

APOLLO 17 ASTRONAUT
Ronald E. Evans talks of his personal impressions of the last Apollo mission before a Goddard audience in the Building 3 Auditorium. All three Apollo astronauts visited Goddard on January 23, 1973. Stories are on Pages 2 and 3.

Explorer 48 Doing Well

NASA's Explorer 48 (Small Astronomy Satellite B—SAS-B) has successfully completed over two months of operation, carrying out the most comprehensive study of celestial gamma rays ever undertaken.

Its single scientific experiment, a spark chamber gamma ray telescope—the most advanced gamma ray detector ever orbited—is operating flawlessly according to project officials here at Goddard.

Since last November 19 when the experiment was turned on, it has made observations of gamma rays in the region of the galactic center, the galactic plane and various x-ray sources including the Crab Nebula. Ultimately, a sky map of gamma ray sources will be prepared.

Studies of the galactic plane are of special interest since they have a direct relationship to understanding the dynamics of our galaxy. The expansive pressures of the hot cosmic ray gas, the magnetic fields and the kinetic motion of matter in the galactic disc are counterbalanced only by the gravitational attraction of galactic matter in a manner not fully understood. Studies of x-ray sources are important in order to determine if gamma rays are emitted by these unique objects.

Gamma rays are a form of electromagnetic radiation similar to the photon particles in visible light. However, they are vastly more powerful, having energies ranging upwards from 200,000 times the energy of visible light photons. Gamma rays cannot be detected on the earth's surface because they are absorbed in the atmosphere.

Publication of first scientific results from the Explorer 48 experiment is expected in about three months according to Project Scientist, Dr. Carl Fichtel of Goddard's Laboratory for High Energy Astrophysics.

The 186-kilogram (410-pound) satellite was launched November 16, 1972 (Kenya time), by a NASA four-stage Scout rocket. The launch was conducted by an Italian crew from the Italian-operated San Marco Equatorial Range in the Indian Ocean off the coast of the Republic of Kenya.

Explorer 48 is the second of three spacecraft in the Small Astronomy Satellite series managed by Goddard. The first, Explorer 42, called Uhuru—Swahili for freedom—was launched from San Marco on December 12, 1970. It has vastly widened man's knowledge of X-ray sources and their location. The third SAS is scheduled for launching in 1975 from the San Marco Range.

Prime contractor for SAS satellites is the Applied Physics Laboratory of the Johns Hopkins University, Silver Spring, Md.

OAo Copernicus Mission A Success

The latest Orbiting Astronomical Observatory (OAo-3), named Copernicus in orbit, has achieved its scientific and technical objectives and the mission has been declared a success by Dr. John E. Naugle, NASA Associate Administrator for Space Science.

Launched August 21, 1972, from the Kennedy Space Center, Florida, the 2,200-kilogram (4,900-pound) observatory—largest and most complex U.S. unmanned spacecraft—has operated successfully for five months.

Pointing accuracy of the spacecraft has proved to be three times more precise than anticipated.

Its two experiments, provided by Princeton University and the University College, London, have made almost 2,000 observations of 92 ultraviolet and X-ray sources in the sky.

The Princeton Experiment Package (PEP), an 82-centimeter (32-inch) diameter reflecting telescope—the largest ever orbited—has made 1,780 observations of 37 different sources. This device observes ultraviolet sources not visible to ground observatories because they are absorbed by the Earth's atmosphere.

Preliminary scientific results from the PEP reported thus far include:

- Detection of large quantities (more than 10 percent) of molecular hydrogen in the denser interstellar dust clouds. Hydrogen also occurs in atomic form in these regions;

- Observation of surprisingly large amounts of deuterium—a heavy form of hydrogen—in interstellar dust clouds. Deuterium is a basic element for fusion in the formation of stars, and current theories suggest that much of it should already have been used up. These theories may have to be revised in view of the abundance of deuterium observed;

- Determination that lesser amounts of heavier elements exist in clouds than in the Sun;

- Determination that some solid particles or dust grains in interstellar clouds are smaller than believed previously—some less than one-millionth of an inch in diameter;

These initial results were reported by the Princeton investigators in six papers presented at the Winter Meeting of the American Astronomical Society held during the second week of January in Las Cruces, New Mexico.

(See Page 4)

Apollo 17 Astronauts Visit Goddard



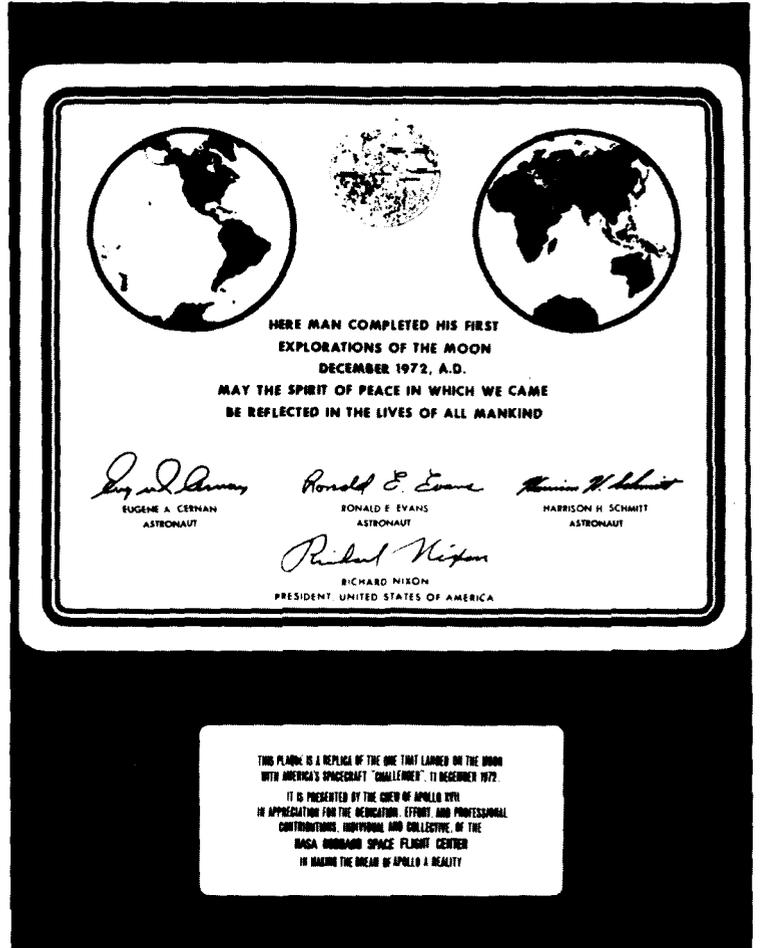
APOLLO 17 COMMANDER Eugene A. Cernan thanks Goddard Director Dr. John F. Clark for Goddard's part in making the last lunar landing mission a success. The Apollo 17 astronauts made a whirlwind tour of Goddard on the morning of January 23. During the visit, Commander Cernan presented Dr. Clark with the plaque shown at right.



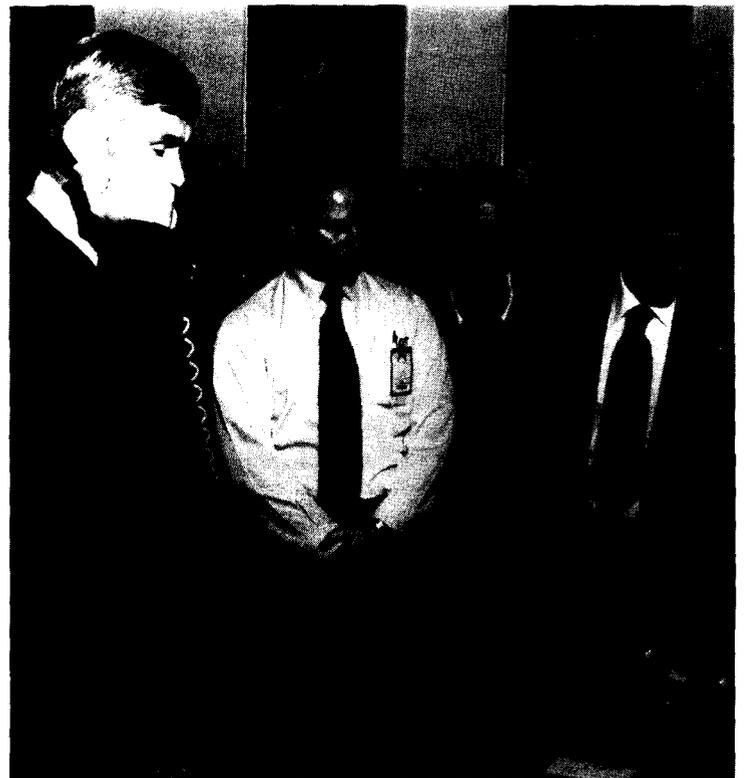
MANAGEMENT COUNCIL MEMBERS chat with the astronauts. From left (clock-wise) are John T. Mengel, Goddard Senior Tracking and Data Scientist; Dr. George F. Pieper, Director of Space and Earth Sciences; Tec Roberts, Director of Networks; Samuel Keller, Director of Administration and Management; Harrison H. Schmitt, Apollo 17 Lunar Module Pilot; Ronald E. Evans, Apollo 17 Command Module Pilot; Dr. John F. Clark, Goddard Director; and Eugene A. Cernan, Apollo 17 Commander.



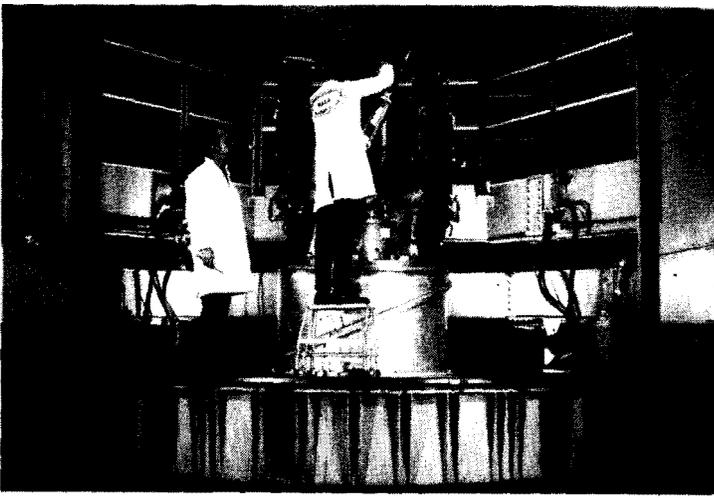
ERTS IMAGERY fascinated the astronauts during their tour. Here Dr. Clark presents them with ERTS pictures of their home regions. From left are Robert Flanagan of NASA Headquarters, Dr. Clark, and Astronauts Cernan, Evans and Schmitt.



THIS PLAQUE IS A REPLICA OF THE ONE THAT LANDED ON THE MOON WITH AMERICA'S SPACECRAFT "CHALLENGER", 11 DECEMBER 1972. IT IS PRESENTED BY THE CREW OF APOLLO 17 IN APPRECIATION FOR THE DEDICATION, EFFORT AND PROFESSIONAL CONTRIBUTIONS, INDIVIDUAL AND COLLECTIVE, OF THE NASA GODDARD SPACE FLIGHT CENTER IN MAKING THE DREAM OF APOLLO A REALITY.



SCAMA VOICE CONTROL. Apollo 17 Commander Eugene Cernan (from left) chats with personnel at Goddard's network stations. With him are Ed Lawless, Ray Sakay and Astronaut Harrison Schmitt.



GODDARD TECHNICIANS prepare the next Radio Astronomy Explorer (RAE-B) for tests in T&E's Launch Phase Simulator. The in-house-built 333-kilogram spacecraft will study low frequency radio signals from the Sun, Jupiter, the Milky Way and other galaxies while in orbit around the Moon. Low frequency radio waves of the type to be studied by RAE-B cannot be detected by ground-based observatories because they are absorbed by the Earth's ionosphere. Placing the RAE-B into orbit around the Moon will permit it to operate out of range of interfering earth-oriented radio noise. Like the earlier RAE-A (Explorer 38), RAE-B will be unique in that its radio signal sensing booms will extend to an overall tip-to-tip length of 457 meters. Explorer 38, placed into Earth orbit in July 1968, provided the first low frequency radio map of the Milky Way. It was retired on December 31, 1972. RAE-B is scheduled to be launched during midyear of 1973 by Goddard's Delta rocket from Cape Kennedy, Florida. John Shea is Goddard RAE Project Manager.

Goddard Mourns. . .

Edward J. Lenart, a member of the Data Processing Branch in the Information Processing Division, died on December 26, 1972. He had previously been a member of the Processor Development Branch for nine years, coming into that branch and NASA in 1962. Before coming to Goddard, he worked for Honeywell as an electronic technician.

Mr. Lenart had been ill since last spring and finally retired in November of 1972.

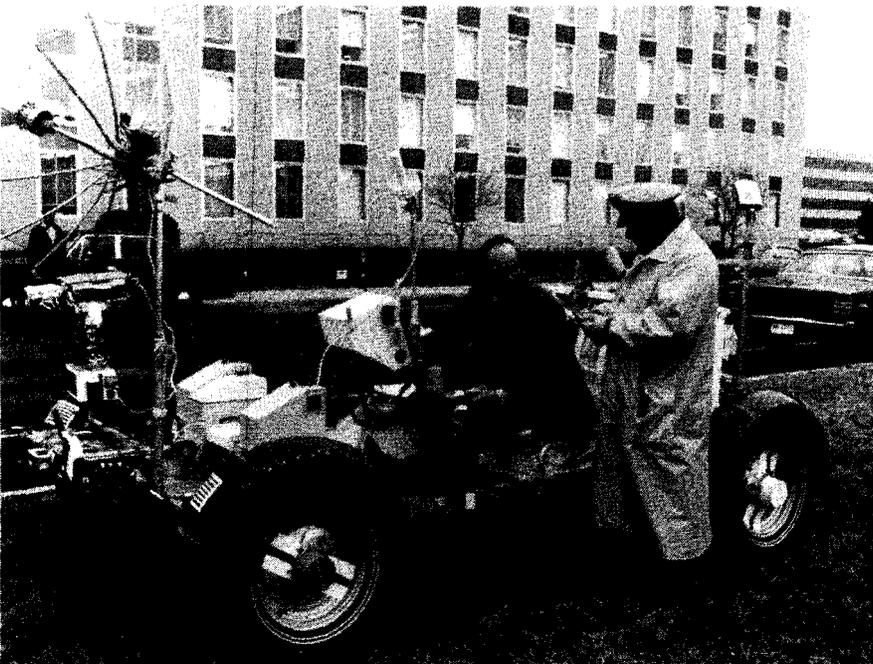
Ray Sumser Appointed NASA Personnel Director

Raymond J. Sumser, Goddard Personnel Chief since 1967, has been appointed Director of Personnel at NASA Headquarters. He took over his agency-wide duties on January 22, 1973.

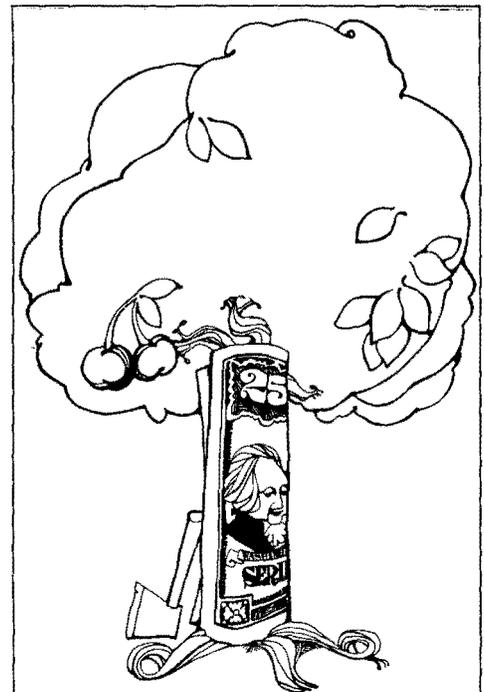
As Chief of Goddard's Manpower Utilization Division, Mr. Sumser had been responsible for developing much of the Center's personnel management program. He received the NASA Exceptional Service Medal for this work in November of 1972.

Mr. Sumser came to Goddard on July 10, 1967, following a year as a Mid-Career Fellow at Princeton University's Woodrow Wilson School of Public and International Affairs. Before this, he was Chief of Central Personnel Services for the U.S. Department of Labor in Washington, D.C.

From June 1952 to November 1959, Mr. Sumser served as Navy multiengine pilot, and at present he holds the rank of Commander and serves as Executive Officer of the Naval Air Reserve Division AI, Naval Reserve Training Unit, Andrews Air Force Base.



CRIME DOES NOT PAY seems to be the moral of this story. Will Beck of Houston received a "parking ticket" from J. Janny of the Goddard security force when he parked a model of the lunar rover on the grass in front of Building 8 during the Astronauts' visit on January 23. Actually, the rover was here on display for about two hours to give Goddard employees a chance to see what the Moon buggy looks like.



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ATS-F Shipped to California

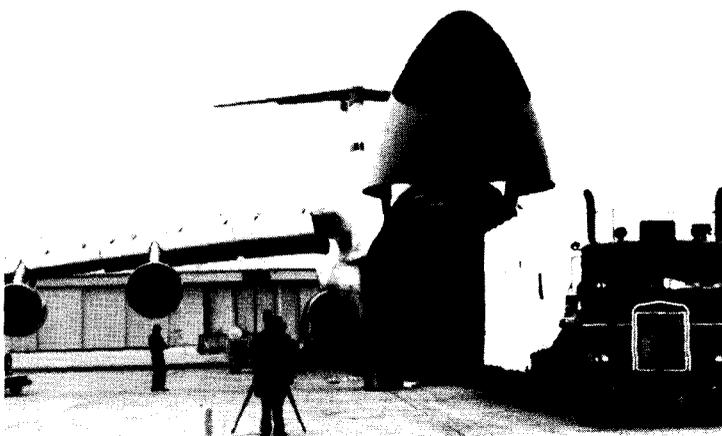
On January 3, 1973, the full scale thermal structural model of the next Applications Technology Satellite (ATS-F) was shipped to the Thompson-Ramo-Wooldridge facility at Redondo Beach, California. At TRW, the spacecraft underwent a modal survey. Modal survey is a special type dynamic test to determine frequencies and mode shapes of the spacecraft structure.

The spacecraft began its journey at the Fairchild Industries plant in Germantown, Maryland, where it was built. Mounted on a specially constructed trailer, it was towed along Interstate 70S and the Washington Beltway to Andrews Air Force base, at a maximum speed of 10 miles per hour. At Andrews, it was loaded on a C5A aircraft for the trip to California. The C5A is just about the only aircraft available to handle a package of the size and weight of the ATS-F spacecraft. At the California end of the trip the C5A landed at Los Angeles International airport where the trailer was unloaded and transported to the TRW facility.

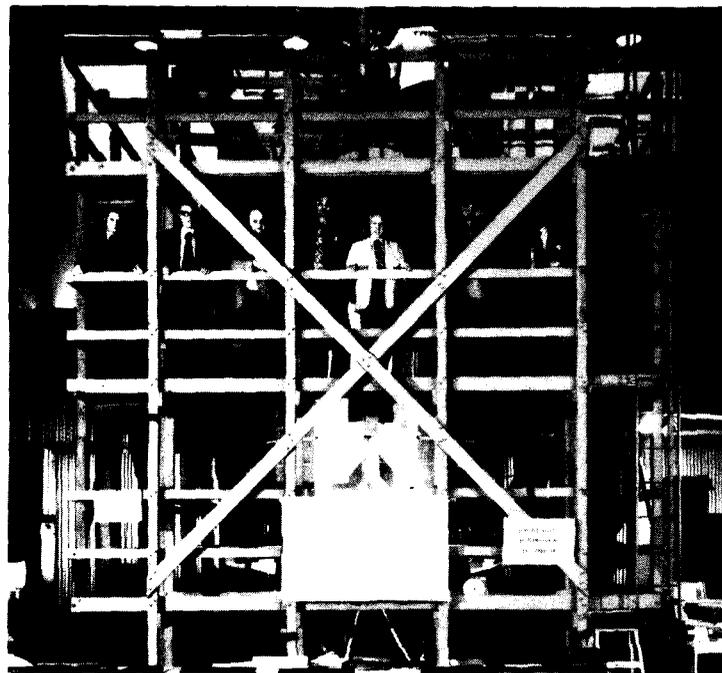
Project Manager, John Thole, and the entire project team check this off as another milestone on the road to a Spring, 1974, launch.



JOHN THOLE, ATS Project Manager; Bill Kamachaitis, Fairchild Industries Proto/Flight Spacecraft Director and Gary Banks of the ATS Project Office are briefed on the Modal Survey Control equipment by an unidentified TRW employee. In the background, another TRW employee looks on.



ATS-F Thermal Structural Model being loaded on a C5A aircraft at Andrews Air Force Base, Maryland.



ATS-F THERMAL STRUCTURAL MODEL in the Modal Survey fixture at the Thompson-Ramo-Wooldridge facility in Redondo Beach, California. At the top of the fixture, looking away, is an unidentified TRW employee. On the second level are John Thole, ATS Project Manager; Bill Kamachaitis of FII, Stu Hanlein of GSFC, Gary Banks of GSFC, Dorsey Miller of FII, Ron Luzier of FII and George Honeycutt of GSFC. On the lower level is Joe Alexander of FII.

OAD COPERNICUS . . . From Page 1

Preliminary scientific results from the University College, London, X-ray experiment involve 191 observations of 55 unique objects, with viewing accuracies superior to those expected. The most striking finding thus far is that the period of rotation of the Cygnus X-3 binary system is increasing at a rate perceptible after only one month of observations.

Additionally, the experiment, now fully calibrated, is scheduled to begin observations of the clusters of galaxies in Perseus, Coma and Virgo as well as the supernova remnants in Puppis.

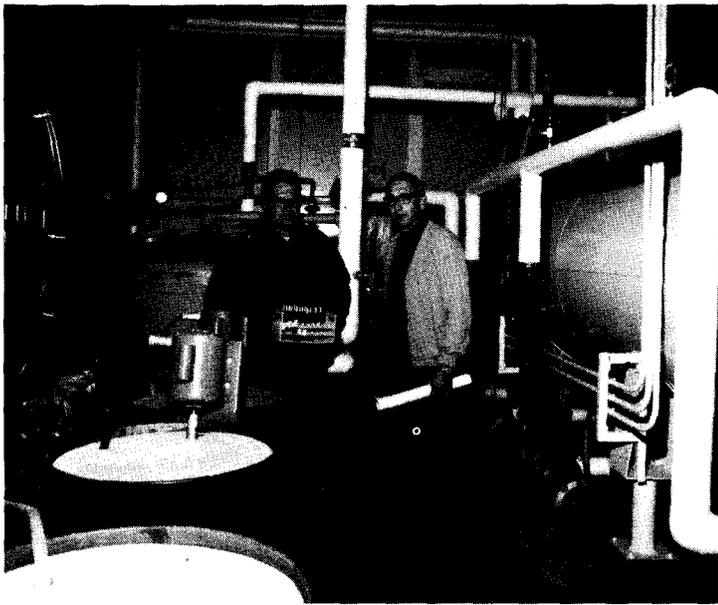
Another series of observations, scheduled during the next few months, will be to locate more specifically the several hundred X-ray sources already known to astronomers.

The OAO program is directed by the Office of Space Science, NASA Headquarters. Project management is under direction of Goddard, and Goddard is also responsible for operation of the OAO Control Center and tracking and data acquisition.

The Grumman Aerospace Corp., Bethpage, N.Y., is prime contractor for the OAO spacecraft. The PEP was built by Sylvania Electronics Systems, Needham, Mass., and the Perkin-Elmer Corp., Norwalk, Conn. The University College, London, X-ray experiment was built by a group of firms in the United Kingdom, including Pye Telecommunications, Cambridge; Elliott Brothers, London; and Rank-Taylor-Hobson, Hertfordshire.

OAO-3, fourth and last in the NASA OAO series, was named Copernicus in honor of the Polish astronomer Nicolaus Copernicus (1473-1543), father of modern astronomy. The international scientific community will begin observing the 500th anniversary of his birth on February 14 with a series of special Copernican programs and events.

GODDARD AROUND THE WORLD



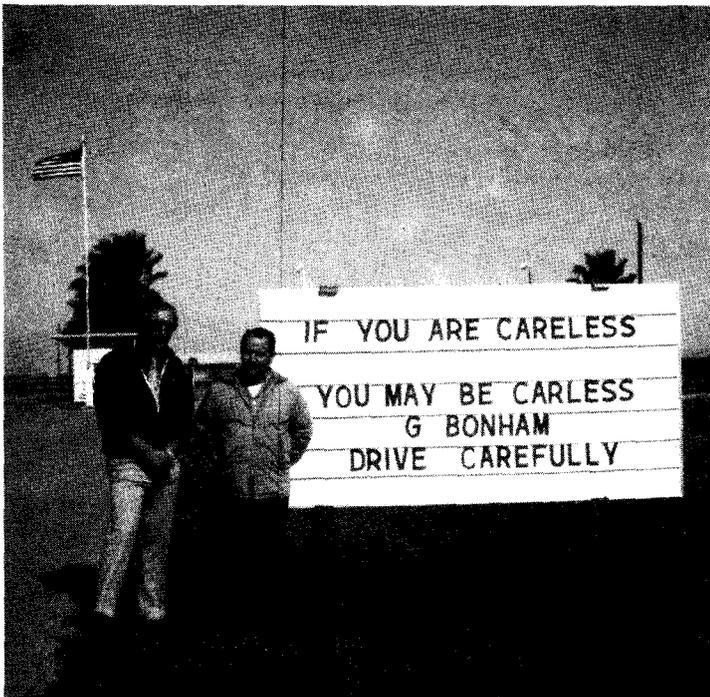
FAIRBANKS, ALASKA. Station Director Edward Eisele (right) and Duncan Plowman, inspect one of the new water purification plants recently set up at key sites at the station to insure a good supply of potable water. The Alaska station gets its water from five wells, each of which differs greatly in terms of iron, sulfate, carbon dioxide, hydrogen, sulfide, alkalinity and hardness content of the water. No one purification plant can handle all these varying water conditions, and all plants have to be completely enclosed because of severe Alaskan winters. When the old purification system became inadequate last year, Goddard and Bendix personnel ran extensive tests on the plants at the Alaska, Minitrack, Gilmore and R&RR buildings. All purification equipment was thoroughly cleaned and modified and completely new plants were built at Minitrack and Gilmore. The new system was in operation in time for winter and is being maintained by constant checks on water quality. The Goddard resident engineer during the test work, design and construction was Jim Robinson.



HONEYSUCKLE CREEK, AUSTRALIA. Former Astronaut James Irwin of Apollo 15 is greeted by Station Director during a visit to the station.



MADRID, SPAIN. Upon completion of the Apollo 17 mission, Dr. Luis Ruiz de Gopegui (left) received the symbolic key to the Madrid STDN Station from Chet Shaddeau. Under the terms of the new contract between NASA and the Spanish space agency (INTA), Dr. Gopegui became Station Director. M&O responsibility previously held by Bendix Field Engineering reverts to INTA. Mr. Shaddeau became Goddard representative in Spain.



CORPUS CHRISTI, TEXAS. The station recently started a safety slogan contest. Clarence G. Bonham (right), Acquisition Aid Technician, was the first winner. His slogan, "if you are careless you may be carless," was displayed at the main gate to the station for a couple of weeks. Shown here with him is James R. Benning (left), Loss Prevention Specialist.



VIP VISITORS. Their Royal Highnesses Prince Juan Carlos De Borbón and Princess Sofía visited the Madrid STDN Station during the critical lunar module ascent of Apollo 17. At the Apollo M&O console in the foreground are (from left) Felix Castañer of INTA, John Lacewell of Bendix, Andrés Ripoll of INTA and Steve Stompf, NASA Assistant Station Director. Seated are Colonel Oliver, Director General of INTA; Joseph Montllor, Minister Counselor of the U.S. Embassy in Madrid; U.S. Ambassador Horacio W. Rivero; Prince Juan Carlos and Princess Sofía and Mrs. Montllor. Speaking with the Prince is Dr. Manuel Bautista, Spanish Station Director of the Madrid station complex which includes the JPL station.



DR. GEORGE F. PIEPER, Director of Space and Earth Sciences, presented cash awards to Dr. David S. Leckrone of the Laboratory for Optical Astronomy (left) and Dr. James H. Trainor of the Laboratory for High Energy Astrophysics (center) for outstanding presentations at Goddard's annual Science and Technology Presentation held November 7 and 8, 1972. Dr. Leckrone spoke on "The Ap and Bp Stars in the Ultraviolet," and Dr. Trainor on, "Observations of Solar Cosmic Rays at 2 A.U.," and "Cosmic Radiation Experiment, Pioneer F/G Jupiter Mission."

Year-End Retirements

Best wishes to the six Goddard employees who retired at the end of 1972. They include Otto P. Lund of the Plant Operations and Maintenance Division who retired in November.

Retiring in December were:

Helen H. Pierrot of the Procurement Division

Joseph F. Price of the NASA Communications Division

George F. Fogelman, Jr., of the Management Services and Supply Division

Phyllis V. Smith of the Manpower Utilization Division

Eva O. Rexroad, Secretary to James Flemming, M&DO Assistant Director for Center Automatic Data Processing.

Satellite Receiving Stations for the Calypso

Jacques Costeau's ship Calypso, now on a mission to study marine life in the Antarctic, is carrying a station to receive weather pictures from NASA and NOAA weather satellites, a communications satellite terminal, and a NASA experiment to measure certain characteristics of ocean currents.

The NASA weather and communications satellite stations were set up by Goddard's Locke Stuart and Dave Nace who boarded the ship in October while it was docked at Buenos Aires, Argentina. They then sailed with the Calypso as far as the southern tip of Tierra del Fuego while they set up the equipment and instructed crew members in its operation. Dr. Ellen Weaver of the Ames Research Center set up the automated equipment for studying ocean currents while the ship was in Buenos Aires. Her experiment is being used to gather data on ocean chlorophyll content and temperature.

The purpose of the present Calypso voyage is to sample and film sea life such as right whales, sea lions, and penguins along the east coast of South America and along the Antarctic (Palmer) Peninsula. The ship will return, probably in March, along the west coast of South America. Other studies being conducted are the measurements of ocean chlorophyll and temperature and observations of sea ice distribution and pack ice extent.

The satellite receiving station is being used several times daily to receive weather information in the form of live picture transmissions from satellites. Another station communicates with and receives scientific data from the ATS-3 communications satellite. Satellites involved are Nimbus 4, ESSA 8, NOAA 2 and ATS 3.

On board the Calypso, Mr. Nace, of the Communications R&D Branch, set up the communications equipment, and Mr. Stuart, of the Special Programs Office, set up the weather data receiving equipment. At Goddard, Charles H. Vermillion of the Earth Sensors Branch was responsible for logistic and scientific liaison and technical support. Howard Pedolsky of the ATS Project was responsible for communications support, and John Lindstrom of the ERTS Nimbus Project provided Nimbus-4 support for the sea ice study. John Chitwood of the Communications R&D Branch also was responsible for logistics and technical support.

Dr. Ellen Weaver was backed up by Dr. John Arvesen at Ames who provided communications and technical liaison support.

The 25-member crew of the Calypso is headed up by Commandant Costeau and Captain Alain Bougerant.



LOCKE STUART tries to make friends with a group of manchot penguins near the Gulf of San Jorge, Argentina. While sailing on the Calypso from Buenos Aires to Tierra del Fuego, he and Dave Nace had the chance to observe right whales, sea lions and penguins.

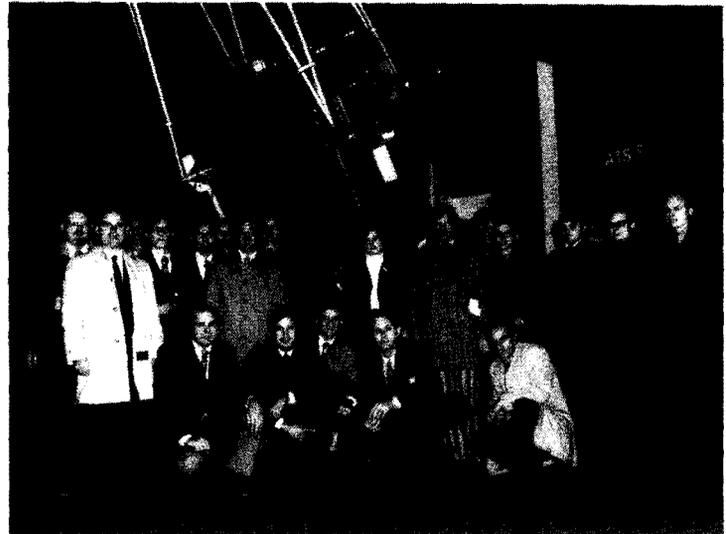


DAVE NACE works on the communications satellite terminal which he set up on Jacques Costeau's research ship Calypso.

Chi and Wolff Elected IEEE Fellows



IEEE FELLOWS. Andrew R. Chi (left), of the Network Engineering Division, and Dr. Edward A. Wolff, Head of the Systems Studies Office in the Communications and Navigation Division, have been elected Fellows of the Institute of Electrical and Electronics Engineers (IEEE) as of January 1, 1973. Mr. Chi was elected a Fellow for "contributions in worldwide precise time and frequency synchronization, and in frequency control" Dr. Wolff received his award for "Contributions to antennas, geoscience instrumentation, and management of scientific projects."



PSD EMPLOYEES TOUR. As a part of its new employee indoctrination program, the Program Support Division, with the cooperation of the ATS Project Office, recently arranged for a tour of the Fairchild Industries facilities in Germantown, Maryland. The new PSD employees, primarily made up of recent college graduates who have been hired over the past six months, were afforded the opportunity to review first-hand, Spacecraft hardware being assembled and tested. They were given a complete tour of the Fairchild facilities as well as a comprehensive presentation of the ATS program by management personnel. Most of the new employees felt that this tour provided them with a better insight into the NASA/Contractor interface and a better understanding of the problems associated with the management of large R&D programs. This group is comprised of Financial Analysts and Support Specialist personnel recently assigned throughout the Center providing resident business support to the major projects and technical divisions. The group was photographed in the Fairchild Astrophere posing under a mock-up of the huge ATS-F spacecraft.

Engineering Lecture Series



JAN P. NORBYE

Jan P. Norbye, automotive editor, sports car reporter and expert on the Wankel (Rotary) Engine will speak at Goddard on March 21, 1973. This widely acclaimed and recognized authority on matters automotive will present an illustrated talk on the newest power system proposed for U.S. cars as part of the Engineering Lecture Series for the '72-'73 season. Described as the most innovative concept for power generation since the advent of the steam engine, the Rotary-Compression gasoline unit will be the central theme of Mr. Norbye's talk. Present plans call for his presentation to follow the usual schedule designated for the Engineering Lecture Series—3:30 PM, Wednesday, in the Building 3 auditorium.

His widely acclaimed text on the Wankel type engine has become required reading in many technical and engineering schools throughout the country.

Explorer 1

Launched 15 Years Ago

America's first artificial Earth satellite, Explorer I, was launched 15 years ago January 31.

The 13.8-kg (30.8-pound) object, shaped like a stovepipe, 15 cm (6 in.) in diameter and 200 cm (80 in.) long, entered the U.S. and the western world into the age of space. Explorer I's principal scientific achievement was a major one—the discovery of the Van Allen Radiation Belts surrounding Earth.

Explorer I was prepared and launched by two Army organizations which are now elements of the National Aeronautics and Space Administration: the development group of the Army Ballistic Missile Agency (ABMA) and the Jet Propulsion Laboratory (JPL). The development group of ABMA was transferred to NASA and became the nucleus of the new Marshall Space Flight Center in 1960, one and one half years after JPL was assigned to the space agency.

ABMA provided the modified Redstone booster and the basic satellite design, while JPL furnished the solid propellant upper stages of the career vehicle and packaged and tested the payload.

Explorer I's launch came at 10:48 p.m. EST, January 31, 1958, 84 days after the Department of Defense gave the Army group the go-ahead to prepare the orbiter as a backup to the existing Vanguard satellite project.

The small satellite dispatched information on the spatial environment to Earth stations until May 23, 1958, when its small batteries were exhausted. The vehicle, however, continued to orbit for several years before reentering the Earth's atmosphere on March 31, 1970.

CLIP AND SAVE

GEWA Council for 1973**Executive Board Members for 1973**

		<i>Ext.</i>	<i>Code</i>
Administration and Management	Robert O'Steen	4828	240.2
Systems Reliability	Albert E. Fitch	5521	321
Projects	Gilbert Bullock	2859	460
Mission and Data Operations	Marc J. Selig	6073	564.1
Space and Earth Sciences	John J. Quann	6989	626
Space Applications and Technology	John Libby	4714	712.3
Networks	Robert Miller	4681	850
Office of the Director	George Anikis	2624	120
Advisors to the Director	Sam Keller	4641	200
	Alberta Moran	5067	100

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Second Vice President	George Anikis
Executive Secretary	Gilbert Bullock
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Archery	Wilson Bedwell	2345
Art	Roger Ratliff	6987
Astronomy	Victor Lazo	2527
Automobile	Jim Schaughnessy	2357
Basketball	Tom Canning	4583
Bowling:		
Tues. Mixed TP	Joe Bently	2127
Thurs. Mixed TP	Francis Federline	6686
Wed. Men's TP	Steve Evan	4705
Thurs. Men's TP	Walter Flourney	5308
Tues. Mixed DP	Bill Tallant	4846
Youth DP	Mary Jane Brown	5244
Bridge	Daniel McHugh	4327
Chess	Daniel Dembrow	5710
Fishing	David Nava	5483
Flying	Paul Rall	6726
Football:		
GSFC Touch (Outside)	Cyrill Bock	5147
Golf	Robert Powless	4415
Gun	Larry Pratt	4414
Ice Skating	Shu Schumann	5123
Judo	Earl Gernert	4734
Karate	Bob Morrissey	2366
MAD	Gene Smith	6408
Men's Chorus	Charles Miller	4865
Movie	Robert Miller	4681
Photo	Marvin Maxwell	4036
Radio	Bill Scholtz	6321
Sailing Assn.	Gene Willingham	5148
Scuba	Ron Miller	4713
Ski	Jay Oberfield	4323
Soccer	Ed. Pucinelli	5081
Softball:		
Men's	Jack Thomson	6182
Women's	Ruth Higgs	4065
Square Dance	Everett Besse	2661
Stamp	Pedro Sarmiento	5827
Tennis	Tom Kelsall	5272
Toastmaster	Carroll Horne	4786
Trap & Skeet	Walter Carrion	4942

SCIENTIFIC COLLOQUIA

- February 16 – Sebastian Von Hoerner
National Radio Astronomy Observatory
Green Bank, West Virginia
POPULATION EXPLOSION AND INTERSTELLAR
EXPANSION
- (date to be announced) – Harold Masursky
Center of Astrogeology
U.S. Geological Survey
Flagstaff, Arizona
MARINER 9 EXPLORATION OF MARS
- February 23 – Jack Minker
Department of Computer Sciences
University of Maryland
College Park, Maryland
ARTIFICIAL INTELLIGENCE
- March 2 – Charles A. Barth
Laboratory for Atmospheric and Space Physics
University of Colorado
Boulder, Colorado
MARINER 9 UV MEASUREMENTS OF MARS
- March 9 – David H. Staelin
Department of Electrical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts
REMOTE SENSING OF THE TERRESTRIAL
ATMOSPHERE WITH PASSIVE MICROWAVE
TECHNIQUES
- March 16 – William A. Fowler
Kellogg Radiation Laboratory
California Institute of Technology
Pasadena, California
THE AGE OF THE ELEMENTS AND THE GALAXY
- March 23 – Charles L. Hyder
Albuquerque Station of the Laboratory for Solar Physics
Goddard Space Flight Center
SOLAR FLARES: POSSIBLE MECHANISMS
- March 30 – Icko Iben, Jr.
University of Illinois Observatory
Urbana, Illinois
STELLAR EVOLUTION
- April 6 – Aaron Fleisher
Department of Urban Affairs
Massachusetts Institute of Technology
Cambridge, Massachusetts
URBAN REDEVELOPMENT

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