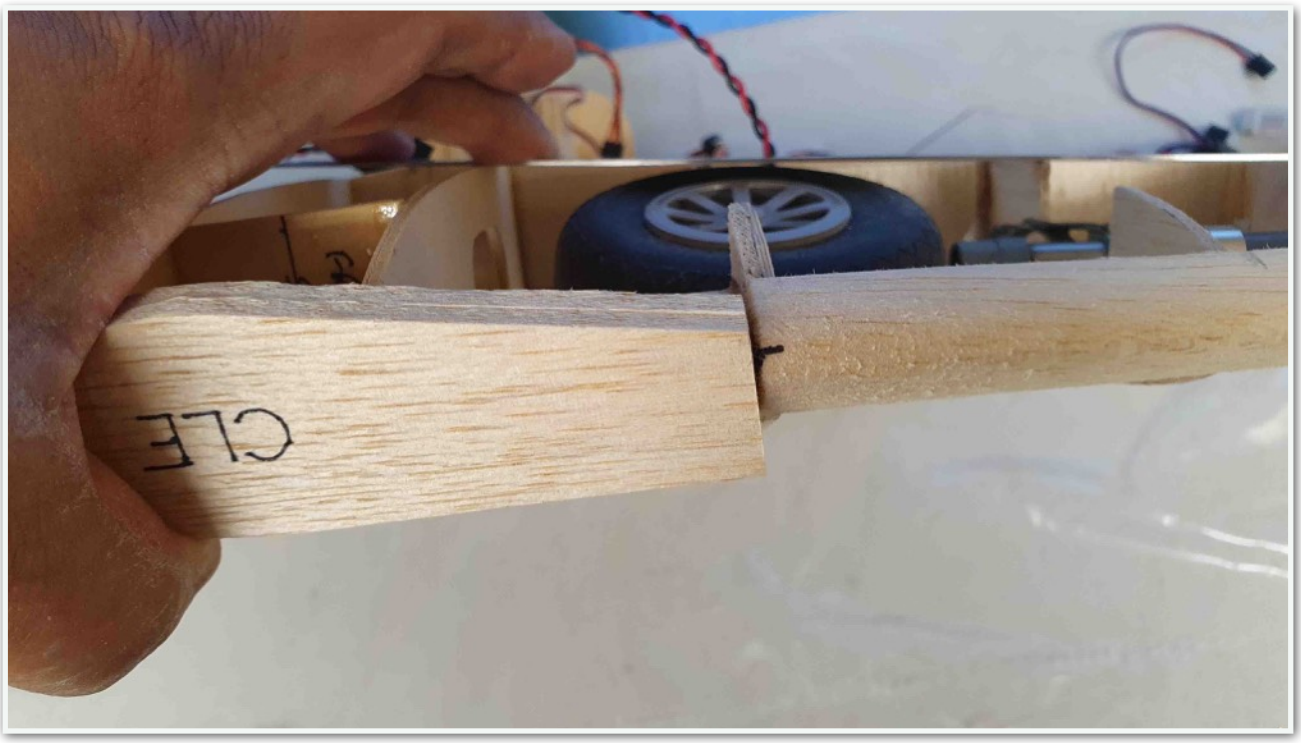
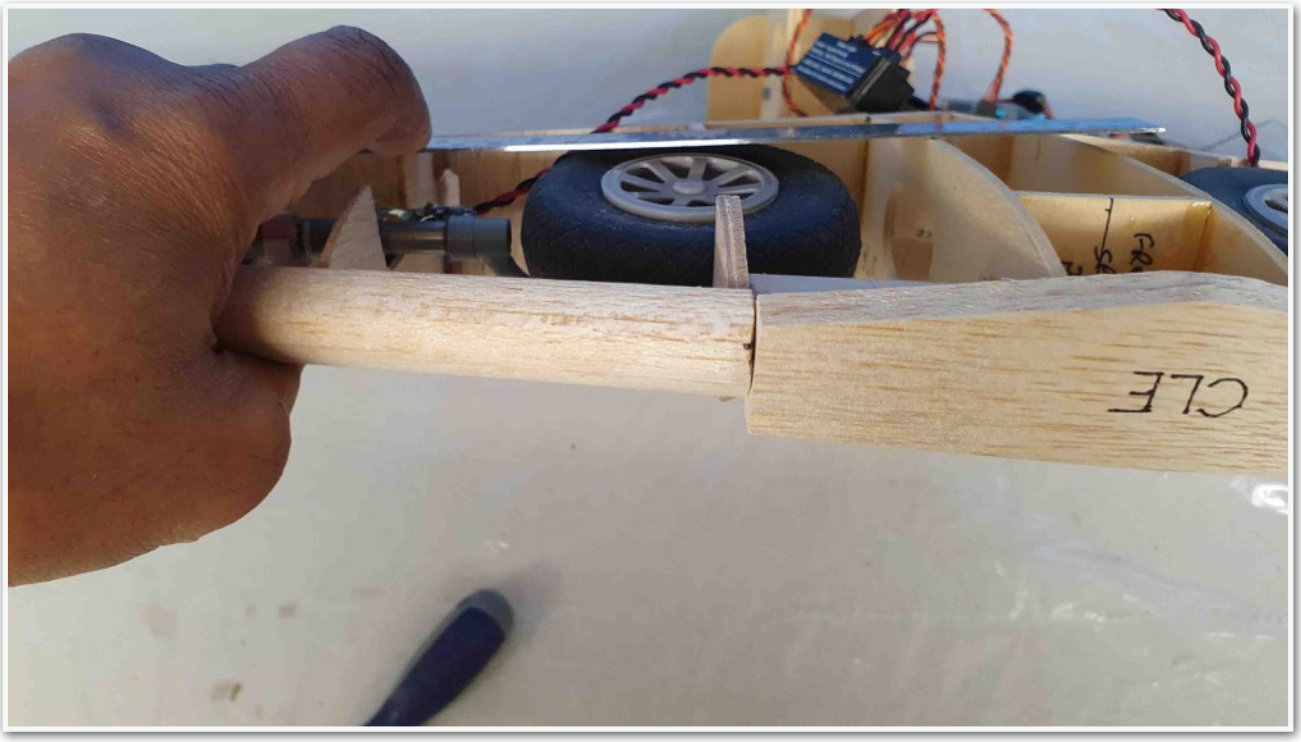
Mustang Build 3 – Peter Jenkins

Before starting the wing sheeting, I wanted to make sure that my main undercarriage geometry was correct.

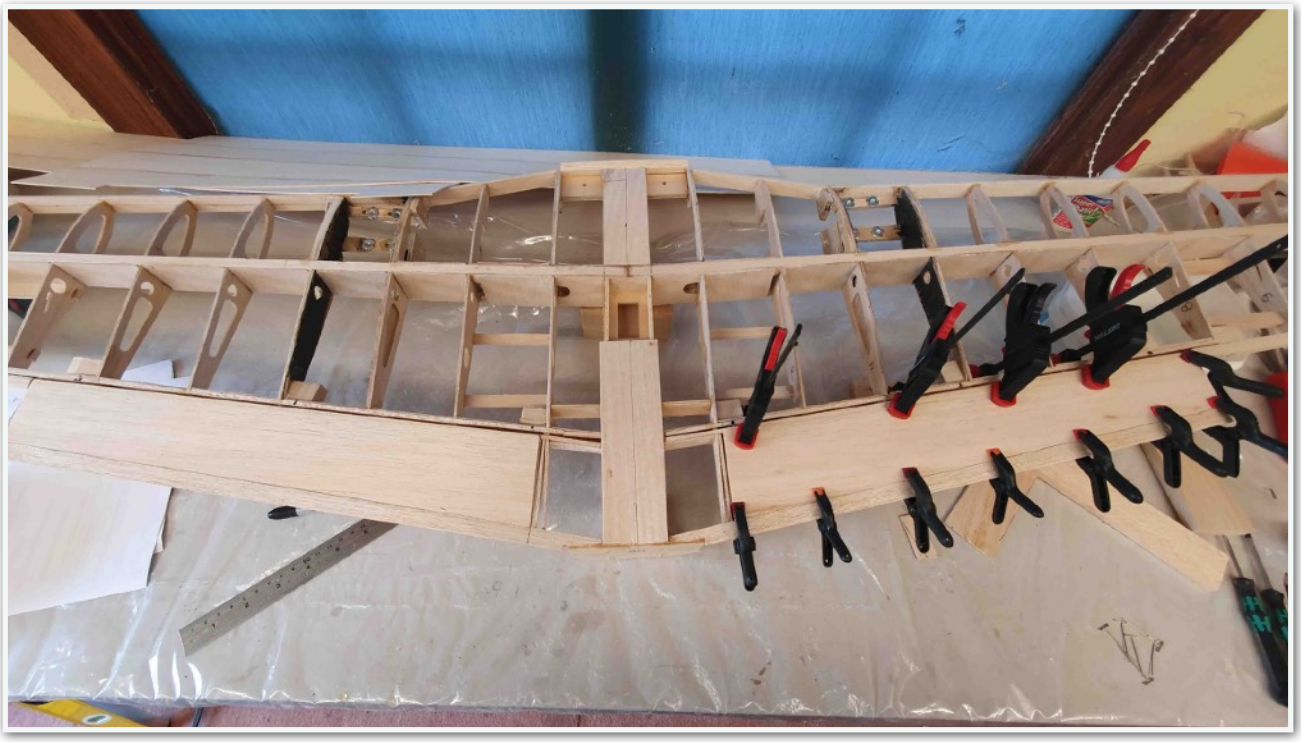
So, I fitted both retracts into position and I'm pleased to say that both legs were inclined forward at the same angle! I was half expecting to have to fiddle around to line up the legs with a shim or two!

I then retracted the wheels and checked that both were still sitting under the skin line.





The instruction manual says that you can cover the flaps separately if you intend to use flaps as this allows you to leave a small gap between the wing skins and the flap skin which makes life easier for when you have to cut out the flap. So, that's the route I followed. This photo shows the last bit of flap being sheeted.



Having made up the 4 wing skins, the next move was to glue them on. The instructions tell you to use medium cyano to glue the LE first and then dribble medium cyano around the ribs and smooth down the wing skin. All sounds very simple, but I was going to use aliphatic glue and that takes a couple of hours to set before you can safely handle parts. The next photo shows the first section of skin being glued to the LE. I had decided that I needed a bit of strip balsa to clamp down the sheet at the LE.

Suffice to say that I got all the skin stuck down only to find that the section between the LE and the spar had not glued in some areas! So that forced my hand and I had to break out the medium cyano to take remedial action. The reason for the skin not sticking to the rib was the need to bend the wing skin around the ribs and in doing so not pinning the skin to the rib thus allowing the skin to pull a little bit away from the back edge allowing the front highly curved section to pull away. Then I had a brain wave and remembered I'd bought a battery powered steam iron for pressing suits and trousers that were on hangars.

A relatively short burst of steam onto the next wing skin had it falling into shape and happily adhering to all parts of the ribs. Success!

Before I stuck the bottom sheeting on, I needed to put carbon fibre cloth onto the skin above the ribs holding the retracts. (I had removed the retracts before starting the wing skinning.) It was a little bit fiddly but not too bad. This has now provided a very strong structure that will resist tension quite well as any landing loads will put the top surface of the wing under tension and the bottom surface under compression forces.

After the top wing skins were glued on, the next job was to use spare 1/16” sheet to fill in all the little gaps in skin covering and drill the access holes to the wing bolts.

Having completed the wing sheeting I weighed the wing and then all the bits that will go into the wing. The outcome was as follows:

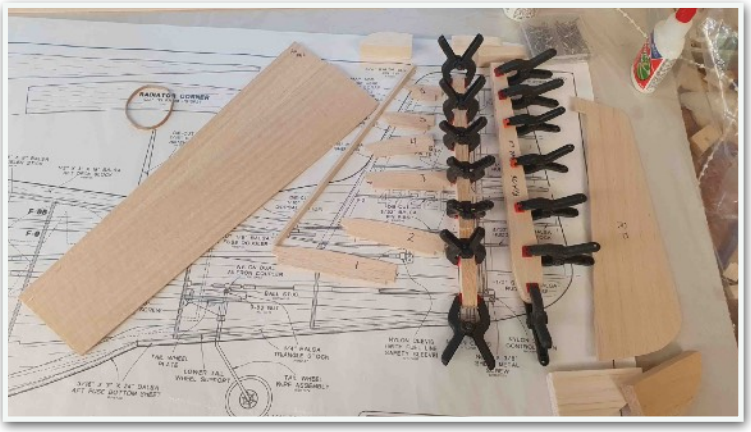
- fully built and sheeted wing 24 oz
- Wing tips and ailerons 1.5 oz
- 12 Robart 3/16" pin hinges 0.2 oz
- 4 standard servo 5.6 oz
- 2 mini servos (doors) 2.0 oz
- 2 Robart electric retracts inc wheels 12.6 oz
- Retract sequencer and Robart control 1.7 oz
- Servo lead extentions (estimated) 2.0 oz
- 2S LiPo for gear operation 2.0 oz
- GRAND TOTAL 51.6 oz or 3 lb 3.6 oz

I will need to cover it obviously and put on the decals but I can't see that adding more than say 8 oz, so say 3 lb 11.6 oz.

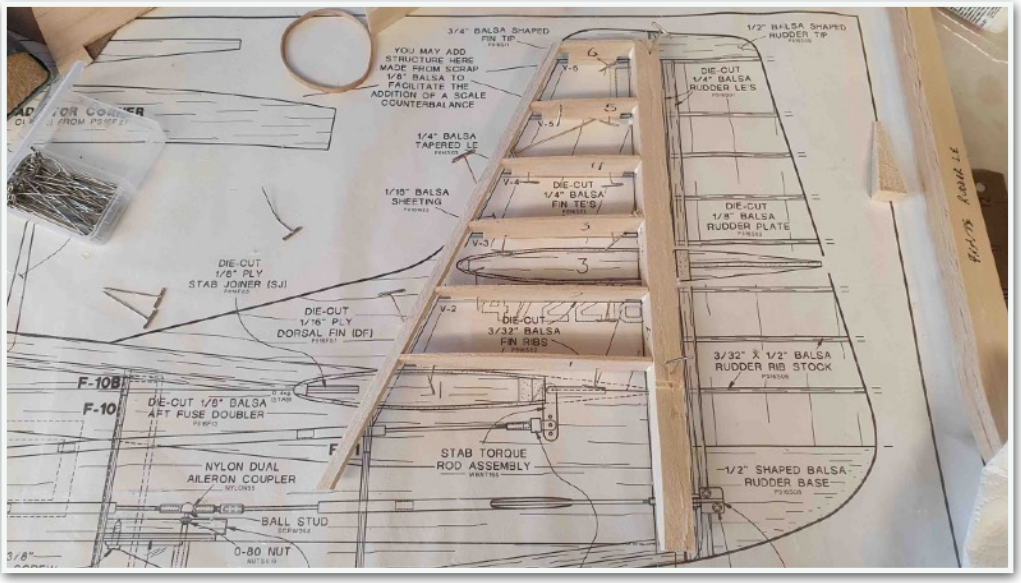
I decided to weigh all the wood that I have for the fuselage build.

The heaviest parts were all the plywood formers and they tipped the scales at 7.2 oz. The total for all the material for the fuselage came to 6 lb 7.5 oz and that allowed for 4 oz for glue (not sure whether that's realistic) and 5 oz for the covering. I have yet to weigh the prop and spinner. I suspect the 4" spinner will be around 4 oz with a Xoar wood prop coming in at 2 oz. That will push the fuselage up to almost 7 lb. This does include the tailplane, fin and rudder.

If I add in the estimated wing weight of 3 lb 6 oz, I get an all up weight of 10lb 6oz. Top Flite quote a range of 8-10 lb. I suspect 8 lb is for a fixed u/c setup. 10lb would be perfectly reasonable for a 90 2 stroke. I will be happy to hit 10.5 lb dry weight. The RCU forum had folk with an 11.5 lb airframe that flew well.



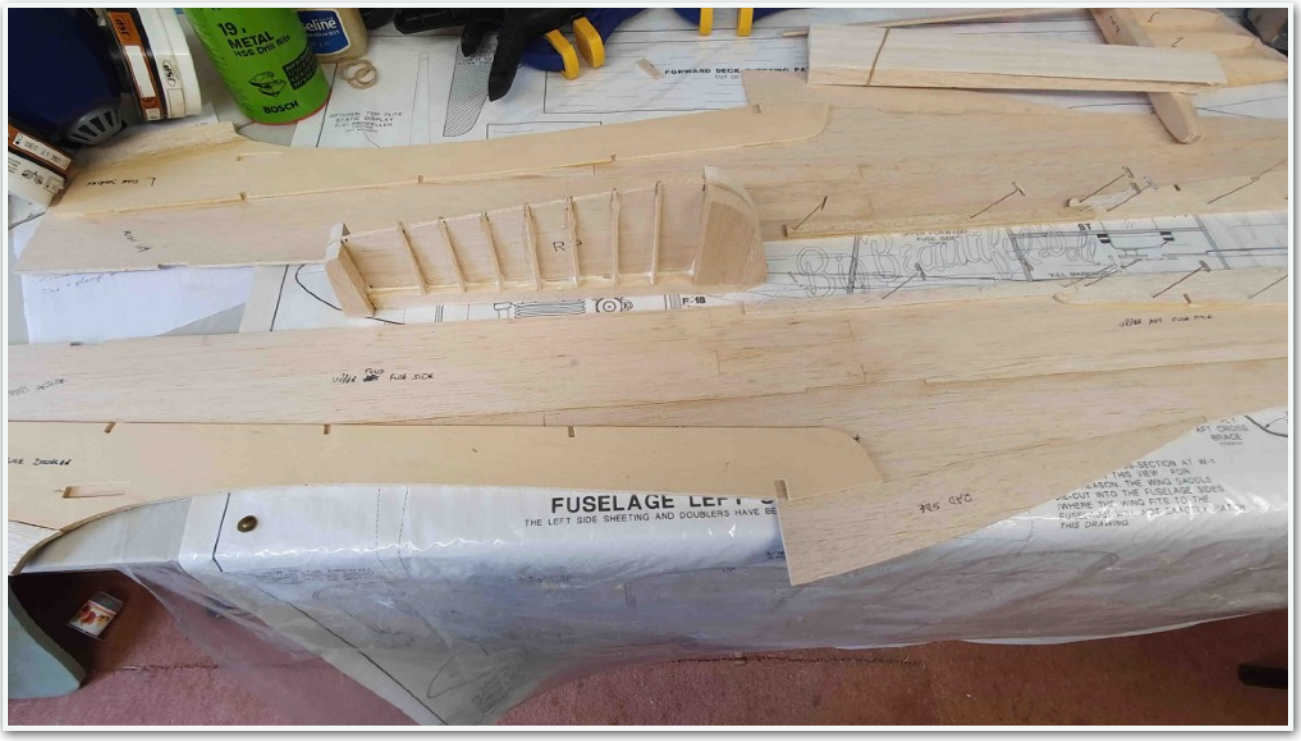
Next up was building the fin and rudder. These were supposed to be built after the tailplane but they are drawn on the fuselage plan that was still rolled up! They are relatively simple to build as you will see from the photos. The only thing I had to remember was to build in the structure for the aerodynamic balance for the rudder.



At this point, I was keen to get on with the fuselage so before finishing the fin and rudder, I got out the fuselage parts and set to and made 2 fuselage sides making sure I made a left and a right side! Each side is made from 4 pieces of die cut balsa. The die cutting was extremely accurate but did require a small amount of sanding of one part before gluing them together.

Next up were the fuselage doublers. Again, excellent die cutting of the ply parts and there wasn't really any excess ply so I felt it safe to use them as is.

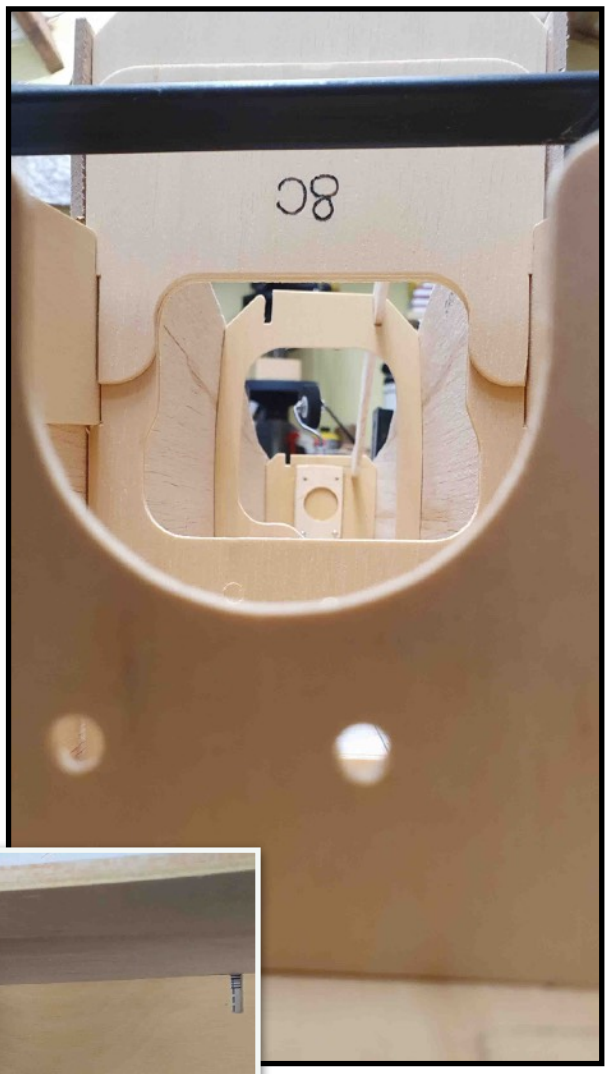
The next photo shows the 2 fuselage sides with doublers added and ready to have the fuselage formers added. It also shows the completed rudder with the top and bottom blocks still awaiting sanding. It's quite a substantial part!



I have acquired a SLEC building board and used it to build the Mustang fuselage. The instructions recommended cutting the plan view of the fuselage off the main plan to build the fuselage on top of. I placed this plan on the SLEC building board, covered it with SLEC plan saver plastic film and lined up the plastic supports that will hold the fuselage sides.

The first thing I did was to dry assemble the fuselage and formers to check how to fit the tail retract pushrod and the 2 pull pull tail steering wires. The next photo shows the view from the servo tray. I made a new servo tray using the original one as the pattern as I needed to find room to mount the tail wheel retract servo. I'm using a mini servo for this task but as I only had digital minis I have slightly more torque from the servo than the standard S3003/S148 servos I am using for all the other surfaces. I selected how to run

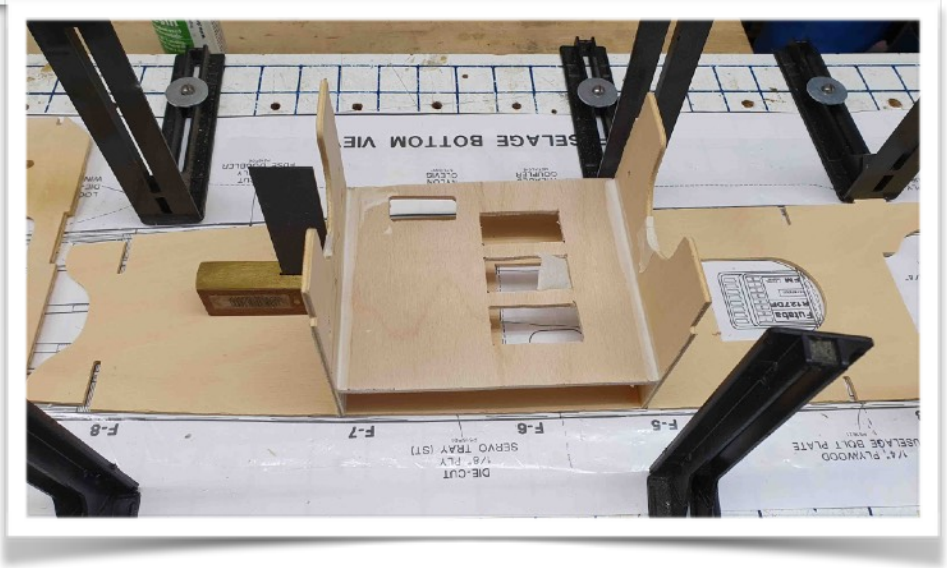
the pull pull wires and the retract pushrod after studying the space in the fuselage.



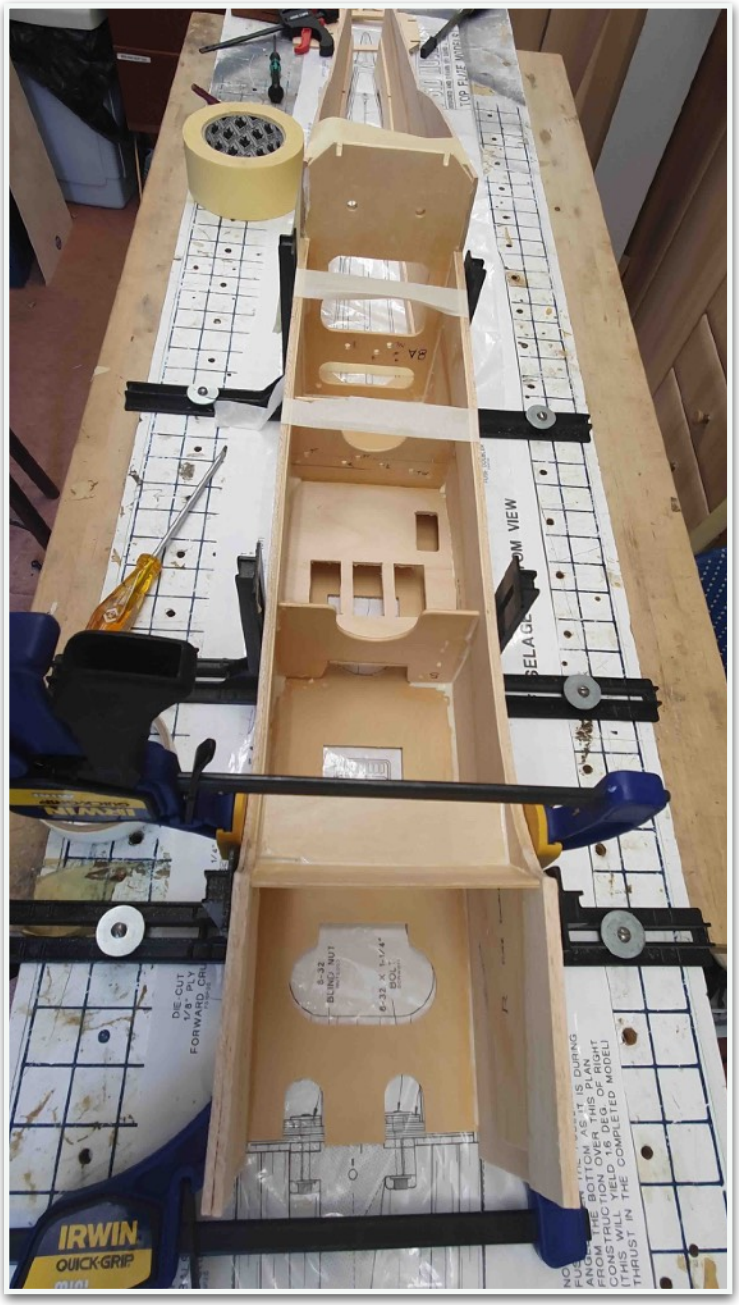
In the next photo, you will see that having moved the 3 usual servos forward where I mounted the retract servo, the standard rudder servo and the tail wheel steering arm. This arm is just a servo arm with a close fitting bolt as a pivot. The rudder pushrod will connect to one side of the rudder servo arm, while the other side will be connected to the tail wheel steering arm. The pull pull wires will cross over in the fuselage so that the tail wheel will turn in the same direction as the rudder.

Note, only the rudder servo and mini retract servo are fitted.

Having established the route for all the pushrods and wires, I then started the gluing process. This begins with the centre plywood crutch being pinned to the building board and the servo tray and two formers that support it being glued into position.

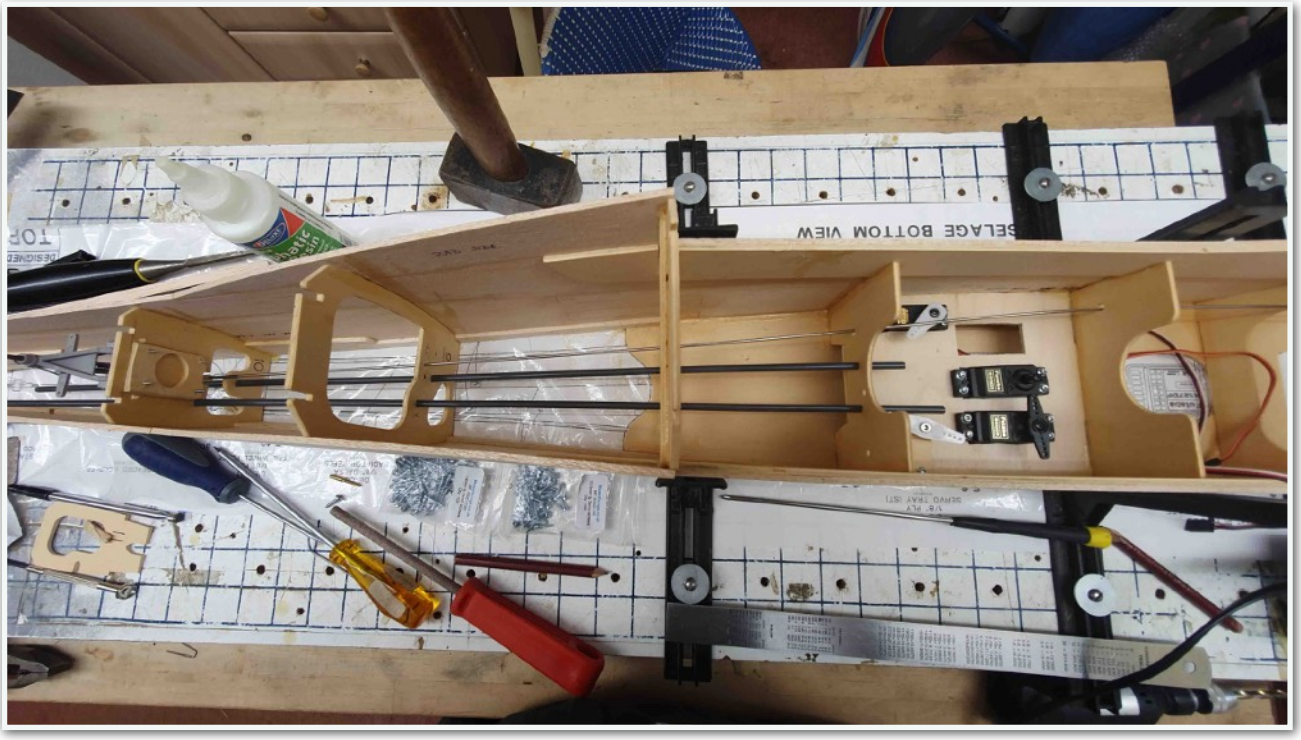


The instructions recommend the use of cyano and so construction tends to follow the process of gluing small bits at a time. As I have chosen to use aliphatic glue, I decided that I would glue all the next set of formers which went from just in front to just behind the wing and included the wing bolt plate all concurrently using my slower setting glue. I had worked out which clamps to use and where as well as lining up strips of masking tape to pull the fuselage in to contact the inward curve at the bottom of the fuselage formers at the rear. This all worked surprisingly well thanks to the SLEC building board and clamps. I left this to dry overnight and I was pleased to see that the tail of the fuselage was exactly over the plan when I took all the clamps off.

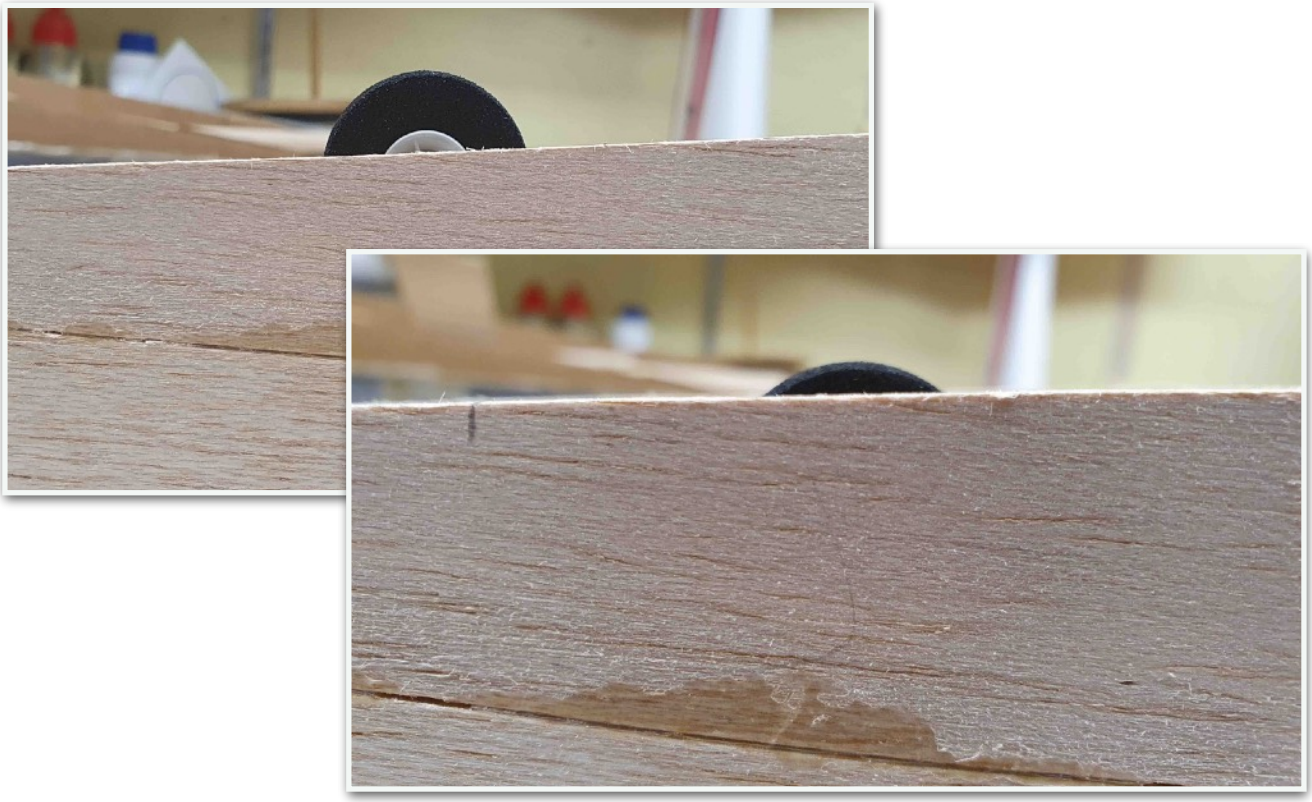


The next problem to sort was the position of the retracting tail wheel. The fixed tail wheel is bolted to former F10. The easiest solution of where to mount the retracting tail wheel was to use F10. The constraints at F10 were that both the rudder and elevator pushrods went through it and the retracted tail wheel had to be inside the fuselage skin outline while being in the right place and having the tail wheel poking out of the fuselage far enough to give adequate clearance to the rudder. Note that the Mustang tail wheel is just in front of the tailplane. It took 2 attempts to get a satisfactory solution! I modified the retract unit to allow the wheel to retract a bit further although this means that the extension of the tail wheel does require a powerful push to get it to move. Thankfully, the mini digital servo is up to the job!

After gluing F10 (with the tail wheel fitted) and F9 into the fuselage, this is what it all looked like. Note the position of the tail retract rod, as well as the tubes for the rudder and elevator.

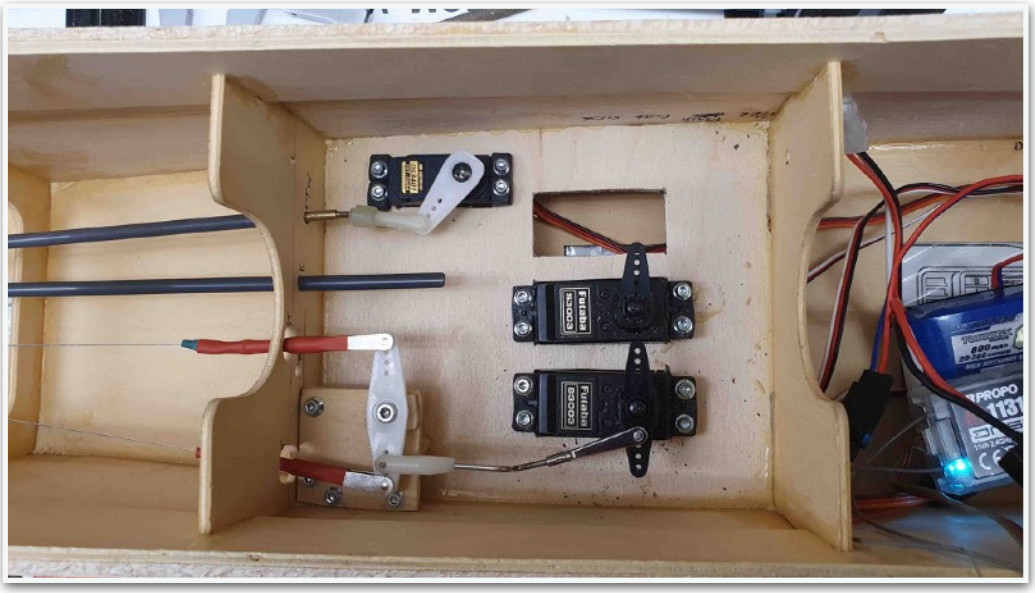


You will see in the next set of photos how much I had to lower the tail wheel when it was retracted. Without doing this, the tail wheel would have protruded from the fuselage as there is only a 3/16” thick sheet that covers the aft fuselage!



The other thing I had to determine was whether the pull pull cable run was clear of the structure. This next photo shows the clearance I had to file in one of the formers to give the cables a clear run. It was a little bit hit and miss on the first clearance!

My next task was to fit the retract rod. These rods are only threaded at one end, the intention being that you cut them to size and then silver solder a brass threaded coupler onto which you screw a metal clevis. My silver soldering torch is a bit overkill for this but it all worked very well. The only issue there is on the extension side is that the actuating arm on the tail wheel is almost in a straight line with the part it needs to move.



As I mentioned above, it requires a big push to get the extension going. However, after a good deal of tweaking, this is what the control system looks like.

In this next photo, you will see that I have now installed all the control rod guide tubes for the rudder, elevator and retract as well as showing the tail wheel steering arrangement.

You will also see that I have put heat shrink over the clevis and threaded coupler. In this photo, the tail wheel is retracted and so the pull pull cables are relaxed and the clevis and coupler are free to flop around. I found that with the cables relaxed there was a regular jamming of the rudder as the sharp changes in cross section going from threaded coupler to clevis hit the former hole. So, my solution to avoid this undesirable state of affairs was to apply heat shrink over the whole assembly to enable it to slide in and out of the clearance hole in the former without causing any problems!

More shortly!