

MANY YEARS AGO I WAS FLYING my slope soarer into an ever darkening Dorset dusk. It happened to be one of those delightful plastic 'birds of prey', the Micromold Gyro Falcon designed by Douglas Pain. A fellow Marquis club member then suggested that, in the somewhat eerie surroundings, I should be flying a model bat!

My first reaction was "what a splendid idea but that is all it will ever be". After all, nobody in their right mind would ever expect a model bat to be suitable as any kind of flying machine.

Then I read the write-up on Stephen Winkworth's Pteranodon and I had to admit that, with enough effort, anything with surfaces remotely resembling wings should be capable of flying. Maybe a bat would need a force 6 straight upwards but it did seem worthwhile experimenting further.

Big Batrick

Mammalian Marvel

from the fertile

imagination of Geoff

Andriessen

Slope Soaring Bat with an extended wingspan of 39in. for two function radio



Events moved on... I produced the Transmitter mixer featured in the September 1985 R.C.M.&E and with that came the realisation that swing wings with a difference were now possible. For example: swing both wings back for a dive and then swing them forward to pull-out. Also, one wing forward and the other back might induce turn.

I convinced myself! But a bat? Well the real thing had plenty of hinges, far too many in fact. Also no-dihedral, no vertical tail area, not much horizontal tail area. In fact it was becoming apparent that millions of years ago it flew not 'because' but 'in spite of'!

At this time there were illustrations of bats all over the house. My long-suffering wife was threatening to find a belfry for me. "Ugh! don't know why you want to make a horrible thing like that for" came the cry. So I resolved that if, and when I did make one, why, it

would have to be a friendly one. Sinister, drooling black vampires with gore dripping from their teeth were out. Pity, I'd always fancied wearing an opera-cloak and top hat on the hillside! What is the well-dressed slope-soarer wearing this year?

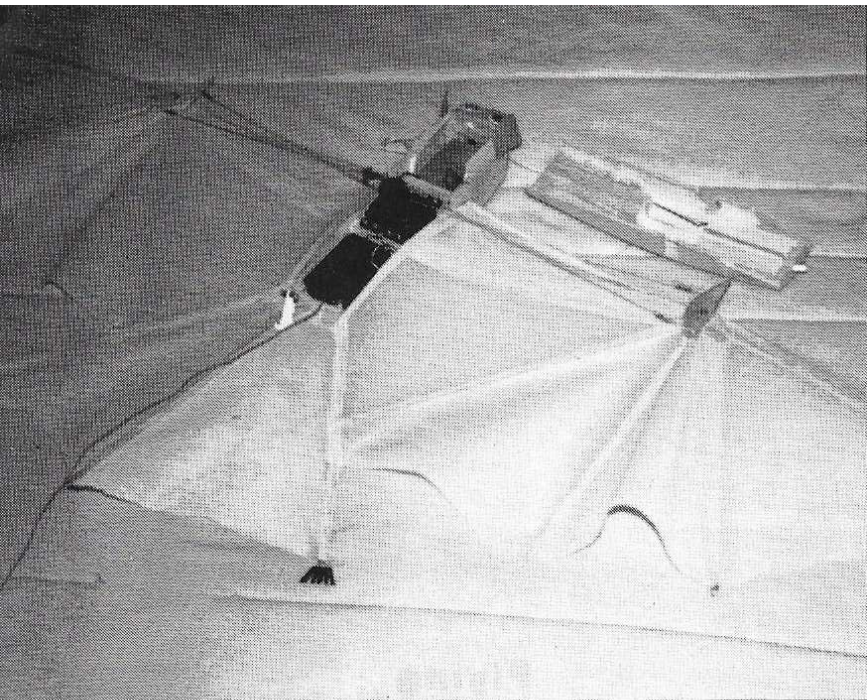
The appearance of the bat was greatly influenced by reading "Golden Bats and Pink Pigeons" by Gerald Durrell. This fascinating book leads one to realise that it is pleasant to carry out projects not only because they might be worthwhile, but also because they are fun. Not only for oneself but also for others.

The final design was arrived at by once more finding the right thing to unashamedly copy. Inspiration dawned one day when looking at a hang-glider picture and realising that a bat closely resembled a pair of hang gliders side-by-step. Of course it was

not possible to get the Centre of Gravity low enough to actually build a hang glider bat but Rogallo wings can be configured with a tail-plane.

The bat has a membrane joining his hind legs, which is in the right place as far as we are concerned but not at the required negative angle. Furthermore sweeping the hind legs up would inevitably ruin the wing angle. However the bat's tail divides this membrane and by angling the tail up the membrane forms an anhedral tail unit at a negative angle. This also solves the problem of achieving some vertical tail (fin) area.

I don't know what the bat would think about this reasoning but it pleased me. Actually some bats catch their prey



*Only birds and
fools fly, and
bats and B---
fools fly at
night! Our bat
flies during the
day and you
don't have to be
an idiot to fly it.*

and temporarily store it in the tail membrane by curling their tail *down*. Now in my ignorance I should have expected that to result in consecutive bunts.

Enough theory, let's have some practice.

A friend's daughter was shortly to celebrate her birthday! What better present I asked myself than a nice cuddly bat! Much better to try the concept out without risking expensive radio-control equipment.

A few lengths of $\frac{1}{8}$ in. square, some tissue and a small piece of $\frac{1}{8}$ in. sheet rapidly produced a $\frac{1}{2}$ metre glider in which the outer leading edges were hinged with push-in type horny hinges. A few test glides soon established that the system worked, though

aesthetically the nakedness of the poor animal needed attention. My wife rapidly knitted a mohair jump-suit. This was fitted and suitable features incorporated before the presentation.

The beastie was immediately christened "Batrik" so on making the "larger" 1 metre radio-controlled version there was no option: he had to be "Big Batrik".

The first flights of "Big Batrik" took place on the local slope with, as usual, too little wind. This showed the control system to work O.K., but to be very gentle, the model itself being very stable and in common with most hang gliders, to possess a rather poor glide angle.

It had been anticipated that an alternative control system for those

without mixing facilities should be devised. This was proceeded with since it would double the steering effect and also enable the pitch control to be varied as required.

Construction

This is fast, cheap and comparatively straightforward. Get yourself a bargain packet or balsa bits. Choose the right one and that will provide nearly all the material, apart from the flying surfaces membrane for which you will require something less than 1 metre of Solartex. The other main item is a piece of $\frac{1}{64}$ in. ply about 2ft. x 1ft.

Note

The terminology is a bit different from most models: so here is a GLOSSARY.
Leading edge — arm and forefinger.
Wingspars — 2nd, 3rd and 4th fingers.
Control horn — thumb.
Tailplane leading edge- (DO NOT
hind leg FORGET
Wing trailing edge THE FOOT)
Fuselage — Body.
Ears — Dive brakes?
GOT IT?

Wings

All the limbs and appendages are constructed from a ply-balsa-ply sandwich, thus taking a hind leg, for example, cut two pieces of $\frac{1}{8}$ in. balsa

and 4 pieces of ply. This is sufficient to give the right and left leg. The $\frac{1}{64}$ in. ply may be very easily cut with a medium sized pair of scissors (say 4" blades). Run all the major grains fairly well lengthwise and stick together. I think the best (and cheapest) glue for this is a waterproof P.V.A. but a five-minute epoxy is undeniably faster.

Weight the laminated limbs down whilst they dry.

Having got the arms, legs and fingers laminated, assemble them on the plan, apart from the first and second fingers, and glue them together. Take the first and second fingers and glue them together at the angle shown. When dry, add the reinforcing pieces of $\frac{1}{64}$ in. ply. Now drill the holes for the 8BA steel bolt that is going to form the hinge for the swing-wing.

The reinforcing pieces on the wrist will take the main sliding/rubbing load so these are separated by a piece of Mylar (as sold for hinging ailerons).

Add the $\frac{1}{16}$ in. ply joiner between the hips.

Body

This is made by cutting the two basic sides (lower) from $\frac{1}{8}$ in. sheet and glueing pieces of $\frac{1}{8}$ in. square (or the nearest from your bargain pack) to form the floor and the front. A razor-plane and some abrasive paper will rapidly produce a pleasing shape. Add servo bearers to suit your "gear", there is room for most outfits.

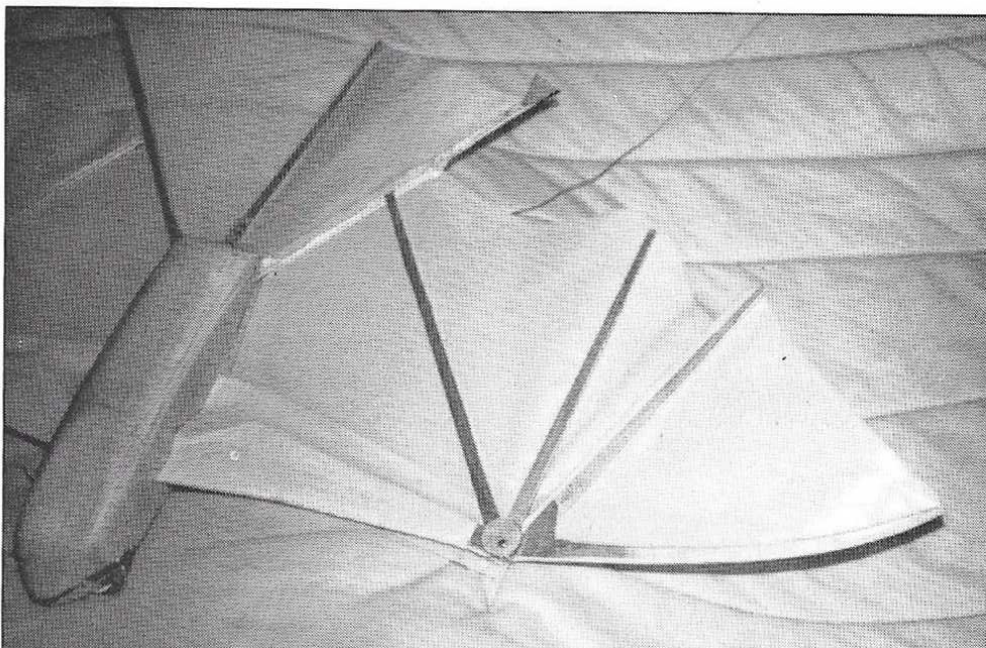
The top (which is also the removable hatch) is built up in a similar manner between the two basic sides (upper). Remember that the top has to fit down in between the lower sides.

The wing roots are made by bending $\frac{1}{64}$ in. ply over the top of the basic sides (lower) after glueing the wings in position. Add the wire L.E.

Tail

Make in a similar manner to the legs and when dry hinge it to the hip joiner (should that be the pelvis?). It is possible to dispense with a separate hinge as such and use the Solartex covering.

Almost a swept wing delta! Hinged outer panels sweep forward and rearwards, in opposition, to give turn.



Covering

The two pieces of the body are covered with Solartex in the conventional way. Instead of, or on top of the Solartex, if you want the strength, you may be inclined to clothe it in simulated fur (if you can lay your hands on a nice piece). Do remember the best bit of the exercise: take the girl-friend out of it first!!

Covering the wings is rather more difficult. On the portions of the wing and tail which are not structurally enclosed it is not possible to successfully tauten the covering by using heat. Furthermore it is also necessary to have somewhere near the right amount of slack.

"Two reefs in the storm jib, Jim lad!!".

Use a separate piece of Solartex for each wing and the tail area. Iron the wing root followed by the arm. Stretch to the leg next and iron, then stretch to the 4th finger and iron.

Next wrap the front around the leading edge wire and trim it so that it extends about $\frac{3}{8}$ in. behind the arm on the underneath. Iron to the underneath of the arm and glue using a clear contact adhesive to the top surface behind the arm.

This is the only area to be heat shrunk. Pull the Solartex from the 4th finger towards the 3rd finger and iron to the 3rd finger leaving the material slack enough to permit the centre of the trailing edge to be lifted to a height of approximately 1".

With the 1st and 2nd finger assembled and in the position shown on the plan, iron to the 2nd finger leaving the material slack enough to permit the centre of the trailing edge to be lifted to a height of approximately $1\frac{1}{2}$ in. (This corresponds with neutral at the transmitter).

Finally stretch the material to the 1st finger (leading edge) ironing it down so as to keep the outer section of material fairly taut. In practice you will probably still have some $\frac{1}{2}$ in. at the centre of the trailing edge. Do not worry, it is not too critical, the main thing is to get both wings similar.

The tail area is covered to be fairly taut at full up elevator, again do not attempt to heat shrink.

If you experience difficulty in ironing down on to the limbs without getting

unsightly "puckers", it would be possible to use a clear contact adhesive for most if not all of the covering.

I used yellow Solartex for covering the upper and lower body sections. Ensure that there is sufficient clearance to run the closed loop linkages from the "rudder" servo to the two thumbs which form the bell cranks for the wingtips. The ears were fabricated from orange Solartex and definitely add to the creature's charm and drag. For those of you intent of being "The Compleat O.B.E." (Off Beat Enthusiast) I suggest that you model the head on the "Long Eared Bat" and connect the ears to a 'spoiler' servo to use as dive brakes!

Flying

Check that the C.G. is roughly as shown on the plan plus or minus $\frac{1}{4}$ in. tolerance, and be prepared to re-balance outside of these limits for optimum performance. Now establish that the tail moves up and down the amount shown on the plan. This will probably require making a hole in the servo arm approximately halfway between the centre and the normal inner hole.

Most important now (because of the unorthodox steering) is to check that left stick results in the left wing swivelling back and the right wing swivelling forward. Right stick should similarly produce left wing forward and right wing back.

When a wing is swivelled to the forward position the membrane between the second and third fingers should just come taut.

When swivelled back this membrane should come up like a very sharply pointed hang glider. This has the effect of reducing the area of the section between the second and third fingers and also of reducing its angle of incidence. This reduces the lift on that side; together with the membrane between the first and second fingers now having less leverage a turn is produced.

For the initial flights choose a very steep ridge or cliff with a Force 3 or 4 blowing directly on to it. The prototype is not very sensitive and stalls so gently without dropping a wing-tip that one might expect to be able to shift the balance point back quite some way. The individual degree of tautness or otherwise of the wings will determine the best balance point and I should expect there to be some scope for experiment here.

The sight of this "beastie" with its weird shape outlined against the sky is most rewarding. Now (in January) there are not many spectators around, but I look forward to the remarks that will probably be made by flabbergasted — not to mention, horrified, members of the public.

P.S. To prevent horrifying onlookers (and yourself) too much, please do remember to put LOCTITE or lock nuts on the 8BA wing pivots.

Otherwise!