GODDARD NEWS July 1973 Vol. 21, No. 4

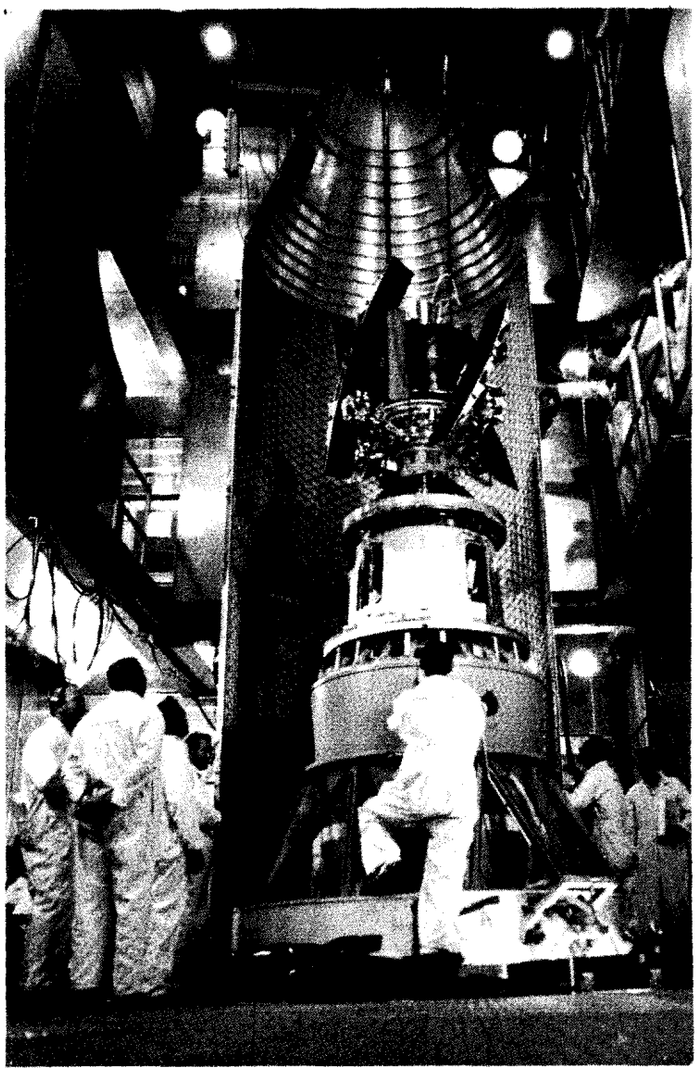
Explorer 49
A Success Story

At precisely 2:04 PM (EDT), Wednesday, June 20, the Goddard-built Radio Astronomy Explorer-B—officially renamed Explorer 49—sent back its first scientific data from a near perfect "anchor" orbit around the moon.

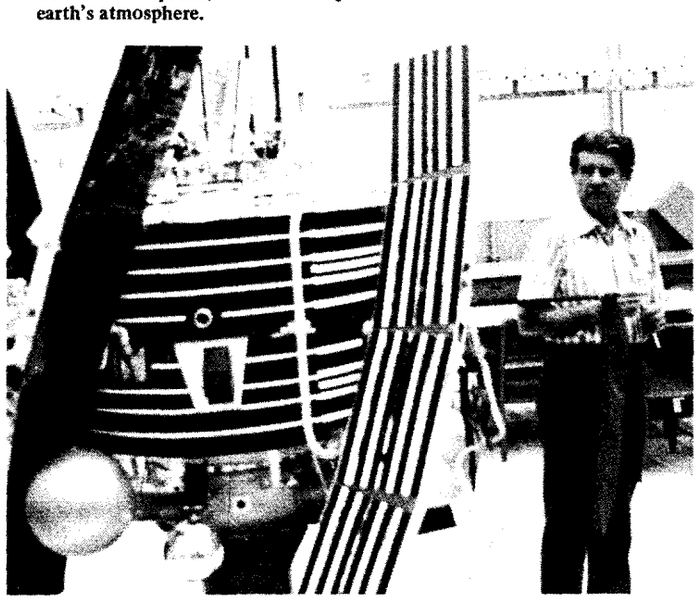
These initial bits of data—the crackle, squeek and buzz of celestial low frequency radio noise which cannot penetrate the earth's ionosphere—were the culmination of the dedicated efforts of hundreds of space experts at Goddard and elsewhere which began on June 10 when the satellite was successfully launched from Cape Kennedy, Florida.

The data came from the radio signal sensing "ears" of the dipole antenna system extended 120-feet tip-to-tip by ground command 28 minutes earlier.

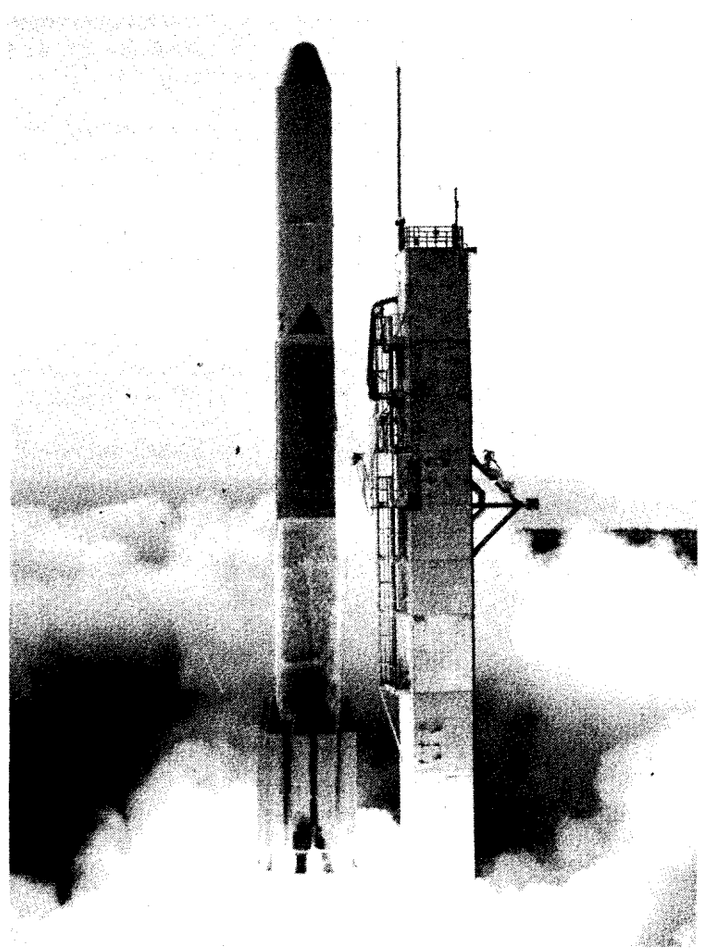
What remained to be done by the RAE team headed by veteran Project Manager, John Shea, was extension of the four 750-foot-long primary booms of the satellite. This huge unfurling is scheduled for the week of July 23, after which the 442-pound satellite will be fully operational.



TECHNICIANS place the huge protective shroud around RAE-B atop the third stage of Delta 95. Designed to protect the satellite during the initial launch phase, the shroud is jettisioned after the rocket leaves the earth's atmosphere.



RAE PROJECT MANAGER John Shea inspects an engineering model of the Radio Astronomy Explorer in Hanger S at Cape Kennedy.



DELTA 95, carrying RAE-B towards its historic rendezvous with the moon, thunders away from Comples 17B, Cape Kennedy, at 10:13 a.m. on June 10. Delta's record now stands at 88 successes—a new record for NASA launch vehicles.

It's Been Ten Years Since SYNCOM

Ten years ago, on July 26, 1963, Goddard launched SYNCOM-2 aboard a Delta launch vehicle. By early September of that year, ground controllers had completed a series of maneuvers that positioned the satellite in a near-perfect synchronous orbit at an altitude of over 22,300 miles above Brazil.

SYNCOM-2 had become the world's first successful synchronous communications satellite. With the capability of transmitting and relaying data, telephone, facsimile and television transmissions, the spacecraft was a forerunner of Early Bird and such commercial satellites as the INTELSAT series of the Communications Satellite Corporation (COMSAT). It, along with the later SYNCOM-3, was also the prototype for Goddard's Application Technology Satellites which have led to an increasing number of practical "experiments" ranging from aircraft navigation tests to operational educational television and medical alert networks (See story on pages 6 and 7).

Looking back on the early years, Alton Jones, SATD Assistant Director for Engineering and Project Manager for the first SYNCOM, says "During the early days of SYNCOM we realized it was a challenging project, but we didn't realize that ten years later world-wide communications would have been revolutionized and we would be using fourth generation commercial communications satellites."

SYNCOM-2 was a spin-stabalized satellite using solar cells for energy and carrying a 7,200 Mc receiver and a 1,800 Mc transmitter. Because the orbit was inclined to the equator, the satellite appeared from the ground to move in a figure eight pattern over Brazil once a day.

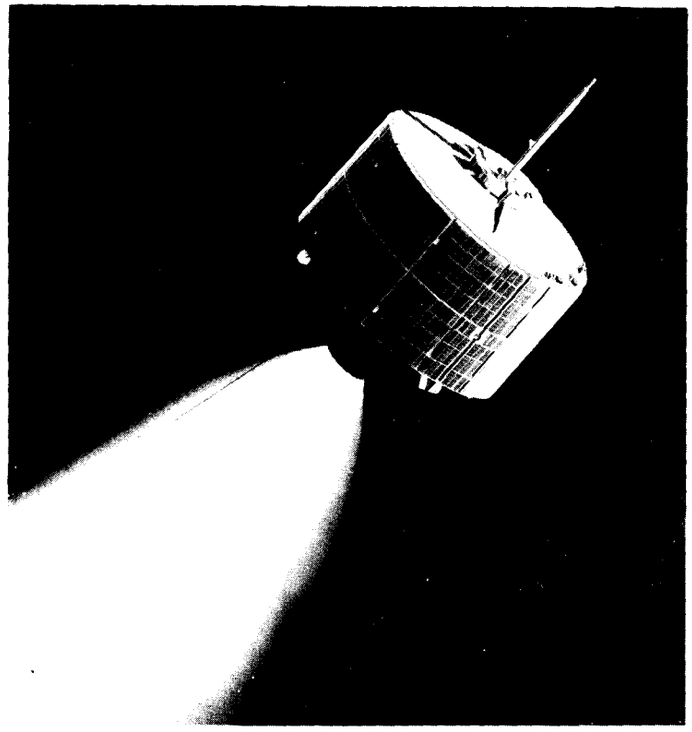
Early SYNCOM-2 transmissions included a telephone conversation on August 23, 1963 between President John F. Kennedy in the United States and the Prime Minister of Nigeria in Africa which confirmed the feasibility of a synchronous communications satellite system. A network of three such satellites in synchronous orbits at an altitude of 22,300 miles above the equator can provide communication for almost all the earth's surface.

A previous spacecraft, SYNCOM-1 launched on February 14, 1963, was the first test of the Delta's capability for placing a satellite in a 24-hour orbit. The rocket performed well, but communications were lost about 20 seconds after the apogee motor fired to place the satellite into a near-synchronous orbit.

SYNCOM-3, in a circular equatorial orbit, became the world's first geostationary satellite after launch aboard a Thrust-Augmented Delta rocket on August 19, 1964. One object of this project was to provide improved television transmissions by satellite. Positioned over the International Date Line, this advanced SYNCOM was used to transmit the Olympic Games of October 1964 from Japan to the United States.

Prime SYNCOM team members still at Goddard include: Alfred J. Babecki, Robert G. Chaplick, Joseph P. Corrigan, Richard A. DeMarco, Don V. Fordyce, George H. Harris, Alton E. Jones, Paul Karpiscak, Jack Evans, George Kronmiller, John Larson, Dr. Joseph W. Siry, Carl A. Wagner, Forest H. Wainscott, and John B. Zegalia. Robert J. Darcey was Project Manager for SYNCOM-2 and 3 and the early ATS satellites.

MEMBERS OF GODDARD'S SYNCOM TEAM reminisce about the satellite they helped launch ten years ago. From left are Robert G. Chaplick, Don V. Fordyce, Alton Jones, John Larson and George Kronmiller.



SYNCOM-2, the world's first synchronous communications satellite, was launched on July 26, 1963.

Computer Optimization Team Honored

Eight members of Goddard's Computer Program Optimization Team have recently received the Presidential Management Improvement Award for "excellence in improvement of government operations. The noteworthy efforts and intense dedication required for this achievement exemplify the high performance needed to keep our country strong."

The men receiving the award were: Chesley H. Looney, Jr., Chief of the Mission Operations Computing Center; and Darrin H. Gridley, Evmenios P. Damon, and Adolf Goodson, all of the Mission Operations Computing Center; William F. Cahill, Chief of the Space and Earth Sciences Computing Center; and Hans O. Bremer, William D. Putney, and Frederick B. Shaffer, Jr., all of the Space and Earth Sciences Computing Center.

The Goddard Space Flight Center has one of the largest concentrations of computer equipment in the world. The Computer Program Optimization Teams provides the management impetus and technical direction for intensive application of newly developed computer program evaluation and optimization techniques to the utilization of the center's large-scale general purpose computers.

Cost Reduction Awards Presented

On June 15. 1973. Goddard's Annual Cost Reduction Award Ceremonies took place in work areas throughout the center. The awards, presented by Dr. John F. Clark, Goddard Director, and Daniel Mazur, Associate Deputy Director for Engineering, went to men and women whose quick and cost-conscious thinking netted Goddard real savings during the past fiscal year.

Each awardee received either a cash award and a certificate of merit or a plaque.

Employees in the Administration and Management Directorate who received awards were: Edward J. Baden, of the Financial Management Division; Jule A. Johnson, Raymond W. Tolplski and Robert L. Ball, Jr., all of the Program Support Division; and Henry D. Obler, of the Facilities Engineering Division.

From the Systems Reliability Directorate, Marilyn B. Bassford of the Quality Assurance Division, received an award as did Evmenios P. Damon, of the Mission Operations Computing Center in the Mission and Data Operations Directorate; Fred B. Shaffer, Jr., of the Space and Earth Sciences Computing Center in the Space and Earth Sciences Directorate; and Joseph Arlauskas, of the Earth Observations and Systems Engineering Division in the Space Applications and Technology Directorate.

Six employees from the Networks Directorate received awards. They were Seaton B. Norman, of the NASA Communications Division; Loren D. Strege, of the Network Engineering Division; Leonard L. Stewart of the NASA Communications Division; Benjamin Norcia of the Network Facilities and Services Division; and Robert L. Owen and Carl S. Moore, of the Network Engineering Division.

Cost Reduction Awards for employees in the Projects Directorate were presented at a later date. They went to: Thomas D. Stuart, of the Delta Project; Lloyd G. Green, of the ERTS/Nimbus Project; and Richard Fenton, of the Delta Project.

GODDARD DIRECTOR Dr. John F. Clark presents a Cost Reduction certificate to Marilyn B. Bassford of the Systems Reliability Directorate.

EMPLOYEES from the Networks Directorate comprised the largest group to receive Cost Reduction awards during the 1973 ceremonies. From left are Robert Owen, Carl Moore, Benjamin Norcia, Loren Strege, Leonard Stewart, and Seaton Norman.

LST Gets Underway

The Large Space Telescope (LST) Phase B effort got underway with a joint MSFC/GSFC meeting of the LST Working Group and Instrument Definition Teams (IDT) at the Sheraton Inn, Lanham, Maryland, on June 11 though 13.

Jesse L. Mitchell, Director of Physics and Astronomy at NASA Headquarters, greeted the Working Group members on June 11. Dr. John F. Clark, Goddard Director, opened the first session of the six Instrument Definition Teams on June 12.

The LST is to be a diffraction limited optical telescope to be launched aboard the Space Shuttle in the early 1980's. It is to serve as an international facility. The Marshall Space Flight Center has project management responsibility, while the Goddard LST Study Office under George M. Levin is responsible for the Scientific Instrumentation and Mission and Data Operations. This joint meeting was the first in a series to extend over a period of 18 months during which the scientific objectives of the instrumentation will be defined.

The Working Group, chaired by Dr. C. R. O'Dell, Project Scientist from MSFC, will be concerned with overall system problems and management. The Definition Teams, managed by Dr. S. Sobieski, Instrument Scientist from Goddard, are responsible from definitions in the areas of high and low resolution spectroscopy, imaging, astrometry, infrared techniques, and data management. The teams are comprised of prominent scientists from the United States and abroad.

KEY MEMBERS OF THE LST WORKING GROUP are (from left) Ken Meese, LST Study Coordinator from Goddard; Gene Olivier, Chief Engineer from MSFC; Dr. George Pieper, Goddard Director of Space and Earth Sciences; Dr. Anne B. Underhill, Chief of Goddard's Laboratory for Optical Astronomy; Dr. C. R. O'Dell, Project Scientist from MSFC; Marc Aucremanne, Program Manager from NASA Headquarters; Dr. Stanley Sobieski, Instrument Scientist from Goddard; and Dr. Donald West, Mission Operations Scientist from Goddard.

RAE . . . From Page 1

Ironically, the latest satellite success for Goddard also marks the last U. S. scheduled space mission to the moon.

Actually, the saga of Explorer 49 began long before its launching on the hot and humid morning of June 10 from Complex 17B at Cape Kennedy. In fact, the concept of using the moon as an anchor for a RAE satellite was first proposed by Dr. John F. Clark, Goddard's Director, in 1968. The rational for a lunar orbit was to use the moon as a shield to keep out extraneous interference from the earth and the magnetosphere when the satellite orbited the lunar backside.

The concept is indeed valid, according to Dr. Robert S. Stone, RAE Project Scientist, and after his first look at the initial data he reports it to be "excellent" in every respect.

Launch operations for the Goddard managed Delta rocket at Cape Kennedy were conducted by the Kennedy Space Center's Unmanned Launch Operations team. Supervising RAE operations there was Carl L. Wagner, Assistant Project Manager, who headed a team of about 30 engineers and technicians.

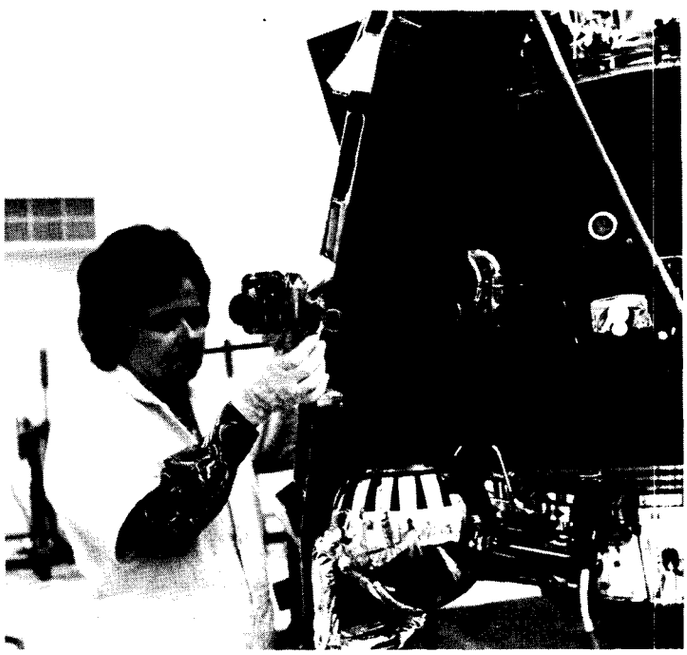
John Shea directed post-launch operations from the RAE Control Center at Goddard aided by tracking and spacecraft specialists.

Explorer 49 achieved its lunar orbit at 3:21 AM on June 15—some 113 hours after launch—when its small lunar insertion motor was fired for 20 seconds by ground command from the Rosman, North Carolina, tracking station.

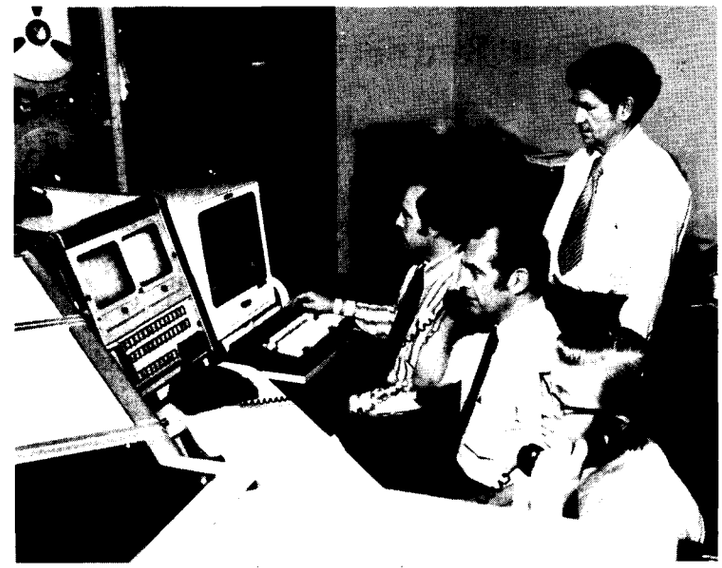
The basic mission of the new stellite is to carry on the pioneering radio astronomy observations made by Explorer 38, the first RAE, launched on July 4, 1968.

From its moon orbit Explorer 49 will conduct what is described as "the most extensive study ever undertaken of low-frequency signals from galactic and extragalactic radio sources and from the Sun, Earth and Jupiter." Its operating lifetime is expected to be at least one year. Explorer 38 operated until December 31, last year, when it was turned off by ground command after far exceeding its planned objectives.

It is impossible to cite everyone who contributed to the success of Goddard's newest satellite. The project has been a true team effort—typical of the Center. For those involved the promise of great scientific achievement is in itself a most satisfying reward.



MRS. GRACE M. MILLER of the Thermal Coatings Section in the Engineering Applications Branch inspects thermal coating on a RAE-B solar panel during pre-launch checks at Cape Kennedy.



IN THE RAE CONTROL CENTER at Goddard, Project Manager John Shea checks on maneuvers to deploy the spacecraft's dipole antennas in lunar orbit. Seated (from left) are Eugene Horn, Programmer; McLean Grant, Electrical Integration Engineer; and Robert Sutton, Electronics Technician. The Radio Astronomy Explorer would be fully operational after the 750-foot-long primary booms are extended during the week of July 23.

AWAITING FIRST DATA from the just launched Radio Astronomy Explorer in the Delta Launch Control Center at Cape Kennedy are (from left, foreground) Allen L. Taylor, Electro Mechanical Branch; Goddard Director Dr. John F. Clark, who proposed the RAE lunar "anchor" mission in 1968; Carl L. Wagner, RAE Assistant Project Manager; and Paul Butler, Chief of Goddard's Explorer projects Office.

A PRE-LAUNCH PRESS BRIEFING for RAE-B was held at the Skylab News Center in Cocoa Beach. Describing the fine points of the mission to John Vendegriff, Agency French Press Correspondent (right), are (from left) Carl L. Wagner, RAE Assistant Project Manager; Dr. Robert Stone, RAE Project Scientist; and Paul Butler, Chief of the Explorer Projects Office.

Congratulations ERTS on One Year in Orbit

Goddard's Earth Resources Technology Satellite will be one year old on July 23, 1973. The record-breaking spacecraft has revolutionized the study of the earth's surface by giving man a new orbital tool for such sciences of geology, ecology, hydrology, oceanography, agriculture, forestry and range resources.

On this page are pictures of some of the people who made ERTS possible and who are helping to guarantee the continued operation of the spacecraft and ground systems.

PROJECT TEAM MEMBERS are (from left) Archie Ansel, Project Support; Joseph Arlauskas, Experiment Manager; Luis Gonzales, Mission Operations Director; Robert N. Lindley, Director of Projects; Stanley Weiland, Project Manager; John H. Boeckel, Deputy Project Manager; Leonard Hardis, Project Coordinator; and George Hogan, Spacecraft Manager for Nimbus.

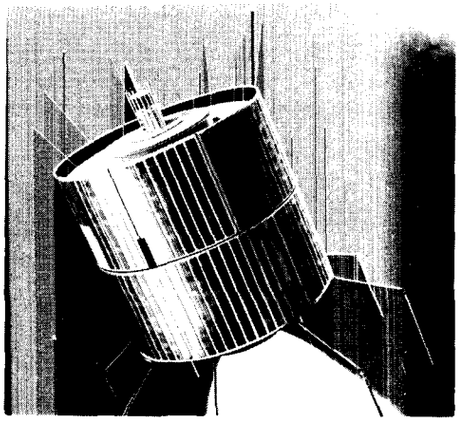
MEMBERS OF THE ERTS SPACECRAFT TEAM are (from left, seated) Edward W. Crump, George R. Stonesifer, Helen Neumann, Oscar Weinstein and Robert J. Wilkinson. Standing are Joseph W. Bentley, William P. Jones, Donald E. Murray, John M. Hayes, Joseph R. Schulman, Charles F. Rice, John J. Moyer, M. Davis Streaker, James C. Broderick, Robert J. Davidson, Frederick Gordon and Harold Schnur.

GATHERED TOGETHER are some of the many employees who have helped make the NASA Data Processing Facility a success. From left (seated) are Robert Powless, Valerie Thomas, Marie Isham, Lottie Brown and Robert Feinberg. Standing are T. Mackin and J. Fritz, of Computer Science Technical Associates (CSTA); H. Paull, D. Marquis of CSTA; E. Connell; P. Walsh, of CSTA; Gerald Grebowsky; Richard Holmes; William Watt; Paul Heffner, William Webb; D. Howe, of CSTA; Robert Hermann; Joseph Tinsley; and James Billingsley.

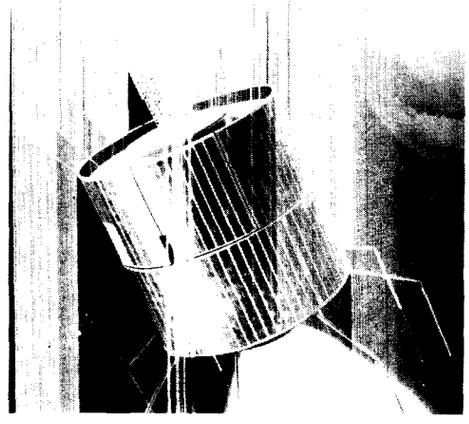
ERTS SCIENTIFIC MONITORS AND INVESTIGATORS. From left (seated) are William L. Alford, Herbert W. Blodget, Dr. Stanley C. Freden, Assistant Chief of the Laboratory for Meteorology and Earth Sciences; and Dr. Harold L. Mathews. Standing are Bernard Peavy, Paul Heffner, Gerald J. Grebowsky, Dr. Nicholas Short, James R. Greaves, Dr. Raymond Wexler, and Peter H. Van Wie. Not shown are Dr. William Nordberg, ERTS Project Scientist; Dr. Enrico P. Mercanti, Dr. Louis Walter, Dr. Vincint V. Salomonson, Dr. Charles Schnetzler, Dr. Warren Hovis, Arthur Anderson, Dr. Philip Cressy, Arthur Doan, Dr. Robert Fraser, Dr. Paul Lowman, Dr. Robert Mueller, Dr. David Nava, Dr. John Philpotts, William Shenk, and Dr. Albert Rango.

ERTS OPERATIONS CONTROL TEAM MEMBERS are (from left, seated) James Williamson, James Michael, and Lee Smith. Standing are Joseph Wozniak, of RCA; Jerome Taube, and Thomas Winchester, of General Electric.

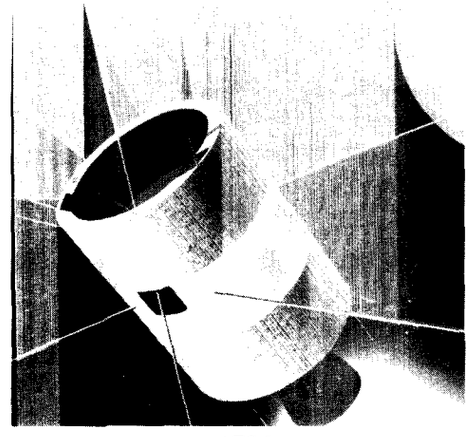
ERTS TRACKING SUPPORT GROUP. From left (seated) are George Johnson, Computer Technician; Catherine Bouldin, Receiver/Exciter Operator; and Chris Flores, USB Antenna Technician. Standing are Ray Ellis, USB Supervisor; Dick Bolan, USB Receiver/Exciter Technician; Bob Ciesielski, Operations Engineer; John Soldo, USB Antenna Technician; Len Lathrem, USB Lead Engineer; John Cofer, USB Digital Technician; Ed Bennis, Computer Technician; George Olsen, USB Receiver/Exciter Technician; and Ralph Valusek, USB Digital Engineer.



ATS-1



ATS-3



ATS-5

ATS Experiments Can Be of Life and Death Importance

Which of Goddard's satellites has saved lives during medical emergencies; broadcast educational programs to remote towns in Alaska, Hawaii and Micronesia; provided splashdown support for both Apollo and Skylab missions; and helped maintain communications for a recent US/USSR scientific study in the frigid Bearing Sea? The answer is ATS-1, a research satellite in orbit over the Pacific that has long outlived its design lifetime and is now being used by many non-NASA experimenters to conduct satellite studies of down-to-earth importance.

ATS-1 and her sister Applications Technology Satellites—ATS-5 in orbit due south of Colorado and ATS-3 over the Atlantic—are providing a wide range of communications and scientific investigations, many of which were not thought of when the project was first begun. All three satellites are in synchronous orbits approximately 22,300 miles above the equator.

The first of this trio, ATS-1, was launched on December 6, 1966. The satellite exceeded its test objectives and was made available to non-NASA experimenters in September of 1969.

Perhaps the most outstanding of these experiments are the educational and biomedical communications experiments being conducted by the Alaska Educational Broadcasting Commission. The Alaska system uses economical ground stations to bring scheduled programs and two-way voice communicatons to remote villages via ATS-1. A typical day's programming might include classroom exchanges in which students and teachers are able to talk between many Alaskan villages, California and the South Pacific; a satellite seminar sponsored by the National Education Association; health talks; local news programs and community "meetings" on the air. At least one hour each day is given over to routine communications between hospitals and doctors in the area, and regularly scheduled programs are frequently interrupted by calls in times of medical emergencies.

Howard Pedolsky, ATS 1-5 Mission Operations Director, reports that "Over twenty emergency medical situations have been handled by the satellite to date, some involving several patients. It is believed by the experimenters that lives would have been lost in many of these cases without the satellite communications."

In one recent emergency, five persons in a remote village were severly burned when a stove exploded, causing a fire. By ATS-1, a Public Health Service physician was contacted and arrangements made to evacuate the victims to the hospital in the town of Tanana. Severly purned patients were subsequently evacuated to the Army hospital in Fairbanks and one was sent to the Burn Center in San Antonio, Texas. The most seriously injured patient was a five-year-old child.

Alaskan ground systems that make such communications to remote sites possible consist of single, eight-foot helical antennas. The transmitter-receiver systems are simple 100 watt, Motorola police radios such as those used in city/county law enforcement. They are economical, portable and relatively simple to operate.

The University of Hawaii is conducting a similar experiment to demonstrate satellite communication system capabilities between Hawaii and outlying islands in the Pacific basin. The system for educational, civic and medical broadcasting has recently been extended to include isolated regions in Micronesia. On one occasion a medical team in Hawaii provided medical aid for an Alaskan native via satellite until Alaska medical personnel could get on the air.

Other recent ATS-1 experiments include VHF support of the splashdowns of several Apollo missions and the recent Skylab; tests of the feasibility of transmitting medical library materials computer-to-computer by satellite; the transmission of fingerprints to test the feasibility of satellite communications for federal, state and local law enforcement; VHF communications support between ships and aircraft used in a recent joint US/USSR experiment to determine the microwave characteristics of ice and cold water in the Bering Sea; and VHF communications between launch sites during sounding rocket barium cloud studies of the earth's geomagnetic field.

Indian school children in New Mexico are using computer terminals to learn reading, languages and arithmetic thanks to ATS-3. The satellite (originally launched on November 5, 1967) is being used by Stanford University and the universities of Nevada and New Mexico to beam computerized courses to remote areas where standard telephone lines would be too expensive. The program was a success and may be expanded to include other universities and expanded programs.

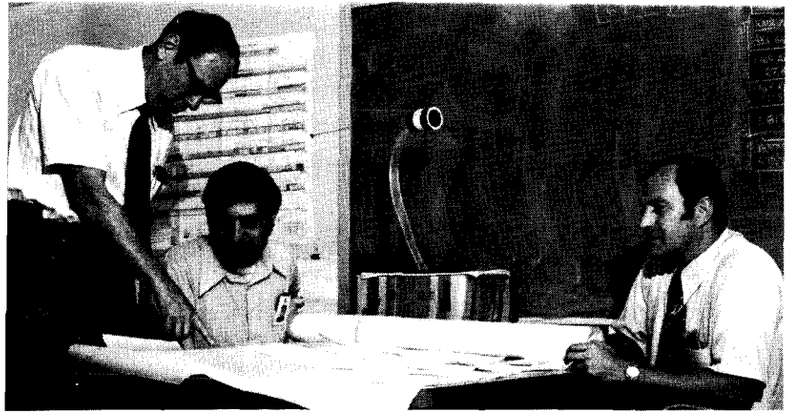
ATS-3 with its capability of photographing almost the entire disk of the globe every 27 minutes during the day is also being used in early warning systems for hurricanes and other storms. The spacecraft has also provided picture support of efforts to study the solar eclipse on the eastern coast of the United States in March of 1970 and of the African eclipse on June 30 of this year. Its VHF communications capabilities provided valuable support for Jacques Cousteau's ship the Calypso during its recent Antarctic expedition and emergency.

ATS-5, launched on August 16, 1969, has been used in L-band aircraft communications studies for the Boeing Corporation, and to perform prelaunch ground system checks in preparation for both the Canadian domestic satellites ANIK1 and 2. The spacecraft has been teamed with ATS-3 to conduct position location and two-way communications studies for the Maritime Administration (MARAD). The satellites, serving as C-band relay platforms, transmit signals between ships at sea and the MARAD center at Kings Point, New York, to provide quick communications and location of the ships. "Prior to this experiment," says Mr. Pedolsky, "it has historically taken up to three days to communicate with ships from the maritime control center."

The MARAD experiment is a success in spite of the fact that technical difficulties on both satellites have caused their C-band antennas to spin in relation the earth. Signals must be buffered and compressed at the transmitter and expanded at the receiver.

The ATS-3 and 5 spacecraft have also been used in the Vanguard Pre-PLACE experiment to check out the Position Location and Aircraft Communications experiment scheduled for launch aboard ATS-F in 1964. This experiment used a MARAD C-band terminal placed aboard the tracking ship Vanguard on its was to begin its Skylab duties at Mar del Plata, Argentina.

ATS-F will be the next and last satellite in the Applications Technology Satellite series. The advanced "second generation" ATS will conduct 21 major technical and scientific experiments.



ATS SYSTEMS ENGINEERS AT WORK. From left are Joe Giffors, Fred Kissel, and James Meenan.

IN THE ATS MISSION CONTROL ROOM are (from left) Grady Floyd, ATS Controller; John Thole, ATS Project Manager; Howard Pedolsky, ATS Mission Operations Director; and George Demas, ATS Control Center Manager.

THE ATS SCHEDULING OFFICE is manned by Robert Youngblood, ATS System Engineer, and Joe Pitts, ATS Mission Planner.

Three from Goddard Named Venus Probe Investigators

Three Goddard men are among the 22 scientists tentatively chosen by NASA to provide the experiments for one of two spacecraft destined for Venus in 1978. They are Nelson W. Spencer and Harry Taylor who will develop experiments to determine the characteristics of the Venus atmosphere, and Siegfried Bauer who has been named a participating theorist in the project.

The group, including one each from France and Germany, was selected from among 72 scientists who submitted proposals in response to a NASA invitation last August.

The Pioneer-class spacecraft is designed to launch four scientific probes toward the surface of Venus and then enter the atmosphere itself, transmitting additional data to Earth until it burns up.

An instrument-laden sister ship is scheduled to go into orbit around the cloud-shrouded planet at about the same time.

Primary objective of the twin missions is to gather detailed information on Venus' atmosphere and clouds, which could lead to a better understanding of our own atmosphere.

The participating scientists will define experiments dealing with the composition and structure of the Venus atmosphere down to the surface, the nature and composition of the clouds, the circulation pattern of the atmosphere, and the radiation field in the lower atmosphere.

Five members of the team will serve as participating theorists, coordinating the various experiments and participating in the analysis of the returned information.

The Pioneer Venus probe mission will utilize a bus, a large probe and three small probes. The spacecraft will be spin-stabilized, use solar power, and will weigh about 380 kilograms (840 pounds) at launch. The trip from Earth to Venus will take 125 days, and will include two or three midcourse maneuvers.

The probes will be separated from the bus 10 to 20 days before entry. The large probe will carry about 27 kilograms (60 pounds) of science instrumentation, and provide 60 watts of power. Each small probe will carry one-and-a-half kilograms (three pounds) of instrumentaton, consuming four watts of power.

The large probe will take 1 1/2 hours to descend through the atmosphere. The small probes will fall free to the surface. Their mission is designed to end when they reach the surface, about 75 minutes after entry.

The bus will be targeted to enter the Venus atmosphere at a shallow entry angle and transmit data to Earth until it is destroyed by the heat of atmospheric friction.

During its descent, the bus will transmit information to Earth by telemetry at the rate of 300 bits per second. The large probe will return 100 bits per second.

The spacecraft for the atmosphere probe is scheduled to be launched in May 1978, about three months prior to the launch of the orbiter. Both ships will arrive in the vicinity of Venus within a few weeks of each other in December 1978.

By comparing the atmosphere of Venus, Mars and Earth, scientists hope to be able to construct a better model of Earth's atmosphere for use in predicting long-term changes in climate, as well as short-term effects caused by environmental pollution.

Scientific experiments for the Pioneer Venus orbiter mission will be selected in early 1974, according to Dr. John E. Naugle, NASA Associate Administrator for Space Science.

Daniel H. Herman, NASA Headquarters, is acting program manager for the Pioneer Venus probes, and Dr. Robert F. Fellows is program scientist. For Ames Research Center, which manages the project for NASA, Robert Nunamaker is acting project manager, and Lawrence Colin is acting project scientist.

INVENTION AWARD. Wayne T. Chen (center) of the Technology Utilization Office receives an award check from Donald S. Friedman, Goddard Technology Utilization Officer, while Charles P. Boyle, Chief of the Special Programs Office, looks on. The award was presented for an Arterial Pulse Wave Pressure Transducer that was developed during the 1971 Summer Institute in Biomedical Engineering which, Mr. Chen coordinated. Coinventors Chung Kim and Donald Gorlick were undergraduate college students when they took part in the ten-week program to develop the device.

The Energy Crisis

By David G. Lewoc
Assistant Chief
Plant Operations and Maintenance Division

The energy crisis is having its effect on Goddard. The Plant Operations and Maintenance Division (POMD) is urging all employees to utilize the "English lighting system" to conserve electricity. The English lighting system is simply a method of lighting whereby artificial lighting is not used when natural light *is sufficient*. Of course, personnel on the solar sides of buildings are instructed *not* to open the blinds and let in heat rays as well as light rays. This would increase the cooling load and defeat the conservation purpose. On the shady sides of buildings, however, if the natural light is sufficient to see comfortably, employees are encouraged to open their blinds and turn off their electric lights.

The cooperation has been fantastic. Even before we requested that unnecessary lights be turned off, Goddard personnel were already participating.

What does this save? It saves about 18,000 kilowatt-hours a day, or six percent. What does it mean? It means that PEPCO may not have to reduce voltage in order to supply all of its customers. Although information is given out that a voltage reduction has no adverse effect on equipment, we invite you to reconsider. The information indicates that a ten percent reduction will be damaging. So, if ten percent hurts, then five percent will hurt half as much. If you question the validity of this, go listen to your air conditioning compressor during a five percent voltage reduction and you can hear it "laboring."

What does POMD have in mind as to its part in alleviating the energy crisis? For one thing, we're not only concerned about electricity but about gas and oil as well. There is just so much POMD can do—like getting more hard-nosed about turning on air conditioning systems during non-working hours. We have a strong objection to cooling a section of a building (perhaps 100 tons of air conditioning) simply because one individual prefers working evenings. With respect to fuel conservation, we are also stop-gapped (other than turning off heating systems) because thermostatic control is in the hands of the building occupants.

The following utilities costs and consumption figures for FY 73 should impress you:

Utility	*Consumption*	*Cost*
Electicity	119,000,000 KW-Hrs.	$1,600,000
Gas	338,000,000 Cu. Ft.	248,000
Oil	1,330,000, Gallons	160,000
Water	170,000,000 Gallons	77,000
Sewage	120,000,000 Gallons	60,000
		$2,145,000

We can expect an eighteen percent increase in power costs and a fifteen percent increase in water/sewage costs. Gas and oil is a big problem, and your guesses as to the eventual cost are as good as ours. The cost will depend on the availability; and if the news stories are only partially accurate, we can expect a substantial increase.

Cooling Invention Wins Award

With temperatures soaring in the 90's, it's reassuring to know that two employees of the Facilities Engineering Division are thinking of inventions to make the rest of us comfortable.

Hugh B. Bauer and Henry D. Obler received monetary awards on June 14, 1973, for their joint invention titled, "Automatic Air Flow Control in Air Conditioning Ducts". The presentation was made by James F. Mills, Division Chief, and the patent application for the device has been filed in the U.S. Patent Office.

The invention involved designing a device which automatically selects air flow coming from either of two opposite directions and which can be adjusted to the desired air volume whether the air flows from one or the other direction.

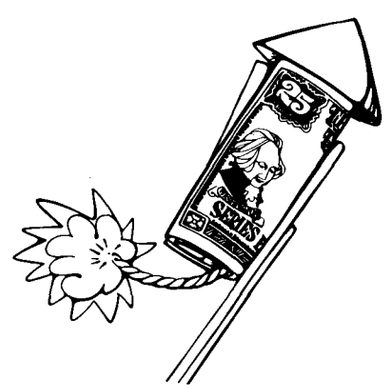
When a building uses at least two air conditioning units located at its opposite ends, their ducts may be converged to any given area so that air supply to that area is uninterrupted in the event of one unit breakdown. With the two ducts converging to a branch connection, it is necessary to select the air flow from one of two opposite directions. Commercially available air volume control scoops are not designed for such selection. The device described above makes it possible.

Mr. Bauer is Head of the Mechanical Engineering Section of the Design and Engineering Branch of FED and Mr. Obler is a co-worker in that section. During their several year's service at the Center, they have instituted numerous improvements to the air conditioning systems. Both employees are actively engaged in the planning, design, and construction of the mechanical engineering aspects of the utility systems simultaneously controlling the humidity temperature and filtration of the various areas, i.e., computer rooms, clean room, laboratories, offices, auditoriums, cafeterias, and warehouses.

Mr. Obler has initiated numerous operating cost reductions and energy conservation measures for which he has received two Certificates of Merit under the Cost Reduction Program for 1971 and 1972.

HUGH B. BAUER and Henry D. Obler of the Facilities Engineering Division receive monetary awards for their joint invention titled, "Automatic Air Flow Control in Air Conditioning Ducts" from James F. Mills, Chief. Looking on are Bernard S. Coski, Head of Design and Engineering Branch, and Larry E. Brown, Assistant Chief of FED.

SHOOT THE WORKS WITH



U.S. SAVINGS BONDS

Evans Again Golf Champ

THE CHAMP smashes a tee shot into the creek on number 11. He quickly followed the ball into the water.

The Management Services and Supply Division conducted its second Annual Sam LaBarbara Memorial Golf Tournament on June 7 at the Laurel Pines Country Club. Participants were treated to a very pleasant round of golf, videotape replay of their golf strivings, and a buffet luncheon at which Mrs. LaBarbara was guest of honor. Sam, who passed away several years ago, was an MS&SD staff member and an avid golfer.

Last year's winner, Kurt Evans, was a repeat performer this year with a low gross score of 81. During the round, however, the embarrassed champ managed to fall into the creek bordering the eleventh hole. He was quietly rescued by Dan Pendleton. Low net score went to Bill Cooper with 150-85=65.

A portion of the proceeds were contributed in Sam's name to the American Cancer Society.

KURT EVANS (left), winner of the second Annual Sam LaBarbara Memorial Golf Tournament, stands with Mrs. LaBarbara and Herb Fivehouse, Chief of the Management Services and Supply Division.

FPT Champs Again

TENPIN LEAGUE CHAMPS. For the third time in the last four years, the team called FPT (for First Place Team) appropriately finished first place. The winning team members are (from left, standing) Joe Fedor, Team Captain; Ton Eng, a new comer to the team this year; Doris Norton, and Fran Federline. High average honors went again this year to (seated) Jim Marshburn with an average of 180 and Maureen Bowie with an average of 185. Special honor goes to Maureen for attaining the highest average of both men and women in the Goddard Tenpin Leagues.

Outputts by Maceo Leatherwood

Small Post Office Opens

NEW POST OFFICE. Herbert J. Fivehouse (left), Chief of the Management Services and Supply Division and James F. Mills (right), Chief of the Facilities Engineering Division participate in the opening of Goddard's new automated post office. With them are: Emory A. Harman, Greenbelt Postmaster; John W. Roberts, Manager of Prince George's Sectional Customer Services; James L. Roby, Manager of the Prince George's Sectional Postal Facility; and Dean O. Croyle, Prince George's Sectional Customer Service Representative. The self-service postal facility provides all the normal mailing services of a manned post office. The facility is open 24 hours a day and has mail pickups at 8:30 a.m., 2:30 p.m. and 5:00 p.m. daily. It is located on the northwest corner of the Building 8 parking lot directly across from the heating plant. The facility provides quick, dependable daily mail service for GSFC employees' personal mail.

GODDARD AROUND THE WORLD

CORPUS CHRISTI, TEXAS. Cindy Kirk is a teletype operator at the Texas station. She represented the Padre-Staples Mall in a beauty pageant which is part of the Buccaneer Days Festival held in Corpus Christi the first week in May of each year. Station Director Lloyd White says "Cindy was somewhat at a disadvantage in that the station was on mission status throughout the competition and she was working shifts. However, we are very proud of the fact that she was selected Beauty Queen, first runner-up."

CLIP AND SAVE

This is the fourth of a series of articles by Earl D. Ellis on plating, protective coatings and electrochemical processes available from Goddard's Experimental Engineering and Fabrication Division. For further information, Mr. Ellis can be reached on extension 4870.

Chemical and Electrochemical Finishes for Magnesium and Magnesium Alloys

Chemically or electrochemically deposited coatings are required on magnesium alloys used for most Aerospace Applications.

A—Surface Conversion Treatments

Dichromate Treatment

Dichromate conversion coatings are applied to increase corrosion resistance and to provide a durable paint base to most magnesium alloys. No dimentional change takes place during this procedure and the process conforms to military specification mil-m-3171A.

Anodic Treatment

Anodizing most magnesium alloys will provide good corrosion resistance, good hardness and abrasion resistance and a non conductive surface. The thickness of this finish can be controlled and may range from .1 mil to 2 mils. The coating penetrates and builds up. Approximately one third of the required thickness is penetration and thirds constitutes build up. This process meets military specification mil-m-45202.

Stannate Immersion Treatment

The Stannate Immersion process can be applied to all magnesium alloys. This process was developed as a protective paint base on all magnesium alloys that contain inserts or fasteners of dissimilar metals such as brass, copper, steel, etc. This treatment deposits a layer of tin and greatly reduces the chance of galvanic corrosion.

B—Electrochemical Depositions

Electrochemical depositions of various metals may be applied to magnesium alloys after the base metal has been chemically treated and electroplated with copper.

Black nickel or black chromium are frequently applied to magnesium for thermal control, to minimize light intereflections, and to control emissivity. These coatings also provide electrical conductivity, a property not exhibited by most other black coatings.

Many other metals such as gold, silver, nickel, etc., may be applied to magnesium for ease of soldering, for improved reflectance, or other specialized requirements.

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Editorial Staff

Nancy Mengel Jim Kukowski

Mrs. Patricia Ratkewicz, Ext. 4141