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LANGLEY 50TH ANNIVERSARY

On Oct. 7, 1903, Charles M. Manley, chief assistant to Samuel Pierpont Langley, was launched from a houseboat on the Potomac in a heavier-than-air machine that was designed to fly. It sank.

Sixty-eight days later a similar wood and canvas contraption, designed by a pair of bicycle mechanics, Wilbur and Orville Wright, shot down the sands at Kitty Hawk, N.C., stayed in the air for 3.5 seconds and covered a distance of 105 feet.

A few weeks from now a sleek rocket, the Saturn V, 365 feet tall and with a thrust comparable to 160 million horsepower, will take off from Cape Kennedy, Fla., on a test flight in preparation for this country's first trip to the Moon and back.

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As unlikely as it seems, the Saturn V had its genesis in the Langley and Wright machines.

The journey from the first biplanes to supersonic aircraft and space vehicles was exciting, arduous and rewarding. Credit for the success of man's conquest of the air and space must go in large part to the work done at the research center, later named after Dr. Langley, located in Hampton, Va.

In recognition of Langley Research Center's contribution to the advancement of the United States in aeronautics and astronautics, the first week of October has been set aside by Presidential proclamation to commemorate 50 years of service to the Nation.

From 1917 to 1938, Langley, as the single laboratory of the National Advisory Committee for Aeronautics, provided the facilities and scientific brainpower necessary to keep the nation in the vanguard of aviation progress. As other research centers were established across the country after 1938, Langley staff members provided the leadership to make them work. When the National Aeronautics and Space Administration was established in 1958, it was built largely around NACA and the experience gained at Langley.

Langley has assisted in increasing the speed of the airplane from less than 100 miles-per-hour to more than 4,000 miles-per-hour. It has helped man conquer the air and move toward mastery of the infinite space above the atmosphere.

Its milestones include:

--The development in the 1920's of a cowling for aircooled engines, a streamlining effect credited with increasing the speeds of airplanes of that period from 12 to 15 per cent; an innovation that made possible the use of engines of much higher horsepower;

--The accumulation of scientific data and technical competence that increased the performance and utility of aircraft used in World War II;

--The conception in the 1940's of research planes leading to history-making advancements at supersonic and hypersonic speeds;

--The design, development, and practical application in the '50's of the world's first transonic wind tunnels which bridged the technological gap in research facilities between subsonic and supersonic speeds;

--The discovery and verification of the Area Rule, a revolutionary idea concerning the configuration of aircraft;

--The development of much of the technology for a practical supersonic commercial air transport plane.

Langley continues in its aeronautical researches, working on current and future concepts of hypersonic flight, advanced supersonic aircraft, helicopters, vertical takeoff and landing and short takeoff and landing aircraft (VTOL/STOL), and support services for the exploration of space.

If Dr. Langley were alive today he would be gratified by the nation's space program. He would also have a part in it. He had from his earliest years been interested in astronomy. For many years he was interested in research as Secretary of the Smithsonian Institution. He and his brother John built from scratch a telescope with a five-foot focal length and a seven-inch mirror. They polished and discarded 20 mirrors before they fabricated one that met their standards.

Later, at the Allegheny Observatory, he made drawings that served for years as classic sunspot representations. Having realized early the limitations placed on astrophysics by the blanketing layer of Earth's atmosphere, he attempted to overcome them first by trying to find a constant that would represent the filtering atmosphere of the Earth, and later by moving instruments to the tops of mountains where this effect would be minimized.

In order to explore the physics of outer space further he invented the boloscope, a device that could measure temperature differences of 1/100,000 of one degree Centigrade. With this instrument he extended the spectrum to a point until then undreamed of.

It was not until he was 50 years old that he launched a new career in aerodynamics.

The credit for flying the first heavier-than-air machine was hotly disputed by followers of the Wright brothers and Langley for many years, but time eventually dulled the dispute and all of the figures involved were given due credit.

Disputes were not unusual in the history of aviation progress.

Attempts to end NACA's existence as an independent agency were made with regularity. It was proposed at varying intervals that NACA's facilities and functions be transferred to the Navy, the Army, the Bureau of Standards, the War Department and the Department of Commerce.

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The Langley laboratory also suffered its share of natural disasters. Wooden buildings, hangars and wind tunnels were beset by fires, and storms and floods took their toll. Langley, however, pushed aviation progress ahead in the face of adversity in politics, natural disasters, and a shortage of funds during the Great Depression of the 30's.

A five-foot wind tunnel was opened in 1920. In many ways, the development of the airplane has been the development of the wind tunnel, and Langley consistently has pioneered in these devices, extending with each new one the range of aerodynamic testing that can be done on the ground.

Langley's first wind tunnel was not unusual. It was modeled after one in use at the British National Physical Laboratory. Similar models were in use by the Army, Navy and various engineering schools. Its operation was quite simple: it directed a stream of air across a model airplane, where gages measured the stresses.

By the following year it was decided that a new kind of wind tunnel was needed, one using compressed air. It was known for some time that a model's behavior differed from that of a full-scale airplane. By raising the air pressure in the wind tunnel this difference in the effects of scale was overcome. As a result of tests in this so-called "variable density" wind tunnel, NACA studied the feasibility of jet propulsion some 25 years before the first jet airplane flew.

In 1927, a tunnel known as the propeller research tunnel, large enough to test full-scale parts, was put into operation. It had a 20-foot test section through which air flowed at 110 miles-per-hour. This tunnel, the world's largest at that time, allowed aerodynamic tests on full-scale propellers, fuselages, landing gear and other aircraft parts.

The most dramatic breakthrough achieved by this equipment was what came to be known as the NACA cowling. A steamlined covering for radial air-cooled engines, the cowling reduced the drag created by exposed engine parts. Because it greatly improved cooling, it permitted much larger engines of greater power.

In its 1928 report, NACA stated, "by the application of the results of this study to a Curtiss AT-5A Army pursuit training plane, the maximum speed was increased from 118 to 137 mph. This is equivalent to providing approximately 83 additional horsepower without additional weight or cost of engine, fuel consumption, or weight of structure." For this achievement, NACA was awarded the Collier Trophy for 1928.

Another benefit from the Propeller Research Tunnel was the location of engine nacelles on the leading edges of wings, rather than slung beneath them as had been the previous practice. This resulted in important speed gains. The amount of drag on fixed landing gear was also accurately determined.

Throughout the 1930's, aviation continued its advance. The shape of wings and airplane bodies all over the world were determined by the knowledge gained at Langley. And when World War II came, the information acquired over the years at this NACA facility contributed mightily to America's superior wartime air power.

Elaborately instrumented research rocket planes were carried above the atmosphere, where the density of the air was low, to explore transonic and supersonic speeds. Starting with the spectacular flight of the X-1 and progressing through the more and more advanced models, speed and altitude records were broken again and again. Langley shared the Collier Trophy with Bell Aircraft and the U.S. Air Force for this pioneering research in 1947. Today the X-15, latest in the series, has achieved speeds over 4,000 miles-per-hour and altitudes of more than 354,000 feet.

Langley was honored with the Collier Trophy again in 1951 for the development and practical application of the transonic wind tunnel, a facility that bridged the gap which once existed in wind tunnel research in the range from high subsonic speeds to those just above the speed of sound.

Langley's fourth Collier Trophy was won in 1954 for the discovery and experimental verification of the Area Rule.

Essentially, the Area Rule is a method to balance in a rational way the lengthwise distribution of volume of fuselage and wings in order to produce an airplane with minimum drag at transonic speeds.

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Slight modifications of the shape of the airplane fuselage can result in highly-improved performance. For example, a fighter plane prototype was unable in tests to achieve supersonic speed. With slight modifications indicated by the Area Rule, a gain in speed as much as 25 per cent was attained.

Today, Langley continues to improve the speed and versatility of aircraft. Some of its objectives are improved helicopters for urban travel up to 100 miles, short takeoff and landing aircraft for interurban travel up to about 500 miles, and improvements in subsonic jet transports to allow short runway operation.

Work is going forward on the supersonic airplane, and in the more distant future for an airplane designed to go more than five times the speed of sound--the hypersonic airplane.

Langley was the birthplace of Project Mercury, the first United States manned space flight project. It was instrumental in some of the key research in support of the successful Gemini project and the Apollo program, now just getting under way.

Langley research contributed to the Echo passive communication satellites. Once launched into orbit, a large aluminum-covered mylar plastic balloon automatically inflated and was used to bounce electronic signals from one point on Earth down to another. Line-of-sight electronic transmission is generally restricted to about 150 miles; by means of Echo satellites, this range was extended to span oceans and continents. In addition, regularly published reports of the transit of the Echo balloon allowed people all over the world to see their first man-made satellite move across the night sky.

Langley also took part in the development of the versatile Scout rocket, first all-solid-fueled launch vehicle to put a satellite in orbit, and the management of Lunar Orbiter, a spacecraft which circled and helped map the Moon. Lunar Orbiter was successful in five launches on five attempts.

Mercury models were tested in Langley's wind tunnels. Tests varied from static stability studies on full-scale models to drag and heat transfer investigations on models weighing less than a ping-pong ball.

The research center is supporting project Apollo through the use of unique simulators and specialized laboratories, designed to enable the country to gain on the ground experience of the rigors of outer space.

The experience and accomplishments gained at Langley, combined with the availability at one location of an array of specialized laboratory facilities and equipment at Hampton, is unique. Langley today constitutes a vital national resource for the future conduct of advanced research and technology programs in aeronautics and the manned and unmanned exploration of space.

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