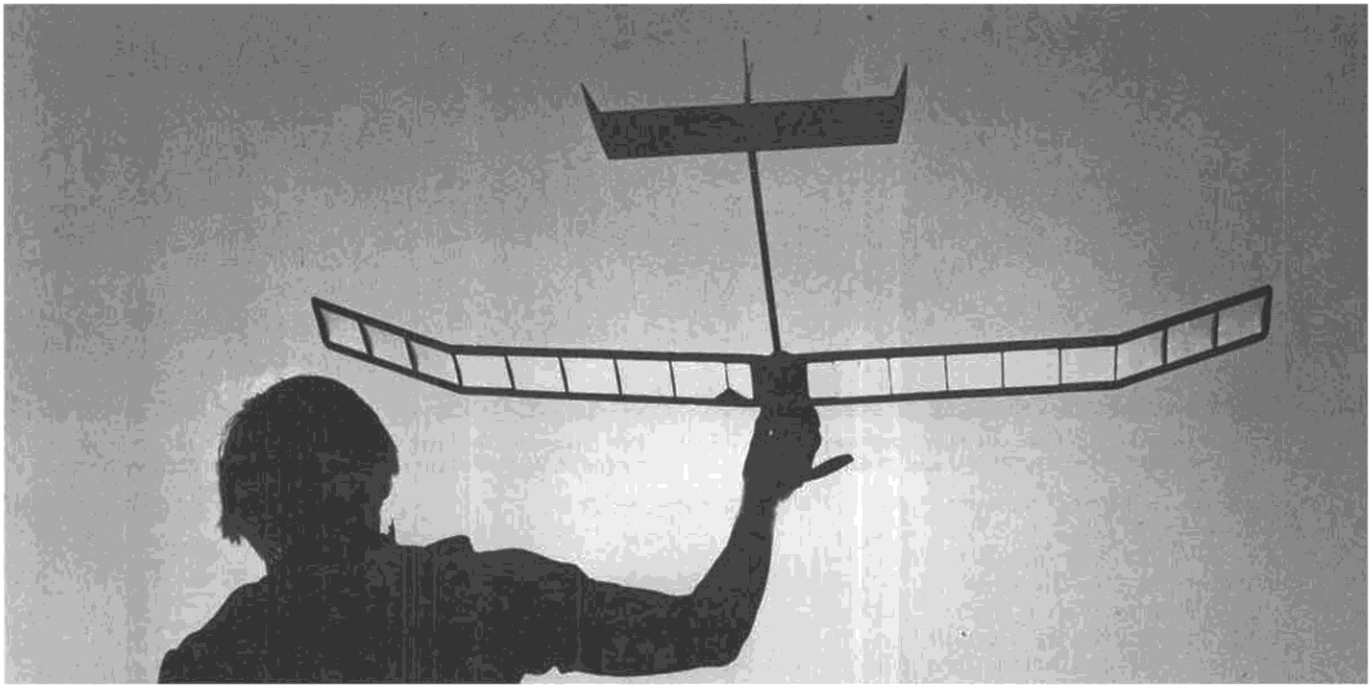


'Polliwog'

By JACK HEADLEY . . . Want to *really* relax with this hobby? Electric power assisted, single-channel R/C gliding is the way to go. It's also quite relaxing on the pocketbook. Try . . it . . . you'll . . . . . zzzzzzz.

• My interest in electric powered models actually started some (I won't say how many) years ago when one of the model magazines, I forget which, published the plans for an electric motor suitable for "round-the-pole" model flying. The main advantage here was, of course, that this permitted one to do a little indoor flying in winter (I used to live in a place that had a WINTER). Also, the power for the motor was run down the lines, hence the model didn't have to carry around any batteries, which was fortunate, as back in those days, batteries were batteries, and not the silver-plated M-and-M's we have today.

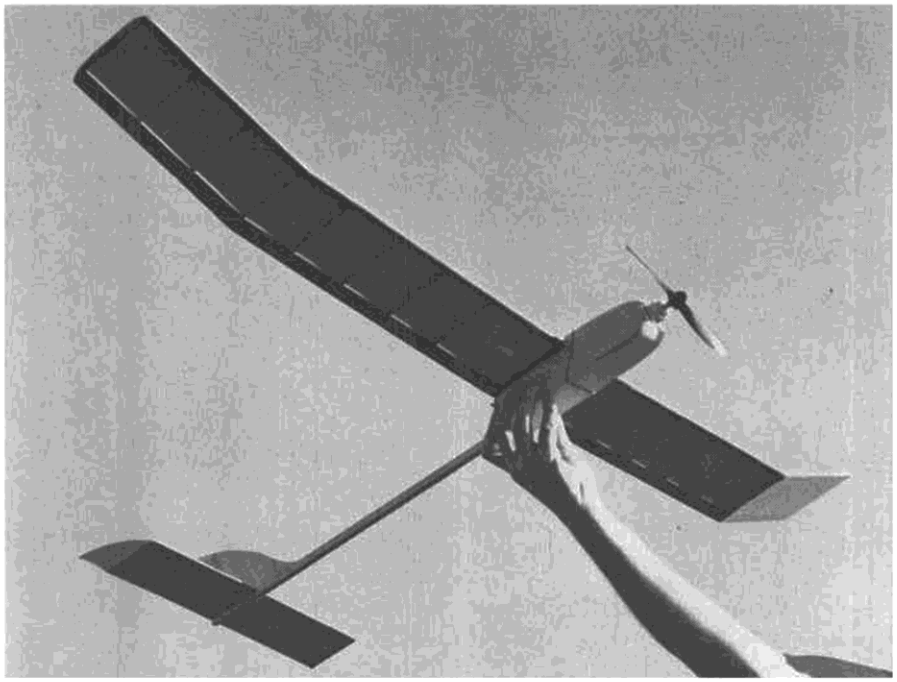
Needless to say, with all my skill, and despite having all the resources of a giant airplane factory behind me, the motor was never finished, and there I left electric models, and went on to making my own diesel engines, all of which, curiously enough, also seemed to be unfinishable.

My interest in electric power remained dormant for a long time after this. After all, with myriads of glow motors available for less than ten bucks, and with the then current reverse ideas about noise pollution (the noisier the better), there was little reason to even worry about an alternate power source. But times change, and ten dollars doesn't buy much of anything anymore . . . but it did buy me a Mattel Super Star Electric Free Flight model, and my interest in this type of flying instantly returned.

There's not much point in going over all the advantages electric power has in the present day modeling environment, as better authors than I have covered this topic in a much more interesting and thorough manner than I ever could. However, it does seem that these motors, with the added advantage of a plentiful supply of lightweight, rechargeable batteries, should be as much a part of the contemporary sport modeling scene as the .049 size glow engine.

I'm still not sure that the electric motor will ever replace the thoroughbred contest engines putting out 1 to 2 H.P., but who knows what lies ahead in battery design, maybe a nuclear power cell will appear!

But that's enough speculation for a while, let's get back to the Polliwog. After flying the Mattel unit for a few



Photos above, and at the top of the page, indicate the relative sizes of the "Polliwog", and its designer/builder, Jack Headley. VL Hytork electric motor and Ace single channel radio in pod.

When the slope wind is up, save the batteries the batteries for the next calm period! If flat soaring, use power to get up for thermalling.

weeks, I tried to repackage it a little . . . anyone who's used one of these motors will know how bulky they are . . . but even with a drastic chopping and channeling job, it still came out quite large, so I began to look around for some other unit.

By a curious coincidence, the VL company had just placed its Hytork system on the market, and this seemed to be exactly what I wanted. And indeed it was, a small neatly packaged motor/gear-box assembly with separate battery pack and switch unit, ideal for the small type sport model that I could fly in my neighborhood area. I bought one quickly, then designed the smallest fuselage I could around this motor and battery, together with the Ace single-channel receiver/actuator. This resulted in a pod and boom design that was labelled "Polliwog", for rather obvious reasons. A simple wing and a "Vee" tail unit completed the design. This latter item was a BIG mistake, as the flapping frequency of the Ace actuator was almost the same as the torsional frequency of the tail boom, and the tail unit would occasionally go into violent oscillations. This did tend to make some flights more exciting than others, but it was obvious that it was just a matter of time before the tail end would part company with the rest of the model. So, it was back to the drawing board and on with "Polliwog II", which was fitted with a more conventional tail unit.

The basic idea behind both of these models was to produce a powered glider, something to take to the slope and switch on the motor if the wind failed. If the wind was OK, then the prop was removed and replaced with a big spinner to protect the engine. However, the VL company has recently introduced longer life batteries (4 minutes, rather than the original 40 -60 second types), and this lets us fly the model mainly as a power model, with some thermal soaring capabilities.

By now you're probably wondering if I'll ever get around to discussing the construction, and I will, after this commercial message . . . Try electric flying, you'll like it! . . . Now, on with the "stick item A to flange B" bit.

WINGS

When I began to draw the final plans, I intended to show only the right wing, assuming that the other wing could be built on the back of the plan, but after a little sketching I could see that both wings could be included if I squashed thing up somewhat. This accounts for the rather cramped fuselage drawings, but I think that showing both wings will compensate for this.

As I've talked about the wings so much, we might as well begin the construction with these; and the first thing to do is to get good pieces of wood for the leading and trailing edges. With this kind of "sparless" construction, a little more time than usual should be spent selecting the wood; strong, straight grained balsa, not too heavy is ideal. The wings are made initially in two pieces, a left and right hand panel, so first pin down the trailing edges on the plan, then trim the upper side of the leading edge to shape, and pin down.

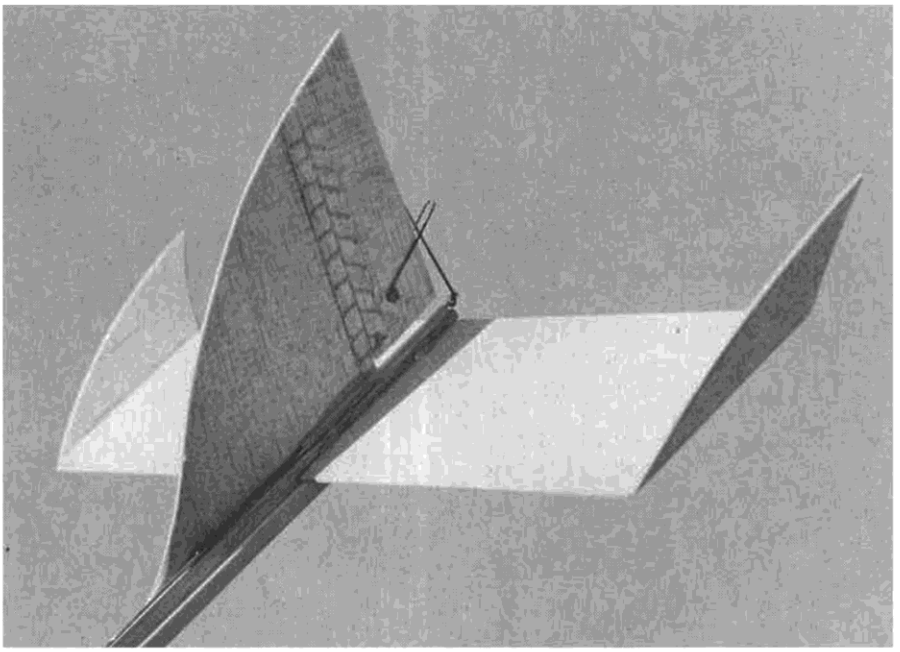
Cut out enough R1 ribs for the whole wing, slightly too long, then trim each individually, and cement into place at all the R1 stations. Cut all the wing joiners from 1/16 inch ply while this cement is setting up. Separate the wing tips from the inner panels now, and trim the edges of the wood to the correct bevel before cementing them back into place with the W3 and W4 joiners. Install the R2 ribs (which are cut down R1's) at the dihedral joint, then repeat the whole operation at the center-section, this time using the W1 and W2 joiners. The wing tips, cut from soft balsablock, can now be glued on, then the leading edge is shaped to the correct contour, and the whole wing is sanded. Adding the 1/32 sheeting at the center-section completes the wing construction. A final pass with the sanding block, and the wing is ready for covering.

Solarfilm was used on the original, transparent of course, and this gives a very durable covering. I have also used tissue on this type of wing. This comes out lighter, but you have to spend more pre-flight time sticking little patches all over the wing.

FUSELAGE AND TAIL UNIT

Construction of the fuselage/tail unit begins with making the tailplane. This is cut from a flat sheet of 3/32, as are the tailplane tips. Note the grain direction for the tip pieces. Bevel the ends of both of these tips, and the tailplane, before gluing them together at the 45^{0} angle. Sand off all the rough edges now, then glue this unit to the 1/4 x 3/8 hardwood boom. Cemented to the top of this hardwood boom is a strip of 3/32 x 3/16 hard balsa, this being cut away at the back to run over the tail-plane. Be sure to glue this stiffener in the center of the boom, and make doubly sure that the boom is flat when doing this operation. Make the fin and rudder from 3/32 sheet, sand lightly all over, then round off the corners. The rudder is hinged to the fin by Figure "8" thread hinges, these being the lightest, free-est (and cheapest) type available. If you haven't done this before, the first thing to do is to drill a line of 1/16 dia. holes along both the fin and the rudder (see plan), then, using carpet thread, literally sew the rudder to the fin with a figure "8" pattern. Put a drop of cement on the thread at each of the holes and smear it around a little. This helps to keep the

Continued on page 69



Simple torque-rod linkage allows for adjustment of rudder throw . . . just raise or lower wire loop attached to rudder; up for more, down for less. Note "T" shaped tail boom.

hinges in place. Cement the fin to the boom and to the right side of the stiffener. Before this dries, re-check that the fin is truly at right angles to the tailplane.

Now it's time to install the actuator, and connect up the rudder. My own favorite system for this is to bolt the actuator down to the structure (first replacing the bolt supplied by Ace with a longer one), so begin by drilling a 1/8 dia., hole in the boom for this bolt. This installation is shown on the plans far better than I can describe it, so spend a moment looking over the installation drawing. With the actuator in place, bend up the loop on the front end of the torque wire, then slip on a couple of lengths of inner Nyrod, each about 3 inches long, then bend up the aft end of the wire. The inner Nyrod pieces act as guide/bearings for the torque wire, and these can now be epoxied to the top of the boom stiffener. Don't let the epoxy run over the ends of the bearings, as the torque wire must be very free in order to operate satisfactorily.

We now build up the fuselage pod around the actuator, starting with the 1/8 sheet bottom, and the forward 1/4 sheet doubler. Cut out these items, and cement them together, then on to the boom, after which the frames F2, 3, 4, and 5, can be made and installed. Note the various cutouts in the frames for the wiring runs, and in F5, so that it fits around the boom.

The 1/8 sheet separator between F2 and 3 comes next, don't omit this piece, as it isolates the receiver from the motor battery. Make the fuselage sides from 1/8 inch sheet, and cement onto these the 1/4 inch sheet forward doublers. When dry, glue the fuselage sides to the bottom and the frames, then add the various 3/8 inch triangular gussets.

While all this is drying, make the F1 frame from 3/32 ply. An oversize 1 inch dia. hole is cut in this for the motor . . . do this before the frame is installed. F1 is initially cut to a rectangular shape, then sanded to the final outline after the fuselage is completed, as indicated on the plan. Cement F1 into place now, and install the motor, which will entail a little chopping on the 3/8 triangular gussets in the nose. Temporarily install the motor batteries, and check all the wire runs to the switch, which should be installed in a convenient location. Remove all the equipment now, add the upper 1/4 inch sheet between F1 and 2, not forgetting to bevel the aft end of this slightly. A small balsa block aft of F5 completes the basic fuselage construction. Sand all over, round off the nose a little, then drill the 1/8 dia. holes for the wing dowels, and cement these into place. A 1/4 inch sheet hatch is required to cover up, and provide access to, the motor battery and receiver compartment, and this is sanded to the local fuselage contours. The cover is held in place by a small rubber band.

COVERING

Finishing is no problem. As there's no fuel around, there's not much reason to put on many coats of dope. The model shown in the photographs had a Solarfilm covered wing, as mentioned previously, and the rest of the structure was given a couple of coats of clear dope, mainly to stop my grimy fingers from marking the wood too much.

One of the other models in this series had a red Solarfilm front fuselage, transparent yellow wings, and a natural boom and tail unit. So take your pick, but whatever you choose, just remember, the more weight you add the more the model is attracted to the earth!

FLYING

Most of my flying is usually on the slope, and with a wing loading of less than 8 oz. per square foot (this includes the motor and batteries), the Polliwog makes a good slope soarer. Using the shorter duration batteries on the slope provides instant lift, ideal for those changeable days.

Trimming for single-channel flying is basically getting two things right. The first is to make sure that the control is satisfactory, and that the model will turn well in both directions. Do this by adjusting the rudder loop up or down, up for more rudder, and bending the torque rod left or right, to get even control in both directions. The other item is to get the model to turn without stalling, by moving the C.G. around a little.

Most of these adjustments will vary from model to model, but after a couple of flights, you should be able to establish your own settings, after which it's all fun.

Happy flying. •