Fairchild's S.T.O.L.

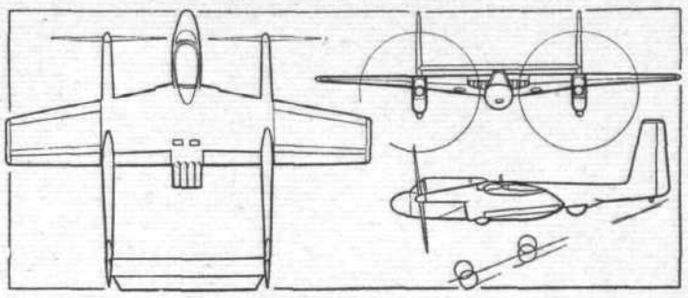
THE accompanying general-arrangement drawing depicts an S.T.O.L. (short take-off and landing) design, a prototype of which—designated M-232—is at present being constructed by the Aircraft Division of the Fairchild Engine and Airplane Corporation, of Hagerstown, Maryland. The concept has been generally worked out by Mr. W. E. Hunt, of the Wiggins-Hunt Engineering Corporation, who hold a joint patent for the design with Mr. E. A. Blonquist, of New York City.

In the early 1930s Mr. Hunt had been engaged in the design of the Crouch-Bolas Dragonfly, a well-known slow-flying biplane in which almost the entire wing area was subject to slipstream from two large airscrews. Previously the same technique was patented by Dr. A. Zahn (1917), although in this case there were no fewer than five lifting surfaces, one above the other, and three airscrews. A generally similar principle—that of making the entire wing subject to slipstream—was employed in 1940 in this country by both Airspeed, Ltd., and General Aircraft, Ltd., in their designs of fleet shadower aircraft. Both these designs were fully slotted and flapped, and were powered by four Pobjoy radial engines distributed evenly along the wing.

In the new Fairchild, power is provided by a pair of buried Lycoming SO-580 piston engines, which pass some 800 h.p. to a gearbox and drive-shafting incorporating over-running clutches. The 13ft-diameter airscrews, placed well ahead of the wing and tilted slightly downwards, have provision for pitch variation and flapping after the manner of helicopter rotors. In the take-off configuration much of the air handled by the airscrews is deflected downwards through a considerable angle by the wing, which has full-span slats and trailing-edge flaps. It is intended ultimately to make the airscrew axes variable in order to satisfy the requirements of take-off and cruising flight.

One obvious disadvantage of such layout is that the design of the airscrew blades cannot be that for peak efficiency in both slow-speed and cruising flight, particularly in view of the fact that Fairchild are aiming at a cruising speed considerably greater than 200 m.p.h. General stability and control problems at low airspeeds will also be acute, a particular difficulty being the achievement of an adequate smooth airflow over the fixed tail surfaces. The consequences of failure of the transmission shaft (either on one side or on both sides) would also seem to be disastrous at low air speeds. Nevertheless, this is the first time that a completely integrated design of this nature has been translated into metal, and flight trials may, in fact, show that such aircraft combine many of the virtues of the helicopter without the attendant shortcomings in performance and high operating cost.

The prototype is rapidly approaching completion and should certainly fly before the middle of this year. The work is being financed by Fairchild.



Fairchild M-232 experimental short take-off and landing aircraft powered by two Lycoming SO-580 flat-eight piston engines driving airscrews through shafting: Span, 39ft; length in flying position, 29ft 6in; length of nacelle, 18ft 4in; distance between centre lines of airscrews, 17ft; ground angle, 25 deg (landing) or 22 deg (take-off). Maximum weight, 7,000 lb; accommodation, pilot plus passenger; also provision for belly nacelle accommodating eight men or four stretchers. Short-field requirement, to be able to use 500ft clearing with 50ft-high surround; cruising speed, 242 m.p.h.

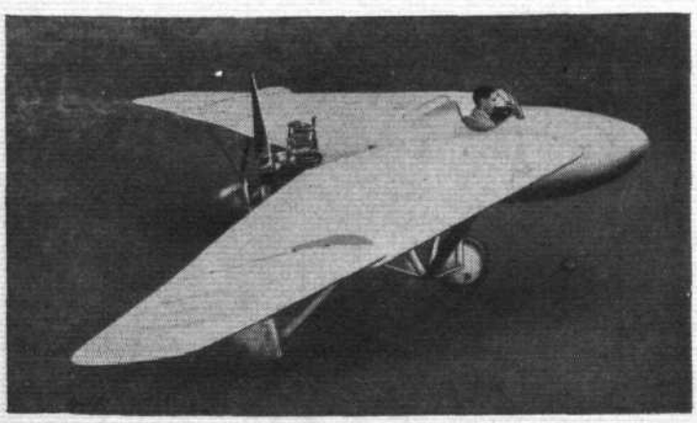
PROFESSOR G. T. R. HILL

IT is with deep regret that *Flight* has to record the death of Prof. G. T. R. Hill, M.C., M.Sc., M.I.Mech.E., F.R.Ae.S., whose name will always be associated with the Pterodactyl tailless aircraft. He died in Londonderry at the Christmas week-end after several years of ill health. He was 60. Prof. Hill had taken up farming after his retirement, in 1954, from the post of chief aeronautical consultant to Short Bros. and Harland, Ltd.

Geoffrey Terence Roland Hill was educated at University College School and University College, London. While he was still in his early teens he achieved prizewinning credit as a builder of model aircraft, in which pursuit—and subsequently in the construction of a near-successful full-scale glider—he shared the enthusiasm of his brother, who was later to attain fame both as an aeronautical artist and as a senior officer of the Royal Air Force—Air Chief Marshal Sir Roderic Hill.

After obtaining a B.Sc. in 1914, G. T. R. Hill joined the Royal Aircraft Factory as a graduate apprentice. From the outset the practical side of flying attracted him even more strongly than the theoretical, and by 1916 he had obtained a commission as a 2nd lieutenant in the Royal Flying Corps; he fought in France with No. 29 Sqn., was awarded an M.C., and was later invalided home with the rank of captain. Test piloting attracted him, and by 1918 he was in command of the Aerodynamics Flight at Farnborough. When the war ended he went to Handley Page, Ltd., as their chief test pilot, and in 1919 took a W.8 up to nearly 14,000ft—a world record for an aircraft of 1,500 kg all-up weight.

Prof. Hill with the Pterodactyl Mk. 1a. The heading portrait was taken in more recent years.



Even in the earliest days at Farnborough, Hill had been gravely concerned at the phenomenon of stalling, and its results; and the thought which he had devoted to the problem crystallized in the design of the Pterodactyl, which he first flew as a glider in 1924 and with an engine a year later.

Impressed by the design, the Westland company undertook to develop it, and Capt. Hill joined their organization. During the next seven years, five marks of Pterodactyl appeared, of increasing size and power; the last, the Mk V of 1932, was a two-seater fighter powered by a Rolls-Royce Goshawk, weighing 5,100 lb with military load, and capable of 190 m.p.h. at 15,000ft. Throughout the series Hill's object had been—in his own words—"to try to design an aeroplane which would never, through an error on the part of the pilot, get out of control."

Between the wars, academic distinctions began to come his way, and in 1934 he was appointed to the Kennedy Chair of Mechanical Engineering at University College, London. Five years later he was seconded to the Air Ministry, and subsequently to the Ministry of Aircraft Production, for special research work. In 1942 he acted as a scientific liaison officer between the British and Canadian Governments.

At the end of the war he acted as a consulting engineer, notably to Short Bros. and (in 1947-50) General Aircraft; in 1948 he retired from his University College chair, but continued with a number of activities in Ulster; he was a special lecturer to Belfast Technical College, and president of Belfast R.Ae.S. branch.

The final years of Prof. Hill's career brought no diminution in his ability as a designer. Just as the problem of the stall had occupied him in earlier days, so did he now bring his analytical mind to bear on the problems surrounding the control of high-speed, high-altitude aircraft. His approach was the aero-isoclinic wing, the aerodynamic and structural behaviour of which are such that the incidence at any section remains constant in the face of deflections caused by flight loads. In order to test this wing an *ad hoc* aircraft, the Short Sherpa, was prepared. A particular feature of the Sherpa is the use of rotatable wing-tips for both lateral and pitching control—in a manner not unlike that employed on Hill's Pterodactyls.