

ALMOST GLIDER-LIKE FLIGHT POSSIBLE WITH THIS 049-POWERED TRAINER. IT WAS DESIGNED ESPECIALLY FOR THE POPULAR TWO-CHANNEL RADIOS.

2T

by RON JACOBSEN

"What we need is a simple model plane that is easy to build, goes together fast, takes hard knocks—yet flies with the best of them." That was the observation of Ken Wilson, the owner of the hobby shop where I am employed in Shawnee, Kansas.

"It should be something we can recommend to the many new customers who are buying two-channel bricks or single systems," Ken went on. "They want something easy to build and fly. When they buy a simple rig, they aren't expecting flaps, retract-gear and so on. They *do* want something that will fly stably and yet be responsive. This model should be a box with simple lines, built of fairly hefty balsa for strength, and ample area for good flight and glide characteristics, and take an 049 engine for economy."

I suggested that we could use some Ace foam wings to get over the hardest hurdle a beginner has—building wings without a warp. "Right," the boss said. "How about taking just one section of the constant chord wing, both sections of the taper? Let's leave the center flat, and put the dihedral on each of the taper tip sections. That would give us about 258 sq. in. with a span of around 50 in."

I had pulled out some paper while he was talking and made some rough sketches. "It's going to be boxy and ugly as sin," I said, "but I believe it will really fly—it just looks like it will!" I took my rough sketches and drew up full-size plans, checking all dimensions as I went. (I like to build from full-size plans, as it makes everything much easier.)

I made notes of materials I would need—some I had to get out of stock, others I had in my scrap box. Included on my list were: two sheets of 3/32 x 3 x 36" balsa; two sheets of 3/16 x 3 x 36" balsa; one sheet of 1/4 x 3 x 36" balsa (just 9 needed for one plane); one 3/32 x 6 x 12" ply; one 3/16 x 12" dowel; one 1/16" music wire; one 3/32" music wire; and one pair of 1 3/4" wheels. I also needed a 1 1/2 x 1 1/2" section of 1/4" ply and a 2 1/2 x 2 3/4" piece of 1/16" ply, but I had these in my extras. The choice of hinges and linkage and other hardware could wait, as any of the hardware made by all of the top manufacturers would work.

I decided I might as well get enough wood for two planes, so I doubled up on some of the materials. Generally, when I build from scratch plans or from magazine plans, I like to build two, especially if it is as simple as this job promised to be. By cutting two sets of parts, time is saved in the long run. I gathered my long steel rule, double-checked my X-acto knife blade, and made sure I had plenty of 5 minute epoxy. I also got out my sanding block. On the back of the bench I had containers of pins, rubber bands and some masking tape. I would use these to hold things together as they dried. My triangle was also in its place—I wanted my angles just right, and not so-so.

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Photos by Roy Inman

Begin construction by first cutting out all parts using the plan as a guide. Some modelers cut the plan and rubber cement it to the balsa wood. This is helpful, since it does let you make economical cuts and save wood. The rubber cement just peels right off and cleans up easily. Double-check fit all parts now. With everything set, and using 5 Minute Epoxy throughout, laminate F2 and F3. Next, glue the laminated formers to the right-hand fuselage at right angle using square; glue left-hand fuselage side to F4 and to laminated F2-F3. (Double check this for right angle.) Cement plywood plate F5 to bottom of fuselage. Pull tail together and cement after visually double checking alignment, then position landing gear against F2-F3 and epoxy.

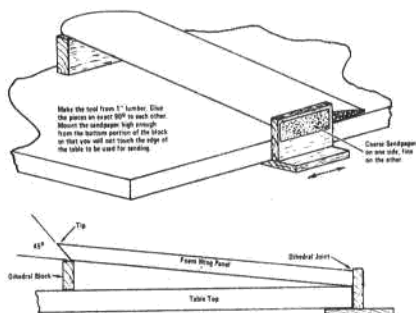
Now epoxy nose doubler sections inside the nose, making sure that shorter doubler is on the right. Position blind nuts on back of firewall for engine and cement. Cement firewall to sides using masking tape or rubber bands to pull sides together. (Give firewall plenty of epoxy.) Let dry thoroughly, and then give firewall and landing gear another generous dose of epoxy.

Cement top and bottom 1/4" nose sheets in place. Install the landing gear anti-spreader (really protects on landings). Plank bottom of fuselage with cross grain sheet, except for plywood tail skid mount where plywood is used. Cement stabilizer, checking for square and alignment. Cement tail skid and mount to bottom. Install wing dowels. Cement rear top to fuselage. Next, cement fin and dorsal, checking alignment. Join elevator halves using 1/16" music wire bent as shown. Then, install elevator on stab using hinges of your choice, and then install rudder.

Sand entire fuselage and surfaces smooth and finish as desired. Simply dope to color wanted, or cover with silkspan, or TopCotE, MonoKote, or any method you choose.

For the wing, a constant chord panel and both taper panels of the Ace foam wings are needed. (We understand Ace will make a special package of the three sections available separately.) Sand off any flash on the wing edges. I left the tip of the taper sections square, since I did not take the time to round the tip or bevel the edge. I don't believe this helps performance, but it sure does help improve the appearance, so do it if you wish. Note there is a left and right panel on the taper sections. You will need to watch this in the next steps, since you want the entire front edge of your wing to be straight.

Sand the dihedral angle into each taper section. If you are doing only one wing set, a sanding block is alright—but do use a block. If you are planning to make several foam wings, the simple tool shown in the drawing and developed by Carl Mohs of Madison, Wisconsin is easy to make. It helps make this job a cinch and assures you the angle is right.

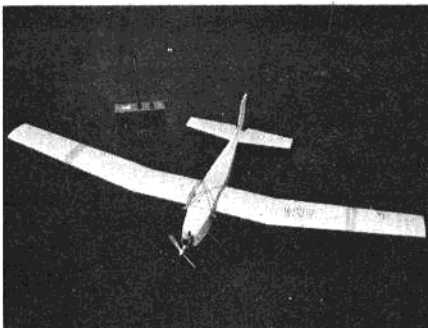


Block up the tip of one taper panel 4" from the workbench. Sand the edge of the wing right at the bench edge. Use sanding block to sand in dihedral angle. If bench is square, the block will assure you of a smooth and straight dihedral joint. Then follow the same procedure with the other panel.

Using weights, hold down center section. With block to give a 4" dihedral under each tip, epoxy one tip at a time. Use Saran Wrap between the wing and the bench to help take it off—no sense epoxying the wing to the bench! Make sure that the leading edge is straight. Note: Epoxy must be used for these joints—any other type of cement will melt the foam.

When thoroughly dry—you can wait a bit longer than five minutes—remove wing and double check alignment. If satisfactory, apply 1/2" to 3/4" Scotch filament strapping tape on the bottom of the wing as shown on the plan. This adds tremendous strength to the wing, yet it is still flexible. There is again a wide choice as to finishing. We have flown protos of the 2-T with absolutely no finish on the foam—just as they come out of the box—but they pick up dirt and fuel easily. For a more finished look, considerably more strength, and protection against dents, scratches and even "bending," TopCotE is recommended. If TopCotE is used, the wing should be sanded very smooth. The material is transparent, but may be colored with dope to any color desired. Two spray coats do a nice job. Decorations can easily be made from MonoKote Trim Sheets—just draw your patterns, cut out and apply. Mount the engine and prop and then install the wheels.

Now is the time to position your brick or radio. With the batteries in the forward compartments, find the proper position for the brick, so the plane balances at the CG as shown on the plans. When you're satisfied, epoxy the radio mount doublers and hardwood rails into position. Finish the rest of your RC installation at this time. Make cuts



Brick two-channel radio systems are now available from Kraft Systems, World Engines, E.K. Products, and Cannon.

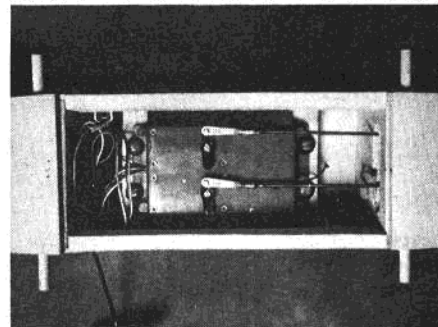
for the necessary pushrods and install horns, wheels, hardware, and all last-minute details. Double check for balance again. Minor shifting of CG can be done by moving the battery forward or backward. Use lead fishing sinkers in battery compartment if necessary. Use good foam rubber to wrap around the batteries. For test flights a 5 1/2 x 4" prop was used.

Your plane should go out of your hand with a slight push at a good *straight* glide forward without any tendency to stall or dive. Shifting of batteries for different CG may help if you experience any of these. Incidentally, with the wing on, always measure CG (balance point) at the fuselage, and not

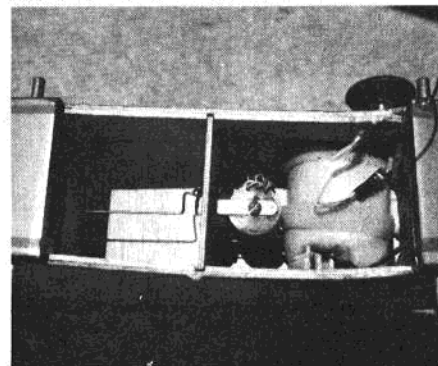
the tips. However, the CG shown on the plans should put you in business. When satisfied with the glide, fuel up but don't fill the tank—you may need to change either the right thrust or down thrust that is built in.

When the engine is running satisfactorily, and radio on (both transmitter and receiver), hand launch with a gentle shove forward and nose pointed straight ahead. The plane should want to fly right out of your hand. Watch for any tendency to turn or to stall or dive under power. These can be corrected if the thrust line of the engine is changed by adding washers where needed.

After you are satisfied with your test hops, gas her up full and you are set to go.



Typical brick system installation.



Installation of Ace RC pulse system.

Your 2-T should go up in a gentle climb, even in 10-15 mph wind (you may have to trim in a bit of down). As you become more familiar with it, you'll find that the 2-T will go almost anywhere you command. It has proven one of the most pleasing and easy to handle jobs we've ever flown.

If your experience is like Ken's and mine, you'll find all those cynics on the field who doubted before, leaving their ships, coming up and wanting a turn at the stick. They will want to make the 2-T or "Two-Channel Trainer" for their next project.

We gave Tom Runge some of the first 2-T plans and after talking to him, we agreed it should also make a good single-channel Pulse Rudder Only ship. Tom built it, using a Commander Stomper. It has proven to be an exceptional RO job. Tom used TopCotE both on fuse and on wings, and painted it a light green. He's calling his a 1-T.

For the Rudder Only fans, here are a few hints: Cement the elevator on and make the rudder out of 3/32" balsa. For hinges, use "Figure 8" jobs sewn in with Button and Carpet thread. Installation is shown on the bottom center of the plan and is conventional rudder only torque rod using .045 music wire. Actuator is sewn on a 1/8" piece of ply cut to fit where shown. This may be glued in, although rails can be installed so actuator and plate are removable. Receiver is wrapped in foam and stuffed ahead of the actuator.

Batteries are also wrapped in foam and with more foam are stuffed up front against the firewall. The linkage at the tail is a crank, with yoke on the rudder. The .060 ID plastic tube bearing is mounted as shown.