FOAM BOARD CLUBBA BUILDING INSTRUCTIONS summary.

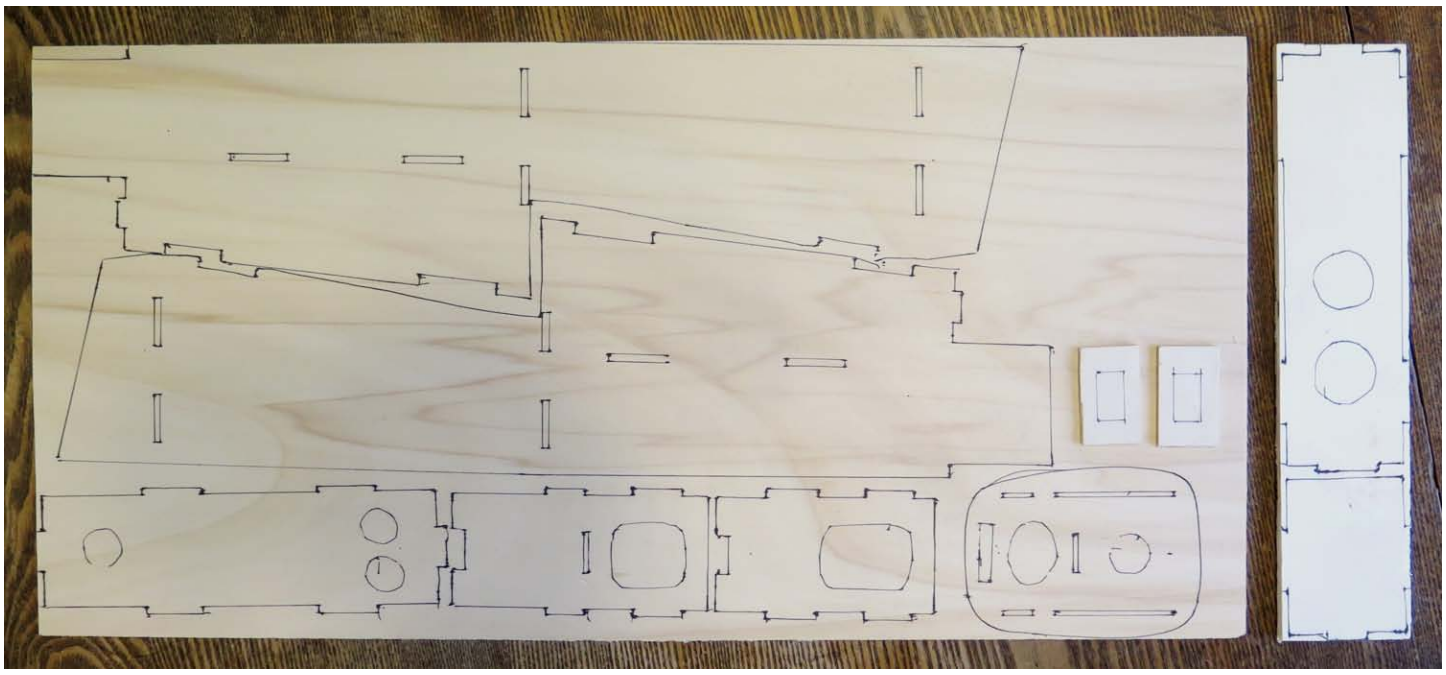
As I suggested in my earlier correspondence, if you haven't already, I would advise you watch this Flite test Video https://www.flitetest.com/articles/ft-spitfire-build as it will give you an over view of building with foam board and a hot glue gun.

The following is a template of how I've gone about the build that I hope might be of help to prospective builders. I'll modify it from time to time if deemed necessary and if any builders have questions or ideas for changes, please let me know.

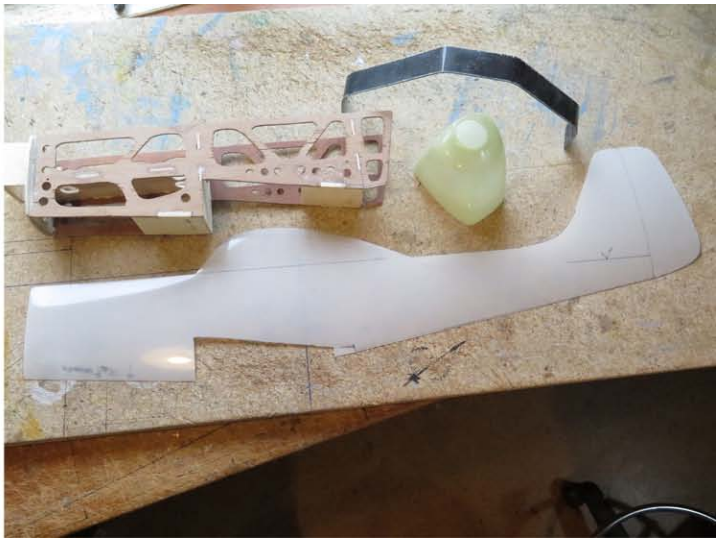
The main tools required are a straight edge, a very sharp knife, a sanding block, an 11/12mm hot glue gun and a fine pointed pen.

FUSELAGE.

1. Cut out liteply fuselage box parts, adjust and trial fit. Before final assembly, drill and fit the undercarriage blank to the bottom plate and epoxy in the blind t-nuts. Now assemble the box, gluing the parts together. I prefer to use an epoxy with micro balloons/powder as a gap filler, but if the fitting is reasonable, aliphatic PVA should be sufficient. Fig 1. Below shows the fuselage box formers layout on the liteply sheet. These can be cut out with a sharp modelling knife or a scroll saw as preferred. Lightening holes can be cut in the two side panels using various sized holes saws.



2. Tape and hot glue two foam board sheets (long sides) together, mark out the fuselage pattern using the template or plan and cut out the whole single shape. Remove the foam from the slots as per the demonstration and fold sides up from bottom panel. Fig 2 below.



3. Apply hot glue to the bottom of the fuselage box and press onto the foam board bottom centre panel. This needs to be done accurately and quickly and held in place with pressure for a few seconds whilst the glue cools and dries.

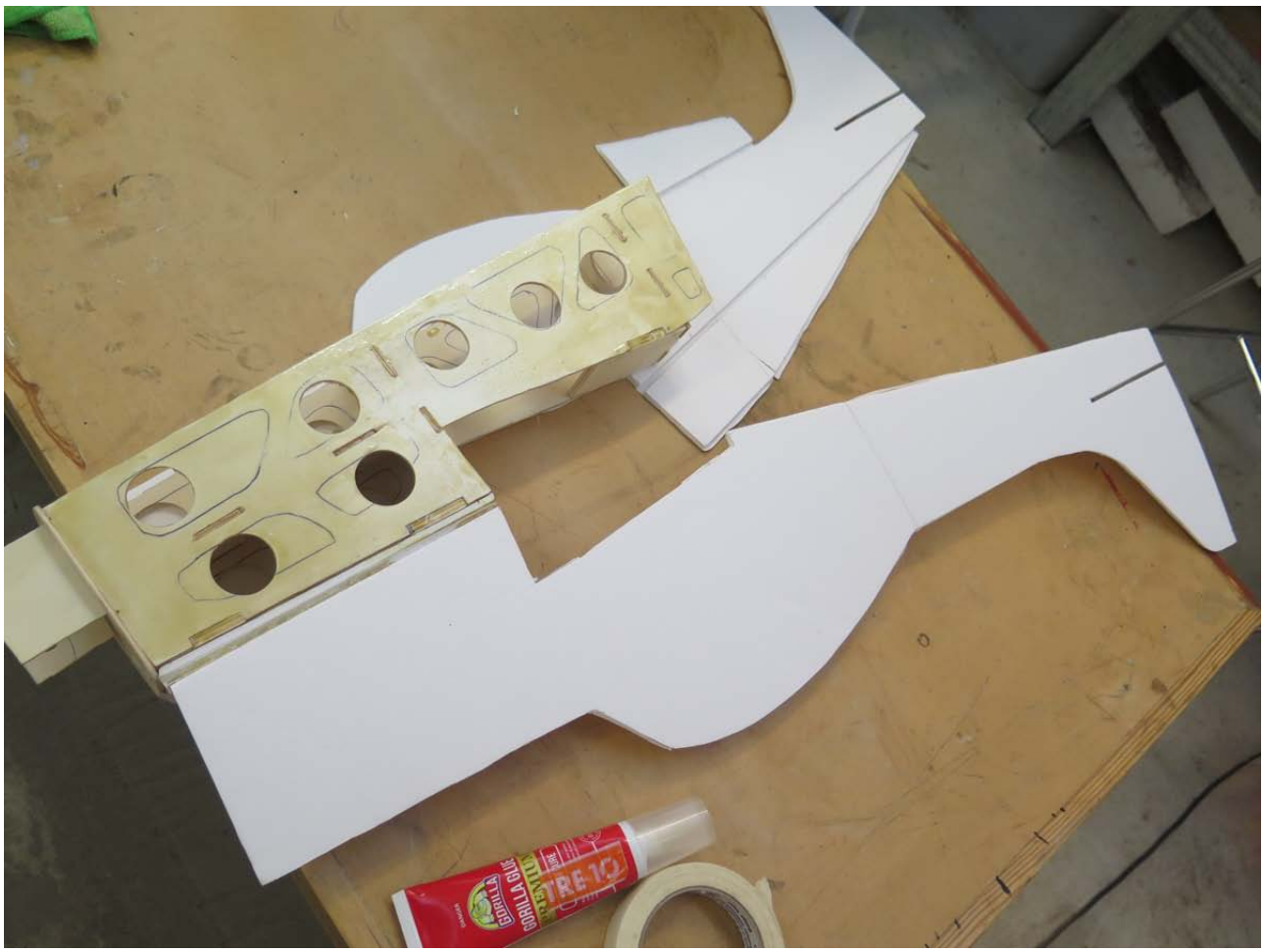


Fig 3. Gluing the fom board to the fuselage box.

4. I prefer to glue the fuselage sides to the ply box using Gorilla polyurethane glue. (Fig 3) This is a slower setting glue that gives plenty of working time to ensure the foam board is fitted accurately and the rear of the fuselage is straight. The sides need to be folded up and glued to the box one side at a time. After the first side is glued, fold up the second side and trial fit by slotting the elevator into the rear slots and making sure it is sitting level and the fin vertical, straight and central. When happy with the straightness of the body, the foam can be taped tight to the ply box to ensure a close and accurate fit.

5. Make the fuselage top between the cowl and front of the canopy from 1/8th balsa sheet in which you can cut out a hatch to access the battery and ESC etc, which need to be mounted well forward to suit the CofG placement. Fit a ply tongue and canopy latch to make access easy and secure. (Fig 4)

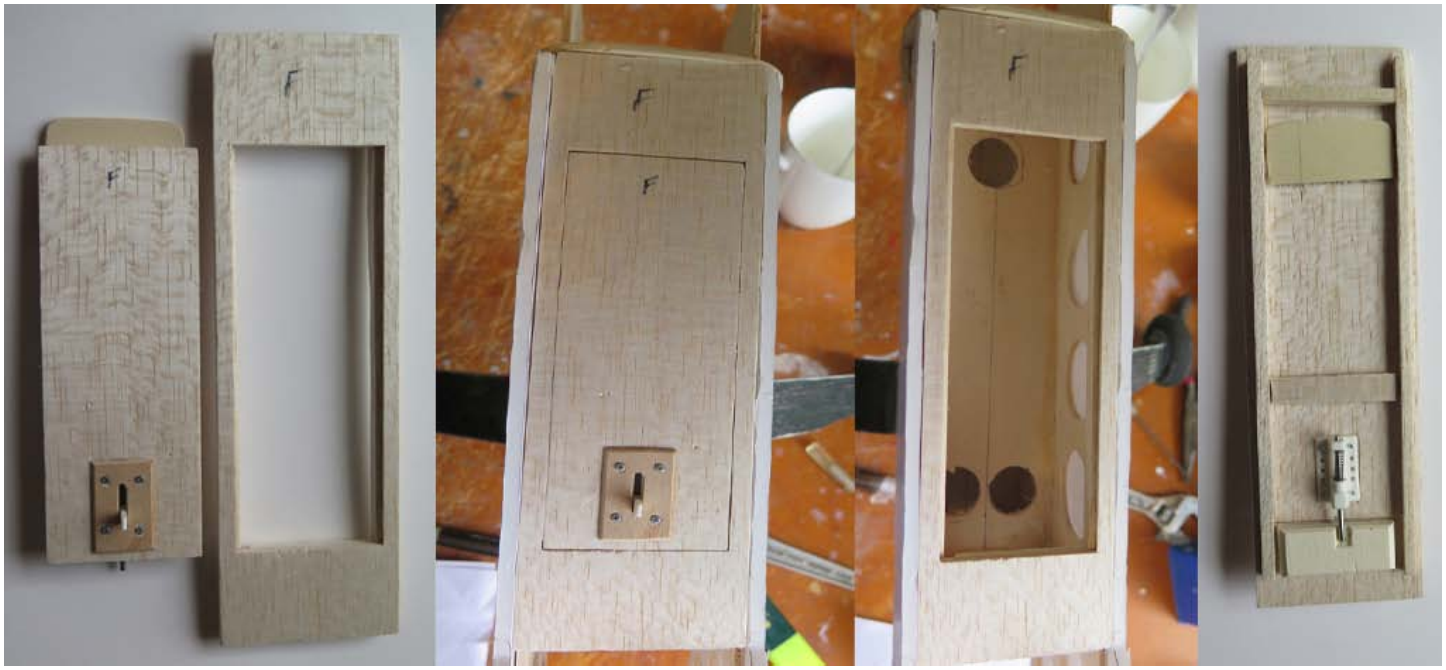


Fig 4 Balsa hatch construction.

6. Two liteply servo plates can be glued to the rear of the fuselage at suitable locations.

7. A motor mounting plate is cut from a piece of 6mm liteply and glued between the two protruding fuselage sides to form a motor mount. This need to be set with approximately 2 degrees each of right thrust and downthrust. Just temporarily pin the plate and trial fit the motor and the cowling to get both aligned and then secure the cowl with three servo retaining screws into hardwood blocks epoxied onto the front of F1.

8. Top of the canopy is formed from 1mm white card . NB. Don't glue this on until the wings have been fitted as you need access from the top to glue in the 6mm blind nuts for the wing hold down nylon bolts.

ELEVATOR.

1. This is cut from a piece of 3.2mm Coreflute using the plan or the template. Remove one flute from the underside to create the hinge line, and epoxy a piece of 1.5mm ply (or and ice block stick) top and bottom to strengthen the joining of both sides and making the attachment platform for the elevator horn.

2. Coat the 400mmx 2.5mm carbon rod with some epoxy and slide it into a flute in the stabilizer for stiffening.

Fig 5 The coreflute elevator with carbon stiffening rod, ply joiner and epoxied into fuselage slot.

3. The stab can be glued in the rear fuselage slot, check and trim for level. I mask the foam board around the elevator slot and prefer to fix with epoxy and micro balloons, giving time to make sure all is aligned and the bog forms a nice fillet

RUDDER.

1. Remove the paper from the inside of the two rudder halves and sand to a taper at the trailing edge about two mms thick and then hot glue the two halves together to create the nicely shaped and tapered rudder.

2. Once the elevator is fitted the rudder can be attached with the pin hinges after the cut out is made to accommodate the elevator joining strip.

3. The rudder horn is cut from 1.5mm ply and hot glued or epoxied into a slot.

4. A small tail wheel can be fixed to the

WINGS.

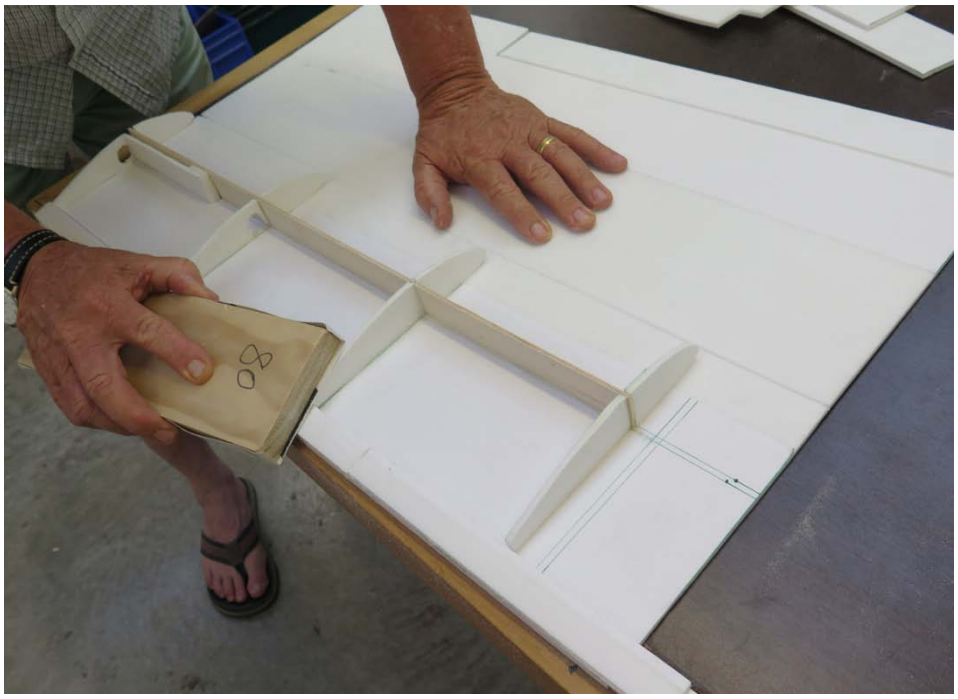
1. When cutting out the patterns for the two wing halves using the plan or the templates it is important to study and understand the cutting and folding sequence remembering to make mirror images as it is very easy to finish up making two right or two left wings … bugger !! Been there, done that !

2. Along the leading edge line, make a small half cut into the foam and then form a groove with the edge of a ruler or the blunt end of the handle on a modelling scalpel. This forms the leading edge bend line when folding the top half over .

3. Hot glue the liteply spar to the bottom inside of the wing. Glue in a 27mm wide foam strip behind the root end of the spar to create a socket to glue the ply wing joiner in. The wing joiner should be cut from a hard 3mm ply as per the plan.

4. Glue in the four foam ribs, cutting a generous servo lead hole adjacent to the back of the spar in the two inner ribs.

5. Glue the two 20mm foam packing strips along the spar side of the aileron hinge line. The top packer needs tapering in thickness from front to back. Remove the paper from the outside of the packer and sand the taper towards the rear edge to about 2.5 mm thickness. Fig 6 below.7.



6. **VERY IMPORTANT !** Remove the paper from the inside of the wing sheet on both sides of the leading edge as shown on the plan. This allows the foam to bend up around the leading edge and evenly across the top surface rather than creasing, which happens if you try to bend a normal piece of foam board.

7. Fold the top half over at the leading edge and check the trial fit. Now this has to be glued down, and as quickly as possible so the hot glue doesn't dry first. Apply a bead along the leading edge V and to the top of the spar, the ribs, the rear packer strip and along the trailing edge. Press down and hold for at least 30 seconds with a wide board or similar to spread the pressure and ensure an even good glue bond.

Fig 7. Wing ready for gluing and the finished product.

8. Cut a tip rib and butt glue to the end of the wing. Insert the wing joiner and adjust the root of each panel to get a nice even fit. Once satisfied the joiner can be glued in one side and when set the other panel can be glued on. The gluing can be done with hot glue, making sure you are quick and accurate. I prefer to use a slow epoxy bog which allows more time to get everything aligned and adjusted if necessary.

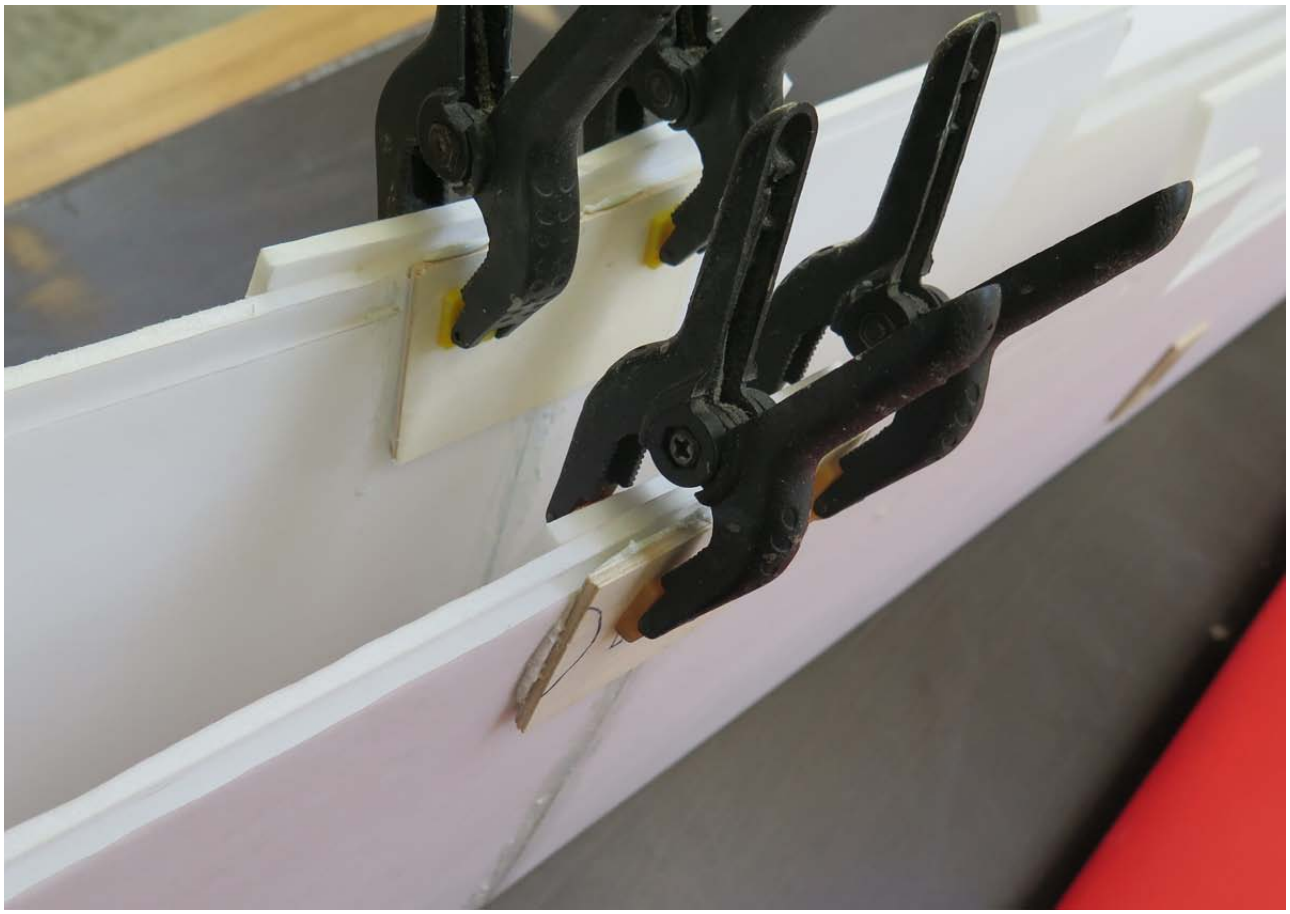
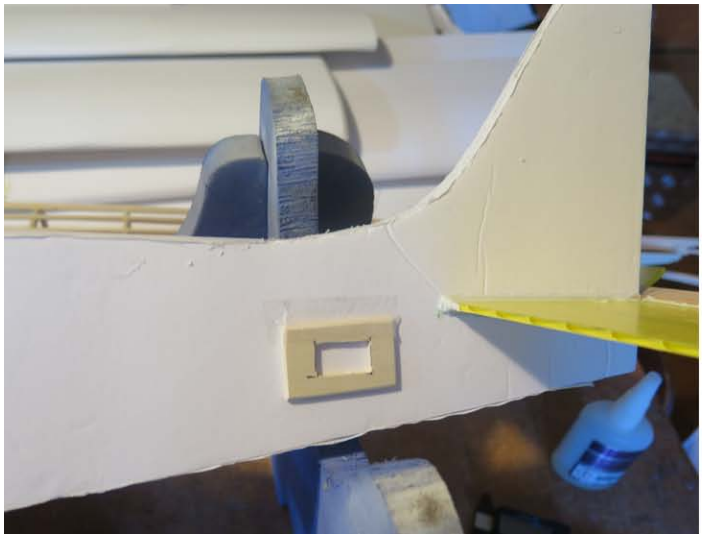


Fig 8. A 3mm ply wing bolt plate is glued to the underside of the wing, rear centre. At the same time as the two wing halves are being joined. This gives seating for the two wing bolt heads and helps to strengthen the wing joint and align the trailing edges.

9. Glue in the liteply servo mounting plates and glue in the aileron control horns.



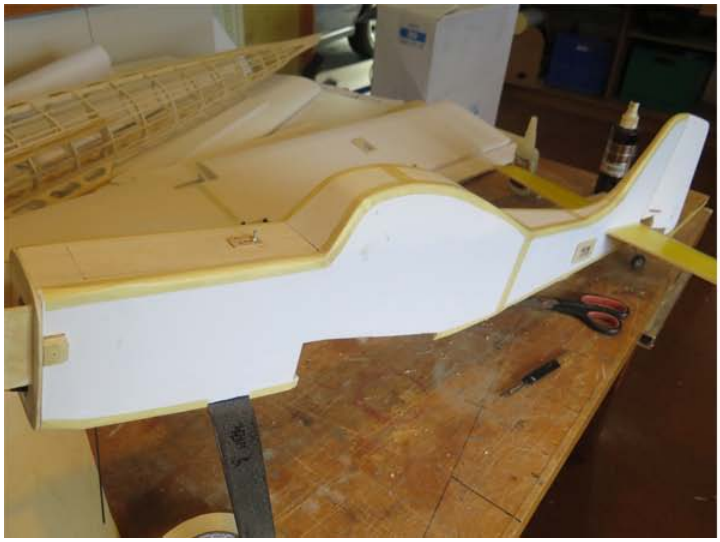
Servo mounting plates and control horn

10. The front centre of the joined wing needs to be cut out to the fuselage width back to the spar. Two 6mm dowels need to be glued through the spar and accommodating holes drilled into former F2 to accept the wing dowels and secure the wing. Two 6mm or ¼ in nylon wing bolts are to fitted near the trailing edge and blind T-nut glued into the 6mm liteply wing securing panel on the bottom of the fuselage box.

FINISHING.

1. Screw in the four servos with extension leads attached and fit the 2mm control rods and clips supplied, cutting and bending the rods to the required length.

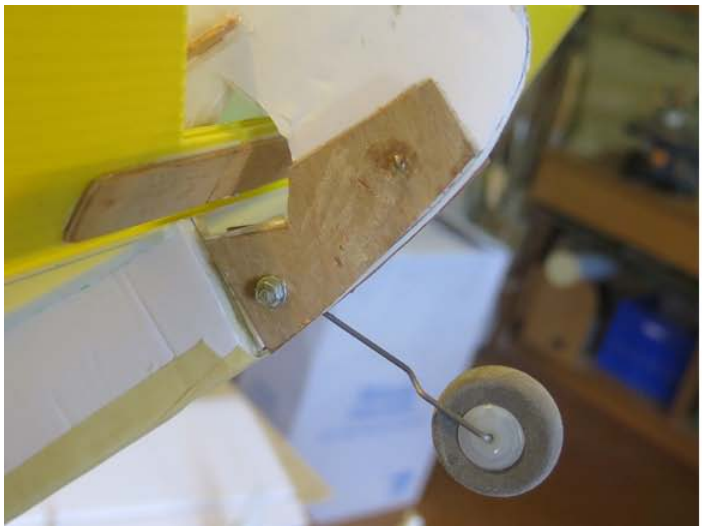
2. I have found binding the edges and corners of the foam and coreflute with a good quality 18mm masking tape before painting gives a nice clean finish. To date the best product is a Hi Tack Scotch masking tape, forms well and stays stuck.




3. The plane needs to be painted to make it water proof and I find Resene test pots ideal and inexpensive. To make the paint flow nicely I thin the test pot with about 20% + (to taste!) BARS BUGS costing about$6.50 from Miter 10. Be careful to apply the first coat sparingly so as not to wet the paper too much and cause it to wrinkle and lift. After that dries then another coat or two is desired and the finish should be good.

4. The Rx can be Velcro mounted above the wing on the fuselage side. The ESC velcroed on the fuselage side adjacent to the firewall and this allows the battery to be fitted to a Velcro pad on the middle floor as far forward behind the firewall as possible.

5. A tail wheel needs to be fashioned from some small gauge wire and wheel and attached to the bottom of the rudder. I glued some 1mm ply to the bottom of the rudder and fitted the wire to that.




SET UP GUIDE.

The throws will need to be adjusted to suit the pilot's skill and requirements. As a starting point I would recommend the following. Set all the throws at 120% and then mechanically adjust the centre point and the throws as near as possible to produce the following movements. The nearer you can get it right in the mechanical set up the better, and then use the radio sub trims and end point adjustment for fine tuning.

Elevator .. Low rate 8mm up & down High rate 12mm up & down
Rudder.. Low rate 17mm R & L High rate 21mm R & L
Ailerons.. As we are using two aileron servos, the wing can be set up with some differential. When we have a lifting type airfoil (Clarke-Y) as on the Clubba, the down deflecting aileron creates more drag than the up aileron and this creates what is known as adverse yaw. Right aileron input makes the plane roll to the right but because the down

aileron causes more drag the left wing is also pulled to the left (left yaw) which can result in an ugly elliptical roll rather than a smooth axial roll. To counter this we program in a differential setting which allows the down aileron to travel to a lesser percentage and by subsequent trimming we can get the plane rolling more accurately. Different radio systems have different programming systems, but with the more prevalent Spektrum gear in the initial set up, you need to set wing type to 2 Ailerons and plug the right aileron into the Aileron channel and the left into Aux1 (channel 6). Now enter the DIFFERENTIAL Menu and highlight INHIBIT and set the switch to ON, leave the percentage at ZERO and set the aileron throws at equal up and down, 7mm for low and 10mm for high rates. Now activate the differential facility by increasing the screen percentage to the value required, say 25% for starters. In the case of Spektrum, the differential value is positive, if you are using Futaba, I think it is a negative value, you may need to take advice, or at least read the instruction manual and check the throws and the movement!

EXPONENTIAL . Our radios have this facility which softens the control input around the centre stick movements and makes for much smoother flying. The basic stick controls are linear but by programming in exponential the stick movements around the centre give less control throw which the increases progressively as the control stick is moved depending on the setting. As a starting point I like to set the AILERON and the RUDDER EXPONENTIAL at say 45 % and the ELEVATOR at 35%, preferring the elevator to be a little more sensitive. These are starting values only and can be adjusted to suit your preferences and ability. This is a guide only for test flying and then adjustments can be made to suit the aircraft and the pilot.

The model was designed with a 3S 2200mah Lipo 30 to 40 C battery in mind as they are less expensive and a lot of modelers already have them. This will give a flight time between 5 and 8 minutes depending on throttle usage. We have flown the model on a 3S 4000 battery which is about 6 ounces heavier with no significant loss of performance so you could choose to use 3S batteries of a larger capacity between say 3000 and 4000mah for longer flight times if so desired. If you are starting afresh and needing new batteries, then a good choice would be a Lipo like this Turnigy 3000 3S 40c https://hobbyking.com/en_us/turnigy-battery-3000mah-3s-40c-lipo-pack-xt-60.html

Barrie Russell MFHB.