Fancy rotary winged R/C flying?
Scared-off by the complexity of the true helicopter?
Then try this simplified R/C Whirlybird!

CHIPPEWA 4

By ERIC SMURTHWAITE

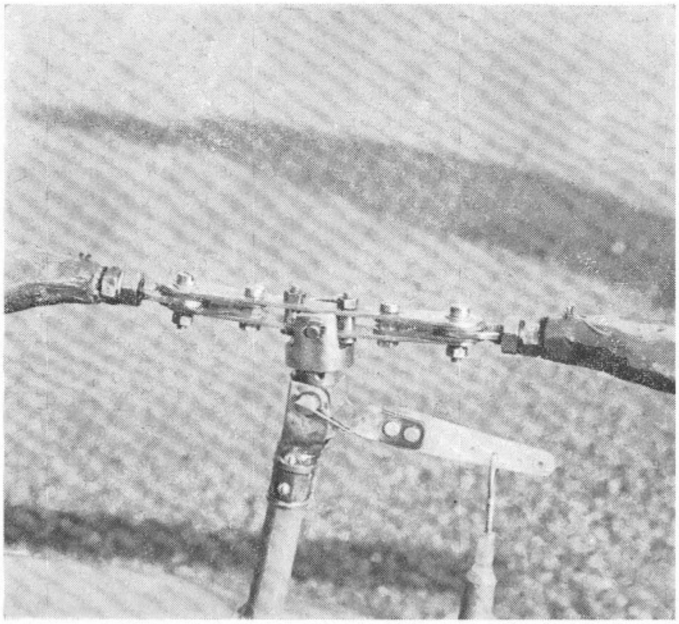
SUNDAY, May 17, 1970: after four years and four months, of many disappointments and a few enlightening moments, a rather strange-looking model taxied down the runway at the L.A.R.K.S. flying field. It turned into the wind, waited a while as the rotors gathered speed. Then, as the engine opened, accelerated away and slowly lifted off the ground.

Five flights were made that Sunday afternoon, with passes down the runway at six feet altitude, with turns to left and right around the cine cameraman, taking shots for the record! Gentle climbs and dives presented no problems and it was obvious from these first flights that landing would present no troubles at all. With a characteristic near-zero ground speed, landings could be made with very little fuss.

My own feelings at this time, seeing something very unusual flying around the sky made everything worthwhile, particularly the elation of fellow club members.

A great deal was learnt about rotors on the first model, used mainly for static tests, and only minor modifications have subsequently been needed. The second prototype not only had rotor head tipping back and forward for 'elevator' control, but also sideways for lateral control. The lateral control, however, did not work out at all, and the model displayed violent left roll characteristics due to torque on each attempted flight just after take-off.

Prototype No. 3 was a highly-ambitious effort, with contrarotating propellers off one engine in an attempt to overcome the torque-induced roll. This also, I might add, was doomed to failure, although the contrarotating pro-



The Chippewa 4 rotor head is much simpler than for a true helicopter, but does still demand a certain amount of ability in metalwork. If you think the work is beyond you, then search through the club membership roster for a likely helper who can turn out the metal pieces for you.

peller assembly was an absorbing technical exercise in itself.

The cure-all for the problem came with the fitting of 'ailerons' to the horizontal tail surfaces which were first applied to Model No. 4, and with this modification, full, safe control was achieved for the first time.

Some 30 or more flights have now been achieved with this machine which, with slight modifications, appears on the plans herewith.

Construction

A little more model hardware has to be made when building an R/C autogiro than is the case with a conventional model aircraft, but this really only involves the rotor head assembly, and, anyway, on the plus side, just remember that there's no wing to carefully build warps into!

Chippewa 4 uses very conventional construction methods. It has a 63 in. rotor diameter, uses 49-61 power and should weigh about 5 lb. ready to fly.

Fuselage

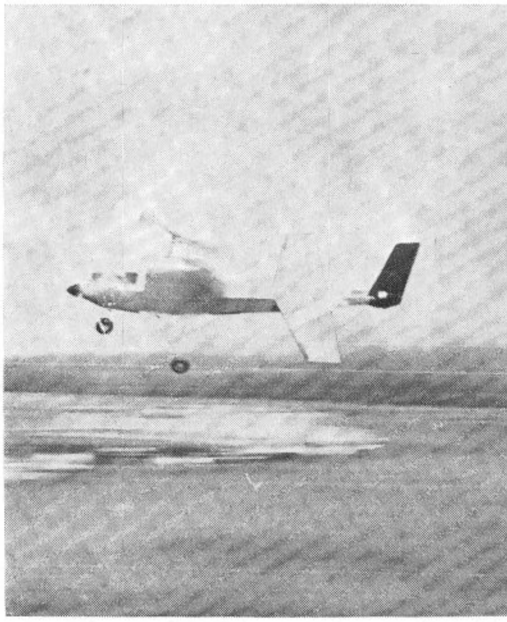
Cut out all formers, fin and nosewheel base. Glue the two datum longerons either side of the fuselage formers and stand on blocks to align. Fit and glue the remaining longerons along the sides and on the bottom, taper the inside edges of longerons at the rear of the fuselage and glue in the fin. Glue in the top edge single longeron, cut 1 mm ply plate, glue and bind in place around the top of the fuselage.

Next, cut $\frac{3}{4}$ in. sq. rotor pylon hole when the plate has set. Glue in the dummy windscreen block and shape, followed by the motor firewall which forms the mount for the cast metal motor mount used.

Position and cement the remaining $\frac{1}{4}$ in. sheet balsa rear formers, tailpost and also the tailplane supports. Next, cut out the pylon platform and struts, make, fit and cement into place the pylon post, from $\frac{3}{8}$ in. sq. hardwood.

This virtually completes the basic fuselage construction. However, when fitting the engine, do ensure that there is no less than five degrees of downthrust.

The tailplane can be built up on a



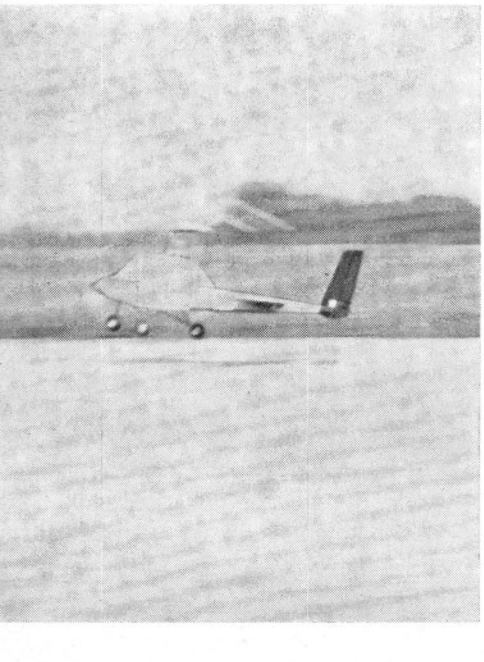
building board in one piece. Cover both sides with 1/16 in. sheet balsa. Sand to final section and glue into the fuselage assembly. At this time also you can tailor in your servo mountings.

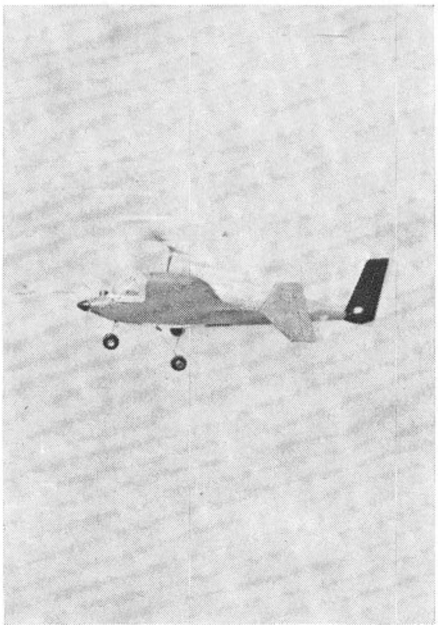
Build up the nose fairing between the spinner ring and firewall around the motor by fitting the motor to its mount. Wedge the front spinner ring in place at the prop driver with slivers of balsa and cover the fuselage with 1/16 in. balsa. Remove the motor, double glue all joints and the front end and cover the area with nylon, gluing the nylon on damp, and covering with cellulose when dry.

Make ailerons and rudder, access hatches, fin and skid.

Rotor blades

The rotor blades are made up of





Action sequence of first flight, back in May 1970, when pictures were taken 'just in case'. Note that this prototype has much less side area than the latest version shown on the plans. 'Elevator' control is used to alter the rotor incidence and directional control is applied via 'ailerons' on tailplane. Rudder is normal.

three laminations of $\frac{1}{8}$ in. medium hard balsa. The attachment to the rotor head is pinned in place with wood dowels, then bound at the root of the rotor with thread. Plane the blades to section with a mini-plane or, alternatively, contour with a sharp knife and sandpaper, and be sure to balance the rotors.

The rotor head looks frighteningly complicated at first glance, but careful study will show that it is not too difficult a job, just rather unusual by our modelling standards. The important point to remember is to follow all dimensions as shown on the plan very accurately. If you are still in doubt, maybe you can find an engineering-orientated fellow club-member to turn out the bits for you.

Flying

Start the motor and face the model into the wind. Assuming that the rotors are in line, start the rotors in motion by hand. With full up 'elevator' trim and full up 'elevator', the rotor should soon pick up speed. If the wind is light, the process can be aided if your helper holds the tail of the model down to the ground. This will help the rotors to gather speed.

When sufficient rotor speed has been achieved, up the throttle, and hold the model into the wind as it gathers speed for lift-off. The take-off process is virtually the same as for a normal fixed wing model.

When take-off speed has been reached, say, 20-25 m.p.h., simply feed in up 'elevator' until the model lifts off. At this point, you simply fly it like a normal fixed wing machine, using the 'ailerons' on the tailplane to achieve lateral control.

The landing must be done into wind. Simply throttle back to a fast tick-over of about 4,000 r.p.m. and 'glide' in, gradually feeding in the 'up elevator'. Hold the model dead into wind at all times, using the 'ailerons'.

If your hold-off is correctly timed, your model will settle to the ground at zero ground speed. Like all things, this technique is simply a matter of practice, but it should not take much time to learn. However, don't let the model balloon on the flair and don't let the model fly backwards just before touch-down – yes, this is a condition you can inadvertently get into. When flying, keep the model level at all times, and don't let it get its nose up.

Above all, don't get into the worst possible condition of all, with the model too far away. Remember that an autogiro has no wing which you can use as a reference to keep in touch with the attitude of the model as you fly it around the sky. It is only too easy to lose orientation as the model gets too far away, so keep it fairly tight in as you fly it. If you do get into trouble, the first step is to throttle back immediately, and take any recovery procedure from there.

Good luck!