

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."

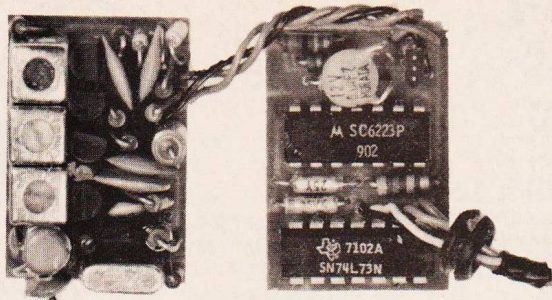
I suggested that we could use some Ace foam wings to get over the hardest hurdle a beginner has—building wings without a warp. "Right," the boss said. "How about taking just one section of the constant chord wing, both sections of the taper? Let's leave the center flat, and put the dihedral on each of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

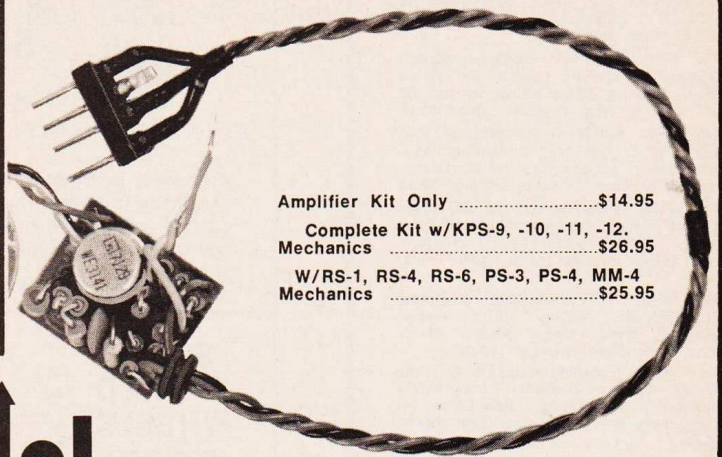
2 Channel Receiver



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2 T



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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

UPCOMING SHOWS and COMPETITIONS

HIAA TRADE SHOW, Conrad Hilton Hotel, Chicago, Ill.
February 6-9, 1972

18th ANNUAL TOLEDO R. C. CONFERENCE, Lucas County
Recreation Hall, Maumee, Ohio, February 26-27, 1972

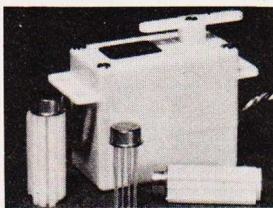
ELECTRONIC FLYERS ANNUAL MODEL STATIC CONTEST & SHOW
Mansfield YMCA, 455 Park Ave., W., Mansfield, Ohio, March 12, 1972

13th ANNUAL PORTAGE AERO MODELERS SHOW, Kent-Roosevelt High School
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We will advertise your show - space permitting

A WORLD ENGINES NEWSLETTER FROM:

J. MALONEY, J. LANTERMAN, B. WELKER, P. BENKNER & D. BROWN



S-5 SERVO & I.C. WE3141

The purpose of this ad is to try to let you know what is going on at World Engines. We are out with a lot of new products that you may not know about. We hope this jammed packed little advertisement will keep you up to date on what we are doing and also give you a chance to know what our opinions are about the goings on in our industry. For instance, in the January issue of this magazine contributing editor Fred Marks gave Orbit the credit for being the first one out with the IC amplifier followed by Heathkit and they mentioned that we, too, had an IC amplifier. Frankly, so far as U. S. manufacturers are concerned, we think that we were the first to use a true IC amplifier (not hybrid) and to offer it to our customers in our servos. Furthermore, we are offering a Bridge circuit integrated circuit with the power devices in the circuit. We also feel that we were the first to really do the job right which really is most important. Actually, there are a lot of conflicting stories about who was first in this IC business in a servo. To our knowledge it was done first in Europe by Ferranti for a German customer on a non-bridge IC and no power devices included in the chip. In any event, if any magazine really wants to get down to brass tacks and define just what they mean by being first, we here at World Engines would be glad to document our activities.

We cannot state that we manufacture more R/C equipment than "anyone in the industry" or "more than the rest of the industry combined" because manufacturers in this business do not report their figures to the public. Incredible, isn't it, that such advertisement get accepted for publication!



72 MHZ BLUE MAX

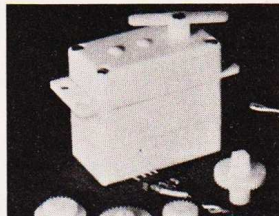
Pictured here is our Mark II Blue Max System and also our 3 Channel System offered with our 2 Channel Brick on the basis that you add the third servo later.

We are pleased to advise that we have received our type acceptance from the FCC for our new 72 mc. Mark II Blue Max System. This is available on four channels at the moment and will be available on other number of channels soon. Price for 4 Channel Blue Max System—Suggested retail: \$300.00.



OS-GRAUPNER WANKEL \$87.50

OS reports that they are going to increase our quota of Wankel engines in 1972. Also, Graupner is co-operating by letting us have some of his German quota immediately. So, if you have a Wankel engine ordered from World Engines, you may get it sooner than we had originally promised. Price—\$87.50.



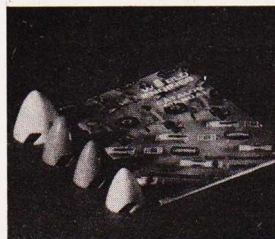
W.E. RETRACT SERVO

We now have the S5-R, a retract servo. This differs from the S-5 in that the top of the case from the mounting lugs upwards is slightly higher than the standard S-5 which permits us to add two more gears and also increase the face of the gears to make for a stronger geared servo. The servo amplifier features an adjustable pot so that you can trim your servo for just 180°. Price assembled: \$35.00. Kit configurations on this retract servo to be announced later. Transit time on this servo is about two seconds which give a scale retraction—to impress judges and awe your friends. We have a negative pulse retract servo for OS systems—Model No. S5-R-OS. This also works fairly well on negative pulse Pro Line systems.



1972 BLUEHEAD

We have a new and more powerful engine. Our test show (15% notro) that we have last year's champ by from 500 to 800 rpms. Besides timing changes on this engine, we are now shipping the engine with slightly looser fitting pistons and shafts. This reduces the amount of breaking required and also gives the hot-shots a better chance to run these engines on motorcycle oil, red pop, or what have you. (Try 15% RoGo for best R/C results.) Also, the engine features the Mark IV throttle which moves from open to close in the same direction that most other engines do. Here is a twin ball bearing engine beautifully made and featuring a chrome sleeve which is something you do not find on most other 60s for only \$59.98.



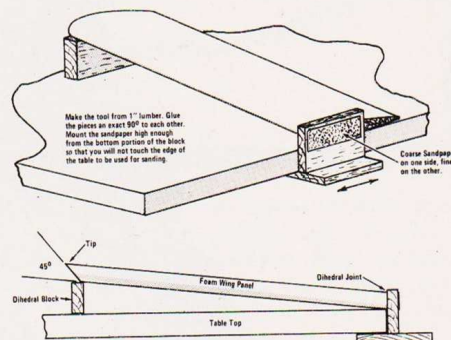
I.M. PRODUCTS & W.E. CATALOG

Featured above are the following size new spacers from IM Products. Sizes are 1 1/4"—\$1.00, 2"—\$1.25, 2 1/4"—\$1.75, 2 1/2"—\$1.95.

IM makes a beautiful line of accessories including hinges, exit guides, tanks, clamps, motor mount stencils. Most dealers stock these IM accessories. If yours does not, bug him a little. Complete line of IM Products is covered in the latest World Engines four color catalog available for \$1.00. This catalog includes a metric to inches conversion, a wing loading chart, an article by Yours Truly on "Jumping into R/C", plus a kit/engine/r/c combo chart suggesting which engine size and control system could be used with each plane. Also, the chart gives wing area, wing position, type of landing gear, and approximate weight of each plane.

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.

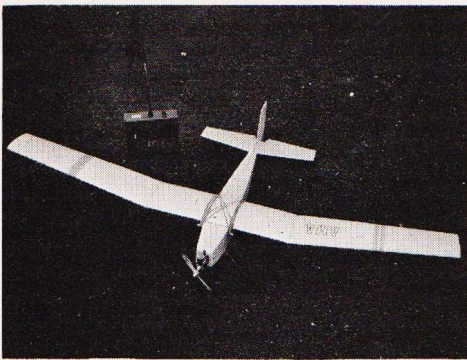
When thoroughly dry—you can wait a bit longer than five minutes—remove wing and double check alignment. If satisfactory, apply 1/2" to 3/4" Scotch filament strapping tape on the bottom of the wing as shown on the plan. This adds tremendous strength to the wing, yet it is still flexible. There is again 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



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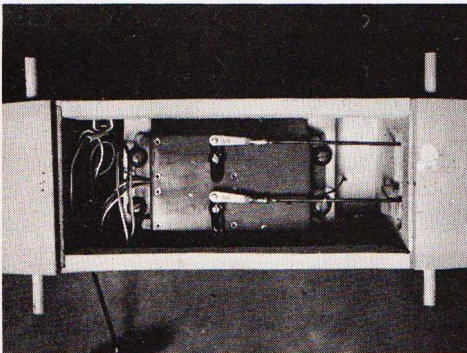
Brick two-channel radio systems are now available from Kraft Systems, World Engines, E.K. Products, and Cannon.

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 and also to stuff in the front compartment. For test flights a 5½ x 4" prop was used.

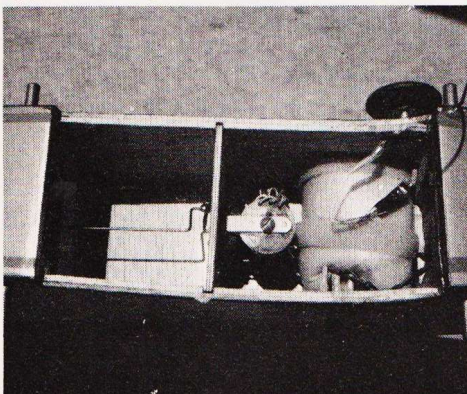
Your plane should go out of your hand with a slight push at a good *straight* glide forward without any tendency to stall or dive. Shifting of batteries for different CG may help if you experience any of these. Incidentally, with the wing on, always measure CG (balance point) at the fuselage, and not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

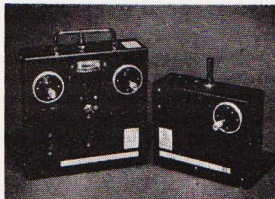


Typical brick system installation.

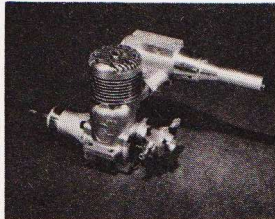


Installation of Ace RC pulse system.

WORLD ENGINES:



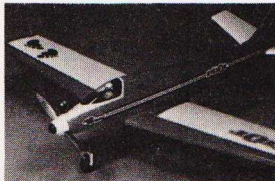
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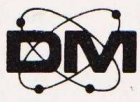


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MARK II
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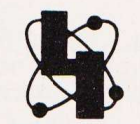
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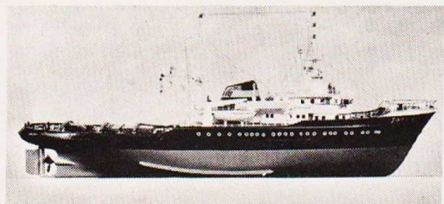
American Aircraft Modeler

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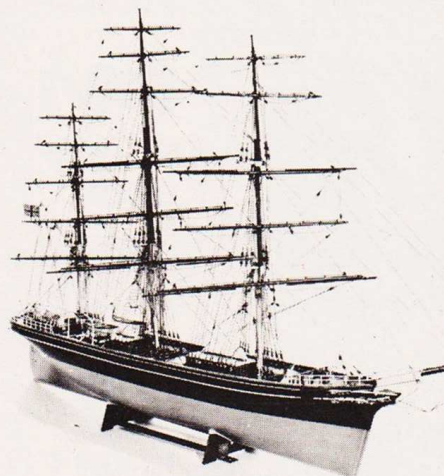


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If your experience is like Ken's and mine, you'll find all those cynics on the field who doubted before, leaving their ships, coming up and wanting a turn at the stick. They will want to make the 2-T or "Two-Channel Trainer" for their next project.

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.

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