



GODDARD NEWS

National Aeronautics and Space Administration
Goddard Space Flight Center

Greenbelt, Maryland/Wallops Island, Virginia

July 1998 Vol. 2 No. 27

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NOAA-15 Spacecraft Successfully Completes Testing and is Turned Over To NOAA

By Cynthia O'Carroll, Office of Public Affairs

The newest polar-orbiting observational environmental satellite, NOAA-15 has successfully completed a comprehensive, two month, on-orbit verification by Goddard and the spacecraft has been turned over to the National Oceanic and Atmospheric Administration (NOAA) to begin the process of becoming fully operational. The NOAA-15 spacecraft will improve weather forecasting and monitor environmental events around the world. NOAA-15 is the first in a series of five polar-orbiting satellites with improved imaging and sounding capabilities that will operate over the next twelve years.

"The NOAA-15 satellite is working beautifully and the mission has been an outstanding success," stated **Harry McCain**, the project manager for the Polar-orbiting Observational Environmental Satellite program. "This success is due to the professionalism of a large team of NASA, NOAA and contractor personnel. Our primary contractors are Lockheed Martin, ITT, Aerojet, Ball Aerospace, Panametrics and L3 Communications. We also have international partners from the U.K., France and Canada. All are to be congratulated for their significant contributions in achieving our joint goal of success for the NOAA-15 mission."

NASA engineers successfully performed a series of over 300 on-orbit verification tests since the May 13, 1998 launch to establish a satellite performance baseline designed to characterize all aspects of instrument and spacecraft operation. The resulting information provides NOAA with a database to support product development and performance monitoring during the operational phase of the mission. This same data provides NASA with valuable insight into overall spacecraft subsystem and instrument interaction, so that enhancements and/or ground test modifications may be applied, if appropriate, to the follow on satellites, NOAA-L, M, N, and N Prime.

More information on the POES program may be found on the Internet at: <http://poes2.gsfc.nasa.gov> and <http://www.2.ncdc.noaa.gov/doc/intro.htm>

NASA's Technical Standard's Program

By Rachel Waters, Systems Engineering Office



In response to OMB policy requiring NASA to formally adopt, support development of, and use domestic and international Voluntary Consensus Standards (VCS) in preference to Government standards in order to accomplish NASA's mission, when appropriate, NASA has established the NASA Technical

Standards Program.

Under this program, emphasis is placed on "preferred" standards which include those developed by NASA and those adopted for use on NASA programs. These standards have been selected by the NASA Engineering Standards Steering Council (ESSC). The term "technical standard" includes practices, specifications, standards, handbooks, regulations, codes, and guidelines.

The objectives of the ESSC are to develop and maintain an integrated system of NASA Preferred Technical Standards for use in enterprise programs; to improve the availability of technical standards for the design, development, and operation of NASA programs; to reduce duplication of effort and improve interoperability; and to promote the increased use and development of national and international Voluntary Consensus Standards in NASA programs. Serving on the ESSC are Steve Brodeur, Code 540, Bill Poland, Code 730, and Jon Wonsever, Code 302.

Currently a survey is underway to identify the engineering standards in use at Goddard. The survey team will be contacting and interviewing representatives within the Center's technical organizations. The expertise that the technical representatives will contribute to the survey process is greatly appreciated by all involved in this effort. For more information, visit the Goddard Technical Standards Program web site at:

<http://joy.gsfc.nasa.gov/GTSP>, or contact **Steve Brodeur**, x6-6555; **Bill Poland**, x6-8592; or **Jon Wonsever**, x6-5648.

Status on Outsourcing Desktop Initiative for NASA (ODIN)

On June 18, 1998, NASA awarded an ODIN master contract to each of the following companies who bid on the ODIN RFP: Boeing, CSC, DynCorp, FedData, OAO, RMS and Wang. GSFC will be initiating an activity called the delivery order selection process (DOSP) which will lead to the identification of one of the aforementioned prime vendors to be the ODIN contractor for GSFC.

Goddard has been preparing an inventory of Information Technology assets to be managed by the ODIN contractor. Over the course of the summer the vendors will be assessing that inventory to provide transition plans and best pricing for GSFC. A small team will be reviewing that vendor information to make a recommendation to the GSFC selection official. The date for the GSFC ODIN delivery order to be in place is Nov. 2, 1998.

ODIN will delivery comprehensive desktop computer, server and intra-center communications services to NASA and its Contractors. Mark Hagerty of Code 250 was recently selected as the ODIN Program Manager for the Agency. The official NASA web site for ODIN is at <http://outsource.gsfc.nasa.gov>

NEWS tidbits

Pradeep Sinha, formerly Executive Officer for Management Operations (Code 200) and Branch Head of the Wallops Facility Management Branch (Code 228), has been named Chief of the Safety Environmental and Security Office (Code 205).

On July 9 the GOES-10 Satellite was activated and will replace the GOES-9 satellite which is failing as it nears the end of its planned life. GOES-10 which launched in 1997 was put into a storage orbit and completed its operational testing in June of this year.

Launch of the Planet-B spacecraft took place from Kagoshima Space Center on an M-V vehicle on Saturday, July 4 at 3:12 a.m. local time (Friday at 2:12 PM EDT). Flight operations will be handled by Sagami-hara Spacecraft Operations Center, and Martian orbit insertion will take place in October 1999, followed immediately by data collection. Planet-B was renamed Nozomi, or "hope," after liftoff. NASA Instruments onboard will aid studies of Martian Upper Atmosphere.

Toni Dufficy of the National Park Service



Ms. Toni Dufficy

Last year, Goddard signed a Memorandum of Understanding (MOU) with the National Park Service (NPS) that acknowledges the mutual interest of both agencies in promoting math and science literacy through technology. This MOU provides the opportunities for both the Park Service and Goddard to share resources and to make educational/outreach materials available to the public.

The National Park Service's main function is to conserve the nation's scenery, natural and historic objects and wild life for our enjoyment and

to protect them from impairment for the enjoyment of future generations. There are 375 sites comprising the National Park Service System.

Ms. Toni Dufficy of the NPS is currently stationed at Goddard for a one-year detail in support of the MOU. Her job is to open lines of communication between the two agencies, develop awareness of the common interests found within each agency and make connections between NPS and Goddard staff so they can develop joint educational/outreach materials. Ms. Dufficy will be working on various projects, including reviewing NASA and Goddard resources that will be useful to NPS and creating a homepage that will highlight the shared resources of the two agencies.

Toni has been with the Park Service for 13 years. She has worked at various park sites throughout her career, including the National Visitor Center in Washington D.C., the Jean Lafitte National Historic Park in New Orleans, Louisiana and once she has completed her detail at Goddard, she will return to her current position at the Everglades National Park in Homestead, Florida.

If anyone has any information, material or resources to share with Toni or if you would like information on the National Park Service, Please contact her at (301) 286-0535 or via e-mail at Toni_Dufficy@nps.gov

Ribbon-Cutting at New Credit Union Facility

On June 30, *Sherry Foster* of the Management Operations Directorate cut the ribbon unveiling the redesigned building 21 Credit Union. In her comments, she noted "Goddard has always had a first-class credit union. Now we have a first-class credit union facility." The building 21 credit union has returned to its regular hours, Monday - Friday, 7:30 a.m. to 3:30 p.m.



Pictured Above (L to R): Danette Schumacher, VP Branch Operations, NFCU; Doug Allman, President, NFCU; Sherry Foster, Director, MOD; Gene Rosen, Treasurer, NFCU; Helen Delaney, Asst. Branch Manager, NFCU

NASA To Open Guam Remote Ground Terminal

by Susan Hendrix, Office of Public Affairs

On July 15, 1998, NASA is scheduled to open its newest ground terminal in Guam with a ribbon cutting ceremony. The Guam Remote Ground Terminal (GRGT) will implement a Space-to-Ground Link Terminal (SGLT) that effectively closes NASA's Tracking and Data Relay Satellite System's (TDRSS) zone of exclusion over the Indian Ocean.

Goddard project officials said that the key purpose for the Guam terminal is to improve the efficiency of NASA's Space Network resources for all customers. The GRGT will provide greater flexibility in

using the Tracking and Data Relay Satellites and provide global full-time, real-time communications for NASA's Space Shuttle, International Space Station, Hubble Space Telescope, while minimizing conflicts with other missions.

The idea for this new terminal came to light when NASA's Compton Gamma Ray Observatory (CGRO) suffered an on-board tape recorder failure in March 1992 and required full-time, real-time support. A limited capability Space Network ground station was quickly established by Goddard in Canberra, Australia in 1993 to provide interim support for CGRO's science mission. However, it became clear to Goddard project officials that an enhanced ground station in the Pacific would better serve NASA's Space Network customers who launch around the Indian Ocean.

Goddard project officials chose a site at the Naval Computer and Telecommunications Station on Guam due to accessibility of support services provided by nearby U.S. Navy and U.S. Air Force installations. An existing building on the Naval Station was renovated to house a complete suite of electronics and computers for the new terminal. Two antenna foundations, each enclosed inside a protective dome, were also constructed adjacent to the building.

An innovative approach called a 'cable stretch' was utilized for implementation of the system. With this approach, one of the six existing SGLTs was relocated from Las Cruces, N.M. to Guam. The 'cable stretch' approach resulted in extending the control, status and data lines to the Guam terminal so it could be operated from the control center in New Mexico, just as if it were one of the local SGLT's.

Shortly after commissioning of the new Guam terminal in July, NASA will deactivate the Canberra, Australia ground terminal.

"The bottom line is that NASA is building a ground station to significantly expand the quantity and quality of services we can provide to our current and future customers," remarked *Tom Gitlin* of Goddard's Networks and Mission Services Project Office. "The new GRGT will allow customers access to NASA's Space Network services from low earth orbit all the way down to the surface of the Earth."

Erection of 59-Foot radome



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The Heartbeat of a Spacecraft (Part 1 of a 2-Part Article)

by Cynthia O'Carroll and Allen Kenitzer

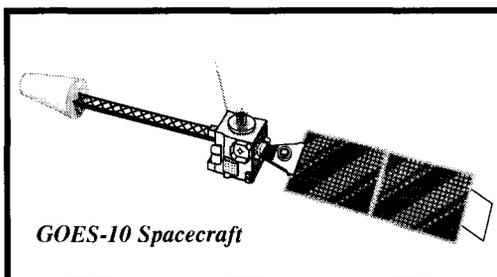
On July 9, the nation's newest geostationary weather satellite, GOES-10, was activated by the National Oceanic and Atmospheric Administration (NOAA). Immediate activation of the satellite that was stored in orbit was possible due, in large part, to innovative measures by NASA Goddard engineers, when they were able to correct a potentially fatal problem with the satellite's solar array which occurred shortly following the launch in 1997.

GOES satellite images are best known to television viewers as the cloud images that are shown during television weather forecasts. Goddard manages the design, development and launch of the GOES spacecraft for NOAA. Once a satellite is successfully checked out, NASA turns it over to NOAA for operations, including the responsibility for command and control, data receipt, and product generation and distribution. Now a year since GOES-10 was launched, it is orbiting in an inverted mode and all systems have been performing well.

What recently ended in an "all systems go" command, began with a virtual nightmare more than a year ago for Goddard GOES engineers. GOES-10, which was launched on April 25, 1997, was to be stored in orbit indefinitely, ready to replace GOES-8 or -9 when one of them failed. But shortly following the launch, controllers noticed an anomaly which caused the system controlling the spacecraft's solar array to

lose its ability to keep the array locked on the Sun.

"The solar array slowed, stopped and then started up again," stated David Martin, the GOES systems manager. "An alarm went off when the glitch occurred, but by the time the controllers had a chance to react, the solar array began moving again and appeared nominal. Since the solar array



GOES-10 Spacecraft

was tracking nominally, the decision was made to allow the array to continue to track while monitoring the motion closely.

Several days later, the array slowed and stopped again. This time the solar array drive was turned off and the spacecraft was commanded into safehold mode per contingency procedure. Now the investigation into the anomaly began in earnest.

A "tiger team" comprised of people from NASA, NOAA, and Space Systems/Loral (SS/L) was formed to investigate the cause of the Solar Array Drive anomaly and to identify some possible reasons for the

failure. Hardware testing at the SS/L facility in Palo Alto, Calif., was performed to determine the actual cause of failure. On-orbit test plans were also developed by the NASA Mission Operations Support Team (MOST) at Goddard.

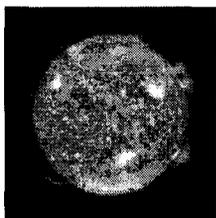
"Because GOES-10 was planned to be NOAA's on-orbit spare, and not needed for immediate operational use, we were very cautious and thorough in our analysis and troubleshooting efforts," said Goddard's GOES Project Manager, Marty Davis. "What we were dealing with here was the heartbeat of a spacecraft," Martin added. "Before we touched anything, we had to make sure we were not going to do harm to the spacecraft."

As arduous and complex as the task may have seemed, realizing how to fix the problem was almost a matter of common sense. "Once we realized what the satellite couldn't do, it was simply a matter of understanding what it could do and then working within those parameters," said Davis. "If the solar array couldn't rotate forward as it was designed to do, but would rotate backward, we decided to proceed in that direction."

During early testing, it was determined that the spacecraft was able to support nominal operations with the array rotating in reverse, when the spacecraft is inverted from the normal on-orbit orientation. (Story continued next week in issue 29)

Scientists Hoping to Reestablish Contact with SOHO Spacecraft While Board Investigates Situation

By Jim Sahli, Office of Public Affairs



NASA and European Space Agency (ESA) engineers are continuing their efforts to contact the Solar and Heliospheric Observatory (SOHO) spacecraft, reasoning that over the next two-to-three months the spacecraft's solar panels will increasingly face the Sun and generate power. Meanwhile, the NASA/ESA investigation board concentrates its inquiry on three errors that appear to have led to the interruption of communications with SOHO on June 24.

Officials remain hopeful that, based on ESA's successful recovery of the Olympus spacecraft after four weeks under similar conditions in 1991, recovery of SOHO may be possible.

The SOHO Mission Interruption Joint ESA/NASA Investigation Board has

determined that the first two errors were contained in preprogrammed command sequences executed on ground system computers, while the last error was a decision to send a command to the spacecraft in response to unexpected telemetry readings. The spacecraft is controlled by a joint ESA/NASA Flight Operations Team at Goddard. The efforts of the investigation board are now directed at identifying the circumstances that led to the errors, and at developing a recovery plan should efforts to regain contact with the spacecraft succeed.

ESA and NASA engineers believe the spacecraft is currently spinning with its solar panels nearly edge-on towards the Sun, and thus not generating any power. Since the spacecraft is spinning around a fixed axis, as the spacecraft progresses in its orbit around the Sun, the orientation of the panels

with respect to the Sun should gradually change. The orbit of the spacecraft and the seasonal change in the spacecraft-Sun alignment should result in the increased solar illumination of the spacecraft solar arrays over the next few months. The engineers predict that in late September 1998 illumination of the solar arrays and, consequently, power supplied to the spacecraft, should approach a maximum. The probability of successfully establishing contact reaches a maximum at this point. After this time, illumination of the solar arrays gradually diminishes as the spacecraft-Sun alignment continues to change.

More information on SOHO, including status reports, is available on the internet at: <http://sohowww.nascom.nasa.gov/>

TRMM Shedding Light on La Niña Phenomenon

By Allen Kenitzer, Office of Public Affairs

Research scientists using data from the recently launched Tropical Rainfall Measuring Mission (TRMM) satellite, are shedding new light on the phenomenon known as La Niña. The TRMM research team has successfully retrieved sea-surface temperature data from the TRMM Microwave Imager (TMI) instrument onboard the spacecraft.

This temperature data, obtained by the TMI, which is the only spaceborne microwave instrument observing sea-surface temperature in the tropics, is giving scientists new insight into the complex evolution of La Niña. The images show changes in sea-surface temperature and ocean current movement and the dissipation of El Niño. While it is too early to draw definite conclusions, the results to date appear to confirm the onset of La Niña-like conditions.

"TMI is an all-weather measuring instrument that can see through clouds," said **Dr. David Adamec**, an oceanographer at Goddard. "The standard instrument (infrared radiometer), used to measure sea-surface temperature, must contend with clouds and atmospheric aerosols. Clouds block the flow of data yet an uninterrupted consistent data stream is crucial for long-term climate study."

La Niña is essentially the opposite of the El Niño phenomena and is characterized by unusually cold ocean temperatures in the eastern equatorial Pacific, as compared to El Niño where warm ocean temperatures are warmer than normal. La Niña and El Niño often are spoken of together and termed the El Niño/Southern Oscillations, or "ENSO." La Niña sometimes is referred to as the cold phase of the ENSO.

At the Earth's surface, La Niña affects of the world's climate tend to be opposite those of El Niño. At higher latitudes, El Niño and La Niña are just two of several factors that influence climate. However, the impacts of El Niño and La Niña at higher latitudes are most clearly seen in winter. During a typical La Niña year, winter temperatures are warmer than normal in the Southeast and cooler in the U.S. Northwest. For more information, visit the Goddard Homepage at <http://www.gsfc.nasa.gov>

Business Incubator To Commercially Apply Goddard's Technology

By Donna Drelick, Office of Public Affairs

Goddard is one of several NASA centers to be awarded cooperative agreements which will establish a high-technology business incubator at our facility. The award is to a team led by the Maryland Economic Development Corporation. Team members include the Emerging Technology Center of the Baltimore Development Corporation; University of Maryland, Baltimore County; the Johns Hopkins University; the Morgan State University (Clarence M. Mitchell Jr. School of Engineering); the University of Maryland; The Abell Foundation; and the CAN Company.

Cooperative Agreements for incubators have also been awarded to the Langley Research Center in Hampton, Virginia and the Jet Propulsion Laboratory in Pasadena, California, combined with the Dryden Flight Research Center in Edwards California.

These business incubators will provide U.S. start-up or small existing high-technology firms and U.S. educational institutions with a wide array of critical business development support services for the primary purpose of commercially applying NASA technology. Each new business incubator will receive funding from NASA in the amount of \$400,000 per year for fiscal years 1998 and 1999, and will in turn match (or exceed) NASA's contribution through cash or in-kind funding from non-federal sources.

In addition to the establishment of these three new business incubators at NASA centers, funds also were provided, based on program guidelines, to the six existing NASA incubators to enhance services to incubator firms. The existing NASA-sponsored incubators include: the Ames Research Center, Moffett Field, CA; the Johnson Space Center, Houston, TX; the Kennedy Space Center, FL; the Lewis Research Center Cleveland, OH; the Marshall Space Flight Center Huntsville, AL; and the Stennis Space Center, MS.

With the addition of the three new NASA business incubators to the existing six, NASA now has in place a nationwide resource to expand the growing high-technology interests of small businesses and educational institutions. For more information, visit the following web site: <http://tco.gsfc.nasa.gov/website/WhatsNew.html>

Executive Council "Scopes Out" Detector Lab

On July 14, as part of the Goddard Program Management Council (GPMC), members of the executive council visited the Detector Development Laboratory (DDL) of the Detector Branch, Code 553. The DDL facility is used in the building of products ranging from single custom detectors to entire turn-key systems, for NASA and other scientific organizations.



Pictured above is Center Director Al Diaz "scoping" out an Infrared Array Camera Bridge Chip. This chip, fabricated in the DDL, measures 1 micron thick by 15 microns wide (a human hair is 25-50 microns thick) and will be used on the Space Infrared Telescope Facility (SIRTF). Murzy Matsumura of the Detector Branch explains this technology to Al while Bill Townsend, Deputy Director, and Orlando Figueroa, Director, STAAC, look on.

In Memory of Donald Edward Stilwell (1936-1998)

Donald E. Stilwell, Chief Staff Engineer of the Laboratory of High Energy Astrophysics, lost his battle with leukemia on June 15, 1998.

Mr. Stilwell began his career at Goddard immediately after his initial work with James Van Allen at Iowa, starting before the Earth's trapped radiation belt was discovered with Explorer I, over 40 years ago. Since then, he had been at the NASA research forefront, supporting many space science and astrophysics experiments through to their successful flights, including Explorers, IMPs, Pioneers, OGOs, Voyagers, Helios and Mariner missions, Galileo, ISEE and GGS missions, in addition to sounding-rocket and balloon-borne instruments.

Befitting his devotion to Goddard, a Memorial service was held at the Center on Friday, June 19th. Contributions should be made in the memory of Donald E. Stilwell for research in MDS, to the Leukemia Society of America, 2900 Eisenhower Avenue, Suite 419, Alexandria VA, 22314.

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The Heartbeat of a Spacecraft *(Continued From Last Week)*

by Cynthia O'Carroll and Allen Kenitzer

Editor's Note: Last week, the Goddard News featured Part 1 of a 2-part article on the heroic efforts of Goddard employees to correct a potentially fatal problem with the GOES-10 satellite. Early testing of the satellite revealed that the spacecraft could operate normally with the array rotating in reverse, with the spacecraft inverted from the normal on-orbit orientation. This week: more on the Goddard Team's efforts to save the GOES-10 satellite.

The spacecraft is now inverted, meaning that initially the solar array was pointed downward in the direction of the South Pole. Now, in its current mode of operations, the solar array is pointed upward in the direction of the North Pole. "We're still able to get the same quality of data because all we're doing is scanning in the opposite direction," stated David Martin, the GOES System Manager.

"Once the spacecraft was inverted successfully, the software specialists stepped in. They had to reprogram all of the instruments looking at the Earth so that they could take the same picture in the opposite direction. In essence, the instruments are scanning backwards, but this change is transparent to the user," Martin added.

One goal in modifying the ground software was to make the changes as transparent as possible to the many different data users. The second goal was to minimize the changes to day-to-day operations, since the same people that operate GOES-10 operate other

satellites and did not want to use different procedures for this spacecraft.

The GOES Mission Operations Support Team (MOST) had spent a year and a half developing a storage mode so that the spacecraft would be ready to be pressed into service when the need arose. "We did not want to get stuck in the same situation we were in before the launch of GOES-8 when the U.S. only had one weather satellite," said Charlie Bengston of Computer Sciences Corporation, the GOES-10 mission director.

The spacecraft remained in this storage mode while the MOST group and NOAA were devising software changes to the ground system. The spacecraft was brought out of storage mode during January, 1998 for two additional months of "post-launch" testing. Once engineers were confident the software changes were correct, they loaded a software patch onboard the spacecraft. The post-launch testing was completed and the spacecraft went back into storage mode. It was handed over to NOAA on June 12, 1998.

The readiness and subsequent hand-over of the spacecraft happened in the nick of time. The GOES project was notified on July 3, 1998 that there were significant problems with GOES-9 due to a malfunction of the only operating momentum wheel which was causing the pictures to be "jittery." This malfunction could also pose serious danger to the mission.

"Coming out of storage was difficult too because we can only move the solar array in one direction," stated Bengston. "But we fired it up early on Thursday morning (July 9) and by the afternoon, we were taking images and performing an instrument functional checkout."

The current plan is to start slowly drifting GOES-10 to 135 degrees west longitude (West Coast) where GOES-9 is now. They will then store GOES-9 moving into the storage mode orbit where GOES-10 once was. GOES-9 will then be available if a serious problem occurs with GOES-8.

Correcting the problem was no small task. Post-launch testing that would normally have been completed in 90 days, for workers on regular day time shifts, now became more than 13 months of tedious 24 hour days. "A lot of personal sacrifice went into correcting the anomaly with the spacecraft which required significant time away from our families," said Martin.

The tiger team report, which makes up eight three-inch binders, documents a complete fault tree as to what all of the possible candidates were for the cause of the malfunction of the solar array. After analyzing hundreds of possible paths, the tiger team narrowed it down to two possible causes, but they could not determine one conclusive cause.

(Continued on Page 2)

Abell Appointed Chief Financial Officer



Ms. Nancy Abell

Nancy Abell, formerly the Deputy Chief Financial Officer, Code 150, has been named Chief Financial Officer, effective July 5. In this capacity, she is responsible for the planning, analysis and control of the management of the Center's resources. Specifically, she is responsible for the overall direction of Center resources including planning, programming, budgeting and accounting.

Ms. Abell, who joined NASA in 1971, has over 25 years of experience in the resources/financial field.

Previous positions include Resources Management Officer of the Space Sciences Directorate, Program Analyst in the Office of the Comptroller, Staff Assistant for Business Support, and Budget Accounting Analyst.

Ms. Abell graduated from the University of Maryland with her bachelor's in 1972, beginning her professional career as a financial analyst, responsible for planning, executing, monitoring and controlling financial resources for various organizations. In 1997, she earned her master's of general administration from the University of Maryland.

Having grown up in Lanham, Abell is local to this area. She lives in Highland, Md. with her husband Mike, and children, Brian, age 19, and Kate, age 12.

NASA Loses One of Its Great Pioneers

Alan B. Shepard, Jr., the first American to fly in space and one of only 12 humans who walked on the Moon, died July 21 after a lengthy illness. He was 74.

"The entire NASA family is deeply saddened by the passing of Alan Shepard. NASA has lost one of its greatest pioneers; America has lost a shining star," said NASA Administrator, Daniel S. Goldin.

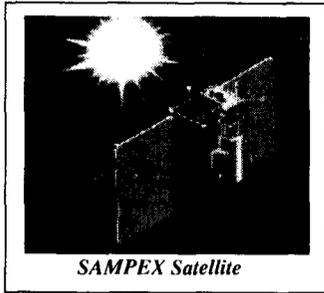
Named as one of the nation's original seven Mercury astronauts in 1959, Shepard became the first to carry America's banner into space on May 5, 1961, riding a Redstone rocket on a 15-minute suborbital flight that took him and his Freedom 7 Mercury capsule 115 miles in altitude and 302 miles downrange from Cape Canaveral, FL. His death leaves only four survivors among the original Mercury 7 astronauts: Sen. John Glenn, Scott Carpenter, L. Gordon Cooper, and Walter Schirra.

He is survived by his wife, Louise, daughters Julie, Laura and Alice and six grandchildren.

For more information, visit the following URL: <http://www.nasa.gov/shepard.html>

University of Maryland Students Are in Satellite 'Drivers Seat'

By Lee Tune, University of Maryland



SAMPEX Satellite

NASA doesn't usually put college students in charge of its satellites. However, recently, graduate and undergraduate students in the University of Maryland's Flight Dynamics and Control Laboratory have been placed in charge of navigation and orbital control for the Solar,

Anomalous, and Magnetospheric Particle Explorer (SAMPEX) -- a satellite used to gather information on high-velocity radiation arriving at Earth from the Sun and from interstellar space.

For the past year, laboratory director David Schmidt and his students have been collaborating with Goddard to develop the capability for real-time mission support of the SAMPEX as well as other NASA spacecraft. Their work has included the development of mission-analysis software and computer and communication interfaces. Maryland's Flight Dynamics and Control Laboratory took over sole control of the SAMPEX satellite on a trial basis in May and now officially has been handed the satellite's "reins." The laboratory performs orbit determination, orbit prediction, scheduling of ground-station access times, ground tracking and other "events," attitude determination, and monitoring of the satellite's sensors.

"Taking over navigational and orbital control of the SAMPEX is exciting both because it is an important part of a unique new research program that our laboratory is developing and because our work with NASA on this project could be a prototype for the agency in turning over mission control responsibilities for other spacecraft in the future," said Schmidt, a professor of aerospace engineering in the university's A. James Clark School of Engineering.

According to *Tom Stengle*, head of the Flight Dynamics Analysis Branch at Goddard, there are a few other cases where the agency has turned flight operations for a spacecraft over to a university. "However, what's different in this case is that here it is entirely graduate and undergraduate students who are doing the [mission control] work," Stengle said. "What's especially neat about [the University of Maryland's work on SAMPEX] is that the students are learning about this area in class and then going over and putting that learning into practice." For more information on SAMPEX, visit the following URL:

<http://lepsam.gsfc.nasa.gov/www/sampex.html>

"Would You Care to Try Some?"



Center Director Al Diaz, smiles brightly as he prepares his speciality, chicken and beef Fajita kabobs, in the Building 21 cateteria.

Mr. Diaz was the guest chef on July 22 and rustled up a tasty, southwestern style lunch for Goddard employees.

Editor's Note: The previous issue of Goddard News cited a name incorrectly. The photo caption accompanying the article titled "Executive Council Scopes Out Detector Lab" should read Murzy Jhabvala, not Murzy Matsumara.

The Heart Beat of a Spacecraft

(Continued from front Page)

One possible problem area was determined to be in the rotation hinge which had a "Deutsche block" fastened to it with epoxy. The Deutsche block carries all of the power to the solar array. "We think that during launch, one of these blocks became debonded," said Martin. "There are a couple of ways that the initial fracture could have occurred during integration and testing, but may have not been detected due to the angle of the work. During launch, it could have dropped off of its correct mount and, attached only by its wires, become lodged between the rotating hinge and the fixed dog dish ribs."

For the next spacecraft, the Deutsche block is fastened with screws rather than epoxy, and the plate that it attaches to is now made out of aluminum, not fiberglass. In addition, the fixed ribs have been eliminated.

The other problem area was in the final drive of the solar array drive assembly. If a workmanship problem occurred, a jam in the final gear drive could have produced the exact telemetry data signature displayed by the anomaly. This potential problem has been eliminated on future flights with a combination of integration procedure changes and extended ground tests.

The GOES-10 spacecraft was procured, launched and checked out by NASA Goddard for its operator, NOAA, and is manufactured by Space Systems Loral, Palo Alto, Calif. NOAA's National Environmental Satellite, Data, and Information Service operates the GOES series of satellites at NOAA's Satellite Operations Control Center in Suitland, Md. GOES-L is scheduled for launch in March 1999. The launch of the final spacecraft in the series, GOES-M, is scheduled for the 2002-2004 timeframe.

Data from the GOES spacecraft is helping NASA scientists design instruments for follow-on missions for NASA's Earth Science Enterprise, a long-term research program designed to study the Earth's land, oceans, air, ice and life as a total system.

Stellar Cannibal To Provide Missing Link

By Bill Steigerwald, Office of Public Affairs

Scientists have discovered a new pulsar star, one that is emitting rapid pulses of X-rays. This new X-ray pulsar may be the long sought-after missing link between old neutron stars that emit powerful flashes of X-rays and older, rapidly-spinning neutron stars, called millisecond pulsars.

The new pulsar has greatly sped up its own rotation at the expense of a nearby "companion" star by pulling gas from the companion onto its own surface, in a process called accretion. The fastest of its type, the newly discovered pulsar is now rotating at more than 400 times per second and is the first known accretion-powered millisecond pulsar.

Two competing teams used NASA's Rossi X-ray Timing Explorer spacecraft to make the discovery. The first team, led by Dr. Michiel van der Klis and Rudy Wijnands of the University of Amsterdam, the Netherlands, discovered the pulsar and measured the time between rapid pulses of X-rays from the star to derive its rotation rate. The second team, led by Dr. Deepthi Chakrabarty and Dr. Edward Morgan of the Massachusetts Institute of Technology, Cambridge, Mass., discovered the two hour orbital period of the pulsar and measured the size of the orbit, inferring the presence of a companion star. For more information, visit the Goddard Homepage at <http://www.gsfc.nasa.gov> and choose *HOT TOPICS*.

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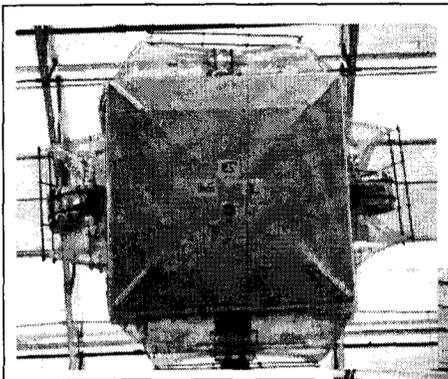
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Test of Inflatable Sunshield for NGST

By Dan Blackwood, HST Project



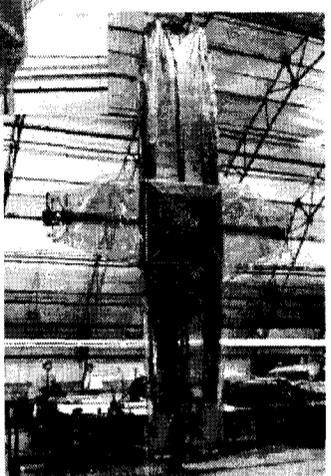
The Next Generation Space Telescope (NGST) project recently completed an engineering model test deployment of an inflatable sunshield at International Latex Corporation (ILC) Dover in Delaware.

Inflatable and rigidizable structures potentially offer distinct advantages over existing mechanical structures: they are not as mechanically complicated; they are lighter, less costly, allow conformal stowage and potentially offer a faster development cycle. Goddard, the Langley Research Center and the Jet Propulsion Laboratory are investigating this technology due to its potential advantages for future missions.

The sunshield is a 33 meter by 11

meter structure designed to cool the NGST spacecraft scheduled for launch in 2007.

In order to demonstrate the technical and cost viability of an inflatable sunshield to the industry prime contractors for NGST, and to correlate data with analytical predictions, a test flight on the Shuttle is planned to address these issues. This experiment is called the Inflatable Sunshield in Space (ISIS). The ISIS flight experiment is currently planned for a September 2000 launch on STS 107.



The sequence of photos above shows the inflation of the sunshield test model.

Efforts to "Rescue" SOHO Spacecraft Continue

By Bill Steigerwald, Office of Public Affairs

Since June 24, when radio contact with the Solar and Heliospheric Observatory (SOHO), NASA's joint mission with the European Space Agency, was interrupted, scientists have been working steadily to re-establish contact with the spacecraft. Now, a month later, through their efforts using ground-based radio telescopes, scientists have detected the spacecraft: they have discovered it to be rotating slowly near its original position in space. This is a potentially important step towards the possible recovery of the spacecraft.

On July 23, researchers using a telescope located at the U.S. National Astronomy and Ionosphere Center (NAIC) in Arecibo, Puerto Rico, transmitted a signal towards SOHO. NASA's Deep Space Network in Goldstone, California, acted as a receiver, locating the spacecraft's echo and tracking it, using radar techniques. Preliminary analysis of the radar data indicated that SOHO is still in its nominal halo orbit and is turning slowly at a rate of roughly one revolution per minute.

Staff members of NAIC and the Deep Space Network, in close cooperation with NASA and ESA are continuing to analyze the radar data to extract more precise information on SOHO's location and motion. This could aid in future recovery efforts, as SOHO's solar panels continue to turn towards the Sun. The SOHO website is <http://sohowww.nascom.nasa.gov/>

Quick Ride Contractor Selected

by Susan Hendrix, Office of Public Affairs

Goddard has awarded an indefinite delivery/indefinite quantity contract known as "Quick Ride" to Final Analysis, Incorporated of Lanham, Maryland. The contract, which has a maximum value of \$49 million and a minimum ordering amount of \$1,000, will allow for the placement of firm, fixed-price task orders within 30 days.

Under NASA's current contract consolidation initiative, any NASA Center along with other government agencies will be able to procure excess space onboard commercial satellites for the purpose of accommodating various Earth science, space science and technology instrumentation payloads.

During contract performance, NASA will be developing a catalog for potential customers which will include information regarding satellite launch dates, intended orbits, and configuration

of available space for each contractor participating in Quick Ride.

A precedent setting contractual mechanism under the Quick Ride contract called "On-Ramps" will allow NASA to solicit additional proposals and accept unsolicited proposals from commercial satellite firms during the contract's five year performance period, thus allowing NASA to provide additional Quick Ride services to potential customers.

NASA's intent is for Quick Ride to conform with commercial industry practices. Government-provided instrumentation and/or payloads will be expected to conform to the accommodations onboard the commercial satellites in order to prevent any impact to commercial integration and launch schedules or primary payloads.

NEWS RELEASES

The Neutral Mass Spectrometer (NMS) aboard the Japanese Planet-B Mars mission was successfully tested on July 24. All data indicates a nominal performance for this first test following the launch from Kagoshima Space Center on July 4. Steven Feng represented Code 915 in Japan during this test and reported that the data showed very little change from the pre-launch values. The NMS will begin taking Mars atmospheric data in October 1999 when Planet-B arrives in Mars orbit.

The African American Awards Committee is sponsoring a contest for the development of a logo. This contest is open to both civil servant and contractor employees. The logo must be submitted by August 31, 1998 to Dennis Small, Code 584, or via e-mail to Dsmall@pop500.gsfc.nasa.gov. The winning logo will be announced at Celebrate Goddard Day to be held on September 10. The logo must include the African American Awards Committee name within or as part of the design.

kudos! Library Homepage in the Spotlight

By Linda Bringan

Recently, Goddard's Library web site, located at: <http://library.gsfc.nasa.gov>, was in the spotlight as a place to "travel cyberspace to enter outer space at home." USA Today's Hot Sites first cited the GSFC Library's web site in its July 17 online issue. The front page of the Library web site was then featured in the follow-up July 22 Tech Extra section of the print publication.

Janet Ormes, Head, Library Branch, described the Library's new web site: "It's a major step toward achievement of our goals in providing increased access to electronic information via the Library." The Library's government and contractor (SANAD Support Technologies, Inc./NCI) staff worked together to achieve the dynamic site as part of the Library's mission to provide innovative cost-saving information resources and technology.

In 1994, the GSFC Library was one of the first Federal libraries to offer remote access services via an Internet web site. Now in its third generation, the Library Web Site offers worldwide access to the Library's catalog, Goddard GALAXIE, as well as a Kid's Page. For GSFC employees, it offers access to electronic journals, remote request services, and a number of scientific and engineering databases.

The Library's Web Site has received three other awards for web site excellence, including the Medaille d'Or, which also highlighted the NASA STS-86 crew's home page.

For more information, contact the Library at <mailto:library@sun.gsfc.nasa.gov> or call them at 301-286-7218. Be certain to check the library out in person too, in Building 21, above the Cafeteria.

Workshop Attracts Teachers to ISTP

By Mike Carlowicz, Lab for Extraterrestrial Physics

It was all about magnetism. That's the best way to describe the "charged" educational interaction between a group of science teachers and the science team of the International Solar Terrestrial Physics program recently held at Goddard. Demonstrating that they are all aligned along the same intellectual field line, teachers and solar-terrestrial scientists from Goddard shared ideas and enthusiasm for science education at the Connecting Kids to the

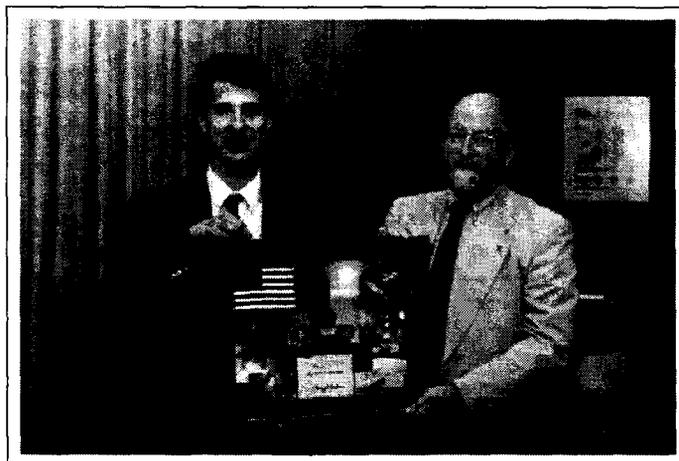


Teachers Gene Dunne (Arlington, VA), Jerry Roth (Cape May, NJ), and Tim McCollum (Charleston, IL) compare notes on an auroral plotting activity during ISTP's "Connecting Kids to the Sun-Earth Connection" education workshop.

Sun-Earth Connection workshop.

Attended by 20 science teachers from 8 states, the workshop included interactive discussions and demonstrations of how the science of Sun and Earth can fire student interest in space and Earth sciences and simultaneously serve the goals of inquiry based learning promoted in national science education standards. Middle and high school teachers became students for three days as they were led through tutorials on solar and magnetospheric physics and through hands-on activities, including a chance to build their own magnetometer out of a simple soda bottle. At the same time, the ISTP team learned as much as their pupils, getting a better sense of how science is taught in the real classroom and how NASA can produce better educational materials.

NASA Scholarship Fund Recipient Recognized



In the photo above, Joseph Comberiate, the son of Anthony Comberiate, Code 585, stands with Bill Townsend, Deputy Center Director. Joe is a recent recipient of one of five 1998 scholarships awarded to the children of NASA employees by the NASA Scholarship Fund, Inc.

On July 27, the Center congratulated Joe at Executive Council and presented him with the STS-90 photo collage above. Joe, a recent graduate from Mt. St. Joseph High School, and top in his class, is working at the Center for the summer and plans to attend the University of Illinois this fall where he will study Electrical Engineering.

Recruiting Celebrate Goddard Day Participants

By Denise Konopka, Customer Service Office



The Third Annual Celebrate Goddard Day will be held Thursday, Sept. 10 on the mall beginning at 10:00 am. This celebration of Goddard's diverse workforce is an event to showcase the many talents, cultures, traditions, abilities and professional styles that make Goddard a great place to work and conduct business. The event is sponsored by the Center's Multi-Cultural Advisory Team (MCAT) and is being co-chaired this year by Merle Robbins and Dennis Small.

The event planners are looking for eager, energetic members to serve on the following committees: Marketing and Promotions; Logistics; Entertainment; Food and Beverage; Crafters and Artisans; and Finance. If you are interested in volunteering or have an idea about the event in general or specific committee tasks, contact the appropriate committee chairperson listed below. If you have questions, call the following event Chairpersons: Merle Robbins (x6-7819), Dennis Small (x6-9755) or Sharon Bland Johnson (x6-7022). The committees and their respective chairpersons are below:

<u>Committee</u>	<u>Chairperson</u>	
Crafters & Artisans	Catherine Simkins	x6-3304
Entertainment	Pat Greco	x6-6118
Finance	Dino Fasce	x6-0445
Food & Beverage	Dan Krieger	x6-7913
Logistics	Pat Fogleman	x6-2109
Marketing/Promotions	Denise Konopka	x6-1382
Program & Education	John Bilal	x6-6440

"The success of this event depends largely upon the enthusiasm and participation of the Goddard workforce. This is a day to 'celebrate us!' and our uniqueness," said Robbins. "All are invited and encouraged to help to make this year's event a terrific success," Small added.



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