NASA
National Aeronautics and Space Administration
Goddard Space Flight Center

Goddard News

Greenbelt, Maryland and Wallops Island Island, Virginia

Vol. 30 No. 1 January 15, 1984

1983 was banner year for Goddard activities

Two engineering milestones, both of which captured world headlines and international acclaim, highlighted activities at the Goddard Space Flight Center in 1983.

One of the engineering feats was the recovery in June 1983 of the Tracking and Data Relay Satellite (TDRS), which failed to reach geosynchronous orbit following its launch from the STS-6 orbiter in April 1983.

Quite likely, graduate engineering students will be making use of the TDRS recovery for years to come as one of the most extraordinary achievements in space history. After the communications satellite failed to achieve geosynchronous orbit because of a malfunction in the U.S. Air Force Inertial Upper Stage booster, a NASA/industry team, represented by Goddard; TRW, which built the spacecraft; and Spacecom, which owns and leases it, worked out details to recover the satellite.

Using six tiny, one-pound thrusters the team literally "inched" the spacecraft 8,662 miles into geosynchronous orbit. The painstaking mission began May 2 and ended June 29 after 39 thruster firings. Without geosynchronous orbit, TDRS would have been doomed to limited activity, sorely affecting future shuttle and Spacelab missions. Ronald K. Browning, Code 405, is the project manager for TDRSS.

The spectacular maneuvers of the International Sun-Earth Explorer (ISEE-3) spacecraft was another signifcant accomplishment. After a year and a half of dizzying maneuvers, ISEE-3 made its fifth and final pass by the Moon on December 22, barely skimming the lunar surface at 116 km (72) miles altitude before being "flung" by gravity on a path to intercept a comet 21 months hence.

The encounter will take place on September 11, 1985 with Comet Giacobini-Zinner, a relatively unknown comet which passes by Earth every six and a half years. Renamed International Cometary Explorer (ICE) because of its new mission, ICE will be the first spacecraft to intercept a comet, giving the United States another space "first." It also will fly through the tail of Giacobini-Zinner, while all the Halley missions in 1986 will fly upstream of that comet.

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ICE MANEUVERS — Dave Suddeth, who has worked on the ICE Hydrazine Propulsion System (left) and ICE Project Scientist Dr. Tycho von Rosenvinge look at temperatures of ICE's hydrazine thrusters and external lines to see if they had remained above freezing during the spacecraft's pass by the moon. Success of ICE maneuvers was one of Goddard's major achievements of 1983.

Goddard satellite gives near-perfect performance for STS-9

The Tracking and Data Relay Satellite (TDRS) proved an exceptionally reliable communications link for the ninth Space Shuttle mission, according to network and project officials at Goddard.

During the 10-day Spacelab mission, the Columbia and its payload were able to remain in contact with Earth more than 99 percent of the time the Orbiter was within range of the satellite.

Of 138 hours and 48 minutes scheduled for TDRS during the mission, communications were maintained for 137 hours and 31 minutes. Chuck Hunter, Deputy Project Manager for TDRS, said the satellite surpassed expectations in its mission performance.

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Two engineering milestones highlight 1983 at Goddard

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The idea to make further use of ISEE-3 was generated at Goddard, primarily by Dr. Robert W. Farquhar, Senior Staff Engineer for Advanced Projects (code 580). With its new mission in sight, code 600 director Frank Martin established an ISEE-3 team, which will see the spacecraft through its mission to the comet and then on two upstream passes of Halley.

While those two activities won the most attention during the year, many other achievements were carried out by Goddard employees which deserve mention.

The Delta team, as everyone has come to expect, had another successful year, conducting eight launches without a failure. The last launch, Galaxy-B on September 22, marked the 173rd use of the McDonnell-Douglas-built launch vehicle since 1960. Of that number, 162 have been successful, a record-establishing 93.9 percent.

The Delta project is now under the direction of Goddard's Bill Russell.

NOAA-E, under a project headed by Jerry Longanecker, was launched successfully aboard an Atlas launch vehicle at Vandenberg Air Force Base last February, leaving Longanecker with a record of 11 successes in 11 launches. The spacecraft, known as NOAA-8, encountered some difficulties shortly after launch, but engineers at RCA and Goddard were able to find a solution, and the satellite has been performing well since.

NOAA-E, by the way, was the first United States spacecraft to carry search and rescue equipment. It joined two Soviet satellites in orbit to participate in another Goddard-directed project. Known as COSPAS/SARSAT (Search and Rescue Satellite-Aided Tracking), the project is international, involving Canada, France, the Soviet Union and the U.S., with Norway and the United Kingdom lesser participants. The program makes use of satellites to pick up emergency distress signals from planes or ships in distress to speed recovery of the victims.

The project, under the direction of Bernard Trudell, has saved 137 lives since its inception in September, 1982.

Landsat 4, under the guidance of Luis Gonzales and Vince Salomonson, continued to provide important Multi-Spectral Scanner and Thematic Mapper images, in spite of problems with radio transmitters and cables bringing power to the spacecraft from the solar panels.

The Goddard networks, under code 500 Director Dick Sade, continued to produce in near perfect fashion, with five individual networks now in operation from Goddard.

One of the most demanding times for the network occurred during STS-6 in April when TDRS failed to achieve orbit. Had the spacecraft achieved its anticipated orbit, communications would have flowed through White Sands, New Mexico, to Goddard without making use of the network's worldwide system of ground stations, which had its hands full tracking the Shuttle. When TDRS failed to achieve orbit, however, the network was faced with tracking both the Shuttle and TDRS, leaving Gary Morse and his dedicated associates with an extremely difficult job.

Network personnel continue to track their normal 24 to 30 satellites with which they maintain communications 24 hours a day, 365 days a year during the Shuttle missions. When trouble came on STS-6, however, the controllers kept things going with those spacecraft as well as with the Shuttle and TDRS.

Goddard personnel in widely-diversified areas provided support to the Space Shuttle missions, which started with STS-6 last April and ran through STS-9 in November-December. In addition to the networks support for the Shuttle missions, a number of Getaway Special experiments, a project directed here by Jim Barrowman and Clarke Prouty, flew on board Shuttle missions.

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Short Takes

Landsat D Prime Launch

The Landsat D Prime spacecraft is scheduled to be flown from the General Electric plant in Pennsylvania to Vandenberg AFB, Calif. January 24, according to project officials here at Goddard.

The Earth-resources satellite, scheduled for launch aboard a Delta launch vehicle from the Western Test Range in Lompoc, Calif., on March 1, is the fifth in a series of Landsat satellites designed and built for NASA by General Electric Company's Space Systems Division at Valley Forge. The satellites are designed to provide timely, accurate, and specialized data on Earth resources for applications in oil and mineral exploration, agriculture, land use planning, forestry, water management, and mapmaking. The first Landsat satellite was launched in July, 1972.

The National Oceanic and Atmospheric Administration (NOAA) will assume operational responsibility once the spacecraft has achieved orbit and begins transmitting data.

Landsat D Prime will supplement Landsat 4, the current satellite, launched in July, 1982, which has transmitted more than 168,700 Multispectral Scanner images of portions of the Earth and more than 9,400 Thematic Mapper images.

Once launched, the satellite will provide overlapping coverage of the Earth, with the exception of the poles, every 16 days.

SLDPF data capture

Goddard's Spacelab Data Processing Facility (SLDPF) had processed and released to the European Space Agency (ESA) 94 percent of the data it captured during the recent STS-9/Spacelab 1 mission at press time and was closing in rapidly on 100 percent, according to S. Richard Costa, Head, Information Processing Division.

The facility captured six trillion bits of information from the scientific laboratory during the 10-day mission, the high-data flow having been made possible by Ku-band transmissions via the Tracking and Data Relay Satellite (TDRS), another Goddard project which performed highly successfully during the mission, also.

Bloodmobile dates

APRIL 4, 1984
JUNE 6, 1984
AUGUST 1, 1984
OCTOBER 3, 1984
DECEMBER 5, 1984

For more info call 344-7409

CFC wrapup

Again this year Goddard has demonstrated its fine tradition of sharing with the needy by contributing $253,337 to the Combined Federal Campaign.

Of the total, $236,769 was given to the National Capital Area (representing 110 percent of our $215,000 goal) and $16,568 was contributed to Central Maryland.

The following employees conducted the 1983 CFC campaign: Chairman, Steve Fogleman; Co-Chairpersons, A.T. Dannessa and Lynn Marra; and Publicity Chairperson, Diane Lewis. The remaining members of the team were Nancy Spencer, Rodney Green, Rick Keegan, Marietta Sturgell, Barbara Sweeney, Betsy Edwards, Kathy Henderson, Clay Magee, Roberta Valonis and Carol Arkwright.

COMBINED FEDERAL CAMPAIGN — Center Director Noel W. Hinners and Goddard's 1982 Combined Federal Campaign (CFC) coordinator Dr. Freidrick O. "Fritz" von Bun display a presidential CFC award given to Goddard for its 1982 CFC drive. Goddard also has been selected for a 1983 Presidential CFC Award. To qualify for the award, organizations must have total contributions averaging $75 or more per employee.

Goddard gives generously to Combined Federal Campaign:

Center will receive 1983 presidential CFC Award

ICE speeds toward Giacobini-Zinner

NASA's International Sun-Earth Explorer (ISEE-3) satellite is speeding to intercept the oncoming Comet Giacobini-Zinner, making it the first spacecraft to encounter a comet.

ISEE-3 got its fifth and final boost from the moon's gravity December 22. As it completed its swing by the moon, the spacecraft was given a new name by NASA, one more in keeping with its new mission. As a result, ISEE-3 has become the International Cometary Explorer, or ICE. The lunar gravity push boosted the spacecraft's speed by 2,200 miles an hour and sent it on to rendezvous with the comet on September 11, 1985.

Giacobini-Zinner, first discovered in 1900, orbits the Sun once every six and a half years. It has a tail estimated to be about 500,000 km (310,000 mi) long. ICE's encounter with Giacobini-Zinner will provide a low cost exploration of the comet's tail and its relation to the solar wind.

Last month's lunar swingby was crucial to the success of the satellite's second mission. The close flyby was essential for picking up sufficient speed and the necessary direction to reach the comet. Dipping 116 km (72 mi) low over the Moon, the spacecraft picked up enough speed by the moon's gravitational pull to escape from the Earth-moon system. Except for lunar landers, the 1,000-pound spacecraft made the closest pass of the moon ever attempted.

"That was a decisive moment for the satellite," said Dr. Robert Farquhar, Goddard flight director for the orbital maneuvers.

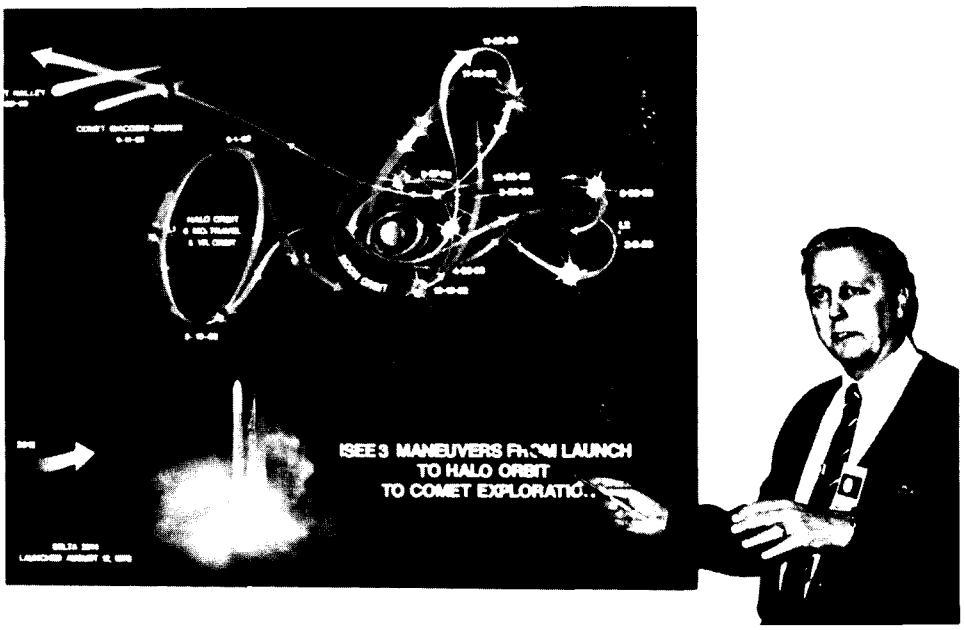
"It was tricky because flying 116 km (72 mi) over the moon's surface does not leave much margin for error in navigating the spacecraft," he said.

Launched in 1978

Farquhar conceived the idea for the second use of the spacecraft. ISEE-3 successfully completed its original mission in 1982 and the first phase of its new mission in the Earth's geomagnetic tail in October 1983.

The spacecraft has outlived its expected mission life of three years. It remains in good condition, with about 70 percent of its fuel reserves left.

By the time the comet exploration mission ends, ICE will have completed the most complex set of trajectory modifications ever attempted by a NASA spacecraft. The maneuvers to study the Earth's geomagnetic tail, visit Comet Giacobini-Zinner and then study the solar wind upstream of Halley's Comet will just be the latest in a series of complex orbital gymnastics performed by the spacecraft since its launch.



ICE ENROUTE TO COMET — Dr. Robert Farquhar, the Goddard Flight director who conceived the second use for the spacecraft, explains the details of the ICE mission.

TDRS

Continued from page 1

Ninety-Nine Percent Coverage

The 99 percent coverage, said Hunter, resulted from "a lot of hard work and problem solving between STS-8 and 9." As a result, Hunter noted, the spacecraft now has demonstrated all of its capabilities, which were put in jeopardy by a faulty launch of the satellite from STS-6 in April 1983.

Using TDRS operationally for the first time, NASA was able to communicate with STS-9 for 66 percent coverage of each of Columbia's orbits over the Earth. Previous shuttle missions—using NASA's ground tracking network—have enjoyed only 15 to 20 percent coverage.

The satellite was able to serve Spacelab with all anticipated communication channels but one: a forward K-band link, which is part of a pair of two-way, high data rate channels. The STS-9 mission had intended to use the affected K-band channel as an open conference line for astronauts, payload specialists, mission controllers and ground scientists to use together.

Additionally, the line was to be used for sending text and graphics to the Columbia's crew and to direct pointing of the Columbia's K-band antenna towards TDRS.

S-band Substitutes

To substitute for the faulty K-band link, TDRS controllers used one of the satellite's S-band channels for the group communications and air-to-ground UHF links through Goddard's network ground stations. To uplink graphics and text, mission controllers used NASA's existing network of world-wide ground stations, as in previous Shuttle missions.

To maintain pointing of its K-band antenna, Columbia used programs uplinked to the orbiter's onboard computers. None of the subsitutions impacted mission operations.

Joint NASA/Goddard Honor Awards Ceremony

NASA/GSFC HONOR AWARDS

Twenty-nine individuals and 14 groups received NASA Honor Awards at the annual Joint NASA/Goddard Awards Ceremony at Goddard December 14. Goddard Honor Awards were presented to 30 people and eight groups.

NASA Administrator James M. Beggs and Center Director Noel W. Hinners presented the awards to the honorees.

In his address, Beggs congratulated Goddard on its continuing strong tradition of excellence.

"Outstanding contributions have been made in the entire range of Goddard's activities," Beggs said. "A few of those areas have been in space and Earth sciences; in the development and production of spacecraft; in data processing and applications; in spacecraft tracking and communications; and in the launch vehicle and technology transfer area."

Listed below are the recipients of this year's awards:

NASA Honor Awards

Outstanding Leadership Medal:

Peter T. Burr/430
Jon R. Busse/700
George D. Hogan/425

Exceptional Scientific Achievement Medal:

Kenneth J. Frost/684
Gerald R. North/915
Richard F. Mushotzky/661
Vincent V. Salomonson/920

Exceptional Engineering Achievement Medal:

Edward J. Devine/716.2
Anthony R. Kerr/980
John Sudey, Jr./716.2
Oscar Weinstein/former employee

Exceptional Service Medal:

Richard A. Austin/430
Francis M. Collins/742.1
John L. Donley/430
Luis Gonzales/435
Arun K. Guha/400.2
Frank L. Heddinger/435
Henry C. Hoffman/792
Robert A. Hoffman/696
George T. Jenkins/850
John C. Lyon/former employee
Ann C. Merwarth/400.2
James V. Moore/405
Charles E. Rhoads/405
Dean S. Smith/973
Bernard J. Trudell/480
Vaughn E. Turner/841
William C. Webb/435

Public Service Medal

Andrew F. Nagy/Univ. of Michigan

Group Achievement Award

Automated Pilot Advisory System Development Team
Dynamic Explorer (DE) Project Team
DE Science Team
Eastern Regional Remote Sensing Applications Center (ERRSAC)
GSFC Small and Minority Business
Magsat Scientific Investigation Team
Nimbus-7 Sensor Data Processing Team
Project Condor Team
Solar Maximum Mission (SMM) Project Team
SMM Scientific Team
Wallops Flight Facility Storm Hazards Team

Public Service Group Achievement Award

Morton Thiokol, Inc., Elkton Division

Goddard Honor Awards

Award of Merit:

Charles M. Mackenzie/415
Joseph Purcell/400.4
James H. Robinson, Jr./270

Exceptional Achievement Award

Richard F. Baker/151.3
William F. Bangs/302
John L. Barker/923
Gerald L. Burdett/400.1
Robert A. Burns/1022.4
Frank J. Ceppolina/408
Eduardo Diaz/850
Bertram D. Donn/691
Albert J. Fleig/910.2
John H. Henninger/754.2
Robert L. Hermann/562
Thomas S. Johnson/723.2
Maceo A. Leatherwood/253.3
Paul L. McKowan/562
Jaylee M. Mead/680
Karen L. Moe/502
Leland R. Murphy/151.2
Frank J. On/731.1
Claudette D. Parent/246.2
John A. Underwood/480

Equal Opportunity Award

John E. Hodge/901
Michael J. Ladomirak/280

Community Service Award

Fidel R. Rul, Jr./850

Group Achievement Award

Goddard Health Unit
Project Development/Operations Team for the Landsat Thematic Mapper Early Access System
Multimission Modular Spacecraft Project
The "Mobility" Subcommittee of the Women's Program Advisory Committee
STS-8 Active Atomic Oxygen Monitor Program

Certificate of Appreciation

Joseph W. Dunst/604
Barbara J. Karth/Goddard Child Development Center
U.S. Naval Academy Band

Suggester of the Year Award

Eugene W. Williams/former employee

The ceremonies were held in the building 8 auditorium.

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

344-8102

Goddard employee is virtual year-round Santa Claus

What started over a decade ago as a gesture of goodwill is now a perennial activity for a Goddard employee who likes helping the needy.

At least 10 times a year for nearly 12 years, Frank Martin, Head, Engineering Design Branch, has been delivering goods to the poor of Appalachia. Martin collects items from the community throughout the year, but for Christmas he has an extra stop, he collects goods on Center.

Goddard personnel are notified of the Appalachia drive a month before Christmas and bring their goods to the building 1 parking lot. A 14-foot truck awaits their contributions of clothes, food, toys and household items. The collection is conducted in cooperation with the Goddard Employee Welfare Association.

"Goddard's Appalachia drive this year was one of the best," Martin said. "Sometimes I only get two or three truckloads. This year, Goddard people brought enough items to fill the truck four and a half times. . .I'm very happy about that."

Started in 1972

Martin said collecting items on Center used to be different and very hectic.

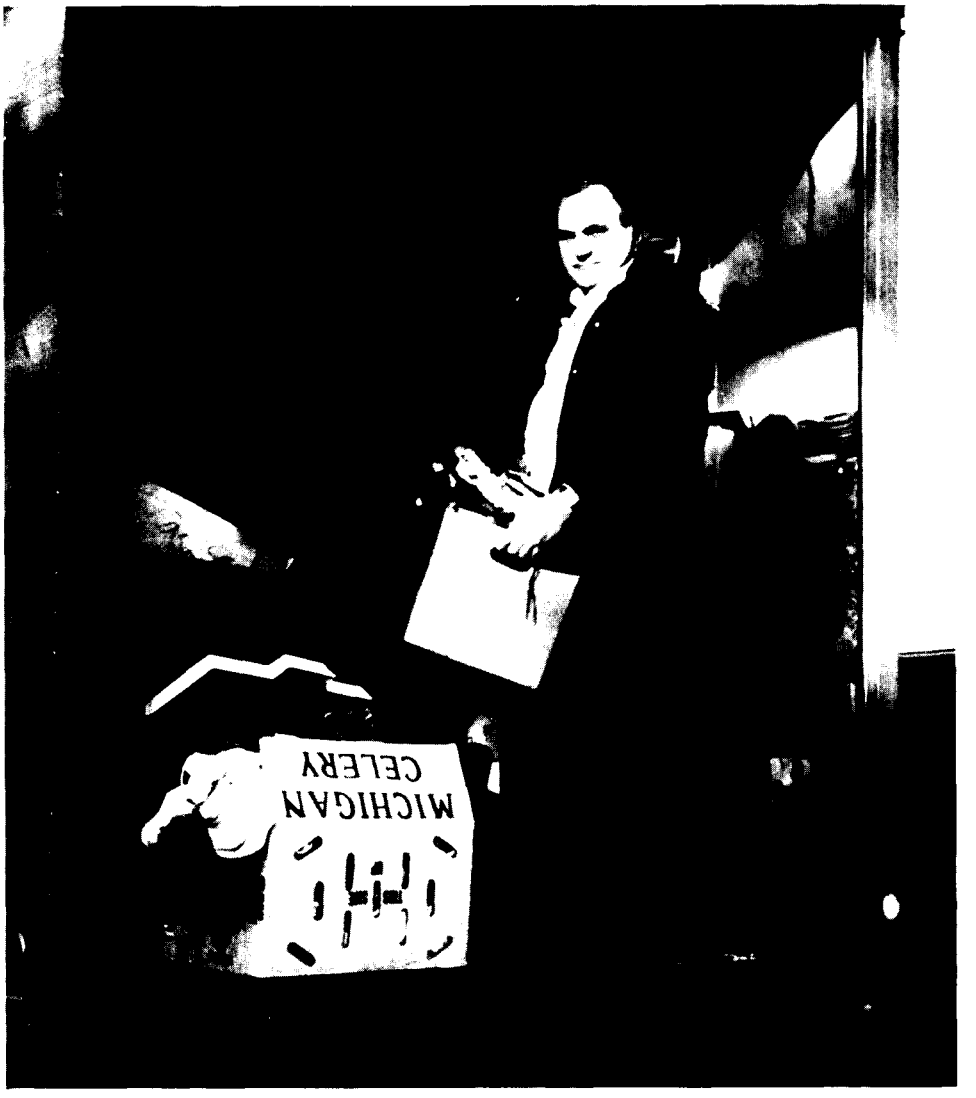
"Back in 1972, I obtained Goddard's permission to start the first drive. I placed boxes in 20 buildings and every night drove from building to building with my motor home to empty the boxes. I then delivered the donations to a storage area in Arlington, Va., and returned home before midnight. All that running around really wore me out."

In 1974, the method was changed to using a collection truck.

What motivates a person to be a virtual year-round Santa Claus and to drive sometimes for four hours to deliver goods in the mountains?

"It's probably the admiration and respect I have for John Lamb, who—after seeing children play barefoot in the snow in the Blue Ridge Mountains—waged a personal war on poverty in Appalachia for 25 years."

The results of Lamb's personal war on poverty were astounding. He organized about 50 libraries, transformed a chicken house into a home, rebuilt shacks, improved sanitary conditions, obtained volunteer medical and dental services, and delivered food, furniture, and clothing by the truckloads. Those who knew of Lamb's efforts would leave items on his front porch and, twice a week, Lamb would load everything on his truck and take it to the mountains.



APPALACHIA DRIVE — Frank Martin packs 14-foot truck with various goods for Appalachia's needy. Martin said this year's drive was one of the best ever, with four and half truckloads of items collected on Center. For over a decade, Martin has been the focal point of Goddard's Appalachia Drive.

Work helps 600 families

Lamb's efforts were sometimes featured in local newspapers and on one occasion, Martin's wife showed him an article on Lamb. That was in 1971. Before Lamb died in 1972, Martin volunteered his services and became the main driver, making regular trips to the mountains.

Martin and the other volunteers that Lamb had organized over the years agreed to continue Lamb's work and renamed the organization Lamb started the John Lamb Foundation. They are trying to make life better for the more than 600 Appalachian families.

Martin has been at Goddard since its inception. This year Goddard is 25 years old and, for half of those years, Martin has volunteered his services to the John Lamb Foundation.

As for the future, Martin intends to keep up his humanitarian efforts. He's not Santa Claus, of course, but to those Appalachian families he comes pretty close.

Red Cross awards Goddard, employee

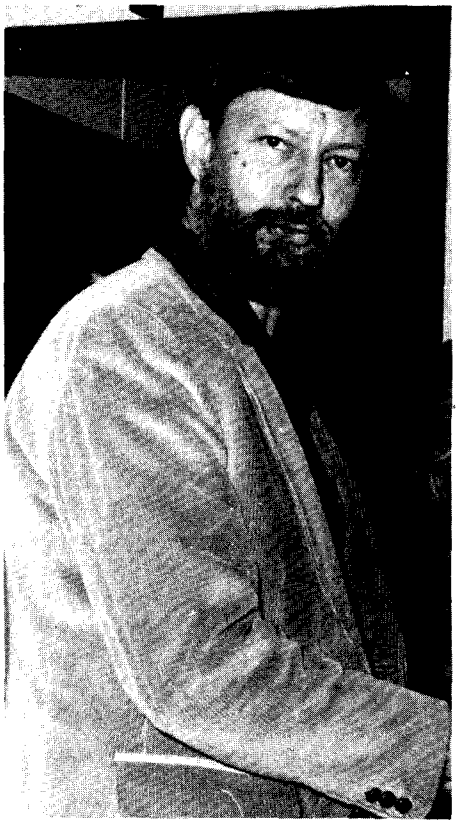
The Prince Georges County Chapter of the American Red Cross awarded a Goddard employee with a certificate of appreciation recently for donating 100 pints of blood.

John Unger, a Program Analyst in the Networks Directorate, boasted of being a gallon donor when he joined Goddard in 1962 and has been giving blood regularly ever since.

However, Unger's blood donations didn't begin in 1962. He first noticed that giving blood "didn't hurt" back in the 1950's, during his college days. "Donating blood is an easy way to help people and it is very convenient to give right here at Goddard," he said.

Goddard also received a certificate of appreciation from the Prince Georges County Chapter of the Red Cross. At the 15th annual blood services awards dinner last month, the Center was honored for "it's outstanding support in providing blood needs of the community." Accepting the award for Goddard was the Center's Bloodmobile Coordinator Pamela Brown, of the Compensation Claims Office.

The next Bloodmobile visit is April 4. Please donate.



BLOOD DONOR HONORED — John Unger received a Red Cross Award for donating 100 pints of blood.

Collective Bargaining Agreement Signed

Center Director, Noel W. Hinners and Goddard Engineers, Scientists, and Technicians Association (GESTA) President Fredrick G. Schamann shake hands after signing a basic collective bargaining agreement covering the approximately 1200 Goddard non-supervisory and non-managerial scientists and engineers. This agreement was the first between the parties and was effective on October 12, 1983 and will run for three years. Pictured, standing left to right in the first row are: Floyd Ford, Jerry Hodge, Joyce McMullen Crooke, and Mary Caraker, all members of management's bargaining team. In the second row are representatives of the International Federation of Professional and Technical Engineering (IFPTE) of which GESTA is a Local, as well as representatives of the Local. Standing left to right are: Gary Hattal, IFPTE President Rodney A. Bower, IFPTE Secretary/Treasurer John H. Dunne, Stan Watson, Robert Gordon, Danny Mistretta, and the General Counsel for the IFPTE Steve A. Schwartz. Seated left to right are John Ferguson, Chief Negotiator for management, Director Hinners, Mr. Schamann and Richard Person, International Representative and Chief Negotiator for GESTA.

1983 roundup

Continued from page 2

Most significant was the completion (at Goddard) of the Spacelab Data Processing Facility SLDPF, headed by Bill Barnes, Code 564.2. The SLDPF, as it is more popularly known, accumulated some six trillion bits of information from Spacelab during the 10-day STS-9 mission and operated without a hitch throughout the mission. The high data flow was made possible by the fact that TDRS, though handicapped by forward link Ku-band problems, maintained communications with the Shuttle and its crew more than 99 percent of the time it was in sight of the orbiter.

Without much public attention, Goddard employees continued to work on a great many other projects that although they did not win headlines, measure high on the scale of contributions. A number of the projects, such as Space Telescope under Frank Carr; Upper Atmosphere Research Satellite (UARS) under Peter Burr; Cosmic Background Explorer (COBE) under Roger Mattson; Earth Radiation Budget Satellite (ERBS) under Carl Wagner, to name just a few, are waiting in the wings.

One of the most spectacular Shuttle missions ever is scheduled to take place in April when astronauts will seek to recover and repair the ailing Solar Maximum Mission (SMM) spacecraft and place it back in orbit to continue its highly significant observations of the Sun. The repair mission is a Goddard Project headed by Frank Cepollina.

Solar Max, launched in February, 1980, operated effectively for nearly 10 months before losing its altitude control system. That failure left some of the seven instruments on board incapable of performing their scientific missions because they could not be pointed accurately to specific areas of the Sun.

Goddard's Wallops Flight Facility (WFF) also had a very productive year. The WFF conducted launches of 210 sounding rockets and 48 scientific balloons during 1983. Launch sites included Wallops and many other locations throughout the free world with a major campaign successfully completed in Peru. Wallops also supported numerous aeronautical research tests for NASA, DOD and other agencies including the highly successful Storm Hazards Research Program. Wallops aircraft continued to provide support for Applications research including, for the first time being able to detect remotely laser induced florescence of tree leaves and grass.

Another Landsat is scheduled for launch March 1 from the West Coast, and 10 Shuttle missions are planned for the year.

In looking over activities of this past year, Center Director Dr. Noel W. Hinners agreed that 1983 was quite a productive year for the Center and one in which all employees could take pride.

"We have shared a great deal of responsibility here at Goddard this year, and we have lived up to all challenges with the dedication and devotion that is the spirit of Goddard," Dr. Hinners said. "We can look ahead to 1984 with confidence."

Asked what he believed was the highlight of 1983, Dr. Hinners said: "I feel the TDRS recovery, subsequently leading in to the fantastic operation during STS-9/Spacelab I, was the highlight of 1983. I must add that, for me, 1983 was a year of getting to know Goddard and its people, and from that developing a confidence that we accomplish the goals we establish for ourselves."

Five GAS payloads to fly on 41B

Five Getaway Special payloads will be aboard STS 41B when it takes off on its nine-day mission February 3 from the Kennedy Space Center, according to James S. Barrowman, project manager.

The experiments include two from Utah State University; two from Goddard — one sponsored by the U.S. Air Force; and one from GTE Laboratories Inc. in Danvers, Mass.

One of the Utah State experiments, sponsored by L.R. Megill, a Utah State professor, has three separate "space-paks." One was built by Taka Kitaura, a Utah State student from Japan, and it is designed to study capillary in liquids. The second experiment, built by Utah State student Scott Thomas, will study thermocapillarity, or the motion of liquids due to surface tension effects in which a temperature gradient has been established. The third "space-pak" contains three experiments developed by Utah State students from the University of Aberdeen, Scotland. They will study dimensional stability, light scattering, and the flight of some spores into space.

The second Utah State canister was donated to the university by the Utah Section of the American Institute of Aeronautics and Astronautics. It, too, will have three "space-paks." One, built by students from Brighton High School, will sprout seedlings of radishes to study the nature of the phototropic response under zero-G conditions. The seeds, incidentally, were flown in space earlier by the Park Seed Co. on STS-5. A second experiment in the canister will attempt to crystallize proteins, a study by students from the University of Utah. The third experiment, by Utah State students, will study soldering under zero-G conditions.

The GTE experiment will pursue fundamental research on the configuration of an arc lamp in gravity-free surroundings. Arc lamps, normally used for outdoor lighting of football fields and indoor lighting of arenas, are commercial. Scientists hope the experiment will pave the way for the development of a more energy-efficient light.

The Air Force-sponsored Goddard experiment is being conducted by John Adolphsen and was flown successfully on STS-8, also. Known as the Cosmic Ray Upset Experiment (CRUX), it is designed to study upsets of memory microcircuits by energetic particles (cosmic rays).

The other Goddard experiment is the Atomic Oxygen Flux Monitor, which also was flown successfully aboard STS-8. Principal investigators are Jack Triolo, Roy McIntosh, and Ray Kruger. The experiment is designed to measure the effects of atomic oxygen on the Shuttle environment.

NASA National Aeronautics and Space Administration
Goddard Space Flight Center

Goddard News

Greenbelt, Maryland and Wallops Island, Virginia

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 before the date of publication. For additional information on articles contained herein, contact the editor on (301) 344-8102. Editor: David W. Thomas