NASA
National Aeronautics and Space Administration
Goddard Space Flight Center

Goddard News

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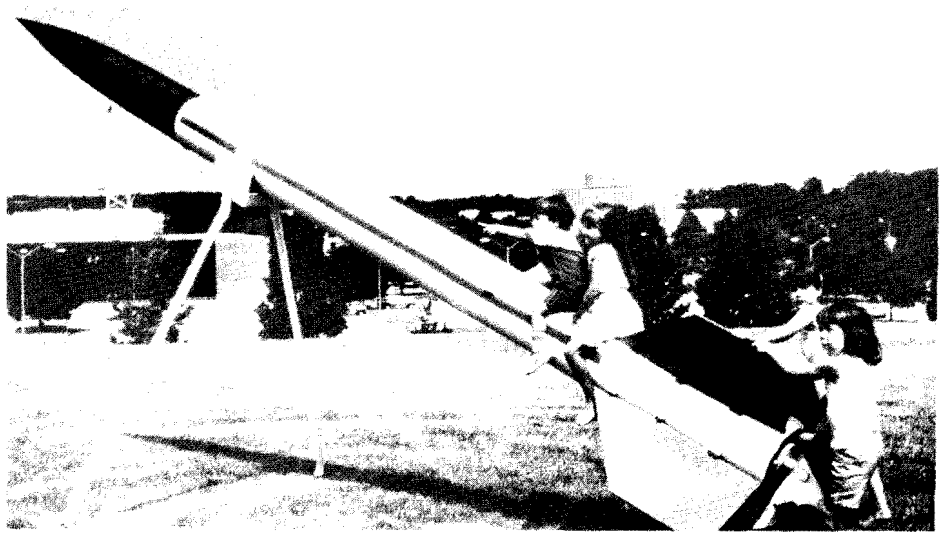
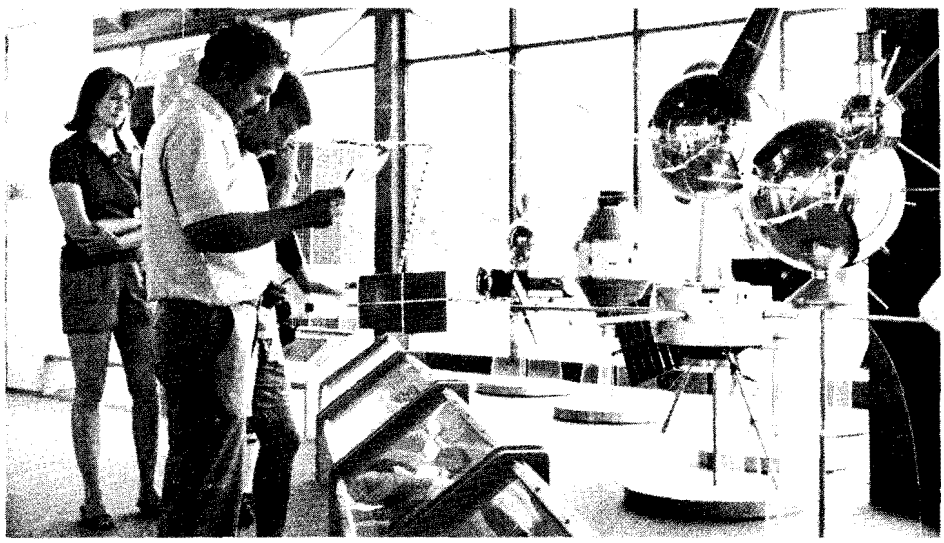
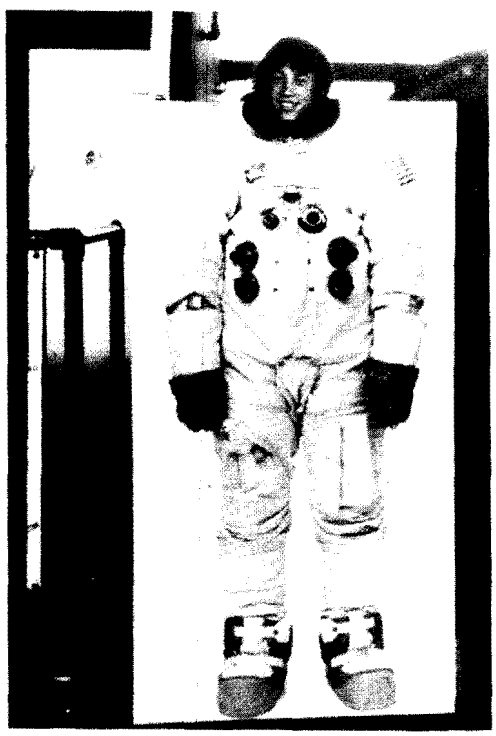


Festival of Flight
June 14 - 15, 1986





Photography by Debbie McCallum

Presidential Commission Absolves GSFC Payloads

(Editor's note: Two of the major payloads—the Tracking and Data Relay Satellite and the Spartan Halley—were aboard Challenger on its tragic flight of January 28. In its report to the President, the special commission investigating the crash absolved both payloads from blame for the tragedy. Because both payloads were Goddard projects, we thought our readers would be interested in excerpts from the payloads portion of the Commission report.)

The payload bay of the Orbiter Challenger contained a Tracking and Data Relay Satellite (TDRS) attached to an Inertial Upper Stage (IUS) booster rocket and associated airborne support equipment. The IUS contained two solid rocket motors (SRMs): SRM-1 and SRM-2. The combined weight of these components was about 40,000 pounds. About five percent of the payload, IUS and support equipment was recovered from the ocean. Components recovered included segments of the cases of both IUS SRMs, the ignition safe/arm device for each SRM, the igniter for SRM-2, fragments of unburned propellant from each SRM, five explosive separation bolts that secure the two SRMs together, the forward support equipment trunnion, the aft trunnions with spreader beams and an undetonated section of explosive fasteners.

No Evidence

There is no evidence of scorching, burning or melting on any of the components and structure recovered, and all fractures were typical overload fractures. The safe arm device for each IUS SRM was in the safe position, the five explosive SRM-1/SRM-2 separation bolts were intact and pieces of propellant were not burned, indicating that the SRMs had not ignited.

The two aft trunnion spreader beams were intact but were bent in the downward direction relative to the Orbiter. The right spreader beam was cracked and deformed about 7.5 inches, and the left spreader beam was cracked and deformed about 1.5 inches. These deformations indicate that the payload and upper stage package were intact and secure in the cargo bay while being subjected to significant inertial flight load. . .

IUS/TDRS payload shifting or breaking free within the Orbiter due to structural failure or premature separation was investigated . . . Four possible faults that could have led to Orbiter damage or substantial payload shift were considered: IUS stage 2/TDRS separation, IUS stage 1/stage 2 separation, IUS/TDRS separation from the airborne support equipment and IUS/TDRS support equipment separation from Orbiter. All were eliminated because dynamic response data conclusively showed that IUS/TDRS responded normally until the final loss of data. Further, TDRS data, which pass through the IUS Stage 1/stage 2 and support equipment, were continuous until data loss, verifying that these elements did not separate . . .

WILLIAM P. ROGERS **served as Chairman of the Presidential Commission on the Space Shuttle Challenger Accident. He was formerly Secretary of State (1969–1973) and Attorney General (1957–1961) and currently is a practicing attorney affiliated as a partner with the law firm of Rogers and Wells in New York City.**

Thermal Subsystem

The thermal subsystem was monitored by 82 configuration status indicators and 137 analog temperature channels. This telemetry showed that the TDRS remained in its normal thermal configuration and experienced normal temperatures until signal loss.

No data indicated that the IUS separated from TDRS, that any deployable appendage ordnance had been fired or that any appendage motion had begun.

The TDRS reaction control system was inactive at launch and required an IUS command and two ground commands to activate any propellant. Telemetry indicated no valve actuation, changes in tank pressures or temperatures or propellant temperature violations. Further, there was no telemetry that would suggest a hydrazine leakage or abnormality and no indications that the TDRS reaction control system contributed to the accident.

During the launch phases, the attitude control subsystem was disabled except for the gyros and associated electronic necessary to provide the telemetry. All telemetry parameters reflecting attitude control subsystem configuration remained normal and unchanged during the STS 51-L prelaunch and post-launch periods. . .

TDRS Telemetry

TDRS telemetry during the launch phase was transmitted by electrical cable to the IUS and interleaved with upper stage data. If separation had occurred at either the TDRS/IUS interface or the IUS/support equipment interface, TDRS data would have stopped. There was no abnormal telemetry until signal loss of all vehicle telemetry. TDRS also received power from the Shuttle via the IUS through the same interfaces. There were no indications of TDRS batteries coming on line. This indicates that structural integrity at the TDRS and IUS interfaces was maintained until the structural breakup. Additionally, an inspection of the recovered debris gives the following indications that the TDRS/IUS remained intact until the structural breakup. First, the separation bank lanyards frayed at the end where they attached to the band, indicating that the spacecraft was pulled forcefully from the adapter. Second, the V-groove ring structure at the top of the adapter was torn from its riveted connection to the adapter, indicating that a strong shear existed between the spacecraft and IUS which would only be generated if the two were still attached. Finally, the adapter base was torn where it attached to the IUS, again indicating high tension and shear forces. There were no indications from telemetry or recovered debris that showed that the structural integrity of the satellite or the satellite/stage interface had been compromised . . .

There were no findings that revealed unsafe conditions or that any safety requirements had been violated or compromised.

Assessment of possible upper stage contribution to the accident centered on the elimination of three possible scenarios:

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Presidential Commission

Continued from page 2

premature upper stage rocket ignition, explosion/fire in the payload bay and payload shift in the payload bay. Premature ignition of either the upper stage 1 and/or stage 2 motor while still in the Orbiter bay would have resulted in catastrophic failure of the Orbiter. Potential causes for premature ignition were electrostatic discharge, inadvertent ignition command and autoignition. Each would have caused a rapid increase in the Orbiter payload bay temperature and pressure and would have been immediately followed by structural damage to the payload bay doors. The payload bay temperatures remained essentially constant, and the Orbiter photographic and telemetry data indicated the payload doors remained closed and latched from liftoff until signal loss. Both indications verified that there was no ignition of the IUS solid rocket motors.

IUS Component

An IUS component explosion or fire could have damaged critical systems in the Orbiter by overheating or impact. Five sources other than an upper stage motor pre-ignition were identified as potential origins of a fire or explosion in the payload bay: (1) release and ignition of IUS hydrazine from the reaction control system tanks, (2) fire or explosion from an IUS battery, (3) impact or rupture of a motor case and subsequent ignition of exposed propellant, (4) fire or electrical origin due to a short and (5) fire or inadvertent ignition of pyrotechnic devices due to radio frequency radiation.

Thermal measurements in the propellant tank and in components adjacent to the propellant tanks indicated no abnormalities. Pre-launch and thermal measurements in the Orbiter payload bay and in TDRS near the reaction control system were stable throughout the ascent period. A fire and/or explosion resulting in shrapnel from an IUS battery was eliminated based on pre-launched monitoring of open circuit voltages on all batteries, except the support equipment batteries. Location of these batteries made the potential for damage to critical systems very small if they burned or exploded. Motor case impact or rupture and resulting exposure and propellant ignition was determined improbable because batteries and reaction control system burning or explosion were eliminated by flight data analysis . . . Propellant burning was not indicated by payload bay thermal measurements. Electrical shorting was elimi-

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Fletcher Responds to Rogers Report

The following are excerpts from the statement delivered by NASA Administrator James C. Fletcher on June 9 to members of the press following the release of the Presidential Commission Report on the 51-L accident. William Rogers chaired the Commission which had 120 days to investigate the mishap and conclude the causes.

After the Challenger accident, President Reagan told our shocked nation, "The future does not belong to the faint-hearted. It belongs to the brave. . . The Challenger crew is pulling us into the future and we must continue to follow them." In words of special meaning to NASA, he said, "We must pick ourselves up again and press on despite the pain."

We have been pressing on, despite the pain, seeking answers to difficult questions, beginning carefully to make changes where they are needed. We have been at work. Yet like all Americans, we have awaited the Rogers Commission Report, hoping to learn from it as well.

The report of a Presidentially-appointed, independent body carries with it special status and the compelling obligation to study its conclusions with great care.

We are prepared to do that with an open mind and without reservations. . .

We—and I mean all of us at NASA—will be studying the Commission's judgments and recommendations carefully and thoroughly during the days ahead. We will be offering to the President and to all

JAMES C. FLETCHER
NASA Administrator

Americans our specific responses in an orderly and timely way. . .

I have accepted the President's call to make this agency as vibrant and careful as it can be, to help it earn the respect it deserves and the excellence that has been its hallmark. . .

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PRESIDENTIAL CONGRATULATION—**Jack Brandt, Chief, Laboratory for Astronomy and Solar Physics (left) is congratulated by President Reagan (right) for the contributions he has made to cometary science as Dr. Torence Johnson of the Jet Propulsion Laboratory looks on.**

Thirteen Out of Fourteen Isn't Bad!

by Carolynne White

Build a satellite in 60 days?

No trouble for Gerald W. Longanecker, the affable, silver-haired project director for the Meteorological Satellites (METSAT) Project.

In October of '62, when the Russian bomb "Starfish" exploded in space, the US wanted to get a satellite up to examine the radiation environment and its dissipation—quickly. Longanecker was a member of the team that built the Explorer 15 in 60 days.

JERRY LONGANECKER
METSAT Project Director

"We had most of the hardware and instruments ready at Goddard," he said, "All we had to do was build, test and launch it. Contracts for new hardware were executed in record time. For example, the solar array was built in one month in California. Our integration and test teams worked 12 hours shifts, seven days a week.

"Back then we could do things so much quicker than we can now," explained Longanecker. "Goddard then maintained greater in-house capability for building spacecraft," he continued, "whereas now most of the actual work is contracted." "The flavor is different," he said, "but just as exciting because our programs are much more complex."

As director of the METSAT project, Jerry Longanecker primarily is involved with the launching of two series of weather satellites, the Geostationary Operational Environmental Satellite (GOES), and the Television and Infra-Red Observation Satellite (TIROS). (The latter is renamed NOAA when its operation is turned over to the National Oceanic and Atmospheric Administration.) These satellites, launched in series, orbit the Earth in complementary orbits, producing the weather pictures you see on the news every night, providing data for the National Weather Service, and carrying equipment for the Search and Rescue program.

The most recent of the current series, GOES-G, was destroyed in the Delta explosion of May 3. "It was my first experience at not getting a spacecraft into orbit," said Longanecker. The GOES-G would have been his 14th successful launch. "It made us feel awfully bad," he said.

Thirteen successful launches in 27 years is quite a track record for one individual. Jerry Longanecker's pride in this accomplishment is evident from the careful records he keeps of each launch. In the fall of 1984, a TIROS/ NOAA satellite launch at Vandenberg Air Force Base was postponed 13 times due to adverse weather conditions. "I'd never seen anything like it in all my years in this business," Longanecker commented

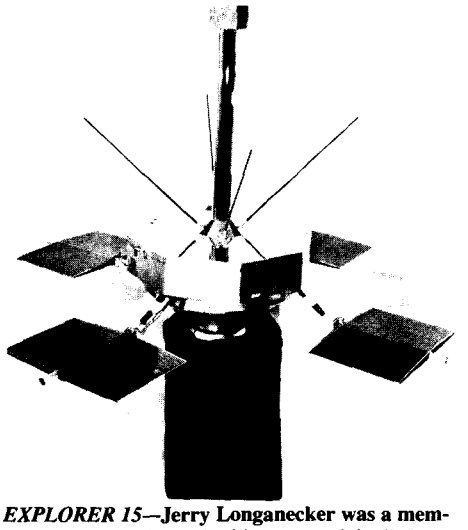
When he's not running back and forth between home and launch site, Jerry can be found on the golf course, conveniently located just behind his house in Crofton, Maryland. He golfs with his wife, Cynthia, who also enjoys the sport. Longanecker's middle son, Mark, plays for the Towson University golf team, and has golfed his way to a four stroke handicap.

"That's better than mine," says Longanecker, whose handicap is seven. Both Mark and Longanecker's oldest son, Craig, enjoy lacrosse as well.

Daughter Stacey is an electrical engineering major at the University of Maryland where Longanecker earned his Masters of Science in Civil Engineering on a full University Fellowship in 1955.

Longanecker's previous experience has included managing the Small Scientific Satellite (S^3) Project, several Explorer class satellites, and the International Ultraviolet Explorer (IUE) spacecraft. The IUE is in its 9th year of operation and has provided data upon which more than 350 scientific papers have been based.

From the early Explorers to the weather satellites which provide valuable information to more than 200 countries, Jerry Longanecker has directed and managed projects with a success that has earned him



***EXPLORER 15*—Jerry Longanecker was a member of the team that built this spacecraft in 60 days.**

awards such as the NASA Certificate of Merit, the GSFC Certificate of Commendation, the GSFC Exceptional Performance Award, the NASA Exceptional Service Medal, the NASA Medal for Outstanding Leadership, as well as the respect of his colleagues in NASA and NOAA.

Procurement Conferees Exchange Ideas

Providing a forum for the open exchange of ideas between industry and government was the theme of the GSFC/Industry Procurement Conference, held June 5, in the Building 3 auditorium.

The day-long conference was designed to provide GSFC with "a better understanding of [industry's] problems and how we can work within the system's flexibilities to solve them," said Charles Dunfee, Procurement Officer for Goddard. "This format also helps give them [industry] a better understanding of where we're coming from."

Following opening remarks by Center Director Noel Hinners, government and industry subpanels discussed various aspects of mutually chosen topics.

Of the 50 small and large contractors invited, 41 firms were represented. Those in attendance accounted for 80 percent of Goddard's major contractors.

This is the second such conference Goddard's procurement community has hosted. "We plan to have one about every two years," said Dunfee.

Procurement has put together a plan of action to address topics and issues discussed at the conference. Additional input is being solicited from contractors to permit continued analysis.

Goddard Visitor Center Renovations Begin August 18

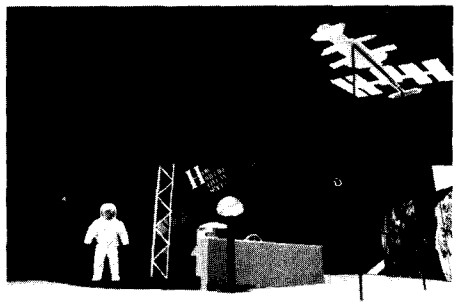
by Randee Exler

The Visitor Center (VC) will be getting a new look. On Sunday, August 18 through the end of September, the inside portion will be closed for a total renovation. During this time frame, the Hall of Satellites, auditorium and planetarium will remain open for continued public programming.

In the ten years since the VC first opened, many changes have taken place in the space program which have not yet been reflected in our Visitor Center. The new exhibits will not only bring the VC up to date, but also will adapt well to the future. The plans to remodel the VC have been in the works for about one and a half years.

What will guests see when the new VC reopens? "Our VC will be different from a lot of other VCs where you get the scrapbook approach of what the NASA center is all about", explained Jan Wolfe, Chief, Office of Public Affairs.

"We're turning that around and paying attention to what our audiences' interests and needs are," she added. The biggest audience at the VC is young people with an interest in science who want to learn about astronomy and physics. The exhibits are also designed to show how Goddard fits into the big picture.



VISITOR CENTER FACELIFT—**The Goddard Visitor Center will be renovated from August 18 through the end of September. Pictured is a model of a proposed exhibit, which focuses on living in space.**

The near gallery in the VC will house thematic areas filled with interactive exhibits. The exhibits simulate living in space, working on the Space Shuttle, and performing scientific and commerical experiments on the space station.

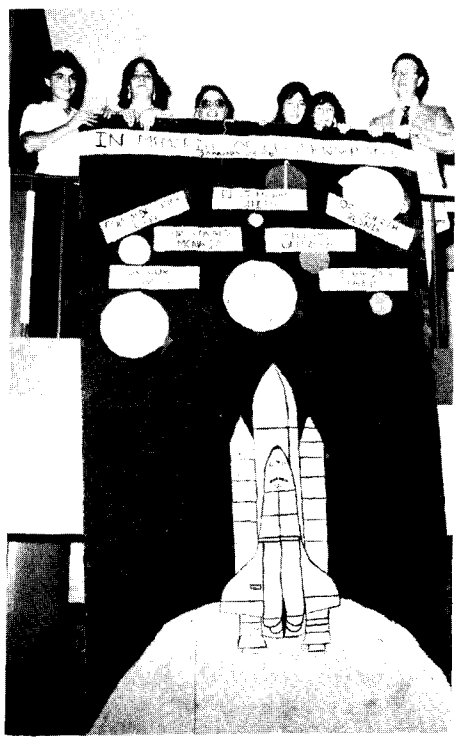
Among other attractions, visitors will be able to sit in a Manned Maneuvering Unit and simulate the operation of the vehicle, sign up to have their name carried into space, or sit in a gyro chair and feel what its like to navigate and control a spacecraft.

The centerpiece of the new hall will be an eight-screen visual experience highlighting a window into deep space. Through graphics, slides and film, visitors will learn about space and Earth science in forms made possible only by observations from space vehicles.

A model of the Hubble Space Telescope (HST) will be suspended from the ceiling of the theatre. As imagery from the HST is developed, it will be presented as a regular feature in the theatre.

When visitors leave the VC, they will have acquired a better understanding of the importance of the national space program and of the major role played by the people of the Goddard Space Flight Center.

Sixth Annual Model Rocket Contest: July 20



ART MEMORIAL—**Four seniors and their teacher from Bayshore Jr. High School, Leonardo, N.J., recently donated this painting on the school's behalf to Goddard in remembrance of the seven astronauts who died in the Challenger accident. The youths took two months to complete the 5 × 20 painting. From left to right: Gus Valentino; Casey Heeren; Valerie Walker; Chrissy Rueck; Chris Eckhoff and Center Director Noel W. Hinners.**

The Sixth Annual Goddard Model Rocket Contest will be held at the Visitor Center on Sunday, July 20 at 10:00 a.m. Model rocketeers from a wide geographical area are expected to participate.

There is no registration fee, and participants can register at the launch site on the day of the event. Certificates of participation will be awarded to all model rocketeers. Prizes to be awarded include trophies, posters, and model rocket kits.

This year's contest is scheduled to commemorate the 16th anniversary of the Apollo Moon Landing, and the 25th anniversary of America's first manned space flight. It also is designed to promote interest in space-related activities.

The model rocket competition is sponsored by the National Space Institute, the American Institute of Aeronautics and Astronautics/National Capital Section (AAA/NCS) and the Goddard Visitor Center through the Office of Public Affairs. Local sections of the National Association of Rocketry (NAR) are cooperating, also.

For contest rules and further information, call 286-8981, Wednesday–Sunday, 10:00 a.m.–4:00 p.m.

Fletcher Responds

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Where management is weak, we will strengthen it. Where engineering or design or process needed improving, we will improve them. Where our internal communications are poor, we will see that they get better.

This is an agency whose excellence and commitment to new frontiers drew to it seven exceptional Americans. Our response must be to overcome our errors, not to quit, to stop, or to cave in. To stumble now in hesitation is to mock their commitment to reaching for distant horizons, and their willingness to take a chance in seeking knowledge and understanding.

Let me conclude by repeating my thanks to the Rogers Commission, for undertaking a tough job and working commendably through long weeks toward their conclusions. Their work, I give you my sacred pledge, will not have been in vain. And I think I speak for all NASA employees when I say that. We are in a very special way, an agency with a mission determined now to regain our honor in its fullness. This is a day of tension for us, but it is also a day of resolve, a time of beginning, and a time of rededication.

Thank you.

ICE Exhibit on Display at National Air and Space Museum

by David Thomas

Animal lore gives cats nine lives but only man can give a bird another chance. In this case, the bird lived three times. Birds, NASA jargon for man-made satellites, routinely transmit data to Earth from space. But rarely are they used for three different missions after being designed initially for just one. Such is the case with the International Cometary Explorer (ICE), the first spacecraft to visit a comet.

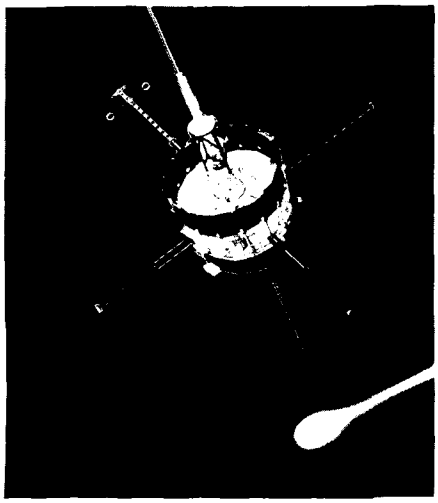
"The Three Lives of ICE," a NASA exhibit, is currently on display at the National Air and Space Museum (NASM) and will run through mid-November. It is located adjacent to the Albert Einstein Planetarium on the second floor of the NASM. The exhibit details simply and graphically how ICE monitored the solar wind; surveyed Earth's magnetotail; and studied the tail of Comet Giacobini-Zinner (G-Z) since being launched in 1978.

Originally called the International Sun-Earth Explorer-3, ICE's first job was to monitor the solar wind upstream of Earth. Next, ground controllers commanded four lunar swing-bys, using the Moon's gravity to direct the spacecraft deep into the Earth's magnetotail. Finally, aided by a fifth lunar swingby, ICE was hurtled toward Comet G-Z and passed through its tail on September 11, 1985.

The exhibit explains each of these space odysseys briefly and concisely using five panels and a 1/10 scale model of the ICE spacecraft. Paintings, drawings, photos and a schematic cover the panels, which include an audio tape playing the actual sounds emitted when ICE rendezvoused with G-Z.

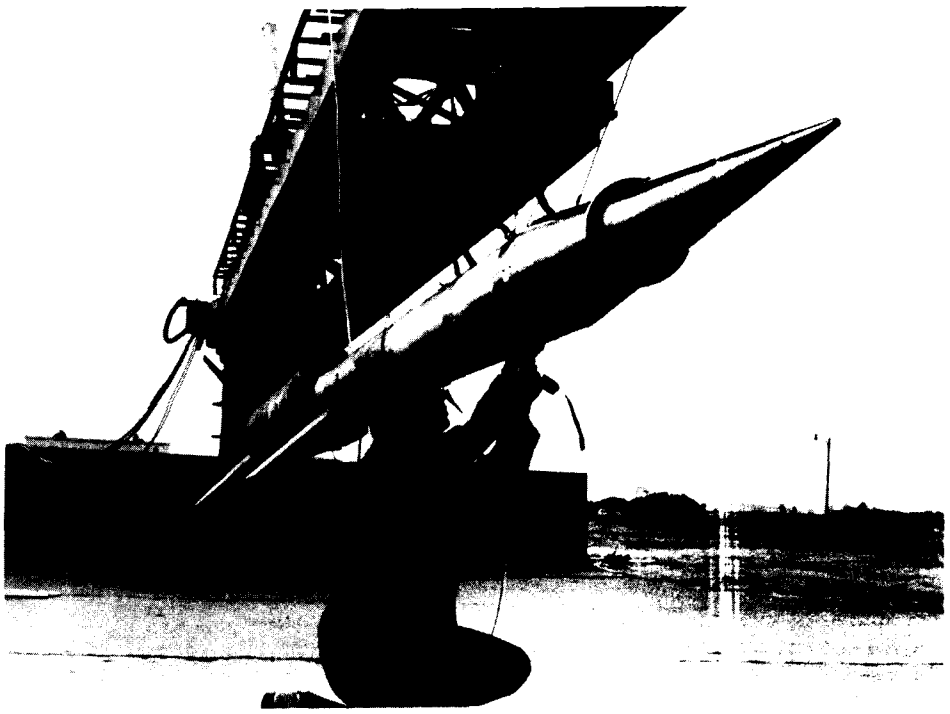
ICE's cometary expedition was conceived by Dr. Robert W. Farquhar of Goddard, who is mentioned in the exhibit. The tape of the actual "blips" from the mission are the courtesy of Dr. Frederick L. Scarf, of TRW, Redondo Beach, CA, who also was instrumental in the mission. The model of ICE is from Fairchild Space Co., Germantown, MD.

The National Air and Space Museum, located at 6th and Independence Avenue, S.W., is open to the public seven days a week, every day except December 25, from 10 a.m. to 5:30 p.m. Admission is free.



ICE Famous Firsts:

1st spacecraft to orbit a libration point.
1st continuous monitoring of solar wind approaching Earth.
1st deep survey of the Earth's magnetic tail.
1st use of multiple lunar swingbys for orbital control.
1st lunar gravity-assist maneuver for targeting and escape trajectory.
1st spacecraft to visit a comet.



A TAURUS-ORION—sounding rocket was launched from Wallops to study the effects of lightning on the Earth's upper atmosphere.

Wallops Rockets Probe Nighttime Thunderstorm

by Joyce Milliner

A coordinated series of rocketborne and aircraft experiments were scheduled to be conducted at the Wallops Flight Facility on Monday, June 30, at the time of this printing, to study the effects of lightning on the Earth's upper atmosphere. A second series is scheduled for August 1986.

These scientific missions are part of the overall NASA Sounding Rocket Program which is managed by Wallops.

The primary objective of this mission is to study how Very Low Frequency (VLF) radiowaves—emitted by lightning flashes—propagate into the magnetosphere and cause high energy electrons to spread into the upper atmosphere.

The lightning measurements were made by simultaneous data collections aboard

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CLOSE-UP

The Goddard Tae Kwon Do Club recently held its annual picnic at the Goddard Recreation Center. The event was attended by approximately 125 members and guests. Members from other clubs affiliated with the World Martial Arts Association also attended. Activities included demonstrations of forms, board-breaking and self defense as well as softball and volleyball. The guest of honor was Grand Master Peter Soo-Young Cha who was instrumental in starting the Goddard club nearly twenty years ago. Two members of the Goddard Club, Carolyn Dent and Cliff Quicksell, qualified for the Twelfth Annual National Tae Kwon Do Championship held in Dayton, Ohio, last April.

TAE KWON DO CLUB PICNIC—**Bernie Dixon, Code 152 (center) watches as Chul Cha (right) prepares to break a board with his foot. Members from other clubs (left) assisted.**

SPLASHING SUCCESS—**Laboratory Chief Dr. Stephen Holt (right) gets a dunking while Dr. Jonathan Ormes (left) looks on at the recent Code 660 laboratory picnic. Activities included T-shirt silkscreening, live entertainment by lab members, and a softball grudge match. The highlight was an opportunity to make a splash with the chief and branch heads as they took turns sitting in the dunking machine.**

The Public Service Branch of the Public Affairs Office welcomes two new faces to its staff.

Sheila Duck, (below), who has been the Assistant Manager of the Visitor Center for two years, and Manager of the Teacher's Resource Center for one, is now in charge of exhibits in the Public Service Unit of Public Affairs. In her new role, Sheila is in charge of traveling exhibits that Goddard lends to various groups in the Northeastern United States, as well as refurbishing, designing, and updating on-Center exhibits to keep them current with NASA programs.

Howard Ottenstein, (below), former Head of the Personnel Services Branch, is now Chief of the Public Services Unit. Howard has been performing the duties of his new office in an active capacity for some time, conducting VIP tours, maintaining Congressional relations, and overseeing the Visitor Center. Currently, Howard is actively involved in the remodeling of the Visitor Center, scheduled to begin in August.

RETIREES

Farewell and best of luck to the following retirees who left Goddard in June!

	Code	Years
Andrew, Ella H.	254.2	25
Arillo, Vince	728.1	31
Ashton, Thomas S.	674	37
Brahm, John J.	725.3	35
Caporale, Anthony	470	35
Coley, Robert L.	615.3	31
Corrigan, Joseph P.	603	35
Falkenhan, Charles	743.3	20
Glovier, Malcolm	834.1	42
Goesel, LeRoy H.	303	25
Gould, William I., Jr.	710.2	36
Hagemeyer, James	615	35
Horning, Lee J.	751.1	35
Jones, Alton E.	300	36
Kocher, Frederick R., Jr.	754.3	35
Lundholm, Joseph G.	402	21
Martin, Norman	750	33
Ott, Allen	712.2	40
Palandati, Charles F., Jr	711.2	33
Retzler, Anthony	754	30
Richardson, Burree	553	40
Riley, Thomas A.	754.4	35
Slaw, Harry	625	37
Spencer, Nelson W.	610	28
Steudl, Robert M.	683	30

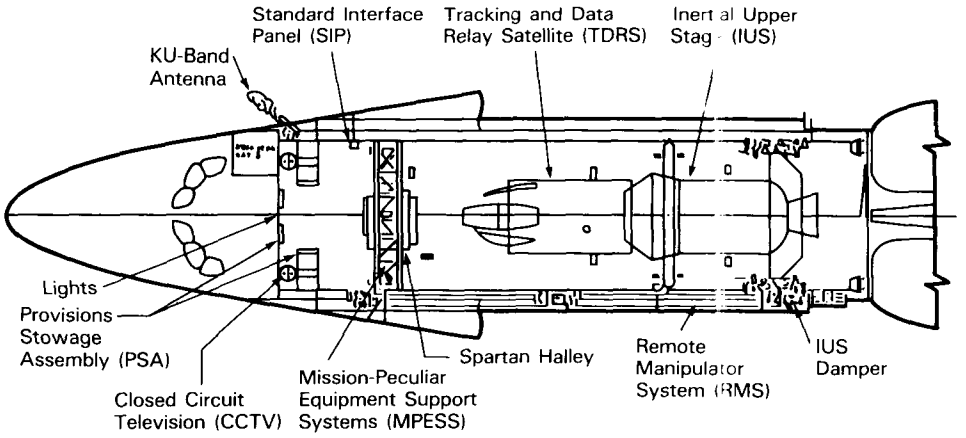
Mail your story to the Goddard News (Code 130), or call the Editor at 286-7277.

BLOOD DONORS

The next mobile is scheduled for Wednesday, August 6, 1986 in the bldg. 8 auditorium from 8:30 a.m. to 2:30 p.m. Watch flyers for details!

Congratulations to the following Goddard scientists/engineers whose efforts were published in the May/June **NASA Tech Briefs:**

"Fabrication of an X-Ray Imaging Detector"	George E. Alcorn, Code 724.3. Andre S. Burgess, Code 724.1.
"Variable Synthetic Capacitance" and "Temperature-Sensitive Oscillator"	Leonard L. Kleinberg, Code 728.3.
"High-Resolution Thermal X-Ray Detector"	S. Harvey Moseley, Code 697
"Echelle/Grism Spectrograph"	Andrew A. Dantzler, Code 717.4
"Analyzing Multidimensional Image Data"	Stephen W. Wharton, Code 623
"Feedback-Controlled Regulation of Gas Pressure"	James C. Smith, Code 674 Peter Leone, Code 674



***51-L PAYLOAD CONFIGURATION*—Overhead drawing of the Orbiter shows position of payloads including Goddard's Spartan Halley and TDRS-B spacecraft as well as other elements within the paylod bay of the Space Shuttle Challenger.**

Presidential Commission

Continued from page 3

nated as a fire source in the payload because IUS electrical and Orbiter voltage monitors were normal at launch and during STS 51-L ascent. Fires initiated by radio frequency radiation . . . were eliminated because data showed worst case radiation during ascent was less than ground-emitted radiation to the payload bay during pre-launch checkout. The ground-emitted radiation was within specified limits.

Spartan Halley

A review and assessment of Spartan Halley performance was conducted to establish any possible contributions to the STS 51-L accident. The Spartan Halley was unpowered except for the release/engage mechanism latch monitor. Its electrical current was in order of milliamps and the telemetry records obtained from the Orbiter indicated that the latches were in the proper configuration and thus Spartan Halley remained firmly attached during flight. In addition, the TDRS spacecraft data indicated there was no interaction from Spartan. Therefore, the Spartan Halley and its support structure remained intact. The payload bay temperature in the vicinity of Spartan was 55 degrees Fahrenheit indicating no abnormal thermal conditions.

As a result of detailed analyses of the STS 51-L Orbiter, the payload flight data, payload recovered hardware, flight film, available payload pre-launch data and applicable hardware processing documentation, the Commission concluded that the payload did not cause or contribute to the cause of the accident.

NASA Space Station

This is the new Space Station logo adopted by NASA Headquarters.

NASA
National Aeronautics and Space Administration
Goddard Space Flight Center

Goddard News

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Executive Editor ..... James C. Elliott
Managing Editor ..... Randee Exler
Senior Editors ..... Carter Dove and Joyce Milliner (Wallops).

Wallops Rockets

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two rocket payloads in the air at different altitudes. Measurements of the energetic electrons and their effect on upper atmospheric electric fields and conductivity also were made from each rocket.

The NASA U-2 aircraft and a series of ground-based instruments designed to detect the location and characteristics of lightning coordinated the measurements.

For this experiment, two Super Loki Datasondes—small meteorological rockets—were launched following the two-rocket series. This determined the meteorological characteristics in the upper atmosphere near the time of the other measurements. In addition, the ER-2 (U-2) aircraft from the Ames Research Center at Moffett Field, CA made correlative measurements during the rocket flights. The plane flew out of Wallops for these experiments.

The two sounding rockets were launched about one minute apart. First a single-stage Orion rocket was launched followed 60 seconds later by a two-stage Taurus-Orion. This allowed both to obtain simultaneous data in the critical altitude region. Both are solid propellant sounding rockets.

The Taurus-Orion lofted its 306-pound (138-kilogram) payload to a peak altitude of 110 statute miles (177 kilometers) and the Orion carried its 90-pound (40-kilogram) payload to a peak altitude of 53 statute miles (85 kilometers). The Taurus-Orion payload contained a water recovery system which used an eight-foot parachute with flotation bag, flashing strobe light and recovery beacon.

The scientific payloads will be returned to Wallops for refurbishment and future space flights.

The two sounding rockets used in this series are the Taurus-Orion, 23 inches (58 centimeters) in diameter and 36½ feet (11 meters) long, and the Orion, 14 inches (35 centimeters) in diameter and 16 feet long (5 meters) (both including payload section).

A second series of similar experiments is scheduled for August. This also will include collaboration with stratospheric balloon flights involving Professor Robert Holzworth of the University of Washington.

Dr. Richard Goldberg, Code 696, is the Goddard principal investigator, and Charles Manion is the Wallops payload manager for the experiments carried on board the Taurus-Orion. Dr. Keith Ogilvie, Code 692 at Goddard, is also a co-investigator.