

SZD Ogar-Powered bird of Poland

Unique in concept, the Polish SZD Ogar powered soarer is a natural for modeling. Stand-Off Scale/Howie Applegate

I suppose all of us want to build a model that's a little bit different from the rest. While going through a soaring magazine, I saw some three view drawings of several sailplanes. Ogar caught my eye as "the" different airplane. A powered sailplane without a power pod seemed quite novel. Before starting construction, let's take a minute for some background on the full-sized machine.

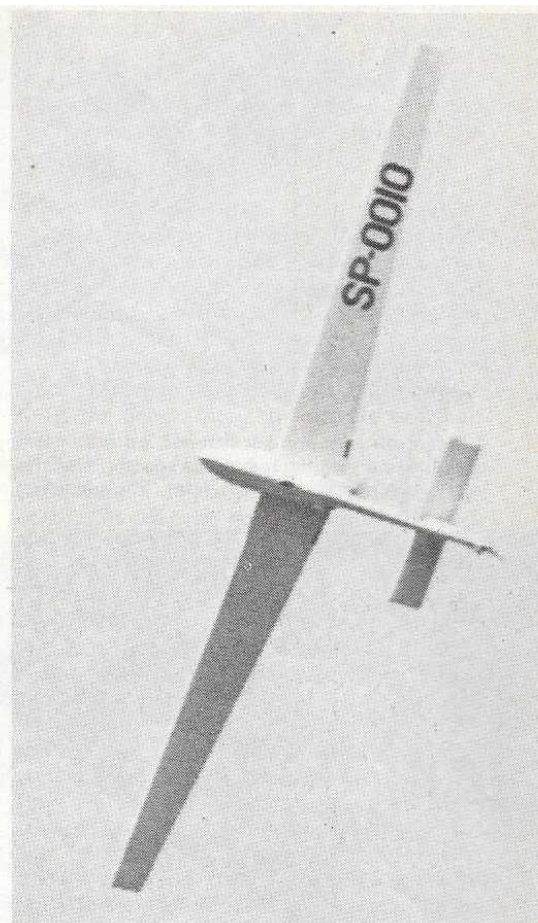
Ogar is a Polish design, built by SZD. It has a 17.5 meter span (approximately 56.5 ft.), two place seating configuration, with the student in the front seat and the instructor in the rear. The seats are staggered so the occupants' shoulders overlap (the student's right with the instructor's left). Power is a 68 H.P. (a V.W. engine modified for aircraft). The ship has a partially retractable wheel in the belly and is equipped with wing tip casters to help prevent ground looping.

I took a few liberties with this ship to ease construction and still insure good structural qualities. I decreased the aspect ratio of the wing from 16 to 1 to 14 to 1. This permitted me to place the spar near the maximum curvature of the wing and still keep the leading edge planking from becoming too wide. Naturally the tail area was increased and the wheel is a dummy glued to the belly. The wing tip casters were omitted, and a set of optional tow hooks were added. The fuselage was slimmed down also.

Now let's get down to building.

Fuselage and Boom

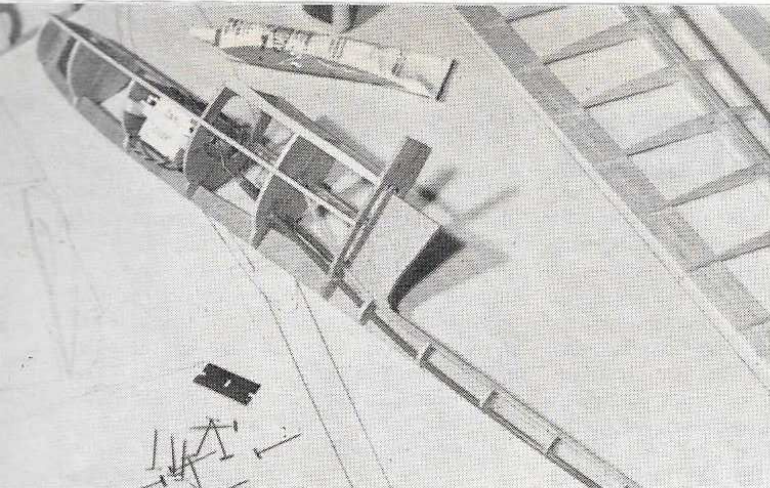
The fuselage is definitely the most difficult part to build. The construction is $\frac{1}{8}$ " sheet profile reinforced with $\frac{1}{64}$ " plywood on both sides. This profile can be pinned directly onto the plans. Use some scrap strips of $\frac{1}{64}$ " thick plywood as shims to



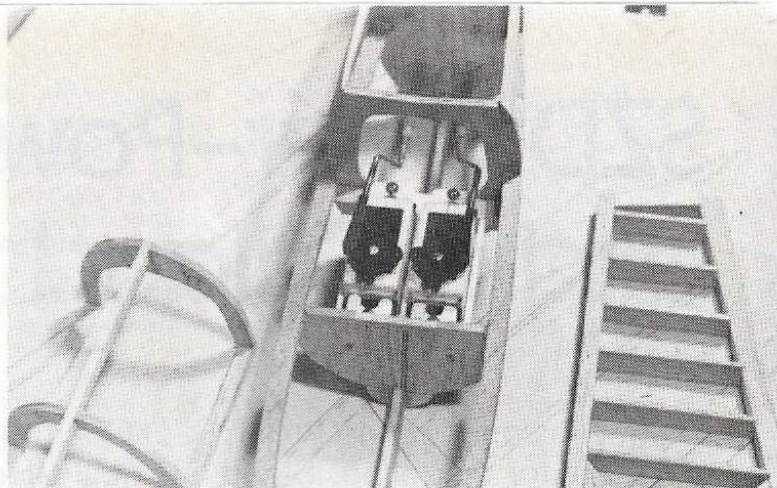
Ogar is about to demonstrate the wing mounting system. Cartwheeled in, popped free, undamaged. Photos below: Lunchtime at Grumman. Howie gets it off, no hi-start required. A cowled in .049.

PHOTOGRAPHY: HOWIE APPLAGATE

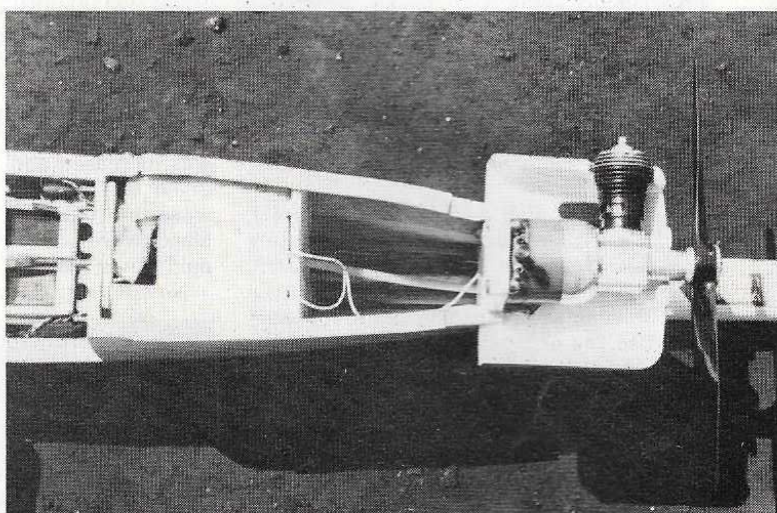
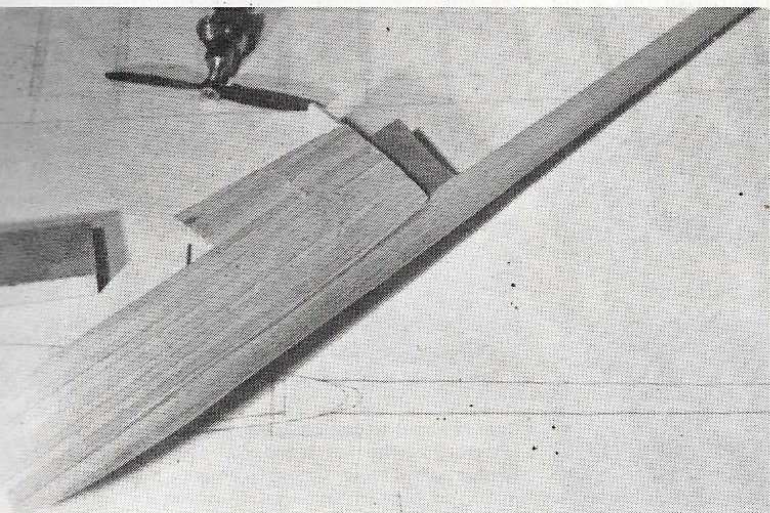




A central core profile, fattened up with formers. Logical construction, simple to install equipment as you go. Note the Gold N' Rod along boom. Below: A couple of nights later. The planking, prior to sanding smooth.



Servos side by side. Full scale machine seats instructor and student in staggered tandem positions. Below: Cox Baby-Bee .049 installation. Use pusher prop, start and launch quickly for an in-flight cooling airflow.



support the areas where the doublers are not used. The vertical fin substructure should be added while the profile is still pinned down. The elevator cable sheath may now be installed as the boom bulkheads must be notched to clear this and also the Gold N' Rod sheath. The Gold N' Rod sheath should be running slightly up hill going toward the front of the fuselage and also climbing toward the top of the fuselage. It should exit the boom about $\frac{1}{4}$ " above the profile piece and about $\frac{1}{4}$ " higher than the horizontal centerline of the boom.

Now, glue all the left side bulkheads into position. The boom bulkheads should already be notched to clear the elevator sheaths. Also, fuselage bulkheads #5 and 6 should be drilled and/or notched to hold the sheath. Add a $\frac{1}{16}$ " balsa shear web to the boom (grain lengthwise); this will help hold the boom straight during the planking operation. Next, add the left side longeron and the canopy longeron. Note: Make sure these two longerons do not get accidentally glued together. Complete the left side of the fin with its $\frac{3}{16}$ "x $\frac{3}{8}$ " L.E. and $\frac{3}{16}$ "x $\frac{1}{4}$ " spar. Add the $\frac{1}{16}$ "x $\frac{3}{16}$ " ribs (notch for cable sheath). The left side is now complete. Glue on all the right side bulkheads and add the $\frac{1}{16}$ " balsa shear web. The rudder Gold N' Rod rests along the outer contour of the boom bulkheads, either above or below the shear web. Notch the boom bulkheads and notch and/or drill fuselage bulkheads #5 and 6 and install sheath.

I did not want my antenna wire to be

external of the boom for fear of the prop eating it, so I installed another tube under the planking of the boom. I used the left-over sheath from the flex cable and installed it on the left top side of the boom along the outer contour of the bulkheads. The antenna tube also runs uphill toward the wing inside the fuselage, so it is accessible from bulkhead #5 for ready insertion of the antenna wire.

The right side of the fin can now be installed after which both sides of it can be covered with $\frac{1}{32}$ " sheet balsa (grain spanwise).

The boom is now ready for planking. If you wish to install tow hooks, cut out the fuselage profile piece where shown on plans. The planking can be cut away later to suit the tow hook mount. All planking should be $\frac{3}{32}$ " medium balsa. My method of planking is as follows: Cut the first plank (about $\frac{1}{8}$ " wide and glue it anywhere along the length of boom. Now bevel the edge of the $\frac{3}{32}$ " sheet to suit the mounted plank; cut it off the sheet about $\frac{1}{8}$ " wide and glue it in place. Narrow strips work best on highly curved surfaces such as the boom; wider strips may be used on less curved surfaces, as on the fuselage sides. Planking is not difficult, but it does require some care in keeping the seams tight. I suggest you use Ambroid glue, not white glue for planking, as white glue is very difficult to sand and may tend to give flat spots on the sanded planks.

Before planking the fuselage, the servos should be installed. It will be much easier at this point to bend the $\frac{1}{16}$ " dia. music

wire connecting rods to join the rudder and elevator Gold N' Rods to the servos. After you are satisfied with your servo installation, cut the appropriate slots to clear the servo pushrods in the $\frac{1}{32}$ " thick ply receiver platform, and glue it in place. Sand the upper boom planks to round contour as shown on the plans. Also, contour the $\frac{3}{4}$ "x $1\frac{3}{4}$ "x $2\frac{3}{4}$ " aft fuselage fairing blocks to fit the top boom planking and glue them in place. Glue the wing contour pieces across fuselage bulkheads 4, 5 and 6, and sand the fuselage and canopy longerons to blend into the contour of bulkheads 1, 2, 3 and 4. The fuselage can now be planked. The fuselage planks should be wider at the back than at the nose, perhaps $\frac{1}{4}$ " wide at the back and $\frac{1}{16}$ " or $\frac{1}{8}$ " wide at the nose, due to the severe taper of the fuselage. Sand straight and square edges along the canopy seating surfaces. Replace canopy frame with a sheet of waxed paper between it and the fuselage. Use heavy "T" pins to hold it in position. Now plank the canopy; do the entire canopy except the last few planks near the longerons. After the glue is completely dry, remove the pins and canopy so the last canopy planks can be added. The nose blocks and tail fairing blocks can be added and carved to shape in preparation for sanding. The next one hour and ten minutes shall be reserved for fuselage sanding.

The Tail

Ogar's horizontal stab is very simple to build. It is symmetrical in airfoil and has no spars. You may want to sand the $\frac{3}{16}$ "

sq. L.E. and the $\frac{1}{8} \times \frac{1}{4}$ " rear strip to the proper bevel on the top side so the $\frac{1}{32}$ " sheet covering can be applied while the stab is pinned to the plans. Before adding the bottom sheet, install the elevator hinge blocks. Glue on the $\frac{1}{4} \times \frac{1}{2}$ " tips and the stab is ready for sanding. The elevator is made of a strip of $\frac{1}{4} \times 1$ " medium balsa tapered top and bottom. Cut the two elevator halves to length shown, and sand the leading edge bevels as shown on side view. The small piece of elevator strip that is left is used for the spacer between the two halves. Cut a $\frac{1}{16}$ " wide groove into this piece along its front to permit the elevator joining wire to be installed. Glue this piece onto the stab with the elevator joining wire captured in it.

The rudder is made up of a $\frac{1}{4} \times \frac{1}{2}$ " L.E. and a $\frac{3}{16} \times \frac{3}{8}$ " T.E. with $\frac{1}{4} \times \frac{1}{2}$ " top and bottom. All the ribs are $\frac{1}{16} \times \frac{1}{2}$ ". When dry, sand to shape shown on top view.

Wing Notes

The wing is very straightforward in construction. It has a shallow curved lower chamber which enhances its flight characteristics. No washout was built into the original. However, if washout is your thing, build some in. Pin the $\frac{1}{8} \times \frac{1}{4}$ " lower spar to the plans and use a piece of $\frac{3}{16}$ " sheet balsa under the $\frac{1}{16} \times 1$ " lower T.E. then, insert the ribs using the setting template to align the center rib. Install the $\frac{1}{8} \times \frac{1}{4}$ " upper spar and the $\frac{1}{4} \times \frac{3}{8}$ " leading edge. You may wish to put in the $\frac{1}{16} \times \frac{3}{16}$ " shear webs on the lower trailing edge now. Sand

a bevel on the lower trailing edge and add the $\frac{1}{16} \times 1$ " upper T.E.; also the $\frac{1}{8} \times \frac{1}{4}$ " upper rear spar. Do the same for the left hand wing panel. Join the two panels together using the $\frac{1}{32}$ " ply dihedral braces. Glue in the $\frac{1}{16}$ " sheet shear webs along the forward faces of the spars. Cut out the rear center-section and the rear end of the center ribs. Add the lower $\frac{1}{16} \times 2$ " lower leading edge plank. Place the wing on the fuselage and drill through the $\frac{3}{16}$ " dia. hole in bulkhead #6 into the wing cutout and insert a piece of $\frac{3}{16}$ " dia. dowel. Install a piece of $\frac{3}{16}$ " dowel into the leading edge as well. The rear dowel also serves to hold the upper cowl in place. Now the upper $\frac{1}{16} \times 2$ " sheet may be added. Put on the remaining $\frac{1}{16}$ " thick center and tip sheeting and $\frac{1}{16} \times \frac{1}{4}$ " capstrips and your wing is ready for sanding.

The Cowl

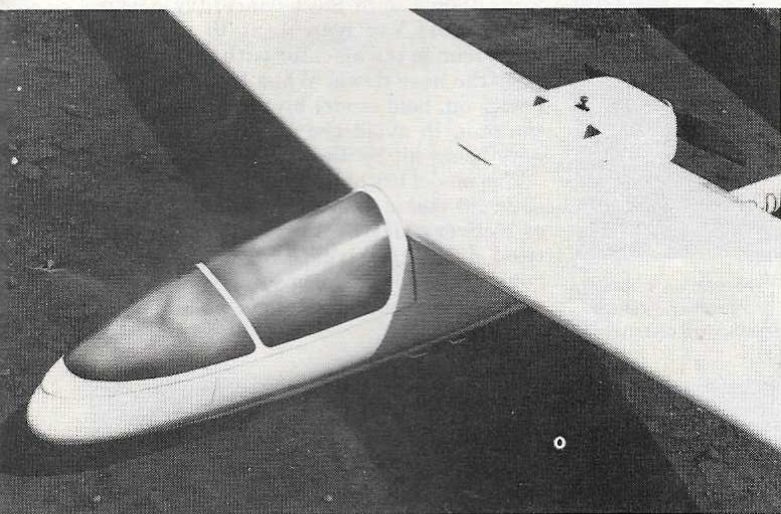
The cowl is made in two halves with its parting line along the center axis of the engine. The lower half has a $\frac{3}{16}$ " sheet bottom and rear with $\frac{3}{32}$ " thick sides. The top half has a $\frac{3}{16}$ " thick balsa top and rear and front bulkhead with $\frac{3}{32}$ " thick balsa vertical bulkheads, sides, and top (front). Glue in the $\frac{3}{16}$ " or $\frac{1}{4}$ " triangular stock on the inside corners, and sand to shape shown in section. Cut out the right side to clear the engine cylinder head and cut out cooling exits on the rear. The engine used on the original model was a Baby Bee with a tank extender. If a Golden Bee or a Black Widow is used, spacers may be needed on the rear face of bulkhead #6 to make the

prop come out in the same position as shown on the plans. The lower cowl half is glued onto the fuselage fairing blocks. The upper half is held in place with the $\frac{1}{32}$ " plywood tab which is glued to the $\frac{3}{16}$ " forward cowl bulkhead.

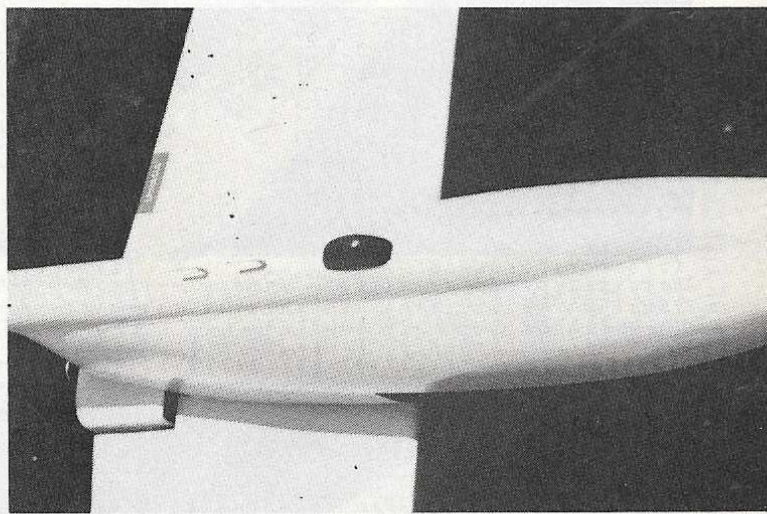
Miscellaneous Parts

A few final parts remain. The tailskid is made of two pieces of $\frac{1}{8}$ " sheet glued together. Contour the skid to match shape of the boom. Glue it on, and sand the outside to a half round shape. The belly wheel is made of two pieces of $\frac{3}{16}$ " sheet glued to a $\frac{1}{32}$ " plywood center. Contour the wheel to fit the boom. Sand the outside to a half round shape. Do not glue it on yet.

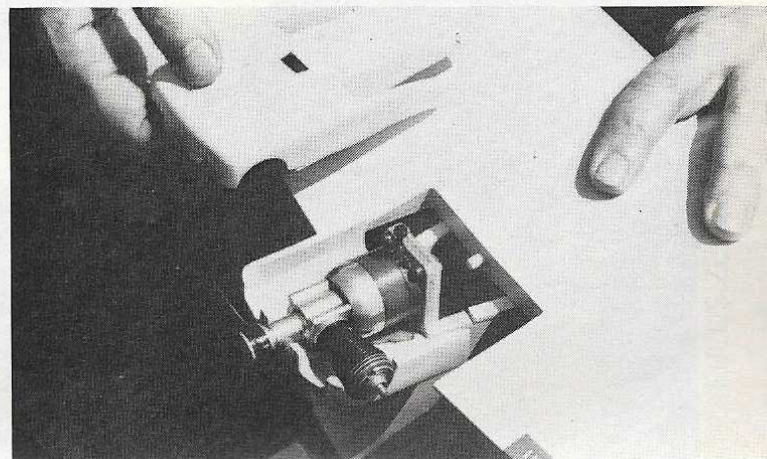
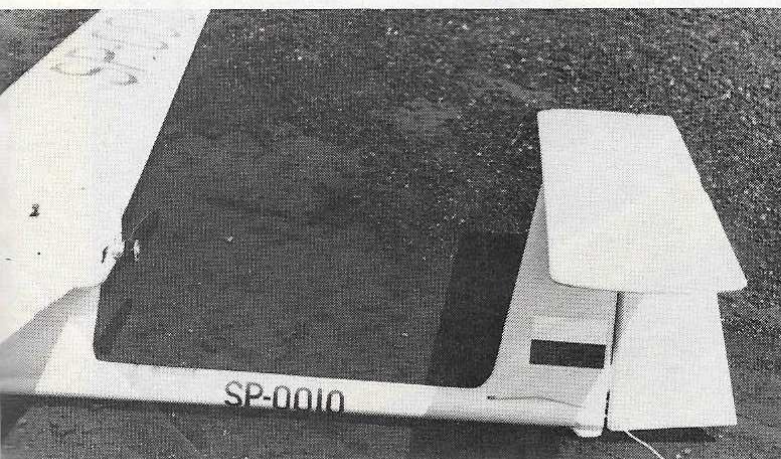
The rudder fairing is made of two pieces of $\frac{1}{8}$ " sheet. These pieces fit between the bottom of the stab and the top of the rudder. Taper the inside trailing edges to suit the taper of the rudder. Glue the stab and elevator to the top of the vertical fin. Put the elevator horns on and bend the elevator pushrods to suit the elevator cable. Solder the pushrods to the cable using a short piece of $\frac{1}{8}$ " dia. brass tubing as a ferrule and a solder path. Carefully mark the path of the pushrods on the rudder fairings and glue them in place after cutting the openings. Cut the belly and add the tow hooks if you care to use them. Bend the wing hold-down hooks of $\frac{1}{16}$ " dia. music wire. Epoxy them to bulkhead #4 with the aid of $\frac{1}{4}$ " sq. hardwood blocks. The canopy hold-down hooks are made of .040 dia. music wire. Secure them to bulkhead #3 and the inside canopy profile.

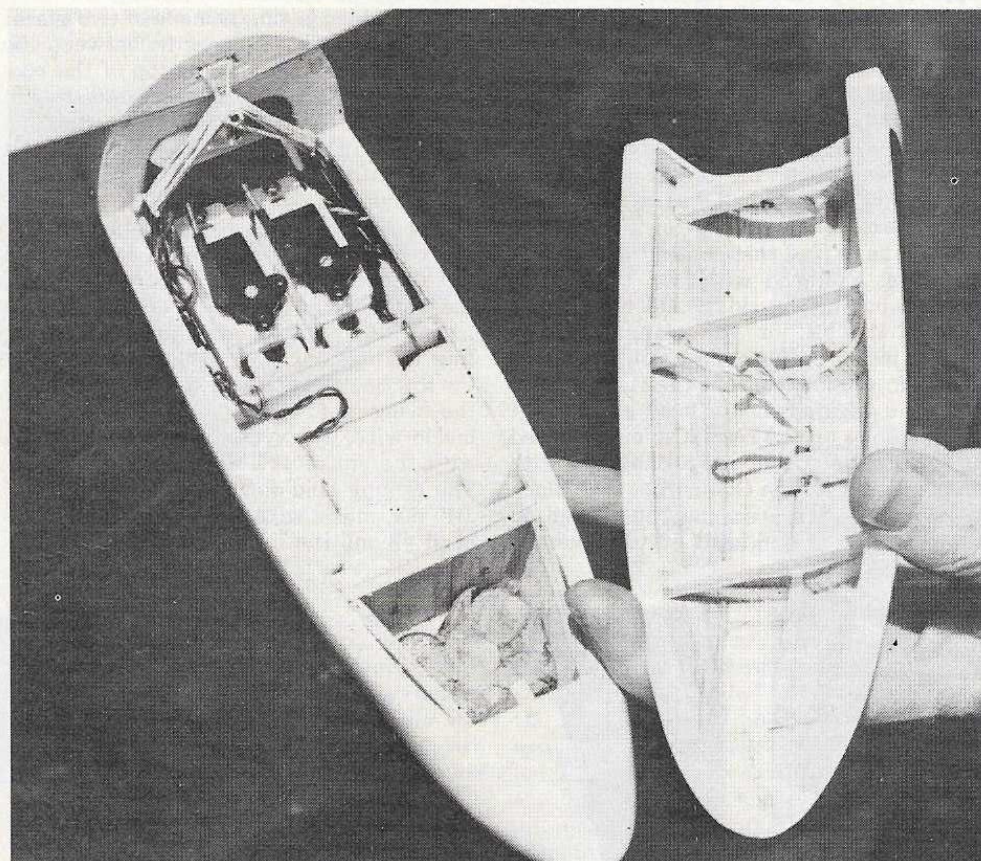
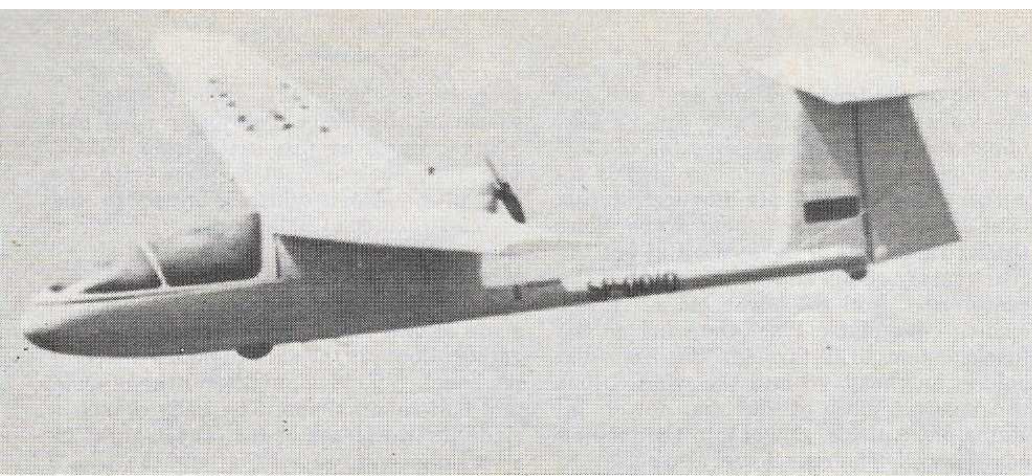


Howie has a knack with an airbrush, simulates the reflected colors of a canopy in painted trim. Note the smooth airflow into the engine cowling. **Beneath:** A rounded planked boom, high fin and T-tail stab configuration.



Choice of hook positions, aft one for calmer conditions. The belly wheel is a dummy, but useful as skid. Pod and boom fuselage has a sturdy feel. **Below:** engine cowl lifted, what better access? Power to reach thermals.





The pod parts company, exposing radio system for servicing. Weighty items are placed forward. At top: Flights end, Ogar drifts in on slender wings. The best of two worlds, powered and soaring. Beneath: The high stab mount is easier on the boom, less chance of catching stab tip on landing.

Finishing

On the original model the fuselage cowl and tail were covered with Silkspan after applying two coats of butyrate clear dope. These parts were filled with Sig Sanding Sealer after applying three coats of clear. After a thorough sanding, one more coat of clear was brushed on. The wing was covered with silk after applying two coats of clear. The silk was given six coats of clear and the center-section got the sanding sealer treatment. The entire model was sprayed white followed by the final color which was cream butyrate dope.

The license numbers were cut out of contact paper masks and sprayed maroon. The danger markings were masked and sprayed red. The word "UWAGA" (pronounced UVAGA), which means "Careful" in Polish was cut from a tiny vellum stencil with letters $\frac{5}{32}$ " high. The stenciled words were sprayed white (wing four places, boom two places). The Polish flag on the vertical tail was masked and sprayed white on top, red on the bottom (both sides). The belly wheel painted black, then glued to bottom of boom. The tailskid bottom and sides were painted black to represent a tailwheel.

Mask the canopy as per the plans and paint it as described in "The Hightailer" FLYING MODELS November, 1976 issue. The model was next overcoated with a fast coat of clear butyrate dope, sprayed on.

Flying Notes

After installing radio gear and balancing the model, give it a few hand launched test glides from shoulder height. After you are satisfied with the balance, try a powered flight. You may want to use some down trim in the elevator with power on to keep the nose down. When launching with power on, hold model by the boom behind the prop to avoid the chance of your fingers being hit by the prop.

This model has only 4 degrees of dihedral, so avoid making turns that are too tight, as recovery may be a little slow. I haven't tried a Hi-Start launch with the engine running, but it could prove very interesting. Enough said, guys, let's build and fly his sweet ship. ☺

