BUILD FROM OUR FULL-SIZE PLANS!

Young designer Philip Geoghegan with the first prototype Firefly at ASP's Designs Day back in April; Mk2, the subject of our plans this month, is virtually identical.

FIREFLY

This 30" span sports aerobatic model by junior Philip Geoghegan was among the runners up at this year's ASP Designer of the Year competition at Old Warden

The design for the Firefly was first drawn up over a year ago and was intended to be a practical and compact sports model which could be left in the boot of a car to be flown after work (or in my case, after school.) I decided to use a Cox 049 since it only needs a 1 .5v battery and a bottle of fuel to operate which makes the model even more convenient.

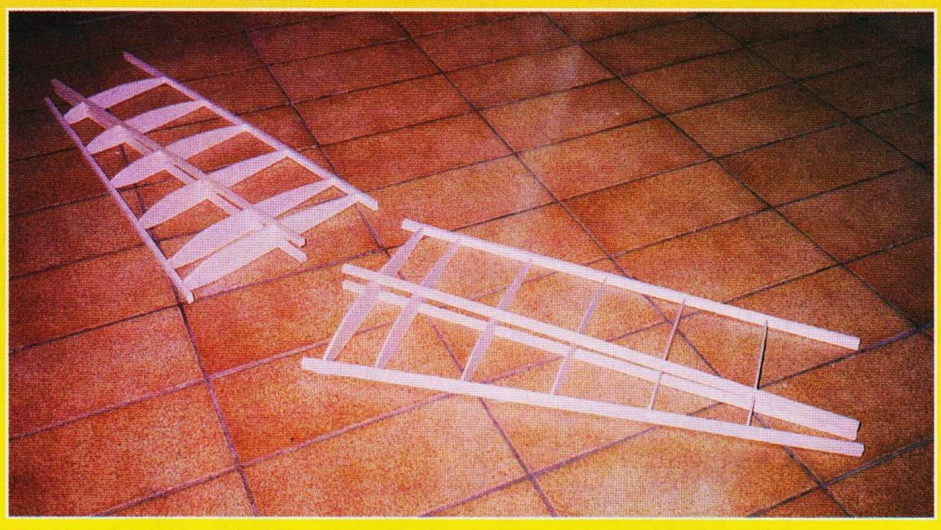
I was unable to begin construction until about four months ago when I applied for, and was awarded, a grant from an enterprise scheme handled through my school, Trinity School, Croydon. After receiving the award, I soon started work on building a prototype model from the initial design. This was soon up and flying and I took it along to the A.S.P. Designs Day on April 24th.

Firefly 1 flew well but, nevertheless, I felt that certain alterations to the construction would improve it. The main change from the construction point of view was plug-in wings and a vacuum formed canopy and cowling.

Fuselage

The fuselage follows the usual method of assembly being made from sheet balsa around several square formers. The fuselage sides are made up from 1/16 balsa with doublers at the nose and at the tail - also cut from 1/16 balsa. Between the doublers the fuselage is reinforced with 1/8 x 1/8 strips horizontally and vertically. The first two formers are fairly close and it is easier to have previously wet the nose and let it dry, clamped to some curved surface. The two sides are then glued around the formers, preferably using a jig, and certain formers reinforced with balsa strips.

The nose is designed to take the Cox Dragonfly engine so has the engine firewall a distance from the first former which is constructed from 1/8 balsa. This means that,



Basic wing structure; later the leading edge and tips from last rib outboard will be sheeted.

once the fuselage is complete, a hole can be cut in the firewall revealing a hollow area to hide the fuel tank. If a .10 sized motor is to be used then either the firewall could be made from ply and the second from balsa, or the second left as it is but having the fuselage sides shortened beyond this so that, in effect, F2 becomes the first former. The model has not been flown with this motor and may need some reinforcement around the engine mounting.

The bottom of the fuselage is sheeted with 3/32 balsa, with the grain going across the fuselage. The upper fuselage has three pieces of 1/16, of which the two side pieces are attached first. These are cut oversize and can easily be trimmed using a razor plane across the top. This will then be fairly flat enabling the top piece to be added easily. 1/16 was used to sheet across the top of the nose and 1/8 across the area where the tailplane would be situated. The two aluminium tubes for the wing locating rods should be inserted . At this point the canopy was carved from balsa and vacuum formed in my school workshop. If these facilities had not been available I would have simply hollowed out the balsa canopy and used that instead. The cowling was also made in a similar fashion and trimmed to clear the engine. The tail could be cut from sheet 3/16 balsa but, to save weight, it is better to construct one from strip balsa.

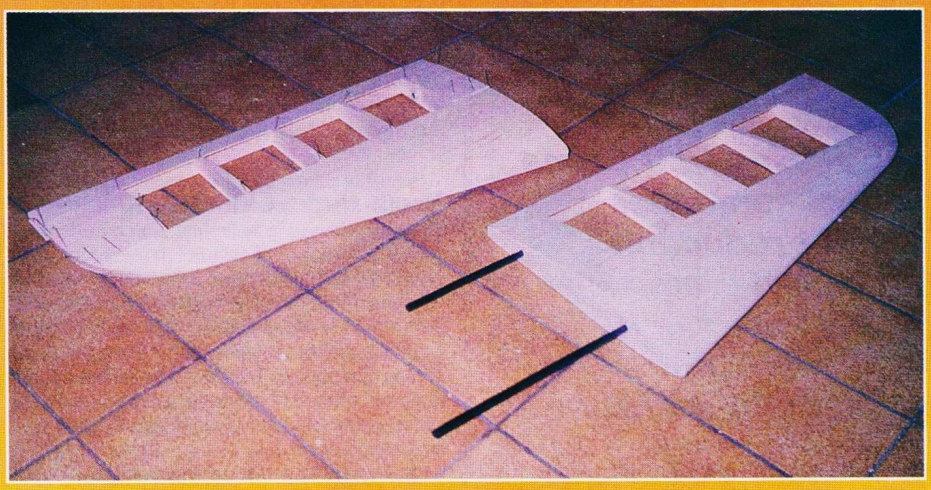
The wings

The wings are a conventional built-up structure and since the wing section is Clark Y it can be easily constructed straight onto the building board. There are two main spars made from 1/4 x 1/4 balsa between which there are six tapering ribs, all of which are 1/16 balsa except the first rib which is 1/8. The leading and trailing edges of the wing then have 1/4 x 3/8 balsa strip attached to them. At this point the aluminium tubes for the wing locating carbon fibre rods should be inserted. The plug-in wings are not essential on a model of this size but give more space within the fuselage. With the wings removed the model can be stored in a very small space - great for taking on holiday! The wing tips should be constructed by laminating four layers of 1/16 x 1/4 balsa glued together around a suitable jig. These can then be cut to shape and fitted to the wing.

The leading edge should be rounded off using a razor plane. 1/16 sheeting can then be added to the upper and lower surfaces of the leading edge and 1" strips of 1/16 can be added to the trailing edge on both sides of the wing. The wing root between the first two ribs should be sheeted with 1/16 as should the area between the tips and the final rib. To complete the wing, capstrips should be added to the remaining ribs. The ailerons are standard 1.1/4 x 3/8 trailing edge stock hinged into the back of the wing. Short lengths of 1/8 x 1/8 square tube are inserted into the end of the ailerons so that the control linkages can easily be attached when the wings are plugged in. The control horns for the ailerons are made form smaller square tube which fits within the aileron tubes. The ends of these tubes are flattened out, drilled and bent upwards.

Finishing

The radio used in my case was Hitec Micro gear so that three channels could easily be accommodated within the fuselage. If standard sized equipment was used the throttle control could be omitted to save weight. The second prototype was covered in tissue, sprayed and then painted with enamel for trim but the initial model had Fibafilm covering.



Firefly is unusual in that it features detachable plug in wings - photos above show finished wing panels and partially completed fuselage with aluminium tubes and carbon fibre rods.

Flying

This is where Firefly is really at home and its low weight makes it a lively aerobatic model. My model weighs 20 oz. which means that the glide is very good and I have been encouraged to take it slope soaring although I have not yet done so. Take off is a simple hand launch but the model does not accelerate that quickly since the small Cox does not move that much air. The engine is fairly small but, due to the weight of the model, it is perfectly adequate and the climb is quite steep. The stall takes a while to happen since the model can fly very slowly and nothing dramatic results.

This model has been really successful and fulfils my initial intentions with ease. I am really thrilled with it and it flies as well as it looks! One ounce of fuel equals five minutes of great fun in the sky - try that on your sixty powered model! The landings take a while to perfect since the glide is so flat and it is easy to overshoot the runway or come in too fast. Anyway, if you build a Firefly I hope you get as much pleasure from yours as I have done from the prototypes.