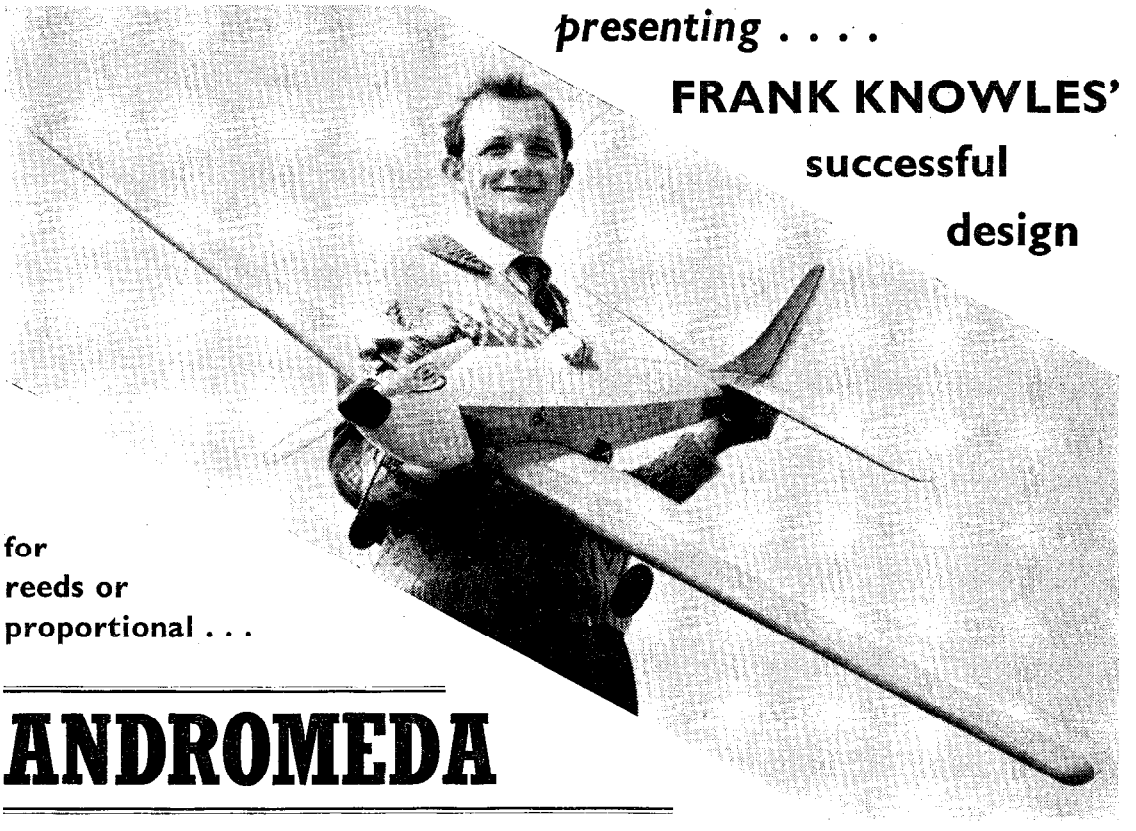
presenting . . . .

FRANK KNOWLES' successful design



for reeds or proportional . . .

ANDROMEDA

ANDROMEDA is a multi-channel aerobatic model, with a layout which is suitable for either reed or proportional gear—having been flown with both. The original first flew in November 1964, powered by a Merco 61 and controlled with F. & M. reed equipment and Bonner servos. The model weighed in at 6lb. 6oz. and the Merco had plenty of power to take her through square loops, square bunts and even horizontal square eights.

Andromeda showed great promise for competition work, so in March 1965 I proceeded to Great Saling for the first competition of the season. In the scramble to get in a test flight, however, I forgot to carry out a check on the equipment at take-off. *Andromeda* took off beautifully, made a smooth turn to the left—and continued turning, right back into the ground about 150 yards downwind. All without receiving a single signal from me! Of course, I immediately demanded to know whose transmitter was switched on, only to make the dismal discovery that my own was switched firmly off! So, be warned: no matter how much flying experience you have, *go through your cockpit drill.*

The damage, however, was not so bad as it at first appeared; the wings, in fact, were hardly damaged at all. Repairs were quickly carried out and *Andromeda* was very soon flying again. This time I installed a set of C. & L. Servomites which gave very good service for the rest of my career with reed equipment. The model flew with this set-up to place second at the 1965 British Nationals.

Shortly after the Nationals, I obtained F. & M. Digital 5 proportional gear, with which I have flown this model ever since. The only modification I have carried out since this time is the addition of the small underfin. There was a slight tendency for the tail to waggle in turbulent air, so I experimented with a thick fin but found little improvement. The underfin, however, made all the difference.

At the time of writing, *Andromeda* is still flying well, although the weight is now in the region of 7lb.—due, no doubt, to the amount of oil that has worked its way into the airframe. I feel that the model will perform well, therefore, with the weight anywhere between 6¼ and 7½lb.

Building the Model

Fuselage. Cut out the engine bearers exactly to the drawing, noting the differing shapes of right and left-hand pieces. Next make the tank tray from ⅛in. sheet balsa. Working over the plan, cement the bearers to the tank tray and add ⅛ x ½in. cross members between the bearers. (These can be removed after assembly). Now cut out the ¼in. ply former F.1, and cut out and laminate F.2 and F.5. Make the ⅛in. sheet doublers, D.1 and D.2, exercising special care over the angles. Using "Aerolite" or "Hobby-Poxy" glue, fit F.1 and F.2 into position, pressing up hard against the front and rear of the tank tray. Before the glue sets, fit D.1 and D.2. Hold the whole assembly together with pins and rubber bands until set. The nose assembly now has the downthrust and sidethrust built in. When the glue has thoroughly set, drill the engine bolt-holes and fit mounting blocks for whatever nosewheel gear is to be used.

Now cut out the ⅛in. sheet fuselage sides, carefully marking the position of F.2 on them. Make the ⅛in.

balsa doublers and cement them into position on the fuselage sides, followed by the $\frac{1}{8}$ x $\frac{3}{8}$in. longerons and uprights. The fuselage sides are now cemented to the nose-unit, lining the assembly up carefully. Pin or clamp into position until thoroughly set. The next step is to lay the fuselage upside down on the plan and cement F.2 and F.5 into position, followed by $\frac{1}{8}$ x $\frac{3}{8}$in. cross-members at the former positions, once again laying the assembly aside to set.

While the fuselage assembly is drying, you can build the tailplane, as this will be needed next as it has to be cemented to the fuselage at this stage. Construction is quite straight-forward, no additional notes being necessary. Cover it with nylon and dope it before cementing it to the fuselage. Use plenty of glue for this joint.

Now cut out the curved top formers, F.6-F.9 and cement them to the fuselage top. The 3/16in. square stringer should now be fixed along the top of the formers. If the fuel tank is to be fitted permanently, it should be installed at this stage. Access to the tank for maintenance is through the engine bay. Now plank the entire top of the fuselage with $\frac{1}{8}$ x $\frac{1}{4}$in. strip. After this the fin is made from soft $\frac{1}{2}$in. sheet and cemented in position on top of the fuselage. making sure it is accurately aligned, both vertically and directionally fore-and-aft.

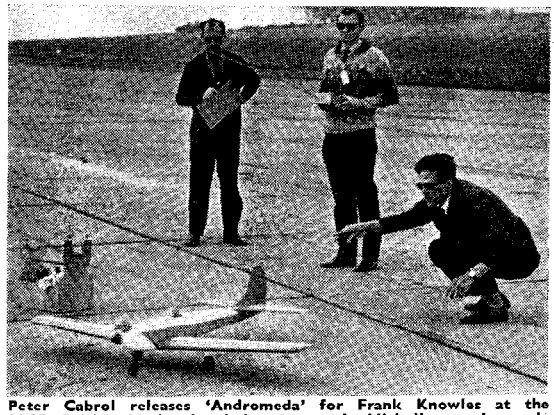
Plank the underside of the nose with $\frac{1}{8}$ x $\frac{1}{4}$in. strip. After finishing, this section may be strengthened with fibreglass if desired. Sheet the bottom of the rear fuselage with 3/32in. sheet and cement the underfin into place. Make-up the nose-block from pieces of $\frac{3}{4}$in. sheet. Now fit the 1/16in. ply nose former and carve the blocks so as to blend with the fuselage planking and the nose ring.

Make the elevator, covering and doping it and adding the control horn. After fitting the elevator (using whichever type of hinges you prefer), insert a small piece of block to connect the trailing edge of the fin to the fuselage, as shown in the side view on the plan. The entire fuselage should now be rubbed down and covered with nylon or silk. Finally, make the rudder and fit it after covering and doping.

Wings. First cut out all the wing ribs and the 3/16in. sheet mainspar. Now assemble the ribs on to the mainspar *without cementing,* and check that the fit is not too tight, as this would cause the spar to twist. When satisfied, pin the spar down on the plan. The ribs may now be cemented into their slots, and the bottom trailing edge sheet into the slots in the ribs—cementing to the ribs only, not the lower part which merely acts as a jig, being removed after completion. Now cement the $\frac{1}{8}$in. square trailing edge spar in position, followed by the top trailing edge sheet. Make the $\frac{1}{4}$in. sheet leading edge spar and cement it into position. Now add the 3/32in. sheeting—on the top surface only at this stage—and the 3/32 x $\frac{1}{4}$in. cap strips. Lift the wing half from the plan and check for trueness.

Repeat for the other wing-half.

Trim the wing-roots until the wing-halves fit together neatly at their correct dihedral, which is given by the key piece, and cement them securely together. When set, remove a section from W2 and W3 to clear the doubler. Cement the $\frac{1}{4}$in. sheet doubler into position on the spar and fix dihedral braces at the leading and trailing edges. Now fit the undercarriage rails and check the fit of the undercarriage. The lower sheeting may now be added and the wing checked for warps by laying it on a flat surface. It is at this stage that the now surplus "jigs" are removed from the wing-ribs. Finally, make and fit the soft block tips.



Peter Cabrol releases 'Andromeda' for Frank Knowles at the 1965 British Nationals. Judge Henry J. Nicholls stands ready with score sheet.

The wing is covered with nylon and doped before fitting the ailerons, which are made from pieces of hard 1 x $\frac{1}{4}$in. trailing-edge stock.

Installation details

The aileron horns I use are standard "Soraco" fittings. The elevator and rudder push-rods are $\frac{3}{8}$in. square balsa and the throttle push-rod is 16g. piano wire in a brass tube. The end of the wire nearest the engine is annealed for a length of 2in. by holding it in a flame until it becomes a dull red and allowing it to cool slowly. This makes for much easier adjustment of the length of the rod when installing it in the airframe. The elevator horn I used is of dural as I could not obtain a nylon horn with sufficient holes at the time of construction. The rudder horn is a standard nylon fitting.

The aileron servo is screwed into the cut-out in the wing and has a standard commercial strip aileron linkage. All the other servos are screwed to the sides of the fuselage if using Bonner or similar servos. I have found that this prevents most of the damage usually sustained by the Rx in the event of a bad crash. If proportional gear is being used, it is advisable to *bond* all metal-to-metal linkages. This is quite a simple job. For example, on the aileron horns I solder one end of a piece of light-weight flex to the horn, take one complete turn around the 12g torque-rod and solder the other end to the tube. This allows plenty of freedom of movement but prevents any extra noise going to the receiver!

Next month—"Trimming Out".