goddard news

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Apollo 11: Fifth Anniversary

July 20, 1969, 4:17:40 p.m., E.D.T.—"Houston, Tranquility Base here. The Eagle has landed."

It had finally happened; man had landed on the Moon. And just six hours and 38 minutes later, Apollo 11 Commander Neil A. Armstrong descended the ladder of the Lunar Module, "Eagle," becoming the first man to set foot on the Moon. His words: "That's one small step for a man, one giant leap for mankind."

Edwin E. "Buzz" Aldrin followed his companion at 11:15 p.m., E.D.T., while crewman Michael Collins orbited the Moon in the Apollo Command Module, "Columbia." Meanwhile, an estimated one-sixth of the people on Earth viewed the event on television with the aid of the 210-foot antenna at Australia's Parkes radio astronomy site. Also, 210-foot antennas in California and Australia augmented TV coverage of the journey while Apollo was near the Moon.

The flight from Earth, beginning on July 16, 1969, at 9:32 a.m., E.D.T., was flawless. This part of the trip had been done in Apollo 8 and Apollo 10, missions designed to test equipment at lunar distances from Earth, but not prepared to land. The Command and Lunar Modules of Apollo 11 undocked at 1:47 p.m., E.D.T., on July 20, and Armstrong and Aldrin headed for the Moon.

On the Moon, the astronauts walked, hopped, collected samples, and deployed scientific experiments for two and one-half hours. At 11:41 p.m., E.D.T., they planted an American flag on the footprint-covered surface. A plaque left on the Moon, bearing the signatures of the three astronauts and President Nixon, is inscribed, "Here men from the planet Earth first set foot upon the Moon, July 1969 A.D. We came in peace for all mankind."

Goddard Links Earth and Moon

Goddard's job in the mission centered on the tracking and communications links of the Manned Space Flight and NASA Communications Networks (MSFN and NASCOM). Teams worked con-

(See Page 3)

RICHARD BUNEVITCH checks ATS-6 data on CRT in real time. For the IPD ATS-6 data processing story see Page 2.

DR. PAUL D. LOWMAN, JR. receives Goddard's John C. Lindsay Memorial Award on June 14 during the ninth annual Scientific Colloquium and awards lecture. Presenting the award is Goddard Director Dr. John F. Clark. Professor Martin Rees of the Institute of Astronomy, University of Cambridge, Cambridge, England, gave a lecture titled, "Neutron Stars and Black Holes: The Evidence from X-Ray and Gamma-Ray Astronomy."

Paul Lowman Receives Lindsay Award

Dr. Paul D. Lowman, in Goddard's Geophysics Branch, has received the John C. Lindsay Memorial Award for "his initiative in the acquisition and utilization of orbital photography from the Mercury, Gemini, Apollo, ERTS, and Skylab missions. His analysis of the geological data from these and other experiments has led to an increased understanding of the crustal evolution of the terrestrial planets and, in particular, the Earth."

The Lindsay Memorial Award is presented annually in memory of Dr. John C. Lindsay, first head of Goddard's solar research team, who died in 1965. It is given to a Goddard employee or employees who have made an outstanding contribution to science or technology.

The award was presented to Dr. Lowman by Dr. John F. Clark, Goddard Director, during a special Scientific Colloquium and awards ceremony on June 14. Lecturer for the occasion was Professor Martin Rees of the Institute of Astronomy at the University of Cambridge, Cambridge, England, who spoke on "Neutron Stars and Black Holes: The Evidence from X-ray and Gamma-ray Astronomy."

Originally from Rahway, New Jersey, Dr. Paul Lowman received his B.S. degree in geology from Rutgers University in 1953. After two years in the U.S. Army, he attended the University of Colorado from which he received his Ph.D. in geology in 1963.

Dr. Lowman came to Goddard in 1959 where his first work was on the origin of tektites and the geology of the Moon. He served at NASA Headquarters in 1963-64 working on Apollo and post-Apollo lunar exploration planning. During the Mercury program, he became involved in orbital photography and was Principal Investigator for terrain photography experiments during Mercury, Gemini, and Earth-orbital Apollo flights. He was also co-investigator for the analysis of returned lunar samples, X-ray fluorescence experiments on Apollo 15 and 16, and the infrared spectroscopy experiment on Mariner 9. He has assisted in astronaut training and photo interpretation for the Skylab missions, and is scientific monitor for several ERTS investigations.

Dr. Lowman has taught courses in lunar geology at the Air Force Institute of Technology, the University of California (Santa Barbara), and the Catholic University of America.

He is the author of *Space Panorama*, *Lunar Panorama*, and *The Third Planet*, and of technical papers in various fields.

Dr. Lowman lives with his wife Karen in Bowie, Maryland. His spare time activities include cycling, boating and short-wave radio.

IPD Support of ATS-6 Is a Big Job

By Robert C. Service

Telemetry from the large number of experiments on board ATS-6 produces a tremendous volume of data—all of it in real time. Never before has the Information Processing Division (IPD) been called upon to handle such a huge flow of real time data, nor has the processing of real time data been required over such an extended period.

During the lifetime of the ATS-6 mission, IPD will receive raw telemetry data from the ATS ground stations, record and evaluate this data, convert it from analog to digital form, edit and decommutate it, then merge the orbit and spacecraft attitude ephemeris data on tapes and ship them to the experimenters.

The IPD facility was upgraded to support the ATS-6 mission. Functioning simultaneously with on-line, real-time data, it receives and records technological (TEC) and environmental measurements experiments (EME) data in analog or digital format, produces strip charts from both bit streams, displays data on the octal or decimal readouts of the data handling equipment and via the Data Reduction Laboratory (DRL) for plots, calibrated functions, or experiment status, and receives and records from Rosman spacecraft data from the interferometer, very high resolution radiometer experiment (VHRRE), antenna pattern measurements, spacecraft attitude precision pointing and slewing adaptive control (SAPPSAC) experiment and others.

Paul L. McKowan, Data Processing Engineer, stated that this data processing system is unique. "One of the things that makes it unique," he said, "is that we can swap bit streams around in real-time for instantaneous display and analysis of raw or calibrated telemetry data."

ATS-6 is in geosynchronous orbit and, therefore, carries no recorders. Data coming down to the ground stations are transmitted to IPD in real time on the 7.2-kbps data link. The ground stations also make analog tape recordings for use as backup for forwarding to IPD on request.

A selected group of experimenter and spacecraft systems engineers are provided special processing support. These are the VHRRE, millimeter wave (MMW) experiment, tracking and data relay experiment (T&DRE), antenna pattern measurements, interferometer, magnetometer, position location and aircraft communications experiment (PLACE) and SAPPSAC. Special purpose handling consists of processing selected data types at the ground stations and then sending it to IPD via a high speed data link. Here the data are evaluated for quality, reconstructed to resemble station tapes and forwarded to the experimenters. Also special real-time support on a 24-hour continuous basis is provided from 30 to 90 days after launch. This is in addition to the regular data processing support being provided.

Two types of telemetry data are being recorded by IPD. These are TEC systems-oriented data and EME data. TEC data are being distributed to seventeen principal experimenters in both the normal or dwell mode format. Ten experimenters are receiving the EME data which are scientific-oriented. The two major processing computer systems that are used in the generation of experimenter tapes are the CDC 3200 and UNIVAC 1108.

During the first 30 days after launch, IPD processed spacecraft telemetry data in near real-time and provided the ATS project with spacecraft housekeeping data. The IPD also provided data processing support requested by the experimenters for experiments which became operational during this period. During the scientific experiment period, IPD's DRL provides CRT displays of processed TEC or EME data for visual presentation to the experimenters.

IPD also provides strip-chart recording from telemetry interferometer data and antenna pattern plots from antenna pattern measurement data. Because of the large quantity of incoming telemetry data, IPD has had to devise new methods of processing and handling. Input from the average satellite is about 100 tapes a week, with an output of about 300 tapes a week. ATS-6 will receive about 200 tapes input and generate about 900 tapes output a week. This heavy load is due primarily to the large number of experiments on board ATS-6. New equipment added to handle this are two digital data reduction systems and an interface unit between a Varian 620I computer and the UNIVAC 1108 Central Processor.

GSFC owes a special vote of thanks to the highly skilled team of programmers, engineers, and operations personnel who built and supported this system which operated almost flawlessly during the ATS-F launch, orbit adjust, deployment, experiment turn-on and station-keeping maneuvers.

. . . Well done team!

MEMBERS OF THE IPD DATA PROCESSING TEAM for ATS-6 are Data Processing Engineer Paul McKowan (seated) and (from left, standing) Hermin Hines, John Thompson, Thomas Rosenberg, Arnold Cephas, Gary Vincent, and Richard Bunevitch.

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

Honorable James C. Fletcher
Administrator, National Aeronautics
and Space Administration
Washington, D.C. 20546

Dear Jim:

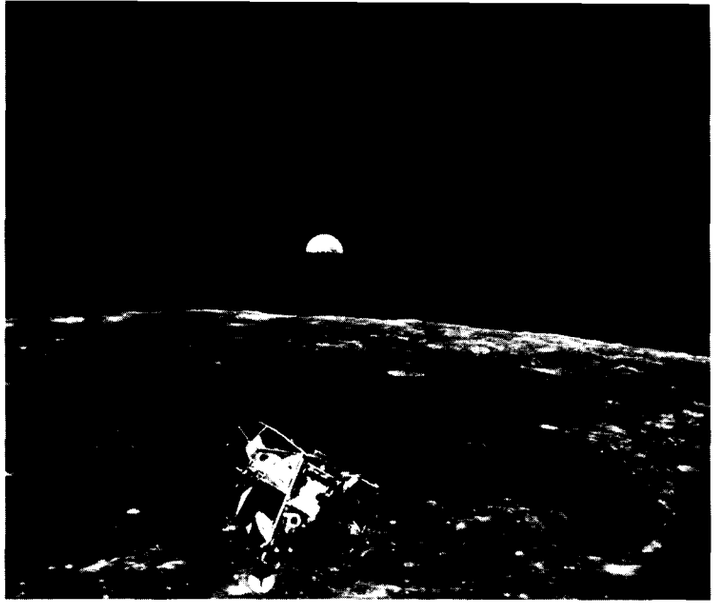
I would like to congratulate the National Aeronautics and Space Administration Synchronous Meteorological Satellite Project team, led by Donald Fordyce of the Goddard Space Flight Center, for their outstanding performance in recovering a mission success after the first stage failure on the Delta launch vehicle last Friday.

Their skillful optimization studies and tradeoff decisions during a period of severe stress were most impressive. I am told that all of the many spacecraft operations and maneuvers were conducted in a flawless fashion in spite of the pressure of time.

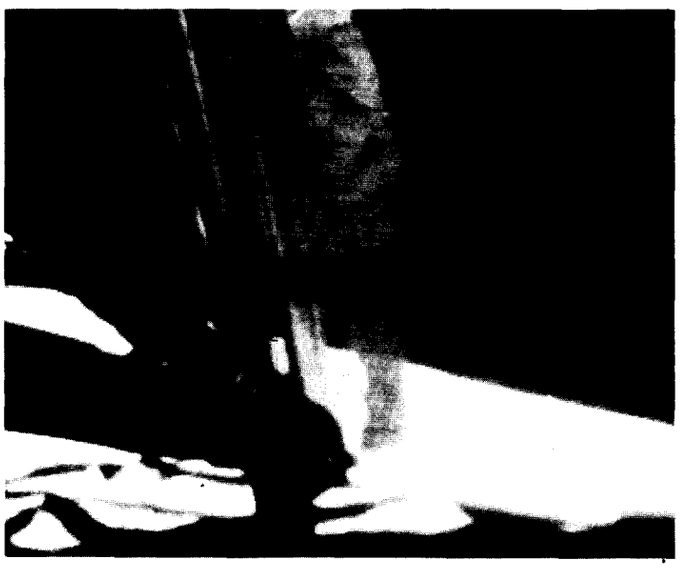
My thanks should also be expressed to all of the supporting personnel at the Goddard Space Flight Center and its field tracking stations who assisted in this unusually difficult and most successful operation.

Sincerely,

Secretary of Commerce



WITH THE EARTH RISING over the Lunar horizon, the LM ascent stage prepares to dock with the CSM. The large dark area on the Lunar surface is Smith's Sea.



AS MILLIONS WATCH on television, Commander Neil A. Armstrong carefully descends the LM ladder, just before becoming the first human to set foot on the Moon.

APOLLO 11 COMMANDER Neil A. Armstrong snapped this photo of Buzz Aldrin, LM pilot, with a 70 mm. Lunar surface camera. Reflected in Aldrin's helmet are Armstrong and the LM.

Apollo Anniversary. . .From Page 1

stantly at the computer and control centers of Building 14 and at the remote sites to keep information flowing smoothly between the astronauts, tracking stations, and Mission Control in Houston. The primary switching center for the NASCOM Network that routed mission communications was here at Goddard. Intermediate switching centers were at Canberra, Madrid, London, and the Jet Propulsion Laboratory.

During the mission, the MSFN used 17 ground stations, four ships, and eight instrumented jet aircraft. When the Apollo Saturn V began its ascent, voice and data were instantly transmitted to Houston, where the data was sent through computers for visual display to flight controllers. Eighty-five foot antennas located 120° apart at the prime sites—Madrid, Spain; Canberra, Australia; and Goldstone, California—tracked the spacecraft from an altitude of 10,000 miles to the Moon. Ground controllers were out of contact with the spacecraft only during the 45-minute period in each orbit when Apollo 11 flew behind the Moon.

However, the work did not end with the successful splashdown at 12:49 p.m., E.D.T., on July 24. Apollo 11 MSFN stations continued to receive data for four and one-half months from the Passive Seismic Experiment Package, one of two experiments in the Early Apollo Scientific Experiment Package (EASEP). This experiment was the pioneer of the five Apollo Lunar Surface Experiment Packages (ALSEP) which were placed on the Moon by later Apollo missions.

Two Goddard groups participated in the study of Moon rocks brought back by the astronauts. The first group analyzed the samples with an electron microprobe to determine the minerological composition of the rocks. The second group used a mass spectrometer to determine the concentration of rare earth elements in the samples.

Spin-offs Benefit Mankind

Now, five years after that first journey to the Moon, we can see many scientific advances which resulted from space technology. Many Americans come in contact with these advances in their daily lives. For example, the Applied Physics Laboratory of Johns Hopkins University developed a rechargeable heart pacemaker using battery and circuitry techniques developed by NASA. The pacemaker is smaller than earlier devices, and its nickel-cadmium batteries can be recharged at home by the patient with an external power source, thus eliminating the need for replacement surgery every two years.

Another result of space technology was the development of modified fuel cells for electric power generation on Earth. Although the fuel cell concept, combining oxygen and hydrogen to form electricity and water, is over 100 years old, the breakthrough came just recently when Pratt and Whitney developed fuel cells for Apollo spacecraft. So far, 12.5 kilowatt fuel cell generators have been set up at 35 locations around the world, and have operated for more than 200,000 hours.

Hazard analysis and quality control techniques developed by NASA in the Apollo program are helping to make offshore oil operations safer and more efficient. At a request from the U.S. Geological Survey, NASA recommended several ways to improve the reliability of safety and anti-pollution equipment used in offshore oil production.

These are only a few of the many advances resulting from space missions. Because of the accelerated national effort to reach the Moon, this country has compressed into approximately one decade the normal technological advances of several decades.

By fulfilling man's dream of reaching the Moon, man also achieved the goal set eight years earlier by President John F. Kennedy. On May 25, 1961, President Kennedy stated, "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to Earth."

Tech Brief Award

JAMES B. Billingsley (center) of the Computer Systems Branch, recently received an award for the publication of Tech Brief 72-10608 entitled "Two Autowire Versions for CDC-3200 and IBM 260." Here he receives his certificate from Peter A. Bracken (left), Head of the Computer Systems Branch; and John J. Quann, Chief of the Information Extraction Division.

Goddard Mourns. . .

Edward G. Lewis, 52, of the Construction Management Branch of the Facilities Engineering Division died on May 29 in the National Institute of Health. Mr. Lewis first joined Goddard in 1965, and has worked on the Center's minor construction, alterations, maintenance and repairs for the Facilities Engineering and Plant Operations and Maintenance Divisions. Through the years, he was one of the specific contacts for Work Requests in the area of construction.

Mr. Lewis was a World War II veteran and served in various positions with the VFW including Post Commander. He is survived by his wife Mary and his daughter Christine.

Richard P. Schorman, 54, died on June 5. He first came to Goddard's Test and Evaluation Division in July of 1963 after having worked 14 years as a process engineer and project manager for heavy industrial construction. At T&E, he has been senior project engineer for the design and construction of the Launch Phase Simulator, Head of the Facilities Project Section, and later a senior engineer in the T&E Engineering Support Office.

He is survived by his wife Adele, three sons and a daughter, grandchildren, his parents and a brother and sister.

William T. Warrick died on June 9. Mr. Warrick entered on duty at Goddard in July of 1967 to become a member of the Plant Operations and Maintenance Division. As a member of the Facilities Mission Support Group, he was a building engineer in support of the tracking and data networks.

Goddard Receives M.V.A. Course Plans

GODDARD EMPLOYEES who do most of the driving of government vehicles are getting the benefit of the State of Maryland's driver training program beginning last June 17. Maryland Motor Vehicle Administration (M.V.A.) officials were at Goddard June 13 to formally present course materials to Goddard officials. The course consists of six hours of classroom and road training in two hour segments. About 120 Goddard drivers will be taught during the first few weeks. After the professional drivers are trained the course will be open to those who drive government vehicles often, and finally, it will be offered to all employees. Shown in the above picture are (from left): Leven B. Gray, Chief of Goddard's Health and Safety Engineering Office; Leonard Kestler, Director, Division of Driver Review and Rehabilitation, M.V.A.; and William A. Mecca, Goddard's Deputy Director of Administration and Management. M.V.A. officials, not shown in the picture, who also visited Goddard are: Raymond Dick, Chief of Driver Rehabilitation Clinic, and Stephen V. Versace, Instructor, Rehabilitation Clinic.

Key Personnel Appointment

ALPHONSO M. GANTT was recently appointed Head of the Scheduling Systems Section in the Operations Scheduling Support Branch. Mr. Gantt supervises a seven-person staff which is responsible for the programming and operations support of satellite prediction programs, tracking data processing programs, the Computer Assisted Interactive Resource Scheduling System, and numerous special programs. Other projects Mr. Gantt has worked on since he joined Goddard in 1962 include the Echo satellite visibility prediction program, Goddard Real Time System, and the Computer Assisted Network Scheduling System. He serves on the TDRSS Performance Specification Review Committee for Code 500 and the M&DO 360 User's Committee and has received the Manned Flight Awareness "Silver Snoopy" Award. Born in Winston-Salem, North Carolina, Mr. Gantt served in the U.S. Air Force from 1954 to 1957, and then attended North Carolina Central University in Durham, North Carolina, from which he received a B.S. in mathematics in 1962. His wife, Rubye, is a substitute teacher for the Montgomery County School System. The Gantt's have two sons, Alphonso II, age 11, and Geoffrey, age nine.

SUMMER PROGRAMS PART I

THIS IS THE FIRST of a three-part series of articles focusing on the many people taking part in this year's summer programs at Goddard. Pages 5, 6, 7 and 8, the July issue feature three summer institutes for undergraduate college students and two summer research programs for college faculty members. Coming up in August will be Civil Service summer employees, Summer Aids, and the outstanding high school students in a program sponsored by the American University.

Summertime, for students and teachers alike, is often a time to gain practical experience and pursue studies away from the regular textbook-classroom routine of the academic year. For participants in the following five programs, summer at Goddard is also a time to conduct individual research projects to gain in-depth knowledge in their chosen fields or to develop practical technology for long-range future applications.

SUMMER INSTITUTE FOR BIOMEDICAL ENGINEERING

The solution of medical problems through the practical application of technology developed by the space program is the goal of the eight undergraduate students taking part in the 1974 Summer Institute for Biomedical Engineering. This program, now in its sixth year, is being conducted jointly by Goddard and Howard University under the direction of Wayne Chen of Goddard's Technology Utilization Office and Dr. Eugene DeLoatch of Howard University.

The young biomedical engineers are working in teams of two members each to tackle such diverse problems as an improved device for weighing babies in controlled environments to a better brace design for children. If the teams come up with practical solutions during their ten weeks at Goddard, their devices and theories will be further developed and tested in hospitals and may find use in improving the care of patients in the future.

Biomedical engineering research programs being conducted this summer are:

- IMPROVED DESIGN OF AN AUTOMATIC WEIGHT SCALE FOR AN ISOLETTE. This is a continuation of a project that was started during the 1973 Summer Institute. The students will begin by evaluating the device developed last year to weigh infants without exposing them to the nursery atmosphere in hospitals. They expect to develop an easily read data display plus the capability of providing a digital readout of weights and the specifications required by doctors.
- CERVIX-RECTUM MEASURING DEVICE. Cancer of the uterine cervix is one of the most prevalent cancers in the Black U.S. population as well as in most developing countries. The key to successful treatment is intracavity radiotherapy. Students working on this project will attempt to develop a device that can measure the exact distance between the radiation applicator and the rectum during treatment in order to determine the dosage to the rectum to prevent overexposure.
- A NOVEL BRACE DESIGN. This project is aimed at devising a lock for leg braces so that children with spasticity and other neurological problems can unlock their braces only in the sitting position, while having them re-lock to provide rigid support for the leg joints when they walk. With present braces, children can unlock their braces while walking, a practice that often causes an aggravation or recurrance of the deformity.
- DEVICE TO ALLEVIATE PULMONARY DISTRESS. Many patients with pulmonary disease such as cystic fibrosis and pneumonia, and patients who are bedridden for long periods, must expell accumulated mucous or toxic substances from their lungs. The goal of this project is to develop a vibration device that can be used, for example, on a patient's bed to help move any material in the lungs along the bronchial tubes to the month where it can be removed. It is hoped that such vibrations can be used even on unconscious patients.

BIOMEDICAL ENGINEERING

Student	School
Benico Barzilai	Case Western University
Jireh I-Le Chao	University of Pennsylvania
Matt Christiano	Rice University
David Fischell	Cornell University
Michelle Hoyte	Howard University
Jeffrey Mazique	Brown University
Theodore Morgan	Tugaloo College
Darwyn Parker	Brown University

SUMMER INSTITUTE FOR BIOMEDICAL RESEARCH. From left (seated) are JoAnn Harris and Dr. Anna Cobel, both of Howard University; Michelle Hoyte; Helen Attick, Goddard Technology Utilization Office; and Darwyn Parker. Standing are Wayne Chen and Ron Robertson, both of Goddard's TU Office; Dr. Eugene DeLoatch, Howard University; Ben Barzilai; Jireh Chao; Matt Christiano; David Fischel; and Ted Morgan. Not shown is Jeff Mazique.

SUMMER INSTITUTE IN COMPUTER APPLICATIONS

Students in the Summer Institute in Computer Applications are here to learn computer basics and such computer languages as FORTRAN, PL/1, LP/C, Job Control Language, and CRBE.

The program was first organized in 1970, and is being conducted cooperatively by Goddard and Bowie State College. Director for this year's institute in Dr. Carl H. Kirksey of Bowie State under the coordination of William F. Cahill and Hans O. Bremer of Goddard's Space and Applications Computing Center.

As in past years, the institute participants are divided into two groups—students here for the first time and returnees who are back for a second summer of more intensive training and experience.

During the first three weeks of the program the two groups receive formal classroom instruction in the first half of their workday. The remainder of the day is spent getting "hands-on" experience with assistance and direction from their advisors in the writing of programs and the solutions of practical problems.

The last seven weeks of the institute will be spent solving an assigned problem relevant to space technology or management. The results and solutions obtained will be written in the form of a technical report by each student and submitted as a part of the final administrative and technical report to be presented to NASA.

COMPUTER APPLICATIONS

Student	School
Rosa Allen	Washington Technical Institute
Lavetta Alston	Bowie State College
Mariah Barnes	D. C. Teachers College
Teresa Boone	Howard University
Shelia Carter	University of Maryland, E. Shore
Brenda Chaney	Coppin State College
Michael Corcoran	Morgan State College
William Cornish	University of Maryland, E. Shore
Lance Fletcher	University of Maryland, E. Shore
Alfred Jackson	Lincoln University
Marion Jones	Bowie State College
Deborah Hollingsworth	Howard University
Josephus Lee	Bowie State College
Leatrice Miller	Bowie State College
Regina Nichols	University of Maryland, E. Shore
Sheila Upshur	Federal City College

PUBLIC ADMINISTRATION

Student	School	Advisor
David Abernathy	Vanderbilt University	James E. Graalman
Regionald Clark	Duke University	Carroll C. Dicus
Joan Fagan	Yale University	Charles Boyle
Tom Gallagher	University of South Dakota	William A. Landymore
Jo Goddard	Smith College	Russell Salter
Peter Kougasian	Princeton University	Martin D. Menton
Denise Polivy	Wesleyan University	Harold J. Peake
Harriet Rosenthal	University of Maryland	Ronald R. Dapice
Janet Scagnelli	Lehigh University	Howard K. Ottenstein
Jane Beth Snyder	Wellesley College	August C. Buffalano
Claudia Stone	Wellesley College	Edward Mason
Margaret Stone	Swarthmore College	Marjorie Townsend
Jefferson Strait	Harvard University	James I. Vette

SUMMER INSTITUTE IN COMPUTER APPLICATIONS. From left (first row) are Teresa Boone, Lavetta Alston, Marion Jones, Leatrice Miller, Mariah Barnes, William Cornish, and Director Dr. Carl Kirksey. In the back row are Michael Corcoran, Regina Nichols, Branda Cheney, Josephus Lee, Alfred Jackson, and Lance Fletcher.

SUMMER INSTITUTE IN PUBLIC ADMINISTRATION

The 13 students in the Summer Institute in Public Administration (SIPA) are learning about how a government installation such as Goddard is run through an intensive program of individual research projects, seminars and field trips.

At the heart of each participant's ten weeks at Goddard is an individual research-study project into some practical phase of Center operations. Sample topics in this year's program include: the Application of Space Management to Social Problems, Matrix Management and the Procurement Office, Management of Space Science Data Center, and Alternative Outlets for Public Affairs Material on ERTS.

In addition to work on their research topics, SIPA participants are gaining insight into the public administration of other government agencies through field trips that include visits to Wallops Island, the National Environmental Satellite Service, the Treasury Department, NASA Headquarters, and the Smithsonian Air and Space Building. One highlight of the SIPA was a talk with Senator Moss of the Senate Aeronautics and Space Science Committee.

The institute is now in its seventh year. Carl Mohrwinkel of Personnel is again Coordinator, and Dr. Bill McGregor is Academic Advisor.

SUMMER INSTITUTE IN PUBLIC ADMINISTRATION. From left (kneeling) are Joan Pagen, Margaret Stone, Beth Snyder, Denise Polivy, and Claudia Stone. Standing are SIPA Assistant Dan Dunham, Dave Abernathy, Peter Kougasian, Jefferson Strait, Reginald Clark, Tom Gallagher, Janet Scagnelli, Jo Goddard, Professor Bill McGregor, and Coordinator Carl Mohrwinkel. Not shown is Harriet Rosenthal.

GSFC/MORGAN STATE SUMMER RESEARCH PROGRAM

The detection of lead paint and the statistical analysis of starlight polarization are but two of the complex research projects being conducted by nine members of a summer faculty research program. Now in its fourth season under the direction of Goddard and Morgan State College, the program is designed to strengthen the teaching skills of faculty members from minority colleges and universities by giving them access to the research and educational opportunities at Goddard.

Dr. Nathaniel Proctor, Professor of Biology at Morgan State College, has been with the program since its inception as both director and coordinator.

An example of the value of this research program can be seen through the problem of lead paint detection being studied by Dr. Clarence P. Carter of D.C. Teachers College under the guidance of Technical Monitor Evan Eller of Goddard's Sciences Directorate. Exposure to lead paint poisoning has increased because of the dense population of low income families in the older areas of our major cities. Although manufacturers sell lead detection devices, one of the aims of this research is to improve the speed, reliability and accuracy of lead detection.

Other problems included in this summer's program are the prediction of reaction times due to ultraviolet radiation, numerical least squares minimization, clinical application of the firefly luciferase ATP assay, use of the utility theory for project planning or descoping of payloads, the mechanism of positive plate failure when subjected to low temperatures, productivity in estimating manpower needs which is aimed at increasing efficiency in management at Goddard, and the development of a computer program for statistical analysis of starlight polarization data.

GSFC/MORGAN STATE SUMMER RESEARCH PROGRAM

Faculty Member	School	Goddard Technical Monitor
Valerie N. Bush	Delaware State College	Dr. Grace Picciolo
Dr. Clarence P. Carter	D. C. Teachers College	Evan Eller
Dr. Douglas M. Council	Bowie State College	Raymond Kruger
Dr. Herbert Farkas	University of Maryland, E. Shore	Urban Ludwig
Dr. Patrick P. McDermott	Coppin State College	Floyd Ford
Andrew Nelson, Jr.	Washington Technical Institute	Herbert Fivehouse
Sylvan Pinsky	Coppin State College	Dr. August Buffalano
Donald Williamson	Morgan State College	Dr. Frank C. Jones Thomas Kaiser
Henry Witaker	Morgan State College	Robert Warren

GSFC/MORGAN STATE SUMMER RESEARCH PROGRAM. From left are Dr. Douglas Council, Dr. Clarence Carter, Dr. Patrick McDermott, Program Coordinator Dr. Nathaniel K. Proctor, Valerie Bush, Andrew Nelson, Henry Whitaker, Sylvan Pinsky, and Donald Williamson. Not show is Dr. Herbert Farkas.

NASA/ASEE SUMMER FACULTY FELLOWSHIP

One of the oldest faculty research programs at Goddard is the Summer Faculty Fellowship sponsored by Goddard and the American Society of Engineering Education. This year, 25 college and university faculty members are taking part in the ten-week program that is aimed at up-grading their teaching skills by stimulating their research interests.

Co-directors for the program are Dr. Fawzi Emad of the University of Maryland, Dr. James C. Morakis of Goddard's Communications and Navigation Division, and Dr. Bertrand Fang of the Catholic University of America.

While the program was started about ten years ago in what was then the Tracking and Data Systems Directorate, it has been expanded to include participants in most Goddard directorates and a wide range of disciplines.

(See names on Page 8.)

NASA/ASEE SUMMER FACULTY FELLOWSHIP. Faculty fellows gather with (seated) Dr. Bertrand Fang (left), Co-director from the Catholic University of America; and Leonard Roach, assistant to Dr. James Morakis, Goddard Co-director. Not shown are Dr. Morakis and Dr. Fawzi Emad, Co-director from the University of Maryland.

FACULTY FELLOWSHIP

Fellow	School	Goddard Colleague
Albert N. Andry	University of Maryland	George Winston
Li-Jen Du	University of Louisville	Nelson McAvoy
Bobby R. Junker	University of Georgia	Dr. Aaron Temkin
Joel C. Katzen	Florida Technical University	Dr. Robert Hobbs
Chao Hung Ma	University of Mississippi	Dr. Jerry Eckerman
Leopold May	Catholic University	Floyd Ford
Frederick W. Oliver	Morgan State College	Dr. John Philpotts
Thammavarapu R. Rao	University of Maryland	Rodger Cliff
John W. Rhee	Rose-Hulman Institute of Technology	Otto Berg
Alvin M. Strauss	University of Cincinatti	William Cherry
James M. Turner	Morehouse College	Dr. Norman Ness
Richard J. Van Brunt	University of Virginia	Dr. Michael Munna
SECOND YEAR FACULTY FELLOWS		
David R. Alexander	Wichita State University	Dr. Warren Sparks
Chiou S. Chen	University of Akron	William Alford
Jack Kovach	Muskingum College	Dr. Charles Schnetzler
Samuel J. Kozak	Washington and Lee University	Dr. Charles Schnetzler
Richard W. Longman	Columbia University	Dr. Joseph Fedor
James H. McGuire	Kansas State University	Dr. Kazem Omidvar
Thomas L. Noack	University of Missouri	William Polland
Hsien P. Pao	Catholic University	Dr. Raymond Wexler
Jagdish C. Prabhakar	Texas Tech University	Gilbert Branchflower
Arthur R. Thorbjornsen	University of Toledo	Daniel Brandel
Leo W. Todd, Jr.	Broome Community College	Dr. John Scialdone
Kuo U. Wang	University of Cincinatti	Leonard Roach
Peter B. Worland	University of Nebraska	Dr. James Morakis

Goddard Focuses on Small Business

ORGANIZERS of the Small Business Expo 74 are (from left) Al Glorioso, Doris Martin and Art Wolter of the Industry Assistance Office.

Some 400 people attended Goddard's recent Small Business Expo 74 in the Building 8 Auditorium. The visitors included retired Goddard employees and many representatives from NASA Headquarters and other government agencies.

Organized by Goddard's Industry Assistance Office, the Expo served the dual purpose of acquainting the Goddard technical community with the products of small businesses and offering advice on setting up small businesses.

Attendees viewed a wide range of small business displays and had the opportunity to talk with representatives of small businesses and large corporations, the Small Business Administration, and the National Association of Accountants.

RETIRED GODDARDITE Jim Rice discusses small business opportunities with a representative of the Washington Business Resources Center at the Expo 74. Counseling was also available from many other organizations including the Small Business Administration.

Employees Cited for Cost Reduction Plans

The Annual Cost Reduction Awards Ceremonies took place at Goddard on Tuesday, June 18. The 20 employees who were honored for their outstanding contributions to the cost reduction program in the 1973 fiscal year are:

Administration and Management Directorate: Stanley D. Manuel, Ben Goldman, Edward C. Cranston, John J. Tominovich, and Alfred J. Wolfson.

Systems Reliability Directorate: T. J. Greenwell and George T. Clawson.

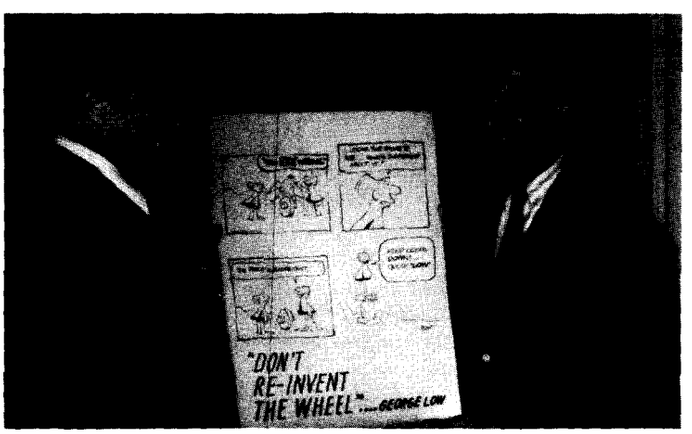
Projects Directorate: Richard L. Fenton and Paul Butler.

Mission and Data Operations Directorate: Roger D. Werking, Gerald D. Repass, A. Gerald Johnson, and Martin J. Keller.

Sciences Directorate: Michael L. Kaiser.

Networks Directorate: David C. Hartman, James N. Scott, Leonard L. Stewart, Edwin A. West and Lynn F. Woodward.

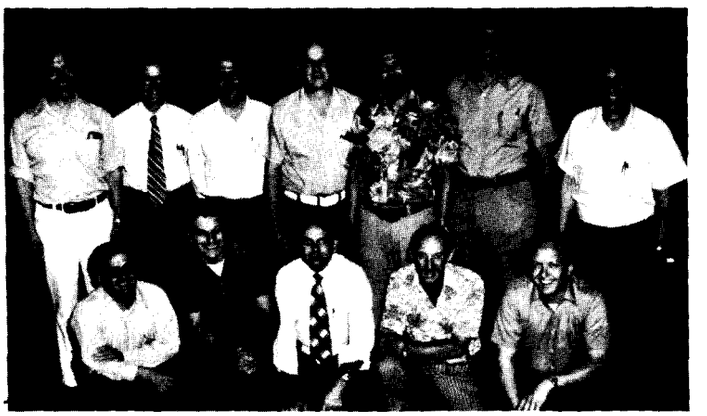
Applications Directorate: John L. King.



LOW COST LOWDOWN. Adelbert O. Tischler, Director of the newly-established NASA Low Cost Systems Office, and Dr. George M. Low, NASA Deputy Administrator, show the first of a series of "Quote Low" cartoons by Johnny Hart designed to promote the Low Cost Systems Program throughout NASA. The purpose of the Low Cost Program is to standardize commonly used spacecraft components and to find efficient, cost-saving management techniques to carry out the NASA mission more effectively. Cartoonist Hart is donating his services for the series.

Fourlorns Top Guys and Dolls League

THE FOURLORNS are the number one team for the recent bowling season of the Goddard Guys and Dolls Tenpin League. High average went to Maureen Bowie (174.6) and Don Wrublik (178.9). Team members are (from left, first row) Andy Anderson; Maureen Bowie; Wini Cameron; (back row) Larry Fontaine; Fred Taub, Captain; and Don Wrublik. Not shown is Harry Sondberg.



THE MAD MEN is a chorus made up of Goddard employees who are dedicated to providing their co-workers with musical entertainment. Now preparing for this year's Music and Drama (MAD) production of "Oklahoma," for which try-outs are now being held, the group has sung for many rest homes and for Goddard's annual Awards Ceremony. They have also presented a singing program for the code 600 and code 700 Christmas party and participated in MAD's Summer Music Night on June 21. Under the musical direction of Gil Mead, the leadership of Vince Arillo, and the management of Jerry Hodge, group members shown above are: (front row, from left) George Schoppet, Vince Arillo, Jack Libby, Bill Pruett, Jack Richards, (back row) Bill Cruickshank, Gil Mead, Ralph Durbin, Herb Richard, Norm Ackerman, George Pieper, and Jim McChesney. Not shown are Jerry Hodge, Tom Cherrix, John Clark, Ken Duck, Charles Young, and Don Voelker.

The group was formed in September, 1972, when ten men responded to a call for men interested in organizing a barbershop quartet. A year later, the repertoire was expanded. At that time, the group had only sung for the Greenbelt Nursing Home, a retirement, and a Ski Club party. Most of the group participated in last year's MAD production of "South Pacific," and the chorus was then made a part of MAD. Hence the name, "MAD MEN."

If anyone is interested in joining the group or would like the group to perform for any function, please call Jerry Hodge, extension 6988.

Recent Retirements

Best wishes to the eighteen Goddard employees who retired between February 1 and June 30, 1974. Listed by directorate, they are:

Administrative and Management Directorate

Stuart W. Blakely
Marcia R. Fontana
Willard E. Graves
George Hornak
Helen C. McClellan
George Mikalaske
Hubert Turner
Dorothy M. Watts

Mission and Data Operations Directorate

Leonard Keller

Sciences Directorate

Betty J. Morrill

Engineering Directorate

Raymond F. Berkeley
John J. Meehan, Jr.
Louis Vasilas, Jr.

Networks Directorate

Archimedes M. Panagopulos
Otto T. Steiner
Lloyd White
Turner N. Wiley

Applications Directorate

Joan L. Schembri

Servomation Comes to Goddard

Servomation Corporation, the nation's second largest food service management company, took over management of the vending and cafeteria food services at Goddard on June 17. From its headquarters in Towson, Servomation brings an excellent reputation for quality food service.

Once a month, the cafeterias will offer a luncheon special. The first special on June 26 was the "Grand Opening Special," for which the cafeterias offered steamship roast, a baked potato, salad, and beverage for $1.75. Also, all customers on that day were served free coffee.

Servomation also provides vending services which offer a variety of soups and sandwiches. Employees who cannot get to the cafeterias can take advantage of the "Servo Chef" truck which provides many luncheon selections and will soon offer doughnuts and other breakfast items.

The new concessionaire is offering services in catering special parties and banquets for such events as retirement dinners, award ceremonies, and other special affairs. Also, a variety of decorated cakes for all occasions are available from the Servomation bake shop.

Although you will certainly recognize some familiar employees dressed in their new Servomation uniforms, you will also notice a number of new faces on the management team. Heading the team as resident Food Manager is Robert "Sonny" Parker who is a four-year Servomation veteran. Mr. Parker is assisted by Chef/Production Manager Jeff Zitzman. Area General Manager Harlan Clark brings 13 years experience with Servomation to Goddard. Mr. Clark's superior, Regional Food Manager Bill Pfaff, also lends a hand.

Servomation staff specialists are Billy Rasnake, hot food production; Joanne White, cold food production; and Dick Norris, Director of Personnel. Handling vending services are Supervisor/Mechanic Walt Farbaugh and Branch Manager Jay Krupinsky.

For special needs, complaint referral, or recommendations, call extension 2478 or 6730.

SERVOMATION EMPLOYEE Carl DePaulis serves roast beef for the cafeteria's Grand Opening Special on June 26.

Attention Boating Enthusiasts

The 1974-75 edition of the "Guide For Cruising Maryland Waters" is now available. The guide consists of 20 charts with 50 insets of rivers and harbors. Bought individually, these charts would cost over $40. Also listed are marine facilities, boating rules and regulations, distances between buoys, and over 200 courses. A new feature in this issue is the location of A.M. radio station antennas, including radio frequencies and call letters. The guide can be obtained at marine dealers or by sending a five-dollar check with four percent sales tax to Department of Natural Resources, Tawes State Office Building, Taylor Avenue, Annapolis, Maryland 21401.

Bering Sea Studies Prove Successful

THE FOURTH AND FINAL MEETING of the U.S./U.S.S.R. Bering Sea Experiment Scientists was held in Leningrad, U.S.S.R., May 12-19, 1974. Participants shown above are (left to right): Dr. Duncan Ross, National Oceanic and Atmospheric Administration; Mrs. Barbara Gloersen; Mr. Phil Thibideau, NASA Headquarters; Dr. William Webster, GSFC; Dr. Rabinovich, U.S.S.R.; Alberta C. Moran, GSFC; Vassaly Kondratyen; Professor Kondratyen, U.S.S.R.; Dr. Tom Wilheit, GSFC; Dr. Per Gloersen, GSFC; Dr. William Campbell, U.S. Geological Survey; Mrs. Larissa Kondratyen; Dr. Rene Ramseier, Department of Environment, Canada.

American and Soviet scientists met for a joint symposium on the Bering Sea in Leningrad, U.S.S.R., May 12-19, 1974. Goddard participants were Dr. Per Gloersen, Dr. William Webster, Dr. Thomas Wilheit, and Mrs. Alberta Moran, all of the Applications Directorate.

The purpose of the meeting was to report final results of the U.S./U.S.S.R. Bering Sea Experiment on Microwave Sensing of Atmospheric and Oceanographic Characteristics. The group found that satellite data can be used to accurately assess sea surface and related atmospheric conditions.

NASA and the Soviet Academy of Sciences provided research aircraft which obtained data during February and March, 1973. A U.S. ice breaker and a Soviet oceanographic research ship worked with the aircraft to study Bering Sea ice cover, surface state, and zones of precipitation.

Using microwave radiometry techniques and comparison data from the two research ships, two groups independently studied the sea surface under identical atmospheric conditions. In general, the findings of both groups were in agreement, allowing much confidence in the collected data and its interpretation. Small discrepancies in the conclusions resulted from differing details of the physical assumptions and calibration errors.

The scientists found that satellite microwave measurements can be used to assess sea ice distribution, motion, and stress. Also, the study gave convincing proof that multi-spectral observations enable scientists to determine the content of liquid water and water vapor in the atmosphere above the sea surface.

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