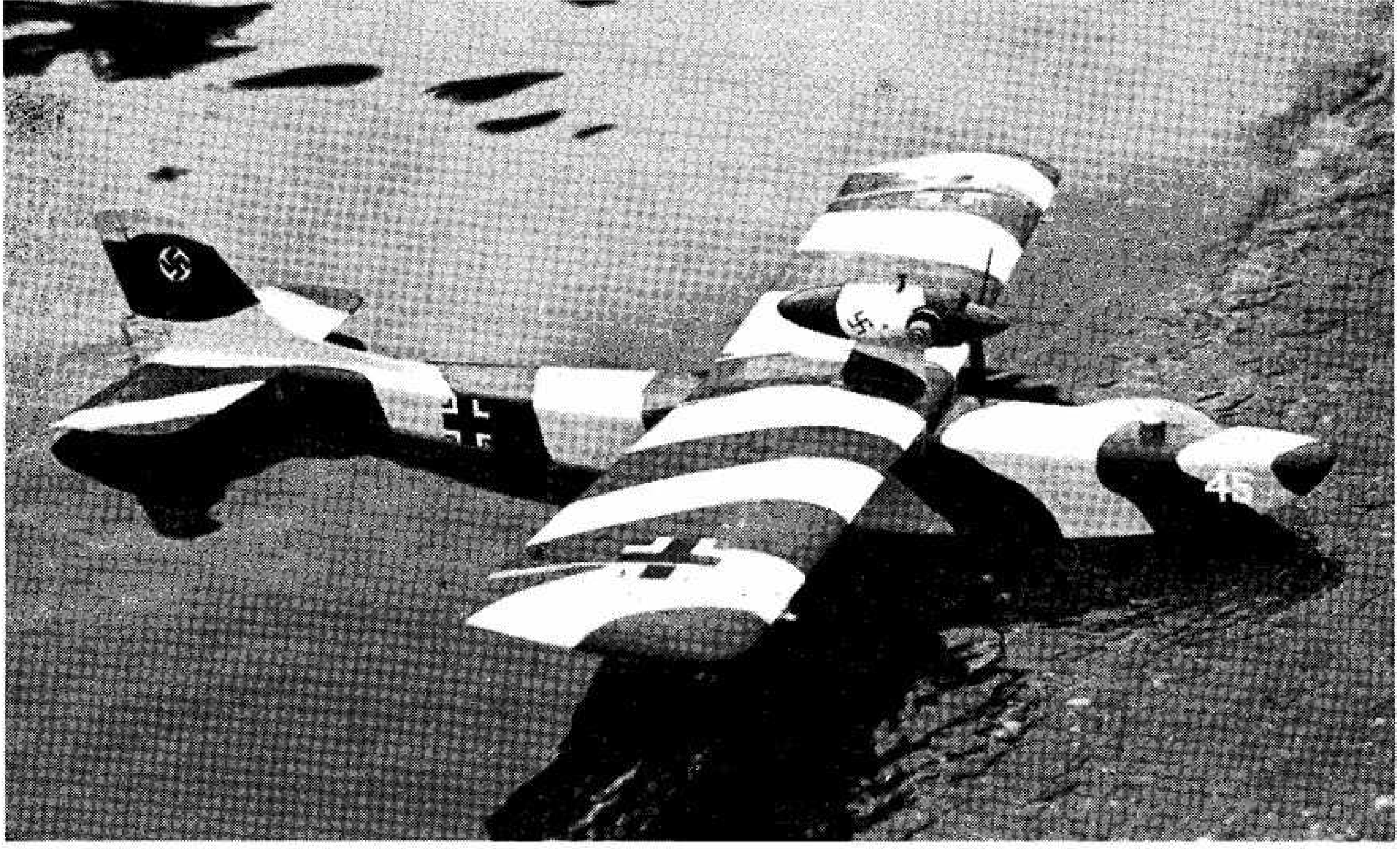


Das Ghosten Flugboot

A 36" span flying-boat for lightweight galloping-ghost

BY DEREK WALTON

HAVING worked through a number of single channel aircraft, including deltas and flying-boats, I decided it was time to introduce an extra function—and proportional control—by building "Galloping Ghost." My first G.G. model was an all-sheet, shoulder wing job, much on the lines of *Weekender* but with a Jedelsky airfoil section—*i.e.* highly undercambered with exposed ribs—and a longer moment arm.

When this plane went the way of most models, I had to produce another to replace it as quickly as possible. I wanted, also, one that would be a functional model and yet with an out-of-the-rut appearance. Innumerable sketches on old envelopes, book margins and table cloths then followed, of every type of model I thought had possibilities—low wing, shoulder wing, high wing and back to deltas and flying-boats, my two main loves in aircraft. I finally settled on a flying-boat, as a delta seemed too fast flying in view of my limited experience. At this time I saw an article on a Ken Willard design, *Shearwater* which influenced the end result somewhat.

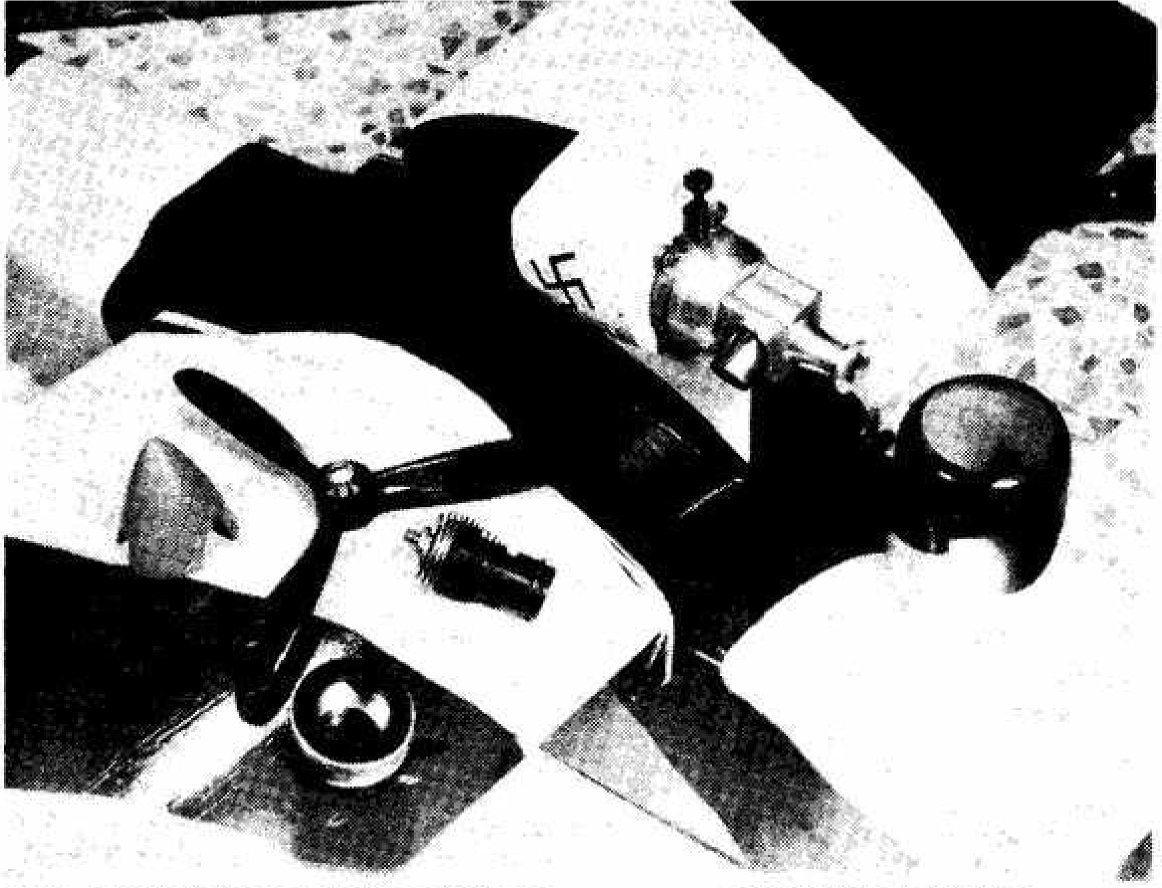
I designed specifically for the .049 class, and the Cox QZ motor in particular, as I had used this type of engine before and was very impressed with its ease of starting and reliability. (T.D.'s and Medallions would also be fine, mounted in C/L profile fashion as indicated on the plan, but I think to try and use Babe and Golden Bee's which, when muffled, lose a large amount of power, would mean increased take-off run and an all-round reduction in performance).

When designing the airframe I settled on a fairly long moment arm and strip elevator and rudder, to remove as much of the "gallop" from the G.G. system as possible. As I was not using a throttle, the engine could be mounted on the wing, enabling a reasonably short nose to be used to assist the model's turning capabilities and recovery. I also decided on a flat-bottomed hull for simplicity; this I knew, from past experience with flying boats and airscrew driven hydroplanes, would be quite satisfactory. It would also allow me to use plywood for extra strength, as I intended to fly the model over grass as well as at the lake. Finally, I decided that a wing cut-out would mean more chance of water getting at the works and so runners were used to seat the wing and have proved quite satisfactory in use.

When building was commenced, I decided to produce two versions. The first one used rudder-only, with a Compact escapement and the increased dihedral detailed on the plan; the second version using a Mighty Midget servo for economy and the "squirrel cage" type of connections to rudder and elevator—for simplicity of water-proofing the exit. It would be perfectly O.K. to use a Rand or similar servo but the builder would be advised to locate the push-rod exits on the top of the fuselage. (See "water-proofing").

Although the wood sizes used in the fuselage may at first sight seem rather thick, careful selection of grades enable a light but very robust fuselage to be built. One, in fact, that will withstand the normal rough field flying. The escapement version weighed in at 20 oz .and the G.G. version at 22 oz., due to the extra Deac used.

Flying these craft gave a great deal of satisfaction as they handle just like a normal sport R/C model, but with no tendency to tip over when landing, and they



One-piece aluminium cowl on prototype necessitates removal of liner and muffler for fixing. Reinforced card could be used.

even proved able to take off from *wet grass* quite quickly! Water take-offs are a dream. The flat-bottomed hull generates a lot of lift and the model begins to plane in about 10 to 15 feet and will usually unstick in about 50 feet in anything other than a flat calm. The long fuselage keeps the nose into wind, even when one float is dragging in the water. When it comes into land, the glide seems to flatten off about 3 feet above the surface and it skims along until it kisses the water and comes to rest in a flurry of white foam and spray. *(Poetical, some of these modellers, too!—Eds.).* Be careful where you choose to land, as it takes a surprising amount of room to come to rest.

As soon as I have built up my Quantum-6 (at present 2 functions) to Full House proportional (the delay on the remaining functions and servos being financial!) I intend to scale up *Flugboot* to 56in. span and fit a .40 motor for some real thrills!

CONSTRUCTION

Fuselage

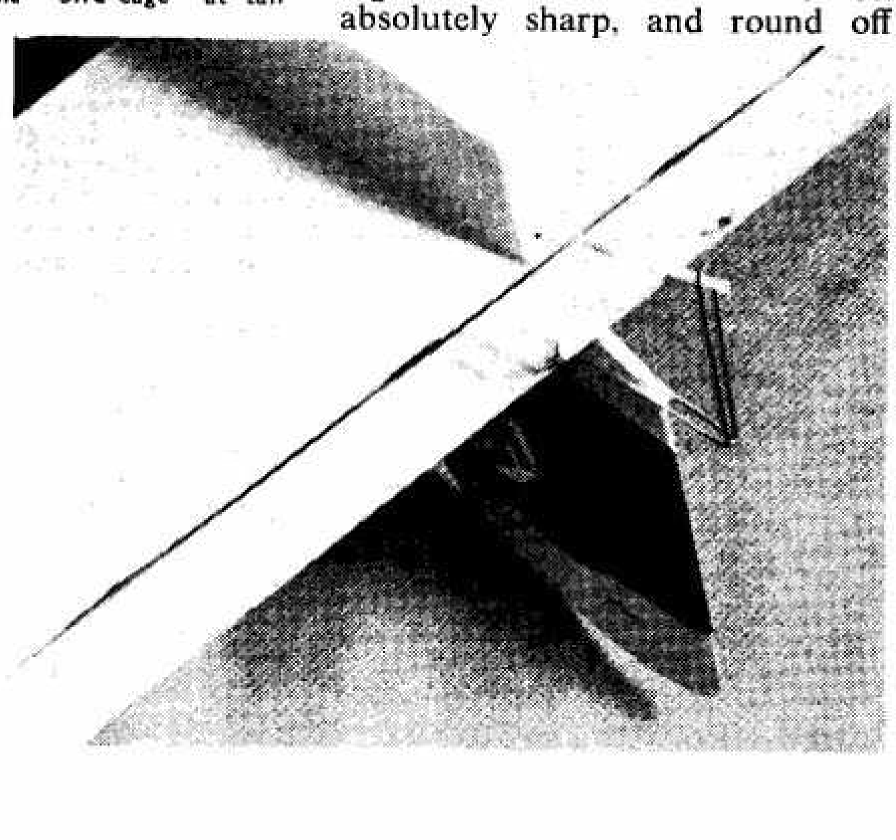
Selecting two identical pieces of medium-soft balsa, cut the fuselage sides to the inside lines shown on the plan. Assemble inverted on the building board with formers 4 and 6, ensuring that the ends are true and the formers are square to the centre line. (All fuselage joins must be made using a double cementing or "pre-coating" technique, *i.e.* coating the mating faces with cement and allowing them to dry before joining with fresh cement). When dry, draw in the rear fuselage and glue in the tapered sternpost and F7. Similarly, when dry, draw in the nose and add former F.1. ensuring all the while that the fuselage is true. A line drawn on the building board and a centre line marked on each item is very useful here. The order of assembly was chosen to avoid a "bulgy" rear fuselage without resorting to a mass of rubber bands to hold it all.

Glue in the two $\frac{1}{2}$ x $\frac{1}{4}$in. rails from F.1. to F.4. Add the remaining formers, trimming to size if necessary, and the scrap $\frac{1}{4}$in. sheet packing between them. Carve the nose block to fit between the sides and glue it in position. When everything is dry, preferably after leaving overnight, sandpaper the top and bottom using a sanding block to ensure the formers are flush with the sides. Again working with the fuselage upside-down on the board, cover from the step (F.5.) to the sternpost with medium $\frac{3}{32}$in. sheet, with the grain running across the fuselage. Then, from the step forward, with a piece of $\frac{1}{16}$in. ply, with the visible grain running across the fuselage. This should be cut as near to size as possible before fitting and will need steaming to suit the curve of the bows.

Drill a $\frac{3}{16}$in. dia. hole through the sternpost, if using a torque-rod, and fit the bearing with Araldite. Now glue in the $\frac{1}{32}$in. ply dowel hole strengtheners. Rough cut the $\frac{1}{4}$in. medium balsa top decking to size and before fitting it, dope the underside and the inside of the fuselage with at least one coat of 50% dope 50% thinners, to reduce the risk of water absorption. Pay particular attention to the front compartments as these are the most likely to collect water.

Install the actuator and torque-rod or push-rods at this stage, but do not make the final bends at the control surface end yet. Fit the top decking, building up the hatch and retainer. Sand all over, ensuring the bottom corners are left absolutely sharp, and round off

Close-ups show (left) the specially shaped cowling and (right) the "bird-cage" at tail end, for oscillating type actuator.



the top decking and noseblock as shown. Glue the tailplane in position, ensuring that it is square with the fuselage and, when dry, cut the slots to take the fin and fit it, again ensuring that it is square. Finally glue the wing runners and dowels in position after shaping them.

Engine pod and pylon

I was fortunate to have a friend spin a cowl for me out of aluminium, and so was able to tailor it to suit the engine, giving the smallest cross-section possible. Alternative methods would be to form one out of sheet aluminium, making the appropriate cut-outs to suit the engine; or from card, soaking it in fibreglass resin mix for extra strength and using a balsa front ring to give the shape. Whichever method is chosen the cowl should be made before finally sanding the fairing blocks to shape, to enable a smooth transition to be made by using the cowl as a guide. I also set the engine mount at the 3° sidethrust, trimming the fairing blocks to butt up against it. This then throws the cowl in line with the engine centre-line. Although this gives the finished cowl a slightly banana-ish appearance, viewed from above, it is a lot more attractive than an offset engine in a straight cowl!

Cut the pylon from marine ply and carve to the correct cross-section, making any alterations necessary if a different engine is used. Securely glue the engine mount in position, setting it at the correct sidethrust. Temporarily mount the cowl in position and use it as the guide to carve the cheek blocks and finally sand these to shape after gluing them in position.

Wings

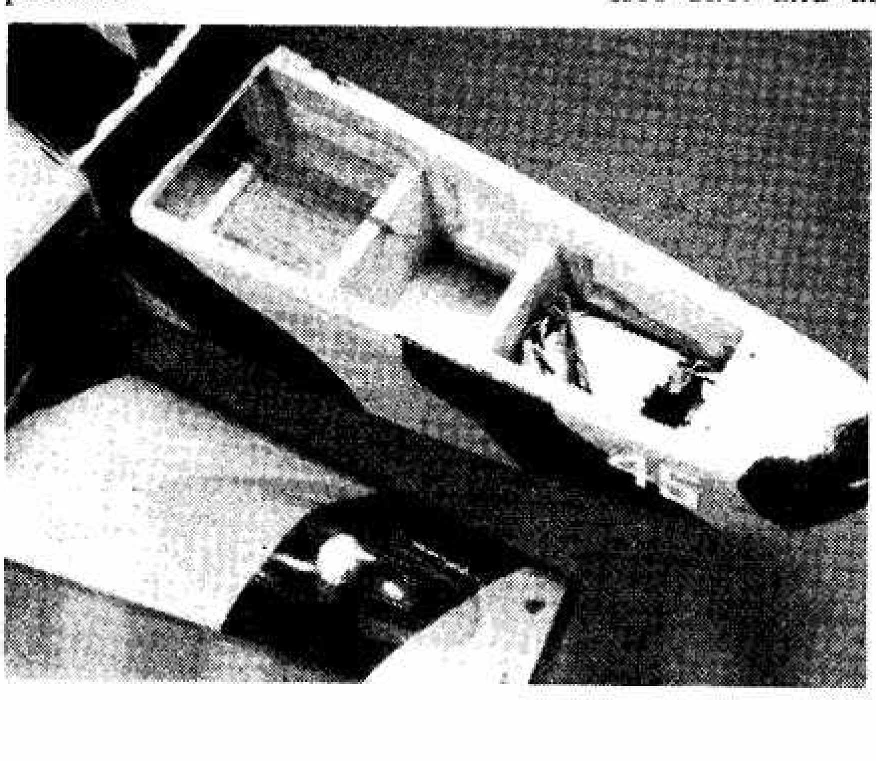
When making all-sheet wings, the wood should be sanded after joining the pieces together but *before assembly*. Otherwise, the wood sags between the ribs, making sanding difficult. Care also must be taken when joining the pieces, to prevent the cement warping the wood. (I borrow all the tinned food in the house, dog meat, peas, etc., and place them at intervals along the join to prevent the cement pulling up).

Mark out the rib positions on the top face and cement on the leading edge, ensuring that it is straight. Add the ribs, except for the two adjacent to the pylon (R.1.), main spar and trailing edge support. When dry chamfer the t.e., turn over and lightly score the sheet to allow it to be cracked for the dihedral, and notch the leading edge. Prop up one tip to the correct dihedral and securely cement the dihedral keepers in place. Cement in place the completed pylon, making certain it bisects the dihedral angle, and add ribs R.1. and all gussets. Lightly sand the assembly, to remove any blobs of cement, and add the top skin. Work on each half separately pinning it to the building board to prevent warps, and leaving overnight.

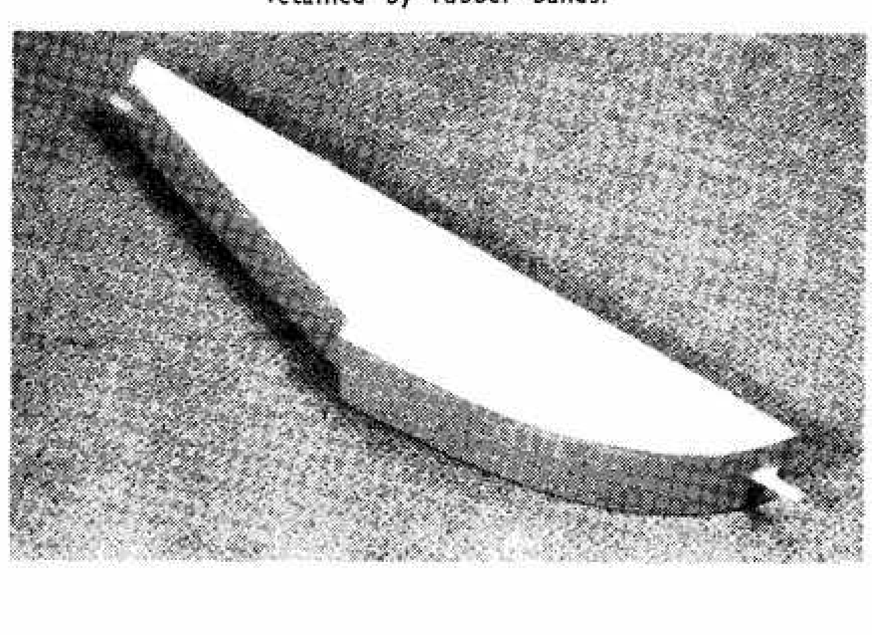
The sheet should be carefully shaped to fit around the pylon and, when assembling, it will be found easier to treat it as two sections, cementing the sheet to the leading edge, the front half of the ribs and the mainspar, forming the "D" section which makes the anti-warp part of the wing, and when these joints are nearly dry, cementing along the remainder of the ribs and the trailing edge. Trim the outboard ends and add the light block tips, hollowing if desired. Carve and sand the tips and leading edge to shape.

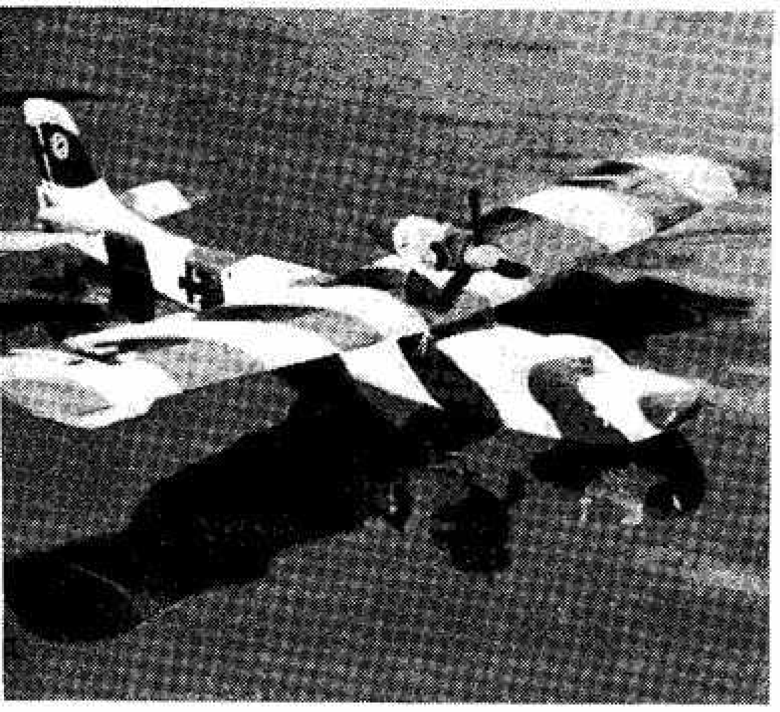
Tailplane, fin and control surfaces

It is essential to use *quarter-grain wood (i.e.* with a mottled appearance) for these items to prevent warping due to the moist air around the lakeside. If anti-warp keys are used, while prevent-



Top: designer Derek Walton with prototype "Flugboot." Left: hatch removed to show equipment space, with Deacs in front compartment. Below is one of the simple but effective wing-floats, retained by rubber bands.





The "Flugboot" sits comfortably with its flat-bottomed hull. Below—"as sometimes it may happen . . ."—but doesn't waterlog easily!

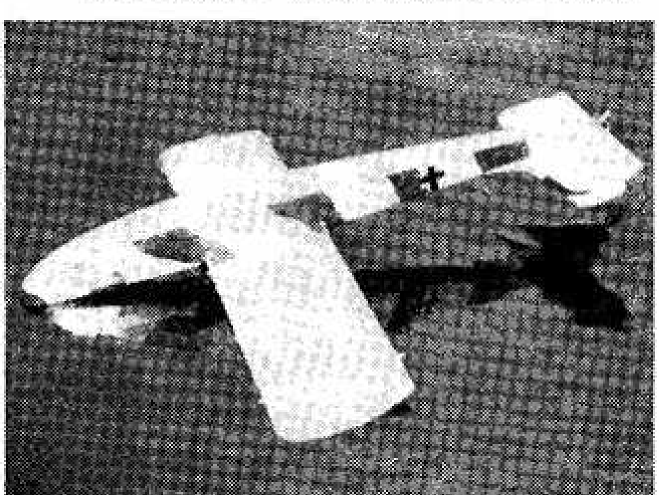
ing warping across the grain, they offer no resistance to twisting of these surfaces. After cutting to shape the various items, taking note of the grain directions and joining where necessary, sand the leading and trailing edges to shape, and pierce the holes for the thread hinges.

Floats

Build these up from medium soft wood ensuring that, after sanding, the bottom corners are left as sharp as possible. Make two holes and push through the $\frac{1}{8}$in. dowel, cementing it in position.

Final assembly

Temporarily sew the control surfaces in position. (This can only be done finally, *after painting* as paint would stiffen them.) Figure-of-eight stitches, made with linen thread, are the most freely moving. Form any necessary wire bends and glue in any remaining wire fittings, supporting them with nylon patches, well cemented in position. Add the split dowel wing alignment keys,



making sure the wing is square to the fuselage.

Finishing

The paint applied should be waterproof and care should be taken to apply it as evenly as possible.

My finish consisted of two coats of thinned sanding sealer and two coats of light blue Humbrol enamel, rubbing down between coats with fine "wet and dry." I used enamel as it is lighter than dope (that is to say it has better "covering" properties and may be brushed out more easily). The "camouflage" effect is a brushed coat of dark blue enamel. After applying the transfers, the whole model was sprayed with polyurethene varnish. Other builders may wish to cover with tissue before painting, for extra durability.

Waterproofing

As you may see from the photographs, I have used two small woodscrews as hatch retainers. These are my personal preference but, while serving their function admirably, can be a bit of a nuisance when a small screwdriver is not to hand—or when it slips, marking the finish! The builder may wish to substitute his own favourite method such as a magnetic retainer or internal rubber bands and hooks, but it should be borne in mind that, as well as retaining the hatch, a reasonably watertight joint must be achieved. If there is any "give" in the system, it may lift on a hard landing, allowing water to get inside. A nearly perfect seal is obtained with the hatch and screws shown when Vaseline is smeared around the mating faces.

If the builder is using a torque-rod to drive the control surfaces, all that is required to seal the hole is a further smear of Vaseline around it at the sternpost. If pushrods are used, as mentioned already, the slots should be on top of the fuselage and sealed with a rectangular patch of thin rubber with a slit in it for the pushrod. This can be glued in position with Bostik or Evo-stik. Smear the patch with Vaseline, not only for additional sealing but also for some lubricating, to reduce the servo load.

Protection of the radio gear is important, obviously, and is simply achieved by wrapping everything in polythene bags, binding the corners where wires emerge with rubber bands. It is advisable, after a water-borne flying session, to release these bands and leave the hatch cover off for a couple of days to dry out, as it is still possible for condensation to collect inside the model.

Finally, when "glue" is mentioned in the text, I refer only to *balsa cement* as the white "glues" such as P.V.A. or Resin-W are water soluble—as I once discovered to my cost!

Flying "Flugboot"

As stated already, *Flugboot* flies like a conventional model and normal trimming techniques are used. Trim for a flat glide by re-disposing the radio gear or by ballasting. It is *not* advisable to make any adjustments to the wing or tailplane angles as this will upset the water characteristics, even if the thrust line were corrected. First power flights are made in the normal way, starting with about three-quarter power and increasing it as confidence is gained. These flights may be made over land for convenience. Any nose-up tendencies should be corrected with downthrust. No downthrust was required on the original but this will depend on the power used.

When confident enough, water take-offs may be made. There is nothing difficult in these, except for the care needed to align the model into wind before releasing it, as there is no chance to steer the model afterward due to the long waterline.

Should any difficulty be experienced on take-offs due to a below-par engine, or overweight model, a $\frac{1}{16}$in. or $\frac{1}{8}$in. square strake glued to the side, extending from the nose to the step, about $\frac{1}{8}$in. from the corner parallel to it, should effect a cure.

Should the model ever end upside-down in the water (as will eventually happen—even if it is only some distraught angler throwing it in!) it is only five minutes' work to blow through the exhaust ports, flush out the tank with fresh fuel and flick over the engine preferably choking it, until the white goo stops coming out of the ports and you are ready to fly again. Incidentally, have no fear of the model sinking as there is sufficient wood in the fuselage to float the radio gear even when full of water.

Here's to dry landings—and don't forget the "Wellies".