



"Flight" photographs.

This view of the Sunderland I shows to advantage the shape of the planing bottom with the "knife edge" rear step.

THE SUNDERLAND I.

A Detailed Study of Our Latest Four-engined Service Flying Boat : Derivation from Short Empire Commercial Type : Long Range and High Performance

THERE are now very few categories of military aircraft in which Great Britain cannot claim to be supreme in technical quality. Certainly these classes do not include the large long-range four-engined military flying-boat as exemplified by the Sunderland I, a superb example of the distinctive marine aircraft produced by Short Bros., of Rochester. Already a very useful quantity of Sunderlands has been delivered to R.A.F. units at home and overseas, while foreign prototypes of comparable size are not yet in production.

Essentially the Sunderland is a development of the Empire, or "C" class, of flying-boat designed for Imperial Airways. The fitting of more powerful engines has permitted an increase of normal all-up weight and, despite the larger hull with its gun turrets and other military equipment, an even higher performance.

The Wing

Structurally, the high monoplane wing is similar to that of the Empire boat, but revised design gives a swept-back effect. The main plane is built round a spar consisting of four Hiduminium extruded "T" sections, two at the top and two on the bottom surface, the flanges following the section of the wing. Tubular struts, running vertically and diagonally, brace the top and bottom booms. The two trusses thus formed taper in plan form toward the wing tip and are connected by drag members which take the form of comparatively small extrusions, also of "T" section, and light alloy members shaped to the wing profile. Incidence wires run diagonally between the front and rear corners of the spar "box."

The leading and trailing edges are built separately, the former being made up of a series of shaped diaphragms while the latter has ribs of "T" section extrusions. The wing tips may be detached as units.

Three fuel tanks are housed between the spar trusses, and

holes are cut in the skin covering to permit entry when these are installed. The covering is of Alclad with countersunk riveting.

Typically, each nacelle has seven frames, interconnected by stiffeners of "V" section. Sections of the leading edge of the main plane are made to hinge forward alongside the nacelles to form maintenance platforms.

Ailerons are of the Frise type, embodying a spar of two channel sections.

As on the Empire boat the flaps are of the patented Gouge type, which give a substantial increase in wing area in addition to providing the normal flap effect. Each flap has three longitudinal members with transverse ribs, and is supported by four arms. An electric motor for operating the flaps is mounted on the upper deck and drives a torque shaft through a gear-box arrangement.

The wing floats are similar in construction to those of the Empire boat, with tubular struts braced by streamline wires. Elevators, fin and rudder also follow previous Short practice; the elevator and rudder have trimming tabs of mahogany.

Controls

All controls, except those of the ailerons, are duplicated, appropriate locking gear being provided in the cockpit for use when the machine is moored. The locking system takes the form of a pronged handle, inserted through extruded channels fitted to the control duct and passing through links on the control rods. There are spring-loaded oil dashpots on the levers of all the main control surfaces to prevent sagging due to variations in temperature, etc.

The hull embodies vertical frames of channel section interconnected by stiffeners of "Z" section; the sheeting is riveted on longitudinally with countersunk rivets, the resulting surface being quite flush. Before being riveted into position the sheeting is treated anodically. The hull is divided, for structural purposes, just aft of the rear step,

(Continued after double-page drawing.)