Y.A.1 in the air

Experience in a Blackburn Strike Aircraft with Power-operated Ailerons

(29th Test in Current Series)

By Wing Cdr. Maurice A. Smith, D.F.C.

POWER-OPERATED controls, particularly ailerons, are still the subject of experiment and something of a novelty in this country, although they are to be found on the majority of American high-speed aircraft. True, power assistance is required and specified for the very large aircraft now under construction in Britain, and is likely to be found on future very high-speed designs, large or small. The D.H.108 research aircraft has provided experience with powered control surfaces and an experimental Lancaster fitted with powered ailerons has also contributed to the store of practical knowledge.

A third aircraft which is being used for the examination and development of power-assisted controls is the Blackburn S.28/43 (Firecrest), or Y.A.1 as it is called locally. Had war continued the Y.A.1 would have followed the Firebrand into service as a deck-landing strike aircraft—the first British monoplane to be designed to such a specification. There is little doubt, moreover, that the Navy would like a few squadron of these machines to be in service at the present time. Orders, however, covered prototypes only, and it is the third prototype, equipped with power-operated ailerons, which I was permitted to fly recently.

This machine, VF.172, differs in certain details from its predecessors. Perhaps the most important change is the reduction in dihedral from nine to three degrees. On the ground this small angle, coupled with the taper on the wind leading-edge outboard of the knuckle, gives a definite impression of anhedral. By comparison with the Firebrand the Y.A.1 is notable for the marked improvement in view for the pilot on take-off, approach and landing, and for reduction in airframe weight. The cranked, laminar-flow wing with two-break, power-folding is also of more advanced conception. A good deal of the information gained following experience with the interim Y.A.1s will be directly applied to later Blackburn types.

When originally designed the Y.A.1 had a smaller fin and rudder, as at that time the Centaurus engine was to drive a contraprop. This particular engine was not proceeded with and the vertical tail surfaces had therefore to be increased in area. The structure of the Y.A.1 was described in some detail in *Flight* dated May 29th, 1947.

Measurement of performance was not included in the test schedule for the third Y.A.1, but an earlier machine with the 9-degree dihedral wings was found, in general terms, to be 20 kt faster all round than the Firebrand. This means that the maximum speed at 18,000ft is in the region of 330 kt. A limit of 382 kt was placed on diving speed.

Handling-Notes and the Cockpit

No book of pilot's handling-notes has been prepared to cover the Y.A.1, so I was carefully briefed and shown over the cockpit by Mr. Peter Lawrence, Blackburn's chief test pilot. In particular, the trimming devices and use of aileron power needed to be explained in detail. A trimming tab is provided in addition to the aileron bias control associated with the power operating system. A double-acting spring box to centralize the control column provides the only "feel" that the pilot has. No aerodynamic loads are transmitted to him, as the aileron servodyne has "zero feed-back." In addition, with hydraulic power in use, the normal aileron trimmer is ineffective, so the bias switch is used in its place. In the event of a power failure both aerodynamic and spring loads would be transferred suddenly to the pilot, and as a precaution against very high stick loads it is important to keep the ailerons trimmed aerodynamically. The recommended position for the tab on the port aileron is half an inch up at the trailing edge.

Moving round the cockpit from left to right the important controls and dials are as follows: Tucked away behind the left elbow is the lever removing the wing bolts and controlling the power folding; a movement rather similar to a car gear-change from top to second on a four-speed gate is required. Grouped on the left side are the throttle, pitch lever, combined main trimmer control and undercarriage lever. Low down is the power-for-controls selector lever and a little forward of the others the flap selector. The trimmer employs the Miles electric actuator system