

# BI-FLY

A "Fly-For-Fun" Design for .15 Engines and Anything From Galloping Ghost to 3-Channel Digital.

BY JOHN RILEY

Bi-Fly — a fly for fun plane which is the result of a number of ideas which lay dormant until the RCM Design Contest came along and provided the incentive to get the project underway. I have built and flown many different types of models, mostly gas, and now really enjoy the thrills of R/C modeling. As a modeler dating way back to pre-Plymouth Internat days, I have some pretty strong convictions on how a model should be constructed and so really jumped at this opportunity to express these ideas.

With the power of today's engines, and the reliability of R/C equipment, we now have real freedom in the design of the model and can lean towards good appearance in design and model finish. Since the Bi-Fly is a fly-for-fun plane, I looked first to a realistic configuration. There are a lot of us who like a bi-plane, as is evident by the increasing numbers seen in R/C circles today and, I personally, like a cabin model, so I molded the two design ideas into the Bi-Fly. My second criteria for a model is that it must be rugged. I like a plane which will get up and go without spending a lot of time out for repairs. Despite all one does to prevent accidents there are times when they do happen, and so I appreciate a model that can take a few bumps and still come out on top. I can assure you that if you are careful during construction that the Bi-Fly will meet this criteria. Third, if it is a little out of the ordinary the plane will make a good conversation piece and, in my research, I sure didn't turn up many cabin type bi-planes!

One of my biggest problems is finding time for modeling, so I really look for short cuts in construction and, as is evidenced by the plan, this is a slab sided model with the corners rounded off to dress up the appearance. Since I abhor the building of wing structures the next big short cut is in the flying surfaces. I used the "Testors" foam wing and stab, but the "Midwest" or Sig foam wings would do just as well.

The original was flown with a Controlaire GG, Rand LR3 and a Fox '15' engine. Those of you with one of the new, smaller digital rigs should find the Bi-Fly very satisfying as well as those of you who prefer pulse proportional systems.

So there you have it, a cabin biplane which is a little off the beaten track in basic configuration; a model which is designed to have eye appeal, and yet is built ruggedly enough so that it will provide many hours of good flying fun and stand up over the years as a real asset to your flying fleet.

## BASIC CONSTRUCTION DETAILS:

**Fuselage:** Select medium to hard balsa for the fuselage sides with the main criteria being that both sides should be equal in weight so that they will bend equally when forming the nose and tail. Butt glue the 3" and 4" sheets of 1/8" balsa together in preparation to cutting out the fuselage sides.

One of the big jobs in building a model from scratch is the transfer of the part shapes from the plans to the wood. I like to use a trick used in the sheet metal trade, being that of placing the plan over the material and then punching, or in the case of balsa wood, taking a pin and poking through the plan into the balsa at each corner of the part. In the case of curves, space the points about 1/2" to 1" apart, depending upon how straight or sharp the curve is. Once this is done remove the plan and, using a straight edge, (except on curves) and an X-acto knife, line up the points and cut the parts out. This will make a neat and accurate part which will aid in construction.

After the sheets for the sides have dried, place the plan over the sheet and line up the reference line on the plan with the glue joint between the (continued)



3" and 4" sheets. This reference line will be of real value later when fitting the foam surfaces to the fuselage in order to obtain the correct incidence. Proceed to transfer and cut out the sheet sides, doublers (actually this is reinforcement for stress areas), and fuselage formers. Don't forget to make the right side shorter to allow for the 3° right thrust. After these parts are cut out, proceed to assemble them. The original has a see through cabin for the sake of appearance. The model is reinforced in this area with 1/8" plywood and is well worth the effort, but if it is preferred, a block of balsa for the windshield and painted windows will suffice.

Glue on the doublers making sure you build a right and a left side. (I suggest contact cement for this operation). As you glue in the doublers, a scrap of 1/8" sheet is convenient to use in order to obtain proper spacing for the fuselage formers. The better the fit you obtain here the stronger your plane will be. After the doublers are in place and the glue well set, you should add the triangular stock to the sides. To make the triangular stock I used an X-acto knife and diagonally split 1/2" square stock.

The next few steps will bring the model up to where it will begin to reward you by quickly taking on shape. Don't forget the doublers on formers 4 and 5. This is needed to keep these formers from breaking during the bending process of bringing the tail together. At this point I suggest the use of white glue (Elmer's) for all hardwood parts. Now glue in formers 3, 4, 5 and the 1/8" x 1/2" strip in front of the lower wing. This step is followed by sheeting the bottom of the fuselage in the area of the landing gear and adding former number 2. When this is dry, pull the nose and tail together (rubber bands, pins, etc.), add formers 1 and 6, and glue the tail end together. Caution: at all times, when gluing in formers, double check to make sure everything is square. This will prevent a lot of trouble later on.

The tail wheel bearing, and nose and tail balsa blocks are next. The original has a swivel tail wheel rather than a stationary one or a tail skid in an effort to ease ground handling when using GG or other similar R/C gear. The 1/2" square hardwood bearing is fitted at the angle shown and is secured lightly for flying with a rubber band around the dowel in the tail of

the plane. Now add the tail balsa wedge, the bottom nose block, and the 3/8" nose side sheets. When these are dry, add the balsa block just under the engine. (If you prefer an inverted engine for appearance sake a few changes in the balsa nose blocks is all that is needed.) It is a good idea to install the engine mounting nuts at this time. The original has a Tatone "15", large tank, and engine mount with blind nuts in the firewall. Before adding the balsa block at the front of the cabin, the battery area between formers 1 and 2 should be lined with about 1/2" of styrofoam. It is also a good idea to line the floor of the cabin between former 2 and the front of the lower wing. This is a quick, easy and light way to strengthen the nose and also adds a cushion effect for the R/C gear. Caution: always use white glue on styrofoam. Now add the cabin balsa blocks. With this complete and dry, double check all joints and re-glue all fuselage former glue joints. This operation is well worth the time and effort as it is a real strength builder and also adds to the internal appearance of the structure.

We are now ready to cover the top and bottom of the fuselage with 1/8" sheet. The best results can be obtained by cutting the balsa about 1/8" to 1/4" longer than the width of the fuselage, glue in place, let dry and then sand flush with the sides.

The next step is to rough carve the blocks, then sand both them and the fuselage corners to a round cross section. Sand through the corners of the top and side sheets until you are into the triangular stock approximately 3/32 of an inch. Use a good sanding block and, with a little care, the results of this effort will really reward you as it gives a "Cessna" appearance rather than a "boxy" one. After you are satisfied with the shape of the fuselage the tie down dowels can be added.

**Stabilizer and fin:** As you make the fit between the fuselage and the stab, double check to be sure of the incidence. Glue in the stab and let dry (white glue). Carve out the stab to receive the fin and glue in place. (white glue). Now a few notes on handling foam flying surfaces: The procedure outlined in the December, 1966, RCM article on the "Whiz Kid" works fine and will be described as a tried and proven method. 1. Sand all surfaces lightly to clean off flash and break the shiny surface. 2. "Paint" on two coats of 50-50 white glue and

water mixture. Sand lightly between all coats of "paint". 3. Using wet gas model silkspan cover the wings and stab. 4. "Paint" on two to three more coats of 50-50 white glue mixture. This seals the styrofoam from dope, oil, etc. and adds greatly to the strength of the flying surfaces. After treating and covering the stab, mold in the rudder using plastic balsa or some other fillet material. Attach the rudder to the fin and the elevator to the stab using Micro-mold, Dubro, or any other low friction hinge.

**Wings:** Clip as per plan specifications using a hot wire cutter. If one is not available, a coping saw will do. Cut out and insert in the trailing edge of the wing, three inches on each side of center, a 3/16" dowel to take the strain of the hold down rubber bands. Sand and finish as per the 50-50 white glue and water procedure listed previously. The center of the wings should be fiberglassed (five inches wide) to help ease the strain placed on them by the fuselage and the hold down rubber bands. Now is the time to make the final fit between the wings and the fuselage. A sheet of carbon paper between the wing and fuselage will aid in finding the high spots. Caution: check the wing incidence while making this final fit.

**Landing gear:** The original has a knock-off, Cessna type gear. This eases the strain on the fuselage during rough landings. The gear on the original was hand made but a ready made one approximately the same size will do. This completes the construction of the model.

**Finishing:** The original has three coats of brushed Aero-Gloss balsa filler coat, (sand between all coats), two spray coats of white, and was trimmed by spraying on maroon. The wing surfaces are painted with Sig Super Glo Plastic Finish as it has less tendency to "check".

**Flying:** If you are careful with regard to incidence and thrust lines during construction you should experience no real problems when test flying. The model could not be regarded as a trainer but fits well into that middle area between a trainer and the large full house rigs. The Bi-Fly's flying characteristics can be summarized by saying that it is a stable, not too fast, very responsive model. Keep the CG as shown or slightly forward of this point. The control surfaces are adequate and could be slightly reduced for GG.