



Collision Repair

Flexible Instruction Day

Assignment #5

Learning Standard	1.2.11 read and understand essential content. 2.2.11.E recognize the degree of precision needed in calculating a number and environmental health and safety. 3.6.12 science and technology
Task # & Description	1106 complete a plug weld on a door skin
	504 repair metal to meet industry standards

CONTACT INFORMATION/ASSISTANCE

Instructor Name: Dave Peters

Instructor E-Mail: petersd@butlertec.us

I will be available by email from 7:40-12, and 12:30-3:10 to answer your questions. Please reach out if you are having difficulty completing your assignments.

INSTRUCTIONS

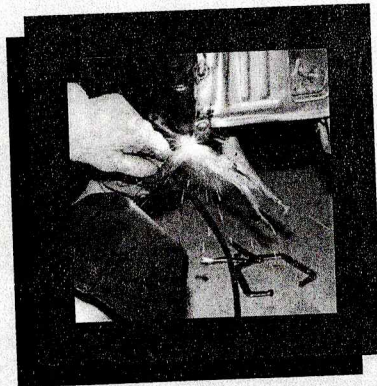
- ✓ All work is due on the day we return to school. This is counted towards your attendance **and** as a classroom assignment.
- ✓ Read supplied materials
- ✓ Complete the replacing structural parts and corrosion protection quiz and the door skin quiz

Name: _____

Session: _____

____/____ points

22



Replacing Structural Parts and Corrosion Protection

Objectives

After studying this chapter, you should be able to:

- List the parts of the vehicle that are considered structural.
- List the steps necessary for replacing a part along factory seams.
- Describe how spot welds are separated.
- Explain how new body panels can be positioned on a vehicle.
- List the steps for welding new body panels in place.
- Describe how to install foam panel fillers.
- Section rails, rocker panels, A- and B-pillars, floor pans, and trunk floors.
- Define corrosion and describe the common factors in its formation.
- Identify the principal methods of corrosion protection.
- Choose the correct anticorrosion materials and equipment.
- List common types of seam sealers and explain where each should be used.

Introduction

Most collisions will involve at least some parts replacement. While many parts on a vehicle add to its structural integrity, some parts play a greater role. These parts are known as structural parts. **Structural parts** can be defined as those parts of the vehicle that:

1. Support the weight of the vehicle
2. Absorb collision energy
3. Absorb road shock

The illustration in Figure 22-1 shows parts that are generally considered to be structural. These parts include:

1. Core support/tie bar
2. Front rails
3. Strut towers
4. Rocker panels
5. A-pillar (hinge pillar)
6. B-pillar (center pillar)
7. Rear rails
8. Rear strut towers
9. Suspension crossmembers

Restoring corrosion protection is also a vital aspect of collision repair. Failing to do so can result in major structural failure. Corrosion of structural parts can severely impair the handling and crash worthiness of the vehicle. This damage may not be evident until a collision, but then it will be too late.

NOTE! For complete comprehension of the information in this chapter, you should have already studied Chapter 9, Welding, Heating, and Cutting.

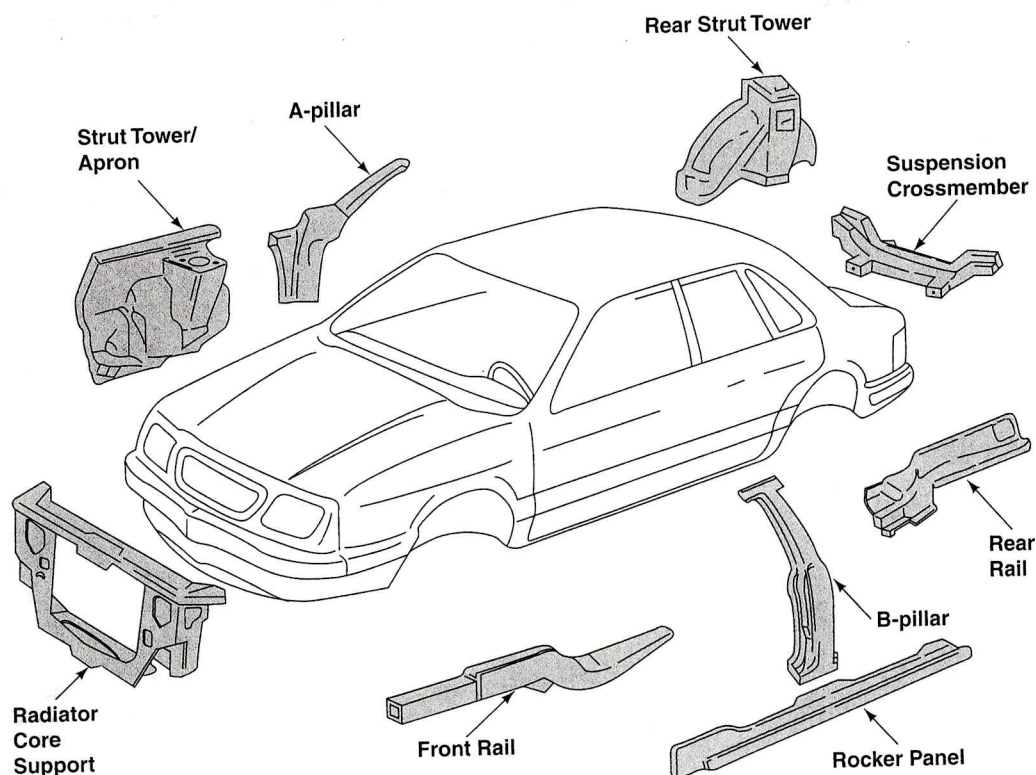


Figure 22-1 Note the typical structural parts of a vehicle.

REPAIR OR REPLACE GUIDELINES

The decision to repair or replace a structural part will be based on the judgment and skill of the technician/appraiser. A simple rule is:

If the part is bent, repair it.
If the part is kinked, replace it.

Whenever possible and practical, the part should be repaired rather than replaced. See Figure 22-2.

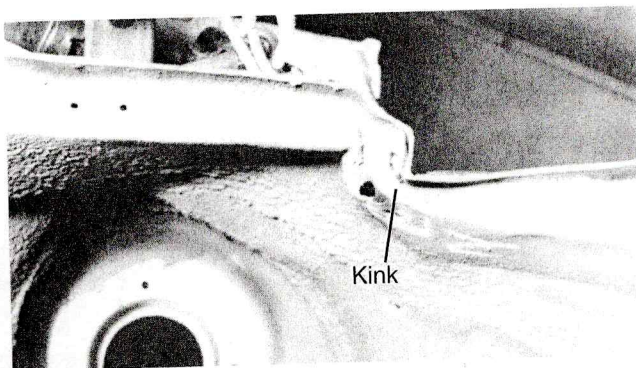


Figure 22-2 This badly kinked part would require replacement. It is too severely damaged for straightening.

TYPES OF STRUCTURAL REPLACEMENTS

Structural replacement can take one of two forms: replacement at factory seams and sectioning.

Replacement of panels along **factory seams** (the end or edge of a panel) should be done when practical and economical. The result is almost identical to factory production in both strength and appearance. Replacement of damaged parts along factory seams is a common practice in collision repair. Parts should be replaced along factory seams whenever it is practical and possible.

Sectioning involves cutting the part in a location other than a factory seam. This might or might not be a factory-recommended practice. Special care must be taken. Sectioning a part should be analyzed to make sure it will NOT jeopardize structural integrity.

There are three general types of structural parts:

1. Closed sections, such as rocker panels, front rails, A-, and B-pillars
2. Hat channels, such as rear rails
3. Single layer, flat parts, such as floor pans and trunk floors

Most manufacturers have specific recommendations for parts replacement. Always follow the procedures described in the body repair manual.

When planning to section a structural part:

1. Check the body repair manual for model-specific sectioning procedures.
2. If specific sectioning recommendations do NOT exist, follow the general guidelines presented here. Body repair manuals are available through various publishers and vehicle manufacturers.

Keep in mind that the vehicle must be returned to precollision condition. Failure to restore precollision crushability may affect future air bag deployment, leading to liability exposure.

When choosing a sectioning location, look for a uniform area with enough clearance to perform welding operations.

You should NOT section in or near:

1. Suspension mounting locations
2. Structural part mounting locations
3. Dimensional reference holes
4. Compound shapes
5. Reinforcements (except as noted)
6. Compound structures
7. Collapse/crush zones
8. Engine or drivetrain mounting locations.

DETERMINING SPOT WELD LOCATIONS

To start removal of a structural component, you usually must first locate all factory spot welds. Remove the paint, sealer, or other coatings covering the joint area to find the spot welds. A coarse scuff wheel mounted in an air tool is often used to remove the paint so you can locate the spot welds on the damaged component.

Another way to do this is to heat the paint film. It is the best choice for loosening the paint film. A coarse wire wheel or brush attached to an air drill or grinder can be used to remove the paint, sealers, and other coatings.

Scrape off thick portions of undercoating or seam sealer before scorching the paint. Do NOT overheat the paint film so that the sheet metal panel begins to turn color. Heat the area only enough to soften the paint and then brush or scrape it off. It is NOT necessary to remove paint from areas where the spot welds are visible through the paint film.

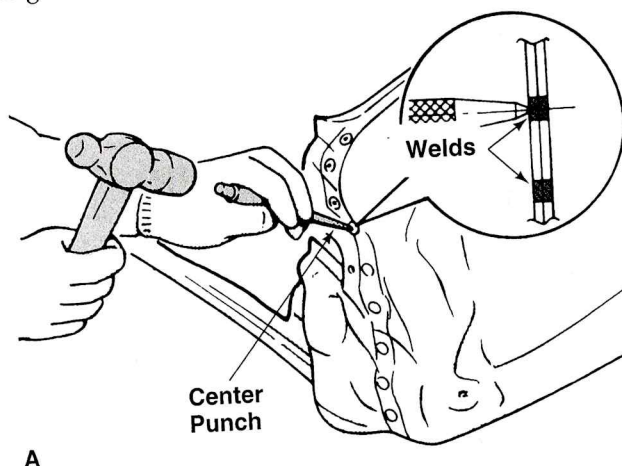
In areas where the spot weld locations are NOT visible after the paint is removed, carefully drive a

chisel between the panels. Doing so will cause an outline of the spot welds to appear.

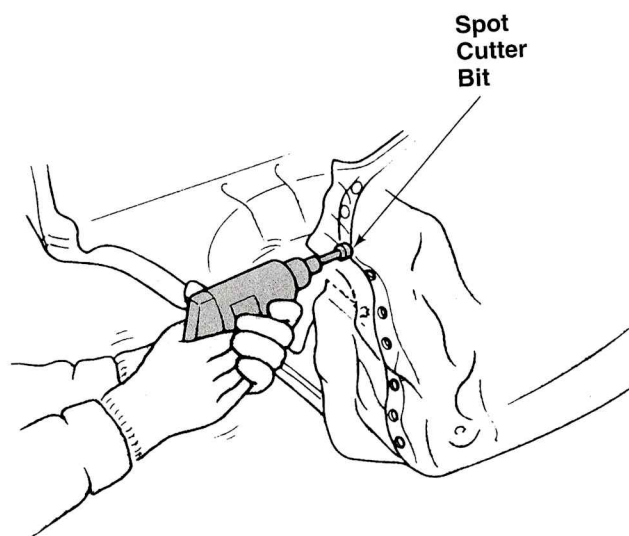
SEPARATING SPOT WELDS

After the spot welds have been located, there are several methods of separating them. You can use a hole saw, compound drill bit, conventional drill bit, cutoff saw, or spot weld cutting tool. Regardless of which is used, be careful NOT to cut into the lower panel if it is to be used. Also be sure to cut out the spot welds without creating an excessively large hole.

If needed, center punch each spot weld before drilling. This will keep the bit from wandering. See Figure 22-3.



A



B

Figure 22-3 Spot welds can easily be seen and removed after any paint hiding them is removed. (Used with permission from Nissan North America, Inc.) (A) Center punching will help the drill stay in the center of spot welds. (B) Use a drill to cut out the spot weld. Do not drill through the lower panel if it is to be reused.

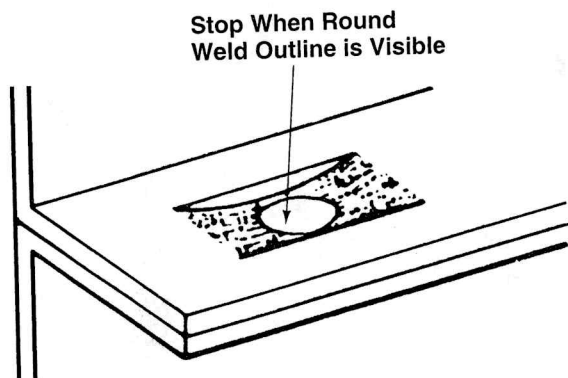
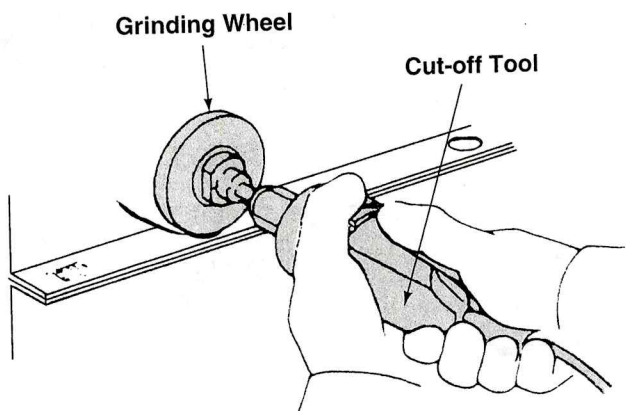


Figure 22-4 A cutoff tool provides another way of removing spot welds. (A) Carefully hold the cutoff tool over the spot weld to grind it away. (B) To prevent panel damage, stop grinding when you reach the lower panel.

Make sure the bits are sharp, and use the same pressure on the drill as if you were drilling mild steel. The speed at which the bit turns should be slower than for mild steel. This will keep the heat from affecting the metal.

Figure 22-4 shows how a cutoff tool can be used to remove spot welds.

After the spot welds have been removed, drive a chisel between the panels to separate them. Be careful NOT to cut or bend the undamaged panel. Look at Figure 22-5.

Remember! A chisel should never be used by itself to remove spot welds. This will create excessive damage to adjacent panels.

SEPARATING CONTINUOUS WELDS

In some vehicles, panels are joined by continuous MIG welding. Since the welding bead is long, use a

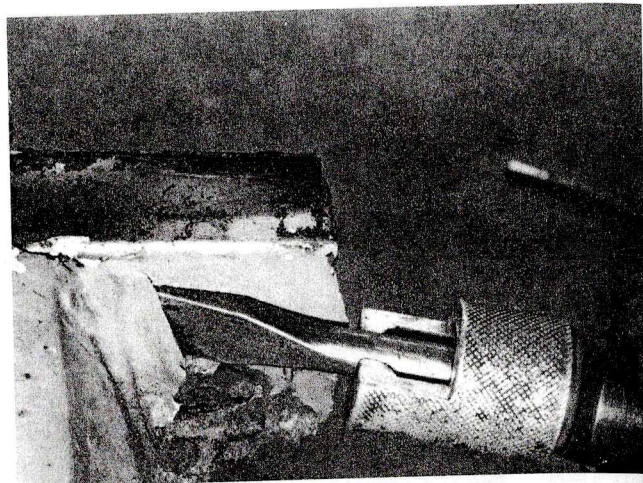


Figure 22-5 Only after removing spot welds can you use a chisel to separate panels. (Mustang Monthly Magazine)

grinding wheel or cutoff tool to cut through the weld. Be careful NOT to cut into or through the undamaged panels. Hold the cutoff tool at a 45-degree angle to the joint. After grinding through the weld, use an air chisel to separate the panels.

PREPARING VEHICLE FOR NEW PANEL

Always refer to the appropriate body repair manual for the type and placement of welds. The manual will also give other details for the specific vehicle.

After removing the damaged panels, prepare the vehicle for installation of the new panels:

1. Grind off the welding marks, Figure 22-6. Use a wire brush to remove dirt, corrosion, paint, seal-

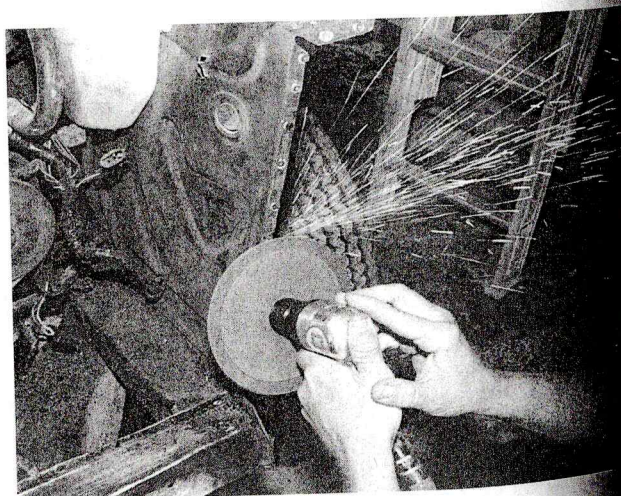


Figure 22-6 After removing the damaged panel, carefully grind and smooth any small beads left from spot welds. (Mustang Monthly Magazine)

ers, and so on from the joint surfaces. Zinc coatings should NOT be removed.

2. Remove paint and undercoating from the back-sides of the panel joining surfaces on parts that will be spot welded during installation.
3. Smooth the mating flanges with a hammer and dolly.
4. Apply weld-through primer to areas where bare metal is exposed.

PREPARING REPLACEMENT PANEL/PART

Since all new parts are coated with primer, it is important that this coating be removed from the flanges to allow the welding current to flow properly. Also, holes for plug welds must be drilled precisely.

To prepare a replacement panel for welding, follow these steps:

1. Use a disc sander to remove the paint from both sides of the spot weld area. Do NOT grind into the panel. Do NOT heat it too much. You do NOT want the panel to turn blue or warp.

DANGER! Whenever possible, grind so that sparks fly down and away. Always wear proper eye and hand protection when grinding.

2. Apply weld-through primer to the welding surfaces where the zinc coating was removed.
3. Drill or punch holes for plug welding. Always refer to the body repair manual for the size of plug weld holes. Always be sure to duplicate the location and number of spot welds used at the factory. See Figure 22-7.

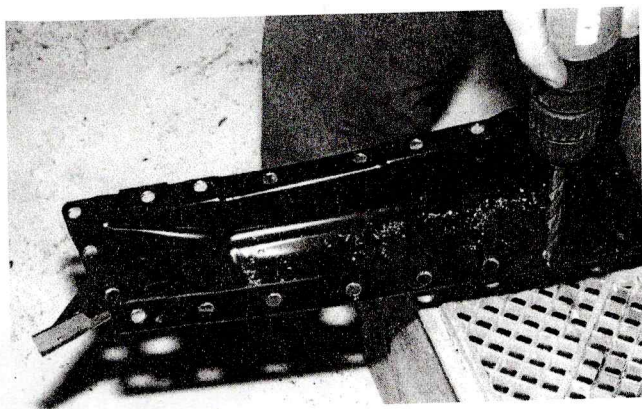


Figure 22-7 The correct number and size holes should be drilled or punched in the replacement parts. Holes should be positioned as explained in factory service literature.

4. Be sure all plug weld holes are of the proper diameter. If a recommended hole size is NOT given in the repair manual, drill $\frac{3}{16}$ inch (8 mm) holes.
5. If the new panel is sectioned to overlap any of the existing panels, rough cut the new panel to size using an air saw or a cutoff wheel. The edges should overlap the portion of the remaining panel by $\frac{3}{4}$ to 1 inch (19 to 25 mm).

Remember! If the overlap portion is too large, it will make positioning of the panel difficult. If the overlap is too small, structural integrity will suffer.

POSITIONING NEW PANELS

Aligning new panels is a very important step in repairing unibody vehicles. Improperly aligned panels will affect both the appearance and quality of the repaired vehicle.

Use a measuring system to determine the installation position. Remember that the fit of the new and old parts must be within specifications. Whether structural or cosmetic panels are being replaced, proper measurement and fit are critical.

Panel alignment marks can be provided to help position parts before welding. Refer to the manufacturer's published materials for more information on panel alignment marks.

Once you have the part in relative position, use locking pliers or self-taping screws to hold it in place. Use self-tapping screws only in places where there is not sufficient room for locking pliers. You will have to remove and weld each hole made by a self-tapping screw. Measure the position of the panel and adjust its location if needed. See Figure 22-8.

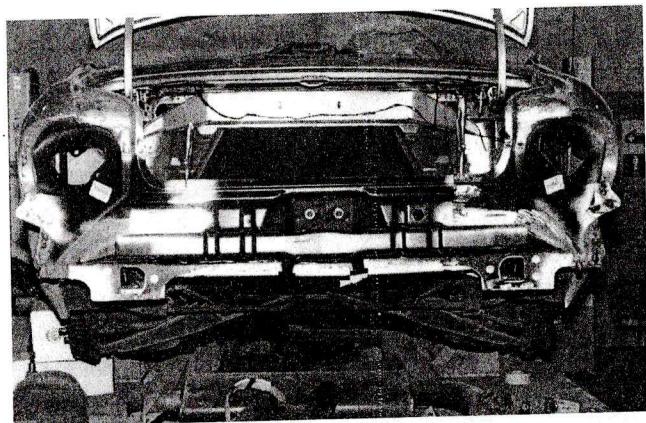


Figure 22-8 Before final welding, parts should be positioned and held in place with locking pliers. Self-tapping screws can also be used in tight places that must be drawn together. Measure the structure as you tack weld parts in place. This will allow you to adjust the position of parts before final welding.

Panel Positioning and Measurement

The vehicle must be properly positioned on the straightening bench before the new panel can be correctly aligned. All straightening must be done before replacing panels. Otherwise, proper alignment of the new panels will be impossible.

As an example of a typical procedure for structural part replacement, we will describe the replacement of a front fender apron, front crossmember, and core support/tie bar.

1. Match the assembly reference marks on the installation areas of the front fender apron and the rail. Secure them with locking pliers. Parts that have no assembly reference marks should be positioned in the same location as the old parts.
2. Align the parts by measuring the distance between reference points. Temporarily install the front crossmember by tack welding one spot. Make any length adjustments by light tapping. Use a hammer against a wood block to adjust the panel without damage, Figure 22-9A.
3. Mark a positioning line at the end of the part that is NOT welded. Use locking pliers to hold the parts together. You can also drill small holes and fasten them together with sheet metal screws. Mark a line on the apron area but do NOT weld the panels together.
4. Use a measuring system to match the height of the new parts to the parts on the opposite side of the vehicle, Figure 22-9B. Support the new parts with a jackstand to make sure that the height does NOT change at all.
5. Measure the lower diagonal and width dimensions, Figure 22-9C. Support the parts with jack stands so that the height does NOT change. Then, adjust the rail as needed to obtain the correct dimensions. Confirm the height dimensions again.
6. Take care to position the front crossmember so that both the left and right ends are uniform.
7. Once the dimensions of the rail match the dimensions found on the dimension chart, secure the part in place. The suspension crossmember can also be installed with fixtures. Use a sufficient number of plug welds to fasten the joining area of the rail to the front crossmember.
8. Make sure that the apron's upper length has NOT changed. Confirm by checking for shifting of the marked line.
9. Measure the diagonal dimensions between the fender rear installation hole and the strut tower

hole or fender front installation hole, Figure 22-9D.

10. Measure the width dimension of the strut tower and the front fender bolt hole and fasten them together. If the width dimension does NOT match the body dimension manual, make a small adjustment. Be careful of changes in diagonal dimensions. Temporarily install and fasten the upper core support and the core support, Figure 22-9E.
11. Measure the rail width dimensions. Set the measuring system to the proper measurement and adjust the apron as needed. Lightly fasten the support with locking pliers and tap it softly by hand to move it into place.
12. Measure the diagonal dimensions for the side supports, Figure 22-9F. Be sure these dimensions match.
13. Temporarily install the front fender and inspect it for proper fit with the door and hood. If the clearance is NOT correct, it might be because the fender apron or the rail height is NOT correct.
14. Measure as previously described, and verify the overall dimensions once more before welding.

WELDING NEW PANELS/PARTS

When the position and dimensions of the new panel are satisfactory, it can be permanently welded in place, Figure 22-10. Under ideal circumstances, the general welding procedure for panels should be:

1. Apply weld-through primer to bare metal surfaces.
2. Clamp parts in position.
3. Tack weld parts in position.
4. Remeasure part positions.
5. Plug weld parts in final position.
6. Grind cosmetic weld surfaces.

Remember that it is very important to duplicate exactly the location and number of original factory spot welds.

SECTIONING

As mentioned, sectioning involves cutting and replacing panels at locations other than factory seams. When body parts need to be replaced, replacing them

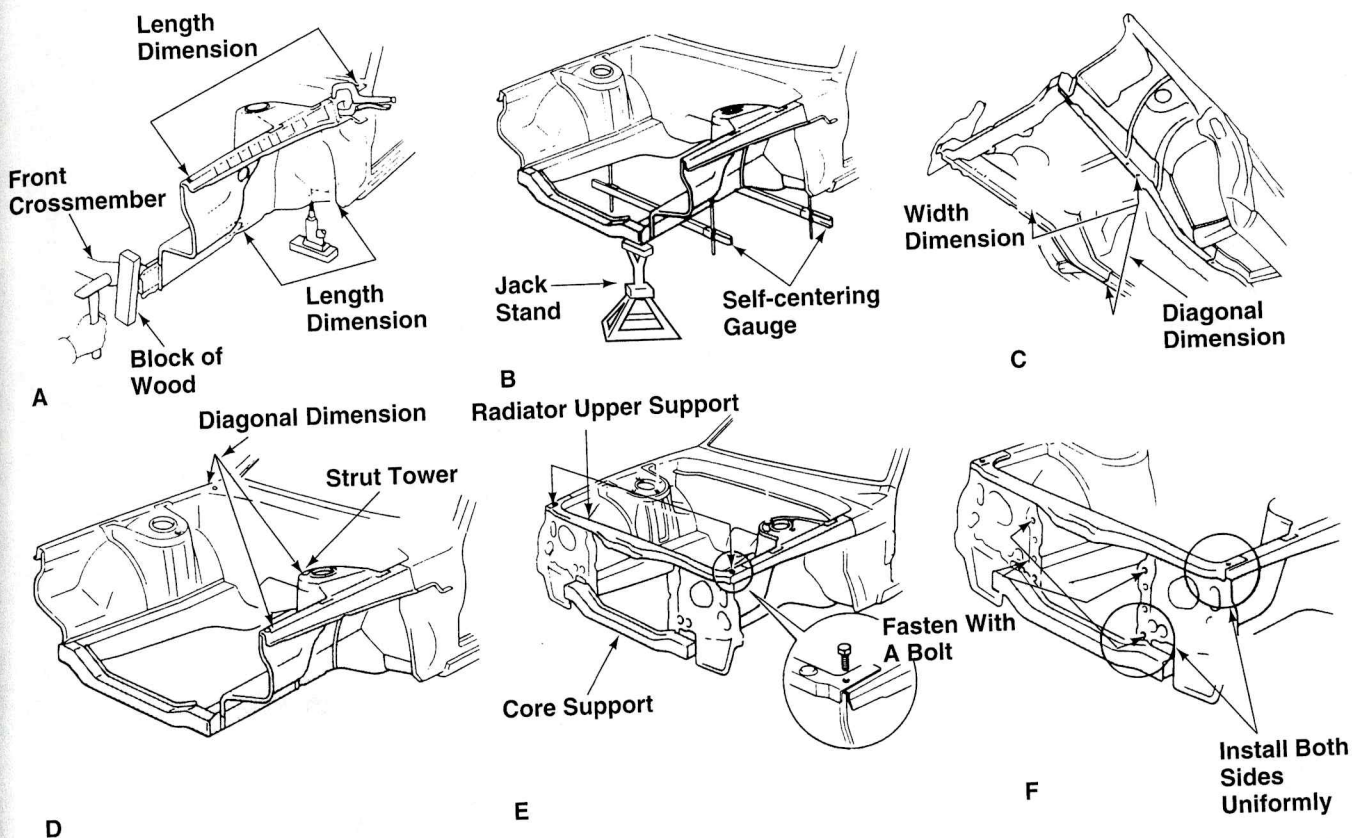


Figure 22-9 Carefully measure and position the panel before welding. (A) Use a wood block and light blows to adjust the panel as needed. (B) Jack stands should be used to support the panel. Use a measuring system to check panel positioning. (C) Measure the width and diagonal dimensions. (D) Note the basic method for measuring fender apron dimensions. (E) After the inner component, the apron in this example, is secured, install the next component, core support. F: Measure each component's location before final welding.

at factory seams is the logical first choice. However, this is impractical when many seams have to be separated in undamaged areas. In some repairs, sectioning of parts such as rails, pillars, and rocker panels may be required to make their repair economically feasible. See Figure 22-11.

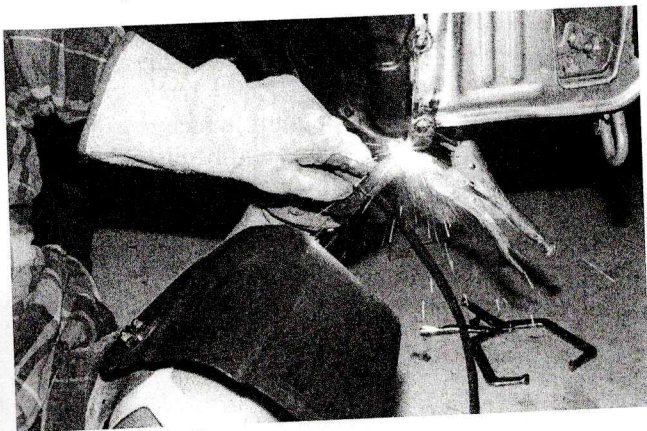


Figure 22-10 Follow all safety rules when welding structural panels in place. Wear welding helmet, welding respirator, and leather gloves.

Remember that sectioning requires precision, as well as strict adherence to recommended procedures. Always check the body repair manual for the vehicle manufacturer's procedure for the specific sectioning location.

As a collision repair technician, never forget that sectioning finally comes down to sound judgment. It is the technician who must assure the quality of the repair through the proper application of tested and proven procedures.

Unibody parts to be sectioned involve these types of construction:

1. Closed sections, such as rocker panels and A- and B-pillars
2. Hat or open U-channels, such as rear rails
3. Single layer or flat parts, such as floor pans and trunk floors

With structural parts, it is best to treat them all like high-strength steel. Then you do not have to identify every piece of high-strength steel. Also, you can use a MIG welder on all repairs.

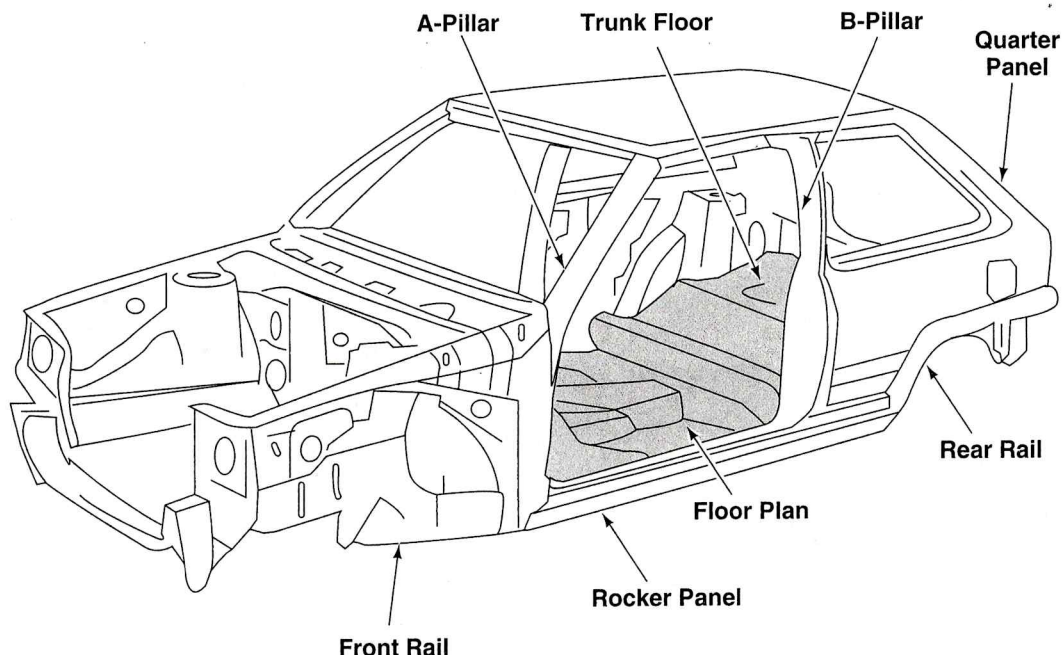


Figure 22-11 Note these common sectioning areas on a vehicle.

Using New Versus Recycled Assemblies

Recycled assemblies are undamaged parts from another damaged vehicle that are used for repairs. The use of recycled assemblies in collision repair makes sense for a number of reasons:

1. Fewer welds need to be made when using recycled assemblies compared to new, separate parts.
2. Less factory corrosion protection is disturbed.
3. Less measuring is required than when welding separate new parts and attaching them to the vehicle.
4. There is an abundance of recycled assemblies available in most areas.

Section Locations

When deciding where to section, look for an area with a uniform cross section. Check the vehicle manufacturer's body repair manuals and bulletins provided by the vehicle manufacturer. Much of this literature provides specific instructions on how and where to section.

Sectioning Joint Types

There are three basic types of sectioning joints. They are the:

1. Lap joint
2. Offset butt joint
3. Butt joint with insert

One of these joints, or a combination of these joints, will be used for all sectioning procedures. The type of joint used for a specific repair will depend upon the location and design of the structural part. See Figure 22-12.

A butt joint with insert is used mainly on closed sections, such as rocker panels, A- and B-pillars, and rails. **Inserts** make it easy to fit and align the joints correctly. They also help make the welding process easier.

Another basic joint is an **offset butt joint** without an insert. This type is also known as a **staggered butt joint**. The staggered butt joint is used on A- and B-pillars and front rails.

The third type is a lap joint, which is used on rear rails, floor pans, trunk floors, and B-pillars.

The configuration and makeup of the part being sectioned might call for a combination of joint types. Sectioning a B-pillar, for instance, might require the use of an offset cut with a butt joint in the outside piece and a lap joint in the inside piece. See Figure 22-13.

Using Lap Joints. Lap joints are used on floor pans, trunk floors, rear rails and other flat or hat channel shaped parts.

When welding lap joints:

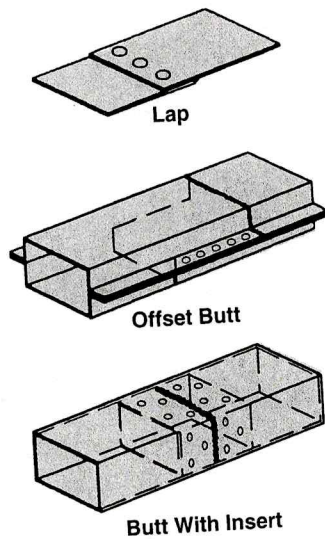


Figure 22-12 These are the three basic types of joints used for sectioning. (I-CAR)

1. Parts should be overlapped $\frac{1}{4}$ inch to 1 inch (6–25 mm) as specified. See Figure 22-14.
2. Use plug welds in the overlap area. Weld from the top piece down.
3. Close the bottom edge with a continuous weld bead.
4. Seal lap joints in floor pans and trunk floors to prevent water and fumes from entering.

Using Offset Butt Joints. Offset butt joints are used for closed sections such as A- and B-pillars. They are used on B-pillars to avoid disturbing the D-ring anchor. Offset butt joints are also used where three or more pieces join in the construction of a part, making it difficult or impossible to use an insert.

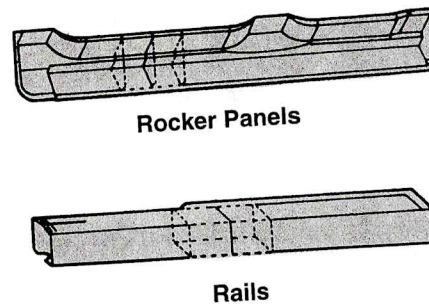
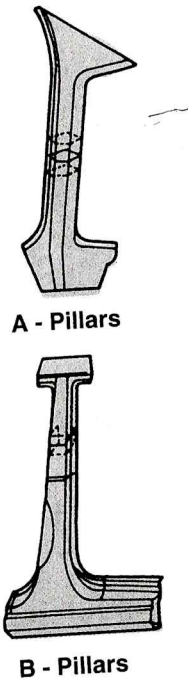


Figure 22-13 A butt joint with an insert produces a very strong repair.

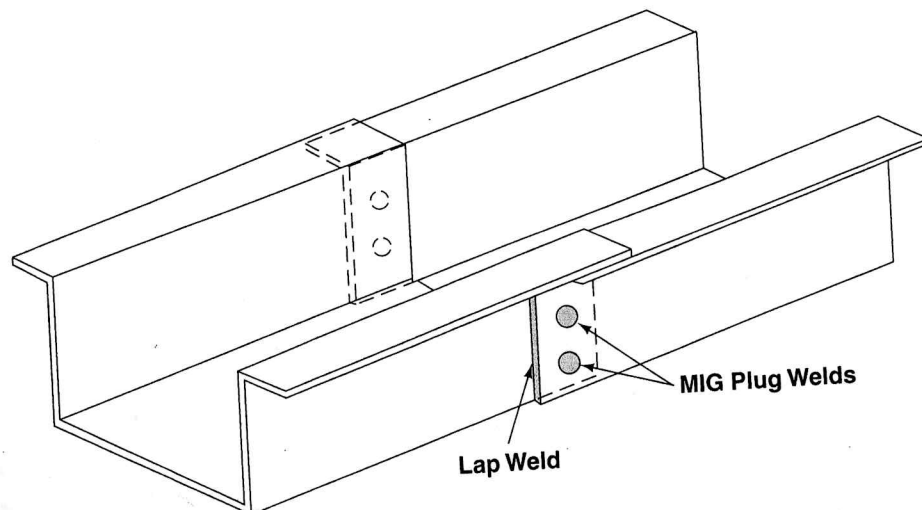


Figure 22-14 Lap joints should overlap about an $\frac{1}{4}$ inch to 1 inch (6–25 mm). Use both plug and continuous welds to join parts. (I-CAR)

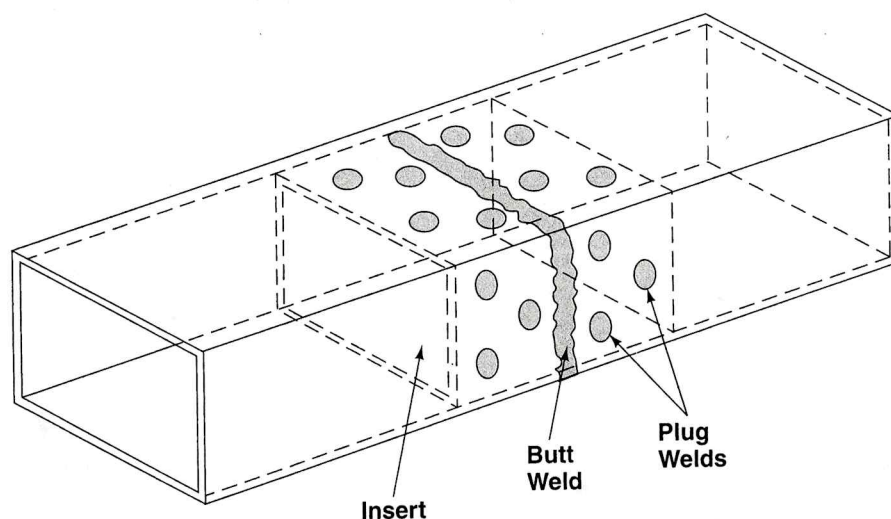


Figure 22-15 Note how a butt joint with an insert is typically made. (I-CAR)

Using Butt Joint with Insert. The butt joint with insert is used on closed sections, such as rocker panels, A-pillars, B-pillars, and front rails. Look at Figure 22-15.

The insert is made from a section of either the replacement or damaged part, Figure 22-16. The insert is used for the following reasons:

1. It provides a backing for the MIG butt weld.
2. It keeps burn-through to a minimum.
3. It ensures a completely closed joint.
4. It aligns the parts for the best possible fit.

NOTE! When sectioning front and rear rails, DO NOT put inserts in collapse/crush zones. Strengthening these parts will change the way collision damage is absorbed, possibly endangering the passengers.

Sectioning—Butt Joint Method

The procedures for sectioning with a butt joint with insert are as follows:

1. The length of the insert is twice the width of the part at its widest point.

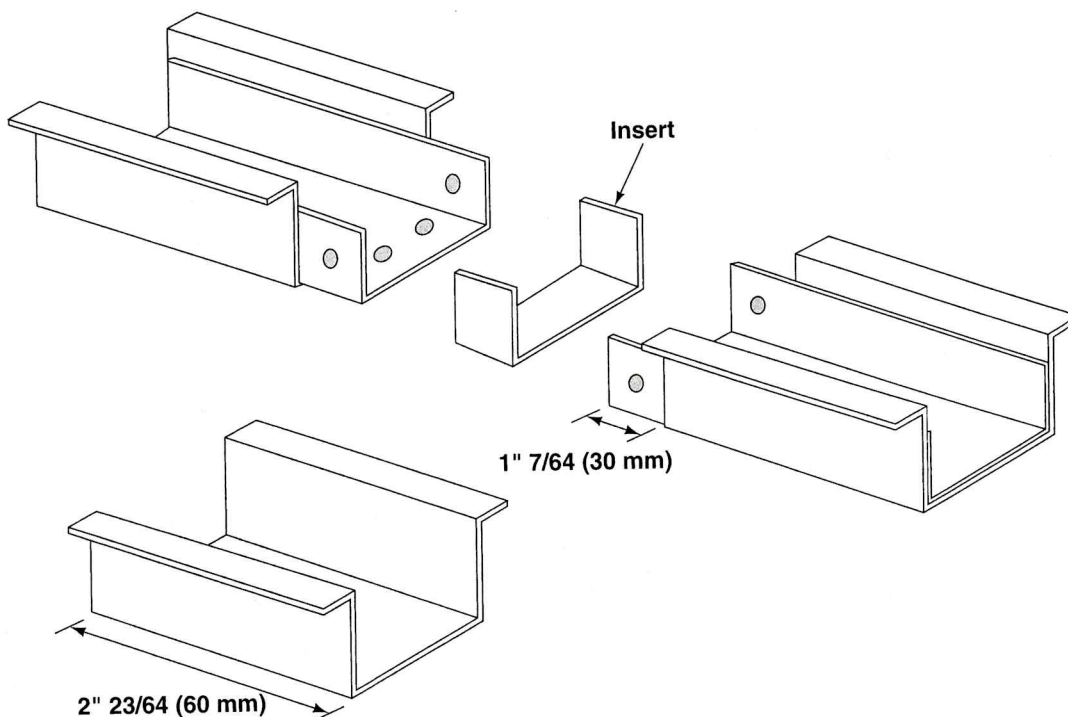


Figure 22-16 An insert can be made by cutting off excess material from the new or old part. (Used with permission from North America, Inc.)

2. Cut insert pieces from either the damaged part or replacement panel. Use a section that closely matches contours.
3. Trim away flanges. Make lengthwise cuts in the insert.
4. Check the fit of the individual pieces of the insert. There should be no gaps between the insert and the inside of the rail or pillar.
5. Drill $\frac{5}{16}$ -inch (8-mm) plug weld holes so that heat affect zones from the butt weld and plug welds do not overlap.
6. Remove burrs from all panels.
7. Remove all paint, undercoating, and seam sealers. Do NOT remove galvanizing.
8. Apply weld-through primer.
9. Make test welds.
10. Fit the insert and secure it in place.
11. Butt the pieces up, leaving a gap the thickness of the panels being welded.
12. Check measurements and fit.
13. Tack weld and measure again.
14. Complete and dress all welds. Make sure the joint is completely closed and the weld has penetrated the insert.
15. Prep for corrosion protection and topcoats.

The most common joints used to section front and rear rails are the butt joint with insert and the lap joint. The butt joint with insert is used most often on front rails. Lap joints are commonly used on rear hat channel rails.

There is an additional combination lap joint—offset butt joint procedure that is used on front rails. This procedure should only be used when tested repair procedures are available for the specific vehicle being repaired.

Making Cut Templates. Parts must be measured and marked prior to making cuts. This can easily be done by making a cutting template:

1. Decide where to section.
2. Cut damaged section off the vehicle.
3. Apply a sturdy, wide tape to the remaining section.
4. Use a razor to cut the tape around various reference holes and the cut line.
5. Remove the tape.

6. Align holes cut in the tape to identical holes on the replacement part.
7. Apply the tape template to the replacement panel.
8. Cut along the tape template cut line.

Heavy paper and masking tape can also be used to create a template.

Sectioning Front Rails—Insert Method

The procedures for front rail sectioning using a butt joint with insert are as follows:

1. Decide where to section.
2. Measure and mark the cuts on both parts.
3. Make straight cuts along cut lines.

WARNING! Do NOT throw any parts away until the repair is finished.

4. Make and fit the insert to the rail sections.
5. Drill $\frac{5}{16}$ -inch (8-mm) plug weld holes so that heat affect zones from the butt weld and plug welds do not overlap.
6. Remove burrs from all panels.
7. Remove all paint, undercoating, and seam sealers. Do NOT remove galvanizing.
8. Apply weld-through primer.
9. Make test welds.
10. Fit the insert and secure it in place.
11. Butt the pieces up, leaving a gap the thickness of the panels being welded.
12. Check measurements and fit.
13. Tack weld and measure again.
14. Complete and dress all welds. Make sure the joint is completely closed and that the weld has penetrated the insert.
15. Prep for corrosion protection and topcoats.

Sectioning Rails—Combined Joint Method

Rails are also sectioned using combined lap and offset butt joints. The following procedures and

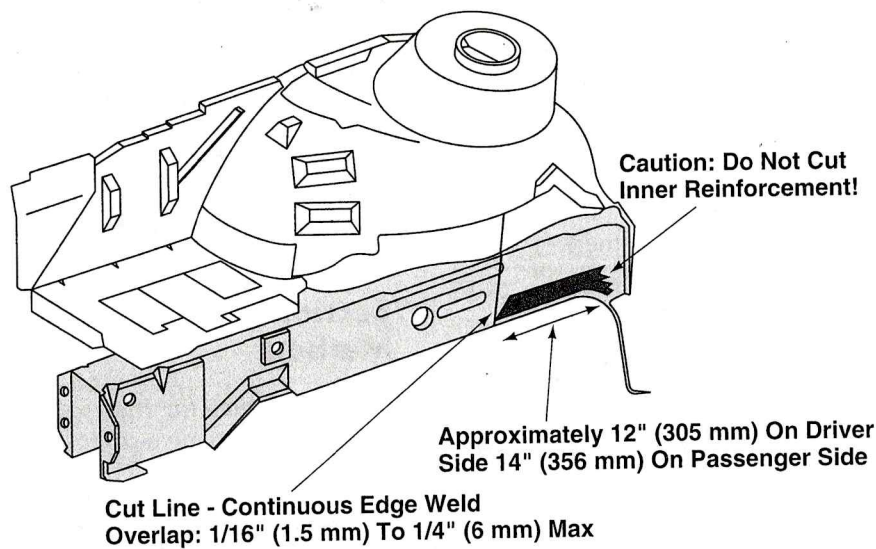


Figure 22-17 Since sectioning of the front frame rails is critical to the integrity of the vehicle, use great care. This is a typical example on a unibody vehicle. Always refer to manufacturer's procedures, however. Do not cut inner reinforcements. (Used by permission from Tech-Cor, Inc.)

measurements are based on Figure 22-17. Always refer to an industry-accepted and -tested procedure for specifics.

1. If necessary, remove the engine, transmission, and cradle as a unit.
2. Locate and remove factory spot welds that attach the upper rail to the cowl at the base of the windshield.
3. Remove paint, undercoating, and seam sealers from the spot weld areas.
4. Remove the two spot welds that hold the upper rail to the rear outer flange of the strut tower. These spot welds can be accessed through the hole at the rear of the upper rail.
5. Remove spot welds that attach the strut tower to the rail extension panel at the base of the strut tower.
6. Remove paint, undercoating, and seam sealers from inside the engine compartment.
7. Remove sound-deadening material from the wheelhouse.
8. Prepare to section the rail in front of the strut tower center point. Because of the inner reinforcement, this area is ideal for sectioning. See Figure 22-17.
9. Make a staggered cut on the inner and outer lower rail. An electric reciprocating saw with a laminated blade makes the best cuts.
10. Before cutting, remove the two spot welds that attach the reinforcement to the inside of the lower

rail. One is on the wheelhouse side of the rail. The other is on the bottom of the rail. Refer to Figure 22-18.

11. Cut the engine side of the rail near the end of the inner reinforcement. In the example shown in Figure 22-17, this is about 12 inches (305 mm) from the cowl.
12. Cut the wheelhouse side of the rail behind the engine side cut. In the example shown in Figure 22-18, this distance is about 3-5 inches (76-127 mm).
13. Use a staggered butt joint for sectioning the rail. The parts should overlap to aid in alignment and welding. In Figure 22-17, the overlap should be $\frac{1}{16}$ - $\frac{1}{4}$ inch (1.5-6 mm). To prepare for the overlap, cut the corners of the original part. In Figure 22-17, this distance should be $\frac{1}{4}$ inch (6 mm).
14. Position the replacement part OVER the original part. This will allow the corrosion protection treatments inside the rail to better penetrate the joint. Any part of the cuts exposed after fitting must be welded shut.
15. Separate the opposite side lower rail extension from the lower rail. First, drill the spot welds that attach the radiator core support and apron extension panel.
16. Next, carefully fold up the apron extension panel to expose the other spot welds that attach the rail extension to the rail. This should loosen the damaged part so it can be removed.
17. Prepare the used assembly. Remove the spot welds and make the lower rail offset cut the same

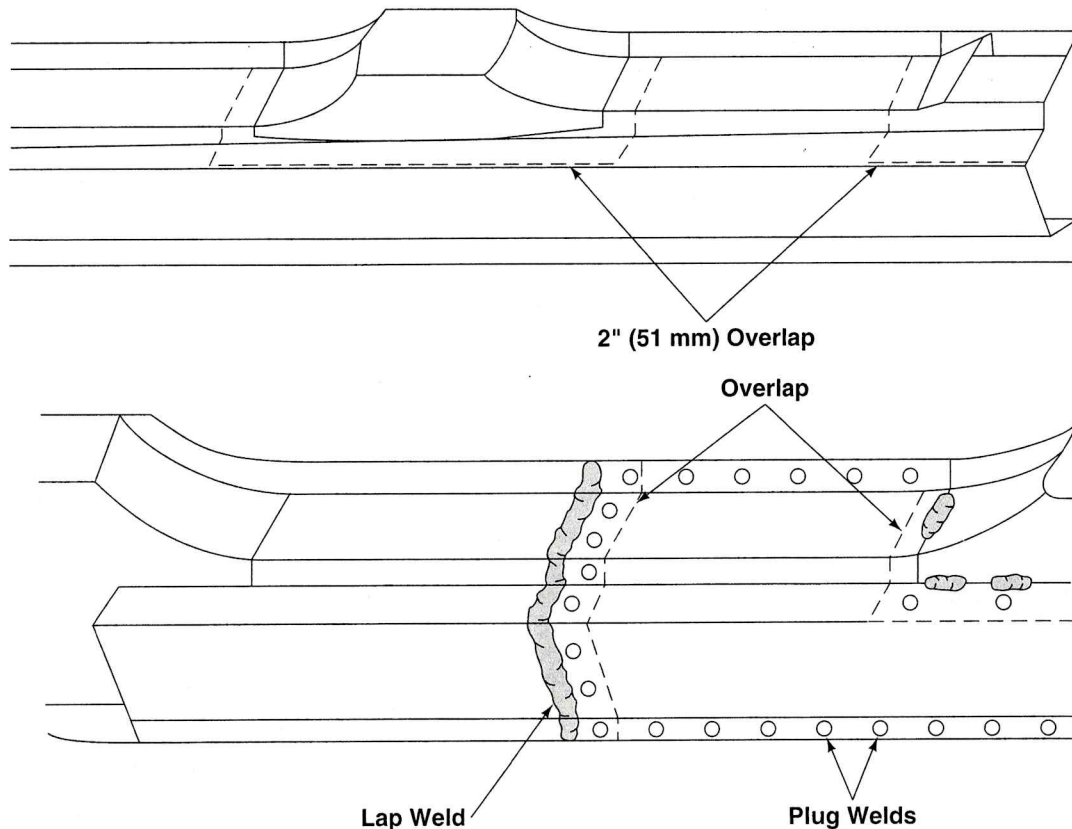


Figure 22-19 Note the typical cut and weld locations for replacing a rocker panel.

4. Make straight cuts along cut lines.
5. Drill two to three $\frac{5}{16}$ -inch (8-mm) plug weld holes in the overlap area.
6. Remove burrs from all panels.
7. Remove all paint, undercoating, and seam sealers from the floor pan. Do NOT remove galvanizing.
8. Apply weld-through primer.
9. Make test welds.
10. Fit the replacement panel, overlapping the original by $\frac{1}{4}$ inch to 1 inch (6–25 mm) and secure it in place.
11. Check measurements and fit.
12. Tack weld and measure again.
13. Plug weld the overlap area. Alternate sides to minimize heat buildup.
14. Plug weld through the trunk floor into the rail flanges.
15. Weld along the lap joint.
16. Dress all welds.
17. Prep for corrosion protection and topcoats.

A “window” is cut into the outer rail to access a weld site on the reinforcement. A butt joint with insert repair is made to the rail reinforcement.

The more complicated the structure, the more challenging the repair procedure. Manufacturers are using multiple part designs more often to increase the rigidity of the passenger compartment. This is of increased importance with convertibles.

Sectioning Rocker Panels

When sectioning rocker panels, the two joints most commonly used are a butt joint with insert or a lap joint. In some cases, only the outer panel is replaced or the rocker may be replaced with or without the B-pillar attached. If the B-pillar is attached, then a B-pillar section will have to be made at the same time.

Use a butt weld with insert when installing a recycled rocker panel with B-pillar attached, or when installing a recycled quarter panel. If working on a three-piece design, remove the outer panel first.

Basic guidelines for replacing rocker panels are:

1. Carefully plan the repair before making the first cut.

2. When cutting rocker panels or other structural parts, use a reciprocating saw to get an accurate cut and to reduce the heat affect zone.
3. Use inserts whenever possible.
4. Be sure to completely weld all seams.
5. Use plug welds to secure any inserts used.

To remove and replace the outer rocker panel:

1. Cut around the pillar bases, leaving an overlap area. Stay about 2 inches (51 mm) from the pillars to avoid any reinforcements.
2. Cut outer panel ends. Keep in mind that you will overlap those areas when replacing the rocker panel.
3. Cut or drill out the spot welds along the pinch-weld seams. Separate the panels/components.
4. Cut the replacement panel to allow for a 1-inch (25-mm) overlap of the pillar bases and panel ends, Figure 22-19.
5. Drill $\frac{5}{16}$ -inch (8-mm) plug weld holes so that heat affect zones from the butt weld and plug welds do not overlap. Plug welds along the pinchweld should be made following the manufacturer's recommendations. If recommendations are not available, duplicate the number and location of the original welds. Plug welds also have to be made in the overlap areas.
6. Remove burrs from all panels.
7. Remove all paint, undercoating, and seam sealers. Do NOT remove galvanizing.
8. Apply weld-through primer.
9. Make test welds.
10. Check measurements and fit.
11. Tack weld and measure again.
12. Complete and dress all welds. Make sure the joints are completely closed.
13. Prep for corrosion protection and topcoats.
4. Check the insert for fit, Figure 22-20.
5. Cut the replacement part to fit.
6. Drill $\frac{5}{16}$ -inch (8-mm) plug weld holes on both the vehicle and replacement parts. Stagger the holes to avoid overlapping heat affect zones.
7. Remove burrs from all panels/components.
8. Remove all paint, undercoating, and seam sealers. Do NOT remove galvanizing.
9. Apply weld-through primer.
10. Make a test weld.
11. Fit the insert and secure it in place.
12. Butt the pieces up leaving a gap about the thickness of the panels being welded.
13. Check measurements and fit.
14. Tack weld and measure again.
15. Complete and dress all welds. Make sure the joint is completely closed and that the butt weld has penetrated the insert.
16. Complete other necessary sectioning or welding procedures.
17. Prep for corrosion protection and topcoats.

Sectioning Rocker Panels— Insert Method

To section a rocker panel using a butt joint with insert:

1. Plan the cut to be near the middle of the door opening.
2. Cut straight across the rocker panel.
3. Make an insert from either the damaged or replacement part.
4. Work from the inside out, starting with the inner rocker or main floor side member. Then, attach the flat reinforcement, the channel reinforcement, and finally the outer rocker. Check the fit at various points to make sure all is correct.
5. Cut a piece of the rocker to form an insert, providing backing for the weld.

Sectioning Multi-Part Rocker Panels

The **multiple part rocker** assembly is made up of several pieces of sheet metal with internal reinforcements. Reinforcements make it more difficult to use inserts. It is also more important to plan the exact order the work will be done. This will ensure that all the welding will be done in the right sequence. Also, the various rocker parts will be cut so as to provide maximum reinforcement to one another.

1. Plan the cut in the middle of the door.
2. Cutting points for various parts of rocker assembly should be planned so panels overlap, providing continuity for one another.
3. If more than just the outer rocker is being replaced, you will have to separate the rocker assembly into its individual parts.
4. Work from the inside out, starting with the inner rocker or main floor side member. Then, attach the flat reinforcement, the channel reinforcement, and finally the outer rocker. Check the fit at various points to make sure all is correct.
5. Cut a piece of the rocker to form an insert, providing backing for the weld.

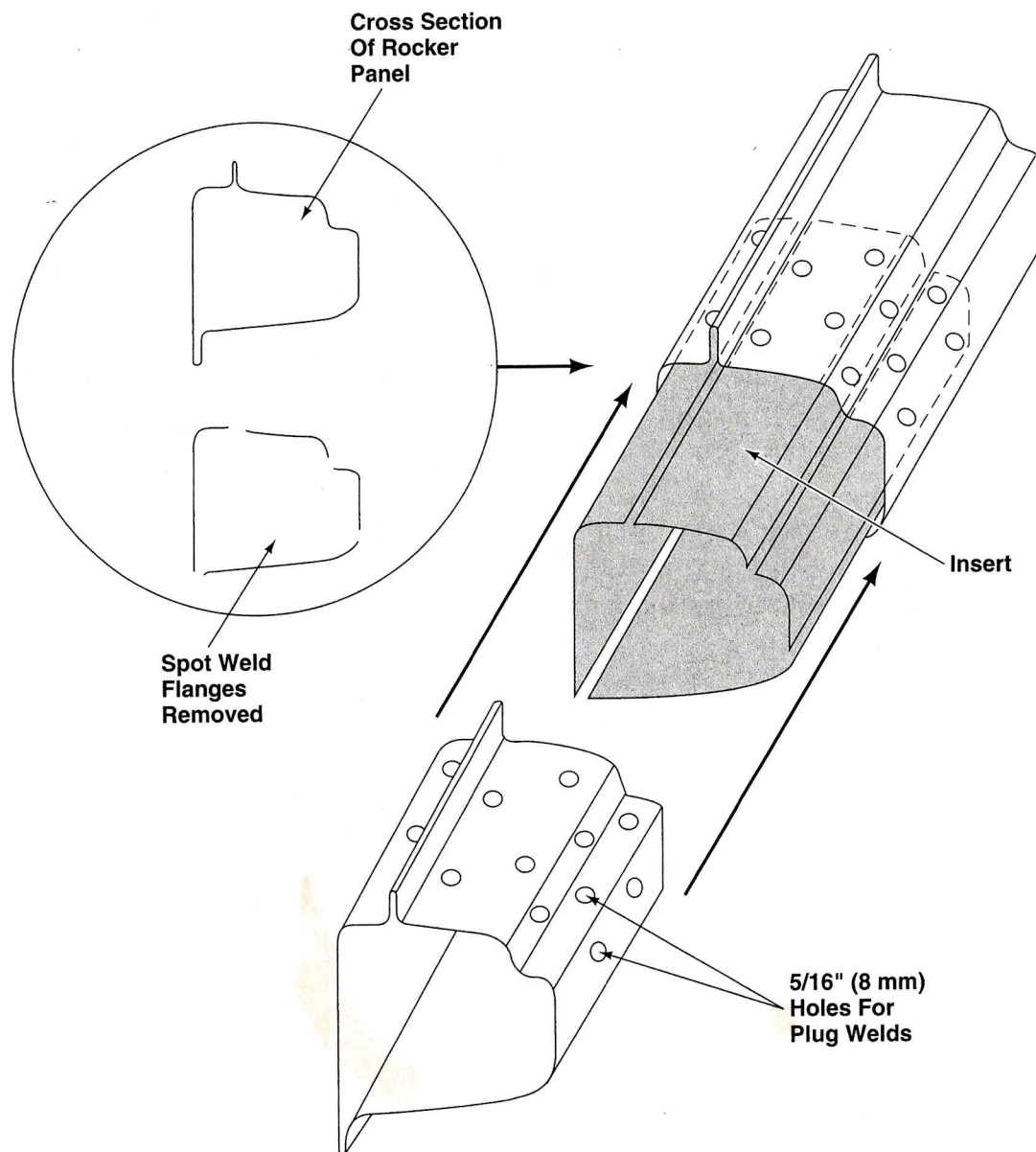


Figure 22-20 An insert can be made and used with a rocker panel replacement. (I-CAR)

6. Be sure to weld all butt and lap joints completely closed. Weld in segments to minimize heat distortion. Use weld-through primer.
7. Finish the inside of all cavities and outside weld joints with two-part epoxy primer. Apply anticorrosion compound to enclosed areas.

NOTE! You may have to treat some of the cavities before final assembly in order to be able to reach all areas.

Sectioning A-Pillars

A-pillars use either two- or multiple-piece construction. They can be sectioned using a butt joint with insert or an offset butt joint.

A butt joint with insert or an offset butt joint can be used on two-piece A-pillars. On multiple-piece A-pillars, the design of the part will guide repair planning. There is often an inner reinforcement at the upper and lower ends, so an offset butt joint may be the only choice. Reinforcement locations vary, so refer to a body

Technical Terms

<i>structural parts</i>	<i>jigs</i>
<i>factory seams</i>	<i>weld-bond adhesives</i>
<i>sectioning</i>	<i>structural adhesives</i>
<i>panel alignment marks</i>	<i>corrosion</i>
<i>recycled assemblies</i>	<i>oxidation</i>
<i>inserts</i>	<i>anticorrosion compounds</i>
<i>offset butt joint</i>	<i>seam sealers</i>
<i>multiple part rocker</i>	<i>weld-through primers</i>
<i>foam fillers</i>	<i>corrosion converters</i>
<i>full body sectioning</i>	

Review Questions

- List three functions of structural parts.
- If the part is bent, _____ it. If the part is kinked, _____ it.
- When should you replace panels along factory seams?
- What is sectioning?
- You should not section in or near these eight areas.
- How do you start removal of a structural panel?
- List five tools that can be used to remove spot welds.
- A chisel should never be used by itself to remove spot welds. **True or false?**
- All straightening must be done before replacing panels. **True or false?**
- List the six general steps for welding panels.
- These are three basic types of sectioning joints.
 - Lap joint
 - Offset butt joint
 - Butt joint with insert
 - All of the above
 - None of the above
- When cutting panels, Technician A uses a template. Technician B uses a jig. Who is correct?
 - Technician A
 - Technician B
 - Both Technicians
 - Neither Technician
- _____ are used to add rigidity and strength to structural parts.
- Avoid applying corrosion protection materials to these 15 areas or parts.

ASE-Style Review Questions

- Technician A says that the core support tie bar, front rails, strut towers, and rocker panels are structural parts. Technician B says that pillars and the suspension crossmember are structural parts. Who is correct?
 - Technician A
 - Technician B
 - Both Technicians A and B
 - Neither Technician
- Which of the following locations can be sectioned?
 - Suspension mounting locations
 - Structural part mounting locations
 - Dimensional reference holes
 - Uniform area with clearance
- To find spot welds on a damaged panel, Technician A uses a coarse scuff wheel mounted in an air tool. Technician B heats the panel until the metal glows red hot to remove the paint. Who is correct?
 - Technician A
 - Technician B
 - Both Technicians A and B
 - Neither Technician
- When removing spot welds, Technician A drills through the top and bottom panel. Technician B drills through the top panel only. Who is correct?
 - Technician A
 - Technician B
 - Both Technicians A and B
 - Neither Technician
- When preparing a new structural panel for installation, Technician A applies weld-through primer to areas where bare metal is exposed. Technician B duplicates the location and number of spot welds used at the factory. Who is correct?
 - Technician A
 - Technician B
 - Both Technicians A and B
 - Neither Technician
- Technician A says to remove the vehicle from the straightening bench before starting installation of new parts. Technician B says that further straightening may be needed after installation of new structural parts. Who is correct?
 - Technician A
 - Technician B
 - Both Technicians A and B
 - Neither Technician
- When determining where to use new or recycled assemblies for structural repairs, Technician A says that less factory corrosion protection is distributed

when using recycled parts. *Technician B* says that more measuring is required when welding separate new parts and attaching them to the vehicle. Who is correct?

- a. Technician A
- b. Technician B
- c. Both Technicians A and B
- d. Neither Technician

8. *Technician A* uses a butt joint with insert rocker panels, A-pillars, B-pillars, and front rails. *Technician B* uses a butt joint with insert on floor pans and hoods. Who is correct?

- a. Technician A
- b. Technician B
- c. Both Technicians A and B
- d. Neither Technician

9. A-pillars with multiple piece construction must be sectioned. *Technician A* is going to use a butt joint with insert. *Technician B* is going to use an offset butt joint. Who is correct?

- a. Technician A
- b. Technician B

- c. Both Technicians A and B
- d. Neither Technician

10. A floor is going to be sectioned. *Technician A* says to cut the replacement panel to overlap the existing panel by at least 1 inch (25 mm). *Technician B* says to tack weld the panel in place and re-measure before final welding. Who is correct?

- a. Technician A
- b. Technician B
- c. Both Technicians A and B
- d. Neither Technician

Activities

1. Inspect a damaged vehicle. List the structural parts that would require replacement.
2. On the same vehicle, summarize the procedures for structural part replacement.
3. Visit a collision repair shop. Ask the owner to allow you to watch a technician replacing a structural part.

Door Skin Removal Steps

1. Take door off vehicle.
2. R&I everything inside and outside of door;
 - Interior Trim
 - Door Handle
 - Mirror
 - Belt Moldings
 - Side Moldings
 - Windows
3. Grind edge of door until door skin separates from door.
4. Air chisel or use a hammer & chisel to separate the skin from door.
5. Grind edge of door clean.
6. Fit new door skin clamp in place using vise grips and small clamps.
7. Fit door to the car making sure skin is aligned properly.
8. Take door back off car.
9. Mark skin so you know where to put back on.
10. Take skin back off.
11. Run fuser all around the door frame at least 1/8 inch thick bead of fuser on the bare metal.
12. Put the door skin back on, clamp in place, and then hammer & dolly the lip over.
13. Let dry before finishing.
14. After it dries, repair any dents on the outside and DA the door skin. Then primer.
15. Grind any fuser off, seam seal the inside, and refinish.

Door skin quiz

1 2 points

To replace a door skin do you have to take the door off the vehicle?

- ☐ Yes
- ☐ No

2 2 points

Can you fusor a door skin on?

- ☐ Yes
- ☐ No

3 2 points

How many times do you fit a door skin to the vehicle to make sure its aligned correctly before welding or fusoring the skin to the door?

- ☐ 1
- ☐ 8
- ☐ As many as it takes
- ☐ 5

4 2 points

You Should remove everything from the door when replacing the door skin? EX: belt mld. window. mirror.handle.ect.

- ☐ True
- ☐ False

5

2 points

Do you hammer and dolly the door skin on?

☐ True

☐ False