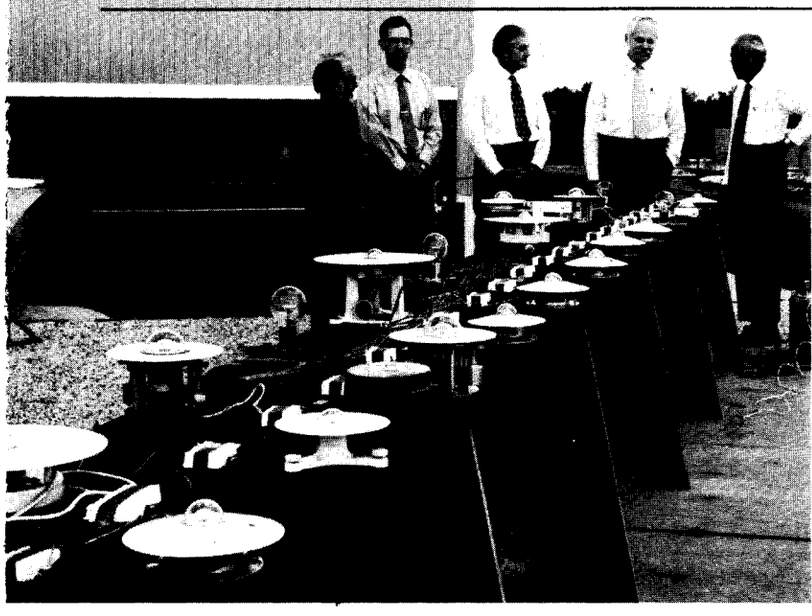
GODDARD NEWS
June 14, 1971 Vol. 19, No. 3



SOLAR RADIATION STANDARDS COMPARED. Eight different types of radiometers from 11 foreign countries and several laboratories in the U.S. were compared here during the recent International Solar Energy Society Conference. This was the first time an attempt has been made to bring together the standard instruments from different countries around the globe in order to set up a uniform scale on which to report solar radiation data. Major findings of the exercise indicate that the standards used in some countries will have to be revised—in a few cases by as much as 8%. In other cases, the agreement between different types of instruments all calibrated independently was higher than could be expected as, for example, between those of the U.S. Eppley Laboratory, the Davos Observatory in Switzerland and Australia's Commonwealth Science Industry Research Organization (CSIRO). Shown in the picture at left with the instruments after they were set up on the roof of Building 7 are (from left) David J. Norris of CSIRO, Melbourne, Australia; Reginald S. Mitchell of Goddard's Test and Evaluation Division (T&E); Roger N. Morse, Chief of Mechanical Engineering at CSIRO and past President of the International Solar Energy Society; Meredith Wilson of T&E, and Project Coordinator Dr. Matthew P. Thekaekara of T&E. For the conference story see Page 2.

Symposium Discusses Gum Nebula Mysteries

Over 100 scientists met at Goddard on May 18 for a special symposium held to discuss some newly observed aspects of the Gum Nebula and changing theories about the nebula's size and how it was formed.

Events leading up to the symposium began last fall with an almost accidental discovery by four astronomers (three of them from Goddard) which revealed a new class of celestial object. Dr. John C. Brandt, Chief of the Laboratory for Solar Physics, was studying the solar wind. During these studies, he wondered if the Gum Nebula, a nearby gas cloud, might overlap with the solar system and thus interact with the solar wind. He asked Theodore P. Stecher of the Laboratory for Optical Astronomy, Dr. David L. Crawford of the Kitt Peak National Observatory, Tucson, Arizona; and Dr. Stephen P. Maran, Head of the Advanced Systems and Ground Observations Branch; to help analyze the nebula, which is located in the southern sky.

To analyze the Gum Nebula, Stecher studied ultraviolet data gathered from previous rocket flights on stars in the nebula; Crawford went to Chile and observed young stars in the nebula with the 60-inch telescope on Cerro Tololo; Maran examined the effects of electrons in the nebula on radio signals from pulsars. Putting all the results together, the astronomers found that the nebula was more distant (1500 light years) than previously thought and also far larger than any other nebula. The diameter is about 2300 light years, so that the edge of the nebula misses the solar system by about 350 light years and does not collide with the solar wind at all.

The problem raised by these findings was that no way was known to create so large a nebula. The four astronomers suggested that a burst of x-rays and ultraviolet from an ancient supernova may have "lit up" and ionized a vast region of the galaxy, which continues to shine today as the Gum Nebula, long after the exploding star has faded away. This idea differs from the explanation for the well known "supernova remnants" such as the Crab Nebula, which are actually produced by the ejection of matter from the explosion. They are much smaller than the Gum Nebula. Purpose of the symposium was to review the observations of the Gum Nebula, and compare theories for its origin. Among the roughly 120 scientists who attended was astronaut Karl Henize from NASA/MSC. Another

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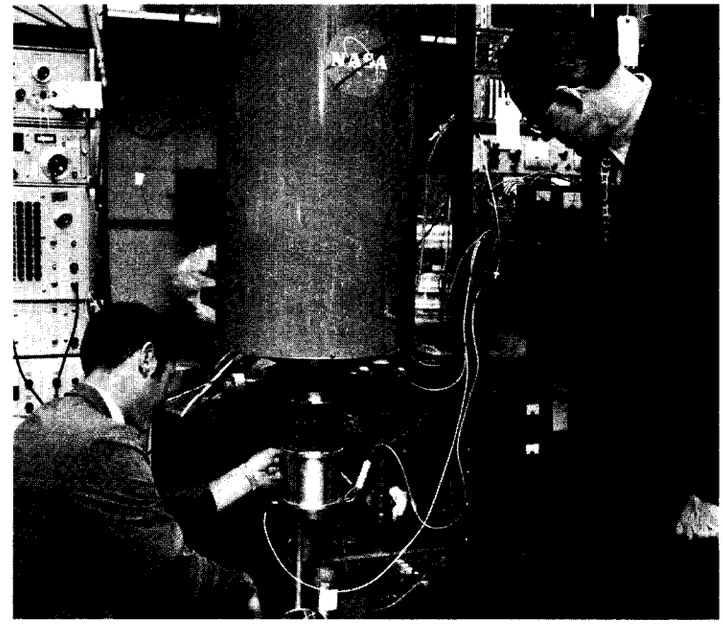

LINDSAY AWARD WINNER Harry Peters (right) and Ed Johnson make adjustments on an experimental hydrogen maser in the Building 12 Maser Laboratory. Mr. Peters was awarded the 1971 John C. Lindsay Memorial Award during a Scientific Colloquium on June 4.

Harry E. Peters Receives Lindsay Award

Harry E. Peters of the Laser Data Systems Branch has received the 1971 John C. Lindsay Memorial Award for his individual contributions to the advancement of Hydrogen Maser Frequency Standards resulting in the most stable frequency standards known and which make possible a dramatic improvement in space tracking and system precision.

The award was presented by Goddard Associate Director Eugene Wasielewski during the final Scientific Colloquium on June 4, 1971. Lecturer for the occasion was Professor Leo Goldberg, Director of the Harvard College Observatory.

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

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SUN .... From Page 1

Solar Energy Conference

The sun and its radiation was the prime topic of interest for about 200 scientists here during the week of May 10-14. The occasion was the 1971 International Solar Energy Society Conference hosted jointly by Goddard and the University of Maryland. Central theme of the affair was "The Sun's Energy—Resource for Survival."

Representing scientific organizations in the United States and 21 foreign countries throughout the world, conference delegates attended eight half-day sessions at Goddard and one at the university. One afternoon was spent touring major attractions at Goddard and a solar heated home designed and built by Dr. Harry E. Thomason of District Heights, Maryland.

Sessions covered such topics as the potential and large scale uses of solar energy, solar power in space, solar energy measurements, meteorology, water heating, solar distillation, cooling and furnaces, and solar energy utilization and our ecology.

Chief organizers from Goddard were Conference Chairman William R. Cherry, Associate Chief of the Engineering Physics Division, who spoke on "The Generation of Pollution Free Electrical Power From Solar Energy," and T&E's Dr. Matthew P. Thekaekara, Secretary-Treasurer of the Conference Committee, who conducted one of the sessions and spoke on "Solar Energy Outside the Earth's Atmosphere." Other Goddard speakers were Thomas Hennigan and Floyd Ford who spoke on "Progress in Electrical Storage for Solar Photovoltiac Systems," and John W. Fairbanks who spoke on "Passive Solar Array Orientation Devices for Terrestrial Application." All three men are from the Space Power Technology Branch.

CONFERENCE CHAIRMAN William R. Cherry speaks on how solar energy could be used to produce all the electrical power needed in the U.S. by the year 1990. He said that, with conventional fuels becoming scarcer, "the development of solar energy sources is attractive from conservation, social, ecological, economic and political standpoints. Developing methods of converting solar energy, our most abundant and inexhaustable natural resource, into electrical power would conserve our fossil fuels for more sophisticated uses than burning, reduce atmospheric pollution by 20%, convert low productive land areas into high productive land areas, and make the U.S. less dependent on foreign sources of energy."

MODELS of solar heated and cooled houses built by Dr. Harry E. Thomason of District Heights, Maryland, were a chief attraction at the conference.

German Solar Probe Topic of Recent Meeting

GERMAN HELIOS Project Manager Ants Kutzer of the Gesellschaft fuer Weltraumforschung (GfW), West Germany's Space Research Corporation, speaks during the recent HELIOS Working Group meeting at Goddard.

The HELIOS Fourth Joint Working Group Meeting was held at Goddard April 28 through May 4, 1971, to discuss the development of two advanced solar probes set for launch by the United States and the Federal Republic of Germany in 1974 and 1975. The meeting was attended by 65 German scientists and engineers plus about 75 representatives from Goddard, other NASA centers and industry.

The HELIOS spacecraft, named for the mythical Greek god of the sun, will be the most complex international scientific space probe yet. They will be launched to within 30 million miles of the sun to study the interplanetary medium in that region by measuring the magnetic field, density, temperature, velocity and direction of the solar wind.

Under a Memorandum of Understanding signed in 1969, Germany will design, fabricate and test the spacecraft and provide instrumentation for the German experiments, data acquisition and spacecraft control throughout the Mission. The two HELIOS probes will be launched from Cape Kennedy and each will carry seven German and three American experiments.

ATTENDING THE HELIOS Fourth Joint Working Group Meeting were (from left, front) Eike Mueller of GfW, Henry Hoffman, Head of Goddard's Stabilization and Control Branch; Tom Dallow of NASA Headquarters, HELIOS Program Engineer; Fred Kochendorfer of NASA Headquarters, HELIOS Program Manager; Dr. Fred Unz of GfW, Spacecraft Manager; Gilbert Ousley, Chief of Goddard's International Projects Office and NASA's HELIOS Project Manager; and (second row) Karl Kaesmeier, German HELIOS Program Manager from the Bundesminister fuer Bildung und Wissenchaft (BMBW), Germany's Ministry for Education and Science.

ENGINEERING LECTURE

"Prospects for Use of Solar Energy"
Dr. George O. G. Lof
Wednesday, June 16, 1971, 3:30 p.m.
Building 3 Auditorium

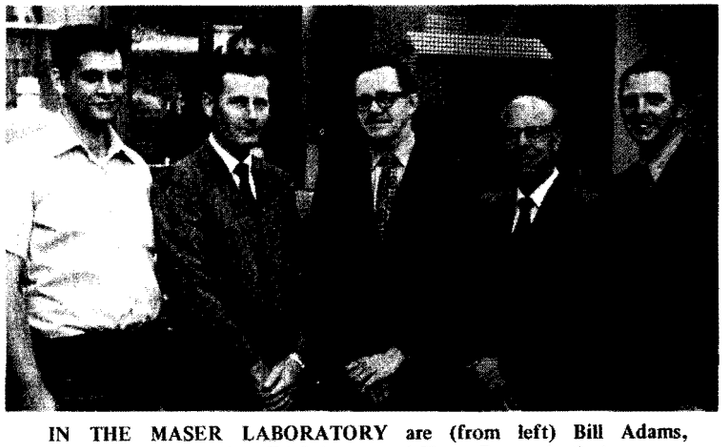
Dr. George Lof, a well known researcher in the field of solar power applications, will discuss the technical and economic prospects for use of solar energy at present and in the near future. He will discuss the low and moderate temperature applications for solar energy now commercially available for heating, desalination, and other uses, and some possible future applications such as direct conversion of solar energy into electric power.

LINDSAY AWARD .... From Page 1

Mr. Peters joined the Goddard staff in July of 1966 to work on a variety of time and frequency standards for use in such critical areas as satellite tracking, geodetic positioning, timing and clock synchronization, and radio astronomy applications. One of the most stable atomic frequency standards is the hydrogen maser which was first conceived by Dr. Norman Ramsey and Daniel Kleppner at Harvard University in 1959. Before 1966, however, hydrogen masers were still essentially laboratory devices. At this time, Mr. Peters became Project Scientist of the Goddard team that was developing existing hydrogen masers for use in the field at NASA tracking stations.

By the end of 1967 the design for four prototype field standards was underway, resulting in the first fully operational standard in December of 1968. Testing of these devices has proven them to be highly reliable. Their use has contributed to the successful results of experiments at the MIT Haystack Observatory, the Caltech Owens Valley Observatory and the National Radio Astronomy Observatory.

More recently, three of the Hydrogen Maser Frequency Standards were shipped to stations in the Manned Space Flight Network where they made possible a dramatic improvement in the tracking system precision attained during the Apollo 14 mission in February of this year. These same three standards are presently at stations of the Deep Space Network where they are being used in support of the JPL Mariner Mars '71 Mission.



IN THE MASER LABORATORY are (from left) Bill Adams, Electronics Technician; Ed Johnson and Harry Peters, both Aerospace Technologists responsible for maser development; Victor Simas, and Thomas E. McGunigal, Head of the Laser Experiments Office and one of the organizers of the original maser program. Before the recent directorate reorganization, Mr. Simas was Head of the RF Systems Branch where most of the maser research was conducted. Not shown is Dr. Robert Coates, Chief of the Advanced Data Systems Division.

SUGGESTION AWARD. J. Edgar Lichtenstein (right), of the Photographic Section, receives a Letter of Commendation from Samuel W. Keller (center), Deputy Director of Administration and Management, and Don C. Hutchison, Chief of the Technical Information Division. The award was made in recognition of Mr. Lichtenstein's suggestion that Goddard use a special nylon-tipped black marker for opaquing lithographic film. The pen now replaces the old brush and liquid method and is quicker and easier to use.

Accident Prevention Awards

On May 4, 1971, Goddard Associate Director Eugene W. Wasielewski presented awards to representatives from eleven Goddard branches that have achieved outstanding safety records during 1970. These Accident Prevention Awards are presented annually to units in industrial shop areas at Goddard where no disabling injuries have occurred during the calendar year.

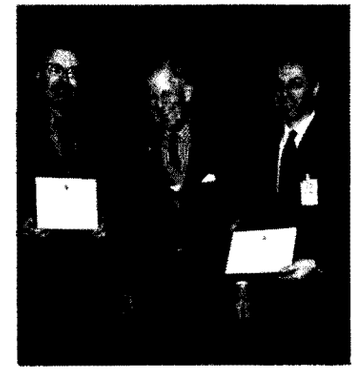
During the May 4 presentation in the Director's Conference Room, five branches received the award for outstanding safety records for two consecutive years, and two branches received it for five consecutive years.

Topping the list with no disabling injuries for the past five years were T&E's Electronics Test Branch and Engineering Support Office.

Two year winners were the Optics Branch, the Fabrication Engineering Branch, the Quality Engineering Branch, the Structural Dynamics Branch, and the Functional Test Branch.

First year winners were the Property and Supply Branch, the Utilities and Operations Branch, the Aerospace Metal Forming and Welding Branch, and the Mechanical Integration and Design Branch.

TWO BRANCHES that had top safety records for five consecutive years were the Engineering Support Office represented by Dwight L. Fortna (left) and the Electronics Test Branch represented by Philip Yaffee (right). Eugene Wasielewski who presented the awards is center.



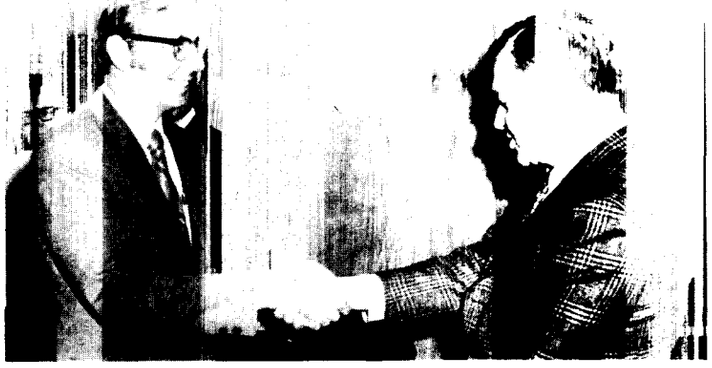
SAFETY MINDED REPRESENTATIVES display the Accident Prevention Awards they received for their branches during a May 4 ceremony. From left are Goddard Associate Director Eugene W. Wasielewski who presented the awards, George Bergen of the Optics Branch, Bernard Cantor of the Fabrication Engineering Branch, Harry Bickford of the Aerospace Metal Forming and Welding Branch, Richard A. King of the Quality Engineering Branch, William G. Brown of the Functional Test Branch, Malcolm J. Tarlton of the Utilities and Operations Branch, Jesse M. Madey of the Mechanical Integration and Design Branch, John F. Fay of the Property and Supply Branch, Philip Yaffee of the Electronics Test Branch, Dwight L. Fortna of the Engineering Support Office, and Camillo Arcilesi of the Structural Dynamics Branch.

Bloodmobile News

The Prince Georges Blood Laboratory reports that it is extremely pleased with the Goddard turnout for the May 12 visit of the Red Cross Bloodmobile. Goddard people donated 195 pints of blood, bringing the total so far this year up to 485 pints. There are 415 more pints to be collected to meet the quota for 1971.

Did you know that blood donated by any Goddard Civil Service or contract employee to any hospital chapter of the American Red Cross may be credited to Goddard's quota? Just indicate how you want your donation credited at the time you give.

The next visit of the Bloodmobile to Goddard will be on July 7 in the Building 8 Auditorium from 9:00 a.m. to 2:45 p.m.



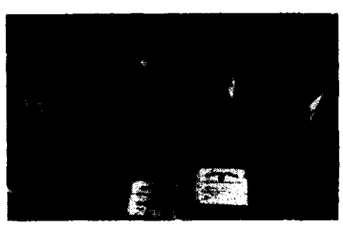
GEORGE D. HOGAN receives a Cost Reduction Commemorative Plaque from Dr. Clark during a series of awards ceremonies on May 25. Others who received Commemorative Plaques were Robert J. Sorrell, Douglas G. Hoover, Paul Butler, and Peter Van Wie.

Annual Cost Reduction Awards

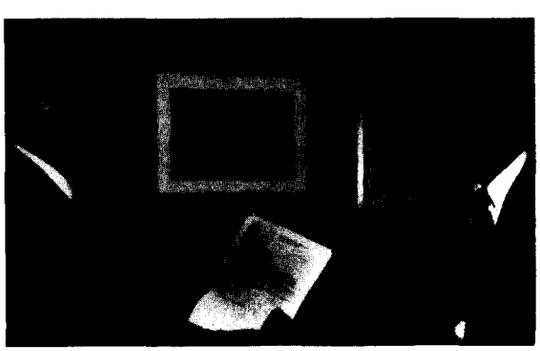
Goddard Director Dr. John F. Clark presented the Annual Cost Reduction Awards on May 25, 1971, in a series of ceremonies held throughout the Center. The awards were presented to 13 men whose quick thinking and dedication to their jobs earned Goddard the highest savings in terms of man hours and dollars during Fiscal Year 1970.

Cost reduction Certificates of Merit and cash awards went to: **Ben Goldman**, Head of the Network Support Branch in the Procurement Division; **Lloyd G. Green**, Senior Computer Systems Engineer in the ERTS/Nimbus Project; **Carmelo E. Velez**, Head of the Trajectory and Attitude Programming Section, Mission and Trajectory Analysis Division; **Herbert Farnham, Paul Shapiro** and **Frank G. Ross**, all Data Analysis Mathematicians in the Computation Division; and **John E. Liner** and **Leonard L. Stewart, Jr.**, both Communications Specialists in the NASA Communications Division.

Commemorative Plaques were presented to: **Robert J. Sorrell**, Project Support Specialist in the Program Support Division; **Douglas G. Hoover**, Property Disposal Officer in the Management Services and Supply Division; **George D. Hogan**, Nimbus-E Spacecraft Systems Manager; **Paul Butler**, Chief of the Explorer Projects Office and IMP Project Manager; and **Peter H. Van Wie**, a Data Analysis Mathematician in the Manned Flight Planning and Analysis Division.



JOHN B. LINER and Leonard L. Stewart, Jr., display their Cost Reduction Certificates of Merit. From left are Dr. John F. Clark, Goddard Director; Ozro M. Covington, Director of Networks; Mr. Liner, Mr. Stewart, and Eugene Wasielewski, Goddard Associate Director. Others who received Certificates of Merit were Ben Goldman, Lloyd Green, Carmelo Velez, Herbert Farnham, Paul Shapiro, and Frank Ross.



SUGGESTION AWARDS were presented on May 4 by Herman E. LaGow (left), Director of Systems Reliability, to Louis J. Demas and Albert E. Fitch (right, inset) for a suggestion that led to the "Reduction in Delay of Vibration Testing of Sounding Rockets due to Telemetry Transmission Problems." Both men work in the Test and Evaluation Division's Structural Dynamics Branch.

CO-DIRECTORS of the 1971 Summer Faculty Fellowship program here at Goddard are (from left) Professor Bertrand Fang of Catholic University, Professor Fawzi Emad of the University of Maryland, and Dr. James C. Morakis of Goddard's Navigation and Data Collection Branch.

Summer Faculty Fellowship Begins Today

Today, June 14, is the opening session of the 1971 ASEE/NASA Summer Faculty Fellowship, a ten-week research-study program sponsored by NASA and the American Society for Engineering Education.

Twenty-four faculty members from U.S. colleges and universities are taking part this year. Conducted at Goddard, the Fellowship consists of a program of lectures, seminars and classes that will benefit both Goddard and the universities through the exchange of scientific ideas.

Co-directors for the 1971 program are Dr. James C. Morakis of the Navigation and Data Collection Branch, Professor Fawzi Emad of the University of Maryland, and Professor Bertrand Fang of Catholic University.

The Summer Faculty Fellowship is conducted in two-year cycles to give participants time to complete research projects begun the year before and to try their hand at solving problems of importance to Goddard.

Goddard Mourns...

Clarence E. Archer, 36, an electronics technician in the Manned Flight Operations Division, died May 17, 1971. Before joining the Goddard staff in March of 1970, he had supported the MFOD program for two years as a member of the Bendix Field Engineering Corporation.

Joseph H. Conn, 33, Assistant Study Manager of the Small Applications Technology Satellite (SATS), died on April 15. During his ten-year career with NASA, Mr. Conn had been honored by the French government for his work on a French satellite and had participated in the launching of two satellites for the United Kingdom.

Michael C. Husich, 45, died on May 5. He came to Goddard in the spring of 1966 and was the Power System Engineer for the OAO 2 spacecraft. Mr. Husich also served as a Center Review Team member for the Nimbus and SAS programs. In August, 1970, he was promoted to head of the Power Systems Design Section, where he coordinated the space power requirements for all projects at Goddard.

David R. McMasters of the Budget Branch died April 21. He was a budget analyst for Advanced Research and Technology and Supporting Research and Technology for three years. He was 47.

William O. Richards of the Sounding Rocket Division died April 16. He was the equipment specialist directly responsible for all shipping and receiving of experimental payloads, rocket motors and necessary support to all the U.S. and foreign firing ranges used by his Division. He was 41.

TOP CLASS IN SESSION. From left are Linda D'Kine, student, Henry M. Thompson, TOP Vice President; Joseph Absalom, student, and Herb Drucker, TOP President.

Employees Found Computer School

NASA and contractor employees in the Network Computing Branch have founded and help perpetuate a unique computer school staffed entirely by volunteers. Called TOP (Training for Opportunities in Programming), the school has recently completed its first class of free instruction to a select group of inner-city students, aged 18 to 41. Interviews are now underway to choose students for the second class set to start on July 7.

Two men responsible for getting TOP started are Herb Drucker and Henry M. Thompson. Mr. Drucker, UNIVAC Apollo SEnior Programmer at Goddard and TOP President in his free time, first conceived of the idea for the school and convinced several of his UNIVAC co-workers and other computer personnel that inner-city people could be trained to be good and competent programmers. Mr. Thompson, an Aerospace Technologist in the Network Computing Branch, found out about the school and volunteered time as a teacher for the first course. He has since helped test and interview students and serves as a student counselor, job recruiter and chief organizer for TOP activities. At present, he is TOP Vice President.

A first step in getting TOP going was to procure classroom space from the Opportunities Industrialization Center (OIC) in Washington. Free computer time was obtained from, among others, the University of Maryland, FDIC, and GE. Many other companies gave books, money and equipment.

Then TOP's initial staff of about 30 people tested and interviewed over 125 applicants. The first class consisted of 37 students, of whom 11 graduated. The course covered basic concepts including assembly language programming for the 1108 computer, COBOL, FORTRAN, RPG, and job placement. Three of the graduates are actively working as programmers for the Association of American Railroads, FDIC, and UNIVAC Apollo here at Goddard. Many of the others have been promoted on the jobs they held while taking the course.

Since this beginning, the TOP staff has grown to over 40 volunteers. An advisory board of prominent businessmen and citizens has been established, and the school has been chartered in the District of Columbia as a non-profit organization.

"However," Henry Thompson says, "we still have two worries—finding jobs for three graduates and improving our future success record so that TOP can eventually be turned over completely to its graduates.

"We are most proud that one of TOP's graduates has already written a program that has been distributed over the country and has received a $400 raise after only two months' work. Another graduate would now be in Lorton were it not for TOP, and TOP's best student has proven that she can adapt by learning two computer languages she was not taught at TOP in only two months on the Job."

In summation, if you can help this organization, contact Henry Thompson on ext. 2423, at his home on 773-8577, or at night at the Department of Vocational Rehabilitation on Pierce Street, N.E., in Washington where future classes will be held.

Leatherwood Sketches at 'Washington and the Arts'

Maceo Leatherwood of the Graphics Arts Branch was the rapid pen artist who covered the day-to-day activities at the "Washington and the Arts" conference sponsored by the Associated Councils of the Arts at the Mayflower Hotel in Washington on May 23 through 26.

President Nixon himself made a personal appearance at the conference which was attended by some 500 delegates representing arts organizations throughout the country. Other notables at the affair included Nancy Hanks, Chairman of the National Endowment for the Arts; Richard Hunt, noted sculptor and painter; East Coast print maker Lou Stoval; Jazz impressario Tony Taylor; and actors Robert Hooks and Vincent Price.

Maceo Leatherwood was invited to sketch the proceedings by Mrs. Bette Lord, the ACA conference director, who was aware of his talent for rapid drawing. His work appeared in the daily conference newspaper "Eagle Ears" and will be a part of a book to be printed this month.

The fast drawing documentary art work which heightens the emotional reaction to a printed piece is one of Maceo's favorite assignments. He hopes to show the outsiders the who, what, where and how of an organization, and at the same time provide insiders with new insights into their day-to-day activities. His particular talent for this type of art presentation began here at Goddard where he is well known for his work in brochures, announcments and the Goddard News cartoon column "Outputts."

Pajama Game for Kids

A special performance of MAD production's "Pajama Game" starring Lou Walter and Jaylee Mead was given for the District of Columbia Department of Welfare Children. Elizabeth Cantor, coordinator of volunteer work for the Dept. of Welfare, Roland VanAllen, GSFC, and Sandy Sadowsky, member of MAD Productions, arranged to have approximately 300 children from the following homes attend this special performance: D.C. Village, Junior Village; Cedar Knoll; Forest Haven; Maple Glen; Action for Children in Trouble (ACT); and Child Welfare Division. Individuals from other organizations, such as: Greenbelt and College Park Golden Age groups and the Great Oak Retardation Center were also guests of MAD.

Residents of Forest Haven wrote a letter of appreciation to Roland VanAllen to pass along to the MAD group. One paragraph read: "Our residents are very grateful when they are invited to activities outside the institution and did express their delight with this particular show."

MAD hopes to do this sort of benefit performance for special groups throughout the area at each of their spring and fall productions throughout the seasons to come.

Tryouts for the fall production will be held in August. *Everyone* has a talent so come out and join the fun. Watch for more MAD news items coming soon.

A TOUR of the United States Capitol building was one of the many side attractions enjoyed by the students. Mary Love Brown has toured the YSC participants the past several years. Her sparkling commentary on the history of the Capitol has always held the students' attention.

GSFC DIRECTOR Dr. John F. Clark joined Congress participants at the reception given for the students, consultants and visiting teachers. About 300 area high school students visited the oral presentations that were given in Buildings 8, 3, and 26.

DR. JOHN CAIRNS, JR. was the featured speaker at the Recognition Banquet held at the University of Maryland's Continuing Education Center. Dr. Cairns is a leading authority on pollution control and heads the Center for Environmental Studies at Virginia Polytechnic Institute, Blacksburg, Virginia.

PAUL GARBER, Historian Emeritus, National Air and Space Museum, Smithsonian Institution, gave participants a personally guided tour of the museum and discussed "Inspirational Leaders from the History of Flight" at a luncheon for the students.

YOUTH SCIENCE

The seventh annual Youth Science Congress was held here at Goddard April 28, 29 and 30 and the forty selected high school students invited to attend left a lasting and favorable impression on many NASA employees, teachers and fellow students. Each of the students were presented with a Congress award and Certificate of Participation at the close of the 1971 Congress.

As in past Congresses held here, the youthful scientists presented oral briefs on science projects they had worked on during the school year. Washington area high school science students were guests to hear the presentations that ranged from microbiology to LASER communications.

Goddard was one of eight NASA field centers to host Youth Science Congresses in 10 regions throughout the United States. The Congress is jointly sponsored by the National Science Teachers Association and NASA.

The busy two and one-half day Congress began with a tour of Goddard followed by a reception in the Director's Conference Room in Building 8 where the students met each other and also became acquainted with the technical consultants and advisors who would work closely with them during their stay.

Highlights of the Congress included a panel discussion featuring Dr. Isidore Adler, Theoretical Studies Branch, Matthew McCartin,

Congress Participants

Richard B. Gold. Baldwin High School, Pittsburgh, Pennsylvania
Sheila M. McRae, Mother Cabrini High School, New York, New York
Hugo E. Huey, Bronx High School of Science, Bronx, New York
Michael B. Hodges, Wolcott High School, Wolcott, Connecticut
Alan S. Grenadir, Martin Van Buren High School, Queens Village, New York
Eric R. Henry, St. Pius X High School, Pottstown, Pennsylvvania
Frank E. Prevost, B.M.C. Durfee High School, Fall River, Massachusetts
Mary A. Calandriello, Saint Dominic Academy, Jersey City, New Jersey
John S. Fedyna, Bergenfield Senior High School, Bergenfield, New Jersey
Lorene M. Lesiak, Saint Dominic Academy, Jersey City, New Jersey
Robert J. Herko, Piscataway High School, Piscataway, New Jersey
Mark S. Noveck, Midwood High School, Brooklyn, New York
Marilyn A. Hudak, Saint Dominic Academy, Jersey City, New Jersey
Barry R. Weiss, Midwood High School, Brooklyn, New York
Sanford N. Kramer, Pikesville Senior High School, Baltimore, Maryland
Michael J. Caruso, Bronx High School of Science, Bronx, New York
James G. McGuire, Gonzaga High School, Washington, D.C.
Ivan Brauer, Bronx High School of Science, Bronx, New York
Robert M. Hackman, Gateway Senior High School, Monroeville, Pennsylvania
Ulus Atasoy, Marlboro High School, Marlboro, New York
Arthur Law, Bronx High School of Science, New York, New York
George Barany, Stuyvesant High School, New York, New York
Michael A. Picheny, Bronx High School of Science, Bronx, New York
Raymond T. Pierrehumbert, North Plainfield High School, North Plainfield, New Jersey
Steven S. Jacoby, Martin Van Buren High School, Queens Village, New York
Mark Lyte, Bergenfield High School, Bergenfield, New Jersey
John F. Kuttesch, Jr., Neshannock High School, New Castle, Pennsylvania
Lynn Orlowitz, Division Avenue High School, Levittown, New York
Eric J. Nestler, Herricks Senior High School, New Hyde Park, New York
Florence A. Nolan, Saint Mary's Academy, Glens Falls, New York
Kenneth Rubenstein, Martin Van Buren High School, Queens Village, New York
Fredrick D. Spelman, Bronx High School of Science, Bronx, New York
Jeffrey A. Andrews, Bethlehem Catholic High School, Bethlehem, Pennsylvania
James K. Stoller, Bronx High School of Science, Bronx, New York
Roberta D. Shahin, Potomac Senior High School, Oxon Hill, Maryland
Marie S. Jernazian, Bronx High School of Science, Bronx, New York
William T. Scharle, Allentown Central Catholic High School, Allentown, Pennsylvania
Vivian A. Kominos, Saint Dominic Academy, Jersey City, New Jersey
Gregory L. Murphy, Greensburg Central Catholic High School, Greensburg, Pennsylvania
Margaret L. Sutton, Oxford Hills High School, South Paris, Maine

CONGRESS 1971

Office of Chief Counsel, Raymond Sumser, Chief of Manpower Utilization Division and Dr. Jacob Trombka, Theoretical Studies Branch. The panel discussed, "How Can Scientific and Technological Resources Be More Responsive to Human Needs". Dr. George F. Pieper, Director of Space Sciences, spoke on "Space in Perspective" at the formal opening of the Congress.

The panel discussion and Dr. Pieper's remarks set the tenor for the Congress as the students gave their oral presentations. During their free time not only their projects but the environment, human needs and resources, the future of science and technology and politics were freely discussed in "rap sessions".

Technical consultants, teacher advisors and guests attended the recognition banquet where Dr. John Cairns, Professor of Biology and Director of the Center for Environmental Studies at Virginia Polytechnic Institute, spoke on "Planning for Survival on Spaceship Earth." Dr. Cairns used his present studies at VPI to discuss environmental pollution and pointed out that technology alone cannot solve the problem, but that social and political concern are also key to the solution.

Elva Bailey, Educational Programs Officer and Dr. James Latham, Science Consultant, Maryland State Department of Education were Congress coordinators.

Technical Consultants

Dr. Isidore Adler, Laboratory for Space Physics, GSFC
Frank Bradley, George Washington University Medical Center
Hans O. Bremer, Space and Earth Sciences Computing Center, GSFC
Charles H. Carter, University Affairs, NASA Headquarters
Sherwood Chang, Office of Space Science and Applications, NASA Headquarters
Dr. Philip J. Cressy, Laboratory for Space Physics, GSFC
Vitaly Danchenko, Space Applications and Technology Directorate, GSFC
Lee N. Foster, Space and Earth Sciences Computing Center, GSFC
Loyal G. Goff, Office of Space Science and Applications, NASA Headquarters
Dr. Andrew F. Hegyeli, Walter Reed Army Medical Center
Dr. Frank C. Jones, Laboratory for Space Physics, GSFC
Thomas N. Kelsall, Laboratory for Space Physics, GSFC
Dr. Norman H. MacLeod, Laboratory for Meteorology and Earth Sciences, GSFC
John H. McElroy, Tracking and Data Systems Directorate, GSFC
L. W. Nicholson, Projects Directorate, GSFC
Dr. Joseph F. Saunders, Office of Manned Space Flight, NASA Headquarters
Richard L. Schmadebeck, Laboratory for Space Physics, GSFC
Edward C. Sullivan, Laboratory for Space Physics, GSFC
Walter Sullivan, Office of Manned Space Flight, NASA Headquarters
Dr. Raymond C. Waddel, Space Applications and Technology Directorate, GSFC

ROBERTA SHAHIN, of Oxon Hill High School in Prince Georges County, receives her medal and Certificate of Participation from Mr. Elva Bailey, Goddard's Educational Programs Officer. Prince Georges County School's Science Supervisor Dr. Howard Owens joined Miss Shahin for the presentation.

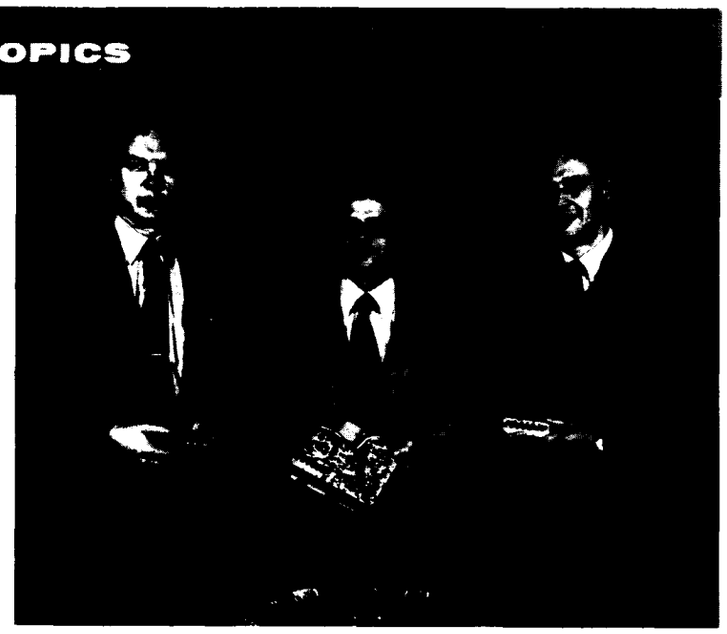
STUDENTS "RAP" with Walter Sullivan, Office of Manned Space Flight, NASA Headquarters, during a reception in the Director's Office. Mr. Sullivan was one of the twenty Technical Consultants chosen to assist the students during the Congress.

HIJINKS by the students proved that they weren't a group of "stuff shirts". Many new friends were made, ideas exchanged and "gaps spanned" between the students and the adults that participated in the Congress.

CONGRESS participants and teachers came from seven states and the District of Columbia. Eight groups of five students each were assigned teacher advisors during the YSC. The program is funded by NASA and administered by the National Science Teachers Association.

DATA TOPICS

IMP-I DATA PROCESSING TEAM. From left are John Thompson, Barbara Walton, Christopher Daly, Ronald Durachka, Richard Bunevitch and Elijah Poole. Missing are Richard Lahn and William Barnes.



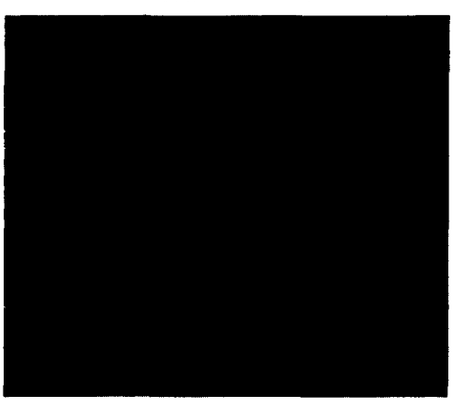
JOHN R. BADGER (from left), Don J. Sabourin, and Don E. Hansen of the GRARR Section, RF Systems Branch, Network Engineering Division, display circuit modules and transmitter built for the GRARR S-Band Transponder Test Set to be used for the test and evaluation of the Nimbus-E GRARR S-Band Transponder.

IMP-I Quick-Look Data Processing

By Elijah Poole
Information Processing Division

The IPD Data Processing team for IMP-I recently completed its longest period of Quick-Look support for a satellite. Beginning with the launch on March 13, support was provided for a period of eight weeks. Experimenters who used the Data Reduction Laboratory facilities of IPD were able to see their data in the form of plots on CRT displays as well as the usual numerical tabular type printouts. Within an hour after data was transmitted by the spacecraft in real time through the Rosman and Alaska stations to GSFC, it was analyzed by UNIVAC 1108 computer programs and viewed on online CRT displays.

Another dimension in Quick-Look data processing was the support of a remote experimenter. Dr. J. A. Simpson, Principal Investigator of the Cosmic Ray Experiment received data via telephone lines at the University of Chicago. Typically an IMP-I pass was run on IPD's UNIVAC 1108 computer and stored on catalogued FASTRAND files. On a ready signal from a computer at the University of Chicago data was transmitted and recorded on tape for further analysis.



THIS TYPE FREQUENCY PLOT was demonstrated by Dr. R. Stone at Goddard's Tenth Anniversary Symposium. A series of these displays gave information on solar activity.

Investigators who utilized the DRL support on site were: Dr. Thomas L. Aggson, Principal Investigator, Direct Current Electric Fields Experiment; Dr. W. C. Erickson, Principal Investigator, and Dr. Robert G. Stone, Coinvestigator, Impedance Probe and Radiometer Experiment; Dr. F. T. Haddock, Coinvestigator, Radio Astronomy Experiment; and Dr. Paul J. Kellog, Coinvestigator, Electric and Magnetic Fields Experiment.

Goddard Computers Aid Circuit Design for GRARR System

The Goddard Range and Range Rate (GRARR) System has provided tracking data for several years so that Goddard's computers could calculate spacecraft orbits. Now, these same computers are being used to design new circuits for the GRARR System.

Faced with the task of providing specialized circuit designs for the GRARR System, John R. Badger, of the GRARR Section, RF Systems Branch, Network Engineering Division, decided to write computer programs for the many complex mathematical design problems. Programs successfully developed provide for: Transistor Characterization; Transistor Feedback Amplifier Design, Ladder Network Analysis; Low Pass and Bandpass Filter Design; Phase Modulator Analysis; Mixer Cross Product Analysis; Matching Network Design; and Step Recovery Diode Multiplier Design. Computers can determine the circuit parameters within microseconds and with a precision unattainable by hand methods. The computer designs take into account normal circuit element tolerances and, when breadboarded, give results amazingly close to those desired. Only minor adjustments are usually required to account for stray effects which cannot be adequately predicted.

The payoff for this effort came late in December 1970. A decision, to change the GRARR S-Band transmitter frequencies, was made which affected the GRARR transponder being built for Nimbus-E. This required a crash program to modify a GRARR S-Band Transponder Test Set.

Considering that this task had to be accomplished within a few months, it was decided to do the task "in house" and the responsibility for its performance was given to Donald J. Sabourin, John R. Badger, and Donald E. Hansen of the GRARR Section.

Using Mr. Badger's programs, the requirements for the new circuits were fed into Goddard's 360/91 and 360/95 computers and a HP9100 calculator computing system and the desired designs obtained. The designs were breadboarded, refined, and final production models built for the GRARR S-Band Test Set. A total of ten different circuits built into fifty modules were required for the project. The Test Set modification was completed within six months; a feat unattainable with the manpower available using older hand calculation and trial and error methods.

GODDARD AROUND THE WORLD

Madagascar STADAN Recieves Performance Award

A Goddard satellite tracking station staffed by nationals of the Malagasy Republic has been cited for outstanding performance and recognized by the U. S. Ambassador to the Malagasy Republic and several members of the United States Congress.

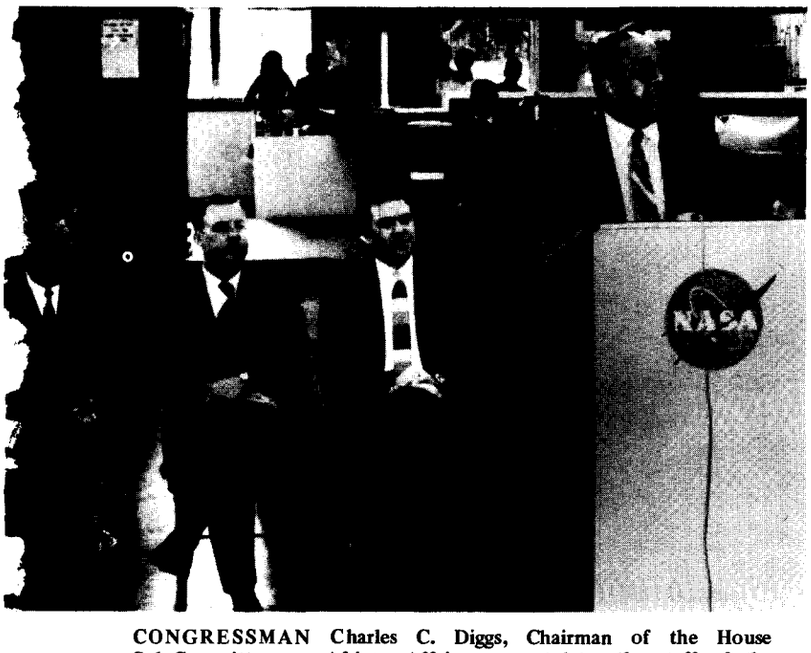
Personnel at the Tananarive, Madagascar NASA facility were honored by Ambassador Anthony D. Marshall and Congressman Charles C. Diggs (D-Mich.), Chairman of the House Sub-Committee on African Affairs, and Sub-committee members, J. Irving Whalley (R-Penn.), J. Herbert Burke (R-Fla.), and Edward J. Derwinski (R-Ill.). Mr. E. G. Shellor, President of the Bendix Field Engineering Corporation, Columbia, Maryland, operators of the station, presented the station staff the firm's "Outstanding Performance" plaque.

The award, made in February, was for a performance rating of 99.92 which was the highest achieved by any NASA tracking station for the last quarter of 1970.

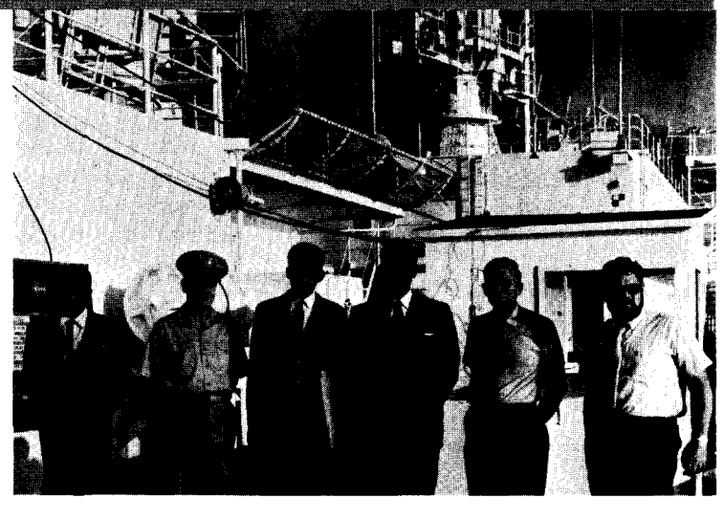
Eleven Malagasy nationals received special commendations for operating the NASA Minitrack system at Tananarive for a period of two years without a single operating error. The high efficiency record, which represents upwards of 21,000 error free operations, has not been duplicated by any other of the seven world-wide sites of the NASA tracking network that employs the Minitrack system.

In addition to the U. S. officials, several high ranking Malagasy government officials and ministers attended the award ceremony. Ambassador Marshall, Congressman Diggs and John South, Acting NASA Station Director, spoke to the gathering of station personnel at the award ceremony and offered their congratulations.

Following the award ceremony the Malagasy and U. S. visitors were given a tour of the NASA station.



CONGRESSMAN Charles C. Diggs, Chairman of the House Sub-Committee on African Affairs, congratulates the staff of the Tananarive, Malagasy Republic, NASA tracking station on their outstanding performance. The station received an "outstanding performance" award from the Bendix Field Engineering Corporation. Seated (from left to right) are D. L. Calp, Senior Manager, Bendix Engineering Corp.; M. E. Kline, Program Manager for BFEC and E. G. Shellor, President of BFEC. BFEC is operator of the station for NASA.



DURING THE VANGUARD'S VISIT to Barbados, a special tour was conducted for the acting Governor General of the island, Sir William Douglas. From left are Major Error Sealy, aide to the Governor General; Captain Duncan S. Baker, Master of the Vanguard; Sir William Douglas' son Peter, Sir William, Station Director Otto W. Thiele, and Christopher Snow, Public Affairs Officer, United States Embassy. The actual Governor General, Sir Winston Scott, was off the island at the time. Sir William is normally the Chief Justice.

Vanguard at Barbados

The USNS Vanguard, a fully equipped tracking station in Goddard's MSF Network, was well received during a visit to Bridgetown, Barbados on May 11-16. The ship was in the Central Atlantic region to support Mariner Mars 71 and made the port of call at Bridgetown for documentation, mail and general re-supply.

Station Director Otto Thiele reports that "Not only was this the first visit of an Apollo ship to the island, but apparently the first instrumentation ship of any kind to dock there." Local press, television, C.B.C., and radio representatives had requested an interview and tour through the American Embassy and were received shortly after arrival. An additional tour was given later for the scientific community represented by the University, Ministers of Science, the Ministry of Communications, the World Meteorological Organization, the High Altitude Research Project (HARP) and others.

Following the second Mariner launch, the Vanguard returned to its home port at Port Canaveral, Florida.

THE AMERICAN AMBASSADOR to the British West Indies, Eileen Donovan, made a courtesy call to the Vanguard during the stop in Barbados. Visiting an MSFN Station was not totally new to Ambassador Donovan since she had previously visited the Dow Hill station in Antigua before it was deactivated. Shown with the Ambassador are Christopher Snow, Public Affairs Officer for the American Embassy; Otto W. Thiele, Station Director; and Captain Duncan S. Baker, Master of the Vanguard.

GUM NEBULA .... From Page 1

astronaut, John Young, is scheduled to observe the Gum Nebula with a special electronographic camera, to be set up on the Moon during the Apollo 16 mission.

Among the Gum Nebula theories put forth at the Symposium was that of Dr. Leo Sartori (MIT). Working with Professor Philip Morrison, he has suggested that the nebula was ionized by ultraviolet light from helium atoms in a shell around the supernova. Dr. Reuven Ramaty of our Laboratory for High Energy Astrophysics countered this idea with the suggestion that the nebula was actually ionized and heated by cosmic ray particles from the exploding star. There is no doubt that the nebula is very hot, as Mr. Joseph K. Alexander (Laboratory for Extraterrestrial Physics) announced new results from the RAE-1 satellite at the symposium. These data show that the temperature of the Gum Nebula is at least 50,000°C. Dr. Richard McCray (Harvard University) called attention to another theory, developed by Dr. Wallace Tucker of the American Science and Engineering Corp., according to which the nebula was produced by radiation from a blast wave set off by the supernova. Everyone agreed that we have enough theories to compare now, and what is needed most is more observations. Already a new French satellite, called D2A, launched in April, is scanning the sky for other objects similar to the Gum Nebula. According to Dr. McCray, if they are common, then they represent the long-sought source of the heating of the gas in interstellar space.

PROFESSOR BART J. BOK, who retired as Chairman of the University of Arizona Astronomy Department last year, showed new photos of the Gum Nebula, which he took in Chile a few weeks before the symposium. Dr. Bok was Director of the Mount Stromlo Observatory in Australia during the 1950's when the late Dr. Colin S. Gum made the observations that revealed the nebula which now bears his name.

PROFESSOR FRANK J. KERR, of the University of Maryland, who worked with Dr. Gum in Australia, described the career of the young astronomer who discovered the nebula, helped define the position of the central plane of the Milky Way Galaxy, and then perished in a crevasse while skiing on Switzerland's hazardous Mer de Glace (sea of ice) glacier.

Is String The Only Thing You Can Save?

Then You Had Better Buy U.S. Savings Bonds

Handicapped Workers Help STADAN

Handicapped employees at an Easter Seal workshop in Maryland are helping Goddard's Space Tracking and Data Acquisition Network (STADAN) by packing the 6,000 skill kits used in teaching the NASA-STADAN Hand Soldering Course. These kits consist of 80,000 piece parts that will be soldered and assembled by students taking the course at the Network Test and Training Facility and STADAN stations around the world.

The Bendix Field Engineering Corporation, prime M&O contractor for the STADAN, was tasked to provide the skill kits. Bendix, with the concurrence of NASA, subcontracted the work to the Easter Seal Society for Crippled Children and Adults, Inc. of Baltimore. The society's employees are experts, it was found, at the close and often tedious work needed to accurately and quickly assemble the kits.

The Baltimore Society is affiliated with both the National and the Maryland Easter Seal Societies for Crippled Children and Adults, Inc., and participates in the annual Easter Seal appeal. In June 1970 the Society became an affiliated member of the United Fund of Central Maryland, Inc. The purpose of the Society is to devise and initiate programs to help prevent handicapping accidents and to evaluate and prepare the mentally and physically handicapped for productive living. Its broad objectives are to assist disabled persons and their families in finding and making effective use of resources that will be helpful to them in developing their abilities and living purposeful lives.

From its headquarters at 1111 East Cold Spring Lane, Baltimore, Maryland 21239, the Society assisted more than 2300 handicapped persons in 1970 in Baltimore City and Baltimore and Howard Counties. The NASA-Bendix work will help increase that figure while at the same time providing a valuable service to Goddard's STADAN.

WORKERS at the Easter Seal Society for Crippled Children and Adults, Inc., in Baltimore, Maryland, package "skill kits" to be used in teaching the NASA-STADAN Hand Soldering Course at the Network Test and Training Facility here at Goddard and at the tracking stations around the world.

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Editorial Staff

Nancy Mengel Jim Kukowski

Mrs. Patricia Ratkewicz, Ext. 4141