



Hulls to the design of John Porte. No complete details are available on the section of the Fury's hull.

THE FELIXSTOWE FLYING-BOATS . . .

Admiral Sir Murray Sueter, the Director of the Air Department of the Admiralty, and told him of the America flying-boat. Captain Sueter immediately recognized the value of such aircraft for the type of warfare likely to be waged around the shores of Britain. He obtained Admiralty permission to purchase two flying-boats of the America type: they were delivered in November 1914 and were given the official serial numbers 950 and 951. It seems probable that one of the two may have been the original *America* itself.

The two Curtiss boats were sent to Felixstowe, where they were tested extensively. They performed quite well, and an order was placed with the Curtiss company for a small batch of the type. In March 1915 a further order for 50 Curtiss flying-boats was placed; the aircraft were delivered late in 1915. They incorporated a number of modifications but their 100 h.p. Curtiss engines left much to be desired and had to be replaced, usually by two Anzani radials of 100 h.p. each, or occasionally by a pair of 110 h.p. Clerget rotaries. The official designation H.4 was allotted to the Curtiss America-type flying-boat.

Writing of the Curtiss H.4s in his book *The Spider Web*, Sqd. Cdr. T. D. Hallam, D.S.C., said: "These were comic machines, weighing well under two tons; with two comic engines giving, when they functioned, 180 horse-power; and comic control, being nose-heavy with engines on and tail-heavy in a glide. And the stout lads who tried impossible feats in them had usually to be towed back by annoyed destroyers."

Early in 1915, Porte was stationed at Felixstowe, where he flew the earlier Curtiss machines operationally. He therefore came quickly to understand their shortcomings, chief among which were poor hydroplaning characteristics, poor stability on the water, and a lack of seaworthiness. With the approval of Captain Sueter, Porte began a series of experiments aimed at producing a seaworthy and operationally useful flying-boat. In September 1915 he was given command of the Felixstowe air station.

The experiments with the Curtiss flying-boats began in the spring of 1915. The first hull to undergo test was that of the

America flying-boat No. 950: this was a 30ft hull with a short forebody and a single step. Porte added side fins which ran fore-and-aft along the chines from a point two feet behind the bows to the step, and thereby provided a maximum beam over the fins of 8ft. With this hull No. 950 weighed 3,100 lb empty and 4,500 lb loaded, and was fairly successful; in rough weather, however, a good deal of water was shipped, since the short forebody did not give sufficient buoyancy forward. The original lifting tailplane was given negative camber to improve in-flight stability.

A new hull was built and was fitted to the Curtiss H.4 No. 1230. This was longer (32ft 7½in) and slightly narrower (7ft 9½in) than that of No. 950. The single step was directly under the rear spar of the lower wing, and the side fins were long; the underside of the tail portion of the hull was slightly concave in side elevation. This last feature proved to be a mistake, for it caused increased suction and made take-off difficult in calm weather. The hull was of lighter construction—it was in fact some 300 lb lighter than that of No. 950—but was not sufficiently robust and failed after several landings.

The next hull was fitted to the Curtiss H.4 No. 3545, and was generally similar to No. 950. This third hull was 32ft 4in in length, and its single step was 12ft 4in from the bows. Whereas on No. 950 the fore-and-aft angle (i.e., the angle between the underside of the tail portion of the hull and the planing surface) had been 10 deg, on No. 3545 it was only 7 deg. This led to long take-off runs and high take-off speeds, for it was not possible to trim back to the optimum take-off angle and still hold up the tail sufficiently far to keep water drag down.

Thus it was established that, to provide adequate take-off trim, a flying-boat hull required a large fore-and-aft angle. Additionally, the experiments showed that hydroplaning performance was improved by having a flat-bottomed tail portion.

Having settled the design features which were fundamental to good take-off behaviour, Porte turned his attention to improving landing characteristics. At the same time he began to study means of increasing the strength of hulls without impairing their hydrodynamic efficiency.

All the hulls he had used up to that time had, like those of the standard Curtiss H.4, been boat-built structures in which a skin of wooden planking was applied to wooden frames. These frail boats had to be handled carefully, but never more than when alighting. In the majority of the breakages which inevitably occurred it was found that the hull failed at the step.

Porte's next experiment set out to determine whether a step was necessary, and this time the test vehicle was the Curtiss H.4 No. 3569. Again a boat-built hull was used; it was very similar to that of No. 3545, but had a completely new bottom. There was no step; the planing bottom had a sharper vee; and the tail was carried high, thanks to the sharper up-sweep of the bottom line of the tail portion of the hull. This hull never flew in its original form, for the available engine power was insufficient to lift it from the water.

A step was then added by the surprisingly simple, albeit obvious, expedient of applying it to the outside of the hull. (The steps of earlier hulls had been formed as integral parts of the structure.) This step was 16ft 10½in from the bows, and 5ft behind the aircraft's centre of gravity. The boat flew successfully at 4,200 lb loaded weight, but the rearward position of the step demanded a considerable physical effort by the pilot to lift the aircraft off the water; the step was therefore moved three feet forward. The sharper vee of the planing bottom made landing easy, with little or no shock at the moment of alighting.

Parenthetically, it should be noted that at about this time two other experimental flying-boats were flown at Felixstowe, but their connection with Porte's experiments is uncertain. The Anzani-powered Curtiss H.4 No. 1231 was tested with a beautiful hull built by S. E. Saunders, a single-step structure with a deeply-fluted planing bottom. Another machine, powered by two Clerget engines, had a deep, ugly hull with a blunt prow, and was known as the Incidence Boat.

During the experiments with the Curtiss America hulls, work had begun on the construction of a very large three-engined flying-boat which had been designed by John Porte. This aircraft was the largest ever built in Britain up to the time of its appearance: it seems to have been officially designated F.B.2, but was facetiously

The prototype Porte Baby with modified engine installation.

