Space News

NASA ROUNDUP!

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Venus Too Hot For Life As We Know It

Surface Temperature About 800 Degrees, Mariner Discovers

Any chances of life as we know it existing on the planet Venus were ruled out February 27 when the National Aeronautics and Space Administration announced from Washington that the surface temperature of Venus was about 800 degrees Fahrenheit.

NASA scientists were disclosing findings of the Mariner 2 space probe which flew by Venus, the nearest planetary neighbor, last December 14.

Contrasting with the high surface temperature—200 degrees hotter than the melting point of lead—was the 60-below temperature of the upper level of Venus' cloud cover, which may consist of a kind of oily smog.

Scientists have spent more than two months studying the data from special instruments aboard the 447-pound spacecraft during its flight. Their conclusion is that Venus is too hot and too dry to be the abode of life as it is known on earth.

Passing 21,600 miles from the perpetually cloud-masked planet, Mariner found that Venus rotates very slowly, once in 250 earth days, and it has either a very weak magnetic field or none at all. There are no breaks in the clouds that eternally envelop Venus, and those clouds have temperatures ranging down to some 60 degrees below zero. One particular spot in the cloud layer is colder than others, raising the possibility it's due to some hidden feature on the planet's surface.

Other Mariner findings include the fact that there is no dense cloud of electrons high in the Venusian atmosphere, as has been speculated.

(Continued on Page 7)

'Friendship 7' To Hang Beside Wrights' Plane

Already surrounded in an "aura of obsolescense," the historic spacecraft "Friendship 7" in which Astronaut John H. Glenn, Jr., orbited the earth was presented to the Smithsonian Institution February 20, the first anniversary of his flight.

See picture, page 7

Friendship 7 will share a room in the Air & Space Building with relics from two other milestones flying history. Almost directly above Glenn as he spoke during presentation ceremonies was Charles Lindberg's "Spirit of St. Louis," in which Lindberg made his solo crossing of the Atlantic 36 years ago. A short distance away was the plane in which the Wright brothers made the

(Continued on Page 2)

THE SPACE VEHICLE PANEL of the President's scientific Advisory Committee met Friday and Saturday in the director's conference room for briefings on the Mercury, Gemini and Apollo programs. Left to right (around table) are Dr. Donald F. Hornig, chairman; Dr. Lester Lees; Dr. H. W. Emmons; Dr. Frank McClure; MSC Director Robert R. Gilruth; and MSC's Dr. W. Lanzkron. At rear is Robert O. Piland.

President's Scientific Advisory Committee Meets At MSC

The Space Vehicle Panel of the President's Scientific Advisory Committee met at MSC Friday and Saturday for briefings and presentations on the Mercury, Gemini and Apollo programs.

Presentations were made in the director's conference room, Farnsworth-Chambers Building, and involved the current project status and the future program for which plans are now firm.

A short executive session of the committee was held Friday at 9 a.m. The presentations and briefings took most of the day Friday, and the committee held a two-hour executive session Saturday morning.

Briefings were included on Project Mercury experience;

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Little Joe II Contract Goes To General Dynamics/Convair

A $6.3 million contract definitizing the cost, design and manufacture of Little Joe II sub-orbital launch vehicles, its launchers and range support, was made public February 20 by Manned Spacecraft Center and General Dynamics/Convair.

The formal contract calls for four Little Joe II vehicles, two launchers, and support at the White Sands Missile Range in New Mexico.

The Little Joe II, designed as an economical and expendable launch vehicle for testing boilerplate models of the Apollo spacecraft in unmanned, sub-orbital flights, is scheduled for first flight in mid-1963. Now being fabricated and assembled at the General Dynamics/Convair plant in San Diego, California, the first Little Joe II will be able to accommodate as many as seven solid fuel Algol engines developing a maximum thrust of about 800,000 pounds. The vehicle has been designed for a maximum Apollo payload of 80,000 pounds.

General Dynamics/Convair

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Saturn V First Stage Will Be Built By Boeing Company

The National Aeronautics and Space Administration has placed in force with the Boeing Co., Seattle, a prime contract for the development and production of the Saturn V first stage (S-IC).

The amount of the contract is $418,820,967. The contract was negotiated by and will be technically supervised by the NASA-Marshall Space Flight Center, Huntsville, Ala., manager of the Saturn program for the NASA Office of Manned Space Flight.

This contract, the largest ever signed by the Space Agency, calls for the design, development and manufacture of ten flight boosters and one ground test booster, as well as providing assistance to the Marshall Center in portions of the S-IC ground test program.

NASA announced Dec. 15, 1961, that it would negotiate with Boeing for this contract. Preliminary development of the booster has been in progress under an interim contract in this period, at a cost of about $50,000,000.

The primary place of performance of the work will be the NASA Michoud Operations in New Orleans, where assembly is to take place. Boeing will also employ forces at its plants at Wichita and Seattle, at Huntsville, the Mississippi

(Continued on Page 7)

Activities Assn. Has Charter; To Hold Elections

The charter for the establishment of an MSC Employees, Activities Association for the promotion of employee recreational activities has been approved by MSC Director Robert R. Gilruth.

The association will function as a branch of the Exchange Council.

Gilruth also appointed an election committee to conduct the initial election of the association's general assembly in accordance with the charter. They are Chris Critzos, Flight Operations Division; Paul Sturtevant, Gemini Project Office; Kathryn Walker, Personnel Division; Bill Wilson, Engineering and Development Office and Elwyn Yeater, Center Services. Yeater is chairman.

The election will be held April 1.

(Continued on Page 7)

Purser, Berry Give Television Talks On Weightlessness

Special Assistant to the Director Paul E. Purser and Dr. Charles A. Berry, chief of the Aerospace Medical Operations Office, participated in a half-hour program on "Weightlessness" over KUHT-TV, Channel 8 an educational television station, Monday night.

The program was the first of a six-program pilot series entitled "Physics Today," pre-

(Continued on Page 2)

Gilruth And Purser Speak To Educators

MSC Director Robert R. Gilruth was the speaker yesterday for the annual Otto Bremer Lecture in Science at Macalester College, St. Paul, Minn.

His subject was "Educational Needs of Space-Age Technology."

Special Assistant Paul E. Purser spoke Friday to Austin school teachers at an Aerospace Seminar sponsored by the Austin Independent School District.

SCIENCE TEACHERS representing a cross-section of all high schools in Harris County visited MSC as guests of the Community Affairs Office February 25 as a preliminary to the effort to develop aerospace science curricula in Texas schools. The visit was part of a continuing series of information exchanges between MSC and the school system.

Houston Science Teachers Tour Part Of MSC Facilities

Twelve select educators from Houston and Harris County schools visited MSC February 25 for an all-day orientation program with two objectives.

One was so that they might develop clearer understanding of the nature of the work performed here in advancing the technology of manned space flight. The other was to give them a chance to discuss techniques for disseminating information on a continuing basis concerning space physics, life sciences, lunar geography, data reduction, space vehicle design and development, etc. to various grade levels in Texas schools.

Space physics and design problems should be related to school subjects such as math, chemistry, physics, and other sciences to provide students with challenging work problems which are aerospace oriented, the group felt.

They toured all work areas of the Crew Systems Division; visited computer facilities at Ellington and received an hour-long lecture on IBM mathematics and practical problems for manned space flight computers; and heard a lecture on Gemini by Project Administration Chief Andre Meyer.

The tour was planned as the first of a continuing series of information exchange visits between MSC and Houston classrooms. Next week several senior MSC engineers will sit in on typical lecture periods in science classrooms around Houston.

Television Talks On Weightlessness

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sented by the University of Houston, in cooperation with the Houston Physical Society. Moderator was Dr. Clark Goodman, vice president in charge of the Research and Development Division of Prengle, Dukler and Crumm, Inc.

Dr. John Allred, vice president and dean of faculties of the University of Houston, discussed the physics background of weightlessness. Dr. Berry discussed the medical and physical problems caused by the phenomena and Purser discussed mechanical and operational problems. A 10-minute round table discussion closed the program.

Toastmistress Club Holds Its Speech Contest

The Annual Speech Contest of the Ellington Toastmistress Club was held on Tuesday, with seven contestants vying for the honor.

They were Silvie Kelarek, Imogene Pulleine, Virginia Thompson, Carrie Ables, Cookie Underwood, Gladys Thompson, and Connie Bohl.

The winner will compete in the Houston-Galveston area contest on April 6 and will represent the Ellington Club as a delegate at the International Toastmistress Club Convention which will be held in July in San Francisco, California.

Col. & Mrs. Lewis P. Ensign were guests at the meeting and Col. Ensign, Base Commander of Ellington Air Force Base, gave the welcoming address. Winners of the contest will be announced in the next issue of the Roundup.

Ellington Toastmistress Club will hold its regular dinner meeting on Tuesday, March 19, at 5:30 p.m., in the San Jacinto Room of the Officer's Club. The theme of the meeting will be "St. Patrick's Parade in New York." All women claiming any Irish ancestry are invited to attend.

Speakers for the evening will be Sue Craig of MSC's Legal Office, Alice Robinson of MSC's Astronaut Activities Office, and Audrey Stevens, an employee of the Gulfgate State Bank. Anyone interested in attending should contact Silvie Kelarek or Virginia Thompson at WA 8-2811, extensions 5260 or 5270.

Williams To Chair Session Of AIAA Cape Conference

MSC Deputy Director Walter C. Williams will be chairman of one session of the AIAA Space Flight Testing Conference at Cocoa Beach, Fla. March 18-20.

Among papers to be presented at the conference are four by MSC personnel.

Williams' session is entitled "Experience with Manned Space Vehicle Test Operations," and will be held at 9 a.m. Monday, March 18.

B. P. Brown of MSC's Cape Canaveral staff is vice-chairman for the session, Papers to be presented will include "Checkout of the Mercury-Atlas Launch Vehicle," by C. D. Fowler of General Dynamics-Astronautics; "Mercury Spacecraft Pre-launch Preparations," Part 1 on "At the Manufacturer's Plant" by A. Anderlub and T. Pandolfi of McDonnell's Cape staff and Part II on "At the Launch Site" by D. M. Corcoran and John J. Williams of MSC's Cape staff; "Review of Lessons Learned in the Mercury Program Relative to Spacecraft Design and Operations," by John Bailey of MSC, Houston; "Astronaut Pre-Flight Preparation," by Astronaut Walter M. Schirra; "Operational Flight Test Experience with the X-15," by Perry V. Row and Jack Fischel of Flight Research Center at Edwards; and "Gemini: Mercury Experience Applied," by Jerry Hammack and W. J. Kapryan of MSC, Houston.

An afternoon session on "Space Test Operations" the afternoon of the same day will be led by Launch Operations Center Director Dr. Kurt Debus as chairman, and MSC's Cape Operations Chief G. Merritt Presonas as vice chairman. A paper entitled "Digital Data Systems for Automatic Checkout of Spacecraft" will be presented by Walter E. Parsons, Harold G. Johnson and Gary J. Woods, of MSC's Cape staff, during this session.

A tour of Atlantic Missile Range test facilities is scheduled for Wednesday, March 20 following the six-session conference.

British Aviation Medicine Specialist Assigned To MSC

A British aviation medicine specialist in climatic and respiratory physiology has been assigned to the National Aeronautics and Space Administration's Houston space center, marking the first direct foreign appointment to the Manned Spacecraft Center.

Dr. John Billingham, formerly with the Royal Air Force Institute of Aviation Medicine, Farnborough, England, and the RAF, will assist Dr. George B. Smith, Head of the Environmental Physiology Branch in the Crew Systems Division.

"Dr. Billingham has a very specialized background in water and thermal balance research," an MSC official disclosed. "He has studied problems in body temperature regulation . . . how liquids in the body are affected by temperature. We feel his background in aviation medicine . . . is an excellent addition to the Center."

At the RAF Institute of Aviation Medicine, Dr. Billingham carried out basic and applied research in aviation medicine, concentrating on climatic and respiratory physiology. He contributed research to the Bioaeronautics Group at the Royal Aircraft Establishment, Farnborough, and also served as representative to international aerospace medical conferences.

President's Committee Meets

(Continued from Page 1)

Gemini project management, mission plans, spacecraft, and launch and target vehicles; flight crew training equipment and program; Apollo project management, mission plans, spacecraft, system integration, systems tests and flight program; MSC project support research and development; and flight monitoring and control.

Chairman of the committee is Dr. Jerome B. Wiesner, scientific advisor to the President. Members of the panel present during the MSC presentation were Dr. Loren D. Carlson, Dr. John F. Kinkaid, Dr. Lester Lees, Mr. Henry Edler, Dr. Nicholas Golovin, Dr. Donald F. Hornig, chairof the Space Vehicle Panel, Dr. Robert Bucheim, Dr. Howard W. Emmons, Dr. Frank T. McClure, Dr. Donald Steininger and Mr. A. F. Donovan.

At the conclusion of the Friday afternoon briefing, the panel chairman, Dr. Wiesner, expressed the appreciation of the group for the MSC presentation and cited the progress of MSC toward the national goal of a lunar landing.

Smithsonian Gets Spacecraft

(Continued from Page 1)

first powered flight 59 years ago.

The spacecraft was presented to the Smithsonian by Dr. Hugh L. Dryden, deputy administrator of NASA.

Glenn, his wife, his two children and his parents were present at the ceremony in the rotunda of the Smithsonian Arts and Industries Building. In addition to the spacecraft, Glenn presented his space suit and a small American flag that he carried on the flight.

Glenn's spacecraft and the other two historic craft "stand as constant reminders that man aspires to the stars," Dr. Dryden said. "In a sense, Col. Glenn's flight was as feeble and faltering as was the flight of the Wright brothers. An aura of obsolescence already hangs over Friendship 7.

"Who can believe that man will be content to go only to the moon . . . We will find our way to the farthest reaches of the universe."

Glenn said the ceremony was "somewhat like a reunion. Both Friendship 7 and I have a good deal more mileage on us now."

The spacecraft has made a tour of the world and has been seen by millions of persons during the past year. Glenn said he hoped it would continue to be a symbol of friendship among peoples.

"In space," he said, "there is no enemy except space itself. I hope we can keep it that way. I hope that there will be no hate or injustice or those other things we plague ourselves with here on earth."

The spacecraft and Glenn's suit were accepted for the museum by Senator Anderson, Democrat of New Mexico, a member of the Smithsonian Board of Regents and of the Senate Committee of Aeronautical and Space Sciences.

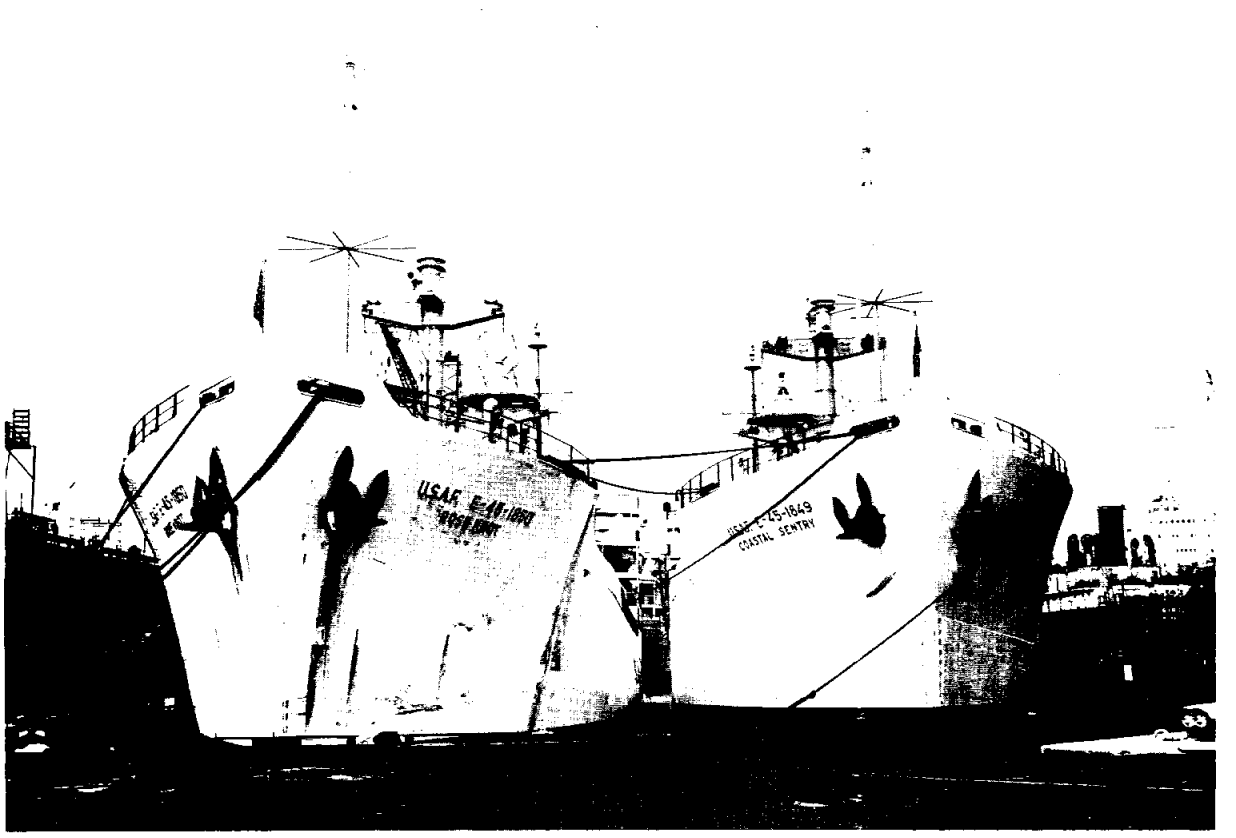
He noted the unexpected presence in the audience of Attorney General and Mrs. Robert Kennedy.

"Of course he can't do it now with these one-man spacecraft, but when we get to Gemini, with room for two, I would not be surprised to see the Attorney General going along as co-pilot, or as we say down in New Mexico, riding shotgun," he said.

Present at the ceremony were NASA Administrator James E. Webb, representatives of the countries in which Mercury tracking stations are located, and representatives of Mercury spacecraft and Atlas launch vehicle contractors.

Glenn and his family were guests at an anniversary luncheon at noon held by the Washington Board of Trade at the Statler-Hilton hotel.

BOB SPEARING, command engineer in Goddard's Network Engineering Branch steps inside a special van to inspect equipment installed under the modification program.



BERTHED SIDE BY SIDE for the first time since early in their Mercury assignments, the Rose Knot and Coastal Sentry undergo modifications for MA-9 at a Baltimore shipyard. The ships are mainstays of the Mercury tracking network operated by Goddard Space Flight Center, Greenbelt, Md.

JACK KOSLOSKY, communications engineer in Goddard's Network Engineering Branch, checks out the inter-communications system aboard the tracking ship Coastal Sentry.

Two Mercury Tracking Ships Get Ready For Cooper Mission

The ships Rose Knot and Coastal Sentry, two mainstays in the world-wide Mercury tracking network operated by Goddard Space Flight Center, have undergone modifications for the MA-9 mission and are ready for sea duty again.

The Coastal Sentry began a 52-day voyage to the western Pacific, via the Panama Canal, last month after a month and a half at the Maryland Shipbuilding and Drydock Company in Baltimore.

The Rose Knot was scheduled to start its assignment near Canary Island after a two-week stay in drydock at Savannah, Ga., where it arrived from Baltimore in January.

The ships will be taking up their positions for the upcoming flight of Astronaut L. Gordon Cooper, now scheduled for mid-May.

Changes made in the ships under the supervision of Goddard's Network Engineering Branch have provided increased capabilities to support MA-9.

Modifications in the Coastal Sentry consisted of installing a dual 600-watt high frequency command system, control console terminal equipment, and antenna changes, according to branch head Dale Call.

The new command system will permit command with the spacecraft during the retrofire sequence which occurs out of range of Goddard's Mercury network ground stations. It will also be able to control from the ground certain other functions of the spacecraft, such as attitude positioning and triggering an "astro-alarm" to awaken the astronaut during periods of sleep. These capabilities will be new to the Coastal Sentry.

In addition, a slow-scan television monitor has been installed to observe the astronaut during the flight. The slow-scan set develops the image on the screen line-by-line horizontally and is similar in appearance and movement to old-time silent movies.

On the Rose Knot, modifications consisted of adding a dual 10-kilowatt command system to the present 600-watt capability installed during a major modification last March.

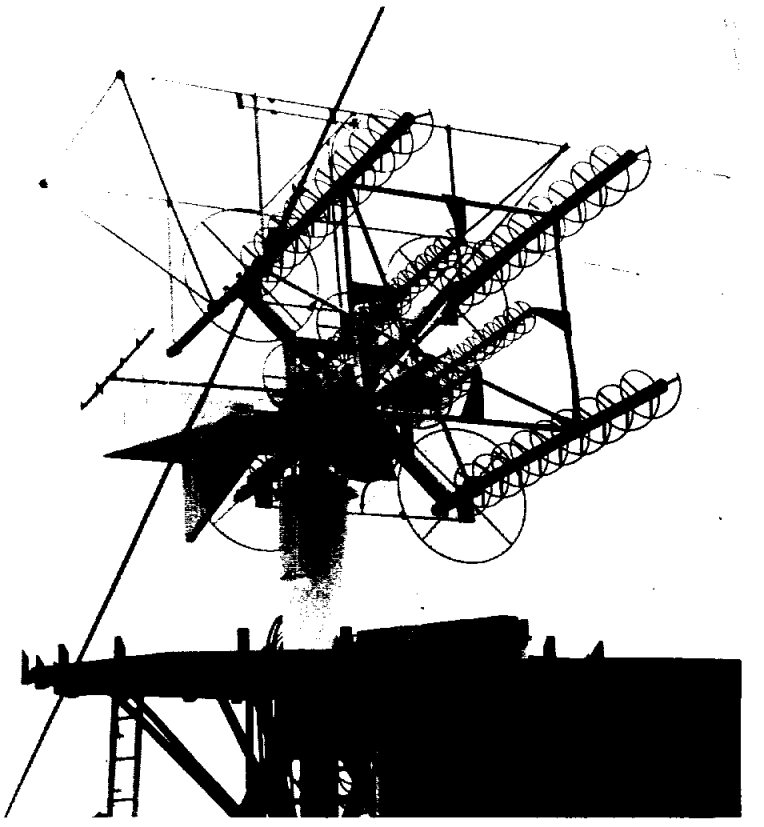
The 10-killowatt system has the configuration required for manned space flights that will follow Mercury, according to Call.

In addition to the command system, other changes made during the March, 1963 visit to the shipyard include installing two 125-killowatt diesel generators and 48 tons of air conditioning equipment, constructing electronic equipment room and machinery rooms, a recreation room, and additional accomodations for flight controllers and the ship's crew.

In addition to the regular crew of about 40, 15 technicians will be aboard the Rose Knot.

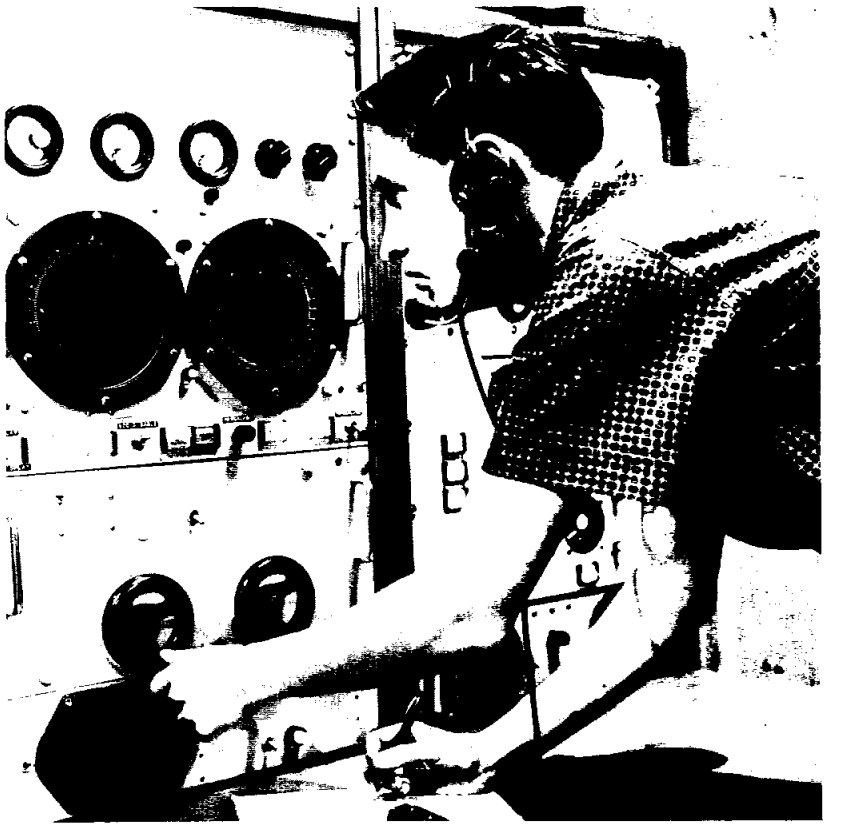
Both ships are operated by the Defense department with Pan American World Airways and Radio Corporation of America personnel providing operational support under contract.

The ships' modifications were performed in record time by the Bendix Corporation under its present contract with Goddard.



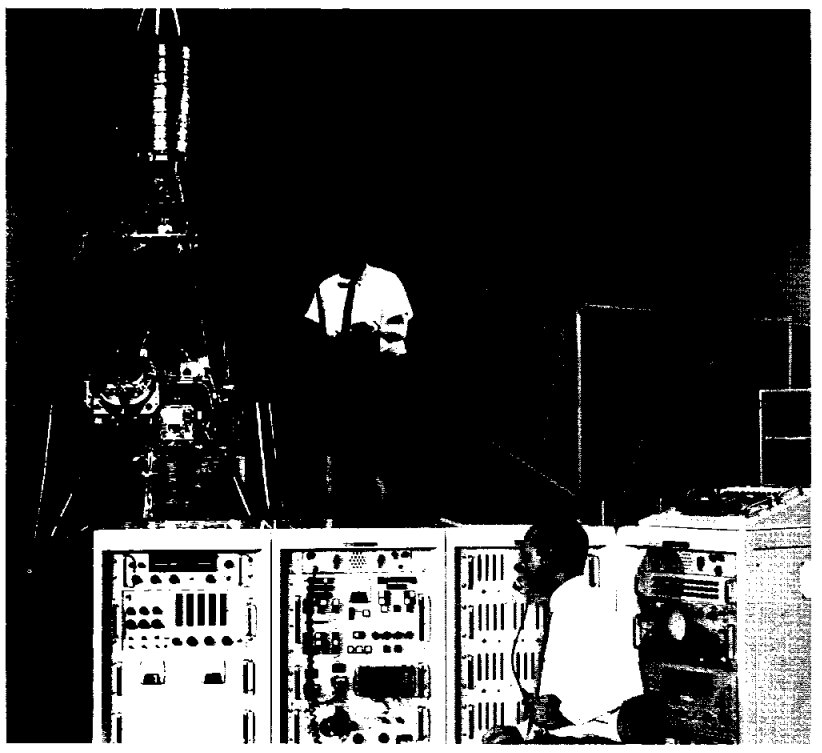
MODIFICATIONS to the Rose Knot included this multi-purpose receiver and transmitter antenna to be used for telemetry, high and ultra high frequency voice, and spacecraft command.

GEORGE BRYANT, telemetry engineer in Goddard's network engineering branch, adjusts the slow-scan TV set recently installed aboard the Coastal Sentry to observe Astronaut L. Gordon Cooper during his upcoming flight, set for mid-May.



RCA MAN J. P. Sewell operates the acquisition aid console, which remotely controls ship antennas for automatic tracking.

Caltech's Jet Propulsion Laboratory Is Resp



THE SPACE SCIENCES DIVISION plans and designs scientific instrumentation for all the JPL spacecraft. Here two members are checking out the scientific instruments during a system test of the Ranger spacecraft used for moon investigation.

GUIDED ONLY BY the precept that knowledge may contribute to the furtherance of JPL goals, the research effort at JPL is widely varied and involves every major discipline of modern science. Here a physical scientist at the laboratory uses an ultraviolet spectroscope to investigate planetary airglow.

DR. WILLIAM H. PICKERING, (seated) director of the Caltech's Jet Propulsion Laboratory, was appointed to his position in 1954. Since then the staff of JPL has more than tripled in size. At left is Brian O. Sparks, deputy director, and at right V. C. Larsen, Jr., assistant director for business administration.

THE SYSTEMS DIVISION is responsible for analysis, design and testing of the overall system for unmanned space vehicles. Here a lunar orbit model is used to give a three-dimensional display.

Located at the foot of the Sierra Madre Mountains in the heart of Southern California, Jet Propulsion Laboratory is operated by the California Institute of Technology under contract to NASA.

JPL is responsible for conceiving, designing and supervising the construction of spacecraft systems for the nation's unmanned lunar and planetary exploration programs, and for maintaining two-way communications with the spacecraft, directing their operation and securing the scientific data gathered during their flights.

Here was the birthplace of the highly successful Mariner 2 Venus probe. Here the blueprint for America's first Mars probe was made. And here, on a 150-acre site 15 miles from the third largest city in the nation, men are plotting a course to Jupiter, largest planet in our solar system.

What started almost 27 years ago as a small experimental rocket propulsion laboratory is today a vast complex of labs and offices employing 3,861 persons, and planning to add over 160,000 square feet of office and lab space in 1963.

JPL gave the United States its first Earth satellite and its first successful Venus fly-by. The challenges ahead include instrument landings on the moon, on Mars, on Venus and eventually the other planets.

Questions which JPL will attempt to answer in the future include, "What is the moon made of?" "Is there life on other planets?" "What effect does radiation have on gases, liquids, solids?"

The present lunar program consists of two projects: Ranger and Surveyor, essential forerunners to the major goal of landing a man on the moon. Current Rangers are being sent to obtain close-up pictures of the lunar surface, with increasing resolution. Following the Ranger series, JPL will send Surveyor spacecraft for soft landings on the moon, easing instrument packages to the lunar surface by means of retro-rockets. Surveyor will carry several television cameras and a soil mechanics instrument—a scoop which can pick up a sample of the lunar surface, pulverize it and determine its chemical composition.

In the planetary program, JPL is designing spacecraft that will fly-by, orbit, and land instruments on Venus and Mars. The first such spacecraft was Mariner 2, launched last August, which successfully flew by Venus at a distance of 21,000 miles, carrying out four successful experiments in flight and two more near the planet.

Another Mariner will be launched to Mars in 1964, to take TV pictures and carry out detailed infrared spectrum analyses.

Later Mariner spacecraft will weigh about 1,000 pounds, and the follow-on program, Voyager, will weigh six to 20 times more.

JPL's Deep Space Instrumentation Facility (DSIF), consisting of three tracking stations spaced about 120 degrees apart on the earth's surface, is capable of sending commands to and receiving data from spacecraft millions of miles from earth. Located at Goldstone, California, Woomera, Australia and Johannesburg, South Africa, they are staffed and run by the host countries under the technical direction of JPL. It was from Goldstone that signals were first bounced off the planet Venus, 35 million miles away. The DSIF set another record last November when it received data from Mariner 2 at a distance of over 23 million miles from Earth. Radio contact was not lost with the spacecraft until it was more than 53 million miles away.

To improve this communications capability, JPL is now planning a "dish" at Goldstone 210 feet in diameter, one of the largest transmitting and receiving antennas of its kind.

Behind the headlined accomplishments of the Rangers, Mariners and the big ears of the DSIF network, JPL scientists are seeking answers to questions such as the use of super-conductivity and the effects of radiation on various materials. These questions are essential components of larger investigatory programs, such as electric propulsion and nuclear electric power, chemical propulsion, aerothermodynamics, fluid physics and electro-physics, particles and fields, planetary atmospheres —and many others.

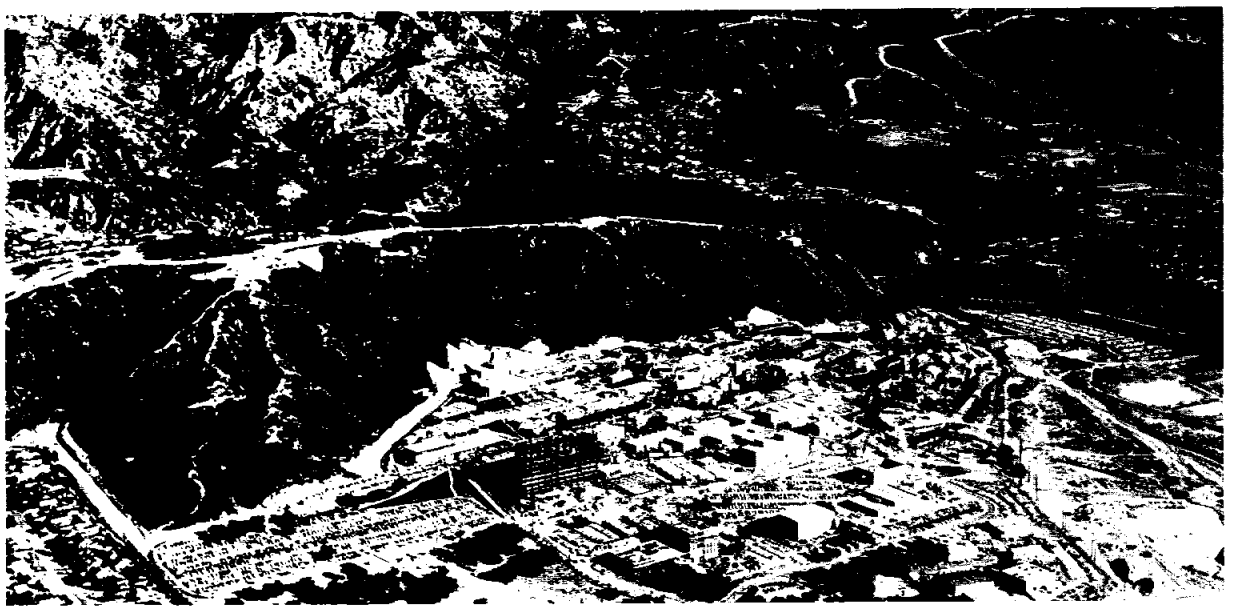
These are the responsibility of the Research and Advanced Development Program. The research effort is guided only by the precept that the knowledge may gained contribute to the furtherance of JPL goals. The development effort utilizes this knowledge for practical application in space hardware and improved techniques. The program is an integral part of each of the JPL technical divisions.

The Systems Division is responsible for the analysis, design testing and evaluation of the overall system for space flight missions from original concept through accomplishment. This includes the spacecraft, launch vehicle, tracking and communications systems, and command and control of the spacecraft.

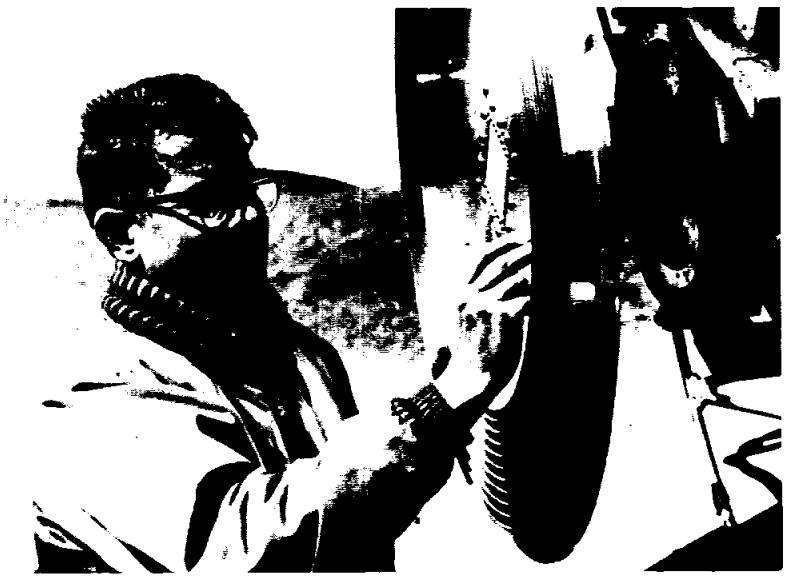
The Space Sciences Division assumes the dual role of devising space experiments and equipping them with the scientific instrumentation needed to carry out the missions. Closely identified with the academic community, it carries on physical and biological research to determine the origin of the solar system and the origin of life, part of an overall program which seeks to determine what phenomena are to be explored in space and how can they be measured.

How far can man send and receive signals to and from space? This question is the responsibility of the Telecommunications Division, which emphasizes advanced research in microwave optics, maser and parametric amplifiers, ultra

onsible For Unmanned Scientific Exploration



AT THE FOOT OF THE SIERRA MADRE'S towering peaks, Jet Propulsion Laboratory is located in Pasadena, California, 15 miles from the nation's third largest city, Los Angeles. More than 3,800 persons are employed on the 150 acre site, operated by the California Institute of Technology under contract to the National Aeronautics and Space Administration.



A JPL ENGINEER adjusts the low-noise high efficiency feed used during the Venus radar experiment. The Telecommunications Division is responsible for extending the state of the art in deep space communications techniques and operation of the deep space tracking network facilities in three countries.

low-noise systems, coding techniques and large antennas, among other things, extending the state of the art through theoretical work in coding research, discrete mathematics, combinatorial analysis and number theory. The division is also responsible for development of all radio equipment aboard the spacecraft, and for the DSIF tracking stations.

The Guidance and Control Division provides solar panels, batteries, power conversion equipment, central computer and sequencer, attitude controls, guidance systems, related optical and inertial sensors and the associated ground support and check-out equipment to indicate flight readiness. This is the unit responsible for keeping the spacecraft on its predetermined course, generating its timed functions, maintaining its attitude in space and powering the onboard equipment.

The Engineering Mechanics Division designs and builds the spacecraft structure, defining the configuration, establishing the general mechanical layout and compatability of subsystems, and developing specific hardware items and coatings for proper temperature control. They design the explosive actuation devices, develop the cabling for the spacecraft and ground equipment, and other such hardware.

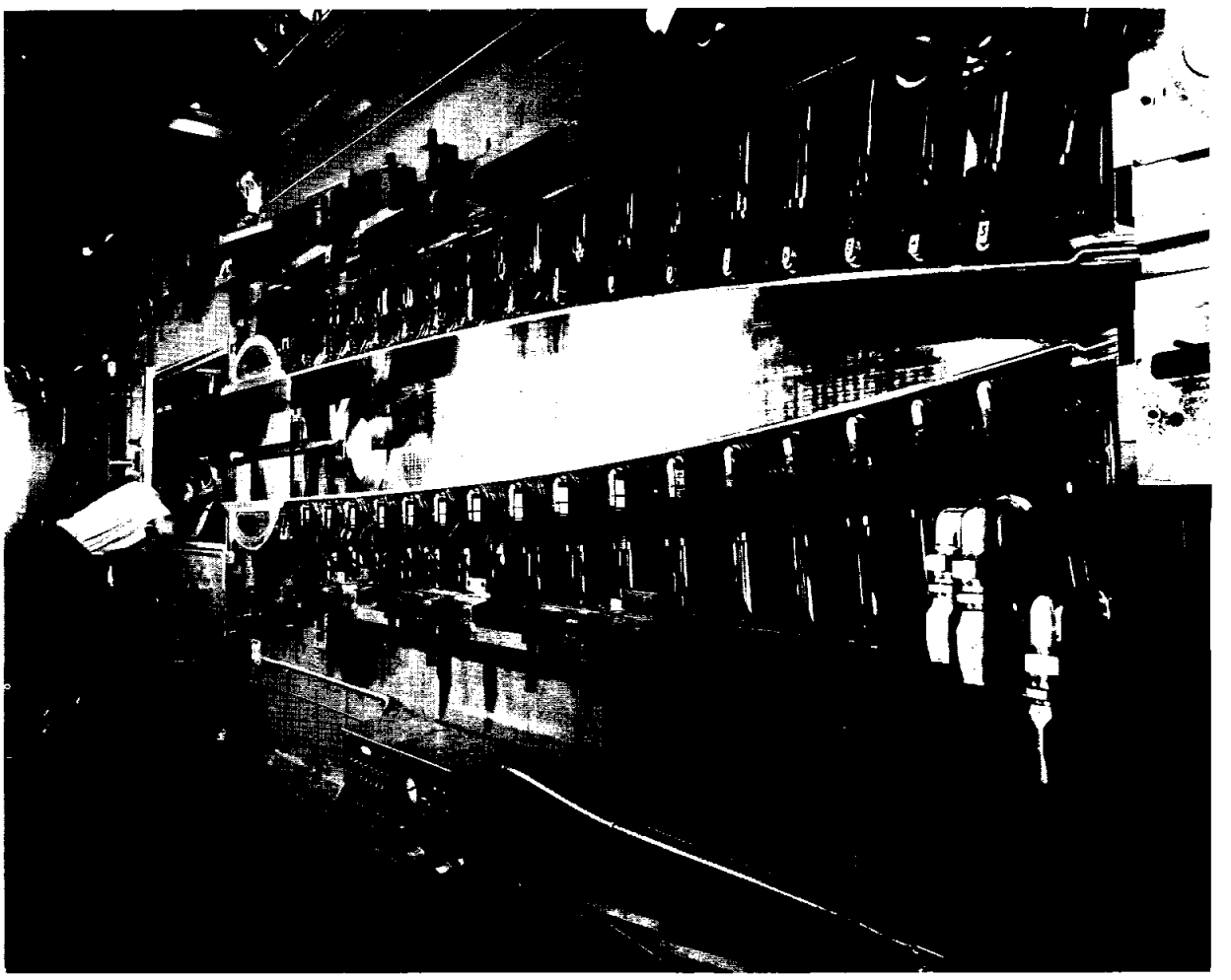
Once the spacecraft is designed and built, there is the question of will it work? What's the best way to test it? How well did it work? The Engineering Facilities Division has the answers, supporting the development and testing of virtually every component in JPL's "hardware." It operates the computers which determine trajectories and reduce data obtained; duplicates the hostile cold and dark conditions of space, and tests everything from the smallest transistor to the complete spacecraft. It operates two ultramodern computer facilities, super- and hypersonic wind tunnels, a high-enthalpy shock tube, a hugh environmental test laboratory, two space simulators, extensive instrumentation laboratories and many smaller facilities and labs.

The Propulsion Division carries on research and development and flight program support in chemical, nuclear and electric propulsion systems and supervises propulsion contracts with private industry for JPL and NASA. It employs well-equipped research and medium-scale development facilities at JPL and larger facilities at nearby Edwards AFB for processing and testing chemical rocket systems.

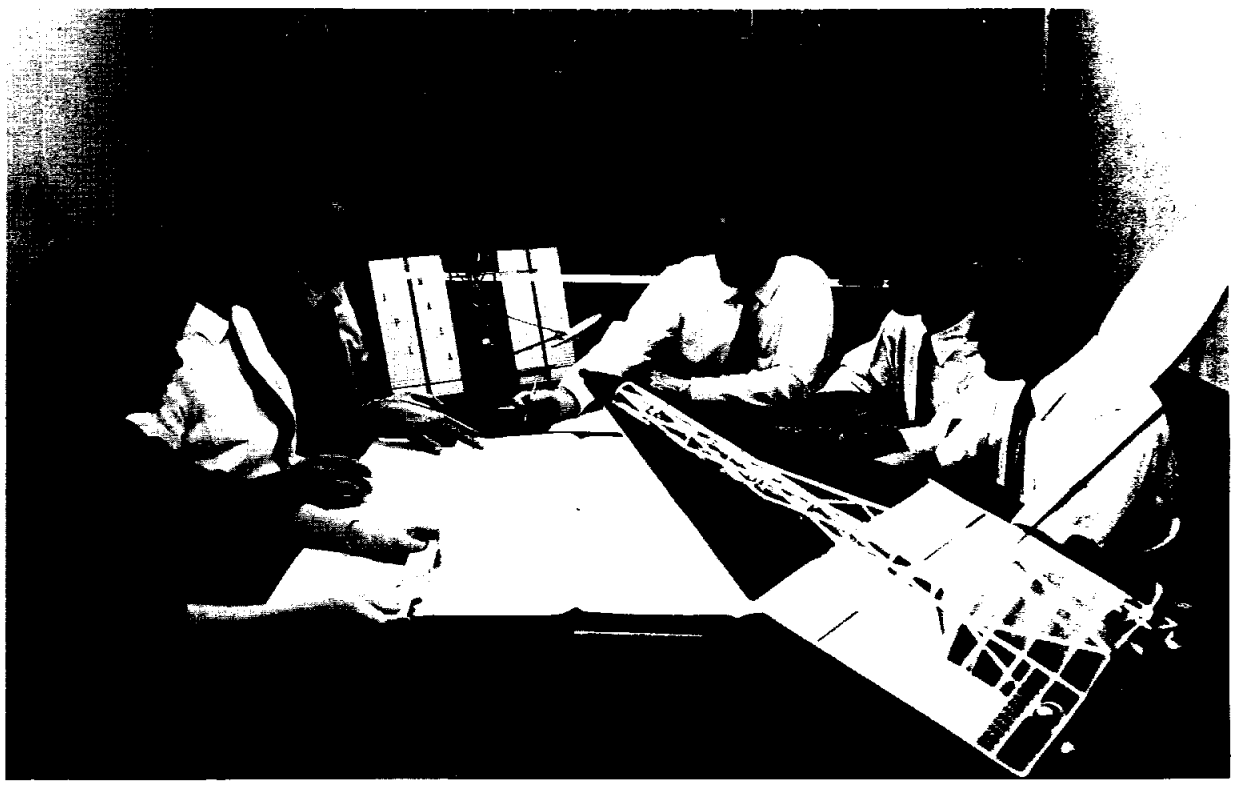
In addition to these divisions, six administrative and service divisions at JPL take care of housekeeping chores such as answering the phones, making technical movies, contracting for space hardware, buying supplies, paying salaries, arranging transportation, keeping the books, getting the buildings built, and hiring the personnel, as similar divisions do here at MSC. JPL has one of the finest technical libraries in the world, a fully-equipped photo lab, metal shops, accounting and personnel offices and the like, providing services and facilities necessary to allow scientists and engineers to devote full time to their job of space exploration.

U. S. space exploration began at JPL, and it goes on without end. The answers to each question that is solved opens new questions, to which new answers are sought. The future of JPL is as limitless as man's need to learn more about the universe in which we live.

Editors Note: This is the tenth in a series of feature articles about the activities of other NASA installations. The information concerning Jet Propulsion Laboratories was provided by the Public Education and Information Office of JPL, and the photos by the JPL Photo Section. The final article in this series will concern the Office of Manned Space Flight, NASA Headquarters.



THE 21-INCH HYPERSONIC wind tunnel at JPL is capable of Mach 11, and is part of the test equipment operated by the Engineering Facilities Division at Jet Propulsion Laboratory.

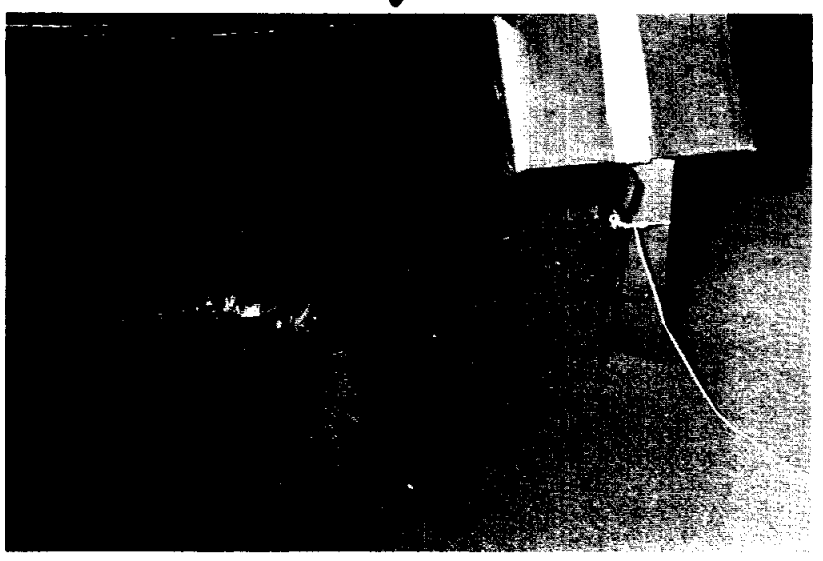


ADVANCED NUCLEAR-ELECTRIC powered spacecraft are among JPL's future plans. Here scientists from the Propulsion Division study the integration concepts of such propulsion systems.

The SPACE NEWS ROUNDUP, an official publication of the Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Texas, is published for MSC personnel by the Public Affairs Office.

Director . . . . . Robert R. Gilruth
Public Affairs Officer . . . . . John A. Powers
Chief, Internal Communications . Ivan D. Ertel
Editor . . . . . Anne T. Corey

On The Lighter Side



The Thing . . . from Earth

Slowly, inch by inch, The Thing crept toward the trap, lured on by a trail of succulent chocolate candies. It had no legs. It had no eyes. It was round. It was hairy. And hair-raising.

It was a wig.

The "creature" in the above photo, which once graced the head of Sandra Sheeran of the Astronaut Activities Office, generated one of the lighter moments in the hard-working day when Astronaut John Glenn spotted it on Sandra's desk. Glenn promptly set a trap for it. Posed with trap the wig sent the office staff into convulsions. It is doubtful if Sandra will ever again be allowed to wear it in peace.

* * *

Coffee break conversation of a couple of weight watching Space Age secretaries might go something like this:

"Why, Hilda, today you weigh 109 pounds, 6.37 ounces—you're down an once and a quarter since yesterday!"

"Yes, but remember, Dearie, yesterday I was holding the two dimes for the coffee machine. Besides, I filed my nails last night which would account for some of the loss."

The scene of this remarkably precise pounds and ounces talk would be Aerojet-General Corporation's Structural Materials Division, where they have an electronic scale capable of weighing up to 10 tons with incredible accuracy.

The need for such a scale was dictated by the extremely close "tolerances" demanded in aerospace systems. With it, entire rocket assemblies can be hoisted and weighed with the relative accuracy of a jeweler's scale.

At its maximum load capacity of 20,000 pounds, it will not be off more than one pound. Applying this same accuracy to a 150-pound person would mean he would be weighed to within hundreths of an ounce. With his bathroom scale, he'd be lucky to get within three pounds of his accurate weight.

All of which doesn't prove that the folks in the Space industry are any fatter or slimmer than anyone else, it's just that they know within a fraction of an ounce the shape they're in.

—Copy by Don Bailer. Reprinted courtesy of Aerojet-General.

WELCOME ABOARD

Manned Spacecraft Center welcomed 86 new employees on board between February 17 and 28.

Office of Director: James C. Elms.

Gemini Project Office: Horace E. Whitacre, Ruby L. Laird, Paul G. Hemmen, Kay A. Woodward, Albert E. Iffrig (St. Louis, Mo.), and LaRue Farris.

Apollo Project Office: Arlene H. Johnston, and Bernard Weinflash.

Spacecraft Technology Division: Donald G. Stafford, Charles Auchterlonie, Thomas W. Lawhorn, L. Joseph Nado, and Robert G. Gregory.

Space Environmental Division: Terence M. Vinson, and Thomas E. Margrave.

Crew Systems Division: David C. Fitch, and Marvyn D. Sprake.

Systems Eval. and Devel. Division: Robert D. Langley, John A. Roberson, Robert L. Johnston, and William E. Simon.

Preflight Operations (Cape Canaveral): Fredic L. Hettinger, Lawrence E. Dyal, Kenneth L. Johnson, Bernard L. Stoffel, Herbert L. Gatchell, William A. Graham, Robert W. Pfau, and Robert F. Hart.

Flight Operations Division: Frank J. Suler, Scott S. McKay, II., Jessie P. McHenry, and Robert E. Regelbrugge.

AMR Operations: Virgil A. Gfeller.

Computation and Data Reduction Division: Josephine Jow, Barney H. Leach, and Louie T. Walker.

Instrumentation and Electronic Systems Division: Shirley R. Dipboye.

Personnel Division: William R. Thaman, Elmer E. Cole, Joseph F. Sarkozy, Reese R. Hardin, Otice H. Abbott, Sondra C. Spurlock, Jack K. Pound, and Hester H. Cross.

Personnel Division (Temporary and Trainees): Lee R. Vaughn, Andrew P. Peterson, Archie R. Rainey, Edward E. Brown, Lester E. Turlington, Robert T. Deen, Kenneth C. Walker, Carole D. Smith, Ross E. Deering, John C. Hooper, III, Larry L. McDougall, and George O. Miller.

Security Division: Etha C. Curtis.

Financial Management Division: Jesse P. Whitt, Jacqueline I. White, Ima Dee Collard, Virginia L. Bradshaw, and Joseph L. Kratovil.

Procurement and Contracts Division: James L. Edwards, Wilfred A. Brugger, and James A. Anderson.

Center Operations Office: Kin Q. Lai, Paul J. McGarrigle, and Wanda F. Wilkes.

Center Medical Operations: Halley M. Bishop.

Administrative Services: Ida M. Sossaman, Franklin H. Morris, Frances M. Morphew, Shirely A. Horn, Genevieve I. Thomas and Colin E. Kennedy.

Photographic Services Division: William H. Johnson.

Technical Services Division: Morgan A. Johnstone, Ruth C. Karpf, and Tommy L. Reeves.

Logistics Division: Calissa B. Fleming.

Program Analysis and Evaluation: Harold E. Newell.

Business Mgr. Resident Office, Bethpage, N. Y.: Elliott H. Cohn.

Business Liaison Rep., Downey, Calif.: Jack R. DeLeonardis.

MSC PERSONALITY

Charles F. Bingman Heads Management Anal. Division

Beginning his MSC career in August of 1961 as "kind of an assistant to everybody," Charles F. Bingman is now head of the Center's Management Analysis Division—and judging from the functions of the division, the scope of his job hasn't decreased much.

Management Analysis conducts organization studies and analyses, analyzing management problems and recommending solutions just as its name implies. But it also prepares organization charts and functional statements, conducts manpower utilization studies, prepares and maintains management reports, participates in business management aspects of source evaluations, runs the issuance system for NASA and MSC management manuals, and conducts methods and procedures studies, among other things.

"Other things" include special assignments for the assistant director for administration, a catagory which covers almost everything "One thing about this job," says Bingman, "is that when you come to work in the morning you never know what you will be doing by the time the day ends. It's never dull."

Born September 11, 1929 in Milwaukee, Wisconsin, Bingman was educated in the city's primary and secondary schools and went on to the University of Wisconsin, where he received a BA in Business Administration, majoring in industrial management, in 1952. He worked for a year and then went into the Army as a personnel specialist at Ft. Meade, Maryland before returning to the University to get his Master's degree. Majoring this time in personnel management, he received his MA in 1956.

Charles F. Bingman

He was immediately recruited for the management intern program of the Atomic Energy Commission working as a manpower analyst at AEC Headquarters in the Organization and Personnel Division.

In that capacity he was part of a team which evaluated management problems from a manpower standpoint, attempting to verify the size of the required organization staff and determine more effective means of using personnel. In the last few months of his stint with the AEC he got into management analysis work and as an outgrowth of this transferred to NASA Headquarters in January of 1959.

Bingman was one of the early additions to the NASA staff after its creation. He worked as a management analyst in the Management Analysis Division, primarily concerned with organizational and procedural studies, establishing new operational techniques and controling office space allocation.

In August of 1961, Bingman transferred to Space Task Group (now MSC) as assistant to the chief of what was then Management Services Division. In this job he conducted a variety of special assignments, shifting from point to point in the rapidly growing organization as staffing and management problems arose.

He received his present title in December of 1961.

Bingman is single and devotes his spare time to fishing ("infrequently"), golf ("very badly"), reading and writing ("only as a personal amusement.")

Better Business Bureau To Hold Information Meet

The Better Business Bureau of Houston will hold a meeting for NASA employees in the Gulfgate Shopping Center auditorium next Tuesday night at 7:30, dealing with the ways in which the bureau can offer service and discussing the guideline program.

The guideline program is a result of the bureau's efforts to formulate a method for better public information. It is designed especially for the women consumers who are housewives and mothers, and is a year—round program of information on the good and the bad for the protection of consumers.

The auditorium has a seating capacity of 250 with overflow arrangements for an additional 80.

National Secretaries' Assn. Seminar Is Set For Saturday

The Houston Chapter of the National Secretaries Association International is presenting its Tenth Annual Seminar for Secretaries Saturday in the Crystal Ballroom of the Rice Hotel.

This seminar is presented in cooperation with the University of Houston and about 1,000 secretaries are expected to attend.

The Training Branch of the Personnel Division will make the necessary arrangements for spaces and payment of registration fees for those nominated and approved for attendance by their supervisors. Only those employees with at least one full year of government service can be sponsored by NASA. Others may participate at their own expense, $5 for members of the NSA, $6 for non-members.

Nominations for the seminar must be submitted to the Training Branch no later than today.

The session begins at 8:30 a.m. and adjourns at 4 p.m. with luncheon in the Grand Ballroom at the Rice.

'Dining In' Held For A.F. Astronauts

A "Dining-In" to honor the Air Force astronauts in the Mercury program was held Saturday at Patrick AFB at Cape Canaveral.

Speaker for the evening was Air Force Secretary Eugene Zuckert.

Astronauts Gordon Cooper, Gus Grissom, Deke Slayton, Frank Borman, James McDivitt, Thomas Stafford and Edward White were honored.

Also present were MSC Deputy Director Walter C. Williams and Public Affairs Officer John A. Powers.

EMR Contract

(Continued from Page 8)

This study will be materially aided by the EMR–developed EDITS I (Experimental Digital Television System). EDITS I is a variable parameter, high quality, flexible digital TV system which allows a wide variety of digital TV system parameters to be set up on the console. It was developed at EMR as an advanced research tool in the company-funded space oriented digital television studies.

Little Joe

(Continued from Page 8)

was selected by the Manned Spacecraft Center of Houston, Texas, in May, 1962 as the Little Joe II contractor. The recent announcement firms the program's exact dollar value and the number of launch vehicles and associated tasks required, termed "definitization" of the contract.

Over 79 per cent of all U. S. credit unions have total assets of less than $300,000.

Tests To Seek Answer To Re-Entry Problems

The Air Force will launch six space vehicles from the Cape this summer which may find the key to eliminating the communications blackouts experienced by Mercury astronauts as they reentered the earth's atmosphere from their orbital flights.

The space vehicles–to be unmanned and non–orbital–will carry experiments to probe the "ionized sheath" created when a fast moving object such as a space capsule reenters the denser atmosphere of Earth.

Such a "sheath" surrounded the spacecraft of the Mercury astronauts and caused some tense moments, particularly during the reentry phase of Scott Carpenter's flight.

Some researchers believe the ionized sheaths transmit radio waves or other impulses which "jam" communications.

The Air Force experiments may provide information which will enable the communication problem to be overcome.

Apollo Firing

(Continued from Page 8)

module, and the lunar excursion module (LEM), in which two Americans are scheduled to descend from the Command Module to the lunar surface. North American's Space Division is designing and building the command and service modules for NASA's Manned Spacecraft Center, Houston; Grumman Aircraft Engineering Corp., Bethpage, Long Island, N.Y., has been selected to design and build the LEM for the Manned Spacecraft Center.

JFD Electronics Gets Subcontract For Apollo Hardware

A subcontract for supplying high reliability precision piston trimmer capacitors has been awarded the Components Division of the JFD Electronics Corporation, Brooklyn, N.Y. and Oxford, N.C. by the Collins Radio Company of Cedar Rapids, Iowa.

The contract is the first ever to be awarded in the high reliability trimmer capacitor field and calls for white room assembly or high-reliability production lines of specially designed units.

Derived from the design of the recently announced Hi-Life series, the Apollo designated units feature among other notable attributes, adjustment life capabilities over 600% in excess of the requirements stipulated.

A FLAG TO REMEMBER was among the momentoes presented by Astronaut John Glenn (second from left) to the Smithsonian Institution on the anniversary of his flight. At left is Senator Anderson (D-N. M.) who accepted the flag, spacesuit and "Friendship 7" spacecraft for the museum. At right are Dr. Hugh L. Dryden, NASA deputy administrator, and Administrator James E. Webb.

U. S. Thanks

(Continued from Page 8)

Sigma 7 spacecraft orbited the earth six times last October 3, expressed his personal appreciation, and that of his fellow astronauts, for the Manned Space Network which kept Astronauts Glenn, Carpenter and himself in constant communication by voice and signal with men on the ground during their orbits around the earth.

Saturn Contract

(Continued from Page 1)

Test Operations and at the NASA Launch Operations Center, Cape Canaveral.

The Saturn V first stage is the largest rocket unit under development in the nation. It will be 33 feet in diameter and 138 feet in length. It will be powered by five Rocketdyne-developed F-1 engines, each developing 1.5 million pounds thrust. The stage, loaded, will weigh nearly 2,500 tons.

This unit is the first stage of the vehicle that will boost the three-module Apollo spacecraft, designed to send a crew of astronauts to the moon late in this decade. The multistage vehicle will be able to launch 120 tons into low earth orbit and 45 tons to the vicinty of the moon. The second stage (S-II) of the three-stage vehicle is being developed by North American Aviation and the third stage (S-IVB) by Douglas Aircraft Co.

The first unit to be produced by Boeing will be a ground test vehicle, to be delivered to the Marshall Center. Boeing's initial flight units also will be brought to the MSFC for static tests, until test stands at the Mississippi Test Operations are completed.

Under terms of the contract, Boeing will assist in launching the booster from Canaveral. NASA retains transportation responsibility to the testing and launch sites.

116 Take Graduate Courses In Houston

Some 116 MSC personnel are participating in graduate courses at Rice University, University of Houston and at East End State Bank Building this semester.

The East End classes are taught by Texas A and M University and include two courses, Numericial Methods in Differential Equations and Celestial Mechanics II.

The other courses, at Rice and the University of Houston, are in various engineering and scientific fields.

Motorola Building S-Band Transponder

Under subcontract to Collins Radio Company, Motorola Western Center is developing and building the S-band Transponder for the Apollo spacecraft. This transponder provides the phase-coherent retransmission used to track the spacecraft at lunar distances from earth-based stations, receives data from earth, and transmits engineering and scientific data, including TV, to earth.

The all-solid-state phase-coherent receiver-transmitter has an output power of approximately one quarter watt. The dynamic loop band-width varies with signal level from less than 150 cps to over 900 cps and centers the received information on a predetection band-width. Loop dynamics are adjusted to the mission flight dynamics.

Mechanical design is compatible with the Apollo standard electronic package, and design goals call for light weight and lowest possible power drain to meet the specified characteristics. Various functions within the transponder are brought out to provide telemetered monitoring of equipment performance during flight.

Fire Protection

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Spacecraft Center comes under the purview of the Center's Safety Branch, headed by John M. Kanak of the Center Medical Operations Office.

Fire prevention and protection services for the permanent facilities being constructed at Clear Lake by MSC will be covered by later arrangements.

Landing Trainer

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craft at maximum accelerations of 2.5G by means of a pneumatic cylinder. The vertical velocity is achieved by varying the height above ground plane at which the craft is separated from its guiding rails. The pneumatic cylinder has an 11 foot stroke and develops a peak force of about 200,000 pounds at 2,000 psi and is coupled to the accelerating beam by an 8.1 cable reaving system.

Mariner Finds

(Continued from Page 1)

If there is carbon dioxide in the atmosphere above the clouds, the amount is too small to have been detected by Mariner's instruments.

Scientists feel, though, that there is carbon dioxide in the atmosphere beneath the clouds. The new information indicates the cloud layer is about 15 miles thick, beginning some 45 miles above the planet's surface.

Activities Assn.

(Continued from Page 1)

The association was established solely for the benefit of all MSC employees. Each is urged to support the association and its activities, particularly those members who are selected to serve on the governing body or any of its boards or committees.

Series Of Apollo Test Firings Completed By Various Makers

Successful first firings have been achieved on all six Apollo spacecraft rocket engine configurations. "Moreover, these test firings were accomplished within one year of the initial request for bid on the launch escape engine," said Robert E. Field, manager of Service Module Propulsion at North American Aviation's Space and Information Systems Division, Downey, Calif.

Successful first firings were completed during 1962 by the following S&ID major subcontractors: Aerojet-General's Space Propulsion Division, Azusa, Calif., service module propulsion engine; Lockheed Propulsion Co., Redlands, Calif., launch escape engine and also the pitch control engine; The Marquardt Corp., Van Nuys, Calif., service module reaction control system engines; Thiokol Chemical Corp.'s Elkton Div., Elkton, Md., tower jettison engine; and North American Aviation's Rocketdyne Division, Canoga Park, Calif., command module reaction control system engines.

"This progress is satisfying to those of us who are in day-to-day contact with the program," Field commented. He forecast the peak of test firings on all spacecraft systems would be reached early this summer.

Space and Information Systems Division is principal contractor to the National Aeronautics and Space Administration for the Apollo spacecraft.

The Apollo spacecraft consists of the command module, in which three Americans will "fly" to the vicinity of the moon; a service module, which will contain most of the power supplies for the command

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EMR Gets Digital TV Study Contract

A contract for the study of digital TV has been awarded to Electro-Mechanical Research, Inc. (EMR) by Manned Spacecraft Center. The Advanced Systems Department of EMR will perform the study which calls for research into advanced and highly efficient band-width compression systems for transmitting television information from manned spacecraft in deep space to earth.

A prime requirement of the study will be the investigation of important parameters that will permit the transmission of television pictures from deep space to earth with minimum power drain from the spacecraft, while still maintaining acceptable error rates at earth receiving terminals. In particular, the study will concentrate on the elimination of redundancy from element to element, line to line, and frame to frame in the TV information. In addition, storage mediums are to be considered; and the study will provide trade-off comparisons for reliability, size, weight, power and system complexity.

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Gemini Landing Trainer Will Be Finished By AM&F Soon

A portable device for testing actual land or sea landing conditions to be encountered by Gemini spacecraft is being designed and built by American Machine and Foundry Company, under subcontract to McDonnell Aircraft Corporation, prime contractor for Gemini.

Because Gemini will be the country's first spacecraft able to make a controlled landing on the ground as well as on water, the unit will be made portable to test the different kinds of terrain astronauts may encounter when bringing the spacecraft in for a landing.

The spacecraft will be suspended from an overhead track and fired by a catapult which will hurl it from the rack at its landing speed, about 68 miles per hour horizontally and 10 miles per hour vertically.

The 1000-foot-long test bed of the simulator provides the spacecraft with horizontal velocities up to 100 feet per second and vertical ground impact velocites of from zero to 15 feet per second.

The entire simulator is capable of being readily assembled and disassembled for transportation by standard highway truck and set up at any remote, undeveloped site.

The company expects to complete the testing device in March and turn it over to McDonnell Aircraft for ground testing on various terrains.

The horizontal component is obtained by driving the space-

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U. S. Thanks 16 Countries For Tracking

Sixteen cooperating countries have been thanked by Government representatives at a ceremony marking the fifth anniversary of the international tracking of space vehicles held at Goddard Space Flight Center, Greenbelt, Maryland.

Dr. Harry Goett, GSFC director, presided at the ceremony and Astronaut Walter M. Schirra, Jr. was one of the speakers. Participating in the ceremony were Vice President Lyndon Johnson, Secretary of State Dean Rusk and NASA Administrator James E. Webb.

The Vice President, as Chairman of the National Aeronautics and Space Council, awarded scrolls of appreciation to the ambassadors of the countries which cooperated with the U.S. in the establishment of the world-wide networks used in tracking manned and unmanned satelites.

The tracking station network was activated to track Explorer 1, launched on January 31, 1958. Explorer 1 carried the International Geophysical Year scientific experiment of Dr. James A. Van Allen and discovered the radiation belt around the earth. The satellite is still in orbit, although no longer transmitting information from space.

Astronaut Schirra, whose

(Continued on Page 7)

ASNE Committee Visits The Center

A committee from the American Society of Newspaper Editors visited MSC Friday to discuss news dissemination policies and procedures of NASA's manned space flight programs.

Included in the discussion were news coverage plans for the upcoming orbital flight of Astronaut L. Gordon Cooper, Jr. in May.

Chairman of the committee Eugene C. Patterson, editor of the Atlanta Constitution.

Other members of the committee included Charles Guy, editor of the Lubbock Avalanche-Journal, and William P. Steven, editor of the Houston Chronical.

Fire Protection Contract Goes To Houston Company

A contract in the amount of $17,294 has been awarded to the Houston Fire Safety Equipment Company for various services associated with fire prevention in all MSC temporary sites.

The range of services under the contract includes conducting a comprehensive fire prevention and protection survey of the temporary sites, performance of fire prevention and equipment inspections, training of designated MSC personnel in fire prevention and use of emergency firefighting equipment, development of emergency fire plans for each facility, and rendering consultative services in fire protection engineering matters.

The contract negotiator is Raymond A. LaPlante of the Center's Facilities and Construction Procurement Office. The fire protection and prevention program of the Manned

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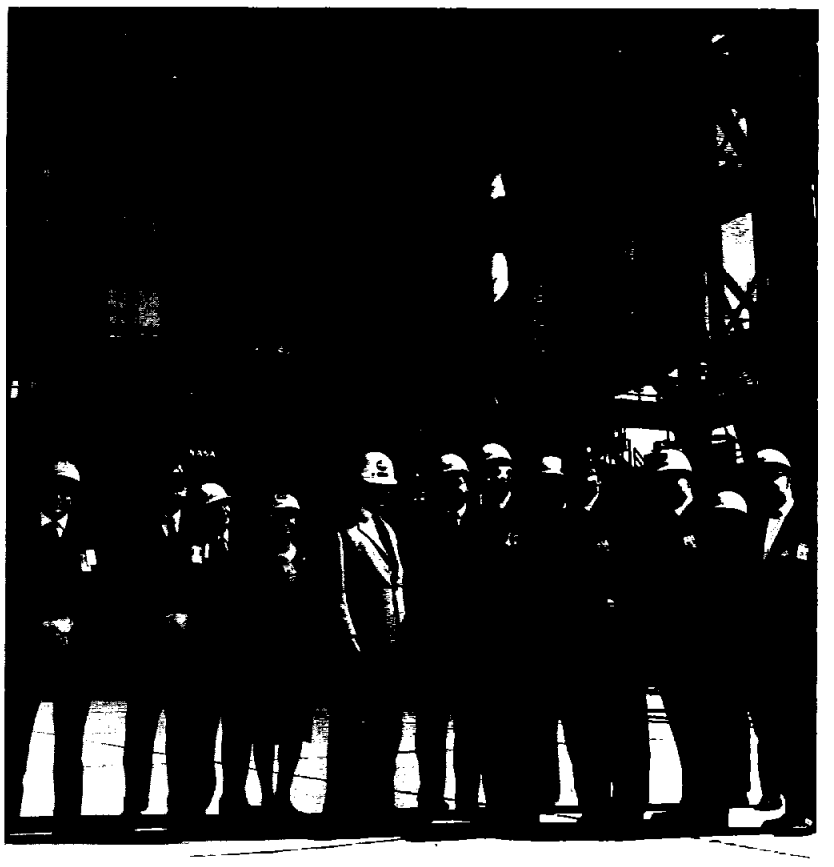
Space News NASA ROUNDUP!

SECOND FRONT PAGE



GRUMMAN AIRCRAFT Engineering Company officials, contractors for the construction of the lunar excursion module for Apollo, attended a two-day briefing session at Atlantic Missile Range, Cape Canaveral last month. The group toured Cape facilities, spending considerable time at Complexes 34 and 37, launch sites for Saturn C-1 vehicles.

Gill Speaks To Environmental Science Chapter Organized Here

William L. Gill of MSC spoke on "The Environment of Space" at the first meeting of the Houston Chapter of the Institute of Environmental Sciences, which met Tuesday night in the grand hall of the Student Memorial Center at Rice University.

Gill is head of the Radiation Protection Branch of the Crew Systems Division of NASA. He holds a Master's degree from Vanderbilt University and has had extensive experience in nuclear reactor design and atom bomb testing.

The Institute of Environmental Sciences is a national organization with seventeen chapters and over a thousand members throughout the United States. The Houston Chapter was organized by representatives of MSC, M. D. Anderson Hospital, Rice University, and several industrial concerns. Vice President is John W. Ogden of MSC and Secretary is Lee Pearson, also of MSC.

AFGE Meetings Scheduled

The American Federation of Government Employees will meet with interested employees during the week of March 11, 1963 to discuss the advantages available to members of AFGE.

To facilitate the presentation of this message from AFGE, the conference rooms of several of the MSC buildings, plus a conference room at Ellington Field, will be utilized; and those interested are scheduled by building where they are assigned.

All employees have the right to attend or refrain from attending these meetings, scheduled during the lunch period.

Date	Location of Meeting	Time	For Employees In
Mar. 11	Office City, Room 201	11:30	Office City & Rich
		12:00	Office City & Rich
		12:30	Office City & Rich
Mar. 12	Hous. Pet. Center, Rm 143-B	11:30	HPC
		12:00	Stahl Meyer
Mar. 13	Farnsworth Chambers, Room 270-A	11:30	F and C
		12:00	Peachey
		12:30	Franklin Dev.
	Ellington Field, Build. 15	4:35	Ellington
Mar 14	Lane Wells, Room 242	11:30	Lane Wells
		12:00	Mpls. Honeywell
		12:30	Canada Dry
Mar. 15	East End State Bank, Rm 16	11:30	EESBB
		12:00	VA Building
		12:30	U of Houston