

Fitting body steel work-doorhinges

1. You should have completed all the riveting of the body shell by this point; the next job to do is to fit the steel work into the inside of the body.



2. It is best to trail fit the steel work into the cockpit, then remove and paint before refitting. The above & below picture shows the steel work in position without the body and the steering column fitted.



3. The first parts to be fitted are the side plates, these hold the door hinges and windscreen legs & the steering column/scuttle bar.



4. The above picture shows the side plate in final fitting stage before removing for painting. You should have the holes cut in the GRP floor pan when fitting the body. You may find that the GRP of the body is thick at the point of the door hinge brackets, if the GRP is stopping the side plate from fitting upright, then it is ok to sand it thinner in these areas, as above, but not less than 5mm final thickness! If the form core is in the way it is also ok to sand through it and then re-glass over when you bond the Big Head bolts in.
5. Place the lower end of the side plate into the hole in the floor pan, and insert the **M12 x 50 x 1.75 mm high tensile bolt** through the chassis tube, and into the welded nut on the leg end. leave these bolts loose. If you have trouble finding the nut check that the leg is going all the way down and is not catching on any excess sealant or that the floor pan GRP is not too thick at this point, if the GRP is the problem thin it down with a sander and retry, until you can fit the bolt easily.
6. Now take the 19 x 19 mm support bar that runs forward and down to the second tube in the chassis, place the **M12 x 1.75mm** boss through the floor pan and insert the **M12 x 50 x 1.75mm h/t bolt**. You may have to trim some more from the hole to allow the bar to be lifted to slide the top of the bar behind the side plate. With the lower bolt loosely fitted slide the top end behind the side plate and line up the two **M8** threaded bushes and loosely fit two **M8 x 25 x 1,25mm bolts**.
7. Repeat this operation on both sides. The side plates should now be in the correct position with a small amount of movement to allow for any adjustment. Take one of the Bighead bolts that you have obtained (or made yourself as we do by welding a stud onto a mesh plate), pull the side plate forward and insert the bolt through the bolt hole below the lower door hinge bracket as in the picture below.



- 8.** With a nut on the GRP side of the side plate to adjust the gap and push the base of the big head on to the inside of the body skin. **Note:** 1, The base of the BigHead may need some trimming to miss the hinge bracket. 2, the base of the Bighead should bond on to the edge of the inner skin form core and not on to the outer skin of the body. If in the rare case it dose not fall onto the inner shin do not worry, contact RVD and we will instruct you as to the required steps to take depending upon you skills and equipment available to you.



- 9.** Next bolt in the steering column support cross member/ scuttle support. This fits in between the two lugs each side on the side panels, and is held in place with four **M8 x 70 mm h/t bolts 2 each end.** You may need to line up the holes with a large cross head screwdriver as there is some 'spring' in the side plates until all the bolts are in position.
- 10.** Once this is in place fit the door hinges in-between the lugs of the side plates, there should be a washer at the top and bottom of the hinge pivot tube to prevent rubbing of the bush on the bracket, and then trail fit the door in place. With a 2 clamp the door to the hinge, repeat this both sides.



- 11.** Now adjust the door so that it swings freely and lines up as you require, you may need to tighten up the bolts that have been 'loosely' fitted to stop the side plates moving. Adjust the bighead bolts on each side plate to bring the doors **flush** or to the **inside** the main body shell. As the doors can be '**shined out**' but you cannot bring them in! The doors have to be finally 'shined' later in the build.
- 12.** Once the doors/steelwork are centered in the body, drill the four bolt holes 3/8" or 9.5mm (make sure that the drill bit you use is sharp as there is a metal plate in the door lay-up to strengthen the door at the hinge mounting point. If you have difficulty getting the large drill bit through in one go then use a smaller bit in the center of the bolt hole first, and then open up to the full size). bolt the door on with four **M8 x 25mm h/t bolts** each side. We will come back to the doors later for locks and fitting.



- 13.** With the pedals removed, offer the pedal box into position. It should be mounted as far as possible to the outside of the car and against the inner skin of the body shell, if there is a build up of GRP where the engine bulk head has been bonded in to the body. This will need to be sanded to allow the box to fit as flat as possible to the bulk head. Hold the box in position up against the two arm sections of the steering column support bar, this gives you the correct height for the pedal box. Level the box up as well as you can with one hand and mark the position of the large hole for the brake servo.
- 14.** Make a smaller hole in the center of where you have just marked, that is of a size that you can fit a small “G” clamp through to hold up the box and allow you to line it up in to the required position.



- 15.** Check that the box is horizontal and as far to the outside of the car as it will go with out cutting into the body. When you are happy that the box is in the correct position drill through the eight **9mm** holes in the pedal box (2 at the outer end, 4 around the brake hole 2 top and bottom of the clutch master cylinder, **IF auto gearbox you will not need the clutch holes**).
- 16.** Fit some “**slave**” bolts in to some of the holes just drilled to hold the box in position so that you can remove the “G” clamp. With a diamond cutter or a rotary burr open up the holes in the bulk head to the same size as the size in the pedal box.



- 17.** Once the larger holes are complete, mark the 4 bolt holes back from the steering column support arms onto the top of the pedal box as shown above (your parts have M6 nuts welded to the steering column support arms as it was found to be hard to fit the nuts! Unlike in the picture) drill the 4 holes to 7mm to 7.5mm and de-burr, test fit once again to make sure the hole line up ok. You will need to make a hole for the throttle cable above the pedal box. This can be done now or later if you do not have the cable at this point.



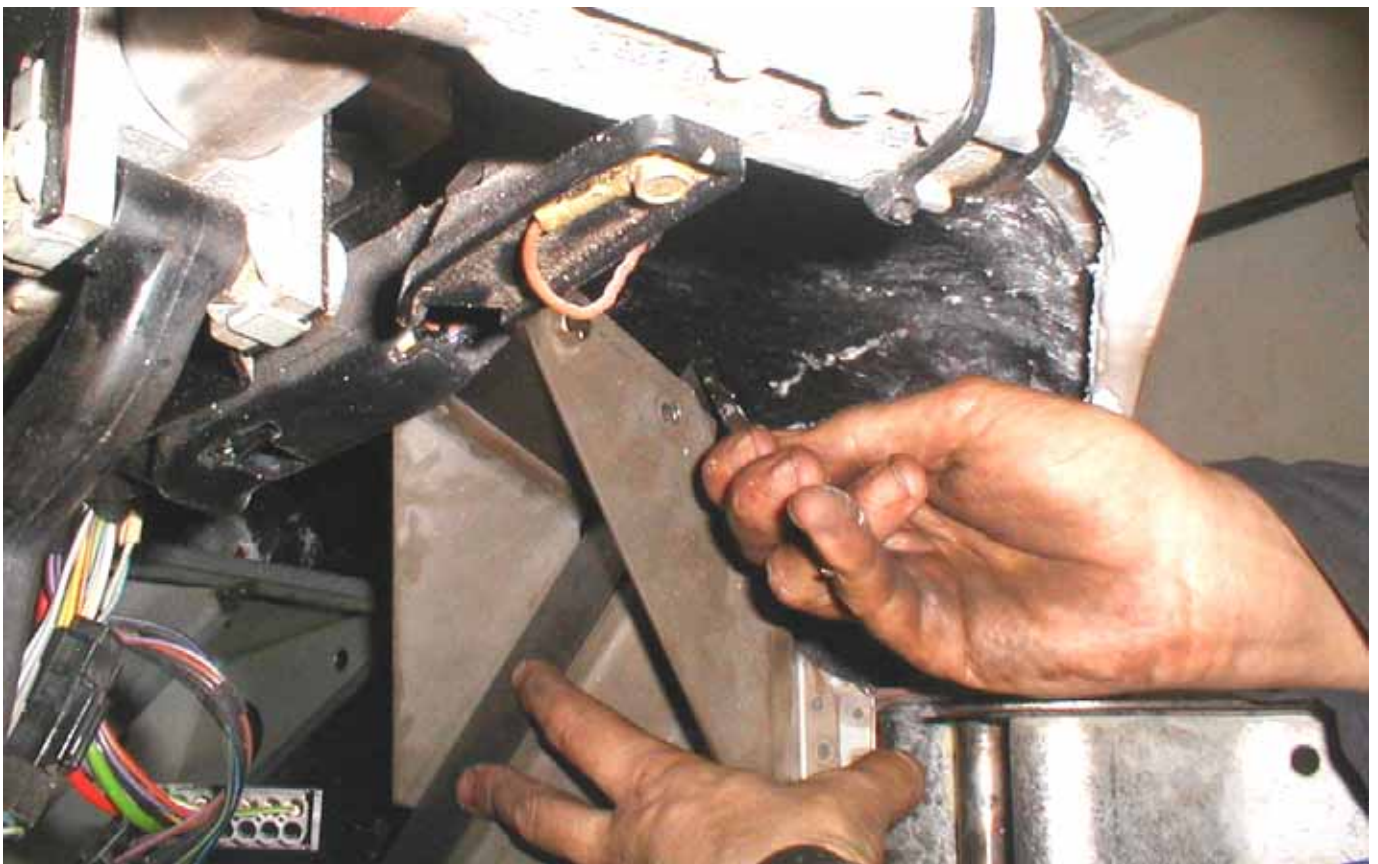
- 18.** Mount the steering column onto the brackets using the original spacers and long **M8** bolt as it was in the donor car. With the steering column in position and your lower column shaft extended (see steering shaft extension modification, if this job has not been completed previous) you can cut the hole in the bulk head. This goes through the bulk head approximately 25mm 1" above the kink line in the bulk head, first drill a small hole from the inside of the bulk head at the end of the second bend in the lower edge of the pedal box and in the center of the remaining exposed GRP as marked above with the white dot.



- 19.** Open up the hole until the shaft will pass through, you may need to extend the hole down and in towards the engine to allow the shaft to be pulled back in to the column and out of the lower UJ on the steering box. This will save you having to remove the steering column every time you need to remove the steering shaft. (It can often be in the way when you are working on other jobs such as piping the power steering pump, so best to remove and fit back later) as shown in the following pictures.



20. With all the steel work in place it's now a good time to cut the slots for the windscreen posts, these are marked from the brackets on the side plates back up onto the GRP. With a steel rule or a strip of steel sheet, lay it on the windscreen bracket and lineup the top edge of the strip/rule with the bend in the bracket, slide the strip/rule up until it touches the GRP and mark this point with a scriber. Line up on the lower bend and mark this point on the GRP,



21. Drill a small hole up through the scuttle at the rear most mark remembering that the screen posts lean back. As the scuttle with the form is around 10-15 mm thick as you drill up straight the hole at the top surface will be forward of the hole on the inner skin due to the angle of the screen ! Once you have one hole you can drill at the correct angle from the outer surface down between the marks on the inside, to give a row of small holes in the center of the area to be removed for the screen frame.



22. Place a 6mm or ¼” drill bit in to the center hole of the row of holes that you have drilled and slowly lean it backwards to remove the GRP in-between the holes to make a slot, if you have a diamond pin cutter or a 6mm rotary burr these are the best tool for the job. When you have a slot that you can fit a file into, file the slot out checking using a rule or strip of steel from the underside to make sure that you are filing in the right direction. As the face of the bracket on the side plate is the widest part of the screen, thus if the rule is slid up on the face of the bracket it should pass through the cut out in the scuttle easily. You can now open up the slots until the frame ends will pass through from the out side



23. Mark around the leg of the screen frame with a pencil to give the correct clearance and shape of the slot to allow for movement when on the road, also to give clearance for paint. You will gain at least 1mm of paint. With this in mind you should have at least 2mm clearance all round, if you over cut the hole by 1 or 2mm do not worry as there will be a cover trim fitted later, but if it is over cut by a large amount then you will need to refill the hole with GRP or there may be no material to fix the trim plate to.

24. The final job to perform before removing and painting the steel work is to position the three remaining Big head bolts in position and bond in place. As with the side plates thread a nut down the stud of the big head and fit into the three slots on the steering column support brace, and screw down the nut to position the base of the big head on the GRP, mark the positions of the bases and rough up the surrounding surface with 40 or 60 grit sand paper.

25. With either P40 Isopon resin or a mix of resin Cabosil (talc) & chopped strand to make a past to tack the big heads in place, place a small amount of the past (make sure that you add the catalyst first and not to much that it goes off to fast) and then reposition the big head back in place. Screw the nut down to the lug to force the back side of the big head bolt to the GRP of the body, make sure that the stud is in the center of the slot (side to side & back to front) to allow for adjustment and easy removal later. Remove and excess past that comes through the holes in the base plate. Repeat this for all three of the steering column lugs.

26. Remove the doors and hinges first then the pedal box and steering column support once the bonding pasted has hardened. Loosen the **M12 bolts** that run through the chassis to the side plates to allow them to be pulled in enough to place a small amount of bonding past behind the base plate of the big head bolt on the side plates under the door hinge.



27. Mix the past and repeat the procedure as for the steering column support. Make sure that the bolt is in the center of the hole in the side plate or it may jam when you try to remove the side plate, or it needs to be more towards the top of the hole.

28. Once all the Big heads are “tacked” in position they now require bonding over with at least 600g or 2oz of chopped strand mat (this can be obtained from most motor shops or Kit Car small adds, when required as the resin does not have a long shelf life depending on the time of year) cut the mat into a circle to give around 40mm or 1 ½” extra around the base of the Big Head. Fold into four and cutoff the point of the cone you have just folded at a round 6mm down. This will give you a hole in the center of the mat. Sand down any lumps or sharp edges before bonding. If you are using “real” Big head bolts you will have a plastic sleeve to cover the thread when bonding supplied with them. If “home made” them masking tape will do! Cover all the exposed threads and cover anything that you don’t want to have resin on!

29. Prepare the tools for fiber glassing, & cleaning materials for the tools. Catalyze a small amount of resin around 25g, per bolt in a suitable container (an old paper soft drinks cup or ‘pot noodle’ cup is good for resin, as some materials will melt with resin).

Note: Resin is somewhat like a hand-grenade! (In some ways)Once the pin is out! (The catalyst is in) **IT WILL GO OFF!!!** As long as it has a minimum 1% catalyst (If the temp is above 30 deg ‘C’ you can go down to 0.7% but no less!!!)

It’s just a mater of **WHEN!!!!** **You are up against the clock once you start!**

You may want to do a small test mix first to test the curing time? As not to get court out half way through the job and have to remove it all and start again!

- 30.** Wet the area to be covered by the mat you have cut with the catalyzed resin, place the mat over the stud and wet-up with resin evenly all over make sure you cover all the mat well, (if your mat is thinner than 600g then you may need more than one layer) allow the resin to 'wet' the mat then roll out the air bubbles (or brush out). You can tell when the mat is 'wet' as it will become more and more transparent as the starch holding the strands together is dissolved by the styrene in the resin. Repeat this on all the Big heads, wash up tools and clean up.
- 31.** There is a point where the GRP is 'Green' and is not cured but hard. It can be cut with a craft knife easily, if you can its best to cut around the base of the stud at this time to remove any resin and glass strands from the stud. This will be a harder job later needing sanding or grinding away. This can risk damage to the thread of the fixing if not careful.
- 32.** If you are happy that all the holes are correct and you have trial fitted the master brake cylinder/servo and the clutch cylinder, along with the pedals and they all line up and work as they should. the clutch cylinder may vary depending on the engine that is fitted, but for most BMW applications a **0.625" (16mm)** Dia Girling cylinder as used on "Land Rover's" early models will work well, and are easily available. The E34 servo mount is not suitable for you python and you will need a new mount/adaptor available from RVD. You will also need to remove the "over run stop from behind the fork on the servo push rod, as this is no longer required



- 33.** Over run bracket that needs to be removed, and fitted with new RVD servo adapter piece. If you wish this can be made by cutting and welding the original E34 piece, but this will require a large amount of skill to modify & weld. If you are not confident on how to do this it's best to use the RVD part. With the brakes it's best not to be in any doubt of the strength or reliability of the parts used.



- 34.** Above Girling type clutch master cylinder, as used on early land rovers and available from a wide range of suppliers. The angel of the reservoir is correct for your python bulk head and pedal box.



- 35.** The above picture shows the finished pedal box, this is RVD's own part and unique to the python. Due to the narrow foot wells compared to the BMW and the way most E34 and E32 pedals are connected to the original Left hand drive set up. There are no easily was to make use of the originals. Below is the prototype BMW Python, this varies a little from the production models.

