

H. B. IRVING, O.B.E., B.Sc., *Fellow.*

HENRY BRAID IRVING, a distinguished aerodynamicist, died in hospital, some months after being seriously injured in a car accident, at Stoke Mandeville, Bucks., on 12th January 1961 at the age of 71. He was born on 25th April 1889, at Hoole, near Chester, one of a large family.

He was educated at the King's School, Chester, and at the Manchester College of Technology, where he was the leading student in his subject and obtained a Bachelor of Science degree with first class honours from Manchester University. After four and a half years of practical and design experience in marine and general engineering on the Clyde he left to undertake aerodynamic research at the National Physical Laboratory early in 1914.

His great contribution towards the advancement of aeronautical science is indicated in some measure by the publication during the twenty-five years at the Laboratory of more than sixty papers. His experimental work in the wind tunnels related in the main to aeroplane stability and control problems and to aeroplane spinning. His best known work concerned lateral control and the use of slotted wings. The papers cover, however, a wide field which includes airships, seaplanes, kite balloons, radiators, stress calculations, and buffeting. He was the first to suggest the use of the slot for the improvement of lateral control, in August 1922, and he published subsequently several papers on this aspect. This was later recognised by the award of the Charles Wakefield Gold Medal by the Royal Aeronautical Society in 1929.

A method of balancing split flaps to reduce operating loads, published in *The Aeroplane* in May 1936, is known by his name and drawings by J. H. Clark in that journal showed the eminent practicability of the idea. A year later he wrote another article for the same journal about a suggested means of obtaining variable wing area. The scheme was to arrange a biplane wing structure so that it might be folded together into a monoplane wing to reduce wing area. It was backed by wind tunnel results obtained from suitably devised aerofoil sections. In this article he wrote "The only alternative (to variable wing area) that one can see is the successful development of boundary layer control either in increasing maximum lift or (a more remote possibility) in reducing drag by keeping the boundary layer laminar."

Much of the early work on ailerons, published like most of Irving's papers in the Reports and Memoranda series of the Aeronautical Research Council, was summarised in articles published in *Engineering* and in a paper in the October 1921, *Journal of The Royal*



Aeronautical Society, entitled "The design of aeroplane control surfaces, with special reference to balancing." These dealt with the effectiveness of the controls for a range of angular movements, the hinge moments needed to operate the controls and three methods of aerodynamic balancing using horns, a backward hinge instead of on the leading edge of the control, and the Avro balancing plane above an aileron as fitted in the "Manchester." Of these three the backward hinge became standard practice. The importance of the effect of the gap between the nose of the aileron and the wing and the shape of the nose in the gap were stressed and much has been done in these matters since that date. Irving conducted many more wind tunnel experiments on this subject and put forward in November 1939, a proposal for a shrouded nose balance to avoid the gap effect.

Messrs. S. B. Gates and L. W. Bryant wrote a monograph on the spinning of aeroplanes in October 1926, and also lectured to the Society in March 1927 on the subject. Although Irving published a paper on the effect of stagger and decalage on the auto-rotation of a biplane in September 1920, he did not undertake other work on spinning until he published in November 1926, "Experiments on a model of the B.A.T. Bantam with special reference to spinning accidents." Many other papers followed, culminating in the second lecture to the Society on spinning which he gave in November 1931 with A. V. Stephens of the Royal Aircraft Establishment. Entitled "Safety in Spinning" it summarised the progress made in the intervening four and a half years, both in theory and in full scale and model tests. For the first time attention was drawn to the importance of the difference between the rolling and pitching inertias of

aeroplanes in relation to spinning, due to the loading up of the fuselage in those days without at the same time spreading loads on the wings. The paper was welcomed by a well-known chief designer for its clarification of ideas as to the causes and the prevention of spinning. A feature of the occasion was a demonstration of freely falling models in a vertical wind tunnel set up on the dais.

In the early summer of 1939 Irving was chosen to start a new experimental research station on stability and control at Duxford. To this end his long association with the N.P.L. was severed and he was transferred to the Royal Aircraft Establishment at Farnborough, but the outbreak of war frustrated the intention, so he remained to do wind tunnel work at that establishment. When hostilities ended, he was posted to the Ministry of Supply in London, becoming Assistant Director of Research (Air) until he retired in 1954.

While at the ministry he was responsible for initiating in 1950 researches on the reduction of noise from jet engines, a subject which engaged his interest for the rest of his life, first as a consultant to the ministry from 1954-57 and then as consultant to Bristol Siddeley Engines Ltd. and Westland Aircraft Ltd. During part of this time he was Chairman of the Noise Research Committee as well as a member of other committees of the Aeronautical Research Council.

Irving's main contributions to aircraft noise were firstly his appreciation that this was an important problem on which research was essential and secondly, on his certainty that this was a problem that could be tackled by the universities as well as at firms. His persuasiveness and encouragement to all the English universities on the noise problem played no small part in the relatively successful efforts made ultimately in this country and overseas on the noise reduction from jet engines both on the ground and in flight. He set up the meeting of Noise Researchers, from 1950 onwards attended by both university workers and members of firms; it was by way of his invitation in 1953 to workers in the United States to attend these meetings, that the States became aware of the problem and the progress made in this country. From that time onwards the two-way exchange of visits and invitations was found to be most profitable in the development of the subject. A recent letter from Langley Field draws attention to this, "I think that many of us feel a debt of gratitude to you for your labour in promoting noise work in U.K. and U.S.A. and look on this Agardograph (which Irving

was editing) as a somewhat belated personal acknowledgment." In addition to jet noise, Irving took an increasing interest in the noise from helicopters and wrote a paper on this subject which was presented to the Helicopter Association.

He was Chairman of a little-known body, the Low Speed Aerodynamics Research Association, which had come into being to find out more about flight at very low speeds. In that capacity he attended the historic meeting at Cranfield in January 1957, at which MAPAC was founded, internationally known today as the Man Powered Aircraft Group of the Royal Aeronautical Society. This absorbing interest remained with him to the end and he wrote an article, while lying helpless on his back, which was published in *The Aeroplane* on 4th November 1960. In this subject he took on the role of encouraging others to work in this field and helped in no small measure to co-ordinate their respective efforts. The small amount he wrote was in no way a measure of his achievement in this as indeed in his many other activities. He himself gave generously to the cause of man powered aircraft and he donated all he received from articles and T.V. programmes to the Man Powered Aircraft Fund. He encouraged others to do likewise and if Man Powered Flight in the sense we know it, is achieved, it will be a fitting memorial to one who had the courage to hold the torch and to persuade the sceptics that here was a scientific experiment of sufficient complexity to tax the energy and resources of aerodynamicists, aeronautical engineers and designers of the present day and age.

Mr. Irving was elected an Associate Fellow of the Society in February 1917 and a Fellow in 1932. He was a past Chairman of the Society's Aerodynamic Data Sheets Committee, Chairman of The Man Powered Aircraft Group, and a visiting lecturer to the College of Aeronautics.

Throughout his life Irving was a very sociable person, engaging in several athletic sports in his earlier years and developing into a keen and successful gardener in his later years. His hospitality in a delightful house and garden at Cobham, Surrey, has been enjoyed by many. He was a man of great personal charm, kindness and sincerity and his strength of character and integrity were an inspiration to all who knew him. He will be greatly missed by his widow and daughters, by his friends of all ages and by his many business friends in this country and in the United States of America.—J.L.N.