Pepperpot

49in Span Electric Sports Model 4/500w Motors & 4-6 Channel RC Equipment.

Designed by: Stan Yeo

Produced by: Phoenix Model Products

Introduction

The Pepperpot is a 4/5 channel stylish electric power sports aerobatic model that has a spritely performance. With a typical 4/500w 3542 1250Kv motor and using 3S 22/2700mA LiPos the Pepperpot. it is both a delight to fly and build. It will attract complements on both fronts. The all wood easy build construction follows the now well proven path of other models in our range in that it incorporates a fully sheeted built-up wing with a selection of cut parts and accessories. The optional flaps are an added bonus for those who like to play with different control setups

Radio Equipment Required

The recommended radio equipment required for the Pepperpot is two metal geared micro servos i.e. Hitec HS82MG or the Ripmax New Power XL16HM or XL17HMB for the Ailerons/Flaps plus two standard size servos for the Rudder & Elevator with a 4/6 channel receiver. For Flapperon operation a 6ch transmitter and 6ch receiver is required.

Electrical Power Train

The Pepperpot requires a 3536/42 Brushless Motor rated at 400-500w and 1000 – 1300 Kv. A 50/60A Speed Controller (ESC) and a 2200 3S LiPo. The prototype used a 3542 1250Kv motor with a 60A ESC. 9x6in APCE propeller and a 2200mAhr 3S 30C LiPo. With this set-up the Pepperpot is more than adequately powered with typically flight duration of up to10 minutes. If you use a different specification motor or a 4S battery then a different size propeller should be used and be aware this could have an impact on the balance point. If you are unfamiliar with model electrics then please read the articles on our website www.phoenixmp.com .

Tools / Materials Required

The tools required to build the Pepperpot are a modelling knife with spare blades, a 2ft /1 Metre Straight Edge, 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 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.

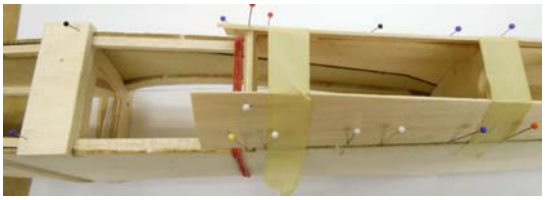
Please Note: PVA is the recommended glue for nearly ALL wood joints, particularly when building the wing. Also for maximum glue joint strength we recommend lightly sanding laser cut edges before gluing.

Building the Fuselage

1. Lightly sand the ply fuselage doublers with 180 grade wet and dry to remove the 'release' agent. Remove dust with a small brush or vacuum cleaner.
2. Using a ***spirit*** based contact adhesive such as Uhu or EvoStik glue the ply nose doublers in position ensuring there is a left and right side. Motor side thrust and down thrust is built in consequently the right side is shorter than the left!!!
3. Mark out the position of formers F2, F3 and F4 on the inside of the fuselage sides ensuring there is a left and right side (they are marked!).
4. Cut slot for Rudder and Elevator cable exits as indicated on plan (Both underneath Tailplane).
5. Lightly sand edges of fuselage side to prepare gluing surface to receive top and bottom sheet.

6. Glue strip longeron super structure including wingseat doubler, spruce tail doubler and 4.5mm x 12mm coaming support strip.
7. Glue F2A to F2.

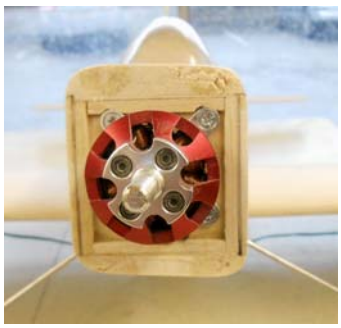
8. Using F2 & F4, join fuselage sides together over the plan ensuring that it is both are straight and square.
9. Fit F2 and 3mm cockpit floor. Use masking tape to 'pull' fuselage sides in for snug fit.
10. Glue Fin to Tailplane ensuring it is central and vertical.



11. Fit 'oversize' 1.5mm sheet coaming sides. Use masking tape to hold in position whilst the glue sets.
12. Using 180 grade Wet & Dry sand 1.5mm coaming sheet flat to receive top coaming. Note coaming sheet taper ends at leading edge of the Tailplane.
13. Taper underside of rear of top coaming. To align coaming sheeting and top of Tailplane use plan and dry fitting Tailplane.
14. Sand top coaming to shape.
15. Fit Rudder and Elevator control rods. Control rods exit fuselage on opposite sides. Anchor to fuselage sides every 100-120mm using scrap balsa. Superglue in place. Before fixing control cables check control cables are not binding and move freely. Tie and glue control rods together where they cross.
16.
17. Assemble wing retaining bolt plate and glue tapered spruce support plates to fuselage sides.
18. Fit wing to fuselage and drill holes for dowel tubes in wing using a long shank 5mm drill bit or one fashioned from 4mm piano wire.

19. Glue 6mm ply undercarriage plate in position.
20. Using undercarriage to assist alignment glue 6mm ply U/C Torsion plates in position.
21. Fit Fuselage bottom front and back including ply undercarriage plate using PVA glue.
22. Bend 2mm piano wire tailskid to shape and fit tailskid assembly.

23. Fit 4mm ply motor mount. If using a 3542 motor then set the mount back 3mm from front of fuselage sides. Glue 3mm sq. around front of mount. If using a 3536 motor mount motor flush with end of fuselage sides.



24. Glue 6mm triangular reinforcing strip around rear of motor and base of U/C torsion plates
25. Fit fuselage top front and rear of the Hatch and fit 0.8mm ply end plates.
26. Construct Hatch and fit as per diagram.

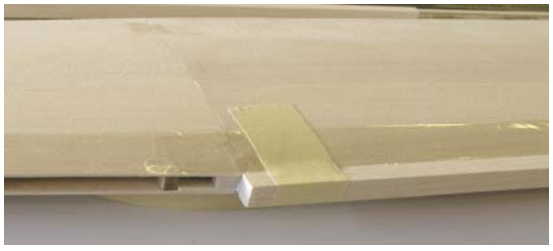
27. Glue Tailplane in place checking that it is both horizontal and the distances between hinge corners on tailplane to rear corner of cockpit are equal.
28. Fit Rudder and Elevator servos.
29. Cut Mylar Hinges to size (12mm x 25mm). Trim corners to stop them digging in and roughen gluing surface with Wet & Dry.
30. Hinge Rudder and Elevator control surfaces. Do NOT glue until the model is covered.

Building the Wings

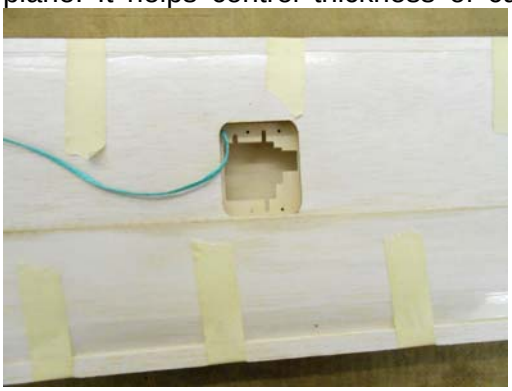
1. To protect the plan cover in either thin polythene or cling film.

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 bottom sheet on plan and pin to plan. Note: 1.5mm sheeting overhangs the front and rear of the wing ribs by approximately 2mm.
4. Accurately mark position of mainspar on bottom sheet and using a straight edge set square glue and pin mainspar in place.
5. Elevate underside of sheeting at front and rear with scrap to conform with airfoil profile.

6. Omitting W1 glue wing ribs in position.
7. Glue 6mm strip to front of Mainspar 1mm from the top. Ensure that it is a snug fit between the ribs.
8. Glue together Wing Servo Mount Assembly using PVA and before glue sets fit mount into servo bay between W4&5. Consult plan as they are handed i.e. there is a left and right hand! Push sides of servo mounts against W4&5 to make good gluing contact.
9. Using guide lines on plan glue ribs in place. For the servo bay ribs use servo mount for alignment.
10. Build second Wing.
11. Trim and align root end of each wing panel. Note the mainspars are straight and not swept in either direction. Glue panels together with 10mm dihedral under each tip.
12. Glue 0.8mm ply servo lead exit support washers in place and 1.5mm ply wing braces.
13. Fit W1 & sub-ribs.



14. Thread a string through servo bay and ribs to aid final servo installation.
15. Fit 1.5mm top sheeting taking care to ensure that it is making contact with both the wing ribs and the mainspar. Tip: Use masking tape to help support sheeting whilst glue sets.
16. Plane / sand wing sheeting back to ends of ribs using David Plane and large flat 180 grade Wet & Dry sanding block.
17. Place Sellotape along sheeting edges to collect surplus glue. Tip: Do not try to align Sellotape with edge of sheet but let it overlap and trim with a sharp scalpel.
18. Using PVA glue fit leading edge and rear spar using masking tape to hold in position whilst glue sets.
19. When glue is set remove Sellotape.
20. Carefully plane/sand both rear spar and 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.



21. 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.
22. Sand wing tips to shape.
23. Fit centre section trailing edge.
24. Shape Ailerons and cut to length. At this stage do not make allowance for 0.8mm ply ends.
25. Tape ailerons in position using Wing Tip as a reference. Check for twist.
26. Using ailerons as a guide mark TE position on centre section trailing edge. Lightly draw guide line along TE.
27. Shape centre section trailing edge using Aileron as a reference.
28. Drill holes for brass wing dowel
29. Mark position of aileron control horn. Draw a line on underside of Ailerons to indicate extent of shaping required for down going Aileron relief. Shape ailerons and cut to length allowing clearance for 0.8mm ply end plates and covering material.

30. When complete add 0.8mm ply end plates using Superglue to both Ailerons and Centre Section.
31. Cut slot for aileron control horn. Needs to snug fit. Roughen surface and superglue in position AFTER covering.
32. 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. Spray motor cowl to match your colour scheme (rattle can) (Hycote gloss white is a perfect match for white Profilm).
6. Fit motor using M3 x 12mm countersunk screws.
7. Fit motor cowl using clear UV resistant tape and fit propeller.
8. Fit aileron servo output arms in centre position.
9. Superglue Aileron control horns in position and hinge Ailerons Sellotape Diamond or substitute or Oracover.
10. Centre Aileron servos using transmitter sub-trim and adjust Aileron pushrods. When satisfied tape servo covers in place.
11. Fit controls, hinge rudder, carry out final adjustment to elevator neutral and balance the model including the wings (laterally).

12. Set the control movements as per the plan i.e. Elevator +/- 10mm. Rudder +/- 30mm. Aileron Up 16mm Down 13mm. Full up Elevator, Landing Flap1 Down 6mm Landing Flap2 Down 12mm. Balance point 65mm +/- 5mm from Leading Edge. Exponential is recommended for both Aileron and Elevator controls. Typically 30%. Landing flap may require elevator compensation to counteract any pitch change when deployed. It is recommended that a pitch change check is carried out at a safe height!!
13. If using 2.4Ghz R/C equipment it is recommended that you re-bind / pair the receiver to update failsafe settings after set-up and before flying your Pepperpot. Remember that the throttle control must be in the LOW throttle position when binding / paring. Failure to do this has resulted in a number of serious accidents in the past. Remember the Transmitter is first ON and last OFF!
14. Check that when the transmitter is turned off that motor STOPS.
15. A few simple rules for electrics. In flight it is normal for the battery / speed controller (ESC) to get warm but if it gets hot then the reasons could be insufficient cooling, too large a propeller or the battery / ESC of too low a specification. For the battery it could be due poor condition, too low a 'C' rating allied to lack of capacity. To avoid discharging the battery below the recommended voltage always land when you notice there is less power on full throttle. When landing in foliage cut the throttle immediately to avoid burning out the speed controller.

Trimming

Trimming is carried out in two stages. The first stage is to set up the power OFF glide by adjusting the balance point as required by moving the battery backwards and forwards. The second stage is to fine tune the thrust line of the motor by inserting washers, as appropriate, between the motor star plate and the motor mount. To test for sidethrust put the model in steep climb, into wind, and note if the model turns to the right or left as the speed falls off and place washers as before on the side the model is turning towards. Downthrust is determined by the amount of elevator required to maintain the power on flight path desired. Some modellers will want the model to go

into a steady climb under power whilst others may prefer the model to remain in level flight. Adjust motor Downthrust using washers as before. Mixing a small amount down elevator with the throttle can be used to fine power on flight.

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 turbulent. If you are inexperienced please seek assistance for the maiden flight. If set up correctly very little trimming should be required. The Pepperpot, as previously mentioned, is a very lively model and if set up with extravagant control throws is capable of almost any manoeuvre that could be expected of this type of model including sustained inverted flight, inside and out side loops plus blink and miss rolls. The only real limitation is your flying ability and imagination!

Happy landings,

Stan

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