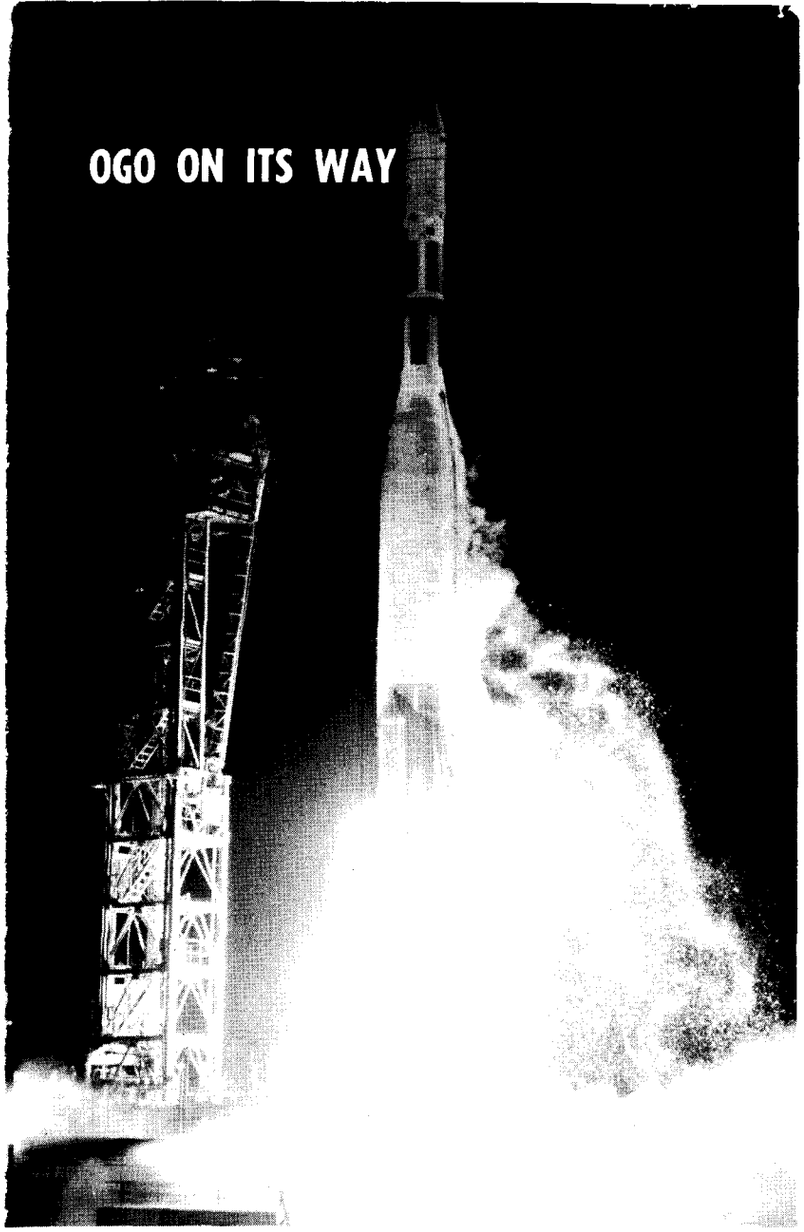

GODDARD NEWS

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

VOLUME VII, NUMBER 9 SEPTEMBER 21, 1964

OGO I Is Providing Useful Scientific Data

Goddard's launch operations, under the direction of Bob Gray, successfully launched the 1,073-pound Orbiting Geophysical Observatory (OGO I)—the nation's largest scientific satellite—from Cape Kennedy on September 4.

Performance of the Atlas-Agena launch rocket was normal. OGO I achieved an orbit very close to the one planned. However, shortly after separation from the Agena second stage it appeared that the mission might be in jeopardy because of non-deployment of two booms. This resulted in abnormal operation of the automatic control system causing most of the control gas on board to be used in the attempt to lock the spacecraft into its Earth-stabilized orbit. The inability to lock on the Earth was later attributed to the fact that the satellite's Earth-seeking sensor was obscured by one of the undeployed booms. Efforts to deploy the booms on ground command were not successful.

About four and one-half hours after launch, OGO I was commanded into "hold" condition while project officials evaluated telemetry data and prepared a contingency operations plan for a spin-stabilized spacecraft.

Beginning September 5 a series of interrogations through the Rosman, North Carolina, tracking station was undertaken to confirm successful spacecraft and experiment operation. Power levels became progressively weaker and OGO I's continued existence was again in doubt. Project officials agreed that the solar panels should be turned toward a more favorable Sun angle. The big question was whether or not the spacecraft would accept the command.

Then, on September 10, during the pre-apogee pass the "turn" signal was transmitted and OGO responded properly. Its panels were turned 42 degrees toward the Sun and adequate power for continued operations was assured.

As the Goddard News went to press, all 20 of OGO's experiments had been turned on and have transmitted data. The value of this data varies, depending on the equipment, and detailed analysis is now underway.

The latest orbital data for OGO I was computed here at Goddard. The apogee was 92,827 statute mile (versus nominal of 92,689), a perigee of 175 miles (versus 171), an orbital period of 63.59 hours (versus 63.51) and an inclination of 31 degrees (versus 31 degrees) to the equator.

(Cont'd on p. 2)

Excerpts From OGO I Press Conference Held Sept. 16

(Cont'd from p.1)

Dr. Goett . . . I think all of us have gotten a few extra gray hairs during the past three weeks, because . . . shortly after it was separated from the Agena, we realized we had a crippled spacecraft, because two of the major appendages had not been deployed. And then as the week went on, it looked like it was more and more seriously crippled and there was a potentiality that this meeting would be a wake. Fortunately, last Friday a maneuver . . . was executed and the life blood of the spacecraft, the battery charge . . . was increased sufficiently so now we feel that we have quite a vigorous cripple.

One of the things I am trying to find out is what percentage of what we expected to get are we getting. And the answer I get back from Dr. Ludwig is that at a minimum, 50 percent of the experimental data he expected to get back is coming back to him. It might be as much as 75 percent.

The other item of particular note is that although this spacecraft is crippled . . . it is sending back at a minimum as much data as you would get out of 10 IMP spacecraft . . . This was as a result of some messaging from extreme distance.

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Mr. Wilfred Scull (OGO Program Manager) . . . The spacecraft right now, appears to be working very well under situations for which it really wasn't designed.

. . . We have operated [it] on nine separate interrogations, varying from a half hour up to as long as four hours. We have probably given it between 500 and 600 commands at . . . distances from perigee to apogee. And we have operated the tape recorders twice, each of these tape recorders can hold 12 hours of data, and we are apparently successful on that.

The attitude control system we are not using . . . and the only time we will use it again will be when we have to turn the paddles.

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Dr. Ludwig (OGO I Project Scientist) . . . My feeling is that we can meet about two-thirds of the initial goals of this mission with the experiments in the present configuration. I would also like to emphasize that we are at the present time on a regular schedule of operation.

Our mode of operation in general will be to recover data in real time during the ascending portion of the orbit, that is when antenna orientation is favorable to recover data in real time.

During the back portion of the orbit, where the antenna orientation is less favorable, we will recover data from the onboard tape recorders.

Questions and Answers

Press: How do the booms unfold? What is the mechanism?

Mr. Scull: They are mechanically constructed, with hinges and torsional springs, which cause them to unfold after they have been unlatched. Now the latch is a pneumatically operated latching mechanism that is set up on a redundant pneumatic supply. Either side of the latch will release them.

Press: With your limited power supply, are you able to operate all of the experiments simultaneously, as you had planned?

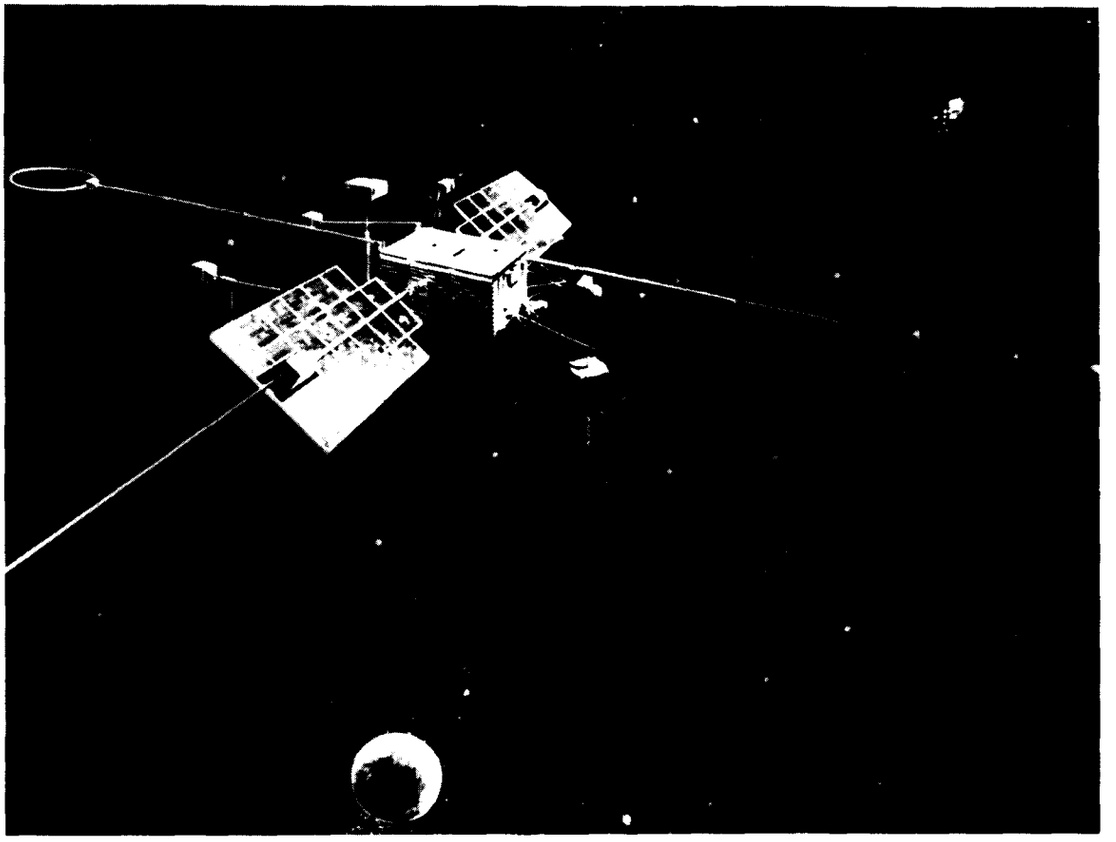
Dr. Ludwig: No, we are not. But it turns out that this is not a serious problem because different experiments are intended to investigate different regions along the orbit of the Observatory. So we turn off the experiments which are intended to look just around apogee, when we come into closer distances. We turn off the radiation belt experiments when we are at apogee.

Press: As I listen to this, it sounds so successful that the question arises in my mind, why did you go to all of the technical difficulties of trying to establish it [the earth orientation] in the first place?

Dr. Ludwig: That is a very good question and that is one which I thought about . . . Now, I think it is easy to answer that, though. There are a number of pieces of the answer.

In the first place, the direction information from a number of the experiments will be lost. It will be lost because the time for measurement is large compared with the time that it takes for one spin.

A number of the other experiments which desired directional information had a very short sampling time, so this means it will be possible to get the directional information by doing a much more complicated data processing maneuver.



Above, is an artist's concept of Goddard's Orbiting Geophysical Observatory (OGO-I). The 20 scientific experiments onboard weigh approximately 172 pounds. The experiments (more than carried by any other scientific satellite to date) were contributed by scientists from seven government laboratories and nine universities.

Electronics Colloquiums Will Begin Here At Goddard

In an effort to help keep its electrical and electronics engineers updated on the latest developments in the field, Goddard will hold the first in a series of Electronics Colloquiums on Wednesday, September 23.

The colloquiums will consist of one-and-a-half hour lecture-discussion periods presented on a bi-weekly basis. Key engineers who are technical leaders from government, industry and universities across the country will present the lectures.

It is intended that the colloquiums give the Goddard engineer additional technical knowledge which will help him keep the design of spacecraft and support system electronics upgraded.

Discussing possible speakers and subjects for the colloquium series are from left: Philip Yaffee, test and evaluation; Edmund Habib, data systems; Harold J. Peake, co-chairman, spacecraft technology; Thomas Lynch, co-chairman, advanced development; Allan Franta, spacecraft integration & sounding rockets; James Reese, organization and personnel. Absent were Dr. Robert Rochelle, spacecraft technology; Victor Simas, advanced development; and Albert Ferris, network engineering & operations.

First Two Lectures

The first lecture in the series is entitled "Demodulation Processes or Making the Best Bet" and is scheduled for 3:00 p.m. in the auditorium of building 3. Presentation will be made by Dr. Lawrence L. Rauch of the College of Engineering at the University of Michigan. The second lecture is scheduled for October 14 and is entitled "A Structure for Scientific Information Retrieval." It will be presented by Dr. Howard Tompkins, head of the Electrical Engineering Department at the University of Maryland.

Other lectures on timely topics pertinent to spacecraft and support systems are being scheduled for about every two weeks thereafter and are intended to run indefinitely.

Key Engineers

A committee composed of key Goddard electrical engineers has planned the program and made the selections for appropriate topics and speakers. This committee is composed of the following people: Harold Peake, spacecraft technology division, co-chairman; Thomas Lynch, advanced development division, co-chairman; Dr. Robert Rochelle, spacecraft technology division; Edmund Habib, data systems division; Allan Franta, spacecraft integration and sounding rocket division; Victor Simas, advanced development division; Philip Yaffee, test and evaluation division; Albert Ferris, network engineering and operations division; and James Reese, organization and personnel division. The administration of the program is the responsibility of the employee development branch.

475 Goddard Engineers

Electronics is the largest single discipline represented here at Goddard. Consequently, approximately 475 electrical and electronics engineers are expected to participate in the lecture series from time to time.

Anyone whose duties permit and who has supervisory approval may attend. In addition to being open to all interested Goddard personnel, outside representatives from local universities, industry and government agencies will be invited to attend.

Each session will be announced and publicized several days in advance.

Baker Presents Paper On Syncom II

During the week of September 7th Goddard's James L. Baker of the communications satellite projects branch participated in the 15th International Astronautical Congress held in Warsaw, Poland.

The paper he presented was entitled "Orbital Placement and Control of the Syncom II Spacecraft," deals with the maneuvers applied to the Syncom II experimental communications satellite, which was launched from Cape Kennedy on July 26, 1963, and placed in the synchronous orbit, 22,300 miles above the earth, where a satellite appears to be virtually motionless.

Mr. Baker's paper covered the maneuvers required to launch and control Syncom II. His experiences since joining Goddard in August 1962 led to the paper (of great current interest) which he presented to the international conference of space scientists in Poland.

James L. Baker

Mr. Baker is currently coordinator for the Advanced Technological Satellite Project which will carry meteorological, navigational, and communications experiments while travelling in a synchronous orbit.

Recent Technical Publications Authored by Goddard Staff

W. B. Fussell and J. B. Schutt, "Temperature of a Gray Body Most Closely Fitting the Solar Extraterrestrial Spectrum," NASA Technical Note D-1845, August 1964.

D. Stern, "A Simple Model of the Interplanetary Magnetic Field. Part I: Calculation of the Magnetic Field," NASA Technical Note D-2043, August 1964.

D. Stern, "A Simple Model of the Interplanetary Magnetic Field. Part. II: The Cosmic Ray Anisotropy, NASA Technical Note D-2404, August 1964.

R. A. Hanel and F. Bartoko, "Radiative Equilibrium in Planetary Atmospheres. I. Application of the Strong Line Absorption Law to the Atmosphere of Venus," NASA Technical Note 2397, August 1964.

News About Space & Aeronautics

● A relocation and expansion of NASA's tracking station on Madagascar has been agreed to by the Malagasy Republic and U.S. government.

The station, previously located at Majunga in the island republic. is being relocated in the vicinity of Tananarive and expanded to include equipment for monitoring and communicating with Project Gemini astronauts, and for tracking and recording data from scientific satellites.

Construction on the site is expected to begin sometime during September.

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● NASA has signed a nine-month $496 million extension of its Project Apollo spacecraft contract with North American Aviation's Space and Information Systems Division in Downey, Calif.

The extension calls for five additional Apollo command and service modules, one additional flight boilerplate spacecraft, and one more full-scale mockup. Also included in the extension is the building at NAA's Tulsa, Okla., plant of nine adapters to house the Apollo Lunar Excursion Modules aboard Saturn V launch vehicles.

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Goddard Speech and Paper Presentations

(Technical presentations approved as of September 14, 1964 for period through October 5. Requests for copies of speeches and papers should be made directly to the author.)

PAPERS

A. G. W. Cameron, N. Y. Naval Applied Science Laboratory, September 25, Brooklyn, N. Y., ***"Communicating with Intelligent Life on Other Worlds."***

D. L. Waidelich, 1st International Congress on Instrumentation in Aerospace Simulation Facilities, September 28-29, Paris, France, ***"Coil Systems for the Magnetic Simulation of Space."***

P. Yaffee, 1st International Congress on Instrumentation in Aerospace Simulation Facilities, September 28-29, Paris, France, ***"Instrumentation for the GSFC Space Environment Simulator."***

Paul D. Lowman, Jr., UNESCO, September 25, Tolouse, France, ***"Photography of the Earth from Sounding Rockets and Satellites: A Review."***

John T. O'Connor, Cedar Rapids Section of the IEEE, September 25-26, Cedar Rapids Section of the IEEE, ***"The NASCOM Network: Its Present State and Planned Evolution."***

Wilmot N. Hess, Brown University, September 24, Providence, R. I., ***"Radiation Belts in the Earth's Magnetosphere."***

Joseph Purcell, DOD Symposium on Electronic Intelligence, September 24, Long Island, N. Y., ***"Communications & Data Handling on Large Scientific Satellites."***

A. L. Franta, American Institute of Aeronautics, and Astronautics, September 23, Washington, D. C., ***"Integrating Spacecarft Systems."***

J. A. Kaiser & K. L. Hanlin, 1964 PTGAP International Symposium, IEEE, September 22-24, Long Island, N. Y., ***"Automatic Polarization Analysis of the Turnstile Radiation Field for Satellite Attitude Determination."***

J. A. Kaiser and J. H. Little, 1964 PTGAP International Symposium, IEEE, September 22-24, Long Island, N. Y., ***"Phase Comparison Properties of the Dual Mode Spiral with Application to Direction Finding."***

Joseph D. Picot, UNIVAC Users Association, September 14-16, New York, N. Y., ***"NASCOM System Programming."***

Wilmot N. Hess, U. S. Antarctic Research Program's 1964 Orientation, September 14-19, Skyland, Va., ***"Atmospheric Sciences at High Latitudes."***

T. Neil Davis, U. S. Antarctic Research Program's 1964 Orientation, September 14-19, Skyland, Va., ***"Evaluation of Antarctic Auroral Investigations Since 1957."***

R. H. Plaumann, UNIVAC Users Association, September 14-16, New York, N. Y., ***"The Use of a UNIVAC 490 As a Real-Time Message Switching Unit."***

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 space program has been a catalyst, a stimulus to *education* at all levels, with particular attention to science and engineering. How much is it worth to have raised the educational sights of our young people and at the same time to have increased significantly the wealth of knowledge with which to condition them? I cannot put a price on it, but I believe its value will exceed the total cost of the space program.

"The contribution of our space program to our *national security* is also considerable. How much more secure are we, due to improved communications, more accurate navigation, more complete weather information, and better world-wide mapping? How much is it worth to be better informed about potential sources of danger? How can we assess the advantage of developing competence to detect and offset possible agression from space? I cannot put a price on these contributions to national security, but I am confident that their value also exceeds the total cost of the space program.

"The space program stimulates the development of new products, new productive processes, and new managerial techniques. I cannot place a precise value upon such innovations, but I would estimate that such investment will repay itself many times over.

"A substantial difference in influence in *world affairs* evolves from whether a country is in a first position or a second position in power. To a significant degree, a nation's relative position depends on how it stands in advanced technology. International prestige is not a mantle to be weighed lightly or to be worn carelessly. We should be concerned with the image that people of other nations have of the United States. The ideal picture is that of a nation strong in ideas, in technology, in freedom, in standards of living, and in military power to protect the viability of the other prestige ingredients. The space program, effectively and imaginatively conducted, contributes positively to all of those ingredients. I do not know how much such a contribution is worth, but I am confident that if we fail to strive for it, we will make it clear that we no longer value our freedom highly."—*Dr. Edward C. Welsh, Executive Secretary, National Aeronautics and Space Council, addressing Aerospace Industries Association Council, Seattle, Washing, August 8, 1964.*

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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