

GODDARD NEWS

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

VOLUME IX, NUMBER 8 JULY 26, 1965



APOLLO Unified S-Band Antenna. W. Paul Varson (left) and Carl O. Roberts are two of the principals in the Apollo tracking data acquisition system.

Apollo USB Conference Attracts 450 Nationwide

Some 450 scientists, engineers, and tracking/data experts attended the 2-day Goddard conference on the Apollo S-Band System, July 14-15.

Conference Chairman was Kenneth E. Peltzer, of Goddard's Manned Flight Support Office (T&DS). Co-chairman was George E. Abid, Project Support Branch (OA). Goddard's Associate Director Eugene W. Wasielewski was the introductory speaker.

Under discussion by twenty-nine speakers, of whom twenty-four were Goddard personnel, and by numerous panel groups were solutions to telecommunications problems of future manned spaceflights to the moon and back.

Ozro M. Covington, Goddard's Deputy Assistant Director for Tracking and Data Systems, said:

"From what I observed, the conference certainly accomplished its main purpose of providing comprehensive information to the many Government and contractor organizations who are participating in various aspects of the Apollo Network Program. This is further brought out by the many favorable comments and by the interest displayed by visitors. The participation of speakers from the Manned Spacecraft Center, Jet Propulsion Laboratory, Marshall Space Flight Center, and Goddard, contributed greatly to the success of the conference."

Goddard speakers who presented papers at the technical conference were: W. Paul Varson, Werner D. Kahn, Lloyd E. Hightower, Nicholas Raumann, John Flowers, John B. Martin, John H. Jacobi, George Hondros, Thomas E. McGunigal, William M. Hocking, Raymond L. Granata, James J. Donegan, Jerome Barsky, Carl O.

Roberts, Jr., William A. Dentel, Carl B. Knox, George N. Georgeadis, Raymond H. Newman, Jr., William B. Dickinson, Merton D. Greene, and Lloyd C. Shelton. Program status was presented by Ozro M. Covington in the last session on July 15. (See Page 2)

Dr. Goett to NASA Hdqtrs.; Dr. Clark, Acting Director

Dr. Harry J. Goett, Director of Goddard, became Special Assistant to NASA Administrator James E. Webb, effective July 22.

Dr. John F. Clark, NASA Director of Sciences for Space Science and Applications, was named Acting Director of Goddard.

Dr. John W. Townsend, Jr. Assistant Director for Space Science & Satellite Applications, became Deputy Director of Goddard. The position of Deputy Director is a new post at the Center. Eugene W. Wasielewski continues as Associate Director.

Dr. Goett, who plans to retire from Civil Service next July, will assist the Administrator in carrying out a number of scientific responsibilities and functions.

Dr. Clark will serve as Acting Director until a successor is named.

(See Pages 6 & 7)

Goddard's Part in the Mariner-IV Probe

Goddard communication links and a scientific experiment developed by four GSFC scientists contributed to the Jet Propulsion Laboratory's highly successful Mariner-IV mission.

A Cosmic Dust Experiment which has functioned successfully aboard the spacecraft was the brainchild of four Goddard men: W. Merle Alexander, Head of the Astrophysics Section; Otto E. Berg, Curtis W. McCracken, and Luc Secretan, along with Dr. J. Bohn and Dr. O. P. Fuchs of Temple University.

Its purpose was to make direct measurements of the dust particle momentum and distribution near the earth, in interplanetary space and in the vicinity of Mars. The experiment weighs two pounds and is mounted on the upper side of the spacecraft. The sensor plate, which yields a microphone signal when struck by a dust particle, measures 8" x 10".

Otto E. Berg, of Goddard's Astrophysics Branch, said:

"Some 240 impacts by micrometeoroids were registered on the sensor area in the 240-day period. Much of the experiment's success and reliability can be credited to its built-in calibration system, without which the results would have been questionable.

"The experiment's ultimate aim was to determine the hazards of space travel, and it has done an effective job in proving that micrometeoroids are far less hazardous than expected.

"Cosmic dust travels up to 70 times the speed of a high velocity army rifle. This hypervelocity region starts where the projectile's velocity exceeds the speed of sound, which averages for most material from a fraction to 2 kilometers per second."

In discussing the Mariner-IV communications, Robert J. Rodgers of the NASA Communications Division, said:

"Goddard worked with the Jet Propulsion Laboratory (JPL) to develop the communications requirements. We maintained and operated the communications network for them, which involved teletype and voice circuits to Johannesburg, S.A., Madrid, Spain; Woomera and Canberra, Australia. All of which are connected to the Space Flight Operations Facility (SFOF) at JPL."

The Mariner-IV, a mission responsibility of the Jet Propulsion Laboratory in Pasadena, Calif., was launched November 28, 1964, by Goddard Launch Operations, Cape Kennedy.



Curtis McCracken



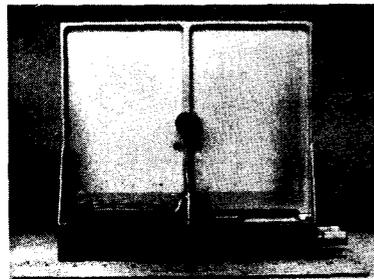
Otto E. Berg



W. Merle Alexander



Luc Secretan



COSMIC DUST EXPERIMENT, a Goddard experiment on Mariner-IV.

EDITOR'S NOTE: Space limitations prohibit our publishing the pictures of all 29 speakers, of which 24 were Goddard men.

Speakers at the APOLLO USB SYSTEM CONFERENCE



KENNETH E. PELTZER, at the lectern, was conference chairman. Co-chairman George E. Abid is at left.



OZRO M. COVINGTON presented program status at last conference session.



Carl Roberts



Ben Hood



William Kuykendall



Lloyd Shelton



Carl Knox

Goddard Workshop Plans New School Supplement on Space Geometry

The third Goddard summer workshop for the development of space-oriented mathematics supplements for secondary schools got under way this month. Sponsored jointly by the U.S. Office of Education and Goddard, the 1965 project envisions the development of supplemental material in space-oriented geometry. This year, the workshop is being directed by Dr. Bruce Meserve, Professor of Mathematics, University of Vermont.

Participants are: Mrs. Evelyn Brayton, Mathematics Teacher, East Lansing High School, Lansing, Michigan; Robert F. Chambers, Science Teacher, Newark, High School, Newark, Delaware; Wilfred H. Miller, Jr., Chairman, Department of Science, Brandywine High School, Wilmington, Delaware; Robert A. Mousseau, Churchill Area School, Pittsburgh, Pennsylvania; John Soroka, Firestone Senior High School, Cleveland, Ohio; and Anthony Trono, Burlington Vermont High School, Burlington, Vermont.

During the first week of the workshop the participants met

PRESENT & FUTURE INVESTIGATION WITH SOME GEOMETRICAL APPLICATIONS FOR DETERMINATION OF FUNDAMENTAL DATA by Mrs. Jaylee Burley, Astronomer, Theoretical Division; DISCUSSION SESSION WITH PANEL OF GSFC MATHEMATICIANS Robert W. Bryant of the Theoretical Studies Branch, Elizabeth E. Corwin and Thomas H. Ratliff of the Spacecraft System Branch; and AMATEUR ROCKETRY by Howard Galloway, Sounding Rocket Division.

The program is directed by a Committee on Space Oriented Mathematics. Dr. Michael J.



GODDARD WORKSHOP FOR SCHOOL SUPPLEMENTS. Seated from left are Anthony Trono of Burlington, Vermont; Mrs. Evelyn Brayton of Lansing, Michigan; Dr. Patricia Spross of the U.S. Office of Education; and Robert F. Chambers of Newark, Delaware. Standing are Wilfred H. Miller, Jr. of Wilmington, Delaware; Dr. Bruce Meserve of the University of Vermont; Robert A. Mousseau of Pittsburgh, Pennsylvania; and John Soroka of Akron, Ohio.

with members of the Goddard staff to be briefed on the Center's mission and the use of mathematics in the scientific exploration of space.

The briefings included: **MATHEMATICS OF ORBIT DETERMINATION** by Dr. Joseph W. Siry, Head, Theory & Analysis Office; **EDUCATIONAL RESOURCES** by Elva Bailey, Richard Crone, Milton Foelske, and Robert Perry, Education and Special Programs Office; **SPACEMOBILE SPACE SCIENCES LECTURE-DEMONSTRATION** by Hendrick Hudson; **MARS: PAST,**

Vaccaro, Assistant Director for Administration, is Chairman; Dr. Patricia Spross, U.S. Office of Education, is technical director; and Alfred Rosenthal, Public Information Officer at Goddard, is publication director.

This committee has already published "What's Up There" and "From Here, Where?" to supplement the material usually studied in elementary and secondary school mathematics classes. These publications are distributed by the U.S. Office of Education and the Superintendent of Documents.

The 'Youth Opportunity Campaign' (YOC) in Action

Thirty young people aged 16 to 21 are working during the summer months here at Goddard in three major areas: Management Services and Supply Division, Technical Information Division, and Facilities Engineering Division, as beneficiaries of President Johnson's *Youth Opportunity Campaign* (YOC).

Upon the President's announcement in late May, four Goddard officials went personally to the United States Employment Service (USES) office and interviewed applicants to speed up the hiring procedure. The officials were *Hugh W. Easter*, Assistant Chief of Management Services and Supply Division; *Leo F. Smith*, Head of the Graphic Services Branch; *Robert E. Lee*, Head of the Goddard Board of U.S. Civil Service Examiners; and *Thomas J. Delaney*, Staffing Specialist and 1965 YOC coordinator.

Ask any of the YOC supervisors how these young people are doing, and you'll get a quick and enthusiastic reply. Leo F. Smith has five YOC employees in his Graphic Services Branch. Here's what he says:

"Their ability is fantastic. I got the surprise of my life. I never expected them to dig in so quickly, and with such enthusiasm, to learn their jobs. They're learning. They're interested. They're making the most of a great opportunity to acquire good work habits and get valuable experience."

Hugh W. Easter, who has ten YOC workers in the Management Services and Supply Division, said:

"It's a pleasure to see young people take serious advantage of a splendid opportunity as our ten are doing. We are pleased with the sharp-mindedness and eagerness of our group as shown by the fact that many of them can dig right into a job, learn it on the spot, and in a short while be proficient enough to teach it to someone else."

John M. Weaver, Head of the Library Branch, said:

"We're delighted with the way the four YOC employees are working out in our branch. They are quick to learn and show a keen interest in their work. Two of them are still in high school. George Robinson, who took his college entrance exams the other day, still has a year of high school. And it's the same with Sandra Carson. She would like to come back to us full time after graduation. Gary Colbert will take off early in September for college in Shippensburg, Pa. Vicki Jenkins, who has studied shorthand, typing and business machines, has just finished high school. This is her first job, and consequently, her introduction to the working world and also to the advantages of a Government job."

N. Philip Miller, Chief of the Facilities Engineering Division, said:

"We have five YOC employees in our division. The program is a splendid idea, offering young people a valuable opportunity. A case in point is Bill Martin, who at 16 handles himself well in an office, running errands for draftsmen and engineers, pulling drawings and making prints. He is conscientious, attentive to duties and very dependable."

Additional young people participating in the YOC program at Goddard are: Eugene Artis, Reginald Brooks, John Burgess, Susan Crandell, Joseph Crivella, Susan Foushee, Thomas Kalo, Blake Lewis, Nancy McIlvaine, Faye Roberts, Vernon Samuel, and Robert Terry.

Robert W. Hutchison, Chief of the Organization & Personnel Division, said:

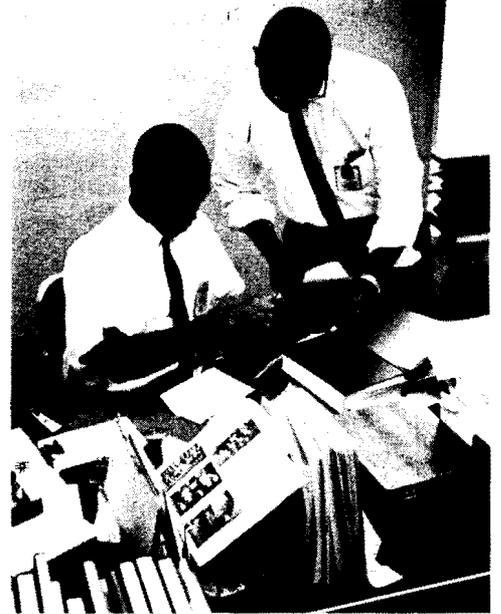
"Through participation in the President's Youth Opportunity Campaign, the 30 young people employed at Goddard this summer are receiving fair wages for real work performed in meaningful space efforts. The satisfaction of contributing to family and individual needs is further increased by the knowledge gained through practical work experience, which for many youths enables them to clear the hurdle of 'that first job' for future employment recommendation."

(Pictures on Pages 4 & 5)



VICKI JENKINS, YOC employee, is cataloging and filing scientific papers and booklets in the Library.

GEORGE ROBINSON (from left) YOC employee, and supervisor Hugh Turner are checking reference material in the Library Branch, Technical Information Division. ➔



EMMETT SWAYNE, YOC worker, is brushing out a Goddard station wagon at the Motor Pool, Administrative Services Branch. ▼



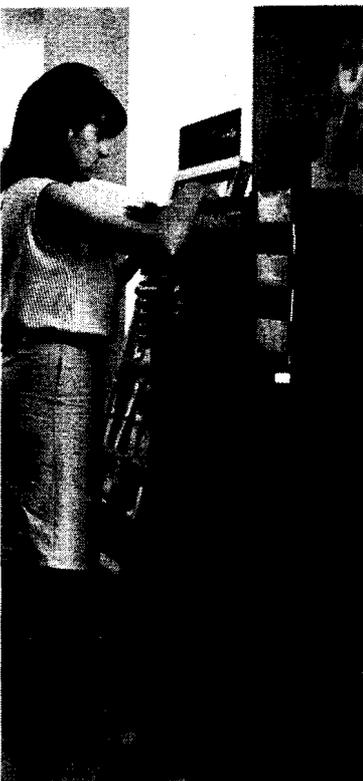
Godard Supervisors Report,

This is the first in a series of four articles on Goddard summer employees.

PHOTOGRAPHER VIRGIL McIE (center) is instructing two YOC trainees: **BOB JEFFRIES** (left) and **MILTON ALSTON** in the Photographic studio. ➔



SHELIA DEPEW, YOC employee, is filing vouchers in the Travel Office of the Management Services and Supply Division.



TERRENCE SHELTON (from left) and **MICHAEL MYERS**, both YOC employees, are receiving an introduction to their summer jobs from Bill Gray in the self-service Stock Room, Storage and Transportation Branch (MSSD).



GARRETT "GARY" COLBERT, YOC is putting books and pamphlets on shelves in the Library Branch, Building I.

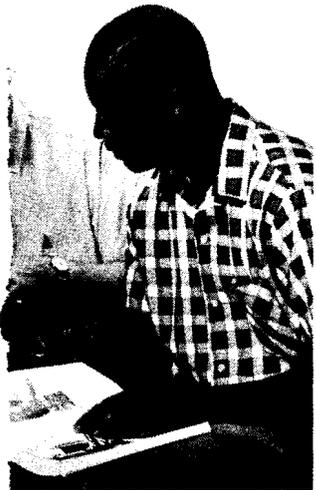


HARRIET SAYLOR (right), YOC employee, and Wilma Mullens are reviewing accounts in the office of the Photographic Branch.

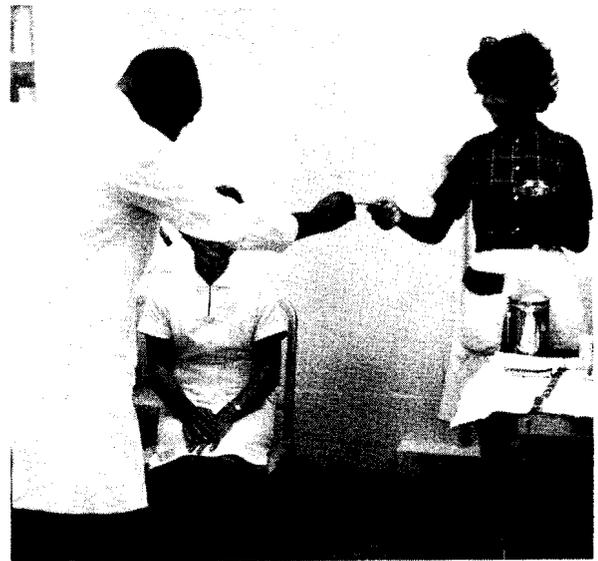


LINDA DeCOFF (right), YOC worker, and Lillian Flee are tabulating vouchers in the Administrative Service Branch (MSSD).

‘YOC Employees Surprise You’

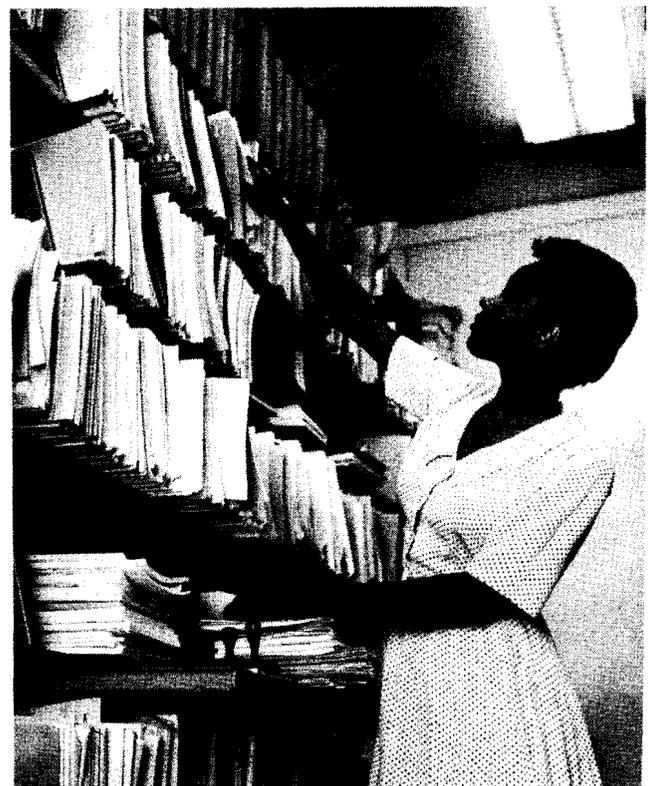


LORETTA ACTY (right) YOC employee, is working as a nurse's aide in the Goddard Health Unit, Management Services and Supply Division, in Building 5. With her are Dr. Edward Cornwell, Jr. and Mrs. Helen Riess, nurse.



SANDRA CARSON, YOC employee, is storing technical notes and proceedings at the Library Branch, Technical Information Division (OA).

FOUR YOC WORKERS in the front office of the Graphic Services Branch, Technical Information Division (AO): **TOM COMER** (from left) **SHARON OLDS**, **JACQUELINE MARTIN**, and **STEVE TURNER**.



worker.
the shelves

Orbiting Spacecraft Puts Earth-Bound Space Chamber To Test

It's no news that test chambers long have been torturing spacecraft prior to launch. But when the situation is reversed and a spacecraft puts an earth-bound spacechamber to the test, then there is a story.

Engineers at Goddard are involved in just such a venture. It is all part of Project ASSESS, so named because it is designed to assess the operation of the Center's Space Environment Simulator (SES). The project also allows Goddard engineers the opportunity to study the behavior of a complete scientific spacecraft under prolonged exposure to a simulated space environment.

In this project, the early performance of a scientific spacecraft in orbit around the earth is being compared to the performance of a sister spacecraft recently "orbited" for six weeks inside the SES. Completed only this week, the project was the first full scale test of the space environment facility.

The extended test in the SES was by far the longest known duration test of any space simulator in the free world. During the 44 day test, the spacecraft inside the chamber witnessed 445 sunrises. Powered only by solar energy, the flight unit received commands for and executed 539 playbacks of data recorded during its "flight." Valuable scientific and engineering data was telemetered at the rate of over 3,000 words per minute during the project.

For the test, the United Kingdom-D or UK-D scientific spacecraft is a fully integrated flight capable unit which served as

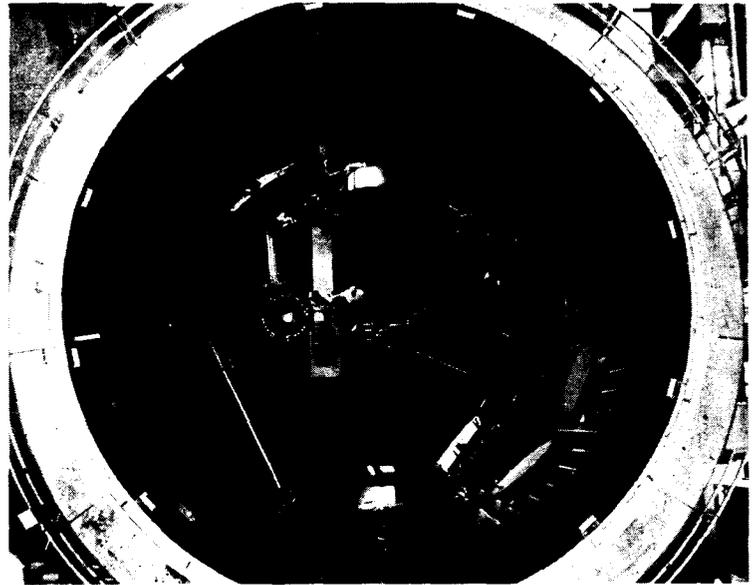
the backup model for the UK-II launched successfully into earth orbit on March 27, 1964. The flight plan for the UK-D inside the chamber followed the general flight plan of the initial flight days of the UK-II.

Project manager for Project ASSESS is Ray Kruger of Goddard's Test and Evaluation Division. According to Kruger, "preliminary review of the data obtained during the prolonged test indicates that operation of the SES was very good throughout the test period."

"The facility maintained a vacuum equal to one/one hundred billionth of the earth's atmospheric pressure at sea level for the duration of the test. The only exception to this was a one hour preventative maintenance break for one of the pumping systems," he added.

"In fact, the spacecraft inside the SES experienced the same minor malfunction of a temper-

(See Page 8)



GODDARD'S SPACE ENVIRONMENT SIMULATOR (SES) located in the Test and Evaluation Division's Building #10 is used to check out unmanned spacecraft under a near vacuum and simulated solar radiation conditions. The chamber can simulate vacuum and solar radiation conditions existing at an altitude of 400 miles. Test units are placed into the chamber from the top after the removable lid is slid to the right side.

Dr. Clark was NASA's Director of Sciences

Dr. John F. Clark, Goddard's new Acting Director, came here from NASA Headquarters, where he was Director of Sciences in the Office of Space Science and Applications.

Dr. Clark was Director of Geophysics and Astronomy Programs (Nov. 1961-May 1962). He served consecutively as Chief, Ionospheric Physics Programs (1958-1959); Chief, Planetary Science Programs (April 1959-Aug. 1960); and Chief, Geophysics Programs (Satellite and Sounding Rocket Programs).

From 1954 to 1958, Dr. Clark served as Head of the Atmospheric Electricity Branch in the Atmospheres and Astrophysics Division, Naval Research Laboratory. From 1948-1954, at NRL, he was responsible for a coordinated series of rocket experiments to measure directly the physical characteristics of the ionosphere. From 1947 to 1948, he served as Assistant Professor of Electrical Engineering at Lehigh University, Bethlehem, Pennsylvania.

From 1942 to 1947, he was an electronics engineer at the Naval Research Laboratory, where he was responsible for research, design and development of radar beacons.



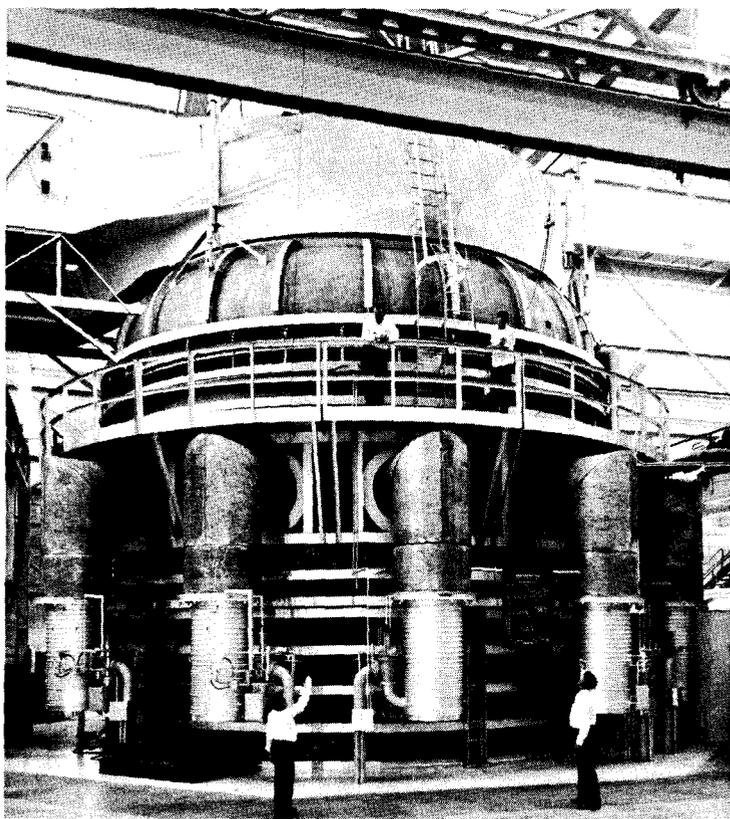
Dr. John F. Clark

Dr. Clark was born in Reading, Pennsylvania, on December 12, 1920. He received his BS Degree in Electrical Engineering (with honors) in 1942 from Lehigh University; his MS Degree in mathematics from the George Washington University (1946) and his Ph.D. in physics from the University of Maryland in 1956.

Dr. and Mrs. Clark and their two children, Linda 19 and James 16, live at 10709 Kinloch Road, Silver Spring, Md.



PERSONNEL from Goddard's Test and Evaluation Division prepare the UK-D satellite for thermal vacuum testing in the Solar Environment Simulator (SES).



THE SPACE ENVIRONMENT SIMULATOR with its dome removed. Inside, engineers work on the UK-D spacecraft in Project ASSESS. The UK-D is fitted on the spacecraft positioner inside the huge chamber.

Dr. Townsend is New Deputy Director

Dr. John W. Townsend, Jr., Goddard's new Deputy Director, was formerly Assistant Director for Space Science and Satellite Applications.

On graduation cum laude from Williams College (1949) with a BA, plus an MA in Physics, he joined the Naval Research Laboratory and participated in development of radio frequency Mass Spectrometers for rocket research work. He received an honorary Doctor of Science degree from his alma mater.

Between 1949 and 1958, Dr. Townsend was Head of the Composition Unit, Rocket Sonde Branch, and then Chief of the Rocket Sonde Branch of NRL.

He came to Goddard in 1958 as Chief of the Space Sciences Division and was made Assistant Director for Space Science and Satellite Application in April, 1959.

Dr. Townsend has achieved prominence in the field of space technology. He is the author of numerous scientific papers, has received the Professional Achievement Award (1957), the



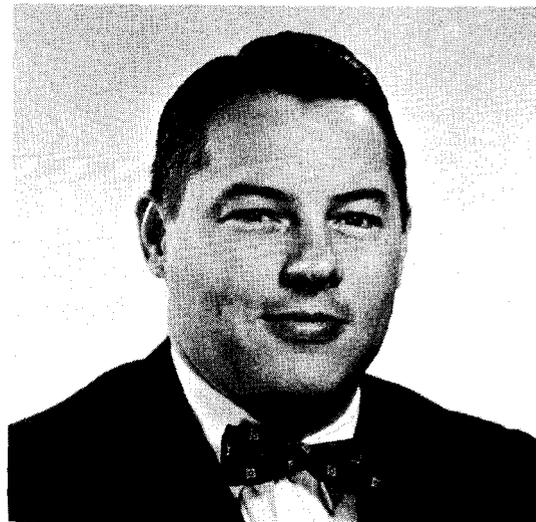
Dr. John W. Townsend, Jr.

Meritorious Civilian Service Award from the Navy (1957), and attended the Brookings Conference for Federal Scientific Executives (1960).

Dr. and Mrs. Townsend and their four children reside in Severna Park, Maryland.

Meet Our People

This is another in a series of articles on Goddard personalities



Robert C. Baumann

Robert C. Baumann, an early member of America's space team, is Chief of Goddard's Spacecraft Integration and Sounding Rocket Division.

He holds the first U.S. patent on a satellite, issued in May, 1958, and is co-inventor of the Spin Adjusting Mechanism, a patent filed in April, 1959, on a device to control rotation rate of objects in space.

He has published numerous papers and government reports, such as the "Design Fabrication & Testing of the First Man-Made Satellite," presented to the American Rocket Society in April 1957, and "The Ariel I Satellite," presented in May, 1963, to the Royal Society in London, England, and later published in the Proceedings of the Royal Society.

During a two-year period, 1956 through 1958, he presented over fifty lectures on satellites and Project Vanguard to technical groups, professional societies and the general public.

He joined Goddard in October, 1958, after 10 years at the U.S. Naval Research Laboratory (NRL). As Head of the Satellite Structures Group, his last assignment at NRL was on Project Vanguard.

Since then he was Head of the Mechanical Systems Branch, Project Manager of ARIEL I—1st International Satellite Project Coordinator of SERB—Explorer XV, Vice Chairman of the Goddard Dedication, and Co-Chairman of the 5th Anniversary of Tracking.

As division Chief, he has charge of the project management, engineering, engineering development and integration of spacecraft, satellites, space probes and sounding rockets, from project initiation through launch. He is also responsible for the engineering and integration of allied ground support equipment, as well as the design and development of electronic subassembly packing techniques, and advanced technical development in the areas of materials, structures, mechanisms, and theoretical analysis capability. In addition, he is current Project Manager of ESRO I and II, and Vice Chairman of the GSFC Reliability Assurance Council.

He served in the U.S. Marine Corps in World War II and graduated from the George Washington University with a BME degree in 1953.

A senior member of the American Institute of Aeronautics and Astronautics, Mr. Baumann also is a member of Phi Sigma Kappa and Theta Tau national fraternities, and the Seabrook Maryland Little Theater.

His primary hobby is rock collecting, and his special interests and activities are centered around camping, fishing, and raising children.

Mr. Baumann and his wife, Evelyn Jean, live at 9308 Woodberry Street, Seabrook, Maryland, with their five children: Merry Christine, 14, Robert Allen, 12, William Charles, 8, Elizabeth Evelyn, 7, and Lucinda Louise, 6.



DR. RAMOND C. WADDEL, (left), Consultant to Goddard's Spacecraft Technology Division, receives a plaque July 14 at the 1965 IEEE Annual Conference on Nuclear & Space Radiation Effects in Ann Arbor, Michigan, for the best technical paper presented at the 1964 IEEE conference, titled: "Radiation Damage to Solar Cells on Relay I and Relay II." Chairman Edward E. Conrad presented the award.



IEEE CONFERENCE ON NUCLEAR & SPACE RADIATION EFFECTS. Frederick Gordon, Jr., (center in light coat) of Goddard's Space Power Technology Branch, was chairman of a round table discussion on Electronic Design for Space Environments. At far left is Roland L. Van Allen, Head of Goddard's Video Techniques Section. The conference was held at the University of Michigan, Ann Arbor, Michigan, July 12-15, 1965.

Orbiting Spacecraft—

(From Page 6)

ature sensor which its sister spacecraft experienced in orbit," Kruger concluded.

Description of the SES

The Space Environment Simulator is essentially a large vacuum chamber equipped with an artificial sun in its dome and an inner-wall which is black and can be temperature-controlled to simulate the dark and cold of outer space. A mechanical spacecraft positioner has been installed inside the chamber to orient test satellites in relation to the artificial sun overhead.

The dome of this chamber is lifted and moved to one side with a special handler when spacecraft are to be placed inside for testing. The satellite is lifted into the chamber with a 15-ton overhead crane. An airlock door in the base of the chamber permits personnel to enter prior to and after tests to work on the test satellite.

The Space Environment Simulator is equipped with a closed circuit television system which permits observation of the tests being conducted inside the chamber. Six cameras located at special observation ports in the chamber allow the test to be observed from different angles. The viewing screen for this system is located on a control panel which is part of a nearby Master Console from which the SES is controlled and monitored.

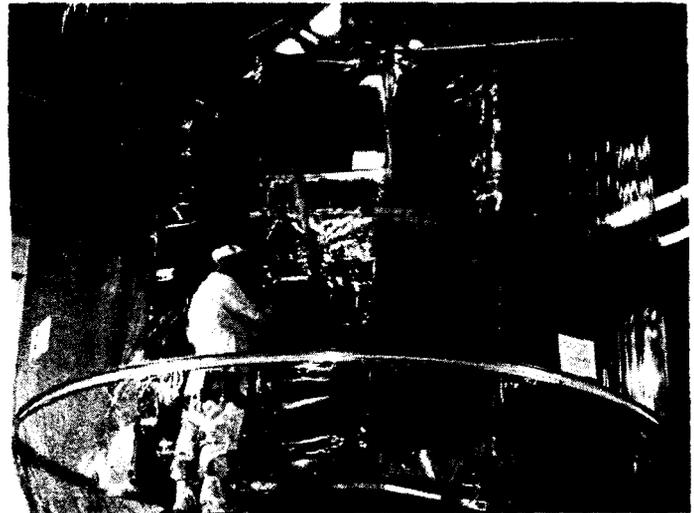
The Need

It is often necessary to control the temperature of a satellite in outer space to within a few degrees for proper operation of its sensitive scientific instruments. This is achieved by design measures which regulate the heat balance of the spacecraft by controlling heat absorbed from solar and planetary sources and heat rejected back to space.

Dependence of spacecraft function upon controlled operating temperature requires that experimental verification of spacecraft operation be made under simulated orbital conditions in an advanced facility such as the Space Environment Simulator.

Simulated space environment tests of the individual components and sub-assemblies of the actual flight model of a satellite eliminate many potential causes of failure. After all of these components and the spacecraft's scientific experiment packages have been integrated with the structure, additional tests of the ingrated spacecraft are necessary to verify operation of the entire system for flight. Such tests demonstrate the compatibility of the system elements and permit identification of interactions which can not be found during separate tests of the components and sub-assemblies.

A large thermal-vacuum facility like the SES is required to subject large, advanced satellites such as the OGO to these tests.



ORBITING ASTRONOMICAL OBSERVATORY (OAO) in a dust-free plastic tent, is undergoing checkout tests at Grumman Aircraft Engineering Corporation. It is one of the nation's most advanced scientific satellites ever developed. OAO, scheduled for launching early in 1966, is a program managed by Goddard. It will give scientists their first view of the universe above the distorting influence of the earth's atmosphere.

GODDARD NEWS

JULY 26, 1965

"It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow."

—DR. ROBERT H. GODDARD

The Goddard News is published biweekly by the Public Information Office of the Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.

Jerry Stark, Editor

Stephen Jacobs, Editorial Assistant

Photography by Goddard's photographic branch

* Press date precedes publication date by approximately seven days.