

RT MODELS

RV 4

Building Instructions

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RV 4

Construction

General

While every care is taken to ensure that your kit is complete, please take a little time to check the contents against the parts list included at the back of this booklet. Should you find that a part has not been included, contact us and we will be pleased to forward the part.

Caution - some people experience allergic reactions when exposed to epoxy or cyanoacrylate adhesives. While this is rare it is extremely important that these glues, and also paints, thinners and solvents, are used in an adequately ventilated area.

LIMIT of LIABILITY

In use of our products, RT Models only obligation shall be to replace such quantity of the product proven to be defective. User shall determine the suitability of the product for his/her intended use and shall assume all risk and liability in connection therewith.

Radio Requirements

A standard radio (standard servos, receiver and battery pack) may be used in your RV 4. However, a smaller, lightweight system will improve performance when using a .15 cu in engine. Be certain that your radio system's frequency is approved for use in radio controlled model aircraft.

Introduction

The RV 4 is a 4 channel, .15 size 2 stroke, Sport Scale/Sunday Flyer model of the popular full size EAA homebuilt. The RV 4's elegant, smooth and clean lines have generated great favour with the homebuilt crowd for years. You're likely to see one at most airports these days.

The model of the RV 4 builds light, strong, quick and easy. The RV 4's size is just right, not too big or too small to easily slip into most standard car trunks in one piece. No fussing or troubles, just pick it up and get flying. Performance is stable enough to fly hands off, but when switched to high rates the plane becomes fully aerobatic. Characteristics are very predictable and can easily be flown as low wing trainer. The 4 oz tank will keep you flying for about 20 minutes. The RV 4 will provide all the fun you could want at the fuel economy you need.

The RV 4 features:

- Interlocking balsa and ply construction;
- Laser cut parts;
- Pre-bent wire landing gear;
- Clear bubble canopy;
- ABS formed nose blisters and wheel pants; and
- Full size plans with construction booklet.

Additional items required in building the model are:

- .15 size 2 stroke engine & engine mount;
- Engine mount bolts and blind nuts;
- 4 Channel Radio - Regular or Mini servo's recommended;
- At least 1 large roll of covering material;
- Glue Ca & Epoxy;
- A pair of 2" light main wheels and 1/2" tail wheel; and
- A 4 oz Sullivan RST-4 No 425 fuel tank

Construction

The Fuselage

Step 1.

Locate and mark the inside of the two fuselage sides with the location of the formers. Lay one fuselage side down over the plan and using a straight edge transfer the locations that are on the plan. Place the other fuselage side and lay it back to back along the long top straight edge. It should look like an open book in front of you. Copy all the pen lines over to the other piece. You should finish with what is a mirror image with two identically marked pieces that are the insides of the fuselage.

Step 2.

On each side of the fuselage there are four $\frac{1}{8}$ " balsa parts needed for the support of the landing gear and wing saddle area. Note the wing saddles on each fuselage side is made of 2 pieces with a $\frac{1}{16}$ " gap on both sides of Former F3. This gap will let the fuselage sides bend with out binding in a later step.

Step 3.

Glue the two Former F2s together to make a single firewall $\frac{1}{4}$ inch thick. When set mark the location of the fuselage centre line and the engine thrust line. Line up the engine mount you have chosen on these lines and mark and drill the holes for the mounting "T" nuts. Once the "T" nuts are installed, mount your engine on the engine mount and mount to the firewall. This will enable you to position the throttle pushrod and fuel line holes in the firewall. Drill the holes for the fuel tank lines and throttle cable. Note that the firewall (F2) has alignment notches that will slip into each half of the fuselage.

Note you may want to use a fuselage building jig for the next few building steps. The fuselage is diamond shaped with straight sides. Its very important that from bulkhead F1, F2 and F3 the sides be completely straight as the nose blisters will be glued directly flush to the sides.

Note for ease of assembly you should draw a centreline on all the Bulkheads.

Step 4.

For best results assemble the nose half of the fuselage first from F2 to F3. Place the two fuselage halves upside down over the top view of the plans. Also ensure the inside halves are facing each other. Locate the $\frac{1}{8}$ " Ply bulkhead F3, F2/F2A as well as the Landing gear Ply Floor and the F8 ply wing attachment plate. Test fit all the parts. By using a jig it is possible to glue all the formers to the fuselage sides at the same time. Ensure the parts are aligned over the fuselage centreline. When the glue has dried you can glue in the nose ring F1. Glue in the 1/2" triangular stock between F1 and F2 as shown on the plans. Note the bottom of bulkheads F2 may slightly extend below the fuselage sides. Sand flush with the sides. Also if any of the formers show signs of bending stiffen them with scrap $\frac{1}{8}$ " balsa.

Step 5.

When the glue is completely dry from Step 4 pull the tail ends of the fuselage sides together. Before gluing the tail ends together ensure the centre line of F3 is exactly over the centreline of the top view as marked on the plans also the tail ends should meet over the same centre line. Before gluing you should test fit formers F4, F5 and F6. The fuselage sides from the tip of the tail to F3 should be completely straight in the shape

of the letter "V" You should have no bulges on any side. You may have to sand F5 and F6 to achieve the straight sides of the letter "V". When everything fits exactly over the plans and the centreline, glue the formers and tail together.

Step 6.

Mount the 4 oz fuel tank into place. Note you may want to make a fuel tank floor or supports from your scrap box. The floor is not shown on the plans as everyone has a different way to installing the tank. The fuel tank should be isolated with foam to prevent vibration. Also this is a good time to also add the throttle cable, Nyrods and servo rails.

Step 7.

The Upper fuselage is very simply $\frac{1}{4}$ " balsa sheet planking glued over the formers. Then the Planking is be sanded to the shape as shown on the plan. Glue formers F2A, F3A and F5A to F2, F3 and F5 respectively (see plan). Cut $\frac{1}{4}$ " balsa sheet to length to fit between formers F2 and F3, F3 and F5 and F5 and F6. Trim these to size and bevel the edge that will attach to the fuselage side. Glue in place. When set, plane and sand the upper edges level with the top s of the formers. Make sure that the edges are straight between the formers. Now cut pieces of $\frac{1}{4}$ " balsa sheet to fit between the formers. Glue in place. When set shape the fuselage top (using a plane and sanding bar) to the shape shown on the plans. Cut templates from the plans to ensure that the correct section is achieved.

Note. The fuel tank hatch area is optional (see plans side view). If you use the hatch simply cut the fuselage top at FA/FB and F2A. Use F2A and FA and hatch formers and FB as a fuselage former.

Step 9.

Trial fit the engine on its mounts on the firewall F2. You may have to remove some of fuselage sides to accommodate the needle valve and muffler.

Step 10.

Locate the $\frac{1}{8}$ " ply tail-wheel floor mount and carefully remove the $\frac{1}{8}$ " balsa fuselage sheet side area as seen on the side view of the plans and glue the ply tail-wheel floor into place. Also locate the main landing gear supports pieces and glue the $\frac{1}{8}$ " ply pieces into place ensure the $\frac{1}{8}$ " wire gear fits snugly in the gaps you are creating.

Step 11.

Using Cross grain $\frac{1}{16}$ " Balsa sheeting, sheet the bottom of the fuselage from the nose to the tail. Sand to shape the bottom nose area round from the front of the landing gear forward. Follow the contours of the circular F1 nose ring. You can add any scale details like the oil cooler using a piece of $\frac{1}{4}$ " dowel under the chin area of the nose when you're finished.

The Tail Feathers

Step 1.

When gluing any parts over your plans use wax paper to protect your plans. Locate all the $\frac{3}{16}$ " balsa parts needed for the vertical stabiliser and the rudder and glue the parts together as shown on the plans. The cross grain end parts stiffen the tail feathers preventing warps that may occur during covering and induced flight loads. Sand all edges that will be exposed to the slipstream and those edges that need to be hinged, round.

Step 2.

Locate all the parts needed for the $\frac{3}{16}$ " balsa horizontal stabiliser and elevator and glue parts together as shown in figure 1. Again sand off all edges exposed to the slipstream and those that need to be hinged.

Step 3.

Locate the $\frac{3}{16}$ " dowel elevator joiner. Carefully cut slots in the elevator ends for the dowel to fit. The dowel should be flush with edge of the elevator as seen on the plans. When you have the dowel mounted as seen on the plans use epoxy and glue to the elevator halves. Ensure the elevator halves sit flat and level to each other. Note you may want to wrap the area of wood that contains the dowel with a single layer of thin fibreglass cloth (not provided). Use epoxy or CA glue to secure the fibreglass cloth.

Step 4.

Note The vertical stabiliser has a built up area of solid balsa that follows the contours of the fuselage from F6 back. Using $\frac{1}{4}$ " x 1" x 4" pieces of balsa glue in as shown on the side view of the plans for each side. When the $\frac{1}{4}$ sheet balsa blocks are glued in place, draw a line from below following the fuselage as a guide and remove all the wood from outside of the line. Take your time when sanding the wood next to the rudder as it is easy to damage the rudder and vertical stabiliser.

Note. Before gluing any of the tail feathers dry fit the parts on the fuselage and ensure everything is square and aligned. You only get one chance to get right. You may want to wait till the wing is finished before doing this.

Note. It may be easier to cover the tail feathers separately before gluing them onto the fuselage and hinging the rudder and elevator. You must have wood on wood for a good glue joint when joining the tail feathers to the fuselage. So remove any covering material that will be in contact with glue. Epoxy is recommended in this area.

Wings

Step 1.

Remove all the ribs from their sheets and lightly sand the edges - just enough to remove the brown burning from the laser cutting. Make sure you have 14 R1 ribs and 4 R2 ribs. Note that the ribs have an alignment tab at the trailing edge to help build your wing straight. Make sure your building board is flat and untwisted. If your board is twisted then your wing will be as well. Take the time to check and shim if necessary.

Step 2.

Lay out the plan and cover with a clear film such as the backing from your favourite covering material. Build one wing panel at a time following the steps below.

Step 3.

Start with the left wing panel. Cut a piece of $\frac{1}{4}$ x $\frac{3}{16}$ " balsa to the length of the main spar. Pin the lower main spar down over the plan. Glue in the 7 R1 ribs making sure they are perpendicular to the spar. Cut another piece of $\frac{1}{4}$ x $\frac{3}{16}$ " balsa for the upper spar and place in the notches in the ribs. **DO NOT GLUE AT THIS TIME.** Find the dihedral brace R3 and align with the wing centre line and the spars. Mark the angle that the centre of R3 makes with the spars. Trim the spars to match. Glue R3 to the spars and the top spar to the wing ribs. Add the $\frac{1}{8}$ " x $\frac{1}{8}$ " rear spar to the top surface. Glue in the rear dihedral brace R4 to the top rear spar. The lower spar will be added when you remove the wing from the building board. Now add ribs R2b between the dihedral braces, R2a to the front of R3 and the front spar and R2c to the rear of the rear dihedral brace and rear spar on the centre line

Step 4.

Add the $\frac{1}{4}$ x $\frac{3}{8}$ trailing edge to the rear of the wing ribs. Note that at least $\frac{1}{16}$ " of material should extend above and below the ribs to accommodate the trailing edge sheeting. Add the $\frac{1}{8}$ " x $\frac{1}{2}$ leading edge strip to the front of the ribs. Once set, this should be sanded to match the slope of the top of the ribs. Also sand the top of the rear spar to match the wing ribs. Care must be used here not to catch any of the ribs. The wing leading and trailing edges are sheeted on top and bottom with $\frac{1}{16}$ " sheeting. The leading edge is $\frac{1}{16}$ " x $1\frac{1}{2}$ " and the trailing edge is $\frac{1}{16}$ " x 1". Sheet the Leading edge stock by first dampening the wood on the top so that it will more easily bend following the contour of the airfoil. Liberally apply glue to the bottom of the sheeting and place it with its edge flush with the leading edge. Pin or tape in place until the glue dries.

Let dry before removing all the pins. The Trailing edge stock $\frac{1}{16}$ " by 1" is done exactly the same although you shouldn't have to dampen the sheeting.

Step 5.

Repeat steps 3 and 4 to construct the right hand wing panel. During construction block up the left hand wing panel so that the tip rib is 2" above the board. This will give 1" dihedral under each tip when the wing is complete.

Step 6.

When the glue has set remove the wing from the building board. Check that both wing panels are aligned and untwisted. Slight twists can be corrected at this point.

Step 7.

Add the lower rear spar from $\frac{1}{8}$ " x $\frac{1}{8}$ " balsa. Glue to all ribs and R4. Shape the lower edge of the leading edge strip so that it matches the slope of the ribs. Now add the lower leading edge sheeting as described for the upper surface sheeting.

Step 8.

Remove all the alignment tabs from the lower surface of all the ribs. Carefully sand the bottom of the ribs to remove any roughness and also sand the bottom of the rear spar to match the contour of the wing ribs. Add the lower trailing edge sheeting. You will note that $\frac{1}{4}$ x $\frac{3}{8}$ trailing edge is not flush with the airfoil. This excess wood above and below the sheeting must be removed. Use either a razor plane or a sanding block to carefully remove the excess until it is flush with the trailing edge sheeting. Note when your finished this step the trailing edge should measure $\frac{1}{4}$ ".

Step 9.

Add the $\frac{1}{8}$ " x $\frac{1}{2}$ " leading edge cap to the front of the wing and sand to the shape shown on the plan.

Step 10.

Sand any excess wood that extends past the tip ribs of both wings so that it is flush with the ribs. Add the wing tip blocks but do not shape at the moment. Add the $\frac{1}{16}$ " x $\frac{1}{4}$ " rib cap strips and the $\frac{1}{16}$ " centre section sheeting. Now shape the tips. Note that the upper wing tip surface is flush with the wing upper surface and the lower surface is bevelled from the tip rib to the tip.

Step 11.

Locate the $\frac{3}{16}$ " by $\frac{3}{4}$ " tapered aileron stock. Measure and cut the ailerons. Sand the leading edge to the bevel indicated on the plans and install the hinges. It is recommended that you do not glue the hinges in at this point but rather leave that step until the wing and ailerons are covered.

Note: The aileron servo is mounted upside down inside the wing flush with the lower surface with the arm showing through the sheeting. Use push rods connected directly to the control horns on each aileron. (See side view)

Step 12.

Drill the leading edge to mount a short piece of $\frac{1}{4}$ " dowel in the centre. This dowel should match the hole in F8.

Finishing

Step 1.

Cover the entire model with your favourite covering material. The ABS Nose Blisters provided are very easy to work with. Carefully cut them out with a pair of scissors. There is a slight indented line $\frac{1}{4}$ inch above the open side of the blisters. Trim to this line. To mount your blisters to fuselage make sure the blisters are completely flat on the bottom and fit flush with the fuselage. Use CA glue to hold in place.

This is the time to paint them with the colour of your choice.

Step 2.

Locate the clear Canopy and carefully cut to fit. Trial fit the canopy and trim it so it fits squarely and flush with the fuselage. Note the area under the canopy can be cut out if you wish to add any scale detail. But for sheer simplicity cover the area with black covering to help it look more scale. Adding the RV 4 Roll bar and pilot heads would help also. You may want to tint your canopy before gluing. Use a suitable clothing dye in hot, not boiling, water for best results. Another option is to spray the inside of the canopy with silver or black paint. When satisfied glue the canopy into place.

Step 3.

Ensure the Firewall and engine compartment area is given a coat or two of fuel proofing. Note you may want to drill a small hole at the bottom of the fuselage in front of the F2 firewall to allow excess fuel or oil to drain. When dry mount your engine and hook up your fuel lines and throttle linkages.

Step 4.

Mount all your servo's and hook up all the linkages. Mount your receiver and battery and switch. Check the "C of G" with what is indicated on your plans. You should be able to achieve this with the placement of servo's and battery.

Step 5.

Locate both parts of the pre bent landing gear and assemble them into place on the fuselage and ensure you obtain the correct sweep back angle. (see side view). Mount your landing gear into place with the metal straps provided. Using $\frac{1}{16}$ " ply you can make scale like leg covers that can be glued into place with silicone or thick type glue like zap-a-goo and covered with small pieces of glass cloth and epoxy. Paint to suit your colour scheme.

Step 6.

As with the nose blisters, the wheel pants need to be trimmed $\frac{1}{4}$ " above the open side of the moulding. When trimmed sand the trimmed edge on a piece of sandpaper attached to a flat surface. When you are satisfied, glue the two halves of each pant together. Additional reinforcement of glass cloth and epoxy (not supplied) may be used on the inside of the pants. Glue in some scrap $\frac{1}{8}$ " plywood to provide an anchor for the screws for the wire saddles to attach. Paint the wheel pants to suit your colour scheme.

Step 7.

The tail wheel is easily attached to the bottom of the rudder by sewing it on with dental floss. Cover the wire with small diameter fuel tubing and then sew around the tubing into the bottom of the rudder with the floss. Then cover the floss with a thick coat of CA+ glue. The glue wicks into the floss and sets solid.

Step 8.

When hooking up the radio ensure the control throws don't exceed 1" up or down for the elevator, 1" left and right for the rudder and $\frac{1}{4}$ " up and down for the ailerons. You can adjust these later after the first flight. Check the entire plane to ensure the movements are in the correct direction. Charge your batteries for both TX/RX before attempting any flight. Don't forget the range check!

Flying

Lets go flying! Start you plane and taxi out onto the runway. If you plane is not taxing straight shut it down and make your corrections with by bending the tail wheel left or right. Gently throttle up and gain speed keeping it running straight with a bit of right rudder. The tail will come up. Get up a good head of steam and the plane should lift off all by itself. Keep the climb out low and steady. Do a couple of circuits of the field and trim the plane for hands off flying. The RV 4 should cruise nicely at $\frac{3}{4}$ throttle. Take it up and see how it stalls. If you balanced you plane correctly both laterally and with the correct C of G it should fall forward without dropping a wing. The plane should fly like any good low wing trainer. We put the RV

4 through the ringer and at full throttle and it just did it all! Landings are simple with the thick airfoil the plane slows down fairly fast after you pull back the power. You can shoot 3 point landings all day if you choose. The RV 4 is simple and honest and will not surprise you in any way. If it does then check for warps.

We hope you enjoy flying the RV 4

RT MODELS
1720 N.W. 38th Ave. #85
Ocala, Fl 34482
352.867.9836

visit our web site at **WWW.RTMODELS.COM** for other kits.

Parts List:

Part	Part Number	Material	Quantity
Fuselage			
Fuselage Sides		1/8" Balsa Laser Cut	2
Fuselage Doubler	F12	1/8" Balsa Laser Cut	2
Fuselage Doubler	F13	1/8" Balsa Laser Cut	2
Spinner Plate	F1	1/8" Lite Ply Laser Cut	1
Firewall	F2	1/8" Lite Ply Laser Cut	2
Former	F3	1/8" Balsa Laser Cut	1
Former	F4	1/8" Balsa Laser Cut	1
Former	F5	1/8" Balsa Laser Cut	1
Landing Gear Floor	UC1	1/8" Lite Ply Laser Cut	1
Landing Gear Plate	UC2	1/8" Lite Ply Laser Cut	1
Landing Gear Plate	UC3	1/8" Lite Ply Laser Cut	1
Landing Gear Support	F9	1/8" Lite Ply Laser Cut	2
Landing Gear Support	F10	1/8" Lite Ply Laser Cut	2
Landing Gear Support	F11	1/8" Lite Ply Laser Cut	2
Pre Bent Landing Gear		1/8" Piano Wire	2
Tail Wheel support	F7	1/8" Lite Ply Laser Cut	1
Wing Support Former	F8	1/8" Lite Ply Laser Cut	1
Forward Tank Hatch Former	F2a	1/8" Balsa Laser Cut	1
Aft Tank Hatch Former	FA	1/8" Balsa Laser Cut	1
Upper Fuselage Former	FB	1/8" Balsa Laser Cut	1
Upper Fuselage Former	F3a	1/8" Balsa Laser Cut	1
Upper Fuselage Former	F5a	1/8" Balsa Laser Cut	1
Fuselage top		1/4" x 3 x 36 Balsa Sheet	1
Nose Blisters		ABS Plastic	2
Clear Canopy		Clear Plastic	1
Tail Feathers			
Tailplane		3/16" Balsa Laser Cut	1
Cross Grain Horiz Stab tips	E3	3/16" Balsa Laser Cut	2
Elevator		3/16" Balsa Laser Cut	2
Cross Grain Elevator tips	E2	3/16" Balsa Laser Cut	2
Cross Grain Elevator Roots	E1	3/16" Balsa Laser Cut	2
Elevator Halves Joiner wire		3/16" x 3" Dowel	1
Fin		3/16" Balsa Laser Cut	1
Rudder		3/16" Balsa Laser Cut	1
Cross Grain Fin Tip	V1	3/16" Balsa Laser Cut	1
Cross Grain Rudder Tip	V2	3/16" Balsa Laser Cut	1
Cross Grain Rudder Bottom	V3	3/16" Balsa Laser Cut	1
Horns			2
Quick Links			2
The Wings			
Ribs	R1	1/16" Balsa Laser Cut	15
Ribs	R2	1/8" Balsa Laser Cut	4
Forward Dihedral Brace	R3	1/8" Lite Ply Laser Cut	1
Aft Dihedral Brace	R4	1/8" Lite Ply Laser Cut	1
Leading Edge		1/8" x 1/2 x 36 Balsa	2
Trailing Edge		1/4 x 3/8 x 36 Balsa	1

Main Spar		$\frac{3}{16}$ " x $\frac{1}{4}$ " x 36 Balsa	2
Rear Spar		$\frac{1}{8}$ " x $\frac{1}{8}$ " x 36 Balsa	2
Leading Edge Sheeting		$\frac{1}{16}$ " x 3 x 36 Balsa	1
Trailing Edge Sheeting		$\frac{1}{16}$ " x 1 x 36 Balsa	1
Tip		1 x 1 x 9 Balsa	2
Aileron		$\frac{3}{16}$ " x $\frac{3}{4}$ " x 36 Balsa	1
Horns			2
Quick Links			2