

Pitch Panic

How Hurried Changes from Two-pitch to Constant-speed Airscrews Were Made in Time for the Battle of Britain

AS long ago as 1936 the De Havilland Co. had both Spitfire and Hurricane included in their programme for variable-pitch airscrews, but in those days the accent was on lightness where fighters were concerned, and as both types could leave the ground fairly well with fixed-pitch two-bladed wooden airscrews, the company was not instructed to provide v.p. until much later—in fact not until 1938, when pilots were beginning to say that they needed variable pitch for safety in night take-offs. The R.A.F. expansion was then going ahead strongly and two-pitch airscrews were specified for single-engined fighters because quantity deliveries of these could be given more quickly than of the constant-speed type. By the time Paris fell, De Havillands had delivered about 1,250 two-pitch airscrews for the Hurricane, 1,000 for the Spitfire and 325 for the Defiant. They were delivering constant-speed types then in quantity for Wellington Ic, Hampden, Beaufort, Beaufighter, Whirlwind, Stirling, Manchester, etc., but the single-engined fighters, the Blenheim and other types, were still being retained as two-pitch installations.

At the time of the Battle of France airscrew engineers and test pilots used to hear at the fighter stations that the Me 109s had a slightly greater ceiling than our fighters, though their manoeuvrability high up was not so good as ours, and that they had an advantage in accelerating and power diving. Our two-pitch fighters had to throttle back in the dive to avoid over-revving. It was also clear that constant-speed control would give us a much improved climb for intercepting. Changing from fine to coarse pitch with the two-pitch control, as set for the Spitfire's rated altitude, was rather like changing from bottom to top gear in a small four-speed car. In many talks with hard-worked pilots during Dunkirk week and thereabouts all agreed that constant-speeding would be a considerable help, especially as it did not mean new airscrews, but only governor units, piping, etc.

First Spitfire Converted

On Sunday, June 9, when the Germans were pouring across the Marne, De Havillands had a 'phone call from an engineer officer asking whether they could convert one Spitfire as a sample. They said they could, quite easily, and sent one of their test pilots with an engineer to explain that the work involved would not take many hours, but that if they were likely to be called upon to make conversions in quantity they would have to be given authority to divert materials and labour from the contracts upon which they were fully engaged.

They at once set about the parts and pipe lines for the trial conversion. These were ready in about four days, and half a dozen picked D.H. airscrew installation engineers effected the conversion at an airfield during one night, while the Huns were rejoicing in Paris and Goering was regrouping for the attack on England.

A report dated June 20, from a D.H. test pilot, Mr. E. Lane-Burslem, stated that he had flown the converted Spitfire and so had Sqn. Ldr. Cooke, who commanded 65 Squadron, and a number of his pilots. They estimated that there was more than 7,000ft. of increase in ceiling, and the manoeuvrability at height was much improved, not to mention the obvious advantages of reduced take-off run and increased rate of climb—in brief, the ability to use maximum efficiency at any altitude in all conditions.

Enthusiastic for other squadrons as well as his own, and backed up by his engineer officer Flt. Lt. McGrath, Sqn. Ldr. Cooke got in touch with the technical authorities and interest spread rapidly. Among the experienced operational pilots who were first to appreciate the advantages was Wing Cdr. H. Broadhurst.

Conversion in the Field

On Saturday, June 22nd, De Havillands were verbally instructed to convert in the field all Spitfires, Hurricanes and Defiants, with priority over other contracts, and the Spitfires had to be done first. Sqn. Ldr. Cooke, in his constant-speed Spitfire, led his two-pitch squadron into battle and the practical advantage was immediately apparent. Unfortunately, on his second sortie he was killed.

Minutes of a meeting held on June 22nd with the Senior Technical Officer of Fighter Command relate that de Havillands would start the conversion at twelve Spitfire stations on Tuesday, June 25th (less than a week after the first test flight) and could provide twelve men capable of supervising a station apiece; that the firm estimated that each squadron would take ten days to convert, and that all Spitfire squadrons could be completed by July 20th.

The same minutes recorded that de Havillands had put in hand the production of 500 conversion sets, without contract cover, and that these would be coming out at the rate of 20 sets daily from June 24th, two days later. Supermarines were to be supplied with 20 sets per week from June 25th for aircraft coming off the production line; this would mean that two-thirds of the Spitfire production from that day onward would be "constant-speed." After completing the squadrons the D.H. engineers were to modify any Spitfires in storage at Maintenance Units (the word "any" had a grim significance!)

A small quantity of constant-speed units produced for the French Government, useless to them after the collapse, formed the nucleus for the job that began on June 25th, and bulk production duly followed without a break. The conversion called for this constant-speed unit; a small shaft drive to connect it to the engine; four external engine oil pipes; a complete cockpit control with conduit, and detail parts. The airscrews did not have to be changed, having been designed for constant-speeding, but each had to be dismantled to move the index pins so as to give full pitch range and shift the range bodily several degrees towards the coarse limit. As Rolls-Royce could not, consistent with other heavy demands, produce the quill shafts for driving the c.s. units, or the engine oil pipes, the data were given to de Havillands and the facilities of the Gipsy engine factory were pressed into service to make over 1,000 sets of these parts. Everybody in the D.H. organisation who could contribute anything was transferred to this job. Several outside suppliers were involved, and in particular it may be recalled that M.R.C., Ltd., the makers of the pilot's control, astonished at the demands made on them, co-operated magnificently. Many of the "inside" people did remarkable work; for instance, Mr. Ivor Jones, of de Havilland's Progress Department, who chased and controlled all the parts supplied.

Day and night air raids on England began about Monday, June 24th. The next day 13 D.H. engineers set forth in cars for twelve Spitfire stations. (Two went to one station.) Each was provided with about six conversion

NOT until now has it become possible to tell the story of how a small band of men, working sometimes 20 hours or more out of the 24, converted Hurricane and Spitfire Merlins for constant-speed airscrews. It is no exaggeration to say that but for their heroic efforts the Battle of Britain might have ended differently.

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sets to be going on with. Their names were: W. E. Crease; J. B. Houston; S. C. Bentley; W. M. Bentley; B. J. de Sibour; A. Moser; C. A. Luke; A. Metz; W. Hook; T. Beavis; W. Pickford; S. J. Reed; A. J. Tribell.

At each station the D.H. man on arrival asked for a picked crew of N.C.O.s and fitters, converting the first aircraft himself and instructing the men at the same time. The second aircraft was then converted by the R.A.F. crew with his help, and the third with his supervision only. After that, if all was going well, he would proceed to the next station. Youthful engineers like de Sibour found themselves directing senior flight sergeants and quite big squads of fitters. Mr. Lane-Burslem flight-tested the first machine and instructed the R.A.F. pilots in the constant-speed operation, and then flew on to the next station.

Working 150 Hours a Week

The working times of the D.H. engineers during the ensuing weeks averaged about 105 to 110 hours (15 to 16 hours a day), with instances of 130 and up to 150 hours (19 to 21½ hours out of the 24). At some squadrons as many as four and five Spitfires were converted and test-flown in a day.

There was much improvisation at the stations. Home-made arbors were contrived for dismantling the airscrews and off-set spanners were made to get at nuts without having to remove the Merlin glycol header tanks.

Some of the squadrons which had borne the brunt at Dunkirk and were resting, in South Wales and elsewhere, flew their Spitfires across England in ones and twos to be converted, and some aircraft were flown for conversion to De Havilland's own factory.

The rush had its light moments. As all the initial production and conversion arrangements were made without contract cover of any kind, De Havillands had the authorities on one side pressing almost impossible promises

out of them, while other branches were cautioning them that their action was irregular. A contracts clerk said, "We shall probably never get paid for this," and an engineer was heard to reply, "If it isn't done we may never live to be paid for anything." Even in March, 1943, the De Havilland contracts department were still being called upon for the routine evidence that certain aircraft had been converted.

800 Sets in 44 Days

An entry dated Friday, August 2nd, records that by then, 44 days after the test flight of the first converted Spitfire, the production of conversion sets for all existing Spitfires (more than 800 sets, fulfilling the schedule of 20 a day) was complete, and they had therefore started producing for the Supermarine assembly line; De Havillands then had 400 Hurricane conversion sets in hand and expected to convert a total of 700, after which constant-speed airscrews would be embodied in the new aircraft.

The worst of the rush was over, six days before the *Luftwaffe's* mass attacks began, and a chance diary entry records that the company was already busy on another urgent job, of fitting airscrews to 24 Hurricanes to be sent at once to the Middle East! Another diary entry of that month which serves as a reminder of gloomy expectations records that De Havillands were doing 1,500 sets of bomb racks for Tiger Moths!

Those July raids had, fortunately, been little more than skirmishes. If only the German High Command had realised! The mass attacks on Channel ports and shipping which began the intended final assault upon Britain did not start until Thursday, August 8th—but all our Spitfires had constant-speed airscrews by then. By August 16th 1,051 Spitfires and Hurricanes had been converted—an average of 20.2 aircraft per day, over 52 days. In the eight days, August 8th to 15th, the German losses averaged 81 aircraft daily—four times our own losses. One of the highest officers of Fighter Command remarked to a D.H. engineer that but for the conversion job the figures might have been reversed.

BLIND LANDING IN MID-ATLANTIC

THE story has been told of an amazing blind landing by a Fleet Air Arm pilot on the tiny flight deck of an escort carrier operating in the Atlantic.

The pilot was Sub Lt. (A) R. A. Singleton, R.N.V.R., and his observer Lt. Cdr. (A) J. Palmer, R.N.V.R.

Within ten minutes of the *Swordfish* taking off on reconnaissance patrol over a convoy the ships were enveloped in thick fog. The carrier had her fog buoy streamed, and this was used by the pilot as a guide for his approach. His first attempt failed, but he circled the ship and successfully landed at the second try, with visibility only about 50 yards.

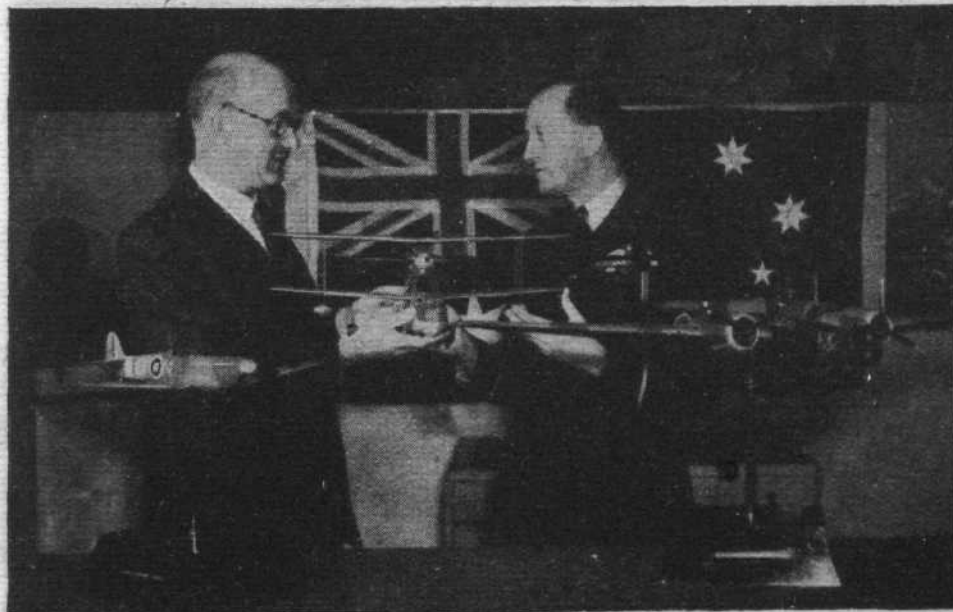
Lighted "bats" were used by the flight deck officer.

ATLANTIC RECORD

BY making the non-stop flight of 3,100 statute miles from Montreal to an airport on the west coast of Britain in 11 hours 35 minutes, Capt. Richard Allen recently eclipsed all long-distance and transatlantic air-speed records. Capt. Allen was flying a B.24 Liberator on the R.A.F. Transport Command North Atlantic shuttle ferry for British Overseas Airways Corporation.

In this flight he clipped 21 minutes off the previous best, put up some weeks ago by a British-built Lancaster piloted by Capt. M. B. Barclay, of Perth, Scotland, on the Canadian Government Atlantic service operated by Trans-Canada Airlines.

The time of 11 hours 35 minutes was calculated from actual take-off to landing. On the flight the aircraft was helped by a strong tail wind which raised the average "ground" speed to 275 m.p.h.



R.A.A.F. WAR MUSEUM

The Royal Australian Air Force has started to collect souvenirs and other exhibition war material for the Australian equivalent of our Imperial War Museum. This picture shows Major H. R. Kilner, M.C., chief of the aircraft section of Vickers-Armstrongs, Ltd., and president of the Society of British Aircraft Constructors, presenting models of Walrus, Spitfire and Wellington aircraft to Air Vice-Marshal H. N. Wrigley, C.B.E., D.F.C., A.F.C., A.O.C. R.A.A.F. Overseas Headquarters in London.