

Carrera Mk2

63in Span Sports Aerobatic Slope Soarer for 4-6 Channel RC Equipment.

Designed by: Stan Yeo

Produced by: Phoenix Model Products

Introduction



The Carrera is a stylish aerobatic slope soarer. It was originally designed in the early 80's in response to comments made by my then teenage son that all my models looked the same. Gauntlet down I challenged him to come up with something different. He sketched out the profile. I contributed the structural design. The resulting model was an immediate success. It also happened to be one of the fastest sport aerobatic slope soarers at that time. Production ceased when EPP (expanded polypropylene) came along. EPP has now run its course and there is an increasing demand for 'conventional' wood built kits so we have invested in a Laser Cutter, CNC Router and a digital AO plan printer the with aim of re-working the more popular wooden kits we produced. Kit production has always been at the heart of PMP and since we stopped producing kits a couple of years ago I have missed that part of the business and the resulting customer contact. The Mk2 kits will all feature 'built up' wings avoiding the use of fibreglass, epoxy and polyester resins which can cause an allergic reaction in some people. I also find them more pleasurable to build!

The Mk2 Carrera has an Aileron servo in each allowing the Ailerons to be used as Flapperons thus significantly enhancing the versatility and aerobatic performance of the model. The servo mounts are included in the kit.

Radio Equipment Required

The recommended radio equipment required for the Carrera is two metal geared servos i.e. Hitec HS82MG or the Ripmax New Power XL16HM or XL17HMB plus two standard size servos, a Square AA receiver battery and a 4/6 channel receiver. For Flapperons a 6ch receiver is required.

Tools / Materials Required

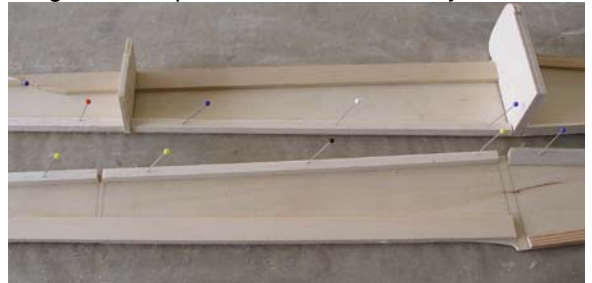
The tools required to build the Carrera are a modelling knife with spare blades, a One Metre Straight Edge, a miniature David Plane, 180 grade Wet & Dry sanding block and soldering iron. The glue used to build the model white PVA wood glue, thin Superglue (please observe safety precautions)

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 Easycot.

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. Align the fuselage sides with the Wingseat and mark out the position of formers F2 & F3 on the inside of the fuselage sides ensuring there is a left and right side. Aligning with the Wingseat is to offset any variation in plan length due to changes in moisture content in the paper.
3. Cut slot for Rudder cable exit as indicated on plan (bottom of fuselage).
4. Tape fuselage side together and drill holes for Tailplane Bellcrank and cut actuating slot.
5. Using PVA (wood glue), glue spruce nose and wingseat strips to fuselage sides. Note wingseat strip extends back beyond F2.



6. Glue strip longeron super structure on the fuselage sides.
7. Lightly sand edges of fuselage side to prepare gluing surface to receive top and bottom sheeting.
8. Build Fin super structure on one Fuselage side.
9. Assemble Elevator control rod and install in fuselage along with Elevator Bellcrank. Anchor to fuselage side every 100-120mm using spare 6mm sq strip to form a bridge secured with Superglue.
10. Join fuselage at Fin taking care to ensure that the Tailplane piano wire rods are square to the fuselage in ALL direction both sides. Check for full and free movement of Elevator bellcrank.
11. Fit 1.5mm sheet to top of Fin.
12. Join fuselage sides (F2 & F3) together over the plan ensuring that it is both straight, square and not twisted! When glue has set fit F1 again carefully checking fuselage alignment.
13. Fit Rudder and control rods. Anchor to fuselage side every 100-120mm as per Elevator control

- rod. Before fixing control cables check control cable inners are not binding and move freely.
14. Fit Fuselage bottom front and back plus 10mm top nose sheet.
 15. Carve out Noseblock to accept 90grms Nose weight. Approximately a further 60grms of nose weight will be required inside the nose area to achieve the correct Balance Point.
 16. Sand the front 3mm ply former F1 flat and fit Noseblock.
 17. Angle rear face of hatch to match front face of F2. Centrally position 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. After sanding front of fuselage to shape remove hatch and mark position of 3mm hatch retaining dowel.
 20. Drill hole in hatch for retaining dowel and transfer position of dowel hole onto ply hatch locating plate.
 21. Drill Hatch dowel locating hole in fuselage.
 22. Mark position of hole for Hatch Latch on rear of F2. Tape Hatch in place and drill 1.5mm hole thro' F2 into Hatch.
 23. Prepare Hatch Latch for fitting.
 24. Fit ply Latch plate support.
 25. Epoxy Latch assembly in place. Grease latch to avoid latch sticking.
 26. 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 a long 3mm piano wire drill.
 27. Epoxy 6swg Brass wing dowel retaining tubes in place.
 28. Using the wing, align the wing retaining nut plate, assemble and fit said plate.



29. Bolt wing in position and fit front and rear wing fairings.
30. Fit Rudder & Elevator servos as shown on plan.
31. Mount On/Off switch using switch plate provided.

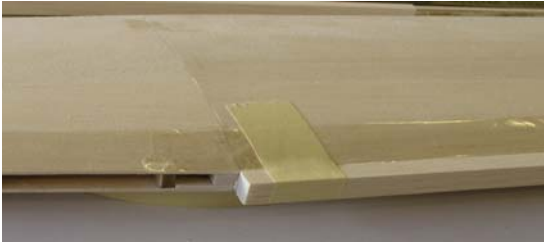
32. Cut Mylar Hinges to size (12mm x 25mm). Trim corners to stop the digging in and roughen gluing surface with wet & Dry and hinge Rudder. Do NOT glue until model is covered.

Building the Wings

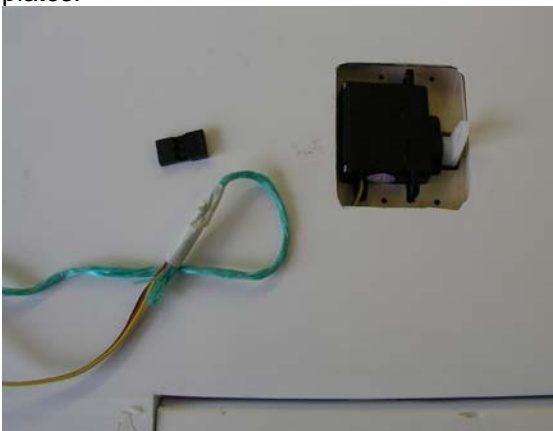
1. To protect the plan cover in either thin polythene or cling film.
2. Glue together Wing Servo Mount Assembly using PVA. Consult plan as they are handed i.e. there is a left and right hand! If you make a mistake the mount can be disassembled in water!
3. Join front & back 1.5mm sheeting. Use metal 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. Accurately align bottom sheet on plan. Note rear of sheet overhangs rear spar by 1.5mm.
5. Accurately mark position of mainspar on bottom sheet and using a straight edge glue and pin mainspar in place.
6. Elevate underside of sheeting at front and rear with scrap to conform with airfoil profile
7. Omitting W1 glue wing ribs in position.
8. Glue 6mm strip to front of Mainspar 1mm from the top. Ensure that it is a snug fit between the ribs.
9. 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.
10. Using guide lines on plan glue ribs in place. For the servo bay ribs use servo mount for alignment.
11. Build second Wing.
12. Trim align root end of each wing panel. Sweepback on trailing edge of wing is 38mm (1.5ins).
13. Fit Spruce rear spar reinforcing strip and W1 ribs
14. Fit 12mm centre sub-ribs W1A.
15. Fit 0.8mm Ply Ends to fixed centre trailing edge.
16. Thread string through servo bay and ribs to aid final servo installation
17. Trim and 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 support sheet whilst glue sets.
18. Using a David Plane / 180 grade Wet& Dry sanding block trim leading & trailing edge sheeting until level with the wing ribs. When satisfied place Sellotape along edge of sheeting top & bottom to minimise glue overspill. Tip: Do not try to align Sellotape with

edge of sheet but let it overlap and trim with a sharp scalpel.

19. 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.



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 centre section trailing edge.
23. Shape Ailerons and cut to length. At this stage do not make allowance for 0.8mm ply ends.
24. Tape ailerons in position using Wing Tip as a reference. Check for twist.
25. Mark TE position on centre section trailing edge. Lightly draw a line across TE.
26. Shape centre section TE to shape using Aileron as a reference. When complete add 0.8mm end plates and mark position of aileron control horn.
27. Cut slot for aileron control horn. Needs to snug fit. Superglue in position AFTER covering.
28. Fit 0.8mm ply Wing Bolt washer. Give wing a final sand using 320 grade Wet & Dry.
29. 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 for 0.8mm ply end plates.
30. Cut slot in Aileron for fibreglass control horn. Do NOT glue in position until Aileron is covered.
31. Fit centre wing fairing complete with ply end plates.



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 thins the sheeting on top of the rib and seriously 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. Hinge Ailerons using Superglue and fit aileron servos.
6. Centre Aileron servos and adjust Aileron pushrods. When satisfied tape servo covers in place.
7. Fit controls, hinge rudder, carry out final adjustment to elevator neutral and balance the model including the wings (laterally).
8. Set the control movement as per the plan i.e. Elevator +/- 10mm. Rudder +/- 30mm. Aileron Up 16mm Down 13mm. Up Elevator Flap Down 3mm. Down Elevator Flap Up 4mm. Landing Flap1 Up 6mm Landing Flap2 Up 12mm. Balance point 105mm +/- 5mm from Leading Edge. Exponential is recommended for both Aileron and Elevator controls. Typically 30%. Landing flap will require up elevator to compensate for nose down attitude when deployed.
9. 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 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. If set up correctly very little trimming should be required. The Carrera is capable of almost any manoeuvre that a non-powered model can perform including in the right conditions sustained inverted flight, inside and out side loops with rolls in the middle. The only 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