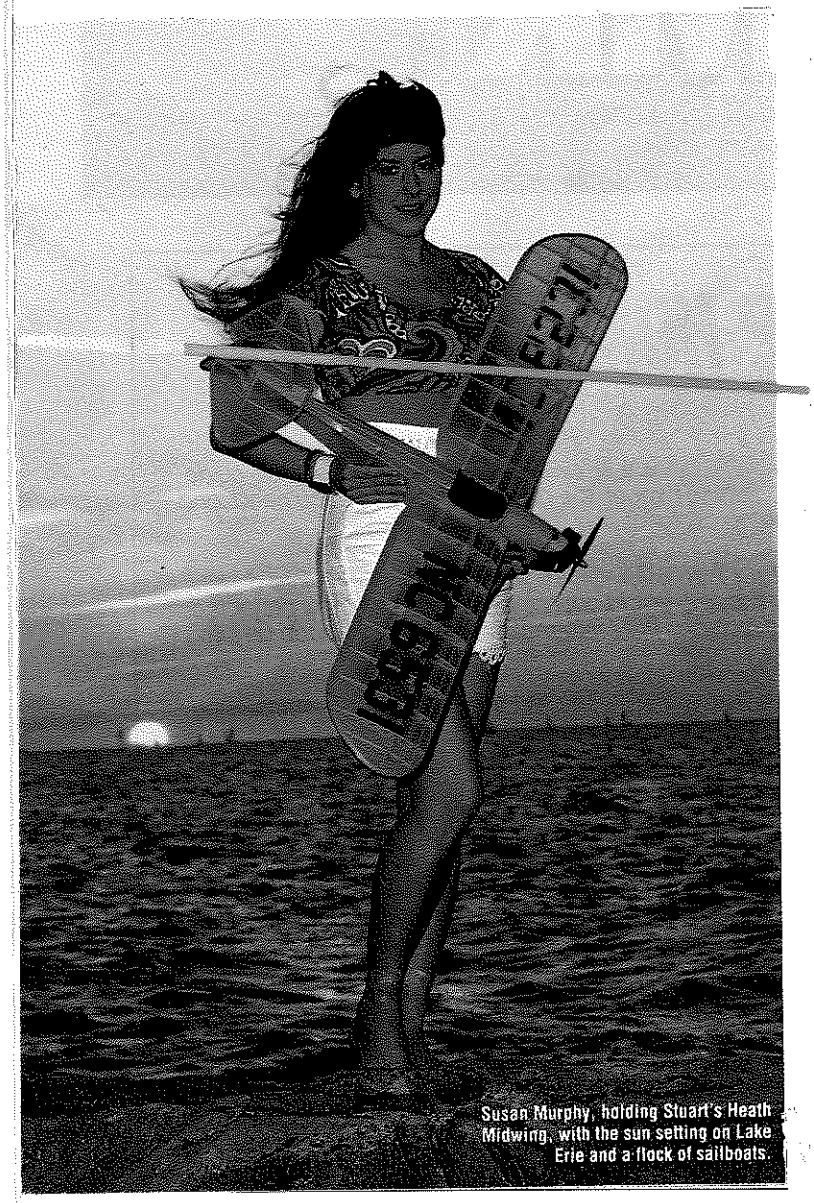
HEATH MIDWING 1/2A RC

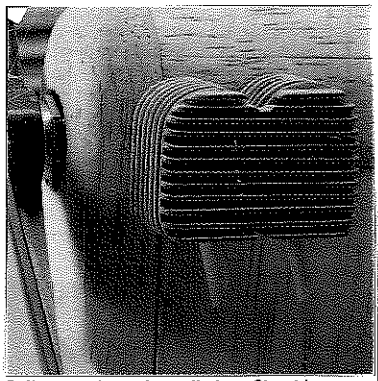
BY STUART WARNER



Susan Murphy, holding Stuart's Heath Midwing, with the sun setting on Lake Erie and a flock of sailboats.

As is the case with many scratch-built models, this one was the result of a search for an out-of-the-ordinary and obscure aircraft . . . to use for our local SAM 1/2A Texaco scale event. The basis for this model was the 1937 Peerless rubber model plan. The original aircraft was built in 1933 as a raceplane powered by an A-40 Continental engine. Its similarity to the more famous Heath Parasol is quite evident as the shape of the wing trailing edge is a dead give-away. The more publicized Church Midwing is actually a well modified Heath Midwing. For those of you wanting to do more research, the original plane was granted ATC 495.

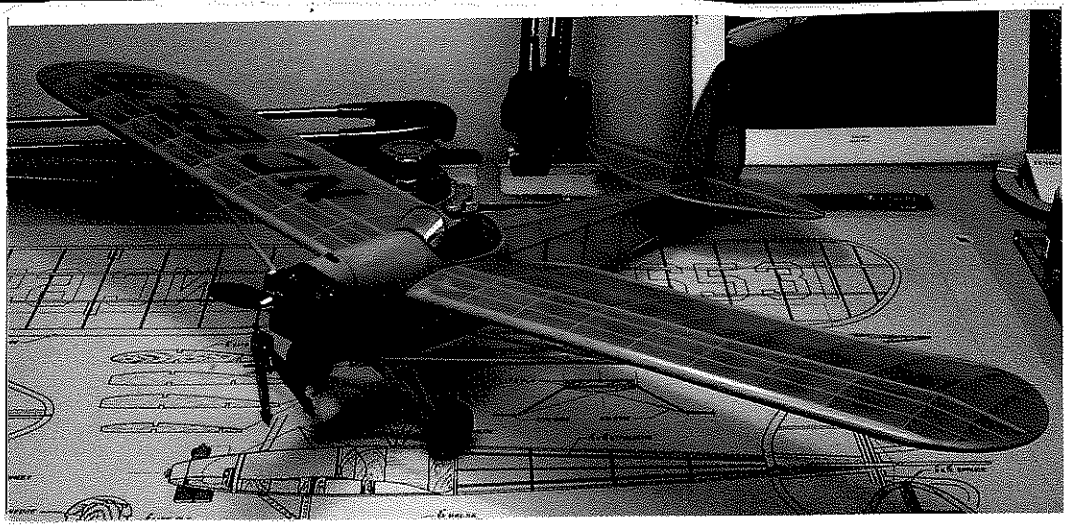
The first step in this project is to study the plans. You will note that the wood grain has been shown to indicate the different types of wood. These woods may be easily substituted to suit your building style or whatever is in your building box. The wing tips and stabilizer outlines just cry out to be laminated. This is the direction I went, but built-up sections will work just as well. I have indicated both on the plans. If you have not as yet discovered See-Temp, now would be a great time to try some. I have become dependant on this material for every step of the construction. As construction



Built-up scale engine cylinders. Stuart is obviously a glutton for punishment, but its beautiful work!

progresses, I will try to give some of my scratch building tips and show how to build some special tools. So let's begin!

I generally begin with the fuselage and right away is my first use for the See-Temp pattern material. Note that the primary structure of the fuselage is made of 1/8-inch or 3mm Lite Ply. Use a utility type knife and score the See-Temp to make a pattern for the



The completed Half-A RC Scale Heath Midwing resting on the plans from which is sprung . . . sprang . . . flew!

fuselage sides. The utility knife has a very stiff blade, allowing you to trace the curved outlines from the plans freehand. A metal straightedge is used to assist for tracing the straight sections. Using a #11 type of knife will lead to problems because the blade flexes and will wander from the pattern or straightedge. The patterns can be dressed up with sandpaper to get to the desired finished shape. The round inside corners can be final shaped with sandpaper wrapped over a dowel.

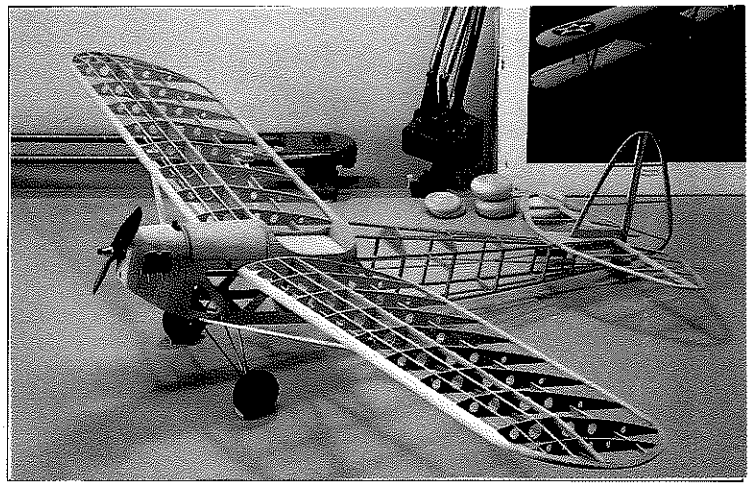
For straight lines, I find that it is easier to use a utility knife and a metal straightedge than it is to use a jig saw for thin plywood. Build two identical sides with the 1/8-inch balsa nosepiece forward of the firewall attached to the Lite Ply. Once the two sides are completed, the cross pieces can be cut to length and the fuselage box completed over the top view of the plan. Note that the firewall has down-thrust planned in. Just glue the firewall between the fuselage sides using the forward edge of the Lite Ply as a guide. The cockpit floor is made of both balsa and Lite Ply. The Lite Ply of the cockpit floor will form the top of the wing spar box.

Once the cockpit floor is in place, finish the wing spar boxes. I would recommend that if you are going to use flexible pushrods that you install them now, because from here on the fuselage gets a little cramped to work inside. I prefer to use Sullivan's small cable pushrods. I substitute 1/32 wire for the cable and the installation is almost invisible.

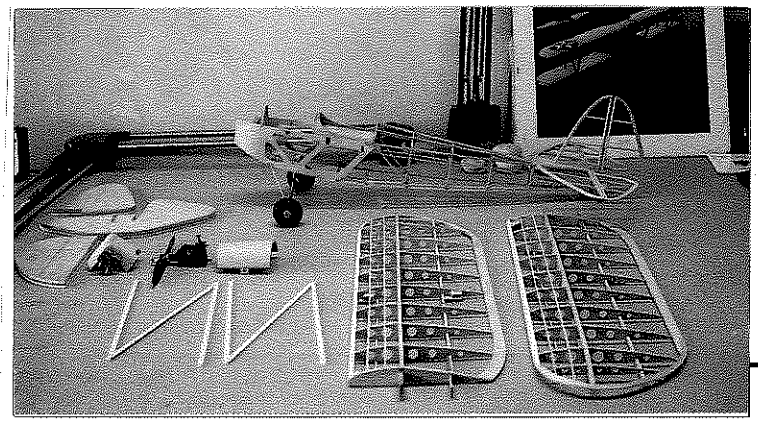
The turtledeck and fuselage bottom formers can now be added. Before the stringers can be added to the bottom, the main landing gear mount and .078 wire has to be installed. The forward .031 brace wire is added after the main landing gear is installed. This wire is attached to the fuselage bottom by gluing it into a slot cut in the Lite Ply bottom piece. The forward brace and cross brace wires can now be soldered to the main landing gear wire. Because I like Trexler wheels on my oldtimer, I made a special axle by soldering a brass tube over the main wire. The tube should be at least 3/32 longer than the axle wire. A hole can then be drilled through the tube, top to bottom, so that a cotter pin can be used to secure the wheel on the axle. I used the cotter pins from the large DuBro hinges which can be purchased separately in packages. The true scale wheel size is close to 1-1/8", but I felt that this was too small for flying and landing on grass.

The top and bottom of the last bay of the tail are both filled in with sheet. The cockpit rim, hatch and forward nose section are carved from soft balsa block.

The firewall is made from Lite Ply. The back side, where the engine blind nuts will mount, is reinforced with 1/32 ply. The engine mounts on a 3/32 ply thrust wedge sanded to give two degrees of right thrust. Again, this is an excellent place to use the See-Temp for the pattern making. With the hard pattern created by the See-Temp you can cut the Lite Ply pieces without the use of a jig saw and only a utility knife. The Cox Texaco .049 can now be blind nutted in place. One nice thing about this installation, no needle valve extension is required. The nose block can be shaped to fit over the engine. The dummy engine can now be fabricated. I made mine from layers of 1/16 balsa.



The Heath before being dressed in its cloak of orange silk and many, many thinned coats of clear dope. Trexler wheels.



No those aren't alternate sheet tail surfaces. They're 3/8-inch plywood forms around which the laminated balsa outlines are bent.

The head fins were made from 1/32 plywood strips spaced 1/32 apart. These were then sanded to shape. I attached my dummy cylinders to the top half of the removable cowl. Note that the top half and front of the cowl are glued together as one piece.

If you intend to laminate the tail outlines and wing tips, you should have the 1/16 strips soaking. I cut my laminating patterns from a piece of 3/8-inch plywood. This is inexpensive and can be purchased in 12 x 24-inch sheets at most DIY type stores. The pattern can be cut to the size of the inside of the outline shown on the plans.

Again, I used See-Temp to transfer the pattern from the plan to the wood. Once the pattern is cut, nail it to a slightly larger piece of wood for a backer. I usually place a piece of wax paper or plastic wrap between the pattern and the backer. This will help when the laminations are finally glued together to keep them from sticking to the pattern or backer.

Another trick is to use plastic electrical tape stretched around the perimeter of the pattern to keep the laminations from sticking to the pattern. It is "quick and dirty," but it works great. I generally soak the strips for 48 hours maximum. Once the strips are pliable enough, they can be bent around the pattern. They can be held in place by small wood blocks nailed into the backer board. This should be left for at least 48 hours, or until the wood is almost completely

dry. The laminations can now be carefully removed from the form, glued together with a white glue and placed back on the form to dry. If you try to glue the laminations together while they are too wet, the glue will not bond well, thus the reason for letting the assembly dry first. It will take at least 48 hours for the glue to set. While this is a very drawn out process, the results are well worth it. The result is a *very* strong and thin outline.

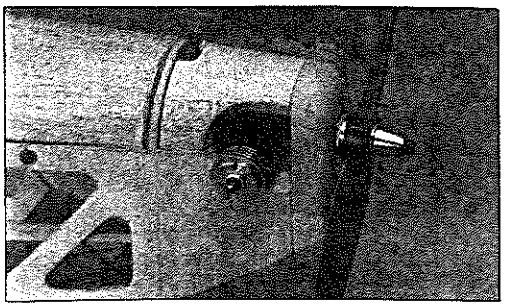
If you wish, you can build up the surfaces, using the patterns furnished. The strips closest to the hinge lines are spruce. This adds some strength to the thin tail surfaces and provides some meat to set the hinges into. The spruce is backed up with a strip of balsa to give some surface to fasten the covering to. Note that the rudder post goes full length, and extends to the bottom of the fuselage. These surfaces can be hinged with your favorite flavor of hinges. I find the small, flat type with the removable pin the easiest to install and use because the surfaces can be covered and then assembled. Once these surfaces are finished and covered they can be installed on the fuselage.

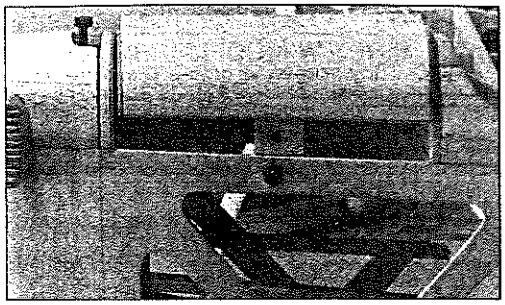
The wing is of conventional construction. If you desire to laminate the tips, use the same procedure as used for the tail. The only difference is that the strips used should be 1/16 x 1/2. The root rib (#1) should be made of Lite Ply, particularly if the wing is to be removable. All other ribs are of light 1/16 balsa. The #2 rib is a #3 rib cut shorter at the trailing edge and sanded to fit the 3/16 x 1/2, pre-shaped trailing edge. The spars should be cut and tapered to the tip from where they cross #4 rib. If the bottom, rear spar is sufficiently tapered, the depth of the bottom slots in rib #5 could be cut shallower. The dihedral joint/wing joiners are made from 1/8 plywood. The forward joiner is doubled for strength. Note the step cut in the top of the forward joiner. This must be done so that the wing will fit into the spar box correctly. The wing is sheer webbed with vertical grain 1/16 sheet out to where the struts are attached. As before, the See-Temp proved to be very valuable for transferring the patterns from the plan to the wood.

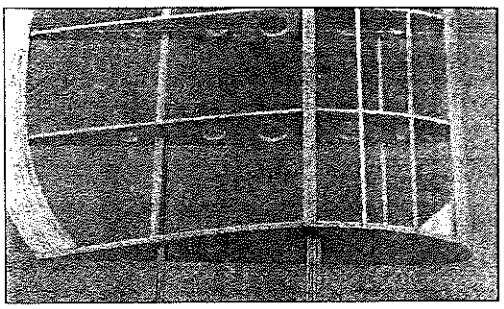
The struts are made from 1/4 x 3/32 spruce for strength. If you use balsa, you will be constantly replacing them. I reintorced the top side of the "N" joints with 1/2 oz. fiberglass cloth. Because the wings on my model are removable, the struts take a lot of abuse. I used modified small Robart flat hinges to mount my struts, although I understand they are no longer made. If you can find some, they are great. Cut the hinge in half. Pull it apart and affix the one half to the strut mounting point, and the other half to the strut. This makes a neat pop-off mounting. A similar mounting point can be made by cutting a conventional, loose-pin hinge apart and mounting it the same way.

Covering can now be completed on the airframe. I chose to use Japanese silk, but any conventional covering can be used. The original plane was overall orange with a black nose trim and registration numbers. See-Temp . . .one more time! When making the pattern for the registration numbers, just place a piece of See-Temp pattern material over the plans and scribe the pattern onto the material. The resulting pattern can be used to cut the numbers out of covering material or to cut a masking pattern for painting. The pattern can also be used to locate the lettering in the correct location on the wing. The same technique can be used to trim the nose. Chartpak ITC MACHINE 60PT./M15560C rub-on transfer lettering is so close to the original tail registration lettering that "only its mother would know the difference."

The guidance machinery may now be installed. I used Futaba S-133 micro servos along with a micro 2-channel receiver and a 250 milliamp battery. The servos should be placed at the rear of the hatch area. The battery pack is fastened to the rear of the firewall in a vertical position. I have found that a Velcro strap works well for this purpose. The receiver fits between the servos and the battery pack. With the equipment in this position, I needed no ballast to achieve a 33 percent-of-chord balance. I fitted a mini-switch and charge plug into the instrument panel face.







(Top) Cox engine nestled in its removable balsa cowl. Plenty of cooling available. (Center) Neatly structured hatch carved and hollowed from balsa block. Note ply end plates to prevent wear and tear, and 2-56 locking bolt. (Bottom) Close-up of left inboard wing structure.

The all-up weight of my bird is 19-1/2 ounces and that is with what must be a quart of clear dope on the silk. This plane should be able to be built at about 16-1/2 ounces total weight. With 300 square inches of wing area, this would result in an 8 oz. wing loading and should produce a real "floater" which should fly almost hands-off. **MB**

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