

# Messerschmit ME109 CS

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

Designed by: Stan Yeo

Produced by: Phoenix Model Products

## Introduction



The Messerschmit ME109 is another favourite among modellers being the most formidable German fighter of World War 2. Out gunning and out performing the Spitfire in a number of areas so it is was natural choice after bypassing the Spitfire and Hurricane. As previously a number of liberties have been taken with the design hence the CS (Character Scale) tag. It is up to you to add the refinements. Hopefully, once again, we have captured the essence of the full size aircraft. With a typical 4/500w 3542 size motor and using 3S 22/2900mA LiPos, the ME109 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 parts and accessories. The unique adjustable motor mount assembly means most 35mm diameter brushless motors can be accommodated within the cowl.

## Radio Equipment Required

The recommended radio equipment required for the ME109 is two metal geared micro servos i.e. Hitec HS82MG / JX PS/PDI 1171MG for the Ailerons plus two standard size servos for the Rudder & Elevator with a 4/6 channel receiver.

## Electrical Power Train

The ME109 requires a 3542 Brushless motor rated at 400-500w and 1100 – 1300 Kv. A 50/60A Speed Controller (ESC) and a 2200 / 2700mAh 3S LiPo. The prototype used a Overlander 3542/05 1250Kv motor with a 50A ESC, 10x6in APCE propeller and an Overlander 2200/2900mAh 3S 35C LiPo. With this set-up the ME109 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](http://www.phoenixmp.com).

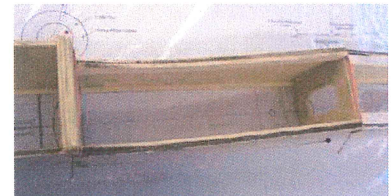
## Tools / Materials Required

The tools required to build the ME109 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

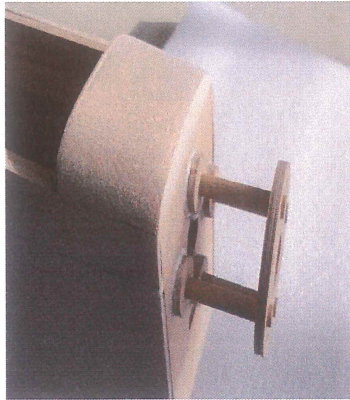
1. Glue fuselage extensions to sides to complete fuselage sides.
2. Using a *spirit* based contact adhesive such as Uhu or EvoStik glue the ply nose doublers in position ensuring there is a left and right side.
3. Mark out the position of formers F2 & F3 on the inside of the fuselage sides.
4. Glue shaped 6mmx12mm strip along top edge of fuselage.
5. Glue wingseat and 10mm Triangular strips in place along the bottom edge of fuselage.
6. Sand edges of fuselage sides with 180 grade Wet & Dry to provide a good gluing surface for top and bottom structure.
7. Using wing dowels carefully aligning and glue F2 & F2A glue together. Clamp and remove dowels before glue sets.
8. Fit 12mm Tail post block.
9. Dry assemble fuselage sides upside down over plan and position formers F2 & F3
10. Taper Tail post to provide to match opposite side when joined.
11. After ensuring the fuselage is properly aligned and all square glue formers F2(A) & F3 in



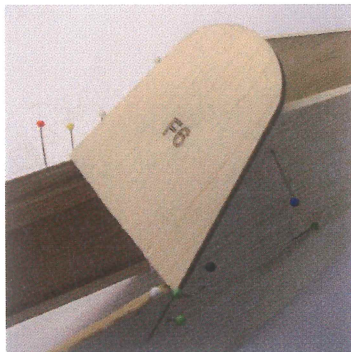


position. Use rubber bands and weights to aid alignment whilst the glue is setting.

12. Glue join fuselage at the tail.
13. Fit spruce wing backstop and glue.
14. Fit 6mm rear fuselage bottom sheet plus 6mm ply Tail wheel mount.
15. Do NOT glue remainder of bottom sheet between F1 & F2 or F3 and Tail Wheel bracket in place until wing is built and Control rods fitted.
16. Glue balsa motor back plate to 4mm ply motor mount.
17. Glue 6mm motor dowels and 4mm washers 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.
19. Glue 10mm triangular strip reinforcement to ply formers.
20. Glue 3mm rear fuselage top to fuselage bottom.



21. Glue 3mm F7 in place. Note it is angled to meet 12mm top decking.
22. Fit 12mm top decking and sand to shape.
23. Fit 3mm front fuselage top.
24. Fit 3mm F6 and 3mm cockpit floor and 3mm F5.
25. Fit 12mm sheet forward of F5 and in front of hatch.
26. Cut hatch to size and glue 0.8mm ply ends as shown on plan. Leave a small gap between hatch and adjoining structure to allow for thickness of covering.



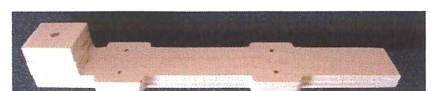
27. Using 0.8mm ply 'jam' the hatch in position.
28. Sand the nose section to shape.
29. Fit the hatch latch and 0.8mm ply tab and latch pin support. See plan.
30. Assemble and glue Tailplane and Fin together ensuring they are square and perpendicular.



31. Fit tailplane assembly to Fuselage. Again checking for longitudinal and lateral alignment.
- 32. Build Wing.**
33. Fit wing to fuselage. Adjust wingseat as necessary. When satisfied position wing and drill wing dowel holes from the front of F2. using a long 5mm drill bit. This can be made from a suitable length of piano wire.
34. Check the gap between fuselage sides and wing.
35. Fit 0.8mm ply / 3mm balsa wing sub ribs. Adjust balsa rib thickness to allow for covering and removal of wing.
36. Fit 5mm brass dowel tubing into using epoxy.
37. Drill holes for 5mm Wing Bolt and glue 0.8mm ply support washer in place.
38. Assemble wing dowel nut plate.
39. Glue 3mm spruce nut plate wedges in position checking alignment with wing bolt.
40. Fit Rudder and Elevator servos as indicated on plan using supplied servo bearers.
41. Fit 10mm front bottom sheet between F1 & F2 in place. Using the motor cowl as a guide sand to shape.
42. Assemble mount motor and fit motor to mount.
43. Fit motor cowl and make any necessary adjustments. It cannot be done after covering!!
44. Adjust motor position as required to suit cowl.
45. 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 together whilst glue is setting. **Note:** Bottom sheet has UC and servo bay cut-outs. Top sheet only has servo lead exits.
3. Glue ply servo exit support in place on the underside of top sheeting. Check you have a left and right panel!
4. Accurately align bottom leading edge sheet on plan and pin in position. Note the sheet overhangs front and back of ribs.
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. **Note Orientation!**
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 but NOT W1.
11. Check that aileron servos fit servo mounts. Adjust as necessary. Snug fit!
12. Assemble and glue wing servo mounts in position checking orientation. Assemble and





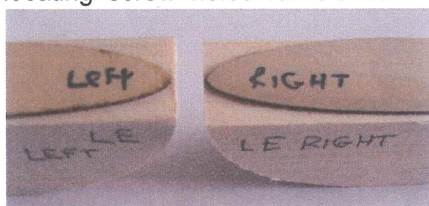
mount in wing with glue still runny to allow alignment.

13. Glue 6mm square strip to top of main spar between ribs..

#### 14. Build second wing.

15. Join wings over the building board.
16. For Dihedral place 40mm blocks under mainspar at each tip.
17. Glue 1.5mm ply Dihedral Brace in place.
18. Glue 3mm sheet in between W2A. Trim to size.
19. Cut rear of W1 x2 to size Glue in place.
20. Repeat for front of W1.
21. Glue 15mm sq. wing dowel blocks in position.
22. Remove dihedral blocks from tip.
23. Using undercarriage plate holes as a guide drill 1.5mm pilot holes through bottom sheet to assist in locating screw holes for UC saddle clamps.

24. Thread string from servo bay through



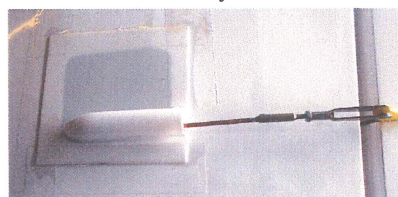
to centre section of each wing. Leave a reasonable amount of slack each end.

25. 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.
26. Check the wing is not being twisted.
27. Fit wing top sheeting.
28. Repeat for second wing panel using support blocks used on 1<sup>st</sup> panel.
29. Using David Plane / 180 grade Wet & Dry sand wing sheeting back to ends of ribs.
30. Place 20mm wide Sellotape along the edges top and bottom of the wing sheeting. *Tip overlap tape by 5-10mm and trim with sharp scalpel.*
31. Using masking tape fit leading and trailing edges to wing and sand to shape.
32. Glue ply Tip Ribs to Tips. Check there is a left and right!! Thick Superglue can be used.
33. Roughly carve tips to shape.
34. Glue Tips to wing and sand to shape.
35. Glue centre section trailing edge in position.
36. Cut ailerons to length and tape in position aligning aileron trailing edges with TE wing tip.
37. Shape centre section to align with aileron TE.
38. Fit ply ends to ailerons and centre section. All approximately 0.8mm for covering material.
39. Place Sellotape on ends of 4mm ply dowel plate and tape in position.
40. Glue 3mm sub rib to inside face of F2A.
41. Remove Wing Dowel plate.
42. 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.

43. Fit 0.8mm ply sub-rib facing.
44. Make minor adjustment to wing seat as required.
45. Drill wing bolt hole and glue ply washer in place.
46. Run thin Superglue around wing bolt hole to stiffen it.
47. Using PVA, glue 4mm ply wing dowel plate in position.
48. Whilst glue is still wet place wing on fuselage and push the wing dowels through front of F2 to locate in holes in the dowel plate.
49. Check the wing is seated properly on fuselage. Remove wing dowels trying not to move dowel plate. Allow glue to set.
50. Drill holes for 6swg Brass wing dowel tubes.
51. Epoxy brass tubes in place.
52. Check servos for serviceability and centre.
53. Install Aileron servos checking they are operational after fitting.
54. Determine position for slot for Aileron control horn.
55. Cut slot for Aileron control horn. Must be a snug fit. Glue in place with thin Superglue after covering.
56. Give wing final sand using 320 grade Wet & Dry. Remove dust with brush and vacuum cleaner.
57. Before covering trim the thin **WHITE** canopy to size to make a template for the clear canopy.

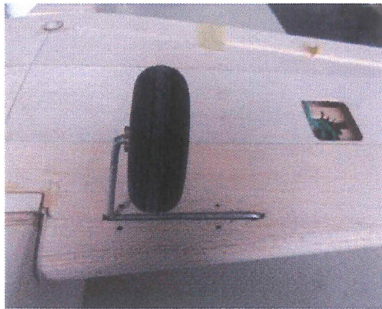


#### Covering & Finishing

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. Trim canopy to fit. Glue pilots in position and fit canopy using canopy glue. Cover edges of canopy with 12mm wide self adhesive trim tape. **Note** top of canopy is in line with top of rear fuselage coaming.
8. Fit and trim motor cowl BEFORE covering. To avoid splitting put masking tape around edges before trimming.
9. Fit motor assembly and adjust position on dowels to suit cowl and glue motor in position.
10. Tape cowl in position after covering the fuselage. Tip use double sided tape on inside the side cheeks but still tape on outside.
11. Fit undercarriage. Check tracking! Very important. This was not done when the Chipmunk CS was built resulting dodgy a takeoff!
12. Fit controls, hinge rudder, carry out final adjustment to elevator neutral and balance the model including the wings (laterally).
13. 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%. Balance Point **Mainspar**.
14. If using 2.4Ghz R/C equipment it is recommended / imperative you re-bind / pair the receiver to update failsafe settings after set-up and **before** flying your ME109. 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.
15. A few simple rules for electricians. 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 too low component specification.
16. 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

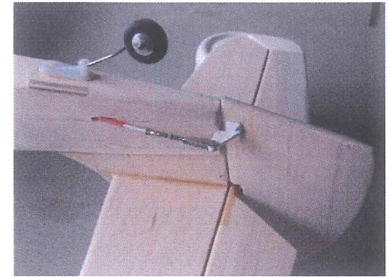


recommended voltage always land when you notice there is less power on full throttle. When landing in foliage cut the throttle immediately to avoid burning out the speed controller / motor. Before and after each flight is advisable to check battery capacity (charge state). Remember if any of the cells 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 and a touch of right rudder may be needed on takeoff. For trimming procedure is trim for a power off glide and adjust the balance point (C of G) to remove any elevator trim. Next check the side thrust. Check Rudder is in neutral. No trim. Fly the model at high speed, into wind and initiate a steep climb. As the model loses speed if side thrust needs adjusting the model will veer off to the left or the right. If to right increase the amount of left thrust, if to the left increase the right thrust. The ME109, 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 ME109 and it gives you many hours of pleasurable flying.



Happy landings,

*Stan*