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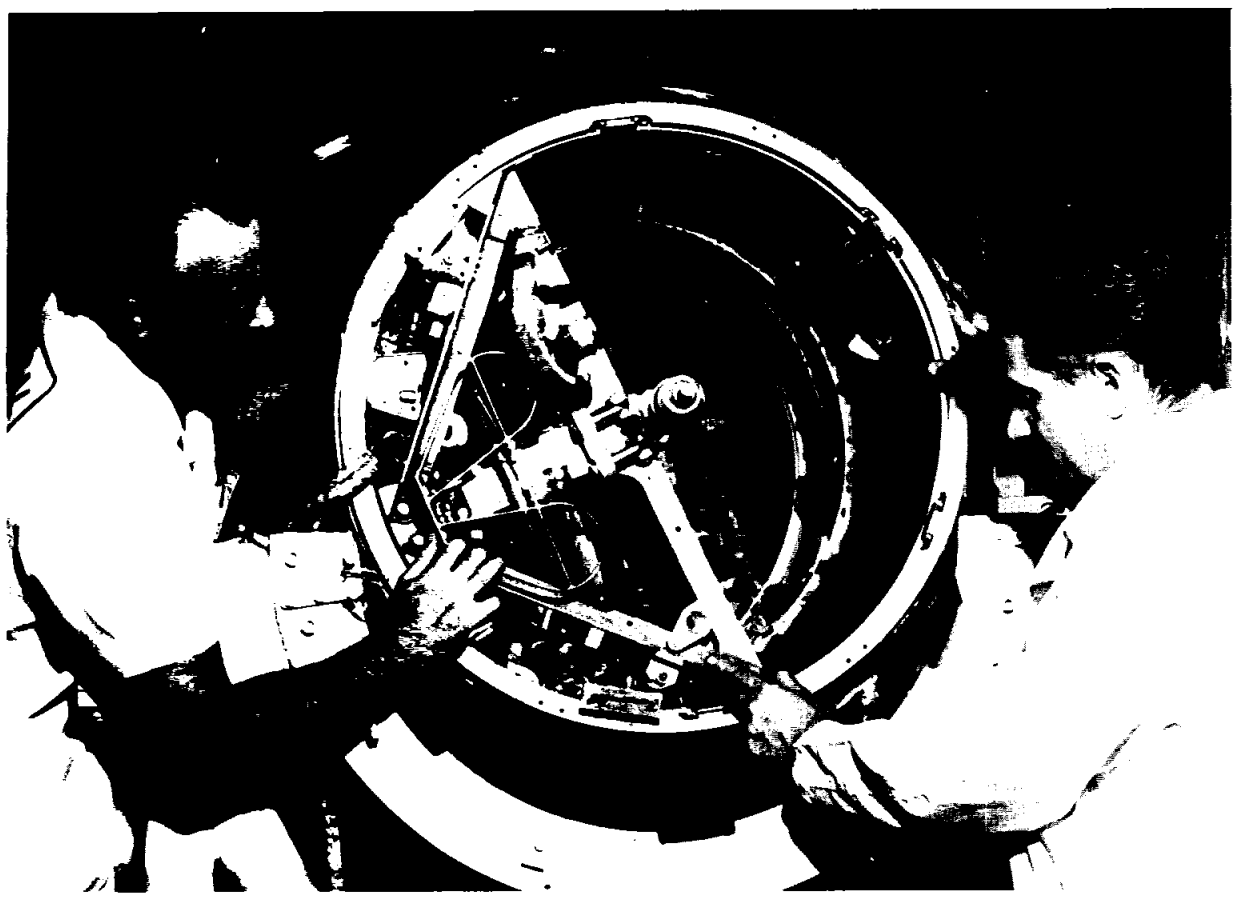
MA-7 Conference Reviews Results In Detail



TECHNICIANS James Adkins (left) and Robert Bernardin work on instrumentation of spacecraft number 10, being readied for ECS testing by Life Systems Division. The spacecraft was formerly used for Project Orbit testing at McDonnell Aircraft Corp., St. Louis, Mo., manufacturers of the Mercury spacecraft.

Life Systems Acquires Project Orbit Spacecraft For Use In ECS Tests

The Enviromental Control Systems Branch of MSC's Life Systems Division has recently acquired a Mercury spacecraft for use in testing and is presently intrumenting the spacecraft in a "clean room" in Lane Wells Building.

Prior to this, the branch tests have been conducted in boilerplate mockups which presented a number of problems. For instance, "We had more problems with outside air leaking into the mockup than we did with what was inside leaking out," commented Dick Mayo, project engineer for Spacecraft 10.

The spacecraft is Number 10 in a series of 20 Mercury craft McDonnell Aircraft Corp., St. Louis, Mo. has built. It was used at McDonnell in Project Orbit, a series of tests involving simulated missions inside an altitude chamber.

At MSC, it will be used for environmental control system tests for manned one-day missions. Since the spacecraft arrived July 23 it has been moved inside a "clean room" in the shop area of Lane Well Building.

The room is constructed of polyvinyl plastic stretched over angle irons and sealed, and is equipped with its own air conditioning system. Technicians working inside on instrumentation wear white smocks and the interior of the transparent "room" is kept as clean as possible.

When the instrumentation of the capsule is finished, in about three or four weeks, it will be moved into the altitude chamber in Lane Wells on specially constructed dollies.

There, "we can heat it up to simulate the mission thermal environment, and evaluate the new carbon dioxide partial pressure sensor, the manual water separator travel indicators, new instrumentation for controlling the heat exchangers and anything else that comes up," Mayo said.

The spacecraft will also eventually be used as a test bed for bio-instrumentation studies conducted by Life Systems Division.

Markley, Rector Appointed Apollo Project Heads

Effective Aug. 1, J. Thomas Markley was appointed project officer for the Apollo spacecraft command and service module contract and William F. Rector the project officer for the lunar excursion module contract. Both are members of the Apollo Project Office.

Project officers are responsible for insuring that functions of the project office relative to his contract are carried out and that all contractual requirements placed on the project office are assigned and carried out.

All directives to the contractor will be issued through the project officers.

Until such time that a letter contract is issued on the lunar excursion module, Rector will work with Robert O. Piland relative to the module proposal.

"Aurora 7," a new color film with soundtrack including a full musical score, prepared by Public Affairs Office was released to the public as of noon Tuesday, concurrent with the MA-7 Results Conference.

Pilot Shares 'Supreme Experience' With 1500 Scientists, Educators

Astronaut M. Scott Carpenter presented an account of major events and personal observations of the MA-7 flight here yesterday, as one of seven reports which made up the Results Conference of the Second United States Manned Orbital Space Flight.

Some 1,500 scientists, engineers and technical personnel from the fields of industry and education as well as representatives of Congress, the President's Scientific Advisory Committee and various space science boards gathered in the Rice Hotel Ballroom Tuesday for the all-day session.

Reports on key aspects of the MA-7 mission were interspersed with discussion periods.

Carpenter's report added significant information for further space efforts and confirmed many of John Glenn's earlier observations, among which were less noise and vibration before and during powered flight than expected; a lack of discomfort and improved mobility under weightless conditions; the presence of space particles and the bright horizon band, which were again noted with additional observations; and the success of prolonged drifting flight.

Launching

Discussing the launch phase, Carpenter said, "During the prelaunch period I had no problems. The couch was comfortable, and I had no pressure points. The length of the prelaunch period was not a problem. I believe I could have gone at least twice as long. Throughout this period, the launch vehicle was much more dormant than I had expected it to be. I did not hear the clatter that John Glenn had reported.

"I had expected to feel the launch vehicle shake, some machinery start, the vernier engines light off, or to hear the lox valve make some noise, but I did not. Nothing happened until main engine ignition; then I began to feel the vibration. There was a little bit of shaking. Lift-off was unmistakable."

"About a minute and a half after lift-off, the sky changed in brightness rather suddenly. It was not black, but it was no longer a light blue. The noise and vibration increased so little during maximum dynamic pressure that it would not be noticed unless you were looking for it. The booster engine cutoff was very gentle. Three seconds later, staging occurred. There was no mistaking staging. Two very definite noise cues could be heard: one was the decrease in noise level that accompanied the drop in acceleration; the other was associated with staging. At staging there was a change in the light outside the window and I saw a wisp of smoke.

"At tower jettison, I felt a bigger jolt than at staging, and the tower was gone in a second. Out the window, the tower could be seen way off in the distance, heading straight for the horizon. It was rotating slowly with smoke still trailing out of the three nozzles.

"At SECO (sustainer engine cutoff) the rapid drop-off in acceleration was hardly noticeable. The best cues to the end of the powered flight were weightlessness and absolute silence."

Orbital Phase

The turnaround, Carpenter said, was just like the trainer except that he was somewhat distracted by the sensation of weightlessness.

"Following the turnaround," Carpenter continued, "I watched the expended launch vehicle through the window as it fell behind me tumbling slowly. It was bright and easily visible. I could see what looked like little ice crystals spewing out the sustainer engine nozzle. They seemed to extend for two or three times the length of the launch vehicle, in a gradually broadening fan pattern."

Weightlessness was exactly as he had expected. He said, "It was very pleasant, a great freedom, and I adapted to it quickly. Movement in the pressure suit was easier and the couch was more comfortable. Later, when I tried to eat the solid food provided for the flight, I found it crumbled in its plastic bag. Every time I opened the bag, some crumbs would come floating out; but once a bite sized piece of food was in my mouth, there was no problem. It was just like eating here on earth."

(Continued on Page 4)

Spacecraft, Launch Vehicle Worked Well; Difficulties Were Compensated

"The performance of the Mercury spacecraft and Atlas launch vehicle for the orbital flight of Astronaut M. Scott Carpenter was excellent in nearly every respect," reported John H. Boynton and E. M. Fields of Mercury Project Office at the MA-7 results Conference Tuesday.

"All primary mission objectives were achieved. The single mission-critical malfunction involved a random failure in the pitch horizon-scanner circuit."

"This anomaly was compensated for by the pilot in subsequent operations so that the success of the mission was not compromised. A modification of the spacecraft control-system thrust units was effective. Cabin and pressure suit temperatures were moderately excessive but not intolerable."

"Some uncertainties in the data telemetered from the bioinstrumentation prevailed at times . . . however, associated information was available which indicated the continute well-being of the astronaut."

The report noted the following points:

The performance of the heat protection system was quite satisfactory.

The entire group consisting of separation devices, rocket motors, landing system and internal spacecraft structure functioned satisfactorily. Ignition of retrorocket motors was about three seconds later than expected but rocket motor performance was satisfactory. As planned, Carpenter manually deployed the drogue parachute when he felt the need for additional spacecraft stabilization. He also manually deployed the main 'chute at an altitude of about 9,500 feet rather than waiting for automatic deployment, which would have occurred at about 8,200 feet.

Spacecraft Listing

The Spacecraft's severe list angle after landing is attributed to Carpenter's egress activity, which took place before the spacecraft would normally have righted itself to the erect position. The majority of sea water found in the spacecraft is believed to have entered through the small pressure bulkhead when Carpenter left the spacecraft. Small leaks in the internal pressure vessel would have contributed little of the water found in the cabin. The drops Carpenter noticed on the tape recorder immediately after landing are believed to have resulted from a surge of water which momentarily opened a spring-loaded pressure relief valve in the top of the cabin.

Of the control system, the report notes that postflight analysis of the faulty pitch horizon scanner circuits was impossible since the scanners were lost when the antenna canister was jettisoned during normal landing procedure. The failure is believed to have been in the scanner circuit and of an apparently random nature. "Because the malfunctioning scanner circuit resulted in pitch errors in the attitude-gyro system, the pilot was required to assume manual control during retrofire," the report said.

"Double authority control was inadvertently employed at times during the flight and the high thrust units were accidently actuated during certain maneuvers, both of which contributed to the high usage rate of fuel," the report stated. "MA-8 and subsequent spacecraft will contain a switch which will allow the pilot to control the use of the high-thrust units.

High Temperatures

High cabin temperatures in the MA-7 flight were attributed to a number of factors, such as the difficulty of selecting proper water flow rates and vulnerability of the heat exchanger to freezing-blockage when too high rates of waterflow were used. Tests currently being conducted should determine if the cabin temperature can be lowered without requiring substantial redesign of the cooling system.

Concerning the high suit temperatures recorded, "It is believed that the suit-inlet temperature could have been maintained in the 60 to 65 degree range . . . had not the comfort control valve been turned down early in the flight." Carpenter reduced this valve setting when the cabin heat exchanger indicated possible freezing.

The failure of the retrorockets to fire automatically from the clock is attributed to the fact that the pitch attitude gyro (which was shown to be in error) did not indicate that the pitch attitude was within acceptable limits. The attitude-permission circuits therefore would not pass the retrofire signal from the clock. Carpenter waited for two seconds before actuating the manual retrofire switch. An additional one-second delay before the retrorocket ignition has not been explained.

Experiments

The cause of the failure of the balloon used in the drag experiment to inflate was attributed to a ruptured seam in the balloon skin. Aerodynamic drag measurements were thus invalid since the surface area of the balloon was not known. In addition the visibility portion of this experiment suffered because only two of the five surface colors on the balloon were visible to the pilot.

A heavy cloud cover over Woomera effectively foiled the ground-flare visibility experiment on the first orbital pass, and it was discontinued for the remainder of the flight since the cloud cover remained. The exercise will be repeated in a future flight.

Man Now Ready For Longer Missions, Says Crew Report

"The results of the MA-7 flight provide additional evidence that man is ready for a more extended mission in a weightless environment," personnel of the Flight Crew Operations Division stated Tuesday in a report to the MA-7 Results Conference here in Houston.

The report, prepared by Helmut A. Kuehnel, William O. Armstrong, John J. Van Bockel and Harold I. Johnson, was entitled "Pilot Performance" and was one of seven presented at the conference.

Training

Astronaut M. Scott Carpenter spent more than 70 hours in ALFA and Mercury procedures trainers before the flight, doing 73 simulated missions, 143 simulated failures, and 255 simulated control manuevers. He spent 45 hours in spacecraft systems checks, almost twice what John Glenn spent this way, prior to the flight.

In addition, Carpenter spent 80 hours in the MA-6 spacecraft while acting as backup pilot for Glenn during the checkout period at the launch site.

Space Observation Good

Investigating a pilot's ability to observe an object in space, "Carpenter readily sighted the detached sustainer stage after turnaround and calculated the distance at about 300 yards. He continued to observe and photograph the sustainer for 8 1/2 minutes, at which time it was about three miles away."

A continuous drifting period of one hour and six minutes during the third orbital pass was reported as not at all disturbing. Data showed the spacecraft attitude rates were less than 0.5 degrees per second during one period of the drifting flight, so little that the moon stayed at or near the center of the window for a significantly long period.

Pitch Scanner Malfunctions

Malfunction of the pitch horizon scanner circuit dictated that the pilot manually control spacecraft attitudes during retrofire, and the maneuver was believed to have proceeded normally except for late ignition of the retrorockets. However, the spacecraft overshot the intended landing point by about 250 miles. Carpenter backed up the automatic retrofire system by pushing the manual button when the event did not occur.

Retrofire occurred three to four seconds late, accounting for about 15 to 20 miles of the total overshoot error.

Radar tracking data have indicated that the mean spacecraft pitch attitude during most of the retrofire period was essentially correct. Some deviations showed up in roll attitude, but roll errors of this size have a negligible effect on landing point dispersion. Thus the error in landing position resulted primarily fron a misalignment in spacecraft yaw attitude which, deduced from radar tracking data, was believed to about 27 degrees during retrofire.

Ground Communication Net Improved Since Glenn Flight

"The Mercury Network performed very well in support of the Mercury-Atlas-7 mission," Goddard Space Flight Center scientists told participants in the MA-7 Results Conference Tuesday.

The report, one of seven presented, was authored by James J. Donegan and James C. Jackson of the Manned Space Flight Support Division.

"No problems were encountered with computing and data flow. The computers at Goddard accurately predicted the 250 mile overshoot immediately after . . . tracking data . . . were received. Radar tracking was generally horizon-to-horizon and the resulting data resulted in accurate orbit determination early in the mission.

"Ground communications network performance was generally better than that of the MA-6 mission. The ground-to-spacecraft communications were slightly inferior to MA-6 performance, particularly when patched onto the conference network to allow monitoring by other stations." Telemetry reception, as in the MA-6 flight, was good.

For the MA-7 flight there was no Mid-Atlantic Ship and the Indian Ocean Ship was repositioned in the Mosambique Channel.

The telemetry reception of aeromedical data on astronaut heartbeat rate, respiration, EGG, blood pressure and body temperature was good, operating from horizon-to-horizon at all tracking stations.

Blackout Interrupted

The expected blackout of telemetry occurred at reentry, when ionized air building up around the spacecraft blocked transmission to ground stations. But though the effect began at a ground-elapsed time of four hours, 43 minutes and 58 seconds, telemetry contact was regained four minutes and 49 seconds later and held for about 12 seconds at the Grand Turk Island station. After that, final loss of telemetry was due to extreme range and low elevation angle.

The dual ground command system operated normally in spite of several minor malfunctions that had no effect on the mission.

The teletype and voice network between ground tracking stations performed well with only three minor difficulties occurring, all of them noncritical interruptions.

HF and UHF voice transmission between ground and spacecraft was adequate, although the majority of stations reported a lower signal level than was experienced for MA-6.

Mission Operations' Report Reviews Carpenter's Flight

Assistant Chief for Flight Control John D. Hodge and two other members of the Flight Operations Division, Egene F. Kranz and Williams C. Hayes, were co-authors of a report on mission operations presented at the MA-7 Results Conference Tuesday.

Launch vehicle countdown and the prelaunch phase were nearly identical to that for MA-6. The launch phase proceeded almost perfectly, the report said, and powered flight was normal. "The flight was satisfactorily monitored by Mercury Network Ground stations and no major flight descrepancies were evident until just prior to retrofire, when it was discovered that the automatic control system was not operating properly."

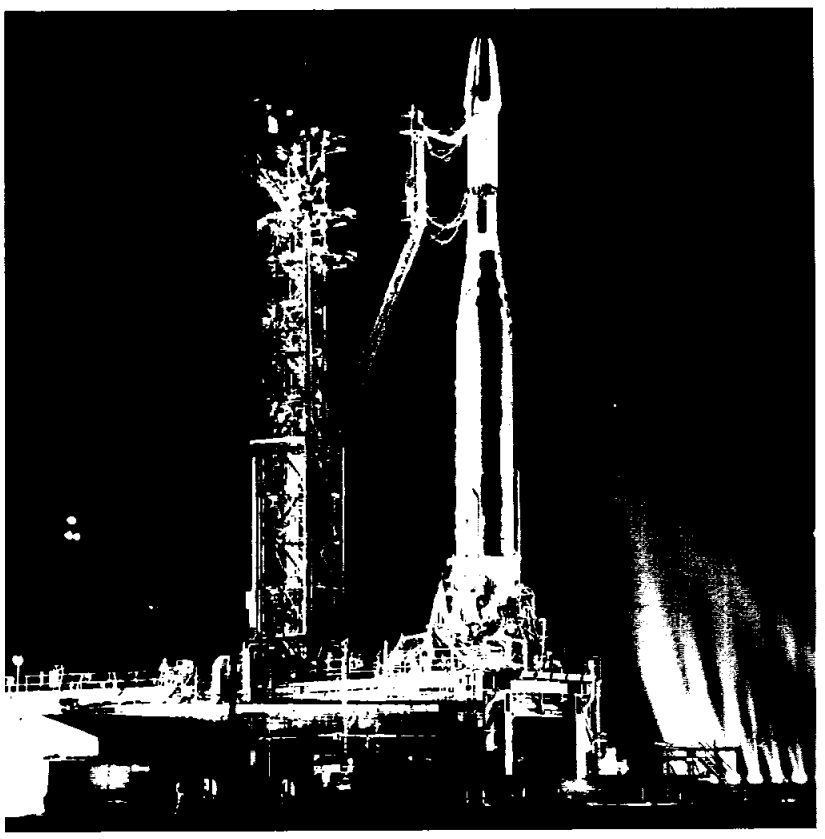
Some small changes from the MA-6 operational support were made, most of them associated with the development of appropriate support procedures for further missions of longer duration.

The flight plan was basically the same as for MA-6 with two differences: the astronaut had more manually controlled tasks to perform and a larger number of experiments were to be accomplished.

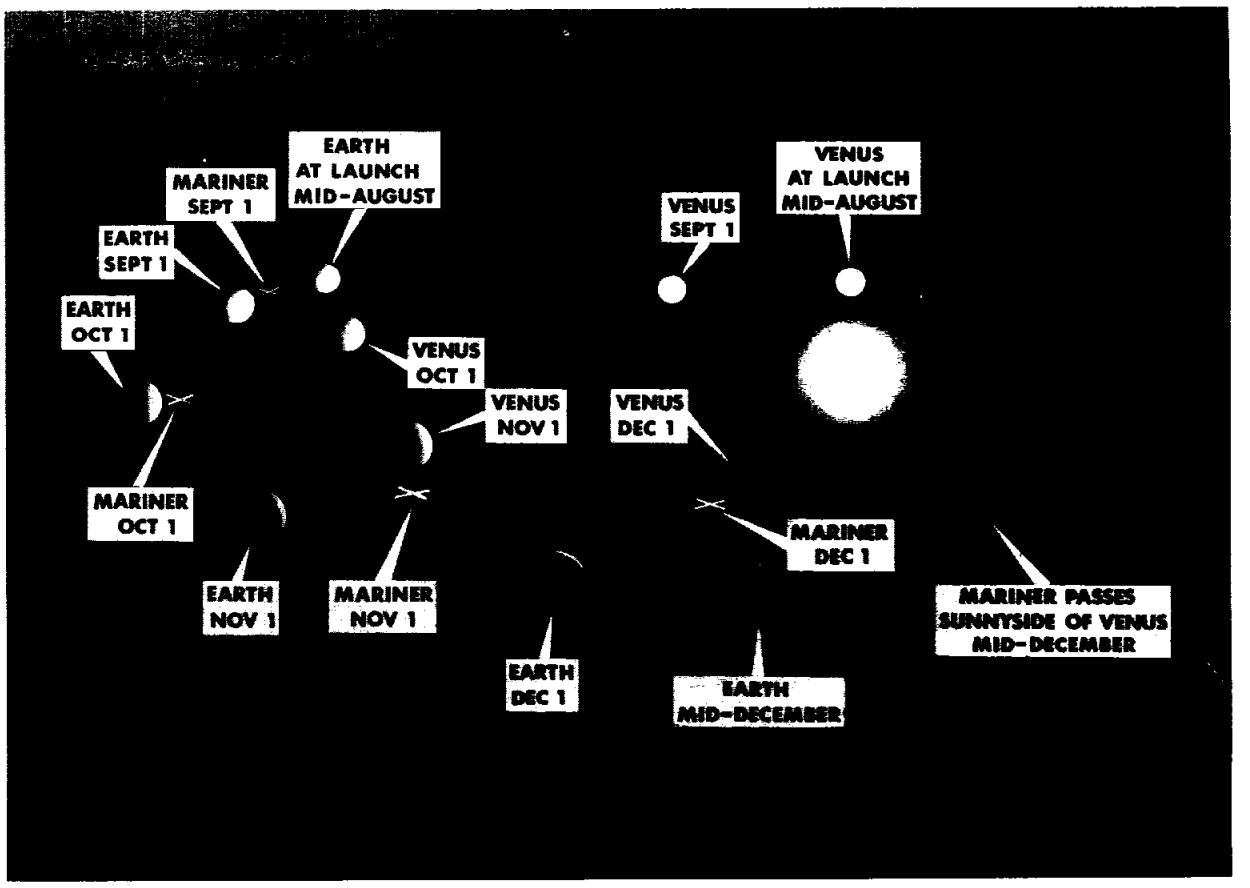
New network countdown

A new network countdown was used and a high degree of confidence in the countdown format established. The second part of the split countdown, that part held just prior to launch, was "probably as close to perfect for the launch-vehicle, spacecraft and network as could ever be expected," in the words of the report.

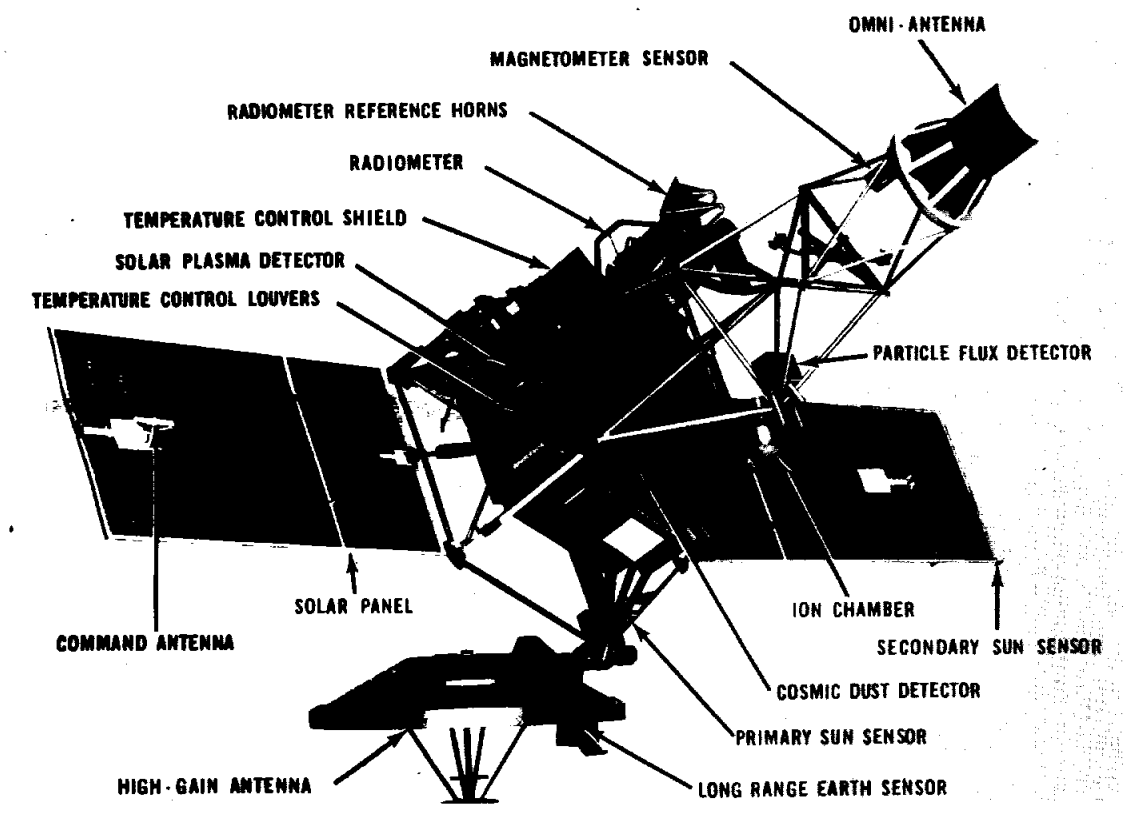
A remoteing facility for transmitting air-ground voice to the Mercury Control Center through the Bermuda site transmitters was used for this mission, allowing the Mercury Cap Com to transmit data to the astronaut in real time and eliminating much of the requirement for relaying information between the Canaveral and Bermuda controllers.



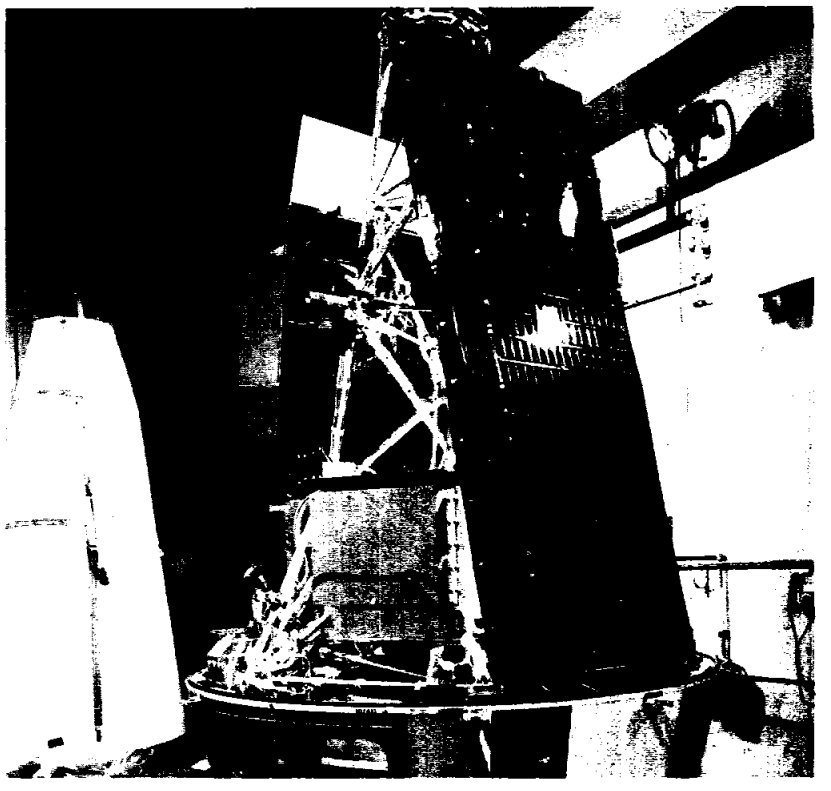
POISED FOR LAUNCH atop the Atlas-Agena B, the Mariner 2 spacecraft rests under a shroud at the top of the rocket on its Cape Canaveral launch pad. Its flight is expected to cover about 191 million miles in between 92 and 117 days, probing the secrets of the planet Venus.



LAUNCHED IN MID-AUGUST, Mariner would reach the vincinity of Venus sometime near the first of December, passing near the sunny side, which is turned away from earth, in mid-December and broadcasting its information across 36 million miles of space.



AN ARTISTS'S SKETCH of the Mariner 2 spacecraft, identical with Mariner 1 (which failed to achieve the proper trajectory July 22 and was destroyed), shows the solor panels extended in cruise attitude and the various experimental devices aboard the spacecraft.



IN LAUNCH POSITION, during a checkout at Cape Canaveral, Mariner 2 rests with its solar panels folded flat against its sides. The shroud at left is placed over the spacecraft before mating to the Atlas Agena B launch vehicle.

Mariner Aims At Secrets of Cloud-Hidden Planet

Mariner 2, the second spacecraft intended as an informational probe near the planet Venus, is expected to be launched from Cape Canaveral, Fla. no earlier than August 26.

NASA launched Mariner 1 early on the morning of July 22, but the spacecraft and its booster were destroyed by the range safety officer after only 290 seconds of flight because of deviation from the planned flight path.

Measures have been taken to correct the difficulties experienced in the Mariner 1 launch, NASA said in a release last week. These include a more rigorous checkout of the Atlas rate beacon and revision of the data editing equation. The latter is designed as a guard against acceptance of faulty data by the ground guidance equipment.

Mariner 2's mission is identical to that of Mariner 1. It will carry six experiments, including infrared and microwave radiometers to make measurements at close range as Mariner 2 flies by Venus and communicate this information over a distance of 36 million miles.

Four other experiments on the spacecraft—a magnetometer, ion chamber and particle flux detector, cosmic dust detector and solar plasma spectrometer—will gather information in interplanetary phenomena during the trip to Venus and in the vicinity of the planet.

Flight time will vary from 92 days to 117 days. The closest approach of Mariner to Venus will be about 10,000 miles. Overall flight distance will be 191 million miles.

The next launch opportunity for Venus will not occur for another 19 months, in 1964.

For that reason and because of the inherent difficulty of an interplanetary mission, NASA assigned two launches for the Mariner this year.

Mariner weighs 447 pounds and is five feet in diameter at the base and almost 10 feet in height. In cruise position, with solar panels extended, it is 16.5 feet across in span and almost 12 feet high. The design is a variation of the hexagonal concept used for the Ranger series. The solar panels contain 9800 solar cells to collect energy from the sun and convert it to electrical power.

The launch vehicle is an Atlas D-Agena B. Following insertion of the spacecraft into a "parking orbit," the Agena B will fire a second time after a 13-minute coasting period. The second Agena B burn injects the spacecraft into an escape trajectory at 25,700 miles per hour.

The six Mariner experiments are designed to:

(1) Determine the temperature of the planet surface and details concerning its atmosphere. (Astronomers have been hampered in attempts to investigate Venus by its continual cover of dense clouds.)

(2) Determine any fine structure of the cloud layer. (Changeable dark and light markings in the layer have long puzzled scientists.)

(3) Measure changes in interplanetary magnetic fields.

(4) Measure charged-particle intensity and distribution in interplanetary space and near Venus.

(5) Measure the density and direction of cosmic dust.

(6) Measure the intensity of low energy protons from the sun.

Project Management for the mission is assigned to the California Institute of Technology Jet Propulsion Laboratory. Marshall Space Flight Center has responsibility for providing the launch vehicle with the support of the Air Force Space Systems Division. Atlas D is provided by General Dynamics Astronautics and Agena B by Lockheed Missiles and Space Company.

Mariner tracking and communication will be provided by JPL's Deep Space Instrumentation Facility with permanent stations at Goldstone, Calif., Woomera, Australia and Johannesburg, South Africa.

Space Flight No More Demanding Physically Than Aircraft Testing

"A review of the detailed medical examinations accomplished on two astronauts who each experienced approximately 4½ hours of weightless space flight reveals neither physical nor biochemical evidence of any detrimental effect. Such flights appear to be no more physiologically demanding than other nonspace-oriented test flights."

This was the opening statement in a report entitled "Clinical Aeromedical Observations" authored by Dr. Howard A. Minners, astronaut flight surgeon for MA-7; Dr. Stanley C. White, chief of Life Systems Division; Dr. William K. Douglas, Air Force Missile Test Center, Patrick AFB, Fla.; Dr. Edward C. Knoblock, Walter Reed Army Institute of Research, Washington, D. C.; and Dr. Ashton Graybiel, U. S. Naval School of Aviation Medicine, Pensacola, Fla. The report was presented by Dr. Charles A. Berry, chief, Aerospace Medical Operations Office.

The report was part of the series delivered at Tuesday's conference.

"The experience gained in the MA-6 flight altered the medical planning for the MA-7 flight in two important respects. A comprehensive medical evaluation . . . was conducted at the earliest opportunity after landing when the pilot's impressions were freshest . . . The flexibility of the procedure at the debriefing site was increased to take greater advantage of any medical symptoms which might appear."

The triple purpose of the clinical observations, the report said, was to determine astronaut fitness for the flight, to provide baseline information for the aeromedical flight controllers and to measure any changes which might have occured during the flight.

A special diet was used for 19 days before the flight, and a three-day low residue diet immediately prior to the flight. Carpenter maintained his physical condition with daily workouts on the trampoline and with distance running.

Breakfast on the morning of the flight consisted of filet mignon, poached eggs, strained orange juice, toast and coffee. The night before the mission Carpenter had about three hours of sound sleep.

Physical examination aboard the aircraft carrier after the flight showed the pilot without injury and in good health. He showed a mild reaction to the adhesive tape used to keep four EGG sensors in place and at the blood-pressure microphone location.

Special Tests

Two specials tests were used during both MA-6 and MA-7 to measure any effect of space flight and weightlessness on human vestibular apparatus. In the first, the subject's ear was irrigated for 45 seconds with water below body temperature which could be warmed or cooled under precise control, and the temperature at onset of nystagmus (fine eye jerk) was noted. Astronaut John Glenn showed no significant change in threshhold temperatures before and after the flight, nor did Carpenter.

The other test measured the subject's ability to balance on successively more narrow rails, similar to those of a railroad track. Both astronauts showed a small increase in their postflight versus preflight scores in this test, thus showing no detrimental change in balancing ability.

A xylose tolerance test to measure intestinal absorption during weightless flight was carried out, but results were not as conclusive as in the Glenn flight.

Physiological Responses

The second portion of the medical report concerned physiological responses of the astronaut, and was written by Dr. Ernest P. McCutcheon, Dr. Charles A. Berry, and Robie Hackworth, all of the Aerospace Medical Operations Office, MSC; Dr. G. Fred Kelly, USN; and Rita M. Rapp, of Life Systems Division.

"The heart-rate response to nominal exercise demonstrated a reactive cardiovascular system. The abberant from the increased respiratory effort associated with continued speech during maximum acceleration. Carpenter felt that all body functions were normal. Solid foods can be successfully consumed in flight but precautions must be taken to prevent crumbling of the food. The biosensors provided useful EGG data with minimal artifact. The respiration rate sensor provided good prelaunch but minimal inflight coverage. Due to erratic amplifier behavior, the rectal temperature thermister gave invalid values for approximately one third of the flight. At the present time, inflight blood pressures cannot be interpreted.

"The instability of the body temperature readout is believed to have been the result of erratic behavior of the amplifier from 59 minutes to two and a half hours after launch," or about one third of the flight. Values at other times were considered valid.

"Carpenter stated that the flight was not physically stressful. He was subjectively hot and perspiring during the second orbital pass and the first half of the third pass, but was never extremely uncomfortable."

"Violent head maneuvers within the . . . helmet were performed several times without symptoms of disorientation or vertigo."

Goddard Scientists Discuss Airglow Layer, 'Snowflakes,' Solar Flattening

Two scientists from Goddard Space Flight Center discussed the airglow layer at the earth's horizon, the space particles reported by Astronauts John Glenn and Scott Carpenter, and the flattening of the solar image at sunset in a paper presented at the MA-7 Results Conference here Tuesday.

They were Dr. John A. O'Keefe, and Winifred Sawtell Cameron, both of Goddard's Theoretical Division. The paper was entitled "Space Science Report."

The airglow layer, brightest about 10 or 15 degrees above the horizon, has been estimated as extending from 90 to 118 kilometers above the earth.

Carpenter noted that it was relatively bright, compared to the moonlit horizon and to the star Phecda in Gamma Ursae Majoris, a star of 2.5 magnitude.

Wavelength observations of the layer were made with a special filter supplied by Goddard, and the band was definitely identified as the 5,577 Angstrom layer.

Carpenter estimated the height of the layer to be from 8 to 10 degrees, (Glenn's estimate was 7 degrees) noting it was about twice the height of the twilight layer, which he estimated at five sun diameters. He also observed the star Phecda as it passed the middle of the band.

Calculations, however, showed the lower boundary of the layer to be at 73 kilometers, at about 2 or 3 degrees above the horizon illustrating the well-known illusory effect which exaggerates angles near the earth's horizon.

The authors of the report noted that Astronaut Gus Grissom may have observed the airglow layer during the daytime. He reported a grayish band at the top of the blue sky layer during his flight.

Carpenter did not note any verticle or horizontal structures in the layer nor did he attempt a continuous survey around the horizon; however he did note the layer at several points along the horizon and believed it to be continuous.

Carpenter also noticed and photographed white objects like snowflakes at sunrise and at various periods following sunrise on all three orbits. Shortly before retrofire the astronaut accidentally struck the spacecraft hatch when reaching for an instrument, and promptly saw a cloud of particles fly past the window. He hit the spacecraft walls and produced the same results each time.

Two plausible sources within the spacecraft are "snow" formed by condensation of steam from the life support systems; and small particles of dust, waste, bits of insulation and other sweepings.

The strongest theory on the origin of the particles is that they were indeed snowflakes formed by the freezing of water vapor from the spacecraft.

The condensation probably occurred in the space between the heat shield and the large pressure bulkhead of the spacecraft (rather than outside) from the steam exhaust from the life support system. It is suggested that the snowflakes may have escaped into space through the ports, driven outward by expanding water vapor.

New information regarding refraction by the earth's atmosphere of celestial objects seen from space was provided when Astronauts Glenn and Carpenter obtained photos of the setting sun that illustrate the effect strikingly. Carpenter recognized the phenomenon visually; Glenn did not.

'Just At Dawn, I Discovered The Source Of The Space Particles . . .'

(Continued from Page 1)

In contrast to Russia's Gherman Titov, disorientation was not a problem. Carpenter stated that he knew at all times where the controls and other objects within the capsule were in relation to himself. At times, when the gyros were caged and nothing was visible out of the window, he had no idea where the earth was in relation to the spacecraft, but he had only to wait and the earth would again appear in the window. Although the wide field of view of the periscope was particularly useful for earth-spacecraft orientation, Carpenter said that without it, the window would have been adequate.

During the flight a number of unusual flight attitudes were investigated. "One of these," Carpenter said, "was forward inverted flight." I think I could pick out the nadir point, that is, the ground directly below me, very easily without reference to the horizon. I could determine whether I was looking straight down or off at an angle. During portions of the second and third orbits, I allowed the spacecraft to drift. Drifting flight was effortless."

Carpenter noted that for normal maneuvering in orbit, "fly-by-wire, low thrusters only, is the best system."

"At balloon deployment, I saw the confetti as it was jettisoned but it disappeared rapidly. The balloon . . . looked like it was a wrinkled sphere about eight to ten inches thick . . . (with) small protrusions at each side . . . Motion following deployment was completely random."

View From Space

"The view of Earth looked exactly like the pictures from other Mercury flights. The South Atlantic was 90 percent covered with clouds but all of western Africa was clear." Jungle areas showed up green. Over California Carpenter saw the area around El Centro quite clearly. "I saw a dirt road and had the impression that had there been a truck on it, I could have picked it out."

Carpenter did not see any more stars than could be seen from earth and said he was convinced that a lot more stars can be seen from the ground than through a spacecraft window.

At dawn on the third orbit, Carpenter accidentally discovered the source of the "space particles" when he inadvertantly struck the hatch, dislodging a cloud of them which flew past the window.

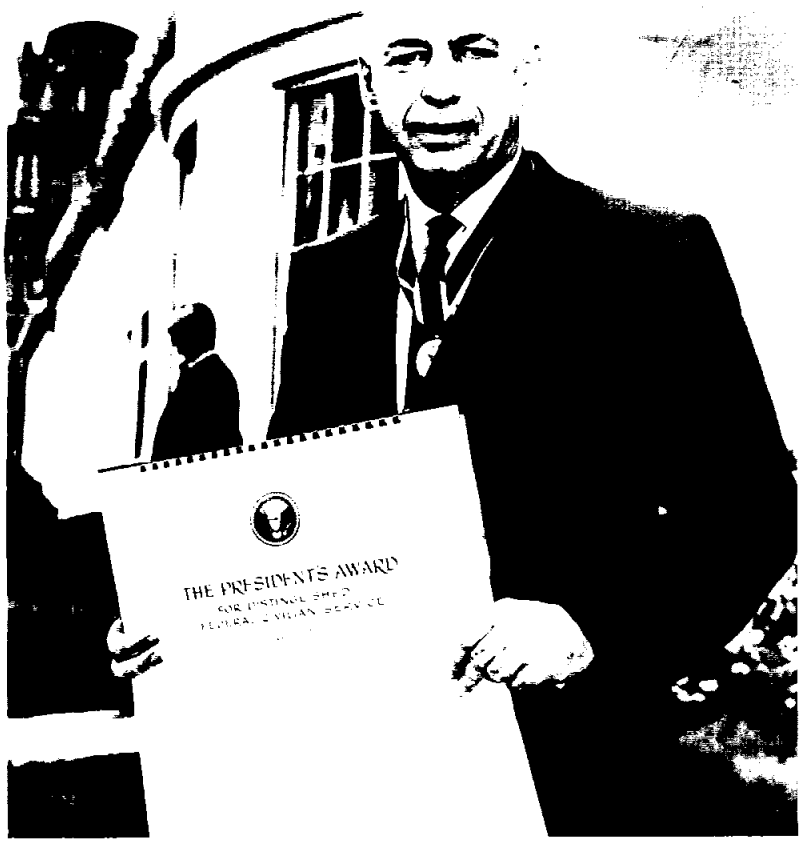
Re-entry

After retrofire, in which he experienced several difficulties (see other reports, pages 2 and 4) and during reentry, Carpenter began to hear the hissing noise outside the spacecraft described by Glenn and to see the reentry glow from atmospheric friction. "I could see a few flaming pieces falling off the spacecraft." He noticed an orange glow about the window and a green glow around the cylindrical section of the spacecraft.

Carpenter deployed the drogue parachute manually at 25,000 feet when he felt the spacecraft oscillations were getting too serious, and operated the main parachute deployment switch manually at 9,500 without waiting for automatic deployment. "The landing was less severe than I had expected . . . more noticeable by the noise than by the g-load. I was somewhat dismayed to see water splashed on the face of the tape recorder box immediately after impact. The spacecraft did not immediately right itself, listing halfway between pitch down and yaw left. I knew I was way off my orbital ground track because I had heard earlier the Cape Cap Com transmitting blind that there would be about an hour for recovery. I decided to get out at that time. Egress is a tough job. The space is tight and the small pressure bulkhead stuck slightly."

Carpenter described his activities during the time until he was spotted and recovery took place. He was dunked in the sea during the hoisting operation which took him aboard the rescue helicopter, and once aboard took off his boots and "poked a hole in the toe of my left sock and stuck my leg out the window to let the water drain out of the suit."

President's Award Goes To Gilruth In White House Ceremony

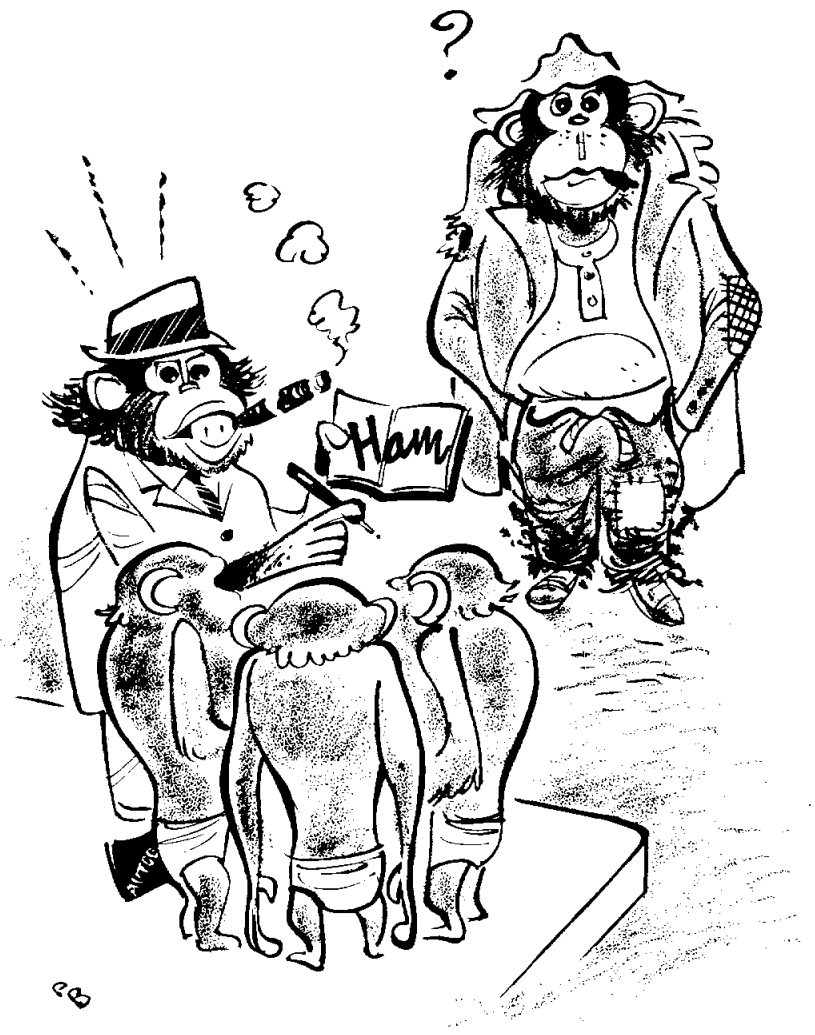


President John F. Kennedy is pictured at the upper left as he places "The President's Award for Distinguished Federal Civilian Service" around the neck of MSC Director Robert R. Gilruth during ceremonies at the White House August 7, and at upper right he completes his task. At left, center, Dr. Gilruth holds the citation which accompanied the award, and at the right, he is shown receiving the congratulations of three well-known members of the team which he said made the award possible—Associate Director Walter C. Williams, Astronaut Alan B. Shepard, Jr., and Astronaut John H. Glenn, Jr. Dr. Gilruth is shown with the President again, at the left, and at the right he is pictured with three other persons who were present for the ceremonies — his mother and father, Mr. and Mrs. Henry A. Gilruth, and his wife, Jean.

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

Director . . . . . Robert R. Gilruth
Public Affairs Officer . . John A. Powers
Editor . . . . . Ivan D. Ertel
Staff Writer . . . . . Anne T. Corey

On The Lighter Side



'Alas, Poor Yorick'

"Ham" is the new star of the monkey kingdom, no question about that. When he made his 155-mile high trip in a Mercury capsule, they hung a star on his cage and darned near vice versa.

But as Ham basks today in the scientific spotlight, his name up in lights on the marquee of the space frontier, somewhere in the zoological world broods an earlier star of simian spacemanship.

His stardom came in 1951, when he soared 80 miles up in an Aerojet-General Aerobee rocket, and came back, monkeydom's first successful round trip.

Aerojet personnel called him "Yorick," and they knew him well indeed in those early days a decade ago. And Yorick knew THEM well, too.

For ten days prior to his trip they gave Yorick test doses of a drug they used to "anesthetize" him for the actual voyage. He became so fond of these test tranquilizers he would jump in delight at mere sight of the needle bearers.

Out of deference to his species, attendants speculated only privately, behind his back, that he had a monkey on it.

Regardless, tranquilized tourist or not, he made his famous first flight ten years ago, long before this particular Ham became a household word.

And today, nit-picking around a zoo somewhere like a fading ex-matinee idol, scraping for peanuts with the rest of the pack, poor Yorick, alas, surely must be brooding over the fickleness of fame—and contemplating science's new premium, Ham, or wry terms, with little relish.

—— Cartoon by Pete Bentovoja, Los Angeles Examiner. Copy by Don Bailer. Reprinted courtesy of Aerojet-General.

EDITORIAL EXCERPTS

Washington Star
Aug. 8, 1962

'MIDGET' GEORGETOWN FIRM LANDS FOUR SPACE RESEARCH CONTRACTS

By Truman R. Temple

Does a corporation have to come in the jumbo American Tel & Tel size in order to land a space contract?

Tucked away on a side street in Georgetown is a concrete argument that you don't have to be big, old or powerful to get into the race.

Its name is Cosmic, Inc., and it has 10 employees, a history dating back to 1960, and a two-story building converted from horse stables.

Yet it is embroiled in defense and interplanetary travel right out of Buck Rogers.

Dominique Gignoux, the 33-year-old president of Cosmic, actually prepared for the task by representing foreign companies in high voltage equipment in New York. A native of Grenoble, France, he holds graduate degrees from the Sorbonne and Harvard in physics and economics.

After working on an electrostatic ignition device, he attracted the interest of the Air Force, which was probing futuristic schemes such as ion and colloidal propulsion of rockets.

No sooner had he organized Cosmic two years ago when Mr. Gignoux (pronounced gin-oo) found himself in competition with giants, among them Westinghouse and Goodrich. He refused to be impressed and proceeded to land four contracts.

Thus far, all the space shots by Russia and the United States have used chemical fuel because of its high thrust. But the experts warn that long-range travel to other planets must get better mileage.

One nuclear model would work like this: Heat from the reactor would spin a turbine, generating high voltage power. This in turn would excite some other medium, such as minute electrified metal particles, into giving the missile its thrust.

Cosmic, Inc. is busy under an Air Force contract on a study and small model of the high voltage generator that would form a critical link in this chain of dominoes.

The privately-owned company seems to have gone out of its way to pick an unlikely site. It is located at the corner of two quaintly named passageways, Cherry Hill lane and Grace street, the latter a cul-de-sac with cobblestones.

"The mortar in this place is so old you can dig it out with a pencil," grumbled Hermann Anton, chief engineer.

But then, the atom bomb was developed in a basement under a football field in Chicago.

MSC PERSONALITY

Data Computation Head Eugene H. Brock Is An Artist, As Well

In what used to be the control room of a Houston television station, a tall man of 49 looks down through a partial glass wall over a gym-sized bay area. He can see banks of equipment and a number of technicians, moving back and forth between rows of boxy consoles where tapes move in jerky rythmn and lights wink on and off.

The man is a musician, and an artist of some note. He is also the chief of MSC's Data Computation and Reduction Division, Eugene H. Brock.

Data Computation, which has recently moved to the former KHOU-TV station on Cullen Blvd., is responsible for the formulation of physical and mathematical equations in "computer language."

Brock is a native of Texas, born in Leggett. Coincidentally, his working career began in 1933 here in Houston as a high school teacher, after his graduation from Texas Technological College in Lubbock with a BA in mathematics.

In 1941, he switched to college teaching at Texas A. & M. so that he could further his own education. He received his BS in engineering in 1943 and the same year became assistant to the Dean of Engineering. He completed his MS in engineering in 1945.

In July of 1948, Brock began a one-year leave from Texas A. & M. to work at the University of California's Los Alamos Laboratory. In 1950, still on leave, he was loaned to the Atomic Energy Commission civil service group to act as chief engineer at the AEC Nevada Test Site in highly classified work.

Returning to Texas A. & M. in February of 1952, he remained there as professor and private engineering consultant until 1955 when he moved to Arizona State University as director of the physical plant. He spent the summer at Holloman Air Development Center, Holloman AFB, N. M. as a consultant to plan the assembly of technical equipment for use in a new missile testing facility. Brock designed a computation center there to handle real time calculations of missile flight.

With Arizona State University, at Tempe, he supervised some 80 personnel providing a complete physical plant and services, planned buildings, assisted in preparing the college budget, and supervised construction, assisting as well in the program of the university's computer center.

In September of 1957 he took over as manager of administrative services at General Electric's Tempe Computer Center, supervising the provision of management services to commercial and research computor centers.

Eugene H. Brock

In February of 1959 he was transferred to the GE Huntsville Computer Center as manager. The center provides operation of computer equipment in programming in the fields of trajectories, thermodynamics inventory control, etc., for NASA'S Marshall Space Flight Center and for several Army organizations.

In the summer of 1961 he transferred again, this time to the Phoenix, Ariz. Information Processing Center, the General Electric headquarters center, as manager.

He joined Manned Spacecraft Center April 4 of this year.

The author of numerous papers and books, including a college text, and a veteran of many speaking engagements before educational and professional societies, Brock is married to the former Virginia Dare Wood of Hollis, Okla.

He has a son, Ronald, 21, and a daughter, Barbara, 18. He is an artist, working in oils and etchings as well as other media, and has had a number of one-man shows in galleries around the United States. His other hobbies include music and salt-water fishing, the latter of which he "hasn't had much time for lately."

Tired Sigh Department

Getting out this paper is no picnic.

If we print jokes, people say we are silly. If we don't, they say we are too serious.

If we stick close to the office all day, we ought to be around hunting material. If we go out and try to hustle, we ought to be on the job at the office.

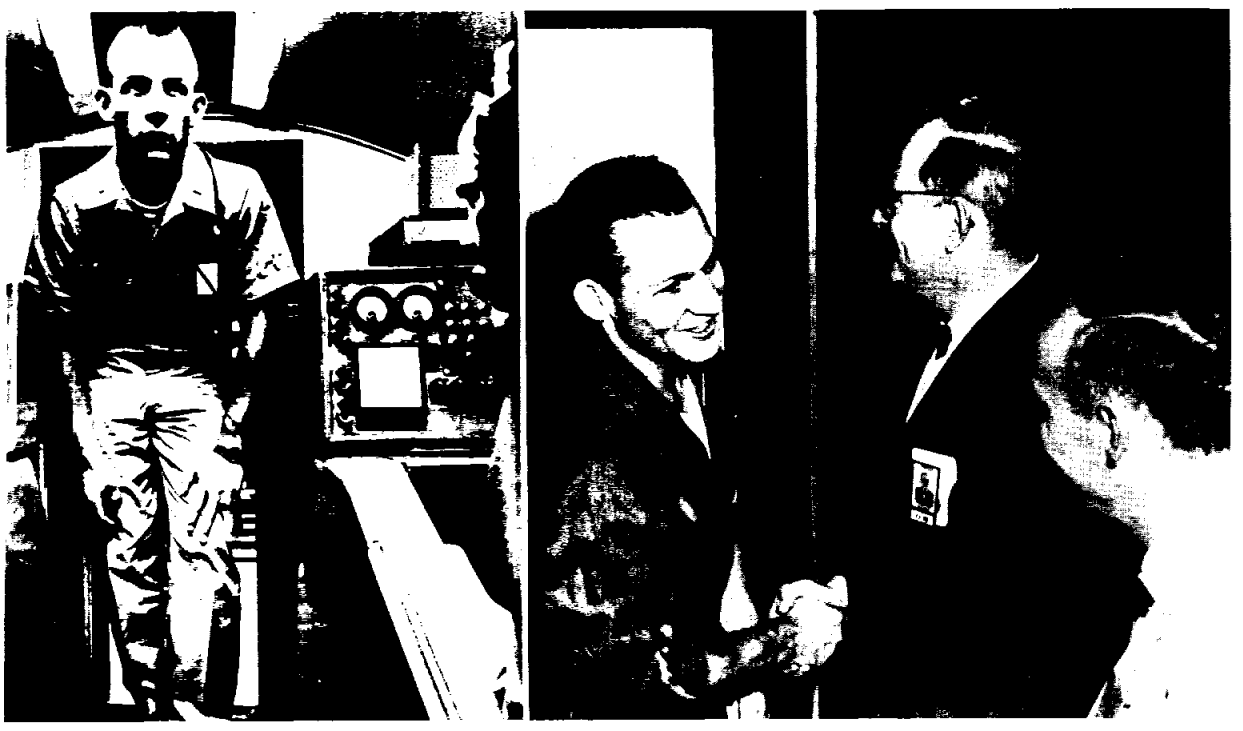
If we don't print contributions, we don't appreciate genius. And if we do print them, the paper if filled with junk.

If we edit the other fellow's write-up, we're too critical. If we don't, we're asleep.

If we clip things from other papers, we're too lazy to write them ourselves. If we don't, we are stuck on our stuff.

Now, like as not, some guy will say we swiped this from some magazine.

We did.



BEFORE AND AFTER 15 DAYS "OUT OF WORLD," Lt. Robert Staib of Chicago, in uniform, is shown as he bends down to enter the crew compartment (total area 1,100 cubic feet). At right, fifteen days later and dressed in a flight suit, the smiling Staib is "welcomed back to the world" by Dr. Earl Alluisi of Lockheed and Dr. W. Dean Chiles of the Air Force's Aerospace Medical Research Laboratories at Wright-Patterson Air Force Base, Ohio, both psychologists.

Air Force Volunteers Spend 15 Days In Isolated Astronaut Crew Study

How does it feel to be "out of this world" for two weeks? No newspaper, no television, no radio, no contact with the daily goings-on. . . .

Just you and five companions . . . in a small "earth-bound space cabin" working four hours and resting two hours, over and over, day and night....

Six volunteers from the U. S. Air Force Academy have completed a psychological experiment which shows – from first indications – that astronauts can perform well together as a team when a crew, instead of an individual, is launched in future space vehicles.

The potential future astronauts (ages 20 to 22) were confined for 15 days in a crew compartment at the Lockheed Human factors Research Laboratory at Marietta, Ga. They participated in a study which Lockheed conducted for the Air Force's Aerospace Medical Division, Air Force Systems Command. Complete findings will await analysis of the volumes of data collected during the 15 days the men were in the compartment.

The cadets worked together for 16 hours a day for two weeks. They performed operator duties four hours and were off duty two hours, around the clock. During their four-hour duty periods, they sat at flight stations, operating consoles in order to solve problems fed to them electronically by psychologists.

"It is our first impression, that the crew performed at a very high level all the way through the study," commented Dr. W. Dean Chiles, Air Force project officer and psychologist. "The Air Force Academy group's performance generally exceeded that of college men previously used.

The crew members, themselves, said they got along well together while carrying out demanding tasks in the small (1,100 cubic feet) "space cabin" over this long period ot time.

"We got on each other's nerves only once or twice during the 15 days," said Cadet Phillip Patterson of Richmond, Mo. "When this happened, we kept quiet for about 15 minutes and everything got okay."

The men spent their leisure time sleeping. They said they were too tired to try to read. They weren't bored, except sometimes when the work load was light.

A preview of outerspace medical practice was made possible during this study.

On the twelfth day of the experiment, one of the cadets suffered from an ear ailment. A Lockheed physician looked at him on a closed-circuit television set, asked the youth to describe his symptoms and to put his finger where it hurt, and then prescribed for him. this scene could well be repeated in event an astronaut became ill during flight.

Dr. Earl Allusi, Lockheed psychologist and project leader said. "A major finding of our study was that six men were able to perform 16 hours a day on a heavy work schedule in a confined area, and that, on leaving, they said they could have continued on the job even longer," Dr. Allusi observed.

Why did he choose the Air Force Academy cadets?

"If we look at the present astronaut population, and subtract ten years from the age, we come close to the ages of the cadets tested," Dr. Chiles replied. "In ten years the new space systems will be ready, and these men are representative of the men who will be flying them."

Actually, Dr. Chiles stated, astronauts will serve as monitors, checking various systems of a space vehicle. So, the cadets were assigned to monitoring tasks that are typical of those used to represent emergency conditions and normal conditions. Astronauts will monitor auditory systems from ground stations; so the cadets monitored varying tones. Astronauts will be doing mental calculations: so the cadets were given rather difficult arithmetic problems to solve, without paper and pencil – three of these a minute! Astronauts will be monitoring and reacting to radar signals; so the cadets watched a series of patterns flashed before them and tried to determine their forms in the presence of interference.

Astronauts in the future will perform as a team; so the cadets were required to solve an electrical combination code lock. Each had a button which, when pushed in proper sequence, solved the problem. They had to work as a team to get the right sequence.

Saturn's Roar And Mercury Display Hold Fair Crowds

The National Aeronautics and Space Administration Space Exhibit at the World's Fair in Seattle, Washington is attracting one out of every five visitors to the Fair as a whole, according to records kept by Fair officials.

Crowds jamming through the space exhibit building are consistently running nearly 25,000 people each day.

First stop inside the space exhibit is the Space Theatre, a 275-seat room in which the visitor receives a space age briefing and watches colored films, including one on Astronaut John Glenn, Jr.'s orbital flight.

Visitors leave the theatre to be confronted by a huge revolving world globe, encircled by plastic strips illustrating the orbits of all known satellites. Nearby is a transparent model of the Tiros weather satellite on which the world's weather is plotted each day.

Suddenly the pavilion is rocked by a thunderous roar, like the sound of a giant rocket leaving the launch pad. It comes from a replica of the business end of the Saturn C-1 rocket, suspended from the ceiling.

Every NASA field installation has a display, but perhaps the most popular section of the pavilion is the last, which is devoted to manned space flight. The display includes material on balloon flights, the X-15 program and the space flights of American astronauts Glenn, Alan Shepard and Virgil Grissom.

The longest lines form in front of a full-scale mock-up of the Mercury Spacecraft, in which Glenn made his space trip. Blonde guide Mary Jane Douglas, 23, patiently answers an endless number of questions about how the astronaut eats, sees and what he does "with that little gadget over there."

"It's amusing how many kids come through and tell their parents all about it," Miss Douglas said. "They pat the capsule and say, 'Look mom, this is the heat shield, and those are the retro-rockets.' The kids will be replacing us if we don't watch out," the young guide commented.

NASA To Set Up Operation Office In Boston Area

The National Aeronautics and Space Administration will establish a Northeastern Operations Office, Administrator James E. Webb has announced.

The Office, is to be located in the Boston, Mass. area, will be staffed initially by about eight people and will increase eventually to 25 to 30 people.

Mr. Webb said, "We are setting up this office because the rapidly expanding activities of the national space program have considerably increased our day-to-day dealings with universities and business organizations in the Northeast. In the last ten months alone, we have let more than $15 million worth of contracts in the six New England states."

To manage more effectively NASA's grants and contracts in that area, the Northeastern Office will conduct technical and administrative liaison with contractors, research institutions and other government agencies in the Northeast.

A specific location for the office, which will open in the near future, has not been selected.

THE MSC EXCHANGE COUNCIL met Aug. 7 at First Pasadena State Bank, 109 E. Shaw, to open an account with $1600 to be used for employee welfare activities. The money has accumulated from vending machine sales at MSC sites since March. At a future date employees will be called upon to elect members of an Employee Benefit Association to supervise the use of such funds. The Exchange Council sets up contracts for vending machines at MSC sites, such as the Farnsworth & Chambers Building cafeteria, and arranges for mobile catering unit services and on-call catering service for banquets. Machines similar to those in Farnsworth and at East End State Bank Building will soon be set up at all sites. Left to right are Hazen Walker, Logistics Division, council chairman; Roy C. Aldridge, chief of Administrative Services; Bill Bower, Office Services, council supervisor; Mrs. Grace Winn, Relocation Office head, council treasurer; Mrs. Leona Martin, in charge of new accounts at the bank; and bank president S. R. "Buddy" Jones.

Space News NASA ROUNDUP!

SECOND FRONT PAGE

Search For Our Lunar Landing Site Narrows

The first United States astronauts to land on the moon will come down in an area within ten degrees on either side of the lunar equator, and between longitudes 270 to 360 degrees.

This information was included in a paper delivered before the American Rocket Society last month by Dr. Joseph F. Shea, deputy director for systems of the Office of Manned Space Flight, NASA.

"The initial landing sites must be established early," said Shea, "so that effort may be focused toward surveying these areas intensively. The choice of Lunar Orbit Rendezvous (LOR) as the prime mission mode limits the initial landing to a belt within 10 degrees of the lunar equator. The areas which can be easily reached by the unmanned vehicles (to be used for initial exploration) lie on the leading quadrant of the moon. Hence, the initial lunar landing will occur in a space bounded by lunar latitudes plus-minus 10 degrees and longitudes 270 degrees to 360 degrees.

"The actual site will be chosen for its apparent scientific potential. Fifteen sites have been recommended by the Astro-geology Branch, U. S. Geological Survey and several of these sites fall within the preferred landing space."

"Before the actual Apollo landing site is selected, more detailed reconnaissance is required. For the landing . . . we require maps at a scale of 1:250,000 over 10 square mile areas . . . For the landing site, maps should be available at a scale of 1:25,000 over one square mile area . . . These accuracies are required for navigational fixes as well as initial exploration.

"In addition to maps, detailed pictures of the lunar surface are required. Stereoscopic imagery is preferred but early monoscopic pictures will be useful . . . At the actual landing site, imagery taken from a landed unmanned spacecraft is required covering a 360 degree horizontal scan . . . with resolution to permit identifying half-inch objects ten feet from the camera."

Lunar landing maneuver and operations on the moon will be strongly influenced by surface characteristics, Shea said. We should measure roughness, to 0.5 ins. over areas 10 feet in diameter, and slope, particularly to identify areas where the grade exceeds 20 degrees.

Another factor to be measured is the depth of the expected dust layer. "Depths less than five inches should represent no problem; those above 20 inches will seriously hamper operations."

Surface strength, including static load and total sinkage, must be measured.

The unmanned lunar program, including both the Ranger and Surveyor series, "will be the source of extensive scientific data as well as the engineering information indicated above."

"If these data are obtained prior to the initial manned landings, the operations can be carried out with a high degree of confidence that the mission will hold no surprises in store for the astronauts."

ASTRONAUT M. SCOTT CARPENTER delivered a detailed account of his experiences in the MA-7 mission at a results conference in the Rice Hotel here Tuesday. Six other reports on various aspects of the flight made public new information. (See story, page 1).

WELCOME ABOARD

Manned Spacecraft Center acquired 78 new employees between July 22 and August 10. The three listed for Preflight Operations will be stationed at Cape Canaveral; the rest here in Houston.

Mercury Project Office: Frances T. Burgeson and Imogene C. McDonald.

Gemini Project Office: Dora L. Avilez.

Apollo: James T. Kennedy, Arthur S. Taylor and Yvonne R. Donaldson.

Apollo Spacecraft: Gene T. Rice, Lyman E. Wood, Charles F. Wasson, Earl K. Smith, Laverne H. Peck and Ralph L. Latta.

Spacecraft Research: William H. Michie, Ronald D. Mercer, James L. Bullard, Robert W. Ward and Jerrald W. Smith.

Life Systems: Talmadge W. Holt, and Cline W. Frasier.

Systems Evaluation and Development: Charles B. Holder, Marilyn J. Catoe, Phillip L. Goode, Donald E. Coles, David T. Bettler and Albert C. Copeland, Jr.

Preflight Operations: Edwin C. Johnson, Jr., Louis Hammer and John D. Jeter.

Flight Operations: Sue R. Erwin, Lawrence L. Armstrong and Arthur L. Schmitt.

Flight Crew Operations: Mary J. Bothwell, Ross C. Butcher, Thomas H. Henderson, Clarke Covington and Charles Teixeira.

Personnel: Mary M. Duckett, and M. Mercedes H. Cook

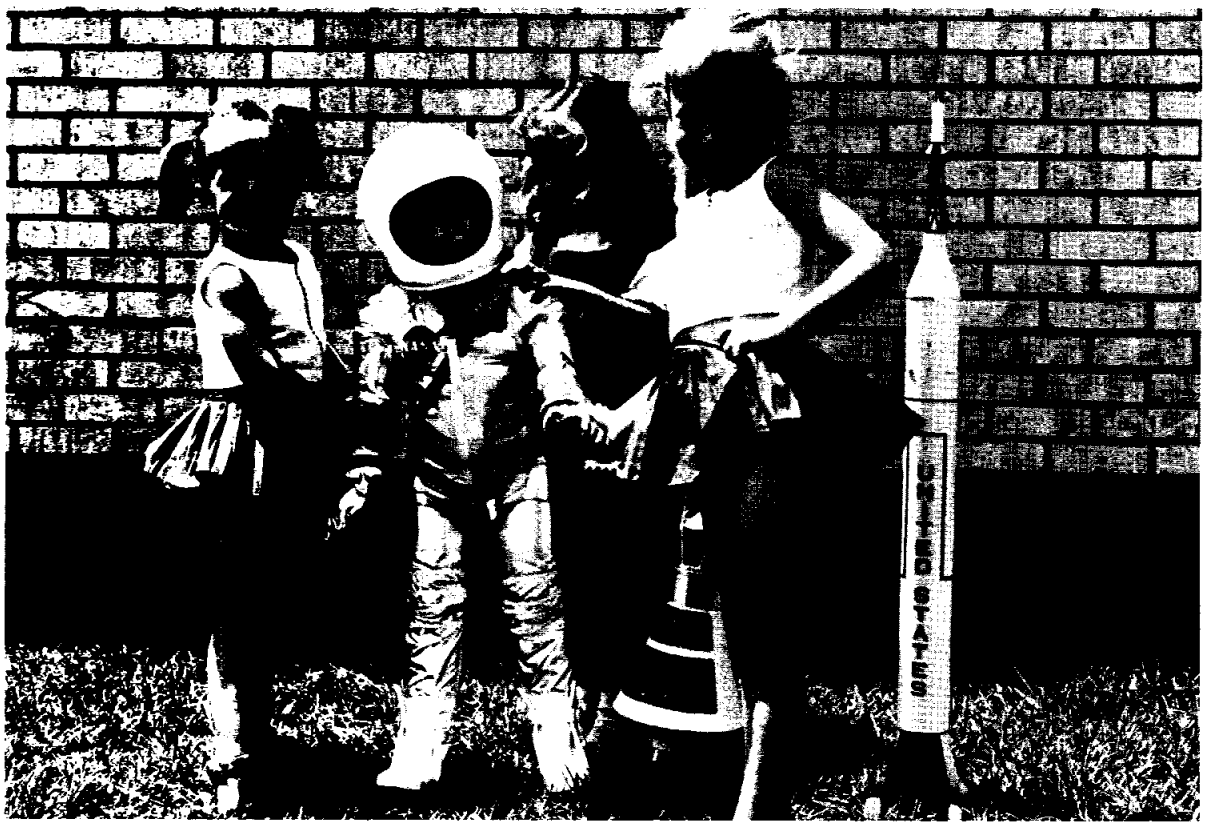
Procurement & Contracts: Carolyn L. McKinney, Carolyn F. Kiesling, Winifred E. Collins, Clarence C. Holbourn.

Financial Management: Gayle Porter, John E. McIver, Lucille E. Blanco, and Walter G. Danley.

Facilities: Chester Cotton, and Patsy D. Murphy.

Administrative Services: Charlotte R. Adams, Enoch D. Pike, Sue M. Simms, Billie J. McClund, L. Katherine Robbins, Bradford J. Jackson, Troy D. Caruthers, Gloria L. Blackman

Technical Services: Edward E. Harger, James N. Osburn, Jackie D. Mays, John L. Palmer, Joseph L. Gillis, Tommy L. Reeves, Joseph A. Mulla, Robert W. Farley, Richard J. House, Sims T. Vetuski, and Edward W. Smithson.



THREE LITTLE GIRLS are obviously delighted with the Mercury astronaut doll, part of an exhibit being prepared for the 8th Annual Houston Trade and Travel Fair in the Sam Houston Colliseum Sept. 21-30. Left to right they are Lisa Rankin, 3, Barbara Ann Schoemaker, 3, and Tammie Rankin, 4. The Rankin girls are daughters of Houston photographer James Rankin and Barbara is from Holland, daughter of the Dutch representative of Tennessee Gas Company. International Department. The fair will include a Space Travel Pavillion in the International Commerce section in the Coliseum annex. Some 150,000 persons are expected to attend. A parade, covered by KTRK-TV (channel 13) will be held in downtown Houston Sept. 22.

Shawnee, Okla. Armory Named For Elder Cooper

A new reserve armory was dedicated as a memorial to the late Col. Leroy Gordon Cooper Aug. 11 in Shawnee, Okla., birthplace of Col. Cooper's son.

Participating in the ceremony was the son who bears his name, Project Mercury Astronaut L. Gordon Cooper. Cooper was accompanied to Shawnee by Astronaut Walter M. Schirra, the prime pilot for America's next orbital flight, scheduled in late September. Cooper is to be Schirra's back-up pilot for the mission.

The armory, which will be occupied jointly by Army and Navy reserve units, was dedicated to a man who served his country in the Army, Navy and Air Force.

Shawnee turned the astronauts' visit into a colorful "Cooper Day" with a parade, a press conference at Oklahoma Baptist University, and a luncheon, at which the astronauts were the guests of OBU president Dr. James R. Scales.

Cooper's wife, the former Trudy Olson of Seattle, and daughters Cam, 12 and Jan, 10 were present, as well as the astronaut's grandmothers, Mrs. Cora Cooper and Mrs. Orena Hurd.

Oklahoma Governor J. Howard Edmons presented him with a certificate as honorary member of his staff.

Officials of the Otoe tribe, representing the Oklahoma City Chamber of Commerce, presented Cooper with a colorful warbonnet and named him "Chief Oklahoma Space Man."