

**Ripmax**

# wots·wot

BY  
**CHRIS FOSS**



**A Chris Foss Design**



## Instruction Manual

## The Designer



# Chris Foss

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The fascination of flight captured Chris's imagination early on in his life when he started building, from kits and plans, simple free flight gliders and rubber powered models. By his early teens, Chris was already experimenting with his own designs, several of which have been featured as constructional plans in various aeromodelling magazines.

It wasn't long before his fiercely competitive nature started to show itself, with Chris channelling his energies into competing at national level with his own high performance free flight gliders.

In due course, Chris became tempted by the affordability of simple and fairly reliable radio control equipment, so by 1967 he had already designed, built and flown his first radio controlled glider. By 1976 his career in the architectural profession came to an end when he decided to channel his knowledge and experience into a full time kit manufacturing business, 'Chris Foss Designs'. It soon developed into one of the UK's most successful and respected R/C model businesses, offering a range of stylish and quality products.

With the advent of reliable and advanced radio control systems, Chris was able to expand his competition flying with considerable success. His competition highlights include becoming 1977 British National Thermal Soaring Champion, 1986 British National Scale Champion, placing 4th at the 1986 World Scale Championships in Norway, placing 6th at the 1992 World Scale Championships in the USA, and winning both 1992 and 1993 'Radioglide' National Thermal Soaring Championships.

In the late 70s Chris joined the local gliding club and achieved his ambition to actually fly himself! A few years later he expanded into powered flight and qualified for his Private Pilot's Licence. By 2007 Chris had accumulated 2000 flying hours in a wide variety of light aeroplanes, including a vintage Piper Cub, Jungmann aerobatic biplane, various glider tow planes and his favourite, a Vans RV8 American aerobatic kitplane.

## Introduction

Congratulations on your purchase of the WOTS WOT ARTF - the first Almost Ready to Fly version of this classic biplane. Designed to be quick to rig at the flying field (and fit in most family cars fully assembled) it can be completed in the minimum of time.

Before commencing construction, please ensure that you read these instructions in their entirety.



## Fitting the Ailerons and Assembling the Lower Wing

### STEP 1

The wings and ailerons are supplied with the hinges loose fitted, ready for installation. Remove both ailerons and ensure that the hinges are inserted mid-way in their slots. Using thin cyano, pour a couple of drops onto each hinge - above and below - ensuring the glue soaks into the hinge and the surrounding wood.



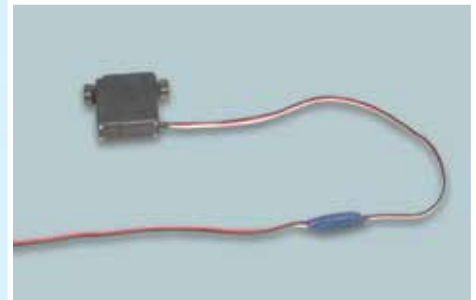
### STEP 2

Carefully slide each aileron into position, ensuring a gap-free hinge line. Make sure that each aileron lines up with the wing tips and that they are free to move through their entire travel. Centre each aileron between the root and tip so that there is an equal gap at both ends. Minimise any hinge gap, then carefully add a couple of drops of thin cyano to the top and bottom of each hinge ensuring that the glue does not run through the hinge line onto the bottom of the wing. Turn the wing over and drop more cyano onto each hinge from the other side.



### STEP 3

Prepare your aileron servos by connecting a suitable 300mm extension lead to each. It is a good idea to use a lead-lock, a turn of insulation tape or heatshrink tube over the joint for additional security.



### STEP 4

Cut away the covering over the servo lead holes in the top of the wing panels, and carefully pull the cotton thread already inside the wing through the hole and retain with a short length of tape to stop the thread pulling back into the wing.



### STEP 5

Use a ruler as a straight edge to get the orientation of the wing joiner correct. The rear of the joiner is straight (with all the taper being on the front) and the upper surface is almost flat with the underside having all the dihedral.



## STEP 6

Locate the nylon dowel and epoxy into one wing panel to act as an alignment peg.



## STEP 7

Check the fit of the joiner in the two wing halves and once happy, mark the centre-line of the joiner. Coat the inside of the corresponding slot in the wing panel and one half of the brace with rapid setting epoxy. Ensure that adequate epoxy is used to fully cover all surfaces. Insert the brace half-way into the wing panel using the centre-line as a guide. Wipe off any excess epoxy.



## STEP 8

Protect the covering with masking tape, then spread sufficient epoxy over the opposite panel joiner slot, wing joiner and root rib. Bring the two panels together ensuring the epoxy fills the join. Wipe off any excess that squeezes out of the joint, then use tape and clamps to hold the panels together as the adhesive cures.



## STEP 9

Trim away the covering and check that your choice of servo fits the servo apertures in the underside of the wing. Adjust the size of the mounting holes with a sharp knife if required. Carefully tie each aileron servo's lead to the length of cotton already in the wing panels. Carefully pull the leads through to the centre of the wing and lift out the servo connectors. Retain the servo leads with a short length of tape to stop them pulling back into the wing.



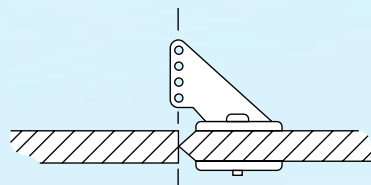
## STEP 10

Screw the aileron servos in position using the mounting screws, rubber grommets and ferrules supplied with your radio. Note that the output shaft end of the servo is towards the front of the wing.



## STEP 11

Locate the aileron control horns. They are screwed in position on the ailerons in line with the aileron servo's output arm (see the photo in step 16). Align the row of holes in the horn with the hingeline. Mark and pilot drill two mounting holes.



## STEP 12

Now screw the horn to the aileron. The screws thread into the moulded horn plate on the top surface of the wing.



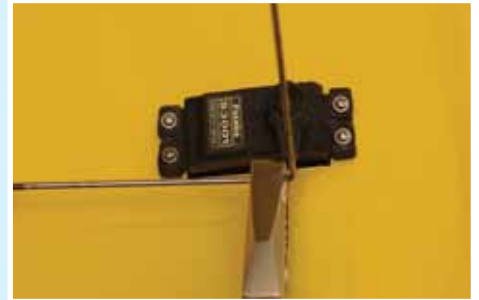
## STEP 13

Do not overtighten the control horn mounting screws - you don't want to crush the aileron. Turn the model over and trim off any excess thread using side cutters.



## STEP 14

Use a small length of tape to hold each of the ailerons at their neutral position while you complete the aileron linkages. Ensure that both aileron servos are centred. Locate a threaded wire aileron pushrod and attach a nylon clevis to the end. Connect it to the aileron horn and mark the position the control rod passes over the servo's output arm. Bend the pushrod up at 90° at this point.



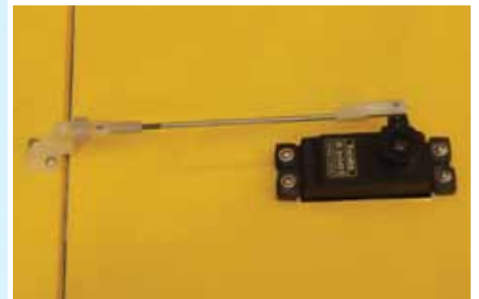
## STEP 15

Slide the aileron servo horn over the wire, re-fit to the servo and snap a moulded keeper onto the pushrod to retain it. Trim off the excess pushrod wire using side cutters. Repeat the procedure for the second aileron in exactly the same way.



## STEP 16

Adjust the pushrods to ensure that the ailerons are centred with the aileron servos at their neutral position. Test to ensure that both ailerons move freely across their entire throw. Fit short lengths of fuel tube over each clevis to ensure they cannot open under flight loads.



## STEP 17

Locate the pre-cut slot for the aileron link horn. Carefully trim the film away from the upper side of slot as shown. Make sure that you do not cut through the film on the underside of the aileron.



## STEP 18

Locate the fibreglass aileron link horns. Test fit the horn in its slot on the top surface, noting that the hole is towards the rear of the aileron. Remove and roughen the horn with coarse sandpaper. Epoxy in position with the base of the horn flush with the bottom of the aileron.



## Completing the Upper Wing

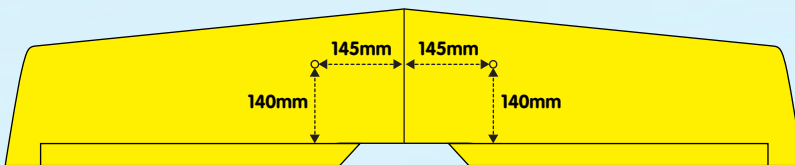
## STEP 19

Hinge the ailerons using the same method as with the lower wing. Now locate the nylon dowel and epoxy into one wing panel to act as an alignment peg.



## STEP 20

Using a sharp knife, carefully trim away the covering to expose the holes in the underside of the wing, for the screws that thread into the wing joiner tube.



## STEP 21

The upper wing is joined with an aluminium wing joiner tube that is secured in place with screws through these holes.



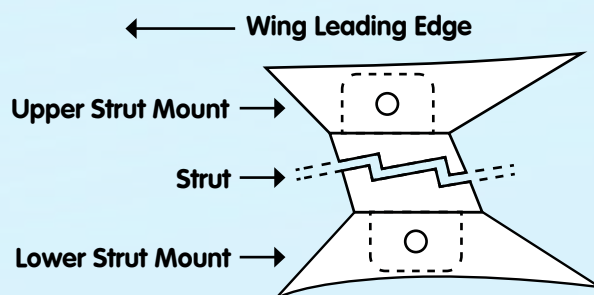
## STEP 22

Using the same technique as the lower wing, roughen and glue the aileron link horns in position on the underside of the ailerons. Note that the holes are orientated towards the rear of the ailerons.



## STEP 23

Locate the four plastic moulded interplane strut mounts, and identify the top and bottom mounts. The lower mount is more curved than the upper. Scuff the locating tabs for a good key when gluing.



## STEP 24

Place the strut mount in position on the wing. Check that you have the correct mounts - the top and bottom are shaped differently to suit the wing curvature. Also check that the mounts are the correct way round by temporarily dry assembling the model with the struts in place to ensure that they are correctly orientated. Using a sharp knife, carefully trim around the mount's outline as shown.



## STEP 25

Remove the film as shown and glue the mount in position using 5 minute epoxy. Repeat for the other side of the wing.



## Fuselage

## STEP 26

Using a sharp knife, carefully trim away the covering from the pre-cut cabane mounting slot in the top of the fuselage with a sharp knife.



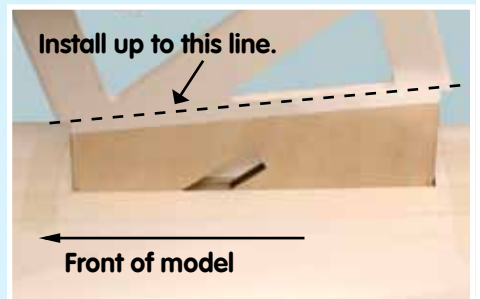
## STEP 27

Use strips of masking tape to protect the covering film from excess epoxy.



## STEP 28

Noting the orientation of the cabane, apply sufficient epoxy onto the plywood cabane and slide it fully into position in the fuselage so that the tabs sit flush. Wipe off any excess epoxy then remove the masking tape before the adhesive cures.



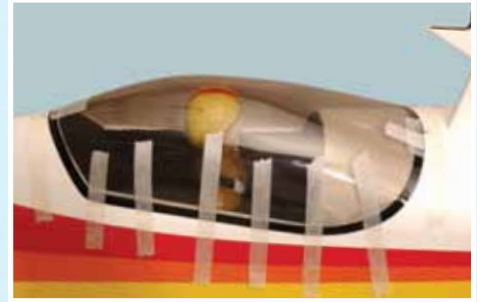
## STEP 29

Use epoxy to fix the pilot figure in position. Use strips of masking tape to retain the figure while the adhesive cures.



## STEP 30

Using epoxy or canopy glue, fit the canopy using strips of tape to secure while the adhesive cures. Ensure that the canopy is correctly centred front to rear and left to right. Alternatively the canopy can be secured with small screws if preferred.



## Undercarriage

### STEP 31

Locate the aluminium main undercarriage, wheels and wheel mounting hardware (axles, collets, washers and nyloc nuts).



### STEP 32

Insert the axle through the undercarriage leg, fit a washer and tighten the nyloc nut. Slide a wheel over the axle and retain with collet using a little thread locking compound on the grub screw. Repeat for the other wheel.



### STEP 33

Install the main undercarriage using the two mounting screws and washers supplied. For security, use thread lock compound on the screws.



### STEP 34

Locate the pre-bent tailwheel assembly and fit the tailwheel using the supplied collet. Hold the tailwheel bracket in position with the tailwheel wire inline with the rear of the fuselage. Pilot drill holes for the retaining screws.



### STEP 35

Screw the tailwheel bracket in position.

Now trim away the covering from the tailplane and fin mounting slots at the rear of the fuselage.

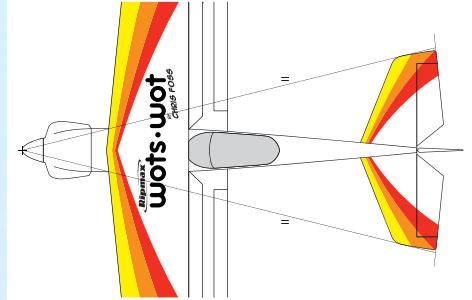




## Tail and Fin

### STEP 36

Slide the tailplane into its pre-cut slot in the rear of the fuselage. Ensure that it is square to the fuselage and centred in its slot using a long ruler or string as shown in the diagram on the right. Mark the tailplane on the top & bottom where it enters the fuselage using a soft, water-soluble pen.



### STEP 37

Slide the fin into its pre-cut slot in the top of the fuselage. Ensure that it is pushed down far enough to touch the top of the tailplane. Mark the fin on both sides where it enters the fuselage using a soft, water-soluble pen.



### STEP 38

Remove the tailplane and fin. Cut away the covering from both just inside the marked lines to give a film-free surface for the glue to bond.

**IMPORTANT:** Ensure that only the film is cut - not into the wood - as this will seriously weaken the structure.



### STEP 39

Roughen the wire elevator joiner. Now loosely position the joiner at the rear of the tailplane slot. Slide the tailplane into position. Do not omit this step as you will not be able to install the joiner after the tailplane is glued in position.



### STEP 40

Check that the tailplane is correctly aligned and square to the fuselage. Use thin cyano to glue the tailplane into its slot, taking care not to allow glue to run out of the joint.



### STEP 41

Apply thick cyano or epoxy to the base of the fin then slide it into position. Check that the fin is pushed down fully into its slot in the top of the fuselage and ensure that it is perpendicular to the tailplane using a set square. Use thin cyano to glue the fin into its slot, taking care not to allow glue to run out of the joint.



## STEP 42

Insert two hinges into the rudder and two more in each elevator half, ensuring they are located mid-way in their slots. Using thin cyano, pour a couple of drops onto each hinge - above and below - ensuring the glue soaks into the hinge and the surrounding wood.



## STEP 43

Protecting the rear of the tailplane with a strip of masking tape, apply epoxy to each half of the wire elevator joiner and force it into the corresponding slots and holes in the elevator halves. Slide the elevators into position ensuring that the joiner and all four hinges enter their pre-cut slots in the tailplane.



## STEP 44

Ensuring a gap-free hinge line and a 1mm gap between the elevator and tip, hold the elevator halves level using strips of masking tape until the epoxy cures.



## STEP 45

Now add a couple of drops of thin cyano to the top and bottom of each hinge. Make sure that the glue does not run through the hinge line onto the bottom of the tail.



## STEP 46

Protecting the rear of the fuselage with a strip of masking tape, mix and apply a small quantity of epoxy to the tailwheel wire. Force some into the slot and hole in the rudder then slide the rudder in place making sure that both hinges are located in their slots in the fin and that the tailwheel wire fits neatly into its recess in the rudder. Wipe off any excess epoxy.



## STEP 47

Ensure that the rudder is aligned to the top of the fin and there is free movement left and right plus a gap-free hinge line. Now apply a couple of drops of thin cyano to each side of each hinge taking care not to allow the adhesive to run through the gap onto the other side of the model.



## Radio Installation

### STEP 48

Locate the factory assembled elevator pushrod and slide it into position from the radio bay and out through the exit slot. Screw a nylon clevis onto the rod as shown.



### STEP 49

Connect the clevis to a control horn and position the horn so that it is in line with the hinge line. Holding the horn in position, pilot drill the elevator for the mounting screws.



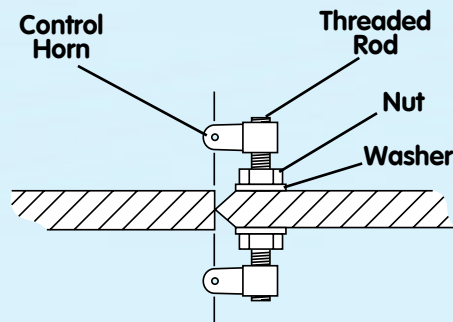
### STEP 50

Screw the control horn to the underside of the elevator allowing the mounting screws to thread into the moulded horn plate on the top surface of the elevator.



### STEP 51

Locate the closed loop horn and install it in the rudder in line with the slots in the fuselage using the nuts and washers as shown. Use a threadlocking compound on the nuts to ensure they do not loosen due to engine vibration.



### STEP 52

Cut the supplied single piece of closed loop wire into two equal lengths, then fit a clevis onto the closed loop adaptor. Now loop one piece of the closed loop wire through the adaptor and slip the brass tube supplied over the join. Crimp firmly with pliers or side cutters and add a drop of cyano for increased security. Repeat for the second length of wire.



### STEP 53

Install your rudder and elevator servos in the pre-fitted servo tray as shown. Note the orientation of the servo outputs. Note that there are two servo spacers glued to the tray; these raise the height of the rudder servo for additional clearance on the elevator servo.



## Radio Installation

### STEP 54

With the elevator and servo centred, mark the point that the pushrod passes the servo output arm. Use a wrap of masking tape on the rod to make marking it easier if required. Bend the pushrod up at 90° at this point.



### STEP 55

Slip the bent pushrod through the servo horn and fit a moulded swing-in keeper. Now trim off the excess length of wire, refit the horn and test the operation of the elevator.

Elevator  
Servo

Rudder  
Servo



### STEP 56

Slide a thin piece of wire forward through one of the closed loop exits in the rear of the fuselage and feed it forward into the radio bay. Tape the closed loop wire to this and use it to pull the closed loop wire out through the exit. Remove the tape.



### STEP 57

With the servo and rudder centred, connect the closed loop wires to the servo horn as shown. .



### STEP 58

Fit a clevis onto a closed loop adaptor and attach to the rudder's closed loop horn. Now slip a length of the supplied brass tube over the closed loop wire, pass the wire through the adaptor and back through the tube. Crimp the tube carefully with pliers or side cutters and for additional security, add a drop of cyano. Repeat for the second wire.



### STEP 59

Install your receiver using foam backed double sided tape (if using an electric powerplant) or use foam rubber if using an I/C engine.



## Four Stroke Engine Installation

### STEP 60

Screw the engine mount onto the bulkhead as shown noting the orientation of the mount. Use the supplied mounting screws and washers using thread locking compound to secure. Note that the captive nuts have already been factory installed in the bulkhead.



### STEP 61

Place your engine on the mount. Adjust its position until the distance from the front of the prop driver to the front of the main bulkhead (not plywood mount plate) is 127mm.



### STEP 62

Holding the engine steady, mark the position of the mounting holes on the mount as shown. Remove the engine and drill four clearance holes through the engine mounting beams to suit the bolts supplied.



### STEP 63

Screw the engine to the mount using the four bolts, washers and nuts supplied. Locate the throttle pushrod outer sleeve. Install the tube through the bulkhead and secure with a drop of cyano. Form a 'Z' bend in the throttle pushrod. Fit to the carburettor throttle lever and slide the pushrod into its outer. To do this, you will need to temporarily remove the throttle lever from the carburettor.



### STEP 64

Prepare the fuel tank for fitting by assembling the tank stopper with the feed, vent and fuel pipes. Ensure the clunk tube length is cut to allow the clunk to move around the tank without catching on the tank's base. Fit the assembled tank bung and tighten the retaining screw noting that the tank is fitted on its side. Take care not to over-tighten this screw. Test that the tank is leak-proof.



### STEP 65

The tank is installed in its bay via the radio bay. Fit and identify your fuel tubes, then feed the tank into position, drawing the fuel tubes out through the hole in the centre of the firewall. If installing a receiver battery below the tank, do this now before the tank is fitted. Ensure that the battery is wrapped in foam.



## STEP 66

Install your throttle servo in the precut slot in the radio tray. Adjust the length of the linkage so that mid-throttle stick position corresponds to the carburettor being open 50%. Tighten the screw in the connector and adjust the high and low throttle positions.



## STEP 67

Connect the fuel line to the engine, pressure to the exhaust (if using exhaust pressure) and block the vent line.



## STEP 68

Trim the fibreglass cowl to clear the engine and silencer. The cowl should just overlap the front of the fuselage. Carefully measure the positions of the cowl mounting blocks and transfer these measurements onto the cowl. Pilot drill the cowl and retain with three self tapping screws, one top centre and one each side. Fit your propeller and spinner. The model is complete and ready for final installation.



## STEP 69

Cut a suitable aperture and fit your radio's switch (and charging socket if used) to the left hand side of the fuselage.



## Electric Motor Installation

## STEP 70

Electric power requires a hatch to be cut in the bottom of the model for easy access to your Li-Po. The hatch line is pre-cut by laser at the factory, leaving tabs to hold it in place. The cut line can be seen through the film covering. We suggest that you iron down the film around the hatch before it is removed to ensure that it does not lift when cutting. Begin by cutting through the film where marked using a sharp knife.



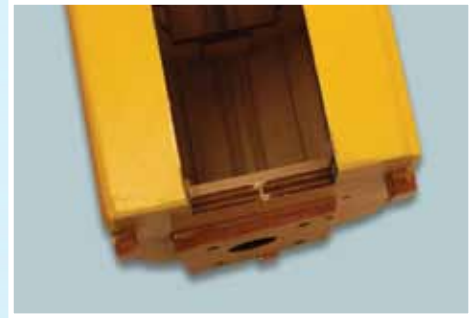
## STEP 71

Use a razor saw to carefully remove the hatch in one piece.



## STEP 72

With the hatch removed, access to the Li-Po bay is gained.



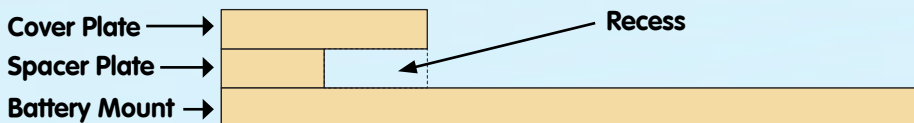
## STEP 73

Locate the fixed battery mount. Use a small amount of epoxy to glue the spacer to the end opposite to the bolt hole.



## STEP 74

Glue the cover plate over the spacer (shown dotted) to form a recess for the tongue of the removable battery tray to locate.



## STEP 75

Press in a captive nut from the underside of the fixed battery mounting plate as shown and secure with 5 minute epoxy.



## STEP 76

With the model upside down glue the fixed battery mounting plate in position. The front should be flush with the bulkhead and the rear locates in the cabane strut. Use five minute epoxy for this. Use the supplied piece of triangular balsa under the front of the plate where it joins to the front former.



## STEP 77

The 'tongue' on the removable tray locates in the ply pocket at the rear of the fixed tray and a nylon bolt retains the plate. The removable plate has a keyhole slot so that the retaining bolt needs to only be loosened to allow the plate to be slid forward and removed to charge your Li-Po.

Attach your battery to the plate with several layers of either electrical or clear adhesive tape as shown.



## STEP 78

Install your choice of motor to the mounting plate using the screws, washers and nyloc nuts supplied. Screw a threaded stud into the rear of each aluminium stand-off. Now screw the stand-offs to the front former. Use pre-drilled hole in each stand-off for a tommy bar to be used to tighten. Now fit the motor mounting assembly to the stand-offs using the four screws and washers supplied.



## STEP 79

Mount your ESC as shown to ensure that it gets plenty of cooling air over it.



## STEP 80

Use a sharp knife to open up the panel as shown on the underside of the model to allow cooling air to exit.



## Rigging for Flight

### STEP 81

Rigging the Wots Wot is quick and easy if you follow this simple step-by-step guide. Fit the interplane struts to the lower wing using the bolts, washers and nyloc nuts supplied.



### STEP 82

Slide the wing tube into the right-hand upper wing panel and tighten its retaining screw. Connect a nylon clevis to the aileron linkage rod and attach to the link horn on the upper aileron.



### STEP 83

Slide the wing tube through the cabane strut holding the wing level.





## STEP 84

Now slide on the second wing panel ensuring it butts together to give a gap-free join



## STEP 85

Tighten the second wing tube retaining screw. Ensure that you do not over-tighten the screws.



## STEP 86

With the model standing on its nose, connect up the aileron extension leads and locate the lower wing in its seat. Guide the two interplane struts into their strut mounts in the underside of the upper wing.



## STEP 87

Install and tighten the nylon wing retaining bolts.



## STEP 88

Retain the interplane struts in the upper wing using the bolts, washers and nyloc nuts supplied.



## STEP 89

With the ailerons centred and the surfaces level, complete the aileron linkage rods by bending the rod at 90°, connecting to the link horn and fitting a nylon keeper.



## STEP 90

Congratulations - your Wots Wot is complete! Do not omit the following steps - checking of the balance point is critical.



## Control Throws

For initial flights, we recommend the following control throws - each measured at the widest point of the surface:

Elevator:	20mm up - 20mm down 20% exponential
Rudder:	60+mm left - 60+mm right No exponential
Ailerons:	10mm up - 10mm down (Measured on lower Ailerons) 30% exponential

## Balancing the Wots Wot

The Centre of Gravity (C/G or Balance Point) should be 115mm (4-1/2") back from the leading edge of the upper wing at the root. This should be measured with the fuel tank empty or a Li-Po installed. Support the completed model under the wing either side of the cabane strut at this point and add weight or adjust the position of the radio or flight battery in its bay as necessary to achieve a slightly nose down attitude. A model that is not correctly balanced will not perform as it should and, at worst, be unstable or unflyable, leading to damage to the model or injury to yourself or others. Do not miss out this step in completing your Wots Wot!

## Flying the Wots Wot

The new Wots Wot biplane is a new addition to the Wot series of aircraft and it has (by general agreement) the best flying characteristics of them all! With its sleek aerodynamic design and relatively large wing area, the Wots Wot has incredible low speed handling; being able to fly at amazingly slow flying speeds. Yet open the throttle and the aerobatic performance and precision is truly outstanding! With a .70 to .81 four stroke engine or electric power with suitable motor and 5 cell battery pack, the Wots Wot offers a sparkling performance that will satisfy even the most demanding pilot. The model has been optimised for rapid assembly/disassembly, requiring only 6 screws tightening and 2 clevises connected to be flight ready... but it's compact enough to fit into most cars in one piece!

## Spare Parts and Service

Spare parts are available for the Wots Wot ARTF from all Ripmax stocked model shops. In case of any difficulty, any product queries, or to locate your local Ripmax stockist, please write to the address below or visit [www.ripmax.com](http://www.ripmax.com)

## Pre-Flight checks

- Completely charge your transmitter and receiver batteries before flying.
- Carefully check your model over to ensure that all screws are tight and everything is well bonded.
- Double-check the Wots Wot's Centre of Gravity.
- Check the control surfaces for both the correct throw and direction. Ensure that each surface moves freely, without any binding.
- Check the receiver aerial is fully extended.
- Ensure the wing bolts are tight.

Always fly the Wots Wot in a safe location at a recognised club. For further information on flying in the UK, please contact:

British Model Flying Association (BMFA)  
Chacksfield House,  
31 St Andrews Road,  
Leicester. LE2 8RE.  
Tel: (+44) 116 2440028 Fax: (+44) 116 2440645  
[www.bmfa.org](http://www.bmfa.org)

*Always Fly Responsibly and Safely*

# WOTS WOT - Instructions



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