Space News ROUNDUP!

VOL. 3, NO. 7 MANNED SPACECRAFT CENTER, HOUSTON, TEXAS JANUARY 22, 1964

Deputy Director Elms To Return To Private Industry George M. Low, NASA Hq., Named As Replacement

JAMES C. ELMS

The decision of James C. Elms, deputy director of the Manned Spacecraft Center, to return to private industry was announced this past week by Dr. Robert R. Gilruth and as Elms' replacement, NASA has named George M. Low who is presently deputy associate administrator for Manned Space Flight at NASA Headquarters in Washington, D. C.

Low will assume his new duties as deputy director here at MSC when Elms leaves in February, and in addition will continue to act in his post as deputy associate administrator of MSF until May 1.

Dr. Gilruth said that Elms decision to leave MSC was made after he had completed his primary mission of reorganizing the management structure of the space center here.

"Like all growing organizations, the Manned Spacecraft Center reached a point in its evolution about one year ago, where a major management reorganization was necessary to more expeditiously carry forward the Gemini and Apollo spacecraft programs, "Gilruth said,

"Because he had a remarkable background of experience in the field of industry organization and general management, I requested Jim Elms to assist me with this task. Jim agreed, provided he would be free to resume his career in industry when the job was completed. Jim has done an extraordinary job here, "Gilruth said. "Our center, our agency, and our nation owe him a debt for his accomplishment. I cannot adequately express to him my own deep and personal appreciation. I sincerely wish that he could be persuaded to devote further time with us. I do understand, however, the urgency of the personal considerations which compelled him to set a time limit on his services to our center.

"We worked on the management structure for about one year and announced our reorganization on November 1. We have since noted with great satisfaction the

(Continued on page 3)

GEORGE M. LOW

MANNED SPACECRAFT CENTER'S

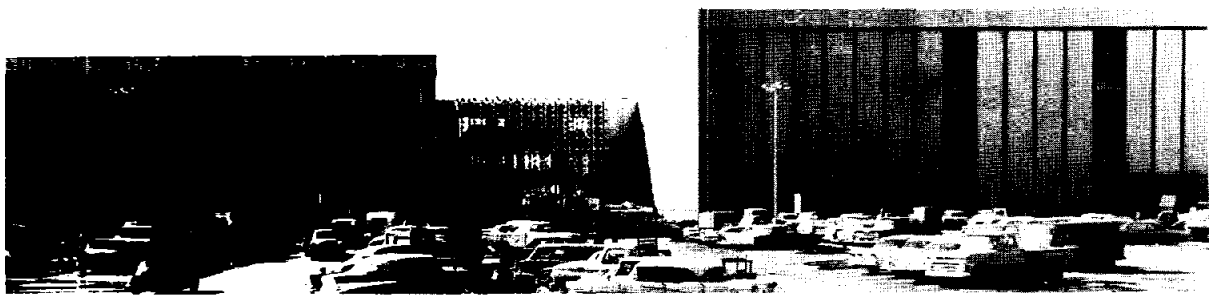
MCC Moves Step Nearer Completion

The nerve center of the world-wide tracking network which will be used to control the later Gemini and future Apollo missions has moved a step nearer completion in recent weeks at the Clear Lake site.

The Manned Spacecraft Center's Mission Control (MCC) reached a point in the construction which permits cable and pneumatic tube installation by the Philco Corporation, prime contractor for flight control equipment.

The control center complex consists of a Missions Operations Wing, Lobby and an Administration Wing. It's three stories high and contains 245,000 square feet of space.

In addition a 6,300-square-foot MCC Mechanical and Electrical Control Building has been constructed and heating plant expansion is in progress under terms of the MCC building contract.



MISSION CONTROL CENTER—The control center complex is shown above. On the left is the administration wing with the lobby wing in the center and the windowless operations wing on the right.

The mechanical and electrical building will assure power for the control center under any conditions during a mission, and the heating plant expansion will provide steam and coolant water for the control complex.

Two mission control rooms, located on the second and third floors, are in the windowless operations wing. The rooms, similar in configuration, each contain 7,800 square feet of space. Identical control rooms are required because of the detailed control preparation that will go into the missions, frequency and length of the flights and the extensive training programs that are essential to mission success.

Gemini rendezvous and

(Continued on page 3)

Design Submitted To MSC For Mars Return Vehicle

Astronauts making a trip to Mars in 1975 may carry quite a bit of "excess baggage." However, they won't mind having it around, for they couldn't get back home without it!

The "excess baggage" may be a space vehicle made up of portions of a blunted circular cone and an elliptic cone, fitted together. This odd vehicle will do nothing much but "go along for the ride" for most of an approximate 400-day mission.

But, for the final eight hours of the mission -- near approach to the Earth, reentry into Earth atmosphere, and the landing -- it "comes alive." And, its performance determines whether the mission succeeds or fails.

Its job is to carry four to six astronauts to a safe Earth landing. To do this, it must withstand high heat-

(Continued on page 3)

John Glenn Resigns From Space Program

John H. Glenn Jr., one of the original seven Mercury astronauts and the first American to orbit the Earth, resigned from his assignment with the NASA Manned Spacecraft Center, effective at noon on January 16.

The request to be relieved of his assignment with NASA was submitted by Glenn to Dr. Robert R. Gilruth, director of MSC, who granted the request.

Dr. Gilruth praised Glenn for his outstanding contribution to the manned space flight program and wished Glenn and his family every happiness.

With the resignation of Glenn, six of the original seven astronauts remain and they, along with the other two groups selected, make a total of 29 astronauts to fill the flight requirements for the future Gemini and Apollo flights.

Glenn, a lieutenant colonel in the U. S. Marine Corps, was assigned to the Manned Spacecraft Center in April 1959 after his selection as a Project Mercury astronaut.

He was the pilot for the Mercury-Atlas 6 orbital space flight on Feb. 20, 1962. His flight started at

JOHN H. GLENN JR.

Cape Canaveral, Fla., (now Cape Kennedy) at 9:47 a.m. EST and in a little less than five hours he orbited the

(Continued on page 6)

Flight Control, Plans, Provides Training For MSC Missions

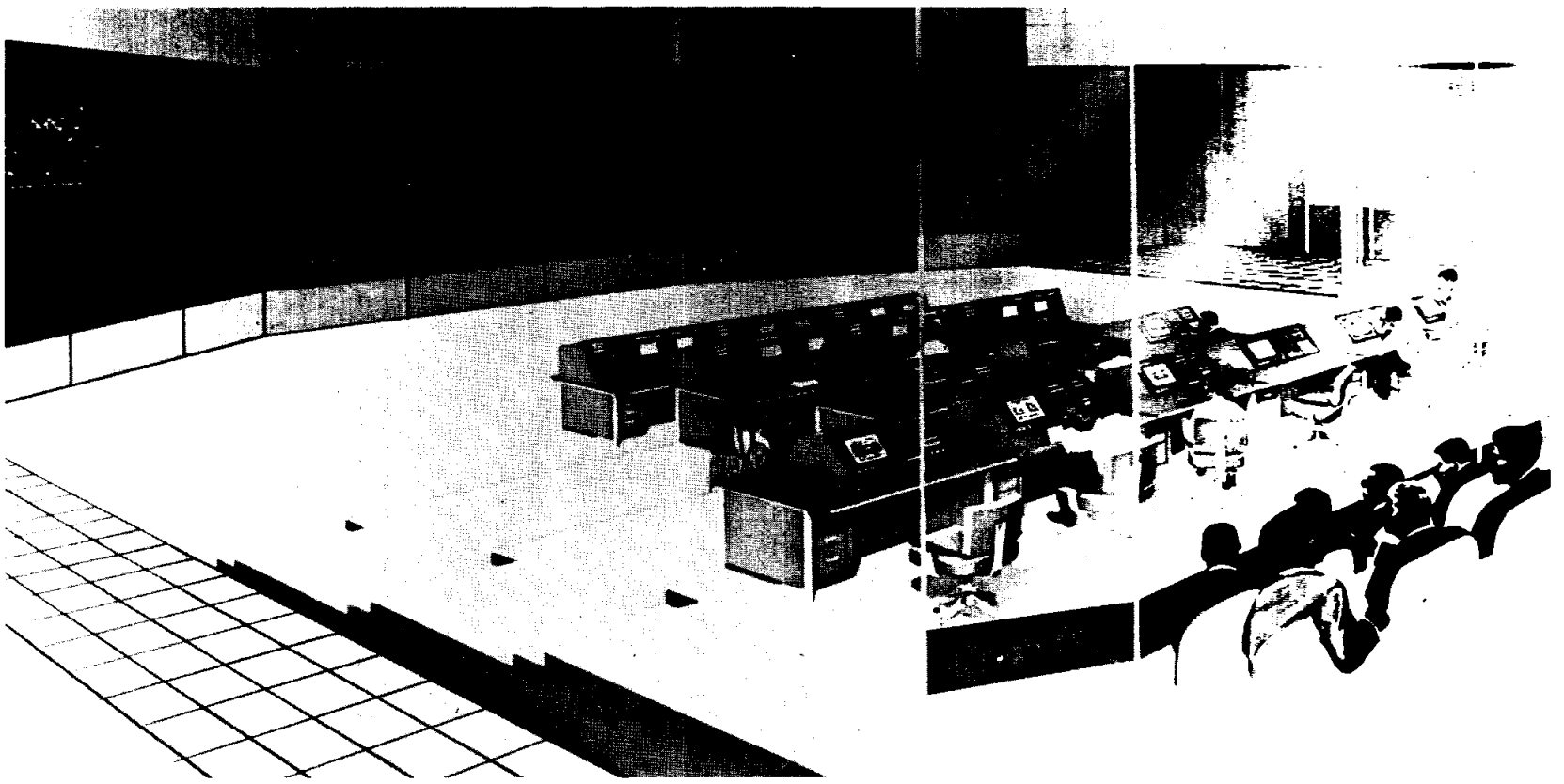
During the upcoming Gemini flights, members of the Flight Control Division of the Manned Spacecraft Center will have as their fundamental aims the safety of the astronauts and the successful completion of the missions.

This division, headed by John D. Hodge, is part of the Flight Operations Directorate under Christoper C. Kraft Jr. and is responsible for the planning, training, documentation and provision of flight control support for all MSC spaceflight missions.

Areas of responsibility include establishing requirements for ground instrumentation and for providing the MSC point of contact for coordinating the implementation of these requirements to meet operational schedules.

Other functions of the Flight Control Division include furnishing requirements to the Ground Systems Project Office for the mission control center and the necessary interface with the network and the launch facility, and for assisting the Mission Planning and Analysis Division in the development of mission logic for real-time and simulation computer programs for mission control.

This ground-based system of people and equipment is designed to provide the link between the Operations Director, who is in command of the mission, the Flight Director and the astronaut(s), who control the spacecraft. The continuious monitoring of the mission status and flight systems provides the Flight Director with a course of action to take in the event of a non-normal situation. The monitoring, the analysis, the decision-making and the action must all take place while the mission is in progress.



MISSION CONTROL ROOM—An artist's concept of the completed Mission Control room in the Mission Control Center building at the Clear Lake site of the Manned Spacecraft Center. This room will be used to control the later Gemini and future Apollo missions. The MCC facility, now under construction, is presently being fitted with cable and pneumatic tubes by Philco Corporation, prime contractor for flight control equipment.

Flight Control Division is divided into three branches: Flight Control Operations, Operational Facilities and Mission Control Center.

The task of Flight Control Operations covers the premission preparation phase and terminates with the recovery of the spacecraft and crew.

Areas of responsibility include preparation of the ground crews prior to launch, which covers the detailed development of flight plans, countdowns, mission rules, and training of personnel in vehicle systems and ground network operations.

This group, with Eugene F. Kranz as its head, directly supervises and coordinates the mission real-time ground support. They supplement the vehicle systems analysis capability of the spacecraft crew, primarily by the compilation, reduction, and evaluation of telemetered and voice data from the spacecraft and its crew.

The Flight Control Operations Branch also assists the spacecraft crew in obtaining the mission objectives by participation in the development of an optimum flight plan. This includes provision and coordination for real-time ground support necessary for execution of this optimum flight plan and modification of the flight plan in real-time as required.

Another phase is participation in postmission analysis, recommendations and the preparation for subsequent flight programs.

The Operational Facilities Branch, Dennis E. Fielder, head, is responsible for the concepts, planning, development, and specification for all facilities required for the operational support of all manned missions.

Facilities included in the area of responsibility are NASA, DOD and other sites or facilities incorporated for the operational support of manned missions of space flight programs.

These facilities, interconnected with communications and data links, controlled from the Mission Control Center, form the Manned Space Flight Network.

Some of the major systems of this network are tracking, telemetry, command (up-data), voice communications, and data transmission and processing.

This branch also develops the ground support requirements for all manned space flight programs and determines the operational compatibility between the spacecraft and the ground operational support. Another duty is the preparation of the related ground support system documentation.

In addition, the Operational Facilities Branch provides engineering services to the other elements of Flight Control in the resolution of operational system design trade-offs, information, data flow, and frequency management coordination.

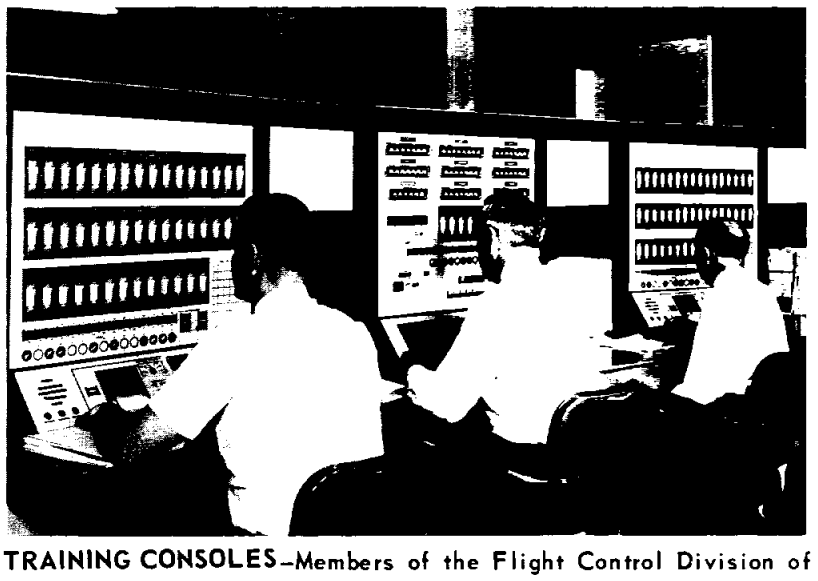
The Mission Control Center Branch under Tecwyn Roberts is responsible for the building of the Mission Control Center (MCC). Tasks of this group include determining operational requirements for the MCC, evaluating requirements levied on the MCC by other branches, monitoring the equipment design and providing flight dynamics personnel for the operating positions in the MCC.

This branch, responsible for overall Clear Lake MCC and Cape MCC operational requirements, is concerned with the requirements for the Clear Lake MCC communications system, the visual display system and the expansion of the Mission Control Center at Cape Kennedy to support the early Gemini missions.

Also determining requirements upon the two Mission Control Centers, and the Gemini and Apollo spacecraft insures adequate control of the mission with respect to flight dynamics, and determining requirements on the Clear Lake MCC Display and Control System.

Another area of responsibility is the requirements placed on Clear Lake MCC-Simulation Checkout and Training System. SCATS provides a facility for training of the flight controller within the MCC and the Ground Operational Support System remote sites. This branch ensures that the flight crew trainers are interfaced with the SCATS to provide integrated flight controller and flight crew training.

FINLAND VISITOR TO MSC—Professor Vieno Johannes Sukselainen, chairman of the Agrarian Party and member of the Finland Parliament meets Astronaut Neil A. Armstrong while visiting the Manned Spacecraft Center last week. Armstrong was training in the Gemini Part Task Trainer at the time.



TRAINING CONSOLES—Members of the Flight Control Division of the Manned Spacecraft Center are shown during a simulated flight at the remote site flight control trainer consoles for Gemini and Agena Systems engineers and the spacecraft communicator.

Elms

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increased efficiency that is now being generated by our management team, "Gilruth said.

"I have enjoyed my tour at MSC and my association with Bob Gilruth more than any other year of my career, "Elms said. "At MSC we have a managerial team that I consider to be unparalleled in the country. I am certain they will get us to the moon and back successfully."

Elms said his future plans would be announced shortly.

Dr. George E. Mueller, associate administrator for Manned Space Flight in Washington, said, "George Low has been a strong right arm for me in Washington. The smooth transition during our recent management realignment in Manned Space Flight was due in no small way to his leadership. We will miss Low at Headquarters, but knowing that his background and talent are still available to us gives me further assurance that we will be successful in achieving our goals in the manned lunar landing program."

Dr. Robert R. Gilruth, director of the Manned Spacecraft Center, stated, "I am delighted to have a man of Mr. Low's great capabilities and long experience in manned space flight programs join us here in Houston as my deputy. He was chairman of the Select Committee which performed the original studies leading to the manned lunar landing program, and he is thoroughly familiar with all aspects of our programs at the Manned Spacecraft Center."

Low joined the National Advisory Committee for Aeronautics, predecessor of NASA, at the Lewis Research Center in Cleveland, Ohio, in 1949. There he specialized in research in the fields of aerodynamic heating, boundary layer theory and transition, and internal flow in supersonic and hypersonic aircraft. During his years at the Lewis facility, he was head of the Fluid Mechanics section, and later chief of Special Projects Branch.

In October 1958, when NASA was established, he was assigned to the headquarters office as assistant director for Manned Space Flight Programs. Since that time he has held several positions of increasing responsibility in the NASA Headquarters of Manned Space Flight, culminating in his most recent assignment as deputy associate administrator for Manned Space Flight. He was responsible to the associate administrator for Manned Space Flight for the overall management and direction of the Manned Space Flight programs (Gemini, Apollo and advanced missions) and the field centers directly associated with these programs.

The author of numerous technical papers and articles, Low is an associate fellow of the American Institute of Aeronautics and Astronautics. He was awarded NASA's Outstanding Leadership Medal and the Arthur S. Fleming Award, for his contribution to Project Mercury.

Low is 37 years old. He attended Rensselaer Polytechnic Institute, where he earned a bachelor of aeronautical engineering degree in 1948 and a master of science aeronautical engineering degree in 1950.

Low is married to the former Mary R. McNamara. With their five children, they reside at 7204 Broxburn Drive, Bethesda, Md., and plan to move their home to the Houston area at the conclusion of the present school term.

Elms joined the MSC staff on Feb. 1, 1963. He had been Director of Space and Electronics at the Aeronutronic Division of Ford Motor Company. He has served in key management roles at North American Aviation, Inc., in the development of radar bombing systems and at the Denver Division of the Martin Company on the Titan I missile. Later, he was executive vice president of the Crosley Division of AVCO. As deputy director of the Manned Spacecraft Center he was charged with responsibility for general management of the center under Dr. Gilruth.

While working in Houston, his family has remained at the family residence in Newport Beach, Calif.

NEW CONCEPT IN VEHICLE RE-ENTRY DESIGN—This preliminary design for a 1975 Mars mission Earth re-entry vehicle was conceived by the Lockheed Missiles & Space Company for NASA's Manned Spacecraft Center. It could return as many as six astronauts to earth, after being detached from the main mission module eight hours before the end of a 400-day trip.

Mars Vehicle

(Continued from page 1)

ing rates generated by a fantastic Earth-atmosphere entry speed, and heavy external pressure loads. Further, it must be able to land in a predetermined area.

A preliminary design for such a vehicle has just been submitted by Lockheed Missiles & Space Company to NASA's Manned Spacecraft Center. The proposed configuration represents a new concept in re-entry vehicle design.

According to Dr. D. J. Shapland, advanced systems engineer of National Space Programs at Lockheed, who headed the re-entry project study under a NASA contract, entry speeds up to 65,000 feet per second had to be considered for a return from a 1975 Mars mission!

By comparison, the Mercury spacecraft entered the Earth's atmosphere at only 26,000 feet per second. Apollo flights will be subjected to the slightly higher rate of 36,000 feet per second.

Thus, Earth re-entry heating rates will be very high. Air temperatures can be as high as 20,000 degrees centigrade, compared to the Sun's surface temperature of 6,000 degrees!

Protection from this heat will come from a shield of ablating material of advanced design. This material, about three and one-half inches thick, will absorb the incoming heat by "burning off" of the front cone. It will thus hold the main structure to a safe temperature of about 300 degrees.

Behind the heat shield will be the main shell, a stainless steel sandwich. The inner skin of the sandwich will be a pressure vessel to withstand high external loads as well as pressure from an internal atmosphere.

The shape of the proposed re-entry vehicle was developed by Lockheed's flight mechanics research group. The forebody or main heat shield is a blunted circular cone, raked off at a suitable angle. Together the cones enclose a 500-cubic-foot volume. The afterbody is an elliptic cone.

The re-entry vehicle is designed for parachute recovery, as in the Apollo series, and surface landing. Emergency water landing also could be made.

Perceptible atmosphere will be entered at about 400,000 feet altitude at an entry angle of approximately seven degrees. The vehicle will pull out of its trajectory at about 200,000 feet, and decelerate in level flight.

At this point, reaction jets -- actually rockets -- will control the vehicle's attitude. Maneuvering will be done by rolling the vehicle to control the direction of the lifting force. This will allow selection of widely-separated, alternate landing sites.

For example, a downrange flight of 16,000 nautical miles may be achieved, with a cross-range movement of 1,000 nautical miles. This means that if the original landing site had been in California's Mojave desert, the alternate landing point could be as far away as Woomera, Australia!

MCC

(Continued from page 1)

Apollo flights will be directed by the new control center just as Project Mercury's flights were run by Mercury Control at Cape Canaveral (now Cape Kennedy).

MCC will be the focal point for the entire ground operational support system. From it the manned spacecraft and the network of world wide tracking stations will be directed.

The center will consist of several major electronic subsystems: communications, displays, computers, simulation and training. Philco will tie the entire complex together into an integrated operational system.

The computer complex and communications center are located on the first floor. Computer driven data displays will provide quantities of real-time data which can be plotted and displayed on huge control panels. The displays will use television and back lighted projection techniques extensively.

Fewer than 20 controllers will be in the control room during a flight, but upwards of 250 technical and administrative people will be involved in carrying on supporting functions in adjacent rooms. These include recovery control, communications, meterology, trajectory data, network support, life support and vehicle systems personnel.

The real-time computer is being built by the Federal Systems Division of International Business Machines Corporation, Bethesda, Md., under a $21,220,000 cost plus fixed fee equipment contract.

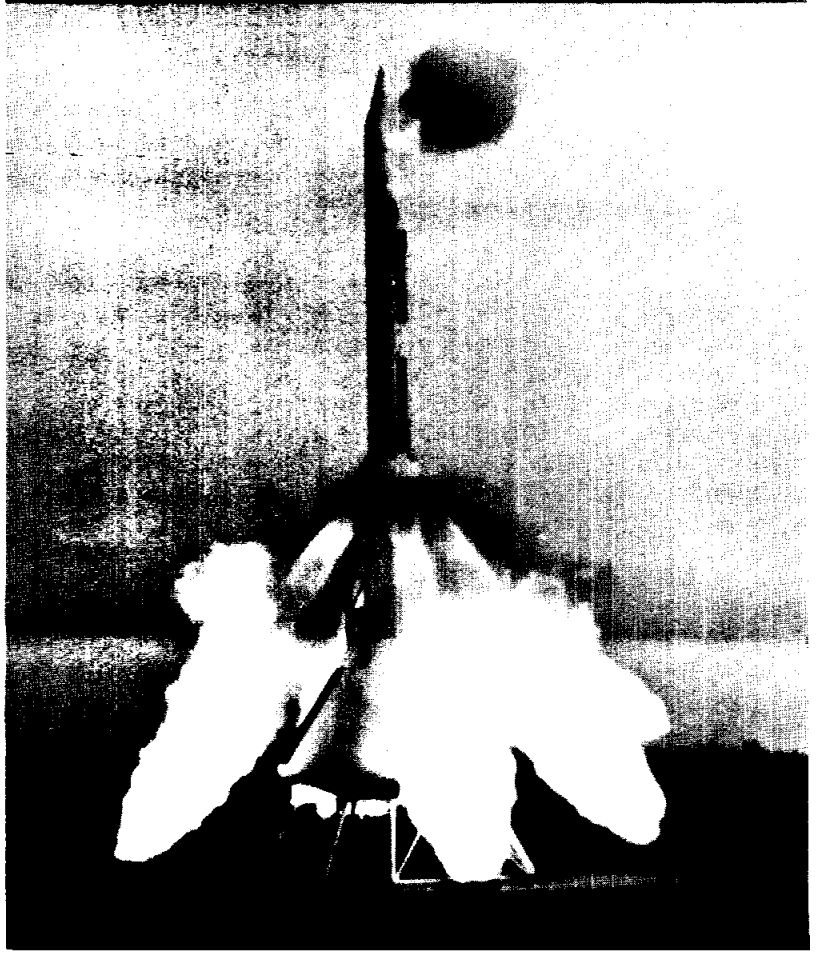
Cooperation from the Weather Man has sent the control center rocketing toward completion ahead of schedule. If no significant delays occur, flight control engineers will occupy the Administration Wing of the complex by mid-64. Personnel assigned to MSC's Ground Systems Project Office, as well as the Flight Control, Recovery Operations and Mission Analysis Divisions of the Assistant Director for Flight Operations are scheduled to move in on June 26.

To date 13 facilities at MSC's Clear Lake site have been certified as operational or ready for occupancy. Included are the Technical Services Shop' the Central Data Office Building; support offices, interim facilities, the fire station and utility plants.

The major move into Clear Lake is scheduled to take place in March. About 2,500 workers will be relocated.

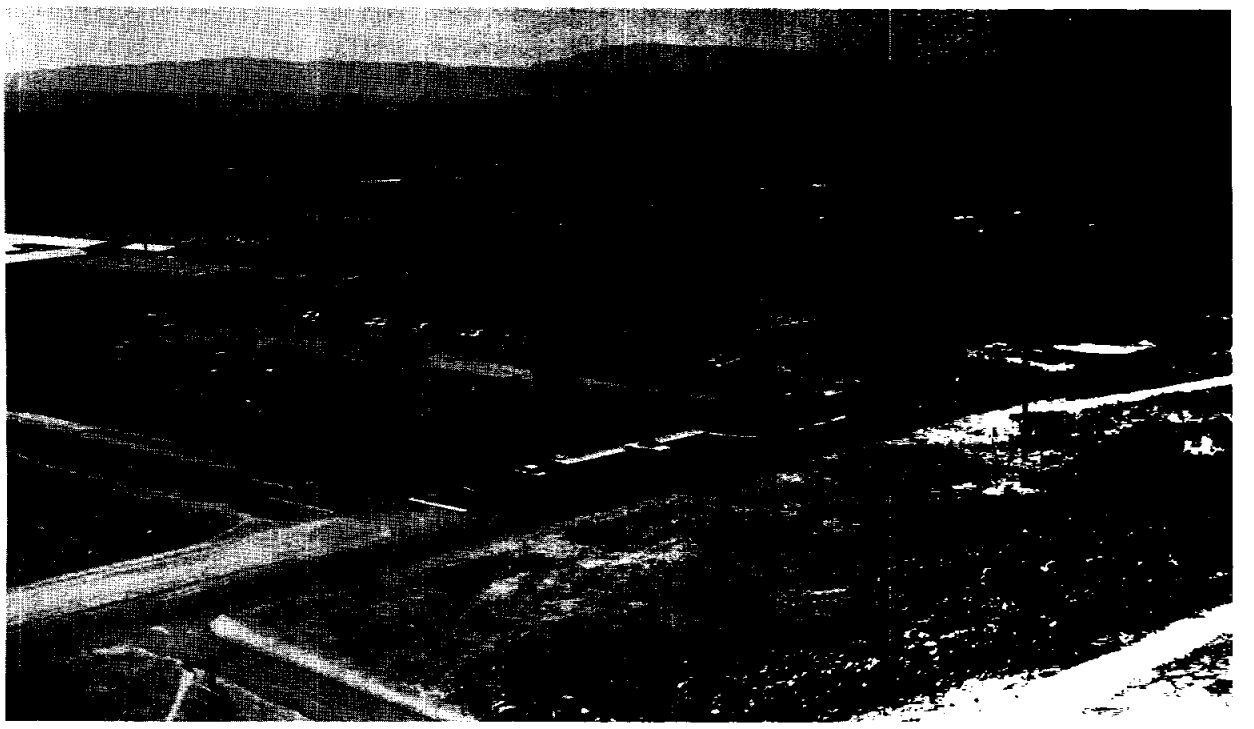
Completion work on many of the administrative buildings will come during February and March with several of the laboratories and test facilities following in July and September.

Total value of construction and equipment at Clear Lake stands at $147,452,700.



PAD ABORT–Lower photo shows the Apollo Boilerplate Six just after ignition at the Apollo-Little Joe II Launch Complex, White Sands Missile Range, N. M. Top photo shows the pad abort launch escape system rocket instants after take-off.

COLD FACTS–Lockheed Propulsion Company technician measures diameter of star-shaped propellant grain in cold environment test of Apollo launch escape motor. The frost-coated motor was subjected to progressively lower temperatures until stresses caused by propellant shrinkage finally caused cracking at minus 62 degrees Fahrenheit.



AERIAL VIEW of Redlands plant shows propellant research building and two engineering buildings. Lockheed's Redlands plant is located at the foot of the San Bernardino Mountains 65 miles east of Los Angeles.

Mercury And Apollo Escape Rockets De

At precisely 9 a.m. last November 7 the stillness at White Sands Missile Range was shattered by a rocket's roar, and four angled bright yellow columns of fire thrust the Apollo boilerplate spacecraft into the sky. Simultaneously, a smaller flame shot out at right angles near the nose of the launch escape system to shove the vehicle into a curving flight path.

As NASA/MSC observers watched, including Dr. Robert R. Gilruth and Dr. Joseph F. Shea, the two Lockheed Propulsion Company solid propellant rocket motors completed their assignment in the first launch test of an active Apollo system. Seconds later, the vehicle coasted to a height of nearly a mile, and a jettison motor fired to remove the escape tower. A series of parachutes lowered the spacecraft to a soft landing on the desert floor.

The successful pad abort test was the most spectacular milestone to date in Lockheed Propulsion Company's assignment, as a subcontractor to North American Aviation's Space and Information Systems division, to develop and perfect the launch escape motor and pitch control motor which will safeguard lunar astronauts on Apollo missions.

Preceding this test were an integrated "tie-down" firing of the escape system, and a large number of individual static firings of each of the Lockheed motors. Still ahead, lie in-flight tests after launch atop Little Joe II and Saturn vehicles. Only after the system passes these tests, and sufficient data is gathered on additional qualification ground tests, will it be considered "man rated" for its vital Apollo mission.

The larger unit, the launch escape motor, is about two feet in diameter and 15 feet long. When the nozzle assembly is added the overall length is 18 feet. Containing a bit less than two tons of propellant, the motor develops 155,000 pounds of thrust. Burning time is 8 seconds. The pitch control motor can be lifted by one man. It weighs considerably less than 100 pounds, and burns for just half a second.

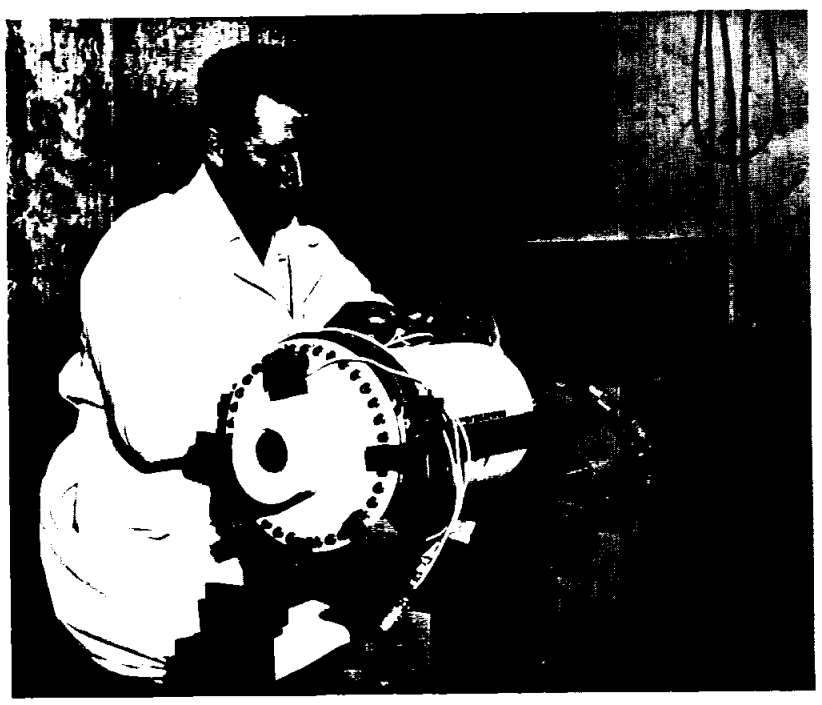
Design and manufacture of these motors takes place at Lockheed Propulsion's headquarters at Redlands, Calif., 65 miles east of Los Angeles. A 750-acre site there is devoted to research, development, testing of smaller motors, and production. Twenty miles southeast near Beaumont, the 9,000-acre Potrero facility is currently the scene of Apollo launch escape motor firings. It also houses a 25 million electron volt X-ray unit used to seek out propellant grain cracks or other defects in Apollo motors.

Future plans for Potrero include establishment of large motor production. The company also owns a second large test site, some 2,500 acres, in the Beaumont area.

LPC's staff presently numbers about 700 persons, many with advanced technical degrees. The company is a division of Lockheed Aircraft Corporation, with the full support of that organization.

Because it is one of the firm's top-priority programs, Apollo receives much personal attention from LPC President Robert F. Hurt, who acted as full-time program manager during early stages, and

TEST FIRING–Launch escape motor for Project Apollo makes spectacular flame pattern during static firing at Lockheed Propulsion Company's Potrero facility near Beaumont, Calif. Four nozzles, canted outboard, split the flame of the solid rocket motor into four equal tails.



PREPARING TO TEST-FIRE–Lockheed Propulsion Company technician connects instrumentation in preparation for test firing Apollo pitch control motor in test bay at the rocket firm's Redlands, Calif., plant.

veloped By Lockheed

from G. R. Makepeace, vice president and technical director. But Apollo at Lockheed is really the baby of Irwin A. Spitzer, program manager, who began as senior project engineer at the program's inception in February, 1962. Working closely with him is Thomas G. Flock, now senior project engineer. Spitzer and Flock were among the pleased observers at the pad abort test.

Spitzer, a recognized authority on launch escape systems with previous experience on the similiar job LPC performed for Project Mercury, believes that their design philosophy requires an approach quite different from that taken to the average solid propellant motor. In a paper presented to an American Institute of Chemical Engineers meeting at Galveston, Tex., he explained that "... achieving high reliability outweighs all other considerations." Only thoroughly proven propellants, concepts, hardware and fabrication methods can be considered. Design, therefore, is conservative.

This approach paid off on the Mercury escape rockets. Fortunately, Lockheed's motors never had to be fired in an emergency. Nevertheless, they were fired on each of the manned flights in self-jettisoning procedures, and performed perfectly each time. In all, there were 74 consecutive successful firings of the Mercury rocket motor.

Such reliability has been a keynote of the firm's 12-year record. Early achievements included the upper stages which placed Explorer I and Vanguard satellites in orbit, SWORD rockets used for stage separation of the Titan, second-stage motors for Nike-Zeus, JATO rockets, and the JAVELIN and VIPER series of supersonic sled rockets used in experiments with G-forces.

Along with reliability, the firm has stressed cost consciousness. Its current Apollo efforts reflect the results of an eagle-eye scrutiny by the company's formal cost reduction management organization, as well as of participation in an Apollo team cost reduction campaign coordinated by North American.

This spring, near the time of the next flight test of the Apollo launch escape system, Lockheed will test at its Potrero site a 156-inch diameter motor containing two-thirds of a million pounds of propellant and developing nearly a million pounds of thrust. This feasibility demonstration, funded by the Air Force but under joint sponsorship with NASA as part of the national space program, will kick off a new generation of giant solids. It could unlock the door to multi-million-pound-thrust solid booster rockets for a multiplicity of military and civilian space assignments.

As LPC's Spitzer pointed out in his talk at Galveston, solid propellant rockets are not new. They date back to the "arrows of flying fire" with which the Chinese fought Mongol invaders in the 13th Century. Their development, however, has been slow, spurred sporadically by the needs of specialized jobs for which they were best suited.

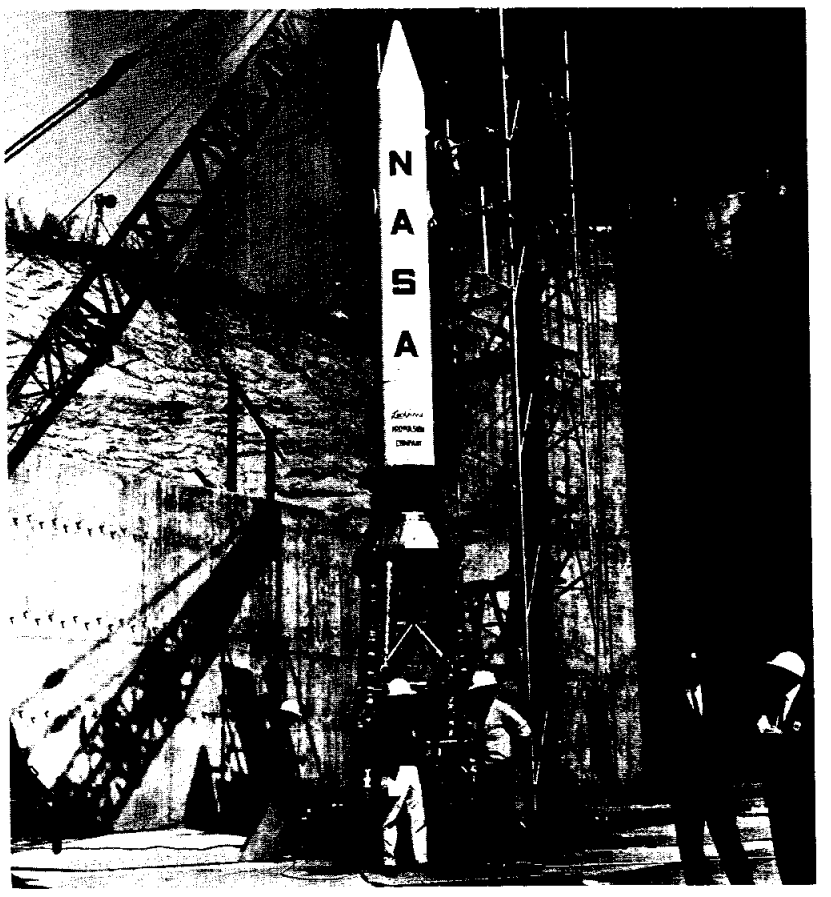
But advancements in the solid field in the past decade have made it apparent, Spitzer believes, that the arrows of flying fire will travel farther than their Oriental inventors ever could have dreamed. The bulk of solid propulsion history, he concludes, seems to lie more in the future than in the past.

And LPC's President Hurt touched on the same note when he remarked recently, "In the uncharted vastness of space, it is hard to look a decade into the future. But however far man will voyage, Lockheed Propulsion is confident that it will have helped to get him there."

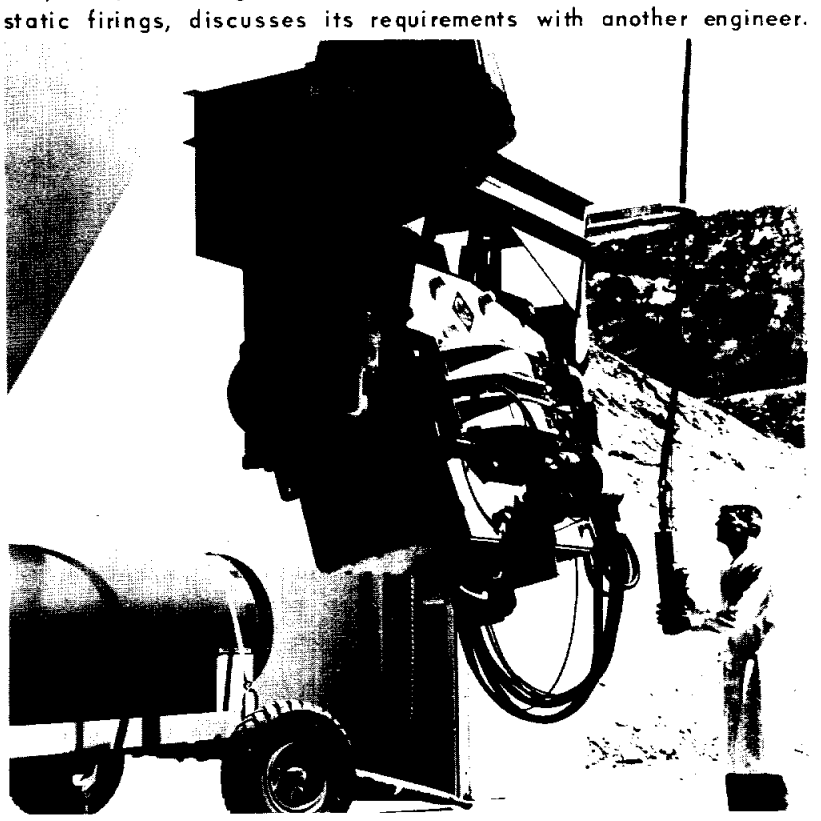
EDITOR'S NOTE: This is the twentieth in a series of articles designed to acquaint MSC personnel with the Center's industrial family, the contractors who make MSC spacecraft, their launch vehicles and associated equipment. The material on these two pages was furnished by the Public Relations Office, Lockheed Propulsion Company.

ROBERT F. HURT
President, Lockheed Propulsion Company.

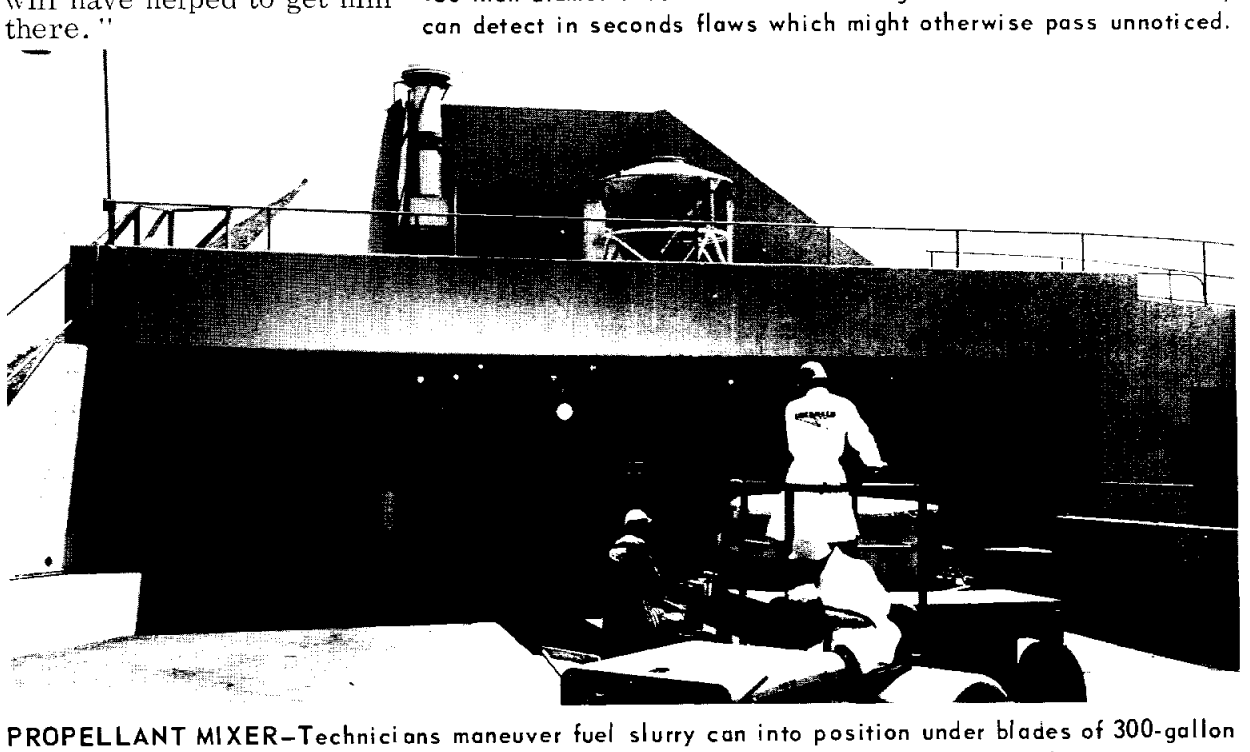
I. A. SPITZER
Apollo program manager, Lockheed Propulsion Company.



COMPLETE APOLLO launch escape system, including tower, is rigged for tie-down firing at Lockheed Propulsion Company's Potrero site near Beaumont, Calif. At right (with dark glasses) Tom Carpenter, test engineer who has conducted most of the Apollo static firings, discusses its requirements with another engineer.



HIGH-POWERED TOOL-Lockheed Propulsion Comapny non-destructive test technician aims a 25-million electron volt X-ray machine at solid propellant rocket motor at the firm's Potrero facility near Beaumont, Calif. The test equipment, capable of inspecting 156-inch diameter solid rocket motor segments or 20 inches of steel, can detect in seconds flaws which might otherwise pass unnoticed.



PROPELLANT MIXER–Technicians maneuver fuel slurry can into position under blades of 300-gallon vertical mixer. On upper level of structure, hopper containing oxidizer for solid propellant is waiting for use. This mixer, largest in the industry, can make a 4000-pound batch of Apollo launch escape motor propellant in two hours.

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

Director ..... Robert R. Gilruth
Public Affairs Officer ..... Paul Haney
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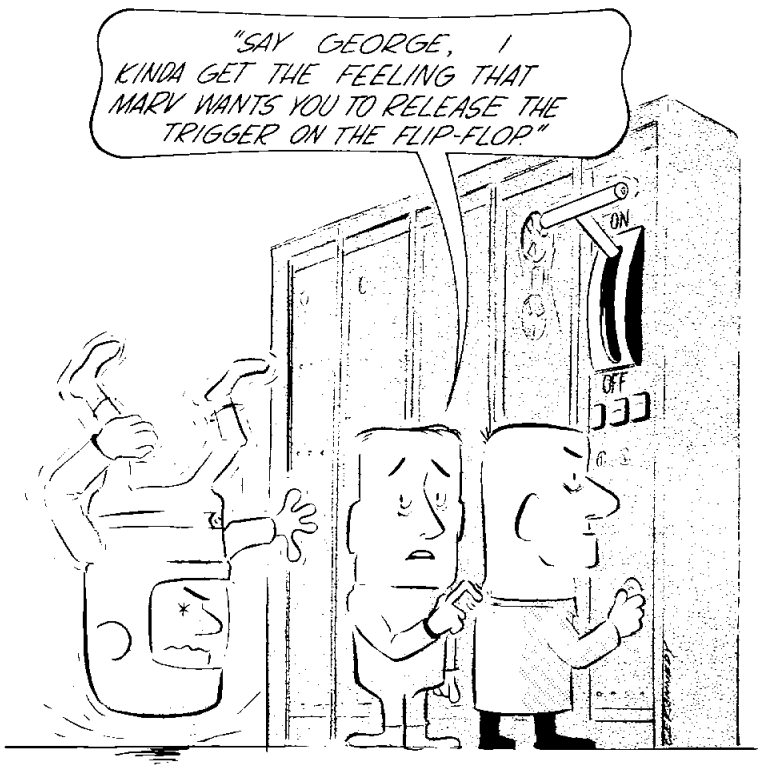
On The Lighter Side



"Triggered Flip Flop"...now there's an interesting sounding item that was designed to do a job and apparently does it well, because according to Rex Talbert of Instrumentation and Electronic Systems Division, they are used by the hundreds.

Before finding out what the item was (of course anybody should know, it's just what it says it is), a call was made to Procurement and Contracts Division to find the person that ordered "it". The first reaction from the girl that answered the phone was rather mirthful as she replied..."I typed the contract order but I have no idea what it could be."

As Rex explained, it's a bi-stable multi-vibrator switching element with one input and two outputs, one in the opposite sense or state from the other such as positive or negative polarity. When triggered with a pulse or signal, this causes it to switch from one circuit to the other, or one is flip conditioned and the other is flop conditioned.

And there it is...no high sounding phrases are used to name this item...it's just a plain old Triggered Flip Flop and without this digital device or circuit, MSC's airborne and ground digital data equipment probably wouldn't hit a lick, and it might also put a few computers out of business.

Glenn

(Continued from page 1)

earth three times, traveling more than 80,000 miles at an orbital velocity of approximately 17,500 miles per hour and then splashed down in the Atlantic in the vicinity of Grand Turk Island at 2:43 p.m. EST. Eighteen minutes later he was picked up by the destroyer USS Noa and after his spacecraft Friendship 7 was set on the destroyer's deck, he reported to the Noa's crew, "My condition is excellent."

Glenn was born in Cambridge, Ohio and grew up in New Concord, Ohio where he met his wife, the former Anna Margaret Castor. They have two children, John David and Carolyn Ann.

Glenn was a member of Marine Fighter Squadron 155 during World War II and he flew 59 combat missions. During the Korean action he flew 90 missions. He has been awarded the Distinguished Flying Cross on five occasions and holds the Air Medal with 18 clusters for his service during World War II and Korea.

WELCOME ABOARD

Twenty-four persons joined the Manned Spacecraft Center's operation during the period Dec. 22, 1963 and Jan. 6, 1964. Of these, two were assigned to MSC's White Sands operations and one to the MSC Florida Operations.

MSC FLORIDA OPERATIONS (Cape Kennedy, Fla.): Melville J. Shepard.

SECURITY DIVISION: Dianne P. Ryan.

APOLLO SPACECRAFT PROGRAM OFFICE: Dr. William A. Lee.

OFFICE OF TECHNICAL AND ENGINEERING SERVICES: Ruth L. Dixon.

FLIGHT OPERATIONS DIRECTORATE: Patricia Lee Claffey, and James M. Rutland.

OFFICE SERVICES DIVISION: Toy R. Carter, Lella C. Harding, and Jeanne R. McDaniel.

COMPUTATION AND DATA REDUCTION DIVISION: William L. Stein.

PROCUREMENT AND CONTRACTS DIVISION: C. Helen S. Gregory, and Don L. Hathaway.

WHITE SANDS MISSILE RANGE (White Sands, N.M.): Leonard A. Schluter, and Kenneth R. Haynes.

ADVANCED SPACECRAFT TECHNOLOGY DIVISION: John Perry Hughey Jr., Mickolas L. Faust, and Frederick R. Frisbie.

PUBLIC AFFAIRS OFFICE: Robert G. Button Sr.

GROUND SYSTEMS PROJECT OFFICE: William J. Drewes.

STRUCTURES AND MECHANICS DIVISION: George D. Gentry, and Peter Gillette.

CREW SYSTEMS DIVISION: Martin H. Graham.

SPACE ENVIRONMENT BRANCH: Thomas W. Lee.

FLIGHT CREW OPERATIONS DIVISION: Frank R. Svejcar.

MSC PERSONALITY

Two Historic Flight Events Part Of John Mayer's Past

Breaking the sound barrier is nothing new today but it was in 1947 when the first aircraft attained that speed, and John P. Mayer, chief, Mission Planning and Analysis Division was on hand to participate in that historic event.

He was the first to know the X-1 rocket research plane had broken the sound barrier. By tracking the plane on radar he knew before the pilot was aware that he had passed mach 1. Mayer said they heard a

JOHN P. MAYER

loud noise but at the time no one knew what a sonic boom was.

Mayer said that as far as he was concerned there were three major divisions in flight--the Wright brothers, breaking the sound barrier and manned space flight--and he was proud to have participated in two of them.

As chief of the Mission Planning Division, Mayer is responsible for the development and the design of operational trajectories for all Manned Spacecraft Center space flight missions. Other responsibilities include formulation of computer logic, mathematical formulation and programming techniques associated with the real-time and simulation computer programs. Postflight trajectory analysis for development and operational missions are also performed by this division.

A native of Binghamton, N.Y., Mayer was graduated from the University of Michigan in 1944 with a BS degree in aeronautical engineering and mathematics.

He then joined the Langley Research Center in Virginia and conducted flight testing of fighter planes for load capability and did research on supersonic aerodynamic techniques.

In 1947 he was at Edwards AFB, Calif. where he participated in the tests of the X-1 rocket research plane. He also spent time at Edwards in 1949-50 doing research on the D558-2 Douglas Skyrocket.

In 1957, Mayer became involved in space flight research in orbital mechanics, orbital trajectories and lunar trajectories.

During this early period while with the National Advisory Committee for Aeronautics, Mayer said it was almost a matter of self education when it came to matters on space.

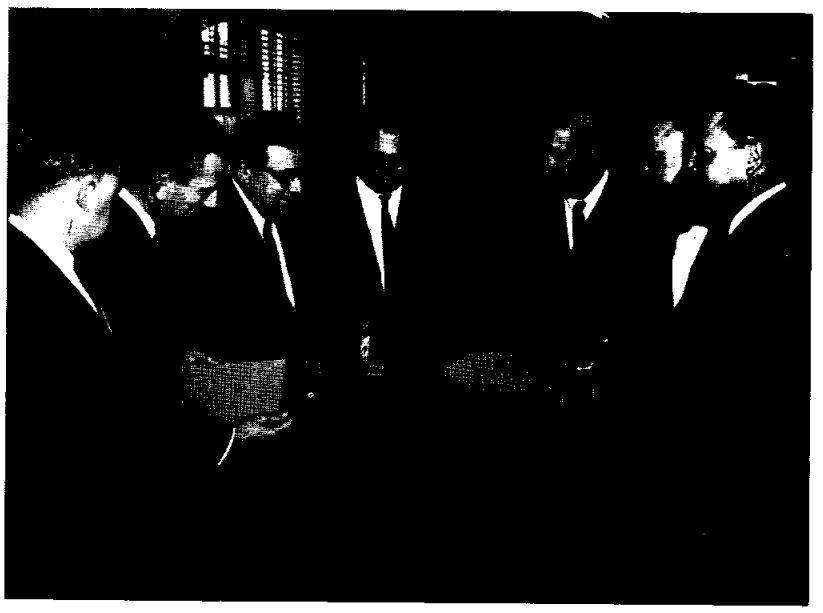
He contributed the "Orbital Mechanics and Lunar Trajectories" section to a book "Notes on Space Technology" which was published by NACA in February 1958. This was one of the first space text books. Mayer said a lot of the book is now elementary, but it wasn't in 1958.

He was one of the original 35 from NACA that formed the Space Task Group which later became MSC.

Mayer has authored some two dozen NASA reports dealing with flight research, supersonic aerodynamics, and flight tests on research planes. He is a member of the American Institute of Aeronautics and Astronautics and the American Rocket Society.

His hobbies include photography and listening to hi-fi stereo music. His musical interest stems from his high school and college days when he was a trumpet player in a dance band.

Mayer lives in Houston with his wife, the former Geraldine Couch of Elkin, N. C. The couple has three children: Dale 11, Cynthia 7, and Gwen Ellen 3.



POSTMASTER GENERAL VISITS MSC—Postmaster General John A. Gronouski visited MSC and presented sheets of the new Sam Houston postage stamp to MSC officials. He was in Houston for ceremonies connected with issuance of the stamp. Shown (l. to r.) are Frederick Belen, assistant postmaster general; D. K. Slayton, Astronaut Office; Gronouski; Wesley Hjornevik, assistant director for administration; Dr. Robert R. Gilruth, director, MSC; Granville Elder, Houston postmaster; and Senator Ralph Yarborough.

South Pole Living Problems Compared To Other Planets

A NASA-Marshall Space Flight Center engineer returned recently from the South Pole, convinced that it is the best place on earth to compare with the moon.

Paul J. deFries is studying various problems associated with supplying astronauts during long stays on the moon, a space station or other planets. In some ways, the inhospitable Antarctica suggests conditions that will be faced in establishing and supplying "space bases."

A specialist in lunar operations, deFries said his trip confirmed a suspicion that astronauts and scientists on long stays following the early moon landings will need more supplies than some engineers presently think.

NASA scientists have known for years that living on the moon will be much more severe than conditions anywhere on earth. Even the ice and snow which plagues the North and South Pole, would be welcome, in smaller quantities, to moon dwellers. It doesn't have air, either.

DeFries visited about half a dozen stations in Antartica, trailing supply vehicles and interviewing scientists. He believes the area could be used effectively for environment tests on equipment proposed for long moon stays.

He said morale was high at the South Pole stations. They were preparing for a routine white Christmas, minus a tree, while he was there.

Although the South Pole is cold (about 40 degrees below zero when deFries was there) it is not as cold as the moon at its coldest. During the 14-day lunar night, the temperature dips to about minus 200. But during the lunar day, which is also 14 days long by our earth measurement, the temperature rises to more than 200 degrees above zero.

DeFries pointed out incidently that the Antarctic day comes only once a year -- it was daylight the entire two weeks he was there.

DeFries said the men isolated at the South Pole were happy as long as they had (1) ample supplies and (2) good communications links.

MSFC Resident Liaison Office Opened Here

The Marshall Space Flight Center recently opened a liaison office here at the Manned Spacecraft Center with a resident representative to coordinate the activities between the two centers.

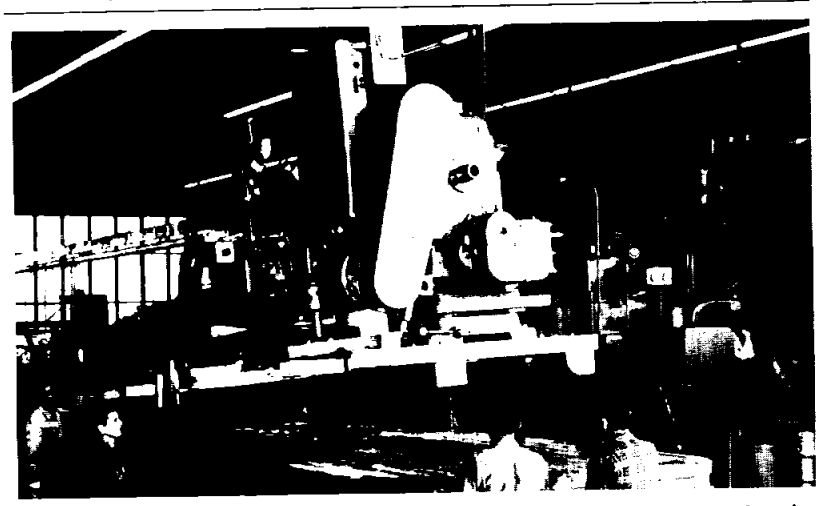
William E. (Bill) Davidson, who was transferred from MSFC to Houston last July to work on flight con-

WM. E. (BILL) DAVIDSON

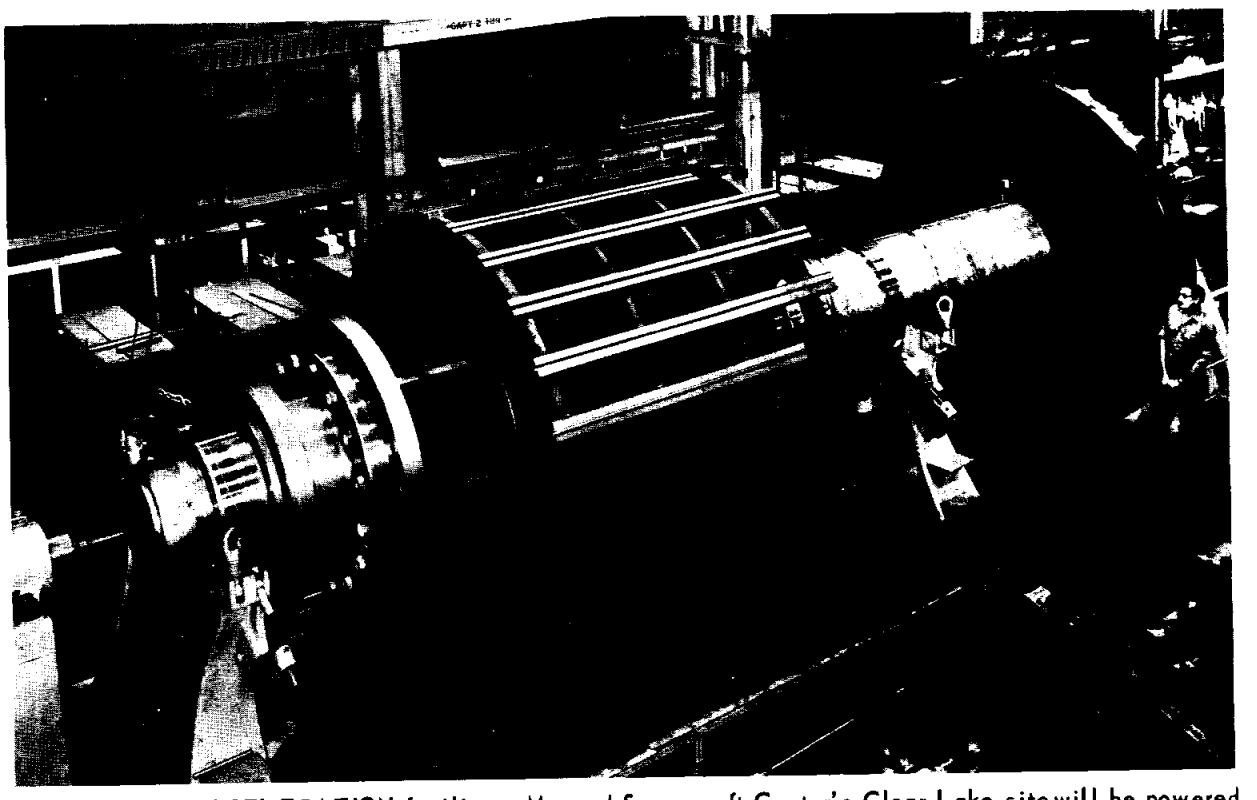
troller problems, has been chosen as Marshall's representative.

His background covers the Jupiter program as well as the Mercury-Redstone, Saturn and nuclear engine programs.

Davidson will handle the technical liaison for R & D operations, program and schedule liaison for industrial operations, plus coordination of many types of information exchanges between the centers. He will also provide administrative support of MSFC personnel residing at MSC.



HEAVY EQUIPMENT—A piece of the heavy equipment used by the Technical Services Division is loaded on a truck. Woodworking, foundry and other heavy machinery used by the Division is being moved from the temporary facilities at Ellington Air Force Base and Houston to Clear Lake. The relocation is scheduled for completion next week.



THE FLIGHT ACCELERATION facility at Manned Spacecraft Center's Clear Lake site will be powered by this giant 10,700 horsepower motor that is being built by Westinghouse under a direct contract with MSC.

MSC'S FLIGHT ACCELERATION FACILITY

DC Motor To Develop 10,700 HP

A direct current motor designed to develop 10,700 horsepower and 5,000,000 pound feet of torque is under construction for use in the Flight Acceleration Facility as MSC's Clear Lake site.

The motor is being built by Westinghouse Electric Corporation in East Pittsburgh, Penn. and will be the main drive for the flight acceleration simulator.

Making up the simulator will be a gondola, a 50-foot arm to which the gondola is attached and the drive motor. The simulator will be capable of acceleration forces up to 30 times the force of gravity.

Astronauts will train for space flight by riding in the gondola. Here they will experience simulated conditions encountered during launch and reentry of their spacecraft.

Probing 'Gulliver' To Fish On Mars

Some day in the near future NASA's "Gulliver" may go fishing on Mars.

The tackle will consist of three "sticky strings" dropped out of a porthole.

As the strings are reeled in they will retrieve living organisms -- if any -- in the soil.

Gulliver will "cook" the prey on the spot.

And if Gulliver catches anything, it will radio the news to Earth after it digests the results of its fishing expedition.

The question of life on other worlds has long fascinated man and now, for the first time, he may be on the threshold of learning the answer.

While NASA has already flown Mariner II past Venus and provided some clues as to whether life exists there, it will not be until instruments can be landed on the planets that conclusive answers may be had.

One experiment designed for this purpose is the radio-isotope biochemical probe, named Gulliver.

Gulliver has been designed as part of an over-all package to be landed on Mars and is a relatively small instrument for the job it must do.

Measuring about five inches across the base and only a little taller, it will weigh approximately three-fourths of a pound.

When Gulliver lands on Mars, small ports will open in the capsule wall and projectiles fired. They will carry three strings out about 50 feet.

The strings, which will be covered with a sticky substance, will be reeled back. Once inside the capsule, soil particles picked up along the way will be doused with a sterile broth tagged with radioisotopes.

Should the Martian soil contain any living organisms they should begin to grow within four hours and produce a radioactive gas inside Gulliver. This gas will be detected by a transistorized geiger counter.

Thus, it may be a series of clicking noises radioed across the reaches of space which tell men on earth of life on another world.

'GONE FISHING' ON MARS—The strings protruding from this interplanetary prober called Gulliver are "fishing" on Mars. They're fishing for information of whether there is life on the planet. After being landed on Mars, Gulliver shoots out the strings. Organisms caught by a sticky substance on the strings are reeled in. Their life activity—if any—would be recorded by a geiger counter and radioed to Earth from the Gulliver.

Space News NASA ROUNDUP!

SECOND FRONT PAGE

Hickey Named To Head MSC's Protocol Office

The establishment of a Proctocol Office for the Manned Spacecraft Center was announced this past week by Dr. Robert R. Gilruth with Francis J. Hickey Jr. being named as chief of protocol.

As a branch of the Public Affairs Office, it will provide a central point of coordination for all MSC activities relating to official visitors to the Center, excluding members of Congress and their staffs.

FRANCIS J. HICKEY JR.

Also falling under the Protocol Office will be official public or ceremonial appearances of MSC personnel.

The office, located in the F & C Bldg., will ensure that all visitors to the Center are afforded all necessary courtesies and that all their physical requirements will be met while they are here in Houston.

Ranking government and industry officials, foreign visitors and the general public will receive the maximum information available from this office regarding MSC activities, as well as present and future plans.

This office will also advise the director and staff on matters of protocol, maintain liaison outside MSC relative to potential distinguished visitors to the Center and will coordinate the efforts of all participating elements within MSC required to effectively perform its mission.

Another function of the Protocol Office will be to serve as a central point of coordination for all tour requests.

Hickey, a former Secret Service employee with the Treasury Department for seven and one-half years before joining MSC in August 1961, served on protective assignments for Presidents Eisenhower and Kennedy.

He also served on protective assignments to Vice Presidents Nixon and Johnson and their families and was on the protective detail assigned to the Mrs. Jacqueline Kennedy.

A graduate of Washington University in St. Louis, Mo. with an AB degree in psychology, he also had specialized training in handling of dignitaries while in the Secret Service.

While in the Secret Service, Hickey worked with Interpol and occasionally did investigation work for other countries, mostly in the field of counterfeiting and narcotics.

Prior to becoming MSC's protocol officer, Hickey was head of the Physical Security Branch which is responsible for overall protection of Center property and classified material and controlling access of all visitors to the sites.

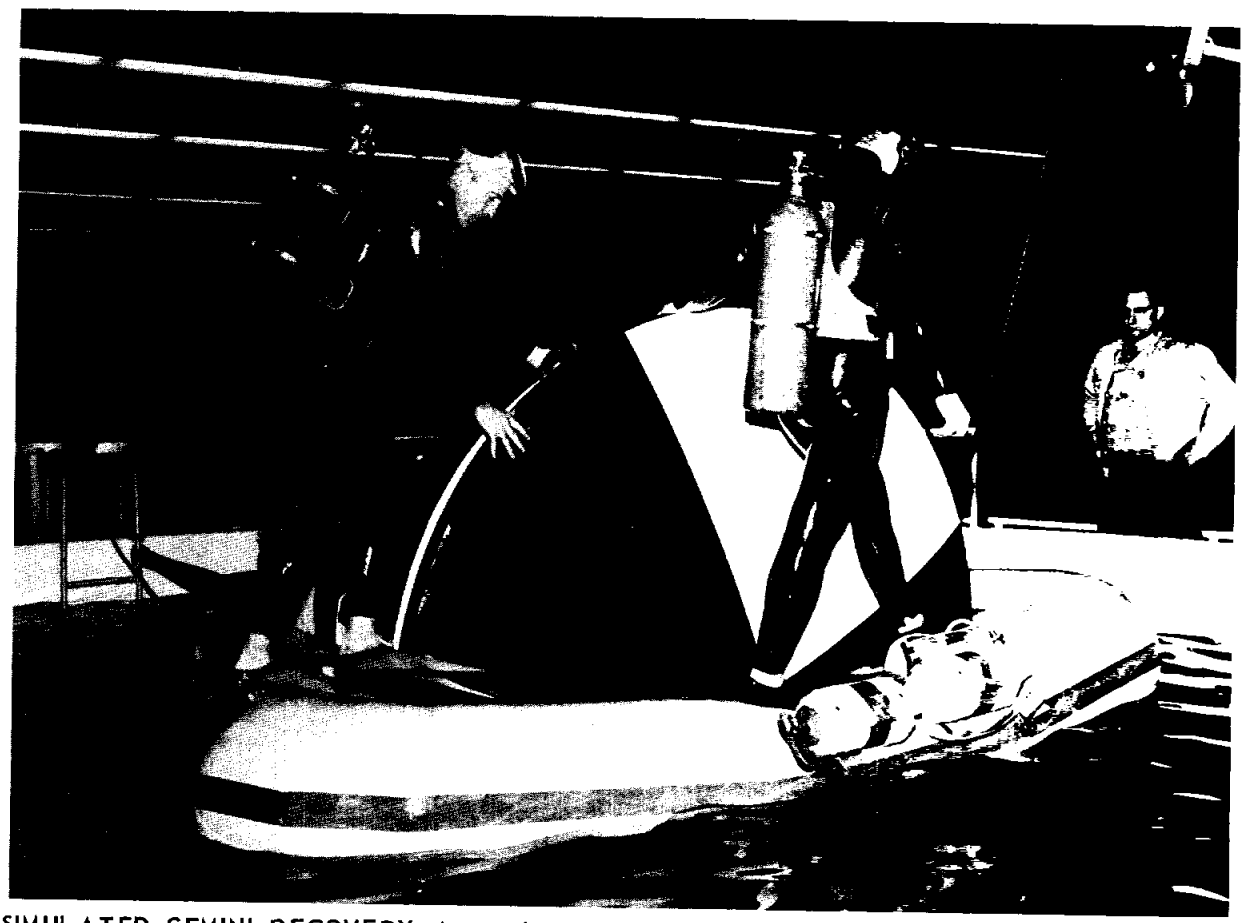
Astronaut Shepard Undergoes Surgery Everything Is Fine

Astronaut Alan B. Shepard Jr. the first American to ride a rocket into space, underwent surgery last Friday in a Houston hospital for removal of a small benign nodule (lump) from his thyroid gland.

The operation was successful and will not affect Shepard's flying status either in conventional aircraft or in spacecraft.

Shepard was discharged from the hospital Monday, and will spend a few days resting at his home before returning to work.

ALAN SHEPARD reads a book in his hospital room while recuperating from his recent operation.



SIMULATED GEMINI RECOVERY—A simulated recovery maneuver of the Gemini spacecraft is performed by members of the Field Test Branch of the Technical Service Division. The SCUBA divers attach and inflate the floatation collar on a Gemini boilerplate in the recently constructed tank in Hanger 135 at Ellington AFB. The tank is 16 feet deep with a 25 foot diameter and a capacity of 55,080 gallons of water. All MSC elements that have requirements for a water facility will be able to use the new tank. Four underwater viewing ports for photography and observation are built in at different levels.

FOR SOFT LUNAR LANDINGS

Crushable Metal Honeycomb Under Study

The NASA Manned Spacecraft Center has awarded a $99,973 study contract to Bendix Products Aerospace Division, South Bend, Ind., for a shock absorbing device which will permit a soft landing on the moon.

The work involves testing full-scale crushable aluminum honeycomb structures under the various environmental conditions which scientists expect spacecraft to encounter during a moon mission.

In the study program, Bendix engineers will test various sizes and shapes of shock absorbing capsules of the aluminum material to determine the performance characteristics.

Engineers explain that a shock absorbing system for a lunar gear must be able to soften the landing shock, but must not contribute rebound which would make the moon craft bounce in the light gravity of the moon.

Aluminum honeycomb is under study because it crushes on impact and is almost non-elastic. Thus, it reduces rebound problems. The aluminum honeycomb also offers advantages of light weight and high reliability.

SIGNAL CONDITIONER—The heart of the Project Gemini blood pressure measuring system is comparable to an average cigarette lighter. Earlier Project Mercury unit is shown at left. The transistorized micro-circuit signal conditioning device has been developed by Garrett-AiRearch of Los Angeles, Calif.

Deep Space Laser Requested By MSC For Communications

If a deep space mission is to be successful, the pilots that will explore the planets beyond the Moon must have continuous communications with the control center on Earth.

To achieve this is the object of a study called for from industry by the NASA Manned Spacecraft Center. The request asks for proposals for a deep space laser acquisition and tracking study from time of launch to a mean range of 50,000,000 nautical miles.

Study specifications call for high priority development of laser tracking techniques between Earth and a Manned Deep Space Vehicle (MDSV) or between a satellite and two MDSV's.

The system must be capable of handling two-way telemetry and voice communications, as well as spacecraft to ground television.

Using ultra-narrow beams, a laser devise could penetrate fantastic distances more accurately than microwave devices. MDSV transceivers that sense deviations of the spacecraft attitude relay correcting signals almost instaneously over the million mile range.