



# SP21S

## Crossmember, Welded

**Uniform  
Procedures For  
Collision Repair  
UPCR**

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v.4.0



### 1. Description

This procedure describes the repair and complete replacement of a steel welded crossmember on a unibody vehicle. Inspection and evaluation requirements are also included.



### 2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality repair of welded crossmembers on unibody vehicles. This procedure is intended for use by professionals who are qualified through training and experience.



## 3. Referenced Documents

The following documents are considered part of this procedure by reference.

### 3.1 Procedures

- CP01S Corrosion Protection
- ME01 Three-Dimensional Measuring
- PS01 Personnel Safety
- RF01S Surface Preparation
- RF41 Finish Application
- ST01S Stress-Relieving Heat Limitations
- ST11 Structural Straightening
- ST21S Metal Repair
- WA01 Wheel Alignment, Front
- WA11 Wheel Alignment, Rear
- WE01S GMA (MIG) Plug Weld
- WE11S GMA (MIG) Fillet Weld

### 3.2 Other Information

- Vehicle-specific dimension information
- Vehicle-specific repair information



## 4. Equipment And Material Requirements

### 4.1 Straightening And Measuring Equipment

Use straightening equipment as described in **ST11**.

Use measuring equipment as described in **ME01**.

### 4.2 Welding Equipment

Use GMA (MIG) welding equipment as described in **WE01S** or **WE11S**.



## 5. Damage Analysis

### 5.1 General Damage

Inspect an engine or rear crossmember for these types of damage:

- visible damage
- corrosion
- improper previous repairs
- dimensional misalignment

Determine whether the engine crossmember should be repaired or replaced. Verify the availability of replacement parts. Refer to the vehicle maker's body repair manual for repair recommendations.



## 6. Personnel Safety

### 6.1 General Safety

General safety information is in **PS01**.

### 6.2 Straightening Safety

Straightening safety information is in **ST11**.

### 6.3 Welding Safety

Welding safety information is in **WE01S** or **WE11S**.



## 7. Environmental Safety

Does not apply.



## 8. Vehicle Protection

### 8.1 Stress-Relieving

If heat is used for stress-relieving, use temperature-measuring methods as described in **ST01S**.

Note: Some vehicle makers recommend against the use of heat for stress-relieving.

### 8.2 Electronic Parts

To protect computers and other sensitive parts from damage:

- Follow the vehicle maker's recommendations for recording and resetting electronic memories.
- Ensure that the ignition switch is in the LOCK position, and the key is removed.
- Disconnect and isolate the negative battery cable, and disarm the passive restraint system. Follow the vehicle maker's recommendations.
- Carefully remove computer modules when welding or heating within 300 mm (12"), or a greater distance when recommended by the vehicle maker.
- Protect modules, connectors, and wiring from dirt, heat, static electricity, and moisture.
- Loosen or remove any wiring harnesses or electrical parts that could be damaged during the repair process.

Remove the battery if it is in an area to be welded or heated.

### 8.3 Adjacent Areas

Protect glass, upholstery, and other cosmetic surfaces from welding, grinding, or cutting sparks. Remove interior trim and adjacent parts that cannot be protected.



## 9. Repair Procedure

### 9.1 Straightening -

To straighten an engine or rear crossmember:

- 1. Make sure the vehicle is properly anchored to the straightening system.
- 2. Make underbody measurements to determine the location of the crossmember.
- 3. Use multiple pulls and stress-relieving to return the crossmember and the surrounding structure to proper dimensions. Follow the tolerance recommendations of the vehicle maker. If no recommendations are given, use a tolerance of  $\pm 3$  mm ( $\frac{1}{8}$ " ). Use a three-dimensional measuring system and adjacent panels to verify that the part is properly aligned.
- 4. If heat is used for relieving stress, follow the vehicle maker's temperature and time recommendations. If the part cannot be identified as mild steel, treat it like high-strength steel (HSS).  
Note: Some vehicle makers recommend against the use of heat for stress-relieving.
- 5. Plan to replace any areas that are kinked, have stress cracks, or develop cracks during straightening. If replacement is required, see **9.2** and **9.3**.
- 6. Apply corrosion-resistant primer to all interior and exterior surfaces and other areas damaged by the collision, repairs, or anchoring.
- 7. Apply seam sealers, as necessary, to seal the joints and restore pre-accident appearance. Reprime if required by the product maker.
- 8. Apply anti-corrosion compounds to all enclosed areas.
- 9. Refinish areas damaged by the collision, repairs, or anchoring, as required to restore the appearance.
- 10. Continue vehicle reassembly.

### 9.2 Crossmember Removal

To remove an engine or rear crossmember:

1. Perform underbody measurements and adjacent panel alignment and straightening. See **9.1**.
2. Identify areas of overlapped panels to ensure that the replacement panel will remain in the same relative position. Note: It may be necessary to remove undamaged structural parts or reinforcements to replace the crossmember.
3. Remove any undercoating from around the crossmember.
4. Identify and mark all spot weld locations.
5. Remove the spot welds. Do not damage the parts attached to the crossmember which are not to be replaced.
6. Remove the damaged crossmember.
7. Remove any burrs or spot weld nuggets from the mating surfaces, and repair any damage. Avoid removing any zinc coating.
8. Straighten the mating surfaces, if necessary to ensure a proper fit-up with the replacement part.

**(cont'd)**



## 9. Repair Procedure (cont'd)

### 9.3 Crossmember Installation

To install an engine or rear crossmember:

- 1. Perform a trial fit of the replacement parts.
- 2. Clean the mating surfaces. Avoid removing any zinc coating.
- 3. Refer to the vehicle maker's body repair manual for the recommended welding method. Some vehicle makers may require grinding a V-groove between the mating surfaces to allow for better weld penetration.
- 4. Refer to the vehicle maker's recommendation for the location, number, and size of plug weld holes. If no recommendations are available, punch or drill 8 mm ( $\frac{5}{16}$ " ) holes in the replacement panel at the same locations used originally by the vehicle maker. If using a lap joint, allow for a 6 mm ( $\frac{1}{4}$ " ) overlap. If STRSW is used, refer to the vehicle maker's recommendations for the electrode diameter, weld locations and spacing, etc.
- 5. Test-fit the replacement crossmember and clamp it in place.
- 6. Remove the replacement crossmember from the vehicle.
- 7. Apply weld-through primer to all weld mating surfaces that do not have zinc coating, or where the zinc coating was removed. Follow the vehicle maker's recommendations. Due to the poor adhesion property of some weld-through primers, it may have to be removed from all exposed surfaces after welding, before applying other coatings and sealants.
- 8. Apply weld-bond adhesive when recommended by the vehicle maker.
- 9. Position the part on the vehicle and clamp it in place.
- 10. Use a three-dimensional measuring system and adjacent panels to verify that the part is properly aligned.
- 11. Make test welds, before welding on the vehicle, using the same type and thickness metal that will be welded on the vehicle. Make the test welds in the same position as the welds on the vehicle, using weld-through primer if applicable. Visually inspect and destructively test the welds before welding on the vehicle.
- 12. Tack weld, or securely hold, the crossmember in position.
- 13. Recheck the alignment using the measuring system and the adjacent panels.
- 14. Make the required welds.
- 15. Use the three-dimensional measuring system and adjacent panels to verify that the crossmember is still properly aligned.
- 16. Dress the welds, if necessary.
- 17. Apply corrosion-resistant primer to all interior and exterior surfaces and other areas damaged by the collision, repairs, or anchoring.
- 18. Apply seam sealers, as necessary, to seal the joints and restore the appearance. Reprime if required by the product maker.
- 19. Apply anti-corrosion compounds to all enclosed areas.
- 20. Refinish areas damaged by the collision, repairs, or anchoring, as required to restore the appearance.
- 21. Replace any removed undercoating.
- 22. Continue vehicle reassembly.



## 10. Use Of Recycled (Salvage) Parts

### 10.1 Inspection Of Salvage Parts

Do not install a salvage crossmember having any of these defects:

- unrepairable damage
- corrosion that has caused pitting
- improper previous repairs
- missing mounting locations

### 10.2 Preparation Of Salvage Parts

To prepare a salvage crossmembers for installation:

- Clean the part to remove dirt, wax, grease, undercoatings, corrosion, etc.
- Remove all heat-affected zones.
- Trim the part to fit.
- Make sure the part is not deformed along the weld joints.



## 11. Inspection And Testing

### 11.1 Inspection Of A Repaired Or Replaced Crossmembers

Inspect a repaired or replaced unibody crossmembers for these conditions:

- dimensional alignment
- weld quality
- proper finish appearance and film thickness
- proper application of corrosion protection

Correct any defects.

A suspension alignment is required after repairing or replacing a crossmember.