

**Ripmax**

# Harmony



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## INSTRUCTION MANUAL



# Harmony

Congratulations on your purchase of the Ripmax Harmony! Despite it being a twin, final assembly is quick and straightforward. We recommend that you read these instructions fully before you commence assembly.

## The Wings

### STEP 1.

Locate the aileron hinges and insert 4 mid-way into each wing half's trailing edge (eight hinges in total). Each of the slots has been pre-cut, but may need gentle opening with a sharp knife. 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 is centred between the root and tip and that they are free to move through their entire travel. 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.

Cut away the covering film from the aileron servo apertures. Check that your choice of aileron servo fits the pre-cut aperture. Adjust the size of the mounting holes with a sharp knife if required. Carefully pass each aileron lead through to the centre of the wing. You will need to extend the length of your aileron servo leads using a pair of extension leads. Note the orientation of each servo - the output horn should face the front of each wing panel.

### STEP 4.

Fit the rubber servo mounting grommets and brass ferrules supplied with your radio equipment in accordance with the radio manufacturer's instructions. Install the two aileron servos in their mounts. Screw each servo into position.

### STEP 5.

The aileron horns are mounted on the underside of each aileron, in line with the servo output arm and the hinge line. Use a small drill to mark the horn's position on the aileron then drill clearance holes. Mount the two aileron control horns using the screws provided. Do not over-tighten the screws into the mounting plates.



### STEP 6.

Locate the aileron control rods with pre-formed z-bend ends. Connect the control rods to the aileron servos and tighten the servo horns. Check that both ailerons move freely across their entire throw with no binding. Adjust their neutral positions if necessary.



### STEP 7.

Find the pre-cut wing joiner and ensuring it is correctly orientated, dry assemble the two wing panels to ensure they fit together with no gaps between the root ribs. Now mark the centre position of the joiner as shown. It is a good idea to run a strip of masking tape around the wing at the root to protect it. Mix up sufficient epoxy (30 minute or 1 hour type recommended) and work plenty into the wing joiner pocket.



### STEP 8.

Liberalily coat one half of the wing joiner front and back, top and bottom. Carefully push it fully into its pocket, removing any excess epoxy that runs out. Now coat the second half of the joiner and the face of the root rib. Work plenty of epoxy into the second wing joiner pocket as before.



### STEP 9.

Working over sheet of polythene to avoid epoxy damaging your work surface, draw the two wing panels together. Make sure that you don't allow excess epoxy to run onto the servo leads or retract pushrods as the two panels meet together. Ensure aileron servo leads exit through access holes in top of wing.



### STEP 10.

Ensuring that the two wing panels are accurately aligned, use tape to secure them as the epoxy cures. Check that there are no gaps between the root ribs. There should be a small amount of dihedral on the underside of the wing only (the top surface of the wing should be flat) but this is assured when the root ribs meet together. Wipe off any excess epoxy from the wing join, then leave the wing to one side for the epoxy to cure thoroughly.



### STEP 11.

To complete the retract linkage, locate the two metal pushrod connectors and fit them to a suitable servo output horn. You will need to measure the distance each operating pushrod needs to move to fully extend and retract your undercarriage and choose an output horn that will give this operating throw.



### STEP 12.

Check that your choice of retract servo fits the pre-cut aperture. Adjust the size of the mounting hole with a sharp knife if required. Note that the servo may extend through the underside of the wing so trim away the covering to allow this if necessary. Fit the rubber servo mounting grommets and brass ferrules then pilot drill and screw your servo in position.



### STEP 13.

Fit the prepared servo output horn and slide the retract operating pushrods through the connectors. It may be easier to remove the retract mounting screws for this so that each unit can be slid part way out of its mount during connection and adjustment of the linkage. Once happy with the operation of the retracts, fully tighten the connectors and re-fit all eight retract mounting screws.



### STEP 14.

Locate the wing mounting dowel and slide it into its pre-cut hole in the leading edge, trimming the covering if necessary. Slide the plywood underwing fairing former over the dowel and with its curved surface to the bottom of the wing, mark its shape onto the film. Remove the marked section of film with a sharp knife and epoxy the former and dowel in position as shown.



### STEP 15.

Once the epoxy has fully cured, temporarily bolt the wing to the fuselage using the two nylon retaining bolts. Holding the underwing fairing in place - ensuring it is centred front and back, left and right - mark its position with a felt pen. Do not press too hard on the fairing otherwise it may distort and spread wider than the fuselage.



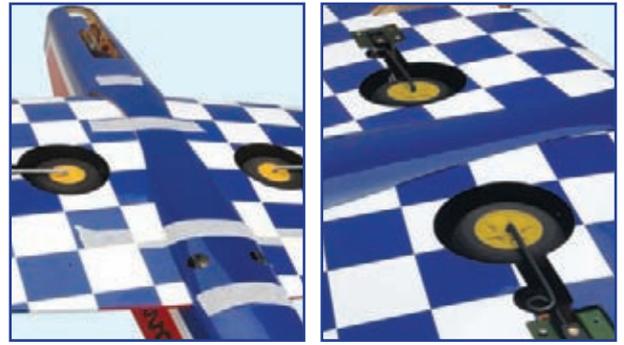
### STEP 16.

Remove the fairing and carefully trim inside the lines you just marked using a sharp knife. **VERY IMPORTANT:** Make sure that you do not cut into the wood otherwise the strength of the wing will be severely weakened. Prior to gluing the fairing in place, you may like to protect the fuselage with clear tape or film so that you do not accidentally glue the wing to the fuselage in the next step!



**STEP 17.**

Using 5 minute epoxy or thick cyano, run a bead of glue around the perimeter of the underwing fairing and over the underwing fairing former. Avoid using too much glue as any excess will simply run out onto the wing covering or bond the fairing to the fuselage rather than the wing. Use strips of masking tape to hold the fairing in place until the glue dries.



### The Engine Nacelles

**STEP 18.**

Locate the two plywood engine mounting plates. Note that they are handed for the left and right wing and only fit one way round. Dry fit the mounting plates to ensure that they locate correctly in the wing. Each mounting plate slides into the pre-formed plywood mounting points and has four dowel security pegs on each.

**STEP 19.**

With each mounting plate temporarily fitted in place, mark the covering where the plywood strengtheners touch. The covering must be carefully cut away from these areas using a sharp knife making sure that the surface of the wing is not cut.

**STEP 20.**

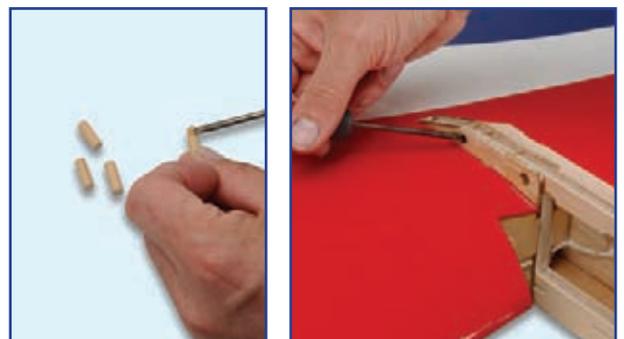
Mix sufficient epoxy - 30 minute type is recommended - and apply it liberally to the engine mounting plate and the plywood mounting point in the wing. Only work on one mount at a time and ensure that all surfaces are well coated as any excess can be wiped away before it cures.

**STEP 20.**

Slide the mounting plate in position ensuring that it seats fully home in its mount. Work with tissue underneath, so that any excess epoxy that oozes out of the joint does not damage your work surface.

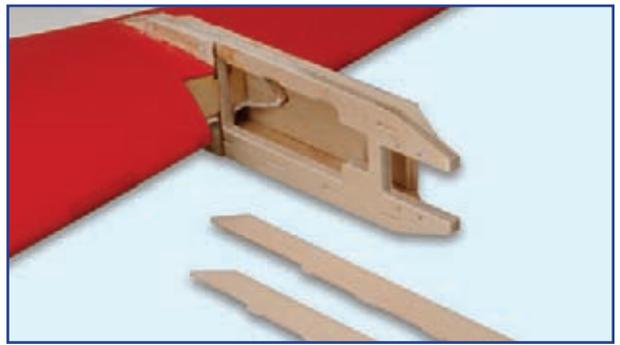
**STEP 21.**

Coat each of the four security dowels with epoxy and push them through the plywood mount ensuring that they pass completely through both sides. Use clamps or tape to hold the assembly together as the glue cures. Wipe any excess glue from the mounting plates but make sure there are no gaps between the mount and wing. Repeat the procedure for the second engine mounting plate.



**STEP 22.**

Once the epoxy has cured, locate the plywood engine mount reinforcing plates. These stiffen the mount assembly considerably.

**STEP 23.**

Mix up some 5 minute epoxy and glue the upper and lower reinforcing plates in position. Use clamps to secure as the epoxy cures. Now repeat the procedure for the other side.

**STEP 24.**

Prepare the two fuel tanks as shown. Cut the clunk tubes to the correct length so that the two clunks are free to move inside the tanks without touching restriction. Insert each tank into the engine mount as shown. Use a dash of silicone sealant to retain each of the tanks in position. Check that fuel output and vent pipes clear the mount, the tubing can run either side.

**STEP 25.**

Check that your choice of throttle servo fits the pre-cut apertures. Adjust the size of the mounting holes with a sharp knife if required. Fit the rubber servo mounting grommets and brass ferrules supplied with your servos. Extend the length of the servo lead or fit an extension lead to each servo and thread them through the wing and out of the forward exit hole in the wing centre section.

**STEP 26.**

Drill four pilot holes for each, then mount the servos using the screws supplied with your radio equipment.

**STEP 27.**

The Harmony is designed for a pair of .40 or .46 engines - the O.S. 46 AX being particularly recommended. Each engine is mounted with its silencer facing down using the mounting screws, washers and nyloc nuts supplied. Attach each engine to its mount leaving the silencers off at this stage.



**STEP 28.**

Screw a clevis onto each throttle pushrod, thread the z-bend through the servo's output horn, then connect to each engine's throttle arm. Adjust the rod lengths carefully to ensure that if you are connecting the servos via a 'Y' lead that the idle and high speed positions match.



**STEP 29.**

Complete the engine installation by plumbing the engine's fuel, fill and pressure lines. It is a good idea to use different colour fuel lines so that the installation is nice and clear and plumbing errors are avoided.



**STEP 30.**

Test fit the moulded nacelles. Note that they are handed for the left and right wing and only fit one way round. Trim the top half to clear the needle valve assembly and retain it in position using two self tapping screws into the engine mount after pilot drilling the holes.



**STEP 31.**

Fit the lower nacelle in the same way after carefully trimming it to clear the silencer. Use tape to hold it in position, then pilot drill and fit two self tapping screws to retain the lower nacelle moulding to the engine mount. Use a further six self tapping screws - three per side of each nacelle - to seal the joins between the two nacelle halves as shown.



**STEP 32.**

Now connect up the prepared fuel lines - if you used different colour tubing, this is an easy task! Ensure that the silencer is tight and the pressure line connected. Blank off the vent line with a plug. Now fit your propeller and spinner and tighten with the correct spanner or wrench.



**STEP 33.**

Once the second nacelle has been completed in the same way you have completed the wing assembly. Take a few moments now to carefully mark the aileron, throttle and retract servo leads so that they are easily identified when rigging the model.



## The Tailplane and Fin

### STEP 34.

Locate the elevator hinges and insert 3 mid-way into each elevator. Use thin cyano to secure each hinge, ensuring the glue soaks into the hinge and the surrounding wood. Now join the two elevator halves using the pre-bent wire elevator joiner coated with epoxy and inserted into the drilled holes in each elevator half. While the glue cures, ensure both elevator halves remained aligned.

### STEP 35.

Slide the elevator assembly into position, ensuring a gap-free hinge line. Make sure that elevator is centred between the tailplane tips and that it is free to move through its entire travel. Now 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 tail. Turn the tail over and drop more cyano onto each hinge from the other side.

### STEP 36.

Trim away the covering from the pre-cut elevator servo aperture. Extend the length of the servo lead, or use an extension lead, then thread the lead through the fuselage up to the radio bay. Noting the orientation, fit the rubber servo mounting grommets and brass ferrules supplied with your radio and install the servo.

### STEP 37.

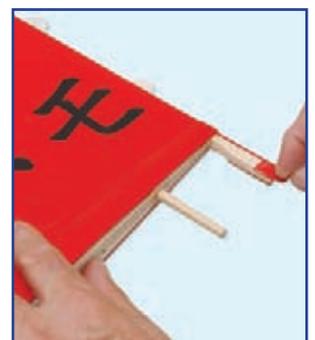
Now position the tailplane over its pre-formed mount in the fuselage. Locate the fin and carefully pass the wooden dowels in the fin's base through the tailplane and into the bottom of the fuselage. Using the fuselage and fairing as a guide, score the film on the tailplane top and bottom using a sharp knife.

### STEP 38.

Ensuring that you don't cut into the tailplane, cut the film at the scored lines and remove the covering on the top and bottom of the tailplane as shown. Remove the covering from the rudder post in the same way.

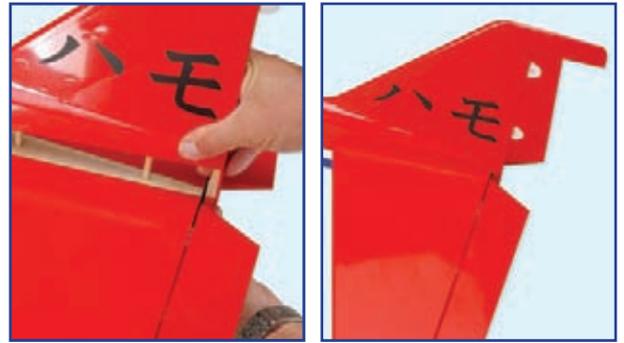
### STEP 39.

Now mix up sufficient epoxy (30 minute recommended) and apply to the tailplane mount in the fuselage. Fit the tailplane, then add more epoxy to the top of the tailplane and the rest of the fuselage opening where the fin fairing will fit and move straight onto the next step



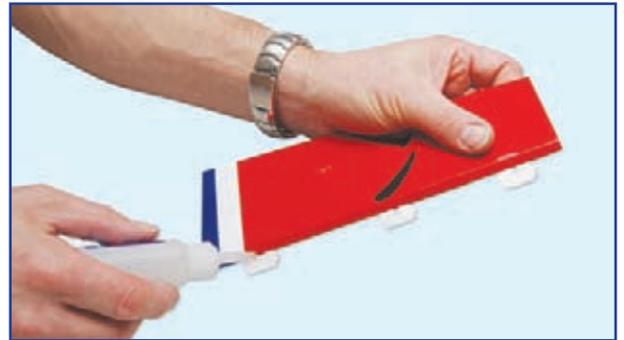
**STEP 40.**

Coat the underside of the fin fairing and the two dowels with more epoxy. Thread the dowels through the holes in the tailplane and push the fin fully into position. Use a tissue to remove any excess epoxy and check for the correct alignment of the tail and the fin while the epoxy cures.



**STEP 41.**

Locate the rudder hinges and insert 3 mid-way into rudder. 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.



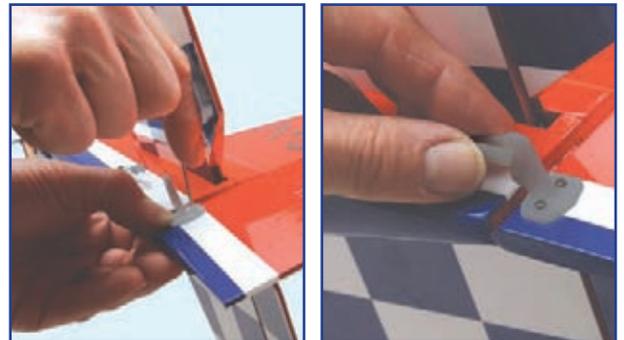
**STEP 42.**

Slide the rudder into position, ensuring a gap-free hinge line. Make sure that rudder is centred between the fin tip and the bottom of the fuselage. Check it is free to move through its entire travel. Now carefully add a couple of drops of thin cyano to each hinge ensuring that the glue does not run through the hinge line onto the other side of the fin. Turn the model over and drop more cyano onto each hinge from the other side.



**STEP 43.**

Screw a clevis onto the rudder pushrod and slide it into the fuselage from the rear of the model. Now attach a control horn onto the left-hand side of the rudder in line with the pushrod and aligned with the hinge line. Snap the clevis closed as you will complete the rest of the rudder linkage once the nose retract is fitted.



**STEP 44.**

Screw a clevis onto the elevator pushrod. Now attach a control horn onto the underside of the right-hand side of the elevator in line with the already fitted elevator servo and aligned with the hinge line. Pilot drill the mounting holes, screw the horn in place, cutting off any excess screw length that passes through the retaining plate.



**STEP 45.**

With the elevator and elevator servo centred, adjust the clevis until the rod is the correct length. Snap the clevis closed, then test to ensure that the elevator moves through its entire travel without binding.



## Nose Retract

### STEP 46.

The nose retract comes pre-fitted. Mount your servo in the pre-cut bay immediately behind the retract unit using the grommets, ferrules and screws supplied with your radio. Fit a clevis to the retract pushrod and connect. Adjust the length of the rod so the noseleg retracts and extends without binding.



### STEP 47.

To complete the rudder and steerable linkage, install your rudder servo in the pre-cut tray in the fuselage as shown using the grommets, ferrules and screws supplied with your radio. Now fit two metal pushrod connectors to the servo output arm and slide them over the noseleg steering and rudder pushrods before fitting to the servo. Centre the servo, noseleg and rudder before tightening the retaining screws.



### STEP 48.

The moulded nose-cone can now be fitted. Check the fit of the nose-cone and trim with a sharp knife if required. Run a bead of thick cyano around the front of the fuselage and glue the nose-cone in position.



## Final Assembly

### STEP 49.

The canopy can be fitted using canopy glue or with the six self-tapping screws supplied. If using the latter, hold the canopy in place using tape after centring it so that the overlap onto the fuselage is even on both sides. Carefully pilot drill and fit the six retaining screws as shown.



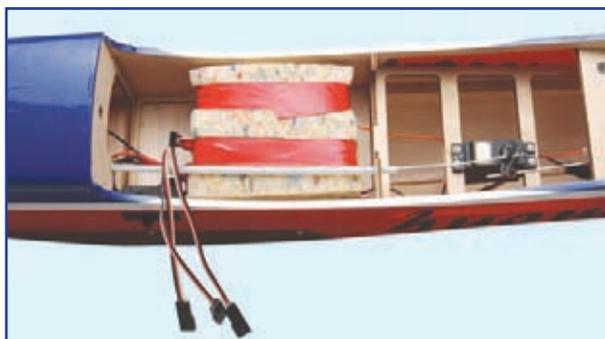
### STEP 50.

There is a pre-cut hole for the switch in the right hand fuselage side just below the canopy. Locate its position and trim away the covering for the switch and mounting screws. Screw the switch in position.



### STEP 51.

Complete the radio installation by packing both the receiver and nicad in protective foam in the radio bay as shown. The final position of the battery should be determined by the model's balance point - moving it forward or rearward in the radio bay to ensure the model balances correctly.



## STEP 52.

The aerial should be routed through the final remaining tube in the rear of the fuselage and retained with tape where it exits at the rear.

***Congratulations - you have completed the assembly!***



### Control Throws:

For initial flights, we recommend the following:-

**Elevator:** 17-20mm up and 17-20mm down

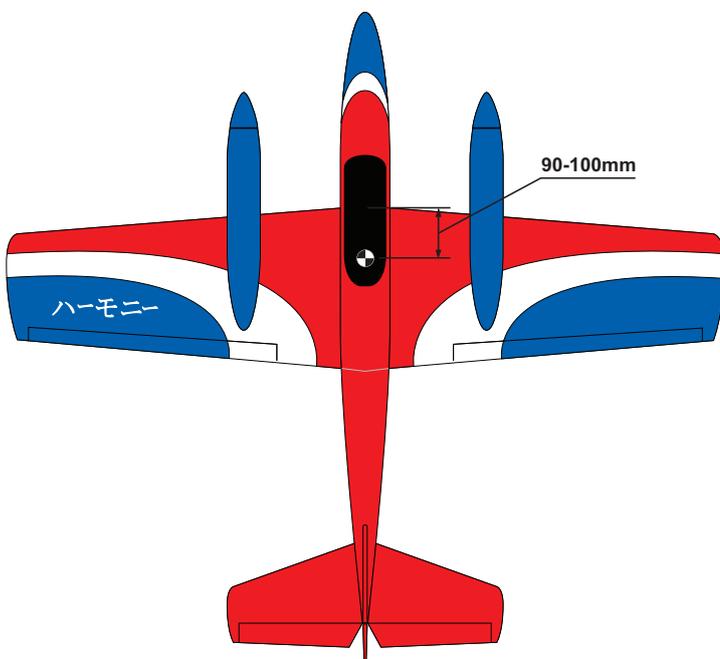
**Ailerons:** 17-20mm up and 17-20mm down

**Rudder:** 50mm left and 50mm right

Once comfortable with the Harmony the control throws can be increased to suit your flying style, however, these are a good starting point for the majority of pilots.

### Balancing the Model

The Centre of Gravity position should be 90-100mm back from the leading edge measured at the root of the wing. Support the completed model at this point and move the model's battery forward or rearward 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 Harmony!



### 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 Harmony'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.

### IMPORTANT

The Harmony flies like any high performance sport/aerobatic model. However, the reliable running of your engines is particularly important - especially with a twin. Run the engines in correctly and ensure that both throttle cleanly and their rpms match. If using two separate channels, you have considerably more control, but linking the two throttle servos with a 'Y' lead is perfectly acceptable. Ensure that you have sufficiently powerful servos on the main control surfaces. The Harmony has a smooth and predictable performance - but it is not a beginner's model.

Always fly responsibly and safely.

### The Ripmax Harmony is distributed by:

Ripmax Ltd.,  
241 Green Street,  
Enfield,  
EN3 7SJ,  
United Kingdom.



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