Snowy-E

63in Span Rudder Elevator Electric Soarer for 4-6 Channel RC Equipment.

Designed by: Stan Yeo

Produced by: Phoenix Model Products

Introduction

Snowy-E is an introduction to traditional model building and an entry level electric soarer. In the past model building was sometimes looked upon as something of a chore but a rite of passage to the more exciting bit of model flying. For us at PMP there is as much pleasure to be gained from building as from flying. Not only must the model be a great flyer but it must also be structurally sound and a pleasure to build with the minimum amount of fuss enabling the modeller to produce a model that they will be proud of. Snowy-E meets this criteria. It is a great flyer, an excellent trainer, will take a lot of hard knocks and is easy to repair unlike most ARTF (Almost Ready to Fly) kits not forgetting it is a pleasure to build.

Airborne Equipment Required

The recommended radio equipment required to fit out the Snowy-E is two standard size servos such as the Hitec HS311 and a 4/6 channel transmitter and receiver. For the power train we recommend an Overlander Thumper 2836 270w, 1100Kv brushless motor, a 40A speed controller and a 1800 /2200mAhr 3 cell LiPo battery driving an 9x5 folding propeller.

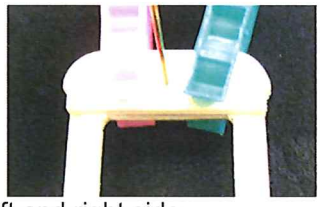
Tools / Materials Required

The tools required to build the Snowy-E are a modelling knife with spare blades, a One Metre Straight Edge, a minature David Plane,180 grade Wet & Dry sanding block and soldering iron. 10mm thick Sundela is recommended for use as a building board (you can stick pins in it!). The glue used to build the model white PVA wood glue, thin Superglue (please observe safety precautions) and a small quantity of two part epoxy. We recommend using a polyester film for covering such as Oracover / Profilm or the thinner more economic version Easycoat.

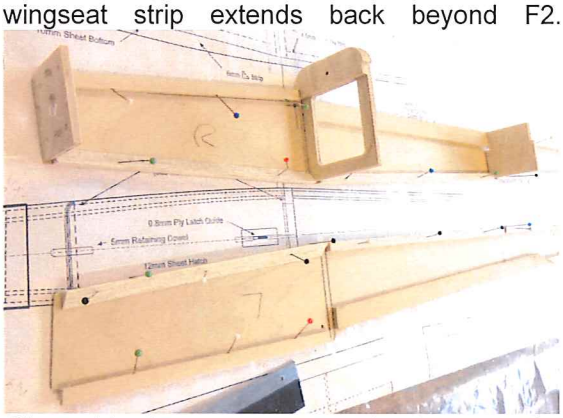
Please Note for ALL wood joints use PVA wood glue unless otherwise stated

Building the Fuselage

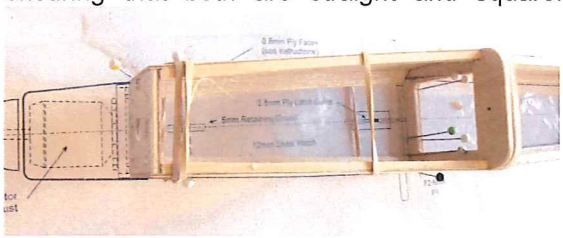
1. Lightly sand the fuselage sides, top and bottom with 180 grade wet and dry to remove the 'release' agent. Remove dust with a small brush or vacuum cleaner.
2. Glue F2A to front face of F2.
3. Mark out the position of formers F2 & F3 on the inside of the fuselage sides ensuring there is a left and right side.



4. Tape Fuselage sides together and mark centre of Wing Dowel holes.
5. Cut slot for Elevator cable exit as indicated on plan (bottom of fuselage.
6. Using PVA (wood glue), glue spruce nose and wingseat strips to fuselage sides. Note wingseat strip extends back beyond F2.



7. Glue strip longeron super structure on the fuselage sides noting there is a right and left. To avoid mistakes we recommend both fuselage sides are place on the building with the undersides facing each other.
8. Lightly sand edges of fuselage side to prepare gluing surface to receive top and bottom sheet.
9. Join fuselage sides together over the plan ensuring that both are straight and square.

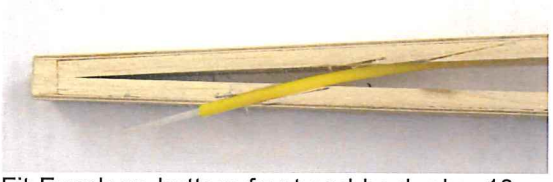


10. 7. Lightly mark out centreline on tailplane ensuring it square to the hinge line.
11. Glue triangular strips to base of Fin and glue Fin to Tailplane ensuring it is perpendicular and ***square***. If, when glue has set, Fin is not quite perpendicular to the Tailplane then slice the triangular strip on the acute angle (leaning towards) side and insert a thin cardboard

wedge to correct inaccuracy. Thin Superglue wedge in place.

12. File a recess in triangular strip on one side of Fin base to accept Rudder control cable.

13. Glue Tailplane in place checking that it is both horizontal, in line with axis of fuselage and the distances between Tailplane hinge edge corners and centre of F2 are equal.
14. Fit fuselage top sheet. When glue has set drill hole close to Fin (item 11) at an acute angle for the Rudder control rod. Use a long drill constructed from a piece of 3mm (10swg) piano wire as per the wing dowel drilling tool shown on the plan.
15. Fit Rudder and Elevator control rods. These must be anchored to the fuselage side every 100-120mm using spare 6mm x 10mm strip to make a bridge. Superglue in place. Before fixing control cables check control cable inners are not binding and move freely.



16. Fit Fuselage bottom front and back plus 10mm top nose sheet.
17. Angle rear face of hatch to match front face of F2. Centrally position 0.8mm ply end face and Superglue in position.
18. Cut Hatch to length and slope end at front of hatch to match abutting face. Allow enough space between the front of the hatch for the two ply end faces plus enough to 'jam' a third ply plate (supplied) to hold the hatch in position whilst the 'front end' is sanded to shape. This gap is to allow for the thickness of the covering material fitting/removal.

19. Align back of hatch with holes for 3mm hardwood dowels in F2 and drill dowel holes through F2 into hatch.
20. Dry fit 3mm dowels in hatch to prevent hatch from moving during nose shaping.
21. PVA Glue ply faces in position and jam hatch in place using third piece of 0.8mm ply. (Superglue can be used but with extreme care). Do not shape the front 0.8mm end faces.
22. With the hatch firmly held in position sand and shape nose to achieve a smooth line.
23. Remove Hatch from Fuselage when glue has set and fit 3mm Hardwood retaining dowel and Hatch

Latch. Grease Latch before Epoxying brass tube in place to prevent it sticking.

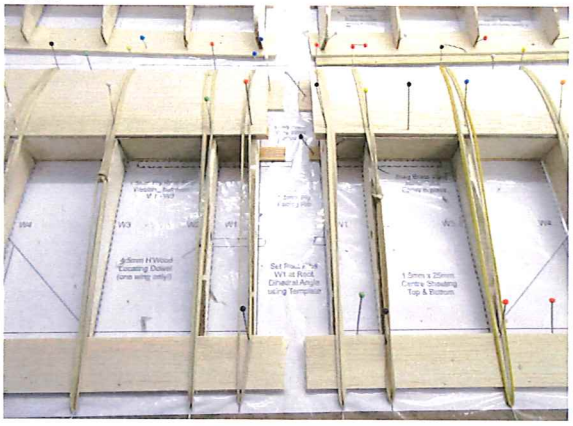
24. Fit Rudder and Elevator servos.
25. Cut Mylar Hinges to size (12mm x 25mm). Trim corners to stop the digging in and roughen gluing surface with Wet & Dry.
26. Hinge Rudder and Elevator control surfaces. Do NOT glue until the model is covered.

Building Snowy-E Wings

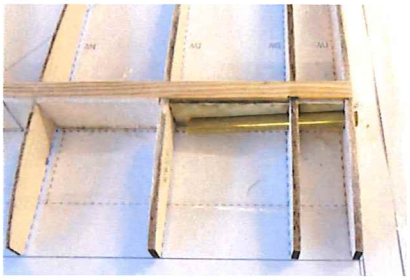
To avoid delays when building the wing panels waiting for the glue to dry separate the wing panel plans from the fuselage plan and mount both sets on the building board and cover with clear polythene / cling film. We strongly recommend using PVA wood glue throughout except for fixing the wing joining tubes where two part epoxy is used.

Wing Centre Panels

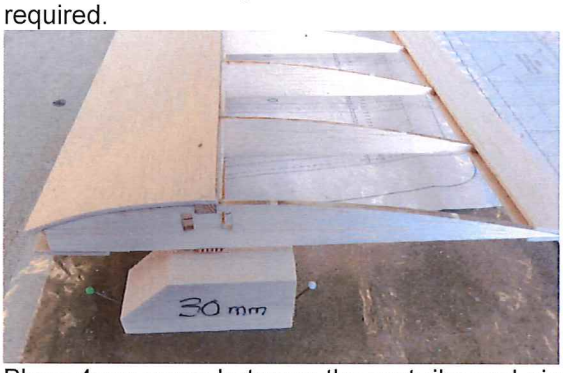
1. Pin Leading Edge (LE) lower sheeting to the plan observing the rear location line and NOT the LE Strip line. ALL LE sheeting deliberately overhangs the front of the wing ribs by 4 or 5mm.
2. Using 1.5mm sheet scrap lift front edge of bottom LE sheeting to conform to rib profile.
3. Pin bottom 1.5mm x 10mm spruce spar in position along with the 1.5mm x 25mm bottom Trailing Edge (TE) strip.
4. Using a 'rib locator jig' align the ribs fore and aft for top spar and vertical alignment. Glue ribs in position.
5. Use 1.5mm ply dihedral brace to set root rib angle.
6. Before the glue sets fit 3mm x 6mm spruce top spar. Adjust ribs for and aft as required to accommodate top spar. After fitting top spar check root rib angle is still correct.
7. Again, before glue sets, fit vertical ply rib bracing between W1 –W3.
8. Fit 1.5mm vertical spar bracing. Note grain is vertical for strength and on both sides between W4 & W5.
9. Chamfer joining edge of 1.5mm sheet top TE strip and glue in place.
10. Fit top LE sheeting. Use rubber bands to hold sheeting in position whilst the glue sets.



11. Remove wing panel from building board.
12. Build opposite wing centre panel.
13. Lightly grease 8swg piano wire wing joiner to prevent sticking.

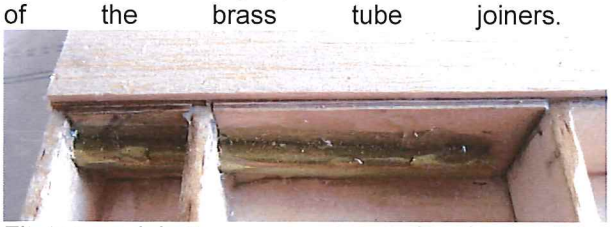


14. Dry assemble centre wing panels together using 8swg brass tubes and piano wire joiner.
15. With 30mm tall blocks under each panel tip rib push panels. Adjust contact faces as required.



16. Place 4mm scrap between the root ribs and pin together using modelling pins or clothes peg.
17. Push brass joiner tubes together so they meet in the middle of the 4mm gap.
18. After checking 30mm dihedral blocks are correctly positioned epoxy brass tube wing joiners in place.

19. When epoxy has set lift panel from building board and add an epoxy bead to the underside of the brass tube joiners.

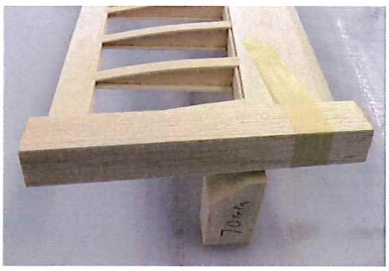


20. Fit top and bottom rear centre sheeting and 1.5mm rib capping strips.
21. Using a David Plane and 180 grade Wet & Dry sanding block, plane / sand leading edge sheeting back to end of ribs.
22. Place Sellotape along leading edge joint to prevent excess glue going on the leading edge sheeting. This best done by letting the tape overhang edge of sheeting and trimming back with a sharp scalpel.
23. Glue leading edge in place. Use strips of masking tape to hold LE in position until the glue is dry.
24. Sand and shape leading edge.
25. Glue 1.5mm Ply end faces in position.
26. Fit 4.5mm hardwood locating dowel to one wing panel.
27. Chamfer edges of 0.8mm ply wing band protectors and glue in position.
28. Harden leading edge with Superglue around wing band area to protect it from damage by the rubber bands.

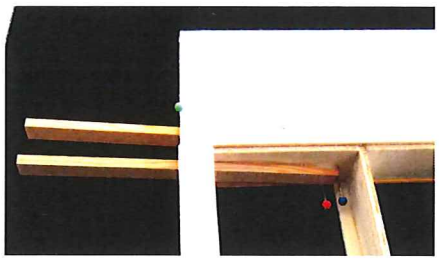
Tip Panels

1. Pin Leading Edge (LE) lower sheeting to the plan observing the rear location line and NOT the LE Strip line as before.
2. Using 1.5mm sheet scrap lift front edge of bottom LE sheeting to conform to rib profile.
3. Pin bottom 1.5mm x 10mm spruce spar in position along with the 1.5mm x 25mm bottom Trailing Edge (TE) strip.
4. Using a 'rib locator jig' to align the ribs fore and aft for top spar and vertical alignment glue ribs in position.
5. Glue ribs in position. For tip panel root rib use Tip Dihedral Template to set rib at correct angle.
6. Before the glue sets fit 3mm x 6mm spruce top spar. Adjust ribs fore and aft as required to accommodate top spar. After fitting top spar check root rib angle is still correct.
7. Fit top 1.5mm TE strip. Again chamfering the join edge.
8. Fit 1.5mm vertical spar bracing. Note grain is vertical for strength and on both sides between W5 & W6.
9. Pin Tip panel to building board front and back at the root rib W5 and at the front of the tip rib W11. Remove all other modelling pins.
10. To build 'Wing Washout' into wing tip panel place 5mm scrap under trailing edge at the rear of tip rib W11 and in place.
11. Fit top LE sheeting. Use rubber bands to hold sheeting in position whilst the glue sets.
12. Fit 1.5mm rib capping strips.
13. Using a David Plane and 180 grade Wet & Dry sanding block, plane / sand leading edge sheeting back to end of ribs.
14. Place Sellotape along leading edge joint to prevent excess glue going on the leading edge sheeting. This best done by letting the tape overhang and trimming back with a sharp scalpel.
15. Glue leading edge in place. Use strips of masking tape to hold LE in position until the glue is dry.
16. Sand and shape leading edge.
17. Fit and shape balsa block wing tips.
18. Build opposite wing tip.
19. Check 3mm x 6mm spruce tip braces are a comfortable fit in their respective wing panels.

20. Dry assemble Tip & Centre wing panels with centre panel, weighted, flat on the building board and 70mm blocks under end tip rib.



21. Check the two panels make a good joint. Adjust as necessary.
22. Centrally align the rear spruce brace on each inboard panel and mark its position with a pencil.



23. Glue spruces braces in position on the inboard panel ensuring they are aligned with each other.
24. Glue and re-assemble panels as before.

Wing Panel Finishing

Using fine (400) and medium (180) grade Wet & Dry finish sanding wing panels. Fill in any gaps /blemishes with light weight filler. Dents can be addressed by wetting the area and expanded back out with a hot iron. Remove sanding dust with a soft brush and vacuum cleaner. Failure to do this will result in pimples when the covering is applied.

Covering & Finishing

1. The originals were covered in heat shrink film and this has proved more than adequate. Should you wish to cover in a different material please take into account any potential weight penalty that it may incur and puncture / tear resistance / repairability.
2. Give the complete model a final sanding with 320 grade Wet & dry. DO NOT use a sanding block on wing sheeting. It sand away material on top of the rib and weakens the wing.
3. Before covering vacuum the model to remove embedded dust to avoid 'pimpling' when covering.
4. Please follow the instruction for the covering material being used. Normal procedure is to tack the material at one end. Tack the other end and then proceed to gently stretch and tack along its length before sealing all along the edges and shrinking with a Heat Gun.
5. Fit controls, hinge rudder, carry out final adjustment to elevator neutral and balance the model including the wings (laterally). Balance Point 65mm +/-3mm behind the leading edge.
6. Set the control movement as per the plan i.e. Elevator +/- 10mm. Rudder +/- 30mm. If using 2.4Ghz R/C equipment it is often recommended that you re-bind / pare the receiver to update failsafe settings. Please consult your equipment manual.

The Electrics

We recommend using a 2.4Ghz radio control system to reduce the risk of interference from the power train. The motor recommended is a 2836 270W, 1100Kv with a 40A speed controller with the brake ON and a 1800/2200mA 3S LiPo battery driving a 9x5in folding propeller. If using 2.4Ghz radio then the Tx / Rx must be paired / bound with the throttle in the LOW throttle position to set the Failsafe. If when powering up the motor it does run then swop two of the three motor leads. If it runs in reverse either swop two leads or reverse the throttle channel on the transmitter. If it just sits there with the ESC beeping then increase the travel on the throttle channel via the EPA / Travel Adjust menu and re-pair / bind the Tx and Rx again. The ESC is armed using the Leading / Trailing edge of the throttle control pulse supplied by the Tx via the Rx. When satisfied run motor on low throttle and switch off Tx to check the failsafe. If motor continues to run then increase the travel on the throttle channel, re-pair / re-bind and repeat test.

As the motor is reversed mounted a 54mm long motor shaft is required with a 4mm collet (reverse mounting kit). A shaft can be made from 4mm dia. Silver steel.

Flying

When satisfied, the model set-up and ready to go choose a suitable site and day to test fly Snowy-E i.e. wind not too strong or too light. If you are an inexperienced flyer please get an experienced flyer to test fly the model and give you some flying tuition. If set up correctly very little trimming should be required. The Snowy-E is capable of almost any manoeuvre that a non–powered rudder elevator model can be expected to perform. There are a number of articles on flying slope soarers on our website www.phoenixmp.com These include the basics of learning to fly, aerobatics, a discussion on landing techniques and more detailed information on model preparation.

Happy landings,

Stan