SLINGSBY DART 17

CONSTRUCTION MANUAL Version 1.1

SCALE	1/10
WING SPAN	1700mm (67 inches)
WEIGHT	19 OZS
WING AREA	330 SQ INS
WING AIRFOIL	SELIG 3021
WING LOADING	8.3 OZS/SQ FT
MOTOR & PROP	2040 brushless in-runner R/C car motor driving a 5.1 x 3.1 inch folding prop, or up to 28mm outrunner (with mods)
LIPO	2S x 1300mAh
POWER	Measured 104W @13.2A, Surpass Hobby 2040 in-runner, 3200kv, on 2S

TIMELESS WINGS
FLYING SCALE AVIATION

PRELIMINARY NOTES

- This model came about in early 2020 during a period of Corona Virus restrictions, and was designed to use items at hand at the time. Specifically, it was designed to be a small balsa build to use the diminutive 5.1 x 3.1 inch folding props I had on hand. These suit a 2mm to 2.3mm shaft, so originally an old Hacker B20 motor was fitted. This has been recently replaced with an inexpensive contemporary Surpass Hobby 20mm R/C car motor with a 2.3mm shaft, which works really well in this application.

- Although designed for a 20mm in-runner, the nose is wide enough to fit up to a 28mm outrunner if desired, but some modifications will be required. The construction notes assume previous experience building similar models.

- Despite its small size, this model is very efficient with its Selig 3021 airfoil and keeps up very well with the larger gliders at our field. Penetration is especially good.

- Whilst clearly only “semi-scale”, this model was designed to keep the character of the original Dart with its small tail volume compared to the wing. This necessitates a Centre of Gravity further forward than you would normally expect. A small amount of lead ballast will likely be necessary to achieve the CG on the plans. The first flight of the prototype was with a much too rearward CG, which, combined with large control throws made for a very unstable model! The CG on the plans should definitely be adhered to!

- This Dart could easily be built as a slope-soarer by using a solid balsa nose instead of the motor. This construction manual assumes that the builder is familiar with “traditional balsa construction methods”. The construction notes and plans have some small changes from the original prototype which reflect improvements, and should take precedence over any differences noted compared to the photographs.

- The manual will assume that a kit of all parts has been cut before assembly commences. Metric and imperial sizes are used interchangeably. The parts layout files are recommended only. These, and the plans may be used as desired for private purposes. For commercial use, please contact the designer.

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May 2021

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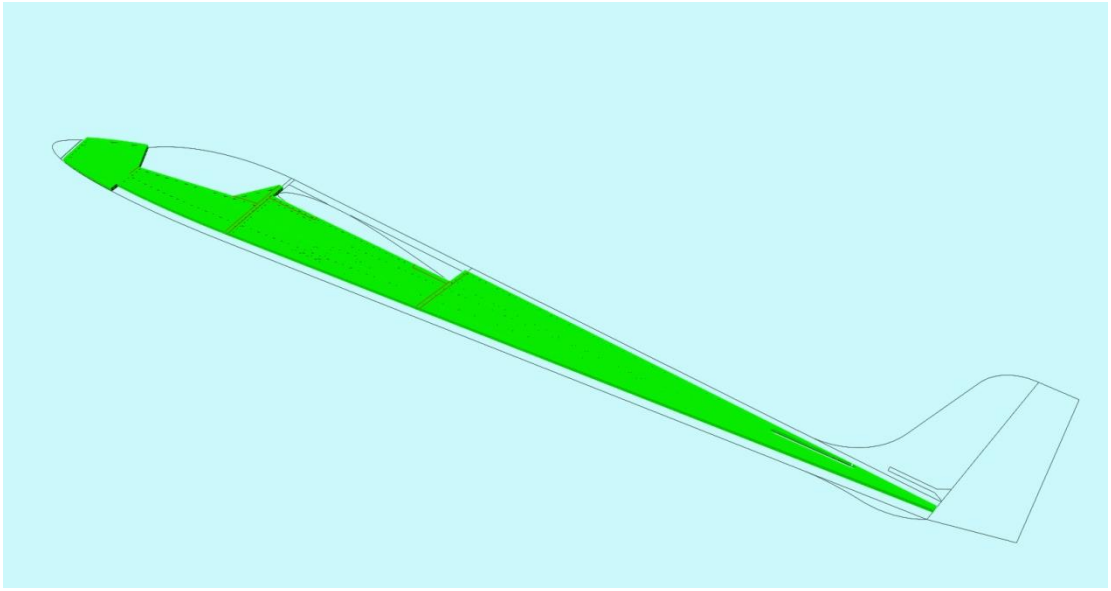
FUSELAGE CONSTRUCTION

1. Mark the position of formers on the fuselage sides, then pin the right fuselage side to the building board (50mm thick Styrofoam insulation with baking paper on top works well as a building board). Note that the left and right fuselage sides are different because of the staggered position of the pushrod exits.



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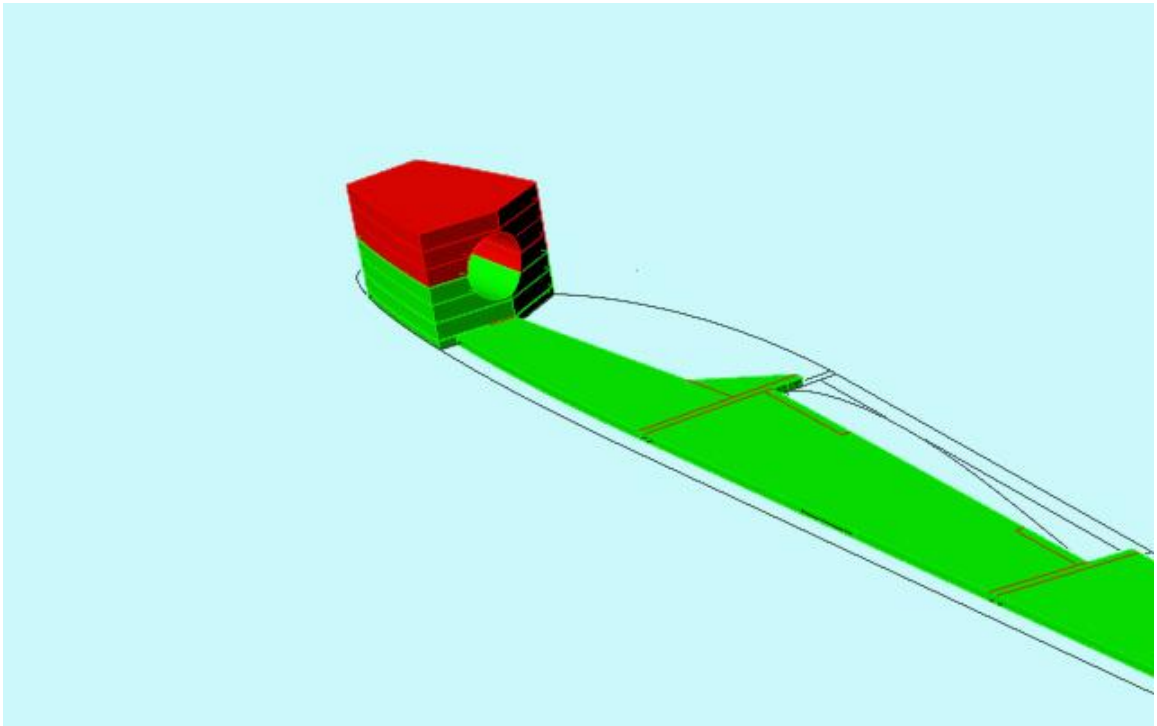
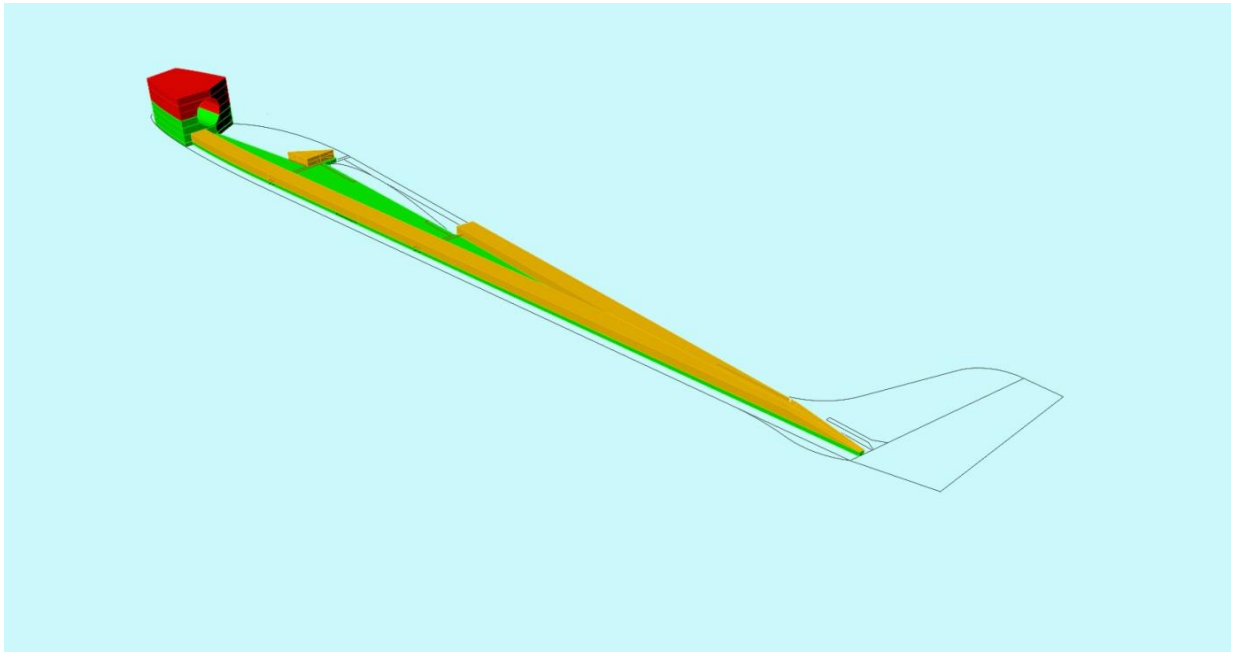
2. Make up the noseblock assembly in two halves, by gluing 3 LHS pieces together (shown in red), and 3 RHS together (shown in green). The location of the motor cut-out is now drawn on front and back (refer to plan for location) then removed using a coping saw. The two halves can then be glued together, then glued to the fuselage RHS.



3. Glue the 6.4mm balsa fuselage doublers to the fuselage RHS as shown. Separately, glue the 6.4mm balsa fuselage doublers to the fuselage LHS.



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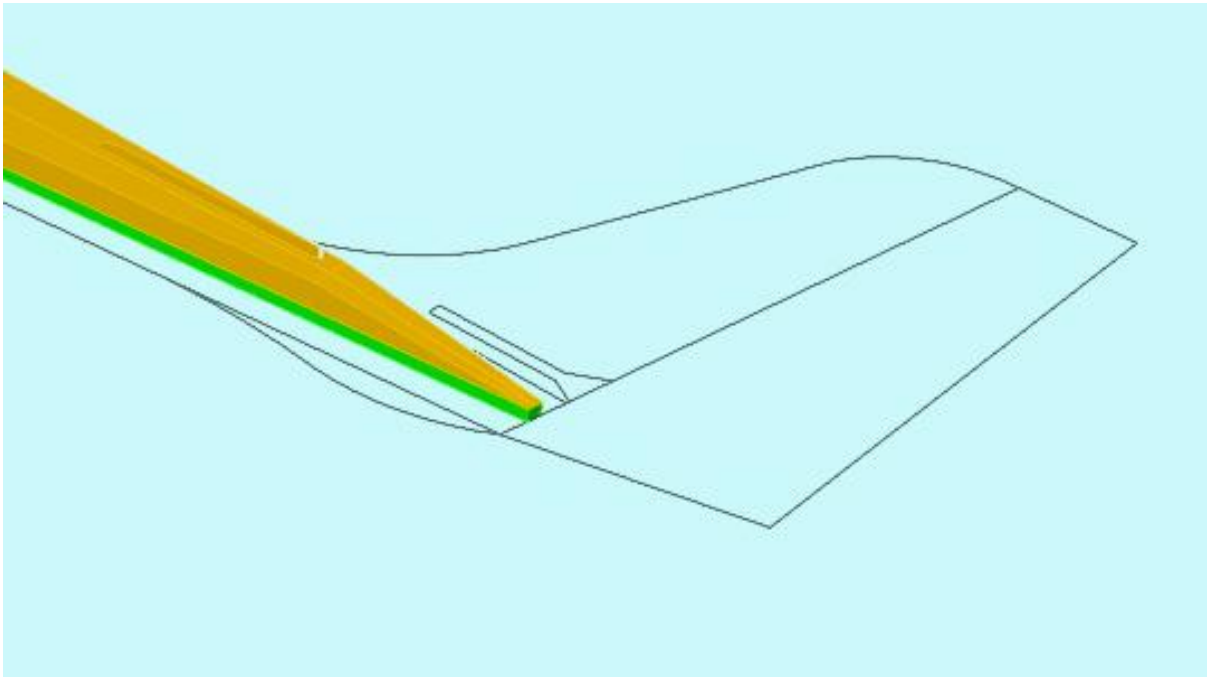
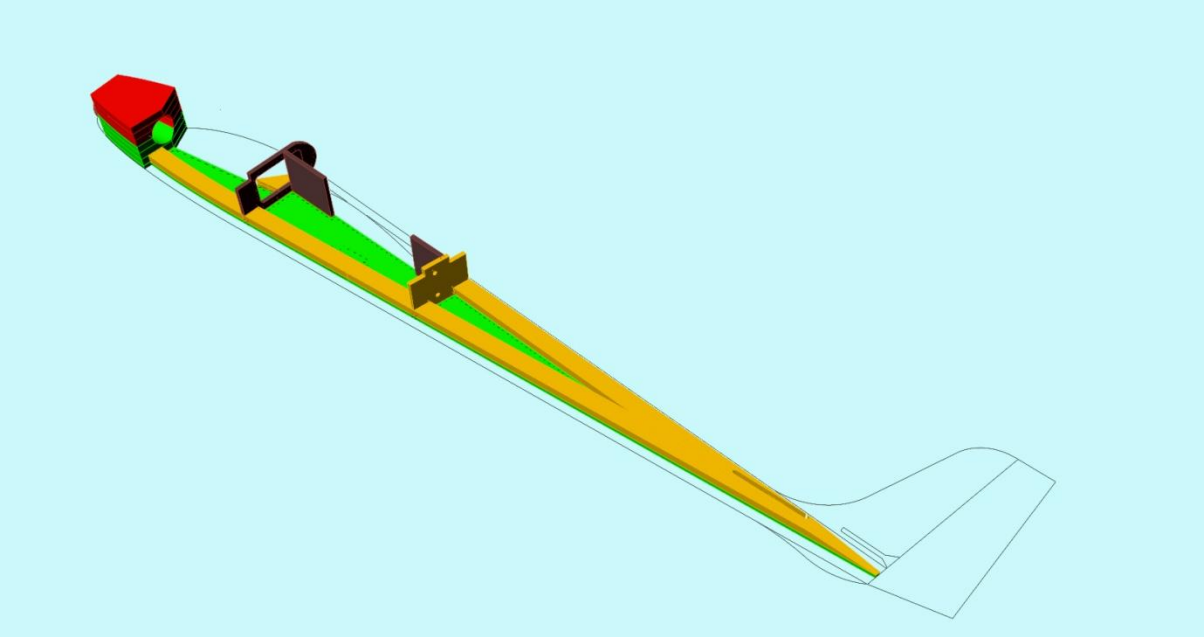
4. Chamfer the rear of the fuselage doublers where the sides will be drawn together



5. Glue the fuselage formers all in position as shown, along with the 3.2mm ply wing mounting plates and motor mount formers.



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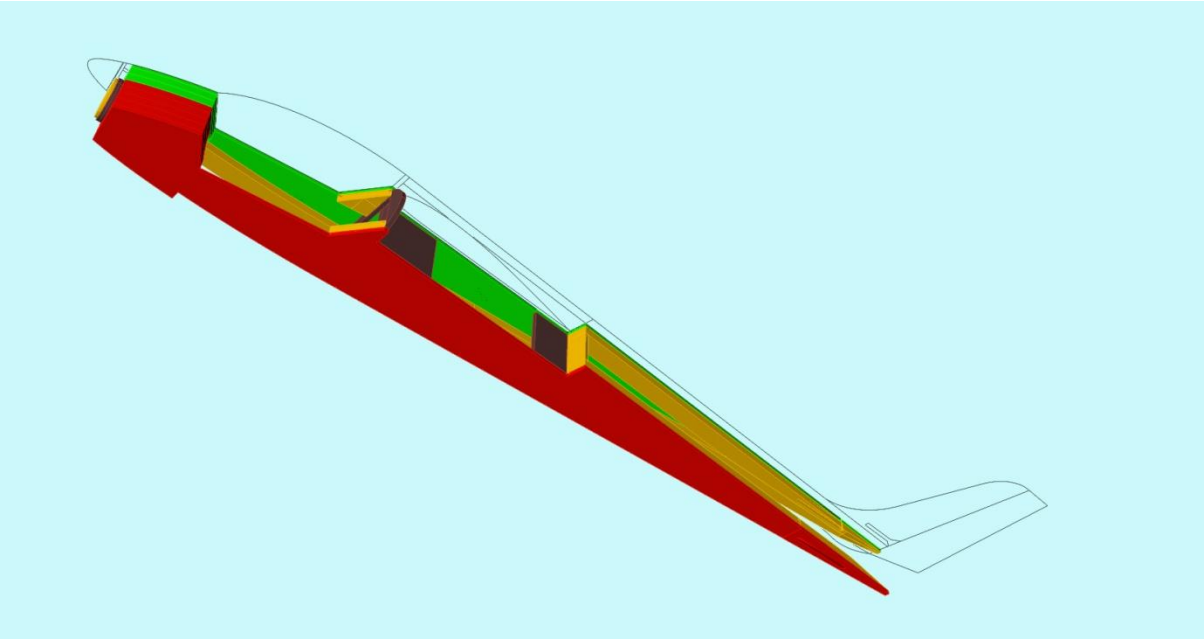
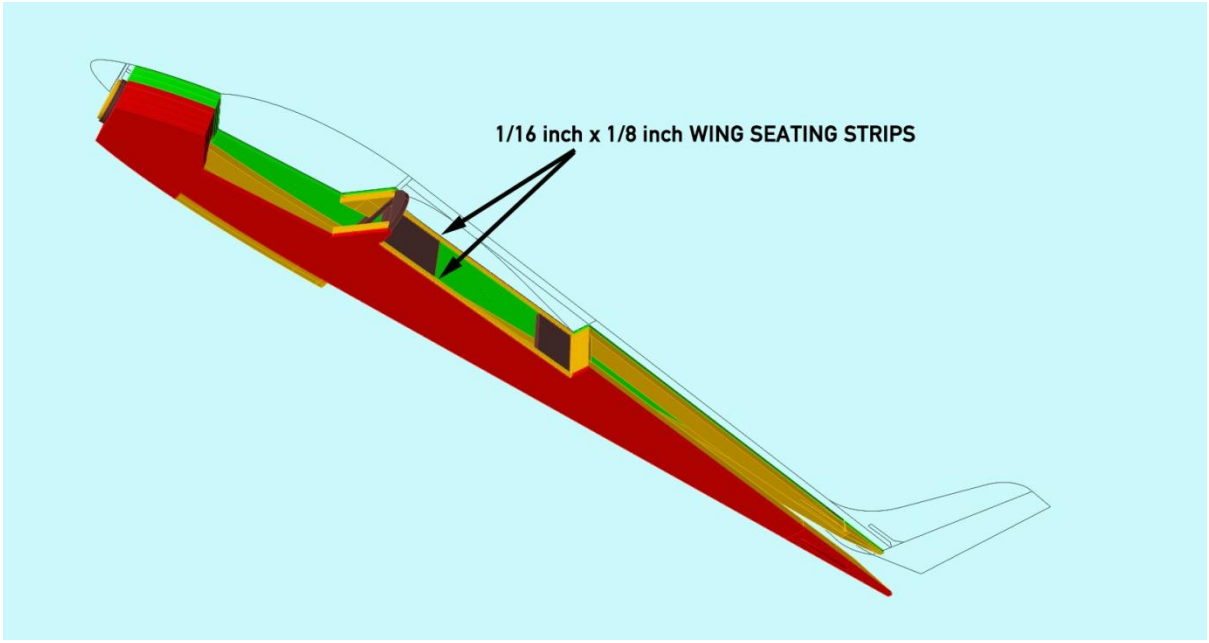
6. Glue fuselage LHS assembly to fuselage RHS assembly.



7. Glue the 6.4mm balsa forward fuselage bottom sheeting in place, as well as scrap 1/16” x 1/8”balsa wing seating strips (which are to allow for the wing dihedral).



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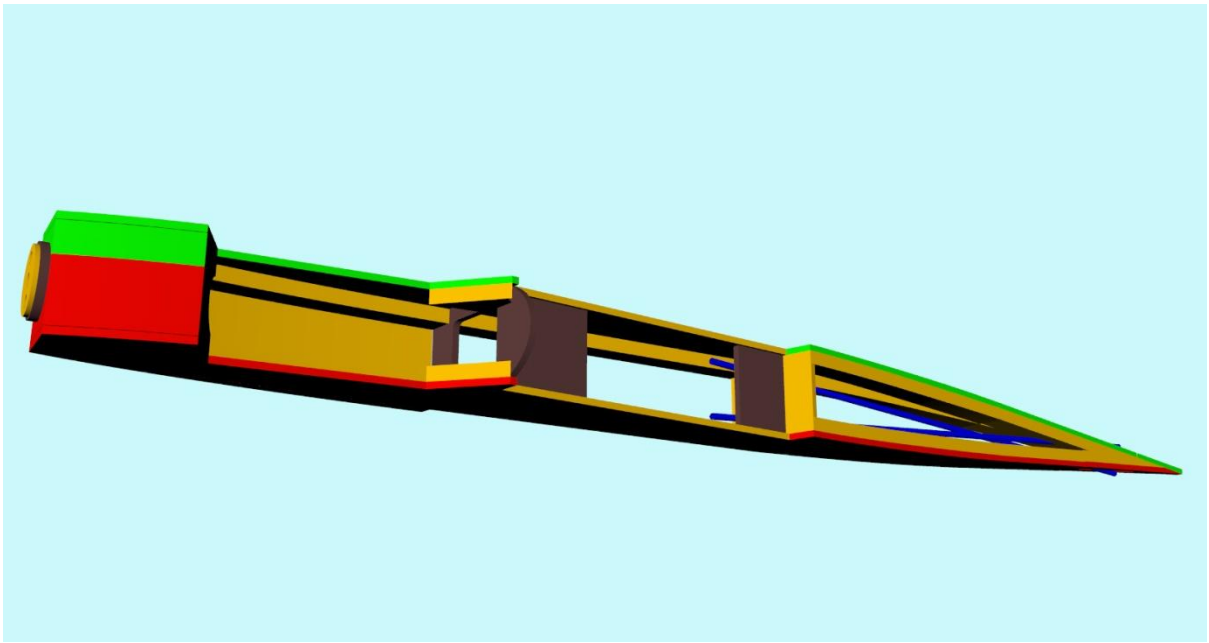
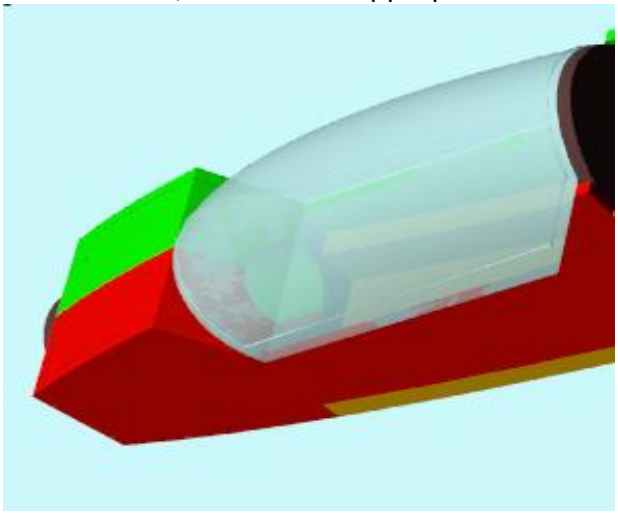
8. Glue the rear fuselage sides together, then glue in the 1/8” OD plastic sleeves for the pushrods. Note that these are crossed to give the best geometry.



9. Before the fuselage is shaped you will need to complete the canopy, which is used as a shaping guide for the forward fuselage. The prototype model used a 3D printed canopy, from 2 x 0.4m layers of clear PLA – canopy file available from here:
   https://timelesswings.com/downloads
   The 2 layers of clear PLA may distort if left in a hot car, but should be fine for normal use on the model. If preferred, PETG can be used for printing as it is more heat resistant. Those without access to a 3D printer may wish to form the canopy from foam or balsa, hollowed as appropriate.



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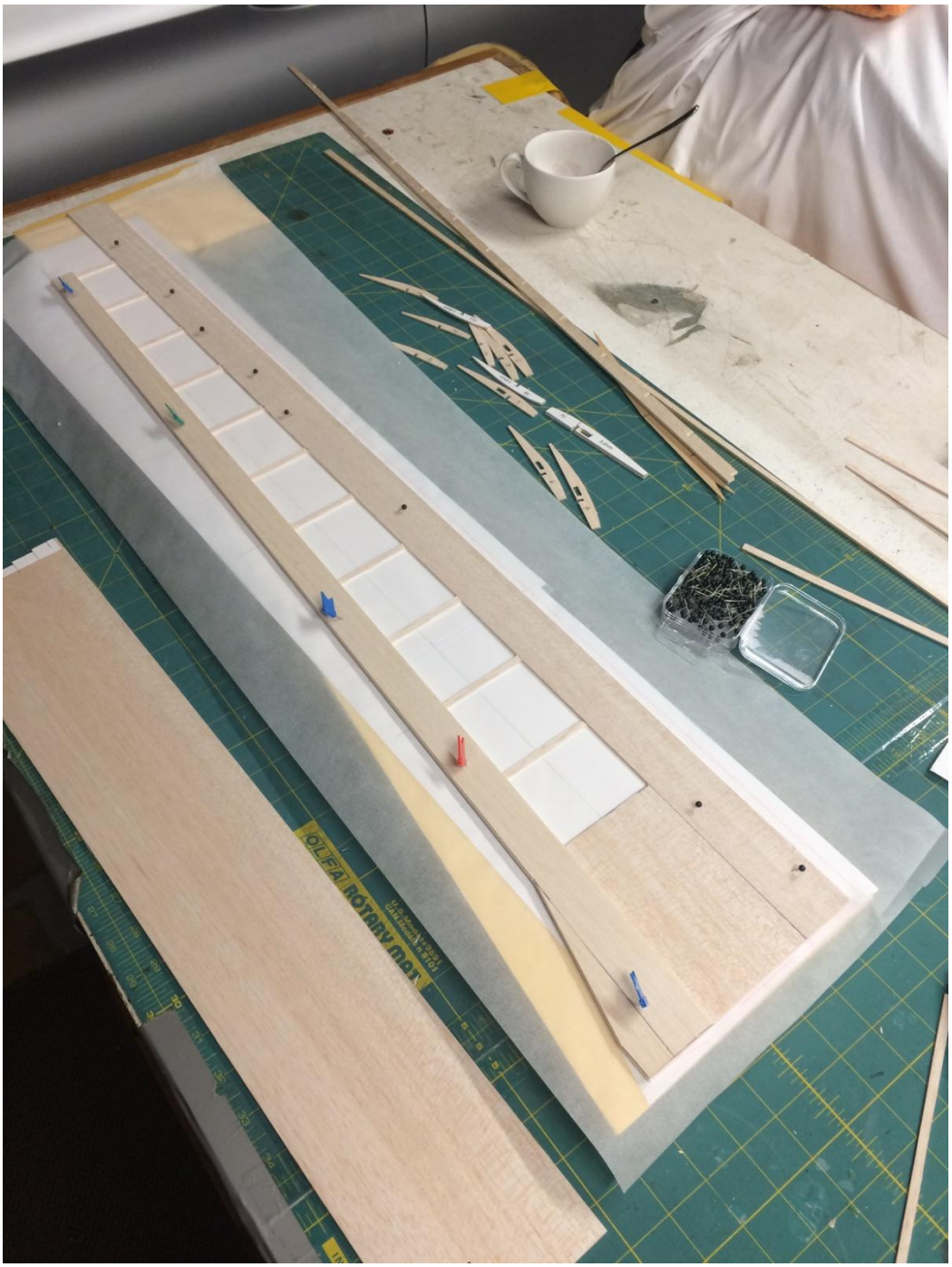
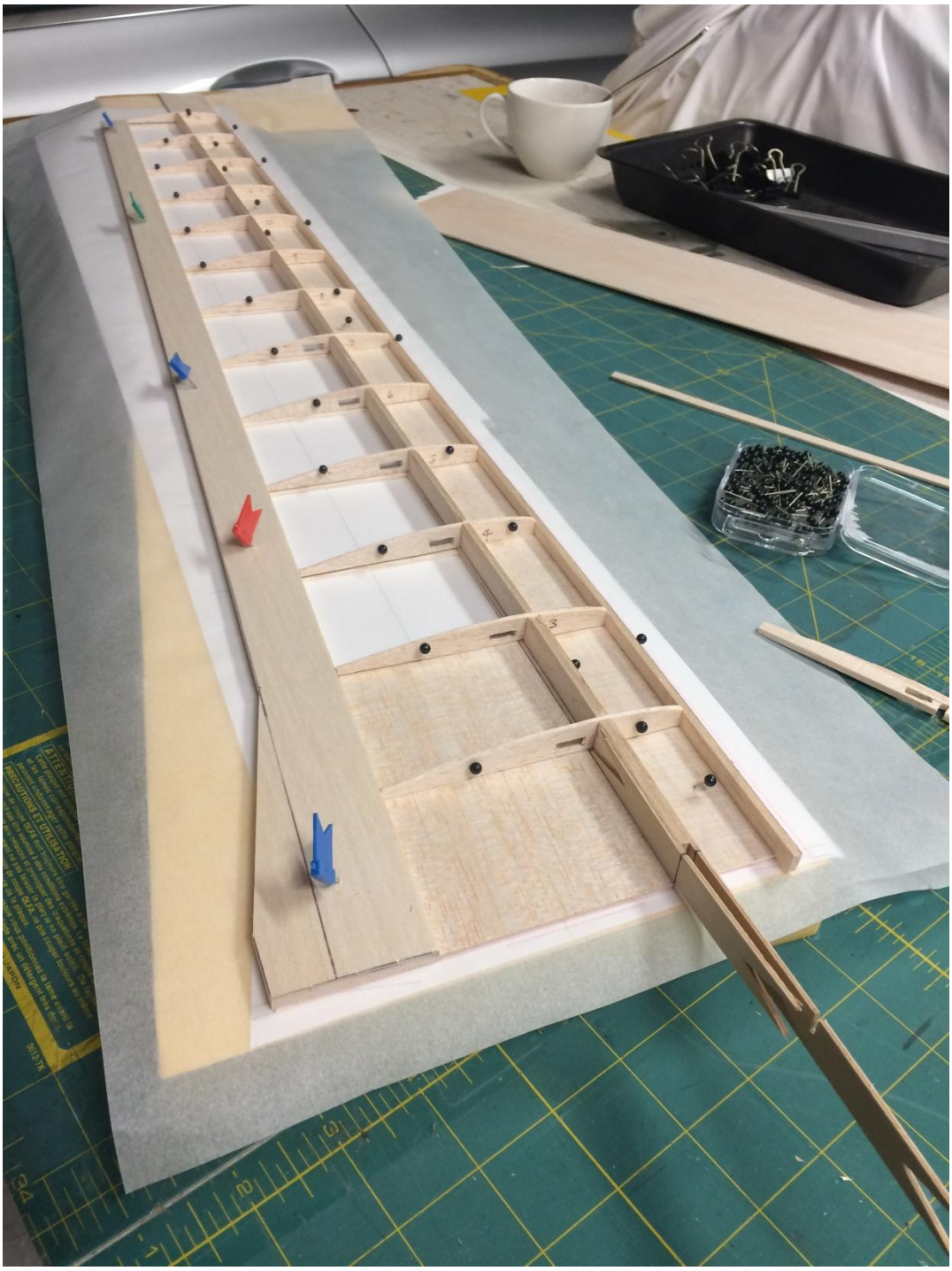
10. Add the remaining 6.4mm balsa fuselage top and bottom sheeting, leaving a slot in the rear section for the fin. Generously carve and sand fuselage to approximate the shape shown on the plans. Shape the fin and rudder then glue the 3/16” balsa fin in position. Make up the tailplane and elevator from 1/8” balsa and 1/8” x 1/4” bass or spruce (as shown on plan) shape, and glue to fin. Note: the tailplane and elevator should be hinged before assembly. (Prototype used iron-on film as a hinge). Fit skid under rear fuselage.

WING CONSTRUCTION

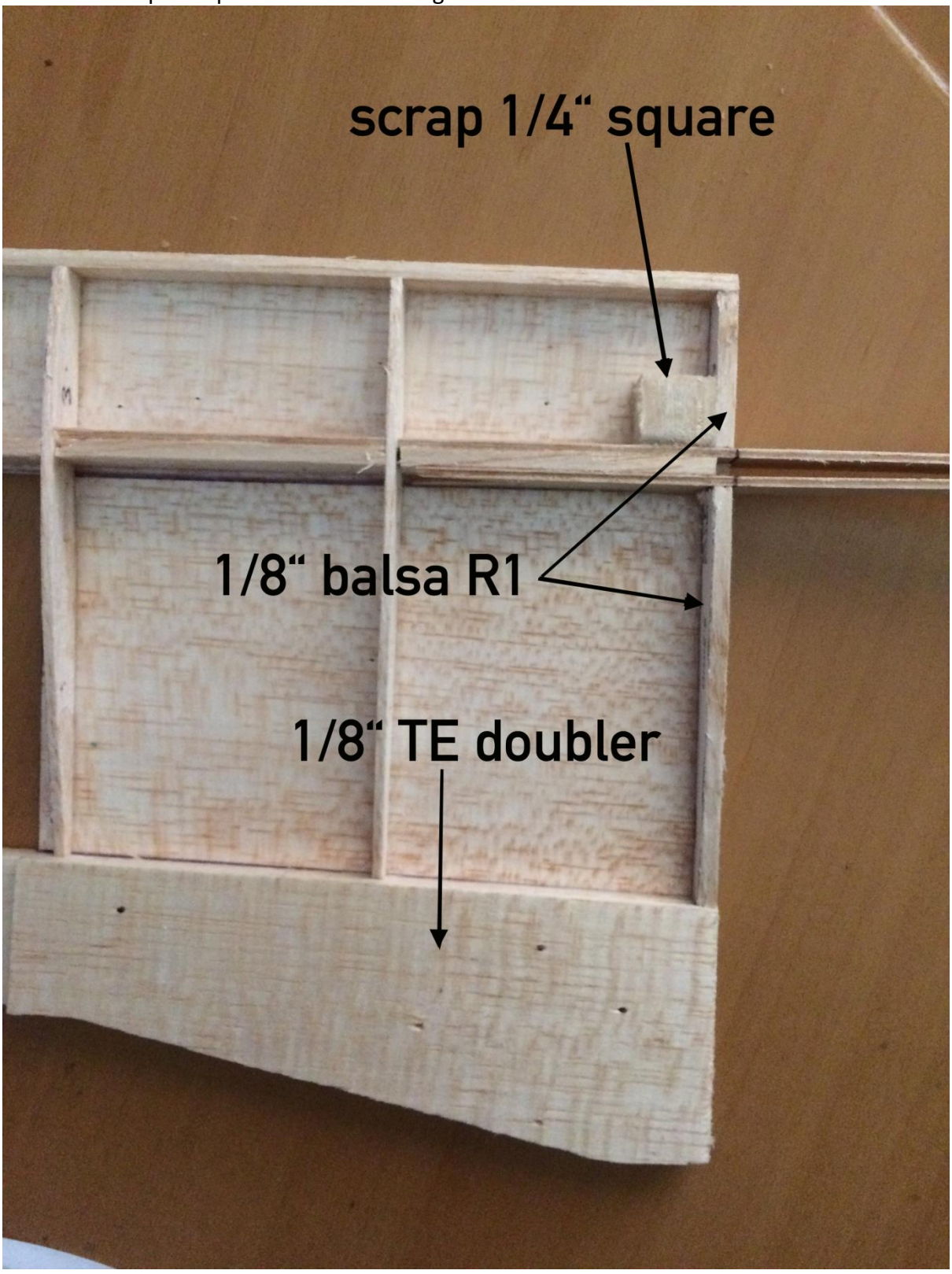
11. Tape the left wing plan to the building board with a layer of baking paper on top, then pin in place the 1/16” sheeting and 1/4” trailing edge , and glue cap strips in place as show below.



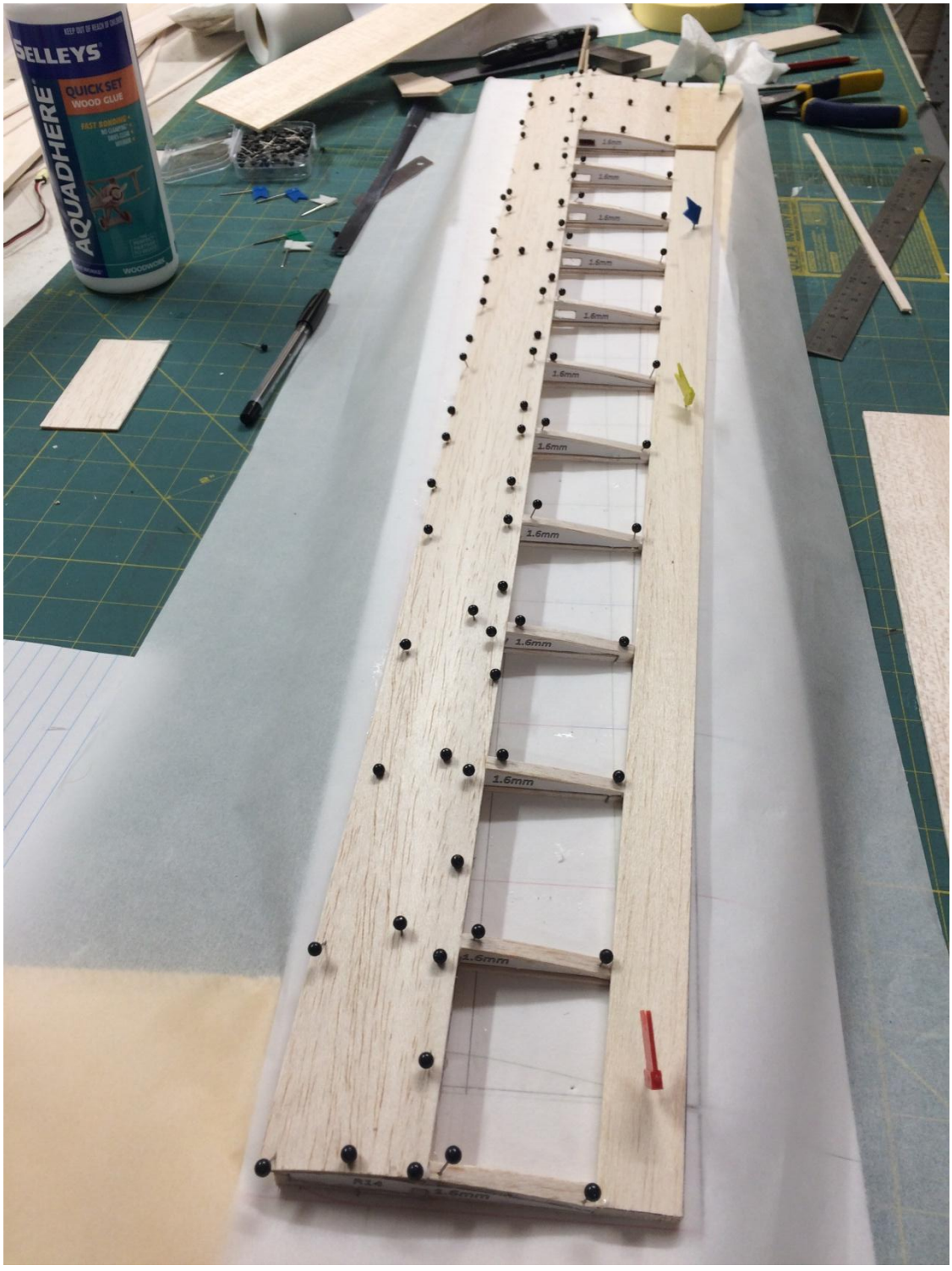
12. Glue the front and rear dihedral braces to the spar, then thread the ribs onto the spar and glue this assembly into position over the sheeting and cap-strips. PVA works well here. Glue the false LE in place.



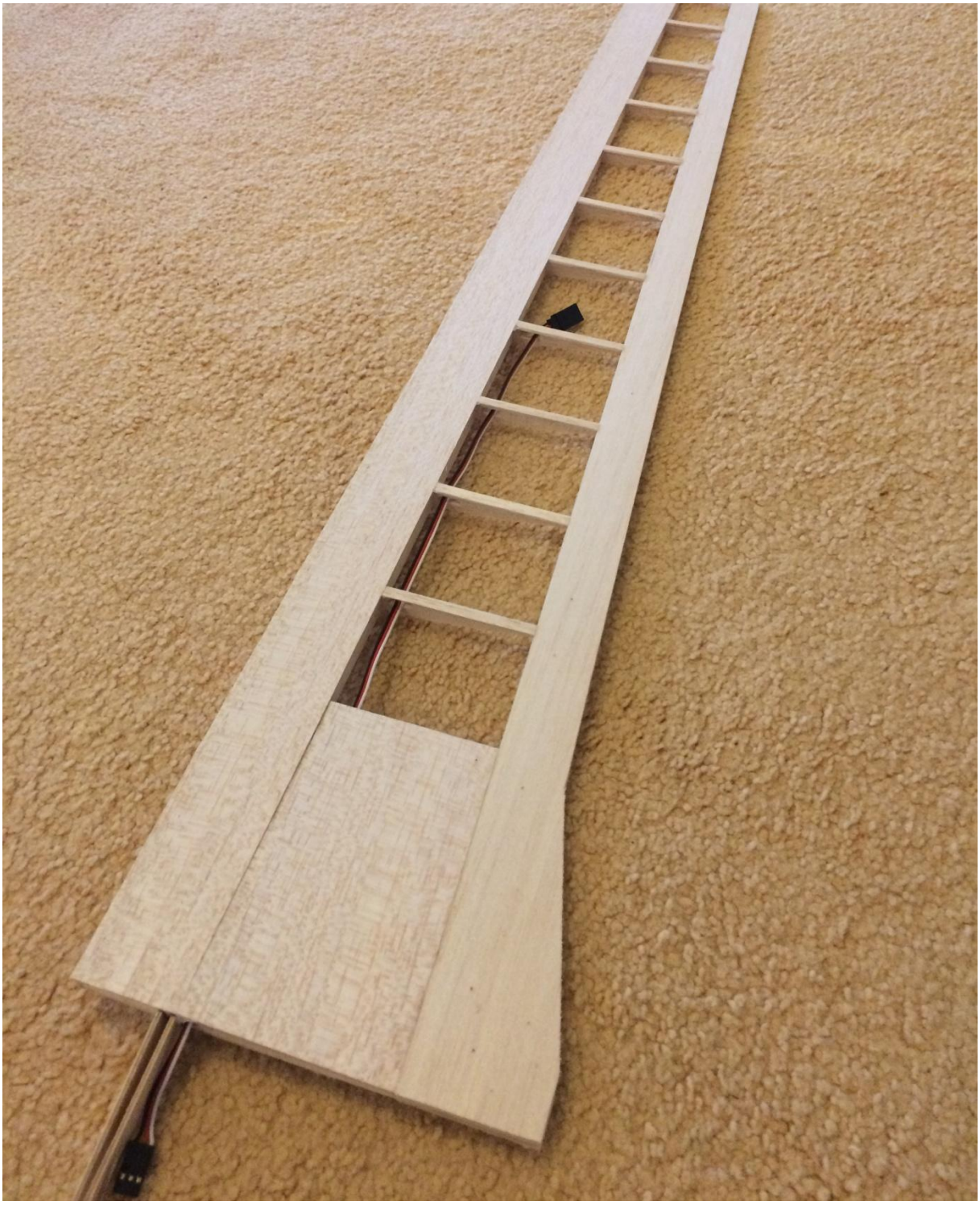
13. Fit and glue front and rear sections of 1/8” (3.2mm) balsa root rib R1, as well as TE doubler and scrap ¼” square balsa front wing bolt reinforcement.



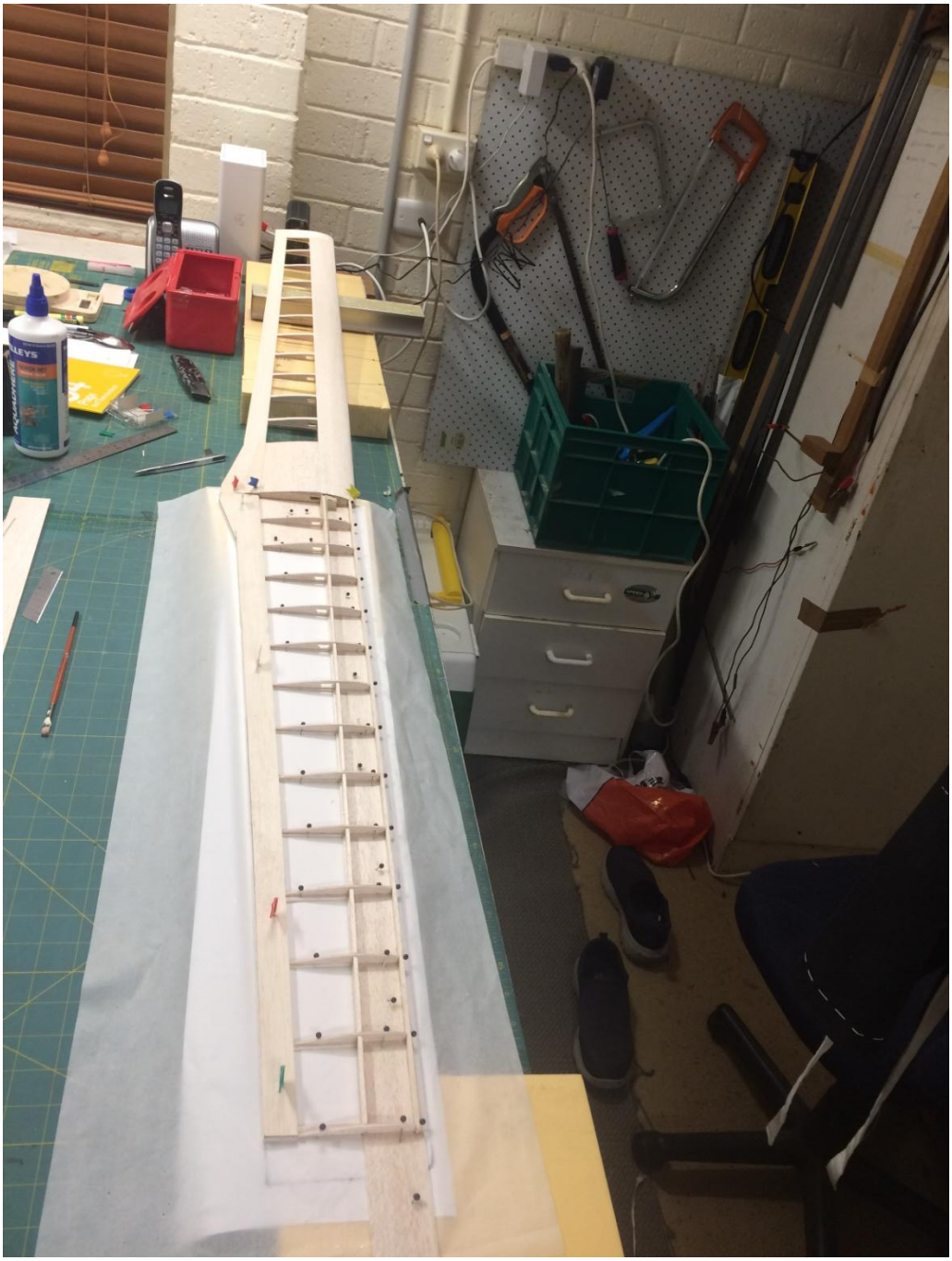
14. Glue on the LE sheeting using PVA.



15. Trim and sand the LE and wingtip and fit 6.4mm balsa LE left and WINGTIP. Sand to shape. Thread the aileron servo extension lead through the appropriate holes in the ribs. Depending on how you choose to fit the wing servos, you may add the servo mount sheeting and reinforcements now, or after the two wing halves are joined. Underside of left wing shown below.



16. Build the right wing over the plan, propping up and joining the left wing to the right wing during construction before the top sheeting is added. A hole is made in the bottom RHS centre-section sheeting for the aileron servo leads to exit.



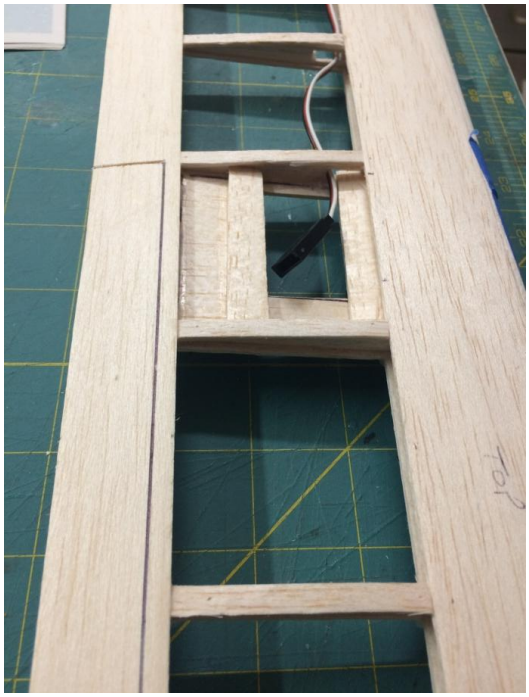
17. Once the wing structure has been completed, drill holes for 2 x 4mm wing bolts (use location shown on the plans) then present wing up to fuselage, marking the position on the ply fuselage wing mount plates where the bolts come through. Drill and tap holes for the 4mm bolts in the ply or for alternative blind retention nuts.

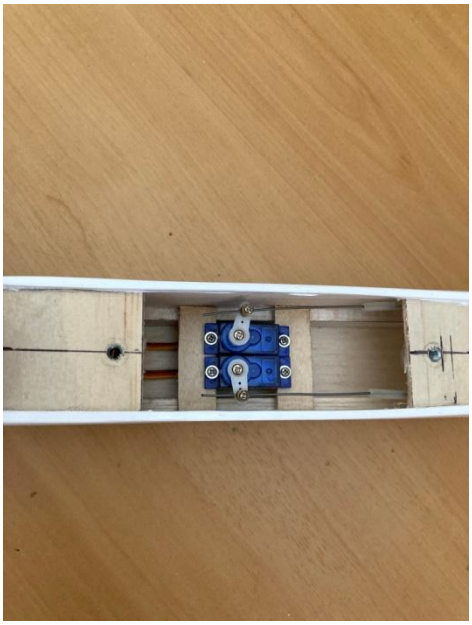
18. Make up the fuselage over-wing fairing as shown on the plans, and temporarily fit in place to shape. The model is now structurally complete, and should look something like this:

FITOUT

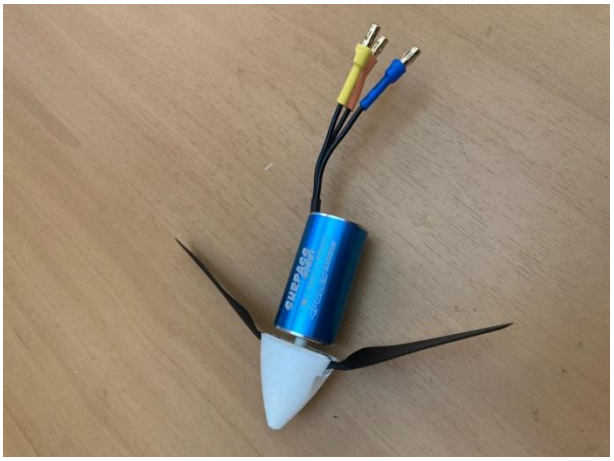
19. Decide how you wish to hinge the ailerons; then cut out from the wing and bevel to suit. The prototype used clear tape, top-hinged. The rudder can be hinged according to preference. Fit the aileron servo attachments of choice, if not already done earlier.

    The prototype was covered with HobbyKing iron-on covering, which goes on easily and gives a great result. HXT900 servos are fitted side by side in the prototype. Smaller servos would be fine too. Fit control horns and associated connectors etc.





Fit the motor and radio gear. Air holes for motor cooling have not been added at this point in time, but should be considered for motor longevity. If using a 3D-printed canopy, hollow the bottom with a soldering iron to fit the flight battery. Rare earth magnets were used to hold canopy in place. The fairing over the top of the wing is held on with clear tape.



FLYING

Control throws (all measured at widest point of surface)
ELEVATOR: 8mm UP /4mm DOWN. AILERONS: 8mm UP/4mm DOWN. RUDDER: 20mm LEFT/RIGHT. Expo to taste.

The importance of a forward Centre of Gravity position cannot be emphasised enough with this model! Do balance as shown on the plan, even if a small amount of lead in the nose is necessary, as it probably will be. The CG shown gives a neutrally stable model which performs well, and is responsive with good glide and penetration. It flies faster than a floater like a Radian or Aquila, but does not disgrace itself in their company especially once the wind picks up.

This model would perform well on the slope without a motor too. On the flat field it has done basic aerobatics including loops and rolls.

Enjoy!

A short flight video can be found here:

https://www.youtube.com/watch?v=oBufEUaoIu4