

Space News

ROUNDUP!

VOL. 3, NO. 20

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

JULY 22, 1964

Administrator Webb Visits Center, Tours Facilities, Meets With Glenn

NASA Administrator James E. Webb was here at the Manned Spacecraft Center on July 10 for a tour of the Center facilities and to meet with Col. John Glenn.

Webb was last here on April 29 for a short visit.

Following his tour of the area, Webb met with Glenn at the home of Dr. Robert R. Gilruth,

Medical Groups Meet Here, Get Briefings

Two medical groups were here at the Manned Spacecraft Center this past week, one for briefing on the Center medical program and the other for a look at the Apollo medical experiments.

The NASA Research Advisory Committee on Biotechnology and Human Research was here last Wednesday for a briefing on the Center Medical Office and its program.

Heading the 21 member group was Dr. Charles I. Brown, medical director, Lockheed-California Co., Burbank, Calif. Dr. Brown is also president of the Aerospace Medical Association. The group was also given a tour of the Center.

Last Thursday, the National Science Academy with head-

director of MSC, where a dinner party was held for the group that evening.

Webb told reporters outside Dr. Gilruth's home, "What we are doing here this evening is discussing some possibilities about Colonel Glenn's future. We have no big announcement to make. He is not returning tomorrow or anything like that."

Glenn accompanied by his wife, Annie, told reporters that he has been feeling "real well" and that he hoped to "return to work, at least on a part-time basis, real soon."

He told reporters that if he returned to the program he would prefer "to be active in the area of astronaut training and activity." He said he did not wish to return as an active astronaut.

Webb arrived at Ellington AFB in a NASA plane accompanied by his son James; Breen Kerr, the late Oklahoma Sen. Robert Kerr's son who recently joined NASA Hq; and U. S. Air Force Maj. Gen. Sam Phillips, his wife and two daughters.

Also in the Webb party were

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Dr. Gilruth Helps Dedicate Houston Museum, Planetarium

Dr. Robert R. Gilruth, director, Manned Spacecraft Center was one of the featured speakers at the ceremonial opening of the Houston Museum of Natural Science and Burke Baker Planetarium on July 9 in Houston.

Also representing MSC at the opening was Astronaut Walter Cunningham.

In the day-long dedication ceremonies the facilities were inspected by city and county leaders, museum trustees, donors to the new \$926,000 building, and newsmen.

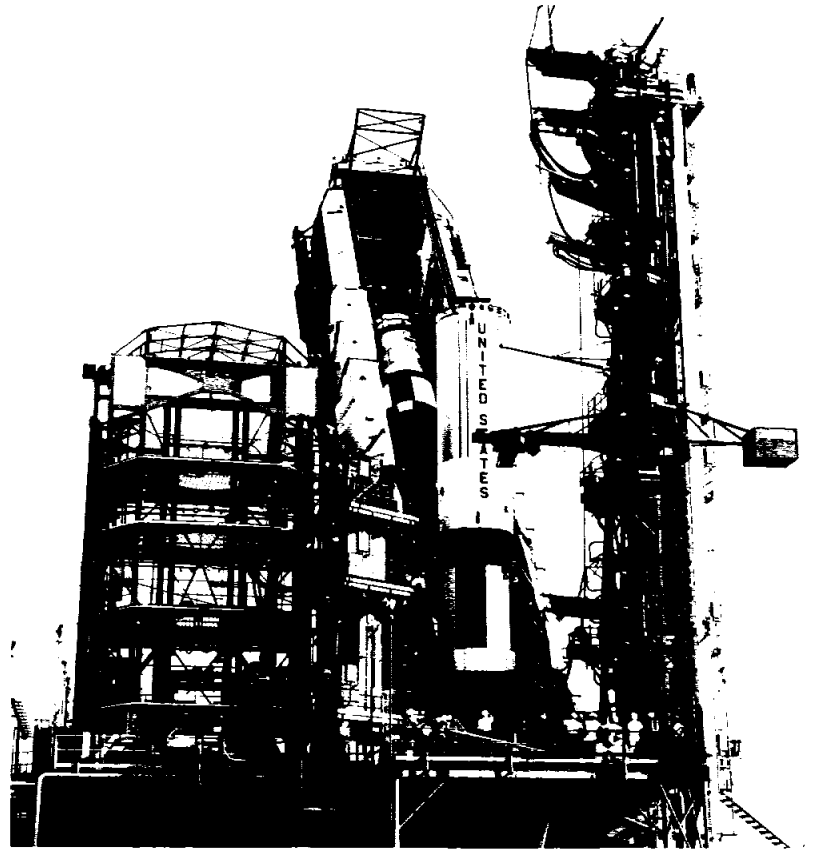
Dr. Gilruth told the preview

guests that the Center is negotiating with museum officials for part-time use of the planetarium for the Apollo project.

"A facility like this one is of great value in the training of astronauts and engineers in this project," Dr. Gilruth said.

The heart of the planetarium

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GEMINI LAUNCH VEHICLE (GLV-2) is erected July 14 at Cape Kennedy Launch Complex 19. The GLV-2 will boost the first production Gemini spacecraft (GT-2) on an unmanned ballistic flight down the Eastern Test Range later this year. This flight will be followed by the first manned Gemini mission (GT-3). The Gemini launch vehicle, manufactured by the Martin Company, Baltimore Division, under contract with the U.S. Air Force Systems Command, Space Systems Division, will be launched for NASA by the 655th Aerospace Test Wing.

MSC Symposium Scheduled July 27

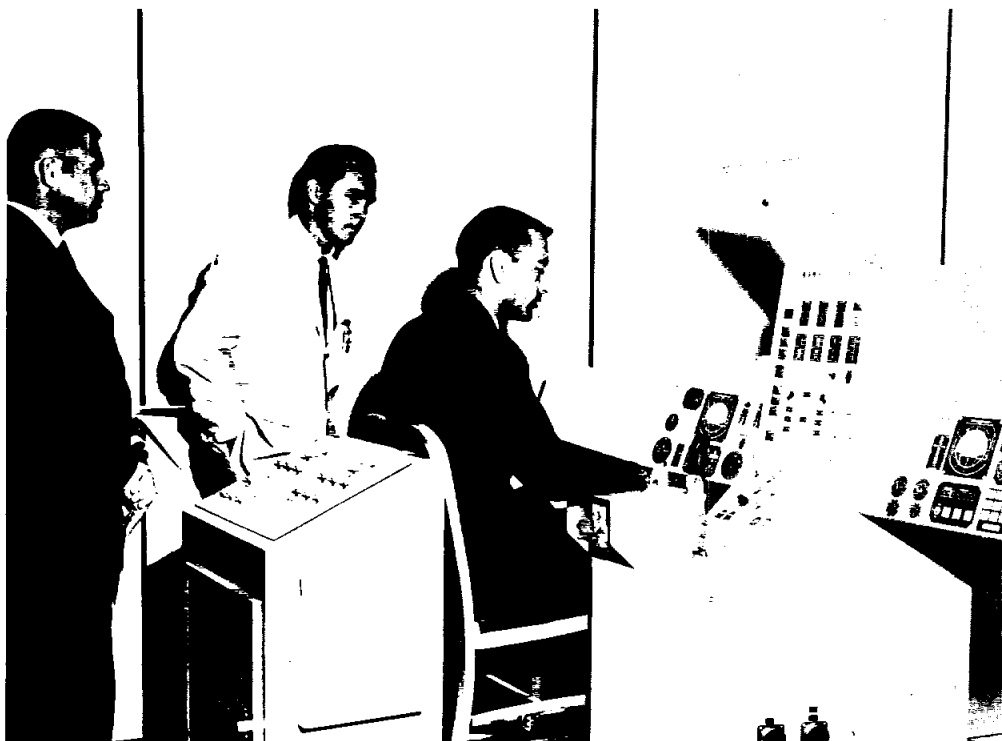
The next regularly scheduled MSC Technical Symposium will be held from 6:15 to 8:15 p.m., Monday, July 27, in the Auditorium here at the Center.

A buffet dinner will be served

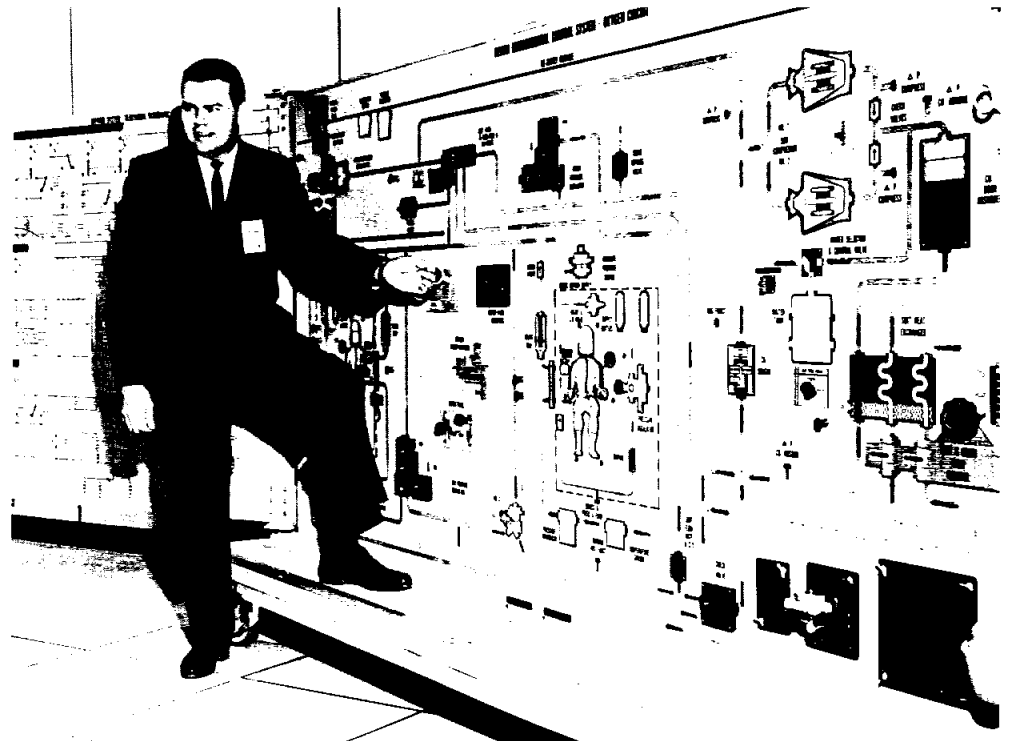
from 4:45 to 6:15 at the Cafeteria for those attending the symposium.

On the program for this month will be Leo T. Zbanek, Facilities

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GEMINI SYSTEMS TRAINERS—A demonstration of the animated lighted-line Gemini Systems Trainers was given last week to members of the local news media. Above left at the mock-up of the Gemini cockpit and instrument panel, Wayne Dessens demonstrates its operation to Tom Jarriel (center), TV newsman, as Timothy M. Brown looks on. Above right, John W. O'Neill demonstrates the Gemini Environmental Control System (oxygen circuit) animated lighted-line trainer. Other Gemini animated lighted-line trainers are the Environmental Control (coolant); Attitude and Maneuver Control; Propulsion (orbital attitude, reentry attitude); Electrical Power and Distribution; and Sequential Circuits.



The trainers were built by McDonnell Aircraft Corporation at a cost of \$750,000 and are operated by the Spacecraft Systems Operations Branch in the Flight Crew Support Division on the second floor of Building Four here at the Manned Spacecraft Center. In addition to providing background and preliminary study of systems for flight crews and other operations groups, the trainers prepare technicians and maintenance personnel for actual spacecraft hardware operation and check-out. The trainers are also a means of providing continuously the information on all spacecraft systems changes and their effects on operation, maintenance, and checkout for project support groups.

Science Teachers At MSC Help Schools Get Space Facts

Two Houston science teachers assigned by the Houston School Board to the Manned Spacecraft Center are helping to devise methods for transferring NASA information to the classrooms of area schools.

The teachers are Grant Morrison and Ernest R. Baker, from Waltrip High School and Austin High School, respectively.

Their work at MSC has included compiling specially-edited, fast-reading fact sheets for teachers, and easy-to-set-up classroom science displays.

Morrison and Baker have been working since March on the science education program

which will be used for the first time this fall in Harris, Galveston, and Brazoria County schools.

By August 15, they will have approximately 20 of the fast-reading fact sheets available for the teachers.

In addition to the fact sheets they have worked in the development of an educational fold-out display for classroom and library use. It is available for temporary loan to area schools and is also being produced in 35-mm slide sets.

Beginning this fall, teachers in 156 junior and senior high schools will receive the special bulletins describing new developments in such fields as environmental studies of life in space, and the physical nature of the universe.

In addition to these, the teachers will receive bulletins telling where supplemental classroom materials can be ordered.

Plans call for the co-operative science project to be expanded from Gulf Coast schools to an eight-state area and eventually to schools throughout the nation.

One of the benefits of the program will be supplying information to help solve a major educational problem which has developed due to the suddenness with which science text books have been found to contain obsolete information.

As Morrison put it, "Industry is going to keep up (with current changes), and we feel that the schools should be right along with them."

Mars Explorers May Go, Return By Venus Route

Either on the way to Mars or on the way back to Earth, the early explorers of interplanetary space may find it helpful to fly close by Venus.

The side trip would lengthen the voyage by a few months, conceded Paul G. Johnson of the Atomic Energy Commission-National Aeronautics and Space Administration Space Nuclear Propulsion Office, but the gravitational deflection from Venus also would hold the spacecraft to a safe speed for return to the Earth's atmosphere.

In a paper prepared for delivery at the American Institute of Aeronautics and Astronautics in Washington recently, Johnson said that with nuclear rockets the trip to Mars would be possible during the 1980's. He surmised as well that the mission would involve six to eight crewmen and take between 400 and 500 days.

AC Named Prime For Apollo Guidance, Navigation System

Realignment of contractor relationships for production of the Apollo spacecraft guidance and navigation system was announced recently by NASA, with AC Spark Plug, Division of General Motors Corp., Milwaukee, Wis. becoming the prime contractor.

In regard to AC's new role, Dr. George E. Mueller, deputy associate administrator for manned space flight, said: "As we move from the initial design phase of the guidance and navigation system into the development and production of complete systems, it has been determined that the most effective management of manufacturing complete systems can be achieved through a prime contractor.

"The designation of AC Spark Plug as the prime contractor during the production phase, does not affect the level of participation by the other principal industrial contractors. Kollsman Instrument and Raytheon Missile & Space Division. The Instrumentation Laboratory of Massachusetts Institute of Technology, under a separate contract, will continue to direct overall design, development and integration of the system into the command and lunar excursion modules."

Kollsman and Raytheon will become sub-contractors to AC and retain responsibility for providing the following:

Kollsman — Scanning telescope, sextant, map and visual display unit.

Raytheon—Onboard computer.

AC Spark Plug, will retain its responsibilities for assembly and test of the complete system and provide the inertial measuring unit, which includes precision gyroscopes, navigation base, power and servo assembly and coupling display unit.

The three firms were selected from 21 industrial bidders in May 1962 to participate in development of the guidance and navigation system. The MIT Instrumentation Laboratory was selected by NASA in August 1961 to design and direct development of the system.

Sperry Gyroscope, Great Neck, N.Y., will provide the



SCHOOL SCIENCE DISPLAY—Ernest R. Baker, left, and Grant Morrison display the educational fold-out science display on which they have been working. The display has interchangeable panels so that it can be updated from time to time. It will be available to area schools on a temporary loan basis.

Proposed One-Man Propulsion Unit Would Provide Moon Transportation

A one-man propulsion unit for the moon, designed to give the lunar explorer a greater range in examining the surface of the moon, has been the subject of a \$70,000 study.

Wooden mockup models of the propulsion unit were constructed to give Manned Spacecraft Center officials an idea of how the units would look.

The study conducted by Hamilton Standard, a subsidiary of United Aircraft Co., had as its main objective to find a way to give the astronaut, already weighted down with pressure suit and back pack, a means of getting quickly over the lunar surface.

Hamilton Standard constructed two models, after studies showed a single unit would weigh too much, one for free space and one for lunar exploration.

The free space unit would enable transfer from the Apollo to the command module, allow repairs on interplanetary missions, and transfer to a space station from a transport ship.

The lunar and free space models have some identical characteristics. Both are body mounted with clamps at the waist, use hydrazine fuel and the same catalyst.

Resembling an overstuffed arm chair without the seat or legs—just the arms, the lunar propulsion device will be controlled by hand levers.

The lunar model has total thrust from four 30-pound thrust

system's pulse integrating pendulum accelerometer under a separate contract to NASA.

All contracts for the Apollo navigation and guidance system are managed by the Manned Spacecraft Center.

rockets, while the free space model gets its power from four 10 pound rockets and twelve two and one-half pound thrusters.

Weight of the units is 158.6 pounds for the lunar model and 92.6 pounds for the free space model. Both have automatic stabilization controls with a manual override, and both are guided by line of sight.

The next phase will be to let a contract for flyable models of the one-man units. The units may not be included in early lunar missions because of the weight problem.

Need for an automatic stabilization control system for the system was shown by the study, because control over the unit could not be maintained by the operator.



THIS ONE-MAN ROCKET propulsion device, light enough and small enough to be stored in a space ship, will enable astronauts to make a quick and close examination of the moon's surface. The model is a result of a recent study conducted for MSC.

Gilruth

(continued from page 1)

is a dumbbell-shaped projector called the Spitz ISTP (Intermediate Space Transit Planetarium, built by the Spitz Laboratories in Yorklyn, Del.

The computer-driven projector and related technical equipment cost \$180,000, is only the second of its type ever built, and is called the most sophisticated in the world.

It works on three axes—earlier projectors have only two—and, unlike earlier projectors, can transport a viewer to the moon or to a satellite traveling in space.

The machine projects 4,170 different stars, 18 of them in colors, onto the 50-foot wide dome. Special shows at the 232 seat planetarium will include the flight of Halley's comet in 1910, the drama of the Star of Bethlehem, the spectacle of a solar eclipse, and the beauty of sunrise and sunset as seen by an astronaut orbiting in space.

Each public showing at the planetarium is closed with a tape recording of the prayer composed by Astronaut L. Gordon Cooper as he orbited the earth in May of 1962.

Webb

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U. S. Army Maj. Gen. Harris B. Hull, who is on Webb's staff, and Stan Smolenski, from the Office of Manned Space Flight.

On hand to greet the group at Ellington were Congressman Albert Thomas; George M. Low, deputy director, MSC; and Dr. Gilruth.

Medical

(continued from page 1)

quarters in Washington, D. C., had six members here to look at the Apollo experiments which are basically related to medicine.

The group was headed by Dr. Loren D. Carlson, who is chairman of the University of Kentucky Department of Physiology and Bio-Physics.

Also in attendance with the group was Dr. Nello Pace who represented the United States at the seventh meeting of the Committee on Space Research (COSPAR) in Florence, Italy, last May, where he presented a paper. Dr. Pace is with the Department of Physiology at the University of California, Berkeley.



TALKING WITH REPORTERS—NASA Administrator James E. Webb, left, along with Col. John Glenn and his wife Annie, and Dr. Robert R. Gilruth, director, MSC, talk to reporters in front of Dr. Gilruth's home in Dickinson, Tex.

Old Mercury Altitude Test Chamber Being Modified For Gemini Program

The altitude chamber used at Cape Kennedy during Project Mercury will be modified and moved to the Manned Spacecraft Operations and Checkout Building at the Merritt Island Launch Area for use in the Gemini Program.

The chamber will be used in preflight acceptance test operations of Gemini spacecraft by Manned Spacecraft Center-Florida Operations and personnel of McDonnell Aircraft Corporation. Flight configured spacecraft and fully suited astronauts will be inserted into the chamber and chamber pressures will be decreased to simulate space flight altitudes of approximately 120,000 feet.

NASA announced that work on the altitude chamber, located in Hangar S, is expected to start next week and is to be completed by mid-September. The first spacecraft to be tested in the modified altitude chamber will be Gemini Spacecraft 3, which will fly the first manned Gemini mission.

At first glance, the massive,

18-foot chamber resembles a huge pressure cooker with windows around its 11-foot diameter. In the air lock, which extends from the main chamber to form the "handle," a two-man team, intimately familiar with spacecraft environmental control systems as well as the physiological aspects of manned spaceflight, is stationed in simulated altitude conditions of 8,000 feet.

The design of the main chamber allows for ascent from sea-level pressures to simulated altitude of 120,000 feet in 45 minutes. However, the chamber can be repressurized to an altitude of 25,000 feet in 30 seconds in the event of a malfunction or emergency. At the same time, the pressure in the air lock can be decreased to 25,000 feet so the observers can enter the main chamber to assist the astronaut or to check the spacecraft.

In addition to other environmental control systems tests, the Mercury spacecraft and the suited astronauts spent approximately four and one half hours (three orbits) in the chamber, simulating actual mission profiles. For the MA-9 mission, Astronaut Gordon Cooper and his spacecraft were in the chamber for approximately 11 hours to meet testing requirements for the longer orbital flight.

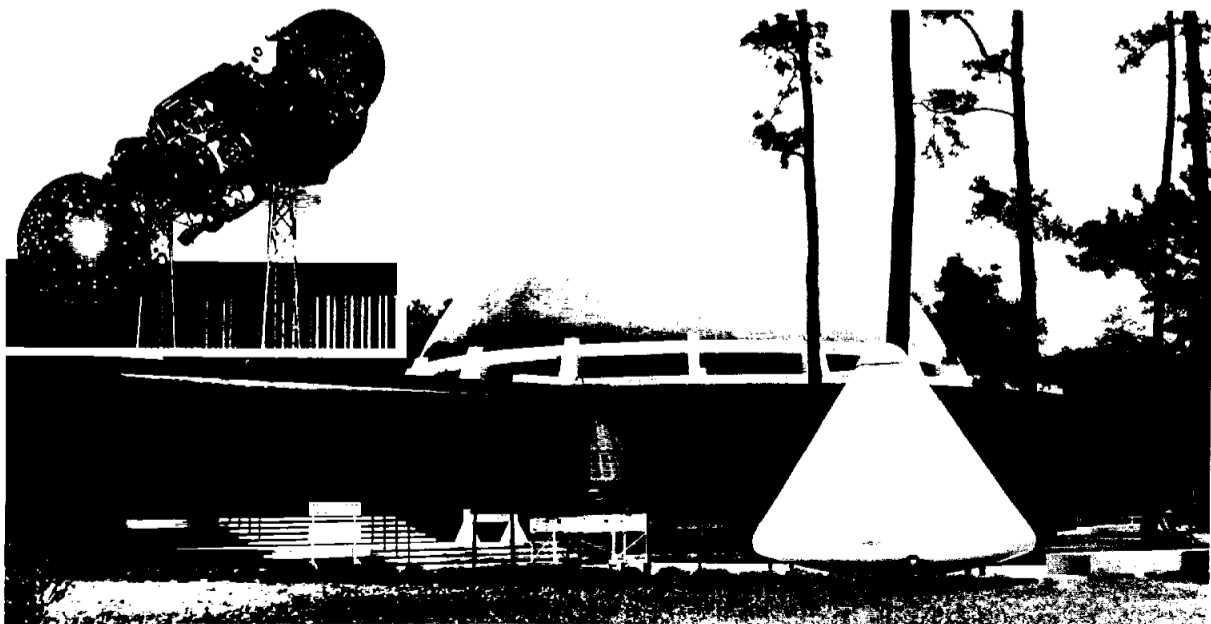
Major modifications to the chamber include elongating the chamber approximately 9 feet, doubling the size of the present pumping system, and adding a nitrogen cold trap system to prevent contamination of the pumps, and an air-conditioning system to cool the chamber during extensive preflight checkout of spacecraft.

Time spent in checkout and testing of Gemini spacecraft in the altitude chamber will be extensively increased over previous Mercury missions due to increased sophistication of the Gemini environmental control system. However, philosophies similar to those proven on the Mercury program will be used during Gemini tests.

The operational and structural integrity of Gemini spacecraft will be insured by a battery of tests such as a pre-chamber run at sea level to check functions required by the flight physicians, suit technicians, and instrumentation engineers. This will be followed by an unmanned altitude chamber run to verify spacecraft environmental control systems. After verification of these systems, the astronauts will be inserted into the Gemini spacecraft and simulated missions will be flown.



COOPER'S PRAYER—Dr. Robert R. Gilruth, left, presents a framed copy of Astronaut L. Gordon Cooper's prayer, composed while he orbited the earth in Faith Seven, to the Houston Museum of Natural Science. Accepting the gift is E. Clyde McGraw, museum president. A tape recording of Cooper's prayer is used as the closing for each public showing in the planetarium.



BURKE BAKER PLANETARIUM—The Burke Baker Planetarium located in the northwest corner of Hermann Park in Houston is classed as one of the world's finest planetariums. Mercury and Apollo spacecrafts shown above are part of the display furnished by the Manned Spacecraft Center at the museum and planetarium. The domed roof of the planetarium is an Italian glass mosaic composed of 756,452 bronze-colored tiles. Inset shows the computer-driven projector in the planetarium.

Symposium

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Division presenting "The Design of a Space Center from Master Plan to Occupancy": Clarke T. Hackler, Guidance and Control Division, "Lunar Landing Approach Studies": Richard E. Day, Flight Crew Support Division, "LEM Free-Flight Simulation"; and Milton Beilock, Jet Propulsion Laboratory, "Surveyor Follow-On Mission and Objectives".

Admission to these monthly meetings requires a security clearance at the confidential level.

For additional information on the symposiums, call Warren Gillespie Jr., meeting manager, at Ext. 33711.

LEM, Agena Engines And Lunar Landing Simulat

A broad spectrum of space components and systems, ranging from tiny electronic sensing devices for spacecraft to rocket engines and unique vehicles for simulating lunar landings on earth, are being designed and built by Textron's Bell Aero-

systems Company in support of the manned space flight program. Bell Aerosystems, active in the nation's manned space effort

since early 1959 when the company was selected to design the reaction control system for Project Mercury, now is making these contributions to the manned space program:

—The Agena rocket engine and secondary propulsion system for the Gemini Target Vehicle.

—The ascent rocket engine for Project Apollo's Lunar Excursion Module.

—Lunar Landing Research Vehicles which are designed to provide a realistic simulation on earth of landings in a lunar environment.

—Positive expulsion propellant tanks for the reaction control systems of the Command and Service Modules and Lunar Excursion Module of Project Apollo.

The efforts of many of the 4,400 creative scientists and engineers, skilled craftsmen and administrative personnel employed by Bell Aerosystems are applied to these programs of the National Aeronautics and Space Administration.

Founded in 1935 as Bell Aircraft Corporation by the late Lawrence D. Bell, the Senior aviation industry pioneer at the time of his death, the company produced the famed P-39 Airacobra and B-29s during World War 2 and paved the way into the jet age with the development of the XP-59A, America's first jet aircraft.

After World War 2 Bell pioneered the supersonic era by designing and building the X-1, X-1A and X-2 rocket research airplanes. Bell's development of the X-5, first aircraft to feature wings whose degree of sweepback could be varied in flight, and the X-14, first jet-powered vertical takeoff and landing airplane, followed the supersonic craft.

In July 1960, Textron Inc. of Providence, R.I. acquired Bell Aircraft's space and defense operations. Bell Aerosystems Company emerged as the operating division for research, development and production of rocket engines, space systems, avionics equipment and other aerospace products.

William G. Gisel, an executive with nearly a quarter-century of experience in the aerospace industry, is president of Bell Aerosystems.

Headquarters and main engineering and production facilities for Bell Aerosystems are adjacent to Niagara Falls (New York) Municipal Airport, where more than 1.6-million of the company's 2-million square feet of facilities are located.

Bell also operates a rocket test center in Niagara County, N.Y., near its main plant and recently announced selection of a 20,000-

acre site in southern New Mexico near White Sands Missile Range as the potential location of a new facility for development testing of advanced rocket engines using high-energy propellants.

Bell Aerosystems' Agena rocket engine, which has achieved a reliability record exceeding 99



WILLIAM G. GISEL
president of Textron's
Bell Aerosystems Company

percent in more than 100 firings in space during the last five years, has been modified to provide multiple restart capability and will serve as the primary propulsion system for the Gemini Target Vehicle with which the two-man Gemini spacecraft will rendezvous in space.

In addition, Bell developed for the Gemini program a new secondary propulsion system for the target vehicle. The secondary system, composed of twin sets of 16 and 200 pound thrust radiation cooled rocket motors plus the propellant and pressurant tankage and all control components, provides on command small changes in velocity for the docking maneuver. The system also is used to re-orient the propellants within the Agena's tanks.

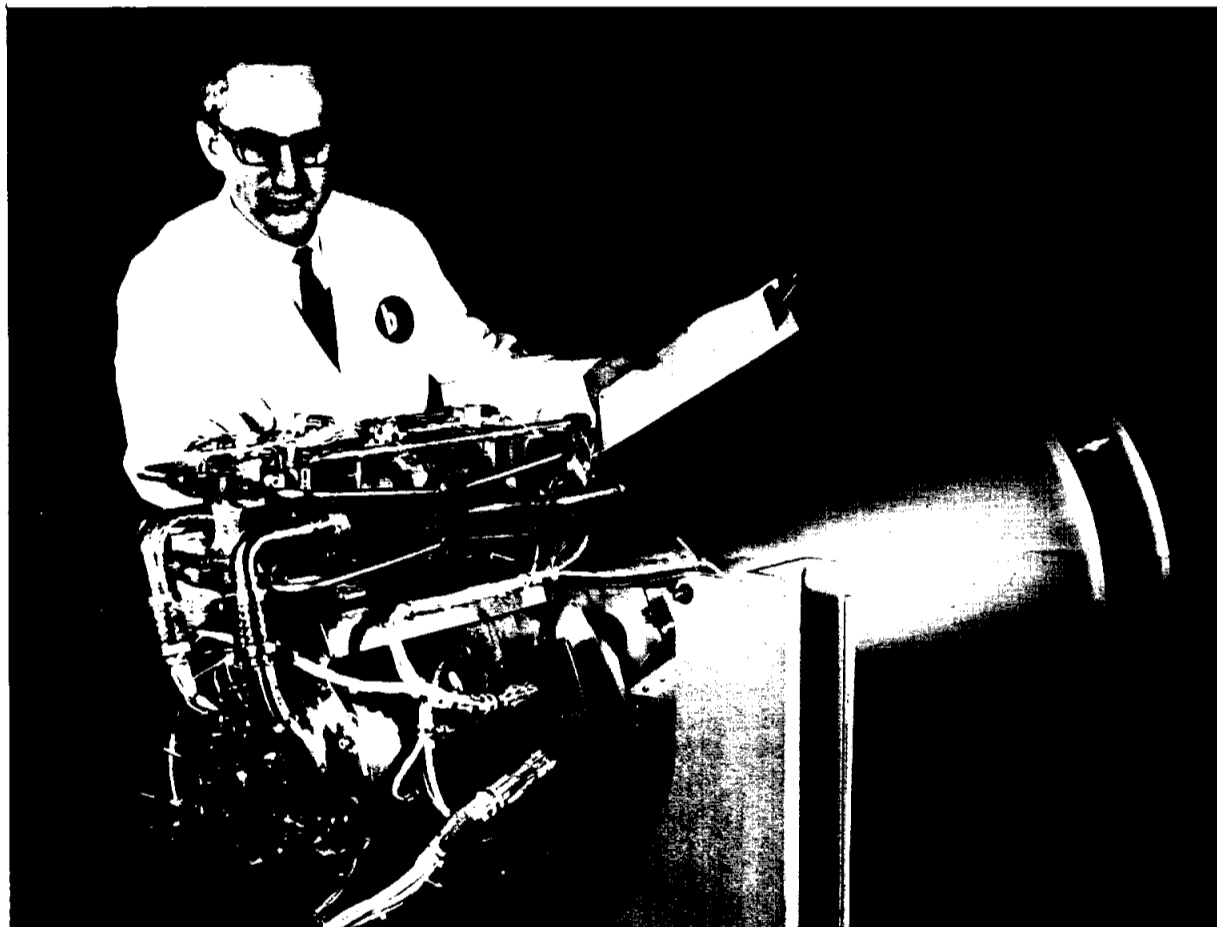
After mating of the Gemini spacecraft with the target vehicle has been achieved, the Bell Agena engine can be restarted by the astronauts, at will, and a variety of maneuvers can be conducted with the joined vehicle. Agena can be maneuvered from either the Gemini spacecraft or the earth.

The 16,000-pound thrust liquid rocket engine, built by Bell under contract to Lockheed Missiles & Space Company of Sunnyvale, Calif., also was the second stage propulsion system for the Ranger spacecraft which impacted the Moon and for the highly-successful Mariner 2 Venus fly-by mission. The Agena engine also is used in other NASA programs, including Echo II, Mariner Mars, OAO, POGO, EOGO and the Nimbus.

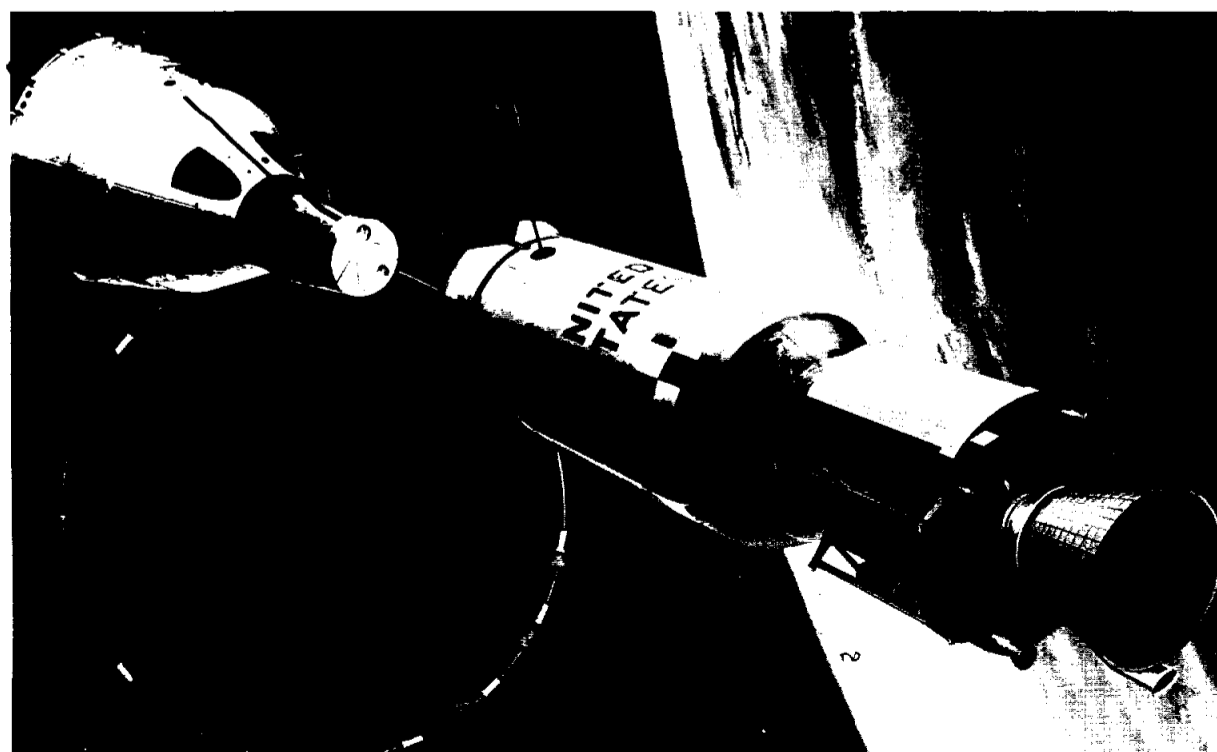
For the Agena vehicles, Bell



BELL AEROSYSTEMS Company headquarters and main plant is situated adjacent to Niagara Falls, N.Y., Municipal Airport and encompasses more than 1.6-million of the company's 2-million square feet of facilities.



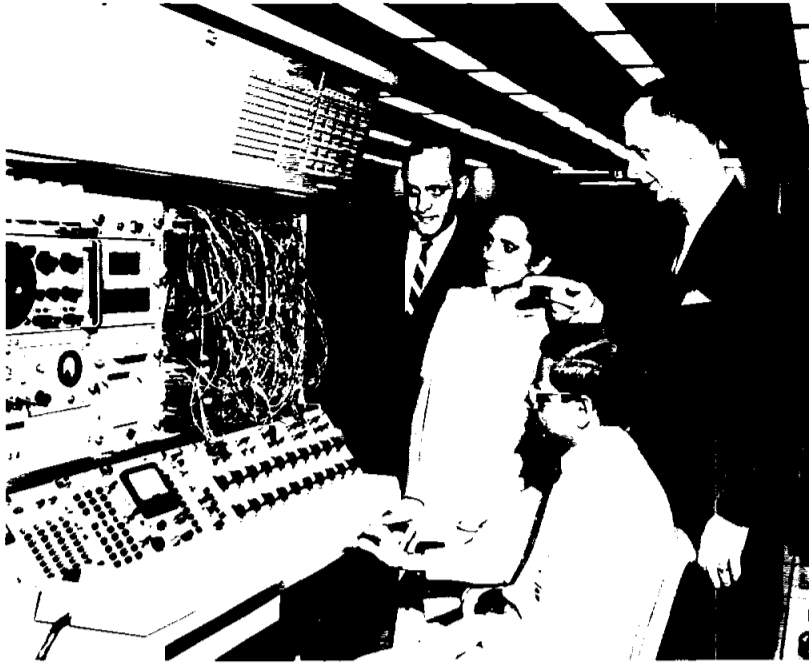
LEM ASCENT ENGINE—Full-scale mockup shows the final configuration of the Lunar Excursion Module's ascent rocket engine now being developed by Bell Aerosystems Company. Entire thrust chamber and nozzle extension are made of an ablative material. The engine, being checked here by a Bell engineer, will develop 3,500 pounds thrust.



RENDEZVOUS AND DOCKING maneuver in space is illustrated in this artist's concept of the two-man Gemini spacecraft about to mate with the Agena Target Vehicle. Bell Aerosystems provides the 16,000-pound thrust Agena rocket engine for the target vehicle (right) as well as the twin-module secondary propulsion system which fits snugly astride the Agena's aft rack.

EDITOR'S NOTE: This is the thirty-first in a series of articles designed to acquaint MSC personnel with the Center's industrial family, the contractors who make MSC spacecraft, their launch vehicles and associated equipment. The material on these two pages was furnished by the News Bureau, Bell Aerosystems Company.

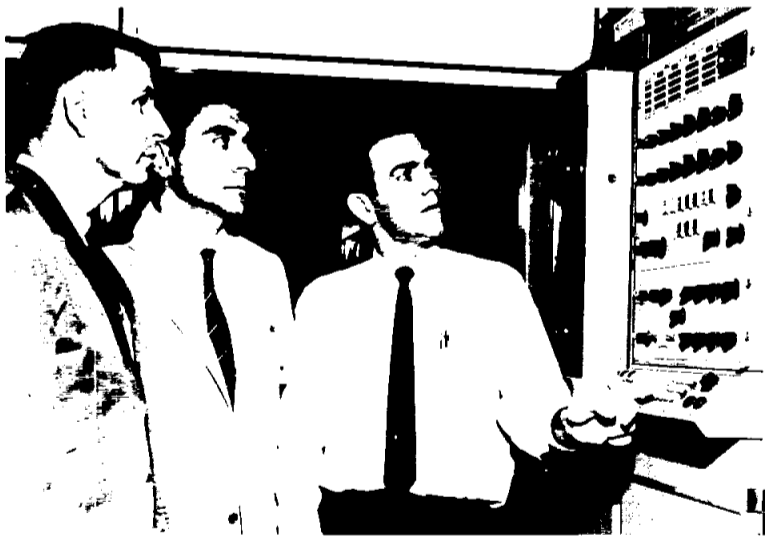
Visitors At MSC . . .



INDIA VISITORS—Robert C. Duncan (right), chief, Guidance and Control Division, explains equipment in his division to Ranchhodlal Amratlal Patel and his wife Taramatir as D. C. Cheatman, assistant chief of the division looks on. The Patels from Bombay, India, are in this country visiting their sons in Houston, one a student at the University of Houston and the other with United Carbon Co.



SCHOOL CHILDREN from a village of the Alabama Coushatta Indians near Livingston, Tex. were recent visitors here at the Center. Fifty were present for the tour.



ITALIAN VISITOR Sergio Passeggeri, center, is shown a computer by Larry Stevens, Central Data Office, during a recent tour of facilities at MSC, as W. J. Wagoner, Resources Management Division, looks on. Passeggeri is in the U. S. through the Eisenhower Exchange Fellowships Inc.



MATH TEACHERS—A group of 45 teachers participating in the National Science Foundation Summer Institute for Secondary School Teachers of Mathematics were given a tour of the Center recently. They are attending the institute at Southern University, Baton Rouge, La.

Sleepers League Leaders, Sharp's 270 Tally High

As the NASA Space Couples Mixed League Bowling finished the third week of competition at Beach Bowl bowling alleys, Cocoa Beach, Sylvia Sharp, Jean Vaughn, Fred Sharp, and Norbert Vaughn of the Sleepers were still firmly entrenched in first place.

The Way Outs' Marjorie Jones, Billie Miller, Bill Underwood, and Dave Ouellette also retained their hold on second place. For third place honors, Micke Long, Ann Heard, Paul Backer, and Ed Thomas of the Fabulous Four, last week's fourth-place team, traded places with the Apogees.

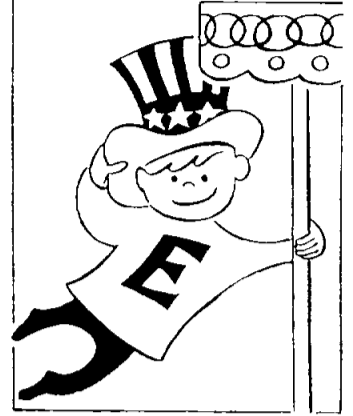
High Male Average went to the Eggheads' George Boukedes with his 180, and High Female Average was won again by Babbett Cissel's 151 for the Aggitators. Cissel also walked away with the High Game Female, awarded for her 198

game. High Game Male was copped by Sleeper Fred Sharp's 270.

August 1 Deadline For Entering Graduate Program

All employees at the Manned Spacecraft Center who are interested in the part-time graduate program at the University of Houston should apply for admission by August 1, if they have not been previously en-

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rolled in the program. Admission blanks are available at the Training Branch in Bldg. 323 at Ellington AFB, or call Ext. 7311 for more information.

Management Requests, Schedule Lunch Periods To Alleviate Congestion

Employees at the Manned Spacecraft Center have been requested by Center management to normally schedule their lunch periods during certain hours to alleviate the congestion in the MSC Cafeteria.

Employees whose duty hours are from 8 a.m. to 4:30 p.m. are asked to schedule their 30-minute lunch period sometime between the hours of 11 a.m. and 12:30 p.m.

Those with duty hours from 8:30 to 5 p.m. are asked to schedule their lunch period during the hours 12:30 to 2 p.m.

Spotlight On Secretaries . . .

REBECCA KINARD (top r.) is secretary to Philip R. Maloney, who heads the MSC-Florida Operations liaison office here at the Center. She joined NASA at Cape Kennedy, Fla. in September 1962 as a secretary in the Mechanical Systems Branch. Rebecca was born in Starkville, Miss. and completed high school in that city. She was graduated from Mississippi State University with a BS degree in commercial education. Prior jobs were with the USDA Farmers Home Administration in Mississippi and before coming here in April she was secretary to the assistant manager for Engineering at MSC-FO. She resides in Houston and sports she enjoys include bowling, tennis and water skiing.

DARLENE BUTLER (right) is secretary to Joseph G. Thibodaux Jr., chief, Propulsion and Power Division. She joined the Space Task Group in September 1961 at Langley where she worked in the Systems Engineering Branch. Darlene was born in Carlisle, Penn. and attended Warwick High School in Newport News, Va. Prior to joining NASA, she was a secretary at the Naval Supply Center, Williamsburg, Va. Her husband, Marshall Butler Jr., is a real estate salesman in Fairmont Park and the couple reside in Pearland, Tex. Among her spare time interests she includes sewing and water sports.



EAA Symbol Contest Offers \$25 Bond Prize

A contest to design a symbol for the Employees Activities Association (EAA) was announced recently with the winner to receive a \$25 savings bond.

The rules of the contest limit entries to employees of the Manned Spacecraft Center. Each employee may submit as many different designs as they wish.

A symbol is needed which will serve as a point of recognition for the organization and can be used also on letterheads,

announcements, marking EAA equipment, and etc. The design should include the letters EAA in some shape or form.

All entries must be in by no later than Tuesday, September 1. Send your entry or entries to Alfred J. Ligrani, president of the EAA, interoffice routing code FB.

Recognition, Cash Awards Await Employee Suggestions

President Lyndon B. Johnson in a recent message to employees on the Incentive Awards Program's "decade of progress," called on employees "to make your suggestions known to your agency."

He added, "I intend that special recognition will be given to those of you who make notable advances in providing efficient service at lower cost.

Worthwhile suggestions will pay off in recognition and cash awards. In turn, these suggestions can help improve Government operations.

MSC employees are encouraged to start on the road to an improvement suggestion right

now—as Federal employees everywhere celebrate during 1964, a decade of progress in the Government-wide Incentive Awards Program.

Suggestion blanks can be obtained in the division offices. Upon completion they should be mailed to the Executive Secretary, Incentive Awards Office, BP22, Building 2, Room 121b.

News Of Employee Activities Solicited For Use In Roundup

News concerning employee activities here at the Manned Spacecraft Center and other MSC employee locations is solicited for inclusion in the center section of the Roundup.

If you are a member of an organized group of MSC employees and wish to publicize your organization's meeting dates and activities, the Roundup welcomes the opportunity to serve you.

Groups that are affiliated with NFFE Seminar To Be Conducted In Houston

The National Federation Federal Employees (NFFE) will hold a seminar for interested MSC and area federal employees, at the Holiday Inn, Wayside Drive and Gulf Freeway, beginning at 9:30 a.m. this Saturday.

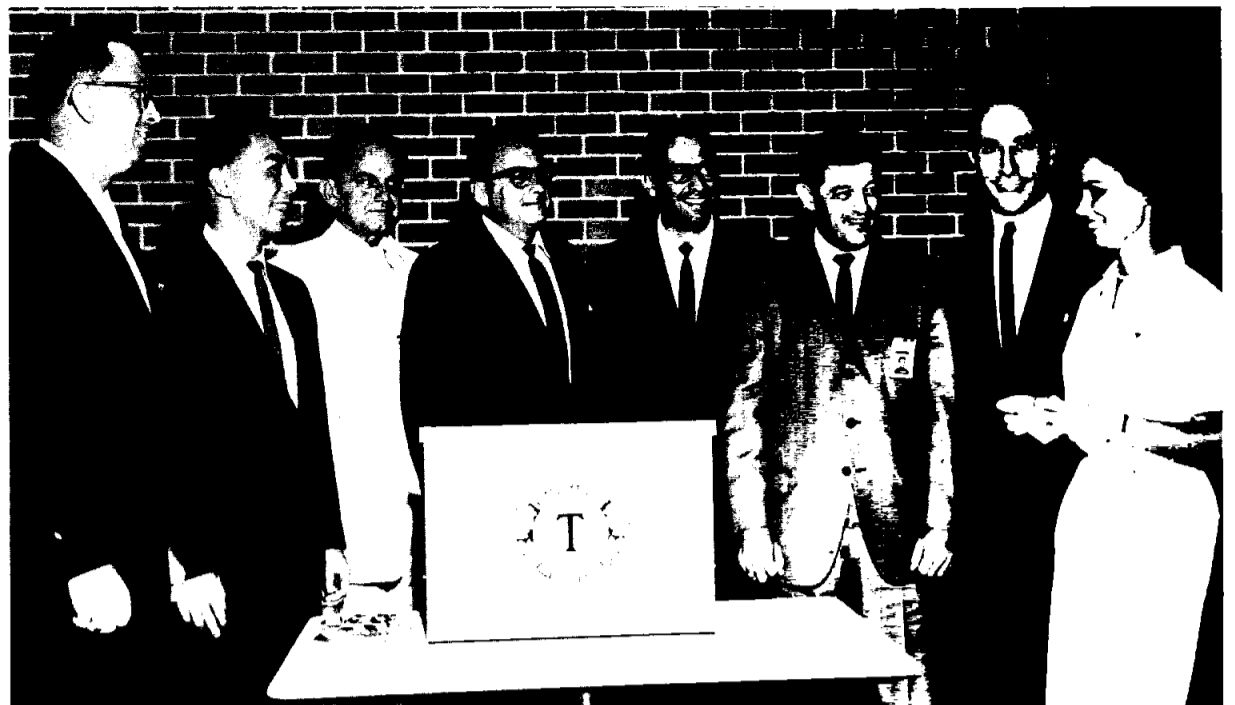
An orientation of the NFFE, its organization, benefits, and opportunities offered to prospective members will be presented.

the Employees Activities Association (EAA) are encouraged to contact the various chairmen responsible for the area covering their organization.

Others not affiliated with EAA send the information directly to the Editor of the Roundup, interoffice routing code AP3, or bring the information to Rm. 140 in Bldg. 1.

If you know of an employee who has performed an outstanding service or received a signal honor, you are solicited to note the facts on paper and send them to the Roundup for possible publication in the employee news section.

All contributions must be signed and have to be in the Roundup office no later than the Wednesday preceding publication for inclusion in the coming issue.



TOASTMASTER INSTALLATION—The Toastmaster club at MSC held an installation of their first slate of officers at the MSC Cafeteria on July 15. Installation ceremonies were conducted by J. W. Albritton (left) area governor of Toastmasters International, and Sylvie Kelarek (right), Ellington Toastmistresses Club. Officers are (l. to r.) Bill Der Bing, president; Philip Hamburger, educational vice president; Art Garrison, (standing in for Marv Matthews) secretary; Don Gregory, administrative vice president; Jim Grimwood, treasurer; and Ron Bake (standing in for sergeant-at-arms). The club meets the first and third Wednesdays of each month in the MSC Cafeteria.



ARCS BENEFIT PERFORMANCE—Mrs. Alan Shepard, left, and Grace Winn make preparations for the benefit performance of "Camelot" which is scheduled for September 1, at the Houston Music Hall, and sponsored by the Achievement Rewards for College Scientists Foundation. Tickets are available through members of ARCS at MSC and from C. L. Spillers, manager of the MSC Cafeteria. For information on who to contact for tickets, call Grace Winn at Ext. 34433. Proceeds will go to the ARCS Scholarship Fund for deserving college-level students in the scientific and technological fields.

MSC at work...



STANLEY LAPINE, stock records clerk, Logistics Division, Storage and Distribution Branch, uses the card file to locate an item for issue.



PAUL O. FERGUSON, of the Instrumentation and Test Section, Crew Systems Division, works on a Gemini cabin heat exchanger.

MSC BOWLING ROUNDUP

MSC COUPLES LEAGUE		
Standings as of July 14		
Team	Won	Lost
Cottonpickers	18½	5½
Our Gang	16	8
Four Aces	16	8
Uncalled Four	16	8
Schpidrunners	14	10
Fireballs	12½	11½
The Thinkers	10	14
Bowlernauts	7	17
Shucks	5	19
Lucky Seven	5	19
Women's High Game: Sharon Swain 210.		
Men's High Game: Leon		

Galler 228.		
Women's High Series: Sharon Swain 590.		
Men's High Series: Leon Galler 657.		
SPACE COUPLES MIXED		
Standings as of July 10		
Team	Won	Lost
Sleepers	9	3
Way Outs	7	5
Fabulous Four	6	6
Apogees	6	6
Aggitators	5	7
Vectors	5	3
Resets	4	8

or Built By Bell Aerosystems

supplies electronic speed sensing devices, called digital velocity meters, which signal the Agena engine to shut down the instant the desired velocity is achieved.

Bell Aerosystems is working on several programs connected with or in support of Project Apollo.

About a year ago, Grumman Aircraft Engineering Corporation of Bethpage, N.Y., the Manned Spacecraft Center's prime contractor for the Lunar Excursion Module, selected Bell to design, fabricate, test and deliver the rocket engines that will be used by Project Apollo astronauts to launch the LEM from the surface of the moon for the return trip to the orbiting Command and Service Modules.

Nitrogen tetroxide and a 50/50 blend of hydrazine and unsymmetrical dimethylhydrazine are the propellants for this rocket engine which will develop 3,500 pounds thrust. Entire thrust chamber and nozzle extension are made of an ablative material. The pressure-fed engine features series-parallel redundant valving and has a valve-out capability which will enable it to fire even if one valve fails.

The development program of the LEM ascent engine now is well under way at Bell and altitude test firings of these rocket engines, which are vital to the success of the Apollo program, are scheduled to begin in the near future.

Positive expulsion tanks, being designed, built and tested by Bell Aerosystems, will be used in the reaction control systems of LEM and the Command and Service Modules to force the propellants to the rockets which are used for positioning, orientation and stabilization of the three-module Apollo spacecraft.

Positive expulsion devices are required in space vehicles because the liquid propellants do not flow naturally to the tank outlet as they would on earth. Instead, under the zero or low gravity conditions of space flight, the propellants tend to

float in the tank or cling to the tank walls.

Expulsion of the propellants is achieved by enclosing the fuel and oxidizer in flexible bladders within the tank. Pressure applied



A BELL ROCKET tank project engineer views in sunlight an inflated positive expulsion bladder, similar to those which will be used in the Command and Service Modules and Lunar Excursion Module for Project Apollo. Visible within the bladder is the collector tube through which the propellant is expelled as the bladder compresses around the tube. Bladder fits inside a metal tank.

between the tank wall and the propellant filled bladder squeezes the propellant to the reaction control rockets.

In April of this year, Bell Aerosystems delivered to the NASA Flight Research Center at Edwards, Calif., two unique Lunar Landing Research Vehicles which will be used in direct support of Project Apollo.

The LLRVs will be used in an extensive NASA research program having the three-fold purpose of exploring the problems associated with lunar landings, providing data to aid in the design of the LEM and training astronauts assigned to the Manned Spacecraft Center in the correct procedures of approach, hover and touchdown on the surface of the moon.

Warren J. North, chief of the Flight Crew Support Division at MSC, called the delivery of the LLRVs to NASA "a significant milestone" in the Apollo program.

These research vehicles now are being ground-tested at NASA-Edwards with flight test-

ing scheduled to get under way in August.

The LLRV is a vertical take-off and landing vehicle that is designed to fly to altitudes of 4,000 feet. It can hover and fly horizontally.

A General Electric CF-700 turbofan engine and Bell Aerosystems' hydrogen peroxide rockets provide the thrust which enables the vehicle to take off, hover and then gently drop to earth in simulated lunar landings.

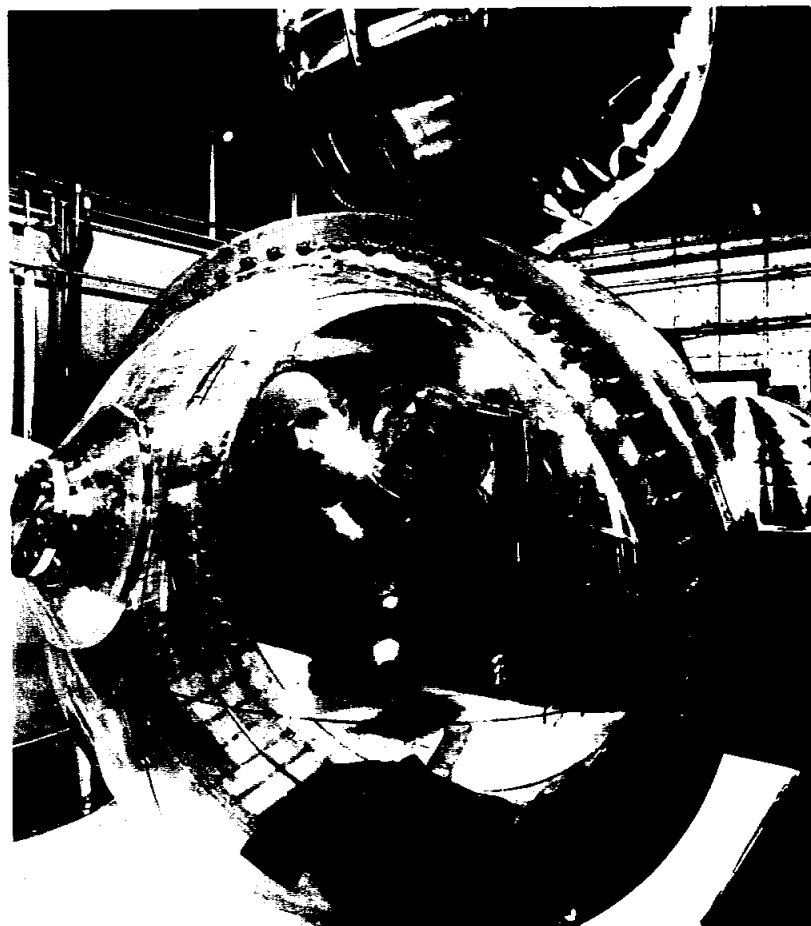
The turbofan engine is automatically controlled and provides lift equal to five-sixths of the vehicle's gross weight. Thus, this engine counteracts five-sixths of the earth's gravity. The remaining one-sixth earth gravity is comparable to the gravity on the moon.

Lift of the remaining one-sixth of the vehicle's weight is provided by two Bell rocket motors with 500 pounds thrust each. Controlled by the pilot, these rockets are throttleable and simulate the engine used for lunar landings. Bell reaction control rockets, similar to those used on all of the nation's manned space flights to date, provide attitude control for the LLRV.

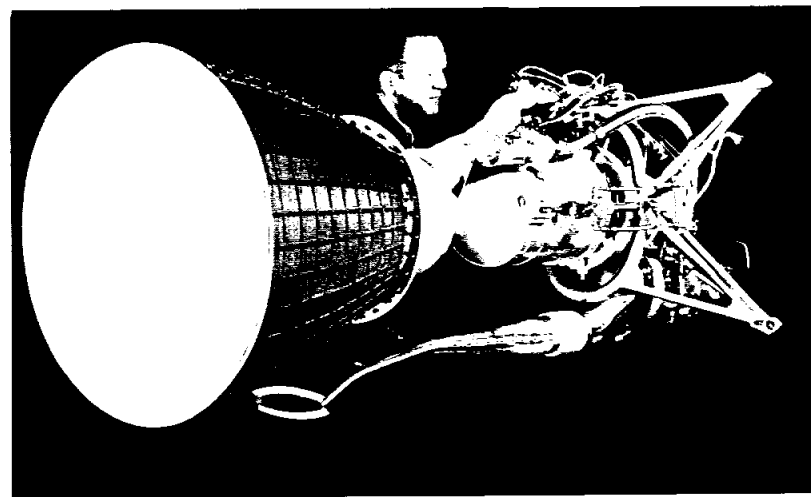
Rounding out Bell Aerosystems' work for the manned space program are the company's investigations of space and lunar locomotion.

Bell scientists recently completed for the NASA Office of Advanced Research and Technology an extensive program in extra-vehicular locomotion and life support systems. The study concluded that for most tasks, especially on the lunar surface, a powered surface-contact vehicle with a supplemental rocket propulsion device would provide the best means of locomotion.

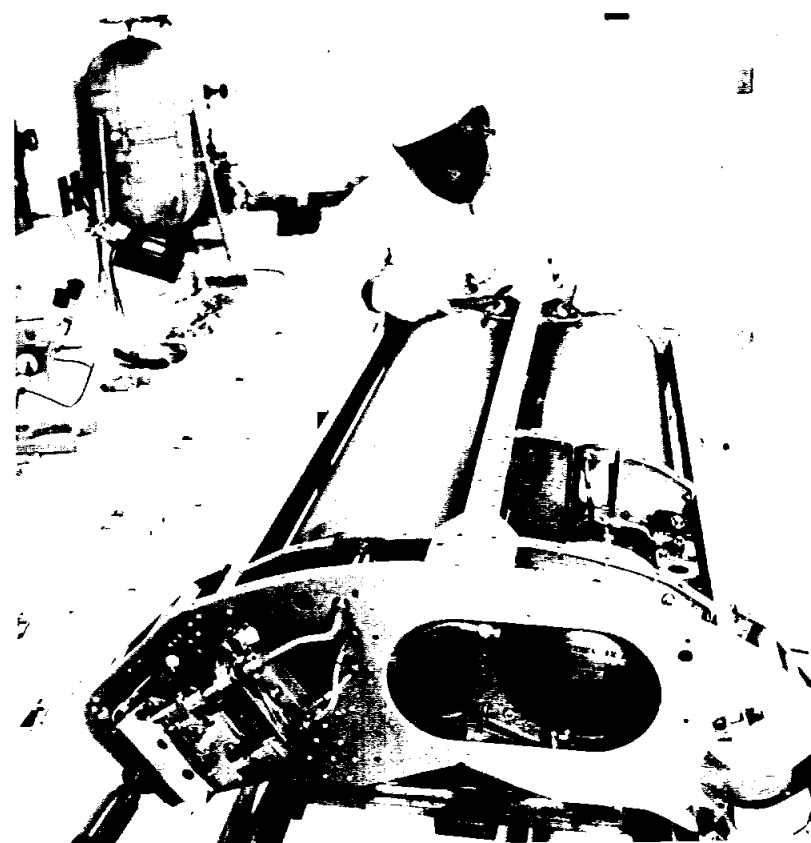
In the field of one-man rocket propulsion systems, Bell has designed and built the only known rocket-powered device in the world which propels man above the ground in controlled free-flight. Studies of flight tests of the Bell Rocket Belt have indicated that no new stabilization and control problems will be encountered on the moon.



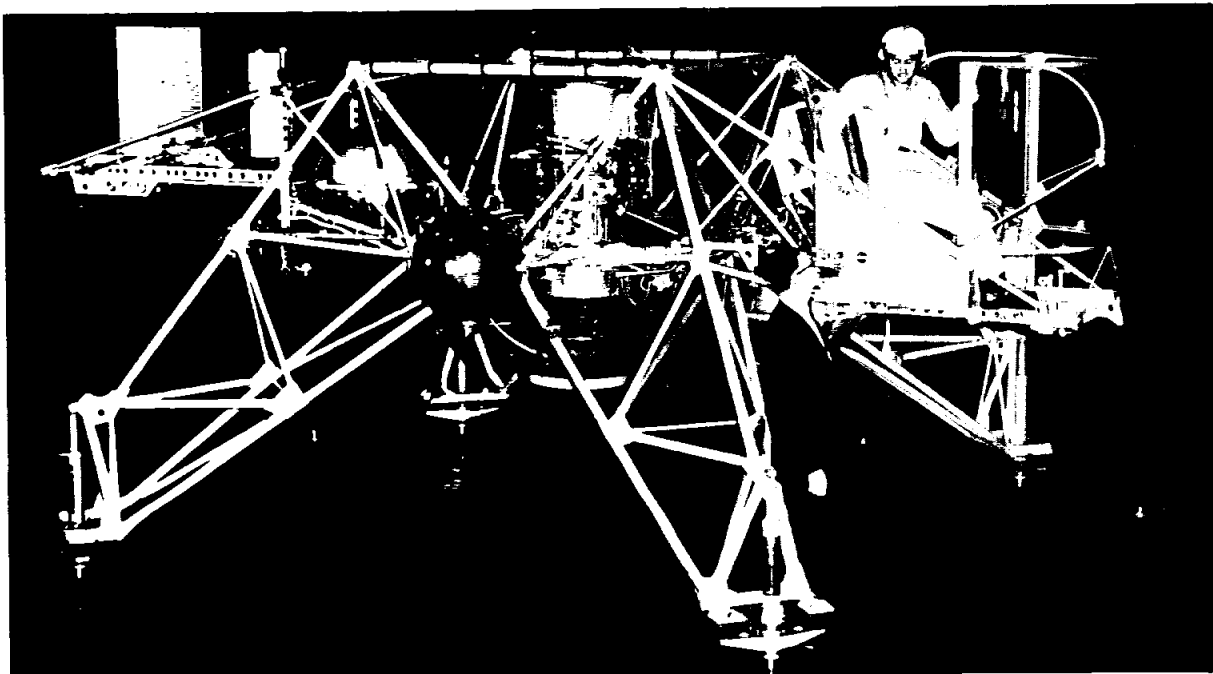
POSITIVE EXPULSION DEVICES designed by Bell Aerosystems will be used in the reaction control systems of the Command and Service Modules and Lunar Excursion Module for Project Apollo. Here, a rocket technician examines a spherical-shaped plexiglas test tank which permits visual monitoring of positive expulsion bladders for rocket propellants.



THE BELL AGENA rocket engine, being checked here by a Bell Aerosystems technician, has accounted for 117 spacecraft in earth orbit or 65 percent of the 180 U.S. spacecraft orbited during the past five years. The Agena engine has been modified to provide multiple restart capability for the Gemini mission.



AGENA SECONDARY PROPULSION system, shown here being inspected in a Bell Aerosystems clean room, consists of a set of 16 and 200-pound thrust, radiation-cooled rocket motors, positive expulsion propellant tanks, a pressurization system and various valves and controls necessary to support each module. Each Target Vehicle used in the Gemini mission will have two modules which fit snugly astride the Agena's aft rack.

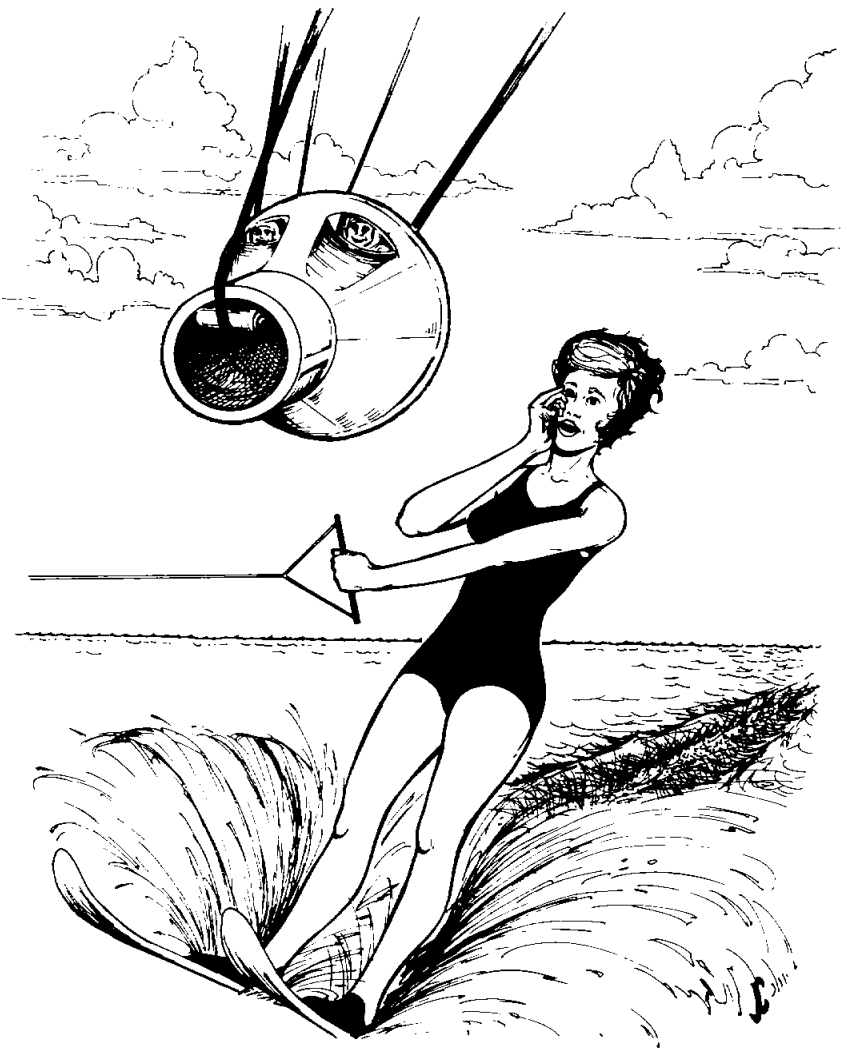


THIS UNUSUAL DEVICE is the Lunar Landing Research Vehicle designed and built by Bell Aerosystems to enable astronauts assigned to the Manned Spacecraft Center to perfect techniques of lunar landings.

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 Paul Haney
Chief, News Services Branch Ben Gillespie
Editor Milton E. Reim

On The Lighter Side



"George! I think I'm being followed!"

Confidence Is Expressed In Nation's Continued Backing Of Space Program

Dr. Hugh L. Dryden, deputy administrator of the National Aeronautics and Space Administration, expressed confidence recently that the nation will continue to lend moral and financial support to the peaceful exploration of space.

Addressing the first annual meeting of the American Institute of Aeronautics and Astronautics in Washington, Dryden traced the history of the nation's goals in air and space—from the early one-man project aircraft to

today's complex aerospace technology and its management.

"Within the past two years," Dryden said, "the subject of the broad national goals of the space program has emerged as a subject of public debate. Many of the participants mistakenly assume that there is a single such goal but in fact there are many."

Dryden listed human knowledge of space, development of efficient space vehicles and the utilization and international exchange of technological information as three significant goals along with national prestige and national defense.

"It is because of the sum total of all these goals that the nation has so far supported, and I believe, will continue to support a comprehensive program to explore space. I believe that the rate and scale of the program are not excessive in view of the great resources of this country."

Dryden was the recipient of the AIAA's Louis W. Hill Space Transportation Award at Honors Night ceremonies preceding his address.

Welcome Aboard

Sixty-six new employees joined the Manned Spacecraft Center during the last reporting period. Of this total, 32 were assigned here in Houston; 20 to Cape Kennedy, Fla.; 12 to White Sands Operations, New Mexico; one to Daytona Beach, Fla.; and one to St. Louis, Mo.

AUDIT OFFICE: Wayne S. Fagan.

PUBLIC AFFAIRS OFFICE: Elaine P. Strack.

PROCUREMENT AND CONTRACTS DIVISION: Kathleen Warren.

RESOURCES MANAGEMENT DIVISION: Bernadette M. Carona, J. C. Le Flore, and Peggy S. Miller.

WHITE SANDS OPERATIONS (New Mexico): Jack Blacker, Albert A. Duran, Leslie W. Dyer, Sheldon V. Jennings, Charles E. Kelch, Wallace R. MacGregor, Winford C. Oliver, William M. Schroeder, Robert L. White, and Warren J. Wood.

ENGINEERING DIVISION: Edward C. Bernard, William T. Jackson, and Charles A. Lauritzen.

TECHNICAL SERVICES DIVISION: Charles J. Genand.

OFFICE OF ADMINISTRATIVE SERVICES: Teresa R. Sullivan, David Kogen, and Leavie I. Needham.

TECHNICAL INFORMATION DIVISION: Herbert L. Tash.

GEMINI PROGRAM OFFICE: Patricia A. Jackson, and Clinton D. Marsh.

APOLLO SPACECRAFT PROGRAM OFFICE: Marquis W. Bolton, Roy A. Harlan, Alexander S. Paczynski (WSO, N.M.), Joan M. Pesek, and Lois S. Rice (Daytona, Beach, Fla.).

STRUCTURES AND MECHANICS DIVISION: Charles H. Jackson, and James J. Liput.

ADVANCED SPACECRAFT TECHNOLOGY DIVISION: Charles R. Davis, and John F. Stanley.

CREW SYSTEMS DIVISION: Fred A. McAllister, George A. Post, Donna S. Scott, and Elton M. Tucker.

INSTRUMENTATION AND ELECTRONIC SYSTEMS DIVISION: Charles D. Levy.

PROPULSION AND POWER DIVISION: Michael C. Brandon (WSO, N.M.).

MSC-FLORIDA OPERATIONS (Cape Kennedy, Fla.): John W. Baicy, Michael C. Brandon, Charles E. Carraway, Harvey E. Crawford, Anita M. Culotta, Marie D. Culotta, Fred Fisher, Mansour A. Jowid Jr., Paul B. Keith, Thomas M. Levann, Richard D. Nathan, Joyce L. Newgent, William D. Nowlin, William R. Parry, Lowell J. Price, Gerald F. Schiedel, M. Carolyn Schrunck, Raymond L. Schrunck, Donald B. Simmons, and James W. Weldon Jr.

FLIGHT CREW SUPPORT

MSC PERSONALITY

Dr. William A. Lee Of Apollo In On Early Mercury Program

The man who was responsible for implementation of the Mercury Control Center at Cape Kennedy and the Bermuda Control Center during the early days of Mercury, is now chief of the Operations and Planning Division in the Apollo Spacecraft Program Office.

He is Dr. William A. Lee, and when he was doing the above, he was not with NASA but with the Bell Telephone Laboratories.

In addition to the above while with Bell, he was also in on the operational planning for the Mercury ground tracking network and was responsible for the operational planning and design of control consoles for the Telstar ground station in Andover, Me.

Lee's responsibility in his present position is planning the lunar landing mission to determine the functional requirements to be placed on the flight hardware, coordination with the Office of Manned Space Flight in the development of the Apollo systems specifications, and planning the Apollo test flight program.

He joined NASA in March 1962 as assistant director, Systems Studies, OMSF, NASA Hq and accepted his present position with MSC on Dec. 22, 1963.

Lee was born in New York City and attended high school at Peekskill, N. Y. Military Academy.

ASSISTANT DIRECTOR FOR FLIGHT OPERATIONS: Mary T. Wickham.

FLIGHT CONTROL DIVISION: Harley E. O'Pry Jr., and Arda J. Roy Jr.

He received a BA degree from Williams College in Williamstown, Mass., a MA degree and his PH.D from the University of Virginia. His field of study was in experimental psychology.

From 1955 to 1962, Lee was a supervisor and member of the

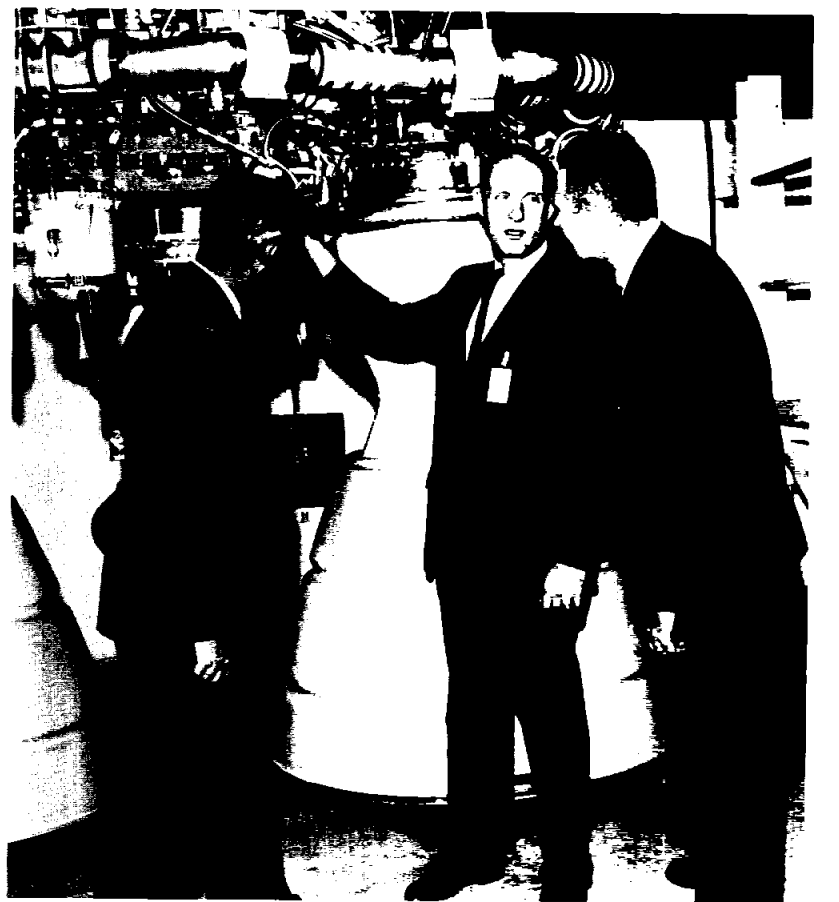


DR. WILLIAM A. LEE

technical staff of the Bell Telephone Laboratories.

He is a member of Sigma Xi, American Psychological Association, American Association for the Advancement of Science, Human Factors Society, and the Psychonomic Society.

Lee is married to the former Ruth Fuhrer of Gloversville, N. Y. and the couple has four children: Robert 12, Edward 9, Nathan 5, and Charles 3. The family resides in El Lago, Seabrook, Tex.



POWER FOR MANNED GEMINI—Astronaut Tom Stafford (center) examines the main rocket engine for the first manned Gemini flight scheduled later this year. Stafford is the back-up co-pilot on the first flight. Looking on are Col. Richard C. Dineen (left), director, Gemini Launch Vehicle Directorate at the Air Force's Space Systems Division, and James F. Toohy, of Aerojet-General Corporation's Liquid Rocket Operations where the engine was produced. Toohy is the "Guardian Engineer" for the rocket system and goes with the engine from the time it is a collection of parts, through assembly, purchase test checkout and right up to the moment of launch.

SPACE QUOTES

"The moon as the objective of the Apollo program may be likened to the Paris objective of Lindbergh's flight. His goal was not Paris but the development and demonstration of the capability, equipment and know-how for transatlantic flight." Dr. George E. Mueller, associate administrator for Manned Space Flight, NASA.

Mexico City Matador Used In Medical Experiments For MSC

A charging bull, a bravemataador, cheering Mexico City aficionados—hardly the place for a space medicine experiment.

But it was. Beneath the matador's costume, pinned to his skin, were sensors, sending

and skiers undergo as much or more physical stress as astronauts in space flight.

None of the orbiting astronauts had heart rates higher than 184 beats a minute, while race car drivers reached 200.

Public Health Service Hospital in San Francisco using a drug that retains salt in the body.

An orbiting astronaut perspires profusely and in most cases suffers dehydration. The drug would be injected just before re-entry—maximum stress period, Dietlein said, and the salt content would stay constant, hopefully stopping dehydration.

Dietlein said studies also were being made to use drugs to retain water in the body.

The main ill effect of space travel, encountered by us and the Russians, was postflight dizziness.

"It is not certain," Dietlein said, "whether weightlessness or immobilization caused the dizziness."

Three bed rest studies are being conducted in connection with immobilization. Weightlessness cannot be simulated except for brief seconds in a diving airplane, which is not applicable for medical experiments, Dietlein said.

The Baylor School of Medicine at Houston puts paid student volunteers to bed for periods of two weeks or longer.

After a check of pulse rate, blood pressure and respiratory rate—before and after bed rest—the student is rotated on a tilt

table.

"It produces the same dizziness astronauts experience," Dietlein said.

The dizziness has been curtailed by exercise while in bed—raising arms over the head, or

kicking one leg at a time—movements that could easily be done in a spaceship.

An inflatable cuff placed around the thighs, calves and forearms, has cut dizziness also, Dietlein said.



SENOR FERMIN RIVERA, famed Mexican matador, is prepared for bio-instrumentation before entering the bullfighting arena in Mexico City. Sensors are attached to his body by David Haswell, project engineer for Biodynamics, Inc., Cambridge, Mass., who has also monitored the heart rates and other physiological data of sky divers, skiers, hockey players and sports car racing drivers as part of a study on physiological stresses being conducted for the Manned Spacecraft Center. Dr. Pedro Navarro, the matador's personal physician, (left) assists Haswell.

telemetry signals to recording machines inside the bull ring.

Each time the bull lunged at the matador, the sensors recorded the body's reactions. The heart beat, respiratory rate, body temperature—all were noted.

Manned Spacecraft Center doctors used this information in a study to determine how much physical stress the human body can stand, and what effect stress has on performance.

From past studies, it was determined that race car drivers, hockey players, sky divers, bowlers, milers, polo players

The heart's normal rate is between 50 and 60 beats a minute, but healthy persons have experienced 180 beats a minute sitting in a dentist's chair.

Physical stress is one of 13 experiments financed by the National Aeronautics and Space Administration. Bio-Dynamics Inc., Cambridge, Mass., conducted the study.

All experiments are under the supervision of the space medicine branch of the Manned Spacecraft Center and headed by Dr. Lawrence F. Dietlein.

The tall, pipe-smoking doctor, told of an experiment at the U.S.

Realistic Space Flight Trainer Being Built For Center Use

Flight crews for Gemini and Apollo space flight missions will receive realistic training—vibration, motion, noise, everything except the smells—in a Dynamic Crew Procedures Simulator to be built by Ling-Temco-Vought Astronautics of Dallas.

NASA Manned Spacecraft Center has signed a contract with LTV-Astronautics for \$1,125,040. Under terms of the contract, LTV will deliver the simulator within eleven months.

Mounted on a moving base, the simulator will be designed to satisfy two training needs by providing a flexible device for study of man-machine task assignments, and by providing a realistic launch vehicle simulator.

LTV will be responsible for the design, construction, evaluation, check-out and installation of the simulator in the Center's Mission Training and Simulation Facility.

Although the simulator will be equipped initially with a two-man Gemini gondola, a three-man Apollo gondola will be fitted at a later date for training astronauts for lunar missions.

Also, the simulator will be capable of driving the gondolas through all the spacecraft motions—roll, pitch, yaw and vibration.

Another feature of the trainer is a visual display system capable of simulating through-the-window views of star fields, earth or moon horizon, rendezvous target vehicle or landscape.

Computer equipment will be utilized to drive the moving-base gondolas and their cockpit displays in realistic "feel-of-flight" simulations.

In addition to the normal motions of yaw, pitch and roll, the crew procedures simulator will feed vibrations into the cockpit to simulate lift-off, powered flight and reentry conditions. Noises attendant to these flight phases will also be fed into the crew gondolas.

Space Electric Rocket Test-I Flight To Verify Ion Engine Space Thrust

The National Aeronautics and Space Administration's launch of the 375-pound SERT I (Space Electric Rocket Test) spacecraft on a sub-orbital flight from Wallops Island, Va., was scheduled for no earlier than July 18 using a four-stage solid-fuel Scout rocket.

The experiment will test for the first time in space two NASA electrostatic (ion) engines.

Primary purpose is to verify that the ion engines can produce thrust in space. This is possible only if the positive ion exhaust beam can be effectively neutralized. Methods of neutralizing the beam appear to work in ground vacuum tank tests but must be verified in space.

The SERT I flight test is part of the program being carried out by the NASA Headquarters Office of Advanced Research and Technology at the Lewis Research Center. It is aimed at providing research information and technology required for future development of electric engines.

Since electric engines exhaust their propellant at speeds much greater than conventional chemical rockets, they become contenders to propel future deep space missions. This increased exhaust velocity gives them a greater "specific impulse"—a miles-per-gallon-type figure for rockets.

SERT's test engines have exhaust velocities greater than 100,000 miles per hour. For research use, the thrust of the two test engines, .001 of a pound and .006 of a pound, is sufficient to study the problem of ion beam neutralization.

The SERT I spacecraft is spin-stabilized and contains two



FAMED MATADOR Fermin Rivera executes a "pase de fecho" during a bullfight in Mexico City recently. During the competition Senor Rivera's heart rate was monitored by tiny electrodes and transmitters as part of a study on physiological stresses being conducted for NASA's Manned Spacecraft Center by Biodynamics, Inc., Cambridge, Mass.

ion thruster engines of different types driven by a single battery supply.

One engine, using mercury as a propellant, is an electron bombardment ion engine, built by the Lewis Research Center. The other engine, built by Hughes Aircraft Co.'s, Hughes Research Laboratories, Malibu, Calif., is a contact ionization thruster and uses cesium for a propellant.

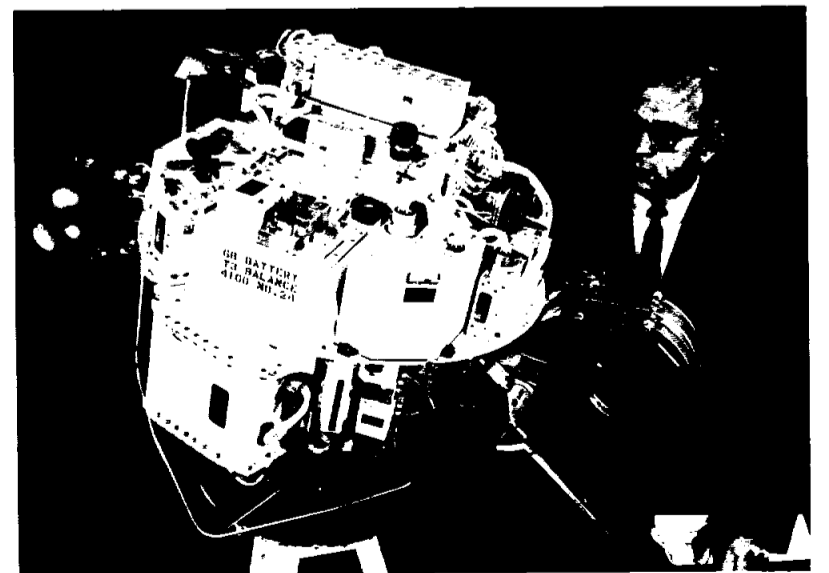
The engines are mounted so that their thrust will change the spin rate of the spacecraft permitting engineers on the ground to calculate the thrust produced

by the two engines.

The Hughes engine is scheduled to run for 20 minutes causing the spin rate of the spacecraft to decrease, and then the Lewis engine is programmed to operate for another 20 minutes to increase the spin rate.

Other spacecraft and engine measurements will be taken for a comparison between vacuum tank and flight data.

SERT I will reach about 2,500 miles altitude to give about fifty minutes of flight time. Trajectory inclination is not critical. The payload will not be recovered.



ELECTRIC SPACE ENGINE—Raymond J. Rulis, SERT-I program manager, examines the SERT-I spacecraft at the NASA Lewis Research Center where pre-flight testing took place. The Lewis built engine is on the right and the Hughes engine, in its vacuum pod, is on the left.

Space News **ROUNDUP!**

SECOND FRONT PAGE

Study Shows Space Communications Will Have Plenty Of Competition

The no man's land that space-ships must cross for astronauts to explore the planets is noisier than a rock-and-roll hootenanny.

Human ears can't detect it, but the hubbub of a million galactic voices all shouting at once will play hob with the communications link between earth and manned interplanetary expedition.

Radiation from colliding galaxies, the stars, sun, planets and even our own moon contribute to the outer space tumult called radio noise.

Interference with radio signals, a kind of natural jamming, is one of the interplanetary flight problems that Douglas Missile & Space Systems Division engineers investigated in a recent

study for the National Aeronautics and Space Administration of the possibilities of sending men to Mars in the 1975-1985 time period.

Douglas researchers determined that data transmissions between a manned spacecraft and earth must traverse as much as 250 million miles of space, every inch of it teeming with radio noise.

The sun was found to be the chief offender on two counts of communications interference — generating radio noise and blocking the signal path. Radio silence between Mars and earth could exist for as long as 60 days when the two planets are in conjunction, that is when the sun eclipses one from the other.

In the study on manned Mars exploration for the Future Projects Office of NASA's Marshall Space Flight Center, Douglas engineers found that the use of a solar communications satellite was one method of piercing the space communications silence.

The space travelers would be able to use the satellite as a radio relay link with earth whenever the sun gets in the way.

Another communications link must be maintained between the Mars Orbiting Module, as it swings around the target planet at about 340 miles altitude, and an excursion module on the surface of Mars.

If Martian radio frequency "windows" are comparable to those on earth, two manned units could be in radio contact for 22 minutes of each two-hour orbit for transfer of surface scientific data to the mother ship.

Monitoring Spacecraft Quality Keeps MSC Inspector On Go

"In a GO condition" is more than just space-age lingo for NASA's Jack Jones who criss-crosses the country from Florida to California and from Missouri to Texas monitoring the quality of the nation's Gemini and Apollo manned spacecraft and components at manufacturer's and vendors plants.

Keeping a bag packed and ready for instant use is standard operating procedure for Jones, who is head of the Off-Site Inspection Section, Manned Spacecraft Center-Florida Operations (MSC-FO) at Cape Kennedy.

Maintaining a schedule comparable to airline pilots', Jones is responsible for all MSC-FO off-site inspection personnel assigned to manufacturing plants and remote testing sites across the country.

Any week of his whirlwind schedule may find Jones coordinating the activities of NASA inspectors at White Sands, N.M.; McDonnell Aircraft Corporation, St. Louis, Mo.; North American Aviation, Downey, Calif.; Edwards Air Force Base, Calif.; and the parachute test site at El Centro, Calif. In addition to these main off-site locations, Jones' group is ready for instant assignment to any NASA contractor's plant

throughout the country.

Jones says, "Our group is NASA's eyes at the manufacturer's plants. We work closely with contractor inspectors, NASA engineering and programs offices, and resident Government quality control and inspection teams to maintain top-flight inspection programs at the manufacturer's plants during final spacecraft component and system qualification testing."

Operating out of Cape Kennedy, Jones' Off-Site Inspection Section is more than just a group of quality-control inspectors involved with acceptance or inspection of various standard components. Stationed at the contractors' plants, these space-age sleuths monitor the final phases of spacecraft components and system testing, recording discrepancies and insure that tests are run in strict accordance with NASA-approved procedures.

Astronaut Carpenter Recuperating In Hospital From Injuries Received in Motor Bike Accident

Astronaut M. Scott Carpenter is recuperating in Methodist Hospital in Houston, from injuries received in a motorbike accident in Bermuda last Thursday.

Carpenter was scheduled to take part in the Navy Project Sea Lab I which began last week off the coast of Bermuda.

The accident happened early in the morning as Carpenter and a Navy doctor were returning from checking underwater lights and cameras that were to be used on the project.

To avoid a collision with an on-coming automobile, Carpenter turned into a driveway and before he could stop collided with a rock wall.

He suffered a compound fracture of the lower left arm, a simple fracture of the left great toe, and contusions on the left knee.

Dr. Charles A. Berry, chief, Center Medical Programs Office at the Manned Spacecraft Center, said that a watch will be maintained on Scott Carpenter's condition for a few days and that they might change the cast on his arm later this week.

"The break is healing well," Dr. Berry said, "and like any fracture, this one will require a

few weeks in a cast, but Scott will not be hospitalized all that time, naturally."



GEMINI SUIT FOR APOLLO—The Gemini pressure suit above will be used in the Block-Two Apollo flights it was announced recently. Use of the Gemini suit for these early flights will allow more time to develop the Apollo suit for later use on the moon's surface. The early Apollo flights will be earth orbital and are currently scheduled to begin in late 1966. John Young, a member of the prime crew for GT-3, models the Gemini suit.



THERMAL OVERGARMENT—Members of the Crew Systems Division at the NASA Manned Spacecraft Center demonstrate a prototype thermal overgarment which American astronauts will use for protection against the direct rays of the sun while on the lunar surface. Gilbert Freedman, right, wears a prototype Apollo pressure suit; Walter D. Salyer wears the thermal overgarment.



CARPENTER'S ASTROS, a teen-age diving team coached by Astronaut M. Scott Carpenter, surprised him in his Methodist Hospital room Sunday with a large cake decorated with trophies and ribbons they had won in area diving competition. They are (l. to r.) Tom Garrison 14; Billy Buvens 12; Randy Skipinski 17, team president; Cathy Black 14; Carpenter's son Scott 14; and Russell Henry 13. To stay in training the youngsters ate only half the cake, taking the remainder to the Texas Children's Hospital with a "get well soon" note from Carpenter and the team.