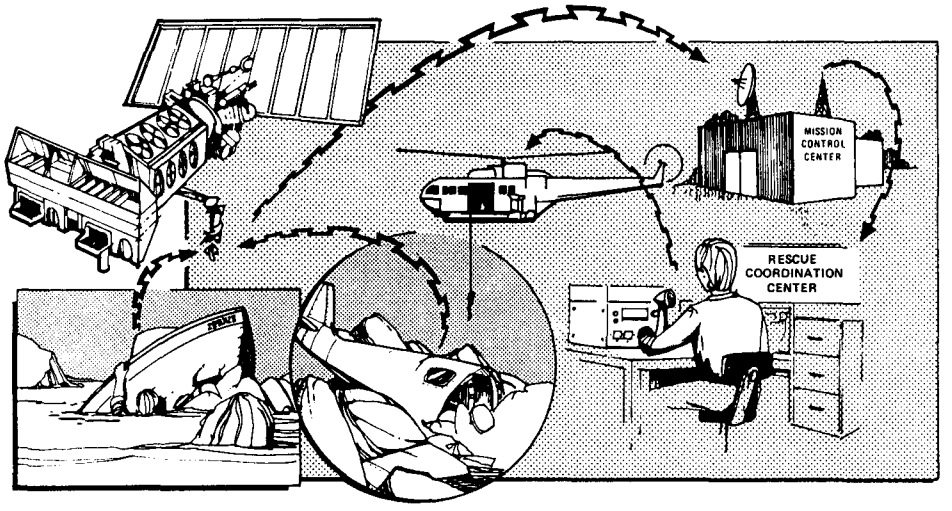
NASA
National Aeronautics and Space Administration

GODDARD NEWS

Goddard Space Flight Center, Greenbelt, Md. Vol. 30 No. 4 April 15, 1983

SARSAT Search and Rescue Satellite-Aided Tracking



Space-age technology for rescue with minimal search

Imagine yourself in the following scene: It is a bitter cold afternoon that is fast turning into night. Your private plane has crashed in the middle of nowhere, and you have a broken leg. Or your fishing boat has sunk, and you find yourself adrift in a lifeboat, tossed by rough water. Your emergency distress radio is emitting a distress signal, as it should. But you are haunted by two very frightening questions: "Will someone hear my distress signal? And, if they do, will they get here in time?"

The answer to both questions could be "Yes."

NASA launched an advanced TIROS-N environmental monitoring satellite last month carrying special instrumentation required to provide a demonstration to search and rescue (SAR) mission agencies. Called NOAA-E (National Oceanic and Atmospheric Administration), the satellite is carrying this instrumentation for evaluation of a satellite-aided SAR system that could lead to the establishment of an operational capability.

The SAR program is a joint Canada, France, U.S. and U.S.S.R. effort. The U.S. effort in the SAR program is managed by Goddard. Mission manager is Bernard J. Trudell.

The objectives of the SAR mission are to demonstrate:

1. The ability of a spaceborne system to acquire, track, and locate existing Emergency Locator Transmitters (ELT's) and Emergency Position Indication Radio Beacons (EPIRB's) that currently are being used aboard approximately 200,000 general aviation and other aircraft in the U.S. alone, are aboard approximately 6,000 U.S. ships, and are operating on 121.5 and 243 Megahertz frequencies.

2. The improved capability for detecting and locating distress incidents utilizing new experimental ELT/EPIRB's operating on a 406 Megahertz frequency. This new capability would provide higher probability of detection and location, greater location accuracy, and coded user information, and would allow for the necessary growth of an increased number of users. In addition, this capability will allow for global coverage by providing spaceborne processing and storage of the 406 MHz data by equipment aboard the spacecraft.

Continued to page 8

SARSAT helps save lives

The Soviet satellite, COSPAS I, aided in the rescue of two more people recently as part of an international satellite-aided search and rescue project (COSPAS/SARSAT) involving the U.S., Canada, France and the Soviet Union. The project's goal is to demonstrate the effectiveness of satellites in reducing the time required to rescue air and maritime distress victims and increase significantly the possibility of saving lives.

The satellite picked up distress signals from a downed airplane in Canada and relayed the message to ground stations in France, Canada and the U.S. The incident marks the first time that ground stations in three different countries picked up signals from the satellite in one emergency.

In another incident, Canadian authorities reported that the satellite assisted in finding the location of a plane with one person on board which had taken off on a flight from Quebec City to Sherbrooke, also in Quebec, but encountered bad weather and ended up landing on a highway near Littleton, New Hampshire.

The rescues of the three people brought to 22 the number of lives which have been saved directly or indirectly with the help of the Soviet satellite since it began operational tests last September. Since then, 6 more lives have been saved.

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Inside

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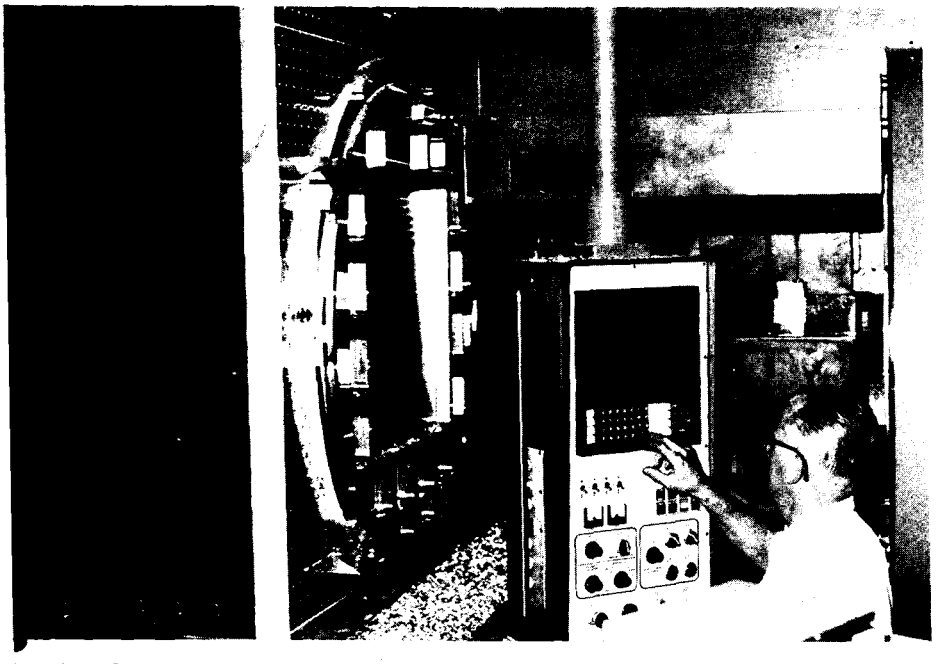
New machine handles shuttle size payload components

A new numerically controlled (N/C) milling machine, with a positioning accuracy at least ten times better than Goddard's other N/C machines, is now preparing components for shuttle size payloads in Goddard's Machining Branch. The DeVlieg Jigmil is the latest in state-of-the-art milling machines and was obtained primarily to machine large payload parts for the shuttle.

The jigmil performs a wide variety of operations including rough and finish boring, heavy milling, contour boring, threading, drilling and tapping. It has a work range of 12′ x 6′ x 4′ for machining a variety of work pieces and can produce workpieces to very precise limits of accuracy. Automatic tool selection from coded tool storage stations and automatic tool changing, combined with four axes of table motion, provide complete machining center capabilities.

Tony Walch, head, Machining Branch, said he chose the machine because of its high accuracy. "Precision. It's a high precision machine, and that's what I like about it the most," said Walch. "It can handle shuttle size payloads in one setup and produce parts that are very accurate."

It is currently performing its first job, the preparation of a large bulkhead for the Energetic Gamma Ray Experiment Telescope (EGRET). The telescope is part of the Gamma Ray Observatory (GRO), planned for a shuttle launch in 1988.



Woodrow Poland (code 751.2) types instructions for the jigmil to perform work on EGRET.

In mid-April, it will begin its second job, milling components for the Cosmic Background Explorer (COBE) spacecraft. The next projected task is the machining of parts for the Upper Atmosphere Research Satellite (UARS). Both are future shuttle payloads.

The major features of the 40-ton jigmil are: computer numerical control; contour boring and threading; automatic tool changing; and in process inspection. One example of its greater capacity for work is that it can remove 25 cubic inches of steel per minute. Previous machines could only remove seven and a half cubic inches per minute.

According to Walch, the new milling machine allows Goddard's machining branch to meet its production deadlines on a more timely basis and machine large parts to very precise tolerances. It can produce parts that are too complex to make on conventional machines and can perform precision work 3 to 6 times faster than conventional machine tools.

Colloquium speakers

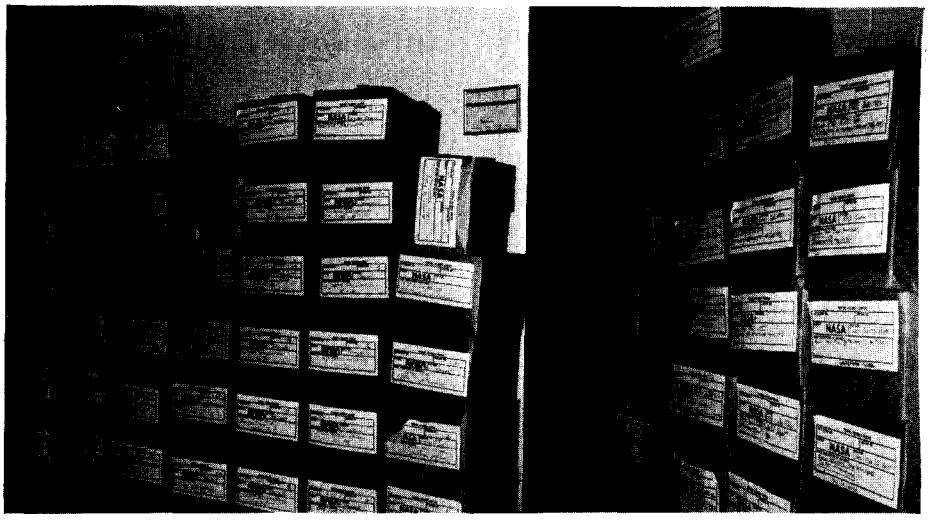
Dr. Antony Hewish

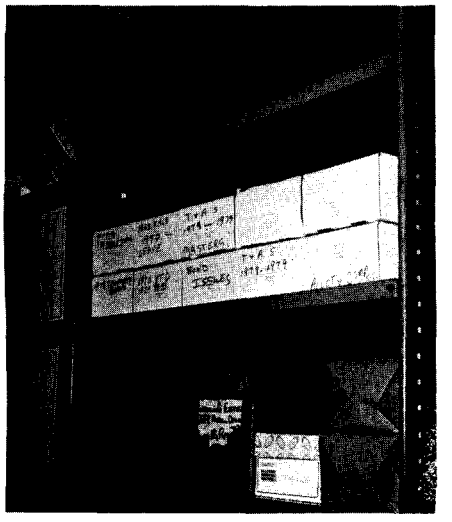
Co-winner of the 1974 Nobel Physics Prize, Dr. Antony Hewish spoke at a colloquium last month on "A New Look at Interplanetary Disturbances." Hewish, a professor at the Mullard Radio Astronomy Observatory of Cambridge, shared the Nobel Prize with Sir Martin Ryle and is recognized for the 1967 discovery of pulsars. He first joined Ryle at the Cambridge radio observatory, where he helped develop antenna arrays and made observations of radio emissions from the solar corona. He then became interested in interplanetary scintillation of radio sources – a "twinkling effect due to spatial and temporal irregularities in the interplanetary medium." Hewish described the "twinkling effect" and discussed its significance.

Dr. Donald Johanson

"Life with Lucy" was the title of the lecture by well-known paleoanthropologist Dr. Donald Johanson at a Goddard Scientific Colloquium last month. Johanson is the founding director of the Institute of Human Origins at Berkeley, and Lucy is a 3.6 million year old skeleton of a two-footed female. Johanson discovered Lucy in Ethiopia in 1974 and rekindled controversy over the nature of the human family tree. He believes Lucy hails from a species of ape that is now a common ancestor of humans and a group of two-footed hominids now extinct. Other paleoanthropologists dispute parts of his theory. Johanson discussed how Lucy's age and complete skeleton are significant to the study of human origins and to understanding the environment in which she lived.

Microfiching records saves money and space





Since 1981, 204 cubic feet of payroll records have been filmed and converted to approximately five cubic feet of microfiche, saving about $4,500 a year in rental space and $6,000 in cabinet costs.

Goddard is saving approximately $4,500 a year in rental space and $6,000 in file cabinet costs by converting payroll records to microfiche, according to Jane Carpino of the Administrative Support Branch (ASB). Since August 1981, 204 cubic feet of records have been filmed and converted to approximately five cubic feet of microfiche. The ASB assisted the Accounting Branch in the preliminary plans of microfiching the payroll records, at no cost, by a NASA HQ contractor.

Aside from the direct savings, there are indirect savings from microfiching the records. Microfiched records save time since they can be easily stored in the office for quick retrieval and usage. In addition, transportation costs are cut since there is less need for records to be transported to and from the storage site in Suitland, Md.

The conversion from paper records to microfiche resulted from unavailability of previous storage space in the Glenn Dale II building near Goddard. Carpino said ASB was asked to clear the Glenn Dale II building in late 1980 of all records (over 1,000 feet) which had been stored there since 1969.

Since witnessing the savings in space and money from microfiche, other offices have begun using microfiche. ASB is encouraging further use of microfiche at Goddard because of the obvious benefits.

Persons interested in learning about microfiching records should call Bill Cooper, 344-8993, or Jane Carpino, 344-5344.

NASA and Navy sign pact on Wallops Naval facility

Goddard Director Dr. Noel W. Hinners and Commander of the Naval Surface Weapons Center (NSWC), Dahlgren, Virginia, Capt. James E. Fernandes agree to establish a NSWC facility at Goddard's Wallops Flight Facility, Wallops Island, Va. Standing from l: Head, NSWC Combat Systems Laboratory Project Office Richard W. Dorsey and Director of NSWC detachment at Wallops Steven R. Habeger.

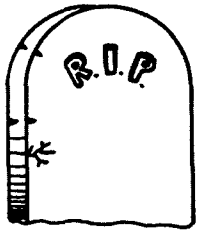
The Host-Tenant Agreement was signed recently at Goddard and allows NSWC to establish a Battle Group research, development, and engineering facility at Wallops to provide life support to surface ship combat systems and to investigate enhancements to force coordination capabilities.

Speakers Bureau

Employee gives over 30 talks on space program

In one of his recent talks entitled "Space Shuttle and NASA Programs," Walters explains to a group in Pennsylvania how the shuttle's remote manipulator arm picked up an instrument from a payload flown on a previous flight.

The best reasons for using seatbelts are always getting buried



The services and talents of Goddard employees far extend their primary duties on Center. Take Joe Walters for instance. Walters is a senior member of Goddard's photographic team. But probably even more interesting is that Walters has made over 30 presentations to outside organizations about Goddard, about the space shuttle, and about the space program as a member of the Center's Speakers Bureau. His talk is entitled "Space Shuttle and NASA Programs."

Among other duties, Walters is responsible for the scientific and technical photography on Center. Some of his recent projects have been to provide photographs and photographic instrumentation for the Office of Space Science payload pallet (OSS-1), which flew on STS-3, and for the Solar Maximum Mission (SMM), a spacecraft designed to study solar activities of the Sun.

However, Walters provides Goddard with much more than scientific and technical photographs. He recently braved the snow-covered highways for more than six hours during the blizzard of '83 to make a speaking engagement in Pennsylvania. Upon arriving there, he found the event had been cancelled an hour earlier because of the weather. Despite the setback, Walters returned a few days later to give his talk.

"I had a commitment, and I always felt it is necessary to fulfill a promise," Walters said. "It is important to get the word out about the shuttle program and the many spinoffs which benefit the public."

Walters has been with Goddard for 11 years and is no newcomer to talking about the space program. He was a docent at the National Air and Space Museum in Washington, D.C. for five years. Before joining Goddard, he worked at Washington, D.C.'s Naval Research Laboratory where he worked on the Apollo 16 and 17 missions as well as the Skylab Orbital work station program.

Walters attended Long Beach State College, Ca., and majored in History and Photo Journalism. He also attended the American School of Photography and the Winona School of Professional

Photography.

Goddard's Speakers Bureau encourages employees to volunteer their services for speaking engagements. The bureau answers requests from sites located primarily on the east coast. The Speakers Bureau's activities will be listed periodically in this newsletter. For more information, contact Darlene Ahalt on 344-8101.

Safekeeping

OFFICE ACCIDENTS HURT TOO

There may be a difference between hazards on a construction job and those in an office – but office accidents can hurt as much as any other. Whether you fall over a steel girder or an open file or desk drawer, you can still break a leg.

Pay more attention to safety and health on the job. Smashed fingers, bruised ribs, broken legs, cuts, nicks, scrapes, burns, scalds and electric shock all can afflict the office worker. In addition, there are a number of fatal accidents each year and quite a few that leave workers in bad shape for months.

Real teamwork is required – on the part of you, your supervisor and management. It's worth every bit of effort.

Accidents, injuries and illness hurt everyone, not just the victim. Injured workers seldom escape physical pain, which may have to be endured for a long time. There is a financial loss, even when covered by a wage health insurance. Valuable time is lost, work impeded or halted. The injured person's work must be done. Accidents inflict a big burden on all concerned. YOU play a key role in keeping your work area and office safe.

Mail your story to the Goddard News, Code 202, or call the Editor at

344-8102

Voyager helps scientists discover large thunderstorms around Saturn

Goddard scientists have discovered that Saturn has thunderstorms like those on Earth, only much larger.

In a scientific paper, to be made public in the British journal "Nature," M.L. Kaiser, J.E.P. Connerney, and M.D. Desch report that analysis of data from two Voyager encounters with Saturn leads them to the conclusion that a thunderstorm region 40,000 miles around Saturn's Equator – a storm that would wrap around the Earth more than 1½ times – existed. The storm is the largest ever found on any planet.

They base their conclusion on a very unusual type of signal detected by the Planetary Radio Astronomy instrument aboard both Voyager spacecraft. The signals, much like static received on a car radio when a thunderstorm is nearby, persisted for several hours, then vanished for three hours only to return again and repeat the pattern many times, according to the scientists.

Even though the resemblance to thunderstorm static was recognized at the time the observations were made, initial analysis of the data concluded that the strange signals came from an exotic object undergoing electrical discharging in the middle of Saturn's rings. The waxing and waning of the signals was thought to be related to the object revolving around Saturn.

When Goddard scientists reanalyzed the data, however, they realized that the overall pattern of signals was inconsistent with an object in the rings. Instead, they found that the radio static came from the massive storm complex spread 40,000 miles around Saturn's Equator.

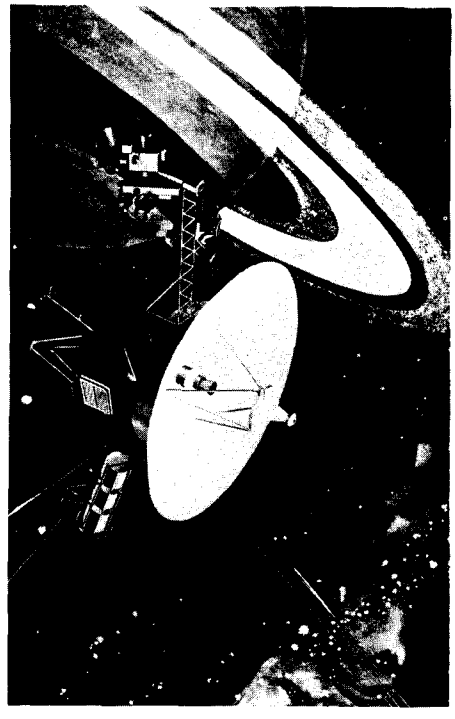
Saturn's Equatorial Region is quite unlike any other found in the solar system, according to the scientists. Winds in this region have been clocked at 1,000 miles an hour.

Thick haze overlying much of Saturn inhibits direct observation of features in the cloud tops, thus, there is no evidence to indicate that photographs taken by the Voyagers will reveal this storm. Moreover, portions of Saturn's Equatorial Zone remain cloaked in darkness for years at a time because they are located in the enormous shadow cast on the planet by Saturn's rings. There is hope, the scientists explain, that this same radio static detected by the Voyagers can be picked up by large ground-based radio-telescopes, and efforts to accomplish that currently are underway in New Mexico, France and Chile.

With this discovery, the scientists said, Saturn becomes the fourth planet to exhibit some aspect of thunderstorms, joining the Earth, Venus and Jupiter. None of the storms on these planets can rival the Saturn storm in size, however, they emphasized.

The Voyager radio astronomy research team estimates that the total power radiated in the radio noise pulses from the lightning storm exceeds 1 billion watts – equivalent to the amount of power generated by a nuclear power station.

The Voyager Planetary Radio Astronomy team is composed of scientists from seven university and government research groups. Dr. J.W. Warwick of the University of Colorado is the team leader.



This is an artist's concept of a Voyager/Saturn encounter. Voyager data has lead scientists to conclude that a thunderstorm region exists around Saturn, 40,000 miles around its equator. The storm is the largest ever found on any planet.

Asteroid named after Goddard scientist

An asteroid discovered in 1960 has been named "Asteroid UNDERHILL" after a Goddard employee in honor of her numerous contributions to astrophysics.

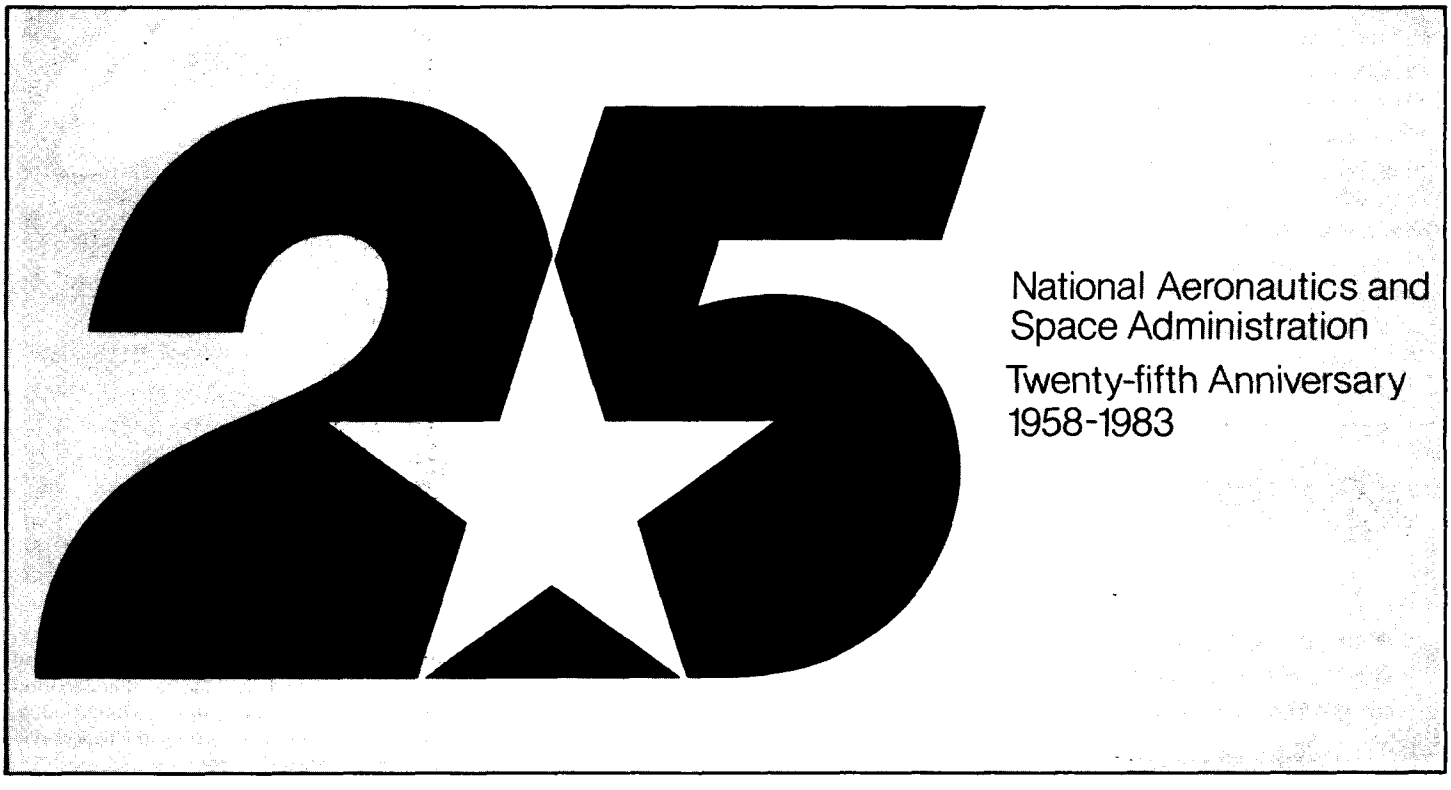
Commission 20 of the International Astronomical Union (IAU Commission on Positions and Motions of Minor Planets, Comets and Satellites) named the asteroid after Dr. Anne B. Underhill, senior scientist in the Laboratory for Astronomy and Solar Physics (LASP), and well-known expert in the structure of early-type stars.

Dr. Underhill came to Goddard in 1970 as chief of the Laboratory for Optical Astronomy (LOA) and in this capacity was responsible for organizing and directing a comprehensive research program in astrophysics and astronomy.

In 1977, the Sciences Directorate was restructured and combined LOA with the Laboratory for Solar Physics to form the current LASP. Dr. Underhill is presently working on a theory that could reveal new findings on the stellar atmosphere. The theory is based on new observations made possible by the Copernicus and International Ultraviolet Explorer (IUE) spacecraft. These space-based observations have enabled scientists to get a better look at stars.

Dr. Underhill's scientific career began at the Dominion Astrophysical Observatory in British Columbia where she was an astrophysicist and later Senior Scientific Officer from 1949 to 1962. She then served as professor of astrophysics at the State University of Utrecht, the Netherlands, for eight years before coming to Goddard.

Dr. Underhill is a member of the American Astronomical Society, the Royal Astronomical Society, the Royal Astronomical Society of Canada, the Astronomical Society of the Pacific, the International Astronomical Union, the Netherlands Astronomical Society, and the Canadian Astronomical Society.



PEOPLE

Toastmasters Club

Center Director Noel W. Hinners (r) receives a token of appreciation from Toastmaster Club President Robert Grigsby after addressing a recent meeting.

Hinners' talk was entitled "Getting There from Here - Goddard in the 80's." He discussed topics ranging from identifying and organizing major directorate activities, to justifications for Goddard to conduct scientific and applications research programs.

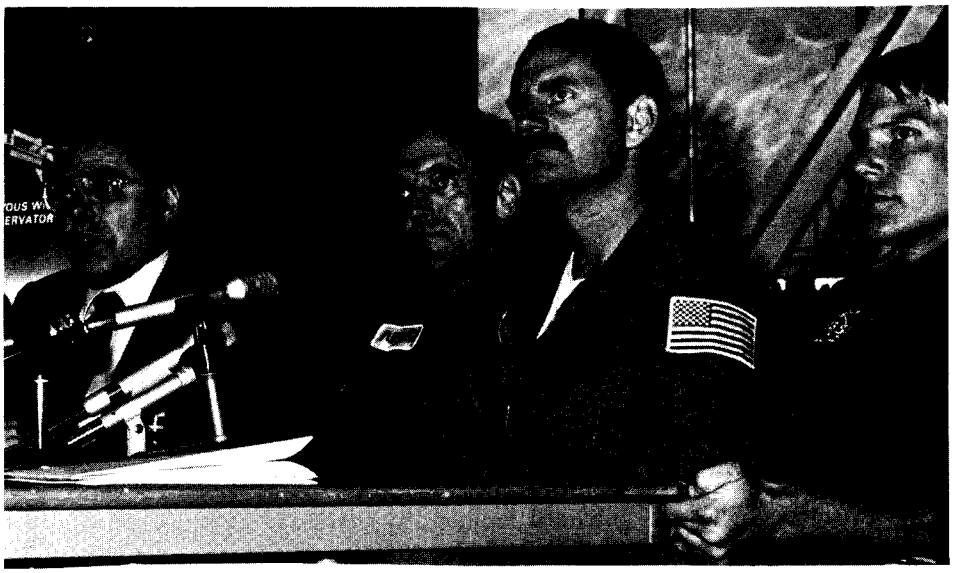
The Toastmaster Club exists to teach people how to use various techniques, like body language, speech organization and voice control, to enhance their communicative skills. The club meets on the second and fourth Wednesday of each month.

Wallops employee Anne L. Davis has received the Outstanding Citizens Award for 1982. The award is presented yearly to a citizen who has shown devotion to the community by contributing to worthwhile projects. Davis was chosen by the Chincoteague Ruritan Club for her work in several clubs and for serving as a board member of a local church. Davis has served the government for 28 years and is a Voucher Examiner in Wallops' Accounting Branch.

Tom Dixon retires

Tom Dixon receives an attaché case from Dr. Jaylee Mead, chairman of the Goddard Scientific Colloquium Committee. Dixon received the gift in recognition of his outstanding contributions in the audio-visual operations for the Center over the past 20 years. Dixon retired March 31.

Astronaut visit



Three of the five STS-13 astronauts visited Goddard recently to discuss details of their upcoming mission. From l-r: Project Manager for the Solar Maximum Mission (SMM) spacecraft repair mission Frank J. Cepollina, Francis Scobee, pilot, and mission specialists James Van Hoften and George Nelson. STS-13 calls for the astronauts to rendezvous with SMM, pull it into the orbiter's cargo bay, make the necessary repairs, and launch it into orbit again. Goddard has responsibility for the operation and repair of SMM.

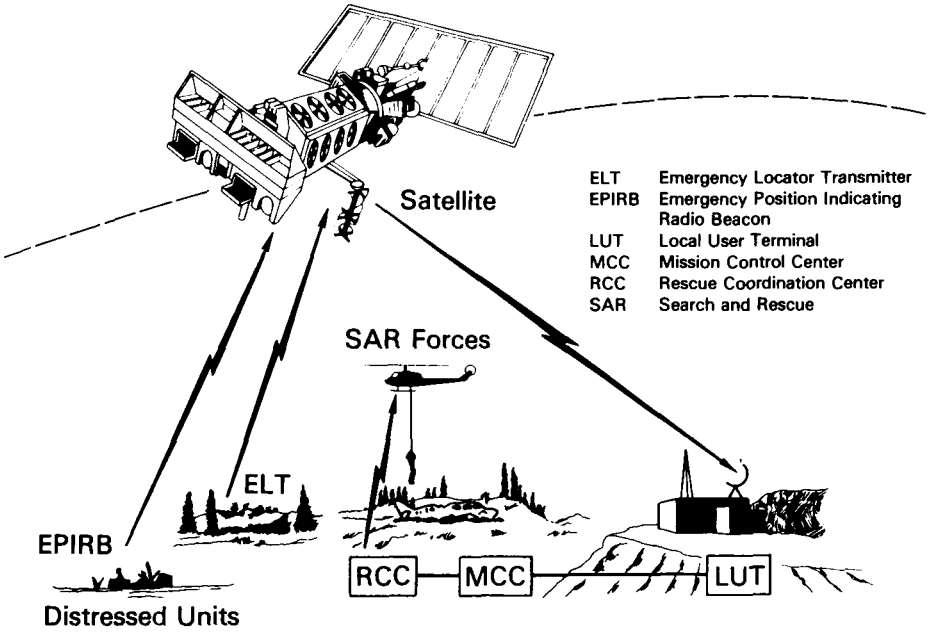
NOAA-E/SARSAT launched

Continued from page 1

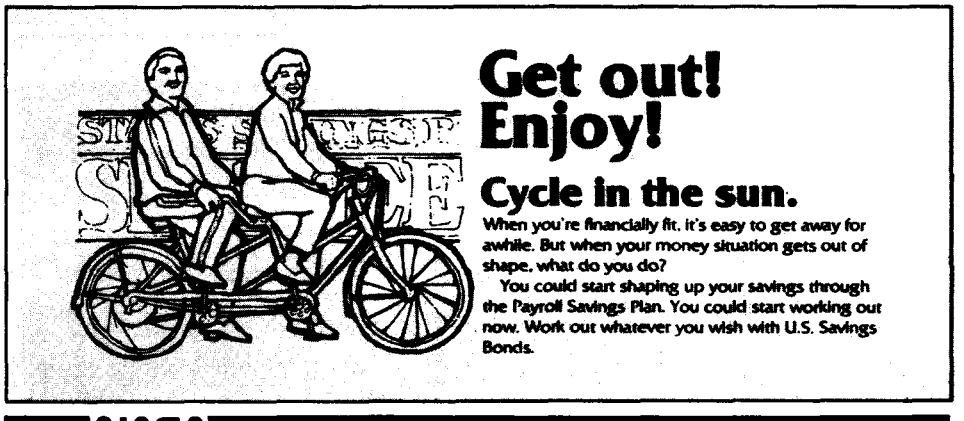
The TIROS program is a cooperative effort of NASA, NOAA, the United Kingdom, and France for providing day and night environmental and associated data for operational purposes on a daily basis.

NOAA-E is the fifth in a series of eight satellites developed to give scientists the most comprehensive meteorological and environmental information since the start of the Nation's space program.

TIROS-N (Television and Infrared Observation Satellite), launched in 1978, was the first in the series of a third generation operational environmental satellite system. TIROS-N was a research and development spacecraft serving as a proto-flight for the operational follow-on series, NOAA-A through G. Advanced instruments on the satellites measure parameters of the Earth's atmosphere, its surface and cloud cover, solar protons, alpha particles, the electron flux density, the energy spectrum, and the total particulate energy disposition at the satellite altitude. As part of its mission, the satellite also receives, processes and retransmits data from free-floating balloons, buoys, and remote automatic observation stations distributed around the globe.



SARSAT System Concept



NASA
GODDARD NEWS

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Editor: David W. Thomas
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Satellite save

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The COSPAS/SARSAT partners originally had hoped for nearly simultaneous launch of SARSAT equipped spacecraft. However, NOAA's previously launched meteorological satellites continued to operate effectively beyond their designed life time, and no replacement was necessary. As a result, the planned 1982 launch of NOAA-E was postponed, allowing the Soviets to launch their satellite first. Several successful rescue operations with the COSPAS/SARSAT system have been carried out saving lives and dramatically reducing search times and costs.

Search and rescue instrumentation will be carried on three NOAA satellites, the first of which was launched last month. Demonstration tests will be conducted with the NOAA satellites once they are in orbit.

NASA
National Aeronautics and Space Administration

GODDARD NEWS

Goddard Space Flight Center Greenbelt, Md. Vol. 30 No. 5 May 15, 1983

GOES-6 spacecraft launched

NASA launched the third in a series of three improved Geostationary Operational Environmental Satellites (GOES) last month in Florida for the National Oceanic and Atmospheric Administration (NOAA).

GOES-6 is in geostationary orbit, positioned at 135 degrees west longitude replacing an older GOES satellite. The older GOES has been placed in a higher orbit and GOES-6 now monitors the western half of the United States, Canada, and the eastern Pacific.

GOES-6 joined a similar satellite, GOES-5, which monitors the eastern half of the United States. Together, these two satellites allow NOAA's National Weather Service to maintain a day-night vigil of severe weather developing over the United States and its adjoining waters. The satellites also are highly valuable to the NOAA forecasters in their preparation of day to day forecasts, particularly in describing short range weather changes.

GOES-5 is of special service in detecting and monitoring hurricanes that develop in the Atlantic and Gulf of Mexico waters, and for locating Gulf Stream system currents for marine interests. Information from this satellite also is used in warning Florida citrus growers of approaching crop-killing frosts.

GOES-6 provides similar monitoring services for the Pacific Ocean and the Gulf of California hurricanes. Information provided by this satellite also is useful for monitoring sea surface temperature variations caused by upwelling of colder bottom waters which carry nutrients attractive to some species of fish. Knowing where these nutrient-rich areas are located is important to commercial fishermen.

Imagery from these satellites is used by commercial weather-casters, including television, to explain and display short range forecasts across the country.

NOAA has maintained operational geostationary spacecraft at the 75 W and 135 W longitude locations for the past seven years as part of its responsibility to observe and monitor the earth's weather as well as some solar activity.

GOES-6 was launched from NASA's launch complex 17-A at the Cape Canaveral Air Force Station. The major instrument aboard the spacecraft is the Visible Infrared Spin-Scan Radiometer and Atmospheric Sounder (VAS). This instrument, first carried into space on GOES-4 on Sept. 9, 1980, not only provides the traditional visual and infrared imagery of the earth's surface and cloud cover familiar to most television weather program viewers, but also can record atmospheric temperatures and the amount, distribution, and movement of water vapor at various levels. These latter functions, known as atmospheric sounding, are being researched by NASA, and will

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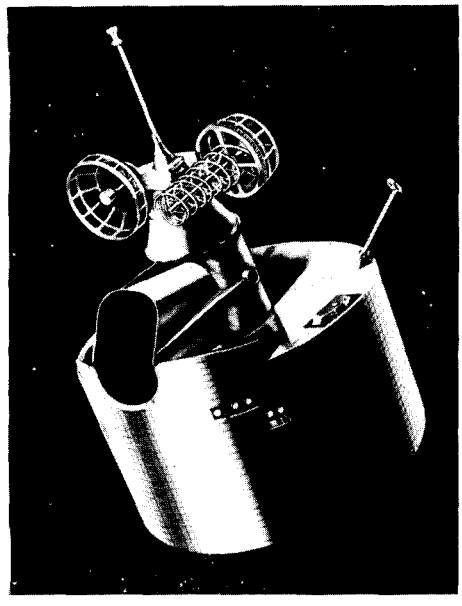

GOES spacecraft

Sounding rocket probes area above Earth's outer atmosphere

NASA launched a three-stage Black Brant X sounding rocket from the Goddard/Wallops Flight Facility last month to probe the interstellar gas above the Earth's outer atmosphere.

Some scientists believe our solar system is immersed in a cloud of matter which originated in the "big bang." They say the solar system evolved from gas and dust which condensed from residue known as the interstellar medium. The properties of the interstellar medium reflect the history of the universe extending back to its beginning.

Much has been learned about large scale properties of the interstellar medium with astronomical techniques. However, two problems limit our knowledge of the local properties: the interstellar medium is very diffuse—just a few particles in a cubic meter; and most of these particles are ionized by solar radiation and swept away by magnetic fields.

Fortunately, however, helium atoms are a part of the interstellar medium, and these atoms can approach the Earth without being ionized by sunlight. During spring, the Earth is moving away from the interstellar gas, and scientists reasoned

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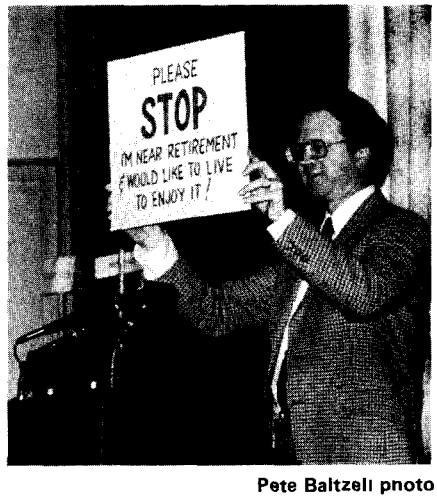
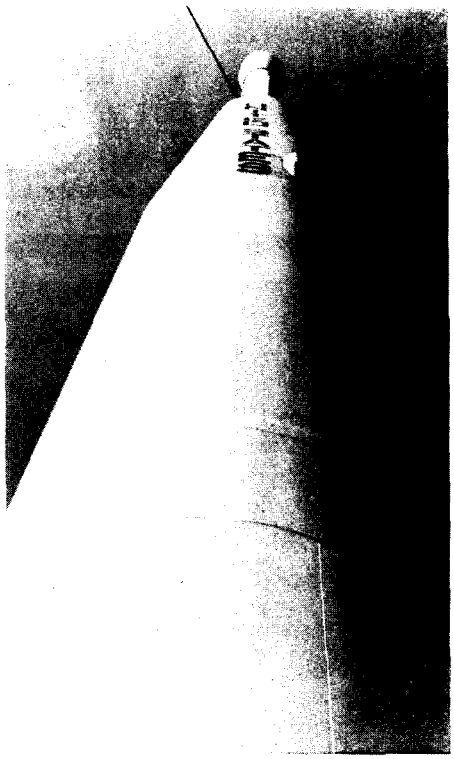
Safety Awards



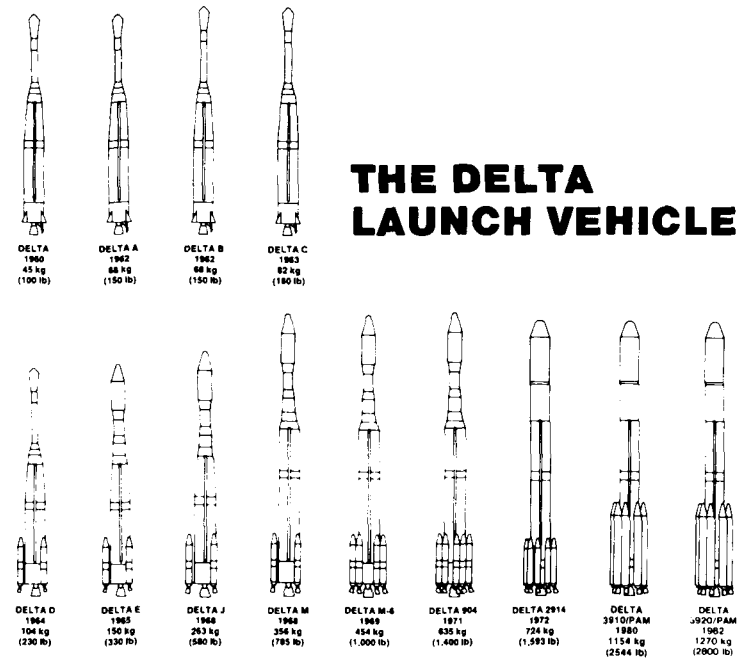
Pete Baltzell photo

See SAFETY AWARDS, page 8



Rick Berry photo

A skyward view of the model Delta rocket on display at the Visitors Center. The 82-foot model is of the Delta A series of launch vehicles and was obtained from the 1964 World's Fair Delta exhibit.



Over the years, the Delta Launch Vehicle has been improved in its performance and launch-to-orbit capabilities to meet the needs of more sophisticated spacecraft systems destined for space. Since 1960, there have been 14 major configuration changes to the launch vehicle.

Today, the Delta can place over 2,400 pounds into geosynchronous transfer orbit, over 20 times its original capability. And with the Delta, spacecraft can be placed into a variety of orbits. These range from the low earth orbit to the geosynchronous orbit at an altitude of 22,300 miles where the spacecraft matches pace with the rotating earth to remain "on station" over the same point above the equator.

The workhorse rocket

Looking up to Delta

Delta has launched more meteorological, communications and scientific satellites, as well as numerous international satellites, than any other free world launch system.

Delta has placed payloads into low, circular Earth orbits, into synchronous transfer orbits, into elliptical Earth orbits extending 170,000 miles into space, and into orbit about the sun. Payloads have varied in size from the 100-foot diameter Echo I to the 28-inch diameter Syncom B; and in weight from the 80-pound Explorer X to the 5,062-pound Solar Maximum Mission.

Delta was the first launch vehicle program in which new developments to upgrade performance have been undertaken on a commercial basis.

Since the first Delta flight in 1960, the Delta rocket has gotten taller, fatter, and in general received "structural plastic surgery." The design changes were necessary so the booster could accommodate larger, heavier and more sophisticated spacecraft. One of the significant changes which helped to improve the rocket's power was the addition of solid motors around the base of the first stage Thor.

It became apparent very early in the Delta history that man's creative ideas would require much bigger machines (spacecraft) to learn more about what's happening in the Cosmos, so mankind could live better here on Earth.

Goddard bears prime responsibility for the Delta launch vehicle, the most frequently used NASA rocket. Project manager is Robert C. Baumann. The powerful rocket has accounted for nearly half of all orbital attempts by NASA. Of these, 93 percent have succeeded. To date there have been 157 successful Delta launches.

Bloodmobile will be here June 8.

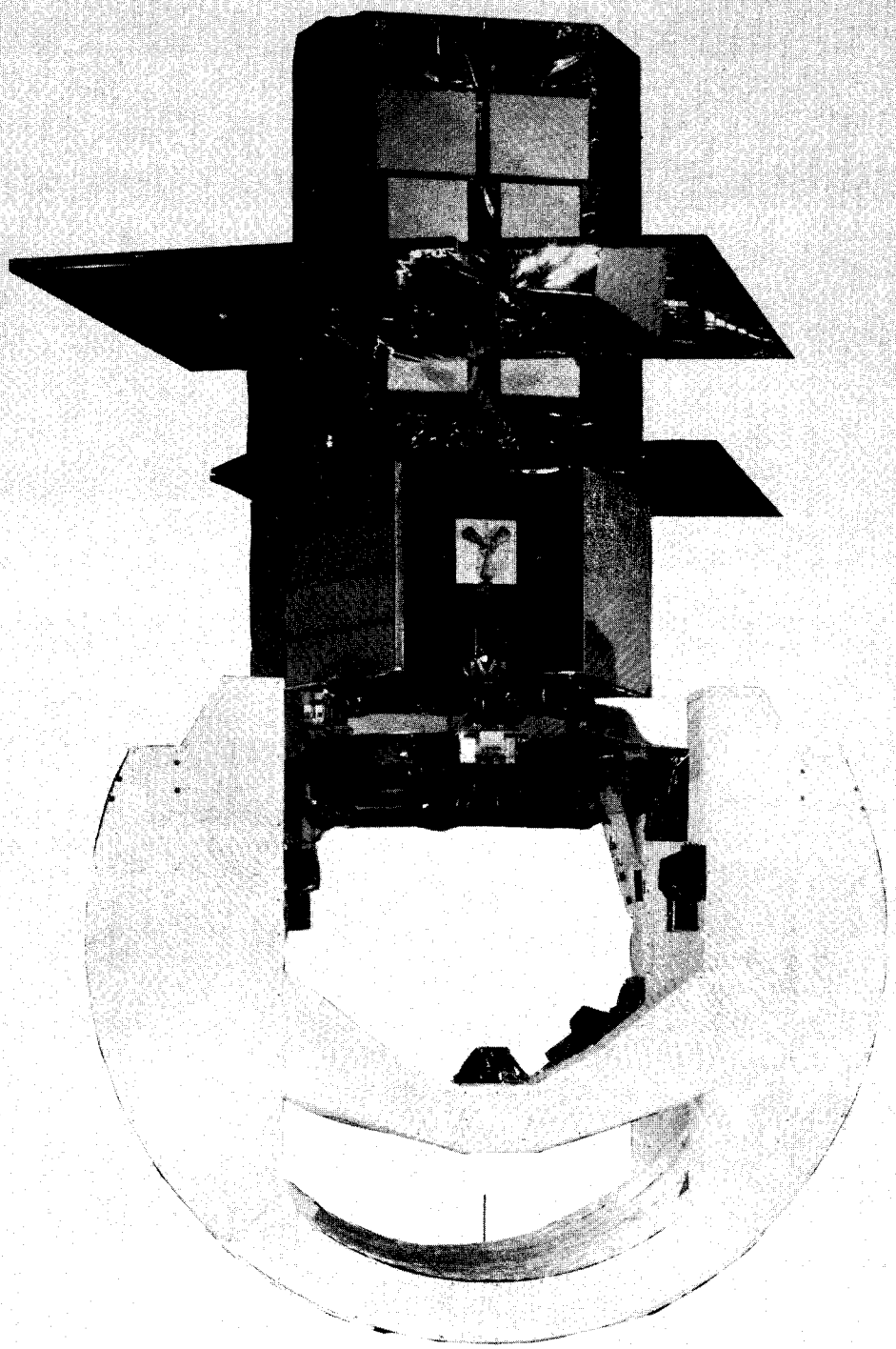
Volunteer.

American Red Cross

Together, we can change things.

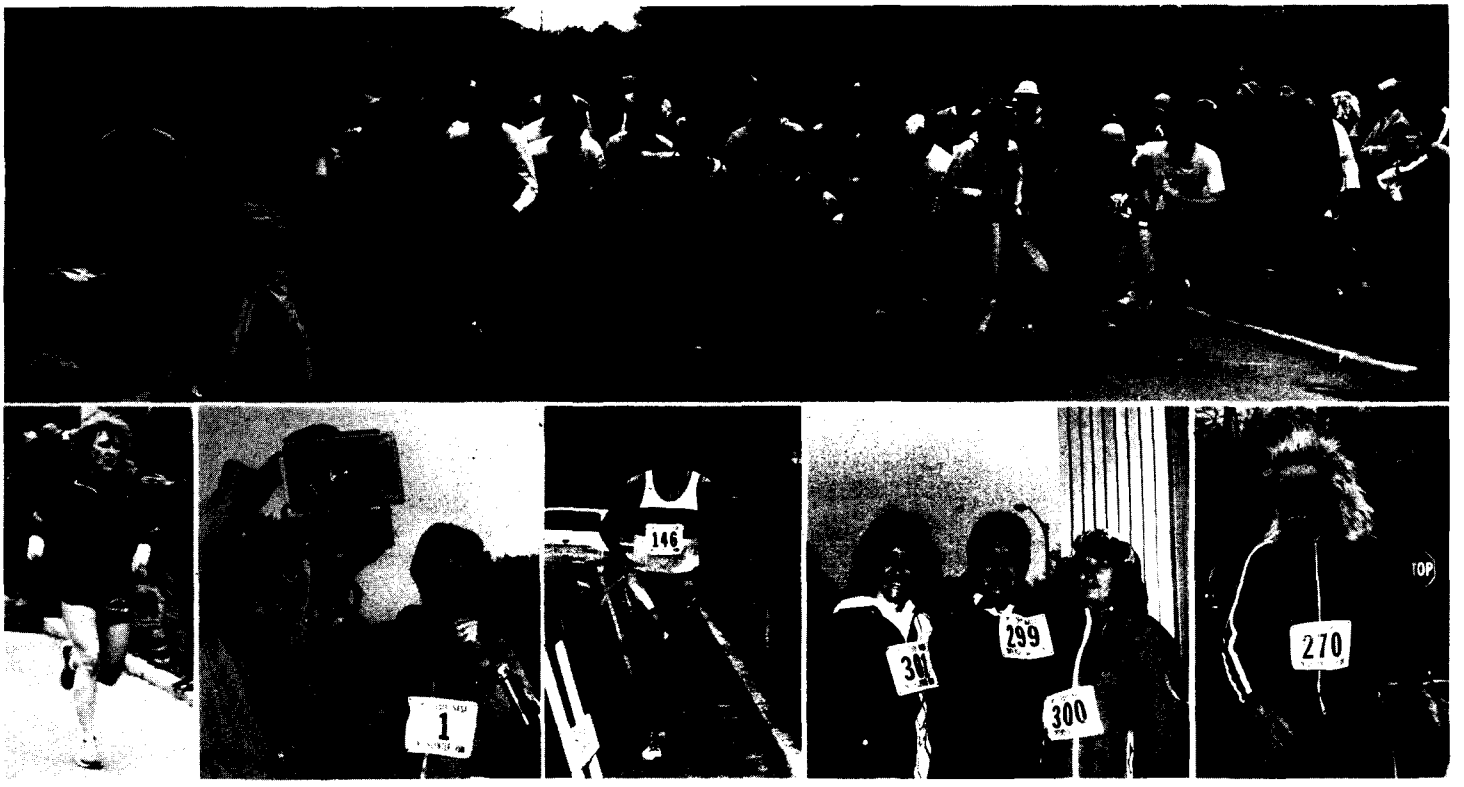
STS-13

SMM repair mission



Joe Walters photo

The Flight Support System (FSS), the cradle fixture, for the STS-13 Solar Maximum Mission (SMM) spacecraft repair mission is shown here with a structural prototype of SMM joined to its positioning platform. STS-13 calls for astronauts to rendezvous with SMM, pull it into the orbiter's cargo bay, make the necessary repairs, and deploy it again. The FSS will be located in the aft section of the cargo bay. Goddard has responsibility for the operation and repair of SMM. The FSS now sits in the clean room, undergoing tests and evaluation.



Debora McCallum photo

Top: Two Hundred and fifty-nine runners begin the 15th annual Intercenter Fun Run. Bottom l-r: Danalee Green, NASA HQ; Center Director Noel W. Hinners announces the opening of the new physical fitness lab in building five; first place winner Tim Minor; Delores Cartier, Jeanette Hines, Patricia Higgs; mystery runner.

FUN RUN

Two hundred and fifty-nine runners and walkers braved unseasonably cold weather and falling snow to complete the 15th Intercenter Fun Run April 20. Tim Minor, code 900, finished first in the two-mile run with a time of 9:36. Former Goddard contractor Nelda Casper captured the number one spot for women at 12:54.

Also finishing in the top 10 were Tom Nolan, code 600, 11:08; Michael Markus, code 900, 11:35; Glenn Stewart, code 200, 11:39; Mark L. Stauffer, code 900, 11:53; Eric Nielsen, code 900, 11:57; Kenneth G. Walton, code 800, 12:01; Tony Mostek, code 900, 12:02; Jon Busse, code 700, 12:07; and Edgar Hemminger, 12:14.

The top ten women were: Claire Parkinson, code 900, 13:08; Mary Callan, 13:10; Danalee Green of headquarters, 13:45; B. J. King, code 100, 14:20; Christina Sante, code 400, 14:31; Arlene Bigel, 14:47; Linda Brennan, code 400, 15:28; Barbara Beckford, CSC, 15:30; Mary Ann Esfandiari, code 600, 15:38; and Sharon Anderson, code 900, 15:55.

Blake Heart Run For Life

TEAMS ON THE RUN – Members of the Goddard Running & Orienteering running team display the plaques they earned for winning first place in the Masters and Female divisions of the "Teams On The Run" competition during the Blake Heart Run For Life 10 kilometer race on Saturday, April 23 at West Potomac Park in Washington, D.C. More than $60,000 was raised to help the American Heart Association in metropolitan Washington fight heart attack and stroke.

Nimbus-5 operations terminated

Operations of the Nimbus-5 earth observation satellite have been terminated. The satellite became expendable when its last on-board tape recorder ceased operation in November 1982. Nimbus-5 was launched in December 1972, and there have been many notable achievements with the instrument data obtained during the 10-year operating lifetime.

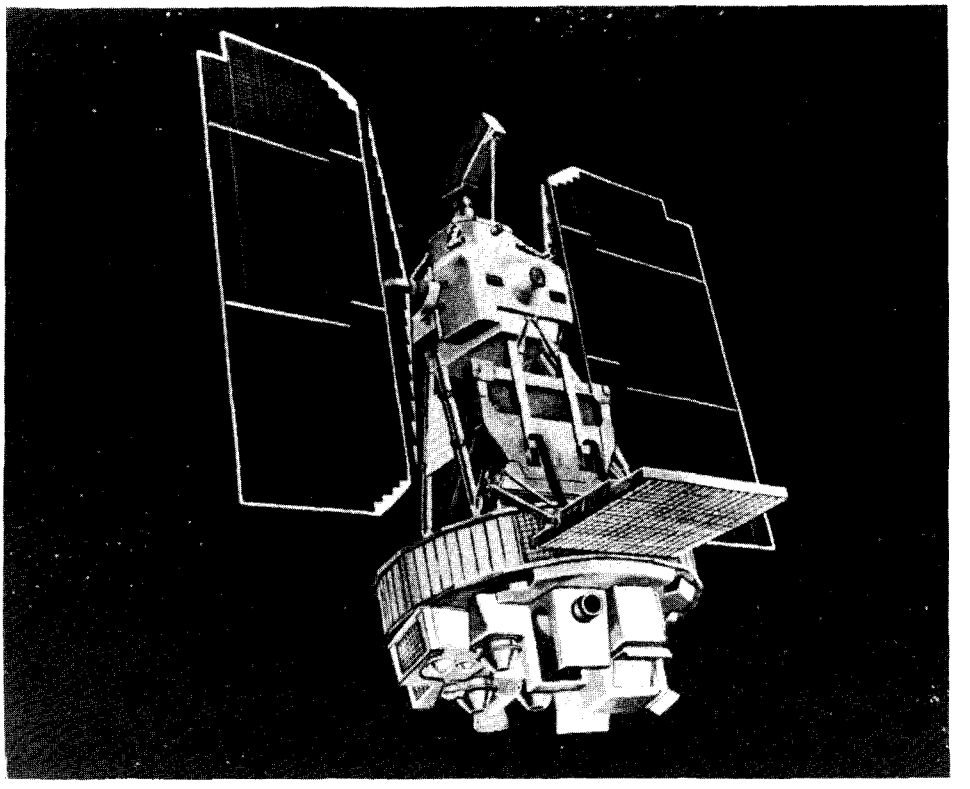
The Electrically Scanning Microwave Radiometer (ESMR) has been a source of all weather information regarding polar ice boundaries. Until the recent failure of the remaining spacecraft tape recorder, the data was used operationally by the U.S. Navy for polar resupply planning and as an input to the Joint NOAA/Navy Ice Center weekly polar ice maps available to the world community. It was also the source of the multi-year ice atlas generated by Goddard. Data of the Nimbus-5 type is now being supplied to the U.S. Navy by the Nimbus-7 Satellite.

The Nimbus-E Microwave Spectrometer (NEMS) was the first instrument to apply the microwave spectrum to sensing the atmospheric temperature structure on a global scale as well as determining atmospheric humidity and cloud water content over oceans. NEMS data, in conjunction with the three-dimensional temperature field provided by the Infrared Temperature Profile (ITPR) instrument, was the source of satellite data used in the Data System Test of the Global Atmospheric Research Program (GARP), demonstrating the utility of multispectral temperature sounding information in weather forecasting models.

The data from the Selective Chopper Radiometer (SCR) provided soundings of the stratosphere that were improved over those derived by the earlier Nimbus-4 and were for several years used in an operational mode by the world meteorological community.

The Surface Composition Mapping Radiometer (SCMR) demonstrated its capability to determine the composition of unvegetated terrain surfaces and became the basis for the Heat Capacity Mapping Mission (HCMM) program.

The data from the Temperature Humidity Infrared Radiometer (THIR) was the source of daily sea-surface temperature maps used in the Joint National Science Foundation/NCAR/NASA Upwelling Experiment off the West Coast of Africa. This activity was the first demonstration of international oceanographic research activity and of near real-time acquisition, distribution, and utilization of satellite data.



Art of Nimbus-5, whose operations have been terminated. Nimbus-5 was the first satellite capable of taking vertical readings from space through clouds.

Goddard mourns

Allen (Al) W. Niles died April 22, 1983, after a short illness in the Cape Canaveral Hospital. In the early 1950's Niles was with the Naval Research Laboratory (NRL), and was in White Sands, New Mexico on the Viking Program and participated in the historic Viking launch from the Norton Sound in the South Pacific. He came to the Cape in 1955 and was a member of the NRL Vanguard Team. He remained at the Cape and became a member of Goddard when it was established as part of NASA and worked in unmanned operations on the Delta, Atlas Centaur, and Atlas Agena Programs until his retirement from NASA in 1974.

Contributions can be made to the American Heart Association, Canaveral Chapter, 3435 South Hopkins Avenue, Titusville, Florida 32780.

Retiree announcement

Two former Goddard employees are forming a 'Goddard Alumni Club' for retired Goddard employees who would like to keep in touch with former co-workers. All interested persons should contact Roland Van Allen, (301) 577-2119 or Gesse Stern, (301) 422-9506.

Keep the Center in touch with what you are doing.

Mail your story to the Goddard News, Code 202, or call the Editor at

344-8102

Ten years of tutoring for tots

CDC celebrates tenth anniversary

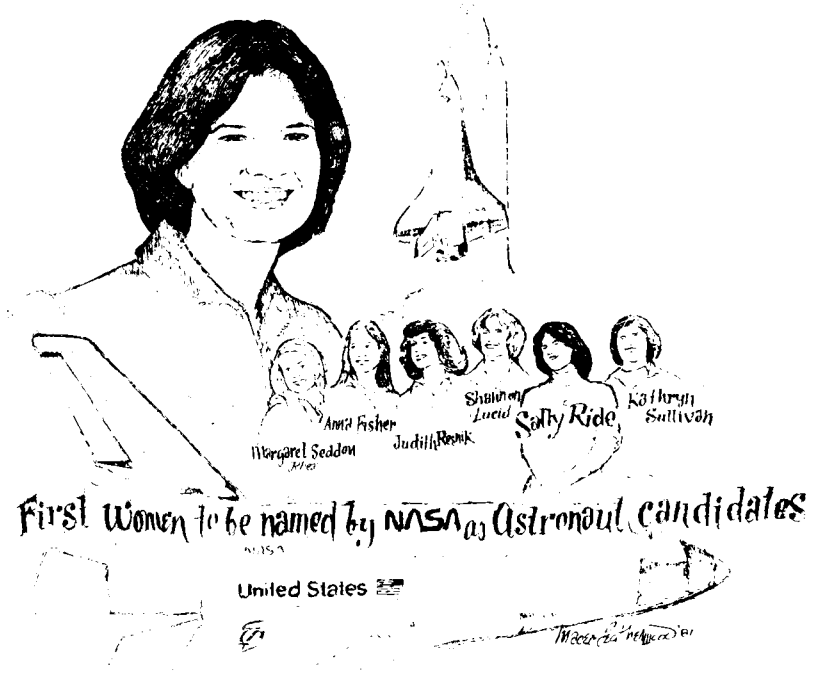
Debora McCallum photos

Goddard's Child Development Center (CDC) celebrates its tenth anniversary next month with an anniversary party June 12 at the rec center. The party begins at 1:00 PM and present as well as former families are invited.

A group of parents started the CDC and felt then that day care at the work site would be effective. Indeed, it has proven effective as evidenced in the convenience of day care at the work site for working parents, as well as the comprehensive curriculum available for children ages 32 months to six years old. The CDC tends 45 children daily from 7:15 to 5:30.

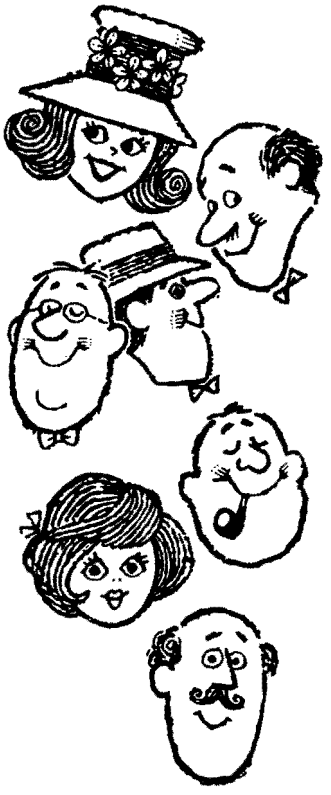
Children are encouraged to think for themselves at the CDC and thus make many decisions concerning themselves. For instance two kids bickering over something might be able to solve the problem themselves. "Often adults neglect to see if the kids involved have a solution to their problem, "said Barbara Karth, head, CDC. "Sometimes, when you ask them what should be done, their solution is more effective than an adults."

Karth feels that society needs to be responsible for the children. She said that the earlier we begin developing their minds and bodies, the better chances are of them becoming model citizens. The CDC provides much more than just day care, it operates on the premise that the children are our future and seeks to prepare them to preserve it.



The person highlighted is Sally K. Ride, the first woman scheduled to trek into space aboard the shuttle. Ride is a mission specialist for STS-7, scheduled for launch no earlier than June 18. She and four other crew members will make Challenger's second voyage on a planned six-day mission.

25th Anniversary
1958-1983



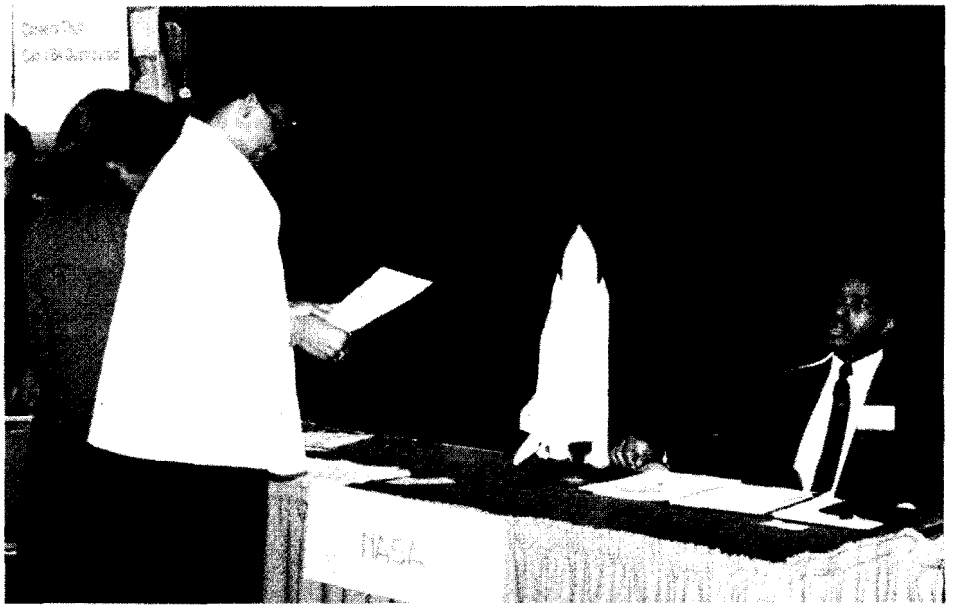
Many...

who never saved a penny...

are saving plenty...

with U.S. Savings Bonds through the Payroll Savings Plan.

PEOPLE



Rick Berry photo

Michael Parrish (r) answers a student's questions about career opportunities at Goddard. Parrish, a Goddard personnel staffing specialist, was among nearly 60 private and government recruiters present at the University of the District of Columbia's annual Career Fair. Last Month's day-long fair attracted about 300 students.

CFC Awards

Deborah McCallum photo

The following received awards from the Director in recognition of their outstanding service to the 1982-83 Combined Federal Campaign (CFC) drive. L-r: Clayborne Magee, Bill Cooper, Sandy Morey, Susan Donnelly, Betty Gasch, Jan Tetrick, Center Director Noel W. Hinners, Marietta Sturgell, Kathy Bayer, Harry Montgomery and Dr. Fritz von Bun. Not pictured are Flo Boswell and Oscar Osvatics. Goddard collected $233,000, three percent over its $202,000 goal. Ninety percent of the directorates were over goal. Goddard will receive a presidential CFC award this month called the Exceptional Achievement Award.

GOES-6

Continued from page 1

eventually be used operationally by NOAA.

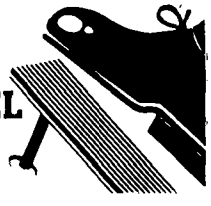
The VAS instrument detects and measures reflected sunlight and can sense infrared energy in 12 spectral bands, 11 more than the radiometer carried on earlier GOES satellites. This expanded capability gives the VAS its sounding ability. The spacecraft has a communications subsystem which includes the transponder for the Data Collection System and the telemetry and command subsystems.

The Data Collection System collects and relays environmental data back to earth from more than 1,500 existing remote platforms on land, at sea and carried aloft by balloons and aircraft, while the telemetry subsystem performs a variety of communications functions.

Also included in the spacecraft's instrumentation package is a Space Environment Monitor which obtains measurements of solar activity, detects solar flares and measures solar wind intensity and the strength and direction of the earth's magnetic field.

Once checked out by NASA, the new spacecraft will be under the control of NOAA's National Environmental Satellite Data and Information Service (NESDIS), Suitland, Md., which will make the imagery and digital data available to users world-wide through its existing distribution network.

ALL IN FAVOR OF SAVING FUEL
RAISE YOUR RIGHT FOOT



Sounding rocket

Continued from page 1

that a sounding rocket, shot out well ahead of the Earth, would be in a position to intercept fast-moving helium atoms as they stream Earthward.

In last month's launch, Dr. John Moore, University of Maryland, and Drs. Chet Opal and Robert Meier, Naval Research Laboratory, used a slotted disk velocity selector which admits fast moving atoms to the exclusion of all other atoms. The fast atoms strike an electronic detector and are counted. The instrument scans back and forth across the sky, and, by recording the direction of the incoming helium atoms, determines the temperature and the source of the interstellar medium. Flight data is being analyzed to determine whether all mission requirements were met and scientific results are currently being published.

The Black Brant X sounding rocket sits poised for launch moments before liftoff from the Goddard/Wallops Flight Facility.

Safekeeping

On-the-job safety should be of prime importance to all of us. But our concern for safety shouldn't stop as we drive out the gate at the end of our workday. With warm weather arriving, there will be many things most of us will be doing around our homes. Many of our activities will be safe, while others can be dangerous.

Let's consider mowing the lawn. With a sharp, steel blade spinning around 3,000 times a minute, a lawnmower can hurl a stone or piece of glass with bullet-like speed, or sever toes or fingers instantly. Even the most safely-designed mower is only as safe as the person using it.

With these things in mind, here are some suggestions to make lawnmowing a safer task. Always wear shoes that will give you maximum toe protection and traction. Keep hands and feet clear of the blade area at all times when the mower is running. Where applicable, make sure bags or deflector shields are properly installed. When lifting the mower to clear away excess grass cuttings, disconnect the spark plug wire for extra protection against accidental starting. If you must move your mower up any steps to mow another portion of the yard, shut it off before moving.

This is a message from the Management Operations Safety Committee.

Safety Awards

Continued from page 1

No, Center Director Noel W. Hinners is not ready for retirement despite the sign he is holding. He used the sign during his recent talk at the annual Safety Awards Ceremony. Recent retiree Pat Kelly used the sign for crossing the streets on Center and, according to Hinners, the sign can be viewed as a preventive safety measure.

Hinners went on to say that "Goddard's policy is to establish and maintain an effective accident prevention program, that will ensure the utmost safety for employees on all levels." Hinners said the best evidence of a good safety program was the safety awards ceremony, an event set aside to acknowledge those that have made significant contributions to accident prevention, and thus make the Center a safer place to work.

NASA
GODDARD NEWS

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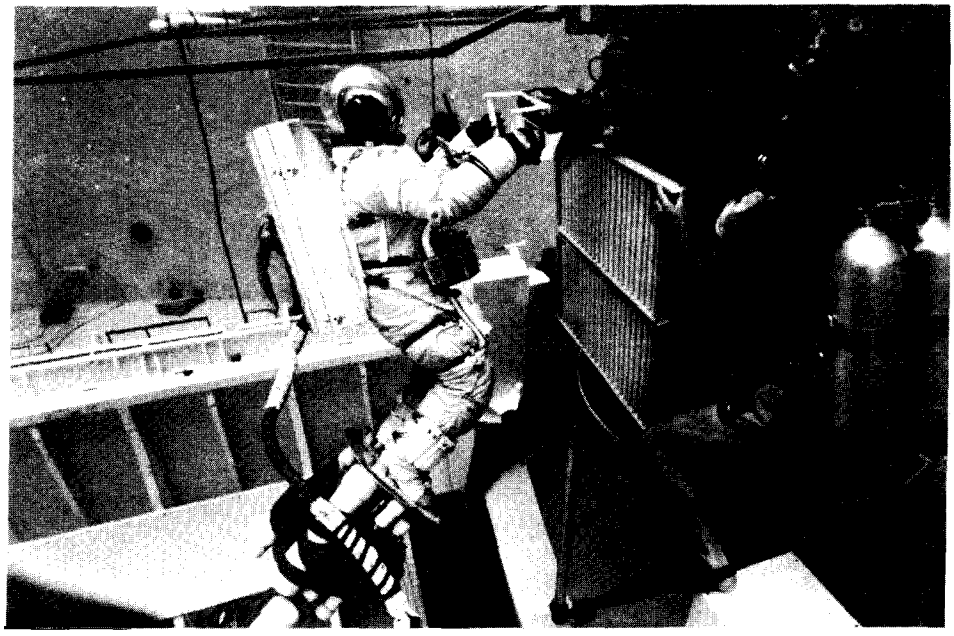
Editor: David W. Thomas
Assistant Editor: Joni Frostbutter

NASA
National Aeronautics and Space Administration

GODDARD NEWS

Goddard Space Flight Center, Greenbelt Md. Vol. 30 No. 6 June 15, 1983

Planning, training keep apace for STS-13 repair mission



Astronaut George Nelson, in space suit, trains for the STS-13 mission in an underwater training facility at Marshall Space Flight Center, Huntsville, Alabama. Looking on is a diving safety official.

Planning and training on Goddard's project for the repair of the Solar Maximum Mission (SMM) spacecraft during the STS-13 mission continued at an increased pace in recent weeks with heightened activities taking place at several locations, according to Frank Cepollina, Goddard's project manager.

At Goddard, work is progressing nicely on construction of a mockup of the Shuttle payload bay, where the astronauts will train with the Flight Support System (FSS). The FSS is the device to be carried on Challenger on the STS-13 flight into which the SMM spacecraft will be deposited for repair by the astronauts. The device has been fabricated and tested by Goddard.

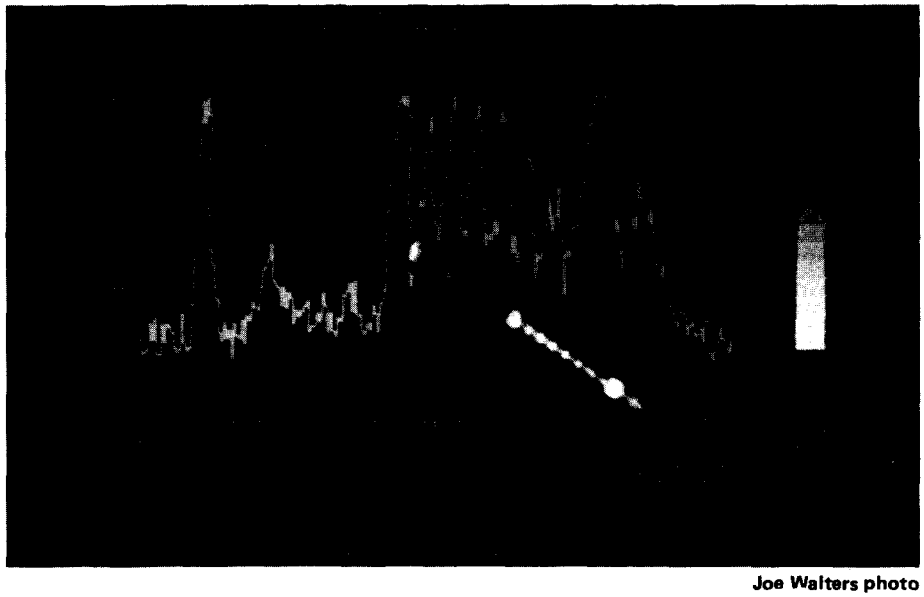
The Shuttle mockup is expected to be completed about September 1, Cepollina reported.

Continued on page 8

IUE makes startling comet observation

Shortly after its discovery by an infra-red satellite and two amateur astronomers, a second astronomical satellite observed Comet IRAS-Araki-Alcock as it made its closest approach to the Earth (2.95 million miles). The satellite, the International Ultraviolet Explorer managed by Goddard, made a startling discovery while observing the comet as it appears in ultraviolet light. The comet seems to contain a substance neither observed before in comets nor anticipated by theory, diatomic sulphur. The tentative identification of diatomic sulphur was made by two university astronomers using the International Ultraviolet Explorer as guest observers: Dr. Michael F. A'Hearn of the University of Maryland, and Dr. Paul D. Feldman of Johns Hopkins University. The astronomers made their

Continued on page 4



Joe Walters photo

A spectrum of Comet IRAS-Araki-Alcock taken on May 11 with a superimposed graph of intensity versus wavelength. The strongest emissions are due to OH; nearly all others are due to S_2 and CS.

Mobile tracking system being used

offers rapid deployment to remote sites

Goddard has developed and is using a new type of highly mobile satellite laser tracking system called the Transportable Laser Ranging System (TLRS-2), with a tracking accuracy of approximately 2-4 cm, designed for rapid deployment to remote sites. The system was constructed and tested here and arrived on Easter Island in the Pacific Ocean earlier this year.

To meet rapid deployment and precision requirements, the system employs modular construction, and low power laser and single photon detection techniques. The TLRS-2 is packaged to fit in the cargo holds of passenger jet airliners.

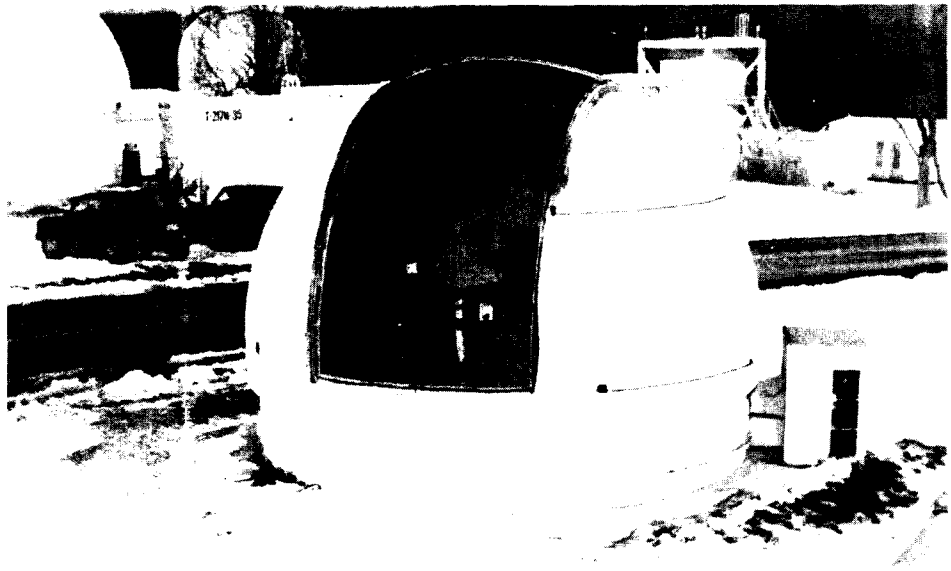
Satellite tracking operations were successfully accomplished last summer, and the TLRS-2 began formal collocation intercomparisons with Goddard's Mobile Laser Ranging System (MOBLAS-7) in September of 1982. After collocation tests were completed, the system was shipped to Easter Island. Routine tracking of the Laser Geodynamic Satellite (LAGEOS) began March 5 and will continue for six months. Lageos acts as a reflector for Earth based laser signals, measuring the transmit times to and from the spacecraft, permitting extremely accurate measurements of changes in the Earth's crust (as small as 0.8 inches).

The Easter Island observations are to be repeated annually, and are important for measuring baselines between the Nazca Plates and the Pacific and South American Plates, where predicted relative motions are expected to range from 8 to 15 cm/year.

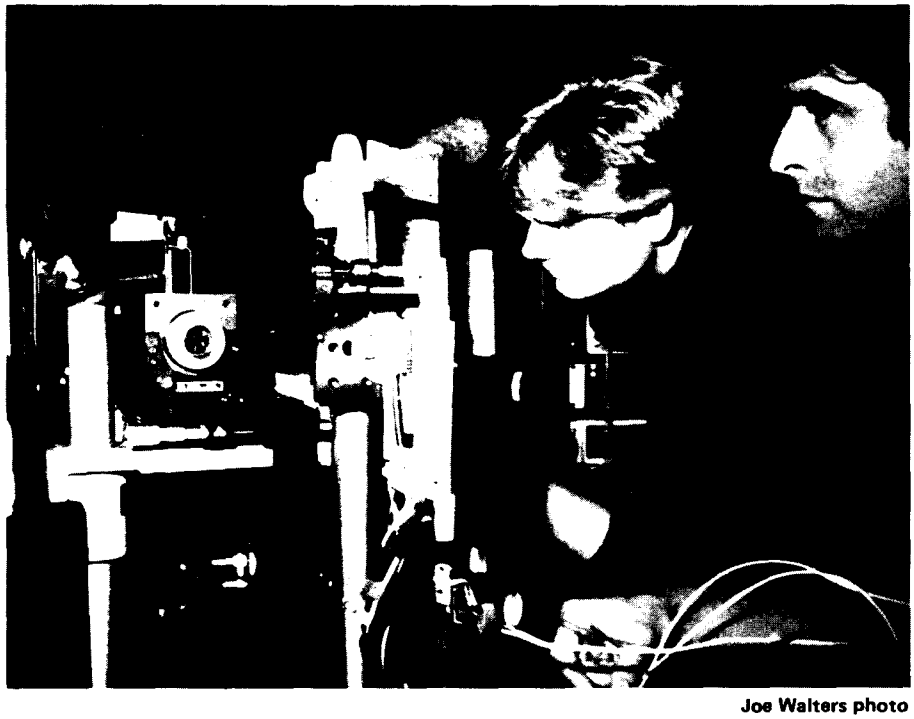
Scheduled to begin in 1984, TLRS-2 observations from Easter Island will also support highly mobile Satellite Laser Ranging observations along and within the deformation zone of the Andes in western South America.

Following the Easter Island operation, the system will be returned to the continental U.S. for an observational campaign at project sites in the southwestern U.S. and Mexico.

TLRS-2



The TLRS-2 highly mobile laser tracking system while in collocation testing at Goddard. The system is designed for 2 cm precision and rapid deployment to remote locations for ranging to orbiting satellites.



Joe Walters photo

Don Cornwell (1) and Goddard's Dr. James Kalshoven experiment with a prototype model of a scanner to be used in testing the next generation of NASA's remote sensors. Cornwell is a local high school student who works in Dr. Kalshoven's Multispectral Linear Array (MLA) Assessment Laboratory (code 925). The MLA concept is the all solid state remote sensor in the Landsat class now being developed. The arrangement of mirrors is a patentable technique designed to simulate spacecraft motion while keeping both scene and detectors fixed while maintaining exact focusing. The technique was proposed by Mitch Finkel (code 972), assigned to the lab full time. Cornwell helped David Tom (code 925), also assigned to the lab full time, build the prototype model, using wood to save time and costs for the large mirror mounts. The model has successfully demonstrated the new scanning technique and represents the early stages of what could be one of NASA's most advanced sensors.

Library User Committee

Marjorie Small photo

Front row l-r: Hubert Tschunko, code 717; Ken Schatten, 961; John Boggess, library staff; William Lau, 915; Ken Behannon, 692; Adelaide Del Frate, librarian; and Dr. Steve Paddack, 400A. Back row l-r: Robert Nelson, LUC president (code 502); Richard Fahey, 685; and Hugh O'Donnell, 855. Not pictured are: Helen Rothman, 110; Mary Holland, 200; Walter Viehmann 313; Robert Streitmatter, 661; and Bhaskar Choudhury, 924.

Since 1965, Goddard's Library User Committee (LUC) has provided valuable services to the Center, assuring that all library users' needs are properly addressed, according to Goddard's Librarian Adelaide Del Frate.

"The committee serves three important functions," Del Frate said. "First, the LUC provides valuable feedback from the user community. This communication channel is essential for an effective library system. Second, the group anticipates research needs based on the changes and modifications in Goddard's mission. This ensures appropriate library resources to support mission personnel. Third, the LUC works with the library to develop long range plans for both facilities and resources."

An increased book budget is probably the most recent and the largest impact that the LUC has had. Del Frate noted that the library's book budget doubled in 1981, "a direct result of the committee's lobbying efforts." Other benefits from the LUC are: the conversion from microfilm to microfiche for searches, and the labeling of rows of books by subject, added to the usual numbering system, making "walk through" browsing easier.

"The LUC envisions a future remote terminal reference system for the library," said LUC Chairman Bob Nelson (code 502). This will allow convenient access to library data from an office equipped with a terminal, telephone, and modem.

The LUC encourages feedback from users or potential users. If you have inquiries or suggestions please contact your LUC representative.

A few famous firsts

- **Goddard is the first and only national laboratory with competence of developing, designing, fabricating, testing, launching and analyzing space science missions.**
- **Goddard is the nation's first laboratory to have developed world-wide communications facilities in support of U.S. manned and unmanned missions.**
- **Goddard provided the first links with Apollo astronauts on the moon. Voice and data links between the astronauts and Earth were received by Goddard's world-wide tracking network, relayed to Goddard and then sent to Manned Space Flight Mission Controllers in Houston, Texas.**

Visitor Center happenings

Below is a list of forthcoming special events and displays offered to the public at the NASA Goddard Visitor Center and Museum. The Visitor Center is open Wednesday-Sunday 10 am to 4 pm for free self guided tours and is located east of the Washington beltway off Route 193 in Greenbelt, Maryland. There is free parking, a picnic area and a museum shop. Telephone: (301) 344-8981.

June 25-26	Amateur Radio Field Day. Goddard members of the American Radio Relay League participate in a national emergency preparedness drill. 10 am-4 pm
July 4	Independence Day. Museum open 10 am-4 pm
July 10	Spacecraft Integration. Explorer Scouts of America prepare science experiments for loading aboard a space shuttle. 10 am-4 pm
July 17*	Space Week Model Rocket Contest. National Space Institute and American Institute of Aeronautics and Astronautics award prizes to youngsters who have the most accurate and longest duration model rocket flights. 9 am-3 pm
And on Thursdays	Guided tour of spacecraft mission control areas[1] 2 pm

*July 24 raindate

[1] tour suspended during space shuttle missions

Dr. Yoji Kondo is visiting professor in Japan

Dr. Yoji Kondo

Dr. Yoji Kondo of the Laboratory for Astronomy & Solar Physics has been invited to be a visiting professor at the Institute of Space & Astronautical Science (ISAS) in Tokyo, Japan.

ISAS is renowned for its research activities in space science. They have been responsible for such successful satellite programs as Hinotori (firebird or phoenix) solar satellite, Hakucho (swan or cygnus) and Tenma (sky horse or pegasus) X-ray satellites, the last of which was launched in February this year and is yielding exciting scientific results.

At ISAS, Kondo will be engaged in astrophysical research of common interest with the Japanese, including planning of coordinated observations with the International Ultraviolet Explorer (IUE) and Tenma. It is also anticipated that his visit at ISAS will help enhance the communication link between the U. S. A. and Japan in regard to possible future collaborations in the space program.

Kondo, who is Project Scientist for the ongoing IUE, will be paying two visits to ISAS in 1983, each consisting of one and a half months; his first visit will be from May 23 to July 8. During his absence, Dr. Robert D. Chapman, associate chief for Laboratory for Astronomy & Solar Physics, will be acting as IUE Project Scientist.

Think About it...

Consider the postage stamp. It secures success through its ability to stick to one thing until it gets there.

-Josh Billings

IUE comet observation

Continued from page 1

tentative identification from the spectra obtained with the satellite's spectrographic detector. The detection of diatomic sulphur could contribute significantly toward our understanding of the chemical processes in comets on their approach to the sun.

Sounding rocket experiments support solar system theory

Recent sounding rocket experiments involving the release of two metallic gases into the ionosphere have provided tentative additional support for a solar system evolution model which was first presented in 1942.

This past March an international team of experimenters from the University of Alaska (Fairbanks), Cornell University (Ithaca, New York), University of California (San Diego), and the Max Planck Institute for Extraterrestrial Physics (Garching, Federal Republic of Germany), carried out two rocket-borne experiments from Peru as part of the NASA-sponsored Project Condor.

The experiments used shaped explosive charges with liners of two different metals–strontium and barium–to produce high velocity gases. The experiments were designed to test a theory proposed by Dr. Hannes Alfven, University of California, San Diego, that a neutral gas will ionize if it crosses magnetic field lines at greater than critical velocities.

Since this theory was first proposed both theoretical work and laboratory experiments have been devoted to testing the effect. Until the Project Condor experiments, however, none of the tests had been carried out in space – the only plasma laboratory where containment vessel effects are nonexistent.

To verify and understand the physical effects proposed by this theory, experiments were needed which created conditions similar to those in the gas cloud from which the solar system was formed. The Project Condor experiments mimicked those conditions by injecting neutral gas across magnetic field lines at speeds greater than the critical velocity. At the magnetic equator, near the launch site, this can be done with sounding rockets due to the horizontal geometry of magnetic field lines.

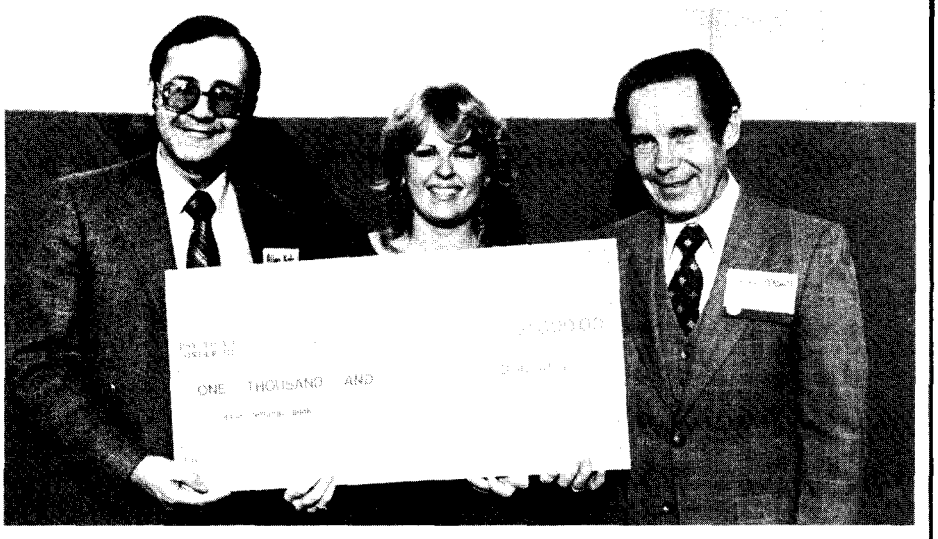
In the barium experiment, measuring instruments were placed in the gas stream about 2 kilometers from the explosive release at 447 km altitude. Electrons, ions and plasma waves expected in the Alfven ionization mechanism were detected. Because the sounding rocket experiments are extremely short-lived, some initial ions were required to seed the process. Solar ultra-violet light provided the seed ionization and the subsequent barium ionization was observed to be very efficient, Dr. Eugene Wescott, the University of Alaska investigator, said.

The strontium experiment differed in that there was a negligible seed ionization due to ultraviolet raidation resulting in very little strontium ionization. Although the strontium experiment was not as efficient as the barium, on the solar system evolution scale of millions of years, this process could be quite efficient and would produce the desired differentiation and energy transfer required to produce the conditions for planetary formation.

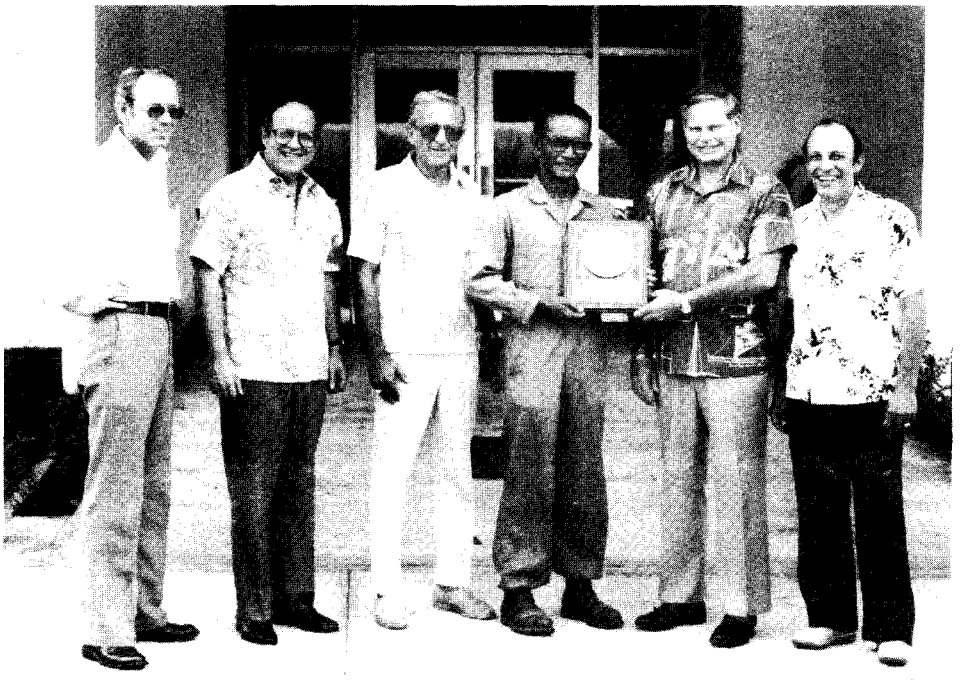
The Alfven – Arrhenius theory is an attempt to answer the question of why all the gas and dust from the solar nebular did not fall into the sun and why all the planets have differing compositions. Dr. Gustaf Arrhenius, Scripps Institution of Oceanography, University of California (San Diego), has collaborated with Alfven on this theory.

PEOPLE

Co-op student wins scholarship



Lori K. Lewis is awarded a $1,000 scholarship from Riggs National Bank for her academic performance as well as responses to essay questions regarding career goals, community involvement, student activities, work experience and banking course relevance. Lewis is an accounting major at Strayer College and has completed a co-op in Goddard's Budget Analysis Office. She is returning to Goddard's Wallops Flight Facility late this month to begin another co-op. L: Allen H. Katz, chairman, Strayer Accounting Department; R: James E. O'Neill, vice president and comptroller of Riggs, and Strayer College alumnus.



OUTSTANDING PERFORMANCE AWARD – Guam tracking station has received its fourth Outstanding Performance Award. Art Mantanona, antenna maintenance technician, accepts the award from Donald E. Smith, vice president of Spaceflight Tracking and Data Network (STDN), Bendix Field Engineering Corporation (BFEC). The award, for the July, August, September, and October 1982 performance period, was made in conjunction with the STDN Motivational Program. The program's purpose is to improve overall performance in all phases of the Bendix contract operation for Goddard. From l-r: M. Edward Briggs, manager, STDN station operations; Daniel A. Spintman, chief, Network Operations Division, Goddard; John P. Obloy, BFEC senior manager, Guam; Mantanona; Smith; and George J. Karras, NASA station director. Guam.

Dr. Eugene Garfield

Dr. Eugene Garfield, an expert on the uses and abuses of scientific literature citations spoke at a Scientific Colloquium last month, and described how a carefully performed citation analysis can lend objectivity to performance evaluations. Garfield is president of the Institute for Scientific Information and is publisher of "Current Contents" and the annual "Citation Index."

He discussed practical and conceptual limitations of citation data, and offered guidelines for using the citation analysis technique. A recently developed literature classification scheme called co-citation clustering was also discussed. Some of its applications as an evaluative tool were illustrated.

Dr. Ronald G. Prinn

Dr. Ronald G. Prinn spoke at a Scientific Colloquium last month and lectured about the chemical composition of the satellites of Jupiter and Saturn being largely determined by the conditions of their formation. According to Prinn, in many ways, the birth of these miniature planetary systems resembled that of the solar system. Yet the interaction between chemistry and dynamics was not the same in both cases, so that the compounds of nitrogen and carbon produced in the Jovian subsystems differed from those produced in the early solar system as a whole.

Prinn, from the Massachusetts Institute of Technology, has researched the chemistry, dynamics, and evolution of planetary atmospheres. His talk was entitled "The Early Solar System and Jupiter's Satellites."

MOD Awards

The Management Operations Directorate held its annual awards ceremony last month, acknowledging individuals for their contributions and achievements. Clockwise from bottom left: MOD Director Benita A. Sidwell (1) presents Jorsie M. Sutton the Golden Star Award, the highest award bestowed on MOD employees; Albert Bush (in chair) is congratulated by Michael Ladomirak for receiving a 25-year service award; Ladomirak receives a knightly gesture; Joan E. Belt receives the Golden Star Award from Sidwell; Preston Pope receives the Gold Star Award from Sidwell; Marjorie Gustafson wins one of the many door prizes; Robert Keefe presents Valarie Parker with a door prize; Jim Mills presents Jack Knox with a Safety Award as safety clown Colleen Quinn looks on; Center: Sidwell makes opening remarks.

Pete Baltzell photos

THE BOARD OF EDUCATION OF THE PRINCE GEORGE'S COUNTY PUBLIC SCHOOLS, MARYLAND

CERTIFICATE OF RECOGNITION

TO

GODDARD SPACE FLIGHT CENTER

The Board of Education proudly presents this Certificate of Recognition to the staff of the Goddard Space Flight Center with deep appreciation for the many outstanding science enrichment programs it has offered to the students of the Prince George's County Public Schools since 1963.

Through film productions, vocational development programs, art projects, internships, workshops, mini-courses and volunteer programs, the Center has helped elementary and secondary students better understand and appreciate the aerospace industry and has increased their interest in the field of science.

For twenty years the Goddard Space Flight Center has actively demonstrated its interest in arousing the scientific aspirations of young men and women in the county. And, with its most recent commitment in the "Get Away Special" space shuttle project, it is providing invaluable assistance in helping students develop experiments which will indeed fly into space.

The Board of Education highly commends the center for its outstanding interest in and commitment to the students of the public schools.

DATE: May 24, 1983

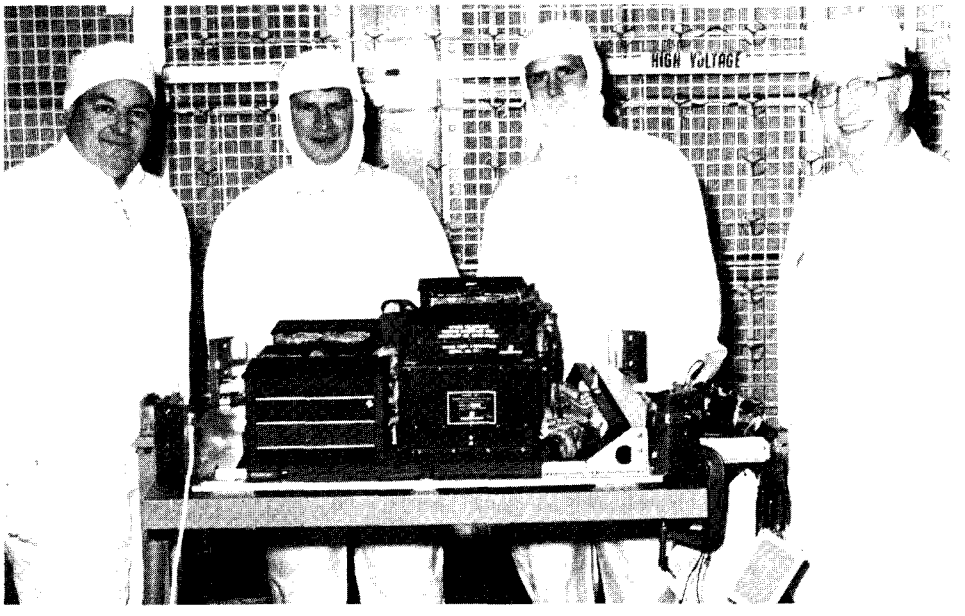
SUPERINTENDENT OF SCHOOLS

CHAIRMAN, THE BOARD OF EDUCATION

Donald A. Krueger, chief, Applied Engineering Division, has received the 1983 Moe I. Schneebaum Memorial Award. Krueger received the award for his exceptional contributions and leadership in the development and implementation of the Landsat-D Mapper Image Processing Facility.

The Schneebaum Award is given in memory of Moe I. Schneebaum, who served as chief of the Earth Observations Systems and Systems Engineering Division and was instrumental in the development of cameras for early meteorological satellite programs. He joined Goddard in 1958 and died in 1973.

Space Telescope subsystem tested



The Science Instruments Control and Data Handling (SI C&DH) subsystem for the Space Telescope was delivered March, 1983 to the Goddard to complete its acceptance test. The subsystem is now in the Bldg. 7 clean room, where it will be electrically integrated with the five Science Instruments for the Verification Acceptance Program (VAP).

The SI C&DH is the command and data interface between the spacecraft and the five instruments, stores delayed commands, collects engineer telemetry, collects and formats the science data, and provides a general computing facility for instrument use. The SI C&DH components are mounted on a tray which is designed for on orbit replacement. L-R: J. Lesko, E. Thomas, D. Stottlemeyer of Fairchild Space Company, and R. Weitzel.

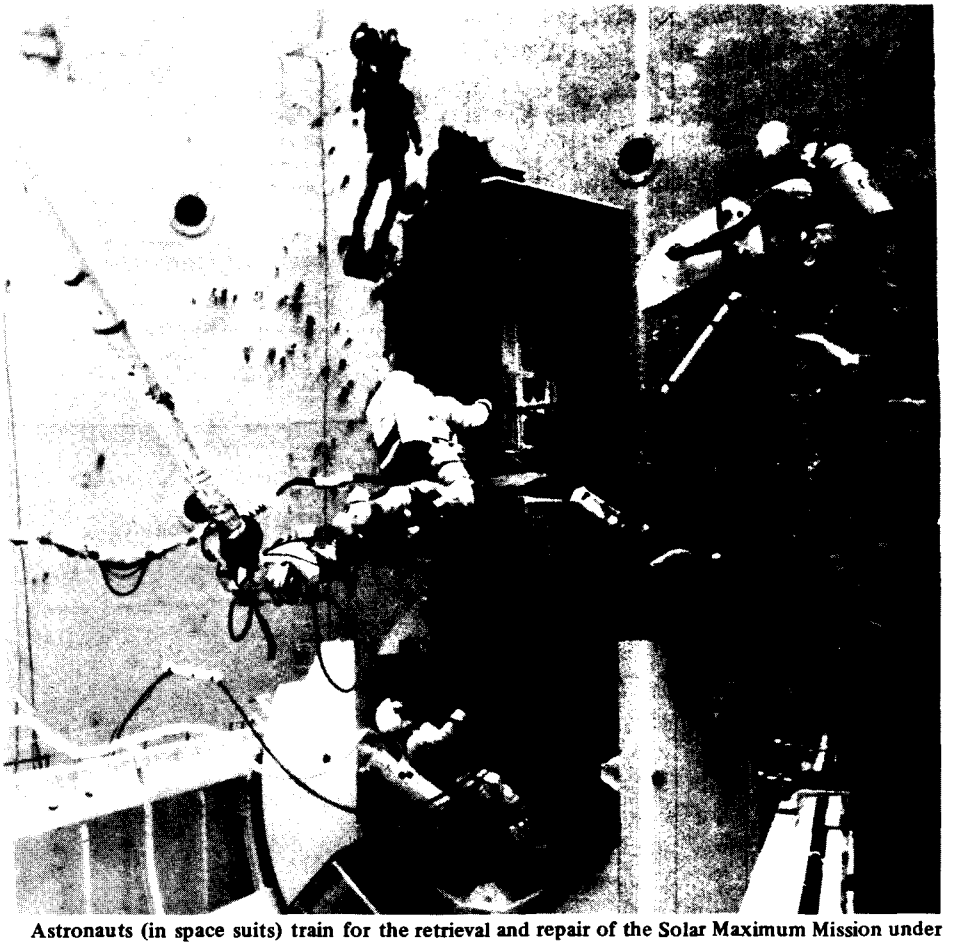
STS-13 repair mission

Continued from page 1

In the meantime, astronauts Dr. George Nelson and Dr. James van Hoften have completed neutral buoyancy training in water tanks at the Marshall Space Flight Center and the Johnson Space Center. The training was carried out in their space suits to give them a better "feel" of the difficulties they might encounter in making repairs to the 5,000-pound spacecraft while they are in a near-zero gravity environment in orbit.

In addition, Nelson and van Hoften spent time at Martin Marietta in Denver, where they worked with the Manned Maneuvering Unit (MMU) simulator. Astronauts Bruce McCandless, II and Bob Stewart who will fly on STS-11 and conduct the initial operational tests with the MMU, also were at Denver at the same time. Martin Marietta and Goddard Public Affairs cooperated in conducting demonstrations for the media while the astronauts were in Denver.

McCandless, a Navy Captain, and Stewart, the first Army Aviator scheduled to fly on the Shuttle, will test the 420-pound self-contained unit on the STS-11 mission, scheduled for January, 1984. First tests will be conducted with a tether. However, later tests on that mission will be free, with the astronauts flying out distances of up to 300 feet from the orbiter without a tether. The MMU is a spacecraft itself with 24 1.7-pound thrusters and an auto pilot that will allow the astronauts to maintain their attitude in space while flying "hands off."



Astronauts (in space suits) train for the retrieval and repair of the Solar Maximum Mission under neutral buoyancy conditions in an underwater training facility at Marshall Space Flight Center, Huntsville, Alabama. Others in the photo are diving safety officials and underwater cameramen.

The more spectacular activities will take place on STS-13, scheduled for April, 1984. On that mission, Nelson, a 33-year-old astronomer who is not a rated pilot, will don his MMU and fly out approximately 300 feet from the Challenger, which will be in orbit at approximately 270 nautical miles, to grapple the SMM spacecraft and then hold it steady while the Remote Manipulator System (RMS) arm grabs the SMM and brings it into the Challenger's payload bay. Once in the bay, the astronauts will replace the spacecraft's attitude control system (ACS) and make repairs to the X-ray Polychromator and Coronograph/Polarimeter instruments on the satellite, which was designed to make the most comprehensive studies of the Sun ever conducted.

SMM was launched from the Cape Canaveral Air Force Station in Florida in February 1980. Following nine months of operation, however, problems developed in the spacecraft's attitude control system. Since then, only three of the seven instruments on board have been able to collect data because the spacecraft, rather than being centered on the Sun, is rotating in something like a figure eight pattern, allowing the sensors to pass through the Sun for short periods of time periodically.

Nelson will be the astronaut who flies out to the SMM to make the grapple and to hold it steady. Astronaut Terry Hart will direct the 50-foot-long orbiter arm to grab it, and Astronaut van Hoften will assist in that operation and be responsible for making some of the repairs after the SMM has been brought into the payload bay.

Following the repairs, the spacecraft will be placed back into orbit by the remote manipulator arm and will resume its investigations of solar activity.

NASA
GODDARD NEWS

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Editor: David W. Thomas
Assistant Editor: Joni Frostbutter

NASA
National Aeronautics and Space Administration

GODDARD NEWS

Goddard Space Flight Center, Greenbelt Md. Vol. 30 No. 7 July 15, 1983

Joe Walters photo

—TDRSS Project Manager Ronald K. Browning

"From the very beginning we were optimistic about recovering the satellite and placing it into proper orbit. We've saved spacecraft before but never anything of this magnitude. I'm glad we had the resources and the personnel to pull this thing together."

TDRS-1 video-teleconference a first—big success

The satellite video-teleconference held among NASA, TRW and SPACECOM, during the final burn which placed TDRS-A into proper orbit, was the first two-way video utilization of satellite communications of this kind in NASA. The NASA satellite video-teleconference among three stations was a very complicated operation but was conducted without a hitch. Congratulations to all involved for making this NASA first a tremendous success.

Making the bird fly high

TDRS-1 recovery team puts satellite into proper geosynchronous orbit

by Jim Elliott

June 29, GSFC – After 58 days of delicate maneuvers, a NASA-industry team of engineers succeeded in placing the Tracking and Data Relay Satellite System (TDRSS) spacecraft into a geosynchronous orbit.

Overcoming what was one of the most demanding engineering challenges ever faced by the Nation's space program, the engineers used tiny one-pound thrusters, with nozzles about the size of a thimble, to boost the 5,000-pound spacecraft 8,662 miles farther into space, a feat never even attempted before, let alone accomplished.

The spacecraft, designed to usher in a new era in space communications, was deployed from the Space Shuttle Challenger on its first mission on April 4, 1983. After the satellite had been deployed successfully from the shuttle, a failure occurred while the Inertial Upper Stage (IUS) booster rocket was attempting to propel the spacecraft into geosynchronous orbit. As a result, the TDRS-IUS combination began tumbling at 30 revolutions per minute. The engineers succeeded in separating the two and in stabilizing the TDRS spacecraft, but its orbit was only 13,574 miles in perigee (low point) and 21,970 miles in apogee (high point), far short of the planned 22,236 statute miles needed for geosynchronous orbit. The elliptical orbit had a period of only 18 hours and the spacecraft was drifting 110 degrees a day. In geosynchronous orbit, the period is 24 hours, meaning that the spacecraft appears to remain stationary over one point of the Earth.

The final maneuver was highlighted by ceremonies at Goddard, where the

Continued on page 3

Pete Baltzell photo

L-r: Richard Sade, Networks Director; Henry Hoffman, Guidance and Control Branch; Charles M. Hunter, TDRSS Deputy Project Manager; Center Director Noel W. Hinners; Robert O. Aller, Director, TDRSS Division, NASA HQ. Hoffman, using a model of the TDRS, shows how the thrusters were used in the maneuvers that engineers developed to boost the spacecraft into geosynchronous orbit.

Simulations Operations Center

SOC crew socks it to em'

The Simulations Operations Center (SOC) personnel operated non-stop for 58 days after TDRS-A failed to reach proper orbit. During each series of burns, the SOC staff and representatives from Goddard's TDRSS project office manned the machines that told them what was taking place on the spacecraft. Clockwise from top left: l-r, Joseph Iffrig, Bendix, Richard Beckwell, Bendix, and Bob Burns, Goddard; Cathy Reed, CSC and Joe Polesel, CSC; Ken Lavery, Bendix; Burns on phone, name unavailable for other man; activities during initial burn; Iffrig. Not pictured are Ken Clark, Ken Garner, George Lokke, John Dissinger, Dan Marx, Ed Moore, Lynn Marnhout and Willard Buchanan, all of Bendix; and Kevin Parker and Henry Zavaleta of CSC.

During pre-launch tests and simulation periods for spacecraft, Goddard uses a special site to emulate the mission's control center. The Simulations Operations Center (SOC) recently operated non-stop for 58 days, after serving as the operations center for simulations that ultimately became the series of maneuvers that nudged the errant Tracking and Data Relay Satellite (TDRS-A) into proper orbit. Headed by Robert Stanley, chief, Simulations Section, and staffed with a civil service/contractor crew of about 15 personnel, the SOC assumed an additional role following the failure of TDRS-A to reach geosynchronous orbit – that of monitoring the delicate maneuvers used to correct the satellite's path.

"The support the SOC provided was outstanding," TDRSS Project Manager Ronald K. Browning said. "By getting real-time information from the spacecraft, we were able to conduct the maneuvers much more efficiently and much more comfortably." Browning said the SOC was a clear demonstration of a low cost flexibility during a high time of need.

During each series of maneuvers, the SOC staff manned the machines that told them what was occurring on the spacecraft, virtually monitoring TDRS-A constantly. Significantly, the additional responsibility placed on the SOC staff required additional equipment. The SOC team not only gathered the equipment, but also got it running and never suffered a major equipment failure.

In just two weeks, the SOC team prepared itself to handle the additional role of providing real-time data from TDRS-A monitoring each of the 39 burns. TDRSS Deputy Project Manager Chuck Hunter said the SOC crew did a "fantastic job in a short time."

TDRS-1 save

Continued from page 1

TDRSS project management team is located.

As the countdown to the maneuver proceeded, NASA Administrator James M. Beggs, gave the order on closed-circuit television to "execute the maneuver" to Flight Director George Harris, at the Spacecom ground facility at White Sands, New Mexico. Harris initiated the burn with a signal that was relayed to the satellite via the Goddard Space Flight Center and then the network tracking station at Goldstone, California.

In remarks following the completion of the burn, which ran approximately six minutes, Beggs congratulated the people on the team which carried out what he described as a "spectacular" space achievement. That included people primarily with NASA; with TRW, which built the spacecraft; and with Spacecom, which owns the spacecraft and operates it for NASA under a 10-year lease agreement. The maneuver was started at 12:25 P.M. EDT.

"The effort of the TDRSS team represents some of the best in American skill and ingenuity," Beggs told an audience of approximately 150 persons gathered in Goddard's Simulations Operations Center. "They have demonstrated what can be accomplished when government and industry cooperate for the benefit of all."

Goddard Center Director Noel W. Hinners also praised the personnel involved in the recovery operations. Holding up a thruster similar to the ones aboard the TDRSS spacecraft, he pointed out that the nozzle of the thruster was about the size of a thimble. By comparison, he said, one could picture something as small as a thimble trying to push a huge, armor-plated limousine 8,600 miles into space.

"That's why it has taken so long," he smiled, underscoring the tedious and sometimes frustrating challenges the engineers have faced during the 58 days of maneuvering.

The final burn lifted the satellite another 23 miles in its perigee, from 22,213 miles to 22,236 miles and corrected its apogee downward from 22,239 to 22,237 miles. Its east-west movement was corrected to zero drift, and its period of orbit was 24 hours. At Goddard News press time, it was located at 67 degrees West longitude, which is over the Equator above northwest Brazil.

Project officials began immediately to check out the communications systems aboard the spacecraft. First, the spacecraft was reoriented to what the engineers call an "Earth mode," meaning that the satellite is now stabilized with its antennas pointed toward the Earth and its solar panels pointed toward the Sun.

The payload activation sequence was activated shortly after reaching the "Earth mode," TDRSS Project Manager Ronald K. Browning said. A series of tests will be conducted then, including a demonstration with the Landsat 4 Earth resources satellite late this month. After the Landsat demonstration, which will be conducted over a four-day period, TDRSS will make tests with the STS-8 Space Shuttle mission, now scheduled to be launched from the Kennedy Space Center in Florida in late August. The TDRSS also will support the STS-9 mission, scheduled for late September, which will carry the Spacelab payload, the European Space Agency's orbiting research laboratory.

TDRS-1 is the first of three communications satellites to make up the TDRSS network. TDRS-1 will be located in its final location at 41 degrees West longitude, over the Atlantic east of Brazil. The second TDRS originally had been scheduled for launch on STS-8 in August. But it has been postponed indefinitely pending definition of the problem with the Inertial Upper Stage booster rocket. When it is launched, it will be positioned at 171 degrees West longitude over the Pacific. A third TDRS satellite, to be launched later, will be used as an in-orbit spare and will be located at 79 degrees West longitude, over the Pacific off the coast of South America.

"...Picture something as small as a thimble trying to push a huge, armor-plated limousine 8,600 miles into space...that's why it has taken so long."

See thruster on page 8

Pete Baltzell photo

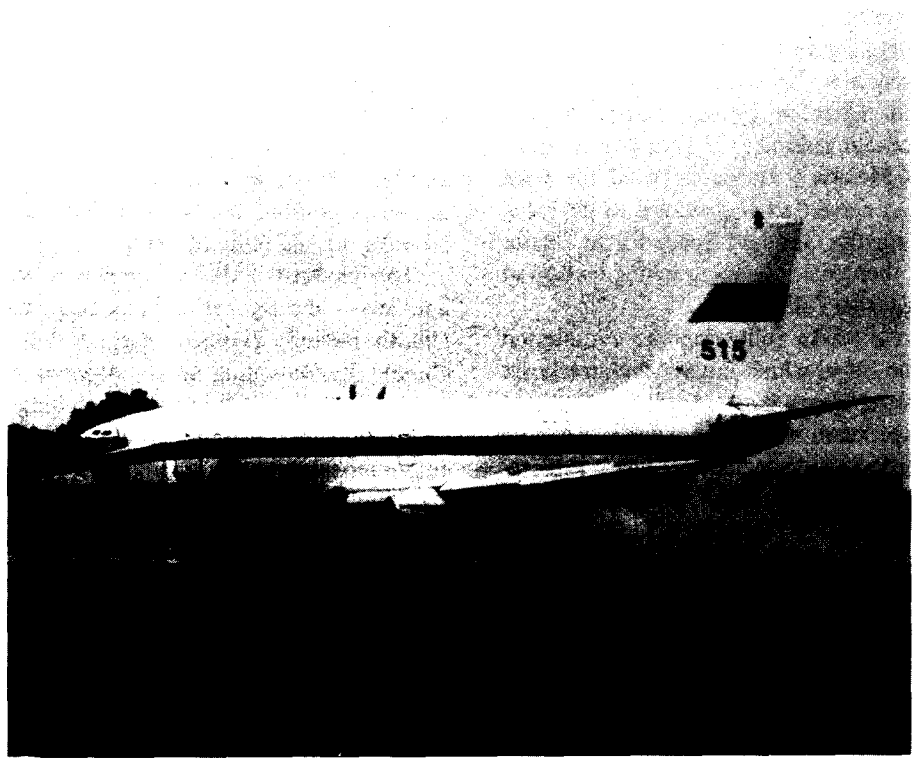
NASA Associate Administrator for Office of Space Tracking and Data Systems Robert E. Smylie (l), Goddard Center Director Noel W. Hinners (c) and NASA Administrator James M. Beggs marvel over the size of the thrusters used to boost TDRS-1 into geosynchronous orbit.

NASA, FAA conduct aircraft braking tests

NASA and the FAA conducted tests recently at two separate airports to measure runway surface friction on grooved and ungrooved runway surfaces. The tests were conducted at Goddard's Wallops Flight Facility and the FAA Technical Center airport in Atlantic City, New Jersey, and could provide timely and accurate information on runway surface friction characteristics under adverse weather conditions. Instrumented aircraft and ground vehicle tests were performed on dry runways as well as simulated wet and natural wet conditions.

A major priority of the tests was to identify the severity of potentially hazardous conditions to aircraft and airport users. Results from the tests will help in evaluating how friction measurements relate to actual aircraft braking performance.

In this first phase of testing, phase-II will begin in the fall, NASA's Langley B-737 aircraft was used. This fall's testing will include the FAA's B-727 as well as the Langley aircraft. Langley Research Center's Impact Dynamics Branch is conducting the program with Tom Yager as program manager. Gene Godwin is the Wallops Project Coordinator.



NASA's Langley B-737 aircraft undergoes braking tests at Goddard's Wallops Flight Facility.

It pays to think

employees get cash for good ideas

Two of Goddard's employees recently received cash awards for their suggestions. In keeping with our never-ending concern for employee safety, Kathleen Gray suggested the use of cradle hooks on machines equipped with air hoses. The air hoses will be neatly coiled and secured in the cradle hooks and only the required length of hose will be released thus eliminating excessive lengths of hose on the floor and walkways. Gray is an Aerospace Engineering Technician in the Machining Branch.

Perhaps you have seen the new preprinted mailing labels which will now be used to forward correspondence to the Wallops Flight Facility. Those labels are the result of a suggestion submitted by Patricia Neff. Having these labels preprinted, leaving a blank space for the attention line, will result in time saved. Neff is a Printing clerk in the Printing Office.

Center employees are encouraged to participate in the Employee Suggestion Program. Implemented suggestions could result in cash awards, certificates, and Center-wide visibility. Please refer to the Goddard Management Instruction 3451.1b for the criteria. For further information, please call the Awards Office at 344-6118.

Employee's son wins grand prize in international Science Fair

A Goddard employee's son recently won one of two grand prizes at the 34th International Science and Engineering Fair in Albuquerque, N.M. President Reagan met the Bowie High School senior and his family, and Bowie's principal and chemistry teacher after inviting them to the White House for a meeting in the Oval Office.

Jonathan Santos, son of Severino Santos (code 855), topped some 560 finalists from 50 states and 12 foreign countries by figuring out a way to make planes fly more cheaply. His invention was a special airfoil attachment for the standard airplane wing.

"I just wanted to do a project to seek a more efficient aircraft," Santos said.

To do so, Santos studied the flight of birds. He said that the characteristic oval shape of an airplane wing that produces its lift during flight also causes a swirling vortex of air at the wingtips that inhibits lifting ability. Airplanes use up to 40 percent of their fuel to combat that effect, he said.

He noticed that in certain situations, birds extend their feathers in a fashion that virtually eliminates the vortex. Santos tried more than 60 plastic shapes to come up with the best form of airfoil to simulate the wingtip effect and tested his model wings in a 10-foot homemade wind tunnel. The end product resulted in increased fuel efficiency by 27 percent in model airplane tests.

Santos won $1,000 in cash, an expense-paid trip to Stockholm for the Nobel Prize ceremony this December, $5,000 worth of scientific equipment for Bowie High School and several free trips to various scientific installations across the country. Santos plans to enter the University of Maryland this fall.

Randy Frisch photo

Jonathan Santos, winner of international science and engineering fair, is shown here with his father, Severino Santos, head, Tracking Systems Branch. Santos is holding a copy of his paper entitled "Tip Vortex Propulsion: A New Approach," autographed by President Reagan. In front of them is a model of his invention.

Galaxy-A launched

NASA launched the Galaxy-A communications spacecraft on Delta 170 from Cape Canaveral Air Force Station, Fla., on June 28. The Galaxy-A satellite, owned by Hughes Communications, is relaying television programming to cable systems in the continental United States, Alaska, and Hawaii. The satellite carries a total of 24 transponders. The 18 primary transponders have been sold to six cable programming companies. One of the remaining six standard transponders has been committed to another major programmer and the rest are in various stages of negotiation.

Galaxy-A is in a stationary orbit 22,300 statute miles above the equator at 134 degrees west longitude, roughly due south of Juneau, Alaska. It operates in the 6/4 GHz C band and has a design lifetime of at least nine years.

The Galaxy-A is the first in a series of three Galaxy satellites. The second and third Galaxy satellites, to be launched in September 1983 and June 1984 respectively, will relay video, voice, data, and facsimile communications in the continental U.S. for large corporations, long haul carriers, and broadcasters.

The Operations Control Center for the Galaxy satellites is located at Hughes Communications' headquarters in El Segundo, Ca., with telemetry and commands terminals in Filmore, Ca. and Brooklyn, NY.

The Delta 170 rocket, a 3920/PAM version of the launch vehicle, consists of an Extended Long Tank First Stage, the thrust of its Rocketdyne RS-27 engine augmented by nine Castor IV strap-on solid motors; the new improved Aerojet AJ10-118K second stage, and a Payload Assist Module (PAM), which functions as the final stage. The entire vehicle is a uniform eight feet in diameter (excluding the strap-on solid motors) and 116 feet high.

Following launch by the first two stages of the Delta 3920, Galaxy-A was inserted into an elliptical transfer orbit by the PAM, rather than conventional third stage. The PAM was attached to the satellite.

To produce a near-stationary orbit, an apogee kick motor, mounted in the satellite itself, was fired. Positioning of the spacecraft followed, using the satellite's on-board attitude-positioning gas system.

Quality Circles

employees resolve problems themselves

by Donald James,
Presidential Management Intern

Quality circles (QC) are a small group of workers organized to find their own ways of improving their work, rather than leaving the task to management. After experimenting with the QC concept since February, the Small Purchases Section of the Institutional Procurement Division has found a solution to a problem they chose to solve.

The problem concerned the distribution of purchase requests to the buyers of this section. The solution entailed devising a way of reorganizing the distribution list in order to alleviate and to make more equitable the internal distribution of purchase requests. The solution evens out the workload among employees in the Small Purchases Section.

Members of the QC presented their findings and recommendations last month. The group solved their problem by outlining the problem, discussing alternative solutions (including pros and cons for each solution), and finally arguing their case for one solution before the Section Head Mickey Garrett and the Branch Head Mike Kelly.

Later that week, the circle's proposal was accepted and presently the section is preparing to implement it.

Joe Walters photo

Terri Howerton (standing) was one of four QC members who presented their findings on a solution to a problem during a QC meeting of the Small Purchases Section. The other three speakers were: Sandy Howard, Laura Simmons and Sheila Zurvalec.

STS-8 crew

L-r: Daniel C. Brandenstein, pilot; Dale A. Gardner, mission specialist; Dick Truly, commander; William E. Thornton, mission specialist; and Guion S. Bluford, Jr., mission specialist. STS-8 is scheduled for launch in August.

Heppner receives Lindsay Award

Pete Baltzell photo

Dr. James P. Heppner (r), head, Electrodynamics Branch, Laboratory for Extraterrestrial Physics, Sciences Directorate, receives the 1983 John C. Lindsay Award from Goddard Center Director Noel W. Hinners.

Heppner received the award for his pioneering research in studies and in-situ measurement with rockets and spacecraft, highlighted in the Chemically Active Material Emitted from Orbit (CAMEO) experiment.

Goddard retirees plan homecoming

A special homecoming for Goddard retirees is scheduled for September 28, 1983 from 4 p.m. to 11 p.m. at the Rec Center. A social hour and a buffet dinner are planned for the occasion. Additional details are forthcoming. For information, call Jesse Stern, (301) 422-9506; Roland Van Allen, (301) 577-2119; or Peggy Becker, (301) 474-7987. Or write: Roland Van Allen, P.O. Box 163, Seabrook, Maryland 20706.

Secondary school girls spend time at Goddard

Thirty students will come to Goddard July 20-29, 1983, to participate in the "Summer Institute in Science and Technology for Junior High School Girls." These girls will be coming primarily from schools in Prince George's County, Montgomery County, and the District. The Institute's purpose is to encourage these girls to pursue careers in engineering, science and mathematics; and to emphasize the importance of continuing the mathematical training needed to achieve these goals. This program developed out of the Federal Women's Program's efforts to give girls role models

Continued on page 8

Agreement signed

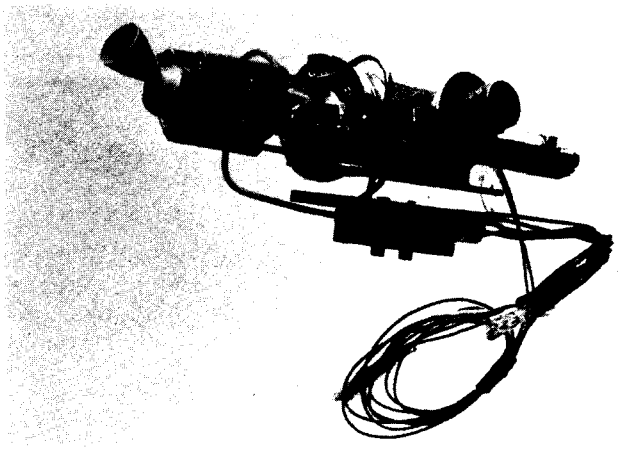
At a recent ceremony, Center Director Noel W. Hinners (1) and Goddard's Engineers, Scientists and Technicians Association (GESTA) President Fredrick G. Schamann sign a Memorandum of Understanding implementing a Performance Appraisal System for all non-supervisory professional engineers and scientists classified in NASA Class Codes 200 and 700. The ceremony culminated 15 months of negotiations and marks the first substantive agreement between the parties. Training for supervisors and GESTA bargaining unit employees has been scheduled for the first two weeks of August. Standing l-r: Joyce Crooke, Mary Caraker, Floyd Ford, John Ferguson, Pat McClain, Stan Watson, Dan Grant, Steve Schwartz; sitting l-r: Jerry Hodge, Hinners, Schamann and Danny Mistretta.

Pete Baltzell photo

SPACE TELESCOPE INSTITUTE DEDICATION – Riccardo Giaconni (l), director, Space Telescope Science Institute and Steven Muller, president, The Johns Hopkins University, Baltimore, Md., cut the ribbon during the dedication ceremonies for the Space Telescope Science Institute at Johns Hopkins on June 15. The Institute, designed to be the world center for astronomical research into the 21st century, will house facilities for astronomers to analyze visual and computer data transmitted from the telescope. Space Telescope (ST) will provide astronomers with images possessing 10 times more detail than existing observatories. ST will also allow them to detect stars 50 times fainter than is now possible. Goddard's John C. Brandt was one of several panelists who addressed "The Promise of ST" during the ceremonies. Brandt is chief of Goddard's Laboratory for Astronomy and Solar Physics and serves as Principal Investigator for the ST High Resolution Spectrograph.

Joe Walters photo

ENTERPRISE LANDS AT DULLES – Over 50,000 spectators lined the roads and filled the parking lots at Dulles International Airport outside Washington June 13 to greet the Enterprise. The space shuttle Enterprise, riding atop a Boeing 747, landed at Dulles after flying at 2,000 feet over the nation's capital, Baltimore and an air show in Easton, Md. Goddard took bus loads of nearly 700 people to greet Enterprise at Dulles, the final stop on a month-long tour. Previously, Enterprise was on display at the Paris Air Show.



Joe Walters photo

Tiny, one-pound thrusters like the one shown above were used to push the 5,000-pound Tracking and Data Relay Satellite some 8,600 miles farther into space. It took 39 burns totaling 44 hours to correct the 18-hour elliptical orbit to the 24-hour circular orbit desired for the spacecraft. The TRW-built thruster has been rightly dubbed "the little engine that could."

Jr. high girls

Continued from page 7

in fields that are underrepresented by women.

The girls will work in pairs with a mentor, and in other activities as a group. The mentors are professional women who have volunteered to show these students what their work is like. Each mentor works with only two girls at a time, who learn by doing a work activity. This year the work activities include: measuring the moisture of plants, using statistics to characterize data, describing moon photographs by their crater structure, setting up and using a telescope to look for sunspots, working with a laser, using a computer to generate graphs, reading weather maps, and analyzing satellite photographs of the earth.

Highlights of the group sessions include: an astronomy night, a tour of Goddard facilities, a talk on sounding rockets used in atmospheric research, a panel discussion by women engineers, a model rocket launch and a demonstration of a "talking" computer.

The Summer Institute, which is in its sixth year, has received enthusiastic support from both the program coordinators and the mentors. In addition, the participants and their teachers have responded favorably. Many of the applicants mentioned that teachers and former participants recommended the program to them. One student, who participated in the 1980 program, will be attending the closing exercises to share her insights about her future with her younger peers.

For further information contact Nancy Goodman, 344-5719, or Varona Wynn, 344-9271.

NASA
GODDARD NEWS

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25th Anniversary
1958-1983

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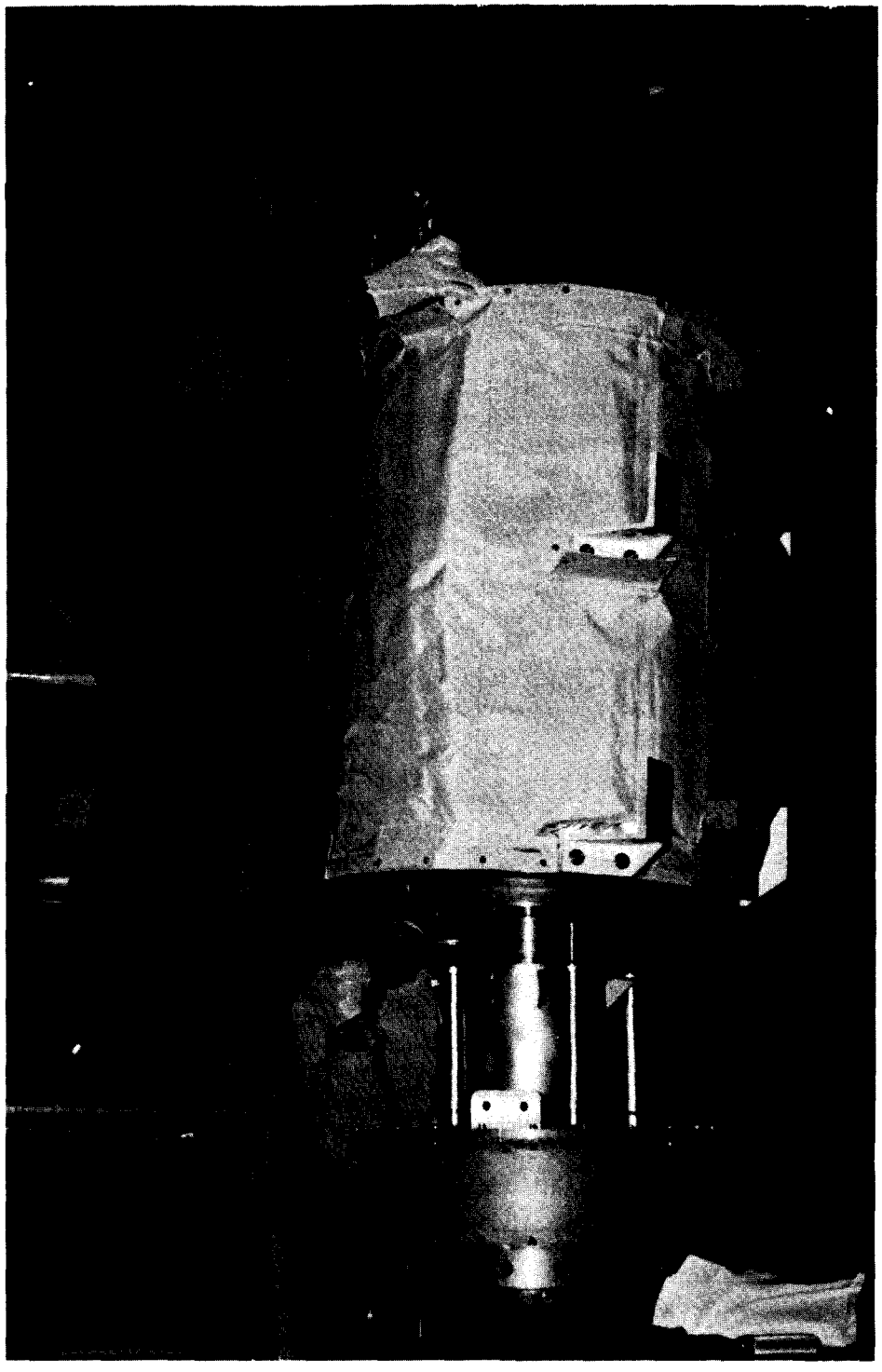
Vol. 30 No. 8 August 15, 1983

Four GAS payloads to fly on STS-8



Gary Walters, GAS field operations officer, code 741, installs G-0347 in its Getaway Special container in preparation for flight on STS-8. At bottom left is Dr. Brian Dohne of the Naval Research Lab. In the background at bottom right is Dr. Werner Neupert, Goddard project scientist for G-0347.

Story on page 2

STS-8 to test TDRS-1

The STS-8 mission will be used as a test flight to establish the ability of the TDRS communications satellite to maintain communications with an orbiting shuttle. This will be the precursor to the use of the TDRS operationally for the STS-9/Spacelab 1 mission, now scheduled for October 28, 1983.

All modes of the TDRS communications will be exercised during the STS-8 mission. The S-band link will be used for voice, commands, and Shuttle housekeeping telemetry data. The Ku-band link will be exercised to show the ability of the TDRS spacecraft to handle high data rate experiment information. The largest and most complex communications satellite ever launched, the TDRS dramatically increases the capacity for transmitting and receiving data. Each TDRS – three are planned, with the current spacecraft to be stationed over the Atlantic, the next one over the Pacific, and a third one to serve as an in-orbit spare, located over the Pacific just west of South America – can relay signals from up to 22 users at the same time. Each satellite is capable of receiving the information packed in ten, 14-volume encyclopedias every second it operates.

Testing is to begin in the first orbit of the STS-8 mission, shortly after the Shuttle passes Hawaii.

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STS-8 to carry four GAS payloads

Four Getaway Special payloads are scheduled for the STS-8 Space Shuttle Mission, officials at Goddard have announced.

The experiments are:

1. A Cosmic Ray Upset Experiment (CRUX) to determine how charged particles might upset or change the logic state of a memory cell. The payload, number GO346, is from Goddard and the investigator is John W. Adolphsen.

2. An ultraviolet photographic film test package to evaluate the effect of the orbiter's gaseous environment on ultraviolet sensitive emulsions. Another Goddard project, number GO347, the principal investigator is Dr. Werner M. Neupert.

3. An artificial snow crystal experiment. This is a follow-on to a similar experiment conducted on STS-6 last April. This payload, number GO475, is sponsored by the Asahi Shimbun newspaper in Japan. Principal investigator is Shigeru Kimura.

4. A Contamination Monitor Package (CMP), GO348, to determine the effect of atomic oxygen within the Shuttle environment. Principal investigator is Jack J. Triolo, Goddard.

The four payloads on the STS-8 mission, scheduled for launch in late August, bring to 16 the number of Getaway Special (GAS) payloads that will have flown on Shuttle missions. The Getaway Special payloads allow individuals, groups, and organizations to buy space on a Shuttle to conduct scientific experiments. Payloads can be purchased for $3,000, $5,000 or $10,000, depending on size and weight.

The first GAS payload was sponsored by R. Gilbert Moore, of Ogden, Utah, who supported a number of student experiments, primarily from Utah State University. The payload flew on STS-4.

On STS-5, the Deutsche Forchungs-und Versuchsanstalt fuer Luft-und Raumfahrt (DFVLR), a German Aerospace Research establishment, made use of X-ray recordings to investigate the behavior of metallic dispersions.

The STS-6 mission had three GAS payloads: the Asahi Shimbun snow crystal experiment, which failed due to unexpectedly low temperatures; a series of six experiments by cadets from the U.S. Air Force Academy; and an experiment with flower, herb, and vegetable seeds by the George W. Park Seed Co., Inc., of Greenwood, South Carolina.

Seven payloads flew on the last Shuttle mission, STS-7. They included five youth experiments sponsored by Kayser-Threde and Jugend Forscht of Germany; three experiments from Purdue University; an ant colony experiment sponsored by the RCA Corporation for urban high schools in Camden, New Jersey; soldering experiments by the Edsyn Co., of Van Nuys, California; a natural radiation field experiment by the Naval Research Laboratory and the U.S. Air Force; an ultraviolet sensitive emulsion experiment from the Goddard Space Flight Center; and two experiments from the California Institute of Technology.

The Cosmic Ray Upset Experiment, or CRUX, on STS-8 is the first flight experiment designed to resolve many of the questions concerning upsets caused by single particles. An upset, or change in logic state, of a memory cell can result from a single, highly energetic particle passing through a sensitive volume in a memory cell. In doing so, it deposits or loses energy, and if enough energy is deposited, the memory cell can change state. In some technologies, enough energy can be deposited to cause another effect, called "latchup," which can result in the device destroying itself by drawing excessive current.

Positive determination of the cause of an upset in flight is difficult because a number of other influences, such as electromagnetic interference (EMI), noise on power supply lines, or voltage dropouts, can result in the same device behavior as if induced by cosmic rays.

The ultraviolet-sensitive photographic emulsion experiment on STS-8 is similar to the one flown on the last Shuttle mission. In evaluating the effect of the orbiter's gaseous environment, the experiment is paving the way for the High Resolution Telescope and Spectrograph (HRTS) being built by the Naval Research Laboratory for Spacelab 2 and for the Solar Extreme Ultraviolet Telescope and Spectrograph (SEUTS) from Goddard, being planned for a future Shuttle flight.

The STS-8 flight is particularly well

Continued on page 4

Goddard aids in major oil find

by H.W. Blodget
(GSFC Geologist)

Successful completion of an Applications Systems Verification Test (ASVT) in 1981 contributed to the recent discovery of a major oil and gas trend along a narrow fault zone in New York's western-most county. The estimated 30 wells drilled along trend had been on stream for less than 1 year at the end of 1982, but they produced 120 of the 150 thousand barrels of oil extracted from Chautauqua County last year. Preliminary oil reserve estimates based on these wells are placed at 2 million barrels; at current prices that translates to about $56 million. Total reserves for oil production throughout New York State have been estimated to be between 8 and 9 million barrels, so these discoveries are truly significant to the State's economy. No estimates have yet been made for extractible gas reserves, but they should also be formidable because single wells have tested at rates as high as 60 million ft^3/day during typical 2 hour open flow tests.—and natural gas wholesales at about $4 per 1000 ft^3.

The ASVT was a 2-year cooperative program conducted by The Eastern Regional Remote Sensing Applications Center (ERRSAC) in collaboration with geologists from seven Appalachian states. The immediate objective was to assess the utility of enhanced, multi-seasonal Landsat imagery for identifying areas that are prospective for economic gas production from Devonian shale formations that underlie much of Appalachia.

The rationale for the experiment was based upon the fact that lineaments identified on Landsat imagery can frequently be identified as surface manifestations of geological faults; these faults are fractured zones in the earth's crust along which there has been displacement of the sides relative to one another. Depending upon the amount and nature of the displacement, faulting can increase permeability in "tight" formations, or form structural traps for hydrocarbon accumulation. Current Devonian shale gas production, for example, is frequently concentrated along zones where the inherently impermeable shale formations have been adequately frac-

Continued on next page

Oil find

Continued from page 2

tured to form economically exploitable reservoirs. In other geological environments, faults often form barriers that concentrate hydrocarbons in traps; these faults prevent upward migration of hydrocarbons through sand and limestone reservoirs.

Producible hydrocarbons exist where four favorable geological conditions occur. There must be source rocks, reservoir rocks and cap rocks that occur in the proper sequence within a structural or stratigraphic trap. A very common type of trap occurs where formations have been folded and tilted; the higher parts of the formations subsequently undergo faulting caused by further stress in the earth's crust, and adjacent fault surfaces are displaced to a degree where porous oil bearing formations are sealed. The lighter hydrocarbons cannot float to the surface ahead of the heavier formational waters, but rather are concentrated in the highest parts of the trap from which they can be extracted.

During the course of the ASVT, it was discovered that in four states, certain lineaments appeared to be associated with the margins of specific oil and gas fields suggesting structural traps; northeast-trending lineaments were particularly pertinent in this respect. These relationships were recognized most frequently in the three western-most counties of New York, as mapped by Arthur Van Tyne, then geologist with the New York Geological Survey. Our findings were reported at the ERRSAC-sponsored Appalachian Lineaments Workshop in October 1979 and again at the more widely attended American Society of Photogrammetry Annual Meeting of February 1981 in Washington, DC.

On June 6, 1983, the Oil and Gas Journal reported that a significant new oil and gas trend had been discovered along a narrow fault trend in Chautauqua County, New York; it has been speculated that this prospective structure may extend northeasterly for as far as 200 miles. The discovery of this trend is credited to Van Tyne. This county was the western-most of three in New York for which lineaments, as recognized in the LANDSAT data, had previously been mapped by Van Tyne. A geologically similar new oil discovery drilled in the southeastern part of the county suggests a second fault trend about 15 miles southeast of and parallel to the first. It has now been speculated that prospects in the area are concentrated along a series of more subtle trends that parallel the first.

Lineaments alone cannot be used to define a drilling prospect. However, when specific lineaments can be shown to have an apparent structural relationship to gas/oil pools, similar classes of lineaments can be incorporated into regional exploration models; such models also include all other information available on the character of the subsurface geology. These data layers would include geophysical data such as seismic reflection and refraction records, stratigraphic information obtained from drill cuttings and well logs of the bore-holes previously drilled in the region, and field maps. A thorough analysis of such geo-based information system

Continued next page

Wallops conducts chemical cloud experiments

NASA successfully completed a series of chemical cloud experiments last month, conducted from Goddard's Wallops Flight Facility, Wallops Island, Virginia. The launch of a pair of rocketborne chemical vapor experiments is part of a continuing investigation of neutral winds and convective electric fields in the upper atmosphere. Specific objectives were to evaluate the visibility and duration of trails formed by releases of small quantities of various chemical compounds. Observation of these chemical clouds provides a technique for measuring winds and electric fields in space.

The trails and clouds released from the two-stage Taurus-Orion rockets contained two constituents. One remained neutral and its glow enabled wind motions of the upper atmosphere to be observed. The other component was ionized by the Sun, its motion governed by electric and magnetic fields. These techniques could possibly be used in later Space Shuttle flights.

The project is managed by Wallops. Dr. James P. Heppner is Project Scientist, Geoffrey L. Bland is Payload Manager and Dempsey B. Bruton, Jr. is Project Engineer.

Telstar 3A launched atop Delta 171

37th consecutive successful Delta launch

Twenty-one years ago last month NASA launched Telstar I, the world's first commercial satellite. Telstar I, built with private funds by AT&T, was the first active repeater communications spacecraft and relayed the first trans-Atlantic television exchange. On orbit 6, the first telephone and television experiments were carried out and on orbit 15, an eight minute television program from France was carried by U.S. networks. All communications transmissions originally planned – overseas telephone, black-and-white and color television facsimile, high and low speed data – were successfully carried out. Nearly a year later, NASA launched Telstar II.

Last month NASA launched AT&T's third Telstar (Telstar 3A) atop Delta 171, the 37th consecutive successful Delta launch, bringing to 160 the total number of successful Delta launches.

Telstar 3A is the first in a new series of three domestic communications satellites providing television, telephone, and information transmission services to the continental U.S., Alaska, Hawaii and Puerto Rico.

The new Telstar series is supplementing and will later replace three other communications satellites. Two other Telstar 3A satellites are scheduled for launch from the Space Shuttle in 1984 and 1985.

Telstar 3A carries a total of 24 transponders, plus six spares, to cover the 48 contiguous states, Alaska, Hawaii and Puerto Rico. Each transponder has 5.5 watts of power, and can relay one color TV signal (up to 60 million bits per second) or up to 3,900 normal two-way telephone calls. By contrast, Telstar I was capable of providing 600 one-way voice channels or one television channel.

Telstar 3A is positioned in geostationary orbit 22,300 miles above the equator at 96 degrees west longitude. This orbital station is located above the Pacific Ocean due south of Houston, Texas and just west of the Galapagos Islands. It will operate in the 6/4 GHz C band and has a design lifetime of at least 10 years.

GAS payloads

Continued from page two

suited for this test because the flight pattern provides an opportunity to face an instrument in the direction of the velocity vector (direction of travel), producing a ram effect, while the vehicle is in sunlight.

That will permit better studies into tne extent of film degradation due to an ion (charged particles) environment. Laboratory tests have shown that the presence of ions produces chemical reactions that can blacken these emulsions, as if they were exposed to light. Clouds of ions that can produce this effect can be produced in space through the action of solar ultraviolet radiation on a residual cloud of gas emanating from the payload or vehicle. If, in addition, an instrument opening, such as telescope apertures, face the direction of motion of the spacecraft, these ions can be scooped up and "rammed" into the interior portions of an instrument where they can interact with sensitive photographic materials.

Six sets of emulsions will be exposed for varying amounts of time for the experiment. The shortest exposure allowed by the electronics is three minutes. Longer exposures of 9, 27, and 50 minutes will examine the effects of longer duration exposures.

The Japanese snow crystal experiment will repeat what was attempted on STS-6 in April but with improved equipment. Post-flight investigation of the STS-6 experiment showed that the temperature of the upper endplate of the GAS canister went down to minus seven degrees Centigrade (19 degrees Fahrenheit), much lower than engineers had expected.

The engineers had designed the equipment to warm up the water in two tanks up to 20 degrees Centigrade (68 degrees F.) to get water vapor enough to make snow crystals. With the colder end-plate, however, and the colder temperatures inside the canister, the water had frozen and the heaters in the water tanks could not heat up the water enough to generate water vapor.

For the STS-8 mission, engineers have increased the power of the heaters threefold. They suspect that the weightlessness in space resulted in no convection current in the cold chamber, causing the water vapor supplied from the water tanks not to be transported efficiently to the fields of view of the TV cameras.

As a result, the engineers have added a small auxiliary fan to stir up the gas in the cold chambers. The fan will be changed in every snow-making experiment, which will be repeated four times. In the first experiment, the fan will be activated for the first third of the time. In the second experiment, the fan will be turned on from the beginning to the end of the experiment. In the third, the fan will be activated for the latter half, and in the final one, it will be on just for a short time at the beginning and a short time at the end of the experiment.

The Contamination Monitor Package is similar to the one successfully flown on the OSS-1 pallet on STS-3. It will be the first GAS payload mounted on the outside of the canister lid. The experiment is designed to measure the atomic oxygen flux. Atomic oxygen, found at Shuttle altitudes, tends to be reactive, more readily causing oxidation. In this experiment, the rate of mass loss of two materials known to be readily oxidized, carbon and osmium, will be measured.

The CMP contains four temperature-controlled quartz crystal microbalances (TQCM) as its only sensors. One TQCM will be left uncoated for reference. The uncoated TQCM, along with one coated with carbon and one coated with osmium, will face out of the cargo bay, and a fourth one, coated with carbon, will face aft.

Oil find

Continued from page 3

data permits identification of those geographic areas that have the best geological conditions for hydrocarbon accumulation, and these are proposed for drilling.

The success of NASA technology transfer efforts has been widely recognized but the results have been particularly difficult to measure quantitatively. This is especially true in the area of mineral exploration where such information is considered proprietary by industry. It is not possible, of course, to determine a relative contribution of each individual data element in an exploration model; each complements the others. When the overall benefits of a Landsat-based application can be measured in the tens of millions of dollars, however, the value of even small contributions is enormous.

STS-8 patch

PEOPLE

MERIT SCHOLARSHIP RECIPIENT – Timothy A. Voss (second from left) receives his National Merit Scholarship from Donald E. Smith (left), vice president and director of Spaceflight Tracking and Data Network (STDN) programs, Bendix Field Engineering Corporation (BFEC). Attending the presentation and dinner held recently in his honor in Cocoa Beach, Fla., are the recipient's parents Faye L. Voss and Jim F. Voss, an electronics technician employed by BFEC at the NASA Tracking Station, Merritt Island, Fla.

Timothy's four-year renewable scholarship, sponsored by The Bendix Corporation, was awarded in recognition of outstanding performance and promise for future educational accomplishments. He plans to major in physics at the Massachusetts Institute of Technology, Cambridge, Mass.

Timothy, a resident of Cocoa, Fla., ranked fourth in his 1983 Cocoa High School graduating class of 395. He has been active in athletics, speech and debate, and computer design projects.

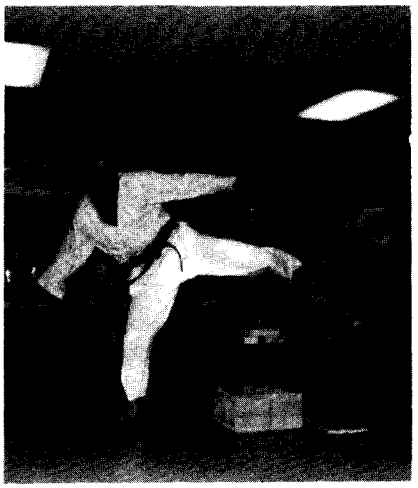
Tracking Station Directors meet

Joe Walters photo

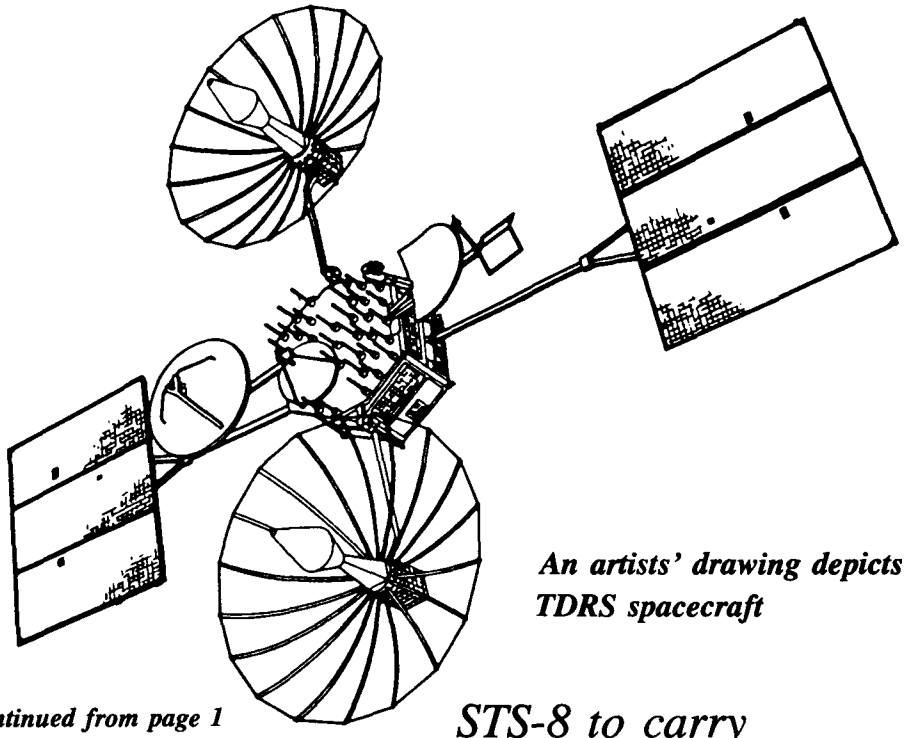
Station directors of the Goddard-managed Spaceflight Tracking and Data Network (STDN) met in Columbia, Md. July 18-22 for the STDN Management Conference. From l-r: George Karras, Guam Station Director (STADIR), Eugene Zink, Ascension STADIR; Paul Smor, Vandenberg AFB (GSFC Rep); Steve Stompf, Bermuda STADIR; George Jenkins, Merritt Island STADIR; Luis Gopegui, Madrid STADIR; Ian Grant, Orroral STADIR; Virgil True, White Sands STADIR; Lynn Woodward, Buckhorn STADIR; Bill Edeline, Goldstone STADIR; Chet Shaddeau, Greenbelt STADIR; Eduardo Diaz, Santiago STADIR; Ed Eisele, Alaska STADIR; John South, Santiago (GSFC Rep); and Fidel Rul, STADIR in residence, code 850.

Karate Club

Bernie Dixon breaks five slag blocks with his forearm as part of his 3rd degree Black Belt Test.



Mike Comberiate speed kicks three slag blocks as part of his third degree Black Belt exam. Congratulations to two of Goddard's long-standing Karate Club members. Mike Comberiate (code 407) and Bernie Dixon (code 152) recently received their third degree Black Belts. Comberiate and Dixon have been Karate Club members since 1969. Begun in 1968, the Karate Club is one of Goddard's oldest. Classes are held Mondays and Wednesdays from 5 - 7 p.m. for $12 a month. For more information contact Lenny Brown, 344-5329.



An artists' drawing depicts TDRS spacecraft

Continued from page 1

The TDRS satellite was launched from the Space Shuttle Challenger during the STS-6 mission last April. The satellite failed to reach geosynchronous orbit when a failure occurred while the satellite was being boosted toward geosynchronous orbit by the Inertial Upper Stage (IUS).

The IUS failure left the TDRS in an elliptical orbit of 13,574 statute miles in perigee (low point) and 21,970 miles in apogee (high point).

Engineers from NASA; Spacecom, which owns and operates the spacecraft and leases it to NASA; and TRW, which built the spacecraft, developed a recovery program that ultimately took 58 days to place the spacecraft in geosynchronous orbit. Using tiny, one-pound thrusters which have nozzles no bigger than a thimble, the engineers nudged the big spacecraft little by little until finally reaching geosynchronous orbit on June 29, 1983.

Since reaching proper orbit, the engineers have been checking out the communications systems. First tests with another satellite occurred with the Landsat 4. The STS-8 test is scheduled to take place late this month, and the operational support for STS-9/Spacelab-1 in late October.

TDRS-B had been scheduled for launch on STS-8. However, following the trouble with the IUS, NASA postponed its launch indefinitely.

STS-8 to carry Philatelic Covers

NASA and the U.S. Postal Service have announced that STS-8 will include a cargo of special cacheted postal covers.

Following the flight of STS-8, each of the covers will be placed in a specially designed folder and sold for $15.35 each, by mail order only, from the USPS Philatelic Sales Division.

Depending upon the space available aboard the Shuttle Orbiter Challenger, NASA expects to fly about 260,000 of the cacheted covers, which will bear the recently announced $9.35 postage stamp, intended primarily for Express Mail.

The cachet design on the front of each cover will be a full-color replica of NASA's crew patch for the STS-8 flight. On the back will be a cachet of NASA's 25th anniversary logo.

The pictorial cancellation on the front of each cover will carry the originally scheduled STS-8 launch date of Aug. 14, which is also the issue date of the stamp. Upon the completion of the flight, the actual date of launch will be noted on the cover. Another cancellation will be applied to each cover, indicating the STS-8 landing date and site.

When they are brought back to earth, the covers will be placed in souvenir folders featuring photographs of the Challenger before they are sold.

Proceeds (exclusive of the postage affixed) from the sale of the Shuttle Flight Folder will be divided equally between NASA and the Postal Service.

Mail orders only for the item (designated as Item Number C572) will be accepted no earlier than the date – still to be determined – when the Challenger returns from its mission. Orders postmarked prior to that date will be returned unopened.

If any covers are still available 30 days after the Shuttle returns, there will be no restriction on quantities ordered.

Orders and remittance should be sent to: Shuttle Flight Folder, Philatelic Sales Division, Washington, D.C. 20265-9997. Personal checks in the exact amount will be accepted for orders up to the folder limit, no cash or postage stamps.

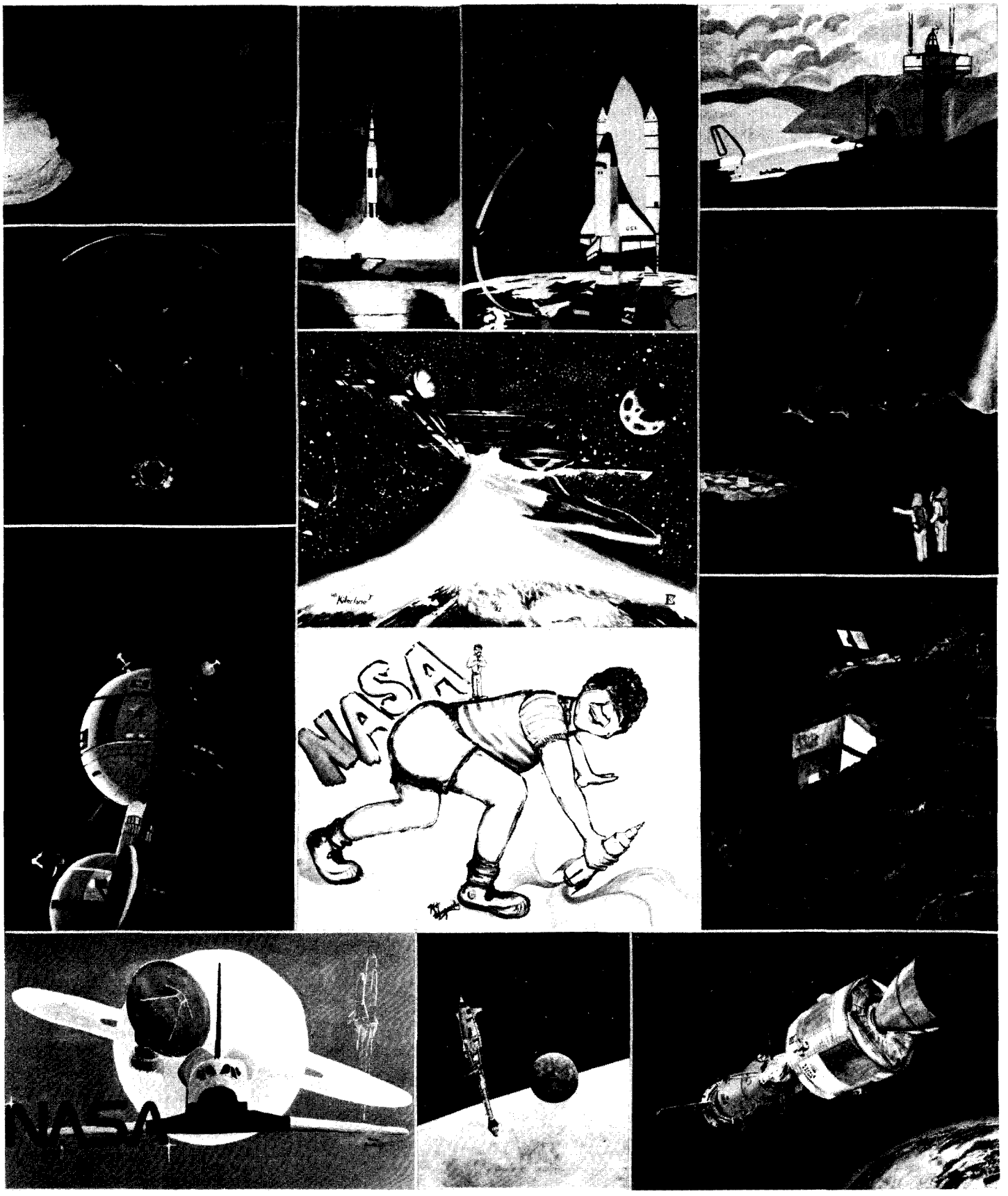
Although the covers have been specially packaged to withstand the rigors of space travel, some minor damage may occur. Some covers are extremely tightly bundled and then stacked in two large storage boxes. Other covers are in eight cylindrical containers that are sealed and then pressurized with pure nitrogen. Both types of containers have been secured in the cargo bay and will be exposed to the temperature extremes encountered when the huge payload bay doors of the Shuttle are opened in space.

Despite all precautions, some of the covers may show evidence of the voyage into space. Because of the limited number of covers, the Postal Service cannot offer replacements for covers damaged in flight or during processing, but will refund the purchase price upon receipt of the damaged cover.

Each cover is imprinted with a special serial number. Under no circumstances will a serial number be duplicated and requests for specific numbers will not be honored.

Mail your story to the Goddard News, Code 202, or call the Editor at

344-8102



SPACE ART PROJECT — Thirty-nine paintings by student artists from 17 high schools in Prince Georges County, Maryland were displayed recently at Goddard's Visitors Center for one month. Above are a few of the pictures included in the exhibit.

Safekeeping: the "Unhealthy Healthy Look"

We all associate a tan with good health, good looks, and the good life. Can there be anything at all wrong with wanting to have a good, healthy-looking tan? A growing body of medical evidence suggests that, under many circumstances, there is.

To start with, dermatologists now consider tanning to be the visible result of damage to the skin - damage done by the ultraviolet (UV) rays of the sun. Under the microscope, the tanning process duplicates (in fast motion) the natural aging process.

The bare skin can, however, be protected from sunlight. Many suntan lotions and potions on the market are effective. There are two basic kinds: sunshades and sunscreens. While sunshades prevent sunburn, they deter tanning - less light gets through. Sunscreens, on the other hand, filter the UV spectrum, partly absorbing rays causing sunburn and allowing longer-wavelength tanning UV rays to pass through. However, since not all of the sunburn effect is screened out, burning does eventually occur. The rule of thumb is that it takes twice as long to burn using sunscreens. Baby oil, cocoa butter, mineral oils, and coconut oil are completely ineffective as sunscreens.

Some UV rays penetrate into the underlying dermis – the living, growing layer of the skin – where they kill many cells, damage others, and disrupt cellular structure and growth patterns.

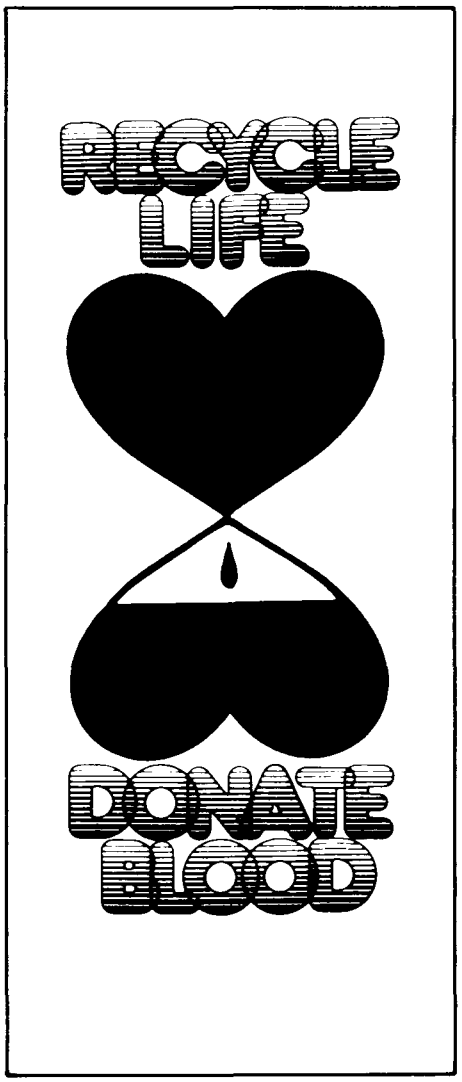
Those disruptions occur to some extent whenever skin is exposed to sunlight. The effect is cumulative. Although the skin can adapt to some degree of damage and continue growing normally, repeated exposure produces a number of long-term consequences: wrinkling grows extreme, patchy brown spots appear, and itching, scaly "solar keratoses" crop up. Usually occurring in people over 50, about ten million keratoses are diagnosed each year. Although they are not in themselves serious, they often develop into skin cancer. Beware of the "Unhealthy Healthy Look." For more information contact the Health Unit on 344-6666. A message from the MOD Health & Safety Committee.

NASA awards Bendix $29 million contract

NASA has awarded Bendix a $29 million contract to operate and maintain Goddard's Payload Operations Control Centers. The two-year, cost-plus-award fee contract has provisions for an additional three years of options worth approximately $50 million. The new contract has incorporated software and engineering services responsibilities, which were previously performed by other contractors.

Bendix began phasing in the software and engineering services August 1 and will assume total program responsibility October 1. Approximately 375 people will be employed to operate and maintain the control centers as well as provide support in documentation, logistics, software development and maintenance, systems engineering, closed-circuit television and operation of the Goddard TV Production Studio, and mission planning and operations reliability.

The control centers serve as the focal point for project-unique scientific satellite mission operations. Real-time mission support consists of computer processing of spacecraft downlink data from the Goddard-managed Spaceflight Tracking and Data Network stations or the Tracking and Data Relay Satellite, for transmission and display to the ultimate project users. Also, vehicle performance data is analyzed and commands uplinked to control spacecraft experiments, orbital parameters and health and welfare of the satellite.



NASA National Aeronautics and Space Administration Goddard Space Flight Center

Goddard News

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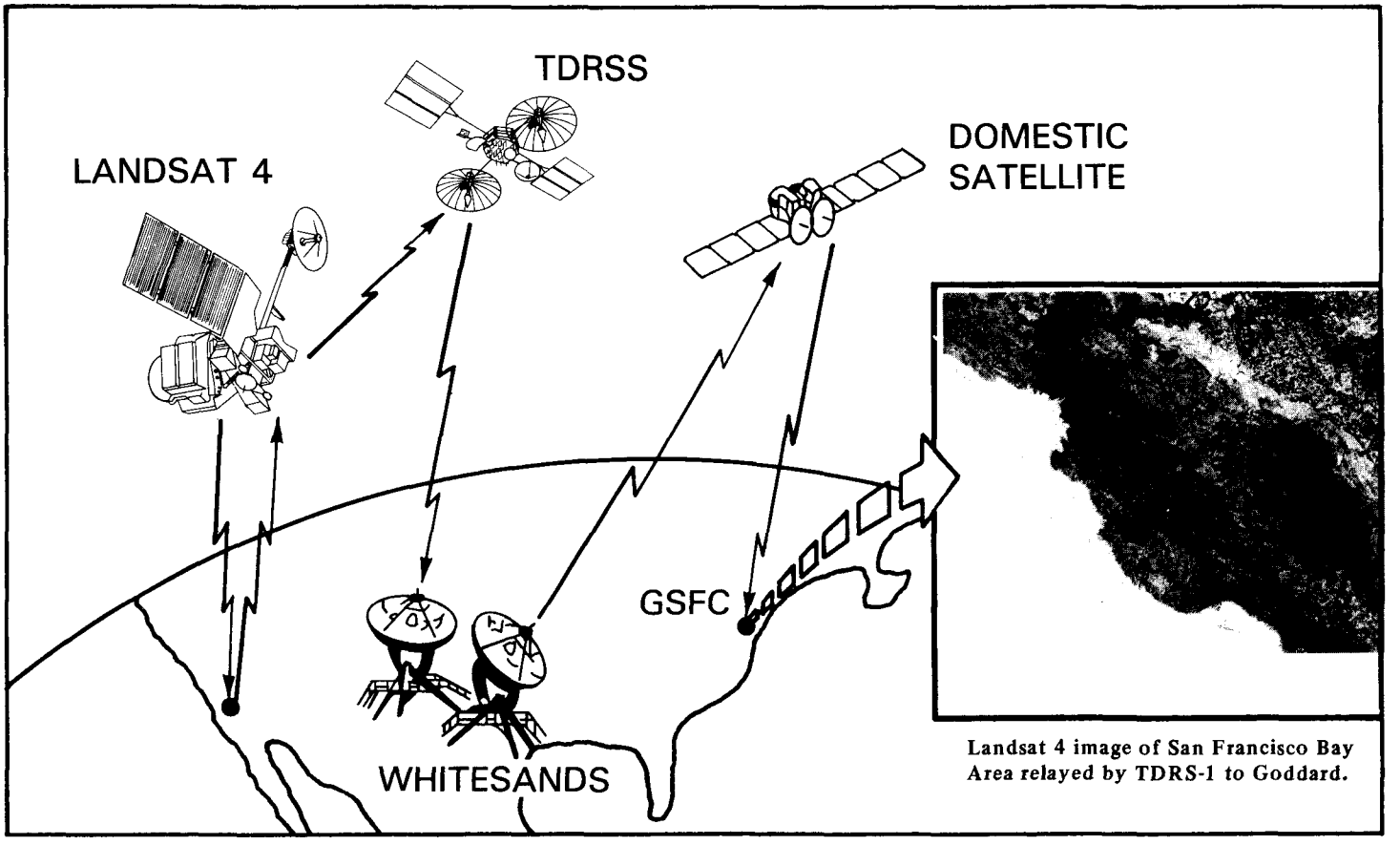
Landsat 4, Shuttle Challenger "talk" to TDRS-1



Landsat 4 image of San Francisco Bay Area relayed by TDRS-1 to Goddard.

The first successful imaging data tests of the Tracking and Data Relay Satellite (TDRS-1) were conducted August 12 using Landsat 4 and additional communications tests between TDRS-1 and the Shuttle Challenger were conducted during STS-8 after Challenger was launched August 30. The tests verified the data transmission capabilities of TDRS-1 and the health of Landsat 4's Thematic Mapper (TM) instrument. Moreover, enough STS-8/TDRS-1 communications tests were conducted to assure support for the STS-9, Spacelab-1 mission, scheduled for October 28.

Several scenes using Landsat 4's TM were relayed from the earth resources satellite via TDRS-1 to Goddard. Landsat 4 has been unable to downlink TM scenes since the direct X-band system failed last February.

The Landsat 4/TDRS-1 test was the first successful use of TDRS-1's high data rate Ku-band capability. Previous tests of the relay satellite's S-band system have been successful with continued transmission of Multispectral Scanner (MSS) images. Shuttle Challenger/TDRS-1 communications testing was also conducted on S-band. The Ku-band is the highest data rate transmission system aboard NASA's new data relay satellite.

Scenes acquired from the August 12 test include Central Oklahoma, the coast and inland area around San Francisco, and portions of Argentina. These scenes were processed through the recently completed Thematic Mapper Image Processing System (TIPS) at Goddard. The new TIPS enhances image quality and increases dramatically the number of TM scenes processed each day.

TDRS-1 failed to reach proper orbit after being deployed from the Shuttle Challenger on STS-6 last April. It was boosted into proper geosynchronous orbit June 29 following 58 days of maneuvers.

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. . . and more

September 12-19, 1983

National Hispanic Heritage Week is being observed this year by the Federal Government from September 12, 1983 through September 19, 1983. This annual observance is the result of a joint resolution, approved by the Congress on September 17, 1968, which requested and authorized the President to annually proclaim the week which includes September 15 and 16 as National Heritage Week.

Hispanic men and women continue to make significant contributions to the social, cultural and economic growth of our nation. Their accomplishments in science, technology, the arts and other important fields have greatly contributed to our way of life. I urge all employees to join in recognizing the significance of National Hispanic Heritage Week.

Noel W. Hinners
Director

U.S. satellite used for first time as part of international program

Two Canadians whose canoe overturned in rapids on the Winisk River and left them stranded in wilderness below Hudson Bay in Ontario were rescued recently when their distress signals were heard by an American satellite.

The distress signals were heard by the NOAA-8 environmental monitoring satellite, launched from Vandenberg Air Force Base in California last March 28, which also is equipped with search and rescue equipment. The rescue marked the first time the American satellite has been instrumental in a rescue.

The satellite is part of an international search and rescue program in which Canada, France, the Soviet Union, and the United States are partners. The Soviets have two search and rescue-equipped satellites in orbit. The satellites receive distress signals from planes and ships and relay them to stations on the ground where officials alert and dispatch rescue forces.

The rescue of the two Canadians, Allan Berry and Jeff Hyatt, was among six incidents in which 10 lives were saved recently through the use of the life-saving satellites. The 10 lives bring to 58 the number of people who have been saved since satellite-aided rescues were started through the international program in September, 1982.

Berry and Hyatt, who live in Ottawa, were tossed from their canoe on August 1 as they were making their way through the Tashka Rapids, according to Canadian rescue officials. Ashore, the men activated their Emergency Locator Transmitter (ELT), and the signals were heard by the American satellite in orbit 517 statute miles above Earth. The first signal was picked up by the satellite at 11:40 a.m. EDT and a second signal was picked up on its next pass over the area at 1:35 p.m. EDT, officials reported.

Canadian rescue forces launched a twin-engine Buffalo aircraft to search for the pair later in the day, but because of the distance involved, the plane did not reach the vicinity until slightly after midnight on August 3.

On the search plane's second pass over the area, the two canoeists were spotted, and the plane's crew dropped a portable radio and supplies. A helicopter, provided by the Ministry of Natural Resources for Ontario Province, was dispatched to pick them up.

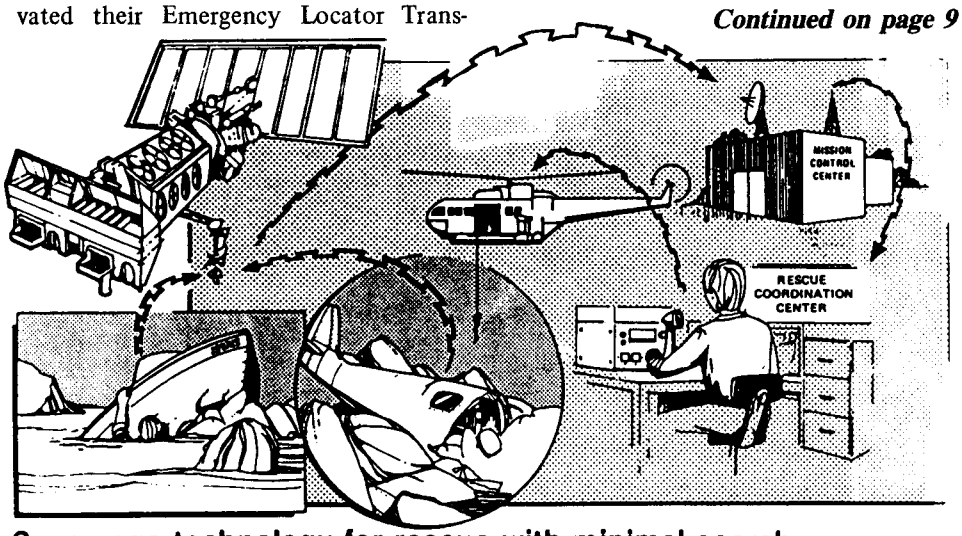
The two men, who had received minor injuries, were flown to a hospital in Moosonee, according to Canadian authorities.

Other rescues which have taken place recently include:

May 31 — One person rescued in an aircraft accident on a remote airstrip in the District of Mackenzie in Canada. No other details available.

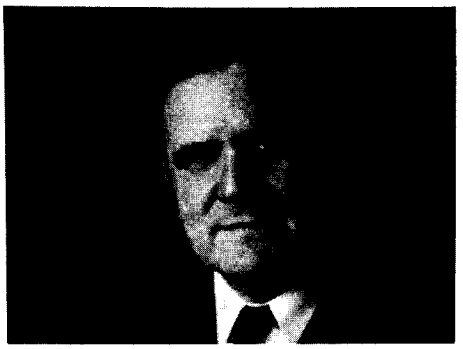
June 3 — One person rescued from a plane that crashed at the 5,300 foot level of a mountain in British Columbia, Canada. Survivor was pilot, M. Kostiuk. One unidentified passenger died.

Continued on page 9



Space-age technology for rescue with minimal search

Former NASA Administrator honored with $500,000 grant



Former NASA Administrator James E. Webb

1961 NASA photo

NASA's second administrator, James E. Webb, has been honored with a $500,000 grant from the Kerr Foundation to the National Academy of Public Administration (NAPA) for his dedication and service to the welfare of government organizations. NAPA officials responded by establishing the Fund for Excellence in Government, with an immediate goal of $2.5 million. Contributions to the fund will be invested to provide income in support of specific NAPA initiatives to increase the effectiveness of state, local and national government.

Webb, now retired, founded NAPA in 1967 as a source of advice and counsel to governments and public officials on problems of public administration. NAPA's service to public administration is much like that of the National Academy of Sciences' and the National Academy of Engineering's service in science and engineering.

Webb's career combines a highly successful record as a business executive with distinguished public service in a variety of key posts in the federal government. As Director of the U.S. Bureau of the Budget, Undersecretary of State and NASA Administrator under presidents John F. Kennedy and Lyndon B. Johnson, Webb demonstrated not only his understanding of government, but also his deep interest in establishing institutions outside the government that are dedicated to improvement of government organization, management and operations.

Continued on next page

Goddard training center to be upgraded

Joe Walters photo

Walter Flournoy is shown here with a student in the M&DOD Training Center. The center will be upgraded soon with the addition of two PLATO terminals. PLATO will enable access to a vast resevoir of self-study courses and information.

PLATO is coming. Not the Greek philosopher, but a unique and widely used computer-based instructional system that will bring the latest in self-study courses to one of Goddard's training centers.

Walter Flournoy (code 500) started the Mission and Data Operations (M&DOD) Training Center in 1974 with only a TV monitor, a cassette player and two courses. The monitor and the cassette player were borrowed from a vendor as a pilot program.

"I started with a very small room and about two courses," Flournoy said. "Later we moved the center to a conference room which had to be re-designed by installing cabinets, desks and chairs. I ordered TV monitors, video tapes and related course materials, and checked other learning centers to get ideas."

In nine years it has grown to three monitors and cassette players and offers 84 data processing courses for computer programmers to systems analysts in fields from finance to spaceflight tracking.

In another three to four months, when PLATO arrives and is combined with the recently acquired 4300 Series of self-study courses, M&DOD's Training Center will be on the brink of becoming a total learning environment, which uses computer course-ware as its focal point. More than 8,000 hours of course-ware on a variety of subjects are available.

"The training center has an enormous growth potential. Current plans call for us to receive two more PLATO terminals, which will enable us to tap into a vast reservoir of training/educational material. PLATO's catalog contains a list of more than 1200 course and curriculum titles, running the gamut from data processing to arcade games," Flournoy said.

According to Flournoy, the system will continue to grow and never become antiquated, because "I can clear the library out and put new stuff in . . . I can also modify anything in there," he said.

PLATO's uniqueness is its ability to provide more accessible and less costly education and training. It organizes and manages the learning process in an individualized, self-paced manner — providing more rapid progress than is possible either with books alone or in a conventional classroom.

PLATO definitely will be an asset to M&DOD's Training Center, which works in conjunction with Goddard's personnel training center, serving over 3,000 students, employees, and contractors. Six government agencies have sent employees to the M&DOD Training Center and many interns and co-ops are sent to the center. For the completion of each course, a certificate is awarded and placed in the individual's personnel file.

"When the training center is upgraded, it will address the training and educational needs of everyone, regardless of their respective areas," Flournoy said. "I'm looking forward to upgrading the center for the benefit of all interested parties."

Interested persons should call Flournoy, 344-8717, or contact him in building 3, room 113.

Webb

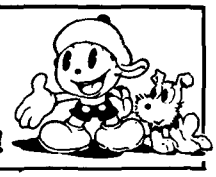
Continued from page 3

Some of his numerous private sector roles include service as president and board chairman of Republic Supply Co., director of Kerr-McGee Corp., McDonnell Aircraft Co., McGraw-Hill, Inc., Gannett Co., Inc., Sperry Corp. and Computer Data Systems, Inc.

"NAPA does me great honor to link my name with its increased drive to achieve excellence in government," Webb said. "That the National Academy of Science and the National Academy of Engineering will now have a stronger sister organization seeking excellence in public administration bodes well for our future."

Webb, 76, lives in Washington, D.C. His many awards include the Presidential Medal of Freedom, the NASA Distinguished Service Award, the Sylvanus Thayer Award of the West Point Graduates Association, the Langley Gold Medal of the Smithsonian Institution and the Hubbard Gold Medal of the National Geographic Society.

Slow Down, Mr. Driver! I'm Going Back To School!



Balloons launched to select ozone measurement instruments

As part of NASA's Upper Atmosphere Research Program (UARP), which assesses the performance of different measurement techniques, most flights of the 1983 Balloon Ozone Intercomparison Campaign (BOIC) were launched successfully this summer from the National Scientific Balloon Facility in Palestine, Texas. Remaining tests will be conducted next month. The BOIC is managed by Goddard.

Project Scientist for the BOIC Ernest Hilsenrath (code 963) said the Triplets series of launches, 16 balloons each carrying three operational ozone instruments (normally carried by weather balloons to 18 mi.), worked "quite well."

"Each of the 16 balloons carried the three instruments to heights exceeding 23 miles," Hilsenrath said. "This was an excellent test of the precision of balloon ozone instruments used world-wide and of their performance at altitudes where ozone depletion could be a serious problem."

The BOIC's goal is to select an ozone instrument which can be used routinely in a balloon up to 24 miles with an accuracy of better than five percent. The instrument would then be used on a series of research balloon flights to measure atmospheric gases important in ozone photochemistry. The instrument would also be used for comparison with satellite ozone measurements.

Although the UARP's overall goal seeks to compare theory with an accurate set of observations, the BOIC is dedicated to evaluate ozone measurements only. Accurate ozone measurements are necessary to understand variations of the ozone layer. Present theory predicts a possible decrease in ozone due to man's activities. The ozone layer is important to life on earth since it helps filter harmful solar rays.

The BOIC is set up as a three-flight mission consisting of The Multiple Instrument Gondola, the Mass Spectrometer Gondola and the Triplets.

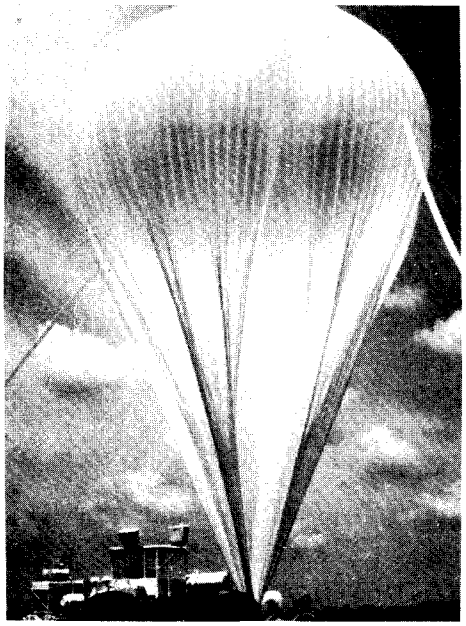
The Multiple Instrument Gondola was flown this summer but failed to reach the desired height because of a balloon leak — a reflight is scheduled for next month. This gondola includes operational instruments and other instruments under development from Harvard University, NOAA's Environmental Research Lab (ERL) and NASA's Goddard Space Flight Center and Johnson Space Center (JSC). Of the developmental instruments, two are remote sensors, six are in-situ sensors and are all potentially capable of measuring ozone very accurately, according to Hilsenrath.

The Mass Spectrometer Gondola carried the University of Minnesota's mass spectrometer, another JSC instrument and a high altitude operational ozone instrument. This gondola ascended 26 miles and all three instruments obtained good data.

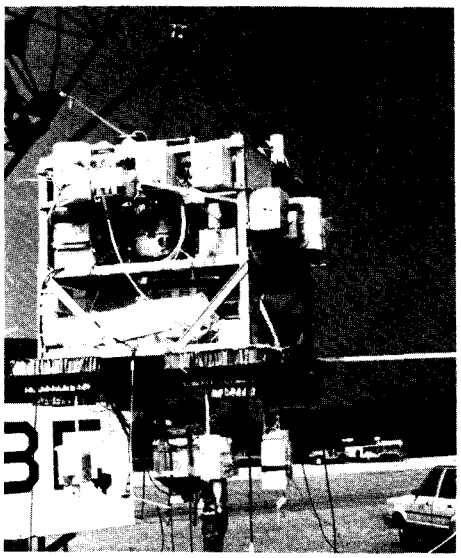
The Triplets contained instruments from the German Weather Service (Deutscher Wetterdienst), the Canadian Atmospheric Environment Service, NOAA's ERL and Goddard's Wallops Flight Facility.

Goddard investigators were: John Ainsworth, Alfred Holland and James Mentall all from code 963; and Arnold Torres, 971. Balloon payload integration engineer was Walter Nagel, 745.2. Other participants involved in the calibrations and data analysis are from NOAA's National Meteorological Center and the National Bureau of Standards.

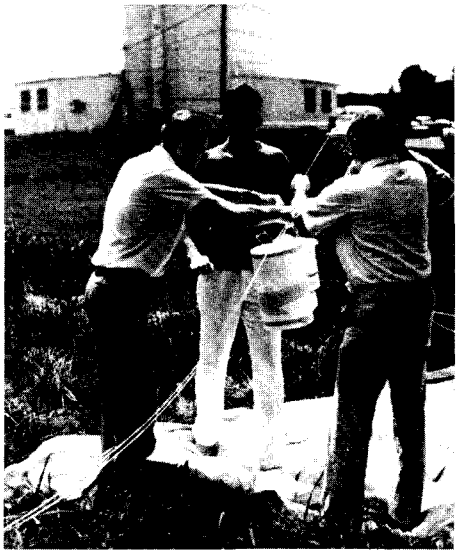
NASA's Balloon Program is managed by Goddard's Wallops Flight Facility, Wallops Island, Virginia. Wallops' involvement in this program in the last four years has resulted in about 200 balloon missions, representing 16 universities and 18 other scientific groups.



A balloon is filled with helium prior to launch in the Balloon Ozone Intercomparison Campaign (BOIC).



Instruments are prepared for flight on Triplets series of launches.



Final checkout of Goddard's gondola (payload) as it sits on the launch crane. The payload contained 11 experiments; four were Goddard's.

Are you putting me on?

In April 1982, President Reagan announced a highway safety campaign aimed at increasing the use of safety belts nationwide.

Reagan pointed out in his announcement that approximately half of all those who die in accidents involving passenger cars, light trucks or vans could have been saved if they had been wearing safety belts.

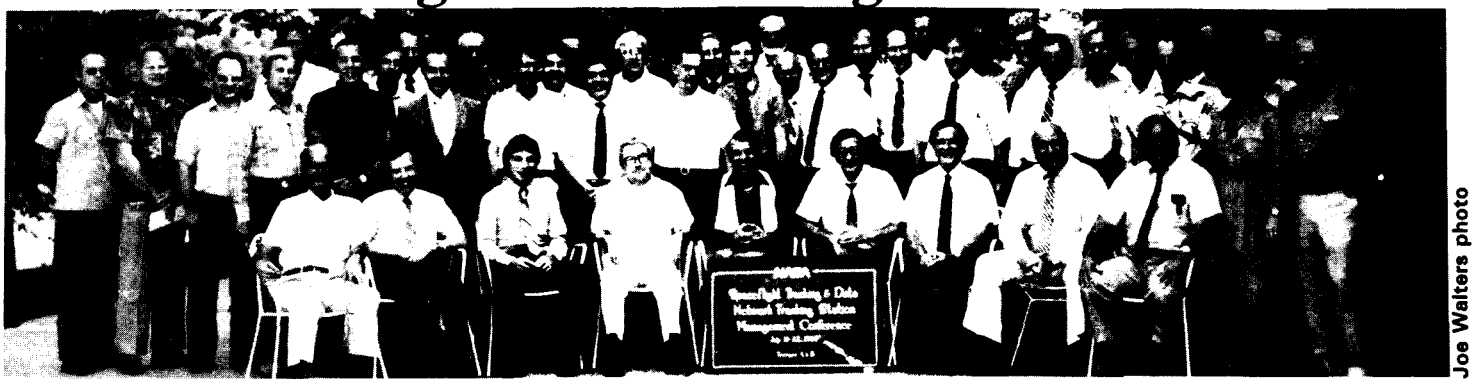
NASA is participating with other government departments and agencies in a national campaign to increase safety belt usage, not only on the job but off the job as well.

The Center director and all senior management personnel at GSFC encourage each employee to get into the habit of using seat belts.

Seat Belt Safety

PEOPLE

STDN Tracking Station Management Conference



Joe Walters photo

Government and Bendix station directors of the Goddard-managed Spaceflight Tracking Data Network (STDN) met in Columbia, Md. recently for the STDN Management Conference. From l-r standing: M.E. Briggs, STDN Operations Group Manager; D.E. Smith, Bendix vice president and STDN program director; I. Grant, Orroral Station Director (STADIR); P. Smor, Vandenberg AFB (GSFC Rep); B.L. Crouch, assistant to mgr., tracking station operations; S. Stompf, Bermuda STADIR; G. Jenkins, MILA STADIR; J.P. Gale, STDN deputy program manager (DPM); V. True, White Sands STADIR; L. Woodward, Buckhorn (BUC) STADIR; W. Edeline, Goldstone (GDS) STADIR; C. Shaddeau, Greenbelt STADIR; P. Schlosser, senior mgr., Ascension (ACN); E. Diaz, Santiago STADIR; E. Eisele, Alaska STADIR; C. Myers, senior mgr., Botswana; J. South, Santiago (GSFC Rep); M. Henderson, Johnson Space Center; W. Koselka, SPACECOM; W.K. Wells, senior mgr., White Sands (NGT); W. Bodin, associate chief, Networks Operations Division (NOD); D. Spintman, chief, NOD; P.H. Johnson, DPM, TDRSS; J.J. Jobes, senior mgr., Greenbelt; G.D. Smith, senior mgr., Alaska; P. Weitz, STS-6 astronaut; W.M. Herndon, senior mgr., Dakar; J.G. Killip, senior mgr., MILA; A.J. Begenwald, STDN program administrator; J.M. Lacewell, senior mgr., BUC; J.P. Obloy, senior mgr., Guam; G. Karras, Guam STADIR; C.M. Hutto, senior mgr., GDS; N. Desmond, administrative officer (GSFC); G. Zink, ACN STADIR; L. Gopequi, Madrid STADIR; Sitting l-r: F. Alcaraz, senior mg., Madrid; D. Kemp, senior mgr., Orroral; G. Morse, Network Director, Goddard; L. Bello, senior mgr., Santiago; F. Ful, STADIR in Residence, Goddard; G.A. Hunsicker, executive assistant, Bendix; J.J. Miller, senior mgr., Laser Subnet; M. Weingarten, president Bendix; and W.F. Way, senior mgr., Bermuda.

Randy Frisch photo

John C. Lemke

John C. Lemke has been appointed chief, Health, Safety and Security Office, Management Operations Directorate (code 205). Lemke replaces Levin B. Gray, who has taken a position at NASA Headquarters (HQ).

Lemke comes to Goddard from HQ, Air Force Systems Command, Andrews Air Force Base, where he was chief, System Safety for three-and-a-half years. Prior to that he worked with HQ, USAF, Wright Aeronautical Laboratories, as director of safety and established a comprehensive safety program for four independent laboratories. Lemke received a BS degree in Industrial Engineering from the University of Wisconsin in 1970 and a Masters degree in Industrial Engineering in 1971 from Texas A&M University.

LIKE THIS UNIFORM?

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Deborah McCallum photo

INDIAN STUDENTS VISIT GODDARD – Two winners of a national essay competition in India on "25 Years of Space Flight" visited Goddard recently as part of their reward. They are shown here with Goddard Deputy Director John J. Quann. L - Sumita Trivedi, r - Ashish Khosla. During their 13-day stay in America the students also visited the National Air and Space Museum and COMSAT, both in Washington, D.C., where they collected materials and documented space science related activities. The two will present student seminars on "Space and Mankind" upon their return to India.

NASA begins major research effort in continuing study of global troposphere

NASA has begun a major research effort in its continuing study of the global troposphere's chemistry and interaction with the stratosphere and with the earth's land and oceans.

More than 20 scientists from 16 research organizations recently gathered at NASA's Wallops Flight Facility on Virginia's Eastern Shore to conduct an intercomparison of several relatively new, high technology instruments for monitoring atmospheric trace species.

Called the Global Tropospheric Experiment, the program is expected to expand through the next decade to include global monitoring missions to learn more about the troposphere and, assess the susceptibility of the globe atmosphere to chemical change.

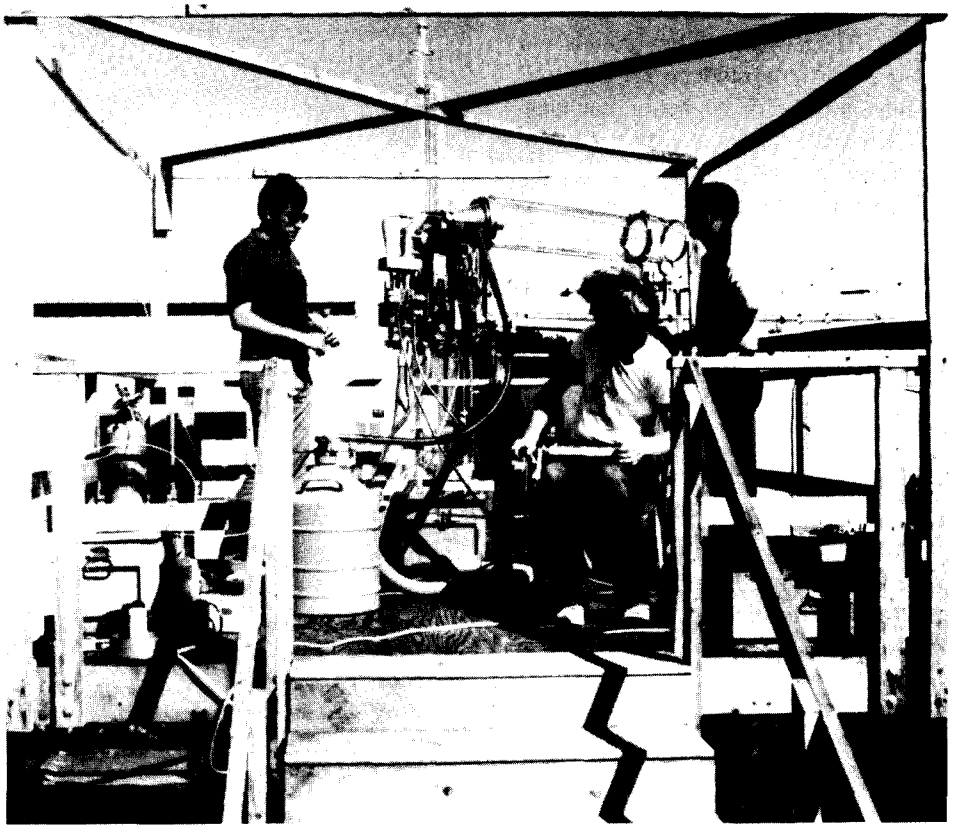
The experiment is managed by NASA's Langley Research Center as part of the Tropospheric Chemistry Program of the NASA Office of Space Science and Applications in Washington, D.C.

Human activities have a strong effect on the global atmosphere. Prime examples are the increasing level of carbon dioxide, caused mainly by the widespread burning of fossil fuels, and the probable depletion of ozone in the stratosphere through photochemistry based on nitrogen and halogen compounds. Other gases, which may have an impact on atmospheric chemistry such as methane and nitrous oxide, are also believed to be increasing.

The Global Tropospheric Experiment reflects growing concern about the atmosphere's lower region. While measurements have been made of specific urban pollution areas, no global study has yet been initiated.

The first phase of the experiment is to develop, test and evaluate techniques that will achieve, under a variety of field conditions, the extreme sensitivity required to measure concentrations of key chemical species in the lower atmosphere. These trace species can have extremely low concentrations, yet still exert great influence on the composition and radiation balance of the atmosphere.

During this intercomparison of measurement techniques special attention is being given to the measurement of hydroxyl, nitric oxide and carbon monoxide.



Scientists and technicians conduct measurements during the recent Global Tropospheric Experiment at Goddard's/Wallops Flight Facility on the north end of Wallops Island.

Other meteorological and atmospheric constituent data will be analyzed to help interpret any differences between the techniques being tested.

The Wallops-based instrument intercomparisons will last about one month. The instruments will then be installed aboard an aircraft for a series of airborne intercomparisons. Flights are planned from the island of Barbados in the West Indies, flying in the tropical boundary layer over the ocean and over tropical forests. The tropical climate will expose the instruments to a wide range of water vapor, marine and continental aerosol, and natural hydrocarbon concentrations.

A third series of instrument and technique intercomparisons will be conducted over the mid-continental United States. Again installed aboard an aircraft, the instruments will be flown in the upper troposphere, where irregularities in the boundary between the troposphere and the stratosphere provide a wide range of concentrations of ozone and other key species.

At the end of the three series of intercomparisons, leading atmospheric scientists will carefully analyze the results, which will provide guidance as to what techniques and measurement strategies to use in later phases of the program.

Long-range plans call for global aircraft sampling in the late 1980s, followed by space-based measurements in the early 1990s.

Both of these phases of the experiment will focus on wide-spread and systematic investigations of the principle processes that govern the key chemical cycles in the global troposphere.

SHARP students finish terms

Summer High School Apprenticeship Research Program (SHARP) students finished their terms here last month and nearly half of the 24 students are currently freshmen at some of the nation's universities. SHARP enables qualified students to be placed with mentors for two months each summer and exposes the students to new learning experiences in science and technology. SHARP is a NASA-wide program geared to prepare the nation's high school students for further study in science and technology and seeks to cultivate today's youth into tomorrow's scientists and engineers.

Two returning students, now freshmen in college, said their experiences this summer were highly rewarding.

"I really enjoyed this year's assignment, even better than last year's," said David Hudgens, now a freshman at Boston University. "I learned to use the Tektronix 7904 oscilloscope, which comes from a new series that has highly sophisticated instrumentation. I used the oscilloscope to put together logic circuits, to test logic components, and to set voltage, amperage and resistance in a bread board system."

Rufus McCrea, now attending the University of Maryland, said his job was equally gratifying.

"I worked in the photography lab of the National Space Data Center. I assisted other employees and completed jobs just as they did. The lab's main function is to develop, print, copy, contact print, enlarge and reduce satellite photos on request from scientists and the public everywhere. The experience was very rewarding and I was even given the chance to do some enlarging on my own," McCrea said.

Many of Goddard's SHARP students have won awards and recognition: John Paul Jones was featured in SOURCEBOOK Magazine last year as one of seven students selected from thousands of high school seniors across the nation as a "super senior" of the Class of '82; Sophia Robinson won the 1982 Olin E. Teague Award for her academic achievements and her performance in the 1981 SHARP program; Frank Gomez Jr. was the 1982 Maryland Chess Champion and several students have won science fair awards and other scholastic recognitions.

Deborah McCallum photos

Summer High School Apprenticeship Research Program (SHARP) students Stacy Barnum (top) and Juanda Andrews (bottom) explain their respective assignments carried out this summer. Each SHARP student gave similar presentations during closing ceremonies.

This year's SHARP coordinator at Greenbelt was Pat Brooks, coordinator of programs for talented and gifted students in the Prince George's County School System. At Wallops, Joyce Milliner coordinated the program for five students.

GAS experiments selected

Eight scientific experiments designed by students of the Prince George's County Public Schools in Maryland have been selected to fly aboard a shuttle in 1985. The selections were made following seven months of intensive research and proposal development by teams of students and teachers at six Prince George's (PG) high schools. The announcement was made on the selections at a recent press conference at Goddard.

The experiments will be constructed during the next ten months and ultimately placed inside a five-cubic foot "Get Away Special" (GAS) canister. The GAS canister was donated to the PG and Montgomery county public schools by Orbital Systems, Ltd., an aerospace engineering firm in Glenn Dale, Maryland.

From a field of 61 original proposals designed by PG students, the eight finalists were selected on the basis of the merits of their investigation, the probability of getting success and their suitability for limited space and power inside the GAS canister. The finalists' projects were submitted by students at Bowie, Eleanor Roosevelt, Friendly, Northwestern, Oxon Hill and Suitland High Schools.

Following the construction of the experiments during the next school year, the eight separate projects will be integrated into the canister. Once integrated, the canister will be sent to Cape Kennedy, Florida, where it will undergo further stress testing. The anticipated launch date is early to mid-1985.

OPEN HOUSE

In celebration of NASA's 25th anniversary, Goddard will host open houses at both Greenbelt and Wallops in October. The Greenbelt Open House, scheduled for Saturday, October 1, is open to Goddard employees and contractors and their families and guests. The Wallops Open House, scheduled Sunday, October 9, is open to Goddard employees, contractors and the public. Make plans to attend!

Congressman Hoyer visits

Joe Walters photo

Congressman Steny Hoyer (D-MD) talks to Goddard employees about pending legislation in the Office of Personnel Management that will affect government workers. Congressman Hoyer, from Maryland's fifth district, spoke at a colloquium recently sponsored by the Goddard Engineers, Scientists and Technicians Association (GESTA) and the Washington Area Metal Trades Council.

Satellite save

Continued from page 3

June 22 One person rescued from a plane crash in Dawson City, Yukon Territory, Canada. No other details available.

August 6 Three persons rescued when plane crashed at 3,600 foot-level of Mt. Katandin in Maine, about 15 miles northeast of Millinocket. Distress signals were heard by both the Soviet and U.S. satellites. Canadian rescue forces brought survivors to hospital in Millinocket.

Pilot Dale Brooker was in serious condition. One passenger suffered broken arm, and the other passenger was in good condition.

August 8 Two persons rescued in Canada's British Columbia. Type of aircraft and other details not available. Distress signals were picked up by Soviet satellite.

The United States' part of the international program, known as COSPAS/SARSAT (acronyms for Search And Rescue Satellite-Aided Tracking) is managed by the Communications Division of NASA's Office of Space Science and Applications. NASA Program Manager is Thomas E. McGunigal. NASA's Goddard Space Flight Center, in Greenbelt, Maryland, is responsible for the execution of the program. Bernard J. Trudell is the SARSAT Mission Manager at Goddard.

Think about it . . .

"A Manager can "Push" a few to achieve modest goals; a Leader can "Inspire" thousands to achieve impossible dreams."
— — — Elva Bailey

There is a difference between leadership and management. Leadership is of the spirit, compounded of personality, vision and training. Its practice is an art. Management is a science. Managers are necessary; Leaders are indispensable — — —
Author unknown

NASA National Aeronautics and Space Administration

Headquarters
Washington, D.C.

National Aeronautics and Space Administration

Twenty-fifth Anniversary 1958-1983

WHAT'S YOUR *"PAIN IN THE NECK?"*

- RED TAPE?
- POOR PLANNING?
- DUPLICATIONS?
- WASTE OF MATERIAL?
- DELAYS?
- INFERIOR PROCEDURES?

Suggest A Better Way!

NASA National Aeronautics and Space Administration
Goddard Space Flight Center

Goddard News

The GODDARD NEWS is published monthly by the Office of Public Affairs, Goddard Space Flight Center, Greenbelt, Md. 20771. Deadline for submitted material is two weeks from the date of publication. For additional information on articles contained herein, contact the editor on (301) 344-8102.

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Assistant Editor: Joni Shipp

NASA
National Aeronautics and Space Administration
Goddard Space Flight Center

Goddard News

Greenbelt, Maryland and Wallops Island, Virginia

Vol. 30 No. 10 October 15, 1983

CFC drive begins

Goddard began its support of the 1983-84 Combined Federal Campaign (CFC) October 11. Center Director Noel W. Hinners (second from right) pledges Goddard's support to helping others in need. Shaking hands with Hinners is CFC Loan Executive William Kelly. From left: Stephan Fogleman, chairman, Goddard Employees Campaign Committee and A. T. Dannessa, co-chairman. This year's goal, established by the committee, is $215,000.

Goddard developed refrigeration system wins I-R 100 Award

A new refrigeration system developed by NASA to cool instruments aboard satellites has received the prestigious I-R 100 award from Industrial Research and Development Magazine. The Magazine has named the invention, known as the Stirling Cycle Cryogenic Refrigerator, as one of the 100 most significant technological advances of 1982.

The refrigeration system was developed by engineers at Goddard and North American Philips Laboratories in Briarcliff Manor, N.Y. John Boeckel, Goddard's Director of Engineering, will receive the I-R 100 award for Goddard.

The award recognizes the new cooling system for innovations and improvements in Stirling cycle closed loop refrigeration design that permit cooling to 5 watts, or 65 degrees K (-343 degrees F).

An additional I-R 100 award has been directed to the Philips Corporation for developing (under NASA contract) frictionless linear magnetic bearings to give refrigerator components longer, wear proof lives that are less susceptible to failure. The bearings are the first application of magnetic bearing technology to reciprocating (or piston type) machinery such as pumps and compressors. Known as Reciprocating Magnetic Bearings, they could be a precursor to future development and use of similar bearings in non-space applications, for example, pumps, motors, compressors and other mechanical devices. The linear magnetic bearings are electronically controlled, and replace

Continued on page 5

TDRS-1 relocation initiated

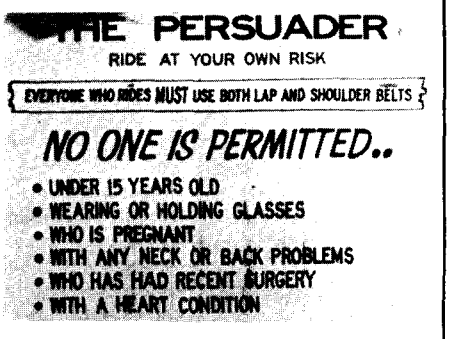
A NASA-industry team of engineers successfully staged two maneuvers late last month to relocate the Tracking and Data Relay Satellite, according to Goddard officials.

Using six tiny thrusters on the communications spacecraft, engineers from Goddard, from SPACECOM, and from TRW conducted two burns to start the movement of the satellite from 67 degrees to 41 degrees west longitude.

The burns will permit the spacecraft to drift at a rate of 1.2 degrees until the thrusters will be fired again on October 16 and 17 to halt the drift at its permanent position, over the Atlantic just off the east coast of Brazil.

The spacecraft was launched from the Space Shuttle Challenger last April. Because of a failure in the booster rocket, the satellite failed to reach geosynchronous orbit. The engineers, using delicate maneuvers over a 58-day period, finally got the spacecraft into a circular orbit on June 29. Since that time, the engineers have been conducting tests and evaluation with the spacecraft, having worked with the Landsat 4 Earth resources satellite and the STS-8 Shuttle mission in preparation for supporting the STS-9 Shuttle mission and Spacelab 1.

Looks like a warning for a ride at an amusement park



It's not. . .see page 8