

BUSY B

By
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Building and flying indoor rubber powered aircraft is a whole different experience in modeling. Try it with one that can make you win.

• The Busy B came about as a result of a long winter of low-ceiling indoor flying, and 6 airplanes, each an improvement over the other. The end product was a light yet strong airplane that will do over 10 minutes in a 35 foot ceiling, and recover with minimum altitude loss due to rafter banging. The airplane has never been flown over 37 feet, but its high-ceiling potential looks good. It can be built by beginner or advanced modeler in a few evenings, but I don't recommend that the beginner attempts to build it too light. The final model weighed less than 1 gram without rubber.

Let's start with the wing building jig. Use the wing outline on the plans and make a standard indoor template of thin cardboard, cutting small triangles out at the rib stations.

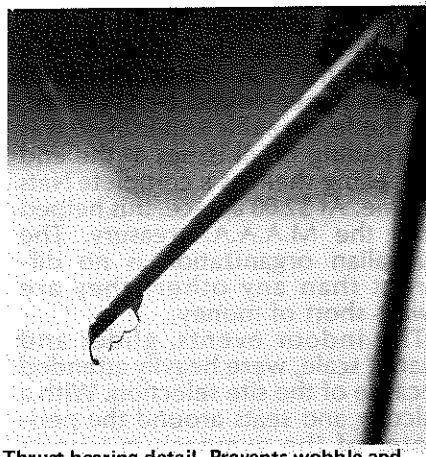
I use the black colored cardboard sold at any art supply store or five-and-dime. Cement the template to a sheet of 1/8 x 4 balsa, leaving an equal amount of extra space at the leading and trailing edges and at the tips. Now slice the sheet at the tip dihedral breaks and sand to a bevel to give you 1-3/4 inches of tip dihedral. Cement the tips to the center section. You will now have a building jig that looks like a H.L. glider wing. Now drill a 1/8 hole at each rib station, including the tips, at the leading and trailing edges.

This is to prevent the spar from being glued to the jig when you install the ribs. Now using some scrap from your balsa box build up a simple stand for the jig approximately 3 inches high. This is to allow for the installation of the wing posts. the jig is complete. Now let's build

the wing.

The wing on any EZ-B must be strong, yet light, as there is no bracing, and the selection of wood is most important. I purchase most of my wood from Micro-X Products, P.O. Box 1063, Lorain, Ohio 44055 (see ad). They have a fine selection of indoor supplies for any project.

The front and rear spars are stripped from a piece of .032 sheet B-grain stock 5-1/2 lb. wt., and cut to .060., using some scrap 3/32 sq., pin the center spars in place on the jig against the template. For the tip spars, use .026 x .060, 4 lb. stock, B-grain, and taper the tips from .060 to .032 at the ends. Cut a bevel at the dihedral break point so you will have a good fit and pin these in place same as the center spars. Now cut the tip ribs from the same sheet used above, to .032 sq., and install these. Now cement the entire wing outline together with indoor cement and an indoor glue gun. Minute drops of glue are important,

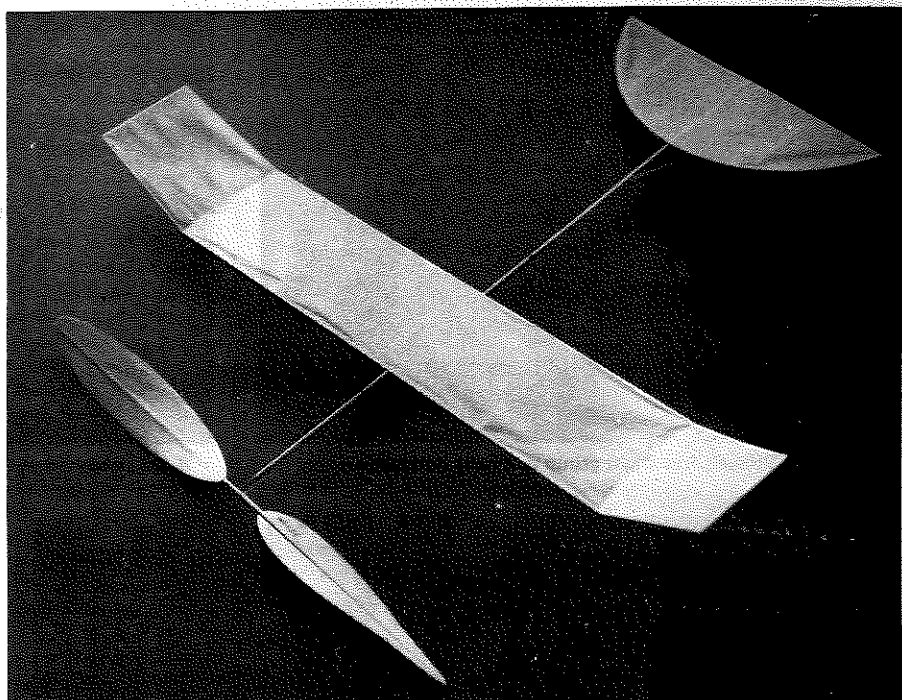


Thrust bearing detail. Prevents wobble and controls offset.

as they save weight. Cut the rib template from a piece of medium thick plastic or aluminum and slice the ribs from 4 lb. C-grain stock, .016 thick by .026 wide. You can go to .032 wide at the compression points if you wish. Those are the center rib and the rib at each dihedral break. Glue the ribs in place and let dry thoroughly.

The covering is condenser paper, and it is wise to pre-shrink it first. Take a full sheet of condenser paper and scotch tape it to 2 pieces of 1/4 sq. top and bottom and pin it to the corner of a wall so the paper does not touch. Spray a fine mist of waxer on the paper and let it dry. It will shrink. When dry cut it off the wood and put it between two pieces of newspaper and press it flat with an iron set on permanent press. You now have a nice sheet with no wrinkles. Draw the outline of the wing on the paper and cut out a sheet so you have about a 1/4 inch overlap on the leading and trailing edges, and about 1/8 overlap on the ribs at the dihedral break points, as the wing is covered in three parts.

I have found that the best glue for condenser paper is white glue thinned to almost water thickness. Using a fine-pointed brush, cement the paper to the center section, making sure that no glue runs off or drips between the spars and the jig. This takes care and patience and you will see why when you remove the wing from the jig. Do not pull the paper too tightly, but just enough to conform to the airfoil. When this is dry, trim the excess off the outer center panel ribs and cover the tips in the same manner. When all is dry, trim all excess paper off, and if



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you're real careful, sandpaper any small burrs with 600 grit paper glued to a small piece of wood to control the pressure.

Now take 2 pieces of 1/20 sq. cut to length as shown on the plans and sand to a taper for wing posts. Glue these in position as shown, offset from the center. Make sure that the wing posts are straight when dry. The wing is now complete and can be removed from the jig, if you wish.

The stab is made the same as the wing. Cut the template using the stab plan outline. Cement to a sheet of balsa, same as the wing. Using 4 lb., B-grain stock for the stab, slice the leading and trailing edges from a piece of .026 sheet to a thickness of .026, so the spars will be .026 sq. Wet the leading edge spar and pin in place same as the wing, using pieces of 3/32 sq. Pin the trailing edge in place and when the wet spar has dried, cement the outline together.

Make a stab rib template same as the wing, and slice the ribs from .016 4 lb., C-grain stock to .026 thick. Glue in place and let dry. Cover the stab at this time and trim excess.

The rudder template is made by using 1/8 sheet balsa. Strip a piece from 4 lb., A-grain stock .016 x .020, wet, and bend around the rudder template and let dry. Hold this aside for now.

The tail boom is made from a piece of .060 sq. 5 lb., B-grain, tapered to a point at the tail.

The motor stick is made from a piece of 5 lb. stock 3/16 x 1/8, and sanded to shape as shown on the plans. A micrometer is a good tool to use here. It will enable you to keep even tapers on all parts of the airplane. Add the rear hook as shown.

The thrust bearing is made in two pieces. The front is made by wrapping a piece of .010 music wire around another piece of the same size. Two wraps is enough. This will form a small wire tube, or a 2-loop tight spring. After the loop is formed, cut to shape and glue to the nose of the motor stick. The rear, or dual portion, is a corkscrew type to keep the shaft from wobbling. This works better than the pre-made thrust bearing because there is no prop shaft end-play, due to a much closer fit. These are made by using a piece of .010 music wire wrapped around a straight pin in the form of a tight spring and then pulled out straight until the prop shaft wire fits with no end play, but yet not tight enough to bind. When completed, cut and shape and glue to the motor stick, using a piece of prop shaft wire as a guide to keep it straight.

You will see how well this works when you fly the airplane.

Now remove the rudder out line from the form and glue it to the tail boom. Add the support rib and cover the rudder in the same manner as the wing and stab. When dry, glue the tail boom to the motor stick with the incidence and left turn settings as shown on the plans . . . 1/4 inch lift rudder and 1/4 inch negative incidence. Now cement the stabilizer to the tail boom with 3/4 of an inch of stab tilt for left turn (left side high when viewed from rear).

Now the heart of the airplane . . . the prop. Carve the form from the block size shown on the plans. When completed, sand and dope the form until smooth.

Cut 2 spars from 5 lb. stock B-grain to a size of .080 x .050 and taper to a point at the tip. Make 2 and splice in the center as shown. Make the prop shaft from .010 music wire and cement this to the spar. Wrap a small piece of tissue around this for strength. Now cut a groove in the prop block in the center as shown on the plan so that the prop spar will just stick up enough to glue the blades.

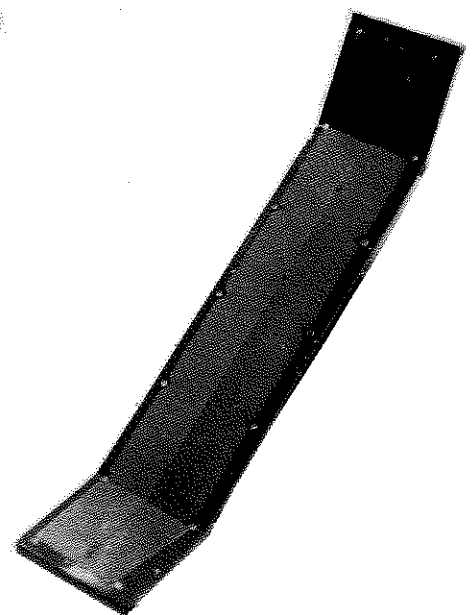
The blades are made of .010 4 lb. C-grain sheet lightly sanded. Make a cardboard template for the blades so you can cut them both exactly the same size and shape. When completed and the blades are smooth wet both blades and lay one on the prop block, then a strip of tissue, and then the other blade on top of the tissue, and then another piece of tissue on top of it. Make sure that the blades are centered on the form, using the spar groove as a guide. Lay a piece of 1/4 inch foam rubber on the top of the blade and wrap this with 3/4 inch elastic band from the local fabric store. Wrap this tightly and bake in a low oven for at least 30 minutes. When completed, separate the blades, secure the spar to the block, and glue the blades to the spar on the form. Glue one side at a time, making sure that one side is completely dry before doing the opposite side. When completed, balance the prop with some 5-minute epoxy as needed. The prop is installed on the thrust bearing by screwing it into the corkscrew portion of the thrust bearing.

Make the tissue wing sockets by wrapping a strip of tissue around a piece of .045 music wire and gluing the tissue to itself. Make sure the glue does not touch the wire. When complete, cut two sockets, each 3/16 inch long. Fit the sockets to the wing posts and sand the ends of the wing post so as to get a snug fit. Set

aside for now.

Locating the C.G. is easy. Install the prop. Tie a loop of rubber and install it between the prop shaft hook and the rear hook, making sure it fits with a slight tension. Now find the balance point and mark it with a pen. Now locate and cement the wing post sockets so that the C.G. is at 55%, approximately 1.65 inches aft of the leading edge of the wing.

The airplane is now ready to fly. Install the wing, using 0 incidence. Test glide the airplane, and adjust the wing so you get a glide with the prop turning and no rubber installed, with a very slight nosedown attitude. Now tie a loop of rubber .037 x 11 inches long. Install 2 small O-rings. You can cut these from nylon tubing . . . the same stuff used for R.C. pushrods030 thick is a good size. If you are winding with a torque meter, these O-rings are a must. Break in the motor in the normal way, wind to maximum turns, and if you're in a room lower than 40 ft., back off to .80 tenths of an inch oz. If the model was built light, you should have approximately a 3-minute climb to about 35 ft. Add wash-in and wash-out to the wing and stab as needed to prevent power stalls and insure correct flight trim. Normal indoor flying and winding techniques apply at this point. The airplane has flown over 10 minutes below 37 ft., and I'm sure you'll enjoy building and flying the Busy B. ●



Simple jig is used to build wing. See text for full explanation.