YOUR FULL-SIZE FREE PLAN

CUE DOT

a 51 inch wingspan A/1 specification glider

Designed by Martin Dilly

THIS model was constructed because a similar structure and aerodynamic set-up worked reasonably well in A/2 size and the author was interested to see how the Benedek 6456-f airfoil performed with smaller chord sizes.

A sheet upper surface is used for the wing as, with the thin airfoil employed, there isn't enough rib depth at the rib to trailing edge joint to provide adequate strength; by using a strong but light grade of 1/32 in. sheet, lightly sanded *before* use and weighing 0.55 to 0.65 ounces for a 4 in. wide yard, the structural weight can be kept within acceptable limits.

It is advisable to start construction with the boom. Commence by selecting two yards of the lightest and most rollable 3/32 in. tangent cut balsa you can find. Cut so they taper from about 2.4 down to 1.4 in. the exact size depending on your particular mandrel; a billiard cue was used for the originals but *anything* else straight and of about the right taper will do. Note that the dimensions at this stage do not have to be very precise, as final seam cutting will take place when the blanks are laid up on the mandrel.

Now look to see if there's any natural curve in the sheets and, if there is, dope the concave side, or any side in the case of a flat sheet, with a couple of coats of unthinned clear dope. This will both curve the wood and waterproof one side; when the sheets are dry, immerse them in a bath of warm water to curve them even more.

The next stage is to roll one of the wet blanks round the mandrel; this requires a little patience and "sympathy for the wood". Starting at the large diameter hold the blank tightly to the mandrel using Sellotape and gauze bandage strip or rubber, but do be careful if you do use rubber, as it's easy to dent the wet wood if the rubber strip is wound too tightly.

When the first blank is dry unwrap the rubber but try to leave the Sellotape intact; now use a steel straight-edge and cut the seam accurately along the length of the overlapping edges, cementing the joint with P.V.A. glue, after having first waxed the mandrel to prevent the whole lot sticking together.

Using a strip of paper as a flexible rule, measure the outside diameters of the ends of the balsa tube, remove the tube, and mark the mandrel where these diameters occur; use these marks for the ends of the second layer, which is made in the same way as the first, direct onto the mandrel, but slid along a little way to give a larger diameter. However, do *not* cement the seam. When this layer is dry remove it, replace the first tube, coat it thoroughly with Cascamite or a similar cold water resin glue, slide on the outer layer and tape up tightly; surplus glue will be forced out of the seam and will bond both layers together. Wipe off any surplus glue, and fill any gaps with slivers of balsa while the glue is still wet. Also while the glue is still wet, make sure that the mandrel will move, pulling it out slightly if necessary.

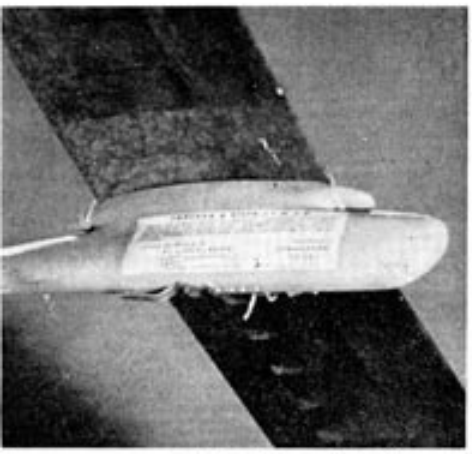
All right, so you've got a boom. Now cut the keel from plywood and the soft balsa side pieces, carving the rear of these to a circular cross section to fit into the boom, but do not cement anything yet. When you're happy that everything fits snugly together, lash the wing, fin and stabiliser into place (these will have been made while the boom has been drying) and hold the skid and timer in place with Sellotape. You ought now to be able to get a rough idea of how much lead to put into the weight compartment before the fuselage is finally assembled.

Final fuselage assembly is as follows:

(1) Cement starboard side to keel.
(2) Hollow out nose compartment and anywhere else you think needs it.
(3) Add lead to nose and cement port side to keel.
(4) Thread nylon lines through boom and tail block tube and out of appropriate holes; make sure the ends can't slip back into the fuselage.
(5) Cement the rear of the nose assembly and slide boom on, after slotting it to take the keel.
(6) Tap the adjustment holes in the dural skid and epoxy it into place.
(7) Using scrap balsa, fill any gaps in the boom to keel joint and carve and sand the whole nose to shape, blending it into the boom.

After that, all that's left is to thread the paper tubes onto the nylon lines and cement them into the fuselage, attach the fin, tailplane mount, wing runners, dethermaliser and auto-rudder release pin tube.

Tailplane construction is straightforward. Use P.V.A. glue for all flying surfaces to prevent warping. Epoxy the D/T hook in place before covering and



Nose close up illustrates adjustable tow hook tapped mounting holes in the Dural skid, and the way the wing mount is carved to form wing band retainers.

cement the plywood trailing edge reinforcement. Cover with jap tissue and give two or three coats of thin clear dope.

The wing is built flat on the board. The upper surface of the leading edge is first carved to rough shape and sanded; it is pinned to the board, with its rear edge lifted as in the cross section. Build the two centre panels and the two tips as separate jobs. The plywood ribs are assembled with the wire joiners in position as each centre panel is made. Note that the undersurface of the leading edge is left flat at this stage, later it is convexed as in the side elevation.

The trailing edge, carved and slotted for the ribs, using a $\frac{1}{2}$ in. Abrafile or a razor saw, is pinned in position and blocked up to the correct angle as shown in the section; at this time strips of scrap $\frac{1}{2}$ can be pinned adjacent to the leading edge to pack up the front of the ribs, and the mainspar can also be packed up and pinned in position.

Thread the double balsa and plywood ribs onto wire joiners and, P.V.A., glue the ribs into place, followed by all the other ribs, noting the pair of thicker ribs at the dihedral break; ensure that all ribs are flush with the lower surface of the trailing edge.

When the glue is dry mark the rib positions onto the light 1/16th balsa chosen for the wing skinning, true up one edge so that a neat joint with the trailing edge will result, and apply a $\frac{1}{4}$ in. smear of contact cement along each marked rib position; contact cement is also applied to the top edges of all ribs. Allow 10-15 minutes for contact cement to dry, then lay a sheet of paper to mask all the pre-cemented ribs; run P.V.A. along the rear edge of the skinning and the pre-carved leading edge, and butt the 1/16th sheet up against the trailing edge, ensuring that the ribs line up with the marked rib positions on the sheet. Then slide the paper out chordwise, gently pressing the sheet onto the ribs and finally pinning into position along the leading edge.

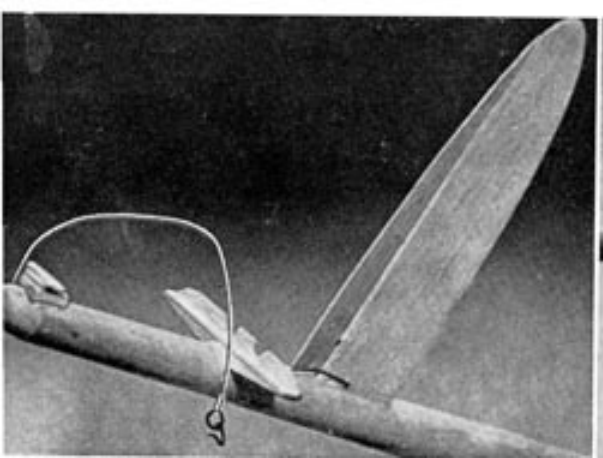
Remove the wing from the board, add tips, centre section sheeting, joiner stops, webbing and gussets and sand the dihedral break ribs to the correct angle; make up a female template for the upper surface and also for the leading edge. Carve and sand the wing to a constant and accurate profile. Cement the dihedral joint, but do not add any nylon reinforcement round the joint; if the wing is going to break it might as well do it where we can mend it again quickly. The centre section however can be covered with light nylon or silk at this stage.

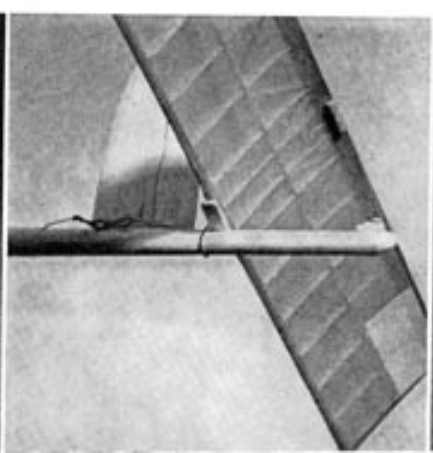
Give the entire structure a coat of thin clear dope prior to covering; cover with lightweight tissue top and bottom but note that the upper tissue stops $\frac{1}{4}$ in. forward of the trailing edge, in order to reduce any tendency for the extreme trailing edge to flatten. Dope the underside with three coats of moderately thin clear dope and one coat of 50-50 clear dope and banana oil; use two coats of mixture on top, sanding lightly between coats.

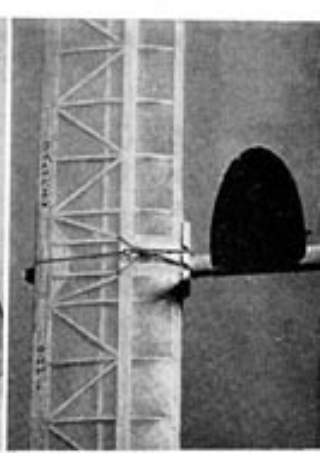
Wind the timer springs, using a piece of 12 s.w.g. wire or a suitable drill shank as a mandrel. Adjust the C of G position if necessary, by adding lead through the timer compartment. Arrange for the tailplane to tilt to about 45 deg. on dethermalisation.

Test glide, to achieve a glide that's just on the stall, and then lose the stall by increasing the turn, to achieve a final turning circle of about 200 ft. in diameter. Make all pitch adjustments by altering the tailplane incidence.

Materials required: 2 sheets 1/32" x 3" x 36" tangent cut balsa; 1 sheet $\frac{1}{4}$" x 3" x 24" soft balsa; 1 sheet 1/16" x 3" x 24" quarter grain balsa; 2 sheets 1/16" x 4" x 36" medium balsa; 2 strips 3/8" x 3/16" x 36" soft balsa; 2 strips 7/8" x 3/32" x 36" quarter grain balsa; 1 strip 3/8" x 1/16" x 36" spruce; 1 strip 3/16" x 3/16" x 24" balsa; 1 strip 5/8" x 1/16" x 36" balsa; 1 strip 1/4" x 1/16" x 24" balsa; 1 strip 1/16" x 1/16" x 24" balsa; 1 strip 3/32" x 3/32" x 24" balsa; 1 sheet 1/8" x 5" x 6" quarter grain balsa; 1 sheet 1/16" x 3" x 18" ply; 1 length of 14,16, 22 s.w.g. wire; 1/16" I.D. alum. tube; .012" C/L wire; 1/16" 20 s.w.g. dural; nylon.







Tail area close-ups illustrate from left to right, tailplane leading edge pivot platform and dethermaliser line with hook that attaches to wire hoop epoxy glued to tailplane structure. Centre: the tailplane in its dethermalised position, note tension band and dethermaliser line both attached to tailplane hoop. Right: the dethermaliser tension band and line attached in flying position.