



R.M.'s report on Enterprise's aerobatic glider kit

—by Norman Hutton and Dave Hughes—

OUR Enterprise Zephyr kit was actually a pre-production one, which was sent to us last winter. Commitments, at the time, were such that clubmate Norman Hutton was "volunteered" to build it, and your "Soarers" columnist to install the gear and put it through its paces.

Let it be noted that this is a sheerly functional aerobatic glider, for out-and-out contest work—in other words, a "pot hunter" with no pretence at looking like a "real" sailplane. As such, it is not a model for beginners to soaring but, for those with aerobatic contest performance in mind, it is undoubtedly a responsive, highly manoeuvrable craft.

Constructional points

The fuselage was built first as, in fact, it was several weeks before the wing plan was available. The quality of the wood provided was first class, and the fuselage structure, with its $\frac{1}{8}$ in. ply sides, to aft of the wing position, and solid block lower decking, is immensely strong. In lining up the fuselage sides, it was found to be absolutely essential to get the former slots in the ply sides in exact alignment—and it is as well to pre-drill the dowel holes with the two sides clamped or pinned together. With such a magnificently robust forward structure to the fuselage, it seems rather unnecessary to leave just three bays of the rear top-decking unsheeted, to be covered in nylon only. We mentioned this point to designer Ron Donohue, who explained that it is otherwise rather difficult

to keep the tail-end light enough to achieve the required c.g. position without excessive nose-weight. We therefore resisted the temptation to sheet in these portions and built the fuselage without any mods., but still feel that the weight penalty would be negligible.

A Woolworth's razor-plane was used to obtain the final contours of the fuselage blocks, after rough-carving with a knife. Great gadget, this razor-plane—no workshop should be without one. It would probably be preferable to install the push-rods while building the fuselage, as it can prove somewhat tricky when done after completion, as was found later. The tailplane is quite rigid, with its anti-warp bracing, and is fixed permanently to the fuselage. This is a good feature from the point of view of immobility for positive trim, but not so good, as we were to find, as regards vulnerability.

The timber supplied to us for construction of the wing was not nearly so well selected as that for the fuselage and was, for the most part, far too soft, only the leading edge being of hard stock. Rather than replace the spars and shaped trailing edge, it was decided to reinforce the main spar structure ($\frac{1}{4} \times \frac{1}{2}$ in. top and bottom) with $\frac{1}{16}$ in. sheet webbing with the grain running vertically. When covered with nylon and doped (50/50 dope/thinners) the structure around the aileron gaps pulled in rather alarmingly, as did the leading edges of the ailerons them-

selves. It would be advisable, therefore, to ensure that you use hard enough wood for these parts, and also to reinforce with ply the inboard aileron riblet and its opposing main rib, as a further precaution against this annoying buckling. In general, however, the wing is a well designed structure which should be adequately strong if sensible grades of wood are used.

The two-sheet plans are very clear and adequately detailed, and the instruction booklet quite comprehensive. Flying instructions, particularly, are really enjoyable to read, as one can feel the designer's own personal enthusiasm for flying this type of model coming through in every line.

Rigging and test-flying

Before we finally trade in our trusty F & M reed gear for propo (two stick!), we thought we would see how the Zephyr handled on reeds, which we installed, "full-house" wise, on ailerons, rudder, elevator and trim.

No difficulty was experienced in obtaining the correct balance. We loaded up the nose with external ballast until the model balanced at the point indicated ($4\frac{7}{8}$ in. from the l.e.), then melted this lead and poured it into the ballast compartment, having previously damped the inside of this to effect swift cooling. As a result, we were left with plenty of room in the compartment for any extra ballast that might be required to bring the c.g. a little further for-

ward for extra docility. All-up weight is just 5lb., of which 1lb. is accounted for by the wing, with servo.

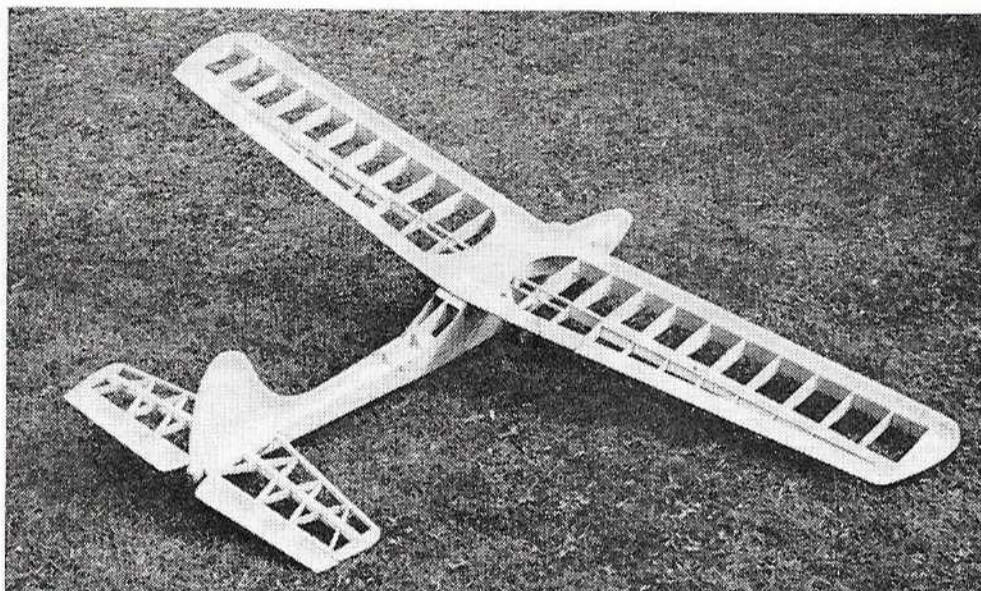
Rigging is zero-zero—unusual for gliders—but then, so is the thick symmetrical wing section. We know that *Senior Falcons* and *Concords* will soar quite happily, given enough breeze, with this set-up, though perhaps the meaning of the word “soar” is being stretched a little here.

First flights were attempted in what we call average conditions—i.e. wind velocity of 15-20 m.p.h. on the Dwyer meter. We started off, “power-fashion”, using ailerons and elevator, but the aileron response was so lively that after a few hectic moments we changed to rudder, to get our breath. Of course, with low aspect-ratio and little dihedral, rudder response is much slower and, on occasions, full rudder had so little effect that we just had to revert to ailerons hastily, to avoid letting the *Zephyr* slide sideways into the hillside. Yes, the hillside, for we could make but little height with this trim at the wind speeds mentioned. In fact, on the second flight, we simply ran out of lift and had to fly the model down to the cornfield at the foot of the slope. It appeared to make a good landing, but the tail-plane was found to be broken when we reached the scene, and we still don't quite see how this happened.

More “blow” required

For our next test-flights we chose a day when the Dwyer was reading around 30 m.p.h. This was more like it! A respectable height was quickly attained, going up in “steps” (we've found this very efficacious for rapidly gaining height—even with propo), then loops, rolls, stall-turns, and even upward rolls! Great fun—as long as you remember to keep well away from the ridge, and allow for downwind drift while throwing *Zephyr* around the sky. Of course, one has to dive a little to build up speed, before attempting a roll—otherwise it simply turns into a spiral dive. (We had become accustomed to ailerons by this time, and were using them for rolls, not rudder, of course).

Getting adventurous, we now removed our “safety factor”, that extra few ounces of lead we'd added to make sure *Zephyr* wasn't too touchy, longitudinally, at first. With the c.g. on its rear-most limit things became exciting



The “Zephyr” ready for covering. Note massive “inset” ailerons and open framework at rear of wing position. The spar webbing is our own innovation, and not normally necessary with good hard spars. There's plenty of room for servos, as can be seen from the shot of fuselage below. Not enough room to stand our receiver upright under detachable “canopy” though, so we angled it at 45°.

once more. If one did not remember to maintain a good flying speed with a couple of taps of down-trim, the *Zephyr* would stall very suddenly and drop a wing, so that reflexes on the aileron control had to be fast to catch it before it just dropped out of the sky. Well, then—what about trying for a spin? This was achieved the first time of asking, coming out nicely on the right heading (*fluke!*), with a dab of down to unstall the wing.

Maintain that flying speed!

The sudden stall and wing-dropping, with absolutely no warning, continued whenever we got careless about that flying speed, so we thought we'd simply “let her go” the next time this happened at a suitable height, and see if a real “hands-off” spin developed. It did. And it was a truly stalled spin, because we forgot to give that dab of down—gave up-elevator instead—and, of course, the model just kept on going—all the way to the deck. No damage resulted, due to the relatively flat “angle of thump”, but we won't forget the “down” again!

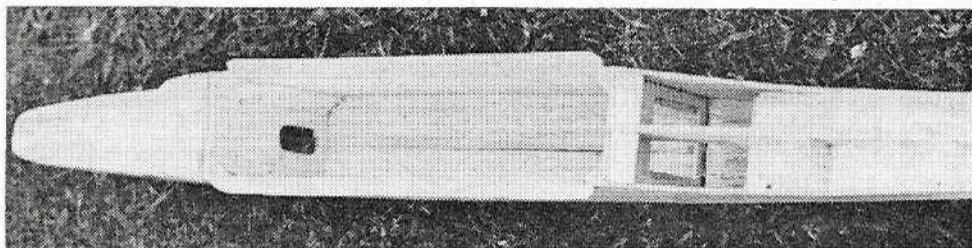
The moral here seems to be that, if you have only 6 channels, you could fit elevator-trim rather than rudder—you'll probably still be able to get your spins. After

all, it's only necessary to get one wing tip to stall (there's no wash-out, remember) and a spin will often follow of its own volition. The fact that we had quite a lot of aileron offset, to counteract a rather nasty built-in right turn, doubtless had a contributory effect here, of course.

More “down” for inverted . . .

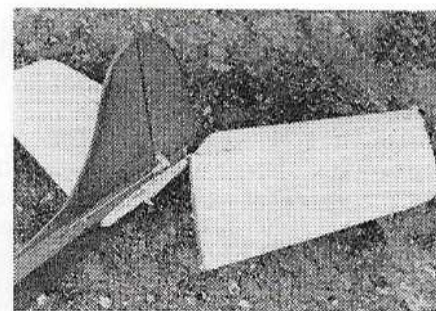
Our quick-link was on the bottom hole of the elevator horn, and this obviously does not give enough movement, as we found we needed to *hold* down elevator continuously, for inverted flying. This, needless to say, left no further down for keeping the nose up in turns, which proved somewhat embarrassing. For this reason—apart from being “chicken”—we've not yet attempted an outside loop. In fact, it's necessary to dive almost vertically to attain enough speed for an inside loop—which again suggests too little elevator travel. Next time out, we'll try upping it a notch.

We have now flown the *Zephyr* in winds of up to 40 m.p.h. At this velocity a very good height can be attained, but one must perform manoeuvres well out from the hillside (especially spins!) because the model very soon comes back downwind, especially if you manage, like us,





Left: Norman Hutton proudly displays the newly - completed "Zephyr" for our camera before "heaving it off the edge" at Ivinghoe Beacon. Right: "Ooops!"—we knocked the tailplane off, rather easily. Several other people, we know, have had the same misfortune. You just have to keep it clear of the ground!



sometimes to pull out towards the slope, inverted!

Rudder yaw effect

It is very interesting to be able to use either rudder or ailerons with this model as, to gain height, one can line up into wind using the rudder, when the *Zephyr* will go up like the proverbial lift. If ailerons are used, however, the nose will drop and up-elevator is needed to correct. The rudder, for the most part, simply produces the required *yaw* and slews the model round without banking it—which, of course, bears out all the

oft-expounded theory on this point.

Quite a lot of alteration to elevator trim was found to be necessary in flight, depending on the distance of the model from the ridge and, thus, the area of maximum lift, and it soon becomes obvious that proportional control will have great advantages here, when one can simply "lean" on the stick, as and when required, to maintain that all-important airspeed.

Summary

Multi slope soaring contests calling, as they do today, for

bunts, inverted flying, rolls and Immelmans, have tended to force the development of this type of layout, and the *Zephyr* is undoubtedly an excellent tool for the job—"unaesthetic" as it may be to the purist. Certainly the *Zephyr* is an interesting model to fly, and one feels that it will take quite a lot of flying-hours to get to know it sufficiently well for its full potential to be realised. Indeed, the instruction booklet tells us that it is capable of the entire multi aerobatic (power) schedule—including Top Hat, Double Stall Turn and Vertical Eight! . . .

Manufacturer: Enterprise Model Aircraft Supplies, Ltd.

Distributor: A. A. Hales Ltd., 26 Station Close, Potters Bar, Herts.

Price: £8 15s. 0d.