Space News ROUNDUP!

VOL. 2, NO. 17 MANNED SPACECRAFT CENTER, HOUSTON, TEXAS JUNE 12, 1963

Recruiting Opens For 10-15 New Astronauts

UP IN THE AIR, in more ways than one. The expressions of these three astronauts mirror the strangeness of their sensations as their feet rise from the floor of an Air Force C-135 during weightlessness orientation at Wright Patterson AFB, Dayton, Ohio. The plane, specially padded inside, dives to gain speed, climbs sharply and dives again. At the top of the parabolic curve at the end of the climb, occupants experience about 60 seconds of weightlessness. Left to right are Astronauts Thomas Stafford, Frank Borman and James Lovell, three of the astronauts chosen last September for programs beyond Mercury. All nine of the "new" astronauts got a chance to experience weightlessness in a four-day trip to Wright-Patterson April 22-25 when they were taken aloft in the special plane in groups of three. The nine also experimented with a space manuevering unit, a back pack designed to propel them.

Deadline For New Application Is The First Of July

The National Aeronautics and Space Administration will recruit ten to 15 new astronaut trainees this summer, NASA announced last week.

Open to both civilian and military volunteers, the program has a July 1 cut-off date for applications. Military services, which will pre-screen their pilots, will have until July 15 to pass on to NASA their recommended applicants.

Pilots selected will join the current astronaut pilot pool in October, based at MSC.

With slight exceptions, selection criteria are similar to those used in the selection of nine manned space flight candidates chosen in 1962. To qualify a candidate must:

1. Be a United States citizen.
2. Have been born after June 30, 1929, so that he does not reach his 34th birthday until

(Continued on page 2)

MA-9 Problems On Reentry Traced To Insulation Break

The malfunction that caused astronaut Gordon Cooper to manually fly "Faith 7" during reentry on MA-9 has been traced to two connectors in an electrical amplifier. The two connectors are located in the amp cal (amplifier calibrator), where electrical signals from various spacecraft systems are converted into commands.

These commands activate the hydrogen peroxide jet thrusters in the automatic control system to maintain proper spacecraft position in relation to the earth.

The spacecraft sensors include the gyroscope and infrared horizon scanners.

First, the appearance of the .05g panel light and later the failure of the ac power from the inverter signalled problems to Astronaut Cooper.

Detailed post-flight examination of the spacecraft circuit revealed the following facts:

The inverter trouble has been traced to an electrical power connector, which passes the AC output from the inverter buss (ASCS) into the amplifier calibrator. The insulation on the connector had failed and permitted the AC power line to find a ground, causing a short circuit.

The inverters will not operate in the event of such a malfunction in the circuit. A post-flight examination of the inverters themselves showed them to be undamaged.

Corrosion was found in and around another electrical connector through which some of the .05g circuit passed. Presence of the corrosion indicated the possibility that moisture had collected in the area and resistance checks of the current passing through the connector indicated changing resistance as though the system were drying out.

Later, tests with completely dried circuits and a new power connector showed satisfactory operation of the amp cal, in-

(Continued on page 2)

Center Operation Divisons Split Into Two Groups In Reorganization

Manned Spacecraft Center last week announced a realignment of its administrative organization, headed by Assistant Director for Administration Wesley L. Hjornevik.

The major change is the establishment of the position of Manager for Missions and Operations Support, occupied by former Center Operations Manager Martin A. Byrnes. The Office of Center Operations Manager has been eliminated.

Byrnes will be responsible for assuring that effective business management service is provided to those elements of the Center reporting to Deputy Director for Mission Requirements and Flight Operations Walter C. Williams. He will also monitor business administration activities at MSC's White Sands Resident Office and at Cape Canaveral Operations.

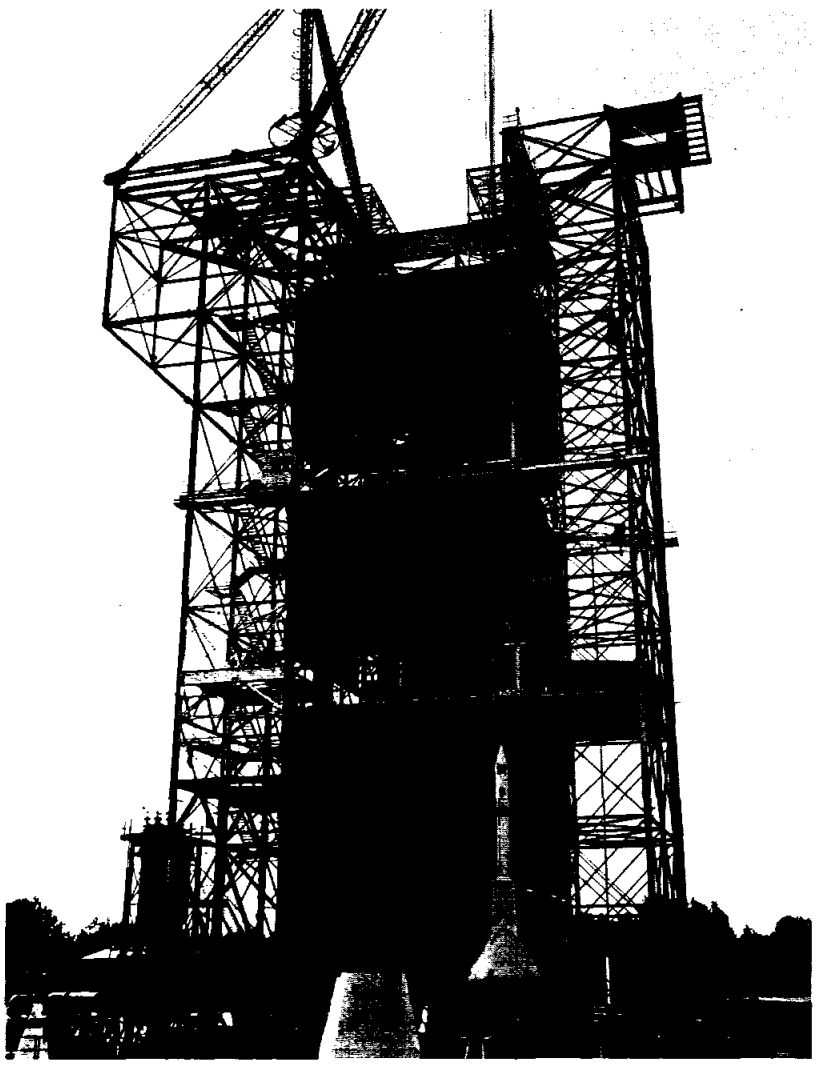
Those divisions which formerly came under the Manager, Center Operations, have now been realigned in two

(Continued on page 2)

Martin A. Byrnes

Joseph V. Piland

Douglas R. Hendrickson



A BOILERPLATE model of the Apollo three-man lunar spacecraft is shown being placed in the dynamics test stand at the Marshall Space Flight Center, Huntsville, Ala. for a series of vibration and mating tests. The Apollo will be tested with the S-IV Saturn upper stage until July. After those tests, the booster, or first stage, will be added to complete the rocket/spacecraft configuration. Sawyer said the tests include simulation of flight vibration to determine the resonance of the entire rocket and spacecraft. The two elements of the Apollo to launched by the Saturn I—the command and service modules will be used.

Gemini Parachute Tests Enter Qualifying Stage

The first in a series of drop tests to qualify the parachute recovery system which will lower the two-man Gemini spacecraft to a water landing has ended successfully at El Centro, California.

The drop was made over Tatu Range. Future drop tests will be made over Pacific Missile Range, Pt. Mugu, Calif.

The parachute recovery system, designed by Northrop's Ventura Division, will be Gemini's prime water landing system. The parachute system is designed for wet landings and will be used for unmanned and early manned Gemini flights. The first manned flight is scheduled for 1964. It will be preceded by two or three unmanned flights.

Just completed were a series of 20 development drops of the main and drogue parachutes at El Centro, California. These tests checked out the deployment characteristics and the structural integrity of the individual chutes.

The qualification tests, scheduled for completion in early 1964, will check out the operation of the recovery system. This will include the parachutes, the pyrotechnic devices which explosively trigger the deployment and release of the parachutes and the sequencing system.

Twenty tests are scheduled using a Gemini boilerplate. Two additional tests using structural duplications of the Gemini spacecraft will finish the series.

Tests over the U. S. Navy's Pacific Missile Range, Pt. Mugu, California (El Centro, California, will be used as an alternate drop area) will be made from a C-310 cargo-type aircraft. The boilerplate, mounted on a sled within the aircraft, will be extracted from the rear of the cargo compartment by an extraction chute, then separate from the sled and "free fall' to about 12,000 feet where the stabilization parachute is separated and the Gemini recovery system is "armed".

At 10,600 feet above water, the sequencing will be initiated with the deployment of the drogue parachutes. After a two-second delay, the canister will separate to deploy the main parachute. The parachute will descend in "reefed" condition for 8 seconds, when it will "dis-reef." (Reefing, or restricting the skirt from opening until a safe descent speed is reached, prevents excessive loading on the canopy. Disreefing releases the restraining band, and allows the canopy to blossom). After 22 seconds, a single point release is fired to free the bridle which will allow the spacecraft to rotate on a two-point suspension system and assume a "nose-up" position 35 degrees from the horizontal.

The 35-degree impact inclination lowers the spacecraft into the water on the "corner" of its heat shield, appreciably lessening the shock of landing impact. This method of water landing also eliminates the need for the impact bag which was used for Mercury spacecraft landings.

The parachute recovery system will be replaced later by a land landing system for which the paraglider is now under development. Throughout manned Gemini flights, ejection seats—which can be triggered by each astronaut individually for a rapid escape from the spacecraft—will serve as the emergency back-up recovery system.

Reorganization

(Continued from Page 1)

new offices, the Office of Administrative Services, headed by Douglas R. Hendrickson, and the Office of Technical and Engineering Services, headed by Joseph V. Piland.

Hendrickson was formerly deputy chief of Financial Management Division. Piland was assistant to the manager of Project Mercury.

Divisions under Hendrickson's Office of Administrative Services will include Office Services Division (formerly Administrative Services), Logistics Division, and the Technical Information Division.

Hendrickson will be responsible for the overall planning, direction coordination and administration of logistics, technical information, and administrative support for all MSC activities.

Reporting to Piland as chief, Technical and Engineering Services will be the Facilities Division, Photographic Division (formerly Photographic Services), and Technical Services Division. A newly-created division, to be called the Engineering Division, will provide engineering support services to MSC and will also report to Piland.

Piland will be responsible for the overall direction of technical support services required by MSC and will effect the necessary coordination and planning of program effort to assure that these services are responsive to MSC activity requirements on a timely basis.

As in the past, five other divisions will report directly to Assistant Director Hjornevik. They are Management Analysis, Procurement and Contracts, Financial Management, Personnel, and Security.

Recruiting Opens

(Continued from Page 1)

after June 30 of this year.

3. Be six feet or less in height.

4. Have earned a degree in engineering or physical sciences.

5. Have acquired 1,000 hours jet pilot time, or have attained experimental flight test status through the Armed Forces, NASA, or the aircraft industry.

6. Be recommended by his present organization.

NASA also announced that conversation will be begun with representatives of nation's scientific community with regard to finding the earliest practicable ways in which scientists can be included in the Apollo mission.

Compared to 1962 selection criteria, the maximum allowable age has been reduced from 35, and certification as a test pilot, while still preferred, is no longer mandatory.

The age reduction is to insure a broad age spread in the pilot pool. Average age of the original group of 7 astronauts is 38; the second group, 34.

In addition, successful applicants will have to be in excellent physical and mental condition.

Applications are to be addressed to the NASA Manned Spacecraft Center, Personnel Office, P. O. Box 18534, Houston 1, Texas, Attn: John Cairl. Civilian applications must be postmarked no later than midnight July 1, 1963.

MA-9 Troubles

(Continued from Page 1)

cluding the .05g circuit. Introduction of small quantities of moisture to the plug resulted in actuation of the .05g circuit as it had done during flight. Thus, it is concluded that actuation of the .05g circuit mission probably resulted from effects of moisture in the connector.

The inverter and .05g troubles during the mission were traced to independent electrical connectors that failed at different times during the flight. There is no indication that the failures were connected other than the fact that the electrical insulation broke down in both cases.

Correction of these problems will include tighter control of moisture within the spacecraft and an increase of the protection of the electrical connectors and other components from moisture.

More than 6,000 people are now employed at the NASA Michoud Operations near New Orleans, La. where the Saturn I and Saturn V space boosters will be produced.

NASA Asks Concept Study On Possible Lunar Base

Proposals have been requested by NASA for a lunar base concept study. Purpose of the program is to provide detailed technical data to determine if a lunar base should be developed.

The study program will attempt to define a versatile lunar base system for use no earlier than the 1970's. The system must be capable of supporting a variety of scientific missions under a wide range of lunar conditions.

The studies will concentrate on the concept of an expandable, modular base adaptable both to small outposts and to larger permanent installations housing up to 18 men.

The first study for which proposals are being solicited will consider the general concept of the complete base system. Within several weeks, additional studies will be initiated to examine in detail three of the major elements of the base: the life support system, the nuclear power plant, and the regenerative fuel system for surface vehicles.

Some months from now a number of other studies will be conducted to investigate additional technical and operational problems. A final overall study will consolidate the data from the other investigations and present a comprehensive picture of the lunar base together with its advantages and limitations.

Alabama Firm Has Low Bid On LUT's

A Birmingham, Ala., firm was announced last week as the apparent low bidder to build three launcher-umbilical-towers (LUT) for the Saturn V Moon rocket.

Ingalls Iron Works Co. submitted a proposal to build the LUTs for $11,225,368.85. Theirs was the lowest of 10 proposals made to the Launch Operations Center.

An award of contract is expected to be made this month.

The government's estimated cost of the job was $12,636,-140.

The bid specifications call for the three LUTs to be constructed within a period of about 18 months. They will be fabricated elsewhere but will be erected and checked out in NASA'S Merritt Island Launch Area, where the Saturn V will be launched.

Each LUT will weigh about 6 million pounds and will tower 426 feet above the ground.

The X-15 aircraft is a joint research project of the Air Force, Navy, and the National Aeronautics and Space Administration.

Apollo Mission Simulators Are Ordered For Houston And Cape

Apollo mission trainers to put space-bound astronauts through simulated two-week trips to the moon and back have been ordered for NASA's Manned Spacecraft Center.

The Link Divison of General Precision, Inc., Binghampton, N. Y. was selected by North American Aviation's Space Systems Division, Downey, California, to develop and install the two spacecraft simulators. Amount of the contract is expected to total approximately $9.5 million.

One of the simulators will be placed at MSC here in Houston and the other is to be at the Atlantic Missile Range, Cape Canaveral.

The Apollo mission simulators will train astronauts from launch through lunar orbit and return to earth.

Unique in design, the trainer provides a new concept in simulation which will project the training into deep space. The trainers will duplicate pre-launch conditions, first and second stage boost and separation, parking and earth orbits, injection into translunar trajectory, initial and mid-course coast, circumlunar pass, pre-retro coast and retro to circular lunar orbit, separation from lunar excursion module, rendezvous with lunar excursion module, injection to trans-earth trajectory, initial mid-course coast, reentry and landing.

The simulator will provide sound effects of booster separation and space lighting effects so that astronauts will be able to see the moon and earth in proper relation to the spacecraft during all mission phases.

Big Saturn

NASA's Saturn V rocket will be 33 feet in diameter, and have a take-off weight of more than six million pounds.

Digital Computers Are Ordered For Saturn V Checkout

High-speed digital computers to check out the huge second stage of NASA's Saturn-V launch vehicle have been ordered from Control Data Corporation, Minneapolis. Amount of the contract is expected to be more than $2,200,000.

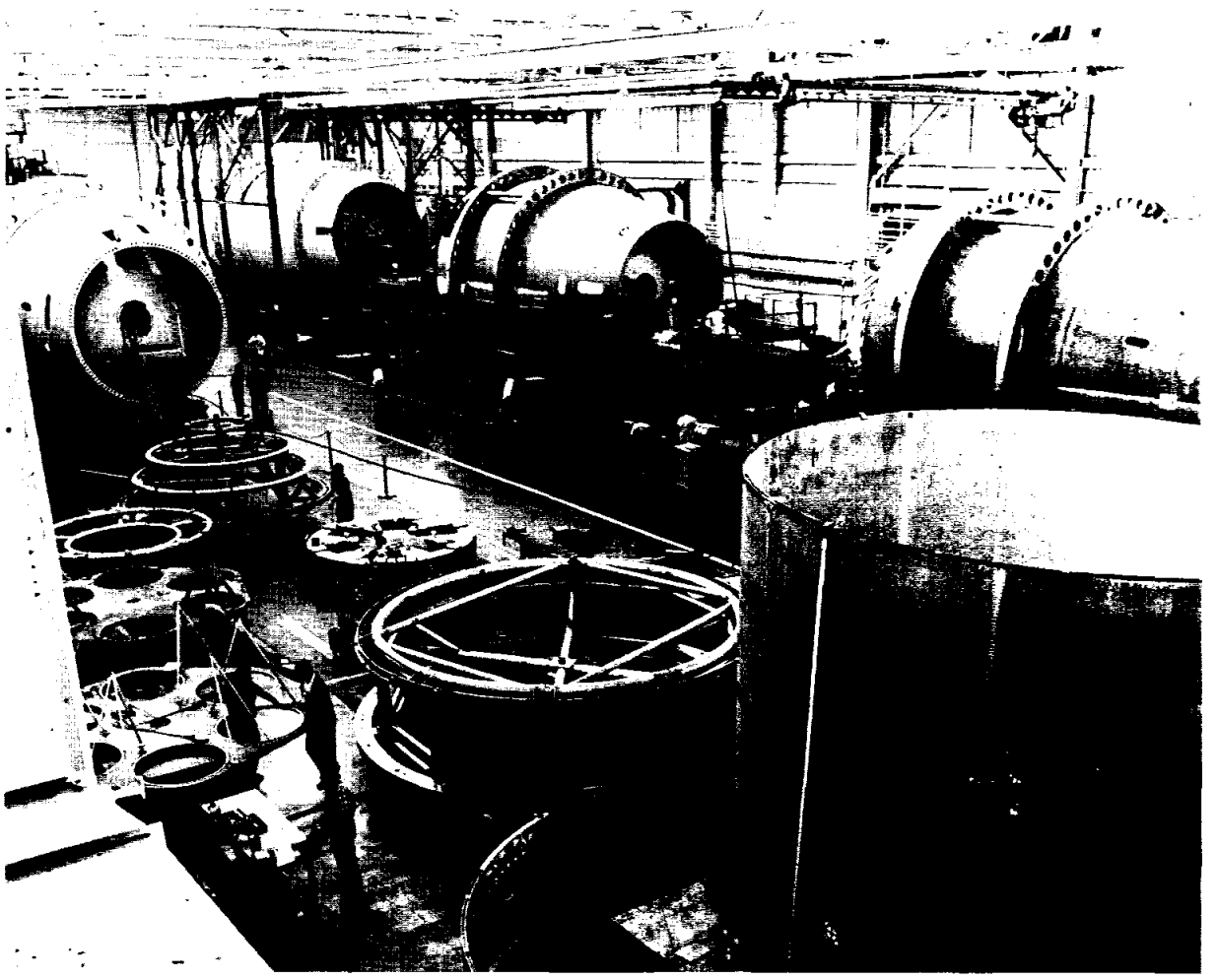
The Minnesota firm was selected by North American Aviation's Space and Information Systems Division, principal contractor for the Saturn (S-11) second stage. The Saturn project is under the technical direction of NASA's Marshall Space Flight Center, Huntsville, Ala.

The computers (designated Control Data 942s) will be utilized for automatic booster vehicle checkout at Seal Beach and the Santa Susana Test Facilities, Calif., the Mississippi Test Operations Center and at Cape Canaveral, Fla., test and checkout facilities.

The contract will provide for six computers, 24 tape units, two printers and other equipment required to check out the Saturn S-11 launch vehicle.

First and second stages of Saturn-V are designed to provide the rocket with the initial and secondary boost toward the moon. The third stage will give the spacecraft the final thrust to the vicinity of the moon.

The second stage of the Saturn-V, for which the computers are being installed, is 82 feet tall, plus adapter, and 33 feet wide. Constructed of aluminum alloy machined skin and supported internally by a rib structure, the S-ll will develop one million pounds of thrust.



HUGE S-IV UPPER STAGES of the Saturn I vehicle which will blast into space for the first time later this year are shown in production at Douglas Missile & Space Systems Division, Santa Monica, California. Four powerful first stages of Saturn I have been successfully flight tested from Cape Canaveral. Next launch will be the first of the complete vehicle—first stage and S-IV second stage—and, if successful, will result in orbiting of the heaviest United States payload to date. S-IV is powered by cluster of six engines generating 90,000 pounds of thrust and using a high-energy propellant combination of liquid hydrogen and liquid oxygen. Douglas is S-IV prime contractor to NASA's Marshall Space Flight Center. S-IVs have been shipped to MSFC, to Cape Canaveral and to Douglas Sacramento, Calif., installation for testing and checkout.

Ford Aeronutronic To Investigate 'Ferry' For Future Mars Mission

A Martian "taxi" to ferry U. S. astronauts between an orbiting spaceship and the surface of the planet Mars will be investigated by Ford Motor Company scientists under terms of a contract negotiated recently with Manned Spacecraft Center. Ford's Aeronutronic Division will conduct the study.

Technical responsibility for the program has been assigned to Dr. Franklin P. Dixon, manager of Advanced Space Systems for Engineering.

"Aeronutronic is studying the requirement for a Mars Excursion Module (MEM), a vehicle carried by a larger spacecraft and designed to taxi astronauts between it and the planet Mars, around which the larger spacecraft would be orbiting," Dr. Dixon explained.

In a Mars mission, perhaps in the middle of the next decade, such a vehicle could land several astronauts on the planet for exploration, remaining there for perhaps as long as 40 days before returning to the mother spacecraft for the return voyage home, the space scientist said.

In such a mission, the vehicle could act as the headquarters for the planetary explorers, he said.

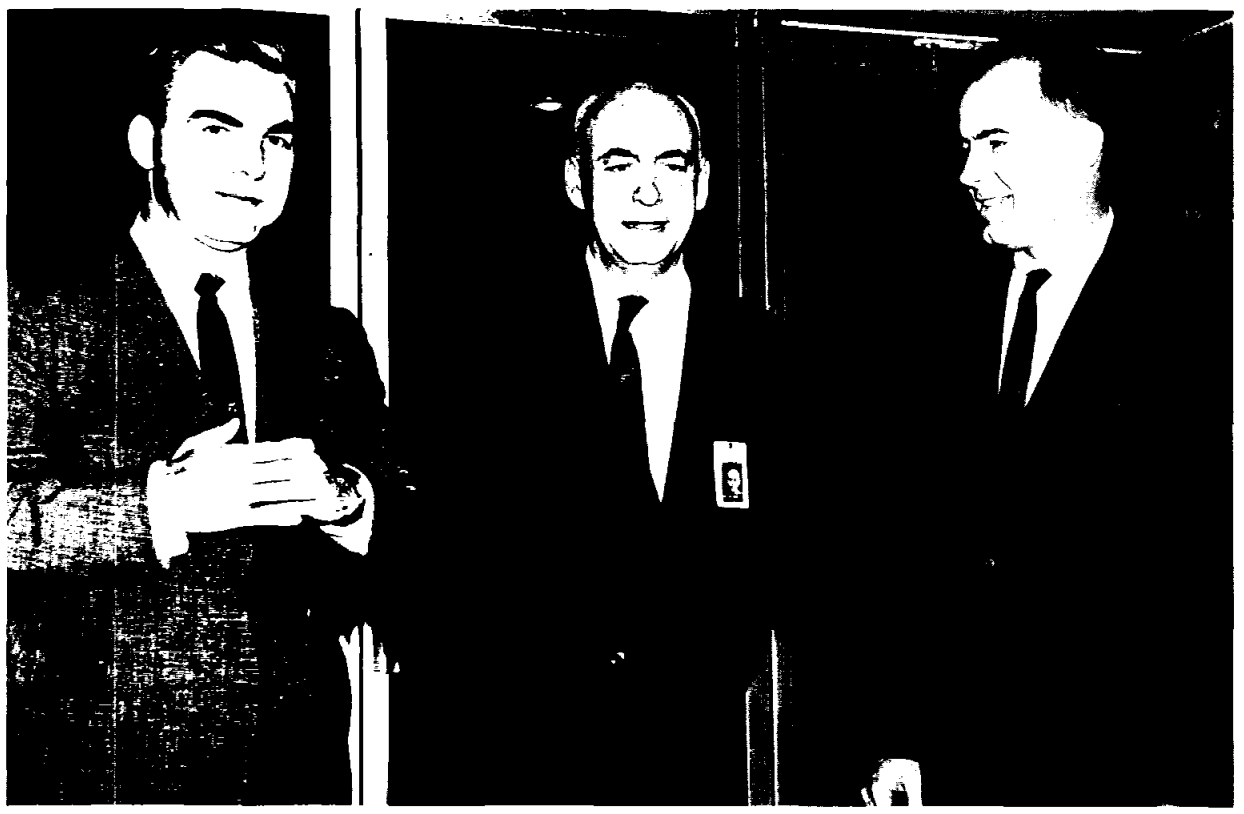
"When the astronauts would decide to leave the planet's surface, they would board their Mars taxi and blast-off for orbital rendezvous with the mother spaceship," Dr. Dixon said.

"Once rendezvous had been completed and the crew transferred to the larger craft, the Mars spaceship would return to earth, leaving the small taxi behind."

Dr. Dixon cautioned that this study does not mean that NASA has scheduled such an interplanetary manned flight; rather a body of preliminary information is being developed for use when and if such a project is established.

Aspects being studied include trajectories, weights and preliminary design, rendezvous, propulsion requirements, life support systems, Martian atmospheric entry, Mars surface operations, long lead-time requirements, funding requirements, and other critical factors.

Directing the contract for NASA is Oscar O. Olhsson, head of the Mars Mission Study, Advanced Projects Office, at the Manned Spacecraft Center.



TWO MEN NAMED EDMUNDSON chat with MSC Director Robert R. Gilruth (center) at the Farnsworth and Chambers Building last Thursday. At left U. S. Senator J. Howard Edmundson (D-Okla.) and at right, Rep. Ed Edmondson of Muskogee, Okla., his brother. Senator Edmondson, former Governor of Oklahoma, is a member of the Senate Aeronautical and Space Sciences Committee, which will begin hearings on the 1964 NASA budget request this week. He spent several hours in a classified briefing with Dr. Gilruth Thursday of last week.

Motion Simulator

(Continued from Page 8)

and escape system operation.

Seven powerful hydraulic "shakers" are connected to a test platform by pushrods and universal joints. Power for the shakers is supplied by 1400-hp hydraulic pumps.

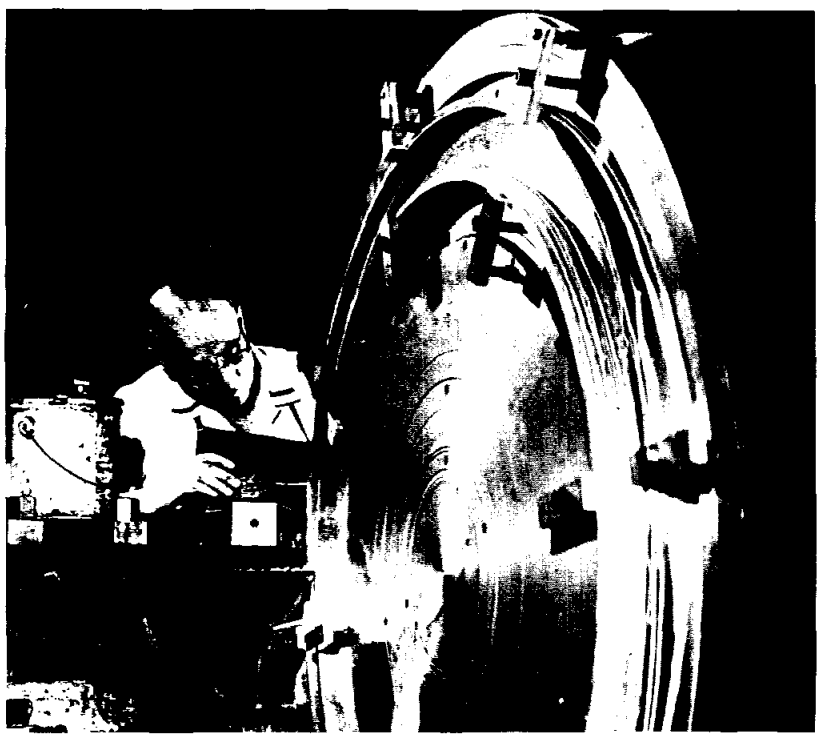
Before space pilots are given a ride on the "shake table," artificial human equivalents and monkeys will be given the simulator test.

The astronauts, clothed in space suits, will lie on space vehicle couches during the tests.

General Dynamics/Convair Builds Little Joe II; First

ABORT TOWER is placed on top of simulated Apollo test payload. This boilerplate, dummy payload will be launched on first Little Joe II flight at White Sands and permit a true checkout of the launch vehicle. The test is scheduled next month.

CONVAIR PLANT, near midtown San Diego and adjacent to Lindbergh Field—the municipal airport, encompasses three million square feet of company-owned laboratory and factory areas. This includes a seaplane test and overhaul facility on San Diego Bay near a Naval Air Station.



MACHINIST turns Little Joe II ring thrust reaction part in gap lathe. Convair craftsmen are supported by modern equipment, including type-controlled numerical milling machines.

NASA TEAM inspected Little Joe II May 6. From left are MSC Deputy Director Walter C. Williams; Acting Apollo Project Manager Robert O. Piland, Convair Little Joe II Program Manager J. B. Hurt, and MSC Deputy Director James C. Elms. First Little Joe launch vehicle and dummy Apollo capsule topped by mockup of abort tower appears behind the four men.

Within 32 days the first Little Joe II flight—a vehicle qualification test—will take place at the White Sands Missile Range in New Mexico.

Only one year ago last month the National Aeronautics and Space Administration selected General Dynamics/Convair to design and manufacture the Little Joe II launch vehicle.

The tightness of this schedule for a completely new launch vehicle — only 14 months from contract go-ahead to first flight—indicates the importance of Little Joe II to the manned lunar landing program.

Little Joe II will be used to thrust the Apollo spacecraft on unmanned suborbital test flights. It will qualify the unmanned Apollo launch escape system and command module prior to missions using major launch vehicles.

Convair has tailored Little Joe II design and fabrication to meet NASA's requirements for a low cost, expendable launch vehicle that is simple, reliable and versatile.

On the initial flight, Little Joe II will be topped by a Convair-designed simulation of the North American Aviation Company's test Apollo payload. By using the boilerplate payload, engineers will be able to obtain extensive information regarding the performance of the launch vehicle and its systems.

Preparations for the first flight have been underway at White Sands for the past few months. The first Little Joe II launcher—also designed and built by Convair—has already been assembled there. Launch pad facilities and support equipment are now being installed.

Early in April the two barrel-shaped sections of the first launch vehicle were test mated at Convair. Later in May the first Little Joe II was trucked from San Diego to White Sands.

During the past year the Little Joe II program, which is managed by the Manned Spacecraft Center and has been consistently on schedule and on—or under—budget, has been credited with a number of "firsts:"

In November of 1962 Convair became the first Apollo program contractor to put a high-speed automatic PERT data transmission system in operation between its plant location and the Manned Spacecraft Center. With direct computer-to-computer communication, Convair sends a two-week program progress report to Houston in five minutes.

In February of this year Convair became the first major Apollo program contractor to receive a definitive contract from NASA. It called for Convair to design and manufacture four Little Joe II launch vehicles and two launchers, and furnish support at the White Sands Missile Range.

In order to fulfill the NASA requirements for a low-cost, simple and reliable launch vehicle, Convair has designed Little Joe II around already-proven systems and components that are available on an off-the-shelf basis.

Little Joe II is the first launch vehicle that is being value controlled from preliminary design to first flight. Utilization of the latest value engineering and analyzing techniques has enabled Convair to control program cost without compromising quality and reliability.

For example, Convair engineers used value control and kept in mind the requirement for off-the-shelf material to come up with an unusual—but extremely effective—design feature.

Little Joe II is the first launch vehicle with a corrugated skin. To make the skins to Convair specification, Aluminum Company of America uses existing dies and machines. The corrugated skin is made on the same folding machines used to put "waves" in industrial siding and from dies similar to those used for patio roofing.

The corrugated skin inherently increases the strength of the vehicle. The corrugation acts as the verticle support for the vehicle, eliminating the need for combination riveted skin and steel stringers. The corrugated skin is riveted directly onto ring frames.

The Little Joe II launch vehicle airframe consists of a cylindrical body and four fins. The airframe is produced in two sections: a forebody about 19 feet long and an afterbody about 10 feet long. The four fins, each about 50 square feet in area, are spaced around the afterbody.

The main structural member of the vehicle is the thrust bulkhead located at the lower end of the afterbody. The solid-fuel rocket motors that propel the vehicle are mounted in this bulkhead.

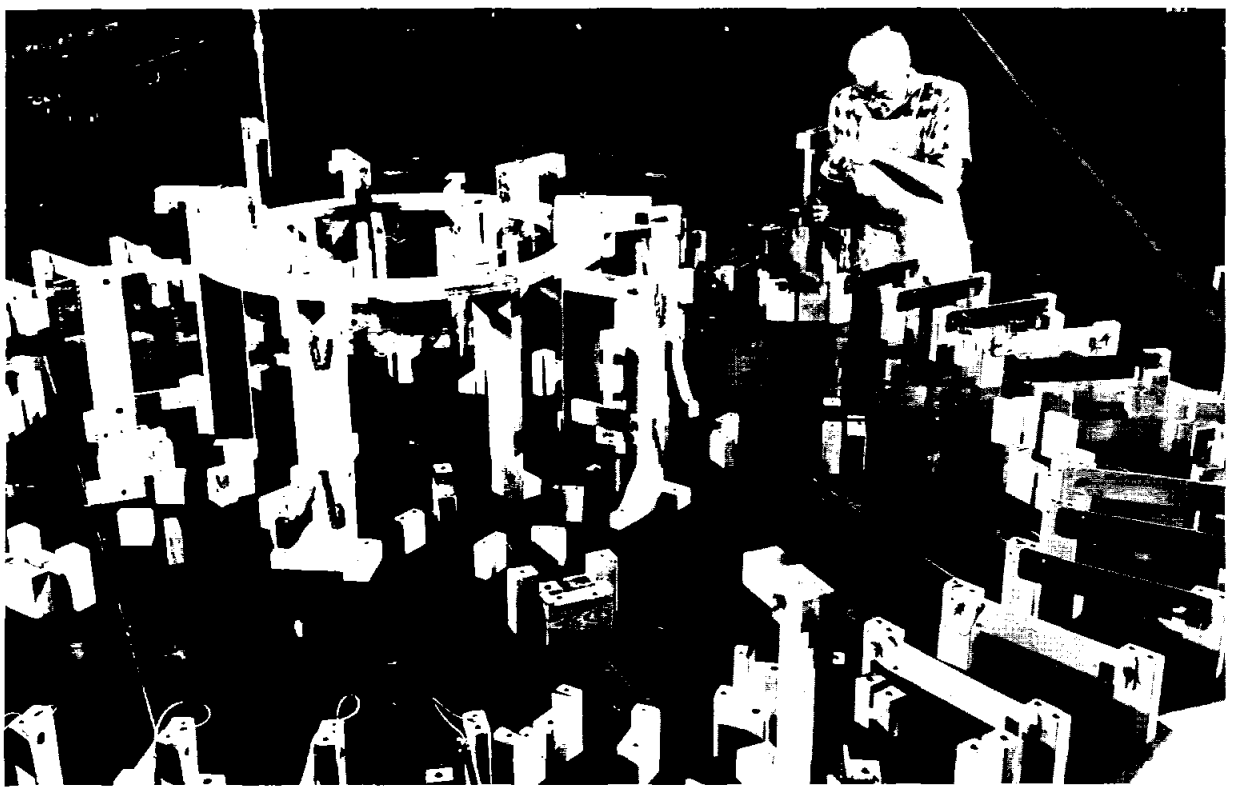
The vehicle can accommodate as many as seven Aerojet-General Algol motors which have a maximum thrust capability of approximately 720,000 lbs. The Mercury-Atlas launch vehicle, for comparison, has approximately 360,000 lbs. of thrust.

Tailoring the thrust of Little Joe II to fit specific mission requirements can be easily and quickly accomplished by changing the number and type of the solid-fuel motors.

On its launcher, Little Joe II stands 43 feet high. The maximum design height of the vehicle and Apollo payload is 95 feet, about as high as a nine story building.

The Little Joe II launcher is a steel structure supported by two curved rails. The launcher weighs approximately 100,000 lbs. To simplify vehicle guidance requirements, the launch-

light To Take Place At White Sands Range In July



CONVAIR CARPENTER works on wood assembly fixture for Little Joe II bulkhead. Use of wood tools—rather than steel—resulted from value analysis recommendation. Wood serves the purpose and lowers assembly cost. The bulkhead is the main structural member.

er is designed to swivel through a 140 degree arc so the vehicle can be swung away from the gantry and aimed down range. The launcher can be aimed in elevation between 75 degrees and a vertical position. To account for any shift in wind, the aim is accurate and controllable up to firing time.

Little Joe II is the first NASA program awarded to Convair. It has been given a top priority by the San Diego company and

J. H. Famme
President
General Dynamics/Convair

a number of special production safeguards have been placed in operation to ensure vehicle reliability.

One of these safeguards is a traceability system. With it, nearly all Little Joe II parts—even nuts and bolts—can be immediately traced back to the source or raw material if inspection finds them faulty.

Although Little Joe II is the first launch vehicle designed and produced by Convair, the company has previously demonstrated its aerospace capability on associated tasks.

For example, under subcontract to General Dynamics/Astronautics, Convair was responsible for design and development of the Atlantic Missile Range (AMR) Complex 36A, and design and modification of AMR complexes 11, 12, 13 and 14. Complex 14 is the one used for manned orbital launches of Astronauts Glenn, Carpenter, Schirra and Cooper.

Engineering and fabrication tasks were also assigned to Convair on the Atlas D, E and F series; Project Centaur; Atlas target for Nike-Zeus; and the Atlas booster for Mercury, Samos, Agnes and Able-5 space programs.

Convair engineering and manufacturing facilities—encompassing three million square feet of company-owned laboratory and factory areas—are located adjacent to Lindbergh Field, San Diego's municipal airport.

These facilities, valued at $56 million, include a large seaplane and overhaul test facility on San Diego Bay, just opposite North Island Naval Air Station and parallel to seaplane takeoff and landing lanes in the bay.

Convair is one of 11 operating divisions of General Dynamics Corporation and the only corporate division to retain the word Convair as part of its name.

In 1961 each element of what was then the Convair Division of General Dynamics was made a separate and independent unit of the corporation. Convair's old San Diego operating division became General Dynamics/Convair.

This division is the home of the world's fastest commercial jet airliner, the Convair 990A, with a cruising speed of 621 mph, and the Convair 880 (614 mph). It is also the birthplace of important military weapon systems such as the Convair F-106 and jet interceptors.

Other products conceived at Convair led to the establishment of separate General Dynamics divisions for their design and manufacture. These include the Atlas launch vehicle (GD/Astronautics), and the Terrier guided missile (GD/Pomona).

Through the years, Convair in San Diego has pioneered a number of aircraft concepts that enabled it to design, develop and build the worlds first successful vertical takeoff fighter, the Navy XFY-1 Pogo; the world's first high-speed jet seaplane fighter, the Navy XF2Y-1 Sea Dart; the world's first supersonic, all weather, jet interceptor, the Air Force delta-wing F-102.

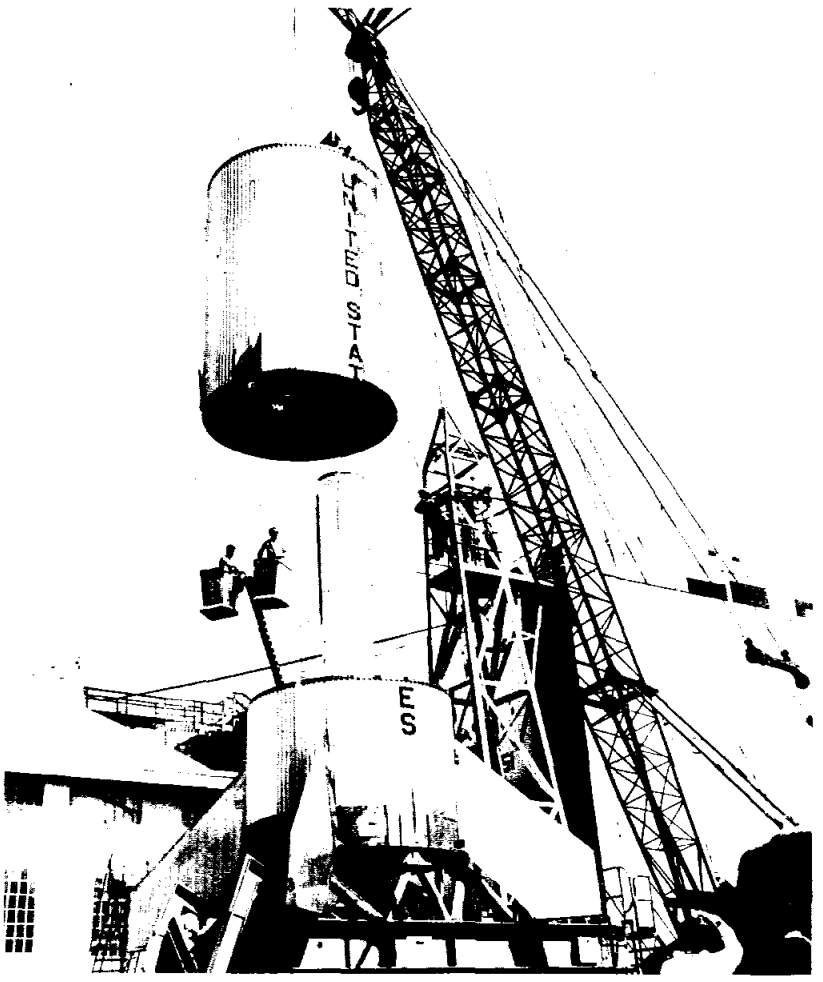
In addition, Convair has produced more than 1,000 twin-engine transports for military and commercial use.

Currently—in addition to launch vehicle systems and associated ground support systems—Convair is at work in the fields of manned aircraft and undersea weapon systems.

Convair craftsmen are supported by numerical, tape controlled fabrication equipment, automated production systems and high-speed computer facilities.

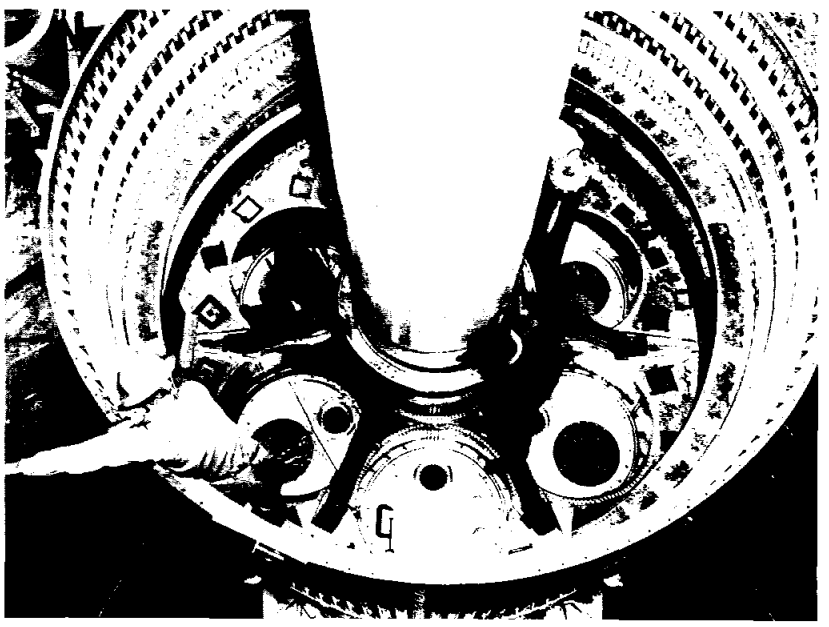
Among the laboratories and facilities available to Convair engineers are hypervelocity, supersonic and subsonic wind tunnels; dynamics tests; a 300 foot towing basin and test equipment for surface and subsurface vehicles; analog and digital computing centers; electronics; electrical; experimental data processing; physics; systems dynamics and materials and processes.

Editor's Note: This is the sixth in a series of articles designed to acquaint MSC personnel with the Center's industrial family, the contractors and subcontractors who make MSC spacecraft, their launch vehicles and associated equipment. The material on these two pages was furnished by the Public Relations Department, General Dynamics/Convair.



UPPER BARREL-SHAPED section of first Little Joe II launch vehicle is lowered into position. The white cylinder protruding from the afterbody is a chamber mock-up of a solid-fuel Algol rocket motor. The motor is made by Aerojet General.

MODULAR PLUG-IN units—part of instrumentation for Little Joe II—are checked at Convair. Little Joe II is scheduled for completion 14 months from the award of the contract in July.

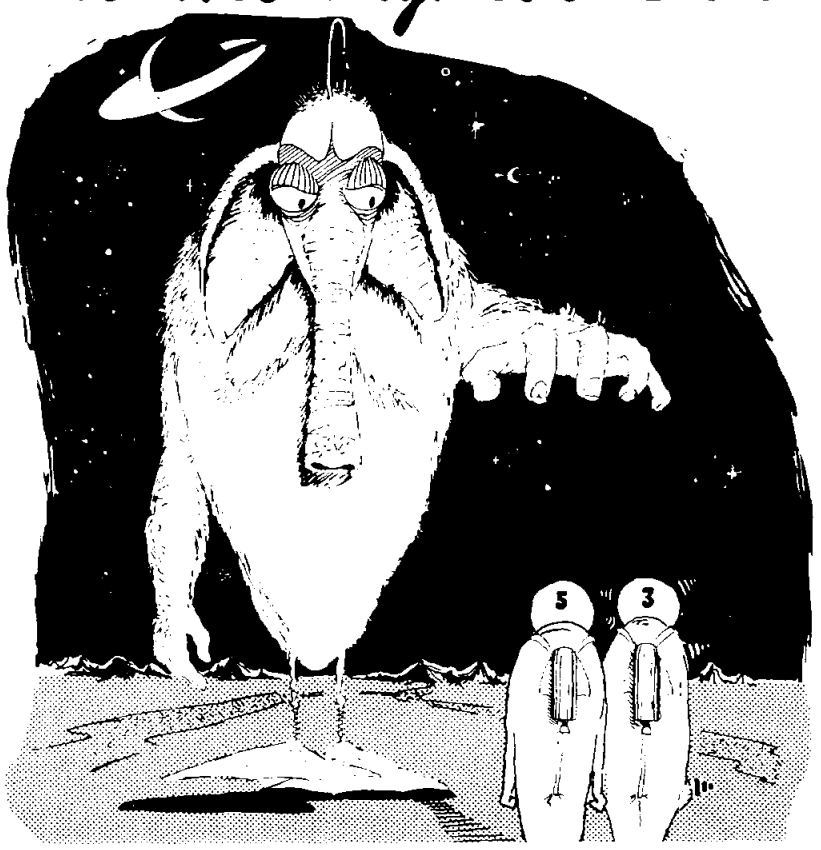


INSIDE LITTLE JOE II, workers check fit of Algol rocket motor chamber mockup. Launch vehicle can accommodate seven of the solid-fuel Algols, which can generate 720,000 lbs. thrust.

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

Director . . . . . Robert R. Gilruth
Public Affairs Officer . . . . . John A. Powers
Chief, Internal Communications . Ivan D. Ertel
Editor . . . . . Anne T. Corey

On The Lighter Side



"Which one of you is in charge?"

A Harvard College astronomer says if Mars is inhabited, its life must look something like a cross between a unicorn, an elephant and a bear.

But, Dr. Donald H. Menzel believes, the possibility of such life is very remote.

Because of the physical nature of the planet, Dr. Menzel says, a typical Martian would have an elongated head with elephant-like ears and nose so he could hear and smell in the rarefied atmosphere.

The Martian would need a chest big as a bear's to breathe, Dr. Menzel said, and he would need an antenna to communicate. The creature, he added,would move on spindly legs and webbed feet.

Spaceport News

* * *

From Cape Canaveral comes word of a new type of combination badge and identification card which incorporates a color photograph of the wearer. They are reported ideal for identification of the men—but some problems are cropping up where the women are concerned. "We've already heard of one case where the hair color has gone from brown to pink," said a security man ruefully.

It is hoped that other physical characteristics, listed on the back of the card, will change more gradually.

* * *

Call it either innocent helpfulness or a pretty wry wisecrack. Anyhow, among the several thousand fan letters pouring into Cape Canaveral for Astronaut Gordon Cooper are a number of packages. One of them contained a complete diesel filter, in apparent reference to the balky deisel engine which refused to move the Pad 14 gantry back during the one-day delay in Cooper's flight.

* * *

Casey Stengal, the beloved ageless-wonder manager of the New York Mets, expressed real concern recently during Astronaut Cooper's flight. Said he, "Does that fella get meal money while he's traveling up there?"

WELCOME ABOARD

Over 120 new employees joined MSC between May 26 and June 5, all but 11 of them here in Houston.

Preflight Operations Division (Cape Canaveral): Arthur L. Arnold, Edward E. Wright, Jr., Paul K. Burdime, and Raoul D. Smith.

Flight Operations Division: Janie M. Plunkett, Eugene J. Langenfield, James J. Taylor, Joseph W. Hall, Charley B. Parker, Daryl R. Lostak, Bedford F. Cockrell, Larry J. Meeker, David E. Jungbauer, and Elric N. McHenry.

White Sands Missile Range Operations: Carl F. Radwanski, Melton M. Aldridge, Howard W. Feindel, Donald D. Kingsbury, and Paul S. Sullenberger.

Logistics Division: Leo Nichols, John A. Carlins, Rene E. Zedekar, Myron M. Hendirckson, and James E. Mikus.

Personnel Division: Penelope Elling, James E. Zemanek, Betty J. Moore, Nancy E. Williford, John B. Merryman, Ben J. Brookman, Jr., Wilfred S. Litzler, Jamie S. Penny, Susan P. Davenport, William L. Gotcher, Jr., Rebecca A. Baas, John E. Novotny, Loren E. Gearhart, Miles A. Smither, Patricia C. Carter, Harold M. Martin, Richard H. Smith, James D. Bozeman, Robert F. Beckman, Lenora F. Guin, Jesse M. Walker, Karen K. Meigs, Diane L. Farman, and Leroy Fair.

Mercury Project Office: Walter M. Winnette, Jr.

Gemini Project Office: Reginald M. Machell, and Dwayne L. Forsythe (St. Louis, Mo.)

Apollo Project Office: Vera M. Buescher, Edward E. Lattier, Jr., Charles A. Rodenberger, and Diantha Davis.

Flight Crew Operations Division: Paul G. Hirsch, John W. O'Neill, William M. Anderson, David D. Lang, James E. Nelson, and Valerie D. Eberwein.

Crew Systems Division: Roger N. Tanner, Eugene S. Nitsch, Leong W. Lew, Hughes M. Zenor, Phillip G. Hoffman, Jr., Charles N. Crews, and Martin Devrobner.

Spacecraft Technology Division: Robert H. Lamb, Robert M. Greenburg, John E. De Fife, Donald M. Curry, Jerry C. Smithson, Harriet C. Hatcher, Dannie C. Barclay, William R. Hammock, Jr. William W. McMahon, John F. Burgland, James J. Kotanchik, and Jack S. Keggins.

Procurement and Contracts Division: Jacqueline A. Pound, Cynthia J. Martin, Jeanene Harville, Helen M. Fagnana, Judith A. Woodward, Mary L. Summers, Nancy L. Middleton, and Stephen M. Newman.

Security Division: Sherry A. Hicks, Polly J. Windle, Judith C. McDaniell, Paula Ann Stricklin, Sandra A. Pace, and Judith C. McDaniel.

Technical Information Division: James E. Davis, and Kent M. Johnston.

Financial Management Division: Leonard J. Pizalate, Ronald C. Kline, and Clara L. Ingleberger.

Systems Evaluation and Development Division: Glenna T. Heggie, Evan B. Pappas, Clinton M. Wagoner, Jerry D. Coffey, and Robert E. McElya.

Administrative Services Division: Audrey L. Swisher, Gerald M. Hurley, Francine J. Dlouhy, and Gwendolyn K. Morgan.

Space Environment Division: David E. Pitts, and Jerry W. Reedy.

Computation and Data Reduction Division: David D. Bland, Jr., Walter A. Bollfrass, Alexandra E. Wynnczok, Nancy E. Earle, and Anthony J. Coumelis.

Technical Services Division: Rodney P. Kaufhold, and Marion R. Zedekar.

Photographic Services Division: Walter D. Hanby.

Facilities Division: David M. McStravick.

Ground Systems Project Office: Robert T. Voigt.

Public Affairs Office Downey, Calif.: Edward A. Orzechowski.

MSC PERSONALITY

Holland-Born Andre J. Meyer Has 20 Years With NASA-NACA

Born in Rotterdam, Holland, MSC's chief of the Project Administration Office, Project Gemini, is Andre J. Meyer, Jr. This year is Meyer's 20th of continuous NACA-NASA service.

His parents immigrated to the United States early in his life, settling in Detroit, and later in Lexington, Ky. As a youngster he liked model airplanes, and designed and build a working model of a five-cylinder rotary aircraft engine.

Before he had finished college at the University of Kentucky, where he received a B.S. in Mechanical Engineering in 1943, Meyer had already put in nine months as a working toolmaker, nearly a year as a part-time draftsman in an airplane engine company, and six months as instructor of a college ordnance class.

Immediately after graduation, Meyer went to work at NACA's Aircraft Engine Research Laboratory in Cleveland, which later became Lewis Research Center, in engine and propeller vibration research work.

Meyer became head of the Stress and Vibration Section in 1952, was made an assistant branch chief when the section became a branch in 1957, and became associate branch chief, Structures Branch in 1957.

In his 15 years at Lewis, his research in the vibration of rotary engine parts was particularly noteworthy.

His contributions included a slip ring system which he developed for measuring vibratory stresses in rotating parts, the invention of a coil pick-up with no moving parts for measuring vibration in axial flow compressor blades, the development of root fastenings suitable for brittle turbine blade materials, and the development of several novel air-cooled turbine blade designs with good cooling characteristics and high reliability. He authored some 33 technical papers and received four patents for inventions.

Andre J. Meyer, Jr.

During his last several years with Lewis, Meyer spent much of his time on temporary duty at Langley Research Center working with the group that was later to form Space Task Group. In July of 1959, he transferred officially from Lewis to Space Task Group as assistant chief of the Engineering and Specifications Division, coordinating the monitoring of contracts for Project Mercury and aiding in the direction of the design engineering staff and contract engineering staff. Except for a month with Project Apollo, Meyer worked with Mercury until he was transferred to Project Gemini with his present title in April, 1962. He was instrumental in drawing up the specifications of the Mercury heat shield, the structural design for the spacecraft and its hardware and the design of the escape tower and parachute system. He is co-holder of three separate patents on the Mercury designs.

Married to the former Loraine Landrus of Lexington, Ky. Meyer is the father of twin girls, Marilyn Lou and Carolyn Ann, 19; and two boys, Andre V, 16 and Bruce Allen, 13. Marilyn is taking nursing at the Memorial Baptist Hospital in Houston and Carolyn was last year named Outstanding Freshman of the Year at the University of Houston, where she is in a special advanced class of the top 25 students. Meyer's hobby, which began with a mineral collection in his boyhood, is gem-cutting, but he says he hasn't had much time to do anything except collect materials lately. He also likes boating and taking the boys fishing.

ASTRONAUT WALTER M. SCHIRRA takes a piece of wild pork from a roasting stick as part of his first jungle meal as the other 15 astronauts dig in. The flight crew took four days of jungle survival training at the U. S. Carribean Air Command's Tropical Survival School in the Panama Canal Zone. Following classroom instruction the crew spent three days in the jungle itself.

ASTRONAUT JAMES LOVELL gives a boa constrictor the once-over at the U. S. Carribean Air Command Tropical Survival School. Two of the snakes ran free in the classroom in which the astronauts received their initial lectures. (See story, page 8.)

Corps of Engineers Calls For Bids On Merritt Island VAB

The U. S. Army Corps of Engineers has called for bids on one construction project connected with NASA's Saturn V Moon exploration complex at Merritt Island. The project has a price tag estimated at $33.5 million.

The larger contract calls for furnishing and erecting the structural steel for the Launch Complex 39 Vertical Assembly Building, a 524-foot-tall structure where the Saturn V will be assembled in an upright position and moved vertically to launch pads several miles away.

Estimated cost of the steel work is $32 million. Subsequent contracts will call for foundation preparation, outfitting the Vertical Assembly Building, and other phases of construction on the massive complex.

Bids will be opened June 25 on the steel erection part of the job.

ASTRONAUT GUS GRISSOM plays Napoleon in a palm rain hat, one of the survival aids the astronauts were taught to make from jungle materials during their four-day course.

Eight Astronauts Practice Troubled Moon Landing Well In Advance

Eight of NASA's astronauts were "flying" a unique simulator at Ling-Temco-Vought in Dallas last month to study well in advance the problem of what to do should the Apollo lunar excursion module's primary guidance system fail during the vehicle's descent to the moon and the landing have to be abandoned.

They're working on manual procedures and instrument display data which may be needed to cope with that emergency in LTV's Manned Space Flight Simulator—a maneuvering, ground-based device which can simulate numerous phases of space missions including launch, orbit, rendezvous, earth and lunar landings and many other.

Contract for the study was awarded by Manned Spacecraft Center and totals approximately $100,000.

The LTV study assumes that the lunar landing vehicle's primary guidance system has a failure on its approach to the moon and the astronauts must use manual control to abort the landing and intercept and rejoin the command module.

As the astronaut flies the mission, he sees a moving presentation of the lunar horizon and star field and the orbiting target "vehicle" he is attempting to intercept and rejoin. Using the cockpit instruments and these references, he can follow the path of the target vehicle and accomplish the intercept in the most efficient manner for a given circumstance.

The external visual cues such as the star field and target are provided by means of computer-controlled projectors which move in relation to the simulated space vehicle's position and attitude. These display the moving images on the inside of a large spherical fiberglass structure surrounding the simulator.

Astronauts participating in the study include M. Scott Carpenter and Walter M. Schirra, Jr. of the original seven astronauts and Neil A. Armstrong, James A. McDivitt, Elliott M. See, Jr., Edward H.

"From flights conducted, there seems to be no doubt an astronaut can manually accomplish the landing abort, launch and intercept mission in the event the LEM primary guidance system should fail," Schaezler said. "He can use any one of several intercept techniques and perform his mission successfully."

MORGAN SMITH, Director of the Tropic Survival School at Albrook AFB, chats with Astronauts Gordon Cooper (center) and Alan Shepard (right) as another primate tries to interrupt. The school keeps a collection of animals, caged and otherwise.

Space News NASA ROUNDUP!

SECOND FRONT PAGE

Space Technology Laboratory To Build LEM Descent Engine

The Grumman Aircraft Engineering Corporation, contracted by Manned Spacecraft Center to build the Lunar landing vehicle in which two U. S. Astronauts will descend to the moon's surface, has named Space Technology Laboratory to develop the lunar descent and landing engine.

A division of Thomason-Ramo-Wooldridge Corporation, STL was selected by Grumman as a result of competition.

The lunar excursion module (LEM) of Project Apollo will detach from the Apollo spacecraft orbiting around the moon, and will slowly descend to its surface.

Two approaches to development of the descent and landing engine for the LEM are being pursued. STL is developing an engine with a ten-to-one mechanical throttling range, while Rocketdyne—a division of the North American Aviation Corporation—was recently selected by Grumman to develop a gas injection scheme for throttling. The parallel development program will continue for approximately a year before a decision will be made between the two development approaches. The selected method will go into production models of the LEM.

Westinghouse Gets Centrifuge Drive System Contract

Manned Spacecraft Center has awarded a definitized contract estimated at $949,000 to the Westinghouse Electric Corporation for the design and delivery of the main drive system of the flight acceleration facility to be built at MSC's Clear Lake site.

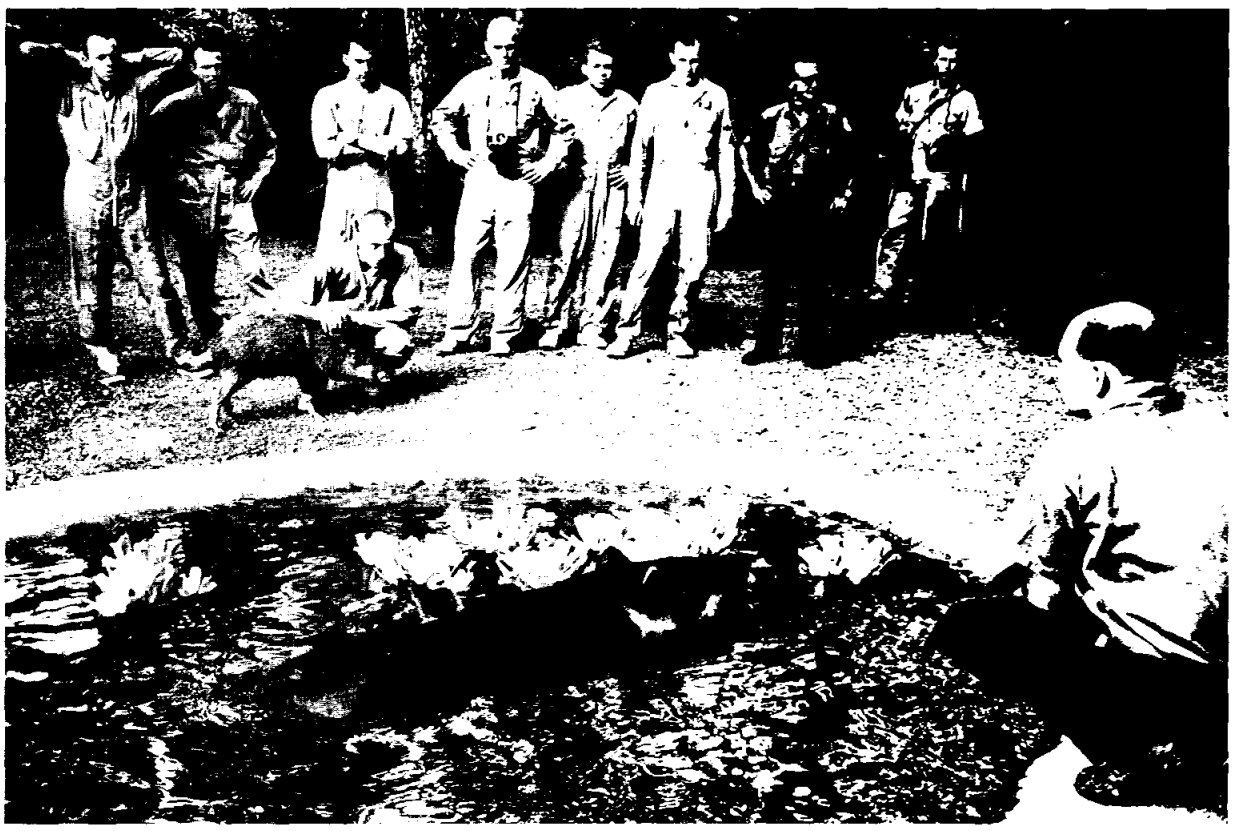
The system is due to be installed by mid-May, 1964.

The main drive motor and three-unit motor generators set and switch gear will be fabricated at Westhinghouse's Large Rotating Apparatus Division, East Pittsburgh, Pennsylvania, and its Research and Development Center, Pittsburgh.

The flight acceleration control system will be fabricated at the Westinghouse Plant in Buffalo, New York.

MSC will use the flight acceleration facility for crew training, for equipment development and test and biomedical testing under g-loads equivalent to those encountered in space flight.

The main drive motor will provide power to rotate a 50-foot arm at the end of which will be fixed gondolas for men or equipment.



A TAPIR gazes back at an audience of interested astronauts from the serenity of his pool, as Astronaut Charles Conrad Jr. makes friends with another tropical animal, a peccary. Both species are found in the jungle. (More pictures, page 7.)

Motion Simulator To Test Astronaut Vibration Reaction

A six-degree-of-motion simulator will be installed at Wright Patterson Air Force Base, Dayton, Ohio next year to test astronauts' reactions to the severe vibrations of launch and reentry.

The tests are designed to find out more about the tolerance of the astronauts to some actual flight conditions.

The simulator study was conceived after the discovery of severe linear and angular oscillations during the launch and re-entry of space vehicles, low-altitude aircraft flight,

(Continued on Page 3)

Three Days In Panama Jungle Teach Astronauts To Survive

The 16 astronauts spent two nights and three days in the jungles of Panama last week, part of a first-hand course in jungle survival that began with class room lectures at the U. S. Carribean Air Command's Tropical Survival School, Albrook AFB, Panama Canal Zone.

They spent their three-day trek separated into two-man teams, completely out of sight or hailing distance of each other. One instructor was assigned to monitor the activities of each two teams, by radio.

The group experienced primitive existance, dressed only in boots and long underwear, the garb they would wear in the event of a jungle landing. (Pressure suits would have to be discarded after such a landing.)

The group was taught to live on plants, fruits and animal life which they recognized as edible. They slept in shelters erected from jungle materials and each team constructed a raft made of vines and branches. Each man was required to build and set a trap and construct and try a hammock.

Water purification, fishing and hunting also came into their jungle experiences.

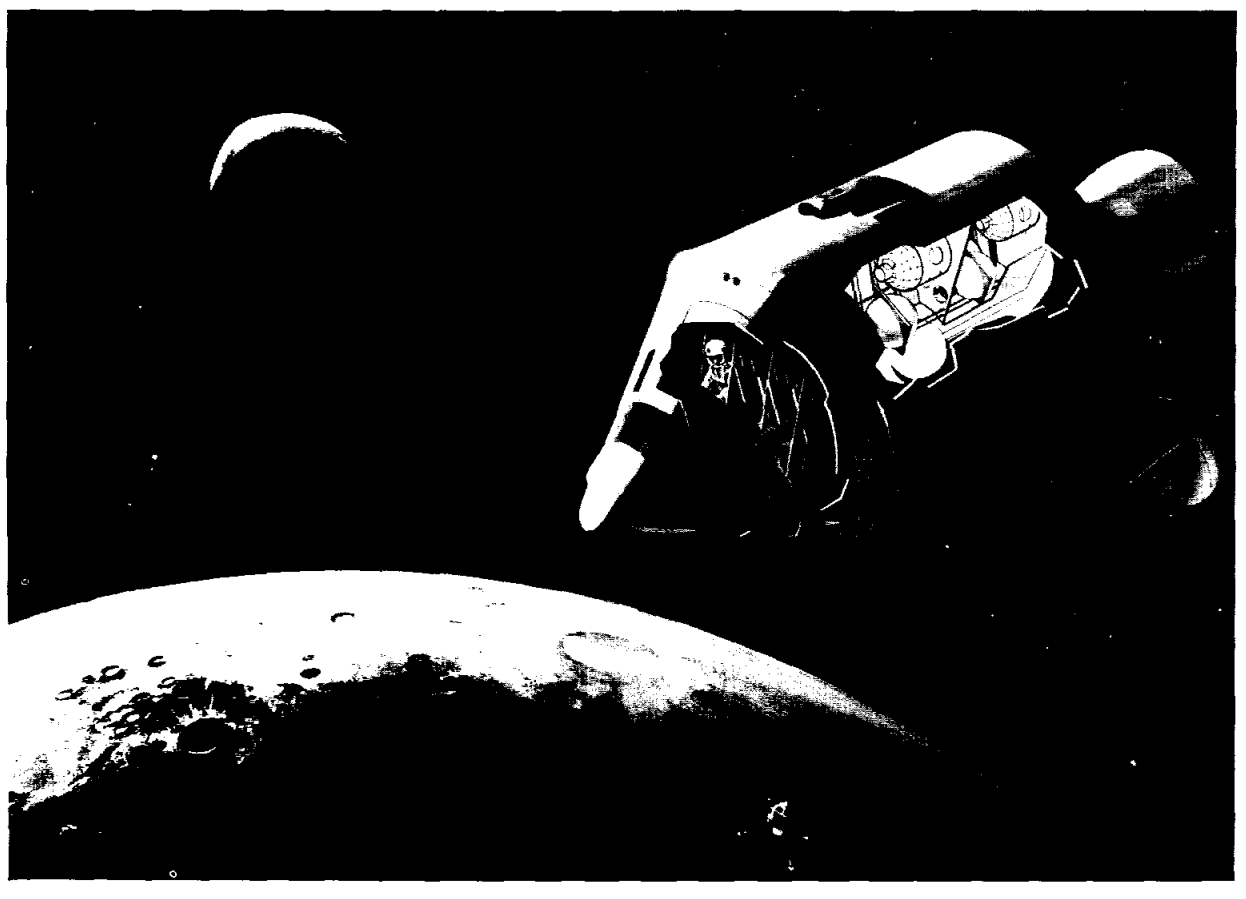
The initial part of the four-day course was conducted in classrooms at Albrook AFB. When the groups headed into the jungle Tuesday of last week, they were accompanied by four other MSC personnel; Dr. George B. Smith and James Barnett of Crew Systems Division and Ray Zedekar and Bud Ream of Flight Crew Operations Division.

The trip marked the first time that the astronauts have received tropic survival training, and the first time all 16 have gone through a training program together.

Tropical survival training is deemed necessary because of the longer space flight missions planned for the future, missions which will require a spacecraft to fly over a greater land area of the earth's surface. There is a remote possibility that a spacecraft would have to make an emergency landing in a tropical area.

The course of instruction was presented by H. Morgan Smith, Director of the Tropic Survival School, and his staff and included classroom instruction on a variety of subjects. The astronauts learned to identify poisonous tropical plants, their locations, safety precautions and first aid; identification of edible plants and fruit, location, and method of preparation prior to eating; identification of animals, reptiles and birds in the tropics, their habits, location, likelihood of attack, palatability, and safety precautions.

The course also included instruction on indigenous people in the tropic areas, native customs, native foods and the proper method of approaching these people, enlisting their aid, and communicating with them.



RELEASED MAY 22 at the Aviation/Space Writers Association conference in Dallas, this new cutaway drawing of the Apollo spacecraft in its latest configuration is first to show the highly sophisticated "cryogenic storage subsystem" installation in the service module. Designed and built by Beech Aircraft Corporation for North American Aviation's Space and Information Systems Division, principal Apollo spacecraft contractor, the cryogenic storage subsystem forms the heart of the environmental control and electric power systems. It stores, controls and delivers—from an ultra-cold liquid to a gaseous state—the oxygen and hydrogen required for life support and power generating equipment during long Apollo missions. Experimental models of Beech subsystem components have already undergone intensive testing by the firm.

Engineers working on the huge Saturn rockets at the NASA Marshall Space Flight Center report that the "baby" of the family, the Saturn I, has about three-quarters of a mile of welds. The Saturn V Apollo moon rocket, now in design, will have about one and one-half miles.

Rocket tanks are made of flat sheet metal, welded together and formed into cylinders. Every inch of weld requires intensive inspection, usually by X-ray techniques.