

FRANK BERNARD HALFORD, C.B.E., F.R.Ae.S.

7.3.94 - 16.4.55

A TRIBUTE

IN THESE hurrying days recollection of men and their deeds of yesterday are quickly blurred by our hopes and problems of to-morrow. When the oak is struck down we miss it from the landscape as we last saw it and not as the young sapling it once was. Most of the many who will mourn the passing of Frank Halford will probably think of him as "Chairman and Technical Director of the de Havilland Engine Company"; as "President" in 1951-52 of the Royal Aeronautical Society; heavily burdened with the technical responsibility of an organisation of world wide repute; as something indeed of an Institution rather than an individual as human as themselves.

For those, however, who met him years long ago and have lived ever since in intimate and abiding friendship and the common task of fostering aero-engine development, there will remain of him an imperishable memory of an ever-young man of dynamic enterprise, warm in heart, extraordinarily magnetic, gay in adventure with the *panache* of a D'Artagnan, an echo of the Robin Hood of his beloved county of Nottingham.

For this reason I have selected to accompany this tribute a photograph taken probably just before the last war, which seems to me the most fitting as a memorial of my best friend of 40 years.

After leaving Felsted School, notable for its "Engineering Side," (where he just overlapped the older R. K. Pierson of Vickers-Armstrongs) and a short period at Nottingham University, he learnt to fly at Brooklands with the Bristol Aeroplane Co., taking his Aero Club "ticket" No. 639 in less than two months (in October 1913) and became a Pilot Instructor, aged 19. But already his burning interest was in "engines," and in April 1914 he joined the recently created A.I.D. at Farnborough, formed under the Director General of Military Aeronautics of the War Office with Lt.-Col. J. D. B. Fulton as Chief Inspector of Aircraft, and Captain R. K. Bagnall Wild, R.E. (Retd.) as Inspector of Engines—to safeguard the quality of manufacture of equipment for the Royal Flying Corps.

Halford joined as an Engine Examiner, at 50/- per 48-hour week (with 6/- per day subsistence allowance!). On the outbreak of war in August he enlisted in the R.F.C. as "Foreman Artificer" and went to France, but was commissioned as Second Lieutenant in January 1915 and re-appointed to the A.I.D. as Assistant Inspector Engines.

In those days the bulk of the aircraft and engines produced for the R.F.C. were designed by the Royal Aircraft Factory, now R.A.E., but there were contracts for French rotary Gnomes, Clergets, and Le Rhones, and the Austro-Daimler 6 cylinder water-cooled engine built under licence by Sir W. Beardmore & Co. Ltd. at the Arrol Johnston works at Dumfries. For these "foreign" "non-R.A.F." types the A.I.D. perforce (but with enthusiasm) acted as overseers of design and development and not only as inspectors, until an embryo Technical Department was set up at the War Office in 1916.

Inevitably and irresistibly young Halford leapt to the opportunity of creation of "more power," and finding a sympathy in the bluff sound T. C. Pullinger, head of Arrol Johnstons, quickly beat up the 120 h.p. Beardmore to give



a reliable 160 h.p. output (a 33 per cent advance!) to the benefit of the R.A.F. F.E.2B pusher biplane.

Following a visit to France about mid 1915, he returned full of enthusiasm for the Hispano Suiza 8 cylinder 90° Vee water cooled engine with its novel aluminium monobloc cylinder construction, and advocated its building in England, under a licence obtainable for a trivial fee. But who was an impetuous lad of 21 to discuss such matters of high War Office policy, and months elapsed and a high price had to be paid before the Wolseley Co. started to produce the Hispano Vipers for the S.E.5 fighter of R.A.F. design.

Meanwhile, undeterred by this rejection of his foresight and appeal, he enlisted the support of Sir W. Beardmore and Pullinger, and almost surreptitiously designed and had built the prototype "B.H.P." 6 cylinder 200 h.p. engine, with aluminium monobloc, and somehow insinuated it in 1916 into the de Havilland D.H. 4 prototype for which the 160 h.p. Beardmore had been officially specified! That aeroplane was a notable advance, and although in the D.H. 4 production form the Rolls-Royce Eagle was fitted, a large number of D.H. 9's were built with the B.H.P. which, for production in large quantity, was taken over and modified by the Armstrong Siddeley Company to be known as the Siddeley Puma.

Early in 1916 Halford met Ricardo (now Sir Harry), then performing magic with single cylinder engines in a shed at the bottom of the garden of his house at Walton, and became an ardent disciple of that Sir Isaac Newton of the natural laws of Thermodynamics, clarifying and enunciating in simple terms fundamental principles in place of the mysteries and almost mumbo jumbo superstition, of detonation, pre-ignition, thermal efficiencies, and supercharging.

One result was the design of the R.H.A. (Ricardo-Halford-Armstrong Whitworth Elswick) 12 cylinder engine with crank case supercharging in 1917. The end of the war came before there was time to comb out the teething troubles, but the association between Ricardo and Halford continued happily, and for some two years Halford was in America dealing with the former's sleeve valve patents, and acquiring much valuable experience.

There was a post-war slump in aviation, and when he came back from the U.S.A. Halford occupied himself with the practical development of the Ricardo-Triumph motor cycle, by securing Auto Cycle Union Class records at Brooklands in August 1921 for 10 miles, and the flying 5 miles, at speeds of 76 m.p.h., and also making a good show in the not un hazardous Isle of Man T.T. race.

In 1923 he set up in private practice as a designer in a little office in North Kensington, with John Brodie (of B.H.P. days at Arrol Johnston and now a Director of the de Havilland Engine Company) as assistant, and designed and got built his 1½ litre Halford Special car which in 1924 in its first race, the J.C.C. 200 miles at Brooklands, he drove into 5th place at 108 m.p.h., and gave a hard battle to the Delage, the winner in 1926, until put out by a back axle failure.

In 1924 he had shifted his office to the A.D.C. Company at Croydon who were faced with the task of disposing of large quantities of redundant war material—including hundreds of new 80 h.p. 8 cylinder Renault aero engines. From this engine Halford produced the 4 cylinder Cirrus by a process of dichotomy which, allied with the genius of his old friends Geoffrey de Havilland and C. C. Walker, resulted in the D.H. Moth, the first practical private owner type of aeroplane. Dissatisfied with the sales policy which sought to keep the engine price unduly high, he again became independent and designed the Gipsy and so became identified with, though not until later directly engaged by, the de Havilland Company. The Gipsy went on, inverted in development, to sustain the first de Havilland Comet in winning the England-Australia race in 1934, a contribution marked by the Royal Aeronautical Society in presenting Halford with its Silver Medal in 1935. The Gipsy, in 6 cylinder form, still goes on, in the Devon, and in the Duke of Edinburgh's Heron.

In parallel he was wholly responsible for the design of the 16 cylinder "H" Rapier small capacity high revving air cooled double crankshaft engine, a bold conception to give minimum drag, built by D. Napier & Son, which crossed the Atlantic E. to W. in the single seater section of the Mayo Composite project; followed by the 24 cylinder Dagger on similar lines with which one R.A.F. Squadron of Herefords was fitted as a variant of the Bristol radial engined Heyford.

There were many at the time and since who deprecated the expenditure and effort applied to these "H" engines, of which relatively little production ensued, but they could hardly deny that these two types acted as violent and effective spurs to the contemporary development of more orthodox air cooled and water cooled types, and, in themselves, under Halford's drive, established many new techniques and advancement in thought helpful in many other directions.

Still questing as ever, and by now, rather uneasily, a Director of the Napier Company, though also associated with de Havillands, in 1937 he designed the Napier Sabre 2,000 h.p. water cooled sleeve valve engine, this time in "H" form, which completed its initial type test and prototype flying in the Hawker Typhoon with exceptional (and therefore ominous) freedom from trouble, and enormous promise. Unfortunately when the inevitable troubles came—almost wholly in producing the sleeves "to stay round"—they had to be tackled under conditions of war time production and in the full glare of Service publicity and political criticism. Nevertheless the Sabre in the Typhoon was a flail of the enemy in Normandy, accounted for many V1 Doodle Bugs, and was finally paid the greatest tribute possible in its adoption by another firm as the basis of the last high powered piston aero engine put into development before the jet engine swept the board.

Despite this load of anxiety in the temporary setbacks of the Sabre, Halford was one of the first to appreciate the potential of Whittle's jet development, and early in 1941 he began, as ever in his own way, to design his own jet—the Goblin of 2,000 lb. thrust at de Havillands—going boldly for a large diameter single-sided impeller and direct air intake instead of a plenum, despite the head shaking of

some of the pundits. His justification is evident enough in the D. H. Vampire, the subsequent Ghost of the Venom and Comet I, and the scope and prosperity they have brought to the de Havilland Engine Company, created under his leadership in 1944.

The Royal Society of Arts recognised his clear thinking and vision in jet development by presenting him with its Silver Medal in 1946.

Since the war, under his fertile activity and direction, have come the Sprite rocket motor and the larger Spectre, his first posthumous contribution which emerged from the veil of Security a few days only after his death.

As the faithful John Brodie, who worked with him as a brother for 32 years, so aptly wrote in his touching tribute in "The Aeroplane" of 29th April:—"Surely there is no single man in all the world of aviation who has left his personal signature so clearly over such a long period!" To that I would add that no great designer has given greater inspiration, unflinching support, and prompt and generous recognition to his staff, and thus earned so richly their loyalty and united team work—in Brodie, Moulton, Arcott, and Ker Wilson, to name only some, all with him over 25 years. We can look to them with confidence to carry on and complete what he was not left long enough to do.

In the accepted sense Halford had no technical or engineering training, and no academic qualifications. He was a "natural." That fact perhaps, plus his skill in cross-examination (which would have made him a brilliant barrister), and his gift for "debunking," made some elements of "officialdom" apprehensive and suspicious of him. His enthusiasm was tremendous and unquenchable. Every new project on which he embarked was going to be a world beater, and such disappointments which sometimes followed were only comparative, and left him undaunted. He had an uncanny knack of anticipating one's questions, and one's own answer to his! To be with him was a tonic.

In his earlier days he was a fine tennis player, and a strong swimmer (nearly drowned twice). Curiously he never returned to flying after he ceased instructing in 1913, except as a passenger when his work or time required, though he was an enthusiastic and excellent motor cycle and car driver, despite two serious crashes.

In later years he was an ardent supporter and Director of the Notts County Football Club, about the only relaxation he allowed himself from unremitting work.

He habitually overworked, draining himself mercilessly of energy, unheeding of the warnings of several prolonged attacks of phlebitis, during which his bedside was always cluttered with slide rules, blue prints, and reports. His devotion to duty and unconquerable courage were shown when, as President of the Royal Aeronautical Society, he presided over the Anglo-American Conference in 1951, after being told only the day before that he was suffering from a grave malady demanding a drastic operation of uncertain success the day after the Conference ended. His tenacity of will power was shown in the fact that within two years he achieved a complete cure, only to die, in full harness, as he would have wished, from coronary thrombosis.

To his wife, his mother, aged 92, from whom he inherited his zest for life and courage, and his daughter in America, must go our heartfelt sympathy. They, as some others, will find consolation that in giving him happiness and comfort in times of ease and stress they helped to pay some of the price which high achievement demands.

The tale of Frank's achievements is not yet finally told. Some of the arrows of desire shot from his bow of burning gold have yet to pass over our heads to hearten and inspire the England he loved and served so well.

For him Shelley might have sung:—

"To defy power which seems omnipotent,
Neither to change, nor falter, nor repent,
This . . . is to be
Good, great and joyous, beautiful and free.
This is above life, joy, empire and victory."

"B.B."