MINI DRAKE

A Beginners 2-function RC Powered Glider for .75 to 1 cc

A powered glider, inexpensive of materials, very economical on fuel, easily transported, very stable but with rapid control responses: an excellent RC trainer.

by Celestino Rossi and the Editor

INTRODUCTION

It is not too difficult for most people to appreciate how an aircraft is steered around the sky with rudder and elevator, and even aileron controls; and the use of a throttle is accepted almost without question. When it comes to the actual application of the basic ideas it is far from easy, and many aspiring pilots have been disappointed with their attempts to fly, particularly Radio Control aircraft. It is NOT easy.

The concept of an easy to fly RC trainer has been attempted many times. The Minidrake is another attempt at this important aspect of RC flying. It was developed by a club in northern Italy, and has been published in Modelistica; although the plan and aircraft featured here were drawn and built, respectively, before it was published in the Italian magazine. AIRBORNE acknowledges the advice and support from our colleagues in Italy, with thanks.

The aircraft is basically a 2 metre span free flight pusher with rudder and elevator controls. The framework is built up to give light weight, re-inforced to cope with stresses of RC flying, and with miniature RC gear, is slow flying, stable and responsive: just what is needed for a trainer.

Here is how Celestino Rossi organised the project (Cel's notes).

Real friends are rare, but when two people with the same ideals meet, they are friends forever. It happened to me during my last visit home (Italy). I met, by chance, Ivan Poloni the secretary and spokesman of G.A.B.: Aeromodellers Group of Bergamo. We talked about aeromodelling, free flight, the old times and to him I mentioned my activities in Australia. Since then, 1978, he has written often and kept me informed of the various activities through the club's newsletter. I regularly send him plans of my FF scale models.

Recently he sent me the plan of the Minidrake for the readers of AIRBORNE. There is nothing exceptional about the model except that is is extremely simple, very cheap and it is the Model of the Year, 1983, for the school of aeromodelling. Falchi (Hawks) is the name of the junior members of the GAB. One of these junior members one day put together bits and pieces of leftovers from damaged models and went out on the field and began to fly what was to become the Minidrake. He took the model to the Think Tank of the senior members and asked them to draw a plan of it so it could be introduced as a basic model for beginners of RC. Ivan took the task and kept everything very simple; basic. I helped in building the model for AIRBORNE readers and the total cost of the building materials is only about $10.

CONSTRUCTION

Fuselage. Cut out the sides and glue the longerons in place. Cut out the formers, glue F2 and F3 to one fuselage side then add the opposite side to form a rectangular box at the wing centre section. When this has dried add F1, pulling the sides into it, then join the aft fuselage ensuring that the framework is symmetrical.

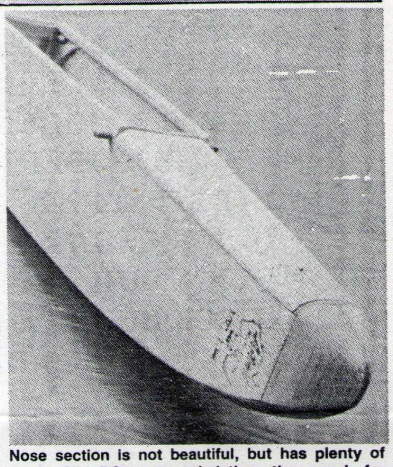
The wheel and plywood skid may now be added, but time can be saved by omitting them. The fuselage nose is actually weakened by the insertion of the skid, so it may be added on the outside of the nose bottom sheeting, later during construction.

The bottom sheeting may be added next and extra strength is gained if the grain is parallel to the centre line, but this necessitates extra cross pieces to prevent the sheet sagging between the sides in the nose area.

Install the rudder cables (and elevator pushrod, too, if you wish) before adding the rear top sheeting. The front top is a removable hatch, rebated into the back of the nose block.

Tailplane and Fin. Both these have flat plate aerofoils which have LEs rounded and TEs tapered after being cut to shape and assembled. They are then glued to the fuselage ensuring that they are correctly aligned. The elevators and rudder are not attached till they are covered.

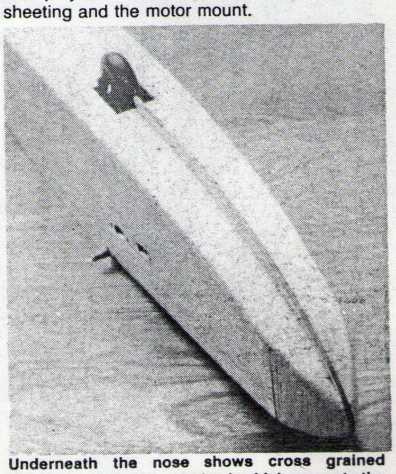
Wing. Cut out the parts, pre-shape the TE, including the rib notches, then assemble the parts in the standard fashion: LE, TE, bottom spar; ribs, spar webs; then top spars and the gussets. When the glue has dried, finish shaping the LE, TE and remove any high spots with a large, flat sanding block.



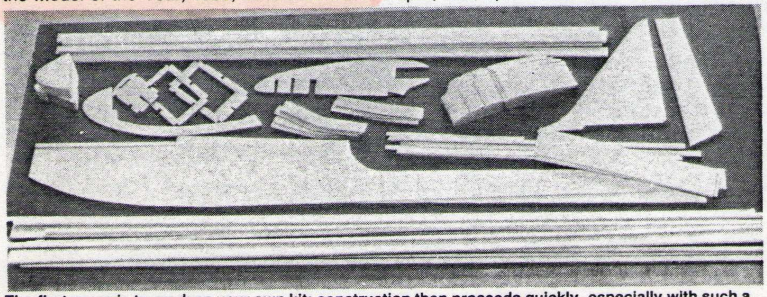
Nose section is not beautiful, but has plenty of room for RC gear, obviating the need for noseweight. From front wing dowels to nose block is removable hatch.

To incorporate the dihedral, cut the spars at the dihedral break and trim the ends to give the required angle. Pre-cement the ends then glue the parts together, adding the braces when the framework can be safely handled.

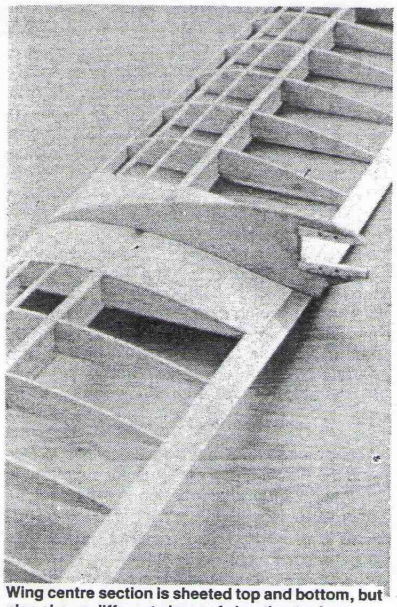
The centre section is re-inforced with two braces, large gussets and a layer of glass fibre and polyester resin right across the centre sheeting and the motor mount.



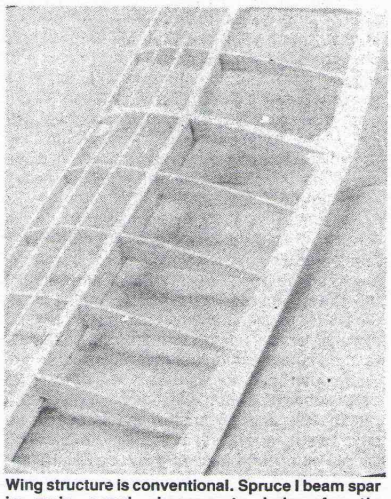
Underneath the nose shows cross grained sheeting, nose skid and wheel, which prevents the aircraft from sitting stably in the upright position, but makes wheely landings (and take-offs) a bit of a challenge. Delete both for a stronger nose.



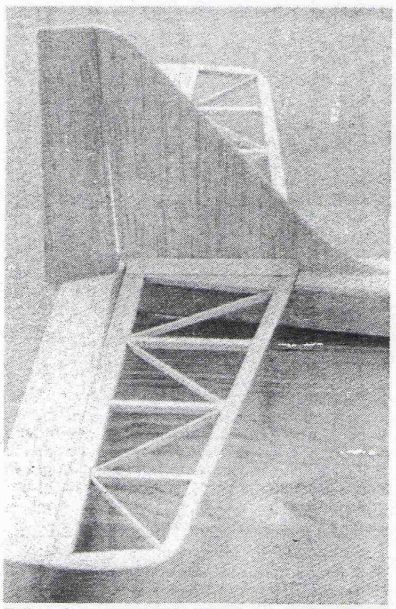
The first move is to produce your own kit: construction then proceeds quickly, especially with such a simple design. Laminated 1/8 balsa formers could be substituted for the plywood. This pic shows twice as many dihedral braces as required.



Wing centre section is sheeted top and bottom, but plan shows different shape of sheeting to decrease the stress points where the sheeting stops. Motor mount has aluminium sheet re-inforcing epoxied on to it. The whole area was covered with one layer of 202 cloth and polyester resin on the original.



Wing structure is conventional. Spruce I beam spar in main panel changes to balsa for tip panel. Dihedral brace sits between spar flanges and against webbing.



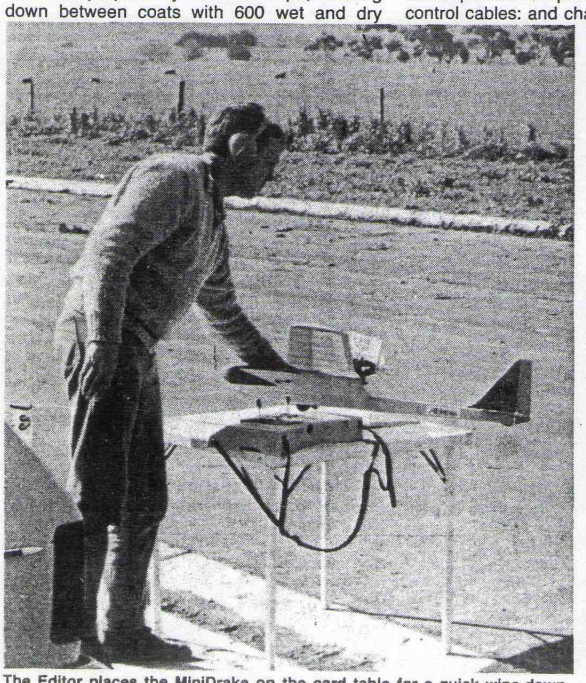
Tail surfaces are simple. Plan shows wide TP LE gusset to prevent breakage beside the fuselage. Plan also shows hinges for elevator and rudder, but the AIRBORNE original used so-called invisible Sellotape. Quick, easy and quite satisfactory.

Radio Gear. With the Rx battery right up against F1 and the Rx on the fuselage floor there is room for the two servos above the Rx, ensuring that the RC gear is as far forward as it can be.

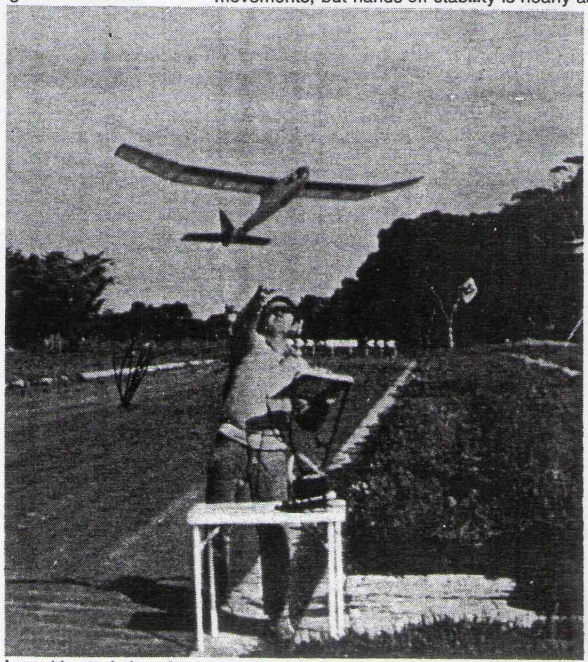
Finishing. Cover the entire aircraft with tissue after two preparatory coats of dope, rubbing down between coats with 600 wet and dry paper. Double cover the wing centre section for 3 bays, and the entire wing leading edge, top and bottom. The extra strength is worth the extra effort. Use coloured tissue to produce a pattern that pleases you. Fuel proof the entire fuselage and tail surfaces and the double-tissued wing centre section with Estapol clear or Testors fuel proofer or a lacquer of your choice. Attach the elevator and rudder with Sellotape and fuel proof the edges. Attach the control cables: and charge the batteries.

FLYING.

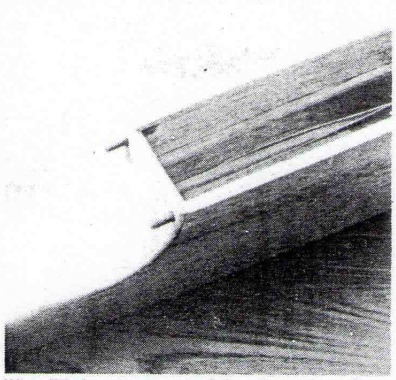
With no warps, control surfaces neutral and the balance point where indicated, the MiniDrake will glide like a 2M sailplane. The polyhedral, light wing tips, light tail surfaces and engine mounted near the CG, make the machine very responsive to control surface movements, but hands-off stability is nearly as



The Editor places the MiniDrake on the card table for a quick wipe-down before the next flight. The model can be re-fuelled, re-started and launched quickly as pre-flight checks are minimal. Gives good utilisation of precious time on the flying field.



Launching technique for the MiniDrake is as simple as can be - just push upwards into the breeze. Tx can be held in the opposite hand. Starting is done on a card table for convenience: the Editor in action. Rossi photo.



Wing TE dowels are out of the airstream and reinforced with gussets, not yet added when photo was taken. Self-adhesive foam tape was added to fuselage sides where wing is seated. Curve in decking under the propeller is done with cross-grained wood.

good as a FF aircraft.

With the engine going properly (none of the prop-on-backwards, low-powered-1st-flight approach, thank you!) push the MiniDrake firmly upwards at about 15º above the horizontal. It will sag a few feet and may need a touch of up elevator before it climbs away at 30º or so. As it does it will turn according to the interplay between the unseen drag factors and the thrustline. Rudder response is fast but wide sweeping turns can be performed by barely touching the Tx stick.

By moving the Rx rearwards about 2cm (Kraft mini Rx and servos with a 550mAh battery were used in the original) the trim was adjusted so that, once the climb was established, the Tx was not required again during the flight; the power to glide transition being smooth (and at considerable height) and the power to glide ratio being about 4 unless lift was encountered. This could entail longish retrieves, so use the Tx to keep the aircraft close.

If the centre wing braces and spruce spars have been properly used, the MiniDrake will do simple aerobatics including inverted flight (but outside loops need the engine to be running!) with the briskness of a spring lamb! With enough altitude it will recover from many odd flight attitudes if you just release the Tx sticks.

The original flew, at different times, with a Cox TD049, a DC Wasp and a PAW 80. A full 5ml fuel tank gave about a 2 minute engine run and about 500ft. altitude, so that 152.4 metres doesn't cost much to be reached, and provides plenty of time for fun, or practice, on the way down.

While not being the most attractive trainer available, the MiniDrake is better than most others, if only because it is so inexpensive: both to build and to fly. And repairs are easy too.

After mastering the MiniDrake, and probably passing it on to a friend who wants to learn RC flying, graduate to the P-Ship, which is comparatively more advanced, but is the next logical step towards your ambitions in RC flying.

Acknowledgement and thanks to Ivan Poloni and the Falchi group of G.A.B. for supplying information and the permission to reproduce the plan.