STAFF PROVIDING TECHNICAL BACKGROUND REQUIRED FOR FUTURE SUCCESS OF LUNAR MISSION, SUPersonic TRANSPORT, OTHER AEROSPACE PROGRAMS

National Aeronautics and Space Administration's Langley Research Center has literally grown up with the science of flight. In operation since 1917, Langley was the first NASA laboratory and is the largest NASA Center specializing in basic aeronautical and space research. Langley has 4,000 staff members, one-third of whom are professional engineers and scientists who are technical experts in the fields of aerodynamics, loads and structures, thermodynamics, and electronics. The remaining two-thirds include skilled modelmakers, technicians, and other support personnel. Graduates of approximately 300 colleges and universities of the United States and several foreign countries are included among the staff.

Located at Langley Station, Hampton, Virginia, the 770-acre Center includes 50 major aerospace research facilities and a dozen shops and administrative structures - an investment of about $250,000,000. Unique new specialized laboratories and simulators, many of them the products of the imagination and pioneering technical contributions of the staff, are increasing Langley's capacity for providing the technical background necessary to accomplish NASA aerospace missions. Laboratory research is supplemented by free-flight studies with models and full-scale aircraft, and through use of rocket-propelled research vehicles at Wallops Island and other launch sites.

In support of Project Apollo and other major national space programs, Langley studies the noise problems of large boosters, space vehicle rendezvous techniques, space flight problems in general, lunar landing and take-off, and reentry from space. Aeronautical research is directed toward improvement in the performance, safety, and utility of airborne flight - including commercial transports, faster-than-sound military aircraft, the helicopter, and low-speed airplanes. Langley currently is engaged in a major aeronautical research program to provide the technology for development of a supersonic commercial air transport.
LANGLEY HELPS IN ESTABLISHMENT OF OTHER MAJOR CENTERS OF NASA

Langley Research Center was the major research establishment of the former National Advisory Committee for Aeronautics from 1917 until the NACA became the nucleus of the NASA, beginning October 1, 1958. After more than two decades of operation as the only NACA field installation, Langley was instrumental in the establishment of four other Centers, providing the personnel nucleus of each: Ames Research Center, Moffett Field, California; Lewis Research Center, Cleveland, Ohio; Flight Research Center, Edwards, California; and Wallops Station, Wallops Island, Virginia.

Wallops Station and Flight Research Center were established and operated for several years as units of Langley Research Center, although both are presently independent organizations reporting directly to NASA Headquarters, Washington, D.C. Wallops has launched about 5,000 research vehicles having from one to seven rocket stages in a variety of aerospace investigations since the station was begun in 1945. Since 1946, the Flight Research Center has conducted full-scale flight research with a number of different research airplanes, including the X-15 - which underwent extensive development study at Langley.

The fascinating history of modern flight extends from the pioneering adventures of the Wright Brothers on the sands of the Outer Banks to the magnificent achievements which characterize man's efforts to solve the mysteries of outer space. During much of this period, many space vehicles and virtually every type of airplane have been scientifically investigated in the Center's research facilities. In the conduct of this research, Langley staff members have made outstanding contributions to the progress of flight and many of them have been recipients of the highest honors and awards obtainable in the realm of science. This history of accomplishment offers a promise of even greater contributions and new scientific honors as Langley looks to the Moon and beyond.

NOISE RESEARCH laboratory (left) provides controlled environment for research relating to the operation of aerospace vehicles. One-fifth-scale dynamic model of the Saturn (center) is studied to obtain information on vibration characteristics of clustered-tank vehicles. Three photographs of free-flight wind-tunnel tests (right) of a model employing variable wing sweep are part of basic studies in the development of a supersonic commercial air transport. Scout, developed by Langley, leaves the launch pad at Wallops Island (below). Scout was the first all-solid-fueled launch vehicle to place a satellite - Explorer IX - into orbit. The satellite is orbiting the earth as an instrument for obtaining air density-drag measurements.
A PARAGLIDER will be rocketed into space in a folded condition, then ejected from its launch vehicle and inflated to telemeter data on the characteristics of micrometeoroids. A full-scale model of the paraglider (above) is installed in a wind tunnel for stability tests preparatory to design of the actual spacecraft. Artist's drawing (left) illustrates a manned rotating space station concept. Langley has been conducting basic research in this field for several years. A technician checks a scale model of a triservice VTOL/STOL airplane (right) which is being scientifically investigated at Langley. Sequence photographs (below) show inflation in space of a 135-foot-diameter rigidized Echo balloon during a ballistic flight preparatory to orbiting the passive communications satellite. The spacecraft and related systems were developed by Langley.

NEARLY HALF CENTURY OF SERVICE BRINGS MANY FLIGHT ADVANCEMENTS

Langley's principal aims are to engage in basic and applied research to advance aerospace flight ... generate new and advanced concepts for future NASA programs ... advise and provide research assistance to other NASA organizations and Government agencies ... search for and identify potential industrial applications evolved in the course of research ... plan, develop, and operate necessary facilities ... and prepare for appropriate dissemination of scientific and technical information resulting from research activities.

A recent example of Langley's efforts in the generation of new and advanced concepts is the extensive exploratory research conducted the past several years to provide basic information required for the design and operation of automatically erectable manned orbital space laboratories of the future. Another pioneering space venture - Project Mercury, was conceived at Langley before NASA was established. After NASA was created, a nucleus of former Langley staff members helped establish the original Project Mercury organization. Langley research facilities were utilized in providing much of the science and technology needed for the development of the Mercury spacecraft and related systems, and the NASA worldwide tracking and ground instrumentation network for monitoring manned space flights was successfully completed under Langley direction.

There have been many other Langley contributions, some of them revolutionary scientific breakthroughs. Langley research milestones include the concept of research airplanes leading to supersonic flight ... the world's first transonic wind tunnels ... the Area Rule, a design principle regarded as the key to practical supersonic flight ... the invention of automatically erectable spacecraft, leading to development of Echo passive communications satellites ... the development of Scout, first all-solid-fueled launch vehicle to rocket a United States satellite into orbit.
TODAY'S RESEARCH GIVES "GO" SIGNAL TO TOMORROW'S NASA SPACE PLANS

When Congress passed the National Aeronautics and Space Act in 1958, a national decision was made that "... it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind," while reserving to the Department of Defense those activities in space necessary to the national defense and security. NASA was created to carry out a program that would explore space in the best interests of the United States and of men everywhere. In carrying out its mission, NASA has grouped its program activities in four major categories: space sciences, practical applications of space technology, manned space flight, and advanced research and technology.

Success of the lunar mission and other important programs requires extensive research and development in almost every branch of science and technology at the frontiers of knowledge in the fields of aerospace flight. New materials and components must be developed; there must be pioneering discoveries in propulsion, electronics, communications, guidance and control techniques, computers; revolutionary information is required to provide basic facts about the performance of the human body under adverse conditions. This new knowledge and experience is expected to provide a sound basis for applying information to advance the aerospace sciences.

NASA plans many spectacular space research projects in this decade to follow the successful orbiting flights of the Nation's astronauts. Some of these include the impact landing of instruments on the Moon... the launching of planetary spacecraft and many satellites... the firing of a two-stage Saturn... the soft landing of instruments on the Moon... the qualification of a 200,000-pound-thrust hydrogen-oxygen rocket engine... reconnaissance of Mars or Venus by an unmanned vehicle... the qualification of a 1,500,000-pound-thrust rocket engine... manned rendezvous experiments in space... the flight test of a nuclear-thermal rocket... the orbiting of a spacecraft around another planet... circumlunar flights... and manned landings on the surface of the Moon. Langley research is expected to contribute to the success of these and many other NASA programs.

LANGLEY'S SPACE Vehicle Rendezvous Docking Simulator, a model of which is left above, is designed to provide basic information in major problem areas of the rendezvous docking operation in space. Three-axis simulator suspended from rail is maneuvered during docking research to contact cylindrical target. Block at left represents an analog computer.

A scale model reentry version of the Project FIRE spacecraft (left) is being prepared for wind-tunnel force tests. FIRE is a Langley-managed program to obtain data on heating rates, materials, and radio signal attenuation on spacecraft reentering the atmosphere at 25,000 miles an hour. Earth landing characteristics of the Apollo manned lunar spacecraft are studied through use of a 1/4-scale model (above), which is designed to simulate parachute letdown into a bed of sand.