

A Good First Year for OAO Copernicus

The OAO-3 observatory, named Copernicus in honor of the famous Polish astronomer, completed its first year of orbital operations on August 21, and continues to send valuable data to Earth which is providing new information on the origin and evolution of the universe.

Launched from Cape Kennedy, Fla., August 21, 1972, the 2½-ton observatory, a record weight for unmanned satellites, is in a near circular orbit 460 miles (statute) high. Copernicus carries two experiments, a 32-inch Ultraviolet telescope provided by Princeton University and several X-Ray telescopes provided by University College, London.

Princeton University astronomers have made an indirect determination of the present density of the universe yielding a lower value than that proposed by some cosmologists. The Princeton finding implies that there is little undiscovered matter in the universe — that it might be as empty as current measurements indicate.

The crucial finding is based on a measurement of the relative abundance of deuterium, a heavy form of hydrogen with twice the weight of a normal hydrogen atom, in interstellar gas and assumes the validity of the “big bang” origin of the universe.

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Nimbus Aids Shipping

The Navy's Fleet Weather Facility (FWF) reports that satellite imagery provided by Goddard from NASA-developed weather satellites is becoming “indispensable” to shipping operations in the Arctic and Antarctic.

Navy weathermen predict that, as a result of satellite pictures showing the location of ice masses, shipping operations may be extended several months — perhaps ultimately through the whole six-month polar night.

FWF said the navigation season is already being extended a number of weeks during the polar darkness periods because of the cloud-piercing capabilities of the microwave sensors on NASA's Nimbus research and development satellite, now being used operationally by the fleet weather facility.

Lt. Commander William Dehn, Head of the FWF Sea Ice Department (Suitland), said: “Satellite imagery that sees the ice pack at both poles day and night and even through clouds with Nimbus-5's new microwave radiometers, has not only extended the navigation season, but has shown us more ice than we ever knew existed.”

FWF can now chart the entire continent of Antarctica in winter and through the almost constant cloud cover. The images show the continent's ice cover, its shape, and major sea ice features. Such a capability was impossible before the Nimbus 4 and 5 and NOAA-2 satellites were launched in 1970, 1971, and 1972, respectively, although previous weather satellites, during the 1960s were called “very helpful” to the FWF's operations. FWF supports international polar operations of many nations, including Japan, USSR, Brazil, Argentina, Chile, France, U.K., etc.

To point up the importance of keeping abreast of ice pack changes in winter, Commander Dehn cited an icy “hook” extending out from the east coast of Greenland which “we didn't know existed.”

(See Page 3 for this and other Nimbus Stories)

15 Years for NASA



HISTORY NOTE. It was 15 years ago, on August 19, 1958, that T. Keith Glennan (right) became NASA's first Administrator, moving from his post as President of Case Institute of Technology in Cleveland. At the White House, President Eisenhower swore in Glennan as Administrator and Hugh L. Dryden (left) as Deputy Administrator. NASA officially began operations a little later on October 1. During Glennan's two-year tenure, NASA grew from a nucleus of 7,966 employees, men and women who had worked for the National Advisory Committee for Aeronautics (NACA), to more than 16,000. But most importantly, the new agency established a solid base in space flight. Unmanned scientific satellites pioneered the exploration of space in regions near the Earth. Experimental communication and weather satellites were orbited. Glennan's administration continued NACA's work in aeronautics and rocket engine research, and put the new agency into the launch vehicle and space operations business.

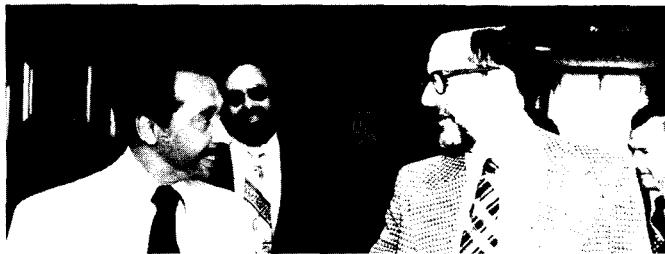
COPERNICUS. . . From Page 1

Deuterium is thought to have been created moments after the "big bang" which started the current expansion of the universe. Further, no way has yet been found in which additional deuterium can have been created in significant quantities in the subsequent evolution of the universe. Therefore, whatever deuterium is detected in interstellar space is a relic of the "big bang". Knowing what fraction of hydrogen became deuterium in the original primordial furnace, gives scientists a way of calculating how much matter was created in the "big bang" and thus the average density of material in the present universe.

Among the measurements made by the University College London experiment include observations of extended X-ray sources identified with rich clusters of galaxies such as those in the constellation of Perseus, Coma, Virgo and Centaurus. The nature of the X-ray emission is still unknown, but studies of the Perseus cluster enabled a soft source to be identified with the exploding Seyfert galaxy, NGC 1275. A localized region, less than three arc minutes in diameter is associated with this strange galaxy. It is probable that some enormous upheavals are taking place in its nucleus, and it is feasible that this is affecting the whole Perseus cluster of several thousand galaxies. The Virgo and Coma cluster observations suggest that X-rays originate in the most active galaxies of the cluster.

In addition to the scientific accomplishments of Copernicus has been the successful operation of an on-board computer called On-Board Processor (OBP). The computer, designed and built at Goddard, has an average instruction execution time of ten millionths of a second and is busy about one-fourth of the time. Thus the OBP since launch has been executing instructions at the rate of 250,000 per second and now after one year has executed over seven trillion instructions which is believed to be a record for space computers.

Congressman Mitchell Tour



CONGRESSMAN Parren Mitchell (left), of the Seventh District of the City of Baltimore, is greeted by Donald Hearth, Goddard Deputy Director, during a visit here on August 7. The visit was arranged by Dr. Robert Collagan (in back) and Dr. Nathaniel Proctor, participants in the GSFC/Morgan State College Summer Faculty Research Program, who are personal friends of the Congressman.



CONGRESSMAN MITCHELL'S day at Goddard included a stop in the Space and Earth Sciences Computer Center in Building 1 where he talked with, among others, Elmer Terry (left), Dr. Proctor (in back) and Kadena Martin, a work study student from Bowie State College. Other highlights of the day were a briefing by Charles Boyle, Head of the Special Programs Office; a discussion of civil rights, recruitment, EEO activities and minority business with Mr. Hearth, Mr. Boyle, Dr. Collagan, Dr. Proctor, and James Mundy, Equal Employment Opportunity and Contract Compliance Officer; a tour of the Spacecraft Exhibit Room, and discussions of tracking and data systems for Skylab and the ERTS Program.

Chris Kraft at Goddard



CHRISTOPHER COLUMBUS KRAFT (center), Director of the Johnson Space Center in Houston, Texas, chats with Fidel R. Rul (left), of the Network Operations Control Branch and Tecwyn Roberts, Director of Networks, during a visit to Goddard on August 10. Deputy Director Don Hearth was host for the day of briefings and meetings which included stops in the ERTS Control Center, IDAMS, a Shuttle Subsatellite meeting and presentation, visits to the Network control areas and a variety of other items.

House Wins 15-Year-Old Bet



CLARENCE HOUSE, winner of a 15-year-old bet, holds an electronic data processing package similar to a part of the micrometeorite experiment on Vanguard-3.

Fifteen years is a long time to wait to win a bet, but Clarence B. House of the Data Techniques Branch had to do just that.

Back in 1958, he and four other early members of the Goddard satellite experiments team decided to bet on the number of micrometeorites that would strike a yet-to-be launched Vanguard satellite. The men — Mr. House, Herman E. LaGow, Robert A. Stroup, John Townsend, and Robert W. Rochelle — placed their predictions and 50¢ bets in a sealed

envelope which was given to Dr. Rochelle to hold.

Eventually, Vanguard-3 was launched on September 18, 1959 and fulfilled its objectives before it ceased operating on December 11 of the same year. Herman LaGow, the cognizant scientist, reduced the micrometeorite data, but the envelope, half forgotten, languished in a safe until Dr. Rochelle decided to retire this June.

At Dr. Rochelle's retirement party on June 28, the envelope was finally opened and Clarence House declared the winner of the silver certificates it contained. His prediction of 141 micrometeorite hits per week was closest to the actual 302.4 hits per week recorded in the Vanguard-3 data.

Herman LaGow, who is now Director of Systems Reliability, had predicted 1800 hits; Bob Stroup, now Assistant OAO Project Manager, predicted 100 hits, Dr. Rochelle, who retired as Associate Chief of the Communications and Navigation Division, predicted 17 hits, and Dr. Townsend, who was for years Goddard Deputy Director and is now at NOAA, predicted 1 hit.

Vanguard-3, the only Vanguard satellite launched by Goddard, was the last in the Vanguard series. The 50-pound satellite carried a Naval Research Laboratory Lyman Alpha Solar radiation experiment, and three experiments developed by Goddard personnel to measure magnetic fields, satellite temperatures, and micrometeoroid impacts.

NIMBUS. . .From Page 1

Operationally he said Nimbus-5 was "extremely useful" late last winter when the Coast Guard icebreaker "Glacier" was given current and expected ice condition messages from FWF, based on the cloud-cutting spacecraft's imagery.

The Glacier was weathered in with a 10-day cloud cover in the Weddel Sea of Antarctica while conducting operations in the ice pack. The ship relied on the Nimbus 5 to determine ice boundaries of the large pack ice, light concentrations of sea ice, the locations of icebergs and other major ice formations, and when the ship could expect to enter ice-free areas of open water. This enabled the Glacier to proceed with a great deal of confidence, according to the FWF.

Nimbus-5 Imagery Shows Changes in Polar Ice

Scientists at Goddard, after studying the first total pictures of the polar ice caps, based on satellite imagery, have concluded that world atlases are far from accurate in delineating the outer boundaries of the caps.

Dr. Per Gloersen, Goddard Co-Investigator for the Nimbus E and F ESMRS, in speaking of the pictures received via a remote sensing device, a scanning microwave radiometer, on board NASA's Nimbus-5 weather satellite, said:

"The pack lines at both poles are not smooth around the ice edge as shown in world atlases, but consist of many indentations. For example, if you were to use a standard atlas of either pole to sail a ship into the area, you probably would be surprised to find you could also sail into a cove or channel extending into the ice pack itself. A Nimbus-5 picture would have shown where such a cove is located."

The satellite pictures can show daily changes if necessary, since the radiometers "see" through the clouds that usually obscure the poles. There is a day-to-day need by shipping industry for such ice cap pictures, and polar expeditions, as well as the Navy, find the Nimbus pictures a great help. Nimbus imagery is being furnished to the Navy's Fleet Weather Facility (FWF), Suitland, Md., which uses it on an operational basis. FWF supports international arctic and antarctic shipping.

A series of these synoptic photos show clearly that the polar regions undergo large scale changes in short time periods. In particular, the boundaries between the multiyear ice pack centered around the North Pole and the large areas of the first-year ice are found to vary significantly within one freezing season. Even greater changes in the ice coverage occur around Antarctica.

Nimbus-5 was launched by NASA on board a Delta launch vehicle last December from the Western Test Range, Lompoc, Calif.

Ziemer Named Associate Deputy Director for Engineering

Robert R. Ziemer has been named Associate Deputy Director for Engineering, replacing Daniel G. Mazur who retired at the end of June. In this capacity, Mr. Ziemer helps in the identification and resolution of technical engineering and engineering management problems throughout the Center and assists in the development and implementation of engineering systems, techniques and applications methods.



Before assuming his new position, Mr. Ziemer was Deputy Director of Projects, a post in which he earned a NASA Exceptional Service Medal in 1972. At one time, he was Project Manager of Goddard's Orbiting Astronomical Observatory (OAO).

Mr. Ziemer transferred to NASA in December of 1959 from the National Advisory Committee for Aeronautics at the Lewis Research Center where his posts included that of project engineer for the Space Vehicle Systems Panel and the Advanced Engines Panel.

He was born in Lincoln, Nebraska and attended high school in Oskaloosa, Iowa. He received his BSME degree from Iowa State University at Ames in 1944.

He and his wife Erma have two grown children, Linda and Robert.

Goddard Mourns. . .

C. Leland Parsons died July 3 after an extended illness. He had retired on June 29 after 11 years as Head of the Magnetic Test Section. He was recognized internationally as an authority on magnetic measurements and magnetic testing.

Robert H. Stewart of the Mechanical Maintenance Branch died suddenly on August 10. He was Climatic Control Foreman of his branch's Refrigeration and Airconditioning Department. Since coming here early in 1960, he had a hand in the design, construction and maintenance of most of Goddard's test chambers.

Harry Burton, 53, an aerospace engineer in the Theoretical Studies Branch, died August 28 following a heart attack. An employee of NASA for over ten years, he came here from the David Taylor Model Basin in Carderock, Maryland where he worked in the aeronautics division.

Weather Satellite Maps Rainfall Over Oceans

NASA's newest weather satellite is filling a critical gap in man's understanding of his environment by measuring daily the distribution of rainfall over the oceans that cover 75 per cent of Earth's surface.

Measurements of water vapor which evaporates from the oceans, changes again to water, and falls back to the surface are made by an Electrically Scanning Microwave Radiometer (ESMR) carried by Nimbus-5.

Until now weathermen have had no adequate way to monitor ocean rainfall on a global scale.

Knowledge of its extent and rate, according to meteorologist John Theon, Goddard's Nimbus-5 Project Scientist, can "give us a

good handle on how much energy (heat) is being released into the atmosphere."

In turn, he said, knowing rainfall rate and the amount of heat thus released will aid immensely in reaching the goal of long-range weather forecasts as well as improving short-term forecasts of severe phenomena such as hurricanes.

The intensity of a storm or even whether there will be one, may be related to the amount of energy released in the area by the process which causes rainfall. Knowing both of these factors may give the weather forecaster the knowledge he needs to understand a tropical storm or hurricane and even predict its short term (24-48 hours) intensity.

Goddard's CPL Aids Programmers

"Please don't re-invent the wheel," is the unofficial motto of Goddard's Computer Program Library. Located in Room 133 of Building 3, the library is a working collection of programs, and their related documentation, generated by Goddard employees and contractors. Its primary goal is to minimize costs and reduce development time through maximum utilization of existing computer software.

Checking with the library to see what has already been done is a logical first step in writing new computer programs, and most new programs should be registered with the library when completed. A computer-generated catalog containing abstracts of all programs registered with the library is printed periodically. A copy of this catalog, which lists over 1500 active programs, is available for viewing in the program library, and interested individuals can be placed on the distribution list by calling extension 2186.

In addition to Goddard originated programs, the library is a contact point for outside sources of software. These off-site sources include the NASA ADP Resources Sharing System (NARSS), the Computer Software and Management Information Center (COSMIC), SHARE (IBM users group handled by COSMIC), and the Univac Science Exchange (USE). Materials are available from these sources without charge to authorized requesters.

Goddard's Computer Program Library is a part of the Mission Operations Computing Center under the direction of Computing Center Chief Chesley H. Looney and Section Head Herbert Farnham. Mrs. Pat Barnes, the librarian since 1962, is assisted by Computer Sciences Technicolor Associates personnel under the direction of Larry Galola.

The overall operation of the program library can be divided into four basic phases—program registration, receiving program materials, abstracting the program, and retrieval of the program for interested users.

The CPL registers new programs when the programming effort is begun or after the program is complete and all necessary materials have been submitted to the library. Registration is required for all significant programs run on general purpose (category A) equipment. These include all IBM 360 computers, the 1400 and 7000 series of IBM computers, the SD-4060, and the Univac 1108.

When materials are received, an abstract of the program is written for inclusion in the *Catalog of the GSFC Computer Program Library*. Programs are cross-indexed according to key-words, subjects, program name and program number. Before new programming efforts are started, responsible individuals should check the catalog since existing programs can often satisfy new requirements.



CPL LIBRARIAN Pat Barnes discusses a new computer program with Charles Cosner of the Operations Computing Support Branch. Library users often find that existing programs can be used for new problems, and save time and money in the process.



LARRY GALOLA is CPL Supervisor for the Computer Sciences Technicolor Associates (CSTA).

If a suitable program is found, the CPL will furnish the requester with everything available in the form of decks or tapes, listings, and documentation. Most Goddard programs have documentation on microfiche which may be viewed in the library, Room 133 of Building 3. Requesters may retain a copy of the microfiche if documentation only is desired.

To illustrate the savings potential of the library, users of Program D00138-NAP3 have reported savings of \$70,000. In Fiscal Year 1972, program requestors reported savings of \$200,000 and six months through the use of existing software obtained from the library.

Additional information on the library may be had by contacting Mrs. Barnes on extension 6796.

Programmers are reminded that all new programs registered with the library are eligible for consideration by COSMIC. For further information on this, contact Sidney Alterescu of Goddard's Technology Utilization Office on extension 6242.

SCIENTIFIC COLLOQUIA

Nobel laureate Hannes Alfvén of the University of California at San Diego will initiate the 1973 Fall Series of the Goddard Scientific Colloquia on Friday, September 21, at 4 p.m. in the Building 3 Auditorium. A native of Sweden and a specialist in plasma physics, Professor Alfvén has long pursued an interest in asteroids and other objects whose study might contribute to our knowledge of the origin of the solar system.

The first month of the 1973 program follows:

- September 21 — Hannes Alfvén
Department of Applied Physics and Information
Science
University of California at San Diego
La Jolla, California
SPACE RESEARCH AND THE ORIGIN OF THE
SOLAR SYSTEM
- September 28 — Patrick Thaddeus
Goddard Institute for Space Studies
New York, New York
INTERSTELLAR MOLECULES AND THE
FORMATION OF STARS
- October 5 — Norman F. Ramsey
Department of Physics
Harvard University
Cambridge, Massachusetts
SPIN TEMPERATURES AND NEGATIVE
ABSOLUTE TEMPERATURES
- October 12 — Estelle R. Ramey
Department of Physiology
Georgetown University School of Medicine
Washington, D.C.
THE HORMONAL BASIS FOR SEX
DIFFERENTIATION IN HUMANS

Goddard's Biomedical Research Program in Fifth Year

Ten undergraduate college students working here this summer have applied space age technology to some common medical problems and come up with answers that may find practical uses in hospitals in the near future.

The students were taking part in Goddard's fifth Summer Institute for Biomedical Engineering. The ten-week program, sponsored jointly by Goddard and Howard University, was coordinated by Wayne Chen of Goddard's Technology Utilization Office and Dr. Eugene DeLoatch of Howard University.

Working in teams of two members each, the students tackled problems in five research areas. These were the development of filters to prevent leaking of excess anesthetic gases into the operating room, the demonstration of an automatic display for a complex ECG system, the design of a scale that can be used to weigh premature babies inside hospital isolettes, the development of a testing device that can differentiate profoundly deaf people who feel sounds and those who have some hearing, and a study of the effects of torsional forces on the tibia.

Perhaps the most successful project in this year's institute was conducted by Marc Jacobs, a mechanical engineering student from Lehigh University, and Eve Higginbotham, a chemical engineering student from MIT. Their project was a follow-on to research started during the 1972 Institute to aid in the environmental control of operating rooms during surgery. While patients are under anesthetic, and in the recovery room, medical personnel are often exposed to small quantities of anesthetic gases. Over long periods, these may prove harmful.

To help solve this problem, Mr. Jacobs and Miss Higginbotham spent their summer using gas chromatography to study the absorptivity characteristics of various charcoal-aluminum oxide filters for hospital anesthetic equipment. A future system using their filter may prevent the leakage of anesthetic gases such as halothanes into the operating room.

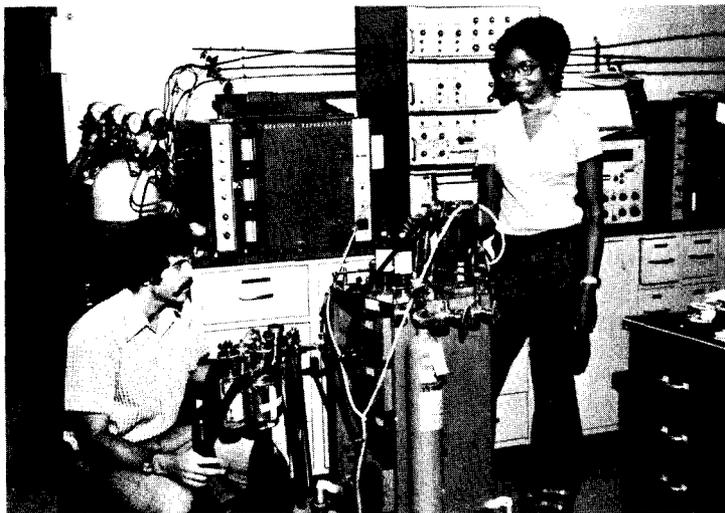
During each beat of the human heart, measurable electric potentials appear at all points of the body surface. An electrocardiographic (ECG) reading of this "surface potential map" that uses 42 points instead of the present 9 points being employed in standard ECG readings would be equivalent to complete exploration and greatly aid in the detection of heart disease. Electrical engineering majors John Sharp, of Wichita State University, and William Jones, of Purdue University, took a step toward obtaining such complex readings by developing a system that might be used to display ECG data taken by electrodes at 42 body points.

William Griffin, a computer systems student at the National Technical Institute for the Deaf at Rochester, and Robert Peterka, a biomedical engineering student at Rose Humman University, used strain gauges, common space age tools for measuring stress in metals, as an approach to the problem of weighing premature infants without removing them from the carefully controlled environment of the hospital isolette. Present weighing procedures often involve risks to the infants.

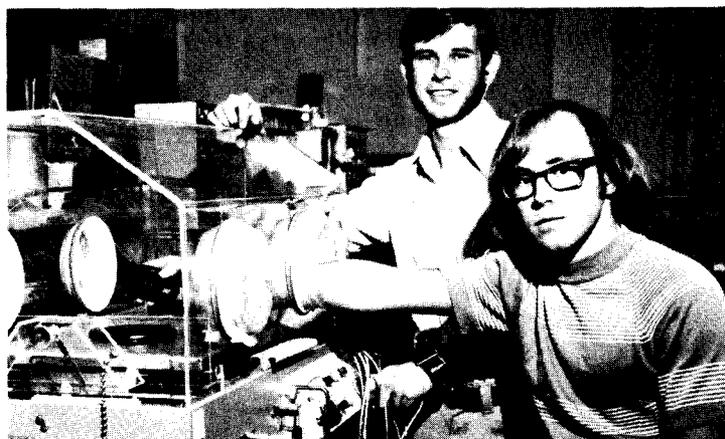
Audiologists who are responsible for testing profoundly deaf persons, especially small children, often have trouble telling which of their patients hear some sounds and which feel sounds. Rodney Creecy, an electrical engineering student at Cornell University, and Ronald Bechtel, a biology major from Gallaudet College, have been using "speech modulated white noise" to help develop a testing device to solve this problem. Their device would use recordings of white noise that differ only in respect to spectral characteristics. If a patient being tested responds to changes in the spectral aspects of the signal, he is responding to sound rather than feeling vibrations.

Juan Cantu, a physical science major at Pan American University, and Coleen Madigan, a biology major at the University of Houston, studied the effects of torsional forces on the tibia. Their goal was to

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REDUCING THE AMOUNTS of anesthetic gases leaked into the operating environment during surgery was the research problem for Marc Jacobs and Eve Higginbotham. They spent their summer developing and testing a charcoal-aluminum oxide filter for anesthetic machines to reduce the amount of excess gases breathed by medical personnel.



WILLIAM GRIFFIN (left) and Robert Peterka spent their ten-weeks at Goddard studying ways to weigh premature babies without removing them from the protective environment of the hospital isolette.



THE RESEARCH PROJECT of Juan Cantu and Coleen Madigan was to analyze devices for detecting and correcting torsional stress of the tibia.

Summer Work Experie

Prince George's County Schools' Vocational Development Program

Nineteen students who will be juniors and seniors at DuVal, Bowie and Largo High Schools this fall worked twenty-five hours per week at Goddard this summer from June 25 through August 3. Each student was specially assigned to a work station in keeping with the students' interest and skill level. Their jobs included food service, computer operations, general art illustration, nursing and medical technology, welding, library technology, supplies and property handling, clerical, auto mechanics, painting, safety technology, carpentry, plumbing, electronics and audio visual support.

The students were paid by funds provided in the Neighborhood Youth Corps programs. The NYC also provided a teacher coordinator, Richard Sonnleitner, at Goddard to work with Goddard supervisors to achieve maximum educational value for the students from the work experience. Areas at Goddard cooperating in the program by providing job placements were: Szabo Food Service; Sounding Rocket Division; Technical Information Division; Health Unit; Management Services and Supply Division; Plant Operations and Maintenance Division; Health and Safety Engineering Office; Mission Operations Division; and the Financial Management Division.

Nine of the students also participated in a remedial reading program at Goddard for two hours each morning. This was through a special arrangement of the county school system and the University of Maryland.



STUDENT PARTICIPANTS in the Prince George's County Schools' Vocational Development Program sponsored by the Neighborhood Youth Corps shown from left (back row) are John Lester, James Stillwell, Richard Sonnleitner, Jice Zimmerman, John Murphy, Lawrence Woodson, Kurt Johnson, Vineca Beard, Peggy Chapman, David Weldrick. In the second row are Lawrence Scrivner, Greg Vaughan, Harry Dakis, James Laios, Ann Peltier, Patricia Clark, Sherri Walker; front row—Michael Burton, Rose Knicely, Linda Hay.



PATRICIA CLARK is shown here measuring the blood pressure of Richard Sonnleitner, Neighborhood Youth Corps Coordinator for the Goddard program, under the supervision of Health Unit Nurse Susanne Schmidt. Nurse Marilyn Fowler who coordinated Patricia's summer work experience reports that Patricia assisted the nurses in filing records, measuring blood pressure, body temperature and a few simpler lab procedures such as urinalysis and blood cell counts.



JOHN LESTER worked with Ed Fortman in the Paint Shop. Here Mr. Fortman is giving pointers on the art of wood graining. Lester sanded a lot, stained wood, cleaned up equipment and began actual spray painting. He also showed talent in wood graining.



TOM DIXON, Presentation Section of the Graphic Arts Branch, explains the intricacies of the Building 8 Auditorium control panel to Larry Woodson, a Bowie High School student. Mr. Dixon found Larry to have high mechanical aptitude and indicated that he learned to operate the major projection equipment in all three Goddard auditoriums.



GENE BISHOFF is shown here with his student worker, Rose Knicely, who really solved an office problem in the Property and Supply Branch this summer. Rose singlehandedly eliminated a large backlog of paperwork by listing and filing retired purchase orders. This was an arduous task, but Rose apparently kept her smile throughout the summer.



THEN THERE WAS GRADUATION. Dick Crone (left), coordinator of the program for Goddard's Educational Programs Office, and Richard Sonnleitner, program coordinator for the Neighborhood Youth Corps, presented each student with a certificate of training at the graduation ceremonies, on August 3 in the Building 3 Auditorium. Present at the affair were the division chiefs, branch heads and the Goddard work experience supervisors from the various areas participating in the program. The students also received a photograph taken at their work location in addition to the certificate of training.

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Montgomery County Program for the Visually Handicapped

The Montgomery County School system has a program aimed at keeping blind and other visually handicapped high school students in regular classes in the public school system. During the summer, many of these students are given the opportunity to sample work experiences in government agencies or private businesses.

On the invitation of the Educational Programs Office, two students, Holly Hunt and Jenny Etowski, spent five afternoons at Goddard. The following is the story of their experience, written in the third person in their own words.

A Week at Goddard

By Holly Hunt and Jenny Etowski

This summer, two students from the Montgomery County Summer School for the Visually Handicapped came to Goddard for a week's work experience. They worked with Nancy Mengel of the *Goddard News*.

One of the students, Holly Hunt, has taken part in the program for two consecutive years. This fall she will be a junior at Charles W. Woodward High School. This is her second experience at Goddard.

The other student, Jenny Etowski, was here at Goddard for the first time. She will be a senior at Lake Clifton High School in Baltimore City.

While at Goddard, the girls were taken on a tour of the satellite exhibits by Locke Stuart of the Special Programs Office. They were impressed by the many varied types, sizes and uses of satellites from the small simple ones of the beginning, to the large complex ones of today. They visited Operations Control and heard actual communications between Skylab and the ground.

On Wednesday of their five day stay, they interviewed Kathy Williams, a partially sighted employee in the Personnel Services Branch who gave them many insights into her career. Both students were interested in how, although Ms. Williams is handicapped, she is able to carry on the same duties as a normal person.

The next day they talked with Adelaide Del Frate, Goddard's Librarian. She gave them many sound and practical suggestions about careers. Jenny Etowski was very interested in the many different types of equipment in the library.

One of Ms. Del Frate's suggestions which could apply to anyone was to "use your memory to save your sight."



JENNY ETOWSKI and Adelaide Del Frate discuss library careers.



HOLLY HUNT Brailles her story for the *Goddard News*.

BIOMEDICAL. . .From Page 5



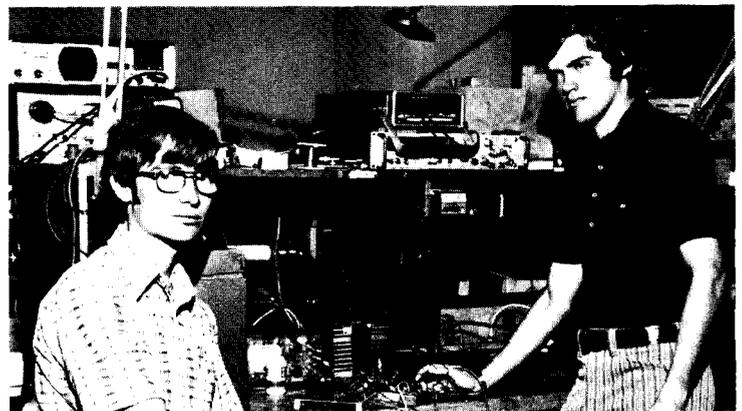
SOME PROFOUNDLY DEAF PEOPLE feel rather than hear sounds. The research project of Rodney Creecy (left) and Ronald Betchtel was to develop a testing device that can differentiate those who detect sound through feeling vibrations and those who have some hearing ability.

determine just what happens to a bone when a corrective brace is used, and how to accurately measure the changes that occur.

The final presentation of results from the 1973 institute took place in Building 26 on August 16. Betty Butler of the National Technical Institute for the Deaf interpreted the presentations of deaf students William Griffin and Ronald Bechtel, who gave their talks in sign language.

Goddard Technical Advisors for the research projects were: Warner Miller and John Yagalowich of the Earth Observations Systems and Systems Engineering Division, Leonard Kleinberg of the Communications and Navigation Division, Frederick Gross and Lawrence Kobren of the Engineering Physics Division, and Roland Van Allen, Head of the Data Techniques Branch.

At the close of their ten-weeks at Goddard, the biomedical students presented "Good Guy" Awards to men at Goddard who helped them design and test the equipment used in their research. Awards went to Maurice Levinsohn, Leon Fontaine, Edmund Smigocki, Burton Kelbaugh, Clifton Owens, William Peed, Frank DeMarco, Frank Purvis, Henry Ernst, Elijah Tankisley, Andrew Harris, Charles L. Davis, and James Mumford, all of the Experimental Fabrication and Engineering Division. Good Guy Awards also went to Philip Robling, Alan Hoffmaster, Brian Keegan, Donald Righter, Joseph Novello, Joe Colony, Carl Haegner, Joe Green, Duane K. McDermond and David Hepler.



JOHN SHARP (left) and William Jones check their method for rapidly displaying data from electrocardiographic (ECG) electrodes used at various points of the body to measure changes in electrical potential during heart beat. Potentially, their system can be expanded to simultaneously display data from electrodes at 42 body points to help doctors in the rapid detection of heart disease.

Summer CS Employees Find More Than Just a Job

According to Samuel W. Keller, Director of Administration and Management, the Summer Civil Service Program is designed to be "something more than a way to earn a few extra dollars in the summer." On July 6, Mr. Keller officially welcomed the program's participants and explained, "Because of Goddard's constant need to find people who like to do the kind of work we do, the program provides an opportunity for us to get to know each other. It gives us a chance to look at you and gives you a chance to look at us."

Ms. Shirley Beagle, Summer Civil Service coordinator agrees and made sure that this year's 74 employees would get a chance to look at the Center by providing them with opportunities for exposure to a variety of Goddard's activities. The opportunities began with Mr. Keller's welcome and William O'Leary's slide and lecture overview of Goddard's history. During the weeks that followed, a special reception with the Center's Director Dr. John F. Clark, a visit to the Planetarium, a tour of the Center, and a series of lectures were made available to the program participants. In the course of the lecture series, Charles Boyle discussed the wide-ranging impacts which the space program has had on mankind, Albert Rango reviewed the importance of the work done by the ERTS-1 spacecraft, and Locke Stuart explained how NASA satellites helped oceanographer Jacques Cousteau when the explorer's ship was damaged by an ice block off Antarctica. In addition John Thole gave an enlightening talk concerning project management and Mrs. Alberta Moran held a meeting for the clerk-typists in the group where she covered NASA's accepted correspondence procedures.

This year's Summer Civil Service Program included workers who ranged in background from recent high school graduates, to college students, to university faculty members. The photos accompanying this story illustrate the wide variety of projects to which they were assigned.

The Summer Civil Service Program was set up to advance Goddard's work while providing meaningful employment for the participants and acquainting them with the activities of the Center. Judging by the duties performed by the summer workers and their other on-Center activities, it is obvious that the program has gone a long way toward accomplishing its goals.



FOLLOWING UP WORK begun last summer as a SIPA student, Sherry Brown spent the past two months writing a history of Goddard's Child Development Center for distribution to other government agencies. Pictured above, she is discussing the facilities' progress with Steve Catoe, another summer worker here. According to Sherry, the history is particularly important since several agencies have tried and failed at setting up child care programs without Federal funding while the one at Goddard has been a success.



AS A MATH AID in the Engineering Physics Division, Olga Penney spent part of her summer programming a computer so that it would correlate the division's budget with man-hours available. Olga, too, is not new to the Center. During the last school year she worked here for one of the Center's contractors.



BRUCE EDELSTON, an Engineering Assistant in the Delta Project Office, used schematic diagrams of circuits as he tried to construct a logical sequence covering a launch vehicle from T minus 60 minutes until the time when its payload is in orbit.



DOROTHY MASTIN, a "veteran" summer clerk-typist at Goddard, worked in the Security Branch last year. This year, the University of Maryland Speech Communications major found herself in the Management Services and Supply Division office helping with typing, filing, and other secretarial tasks.



COLLECTING AND ANALYZING statistical data for use by upper management was part of Allen Webber's summer job at the Center. Assigned to the Administration and Management Directorate, he worked with information in such areas as funding, budgeting, and manpower-on-board.

Summer Civil Servants

- | | | |
|-------------------|------------------|---------------------|
| Edwin Alford | Sarah Hall | Mary Jane Pasquella |
| Michael Anderson | Michael Hartman | Olga Penney |
| Rita Aukward | Stanley Hilinski | Denise Pierrot |
| Barbara Baluch | Richard Hubbard | Rebecca Ragusa |
| Millard Baublitz | Brian Humphrey | Murray Raines |
| Robert Braunstein | Clarissa Inman | Leo Rameck |
| Sherry Brown | Ronald Isaacs | John Rhee |
| David Burton | Paul Jones | Michael Rindler |
| Deborah Carl | Sarah Keegan | Judith Rinearson |
| Diane Chesnutis | David Klein | Harriet Rosenthal |
| Ernest Chesnutis | Sandra Kulansky | David Rubincam |
| John Christian | Joseph LaMonte | Richard Seiden |
| Randy Clark | Mary Ann Lorey | Judith Shapiro |
| Edward Criscuolo | Bonnie Malkin | Janet Shaughnessy |
| Jerrold Davis | Lynette Malkin | David Solomon |
| Norman Delameter | Diane Malos | Karen Stevens |
| Sandra Derting | Dorothy Mastin | Earl Stromberg |
| Marc Donvito | George May | Karen Waldstreicher |
| Bruce Edelston | Patrick Melody | David Wall |
| Larry Einbinder | David Moberly | Allen Webber |
| Richard Fahey | Lee Nackman | Lynn Weller |
| Lynne Fellman | Michael Normile | Laurey Williams |
| Kathleen Gemmel | Robert Norris | George Whitmore |
| Patricia Gillooly | Gary Oswald | Gary Wolens |
| Cynthia Gross | | Evelyn Zeller |

Goddard Team Wins 1973 Federal Trap League Shoot

The Goddard Trap and Skeet Club came out on top during a tournament of the newly formed Federal Trap League held two nights a month from June 13 to August 22 at the Goddard/Fort Meade Trap and Skeet Range. Five teams representing Goddard, the U.S. Army and the Department of Agriculture were entered. Each team consisted of five members plus a substitute.

During the six nights of the shoot, contestants fired at over 15,000 clay birds.

Goddard's winning team members were Louis Caudill, team captain; Paul Spadin; Wes Willard; Don Ketterer; Timothy and Walter Carrion. The team received the league trophy for 1973 and each member received an individual trophy. The team trophy must be

won three times by the same federal agency before it can be kept permanently.

The trophy for the highest average individual shooter went to Carl Stauber of the Department of Agriculture. Two other shooters received patches for breaking 25 straight birds without a miss.

The Goddard Trap and Skeet Club is now forming teams to shoot in the Federal Skeet League. In addition, the club is preparing for the 1973 Fall Trap Matches, NRA Qualification Program and a Teen-ager Trap Match.

For information on the club, call Walter Carrion on extension 4942, Louis Caudill on extension 5611, Mike Feldman on extension 6077, or Paul Spadin on extension 5611.

New GEWA Store



LAURA JAMES, GEWA'S storekeeper, handles customer requests in the new store headquarters that opened early in August. GEWA store services range from discount photo processing to bargains in electrical appliances and catalog items. Mrs. James is happy to announce that the store has, or will have, for sale stockings, umbrellas, greeting cards, wrapping paper, candies and space jewelry — all in time for the fall and winter holidays.



GEWA'S BARGAIN BARN in Building 98 behind the Building 1 parking lot looks like this from the road. Customers are asked to use the store entrance on the other side of the building. Hours are work days from 9:00 a.m. to 1:00 p.m. and 1:30 to 3:00. The store is closed from 1:00 to 1:30 for lunch.



BROWSING IS INVITED through the store's many catalogs and travel brochures. Novelty items on sale include the fancy candles at left. The store is just one of the many activities of the Goddard Employees Welfare Association on Center.

Women's Club News

An "Open House" on September 12 marked the beginning of a new year of activities for the Goddard Women's Club. The affair was held to welcome new and old members alike.

The program for the evening was a short business meeting, a display of the various interest groups, and refreshments made by the Gourmet Group.

The Goddard Women's Club, in existence since 1961, was organized to provide an opportunity, for Goddard women and wives of personnel to get acquainted through various interests and social gatherings. The club meets at least once a month for a wide range of programs—both daytime and evening. Tentative plans for the coming year include a luncheon and shopping trip to Old Alexandria, holiday crafts, a Christmas dinner dance, and wine tasting.

If you wish to become a member of the club or want additional information, please call Linda Dickinson, 557-1378; or Mary Kay Gleason, 794-7905.

New Women's Club Officers

Office	Officer	Phone
President	Linda Dickinson	577-1378
Vice President	Mary Kay Gleason	794-7905
Treasurer	Myrtle Duck	249-7493
Secretary	Sally Harris	577-4531
Newsletter Editors	Brenda Cooley	345-1388
	Dorothy Davis	474-9125
Counselors	Robby Smith, Historian	464-0783
	Lois Slayton, Publicity	927-3531
Nominating Committee	Avis Van Allan, Chairman	577-2119
	Alicia Newman	577-8334
	Ann Nichols	776-6476
	Sue Endres	474-9206
	Pat Burdick	384-9223
Refreshments	Mary Ward	459-1946
Decorations	Sally Godfrey	577-5719
Membership	Sue Endres	474-9206
Hospitality	Karen Stephenson	345-4922

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CLIP AND SAVE

This is the fifth of a series of articles by Earl D. Ellis on plating, protective coatings and electrochemical processes available from Goddard's Experimental Engineering and Fabrication Division. For further information, Mr. Ellis can be reached on extension 4870.

Electroforming

Electroforming is a method of fabricating articles by electroplating a metal, such as nickel, copper, gold, etc., on a pattern or mandrel that is subsequently removed, leaving the electrodeposit intact.

Electroforming is employed for articles requiring close dimensional tolerances, thin walls, precise reproduction of surface detail, or when a configuration is such that mechanical forming or machining is impractical. Tolerances of less than one thousandths of an inch are easily maintained.

Depending upon the shape of the article, the pattern, or mandrel may be removed by pulling, prying, impacting, or by dissolving it chemically. In many cases the mandrel may be used many times.

Typical articles fabricated by G.S.F.C. by this method are nickel and copper reflectors, copper waveguides, gold spectrometer sample holders, copper needle valve bodies and various other specialized components.

Because electroforming is not a high production method, its use in commercial applications is limited. The ability of the method to accurately reproduce intricate surface detail is demonstrated by its use for molds for the production of phonograph records.

Large articles such as an 8000 pound wind tunnel section with 4 inch thick sections have been produced, but the process is better suited for small parts having wall a thickness between 0.0005 inch and 0.125 inch. Articles can be made of practically any metal that can be electroplated, but the most frequently used are nickel, copper, gold and silver.

Various types of electroforms and mandrels may be seen in the Electrochemical Processes Section. Anyone interested may contact Earl Ellis, Building 5, Room 25.

MAD Rehearses *South Pacific*



SOUTH PACIFIC is on the minds of the Production Staff for the fall dinner-theatre being presented in November by MAD Productions. Staff members shown here going over musical scores are (from left) Peggy Becker, Associate Producer; Gil Mead, Musical Director; Ginny Zanner, Director; Tom Cherrix, Orchestra; and Silvia Green, Executive Producer. Not shown are Gene Smith and Mike Jourden.

Rehearsals started in August for the Music and Drama (MAD) Productions presentation of "South Pacific," a story of the islands adopted from James A. Michner's novel *Tales of the South Pacific*.

Last year's performance of "Guys and Dolls" was so successful that the number of performances for this year's show have been extended to eight. The show will be held at the Goddard Recreation Center on November 2, 3, 5, 9, 10, 13, 16, and 17.

Again, as last year, MAD's fall show will be a dinner-theatre using a special three-sided stage set up at the Rec Center and featuring a buffet dinner, beer and set-ups. All phases of the production, from ticket sales to performances, are being handled by participants from all Goddard directorates.

A new concept is being introduced this year in the form of "Dinnertime Entertainment" which is expected to add to the enjoyment and fun of all.

Production staff members (and their codes) for the show are: Silvia Green (270), Executive Producer; Ginny Zanner (626), Director; Gil Mead (641), Musical Director; Peggy Becker (251), Associate Producer; Gene Smith (565), Associate Director; Tom Cherrix (650), Orchestra; Mike Jourden (236), Technical Director; and Betty Huckenpoehler, Choreographer.

Tickets for the eight performances will go on sale the week of October 1. Prices will be \$6.50 for each person in groups of ten to twenty, and \$7.50 for individual sales - except on November 17 when all sales will be \$7.50.

GODDARD AROUND THE WORLD



LONDON, ENGLAND. On July 27 the NASCOM Division honored twenty individuals and four control centers in England, with a presentation of certificates of appreciation for superior contributions to the NASCOM Network in support of the Apollo Program. Eleven men, employees of the British General Post Office, contracted to operate and maintain the NASCOM Switching Center in London, were presented their certificates by the London NASCOM Station Manager, Larry DeHayes. Certificates were also presented to General Post Office managers and engineers who have provided exceptional support to the London Center. The names of the London Switching Center staff receiving the certificates are: Hugh Hynd, Joel Dreezer, Tom Blake, Eric Weldon, Dennis Wellington, Ken Burgess, John Reeve, Henry Dalorto, Noel Morrison, Tony Dua. Shown here is J. Hodgson, Director of the External Telecommunications Executive of the GPO (left) receiving his certificate from Mr. DeHayes.

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