Black Magic!

REVIEW BY: **ERIC LEADLEY**

Eric describes the construction of his second Black Magic, a 60" (1.5 m) span model that will fly on any motor from a geared 500 to a brushless.

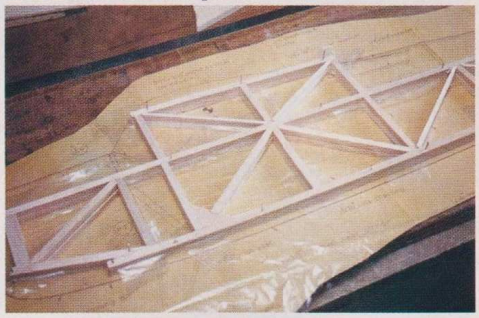
About 14 years ago I bought a kit for a 40 (IC) powered biplane, it was a scale model of a Sopwith Pup. This lay around the house for about 2 years or more and never got started, for whatever reason - I cannot remember. I must have finally given up with it because I remember going to the local model shop (Dave Smith Models) and exchanging it for a Flair Black Magic kit. At that time the new OS26 four stroke had just come out and I had spent hard earned cash on one and this would seem to be an ideal combination.

First Black Magic

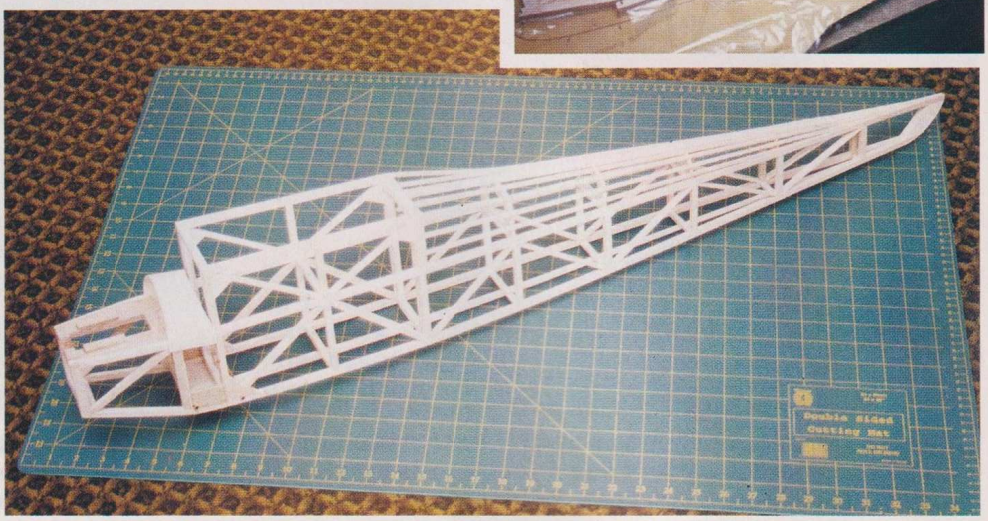
Spare time in those days was at a premium so it took a while to put the kit together and by the time it was almost finished I had acquired an electric Buggy motor and a plan for an electric glider called the Kilowatt. The building of this then took over from the finishing of the Magic. This was my introduction to electric flying and to keep the story short - electrics took over.

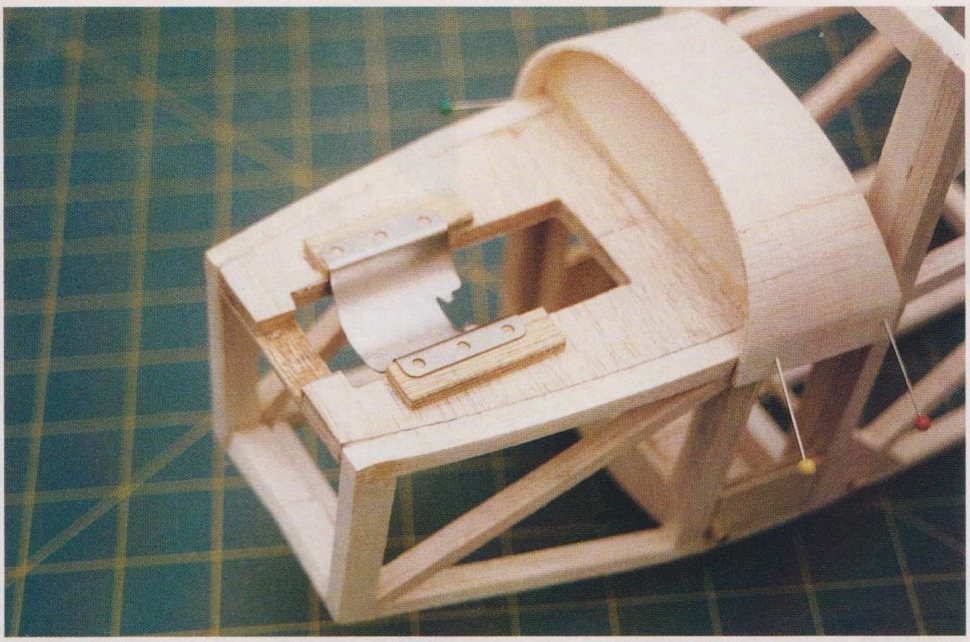
The glider was finished and flew successfully so I then looked at the half finished Magic and decided to try it on electric. My thoughts were: "If it does not fly electric then I will fit the OS 26. The OS 26 was sold on two years later, unused and still in the box, need I say more? On a Speed 600 with a 3:1 gearbox I had a number of years flying Black Magic until

▼ Construction photo 1 - two fuselage sides on the old plan.

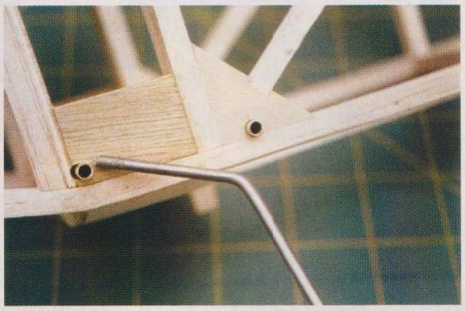


▼ Construction photo 2 - almost complete.

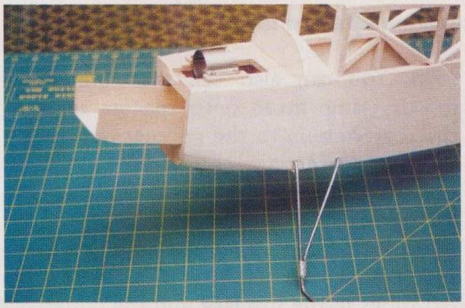




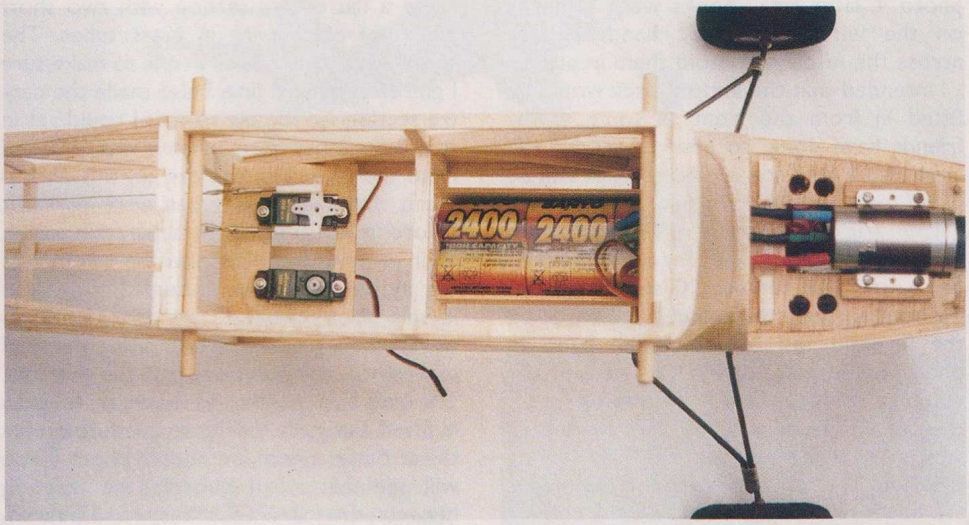
▲ **Construction photo 3 - motor mounting plate.**



▲ **Construction photo 4 - the undercarriage plug in tubes.**



▲ **Construction photo 5 - Liteply tray inserted to hold the battery pack.**



▲ **Construction photo 6 - the motor fitted, the battery pack and the servos, one of which is wired up for the all moving tailplane.**

I got fed up with it and sold it to a fellow club member and he is still flying it to this day.

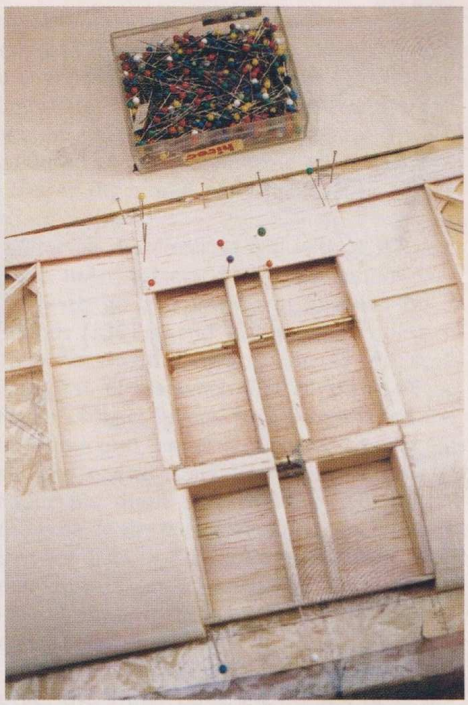
The trouble is, every time I see him out with it I get this feeling that I should have another one so finally, I decided this year to put another one together, using the old plan that I still had.

This Black Magic

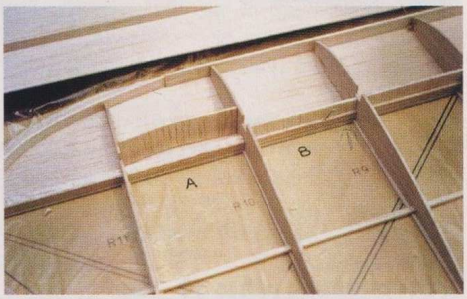
My thought this time was to try and make it a little more like the original Black Magic of Fred Hempsall in 1947 with the minimum of alterations that electric and radio entail, bearing in mind that I had not any access to the old drawings, only hearsay and my old plan.

The wings are in two separate sections and plugged together, there are no elevators on the original so I have fitted an all moving tailplane. For ease of transport I have fitted a split undercarriage that plugs into each side of the fuselage and for looks and lightness all the wing, tailplane trailing edge and tips and the whole fin, are all laminated.

Although the extras I have fitted add weight, with careful wood selection, using glue sparingly and using my sanding blocks a



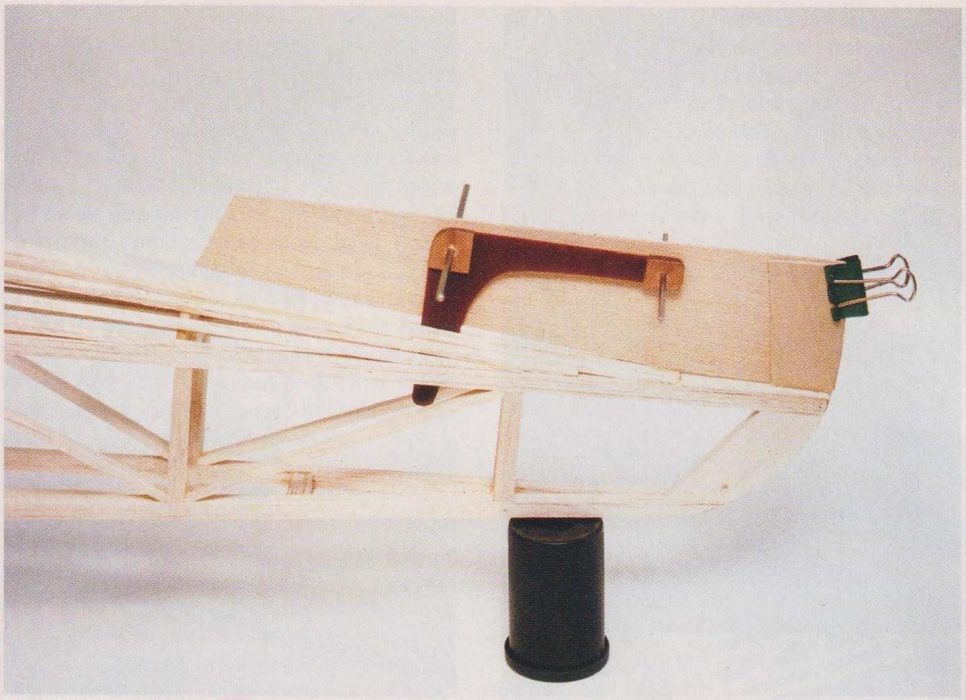
▲ **Construction photo 7 - the centre section of the wings being built.**



▲ **Construction photo 8 - fitting the webbing between the spars is a better method.**

lot I do not expect this model to weigh any more than the old one. I do not plan a weight for a model beforehand as some folks do; I just build it and the finished weight decides itself. This is not a step by step 'construction write up' but with the aid of a few photographs and the following words this is how I built my second Black Magic.

In photo 1 you can see the start of my building on the very old and discoloured plan. One side is built over the other and to stop the two sides sticking together you might just be able to see the small pieces of plastic sheet I have placed under each joint to keep the glue from weeping through. This is easier than putting a whole sheet of plastic between the two which means you have to remove all the pins from the first and when you do this something always moves somewhere and the two sides are not identical. The longerons are stiff 1/4" square balsa and all the spacers are a much lighter grade, the diagonals were cut from a sheet of soft, light 1/8" balsa. The almost completed fuselage is shown in photo 2. The hardest part here is bending the longerons around the plywood motor mounting plate, this was made easier by cutting lots of small vertical slots in the longerons and applying glue to the inside edge then drawing the sides in with a clamp. Do not try to hold this in with your hands even if you are using five minute



▲ **Construction photo 9 - liteply pylon to accommodate the large elevator crank.**

▲ **Construction photo 10 - the completed tailplane mount.**

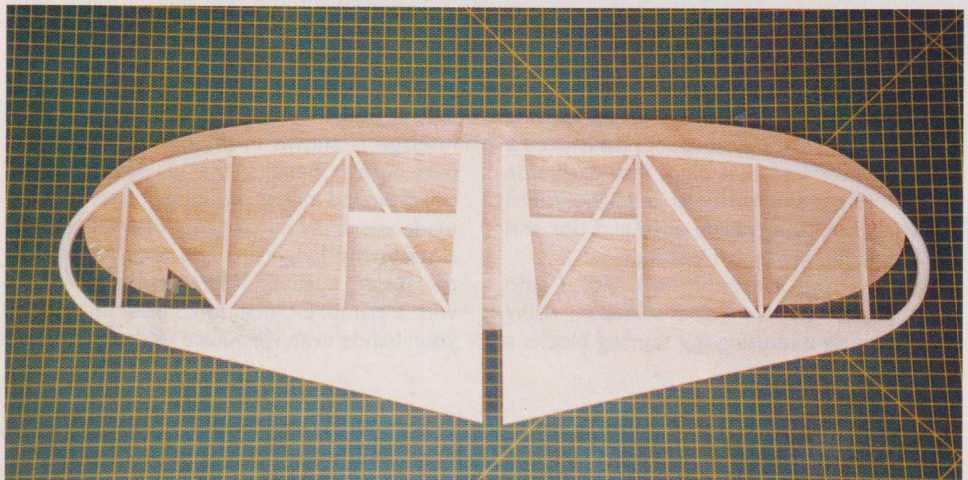
epoxy as it will slide all over the place before it is set, it does need a good pull in. The 1/8" spars that form the shape between the wing TE and the fin need to be firm balsa or the covering will drag them in later to give the starved skeleton look.

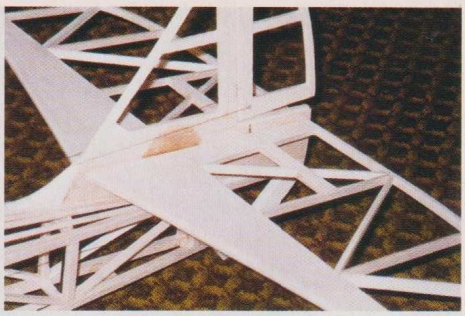
Before fitting the motor mounting plate cut out the space required into which you will fit the motor. As you will see in photo 3 the same plate can be used as was intended for the IC motor. The motor and gearbox I am using this time is 'inline' and the wood mount needs to be cut right through so I glued on a strip of 1/16" ply to stop the longerons pulling it out. To form a good gluing surface to the longerons I used 1/4" ply but instead of the good hard stuff which is heavy, I used a cheap mushy grade to save weight - hence the small ply holding strip. You can also see the commercial motor clamp fitted onto spacers to bring the shaft line up to the correct position.

The undercarriage should be sewn onto the front ply former but this means the battery will not be able to fit into where I wanted to locate it to so for this reason and so it can be removed if required, I fitted tubes in the fuselage and the undercarriage was made up of two halves and these plug into the tubes. These can be seen in photo 4, later small hooks were soldered on the wire and elastic bands stretch across the fuselage to hold them in place.

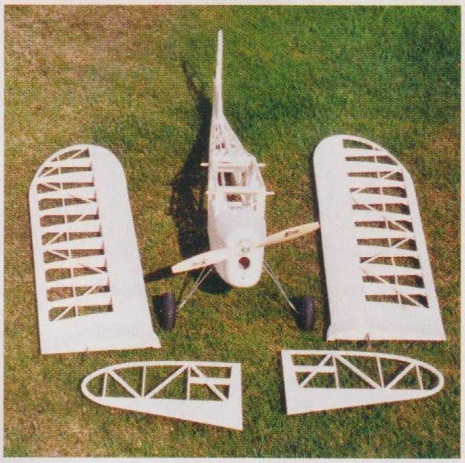
I intended that the battery pack would be fitted in from the front as some of my friends have done, so photo 5 shows the area where a removable nose block will be fitted and a Liteply tray glued in to hold the battery pack. At the time of the photo I did not know where the battery would have to be to attain the correct CG so it was made deliberately long so it could be slid down the fuselage and cut to length later. In photo 6 you will see the top view of the completed fuselage with the motor fitted, the battery pack and the servos, one of which is wired up for the all moving tailplane. The four holes around the motor are not for lightening but to aid the cooling of the motor with a little more air circulation.

▼ **Construction photo 11 - the tailplane and its former.**





▲ **Construction photo 12 - the assembled tail.**



▲ **Ready to cover.**

The plan and the kit use the wing all in one piece which is fine as a 60 inch (1524 mm) wing will go in most cars easily but I wanted to copy the original and make it up in two pieces with joining rods. Photo 7 shows the centre section of the wings being built, I made a flat centre section with two short pieces of piano wire in brass tubes. The tubes were built in as all in one to make sure I got everything in line, I also made the centre section far too big so that I could get in to cut the brass tubes when it was removed from the plan. You can see on this photograph that the brass tubes were part cut before fitting to make the separation easier, after removal from the plan the centre was cut and the excess wood sanded away. Also in this photo you will see one of my pin trays, I am a great believer in using plenty of pins to hold things in place until the glue sets. The main spar webbing as shown on the plan is fitted alongside the spars but I opted for the stronger lighter method. In photo 8 you will see that when one fits the webbing between the spars 60% of the wood is saved. Bay 'A' shows a piece for the side of the spar and bay 'B' shows the better method. Less wood is used and it is stronger because under load it is harder to crush the wood than shear it off the side.

Instead of a balsa pylon for the tailplane I made a liteply one as it had to be hollow to allow for the large elevator crank, this can be seen fitted in photo 9. Photo 10 shows this completed with the pull pull closed loop fitted and the pulley in place.

The tailplane has the TRAILING EDGE and tips all in one with four laminations of 1.5 mm balsa, it was made all in one with the tubes fitted and then cut in half, this ensures the tubes line up later as in the wing. The tailplane and its former are

▲ **Six of the models in the 'York Black Magic Club'.**

shown in photo 11. The assembled tail area is seen in photo 12.

For me the decision time for covering a model takes some time as I can never decide when the airframe is ready. I fiddle here and there, I rub down little bits that I have attended to before and keep looking for areas where I can save a little more weight because once the model is covered all fiddling has to stop; also I like building but I do not really like covering, it is a necessary evil for me.

The fuselage was covered in blue Solarfilm and the open areas of the wings and tailplane were covered in yellow Litespan. The reason for the Litespan was to save weight and for a translucent covering so the framework could be seen in flight (always a nice feature in vintage models). I was lucky in that a friend of mine was talking to a chap at the Nationals (Brian Downham) who was building a Magic from original plans and he volunteered to send a photocopy from the pages of the 1947 Aeromodeller which had the articles and plan in. I found out from these that even the first published plan was not the same as the prototype. There is a photo in the articles and it shows the first model being launched and in the silhouette you can see an extra wing spar and all the ribs are gusseted at the rear. I fitted these before I covered the model which makes for a better effect in the air.

After all the covering and with the 7 cell, 2400 mAh battery fitted the model was ready to go and weighs in at dead on 3 pounds (1361 g) and with a wing loading of 15 ounces to the square foot (45 g/sq.dm). The first flights were like all Black Magic flights - Magic! Several flights were made the first time out, the shortest being 13 minutes and the longest 20 minutes, there was no lift about and these times were 'power on' all the time. In the enclosed photos you will see that we like our Magics up here, there are 8 members in our club and between us we have 7 Magics, six are seen in the photograph here.

Well that is how I did it, next job is to decorate the living room, then it will be a vintage scale Fokker D.VIII. Yes there is a Vintage one, Ben Buckle does an IC plan and kit and I have had one in the workshop for the last three years so it is time it was put together and ELECTRIFIED. **EFI**

◀ **Seeing the framework through translucent covering is always a nice feature in vintage models.**

▼ **Covering is blue Solarfilm and yellow Litespan.**

▼ **Black Magic will ROG from a short grass airfield.**