

Boeing Gets \$20-million Apollo Integration Job

NASA and the Boeing Company have signed a letter contract enlarging the scope of the company's work with NASA by including integration of the three modules of the Apollo spacecraft with the Saturn launch vehicle.

Value of the letter contract will be about \$20 million.

Orbiter's Orbit Lowered to Gain Next Flight Data

NASA's Orbiter IV spacecraft is following a new track around the moon after two successful orbit adjustments made early this month by firing the spacecraft's velocity control engine.

By putting Lunar Orbiter IV into a path similar to that intended for the fifth Orbiter mission, Langley Research Center's engineers controlling the flight of the spacecraft expect to gather useful tracking and gravitational field experience before the next flight.

The low point of Lunar Orbiter IV is now about 48 miles above the moon's surface versus its previous 1,625 mile altitude. The apolune or high point was reduced from 3,850 to 2,450 miles. The 85-degree inclination was unchanged because Mission E will be flown with a near polar orbit.

(Continued on page 3)

Under the new contract, Boeing will assist and support NASA in performance of certain technical integration and evaluation tasks for Apollo project flights AS-501 thru AS-515.

Boeing will be responsible for supporting the Apollo Program Office and NASA's three manned space centers, Marshall Spaceflight Center, Huntsville, Alabama; MSC, and John F. Kennedy Space Center, Florida, in integrating Saturn V launch vehicles with the Apollo command and service modules as well as the lunar module. The work will be performed under overall direction of NASA's Apollo Program Office Washington, D. C.

The new contract extends Boeing's current contracted Saturn work which includes engineering, construction and test of the 7.5-million-pound thrust Saturn V first stage booster; support of assembly and system integration of the vehicle's second and third stages with the first, and design engineering support of certain ground support equipment at Kennedy Space Center, Florida.

The Boeing Company role at MSC will be to support all MSC elements responsible for acceptance testing and checkout of Apollo spacecraft flight hardware systems.

In addition, the company will provide technical management support in areas of program control, configuration management, and hardware change control including interface documentation.

ISA to Hear Dornbach Talk On Lunar Sites

Dr. John E. Dornbach, chief of the Mapping Sciences Branch of MSC Lunar and Earth Sciences Division, will be the featured speaker at the June 28 meeting of the Apollo Section of the Instrument Society of America.

Dornbach's topic will be "Lunar Landing Site Selection" and he will illustrate his talk with examples of how Ranger, Surveyor and Lunar Orbiter photographic data is used in determining optimum Apollo manned lunar landing sites. He will also cover the methods used in the calibration and interpretation of Lunar Orbiter photographs.



A motion picture simulating meteorite bombardment of the lunar surface and resulting hypotheses on the present lunar topography will also be covered in Dornbach's talk.

Dornbach received his PhD in geography June 4 from Clark University, Worcester, Mass.

The ISA meeting will be at the Holiday Inn on NASA Road 1 with cocktails (wine tasting) at 6:15 pm, dinner (\$3.50/person) at 7:15 and the program at 8. Reservations may be made at HU 8-0900 or HU 8-1270 Ext 397. Non-ISA members are welcome.

The changes call for the following:

- A re-assessment of combustibility of all non-metallic materials in the LM, with acceptable substitution or redesign to be accomplished wherever needed.
- Grumman manufacture of an LM metal mockup to test non-metallic material acceptability by intentionally starting fires in a representative lunar module.
- Pressurization of on-board water sources, lengthening of the present water hose, so that it will reach all accessible areas in the LM and provision of a hose nozzle to allow use of water to extinguish fires.
- Use of a built-in handle, rather than the removable universal tool, to open the LM front and top hatches.
- More stringent standards and control on the installation and inspection of electrical systems and wiring.
- Addition to electrical systems of isolation switches to insure no electrical connector is "hot" while it is uncovered or white it is being connected or disconnected.

Latter-Day Armor Suit



HARDSHELL—Elton Tucker of Crew Systems Division describes for newsmen the features of the RX4 "hard suit" under development for MSC by Litton Industries for possible Apollo Applications use. The suit is a composite construction of aluminum and fiberglass. The nose and eyebrows visible in the bubble helmet belong to Joe Kosmo, also of Crew Systems.

Lunar Module Changes Increase Crew Safety

NASA is making at least seven changes in hardware, materials, procedures, and tasks in the Apollo Lunar Module (LM) Program to reduce the possibility of fire and to increase crew safety.

The changes are being made at the Bethpage, New York plant of the LM prime contractor, Grumman Aircraft Engineering Corporation. They are in line with findings of the board which investigated the Apollo 204 spacecraft fire.

The changes call for the following:

- Use of the Apollo Block II television camera to monitor LM cabin activity during ground tests.
- The increase in total weight because of the changes is expected to be from 25 to 125 pounds.

The job of chief of the MSC Guidance and Control Division, Engineering and Development Directorate, has been filled with the appointment of Robert A. Gardiner.

Gardiner, who came to MSC in September 1964, has been assistant chief for project management in the G&C Division.

He succeeds Dr. R. C. Duncan, who left MSC last December to become assistant director for guidance and control research at the NASA Electronics Research Center at Cambridge, Mass.

Gardiner Named New G&C Head

Gardiner, 48, is a graduate of Case Institute of Technology, Cleveland.

He was employed by the National Advisory Committee for Aeronautics at Langley Laboratory, Hampton, Va., in the Instrument Research Division from 1943 to 1955, and as manager of operational engineering at Thompson Ramo Wooldridge Inc., Cleveland, from 1955 until 1964.

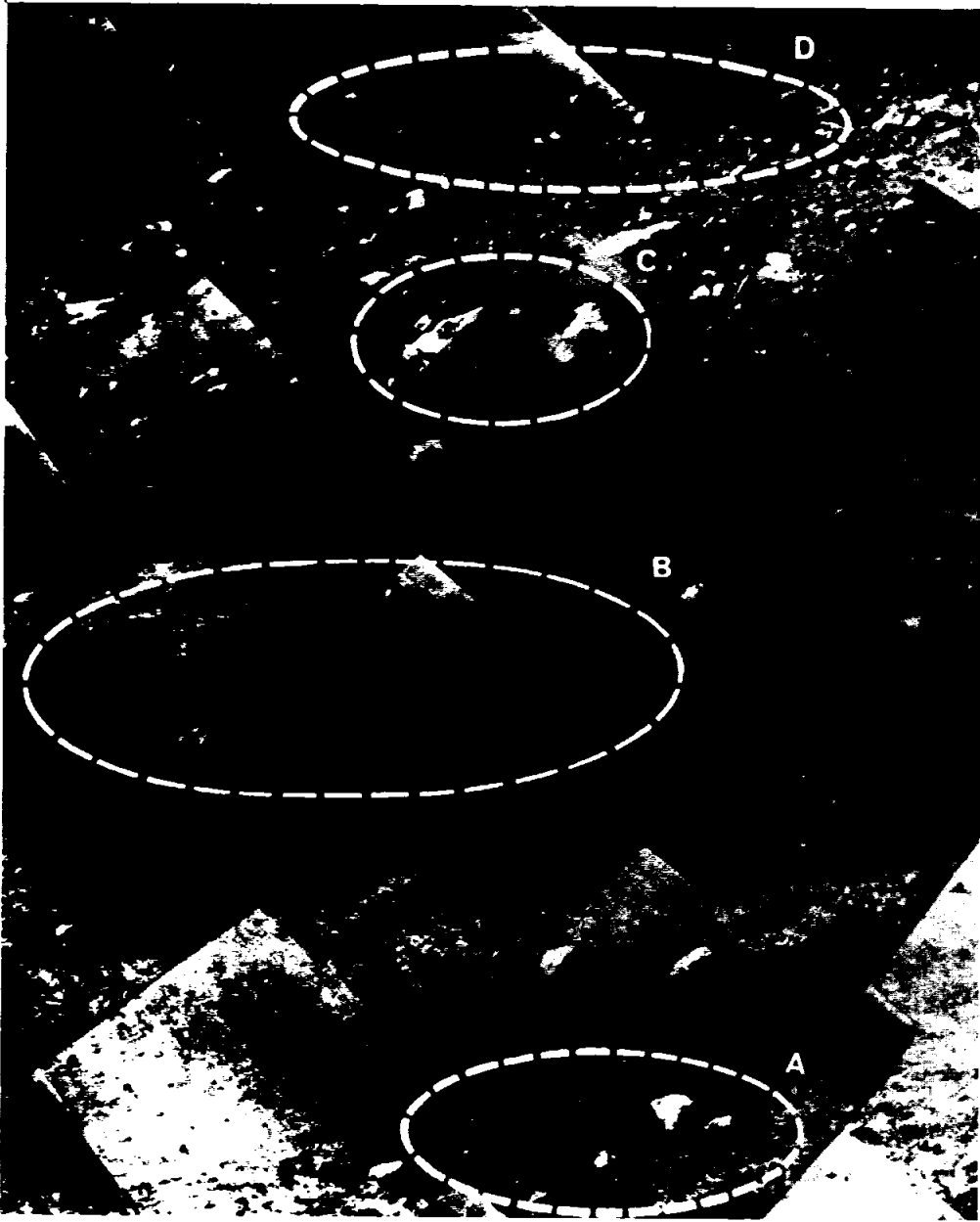
He and his wife, Catherine, live in Friendswood. They have two children, Patricia Louise and Robert Allen III.

Boa Constrictor a la Carte

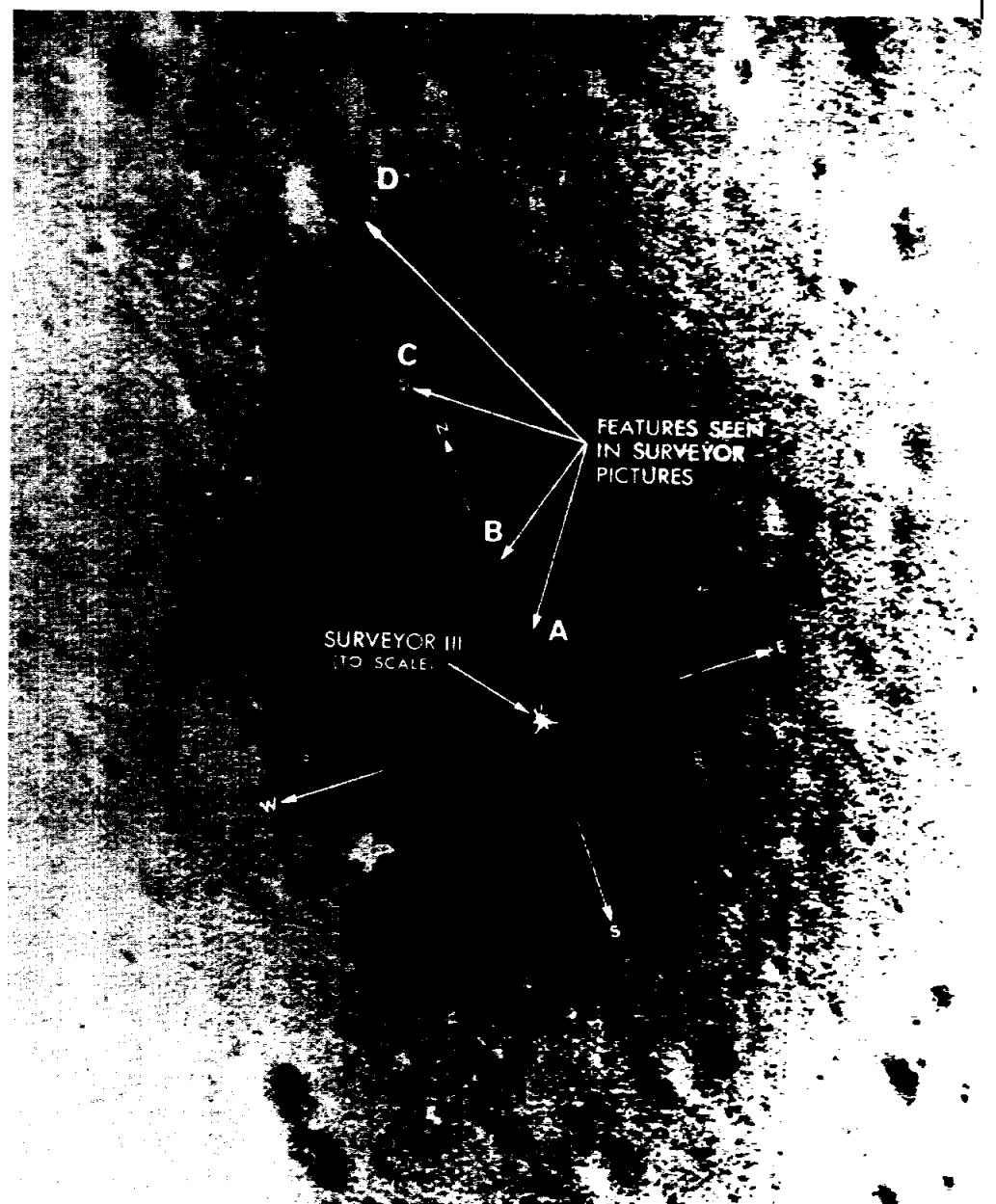


REPTILIAN FARE—Instructors at the USAF Tropical Survival School in Panama demonstrate for 21 MSC pilots the proper technique for separating a boa constrictor from his skin to whip up a meal of braised boa filets. The group learned how to forage for food in the jungle, how to find water and other knowledge necessary to survival after a jungle landing. (See story on page 8.)

View from the Top — and Bottom



TOPOGRAPHY CORRELATION—The craters and lumps identified A,B,C, and D in the Surveyor III photo at left are shown in the Lunar Orbiter III photo at right. Correlation of objects in the two photos helped pin down the exact location of Surveyor III—on an inner slope of a



650-foot diameter by 50-foot deep crater. Some 17 crater features visible in the Orbiter III photo have been identified in pictures taken from the surface by Surveyor III.

MSC Hosts Local Colleges in Summer Faculty Institutes

NASA has granted the University of Houston two contracts of nearly a quarter million dollars to conduct two NASA-American Society for Engineering Education summer faculty institutes jointly with MSC, Rice

and Texas A&M Universities. Similar programs were held the past two summers.

The two institutes are: NASA-ASEE Summer Faculty Research Institute.

NASA-ASEE Space System Engineering & Design Institute.

The two institutes have brought to Houston 41 college professors in engineering and science selected from 20 states

to participate in space-related activities for a 10-week period this summer.

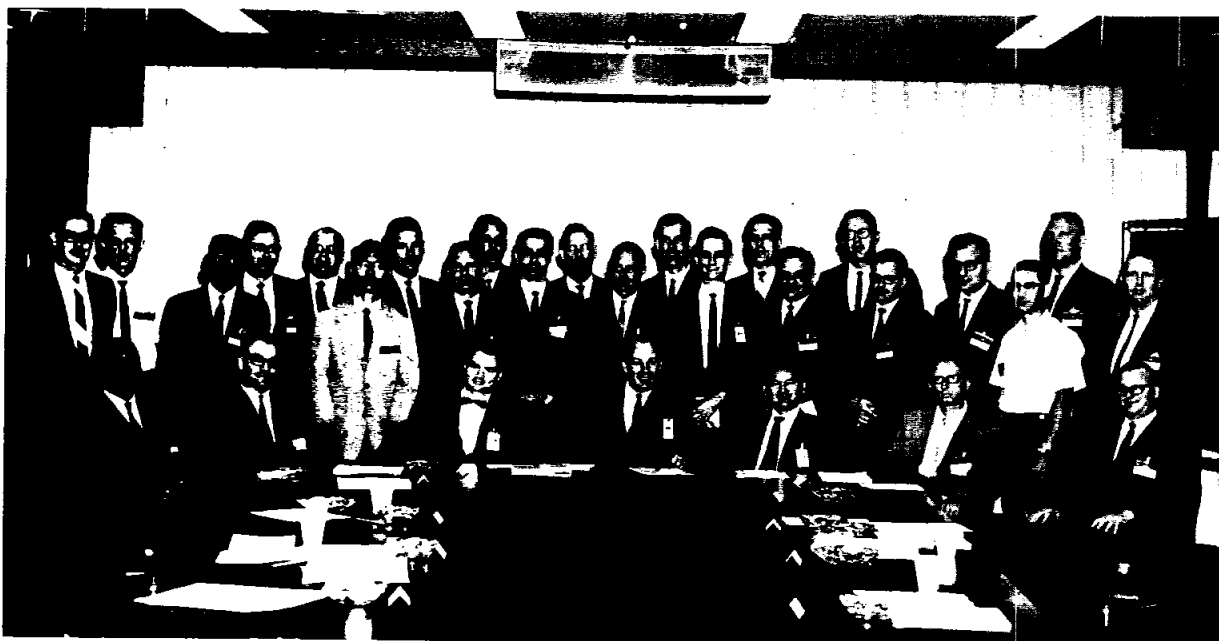
The NASA-ASEE Summer Faculty Research Institute began June 12 and is directed by Dr. C. J. Huang of the University of Houston and Dr. J. L. Youngblood of MSC as co-directors. The 25 Faculty Fellows of this Institute are at MSC to gain actual experience in research and development and will attend the University of Houston for special seminars and lectures. The Fellows will participate in a wide range of interesting research and development activities including advanced communication techniques, Apollo check-out functions, information systems, spacecraft environmental control systems, advanced computation techniques, instrumentation and electronic systems, guidance and control, propulsion and power systems, spacecraft structure and mechanics, space physics, and many other areas.

The advice and assistance provided by their MSC supervisors is a key element in the summer experience gained by these Faculty Fellows. These supervisors are experienced engineers or scientists, chosen to guide the faculty members in the pursuit of their summer studies. This year's MSC supervisors include Dr. F. J. Stebbins, Dr. D. S. McKay, Walt W. Guy, Dr. G. D.

Arndt, Dr. Jay Lewallen, Charles Brady, Joseph N. Kotanchik, Dr. H. Decell, Dr. G. J. Lewis, Joe Fowler, Chester Vaughn, Ben Holder, Charles Glassburn, R. H. Manka, R. W. Ward, W. W. Wilson, and R. W. Polifky.

Three lecture series to be offered at the University of Houston for the Fellows are Hybrid Computational Technique, Advanced Spacecraft Fabrication Technology, and Systems Identification. In addition, a weekly seminar will be conducted by the University of Houston. The lecturers for the seminars include many distinguished scientists, engineers, educators and public officials such as Nobel Laureates, Dr. H. C. Urey and Dr. W. F. Libby, Congressman Bob Casey, NASA Assistant Administrator F. B. Smith, Dean W. E. Gordon of Rice and Dean C. V. Kirkpatrick of U of H.

The U of H—MSC—A&M Institute is one of six such programs to be held this summer, viz., Stanford University—NASA Ames Research Center; Case Institute of Technology—NASA Lewis Research Center; University of Virginia—NASA Langley Research Center; Auburn and Alabama Universities—NASA Marshall Space Flight Center; and University of Maryland and Catholic University of America—NASA Goddard Space Flight Center.



WELCOMING—Summer Faculty Fellowship Participants are shown at the welcoming ceremony June 12, 1967. Standing from left to right are Dr. G. S. Dawkins, University of Houston; Dr. Odin Elnan, University of Cincinnati; Dr. A. K. Mitra, Texas Technological College; Dr. Sumner B. Hixon, University of Mississippi; Dr. Glenn E. Fanslow, Iowa State University; Dr. Myunghwan Kim, Cornell University; Dr. Byron W. Sherman, University of Mississippi; Dr. George W. Lucky, New Mexico State University; Dr. Jimmy Howard Akin, University of Arkansas; Dr. Edward J. Miranda, St. John's University; Karl W. Carlson, Mississippi State University; Dr. Charles Springer, University of Arkansas; Dr. Charles N. Hinkle, Purdue University; Eugene P. Martinez, Lamar State College of Technology; Dr. James R. Partin, Oklahoma State University; Dr. Joseph W. Bursik, Rensselaer Polytechnic Institute; Clifford J. Moore, North Carolina State University; Dr. Allen M. Rowe, Jr., Oklahoma State University; Dr. C. D. Michalopoulos, University of Houston; Dr. Richard M. Haynie, Kansas State University; Edwin R. Sorenson, Eastern Arizona College; Samuel W. Dobyms, Virginia Military Institute. Seated left to right: Paul Smith, Prairie View A&M College; Mahmud M. Dillsi, University of the Pacific; Dr. James L. Youngblood, Assistant for Academic Relations, MSC, and Co-director of this program; Paul E. Purser, Special Assistant to the Director, MSC; Professor C. J. Huang, University of Houston, Co-director of the program; Allen N. Bates, Pan American College; and Brother I. John Haas, Christian Brothers College.

Melpar Picked to Build Lunar Quarantine Units

MSC announced June 14 the award of a \$227,347 contract to Melpar, Inc., Falls Church, Va., for Apollo recovery quarantine equipment.

Included in the equipment will be four mobile quarantine facility units which will house Apollo crews following their return from the moon. The mobile units will be placed aboard prime recovery vessels following recovery. The lunar-returned crewmen will remain in the mobile quarantine facility until they reach the Lunar Receiving Laboratory at MSC.

Melpar will also furnish transfer tunnels through which the pilots will pass when they exit the spacecraft. A plastic tunnel will be linked to the spacecraft and the mobile quarantine facility aboard the recovery vessel. A tunnel will also be used following arrival at MSC linking the mobile unit and the Lunar Receiving Laboratory. (See LRL feature on pages 4 and 5.)

The contract also calls for Melpar to furnish containers in which flight film, tapes, hardware and the lunar sample return container will be placed for dispatch to the Lunar Receiving Laboratory.

The mobile quarantine facility units will be fabricated of heat-treated aluminum, have sleeping quarters, work, food preparation and medical areas for the flight crews and for support technicians. The units will be completely self-sufficient and will be equipped with bunks, chairs, tables, lavatory, sink and kitchen equipment and other items required for debriefing and preliminary medical examinations during the brief transfer period from the recovery vessel to MSC.

The contractor will deliver two of the 35-foot long mobile units within 185-days of award of contract and two other units 30 days later. The units which will weigh approximately 20,000 pounds will be pallet mounted and equipped with a hoisting sling for placement aboard ship or flatbed trailer.

What to Do When Medical Emergency Arises Near You

By Evelyn D. West, Chief Nurse
When a medical emergency arises at MSC, the following steps should be taken:

1. Call 3211 for ambulance service.
 2. State clearly the nature of the emergency.
 3. State the location: Building and room number.
 4. State your name.
- The ambulance attendants are equipped and trained to administer emergency aid and transport the sick or injured to the proper medical facilities.
 - It is the responsibility of the ambulance service to alert the dispensary regarding the emergency.
 - Do not call the dispensary for ambulance service.
 - Do not expect a physician to come to the scene. He can do more for the patient in the dispensary, where there is adequate equipment.

Both the ambulance service and dispensary employees provide high quality first aid and emergency medical service.

Orbiter's Orbit

(Continued from page 1)

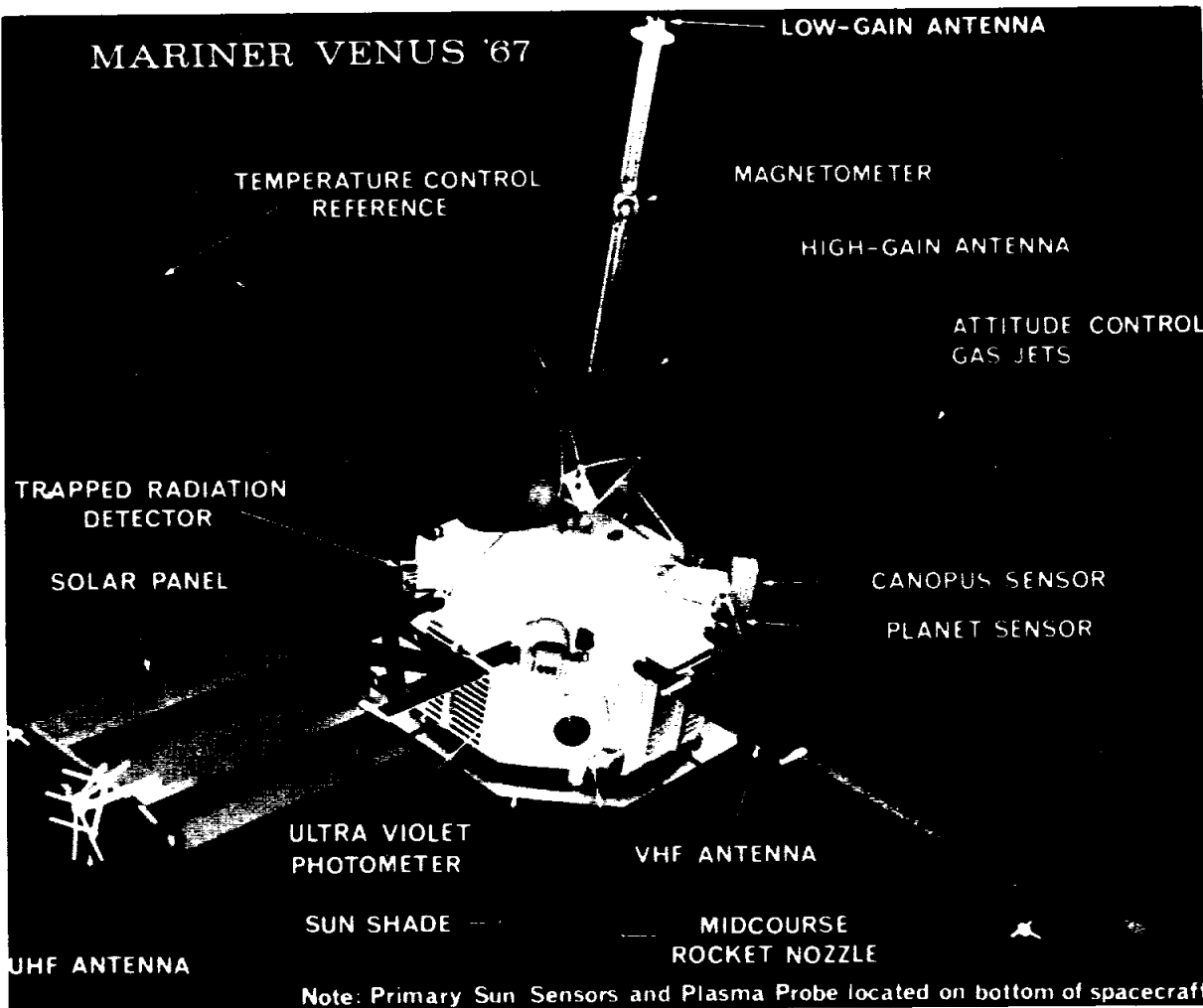
Adjustment of the orbit was made in two steps. The engine was burned to lower the perilune at 6:16 pm CDT on June 5, and again at 5:30 pm CDT on June 8 to adjust the apolune. In its new flight path, Lunar Orbiter IV takes five hours and 44 minutes for one orbit around the moon.

On May 26, Lunar Orbiter IV completed its principal task of obtaining telephoto picture coverage of 99 per cent of the moon's visible face.

Lunar Orbiter IV is managed for NASA by the Langley Research Center, Hampton, Va. The spacecraft is operated by engineers from Langley and from the prime spacecraft contractor the Boeing Co., Seattle. Tracking is provided by NASA's Deep Space Network operated by the NASA Jet Propulsion Laboratory, Pasadena.

1967 MSC/EAA Slow-pitch Softball League Standings as of June 19

American Division			National Division		
Team	Won	Lost	Team	Won	Lost
Mets	4	0	FSD (Supporters)	4	0
Apollos	4	0	TSD	3	0
Animals	3	0	Packers	3	0
Procurement & Controls	2	2	Becker	2	1
CAD	2	2	SMD	2	2
CSB	1	2	LRD-Blue	2	2
RMD	1	2	LRD-Gold	2	2
Charlie Brown All-Stars	1	2	Lunartics	1	2
GRPB	1	2	Coast Guard	1	3
Hustlers	1	2	MPAD-G&PB	1	3
S&AD Comets	1	3	Rats	0	2
BeePees	0	4	Old Timers	0	4



Mariner V Successfully Launched On Four-Month Voyage to Venus

The 540-pound Mariner V spacecraft was launched from Cape Kennedy, Fla. June 14 on a four-month-long mission to Venus. The Atlas-Agena D launch vehicle lifted off launch Complex 12 at 1:01 am CDT.

Mariner's trajectory will take it to within some 2,000 miles of Venus on October 19, about ten times closer to the planet than Mariner II in December 1962. Mariner's looping flight to Venus will cover 212.5 million miles.

Primary objective of the Mariner V mission is to obtain scientific information on the origin and nature of Venus and its environment. Although it is the closest planet to Earth, Venus is largely an unknown planet because of its thick cloud envelope. An opportunity to launch to Venus comes once every 19 months.

The Venusian atmosphere itself is a mystery with theories of its density, for instance, ranging from five to several hundred times the density of the Earth's atmosphere.

The Mariner Venus mission also will gather information on the interplanetary environment during a period of increasing solar activity.

Before modification, the spacecraft flown in this mission was a backup to Mariner IV which, in July 1965, flew within 6,200 miles of Mars, took 22 photographs of the planet, and obtained other scientific data.

Major changes in the spacecraft required by a flight toward rather than away from the sun include the reversal and reduction in size of the solar panels; the addition of a thermal shield on the sunward side of Mariner's octagonal spaceframe; and relocation of science instruments and sensors.

Other changes from the Mariner IV design are required by

trajectory characteristics and a new lineup of scientific experiments. They include a new data automation system for preparing scientific information for transmission to Earth; a two-position high gain antenna; removal of the scan platform on which Mariner IV's camera was mounted; and the addition of antennas and receivers to accommodate the dual-frequency occultation experiment.

The interplanetary science payload includes instruments similar to those carried to Mars by Mariner IV. A solar plasma probe, a trapped radiation detector and a helium vapor magnetometer will report on radiation and magnetic fields from earth to Venus and beyond.

At Venus, the S-band and dual-frequency occultation experiments will provide data on the properties of the atmosphere and the ultraviolet photometer will measure two elements — atomic hydrogen and atomic oxygen—in the upper Venusian atmosphere. Temperature may be deduced from these measurements.

By correlating orbital information from Mariner V with that from Mariner II, celestial mechanics experimenters will be able to increase the accuracy of the following values: mass and ephemeris of Venus; mass of the

Moon; ephemeris of Earth; and the astronomical unit (earth-sun distance).

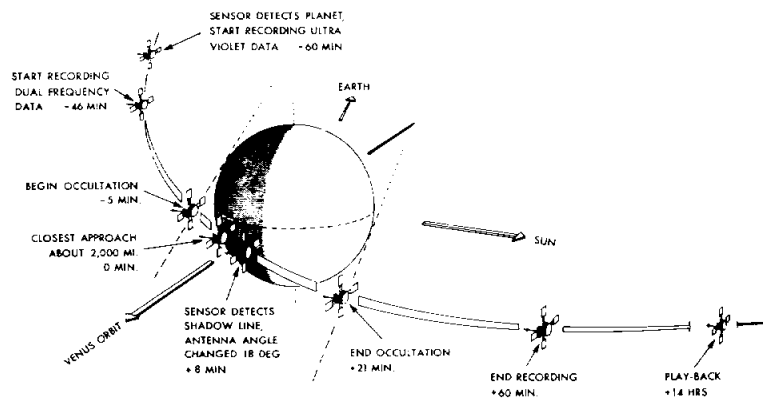
The close approach of Mariner to Venus will have a radical effect upon the spacecraft's orbit which, after fly-by, will bring it closer to the sun than any previous mission.

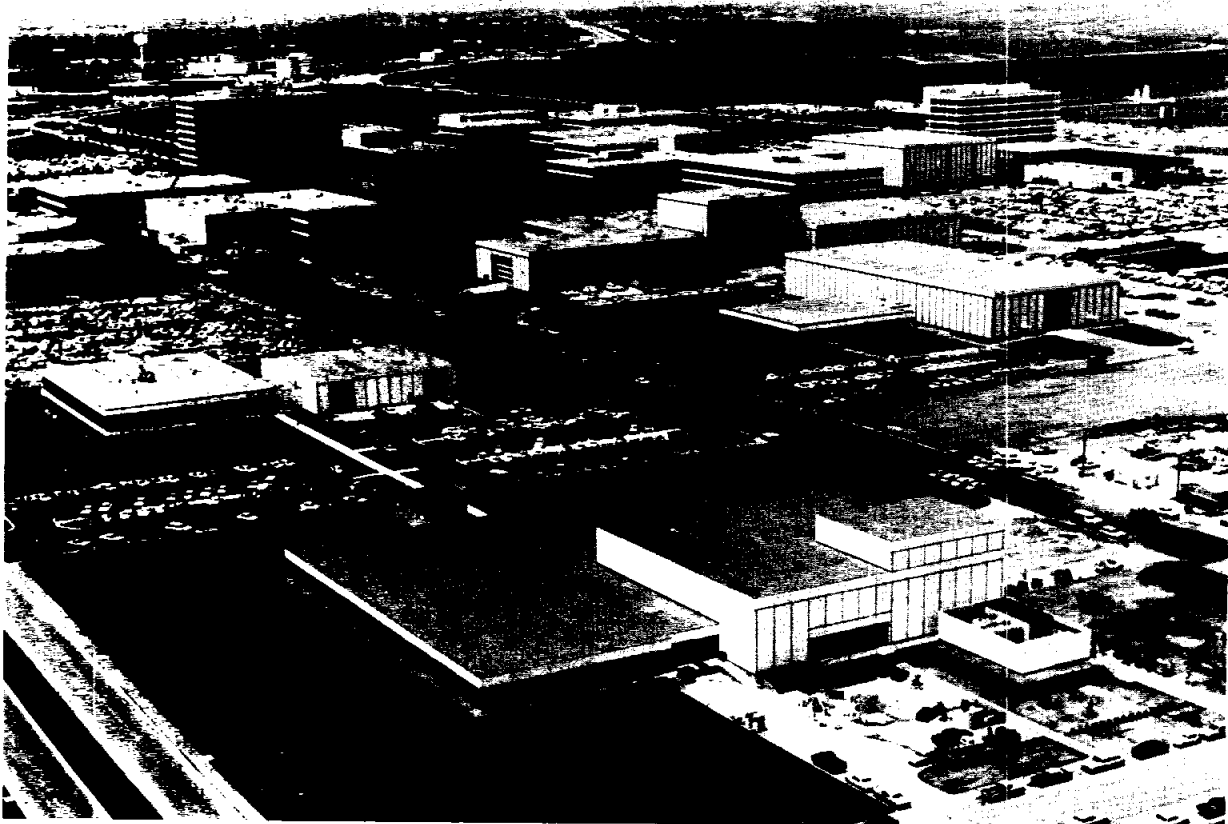
An attempt will be made to track Mariner as long as possible after the Venus encounter because every additional day of telemetry received and analyzed may mean further refinement of our knowledge of the solar system.

Mariner Venus 67 was redesignated Mariner V upon successful launch. The spacecraft stands 9½ feet high and spans 18 feet with solar panels extended. Solar panel surface area totals 43½ square feet, a reduction from 70 square feet on Mariner IV.

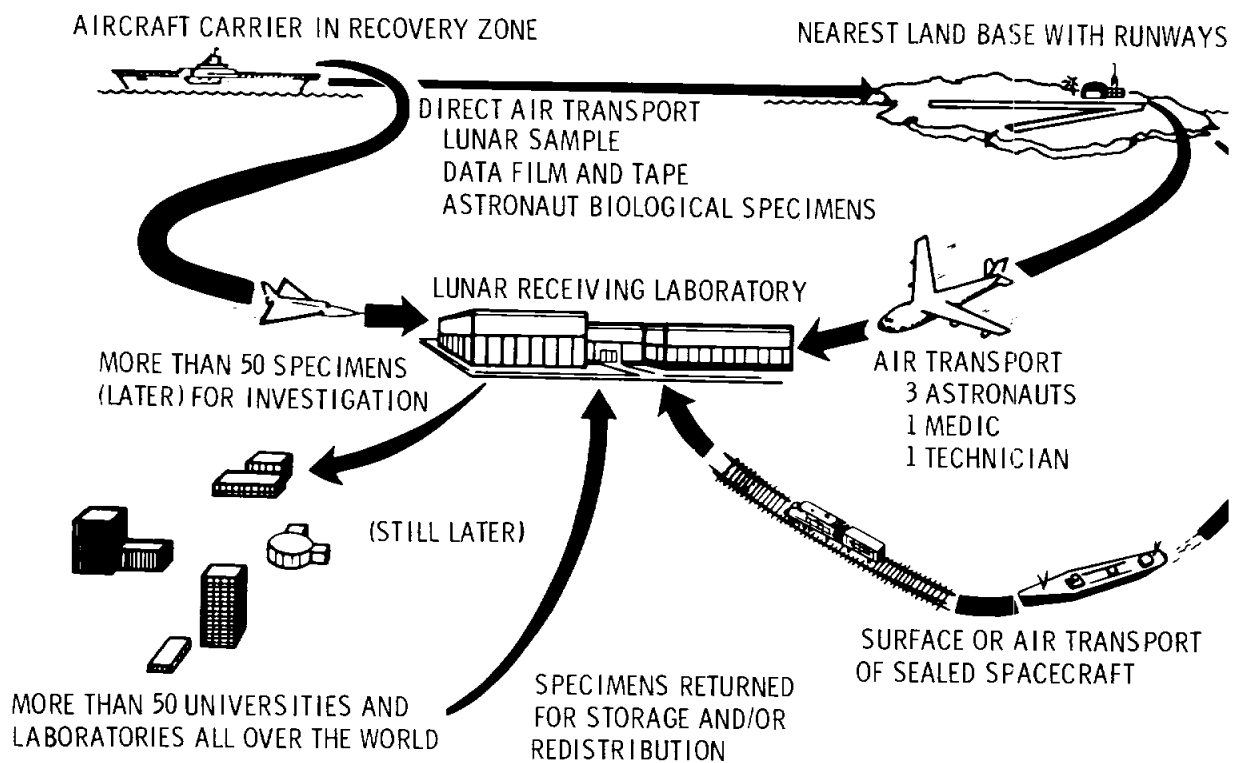
The Venus mission is being conducted by substantially the same NASA-Jet Propulsion Laboratory team that conducted the 1964 Mars mission. This team also will conduct the continuation of data acquisition from Mariner IV during 1967.

For NASA, the Mariner V mission is managed by Lunar and Planetary Programs of the Office of Space Science and Applications.

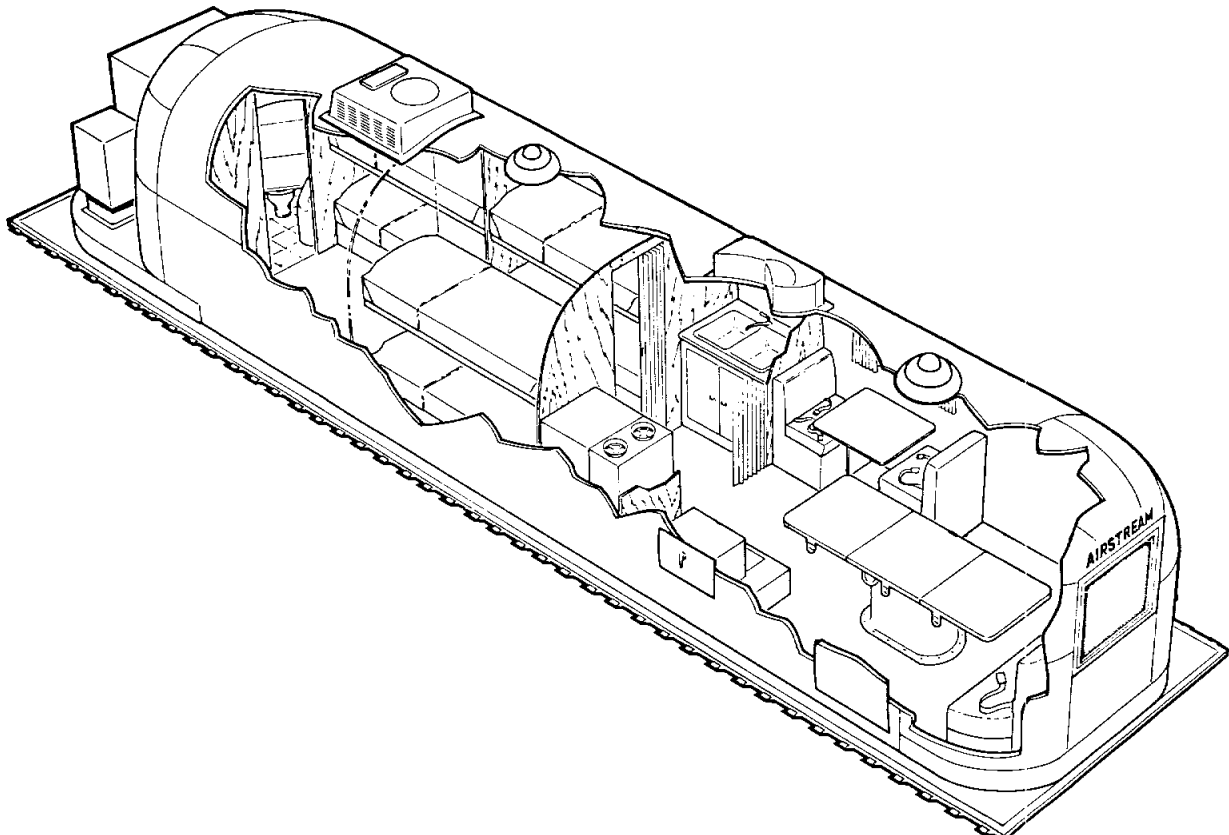




LRL—MSC's newest and most unique facility becomes operational here next week with the move of about 120 contractor and government employees into the Lunar Receiving Laboratory. The new tri-level building (Bldg 37) is located in the southwest corner of the center at Fifth Street and Avenue B. The diagram below shows how crews and samples will be transferred to the Laboratory.



HOME AWAY FROM HOME—Cutaway below shows the mobile quarantine unit in which Apollo lunar crews will be returned to MSC and the Lunar Receiving Laboratory from the landing site in the Pacific. The house-trailer like units are 35 feet long and are fitted with bunks, chairs, tables, kitchen and medical debriefing equipment.



By Bob Gordon

Limited operations begin here next week at the Lunar Receiving Laboratory with the move of approximately 120 contractor and government employees into the most unique research facility at MSC.

It was slightly more than 10 months ago that ground was broken for this laboratory where within this decade American scientists will have their first look at samples of our nearest neighbor, the moon. The LRL will be the focal point where Apollo crews will unfold the story of their lunar flight and the national and international scientific community will begin their investigation of the origin of the moon.

When fully operational, it will be under the supervision of the Science and Applications Directorate at MSC. Dr. Wilmot Hess, Director of the Science and Applications, had indicated that he expects to announce the appointment of a manager for operation of the LRL in the very near future.

Main purposes of the multi-level research structure are as follows:

- Quarantine and testing for possible harmful organisms in the lunar samples, spacecraft, and crews.

- Performance of scientific sample investigations that are time-critical and must be accomplished within the quarantine period.

- Repackaging and distribution of the lunar samples to scientists throughout the world for detailed investigation after the quarantine period.

Joseph V. Piland, Manager of the Lunar Receiving Laboratory Program Office, said partial occupancy of the new structure is a milestone in the facility construction history at MSC. This facility, started last August, is 85 percent complete and this accomplishment is a credit both to the government and contractor personnel, he explained.

Unique Facility

Piland, who as Manager of Technical and Engineering Services responsible for much of the major construction at the Center, said it is one of the most complex and unique facilities at MSC. The LRL, complete with the numerous scientific labs, quarantine facilities, and support units, is probably the only type of laboratory of its kind in the country.

The basic facility was designed by Smith, Hinchman and Grylls Associates, Inc., of Detroit, Michigan and constructed by Warrior Constructors, Inc., Houston, Texas (Phase I); with Warrior Constructors, Natkin and Company, and National Electric Corporation for Phase II. Major test equipment systems are being provided by

the Research Foundation of the State University of New York, Albany, N.Y., Gas Analysis Equipment, and the U.S. Atomic Energy Commission, Oak Ridge, Tennessee, for the vacuum system and Radiation Counting Laboratory.

The move represents occupancy of approximately half of the 83,000-square foot building, Piland explained. Full occupancy and staffing, which should number 175 contractor and Government employees, is expected later this year.

Next Stop: Home

The LRL will be the final stop for Apollo crewmen following their lunar journey but for the samples of the Moon brought back it will be the first stop in a series of scientific investigations.

The NASA Office of Space Science and Applications has selected 110 scientists to perform 122 experiments of varying scope and magnitude on the initial samples. United States investigators were selected from 21 universities, two industrial firms, three private institutions and 10 Government laboratories. Thirty-three experiments were awarded to 27 foreign scientists representing England, Germany, Canada, Japan, Finland, and Switzerland.

The lunar-returned pilots will be transferred to the LRL following their recovery in the Pacific. The lunar samples—photographic film, tapes, and other flight items—will be flown by hi-performance aircraft directly to the LRL, where the samples will undergo a battery of analytical processes.

The crewmen will return to the LRL in an especially designed Mobile Quarantine Facility Unit which resembles a mobile home. They will enter it directly from the Apollo command module after it is brought aboard the prime recovery vessel. Special airtight plastic transfer tunnels will be attached to the spacecraft and the mobile unit for this purpose.

The pilots, together with an MSC physician and a recovery technician will remain in the quarantine facility during the trip to Houston. At port the unit will be transferred to dockside, then to an airport where it will be placed aboard an aircraft for the flight to Houston. It is anticipated the time from recovery, to the time the Mobile Quarantine Facility reaches the LRL, will not exceed five days.

After the crewmen exit from the Apollo spacecraft and enter the Mobile Quarantine Facility aboard the recovery vessel, the command module will be sealed. It will be transported to Houston where it will be placed in a separate LRL quarantine area adjacent to the crew quarters. Access to the spacecraft interior will normally be permitted only after the isolation



WHERE THE MOON MEETS THE EARTH

period is ended. It will, however, be available within this controlled area for inspection as required.

The LRL is located on Avenue B and Fifth Street in the southwest corner of the Center. It is a three-story structure consisting of three adjacent and related functional areas—Crew Reception, Sample Operations, and Support and Administrative.

The Crew Reception Area will serve as quarters for the flight crew and attendant technicians for the quarantine period during which the pilots will be debriefed and examined. Among the attendant employees, estimated to number 15, will be medical doctors and technicians, housekeepers, and cook. This area also has the capability to serve as a contingency quarantine area in the event it is neces-



MASTER CONTROL CONSOLE for the transfer locks within the Vacuum Laboratory are shown on the second floor of the LRL. Scientists will monitor the transfer of the samples from one area to another via this master console.

sary to place people from the Sample Operations Area in quarantine.

Biological Barriers

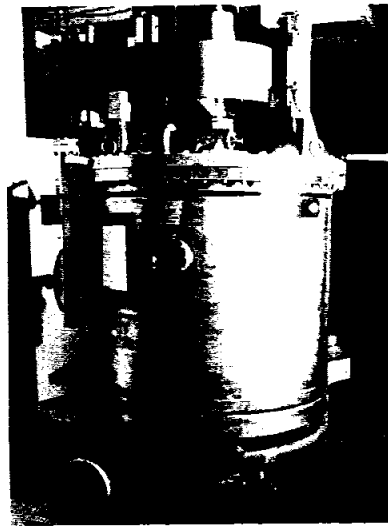
The Crew Reception Area, like the Sample Operations Area, is contained within a biological barrier system. This barrier is unique in that it will protect lunar materials from earth contamination as well as protect the outside world from possible contamination by lunar materials.

Much of the equipment and delicate scientific apparatus which will be used in performing the analysis of the returned samples is on hand within the confines of the LRL. All equipment and systems are expected to be completed by the end of August.

Analysis of the lunar material will be performed in the Sample Operations Area. This includes the vacuum, magnetics, gas analysis, biological test and radiation counting laboratories in addition to the physical-chemical test area. The entire Sample Operations Area, with the exception of the radiation counting area, is within a second biological barrier much like the one which contains the crew reception area.

The Lunar Sample Return Containers first will be brought to the vacuum laboratory where they will be placed in the ultra-clean vacuum system and opened. After preliminary examination of the lunar material, within the lab's vacuum system, samples will be repackaged and transferred to the Biological Preparation Laboratory, Physical-Chemical Test Laboratory and Radiation Counting Lab.

The Gas Analysis Laboratory, is on the third floor above the Vacuum Laboratory. Here analysis will be made with delicate instruments to monitor amounts and types of gases produced by the lunar samples and such gases that may be contained either within the sample or within the individual sample containers.



ONE OF THE CAROUSELS in which lunar samples will be placed is shown in the Vacuum Laboratory on the second floor of the LRL. This F-207 Carousel is just one of the several types already in place in the LRL.

Search for Life

The major responsibility of the Biological Test Laboratory will be to determine if there is and life in the material that may replicate. This will be accomplished by the introduction of lunar samples into small, germ-free animals and plants.

The Biological Laboratory system is composed of the following laboratories: bioprep, bio-analysis, germ-free, histology, normal animals (amphibia and invertebrates), incubation,

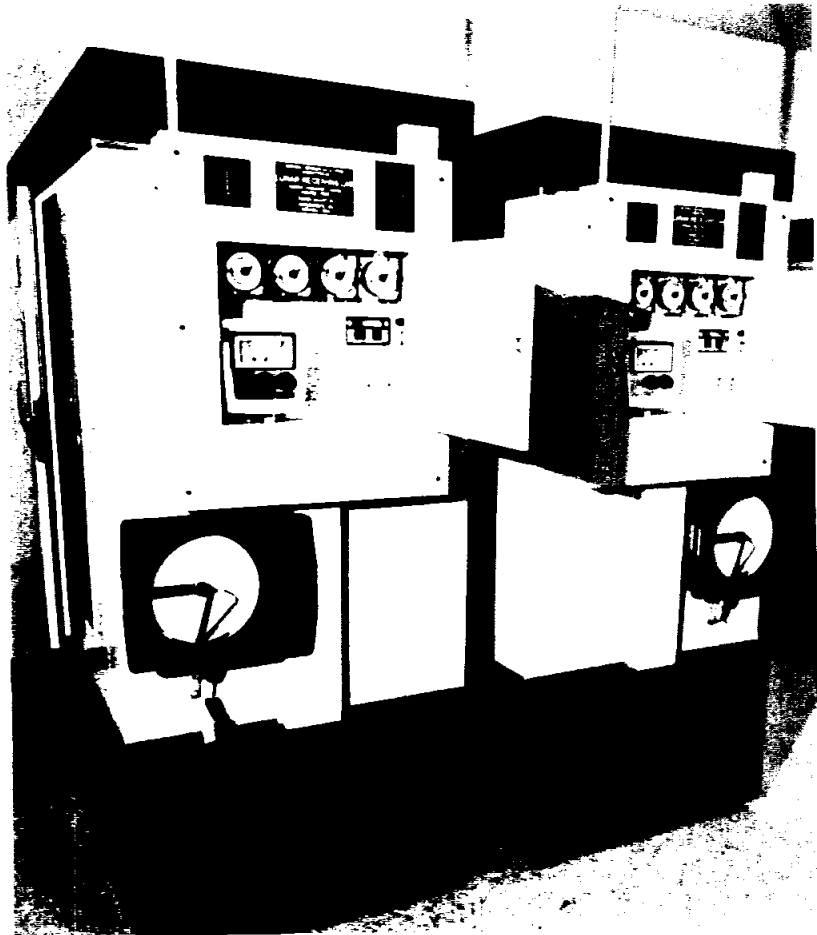
anaerobic and tissue culture, crew microbiology, and plant laboratories.

Lab in Cellar

The only underground portion of the LRL is the counting room of the Radiation Counting Laboratory. This lab has the capability of accomplishing low background radioactive assay of the lunar samples. The lab area is located 50 feet underground for shielding purposes with office areas and support facilities located above on the first floor. A concrete shaft containing elevator, stairs, and service support facilities links the underground lab with the surface.

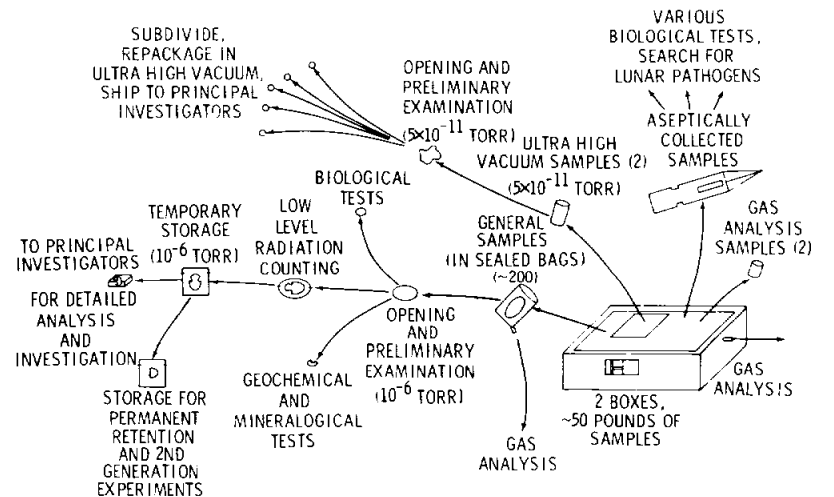
After the samples have been through the Vacuum System for examination and identification, they pass to the Physical-Chemical Test Laboratory. It is here that geochemists will be testing the lunar samples for reactions with atmospheric gases and water vapor. In addition, detailed studies of the mineralogic, petrologic, geochemical and physical properties of the sample will be made.

The Administration and Laboratory Support area, located on the first floor, contains offices, conference room, receiving area, and the necessary laboratory support areas (small shops and supply rooms) to support the labs.



BIOLOGICAL Support Laboratory which will be occupied next week will have four of these plant environment chambers which will be used in the preparation of plants and seedlings for quarantine testing. This is one of the more than score of supporting units designed to furnish laboratory needs to the Biological Sample Laboratory.

SAMPLE FLOW



Used Space Equipment Sought by Smithsonian

NASA and the Smithsonian Institution in March signed an agreement under which space flight artifacts will be stored and inventoried by NASA centers until such time as the Smithsonian can accept them for display in the National Air and Space Museum and in other museums throughout the country.

The agreement defines artifacts desirable for preservation as "unique specimens relating to the science and technology of aeronautics and astronautics, and of flight in the atmosphere and space, which may consist of aeronautical and astronautical objects including but not limited to, aircraft, space launch vehicles, spacecraft (both manned and unmanned), subsystems of the above, such as rocket engines, pressure suits and personal equipment, instruments, significant recorded data, operating handbooks, drawings, photographs, motion picture film and related documents, sound tapes, training devices, simulators and memorabilia."

At MSC, the Exhibits Section of the Protocol Branch of the

Public Affairs Office is responsible for locating, inventory and warehousing of artifacts generated by MSC's part of the space program. With each manned space flight MSC accrues more hardware, spacecraft, equipment and documents of historical significance which must be safeguarded. Also, some of these artifacts continue to have engineering value.

The Exhibits Section is also responsible for scheduling in-house or public display of MSC space artifacts.

MSC organizations are urged to contact Charles Biggs at 4241 with information on artifacts for which there is no further engineering value.

Twenty years from now, today's seemingly obsolete piece of space equipment, or an on-board copy of a mission flight plan, will hold great interest for those who will marvel at how primitive our technology was back in 1967. It is a far better fate for these items than the junkman's melting pot.



Idea Girl

SUGGESTION AWARD — Laverne Brazil of the Reproduction Services Branch received an MSC Suggestion Award for suggesting that MSC Forms 588 and 588A be reduced to a standard size.



Space Photos Featured In KUHT-TV Program

The University of Houston television station KUHT-TV (channel 8) July 11 will carry a program, "Earth Photos from Space," at 8 pm.

Dr. Paul Lowman of the NASA Goddard Space Flight Center and principal investigator for Gemini and Apollo Synoptic Terrain Photography experiments, will discuss the value of space photography to people studying earth structure, geography, natural resources, pollution patterns and oceanology.

First Volume Published In Gemini Photo Series

Earth Photographs from Gemini III, IV, and V, NASA SP-129, US Government Printing office, \$7.

The idea of a NASA publication devoted solely to the striking and beautiful photography of the earth taken from Gemini spacecraft originated with MSC Director Dr. Robert R. Gilruth. He has, since the first few Gemini III photos of the Imperial Valley, been keenly interested in this remarkable new photographic dimension.

The publication contains three Gemini III, 96 Gemini IV, and 145 Gemini V high quality color lithographs, each seven inches square or about three magnifications of the original Hasselblad photos. Scenes taken from 100 to 200 miles above the earth show many diverse areas of the earth.

In desert areas we can see the great seif dunes of Arabia; the barren Sahara Desert which, in many areas, was first photographed by Gemini; the harsh contrast between desert and the fertile valley of the Nile; and vegetation growth caused by the previous days rain in West Texas.

The configuration of the bottom of the sea can be clearly seen in the Florida Keys, Bahama Banks, and Persian Gulf. We can see both Mount Everest and the Dead Sea, the earth's highest and lowest points.

From the meteorological standpoint, we view clouds varying from minute cumulus puffs over Australia to a giant Central Pacific typhoon; the birth of a vortex off Mexico; and the development of weather in Florida on three consecutive revolutions of Gemini V.

Another single Gemini V photo of Southwest Africa clearly shows the results of diamond-forming tectonic forces, the transport of airborne sand over hundreds of miles and the strong effects of ocean currents.

This, the first of three such publications, is a boon to all geoscientists and of significant value to geologists, oceanographers, hydrologists, agriculturists, biologists (marine and terrestrial), and meteorologists, as well as to the aerospace engineer.

Jointly sponsored by NASA's Office of Manned Space Flight and MSC's Director, the book was edited by Dr. Jocelyn R. Gill, the Gemini Science Manager. The informative captions which accompany each photograph was a joint effort of Dr. Paul Lowman of Goddard; Ken Nagler and Stan Soules of the US Weather Bureau; Art Alexiou of the Naval Oceanographic Office; and Dick Underwood and Herb Tiedemann of MSC's Photographic Technology Laboratory. Sandra Scaffidi of the Scientific and Technical Information Division in Washington had the difficult job of organizing the material for publication and insuring that the reproductions would be of first rate quality.

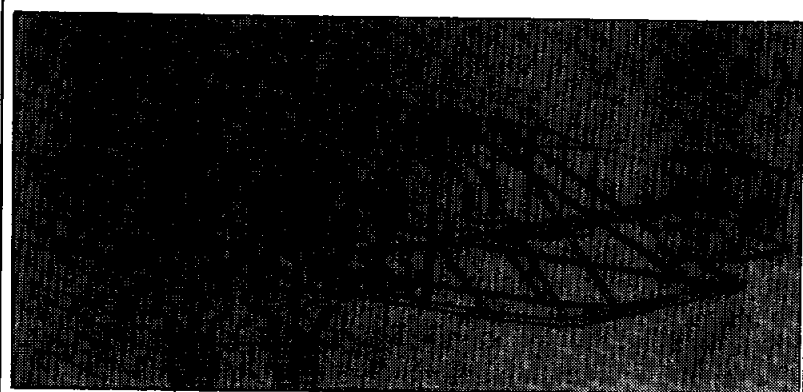
This welcome addition to the aerospace library is available from The Superintendent of Documents, US Government Printing Office, Washington, D.C. 20402 for \$7.00.

The two remaining volumes which will show equally spectacular views of the earth from the Gemini VI-A through Gemini XII missions are now in preparation.

— Richard W. Underwood, PTL

The Roundup is an official publication of the National Aeronautics and Space Administration Manned Spacecraft Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for MSC employees.

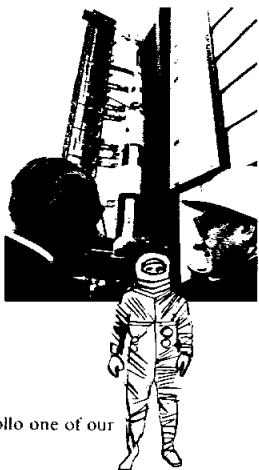
Director Dr. Robert R. Gilruth
Public Affairs Officer Paul Haney
Editor Terry White
Staff Photographer A. "Pat" Patnesky



July 30, 1909

Seven thousand people watched the final test of the War Department's first airplane. Orville Wright and Lt. Benjamin D. Foulois successfully negotiated the five mile course from Fort Myer to Alexandria, Virginia, thus qualifying their craft as "Aeroplane No. 1, Heavier-than-air Division, United States aerial fleet."

- War Department specifications were stringent.
- speed . . . 40 miles per hour in still air.
- weight capacity . . . Two passengers and fuel for 125 miles of flight.
- assembly . . . The "flying machine" must be carried in Army wagons and assembled by soldiers in one hour.



Today's Apollo is far more demanding. Certain critical parts must be machined to tolerances of millionths of an inch, with assembly taking months of effort by highly skilled personnel.

It is such exacting requirements as these that make Apollo one of our nation's most challenging undertakings.



Scholarship Award



ACADEMIC SUBSIDY—Lou Ann Wright, daughter of Bobbie Wright of the Apollo Applications Office, receives an MSC Exchange Council Scholarship from Council chairman Floyd Brandon, right, and Scholarship Committee-member David McCraw. Lou Ann is majoring in sociology at Southwest Texas State College at San Marcos. A similar scholarship was awarded to Margaret E. Taylor, daughter of Maggie S. Taylor, office of the Director of Medical Research and Operations (See May 26 Roundup).

Roundup Swap-Shop

(Deadline for classified ads is the Friday preceding Roundup publication date. Ads received after the deadline will be run in the next following issue. Send ads in writing to Roundup Editor, AP3. Ads will not be repeated unless requested. Use name and home telephone number.)

FOR SALE/RENT-REAL ESTATE

5 or 6-bdr family house, living rm, dining rum, family rm, study, breakfast rm, ¾ acre-wooded lot on creek. \$37,500, commission paid. Imperial Estates, Friendswood. Les Thorn, HU 2-7816.

5 bdr home in Friendswood, brick, trees. Equity, or lease, \$250/mo. Ken Cashion, (day) MI 9-7114, (night) HU 6-0927.

4 bdr home in Clear Lake City, 2-bath, fully carpeted and draped, built-in range, oven, dishwasher, 9 months new. Minutes to NASA, must sell. \$23,350. Full price, our actual equity \$1565, but would consider \$1200, or make offer. Rose Frayer, HU 8-1453.

For Rent: 2-bdr house near Gulf Freeway, living and dining combination, large screen porch, 1 bath, 1 car garage, fenced, trees, air-conditioned, central heat, carpet, drapes, electric stove, refrigerator/w/freezer, washing machine. Convenient to schools. Desirable location. \$135/mo. Dorothy Kubicek, HU 8-1037.

Lot in Sea Isle on West Galveston Island. Many privileges including free boat launch, use of recreational facilities, and use of marina. Lot no. 472. Take \$275 equity and \$10/mo. Carl Busch, RE 3-8286.

For sale in Seabrook, Miramar Addition: 3-bdr, 2 1/2-central air/heat, living rm, panel family rm, all-electric kitchen, aluminum screen porch with all weather panels. Near Seabrook Elementary. Assume \$119/mo on 5 1/4% loan. Frank Wittler, GR 4-3416.

House wanted: From owner, 3 or 4 bdr nicer home in NASA area, prefer Colonial style on large wooded lot. Bob A. Roberts, HU 8-2281.

Nassau Bay: Large lot approximately 300 feet deep with 133-ft. waterfront, near Nassau Bay Yacht Club, Marina and Pool. \$11,500. D. Bell, 591-2340.

For Rent: 3-bdr brick in La Porte. Neighborhood pier privileges. Near Bayshore Elementary School, shopping. Lease for \$125/mo. W. H. Hooper, GR 1-2823.

4-bdr, 2 1/2-bath, brick ranch, 2000 sq. ft., recently redecorated, in Timber Cove, large family rm with fireplace and cathedral ceiling, detached 2 1/2-car garage, large patio, 1/2 block from Taylor Lake boat launching ramp, bus to all schools, assume 5 1/4% loan, payment and taxes \$165/mo. Maj. John C. Marshall, 877-3100.

Like-new residence in Glenbrook Valley, 3 bdr, 2-bath formal living rm, formal dining rm, oversized den with fireplace, automatic kitchen with built-ins, morning-rm with home-planning center, utility rm, covered patio, 2-car detached garage with room for shop and storage. Wayne Young, Ext. 2841, (home) MI 5-2268.

3-bdr, 2-bath in Fairmont Park, garage, dishwasher, disposal, drapes, paneled den, all brick. FHA, \$900. N. J. Beauregard, GR 1-0434.

For Rent: 2-bdr house in Bacliff. Fenced-in yard, single garage, 1 1/2 blocks from Bay and 220 wiring. Debby Hetkes, Ext. 2621. (no home phone)

FOR SALE—AUTOS

1962 Rambler Classic station wagon 4-dr delux 400 series, factory air, reclining bucket seats, headrests, vinyl interior, radio, autotrans. Orig. owner who ordered it from factory. \$875. Financing can be arranged; consider trade. Floyd Turner, RE 3-7667.

1958 Cadillac Coupe de Ville, extra clean, new double-duty battery, new tires, (no air). Best offer, Chris Critzco, Kemah 877-3218.

1962 Ford Fairlane, 49,000 miles; green and white, new tires, has sticker and plates, runs perfect. \$500. John Bergeron, 932-2148.

1964 VW Karmann Ghia coupe, clean, one owner, AM/FM radio, pastel blue. \$1295. D. V. Massaro, HU 2-7976 after 5.

1964 Corvette convertible, 365 hp, hi-perf engine, 4-spd with positraction, factory air, AM/FM radio, tinted glass, elect. windows. Genuine leather seats and new Firestone 500 Super Sport tires. \$2495. H. E. Ream, 877-4308, Kemah.

1966 Corvair convertible, 4-spd trans, Marina Blue, white top. Exclnt condition. Has like-new Gillette Supreme tires. \$1600. Judy Atchison, Baytown, 582-5009 after 5.

1963 Austin Healey Mark II "3000", exclnt condition and low mileage. \$1400. Richard Dessling, HU 4-3317 after 5.

1967 VW sedan, 53 hp, 10,000 miles, factory seat belts, vinyl upholstery, back-up lights, emergency front and rear lights, dual brakes. \$1495. W. H. Hooper, La Porte, GR 1-2823.

1962 Pontiac Bonneville, less than 50,000 actual miles, one owner, good tires, perfect shape. Quinn, GR 4-2489.

1957 Buick Century, 4-dr hdt, pwr steering/brakes/windows. In very good running condition and not bad looking. \$450. Frank Park, HU 7-1255.

1965 Thunderbird convertible, AM-FM radio, heater, air, all pwr. \$2595. James Vincent, OL 8-5637, Alvin.

1964 Chevrolet Impala, 2-dr hdt, air, pwr, automatic, tires almost new. \$1475. C. E. Clouse, 932-3826.

1963 Chrysler Newport 4-dr sedan, factory air, pwr steering/brakes. Still in factory warranty. 45,000 miles. \$1150. Lee Walker, GR 9-4809 after 5.

1947 Plymouth, radio, heater, all accessories operable, two new Sears tires and tubes. Priced at \$65. Clayton Forbes, HU 8-4238.

1956 Ford 4-dr Custom Sedan, radio, heater, clean. \$124.99. H. Kaupp, MI 5-7908.

1967 Ford LTD, power, air, stereo. Only 7,000 miles. Will accept trade and assume balance. W. J. Gilpin, GR 2-0642.

FOR SALE—MISCELLANEOUS

1966 Ducati motorcycle, 160 cc, 70-75 mph, 90 mpg, 1500 actual miles, exclnt condition. Also helmet, tinted bubble, cable lock w/keys tarpaulin. \$300 for all. J. M. Walter, RI 8-5910.

Fender Stratocast guitar, new paint, 3 pickups, tremolo bar; Princeton reverb amplifier, new condition, has vibrato and reverb pedal, 30-ft cord. Guitar alone \$150; amplifier alone \$100; both \$225. John Bergeron, 932-2148.

Adorable AKC champion sired black standard poodle puppies. Gentle, loving family pets. H. Fisher, HU 4-1389.

16' custom deluxe Hollywood boat with 35 hp electric start Evinrude, top, side curtains, bait well, big wheel tilt trailer, water skis and outdoor storage cover. Everything ready to go. \$795. W. Gray, GR 4-2002.

Hi-Fi equipment, Heathkit 4-track stereo tape deck, \$50. 14-watt mono amplifier, \$15. Trio AM-FM stereo tuner, \$30. Garrard stereo record changer, \$30. 12-inch speaker, \$10. Table mike, \$5. Multiplex adapter, \$10. Tex Ward, HU 7-2266.

Small Atlas electric sewing machine, needs some repair, \$10. Boy's bicycle, new, \$20. Girl's bicycle, used, \$10. Marion Bailey, HU 4-5658, evenings.

Regular 4-string electrical bass guitar with dual pickup. Perfect for beginner or to play in group. 4 months old, top condition. \$65. Salvador Villarreal, 932-3885.

30" electric range, Kenmore Coppertone, used 2 yrs, in perfect condition, \$100. Olan Bertrand, 944-9052.

AKC registered, small mini-toy apricot poodles. Bayou Da'rgene blood line. Free generation pedigree furnished. Also available, creams with dark ears. All dogs 6 weeks. \$125. J. Fredrickson, Dickinson, 534-2694.

G.E. Deluxe Electric range, light, time bake oven, clock and timer, exclnt condition. Frigidaire refrigerator, exclnt condition. Blond bedroom suit, bookcase headboard, innerspring mattress and springs, double dresser with large mirror, and 4-drawer chest. All good condition. 20-inch girl's bicycle with trainer wheels. Living room couch and matching chair. Odd chairs, dishes, books, clothes, folding metal table, and many odds and ends. James Weaver, 1506 Webster Street, League City (Golden Acres), 932-2371.

Flight instructions by experienced instructor in late model Cessna C-150 commuter. Based at La Porte. \$9/hr, solo, \$14/hr, dual. Ken Jones, GR 1-3760.

Akai 345 D professional tape recorder. Fully automatic. Run about 30 hrs. \$350. Lee Walker, GR 9-4809 after 5.

Twin-size bookcase headboards, white. \$12.50 each or both for \$20. Dean Allen, HU 8-4024.

1966 Honda S-65 motorcycle with windshield and luggage rack. Will include crash helmet. All 10 months old. 1200 miles. \$255. Going overseas. John Hodgson, HU 8-1475.

Free — puppies, mostly beagle, Ed Samfield, HU 8-4005.

Kenmore electric clothes dryer. \$35. Frank Park, HU 7-1255.

WANTED

Want ride from Bellaire, 4617 Huisache St, to Ellington, Building 339, Monday-Friday, 8 to 4:30. Janet Stineman, MO 6-5649 after 6.

Want roommate to share two-bedroom apartment, Casa Blanca Apts., 3637 S. Shaver. \$67.25 each. Bob Cochran, Ext. 5570 or (after 6) HU 6-0791.

"Bride to be" is interested in buying a used sewing machine. Linda Gabbard, GR 4-2349.

Want ride from U of H, 8:30 to 5. E. Dahl, Ext. 5566.

Want 4-bdr house, preferably in Clear Lake City. W. H. Hooper, La Porte, GR 1-2823.

Want girl's 24" bicycle, good condition. James Weaver, 932-2371.

Want ride from either La Porte or Pasadena (Casa Blanca, S. Shaver) to Bldg. 2, 8:30 to 5. Jana Rogers, Ext. 4850.

Want someone to share ride from Baytown to El Camino Real area. 8 to 5. Betty Fuchs, HU 8-2500, Ext. 59.

Want ride from 3637 S. Shaver, Pasadena, to Bldg. 2. 8:30 to 5. Karen Chapman, Ext. 3671.

Wanted: Deer hunter. \$100. Ideal location, Marble Falls, 800 acres, two cabins. Marion Pringle, HU 2-7160.

FOUND

Brown shoulder-strap purse left at Gulf-gate Roller Rink after EAA Skating Party. Owner may claim purse from MSC Security Lost-and-Found, Bldg. 2. Barbara Vickers, Ext. 5241.



FLEET ADDITION—Aero Club president Don Bray gives the cockpit and panel a going-over on the Club's latest acquisition—a four-place Beech K-35 Bonanza.

FOUR PAIR OF WINGS—

Aero Club Adds Bonanza

The Aero Club's stable of flying machines grew to four recently with the acquisition of a Beech K-35 Bonanza. The other Club aircraft are an Aeronca 7AC, Cessna 150 and Cessna 172.

The four-place Bonanza is fully equipped except for autopilot, and has a full gyro panel. VOR with glide slope, localizer and marker beacon indicators. ADF and DME. Auxiliary tip tanks bring the total gas capacity to 90 gallons. The Bonanza's nominal useful load is over 1100 pounds and maximum cruising

range at 160 mph is 1000 miles. Cruising speed at 75% power at 10,000 feet is about 200 mph.

The Bonanza is available to qualified pilots. Call Aero Club president Don Bray at 4341 for details.

The Aero Club Wednesday began a nine-week private pilot ground school to run each Wednesday at 5:15 pm in the News Center Auditorium, NB Bldg 6. Sandersen visual aids are being used in the course, and the instructor is Aero Club training officer Ken Downing.

FIVE PLAYS PLANNED—

Footlights Draw Five Onto Theater Stage

Five MSC and contractor employees will have parts in the cast or in the production of the Moss Hart comedy "Light Up the Sky" when it opens the Clear Creek Country Theater's third season June 29.

In the cast are Country Theater president David Goldenbaum of ASPO, Edward C. Bernard, Engineering Division, Frank Hess, Lockheed Electronics, and Morgan Redmond,

B&R-N. The play is under the direction of Bill Simmons of Propulsion and Power Division, and is his first directing job with the Country Theater. He is also active in the Pasadena Little Theater.

"Light Up the Sky" has as its plot the opening of a play in Boston by New York theater people. Reservations for performances on June 29, 30 and July 1, 6, 7 and 8 may be made by calling the Country Theater at HU 8-4460 or 932-3714.

Other plays in the Country Theater's season include the Irving Berlin musical comedy "Annie Get Your Gun" scheduled for performances on August 24, 25, 26 and 27 and September 1 and 2.

Goldenbaum will direct a production of "Inherit the Wind" for performances November 9, 10, 11, 16, 17 and 18. A comedy of Army life, "Blood, Sweat and Stanley Poole," will be directed by Redmond and produced by Hess for presentation on February 8, 9, 10, 15, 16 and 17, 1968.

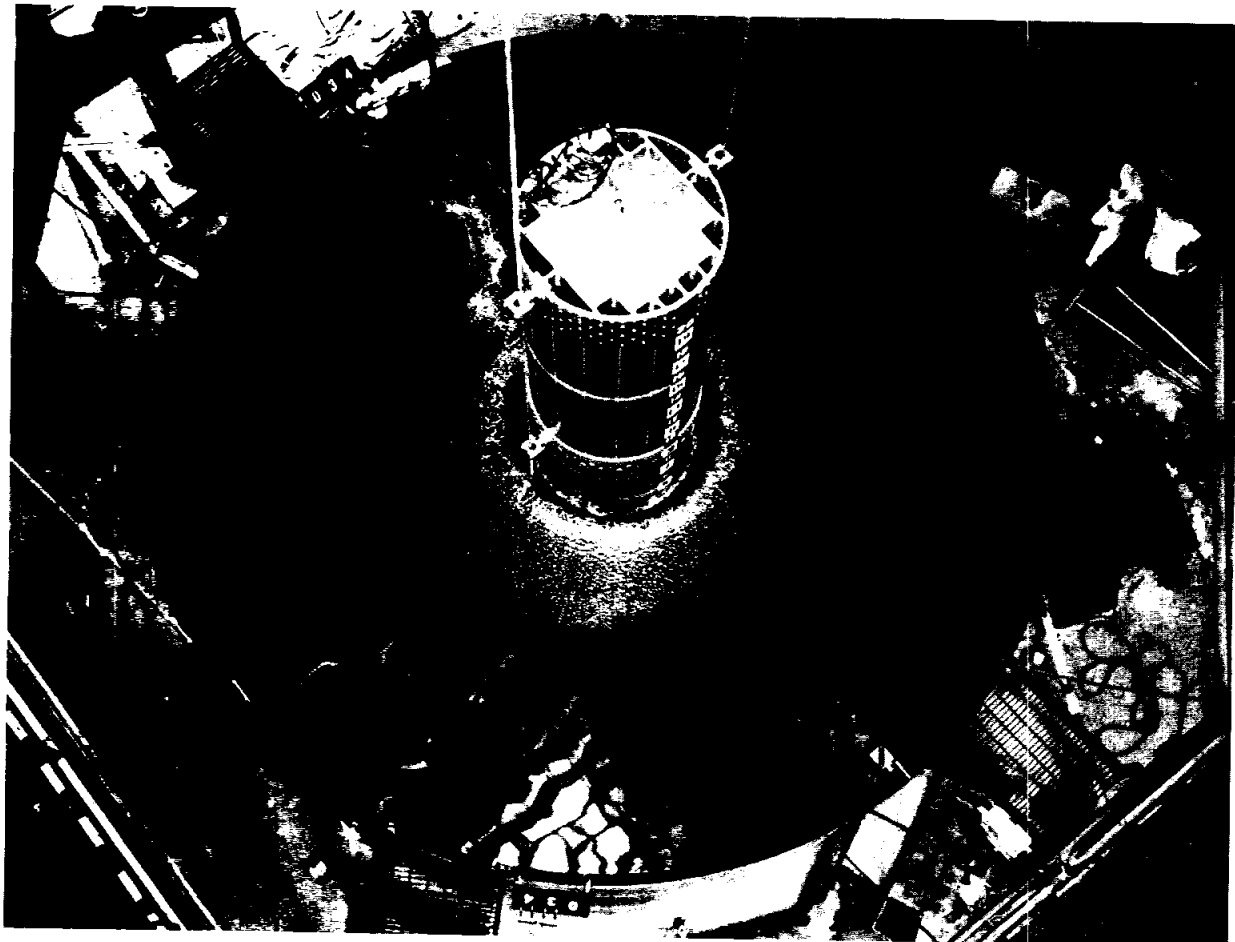
The season's final play will be William Inge's "Picnic," directed by Mrs. Bill Simmons and produced by Leo Zbanek of LRL Program Office. Dates are April 18, 19, 20, 25, 26 and 27, 1968.

Try-outs for "Annie Get Your Gun" are scheduled for July 15-16.

"Light Up the Sky" and "Annie" will be box office plays only; season tickets at \$10 a pair will go on sale in September for the remaining three plays.



SCRIPT REVIEW—The script for the Clear Creek Country Theater season's first production, "Light Up the Sky," by Moss Hart, is reviewed by three members of the cast and the play's director. Left to right are David Goldenbaum, Morgan Redmond, director Bill Simmons and Frank Hess.



'SOFT' (?) SPLASH—A one-tenth scale Saturn V first stage impacts the water in a tank as part of the NASA Marshall Space Flight Center's "soft-splash" tests. The model is dropped from as high as 156 feet to simulate impact of a Saturn V first stage after burn-out. The tests are aimed toward developing methods of recovering flight stages from the ocean for refurbishment and reuse.

'Soft-Splash' Technique Investigated As Way to Recover Spent Stages

Special tests, designed to discover the best way to recover and reuse the first-stage of the Saturn V launch vehicle, are being conducted at the NASA-Marshall Space Flight Center.

In the tests, a one-tenth scale model of the stage—the S-IC—is dropped from as high as 156 feet into a specially built 20-foot-deep water tank. This simulates the descent of a used Saturn V first stage or booster falling through part of the earth's atmosphere and into the ocean.

The series of tests are studying a "soft splash" concept, designed to bring back the S-IC with as little damage as possible, so that it can be refurbished and used again. The results of the tests are being correlated with data compiled by the Boeing Company in a study contract for MSFC.

All stages of NASA launch vehicles are now used only once. Because of the tremendous cost of these units, however, MSFC engineers are attempting to find a way to reuse them. A workable method would save many millions of dollars in future years.

The tests are being conducted at MSFC's Test Laboratory, under the direction of Otto Goetz, Test Laboratory, and George Detko, Advanced Systems Office. Contractor test engineer Warren Ross oversees each test drop. A test stand formerly used to dynamically test the Uprated Saturn I launch vehicle is used for the tests.

As the S-IC model is dropped in the test stand, its velocity reaches as high as 98 feet a second (67 mph) when it hits the water, enough to crush the model without some way of cushioning the impact. The same thing would happen to a full-size S-IC on its return from space, assum-

ing that the booster survived the heat of re-entering the dense portion of earth's atmosphere.

The Boeing analytical study proposes a method of slowing the S-IC as it plunges through the atmosphere in a "head first" position. Control jets, fins, speed brakes and parachutes will help to slow and stabilize the stage. The study further states that, after the stage's forward tank dome is jettisoned and vent holes are blown open (at about 500 feet), the stage will hit the ocean at a speed of about 68 miles an hour.

Without the forward tank dome, the stage becomes a big hydropneumatic cylinder at impact, with water rising into the empty liquid oxygen tank and forcing the air inside the tank, compressed by the rising water, to cushion the shock of impact. The compressed air is vented through the series of holes around the stage's perimeter to prevent stage rebound. The stage will then gradually rotate into an engine-down position for retrieval.

The "soft splash" system will cause only minor damage to the stage and prepare the way for refurbishment. The number and size of the holes around the perimeter will control the stage's rebound. Buoyancy of the stage is assured because the fuel tank remains sealed and air-filled.

The "soft splash" system is receiving major emphasis in the model drop tests at the Marshall Center. After about 50 tests, the system is working as expected. The full test series will include about 100 drops. Later this year, a larger model—one-sixth scale—will be used in testing.

The one-tenth scale model was built by the MSFC Test Lab. It weighs 586 pounds, is

approximately 130 inches long and 33 inches in diameter. There are 58 holes around the perimeter.

In addition to the drop tests, the Marshall Center is conducting other tests in recovery concepts. These include wind tunnel tests at the Langley Research Center to study S-IC control fins and speed brakes; studies of retrieval-at-sea techniques; and studies to identify the technical requirements if a recoverable booster program is begun.

Tarzan's Jungle Fake, Pilots Learn in Panama

By Jack Riley

Twenty-one pilots last week learned what a jungle isn't.

And that, most agreed, was one of the most valuable of the many lessons provided at the US Air Force Tropic Survival School in Panama.

The pilots found that the jungle depicted in Tarzan movies and adventure magazines is a phoney. There is not a snake in every tree or an animal behind every bush. The jungle can be a good provider of food, water and shelter.

Training began early Monday, June 12, at the school at Albrook AFB, Canal Zone. Classroom lectures and practical demonstrations in a nearby jungle area occupied the first two days.

The group learned about tropical plants, how to find good water, tropical animals, emergency signaling, jungle terrain and how to travel through it, first aid, and how to use natural materials in a survival situation.

They were introduced to the gastronomical delights of boa constrictor, iguana, wild boar, armadillo, heart of palm, bamboo shoots, coconut milk, monkey fruit, and other exotic food available in the jungle.

Early Wednesday morning, June 14, the 21 pilots and 7 other MSC employees were flown by helicopter to a small clearing hacked out on top of a ridge. From there, an hour-long hike took them to a small stream, along which they set up 3-man camp sites. Each 3-man camp had an Apollo survival kit.

Their first task was to erect lean-to shelters of palm fronds, and they soon learned why a shelter is of first importance in the jungle, especially during the rainy season. A downpour lasted most of the afternoon.

Most of the campers crawled into their hammocks at dusk. Up early the next morning, they spent the day hunting food and dry firewood and chopping down trees to clear a patch in the jungle canopy so that they could signal to searching helicopters on Friday morning.

Fishing was popular, and several of the pilots caught a substantial number of very small fish to augment the one Gemini meal and one tube of contingency food each carried. Torrential rain fell all afternoon Thursday.

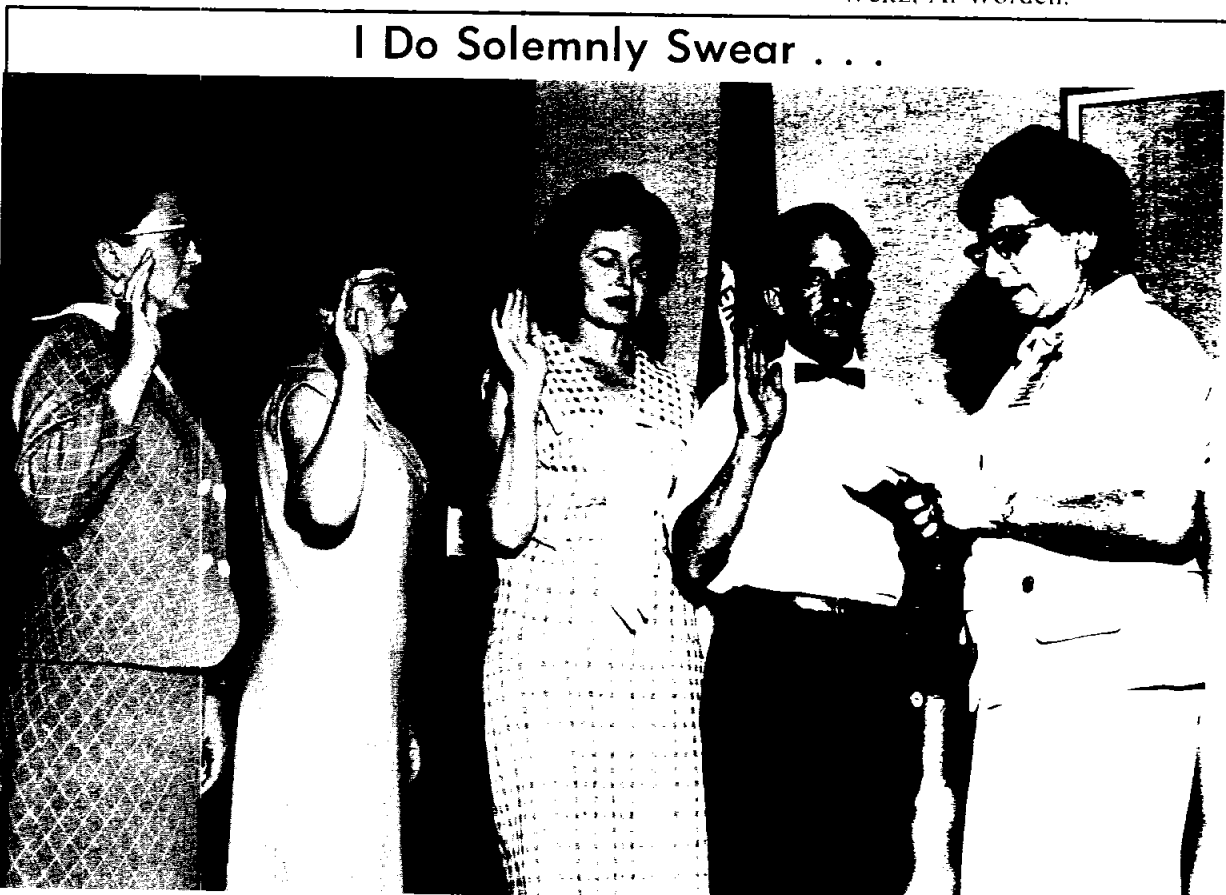
Early Friday morning, each group of campers was able to signal a helicopter for a food drop. They then broke camp and started the trek out of the jungle. Lots of hills, lots of mud and about two hours later, the group arrived at the bank of the Chagres River.

Inflating life rafts and life-jackets, they entered the river for a wild ride of several miles through stretches of rapids to a Choco Indian village. Here they were briefed on the proper way to approach Indians that might be encountered in a jungle survival situation.

Helicopters returned the group to Albrook from the village.

The only snake encountered during the jungle stay was a 5-foot fer-de-lance, one of the most venomous reptiles of the area. It was captured through the cooperative efforts of several persons, and now resides in the Houston Zoo.

Pilots making the trip: Vance Brand, John Bull, Jerry Carr, Charlie Duke, Ron Evans, Ed Gibson, Fred Haise, Jim Irwin, Joe Kerwin, Don Lind, Jack Lousma, Ken Mattingly, Bruce McCandless, Curt Michel, Ed Mitchell, Bill Pogue, Stu Roosa, Jack Schmitt, Jack Swigert, Paul Weitz, Al Worden.



INSTALLATION—New officers of Lodge 2284 American Federation of Government Employees are sworn in during June 12 ceremonies. Left to right are President Alma Hurlbert, Second Vice President Billie Rowell, Recording Secretary Jean Stone, Secretary-Treasurer Norbert Phillipi, and administering the oaths of office, Parliamentarian Helen Ragsdale. Still to be installed are First Vice President Paul Folwell, Chief Steward Herman Fisher and Sergeant-at-Arms Bill Laycock.