

THE PLACE OF NACA IN AMERICAN AVIATION

(Article by Pearl Young in Wing Tips, May 14, 21, 28.)

Five years ago there were four hundred employees of the NACA. Now the personnel is scattered over three field laboratories in three entirely different sections of the United States and has increased nearly tenfold.

In April 1939 the magazine Life published a pictorial report of the activities at Langley Field. Fortunately, they did not wait any longer. Even then the dusk of military secrecy that preceded the total darkness of actual warfare was settling down over the results of research projects and soon newsgatherers were banned from the post and the laboratory except for innocuous handouts. Life at that time said "Almost unknown to the general public, the NACA is recognized in aviation circles as the most famous group in international aeronautics."

This statement poses some questions.

Why is the NACA almost unknown to the general public?

Why is the NACA famous?

Why is it called a "group" and not an "organization"?

An attempt will be made to answer these three questions in a manner that will give our new employees some insight into the history, the purpose, and the personnel of the NACA.

First, the NACA is almost unknown to the non-aeronautical public because it is publicity-avoiding, not publicity-seeking. A research organization not in business to make money, gains nothing by blowing its own horn, and the results of a slow accumulation of fundamental knowledge does not often produce spectacular results. The infrequent times that the NACA has been publicized in the daily papers and the weekly magazines have mostly resulted from chance bits of knowledge squeezed out of Dr. Lewis or Secretary Victory at the time of the annual appropriation or when news of a new improvement leaked out from technical channels.

On the other hand, in technical publications the world over the four initials are a familiar symbol. In America they are pronounced separately; throughout Europe they are usually pronounced as a two-syllable word, NAC-A.

Members of the aeronautical industry know about the NACA cowling, standard equipment on radial engines; the hull developed in the NACA tank and used on the "Yankee Clipper"; the optimum location of engine nacelles as first exemplified in Douglas transports; efficient cylinder finning; improved basic wing sections; work on rivet heads and wing surfaces to decrease drag; improved tail surfaces and research on stalled flight.

Second, what makes the NACA, or any other organization, famous or great? Is it a result of the achievements just listed or is it something more? The answer is tied up inseparably with the third question, why do people think of it as a group and not as an organization?

In a full-page advertisement last month the Minneapolis Star-Journal and Tribune answered a similar query about their high standing in the community and came to the following conclusion: their newspaper is great because in every department there are outstanding people who inject into all their work a human quality.

That, too, is the secret of the place held by the NACA in American and international aviation circles - the outstanding and human quality of its personnel. The attitude resulting in this warm-hearted reception stems from the people at the top and is reflected by the new members as they become assimilated into the group. People in aviation never think of the NACA achievements in cold abstract terms; they think of them as being the work of a likeable, cooperative, unselfish group of Government scientists.

One year at the annual manufacturer's conference at Langley Field many people wondered about the identity of the pleasant, fatherly old gentlemen who, before he sat down to his own luncheon, carried plates of creamed chicken to the typists who had been taking notes all morning. It was Dr. Joseph S. Ames, who was appointed an original member of the NACA in 1915 while professor of physics at Johns Hopkins University. He is the author of NACA Report No. 20 on aeronautical coefficients. He was made a member of the Executive Committee in 1917 and served for many years as Chairman of the NACA. He is representative of a group of distinguished college professors who have served the Committee for a score of years with no compensation.

Last winter one of the new women employees from LMAL stopped at the Washington Office one Saturday afternoon. She reported that there was a nice tall plump red-haired man working late who was extremely pleasant and helpful. She did not catch his name but found out later that it was Dr. George W. Lewis, Executive Officer since 1919 and our present Director of Research. Dr. Lewis is coauthor of Report No. 24 written in 1918 on "Air Flow through Poppet Valves." That research on the same subject carries through today is shown by two recent Technical Notes, Nos. 701 and 717, by C. D. Waldron, also on poppet valves. Dr. Lewis was winner of the Guggenheim medal in 1936 and delivered the Wilbur Wright Memorial Lecture in England in 1939. But he has never lost his warm human interest in younger members of the organization.

A new computer at LMAL once asked if anyone there knew a Mr. Reid with several preceding initials. She said her cousin had competed with him in rifle matches. He was a good rifle shot, a pleasant person, and had some sort of a job with the NACA at Langley Field. It turned out to be H. J. E. Reid, Engineer-in-Charge of LMAL. Mr. Reid came to Langley Field about 1920, a keen young electrical engineer from Worcester Polytechnic Institute. He has developed a well-known line of recording aircraft instruments, including the famous NACA V-G recorder installed on innumerable transport airplanes to measure gust velocities. He is also chairman of the Subcommittee on Vibration and Flutter.

NACA Report No. 13 (submitted by Charles F. Marvin of the United States Weather Bureau) dealt with the dynamics of the atmosphere and Report No. 21 dealt with airplanes in gusts. These reports were the forerunners of the present series of short papers on gust loads being put out by the Flight Research Load Section under direction of Richard V. Rhode. Rhode got a free ride on the Hawaii Clipper to Hongkong in 1938 as a representative of the NACA and brought back V-G records and cloud photographs to demonstrate atmospheric conditions through which Pacific aircraft must pass.

The kindly distinguished 84-year-old gentleman with the white beard who works industriously every day in a small room at the Washington Office never advertises that he is the world-famed Dr. W. F. Durand. While a professor of mechanical engineering at Stanford University Dr. Durand was appointed a member of the original Committee in 1915. He was made chairman in 1916. He is the author of NACA Report No. 14 on propellers. The NACA still publishes Stanford propeller test reports. Dr. Durand is best known as editor of the scholarly encyclopedia "Aerodynamic Theory" sponsored by the Guggenheim fund from 1930 to 1934.

Still donating his time to reviewing NACA theoretical reports on aerodynamics is Dr. A. F. Zahm, now over 70 and head of the Aeronautical Department of the Library of Congress. Dr. Zahm operated the first wind tunnel in the world between 1900 and 1903 and flew a full-scale glider before 1889. He was chairman of the NACA Committee of Free Flight Tests in 1917 and is the author of NACA Report No. 19 dealing with stresses in propellers.

For the first few years the reports of the NACA were mostly contributed by outsiders. In 1919 Edward P. Warner of MIT was made secretary of the Committee on Aerodynamics and went actively to work at the new laboratory at Langley Field. He has since served for a time as Assistant Secretary of the Navy and has for several years been Chairman of the Committee on Aerodynamics.

Well known for his clear intelligent writing on aeronautical subjects - as editor of "Aviation" he frequently wrote many pages of the magazine - he increased the proportion of the NACA contribution to the Reports issued. In the fourth annual volume he wrote on such diversified subjects as flight testing, wind-tunnel design and testing procedures, and the analysis of fuselage structures. He still takes time from his many activities to dictate constructive comment on the form and content of projected NACA papers.

Since the days of the first atmospheric wind tunnel at LAMAL of which Warner wrote, the NACA has pioneered in the design and construction of many unusual types of wind tunnel. Dr. Max Munk designed the first compressed-air wind tunnel, which went into operation in 1921-1922. This tunnel is now part of the air-flow research section whose workers under the brilliant leadership of Eastman N. Jacobs have developed the family of NACA airfoils culminating in the low-drag airfoil now installed on the Mustang P-51.

In 1926 there was constructed at LMAL the 20-foot propeller-research tunnel, then the largest in the world. From this tunnel have come results affecting the design of landing gears and the position of engine nacelles on all airplanes. The first full-scale wind tunnel, accommodating an actual airplane with full-scale engine operating a propeller, was built in 1930. The present supervisor of the full-scale tunnel is Abe Silverstein whose first introduction generally brings forth the comment "You can't be the full-scale Silverstein - you're too young."

Russell G. Robinson fulfilled the promise shown by being in 1922 one of Terman's high IQ kids in California grade and high schools by designing the NACA 500-mile-an-hour wind tunnel in 1934. Robinson is now technical assistant to Dr. Lewis.

Helping to make the NACA known and respected is many another person connected with its achievements since the employees numbered less than 20, the annual appropriation was less than \$100,000, and about a dozen reports were published every year.

Jerome C. Hunsaker, present Committee Chairman, was author of part I, Report No. 1 of the NACA. It dealt with the experimental analysis of inherent longitudinal stability of a typical biplane.

Dr. H. C. Dickinson of the National Bureau of Standards was secretary of the Committee on Power Plants for Aircraft in 1918 and still serves on that committee. He is the author of NACA Report No. 23 written in 1917. This report deals with radiator design, spark plugs, and equipment to test aircraft engines under controlled conditions of density, temperature, and humidity.

Brevoort, Pinkel, Valerino, and Ellerbrock are currently writing about radiator and intercooler design. Whitney, Moore, and Al Young are still designing equipment to test aircraft engines under controlled conditions of density, temperature, and humidity.

So youngsters, don't give up. Even if you reported for duty only yesterday, you are part of the NACA. There is nothing to prevent your being just as kindly, tolerant, and approachable as Dr. Ames, Dr. Durand, Dr. Lewis, and Dr. Dickinson. There are just as many aeronautical research problems for you to solve by the application of brains and hard work as there were the day Orville Wright piloted the first airplane at Kitty Hawk in 1903.
