N.A.S.A. HISTORICAL ARCHIVES

GODDARD NEWS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

GODDARD SPACE FLIGHT CENTER / GREENBELT, MARYLAND

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Nothing But Success . . .

Goddard Adds Three More Satellites to the List of Successful Launches

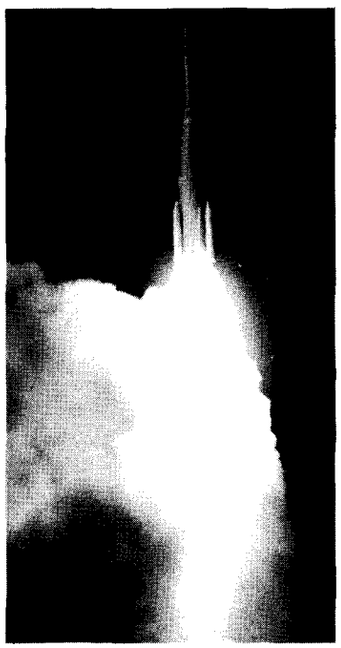
Within 10 action-packed days last month, Goddard successfully orbited three more satellites and entered a new era of space technology progress. Once launched, men on the ground took over command control and in two cases—Syncom II and Nimbus I—made major contributions to mission objectives.

Nimbus I

The case of Nimbus I was particularly cited by the Washington Star's Science Editor, William Hines, as being a true measure of aerospace progress. "What pulls Nimbus out of the ruck of being just another space success is the fact that it is working well despite a rocket malfunction. (The Agena second stage failed to burn for the programmed length of time.) Men on the ground saved the mission even after the spacecraft went into an orbit markedly different from the one planned for it," Mr. Hines wrote. He continued:

Murphy's Law Not Accepted

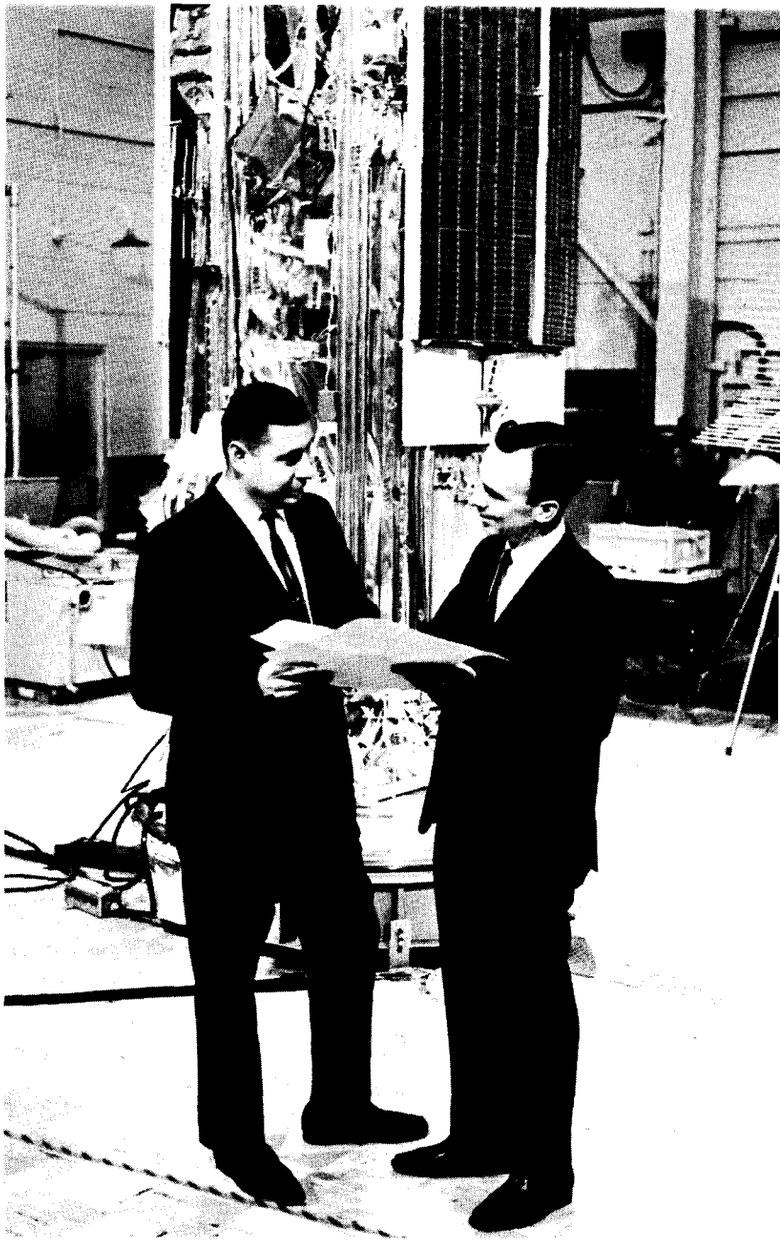
"Agile footwork by the Nimbus crew . . . actually changed Nimbus' mode of operation to correspond with the orbit unexpectedly achieved. This is a gauge of progress since the days when spacemen threw up their hands and quoted Murphy's Law when things did not go exactly to plan. (Murphy's law states: (1) If anything can possibly go wrong, it will; (2) left to themselves, things go from bad to worse; (3) nature sides with the hidden flaw.)"



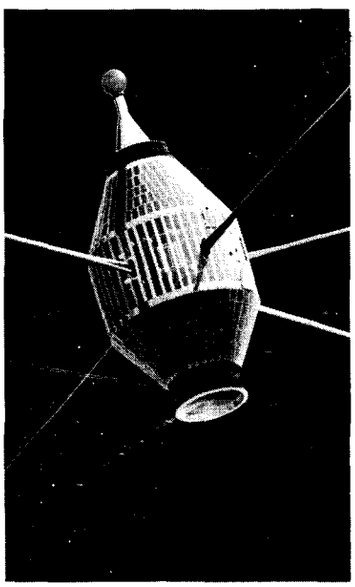
Syncom III

Mr. Hines added that the record of TIROS, Nimbus, Relay, Telstar, Syncom, Mariner and Ranger—to say nothing of sundry smaller spacecraft is "eloquent testimony" to the ability to fight Murphy's Law instead of accepting it.

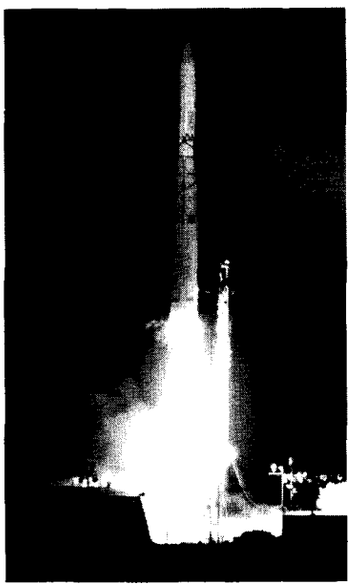
(Cont'd on p. 4)



Goddard's Dr. George Ludwig (left), OGO project scientist, and Wilfred Scull (right), OGO project manager, discuss prelaunch checkout tests of the first Orbiting Geophysical Observatory satellite (in background) at Cape Kennedy. The 1,000-pound OGO, America's most advanced scientific satellite, is scheduled for launch by an Atlas-Agena rocket. It carries 20 advanced scientific experiments to study Earth-Sun relationships.



Explorer XX



Nimbus I

Three Co-op Students Return to Goddard

Goddard has received the first dividends from one of its investments in education. Three students, participants in the Goddard Cooperative Work-Study Program have graduated and returned to work at Goddard. These new electrical engineers, Robert Appel, Donald Sabourin and John Maurschak, graduated from the University of Detroit. They had worked as co-ops at Goddard during the past three years. Henceforth, each year several young scientists and engineers will graduate from this program.

The co-op is a somewhat unique employee. He is engaged in a five year coordinated program of education and work which involves alternation between school and Goddard. His work assignments at Goddard are in keeping with his level of academic achievement. At school he is better able to comprehend the applications of his education. The end result is a highly motivated employee with two years of work experience upon graduation.

By June 1965 seventy-two students will be employed at Goddard as co-ops. These students are enrolled in schools having formal co-op programs. Schools now cooperating with Goddard include: VPI, St. Joseph, Drexel, Georgia Tech., Northeastern, Houston, South Florida, Cincinnati, and Detroit. The students are majoring in electrical, mechanical or aerospace engineering; physics, mathematics or engineering physics. The student is carefully screened by the school co-op director and by Goddard prior to being recommended to Goddard as a participant. When it is determined that he or she meets the high standards for entrance into the program the student is given status as a career employee.

To some at Goddard the philosophy of cooperative education is well known. Dr. Michael J. Vaccaro, assistant director for administration, has served as an officer of the Cooperation Division, American Society of Engineering Education and Mr. Robert Huddleston, assistant chief, organization and personnel division is currently treasurer of the Cooperative Education Association. The program coordinator at Goddard is Mr. Michael Patchan.

The students are working in nearly all of Goddard's technical divisions. They are usually rotated in order to allow them to see the interrelatedness of the work at Goddard. Supervisors are favorable in their assessment of the program, for they have found that the co-op is highly motivated and wants to learn.

Co-op student, Don Sabourin, explains the Minitrack Calibration System (left) to Dr. Michael J. Vaccaro, assistant director for office of administration. Looking on are (from left) Robert Appel and John Marushak.

Co-op student John Marushak, aeronomy and meteorology division, explains the Poloroid Oscilloscope Camera to Mike Patchen, employee development branch. The camera is attached to a Tektronics 535-A Oscilloscope which is used as a monitor for a closed circuit digital picture transmission system using a Nimbus slow-scan vidicon camera. This system will be used for bandwidth-compression technique studies.

From left: Connie Saum, Robert Appel and Ed Hayes of the advanced development division, examine a post-amplifier for a digitally scanned TV system for use in the communications and tracking of spacecraft.

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.

". . . For most of the time man has been on Earth, the great mass of humanity has been accustomed to the idea that, for generation after generation, life would remain a dreary struggle at a level of bare subsistence. Poverty and malnutrition, illiteracy and political instability were the common lot of all but a small minority of the world's population.

"Not until the latter part of the Eighteenth Century was there a sharp break in this traditional pattern. The Industrial Revolution brought with it new tools for man's use, new sources of energy to power increasingly versatile machines, and, consequently, a tremendous rise in the productivity of labor.

"In our own country, the kind of change and opportunity the emerging nations now seek was more than a century in the making. . . .

"The United States, hindsight now makes clear, was very fortunate in its ability to attract capital from many sources. It was fortunate, too, that neither pride nor prejudice, nor nationalistic fervor, impelled us to turn our back on foreign investors and foreign capital. Some of these investors lost money, some made a reasonable return, and others realized substantial fortunes. The ultimate beneficiaries, however, were our own people. With infusions of capital from abroad, together with that available locally, our economy began to grow and grew to such an extent that literally millions of us were able to become investors in turn.

"By itself, of course, capital can never be enough to ensure the economic development of an area. It is but one catalyst among many in a very complex process. To it, for example, must be added the ingredient one might call human capital—a trained work force under skilled management.

"As a nation acquires a group of experienced managers, it benefits on the one hand from their ability to create and run business enterprises. It benefits on the other from their ability to attract investors and make them ready and willing to put up money for new ventures. This is a pattern that has been used successfully in a number of countries and is one which, in my opinion, could advance the cause of progress in many another.

"The third factor I have singled out as among those essential to economic growth is an individual will to achieve. Today, in many of the underdeveloped countries, an acceleration of economic growth awaits the release of individual initiative which is presently stifled by poverty, inertia, and tradition.

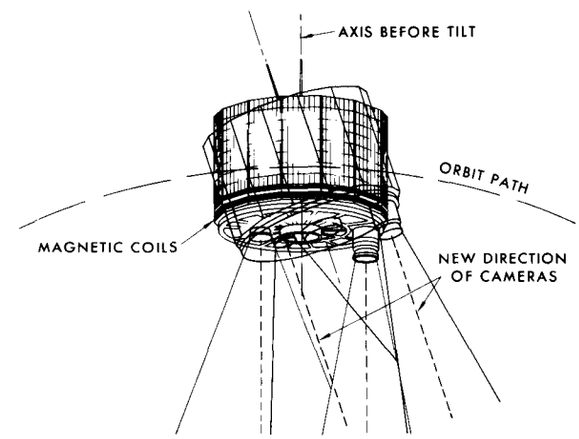
"When an American business goes abroad, it carries with it, in addition to the managerial and technological skills of which I have just spoken, an attitude toward achievement which in the right circumstances can be transferred to large numbers of the people in the host country. Moreover, these attitudes are spread in a multiplier effect through the small businessman whose activities are stimulated by the needs of the new American branch plant for local goods and services.

"By these and other means, American business can make a solid and lasting contribution to economic progress worldwide. Let me reemphasize, however, that this contribution can only be made if the policies and attitudes of the developing countries themselves permit it to be made. Under favorable conditions, the factors I have discussed—a free flow of capital from both external and domestic sources, the development of management skills, and the will to achieve—can provide a health stimulus to a growing economy."—*Remarks by C. E. Reistle, Jr., board chairman, Humble Oil & Refining Company*

How It Works—#6

The Magnetic Attitude Control Coil

During the flight of TIROS I, it was observed that there were mysterious small changes in the attitude of the satellite. They were found to be due to interaction of the Earth's magnetic field with that of the satellite (generated by electronics on board). Alert to the possibility that such magnetic forces might be employed to advantage, TIROS scientists designed a Magnetic Attitude Control Coil into their subsequent spacecraft and it proved practicable. It is used to change the pointing direction of the satellite so that areas of particular interest can be seen. It is also employed to maintain a proper angular relationship between the Sun, the Earth, and the satellite.



The magnetic attitude control coil is simply a length of aluminum wire wrapped 250 times around the TIROS satellite near the base plate. A ground station can control the flow of current through the coil. Thus, at desired times, a magnetic field of varying intensity is generated surrounding the coil. The direction of the field can be reversed by reversing the current in the coil. The magnetized coil then behaves like the magnetized needle of a compass which tends to line up with the Earth's local magnetic field, because like poles repel and unlike poles attract.

Because the forces involved are very small the coil causes a very slow tilt of the satellite (less than one degree per orbit). This provides a fine control system which has several advantages: No fuel, no moving parts, long lifetime.

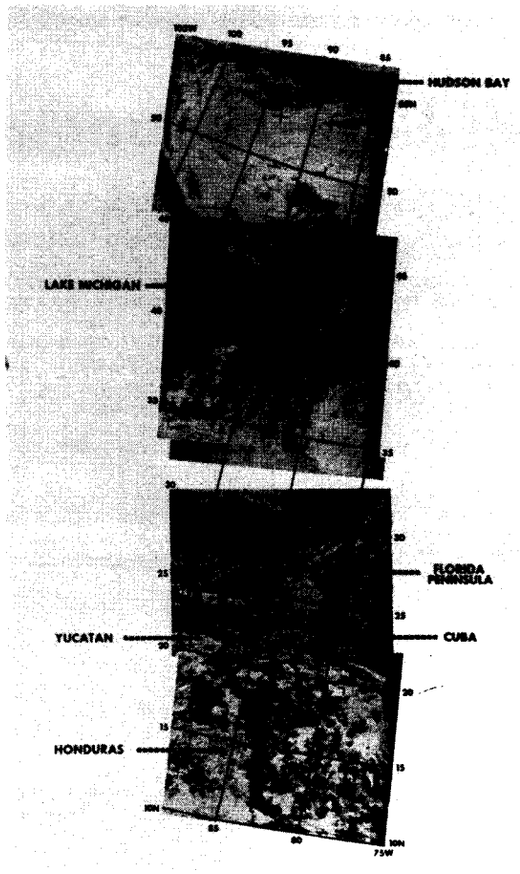
GODDARD NEWS

"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

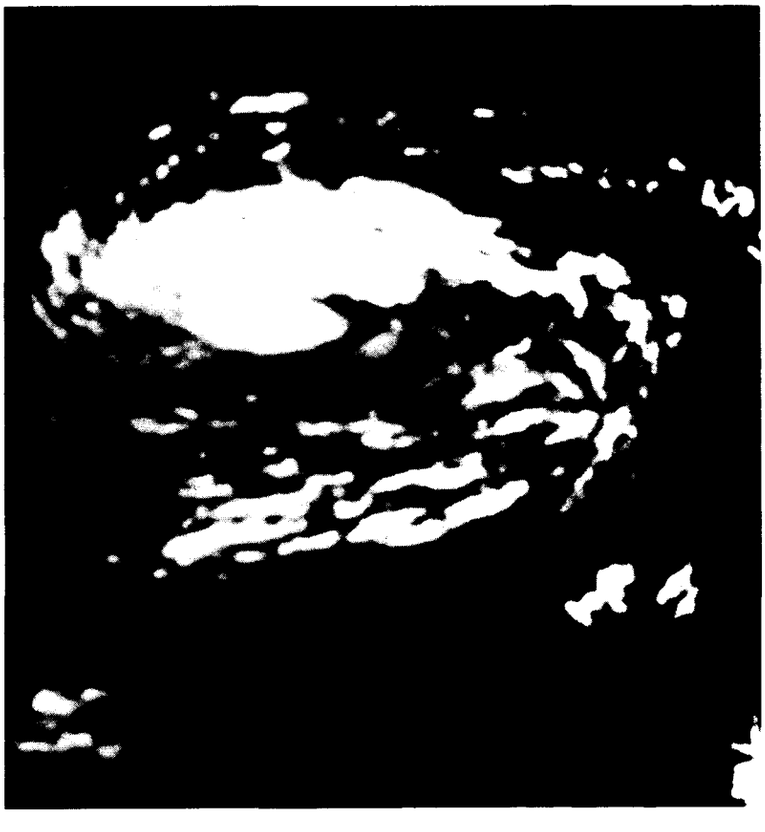
Photography by Goddard's photo branch

FIRST NIMB



Above, APT pictures taken over the Eastern United States. Note that the well-defined cloud pattern in the second frame associated with tropical storm Cleo.

Below, a tropical storm about 100 miles east of the Phillipine Islands is spotted at near midnight by delicate sensors in the Nimbus I weather satellite. This picture was taken from an altitude of 270 miles.



(Cont'd from p. 1)

Launched from the Western Test Range early on the morning of August 28 into a near polar orbit, the 830-pound Nimbus while circling the Earth in a north-south direction is returning photographs better by several factors than those taken in the highly successful TIROS program of eight straight successful satellites. Its actual orbit varies from a 578-mile apogee to a perigee of 252 miles. A circular orbit of 575 miles had been planned, and had there been full burning of the Agena, the orbit probably would have been very close to nominal.

From the beginning, very good Pulse Code Modulation (PCM) telemetry, and data from the Advanced Vidicon Camera System (AVCS), the High-Resolution Infra-red (HRIR) system and the Automatic Picture Transmission (APT) system were received. Included were identifiable landmarks including a classic photograph of the southeastern United States showing the fringes of Hurricane Cleo. This photograph and a montage of Nimbus photographs from Canada to South America were published in many of the nation's newspapers and shown on television soon after launch.

Syncom III

The maiden voyage of the Thrust Augmented Delta (TAD) placed Syncom III in a transfer orbit with a minimum altitude of 700 miles and a maximum altitude of 22,240 miles with about 16 degrees off alignment with the equator, very close to that planned. Then the deft hands and minds of Syncom's ground controllers took over.

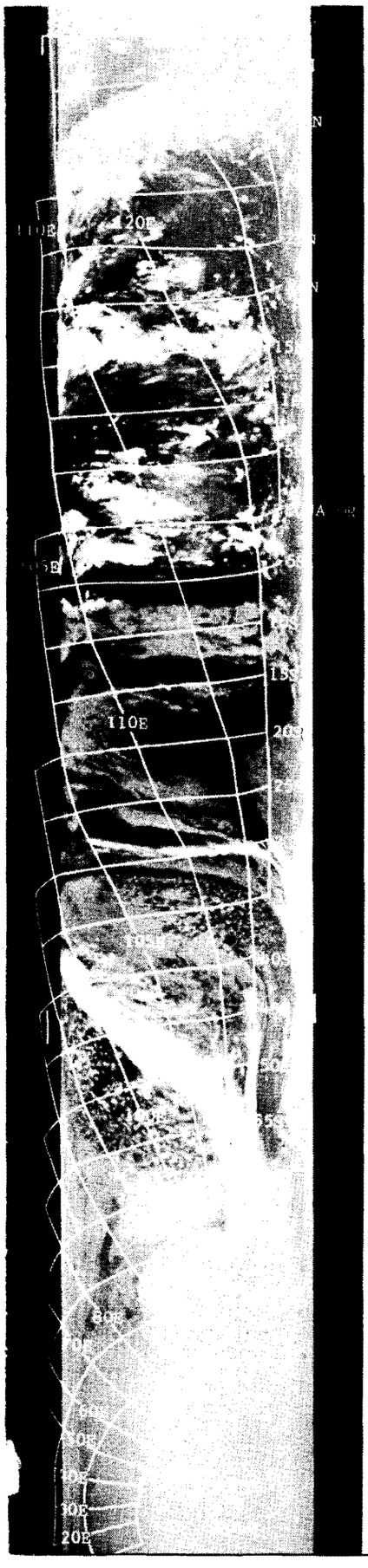
Like airport controllers maneuvering a jet aircraft down to the ground during instrument flight conditions, Goddard-directed engineers and technicians sent commands and maneuvers to Syncom. After the spacecraft had made three orbits in the transfer mode, and a third apogee, Syncom's kick motor fired placing the satellite into near synchronous position. With the help of the satellite's gas jets, Syncom was jockeyed to within one-quarter of a degree of an equatorial orbit, one of the most precise maneuvers made in the short history of space technology. But preciseness and good team work did not end with this maneuver.

The following morning Syncom's gas control jets nudged the satellite very gently to an almost unbelievable precise inclination of .066 degrees to the equator. The satellite was also given a 7 degree per day drift to the east which it maintained

(Cont'd on p. 6)

The "wide eye" of Nimbus' APT camera picks up four states, Florida, Alabama, Louisiana and southernmost border of Georgia, plus Cuba.

US PHOTOS



A nighttime strip of pictures from Nimbus I taken at approximately midnight, extends about 1,500 miles wide from Manchuria in northeastern China at the top, to the South Pole at the bottom. High altitude (very bright) cloud streaks extend across China (top), the tropical Pacific (upper third) and the South Indian Ocean (lower third). Brightness indicates that these clouds extend to altitudes above 30,000 feet. Lower clouds are indicated by their somewhat darker appearance over much of the Indian and Pacific Oceans (center). The west coast of Australia is clearly visible at the right near the center of the strip. The Island of Borneo, partially covered by clouds, can be seen in the upper center. This strip of pictures was taken from altitudes varying between 260 and 400 statute miles.

←

Camera eyes in Nimbus weather satellite photograph the border between Afghanistan and USSR. The Amu-Dar'ya river is shown in upper left and glaciers from the western edge of the Tyana Shaw mountains are in the lower right. The Samarkand area can be seen in the upper center.

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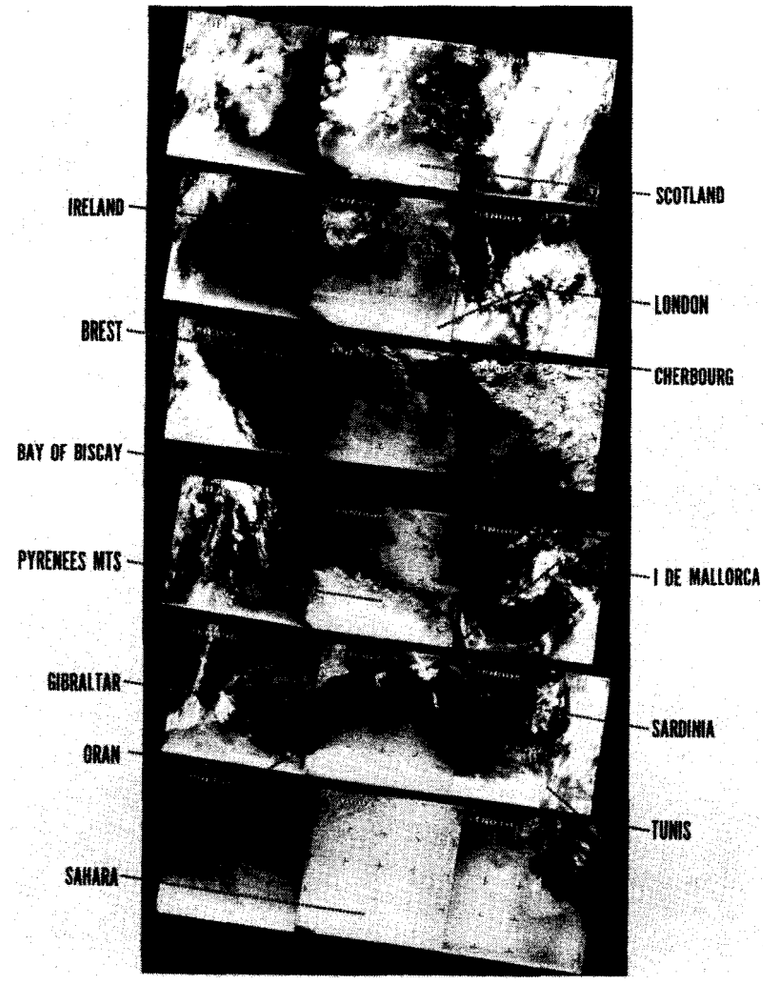
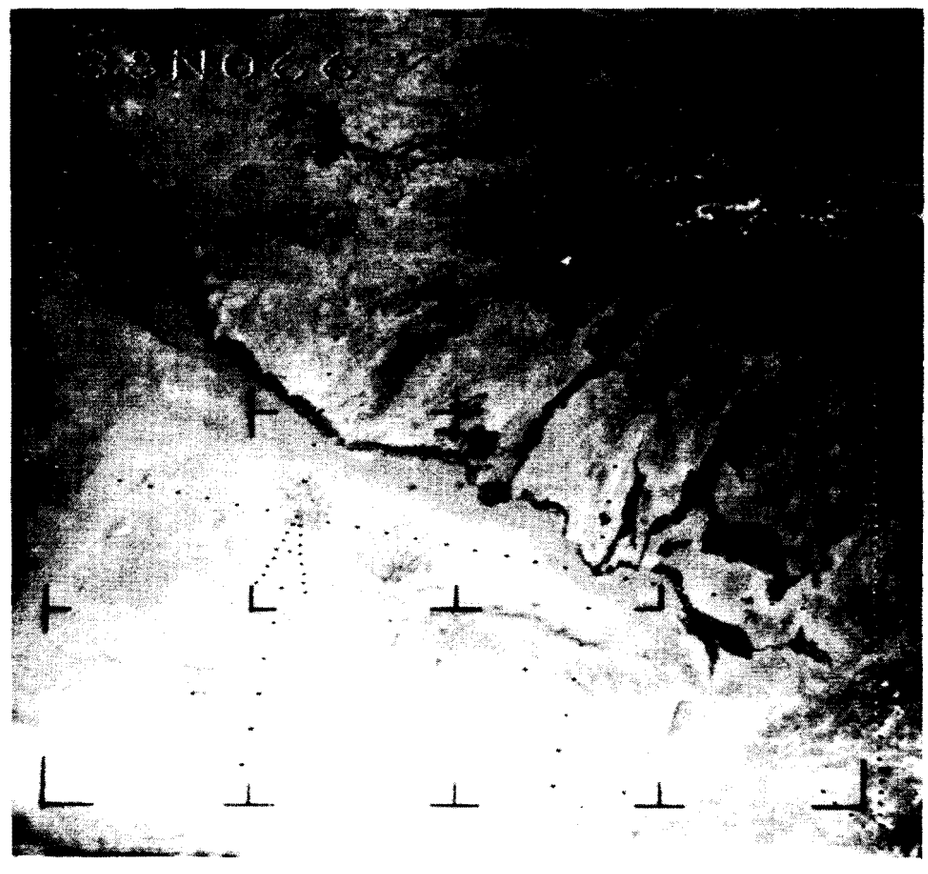


Above, Three-camera AVCS picture coverage over North Africa and western Europe obtained on Orbit 46, Sunday, August 30, 1964



Nothing But Success (Cont'd from p. 4)

until August 28 when two more maneuvers were commanded changing the satellite's attitude and slowing the drift to 3.6 degrees per day.

This would enable Syncom to take its desired position near the International Date Line over the Pacific by September 9 at which time it will be stopped and an attempt will be made to put it in truly stationary orbit. Then if everything goes well, Syncom will among other things serve as the relay link for the Olympic games being played in Tokyo this fall.

Ionosphere Explorer

While perhaps not a "cliff hanger" like Nimbus and Syncom, the 97-pound Explorer XX is doing just what it was designed to do—and doing it well. This Ionosphere Explorer was launched August 25 into a near circular, almost polar, 625 mile high orbit by a four-stage Scout rocket. Scout also successfully orbited Goddard's Ariel II.

Nicknamed "Topsi" by project people, it is collecting and transmitting information on the structure of the upper ionosphere that will have both scientific and practical applications in understanding this region of ionized gases that make long-range radio communications possible.

Goddard Speech and Paper Presentations

(Technical presentations approved as of August 31, 1964 for period through September 18. Requests for copies of speeches and papers should be made directly to the author.)

PAPERS

D. E. Guss, 5th International Conference on Nuclear Photography, September 15-18, Geneva, Switzerland, ***"Nuclear Emulsion Experiments on Sounding Rockets and Satellites."***

H. L. Eaker, IEEE International Convention on Military Electronics, September 14-16, Washington, D. C. ***"Echo II—The World's Largest Satellite."***

Wilbur C. Nyberg, IEEE International Convention on Military Electronics, September 14-16, Washington, D. C. ***"Experiments to Determine Communication Capability of the Echo II Satellite."***

Walter K. Allen, IEEE International Convention on Military Electronics, September 14-16, Washington, D. C. ***"Direct Microwave Transponders for Communication Satellites."***

Dennis L. Backus, IEEE International Convention on Military Electronics, September 14-16, Washington, D. C., ***"Electronically Steerable Antennas for Communication Satellites."***

Harold Horiuchi, IEEE International Convention on Military Electronics, September 14-16, Washington, D. C. ***"Telemetry Instrumentation of the Echo II Passive Communications Satellite."***

Herbert Butler, XVth International Astronautical Congress, September 7-12, Warsaw, Poland, ***"Meteorological Satellite Data Systems."***

James L. Baker, XVth International Astronautical Congress, September 7-12, Warsaw, Poland, ***"Orbital Placement and Control of the Syncom II Spacecraft."***

Varice F. Henry and M. E. McDonald, International Conference on Microwave Circuit Theory, September 7-11, Tokyo, Japan, ***"Syncom II Television Tests."***

R. A. Stampfl and A. V. Balakrishnan, International Conference on Microwave Circuit Theory, September 7-11, Tokyo, Japan, ***"An Adaptive Data Compressor for TIROS Picture Transmission."***

L. Dunkelman and J. P. Hennes, Conference on Photographic and Spectroscopic Optics—International Communications Optics, September 1-8, Tokyo, Japan, ***"Ultraviolet Photography and Spectroscopy using a Spectrally Selective Image Converter."***

Kenneth Hallam and John Mangus, Conference on Photographic and Spectroscopic Optics—International Communications Optics, September 1-8, Tokyo, Japan, ***"An Ultraviolet Spectrophotometer for Satellite Astronomy."***

D. U. Wright, Conference on Photographic and Spectroscopic Optics —International Communications Optics, September 1-8, Tokyo, Japan, ***"An Ultraviolet Rocket Stellar Spectrometer."***

J. P. Hennes, R. Scolnik and W. Welch, Conference on Photographic and Spectroscopic Optics—International Communications Optics, September 1-8, Tokyo, Japan, ***"Ultraviolet Photography from Rockets using a New Fast Spectrograph."***

William R. Cherry and J. A. Zoutendyk, American Institute of Aeronautics and Astronautics, September 1-4, Philadelphia, Pa., ***"Solar Cell Arrays for Space Electrical Power."***

C. Prabhakara and J. S. Hogan, International Atmospheric Ozone Symposium, September 2, Albuquerque, N. M., ***"Ozone and Carbon Dioxide Heating in the Martian Atmosphere."***

SYNCOM III TEAM

Robert J. Darcey, Alton E. Jones, Don V. Fordyce, Richard Buckingham, Forest H. Wainscott, Howard A. Miller, Peg Provoncha, Michael McDonald, Gene H. Melton, John Zegalia, Robert Chaplick, James L. Baker.

TAD TEAM

William R. Schindler, Tony Brozena, Charles Dunn, John F. Corrigan, Jack Ratcliff, Frank Piszkin, Walter Nagel, and Lucille Loche.

EXPLORER XX TEAM

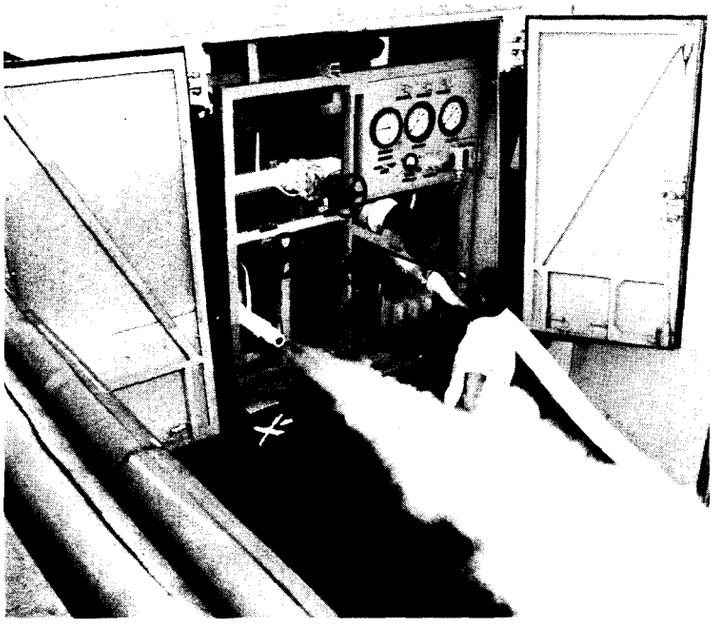
John Jackson, Dale Nelsen, John South, Bill Hoggard, Glenn Johnson, Dick Sade, and Bob Bourdeau.

NIMBUS I TEAM

Harry Press, Dr. William Nordberg, Robert H. Gray, Leon M. Schwartz, John W. Lovelace, Jr., David A. Beiber, Charles Thienel, Ali Arman, Edward R. Watkins, Jr., Christon L. Maskaleris, Irving J. Ross, Gerald L. Burdett, Elliott DeGraff, Charles Mentges, Robert H. Lynn, Dale L. Fahnestock, James Weir, William O. Branch, Jack Sargent, Richard Lee, Charles M. MacKenzie, Ralph Shapiro, Moe Schneebaum, George Harris, A. Gerald Johnson, Lonnie L. Foshee, Benjamin Schlachman, Russell D. Smith, Arthur William Fihelly, Bernard J. Trudell, A. W. Cunningham, Stanley Weiland, Ralph Shapiro, Seymore Kent, Bill Huston, Harry Nichols, Dick Ormsby, Bill Risley, and Silvio Giovannetti.

(Due to lack of space all of the project team members could not be listed. Additional stories on these projects will appear in future issues.)

Goddard Rallied To Cape Kennedy Call...



A sudden increased demand for liquid nitrogen to support the Saturn launch at Cape Kennedy prompted an urgent call to Goddard. Within 14 hours three transporters, each carrying 4,000 gallons of liquid nitrogen, were on their way to Florida. The following day an additional 18,000 gallons were transported by Air Force trailers. Teamwork was displayed by Goddard personnel in an all out effort in getting the job "on the road." Liquid nitrogen is used at Cape Kennedy to help maintain an inert atmosphere within launch vehicles while on the pad. In the picture above T & E's Bill O'Hara is shown filling one of the transporters from the huge spherical storage tank located behind building 10. Goddard's test & evaluation division uses the liquid nitrogen to cool down it's vacuum facilities.

Goddard Has 17 Employees Enrolled In The ¾-Credit Graduate Study Program

Much has been written and spoken about technical obsolescence. Pick up any professional journal these days and you will probably find an article stating that many engineers and scientists are working with reduced effectiveness or that their skills and knowledge are becoming outdated.

The Center's management has recognized this problem and is providing training for its employees through their attendance at local schools, at short courses throughout the country, and in specified subjects at Goddard and by encouraging employees to keep abreast of new developments in their respective fields.

All of these things are done in varying degrees in all research and development organizations. Goddard, however, has gone a step further to combat the problem of technical obsolescence. In cooperation with Catholic University and the University of Maryland, Goddard is now sending qualified employees back to graduate school two full days per week.

In this unique program of graduate study participants work at Goddard on Monday, Wednesday and Friday and attend school on Tuesday and Thursday. Through this program a student will carry approximately nine credits per semester.

The disciplines covered in the program are physics, space science and applied physics, and aerospace engineering at Catholic University and electrical engineering at the University of Maryland. The program at Catholic University has been in existence since the fall of 1962. Maryland University will begin the program in the fall of 1964.

The program has advantages other than the obvious one of accelerated graduate study. The participating schools provide each student with a desk and study area to insure that each student will have a place to study free from distraction. Further, the program allows the student more contact with professors and advisors than is otherwise possible.

Goddard has 17 employees enrolled in the program.

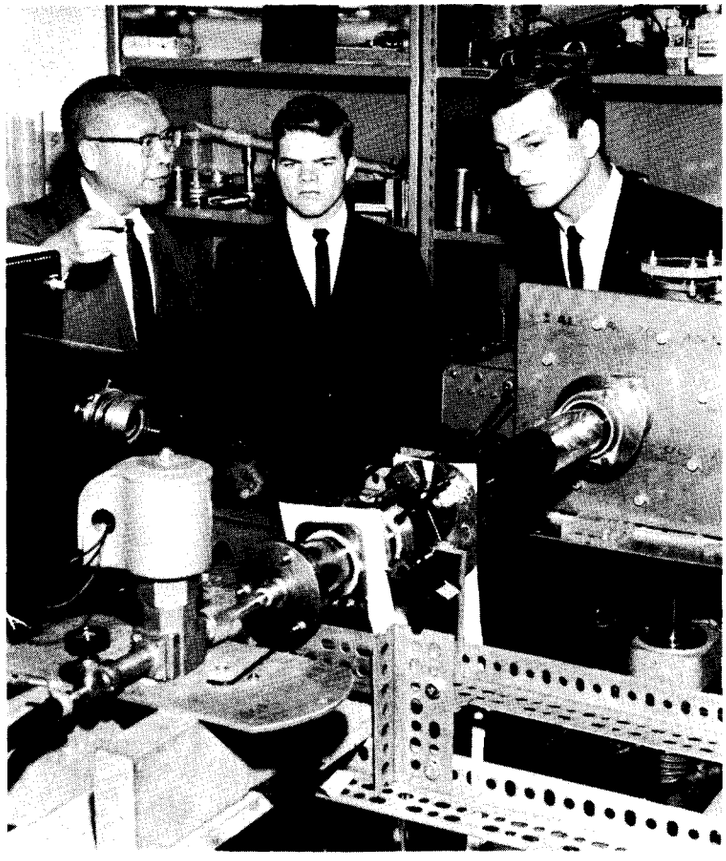
- **Aerospace Engineering:** Donald Frericks, George Honeycutt, Earl Young and Kenneth Rosette; Tom Carson, manned flight operations division; Thomas Flatley, spacecraft integration and sounding rockets division and Albert Fleig, spacecraft systems and projects division.
- **Physics:** James Halow and Donald Kniffen, space sciences division; Stanley Neuder, spacecraft technology division; and Brian Kritt, aeronomy and meteorology division.
- **Space Sciences and Applied Physics:** Richard Ott, spacecraft integration and sounding rockets division; James Williamson, space sciences division; and Sterling Smith, test and evaluation division.
- **Electrical Engineering:** Donald Sabourin, network engineering and operations division; John C. Harris and E. Norman Lurch, advanced development division.

These individuals and their organizations are investing in the future by becoming prepared for it now. The reactions to the program have been very favorable from both the students and supervisors as well as the participating schools. Specifically, the students feel that they are already making contributions to Goddard based on the knowledge they have acquired from their courses.

The supervisors admit that certain problems in work scheduling are encountered at first, but they are unanimous in their belief that the long range goals are well worth the short range problems of work scheduling.

It is hoped that this program will be in existence for many years to come and will continue to assist Goddard in combating technical obsolescence.

Information on this program and other training programs may be obtained from the employee development branch.



The above picture shows Dr. C. C. Chang (left), head of the Catholic University Space Science and Applied Physics Department, explaining the long column plasma gun to Richard Ott (center), spacecraft integration and sounding rocket division and Donald Frericks (right), test and evaluation division. This gun is used for simulating solar wind and shock wave interaction with the geomagnetic field. The camera on the left is capable of taking one million pictures per second and is used to photograph this phenomenon.

Dr. Alan B. Marcovitz, electrical engineering department, University of Maryland, is counselling John C. Harris, advanced development division, on his program for the fall semester.

News About Space & Aeronautics

● One of the most complex missions to be attempted to date by NASA in the U. S. unmanned space program will be the launch of two Mariner space vehicles in the fourth quarter of this year. This will be the first step by the United States in the exploration of Mars with unmanned spacecraft.

Objectives for the two Mariners will be to explore interplanetary space between Earth and Mars and to validate new enginering techniques that will be used for the first time.

The decision to launch two spacecraft on the same mission was dictated by the difficult engineering task that the Mars mission represents and by the necessity of using untried engineering advancements to achieve any probability of success.

The two Mariners will be prepared simultaneously on separate launch pads because of the relatively short opportunity for a Mars launch. The second spacecraft will be launched as soon as is practical after the first. The period in which a spacecraft can be launched to Mars lasts only a few weeks and occurs only once every 25 months.

An Atlas-D/Agena-D combination will be used to launch the Mariners.

The Mariner Mars spacecraft will weigh about 570 pounds. They will have a span of 22 feet with panels extended and a height of 9½ feet.

Duration of the mission requires that the Mariners survive in space for a minimum of nine months. The longest previous lifetime requirements for a U.S. deep space probe was three and one half months for the Mariner II Venus mission.

The nine-month flight requirement is applied to some 138,000 component parts for the Mariner Mars spacecraft compared with 54,000 component parts for the Mariner II.

• • •

● "A major step we are taking in NASA to reduce costs and development time is the borrowing of the 'all-up' flight testing philosophy which was developed in the ballistic missile program. Under this concept of testing, which will be used for the Saturn IB and the Saturn V programs, all flights are scheduled with complete space vehicles, using live stages—instead of on a step-by-step basis as in the past.

'All-up' testing is possible because of the significant advances that have been made in ground testing and our operational experience, reflected in a series of highly successful launches, which include six Saturn I flights and success with the new oxygen/hydrogen systems in the Atlas-Centaur and Saturn flights."—*Dr. George E. Mueller, Associate Administrator for Manned Space Flight, in paper for First Annual Meeting of the AIAA, Washington, D.C., June 29-July 2, 1964.*

• • •

● Ten flashlight-size television cameras have been purchased by NASA's Marshall Space Flight Center Test Laboratory. The cameras can be installed inside Saturn IC and Saturn I rocket boosters during static firings.

The cameras make it possible to watch various components and actions within the booster while the vehicle is being static fired.

Astrionics Laboratory is now studying the possibility of using it in actual flights.

The camera is a 1⅜ inches in diameter, and 6½ inches long. It is enclosed in an environmental housing to dampen vibrations and surrounded by an aluminum shell.

When enclosed in the housing the camera measures 2⅜ inches in diameter.

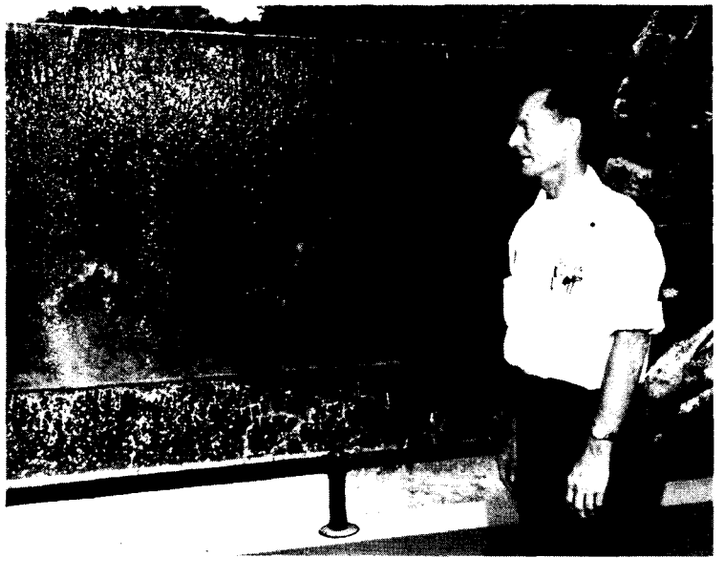
The camera will be monitored in "realtime" (as the test progresses) at the blockhouse while being recorded on video tape simultaneously.

General Electrodynamics Corp., Garland, Tex., developed the lightweight camera (two pounds with housing). The small size makes it ideal for its use in the boosters.

It will be used for the first static firing of the S-IC. booster stage of the Saturn V moon rocket.

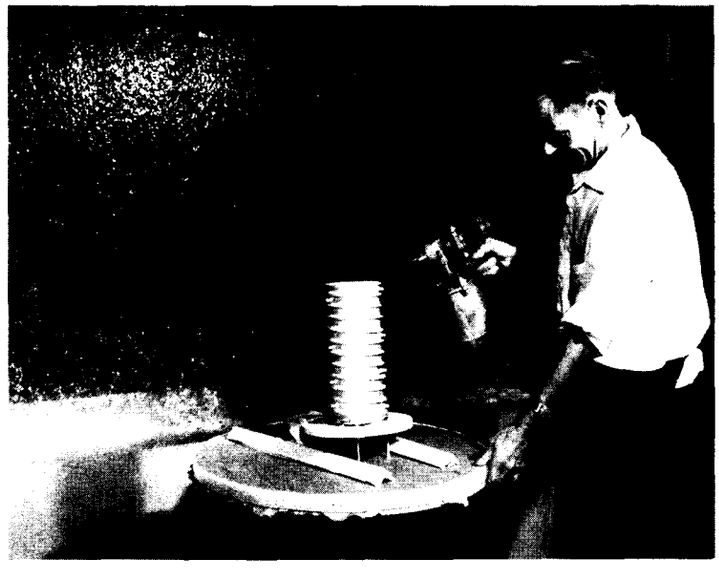
A Waterfall at Goddard

Now You See It . . .



L. K. Hines, model finisher of the Fabrication Division, lets his imagination soar as he conjures an outdoor waterfall at Goddard.

. . . Now You Don't



Hines returns to reality and spray paints a test chamber component. Located in the Fabrication Division paint shop in building 5, the "waterfall" is used to cleanse the air of overspray. Excess paint is washed into detergent solution at the base of the waterfall where it is converted to a sludge.