

was provided with oleo-pneumatic shock-absorption. The ailerons and rudder had inset horn balances and were of large area to afford maximum manoeuvrability. Defensive armament was two Lewis guns, mounted on Scarff rings in the nose and in the dorsal position. Bombs were carried externally.

The Bugle I had a span of 62ft 6in, a wing area of 932 sq ft, a gross weight of 8,760 lb, and a disposable load of 3,681 lb. Sea-level speed was 120 m.p.h. and a height of 10,000ft was attained in 15½ minutes.

P.25a Bugle II. A refinement of the Mk I, the Bugle II had two Napier Lion engines mounted on the lower wings, and the external bomb carriers were faired in by a streamlined ventral structure. Performance was further increased by transferring the petrol tanks from beneath the upper wings to the fuselage. Gross weight was 9,000 lb.

P.29 Sidstrand I. In the years following the First World War Boulton and Paul were conducting extensive investigations into the aerodynamic properties of various combinations of wing, body and engine-nacelle forms in order to minimize interference effects, and in the Sidstrand three-seat day bomber (1927) an exceptional degree of efficiency was attained. Whereas the fuselage was a harmonious combination of curves, horizontal and vertical flying surfaces had a characteristic angularity. The power units were two Bristol Jupiter VIs, having swivelling mountings and set in nacelles on the lower wings. In addition to Lewis guns, in the nose and dorsal positions, there was a third gun giving covering fire beneath the tail.

Basis of the fuselage construction was the locked-joint circular-



P.29a Sidstrand III with Townend rings.



P.29a Sidstrand IIIS.

tube made from strip by a special process of rolling and drawing. Not only did the tube leave the drawbench dead straight, but the locked-joint seam itself was perfectly uniform—a matter of great importance because of the necessity for attaching fittings. Having evolved this satisfactory type of tube for longerons and struts, standardized in a number of different sizes, the next step was to design a neat type of fitting for the attachment of struts to longerons. This was achieved by means of a tubular "pad" of magnesium alloy, fitting snugly over the tubular longeron and with flat faces machined on the outside. Bolts passed through the pad and longeron vertically and horizontally, the strut ends being attached to the bolt heads and the bracing wires to sheet steel links or wiring plates. The wing structure was no less ingenious, and likewise made use of standardized spar flanges, webs and fittings in a manner which gave a sufficient number of combinations to meet well-nigh every demand without recourse to special rollers and dies.

The petrol tanks—three in number—were all in the fuselage, the total tankage being 260 gallons.

Span was 72ft, length 40ft 8in, wing area 943.5 sq ft, speed at sea level 125 m.p.h., speed at 5,000ft 130 m.p.h., empty weight 5,275 lb, and gross weight 8,850 lb.

P.29a Sidstrand II. The Sidstrand I was progressively developed, modifications being made particularly to the ailerons, and the



P.29a Sidstrand III.

type was ordered for service with the R.A.F. under the designation Sidstrand II. Powered with Jupiter VI engines, Sidstrand IIs were issued to No. 101 Bomber Squadron, R.A.F. A feature of the aircraft was a redesigned, servo-type rudder, and the engines had nose-type collector rings with long tailpipes. Although official documents show that the designation Sidstrand II was applied to a machine fitted with Jupiter VIII geared engines, the geared-Jupiter version of the Sidstrand was known to the company and in the R.A.F. as the Sidstrand III.

P.29a Sidstrand III. The Sidstrands of No. 101 Squadron were progressively re-engined with Jupiter VIII and VIIIF geared engines, with a notable increase in performance. Handley Page automatic slots were standardized, and the gross weight was 9,963 lb. An official publication gave the bomb load as two 230 lb or 250 lb bombs, plus a universal carrier for one 520 lb or 550 lb, two 230 lb or 250 lb, or four 112 lb bombs. Additionally there was a light series carrier for four 20 lb sighter or practice bombs. The bomb-sight was of the Mk 2H (high-speed) course-setting type. Two-way wireless, oxygen, and a P.7 or an F.8 camera were specified.

Townend rings were fitted experimentally but were not standardized because of cooling difficulties. Like its predecessors, the Sidstrand III was extremely manoeuvrable and capable of most aerobatics. It could maintain level flight or climb on one engine with full load, and its steadiness as a gun platform is attested by the fact that soon after the type became operational all R.A.F. bombing records for accuracy were broken.

Data for the Sidstrand III, with Jupiter VIII engines, were: Weight empty 6,010 lb, fuel 1,780 lb, oil 230 lb, military load (including crew) 2,180 lb, gross weight 10,200 lb, wing loading 10.6 lb/sq ft, power loading 10.2 lb/h.p., top speed at 10,000ft 140 m.p.h., climb to 15,000ft 19 min, service ceiling 24,000ft, landing speed 54 m.p.h.

P.29a Sidstrand IIIS. This designation distinguished Sidstrand III J7939 as fitted with Bristol Jupiter XFB geared and supercharged engines, at one time with Townend rings. Flying at a weight of 10,200 lb, this aircraft achieved 167 m.p.h. at 11,000ft. Time of climb to 11,000ft was 8½ min, and service ceiling 30,000ft.

P.75 Overstrand I. So high was the performance of the Sidstrand that difficulty was experienced in handling the Lewis guns, particularly that mounted on the Scarff ring in the extreme nose. Boulton and Paul, therefore, sought to provide some means of shielding the front gunner from the airstream and, after experimenting in various directions, designed their first totally enclosed power-operated turret, which was installed in a modified version of the Sidstrand, known as the Overstrand. The fitment of the turret, however, was only one of many innovations. The pilot's cockpit was entirely enclosed and the rear dorsal gun position was provided with an effective form of windshield. Crew comfort was further increased by a controllable hot-air supply, drawn from an air-heater built into the exhaust system of one of the engines, and an automatic pilot was fitted as standard. The airframe was stiffened up to permit flight at a gross weight of 12,000 lb, and the

P.75 Overstrand I (prototype).

