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GODDARD

NEWS

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AN EDITOR HAS DILEMMAS . . .

TAD and Syncom C—Combination For A Complex Launch

How can one write about the Syncom C launch, a real cliffhanger, on Tuesday before the launch to be read by faithful subscribers after the launch?

Syncom C will be one of the toughest. It will be launched from Cape Kennedy with a Thrust-Augmented Delta (TAD). It is a maiden voyage for the TAD system; the first launch of any rocket is hairy.

Syncom C will make a series of intricate maneuvers before the third apogee of its transfer orbit. They are necessary to put Syncom into a synchronous, near-equatorial orbit, never before attempted in space flights. Any one of these maneuvers is very difficult.

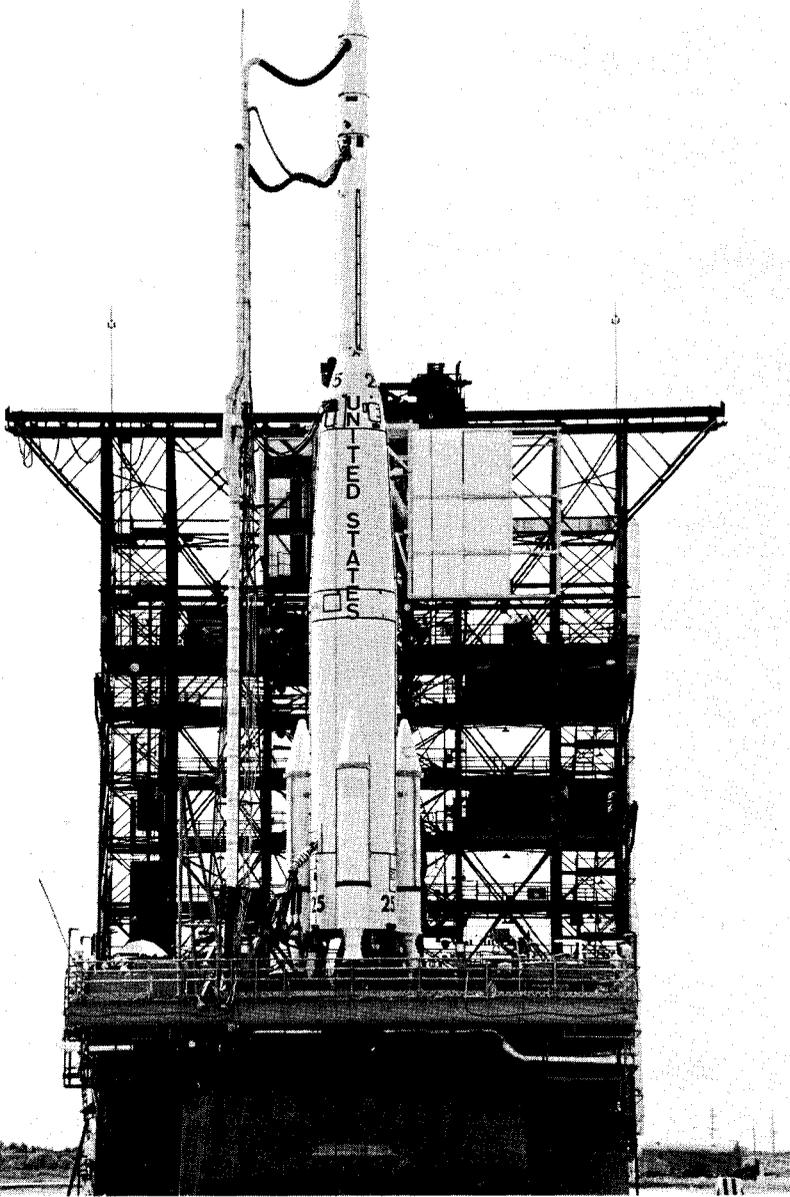
The launch will mark the first use of one satellite to help in

the launch of another. Syncom II will be used to relay range and range rate data from Clark Field to Goddard.

Syncom C will be launched toward the east by the TAD whose three solid fuel motors strapped to the first stage will give the booster additional thrust at lift-off.

After second stage burn the vehicle is aligned by gas jets on the second stage to properly orient the two stages and the spacecraft for third powered flight.

(Cont'd on p. 2)



Thrust-Augmented Delta (TAD)

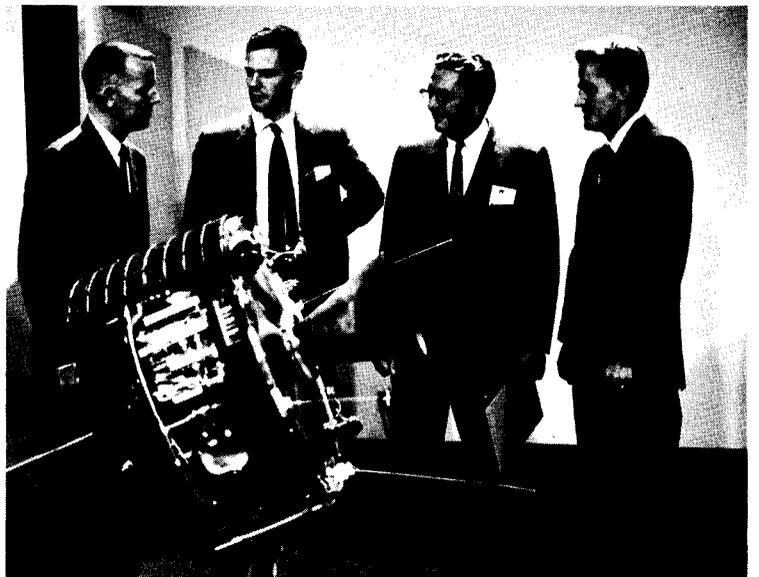
Satellites Presented To Smithsonian

The NASA communications satellites—ECHO, RELAY, and SYNCOM—have been placed with other of America's greatest achievements. At a ceremony recently held in the Museum of History and Technology, the satellites were presented to the Smithsonian Institution.

Among the honored guests attending were: Frank A. Taylor, director, U.S. National Museum, Smithsonian Institution; Dr. Hugh L. Dryden, deputy administrator, NASA; Dr. Harry J. Goett, Goddard's director; Dr. Ragnar Rollefson, director of international scientific affairs, U.S. State Dept.; James Bradley, acting secretary, Smithsonian Institution; and Carl T. Rowan, director, U.S. Information Agency.

Highlighting the ceremony was the acceptance of the satellites by James Bradley for the Smithsonian Institution and remarks on the significance of the International Communications Satellites Program by Carl T. Rowan.

Mr. Rowan, in his remarks commented, "As we view the unfolding drama of the American space program it can be clearly seen that one of its most significant aspects is that it has been carried out in the full, open view of an interested and anxious world. When it was written into the National Aeronautics and Space Act of 1958 that the activities of the new space agency were to be open to the widest practicable and appropriate spread of information, the Congress cast into law one of the deepest instincts of the American people. It was an act of faith to specify that this enterprise should be carried on openly before the gaze of those who wished us well and those who hoped otherwise; it was truly an expression of faith in freedom and the ability of Americans to meet the challenges and opportunities of an era when each day unfolds new perils and new promises."



In the photograph above, the satellite SYNCOM is the center of attraction. From left are: Robert J. Darcey, Goddard's SYNCOM project manager; Dr. Bernard Finn, Smithsonian Institution; Dr. Goett; and Don V. Williams, Hughes Aircraft Co.

SYNCOM C's SUCCESS

Will Be The World's First Stationary Orbit

(Cont'd from p. 1)

During second stage coast flight the vehicle will be in a trajectory inclined about 28 degrees with the Equator.

When the third stage is fired it places the spacecraft in a transfer orbit which has a minimum altitude of 700 miles, a maximum altitude of 22,900 miles and is about 16 degrees off alignment with the Equator.

After third stage burn, the spacecraft will coast for about 5½ hours to its first apogee over the Indian Ocean. Here Syncom II will begin sending range and range rate data, from Clark Field to Syncom II to an antenna in the Hawaiian Islands, thence by cable and land line to Goddard.

About 11 hours after first apogee the spacecraft, now separated from the third stage, will be over the West Coast of South America at its second apogee. Here the satellite will be re-aligned with an altitude change of about 10 degrees, making it more parallel with the Equator on the next apogee when the kick motor fires. However, launch performance too far from the expected orbit at this point could result in a decision to fire the kick rocket on the fourth apogee rather than the third.

In another 11 hours, the satellite will be fired on command from Earth.

Data received from the spacecraft will be complete enough to allow the project director at NASA's Goddard Space Flight Center, Greenbelt, Md., to notify a ground station at Salisbury, Australia, to fire the final stage. If desirable, the firing order may be sent to the USNS Kingsport, a floating communications station anchored at Guam.

With this command the satellite will be kicked out of the looping elliptical orbit and put into a circular, synchronous orbit. It will then be in alignment with the Equator provided all previous maneuvers were successful.

After a few hours, data from Syncom will provide enough information to determine whether the spacecraft is drifting east or west and at what

rate. If it is moving east at the proper speed no corrections will be made. Otherwise a hydrogen peroxide gas jet will be fired from a ground station to provide the desired drift rate, about seven degrees a day.

After about ten days another gas jet will be fired to stop the drift and hold the satellite on station.

NASA is supported in the Syncom program by the U.S. Army Satellite Communications Agency, Fort Monmouth, N.J., which provides the surface sta-

tions in the United States and overseas.

Work is underway to make it possible to transmit the 1964 Olympics from Japan via Syncom to television viewers in the United States. Japan is installing the transmitting equipment, and an antenna at the U.S. Navy's Point Mugu, Calif., facility is being modified to receive the transmissions from Japan in October.

Syncom C also will be able to transmit two-way telephone conversations as well as teletype and facsimile pictures.

The first three months after launch, during the technical phase of the operation, NASA will control the spacecraft supported by the Department of Defense.

Goddard Speech and Paper Presentations

(Technical presentations approved as of August 17, 1964 for period through September 7. Requests for copies of speeches and papers should be made directly to the author.)

SPEECHES

Gilbert W. Ousley and William R. Witt, Jr., AIAA Guidance and Control Conference, August 24, Los Angeles, Calif., "Technical Aspects of GSFC International Programs."

Winifred S. Cameron, National Amateur Astronomers, August 28, Denver, Colo., "Recent NASA Advances in Astronomy."

PAPERS

J. Moody, Society of Photographic Instrumentation Engineers, August 24-28, Miami Beach, Fla., "Day/Night TV System for Cloud Cover Imaging."

J. J. Donegan, C. A. Packard and P. J. Pashby, Association for Computing Machinery (ACM) 1964 Annual Meeting, August 25-27, Philadelphia, Pa., "Experiences with the Goddard Computing System During Manned Spaceflight Missions."

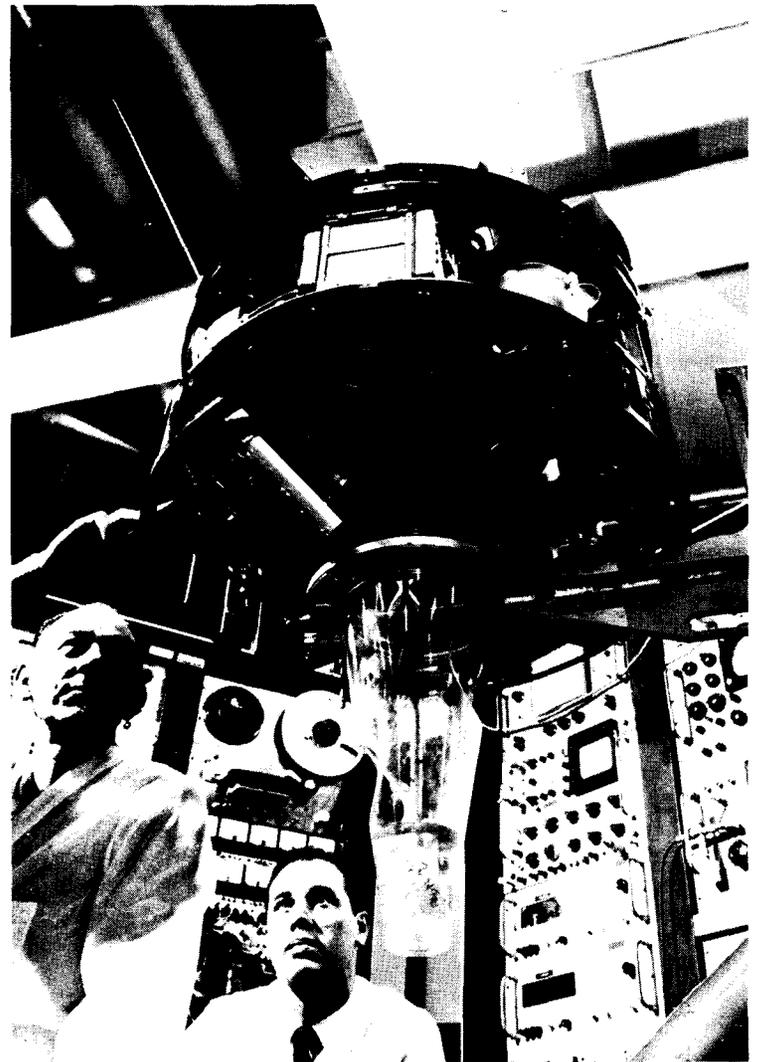
W. I. Adams and P. R. Federico, Association for Computing Machinery (ACM) 1964 Annual Meeting, August 25-27, Philadelphia, Pa., "CADFISS Test System (Computation and Data Flow Integrated Subsystems Tests)."

Gail D. Smith, IEEE 1964 Western Electronic Show and Convention, August 25-28, Los Angeles, Calif., "Flyback Voltage Regulator."

Ozro Covington, 1964 Western Electronic Show and Convention, August 28, Los Angeles, Calif., "Apollo Communications & Tracking."

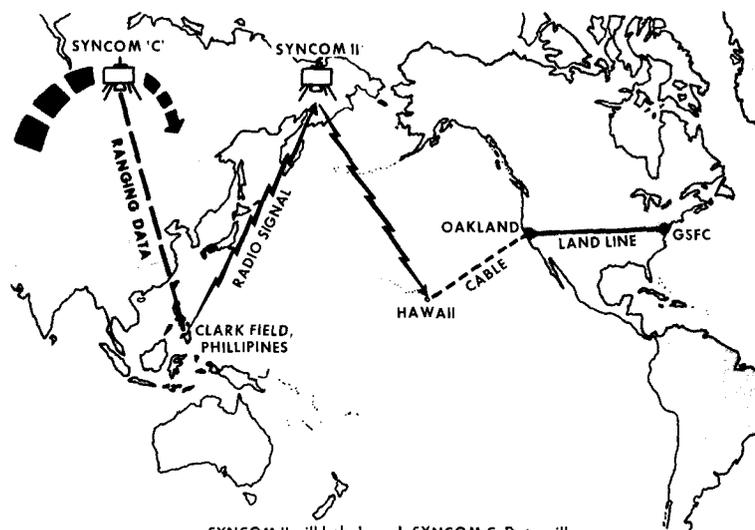
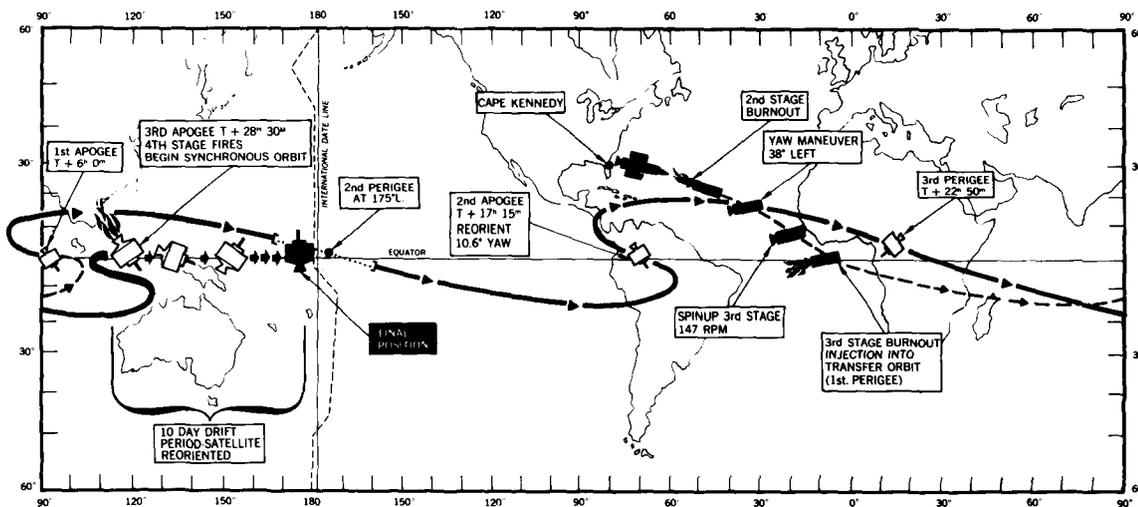
Kaichi Maeda, International Atmospheric Ozone Symposium, August 31-September 4, Albuquerque, N. M., "Ozone in the Polar Upper Atmosphere."

Edith I. Reed and Reuben Scolnik, International Ozone Commission, August 31-September 5, Albuquerque, N. M., "A Night-time Measurement of Ozone above 40 KM."



Syncom C spacecraft is inspected during telemetry testing at Hughes Aircraft Company prior to final assembly and delivery to NASA. Goddard's Joseph Stockel (right), systems evaluation division, looks on as Hughes technician examines circuit connection.

SYNCOM C ORBITING SEQUENCE:



SYNCOM II will help launch SYNCOM C. Data will follow this route to NASA's Goddard Space Flight Center, command center of the operation.

Launch Time For Model Rockets

Last week Wallops Station, Wallops Island, Va., played host to over 50 of the Nation's top model rocket builders during a four day event. Among the honored guests at the National Association of Rocketry's 6th National Model Rocket Championship was Astronaut William A. Anders. Over 500 model rockets were launched by the model rocketeers at the Wallops Station airfield. Many of the small rockets were exact operating scale models of America's space vehicles and reached altitudes of over 3000 feet.

Goddard Employees Can Further Their Education

With the fall semester approaching, supervisors should begin now to determine what academic courses their employees will need to more effectively perform their present or projected duties. The Goddard policy governing employee participation at local colleges and universities and the procedures to be followed by supervisors in nominating employees are covered in Goddard Instruction 17-5-2.

In order to obtain support from Goddard, approval to enroll in academic courses at Government expense must be obtained prior to registration.

Organizations desiring to utilize local courses for the development of employees are requested to submit the completed GSFC Form 17-15, "Request for Approval of Training," to the Employee Development Branch no later than ten (10) working days prior to registration. Since Goddard pays for courses in advance, this deadline must be met in order to give employees a billing letter to present as payment on registration day.

The following are published registration dates for local colleges and universities for the fall term:

School	Registration Dates	Classes Begin
American University	17-19 21-23	24 September
Dept. of Agriculture Graduate School	5-12	14
Catholic University (Undergraduate)	21-22	23
(Graduate)	23-25	28
Georgetown University	21-22	23
George Washington University	17-19	21
Howard University	Varies with each college in the University. Begins Sept. 15	17
University of Maryland	14-18	21
Johns Hopkins University (Evening School)	19-23	24

Dr. Goett Receives Honorary Degree

Dr. Harry J. Goett, Goddard's Director, recently received an honorary Doctor of Science degree from the College of the Holy Cross in Worcester, Mass., his alma mater.

The citation said, in part "... Since 1936, Dr. Goett has been deeply involved in the totalizing problems of aerodynamic research at the Langley Aeronautics Laboratory, at the Ames Laboratory, at Moffett Field and now at Goddard Center, where he is responsible for all the center's missions and objectives in the field of space flight. Under his supervision and care is the worldwide network of Satellite Tracking Stations, the design and development of earth satellites, and the probing of the upper atmosphere through the use of rockets.

In recognition of his contribution to the science of aeronautics and space engineering, Holy Cross takes pride in awarding to her distinguished son the Degree of Doctor of Science."

The occasion was an especially memorable one for Dr. Goett because Holy Cross presented an honorary degree, simultaneously, to President Johnson.



Father Raymond Swords, S. J. (left) president of Holy Cross, congratulates Dr. Goett.

Appropriate action is required to protect the Government's interest in cases where employees fail to successfully complete training through academic failure or failure to continue the training through to completion.

Goddard Instruction 17-5-2 outlines the Center policy on employee development and training.

News About Space & Aeronautics

● NASA has established a new Electronics Research Center to be located in the Boston area.

The Electronics Research Task Group, which has been making plans for the agency's newest major field installation, will move from NASA Headquarters to Cambridge, Mass. about September 1.

The group has 30 staff members and has been under the management of Dr. Albert J. Kelley since its formation early in 1963.

Dr. Winston E. Kock has been named director of the Center. Dr. Kock will resign as Vice-president of Research, Bendix Corporation, Detroit to take up his new duties in September. Dr. Kelley has been appointed as his deputy and will retain his post as Director of Electronics and Control, office of advanced research and technology, until a successor is named.

The Center has been authorized by Congress to conduct advanced research on space and aeronautical problems of electronics, doing its work in the laboratory and by contract with private industry and universities.

A permanent site has not yet been selected for the new Center but NASA is completing a comprehensive study of the Greater Boston area.

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✓? ● "In connection with the moon program, a very practical reason for its continuance is that we are halfway there. A few more appropriation bills in the next three or four years will complete the major financing. . . .

"For the present, however, there is the fact that the huge space industry complex—and the space psychology itself—has found a place in the Nation's consciousness. The United States is more than six years away from its first puny satellite, and in that time the acceleration of progress has been on the edge of the fantastic. The space age has barely been born but we cannot see how anyone can misread the promise of adventure and discovery in the years to come."—*Senator Stuart Symington, Congressional Record (July 20, 1964).*

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● In the photograph on the right, NASA Astronaut Scott Carpenter describes his May 24, 1962, journey into space to a group of children at the New York World's Fair. They are gathered in front of Aurora 7, the Project Mercury spacecraft in which Carpenter orbited the Earth three times. Aurora 7 is one of the most popular attractions in the U.S. Space Park at the Fair. The park, a free exhibit, depicts many aspects of America's exploration of space.

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● A new satellite named "Pegasus" will investigate the hazard of meteoroids in space.

"Pegasus" gets its name from the flying horse of mythology. The satellite has a wing-like panel 96 feet long and 14 feet wide. Pegasus will sweep through space hundreds of miles above Earth and transmit to Earth the penetration of meteoroids on its panels.

For launch aboard a Saturn I rocket the satellite panels will be folded. Once in orbit, the panels will spread. If successful, Pegasus will be among the largest objects in orbit.

The satellites are within the programs of NASA's Office of Advanced Research and Technology. Three of the satellites are being built by Fairchild-Stratos Corp., Hagerstown, Md.

Field management of the project is assigned to NASA's Marshall Space Flight Center in Huntsville, Ala.

Impetus

Editor's Note: This column of thoughts from various quotable sources will run whenever ideas are available which fit this definition—"comments which give impetus to the creative mind; which stretch and exercise the intellect." Publication does not necessarily imply endorsement.

" . . . The progress which the United States has made in space in little more than five years of driving effort, is convincing evidence of the success of American industrial efforts, carried out under a free enterprise system. This has value to the nation not only in terms of the results produced, but as a demonstration to the uncommitted and emerging nations of the productive might which a free society can generate, and the success it can have in a technological contest with a closed society such as the Soviet Union. . . .

"It has been our experience in NASA that most contractors need not be persuaded of the morality or the simple business logic of providing equal employment opportunity. This may stem partly from the fact that in an effort which is so creative in character as the conquest of space, the contribution of the individual gifted brain can be enormous, and even in periods when scientists and engineers are available in abundance, no industry can neglect the resource which one individual, gifted intellect may provide.

"To put it simply, industries seeking new scientific knowledge, and striving for rapid advances in the state-of-the-art in technology, cannot risk losing the innovative contribution of any gifted brain, regardless of the unrelated characteristics of the body which feeds and services it and communicates its valuable new concepts to those who can use them."—*Administrator James E. Webb, Plans for Progress Seminar, Los Angeles, Calif., June 11, 1964.*



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"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 a bi-weekly publication of the National Aeronautics and Space Administration's Goddard Space Flight Center, Greenbelt, Md., suburban Washington, D. C. Phone—Ext. 4141 or 4142

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