

ACCESSORIES & EQUIPMENT

Collision Repair - Corvette

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Cross-Car Brace Mounting Bolts	25 N.m	18 lb ft
Windshield Frame Mounting Bolts	25 N.m	18 lb ft

DIMENSIONS - BODY

Point-to-point measurements are for reference only. All measurements are given in millimeters. Use these measurements for diagnosing and estimating. Point-to-point measurements are duplicated with tram bar pointers set at equal lengths. All die marks, holes, slots and fasteners are measured to the center. All dimensions are symmetrical unless otherwise specified

Point to Point Measurements

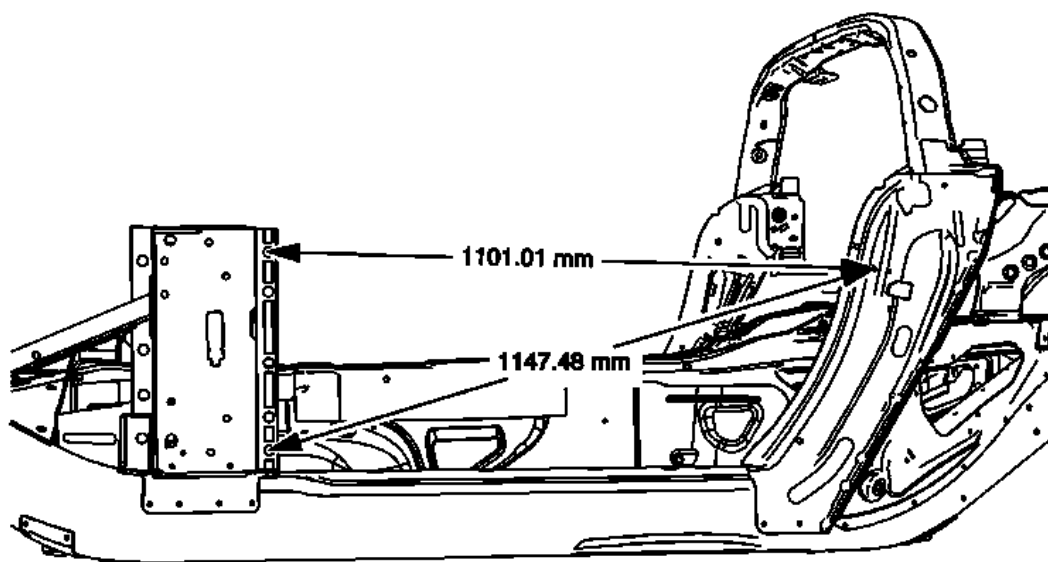


Fig. 1: Dimensions - Body (Point to Point Measurements)
Courtesy of GENERAL MOTORS COMPANY

DIMENSIONS - BODY (MOTOR COMPARTMENT - CORVETTE)

Point-to-point measurements are for reference only. All measurements are given in millimeters. Use these measurements for diagnosing and estimating. Point-to-point measurements are duplicated with tram bar pointers set at equal lengths. All die marks, holes, slots and fasteners are measured to the center. All dimensions are symmetrical unless otherwise specified

Point to Point Measurements

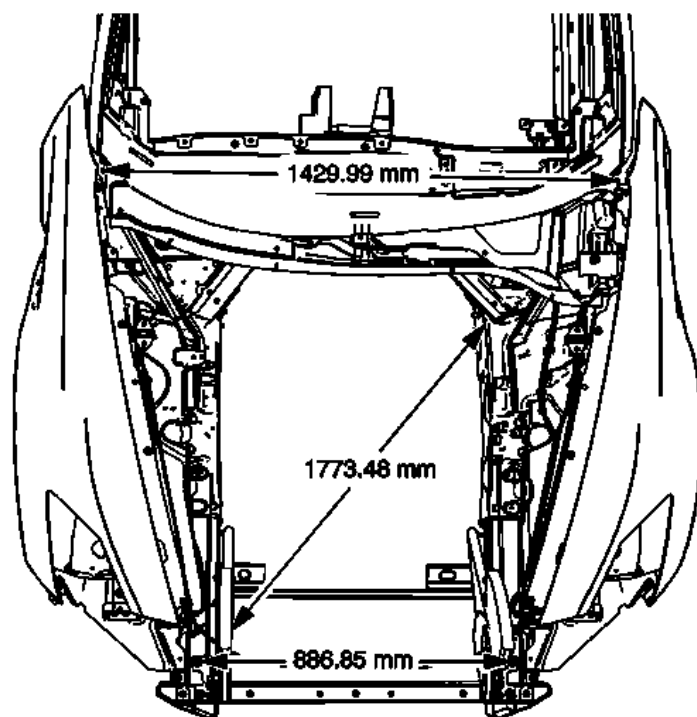


Fig. 2: Dimensions - Body (Motor Compartment - Corvette) (Point to Point Measurements)
Courtesy of GENERAL MOTORS COMPANY

VISUAL IDENTIFICATION

STRUCTURE IDENTIFICATION (CORVETTE)

Inner Panel Identification

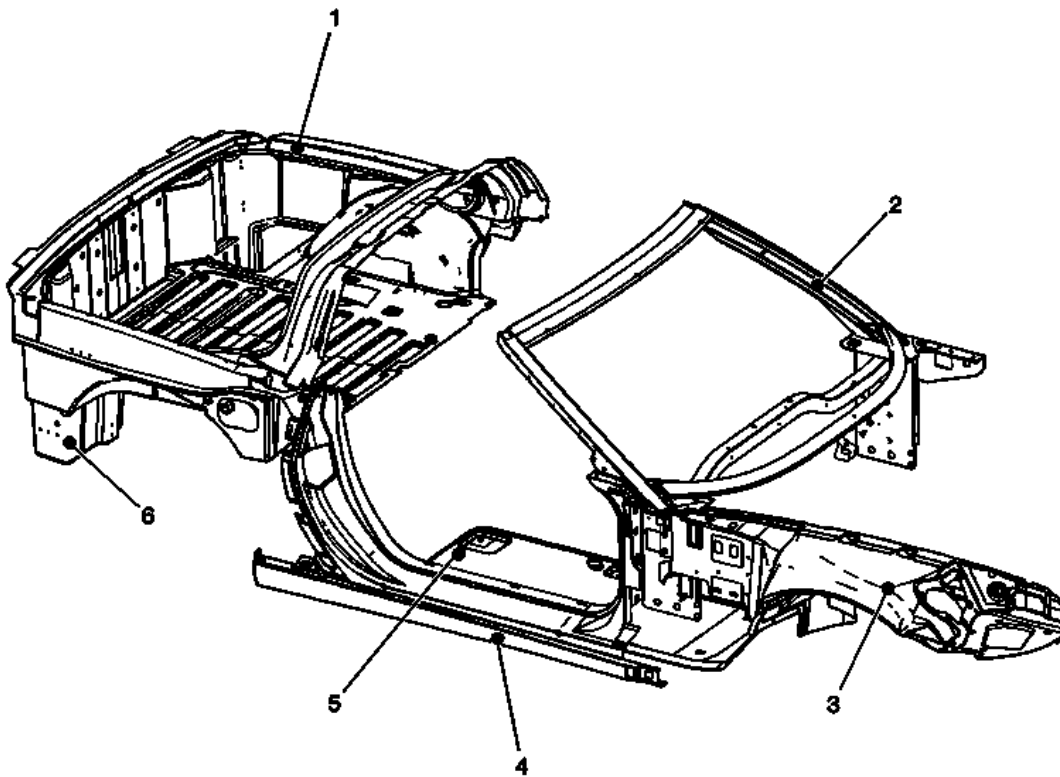


Fig. 3: Inner Panel Identification
Courtesy of GENERAL MOTORS COMPANY

Structure Identification (Corvette)

Number	Description	Material	Procedure
1	Rear Compartment Panel Frame	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Rear Compartment Panel Frame Replacement</u>
2	Windshield Frame	Aluminum	<u>Windshield Frame Replacement</u>
3	Front Wheelhouse	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Front Wheelhouse Panel Replacement</u>
4	Side Door Frame Opening	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Side Door Opening Frame Replacement</u>
5	Floor Panel	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Floor Panel Replacement</u>

6	Rear Compartment Panel	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Rear Compartment Panel Replacement</u>
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Frame Identification

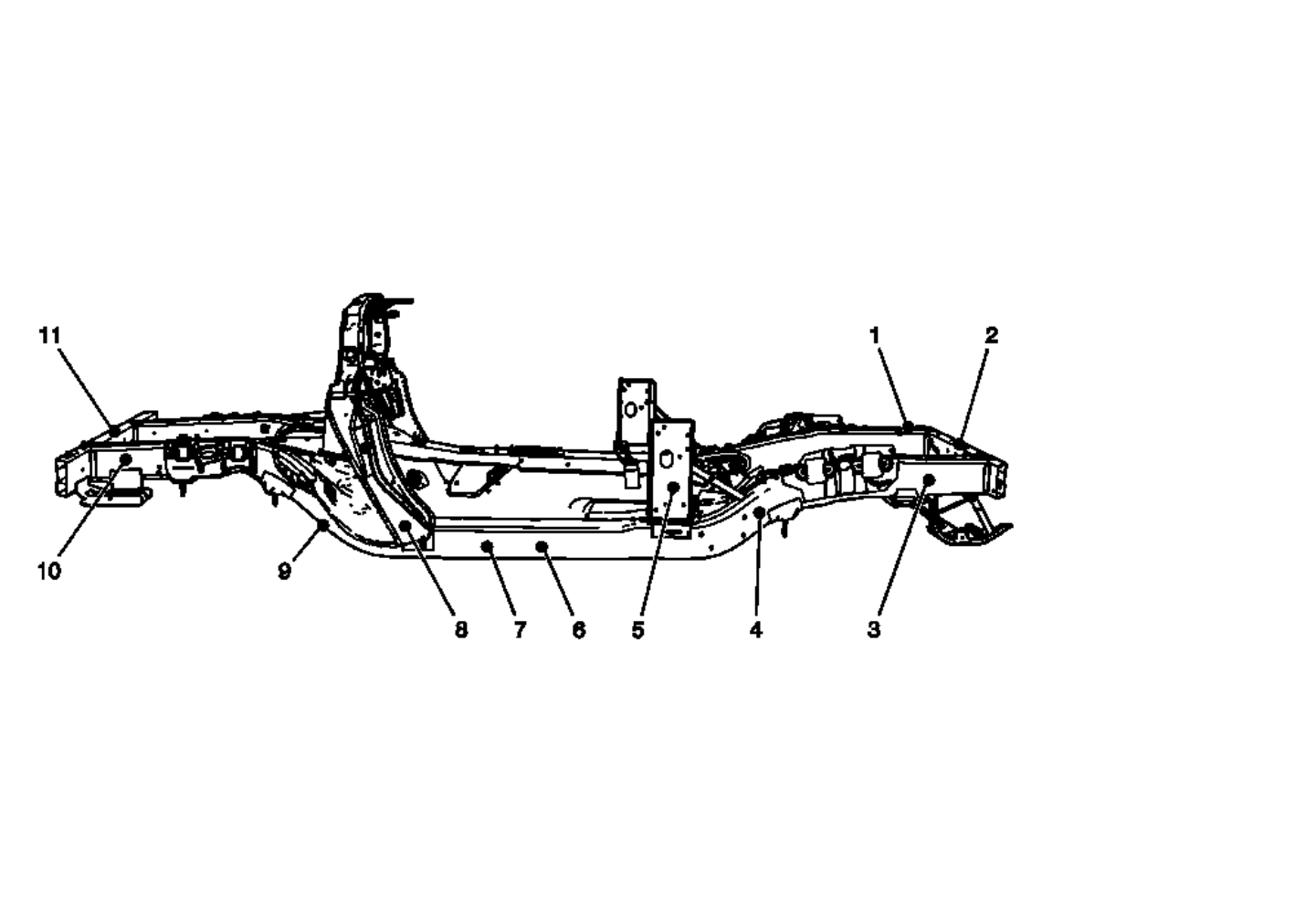


Fig. 4: Frame Identification
 Courtesy of GENERAL MOTORS COMPANY

Structure Identification (Corvette)

Number	Description	Material	Procedure
1	Hood Plate Stud	<u>Mild Steel</u>	<u>Hood Plate Stud Replacement</u>
2	Front Bumper Impact Bar	<u>Ultra High Strength Steel</u>	<u>Front Bumper Impact Bar Replacement</u>
3	Front Rail End	<u>Mild Steel</u>	
4	Front Rail Section	<u>Mild Steel</u>	

5	Front Body Hinge Pillar	<u>Mild Steel</u>	<u>Replacement</u>
6	Front Rail	<u>Mild Steel</u>	<u>Front Rail Replacement (Rear Section), Front Rail Replacement (Front Section)</u>
7	Rear Rail	<u>Mild Steel</u>	<u>Rear Rail Replacement (Front Section), Rear Rail Replacement (Rear Section)</u>
8	Front Door Lock Pillar	<u>Mild Steel</u>	<u>Body Lock Pillar Outer Panel Replacement</u>
9	Rear Rail Section	<u>Mild Steel</u>	
10	Rear Rail End	<u>Mild Steel</u>	
11	Rear Bumper Impact Bar	<u>Ultra High Strength Steel</u>	<u>Rear Bumper Impact Bar Replacement</u>

STRUCTURE IDENTIFICATION (Z06, ZR1)

Inner Panel Identification

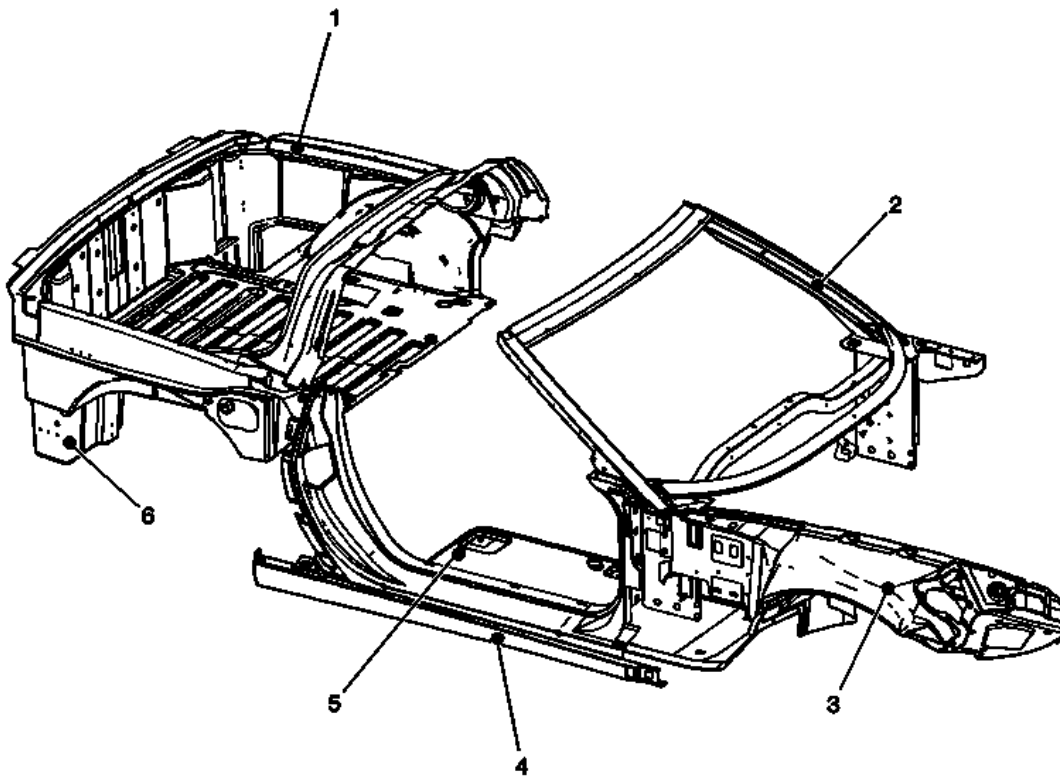


Fig. 5: Inner Panel Identification
Courtesy of GENERAL MOTORS COMPANY

Structure Identification (Z06, ZR1)

Number	Description	Material	Procedure
1	Rear Compartment Panel Frame	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Rear Compartment Panel Frame Replacement</u>
2	Windshield Frame	Aluminum	<u>Windshield Frame Replacement</u>
3	Front Wheelhouse	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Front Wheelhouse Panel Replacement</u>
4	Side Door Frame Opening	<u>Sheet Molded Compound (SMC)</u> <u>Panel Bonding</u>	<u>Side Door Opening Frame Replacement</u>
5	Floor Panel	Carbon Fiber	<u>Floor Panel Replacement</u>
6	Rear Compartment Panel	<u>Sheet Molded</u>	

		Panel Bonding	Replacement
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Frame Identification

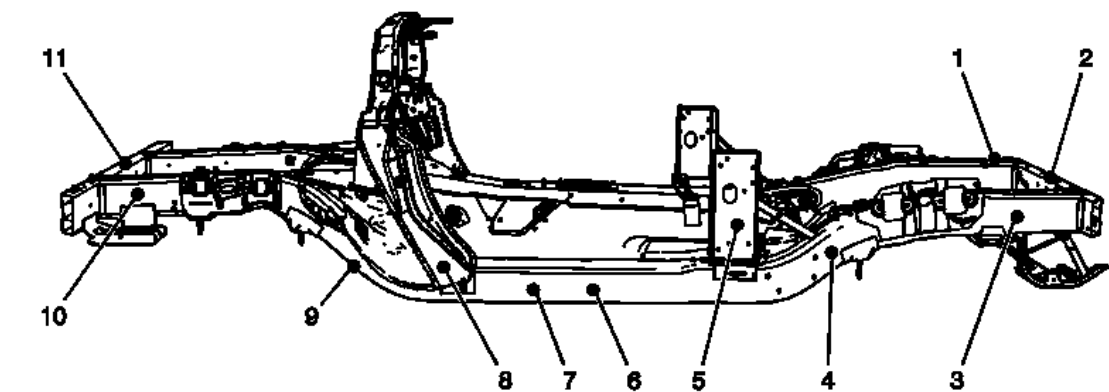


Fig. 6: Frame Identification
 Courtesy of GENERAL MOTORS COMPANY

Structure Identification (Z06, ZR1)

Number	Description	Material	Procedure
1	Hood Plate Stud	Aluminum	Hood Plate Stud Replacement
2	Front Bumper Impact Bar	Aluminum	Front Bumper Impact Bar Replacement
3	Front Rail End	Aluminum	
4	Front Rail Section	Aluminum	
5	Front Body Hinge Pillar	Aluminum	Front Hinge Pillar Body Replacement

6	Front Rail	Aluminum	<u>Front Rail Replacement (Rear Section), Front Rail Replacement (Front Section)</u>
7	Rear Rail	Aluminum	<u>Rear Rail Replacement (Front Section), Rear Rail Replacement (Rear Section)</u>
8	Front Door Lock Pillar	Aluminum	<u>Body Lock Pillar Outer Panel Replacement</u>
9	Rear Rail Section	Aluminum	
10	Rear Rail End	Aluminum	
11	Rear Bumper Impact Bar	Aluminum	<u>Rear Bumper Impact Bar Replacement</u>

REPAIR INSTRUCTIONS

FRONT BUMPER IMPACT BAR REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Repair as much of the damage as possible to the factory specifications.
5. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening are required.
6. Note the location and remove the sealers and anti-corrosion materials from the repair area. Refer to Anti-Corrosion Treatment and Repair .

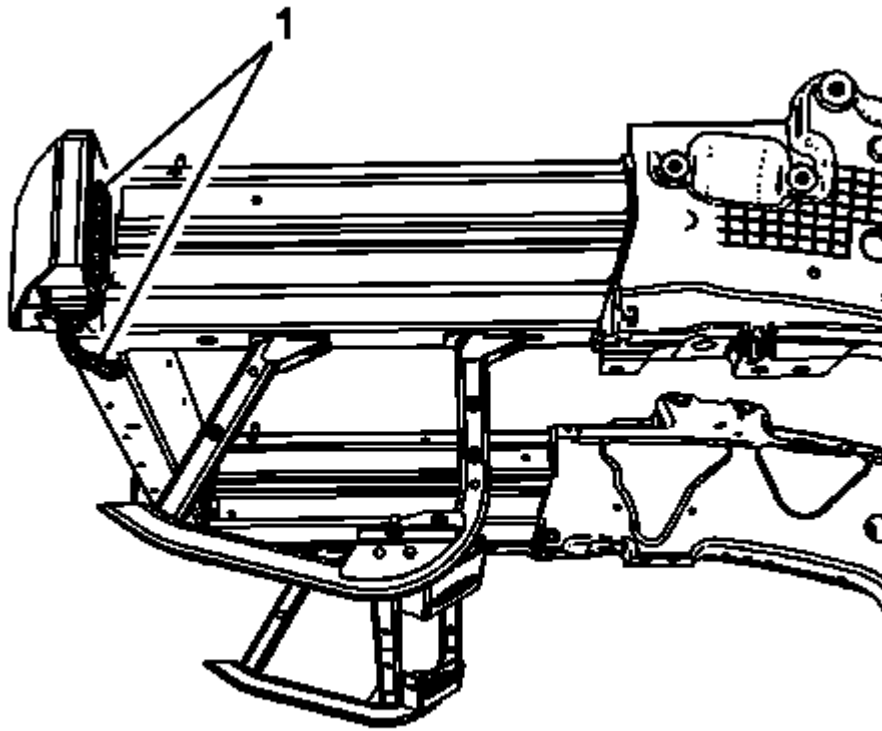


Fig. 7: Removing All Factory Welds
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- Hand tools, saw blades and abrasives used for aluminum repairs should be dedicated for aluminum only to prevent contamination.
- When removing welds, favor the bumper bar side of the weld joint.

7. Locate and remove all factory welds (1) attaching the front bumper bar to the front frame rails. Note the location of the welds for installation of the new bumper bar.

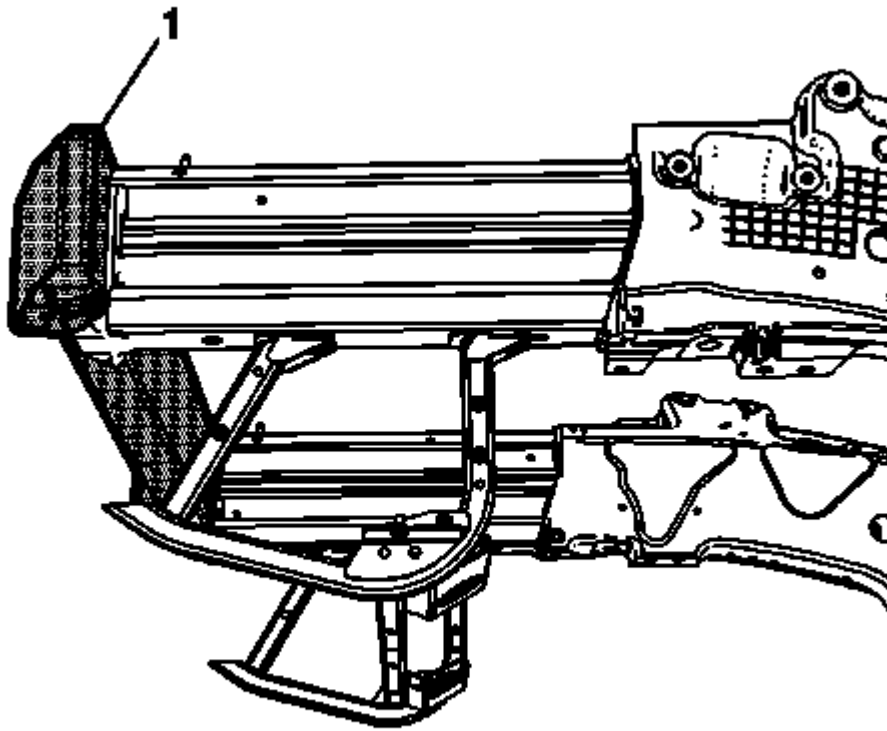


Fig. 8: Damaged Bumper Bar
Courtesy of GENERAL MOTORS COMPANY

8. Remove the damaged bumper bar (1).
9. Remove pieces of the bumper bar which are left attached to the rail ends.
10. Straighten and deburr the rail ends. Keep the perimeter and shape of the rail end as original as possible.

Installation Procedure

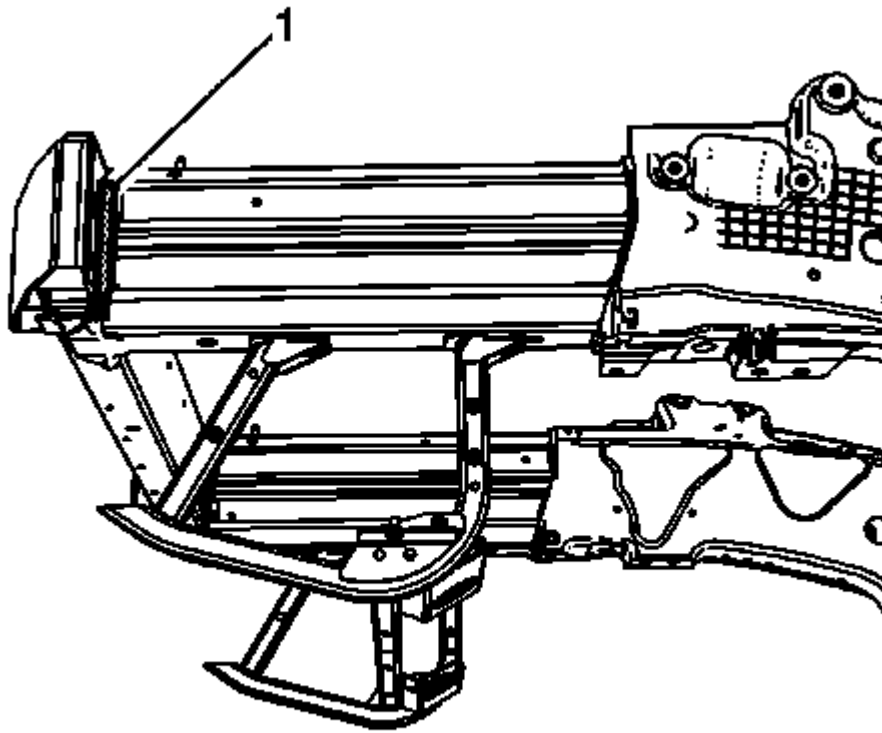


Fig. 9: Welding Triangle Brackets
Courtesy of GENERAL MOTORS COMPANY

NOTE: Due to welding accessibility, it may be necessary to weld the triangle brackets (1) to the bumper bar prior to installation of the bumper bar.

1. Dry fit the bumper bar for proper fit and alignment before welding.

NOTE: Use a stainless steel brush to remove the oxide layer prior to welding.

2. Clean and prepare all of the welded mating surfaces.

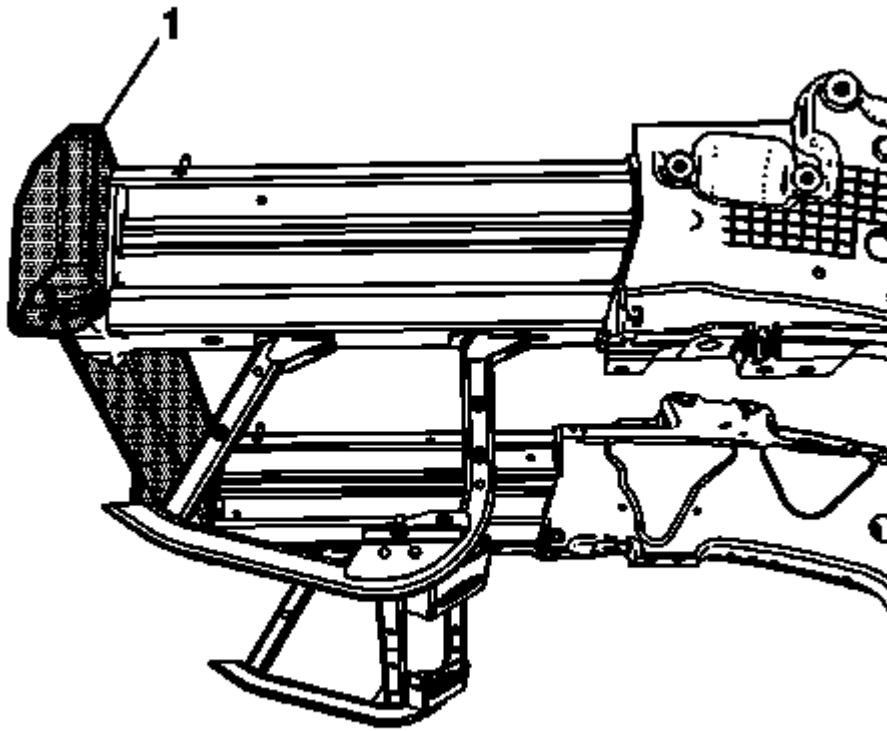


Fig. 10: Installing Front Bumper Bar
Courtesy of GENERAL MOTORS COMPANY

3. Install the front bumper bar (1).
4. Position the bumper bar to the vehicle using 3-dimensional measuring equipment.

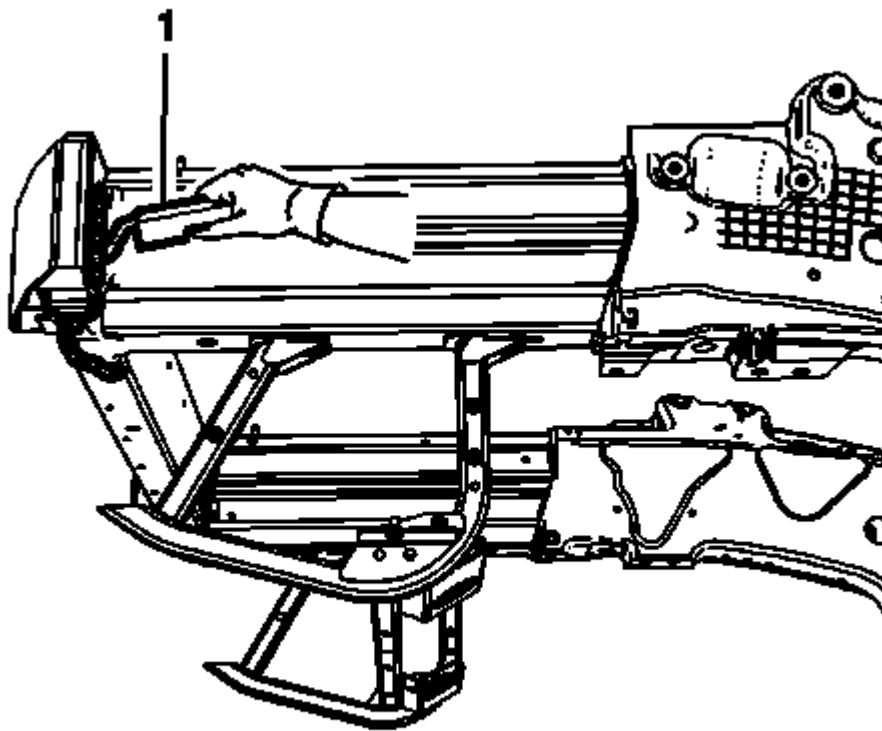


Fig. 11: Welding Bumper Bar To Frame Rail Ends Duplicating Factory Welds
Courtesy of GENERAL MOTORS COMPANY

NOTE: Recommend wire alloy is 5554 and wire size is .035. The shielding gas is 100 percent Argon.

A two minute cooling down period is recommend for every 2 minutes or 100 mm (4 in) of welding.

5. Using a PULSED-MIG (P-MIG) welder, weld (1) the bumper bar to the frame rail ends duplicating the factory welds.
6. Apply the sealers and anti-corrosion materials to the repair area. Refer to **Anti-Corrosion Treatment and Repair** .
7. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems** .
8. Install all related panels and components.
9. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
10. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

HOOD PLATE STUD REPLACEMENT

Removal Procedure

The hood anchor plate assembly is riveted to the inside of the front frame rail. Access to the hood plate assembly will require the removal of the welded front bumper bar.

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Note the location and remove the sealers and anti-corrosion materials from the repair area, as necessary. Refer to Anti-Corrosion Treatment and Repair .
5. Remove the hood hinge. Refer to Hood Hinge Replacement .
6. Remove the front impact bar. Refer to Front Bumper Impact Bar Replacement.

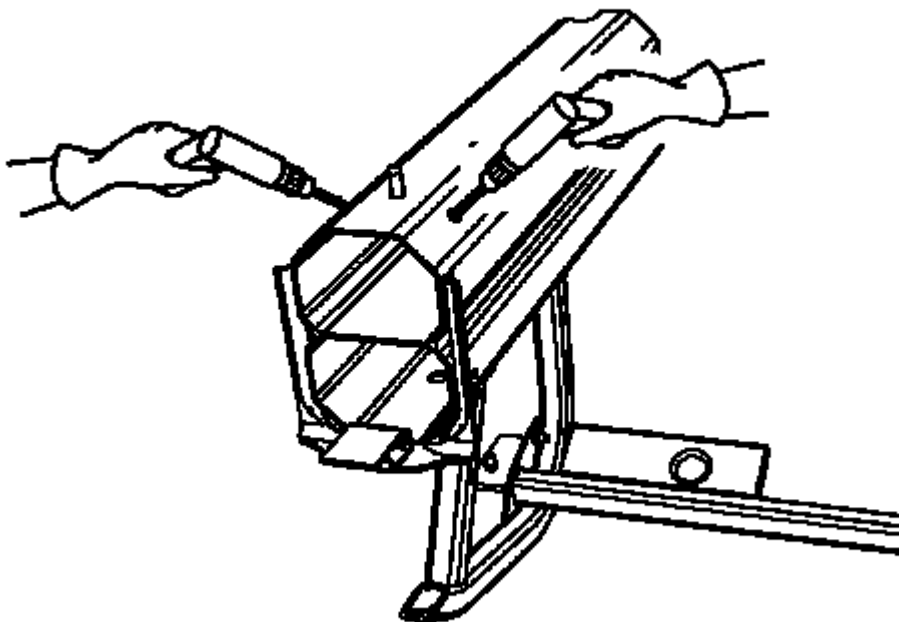


Fig. 12: Drilling Out Two Retaining Rivets
Courtesy of GENERAL MOTORS COMPANY

7. Drill out the two retaining rivets (1) holding the hood hinge bolt bracket.
8. Remove the broken hinge bolt.

Installation Procedure

NOTE: Replacement fasteners used with aluminum frames requires a tin-zinc coating to prevent galvanic corrosion.

1. Install a replacement bolt.
2. Install the hood hinge retaining bolt bracket rivets.
3. Install the front impact bar. Refer to **Front Bumper Impact Bar Replacement**.
4. Install the hood hinge. Refer to **Hood Hinge Replacement** .
5. Paint the repaired area. Refer to **Basecoat/Clearcoat Paint Systems** .
6. Apply the sealers and the anti-corrosion materials to the repaired area, as necessary. Refer to **Anti-Corrosion Treatment and Repair** .
7. Install all related panels and components.
8. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
9. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

FRONT WHEELHOUSE PANEL REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

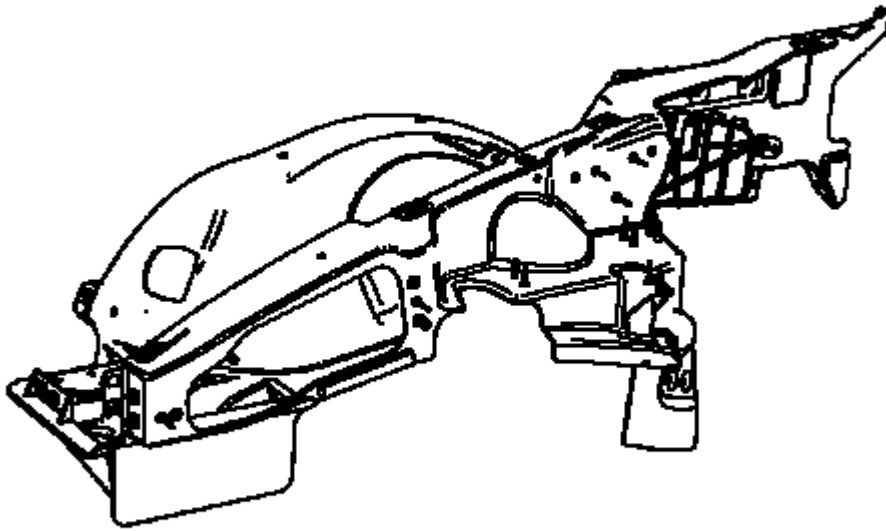


Fig. 13: Front Wheelhouse Panel
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Approved Equipment for Collision Repair Warning .

The front wheelhouse is comprised of 2 types of materials. These include sheet molded compound (SMC) for the inner panel and carbon fiber for the outer panel. The wheelhouse is bonded to the front structure and frame rail with structural adhesive.

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.

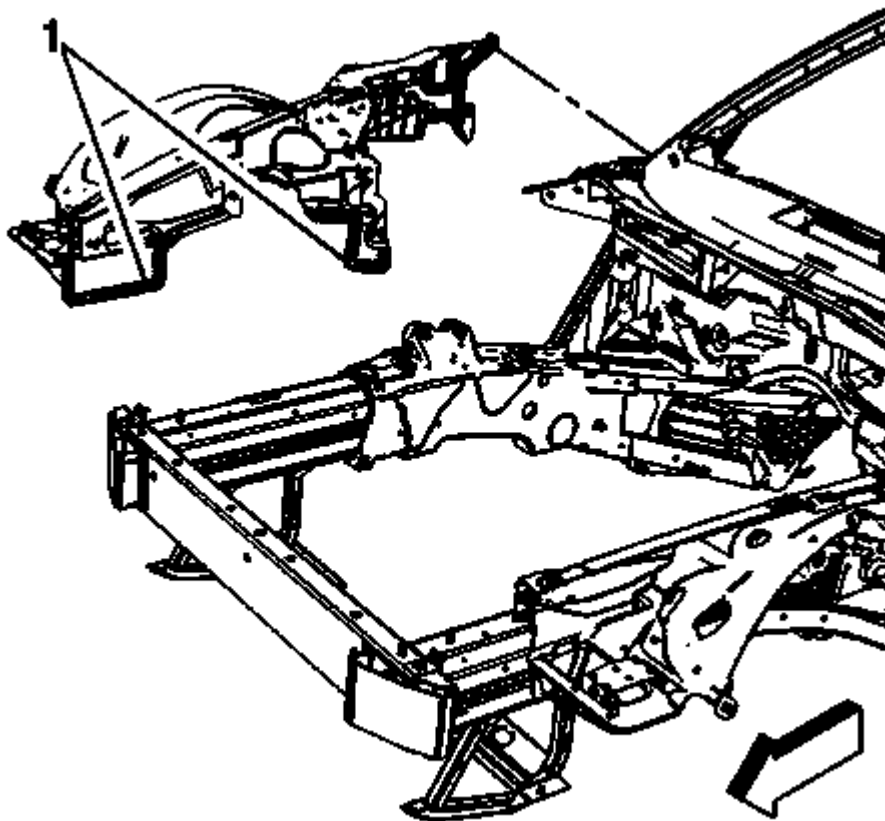


Fig. 14: Prying Detach Adhesive Along Bonding Surface
Courtesy of GENERAL MOTORS COMPANY

4. Remove the wheelhouse by applying heat and pry to detach adhesive along the bonding surface (1).

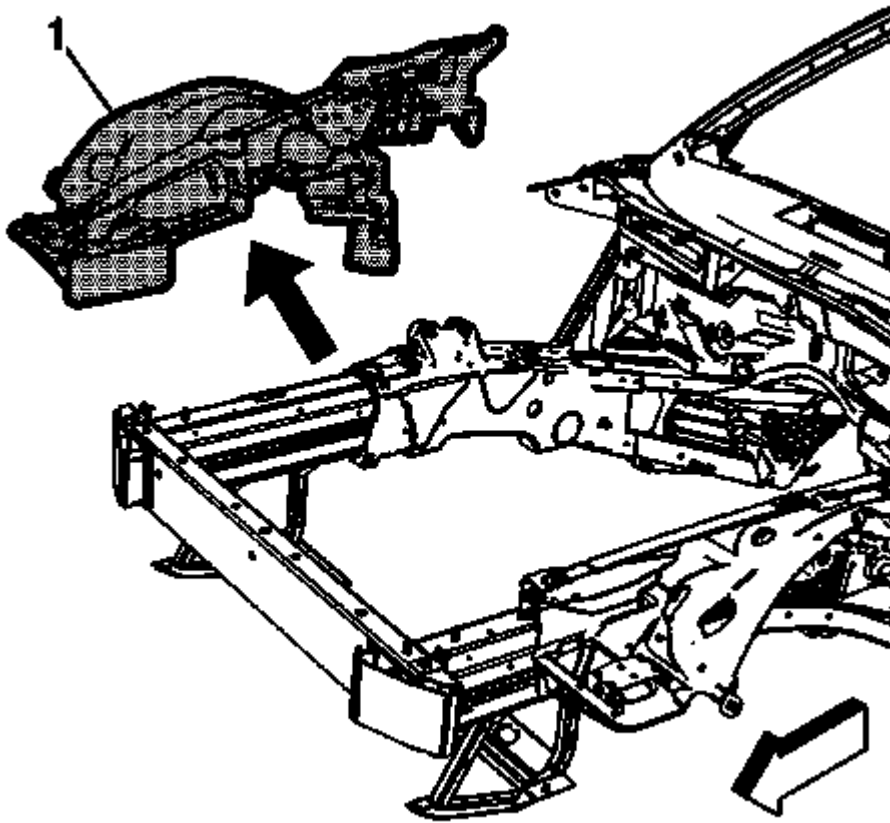


Fig. 15: Wheelhouse
Courtesy of GENERAL MOTORS COMPANY

5. Remove the wheelhouse (1) from the vehicle.
6. Save any and all brackets, mounting studs and accessories for transfer to the new front wheelhouse.
7. Note the location of the adhesive and remove all remaining loose adhesive.
8. Inspect the front structure and frame rails for damage.
9. Repair as much of the damage as possible to the factory specifications.
10. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening is required.

Installation Procedure

NOTE: Shims may be necessary to achieve proper panel alignment.

1. Before applying adhesive dry fit the wheelhouse, fender and hood for proper fit and alignment.

NOTE: DO NOT top coat any bonding surface. Use primer only on bonding surfaces. Refer to adhesive manufacturer's recommendations.

2. Clean and scuff all bonding mating surfaces according to adhesive manufacturer's recommendations.

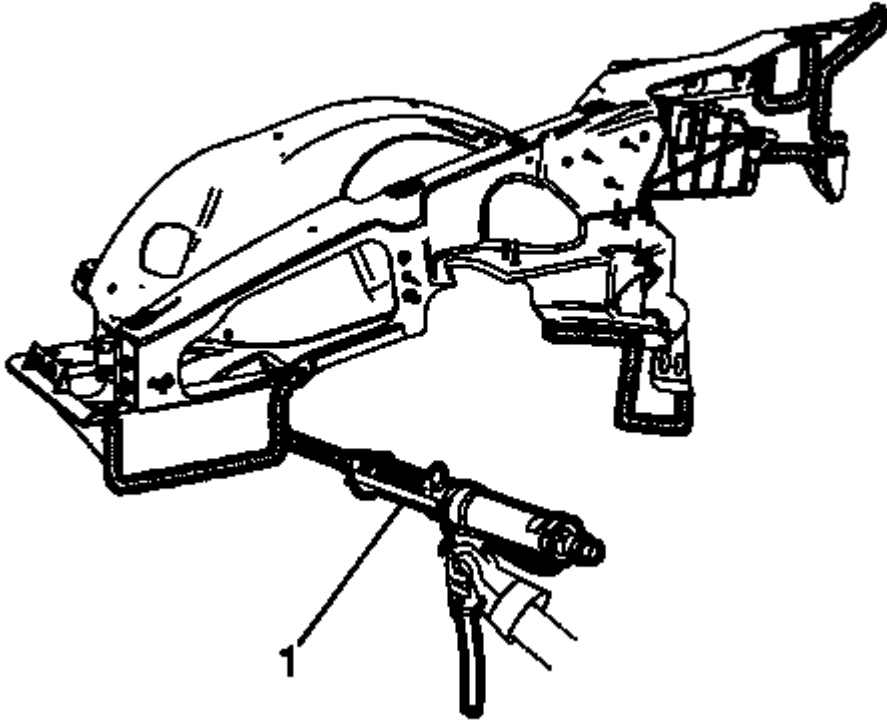


Fig. 16: Inspecting Old Wheelhouse For Factory Adhesive Bond Line
Courtesy of GENERAL MOTORS COMPANY

3. Inspect old wheelhouse for factory adhesive bond line. Apply a consistent bead of structural adhesive (1) 10 mm (3/8 in) in diameter to the wheelhouse to mate with the front structure and frame rail. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

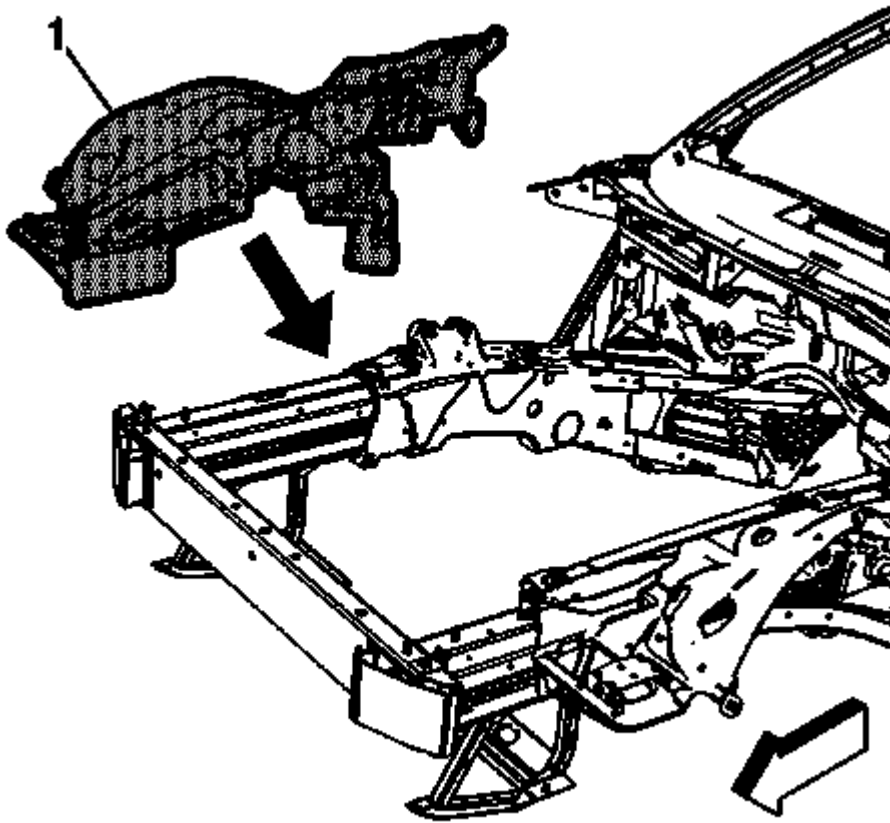


Fig. 17: Wheelhouse
Courtesy of GENERAL MOTORS COMPANY

4. Install the wheelhouse (1) to the vehicle.
5. Apply pressure to the wheelhouse to set the adhesive.
6. Clamp or mechanically fasten the wheelhouse into place as necessary.
7. Remove any excess adhesive and let dry to manufactures specifications.
8. Install all related panels and components.
9. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
10. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

FRONT HINGE PILLAR BODY REPLACEMENT

Removal Procedure

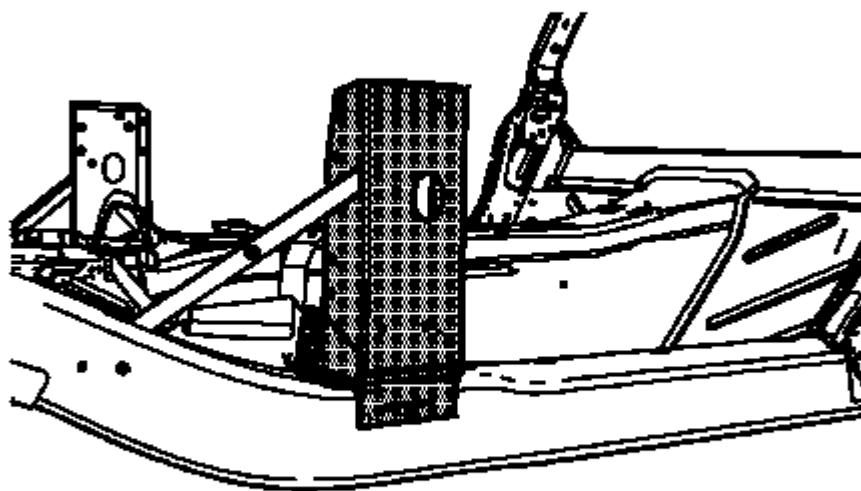


Fig. 18: View Of Hinge Pillar

Courtesy of GENERAL MOTORS COMPANY

NOTE: When welding cast aluminum recommend wire alloy is 4043 and the recommend wire size is 0.035. The shielding gas is 100 percent Argon.

The front hinge pillar panel is bolted, welded and bonded with structural adhesive to the side structure and frame rail. The replacement front hinge pillar panel is comprised of two types of materials. These include 6063 aluminum for the upper panel and A356 cast aluminum for the lower panel. You must remove and replace the side door opening panel in order to replace the front hinge pillar.

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Repair as much of the damage as possible to factory specifications. Refer to Dimensions -

5. Note the location of the sealers and the anti-corrosion materials and remove these components from the repair area as necessary. Refer to **Anti-Corrosion Treatment and Repair** .

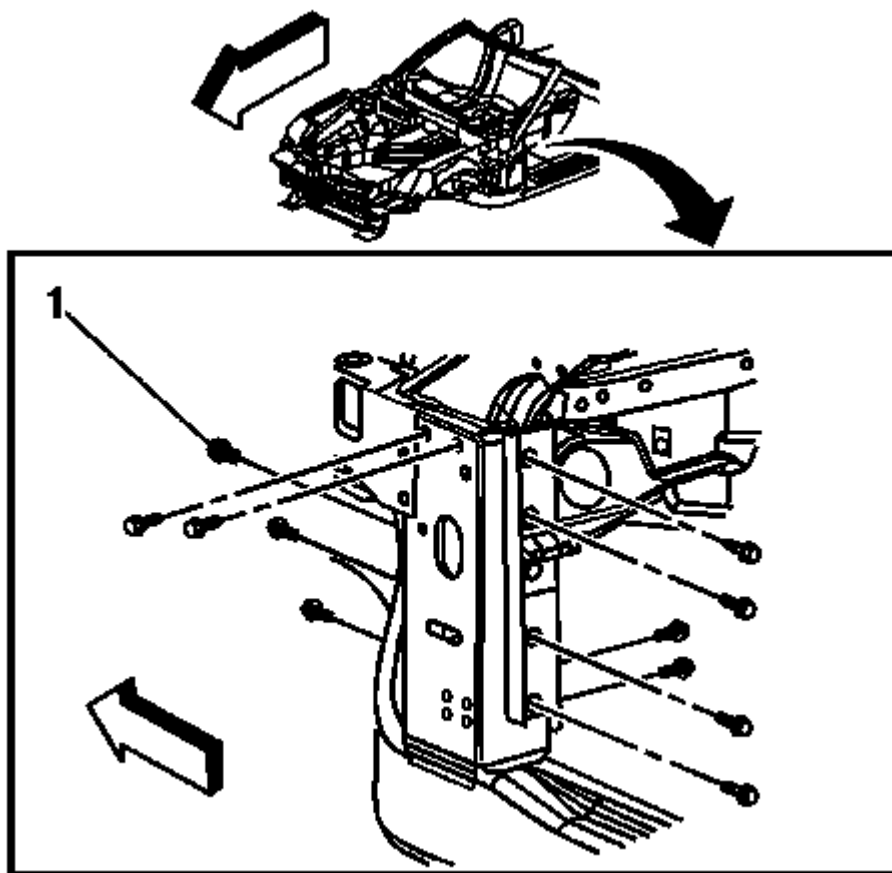


Fig. 19: View Of Windshield Frame To Front Hinge Pillars Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Remove the bolts (1) attaching the front hinge pillar to the windshield frame.

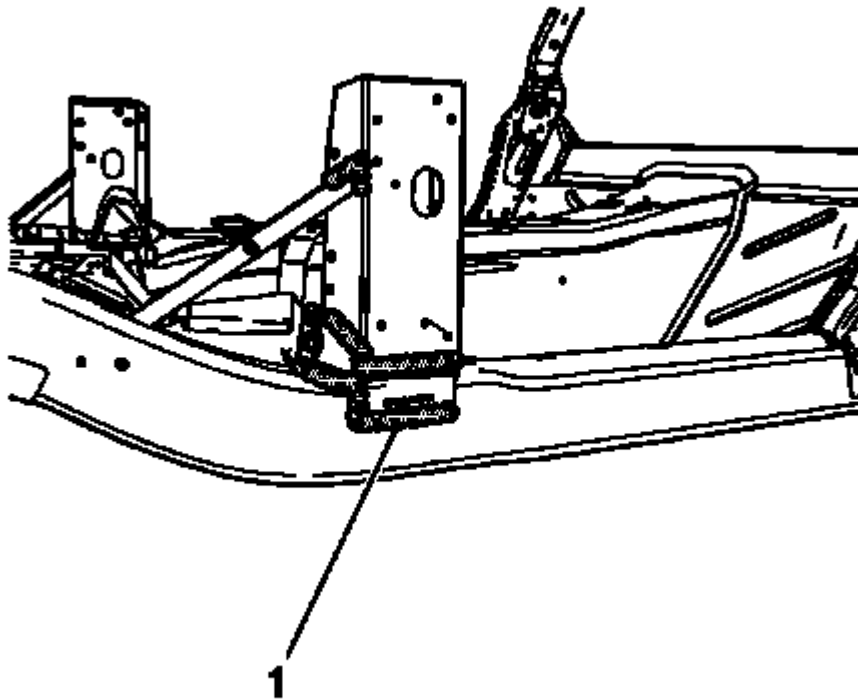


Fig. 20: Locating Factory Welds
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do NOT damage the inner panels or the reinforcements.

NOTE: Hand tools, saw blades and abrasives used for aluminum repairs should be dedicated for aluminum only to prevent contamination.

7. Locate and remove all factory welds (1) from the front outer hinge pillar. Note the number and location of the welds for installation of the new hinge pillar.

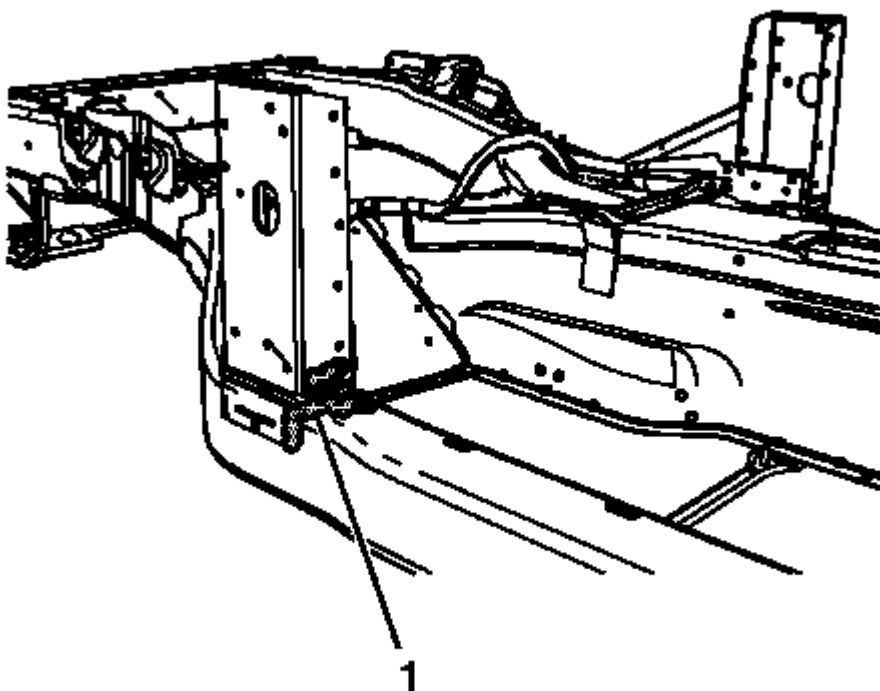


Fig. 21: Locating Factory Welds
Courtesy of GENERAL MOTORS COMPANY

8. Locate and remove all factory welds (1) from the rear outer hinge pillar. Note the number and location of the welds for installation of the new hinge pillar.

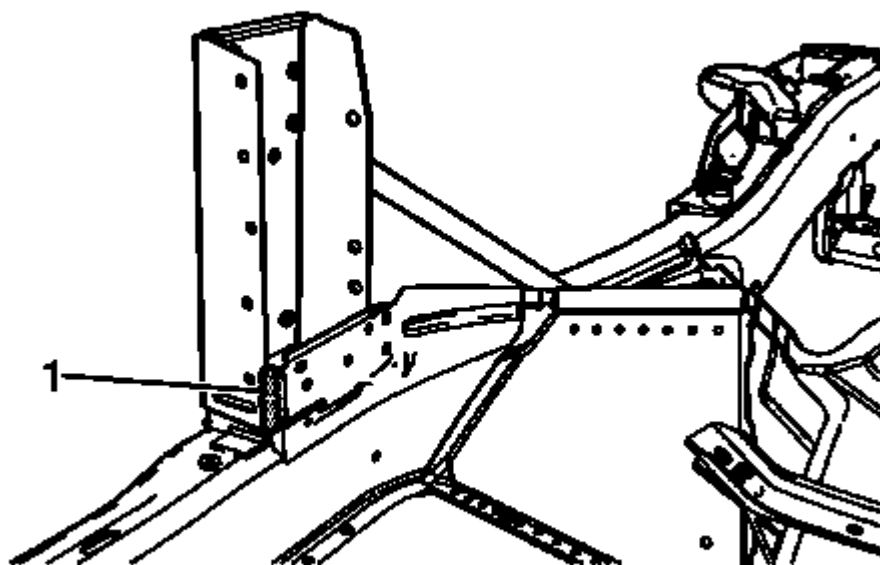


Fig. 22: View Of Inner Hinge Pillar Factory Welds
Courtesy of GENERAL MOTORS COMPANY

9. Locate and remove all factory welds (1) from the inner hinge pillar. Note the number and location of the welds for installation of the new hinge pillar.

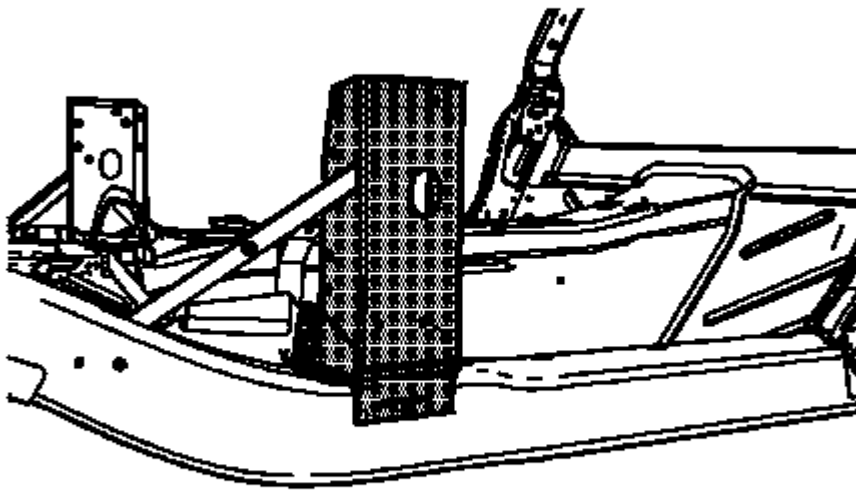


Fig. 23: View Of Hinge Pillar
Courtesy of GENERAL MOTORS COMPANY

10. Remove the damaged hinge pillar.
11. Note the location of the adhesive and remove all remaining loose adhesive.

Installation Procedure

1. Before applying the adhesive, dry fit the hinge pillar for proper fit and alignment.

NOTE: Use primer only on bonding surfaces. Do NOT top coat any bonding surfaces. Refer to the adhesive manufacture's recommendation.

2. Clean and prepare all bonding mating surfaces according to the adhesive manufacturer's recommendations.
3. Apply a consistent bead of structural adhesive 10 mm (3/8 in) in diameter to mate with the bonding surfaces. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

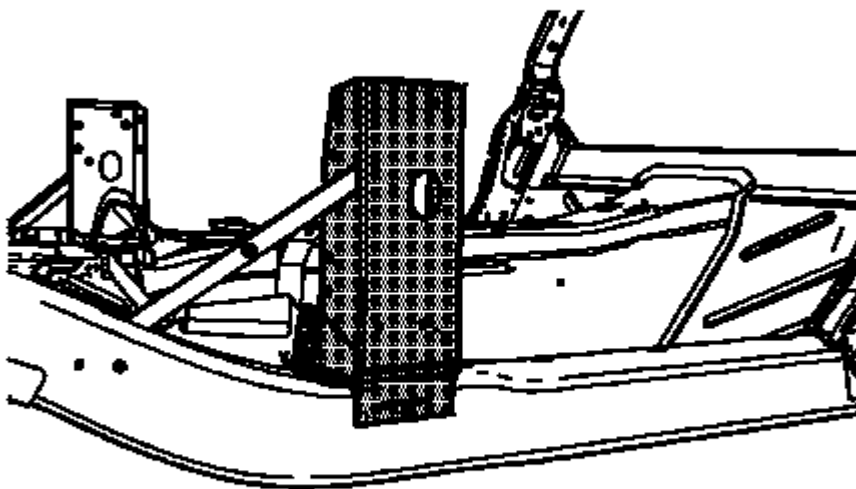


Fig. 24: View Of Hinge Pillar
Courtesy of GENERAL MOTORS COMPANY

4. Position the hinge pillar to the vehicle using 3-dimensional measuring equipment.

CAUTION: Refer to Fastener Caution .

5. Install the bolts (1) that attach the windshield frame to the front hinge pillar and tighten to 25 N.m (18 lb ft).

NOTE: Use a stainless steel brush to remove the oxide layer prior to welding.

NOTE: Recommend wire alloy is 4043 and wire size is 0.035. The shielding gas is 100 percent Argon. A 2 minute cooling down period is recommend for every 2 minutes or 100 mm (4 in) of welding.

6. Prepare all welding attachment surfaces as necessary.

Using a PULSED-MIG welder, tack weld the hinge pillar to the vehicle.

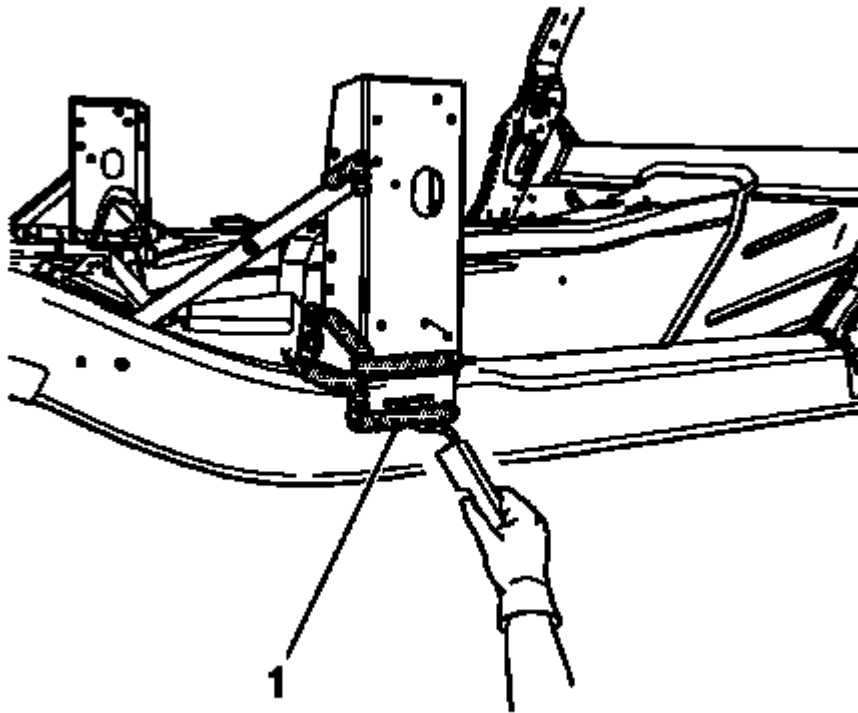


Fig. 25: Stitch Welding Front Outer Hinge Pillar
Courtesy of GENERAL MOTORS COMPANY

7. Using a PULED-MIG welder, stitch weld the front outer hinge pillar to the vehicle in the locations noted on the original panel.

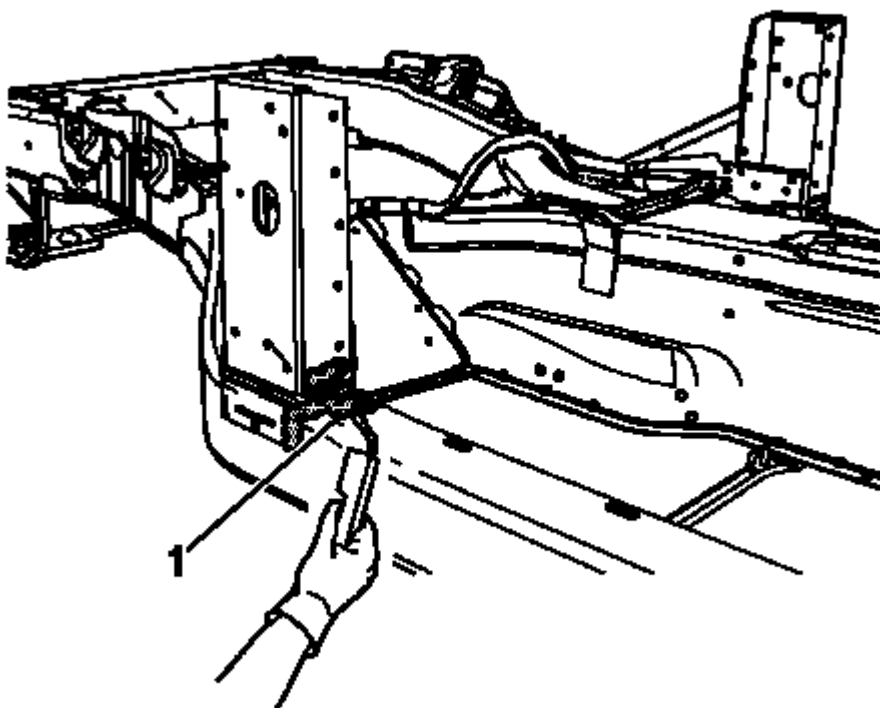


Fig. 26: Stitch Welding Rear Outer Hinge Pillar
Courtesy of GENERAL MOTORS COMPANY

8. Using a PULED-MIG welder, stitch weld the rear outer hinge pillar to the vehicle in the locations noted on the original panel (1).

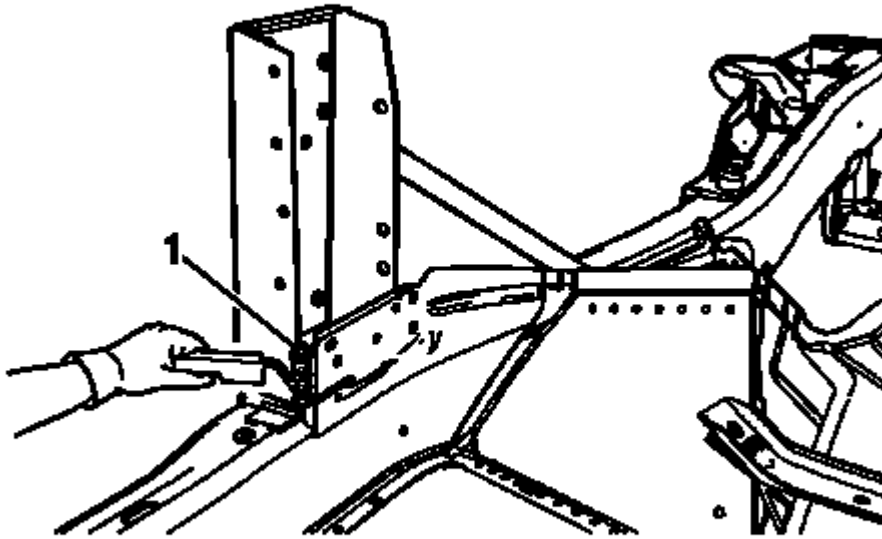


Fig. 27: Stitch Welding Inner Hinge Pillar
Courtesy of GENERAL MOTORS COMPANY

9. Using a PULED-MIG welder, stitch weld the inner hinge pillar to the vehicle in the locations noted on the original panel.
10. Apply the sealers and the anti-corrosion materials to the repair area, as necessary. Refer to **Anti-Corrosion Treatment and Repair** .
11. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems** .
12. Install all related panels and components.
13. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
14. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

BODY LOCK PILLAR OUTER PANEL REPLACEMENT

Removal Procedure

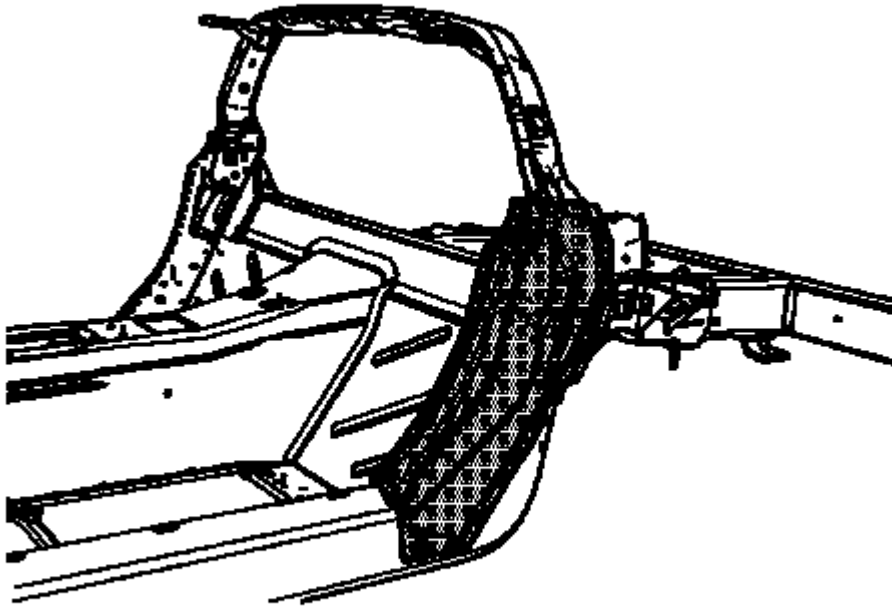


Fig. 28: Position Outer Lock Pillar
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Repair as much of the damage as possible to factory specifications. Refer to Dimensions - Body, Dimensions - Body (Motor Compartment - Corvette).

WARNING: Refer to Sound Deadener Foam in the Lock Striker Pillars Warning .

5. Note the location of the sealers and anti-corrosion materials and remove these components from the repair area as necessary. Refer to Anti-Corrosion Treatment and Repair .

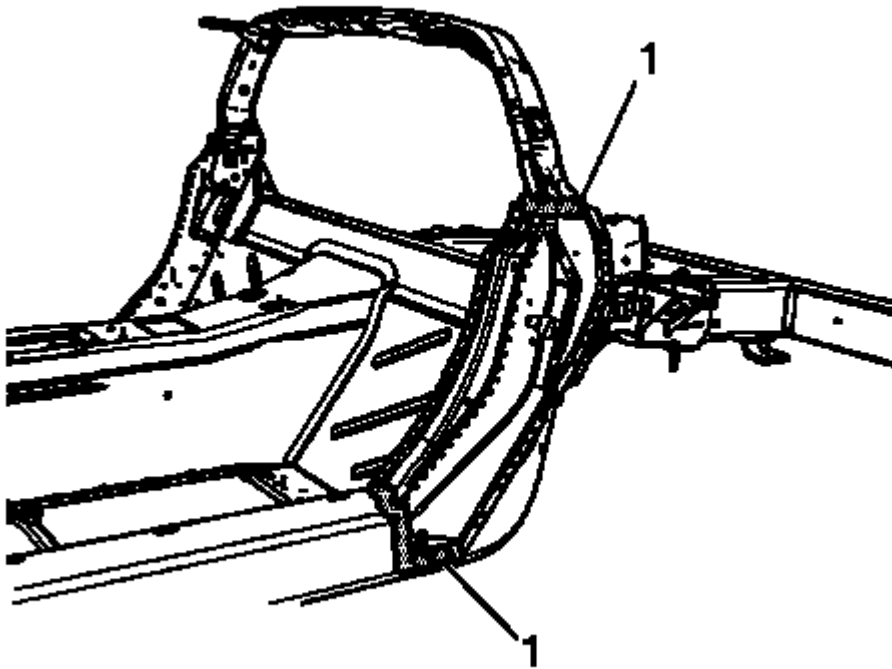


Fig. 29: Locating And Removing All Factory Welds
Courtesy of GENERAL MOTORS COMPANY

6. Locate and remove all factory welds (1). Note the number and the location of the welds for installation of the replacement part.

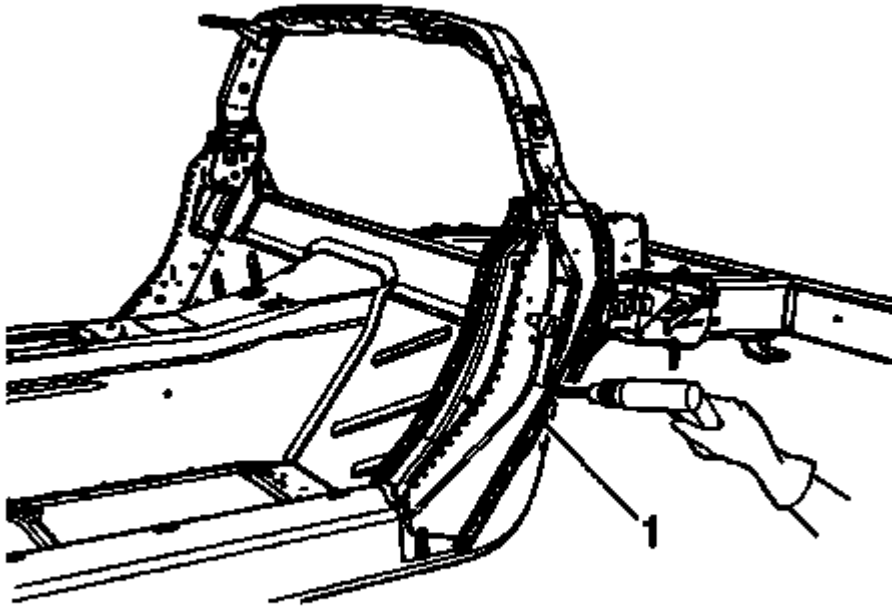


Fig. 30: Using A Drill With A 6 Mm (1/4 In) Bit
Courtesy of GENERAL MOTORS COMPANY

7. Remove the damaged outer lock pillar.

Installation Procedure

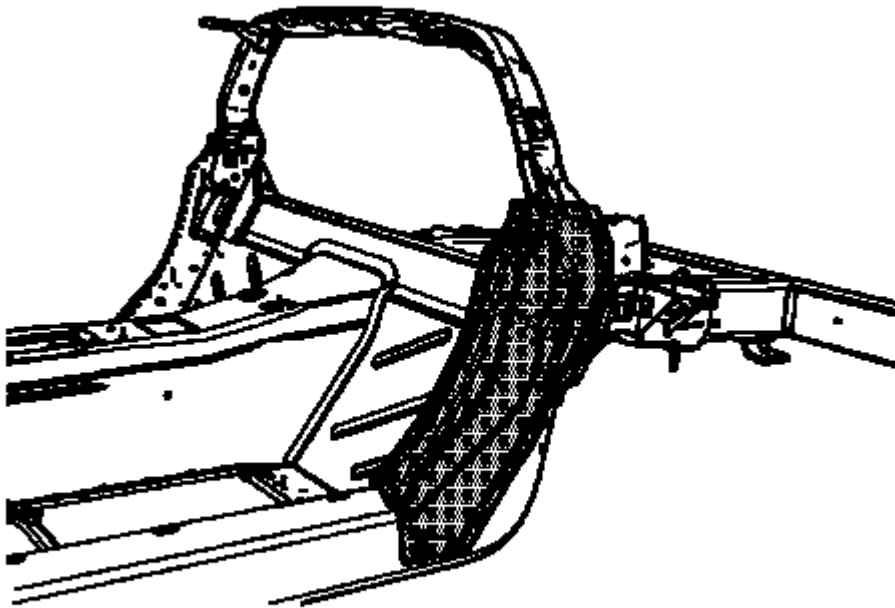


Fig. 31: Position Outer Lock Pillar
Courtesy of GENERAL MOTORS COMPANY

1. Position the outer lock pillar.

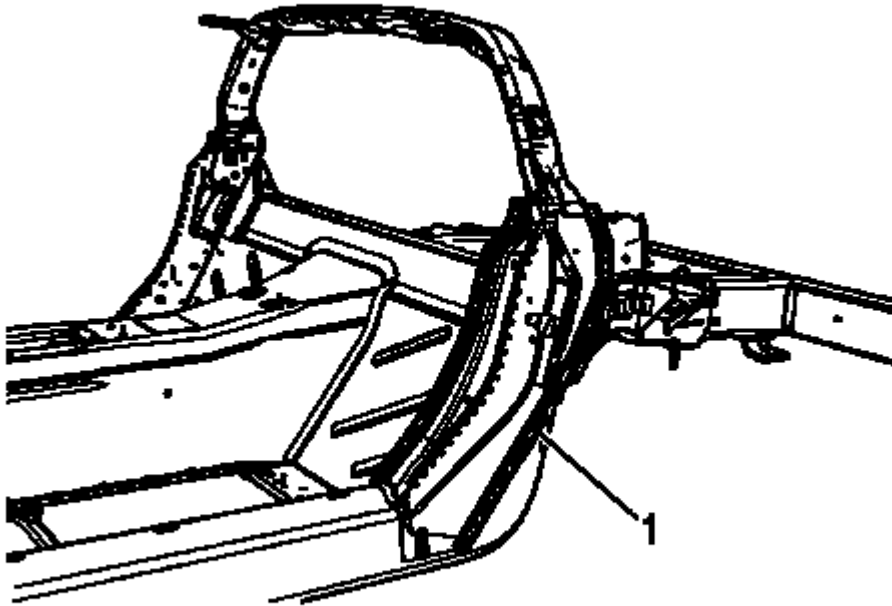


Fig. 32: Drilling 6 Mm (1/4 In) Holes
Courtesy of GENERAL MOTORS COMPANY

2. Clean and prepare all mating surfaces, as necessary for welding.
3. Drill 8 mm (5/16 in) for plug welding around the perimeter of the outer lock pillar (1) as noted from the original panel.
4. Verify the fit of the outer lock pillar reinforcement.
5. Clamp the outer lock pillar into position

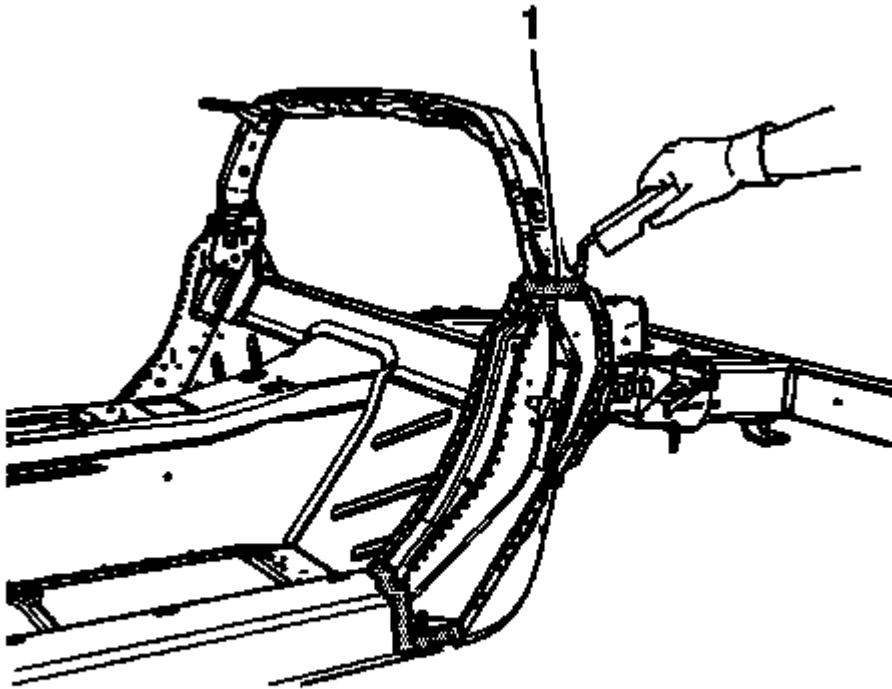


Fig. 33: Welding Lock Pillar To Structure
Courtesy of GENERAL MOTORS COMPANY

NOTE: Recommended wire alloy is 5554 and wire size is 0.035. The shielding gas is 100 percent Argon.

6. Using a PULSED-MIG (P-MIG) or Resistance Welder, weld the lock pillar to the structure duplicating the factory welds (1).
7. Apply the sealers and the anti-corrosion materials to the repair area, as necessary. Refer to **Anti-Corrosion Treatment and Repair** .
8. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems** .
9. Install all related panels and components.
10. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
11. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

REAR BUMPER IMPACT BAR REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Remove or reposition the wiring to avoid damage.
5. Repair as much of the damage as possible to the factory specifications.

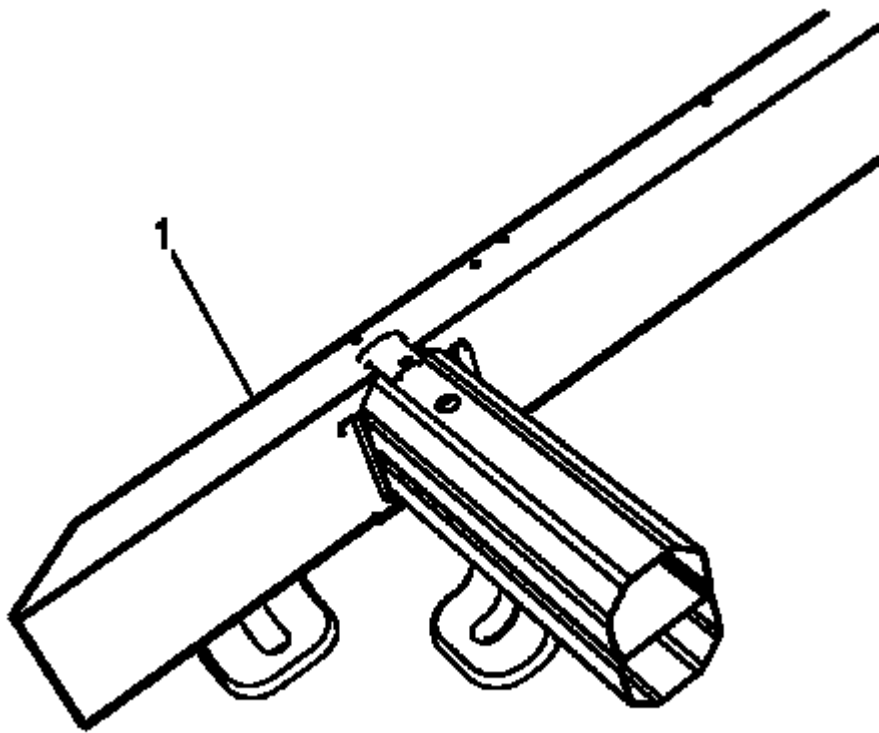


Fig. 34: Using J 42058 Frame Adapter Clamp To Secure Vehicle If Pulling And Straightening Are Required
Courtesy of GENERAL MOTORS COMPANY

6. Use J 42058 frame adapter clamp to secure the vehicle if pulling and straightening are required.

Refer to Anti-Corrosion Treatment and Repair .

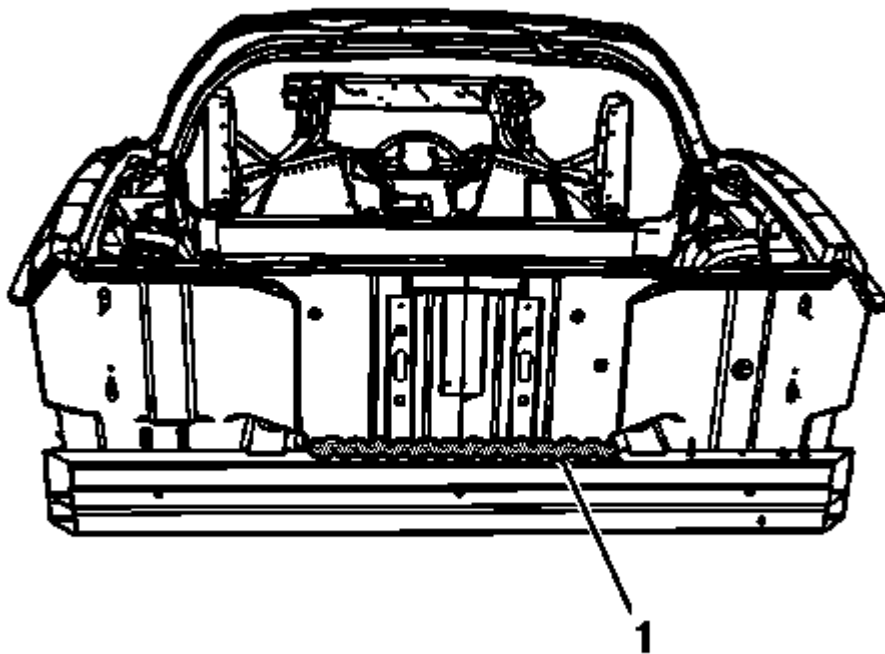


Fig. 35: View Of Detaching Adhesive From Rear Bar
Courtesy of GENERAL MOTORS COMPANY

8. Using a heat gun, detach the adhesive from the rear bar (1) to the rear compartment panel. Apply heat along the top of the impact bar and pry apart to separate the impact bar from the rear compartment panel.

NOTE: Do not cut into the frame rails.

9. Cut the welds around the perimeter of the frame rail ends. Cut the welds favoring the impact bar side of the joint.

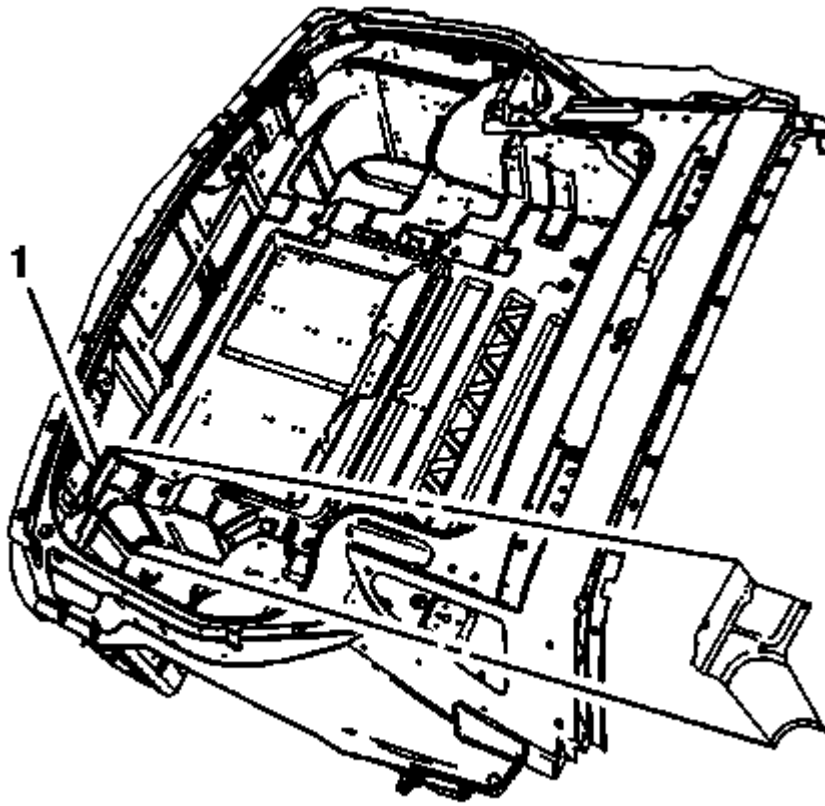


Fig. 36: Modify Rear Wall Of SMC Rear Compartment Panel
Courtesy of GENERAL MOTORS COMPANY

10. To gain access to the inner rail welds, modify the rear wall of the SMC rear compartment panel in the following manner:
 - From inside the vehicle locate, mark and cut out windows in the rear compartment panel.
 - Save the cutouts for re-installation.

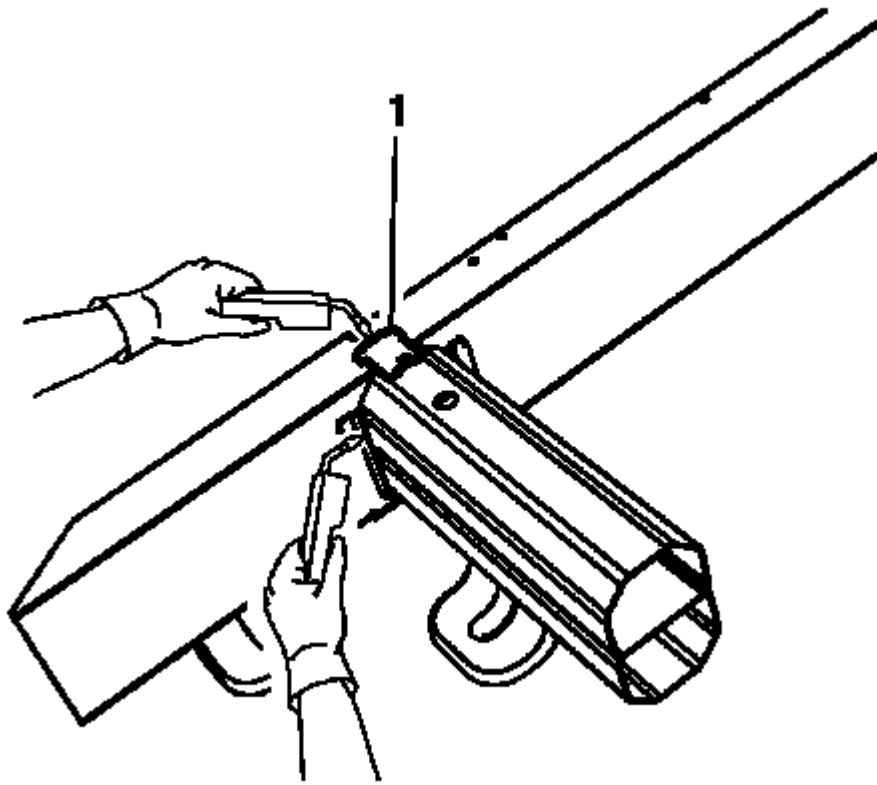


Fig. 37: MIG Welds

Courtesy of GENERAL MOTORS COMPANY

11. Extract pieces of the impact bar which are left attached to the rail ends.
12. The windows provide access to the MIG welds (1) attaching the impact bar to the rails.
13. Cut the remaining welds around the perimeter of the impact bar, favoring the impact bar side of the joint.
14. Remove the damaged impact bar.
15. Extract pieces of the impact bar which are left attached to the rail ends.
16. Straighten and deburr the rail ends. Keep the perimeter and shape of the rail ends as original as possible.

Installation Procedure

1. Temporarily position the impact bar for proper fit and alignment.
2. Clean and prepare all of the welded surfaces.
3. Apply GM-approved Weld-Thru Coating or equivalent to all mating surfaces. Refer to **Anti-Corrosion Treatment and Repair** .

bonding surfaces. Refer to adhesive manufacturer's recommendations.

4. Clean and prepare all bonding mating surfaces according to adhesive manufacturer's recommendations.
5. Apply a consistent bead of structural adhesive to the top impact bar to bond to the rear compartment panel. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.
6. Position the bumper impact bar to the vehicle using 3-dimensional measuring equipment.

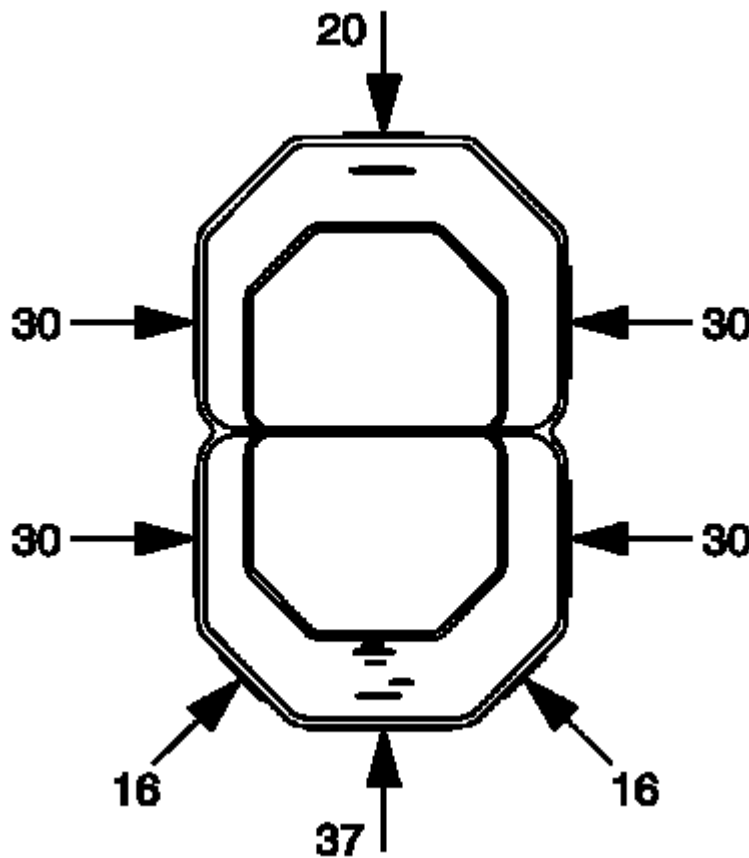


Fig. 38: View Of Weld Locations
Courtesy of GENERAL MOTORS COMPANY

NOTE: If no trace of the original welds are present, follow the pattern specified for welding the side rails to the impact bar.

7. Using a metal inert gas (MIG) welder, stitch weld the rear bar to the frame rail ends.

NOTE: Recommend wire alloy is 5554 and wire size is 0.035. The shielding gas is 100 percent Argon. A two minute cooling down period is recommended for every 2 minutes or 100 m (4 in) of welding.

NOTE: DO NOT top coat the bonding surface of the rear bar. Use primer only on bonding surfaces. Refer to adhesive manufacturer's recommendations.

8. Clean and prepare all bonding mating surfaces according to adhesive manufacturer's recommendations.

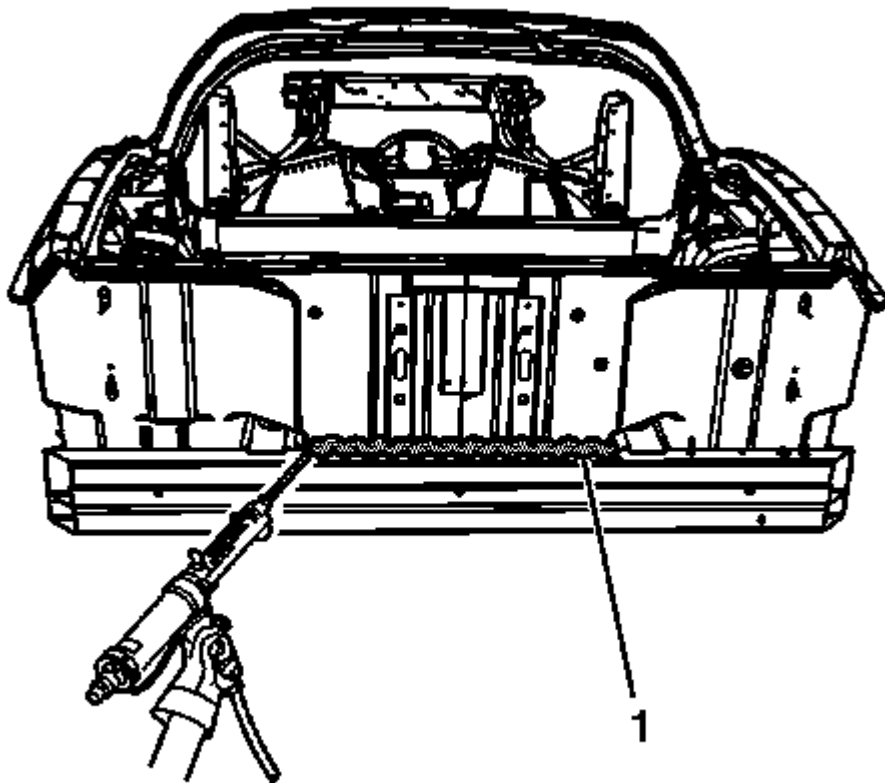


Fig. 39: Applying A Consistent Bead Of Structural Adhesive
Courtesy of GENERAL MOTORS COMPANY

9. Apply a consistent bead of structural adhesive to the top impact bar to bond to the rear compartment panel (1). Refer to **Sheet Molded Compound (SMC) Panel Bonding**.
10. Reinstall the SMC cut outs
11. Apply the sealers and anti-corrosion materials to the repair area. Refer to **Anti-Corrosion Treatment and Repair** .
12. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems** .
13. Install all related panels and components.
14. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
15. Enable SIR system. Refer to **SIR Disabling and Enabling** .

FRONT RAIL REPLACEMENT (REAR SECTION)

Special Tools

J-42058 Frame Adapter Clamp

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

WARNING: Refer to **Approved Equipment for Collision Repair Warning** .

1. Disable the SIR system. Refer to **SIR Disabling and Enabling** .
2. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
3. Remove all related panels and components.
4. Remove the front impact bar. Refer to **Front Bumper Impact Bar Replacement**.
5. Note the location and remove the sealers and anti-corrosion materials from the repair area, as necessary. Refer to **Anti-Corrosion Treatment and Repair** .
6. Repair as much of the damage as possible to the factory specifications.
7. Use J-42058 frame adapter clamp, or equivalent, to secure the vehicle if pulling and straightening are required.
8. Inspect the front of the dash panel, floor panels and all other sheet molded compound (SMC) and carbon fiber for cracks or areas that may need to be repaired or resealed.

NOTE: Hand tools, saw blades and abrasives used for aluminum repairs should be dedicated for aluminum only to prevent contamination.

9. Remove the front floor panel. Refer to **Floor Panel Replacement**.

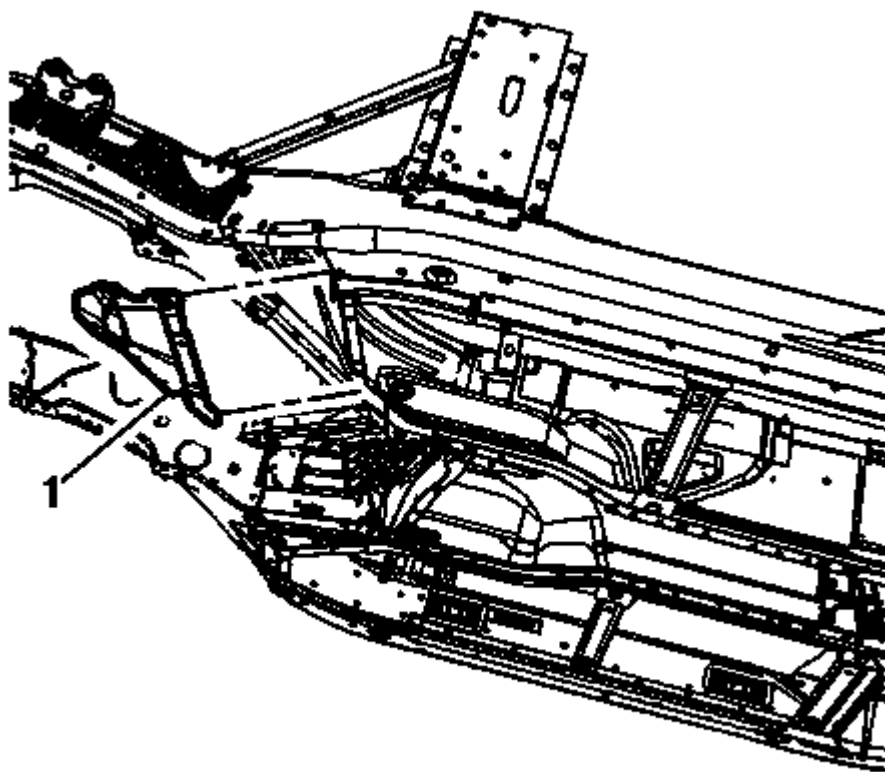


Fig. 40: Screws Attaching Front Floor Panel Extension
Courtesy of GENERAL MOTORS COMPANY

NOTE: The adhesive material will release from the structure by applying heat to approximately 200°C (400°F). A noticeable popping sound can normally be heard when the adhesive releases.

10. Remove the screws attaching the front floor panel extension (1) to the frame rail. The front floor panel extension is bonded to the frame rail.
11. Pry the extension downward while applying heat to the outboard edge of the panel along the bond line to separate.
12. Remove the front lower extension panel.

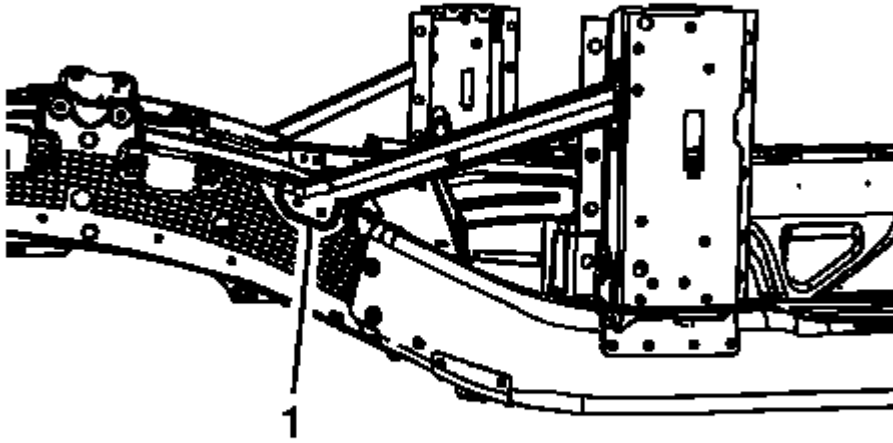


Fig. 41: Screws From Front Floor Panel Upper Support
Courtesy of GENERAL MOTORS COMPANY

13. Remove the screws from the front floor panel upper support (1).

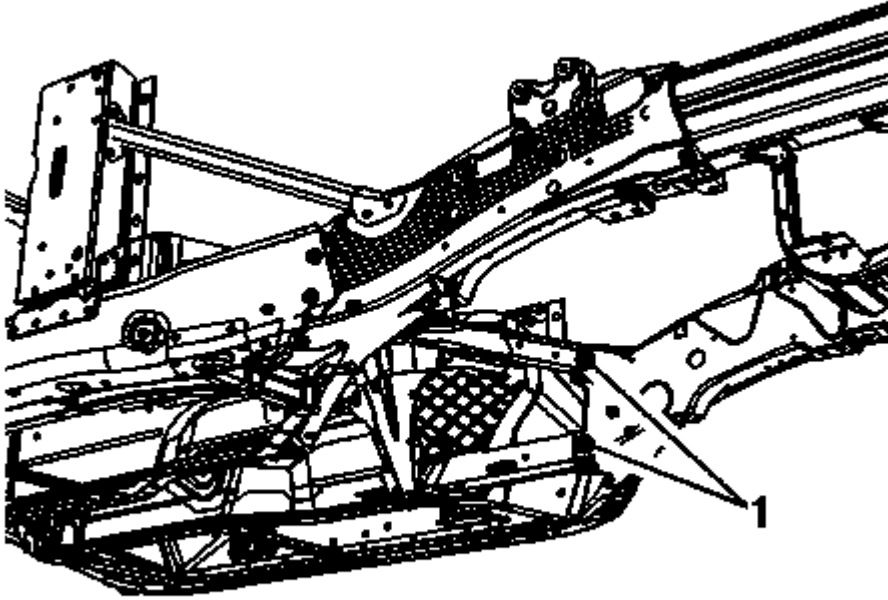


Fig. 42: Screws From Lower Frame Rail Extensions
Courtesy of GENERAL MOTORS COMPANY

14. Remove the screws from the lower frame rail extensions (1).

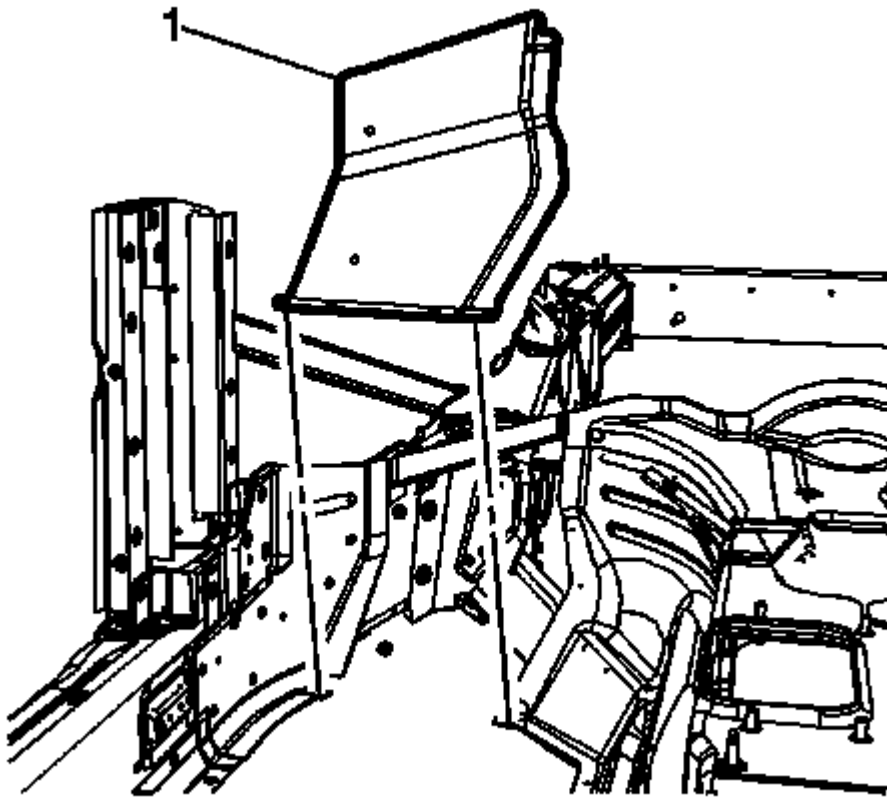


Fig. 43: All Factory Welds From Front Floor Panel
Courtesy of GENERAL MOTORS COMPANY

NOTE: The adhesive material will release from the structure by applying heat to approximately 200°C (400°F). A noticeable popping sound can normally be heard when the adhesive releases.

15. Locate and remove all factory welds from the front floor panel (1). The front floor panel is bonded to the frame.
16. Pry the downward while applying heat to the outboard edge of the panel to separate.

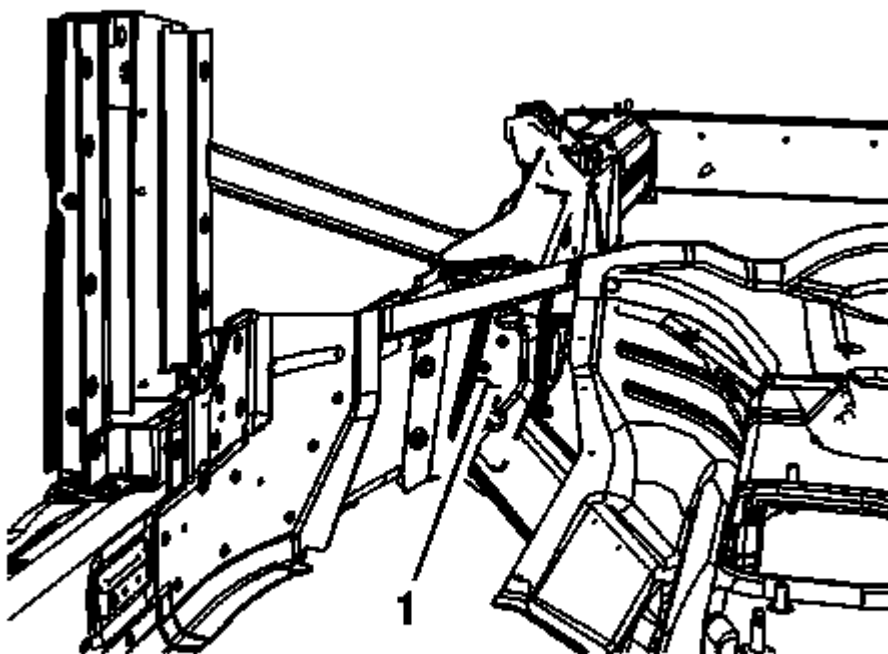


Fig. 44: Screws and Floor Panel Bracket
Courtesy of GENERAL MOTORS COMPANY

17. Remove the screws from the floor panel bracket (1).

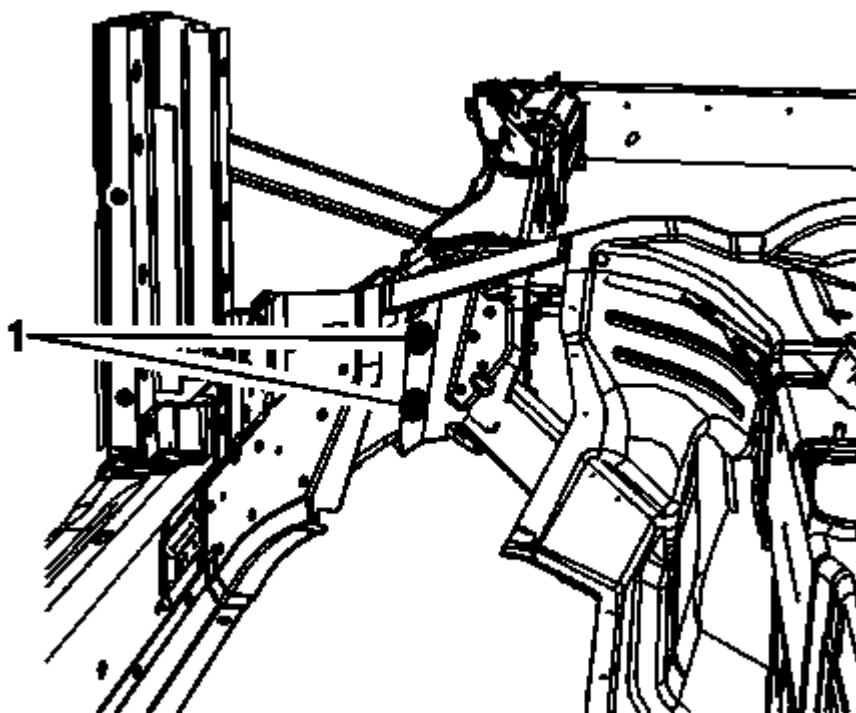


Fig. 45: Removing Bolts From Frame Rail
Courtesy of GENERAL MOTORS COMPANY

18. Remove the bolts from the frame rail (1).

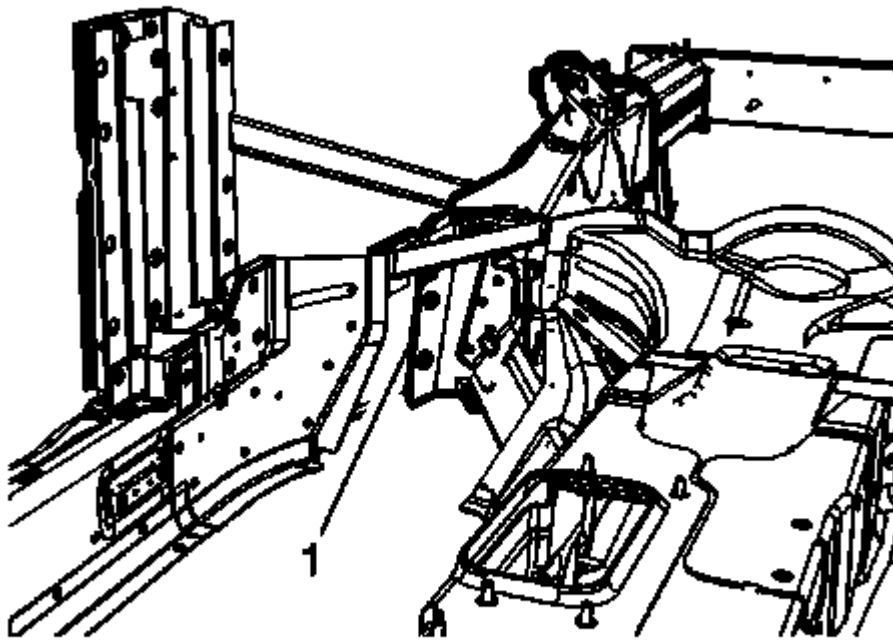


Fig. 46: Center Rail Cut Weld From Cast Rail Section Using A Cut Off Wheel
Courtesy of GENERAL MOTORS COMPANY

19. Favoring the center rail cut the weld from the cast rail section using a cut off wheel or equivalent tool.

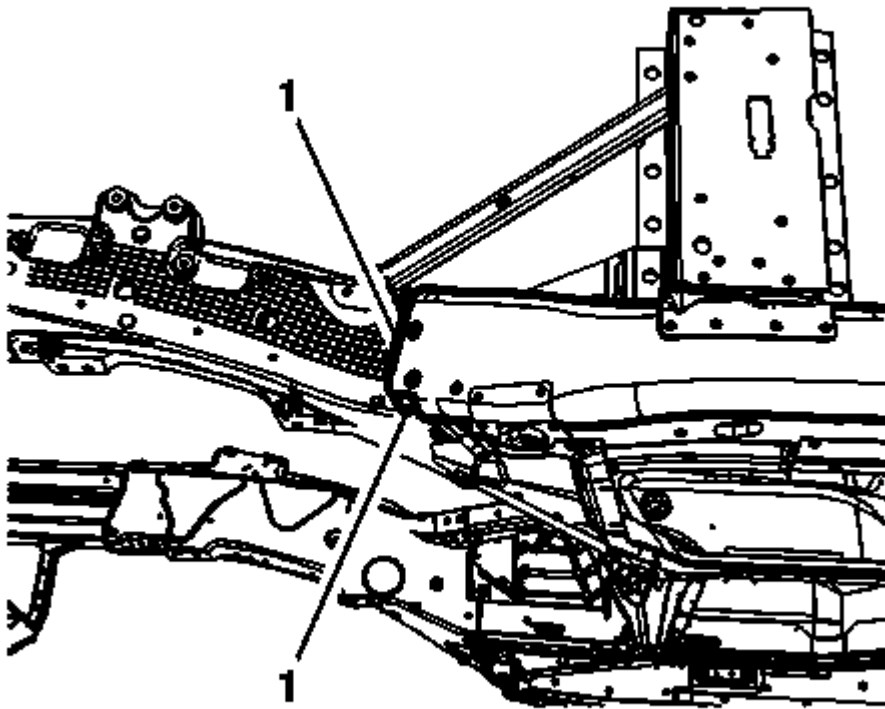


Fig. 47: Center Rail Cut Weld From Cast Rail Section Using A Cut Off Wheel
Courtesy of GENERAL MOTORS COMPANY

20. Favoring the center rail cut the weld from the top and side of the cast rail section using a cut off wheel or equivalent tool.

NOTE: The adhesive material will release from the structure by applying heat to approximately 200°C (400°F). A noticeable popping sound can normally be heard when the adhesive releases

21. The cast frame rail section is bonded to the floor panel upper support and lower the frame rail extensions. To complete the removal of the frame rail, apply heat to the upper support and lower frame rail extensions to cause the adhesive to release and then remove the rail assembly from the vehicle

Installation Procedure

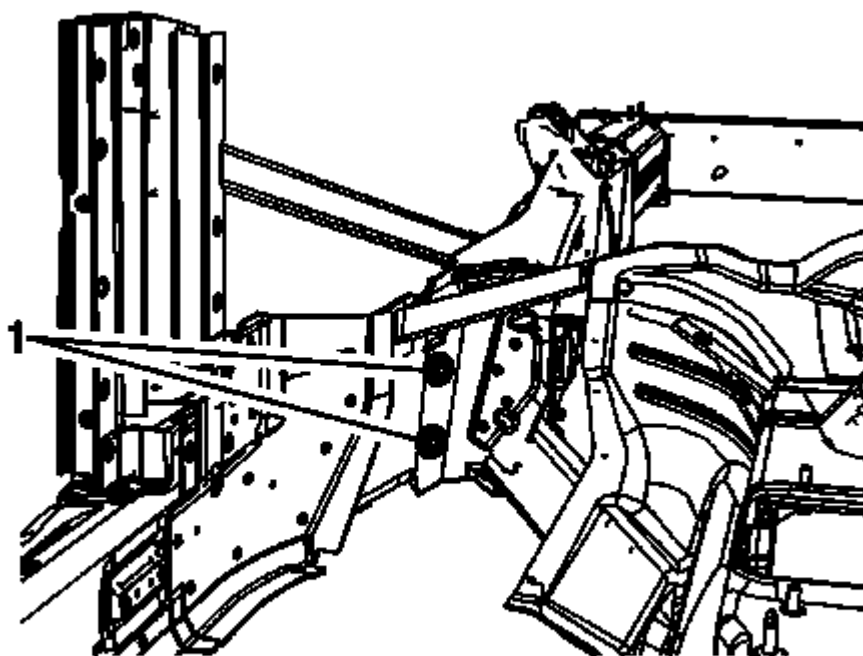


Fig. 48: Inspect Frame Measurements

Courtesy of GENERAL MOTORS COMPANY

NOTE: Use a stainless steel brush to remove the oxide layer prior to welding. Clean and prepare all of the welded mating surfaces.

Inspect the frame measurements three-dimensionally to ensure proper position of the service frame section.

1. Fit the front frame rail to the center rail and install the bolts.

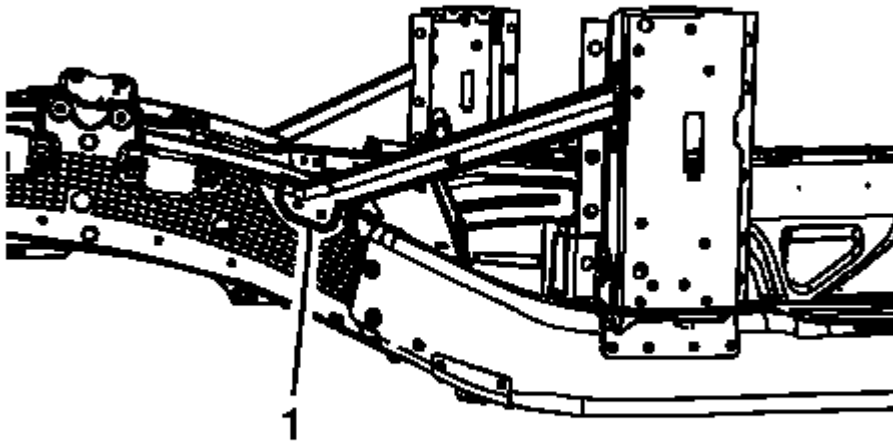


Fig. 49: Front Floor Panel Upper Support
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Pre-Drill holes with 7/32 or 5.6 mm drill before installation of service screw.
As noted from original part.**

2. Install the service screws in the front floor panel upper support (1).

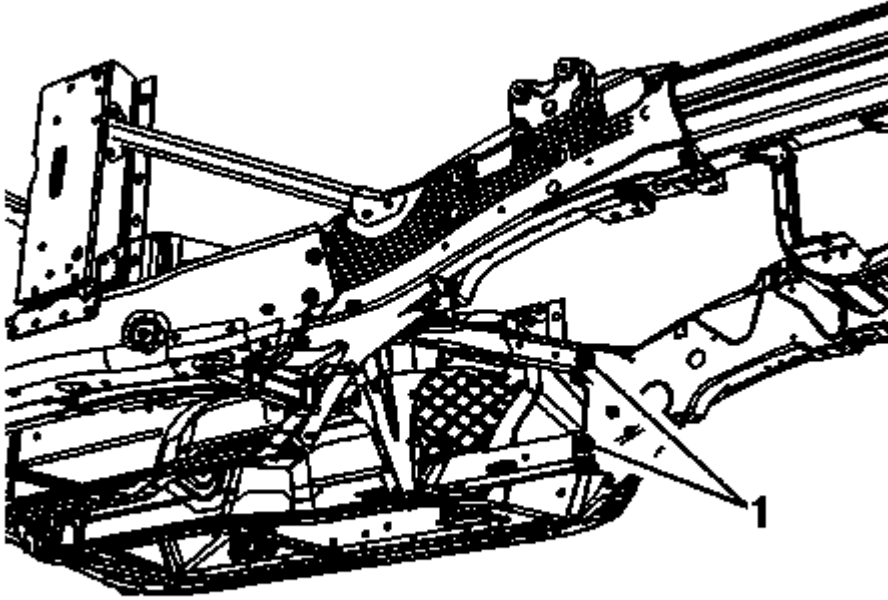


Fig. 50: Screws From Lower Frame Rail Extensions
Courtesy of GENERAL MOTORS COMPANY

NOTE: Pre-Drill holes with 7/32 or 5.6 mm drill before installation of service screw.
As noted from original part.

3. Install the service screws in the lower frame rail extensions (1).

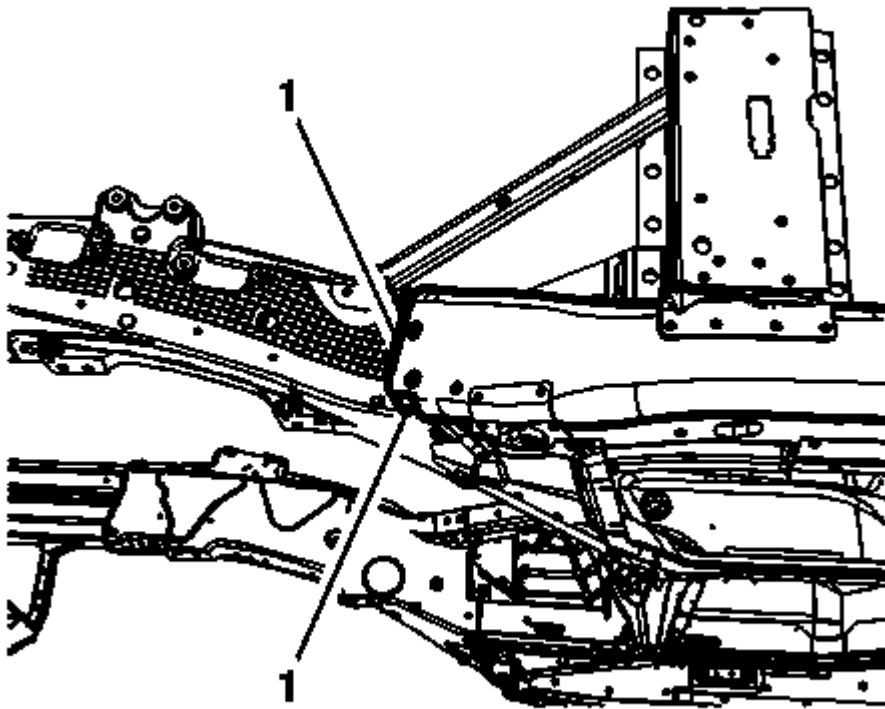


Fig. 51: Inspect Frame Measurements
Courtesy of GENERAL MOTORS COMPANY

4. Inspect the frame measurements three-dimensional to ensure proper position of the service frame section.

NOTE: Recommended wire alloy is 5554 and wire size is 1 mm (0.035 in). The shielding gas is 100 percent Argon.

5. Using a P-MIG welder, stitch weld the outer and lower rail duplicating the factory welds (1).

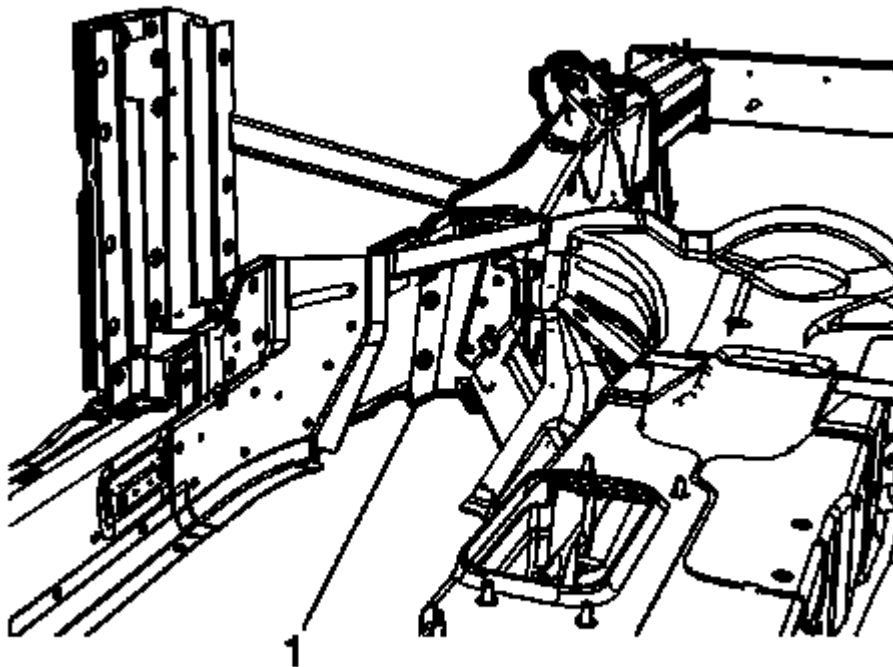


Fig. 52: Inside Duplicating Factory Welds
Courtesy of GENERAL MOTORS COMPANY

6. Using a P-MIG welder, stitch weld the rail on the inside duplicating the factory welds (1).

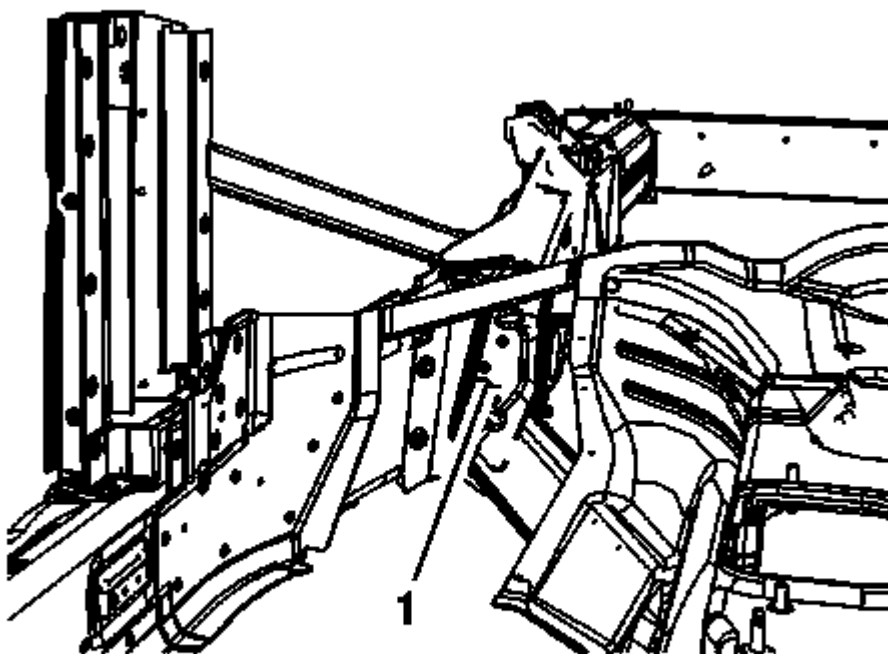


Fig. 53: Screws and Floor Panel Bracket
Courtesy of GENERAL MOTORS COMPANY

NOTE: Pre-Drill holes with 7/32 or 5.6 mm drill before installation of service screw.
As noted from original part.

7. Install the service screws in the floor panel bracket (1).

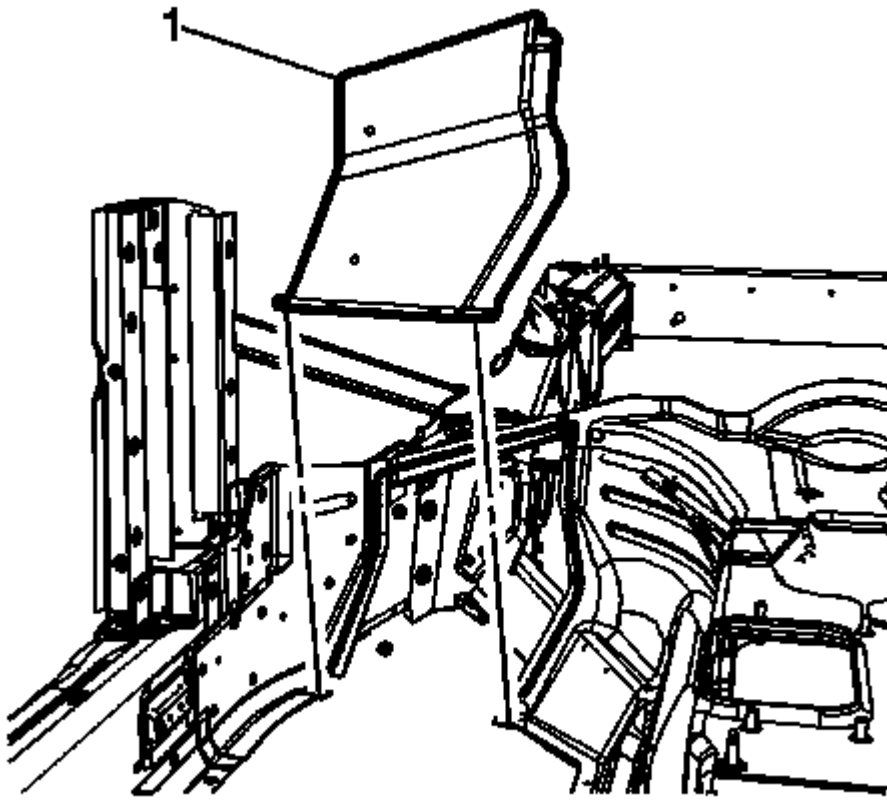


Fig. 54: Applying Structural Adhesive To Front Floor Panel
Courtesy of GENERAL MOTORS COMPANY

NOTE: Avoid applying structural adhesive in the location of plug weld locations.

8. Apply structural adhesive to the front floor panel.
9. Plug weld the front floor panel in place.

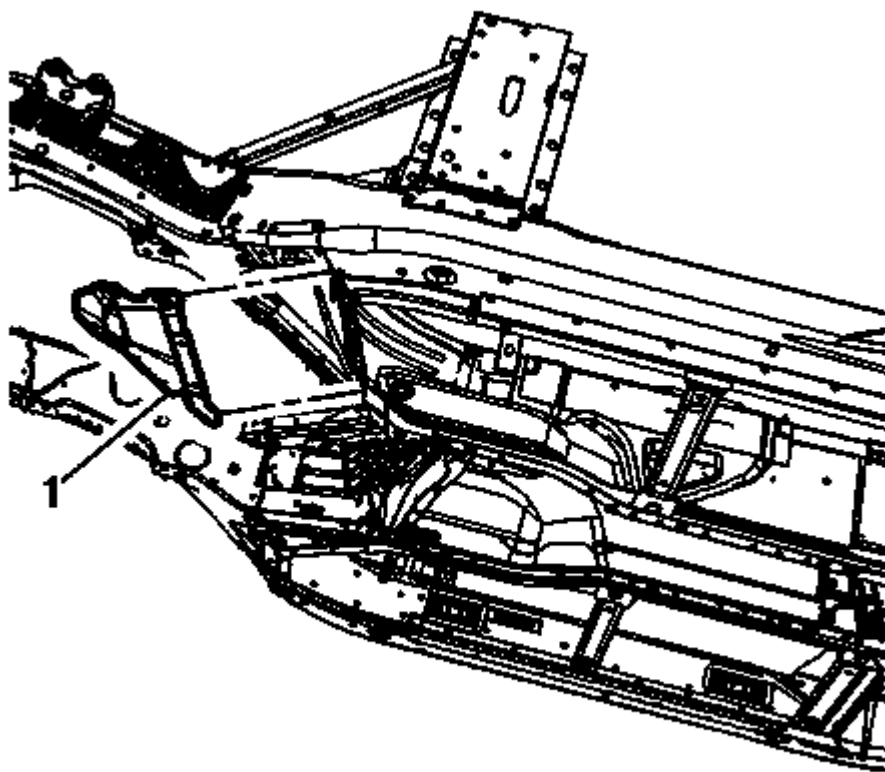


Fig. 55: Front Floor Panel Extension
Courtesy of GENERAL MOTORS COMPANY

10. Apply structural adhesive and install the front floor panel extension (1).
11. Install the front floor panel. Refer to **Floor Panel Replacement**.
12. Install the front impact bar. Refer to **Front Bumper Impact Bar Replacement**.
13. Apply the sealers and anti-corrosion materials to the repair area, as necessary. Refer to **Anti-Corrosion Treatment and Repair**.
14. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems**.
15. Install all related panels and components.
16. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection**.
17. Enable the SIR system. Refer to **SIR Disabling and Enabling**.

FRONT RAIL REPLACEMENT (FRONT SECTION)

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Remove the front impact bar. Refer to Front Bumper Impact Bar Replacement.
5. Note the location and remove the sealers and anti-corrosion materials from the repair area. Refer to Anti-Corrosion Treatment and Repair .
6. Repair as much of the damage as possible to the factory specifications.
7. Use **J-42058** frame adapter clamp to secure the vehicle if pulling and straightening are required.
8. Inspect the front of the dash panel, floor panels and all other sheet molded compound (SMC) for cracks or areas that may need to be repaired or resealed.

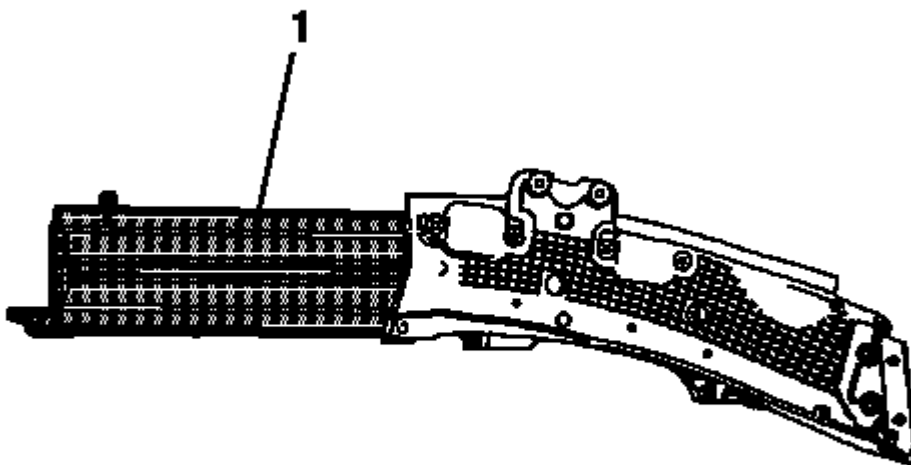


Fig. 56: Damaged Section Of Frame Rail
Courtesy of GENERAL MOTORS COMPANY

9. Remove the damaged section of frame rail. Cut the welds around the perimeter using a cut off wheel or equivalent tool. Grind off the remaining weld from the casting.

Installation Procedure

1. Dry fit the rail for proper fit and alignment before welding.
2. Clean and prepare all weld mating surfaces.
3. Position the front rail to the vehicle using 3-dimensional measuring equipment.

NOTE: Recommend wire alloy is 5554 and wire size is .035. The shielding gas is 100 percent Argon. A two minute cooling down period is recommended for every 2 minutes or 100 mm (4 in) of welding.

NOTE: Use a stainless steel brush to remove the oxide layer prior to welding.

4. Using a PULSED-MIG (P-MIG) welder, weld the front frame rail to the cast rail section duplicating the factory welds.

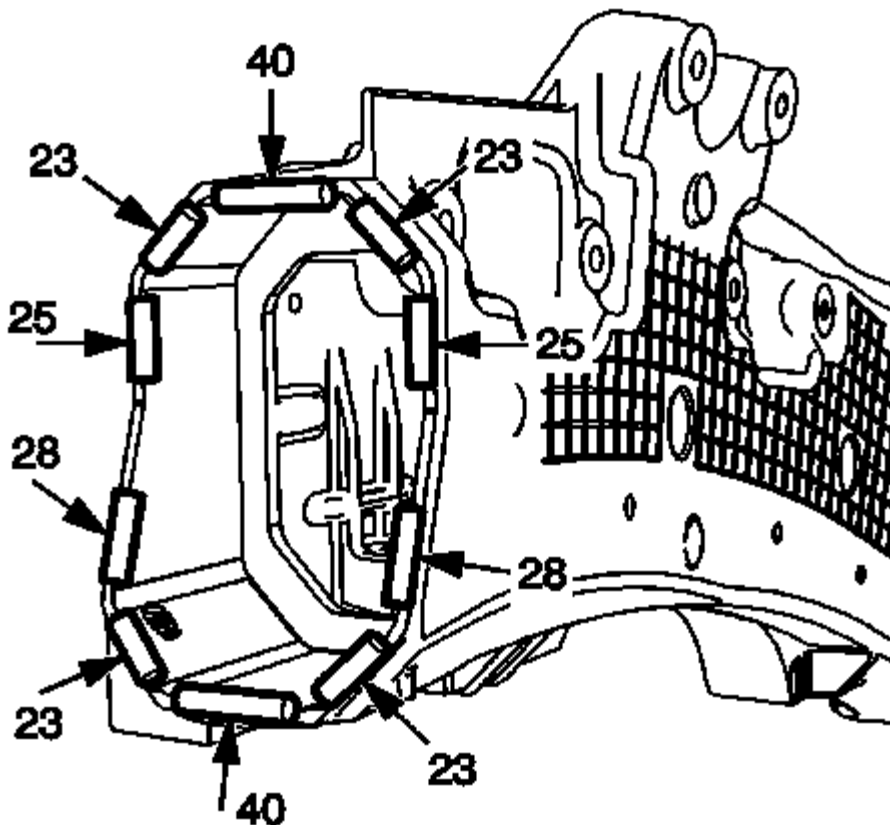


Fig. 57: Installing Front Impact Bar
Courtesy of GENERAL MOTORS COMPANY

NOTE: If no trace of the original welds is present, follow the pattern specified for welding the rail to the cast rail section.

5. Install the front impact bar. Refer to **Front Bumper Impact Bar Replacement**.

NOTE: Recommend wire alloy is 5554 and wire size is .035. The shielding gas is 100 percent Argon. A two minute cooling down period is recommended for every 2 minutes or 100 mm (4 in) of welding.

6. Apply the sealers and anti-corrosion materials to the repair area. Refer to **Anti-Corrosion Treatment and Repair**
7. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems** .
8. Install all related panels and components.
9. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
10. Enable SIR system. Refer to **SIR Disabling and Enabling** .

WINDSHIELD FRAME REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

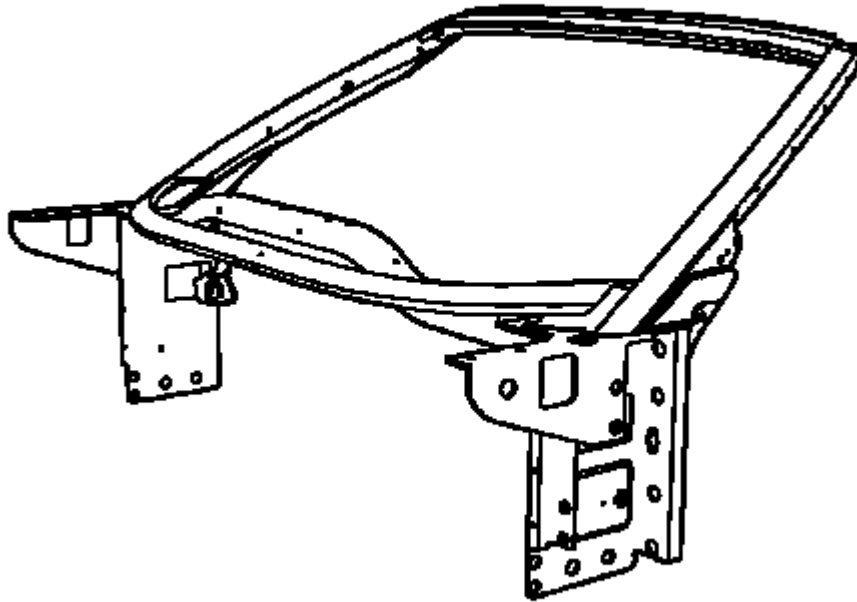


Fig. 58: Windshield Frame

Courtesy of GENERAL MOTORS COMPANY

The windshield frame is made of cast aluminum components. The windshield frame is bonded and bolted to the front hinge pillars with structural adhesive. It is also braced to the tunnel assembly by a bolted and bonded cross car beam.

WARNING: Refer to Approved Equipment for Collision Repair Warning .

NOTE: An attempt to repair the windshield frame may compromise the structural integrity of the vehicle. Complete replacement is recommended.

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Drill out the close-end rivets securing the upper plenum to the windshield frame.

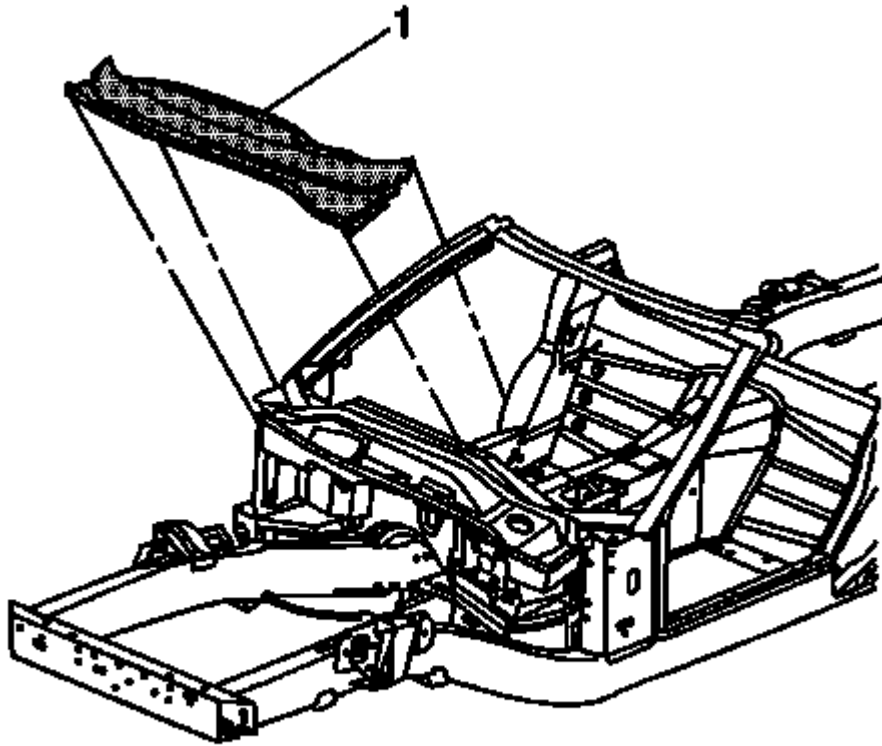


Fig. 59: View Of Upper Plenum
Courtesy of GENERAL MOTORS COMPANY

5. Remove the upper plenum (1) by removing the attaching bolts and applying heat and pry to detach the adhesive along the bonding surface.
6. Separate the lower plenum from the windshield frame by applying heat and pry to detach the adhesive along the bonding surface.
7. Remove the bolts attaching the cross-car brace.
8. Remove the cross car brace by applying heat and pry to detach the adhesive along the tunnel bonding surface.

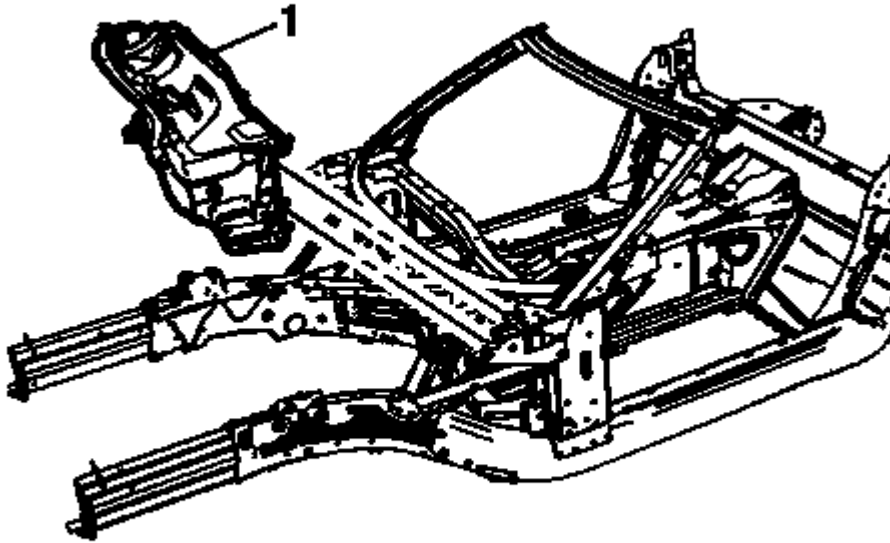


Fig. 60: Lower Plenum And Dash Panel
Courtesy of GENERAL MOTORS COMPANY

9. Remove the bolts attaching the lower plenum and dash panel (1). Apply heat and pry to detach the adhesive along the bonding surfaces.

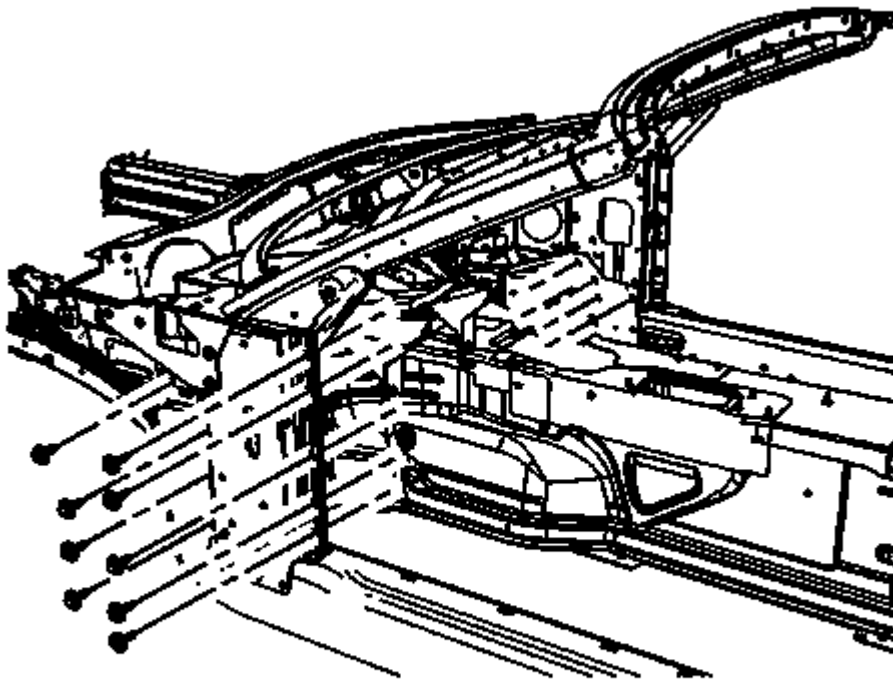


Fig. 61: Windshield Frame And Front Hinge Pillars
Courtesy of GENERAL MOTORS COMPANY

10. Remove the bolts (1) attaching the windshield frame to the front hinge pillars.

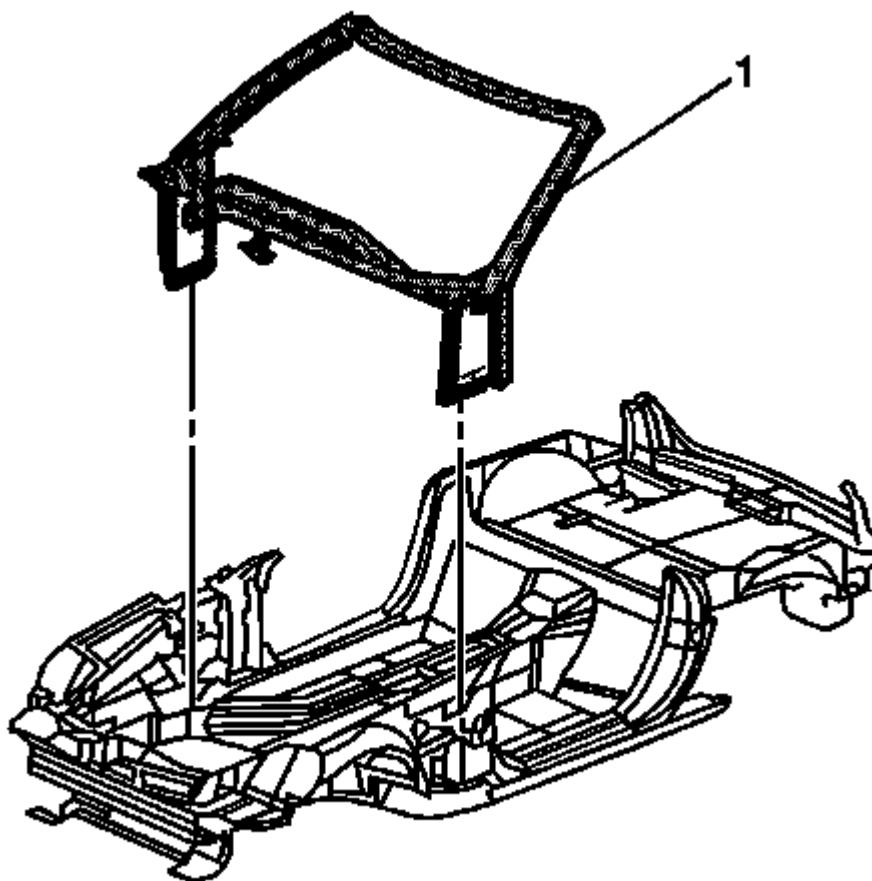


Fig. 62: View Of Windshield Frame
Courtesy of GENERAL MOTORS COMPANY

11. Remove the windshield frame (1) by applying heat and pry to detach the adhesive along the bonding surface.
12. Save any and all brackets, mounting studs and accessories for transfer to the windshield frame.
13. Note the location of the adhesive and remove all remaining loose adhesive.
14. Inspect the structure and frame rails for damage.
15. Repair as much of the damage as possible to the factory specifications.
16. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening is required.

Installation Procedure

1. Before applying adhesive, dry fit the windshield frame for proper fit and alignment.

NOTE: **DO NOT top coat any bonding surface. Use primer only on bonding surfaces. Refer to adhesive manufacturer's recommendations.**

2. Clean and prepare all bonding mating surfaces according to adhesive manufacturer's recommendations.

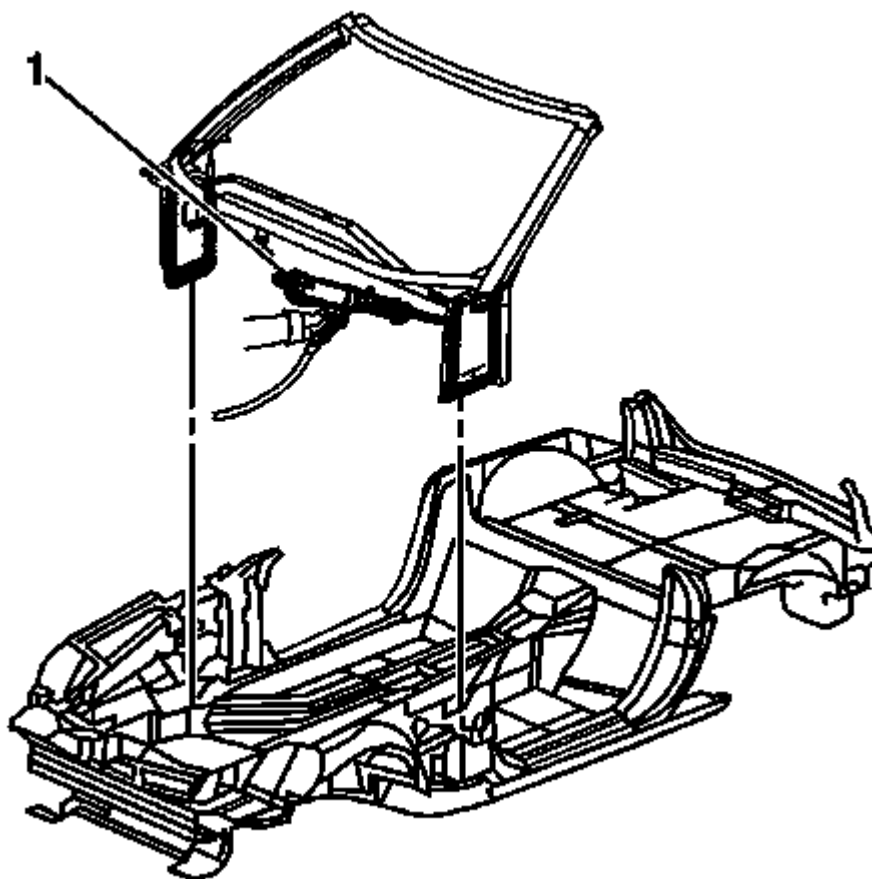


Fig. 63: Applying Consistent Bead Of Structural Adhesive To Windshield Frame
Courtesy of GENERAL MOTORS COMPANY

3. Apply a consistent bead of structural adhesive (1) 10 mm (3/8 in) in diameter to the windshield frame to mate with the bonding surfaces. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

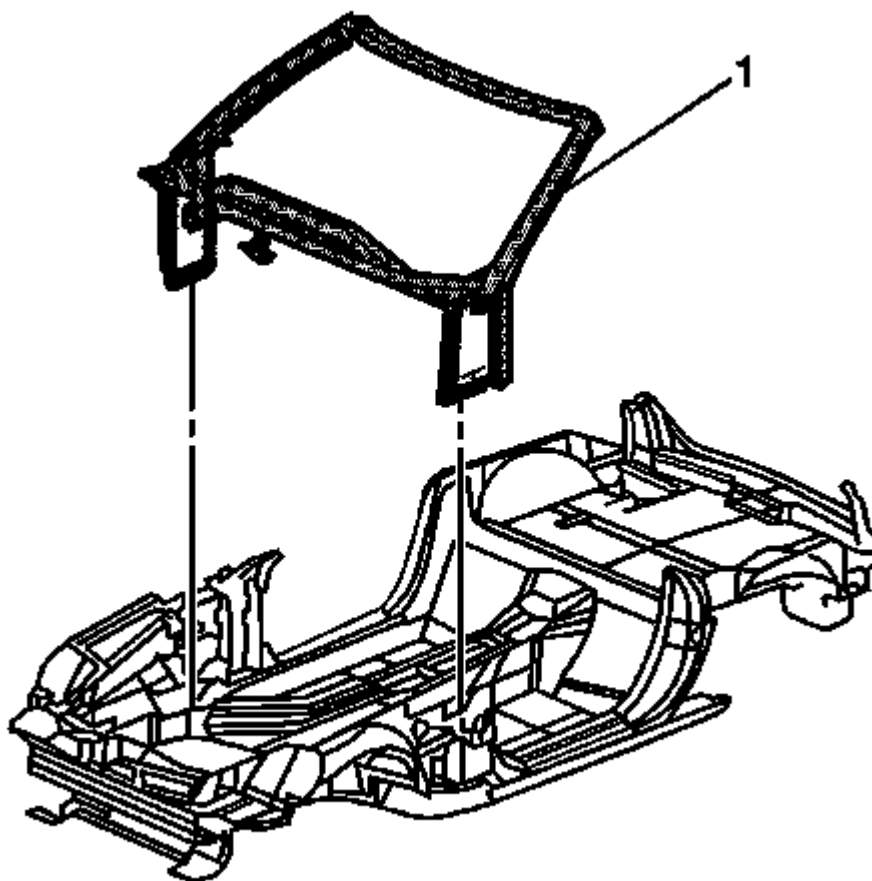


Fig. 64: View Of Windshield Frame
Courtesy of GENERAL MOTORS COMPANY

4. Install the windshield frame (1) to the vehicle.

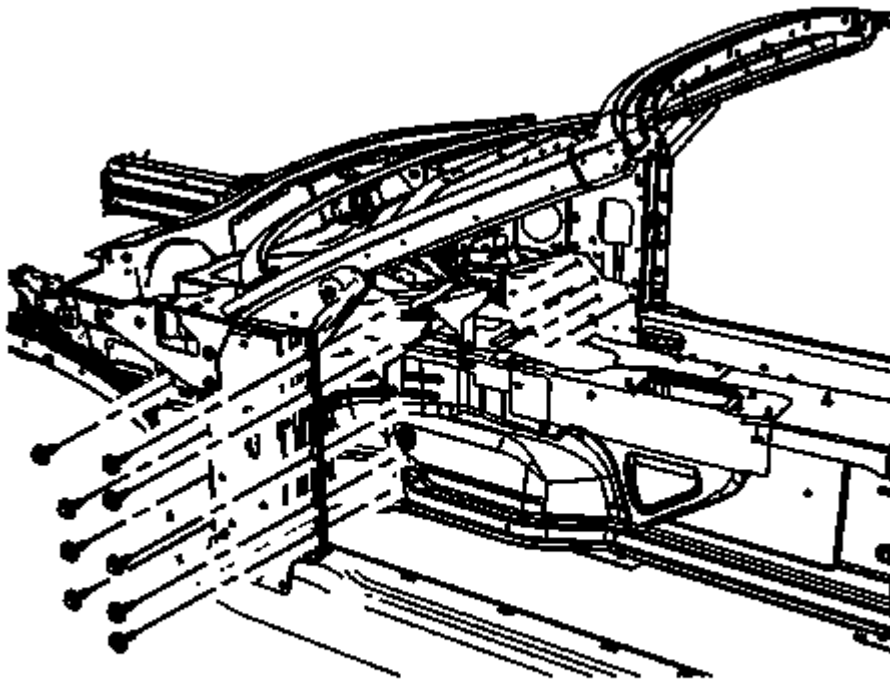


Fig. 65: Windshield Frame And Front Hinge Pillars
 Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

5. Install the bolts (1) that attach the windshield frame to the front hinge pillar and tighten to 25 N.m (18 lb ft).
6. Clamp or mechanically fasten the windshield frame into place.
7. Apply structural adhesive to bond the lower dash panel and lower plenum to the windshield frame. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.
8. Drill holes and use close-end rivets to secure the lower plenum to the windshield frame while adhesive cures.
9. Apply the structural adhesive to the area where the cross-car brace bonds to the center tunnel assembly. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.
10. Install the cross-car brace to the vehicle.
11. Install the cross-car brace bolts and tighten to 25 N.m (18 lb ft).
12. Install all hardware attaching the instrument panel (I/P) supports to the windshield frame.

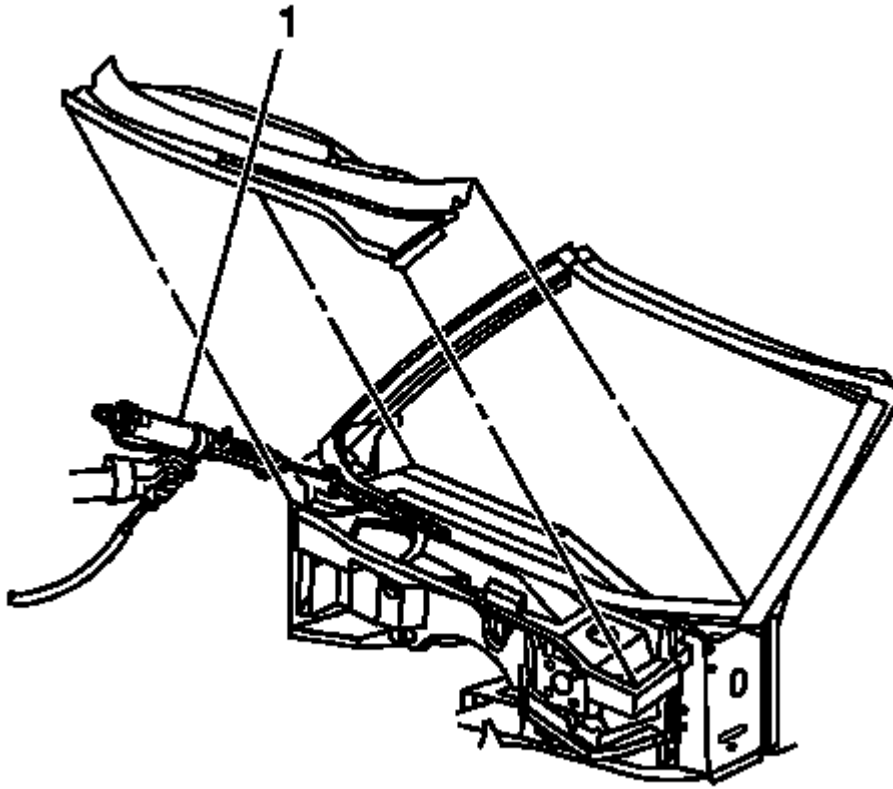


Fig. 66: Applying Consistent Bead Of Structural Adhesive To Bonding Surfaces To Mate With Upper Plenum
Courtesy of GENERAL MOTORS COMPANY

13. Apply a consistent bead of structural adhesive (1) to the bonding surfaces to mate with the upper plenum. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

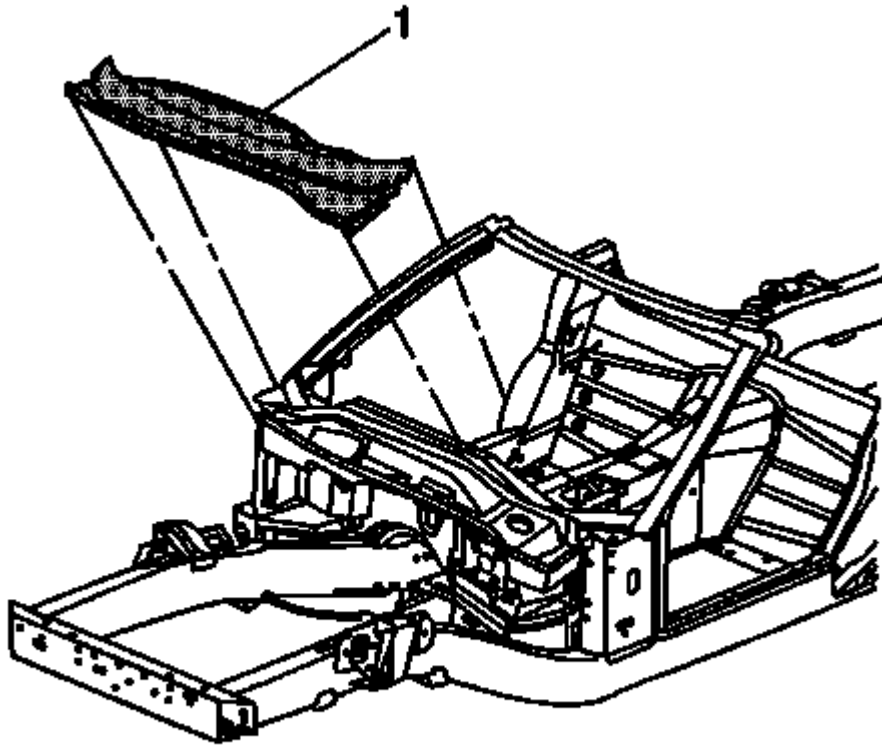


Fig. 67: View Of Upper Plenum
Courtesy of GENERAL MOTORS COMPANY

14. Install the upper plenum (1) to the windshield frame.
15. Install the close-end rivets, in the factory locations, securing the upper plenum to the windshield frame.
16. Remove any excess adhesive.
17. Install all related panels and components.
18. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
19. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

SIDE DOOR OPENING FRAME REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

WARNING: Refer to Approved Equipment for Collision Repair Warning .

The side door opening frame is made of sheet molded compound (SMC) and is bonded to the side structure and frame rail with structural adhesive.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling** .
2. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .

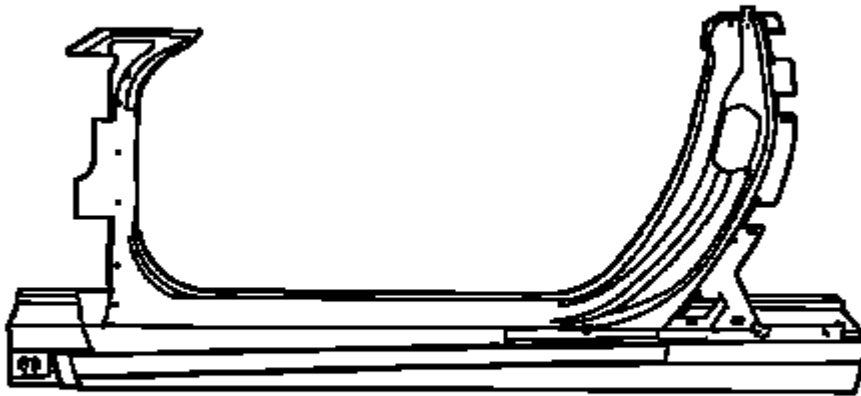


Fig. 68: Door Opening Frame - Side
Courtesy of GENERAL MOTORS COMPANY

3. Remove all related panels and components.

WARNING: Refer to Actions to Take When Working with Fuel Warning .

4. Verify that the fuel inlet is sealed before proceeding with repair procedure.

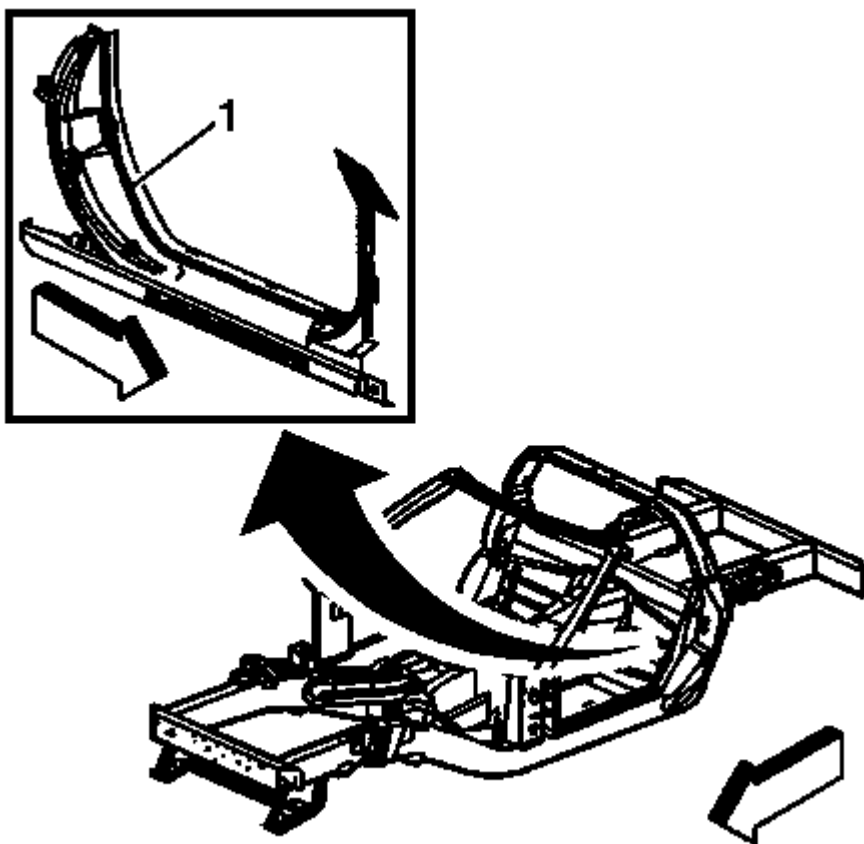


Fig. 69: Locating Door Frame Adhesive Along Bonding Surface
Courtesy of GENERAL MOTORS COMPANY

5. Remove the door frame by applying heat and pry to detach the adhesive (1) along the bonding surface.

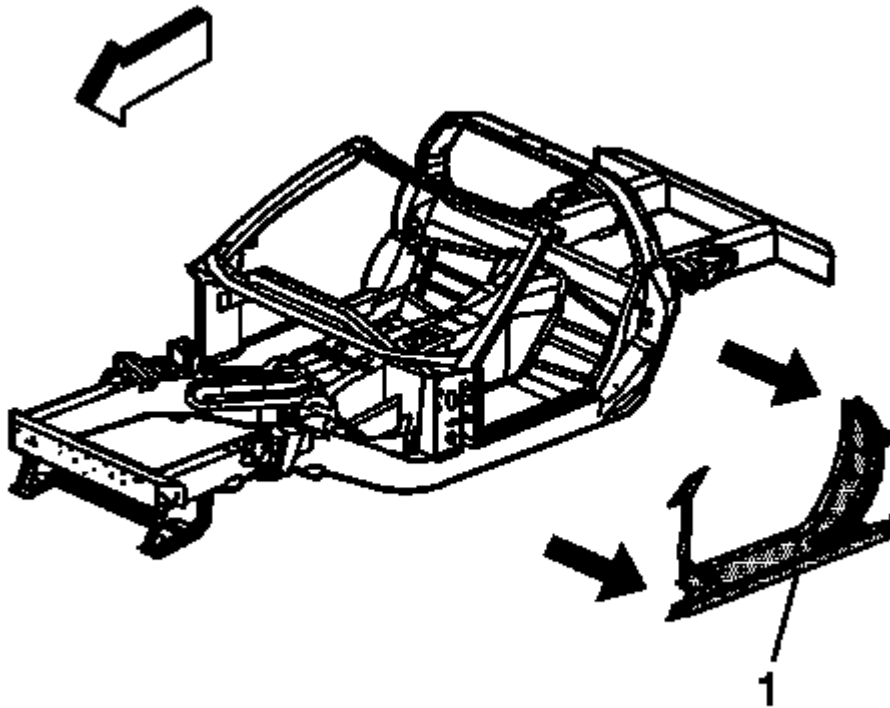


Fig. 70: Removing Door Frame
Courtesy of GENERAL MOTORS COMPANY

6. Remove the door frame (1) from the vehicle.
7. Note the location of the adhesive and remove only the loose adhesive.
8. Inspect the side structure and frame rails for damage.
9. Repair as much of the damage as possible to the factory specifications.
10. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening is required.

Installation Procedure

1. Before applying adhesive dry fit the door frame for proper fit and alignment.

NOTE: **DO NOT top coat any bonding surface. Use primer only on bonding surfaces. Refer to adhesive manufacturer's recommendations.**

2. Clean and prepare all bonding mating surfaces according to adhesive manufacturer's recommendations.
3. Dry fit the door frame and door for fit and alignment.

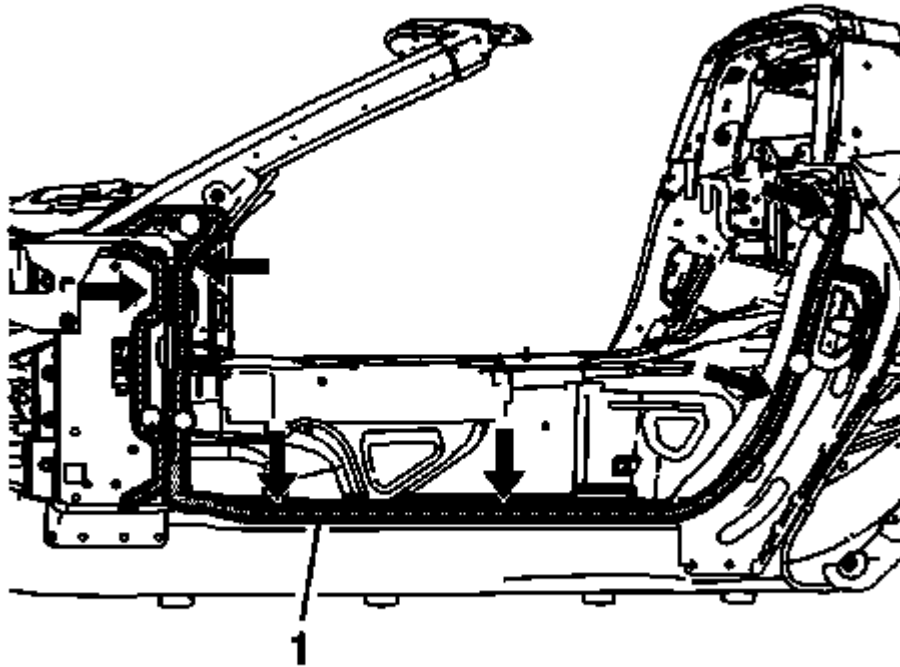


Fig. 71: Side Structure And Frame Rail
Courtesy of GENERAL MOTORS COMPANY

4. Apply a bead of High Viscosity Urethane to the side structure and frame rail and to all areas originally bonded.

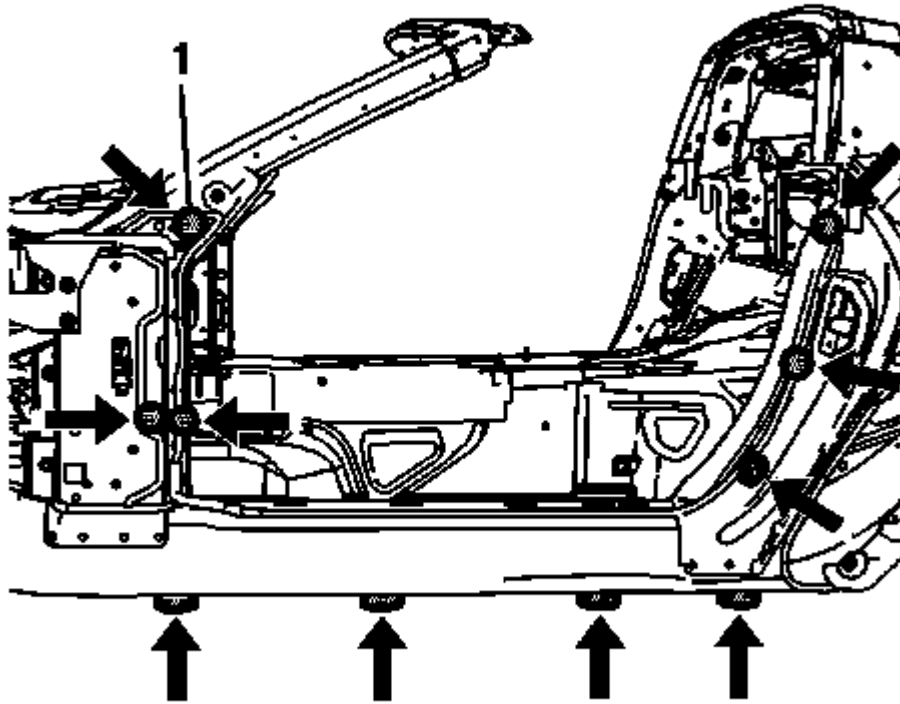


Fig. 72: Structural Adhesive
Courtesy of GENERAL MOTORS COMPANY

5. Apply dollops of structural adhesive (1) to the original locations on the body side. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.
6. Apply pressure to the door frame to set the adhesive.
7. Clamp or tape the door frame in place as necessary.
8. Remove any excess adhesive.
9. Install all related panels and components.
10. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection**.
11. Enable the SIR system. Refer to **SIR Disabling and Enabling**.

REAR RAIL REPLACEMENT (FRONT SECTION)

Special Tools

J-42058 Frame Adapter Clamp

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

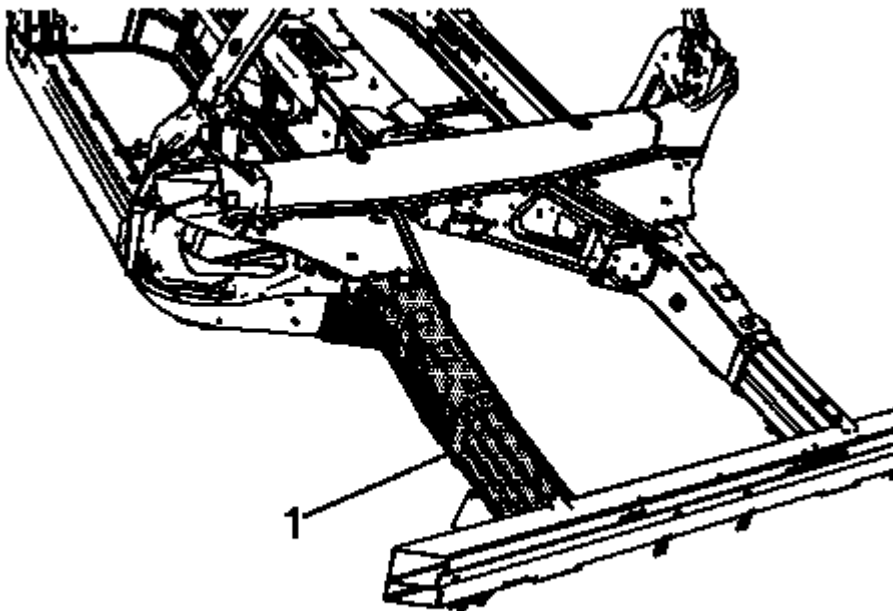


Fig. 73: Rear Rail

Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.
4. Remove the rear impact bar. Refer to Rear Bumper Impact Bar Replacement.
5. Note the location and remove the sealers and anti-corrosion materials from the repair area, as necessary. Refer to Anti-Corrosion Treatment and Repair .
6. Repair as much of the damage as possible to the factory specifications.
7. Inspect the floor panels and all other sheet molded compound (SMC) for cracks or areas that may need to be repaired or resealed.

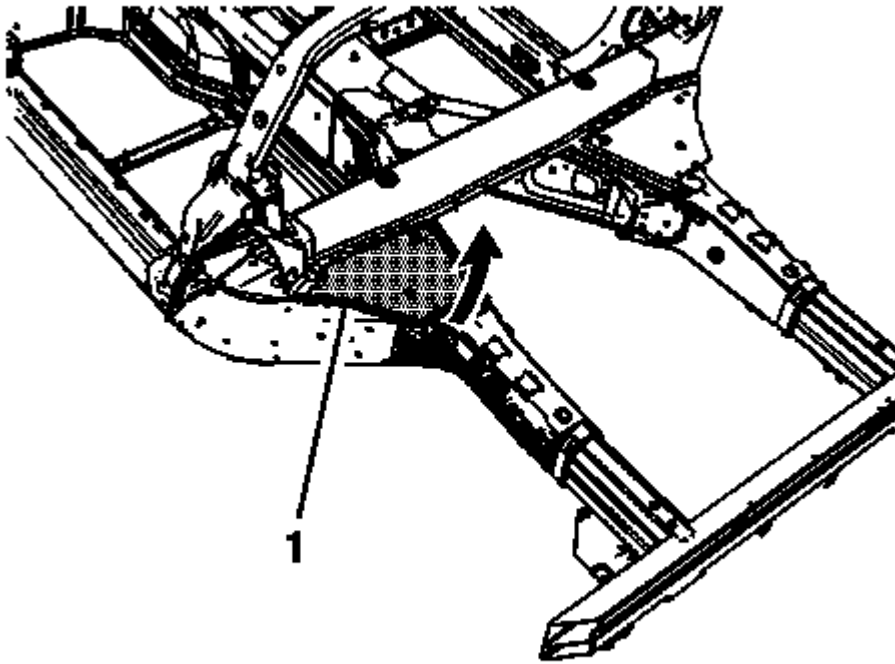


Fig. 74: Upper Extension Panel
Courtesy of GENERAL MOTORS COMPANY

NOTE: Hand tools, saw blades and abrasives used for aluminum repairs should be dedicated for aluminum only to prevent contamination.

8. Locate and remove all factory welds on the inboard side of the upper extension panel (1). Note the location of the welds for installation of the upper extension panel.
9. The upper extension is bonded along the inboard edge. Pry the extension upward while applying heat to the inboard edge of the panel along the bond line to separate.
10. Bend the extension upward at the rear to gain access to the top frame rail weld (1).

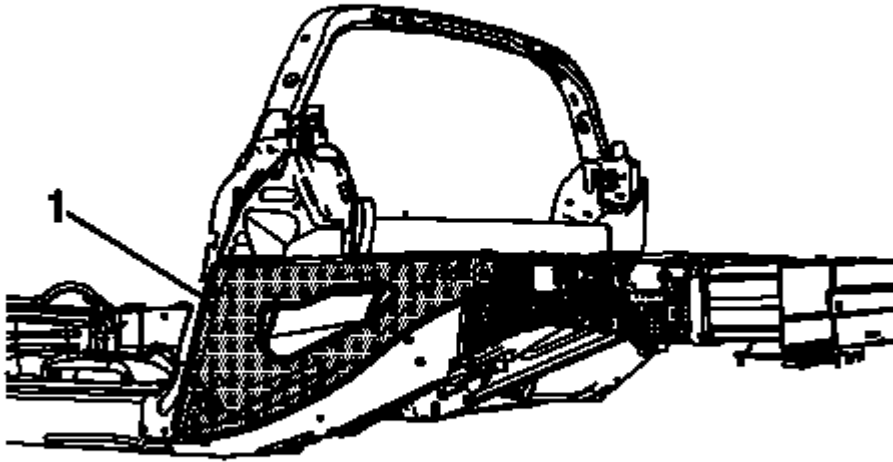


Fig. 75: All Factory Welds

Courtesy of GENERAL MOTORS COMPANY

11. Locate and remove all factory welds (1) attaching the outer body extension panel to the structure. Note the location of the welds for installation of the new extension panel

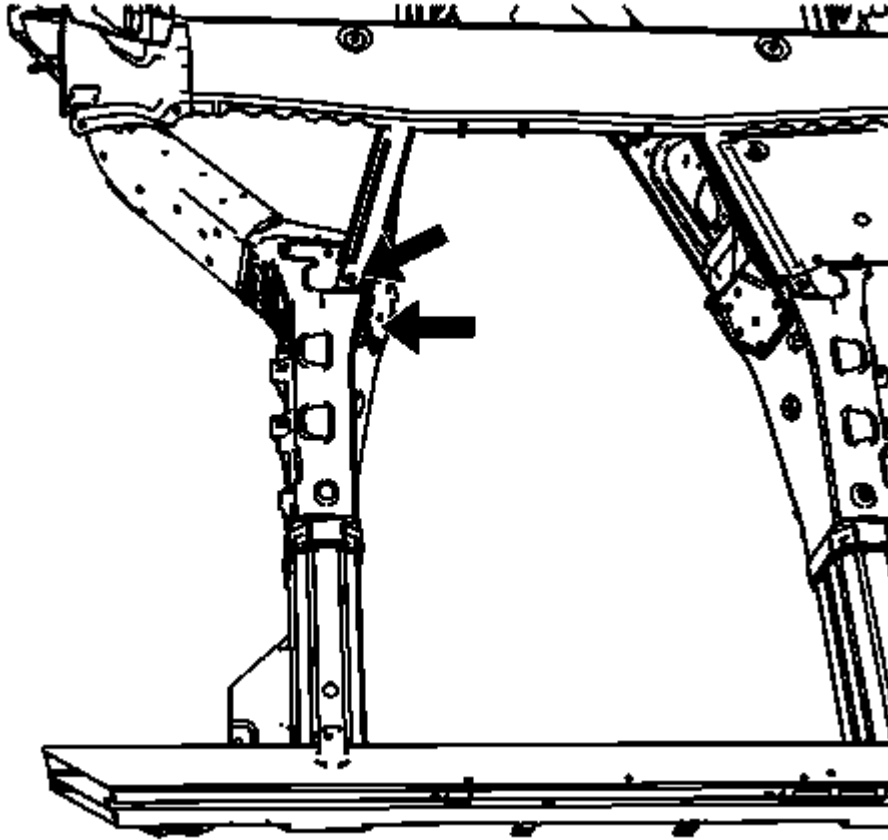


Fig. 76: Extension Panel Bracket
Courtesy of GENERAL MOTORS COMPANY

12. Remove the screws from the extension panel bracket (1).
13. Remove the screws from the floor panel bracket (1).

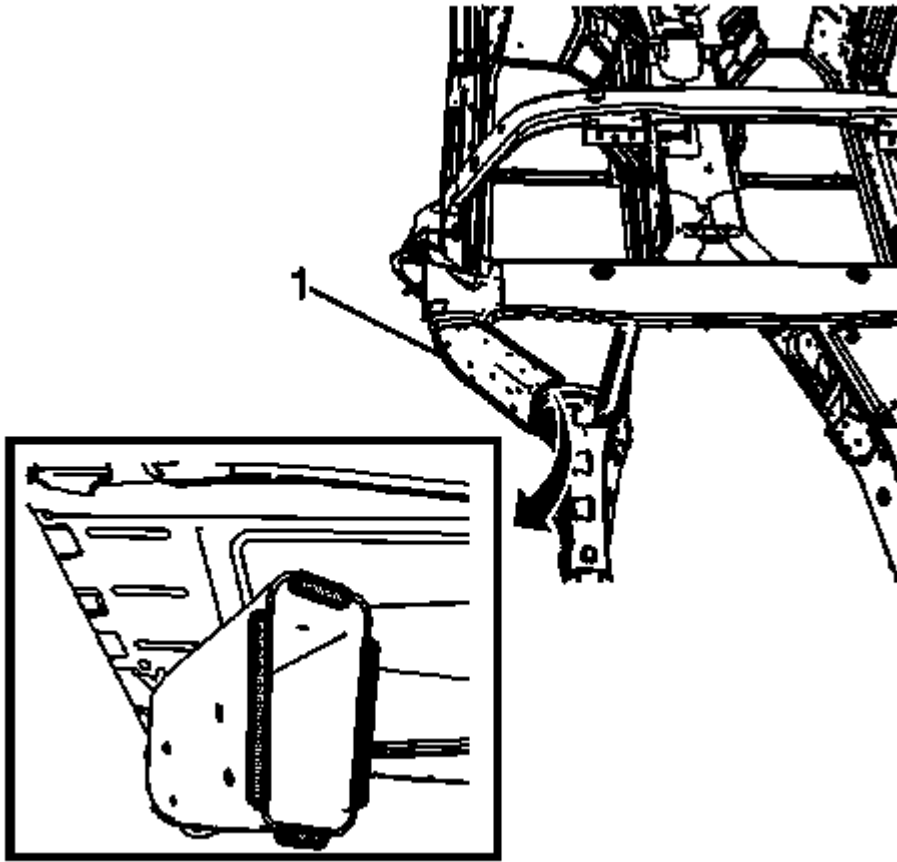


Fig. 77: Remaining Weld And Center Rail
Courtesy of GENERAL MOTORS COMPANY

14. Favoring the center rail cut the welds around the perimeter using a cut off wheel or equivalent tool. Remove damaged rail and remove remaining weld from the center rail (1)

Installation Procedure

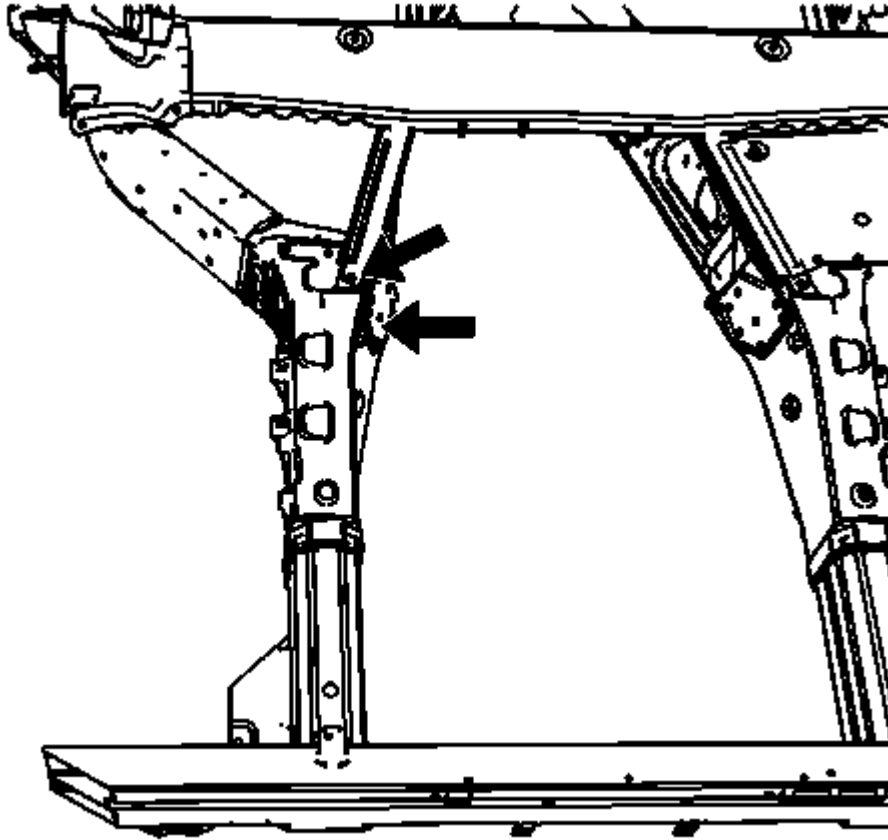


Fig. 78: Extension Panel Bracket
Courtesy of GENERAL MOTORS COMPANY

NOTE: Pre-Drill holes with 7/32 or 5.6 mm drill before installation of service screw.
As noted from original part.

1. Install the screws for the extension panel bracket (1). Refer to **Sheet Molded Compound (SMC) Panel Bonding**.
2. Install the screws for the floor panel bracket (1). Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

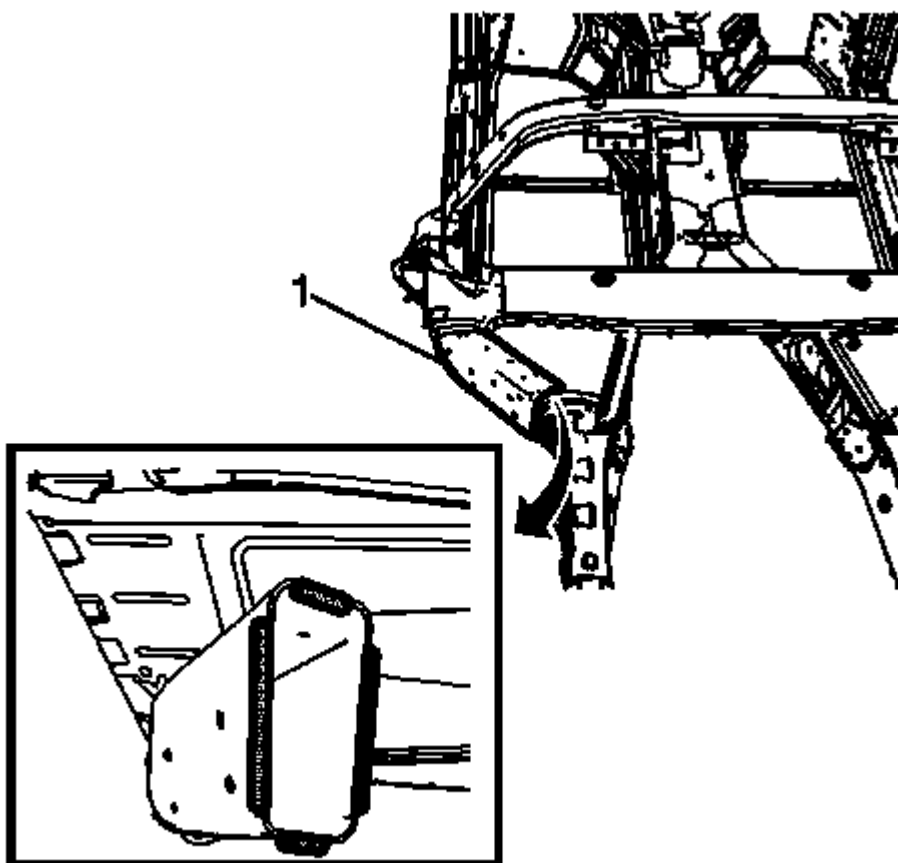


Fig. 79: Remaining Weld And Center Rail
Courtesy of GENERAL MOTORS COMPANY

NOTE: Recommended wire alloy is 5554 and wire size is 1 mm (0.035 in). The shielding gas is 100 percent Argon.

3. Using a P-MIG welder, stitch weld the cast rail section (1) to the center rail duplicating the factory welds.

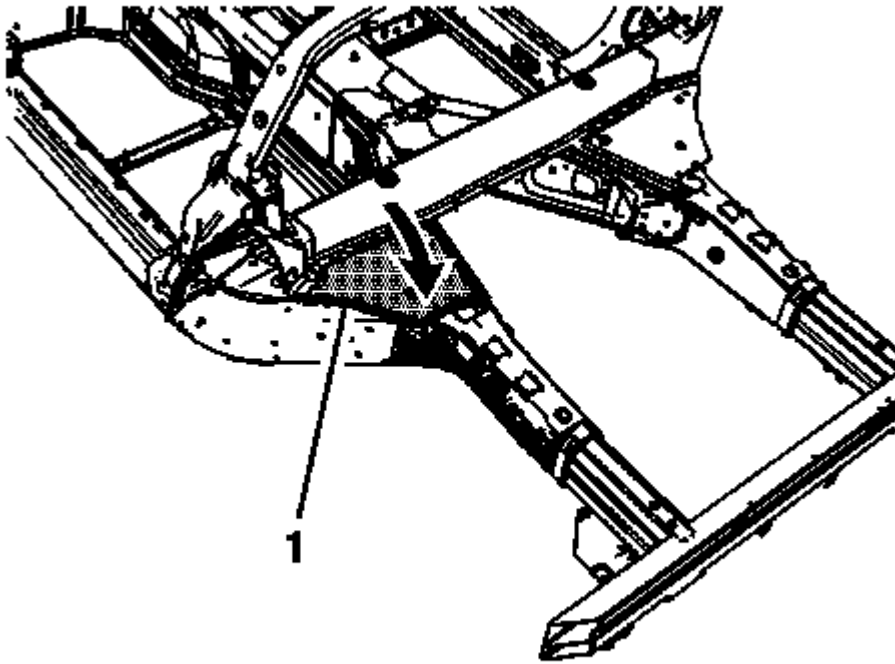


Fig. 80: Upper Extension Panel
Courtesy of GENERAL MOTORS COMPANY

4. Apply structural adhesive to the inboard side of the upper extension panel. (1). Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

NOTE: Recommended wire alloy is 5554 and wire size is 1 mm (0.035 in). The shielding gas is 100 percent Argon.

5. Using a P-MIG welder, plug weld the upper extension panel (1) to the rail duplicating the factory welds.

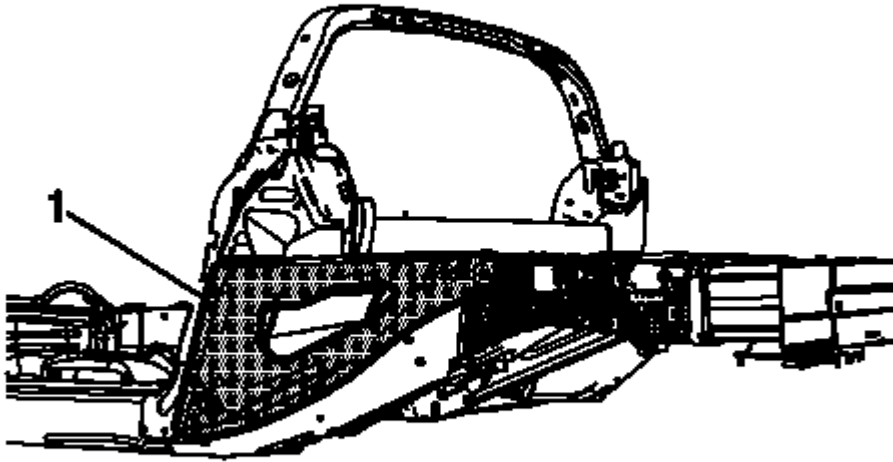


Fig. 81: Outer Body Extension Panel
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Sound Deadener Foam in the Lock Striker Pillars Warning .

NOTE: Pre-Drill holes with 7/32 or 5.6 mm drill before installation of service screw.

NOTE: Recommended wire alloy is 5554 and wire size is 1 mm (0.035 in). The shielding gas is 100 percent Argon.

6. Using a P-MIG welder, plug weld the outer body extension panel (1) duplicating the factory welds.

NOTE: Pre-Drill holes with 7/32 or 5.6 mm drill before installation of service screw.

7. Install the service screws for the outer body extension panel (1).
8. Install the rear impact bar. Refer to Rear Bumper Impact Bar Replacement.
9. Apply the sealers and anti-corrosion materials to the repair area, as necessary. Refer to Anti-

Corrosion Treatment and Repair .

10. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems .**
11. Install all related panels and components.
12. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection .**
13. Enable the SIR system. Refer to **SIR Disabling and Enabling .**

REAR RAIL REPLACEMENT (REAR SECTION)

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

WARNING: Refer to **Approved Equipment for Collision Repair Warning .**

1. Disable the SIR system. Refer to **SIR Disabling and Enabling .**
2. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection .**
3. Remove all related panels and components.
4. Remove the rear impact bar. Refer to **Rear Bumper Impact Bar Replacement.**
5. Note the location and remove the sealers and anti-corrosion materials from the repair area. Refer to **Anti-Corrosion Treatment and Repair .**
6. Repair as much of the damage as possible to the factory specifications.
7. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening are required.

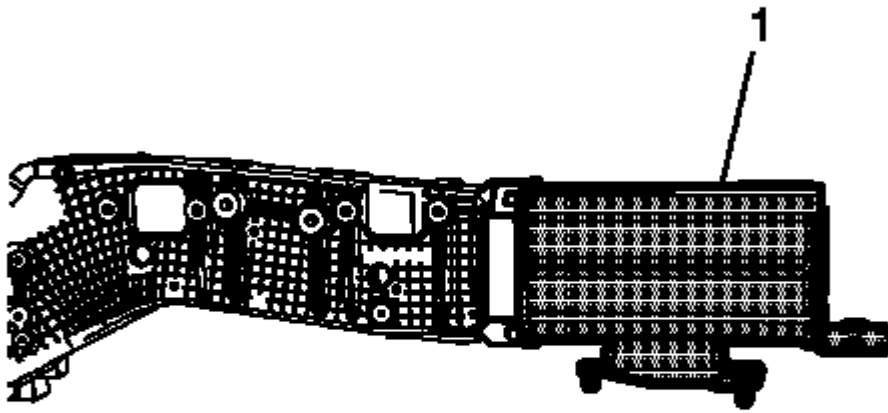


Fig. 82: Damaged Section Of Frame Rail Within Shaded Area
Courtesy of GENERAL MOTORS COMPANY

8. Remove the damaged section of frame rail within the shaded area (1).
9. Remove the damaged section of frame rail. Cut the welds around the perimeter using a cut off wheel or equivalent tool. Grind off the remaining weld from the casting.

Installation Procedure

WARNING: Refer to Collision Sectioning Warning .

1. Determine the sectioning joint location within the recommended area (1).
2. Dry fit the rail for proper fit and alignment before welding.
3. Cut the new frame rail end from the new frame rail assembly.
4. Clean and prepare all weld mating surfaces.
5. Perform the sleeved butt-joint sectioning. Refer to .
6. Position the rear rail to the vehicle using 3-dimensional measuring equipment.

NOTE: Recommend wire alloy is 5554 and wire size is 0.035. The shielding gas is 100 percent Argon.

A two minute cooling down period is recommended for every 2 minutes or 100 mm (4 in) of welding.

Use a stainless steel brush to remove the oxide layer prior to welding.

7. Install the rear impact bar. Refer to **Rear Bumper Impact Bar Replacement**.
8. Using a PULSED-MIG (P-MIG) welder, weld the rear frame rail to the cast rail section duplicating the factory welds.

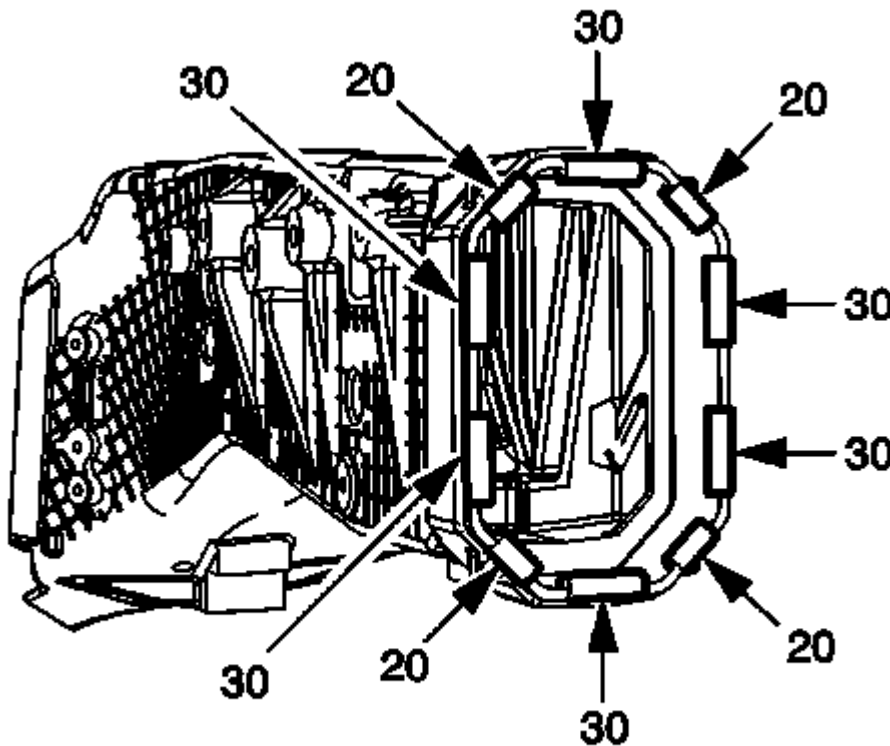


Fig. 83: Rear Impact Bar
Courtesy of GENERAL MOTORS COMPANY

NOTE: If no trace of the original welds is present, follow the pattern specified for welding the rear rail to the cast rail section.

9. Install the rear impact bar. Refer to **Rear Bumper Impact Bar Replacement**.

NOTE: Recommend wire alloy is 5554 and wire size is 0.035. The shielding gas is 100 percent Argon.

A two minute cooling down period is recommended for every 2 minutes or 100 mm (4 in) of welding.

10. Apply the sealers and anti-corrosion materials to the repair area. Refer to **Anti-Corrosion Treatment and Repair** .
11. Paint the repair area. Refer to **Basecoat/Clearcoat Paint Systems** .
12. Install all related panels and components.
13. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
14. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

FLOOR PANEL REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

WARNING: Refer to **Approved Equipment for Collision Repair Warning** .

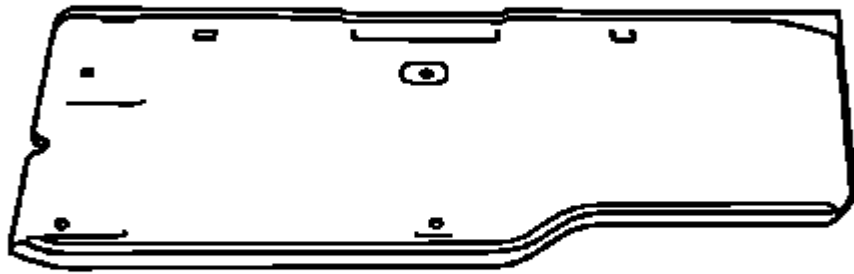


Fig. 84: Floor Panel

Courtesy of GENERAL MOTORS COMPANY

The floor panel is made of carbon fiber and is bonded to the structure with structural adhesive.

1. Disable the SIR system. Refer to **SIR Disabling and Enabling** .
2. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
3. Remove all related panels and components.
4. Remove or reposition electrical components and wiring harness as necessary to avoid damage.
5. Remove wiring harness clips for transfer to new floor panel.

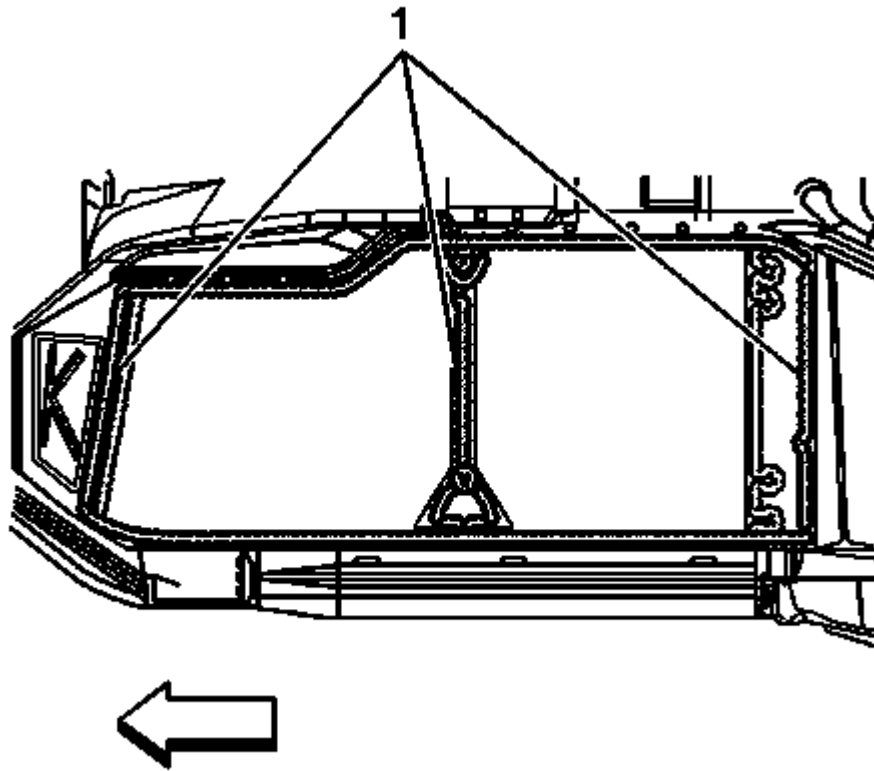


Fig. 85: Detaching Adhesive Along Bonding Surface
Courtesy of GENERAL MOTORS COMPANY

6. Using a reciprocating saw or equivalent tool cut a large section of the floor out to gain access to the bond joint.
7. Remove the remaining floor by applying heat and prying to detach adhesive along the bonding surface (1).

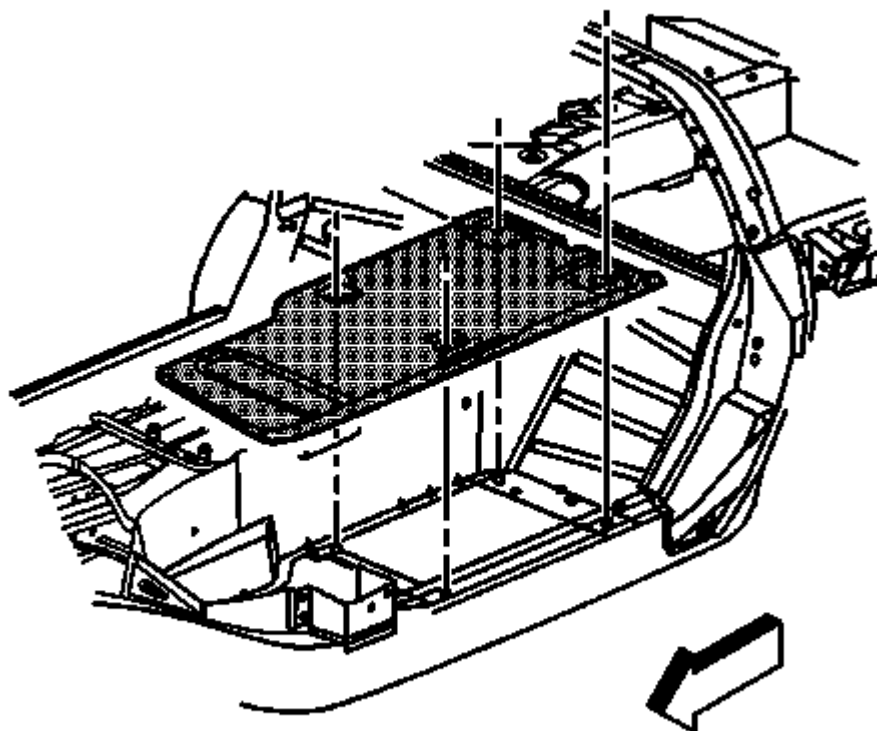


Fig. 86: View Of Floor Panel

Courtesy of GENERAL MOTORS COMPANY

8. Remove the floor panel from the vehicle.
9. Save any and all brackets, mounting studs and accessories for transfer to the new floor.
10. Note the location and remove all remaining loose adhesive.
11. Inspect the structure and frame rails for damage.
12. Repair as much of the damage as possible to the factory specifications.
13. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening is required.

Installation Procedure

1. Before applying adhesive dry fit the floor panel for proper fit and alignment.

NOTE: **DO NOT top coat any bonding surface. Use primer only on bonding surfaces. Refer to adhesive manufacturer's recommendations.**

2. Clean and prepare all bonding mating surfaces according to adhesive manufacturer's recommendations.

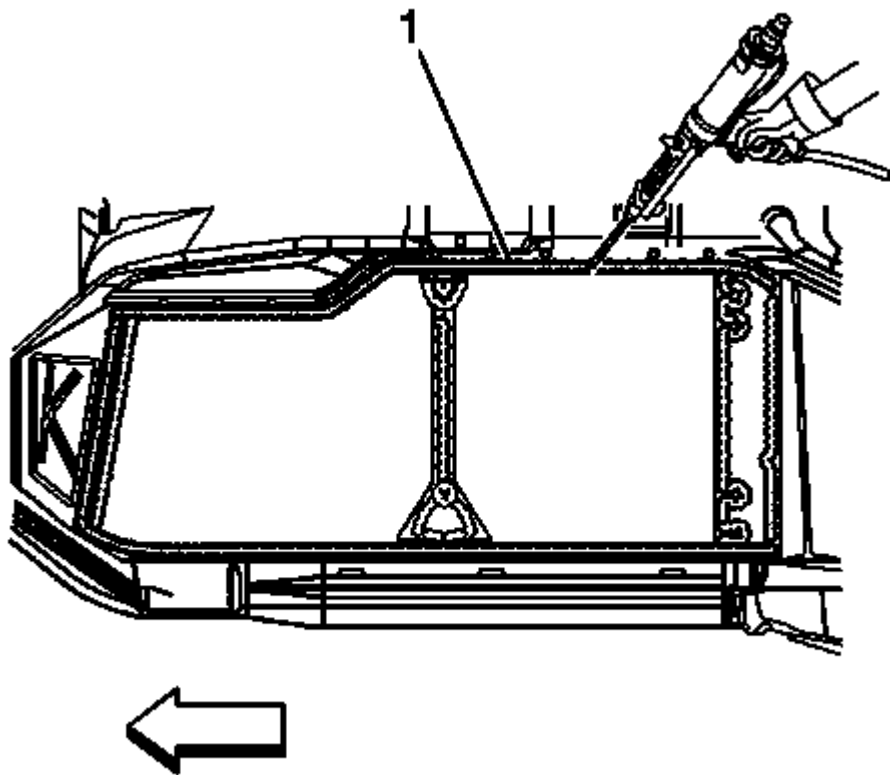


Fig. 87: Applying Consistent Bead Of Structural Adhesive To Floor Structure & Frame Rail

Courtesy of GENERAL MOTORS COMPANY

NOTE: Keep adhesive away from seat studs to minimize squeeze out.

3. Apply a consistent bead of structural adhesive (1) 10 mm (3/8 in) in diameter to the floor structure and frame rail to mate with the bonding surface of the floor. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

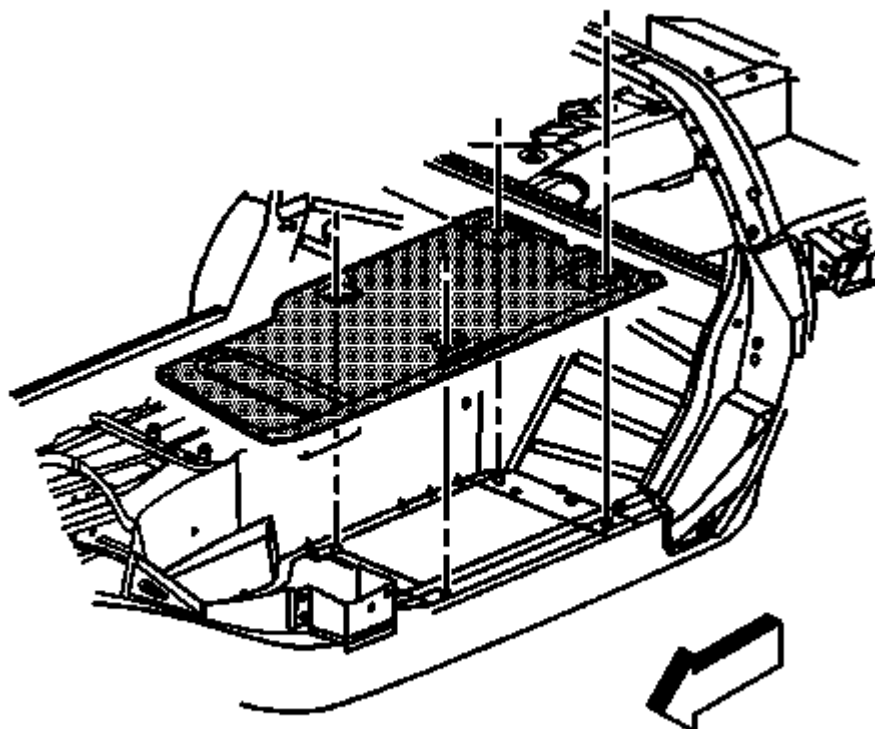


Fig. 88: View Of Floor Panel

Courtesy of GENERAL MOTORS COMPANY

4. Install the floor panel to the vehicle.
5. Apply weight to the floor panel to set the adhesive.
6. Install the seat mounting nuts to set the adhesive at the cross brace.
7. Smooth adhesive around perimeter of floor panel from underside of vehicle to form a consistent, leak-proof seal.
8. Clamp or mechanically fasten the front end panel into place as necessary.
9. Remove any excess adhesive.
10. Install all related panels and components.
11. Remove the seat mounting nuts.
12. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
13. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

REAR COMPARTMENT PANEL REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

The rear compartment panel is made of sheet molded compound (SMC) and is bonded to the rear structure and frame rails with structural adhesive.

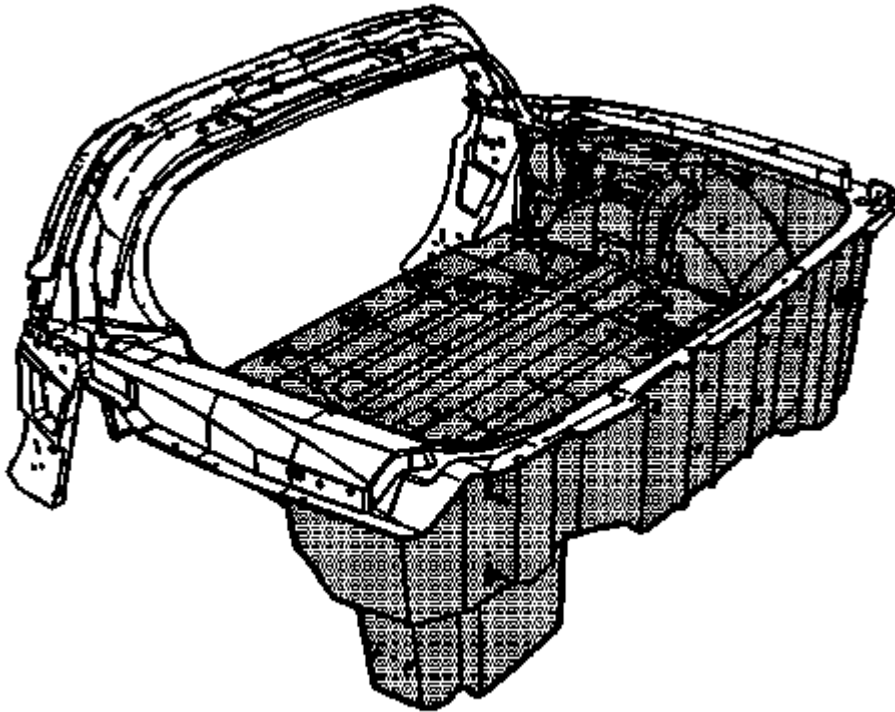


Fig. 89: Rear Compartment Panel
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.

WARNING: Refer to Actions to Take When Working with Fuel Warning .

4. Verify that the fuel inlet is sealed before proceeding with the repair procedure.
5. Remove the rear compartment frame panel. Refer to **Rear Compartment Panel Frame Replacement**.

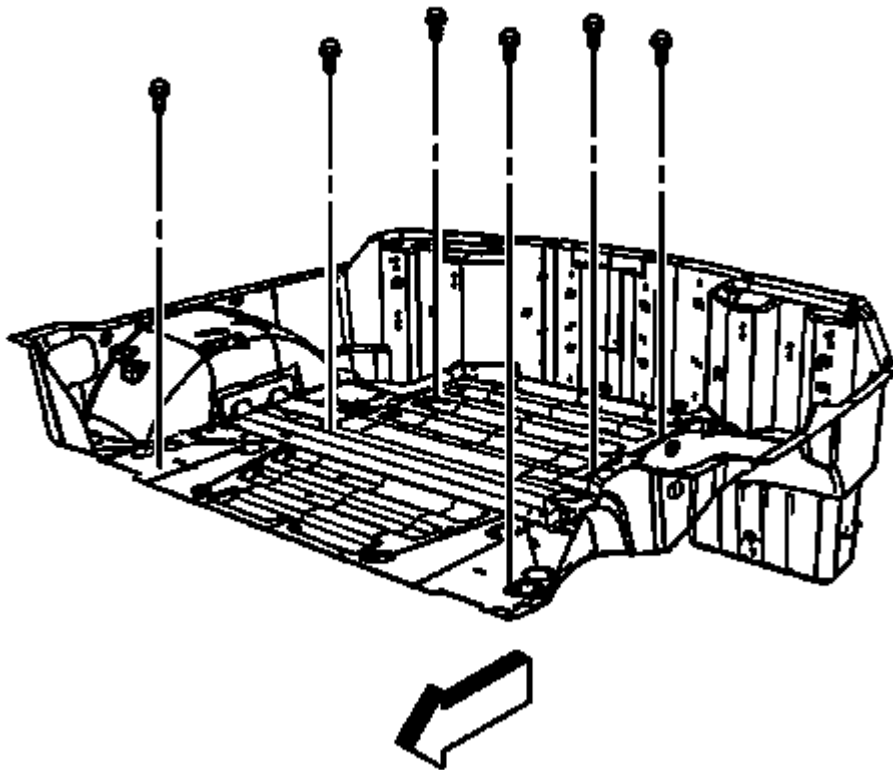


Fig. 90: Rear Compartment Screws
Courtesy of GENERAL MOTORS COMPANY

6. Remove the screws attaching the rear compartment panel to the frame rails.

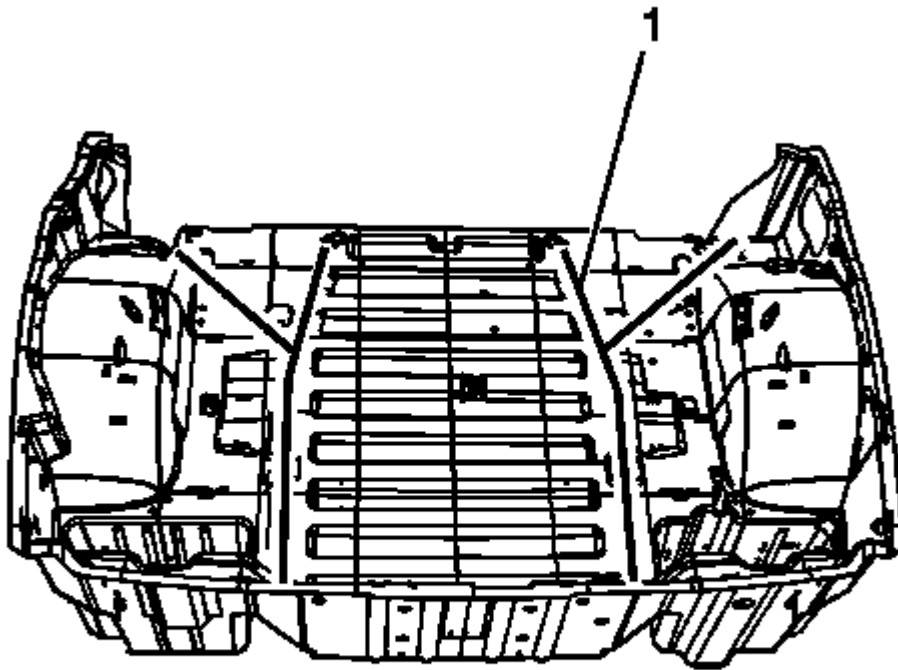


Fig. 91: Rear Compartment Bond Lines
Courtesy of GENERAL MOTORS COMPANY

- NOTE:** The front edge of the rear compartment panel is also bonded across the seatback area and along the top of the rear impact bar.
- NOTE:** The adhesive material will release from the structure by applying heat to approximately 200°C (400°F). A noticeable popping sound can normally be heard when the adhesive releases.
7. Remove the rear compartment panel by applying heat to the inside of the rear compartment along the bond lines (1) indicated on the floor.
 8. Pry to detach the adhesive along the bonding surface.
 9. The front edge of the rear compartment panel is also bonded across the seatback area and along the top of the rear impact bar. Apply heat and pry to detach the adhesive along the bonding surface.

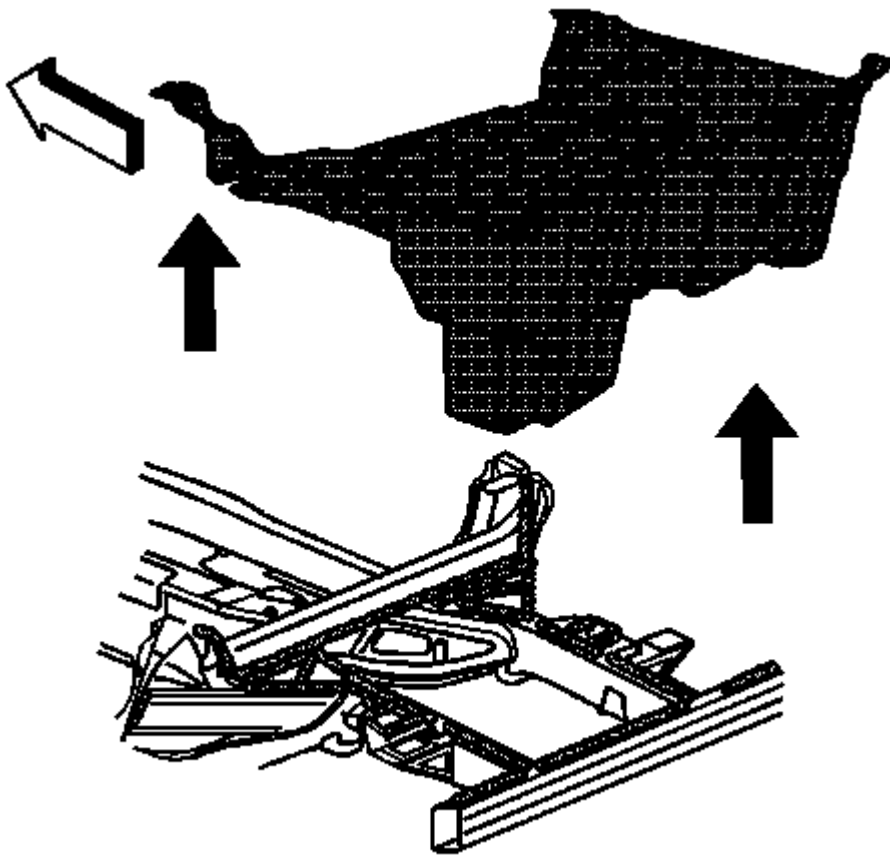


Fig. 92: Removing Rear Compartment Panel
Courtesy of GENERAL MOTORS COMPANY

10. Remove the rear compartment panel.
11. Save all brackets, mounting studs and accessories for transfer to the new rear compartment panel.
12. Note the location of the adhesive and remove all remaining loose adhesive.
13. Inspect the rear structure and the frame rails for damage.
14. Repair as much of the damage as possible to the factory specifications.
15. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening is required.

Installation Procedure

1. Before applying the adhesive, dry fit the rear compartment panel for proper fit and alignment.

NOTE: **Do NOT top coat any bonding surface. Use primer only on bonding surfaces. Refer to adhesive manufacturer's recommendations.**

2. Clean and prepare all bonding mating surfaces according to the adhesive manufacturer's recommendations.

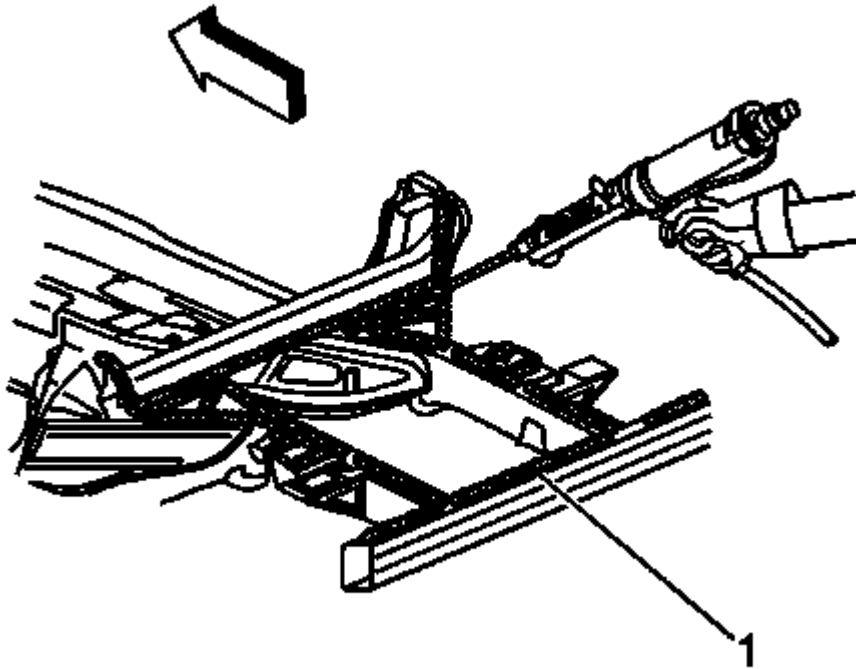


Fig. 93: Applying Consistent Bead Of Structural Adhesive To Top Of Frame Rails
Courtesy of GENERAL MOTORS COMPANY

3. Apply a consistent bead of structural adhesive (1) 12 mm (1/2 in) in diameter to the following locations. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.
 - The top of the frame rails
 - The backside of the lock pillars
 - Over the fuel filler neck
 - To all original bonding surfaces

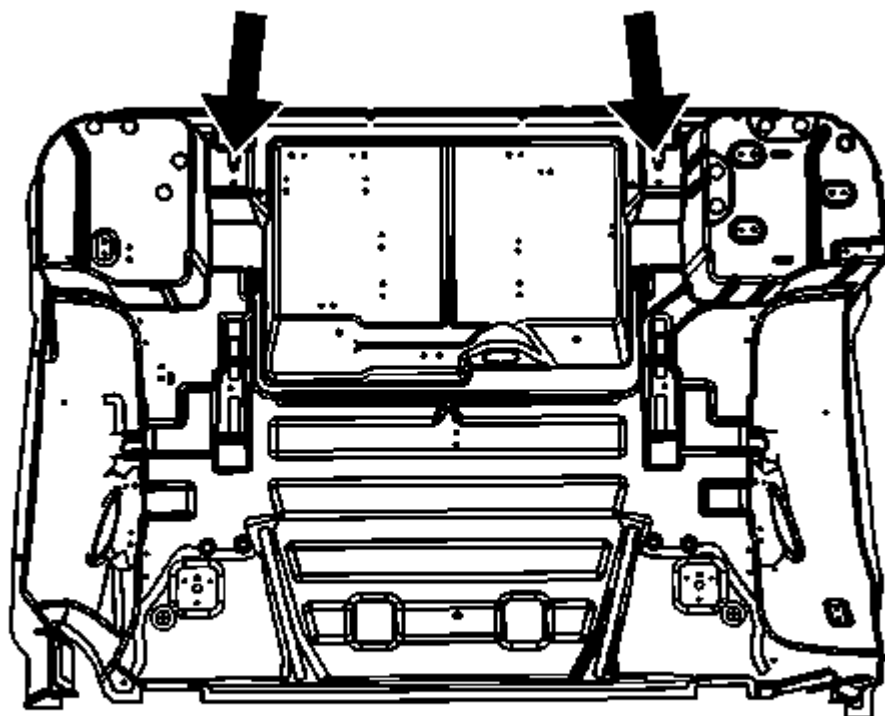


Fig. 94: Rear Compartment Panel Dimples
Courtesy of GENERAL MOTORS COMPANY

NOTE: The rear compartment panel is positioned to the frame rail using 2 dimples formed in the bottom surface of the rear compartment panel.

4. Position the rear compartment panel dimples (1) to the holes in the frame rail.

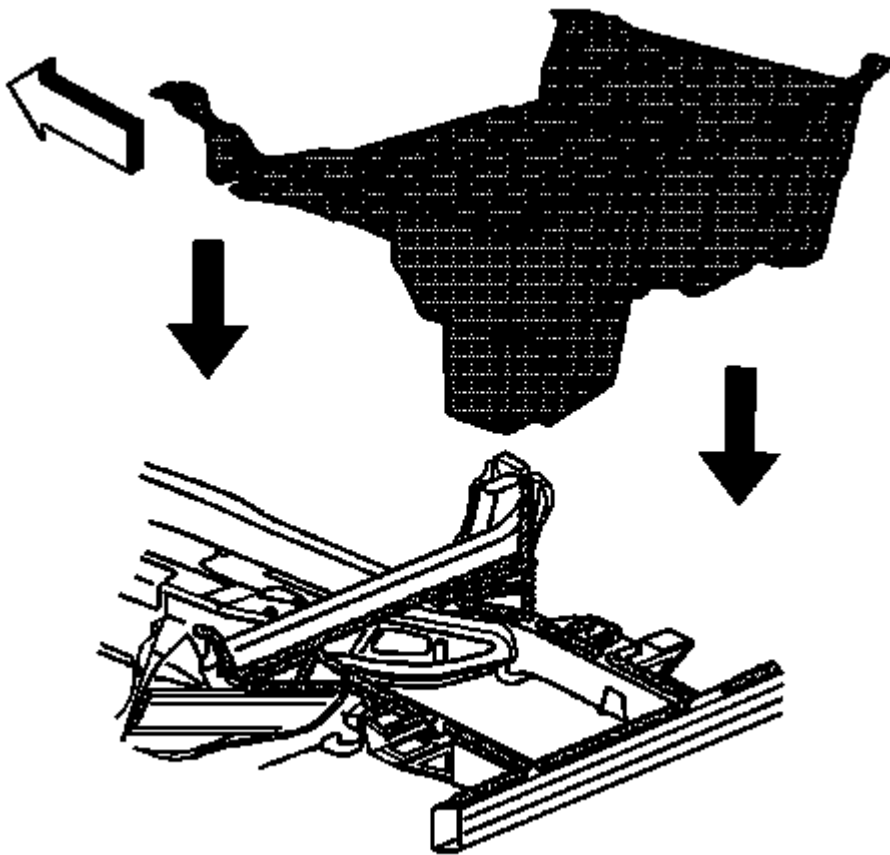


Fig. 95: Installing Rear Compartment Panel
Courtesy of GENERAL MOTORS COMPANY

5. Install the rear compartment panel to the vehicle.
6. Apply pressure to the rear compartment panel to set the adhesive.

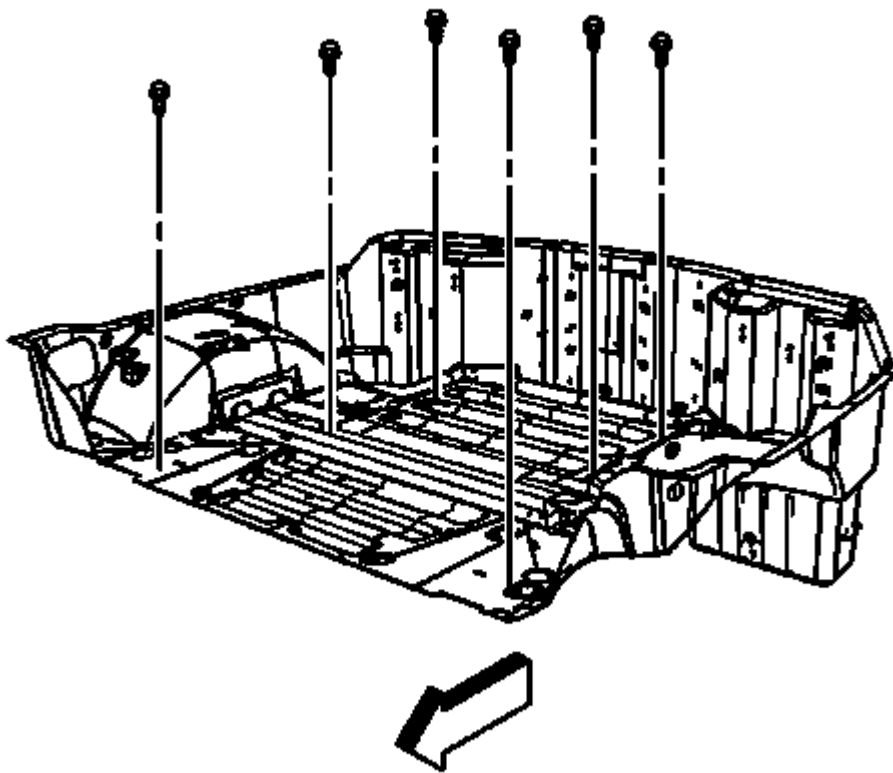


Fig. 96: Rear Compartment Screws
Courtesy of GENERAL MOTORS COMPANY

7. Install the screws attaching the rear compartment panel to the frame rails.
8. Clamp or mechanically fasten the rear compartment panel in place as necessary.
9. Remove any excess adhesive.
10. Install the rear compartment frame panels. Refer to **Rear Compartment Panel Frame Replacement**.
11. Install all related panels and components.
12. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection**.
13. Enable the SIR system. Refer to **SIR Disabling and Enabling**.

REAR COMPARTMENT PANEL FRAME REPLACEMENT

Special Tools

J 42058 Frame Adapter Clamp

Removal Procedure

The rear compartment frame is made of sheet molded compound (SMC) and is bonded to the rear structure with structural adhesive.

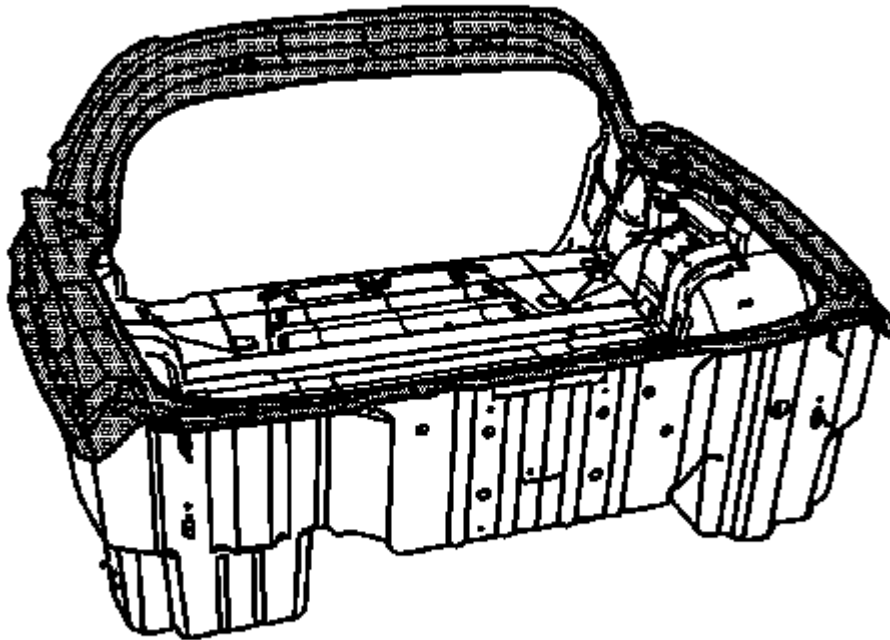


Fig. 97: Rear Compartment Panel Frame
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Approved Equipment for Collision Repair Warning .

1. Disable the SIR system. Refer to SIR Disabling and Enabling .
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Remove all related panels and components.

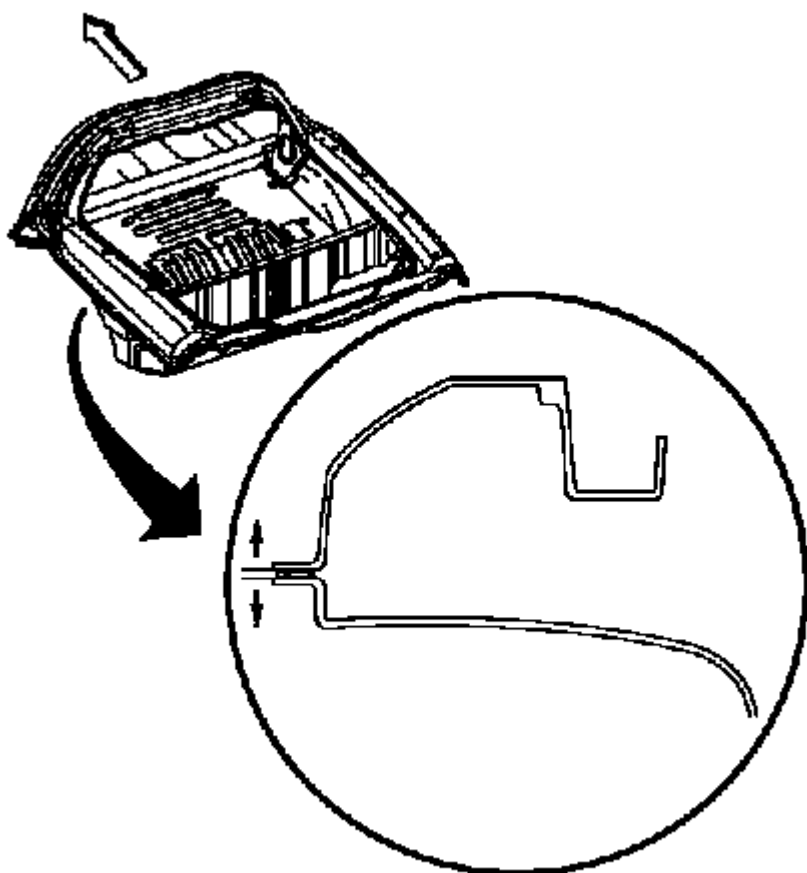


Fig. 98: Quarter-Panels, Roof Bow Cover & Rear Hatch
Courtesy of GENERAL MOTORS COMPANY

4. Remove the rear compartment frame by applying heat and pry to detach the adhesive along the bonding surface.

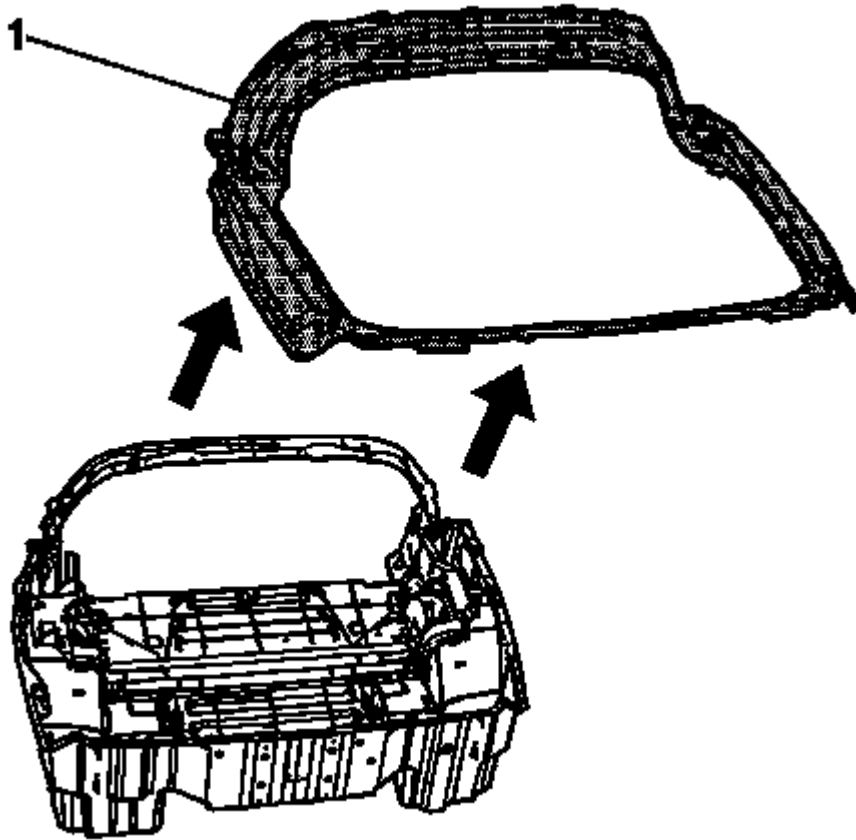


Fig. 99: Removing Rear Compartment Frame
Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear compartment frame (1).
6. Note the location of the adhesive and remove all remaining loose adhesive.
7. Inspect the rear structure and frame rails for damage.
8. Repair as much of the damage as possible to the factory specifications.
9. Use **J 42058** frame adapter clamp to secure the vehicle if pulling and straightening is required.

Installation Procedure

NOTE: **Shims may be necessary to achieve proper panel alignment.**

1. Before applying the adhesive, dry fit the rear compartment frame for proper fit and alignment.
2. Clean and prepare all bonding mating surfaces according to the adhesive manufacturer's recommendations.

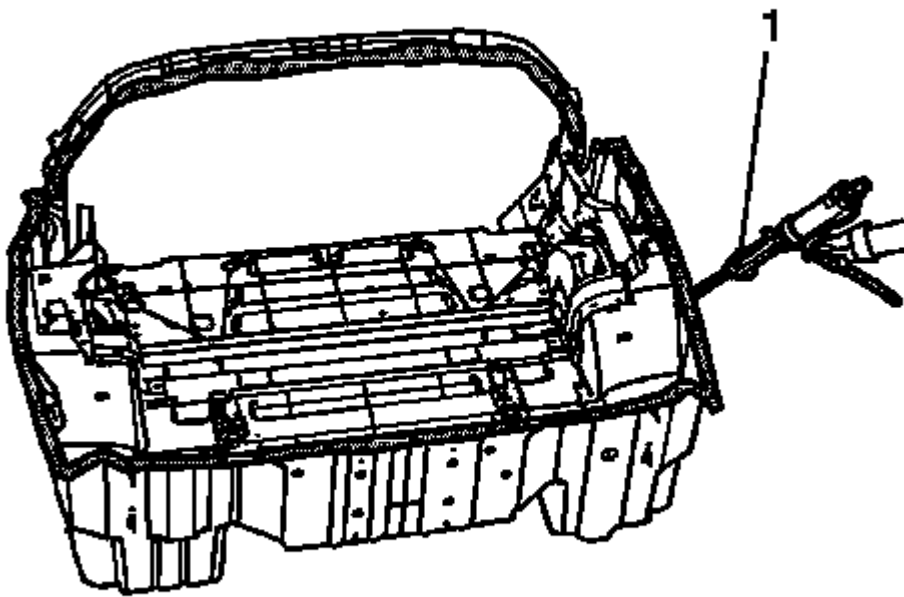


Fig. 100: Applying Structural Adhesive
Courtesy of GENERAL MOTORS COMPANY

3. Apply a consistent bead of structural adhesive (1) 10 mm (3/8 in) in diameter to the rear structure in order to mate with the rear compartment frame. Refer to **Sheet Molded Compound (SMC) Panel Bonding**.

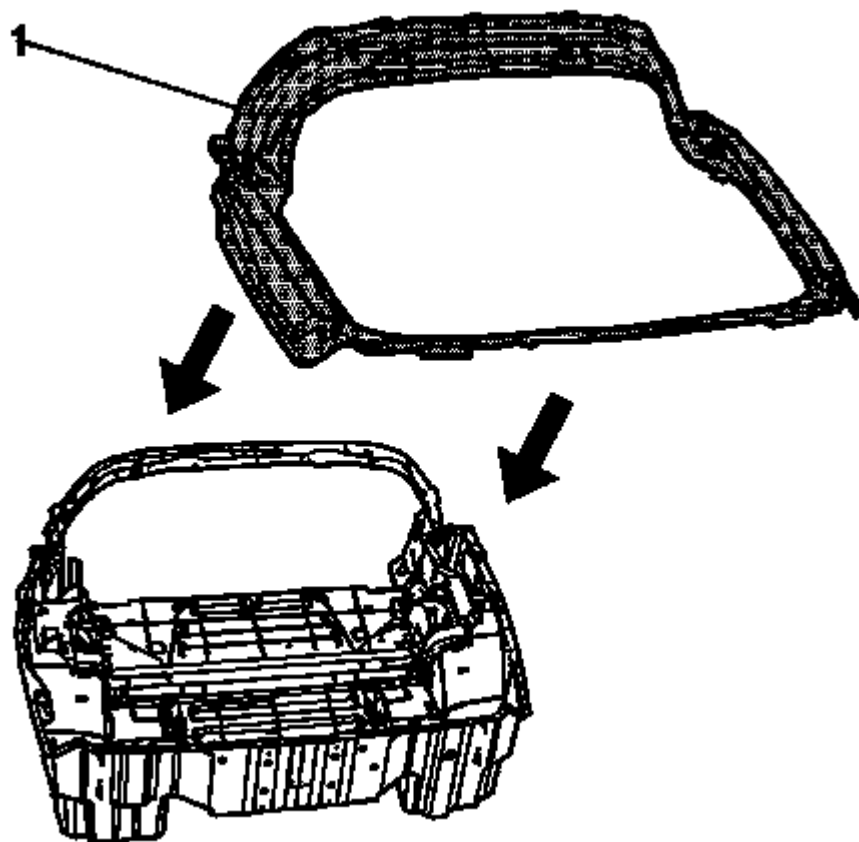


Fig. 101: View Of Rear Compartment Frame
Courtesy of GENERAL MOTORS COMPANY

4. Install the rear compartment frame (1).

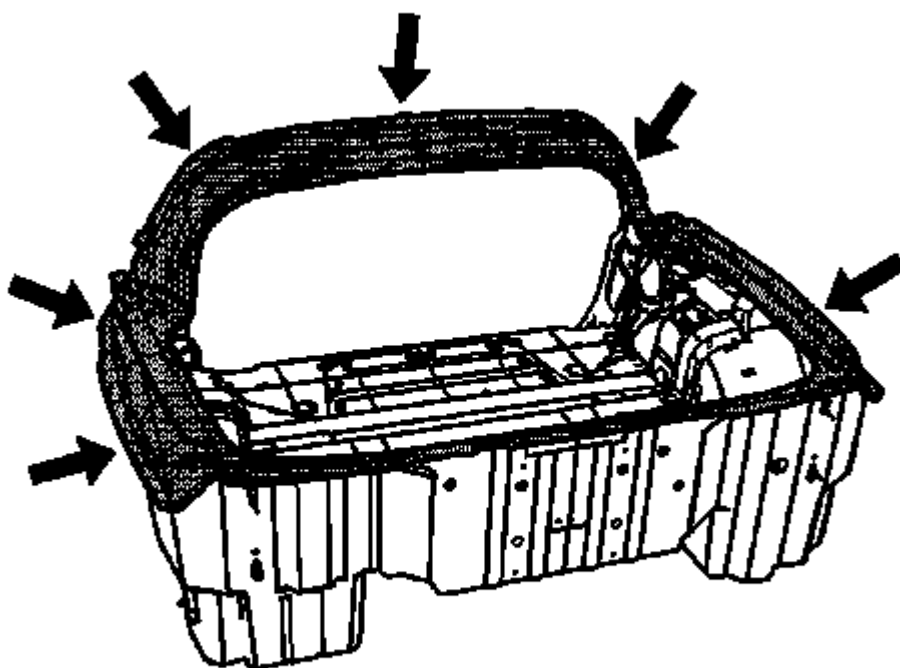


Fig. 102: Applying Pressure To Rear Compartment Panel Frame
Courtesy of GENERAL MOTORS COMPANY

5. Apply pressure to the rear compartment frame to set the adhesive.
6. Clamp or mechanically fasten the rear compartment frame into place.
7. Remove any excess adhesive.
8. Install all related panels and components.
9. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
10. Enable the SIR system. Refer to **SIR Disabling and Enabling** .

DESCRIPTION AND OPERATION

ALUMINUM PANEL BONDING (NON-STRUCTURAL)

This information is intended to provide general guidelines for non-structural adhesive bonding of aluminum panels. Panel bonding of aluminum is only recommended when the panel is originally bonded to the vehicle.

The adhesives listed in this document are known to meet the General Motors specifications and

requirements for non-structural bonding of aluminum body panels.

Bonding procedures in general are applicable only at factory joints.

The use of adhesive to section aluminum panels is not recommended by General Motors.

Rivets, or other mechanical fasteners, may be required in combination with adhesive bonding, if they were used on the original panel, or recommended in the specific service procedure. The recommended rivets, fasteners and adhesive should be used with adhesive, when replacing the original panel.

NOTE: Always follow the adhesive manufacturer's instructions of application, handling and curing for the specific product.

Non-Structural Bonding Adhesives for Aluminum Panels

GM Goodwrench®	GMSPO of Canada	Ashland Pliogrip Structural Adhesives Crest Industries, Inc. 1-800-822-4100	Lord Fusor Structural Adhesive	Product Type
89020330	89020332	7770B	127 EZ	Medium Set
N/A	N/A	7779B	N/A	Fast Set
Canadian applications may use U.S. part numbers. Refer to your GM Dealer Parts Department for the correct part number applications				

ALUMINUM PANEL BONDING (STRUCTURAL)

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The adhesives listed in this document are known to meet the General Motors specifications and requirements for bonding of aluminum body panels.

Bonding procedures in general are applicable only at factory joints.

The use of adhesive to section aluminum panels is not recommended by General Motors.

Rivets, or other mechanical fasteners, may be used in combination with adhesive bonding of aluminum panels. The specified rivets, or fasteners, should be used with adhesive, when replacing the original panel.

Two types of adhesives are listed here. Impact Resistant Adhesive is used in joints in frame rail assemblies and strut tower assemblies and other body structure joints that have critical strength requirements. The factory applied Impact Resistant Adhesive is purple in color when cured. The only adhesive available for servicing these joints is Dow Betamate 2098. The other bonding adhesives are non-impact resistant, offer a lower strength rating and can be used in all other joints that are not

originally made with Impact Resistant Adhesive

NOTE: Always follow the adhesive manufacturer's instructions for application, handling and curing for the specific product.

Adhesives currently meeting the performance requirements include the adhesive products listed below meet these guidelines:

Aluminum Panel Bonding Impact Resistant

Manufacturer and Part Number	Description
Dow 2098	Betamate 2098 Impact Resistant Adhesive Available only from Dow at 800-375-0605

Aluminum Panel Bonding Non Impact Resistant

Manufacturer and Part Number	Description
GM P/N 12378566 (US)	Fast Set Panel Bonding Adhesive
GM P/N 88901674 (Canada)	
Lord Fusor P/N 110B/111B	
GM P/N 12378567 (US)	Medium Set Panel Bonding Adhesive
GM P/N 88901675 (Canada)	
Lord Fusor P/N 108B/109B	
3M P/N 8116	Panel Bonding Adhesive
Ashland Plio Grip Panel 60	Panel Bonding Adhesive

MILD STEEL

This information provides repair recommendations and general guidelines for steel classified as Mild Steel. This type of steel normally has a tensile strength less than 270 MPa. This includes the common steel names of:

- Mild Steel
- Bake Hardenable Steel (BH)
- Solid Solution Strengthened Steel

General Motors recommends the following when repairing or replacing this type of steel during collision repair.

Recommended Repairs:

- Cold repairs can be performed on this type of steel, unless the damage includes kinks. If the damage includes kinks, the part should be replaced.
- Controlled use of heat can be used to repair damage, if the heat does not exceed 650°C (1200° F). The heat should be applied a maximum of 2 times, for up to 90 seconds.

locations, in a specific sectioning procedure.

- This type of steel can be used as a sleeve, or backer plate, when recommended in a specific sectioning procedure.
- Squeeze Resistance Spot Welding can be used to replace factory spot welds, where applicable
- MIG plug welding and MIG stitch welding can be used on this type of steel.
- MIG Brazing can be used on this type of steel.

SHEET MOLDED COMPOUND (SMC) PANEL BONDING

This is intended to provide general guidelines for sheet molded compound (SMC) and carbon fiber adhesive bonding of full panel replacement in regards to collision repair procedures.

Sectioning, partial panel of full panels, is not supported by General Motors unless specifically documented in a Service Bulletin or Manual.

IMPORTANT:

- **Prepare the surfaces to be bonded according to adhesive manufacturer's recommendations. Many adhesive manufacturers have different preparation methods. Do not intermix adhesive manufacturers systems. Mixing materials from different manufacturers can produce unsatisfactory results.**
- **DO NOT top coat any adhesive bonding mating surface. Use primer only on bonding surfaces. Refer to adhesive manufacturer's recommendations for priming applications.**

Adhesives currently meeting the performance requirements include General Motors materials and products manufactured by Ashland and Lord Fusor. At this time, ONLY the adhesive products listed below meet this guideline:

Sheet Molded Compound (SMC) Panel Bonding

GM Goodwrench®	GMSPPO of Canada	Ashland Pliogrip Structural Adhesives Crest Industries, Inc 1-800-822-4100	Lord Fusor Structural Adhesive	Product Type
89020330	89020332	7770B	127 EZ	Medium Set
N/A	N/A	7779B	N/A	Fast Set

Canadian applications may use U.S. part numbers. Refer to your GM Dealer Parts Department for the correct part number applications.

ULTRA HIGH STRENGTH STEEL

This information provides repair recommendations and general guidelines for steel classified as Ultra High Strength Steel, also known as UHSS. This type of steel normally has a tensile strength of 780 MPa, or greater.

This includes the common steel names of

- Ultra High Strength Dual Phase Steel (DPX)
- Martensitic Steel (M)
- Boron/Press Hardened Steel (B)
- Multi-Phase Steel (MP)
- TRIP Steel (TR)

General Motors recommends the following when repairing or replacing this type of steel during collision repair.

NOTE:

- **Repair of this type of steel is not recommended.**
- **This type of steel should be replaced only, at factory joints. Sectioning or partial replacement is not recommended.**
- **The use of heat to repair damage is not recommended for this type of steel.**
- **Stitch Welding is not recommended for this type of steel (unless replacing a factory installed stitch weld).**
- **This type of steel should not be used as a backing reinforcement or a sleeve for a sectioning joint.**

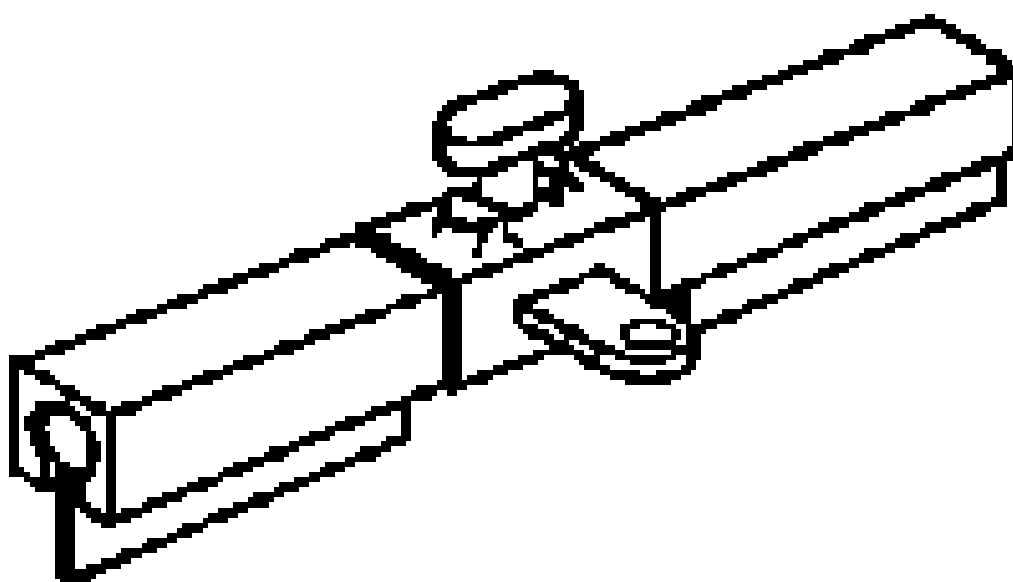
Recommended Repairs

- Squeeze Resistance Spot Welding can be used to replace factory spot welds, where applicable.
- MIG plug welding can be used to replace factory spot welds.
- MIG Brazing can be used to replace factory spot welds.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description



J 42058
Frame
Adapter
Clamp