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GODDARD

NEWS

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

VOLUME VII, NUMBER 5

JULY 13, 1964

Odd-looking Clusters Give Inside Story of Sunlight

Synthetic Sun Will Test Satellites

What is the inside story on artificial sunlight? At Goddard it is a cluster of 127 optical units dubbed the solar environment simulator, and the device is found inside the large Space Environment Simulator (SES) in building 10.

Synthetic sunshine from the units shines from the dome of the huge vacuum chamber (measuring 60 feet in height by 35 feet in diameter) onto satellites being tested therein.

A spacecraft which will be sent into orbit must first prove its ability to withstand the un-earthly conditions of space, and the SES chamber with its facility to create "sunlight" is an important part of the satellite's trial by fire.

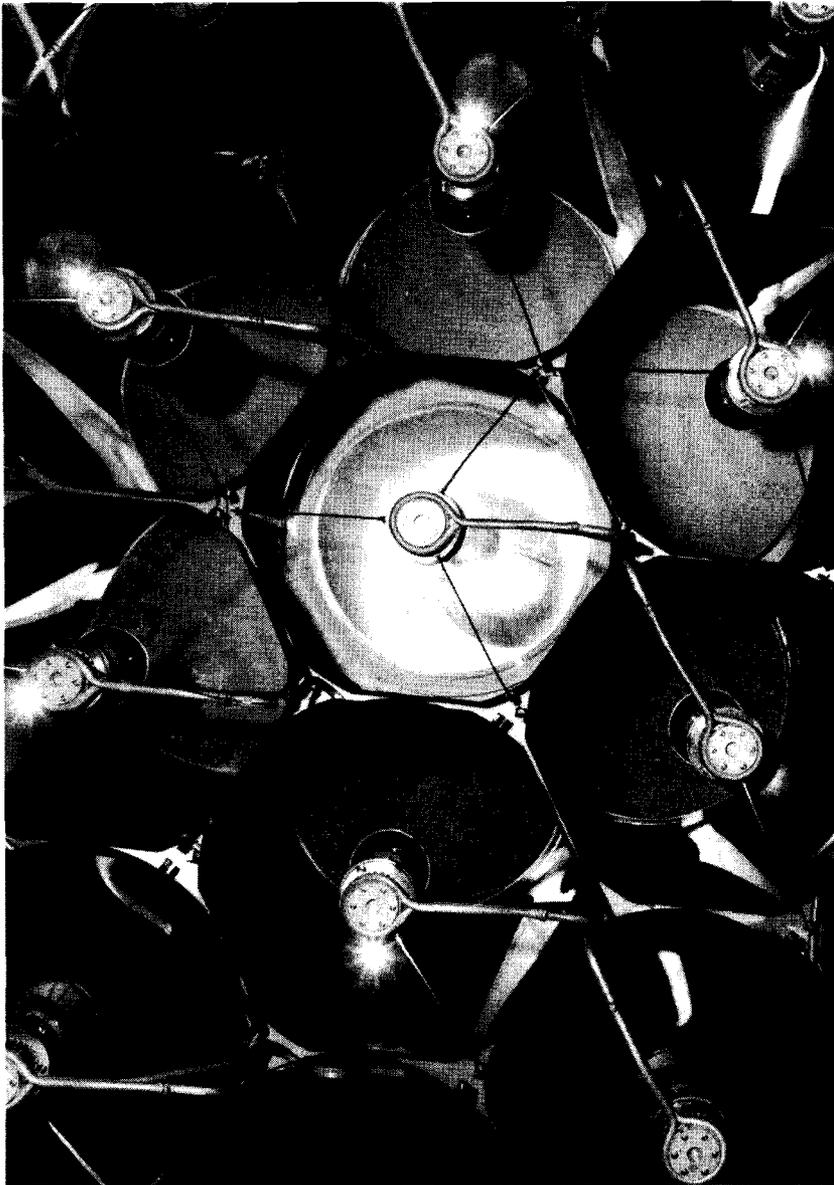
The test satellite can be subjected to temperature and vac-

uum conditions similar to those existing at Earth orbits up to 400 miles in space.

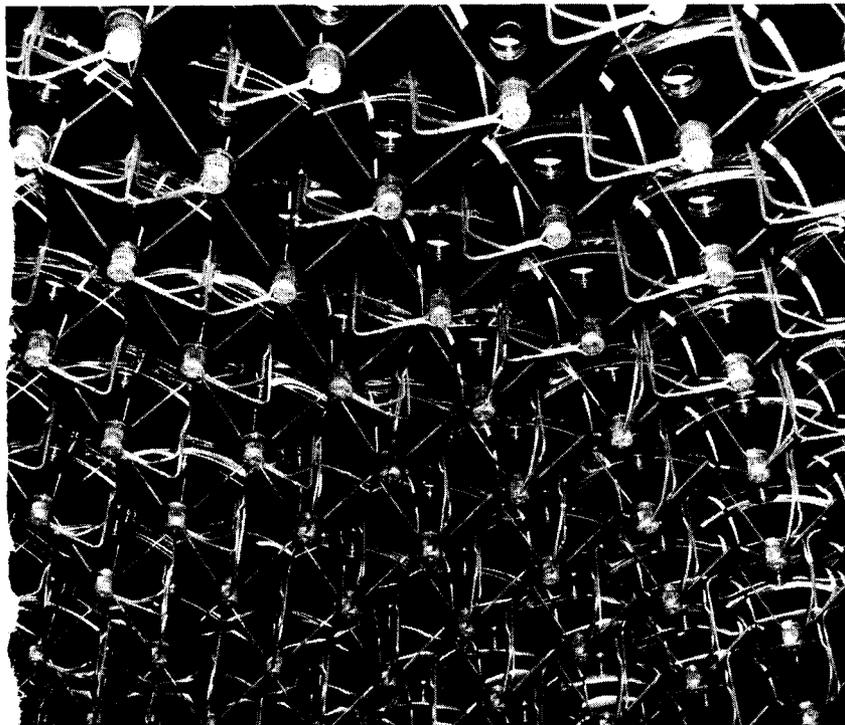
Each of the 127 assemblies consists of a high energy mercury-xenon lamp, an aluminized reflector, and four fused silica lenses which relay the light into the chamber. The bottom lens acts a window and a seal, separating the module from the chamber's vacuum area.

Special reflector units, located inside the chamber beneath each of the 127 optical units, focus the artificial sunlight on infinity. The light inside the chamber is thus relayed in parallel rays similar to sunlight in the vacuum of space.

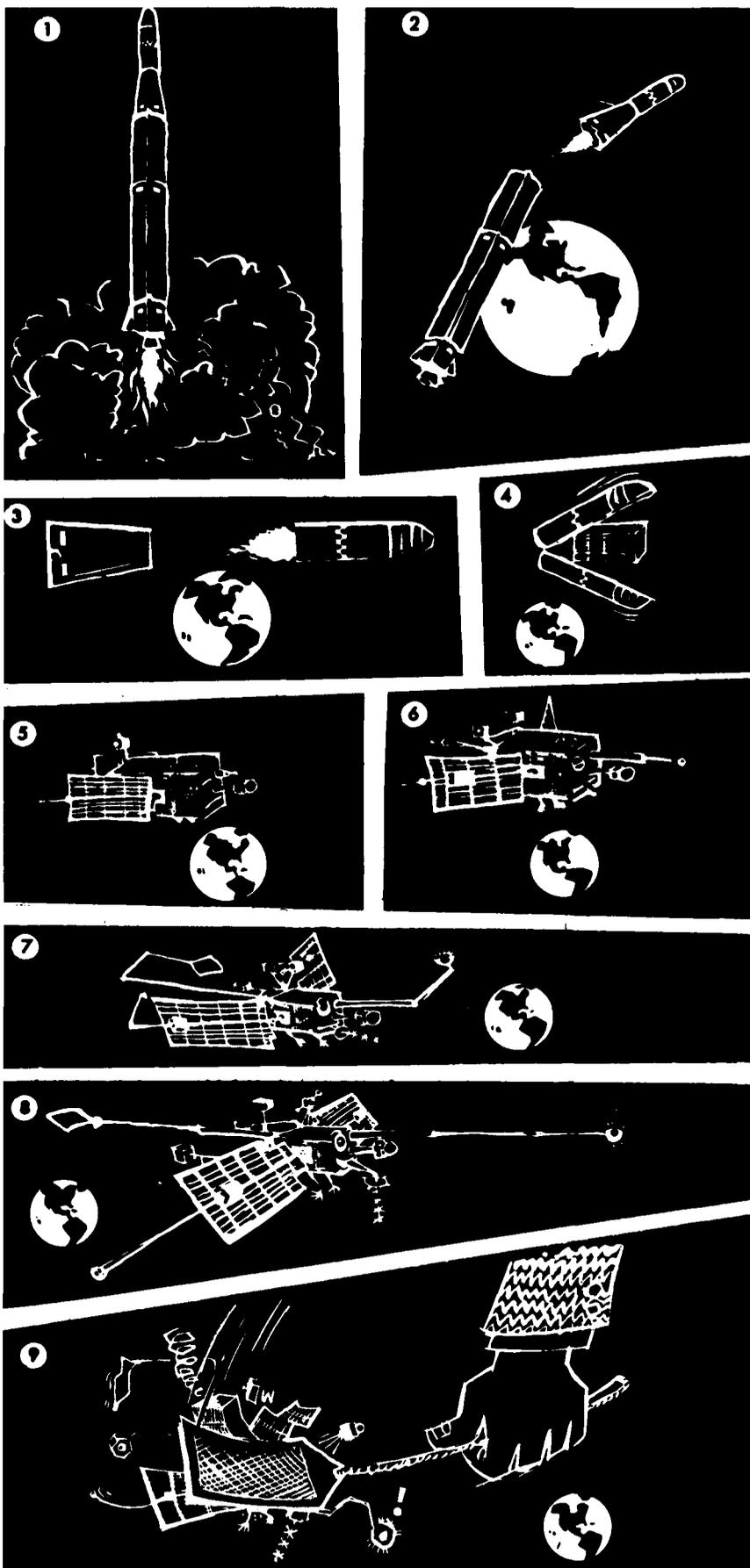
The size of the chamber will enable large second-generation satellites, such as the Orbiting Geophysical Observatory (OGO) series to feel the artificial sunshine before their journeys into space.



This comprises not a sealed-beam honeycomb, as you might imagine at first glance. It is a close-up view of a cluster of unusual optical modules which must simulate sunlight inside Goddard's massive Space Environment Simulator.



Here is an overall view which shows how the solar simulator modules are arranged in the dome of the large chamber.



Oh, No -- OGO!

This series of cartoons illustrates OGO being lifted into orbit, unfolding ready for service, and WHAT???? OGO does look like some unearthly bug. The wife of a project scientist said that she would be tempted to hit one with a fly-swatter if she saw one. Now, in fancy at least, someone has!

FROM INDONESIA:

A Letter Asks for Information

Interest in the nation's space effort is not limited to our own citizens. On almost any given day, letters from all parts of the world reach Goddard's office of public information.

One which is representative of the desire to know more about the Center and its mission in space is printed below. The excerpts are reproduced exactly as written. The English is imperfect, but abundantly expressive in this letter from Indonesia:

"... I'm very glad because I have a chance to write this letter to you. I'm is a teacher in here in St. Joseph High School. I'm very interest about Goddard Space Flight Center program, activities, satellites, development, etc.

"Sir, can you send me some photograph and informations concerning that. I'm sure you like consent my request. That will be assistance to me in teaching in St. Joseph High School. Students in St. Joseph High School very interested about Goddard satellites. Goddard satellites very well known

in Indonesia but photographs and information concerning Goddard satellites very shortage in Indonesia. That is why this letter to you. . . .

"Thank you very much for your appreciate in my letter. . . . Hope you and NASA always successful. I'm gladly awaiting your reply with best wishes."

The teacher in Indonesia, of course, received the information as requested. And through him, the students at St. Joseph's will have their interest fed with facts.

Israel's Prime Minister Visits Our Cape Facilities



Goddard's field projects branch at Cape Kennedy was one of the stops of His Excellency Levi Eshkol, the Prime Minister of Israel, during his recent trip to this country. The branch, headed by Bob Gray, handles launch responsibility for Delta, Agena and Centaur boosters.

In the photo above, the Prime Minister (right) listens to an explanation of a prototype Syncom by John Neilon, Gray's assistant.

In front of Mr. Eshkol is a scale model of Nimbus, a Goddard-managed second-generation weather satellite.

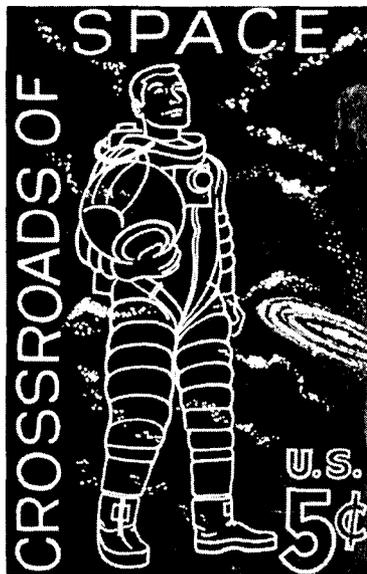
News About Space & Aeronautics

● The NASA is considering improvements to the Saturn V launch vehicle to provide a more powerful vehicle for "post-Apollo" space work.

Possible modifications include the redesign of propulsion stages, improvement of vehicle performance and control, strap-on solid propellant motors and engine improvements.

Proposals for studies to increase Saturn V's payload capability are being sought by Marshall Space Flight Center. Cost of the studies will be approximately \$2 million.

● Pictured here is the grand award winning design of the 1964 Space Stamp Design Contest sponsored by Space Craft Covers, a philatelic organization. The artist is James Pearl of Frederick, Md. The designs submitted were judged recently in the stamp department of a Washington, D. C. department store. Everyone who submitted an entry received an Award of Merit for their artistic response to this contest, which has inspired national interest in procuring a space stamp issue by the U. S. Post Office.



● Blowtorch-like igniters delivering more thrust than the 16 engines of four jet airliners will be used to test fire giant three-million-pound-thrust solid rockets now under development by Aerojet-General Corporation for the Air Force Space Systems Division, which in turn manages the program for NASA.

Nicknamed "Blowtorch," the starter system will be used like a torch to fire a column of flame down the center of the 80-foot-long rockets to ignite the mass of propellant.

The igniter itself is larger than many of today's big rockets, 13 feet long and 2.5 feet in diameter with a thrust of more than 250,000 pounds.

For each test firing, the igniter rocket will be placed inside the 15-foot-diameter nozzle of the big motor. Its exhaust will be directed down the bore of the tunnel running through the propellant mass the length of the motor.

● When manned Gemini spacecraft begin orbiting the Earth, chances are the occupants will spend some of their time performing masticatory manipulations: Chewing gum, that is.

Scientists are investigating the use of chewing gum for astronauts who, because they must spend long periods in a gravity-free environment, cannot use tooth paste or mouth wash.

"Chewing gum won't prevent cavities," admitted Dr. Elliott S. Harris of the MSC's environment physiology branch, "but it will help stimulate dental tissues and freshen the astronaut's mouth during long-duration space flights."

About the sticky problem of disposing of chewing gum in spacecraft?

The astronauts can swallow it.—*Spaceport News.*

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 goal (manned lunar landing in this decade) still stands. The schedule, as stated, still stands. Nothing has happened since 1961 that would cause us to change either . . . One thing is clear: if the lunar schedule should slip into the next decade, such slippage should be due to unavoidable technical factors, not to deliberate failure of our pioneering spirit. . . .

"As important as it is, the lunar project is not the whole space program. Last year, for example all aspects of manned space flight, plus supporting unmanned launches, accounted for 47% of the U. S. expenditures on space. This year, the estimate is 50%. . . .

"In a philosophical sense, the most significant aspects of this national space program is that it disturbs the status quo. It makes obsolete those who think and act only in terms of the past. It inspires those who believe in the future of their country. It even puts stars in the eyes of those accustomed to judge progress solely by last year's profit and loss statements. The national space program is in a real sense a renaissance of the spirit of '76, the Declaration of Independence, and the Westward Movement. . . .

"Our numerical progress in orbiting payloads is impressive. Last year alone, the U. S. put more payloads into Earth orbit than the USSR has since Sputnik I in 1957. . . .

"I am much encouraged by the decision to develop and operate the Manned Orbiting Laboratory—the MOL. This is a positive step to ascertain what man can do in space for defense purposes.

"Moreover, it is another important illustration of coordination between DOD and NASA, with the rockets developed by one agency and spacecraft developed by the other. This is also a step toward the creation of a space station. The future promises rapid progress toward multi-manned, long-duration resupplied space stations in polar as well as conventional low inclination orbits.

"The fact that we do not plan space projects for aggression does not mean that we have a national security space gap or that we will allow one to develop."—*Dr. Edward C. Welsh, Executive Secretary, National Aeronautics and Space Council, Robert H. Goddard Memorial Dinner.*

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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

Photography by Goddard's photo branch

Bruce Brough, Editor

Shirley Deremer, Inside Goddard

This is the fifth in a series dealing with Goddard's Manned Spacecraft Tracking Network stations around the world.

KANO, NIGERIA:

From Groundnuts —

Kano, in the West African nation of Nigeria, is noted as the shipping and processing center of the largest single groundnut (peanut) producing area in the world. The city has outgrown its historic mud wall—12 miles in circumference and become the population center of the second most densely populated area in Africa. Other specialties of the city are "Morocco leather," which is produced in Kano and shipped across the Sahara in camel trains, and the tracking of manned spacecraft.

The latter is the point of intersection where Goddard meets Kano. The Manned Spacecraft Tracking Network station there is the responsibility of this Center.

Goddard's station director, Alva E. Smith, currently heads up a staff of 38 persons. Of this number, 22 are Africans, 11 are Bendix Field Engineering personnel under NASA contract, and four are contract employees of the British Cable and Wireless, Ltd.

The Kano station is a typical remote non-radar site—acquisition aid tracking, telemetry reception, capsule voice communications and point to point teletype and capsule voice communications comprise the station maintenance and operations responsibility.

As the manned Gemini flights loom closer, the station is checking out the new equipment necessary for meeting its responsibilities under that program.

Until Gemini astronauts take to orbit, Smith and his men will continue training and living in Kano. During this period ground communications coverage is maintained daily Monday through Friday with Goddard on a two-shift basis, the closing time being determined by Goddard based upon traffic requirements.

In Kano, all official contacts with local authorities are made by the station director as a matter of NASA policy. On an unofficial, or semi-official basis, the station director meets school or social groups for lectures, etc.

Smith told the GODDARD NEWS, "My wife and I are normal invitees to various social functions such as cocktail parties and garden parties as representatives of the project. This is not from any preconceived plan, but stems from the fact that we are well known in the business and official community. We have a wide acquaintance among local officials; contact being limited,

however, to these official or business generated functions."

Ages Behind the Wall

The old walled city has a recorded history dating back to about 900 AD: At one time it was one of the largest slave trading centers in the world. This part of the city has an estimated population of 150,000. Most still live in mud houses.

Sabon Bari (Hausa for "Strangers Town") is outside the walled city and contains about 35,000 people. These are non-Moslems, in contrast with those within the wall. Most expatriates live in the residential areas of Bompai or Nassarawa, also outside the walled city.

Due to the population density there is no wild game nearby. Out a few miles one might rarely see a monkey or two or a gazelle. There is a game reserve near Bauchi, about 150 miles south of Kano, with herds

of giraffes and the whole gamut of African game.

Several of the men on-site have acquired animals locally as pets. One man, John Clouse, has raised two wildcats from infancy. Another bought a baboon. A variety of other pets—dogs, cats, monkeys, and parrots, have been kept in various homes from time to time. These parrots are a local gray variety.

Some of the personnel are engaged in foreign language studies at home during their off-hours. This interest is based upon possible assignments in other countries, usually European, or in preparation for vacation trips through Europe, usually taken enroute home after tour completions.

There has been considerable off-hours activity in photography of local scenes and swimming at the Kano Club swimming pool.

According to the station di-

rector, the Kano Club, a private club of the "country club" type, offers the major source of local recreation. The club has a golf course of 9 holes, a swimming pool, tennis and badminton courts, squash courts and a bar and restaurant. Also a snooker (pool) room and a circulating library of perhaps 15,000 volumes. A movie (British or American) is shown Monday and Thursday nights, at a cost of 2 shillings six pence or about \$0.35.

The swimming pool is the most popular activity for station personnel (bikinis are very much in evidence). Upon rare occasions, a local amateur dramatic society or club members puts on a play . . . always very well acted and with a cast predominately British.

The Central Hotel is the only remaining hotel in Kano used by expatriates. There are two commercial movie houses attended by expatriates, the Plaza



This photograph is a study in the contrast that is Kano. The native boy is silhouetted against the African sky with Goddard's Manned Spacecraft Network tracking station in the background. Morocco leather, a major product of Nigeria, is sent across the desert via camel train from Kano.

To Astronauts, Heritage of a Walled City



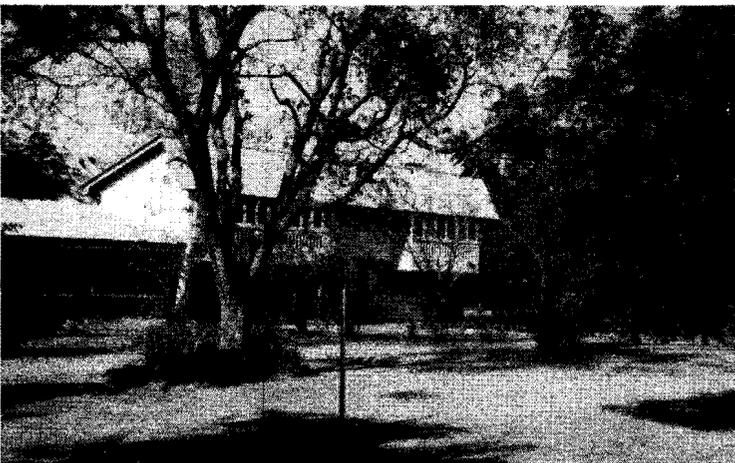
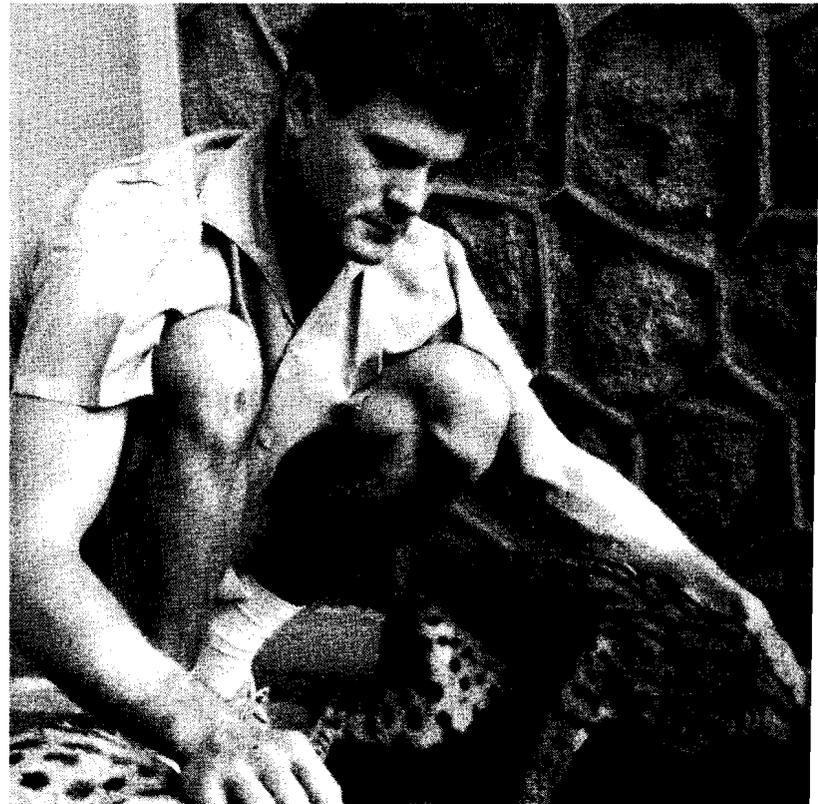
An aerial view of the Kano station gives some idea of the surrounding country. Far from the lush jungle that might be expected, the landscape shows the signs of high population density. Much in view is cultivated.

and the Queens. One has movies for Europeans (British or American movies) Saturday and Wednesday nights, the other on Sunday and Tuesday nights. Admission is 3 shillings six pence and 4 shillings, respectively. Other nights these

movies show Indian films with Hausa soundtracks . . . not attended by expatriates, the Plaza On occasion, there are football (soccer) matches between Nigerian teams for public attendance.

(Cont'd on p. 6)

John Clouse, M&O supervisor at the site, has no tiger in his tank—but he does have wildcats within his walls.



Alva Smith, station director, lives in this house not far from the site. He is a veteran of Project Mercury.

TIROS Stars at Swiss Trade Fair

The Goddard-managed TIROS weather satellite made its mark in Zurich, Switzerland last month. One of its systems, Automatic Picture Transmission (APT), was featured as part of the U. S. exhibit at the Sixth Swiss Import Fair June 5-14.

The APT system exhibit was sponsored jointly by NASA and the Weather Bureau's National Weather Satellite Center.

APT is aboard the latest TIROS, and enables any ground station in the satellite's path to receive cloud cover pictures which are automatically and continuously transmitted.

The special but inexpensive APT ground station equipment was on display. The system, which will also be aboard the upcoming Nimbus (second-generation weather satellite), makes it possible for any nation to receive benefits from present and future meteorological satellites at low cost.

Fairgoers also saw photographs of the Earth and its cloud cover that were transmitted from TIROS satellites.

The U. S. Department of Commerce's Bureau of International Commerce staged this country's exhibit under the department's trade fair program.



U.S. Secretary of Commerce Luther H. Hodges is examining the APT display shown by NASA at the Swiss Trade Fair in Zurich. An APT antenna display is behind Mr. Hodges.

Kano (from p. 5)

The site has been visited by most of the dignitaries of the host country according to Smith. Other visitors are not unusual.

"We get a surprising number of American tourists, Kano being a crossroads of air travel in West Africa, as well as having an old walled city as an attraction," Smith says.

"We have a large number of American missionaries in the area, and a growing number of Peace Corps people. AID (Agency for International Development) now has several families in the Kano area. That's the permanent American contingent, except for two Mobiloil Co. Americans in town."

Late this year, when astronauts "Gus" Grissom and John Young circle the globe, the personnel of Goddard's Kano station will link arms with the rest of the network to follow and record the event. Their training and responses at that time will contribute to the mission's success every bit as much as the Titan II.

'Moon-Blink' Seeks Lunar Volcanos

Lunar volcanos were much in the news last November when astronomers in this country, France and Russia reported red spots which were theoretically attributed to escaping gasses—or human error.

Equipment is being tested here that should eliminate the latter question. Electronic eyes of NASA's "Project Moon-Blink" are being readied to conduct a search for the spots.

A trial run of this equipment was conducted here early in June in conjunction with Goddard's 16-inch telescope.

The image of the Moon travels from the telescope past a spinning filter which is divided into red and blue sides. After passing the filter, the Moon's image is magnified onto an image tube to be viewed by observers. The two colors on the filter will enable any red spots to be either filtered out or shown.

Where the human eye could "play tricks," it is unlikely that the Moon-Blink system would

duplicate the mistake.

The Moon-Blink Project is under the management of NASA's office of advanced research and technology. Dr. James B. Edson technical assistant to the head of the office, considers it a three-step project.

The current step, underway



Here some Swiss fairgoers examine the APT exhibit in Zurich.

here at Goddard, is the development of the image tube device. Next would come work on a more precise and sophisticated closed-circuit television system to permit continual "moon-watching."

Finally, a device could be added to sound an alarm when one of the spots is sighted and to activate photographic equipment at the same time. An additional step would be automatic spectral analysis of the spot.

The ultimate purpose of the program is to determine whether useful materials can be discovered on the moon to further justify the manned lunar landing program.

Goddard Speech and Paper Presentations

(Technical presentations approved as of July 6, 1964 for period through July 27. Requests for copies of speeches and papers should be made directly to the author.)

SPEECHES

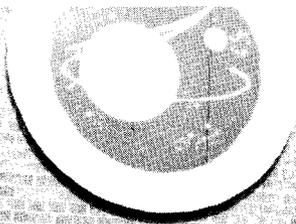
T. G. Butler, Aircraft Industry Assn. (AIA)—Panel 58-A, Dynamics & Aeroelasticity Research, New York & Bethpage, N. Y., July 15-17, "NASA Computer Committee for Structural Analysis."

PAPERS

W. N. Hess, Latin American School of Physics, Tucuman, Argentina, July 27-31, "Lecture on Physics of the Magnetosphere, Part I."

Ramond C. Waddel, Special Technical Conference on Nuclear Radiation Effects (Sponsored by IEEE/PTGNS, Radiation Effects Committee), Seattle, Wash., July 20-24, "Radiation Damage to Solar Cells on Relay I and Relay II."

Daniel M. Brown, Special Technical Conference on Nuclear Radiation Effects (Sponsored by IEEE/PTGNS, Radiation Effects Committee), Seattle, Wash., July 20-24, "Low Energy Proton Damage Effects in Silicon and Gas Solar Cells."



GODDARD SPACE FLIGHT CENTER

Summer Science Research Program Begins



Summer Science Research Program participants begin their training: (Top Row—left to right) Andrew Beck, Erik Schultz, Randolph Norris, Ted Hudson, Norm Sperling, Pete Walpole, Howard Millard, Rick Siems, Jeff Siems, Barry Springer, and Ed McHugh, employee development officer; (Bottom Row—left to right) Mrs. Maury, A. U. program coordinator, Tom Rotkis, Francine Wright, Joyce Berman, Carol Clericuzio, Cathy Gody, Paula Noll, Kathleen Thompson, Joan Harrell, David Seeman, David Freedman and Kermit Frazier.

Area Students Train On-the-Job Here for the Summer

Summer "vacation" will involve on-the-job learning for 21 area high school students who have demonstrated outstanding aptitude in mathematics and the sciences.

The students are participants in the Summer Science Research Program, which is co-sponsored by the American University and the Washington area Joint Board on Science Education (further information on Joint Board in May 4 issue, p. 6). A grant from the National Science Foundation partially supports the program.

Goddard is one of several area research and development organizations cooperating.

The program included 7 participants at this Center last year, compared to three times that number this summer. The students who apply for this training are rigorously screened.

They must submit their science and math grades to the program co-sponsors. Then, they are required to write two essays: One telling why they desire to participate in the pro-

gram and a second relating their interests and achievements in the field.

A note of permission from the parents and a recommendation from a teacher is also required from each.

These future scientists and technicians take up assignments at various areas around the Center where they have been placed by the employee development branch. The first two days of the program were spent at the American University for orientation before work assignments began. Mrs. Margaret H. Maury, who worked with them

there and remains in contact with the participants during the summer, is American University coordinator for the program.

The participants, their high schools and their assignments here at Goddard are listed below:

- network engineering and operations division—Andrew Beck, Yorktown High School, Arlington, Va. and Thomas Rotkis, Toul American High School, Toul, France (His (Cont'd on p. 8)

Students Train At Goddard

(Cont'd from p. 7)

- family is stationed in France).
- spacecraft systems and projects division—
Joyce Berman, Walt Whitman High School, Bethesda, Md.
- spacecraft technology division—
Carol Clericuzio, Walt Whitman High School, Bethesda, Md.; Ted Hudson, Surrattsville High School, Surrattsville, Md.; and Randolph Norris, Washington-Lee High School, Arlington, Va.
- aeronomy and meteorology division—
Kermit Frazier, Frank W. Ballou High School, Washington, D. C.; Joan Harrell, Calvin Coolidge High School, Washington, D. C.; Frederick Siems and Barry Springer, High Point High School, Beltsville, Md.
- spacecraft integration and sounding rocket division—
Norman Sperling and David Freedman, Montgomery Blair High School, Silver Spring, Md.; Howard Millard, Yorktown High School, Arlington, Va.; Paula Noll, Suitland High School, Suitland, Md.; and Peter Walpole, Albert Einstein High School, Kensington, Md.
- advanced development division—
Catherine Gody, Bethesda-Chevy Chase High School, Bethesda, Md.; and Jeffrey Siems, High Point High School, Beltsville, Md.
- test and evaluation division—
Erik Schultz, W. T. Woodson High School, Fairfax, Va.; Kathleen Thompson, Wakefield High School, Arlington, Va.; and Francine Wright, Cardoza High School, Washington, D. C.
- data systems division—
David Seeman, Northwood High School, Silver Spring, Md.

Through this program, bright young people are being provided with the opportunity to determine their career interests and objectives. Their supervisors at Goddard are playing an important role in their career development.



John T. Mengel, assistant director, office of tracking and data systems (left), points to the Vanguard satellite and explains its role in space to Governor Manuel Guerrero, of Guam, a United States Territory. The Governor visited Goddard in June.



Toils Among the Coils...

If you look very closely, you will find three workmen busy during early states of construction of Goddard's Magnetic Fields Component Test Facility. It has now been completed.

Located on the Agricultural Research Center grounds, the series of coils gives our test and evaluation division the ability to calibrate magnetic satellite experiments in prepara-

tion for launch. It can also be used to de-magnetize satellites whose inherent magnetic fields are often greater than the natural magnetic field they are to measure.

When de-magnetized by the field of near-zero magnetism created in the center of the electrically-charged coils, the Earth's magnetic field is "cancelled out."

The $\frac{3}{4}$ -Credit Graduate Study Program in Electrical Engineering was announced prematurely in the last issue.

Planning for the program is still actively underway, and further developments will be published when available.

Those qualified employees interested in the program should contact their supervisors.