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NOAA-F Scheduled For Atlas Launch

NASA will launch an advanced TIROS-N (ATN) environmental monitoring satellite from the Western Space and Missile Center, Vandenberg Air Force Base, California no earlier than November 8, according to NASA and National Oceanic and Atmospheric Administration (NOAA) officials.

The 1,712-kilogram (3,775-pound) NOAA-F spacecraft is a three-axis-stabilized spacecraft that will be launched into an 870-km (470 nautical-mile), circular, near polar orbit with an inclination angle of 98.7 degrees to the equator.

Total orbit period will be just over one and a half hours, with an average of 72 minutes in sunlight and 30 minutes in the Earth's shadow. The circular orbit permits uniform data acquisition by the satellite and efficient command control of the satellite by Command and Data Acquisition (CDA) stations near Fairbanks, Alaska and Wallops Island, Va.

The satellite will be launched so that it will always cross the Equator at about 2:30 a.m. southbound and 2:30 p.m. northbound local time.

NOAA-F will be launched by the Air Force Atlas-E launch vehicle. The standard Atlas launch vehicle consists of an E-series Atlas missile that has been refurbished and modified to a standard configuration for use as a launch vehicle for orbital missions. It is capable of launching a spacecraft into a variety of low Earth orbits.

(Continued on page 3)

Inside

Earth Radiation Budget Satellite Deployed On Flight STS 41-G

The Space Shuttle Challenger blasted off on its sixth trip into space from the Kennedy Space Center, Fla., October 5 at 7:03 a.m. Challenger carried a record-setting seven-member crew and a full slate of scientific instruments and payloads on the 13th flight of the Space Transportation System (STS).

Among the payloads was the Goddard-managed Earth Radiation Budget Satellite (ERBS), the first NASA satellite designed exclusively for shuttle launch. The 2,268 kilogram (5,000-lb) ERBS is one of three satellites developed under the NASA-directed Earth Radiation Budget Experiment research program aimed at improving our understanding of the Earth's climate.

Sally K. Ride, who made her second shuttle flight as one of two women on this mission, used the Shuttle's robot arm to release the ERBS into a preliminary orbit within 12 hours after liftoff. A series of subsequent burns placed the satellite into its operational orbit of 610 kilometers (379 mi) altitude.

GAS Experiments

Eight Get Away Special canisters flew on STS 41-G:

G-0007 - Space Processing and Transmitting Computer Voice on Amateur Radio Bands. This canister consisted of three student investigations and one ham radio experiment. The student experiments consisted of one studying the solidification of lead-antimony and aluminum-copper alloys in a microgravity environment; another investigated the growth of potassium crystals electromechanically, and a third studied the germination of radish seeds in low gravity. G-0007 was sponsored by the Alabama Space and Rocket Center, Huntsville, Alabama.

(Continued on page 2)

41-G CREWMEMBERS—The Space Shuttle Challenger carried these seven astronauts into space on the 13th Shuttle flight. They are (bottom row, left to right) pilot Jon A. McBride; Sally K. Ride, Kathryn D. Sullivan and David C. Leestma - all mission specialists. Commander Robert L. Crippen is flanked by payload specialists Paul D. Scully-Power (l) and Marc Garneau.

STS 41-G

(Continued from page 1)

SPACE ART—Arizona sculptor Joseph McShane was to capture the vacuum of space in this glass sphere carried on a Get Away Special experiment on STS 41-G.

G-0013 - Halogen Lamp Experiment (HALEX). The purpose of this experiment was to verify the use of halogen lamps during extended periods of microgravity. Special optical radiation type furnaces have been developed for material science research and processing in space, and these furnaces rely on halogen lamps as heat sources. The HALEX was expected to operate for at least 60 hours on the 41-G mission. HALEX was funded by the European Space Agency.

G-0032 - Physics of Solids and Liquids in Zero-G. The Asahi National Broadcasting Company, Limited, Tokyo, Japan, sponsored this project, which intended to make two kinds of experiments in weightlessness. One experiment sought clear-cut answers to what happens when a solid is allowed to collide with a liquid in weightlessness. The other was an attempt to produce crystals of three metal alloys and two glass composites in zero-g.

G-0038 - Vacuum Deposition (Art in Space). Sculptor Joseph McShane of Prescott, Ariz., became the world's first space artist. Challenger carried a computerized payload designed by McShane that produced the first art created in zero-g. McShane used vacuum deposition techniques to coat eight spheres with gold, platinum and other metals to create space artwork. In another sphere, he captured the vacuum of space.

G-0074 - Zero G Fuel System Test. This McDonnell-Douglas Astronautics Company experiment was designed to show how liquid fuel in partially-full tanks can be delivered, free of gas bubbles, to engines that control and direct spacecraft in orbit. The experiment was designed to provide data for designing more versatile lower-cost fuel tanks for future spacecraft.

G-0306 - Trapped Ions in Space (TRIS) Experiment. The goal of this experiment was to investigate the unexpectedly large flux of heavy ions — electrically-charged particles — that first was observed in an experiment onboard Skylab in 1973 and 1974. The experiment recorded these particles in a stack of special track detecting plastic sheets. The TRIS experiment is a joint project of the Naval Research Laboratory, Washington, D.C., and a physics honor society at the United States Naval Academy.

CRUX Experiments

G-0496 - Cosmic Ray Upset Experiment (CRUX III). CRUX III was the third in a series of flight experiments on the Shuttle to test for the cosmic ray upsets of microcircuits. CRUX III is a joint effort between NASA and the Federal Systems Division of IBM to study the single event upsets phenomenon. Goddard payload manager is John W. Adolphsen.

G-0518 - Physics and Material Processing. This canister consisted of four experiments designed to study basic physical processes. One experiment excited waves in water and photographed the results; another studied the separation of flux and solder in zero-g; another was a test of a fluid flow system, to be used later in an electrophoresis experiment, and the final experiment studied the flow patterns set up by a temperature difference.

NASA's GAS program is managed by Goddard and allows individuals, groups and organizations to buy space within the GAS canisters to have their experiments flown on the Shuttle.

OSTA-3 Payload

The Office of Space and Terrestrial Applications sent a modified version of the Shuttle Imaging Radar (SIR-B) and three other flight-proven experiments; the Large Format Camera, the measurement of air pollution from satellites and the feature identification and location experiment on the 41-G mission.

The SIR-B experiment contained 44 different investigations in a wide range of disciplines, including archeology, geology, cartography, oceanography and vegetation studies. Among these experiments, Goddard had four: structural investigation of the Canadian shield by orbital radar and Landsat; vegetation penetration biomass and flood boundary assessment with spaceborne L-Band radar; automatic terrain elevation mapping and registration, and remote sensing of soil moisture.

SIR-B experiments were curtailed because of difficulties with the orbiter's Ku-band antenna, which also delayed the planned spacewalk by two of the astronauts. Loss of communications with the Tracking and Data Relay Satellite curtailed high-speed transmission of scientific data for about 12 hours, from orbit 50 to 58, also.

STS 41-G was the first mission to include seven crewmembers, the first flight of a Canadian payload specialist, the first to include two women, the first spacewalk by an American woman, the first crewman to fly a fourth mission (Bob L. Crippen), the first attempt of a satellite refueling technique in space and the first flight with a reentry profile crossing the eastern U.S.

Crew members

Leading the record-size crew was commander Crippen. His pilot was rookie Jon A. McBride. Mission specialists were Ride, first-timers Kathryn D. Sullivan and David C. Leestma. Sullivan and Leestma made the spacewalk. The two payload specialists included U.S. Navy oceanographer Paul D. Scully-Power and Canadian Marc Garneau.

Challenger ended her sixth flight with a landing at the KSC at 12:26 p.m. EDT, October 13.

Satellite Pickup Set For STS 51-A

NASA has set the launch date for the Space Shuttle 51-A retrieval mission for no earlier than November 7. The 51-A mission will be launched from the Kennedy Space Center (KSC), Fla. where it also will land on November 15.

The launch date and time were chosen to ensure proper phasing of the orbiter with the two spacecraft to be retrieved.

The eight-day mission will include the deployment of the Canadian Telesat-H and Hughes Syncom IV-1 communication satellites and the retrieval of the Palapa B-2 and the Westar VI communication satellites. The Syncom IV-I is similar to the Hughes Syncom satellite deployed in "frisbee" fashion during the 41-D Shuttle mission. The Radiation Monitor Experiment and the Aggregation of Red Blood Cells experiment will be carried in the middeck.

The current timeline calls for the Telesat-H satellite to be deployed on flight day 2 and the Leasat-1 satellite deployment on flight day 3. The Palapa B satellite will be retrieved on flight day 5 and retrieval of Westar VI will be on flight day 7.

The crew for the 51-A mission is the five-member team of commander Federick H. Hauck, pilot David M. Walker and three mission specialists—Anna L. Fisher, Dale A. Gardner and Joseph P. Allen.

NATO III-D Scheduled For Launch From USAF Pad In Florida; Will Serve As In-Orbit Com Backup

NASA has announced the launch of NATO III-D, the fourth and final communications satellite to serve the North American Treaty Organization (NATO), from the Cape Canaveral Air Force Station, Florida.

The satellite will be launched by a Delta rocket on a date to be determined.

The satellite will provide an in-orbit backup to the other NATO III satellites in the NATO Integrated Communications System (NICS).

The Delta launch vehicle will boost the satellite into an elliptical transfer orbit with altitudes ranging from 417 kilometers (259 statute miles) to 36,342 kilometers (22,583 statute miles). The flight path will take the NATO III-D across the Equator at a 23 degree angle of inclination.

About two days after launch, a solid propellant rocket on the satellite will be fired when NATO III-D reaches its high point of orbit. This maneuver will circularize the orbit at 35,787 kilometers (22,234 statute miles) and remove its inclination by diverting the satellite to travel along the plane of the Equator.

The NATO III-D will be allowed to drift eastward until it reaches its planned station above the Equator. There, its movement will be stopped by firing a hydrazine-fueled jet system which will drive the satellite up to the geosynchronous orbital altitude of 35,900 kilometers (22,300 statute miles).

At the geosynchronous altitude, NATO III-D will orbit the Earth once every 24 hours "synchronized" with the 24-hour rotation period of the Earth. This keeps the satellite on station over the same spot above the Equator.

The Delta project is managed by the Goddard Space Flight Center, Greenbelt, Maryland, for NASA's Office of Space Transportation Systems. Project Manager is William A. Russell, Jr.

Five previous NATO satellites have been launched successfully by Delta. These include the NATO II-A and B spacecraft in March 1970 and February 1971; the NATO III-A in April 1976; the NATO III-B in January 1977; and the NATO III-C in November 1978.

Delta has launched 176 satellites since 1960 and has a success rate of better than 94 percent. It has launched the last 42 satellites, going back to September 13, 1977, without a failure.

NOAA-F

(Continued from page 1)

NOAA-F will transmit visible images of cloud cover and digital data on a wide variety of other weather phenomenon directly to users around the world for local weather analysis. The operational ground facilities include the CDA, the Satellite Operations Control Center and Data Processing Services Subsystem, Suitland, Md., and a data receiving station in Lannion, France.

NOAA-F also will continue a demonstration of Search and Rescue (SAR) Mission capability by carrying special instrumentation for evaluating a satellite-aided SAR system that may lead to the establishment of an operational capability. This marks the second U.S. satellite to have SAR equipment.

The SAR system on NOAA-E, launched on March 28, 1983, experienced a failure in its attitude control system this summer and subsequently lost its search and rescue capability, which permits the satellite to pick up emergency signals from downed aircraft and ships in distress.

The COSPAS/SARSAT program is a joint Canada, France. and U.S.S.R. effort. The test program began in Sept., 1982, following the launch of June 30, 1982 of the Soviet SAR-equipped navigational satellite Cosmos 1383. Since its inception, the multi-nation program has helped in saving nearly 300 lives. Goddard is a partner with NOAA in managing the operations and research in the program.

The TIROS program is a cooperative effort of NASA, NOAA, the United Kingdom and France for providing day and night environmental and associated data for operational purposes on a daily basis.

NOAA-F is the sixth in a series of eight satellites developed to give scientists the most comprehensive weather information since the start of the Nation's space program. The satellite series is being produced under a $125 million contract at RCA Astro-Electronics, a unit of the company's Government Systems Division.

Mail your story to the Goddard News, or call the Editor at 344-8102

New Bangladesh Warning System

Goddard Team Establishes New Facility To Save Lives From Cyclones and Storms

Next spring, a $6 million facility will open in Dhaka, Bangladesh, that will provide early detection and warning of storms and floods and save thousands of lives.

The facility, designed to receive information from a host of orbiting satellites from the United States, Japan and the Soviet Union, is being sponsored by the Agency for International Development in the State Department. It is managed by the Goddard Space Flight Center under the direction of Chuck Vermillion, Code 675. The contractor performing the hardware and software portion is Science Systems and Applications Inc (SSAI), a small business minority firm.

Completion of the facility culminates efforts that began in 1978 when Goddard personnel first began installation of high resolution receiving set for acquiring data from the TIROS weather satellite.

Need Cited

The new facility will house sophisticated computer and computer processing equipment, Vermillion explained, and will have a failure-proof power system in a building that can withstand winds of 120 miles an hour for up to four hours—not a rare occurrence during that nation's spring "norwesters."

The need for an early warning system in that mid-continent area is self-evident. Until the first warning equipment was installed by NASA six years ago, as many as 500,000 lives have been lost in a single storm. Since their installation, there have been some losses, explained Vermillion, but they have been minimal.

One of the storms occurred in 1978 during the installation of the first system, he said, when a cyclone swept across the Bay of Bengal and roared ashore with tremendous activity. Because the system picked up the storm early, warnings were issued to the coastal residents of Bangladesh and not a single life was lost.

Bangladesh is a nation of 93 million people, and the new detection and warning system offers them not only immediate warning, but long-term cautions as well, Vermillion pointed out.

Versatile Capabilities

With the new equipment, he explained, the nation will have a capability to detect storms and floods and to assess damages from those onslaughts, to conduct routine weather forecasting, to assist in the development of better land use in agriculture, to assess vegetation, and to monitor the snow melt in the Himalayas.

For some time now, a number of Bangladesh scientists have been at Goddard undergoing training to use the equipment in their country. In addition to the main facility in Dhaka, there will be 18 land-based platforms, 2 coastal platforms, plus a marine buoy anchored 160 kilometers (100 miles) off the coast in the Bay of Bengal, according to Vermillion.

Once this system is in operation, Vermillion said, he hopes to develop agreements and encourage countries in this region to acquire equipment to become a part of the international COSPAS/SARSAT program. That effort, in which the primary partners are Canada, France, the Soviet Union and the United States, is designed to save lives of airmen and seamen in distress. Inaugurated in September 1982, the program has been involved in rescuing nearly 300 people. Goddard manages the U.S. portion of that program under the direction of Fred Flatow.

"If we can achieve that involvement," said Vermillion, "we'll be able to save even more lives. A lot of folks there are fishermen, and they often get caught out in storms and lost at sea."

DATA REVIEW—Members of the team establishing an early warning and detection facility in Bangladesh observe remote sensing data processed on the Agro-Climatic and Environmental Monitoring System NASA is developing for the Bay of Bengal region. From left to right: Charles H. Vermillion, project manager; Gene Shaffer, senior scientist, Science Systems and Applications Inc.; and, Dr. A.M. Chaudhurry, deputy directory, Bangladesh Space and Remote Sensing Organization. Joe Walters photo

Goddard Scientist Studies Acid Rain

A NASA team of scientists, led by researchers from the Laboratory for Terrestrial Physics at Goddard, has completed the first phase of a three-year project designed to determine the feasibility of using remote sensing technology to measure the effect of acid rain on forest vegetation.

Principal investigator Darrel Williams and co-investigator Ross Nelson, both of Goddard, along with Dr. Barry Rock, Jet Propulsion Laboratory, Pasadena, CA., conducted the first remote sensing flights of the project over the severely impaired red spruce forests on Camels Hump Mountain in west-central Vermont in August.

Two Aircraft

The scientists made the flights using two NASA aircraft: a C130 from the NASA/Ames Research Center, Moffett Field, CA., and a Bell Iroquois helicopter from Wallops Flight Facility, Wallops Island, Va.

Both aircraft were equipped with different spectrometers and radiometers — devices that measure the intensity of solar radiation reflected from targets such as forest vegetation. The instruments mounted in the C130 provided large area coverage, whereas, the helicopter, hovering about 300 meters (1,000 feet) above the forest canopy, provided the opportunity to obtain detailed spectral information for specific, small areas of vegetation.

"Based on detailed ground observations, twelve red spruce stands were selected as study areas for this project," Williams said. "These stands represented a continuum of vigor classes, ranging from healthy to very stressed." Ground crews marked the plots with helium-filled balloons, to aid in locating the sites from the helicopter and also collected samples of vegetation for laboratory analysis.

"We're trying to determine whether there are any unique, characteristic changes in reflectance which can be associated with the level of stress within a given stand," Williams continued. He cautioned that "we do not expect to be able to determine the exact cause of the stress using remotely sensing data alone. However, remotely-sensed data could be a very useful tool for determining the geographical extent of forest decline, and this information, when coupled with information about prevailing wind patterns and known sources of pollution, could be helpful in documenting the effects of acid rain on the environment."

PRE-FLIGHT CHECKOUT—Darrel Williams, principal investigator for a project designed to study the effects of acid rain on foliage, checks the alignment of the instrument package before the flight. The helicopter was equipped with radiometers and spectrometers to survey small areas of vegetation. In background is Goddard technician Frank Wood.

The scientists say this area was chosen for two primary reasons. According to Nelson, researchers at the University of Vermont have developed the longest, most comprehensive field data base in North America, specifically to evaluate the impact of acidic depositions on forested ecosystems. In addition, "northern Vermont is at the end of several airsheds which funnel winds from the central, industrial states and eastern Canada through Vermont, and the average acidity of the rainfall in this area is high," Williams said.

Little Research

Although a vast amount of acid rain data exists and is being analyzed at various sites around the world, "little research has been conducted to determine whether remote sensing can be applied successfully to detect and monitor the effects of acid rain," Williams said.

Conventional methods for measuring vegetation stress are ground-based and employ hand-held instruments. These techniques generally are not applicable to forest situations because of the extreme height of the canopy. This is why the helicopter approach was employed, according to Williams.

If proven successful, light-measuring devices similar to the ones used in this project eventually could provide an opportunity for global assessments.

Williams said acid rain is not the sole factor but, at the very least, a major factor for the general decline in the productivity of forests. One leading researcher has observed that acid rain "leeches away important substances needed for healthy growth and damages the waxy covering that protects leaves from desiccation and attack by fungi and bacteria."

During the past 25 years in Europe and the past 10 years in North America, accumulated data has suggested that air pollution from emissions of hydrocarbons and oxides of sulfur and nitrogen may damage ecosystems.

The pollutants are deposited from the air in locations remote from their source. Some elements of air pollution are acids or turn acidic upon reaching the Earth's surface and interact with water, soil or plant life.

Several studies have documented the potential damage of acids on ecosystems. Although pollutants may be deposited in dry form or in precipitation, the phenomenon is often called acid rain.

NASA Artisan Transforms Glass Into Spacecraft; Solar Max Model Presented To President Reagan

Bob Harris virtually is his own boss. Often, he gets only a request for a job — the rest is left to him. No instructions from or progress reports to management. No peek-a-boos at the product before its finished. No specifications, rules or guidelines stipulated.

"They simply tell me what they want," he said, "and I take it from there."

Harris, NASA's official Glass Artisan, works in Goddard's Optical Laboratory Section as a Physical Science Technician. His services were requested recently for a commemorative plaque for President Ronald Reagan.

Pete Baltzell photo

NASA GLASS ARTISAN—Bob Harris makes repairs to a model of Landsat, an Earth resources satellite. Encased in frame in background is model of a Tracking and Data Relay Satellite.

When the President visited Goddard August 30 during STS-41D, he received a glass-blown scene depicting the historic Solar Maximum Repair Mission (SMRM) (STS-41C, April 6-13, 1984). The scene, encased in a mahogany frame, showed the Earth in the foreground with the shuttle hovering in the background, while an astronaut with a jet-powered backpack approached the Solar Observatory.

SMRM was the first shuttle mission in which an orbiting satellite was retrieved, repaired and redeployed, and Goddard's orbital maneuvering expertise was crucial to the mission's success.

Hardly anyone saw the President's plaque before it was finished, according to Harris. The apparent "blind faith" in his work is quickly understood after viewing some of his creations. And after learning about the intricate, precise art of high-quality glass blowing, one can better appreciate the end product.

Harris' Two Sides

Actually, there are two sides to Harris.

On the one hand, he has mastered the extremely complicated art of manipulating and molding drab pieces of glass suspended in air into the highly precise glassware needed for Goddard's lab work.

On the other, he has perfected an uncanny ability to combine his scientific knowledge with artistic prowess to create beautiful glass-blown models of spacecraft, or anything desired.

"My two sides complement each other," Harris said. "There's no way I'd be able to make models of spacecraft without my scientific background. And I find experimenting artistically reveals things I can do with my scientific work."

From the purely scientific aspect of the work, he made the vacuum container needed to hold the single Mercury molecule in NASA's atomic clock, used to set NASA time standards. He holds a patent on a method for fabricating a Mass Spectrometer Inlet Leak used to measure chemically reactive species around Venus.

Pete Baltzell photo

GLASS BLOWER—Harris demonstrates the art of forging glass into any shape or form desired.

Goddard Inventor Gets NASA Award

Joe Walters photo

CERTIFICATE OF RECOGNITION—Center Director Noel W. Hinners presents Goddard Astrophysicist Dr. Lo I Yin with a Certificate of Recognition for receiving a NASA patent on the lixiscope — a battery-operated, portable, low-intensity X-ray imaging device for industrial and medical applications. Dr. Yin joined Goddard 17 years ago and currently works in the Solar Physics Branch. Dr. Yin demonstrated his invention to President Ronald Reagan during his visit to the Center on August 30.

Equally significant is the first qualified glass carbon dioxide laser he made for the Titan-IIC launch environment, which included an accompanying paper he wrote for the American Scientific Glass Blowing Society, of which he is a member.

The second, artistic side of his skill has made him one of the foremost, if not the only, space artist in the glass medium and has earned him wide-spread recognition in the space community.

Prior to the plaque made for the President, Harris made a model of Spacelab for NASA Administrator James M. Beggs to give to Erik Quistgaard, former head, European Space Agency. Also, he recently completed a collection of Goddard-affiliated satellites now displayed at the Center's Visitor Center and loaned once a year to the National Air and Space Museum. The display commemorates Goddard's first 25 years and includes models representing ten series of Goddard spacecraft.

Technical Papers

Harris has written and published several technical papers and conducted countless

(Continued on page 7)

Artisan
(Continued from page 6)

workshops for students as well as teachers throughout the country. Workshop participants quickly find that glass blowing is, indeed, an intricate art.

"The glass has to be in constant motion while it is being molded," says Harris. "It looks relatively easy to a spectator, but when given a simple task, they find that glass blowing is a precise art, learned through a lot of practice."

According to Harris, measuring a glass piece with an instrument is very difficult while it is being made; therefore, measurements must be made with the eyes, down to dimensions as small as two microns (.000079 of an inch).

Delicate Productions

Harris' delicate productions are intricate workings of elongated tubular structures or slabs of glass, which are superbly compressed and expanded, twisted and contorted, and ultimately forged into any shape or dimension desired. These amazingly detailed pieces sometimes go undetected by the human eye.

For example, Harris fabricated a microspherical structure through which its users wanted to shoot a laser beam. Such miniature spheres can only be eyeballed in the collective thousands; to look at one, a microscope must be used — like trying to look at one grain of sand.

On another project, Harris had to seal a piece of wire, thinner than the thinnest strand of human hair, into the tip of a piece of glass smaller than a toothpick. The finished product resembled a micro-miniature stick of TNT.

Harris, 45, has worked at Goddard for 18 years and plans to be here for at least another ten, when he figures he will retire and go into business for himself as a commercial glass artisan.

"I'm having a house built on some land now where one day I can add my studio," he said. "I plan to tap some of my heretofore untapped artistic talents when I open."

Anyone with the knowledge and talents of Bob Harris should be allowed to "blow his own horn," so to speak, and Harris does exactly that . . . with his very own, self-made, glass blown bugle.

Ed Pearson Gets Galloway Award For Model Rocket Contributions

Every first and third Sunday at Goddard's Visitor Center (VC) rockets blast off, up, into the sky. These rockets are not Deltas, NASA's "workhorse" rocket, or Atlases or Titans, or even Nike-Tomahawks — they are model rockets.

And there is a man at Goddard who has been heralded for accomplishing a feat with model rocketry that could be equated with what Muhammad Ali did for boxing.

Glenn "Ed" Pearson, the Center's VC manager, recently was cited for " . . . singlehandedly bringing more people in contact with model rocketry than any other person in the world . . ., " by the National Association of Rocketry (NAR).

Pearson received the 1984 H. Galloway Spacemodeling Service Award in August. The commendation letter he received from NAR President J. Patrick Miller read, in part: " . . . This award is the highest honor that the NAR can bestow upon a person or persons who have made significant contributions to the hobby of model rocketry. It is not for service to the NAR . . . it is for service to the entire hobby. There is no doubt that you have with the work you've done at Goddard been of great importance to the hobby . . . . "

A model rocketeer for 26 years, Pearson has been manager of the VC since 1977 and has worked periodically at Goddard since 1965.

The late Howard Galloway was a Goddard flight engineer for 20 years and is noted for his work in the Sounding Rocket Division and also on the ATS-6 Satellite Project. Galloway also is cited for organizing and running several national-level model rocket meets.

Marjorie Small photo

ACE MODEL ROCKETEER—Goddard Visitor Center (VC) Manager Glenn "Ed" Pearson prepares model rockets for launch. Pearson recently received an award from the National Association of Rocketry for making outstanding contributions to the hobby. Model rockets are launched from the Goddard Space Flight Center Visitor Center on the first and third Sunday of each month.

Popular Student-Teacher Programs Here Stress Science, Engineering, Technology; Workshops, Internships Assist Many Move Toward Science

GAS PROJECT—High School summer program participants design a model of an experiment for space flight for a Get Away Special canister. The self-contained payload program allows individuals, groups and organizations to buy space to conduct scientific experiments on the Space Shuttle.

For many students and teachers the regular school year is well underway and summer past is just a memory. Some students and teachers spent their summer vacationing. But others continued their education in programs at Goddard.

The following are descriptions of several programs in the Education and the Equal Employment Opportunity Offices.

Education Office Programs

NASA Educational Workshop for Mathematics and Science Teachers (NEWMAST) is a two-week program in which twelve teachers from six states and the District of Columbia participated. During their stay, the teachers participated in an "engineering simulation"; joined Goddard astronomers at the I.U.E. control center for a weekend observation session; heard presentations from GSFC scientists and engineers on current projects, and became familiar with ongoing and new educational programs and services provided by NASA for students and teachers. The NEWMAST program is sponsored by NASA, the National Science Foundation and the National Science Teachers Association.

Thirteen Aerospace workshops were conducted this summer for teachers in school systems and colleges or universities throughout the Northeastern U.S. Most of the workshops lasted one to two weeks and were planned in conjunction with a workshop director, provided by the hosting organization. The workshops' content was chosen from the following areas of expertise available with four Goddard Aerospace Education Specialist in the Spacemobile Program: Living in Space; Rocketry; Astronomy; and, Monitoring Earth Resources from Space.

Rickover Institute

The Rickover Science Institute combines intensive classroom instruction and internships in scientific research to equip students with the knowledge and skills necessary for their development as future science researchers. Students must have completed the eleventh grade and demonstrated academic excellence. They receive instruction in mathematics, the physical and biological sciences, communication skills for researchers, research statistics and computer science.

The students spend six weeks on a simulated campus environment and three weeks on an internship at Goddard. The internship allows students to work with professional Goddard employees on a specific research project concerned with various fields of science.

SHARP Program

The Summer High School Research Apprenticeship Program (SHARP) is a five-year-old program designed for academically-talented minority students who are interested in a career in science or technology. It enables qualified students to be placed with mentors for two months each summer and exposes them to new learning experiences.

SHARP is a NASA-wide program geared to prepare students for further study in science and technology. Students are exposed to electronics, engineering, astronomy, geophysics, computer programming and various other scientific/technical areas.

Students and Engineering

Physical Science and Engineering Internships for senior high school students provided training for 23 students from Baltimore, Md., and 12 Maryland counties. The program, sponsored by and coordinated with the Maryland State Department of Education, Division of Instruction, is designed for students interested in pursuing careers related to high technology and space exploration.

While housed at the University of Maryland during the two-week program, the students spent the mornings of the first week becoming oriented to NASA/Goddard programs and the overall mission of the agency. The second week of morning sessions was spent learning the "The Engineering Process." The students' afternoons were devoted to laboratory experiences with Goddard engineers and scientists.

Introduction to the Space Sciences for students entering the ninth grade was conducted for 24 students who were housed

(Continued on page 9)

ROCK MAGNETISM LAB—High school seniors working as interns in science and engineering use a Vibrating Sample Magnetometer to mesure Curi Temperature (CT) of a rock. CT tells when rock becomes non-magnetic and is useful for identifying magnetic phases in rock. Shown here are Jenny Sauer and Kurt Roth.

(Continued from page 8)
at the University of Maryland. They represented 12 Maryland counties.

About a half of their time at Goddard was spent in an intensive hands-on computer science training course, while the other half was devoted to introducing them to a variety of space science topics. Specialists in planetology, geology, relativity and cosmology lectured to the students on their respective fields. Program officials hope that through these efforts, students will enhance their awareness of the opportunities for study in the space sciences.

Students Volunteers

Volunteer Service-Student Intern Program involved about ten students this summer. Students must be 16 years old and enrolled in public or private school. They are placed with Goddard volunteers to work in areas representative of their tentative career choice to "learn by doing." Their mentors work out an "experience itinerary" which fully utilizes the students' assigned internship without interfering with the work of the organization.

EEO Programs

The Summer Institute in Computer Applications, conducted with Bowie State College, provides selected college students with formal instruction in computer concepts and programming during the first three weeks of the ten-week program. The remaining seven weeks are spent working on an assigned project under supervision of Goddard personnel. Fifteen students from the following schools participated in the 1984 program: Bowie State College, Bowie, Md.; Cheyney State University, Cheyney, Penn.; Coppin State College, Baltimore, Md.; Morgan State University, Baltimore, Md.; North Carolina State University, Greensboro, N.C.; the University of the District of Columbia, Washington, D.C.; the University of Maryland (Baltimore County, College Park and Eastern Shore) and the University of Puerto Rico, Mayaquez.

Goddard Introduction To Engineering Careers is a two-week program which seeks to make better use of students who are qualified to enter engineering but whose interests have not been stimulated to pursue such careers. Thirty students participated in the 1984 GITEC program, which was conducted with Howard University and the University of Maryland. The program acquaints students with good study habits needed for college, sharpens their insight and concept of various engineering fields, exposes them to engineering practices at Goddard and enables them to stay in a college dormitory.

Intern Program

The Graduate Intern Program In Science and Engineering is a ten-week program designed to provide students an opportunity to gain research experience, to increase their professional knowledge and to expand the source of candidates for Center positions. The 1984 program included six engineers and two geologists from Howard University, one mathematician from the University of Maryland, one marine scientist from the University of Puerto Rico and one physicist from the University of Michigan. Since the program's inception in 1979, 43 students have participated.

SICA STUDENT—Bernard Dixon, Code 150, supervises Arlene Perez as she implements a mission integration and test cost model. Perez participated in the Summer Institute in Computer Applications (SICA).

Seventeen are continuing work toward an advanced degree, and six have been hired by NASA.

The Recruitment Into Engineering Of High Ability Minority And Female Students This program is conducted in support of the Bowie State College dual degree

(Continued on page 11)

NEWMAST MEMBERS—Participants of the 1984 NASA Educational Workshop for Mathematics and Science Teachers (NEWMAST). The 12 teachers came from six states and Washington, D.C. At bottom left is program coordinator Diana Alexander; top left, Elva Bailey, Educational Programs Officer; far right, Assistant Educational Programs Officer Richard Crone.

GITEC PROGRAM—Thirty students participated in the Goddard Introduction to Engineering Careers (GITEC) program. The two-week training allowed students to sharpen study habits and gain insight to engineering practices.

Goddard Inventor Receives Patent On Improved Locator Transmitter

Paul Wren

A Goddard engineer recently received a patent and has signed a licensing agreement for production of an improved Emergency Locator Transmitter (ELT) — a device carried by aircraft that emits emergency distress signals capable of being detected by other aircraft, the Civil Air Patrol, the military, satellites and other sources. The ELT is designed to emit the signal at the force of a crash.

Paul Wren, code 531, who holds the patent, says the improved ELT allows people receiving distress signals on conventional ELT receivers to determine a signal's origin audibly without additional equipment.

Wren said his patent provides for the ELT to emit a special, coded signal that represents distressed aircraft. The code he established for aircraft enables the ELT to send a signal that causes the receiver to emit an alternating eight-second alarm separated by two seconds of silence.

"Eventually, specially-coded signals will be applied to ELTs on other vehicles and for people in distress," Wren said. "Each distressed source will emit a signal that translates into its own unique code."

Technical Advantages

"Other technical advantages exist that improve direct finding capability and extended range detection in the radio frequency signal structure," Wren said. "And the new ELT will offer even greater capability by extending range detection four-fold when used with a new receiver I have designed."

Since the early '70s, general aviation aircraft and ocean-going vessels have been required by law to carry emergency beacons. And in 1982, the first satellite equipped with instrumentation to detect distress signals was placed in orbit.

Goddard Welcomes Fourteen New Employees

Fourteen new employees have joined the ranks at Goddard, according to officials in the Management and Operations Directorate.

While welcoming the new employees, who were on board as of July 1, they also reported the departure of 11 employees by way of retirement. In addition, 71 employees were granted "early outs" in October See upcoming issue for details.

The newcomers and their work classifications are:

Ames, Troy J.
Computer Science
Code 522.1

Basile, Lisa
Computer Science
Code 564.2

Bassford, Suzanne L.
Secretary
Code 402

Brown, Arlene
Clerk-Typist
Code 220

Dantzler, Andrew A.
Electronics Engineer
Code 717.4

Franks, Kellyann T.
Aerospace Engineer
Code 582.2
AST, Flight Mechanics

Jackson, Doris
Clerk-Typist
Code 200

Kallman, Timothy R.
Astrophysicist
Code 665
AST, Fields & Particles

Kennedy, Gregory
Public Affairs Specialist
Code 130

Mattson, Janet M.
Presidential Mgmt Intern
Code 228/200

Payne, Leslie, J.
Electronics Engineer
Code 683.1

Rubinstein, Julie B.
Clerk-Typist
Code 151

Sefcik, Janine T.
Clerk-Stenographer
Code 220

Thornton, Sheri A.
Resources Analyst
Code 403

The retirees are:

Blanchard, Bruce J.
Code 924
8/31/84

Boyer, Robert W.
Code 206.2
6/30/84

Casto, Charles
Code 234
6/30/84

Gault, George W.
Code 850.1
8/3/84

Lacey, Catherine
Code 235.2
6/30/84

Lee, Charles A.
Code 251.3
6/29/84

Pusey, James W.
Code 234
6/30/84

Scopel, Ennis
Code 710.2
6/30/84

Sines, Donald C.
Code 151.2
6/30/84

Taub, Nadine
Code 960
6/30/84

Tull, Stuart A.
Code 752.2
6/29/84

Student Programs

(Continued from page 9)

engineering program. REHAMFS enables ten Bowie entering freshmen to pursue studies leading to a BS degree in mathematics and an engineering degree from the University of Maryland or George Washington University. The program includes a summer session during which the high school graduates attend intensive preengineering courses. Students receive tuition assistance and paid work experience at Goddard during the summer following their freshman year.

Summer Institute

The Summer Institute in Science and Technology for Junior High School Girls is a two-week program which allows local students the opportunity to explore career opportunities in the space field. The girls work with women scientists, engineers, mathematicians, computer scientists and technicians to gain exposure to a wide variety of traditionally non-female career options. The program is sponsored by the Federal Women's Program Subcommittee on Role Modeling for Young People and has been held for the past six years.

Teacher Orientation

The Goddard/Teacher Engineering Orientation Program is a two-week program conducted in cooperation with Howard University's School of Engineering and the D.C. Metropolitan consortium for Minorities in Engineering. Twenty teachers from area junior and senior and high schools spend the first part of the program in a Howard University engineering workshop. At Goddard, the teachers observe engineers at their craft — designing, building and making things work. The theory behind the program is that if math and science teachers can learn more about the "real world" of engineering, they can better motivate their students to pursue such careers.

Students Participate In Fellowship Program

JUNIOR FELLOWS—First row left to right: Vickie Eakin, Karen Thorn and Catherine Kratz. Second row left to right: Lori Arnwine, Jochebed Carter, Hsaio Lim and Melanie Jones. Third row left to right: Nathan James, Michael Danick, Anderson Davis and Joe Sparmo. Not pictured are Antoinette Ware and Anisa Jamil.

Goddard currently has 13 students at its Greenbelt site and eight students at its Wallops site in the Federal Junior Fellowship Program. This program uses an "earn-as-you-learn" concept, which gives eligible students an opportunity to earn money for college, as well as a chance to learn about their chosen careers through related work experiences.

At the same time, the program seeks to provide Federal agencies with highly-motivated and productive part-time employees who eventually could become permanent federal workers.

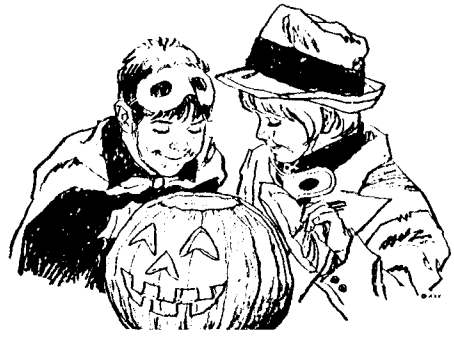
Students in this program work full-time during summers and vacations while in college. After completion of the program and graduation from college, they are eligible for non-competitive conversion to full-time professional positions.

According to program coordinator Bonnie Kaiser, code 224, Goddard recruits for this program from high schools in five counties and Baltimore City in Maryland, and from two counties in Virginia.

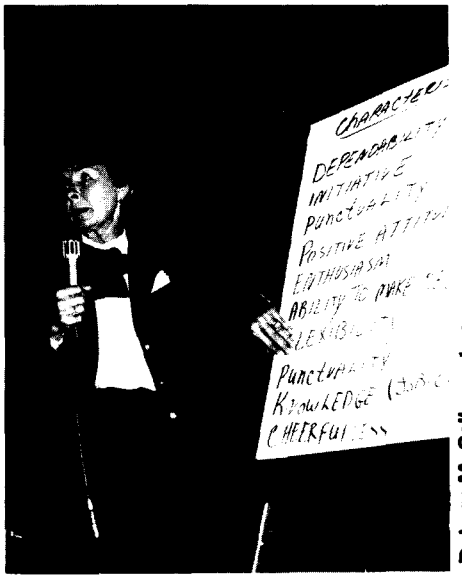
Think About It . . .

The best education in the world is that got by struggling to get a living.

— Wendell Phillips



Halloween is October 31. Make sure you check your kids' treats before they eat.



Debora McCallum photo

LUNCHEON HELD—Frankie Swenholt elaborates on some vital characteristics secretaries need to be effective. Swenholt, president of Swenholt Associates, Inc., a personnel training and development firm, spoke to about 110 Goddard secretaries at a luncheon here at the Rec Center recently. Swenholt is internationally renown and presents training programs nationwide and overseas to both government and industry.

ZEAL SEAL AWARD—Flight Projects Director William Keathley signs his name to list of signatures in ceremony marking transfer of control of Solar Maximum Observatory from the Satellite Servicing Project to the Space and Earth Sciences Directorate. During the ceremony, special awards from Director Hinners, called Director's Zeal Seal Awards, were presented to individuals instrumental in making the Solar Max mission a success. Those receiving Zeal Seals from the Satellite Servicing Project were Peter E. O'Neill, Jr.' Frank Cepollina and Bill Stewart. Pictured from left to right: Dr. Franklin D. Martin, director, Space and Earth Sciences; Cepollina, project manager, Satellite Servicing Project; Keathley and Director Hinners. Joe Walters photo

STREETS RENAMED—John P. Purcell (code 271.5), Facilities Engineering Division, steadies the ladder as contractor Frank M. Tolodziecki renames two of five main thoroughfares on Center, as part of activities stemming from Goddard's 25th Anniversary celebration this year. TIROS Road runs by buildings 5/7 to back gate; Minitrack Road runs from building 12 to building 28. Other thoroughfares were renamed as Goddard, Explorer, Aerobee and Delta Roads.

Randy Frisch photo

THE FIFTY-FIVES—Space pioneers prior to 1955 and their wives are shown in the Wallops Range Control Center during a tour of facilities Tuesday, September 18. Left to right: (back row) Mrs. Gordon Vaeth, Ms. Judy Sloop, Mrs. Bernard Smith, Mrs. Heyward Canney, Mr. Heyward Canney, Mr. John Sloop, and Mrs. John Sloop. (front row) Mr. Kurt Stehling, Mr. Bernard Smith, Mr. Ronald Wakeford, and Mr. Gordon Vaeth, NOAA's Director of Satellite Operations, Suitland, Md.

NASA
National Aeronautics and Space Administration
Goddard Space Flight Center

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