Vital statistics: span 96", weight 1775 grammes, wing area 5.75 square feet, wing loading approx 11 ounces per square foot. Looks good, too!

And now for something rather different... Try Chris Williams' shapely soarer

"Why is it," I asked myself one night in a rare mood of introspection, "that thermal soarers all look the same?" Talking to yourself is, of course, one of the earliest signs of insanity. However, nothing daunted, I took myself to task, "What do you mean, all the same?"

"Well, you know..." I thought for a minute. "Thin, boxy fuselages, inelegant rear ends, it's all so... so, well, predictable."

"Well, it's a bit like hatchbacks, innit. They feed identical requirements into their computers and receive similar results, therefore function ends up defining form." I sat back for a minute, impressed with the elegance of my reasoning.

"Be nice, though, wouldn't it?"

"Eh!"

"To design something different..."

"Mmmmm, I s'pose so."

And thus was the Great Idea born. I'm not a great fan of the Vintage resurrection, (they take it all too seriously) but you have to admit some of those guys had a great eye for shape and form.

"What about," I asked myself, with rising interest, "designing a vintage style model with a modern performance?" In other words, the best of both worlds. We were off and running!

It was at this stage that fellow loony-bin inmate, Dangerous Hawkins, came up with a plan he had brought back from America for a thermal soarer called the 'Scooter', for which great claims had been made for its modified Selig airfoil. Following my own advice for designing models (take something of proved performance, prise out the important bits; section, decalage, moment arm, etc., and change everything else to taste, cook for about four weeks on regulo 6... presto, another model is born! by a strange coincidence the proportions of the 'Birdsong' were almost identical to those of the 'Algebra 2.5M', and I don't even *have* a computer!

The first step then was to make up a couple of small-scale solid mock-ups out of scrap balsa and the like. These were then suspended by a thread from the ceiling so they could be studied from all angles; a very useful practice that I shall use again. The first decision when making the mock-ups concerned the shape of the fuselage. How to achieve a nice fat shape without an unnacceptable amount of drag. The answer lay in the triangular, or 'Toblerone' fuselage; a nice deep, curved shape when viewed from the top or side, but with very little cross-sectional area when viewed from the front, two conflicting requirements met in a nice compromise! The only complication lay in the necessity of constructing a centre-section pylon which was a wee bit complicated to fair-in, but all-in-all, it worked out very well.

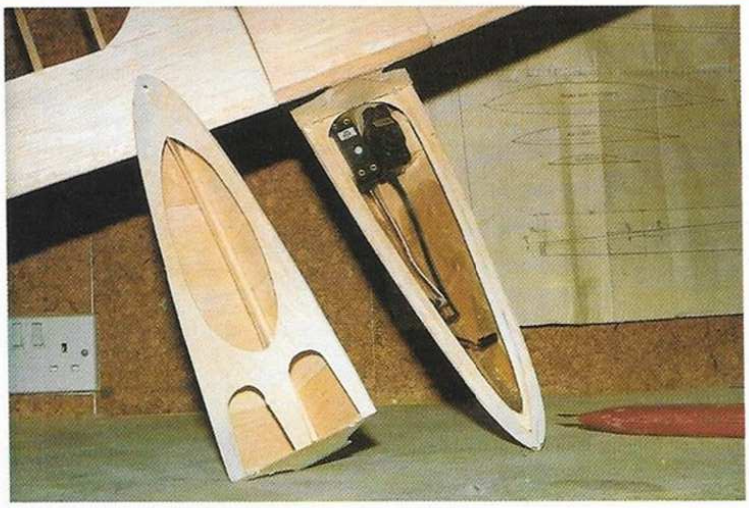
Constructionally, a 'V' tail has a lot going for it, especially if made detachable; only two blades, therefore less drag, and no rudder snag in the grass. It was at this point that I received the latest copy of the 'Soarer', the B.A.R.C.S. magazine, wherein I found a very interesting article on the subject of crescent wing planforms and the increased aerodynamic efficiency to be found in the employment of same. Hence the swept-back centre section panels, the leading edge sweepback of the tip panels and the curious looking tips themselves. How convenient to be able to use something different in the way of wing planforms and dress it up as the advancement of aerodynamic knowledge!

Some changes are shown on the plan from the prototype: The decalage has been increased very slightly, also the tail area. 1/32in ply keels are specified instead of the 1/16in on the original which turned out to be rather over-engineered. The 14mm steel wing joiners are far stronger than necessary but were all that was available at the time of construction. (Instead of 10g piano wire for the other joiners, 10g aluminium welding rod was used – not easy to find, but extremely useful).

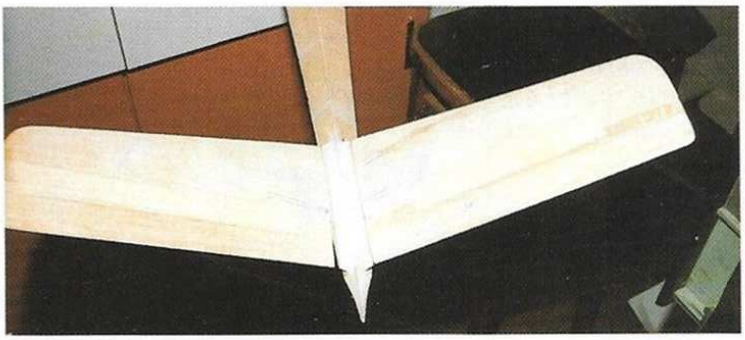
Fuselage

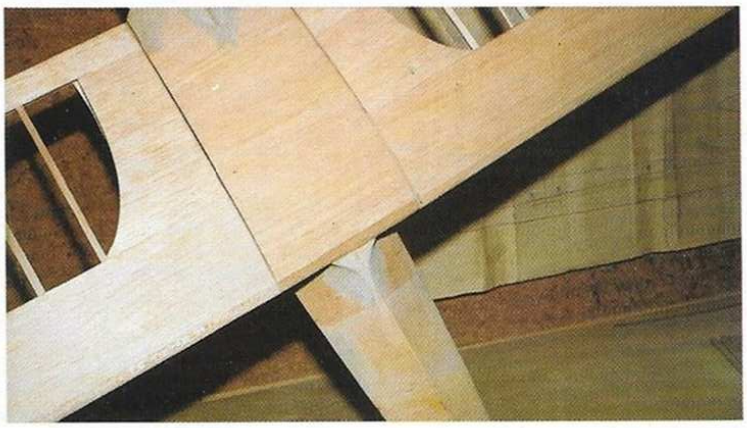
Line 1/32in ply keels K1-K4 with 1/8in soft balsa (to increase the glueing area). Glue top keel K3 in place with formers F1a-F5a after drilling holes for control cables. Fit lower keel K2 in place and repeat the procedure with formers 1-5. Fit cables, ensuring that they are secured for their entire length. Glue top 1/8in sheeting in place as far back as the rear of the wing pylon. Fit crossgrain and don't forget to organise the cable exits. Fit lower sheeting likewise, after glueing in the tow hook.

BIRDSONG



Uncovered airframe picture above shows what a pretty design 'Birdsong' is; shape sprang from a desire to create a 'different-looking' thermal soarer. Left, hatch details; note glasscloth reinforcement in lower nose area. Below, the all-sheet 'V' tail assembly; it's made from medium grade 1/4 balsa. Below right, useful view of the underside of the wing pylon, the only slightly tricky bit on the model; rear is faired in with scrap balsa and filler – take a close look at the plan. Below right, an overhead view of the centre-section pylon and hatch; base of pylon is 1/16 ply with mounting plate sides from 1/32 ply and 1/8 balsa.





(Note that the lower rear sheeting at the back is 1/16in ply to accommodate the ends of the 'V' tail rods). Make the 'V' tail blades from medium 1/4in balsa sheet. Note that the mounting tubes are staggered to allow them to cross over in the fuselage. Glue 3/8in tailplane fairings in place and line with 1/32in ply when blades are correctly angled. (Note: front tailplane rods are only for location and can be made of aluminium or similar to save weight).

Cut oversize slots in blades to allow for 1/32in ply liners each side of the brass tubes; cyano and fill in with balsa. Fit servos and linkages at this stage and check that everything is working satisfactorily. Make up centre section pylon sides (mounting plates) from 1/32in ply and 1/8in balsa; glue in place. Cut out 1/16in ply centre section base and glue in place. Add end ribs with holes ready for joining tube and rear tube. Offer up the wings to finalise the fit of the root ribs before adding the top 1/16in sheet. The leading edge of the pylon and the rear of the hatch should be carefully faired in with scrap balsa and filler to achieve a smooth, streamlined contour. Make up the hatch to achieve a push fit or add a catch, according to preference.

Wings - inner panels

Pin lower spar and lower 1/16in sheet trailing edge to plan and add ribs W1. Leave the first three root ribs out at this stage. Add upper spar and false leading edge. Place 14mm brass wing joiner between the spars to allow maximum dihedral; make up hardwood wedges to support then fill remaining gap with balsa and web both sides of spar with 1/32in ply.

Next, add remaining ribs, remembering to face the second rib with 1/32in ply to support the rear wing rod tube. Web the next three bays with 1/32in ply to the rear of the spars only, the rest of the webbing being 1/16in balsa, also to the rear of the spars. Remove wing from plan and add lower sheeting. When dry, pin the wing flat and add the top sheeting. There is no washout. The second wing panel can be built from the plan simply by changing ends. i.e. swapping root for dihedral break. Use the same procedure for the outer panels. Slice the sheeting at the dihedral brace behind the spars and join the panels with the dihedral brace. (Leave the webbing of these two bays until after this operation). When satisfied with the fit at the centre section, finish off the sheeting and sand to shape. Finally, face the wing root with 1/32in ply.

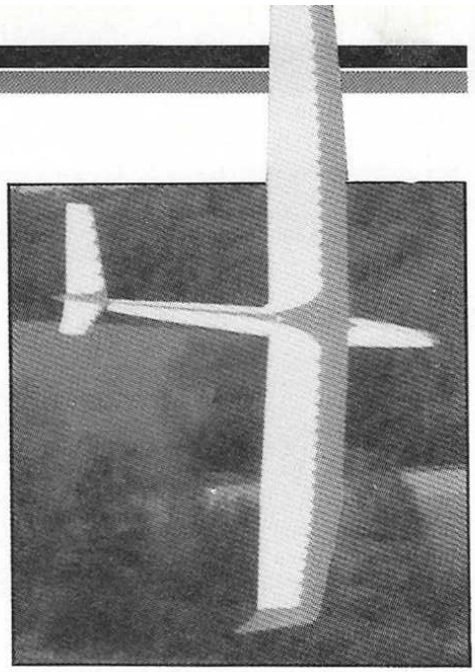
Covering and finishing

The front of the fuselage should be covered in glasscloth and resin back to the half-chord position. The prototype's fuselage was covered in Solartex and painted; the wings were covered in Monokote with the trim painted on in two-pack acrylic paint.

Flying

Try a few test glides on the flat on a calmish day to establish the longitudinal trim. A rearward c.g. will be manifested by an over-sensitive elevator control and a marked pitch instability. Do not be tempted to apply down trim and continue to fly in this condition as tuck-under is a distinct possibility given the minimal projected tail area. When the trim seems reasonable gain height (it's easier to do this on the slope) and try some gentle dives, leaving the stick neutral. The safe trim set-up will be when the model slowly pulls out of the dive by itself. Any tendency to steepen the dive should be corrected by moving the c.g. forward.

'Birdsong' will turn as tightly as required and will hold on to a thermal with no difficulty. Bungee launches are steep and



vice-free on a neutral elevator, no up trim is required. (Interestingly, launches with the prototype's wingtips unplugged showed a tendency to wander and even to tip stall if too steep a climb was attempted). Handling overall is pilot-friendly, the only fly in the ointment being when it's time to land, with its clean lines the model doesn't want to come down. Originally, the model was intended for two channel operation - circumstances, however, rendered this unsuitable. An electronic mixer is the most convenient way of operating the 'V' tail, however, the rudder movements need to be greater than the elevator's, the best way of achieving this being with rate switches; not available on many two channel sets, unfortunately. Using a multi-function transmitter means that you might as well fit spoilers. I certainly would if I could go back and do it again. If you do fit them, make sure they're far enough outboard not to disturb the airflow over the tail surfaces. If you want sweet lines coupled with good performance, go to it; 'Birdsong' could be for you!