



AS SEEN FROM THE MOON—At 4:05 a.m. CDT, August 8, 1967, Lunar Orbiter V aimed its telephoto lens on Earth's sunlit side and made this photo of a nearly full planet 214,806 miles away. Discernible features include, Africa's entire east coast, the Arabian peninsula, the Red Sea and Suez Canal area, Turkey, Greece and Italy. The subcontinent of India shines through a light covering of clouds in the center of the picture. (SEE STORY PAGE 8)



Apollo/Saturn V 'Roll Out' Preludes Major Flight Test

Rollout of the first Apollo/Saturn V space vehicle from the Vehicle Assembly Building (VAB) at NASA's Kennedy Space Center has been postponed about one week. The rollout of this vehicle for its first scheduled flight had been set for no earlier than August 21.

The delay is the result of a decision to provide additional helium venting for the insulation panels that protect the second stage (S-II) hydrogen tank. Launch requirements call for rapid depressurization of the helium gas shortly after liftoff. Installation of the additional vent will require approximately seven working days in the VAB.

After the movement of the 364-foot tall space vehicle on a three and one-half mile trip to its launching pad, at least six weeks of additional testing will be conducted before it will be launched on an Earth-orbital mission.

The mission, designated Apollo 4, will test performance of the three-stage Saturn V rocket and the Apollo spacecraft command module heat shield

under conditions simulating return from a mission to the Moon.

The mission will mark the first flight test of the Saturn V's first stage (S-IC), second stage (S-II), and the first restart in orbit of the third stage (S-IVB) of the Moon rocket.

A second Saturn V launch vehicle (AS-502) is assembled in another high-bay area of the Vehicle Assembly Building awaiting the arrival of the Apollo spacecraft. A combined guidance and control test of this vehicle and a launch vehicle overall test was scheduled this week.

This second flight Saturn V will be used in a mission similar to Apollo 4 in an unmanned test. One of the tests on this mission will concern the new Apollo spacecraft hatch designed to permit faster opening for crew egress.

An Uprated Saturn I rocket (AS-204) is being prepared for launch from Launch Complex 37 on an unmanned test of the Apollo spacecraft lunar module in Earth orbit. The lunar module for this mission is being tested at the Kennedy Space Center's

Manned Spacecraft Operations Building before it is moved to the pad and mated to the launch vehicle.

Spacecraft for future missions, including the command and service module for the first Apollo manned Earth orbital flight next spring, are in manufacture and testing at NASA's contractor plants. Particular attention is being given to modifications of the interior materials and wiring harnesses to ensure maximum protection from fire. North American Aviation's Space Division, Downey, Calif., builds the command and service module. Grumman Aircraft Engineering Corp., Bethpage, L.I., New York, is prime contractor for the lunar module.

A number of Saturn launch vehicle stages and instrument units are awaiting shipment to the Kennedy Space Center. First stages for two Saturn V and five Uprated Saturn I rockets are at Michoud Assembly Facility, New Orleans. Seven S-IVB stages are at the Sacramento Test Facility in Calif.; five to serve as second stages of the Uprated Saturn I and two as Saturn V third stages. Two instrument units are at International Business Machine plant in Huntsville, Alabama.

A Saturn V booster and second stage are in test stands at the NASA Mississippi Test Facility for static firings within a few weeks.

A total of 12 Uprated Saturn I and 15 Saturn V vehicles are being built for the Apollo Program. The Boeing Company is prime contractor for the S-IC (Saturn V first stage). Chrysler makes the Uprated Saturn I booster. Both companies perform the work at the Michoud facility in New Orleans. North American's Space Division also manufactures the S-II, (Saturn V second stage) at Seal Beach, Calif. McDonnell-Douglas Corp.'s Missile and Space Division, Huntington Beach, Calif. is the contractor for the S-IVB stage.

Lunar Module Propellant Injectors Contracted For

North American Aviation's Rocketdyne Division, Canoga Park, Calif., was selected August 2 by NASA to negotiate a contract for design, development and qualification of a backup injector for the ascent engine of the Apollo Lunar Module.

Value of the cost-plus-fixed-fee contract with NASA's (Continued on Page 2)

Eleven New Scientists To Join MSC Pilots

NASA announced August 4, the selection of eleven new scientist-pilots. All are civilians. Ten of them will report for duty at the Manned Spacecraft Center September 18. The eleventh man will complete his medical internship before reporting for duty in about a year.

The ten new crewmen will have two weeks of general orientation activities at MSC and will begin a program of academic, or "ground-school," training on October 2. They will begin Air Force flight training in March to become qualified jet pilots.

The "ground-school" training at MSC will include orbital mechanics, computers, spacecraft orientation, and general math and physics refresher courses, as well as field trips for contractors facility orientation.

Two of the new scientists are naturalized citizens of the United States.

The group is the sixth class of crewmen to be selected and the second selected specifically for scientific education rather than for pilot backgrounds.

The 11-man selection increases the number of NASA pilots to 57 or 56 if recently resigned pilot Scott Carpenter is not included.

They were selected from a 65-man group screened from nearly 500 applicants by the National Academy of Sciences for NASA. Each member of the group has earned a doctorate. Each is married.

The new pilots are:

Dr. Joseph P. Allen, 30, a physicist research associate at the University of Washington in Seattle;

Dr. Philip K. Chapman, 32, a naturalized citizen born in Aus-

tralia, and presently a staff physicist at the Experimental Astronomy Laboratory, Massachusetts Institute of Technology;

Dr. Anthony W. England, 25, a graduate fellow in geophysics at M.I.T.;

Dr. Karl G. Heinze, 40, professor of astronomy at Northwestern University and an experimenter in the Gemini program;

Dr. Donald L. Holmquest, 28, completing medical internship requirements at Methodist Hospital, Houston, and his doctorate in physiology at the Baylor College of Medicine;

Dr. William B. Lenoir, 28, assistant professor of electrical engineering at M.I.T.;

Dr. John A. Llewellyn, 34, a naturalized citizen born in Wales, presently an associate professor in chemistry at Florida State University;

Dr. Franklin S. Musgrave, 31, a post-doctoral fellow at the University of Kentucky with a doctorate in medicine from

(Continued on Page 3)

RCA To Build New Space-Suit Communications

Radio Corporation of America Defense Electronics Products Division, Camden, New Jersey, has been selected, it was announced August 10, by NASA, for negotiation of a contract for a new dual space-suit communications system.

Estimated value of the cost-plus-fixed-fee contract is less than five-million dollars.

The space suit communications (SSC) systems are for use (Continued on Page 2)

Carpenter To Leave NASA, Going Back To Navy Duty

NASA and the Department of the Navy announced August 3 that Cdr. M. Scott Carpenter, USN, is being detached from the nation's space program at the request of the Navy in order that he may be assigned to the Navy's Deep Submergence Systems Project (DSSP).

Carpenter is one of the seven original pilots selected in April 1959 and the second American to orbit the Earth. He piloted Aurora 7 May 24, 1962, on a three-orbit mission. He also was backup pilot for the first orbital mission piloted by Astronaut John Glenn, Feb. 20, 1962.



Scott Carpenter

Carpenter has long been active in the planning and conduct of the Navy's Man-in-the-Sea program, which is under the cognizance of the Deep Submergence Systems Project. He served as a crewman and was a team leader during the SEALAB II experiment in 1965. During this experiment he set a world record in underwater work, living for 30 consecutive days at a depth of 205 feet.

In his new assignment he will assist in the preparation and conduct of SEALAB III, a 60-day experiment to be held to depths of 600 feet in 1968. Carpenter is tentatively scheduled to serve as a crewman in SEALAB III. His duties will include responsibility for SEALAB III ocean floor operations-experiments and equipment, and coordination of team training.

NASA Administrator James E. Webb said: "Cdr. Carpenter was one of the seven original astronauts assigned to NASA by the military services and we are grateful to him and the United States Navy for his services over the past eight years. During the past two years, he has demonstrated that many of the technologies, techniques, and psycho-physiological factors re-

(Continued on Page 7)

Apollo Saturn-V Major Ground Tests Complete

A major ground test program of the Apollo/Saturn V was successfully completed August 3 at the NASA-Marshall Space Flight Center.

In effect, it signals the green light for the launch of the first Apollo/Saturn V later this year as far as the dynamics and structures are concerned.

Ralph Robertson, of the Saturn V Test Office and project manager during the 11 month test, said the dynamic test program was conducted by the Boeing Co., under the direction of MSFC engineers, who provided test criteria and monitored the effort.

He said initial dynamic tests started with the first stage of the Saturn V. Subsequent tests included the second and third stages, instrument unit and the Apollo spacecraft.

Several slight modifications were made to the space vehicle as a result of the dynamics program.

Tests included the bending and vibration characteristics of the complete vehicle. These tests were carried out in a 400 foot high tower in the MSFC Test Laboratory.

Lunar Module

Manned Spacecraft Center, Houston, will be in excess of \$5 million. The contract will provide initially for design feasibility and development testing, with provision for delivery of four production injectors if

32 Years of Service



RETIRED—James M. Towey (I.) is presented a token of retirement by Paul E. Purser, Special Assistant to the Director. Towey retired August 11 after 32 years of government service. He was in the Space Systems Engineering Office of Instrumentation and Electronic Systems Division.

SSP AWARD

NEIL B. HUTCHINSON, Flight Control Division was recently awarded a Sustained Superior Performance Award.



(Continued from Page 1)

required. Two of the injectors would be used in ground test engines at the White Sands, N. M., Test Facility and two would be held for possible use in flight engines.

The propellant injector delivers both fuel and oxidizer into the combustion chamber of the engine. Proper injector design is necessary to insure smooth and reliable ignition and stable combustion in the 3,500-lb.-thrust engine that will lift the LM off the lunar surface and return it to the orbiting Apollo spacecraft.

The new injector will be developed as backup to the present injector in the ascent engine being built by the Bell Aerospace Corp. under sub-contract to the Grumman Aircraft Engineering Corp., prime contractor for the Lunar Module. The Bell injector is causing unstable combustion in the engine chamber and excessive erosion of the ablative thrust chamber in testing under some potential operating conditions. Design modifications underway by Bell are hoped to correct these deficiencies, but it was decided to develop an injector of a different design in the event the problems cannot be corrected.

Rocketdyne, on the basis of proposing the best design, was selected over four other firms. It will carry three variations of its design through feasibility testing. This will give NASA the best option on the design to be selected for development, verification and qualification testing. Improved welding, drilling and other fabrication methods planned by Rocketdyne offered the best manufacturing and development schedule.

NASA Makes \$30.9-Million Mods To Contract For Saturn S-II Stage

NASA announced August 7 modifications to its contract with North American Aviation, Inc. for the Saturn V second (S-II) stage. Total value of the three modifications is \$30.9 million.

One contract modification, valued at \$5.5 million, adds a configuration management sys-

tem for controlling and implementing S-II stage changes.

The remaining two modifications provide for the equitable adjustments of S-II stage changes previously ordered.

Valued at \$5.8 million, the second modification covers seven changes, which provide for additional ground support equipment at Kennedy Space Center, Fla.

The third modification, entailing 12 changes and \$19.4 million, covers modification of S-II selector switches and insulation of the entire S-II stage, including insulation around the liquid hydrogen tank and common bulkhead.

and full duplex (simultaneous transmission and reception) voice between either SSC and the LM. The secondary or backup mode will permit full duplex voice between the SSC and the LM. Combining both primary and secondary modes will permit full duplex voice conference between the two astronauts on the moon and with flight controllers on earth plus simultaneous telemetry transmissions from each astronaut via relay through one SSC.

Communications between the lunar surface and the orbiting command module will be relayed via earth stations.

RCA was selected from among five companies submitting proposals to negotiate a contract for the space suit communication system.

Communications

(Continued from Page 1)

in manned spaceflight and will permit two Apollo astronauts on the surface of the moon to maintain constant voice communications with each other and with flight controllers on Earth. The system will also simultaneously transmit telemetry information from each of the astronauts, while they are on the moon's surface, back to the lunar module for relay to earth.

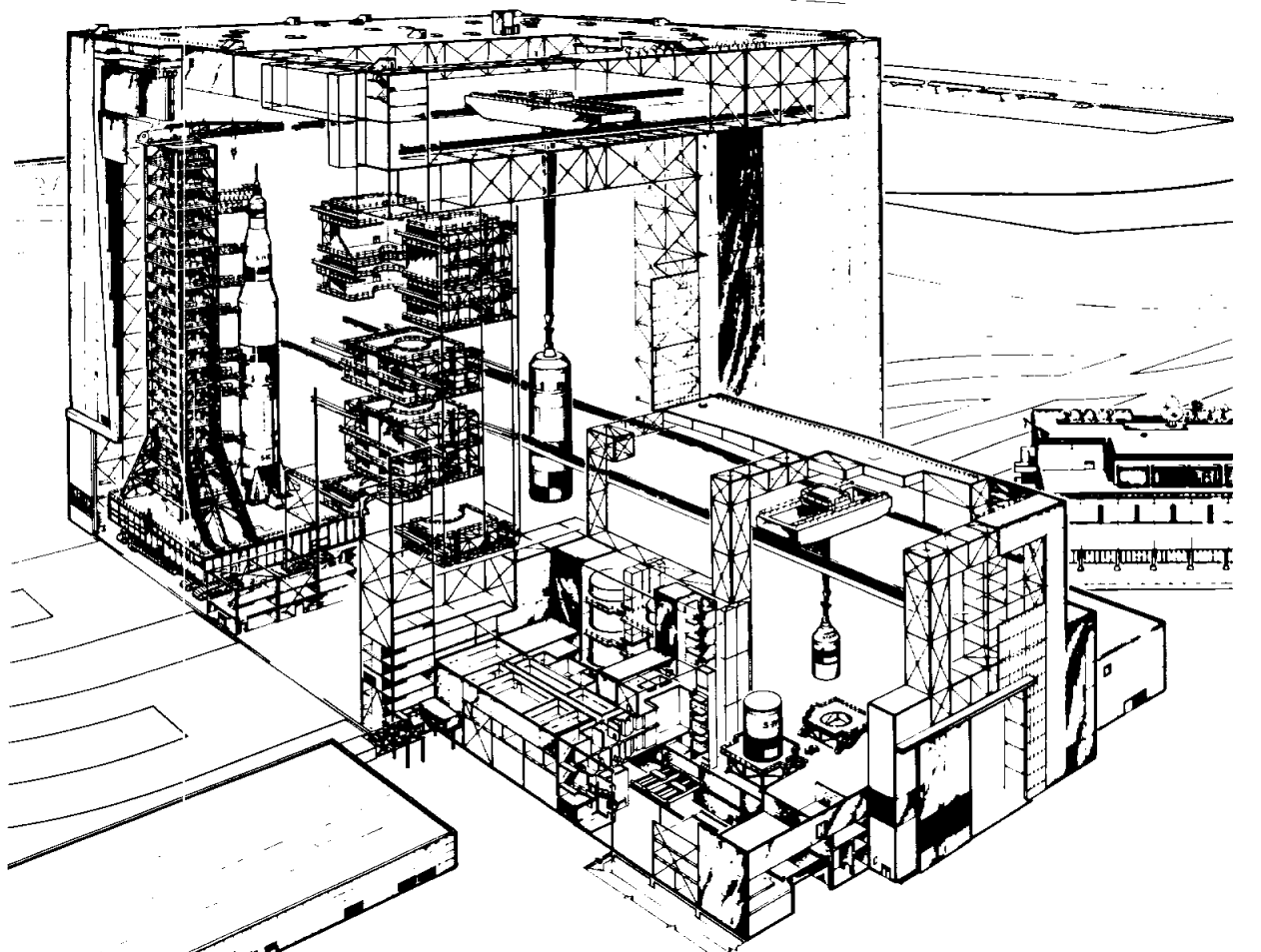
The contract to be negotiated with RCA will call for production of sixteen flight qualified pairs of the SSC systems, with expected delivery of the first two flight units by October 1968.

The communications units will be mounted on the portable life support system carried by each astronaut on the lunar surface. All controls will be accessible to the astronaut. Each SSC system will consist of two AM transmitters, two AM receivers, one FM receiver, one FM transmitter signal conditioning, telemetry system, warning system and related equipment.

The SSC primary mode of operation will permit telemetry

U.S. SAVINGS BONDS NEW FREEDOM SHARES

Moon Rocket Assembly Cutaway View



MOST VOLUMINOUS—Containing 129,482,000 cubic feet of space, the Vehicle Assembly Building at Kennedy Space Center in Florida, is the world's largest building by volume, and its 525-foot height is just 45-feet short of the San Jacinto Monument outside of Houston. To the left of this artist's cutaway view is the high bay area with facilities for assembly and checkout of Saturn V stages, instrument unit and Apollo spacecraft. The low bay area contains eight stage preparation and checkout cells equipped with systems to simulate stage interface and operation with other stages and the instrument unit. Assembly of the first Saturn V for its first test flight is taking place in this building. From here it will be transported 3.5 miles by a giant crawler-transporter to Launch Pad 39.

MSC Expands Visitor Program

The Public Affairs Office announced recently an expanded public visitor program to accommodate the increased public interest in MSC.

Every weekday afternoon Monday through Friday from 1:30 p.m. to 3:30 p.m. a special visitor program is conducted in the Building 1 Auditorium. Reservations should be made in advance by calling the Protocol Branch, Ext. 3368.

Visitors previously turned away at the gates, or those who have not made a prior reservation, are now referred to Building 100 where a PAO Protocol staffer is on duty daily to assist them with last minute reservations. A typical recent day showed 359 people were assisted in entering MSC who previously would have been turned away.

The Sunday afternoon Special Visitor Program continues to be popular with the public. During July, over 67,000 visitors saw MSC through this program. The Sunday program operates 1:00 p.m. through 5:00 p.m. and has been expanded to permit the public to view the interiors of four buildings, Buildings 5, 7-A, 12, and 29. It is planned to open other MSC facilities in the future with a minimum of three open every Sunday.

Newest Group To Join MSC Pilot Program

(Continued from Page 1)

Columbia University and a Ph.D. in physiology from the University of Kentucky;

Dr. Brian T. O'Leary, 27, a Ph.D. in astronomy presently in the NASA trainee program at Space Sciences Laboratory, Department of Astronomy, University of California;

Dr. Robert A. Parker, 30, assistant professor of astronomy at the University of Wisconsin;

Dr. William E. Thornton, 38, who recently completed a two-year tour of duty with the Aerospace Medical Division of Brooks Air Force Base, San Antonio, Texas.



Dr. Joseph P. Allen



Dr. Philip K. Chapman



Dr. Anthony W. England



Dr. Karl G. Henize



Dr. Donald L. Holmquest



Dr. William B. Lenoir

(SEE STORY PAGE ONE)

Dr. Joseph P. Allen was born June 27, 1937 in Crawfordsville, Indiana. He has a BA degree in math-physics from Depauw University, 1959, an MS in physics from Yale University, 1962, and a PhD in physics (nuclear Physics) from Yale, 1965.

He is married to the former Bonnie Jo Darling, daughter of Mr. and Mrs. W. C. Darling, 1327 Mason St., Elkhart, Indiana.

His present position is research associate at the University of Washington, Seattle, Washington.

His parents are Mr. and Mrs. Joseph P. Allen III, 615 Ridge St., Greencastle, Indiana.

His parent is Allan S. Parker, North Street, Shrewsbury, Massachusetts.

Dr. Anthony W. England was born May 15, 1942 in Indianapolis, Indiana. He has a BS degree in geology and physics from MIT, 1965, an MS in geology and physics, MIT, 1965, and a PhD in geophysics MIT, 1967.

He is married to the former Kathleen Ann Kreutz of Fargo, North Dakota.

His present position is as a graduate fellow, MIT, since 1965.

His parents are Mr. and Mrs. H. U. England, River Street South, West Fargo, North Dakota.

Dr. Philip K. Chapman was born March 5, 1935 in Melbourne, Australia. He has a BS degree in physics from Sydney University, Australia, 1956, an MS in aeronautics and astronautics, Massachusetts Institute of Technology, 1964, and a SD in physics (instrumentation), from MIT, 1967.

He is married to the former Pamela Gatenby, daughter of Mr. and Mrs. W. C. Gatenby, Herberton, Queensland, Australia. The couple has one child, Peter Hume, born 1960.

Chapman's experience includes 1957-59 as Auroral/radio physicist with Antarctic Division, External Affairs Department, Commonwealth of Australia, with the 1958 Australia National Antarctic Research Expedition, IGY. In 1960-61 he was staff engineer (electro-optics), Canadian Aviation Electronics, Dorval, Quebec. His present position is as staff physicist, Experimental Astronomy Laboratory, MIT, since 1961.

His parents are Mr. and Mrs. C. R. Chapman, 155 Spit Road, Mosman, New South Wales, Australia. He obtained his U. S. citizenship May 8, 1967.

Dr. Karl G. Henize was born October 17, 1926 in Cincinnati, Ohio. He has a BA degree in mathematics from the University of Virginia, 1948, and a PhD in astronomy from the University of Michigan, 1954.

He is married to the former Caroline Rose Weber of Bay City, Michigan. The couple has three children: Kurt Gordon born 1955; Marcia Lynn, 1956; and Karen Skye, 1961.

His experience includes 1954-56 Carnegie fellow at Mt. Wilson Observatory, 1956-59 senior astronomer at the Smithsonian Astrophysical Observatory.

His present position is professor of astronomy at Northwestern University since 1959.

His parents are deceased.

Dr. Donald L. Holmquest was born April 7, 1939 in Dallas, Texas. He has a BS degree in electrical engineering from Southern Methodist University, 1962, an MD from Baylor College of Medicine, 1967, and a PhD in physiology, Baylor College of Medicine, expected in 1968.

He is married to the former Charlotte Ann Blaha, daughter of Mr. and Mrs. J. E. Blaha, 4709 Hallmark, Dallas, Texas.

His present position is as an intern at Methodist Hospital here in Houston.

His parents are Mr. and Mrs. S. B. Holmquest, 615 Glen Arbor, Dallas, Texas.

Dr. William B. Lenoir was born March 14, 1939 in Miami, Florida. He has a BS degree in electrical engineering from MIT, 1962, an MS in electrical engineering from MIT, 1962, and a PhD in electrical engineering, MIT, 1965.

He is married to the former Elizabeth May Frost of Brookline, Massachusetts. The couple



Dr. John A. Llewellyn

has one child, William B. Jr., born in 1965.

His present position is as assistant professor of electrical engineering at MIT since 1965.

His parents are Mr. and Mrs. S. S. Lenoir, 58570 West 31st, Miami, Florida.

Dr. John A. Llewellyn was born April 22, 1933 in Cardiff, United Kingdom. He has a BS degree in chemistry from University College, Cardiff, 1955, and a PhD in chemistry from University College, Cardiff, 1958.

He is married to the former Valerie Davies-Jones, daughter of Mr. and Mrs. Francis I. Davies-Jones, Cardiff, Wales. The couple has three children: Gareth Roger born 1957; Sian Pamela, 1962; and Ceri Elummed, 1967.

His experience includes 1958-60 research fellow, National Research Council, Canada. His present position is associate professor, Florida State University since 1960.

His parents are deceased. He obtained his U. S. citizenship February 17, 1966.

Dr. F. Story Musgrave was born August 19, 1935 in Boston, Massachusetts. He has a BS degree in statistics from Syracuse University, 1958, an MBA in operations analysis, University of California at Los Angeles, 1959, an AB in chemistry, Marietta College, 1960, an MD at Columbia University, 1964, an MS in biophysics, University of Kentucky, 1966, and a PhD in physiology, University of Kentucky 1966.



Dr. Franklin S. Musgrave

He is married to the former Marguerite Patricia Van Kirk, daughter of Mr. and Mrs. Neil Van Kirk, Wayne, New Jersey. The couple has four children: Lorelie Lisa born 1961; Bradley Scott, 1962; Holly Kay, 1963; and Christopher Todd, 1965.

His present position is post-doctoral fellow at the University of Kentucky since 1965.

His parents are Mr. and Mrs. (stepmother) Percy Musgrave Jr., Stockbridge, Massachusetts.

Dr. Robert A. Parker was born December 14, 1936 in New York City. He has a BA degree in astronomy and physics from Amherst College, 1958, and a PhD in astronomy from the California Institute of Technology, 1963.

Dr. Robert A. Parker

He is married to the former Joyce Whitehead, daughter of Mr. and Mrs. S. R. Whitehead, Route 2, Kennett Square, Pennsylvania.

His present position is as a NASA trainee in Space Science Laboratory of Astronomy, Uni-

versity of California.

His parents are Mr. and Mrs. Frederick A. O'Leary, 4912 River Basin Drive, Jacksonville, Florida.

Dr. William E. Thornton was born April 14, 1929 in Goldsboro, North Carolina. He has a BS degree in physics from the University of North Carolina, 1952, and an MD from the University of North Carolina, 1963.

He is married to the former Elizabeth Jennifer Fowler, daughter of Mr. and Mrs. O. B. Fowler, England. The couple has two children William Simon born in 1959, and James, 1961.

His experience includes: 1956-62 director of Electronics Division, Del Mar Engineering Labs, Los Angeles; 1963-64 instructor, University of North Carolina Medical School; 1964-65 intern, Wilford Hall USAF Hospital, Lackland Air Force Base, San Antonio, Texas; 1965-67 USAF Aerospace Medical Division, Brooks Air Force Base, San Antonio, Texas.



Dr. Brian T. O'Leary

His present position is as a NASA trainee in Space Science Laboratory of Astronomy, Uni-

versity of California.

His parents are Mr. and Mrs. Frederick A. O'Leary, 4912 River Basin Drive, Jacksonville, Florida.

Dr. William E. Thornton was born April 14, 1929 in Goldsboro, North Carolina. He has a BS degree in physics from the University of North Carolina, 1952, and an MD from the University of North Carolina, 1963.

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His experience includes: 1956-62 director of Electronics Division, Del Mar Engineering Labs, Los Angeles; 1963-64 instructor, University of North Carolina Medical School; 1964-65 intern, Wilford Hall USAF Hospital, Lackland Air Force Base, San Antonio, Texas; 1965-67 USAF Aerospace Medical Division, Brooks Air Force Base, San Antonio, Texas.

His parents are deceased.

Some Highlights From The H



ONE OF MAJOR "HOT SPOTS"—This oblique view of the crater Copernicus can be matched with a near vertical photo of the area if Orbiter V follows through as planned. This area is one of the major "hot spots" on the moon's front face according to infrared measurements made during the total lunar eclipse in 1964. Orbiter II shot this central slice of the 60-mile wide crater. The keyhole crater in the foreground is Fauth, 13 miles across and 4,500 feet deep. It is 33 miles south of the rim of Copernicus.

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resolution. Wide-angle picture—65 by 75 miles, 120 feet resolution.

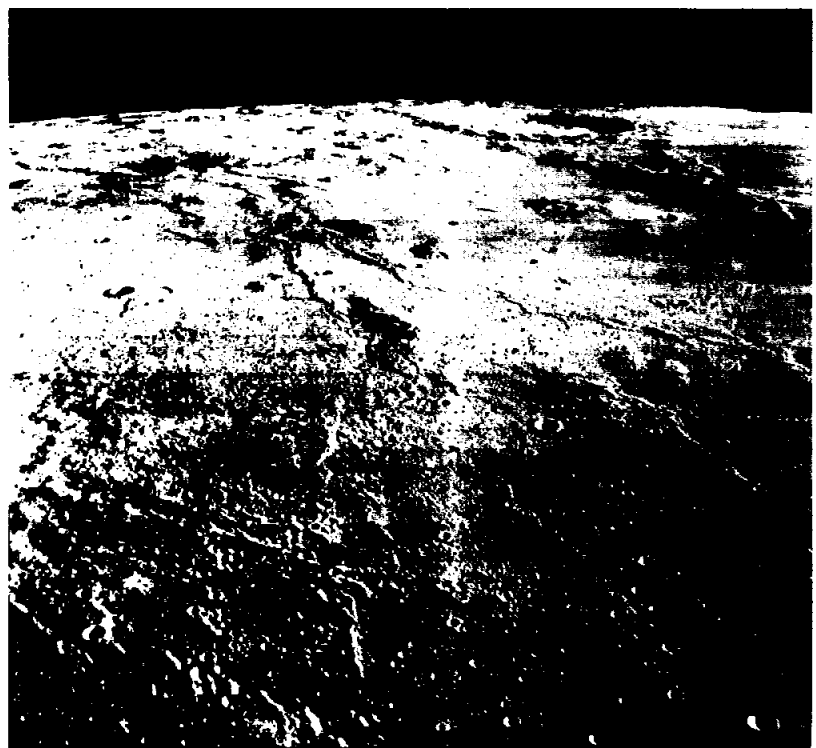
Pictures taken from 60 degrees latitude will provide the following surface dimensions: Telephoto picture—15 by 72 miles, 30 feet resolution. Wide-angle picture—140 by 165 miles, 250 feet resolution.

A recap of previous Orbiter

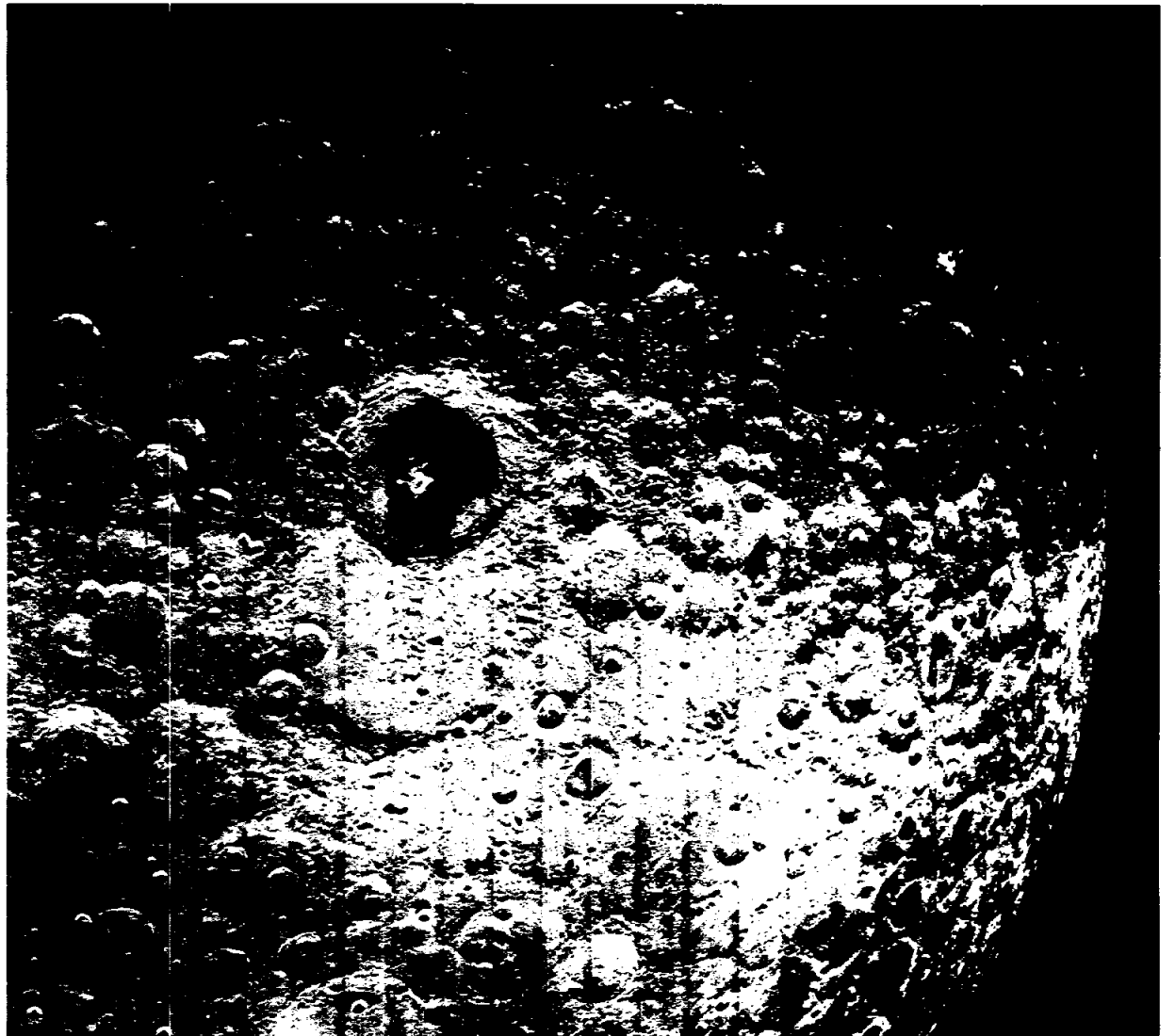
missions follows:

Mission I

Lunar Orbiter I was launched August 10, 1966, and on August 14, was placed in its initial egg-shaped orbit around the moon, the first United States spacecraft to achieve this feat. The perilune was lowered on August 21, in preparation for the main mission of site photography in nine different areas on the earth



THE MOON'S UPLANDS—The Marius uplands at about 50 degrees west and 12 degrees north on the moon's front face, were photographed by Orbiter II. Shown is an array of lunar domes two to 10 miles in diameter and from 1,000 to 1,500 feet high. Crater Marius, upper right, is about 25 miles in diameter and one mile deep. The domes are similar in form and scale to the volcanic domes of northern California and Oregon.



MOON'S BACKSIDE—This photo of the hidden side of the moon was taken by Lunar Orbiter III from 900 miles up. The curved horizon stretches to within 400 miles of the south pole. The photo spans about 700 miles along its northern edge near the equator of the moon.

side of the moon's equatorial belt. The orbit desired and attained for site photography was about 1,150 miles above the lunar surface at apolune and 28 miles at perilune. The inclination of the orbit to the moon's equator was approximately 12 degrees.

Because of a problem in Orbiter I's telephoto lens shutter system, most of the telephoto pictures taken near the moon's surface were blurred; however, Orbiter I did obtain the first high-quality telephoto pictures of the far side of the moon and the first photograph of the earth ever taken from lunar distance. All of the wide-angle photos were obtained successfully.

Hidden Side Photography

Orbiter I provided photographic coverage of about 150,

000 square miles of the lunar surface visible from earth. In addition, about two million square miles of the moon's far side were photographed from about one thousand miles above the surface.

The wide-angle photographs provided sufficient information for NASA scientists to eliminate some of the potential manned landing sites from further consideration. On October 29 after 527 revolutions, Orbiter I was deliberately crashed on the moon's far side to prevent any possible radio frequency interference with Orbiter II during its photographic mission.

Mission II

On November 6, 1966, Lunar Orbiter II was launched from Cape Kennedy and initial lunar orbit was achieved on Novem-

ber 10. The transfer to photographic orbit was accomplished on November 15, and photography of 13 primary sites and 17 secondary sites began on November 18. The orbit height and inclination were the same as for Mission I.

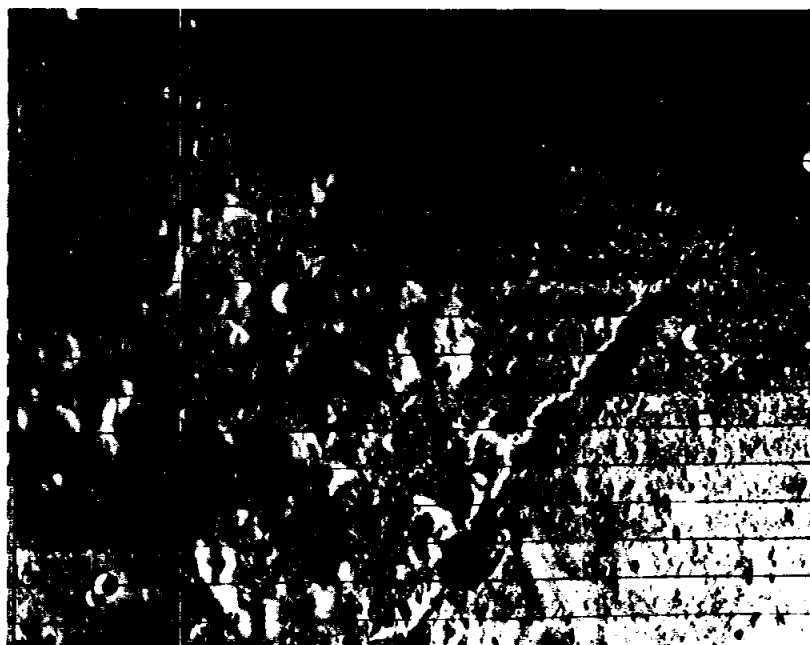
From liftoff to near-completion of the photography transmission to earth, the mission was essentially flawless. The spacecraft performed as designed and the photography of 30 sites was completed on November 25 during the 103rd orbit.

Photo transmission to earth ended on December 6, when the Orbiter's high power transmitter failed, but more than 97 per cent of the 422 pictures taken were read out during the final photo-transmission phase of the mission. Six frames—consisting of four wide-angle and eight telephoto pictures of Site One—were not transmitted during final readout. However, a substantial part of Site One photography was transmitted to earth during priority readout early in the mission.

Details Excellent

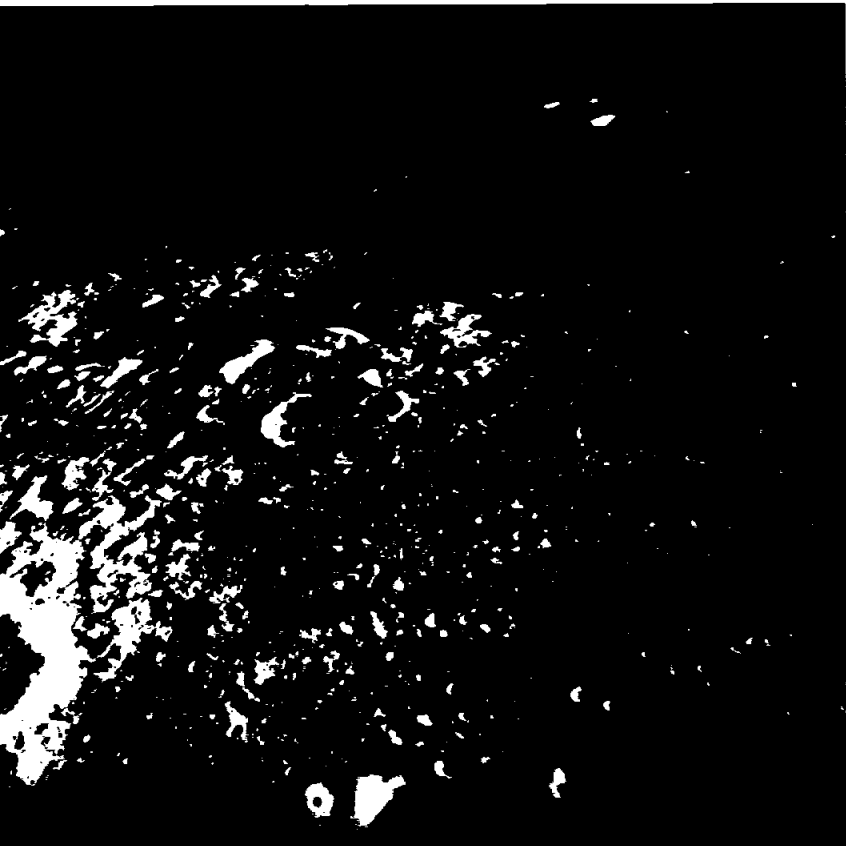
All photographs, both wide angle and telephoto, showed lunar surface details with great clarity. The resolution shown by the telephoto pictures revealed objects less than three feet in diameter—exceeding mission requirements.

High quality photographic data of 14,000 square miles of 13 separate candidate Apollo areas were returned to earth. About 98 per cent of the planned prime site photography was obtained. In addition, Orbiter II took many secondary photographs, including 2,000,000



ALPINE VALLEY OF THE MOON—Lunar Orbiter IV took this photo of Alpine Valley near the zero meridian at 50 degrees north latitude. The valley is a straight cleft in the mountainous region northeast of Mare Imbrium, and is over 75 miles long.

Highly Successful Lunar Orbiter Program



WIDE OPEN SPACES—Lunar Orbiter III took this photo showing the northern portion of Oceanus Procellarum in the background and an area known as the Cavalierus Hills in the foreground. The largest crater in the background is Caldeus, about 10 miles across and over one-mile deep.

square miles of the moon's far side.

Mission III

Lunar Orbiter III was launched from Cape Kennedy on February 4, 1967, and achieved lunar orbit on February 8. The transfer to photographic orbit was accomplished February 12. The orbit was inclined about 21 degrees to the equator, a change from the 12 degree inclination of the two previous missions. The orbit's apolune and perilune were the same as for the first two missions.

The ambitious flight schedule called for photography of 12 primary Apollo sites and 32 secondary sites, requiring about 50 photographic maneuvers of the spacecraft. Orbiter III's basic task was site confirmation, rather than site selection. The first two Orbiter flights obtained sufficient photographic information for space scientists to select 10 sites within the Apollo zone of interest for additional study.

On March 2, during the final picture readout sequence, the film advance mechanism failed and readout ended during the spacecraft's 149th orbit of the moon.

Photographic data was received on all but 29 of the 211 frames taken. During final readout, 136 frames were returned to earth tracking stations. Partial return of another 46 frames was achieved by priority readout in the picture-taking phase of the mission.

Of the 12 primary Apollo sites, full photo coverage was received on the six sites west of 20 degrees East longitude. Partial coverage of the six remaining sites was received during priority readout. All or partial data were received on 29 of the 31 secondary areas photographed.

In area, the photographs returned include 2,200 square miles of telephoto coverage of prime sites and 11,500 square

miles of wide-angle photography.

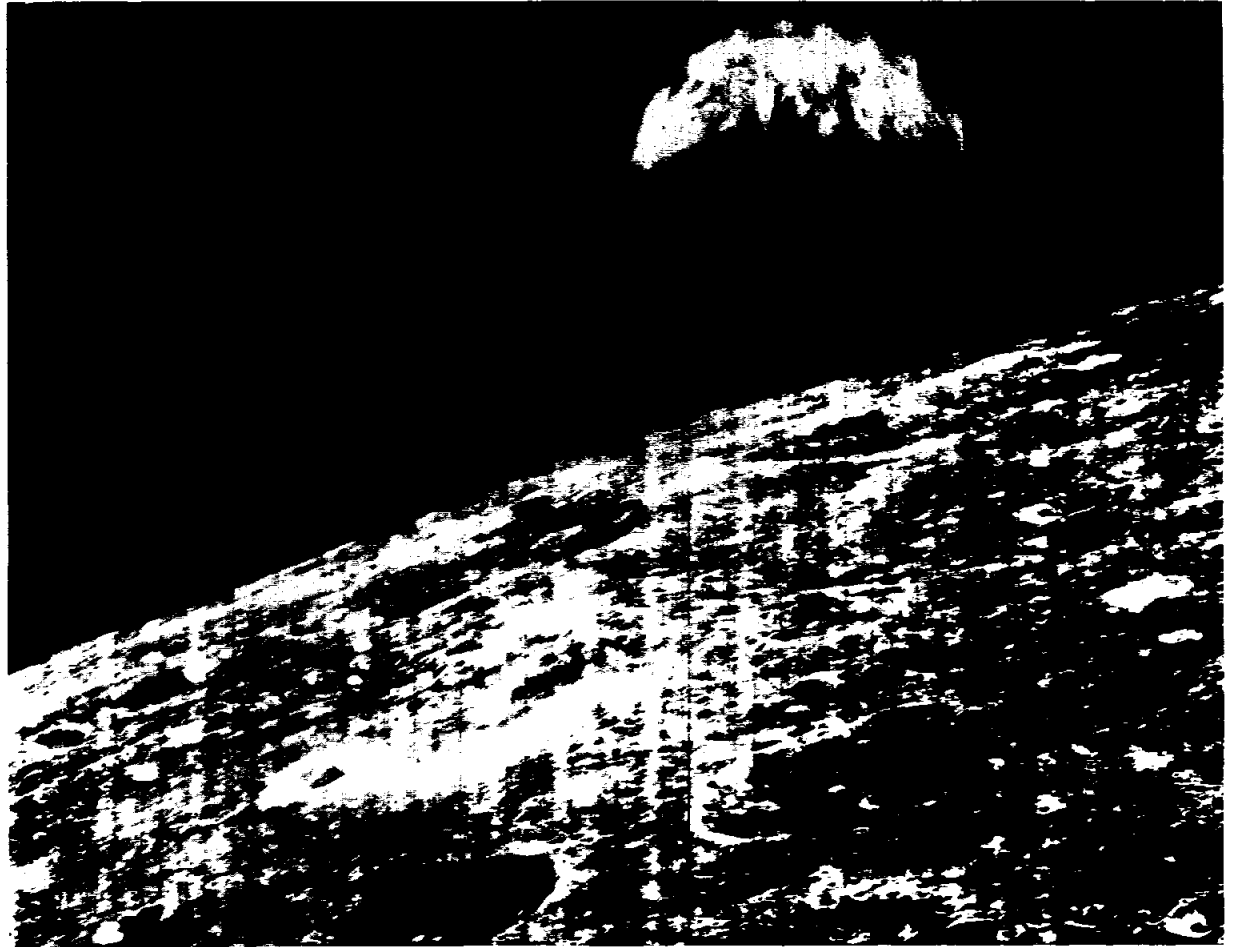
Secondary photography provided 350,000 square miles of coverage in areas of scientific interest on the near side of the moon, plus 900,000 square miles on the moon's far side.

Mission IV

The fourth mission was much different from the first three, which were designed to gather specific information in support of manned landings.

Orbiter IV was assigned a scientific mission—the complete photographic survey of the moon's front face and polar regions, with additional coverage of the far side. This required a near-polar orbit.

Orbiter IV was launched May 4, from Cape Kennedy's Pad 13 by an Atlas-Agena vehicle. The Agena was targeted to place the spacecraft to the right of the moon as viewed from earth. This targeting was similar to the first three missions and was necessary because the Agena was



THE MOON'S EARTH—This was the world's first view of the earth taken by a spacecraft (or by anyone else for that matter) from the vicinity of the moon. Lunar Orbiter I took this view showing the United States east coast in the upper left, southern Europe toward the dark or night side of earth, and Antarctica at the bottom of the earth crescent.

programmed before the mission plan had been determined for Orbiter IV. Space flight controllers used the Orbiter's on-board engine to change the trajectory.

On May 5, the velocity control engine was fired for 53 seconds, shifting the trajectory from an aim point in space about 1,950 miles to the right of the moon's equator to a new location about 1,680 miles above the moon's south pole. Lunar orbit was achieved as planned on May 8, when the engine was fired for 8 minutes and 22 seconds, slowing the spacecraft for capture by lunar gravity. The orbit was nearly perfect — ranging from 1,670 miles above the moon's surface at perilune to about 3,800 miles at apolune. The time to complete one orbit was 12 hours.

Photography and transmission

to earth began on May 11. First pictures were taken of the moon's eastern edge, beginning near the south pole on an ascending orbit. Final photos taken on the moon's western edge showed a 600-mile-diameter bulls-eye called the Oreintale basin, never before seen from directly above.

Orbiter IV took the first pictures of the moon's polar regions and the first vertical photography of the moon's western and eastern limbs (left and right edges). Geological details previously unknown were disclosed, such as fault troughs, impact craters, rugged mountain ranges and additional evidence of volcanic activity.

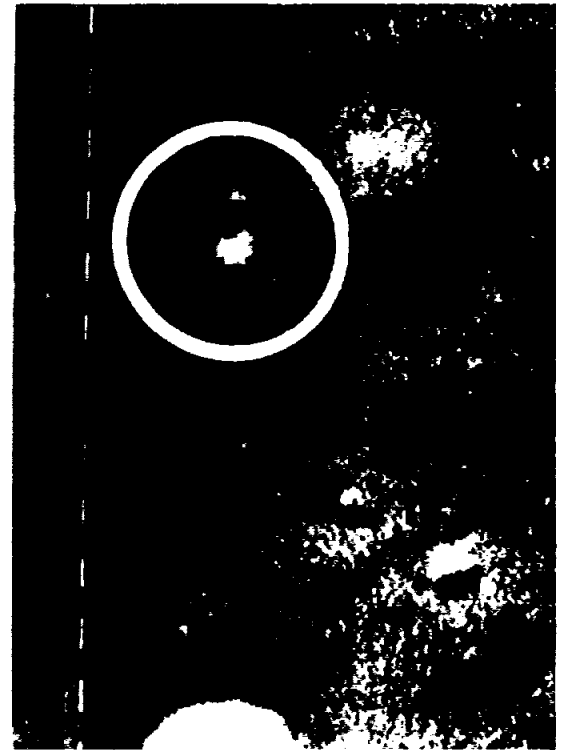
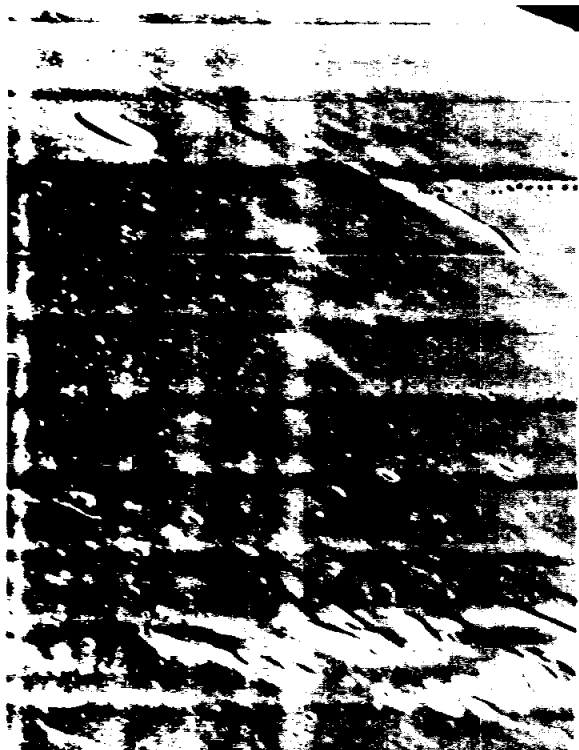
On June 1, transmission of photography was completed with coverage of about 99 per cent of the moon's front face—more than seven million square

miles of lunar surface, providing detail 10 times better than any available through earth-based telescopes.

During its photographic mission the spacecraft obeyed more than 7,000 commands and performed nearly 700 maneuvers.

Lunar Orbiter Team

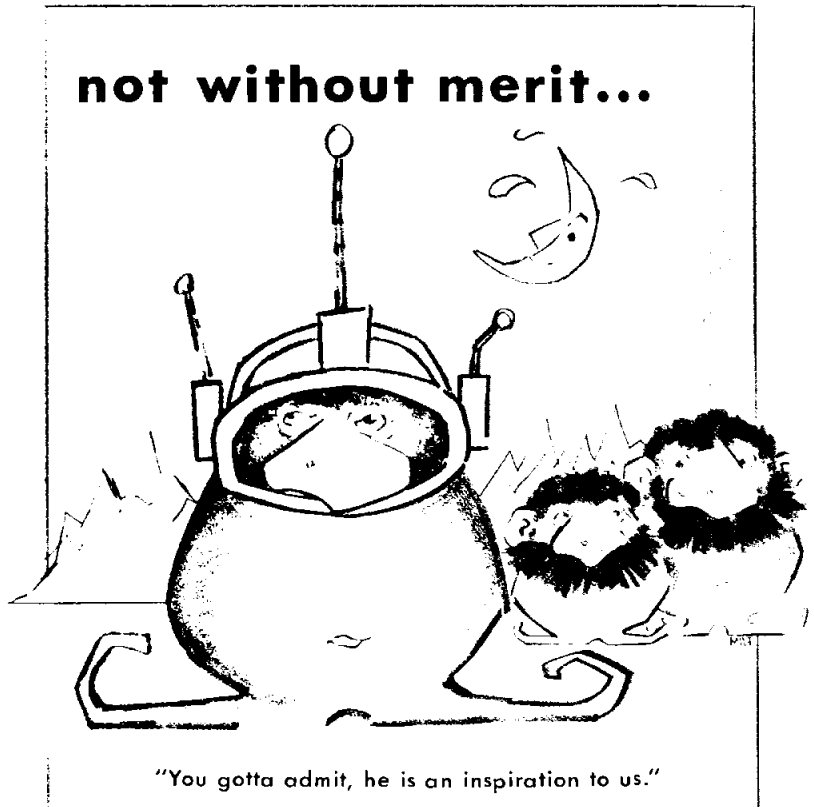
The Lunar Orbiter program is directed by NASA's Office of Space Science and Applications, Washington, D.C. The Langley Research Center, Hampton, Virginia, manages the project for NASA and directs each mission. The Boeing Company is prime contractor to NASA for the development and construction of the spacecraft and is assigned launch and flight operations responsibilities, utilizing facilities and key supporting personnel of the Jet Propulsion Laboratory and the Deep Space Network.



ORBITER PHOTOGRAPHS SURVEYOR—Three photos taken by Orbiter III show the area on the moon where Surveyor I landed on June 2, 1966. The left photo shows Surveyor's location and mountains it photographed. The

center photo is vertical of location of Surveyor (inside square), and the right photo is an enlargement in which Surveyor can be detected as a white object casting a shadow about 30 feet long.

not without merit...



"You gotta admit, he is an inspiration to us."

Instrument Society To Meet Aug. 30

The Apollo section of the Instrument Society of America will meet August 30 at the NASA Road 1 Holiday Inn. Bill R. Cannon of Smith Protective Services will speak to the group on the subject "You Deserve to Know the Truth", the story of the use of polygraph in industry and industrial espionage through electronic monitoring.

A social hour at 6:15 and dinner at 7:15 will precede the presentation by Cannon at 8 p.m. Also to be discussed by Cannon will be the current trend toward the use of electronic monitoring devices and the countermeasures that may be taken against such devices.

USAR Officer School Open For Enrolees, Classes Begin Sept. 6

The Houston USAR school is now enrolling active duty and reserve officers for the 1967-68 school year. Courses will be available in Basic Officer Career Course and Command and General Staff College.

Enrollment and attendance in the school program meet Army requirements for obligatory service officers and prepares officers to qualify academically for promotion to higher grades.

The school meets on Wednesday nights from 7:30 pm until 9:40 pm at the Army Reserve Armory, 1850 Old Spanish Trail, Houston.

All area officers are encouraged to enroll in the school program to keep informed of latest Army doctrine and operational concepts.

Spanish Club Meets, Course Scheduled

The MSC Spanish Club held its regular meeting, August 8, in Room 108. The guest speaker for the evening was Señor Luis Garcia of the Garcia's School of Spanish. Señor Garcia spoke briefly about his schools and gave a short talk on his background.

Information concerning Spanish lessons to be given by Señor Garcia will be given at our next meeting, which will be August 22, 1967, in Building 13, Room 108, at 5:15 P.M. All persons

Straight Talk from your Credit Union



Once again vacation time is coming to an end. School will be starting before you know it. The job of getting the children ready takes up a lot of mom's time, while dad wonders how the family budget can stand the strain.

There's new clothing to be bought, and shoes, and medical and dental checkups. The school activities of the older children and tennagers call for a greater share of the family earnings.

Credit union families, however, face the hectic annual back-to-school rush with financial confidence. Many have anticipated their needs well enough that regular savings can take care of all the bills. Others make use of a convenient credit union loan.

Whatever your back-to-school needs, see the credit union.

gram to keep informed of latest Army doctrine and operational concepts. Reservists transferring into Houston from other areas will be enrolled at the appropriate course level.

Enrollment will extend through the month of August. Classes will commence September 6, 1967. For further information contact Lt. Col. Edward S. Johnson, USAR, HU 3-2771.

interested in learning the Spanish language are urged to attend.

All NASA, MSC employees and contractor personnel are invited. Only members of the Spanish Club will be eligible to take this course in Spanish. Additional information may be obtained by any one of the following club officers: Mr. Perez, Ext. 5431, Mr. Chaffee, Ext. 4871, Mr. Gilbreath, Ext. 3751, or Miss Shrimplin, Ext. 7411.

Todos seran bienvenidos a nuestra proxima junta.

Outstanding Apprentice

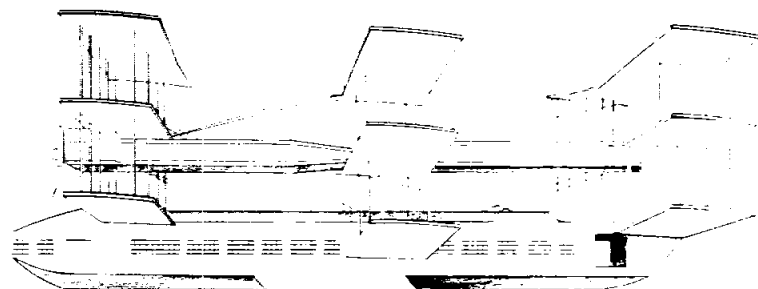


RECEIVES AWARD—Donald M. Jordon, electronic instrument maker, was the recipient of an outstanding apprentice award at the Nineteen Southern States Apprentice Conference at Biloxi, Mississippi, July 20-22. He has been in the MSC apprentice program for three years. While working in the Electronic Branch of Technical Services Division, he has worked on several major tasks connected with Radiation Intensity Measuring Systems for Chamber "A" and "B" in Bldg. 32. He is shown above working on a recovery beacon for use by the Landing and Recovery Division.



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



Gianni Caproni, Italian designer whose huge triplane bombers were widely used in World War I, came a cropper with his gigantic Model 60 'Houseboat.'

When completed, its eight 400-horsepower engines could not lift the nine-wing monster.

Few men in history have made errors in judgement so costly or embarrassing.

JULY 5, 1919



Unlike Caproni's Model 60, Apollo will 'fly' literally thousands of times before being called upon to carry precious human cargo. Realistic simulations are conducted daily where systems and subsystems are subjected to all known hazards of launch, protracted spaceflight, and landing.

In Apollo there is a simple way to avoid expensive oversights.

Do today's work carefully.

And do it today.

KEEP NASA THE SYMBOL OF EXCELLENCE
MANNED FLIGHT AWARENESS
APOLLO

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

3-2-2 in Seascope. Landscaped, cntrl air, drapes, fireplace. Sub-division swimming pool, fishing, boat launching facil. Assume 5 3/4% (5 1/4% in service) loan. Reasonable equity. Avail. Sept. W. Casey, GR 4-3302.

4-2-2 lv. rm, din rm, fam rm, carpets, drapes, air, swimming pool, water front privilege, fishing pier, boat launch ramp, 100 x 145 lot—Baywood Subdivision—Seabrook C. J. Hall—after 5 p.m.; GR 4-2054.

3 bdrm, ranch style, detached garage, boathouse. 3 wooded acres, Friendswood, Farm Road 528. Price: \$35,000. Call Ray Darrah at Holloman AFB. Dial 840 and ext. 3760 or 7075.

3-2-2, 2109 sq ft, brk, sunken liv rm, fam rm w/fireplace, cntrl air, drapes, carpet, enclosed patio, fenced \$23,200, Bayou Chantilly, Dickinson, R. L. Latta, 534-4380.

3 bdrm, 2 bth, brk, Huntsville, Ala., 5 1/4% VA, \$121.65/mo. \$2500 equity for \$350 (incl tax prepymt of ins) 4-ft chain-link fence, schools and shopping (1 mi). Corner lot 120' X 150'. W. H. Hooper, GR 1-2823, La Porte.

Beverly Hills 3-bdrm, 2 bath, GI equity \$2500, \$126/mo at 5 1/4%. Liv rm, lg den, cedar fence, lg lot. Bob Schwartz, 944-4095.

Wooded lot w/creek, 60' X 247'. Dickinson \$2800. Dwayne Weary. 877-2206.

3-bdr, 1 1/2 bth, lg liv rm, din rm—kitch comb, corner lot, across from school, park, shpng. Assume 4 1/2% GI (\$82/mo) or FHA refinance. Edgwd Add., 5783 Bellfort, Houston. C. D. Haines, MI 3-7134.

3-2-2, carpets, drapes, Kitch built-ins, cntrl A/H, 3 patios, 600 ft pier, Oyster Bay, 1/2 mi so of La Porte, \$25,500, Ann Harde-man, GR 1-4776.

Freeway Manor, 3-bdr, cntrl A/H, \$600 equity, assume 5 1/4% FHA loan, \$90/mo 726 Arvana. Barry Mesker, HU 6-9357.

1-bdr, guest cottage w/atch garage in Dickinson. Wrkg girl(s) or couple. \$55/mo unfurn. Util Pd, C. Jernigan, 534-3187.

3-2-2 brk, wooded lot, El Lago; cntrl A/H, drapes, fully equip elec kitch, sep din rm. Lewis H. Lee, 877-4297.

Sagemont brk 3-2-2, liv & din, panel fmlly rm, GE kitch, bkfst noak, Indry rm scrn & porch (22X10), fncd yd. \$18,400 or Equity \$2,200. \$147 mo R. F. Martin, 11227 Sage-labor Dr. Houston, HU 7-2891.

10 X 47 ft Magnolia Mobile home Centrl A/H, auto washer, furn, carpet, 10 X 40 ft alum awn. \$2800. Ragan Edmiston, 8030 Moline, Houston, MI 3-4030.

Clear Lake City 4-bdr, all elec built-ins, assume 6% loan, bal \$17250, equity \$2500. Pat Conroy, HU 8-4486.

Nassau Bay: waterfront lot 300 ft deep, 133 ft on channel, near Marina and Yacht Club. \$11,500. D. Bell, 591-2340.

FOR SALE—AUTOS

'64 Dodge Dart, white, 2-dr, V-8, stick, extras, 38,000, mi. R. Hill, 471-4305.

'67 Triumph TR4A. Grille mtd fog/drng lts, cntr console w/lighter, 2d speaker, R/H Michelin X's, prof de-chromed hood. Rcd maint avail. \$2950 Dave Peterson, GR 4-3681.

'65 VW sedan, orig owner, \$1200 J. H. Levine, MI 9-2569.

'50 GMC P/U, make offer. Dave Massaro, HU 2-7976.

'64 MGB, R/H, tonneau, luggage rack, MG mltin. \$1495. J. C. Whitney, 946-6361.

'67 Triumph TR4A, radio, extras, fact warranty Glenn F. Bailey, HU 4-1710.

'50 Dodge Bus Cpe Ext customizing. Orig paint, \$475. Consider lake lot, woodwrkg tools, trumpet, econ car in trade Benney HU 7-2381.

'62 Ford Galaxie 500 XL Tudor hdtpt, 352 eng., bkt seats, air, new tires, r/h, P/S. Cruisomatic on fl. \$895. Ray Longmire, HU 3-3861.

'62 Valiant—4-dr, r/h, a/c, auto trans., \$795. Phyllis Morton, 946-4752.

'60 Chevy (Impala), 2-dr hdtpt, std shift, good tires, V-8 (348) \$600 Greg. JA 4-6381 or 667-8140.

'64 MG 1100 sed, pnt faded, mech sound, \$695 consider trd for 1/2 ton PU. J. Mibeck, HU 8-3149.

'66 Impala 4-dr hdtpt, fully equip Will arrng financing, best offer James Lovell, Seabrook 877-3250.

'56 Ford 4-dr Custom Sedan, r/h, \$125, H. Kaupp. MI 5-7908.

'67 Corvette, convert, 427 eng.—3 dual carbs, air, FM radio, Firestone wide avals, 2400 mi. R. F. Gordon, Nassau Bay, 591-2389.

'66 Datsun sta/wag, r/h, vinyl int. J. D. Roberts, GR 9-3929.

'66 Mustang, V-8, stck, r/h, a/c tinted

glass, still in warranty. D. Goerig, 944-1199.

'64 Ford Galaxie 500, 4-dr, V-8, auto, pwr extras, R. Hill, 471-4305.

'62 Pontiac Tempest 2-dr hdtpt, a/c, \$500, R. Latta, Dickinson, 534-4380.

FOR SALE—MISCELLANEOUS

Reel pwr mower, \$25, wrk bench—\$5, anti-que kraut bd—\$45, other antiques, J. H. Levine, MI 9-2569.

17' Larson boat—fiberglass—100 hp (Evinrude); Canopy top, wdshld, cushion seats, trailer. Pay off balance; ski equip incl. MI 3-9807.

'63, 75 hp Evinrude mtr, selectric shft, alternator, 16' Zinn Craft boat, top, wnd-shld, bait well, trailer \$650. J. Clowdis, GR 1-2447.

Ford Auto a/c, "Polaraire" \$65; riding lawnmower \$35 or trade; Hawthorne camper trailer \$250. 8 mm Mauser rifle \$30 L. G. Kaigler, 877-4731.

Heathlit Mohawk radio receiver RX-1, \$125, DX-100 transmitter, low pass filter, Coaxial Relay and key \$100. Jeff Lindsey, HU 8-3448.

65 hp Mercury outbd mtr ('64) Elec start w/alternator, long shaft, controls, and tachometer, runs on 50:1 fuel mix. B. F. McCreary, 946-5583.

Beginner's sailing lessons for adults. G. K. Goodrick, ext 5543 (no home phone).

Labrador retriever pups-ACK reg. blk or yellow. W. A. Chandler, 534-3118.

23" RCA b&w TV. Wood cab \$80. Ted Guillery, HU 4-5022.

18' runabout. Fibreglas bot, 40 hp Evinrude selectric, trailer \$900. Ted Guillery, HU 4-5022.

New Gorham Sterl. Silverware, Strasbourg pattern. Sell indiv pieces or all, Dennis Doherty, HU 8-0182.

Voigtlander folding camera \$10; blk buffet \$50; blk liquor cab/rec holder \$35; brwn sheared raccoon coat. E. Simon, HU 8-4043.

TV, Philco "23", 2 yrs, was \$300-sell for \$60. J. N. Lee, 591-3539.

305cc Honda Dream. \$375 or trade for sailboat. Rosemary Nance, ext. 7511 (no home phone).

14' sailboat, trailer; Lido-14 class, 1 yr old, all equip. Donald Blume, 591-2428.

14' Lone Star Fbrglas boat, 40 hp Evinrude, trailer, \$750. T. L. Moser, 877-3048.

Cornet; Conn "Galaxie" model, copper bell, \$75. Larry Dixon, 944-6826.

14' ski boat, fbrglas, 45 hp, incl skis, trlr, 2 gas tanks & trlr hitch, \$650, MI 3-7298.

Farfisa mini-compact combo organ, 1 yr old \$400; and fender super-reverb amp (reverb, tremolo, 4-10" speakers) \$250 or both for \$600. Darryl Sullivan, 944-5033.

Lawn mwr-Briggs & Strtn eng. \$10 Jim Stephens, HU 7-0095.

Reg. Dachshund, 4-mo female blk & tan, has shots. F. De Vos, HU 8-4333.

Camplt. NCX-3 mobile amateur radio stat, 12 VDC pwr supply, whip antenna, \$225, Oran Schmidt, 534-4242.

Hammond organ, model C-2 console; model DR-20 tone cab, \$1000; Lt/Col Barg-strum, HU 8-0069.

Pale lamp, 3 lg ornate drops (\$70) now \$20; antique mantel clock, bronze decor \$65; sml fl fan—\$4; misc antiques and Bric-Brac. J. Levine, MI 9-2569.

Encycl Britannica, '66 Ed, 24 Vol, bksc, Ray Tomlinson or Randy Lefler, 877-1183.

Free Baby Kittens; M&F Mrs. Hatcher, Friendswood, HU 2-7642.

RCA twin cab stereo. All tube circuit \$125. Nancy Corbett, ext. 5861 (No home phone).

'64 Zenith port. 19" TV, \$50, Swivel TV. bkstnd in nutmeg finish, \$13. C. H. Eldred, GR 1-4332.

Grn-gld sofa-bed \$50, grn chair \$25; din-rm, drop-leaf tbl, 2 chrs \$30; '62 Motorola 21" cab TV \$25; 4-drw chest \$15; ladies 26" Schwinn bicycle \$15; mahogany 4-drw desk \$20; bksc cab \$20. J. Mitchell, Nassau Bay, 591-4704.

Chihuahua, AKC (papers avail), 10 mo old, red/brn, h-broken, raised w/children, \$30. Kay Marsh, Dickinson, 534-2075.

Crescent class sailboat—15 1/2' X 5 1/2'—Dacron sails, aux eng—trlr, brass & SS rigging. Lane Brown, 591-2668.

Buy, sell, or trade U.S. coins. Have most dates and mints after 1850 Dick Osburn, Houston, 591-2186.

Kenmore washing mach Used 4 mos \$218 when new, now for \$150. Al Crowder, 946-5640.

21" RCA TV console, \$40 L. M. Arnin, HU 8-2757.

Infant seat \$1.50; diaper bag \$2; scale \$6; stroller-walker \$4; Sterilizer \$5; girl's

infant to 1 yr dresses, shoes coverlets, (all items \$1 or less); also boy's infant to 4 yrs. diaper sets, toddlers suits, dress suits w/ matching ties and hats, b&w dress shoes size 9C, sailor suit w/hat, new cowboy boots b&w, size 7 1/2D. 591-2340.

WANTED

TV, Air cond., sailboat, 14' or smaller, HI-FI outfit, working or not. Don Frisbee, 946-3578. (Houston)

3 or 4-bdr home Prefer colonial style, lg wooded lot. Bob A. Roberts, HU 8-2281.

Ride wanted to Bldg 2 from Birdsall & Memorial or will meet dwntrwn, Austin at Hadley. Hrs 8:30 to 5:00. Bill at ext. 5451.

Carpool fr Glenview Apts #108, 8311 Winkler to MSC Bldg 45, 8-4:30. Ronald Peterson, ext. 4835 or MI 3-5060.

Form or join existing car pool fr SW Houston area (near Rice). Hrs 8-4:30 Bldg 16. Richard Rosencranz, 667-7363.

Ride to New York around Sept. 1. Will share expenses. Lynda, HU 8-1900.

Young bachelor to share apt w/same across fr NASA. Portofino Harbor House, Apt. 127. Rick Heitmann, ext 5341 fr 12-12:30. (No home phone).

Start car pool or join one from North Side near Little York Rd, 8:30 to 5, Bldg 2. Have own car. Chyrene Capps, OX 7-6277, or ext. 5511.

Car pool vicinity of Gulfgate or Park Place. 8:30 to 5. Calvin Guild, ext. 4911.

Clarinet, Earl Rubenstein, Kemah 877-3288.

Ride wanted from Pasadena (Red Bluff Rd vicinity) to Bldg 2. 8:30-5. Jean Taylor, 2510 Ingersol, GR 2-3469.

Rmrate to share mdrn 2-bdr, 2-car garage, house in Dickinson, Oran Schmidt, 534-4242.

Ride from Gulfgate area to Bldg 30, 8-4:30 Wendy, ext 2451 or MI 9-3863 after 5.

Persons interested in forming club to buy a stearman for aerobatic flying. R. W. Grow, 944-1305.

Plans 'A Rollin' For 'Big Top' MSC Picnic

Hopes to make the October 14 MSC Picnic the greatest show on earth are higher than the man on a flying trapeze!

Just to give you a "peek preview." there will be clowns, a circus band, kiddie rides, dancing, rances, and various exhibitions, contests and prizes. A delicious meal and a variety of drinks, as well as cotton candy, snowcones, and popcorn will be served.

Don't forget to circle October 14 on your calendar and tell your family now so you won't miss all the festivities at Galveston County Park in League City. Read the Roundup and check the bulletin boards for details on the events and ticket information.

Volunteers are still needed to help. Call chairman Betty Schick at 3371 or co-chairman Rita Sommer at 2397 if you want a part in getting this show on the road.



GAY R. ALFORD, Astronaut Office secretary was awarded a sustained superior performance award recently.

Judo Club Course To Raise Funds For Ed White Memorial

The MSC Judo Club will offer a short course in woman's self defense later this fall as part of their fund raising drive for the Ed White Memorial Youth Center.

The course will consist of films, practical self defense techniques, and will follow the text on "Woman's Judo" by Ruth Horan, and a course outline used by the Armed Forces Judo Association. The course will be composed of from six to eight lessons. Those interested may call Dutch von Ehrenfried, Ext. 2337.

Emergency Eye Care

by Evelyn D. West
Chief Nurse

Various types of eye injuries are seen at the NASA MSC Dispensary each month. The importance of eye care and what to do in case of an eye injury cannot be stressed too much. Here are a few simple facts:

Foreign bodies in the eye may result from particles in the wind or while cutting, drilling, or sawing hard materials such as metal or wood. **DO NOT RUB THE EYE** or apply pressure with your hand. This tends to do more damage to the eye, and it could cause infection.

Chemical burns are potentially serious and must be dealt with immediately. Irrigation of the eye at the work site is of utmost importance. **USE WATER** from a drinking fountain, bucket, or water hose—even dirty water may be acceptable if nothing else is available—to flush the eye.

Thermal burns to the eye may be caused by a welder's arc, cigarette ashes, hot solutions, or naked flames. These types of burns should have immediate, proper treatment. Come to the Dispensary at once.

Contact lens must be removed at once for any type eye injury. Eyesight is important. Follow a few simple rules and seek immediate medical treatment for eye injuries, and you may prevent serious eye damage.

Carpenter

(Continued from Page 1)

lated to space flight have direct applications to the Man-in-the-Sea program. Thus, Cdr. Carpenter becomes the first astronaut to return to his parent service in order to apply the skills, knowledge, and experience acquired during his assignment to NASA.

"After a successful career in air and space, he now embarks in earnest in this extremely important and interesting new field, and all of us in NASA wish him well."

Carpenter's most recent assignment at NASA's Manned Spacecraft Center, Houston, included responsibilities for underwater Zero G training and for liaison with the Navy.

The Navy's Deep Submergence Systems Project is responsible for the development of advanced submarine location, escape, and rescue; deep-sea search and recovery; large object salvage; and ocean-engineering vehicles as well as the Man-in-the-Sea program.

Golf Association Awards Final Match Winners

The final matches in the MSC Golf Association 1967 Four Ball competition were completed August 5 and trophy winners are as follows:

Championship flight—winner, Cooper and Jones—runner-up, Engert and Kosinski.

First flight—winner, Nixon and Leopold—runner-up, Cooner and Patterson.

In addition to the trophies, prize certificates will be awarded to the first three places in each flight.

Individual match play got underway August 5 and there are 15 entries in the championship flight, and 19 in the first flight. Trophies will be awarded for first and second place, with prize certificates to the first three places in each flight. This competition should be completed in early October.

The standings in the Medal Play Tournaments are listed below with four tournaments remaining in the 1967 season.

Championship Flight
Boatman178
Engert160
Secundo.....129
Biggers124
Anderson112

First Flight
Cooper173
Demmich169
Reaves143
Kosinski.....124
Barker.....118

Second Flight

Leopold.....	138
McWhorter	126
Jones	121
Cawley	110
Davis.....	107

Third Flight

Neal	123
Sparkman.....	106
Conlon.....	97
Lively	89
Patterson	83

The August tournaments will be held at Executive and Hughes Golf Clubs for Group A and B respectively.

It's not too early to start planning for the 1968 MSC GA season. Norm Beauregard, Bob Liounis and Bill Swenney have been appointed to a committee for nominations to the MSCGA executive committee for 1968. Please contact them if you are interested in helping run the league next year.

Lunar Orbiter Program Has Successful Finale

Lunar Orbiter V, the last of the series of flights, was successfully launched from Cape Kennedy at 6:33 p.m., August 1 and swung into orbit around the moon on August 5, to begin its two-week-long picture taking session.

High quality photographs have been returned to Earth from the moon orbiting spacecraft. If all goes as planned Orbiter V will have taken some 424 photographs by sometime tomorrow, when it is scheduled to complete its photo mission.

The launch by the Atlas-Agena rocket was so accurate that only a relatively small mid-course maneuver was required to place the 860-pound vehicle on a precise course to rendezvous with the moon in the planned area.

One year ago (August 10, 1966) the first of five Lunar Orbiter spacecraft was sent to the moon. The mission of the fifth flight spacecraft has a priority assignment to photograph 41 specific areas on the moon's front face, certify five Apollo landing sites and complete photography of the moon's far side.

Many of the sites of scientific interest were selected as a result of Orbiter IV photography. Some photography of Orbiter V will be used to support the Apollo Applications Program.

The spacecraft was placed in an initial orbit inclined 85 degrees to the lunar equator—or near polar, with an apolune of about 3,700 miles and a perilune of 125 miles. About 8 hours and 23 minutes are required to complete one orbit of this type. Far side pictures of the moon were taken in this mode.

Orbiter's perilune was dropped to 60 miles followed by a drop in the apolune to about 930 miles reducing the period required to complete an orbit to 3 hours and 11 minutes and placing the spacecraft in a position to perform its primary assignment for the Apollo support and scientific photography. The inclination of this the final Orbiter is scheduled to remain at about 85 degrees.

Four Kinds of Pictures

Four types of photography will be taken. Far side photographs from the apolune will provide telephoto coverage of about 25 per cent of the moon's far side not yet photographed.

Near-vertical photography will be obtained on sites of high scientific interest, including the Marius uplands and the crater Copernicus, photographed at an angle by Orbiter II.

Convergent telephoto stereo photography is planned for some of the candidate Apollo sites. This will be accomplished by taking photos from one orbit, then rephotographing the same area from a subsequent orbit with the site on the surface located between the two orbital paths.

Two types of oblique photography are planned — conven-

tional obliques and westerly obliques. The westerly obliques are to provide a representative view of the approach to candidate landing sites and are also to be used for landmark identification along the landing site approach path. The Apollo spacecraft will orbit across the moon's front face from East to West (right to left as viewed from earth).

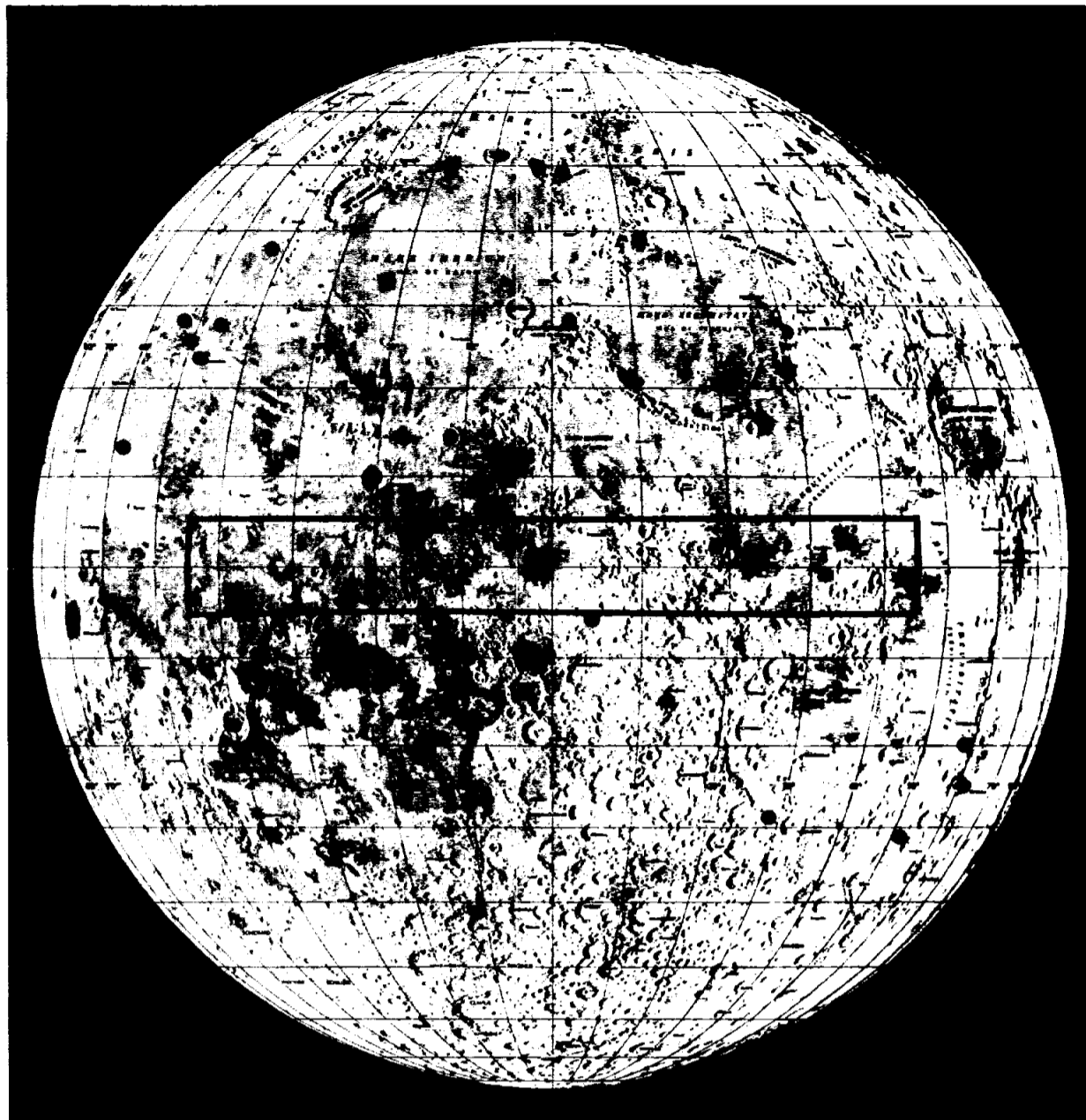
The resolution of telephoto pictures taken vertically from the perilune altitude of 62 miles is expected to reveal objects on the lunar surface about six feet in diameter and larger. However, many of the photographs will not be taken vertically or from the perilune, so the resolution of front side surface features in the telephoto pictures will vary from about six feet across to more than 30 feet in diameter.

Orbiter Footprints

The "footprint," or area of the lunar surface covered by each picture depends on where the photo target is located in relation to the spacecraft's perilune, and whether the picture is taken vertically or at an oblique angle.

During the photo mission the perilune—or low point in the orbit—will be located on the moon's front face approximately above the equator. The orbital altitude will increase north or south of the equator.

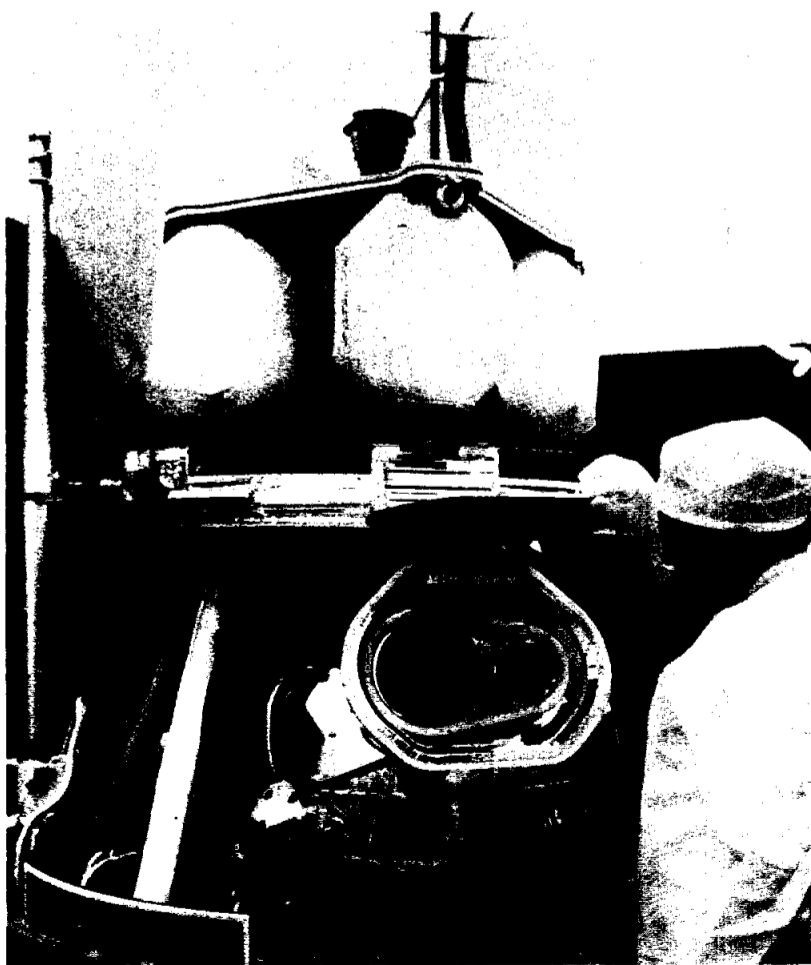
Pictures taken vertically over the equator will have the following approximate footprints from the 60-mile altitude: Telephoto picture—5 by 17 miles, showing objects six feet in diameter and larger. Wide-angle picture—42



ORBITER V TARGETS—The approximate front face locations of the 41 areas scheduled for Orbiter V photography are depicted on this mosaic of the moon. The black circles are areas of high scientific interest. The stars inside the rectangle are candidate Apollo landing sites.

by 50 miles, showing objects 50 feet in diameter and larger.

Pictures taken from 30 degrees latitude north or south of the equator will cover more area but at lower resolution: Telephoto picture—8 by 30 miles, 15 feet
(Continued on Page 4)



"THE CAMERA"—A technician at Cape Kennedy checks the Lunar Orbiter V lens. The self contained photo lab within the egg-shaped pressure shell weighs about 150 pounds. The package includes two cameras—one for wide angle and one for telephoto photography. The cameras view the moon through a protective window of quartz, which is protected by a mechanical flap. A 260-foot roll of 70mm SO-243 film, sufficient for at least 212 dual exposures records the scenes prior to transmission back to earth.



LIFTOFF!—Lunar Orbiter E, the fifth and final of the Orbiter series, lifted off Launch Complex 13 at Cape Kennedy, propelled by an Atlas-Agena D, at 6:33 p.m. EDT, August 1, 1967.