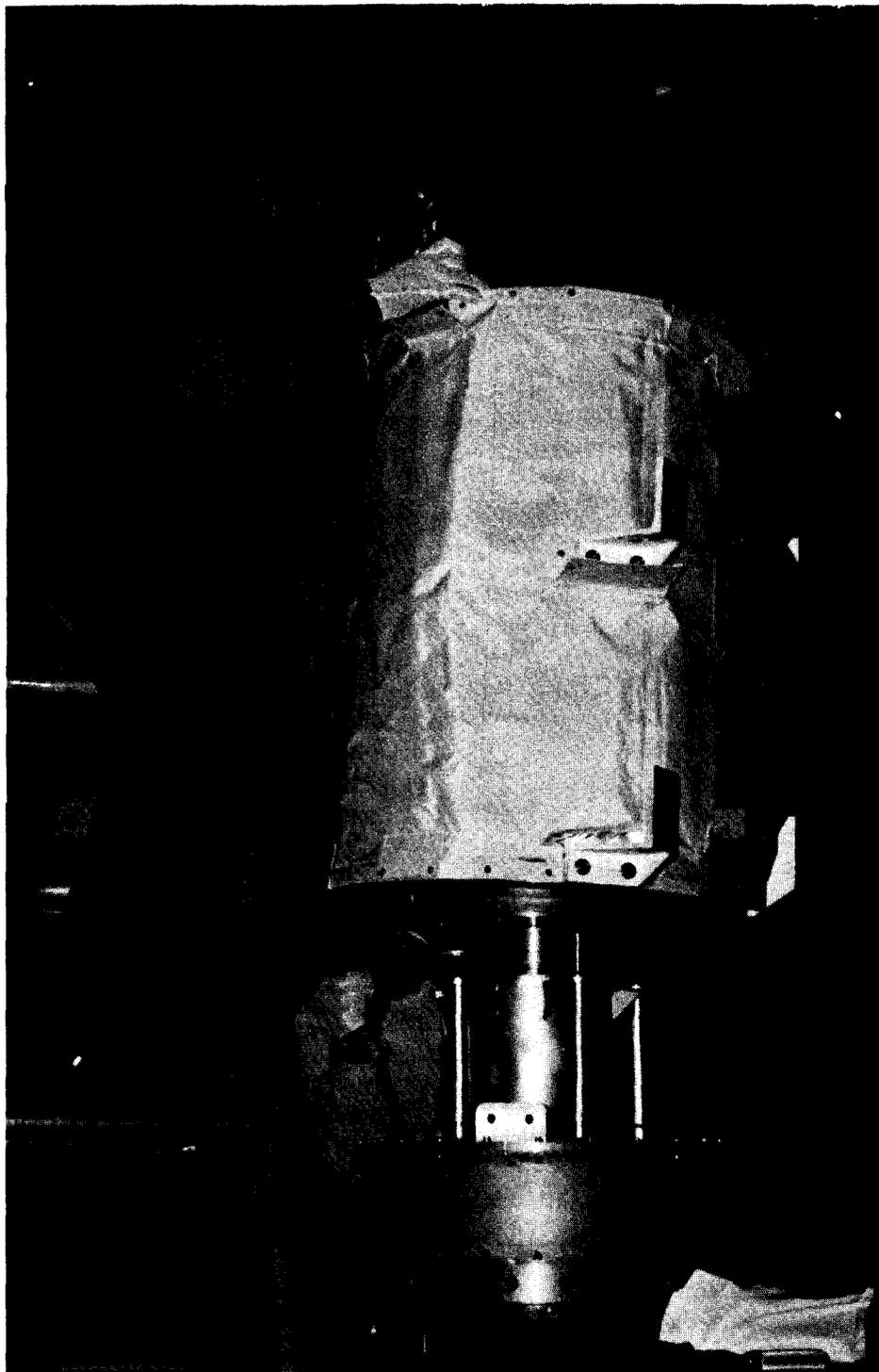


## *Four GAS payloads to fly on STS-8*



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

Story on page 2

## *STS-8 to test TDRS-1*

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

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

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

*Continued on page 6*

### *Inside*

*Goddard helps find oil*

*. . . page 2*

*Wallops launch . . . page 3*

*Telstar 3A launched*

*. . . page 3*

## STS-8 to carry four GAS payloads

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

The experiments are:

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

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

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

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

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

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

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

The STS-6 mission had three GAS payloads: the Asahi Shimbun snow crystal experiment, which failed due to unexpectedly low temperatures; a series of six experiments by cadets from the U.S. Air Force Academy; and an experi-

ment with flower, herb, and vegetable seeds by the George W. Park Seed Co., Inc., of Greenwood, South Carolina.

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

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

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

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

The STS-8 flight is particularly well

*Continued on page 4*

## Goddard aids in major oil find

by H.W. Blodget  
(GSFC Geologist)

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

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

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

*Continued on next page*

## Oil find

*Continued from page 2*

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

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

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

1979 and again at the more widely attended American Society of Photogrammetry Annual Meeting of February 1981 in Washington, DC.

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

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

*Continued next page*

## Telstar 3A launched atop Delta 171

*37th consecutive successful Delta launch*

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

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

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

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

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

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

## Wallops conducts chemical cloud experiments

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

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

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

## GAS payloads

*Continued from page two*

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

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

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

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

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

For the STS-8 mission, engineers have increased the power of the heaters three-fold. They suspect that the weightlessness in space resulted in no convection current in the cold chamber, causing the water vapor supplied from the water

tanks not to be transported efficiently to the fields of view of the TV cameras.

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

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

The CMP contains four temperature-controlled quartz crystal microbalances

(TQCM) as its only sensors. One TQCM will be left uncoated for reference. The uncoated TQCM, along with one coated with carbon and one coated with osmium, will face out of the cargo bay, and a fourth one, coated with carbon, will face aft.

## Oil find

*Continued from page 3*

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

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

## STS-8 patch



# PEOPLE

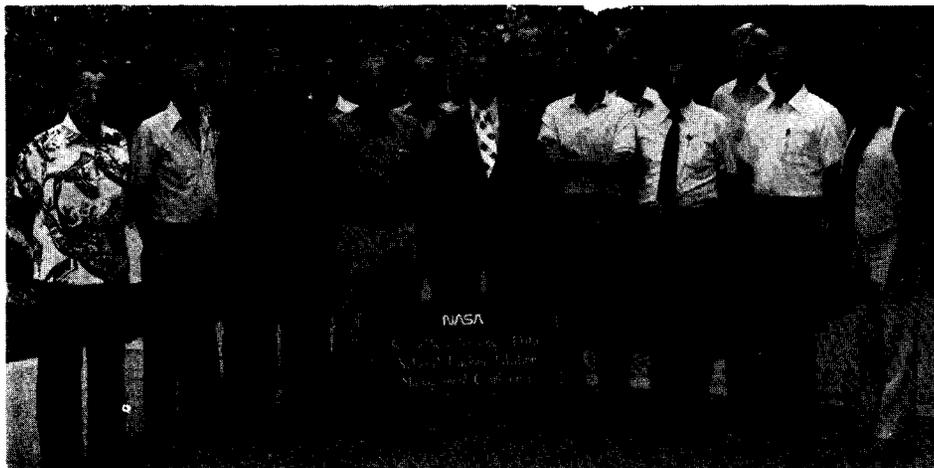


**MERIT SCHOLARSHIP RECIPIENT** – Timothy A. Voss (second from left) receives his National Merit Scholarship from Donald E. Smith (left), vice president and director of Spaceflight Tracking and Data Network (STDN) programs, Bendix Field Engineering Corporation (BFEC). Attending the presentation and dinner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

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

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

## Tracking Station Directors meet



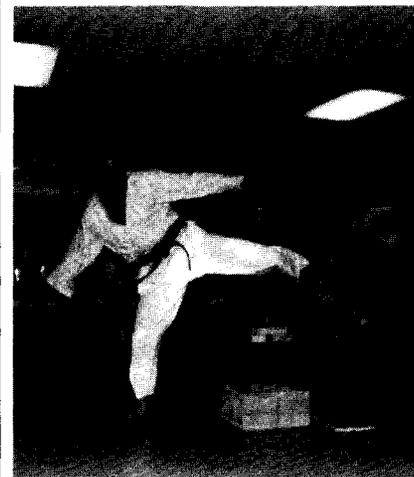
Joe Walters photo

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

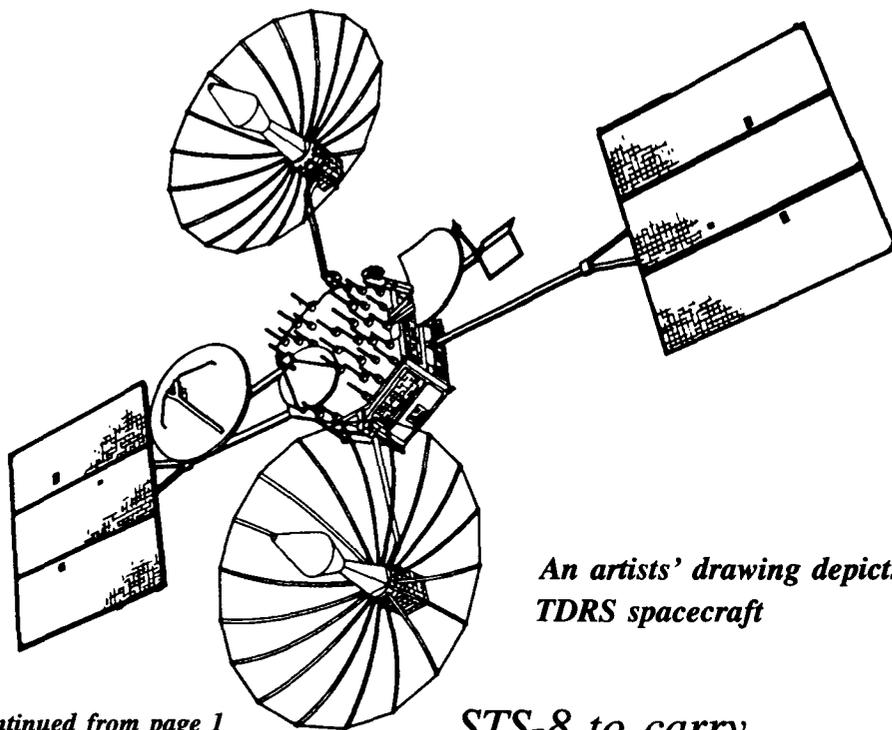
## Karate Club



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



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



*An artists' drawing depicts  
TDRS spacecraft*

*Continued from page 1*

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

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

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

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

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

## *STS-8 to carry Philatelic Covers*

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

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

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

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

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

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

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

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

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

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

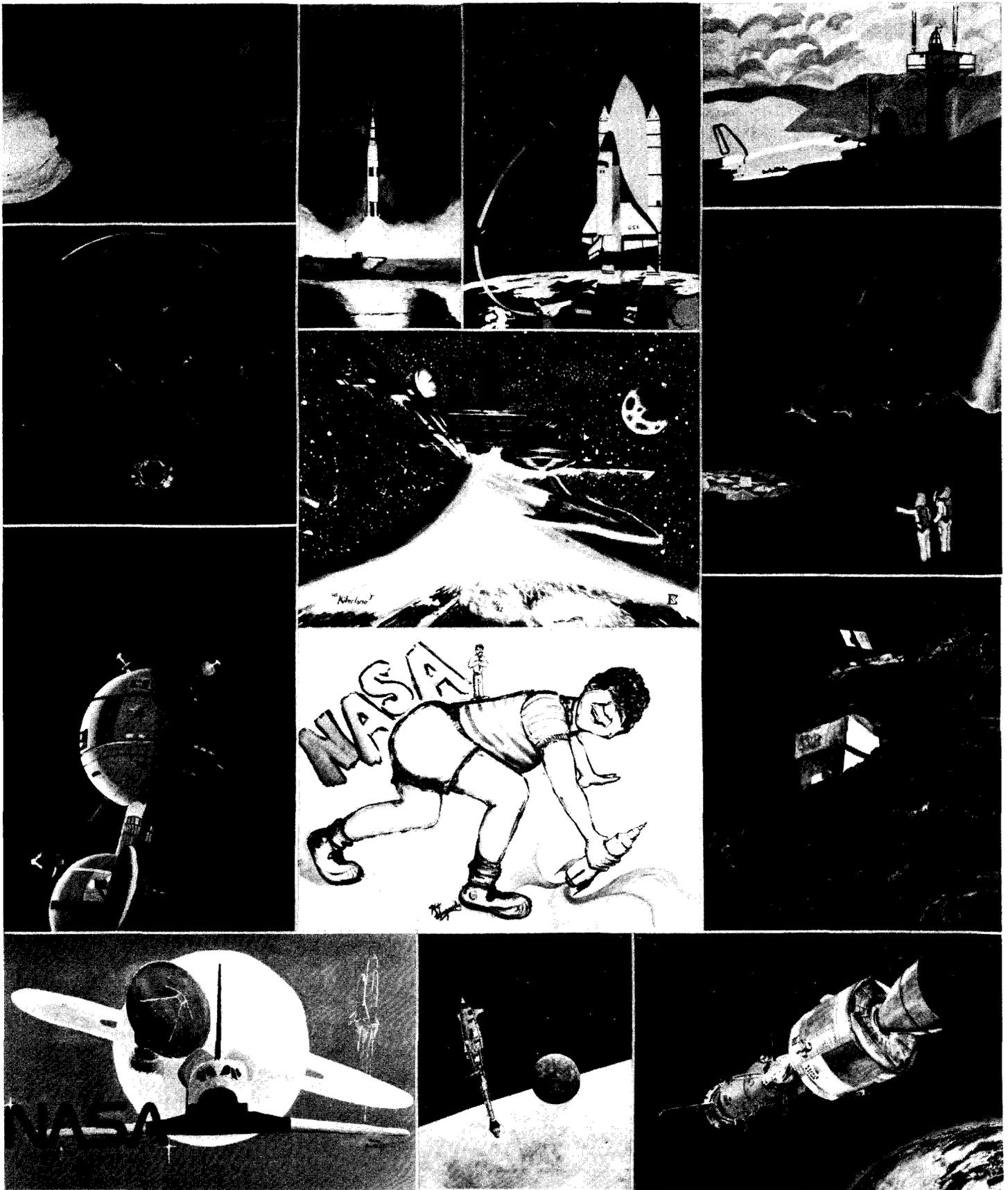
Although the covers have been specially packaged to withstand the rigors of space travel, some minor damage may occur. Some covers are extremely tightly bundled and then stacked in two large storage boxes. Other covers are in eight cylindrical containers that are sealed and then pressurized with pure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

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

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



**Mail your story to the  
Goddard News, Code 202,  
or call the Editor at  
344-8102**



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

## Safekeeping: the "Unhealthy Healthy Look"

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

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

The bare skin can, however, be protected from sunlight. Many suntan lotions and potions on the market are effective. There are two basic kinds: sunshades and sunscreens. While sunshades prevent sunburn,

they deter tanning - less light gets through. Sunscreens, on the other hand, filter the UV spectrum, partly absorbing rays causing sunburn and allowing longer-wavelength tanning UV rays to pass through. However, since not all of the sunburn effect is screened out, burning does eventually occur. The rule of thumb is that it takes twice as long to burn using sunscreens. Baby oil, cocoa butter, mineral oils, and coconut oil are completely ineffective as sunscreens.

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

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

## NASA awards Bendix \$29 million contract

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

Bendix began phasing in the software and engineering services August 1 and will assume total program responsibility October 1. Approximately 375 people will be employed to operate and maintain the control centers as well as provide support in documentation, logistics, software development and maintenance, systems

engineering, closed-circuit television and operation of the Goddard TV Production Studio, and mission planning and operations reliability.

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

**NASA**  
National Aeronautics and  
Space Administration  
Goddard Space Flight Center

# Goddard News

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

Editor: David W. Thomas  
Assistant Editor: Joni Frostbutter

