1917 - 1992
75 Years NACA NASA Langley Research Center

News
Researcher

Bi-weekly Employee and Contractor Publication

Volume 6 ❖ Issue 12 ❖ July 17, 1992

75TH ANNIVERSARY ISSUE

Happy Birthday Langley!

1917-1992: Roots Go Back To The Future

■ BY DR. JAMES R. HANSEN

We are rapidly approaching the dawn of a new century, the 21st, and a new millennium. In the last hundred years humankind has moved from the dim glow of the first electric light bulb to the cold cloud of the superconductor, from the clatter of the steam-powered railroad locomotive to the roar of the supersonic jet airliner.

In the last thousand we have progressed from the water wheel to the fusion reactor, from the ox-cart to the space shuttle. Only a clairvoyant could have forseen the course of our development. It will take an even bolder visionary to imagine where we shall end up 100 years from now, let alone 1,000. Our rate of change, already invisibly rapid, seems only to be picking up.

Spectacular developments

In the field of aerospace technology the developments of the next century should be spectacular. Regularly scheduled flights of supersonic airliners and hypersonic aircraft capable of flying in and out of the atmosphere should enable the peoples of the world to join together on a veritable global village. No spot in the world should be farther away than two hours traveling time—or perhaps even less. There should be permanent outposts on the moon. We should visit Mars and venture out to even more remote bodies of the solar system. New scientific discoveries will change radically our understanding of the universe and our place in it. Perhaps signs of other life in the universe will be discovered.

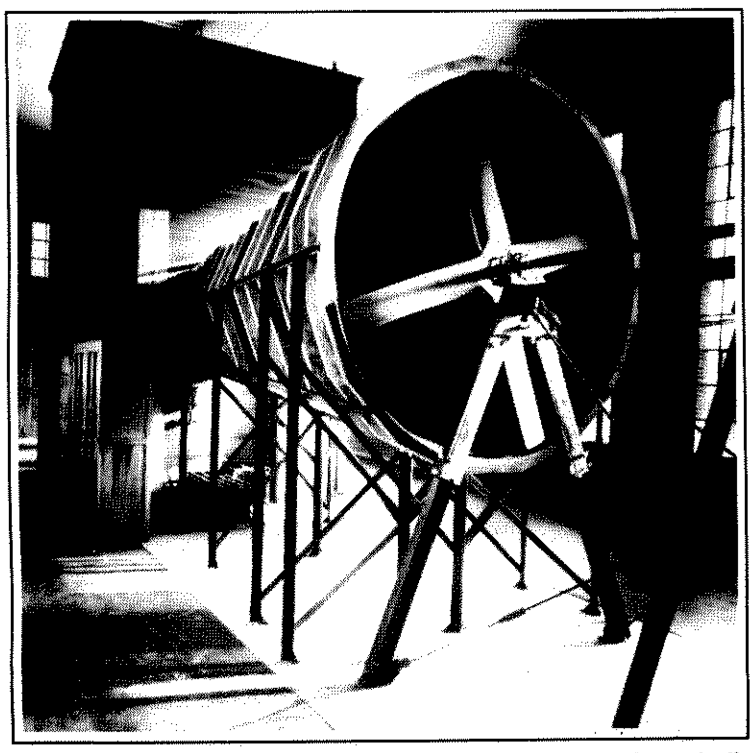
All of these things might very well happen in the "Second Century" of powered flight. If they do, it will be because the next generations of aerospace scientists and engineers will be standing, in Isaac Newton's words, on the shoulders of giants. This article explores the history and contributions of Langley Research Center, the nation's first civilian aeronautics laboratory.

Back to NACA days

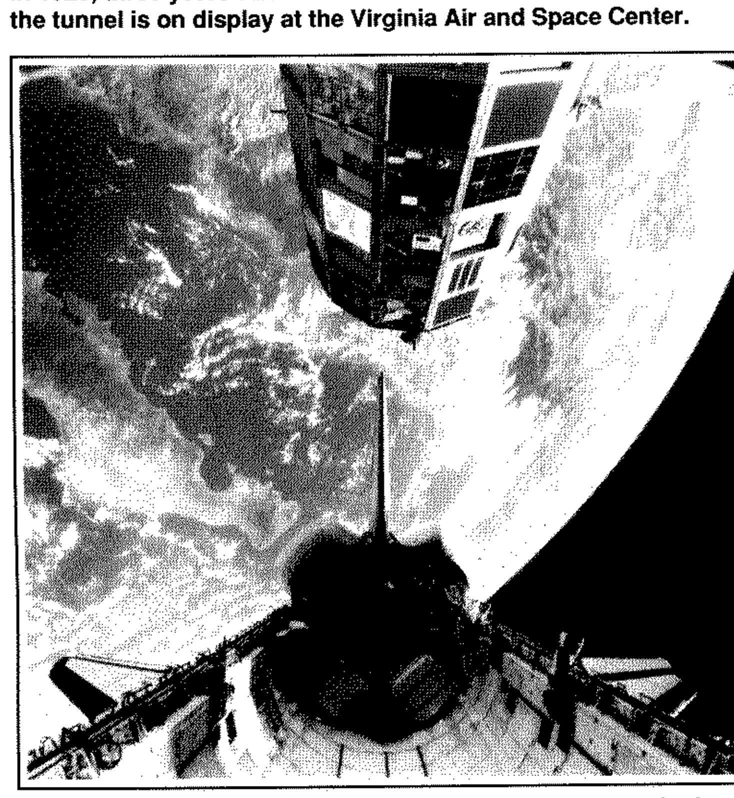
Today's National Aeronautics and Space Administration (NASA) was established in 1958, but its historical roots reach back much farther, to 1915. In that year, 12 years after the Wright Brothers' flight and two years before American entry into World War I, the U.S. Congress created the National Advisory Committee for Aeronautics, or NACA.

In 1915 the airplane was still largely a useless freak. Much had to be done to transform it into a practical and versatile vehicle. The NACA's mission was "to supervise and direct the scientific study of the problems of flight with a view to their practical solution." This meant that the NACA was to treat aeronautics not so much as a scientific discipline, but as an area for engineering research and development. In practice this turned out to mean that the NACA would perform basic research that provided 'practical solutions' to serious problems facing the aircraft industry and the military air services.

Please see **HISTORY,** *Page 4*



FROM THE EARLY DAYS . . . Langley's first wind tunnel was built in 1920, three years after the Center was established. A model of the tunnel is on display at the Virginia Air and Space Center.



TO THE SPACE AGE . . . The Shuttle Columbia retrieves the Long Duration Exposure Facility (LDEF) in 1990. LDEF, which spent six years in space, was conceived, designed and built at Langley.

Weekend Celebration Starts With Ceremony On Friday

Map of bus routes on Page 6.

Seventy-fifth Anniversary events begin Friday, July 17, with a 2 p.m. ceremony in the hangar featuring the unveiling "Expanding the Frontiers of Flight," a 75th Anniversary painting by renowned space artist Robert McCall.

Events also will include a special 75th anniversary video, technical exhibits and an impressive display of aircraft dating from 1917.

CELEBRATING 75 YEARS

Guest speakers are to be announced. This event is open to civil service and contractor employees and NASA retirees.

After the ceremony, those wanting to participate will form a "75" for a group photo. Following this, attendees are invited to a reception sponsored by the Langley Federal Credit Union behind the hangar. The aircraft and technical exhibits will be on display from 12:30 to 4:30 p.m.

From noon to 4 p.m., the Hampton Post Office will sponsor a special stamp cancellation featuring the 75th Anniversary logo and date. Guests may purchase 34-cent embossed envelopes and 19-cent postcards or may bring any item bearing a stamp for cancellation. For 30 days following the anniversary, the Hampton Post Office will stamp letters or envelopes with the special cancellation upon request.

Because parking will be severely limited, employees are encouraged to car pool or take buses, which will run a loop beginning at 1 p.m. to the hangar from the cafeteria and the H.J.E. Reid Conference Center.

If the hangar reaches capacity, arriving guests will be directed to buses for two overflow sites, the Reid center and the cafeteria, where the ceremony will be televised. Buses will be at the sites immediately after the ceremony to return guests to the hangar for the group photo, reception and exhibits. Anyone with a handicap or special needs should call Ann Suit at 864-3305 for a car pass that will admit them to a reserved parking area.

On Saturday, July 18, and Sunday, July 19, employees, retirees and their immediate families are invited to "Langley Days" at the Virginia Air and Space Center (VASC), where they will be admitted free to exhibits. A NASA badge will be required for admittance.

All employees, contractors, retirees and their spouses or adult guest are invited to a wine-and-cheese reception on Saturday, July 18, at 7:30 p.m. at the VASC. The cost is $6 per person. Reservations may be made by using the reply form that will accompany an announcement being sent to all employees, contractors and retirees.

The festivities, co-sponsored by the NASA Langley Alumni Association and Langley Research Center, will feature McCall's 6½-foot by 19½-foot-wide painting, a 75th Anniversary cake and free showings of the IMAX film *The Dream is Alive.*

Time Capsule Ideas Sought

A time capsule preserving 75 years of Langley's achievements will be buried later this year on the Center.

But what should go in it? Organizers are seeking suggestions from Langley employees, contractors and retirees.

The capsule, about the size of a 25-gallon drum, tentatively is scheduled to be buried under a brass arch at the corner of West Durand Street and the Technical Library. It will be formally dedicated in November.

The plan is to open the capsule in 25 years, then reseal it for another half century.

If you have any ideas for what to include for posterity, mail them to the historical program coordinator at Mail Stop 123. Suggestions must be received in writing to be considered.

HISTORY:

Continued from Page 1

Although established in 1915, the NACA did not have operational laboratory facilities until 1920, when Langley came on line with its first primitive wind tunnel. Construction of Langley Field actually began in 1917, but the chaos of mobilizing for war in Europe delayed completion of the NACA's facilities for three years.

Once in possession of effective experimental equipment, however, the laboratory pursued its mission with distinction. Already by the end of the 1920s, with its ingeniously designed Variable-Density Tunnel, Propeller Research Tunnel, and Full-Scale Tunnel, which outperformed any other single collection of facilities anywhere in the world, NASA Langley was generally acknowledged to be the world's premier aeronautical research establishment. Thanks to the reliable data resulting from intelligent use of Langley's unique complex of experimental equipment, American aircraft began to dominate the world's airways.

Langley Research Center has been incubating the ideas and hatching the technology that has helped Americans take off and fly. Today, penetrating minds continue to pursue that mission.

Through systematic aerodynamic testing, NACA researchers found practical ways to improve the performance of many different varieties of aircraft. During World War II, they tested virtually all types of American aircraft that saw combat. By pointing out ways for these aircraft to gain a few miles per hour or a few extra miles of range, their effort in many cases made the difference in performance between Allied victory and defeat in the air.

After the war, NACA researchers turned their attention to the high-speed frontier and solved many of the basic problems blocking the flight of aircraft to supersonic speeds. They played essential roles in the development of several experimental high-speed research airplanes including Bell's X-1, the first plane to break the sound barrier, and North American's X-15, the first winged aircraft to fly into space.

The NACA flourished as a federal agency until the autumn of 1958, when it was formally abolished. In truth, however, much about the NACA lived on. Its laboratories and their staffs, although reorganized, formed the nucleus for the new space agency. The rest is history—NASA history.

The space frontier

Although its name changed in 1958 from NACA Langley Aeronautical Laboratory to NASA Langley Research Center, the mission of its staff members remained constant: to increase the country's knowledge and capability in a full range of aeronautical disciplines and in selected space disciplines.

In the early 1960s Langley helped give birth to the space age. Project Mercury, the nation's inaugural man-in-space program, was conceived and managed initially from Langley. Spearheading this effort was the Center's Space Task Group, a special force of NASA employees that later expanded and moved on to become the Manned Spacecraft Center (now Johnson Space Center) in Houston. Before their move to Texas, however, they led the Original Seven astronauts (Shepard, Grissom, Glenn, Carpenter, Slayton, Schirra, and Gordon) through the initial phases of their spaceflight training at Langley.

Langley went on to make several essential contributions to the Mercury, Gemini, Apollo, and Skylab manned programs. A thoughtful group of engineers at the Center proved the feasibility of lunar-orbit rendezvous. Without the articulation of this successful mission concept, the nation may have still landed men on the Moon, but it probably could not have happened as soon as it did, before the decade of the 1960s ran out, as President Kennedy had proposed.

Spaceflight simulators designed and operated at the Center gave NASA's astronauts the experience they needed to pilot their fragile craft through the many difficult challenges of rendezvous and docking in space and landing on the Moon. The high-resolution photographic maps of the lunar surface made by Langley's Lunar Orbiters made it possible to select the best sites for the landings of the Apollo and Surveyor spacecraft, and thereby learn more about the

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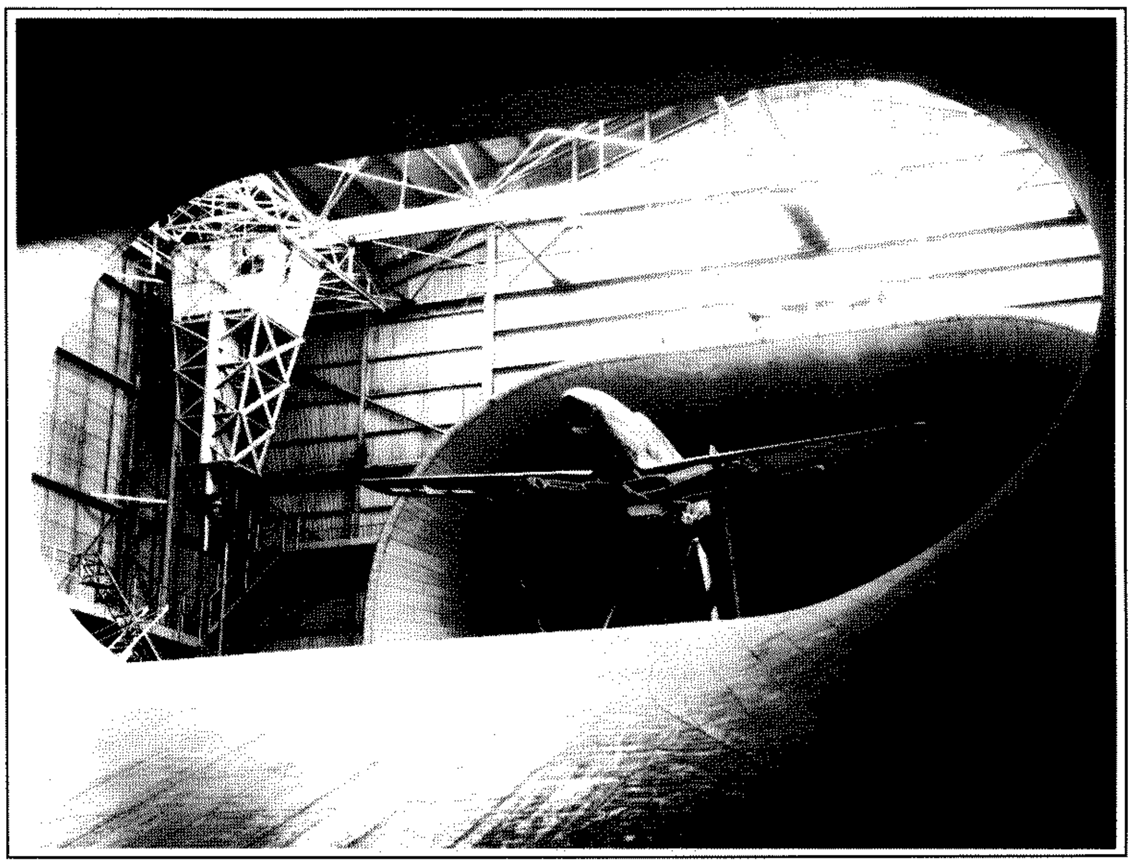
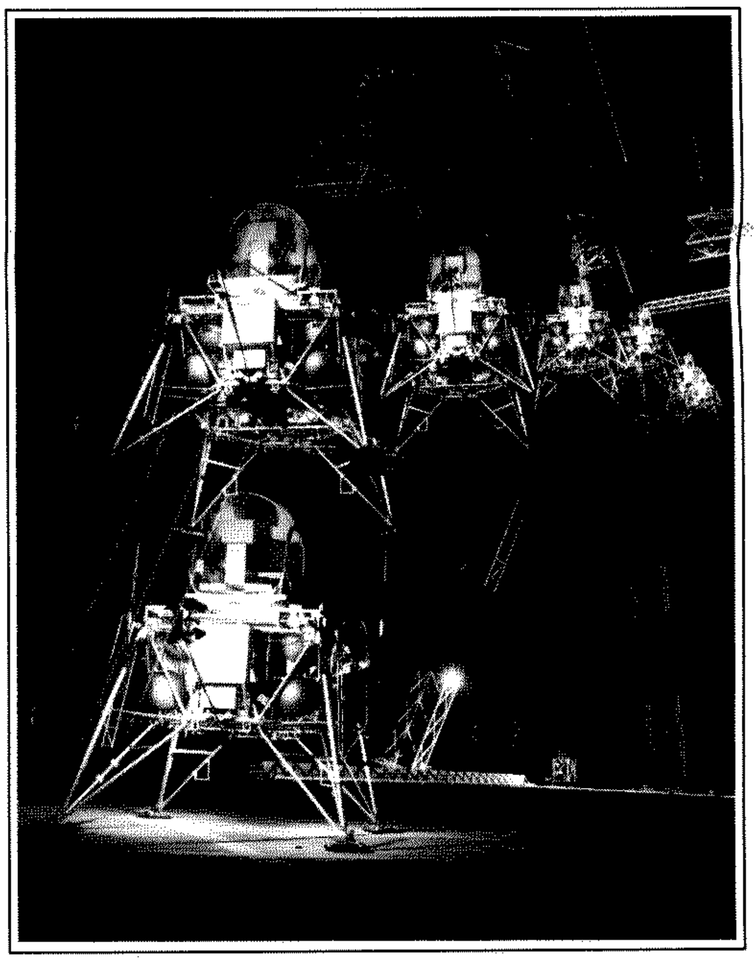
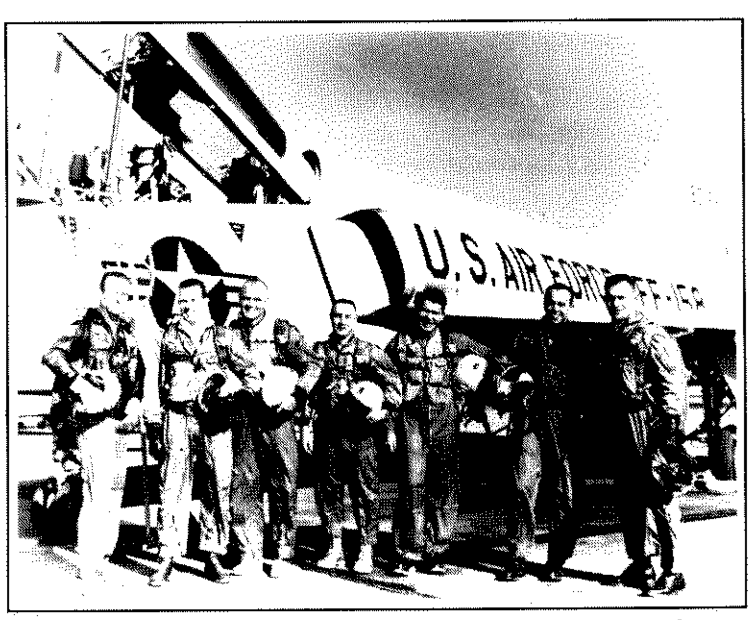


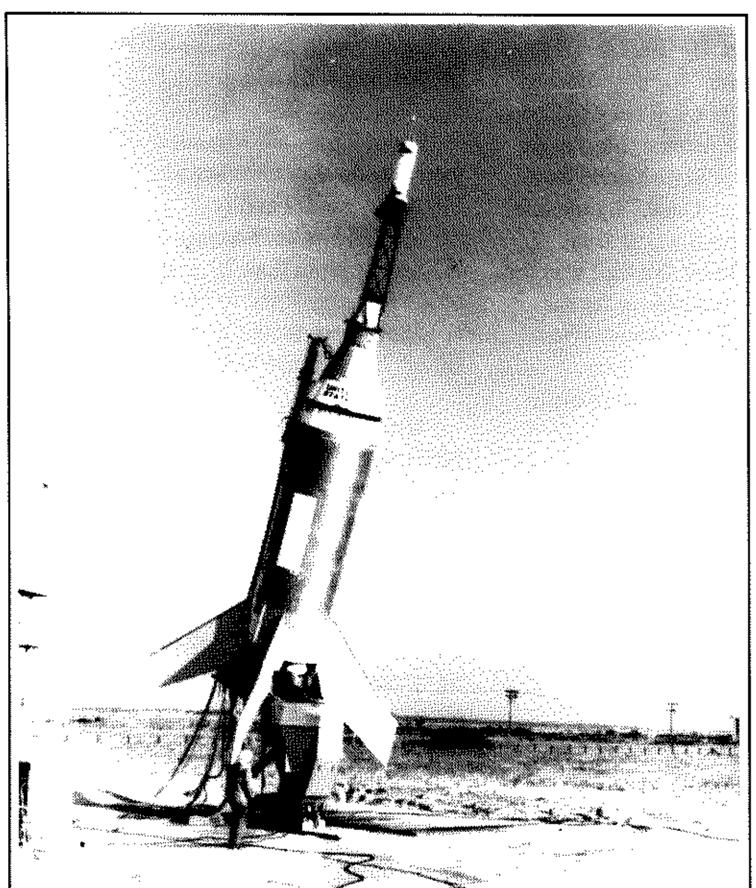
The P-51 Mustang is tested in the Full-Scale Tunnel in 1943. The World War II aircraft was the first to employ the NACA laminar-flow airfoil, which gave it very low drag.



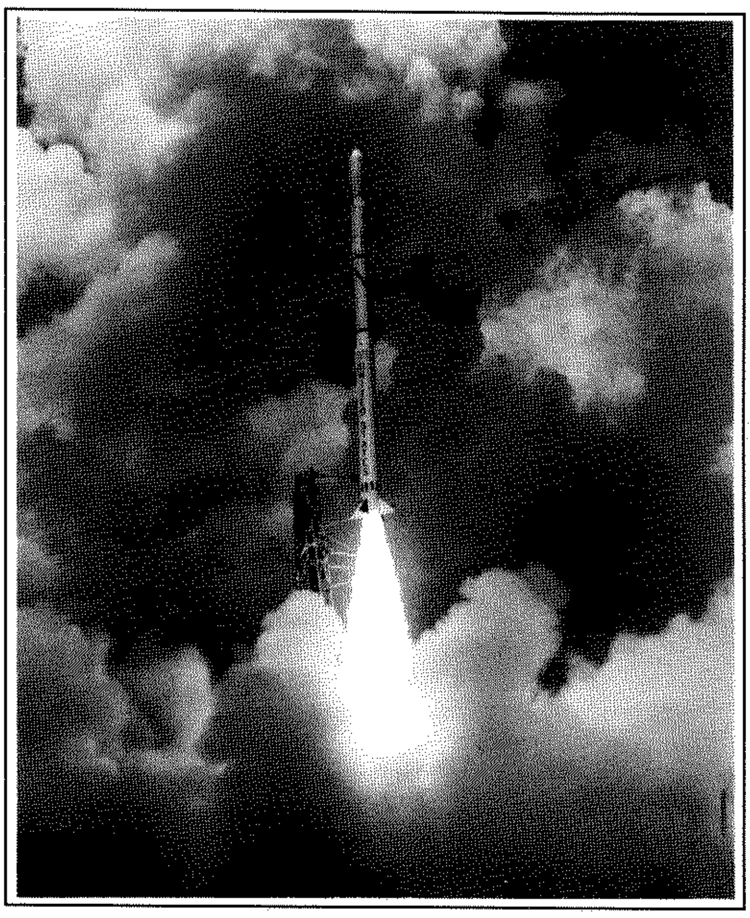
This multiple-exposure photo of the Lunar Excursion Module Simulator (LEMS) was taken at a nighttime session at Langley.



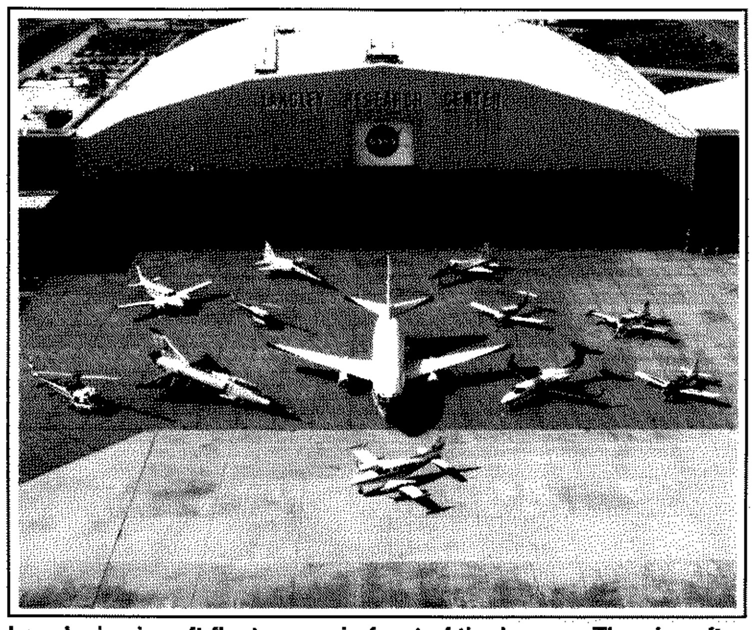
The Original Seven astronauts who trained at Langley are, from left: Scott Carpenter, Gordon Cooper, John Glenn, Virgil Grissm, Walter Schirra, Alan Shepard and Donald Slayton.



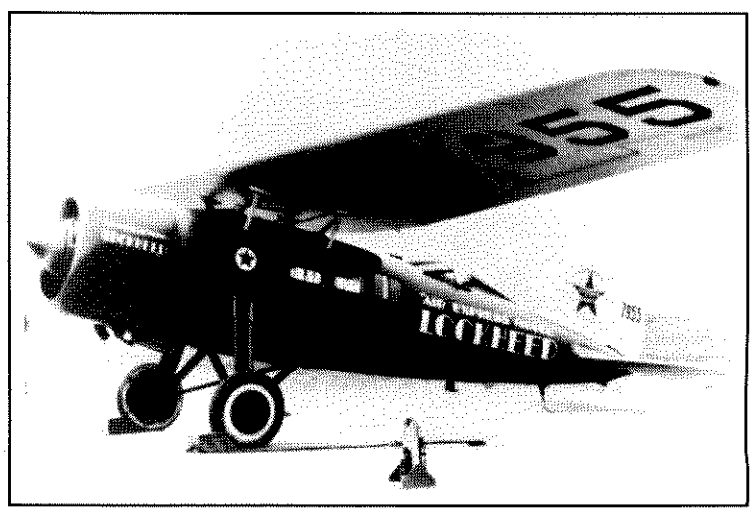
Project Mercury's Little Joe launch vehicle was conceived by Langley engineers Max Faget and Paul Purser.



A Scout vehicle is launched on August 10, 1965.



Langley's aircraft fleet poses in front of the hangar. The aircraft represent a variety of flight research conducted at Langley.



This Lockheed Air Express set a Los Angeles-to-New York nonstop record equipped with the revolutionary NACA cowling.

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nature of the Moon.

Early unmanned space projects involving considerable creative effort by Langley researchers included the Echo, Explorer, and PAGEOS satellites, all of which gave outstanding service as instruments for scientific research and global communications.

A solid-fuel rocket developed at the Center, the Scout, provided NASA with its lowest-cost, multipurpose booster. With it, a great number of precious payloads were launched into orbit. The first Scout was launched in July 1960.

In the wake of the Apollo came Viking. In an effort that in many ways matched and even surpassed the magnitude and adventure of the lunar landing program, Langley helped to send two orbiters and two landers in the mid-1970s to the planet Mars. Although probes did not result in any definitive answer to the question of whether life exists (or has ever existed) on the mysterious red planet, Viking nonetheless provided a wealth of valuable scientific information.

In response to a growing concern in the late 1960s for protection of our environment, Langley researchers began to develop effective means by which to measure the Earth's oceans and continents, and detect the presence of dangerous pollutants. This effort in environmental space science quickly became a major research thrust at the Center. Its goal has been to preserve the Earth's precious ecological balance and prevent an environmental calamity that would have disastrous effects for the entire world. Today at Langley this critically important undertaking is part of what former NASA astronaut Sally Ride has called "Mission to Planet Earth."

An important contribution to this "mission" includes Langley's Halogen Occultation Experiment (HALOE), an atmospheric satellite deployed by the Space Shuttle in 1991. Its overall goal is to provide global-scale data on temperature, ozone, and other key trace gases needed to study and better understand the chemistry, dynamics and radiative processes of the middle atmosphere.

'Space planes'

Langley researchers had thought about "space planes" since the early 1950s. They had pioneered the concept of the boost glider and provided basic concepts for the development of the X-15, America's first hypersonic transatmospheric vehicle. So it was natural for them to become deeply involved in the development and testing of the space shuttle.

Even before it could be test flown in 1977 (its first orbital flight took place in 1981), the shuttle had to be put through thousands of hours of wind tunnel testing and other rigorous experiments. Much of this was done at Langley. Langley also was responsible for optimizing the design of the shuttle's thermal protection system, the unique arrangement of ceramic

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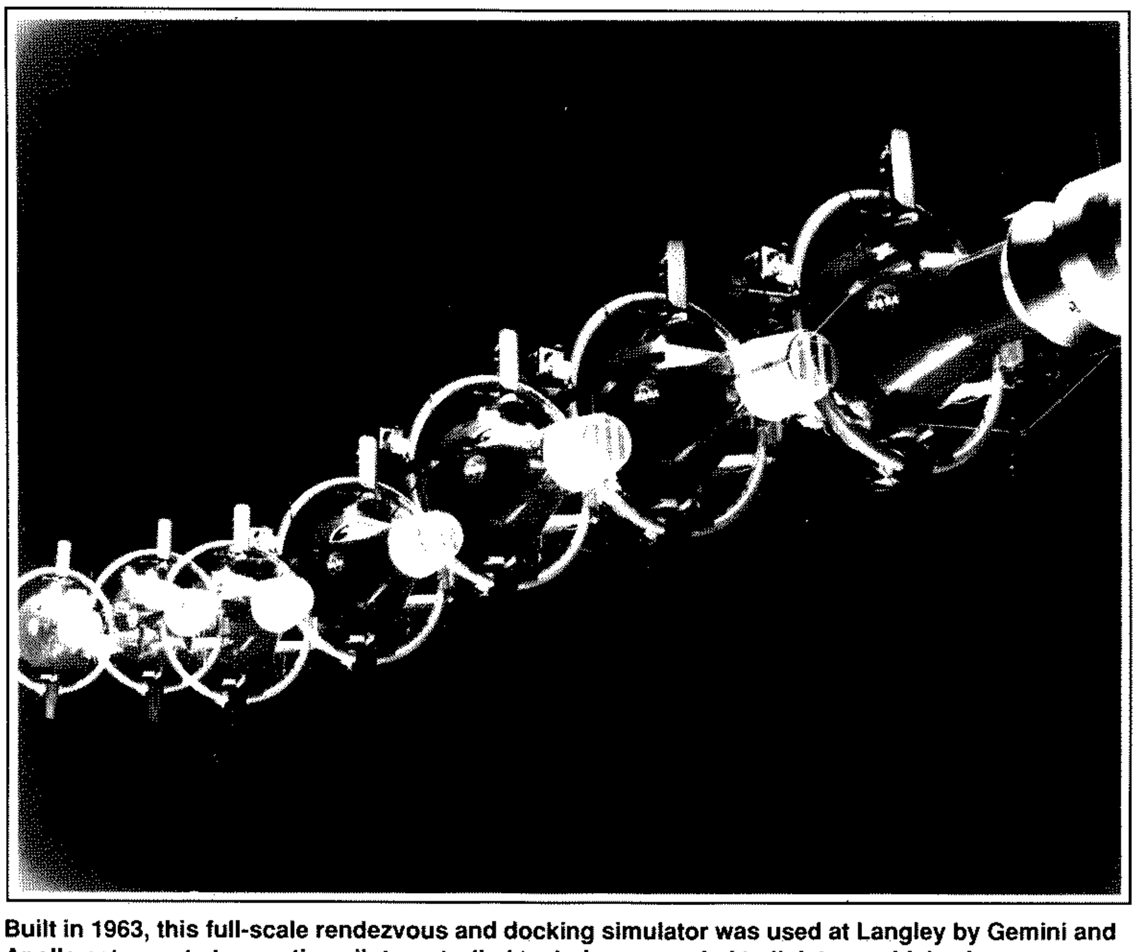

Built in 1963, this full-scale rendezvous and docking simulator was used at Langley by Gemini and Apollo astronauts to practice pilot-controlled techniques needed to link two vehicles in space.

CHRONOLOGY

1915: Creation of the National Advisory Committee for Aeronautics (NACA), Langley's first parent organization.

1917: Foundation of the NACA's Langley Memorial Aeronautical Laboratory (LMAL) and start of construction on original facilities.

1920: Formal dedication of LMAL; operation of first wind tunnel.

1948: Name shortened to Langley Aeronautical Laboratory (LAL).

1958: Dissolution of NACA and foundation of National Aeronautics and Space Administration (NASA); name changed to Langley Research Center.

Historic Landmarks

In 1985 the U.S. Department of Interior designated five Langley facilities as National Historic Landmarks. Each facility made a unique and outstanding historical contribution to American achievements in flight technology.

- Variable-Density Tunnel,1921.
- Full-Scale Tunnel, 1930.
- 8-Foot High-Speed Tunnel, 1935.
- Rendezvous Docking Simulator, 1963.
- Lunar Landing Research Facility, 1965.

Directors

In all of Langley history there have been only seven directors. Until 1948 this officer, Langley's top man, was known by the descriptive title, "Engineer in Charge."

- Leigh H. Griffith, 1922-1925.
- Henry J.E. Reid,1926-1960.
- Floyd L. Thompson,1960-1968.
- Edgar M. Cortright,1968-1975.
- Donald P. Hearth,1975-1985.
- Richard H. Petersen,1985-1991.
- Paul F. Holloway,1991-

Collier Trophies

Although NASA Langley has been honored to receive a number of national awards and international distinctions, over the years many have considered one award, the Robert J. Collier Trophy, to be the most prestigious.

Awarded annually for the greatest achievement in American aviation, the Collier Trophy has been awarded to Langley researchers on five occasions.

The trophy, first awarded in 1911, is named for Robert J. Collier, a prominent publisher, patriot, sportsman and aviator.

Langley's Collier Tropies were awarded in:

- 1929 for the low-drag engine cowling.
- 1946 for de-icing research.
- 1947 for supersonic flight research.
- 1951 for the slotted throat transonic wind tunnel.
- 1954 for the transonic area rule.

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tiles that protect the reusable vehicle from the intense heat of reentry.

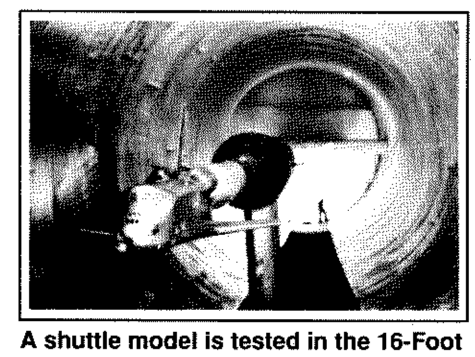
To complement the shuttle system and provide assured manned access to space for the next generation of space programs, Langley has conceived the HL-20 lifting body as a candidate for the Personnel Launch System (PLS). This system was designed for the primary mission of changing the Space Station Freedom crews.

Visions of space stations orbiting the Earth had captured the imaginations of many Langley researchers as well. Long before plans for today's Space Station Freedom got under way, NASA scientists and engineers at the Center had understood the advantages of a manned laboratory in space for scientific experiments, for communications, for astronomical observation, for manufacturing, and as a relay base for lunar and planetary missions and many other purposes.

Excited by the thought of a multipurpose laboratory, they began to explore the problems of designing such a facility and operating it in Earth orbit.

This early brainstorming and testing has provided a solid basis for NASA's development of Space Station Freedom. Today Langley employees continue to investigate the technologies that will be necessary for the design and operation of the space station, as well as for other large space structures.

One such step was the deployment and retrieval of the Long Duration Exposure Facility (LDEF), which was conceived, designed and developed at Langley. The bus-sized satellite carried 57 space experiments to gather scientific data and to test the effects of long-term space exposure on spacecraft materials, components and systems. The wealth of information collected during its six-year journey will be invaluable for the design of future spacecraft.



A shuttle model is tested in the 16-Foot Transonic Wind Tunnel at Langley.

With deep roots going back to the golden age of aviation, Langley never forgot that the first "A" in NASA stood for "aeronautics." Although its achievements in aeronautics were sometimes overlooked in favor of the glories and wonders of spaceflight, Langley not only maintained its historic position as a world leader in aeronautical research it actually built and improved upon it.

During the 1960s Langley scientists and engineers put in a mammoth, Apollo-like effort in support of the government's proposed, but later cancelled, construction of a national supersonic transport or SST.

Concurrently, they explored the potential of the variable-sweep wing and other aerodynamically and structurally novel wing shapes both for the SST and for advanced performance military aircraft.

Noteworthy breakthroughs in aeronautics have included the improvement of vertical takeoff and landing (VTOL) capabilities; the design of the 'supercritical wing' for more effective flight at high subsonic speeds; the enhancement of laminar flow in the boundary layer of a wing; and the refinement of energy-efficient engines and fuels.

All of these research efforts—with the exception of SST, which was cancelled by the U.S. Congress in 1971—continued to yield valuable results into the 1970s and 1980s.

But even the supersonic work did not really come to an end. From the early 1970s on, Langley managed to keep alive a low-level but determined program to develop the technologies required for the effective flight of a supersonic transport. By the mid-1980s, there was a renewed interest at the Center in the development of an American SST. According to estimates, new technologies, including those developed at NASA Langley, now make an SST a much better bet.

~~In the 1970s Langley also kept the~~ dream of hypersonic flight alive. This effort, which has important links back to studies made at Langley as early as the 1950s, now finds application in the National Aero-Space Plane (NASP). The focus of this program, in which Langley is the lead center for its development, is to create the technology base for an entirely new family of aerospace vehicles capable of flying at high Mach numbers to the edges of the atmosphere and beyond. Under this program a single-stage-to-orbit flight vehicle, known as the X-30, might be flying by the end of this century.

From the Curtiss Jenny to the Beech Starship and X-29, from the drone of propellers to the roar of rockets and jets, from a wind tunnel generating a maximum airflow speed of 90 miles per hour to tunnels generating Mach 8, from flight a few hundred feet above the ground to flight in space, Langley has been incubating the ideas and hatching the technology that has helped Americans take off and fly. Today, penetrating minds continue to pursue that mission at Langley. Tomorrow? Well, no one can be sure what tomorrow will bring. But based on what we know about Langley's record, one can rest assured that, where the progress of flight is concerned, Langley will be exploring all the possibilities.

The author, Dr. James R. Hansen, is Langley's historian and a history professor at Auburn University in Alabama. He wrote Engineer in Charge: An Institutional History of Langley Aeronautical Laboratory, 1917-1958.

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