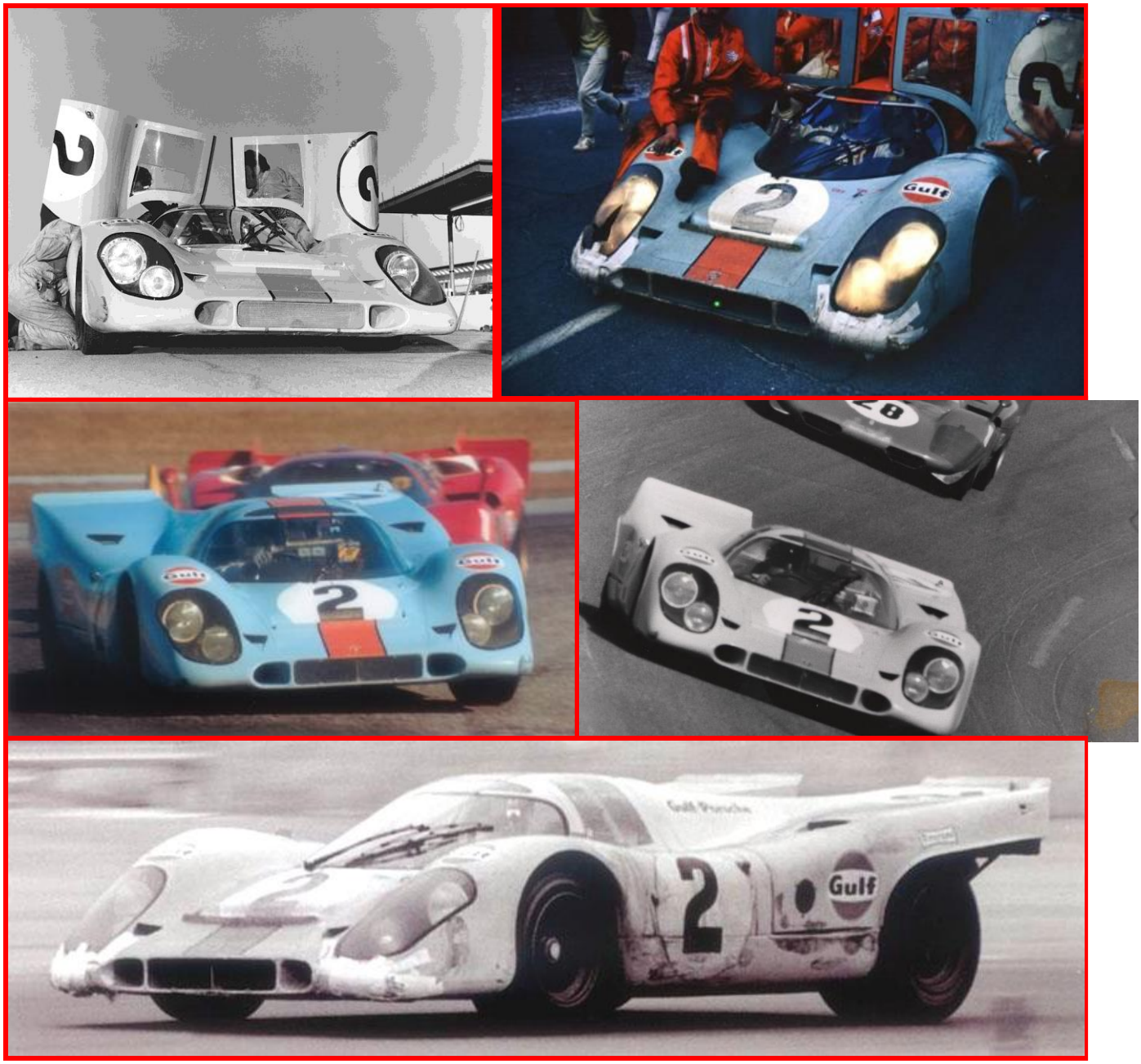
Brianza 1:12 **Porsche 917** Build Summary - Part I

By: Mike Kendel

In 2010 I agreed to build a Porsche 917 model for the man who had purchased it on e-Bay. As this model by ABC Brianza sells for more than $700 as a kit one might reasonably suspect that it would be both highly detailed and true to the prototype. The more deeply I investigated the model, the more it became obvious that neither of these assumptions was correct.

Initial discussion about which car and event markings to build the kit as yielded the decision to build the 1971 Daytona winning Gulf-Wyer machine shown below:



With the actual model identity settled, investigation of the kit itself commenced. Comparison between many kit parts and scaled photos & drawings showed numerous issues. The wheel base was off by about 6" scale inches. The Body showed compression in the cockpit area through the window/door section of approximately 3 scale inches and also a similar amount in the nose. The front floor pan and side pods needed to be extended also.

This kit was missing the fuel injection pump as well as some other pieces. A parts order to Brianza did not rectify this even though the part was ordered and paid for. Fortunately a fellow modeler who had built this kit as a curbside after he evaluated the internal parts sent me the pump and numerous other parts which was a big help in getting this model built.

In the end, as neither the engine nor transmission matched the scale dimensions and both contained several highly visible inaccuracies, the entire driveline ended up being either highly modified or scratch built.

The kit had no suspension or steering components and contained only two rudimentary axle rods. In addition, the "frame" components supplied in soft white metal were inaccurate and incomplete. This meant that a full suspension component set, brake components, and frame needed to be fabricated as well.

To this end, a surface plate fixture with a scaled top view drawing attached to it was made to use as a build fixture. This scaled top view copy was part of a set of plans found on the internet which appeared to be from original Porsche drawings but no source was attributed.

What follows is a summary of the build process for this model. A detailed description would be the subject of a long and probably boring book. With that in mind…

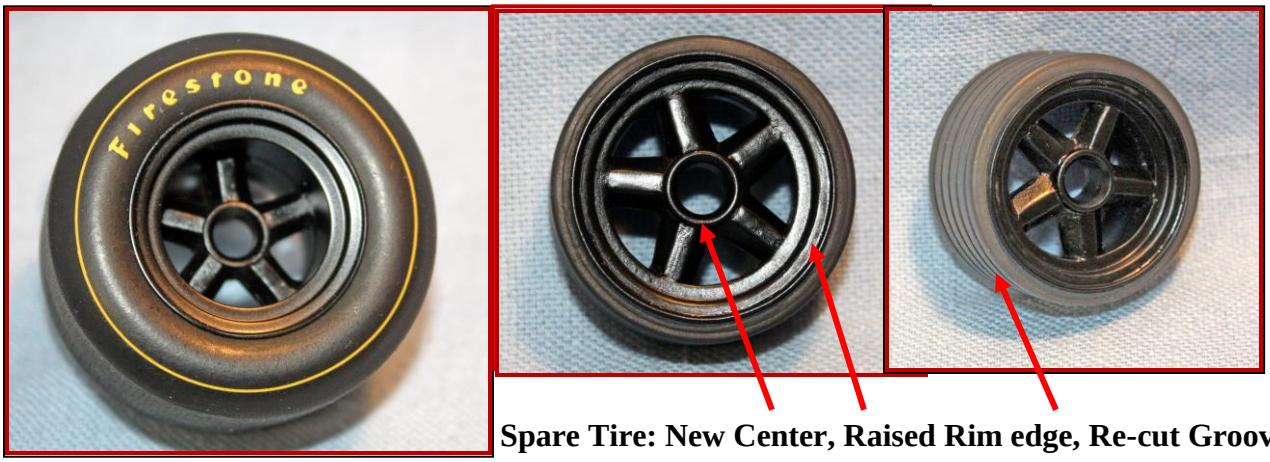
1. Wheels and Tires

The kit wheels were very crude. There were no inner rims and, in the case of the rear tires, the aluminum turned rim ended approximately ¼" inside the tire center so there was not even the illusion of an inner rim. In addition the wheel centers were somewhat rudimentary and included axle holes which were neither centered nor the right size for even the basic axle rods included in the kit.

The actual wheel center of the spare tire was far more accurate than the ones for the road wheels but it suffered from inaccurate centering and size of the central hub. A new center section was turned and installed. Rubber molds were then made from this modified part and from these came the centers used in the main wheels.

In addition, the original spare tire suffered from irregularly spaced and cut "tread" grooves so these were filled and re-cut on a lathe. As this piece is mounted with the inside of the wheel upwards in the car and the original had no internal wheel half in the inner portion, a new wheel inner half was turned and installed so that the part would look proper when installed. In addition a raised lip was added to the outer rim per prototype photos.

For the main wheels, inner wheel halves were machined for all wheels and new center sections were cast from the modified spare tire centers. The finished Rear and Spare tires below reflect the completed assemblies with only the addition of air valves and weathering remaining. These will be done as part of the final assembly.



Spare Tire: New Center, Raised Rim edge, Re-cut Grooves

Main Wheel / Tire Assemblies: Wheel modifications as shown below.

Tires treads were sanded to minimize flash and give worn look. Depth of tread limited amount of sanding here so some flash / un-evenness remains. Tires were then clear-coated, decaled, and dull-coated on outer side only. Wheel mounting centers will be weathered to reflect repeated mounting, un-mounting but will otherwise not be heavily weathered.

Comparison of stock and modified

Comparison of stock kit parts (right) and modified / new parts (left). New inner wheel turning is at lower left and new center wheel casting is in lower center. Note comparison between new wheel center and original wheel center.

2. Birth of Franken-Porsche

Given the major discrepancies between the body dimensions and the scale measurements, or even more basically, the discrepancies between the kit body and its own floor-pan and rear body section, the decision was made to make the body more closely match the dimensions of the prototype. And then to modify the floor-pan to match the corrected body dimensions.

For the main body, a detailed comparison of the plan dimensions with the dimensions of the actual body casting showed that two cuts could form the basis of "stretching" the body to match the scaled major dimensions of the real car. The cut lines are shown as red tape lines below:

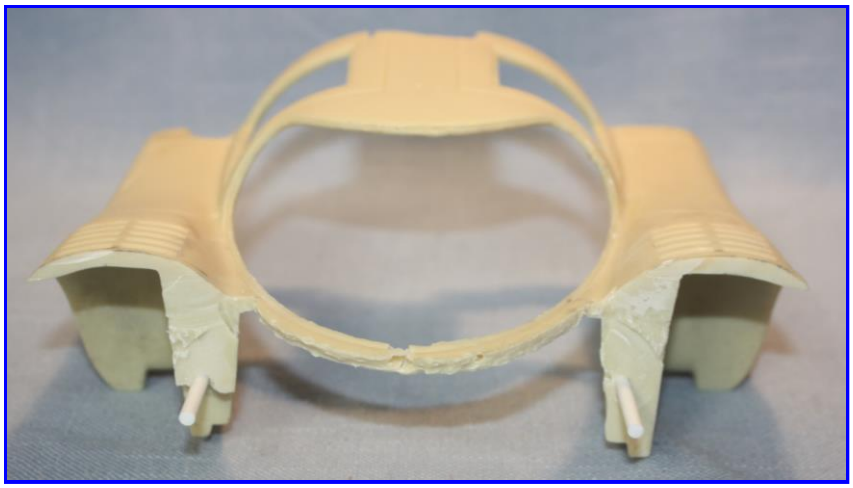
Unfortunately, this kind of cosmetic surgery needed to be both structural and precise in its results. Because of this, it wasn't possible to just start hacking on the body and expect a good outcome.

In order to maintain the alignment of the parts in the long axis of the car and keep them all on the same level, a series of holes were drilled into the body from the front. These holes would be filled with plastic rods which would maintain the critical alignment of the pieces.

The first two holes were drilled into the middle of the smaller driving lights in the front section of the car. (The holes for the rods in the middle two pieces would have been too deep to drill with the nose on anyway).

Once the first two holes were in place, the first cut could be made across the body and through the headlight recesses. Once the front piece was separated, the holes could be drilled for the middle and aft section and then that cut could be made.

The next two pictures show the body sections after cutting and with the plastic rods inserted for alignment purposes.



This picture was taken before the parts were re-joined. The plastic alignment rods are clearly shown.

The part of this cut that goes through the fender is at approximately the front axle center line. It will result in wider wheel wells as viewed from the side of the car, (which agrees with reference data), and will also allow the wheel base of the model to stretch the extra ¼" it needs to make it correct.

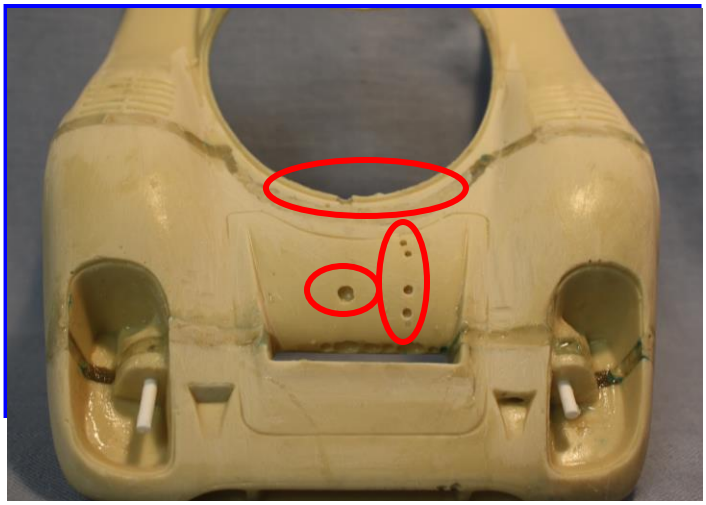
When it came time to start rejoining the pieces, the parts were carefully aligned and super-glue was used to tack them all in place. Once this was done, crude tape dams were made and a core of epoxy glue was poured in to create structural strength.

Following the epoxy, casting resin similar to the original body material was used to fill the remaining space. In the initial pours of resin, clay was used to form the dams and "molds" for the resin. The remains of the blue clay are also visible here.

Any process like this is iterative, meaning that it takes several passes to make everything right and there is a sculptural element to it. If the body was just cut and then bridged, the lines would not end up right, so there is an element of building up material only to sand off most of it. However, at this point, no soft putty is being used because the model needs a solid structural basis.

At this point also, it is time to deal with the "bubbles that are a result of air trapped in the mold when the original casting was poured. All resin models have these to a greater or lesser extent, but I have to say that these are about the worst I have seen in my limited experience.

All of these holes are filled with casting resin to try and minimize the material differences. This will hopefully minimize issues with the paint later.



At this point the upper surfaces are mostly built up and , again, casting resin is the primary top surface for the reason given above.

Below is a picture of the current state of the body. Most of the profiles have been rebuilt and the rough body shaping is done.

Additional Note on Body Filler: Although it was to be a couple of years before final finishing of the body, the areas that had been filled with Epoxy never hardened sufficiently to allow final finishing. This meant that all of the epoxy filler eventually had to be dug out of the body and replaced with casting resin. Automotive body filler could also be used but I would recommend that standard epoxies not be used as fillers with cast resin bodies.

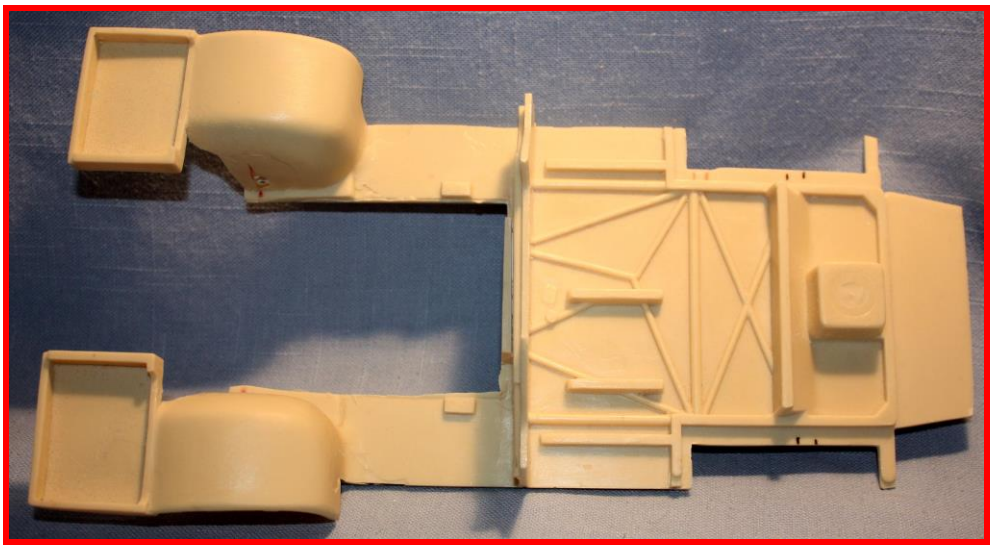
3. …And now, to the Chassis

In evaluating the goals for this model, there were several things that were at odds with the parts available in the original kit. Specifically, the plan for the model included a more highly detailed interior, opening doors, and full suspension.

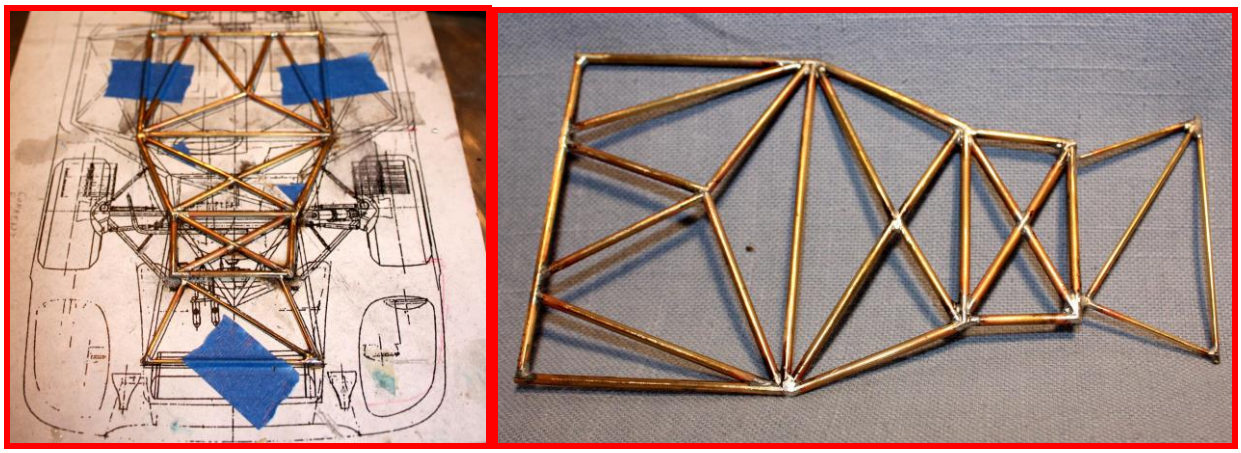
The original kit floor-pan is shown below. While it is completely understandable that many functions have been combined in this one part for production purposes, the fact is that it offers only limited opportunity for the addition of basic things like suspension mounts and interior details like pedals, which would be visible through the open doors. In addition, the shaping of the

ridges representing the chassis tubes is incorrect in several points and the cutouts for the front wheel-wells are shaped very badly.

For this reason, it was decided to "bite the bullet and proceed with the fabrication of a brass chassis for the complete car. It would have been necessary to scratch build the engine compartment framing anyway, so this was merely an extension of the basic decision.



As with the construction of tube chassis on many 1:1 cars, it is often easiest to start with the "floor" level of tubes. Illustrated below is the first stage of the development of the chassis.



As can be seen above, the chassis was laid up directly over a set of plans that had been enlarged to correct 1:12 size. This is a handy build aid, but can be very rough on the plans, so make several sets.

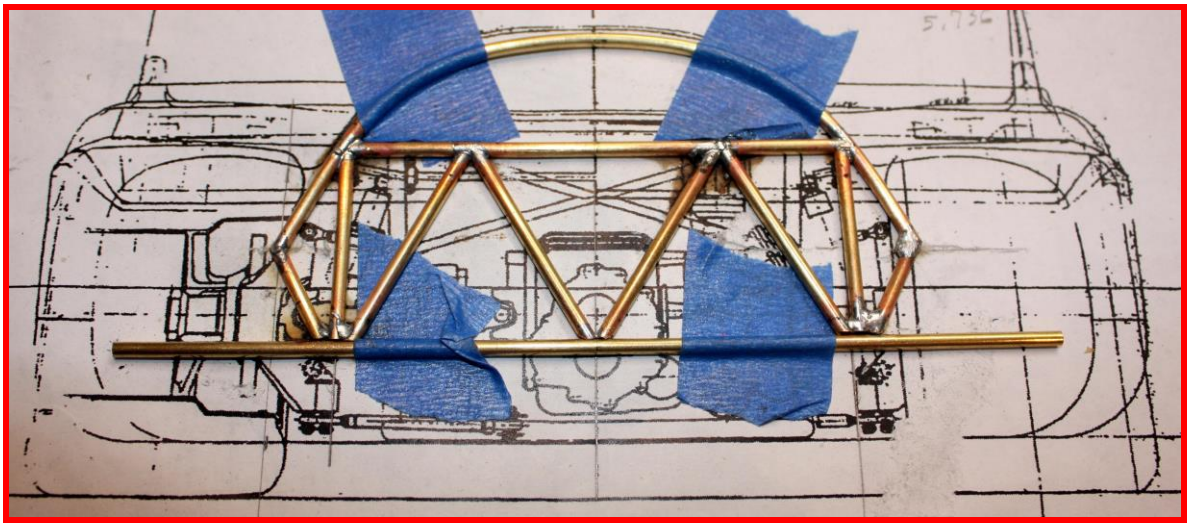
Just a few notes with regard to build techniques here… For the first part of the chassis build, I used a resistance soldering rig to "bring the heat". I find this easier in general for big tasks like soldering brass tubing, (especially when it's sitting on a ¼" aluminum build plate, which also doubles as a dandy heat-sink.) Once the build had "gone vertical", I switched to a mini-torch.

I initially was drawing K&S brass tubing through a drawplate in order to get the absolutely correct diameters, but this got really old fast and, frankly, didn't make a significant difference in the appearance of the chassis, so I just started using stock sizes.

For solder, I used Stay-Brite Silver solder. I just don't trust soft solders for structural work. Also, be aware that the Stay-Brite flux is an acid based flux and will need to be **fully** removed

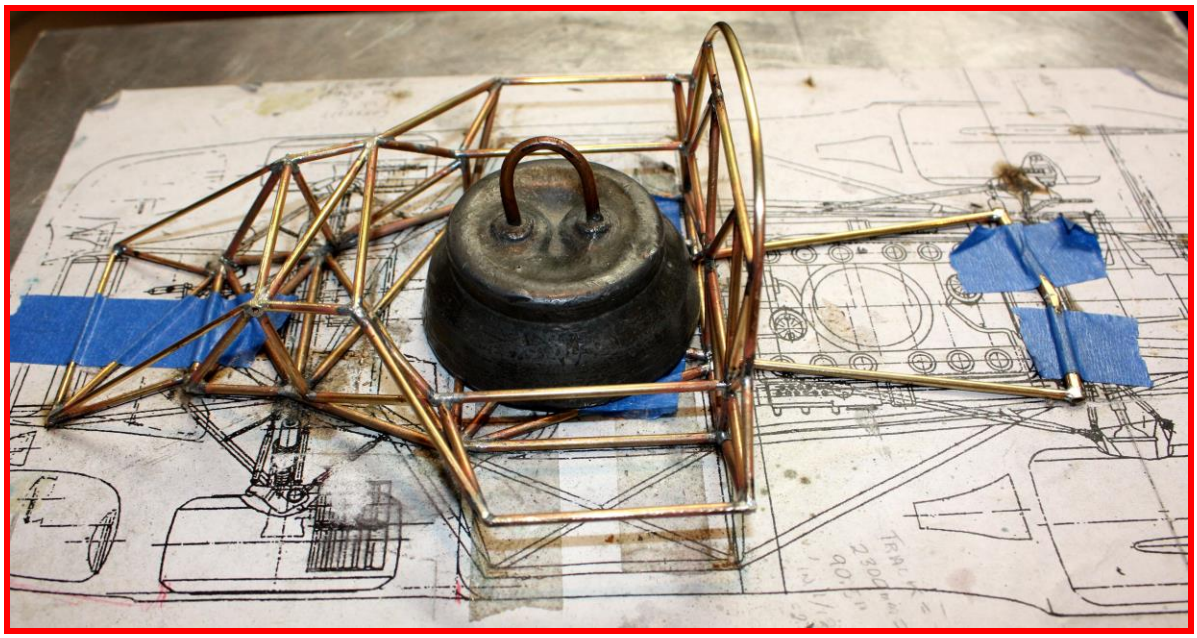
from the chassis, (or whatever you solder), before painting or other finishing. Dire, awful, evil things will ensue if this warning is not heeded!

After the "floor" was done, "going vertical" commenced with the fabrication of the firewall bulkhead at the rear of the cockpit… (Note that framing is not soldered to bottom tube!)

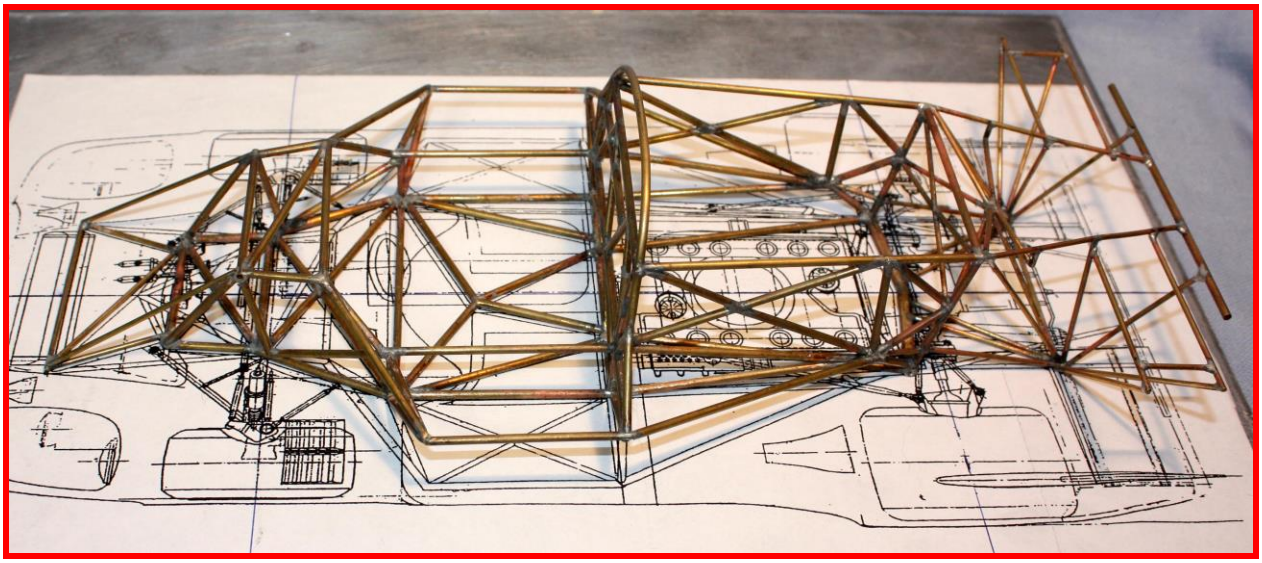


From this point, the main structure is basically built up a tube at a time. If that sounds like a lot of work, it is. However, nothing else is going to give this visually accurate a result.

By the way, the leaden lump in the middle of the cockpit is my grand-dad's home-made trot-line weight. It is really handy to have something heavy and flat to aid in "fixturing" as you build.



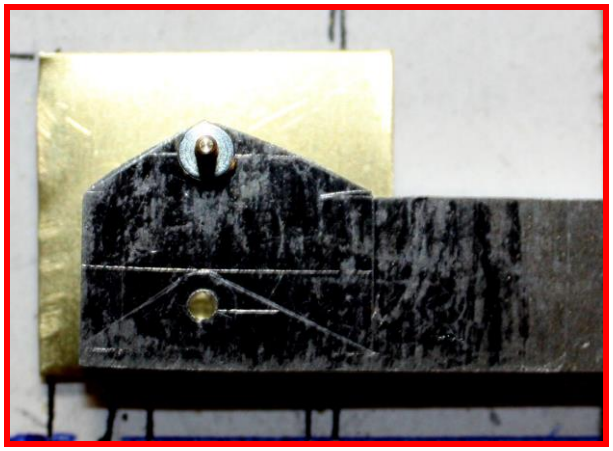
It seems to take an interminable time to get the basic framework done. OK, it does actually taken an interminable time to get the basic framework done… But when you do get there, or nearly there, it will look something like this.



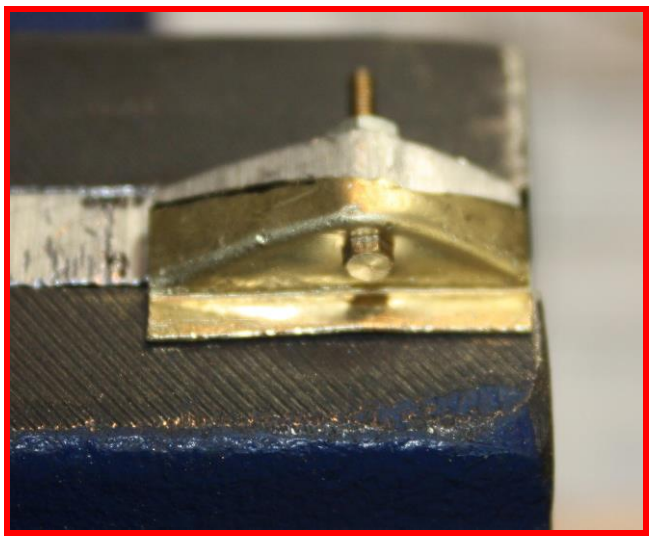
Some eagle-eyed readers may note that some sections have been “simplified” a bit. This was done because it makes no sense, (in my humble opinion), to spend even more time putting in details that will not be visible from any reasonable angle. So, there are no cross braces in the door sill areas because these will be covered by body-work and the front bay bracing is also simplified for the same reason.

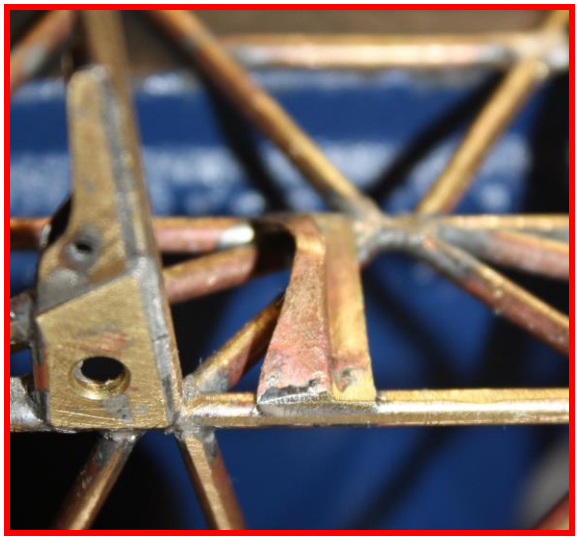
Well, now that we have finished the interminable process of building the basic chassis, we begin the next interminable process of creating and installing the various mounts for minor fixtures like the engine/drive-train, suspension, seats, etc.

As an example of this process, the drive-train in the 917 mounts to the chassis at three points. The first is through a pair of brackets that sit on either side of the engine’s nose casting. A single BHB, (big honking bolt), goes through the casting and the brackets to hold up the nose of the engine. Here’s how those brackets were made.



First an aluminum forming blank was carved out of a piece of scrap stock with saws, files, and creative language. This was then drilled to assure that the bracket holes would be in the correct location. Then the forming blank was assembled with a brass “bracket” blank and clamped into a vice where the bracket was bashed into a nearly correct shape with more use of tools and language.

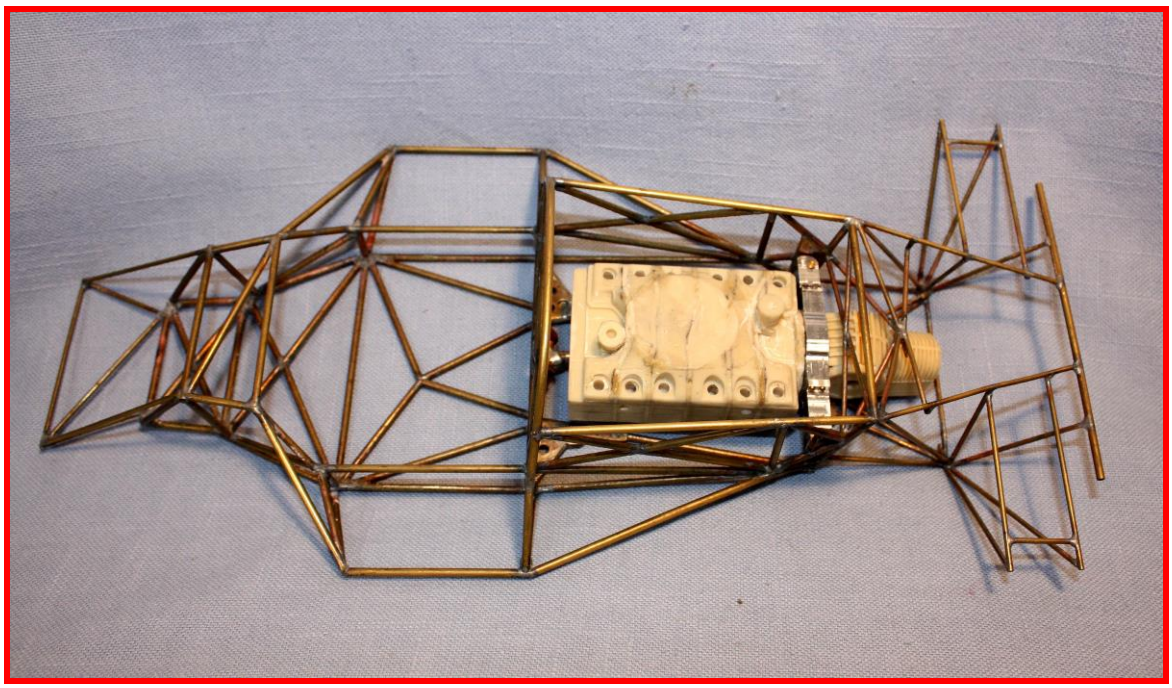




After some precision whomping on the blank with various hammers and such, the finished bracket ended up like this. It was then soldered to the chassis in the appropriate place… And then re-soldered to the real appropriate place when I re-measured to find out why the engine was sitting in the chassis off kilter.

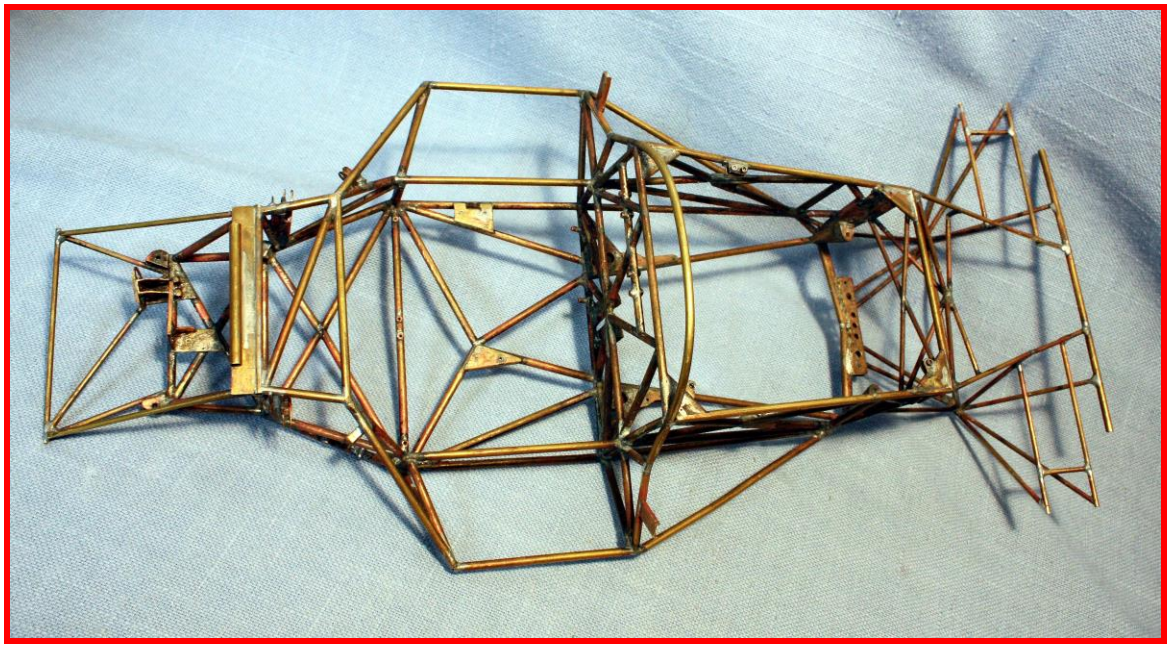
Also visible in that last picture is the forward mount for the lower passenger side radius rod. All of the mount assemblies were made up of brass sheet or tubes using pretty much the same methods.

In general, lots of cutting, filing, sawing, drilling, soldering, and creative language will probably ensue but eventually, you end up with something like this…

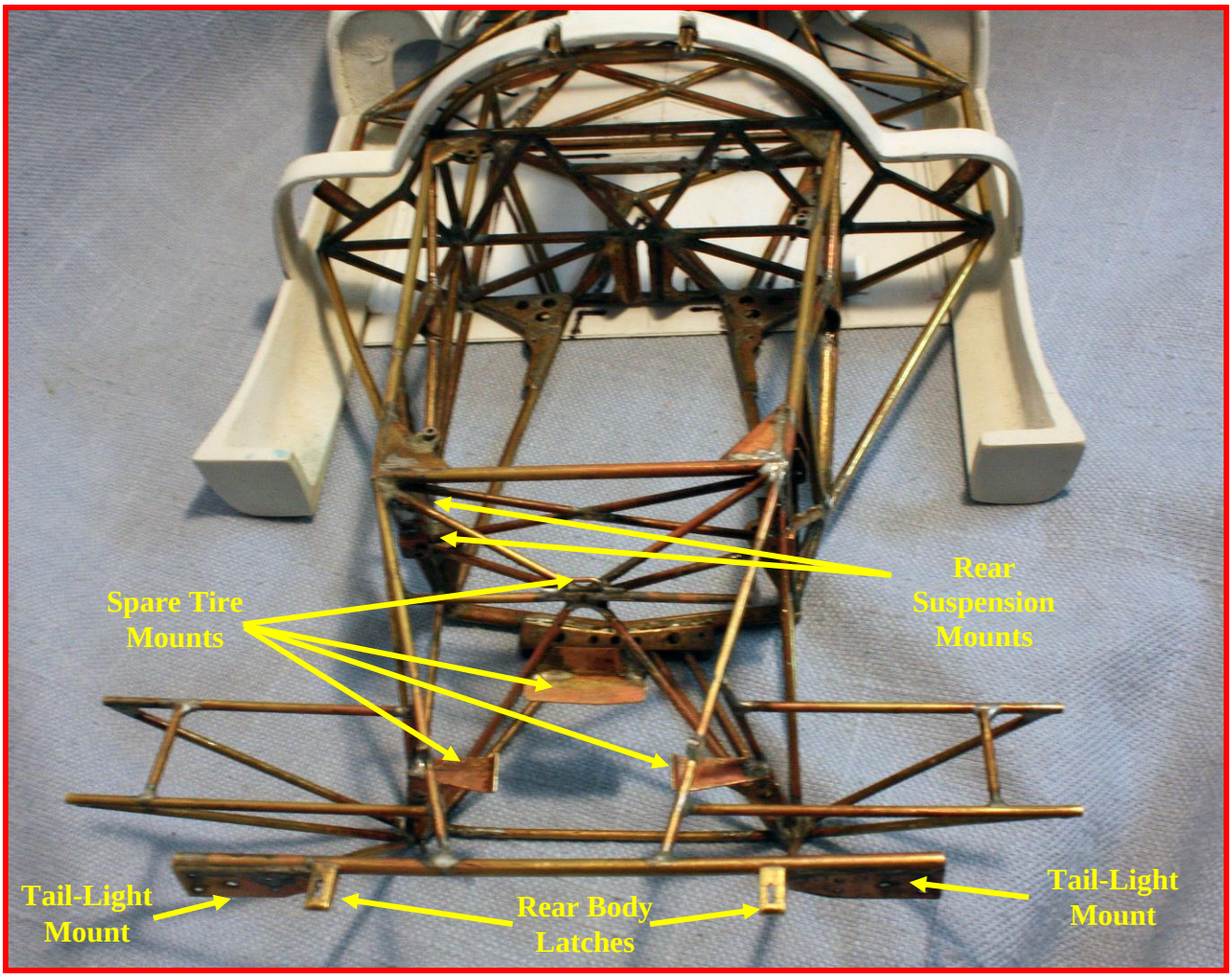


With the basic (stretched) motor and properly spaced gearbox mounted, along with most of the rear suspension mounts, there's still a lot to do but it's coming together.

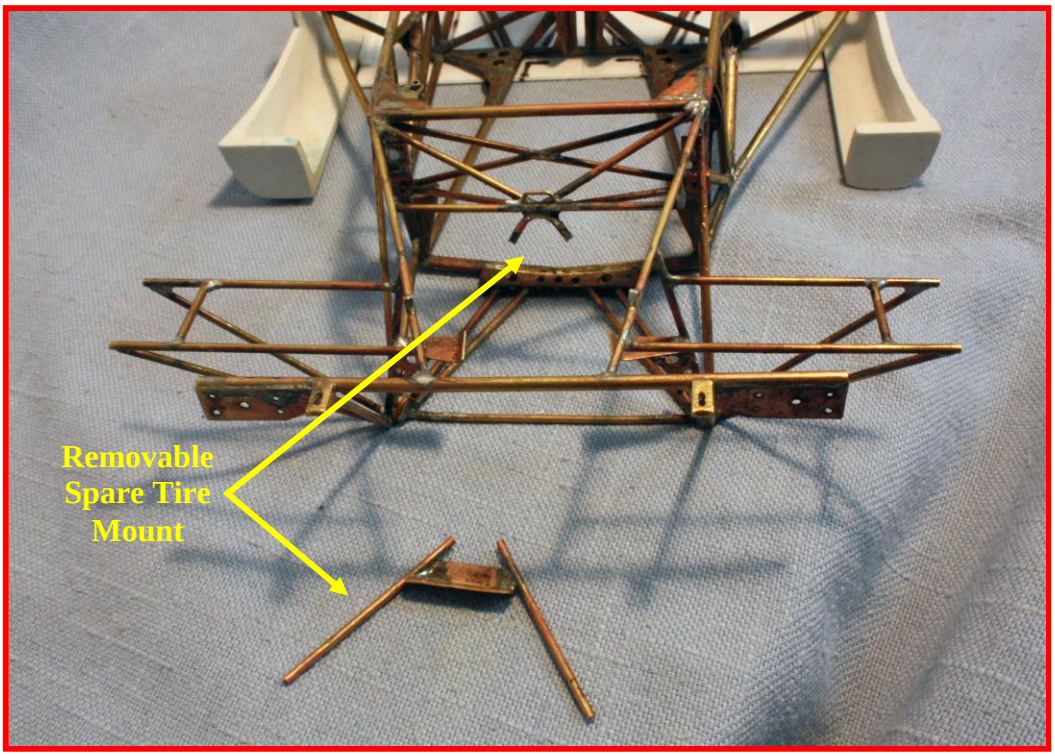
And below is what the nearly complete chassis looks like, (they're never really complete until you have them setting in a display cabinet… and sometimes not even then!) At this point, things like suspension mounts, seat mounts, and bracing are in.



Next all of the mounts for the rear suspension are installed, as are the tail light mounts and the rear body tie down brackets on the rear chassis bar. In addition the pivot mounts for the rear body have also been attached. The only remaining items on the chassis before it can be painted are the oil tank mount and some fuel pump brackets.



For the rear section of the chassis, the biggest challenge was the center spare tire mount and the down tubes that support it. The reason for this is that this section must be removable in order to install the transmission during the final build-up. It would not be practical to be soldering all of this in after the power train was installed.



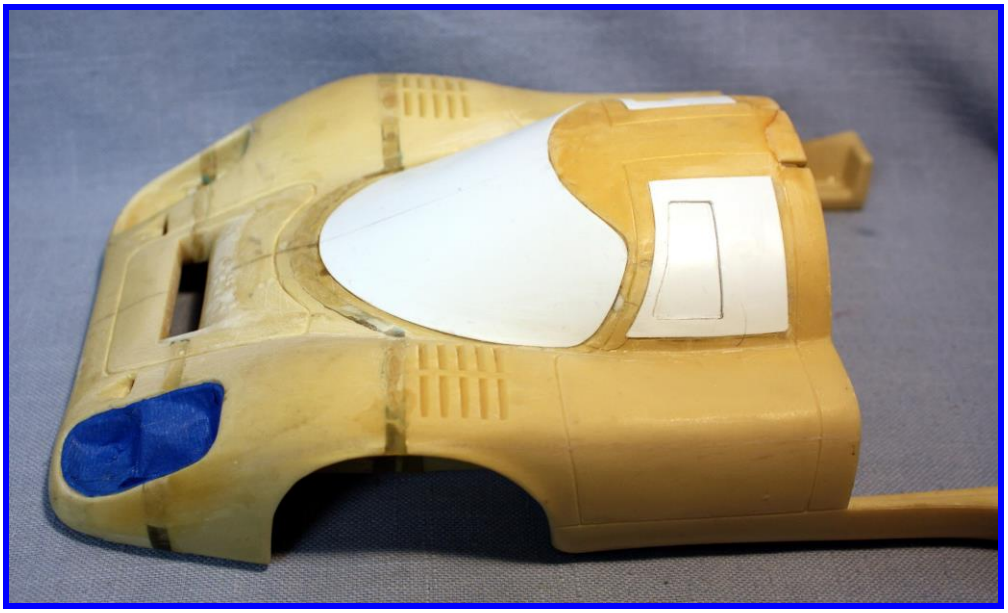
4. And, now back to Body Mods

Due to unusual shapes in the original model and a number of features in the specific prototype selected, several changes were needed in the bodywork. Initial "stretching" of the body was covered in a previous chapter.

The next step in the gestation of "Franken-Porsche" involved creating a "body plug" to be used both for forming the "glass" and the fiberglass door skins. The new "glass" is necessary because the kit only supplies a flat piece of clear plastic to form the windshield and windows out of. This precludes, among other things, putting the side window vents into the door glass.

The door skins are also necessary because the original "doors" are molded into the body and have a very thick section. In order to have the opening doors, the edges of the body molding have to inlet to form the door outline edges. All of this means that new door skins need to be fabricated.

The vacuum forming of the "glass" and the lay-up of the door skins will be covered later in this report. This section will deal only with the actual body modifications made for these processes and to increase the model accuracy.



The image above illustrates the major challenge to building the “body plug”. That is to lay in the glass areas with something that can be later removed without major destruction to the body itself.

In this case, thin styrene sheet was cut to size and installed with super glue. The rationale was that the plastic could then be scraped out after the mold was made leaving a lip to attach the final “glass” parts to. Sometimes the magic works… but in this case it didn’t. More on that later.

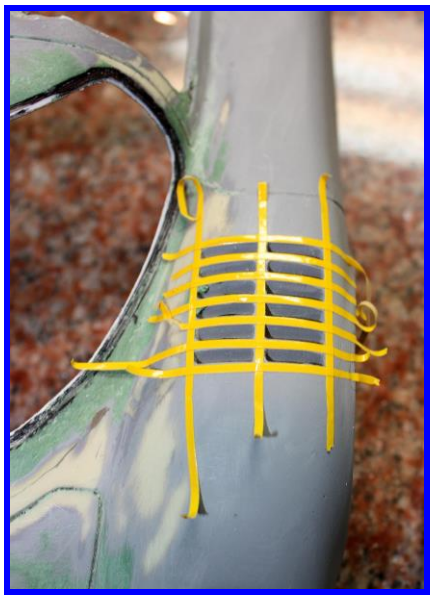
As can be seen, the inlets for the vent windows were put into this section. While not seen, the headlight recesses were filled with plaster and sanded smooth. In order to aid getting the plaster back out of the headlight recesses, the recesses were first covered in blue tape as shown.

Two molds were needed because I decided to do new headlight covers also because one of the body “stretches” went through the headlight recess. So one mold was made to pull the windshield/windows from and another was made to pull the new headlight covers from.

As mentioned above, the actual making of the “glass” parts and the doors will be covered later. This was, however, the first time to do a rough visual check on the basic lines of the front body. In general, it looked pretty good. However, there were several issues that needed to be dealt with.

In a model of the anticipated, (OK, sincerely hoped for), quality of this one, things like the number of cooling slots in the top of the fender should be correct. The model originally had five and I’ve not found a picture of any 917 for which this is correct. The car that is being built originally had six slots as raced at Daytona in 1970. So, the slots had to be fixed.

The image below shows one of the steps to try and get equally spaced and square fender slots. (There’s still a lot of finish work to do on these…)



Among the other issues that needed to be dealt with was the lack of ducting for the oil radiator in the nose. (Remember that the 917’s engine was air-cooled, so it needed serious assistance with cooling from the oiling system.)

The nose in the kit had rudimentary inletting to the “hood” area to represent the outlet for the oil radiator. However, it was open to the floorpan of the model. Similarly, there was nothing that actually represented the radiator and no intake ducting as such in front of it. The NACA ducts on either side were similarly bereft on any representation of the backs of the ducts or the ducting that they fed. The image below shows how these issues were dealt with.

The piece of plastic and “stuff” in the foreground is the backing piece for the right hand NACA duct ready for installation. All of the addition ducting was fabricated with styrene plastic and putty. It was shaped with a lot of trial fitting and filing and more fitting, (and some creative language too).

The whole mess was installed with the old standby of baking soda and super-glue.

While I was at it, I also took time out to build the radiator, but that too will be covered in a later chapter.

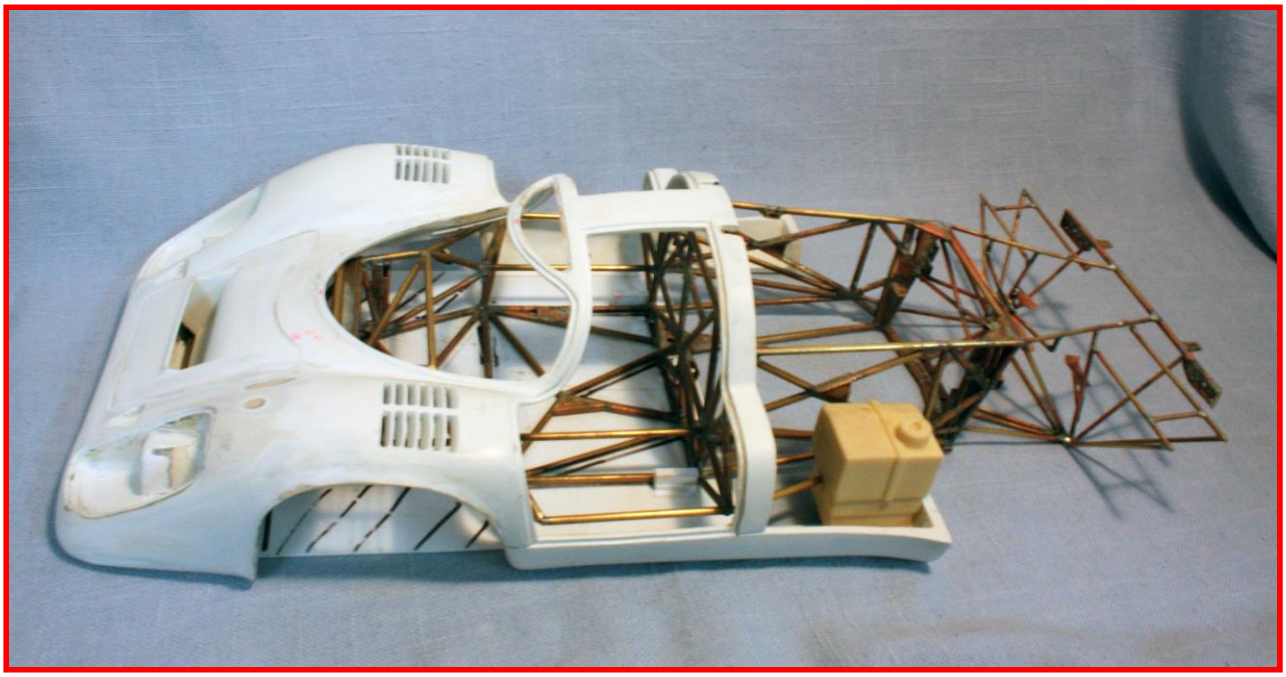
With all of this done, at least to a rough stage, the front body is now ready for finish sanding and shaping. There is still some minor work, like re-installing the lip at the radiator outlet, but most of the fitting for the “glass” installations is done and the ducting is complete as it will be represented in the final model. The front now looks like this…

The radiator and ducting are also shown below…

5. **Rear Bodywork Modifications and Oil Tank Alignment:**

When it was time to lay out the chassis' oil tank mounts and the braces for the back of side-pod, it became obvious that the tank filler did not come close to lining up with the fill hole in the bodywork. It should be noted that this is the case using the way the original parte would fit together without modification. The long and short of it worked out that the NACA ducts were roughly 4 scale inches too long and this also meant that the oil filler hole which is one of the NACA duct floors was not properly located. This will be shown in the next section.

The image below shows that the oil tank must have a relief where a main chassis tube passes through it. This is prototypically correct. In order to make the model tank work, this modification has had to be made. The tank requires several other modifications also and as shown below it is a work in progress.

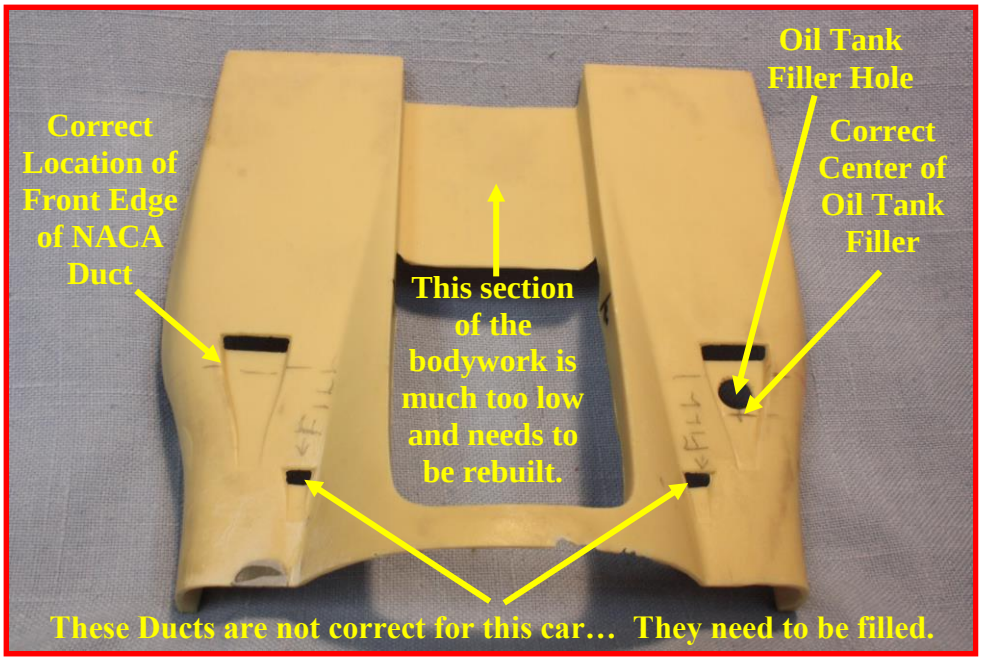


The original plan was to modify the rear body after the chassis was complete. Unfortunately, the need to properly locate the oil tank so that the chassis mounts would be correct necessitated fitting the rear bodywork to the chassis. At this point, it became obvious that the filler hole was mis-located by over 3" in scale and the NACA ducts were 4 scale inches too long.

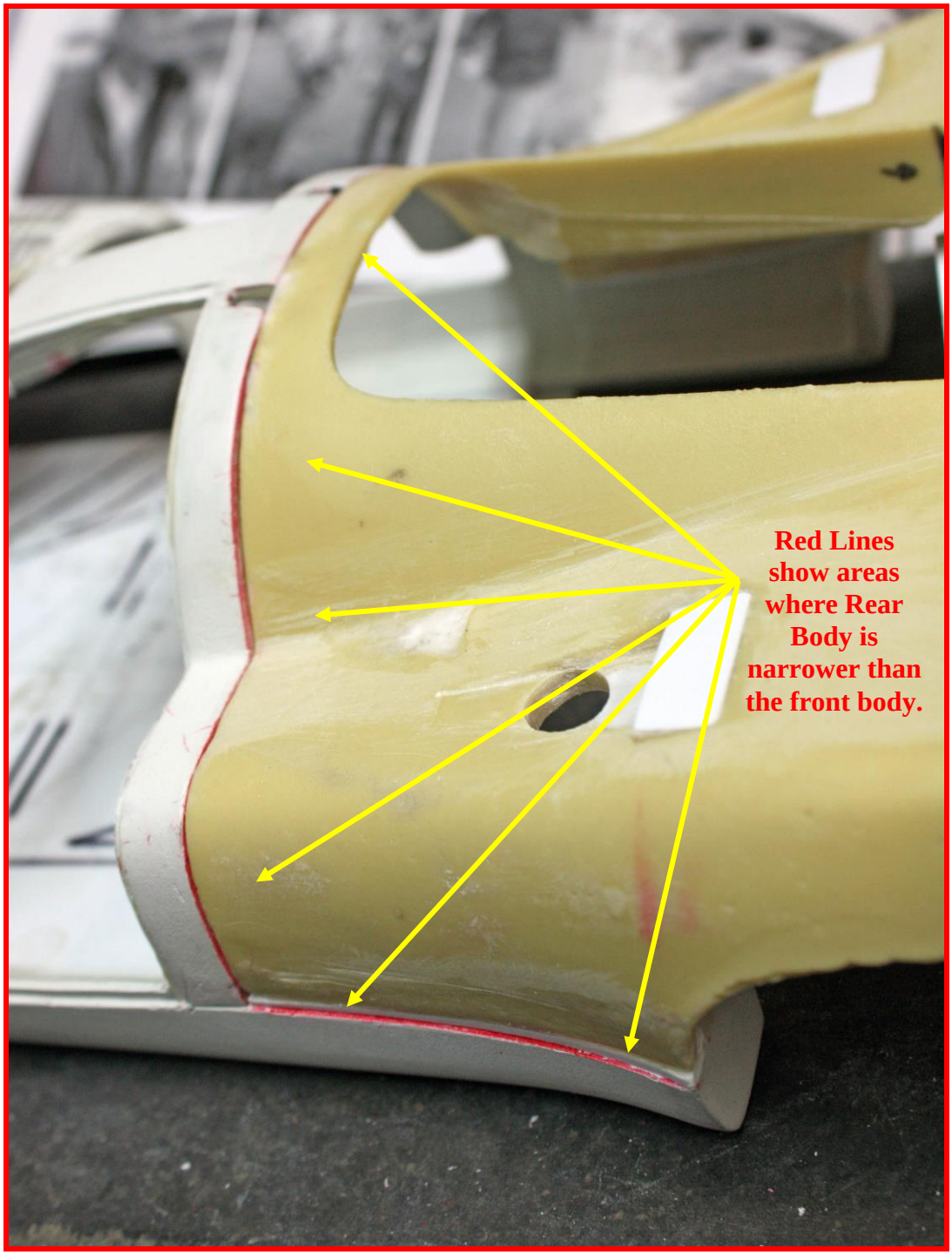
There are other serious rear body issues such as the "floor" in the center of the model being too low by several scale inches. There are also serious voids in the resin, primarily in the arch at the back of the roof.

Lastly, the sections of the piece are so thick that not only does the part weigh over a half pound in stock form, but the appearance of the inside of the piece is totally wrong when the back end is open. So a lot of the work on this part will be done on the inside surfaces.

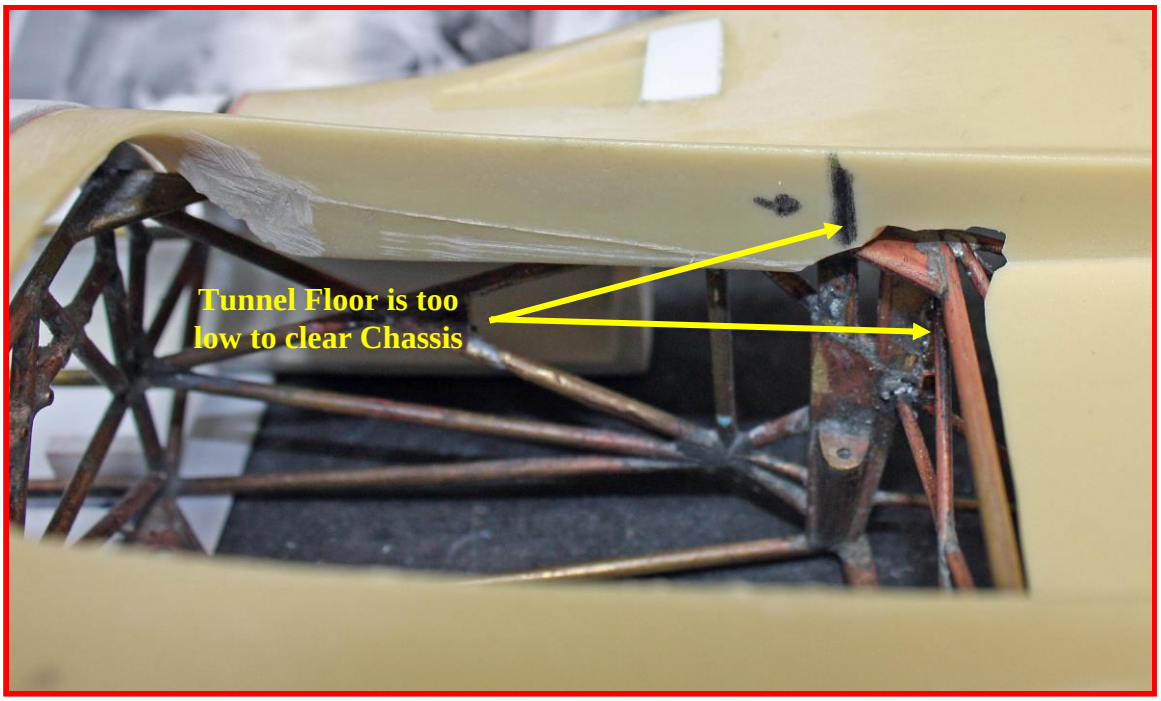
Modifications have been started as can be seen below.


Oil Tank Filler Hole
Correct Location of Front Edge of NACA Duct
Correct Center of Oil Tank Filler
This section of the bodywork is much too low and needs to be rebuilt.
These Ducts are not correct for this car… They need to be filled.

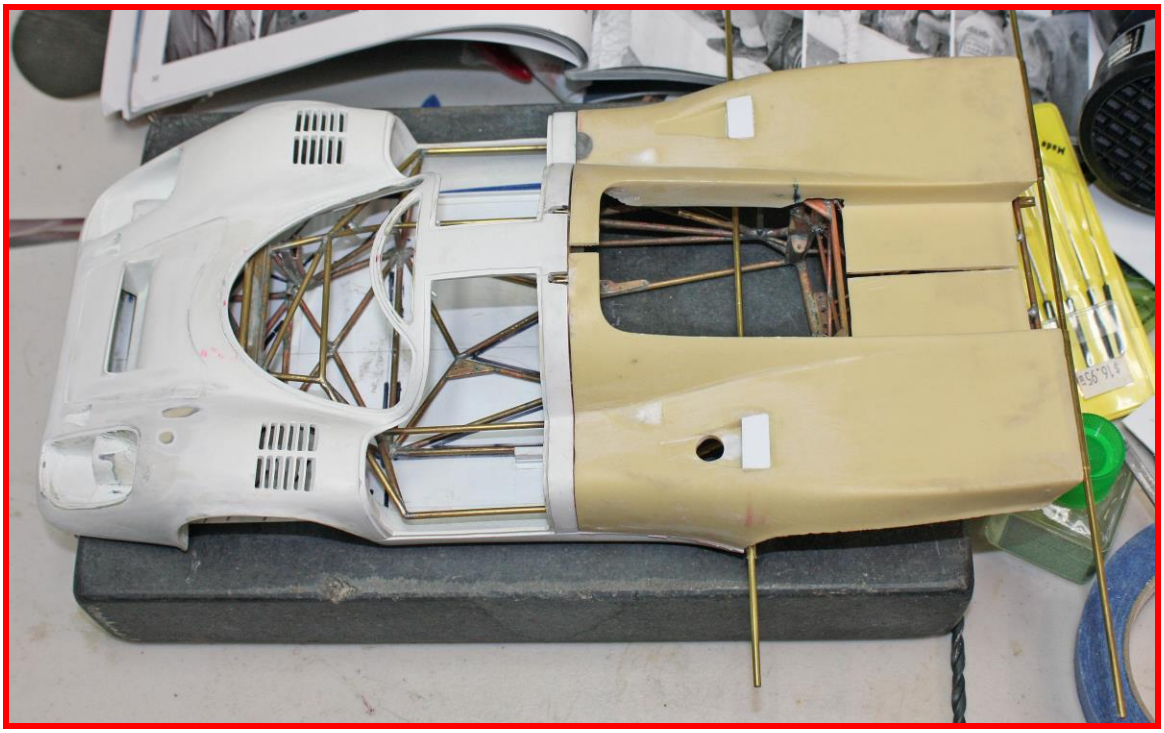

This is the current state of the rear bodywork with the filler hole relocated, the NACA ducts shortened, and the extra ducts filled..



The rear body section is both to narrow and too short. The above pictures show the rear body after it has been shimmed to bring the height up. The rear body is actually centered on the front body so the “gap” is symmetric. The rear body has been stretched to bring the width right but this makes it shorter and the “cabin” is still too narrow. So the only “right” answer is to widen the body.

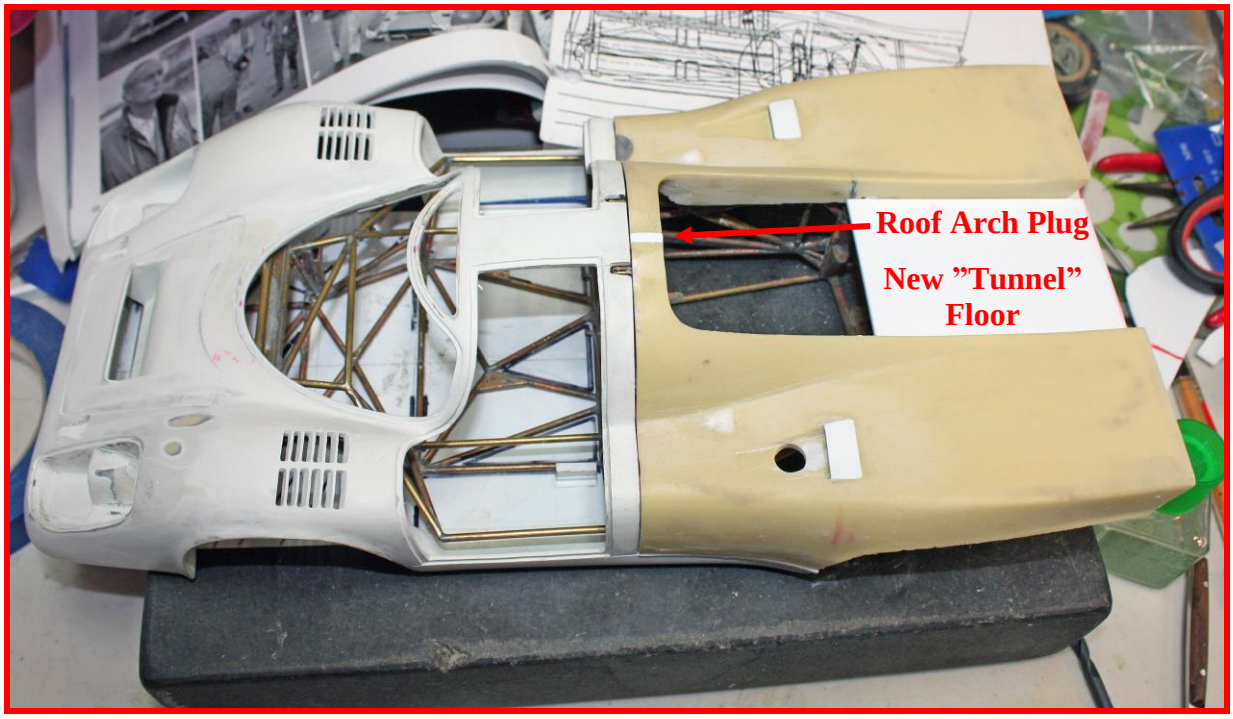


The other issue with the rear body is that the “floor” in the central tunnel is lower than it should be which makes it interfere with the chassis.



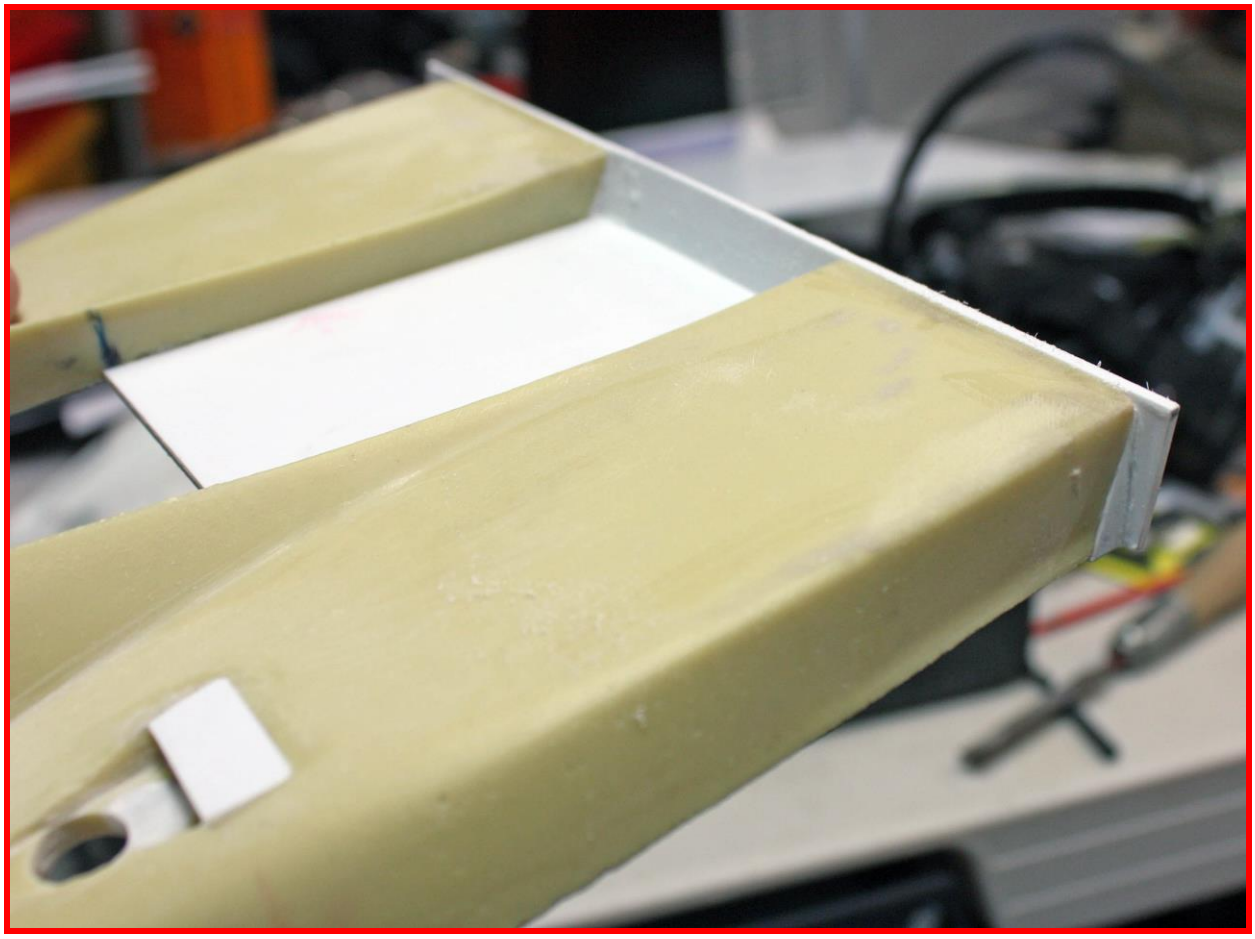
Here, two temporary guide rod bushing sets have been glued to the back body section to hold the alignment and the body has been split at the front edge and the main floor. The body has been opened up until the contours on the cabin match.

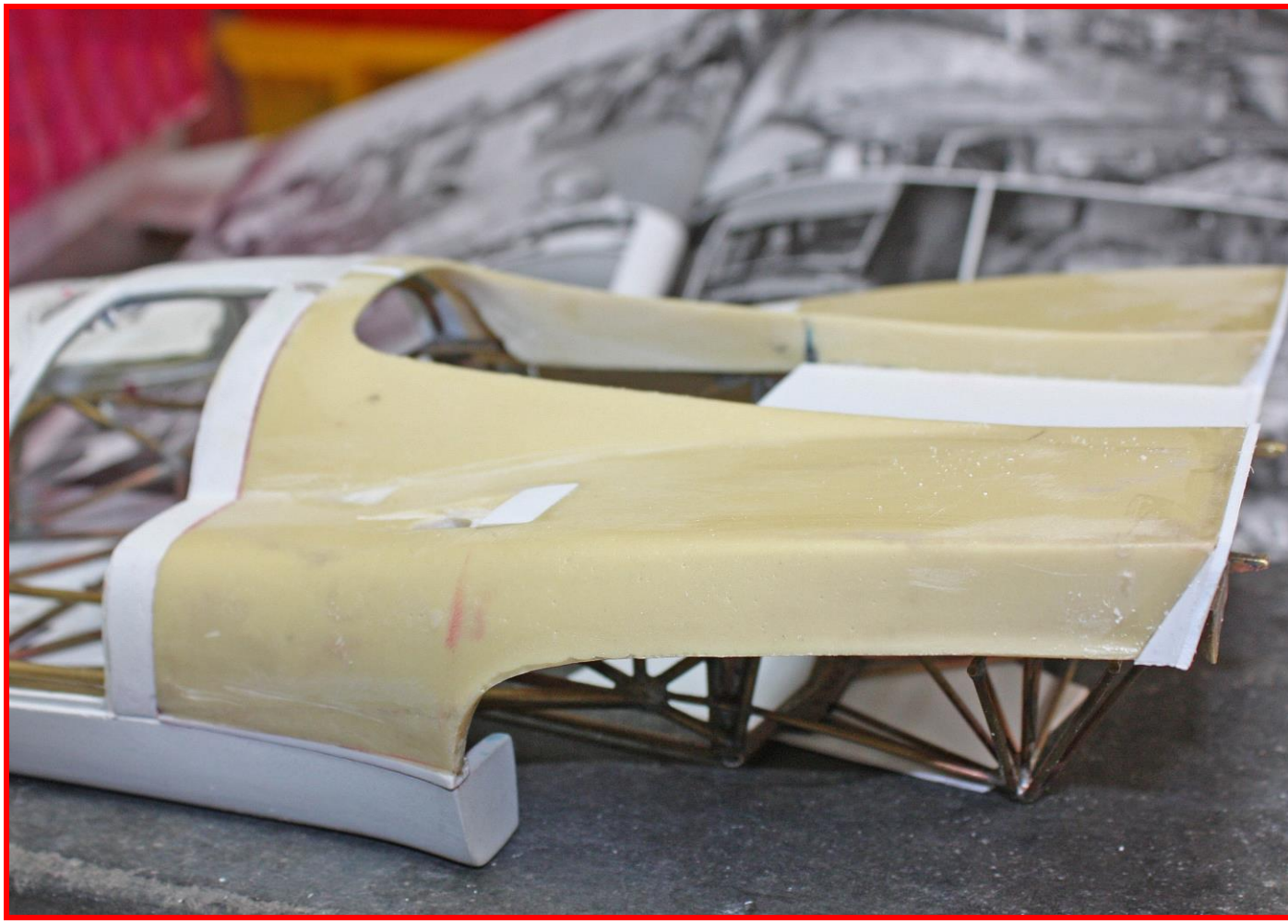
Below is a picture of the body after the widening plug has been inserted in the cab roof loop and the new floor piece has been inserted.



6. **Reshaping the Rear Body Back Edge Slope:**

   The other major issue with the rear body is that the rear slope in at the back is too steep. It is also slightly short, so it is relatively easy to add shims and another wide piece across the tail. I also added a brass rod across the back to hold the alignment of the back parts.





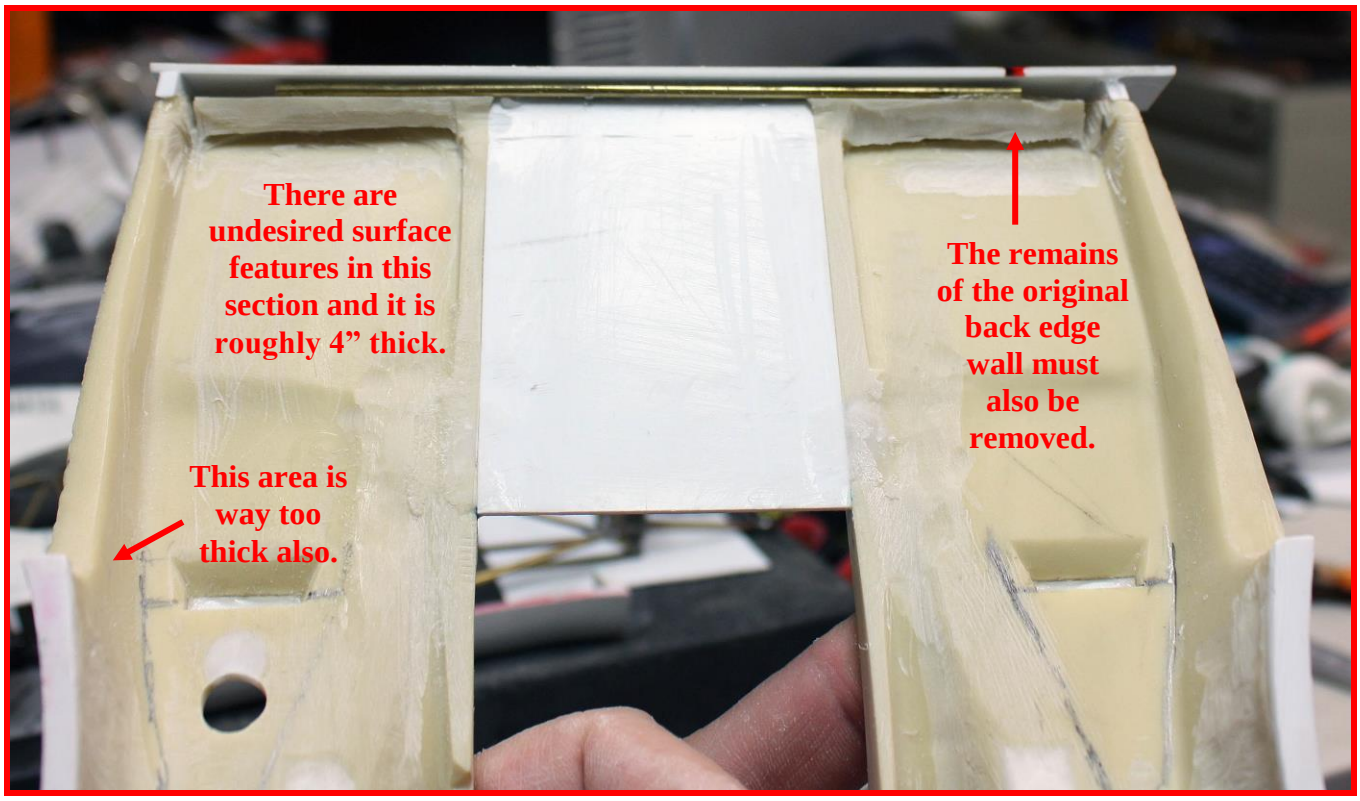
The picture above shows the changes made to the Rear Body and the improved alignment with the corrected width and shims. (Yes, the red edges are still on the back edges of the front body.) There is still finish shaping and sanding to do before the first primer coats.

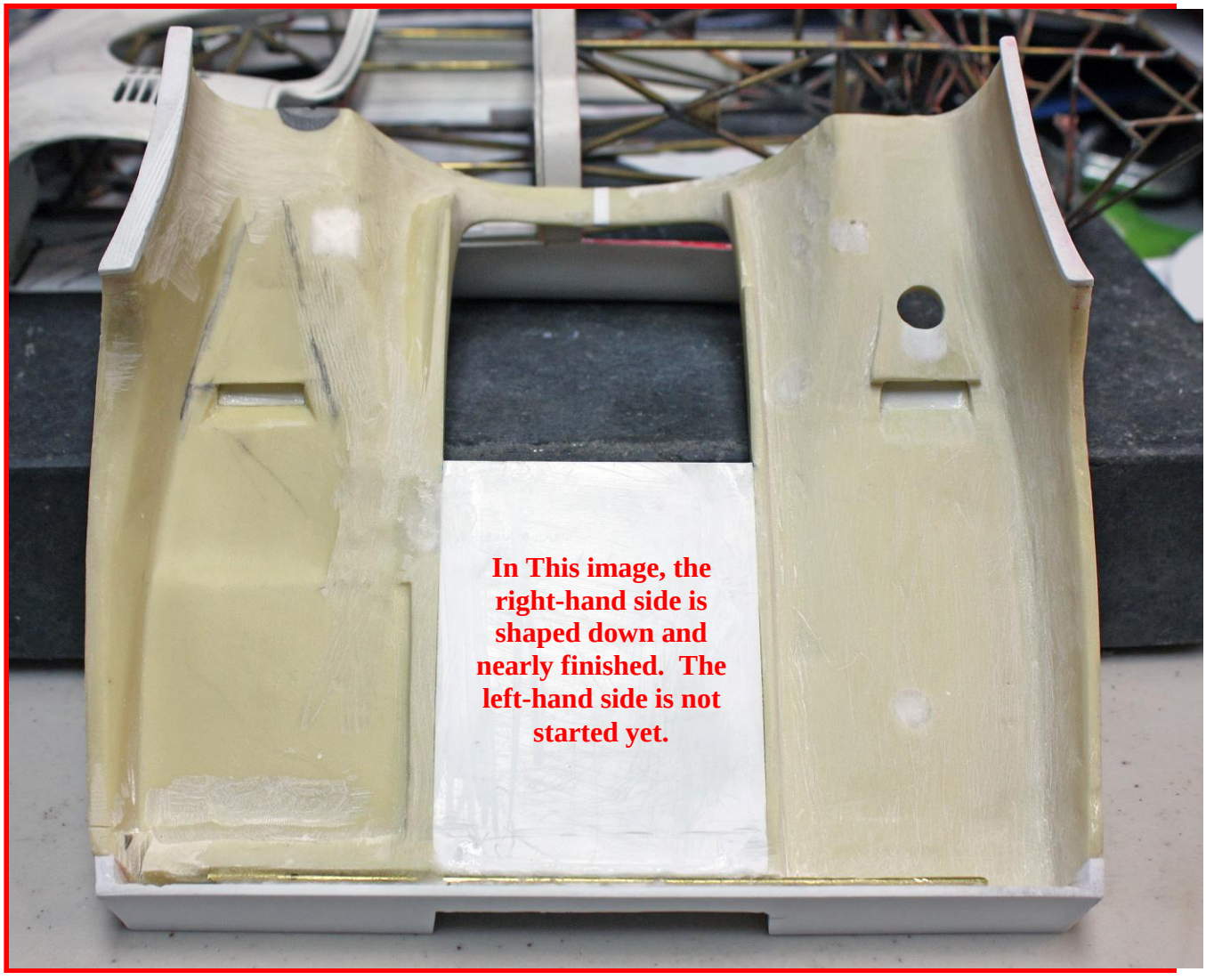
7. **Rear Bodywork Thinning / Smoothing:**

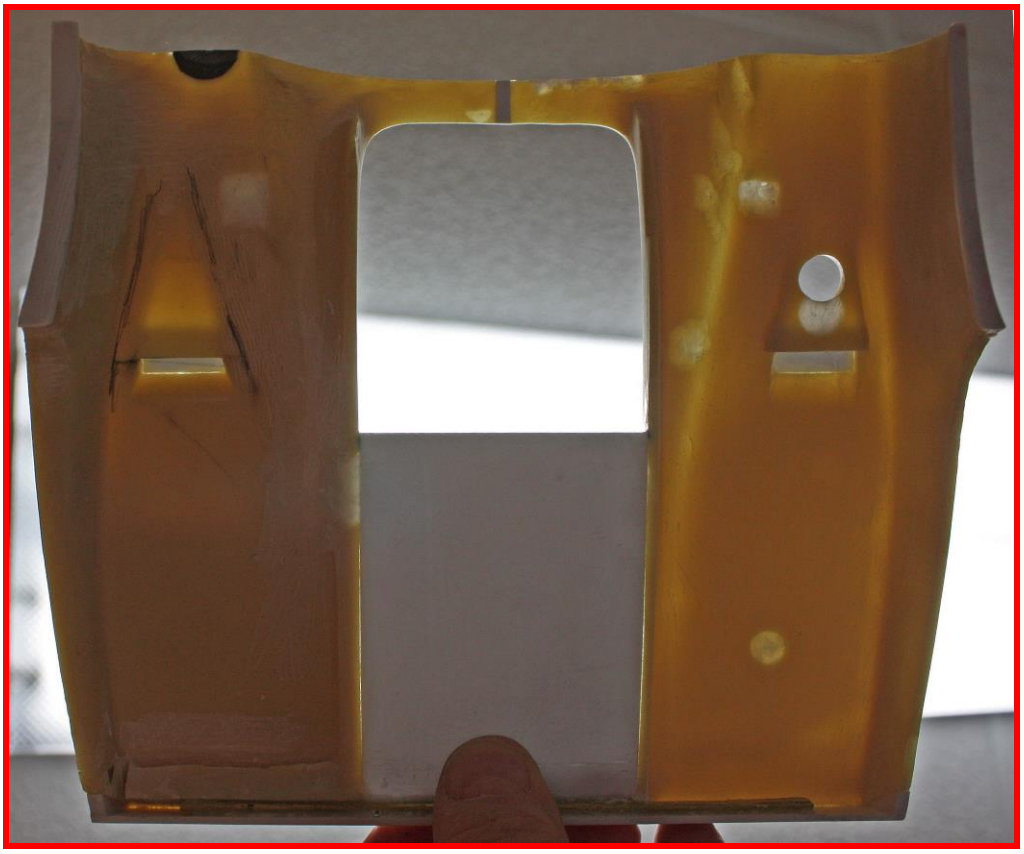
The next problem with the rear body is that the internal surfaces are not anywhere near realistic for this type of bodywork and that some sections are way too thick. There are places on the rear body section where the part is a scale 4" thick or more. This in no way simulates the prototype's fiberglass body which is fractions of an inch thick.

If the rear bodywork were never to be opened, this would not be an issue, but this model is being built in such a way that the rear body will hinge open and can be propped up for display. This means that the inside surface of this body part will be visible and should present at least a believable representation of the inside of the actual part.

The first image below shows the "starting point" for this thinning exercise. The reinforcement brass bar is visible, as are the remains of the original back wall of the part. In addition there are obvious surface features on the outboard sections. These outboard sections must be smoothed and all of the fender and cabin sections thinned in order to present a believable undersurface for this part.


There are undesired surface features in this section and it is roughly 4” thick.
The remains of the original back edge wall must also be removed.
This area is way too thick also.


In This image, the right-hand side is shaped down and nearly finished. The left-hand side is not started yet.



In the image above, the area on the right has been thinned and the difference in material is obvious when the part has been back-lit. The current state of the part with both sides thinned is shown below.

Well, that's it for today… Stay tuned for Part II, (Coming Soon!)