

# Canadian Tailless

## Details and Performance of the N.R.C. Glider

AS a complement to the work initiated in this country during the war, the National Research Council of Canada also undertook the design and construction of a tailless glider at the National Research Laboratories. This undertaking has recently received prominence by the towed flight from Edmonton, Alberta, to Arnprior, Ontario, a distance of 1,780 miles which, it is believed, constitutes the longest flight of a glider of this type.

Despite fundamental similarity in concept and size, the Canadian glider differs in many detail respects from the General Aircraft gliders with which tailless research has been undertaken over here. We assume that, under the "all for one and one for all" spirit of the Commonwealth Aeronautical Research Council's avowed purpose, the total knowledge gleaned from the flight trials in this country with the G.A. tailless gliders has been placed fully and unreservedly at the disposal of the National Research Council in Canada.

The N.R.L. glider has a U-plan wing with a span of 46ft and a length of about 18ft. An original flying weight of the order of 3,700lb gave a wing loading of 10lb/sq ft, so that, at the maximum weight of 4,150lb at which the glider has been flown, the resultant wing loading would appear to be in the region of 11½ lb/sq ft. The primary structure is entirely of wood, a single laminated spar forming the spine for conventional chordal ribs carrying a relatively thick moulded-plywood skin. The surface finish is stated to be good and remarkably free from distortion.

Separate individual cockpits are used, and to mitigate damage in the event of an emergency landing with the tricycle undercarriage retracted, skid shoes can be extended to bear the brunt of the landing shock. Primary flight control is vested in elevons and end-plate fins and rudders, whilst additional control adjustment for pitching moment is given by adjustable wing tips, the incidence of which can be changed as required through a screw jack. Flaps of conventional split type are employed. Instrumentation is comprehensive, and automatic recording is made of the following data: time; airspeed; altitude; tip angle; flap angle; sideslip; rolling rate; pitching rate; yawing rate; elevon hinge moment; elevon angles; rudder angle; ambient air temperature; normal acceleration; longitudinal

acceleration; attitude (gyro and pendulum); angle of bank.

In addition, a wire recorder on the ground takes the pilot's and observer's radio transmissions throughout the tests, and so provides an accurate and permanent record of their observations. The instrumentation, which has functioned very satisfactorily, has made possible a programme of concentrated test flights.

During its three seasons of operation, the glider has flown a total of about 100 hours, of which the first 30 were devoted to handling trials. The initial handling trials were made by the late S/L. Robert Kronfeld, A.F.C., R.A.F., but the subsequent flights have been made by S/L. E. L. Baudoux, D.S.O., D.F.C., F/L. G. S. Phripp and F/L. G. A. Lee, all of the R.C.A.F. Mr. T. E. Stephenson, in addition to being in charge of the glider team, has also been the scientific observer during flight trials; incidentally, the pilot occupies the port cockpit and the observer the starboard cockpit. The flying operations have been carried out by the Winter Experimental Establishment of the R.C.A.F., and in order to take advantage of the exceptionally long runways there, all the flight trials have been made from Namao Airport, near Edmonton.

### Operational Practices

The ground-handling qualities of the glider are good. No taxiing difficulties have arisen, and with its differentially operated wheel brakes, the aircraft is easy to control. Take-offs have been made at speeds between 70 and 90 m.p.h., the take-off run ranging from 2,600 to 3,150ft; there is, apparently, no advantage in unsticking at a speed below 90 m.p.h. A nylon tow-rope, 350ft long, and a R.C.A.F. Dakota have been used for towing, the normal towing speed being 100 m.p.h., although 140 m.p.h. has been achieved in level flight without difficulty. The free flight characteristics of the aircraft in general are good; control, for the most part, is said to be easy and natural. The range of flight speeds from 55 m.p.h. to 150 m.p.h. has been investigated with a range of c.g. positions from 50 to 55 per cent of the centre-section chord. Normally, the glider is towed to an altitude of 6,000 to 10,000ft, after which it glides down in 10 to 15 minutes. Testing is discontinued at an altitude of about 4,000ft in order to permit getting into position for landing. Approach speed is 85 m.p.h. and the normal landing speed 60 m.p.h., but landings have been made at speeds varying between 50 and 75 m.p.h. The approach in landing is simple and straightforward; there is no tendency to float, bounce or swing, and spot landings can normally be made consistently with an error not exceeding 200ft.

During the flight trials, valuable records have been obtained which will be analysed during the coming winter and the information issued in report form. It is expected that the experience and information obtained during the trials will form a valuable contribution to the knowledge of this type of aircraft.

### BOOK REVIEW

*How and Why it Works.* Published by Odhams Press, Ltd. 9s 6d.

CUTAWAY drawings and photographs in conjunction with lucid, not-too-technical descriptions give readers an insight into the workings of more than a hundred subjects, ranging from pianos and printing presses to refrigerators and hot water systems, and telephones and traffic lights. Aviation is represented by sections on aircraft, aero engines, airports, helicopters, turbojets and radar, and though understandably brief, these give accurate and interesting explanations. People of all ages, interested in the mechanical things in everyday use around them, should find "How and Why it Works" full of information of absorbing interest.



Shaking hands are F/L. C. F. Phripp (extreme right) and Mr. C. S. Levy, National Research Council, on the arrival of the N.R.L. tailless glider at Arnprior, Ontario, from Edmonton. On the extreme left is Mr. T. E. Stephenson, N.R.C., with F/L. G. A. Lee. F/L. Phripp and F/L. Lee piloted the glider.