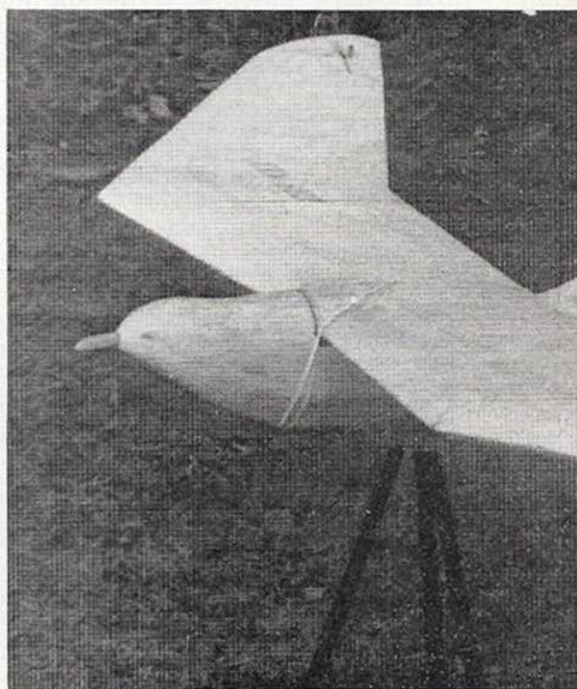
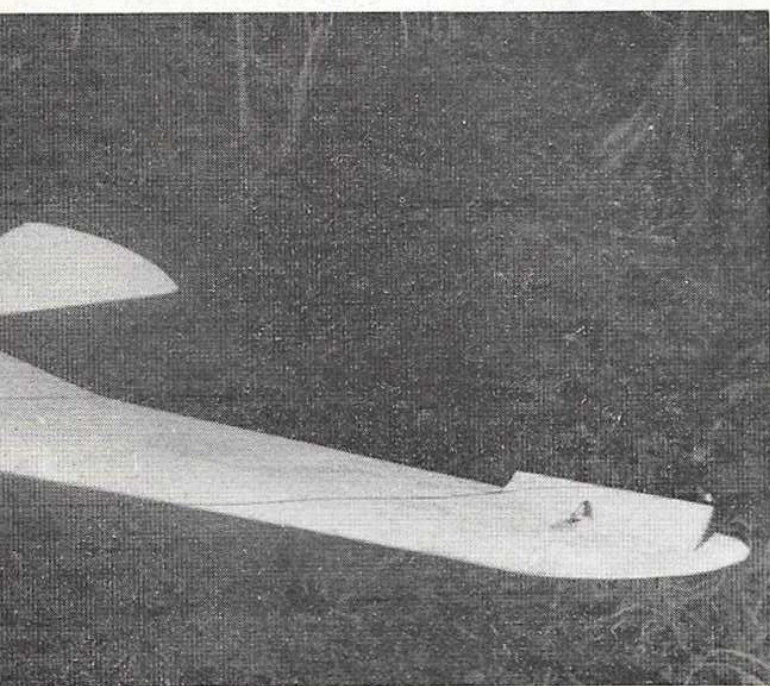
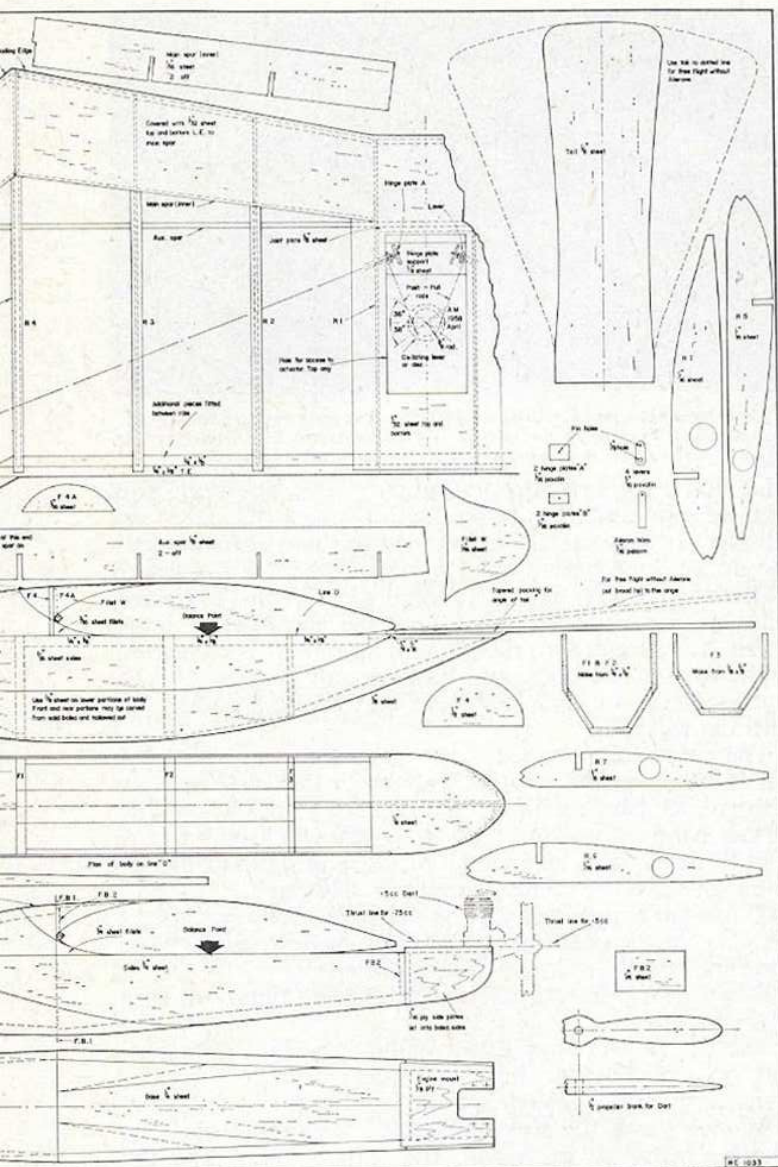


CRI-KEY & FANTAIL

...if you really are looking for something different, try this 54½ in span powered or soaring 'bird' for size

BY _____ HOWARD BOYS





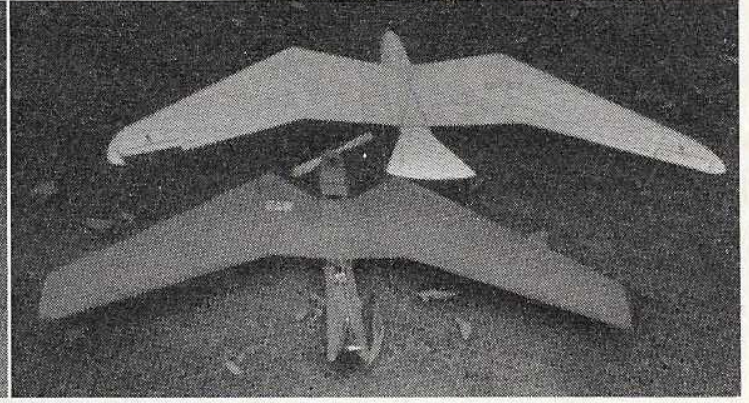
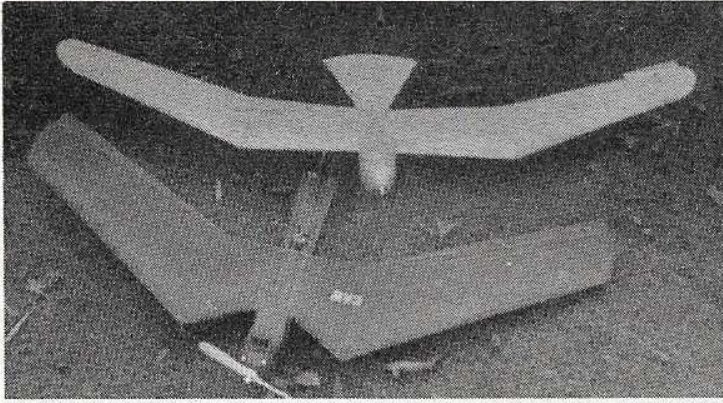
WHEN visiting Old Warden, I saw the fuselage of *Archaeopteryx*, and remembered it landing at Sywell many years ago. The flying was most impressive and Mr. Grainger had said they fitted a rudder because it gave better steering than ailerons. My early R/C models (Circa 1948-50 Ed.) steered well on ailerons but difficulties arose when changing to all-transistor radio. The reminder of *Archaeopteryx* caused the building of a small fuselage with rudder, and Mills .75 c.c. engine, and using the outer panels of the 1948 record model, which were also the wings of my first large rocket model in 1945, resulted in some very good flying.

The only difficulty was the very far forward position of the wing. A new wing of different shape was made, and the name CAW seemed natural so it was covered in black paper. The next model, of course, just had to be 'Cricky', covered white with a Sea-gulls head. Since a small model called 'Tweet' had been made some years ago a few more names soon came to mind. 'Fantail' a pusher version, 'Orter Wagtail' a G.G. version of 'CAW' and 'Flapwing' a G.G. version of 'Fantail'.

Originally 'Fantail' was to have more sweepback to carry the rear mounted engine, but the Editor was once criticised for too many unorthodox designs, so it was decided to go further forward for balance. First flights with 'Fantail' were made with the Mills .75 c.c. engine, but the speed and climb were so good that a .5 c.c. Dart was tried, and found to give very good flying, using a left-handed prop. carved from a bit of straight-grained firewood. A diameter of just over seven inches and pitch of about four inches gave satisfactory results. A copy of half the blank used is drawn on the plan (Don't forget to make two blades!).

To start building, first cut out the wing ribs and main spars. Put the ribs in position on the plan, holding them in place with a pin each side, front and back. The main and auxiliary spars are then pushed down on over them, and the trailing edge and leading edge spars also held in place with pins. The trailing edge spars will need packing up in line with the ribs. Note that at this stage the trailing edge spar goes right out to the tip in one piece. A spot of quick drying cement is put on each joint to tack it in position. The structure can now be lifted from the plan and the cement of one's choice applied to each joint. The structure, which will be one half wing is then put on a flat board to dry, and the other wing is built in a similar manner over the other side of the plan. Some cements take a matter of hours to dry, but since the wing structure can dry out on a flat board, the plan can be used for building the body. The next job on the wing is to add the 1/32 in. sheet. Start with the inner part. Pin a piece of sheet to the bottom of the main spar and carefully bend it round the ribs and pin to the leading edge. Cut the ends to be in line with the middle of ribs 1 and 4. At this stage cement this sheet to the main spar only. The sheet for the bottom, outer part is cut and fixed in the same way. With the wing on a flat board, the T.E. jig strip is put under the T.E. so that twist must be held with weights on the wing, and the sheet cemented to the leading edge. After the cement has set the sheet should be trimmed flush with the L.E. With the T.E. jig strip still in place and the wing weighted down, the top sheet can be put on in a similar manner to the bottom. The tip can now be cemented on.

Cut away the rear part of R8 and fit A.S. and the ribs I.R. and T.R. then the 1/4 in. x 1/16 in. strips top and bottom of A.S. The aileron is now built up with bits of 1/16 in. sheet packing, (which is later removed) between T.R. and T.R.A., I.R. and I.R.A., and A.S. and A.S.I. Add the 1/4 in. thick pieces alongside I.R. and T.R. Fix M.R. and the 1/4 in. x 1/16 in. strips top and bottom behind A.S.I. Cut holes in these strips and fix the aileron horn, being liberal with the cement. Fix the little paxolin



plates up in the corners for the hinges. When all the cement has set, remove the packing and put in the hinge pins. The pin heads must not press tightly on the plates, but give slight end movement. Cut gaps in the T.E. at each end of the aileron and check that the aileron hinges freely. Now fit the rib capping strips, and the $\frac{1}{4}$ and $\frac{1}{16}$ strips each side of the push-pull rod. Cement hinge plate 'B' in place.

The control torque rods are made from $\frac{1}{8}$ in. square spruce or birch. Dowel could be used, but is not usually straight enough. The ends are slightly rounded so that the paxolin levers can be pushed on tightly about $\frac{1}{8}$ in. A pin is then pushed into the centre of the rod as far as it will go. It is then removed and cut short so that when pushed in again, the head protrudes $\frac{1}{8}$ in. The lever is removed and the rod threaded through the holes in the ribs, the lever put on and the pin put through hinge plate 'B' and the pin inserted. The lever, hinge plate and pin can be put on the inner end of the rod, though at this stage the positions of the levers is not important.

The two wings are now joined. The auxiliary spars are butted together with the tips raised. The centre is held flat on a board or table with packing $1\frac{3}{4}$ inches thick under the nose of the tip ribs. A joint plate is cemented to the aux. spars, and L.E. and T.E. spars added. Let the cement set and then put on the sheeting. Cut a hole in the top for access to the actuator and controls. The hinge plates and support are cemented in place.

The original model used a home-made magnetic actuator, but a geared motor or motorised actuator would be suitable. The oscillating lever or disc can be mounted direct on the final gear of the motor or mounted separately and driven with a push-pull rod. With the lever or disc in position, the controls can be linked up. On the original model, ordinary pins were put through the levers and bent at right angles, and linked up with 20 gauge copper wire soldered on. Set the actuator to the neutral position, and adjust the length of the push-pull rods in the centre wing so that the levers on the torque rods are vertical. Now set the actuator to say left turn, and put the lever on the outer end of the torque rod to vertically down. Lift the aileron to the angle shown for fully up, and adjust the push-pull rod to suit. Cement the levers to the torque rod. Put the actuator to the right turn, and carry out the same process on the other aileron.

Smooth off any roughness on the wing surface, put spots of oil on all pins and cover the wing. The original used heavy tissue with two coats of dope.

The bottom part of Cri-Key body can be built upside down on the plan. The only thing important about it is that its top surface is flat so as not to distort the wing. This could be carved from block if desired, and hollowed out to take the radio. A lot of carving can be done with course glass paper. The beak is cut from a rubber, and is easily sanded to shape.

For Fantail Body front, blocks were cemented together to give the required width. It is best here to have one

Above: two views of Cri-Key and earlier tractor motor configuration CAW. You have to admit it's very much the ultimate in 'different' R/C models, and remarkably effective.

joint down the middle only lightly stuck. The body can then be split along the centre for hollowing out, after the outside has been carved and sanded to shape. Most of this should be done before the $\frac{1}{4}$ in. thick sides and base are added for the rear body. Tapered pieces will be needed between the rounded front and the rectangular back parts. At the rear end, the ply ending mount is cemented to the tops of the sides, and the sides cut back flush. The ply sideplates are then cemented on making a good joint with the top ply.

The part of the body stuck to the wing can now be cut off. It is best pinned to the body, with the wing held on with rubber bands while it is cemented to the wing. The former behind this, F4A or FB2 is also stuck on and the fillet W fitted. This will need a bit of sanding to fit nicely. The $\frac{1}{4}$ in. fillets are then cemented to the body.

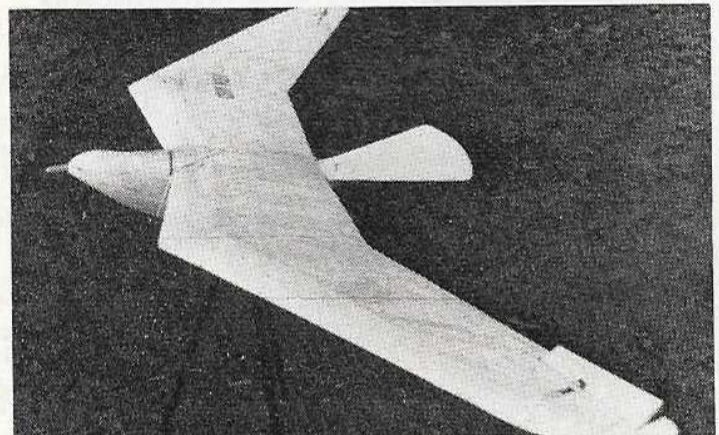
The radio is installed with the batteries forward, to get the C.G. in the position shown. Any trimming desired is done by raising or lowering both ailerons.

When flying, have a packet of birdseed handy in case of lost control!

The design work on these models was by the 'hunch and crunch' systems, but fortunately, due to long experience, the only crunches came from radio faults.

At one stage Cri-Key was tried without radio, the ailerons being set flush with the wing surface, and the broader tail fitted. A piece of plasticine weighing about $1\frac{1}{2}$ oz. was pushed well up into the head to get the C.G. in the right place, and the angle of the tail adjusted. As an alternative to the trim tabs shown, the wing tip could be cut across and hinged. Another variation would be to use an area equal to the aileron, tilted up to half the fully up position shown on the drawing, and use the narrow tail at very small angle as shown.

These models have been designed as straightforward tailless types, with a bird's head just for looks. After all a bird flies normally without using its tail. The tail is used



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only at low speed to give more lift, in the same way that a full-size aeroplane uses wing flaps.

Judging by the way Fantail has behaved when interference has taken over, it would make an interesting free-flight model. Flaps to act as elevators would have to be fitted in place of the ailerons, and weight would have to be added inside the head. Do not use an engine of more than .5 c.c. for free-flight.

The actuator used is fairly economical, the average current drain being about 80 milliamps, so a simple No. 8 battery gives a reasonable life. The neck of Fantail was made to take such a battery, but it could be made larger, if desired.

Cri-Key has been tried out with a 'Gallopig Ghost'

scheme with the linkage shown in the bottom left-hand corner of the drawing, and it behaved very well, though some people might like larger control surfaces for this. For the tests the broad tail was used, and an old Micro-max motor with the gearing reduced to one train. A three-volt centre tapped battery supplied both receiver and motor, so not much power was available for control, but the main purpose of the test was to prove that the simple linkage would operate satisfactorily in flight. Site conditions did not allow any attempts at aerobatics, but it was felt that larger control surfaces and a more powerful actuator motor would be needed. This may be tried at a later date as it would be interesting to see what a gull looks like doing a loop.

The push-pull rods on the crank swing sideways, so the pin holes in the levers need to be large enough to allow this. Also the eye ends on the crank must allow a little up and down movement of the other ends.