Space News ROUNDUP!

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Little Joe II Delivered To WSMR For Full-Scale Apollo Escape Test

The Little Joe II launch vehicle that will be used in the first full-scale test flight of the Apollo spacecraft launch escape system early this year was delivered last week to the White Sands Missile Range in New Mexico by General Dynamics/Convair, San Diego, Calif.

Little Joe II, America's most powerful solid-fuel launch vehicle, will boost a boilerplate (engineering model) Apollo spacecraft with a live launch escape system on a test flight scheduled in April at White Sands.

Little Joe II must boost this payload to an approximate altitude of 20,000 feet. At this point the thrust of the vehicle's solid-fuel Algol motor will be terminated by activating two linear-shaped charges attached to the motor casing.

Upon termination of the vehicle's thrust the spacecraft's launch escape motors pull it away from the vehicle, the escape tower is jettisoned, and the spacecraft is parachuted to earth.

This flight is one of a series to develop and qualify the escape system before manned Apollo flights.

Convair is producing six Little Joe IIs under a $10 million contract managed by the NASA Manned Spacecraft Center.

The vehicle was shipped on an extendable low-bed trailer, and is the second of the six. The first made a successful qualification test at White Sands on Aug. 27, 1963.

Upon arrival at the desert test ground, the 30-foot long vehicle will be checked out and systems installed. When ready for launch the vehicle and payload will tower nine stories high.

On the second flight, Little Joe II will be powered by one Algol and six smaller Recruit motors producing about 300,000 pounds of thrust. Maximum thrust capability of the vehicle with seven

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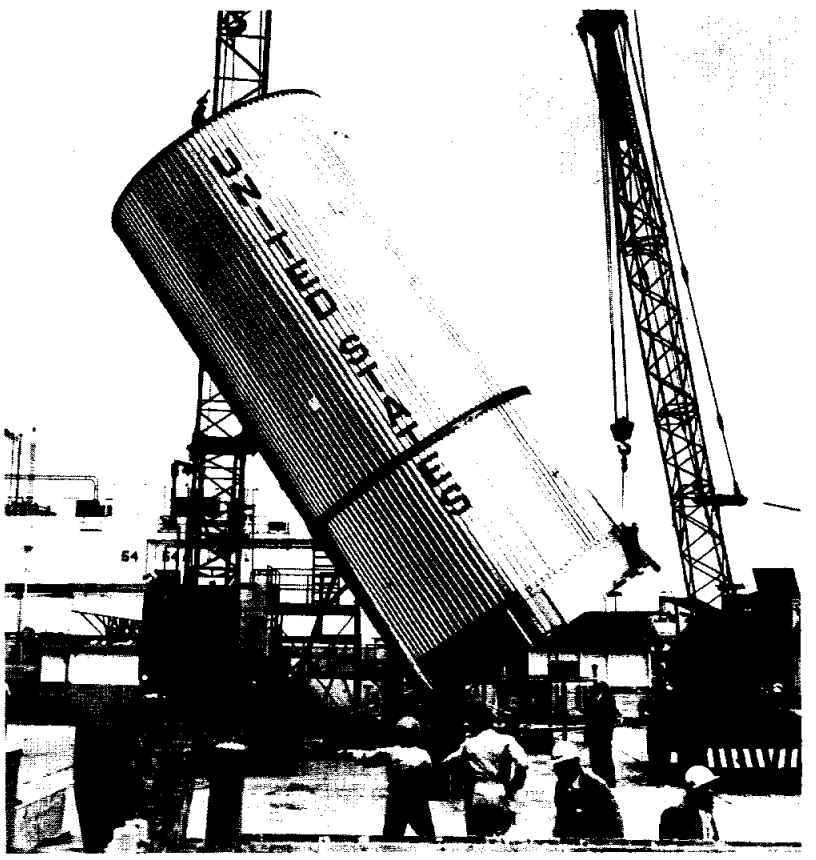


LITTLE JOE II Launch vehicle, America's most powerful solid-fuel booster, is readied for loading on extendable trailer at General Dynamics/Convair in San Diego, Calif. The 30-foot long vehicle left the Convair plant at dawn last Wednesday en route to White Sands Missile Range in New Mexico where it will be used for the first full-scale test flight of the Apollo spacecraft launch escape system.

Boilerplate Apollo Spacecraft For SA-6 Delivered To Cape For April Flight

The three-phase airlift of a National Aeronautics and Space Administration boilerplate Apollo spacecraft from the North American Aviation, Space and Information Systems Division plant at Downey, Calif. to the NASA facility at Cape Kennedy, Fla., was completed this week.

Three separate USAF aircraft transported the boilerplate launch escape system, command module, service module, related ground service equipment, and adapter to Cape Kennedy where they will be checked out and mated with a Saturn I launch vehicle in preparation for **SA-6,** the first orbital space flight of the Apollo boilerplate spacecraft.

The orbital test flight, one of a series in the Apollo program which will place Americans on the moon by 1970, is presently scheduled in April. It will demonstrate the primary mode of the launch escape tower jettison, using the escape tower jettison motor; determine the launch and exit environment parameters; demonstrate the physical compatability of the Saturn I launch vehicle and the Apollo spacecraft under pre-flight and flight conditions; and qualify the Saturn I launch vehicle.

Apollo spacecraft systems used in the test flight

(Continued on page 3)

Major Move To Clear Lake Gets Underway Tomorrow

Nearly 280 employees of the NASA Manned Spacecraft Center will vacate leased offices in Houston tomorrow as the mass move of personnel, furniture and supplies into the Clear Lake site gets underway.

Engineers and administrative persons assigned to the Apollo Spacecraft Program Office, the Procurement and Contracts Division and the Public Affairs Office will move. They will occupy portions of the Project Management Building and the office wing of the Auditorium.

The Apollo group -- num-

(Continued on page 3)

MICROELECTRONICS DISPLAY – Dr. Robert R. Gilruth inspects a microelectronic display at Langley Research Center through a microscope. Shown in the background are **Robert O. Piland, James A. Chamberlin,** and **Dr. F. L. Thompson, LRC,** director.

Langley's Program Reviewed By MSC Director And Staff

Early this month Dr. Robert R. Gilruth and members of his staff at the Manned Spacecraft Center spent two days in Virginia reviewing the Langley Research Center's space research efforts as they apply to the MSC program.

In addition the group was briefed on other research programs that the Langley Center has underway.

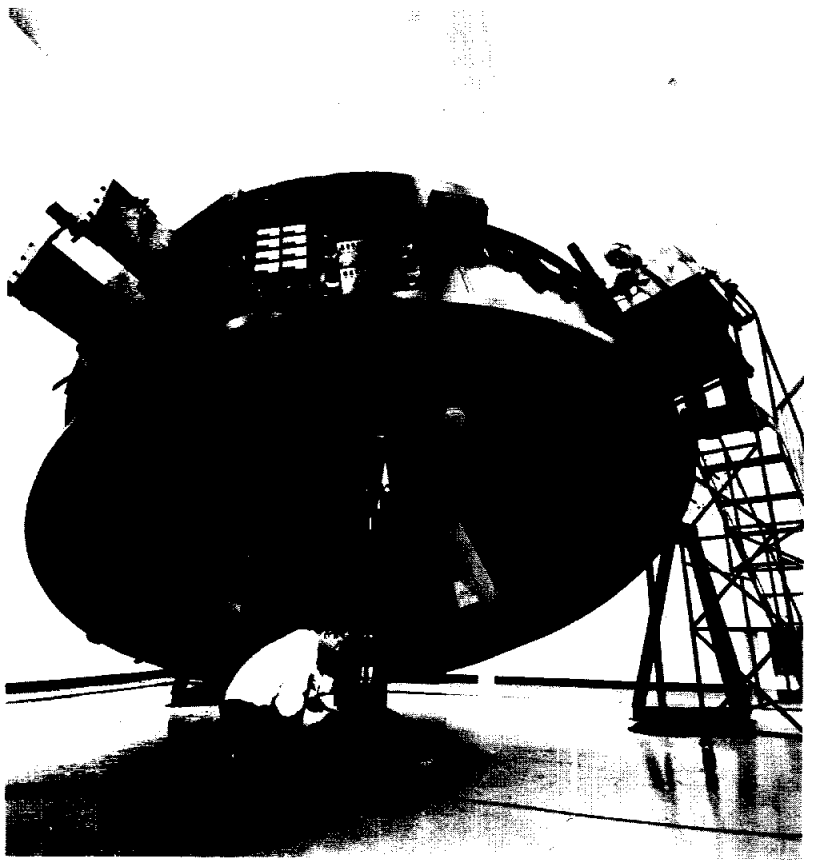
Some of the program briefings included in the February 4 and 5, visit were the rendezvous-docking simulator, the lunar landing vehicle and other equipment, low-speed flight research, supersonic transport, hypervelocity facilities, reentry and satellite flight programs, launch vehicle and spacecraft dynamics, lunar surface and landing studies, attitude sensing control and display, space radiation effects laboratory and the manned orbital research laboratory studies.

Representing MSC at Langley were Dr. Robert R. Gilruth, director; Paul E. Purser, special assistant to the director; Charles W. Matthews, Gemini manager; Maxime A. Faget, assistant director for Engineering and Development; Christopher C. Kraft Jr., assistant director, for

(Continued on page 3)

Huge Spacecraft Platform To Simulate Apollo Moon - Flight Characteristics

Honeywell recently announced completion of what it describes as the largest and most sensitive spacecraft simulation platform ever build -- a massive balanced platform which weighs more than a fully loaded school bus yet can be moved by a puff of air.



APOLLO SPACECRAFT SIMULATOR built by Honeywell for testing of its Apollo stabilization and control system (SCS) is described as the largest and most sensitive device of its kind. Cold gas reaction jets manuever the huge circular platform as it simulates characteristics of the Apollo command module in flight to and from the moon. A single stainless steel bearing (center) resting on a paper-thin cushion of gas supports some nine tons of equipment, virtually isolating the platform from friction and vibration.

The huge device will simulate on earth important flight characteristics of the Project Apollo moonship in space. It will be used during tests of the stabilization and control system (SCS) for the Apollo command module.

The SCS is being built by Honeywell, as was the simulation platform, for principal contractor North American Aviation's Space Division under the overall guidance of the National Aeronautics and Space Administration.

Shaped like a gigantic bass drum perched atop a slender pedestal, the simulator platform balances precisely upon an "air-bearing" which virtually isolates it from friction and vibration -- as close to these conditions of weightless space flight as it is possible to achieve on earth, according to Honeywell.

Fully loaded with SCS equipment and inertia weights, the device weighs some nine tons. It is 13 feet in diameter and stands seven and one half feet high.

Reporters were invited to test the immense simulator's sensitivity by setting the entire nine-ton mass in motion with no more than the touch of a little finger.

The platform is balanced so precisely that no persons are allowed in the room with it during experiments. Honeywell stated that body movements would create minute air currents which could cause the device to move in a manner unlike normal space flight.

Scientists demonstrating the spacecraft simulator explained that its extreme sensitivity is achieved through a large, precision air-bearing, a 17-inch-diameter stainless steel ball machined to a finish of two-millionths of an inch and a sphericity of ten-millionths of an inch.

The ball, securely fastened to the center of the platform, literally floats upon a cushion of pressurized dry nitrogen gas which is approximately one-quarter the width of a human hair, between five and seven ten-thousandths of an inch thick.

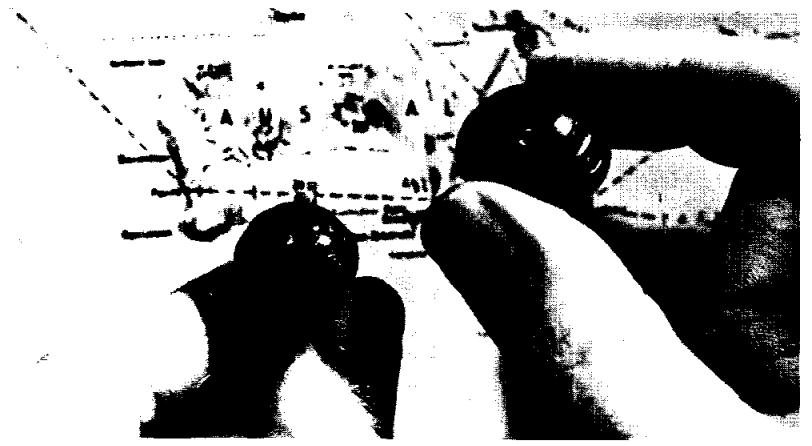
The platform is free to revolve a full 360 degrees and has a freedom of plus or minus 30 degrees in the pitch and roll axes. The company said these three degrees of freedom coupled with negligible friction or damping result in a pure inertia similar to that of the Apollo vehicle in space.

By adding weights (inertias) to the platform and maneuvering it with variable-thrust cold gas reaction jets, Honeywell said, the same three-axis attitude inertia/torque characteristics of the Apollo command and service modules in flight to and from the moon can be simulated in the laboratory.

All instrumentation on the spacecraft simulator is powered by 28 volt dc nickel cadmium batteries mounted upon the flanged skirt of the platform. A telemetry and command system controls and obtains data from systems and devices being tested.

Research Reveals Moon Particles On Earth

Aerodynamic research for the nation's manned space flight program has provided valuable evidence that mill-



TEKTITE COMPARISON – An actual tektite (right) from the moon is compared with a synthetic tektite shaped by earth atmospheric entry conditions simulated in a high speed wind tunnel at NASA's Ames Research Center.

ions of pieces of the moon are on the earth.

In extensive research on the lunar black glassy objects called tektites, a team of scientists led by Dr. Dean R. Chapman of NASA's Ames Research Center, Moffett Field, Calif., has created synthetic tektites by exposing materials in a high velocity wind tunnel at the same speeds and temperatures found in atmosphere entry conditions.

Dr. Chapman has particularly studied Australasian tekites found in large numbers in Australia, the Philippines, Java, and Billiton Island. By studying the similar physical characteristics, through chemical analysis, and age determinations of other scientists, of tektites from these areas, he theorizes that they were all of the same tektite shower on the earth some 700,000 years ago. The other two major tektite showers occurred 15 million years ago over Czechoslovakia and 30 million years ago over the United States.

"Our studies show that the australite entry trajectories are uniquely compatible with origin from the moon," Dr. Chapman said, "and that the primary australites were formed in a near vacuum, or space environment. This constitutes a strong case indeed for the lunar origin of tektites."

He explained that if the tektite is spherical on the back side and the amount of melting on the front and sides corresponds to the part of the sphere that is missing, it can be stated that the object was a sphere before coming into the earth's atmosphere.

Research facilities at the Ames Research Center used by Dr. Chapman and his colleagues include an arc-jet wind tunnel in which the actual and synthetic tektites are tested. Simulation of atmosphere entry conditions at the time of conclusion of ablation ranged from 6,700 to over 15,600 miles per hour in velocity, temperatures of about 4,000 degrees Fahrenheit, and an atmospheric pressure one-hundreth of that on earth.

Synthetic tektites are made by molding glasses of the same composition of actual tektites, differing only in the amount of gases in the tektite interior.

Actual tektites have an extraordinary characteristic of being "dry," or with a minimum of gas. It is believed that the tremendous pressures created by the meteoric impact on the moon removed most of the gases from the ejected lunar materials.

Little Joe

(Continued from page 1)

Algol motors is 720,000 pounds

Because of Little Joe IIs purpose is to test, it has been designed as an inherently reliable and versatile vehicle. But because it is expendable, it has been produced for a fraction of the cost associated with boosters of comparable thrust.

Typical of this economy is the fact that the vehicle's corrugated aluminum skins are produced from the same machines used to fabricate industrial siding and everyday patio roofing. For versatility the thrust of the vehicle is varied by merely changing the motor arrangement.

Because of Little Joe IIs low cost and versatility, NASA and other agencies are investigating its potential for additional space test applications.

SUBCOMMITTEE VISITS CLEAR LAKE SITE – U.S. Rep. Olin Teague, chairman of the House Subcommittee on manned space flight, and other subcommittee members visited the Clear Lake site last Saturday. They have also visited Cape Kennedy and the Marshall Space Flight Center in preparation for formal budget hearings which began yesterday in Washington. Shown at a press conference Saturday are: (l. to r.) Rep. Teague; Dr. Robert R. Gilruth, MSC director; and Rep. Bob Casey.

Shortage Of Parking Spaces May Develop Later At Site

Soon, it might not be a bad idea to leave a bit early for work if you plan to drive to the new Clear Lake Site of the Manned Spacecraft Center.

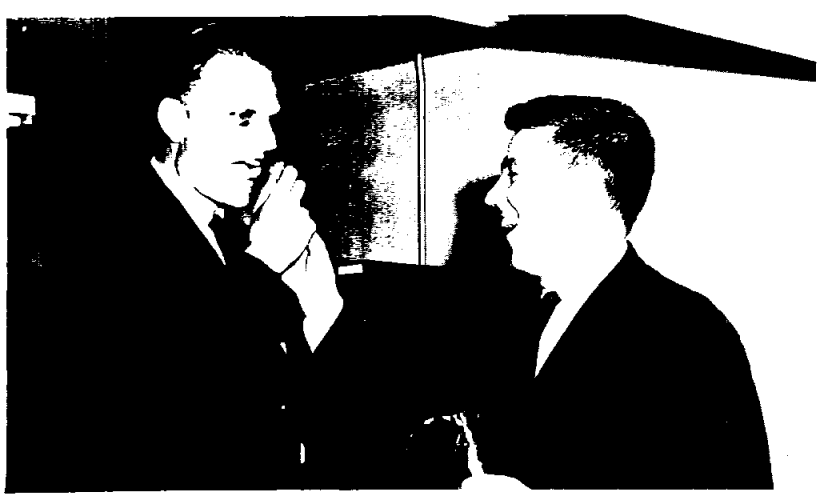
You may have a seven or eight minute drive from your residence to the MSC entrance, but there is the possibility of your also having a ten to fifteen-minute walk if you are not early enough to find a "close-in" parking place.

By July 1, 1964, the ceiling on the number of employees for MSC will be 4300. Add to this number 1100 contractor employees and 2000 construction workers, plus visitors to the site, and then figure out the number of automobiles these people will drive to and from work, and try to place all these automobiles in 2500 off street parking spaces that are available on the MSC Clear Lake Site. Actually there is one space for about every three persons that will be located at the Site by July 1.

Funds for additional parking in the original plans of the Clear Lake Site were deleted from the 1964 budget.

The best solution to the parking problem at present seems to be the forming of car pools by the MSC employees as well as contractor and construction employees.

ASTRONAUT BRIEFING – The 14 new astronaut who officially came on board the Manned Spacecraft Center early this month are shown receiving a briefing from Walter M. Shirra (back to camera), chief, Operations and Training, Astronaut Office. They are (l. to r.) Eugene A. Ceman, Russell L. Schweickart, William A. Anders, Charles A. Bassett II, Clifton C. Williams Jr., R. Walter Cunningham, Donn F. Eisele, Richard F. Gordon Jr., Roger B. Chaffee, Edwin E. Aldrin Jr., David R. Scott, Theodore C. Freeman, Michael Collins, and Alan L. Bean.



MSC VISITORS – Recent visitors to the Manned Spacecraft Center have included (Top Photo) the Rev. Billy Graham, shown sampling "space food" offered him by Richard S. Johnston, chief, Crew Systems Division. (Lower Photo) George F. Prude, Jr., Flight Crew Support Division, explains a spaceflight training phase to Ambassador Avraham Harman of Israel.

Move

(Continued from page 1)

bering some 220 persons -- and Procurement personnel assigned to the Apollo office will be the first to occupy the nine-story headquarters building.

Another major move will take place February 28. This one involves more than 300 persons. Other moves will follow through March and April until nearly 2,500 employees are relocated.

Fifteen facilities at MSC's Clear Lake site have been certified as operational to date. The latest buildings to be completed are the cafeteria, which began operation last week, and the office wing of the auditorium.

With the February 20 move, some 550 persons will have been relocated.

Langley

(Continued from page 1)

Flight Operations; Donald K. Slayton, assistant director for Flight Crew Operations; Robert O. Piland, deputy manager of Apollo; Aleck C. Bond; William E. Stoney Jr.; James A. Chamberlin; Ralph S. Sawyer; James P. Shaughnessy; Willis Mitchell; and Sigurd Sjoberg.

Arrangements for the entire trip were made by Axel T. Mattson, liaison representative for the Langley Research Center at MSC.

SA-6

(Continued from page 1)

will include an instrumentation system which will measure launch and exit environmental conditions; an environmental system which will control temperatures of the instrumentation system; AN FM-FM telemetry system which will transmit launch and exit environmental information to ground receiving station; and a C band transponder which will be used for vehicle tracking purposes.

Towering some 190 feet in height, the Apollo/Saturn I vehicle will be launched from Cape Kennedy with a lift-off weight of over 580 tons and a thrust of approximately 1,500,000 pounds from the S-1 stages eight H-1 liquid propellant rocket engines. The giant space vehicle will ascend to approximately 220,000 feet in less than two and one-half minutes. At this point the first stage (S-1) engine burnout will occur.

The S-I stage will be jettisoned and at an altitude of over 230,000 feet, the second stage (S-IV) will ignite. It's six RL-10 engines will continue to accelerate the Apollo spacecraft with a combined thrust of 90,000 pounds.

At an altitude of about 265,000 feet the launch escape tower will be jettisoned and the S-IV stage engines will continue to burn until the spacecraft has attained some 115 miles in altitude. At this point the space vehicle will be injected into a circular parking orbit around the earth and S-IV engine cutoff will occur.

No recovery of either the Saturn launch vehicle or the boilerplate Apollo spacecraft is planned for this test flight. It is anticipated that the space vehicle will disintegrate upon reentry.

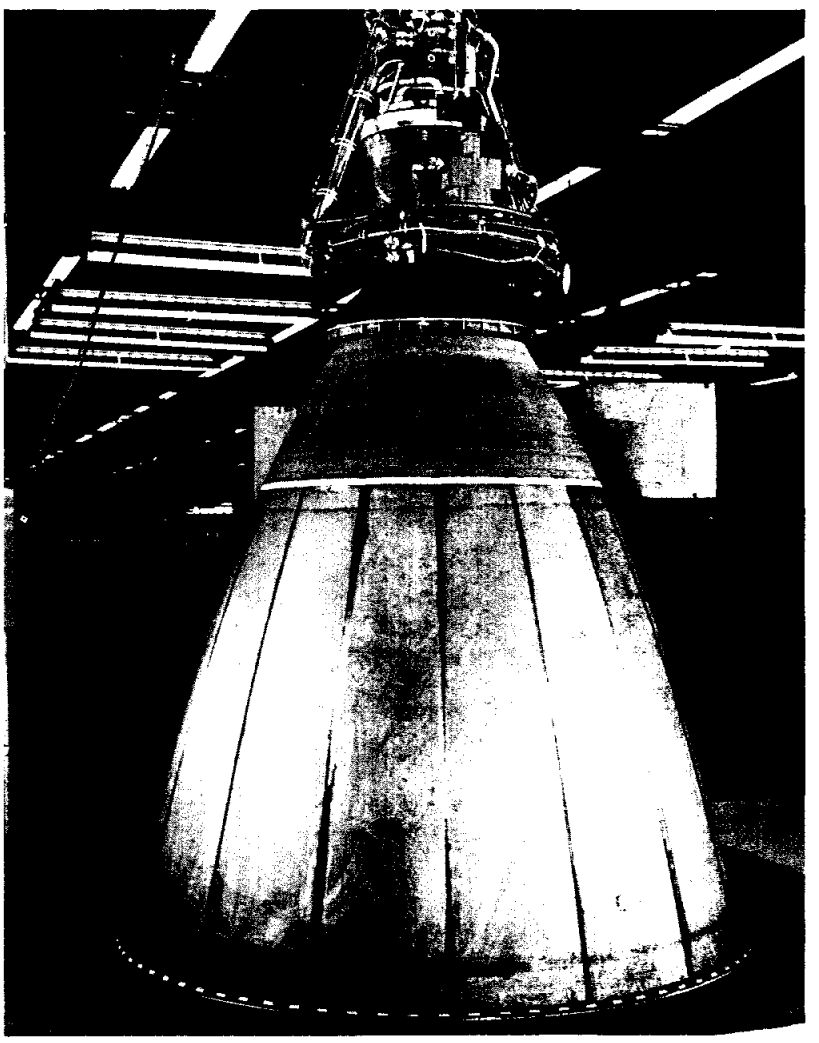
Use Of New Calalyst Makes Possible Hydrazine Guidance/Control Rocket

A NASA-sponsored project with private industry has produced a catalyst which can be used with monopropellant hydrazine rocket engines for spacecraft guidance and control.

The catalyst causes the hydrazine to react and produce high temperature gases. By allowing these gases to expand through the engine nozzle in the usual manner thrust is generated.

Previously, heat had to be applied to get the hydrazine to decompose. With the new catalyst, no heat source or external ignition system is needed. As soon as the catalyst comes in contact with the hydrazine, thrust is generated.

NASA scientists report that the hydrazine compounds produced by the catalytic reaction are fifty percent more energetic than the monopropellant hydrogen-peroxide now used on spacecraft for attitude control and guidance.



SERVICE MODULE ENGINE – This newest of U.S. rocket engines designed for the Apollo Service module by Aerojet-General Corporation is an engine that must work when the space explorers ask for propulsion home, so all its major controls are duplicated. It has been designed so that it can be re-started in space more than 50-times. The developmental model seen here stands 12-feet and seven-inches from the tip of its controls to the bottom edge of its skirt.

SERVICE MODULE ENGINE – The 100 pound thrust reaction control rocket for the Apollo service module is placed in the Altitude simulation chamber for a test. The engine is hot fired to check engine chamber, fuel flow and valve operation.

Apollo Service Module Reaction Contro

This year The Marquardt Corporation will celebrate its 20th year in the business of developing and manufacturing propulsion systems for missiles and aerospace vehicles. Founded in 1944 by its president, Roy E. Marquardt, the company has maintained a position of technological leadership in the defense industry and, is very well known for its work in developing supersonic ramjet engines for the Bomarc interceptor missile.

In early 1962 the Marquardt Corporation was awarded a major contract for the reaction and control engines to provide orbital control on the service module of Project Apollo, NASA's manned lunar project. A major advance in combustion chamber fabrication has resulted from Flo-turning studies conducted during the prototype development phase of the program. The new technique saves approximately 10 man and machine hours and 13 pounds of valuable material for each chamber, and produces a greater strength-to-weight ratio in the finished product. Joseph B. Tuzen is program manager.

A total of 16 of the Marquardt-developed 100-pound thrust engines will be used on the Apollo service module, mounted in four clusters of four engines each. In operation the engines will provide reaction control thrust for controlling the attitude of the vehicle in space, as well as provide vernier velocity changes for rendezvous maneuvers, mid-course vernier trajectory corrections and orbit adjust requirements. The engines were developed and are presently being fabricated under a contract with North American Aviation, Space and Information Systems Division, prime Apollo command and service module contractor.

The Apollo service module reaction control engine contract was followed by a contract for the ullage rocket on Saturn IV-B, the translunar booster stage for Apollo being built by Douglas Aircraft Company, Missile and Space Systems Division.

Late in 1963, Marquardt completed negotiations with Grumman Aircraft Engineering Corporation for a contract covering the development of reaction control system components for LEM (Lunar Excursion Module). Marquardt's responsibility includes design and development of the propellant system and thrust chamber assemblies as a major part of the reaction control system to be used for positioning, orientation, and stabilization of the lunar-landing spacecraft. These small rocket systems make maximum use of the reaction control technology supplied to the Apollo service module. Ted Linton is manager of the LEM program.

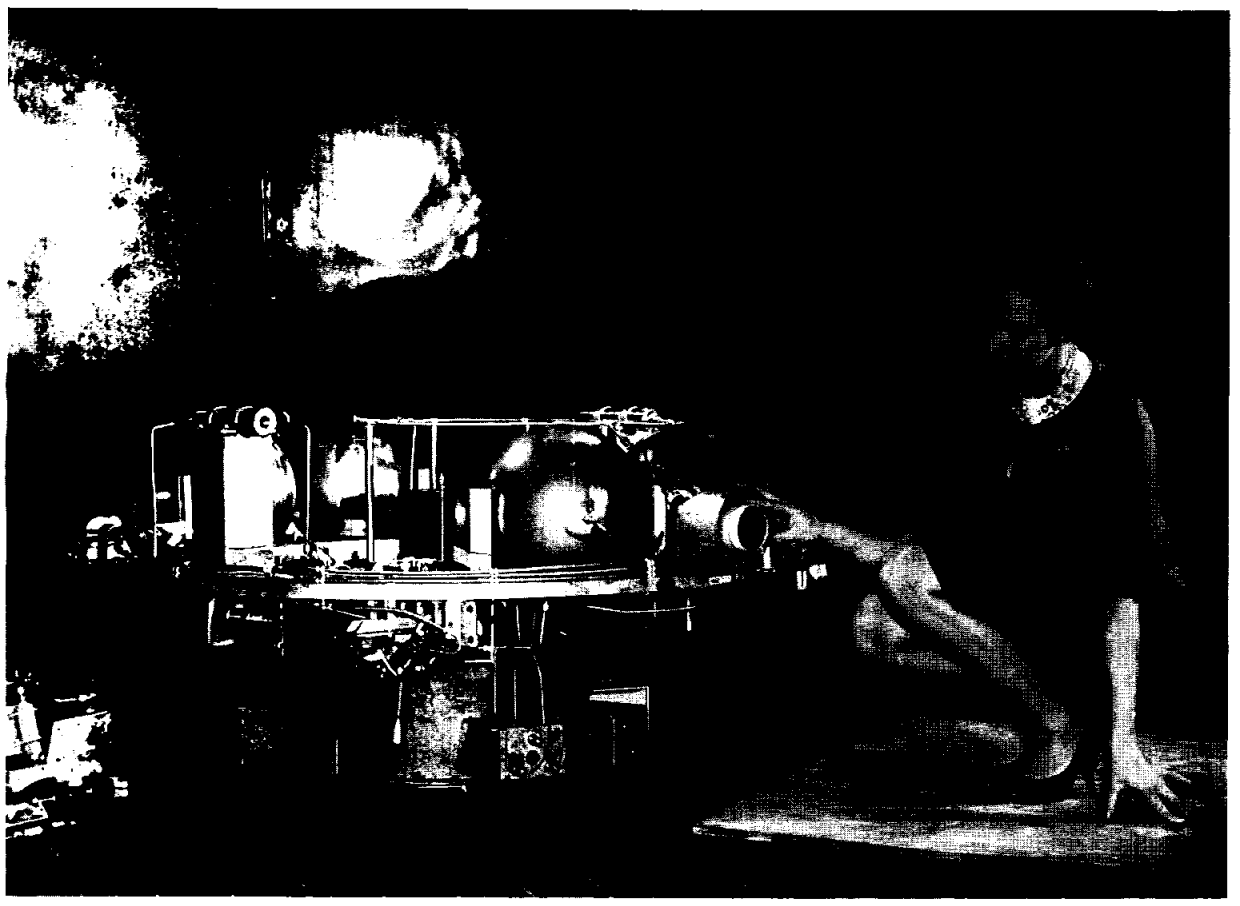
NASA's advanced communications satellite, Syncom Mark II, is designed to use Marquardt-developed control and stabilization thrusters for orientation adjustment and velocity control to insure that the vehicle accomplishes and maintains a precise orbit. The basic elements of the Marquardt system are 5-pound-thrust precision impulse engines which burn hypergolic bipropellants and are designed to fire instantaneously upon command.

Test firings of Marquardt reaction control engine systems to date have been conducted at the company's Jet Laboratory at Van Nuys.

With the increase in workload in rocketry and added requirements for advanced fuels handling, construction of a new rocket facility was begun during the year. The facility is located at Magic Mountain, a remote site about 30 miles northeast of Van Nuys.

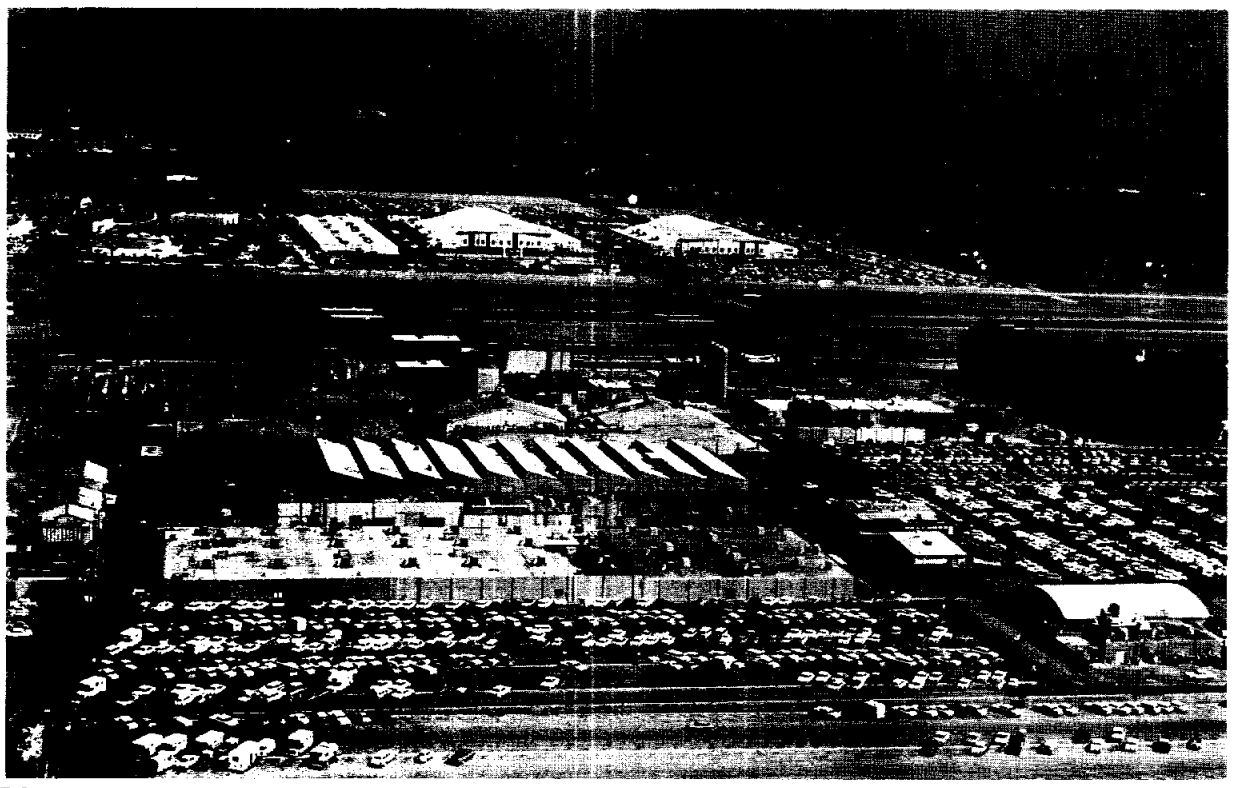
The test site, which consists of 640 acres of mountain land leased from the U. S. Department of Agriculture, Forestry Service, was formerly occupied by a Nike missile radar station. Several of the remaining buildings are being renovated for use as offices, control rooms and laboratories.

Initial elements of the testing facility include test stands for cryogenic and other high impulse liquid propellants, and a chemistry laboratory and mixing area for advanced propellants. A special stand for testing complete attitude control reaction motor clusters and associated systems being developed by Marquardt for use on the NASA Lunar Excursion Module, will also be constructed as part of the initial installation.



SUCCESSFUL TEST – The Syncom Mark II reaction control system is shown in an altitude simulation chamber on a test rig following a successful feasibility demonstration of the breadboard model. This is one application of Marquardt-developed control and stabilization thrusters.

ROY E. MARQUARDT, president of the Marquardt Corporation is shown delivering a speech in Houston, Tex. this past November.



POWER SYSTEMS Division facilities of the Marquardt Corporation are shown in this aerial view at Van Nuys, Calif. In the background is the Air Force/Marquardt Jet Laboratory.

Future manned space missions will involve operational periods of weeks and even months in a space environment, which will require life support systems considerably more sophisticated than those of the relatively short duration Mercury orbital flights. One important life support problem, disposal of human waste materials has been under study for more than a year by the Bioastronautics Department of Marquardt's ASTRO Division. Under the direction of Jack Bitterly, Bioastronautics Dept. scientists have been actively pursuing the development of a waste management system which will process

Engines Developed By Marquardt

REACTION CONTROL ROCKET – Sixteen of these Marquardt-developed 100 pound thrust engines will be used on the Apollo service module, mounted in four clusters of four engines each. The engines will provide thrust for controlling the attitude of the vehicle in space, as well as provide vernier velocity changes for rendezvous maneuvers, mid course vernier trajectory corrections and orbit adjust requirements.

human wastes to produce potable water and minimize the amount of residue to be stored in the space vehicle or station. The original concepts of this system were developed early in 1963 under the company's independent research program.

Current research, which is being conducted under a NASA contract, is directed toward the development of a high performance waste management system for producing potable and palatable water from human wastes in a zero gravity environment.

One other NASA sponsored project which is closely related to waste management, is the Biochemical Fuel Cell study contract awarded to the ASTRO Division in March of 1963. The prime objective of this study is to determine how effectively human waste products can be used in producing electrical energy in the medium of a biochemical fuel cell.

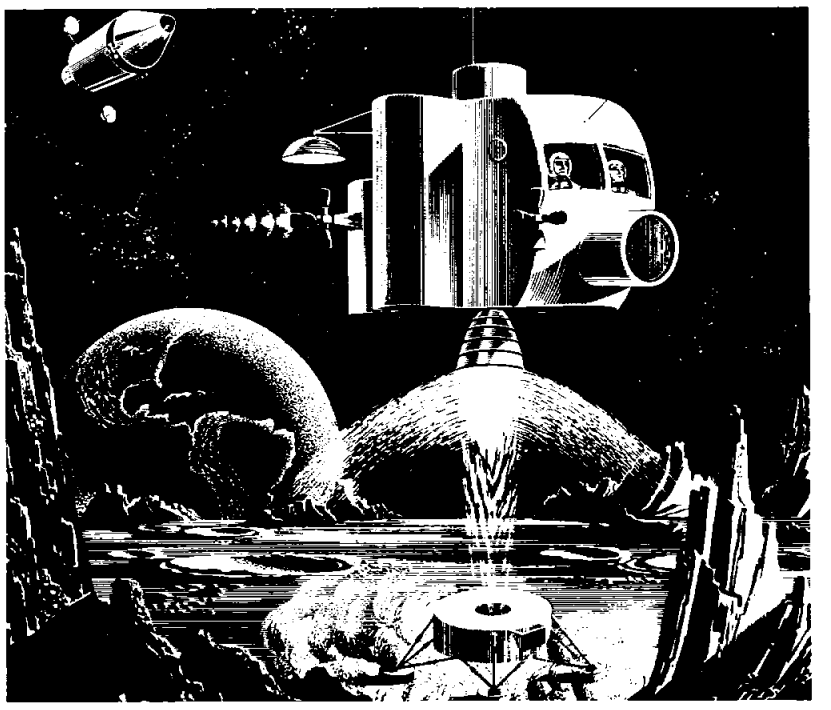
As the term "biochemical" suggests, this type of fuel cell would produce electrical energy through a combination of chemical reaction and metabolic reactions of various microorganisms contained in the waste materials to be processed. Such a power source could be used in a space vehicle for operating transmitters, controls, data recorders and other electrical equipment requiring low power.

One other interesting life support study project, retrieval of an astronaut in space, was pursued by the Advanced Concepts Group of Marquardt's Power Systems Division under a contract received in early 1963 from the NASA Langley Research Center. Although the investigations were primarily concerned with controlled tethering (utilizing a special technique to circumvent motion problems of an orbiting body) as applied to astronaut retrieval, the principles involved and the techniques developed in the study point to other space applications as well. These include controlled docking of logistics vehicles to space stations, mating of space station components in space and alteration of space vehicle trajectories.

The Marquardt Corporation occupies approximately 2,000 acres of property and 1,000,000 square feet of engineering, manufacturing, test laboratory and administrative office space. The company's electronics manufacturing facility, the Pomona Division, is located in Pomona, Calif. The corporate offices, ASTRO Division (central research organization of the company), and the Power Systems Division (PSD) are located at Van Nuys, Calif. PSD also maintains a large modern production plant and the Marquardt Jet Laboratory at Ogden, Utah. Located on the shores of Great Salt Lake a short distance from Ogden, the Jet Laboratory currently is undergoing expansion in support of the company's advanced aerospace propulsion programs.

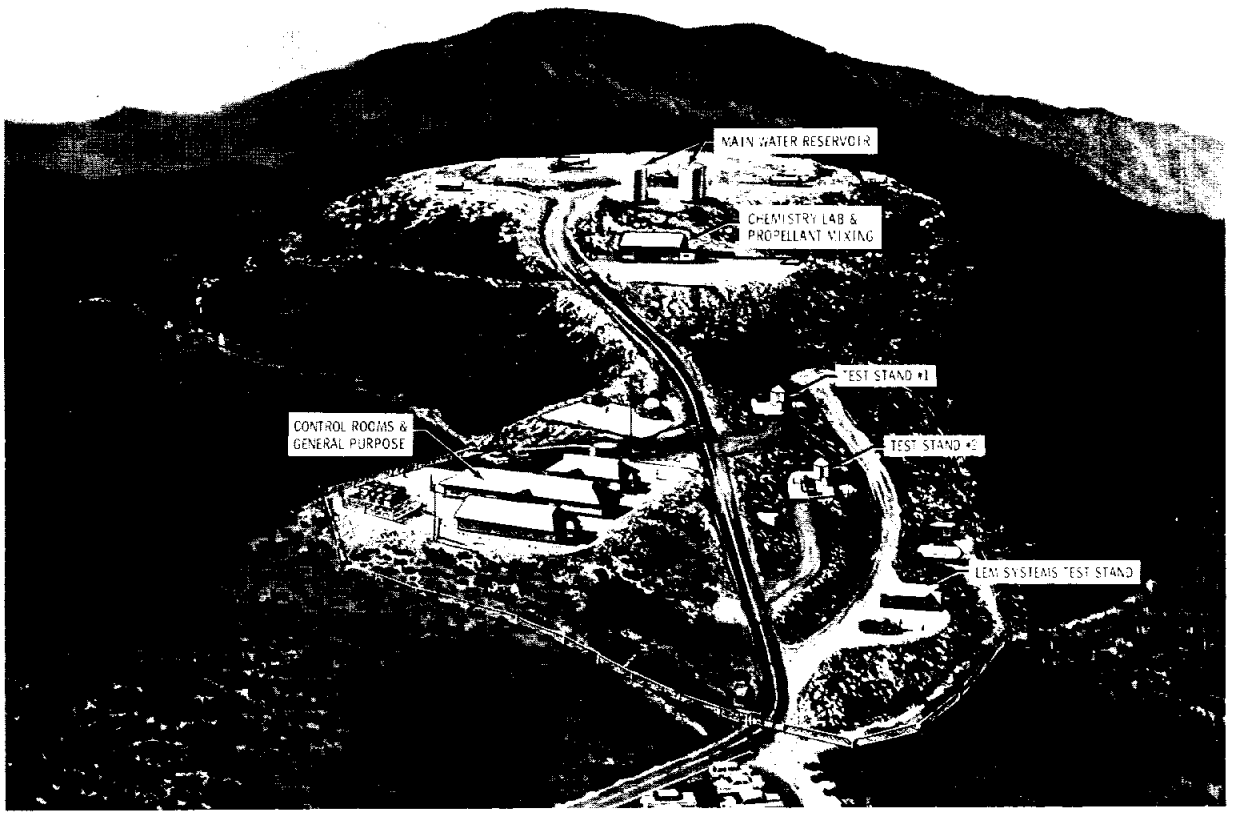
Other PSD test facilities include a large facility located at the Van Nuys plant, the Research Field Laboratory at nearby Saugus, Calif. and the Magic Mountain facility. The Saugus facility is designed for testing of exotic fuels, materials, cryogenics, and for conducting other very advanced investigations associated with air and space programs.

EDITOR'S NOTE: This is the twenty-second 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 Corporate Information Services, Marquardt Corporation.



THIS ARTIST'S conceptual drawing of the lunar excursion module (LEM) illustrates the positioning orientation and stabilization function of the reaction control system on LEM's return trip from the moon to the Apollo spacecraft in lunar orbit. Marquardt will design and develop the propellant system and thrust chamber assemblies as a major part of the reaction control system.

INSPECTING APOLLO MOCKUP – Shown inspecting an Apollo Command Module mockup at a briefing given at North American Aviation, Space and Information Systems Division are (l. to r.) Ted Linton, LEM program manager; Joseph B. Tuzen, Apollo program manager; and Don L. Walter, vice president and general manager, Power Systems Division, The Marquardt Corporation.



TEST FACILITY – An Artist's concept of Marquardt's Magic Mountain rocket and propellant test facility which is now under construction at a remote site about 30 miles northeast of Van Nuys, Calif.

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.

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Editor ..... Milton E. Reim

On The Lighter Side

SMOKERS UNANIMOUS

Going to stop any day now? If you're one of the 20-million said to be on the verge of giving up smoking, watch out for a new brand of medicine men. The money you save on cigarettes can dribble away in repeated attempts to ease the way with everything from hypnosis to non-nicotine cigarettes rolled out of lettuce.

One such system, offered by mail, is called STOPlan. For $29 the smoker gets 200 tablets (mostly flavoring agents) which are said to reduce the desire to smoke, a 36-page booklet and, for two weeks, letters every other day from the firm, bolstering will power, plus report cards on which he tells why he smoked.

First offender to be nailed by the Association of Better Business Bureaus was the Tobacco Guidance Center which offers 120 Pronicotyl tablets, plus advice, for $24.85. Pronicotyl is one of several combinations of flavorings and mild anesthetic agents (in this case menthyl). Other ingredients: ginger, licorice, coriander, and clover.

If you have money to burn, you can reach for a low nicotine cigarette called Gemini at 50 cents a pack. (This one contains two 10-cigarette packs to help the smoker cut down.) Soon you can buy cigarettes having no nicotine at all. Sentry, a cigarette made from the outer leaf of romaine lettuce will, according to the Wall St. Journal, sell for 35 cents a pack. The New York Times reports patents have been issued for adding aluminum to cigarettes to lower the temperature (hot ash conveys the harmful tars) which use both regular tobacco and "reconstituted"--farm-damaged leaves, stems, and dust, formed into sheets and shredded. Finally, Changing Times reports on another product still in the laboratory which is guaranteed to do nothing to you or for you. This one is rolled from a mixture of petunia, cabbage, and dandelion leaves, sprayed with a blend of maple syrup, cocoa, sugar and glycerine, and seasoned with Jamaica rum and herbs. (Reprinted courtesy the credit union magazine "Everybody's Money").

And a final word....as one writer put it...."Smoke Now and Pay Later!"

EGRESS DEVELOPMENT TESTS – Astronaut James A. Lovell Jr., right, and Gordon Harvey of the Flight Crew Support Division are shown as they make a simultaneous egress as part of a test program to qualify the Gemini spacecraft for postlanding at-sea operation. The recent tests in a water tank at Ellington AFB, were conducted by engineers of the Operational Evaluation and Test Branch of the Landing and Recovery Division. Technical Services Division and Crew Systems Division assisted in Supporting the tests.

WELCOME ABOARD

Sixty-eight new employees joined the Manned Spacecraft Center during the period January 19,through February 6. Of this total, four were assigned to the MSC-Florida Operations and the remainder were assigned here in Houston.

GEMINI PROGRAM OFFICE: Andrew J. Sullivan, John J. Turner, Robert L. Plummer, Vernon L. Moore, L. Lee Smith, and Gene M. Jenkins.

FLIGHT CREW SUPPORT DIVISION: Russell A. Moses, Thomas L. Barrow and Brantley C. Booe Jr.

STRUCTURES AND MECHANICS DIVISION: Lonnie Dean Thomas, Robert A. Gammill Jr., and Don K. McCutchen.

RECOVERY OPERATIONS DIVISION: Bobby D. Hile, Allen F. Meyers, and Oral R. Smithwick.

GUIDANCE AND CONTROL DIVISION: Stanley L. Bachman and David N. Arnoldy.

FLIGHT CONTROL DIVISION: Edward I. Fendell, Billy G. Smith, Edward L. Pavelka, and Luther E. Walters.

OFFICE OF ADMINISTRATIVE SERVICES: Jesse C. Spriggs, Mary A. Peck and Mary E. Thompson.

PROCUREMENT AND CONTRACTS:James H. Richburg and Clare J. Martin.

OFFICE OF TECHNICAL ENGINEERING SERVICES: David B. Mullins, Thomas F. Kirkland, Leon W. Galler, Raymond A. Donatto, Morris A. Barnett, Don N. Bateman, Velmer R. Crowley, Ralph F. Herrmann, Fred H. Junek, Murray D. Norman, and Woodrow W. Wilson.

APOLLO SPACECRAFTS PROJECT OFFICE: Claudia E. Cleveland and Flora C. Miranda.

CREW SYSTEMS DIVISION: William L. Burton Jr.

INSTRUMENTATION AND ELECTRONIC SYSTEMS DIVISION: Marjorie E. Hamm.

PERSONNEL DIVISION: Sharon K. Buchanan.

ASTRONAUT OFFICE: David R. Scott, Richard F. Gordon Jr., Theodore C. Freeman, Donn F. Eisele, Michael Collins, Roger B. Chaffee, Eugene A. Cernan, Charles Arthur Bassett, William A. Anders, Edwin Eugene Aldrin, Clifton C. Williams Jr., and Alan LaVern Bean.

MISSION ANALYSIS DIVISION: Earle M. Crum, Harvey C. Saltzman, and Will York.

MSC-FLORIDA OPERATIONS (Cape Kennedy, Fla.): Ella M. Cornelison, Juanita S. Harris, Thelma A. Bomhower, and Joseph T. Garofalo Jr.

OPERATIONS: Barbara A. Beasley and William J. Forsyth.

ADVANCED SPACECRAFT TECHNOLOGY DIVISION: Shelton G. Crabtree.

COMPUTATION AND ANALYSIS DIVISION: Kline M. Bentley and Sadie P. Downs.

PROPULSION AND ENERGY SYSTEMS DIVISION: Doris M. Jernigan.

PROGRAM ANALYSIS AND RESOURCES MANAGEMENT DIVISION: John Rife.

OFFICE OF ASSISTANT DIRECTOR FOR FLIGHT

MSC PERSONALITY

MSC's Financial Advisor Is Role Of Joseph Kratovil

Joseph A. Kratovil, chief, Program Analysis and Resources Management Division, has the role of the financial advisor to the Manned Spacecraft Center management.

To accomplish his role, Kratovil has four branches in his division reporting to him.

The Contractor Cost Analysis Branch, responsible for the implementation of contractor financial reporting procedures and providing management with integrated work/resources analysis, the Financial Management Branch handles the Center's accounting functions, the Program Budget Branch monitors the preparation of Center long and short range resources estamates and the Program Evaluation Branch which monitors the PERT procedure and provides data and analysis to management for use in making decision relative to work plans.

Kratovil joined MSC in Feb, 1963 as chief, Financial Management Division. Prior to joining MSC he was with North American Aviation, Autonetics in Anaheim, Calif., where he was chief of proposals and pricing, and manager of contracts and pricing during the period from Feburary 1961 until he came with MSC.

From 1956 to 1961 he was pricing administrator with NAA in Columbus, Ohio, and from 1952 to 1956 he was staff assistant at NAA, also in Columbus. During the period from 1950 to 1952, he was an administrative assistant at city hall in Cleveland, Ohio.

Kratovil is a native of Cleveland and completed his early schooling there. He has a LLB from Franklin

JOSEPH A. KRATOVIL

Law, Columbus, Ohio and a BS degree from Western Reserve University in Cleveland. Other schools he has studied at are Case Institute of Technology in Cleveland, the University of Biarritz in France and the University of Nebraska.

He has served in the U.S. Army and is a member of National Association of Accountants.

Kratovil is married to the former Mildred Elsie Dort of Cleveland and the couple has two children, Philip James 13, and Sarah Ann 9. The family resides in Houston.

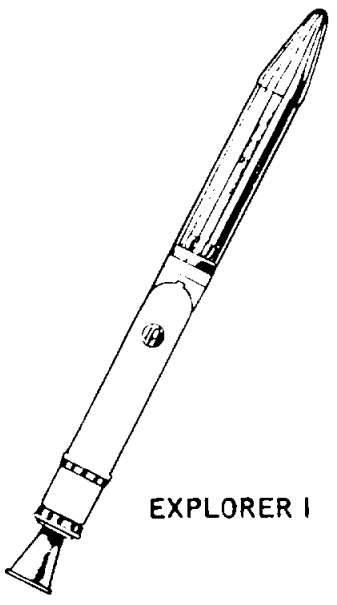
His outside interests include golf, architecture and construction.

A FIRST DAY CUSTOMER – Janice Scott, Facilities Division, MSC, was one of the first customers at the noon meal, February 10, the first day of operation of the new MSC cafeteria. Mabel Fitzhugh, cashier, checks Janice through the line.

America's First Satellite Still Making The Rounds

Remember when teachers explained gravity by simply telling students, "All that goes up must come down?" Well, six years ago this week a team of engineers and scientists, most of whom now work at the Marshall Space Flight Center in Huntsville, Ala., sent up a 30.8 pound satellite called Explorer 1 and they're still waiting for it to return.

It was the first one sent up by the United States and has traveled over 26,000 times around the earth, covering some 775 million miles.



EXPLORER I

The same scientists and engineers are now working on a 1970 model moon rocket.

The MSFC men expect Explorer 1 to plunge back into the atmosphere and burn in 1966--eight years after launch. Four years later they hope the U.S. will have American astronauts on the moon, using a giant Saturn V rocket which will produce some 160 million horsepower at lift-off from Cape Kennedy.

Explorer 1 was launched at 10:48 p.m. EST Jan. 31, 1958.

It rode atop a Jupiter C rocket using a special fuel to raise the thrust to 83,000 pounds. The booster was made at MSFC. After orbit was confirmed, the satellite began what was then considered a big loop around the earth.

It went out in space to 1,585.2 miles and then would sweep back near the earth to within 223.7 miles It now goes out to 1,011.6 miles and back to within 212.5 miles of earth.

It was sent up to detect cosmic rays and micrometeorite impacts.

Significantly, this very first satellite made an important discovery as it orbited the earth. It is credited with finding the Van Allen radiation belt as it orbited at up to 18,500 miles per hour.

The satellite has exceeded all expectations. Scientists, figuring a decay rate based in Sputnik information, said it wouldn't last over five years.

One transmitter was supposed to quit after 60 days, but it kept sending information 105 days. The other transmitter, much more powerful, was supposed to last only 14 days. It ceased after 31 days.

When first launched, Explorer 1 whipped around the earth every 114.9 minutes. It goes around every 104.6 minutes now.

Ranger TV Failure To Be Reviewed By 4-Man Board

The National Aeronautics and Space Administration established, early this month, an independent four-man board to review the findings of the Jet Propulsion/NASA Ranger project team which is now analyzing the recent Ranger VI camera failure.

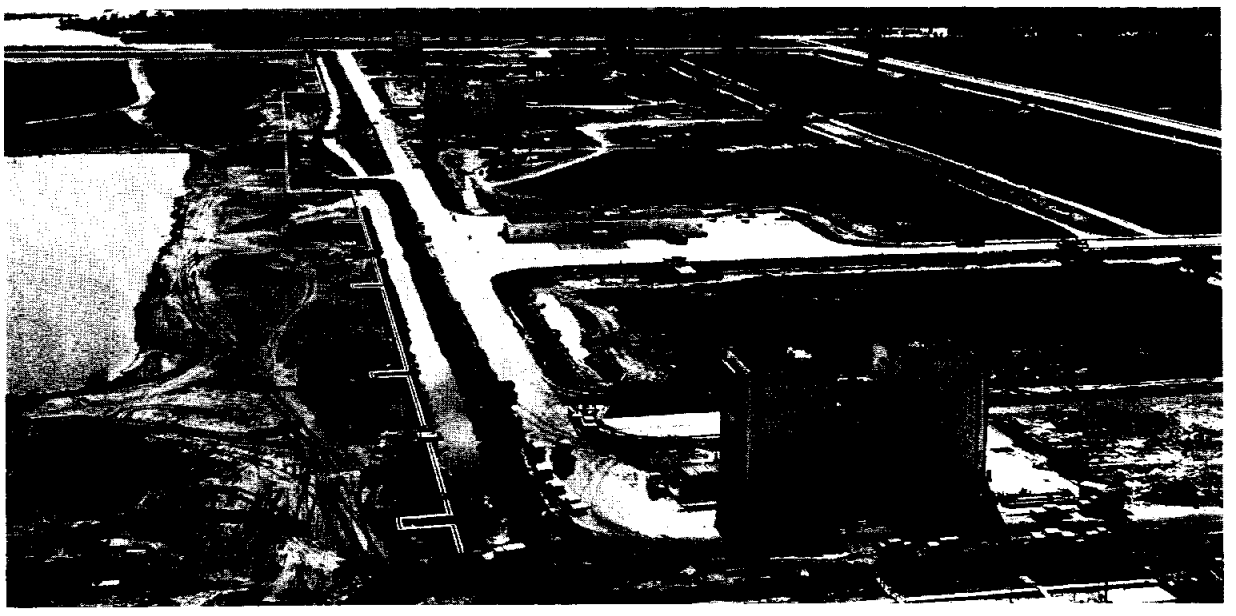
Headed by Earl D. Hilburn, NASA deputy associate administrator for Industry Affairs, the board consists primarily of individuals not directly associated with project Ranger. This follows NASA practice to establish an independent review in major failures.

The results of this independent review will be used by NASA management to determine the future course of action in the Ranger program, including the date of the next launch. For these determinations, the board will draw heavily on the information now being developed by the Jet Propulsion Laboratory, Pasadena, Calif., technical review team.

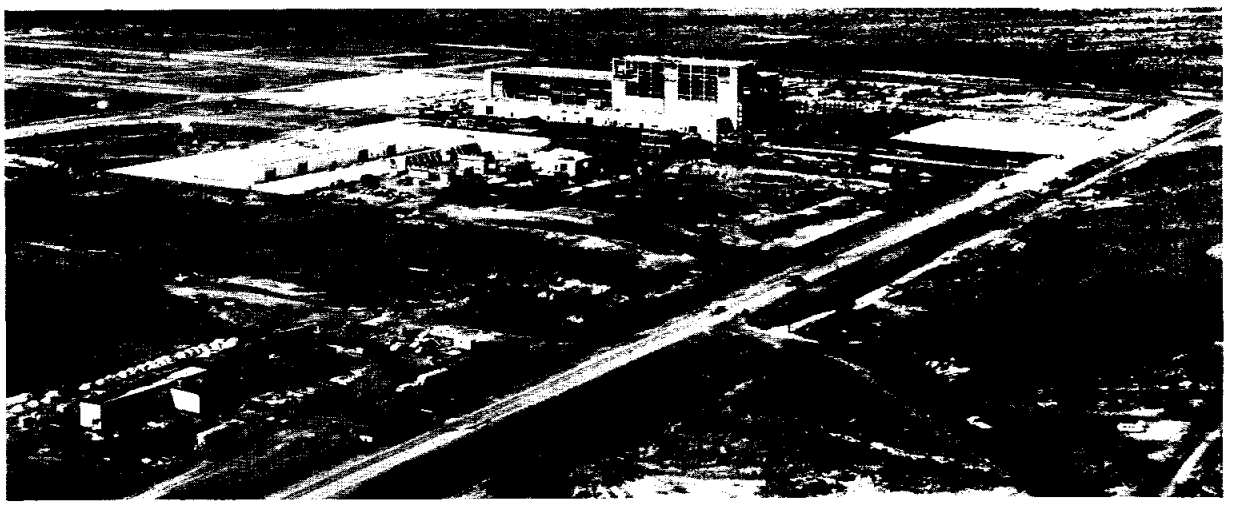
This team is engaged in an analysis of the recent failure of the Ranger VI television subsystem during the final minutes of its mission to obtain high resolution photographs of the Moon. Ranger VI impacted the Moon at 4:24 a.m. EST February 2, within one second of the calculated time and within 20 miles of its aiming point.

The other members of Hilburn's committee are: Herman LaGow, Systems Review Group, Office of Space Science and Satellite Applications, Goddard Space Flight Center; Francis Smith, chief, Instrument Research Division, Langley Research Center; Walter Jakobowski, Ranger Program Engineer, Lunar and Planetary Programs Div., OSSA; and Eugene Dangle, secretary, Technical Program Officer, Office of Program Review, NASA Hqs.

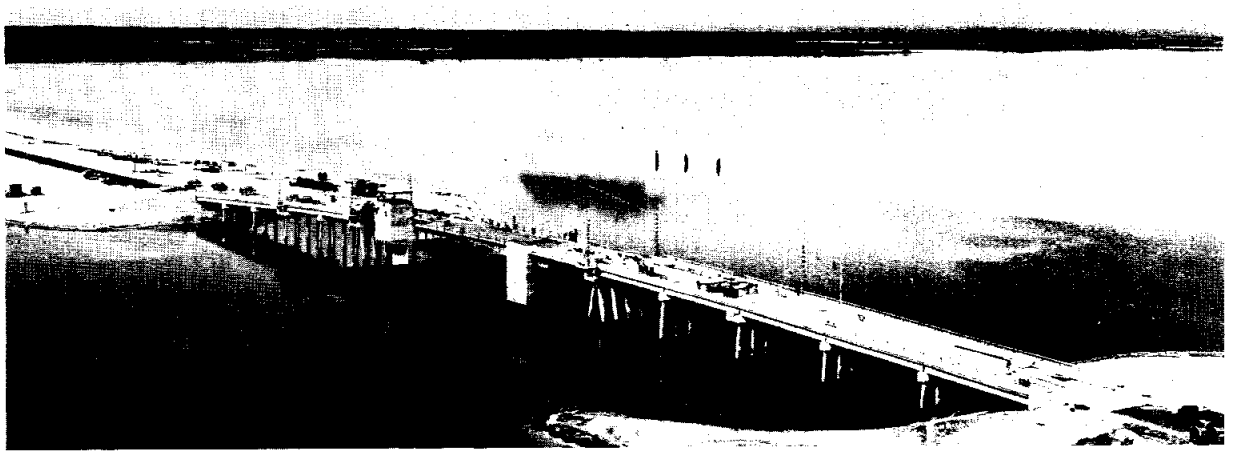
Merritt Island Construction Progress



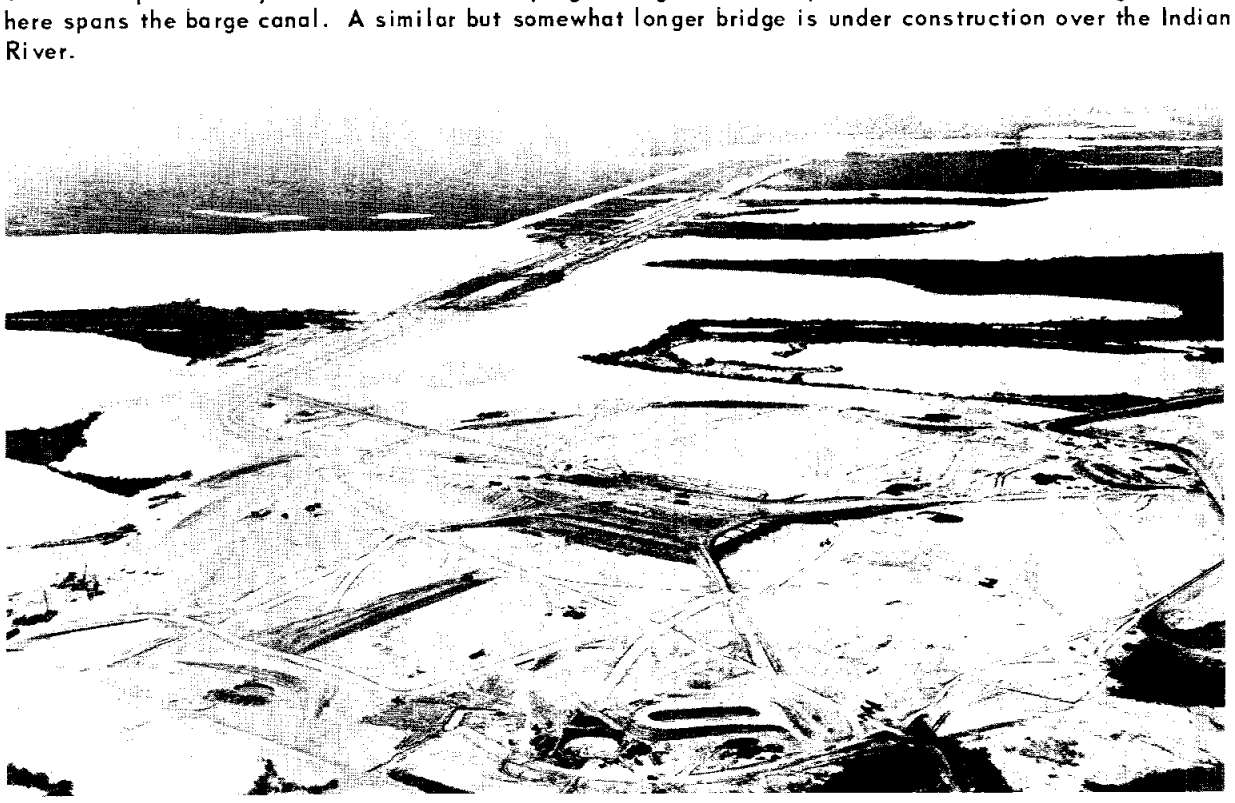
FLUID TEST COMPLEX – This aerial view shows the Manned Spacecraft Center's Fluid Test Complex on Merrit Island in Florida. The buildings are (front to rear), Environmental Control Systems, Fluid Test Complex Support, Hypergolics Test, and Cryogenics Test.



MSC's OPERATIONS and Checkout Building is shown in the rear of the photo with a supply building to the left and the Parachute and Paraglider building in the foreground.



CAUSEWAY – With Merrit Island in the background, the Banana River-Orsino Causeway that will connect Cape Kennedy with Merrit Island is progressing toward completion. The Bascule Bridge shown here spans the barge canal. A similar but somewhat longer bridge is under construction over the Indian River.



PAD 39A – This aerial view of the Merrit Island Pad 39A area shows the build up for the pad in the center of the photo. Going off the pad to the left and making a 90degree turn to the right is the crawlerway that connects Pad 39A (Saturn V launch pad) with the Vertical Assembly Building under construction in the background.

Space News NASA ROUNDUP!

SECOND FRONT PAGE

Astronauts Put On Feet By Ex-Army Sergeants

Two ex-army sergeants who slogged through the Korean conflict on their feet have designed a system that will require American astronauts to land on the moon standing up.

The two former infantrymen, now design engineers here at the Manned Spacecraft Center, have eliminated seats in the Apollo lunar excursion module (LEM) in favor of harnesses.

Pilots aboard the LEM will fly the spacecraft in a standing position similar to the way trolley cars are driven here on earth.

The savings in weight will allow more latitude in the design of the LEM, and a reduction of its overall volume. The LEM is being built in Bethpage, N. Y., by Grumman Aircraft Engineering Corporation.

George C. Franklin, head of the Crew Station Arrangement Section, Flight Crew Operations Division, and Louis G. Richards, flight systems engineer, suggested the harness concept after investigating contour couches, "bicycle seats", and even "barstool configurations" for the first Americans to ride to the moon's surface from a moon orbiting Apollo spacecraft.

Since LEM pilots will spend most of their time weightless--and will probably not exceed the forces of one gravity (1-g) during flight--the seats are unnecessary.

"This means the pilots can stand closer to the window," Franklin said, "and allows us to reduce the window area by 20 square feet."

Astronauts M. Scott Carpenter and Charles Conrad Jr., responsible for providing astronaut point-of-view to cockpit engineers, consider the "trolley car configuration" a major breakthrough.

"From our viewpoint it's ideal," Conrad said. "We get much closer to the instruments without our knees getting in the way, and our vision downward toward the moon's surface is greatly improved."

When flying the LEM, pilots are connected to the ceiling by straps that connect to their pressure suits; other straps anchor them to the floor.

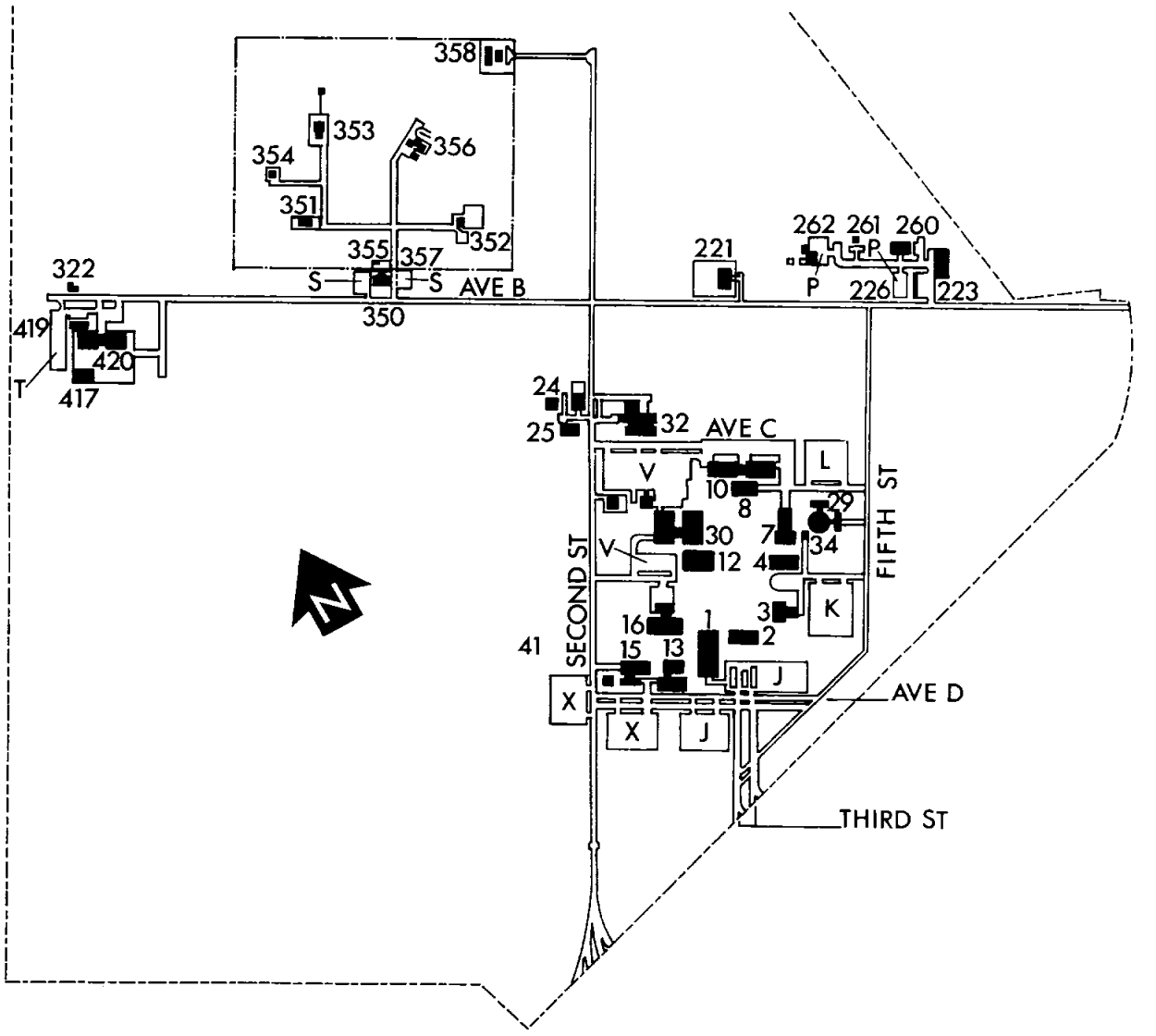
"This way," Conrad added, "we can wear self-contained equipment for use outside the spacecraft after the lunar landing, and we don't have to worry about putting it on and taking it off as we would if we were seated.

Franklin and Richard both worked on cockpit arrangements for jet aircraft before coming to MSC.

Franklin, a native of California, has bachelor of science degrees in zoology from Tulane University and mechanical engineering from the University of Arizona. Richard, of Sulphur, Okla., has a bachelor of science degree in mechanical engineering from Oklahoma State University. Both served in Korea during the 1950-51 conflict.

"We've come full circle," Richard laughed, "from standing up in trolley cars, to sitting in jets and back to standing up in spacecraft. I guess it's the infantry in us."

LEM HARNESS DESIGNERS – Engineers Louis Richard, left, and George Franklin of MSC, stand inside a mock-up of the lunar excursion module (LEM) as Astronaut Charles Conrad Jr., demonstrates the LEM restraining harness they designed. The photo was taken through one of the triangular windows of the LEM.



CLEAR LAKE SITE – This map of the Manned Spacecraft Center at Clear Lake is being published with the hope that it will help orient those who are not familiar with the area and will be moving to the site soon. The main entrance to the site will be the Third Street entrance which is just off the FM 528 highway. The solid black areas are the buildings with the building numbers alongside them. The main parking areas are indicated by the letters J, K, L, P, S, T, X and V.

Extra-Vehicular Life-Support Contract Let

The Manned Spacecraft Center has awarded a contract to the Garrett Corporation's AiResearch Manufacturing Company Division for design and production of an extra-vehicular Pressurization Ventilation System for Gemini astronauts.

The primary objective of the contract is to develop a system to provide a life-supporting environment within the Gemini pressure suit assembly while exposed to free space, with maximum functional response, reliability, material integrity and minimum weight and volume.

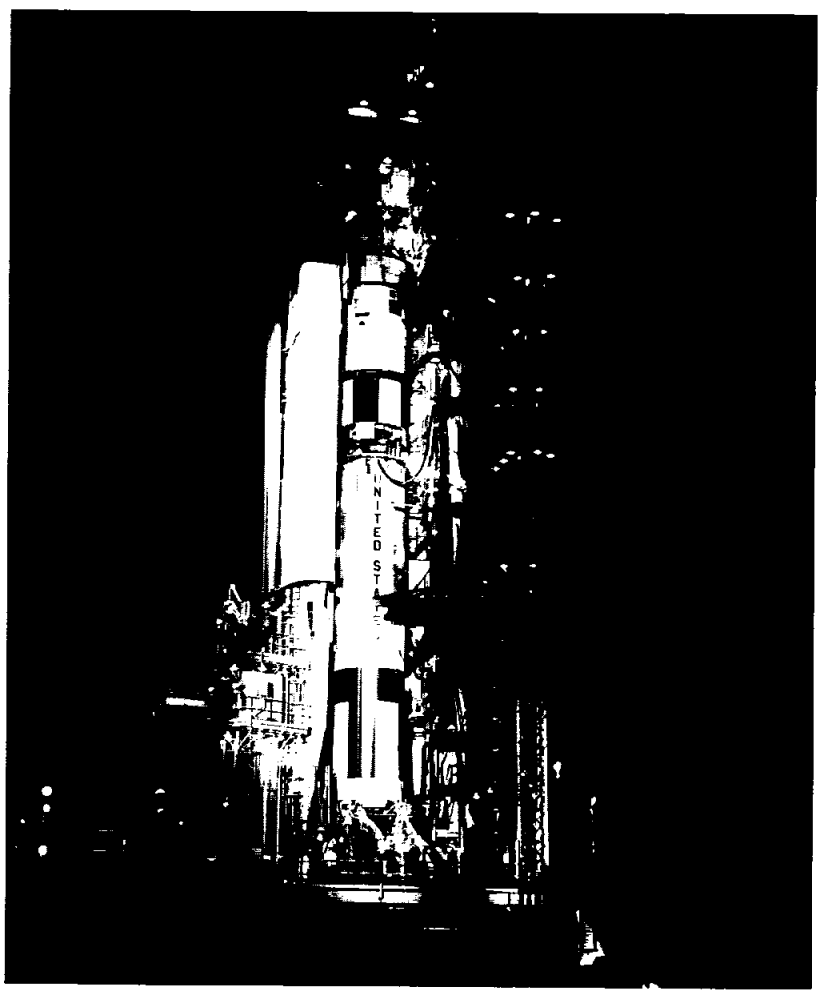
Use of the life support system will come during the Gemini program when the astronaut crewmen open their spacecraft and one of them moves outside it in an experimental effort marking man's first entry into free space in only a pressure suit.

418 'Satellites' Orbit Earth; 77 Added In'63

A total of 77 space payloads went into the computerized catalogue of the North American Air Defense Command's Space Detection and Tracking System in Colorado Springs during 1963.

The system's operations center has been functioning since July of 1961 and has catalogued a total of 747 space objects, and is now receiving tracking data on 418 satellites in orbit.

Of these presently in orbit, 92 are actual payloads; the others are space debris--material that goes into orbit with every launch. Some of the pieces of junk being tracked are no larger than a lead pencil.



GEMINI LAUNCH VEHICLE – The first mating of the Gemini launch vehicle (a modified Air Force Titan II) took place early this month on Pad 19 at Cape Kennedy. The vehicle will be used later this year to launch the first unmanned Gemini spacecraft.