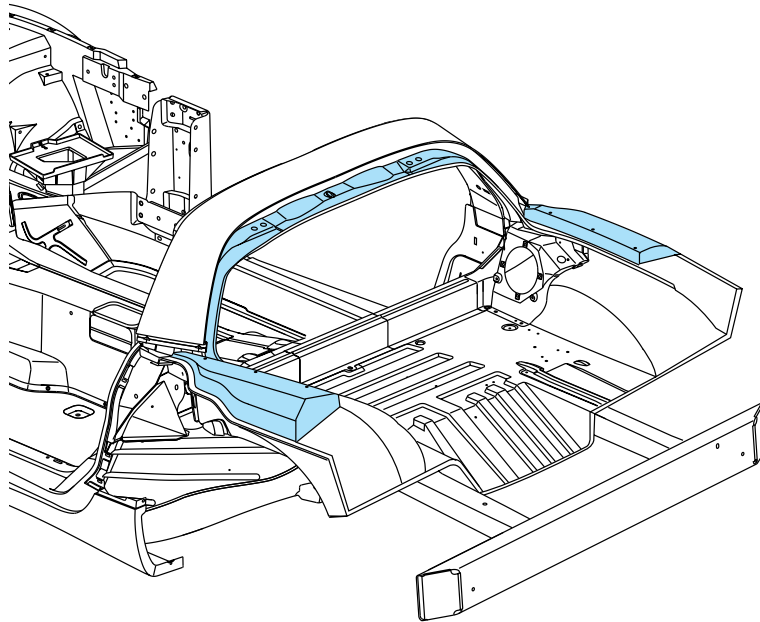
- 1 Visually inspect and restore as much of the damage as possible to specifications using three-dimensional measuring procedures.

**Notice:** *The frame rails and bumper impact bars must be serviced as required, and returned to three-dimensional coordinates before any SMC repairs are attempted (Fig. 3.57).*

- 2 Remove all panels, components, and interior trim located in the rear compartment. Also, remove both rear quarter panels and Rear Compartment Panel Frame (rear surround). (Refer to *Rear Compartment Panel Frame Service Procedures*.)

**Notice:** *Make sure the fuel inlet is sealed before proceeding with repair procedure.*

**Important:** *Save any and all brackets, mounting studs, and accessories for transfer to the new rear compartment panel.*



**Fig. 3.57 — Frame-Rear Compartment Panel Sectioning**

## Rear Compartment Panel

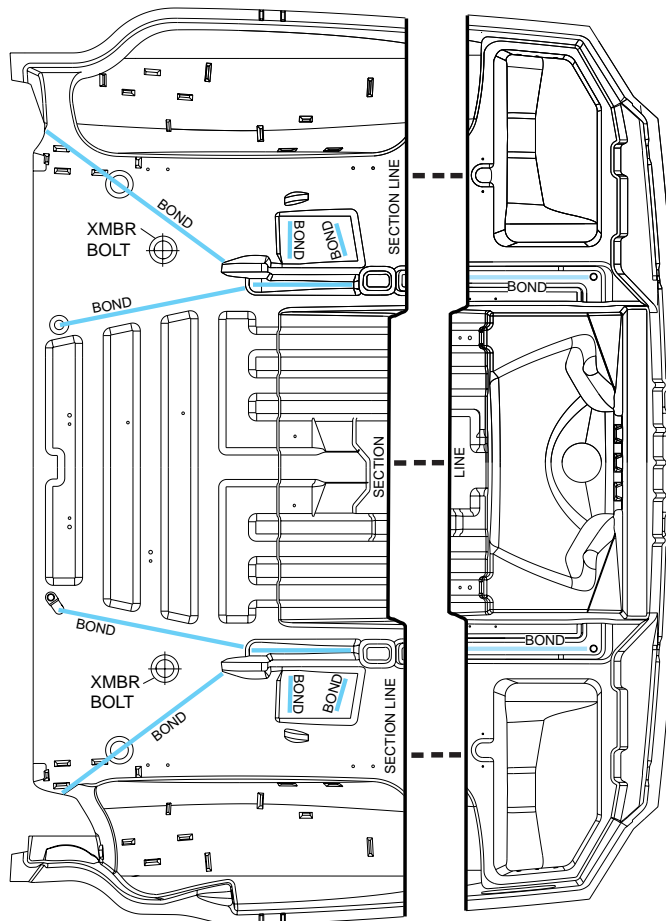
- 3 Identify the **SECTION LINE** etched in the floor of the rear compartment panel (Fig. 3.58). **NOTE:** The etched line is in the floor only, the line must be continued straight up both side-walls of the tub to complete the cuts. (Scuff area with fine sandpaper to highlight the line if necessary.)
- 4 Remove or reposition components on the bottom side of the tub to avoid damage where sectioning procedures are being performed.

**Notice:** Take care not to damage the frame rails when sectioning the rear compartment panel.

- 5 Cut along the **SECTION LINE** and remove the damaged panel.

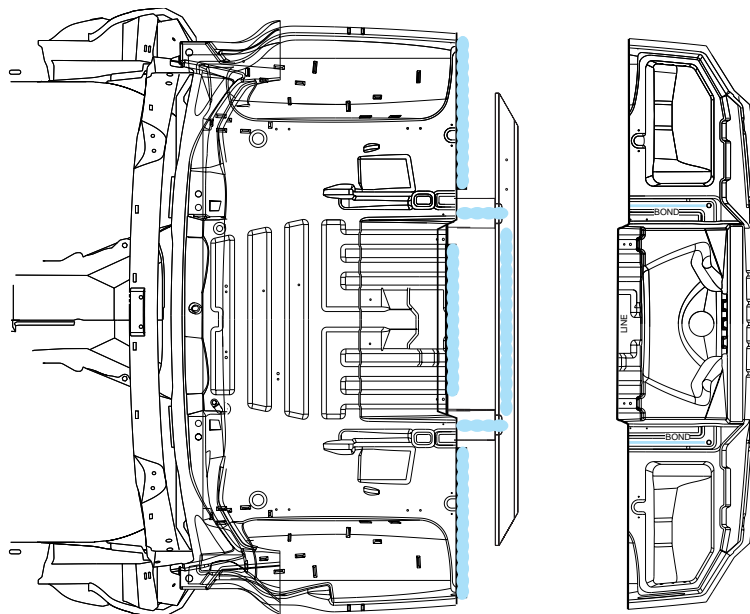
### — INSTALL OR CONNECT —

- 1 Remove all remaining adhesive, and scuff all bonding surfaces to ensure proper adhesion. (Refer to SMC Repair Procedures.)
- 2 Clean and prepare all bonding surfaces as necessary. (Refer to SMC Repair Procedures.)  
**Important:** Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.
- 3 Apply approved anti-corrosion primer.  
**Notice:** DO NOT top-coat any bonding surface.
- 4 Cut the replacement rear compartment panel along the **SECTION LINE** to create service part (Fig. 3.58).
- 5 Create 50mm (2 inch) wide backing plates to be installed along the bottom side of the section joint. (Refer to SMC Repair Procedures.)



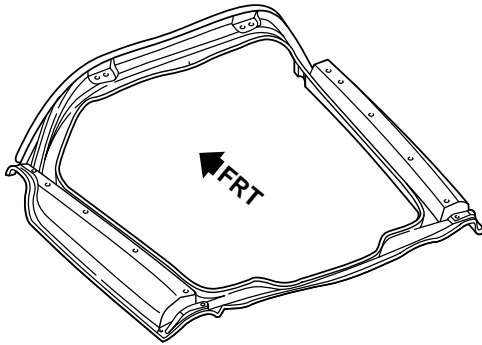
**Fig. 3.58 — Top View of Rear Compartment Panel Section Lines Etched in All Parts**

- 6 Apply structural adhesive to the backing plate strips and secure along the section joint using screws. Remove excess adhesive from the service part mounting area. (Refer to SMC Repair Procedures.)  
**Important: Use US Chemical and Plastics 82006B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 3 minute working time and 15 minute cure time.**
- 7 Temporarily install the modified service panel and check for proper fit and alignment.  
**Important: Use Ashland Chemical Pliogrip 7779/300B adhesive, or equivalent. Notice the 10-minute working time, and one hour cure time.**
- 8 Remove service part and apply adhesive to the extended portion of the mating flange created from the backing strips, and to the frame rails, and rear bumper impact bar as necessary (Fig. 3.59).
- 9 Install the modified service part and press down firmly to wet-out the adhesive. Use two close-end rivets or self-drilling screws in areas indicated along the bond line to hold the tub to the rails while adhesive cures.  
Note: Use fasteners no longer than 20mm (3/4 inch) in length.
- 10 Allow to cure according to adhesive manufacturer recommendations.
- 11 After structural adhesive is fully cured, bevel butt-joint edges to prep for reinforcement and refinishing of the interior joint. (Refer to SMC Repair Procedures.)
- 12 Apply Goodwrench Structural Bonding Adhesive (GM P/N 12345726) to the entire 'joint' area extending across the cut lines and across the backer, use tacky mesh tape or an equivalent reinforcement matting. Allow to cure as necessary. (Refer to SMC Repair Procedures.)
- 13 Prepare the repair areas as necessary to resemble OEM appearance. (Refer to SMC Repair Procedures.)
- 14 Refinish repair areas. Do not combine paint systems. Always refer to paint manufacturer's recommendations.
- 15 Install all related panels and components.

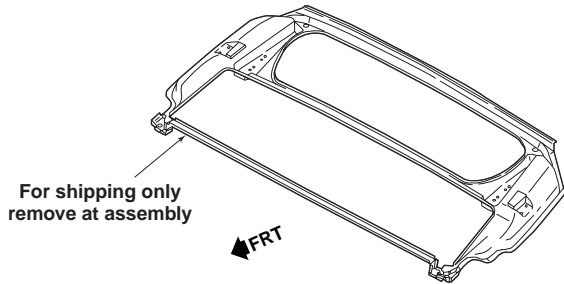


**Fig. 3.59 — Install Sectioned Panel to Backing Plates Created From Undamaged SMC**

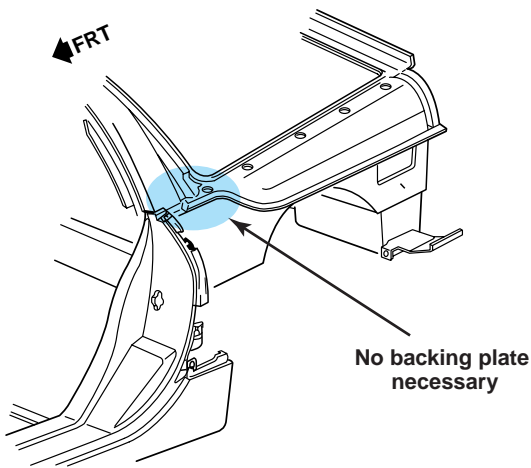
# Rear Compartment Panel Frame



**Fig. 3.60 — Coupe rear panel frame**



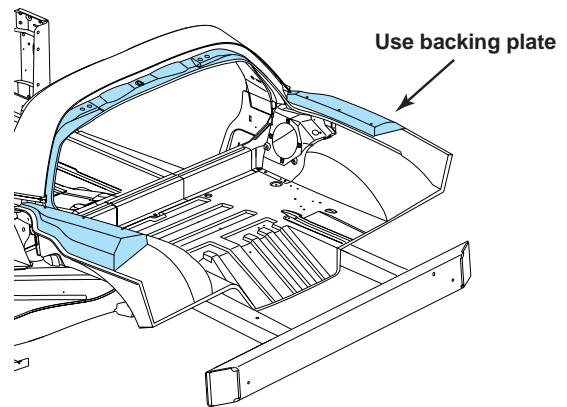
**Fig. 3.61 — Convertible rear panel frame**



**Fig. 3.62 — Section coupe rear surround in shaded area**

The Rear Compartment Panel Frame (rear surround) is made of Sheet Moulded Compound (SMC). This panel, on coupe models, provides a mounting surface for the quarter-panels and is the sealing surface for the rear hatch (Fig. 3.60). Convertible rear compartment panel frame provides a mounting surface for the stow compartment and rear compartment lids (Fig. 3.61). Installing this panel is critical to the proper fit-up of the rear end of the vehicle.

Since the Roof Bow Cover overlaps the Rear Compartment Panel Frame (rear surround), sectioning is faster and more cost effective than full panel replacement, if the Roof Bow Cover is not damaged. The frame panel may be sectioned anywhere along the quarter panel mounting surface. Sectioning in the front corners (at the base of the Roof Bow), does not require the use of a reinforcement, the Rear Compartment Panel flange can act as a backing plate (Fig. 3.62). If sectioning is performed in the middle area of the 'rear surround' a backing plate is required for 'butt-joint' reinforcement (Fig. 3.63). (Refer to SMC Repair Procedures.)



**Fig. 3.63 — Stagger the rear panel frame to rear compartment panel sectioning joints**

The SMC roof bow cover must be removed to replace the 'rear surround' at factory seams. Sectioning of this panel is recommended when damage is limited to the rear portion of the rear surround, not including the "Roof Bow Cover". The rear surround is the mounting surface for the quarter panels (Fig. 3.64), and is shimmed with structural adhesive; it may vary from 1mm ≤ 7mm in thickness.

*Always shim and dry-fit the surround and outerbody panels before bonding.*

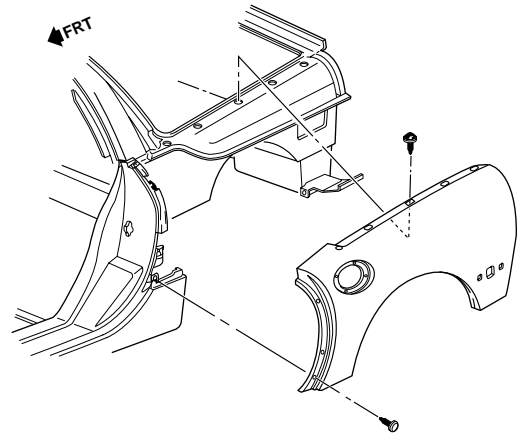
— REMOVE OR DISCONNECT —

- 1 Visually inspect and restore as much of the damage as possible to specifications using three-dimensional measuring procedures.
 

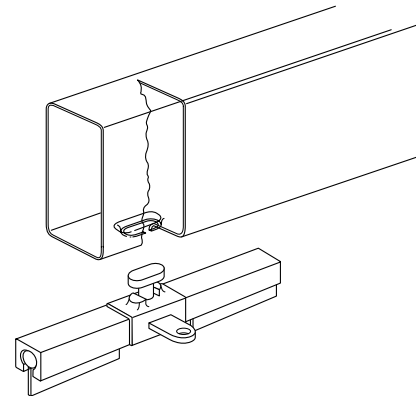
**Notice: The frame rails and bumper impact bars must be serviced as required, and returned to three-dimensional coordinates before any SMC repairs are attempted.**

**Notice: Use Kent Moore Tools Frame Adapter Clamp (P/N J42058) to secure the vehicle if pulling and straightening is required (Fig. 3.65).**
- 2 Remove all interior components related to the rear of the vehicle.
 

**Notice: Save any and all brackets, mounting studs, and accessories for transfer to the new rear compartment panel.**
- 3 Remove quarter panels, rear bumper cover, and the roof bow cover. (Refer to Roof Bow Cover Service Procedures.)
- 4 Apply heat to the Rear Compartment Frame Panel side of the bond area and pry up on the damaged panel. Use caution so as not to damage the rear compartment panel.
- 5 Once the 'rear surround' is completely removed, clean off most of the adhesive bead. Leave a few small areas (about 25mm (1 inch) in length) of adhesive in place to act as shims for the new 'rear surround'.



**Fig. 3.64 — Bolt-On Quarter Panels**



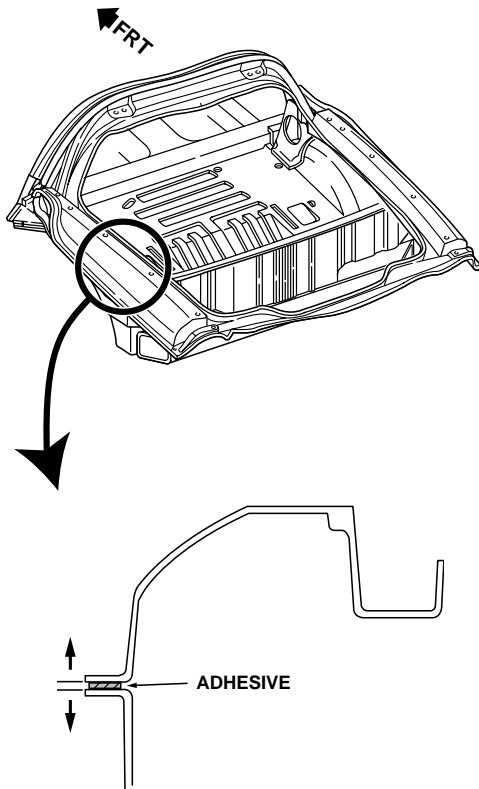
**Fig. 3.65 — Adapter Clamp for Conventional Anchoring System**



## Rear Compartment Panel Frame

### — INSTALL OR CONNECT —

- 1 Scuff the service panel bonding surface to ensure good adhesion. (Refer to *SMC Repair Procedures*.)
- 2 Temporarily assemble rear end of vehicle to check alignment with the doors. This includes installation of the quarter-panels, roof bow cover, and rear hatch. Place shims as necessary to achieve proper panel alignment and establish adhesive thickness (Fig. 3.66).
- 3 Remove and disassemble panels for installation.
- 4 Scuff all bonding surfaces to ensure proper adhesion. (Refer to *SMC Repair Procedures*.)
- 5 Clean and prepare all bonding surfaces as necessary. (Refer to *SMC Repair Procedures*.)  
**Important: Prior to refinishing, refer to GM P/N 4901 Refinish Manual for recommended products.**
- 6 Apply approved anti-corrosion primer.  
**Notice: DO NOT top-coat any bonding surface.**

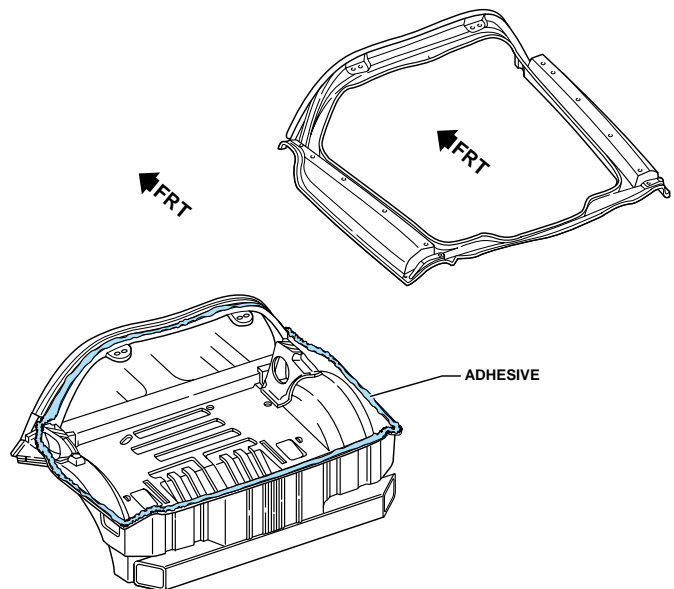


**Fig. 3.66 — Adjust Rear Surround Using Adhesive Bead 1mm ≤ 7mm In Thickness**

- 7 Apply a consistent bead of adhesive to the entire perimeter of the rear compartment panel mating flange and the tops of speaker housings. Apply enough adhesive for proper wet-out (Fig. 3.67).

**Important: Use US Chemical and Plastics 82007B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent. Note the 30 minute working time and 2.5 to 3 hour cure time.**

- 8 Install shims and 'rear surround', clamp in place. Tool excess adhesive to form a consistent leak-proof bond.
- 9 Allow to cure according to the adhesive manufacturer's recommendations. Remove clamps and install roof bow panel. (Refer to *Roof Bow Cover Service Procedures*.)
- 10 Install all related panels and components.



**Fig. 3.67 — Apply a Consistent Bead of Adhesive to the Entire Perimeter to Form a Leak-Proof Seal**

# Rear Bumper Impact Bar

The rear bumper (impact bar) is made of Ultra-High Strength steel. The impact bar is MIG welded to the mild steel frame rails. The impact bar can be repaired if damage excludes kinks, or damage which would require the use of heat to straighten.

Replacing the bumper bar requires special procedures to access the welds attaching the bumper bar to the frame rails. This procedure was developed to facilitate this repair while maintaining the integrity of the bumper system. The rear bumper impact bar as supplied for service includes riv-nuts pre-installed (Fig. 3.68) for energy absorber mounting. Replacement riv-nuts are available from Kent Moore Tools (Riv-Nut Kit: P/N J42151), if needed.

## — REMOVE OR DISCONNECT —

- 1 Remove all panels and components to gain access to the rear impact bar. This includes removing the rear bumper cover, energy absorber, and the mufflers if necessary.

**Notice:** Disconnect exhaust at the bolted joint just forward of the rear axle. From inside the vehicle remove trim panels and pull back the carpeting inside the rear compartment area.

**Important:** Save any and all brackets, mounting studs, and accessories for transfer to the new rear compartment panel.

- 2 Visually inspect and restore as much of the damage as possible to specifications using three-dimensional measuring procedures.

**Notice:** Use Kent Moore Tools Frame Adapter Clamp (P/N J42058) to secure the vehicle if pulling and straightening is required (Fig. 3.69).

**Notice:** The frame rails and bumper impact bars must be serviced as required, and returned to three-dimensional coordinates before any SMC repairs are attempted.

- 3 Remove or reposition wiring as necessary to avoid being damaged.

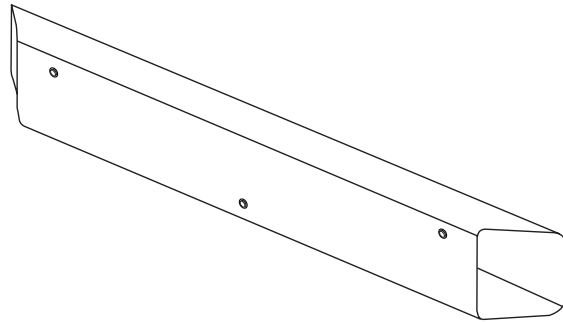


Fig. 3.68 — Ultra High-Strength Steel Beam

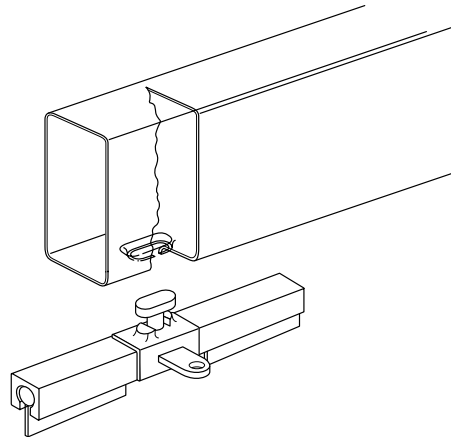


Fig. 3.69 — Adapter Flamp for Conventional Anchoring System

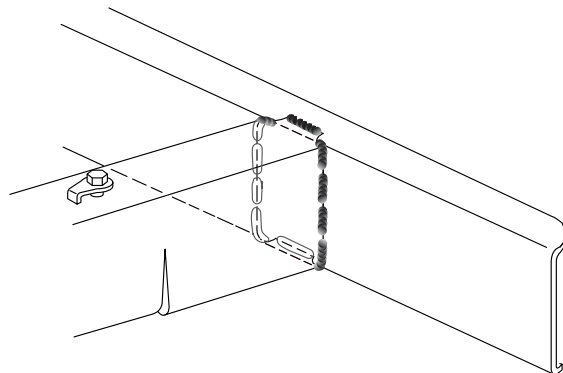
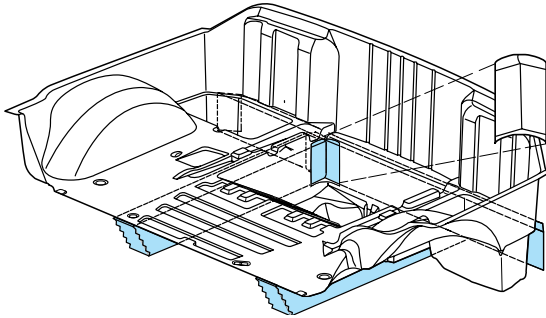
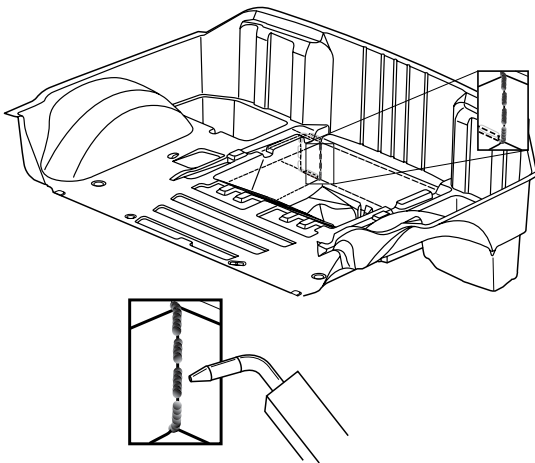


Fig. 3.70 — Mig Stitch Welded to Frame Rails

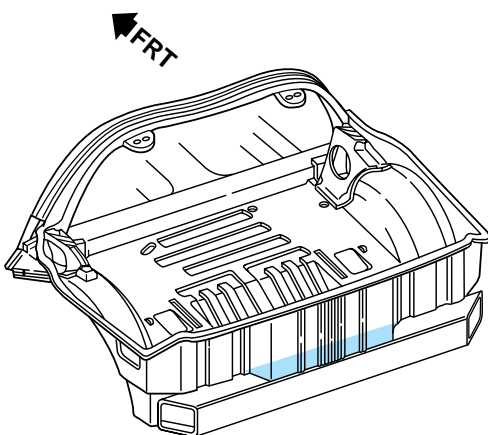
## Rear Bumper Impact Bar



**Fig. 3.71 — Cut and Remove Left and Right Corners (Right Corner Shown)**



**Fig. 3.72 — Create Windows to Access Welds**



**Fig. 3.73 — Bond Between Beam and Tub**

- Using a die grinder or equivalent, cut the MIG welds attaching the rear impact bar to the frame rails. Cut the welds around the perimeter of the frame rail (fishmouth) ends. Cut the welds favoring the impact bar side of the joint. DO NOT cut into the frame rails.

**Notice:** The top and bottom welded edges, as well as the outer rail welds are accessible from outside the vehicle (Fig. 3.70).

**Caution:** DO NOT cut the rails when cutting 'windows' in the rear compartment panel.

- Access to the inner rail welds require modification to the rear wall of the SMC rear compartment panel. From inside the vehicle locate, mark, and cut out 'windows' in the rear compartment panel as in Fig. 3.71. The 'windows' provide access to inner MIG welds attaching the impact bar to the rails (Fig. 3.72).

**Important:** Save the cutouts for re-installation.

- Cut the remaining welds around the perimeter of the impact bar, favoring the impact bar side of the joint.  
**Notice:** Be sure to protect the interior of the vehicle before cutting or grinding the SMC body, or the bumper impact bar.
- The rear impact bar is also bonded to the rear compartment panel, see Fig. 3.73. If necessary, apply heat, then pry apart to separate impact bar from rear panel. (Refer to Rear Compartment Panel Service Procedures.)

With the rear bumper impact bar removed, repair any cracks in the SMC from outside the vehicle. (Refer to SMC Repair Procedures.)

**Important:** Do not install the 'windows' in rear compartment yet; welding access is necessary for installing the replacement impact bar.

### — INSTALL OR CONNECT —

- Straighten and deburr the rail ends as necessary to allow the service bumper impact bar to fit the rail ends properly. Remove any adhesive which is cracked or broken loose from the rails or the rear compartment panel.

## Rear Bumper Impact Bar

- 2 Temporarily position the impact bar and scribe lines into the primer indicating where the welds will be made. Remove the primer from the areas to be MIG welded by sanding with 80-grit paper on a 'Dual-Action' sander (DA). Do Not use a grinder to remove the primer.
- 3 Prepare all bare metal surfaces and apply weld-through primer as necessary. Be sure to apply primer to the inside of the 'fishmouth' area also.
- 4 Position the bumper impact bar using three-dimensional measuring equipment and install per the original weld locations. Stitch weld around the 'fishmouth' joint. If not trace of the original welds are present, use Fig. 3.74 as a guide for welding the side rails to the impact bar. This weld pattern will create a solid weld joint with minimal heat distortion.
- 5 Clean and prepare all welded surfaces, use 3M's Scotch-Brite Clean-N-Strip Discs (disc P/N 07460, mandrel P/N 07491), or equivalent (Fig. 3.75).

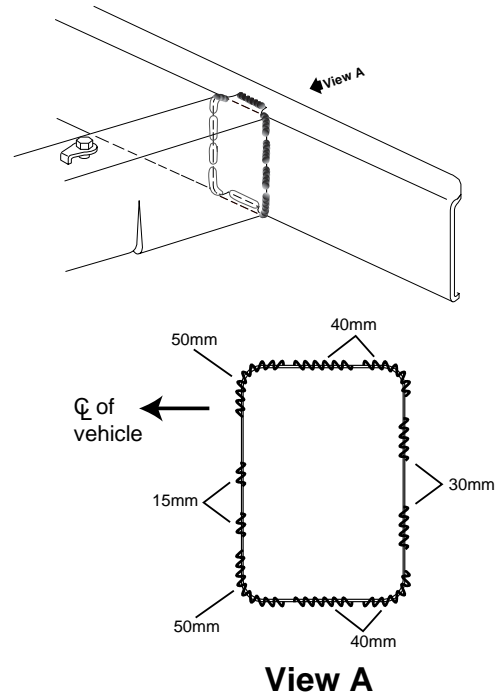
**Important:** Prior to refinishing, refer to **GM P/N 4901 Refinish Manual for recommended products.**

- 6 Apply approved anti-corrosion primer.
 

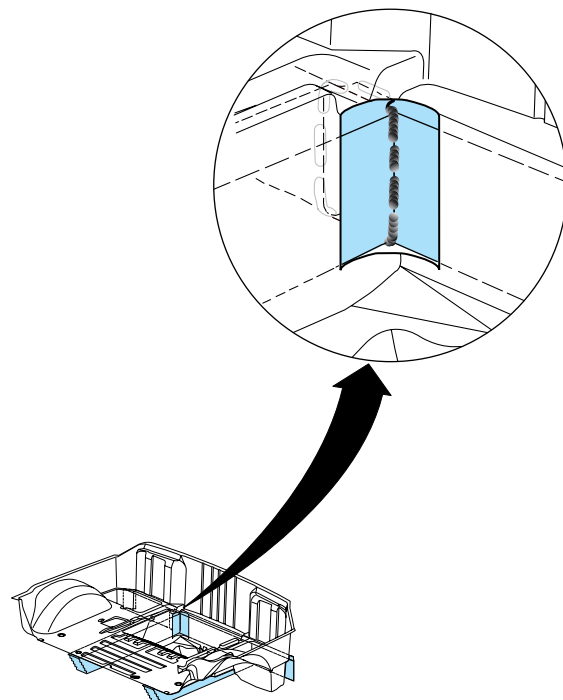
**Notice: DO NOT top-coat any bonding surfaces.**

**Notice: Top surface of impact bar (where it is to be bonded to the rear compartment panel), must not be top-coated, see Fig. 3.73. The bonding area must remain a 'primer only' surface**
- 7 Apply 50mm (2 inch) wide tape over the 'windows' cut in the rear compartment panel, from outside the vehicle. Apply adhesive to the inside of the tape backer, and install the previously cut-out pieces in their original locations (Fig. 3.76). (Refer to SMC repair procedures.)

**Important:** Use **US Chemical and Plastics 82014B System 2000 Structural Adhesive, a PLIOGRIP® adhesive manufactured by Ashland Chemical Company, or equivalent.** Note the 9 minute working time and 1 hour cure time.



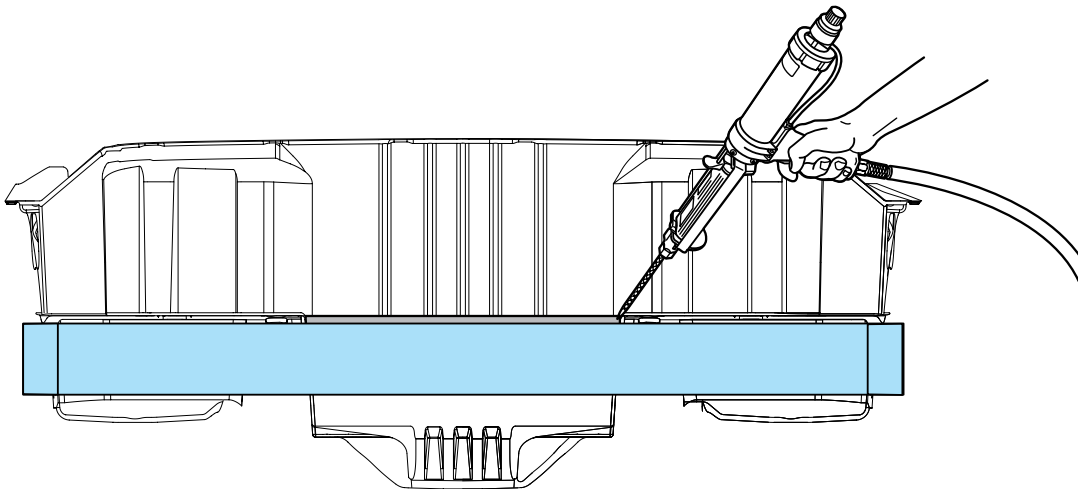
**Fig. 3.74 — Weld Perimeter of Joint, as Indicated**



**Fig. 3.75 — Prime Bare Metal Areas Before Installing Window Cutouts**

## Rear Bumper Impact Bar

- 8 Apply a thin coat of Goodwrench Structural Bonding Epoxy (part no. 1234526), or equivalent, to the entire repair area extending across the cut lines, use tacky mesh tape or an equivalent reinforcement matting. Apply enough bonding epoxy to fully 'wet out' reinforcement matting. Allow to cure as necessary. (Refer to *SMC Repair Procedures*.)
- 9 Scuff all bonding surfaces to ensure proper adhesion. (Refer to *SMC Repair Procedures*.)
- 10 Clean and prepare all bonding surfaces as necessary. (Refer to *SMC Repair Procedures*.)
- 11 Apply a bead of urethane adhesive to bond the impact bar to the rear compartment as shown in Fig. 3.76. This is a structural bond, and care must be used to ensure that the adhesive fills the gap adequately.
- 12 Finish and feather-edge the repair areas as necessary to resemble OEM.
- 13 Prime the SMC repair areas with a suitable primer. Apply appropriate sealers .
- 14 Apply top-coat over all repaired areas. Refer to paint manufacturer's recommendations. Do not combine paint systems.
- 15 Install all related panels and components.



**Fig. 3.76 — Bond Rear Compartment Panel to Top Side at Impact Bar**

# SMC Repair Procedures

## Some Guidelines for SMC Repair

- Clean scuff and solvent wipe all areas to be repaired.
- For added strength and durability, V-groove and reinforce on at least one side of an SMC joint using a tacky mesh tape or equivalent.
- When partial panel replacement is performed, use two inch backing plates made from SMC or E-coated steel, as a reinforcement for all butt joints

## Repairing Sheet Molded Compound Panels

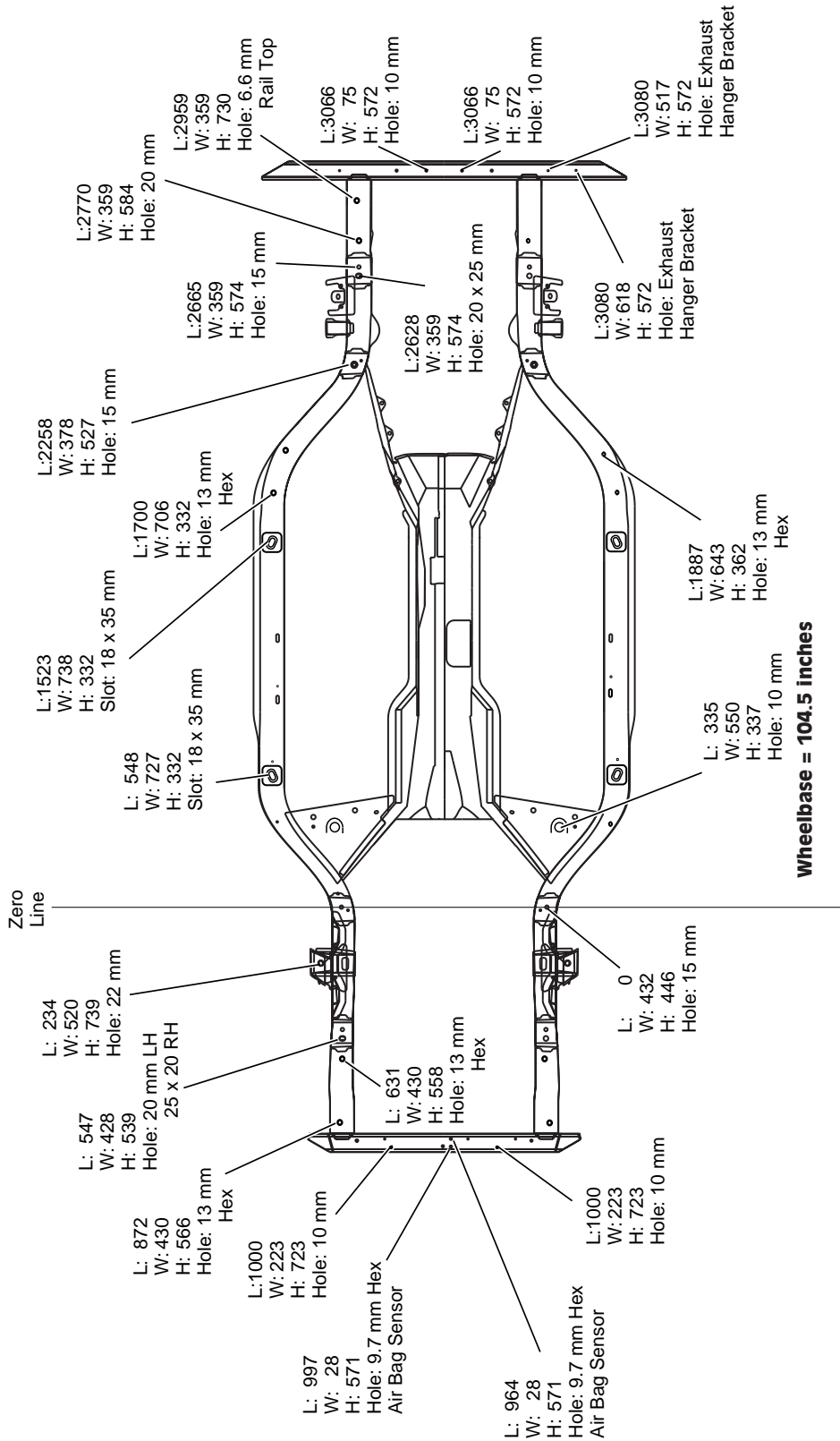
- 1 Scuff area where repair is to be performed.
- 2 Clean bond area with lint-free rag using a water-based cleaner.
- 3 Cracks should be grooved and reinforced on at least one side of an SMC joint using a tacky mesh tape or equivalent.
- 4 Sectioning joints require backing strips 50mm (2 inch) wide, cut strips from leftover pieces of SMC.
- 5 Use US Chemical and Plastics System 2000 Structural Adhesive or equivalent (the US Chemicals customer service number is 1-800-321-0672). Apply adhesive to the entire 'joint' area extending across the cut lines and across the backer. Use tacky mesh tape or an equivalent reinforcement matting. Allow to cure according to adhesive manufacturer's recommendations.
- 6 Apply a thin coat of Goodwrench Structural Bonding Epoxy (P/N 12345726) or equivalent as a final coat to blend in the repair to resemble OEM appearance.

## Bonding Undamaged SMC to Epoxy Coated Steel

- 1 Prime all bare metal areas with an anti-corrosion primer such as PPG's DP90, or equivalent. Some paint manufacturers recommend a pre-primer when bonding to epoxy. Always refer to paint manufacturer's recommendations. Do not combine paint systems.
- 2 Clean bond area with a lint-free rag using a water-based cleaner.
- 3 Scuff both surfaces to be bonded using a scuff pad such as 3M's Scotch-Brite "Red" scuff pad P/N 07447 or equivalent.
- 4 Ensure that the surface is clean and dry before applying adhesive. Use compressed air. Do not final wipe surface with hand or rag.
- 5 Determine whether adhesive is applied to the vehicle or the replacement panel. Refer to specific procedure of part being replaced.
- 6 Apply a consistent adhesive bond to prepared surfaces.
- 7 Mechanically retain panel in place to "wet out" adhesive along entire bonding surface.
- 8 Allow to cure according to adhesive manufacturer's recommendations.

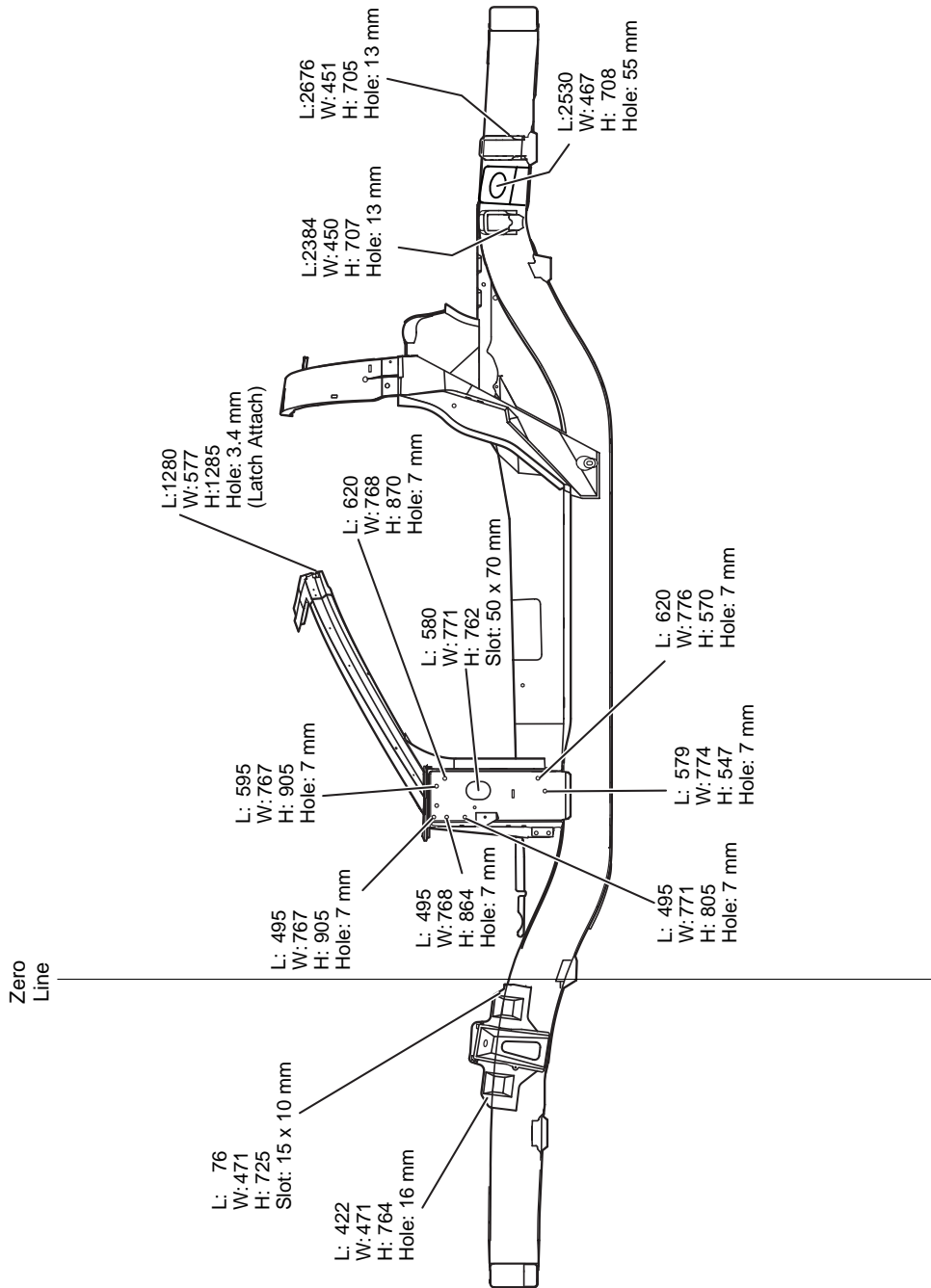
# Body Dimensions

## Underbody Dimensions



ALL DIMENSIONS ARE MEASURED FROM A ZERO LINE, CENTER LINE, AND A COMMON DATUM. ALL DIMENSIONS ARE SYMMETRICAL UNLESS OTHERWISE SPECIFIED.

Side View Dimensions

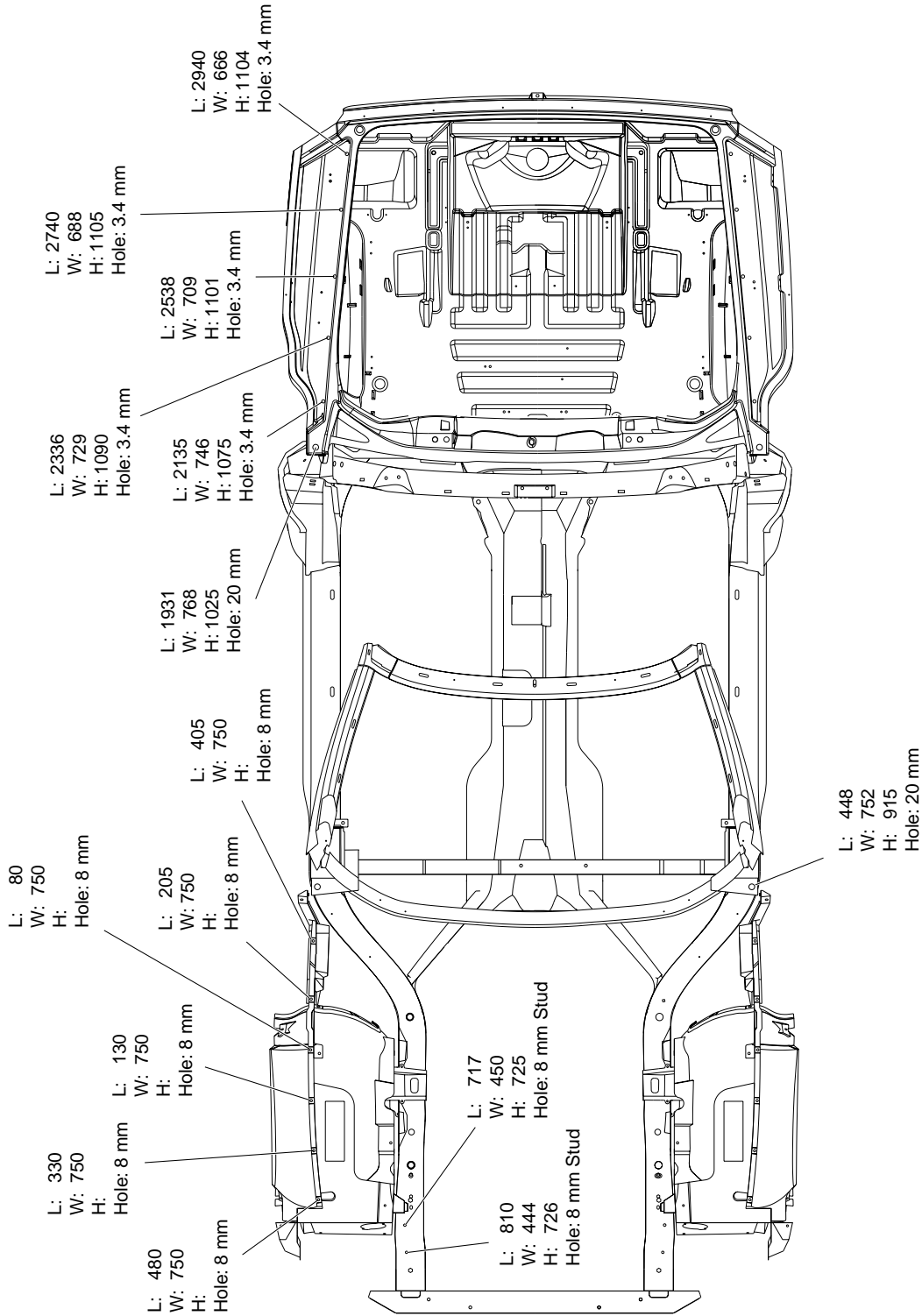


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Body Dimensions

Upperbody Dimensions



ALL DIMENSIONS ARE MEASURED FROM A ZERO LINE, CENTER LINE, AND A COMMON DATUM. ALL DIMENSIONS ARE SYMMETRICAL UNLESS OTHERWISE SPECIFIED.