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National Aeronautics and Space Administration

GODDARD NEWS

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Introduction to Wallops:

This issue focuses on the Wallops Flight Center which, as of October 1, 1981, will become an operational element of Goddard.

The Wallops Flight Center, located on Virginia's Eastern Shore approximately 40 miles southeast of Salisbury, Maryland, is the only flight test facility wholly owned and operated by NASA. It contains three installations, main base, the Wallops Island Launching Site, and the Wallops Mainland Site. Main base houses the administrative offices, technical support shops, a rocket inspection and storage area, and an experimental research airport.

Other facilities on Main base include the Range Control Center, the main telemetry building, a large computer complex, and the Management Education Conference Facility.

The launching site is separated from the mainland by two miles of marsh and inland waterway; it is connected to the mainland by a causeway and a bridge. Located on the island are launch sites, assembly shops, blockhouses, dynamic balancing facilities, some rocket storage buildings, and related facilities.

The Wallops Mainland site is a half-mile strip at the opposite end of the causeway behind the island and is the location for the long-range radars and communications transmitter facilities.

The mission of Wallops is to operate these flight test facilities, with their extensive tracking and data acquisition instrumentation, in support of aeronautical and space research programs. The facilities are used by the scientists and engineers from the laboratories and research centers of NASA, and by any user who secures an agreement with NASA.

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NASA consolidates center operations

NASA is consolidating its Wallops Flight Center under Goddard Space Flight Center Management.

Under the consolidation, Wallops, Wallops Island, Va. becomes an operational element of Goddard, Greenbelt, Md. Wallops will retain its identity but will be under the overall management and direction of Goddard.

Dr. Alan M. Lovelace, NASA Acting Administrator, said the consolidation will focus the resources of each of the installations on what it can do best.

Sounding rocket development and operations for Goddard will be carried out primarily at Wallops.

The consolidations are expected to be effective by October 1, 1981.

Above is an aerial view of Wallops Mainland, the long range radar area.

Wallops Director announces retirement

Dr. Robert L. Krieger, long-time Director of NASA's Wallops Flight Center, Wallops Island, Virginia, recently announced his plans to leave the Government services in early August, after almost 43 years with NACA and NASA. Since 1948 he has headed the Wallops Island facility on the Eastern Shore of Virginia.

Krieger actually retired on February 29, 1980, but, at the request of NASA's Administrator, has continued to serve as Wallops Center Director in order to provide continuity through the busy period of the Shuttle launch. More recently the request has been extended "until August of this year to help make the Wallops/Goddard consolidation as smooth as possible."

A native of Kentucky, Krieger began his career with NASA's predecessor agency, the National Advisory Committee for Aeronautics (NACA) at the Aeronau-

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Wallops to provide support for space shuttle missions

Wallops Control Center during STS-1

Wallops support consisted of radar tracking with data transmission to the Kennedy Space Center and the Johnson Space Center for both the launch and orbital phases of the Space Shuttle flight.

Wallops is providing launch and orbital support for the first several Shuttle flights from NASA's Kennedy Space Center in Florida. According to William T. Burns, the Wallops Project Engineer for coordinating and managing the support, "This is the same kind of support Wallops has provided in the past for the Skylab and Apollo/Soyuz missions."

The Wallops support consists of radar tracking with data transmission to the Kennedy Space Center and the Johnson Space Center in Texas for both the launch and orbital phases of the Space Shuttle flight. It includes the relay of range safety commands generated by Kennedy and display and verbal transmission of computer generated impact prediction data to Kennedy for the launch phase. Redundancy is provided by instrumentation at Wallops and Bermuda for the Eastern Space and Missile Command (formerly Kennedy Eastern Test Range).

A dress rehearsal of all aspects of the first Space Shuttle which was successfully conducted, simulated liftoff with a perfect 20-second launch-pad test firing of the three main rocket engines. This crucial mission verification test and simulation paved the way for Columbia's first orbital test flight piloted by the two astronauts, John Young and Robert Crippen.

The overall objectives of the Space Transportation System (STS) are to reduce substantially the cost of space operations and provide a capability to support a wide range of scientific, defense, and commercial uses. STS missions involve direct delivery of payloads to low earth orbits, placement of payload and transfer stages in parking orbits, rendezvous and stationkeeping with detached payloads for on-orbit checkout, return of payloads to earth from orbits, and provisions for routine special servicing, assembly, disassembly, and docking.

The STS flight hardware consists of a reusable orbiter vehicle including installed main engines, an expendable external tank and reusable solid rocket boosters. In a typical Shuttle mission, which could last from 2 to 30 days, the Orbiter's main engines and the boosters ignite simultaneously to rocket the Shuttle from the launch pad. The Shuttle is launched from Kennedy in Florida for east-west orbits or from Vandenberg Air Force Base in California for north-south orbits.

Mail your story to the Goddard News, Code 202, or call the Editor at

344-5566

Wallops' responsibilities

Advanced Research and Technology
Aeronautical Research
Sounding Rockets
Assistance to Other Agencies and Scientific Groups
International Programs
Small Scientific Satellites
NASA Balloon Program
Advanced Research and Planning

Advanced Research and Technology

A considerable number of the experiments are designed to obtain research information on the flight characteristics of space flight. Payloads flown on such vehicles have reached reentry speeds of approximately 39,000 feet per second (over 25,000 miles an hour), considerably faster than the earth-orbiting astronauts were traveling when they reentered the atmosphere, and one of the greatest speeds ever achieved in the atmosphere by a man-made object. Data have been obtained for design, construction, and instrumentation of manned spacecraft and for lunar and interplanetary unmanned missions which reentered the atmosphere at much greater speeds than earth-orbiting vehicles.

Many of the experiments launched at Wallops fall in the category of basic testing and development of components, systems, subsystems, and instrumentation to be flown in later types of vehicles and spacecraft.

Aeronautical Research

The Wallops Flight Center airport is utilized for conducting research tests of various aircraft and helicopters in the terminal area operating environment. Flight studies are made of new approach and landing procedures using the latest in guidance equipment and technique, pilot information displays, vertical and short take off and landing flight vehicles, helicopter stabilization terminal area navigation, and tests of other systems leading to automatic landing of aircraft.

Wallops airport has three runways ranging in length from 4,000 to nearly

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Responsibilities—

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9,000 feet. The airfield has several unique features. A portion of one runway has several surface compositions which are grooved and ungrooved. The test area can be encapsulated with rubber damming material to test characteristics of hydroplaning and spray patterns. Surface conditions used in testing have been dry, damp, wet, flooded, and slush. Tests have been conducted using ground vehicles and aircraft, singularly and concurrently.

Sounding Rockets

A substantial part of the Center's manpower is devoted to support of the national sounding rocket program. Sounding rockets fly near vertical trajectories carrying scientific instruments to heights of from 40 to several hundred miles above the Earth's surface. Their effective lifetime is usually only a few minutes since they follow a trajectory back to Earth. The scientific data is collected and usually returned to Earth by a radio link.

Sounding rockets are used to fill the gap between the maximum altitude for balloons (about 30 miles) and the minimum altitude for satellites (about 300 miles). Experiments flown on sounding rockets provide a variety of information, including high altitude wind shear and velocity, density and temperature of particles in the upper atmosphere, properties and changes in the ionosphere, measurements of the brightness of stars and natural radiation surrounding the Earth, characteristics of the ionization phenomena as space vehicles reenter the atmosphere, and many other phenomena of Earth's environment in space.

Wallops Flight Center personnel are responsible for planning, organizing and directing the Wallops/NASA Sounding Rocket Program providing program interface with NASA Headquarters, other government agencies, universities, private industry, and the international community. They also provide engineering support for the program including payload design and development involving analytical studies, vehicle engineering, attitude control systems engineering, payload recovery systems engineering, and test and evaluation engineering. Wallops also provides mission and payload management for most of the program's flight projects. Center personnel develop and maintain computer programs for analytical studies and data analysis pertaining to Center functions.

Assistance to Other Agencies and Scientific Groups

Wallops renders assistance in space and aeronautical research to other Government agencies and research groups in colleges, universities, and non-profit laboratories by helping them conduct their experiments at the Wallops Flight Center or sometimes at other locations.

International Programs

A sizable portion of Wallops' effort is devoted to NASA's program of international cooperation in space research. Some 61 countries have sent representatives to Wallops to observe its operations or seek assistance in establishing a sounding rocket launch facility of their own. Some of these countries have brought experiments to Wallops for launching. Others have sent technical personnel here for training in methods and techniques of launching sounding rocket and satellite payloads. Wallops in turn has provided technical assistance to countries in the selection and construction of their own launch sites and in the launching of their first experiments.

Small Scientific Satellites

Nineteen satellites have been launched from Wallops Island on the four-stage, solid-fuel Scout vehicle: Explorer IX, a 12-foot polka-dot sphere for measuring atmospheric density and drag, launched February 16, 1961, reentered the Earth's atmosphere and burned April 9, 1964 (this was the first satellite to be launched by an all solid-fuel rocket vehicle); Explorer XIII, a micrometeoroid satellite designed to determine the puncture hazard of micrometeorites which may be encountered by spacecraft, launched August 25, 1961, remained in orbit only three days; Explorer XVI, a second micrometeoroid satellite; launched December 16, 1962; a satellite launched for the Air Force on June 28, 1963; Ariel II, a United Kingdom satellite, launched March 27, 1964; Explorer XXIII, another micrometeoroid satellite, launched November 6, 1964; San Marco I, first Italian satellite, launched December 15, 1964; Explorer XXVII, a Beacon Explorer and geodetic satellite, launched April 29, 1965; Secor, U.S. Army geodetic satellite, launched August 10, 1965; Explorer XXX, Naval Research Laboratory IQSY Solar Explorer satellite, launched November 18, 1965; OV3-4, Air Force radiation detection satellite, launched June 10, 1966; Explorer XXXVII, Naval Research Laboratory solar radiation satellite (SOLRAD), launched March 5, 1968; Orbiting Frog Otolith (OFO) satellite to study effects of weightlessness on inner ear, along with a "piggyback" Radiation Meteoroid (RM) satellite with radiation and meteoroid experiments on board, launched November 9, 1970; Explorer 44, NRL SOLRAD-10C satellite, launched July 8, 1971; Eole, French weather satellite, launched August 16, 1971; Explorer 46, Meteoroid Technology Satellite (MTS), launched August 13, 1972; Sage (Stratospheric Aerosol and Gas Experiment), NASA satellite designed to provide the scientific community with information about the effects of aerosols and ozone on climate and environmental quality, launched February 18, 1979; and Ariel 6 (formerly UK-6), British satellite designed to conduct scientific studies in the field of high-energy astrophysics, launched June 2, 1979.

Advanced Research and Planning

Walllops Flight Center utilizes the specialized skills available at this facility to identify, plan and conduct scientific studies related to NASA programs. Some current research programs are:

Atmospheric Optics - This program involves experimental and theoretical studies aimed at improving our understanding of the interaction of electromagnetic energy with planetary atmospheres. The studies include laboratory measurements of the scattering and absorption properties of atmospheric molecules and aerosols. In conjunction with the laboratory studies a parallel program is concerned with the development of mathematical models of radiative transfer through planetary atmospheres. The results of the laboratory studies together with field measurements are used to improve and extend these models.

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NASA Balloon Program managed by Wallops

The NASA Balloon Program, managed by Wallops Flight Center, provides balloons, helium, and field support for universities and other scientific groups in support of high energy astrophysics, astronomy, and upper atmospheric research.

The balloons are made of a thin, polyethylene (plastic) material. Sizes of balloons vary with the largest being greater than 50 million cubic feet in volume (approximately 500 ft. in diameter and 400 ft. tall when it reaches its desired altitude). These balloons carry payloads of up to 10,000 lbs. to altitudes of up to 160,000 ft. (30 miles) for flight durations from one to forty hours.

Over the past two years of Wallops' involvement in this program, approximately 120 balloon missions have been flown representing 19 universities and 10 other scientific groups.

NASA's Balloon Program, managed by Wallops, provides balloons, helium, and field support for high energy astrophysics, astronomy, and upper atmospheric research.

Wallops conducts successful chemical cloud experiments

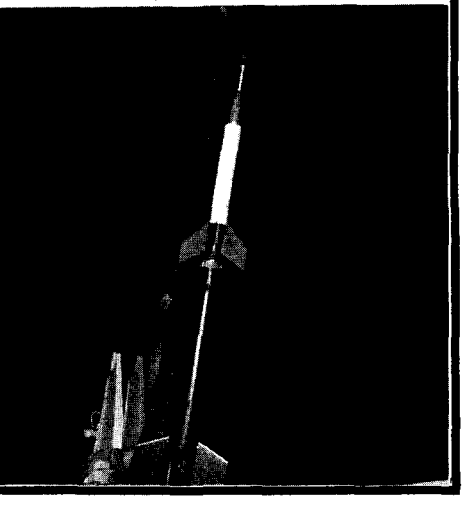
NASA successfully conducted the second in a series of two chemical cloud experiments recently from its Wallops Flight Center (WFC) on the Eastern Shore of Virginia.

The 170-pound payload released three chemical trails - as it ascended, at apogee, and as it descended. A red and blue trail of lithium and strontium was released beginning at an altitude of 140 km (88 miles) and ending near 200 km (125 miles). Then a blue-green barium and strontium cloud was released at 210 km (131 miles). On the downleg of the trajectory another lithium and strontium trail was released beginning at 190 km (119 miles) and ending near 120 km (75 miles).

The colorful trails illuminated by the sun's rays were visible for several hundred miles. (Reports of sightings from Ontario, Canada, Long Island, New York, and Cincinnati, Ohio have been received at the Wallops Range Control Center).

Observation of these chemical clouds provides a technique for measuring winds and electric fields in space. These techniques will be candidates for use in later flights on Space Shuttle.

(Above) Observation of chemical clouds provide a technique for measuring winds and electric fields in space. (Below) Two-stage Taurus-Orion rocket with chemical experiment before launch.



Responsibilities—

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Laser Physics - A program investigating the applications of lasers for remote sensing. A major activity is the Airborne Oceanographic Lidar (AOL) project. The AOL, mounted on the Wallops P3 aircraft, was designed for both bathymetric and fluorescence measurements. The bathymetric mode is not only being investigated in water depth studies but in terrain mapping through ground cover as well. A tunable dye laser is used for investigations in measuring the fluorescence from chlorophyll and oil in the ocean water column. Applications are under study for oil thickness measurements using the attenuation of the laser induced water Raman signal. Both field and laboratory studies are being conducted to measure extinction coefficients of surface oils. A high power ruby laser is utilized for ranging measurements for investigating needs of future satellite geodetic systems. Laser induced fluorescence characteristics of minerals are being studied in the laboratory; the goal of this project is the remote sensing of mineral resources.

Ocean Physics - This program involves experimental and theoretical research on a number of problems listed under the broad categories of Earth Dynamics and Ocean Dynamics. Contained in the former area are marine geodesy and the determination of the topography of the ocean and computation of the figure of the Earth; also included is the determination of precise relative and geocentric positions of geodetic control points of land.

Two unique facilities located on Wallops Main Base

Telemetry Facility

Telemetry is defined as the science of measuring a quantity or quantities, transmitting these measurements to a distant station, and there interpreting, indicating, and/or recording the information. Telemetry at Wallops consists of assembling the transmitter, mating it to a flight vehicle, checking out the transmitter, and receiving all the information from the transmitter while the vehicle is in flight. To do this Wallops has ground receiving stations in permanent buildings and in mobile "downrange" telemetry vans. In these stations the transmissions (which sound like a stream of static) are translated back to show the stress on an aircraft's wings or the heartbeat of an astronaut. Near the telemetry building the three fixed antenna systems are located. Inside the building are the fixed telemetry receiver station, the data reduction facility, the digital telemetry facility, and the headquarters for all the transportable telemetry acquisition facilities.

Aeronautical Research Radar Complex (ARRC)

This specialized complex is an integrated radar/laser/computer instrumentation system designed for unique aeronautical research programs and precision rocket or satellite tracking. Facilities at this site and its associated data systems provide precision velocity and trajectory data for experimental aeronautical projects or launch vehicles, also real-time precision guidance control data for simulated IFR (Instrument Flight Rules) aircraft landings. Recently installed on the airfield is a Nike-Hercules (Ka Band) tracking unit. This radar unit will provide additional terminal area tracking capability. Also to be installed is a Basic Wide Aperture Microwave Landing System which will support studies of aircraft and airport problems in an advanced terminal area environment.

Aerial view of Wallops Main Base.

Krieger

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tical Laboratory in Hampton, Virginia before World War II in 1936. He left Langley to attend the Georgia Institute of Technology and received a BS degree in Mechanical Engineering in 1943.

Returning to Langley, Dr. Krieger was part of the group which established a branch facility, the Pilotless Aircraft Research Station at Wallops Island, Virginia, under the leadership of Robert R. Gilruth, foremost in also establishing the U.S.'s manned space flight program. Working at Wallops part time, Krieger participated in the first firing of a U.S. guided missile on July 4, 1945.

In 1948 he assumed leadership of the Wallops facility which became an experimental laboratory from which instrumented aerodynamic test models were rocket propelled at high speeds, providing data used as the basis of design of supersonic airplanes and missiles.

In 1958 the Wallops facility became an independent field center of the National Aeronautics and Space Administration (NASA) which Dr. Krieger led through a period of rapid growth to make the first successful test flight of the Mercury capsule. He has continued to guide the expansion of NASA Wallops Flight Center's capabilities to accommodate flight systems and component development testing; aerodynamics and heat transfer research; launching small satellites into orbit; sounding rocket probes of the atmosphere; and the training of foreign nationals in space launch, tracking and data acquisition techniques. Thousands of research test vehicles, including nineteen satellites, have been launched from the Wallops range since its beginning in 1945.

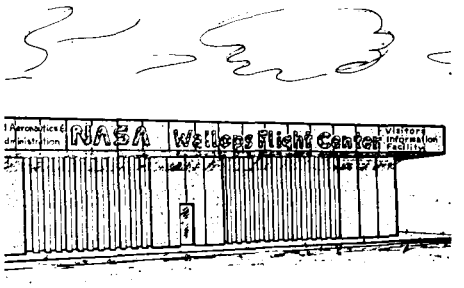
Dr. Krieger has twice been awarded NASA's Outstanding Leadership Medal and in 1974 was awarded NASA's Distinguished Service Medal. He is in Who's Who in America and was elected as a Fellow of the American Astronautical Society. In 1978 he was awarded an honorary Doctorate in Engineering by the University of Maryland Eastern Shore Branch.

Dr. Krieger and his wife, Frances, have acquired a home in Hampton, Virginia, as three of their seven children are residing in that area.

New Visitor Center under construction at Wallops

Construction of a new visitor center at Wallops, scheduled to be completed no earlier than the end of fiscal 1981, will provide schools and visitors with an educational facility and the latest information on the progress of the U.S. space program. Construction of the new facility is on the center's mainland base adjacent to Wallops airport, a half-mile strip behind the island, also the location for long-range radars and communications transmitter facilities.

In the past, the lack of visitor facilities prevented Wallops from adequately serving the public and informing them of Wallops and NASA's role in aeronautics and space. The facility will include a theater for movies and lectures as well as space for exhibits. Wallops expects this new facility to be a significant addition to the center and a welcome asset to the Eastern Shore.



An artist's conception depicts Wallops new Visitor Center upon completion.

One of the three main facilities of the Wallops Flight Center, Wallops Island houses launch sites, assembly shops, blockhouses, dynamic balancing facilities, some rocket storage buildings, and related facilities.

NASA

GODDARD NEWS

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Welcome

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The center prepares, assembles, launches, and tracks space vehicles for the acquisition and processing of scientific information. Its facilities are utilized by scientists and engineers from the laboratories and research centers of NASA, other governmental agencies, colleges and universities, and the worldwide scientific community. Wallops personnel assists these scientific research teams with their projects. Special types of instrumentation and equipment are developed, as necessary, to support these projects.

Wallops has an active role in NASA's program of international cooperation in space research. Furthermore, Wallops has trained foreign personnel in range operations, has assisted activation of foreign launch sites, and has furnished technical assistance and advice to foreign countries in launching their experiments and operating their ranges. Personnel from many countries have visited Wallops to conduct experiments, train, or seek assistance in establishing a sounding rocket facility of their own. International cooperation in space has become a major objective, and nowhere in NASA is this international cooperation demonstrated more actively than at Wallops.

The center is responsible for planning and conducting applied research and development and also manages several of the NASA sponsored projects. Some of the projects are: Geodynamics Experimental Ocean Satellite-3 (GOES-3), the Experimental Inter-American Meteorological Rocket Network (EXAMETNET), the instrument module for SEASAT, operation of remote site launching and tracking facilities, and operation of NASA's portable range facilities for sounding rockets.

Wallops is responsible for a portion of the National Sounding Rocket Program. This requires program interface with the scientific, educational, and international communities. Support furnished by Wallops includes range operational planning, analytical, feasibility, and design studies; payload, vehicle and recovery system engineering; payload construction and integration; test and evaluation; and data analysis and reporting. Field support is provided, as needed, for launch operations at Wallops and at other ranges throughout the world.