GODDARD NEWS

December 14, 1970 Vol. 18, No. 9

UK-5 Cooperation Satellite Agreement

A fifth British scientific satellite will be placed in orbit by the National Aeronautics and Space Administration under a cooperative project agreement signed Nov. 2 by the UK Science Research Council (SRC) and NASA.

The project calls for a NASA Scout rocket to launch UK-5 with its six scientific experiments into a 300-nautical mile orbit in 1973. Launching will be from NASA's Wallops Station, Va.

Purpose of the scientific experiments to be prepared by British universities and a scientific team here at Goddard, is the study of cosmic X-ray sources. The experiments will operate in three modes: scanning for new X-ray sources from a sideways-looking sensor,

(See Page 2)

HARRY L. GERWIN, ATS F&G Project Manager, signs a Memorandum of Understanding between Goddard and the Air Force Space and Missiles System Organization (SAMSO) for the Titan III C/ATS F&G Missions. Roger Mattson of the ATS Project Staff witnesses the signing of the agreement that defines the policies, responsibilities, and operating procedures that will govern field working relationships between the Titan III Program Office (SAMSO) and the ATS F&G Project Office. Colonel William J. Henderson, Titan III Program Director, previously signed the agreement on November 19, 1970. Both ATS F&G will be launched aboard a Titan III C vehicle from the Eastern Test Range and placed in near equatorial, synchronous orbits. ATS-F will be the first NASA spacecraft to be launched aboard a Titan III C vehicle.

Space Research Aids Medicine

Research into ways of detecting life on other planets has led to a practical device which can help to improve medical care by quickly and automatically detecting bacteria in urine samples. Dubbed FLASH for Fast Luciferase Analysis of Specimens for Hospitals, the device was developed at Goddard in cooperation with the Johns Hopkins Hospital in Baltimore.

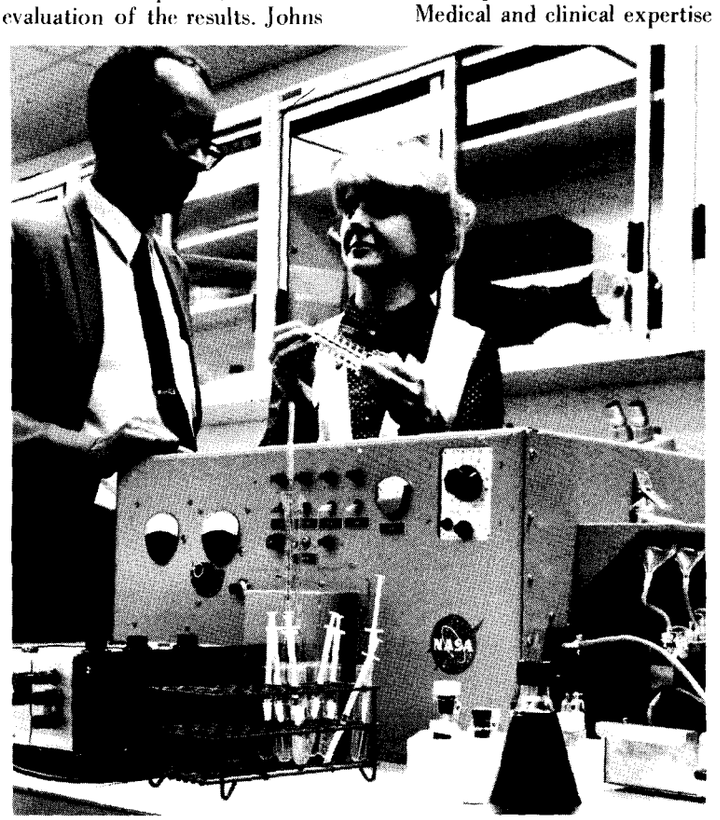
FLASH performs a completely automatic quantitative assay for bacteria in urine. The assay takes 15 minutes and the present device can process one sample per minute. This compares with present clinical procedures which require a 24-hour culture period, extensive manipulation and subjective visual evaluation of the results. Johns Hopkins Hospital presently processes approximately 11,000 urine specimens a month and the workload is increasing each month.

Thus, Dr. Rex Conn, Director of Laboratory Medicine at the hospital, sees an immediate and important application for the device. He feels that FLASH may be the first practical application of automation in the field of bacteriology.

FLASH is the first product of Dr. Albert Fleig's Technology Applications effort. It is a deliberate adaptation of the work on life detection done in the former Space Biology Branch, Laboratory for Atmospheric and Biological Sciences. Emmett Chappelle and Dr. Grace Lee Picciolo developed a process to isolate bacterial ATP from all other sources of ATP present in urine. This enabled them to apply the luciferase assay for ATP to the problem of detecting bacteria in urine.

At this point a Centerwide team effort to develop a machine to automate the process was begun. The mechanical design of the machine, and its fabrication, were provided by Burton Kelbaugh and Maurice Colburn of the Experimental Fabrication and Engineering Division, with the assistance of many of their co-workers. Justin Schaffert of the Instrumentation Branch, Electronics Division designed and supplied the original electronics for the device. Michael Devett, Systems Engineering Branch, and John Kelly, Stabilization and Control Branch, Earth Observations Systems and Systems Engineering Division, supplied additional electronics assistance. Other parts of the Center have also contributed advice and assistance with photomultiplier systems and materials problems.

Medical and clinical expertise were brought to the project by Dr. Rex Conn and Mr. Jack Causton of Johns Hopkins Hospital. It was the close collaboration of the hospital people, in conjunction with the tremendous range of in-house capability which made it possible to develop this instrument according to Dr. Fleig.



EMMETT V. CHAPPELLE and Dr. Grace Lee Picciolo prepare to operate a prototype of a new machine that can quickly and automatically detect bacteria in urine samples.

Urinary tract infections are second in frequency only to respiratory infections in the United States, and are associated with maladies such as kidney and bladder disease and diabetes. This makes the examination of urine one of the most important and frequently done tests in the clinical laboratory today.

The routine procedure for the diagnosis of urinary tract infections consists of incubating a urine specimen with a nutrient from one to two days and counting the number of bacterial colonies appearing. This reveals the number of viable cells capable of dividing. Bacterial counts of over 100,000 per milliliter of urine indicate a probable infection in the urinary tract.

In evaluating their new technique, the Goddard researchers tested

(See Page 2)

MEDICAL....From Page 1

over 1,000 urine samples that had been previously analyzed by the standard culture method and by further, more elaborate means in the Johns Hopkins laboratories.

Every single urine specimen that had a significant number of organisms present was detected by the Goddard developed technique.

Like the original life detection device, the new bacteria detector involves the measurement of a high energy biochemical substance, adenosine triphosphate, commonly called ATP. Since this compound is universally found in all living organisms, its detection is a reliable monitor for the detection of life.

The most sensitive means of detecting ATP is the use of chemicals obtained from the firefly tail. Two chemicals in the firefly tail – luciferase and luciferin – flash when they come in contact with ATP. Since the intensity of the emitted light is proportional to the amount of ATP present, the light and, hence, the ATP can be measured with sensitive photoelectronic devices.

In contrast to the life detection system which was designed to measure the total amount of ATP regardless of its source, the bacteria detection technique must differentiate between bacterial ATP and that from other sources. This accomplishment and the automation of the new technique, both of which have been patented, represent the major accomplishments of the technology transfer effort.

In operation, Goddard's automated prototype device continuously processes a large number of urine samples, each of which is contained in a miniature test tube. The tubes are fed into the light-tight instrument and onto a rotating wheel. There, a series of chemicals are injected into each tube to release and destroy the ATP in any red or white blood cells present in the urine without affecting any bacteria present.

Next, another series of chemicals (including the firefly tail chemical) is injected into each tube. These free the ATP from any bacteria present and cause it to "flash" for detection by a sensitive photo-electrical element. Printed readouts from the element indicate the presence and quantity of bacteria in each specimen.

THE FABRICATION TEAM that helped build the new FLASH bacteria detector poses with the machine. Seated are Stuart E. Tull (left) and Robert F. Harris. Standing are (from left) Wade S. Smith, Anthony M. Votta, Maurice E. Colburn, Burton N. Kelbaugh, and Robert W. Hessler.

AGREEMENT....From Page 1

pointing for more detailed observation of individual sources or groups of sources and pulsar detection.

The spacecraft will be the first British scientific satellite to employ magnetic core data storage, pulse code modulation (PCM) telemetry and a gas jet attitude control system which can be programmed by ground command.

The experiments to be carried by UK-5 are: measurement of source positions and sky survey in the energy range 0.3 to 30 kilo electron volts (keV) by the Mullard Space Science Laboratory of University College, London; the sideways scanning experiment by the Physics Department, Leicester University; study of the spectra of sources in the 2-10 keV energy range by the Mullard Space Science Laboratory; measurement of the polarization of X-rays at 2 and 4 keV by the Physics Department, Leicester University; a study of sources of high energy X-rays up to 500 keV by the Physics Department, Imperial College; and an all-sky monitor in the energy range 3 to 6 keV prepared by GSFC as an adjunct to the pointed experiments.

Previous British satellites launched by NASA in cooperative projects (and renamed Ariel when successfully placed in orbit) are the first international satellite, Ariel I, launched April 26, 1962, Ariel II launched March 27, 1964, and Ariel III launched May 5, 1967. The fourth British satellite (UK-4) carrying experiments to explore the interactions between the plasma charged particle streams and electromagnetic waves in the topside ionosphere is scheduled for launch into a near polar orbit by NASA in 1971.

The present agreement calls for the SRC to provide the spacecraft and experiments. NASA is to furnish the Scout rocket, launching and tracking and data acquisition support.

Guaymas Tracking Station

The Guaymas-Empalme station for space observations in Mexico is now being operated exclusively by the Government of Mexico for Mexican scientific programs. Beginning Nov. 30, 1970, the U.S. discontinued its use for Apollo flights.

Changes in the Apollo mission profile have reduced tracking and data acquisition needs and removed the requirement for continued support from the Guaymas station.

Equipment designed especially for support of the Apollo Program will be removed from Guaymas. Other equipment will be left at the station where it can be used for support of Mexican space activities and future programs of mutual interest to Mexican scientists and NASA.

In addition to the cooperation that has existed between the Mexican National Commission for Outer Space (CNEE) and NASA in the operation of the Guaymas station, the two agencies are currently cooperating in two projects. One will develop a system approach to the use of weather data acquired from U.S. weather satellites by automatic picture transmission (APT) equipment. The other project will develop capabilities and applications for Earth observations utilizing advanced airborne remote sensing instrumentation. Plans are being completed for a new cooperative project involving synoptic meteorological sounding rocket launchings.

The Guaymas station on Mexico's Gulf of California, built in 1961, played a key role in tracking American manned flights in the Mercury, Gemini, and Apollo series through Apollo 13 last spring. It has been a major link in the worldwide Manned Space Flight Net-Network managed by NASA's Goddard Space Flight Center.

Dr. George M. Low, Acting NASA Administrator, stressed that the cooperative establishment and operation of the station over the 10 most exciting years in space exploration stands as a tribute to the friendship and understanding between the two countries.

Calling all Elves And Santa's Helpers

Santa Claus is coming to Goddard on December 20 for the annual Children's Christmas Parties sponsored by the Goddard Employee Welfare Association in the Building 8 Auditorium. To get ready for the big event, Santa will need additional helpers to wrap gifts and handle all the details that will make this year's parties the best ever.

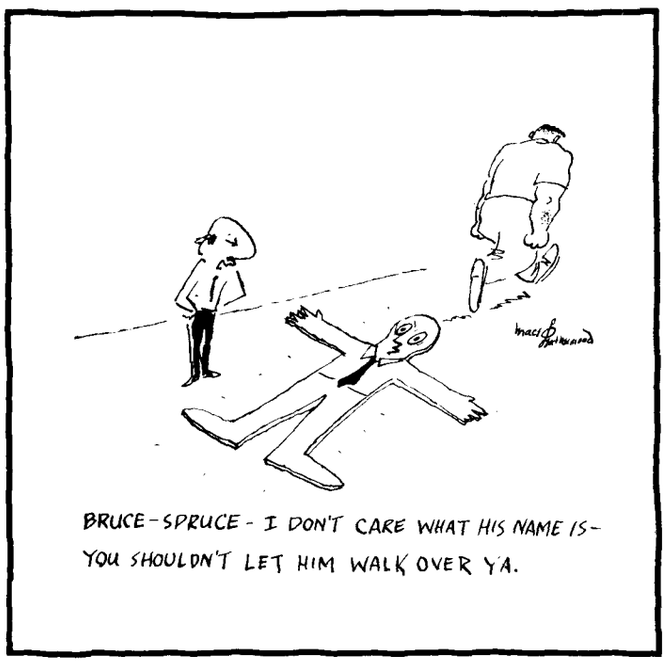
Again there will be two parties – the first from 1 to 3 p.m. for children with last names beginning with A to N, the second from 4 to 6 p.m. for children with names from M to Z. Refreshments will be served in the Building 21 Cafeteria. In the Auditorium, the Fairy Snow Queen and Santa's Chief Helper will be on hand to help Mr. and Mrs. Claus pass out specially selected gifts to each child.

Volunteers for Santa will work after hours on Tuesday, Wednesday, and Thursday, December 15 through 17. Extra helpers for Santa will also be needed on Sunday, December 20, to keep things moving at the parties. Anyone wishing to help out can call Mrs. Claus on Ext. 4498.

Parents are reminded that today, December 14, is the last day to turn in the names and ages of your children who will be attending the parties. Cost of the event is $2.00 per child to help defray the cost of Santa's gift. GEWA pays the rest.

Outputts

by Maceo Leatherwood



GODDARD IN THE COMMUNITY

Patricia Powell: Mother, Secretary, Community Worker

Patricia Powell holds three jobs that for many people would be full-time occupations. She is the mother of three young sons, a well-known secretary here at Goddard, and an active community volunteer for the Boys' Club and mentally retarded children.

Mrs. Powell's interest in boys grew naturally from the activities of her own sons – Richard, now 14; Dennis, 13; and Timothy, 6. She began as Den Mother for the J. Enos Ray School Cub Pack, a post she held for four years, and is presently active as a snack bar cook, chaperon and chauffeur for the Langley Park Boys' Club.

Most of her work in the community, however, is for the mentally retarded children at the Occupational Training Center in Washington, D. C. The Training Center, in connection with the D. C. Department of Vocational Rehabilitation, trains some 200 children age 13 on up in three broad areas of clerical and secretarial skills, custodial and domestic work, and food and cafeteria services. For retarded individuals who cannot function in the community, there is a sheltered workshop.

Recreational activities conducted by volunteers such as Pat Powell are an important part of the Training Center program. This year the children took part in the D. C. Special Olympics for Retarded Children and won 12 out of 19 events. The winners were sent to the International Olympics in Chicago this August using money donated to volunteers who took part in a special Walkathon along the C&O Canal.

Pat takes part in many of these activities. During the Walkathon in June she hiked 12 miles, most of it in pouring-down rain. On more ordinary occasions she visits the Center at least one evening each week to play ping-pong and bingo or dance with the children, many of whom are of adult age.

She says, "What the children need most is just plain TLC to which they respond with a special warmth all their own. During sports events they show a team spirit and concern for the welfare of each other that is often rare among more normal people."

At Goddard, Pat is Secretary for Henry C. Hoffman, and the Stabilization and Control Branch. After 15 years of Government service, she finds members of the branch some of the most helpful and considerate people with whom she has ever worked.

She is a familiar face on Center, having placed among the 9 "Third-Place" winners in this year's Goddard Queen Contest.

Her husband, Thomas H. Powell, is an Inspector for the WSSC. The Powells live in Takoma Park, Maryland.

Chess Club Clashes with Daly's Computers

In recent play the Goddard Chess Club decisively defeated three Varian 620 computers programmed by Chris Daly of the Telemetry Computation Branch. Mr. Daly was recently in the news when his program placed second in the first U.S. Computer Chess Tournament sponsored by the Association for Computing Machinery in New York.

Human players, who included Chess Club members and a number of visitors to the Center, proved more than a match for the computers. Final score of the Goddard event on December 2 was humans 28, computers 5 and 2 stalemates.

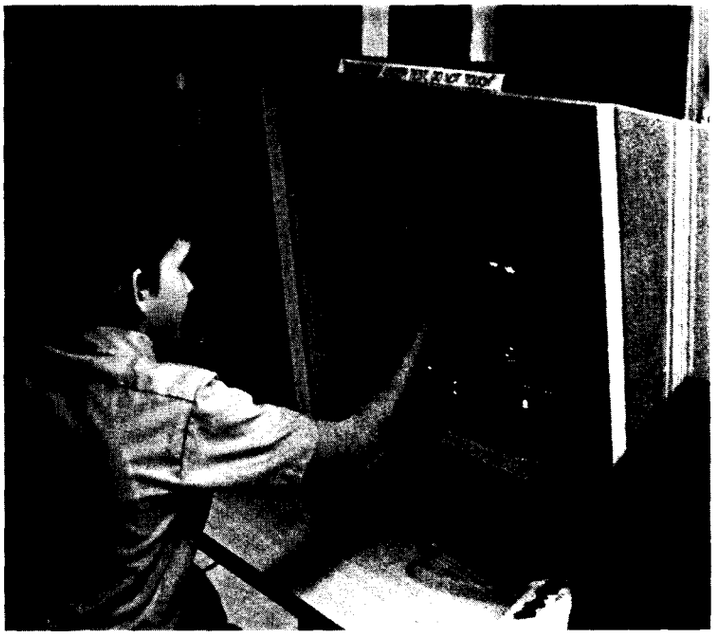
Prominent among the visitors was international grandmaster Lubimir Kavalec, the second rated player in this country (behind Bobby Fisher) and twice Czechoslovakian champion. Kavalec dispatched the computer with ease in both fast (1½ move look ahead by the computer) and slow (2 move look ahead) play, and could generally spot a checkmate four or five moves in advance. Even at a queen handicap, Kavalec beat the machine handily.

Daly's program contains the moves and rules of chess, so that the computer makes legal moves and accepts only legal moves from its human opponent. Play is touch move, and several players lost pieces by inadvertantly pressing the light pen used to move the pieces. In addition, the computer plays two simple strategies. The first is to gain material, and the second is to maximize the number of moves permitted on its next move and to minimize its opponents possibilities.

While the computer's play is weak in an overall sense, it invariably spots blunders. This led to the five computer victories. Among the computer's better games were a win over Ken Capps, twelve-year-old son of Charles Capps, in which it gobbled up a stray queen, and a 1-1 record with Chess Club President John Price.

The computer's best psychological play consisted of jumping with glee by flashing the board on and off when checking its opponents kind, but this did not prove a great advantage. In addition, the computer made its moves by an instantaneous flick of the TV screen, which often proved disconcerting to the viewer.

Chris Daly was thanked by all for the successful evening, and along with the three computers was voted an honorary member of the Goddard Chess Club.



TWELVE-YEAR-OLD Ken Capps tries his hand at computer chess.

CHRIS DALY (left) watches as Lubimir Kavalec (seated) and John Price challenge his computer chess program.

Goddard's New Fishing Club

Spearheaded by the pioneering efforts of Philip J. Cressy, Jr., of the Planetology Branch, the Goddard Drainage Control Pond has recently been opened to fishing via membership in the newly formed Goddard Fishing Club. Thus at last, Goddard fishermen need no longer frustratedly gaze at the pond as its finned critters swim merrily by.

The five acre pond was originally stocked, through the efforts of former Goddard landscape architect Walter L. Olson, in 1966 with largemouth bass, bluegill, and channel catfish. Periodic checks being made by and through the cooperation of the Health and Safety Engineering Office and the Plant Operations and Maintenance Division have shown that the current state of the pond is adequate in terms of life support environment and fish balance, although a stocking with some additional bass is planned. Several fishermen have already reported good bluegill catches, including the 1 lb. 5 oz. bluegill caught by William Hopkins. A few 6-8 inch bass have also been reported observed. The club is interested in being informed of all fish caught by each of the club members in order to aid in planning for future stocking and pond management activities. Fishing in the Goddard pond appears promising enough to include fishing contests in the planned activities of the club.

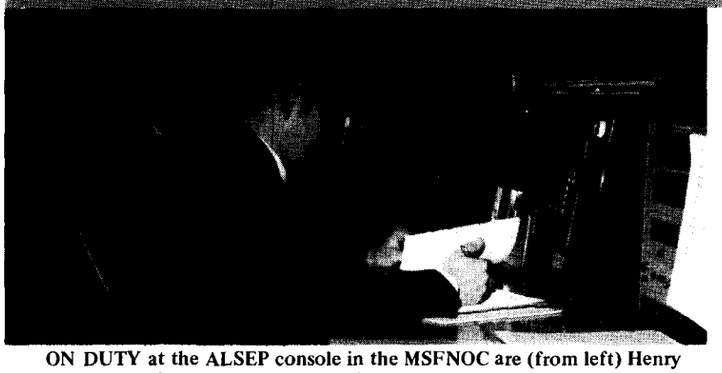
The current membership of the club numbers 158 full-time Goddard employees and on-site contract employees. Maryland state fresh water fishing regulations apply to the pond, including the requirement of a Maryland fishing license.

The current elected officers of the Goddard Fishing Club are: President—David F. Nava, Code 644, ext. 5483; Vice-President—Arthur F. Reid, Code 621, ext. 5818; Secretary-Treasurer—Dixie Hardin, Code 644, ext. 2283; and Activities Chairman—William H. Hopkins, Code 563, ext. 6607.

Members of the GEWA sponsored Goddard Fishing Club are entitled to purchase both fresh and salt water fishing equipment and supplies at a discount from a local wholesaler. Catalogs of this equipment may be examined by contacting any of the club officers and orders may be placed through Arlie Long, Code 563, ext. 5408.

The club policy is to strive to improve the condition and appearance of the drainage control pond waters and area and to promote better fishing through good pond management.

DATA TOPICS



ON DUTY at the ALSEP console in the MSFNOC are (from left) Henry Iuliano, ALSEP Network Operations Manager (NOM); Jerry David, Mission Planner; and Bill Kafer, Duty NOM.

Apollo Lunar Surface Experiments Package (ALSEP I)

by Henry Iuliano
Operations Center Section

November 18, 1970 marked the first anniversary of ALSEP-I that was deployed by astronauts Pete Conrad and Alan Bean during the Apollo 12 Mission. The ALSEP-I has been transmitting continuous data to earth from the Ocean of Storms via the Manned Space Flight Network (MSFN).

The MSFN provides the Principal Investigator located at Houston, Texas, data from five experiments on ALSEP-I. The five experiments are: Passive Seismic Experiment (PSE), Magnetometer (LSM), Solar Wind (SWS), Suprathermal Ion (Side), Cold Cathode Gauge (CCIG), Radioisotope Thermoelectric Generator (RTG) (Central Station).

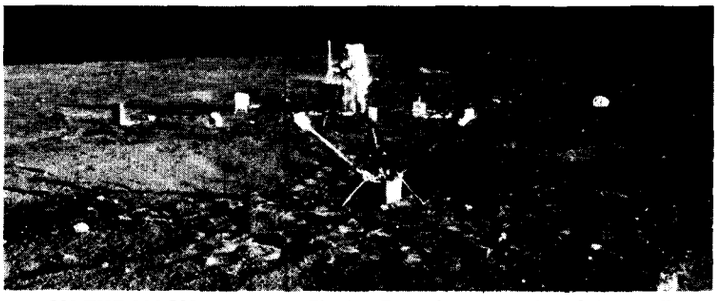
After 366 days of operation, the MSFN has relayed a total of 6500 commands to the package and has received 33,428,160,000 information bits. This is significant only when one realizes that over 1000 bits are received each and every second.

It is recognized that equipment problems may develop from a continuous 24 hour per day support, however to date, there have been no data losses. This is a tribute to the high degree of professionalism displayed by the MSFN personnel and depicts the engineering reliability of the network.

The Manned Flight Support Directorate (MSFD) Manned Space Flight Network Operations Center (MSFNOC) directs the MSFN support through the ALSEP Network Operations Manager (NOM). The NOM has operational responsibility for the MSFN support to ALSEP-I from deployment until shutdown of the package.

The ALSEP-I lifetime is governed by the RTG power source which has half life of 1000 years. The ALSEP-I has a built in safety feature, a two year timer which automatically shuts off the package.

Looking to the future, it is anticipated that as many as three (3) ALSEP's could be operational simultaneously.



ON THE MOON, Astronaut Charles Conrad, commander of the Apollo 12 lunar landing mission, aligns the antenna on the Central Station of ALSEP 1.

IPD DATA PROCESSING TEAM plots OFO data on the display. Seated is Dick Lahn. Standing (from left) are Barbara Walton, Chris Daly, Paul Reuter, DPCC Manager; Fred Wulff, Data Processing Engineer; Ron Durachka, Lillian Jamieson, Computer Systems Analyst, Sue Freeze; Bob Powless, TARES Digital Systems; and Al Gault, Data Equipment Engineer. Not shown are Elija Poole, Richard Libby and Gary Vincent.

OFO Data Processing

by Fred Wulff
Information Processing Division

Orbiting Frog Otolith-1 (OFO) and a piggyback, Radiation Meteoroid Satellite (RMS) were launched on November 9, 1970. Both missions have been declared a success.

The objectives of the mission, as stated by the Principal Investigator Dr. Gualtierotti, were to measure the effects of weightlessness on the balance mechanism of the frogs for three days. The actual nerve impulses in the brain were telemetered to our STADAN stations for almost seven days before the batteries ran down.

It was expected that either the inner ear sensors or the brain's information processing system would adapt to a gravity situation that was completely new to the feedback system which maintains balance in both frogs and man. Measurement of the sensor (otolith) output determined that it was the sensor, not the brain, that adapted.

There was no way to predict just how any adaptions would occur in the mission. The experiment had a timer with three programs. Each program was designed to explore a particular mode of adaption in great detail.

The Information Processing Division developed a combination of biological signal processing and digital computer displays to present the trends to the experimenter. This allowed him to select the best of the three programs. This need was known only one year before the first scheduled launch. We developed completely new concepts and capabilities with very little time and almost no money by use of the Data Reduction Laboratory. Our approach was to call on skills from many portions of the Division to contribute to the development and operation of this system. We were able to present data to the investigator shortly after receipt for direct interpretation.

The two main parts of the problem were recognized as: 1. Analog to digital conversion of pulse interval information from the otoliths and 2. Display of computer derived tables of statistics of the intervals.

Allen Gault, of IPD, designed an electronic system to measure and digitize the interval between otolith pulses and the amplitude of force changes on the frogs which might be causing the changes in pulse rate. This system was built up out of early telemetry hardware, delivered in 1962, and now in semi-retirement.

The other member of Al's team was Mrs. Lillian Jamieson, who developed computer programs to measure the accuracy of the

(See Page 9)

GSFC Exceptional Performance Awards

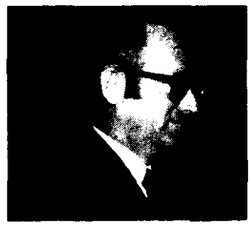
Gene J. Delio

Raymond J. Sumser

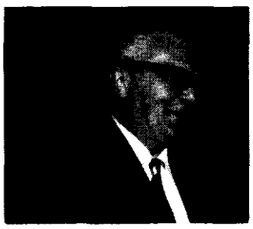
Albert G. Ferris

Harry A. Taylor

J. O'Neil Mackey



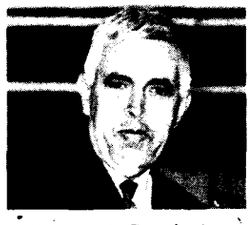
James H. Trainor



Karl R. Medrow

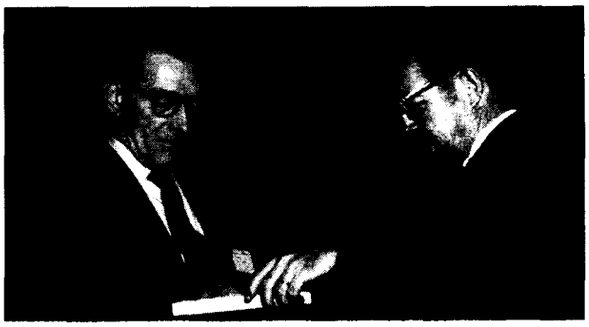
Matthew P. Thekaekara

Clarence A. Schroeder



Chester B. Cunningham

Career Service Award



WALTER J. STEWART (left) receives a 40 Year Career Service Award from Dr. John F. Clark, Goddard Director.

Annual Ceremo

For N

Four Goddard men and a sounding rocket team were among the many NASA employees and groups to receive awards at the agency's 12th Annual Honor Awards Ceremony held November 13, 1970 at the Department of Health, Education and Welfare Auditorium in Washington, D.C.

During the ceremony, Vice President Spiro T. Agnew presented the Distinguished Service Medal—NASA's highest award—to the nine astronauts of Apollos 11, 12, and 13. Other awards for exceptional service, exceptional scientific achievement, exceptional bravery, outstanding leadership and group achievement were presented by George M. Low, Acting NASA Administrator.

One of the Goddard individuals honored was Merland L. Moseson, Deputy Director of Systems Reliability and Chief of the Systems Review Office, who received a NASA Exceptional Service Medal for "establishing the Design Review Program as a recognized and accepted vital link in the chain of events leading to the successful accomplishment of Goddard missions."

Exceptional Scientific Achievement Medals went to Nelson W. Spencer and Patrick Thaddeus. Mr. Spencer, Chief of the Laboratory for Planetary Atmospheres, received his award for "leadership in the NASA Atmospheric Sciences program and for the implementation and conduct of rocket programs and satellite investigations which have provided the most definitive information to date on the structure, behavior, and physics of the earth's upper atmosphere."

At Go

On December 4, the many men and women who have made outstanding contributions to Goddard's programs during the past year were honored during the Center's Twelfth Annual Awards Ceremony in the Building 8 Auditorium.

Dr. John F. Clark, Goddard Director, presented the awards which included nine Goddard Exceptional Performance Awards, eight Certificates of Commendation from the Manned Spacecraft Center, and 179 Career Service Awards.

The GSFC Exceptional Performance Award went to Gene J. Delio of the Nimbus Project for outstanding service in the system design of Nimbus 4; Albert G. Ferris, Chief of the Project Operations Support Division, for outstanding leadership in the administration of the STADAN; J. O'Neil Mackey, Jr., Chief of the Procurement Division, for individual initiative in creating Goddard's procurement organization; Karl R. Medrow, Chief of the Sounding Rocket Division, for outstanding leadership of NASA's Sounding Rocket Program; Clarence A. Schroeder, Deputy Director of Tracking and Data Systems, for outstanding technical and managerial accomplishments and personal contributions to the development of world-wide networks for tracking and data acquisition support; Raymond J. Sumser, Chief of the Manpower Utilization Division, for personal leadership in planning, and administering Goddard's manpoweer management program; Harry A. Taylor, Jr., Head of the Thermosphere and Exosphere Branch, for scientific leadership and

ies Honor Many

ASA

Dr. Thaddeus, of the Goddard Institute for Space Studies in New York, was cited for "forging new advances in astrophysical knowledge by combining experimental and theoretical research to develop a technique of interstellar absorption line measurements as a means of measuring the 'primordial fireball' radiation and as a general tool of observational astrophysicists."

The ceremony's only Exceptional Bravery Medal went to Herbert W. Grandy, of the Plant Operations and Maintenance Division, who, at the age of 62, risked his life to lesson the effects of a fire that broke out in Building 11 on December 10, 1969. His citation reads, "For demonstrating courage and perservance under extreme danger posed by fire and smoke. His action, without regard to his personal safety, prevented the fire in Building 11 from causing extensive and costly damage to Federal property at Goddard Space Flight Center."

George E. MacVeigh, of Goddard's Sounding Rocket Division, and Cary F. Milliner, of the Wallops Station, Virginia, accepted a Group Achievement Award in behalf of the Solar Eclipse Sounding Rocket Project Team. The award, which involves Goddard's entire Sounding Rocket Division, was given "in recognition of the March 7, 1970 Solar Eclipse Sounding Rocket Project Team whose dedicated effort and outstanding performance resulted in the successful conduct of a coordinated series of thirty-one sounding rocket flights on March 6-8, 1970. The results of the experiments conducted on these flights will make significant contributions to the NASA scientific program."

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inventiveness in studies of the ion population of the Earth's environment; James H. Trainor, Head of the Instrumentation Branch, for providing scientific guidance and leadership in the development of instrumentation for high energy astrophysics experiments; and Matthew P. Thakaekara, of the Thermodynamics Branch, for leading and coordinating the solar research that obtained revised engineering standard values of solar spectral and total irradiance.

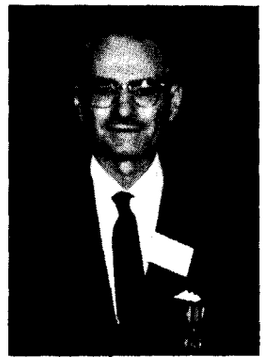
A tenth Exceptional Performance Award will be presented to Chester B. Cunningham for outstanding service as Director of the MADGAR STADAN Station when he returns from Madagascar early next year.

Eight members of Goddard's Manned Flight Support Directorate received special Certificates of Commendation from the Manned Spacecraft Center for their outstanding contributions and performance during the Apollo 13 Emergency. They are Robert L. Owen, Robert E. Spearing, Robert C. Taylor, Richard J. Augenstein, Dale W. Call, William A. Pfeiffer, George A. Cassels and Robert H. Plaumann.

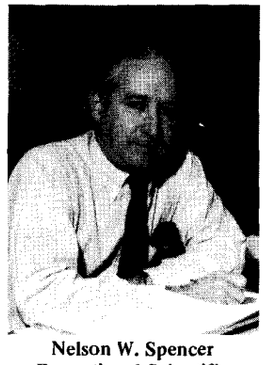
Walter J. Stewart, of the Production Control Branch, led the list of people receiving Career Service Awards when he received his award for 40 years in the government. Twelve awards were presented for 35 years of service, 31 for 30 years of service, 61 for 25 years, and 74 for 20 years.

NASA Awards

Merland L. Moseson
Exceptional Service Medal



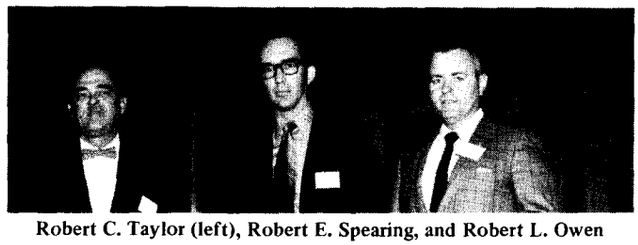
Herbert W. Grandy
Exceptional Bravery Medal



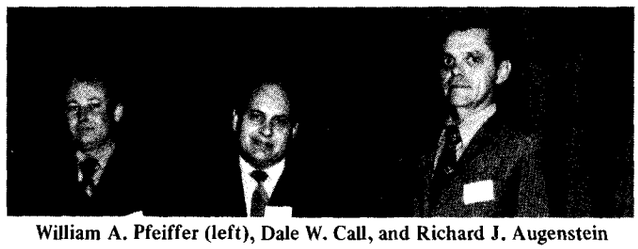
Nelson W. Spencer
Exceptional Scientific
Achievement Medal

Patrick Thaddeus
Exceptional Scientific
Achievement Medal

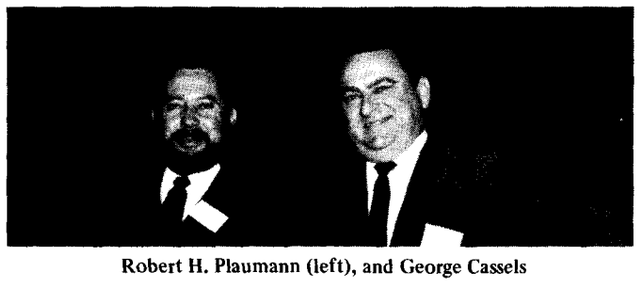
MSC Certificates of Commendation



Robert C. Taylor (left), Robert E. Spearing, and Robert L. Owen



William A. Pfeiffer (left), Dale W. Call, and Richard J. Augenstein



Robert H. Plaumann (left), and George Cassels

Aerospace Education Awards

Goddard's "science faculty" was honored on November 3, 1970, during a special ceremony held here to mark the first ten years of aerospace education.

The top award of the day was presented by Dr. Michael J. Vaccaro, Director of Administration and Management, to 62 men and women from Goddard and NASA Headquarters who have made "exceptional contributions to aerospace education during the first decade of space exploration." A second award, presented by Dr. Frederick Tuttle, Director of Educational Programs at NASA Headquarters, went to Dr. Vaccaro for his work in establishing the aerospace education program at Goddard.

Speakers at the ceremony included Elva Bailey and Richard Crone of Goddard's Educational Programs Office. Dr. Jacob Trombka and Dr. Philip Cressy, both of the Laboratory for Theoretical Studies, and Walter Sullivan, of the Bioscience Program at NASA Headquarters, spoke on their experiences as volunteers for education.

Special guests included Dr. Robert Shockley, Assistant Superintendent of the Prince George's County Board of Education, and Dr. James Latham, State Science Supervisor for the Maryland State Department of Education.

DR. ISIDORE ADLER (right) receives the group award from Dr. Michael J. Vaccaro in behalf of 62 volunteers for education from Goddard and NASA Headquarters. Each member of the group received a framed copy of the picture inscribed with his name and the legend "In recognition of exceptional contributions to Aerospace Education during the first decade of space exploration."

Goddard Volunteers for Education

Dr. Isidore Adler
Joseph K. Alexander
Robert G. Atwood
Dr. Ralph G. Barclay
James S. Barrowman
Herbert W. Blodget
Dr. Albert Boggess III
Hans O. Bremer
Gilbert D. Bullock
Herbert I. Butler
William F. Cahill
Winifred S. Cameron
Emmett W. Chappelle
Joe A. Colony
Dr. Philip J. Cressy
Daniel W. Dembrow
James J. Donegan
Dr. Bertram D. Donn
Dr. Richard J. Drachman
Anthony F. Durham
Alfred G. Eubanks
Elise R. Fisher
Dr. John Foulke
Dr. Henry E. Frankel
Dr. Bevan M. French
Howard L. Galloway
Dr. Abolghassem Ghaffari
Abrom Hisler
Clarence House
Dr. Frank C. Jones
Bernard Kaufman
Victor T. Laczo
Adolf O. Lekebusch
Maurice Levinsohn
Dr. Paul D. Lowman
Dr. Norman H. MacLeod
Harriet H. Malitson
Dr. Gilbert D. Mead
Dr. Jaylee M. Mead
Dr. Peter Musen
Mark B. Nolan
James S. O'Brien
Dr. John A. O'Keefe
Dr. Fred W. Paul
Dr. Grace L. Picciolo
Dr. Charles C. Schnetzler
Thomas P. Sciacca
Paul Shapiro
Dr. Joseph W. Siry
Charles L. Staugaitis
Dr. David A. Stern
David H. Suddeth
Walter Sullivan
Raymond J. Sumser
Harry A. Taylor
Marjorie Townsend
Dr. Jacob I. Trombka
Roland Van Allen
Chuck H. Vermillion
Dr. Louis S. Walter
George H. Wyatt
Dr. Lo I I. Yin

DR. FREDERICK TUTTLE displays a model of the "EDSAT" that was given to Dr. Michael J. Vaccaro in recognition of his work in Goddard's aerospace education program. The model, which lists Dr. Vaccaro as the EDSAT "Project Manager," symbolizes the first ten years of Goddard contributions to aerospace education.

Aerospace Education Group Citation

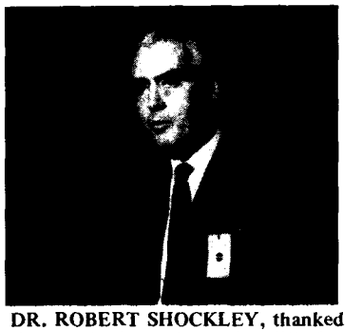
It has been said of many of today's youth that they do not really believe that there is a nature of things. In their view, all functions can be reduced to interpersonal relationships and power. There is no knowledge—only the sociology of knowledge. They have so well learned that physical and sociological research is subsidized and conducted for the benefit of the ruling class that they do not believe there is such a thing as simple truth.

Those of you who are being recognized today for your contributions to aerospace education during the past decade have been responsible for changing this viewpoint. Because of your willingness to contribute to the educational efforts of this space center, a great number of teachers and students have learned something of science and technology. More importantly, they have learned through your association with them about the people who do the science. Through you, they have begun to discover what science is like.

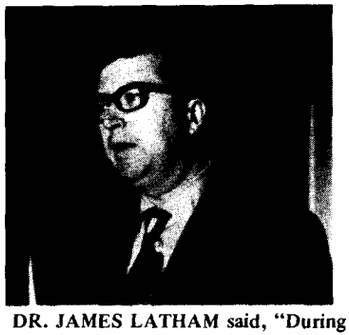
You became the science "faculty" for Goddard as you helped judge science fairs, served as advisors for the Youth Science Congresses, provided work experience for students, assisted in career counseling, helped produce educational films, designed demonstration equipment for space science programs and teacher workshops, and presented numerous talks and lectures to teacher and student groups.

You have shared with the educational community your desire not only to search for simple scientific truths, but also your concern for finding solutions to pressing social problems. You have helped them realize that the scientist can also be a humanist.

We feel confident that with your continued support to education, today's students and teachers will, during the next decade, come to understand how science and technology can help build a better society for all of us.



DR. ROBERT SHOCKLEY, thanked the award winners by saying: "On behalf of the Board of Education of Prince George's County and the Prince George's County Schools, the teachers who took part in the workshop (audience saw a documentary film of this) and all of those of us who have had a chance to kind of rub shoulders with you in the Goddard Space Center, I certainly want to express our very special thanks. Many of us have experiences we will carry with us for a long, long time . . . ."



DR. JAMES LATHAM said, "During the decade of the sixties, we were very much riding on your coattails in education especially in science education . . . we had more money for training science teachers than we have had in our lifetime . . . . more money for science equipment . . . . times have changed and times are changing . . . . as a result we need your continued support. I don't know what you are going to do to top putting a man on the moon during the decade of the seventies, but I wish you would hurry up and get started."

OFO....From Page 5

digitizing process and reformat the tapes from this older hardware to allow acceptance on large scale computers which would do the computation and display. IPD's Data Reduction Laboratory was selected to process and display the data.

DRL's operating system was used by Barbara Walton to accept the digital tape from Lillian's computer and perform the necessary calculations. The data was then reformatted and stored in the computer by another part of DRL software written by Ron Durachka and Elija Poole. Chris Daly's program took the stored data and displayed it.

Our Processing Specialist, Richard Libby, had to be sure that the various offline and computer equipments were operating and then keep track of the various sections of data as they meandered through the system.

Paul Reuter had a big responsibility in keeping our data recording facility responding to the constantly shifting source of data as the OFO spacecraft went from station to station.

These new problems for OFO benefitted IPD almost as much as the OFO experimenter. We developed a pulse-interval and amplitude digitizing capability and a DRL display capability not available before. This experience suggested new, generalized display programs and several improvements to allow more interaction between the experimenter and his data. This work has provided additional experience necessary in preparing for greater experimenter interaction with his data for future missions.

SPACE FROGS. NASA's Orbiting Frog Otolith experiment involved placing two bull frogs in a weightless environment for a period of several days. Through microelectrodes surgically implanted in the vestibular nerves, data obtained provided information about the adaptability of the otolith to a sustained weightless environment as well as its response to vibration and acceleration. Test subjects are shown immersed in a water tank.

The Eventful Flight Of a Goddard Balloon

BALLOON EXPERIMENTERS are (from left) Carol J. Crannell, John F. Ormes, Robert X. Silverberg, Lee Stonebraker, V. K. Balasubrahmanyan, Russell Greer, Michael Torino, Jesse Purvis, Michael J. Ryan, Max Powers, Robert Price, John Laws, Maurice Beazley, and Adam Thompson.

Good data has been received from the latest in a series of High Energy Cosmic Ray Experiments flown by the High Energy Astrophysics Branch. In spite of a run-away balloon that would not respond to ground commands, preliminary analysis of the data has shown it to be of high quality and great potential interest to astrophysicists.

Under the direction of Dr. Jonathan F. Ormes and Dr. V. K. Balasubramanyan, a three-ton, Goddard-built payload designed to study the charge and energy of galactic cosmic rays was recently flown on a balloon from Holloman Air Force Base, New Mexico. This 27-million-cubic-foot balloon was the first to carry such a large payload to an altitude above 100,000 feet. At ceiling, the balloon is about 500 feet in diameter, its mylar material has a surface area of several acres, and is easily visible from the ground.

The launch and early stages of the flight went as planned with the balloon reaching a steady altitude of 110,000 feet. Data from the experiment was transmitted to ground stations at Holloman AFB, Fort Walters, Texas; The Marshall Space Flight Center in Alabama and the NCAR facility at Palestine, Texas.

Trouble started with the AF control package failed to respond to command from the ground causing the balloon to drift past the Texarkana site where the experimenters had planned to release the payload. The balloon continued in an easterly direction, moving quickly with the 50 knot winds that were blowing above 100,000 feet. During the following night it cooled, lost altitude and finally touched ground to drag and dump its payload in the woods near Orangeburg, South Carolina.

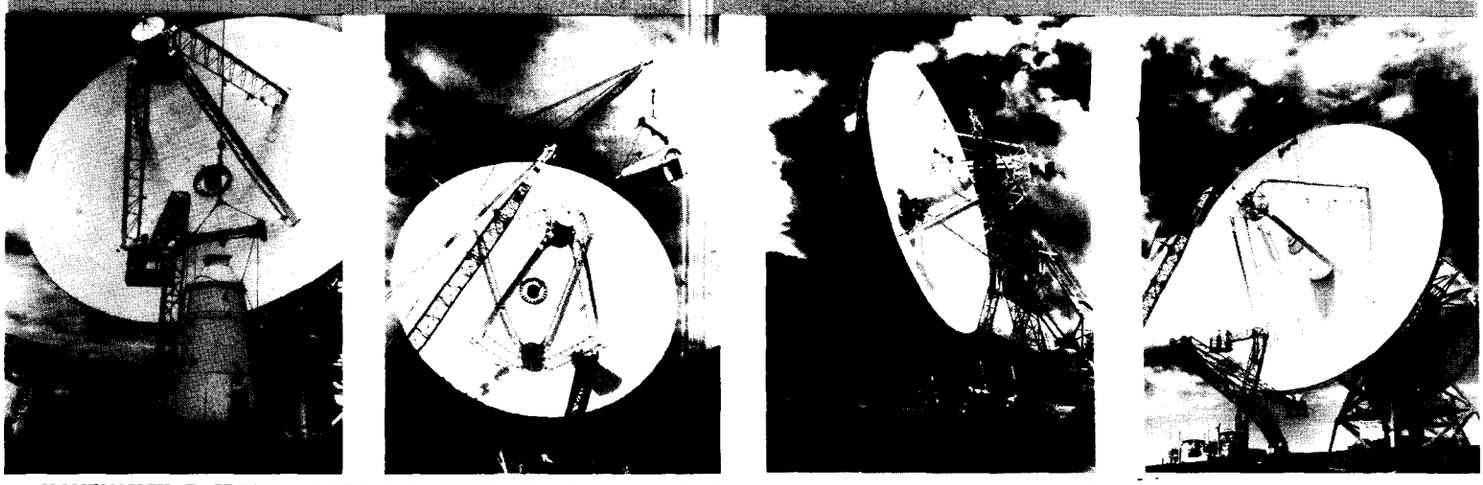
At this time it was not definitely known that the package had been left behind. The Goddard tracking network alerted radar facilities at Wallops Island and later at Bermuda to watch for the balloon. Meanwhile, an extensive land search located the package, which was later returned, to Goddard.

When last sighted, the balloon was 500 miles east of Bermuda and headed for Morocco.

Data from the flight includes 20 hours at 12 K bits rate on approximately half a million events. Analysis of this data will provide information on the high energy nucleon and electrons in the cosmic radiation. These are the first measurements of the nucleon composition at energies above 100 GeV.

This experiment was a prototype of the instrument which has been accepted for flight on the High Energy Astrophysical Observatory (HEAO), Mission A, scheduled for launch in the fourth quarter of 1974. The HEAO-A experiment is being conducted by the GSFC High Energy Group in collaboration with Dr. T. Parnell at Marshall Space Flight Center, Dr. T. Bowen at the University of Arizona, Dr. R. Huggett at Louisiana State University and with Prof. K. Pinkau at the Max-Planck Institute in Munich, Germany. The satellite version will extend the measurements of the charge composition up to the range of 10^{14} eV.

GODDARD AROUND THE WORLD



HONEYSUCKLE CREEK, AUSTRALIA (MSFN). Up she goes. A feed cone is changed on one of the station's antennas. The cone was removed on November 10 and the new feed cone, sent from Goddard, was installed on November 14. Station Director is Don Gray.

QUITO, ECUADOR (STADAN). The station recently celebrated its 13th anniversary by winning the Bendix Best Performance Award for the third time this year. The station marked the occasion by cutting a two tier cake topped with a likeness of Mount Cotopaxi (behind plaque). Here, Donald Fabans (left), Senior Manager, is shown presenting the Best Performance Plaque to Eugene Young, Station Director.

MADRID, SPAIN (MSFN). A Spanish movie company was on site this fall to film a production entitled "El Astronauta" ("The Astronaut"). From left are Felix Garcia Castaner, Telemetry Supervisor INTA; Tony Leblanc, movie star; Isabel Orue, Station Director's Secretary INTA; and Steve W. Stompf, Assistant Station Director. In the picture at right, Senor Leblanc portrays the Astronaut.

ASCENSION ISLAND (MSFN). NASA Aircraft N420NA was at the station recently for a series of tests to drill station personnel on Apollo mission procedures. Simulation Team members and Ascension site supervisors are (from left): John Lacewell, Operations Supervisor; Terry Easton, Computer Observer; Bill Harrison, Assistant M&O; Ken McDonald, Assistant Team Chief; Dave Pine, Simulations Team Chief; Nick Polizos, USB Observer; John Clouse, M&O; Barry Ferguson, Data Systems Supervisor; Norm Hayes, Station Director; Bob Ciesielski, USB Supervisor; Blake Lorenz, Telemetry Observer; Phil Schlosser, Communications Supervisor; and Cal Segree, Communications Observer. Not shown are Jim Helms, Facilities Supervisor; and Clay Krugman, Logistics Supervisor.

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