

Tucano CS

50in Span Electric Sports Model 4/500w Motors & 4-6 Channel RC Equipment.

Designed by: Stan Yeo
Products

Produced by: Phoenix Model

Introduction



The Tucano CS is a 4/5 channel character scale electric power sports model. With a typical 4/500w 3542 size motor and using 3S 22/2900mA LiPos, the Tucano has a spritely performance and capable of performing a wide variety of manoeuvres. It is both a delight to build and fly attracting 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 comprehensive collection of cut part and accessories. The unique adjustable motor mount assembly means most 35mm diameter brushless motors can be accommodated.

Radio Equipment Required

The recommended radio equipment required for the Tucano is two metal geared micro servos i.e. Hitec HS82MG / HD Power 1711MG or the Ripmax New Power XL16HM / 17HMB for the Ailerons plus two standard size servos for the Rudder & Elevator with a 4/6 channel receiver.

Electrical Power Train

The Tucano requires a 3542 Brushless Motor rated at 400-500w and 1000 – 1300 Kv. A 50/60A Speed Controller (ESC) and a 2200 / 2700mAh 3S LiPo. The prototype used a 3542/06 1250Kv motor with a 50/60A ESC. 9x6in APCE propeller and an Overlander 2900mAh 3S 35C LiPo. With this set-up the Tucano is more than adequately powered with typically flight duration of up to 10 minutes. If you use a different specification motor or a 4S battery then a different size propeller should be used. If you are unfamiliar with model electrics then

please read the articles on our website www.phoenixmp.com.

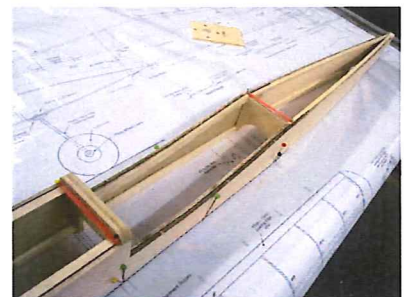
Tools / Materials Required

The tools required to build the Tucano are building board (recommend 10mm Sundela board) 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, Monokote 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. Glue fuselage extensions to sides to complete fuselage sides.
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.
3. Mark out the position of formers F2 & F3 on the inside of the fuselage sides.
4. Glue 3mm x 10mm strip along top edge of fuselage bottom taking care to middle of strip aligns with edge of fuselage sides.
5. Glue wingseat and 4.5mm strip tail seat doublers in position along with 4.5mm internal structure.
6. Sand edges of fuselage sides with 180 grade Wet & Dry to provide a good gluing surface for top and bottom sheeting.
7. Using wing dowels carefully aligning and glue F3 & F3A glue. Remove dowels!
8. Fit 6mm x 12mm tailpost.

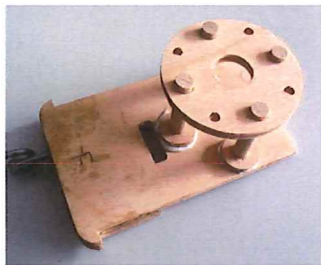


9. Dry assemble fuselage sides and formers F3 & F4 over plan view of fuselage. Fuselage bottom upside down.

10. Taper tailpost to provide to match opposite side when joined.

11. After ensuring the fuselage is properly aligned and all square glue formers F2A & F3 in position. Use

rubber bands and weights to aid alignment whilst the glue is setting.



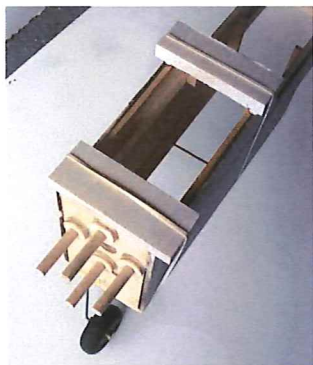
12. Glue join fuselage at the tail.

13. Fit spruce wing backstop.

14. Fit 4.5mm rear fuselage bottom sheet.

15. Install control cables. Anchor to sides every 100mm with balsa bridge made from scrap.

16. Glue balsa motor back plate to 4mm ply motor mount.



17. Glue 6mm motor dowels and 4mm washer in place on F1. To assist alignment slide motor mount into position whilst glue is setting.

18. Mount fuselage over plan and glue F1 in position along with F2 & F5.

19. Fit rear top fuselage sides.

20. Fit top rear top 10mm sheet. Chamfer front as per plan and shape. Use 6mm sheet to centre on fuselage.



21. Fit 3mm cross-grain Cockpit floor.

22. Fit 3mm front fuselage side. Fit F2B.

23. Fit 10mm sheet front and rear of Hatch.

24. Construct Hatch as per diagram. Use extra ply end supplied to wedge hatch in place whilst sanding to leave a gap for the covering.



25. Epoxy Nose Undercarriage leg into F1A with coil to the rear!!! and glue in position on F1. Check Clamp until epoxy is set.

26. Glue tips to Fin and Tailplane. Glue Fin to Tailplane ensuring it is central and vertical.

27. Glue Tailplane in place taking great care to ensure that it is square in all planes. Use thin length of thread pinned to middle of hatch front to check the distance is equal to the same point on both sides of the tailplane.

28. Build Wing

29. Mount M5 Tee nut into 10mm balsa block and glue to mounting plate.

30. Determine position of Wing bolt relative to the fuselage and glue wing bolt plate wedges mid position.

31. With the wing in position slide bolt plate backwards and forwards to align Tee Nut with wing bolt.

32. Fit Rudder and Elevator servos as indicated on plan using supplied servo bearers.

33. Fit 10mm front bottom sheet. Sand to shape.

34. Assemble and fit undercarriage.

35. Assemble and mount motor. Fit motor cowl and adjust motor position as required.

36. Glue motor mount in position. Use M3 washers to achieve sidethrust and Downthrust.

Building the Wings

1. To protect the plan cover in thin polythene.

2. Join 1.5mm wing sheeting. Lightly trim edges to make a good joint. Using Sellotape to hold sheets a together.

3. Accurately align bottom leading edge sheet on plan and pin. Note the sheet overhangs front and back of ribs. Top sheet has cutouts for servo leads.

4. Glue ply servo lead doublers in place on top sheeting. Check there is a left and right panel!

5. Mark position of 3mm mainspar.

6. Glue mainspar in position. Pin straight edge behind mainspar to keep it straight.

7. Assemble 6mm ply undercarriage and place in position along with ribs.



8. Pack up sheeting front and back to follow rib contour.

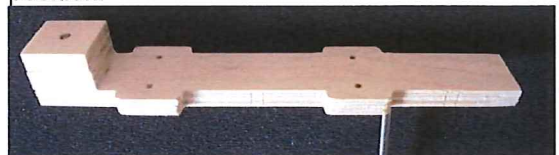
9. Glue undercarriage plates in place in conjunction with adjacent ribs to aid alignment.

10. Glue remainder of ribs in position. NOT W1!!

11. Check that aileron servos fit servo mounts. Adjust as necessary. Snug fit!

12. Assemble and glue wing servo mounts in position. Do NOT pre-glue servo mount assembly. Assemble and mount in wing with glue still runny to allow alignment.

13. Glue 6mm square strip between ribs in position.



14. Build second wing.

15. Join wings over the building board.

16. For Dihedral place 10mm blocks under mainspar at each tip.

17. Centrally fit 0.8mm centre section wing joiner.

18. Glue W1 x2 in position also W2 x2.

19. Glue 3mm sheet in between W2A. Trim to size.
20. Glue 15mm sq. wing dowel blocks in position.
21. Remove dihedral blocks from tip.
22. Using undercarriage plate holes as a guide drill 1.5mm pilot holes through bottom sheet.
23. Thread string from servo bay through to centre section of each wing. Leave a reasonable amount of slack each end.
24. Pin one wing panel by the corners to the build board use distance pieces to support leading and trailing edges. Mark position of blocks for use on other wing.
25. Check the wing is not being twisted.
26. Fit wing top sheeting.
27. Repeat for second wing panel using support blocks used on 1st panel.
28. Using David Plane / 180 grade Wet & Dry sand wing sheeting back to ends of ribs.
29. Place 20mm Sellotape along the edges top and bottom of the wing sheeting. *Tip overlap tape by 5-10mm and trim with sharp scalpel.*
30. Using masking tape fit leading and trailing edges to wing and sand to shape.
31. Glue ply tip ribs to tips. Check there is a left and right!! Thick Superglue can be used.
32. Roughly carve tips to shape.
33. Glue tips to wing and sand to shape.
34. Glue centre section trailing edge in position.
35. Cut ailerons to length and tape in position aligning aileron trailing edges with TE wing tip.
36. Shape centre section to align with aileron TE.
37. Fit ply ends to ailerons and centre section. All approximately 0.8mm for covering material.
38. Place Sellotape on ends of 4mm ply dowel plate and tape in position.
39. Glue 3mm sub rib to inside face of F2A.
40. Remove Wing Dowel plate.
41. Offer wing up to fuselage and check fit. Without 0.8mm ply sub-ribs the gap should be a minimum 2mm allowing for covering. Adjust thickness of 3mm sub-rib as necessary.
42. Fit 0.8mm ply sub-rib facing.
43. Make minor adjustment to wing seat as required.
44. Drill wing bolt hole and glue ply washer in place.
45. Run thin Superglue around wing bolt hole to stiffen it.
46. Using PVA glue 4mm ply wing dowel plate in position.
47. Whilst glue is still wet replace wing on fuselage and push wing dowels through front of F3 to locate in holes in dowel plate.
48. Check the wing is seated properly on fuselage. Remove wing dowels trying not to move dowel plate. Allow glue to set.



49. Drill holes 6swg Brass wing dowel tubes. Epoxy in position.
50. Check servos for serviceability and centre.
51. Install Aileron servos checking they are operational after fitting.
52. Determine position for slot for Aileron control horn. Cut slot for Aileron control horn. Must be a snug fit. Glue in place with thin Superglue after covering.
53. Give wing final sand using 320 grade Wet & Dry and remove dust with brush and vacuum.

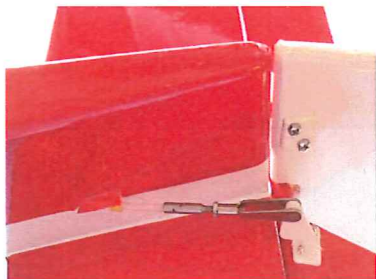
Covering & Finishing

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. Also position aileron servo arms so they do not protrude above wing surface.
4. Please follow the instructions 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. Superglue Aileron control horns in position and top hinge Ailerons Sellotape Clear (UV resistant).
6. Centre Aileron servos using transmitter sub-trim and adjust Aileron pushrods. When satisfied tape servo covers in place.
7. Fit undercarriage and motor etc.
8. Fit controls, hinge rudder, carry out final adjustment to elevator neutral and balance the model including the wings (laterally).
9. Set the control movements as per the plan i.e. Elevator +/- 10mm. Rudder +/- 30mm. Aileron Up 16mm Down 13mm. Exponential is recommended for both Aileron and Elevator controls. Typically 30%. If using



2.4Ghz R/C equipment (recommended) it is imperative you re-bind / pair the receiver to update failsafe settings after set-up and before flying your Tucano. Note the throttle stick MUST be in the low position when carrying out this operation. Also check that when there is a loss of Tx signal the motor shuts down. Failure to do this has resulted in a number of serious accidents. Remember the Transmitter is first ON and last OFF! After landing always disconnect the battery on reaching the model.

10. A few simple rules for electrics. In flight it is normal for the battery, motor and speed controller (ESC) to get



warm but if they get hot then the reasons could be insufficient cooling, too large a propeller or the battery / ESC of too low component 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 / motor. Before and after each flight is advisable to check battery capacity (charge state). Remember if any of the cells fall below 3v this can result in permanent damage to that cell / battery pack.

Flying

When satisfied the model is set-up and ready to go choose a suitable site and day to test fly 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 although some down elevator compensation may be required at full throttle to control the rate of climb. The Tucano, as previously mentioned, is a lively model and capable of any manoeuvre expected of this type of model including inverted flight and multiple rolls etc. Finally we hope you have enjoyed building the Tucano and it gives you many hours of pleasurable flying.



Happy landings,

Stan

2-Jul-18