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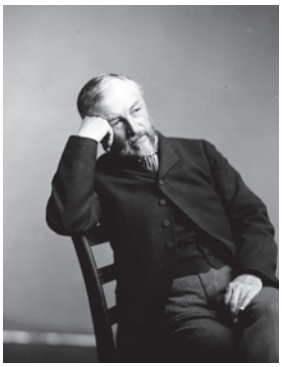
100 YEARS OF LANGLEY

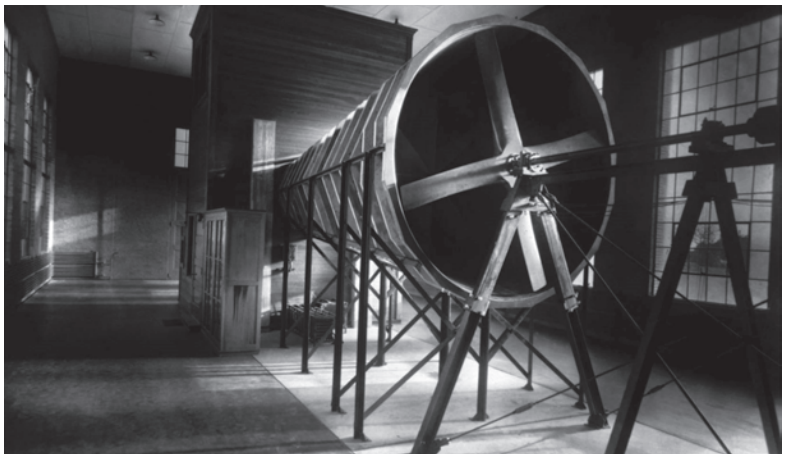
The National Advisory Committee for Aeronautics established the United States' first civilian aeronautics laboratory in Hampton, Virginia, in 1917, a little more than a decade after Orville and Wilbur Wright's historic flight at Kitty Hawk, North Carolina. For 100 years, the Langley Memorial Aeronautical Laboratory, now NASA Langley Research Center, has played a crucial role in the design, testing and development of aircraft and spacecraft, from its development of wind tunnels that transformed aeronautics research to its lunar landing structure that helped put men on the moon to today's efforts to explore Mars. On these pages, we show some of the center's most important achievements. By Debra Werner

1917-1939



Smithsonian Institution

▲ **Samuel P. Langley** (1834-1906), astrophysicist and third secretary of the Smithsonian Institution. Langley Memorial Aeronautical Laboratory was named for him.



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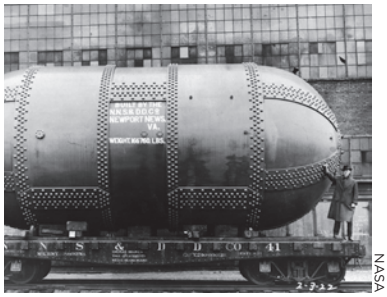
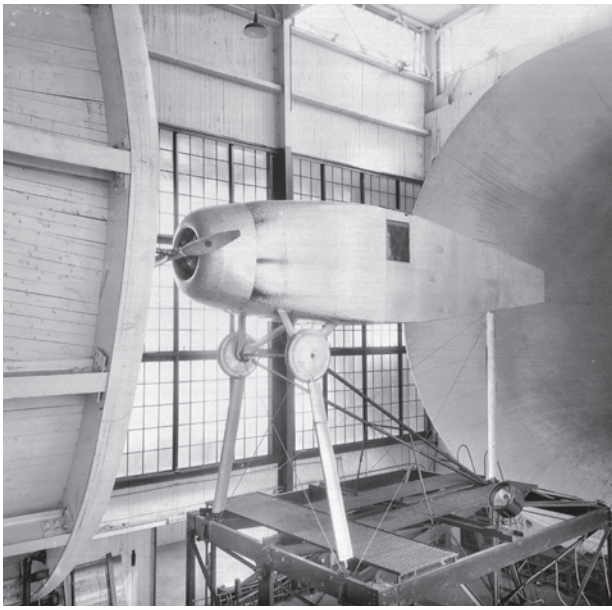
◀ **Langley Laboratory's** first wind tunnel, built in 1920.



NASA

▲ **Operational at Langley in 1922,** the Variable Density Tunnel was the first pressurized wind tunnel in the world.



LANGLEY TIMELINE

1917 The National Advisory Committee for Aeronautics breaks ground on Langley Memorial Aeronautical Laboratory next to Langley Field in Hampton, Virginia, named for Samuel P. Langley, an astronomer, physicist and aviation pioneer.

1920 Langley Laboratory completes its first wind tunnel.

1929 NACA receives the Collier Trophy for Langley Lab's work on cowlings.

1934 The world's largest wind tunnel is built at Langley Field.

1938 A new type of indicator developed at Langley anticipates wing stalls and warns the pilot, NACA announces.

1945 Langley Lab expands to include rocket research.

1947 Air Force pilot Chuck Yeager breaks the sound barrier in the Bell X-1, whose development was made possible by pioneering research in supersonic flight at Langley.

1958 NACA becomes NASA and NACA Langley Laboratory becomes Langley Research Center.

1959 Seven military pilots report to the Space Task Group at Langley to begin training as America's first astronauts.

1965 NASA Langley opens the Lunar Landing Research Facility.

1969 NASA lands Apollo 11 astronauts on the moon after they underwent training at Langley's Lunar Landing Research Facility.

1970s and 1980s Langley's 8-foot Transonic Pressure Tunnel conducts aerodynamic tests of various space shuttle designs.

1973 NASA Langley sets up an office to look at the environmental impact of supersonic flight.

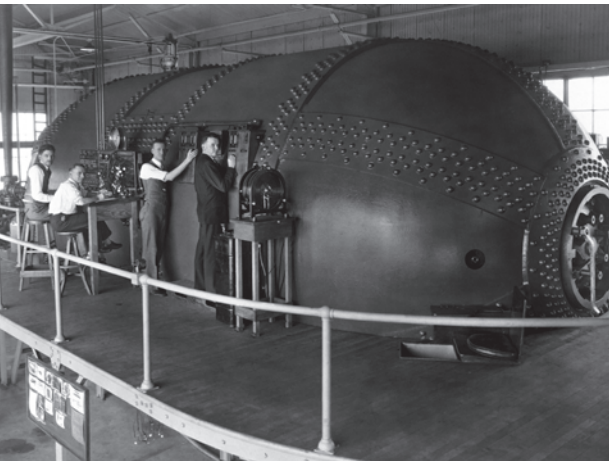
1976 Langley leads the first successful U.S. mission to Mars when the Viking 1 touches down.

1984 In a study of lightning strikes on aircraft, an F-106B fighter takes off from Langley and is struck 72 times.

1992 Langley researchers report developing a fetal heart monitor that can be used at home.

2003 In response to the Columbia shuttle accident investigation, NASA announces Engineering and Safety Center to be opened at Langley.

2016 "Hidden Figures" movie opens, telling the story of female African-American mathematicians who played a key role in NASA's space program.



NASA

◀ **NACA staff conduct** tests on airfoils in the Variable Density Tunnel on March 15, 1929.

NASA

NASA

◀ **A Wright Whirlwind J-5** radial engine mounted in the nose of a representative cabin fuselage with several cowling shapes is tested in the Propellor Research Tunnel in 1928.

NASA

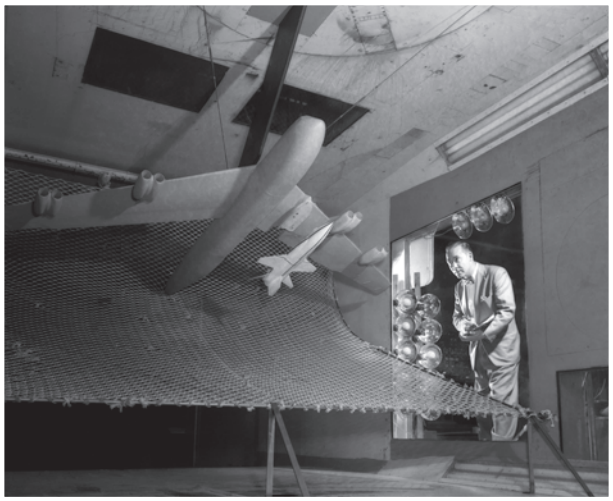
▲ **President Herbert Hoover presents Collier Trophy to NACA Chairman** Joseph Ames in 1929 for the engine cowling.

▲ **Metal shop workers** make engine cowlings, which smooth airflow over the engine and reduced drag.

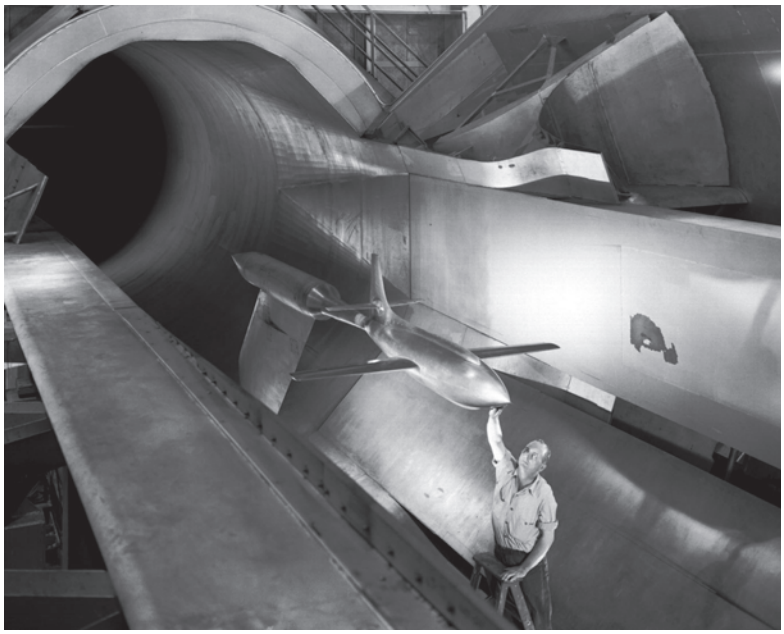
U.S. Air Force

▲ **Capt. Charles E. "Chuck" Yeager** (shown next to the Air Force's Bell-built X-1 supersonic research aircraft) becomes the first man to fly faster than the speed of sound in level flight on Oct. 14, 1947.

NASA



▲ **A one-twentieth scale model** of the X-15, suspended beneath the wing of a B-52 model, helps determine the release characteristics and drop motion of the research airplane.



NASA

▲ **A Langley engineer inspects his installation of a model of the Bell X- 1** supersonic airplane in the new slotted test section of the 16-foot High Speed Tunnel in March 1951.

NASA

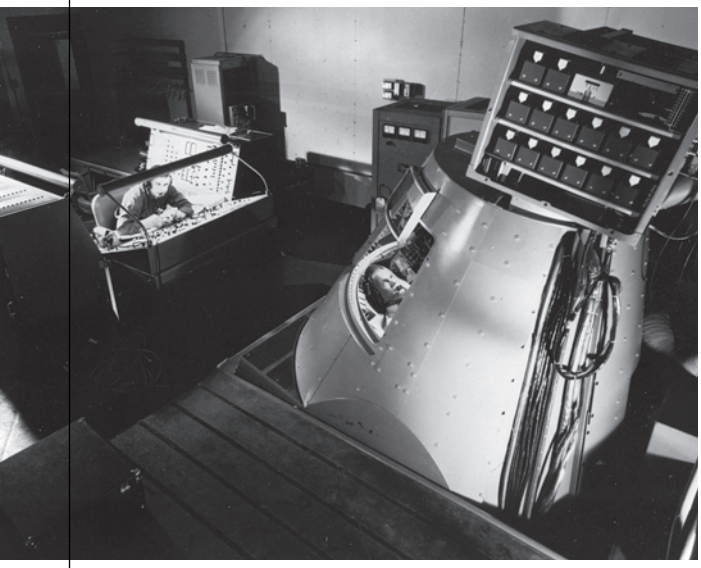
▲ **X-15 program staff** celebrate the first glide flight in June 1959.

▼ **NASA Langley spin tunnel** researchers test a Mercury capsule model in 1959.

NASA

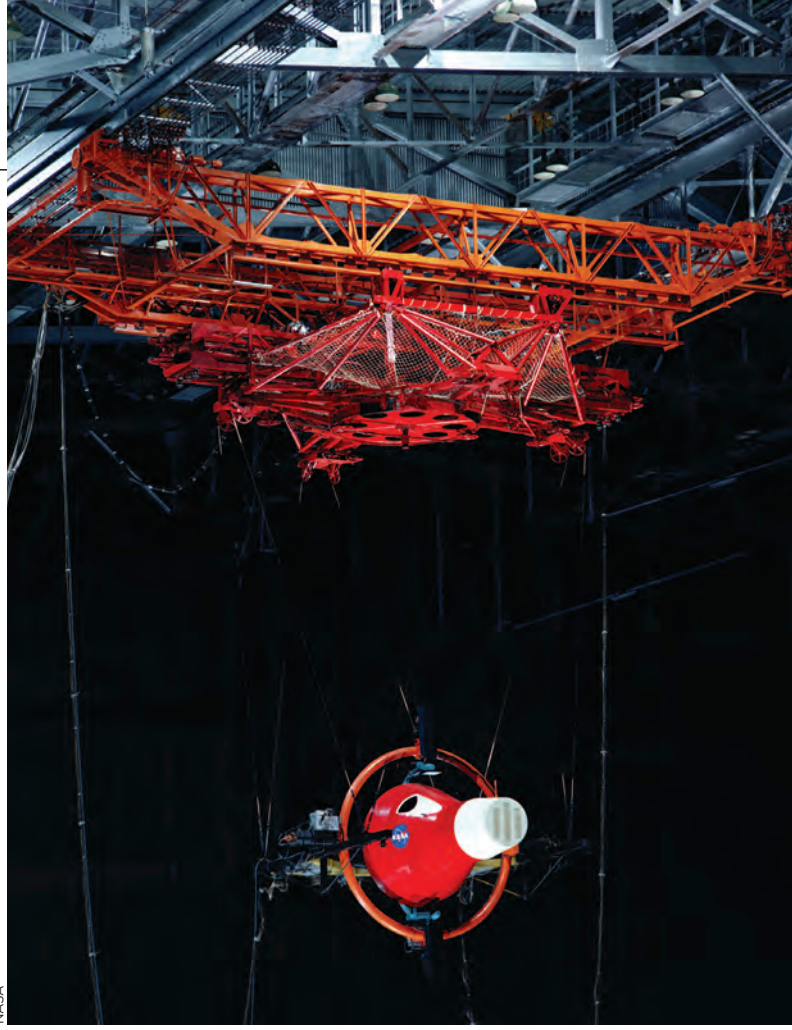
NASA

▲ **The Mercury space capsule undergoes tests** in the Full-Scale Wind Tunnel in January 1959.



NASA

▲ **John Glenn, one of the Mercury 7 astronauts,** runs through a training exercise in 1960, two years before he became the first American to orbit the Earth.



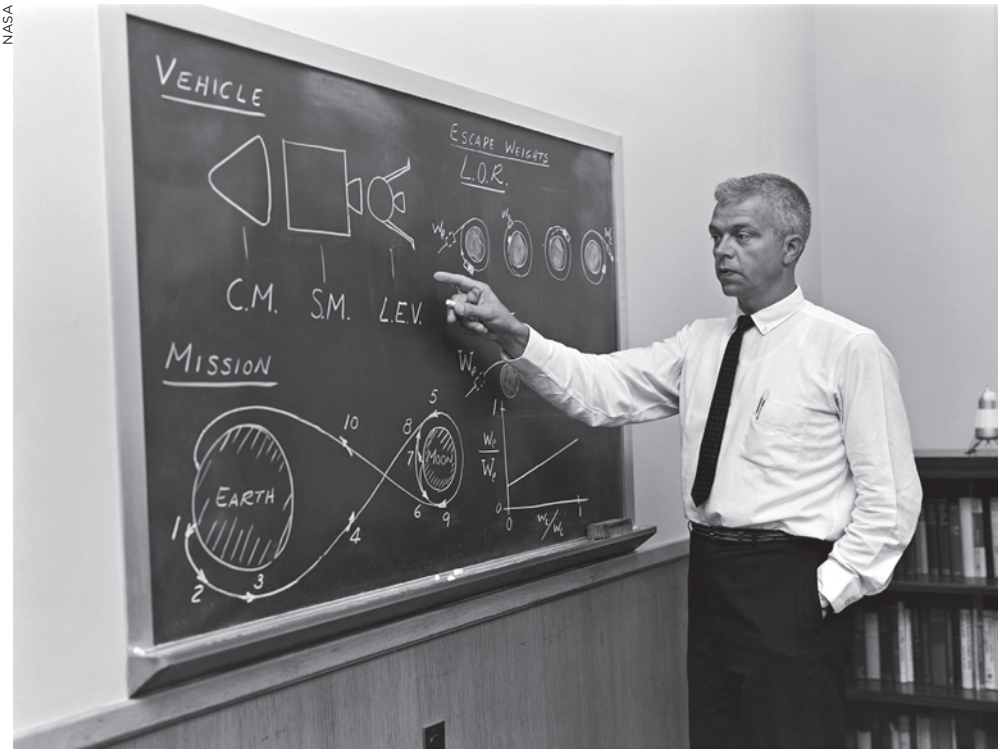
NASA

▲ **After Project Mercury, Langley engineers built a simulator** to help astronauts train to rendezvous and dock Apollo spacecraft.

NASA

▲ **Astronaut Alan Shepard,** in his silver pressure suit with the helmet visor closed, prepares for his Mercury Redstone 3 launch on May 5, 1961, when he became the first American to fly into space.

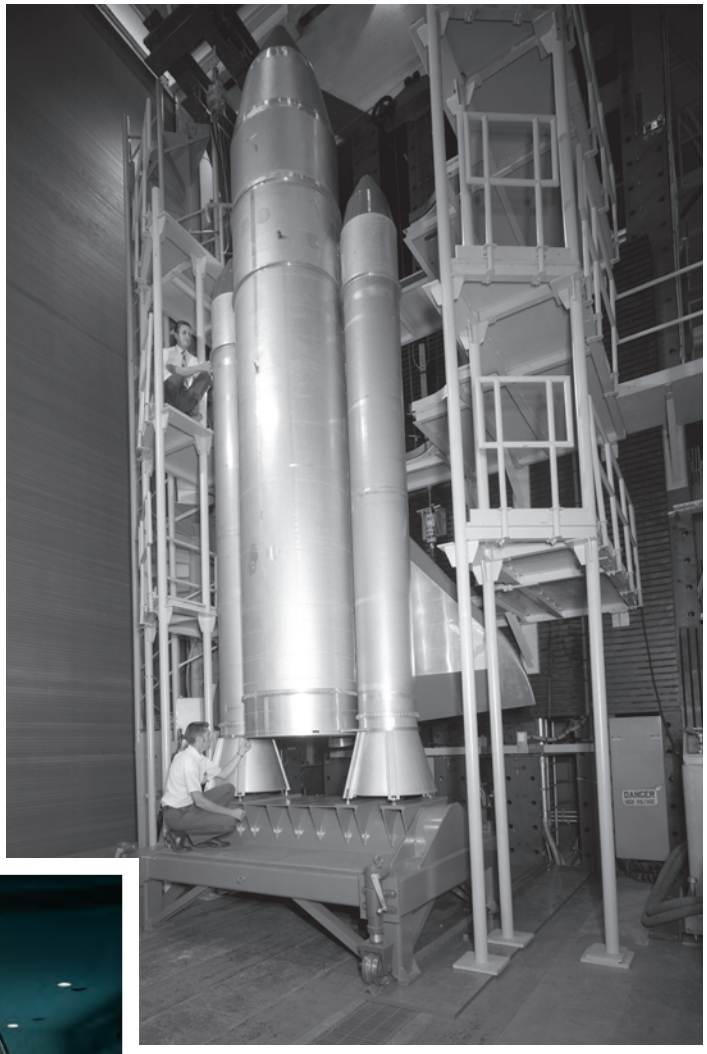
NASA



▲ **Engineer John C. Houbolt describes his space rendezvous concept for lunar landings,** which the Apollo program would use.

NASA

▲ **Astronauts used Langley's gantry to practice** the last 150 feet of the Apollo 11's descent to the moon's surface. Here it is in 1965.



NASA

▲ **A one-eighth model of the space shuttle** is tested in the Structures Lab in 1973.

NASA

▲ **NASA scientists at Langley examine the aeroshell** that protected the Viking Lander 1 during its entry into the Martian atmosphere in 1976.

NASA

▲ **Engineers test a model of the space shuttle** in Langley's 16-foot Transonic Tunnel.

NASA

▲ **The effects of many lightning strikes are visible on an F-106** used for storm research in 1982. The F-106 was another high-speed aircraft developed by Langley engineers and refined through extensive testing in the center's wind tunnels.

NASA

▲ **The Energy Efficient Transport Model undergoes tests** in Langley's 8-foot Transonic Pressure Tunnel in 1992.

NASA

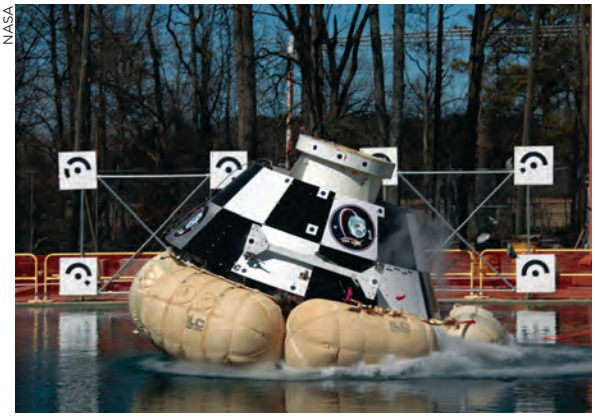
◀ **Langley's Stratospheric** Aerosol and Gas Experiment Satellite leads to the discovery of the existence of a hole in Earth's protective ozone layer.

NASA

◀ **In the 1990s,** Langley researchers adapt aerospace technology to develop a portable fetal heart monitor.

NASA

▲ **The aerodynamics team at Langley in 2014 test a model** of the 70-metric-ton Space Launch System — NASA's heavy-lift launch vehicle that will carry crew, cargo and science missions into deep space.



NASA

▲ **Boeing tests its CST-100 capsule for water landings** at Langley. It is in development under NASA's Commercial Crew Program for transportation to and from the International Space Station.

ILLUMINATING NASA'S "HIDDEN FIGURES"

The movie "Hidden Figures" centers on the contributions made by African-American women at Langley. In the 1940s with aeronautical research expanding and manpower in short supply due to World War II, Langley recruited women with college degrees to perform mathematical calculations for engineers. The women were referred to as "computers" and assigned to a segregated area known as the West Computer Pool.

Many of the women who started their careers in the West Computer Pool went on to calculate the trajectories of space missions. One of them was Katherine Johnson, who calculated the trajectory of the Mercury capsule that carried Alan Shepard, the first American in space, on his historic 1961 flight. On May 5, 2016, the 55th anniversary of that flight, Johnson attended the dedication of a new building at Langley, the Katherine G. Johnson Computational Research Facility.

NASA Langley Research Center

1

Johnson and her colleagues Dorothy Vaughn and Mary Jackson are prominent characters in the movie, which is based on the book "Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race" by Margot Lee Shetterly. Shetterly, whose father worked at Langley, started collecting stories of the computers and conducting interviews in 2010.

"When you listen to these women's stories you see that, to them, they were just living everyday lives, doing their jobs and raising families," says Gail Langevin, Langley's history liaison. "But when you step back a little bit and you see that not just men but women and people of all races contributed to our space program, that makes this story exciting."

More reading:

"Human Computers" website: https://crgis.ndc.nasa.gov/historic/Human_Computers

NASA biographies and interviews: https://www.nasa.gov/modernfigures

NASA/JPL-CalTech

2

NASA

3

1 NASA research mathematician Katherine Johnson works at her desk at NASA Langley Research Center with a globe, or "Celestial Training Device," in 1962.

2 Computers weren't always made of motherboards and CPUs. In this 1959 photo, a human "computer" works with an early machine called the IBM 704.

3 Mary Jackson grew up in Hampton, Virginia, earned her bachelor of science degrees in mathematics and physical science, and taught in Maryland before joining NASA.