

Stage 2R Mk2

63in Span Rudder Elevator Slope Soarer Trainer

Designed by: Stan Yeo

Produced by: Phoenix Model Products

Introduction



The Stage 2 was originally designed as a more sporty rudder elevator only model but it was also available as an Aileron trainer hence the rubber bands to hold the wing on. Rubber bands have the advantage that if the model lands awkwardly then the wing can slide on the fuselage and hopefully avoid being damaged. Once again we have replaced the foam veneer wing of the Mk1 with a simple, easy to build, lighter fully sheeted built up wing avoiding the use of epoxy / polyester resins which some modellers are allergic too. The kit is very comprehensive with virtually all the fiddly bits pre-cut. The Stage 2R Mk2 is capable of virtually all rudder elevator only aerobatics including limited inverted performance and barrel rolls!

Radio Equipment Required

The recommended radio equipment required for the Stage 2 Mk2 is two standard size servos, a Square AA receiver battery and a 4 channel receiver and transmitter.

Tools / Materials Required

The tools required to build the Stage 2 are a modelling knife with spare blades, a One Metre Straight Edge, a miniature David Plane, 180 grade Wet & Dry sanding block and soldering iron. The glue used to build the model are white PVA wood glue, thin Superglue (please observe safety precautions) and a very small quantity of two part epoxy. We recommend using a polyester heat shrink 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. Also for maximum glue joint strength we recommend lightly sanding laser cut edges before gluing.

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. Mark out the position of formers F2 & F3 on the inside of the fuselage sides ensuring there is a left and right side.
3. Cut slot for Elevator cable exit as indicated on plan (bottom of fuselage).
4. Using PVA (wood glue), glue spruce nose and wingseat strips to fuselage sides. Note wingseat strip extends back beyond F2.



5. Glue strip longeron super structure on the fuselage sides.
6. Lightly sand edges of fuselage side to prepare gluing surface to receive top and bottom sheet.
7. Join fuselage sides together over the plan ensuring that both are straight and square.
8. 7. Lightly mark out centreline on tailplane ensuring it square to the hinge line.
9. Glue triangular strips to base of Fin and glue Fin to Tailplane ensuring it is perpendicular and **square**. If when glue has set it 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. Superglue wedge in place.
10. Glue Tailplane in place checking that it is both horizontal and the distances between hinge corners on tailplane to centre of F2 are equal.
11. Fit fuselage top sheet. When glue has set drill hole close to Fin 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.
12. 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.
13. Fit Fuselage bottom front and back plus 10mm top nose sheet.
14. Carve out Noseblock to accept 90grms Nose weight. Approximately a further 60grms of nose weight may be required inside the nose area to achieve the correct Balance Point.
15. Sand the front 3mm ply former F1 flat and fit Noseblock.
16. Angle rear face of hatch to match front face of F2. Centrally position ply end face and Superglue in position.

17. 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.
18. Align back of hatch with holes for 3mm hardwood dowels in F2 and drill dowel holes through F2 into hatch.
19. Dry fit 3mm dowels in hatch to prevent hatch from moving during nose shaping.
20. 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.
21. With the hatch firmly held in position sand and shape nose to achieve a smooth line.
22. Remove Hatch from Fuselage and fit 3mm Hardwood retaining dowels and Hatch latch. Grease Latch before Epoxying brass tube in place to prevent it sticking.
23. Fit and hold wing in position and drill hole for wing retaining dowel brass tube (use drill described on plan). Drill a pilot hole first using previously made 3mm piano wire drill.
24. Using the wing to align the wing retaining nut plate, assemble and fit said plate.
25. Bolt wing in position and fit front and rear wing fairings.
26. Fit Elevator servo. Mount On/Off switch. Fit Rudder servo.
27. Cut Mylar Hinges to size (12mm x 25mm). Trim corners to stop the digging in and roughen gluing surface with Wet & Dry.
28. Hinge Rudder and Elevator control surfaces. Do NOT glue until the model is covered.

Building the Wings

1. To protect the plan cover in either thin polythene or cling film.
2. Join front & back 1.5mm sheeting. Use metal straight edge to trim for a good joint. The sheeting has been Laser cut but may require further trimming due moisture changes in the wood. Sellotape them together along the joint. Hinge joint back and insert PVA glue. Place on flat surface and wipe away excess glue. Run Sellotape along top of joint. Weight down until glue set. Repeat for other three pieces.



3. Accurately align the bottom sheeting on the plan with the wing trailing edge. Note the front

of the sheeting overhangs front of the ribs by approximately 2mm.

4. Accurately mark position of mainspar on bottom sheet and using a straight edge glue and pin mainspar in place.
5. Elevate underside of sheeting in front of the ribs with scrap 1.5mm balsa so the sheeting conforms to the airfoil profile
6. Omitting W1 (abcd) ribs glue wing ribs in position. Use the parallel lines on the plan to aid alignment.
7. Glue ply B1 mainspar brace in place and glue ribs W1c and W1d in position.
8. Glue 6mm strip to front of Mainspar 1mm from the top. Ensure that it is a snug fit between the ribs. *Please note top sheeting is not added until the wing panels are joined together.*
9. Build second Wing, again omitting ribs W1 (abcd).

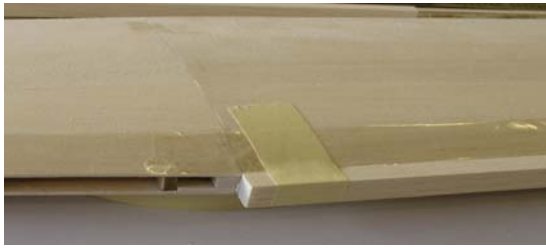


10. Trim and align root end of each wing panel. There is 100mm Dihedral under *each* wing panel, 200mm in total. Adjust ends of mainspars to suit wing dihedral.
11. Pin one wing panel to building board. Align second panel and raise/support the tip at 200mm.
12. Using PVA join wing panels and fit ply wing brace B2 (short one).
13. When glue is set remove panel one from building board and pin panel two in its place.
14. Glue ribs W1 (abcd) in position.
15. Taper trailing edge of top sheeting as shown on the wing cross section drawing



16. Glue wing top sheeting in place.
17. Using a David Plane / 180 grade Wet& Dry sanding block trim/sand leading sheeting until level with the end of the wing ribs. When satisfied place Sellotape along edge of sheeting top & bottom to minimise glue

overspill. *Tip: Do not try to align edge of Sellotape with edge of sheet but let it overlap and trim with a sharp scalpel.*



18. Carefully plane/sand leading edge to shape. *Tip: when using David Plane set blade at slight angle so that the cut is thinner on one side of the plane. It helps control thickness of cut.*
19. Prepare end of wing panels to accept soft balsa tips.
20. Glue 0.8mm ply end ribs to balsa tips. Again there is a *Left & Right!* Roughly shape and glue tip in place taking care to align tip end rib with wing end rib.
21. Sand wing tips to shape.
22. Fit 3mm hardwood dowel wing protection at wing root.
23. Fit 0.8mm ply trailing edge band protectors. Chamfer edges before fitting.
24. Give wing a final sand using 320 grade Wet & Dry.

Covering & Finishing

1. The originals were covered in heat shrink film (Profilm/Oracover). 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 thins the sheeting on top of the rib and seriously weakens the wing.
3. Before covering vacuum clean 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).
6. Set the control movements as per the plan i.e. Elevator +/- 10mm. Rudder +/- 30mm. . Exponential is recommended for both Rudder and Elevator controls.
7. If using 2.4Ghz R/C equipment it is often recommended that you re-bind / pair the receiver to update failsafe settings. Please consult your equipment manual.

Flying

When satisfied the model is set-up and ready to go choose a suitable site and day to test fly it i.e. wind not too strong or too light. If you are inexperienced on this type of model as a minimum get an experienced helper to launch the model. The wing bands should be tight enough to stop the wing moving in flight yet allow the wing to move if model lands awkwardly. If set up correctly very little trimming should be required. The Stage 2R is capable of almost any manoeuvre that a non-powered Rudder / Elevator only model can perform including inside loops and stall turns. In experienced hands it can also perform a rudder elevator barrel roll. To help the novice pilot there are a number of articles offering guidance on learning to fly slope soarers on or website at www.phoenixmp.com. They include basic flying skills, aerobatics and a discussion on landing techniques plus more detailed information on model preparation.

Happy landings,

Stan