

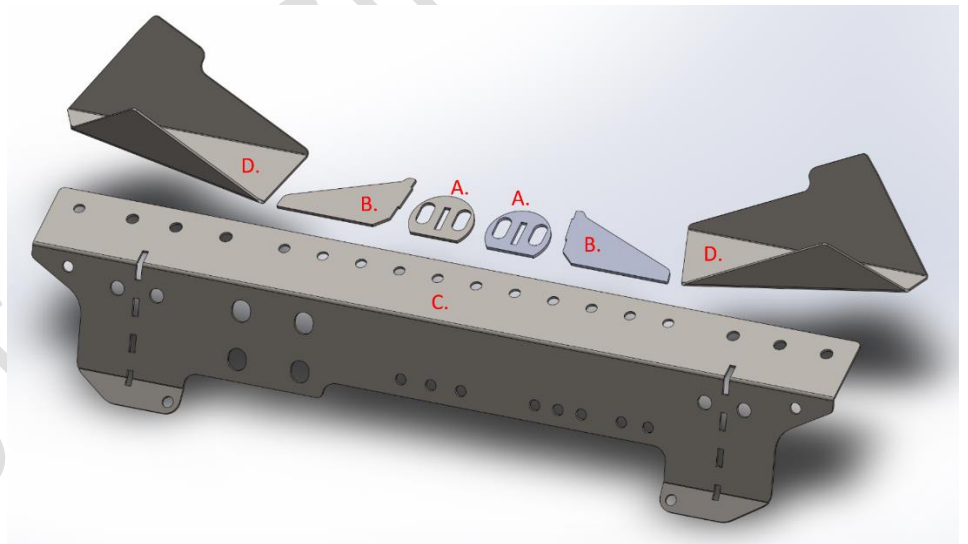
CMP E46 Front RACP Reinforcement Kit Instructions

Notes:

- This reinforcement kit is designed to strengthen the front two of four, rear subframe mounts from above.
- This kit is for all coupe & sedan chassis with split folding rear seats only (no sheet metal wall).
- Underside plates and stitch welding in key areas is still required to achieve a comprehensive reinforcement.
- This kit has an optional bolt in brace for greater mount support & chassis rigidity.
- This kit is entirely hidden beneath the original boot trim except for the chassis gussets (Part D) at each end.
- RACP = Rear Axle Carrier Panel (the section of unibody structure the rear cradle and suspension bolts to).

Components:

- A. 2x – Mount Top Caps
- B. 2x – Mount Gussets
- C. 1x – Bar
- D. 2x – Chassis Gussets (L&R)



Need help?

If you have any uncertainties or doubts during the installation of these products or would like a second opinion, please, don't hesitate to reach out. We're happy to answer questions at any stage of your build so please contact us via Facebook, Instagram or Email.

Email: info@CMPautoengineering.com

Want to share your experience?

We'd love to see your build and hear your feedback on your install so please feel free to tag us at:



@CMPauto



@CMP_Auto_Engineering

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By following these guidelines and/or installing the kit shown or one like it, you acknowledge and agree to the above.

Note:

We at CMP are constantly analysing our products and looking for areas to improve. As a result, there may be very small cosmetic changes to some parts of this kit between batches. Any significant changes will result in an update to the steps below. If you feel uncertain about any step of the installation, please contact us prior to proceeding. We're always happy to help and talk through any steps that may fail to communicate the work clearly enough if need be.

If you would like to offer any images of your own installation to further improve this document, please reach out to us via email at: info@cmpautoengineering.com

Safety:

The first and most important step of any project is safety. We at CMP Auto Engineering cannot stress the importance and seriousness of safety when performing the following steps and strongly recommend that all appropriate Personal Protective Equipment (PPE) be worn when performing the following work. CMP AE recommends a minimum of.

- Safety gloves – all times
- Safety goggles – all times
- Long sleeves – all times
- Ear plugs/muffs – when operating power tools
- Face shield – when operating power tools, wire brushing
- Air filtration mask – during welding, painting, grinding
- Welding mask – during welding
- Welding gloves – during welding

Prep Work:

1. Removing the interior/boot trim

In order to provide a clear and safe working area, it is necessary to remove the rear seats, boot trim, plastic trays as well as carpet and floorboard. Remove the seat belts & clips, spare wheel (tire inflation kit for M3's) and any other removable objects including the battery.

Lay a protective blanket over the rear footwell carpet, front seats, door trim & electrical equipment to shield them from potential metallic dust or weld splatter as it can be damaging and melt into surfaces.

2. Removing unnecessary brackets

Above the fastener securing the rear seat belts, there are two small brackets either side spot welded to the seat base as shown across.

Use a 6mm-8mm spot weld drill bit to drill through the first layer of sheet metal separating the brackets from the floor.

Note: If you accidentally drill a hole through both layers that is not an issue as the bar will cover this area.



Figure 1 – Bracket spot welds location.

3. Removing paint & deadener from welding areas

Place the bar (Part C) and chassis gussets (Part D) atop the edge of the boot floor where it dips down to the rear seat base as shown below. Ensure the chassis gussets are sitting flush and the gap to the bar is equal on both sides.

Note: The seat centre hinge bolts can be used to hold the bar in place.



Figure 2 – Front RACP reinforcement kit test fit.

Stencil the perimeter of all three parts in addition to any spot weld holes cut into the sheet metal components.

Remove any sound deadener beneath or within a half inch (12mm) of the sheet metal parts perimeter using a heat gun and scraper.

Next remove any seam sealer, deadener residue and paint within the welding areas and along the chassis rail to the base of the rear seat curve till raw steel is exposed using a wire wheel.

4. Exposing the front mount top welds

Referring to the stencil marks drawn in the previous step, draw the same profile of each end of the bar 12mm (1/2") inward. Extend the vertical lines upward to the end of the panel at the beginning of the boot floor.

Drill out any spot welds on the top, flat face that land within the newly drawn profile.

Starting from the top, cut downward following the 12mm narrower profile till the leading edge of the cut is flush with the top face of the mounts. Cut horizontally between the two end of the cut till they link and the cut section of panel can be removed.

Note: cut very shallow when performing this step to avoid cutting into the RACP structure beneath.



Figure 3 – Front subframe mount top welds.

5. Inspecting the area for structural failure

There are three key areas that need inspecting for fatigue related cracks and spot welds failure before the reinforcement kit can be installed.

1. Front mount top welds
2. Cracks around anchor points
3. Bench to chassis rail spot welds

1. Front mount top welds

Cracks are prone to initiating at the welds that secure the top of the female threaded body within the RACP structure. The initiation point is often at the ends of the weld if welded on one side like the right example, or from pin holes within the weld like the left example. The front right mount is more likely to have failure present due to the greater point load acting on that mount due to the combination of driveline moments.

It may be hard to see however, there are cracks on both welds in both examples. Use an evaporative cleaner and rag to remove any grime from the surface.



Figure 4 – FR top weld cracks.



Figure 5 – FL top welds cracks.

To repair this, first drill a 3mm (1/8") hole at the very tip of all the cracks present. Proceed to drill more holes along the cracks spaced with small (3mm) gaps between each hole.

Use a rotary tool and carbide bit to grind out the two welds where cracks have formed leaving two indents similar to the originals.

Use a wire wheel or sandpaper flap disk on a rotary tool to remove all paint from the top of the mounts within the circular indentation.

Proceed to weld along the cracks to close the gap they formed. Grind any excess weld material down till flush with the original surface before proceeding.

2. Cracks around anchor points

The sheet metal base for the rear seats is not considered 'structural' in the sense that it is an extremely thin, single layer of sheet metal and not a hollow rigid structure like a frame rail, roof pillar etc.

However, cracking is prone to occur around the female threaded holes in the panel as the threads are in fact a part of the structural RACP and thus, applies some of the force acting on the subframe mounts at these point loads.

Due to how thin and weak the panel is, cracks are prone to form above the bolt holes most often at the ones closest to the chassis rail as per the below.



Figure 6 – Crack above far left anchor point.



Figure 7 – Anchor point crack stop drilled.

This can be repaired by stop drilling the tip of all cracks and opening the crack with a cutting disk on a rotary tool before welding it shut and grinding any weld material that would clash with a bolt head or bracket flush.

3. Chassis rail spot welds

Due to the forces applied to this panel through the bolt holes, the spot welds where this panel meets the chassis rail are also prone to fail.

The spot welds at the very top where the seat panel meets the boot floor often fails beneath the car (between the front subframe mounts and spring perch) however, the remaining on the curved edge pop from above till about the base of the seat (where the RACP ends underneath).

Once the seam sealer along the chassis rail has been removed (with either a scraped or wire wheel), it's common to find several failed spot welds on each side as per the below.



Figure 8 – Bench seat to chassis rail – RHS.



Figure 9 – Bench seat to chassis rail – LHS.



Figure 10 – Bench seat to chassis rail underside.

To repair this area, CMP suggests using a spot weld drill bit to drill out the damaged metal within the centre of the spot weld till the layer of sheet metal beneath is visible. Once the area is prepped for welding, fill the drill hole with weld material creating a plug weld.

Note: When plug welding holes, make a small circular motion with the welding gun rather than holding it in the centre to get good penetration around the whole perimeter without excessive heat and weld material. This technique is also recommended for the bar (Part C) plug welds.

It is strongly recommended that stitch welds are applied between the seat panel and chassis rail along side all spot welds to prevent future failure.



Figure 11 – Bench seat panel to chassis rail stitch weld locations.

6. Installing the mount caps (Part A) & gussets (Part B)

Returning to the front mount top welds, use a wire wheel on a rotary tool to remove all paint from the top face and rear face within the cut out.

Place the mount cap atop the front mounts with the welds within the slots and the flat edge toward the front of the car as shown below.

Place the gusset atop with the notch in the short edge slotting into the mount cap. Slide the gusset back till it leans against the vertical face at the back.

Use a straight edge to bridge the cut out and slide the mount cap & gusset backward or forwards till it sits flush with the straight edge. Ensure the mount cap remains flat atop the front mounts.

Note: If the gusset sits too far forward, any protrusion can be ground down.



Figure 12 – Mount cap position



Figure 13 – Mount gusset locating notch.



Figure 14 – Mount gusset position check.

Once the position is finalised and confirmed, first tack the cap in place along the straight edge, and either end of the gusset to the cap and RACP as shown below.

With both tacked in, place the bar (Part C) over the top of the mounts with the chassis gussets (Part D) either side to ensure it is correctly centred.

Look through the vertical slots in the bar and confirm the cross section of the gusset is centred within them as shown below. If the rib is not centred, cut the tack welds at whichever end is off. Adjust, tack, and repeat till centred.

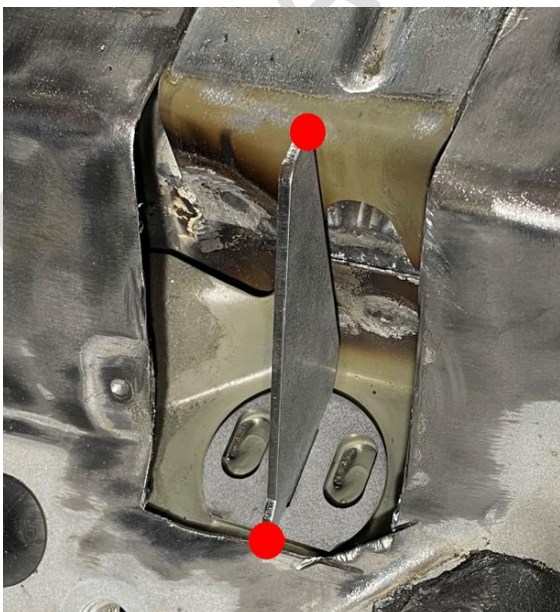


Figure 15 – Mount gusset tack locations.

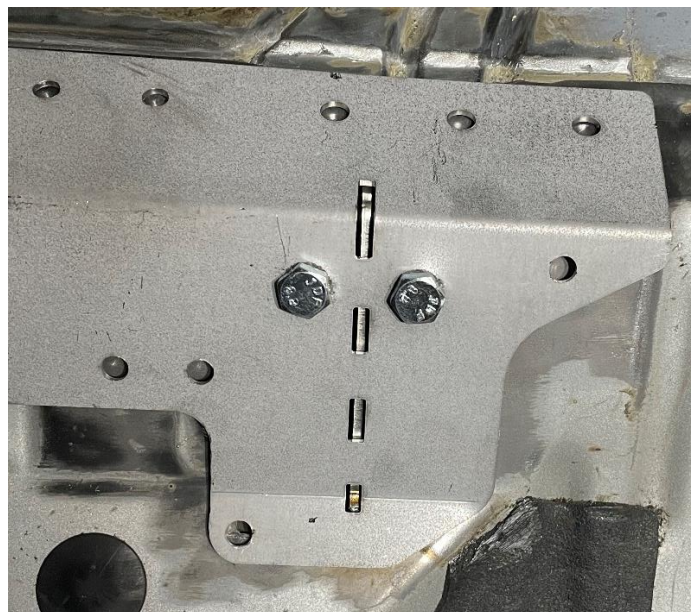


Figure 16 – Mount Gusset aligned with bar slots.

Once the gusset is correctly centred, fill the two oval slots on each mount cap as well as stitch welding the leading straight edge to the RACP as shown below.

Note: do not hold the welding gun to the centre of holes when making plug welds. Instead follow the profile of the shape to ensure good penetration to the parent material and minimise excess heat and thus the possibility of melting through.

Next, stitch along the base of the gusset joining it to the cap on either side as well as where the rear edge contacts the RACP.

Due to how thin the steel is in this area of the RACP; we would recommend using the 'tack' method rather than a continuous fillet weld. Climbing vertically, build a series of tack welds against the shoulder of the previous to keep temperatures to a minimum and prevent melting. Allow the weld to cool till no longer red before applying the next.

Note: This method can be used for all exterior welds for an aesthetic 'stacked pennies' look while also keeping residual stresses (The weld beads desire to shrink as it cools) to a minimum. This is the safest & recommended method for those new to welding thin sheet metal.

Once both parts are welded and have sufficiently cooled, clean the welds with a wire wheel on a rotary tool before cleaning and priming all surfaces within the cut out.

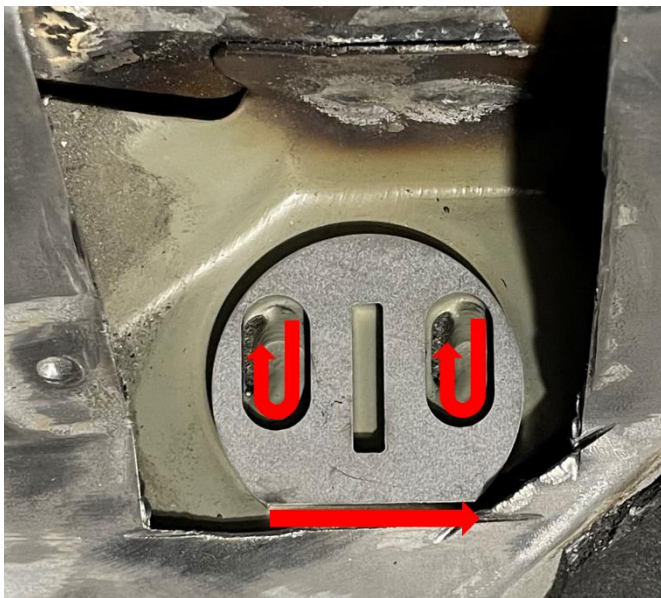


Figure 17 – Mount cap weld locations.



Figure 18 – Mount gusset weld locations.

7. Installing the bar (Part C)

Clean the underside of the bar and the top face of the chassis where it sits with an evaporative cleaner before applying your choice of weld thru primer to both surfaces.



Figure 19 – Primed front mount topside ready for bar install.

Once sufficiently dry, fit the bar in place with the gussets centred within their respective slots. Use the four bolt holes for the rear seat centre hinge to clamp the bar to the top of the front mount.

Note: confirm the bar is flat and flush with the seat base each side, both top and bottom.

Starting from centre and working outward, proceed to fill the circular plug welds locations both top and bottom till all are complete.

Finally, fill the vertical slots with weld material joining the bar to the gusset and thus top of the front two, rear subframe mounts.

Note: To avoid splatter damaging the threads, plug the threads with a M8 bolt or something appropriate.



Figure 20 – Installed bar

Once sufficiently cool, use a grinder and flap disk to rub down any weld material in the top two slots that sits proud of the bars front face as shown below.

Note: Any proud weld material will prevent the bolt in front brace from fitting correctly.



Figure 21 – Mount gusset welds sitting proud.

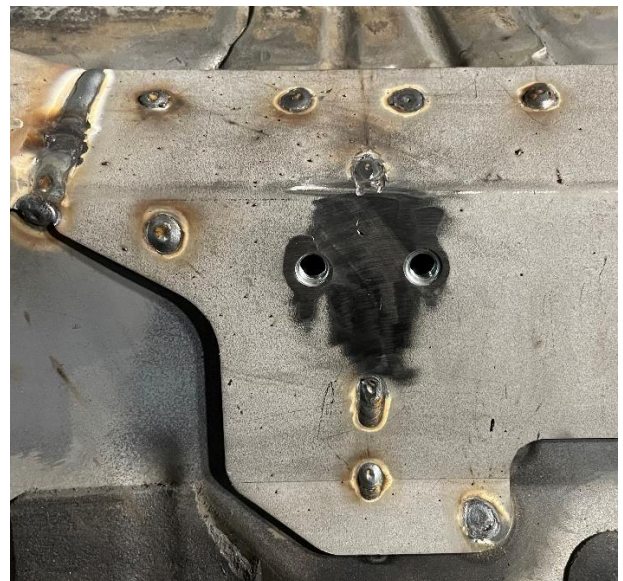


Figure 22 – Mount gusset welds ground flush.

8. Installing the Chassis Gussets (Part D)

Place each chassis gusset to their respective side of the bar. Ensure the edge that butts against the bar is flat against the top of the boot floor and the gusset is slid back so the back edge is aligned with the end of the seat panel. Check for a gap between the gussets and the chassis rail and mark where the part laps the factory bulkhead weld as well as the stitch weld along the back edge shown in figure 11. Use a flap disk to remove material from the chassis gusset till it sits flush along the back edge and chassis rail.



Figure 23 – Push chassis gusset down here.



Figure 24 – bulkhead weld marked on chassis gusset.



Figure 25 – Chassis gusset clearance for stitch weld.

Fit the chassis gusset in position. Ideally, there should be a minimum 2.5mm gap between it and the bar. Proceed to weld the areas shown in addition to over the top of the stitch weld from step 5.3 at the back of the gusset.

Note: Use the tack method detailed in step 6 when welding to the seat base.



Figure 26 – Chassis gusset front weld locations



Figure 27 – Rear stitch weld location.

Congratulations on your successful install of the CMP Front RACP Reinforcement Kit!

Note: The boot trim will need cutting to fit around/over the chassis rail gussets.



Figure 28 – Installed CMP front RACP reinforcement kit

Finishing off:

With the fabrication complete, the final steps are to clean the welds, seal them for corrosion and prep the car for re-assembly.

9. Priming & sealing

Use the wire wheel and grinder to remove the silicate and burnt zinc (white) off the top or around the welds. Wipe down all surfaces with an evaporative cleaner before applying etch primer.

Clean out any weld wire & splatter and metallic dust from the boot/interior space before painting and re-assembling the interior trim.

It is recommended that seam sealer is applied over all welds and edges to prevent moisture ingress into the structure for long term integrity. Once applied and dry, you are free to paint the area in a colour of your choosing!

Completion!

Congratulations, the vehicle is now complete and ready for re-assembly.

Be sure to clean the car thoroughly before its exposed to any moisture as the metallic dust from grinding and welding can embed itself in the paint around the boot opening leaving rust spots.

We would like to thank you for your business and hope this product installation has gone smoothly and given you the peace of mind that your E46 chassis is solid into the future.

If you would like to share your experience with us, or any social media groups please go right ahead. We are always grateful for happy customers to spread the word and look forward to offering continuing support for the E46 community.

For those wanting additional support to their rear subframe mounts, we offer a bolt in brace to further support the front two, rear subframe mounts in addition to offering a noticeable increasing in torsional rigidity to the chassis.

We also have a wide range of suspension upgrades available for E46's and many other BMW chassis and hope you will consider us for any future builds.

Please contact us or visit our site for further information!

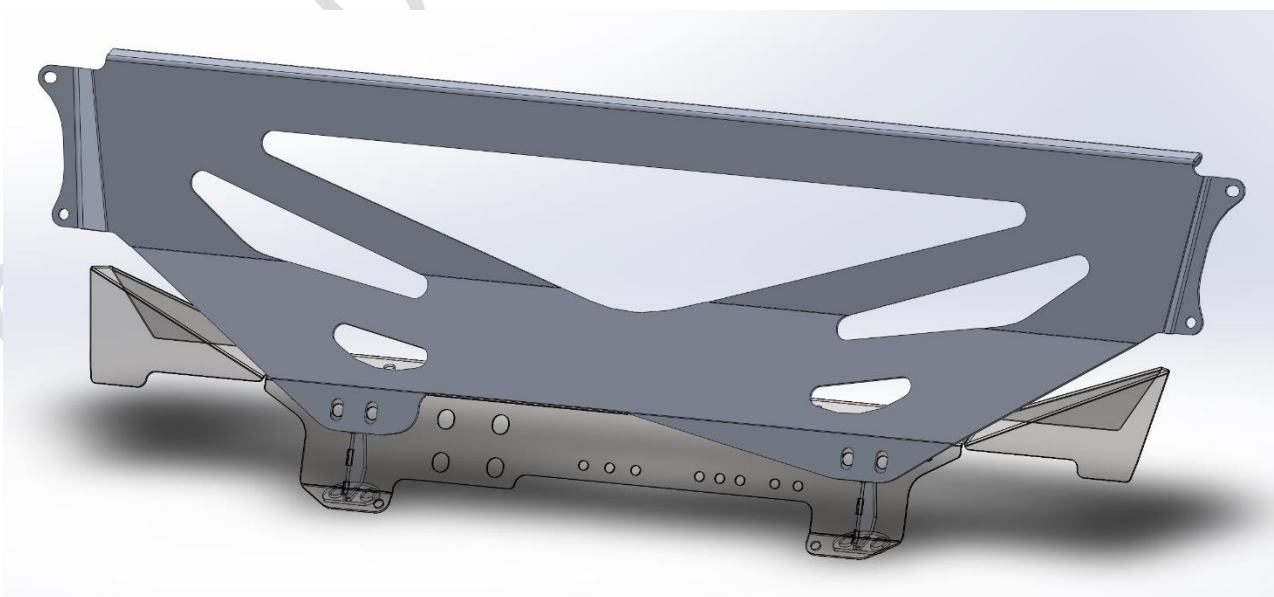


Figure 29 – Front RACP reinforcement brace.