Vagabond Mk2

39in Span Fun Sports Aerobatic Slope Soarer

Designed by: Stan Yeo

Produced by: Phoenix Model Products

Introduction

The Vagabond was originally designed as one of a trilogy of fun sport aerobatic slopers, the others being the Vagrant and Varmint. Whilst the prototype Varmint was built it never went into production. These models are a development of the design concept used in the very successful rudder elevator Mini Metro i.e. a simple box fuselage and a fully sheeted spar-less built-up wing. The Vagabond is capable of any manoeuvre expected of a small aileron elevator only slope soarer. It will stay aloft in all but the lightest lift conditions and yet still cope with some quite stiff breezes and at the same time be great fun to build and fly. All kit items are accurately cut using CNC equipment except for the die-cut fuselage sides.

Radio Equipment Required

The recommended radio equipment required to fit out the Vagabond Mk2 is one HS65 (preferably metal geared) for the ailerons and a Hitec HS81 / New Power XL16/7 size servo for the elevator, a Square AA receiver battery and a 4 channel receiver.

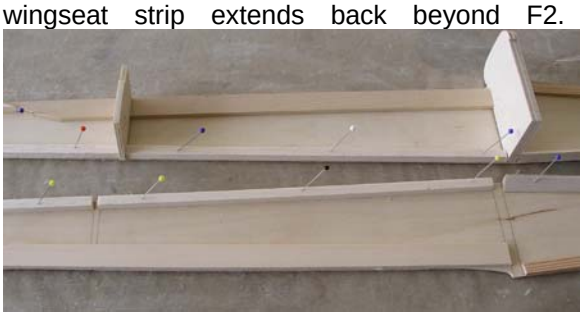
Tools / Materials Required

The tools required to build the Vagabond Mk2 are a modelling knife with spare blades, a miniature David Plane, 180 grade Wet & Dry sanding block and soldering iron. The glues used to build the model are 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.

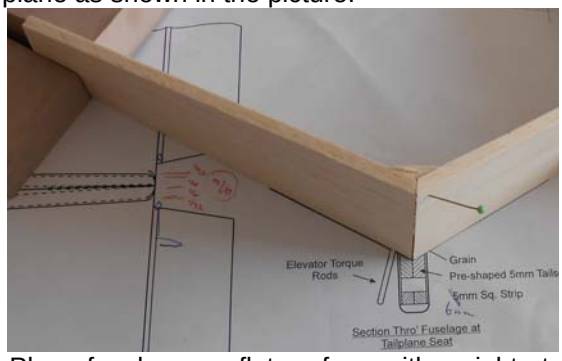
Please Note for ALL wood joints use PVA wood glue unless otherwise stated

Building the Fuselage

1. Lightly sand the fuselage sides 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 including 6mm tail-seat to fuselage sides.
6. Sand rear of tail-seat to thickness of longerons.
7. Lightly sand edges of fuselage side to prepare gluing surface to receive top and bottom sheet.
8. Join fuselage sides together over the plan, initially with F2 & F3, ensuring that both are straight and square. When glue has set join fuselage at nose and rear.
9. Install elevator control Bowden Cables anchoring to fuselage every 120mm spare strip to make a bridge. Note: elevator control cables pass thro F3 on the same side. Check control cables move freely in their conduits.
10. Lightly sand edges of fuselage side to prepare gluing surface to receive top and bottom sheet.
11. Fit 3mm and 6mm bottom sheeting and 10mm sheet top in front of Hatch.
12. Assemble Tailplane. This is best done over the plane as shown in the picture.



13. Place fuselage on flat surface with weights to hold it in position.
14. Glue Tailplane in place checking the tips are the same height above the flat surface and equidistant from the tip hinge corners to the centre of F2.

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. 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.
19. Locate centre of Hatch front face and drill 3mm hole 3mm hardwood hatch dowel. Dry fit Hatch dowel.
20. Build Wing.
21. Locate Wing on Fuselage and determine position for wing retaining dowel (centre of wing leading edge).
22. Holding wing in position and using a *'piano wire drill'* as described on the plan or equivalent suitable long shank drill, drill hole for wing retaining dowel.
23. Dry fit 5mm Wing dowel. Be careful when cutting to length, remember the dowel also retains the Hatch at the rear.
24. Tape Hatch in position and drill rear hatch retaining dowel hole.
25. Fit wing dowel in Hatch to secure Hatch for sanding to shape.
26. With the hatch firmly held in position sand and shape nose to achieve a smooth line.
27. Using the wing to align the wing retaining nut plate, assemble and fit said plate.
28. Bolt wing in position and fit front wing fairing and 3mm x 10mm spruce to rear of trailing edge.
29. Fit 3mm sheet top.
30. Join elevator control cables as indicated on plan.

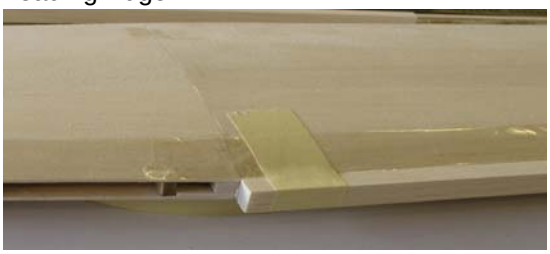
31. Fit Elevator servo. Mount On/Off switch. Fit Rudder servo.
32. Sand Tailplane and elevator to shape and fit elevator torque Rods.
33. Hinge Elevators using Mylar strip. Cut into 10mm x 25mm pieces. Blunt corners and roughen surface.
34. After covering hinge Elevators using thin Superglue and construct Elevator control rods. Bowden cable is not easy to cut. It is sometimes easier to solder the area to be cut and cut with a cold chisel on the back of a vice.
35. The elevators will also act as rudders if they are not correctly adjusted. The test for this is to do a series of loops into wind and the direction the model twists during the loop and adjust elevators individually as necessary.

Building the Wings

1. To protect the plan cover in either thin polythene or cling film.
2. We strongly recommend that the wing is built using PVA wood glue. The reason being Superglue changes the texture of the wood and makes it less resilient to crash damage. Superglue can be used for non structural joints such as end plates on the ailerons.
3. 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.
4. Pin bottom 1.5mm sheeting to plan aligning rear edge with front of rear spar. Note the front edge extends beyond the front of the rib.

5. Elevate front of underside of bottom sheeting with scrap 1.5mm balsa to conform with contour at front of Wing rib (see plan
6. Using guide lines on plan glue ribs in place. Use a square block to align back of rib with bottom sheeting.
7. Fit servo mounting beams using wing servo to set the distance they are apart, the 6mm balsa strip wing bolt reinforcement (not shown). Sand both items to rib profile.

8. Cut 2mm sub-rib to length and glue in position.
9. Fit 1.5mm top sheeting taking care to ensure that it is making good contact with the ribs.
10. Using a David Plane and a 180 grade Wet& Dry sanding block carefully trim and sand leading/trailing edge sheeting until level with ends of wing ribs. *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.*
11. When satisfied place Sellotape along sheeting edges top and bottom to prevent surplus PVA spilling over onto 1.5mm sheeting. *Tip: Let Sellotape overlap edge of sheet and then trim along the edge with a sharp scalpel.*
12. Fit leading edges and Rear Spar. Use Masking Tape to hold in place whilst the glue sets.
13. Remove
14. Trim bottom of rear spar to conform with bottom sheeting and fit centre section TE including Aileron Torque rods. Taking care not to let any glue spill onto the torque rods.
15. Finish shaping rear spar and then shape Leading Edge.



16. Glue 0.8mm ply ends to centre section TE, again not letting any glue contact torque rods.
17. Glue 0.8mm ply end ribs to balsa tips. Again there is a Left & Right! Roughly shape.
18. Carefully align and glue wing tips in place and finish shaping.
19. Fit 0.8mm ply Wing Bolt washer and drill M$ wing bold hole.
20. Bevel leading edge of Ailerons and trim to accommodate aileron torque rods. Cut to length.
21. Hinge ailerons using Mylar strip. Do NOT glue. Trim corners of Mylar strip to aid insertion.

Covering & Finishing

1. The originals were covered in Easycoat heat shrink polyester 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 sands away material on top of the rib and weakens the wing.
3. Before covering vacuum the model to remove embedded dust to avoid 'pimpling' the 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 Aileron servo. Roughen surface of Aileron hinges using 180 grade Wet & Dry.
6. Fit Aileron to wing using epoxy to glue Aileron torque rods in place. *Tip: Slide wide Sellotape in between Aileron torque and rear spar. When Aileron is in position use this to 'shape' epoxy whilst it sets.*
7. Glue Aileron hinges in position using thin Superglue with the Ailerons in position. It will *wick* the full length of the hinge and is more than strong enough
8. Centre Aileron servo using transmitter sub-trim. and adjust Aileron pushrods.
9. Balance the model. The model should balance without the need for nose or tail weight.
10. Balance the Wings (laterally). Bury any weight, if required in the Wing Tip.
11. Set the control movement as per the plan i.e. Elevator +/- 10mm. Aileron Up 13mm Down 13mm. Balance point 68mm +/- 5mm from Leading Edge. Exponential is recommended for both Aileron and Elevator controls. Typically 30%.
12. If using 2.4Ghz R/C equipment it is often recommended that you re-bind / pare the receiver to update receiver settings. Please consult your equipment manual.

Flying

When satisfied with the model set-up and is ready

to go choose a suitable site and day to test fly 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. If set up correctly very little trimming should be required. The Vagabond Mk2 is capable of almost any manoeuvre that a non–powered model can perform including in the right conditions inverted flight, inside loops and roll. The real limitation is your flying ability and imagination! There are a number of articles on flying slope soarers on our website www.phoenixmp.com They include basic aerobatics, a discussion on landing techniques and more detailed information on model preparation.

Happy landings,

Stan