

In the last three Technical reports we have looked at various manufacturers repair procedures and body repair manual information - to follow on from all of those commonly requested procedures and the plethora of information within them, this would appear to be a good time to revisit a lot of terms and descriptions used that we may not necessarily understand fully -

This has also come to the fore in many I-CAR courses that are conducted around the country, where some of the terminology is confusing and difficult to understand - exacerbated when so much of our body repair information is sourced from other countries that use different terms and descriptions.

Further to this, is the fact that so much of what is described in all this reference material is identified with acronyms - ABC this and DEF123 that.

We have put together some useful explanations for a lot of what the auto body repairer is confronted with in their everyday activities - this is by no means comprehensive, but does go some way to alleviating some of the confusion that arises when looking to complete an O.E.M. replacement procedure on a modern vehicle structure.

## “ACTIVE” AND “PASSIVE” SAFETY SYSTEMS

These terms have become blurred definitions for automotive applications:

Systems and elements that “activate” have typically been seen as active safety features - however, in automotive applications, active and passive safety features and elements are best defined as -

- Active Safety: Features that help avoid or prevent accidents.  
These are relevant up to the “moment of impact”.
- Passive Safety: Features or elements that help occupants stay alive in the event of an accident or collision/impact.  
Operate from the “moment of impact”.

## EXAMPLES OF ACTIVE SAFETY

- ABS - anti lock braking systems.
- Rain sensors - high clarity auto glass.
- HUD "Heads Up Display" - featuring speed , gear selection, navigation etc.
- High performance and/or directional tyres.
- Auto function headlamp/lighting systems - directional, high output and light detection functions.
- ESC - Electronic Stability Control.
- Variable Assist power steering.
- ACC - Adaptive Cruise Control - maintains a preset distance to the vehicle in front.
- Traction Control.
- 4WD/constant all wheel drive systems.
- Reversing cameras
- Parking and distance sensors.
- Auto park assist functions
- Reverse traffic alert.
- Lane departure warning systems.
- Blind spot monitoring/alert.
- Forward collision mitigation.

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## EXAMPLES OF PASSIVE SAFETY

- Seat belts and pre-tensioner systems.
- Passenger and driver airbags - including staged deployment-size and weight detection.
- Side and curtain airbags.
- Under dash airbags (knee and lower leg protection).
- Fuel shut off systems and vehicle shut down modes.
- Door and side intrusion limiters and beam structures.
- AHSS, UHSS steels and alloys use to control collision energy transfer and absorption.
- Child restraint systems.
- Pedestrian injury minimisation features.

## EVERYDAY TERMS USED IN BODY REPAIR MANUALS (BRM3) & OTHER REFERENCE MATERIALS

- GMA welding - GMA stands for Gas Metal Arc and is a broader term to describe or identify MIG (Metal Inert Gas) and MAG (Metal Active Gas) welding operations.
- STRSW - Squeeze Type Resistance Spot Welding - both traditional and inverter spot welding machines perform STRSW spot-welds.
- AHSS and UHSS - Advanced High Strength Steel and Ultra High Strength Steel respectively. These acronyms are general terms that cover most of the steels used in modern auto body construction. The "Tensile Strength" of these materials is regularly described by being rated with an alpha numeric value in either Mpa (Mega pascals) or PSI (Pounds per Square Inch) - both are measurements /units of pressure. An example of this would be : DP590 - Dual Phase 590 Mpa steel.
- "Stitch" and "Skip" welding techniques -

Techniques used to weld components together that minimize the Heat Affected Zone (HAZ). Stitching is to complete small lengths of weld and skipping is to perform these welds in different locations around or along the weld joint.

- Partial replacement procedures - this describes replacing parts of structures and/or panels at factory joint locations .
- Sectioning is a defined process that identifies where parts can be joined that are not in factory joint locations - these are typically identified with measurements or -
- The Service Condition of the supplied part - how the panel or structure is cut (supplied) by the vehicle maker.
- Weld - Bonding - where adhesives are used in conjunction with welding processes (typically STRSW), to join parts together.
- Rivet - Bonding - where rivets (solid/blind etc) are used in conjunction with an adhesive to attach components together.
- SPR's - Self Piercing Rivets.
- Panel Stack and build sequence - many vehicle makers identify the number, thickness or gauge of the metals, as well as the location or orientation of panels - OUTSIDE / MIDDLE / INSIDE or 1 panel, 2 panel, 3 panel thicknesses etc. - These are also identified with symbols.
- General Information - this should never be overlooked when the technician is familiarising himself with a repair procedure - is usually found at the beginning of the repair manual and must be read in conjunction with the specific procedure from the vehicle maker.
- Cumulative Heat Time - will normally be referenced in conjunction with a defined temperature that parts can be heated (if at all). This term is used to describe the maximum amount of time that a particular part can be heated to a specified temperature - e.g. 400 o C for 2 minutes X2 - total heat time will be 4 minutes.
- Root Gap - the distance specified between

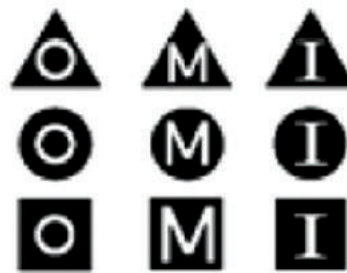
the parts to be joined (open butt welds and butt welds with backing). This is to ensure that correct penetration of the weld and will typically increase with the thickness of the material to be welded.

- Open Butt weld joints - Panels are welded together (with or without root gap), with no backing or insert.
- Butt Weld with Backing - Panels are welded together with an insert or backing for support.
- Fillet Welds - These are welds that are performed on panels that overlap each other "lap welds".

**Fig 1 -**

*Typical symbols and panel stack orientation*

Typical symbols and panel stack orientation.



**Fig 2 -**

## Butt Joint With Backing

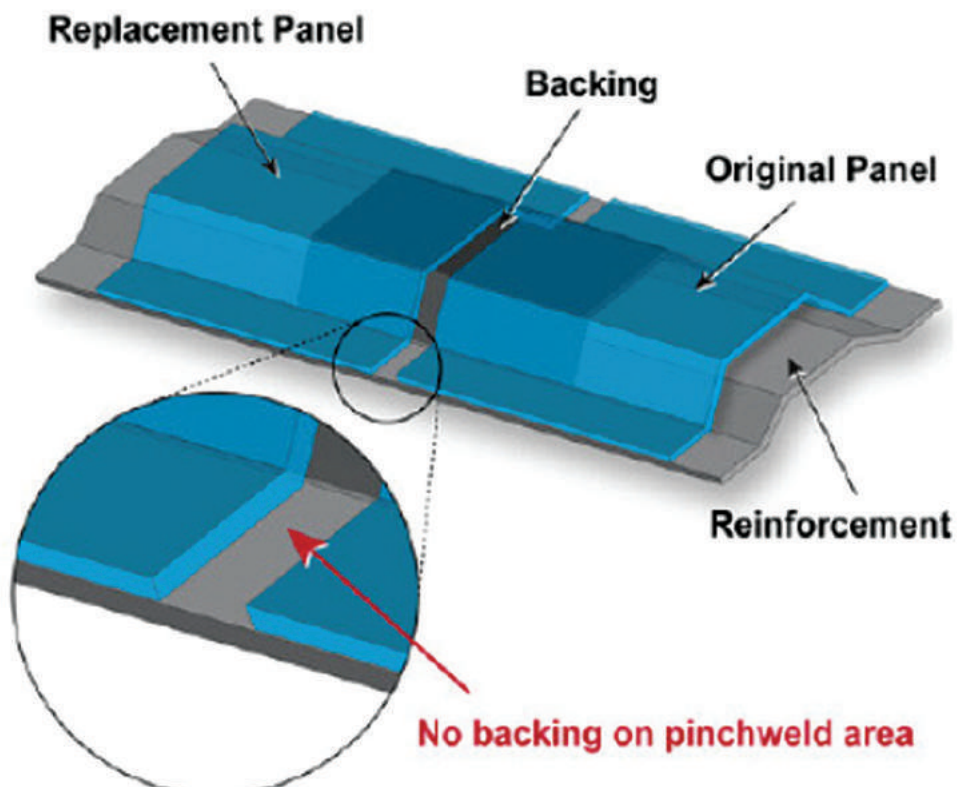


Fig 3 -  
Excerpt from Chrysler body  
repair manuals

Excerpt from Chrysler body repair manuals -

## Requirements of a Welding Repair

The number one requirement of any welding or weld bonding repair is to restore the vehicle to its OEM condition. Materials and technology should duplicate original OEM conditions as much as possible. To meet this requirement, the technician must ensure the following:

- Panel shingling is the same as original.
- Equivalent sealers or adhesives are utilized.
- Welds are replaced in the same size, quantity, and location.

A significant amount of structural adhesive is used at the OEM to improve joint strength.

It may be difficult to determine if the material between the panels is an adhesive or a sealer, and for this reason, the following guideline should be used: **If in doubt, use a two-component, corrosion inhibiting, structural adhesive. The adhesive must meet or exceed DaimlerChrysler MS CD 507.** MIG welding is not recommended within 1- inch of an adhesive as it creates heat that will destroy the adhesive. STRSW on the other hand, can weld through the adhesive and will not destroy its properties.

DaimlerChrysler recommends the same quantity of welds as the original panel, but placement of the new weld should be within 1/4" of where the old welds were located.

(Placement of new welds over an old weld location may lead to metal fatigue or poor weld quality.)

Excerpt from Honda body repair manuals :-  
Symbols

### Replacement

The welding symbols in the removal/installation have these meanings.

- ×: 2-Plate spot welding
- ⊗: 3-Plate spot welding
- ⊠: 4-Plate spot welding
- : MIG plug welding
- ◐: MIG welding
- L = Welding length Unit: mm (in.)
- ( ): The number of welds

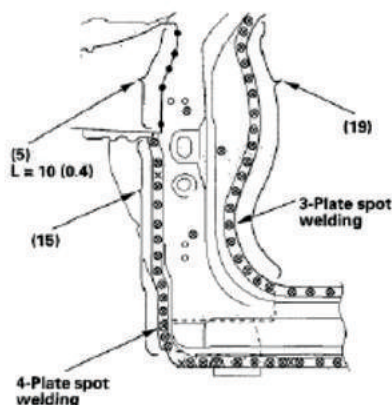


Fig 4 -  
Excerpt from Honda body repair manuals