

electrojet

A smart aerobatic design for electric power and two function radio

I was first bitten by the electric flight bug over twelve months ago. At the time I was Contest Director at the Widnes Model Flying Club Open Thermal Soaring Competition, where Paul Channon from the Chester M.F.C., gave quite a convincing demonstration of his Ermine Slipper electric model during the dinner break. Being extremely impressed with this demo, I purchased a kit from Paul on the spot and it has given many hours of clean, quiet fun. However, as time went by, I began to realise that I wanted something a little more exciting but still utilising the same standard motor and battery pack i.e. Mabuchi 540 and 6 cell, 7.2v Nicad pack. The model I had in mind had to suit the following requirements:-

Relatively inexpensive to build

Lively and aerobatic performance using standard Mabuchi 540 motor and 1.2Ah, 6 cell nicad pack.

Micro radio equipment not absolutely necessary.

Sleek, Futuristic and unusual lines.

Being reasonably inexpensive it should have some appeal to the average modeller

who perhaps, until now, has looked at electric flight as yet another expensive and very specialised category of our sport.

So, after a few months doodling and calculating, I came up with this design. Without further ado I shall run through the construction sequence.

Wing

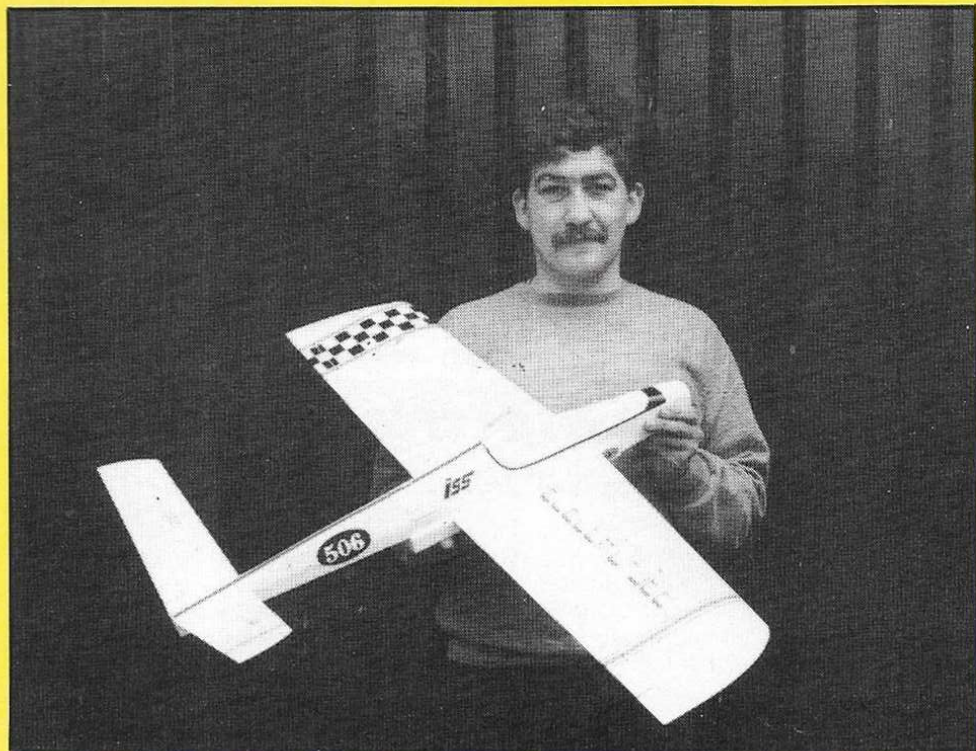
I would recommend that the wing be constructed first as this will form the backbone of the fuselage. Form the top and bottom wing skins from 1.5mm balsa, preferably 100mm wide sheets, gluing with P.V.A. woodworking glue. All the wing ribs can be cut from 2.5mm balsa, the ribs can be cut to suit the tapered planform of the wing by skewing the template on a full size centre rib. Place the bottom skin on a true flat surface and transfer the rib positions, planform taper, and span measurements from the plan to the balsa. Glue the 6mm square leading and trailing edge strips to the

bottom skin and pin securely. All the ribs and the short spar can be glued and pinned in position.

When dry, the wing can be lifted from the board and the leading and trailing edge strips planed to profile ready to receive the top wing skin. The top skin can now be glued on, use plenty of pins here, work from the trailing edge to the leading edge and make sure the wing is flat as any twists cannot be rectified afterwards due to the rigid nature of this structure. A useful tip for pinning the top skin accurately to the ribs is, to insert a pin into the building board marking the position of each rib at the leading edge and the trailing edge, join the pins with nylon thread to mark the line of the rib beneath the top skin, this acts as a guide when pinning the top skin to the ribs. Push plenty of pins into the leading edge to ensure that no gaps occur. It will be necessary to roughly trim the top skin to the taper of the wing to aid workability, do this once the skin is partly in position as a common mistake is to make the top skin the same as the bottom skin, resulting in a nice gap at the leading edge due to the cur-

With its clean, V-tailed outline the Electro jet's looks confirm its performance.





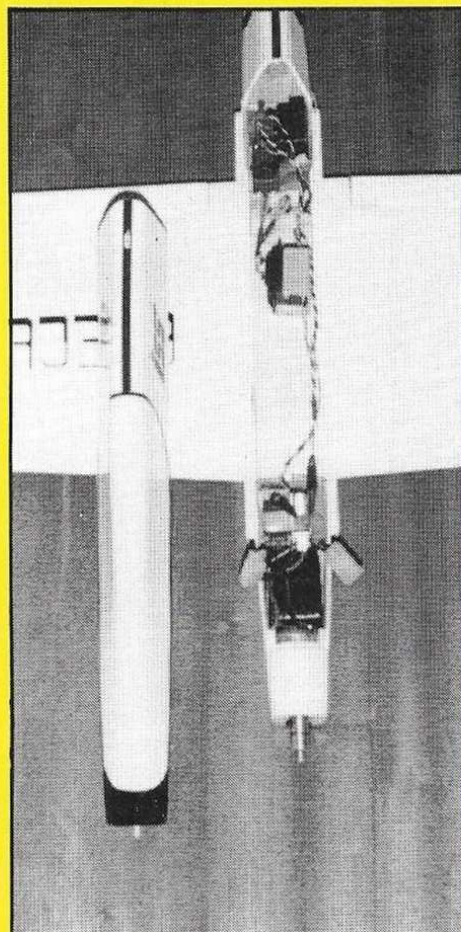
vature of the ribs (no matter how hard you try you cannot stretch balsa wood). Add tip and tip gussets then sand to shape. The ailerons are cut from 25 x 6mm trailing edge stock and the hinge line vee'd. Aileron cranks are bent from 14s.w.g. wire, the bearing being formed by grooving a piece of trailing edge stock, greasing the crank with vaseline and gluing the assembly in place with epoxy but be careful not to be too liberal with the epoxy otherwise you could end up with a bell crank epoxied firmly in place.

Tailplane

Tailplane and elevators can be cut from 100mm wide balsa, 4.5mm thick. It is very important to put the transverse grain tips on the tail to prevent any warping later on. The 16s.w.g. elevator cranks and their bearings are formed in the same manner as those for the ailerons. The dihedral on the tailplane is 100mm under each tip, anything less than this could cause lateral instability during flight, not a recommended in built feature for any aircraft.

Fuselage

Commence by cutting two sides from 1.5mm balsa, then cut and glue on the 6mm dummy engines. Cut out all formers and mark their positions on the inside of the fuselage sides. Join the fuselage sides together with formers F2, F3 and F4; the fuselage will be quite flimsy at this stage so take care. Form motor tube by wrapping a strip of paper around the motor case, gluing each wrap (take care not to glue the paper to the motor). Make sure that the motor can be withdrawn from the tube and then leave motor in tube. Glue motor tube, complete with motor, between fuselage sides and clamp in place ensuring that the thrust line is at 0°. Once dry, fill in around tube with scrap balsa to form a solid nose. Pull in rear fuselage sides and glue in formers F5 and F6, tailplane mounts and leave to set. Sheet bottom of fuselage and glue in the 1.5mm vertical grain balsa doublers to the nose.



The top deck can be removed to get at the radio gear.

The wing can now be stuck to the fuselage, replacing the cutouts in the fuselage sides with 3mm balsa over the wing root. Make up a 16s.w.g. wire 'y' connection for the elevators, secure this to one end of a snake rod, couple to elevator cranks and glue tailplane and snake assembly into fuselage.

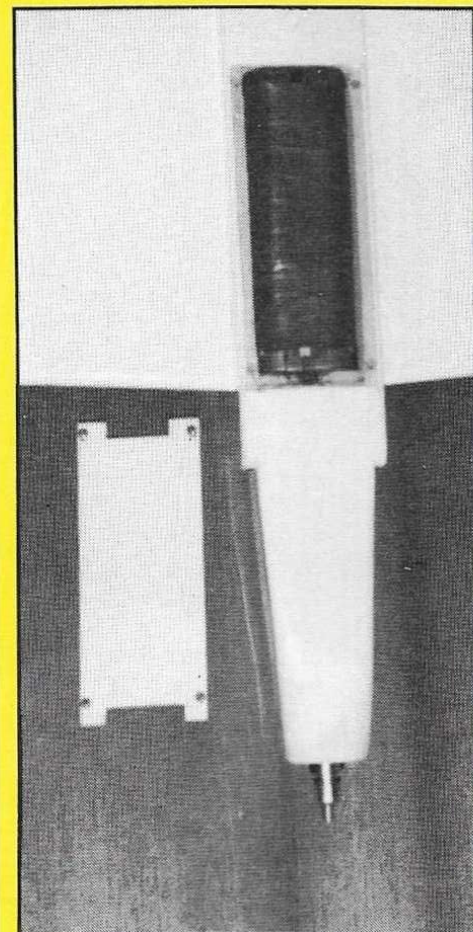
Pin F8 in position, as this needs to be detached later, and glue on the top spine. The top deck sides are fixed in position but do

not glue where the radio hatch will be. The front top deck is built up, former F1 glued in place and the whole fuselage is then sanded to the required shape. Cut through the top deck and release the radio hatch, glue in formers F9 and F10. Fit radio hatch catch and front dowel. Make the battery bay cover from 1.5mm plywood with slots to provide adequate cooling for the batteries. This is secured with self tapping screws into ramin dowels let into the dummy engines. The dummy engines will need to be rebated to receive the battery cover and to allow it to fit flush with the fuselage bottom.

Lightly sand the structure to give a nice smooth surface and apply heat shrink film covering in your own favourite colour scheme.

Radio Installation

As can be seen from the photographs, micro sized radio equipment is not a must but is an advantage. My own equipment is not tiny by any means but I managed to shoehorn it in. The only pre-requisite is a small (225mAh) receiver battery pack to save weight, the 500mAh battery being too bulky and heavy. All servos are secured to the inside of the model with double sided servo tape.



The battery pack is reached by removing the belly hatch.

Motor/Battery Installation

As I expected in the introduction, quite startling results can be expected from this model using a standard Mabuchi 540s motor and any 6 or 7 cell 1.2Ah nicad pack, provided the all up weight of the model is kept to around 1kg (2.2lbs for you imperialists). The motor is just a push fit into a paper tube built into the fuselage. Please ensure that your motor has adequate capacitor suppression to prevent



it from interfering with your radio receiver.

As regards the switching arrangements for the motor, I prefer to use the simple method of a micro-switch operated by a

servo, thus giving an on or off situation. As this model is intended for aerobatic flying the motor must be on all the time during the flight.

The battery pack can be packed into its compartment with foam rubber just enough to prevent it from shifting around during flight. The battery plug/lead is fed through the hole in former F2 so that the plug is accessible from the top of the model when the radio hatch is removed.

Flying

With the control surface deflections and the centre of gravity set as shown on the plan this little model is quite responsive and will certainly keep you on your toes when flying. Once airborne it has a very good turn of speed, it has no vices and if built accurately will give none of the initial flight nasties generally experienced with small models. Electro-Jet is quite manoeuvrable, loops, rolls, Cuban eights etc., even inverted flight is possible. However, I would advise you not to attempt any outside looping manoeuvres because there is insufficient power in the motor to pull a flat bottomed wing through these manoeuvres. So, remember this motto "Bunts Equals Bits". Pylon race type turns are very exciting, Electro-Jet executes these turns with great precision and little loss of airspeed. So come on all you budding electric flyers, it is not as specialised and expensive as you think, build yourself an Electro-Jet and have some clean quiet fun.