

EXP 1R

I decided to continue my efforts in producing attractive, unusual models and this, my latest creation, has seemed to spark off quite a lot of interest both in my club at Widness and a couple of others in the North West area. This model with its twin booms, high mounted tail and pusher engine

configuration does look very different in the air to say the least.

What's in a name?

The name, 'EXP 1R', was arrived at mainly due to my hopelessness at making up names and also making templates for letters!

correct antenna for proper reception). Anyway, I digress; the original model flew so impressively while it was in the air I just had to build another to replace it, hence the birth of 'EXP 1R'.

Many people have asked me why I use a flat-bottomed wing section on my electric models? The answer is simple; (i) for ease of construction, i.e. the wing can be built flat on a board and requires no jiggling, and (ii)

flight performance - for a given speed a flat-bottomed airfoil section will generate more lift than a symmetrical airfoil, so, at the end

of a run when power is at an absolute minimum, landings can be stretched that much further using a flat bottomed wing without the model falling out of the sky.

Now, let us cut some precious balsa.

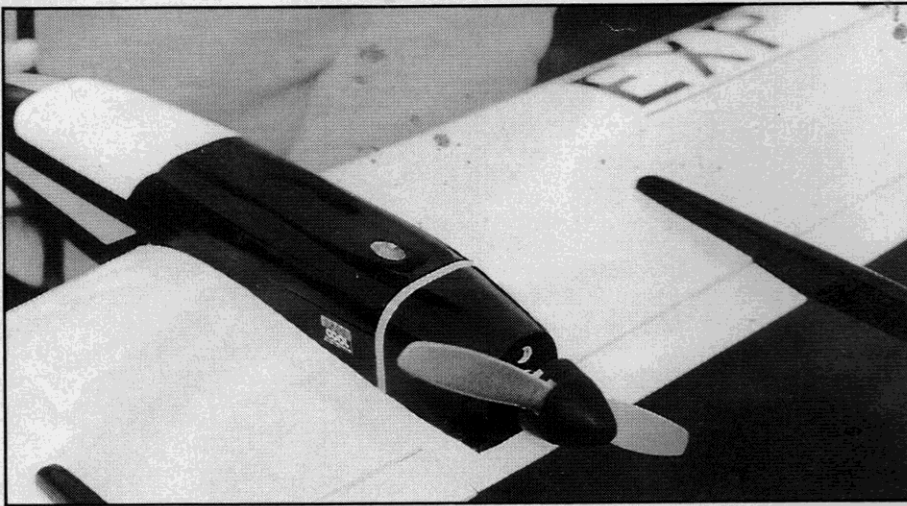
Wing

I always seem to opt for constructing the

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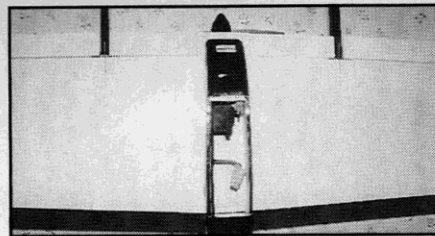
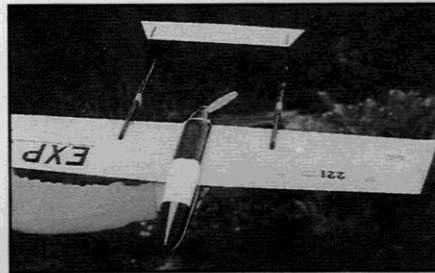
I have been flying electric powered models for almost two years now, and I have been striving to produce some unusual but attractive electric aircraft. Readers will have probably seen my previous design 'Electrojet' in another modelling magazine, which has proved that electric flight is not all large area, lightweight and flimsy aircraft but can be compact, attractive, manoeuvrable and lots of fun.

The original was named 'EXP 1' but, unfortunately, it met its demise on its first outing due to radio problems. After analysis of the disaster I discovered to my horror that I had been flying with no aerial on my receiver yet was able to achieve some 80 metres range which, for my Century Systems club receiver, is exceptional (excellent bit of kit, I would recommend this equipment to anyone provided it has the

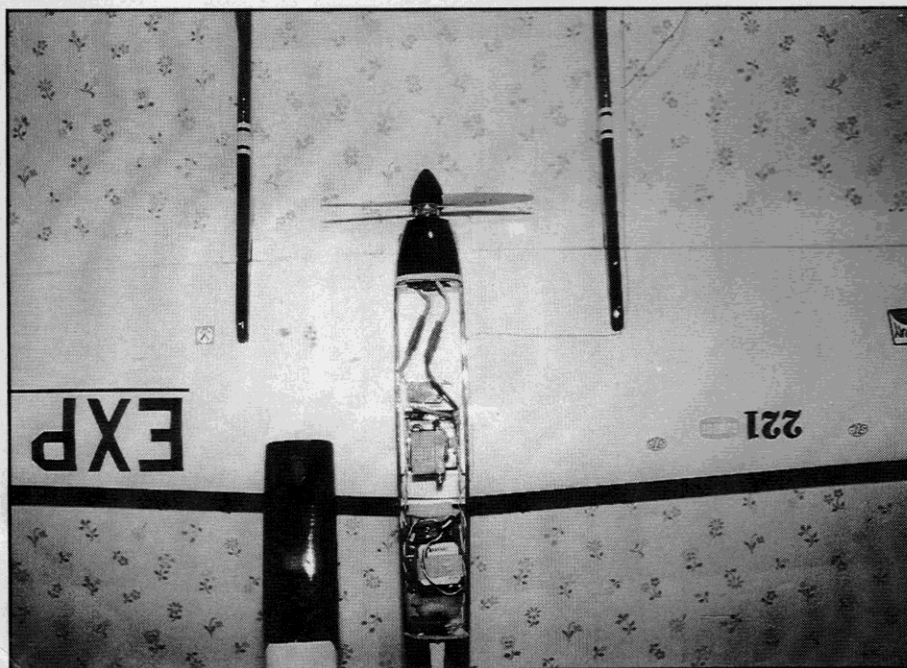


wing first when I am building a model. Commence by forming the two wingskins by butt jointing two 100mm wide by 1.5mm thick sheets of balsa for each skin. The top skin will require a further 25mm wide strip glueing on to allow for the curvature in the wing section. Set the skins aside to dry and, in the meantime, cut out all the ribs and make them all the same size. Once the wingskins are dry, sand them smooth and lay the bottom skin on a flat building board and transfer all the planform and rib spacing measurements from the plan to the bottom skin. Glue on the 6mm square false leading and trailing edge strips and trim up all the ribs to the correct length, cutting them off at the trailing edge.

The correct taper in thickness of the wing can be achieved by skewing the template on a full-size rib and trimming to shape. Glue in all ribs, 3mm horizontal grain spar and the extra supports for the booms (note that the starboard side is different to accommodate pushrod exit). Glue in the 6 x 3mm balsa supports and the 1.5mm ply



Six Sanyo SCR cells power a Demon 540 motor driving a 7x4 prop in the prototype; model is quick and highly manoeuvrable.



bellcrank plate, fabricate bellcrank and pushrod assembly and install into the wing. A good tip here to keep the bellcrank at neutral is to make the pushrod from the bellcrank to the centre of the wing the correct length so that when it hits the centre rib the crank is at neutral.

Plane the leading and trailing edge strips to profile of wing section and glue on the top wingskin. Use plenty of pins to hold every joint down both to the ribs and the leading and trailing edges. You will find that the top skin will require trimming along the leading edge to facilitate the adequate securing of the sheet at this point. Once this assembly has dried overnight it can be lifted from the board, all waste ends and edged trimmed up and the leading edge capping fixed in place. Add tips, tip gussets and filling pieces and sand to shape when dry. All that remains now is to make up the ailerons from 32 x 6mm trailing edge section and glue on the aileron cranks. The bearings for the cranks are formed by grooving a piece of t.e. section and fill with epoxy, grease the cranks with Vaseline and put this assembly in place on the wing. Once the epoxy has set the cranks should remain free...

Tailplane

Use medium to light 4.5mm balsa for this unit because a light tail end will be less prone to damage if whipping occurs or rough landings. Ensure that the tips have their grain at 90° to the grain of the tailplane as this stiffens the tail and also prevents warping. Sand to airfoil section ready for finishing.

Fuselage

Cut out fuselage sides and formers F1, F2 and F3, mark former positions inside of fuselage sides then glue on the 6mm triangular longerons. Join the fuselage sides with formers F2 and F3 and leave to dry. Pull the nose together and glue in former F1. Make sure that the rigging angles of the wing and the motor are as the plan. Cut F4 from 1.5mm plywood and hole to suit your motor mounting centres. Glue in the 6mm doublers at the rear of the fuselage followed by the 9mm triangular fillets to support the motor. Glue the 6mm cross-grain top and bottom sheeting and the nose block, allow to dry then carve and sand to shape. Relieve F3 to give internal access to the motor, mount the motor onto F4 and glue F4 to the rear of the fuselage along with the 6mm balsa infill underneath.

Once dry, remove the motor and carve and sand the fuselage rear to shape. The concave flutings at the rear of the fuselage can be achieved by using sandpaper wrapped around a 20mm dowel. Remove the underwing section of the fuselage to within 25mm of the leading edge using a splice cut and set aside for later use. Glue the fuselage to the wing and replace the previously cut out section under the wing. Cut and release the top hatch from the fuselage, install the hatch catch and the 2.5mm diameter ramin retaining peg, cut out the 6mm balsa belly and fix on the 1.5mm ply locating tongue and recessed hatch fixing screw reinforcement.

Fix in the 6mm square spruce bearers to receive the top hatch hatch pin and the belly hatch retaining screw. An optional air cooling duct may be formed at the rear of the top hatch to cool the motor. Cut and glue in the 3mm balsa floor at the front of fuselage and remove the bottom portion of F2 under the wing to form the main battery bay. Add the 1.5mm vertical grain balsa doublers to the main battery bay commencing at F2 and going back to the end of the belly hatch.

Booms and fins

The booms are constructed from 0.8mm birch plywood sides with 6mm square hard but light balsa longerons and 6mm balsa infill pieces all made up as a sandwich. Please note that the front infill piece on the starboard boom is shorter than the one in the port boom; this is to allow the passage of the elevator pushrod. Don't forget to build in the bowden cable outer for the elevator. The fins are cut from 4.5mm med. balsa, sanded to an airfoil shape and glued to the booms. The starboard fin is grooved on the inboard side to receive the bowden cable outer for the elevator control.

Covering/assembly

The covering that I would recommend for this model is Solarfilm because it is light, colourful and durable. To avoid frustration it is best to cover each individual part before

being assembled, add trim to suit your own taste, remove coverings in areas to be glued and assemble all the unit parts. Don't try to glue on top of Solarfilm because there has not been a glue invented yet that will satisfactorily adhere to film coverings. When fixing the booms on don't forget to solder on the bowden cable to the pushrod. Peg the booms to the wing and also the tail to the fins; this will afford a little extra strength to the joints. Hinge all the control surfaces with mylar strip hinges.

Radio installation

Cut out the top skin of the wing within the fuselage to locate the pushrod for the elevator, box out in scrap balsa to form a well large enough for your servo and secure servo with self-adhesive double-sided foam tape. The aileron servo is mounted underneath the wings as far back as possible. A small access hole will need to be cut in the rear of the fuselage to effect all work to the aileron linkages. The servo and micro-switch controlling the motor are mounted on top of the wing and the receiver and battery in the top front of the fuselage. This leaves the void in the bottom of the fuselage for moving the main battery around to achieve the correct centre of gravity. All control surfaces should have plus to minus 7mm movement.

Power plant

This model will fly comfortably on a

Mabuchi 540S and six or seven cell nicad pack. My own is powered by a Demon Mr T 540 motor with six Sanyo SCR cells. This motor is turning a 7 x 4 pusher propeller at a very fast rate indeed, reflected in the flight performance.

Flying

The first thing to do after charging your batteries and doing a range check is to find yourself a brave helper who does not mind the hairs on the back of his/her hands being removed every Sunday afternoon! With the centre of gravity and control deflections set as shown on the plan and an all-up weight of 1kg or less, no problems should be encountered with this model. The only trim change required on the prototype was a little up elevator.

'EXP 1R' is very quick and smooth in the air; it is also quite manoeuvrable and lots of fun to fly. However, do not attempt outside looping manoeuvres because there is insufficient power in the motor to pull that flat bottomed wing through these manoeuvres but inverted flight is OK with a generous amount of down elevator to keep the nose up!

Conclusion

This model is cheap to build, it is quiet, clean and lots of fun to fly so, if you are looking for these qualities and an out of the run unusual model, try an 'EXP R1' and surprise yourself and your clubmates. 