

AEXI

FOR '15' SIZE ELECTRIC MOTORS & 9.6v. BATTERY

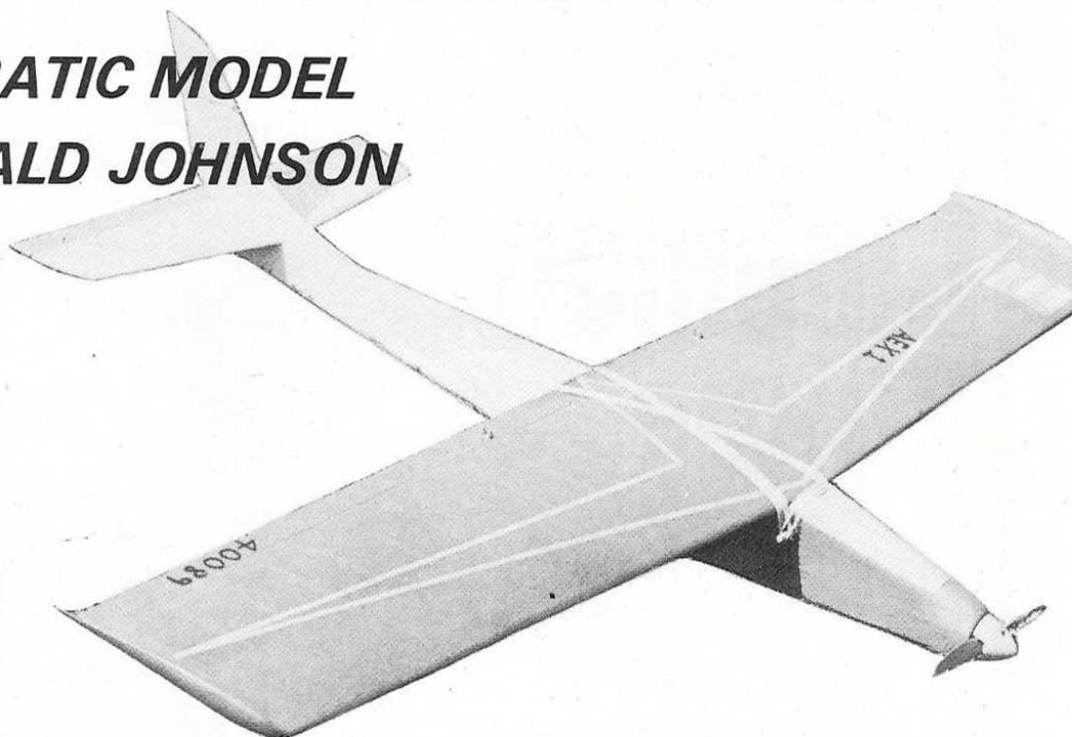
51" SPAN AEROBATIC MODEL DESIGN BY GERALD JOHNSON

ELECTRIC powered flight is becoming a popular branch of our hobby and we have seen many recent improvements in the purpose designed motors and power packs offered by various manufacturers. The established modeller will find that electric powered models are very different from I/C powered models. The power available from a '15' size electric motor is far less than a .15 cu. in. internal combustion engine. A 1.8 c.c. (.10 cu. in.) motor would approximate the power (remembering of course that 14 ozs. of permanent ballast in the form of a flight battery has to be carried).

For best performance, the airframe of an electric powered model has to be of larger area and lighter weight than the norm for I/C power. My approach to electric flight was to accept the weight/power of the 15 size unit, and develop an airframe to suit. Anyone who has built and flown thermal soarers will appreciate the strength of an apparently light/weak structure. Soft wood is not the complete answer, careful design and careful selection of building materials can lead to both lightweight and rigidity. A look at free-flight open-powered model construction will give a good indication of the type of airframe needed.

The AEXI has a wing area of 450 sq. ins. the weight of the completed airframe is 17.5 ozs. The flight pack and radio equipment bring the total weight to 48.5 ozs. which includes 20 ozs. of flight pack plus 11 ozs. of radio equipment. This results in a wing loading of 15.5 ozs./sq. ft. By removing the propeller and flight battery, and adding 2-3 oz. of ballast in the nose, the model can be flown as a slope soarer of 35 oz. weight with a loading of 11 oz./sq. ft. In the pure slope mode using two servos and with the R/C equipment relocated forward, the model weighs 27 ozs. with a wing loading of 8.6 ozs./sq. ft.

Construction is not complicated. I have taken the full size axiom of 'simplify and add lightness'. Wood selection is important, using straight quarter grain balsa throughout, apart from the wing tip blocks, which can be as soft as can be obtained.



Fuselage

Cut out the fuselage sides, and mark the position of the longerons below the wing. Then pin down the sides and glue in all the doublers $\frac{1}{16}$ in. \times $\frac{1}{4}$ in. spruce longerons and fill-in pieces X. The $\frac{1}{4}$ in. \times $\frac{1}{2}$ in. motor support is also fitted at this time. Roll the motor tube from $\frac{1}{16}$ in. ply, using the motor wrapped in Clingfilm as a former. When joining the fuselage sides to the formers, start with F1 and F2. Sand the motor mount area to accept the motor tube and epoxy this into position, using Sellotape to hold the sides firmly to the tube. There is no down or side thrust. Add the rear formers, and when these are dry the remainder of the fuselage can be completed. Ensure the $\frac{1}{4}$ in. sheet fill-in at the bottom of formers F1 and F2 is a good fit and well epoxied as the weight of the battery is taken on this.

Wing

As the wing has $\frac{1}{2}$ in. of dihedral to each panel the basic structure is built in two halves and joined later. Cover the plan with Clingfilm

or polythene and pin down the spars in position over the plan. To set the ribs parallel to the building board, a piece of $\frac{1}{2}$ in. \times $\frac{1}{4}$ in. is pinned diagonally across the rear portion of the plan for the ribs to rest on. Now with the root and tip ribs in position the rest of the ribs will be held parallel by the diagonal. Add leading edge, trailing edge, and top spar. When dry, remove one panel from the board and epoxy it to the other, packing it one inch at the tip. The $\frac{1}{4}$ in. \times $\frac{1}{8}$ in. spruce centre spars can be epoxied in place - they are in one piece and can be steamed to the dihedral angle. The centre ribs are now cut away for the servo compartment and the one piece top centre section rear sheet added. Next, the top leading edge, trailing edge sheeting and cap strips are attached, using white glue. Before repeating this process on the bottom install the servo mount and nyrod.

If the wing is to be covered with plastic film, and the same material used for the aileron hinge, I would recommend completing the aileron covering/hinging before covering the rest of the wing. If covering with tissue the hinge is fitted after both wing and aileron are covered. This gives a trim line to the colour scheme.

Motor installation

The flight pack used in the AEX I is a '15' size electric motor, and an eight 1.2.volt Nicad pack. The switch is an Acroelectric 250/1 amp as used by model train enthusiasts.

The motor is a push fit in the motor tube. This should be adequate but if however, the motor moves under the starting torque a strip of P.V.C. tape wrapped around the front of it will tighten the fit. Don't cover up the cooling slots, cooling air in this model comes through the front of the motor, and exits through the slot in the rear of the canopy.

A no-load neutral set up is used on the switch installation. The switch toggle is drilled to accept a length of 16 swg wire which is soldered to a brass 'Micro-Mold' nyrod end. Mount the switch so that the wire slides freely through the hole in the toggle. To operate the switch, a 16 swg wheel collet is fitted either side of the toggle. To set up the position of these put the switch to the 'off' position, move



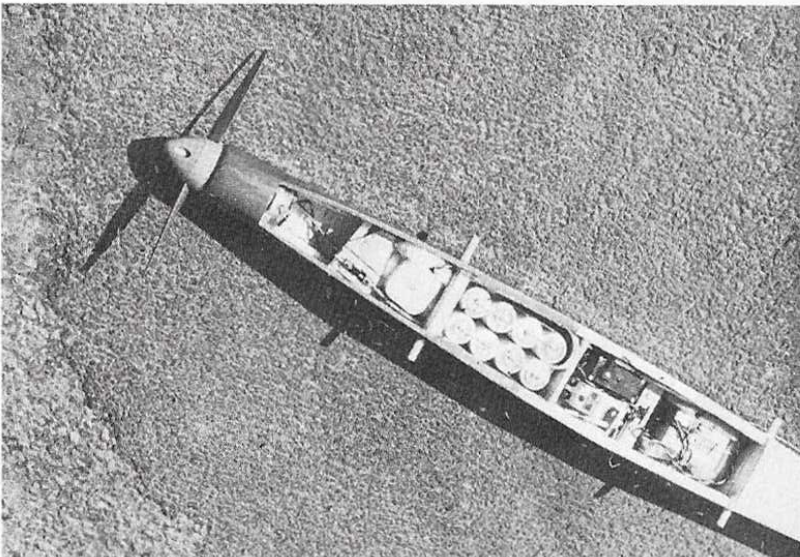
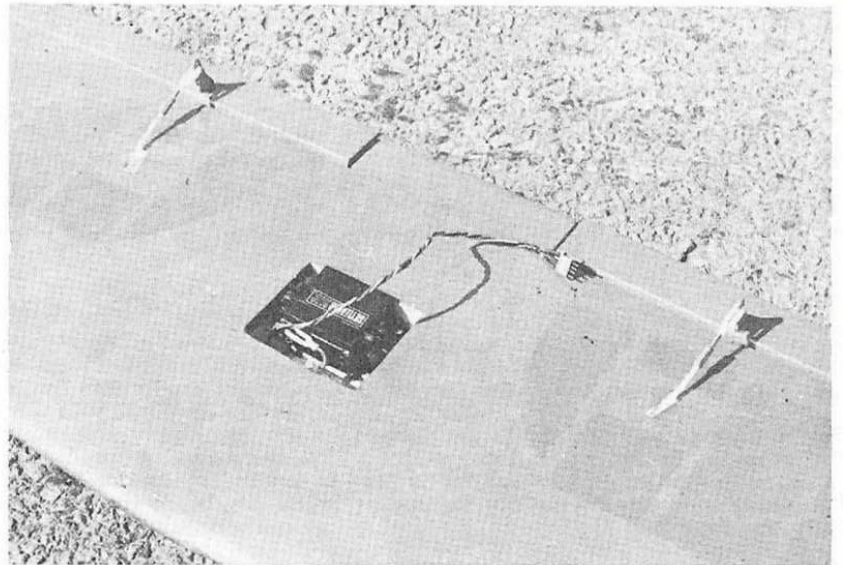
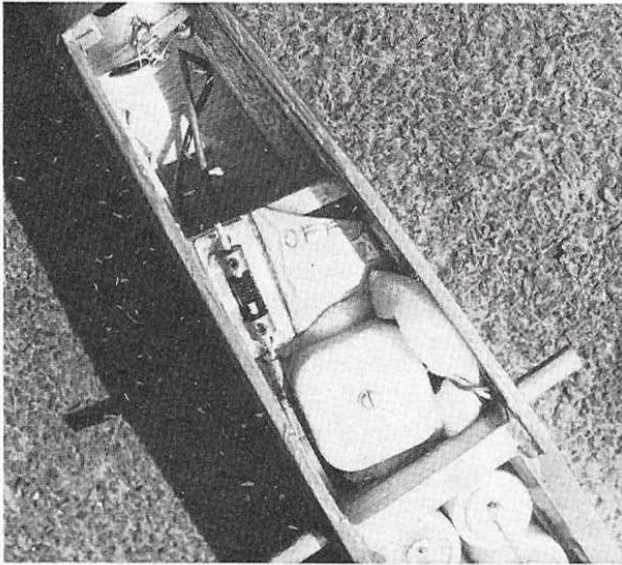
Above: the aerobatic slope-soarer parentage is evident in AEXI. Without the battery pack the model performs well off the slope or from a bungee launch. Left: Gerald Johnson launches AEXI - a smooth steady climb-out should be aimed for until speed has built up.

the TX stick fully one way and switch off the RX. Now slide one collet up to the toggle and lock it in position, repeat the process for the 'on' position. With the servo at neutral, neither collet is touching the toggle so that a no-load set-up results. By pushing the TX stick fully one way or the other the motor will be switched on or off. DO NOT carry out this installation with the flight battery connected.

Flying

I have tried various propellers and have settled for a Cox 7 in. x 3 in., although not the ultimate, and a thinned glass fibre copy of this prop might be the answer if you can afford one.

Initial climb out is slow, so be careful not to over-control. The best way of gaining height is a wide, shallow spiral climb. Don't forget the thermals, even with a high loading, good lift will prolong flight time.



Top left: servo operated 'No load' on-off switch for flight motor. Above right: moulded plastic servo mount used on the original for wing mounted aileron servo. Left: front hatch and wing removed to reveal closely fitting airborne systems. Below: Hoerner anti-vortex tips are employed which contribute to drag reduction.

