

# Tony Ray's Sopwith Camel

One of Tony Ray's Aero Laser Cut Kits

Additional build information from

**Steve Webb Models**



## **Sopwith Camel - Kit Inventory**

- ☐ Wood Part: Balsa wood Sheets \*3, Basswood Sheets \*1
- ☐ Hardware Part: Carbon rod \* 1 , Heat shrink tube \* 1 , Mini magnet \* 8 , Micro Hinge \* 1, Micro screw \* 30, Rubber wheel \* 2
- ☐ Paper Part: Installation drawings \*2, Covering tissue \* 1

## **Required Electronics**

- ☐ RC Transmitter with at least 4 channels
- ☐ Receiver/ESC(If you use Brushless motor)/1.7g Micro servo
- ☐ Motor, 1104 Brushless motor & 8.5MM coreless motor with gearbox
- ☐ Propeller, 5.5in or 138mm Prop /LiPo battery

This is a small model but don't underestimate its complexity. It is suggested that this should not be a first build of a model aircraft. Some prior knowledge would be helpful.

However, I've tried to point out any pitfalls and ease the way to making a successful model of the iconic Sopwith Camel, whether you want it to be a static model or to fly it.

## Before you start

- Some items you may find helpful
  - A sharp, fine modelling knife or scalpel and additional blades
  - Fine nosed pliers or strong tweezers
  - A very fine cross head screw driver for all those minute screws
  - A couple of clear plastic containers for holding small parts. Keep your clear plastic, takeaway food containers, they're ideal.
  - Pins and a small building board.
  - In the main I used thin cyano acrylate (super glue) for the well fitting joints and thinly spread aliphatic resin (yellow glue) for sheet to sheet bonds
  - A small sanding board (make one by gluing 2 pieces of 1/16 balsa, 3inch x 1.25inch with grain crossed at 90deg. You can stick a different grade of sandpaper to each side to make a really handy small sanding block)
- Read through this help sheet in conjunction with the pictorial build document.
- There are 8 small magnets in the kit. To ease things later on, mark them all on the same pole before you start. I found the easiest way was to put them all together and mark one magnet face with a "sharpie". Then remove that magnet and mark the next one... and so on. This means that you can easily identify which way round they need to be in the build.
- Check each "Step" before you start it. Study the photos in the pictorial document.
- Identify all the parts for each Step and remove only those you need from the relevant sheet by cutting through the tabs in the laser cuts around each item. Use a plastic container to hold them until needed in the Step.
- Any offcuts containing other pieces (like the centre of the cowl) can be stored in another plastic container 😊

## The build

Not all of the steps need clarification, this does not mean they aren't important. Make sure you check them as you go through the build.

### Part1 fuselage



- Step 2
  - Put all the magnets in with the faces you marked earlier showing on the same side of the former. When fully pressed home apply superglue to keep them in place
  - Match up the position of the formers with the view in the picture. There is a small hole on the left of the rim in the picture which will help. This is bottom centre when attached to the model.



- Steps 3 and 4
  - These 2 steps are delicate. Be careful
  - Check the inner size of the holes in the cowl formers. The widest hole goes first (step 3), the next three go in diminishing size with the grain at 90 degrees to the one below. Try to avoid damaging the ring supports



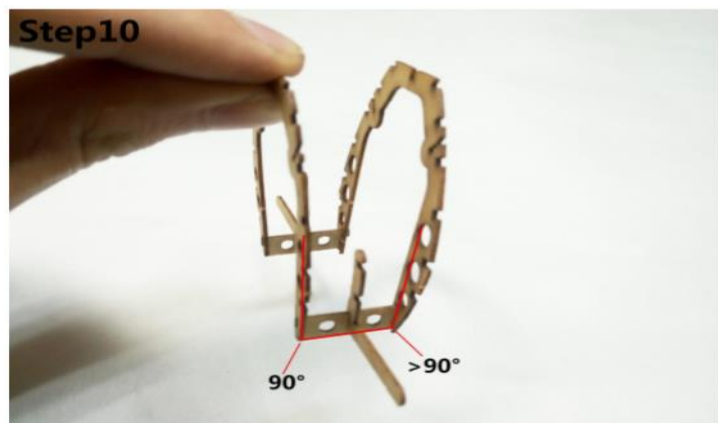
- Steps 5, 6 and 7
  - You may need to lightly sand the edges of the wrap-around sheet to remove any of the tabs left from removing the part from the laser cut sheet. When the ends are joined this part fits exactly inside the edge of the cowl. It may be obvious but the wet side goes to the outside.
  - When dry, sand carefully to the section shown.



- Step 8
  - Carefully break out the formers with fine nosed pliers or mini snips.

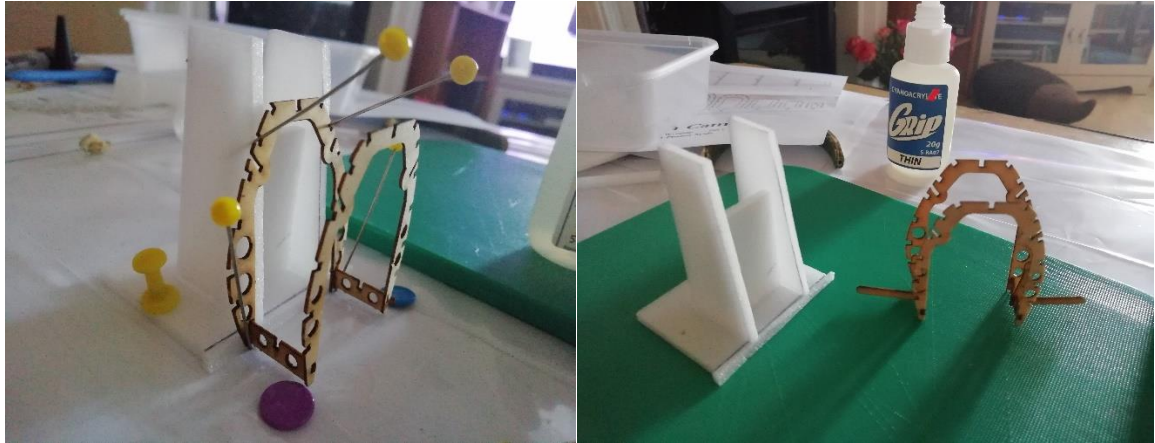


- Step 9
  - Identify these parts carefully
  - The former with 3 circular holes per side is part B. Part C has 2 per side.
  - Note that the 2 small components have one end with an angled cut out. This is the Part B end. These parts have the peg at the top to fit with the slots in B and C, they are the right way up in the picture above.



○ Step 10

- This is a particularly fiddly part.
- The correct angle for part B can be seen on plan sheet Part 1 in the kit. It is angled outwards. It helps if you make a template with the correct angle before fixing it. This can be done with a piece of scrap balsa or cardboard. I made a build jig from scrap depron, see photos. The angle on the jig is taken from the angle of former B on Plan Sheet Part 1



- Make one joint to Part B at a time and make sure they are fully set before continuing.
- Make sure the joints to part C are at a right angle to the bottom pieces.
- Finally fit the two L shaped pieces.



○ Step 11

- Identify and cut out all the parts in the illustration. Confirm the size of the stern post on the plan as there is a similar part on the sheet.

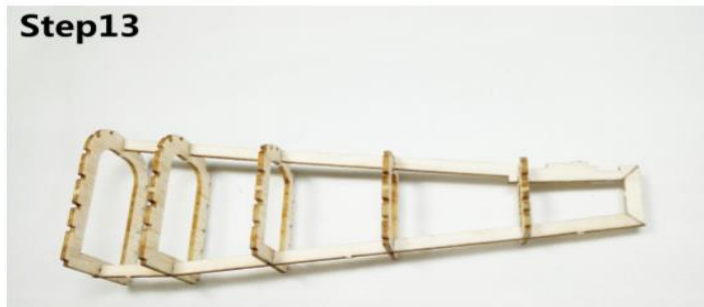


## Step12



- Step 12
  - Before gluing the 2 pieces together, push the magnets into the bass wood ring with the opposite polarity to those you installed in the cowl facing you (i.e. the marks you made on the magnets are not the same as those you can see on the cowl). Check the cowl and this former attract each other before gluing them in. You can slide the two pieces apart to make sure the magnets stay in place before gluing them.
  - Glue this ring to former A as shown.

## Step13

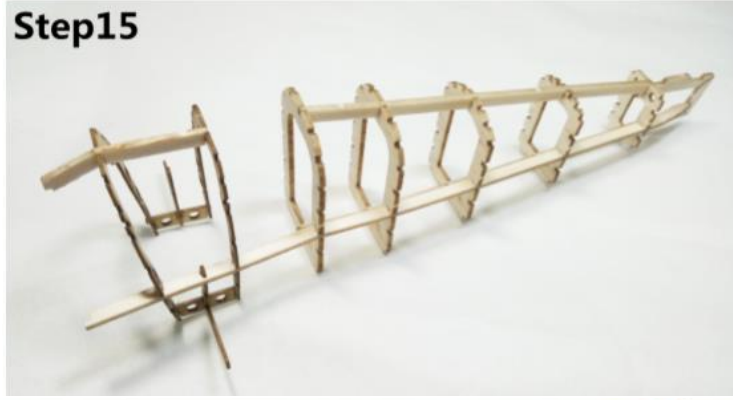


## Step14



- Steps 13 and 14
  - These pieces are pretty much self-jigging but they are small and fairly fragile so take it slowly and carefully. I assembled the frame to the end of step 14 before checking that all was true before gluing each joint, leaving the tail post to last as it's a bit fiddly. Don't do what I did. I glued in the other side longeron before Step 15!!

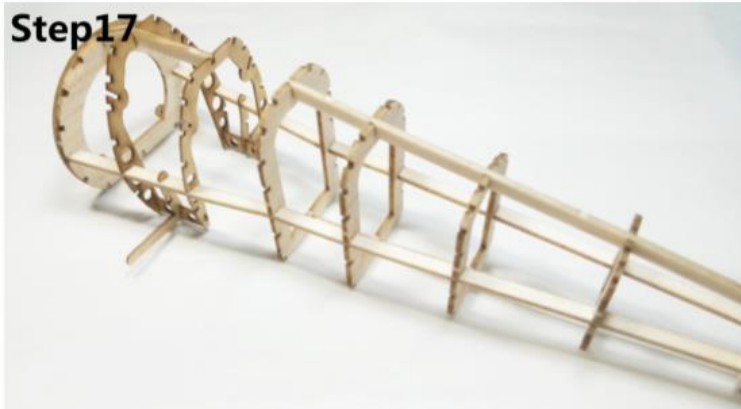
**Step15**



**Step16**



**Step17**



- Steps 15, 16 and 17
  - Position the section containing formers B and C ready for gluing in step 16.
  - When all parts are square, apply glue to all the new joints.
  - Glue the front bulkhead assembly, former A, in place.

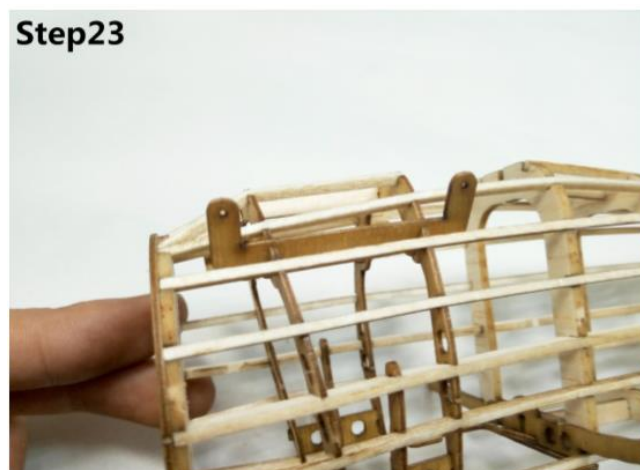




- Steps 18, 19 and 20
  - Remove 12 of the pre-cut stringers from the balsa sheet
  - Chamfer the tail post slightly to improve the glue surface for attaching the stringers to it.
  - Glue in the 2 bottom stringers
  - Glue in the 4 on each side alternately to avoid any warping. The top one on each side of these should finish with the rear end level with the rear of former H.
  - A short length of stringer should be fitted each side behind former H to the tail post top. This should be level with the tailplane seat on the backbone.
  - The remaining 2 stringers on each side share the same notch in former A at the front. They end against the front of former H.



- Steps 21 and 22
  - Note there is a magnet in Step 21 illustration, just above the small tab near the bottom of the picture. Fit this magnet first into the small tab.
  - Fit the cross beam (bottom item in the picture). This goes against former D and on the centre beam it so it's flush with the bottom of the former.
  - Next fit the hatch frame and finally the magnet tab.



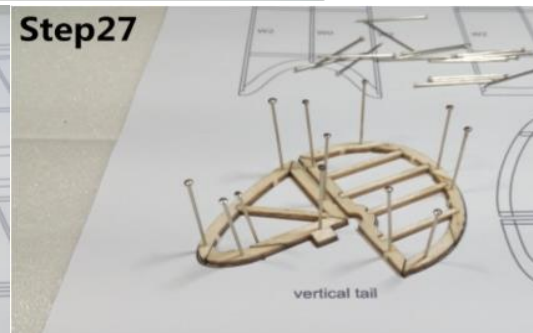
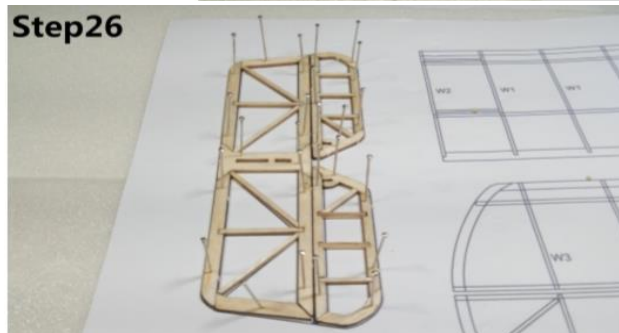
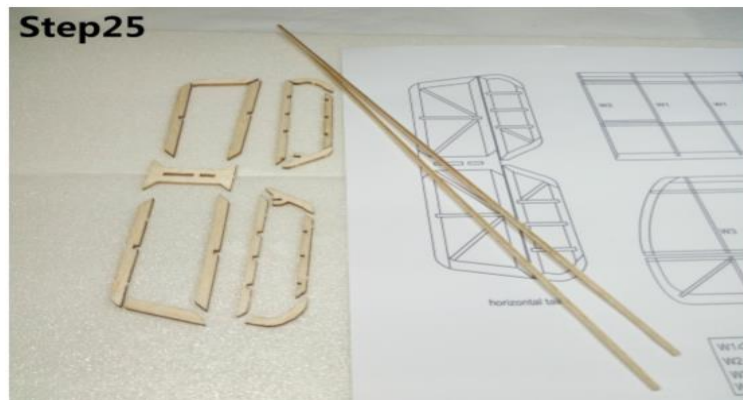
- Step 23
  - Fit the last 2 pieces in the 2 slots at the top of formers B and C. These are a tight fit and need to be fully home as they will form the top wing supports.

**From this point you will need to have a build board and pins.**

This can be as small as A4 size as the plans are on A4 paper. The board should be soft enough to take the pins, something like notice board material or fibre board. It's better to use modelling or dressmaking pins as they have a larger head and don't damage your fingers.

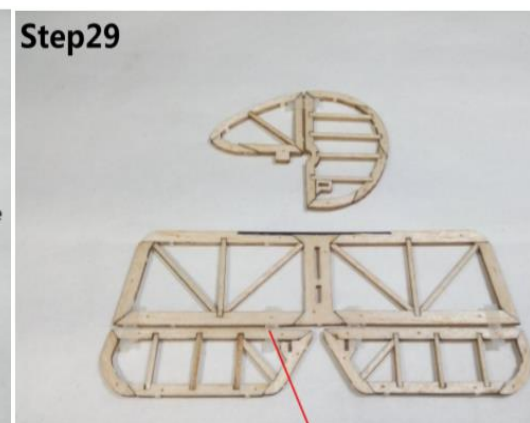
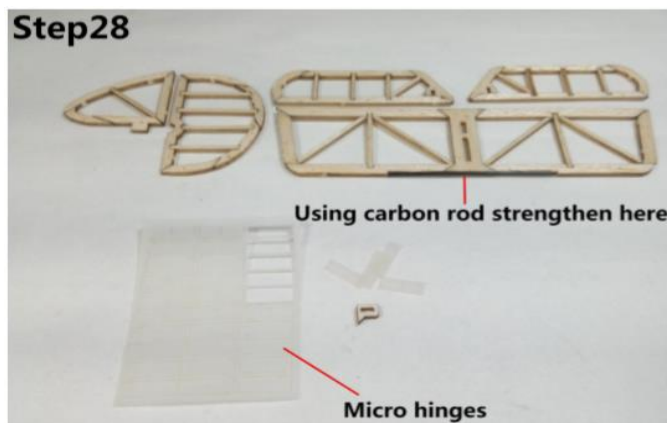
Lay out the plan sheet you intend to use next (with the tailplane and elevators) and cover with clear polythene sheet to stop glue sticking the parts to the plan. You could also rub over the plan with a candle for the same effect. Make sure the plan is flat.





○ Steps 25, 26 and 27

- These are fairly straightforward following the pictures. Build the tailplane and remove when dry before building the elevators. Likewise do this with the fin and rudder. This ensures you don't get glue between the separate parts.



○ Steps 28 and 29

- The red line in Step 29 shows the position of a micro hinge (supplied in the kit). You will need 5 of these for this step, 4 for the elevators, 1 for the rudder. Near the top on the rudder, near both ends of each elevator.
- To position them so that a gap is left for the operation of the control surfaces, use a short piece of stringer (about 1 inch or 25mm). This is to set

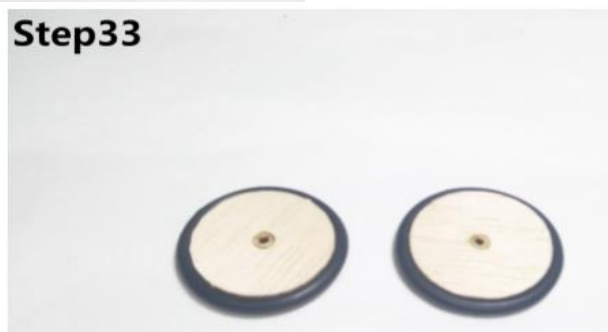
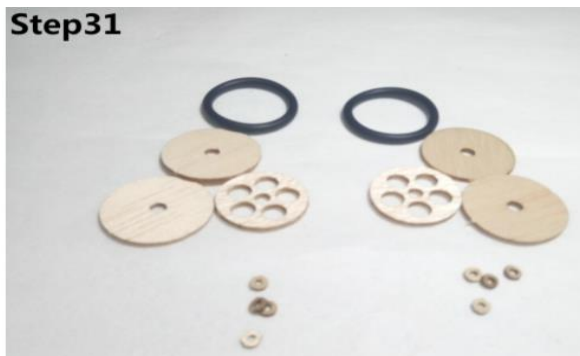
the gap between the flying surfaces when fitting the hinges. It can be sanded down to a bit to reduce the gap if required but allow for movement later.

- Don't put the spacer too close to the point you are going to put the hinge or it could also get glued in.
- The hinges attach to the top surface only (or one side on the rudder). Put a drop of super glue at each side of the gap and place the hinge with the central cut outs in the middle. They can be pressed into place for a few seconds using a small piece of polythene, which won't stick to the glue.



○ Step 30

- For illustration only – DON'T GLUE UNTIL AFTER COVERING.

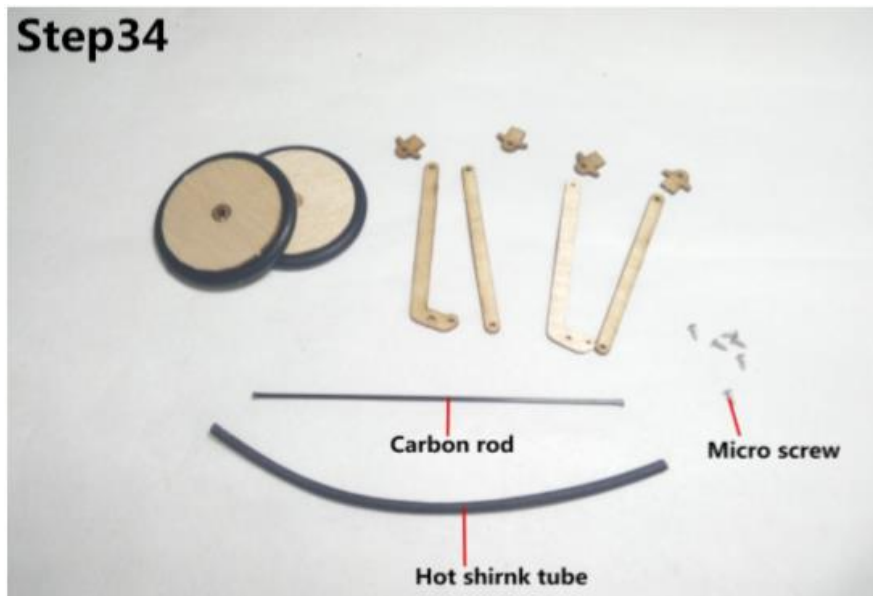


○ Steps 31, 32 and 33

- The wheels are built from 7 pieces each.



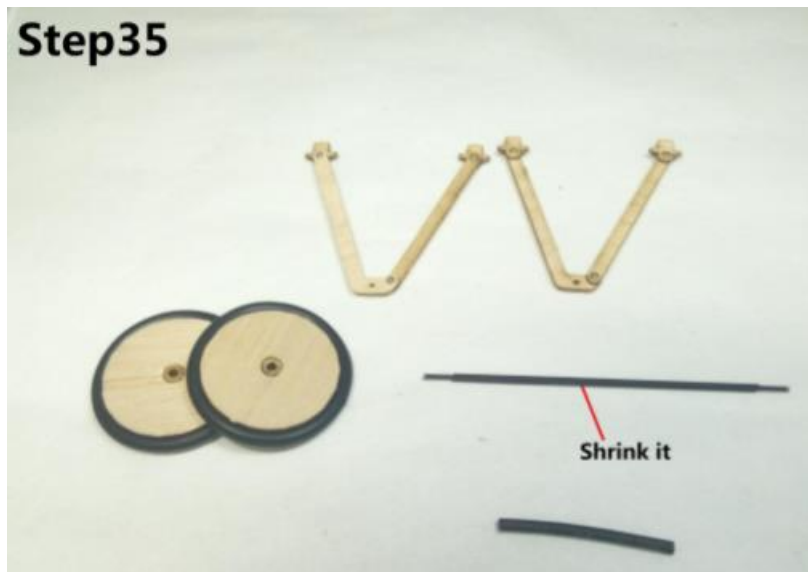
- Glue the 2 solid discs either side of the one with holes in and insert 4 of the small basswood collets in the centre.
- The tyres will stretch over this wheel.



- Step 34
  - Gather all these pieces together and store in your plastic container. This is where you need the small cross head screw driver, and if it's magnetised that's a bonus!
  - You will need 6 micro screws – I kept them attached to a larger magnet so I always knew where they were. Try to work over your board in case you drop them as they are almost invisible on the floor.



### Step35

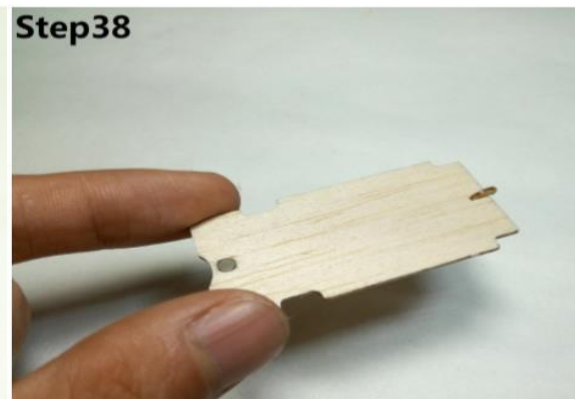
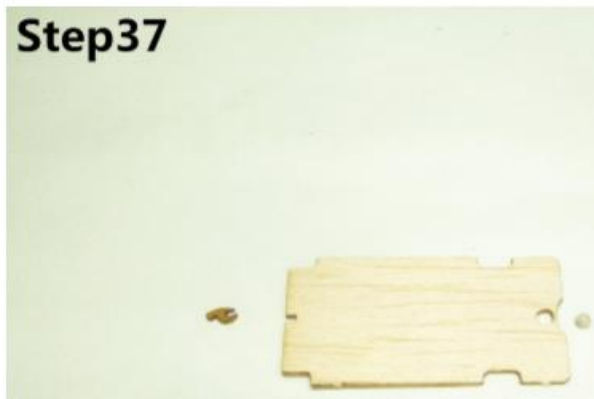


### Step36



#### ○ Step 35 and 36

- Cut the carbon rod to 65mm. The heat shrink for the centre to is 50mm and needs to be heat shrunk onto the carbon fibre axle
- Screw the undercarriage struts together as per the picture in step 35. The 4 small pieces are screwed on with the tabs pointing upwards
- Put the heat shrink tube over the centre of the carbon rod axle and shrink it
- Fit the legs and axle to the fuselage as shown. The L shaped legs are at the front. Do not glue yet.
- Put a small piece of heat shrink on either side of the undercarriage and shrink.
- Fit the wheels and another small heat shrink.
- Check all is square and apply glue where the tabs fit into the fuselage.



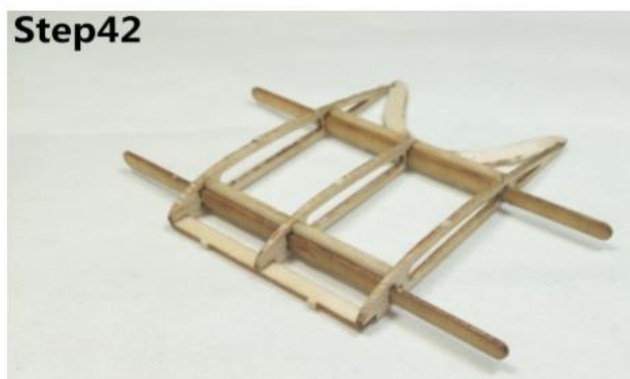
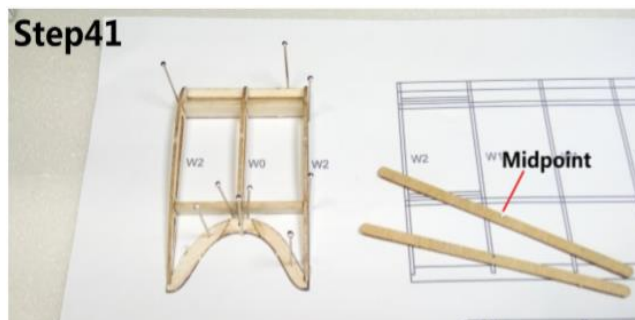
- Steps 37, 38 and 39
  - Fit the magnet.
  - On my kit this was the only part I found which didn't fit as the hole was just oversize. I put it in place on a flat surface and rubbed a superglue filler powder into it and ran superglue into it. This will work with baking powder (but try first on some scrap and do it somewhere well ventilated in case there is a reaction).
  - The part is symmetrical, so either side of the magnet is OK. It should work with the magnet faces marked to unmarked, but check which way up it fits and attracts before gluing the small tab to the front of the hatch door. The small projection on the tag goes to the inside of the door and locates into the small hole in former A.
  - It may be necessary to lightly sand the edges of the hatch cover to fit into the frame.

## Part2 The Wings



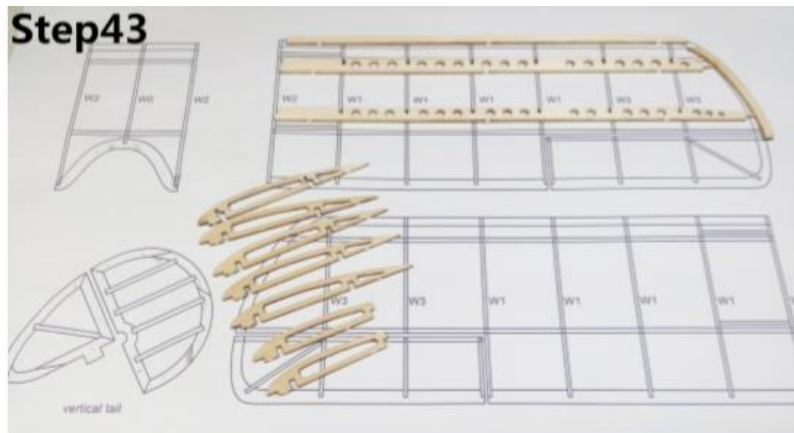
### ○ Step 40

- The wings are quite delicate to build but pretty strong when complete.
- The parts fit fairly tightly and often only need gluing on completion of a section or when you are satisfied you have reached the point where it is needed.
- Make sure you identify the correct ribs W0 and W2. They have an extra cut out in front of the spar slots for the central wing braces.



- Step 41 and 42
- Assemble and glue the trailing edge of the upper wing, centre section, and pin to the board.
- Dry assemble the ribs to the spars and pin in place while gluing the trailing edge in place.
- Fit the leading edge, pin and glue.

- Glue all joints taking care not to block the holes for the joining braces
- Slide the braces into the slots, centralise and glue.



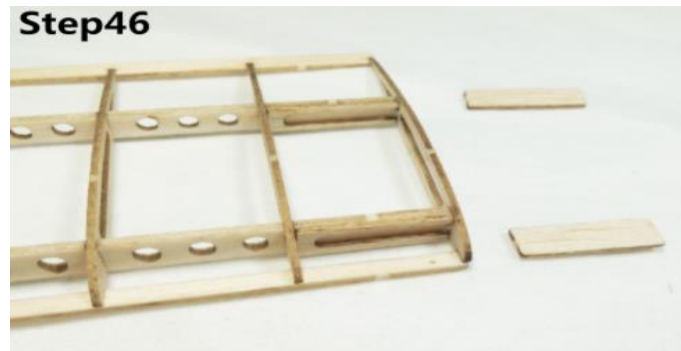
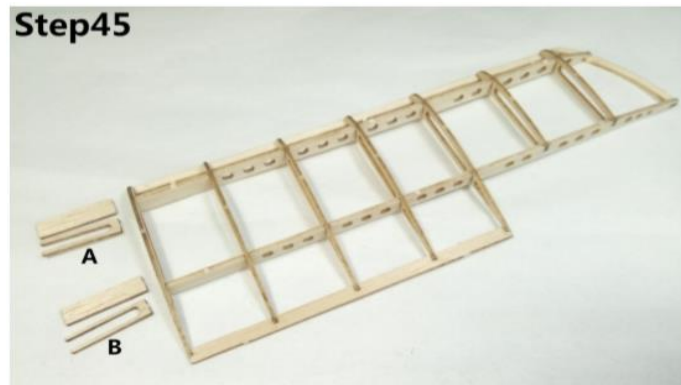
○ Step 43

- Identify and remove the parts for 1 wing.
- Note there is one rib W2 on the inner end of each wing.

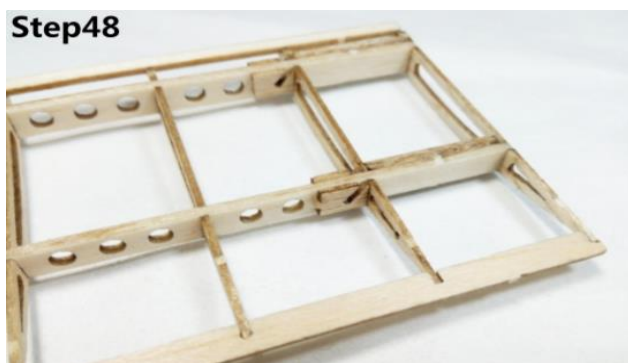
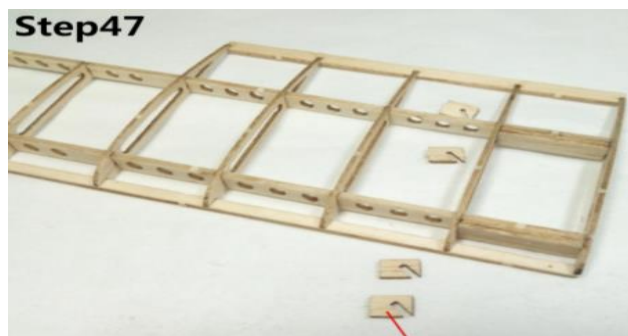


○ Step 44

- Pin the leading edge (LE), trailing edge (TE) and the tip piece to the board.
- Assemble ribs W1, W2 and W3 to the spars.
- When fitting the ribs, make sure you don't press down heavily on the areas over the lightening holes, press carefully over the spars. These are a close fit.
- Glue all joints but don't get any into the holes in W2 for the brace.



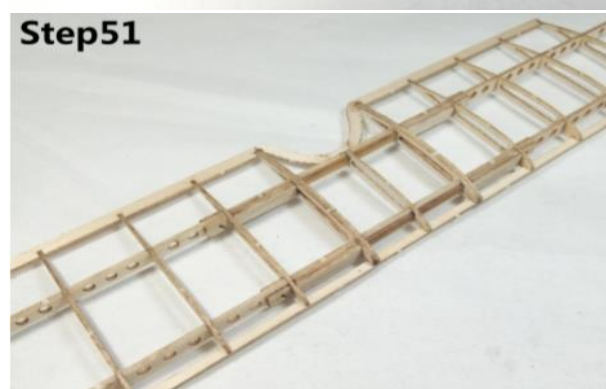
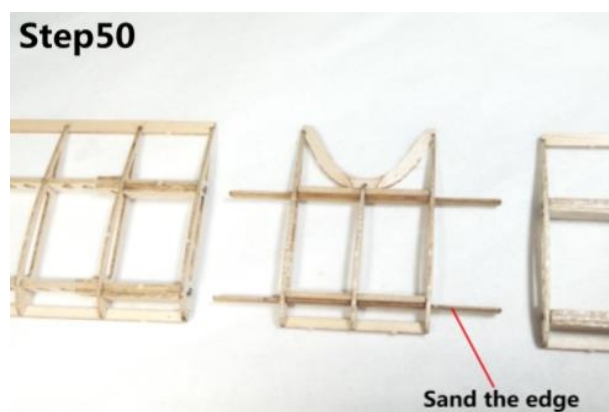
- Step 45 and 46
  - It is very important that you make sure you identify these parts accurately as they will form the boxes for the wing braces. One of the tongues on the fork part A is slightly wider than the rest. This will be the top once installed on the front spar.
  - Glue in the forks with the opening to the centre of the wing, then add the small rectangular tops to close the boxes.



- Steps 47 and 48
  - Add the 4 small tabs to the spars.
  - One to each side of each spar. They should be up against the spar, with the slot pointing towards the bottom corner on the rib side of the spar.
  - See Step 48 for position but note that it is a view of the bottom of the wing.

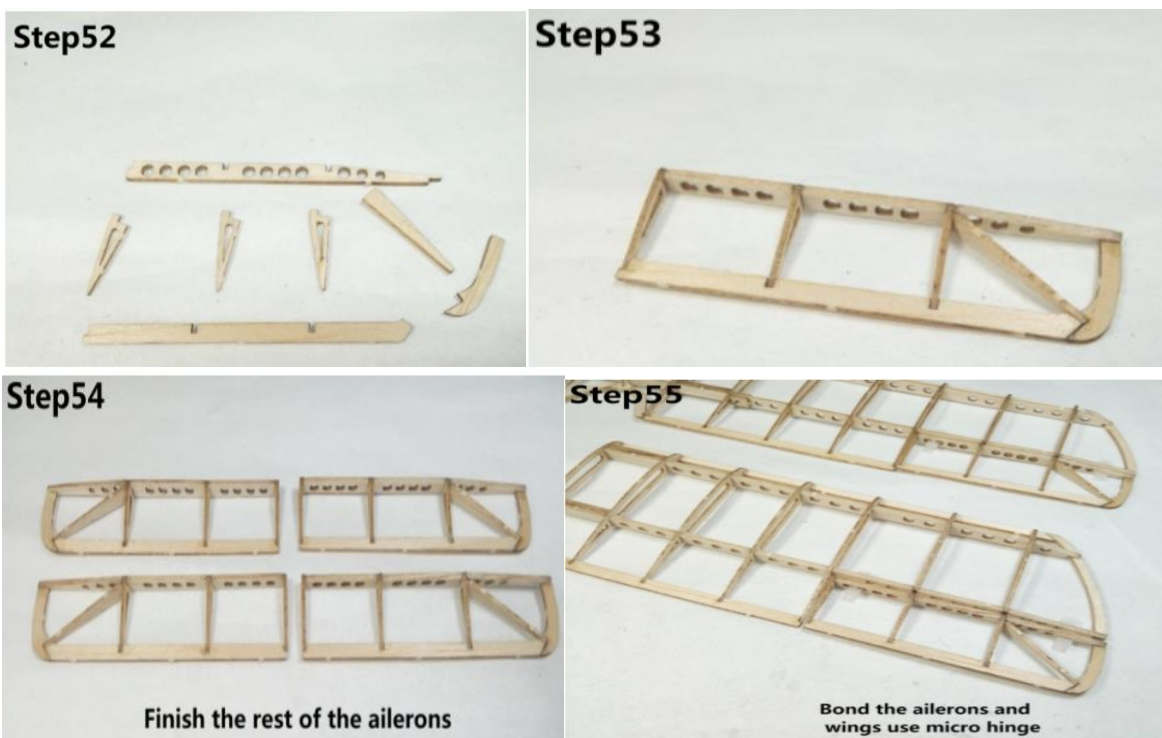


- Step 49
  - Complete the other 3 wings.





- Steps 50 and 51
  - Test fit each of the upper wings to the centre section and gently sand the protruding ends of the joiner until the wings fit snugly. Test fit them frequently and try not to force them as they will then be difficult to remove.
  - You may have to sand the joiner sides slightly to make them slide in comfortably.
  - Don't use superglue, it will probably "go off" before you have time to push home the ends of the joiners.
  - While you are fitting the top wing you can test fit the lower wing, sanding and fitting the joiners to the wing boxes in the same way.



- Steps 52 to 55
  - Build ailerons and attach to the wings using the same method as the tailplane

**Step56**



**Step57**



**Step58**



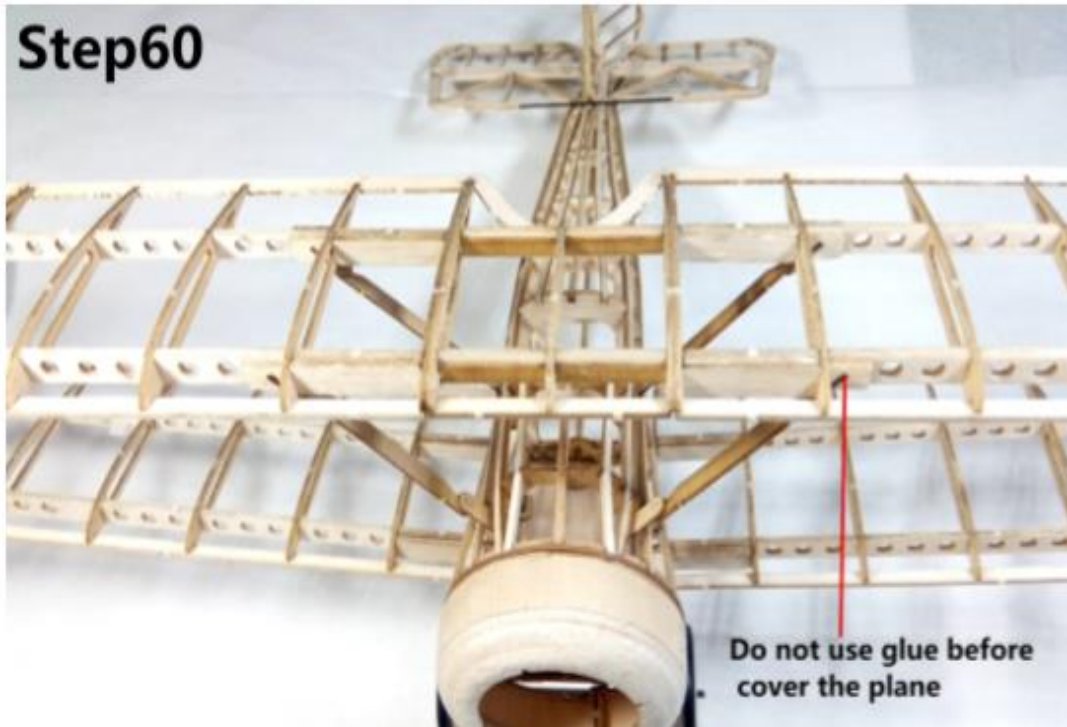
- Steps 56, 57 and 58
  - The longer struts have a “fork” piece at each end, the shorter struts only have one at the top. Screw these on with the micro screws

**Step59**

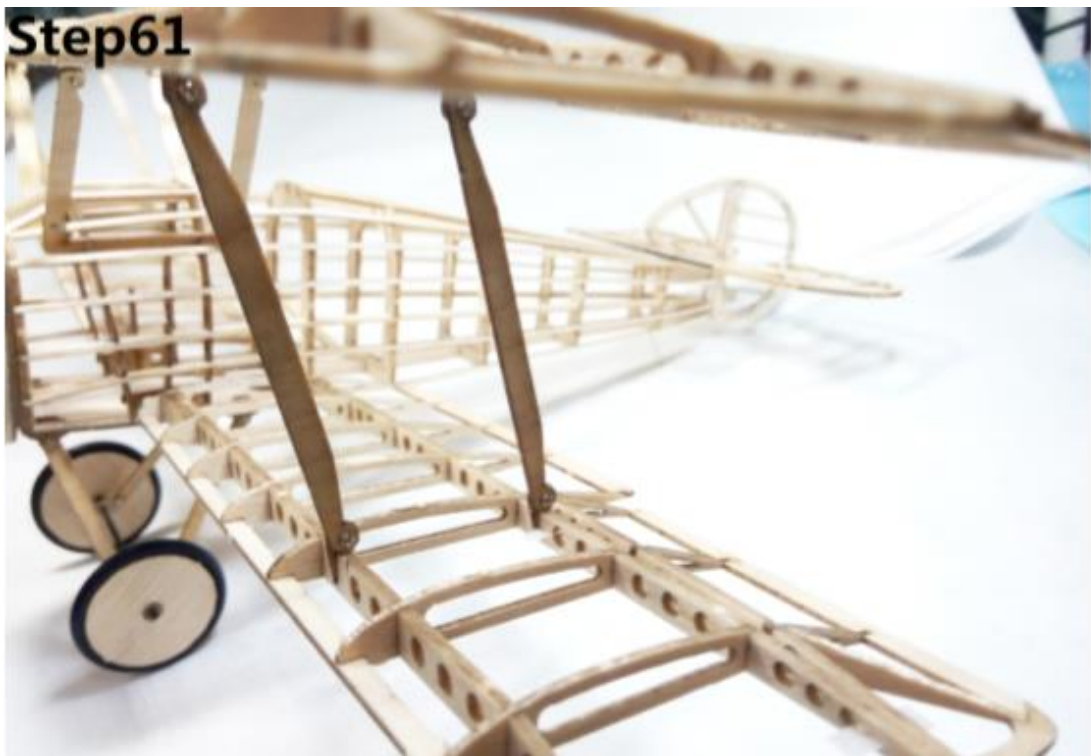


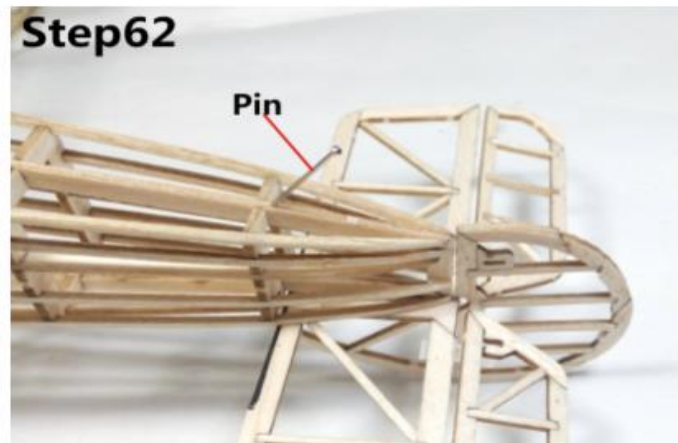
- Step 59
  - Fit the shorter struts to the fuselage.
  - **Steps 60 and 61 are test fittings of the main parts. Do not glue at this stage unless you intend to use this as a display model showing the construction.**

## Step60

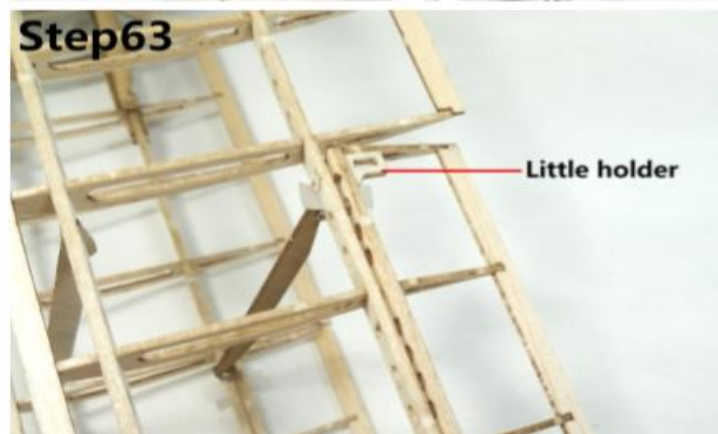


## Step61





- Step 62
  - Insert a pin in the rear as a tail skid. To prevent this catching cut off the head and bend at about 90 degrees upwards.

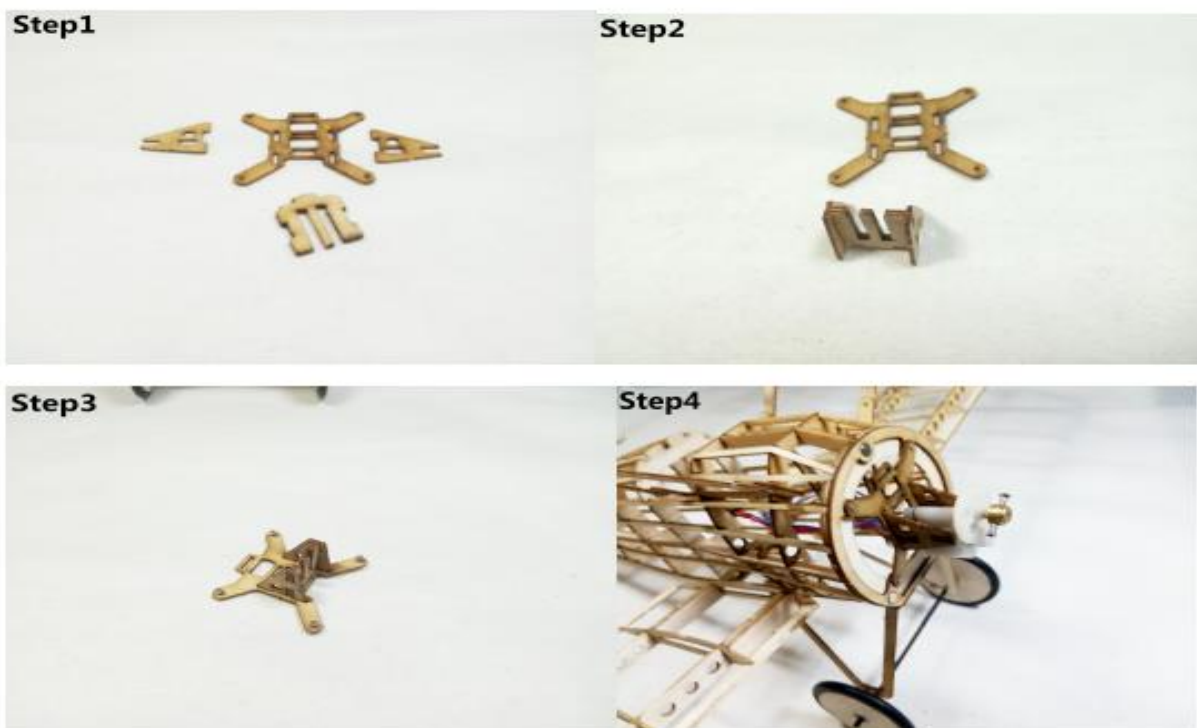


- Step 63
  - Fit the control horn holder to each LOWER aileron.
  - This can be fitted either as shown or at the next rib outwards (as shown in later steps).



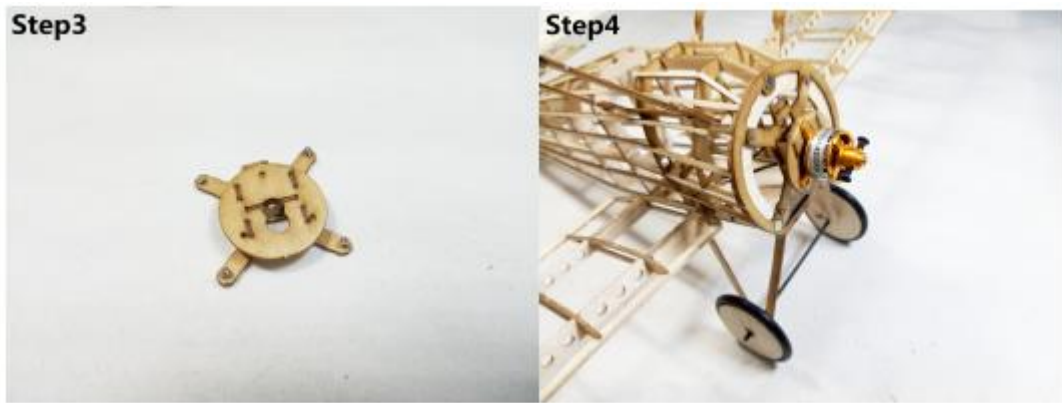
## Motor and Electronics

- Coreless motor (supplied, see illustrations below)
  - Identify and remove the 5 parts of the mount. There are 2 of the forked piece in Step 1 glued together before assembly
  - Glue the triangular sides to the central “fork” with the narrow ends towards the open end of the fork
  - Glue this assembly to the back plate as shown in Step 3 picture
  - The supplied motor fits into the plastic mount and assembles to the central tongue of the fork using the hole in the back centre of the motor mount below the motor.



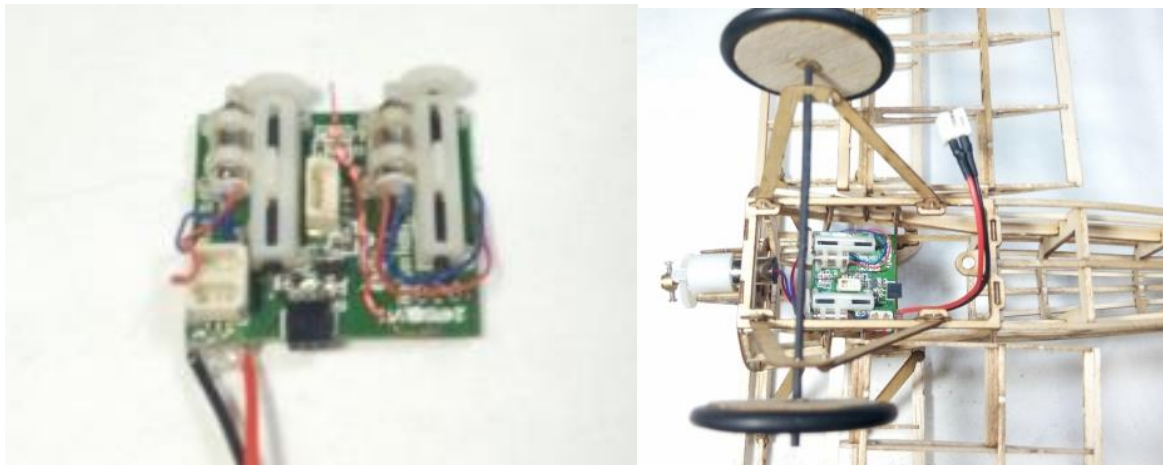
- Brushless motor
  - Illustrations below are of a typical installation
  - Identify the parts and build as shown in the illustrations





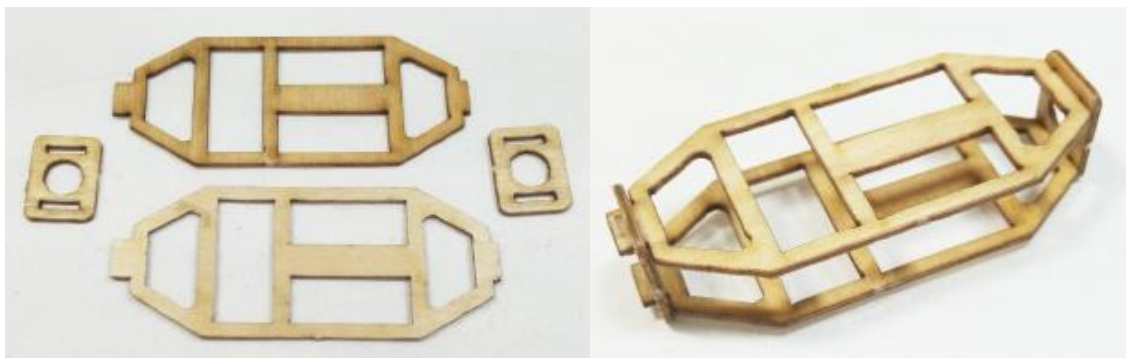
#### ○ Radio installation

- If you use the Spectrum micro receiver/speedo/servo block it can be installed directly into the fuselage attached to the higher stringers as shown below, or onto the quick release module shown below in illustrations Step 1 to 3

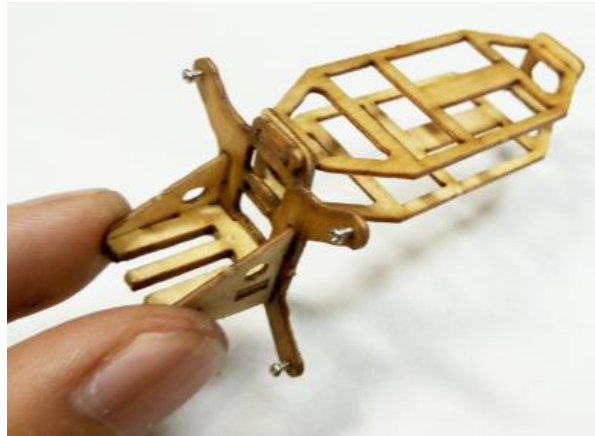


#### ○ Quick release module

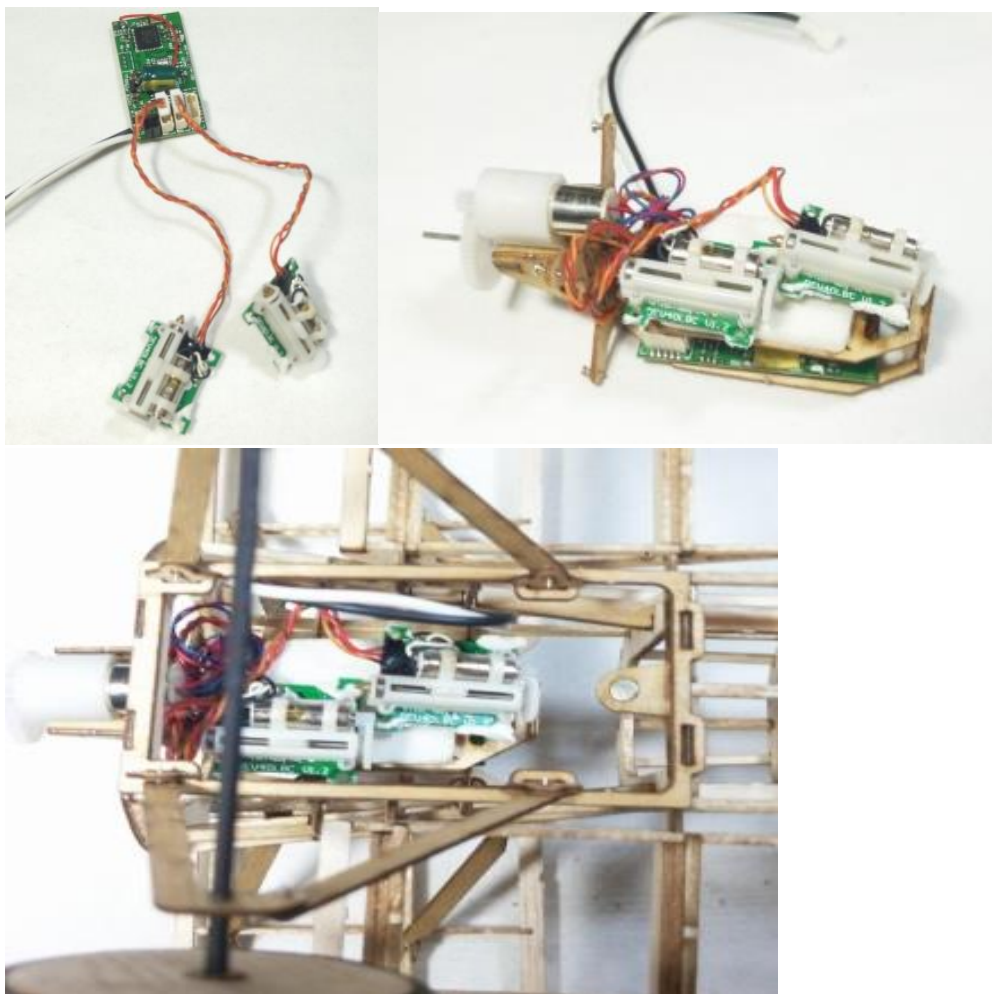
- Identify the parts and assemble as in Steps 1 and 2 making sure the longer tabs go into the same end piece
- Glue this assembly to the motor mount as shown in Step 3



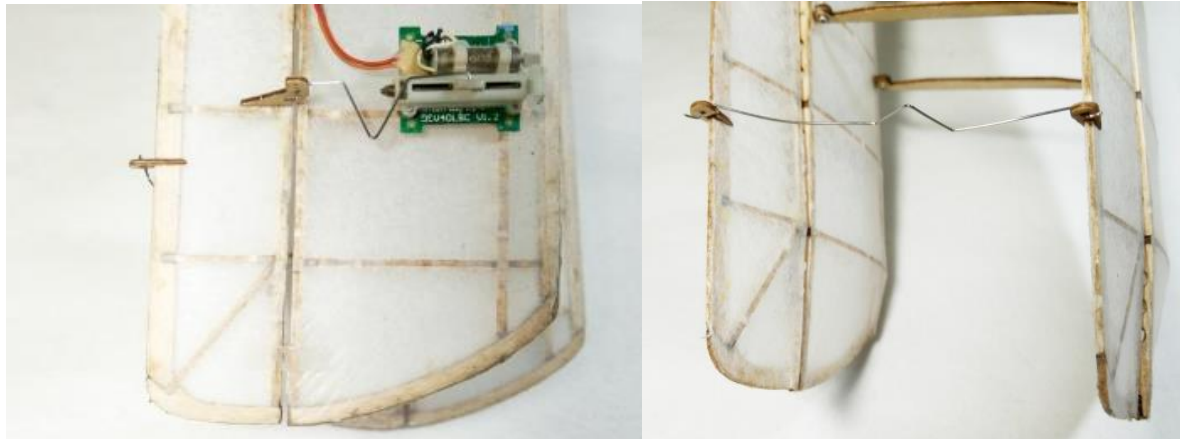




The following illustrations may help with your radio installation. The final layout will vary depending on your choice of equipment. Some suggestions are in the pictures. The quick release module will also accommodate the very small 1.7gm rotary micro servers.



Cover the model before final assembly. If you are new to tissue covering help can be found at <http://www.ffscale.co.uk/comp8.htm>



## If you enjoyed building the Sopwith Camel

**Tony Ray thanks for your support. He is a college student who's mad about micro balsa aircraft and continues to design traditional micro scale models making them affordable without compromising component and material quality. This gives an unparalleled building and flying experience.**



**Other Tony Ray models currently available from Steve Webb Models**

- **Mini Fokker EIII Eindecker**
  - **Mini Zero Fighter**
  - **Mini P51 Mustang**

