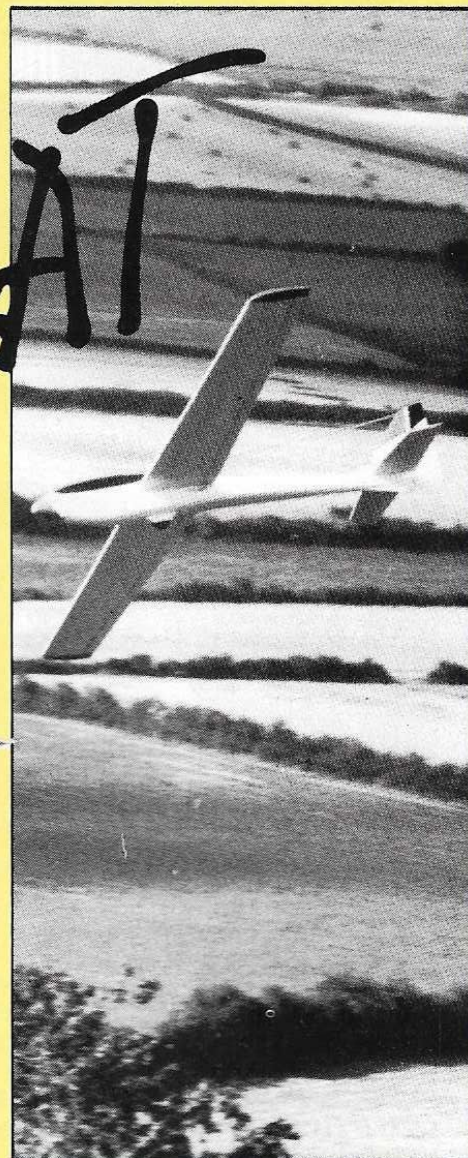
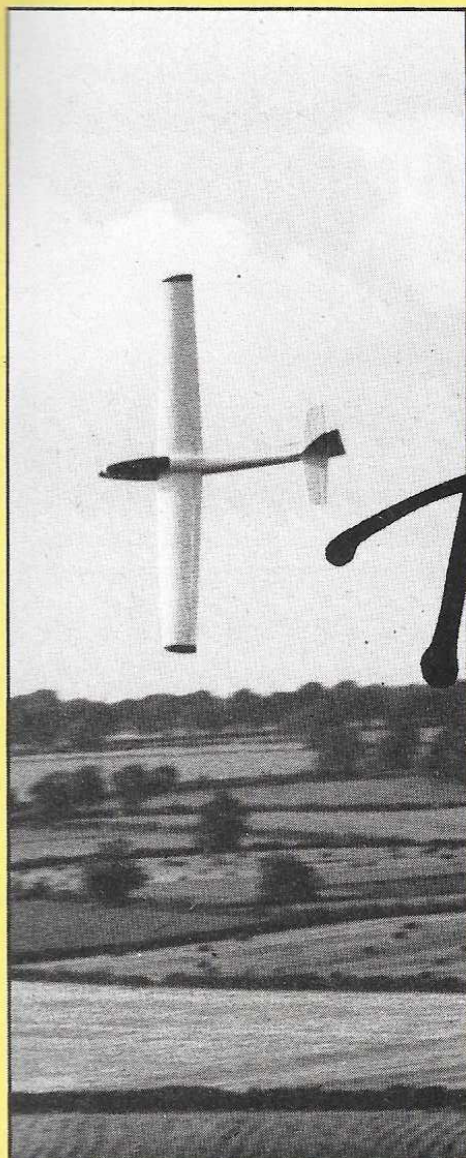




A look and feel of realism marks this 90in. span sports/aerobatic glider for four function radio designed by CHRIS WILLIAMS

"Daddy, what are you doing?"
"Hmmmmm?"

A frantic tugging at my sleeve.

"Daddy, what are you doing?"

I look absently at the upturned face of my youngest daughter. "Er, I'm thinking."

Oh, thinking." She retires, impressed, until a minute later; "But what are you thinking about?"

"I'm thinking about the exact design parameters of an aerobatic sailplane, which must be exactly tailored to my own desired aerodynamic and aesthetic considerations."

"I only asked," she wails, bursting into tears.

Now, every aircraft is created for a specific purpose, the trick is to be very clear at the very beginning just exactly what that purpose is. Having looked long and hard at the current crop of kippers to be seen on the slopes, it seemed that, to my tastes, something was missing, but what?

The answer is realism. I'd better explain

at this point that my main passion is the building and flying of scale gliders, the whole point and purpose of this discipline being the attainment of that elusive goal, realism. Okay, I know you don't see too many full-size aerobatic gliders but the principle remains the same.

So, how do we go about it? Well, I'll tell you.

(i) More scallish approach to outline, i.e. fatter fuselage, landing wheel, and a general appearance tailored to be aesthetically pleasing (difficult, that!).

(ii) Heavier structure. (What?? Yes I said heavier!!) The added weight gives greater momentum for smoother manoeuvres and improved gust stability.

(iii) Flapperons, to support all this weight at slow speed without kicking up huge divots all over the hillside.

(iv) Mid-set wings in separate halves for ease of transport.

This story I'm glad to say has a happy ending; that is to say that from this mish-mash of abstract theory, personal prejudice and general cussedness, I actually achieved what I set out to do.

So if you want to build an aeroplane that can perform in a reasonably majestic style, is not too difficult to build and helps you to stand out from the crowd, then read on!

Construction methods are fairly standard (no high-tech here!), but it is assumed that the builder has a certain amount of experience under his belt.

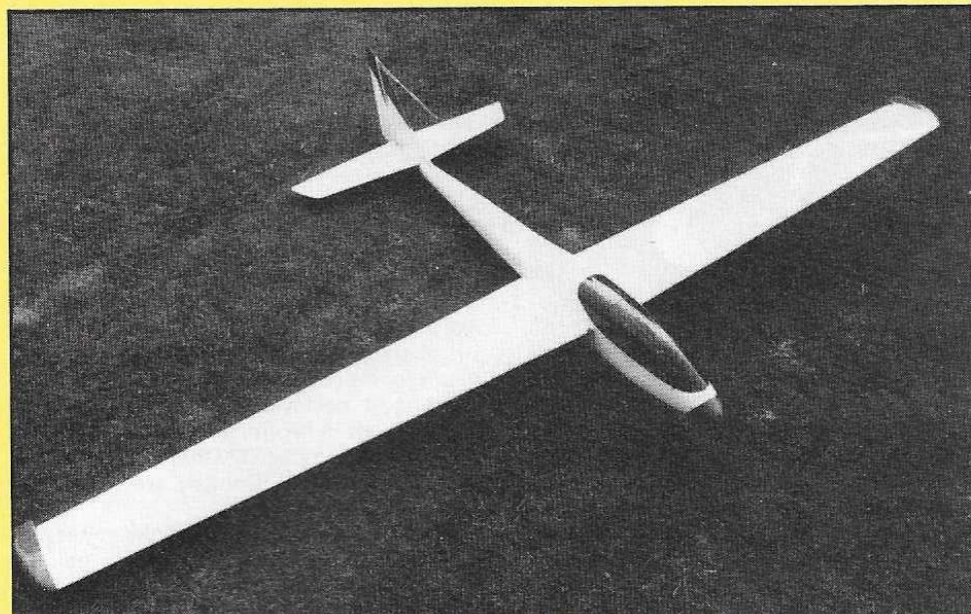
Fuselage

Commence by making the fuselage sides. Each side is made up of two pieces of $\frac{1}{16}$ in. ply joined at the solid cut line shown on the plan. (If you have access to 4ft lengths of wood this joint is unnecessary.) Two similar pieces of balsa are cut and joined at the dotted line; the front piece from $\frac{3}{8}$ in. balsa sheet, the rear from $\frac{1}{4}$ in. sheet. (The difference in thickness is removed at the sanding stage.) Evo-stik Resin "W" is highly recommended for this and most other stages. My favourite trick is to glue things up before I go to work in the morning, at lunchtimes, and before retiring to bed; this way progress is being made even when I'm not home!

Warning!! Do make sure you are making a left and a right side! Glue the balsa sides to the plywood ones. Leave overnight. Make F2 and F3 from $\frac{1}{8}$ in. balsa and $\frac{1}{16}$ in. plywood laminated together. Cut F1 from $\frac{1}{8}$ in. ply.

Next, draw a straight line along your work surface. Mark vertical centres of F1, F2 and F3. Glue fuselage sides to F1 and F2. Draw the rear end together and glue together with a $\frac{1}{8}$ in. spacer between to allow room for the elevator horn. Lay the fuselage along the straight line and ensure that it runs through former centres and the rear end. (Sorry if this seems a little obvious, but it may be new to some.)

Draw sides together at the front and glue



The Howzat has a very realistic look and with equally pleasing performance.

F1 in place. Glue $\frac{1}{16}$ in. triangular stock top and bottom back to F3. Glue $\frac{1}{4}$ in. triangular stock top and bottom from F3 to the rear. Glue $\frac{1}{2}$ in. sheet across the fuselage top and bottom back to F3 and $\frac{3}{8}$ in. sheet from F3 to the rear. The prototype's nose block was made from car body filler slapped either side of a piece of $\frac{1}{16}$ in. ply shaped to the nose profile. This adds weight just where you need it. If you prefer however, $\frac{1}{2}$ in. slabs of balsa sheet either side will do the trick. (It would be advisable to build some lead in before you glue it up.)

You have now reached the messy bit!

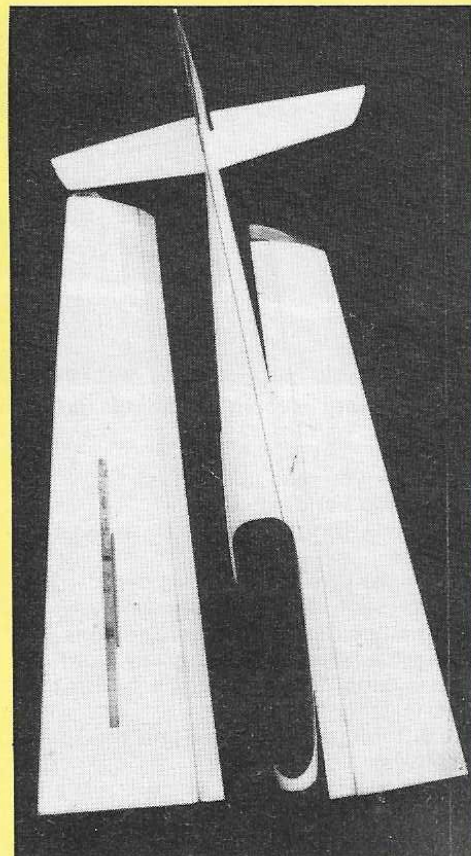
Using plane, knife, coarse sandpaper and lawn mower, carve and sand to shape. (Send the wife out and lock the doors first though!) Build the wheel box from $\frac{1}{8}$ in. ply sides and $\frac{1}{4}$ in. balsa spacers. Cut appropriate slot in fuselage and glue in place. The prototype was covered at this stage with lightweight cloth and fibreglassed, before the radio hatch was sawn and cut out.

Originally named the Wots-Up as referred to in a recent Silent Flight column, this design has been rechristened Howzat to avoid confusion with the designs from the pen of Chris Foss.

Wings

Built up wings as per plan were used on the prototype, but there is no reason why foam wings should not be used provided careful attention is paid to transferring the stresses from the joiner to the wing, with perhaps a full depth, full length spar or some similar arrangement. Commence by cutting out the wing ribs using the sandwich method. How's that! It doesn't work! Of course it does, provided you don't expect each rib to fit exactly, and you're ready to adjust accordingly. This is what you do!

Cut root and tip templates from $\frac{1}{8}$ in. ply. Cut 34 oversize rectangular blanks, drill holes and join together with two cycle spokes bent at right angles at the appropriate length, tighten up with the threaded nipples and Presto! All ready for sanding. Cut spar slots with a hacksaw, then remove ribs and number in pairs from root to tip. That is to say, two R1's, two R2's etc. Pardon? Why 36 ribs? When only 30 are needed! Read on!



Built up wings may be used as per plan, although there is no reason why foam wings cannot be used.

Separate the ribs now into two piles, one pile for each wing. Lay them out on the plan and check each one for length. Some will probably be too long and some too short. Now the reason for the extra ribs. With a bit of judicious juggling and swapping you should be able to select the most appropriate ribs. Simple innit? Transfer R2 and R3 to $\frac{1}{16}$ in. ply and make another $\frac{1}{8}$ in. ply root rib. Pin lower spar to the plan, glue on ribs (after cutting slots for wing joiner) fit upper spar, trailing edge and false leading edge.

Remove wing panel from plan. Trace out wing panel and build other wing on the reverse side. (If you're feeling lazy, soak plan with a bit of cooking oil over the appropriate place and build on reverse side.)

Set up brass strip in wing roots and carefully juggle and wedge to achieve $\frac{3}{4}$ in. dihedral at each tip. When satisfied, glue spruce support wedges above and below brass strip. Fit rear wing dowel tube. Sheet underside of wings. Lay wings flat on building board and pin securely (no washout), glue spar webbing as per plan. Sheet upper surfaces. Fit tips and leading edges and sand to shape.

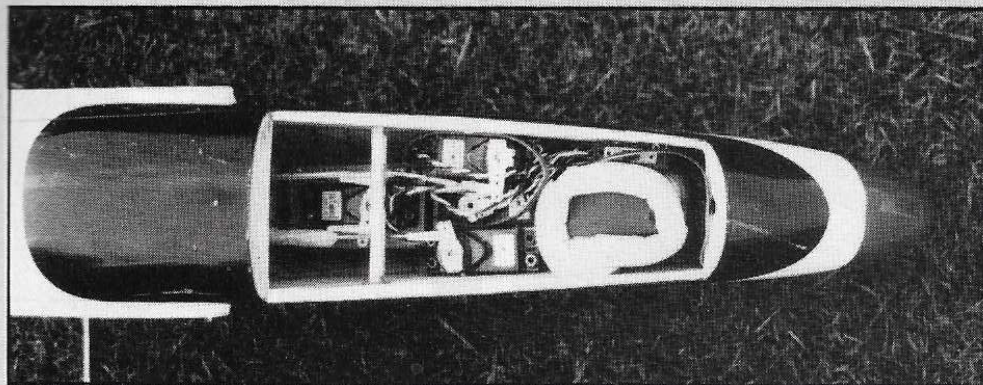
The tailplane details are self explanatory.

Cut out fuselage sides to take brass strip and rear wing dowel tube, leaving them $\frac{1}{4}$ in. proud each side. Fit wings and eye up for perfect alignment, checking particularly that both wings have equal angle of attack. When satisfied make up wing root fairings from $\frac{1}{4}$ in. sheet with $\frac{1}{16}$ in. ply outer facings, glue to fuselage sides and trim for perfect fit with wings.

The prototype was covered with glass cloth and fibreglassed then flatted and polished to a fine finish. This is not, however, a job for the faint hearted and Solartex or nylon would be a much simpler option.

The flapperons are hinged with magic tape, allow for maximum movement.





There is plenty of room for radio installation in the front of the Howzat.

Flying

If, like me, you read this bit first, Hi!

List of do's and don'ts

DO check controls for correct sense and throw.

DO make sure the C/G is as per plan, or even further forward for extra safety.

DO make sure the weather conditions are reasonable. Don't attempt to fly the first flight in dodgy lift or conditions that are too light.

DON'T forget the valium and the spare underwear.

Make sure you know which is up and which is down flap on your throttle stick. (Without having to think about it!) I've arranged mine with stick up/flap up, stick back/flap down, which will make a lot of sense to power flyers.

Leave your flaps up on the first flight, you've got other things to think about! Concentrate on gaining height before trying out the general handling. A high priority is to try out the stall at a safe height. At 5½ lbs the prototype drops a wing and loses 20

feet in the time it takes to loosen your sphincter. A Solartexed model weighing around 4 lbs will probably be far less dramatic but either way its no problem unless you do it close to the ground in which case the verdict will always be pilot error!

On windy days it's best to land with the flaps up. In lighter conditions land with them down. Either way the ailerons retain control all the way down the speed range.

The Flapperons

Once you understand the following two facts, you will be able to use these invaluable little devices to their greatest effect.

(i) Flaps down increases lift, but also increases drag thus incurring a lack of penetration penalty.

(ii) Flaps up decreases lift but improves penetration.

Thus when the lift goes off a bit and other kippers start bouncing off the hillside, you can calmly lower your flaps and cruise around 'til things get better. Don't push it

too far though, or you'll end up with a low altitude stall and a trip to the bottom to pick up the pieces.

Oh, by the way, if you attempt to fly inverted with the flaps down you will age 20 years instantly!

So now you've become used to the general handling; the stall; and you can land it each time without a cardiac arrest. Now for the exciting stuff!

But, first of all a word of warning. If you are used to hurling your kipper all over the sky in the most undignified fashion, turning on a sixpence, 16 rolls per second, 6in. diameter loops and, for the *coupe de grace*, waffling it backwards up the slope and catching it in your teeth, think again! Realism, remember? Try that stuff with this baby at your peril! (Dentists are so expensive!)

Most manoeuvres work better at speed, and for speed you need height to gain it from, so be patient, use your flaps to gain height.

The prototype's speciality is the slow roll, preferably cross or down wind. Given plenty of speed at the entry point you can roll as slow as you like without any need for all that complicated top rudder stuff. Big, in fact, enormous, loops; rocketing vertical rolls, slo-o-ow stall turns are all within the average flyer's reach, and they don't come more average than me!

I've flown this model in conditions that have varied from fairly light to a full-blown gale so you should be able to fly on most occasions and not have to leave it languishing in the car.

So there it is; add a new dimension to your flying, build one today!

Me? I'm working on something new, so watch this space!