

## F-BOATS . . .

about 315 gal and the F.3 a little over 400 gal. With full bomb load the F.2A ordinarily carried 250 gal and the F.3 about the same. The normal habit was to cruise at 60 kt, at which consumption was about 33 gal/hr; some of the Cattewater F.3 pilots cruised at speeds as low as 55 kt to get longer endurance on submarine patrols and at that speed N.4250 was reputed to consume about 25 gal/hr. I do not know the longest recorded flight on an F.3; there were flights of over 9½ hr on F.2As from Dundee and Killingholme, and many others of over 8 hr, but on some, at least, of these flights extra petrol was carried in cans and poured into the tanks. Even apart from such chores, the job of the flight engineer was by no means enviable. The unspeakable petrol system, with its windmill piston pumps, for which the rest of us blamed the prejudices of Felixstowe, very often meant that the later parts of the flight depended on hand pumping; if (as happened not infrequently) a petrol pipe broke, the engineer was more or less expected to climb out in the air and do his best to repair the pump with insulating tape while clutching as best he could on to the flying wires or the engine struts. All the boat pilots of that generation remember their flight engineers, as well as their wireless ratings, with admiration and gratitude.

The serial numbers given on page 932 would provide for a little over 350 boats. Only a fraction of these were actually built and delivered before November 11th, 1918. Mr. Bruce gives a total of 104 Large Americas of all kinds, clearly including H.12s, to the end of May 1918; he gives 53 F.2As and 60 F.3s (including the 18 with the Grand Fleet and Northern Patrol at Houton Bay and the 13 in the Mediterranean) on charge to stations at the end of October 1918, and a further 36 in store or at contractors. By then the rate of building was about 10 to 12 a week. I doubt whether more than some 200 boats were actually built during the war. The majority of casualties, otherwise than by enemy action or very bad crashes, were recovered and repaired; only four are shown as having been written off during October 1918. This roughly accords with a total that can be got from the serial numbers. The earliest F.2A series were N.4510-9 (May, Harden and May) and N.4280-4309 (Saunders). May, Harden and May went on to the N.4530-54 series (a number of the Felixstowe and Yarmouth boats are in this series). At the end of the war they were beginning the N.4480-4504 series; I was delivering N.4484 to Dundee on Armistice Day. Saunders at the same time were

in the N.4430-79 series: N.4433 was delivered shortly before the end of October. Of the F.3s, Shorts had reached about N.4025, and Dick, Kerrs about N.4265 by the end of the war; I seldom flew the Phoenix boats and have no record of their progress, but I believe they had just about finished the N.4400-29 series. I think that a little over 100 F.3s and a little under 100 F.2As is not far off the right total of production during the war itself. Considering their numbers, they made their presence felt very effectively. As late as May 1918, the number of qualified first pilots on any station other than Felixstowe was often no more than six to eight.

Finally, may I add to the list of individual machines those that were at Killingholme up to June 1918? H.4s: N.1232, N.1233, N.1235. H.12s (early type): N.8668, N.8669, N.8688. H.12s (later type): N.4336, N.4343, N.4348, N.4350. F.2As: N.4516 (built by May, Harden and May) and N.4287, N.4290 and N.4291 (built by Saunders); the last of these is wrongly included in Mr. Bruce's Yarmouth list; I helped to collect it from Cowes in April 1918, and flew it fairly frequently during the following three months; it was in N.4291 that Capt. T. C. Pattinson and his crew shot down L.62. One or two of the H.12s were then or later rebuilt with F.2A hulls and all had received Eagle VIIIs.

In addition, there were a number of Porte boats, of which two or three were re-engined during the summer of 1918 with Eagle VIIIs; they were never used from Killingholme on serious military operations, but it was proposed to transfer some of them to the new station at Catfirth in the Shetlands which was being opened with a nucleus of R.N.A.S. staff from Killingholme; since the two Porte boats surviving at October 31st, 1918, to which Mr. Bruce refers are shown in Appendix XLI of *The War in the Air* as on charge to the Grand Fleet and Northern Patrol I would guess that this accounts for them. An air photograph of Killingholme taken during the American period shows three more of them lying paparently derelict behind the sheds.

One wonders in retrospect why no one tried to do for the wing structure of the F-boat what Porte succeeded so remarkably in doing for its hull. By the end of 1918 the F.5 represented a 1914 wing structure on a 1918 hull. The improvement which Gouge managed to make between the rather similar Short Cromarty, building in 1918, and the Singapore (with the same engines) of a few years later shows what a little cleaning-up might have done. An extra 10 or 15 kt would have given the boats the initiative against the Brandenburgs, and would have enabled them to fight or avoid fighting as circumstances required. As it was, the only possibility was to crowd on armament and make them slower.

## FURTHER COMMENT ON THE F-BOATS by J. M. BRUCE

**I**N the foregoing notes Prof. Robinson has made an indisputably authentic and admirable contribution to the history of the Felixstowe flying-boats. As I found to my concern, comparatively little has been recorded about these fine aircraft.

Prof. Robinson's remark about the horn-balanced, constant-chord ailerons of the later F.2As confirms a suspicion of mine, for there are one or two photographs of Felixstowe boats which obviously had such ailerons yet did not have F.5 tail units. I suspected them of being modified F.2As but lacked confirmation.

Whether N.4060 was or was not a standard Curtiss H.16, it was originally ordered as such. It was one of fifteen, numbered N.4060-N.4074, ordered for the R.N.A.S. from the Curtiss concern. Certainly the illustrations of a basic H.16 which appear in the 1919 and 1920 editions of Jane's *All the World's Aircraft* depict an enclosed boat as described by Prof. Robinson. Without being quite certain of the serial number of the boat in the upper illustration on page 895 of *Flight* it is impossible positively to identify it, but I think the odds are against it being an H.16.

Prof. Robinson's comparison of the performances of the F.5 and F.3 is interesting. The figures I quoted were taken from official trial reports as follows: Production F.3—Report No. N.M.155, dated 29.4.18; Prototype F.5—Report No. N.M.165B, dated 9.5.18; Production F.5—Report No. N.M.248A, dated May 1919. In particular, it should be noted that the endurance figures I quoted were in each case directly related to the fuel load specified, and were not maxima. These trials were, of course, conducted with individual aircraft, but their inclusion in the Directorate of Research Record of Performances of British Aeroplanes seems to indicate that they were intended to be regarded as typical.

On the question of the empty weights of the boats one must, of course, accept at their face value the weights quoted in the official trial reports; but the F.5 hull was specifically referred to in the discussion which followed Major J. D. Rennie's lecture, entitled *Some Notes on the Design, Construction and Operation of Flying Boats*, delivered to the Royal Aeronautical Society on January 18th, 1923 (*Journal of the Society*, 1923, pages 123-181). There (page 171), Mr. W. O. Manning is quoted as saying: "As to hull weights, the Author's [Major Rennie's] F.5 weight referred to the special F.5 built at Felixstowe (i.e., the prototype), and not

to the standard F.5 as used. He did not know the exact weight of the latter hull, but it was approximately 2,500 lb, or 1,000 lb more than the other." To which Maj. Rennie replied (page 178):—

"Mr. Manning challenges the percentage weights of the F.5, and says the hull had to be considerably strengthened to make it fit for general service. As I was chief technical officer at Felixstowe, and therefore in a position to know accurately the history of this boat, I must contradict him. As I have already pointed out, this boat had been used extensively, and was well-known to be the best hull turned out at Felixstowe.

"The F.5 was never put into production, which was a great blunder on the part of the Production Dept., Ministry of Munitions. Instead, the F.3 wing structure, the weight considerably increased to facilitate production, and adapters fitted to take either streamline wires or stranded cables, also permanent slinging gear incorporated, was fitted to a mongrel hull, a cross between the F.5 and F.3, and the resulting boat called the F.5. This was done solely because the F.3 was already in production (it never should have been), and the Ministry of Munitions were against a further change as jigs, templates, etc., were already made for the F.3. Therefore Mr. Manning's figures for weights of the F.5 are not accepted for two reasons: firstly, they do not represent the F.5 and, secondly, the hull weight includes bulkheads, seats, etc., and consequently is not comparable with the figures given in my paper."

In this lecture, Maj. Rennie confirms Prof. Robinson's opinion that some 200 F-boats were actually built. On page 175 of the R.Ae.S. Journal he says: "During the war about 500 'F' boats were ordered from various firms. Of these, say, 200 were delivered and used up to the Armistice, after which a certain number were cancelled and the remainder delivered to stores."

The serial numbers I gave on page 932 of *Flight* were neither complete nor exhaustive; it was not my intention to convey the impression that all the machines listed were actually completed.

The addition of the serial numbers of the Killingholme boats is of interest, but the H.4s were properly 1232, 1233 and 1235; and the early H.12s, 8668, 8669 and 8688. Although these aircraft may have appeared with the N prefix, they did not properly belong to the true N series. (There are many other examples of this misleading use of the N prefix.) As for N.4291, might not that boat have been transferred to Yarmouth?

A final point in my own article which I should now like to correct is that the American N.C.4 flying-boat which was the first to make the Atlantic flight was one of three, not four as I stated.