

# GI GODDARD NEWS



THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

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## GODDARD'S ROLE IN GT-4

**PICTURE ABOVE.** Gemini IV spacecraft is lifted aboard USS Wasp. Navy frogmen had the flotation collar in place and stayed with the spacecraft until the USS Wasp could make the pickup from 48 miles away.

**PHOTOS AT RIGHT.** Astronaut Edward H. White II is performing his spectacular space feat (EVA) during the third orbit of the Gemini-Titan 4 flight. He floats into space, secured to the Gemini-4 spacecraft by a 25-foot umbilical line and a 23-foot tether line, both wrapped together with gold tape to form one cord. Astronaut White became the first American astronaut to egress his spacecraft while in orbit. He remained outside the spacecraft for a total of 21 minutes. He wears a specially designed space suit for his extravehicular activities, and has in his right hand a Hand-Held Self-Maneuvering Unit which he used to move about in the weightless environment. His emergency oxygen supply is in the chest pack. White and the GT-4 Command Pilot, Astronaut James A. McDivitt, performed other scientific and engineering experiments before completing their 62 revolutions and returning safely to earth.



## NASA COVERS SOLAR ECLIPSE BY LAND, SEA AND AIR

An all-out effort to probe the Sun's secrets was made May 30, using high-flying jet aircraft, sounding rockets, island expeditions, and balloons launched from a 160-foot private schooner.

The occasion was the 38th and third longest total eclipse of the Sun so far in this century. The place was the South Pacific.

The eclipse permitted a glimpse of solar events normally masked by the bright sky and the intense light of the Sun itself. The zone of total black-out—path of totality—moved eastward about 8,000 miles from the northern tip of New Zealand to the coast of Peru. Except for a few islands and atolls, the path did not pass near land.

The scientists, on land, at sea and in the air, represented NASA, other federal agencies, United States and overseas universities, Douglas Aircraft Co., and two foreign observatories. All were interested in observing the turbulent processes of the

solar atmosphere and the response of the Earth's upper atmosphere and ionosphere to an abrupt interruption of sunlight.

Data obtained was correlated with studies made by other U.S. and foreign scientists during the 1964-65 International Quiet Sun Year (IQSY), a period when solar flares and sunspots are at a minimum. This was the only solar eclipse during the IQSY.

The eclipse was of somewhat unusual length. Near the midpoint of the path across the Pacific, the Moon covered the solar disc for more than five minutes. During the 1963 eclipse over Canada and the northern United States, the Sun was hidden for only 100 seconds. Maximum possible duration is seven and one-half minutes.

A modified NASA Convair 990 research plane flew experimenters and their special equipment at nearly 600 miles per hour along the path of totality. This gave them about 9½ min-

utes of total eclipse viewing time compared with less than five minutes for the ground-based observers.

Flying at about 38,000 feet, the plane was above nearly five-sixths of the Earth's atmosphere and free of ordinary cloud and weather interference.

The aircraft expedition was managed by NASA's Ames Research Center, Mountain View, California, and included Astronaut M. Scott Carpenter. Carpenter conducted an experiment for the University of Minnesota.

On board the plane, in addition to Astronaut Scott Carpenter, were 12 experimenters and 14 associates, including Goddard's Ralph E. Stockhausen and John D. Mangus, both of the Solar Physics Branch. Their scanning interferometer looked through a calcium fluoride window at the solar corona, surveying coronal emission lines from 1 to 3.5 microns to relate them to theoretical estimates of coronal temperatures and densities.

The plane took off from Hilo, Hawaii, to intercept the path of the total eclipse at 132 degrees, 17 minutes west longitude and one degree, 45 minutes south latitude. Interception with mid-totality was timed for 3:23 p.m. EDT, May 30.

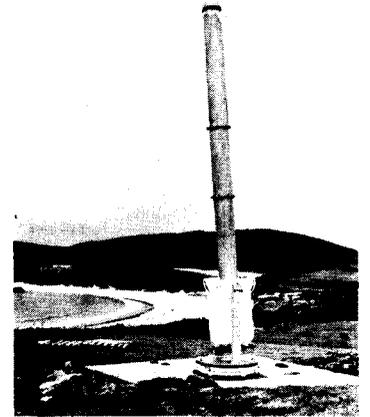
Upon completion of the observations, the aircraft flew to Tahiti to refuel and then returned directly to Hilo. Total flight time was about 15 hours, including the stop at Tahiti.

Two 100,000 cubic-foot balloons were launched from the schooner, "Goodwill," in a project jointly sponsored by NASA and the Office of Naval Research and conducted by Dr. Edward Ney of the University of Minnesota. The sailing ship was made available by its California owner.

The balloons ascended to about 100,000 feet to make observations of the faint corona as far away from the Sun as possible and to record other phenomena such as auroral and airglow emissions and zodiacal light. The high altitude overcame the interference of sky brightness and distortion caused by the dense lower atmosphere.

Launchings were made while the vessel was about 30 miles from the island of Manuae in the Cook Islands.

Firings of six boosted Arcas



**ROCKET LAUNCHER.** Two of this type were used in New Zealand. Miata Bay, in the background, is located on Karikari Peninsula.

rockets were successfully conducted during the eclipse from a site in the path of totality on North Island, New Zealand. The project manager was Ed Bissell, Head of Goddard's Sounding Rocket Instrumentation Section (SS&SA). Mr. Bissell reports:

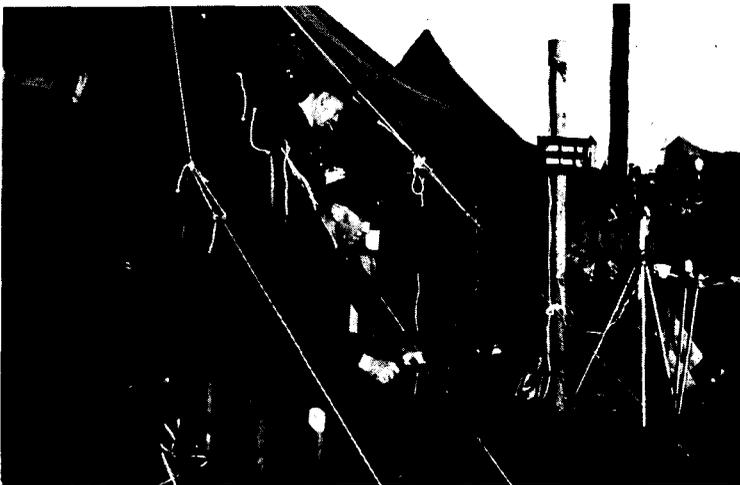
"Starting at 7 a.m., New Zealand time, the firings were conducted at 20-minute intervals for experimental data. All rounds fired perfectly and the experiments were 100% successful. A pre-eclipse launching was made on May 26 to check-out readiness of range and instrumentation."

Project scientists were Goddard's Dr. Joseph A. Kane and Dr. Arthur C. Aikin, both of the Planetary Ionospheres Branch (SS&SA). With them was James Haynes, Payload Technician, of the same branch.

Other Goddard men, from Karl Medrow's Sounding Rocket Branch, were Joe Modlin, Ground Station Technician; and Mike Hendricks, Vehicle Engineer. The rockets carried a radio propagation experiment to measure electron density and a DC probe experiment to measure ion density.

The project was in cooperation with the New Zealand National Space Research Committee. The University of Canterbury at Christchurch managed the New Zealand portion of the project and Goddard managed the NASA effort. The Royal New Zealand Air Force fired the rockets and provided range surveillance.

The rockets, payloads and their ground-support equipment were supplied by NASA.



**COMMAND POST** of the New Zealand experiments. University of Canterbury, Christchurch, New Zealand, and Royal New Zealand Air Force personnel are shown in the picture.



**GODDARD GROUND STATION** instrumentation set-up in New Zealand.

## Baby Nicknamed 'GT-4'

Shortly after the splashdown of GT-4, Goddard's George A. Cassels took his wife, Doris, to the Annapolis Naval Hospital in preparation for another big event—the birth of George Thomas, who made his appearance early June 9, weighing-in at 5 lb. 2 oz.

Not too surprisingly, the happy parents nicknamed their newborn, "GT-4," since his initials are "GT" and the time of birth was 4 a.m.

Since everything turned out so well on the GT-4 mission, we asked Mr. Cassels if he was looking forward to GT-5. He just looked at us and didn't say a word.

Mr. Cassels, who lives at 416 Beach Drive, Annapolis, is a NASCOM Communications Manager in Building 14. He has two other children: Gail, 14, and Sonja, 2.

## Preliminary Results in Laser Tracking Of Explorer 22 and Explorer 27

A meeting was held at Goddard on June 10 and 11, 1965 among organizations which have been performing laser tracking experiments with NASA's Beacon Explorer satellites, Explorer 22 and 27. The organizations participating were:

Goddard Space Flight Center  
DSIR, Radio Research Station, England  
Service D'Aeronomie, CNRS, France  
Air Force Cambridge Research Laboratory  
General Electric Company  
Bell Telephone Laboratories.

Explorer 22 was launched on October 4, 1965 and Explorer 27 on April 29, 1965. A considerable quantity of data was presented during the two-day informal meeting and was subjected to critical discussion and evaluation. The two satellites were fitted by Goddard with special reflecting prisms so as to form an optimum target for bouncing laser beams back to a receiver on the ground. The purpose of the experiment was to answer such questions as—

1. Can a beam from the ground be directed at the satellite with sufficient accuracy to strike it in spite of the extremely narrow pencil beam formed by the laser light transmitter?
2. Does the turbulence in the atmosphere disturb the beam in such a manner as to break it up and prevent it from effectively illuminating the satellite?
3. Can the very short bursts of energy from lasers be utilized for measuring the range of a satellite precisely by means of the time of flight of the pulse?
4. Can the reflected light be photographed against a star background so as to provide very accurate angle position? By means of this accurate tracking, the satellite orbit can be determined very precisely making the technique useful for the study of orbital mechanics and the detailed shape of the earth.
5. What fluctuations in intensity are introduced by propagation of the light beam through the atmosphere?

These questions have an important bearing not only upon the use of lasers for tracking for geodetic and mapping purposes, but also are vital to the use of optical beams in communicating with future deep space missions.

The investigators at Goddard presented results of tracking both of the Beacon Explorer satellites in which reflections from the target were received regularly during most of the pass over Goddard's optical tracking station. Over 260 reflections and range determinations could be obtained during a single pass, thus the difficulty of aiming with the necessary accuracy seems to be coming under the control of new telescopes being developed for this purpose. The consistency of these returns also appeared to allay some of the fears as to how damaging the atmosphere would be for laser propagation. Both the French and Goddard have been analyzing the accuracy of range determinations obtained using laser tracking. These seem to be in agreement with previous calculations. An orbit for Explorer 22 derived by the French team from several laser reflections coincided very closely with the orbit for that same

## Meet Our People

*This is another in a series of articles on Goddard personalities*



**Niles R. "Buck" Heller**

**Niles R. "Buck" Heller**, Chief of Goddard's Manned Flight Operations Division, has charge of the building, maintenance, and technical operation of the world-wide network of stations supporting the NASA manned spaceflight programs, from Project Mercury through Gemini and Apollo.

Asked what he thinks of his job, Mr. Heller replied:

"It's the most interesting, challenging, and frustrating position possible. But I would not make a change for any other job in the world."

Mr. Heller, an early member of the U.S. space team, came to Goddard in 1959 when it was first authorized. He had been with the Naval Research Laboratory since 1946, and was Director of the Project Vanguard Minitrack station in Quito, Ecuador, from 1957 to 1959.

A native of E. Stroudsburg, Pennsylvania, Mr. Heller earned his B.S. degree at Pennsylvania State College and did graduate work at Notre Dame, Harvard, M.I.T., and George Washington University. He has received the NASA Group Achievement award for Project Mercury and the Goddard Sustained Superior Performance Award. As a U.S. Navy electronics officer in World War II, he served aboard aircraft carriers in the Pacific Fleet.

He is a member of the Asociancion Radio Ecuatoriana and is Post Commander of his American Legion organization. His hobbies are gardening and talking golf. He has a 6-handicap, but can't find time to play anymore. Other pastimes include ham radio, Cub Scouts, and the 4-H Club.

Mr. Heller lives at 15 Crain Highway, Sherwood Manor, Mitchellsville, Md., with his wife, Dorothy, and two children: Gary 17, and Nancy, 12.

satellite determined by the Smithsonian Astrophysical Observatory using all the conventional tracking methods available to it. The Air Force representative described an experiment performed in Cambridge by which several photographs of the reflected laser light were obtained.

The English, General Electric, and Goddard reported the reflected signal strength received from S-66 was in agreement with theory.

Directing the NASA effort in laser technology is the Office of Advanced Research and Technology, headed by Dr. Raymond Bisplinghoff. Dr. Henry Plotkin directs the program at Goddard.



**DR. HARRY J. GOETT (left),** Goddard's Director, and **Dr. John W. Townsend, Assistant Director, SS&SA,** listen to conversations of Astronauts McDivitt and White during the first orbit.



**DISCUSSING GT-4 IMPACT POINT,** left to right, **Ed Habib, Assistant Chief, Data Systems Div.;** **"Buck" Heller, Chief, Manned Flight Operations Div.;** and **John T. Mengel, Assistant Director, T&DS.**

**CHECKING GT-4 mission computations are,** left to right, **Cal Packard, Leon Woldroff, Larry Goad, and Larry Jessie,** all of the Manned Flight Operations Division.



## Goddard's Responsibility

**Dr. Paul D. Lowman, Jr.,** Goddard Geologist, whose experiment was aboard GT-4, said:

"The photographs taken by Astronauts McDivitt and White during the GT-4 flight, as part of the Synoptic Terrain Photography Experiment (S-5), proved to be of extremely high quality. Over 120 pictures covering North America, North Africa, and the Arabian Peninsula, were obtained."

**James J. "Jim" Donegan,** Head of Goddard's Data Operations Branch, Manned Flight Operations Division, said:

"The entire computing program and computing system performed without incident during the whole GT-4 mission. Our computed impact-point was within 4 miles of the pick-up point. We not only skin-tracked the booster but also the GT-4 spacecraft. Starting 8 hours before lift-off, we had 80 men working in 12-hour shifts around the clock, with 40 men on each shift."

**James P. "Phil" Carbaugh,** Head of Goddard's Communications Operations Branch, said:

"Everything worked like clockwork. In addition to the regular established crew, we had ten Goddard men on the floor here and three in Honolulu and London, working around the clock—from countdown to splashdown—12 hours on and 12 hours off."

**H. William "Bill" Wood,** Head of Goddard's Manned Flight Operations Branch, said:

"We maintained operation during the whole flight without a major systems failure. For the first time during the Gemini program, we put stations on stand-by status and brought them back up during the mission period. In addition to network station personnel, we had 30 Goddard men at the Houston Control Center as part of the network support team. Twenty-four global-network stations provided orbital support."



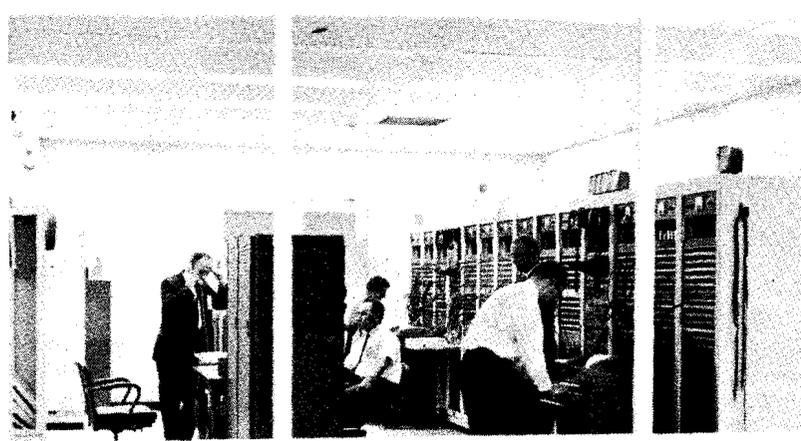
**LISTENING FOR "GO-NO-GO"** decision, left to right, front: **Bill Bahun, Paul Pashby, Bob Kunko, and Don Estridge** (in background).

**JIM DONEGAN, Head, Data Operations Branch,** indicates to **Dr. Harry J. Goett** where impact point will appear on the plotboard.

# ies In Gemini IV Flight



A PORTION of the busy "new" Goddard Realtime Computing Complex during the GT-4 mission.



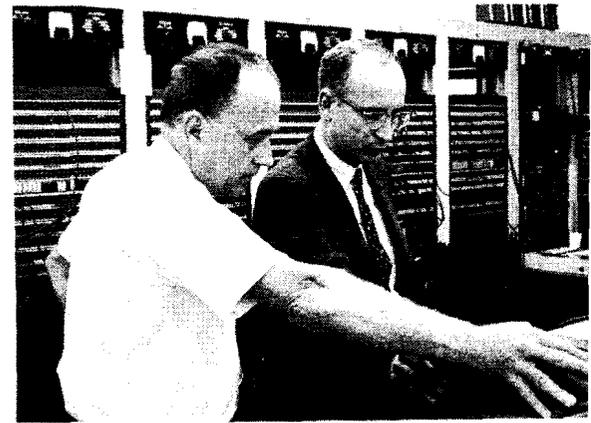
IN THE COMMUNICATIONS AREA, left to right, are: Jones Atkins, Technical Control Supervisor; (background) Cletus Laffey, Technical Controller, monitoring the Rose Knot signals coming from Honolulu; Arturo Heredia, Technical Controller, operating the teletype to Cape Kennedy and Houston; Joseph Sobala, Network Analysis; and Michael Nitka, Technical Controller, communicating with the Rose Knot tracking ship.



WALT ADAMS, CADFISS Test Director, at the "A" computer checks network status and condition of "B" computer during GT-4.



CONTROLLING THE GT-4 NASCOM NETWORK A conference through the "SCAMA" consoles are, left to right, Russell Hoffman, Edward Lawless, and Al Jahnigen

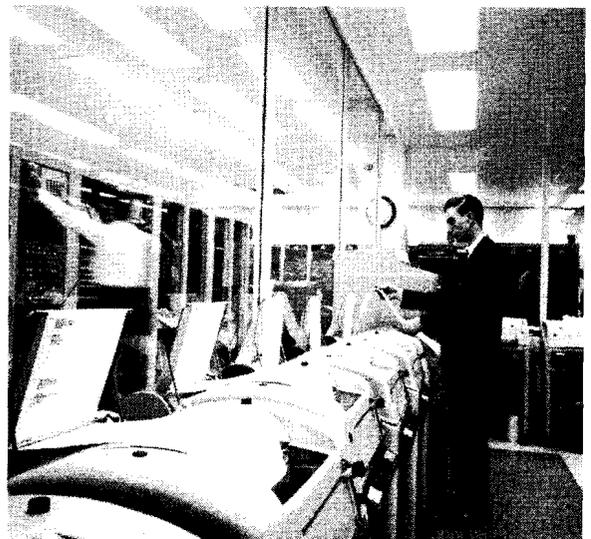


OBSERVING THE HONOLULU, London, A and Adelaide teletype communications link are, left to right, Jones Atkins and Joseph Sobala.

DISCUSSING GT-4 communication routing are, left to right, Duane Robertson, Voice Systems Manager; Jim Lowe, and Euen Marshall.



IN GODDARD'S TELETYPE communications area, Jack Latham checks the 490 communications processor-switched messages.





**COL. JOHN E. WARREN, USAF, (right)** is shown receiving his Gemineer scroll from **William Easter, GSFC representative to the Kennedy Space Center**, after being appointed a member in the Contemporary Order of Gemineers. The presentation was made recently at Patrick AFB during a cocktail party held in honor of the Colonel's retirement from 35 years of military service. Until retirement, Colonel Warren was the DOD Representative for Manned Space Flight at the Cape and participated in both the Mercury and Gemini programs.

## Goddard Hiring Summer Employees In Youth Opportunity Campaign

As part of the Youth Opportunity Campaign (YOC) announced by President Johnson, May 23, Goddard is hiring 25 summer employees, ages 16 through 21.

President Johnson launched the campaign by calling upon all Government agencies—Federal, State, and local—and all private employers throughout the nation to cooperate in providing summer employment opportunities for the two million young Americans leaving school this month.

This is the year that a large number of the "post-war baby crop" of the late 1940's is entering the labor force. It is estimated that half of the unemployment in the United States this month is in the 16 through 21-year-old group. The purpose of the campaign is to provide additional summer job opportunities to American youths who are economically or educationally disadvantaged. The rate of pay is \$1.25 per hour.

The 25 allotted to Goddard are part of the 330 YOC position to be filled throughout NASA. These positions are over and above the normal summer employment and college intern programs in which NASA has participated during the past several years.

Personnel selections to fill positions at Goddard are being



processed through arrangements with the coordinating office of the Youth Opportunity Program, Washington, D.C. which maintains the central register of eligibles for this area. The rule of nepotism applies in this program, whereby children of Federal employees are not eligible for employment by the agency in which the parent works.

## Goddard's Jim Keene Aids Management Intern Seminar



**JAMES KEENE, Personnel Management Specialist at Goddard**, is thanked by **Vice Chairman L. J. Andolsek, U. S. Civil Service Commission**, for his contribution as an advisor to a management intern seminar group, at the final session of the interagency Management Intern Lecture-Seminar Series. The principal speaker for the occasion was Vice President Humphrey.

## Honorary Astronaut Cards Available At Space Park

They're handing out a new status symbol for youngsters at the New York World's Fair this year.

It's an honorary astronaut card signed by Alan B. Shepard, Jr., the first American in space; and Gus Grissom, the first astronaut to make two trips into space.

To qualify for the credentials, all you have to do is visit the United States Space Park at the fair and take a "ride" in the full-scale animated Mercury spacecraft on display there.

Small fry can climb in, push the button, and the countdown begins for an up-and-down ride

made realistic by colored film of the Earth as it looks to an astronaut from 100 miles up.

The Space Park, a two and one-half acre display by the Department of Defense and NASA holds the greatest array of space hardware ever assembled outside Cape Kennedy.

Astronaut Shepard made the first U. S. suborbital flight May 5, 1961; Gus Grissom made the second suborbital flight July 21, 1961 in the Mercury one-man series and, with Astronaut John W. Young, the first manned mission in the Gemini series March 23 of this year.



**DR. HOMER E. NEWELL**, NASA's Associate Administrator for Space Science and Applications, receives the President's Award for Distinguished Federal Civilian Service for 1965. Dr. Newell was cited for being "significantly responsible for this Nation's success in the unmanned satellite and space projects.

*Experiments conducted under his inspired and inspiring professional direction have opened, new vistas in the use of earth satellites to serve the betterment of all mankind."*

Dr. Newell received a gold medal from the President in a ceremony at the White House Rose Garden. The award is the highest for career civilian employees. Looking on at the right is NASA's Administrator, James E. Webb.

## Competition Opens for 1965 Goddard Historical Essay Award

Dedicated to the leadership of American rocketry and astronautics, the National Space Club (NSC) has announced the opening of the Robert H. Goddard Historical Essay Award competition for 1965. This annual nationwide competition, with a \$200 prize, is open to any U.S. citizen.

The contest is named in honor of the world rocket pioneer, Dr. Robert H. Goddard, whose scientific and technological contributions—although belatedly recognized in the United States—opened the door to space.

Essays may treat with any significant aspects of the historical development of rocketry and astronautics, and will be judged on their originality and scholarship. They may bring new information to light or may cast a new and different light upon events or individuals influencing rocketry and astronautics in the United States. Entries should be submitted by November 1, 1965. Get contest rules by contacting the Goddard Historical Essay Contest, c/o National Space Club, 1629 K Street, N. W., Washington D.C. 20006. The winner, who will be announced at the Dr. Robert H. Goddard Memorial Dinner in March, 1966, will receive the Goddard Historical Essay Trophy and a \$200 prize.

Winner of the third Goddard Historical Trophy for 1964 was John Tascher of Case Institute of Technology. His essay was on the Cleveland Rocket Society and will be published in the fall issue of **TECHNOLOGY AND CULTURE**.

The Robert H. Goddard Historical Essay Award is the only literary competition devoted to historical affairs in the field of rocketry. The NSC's Committee for the History of Rocketry and Astronautics, whose members serve as judges for the contest, are: Dr. Eugene M. Emme, Chairman, the NASA Historian; Frederick C. Durant, III, Assistant Director, National Air and Space Museum, Smithsonian Institution; Dr. Paul Edward Garber, Curator, National Air and Space Museum,

## Goddard Show Is Televised Abroad

Apparently American TV shows are not limited to a state-wide audience, for, according to Goddard's Public Information Office, the CBS show "T-Minus 4-Years, 9-Months and 30 Days" has been shown in several different countries. The CBS show was shot primarily at Goddard, and featured Walter Cronkite and Astronaut John Glenn.

The latest request for information has come all the way from New Zealand, where a 14-year old science and electronics

enthusiast reports that he has watched the hour-long show twice.

Our New Zealand friend has asked us to send directions for a telemetry "stripper," a frequency converter which was built for display purposes at Goddard and explained by Glenn in the show.

The show was filmed on March 1, 1965, and shows what goes on during a typical day at the NASA Centers in preparation for landing a man on the moon within the decade.



**HISTORIANS VISIT GODDARD.** Members of the NASA Historical Advisory Committee dropped by for an inspection of Goddard facilities May 21 on their first visit to a NASA center. From left are: Professor James Lea Cate of the University of Chicago; Dr. Alan T. Waterman, first Director of the National Science Foundation; Professor Melvin Kranzberg of Case Institute and Professor Wood Gray, Chairman, George Washington University.

This Advisory Committee reviews NASA's historical requirements and problems and advises the Administrator. Chairman Wood Gray is also a member of the American Historical Association Committee on History in Government. Dr. Kranzberg is also Editor of Technology and Culture and Executive Secretary of the Society for the History of Technology. Dr. Waterman also serves as a consultant to NASA. And Professor Cate was co-editor of the seven-volume *Army Air Forces in World War II* and is on the advisory committee on history of the AEC. Other members of the NASA Historical Advisory Committee are: Lloyd V. Berkner, Graduate Research Center of Southwest; Hunter Dupree, University of California/Berkeley; Laurence L. Kavanau, NAA; Marvin W. McFarland of the Library of Congress (Science and Technology); and Paul P. Van Riper (Cornell University). The NASA Historian, Eugene M. Emme, serves as Executive Secretary.

Smithsonian Institution; Dr. Murray Green, Office of the Secretary of the Air Force; Prof. Melvin Kranzberg of Case Institute of Technology, Executive Secretary, Society for the History of Technology; Marvin W. McFarland, Chief, Aeronautics Division, Library of Congress; and Dr. Charles S. Sheldon, II, National Aeronautics and Space Council Staff.

The purpose of this committee is to promote, encourage, and to otherwise stimulate the documentation, analysis, and publication of the history of rocketry and astronautics, bringing to light the scientific, technological, organizational, and human aspects of significant developments and their impact upon society.

# GLO NEWS --

## Goddard Launch Operations, Cape Kennedy



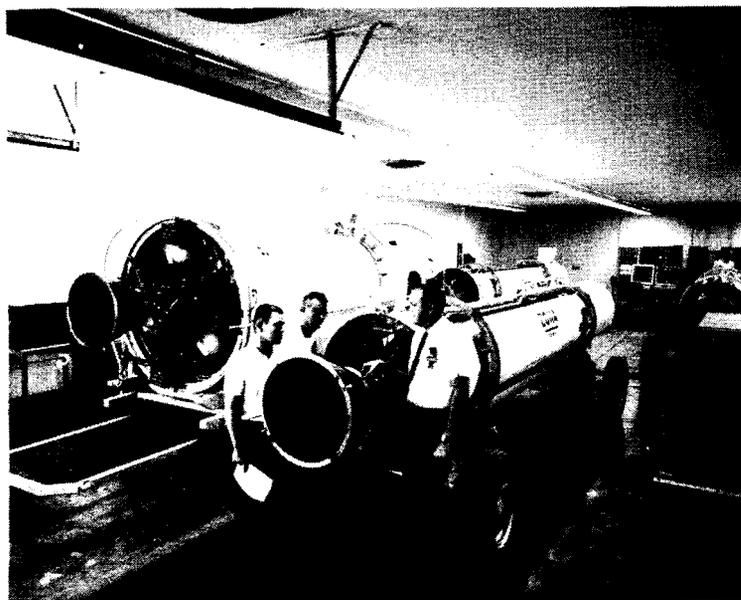
**ROBERT H. GRAY**, Goddard Launch Operations Manager, is shown briefing members of the Euro-space Committee at a recent Kennedy Space Center meeting at MILA.



**JOHN J. NEILON** (left), Associate Manager, Goddard Launch Operations Division, Cape Kennedy explains the mission and workings of the Explorer XII with use of model to President Chung Lee Park (in light suit) of the Republic of Korea during the latter's recent visit to Cape Kennedy.



**SOLAR PADDLES** on the IMP come in quadruplicate. However, Christopher Moyer, mechanical engineer, Mechanical Systems Branch, (SI & SR), shown with the spacecraft in Building AE at Cape Kennedy prior to launch time, is only one in this trick photograph.



**GODDARD LAUNCH OPERATIONS' DELTA** engineers compare the old DELTA vehicle second stage with the improved larger second stage (background) which recently arrived at Cape Kennedy. Left to right are: Lonnie Hughes and Glenn Crawford, DELTA guidance and controls engineers and Wayne McCall, Chief electrical systems engineer.

## **GODDARD NEWS**

JUNE 14, 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

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