

# Ernest Frederick Relf

CBE, ARC, FRS, FRAes.

2nd October 1888 to 25th February 1970



**E**RNEST F. RELF was an unusual man who maintained throughout the whole of his long life a mental alertness of a high order, which enabled him to keep on equal terms in the company of whatever scientific or musical company in which he happened at the time to be. His brilliance was early manifest from the day when he was apprenticed on the 6th January 1904, at HM Dockyard School, Portsmouth, at the age of 15 years, being placed first in the list of successful candidates in the competitive examination. He followed this by taking first place each year in the annual examinations of all dockyards. Another apprentice at the Dockyard, and a colleague later at the National Physical Laboratory, Arthur Page, writes that "he excelled, with no apparent effort, in his studies and without any doubt was the outstanding apprentice during his four years at the School".

After a year at the Admiralty Ship Tank at Haslar, he won a "Royal" Exhibition, tenable for three years at the Royal College of Science, South Kensington, an exhibition awarded by the Board of Education. The Tyndall Prize was won at the end of his first year for his work in Physics, Part I, so he took Physics for his college diploma in the final examination, being second to J. Guild, both being appointed soon afterwards to the scientific staff at the NPL in September 1912. Continuing on the same theme, further recognition came to Relf in many ways. He became a Fellow of the Royal Aeronautical Society in 1926, followed by Fellowship of the American Institute of Aeronautical Sciences (now AIAA). He was elected into the Royal Society in 1936 and in the same year gave the James Forrest Lecture to the Institution of Civil Engineers.

The CBE was awarded in 1944. His Wilbur Wright Lecture to the Royal Aeronautical Society was delivered in 1946.

Relf will be remembered for his publications on aerodynamics, starting in December 1912 as a part author on the subject of the standardisation of the pitot tube for accurate speed determination and in the following March as sole author on a photographic investigation of the flow round a model aerofoil, containing illustrations that are full of interest still, in spite of the low Reynolds number of the experiments that were made in a small water channel. Another early paper on the resistance of wires was followed at a later date (1921) by the singing of circular and streamline wires. These are just examples of the numerous papers written during his early years, including the First World War, covering aspects of fluid flow, the stability of aeroplanes, airships and kite balloons, and the design of experimental equipment. As to this last, special mention must be drawn to the design of the first electric motor small enough to fit into an aeroplane model for wind-tunnel testing and sufficiently powerful to drive a model propeller at the appropriate speed.

In those years Leonard Bairstow, under Thomas Stanton, was the leader of the group of aerodynamicists at the NPL, most of whom had been personally appointed from various universities by Sir Richard Glazebrook, the first director of the laboratory. After Bairstow left, Stanton took over, followed by Richard Southwell for a period of four years. Relf came next as the most experienced, and oldest but one, of the group of young scientists and was appointed as Superintendent in 1925. He successfully led the staff for the next twenty years during which he added many, now well known, scientists. During that time the Aerodynamics Division undertook many investigations, including that which underlaid the Schneider Trophy successes and the development of the Spitfire, Mitchell being a frequent visitor to see Relf, W. L. Cowley and others; the definitive work of R. A. Frazer, W. J. Duncan and A. R. Collar on flutter; that of C. N. H. Lock and others on propeller design and autogyro theory, transonic and supersonic flows; that of A. Fage and others on boundary layers; and that of S. Goldstein and his team during the Second World War on the design of aerofoils. It has been said that Superintendent Relf during this double decade was a constant stimulus to his staff with helpful suggestions put forward, especially at the incidence of a new problem, for he took such a wide interest that he rarely dug deeply into problems, a fact exemplified by the rare follow-up of any of his short papers by a subsequent note.

Relf may be best known for the design of the NPL Compressed Air Tunnel (nicknamed by him as the CAT) for which he was personally responsible under Sir Joseph Petavel, the latter ensuring from his own experiences that it should be a safe and enduring engineering structure; all the finer details, including the ampere balance, were due to Relf. So too were the subsequent planning of several complex experimental facilities added to the Division from time to time.

While he was superintendent, Relf established cordial relations with the aircraft industry. Apart from special visits, he went to all aircraft firms once or twice a year, usually accompanied by one of his staff. The chief designers welcomed these visits and with some of their senior staff devoted a whole day to open discussions on matters of interest but never with any formal agenda. Both sides undoubtedly benefited throughout the years.

In 1946 he became the first Principal of the College of Aeronautics, having taken a keen interest in the discussions which led up to the College's foundation on the recommendation of the Aeronautical Research Council of which he was then a member. In his five years of tenure he firmly laid the foundations of what has become recently the Cranfield Institute of Technology. Throughout that time he continued his interest in aeronautics and at his retirement in 1951 returned to the NPL as part time consultant. For three years he wrote a succession of short but penetrating papers on a variety of subjects as well as stimulating and helping able young men very much younger than himself.

A powerful influence in aeronautical research as a stimulating and co-ordinating body since 1909 has been the Council now known as the Aeronautical Research Council, the value of its work being in great measure due to its individual members and its many subsidiary committees. Relf holds the record of continuous service on one or other of its committees for fifty years from 1918 to 1968 and he only retired at last due to failing eyesight. He had three periods of service on the council itself 1945-49, 1955-57, and 1960-62, and was a chairman of many committees, first as an official member during his government service and later as an independent. His chief interest was in aerodynamics but it extended to other fields based on his engineering and physics backgrounds. R. W. Gandy, the secretary of the council, writes "Relf's longevity as a member was in itself less remarkable than the fact that, up to the last, he retained his liveliness of mind and his remarkable ability to see the essence of a problem, commented by a secretary of a sub-committee on his resignation by the remark 'That's a pity. We will have lost our best ginger group'".

Relf's other side was musical and here he brought talents of the same order as his scientific ability and an unbounded enthusiasm. He has told me that as a young man he had to choose between a career in music or in science. From about fifteen years old until he left the district he was organist at St. Matthews, one of the largest churches in Portsmouth. Fortunately he chose science. He was an excellent pianist as well as an organist and was at his best as an accompanist. Many were the happy hours he spent with musical friends and giving pleasure to those who were good listeners, to say nothing of the times when he deputised to play on either instrument at short notice. Being a perfectionist, his wife tells me that for his last year of life he gave up playing his grand piano because his eyesight was insufficiently good.

On a happier note he and his colleague, R. A. Frazer, devoted their leave in 1923 and 1924 to two Arctic expeditions to Spitzbergen, the first organised by Merton College and the more extensive second by Oxford University. Relf played a significant part as radio expert and his staff, subsequently, often tripped over the head of the polar bearskin that he kept as a memento in his superintendent's office.

Relf was a modest and unassuming man. Although he took no part in any sport, he was pleased to find in his junior days at the NPL that he was the fastest of his colleagues over 50 yards. He greatly enjoyed driving each of his many motor cars, getting livelier as the miles totted up, and was a very pleasant companion on business and pleasure trips. He had a boyish sense of fun of which there are many anecdotes; in one of Manchester's largest hotels he was playing Lexicon in the huge lounge before dinner. The Head Waiter after a while came up and politely stated that playing cards were not allowed there. With a quiet smile Relf turned over a few letters to enjoy the obvious discomfiture of the Head Waiter who retired to explain the matter to a group of waiters that were interested spectators. His puckish sense of humour was enjoyable, which together with his cheerful and helpful manner endeared him to his staff and many others who worked for and with him. He leaves a widow, equally well liked by all, whom he married in 1917. J.L.N.

## Correspondence

### Dagenham Days

Since the publication of my paper "Dagenham Days" in the February issue of the *JOURNAL*, I have discovered, by a fortunate piece of serendipity, confirmation of my suggestion that Mr. A. J. Roberts was the originator of the gyroscopic stability device tested on C. A. Moreing's Voisin biplane. (February *JOURNAL*, p. 139).

This evidence appears in the Cantor Lectures on Aeronautics given before the Royal Society of Arts in November/December 1909, by C. C. Turner, and published in 1910. Turner made a brief reference to Mr. Roberts' device in the third lecture, delivered on 13th December

1909. Page 29 of the published papers shows a picture of the Voisin, with the caption, "Mr. Roberts Gyroscopic Attachment on a Voisin Biplane", and a passage from page 30 reads:—

"Mr. Roberts has just brought out a gyroscopic contrivance to control lateral stability. In it advantage is taken of the precessional movement of the gyroscopes which are brought into play automatically, and bring a pressure to bear against the tendency to depart from the horizontal, either to the right or left. They allow a margin, however, for wheeling movements."

3rd April 1970.

PHILIP JARRETT (*Companion*).