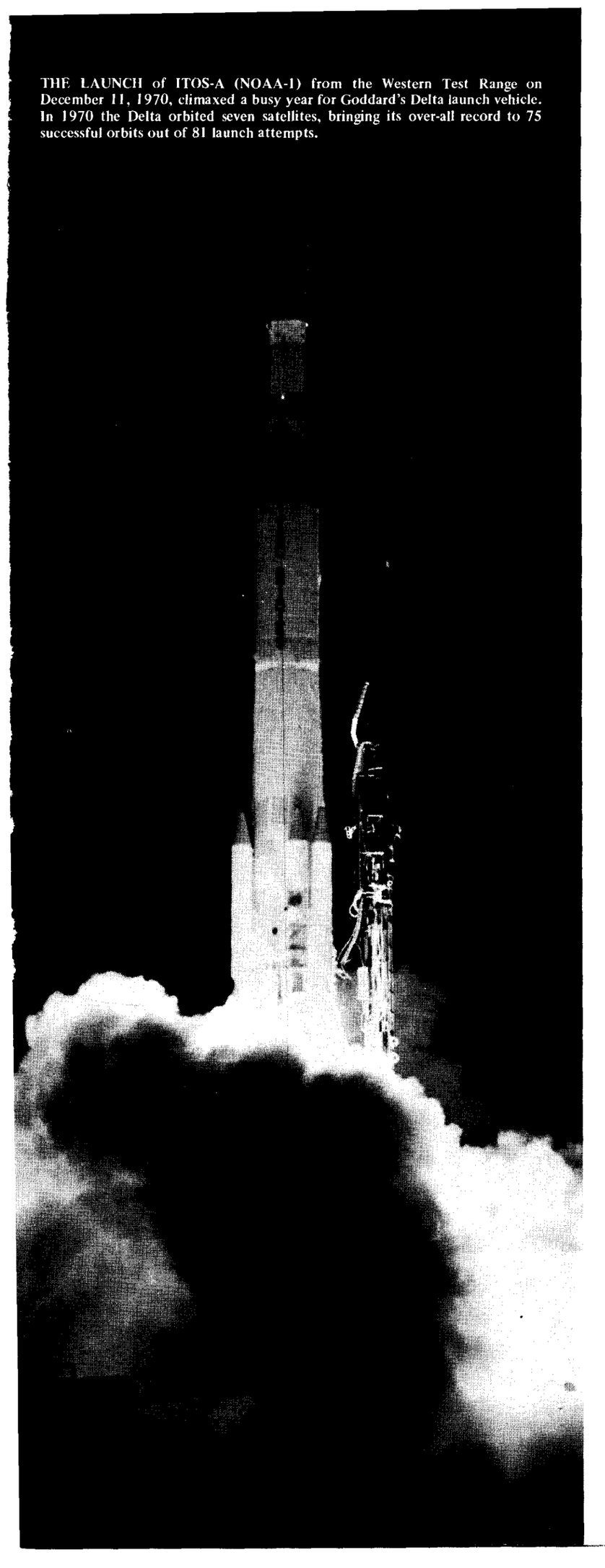


THE LAUNCH of ITOS-A (NOAA-1) from the Western Test Range on December 11, 1970, climaxed a busy year for Goddard's Delta launch vehicle. In 1970 the Delta orbited seven satellites, bringing its over-all record to 75 successful orbits out of 81 launch attempts.

GODDARD NEWS

January 11, 1971 Vol. 18, No. 10

New Projects At Goddard During 1970

The year 1970 was one marked by superior performance, a disappointment and new challenges here at the Goddard Space Flight Center.

Goddard's Manned Space Flight Network (MSFN) distinguished itself during the return to earth of the crippled Apollo 13 . . . the Orbiting Astronomical Observatory (OAO–B) was lost due to a launch vehicle malfunction . . . and several major programs entered their final phase.

The MSFN's world-wide network operated flawlessly during the suspenseful return of the crippled Apollo 13 back to earth. Despite greatly reduced power in the command module's transmitting equipment the MSFN continually maintained contact with the spacecraft. Data flow from the tracking stations through the NASCOM communications network enabled mission controllers to monitor every phase of the crippled Apollo's return to a safe landing in the Pacific Ocean.

OAO-B carrying the world's largest space telescope–the 38-inch diameter Goddard Experiment Package–failed to achieve orbit in late November. A malfunction in the launch vehicle prevented NASA's largest and most complex spacecraft from achieving orbit and training its telescope on the solar system.

Four new satellite programs made great strides in 1970 at Goddard. The Earth Resources Technology Satellite (ERTS), Applications Technology Satellite (ATS) F and G, Synchronous Meteorological Satellite (SMS), and Orbiting Solar Observatory

(See Page 2)

1970: An Eventful Year NASA-Wide

The United States space program produced major new scientific findings in 1970 as the National Aeronautics and Space Administration continued its exploration of the Moon and beyond.

Following up on the historic Apollo 11 and 12 flights, scientists reached a number of conclusions based on the studies of the lunar rocks returned to Earth and data from automatic recorders left on the Moon by Apollo 12.

Among the findings:

– There is no sign of life, past or present, on the Moon.

– Rocks returned from the Moon are older than any found on Earth.

– Lunar rocks are composed of the same chemical elements as some found on Earth, but in unusual proportions.

And a new mineral found on the Moon has been named Armalcol for the three Apollo 11 astronauts–Armstrong, Aldrin and Collins.

Meanwhile America's timetable for further exploring the Moon was set back when the fifth manned lunar mission failed in flight and two of six planned later missions were cancelled for economy.

Apollo 13 was 200,000 miles from Earth and 90,000 miles short of its goal on the evening of April 13 when Command Module Pilot John L. Swigert radioed Mission Control:

"We've had a problem."

A short circuit had ignited electrical insulation in a spacecraft oxygen tank, causing failure of the tank and loss of electrical power in the Command/Service Module.

While a listening world held its breath and thousands of experts were mobilized on the ground to work out emergency flight

(See Page 8)

Major NASA Launches of 1970

*Intelsat III F-6	Jan. 14	Telecommunications satellite. Part of a global communication satellite system for the COMSAT Corp. Delta launched. Successful.
TIROS M (ITOS-1)	Jan. 23	Improved TIROS Operational Satellite. First meteorological satellite to give day and night coverage from a single spacecraft. Delta launched. Successful.
SERT-II	Feb. 3	Ion engine test to demonstrate the capability of an electronic ion thruster-system. Engine operation successful but short of 6 month goal.
*NATO-A	Mar. 20	Military communications satellite. Delta launched. Successfully placed in orbit.
Nimbus-4	Apr. 8	Fifth in a series of seven advanced research and development meteorological satellites. Successful.
Apollo 13	Apr. 11	Third manned lunar landing mission. Astronauts: James A. Lovell, Jr., John L. Swigert, Jr., and Fred W. Haise, Jr. Unsuccessful.
*Intelsat III F-7	Apr. 22	Communications satellite. Part of a global communications satellite system for the COMSAT Corp. Delta launched. Successfully placed in orbit.
*Intelsat III F-6	July 23	Telecommunications satellite. Part of a global communications satellite system for the COMSAT Corp. Delta launched. Spacecraft communication lost.
*Skynet B	Aug. 19	British Ministry of Defense satellite launched by NASA for DOD. Delta launched. Launch vehicle success, spacecraft failure.
OFO	Nov. 9	Small, five-day physiology experiment using two instrumented frogs to study their balance mechanism during weightlessness. Data indicates mission successful.
OAO-B	Nov. 30	Orbiting Astronomical Observatory. Did not orbit.
*ITOS-A (NOAA-1)	Dec. 11	First operational satellite launched for the National Oceanic and Atmospheric Administration. Delta launched. Successful.
SAS-A (Uhuru 1)	Dec. 12	Small Astronomy Satellite to survey celestial sphere and search for X-ray sources inside and outside our galaxy. Successful.

*Non-NAS missions

GODDARD'S YEAR . . . From Page 1

(OSO) I, J and K projects moved into their construction phase.

The ERTS project will place two spacecraft into orbit to provide data of a new and different nature to improve the utilization and preservation of our natural resources.

ATS F and G will be placed into geo-synchronous orbit above the earth. The spacecraft will provide NASA with a space platform to carry out a wide variety of communications and meteorological experiments.

SMS, another synchronous satellite, will carry out advanced experiments in meteorology by maintaining constant surveillance on the earth's weather from a stationary position above the earth.

OSO I, J and K will continue to observe the behavior of the nearest star to earth, our sun.

Three Goddard satellites were placed into orbit during 1970.

TIROS M, an Improved TIROS Operational Satellite, was launched in January. The Goddard-managed weather satellite was the first to provide day and night coverage from a single spacecraft. Upon achieving a successful orbit, TIROS-M was renamed ITOS-1. After extensive checkout and experimentation, it was turned over to the Environmental Science Services Administration for operational use.

In April, Nimbus-4 was placed into orbit to carry out a wide range of research and development experiments. The spacecraft is currently carrying out the most comprehensive investigation of the earth's atmosphere from space ever undertaken. Scientists hope that the contributions from Nimbus will lead to reliable long-range weather forecasting within this decade.

Shortly before the year ended, an Italian launch crew using a U.S. launch vehicle placed the Small Astronomy Satellite (SAS-A) into orbit from a platform in the Indian Ocean off the coast of Kenya. The SAS was given the name Uhuru I in honor of Kenya's Independence Day, December 12, the day the satellite was launched.

The Goddard-managed Delta rocket was successful in all seven launch attempts in 1970. Beside the ITOS-1 launch, Delta was used to place three Intelsat III's into orbit, NATO-A for the North Atlantic Treaty Organization and Skynet-B for the British Ministry of Defense. Delta 81, the year's final launch on December 11, placed NOAA-1 into an orbit for the National Oceanic and Atmospheric Administration, successor to ESSA.

A solar eclipse in March along the eastern seaboard of the U.S. brought a flurry of activity from Goddard's sounding rocket program. Over 30 sounding rockets were used to investigate the phenomenon over Wallops Island, Virginia. In all over 160 sounding rockets were launched by Goddard during the year, bringing the total to more than 1400 since the Center was opened.

In January, Orbiting Astronomical Observatory-2 found a hydrogen cloud as large as the Sun surrounding the comet Tago-Sato-Kosaka.

Another enormous cloud, this one 10 times larger than the Sun, was located in April by Orbiting Geophysical Observatory-5 around Comet Bennett.

Other notable activities that took place during the year at Goddard was the longevity of the OAO-2 which continued to transmit data on the solar systems and the galaxies . . . the ATS-5 millimeter wave experiment that may lead to a technical revolution in the communications field by vastly increasing the number of frequencies available for information and data transmission . . . and the reception of data from the Apollo Lunar Surface Experiment Package (ALSEP) by MSFN.

Goddard's Space Tracking and Data Acquisition Network (STADAN), in addition to receiving data from some 40 satellites weekly during the year, successfully tracked and acquired data from NASA's Orbiting Frog Otolith (OFO) biological project in November.

Now in its 10th year the Goddard Space Flight Center employs more than 4300 government employees and in excess of 2500 contractor personnel at the facility. The site covers over 1000 acres and includes 28 buildings valued in excess of $68 million.

Satellite Launch Support

A climax to Goddard's launch activities in 1970 came in mid December when two satellites were launched about 24 hours and half a world apart.

The first satellite was ITOS-A launched at 6:30 a.m. (Goddard time) on December 11 aboard Delta 81 from the Western Test Range in California. ITOS, for Improved TIROS Operational Satellite, was renamed NOAA-1 when it achieved orbit and will be turned over to the newly formed National Oceanic and Atmospheric Administration later this month.

Goddard's first Small Astronomy Satellite (SAS) was launched at 5:53 a.m. on December 12 from Italy's San Marco Launch Platform off the coast of Kenya. The satellite was the first American spacecraft launched by a foreign country and the first satellite designed to map sources of celestial X-rays.

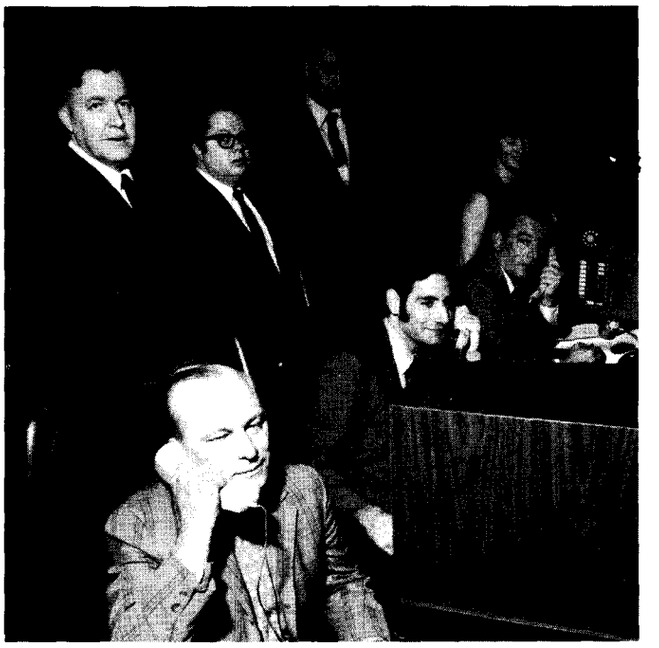
Shown below and on the following page are many of the men and women who worked here at Goddard during the two launches to help insure the success of the missions. Included in the groups are a number of night owls who were on duty for both events.

ITOS

IN THE OPSCON, members of the ITOS Launch Operations Team are (from left, seated) Myron Dakin, MCR Operations Manager; Robert Martin, Network Support Engineer; Mike Prokopchak, Tracking and Data Systems Manager; Dan Quirey, Operations Director; (standing) Doug Wilson, MSFN Mission Planner; Sandy Agee, POB Secretary; Ray Lauver, Data Communications Systems Manager; and Robert Wilson, Assistant Operations Director. Not shown are Ed. Lawless, Communications Specialist; Pat J. McGoldrick, Communications Engineer; and Frank McCluer, Tracking and Telemetry Engineer.

ITOS Orbit and Attitude Determination Cadre. From left are Burree Richardson and John Kaskaske, both of the Orbit Determination Section; Ed Watkins, of the Network Computation Section; A. Rap Fairley, of the Attitude Determination Office; Dan Cannaday, and Frank Lombardi, both of the Network Computation Section; and Roger Werking, Orbit and Attitude Determination Engineer. Not shown is William Richardson, of the Orbit Determination Section.

SAS



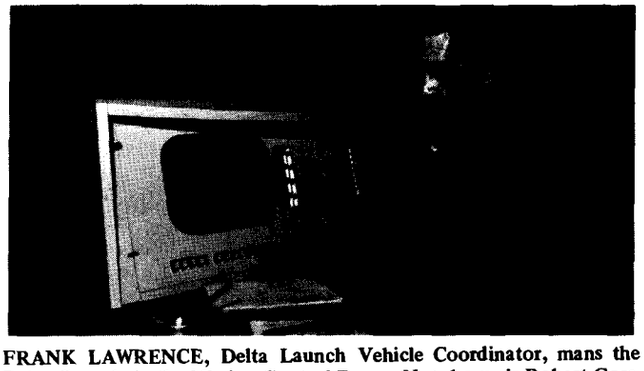
THE SAS CREW who helped maintain contact between Goddard, the San Marco launch site in Kenya and the tracking stations are (from left, seated) Stan Rozmarynowski, Tracking and Telemetry Engineer; John Schneider, Network Support Engineer; Tom Ryan, Tracking and Data Systems Manager; and Don Quirey, Operations Director. Standing are George Gault, Charles Schoppet, Gil Becklin, all of the STADAN Engineering Division and Dottie Leyh, POB Secretary. Not shown are Terry Young, Communications Engineer; Dake Dakin, Mission Control Center Communications; Ralph Carberry, Communications Specialist; Ed Lawless, Communications Specialist (SCAMA); and Doug Wilson, MSFN Mission Planner.

ATTITUDE CONTROL team members for the Small Astronomy Satellite are (from left) Roger Werking, Attitude Computations Engineer; Gary Meyers and Jerry Repass, both responsible for spacecraft attitude determination; and Frank Lombardi, of the Network Computations Section.

(See Page 4)

ITOS . . . From Page 3

ITOS DATA is received in the TOS Checkout Center (TCC). Standing (from left) Ken Edinger, Mechanical Engineer; Harold Oseroff, Project Coordinator Bill Peacock, Spacecraft Dynamics Engineers; and Bill Browne, Mechanical Engineer; examine spacecraft telemetry data in analog format as it comes from the spacecraft. Tony Rossi (seated), Associate TEC Manager; examines the same data after it has been digitized and printed out in plain English by the VARIAN computer.



FRANK LAWRENCE, Delta Launch Vehicle Coordinator, mans the Delta Console in the Mission Control Room. Not shown is Robert Goss, Chief of the Delta Coordination Branch. William R. Schindler, Delta Project Manager, was at the Western Test Range for the ITOS launch.

Goddard EPO Now Serves 12 Northeastern States

Two three-day conferences were conducted for educators of the northeastern tier of twelve states at Goddard Space Flight Center during late November and early December. Over 40 educators representing state departments of education, large municipal school systems such as New York City and Boston, parochial school systems, colleges and universities attended the sessions.

The Space Science Education Project Conference dealt primarily with the problem of proper utilization of the NASA Spacemobile Program in the schools of the new GSFC region. With the closing of the Electronics Research Center last spring, Goddard assumed the educational programs and services responsibility for New York and the New England area. Three Spacemobile units formerly assigned to ERC were turned over to GSFC. The Educational Programs Office at Goddard now coordinates the activities of six Spacemobile units operated by seven professional educators provided through a NASA Headquarters contract with Oklahoma State University. The public elementary and secondary school enrollment in these twelve states is approximately 10½ million students. The demand for the Spacemobile lecture-demonstration school visits continues to be very high.

During the Space Science Workshop and Institute Planning Conference, the visiting educators were briefed on Goddard's teacher workshop programs, and preliminary scheduling was completed for the summer of 1971. Twelve workshops and institutes are presently planned for the GSFC region.

SAS . . . From Page 3

SAS ORBIT COMPUTATIONS: Grouped in front of the IBM 360/75 computer they used to process tracking data and compute the spacecraft orbit are (from left) Harvey Walden, Orbit computations Engineer; Bob Everett, of the Network Computation Section; J. B. Joyce, of the Orbit Determination Section; Dan Cannady, Ed Watkins and Frank Lombardi, all of the Network Computation Section.

MSOCC. In the Multi-Satellite Operations Control Center (MSOCC) SAS team members simulate a satellite pass over the Quito STADAN station. From left are Norm Piterski, of the SAS Project; Don Wrublik, SAS Project Operations and Experiments Manager; Dick Schumacher, Control Center Manager; John Schneider, Network Support Engineer; Eldon Volkmer, SAS Operations; and John Martin of the STADAN Operations Division.

NASA Selects OSO Contractor

On December 22, 1970 The National Aeronautics and Space Administration announced the selection of Hughes Aircraft Co., Los Angeles, for award of a contract to provide a new, more advanced series of Orbiting Solar Observatory (OSO) spacecraft.

The new OSO's will serve as platforms for conducting increasingly complex and sophisticated experiments in solar physics and related fields with improved time, spatial and spectral resolution.

The value of the cost-plus-award-fee contract is estimated at $22 million.

Under conditions of the contract, Hughes will be required to deliver three flight spacecraft to be designated OSO I, J and K for missions in 1973, 74 and 75, respectively. In addition to the spacecraft, the contractor will supply the necessary ground support equipment for qualification and acceptance testing and launch operations, one set of spacecraft spares, and perform pre-launch and post-launch services.

The last OSO spacecraft was launched Aug. 9, 1969.

To date, six OSO spacecraft have been successfully launched into orbit to investigate the Sun, the nearest and most important star to man, and solar cyclic variations and storms that affect life, weather, communications and other Earth processes.

Project management is under the direction of the Goddard Space Flight Center with overall responsibility for program management under the Office of Space Science and Applications, NASA Headquarters.

Four at Goddard Elected IEEE Fellows

Four Goddard men have been elected fellows of the Institute of Electrical and Electronics Engineers. The awards were made by the IEEE Board of Directors and became effective the first of this year. The membership grade of fellow is the highest in the Institute.

Goddard's new IEEE Fellows and their citations are:

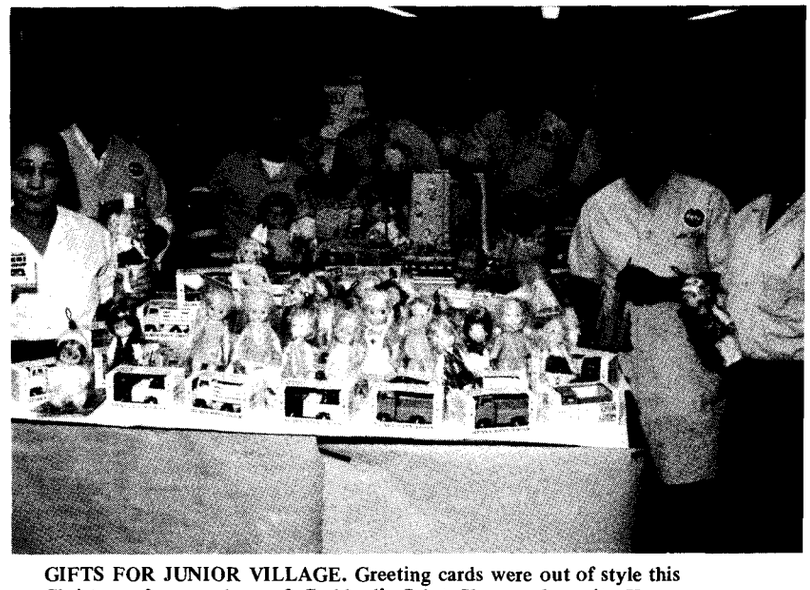
DR. ROBERT J. COATES, Chief of the Advanced Development Division, "For contributions in millimeter-wave radio astronomy, and developments in aerospace technology."

JOHN T. MENGEL, Director of Tracking and Data Systems, "For leadership and technical contributions to the advancement of space programs and world-wide satellite tracking networks."

HAROLD J. PEAKE, Chief of the Electronics Division, "For contributions to spacecraft technology and electronic instrumentation."

DR. RUDOLF A. STAMPFL, Deputy Director of Projects (Advanced Projects), "For contributions to space programs in the fields of telecommunication and system design."

HAPPY NEW YEAR FROM ITOS-1. The snow storm that kept many of us home for the New Year Holiday looked like this from the top. The picture, taken by ITOS-1 at 2:35 p.m. on January 1, 1971, shows Cape Cod and Long Island (center) in the clear as the big storm moves out to sea. Goddard (lower left) is still cloud covered.



GIFTS FOR JUNIOR VILLAGE. Greeting cards were out of style this Christmas for members of Goddard's Print Shop and on-site Xerox personnel. Instead of exchanging cards, they saved their money and bought presents for 55 children, ages three through five, at Junior Village in Washington, D.C. Additional toys were donated by the Eagles Club. Above, Print Shop "Santas" display some of the gifts they collected and later wrapped.

CHRISTMAS is for children of all ages. For proof, turn the page for pictures of the Goddard Children's Christmas Parties on December 20. Everyone, parents, kids, and Santa's helpers, had a good time. Well, almost everyone did. Parents who recognize their children may obtain a copy of the picture from the Director's Office.

BLITZEN

DANCER
CUPID

NASA'S YEAR . . . From Page 1

procedures, the crew rationed the Lunar Module's supplies of oxygen, electricity and water for 3 1/2 days while their crippled craft coasted on around the Moon and back to Earth for a safe splashdown in the Pacific.

Based on a review of the accident, changes were ordered in the spacecraft to reduce the chances of a recurrence and to increase its ability to get back to Earth in an emergency.

Apollo 14 was postponed to no earlier than Jan. 31, 1971 to allow time for the alterations and was retargeted to Apollo 13's intended landing site in the Moon's Fra Mauro Uplands.

The NASA unmanned program also contributed further to our knowledge of the planets. In May, NASA announced, after a study of enhanced photos taken by Mariner spacecraft, that one of Mars' two Moons, Phobos, appears to be very dark and potato-shaped.

Another exciting development was the first positive identification of amino acids of extraterrestrial (non-Earthly) origin.

The find, made at NASA's Ames Research Center in California, is probably the first conclusive proof of extraterrestrial chemical evolution, the chemical processes which precede the origin of life.

The acids, among the principal constituents of living cells, were found in abundance in a meteorite which fell near Murchison, Victoria, Australia.

Albert Einstein's 54-year-old theory of general relativity was upheld by results of radio experiments with two NASA Mariner spacecraft as far as 254 million miles out in space. Measurement of time delay in round-trip radio signals from the spacecraft caused by the Sun's gravity, show that Einstein's predictions are right, to within two to four per cent.

The flight research program with manned wingless lifting bodies achieved a number of milestones this year. On Feb. 18, the HL-10 rocketed to 1.86 times the speed of sound or 1,224 miles-per-hour, the fastest any of the lifting bodies has yet flown.

The X-24 made its first supersonic flight Oct. 14, reaching 760 miles-per-hour and the M2-F3 made its first glide flight in June.

In aeronautical research, a major new task got underway in May when NASA assumed operational control of a YF-12 aircraft in a joint NASA-Air Force research program. The basic purpose of the program is to obtain information from sustained cruise flight at Mach 3, approximately 2,000 miles-per-hour and at altitudes in the 75,000-foot range.

A revolutionary aircraft wing was delivered to NASA's California Flight Research Center in November. The unique airfoil is a test version of the NASA supercritical wing which may make it possible for future aircraft to cruise at substantially higher speeds, almost the speed of sound, without increasing fuel usage.

In NASA's tracking, communications and data acquisition activities, performance of the 210-foot parabolic antenna was a highlight. It achieved a record in the spring when it tracked the two Mars-bound Mariner spacecraft at distances over a quarter-billion miles.

This "big dish" of the Deep Space Network (DSN) is located at Goldstone, California, and two more of the large antennas are now under construction, one each in Spain and Australia. When they are completed, NASA will have a network capable of continuous tracking at planetary distances as the dishes are spaced equally (about 120 degrees apart) around the Earth.

The 210 played a key role in the Apollo 13 emergency as the vital communication function between the crippled spacecraft and the Houston Manned Spacecraft Center control.

NASA's international cooperation program included the visit of a NASA team to Moscow for discussions with USSR engineers on possible future arrangements which would permit NASA and USSR spacecraft to rendezvous and dock in space.

Scientist-investigators of eight more countries—Czechoslovakia, France, India, Italy, Korea, Norway, South Africa and Spain—received lunar samples brought back by Apollo 12.

DuVAL STUDENTS listen intently during tests of voice communications equipment at their school.

DuVal Students in Communication Studies

Teen-age boys from Duval High School on Glen Dale Road are listening to special tapes in their language laboratory for one hour weekly as part of a NASA study to help develop advanced voice communications systems for use in future air traffic control networks. One possible network is a satellite system to guide airline traffic over the Atlantic now under consideration by NASA, the Federal Aviation Administration (FAA) and the European Space Research Organization (ESRO).

The tapes used at DuVal contain actual voice transmissions that were relayed through test equipment. The students, who are all native Americans with normal hearing, are asked to identify words from the tapes. Their scores are being statistically averaged to identify the equipment that produces voice transmissions that will be most easily understood by pilots and ground controllers.

One objective of the study is to test equipment that might be flown on the next Applications Technology Satellite (ATS F). Another objective is to provide data on voice communications for a possible satellite traffic control network, and to evaluate test results obtained from voice systems flown during the NASA/ESRO Balloon-Aircraft experiment last summer. Eventually the study results from all tests conducted with students will go into a data bank that will be used in developing a computer program for automating future tests of voice communication equipment.

Students completing ten listening sessions will receive a certificate of appreciation. They have visited Goddard's communication facilities and will visit an FAA air traffic control center at a major airport as guests of NASA and FAA.

Results of the study will be used by NASA, ESRO, the FAA and the Transportation Systems Center in Boston.

At Goddard, the program is being conducted jointly by the NASA/ESRO Traffic Control System Project under the direction of Assistant Project Manager James L. Baker, and the Communications and Navigation Division under the direction of Division Chief Samuel Gubin. Sheldon Wishna is Voice Systems Manager, and William H. Risley is Voice System Program Coordinator.

Goddard's Educational Programs Office directed by Elva Bailey is coordinating the program here with the school. DuVal language teacher Miss Mary Valente is responsible for student participation at the high school.

WILLIAM H. RISLEY of Goddard's Communications and Navigation Division and Miss Mary Valente, language teacher at DuVal, monitor a test session in the school's language laboratory.

Goddard-Built Recorder for SAS

The small, but highly complex, tape recorder now flying on the first Small Astronomy Satellite (SAS) was designed and built entirely at Goddard by members of the Spacecraft Electronics Branch with fabrication support from the Aerospace Experimental Machine Branch. Without the tape recorder spacecraft data recovery would be severely crippled.

Because of its low equatorial orbit, SAS can be seen by only one of Goddard's STADAN stations—Quito, Ecuador. The single on-board recorder stores all data collected during a single orbit and, on command from Quito, plays this back over the ground station.

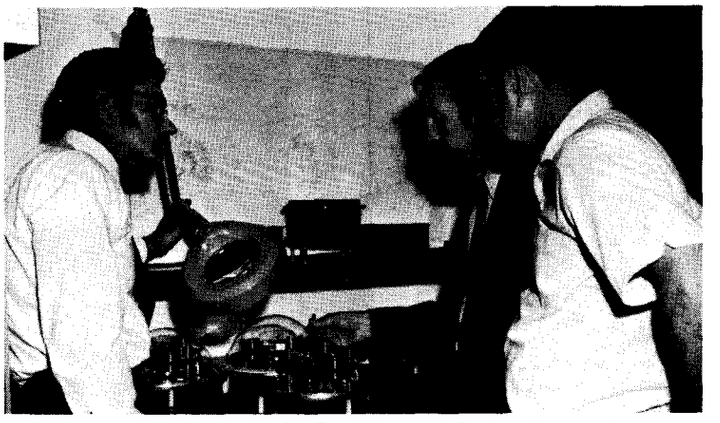
The 6-pound recorder is an endless loop design which has been rigorously tested for the SAS mission. In normal operation, the SAS telemetry system multiplexes digital data and sends it to be stored serially in Manchester Code on the tape recorder and to phase-modulate the low power VHF transmitter. This continuous signal from the transmitter is used as a beacon for tracking the satellite and for the collection of real-time data.

As the satellite makes its 12-minute pass over Quito, a ground command puts the transmitter into its two watt, high power mode and puts the tape recorder in playback mode to "dump" the complete 96-minutes of data collected from the orbit in 3.4 minutes. The tape recorder automatically returns itself to record mode after completion of the 3.4 minute playback cycle and places the transmitter back in the low power real-time mode.

The design and construction of this and future SAS recorders have been in progress for over two years. The SAS program has resulted in a significant upgrading of every phase of recorder efforts in the Spacecraft Electronics Branch from design details and component specifications and selection to assembly controls and check-out and performance testing techniques. The SAS recorder has incorporated some of the most advanced design technology and quality controls to enhance mission success.

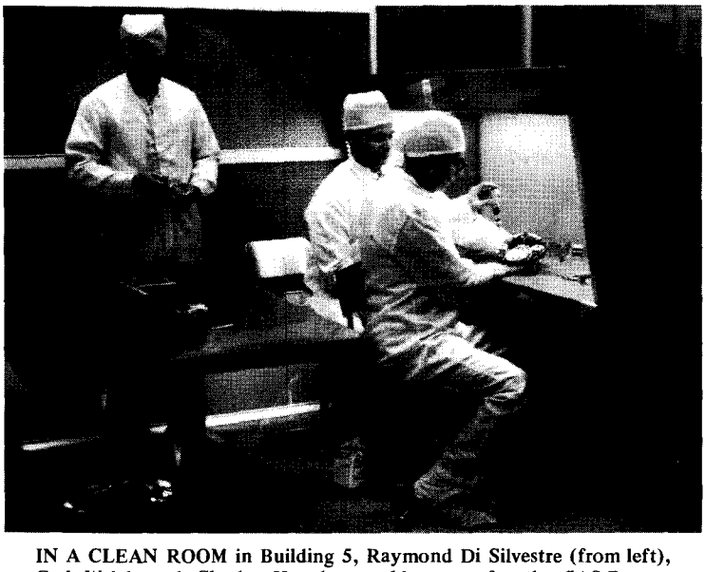
The men responsible for this work from the Spacecraft Electronics Branch are John Steckel, Branch Head; Paul Uber, Mechanical Design Engineer; William Tallant, Electronics Design Engineer; George Shoppet, Electronics Engineering Technician; Raymond Di Silvestre, Mechanical Engineering Technician; and Clinton Carle, Mechanical Engineering Technician/Draftsman.

The Mechanical Engineering Technicians supporting the project from the Aerospace Experimental Machine Branch, Building 11 Staff Shop, are Calvin Allison, Charles Heerd, and Carl Walch.

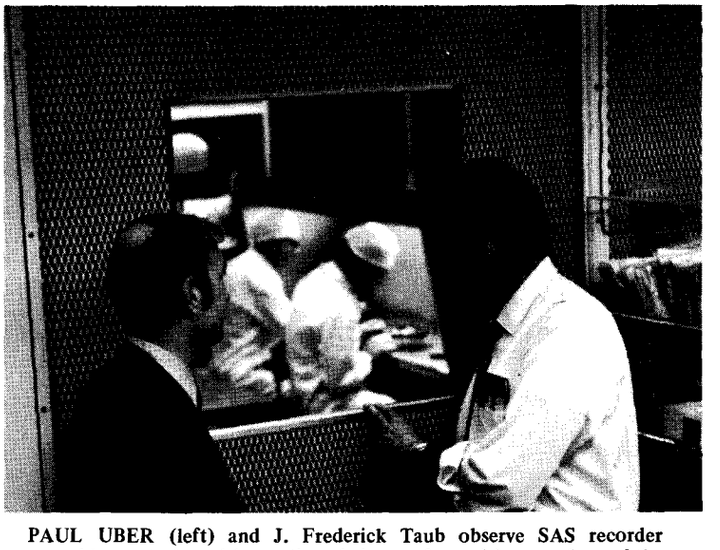


CLINTON CARLE (from left), Paul Uber and Calvin Allison review an engineering tape transport assembly for agreement with the final recorder assembly drawing.

BILL TALLANT (left) and John Steckel observe magnetic head output signal characteristics.



IN A CLEAN ROOM in Building 5, Raymond Di Silvestre (from left), Carl Walch and Charles Heerd assemble parts for the SAS-B tape recorder.



PAUL UBER (left) and J. Frederick Taub observe SAS recorder assembly controls and inspections being performed by members of the Building 11 Staff Shop in the Aerospace Experimental Mechanical Branch's clean room located in Building 5. Behind the glass are (from left) Carl Walch, Charles Heerd and Raymond Di Silvestre.

GODDARD AROUND THE WORLD

HONEYSUCKLE CREEK, AUSTRALIA (MSFN). Assistant Station Director Ian Grant (right) talks with Dr. Philip Chapman, the Australian-born American Scientist-Astronaut, during the astronaut's visit to the station on December 9, 1970. Station Director is Don Gray.

TANANARIVE, MADAGASCAR (STADAN). On November 13, 1970, Malagasy employees at the station dedicated an on-site recreation area to retiring Station Director Chester B. Cunningham. Mr. Cunningham left the station on December 1. Shown here at the dedication of "Cunningham Park" are (from left) Congressman Wiley Mayne of Iowa, the Hon. Anthony D. Marshal, U.S. Ambassador to the Malagasy Republic; Elizabeth Ravandison, Station Senior Manager's Secretary; and Mr. Cunningham.

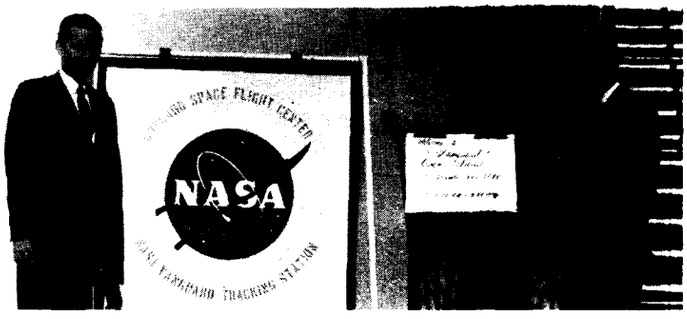
Vanguard Open House at Canaveral

Christmas carols played by a computer were a key attraction during a two-day "open house" aboard the USNS Vanguard tracking ship at Port Canaveral, Florida. The open house held December 5 and 6, 1970, was the first for the Vanguard in the Canaveral area, and the first since the ship became a NASA MSFN station.

According to Station Director Otto Thiele, "The operation was a huge success with approximately 2,000 attendees on Saturday and four to five thousand on Sunday." Station personnel received special praise for the displays which were, as far as possible, oriented to please children.

The computer music was just one part of the overall open house program. Visitors had a chance to inspect the ship's bridge, the navigation center, crew quarters, mess hall, the communications center, lounges and recreational areas, antenna control rooms, telemetry stations and other areas.

The Vanguard is managed by Goddard as a prime station in the Manned Space Flight Network. The Military Sealift Command provides the marine support for the ship, and ITT's Federal Electronics Corporation operates the tracking station.



VANGUARD'S M&O Supervisor Charles Kunz (left) and Station Director Otto Thiele prepare to welcome the general public to an open house held on December 5 and 6.

THE TRAFFIC PROBLEM at the gangway became intense on Sunday when more than 4,000 people attended the Vanguard open house.

RALPH BAILEY, Head of the Vanguard's Calibration Laboratory, demonstrates to children what their voices look like on an oscilloscope during the open house.

GODDARD NEWS is published monthly by the Public Affairs Office of the Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md. 20771.

Editorial Staff

Nancy Mengel Jim Kukowski

Mrs. Patricia Ratkewicz, Ext. 4141