Space News

NASA ROUNDUP!

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Eight House Committee Members Visit MSC

Gilruth Named Visiting Prof. At Texas A & M

Dr. Robert R. Gilruth, director of Manned Spacecraft Center, was named February 7 as a Visiting Professor of Aerospace Engineering at Texas A & M College. A & M President Earl Rudder said the addition of the eminent rocket and missile engineer would add great depth to A & M's program of space technology.

Dr. Gilruth, who served as director of Project Mercury and was awarded NASA's distinguished service medal in 1962 by President Kennedy, will begin a series of lectures in the fall of 1963. He will serve as Visiting Professor without compensation.

In accepting the appointment Gilruth said, "I share A & M's interest in updating both students and staff in the changing engineering requirements of the space age and welcome this opportunity to help in this most important area." The new A & M lecturer received both bachelor's and masters' degrees in aeronautical engineering from the University of Minnesota and has received honorary Doctor of Science degrees from Indiana Institute of Technology, University of Minnesota, and George Washington University. He won international recognition in the 40's for his research on the characteristics of aircraft in flight while with the National Advisory Committee for Aeronautics – predecessor to NASA. He has also pioneered work in this country in the development of high-speed hydrofoil craft.

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MSC DIRECTOR ROBERT R. GILRUTH explains a small model of the lunar excursion module to Rep. William F. Ryan of New York, one of eight members of the House Committee on Science and Astronautics who visited the Center February 9. The group was given progress reports on Clear Lake construction, Projects Mercury, Gemini, Apollo, and the astronaut training program.

Spend Day Here In Briefings And Progress Report

Eight senior members of the Committee on Science and Astronautics of the U.S. House of Representatives paid an informal study visit to Manned Spacecraft Center February 9.

Led by Rep. Olin Teague (D-Tex.) the group also included Congressmen Joseph E. Karth (D-Minn.), Ken Hechler (D-W. Va.), Thomas G. Morris, (D-N. M.), William F. Ryan (D-N. Y.), Joe D. Waggoner, Jr. (D-La.), James G. Fulton (R-Penna.) and R. Walter Riehlman (R-N. Y.).

During briefings, committee members were given a progress report on the nation's manned spaceflight research effort with emphasis on the development and construction of the MSC facility at Clear Lake.

The briefing outlined proposed progress planned for Projects Mercury, Gemini, and Apollo for the coming fiscal year on the basis of the budget proposal now being considered by the House Committee.

Committee members discussed with Astronaut Affairs Coordinator Donald K. Slayton the selection, training, schedules and extra program activities of the team of sixteen astronauts currently in training at MSC.

Congressman Teague said the purpose of the visit was to continue the House Committee's practice of getting first hand knowledge from both the

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Thirty Students To Work, Study Here In Summer Intern Program

A new Aerospace Summer Intern Program to give 30 of the Nation's outstanding college students an opportunity to work and study at MSC was announced February 5 by the Center's Director, Dr. Robert R. Gilruth.

Speaking at the Space Fiesta at Texas A & M College, Dr. Gilruth said that the program was designed to "tie in" practical experience with academic training by giving work assignments and classroom training in the Center's space projects.

Science and engineering students will be selected for 20 of the internships while the remaining 10 will be filled by students in public and business administration.

Intern selection will be from both graduate and undergraduate students of good scholastic standing who plan to continue their academic training. Qualification requires that the junior year of college be completed by June 17, 1963 or that graduate students fulfill their B. A. or B. S. degree requirements by that date. All interns must be strongly recommended by their college deans or department heads.

The Aerospace Summer Intern Program will start June 17 and extend through August 30 of this year. Undergraduates will be paid salaries of approximately $857 while graduate interns will receive approximately $1154 for the 75-day period.

The science and engineering interns will work under the direction of senior Manned Spacecraft Center engineers

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MA-9 Rescheduled To Middle Of May

The next manned U. S. orbital space flight attempt has been re-scheduled for mid-May, NASA announced last week.

The delay from a previously planned April launch target date is attributable to a decision to rewire the Mercury-Atlas flight control system. Results of a continuing reliability study and an analysis of a failure which occurred during checkout of the MA-9 booster identified the flight control system wiring as a possible source of trouble.

Consequently, General Dynamic/Astronautics, assembly and test contractor for the Atlas vehicle, proposed a new wiring technique as a part of a constant effort to increase reliability and safety of a man-rated Mercury booster.

A technical management board met at the Air Force Space Systems Division at Los Angeles, Calif. Tuesday, Feb. 12, to review the proposed schedule of work needed.

MSC Apollo Project Office Announces Reorganization

The Apollo Spacecraft Project Office has reorganized to accommodate the added tasks imposed by the contract for the development of the lunar excursion module under negotiation with the Grumman Aircraft Engineering Corporation.

Charles W. Frick, Apollo project manager, said Robert O. Piland will be deputy project manager for the LEM and James L. Decker, formerly with the Martin Company in Baltimore, Md., has been assigned as deputy project manager for the command and service modules.

Frick said the deputy managers will have responsibility for cost, schedule, technical design and production of the three-module Apollo spacecraft, under the over-all direction of the project manager.

Other Apollo organizational changes include establishment of a Spacecraft Systems Office for the command and service modules with Caldwell C. Johnson as manager, and Clinton L. Taylor as assistant manager, and a similar office for the LEM with Owen E. Maynard,

(Continued on Page 7)

Center Staff Active During National Engineers Week

National Engineers Week is being celebrated throughout the country this week. Theme for the 1963 observance is "America's Engineers Build for the Future."

MSC Deputy Director Walter C. Williams will be the speaker at the principal observance by Houston Engineers. He will speak at the annual banquet at 7:30 p.m. Friday in the Texas Room of the Houston Club, before the San Jacinto Chapter of the Society of Professional Engineers. The membership of the chapter is composed of 1,500 registered engineers in all fields of engineering. His subject will be "Progress in Space."

Special Assistant Paul E. Purser spoke Tuesday before the combined technical societies of Waco, with the Central Texas Section of the American Rocket Society Acting as host.

Assistant Director for Engineering and Development Maxime A. Faget also spoke Tuesday, to the Engineering Societies of Southeast Texas and Southwestern Louisiana meeting in Beaumont. His subject was "Man's Flight to the Moon."

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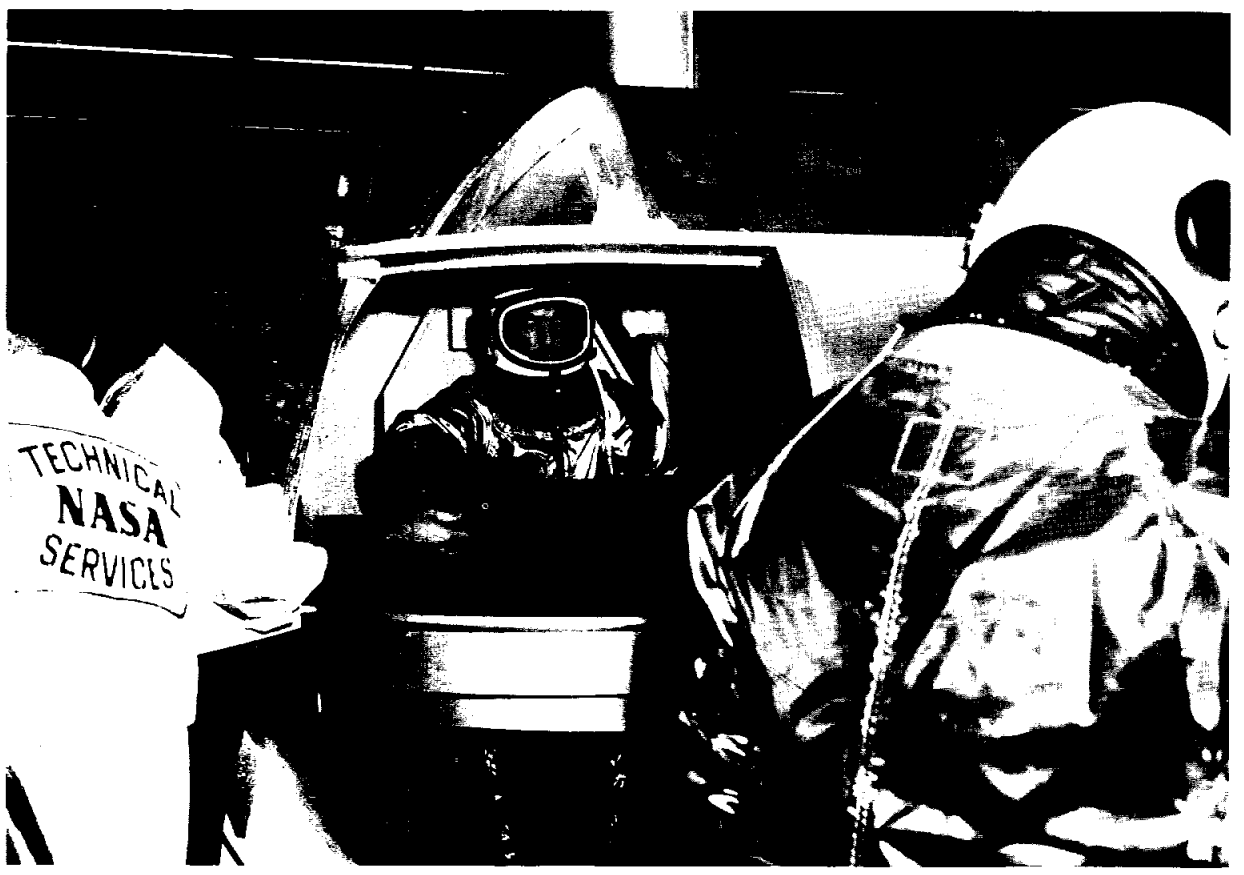


A PLYWOOD MODEL of the lunar excursion module, full scale, was constructed in MSC's Technical Services shop recently for demonstrations during contract negotiations with Grumman Aircraft Engineering Corp. Astronaut Scott Carpenter here demonstrates how pilots would fit in.

MSC Credit Union Elects 1963 Board of Directors

A new board of directors, as well as credit, education and supervisory committees were voted into office January 29 at the annual membership meeting of the MSC Federal Credit Union:

Reelected president was Roy C. Aldridge. Vice president is Robert J. Bailey; Alfred Ligrani is treasurer; and William Kincaide, treasurer.

The board of directors is made up of these four and Jack Kinzler, Burney Goodwin, William Bland, Arthur H. Hinners, and George MacDougall. Aldridge, Baily and Kinzler will hold board-of-director positions for three years; Goodwin, Kincaid, and Lingrani for two, and Bland, Hinners and MacDougall for one year.

The five-man Credit Committee installed in January includes Abner Askew and James Moody, elected for three-year terms; Harold Ferrese and Robert Stubblefield, elected for two year terms; and Troy Williams, elected for one year.

The membership voted to retain the same Education Committee and Supervisory Committee as before.

The Supervisory Committee is made up of Ed Campagna, Hazen Walker and Thomas J. Cassias.

The Education Committee includes Al Morewitz and Anne Corey.

Engineers' Week

(Continued from Page 1)

William M. Bland, deputy manager of Mercury Project Office, spoke Monday before the Dallas chapter of the Texas Society of Professional Engineers at a dinner meeting in the Humphrey Lee Student Center, Southern Methodist University. His subject was "Engineering Experience with Project Mercury."

Technical Assistant Don Gregory spoke yesterday in Freeport, to the Gulf State Chapter of the Texas Society of Professional Engineers meeting at the Dow Chemical plant. His subject was "Engineering and the Space Age."

Gregory will speak again tomorrow in Denver, Colo. to the 47th annual engineering convention of the Colorado Society of Engineers, meeting at the Denver-Hilton.

Other addresses connected with Engineering Week include John M. Eggleston, to the Engineering Society of Detroit today; Edward B. Hamblett, to the Quad City Engineering Council of Davanport, Iowa, today; Norman Foster to the Kansas Engineering Society in Hutchison, Kansas, Friday and to the student body of the university of Wichita Friday night; and Col. John A. Powers to the San Francisco Bay Engineers in San Francisco today.

White Sands

(Continued from Page 8)

test stands, a blockhouse, propellant storage and transfer area, test preparation building, a fire station, and administration area. The administration area will contain a headquarters building, warehouse, maintenance shops, cafeteria, security control center, and a helicopter stop.

Other tests at the new facility will involve the reaction control engines for both the command and service modules, propellant tanks, pressure systems, valves, electrical power, and the environmental control system for the spacecraft.

Destruction of all classified material (including drafts, carbon sheets, ribbons, stencils, plates, recording tapes, stenographic notes, etc.) is accomplished by the MSC Security Division.

THE MSC CREDIT UNION topped the $100,000 mark in shares recently when Claude F. Ingels of Logistics, right, handed his check to Ellington credit union representative Ivan Nachman. The Credit Union is beginning its second year of operation.

New York Company Selected To Provide Expulsion Tanks

Textron's Bell Aerosystems Company of Buffalo, N.Y., has been selected to provide the positive expulsion tanks for the reaction control system of NASA's Apollo spacecraft by North American Aviation's Space and Information Systems Division at Downey, Calif., principal contractor on the service and command modules.

The tanks will be used to supply the propellants to the reaction control rockets which will position the space vehicle during the flight to and from the moon, and provide control during the reentry maneuvers.

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

Gilruth Named

(Continued from Page 2)

In 1950, Gilruth was awarded the Sylvanus Albert Reed Award by the Institute of Aeronautical Sciences for notable contributions to aeronautical research. In 1962 he received the Robert H. Goddard Memorial Trophy of the National Rocket Club for his leadership of Project Mercury, and most recently was elected Honorary Fellow for 1962 of the Institute of Aerospace Sciences. Gilruth, a veteran of 23 years of Government service, has served as Department of Defense advisor on guided missiles and aeronautics, and a member of the U. S. A. F. Scientific Advisory Board.

Gemini Antenna Contract Is Awarded To deHavilland

The Special Products & Applied Research Division of deHavilland Aircraft of Canada, Ltd., has been awarded the ultra high frequency antenna contract for the Gemini spacecraft, from McDonnell Aircraft Corporation, prime contractors to MSC.

The "jack-in-the-box" antenna is a development of the SPAR Division's family of storable tubular extendible member (STEM) antenna devices. The 13 in. long 2 in. wide by .002 in. thick, beryllium copper antenna element strip is contained in a 4 inch long unit weighing only 6.5 ounces. When released by the solenoid, the lid of the unit is forced off by the potential energy of the coiled element and extends from a tube of 0.5 inch diameter.

The antenna will radiate 20 watts output in the frequency range 225 to 460 megacycles, with a VSWR of between 2 and 5:1, and will be used for voice communication between the spacecraft and ground monitor stations. Two of the antenna units will be mounted on the Gemini spacecraft.

Students To Spend Summer Here

(Continued from Page 1)

and scientists with duties that are related as far as possible to the students' academic training and background.

They will also attend daily Aerospace Engineering Seminars which have been developed by senior technical staff members of the Center and will constitute a special course based on MSC's experience in conducting the Mercury, Gemini, and Apollo Programs. Although this course is not available in colleges at this time, Rice University and the University of Houston plan to offer it during the 1963-64 school year.

Public and Business Administration interns will likewise be given assignments which are related to their special interest and academic background. In some instances, duties will be rotated to give experience in more than one division within the Center. They will attend weekly seminars of two hours duration at a level comparable to graduate courses in management theory.

Further information and details of the program will be made available through colleges and universities throughout the country.

Chute Tests

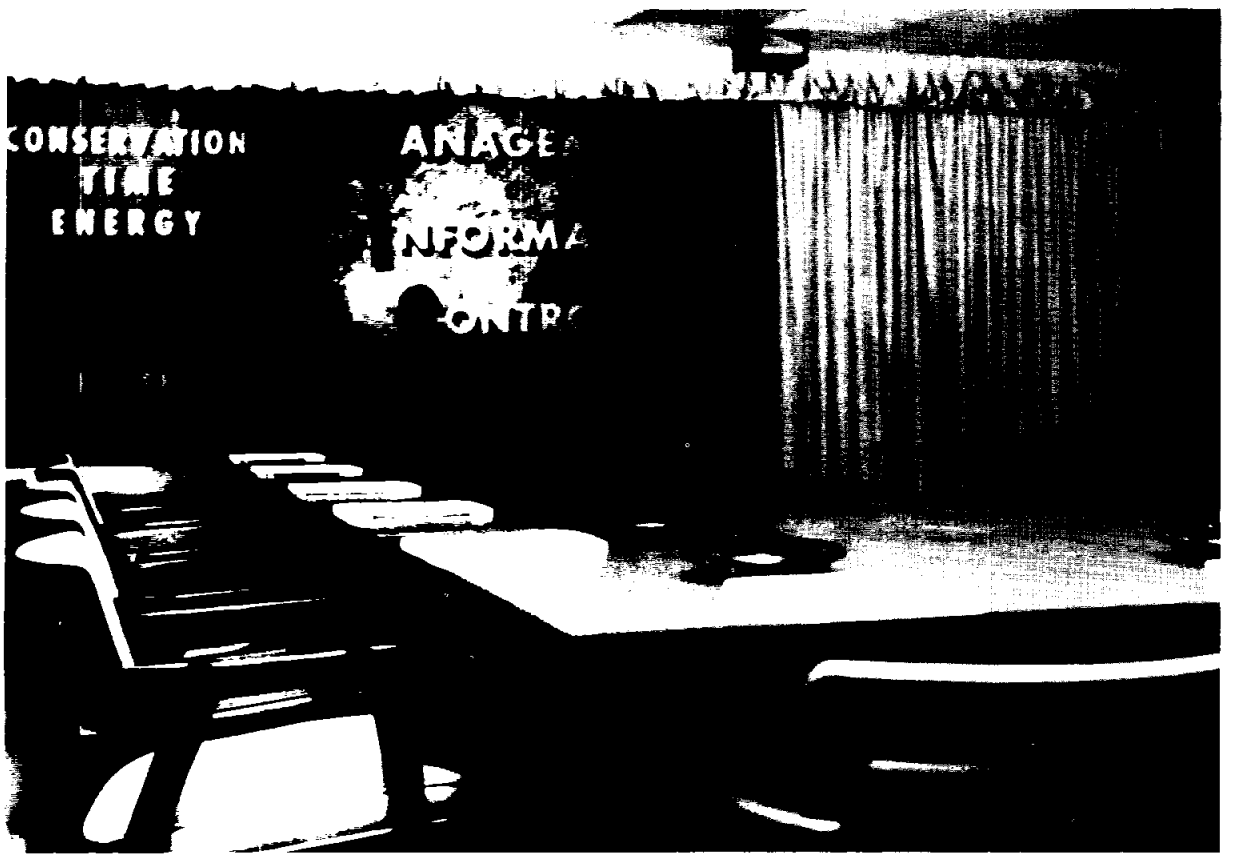
(Continued from Page 8)

psf in the last two tests. Only minor damage to the canopy was incurred from "red-lined," or excessive loads.

The parachute system, made by Northrop's Ventura Division, is primarily a paraglider system back-up and will be used for wet landings of early unmanned and manned Gemini spacecraft.

The parachute recovery system consists of an 18-foot diameter ring-sail drogue and an 84-foot diameter ring-sail main chute packed in a rendezvous-and-recovery system canister which also includes the Gemini radar recovery aid. The drogue is essentially scaled down from Mercury, while the main chute is scaled up from Mercury.

Commercial banks and sales finance companies hold 64.6 per cent of all U. S. installment loans—credit unions hold 10.1 per cent.



TYPICAL BEGINNING for a lecture accompanied by slides shows the program title on the main screen, the ideas behind it on the small side screens. The speaker controls all three illustrations from the lectern singly or together, as he illustrates his talk.

MSC Control Room Features Latest In Communication Aids

Anybody that has ever watched a speaker wave his hands, about, or struggle with a broken piece of chalk at an ill-lighted blackboard to get his subject across, will appreciate the marvels of MSC's space-age communications facility.

Referred to as the control room, it is located in the basement of Farnsworth and Chambers Building and is equipped with everything except a trap door to drop the speaker through when he's been there long enough.

George V. Sowers, the man-in-charge, says even that was discussed—jokingly, of course, —when the equipment was installed. The next best thing, a timing device to let the speaker know how long he has been talking, was included.

Basically, the control room is a management tool used for the review, analysis, and solution of technical and administrative problems of program management. Using advance audio-visual techniques to convey more information quickly, it gives a speaker tools which compliment his oral delivery with a minimum of distraction, including anything from off-the-cuff comments to completely pre-planned, rehearsed and programmed viewing techniques.

The control room, for instance, is a place where an MSC executive can watch launch preparations at Cape Canaveral projected onto a giant 5 by 7-foot screen by commercial TV, and at the same time get the classified details by telephone over a "hot line" to the Cape.

It is a place where special messages from the President can be seen by a large audience on the same screen; a place where the NASA Management Council sometimes meets to hear presentations, a place where management can keep well-informed on the progress of the space program as a whole.

"As the Center grows," Sowers points out, "and we accumulate more people, we are also accumulating more and more information. Facilities like this allow us to put that information across quickly and efficiently to large numbers of people."

Externally, the control room resembles any well-ordered executive conference room—until somebody starts pushing buttons.

Then a motorized curtain at the front of the room glides back to show a set of three rear-projection screens. The largest is five by seven feet, flanked on the left by two 3½-by-2¾ screens. From a control room behind, four different projectors can light the center screen with television, slides or movies.

Which it is—and in what order—the speaker himself determines without venturing from the lectern.

"They say a picture is worth 1,000 words," said Sowers, "so I guess that is about 3,000 words right there. For instance, if a speaker was using slides, he could outline his material on the center screen and put detail-slides on the two side screens."

And this is only the beginning. Using the lectern controls alone, the speaker can "dial" the number of any one of 99 slides he wants on the side screens, and have it magically appear. He can then run through a slide sequence either forward or backward, focusing and turning the projector lamp on and off as he wishes and positioning the curtain to cover what portion of the screen he isn't using. Then he can switch at will to a movie or TV transmission on the main screen.

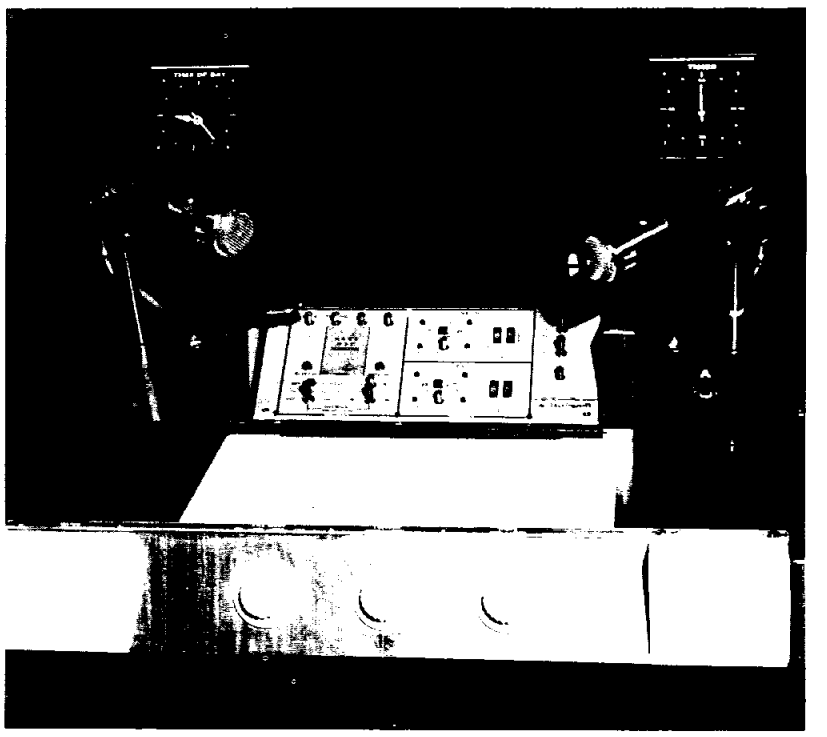
He can adjust the motorized lectern to his height, control a "fill light" to eliminate shadows under his chin if he is having his picture taken, adjust the room lights to agree with his visual presentation, control a tape recorder to either record the session or play something back, draw himself a glass of water, and tell instantly how many minutes he's been talking and what time of day it is—all without moving from the lectern.

Meanwhile his audience is seated comfortably around a horseshoe-shaped table with pencils, pads, and ashtrays.

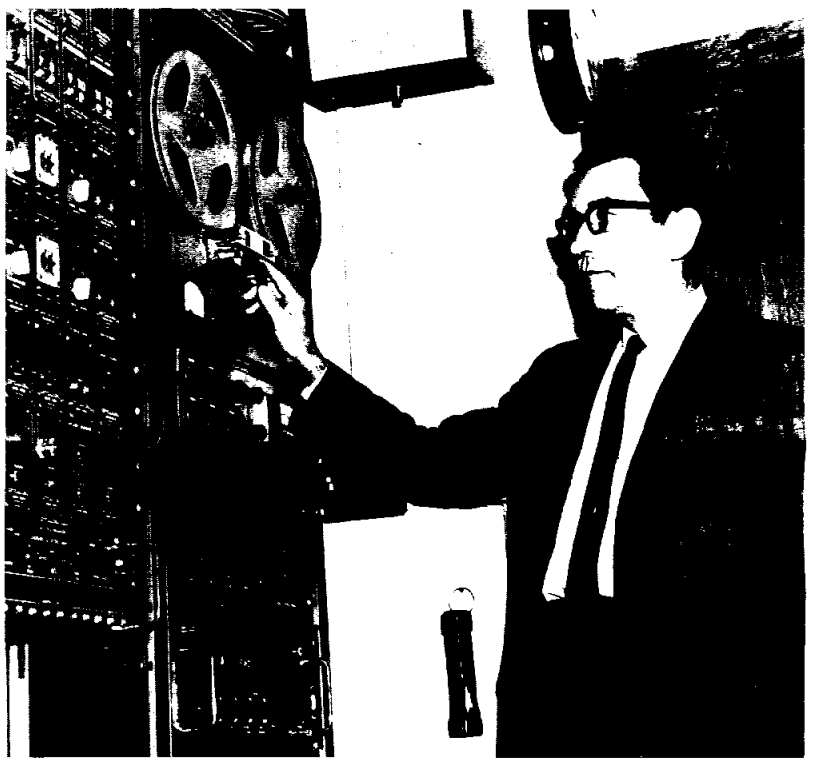
"Some 655 people used this room in November and December," Sowers said, "and December was a slow month. At Clear Lake, we expect to have a similar arrangement, except that we will have two six-by-eight foot screens, and two more TV projectors back of the screen so that we can also get closed-circuit TV from the new mission control building."

All classified material should be covered with the appropriate MSC cover sheet at all times except when it is in file, or when it is prepared for transmission outside of MSC.

Combinations of safes, safe-type filing cabinets, and combination locks will be changed by the Physical Security Branch of the Security Division.



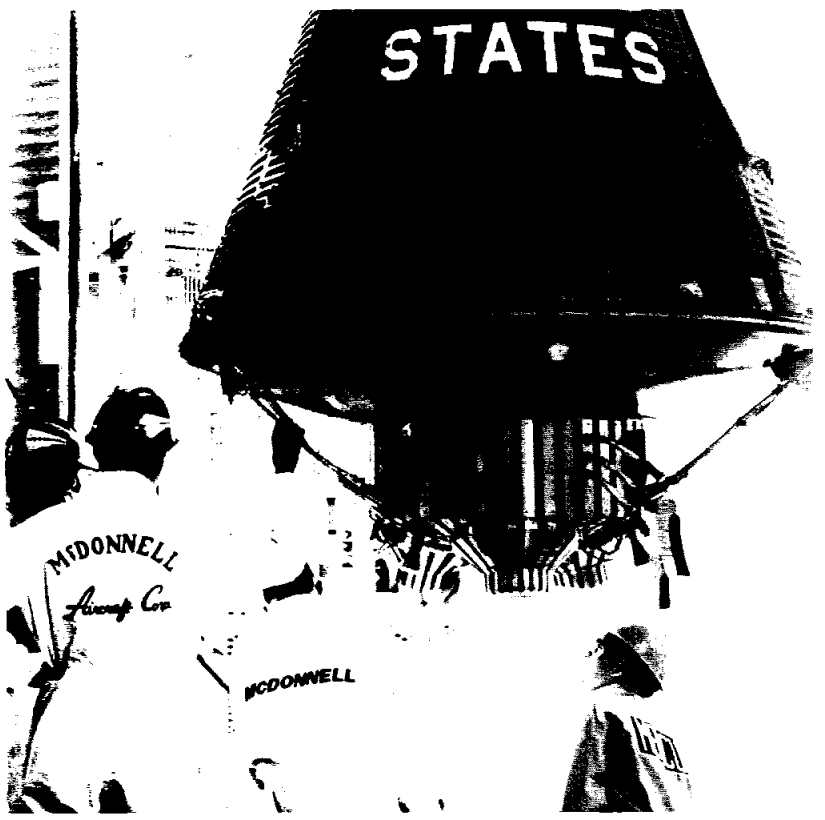
THIS IS HOW it's all done. At top right and left, clocks for time-of-day and time-of-speech, at bottom water tap and ashtray, and in the center, controls for the three screens.



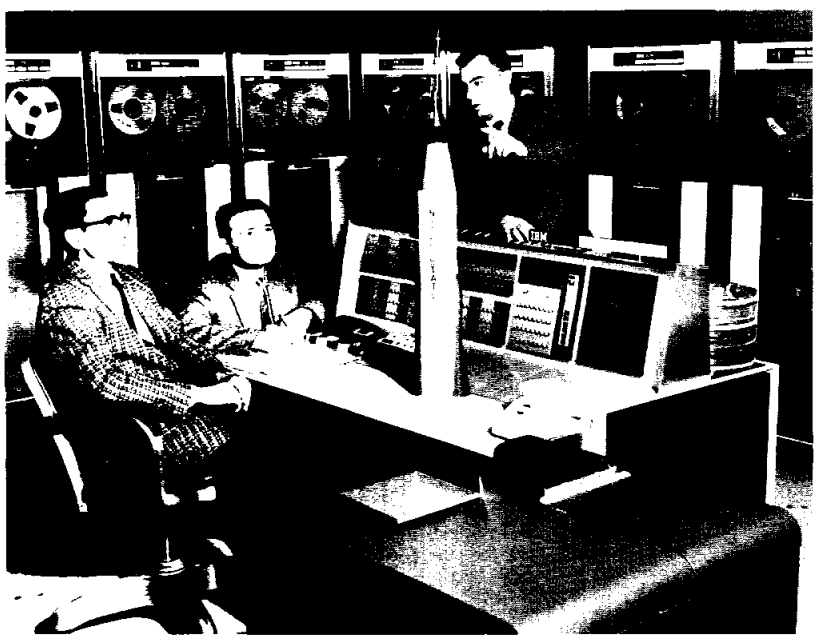
ARTHUR DEATON, the "man-behind-the-scene" in the control room, helps speakers set up and automate their programs and monitors the equipment to keep things running smoothly.

CONTROL ROOM CHIEF George V. Sowers "simulates a speaker" behind the mechanized lectern of the MSC control room. The room seats 15 conferees around the table and another 22 in the row of chairs against the wall; could accommodate more.

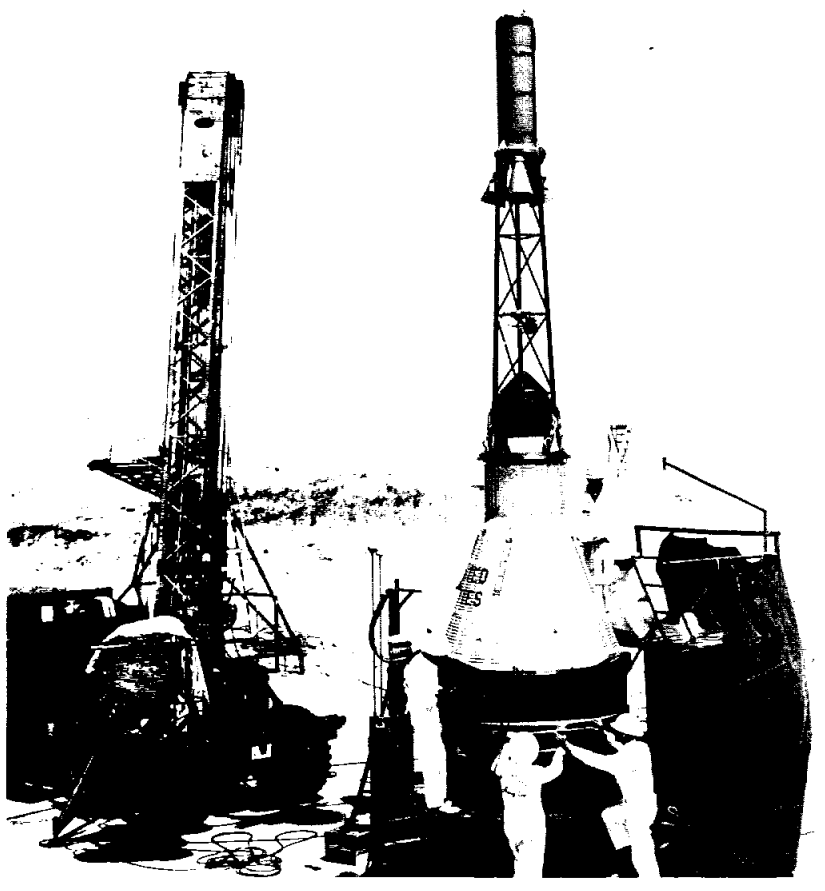
McDonnell Aircraft of St. Louis, Mo. Has Prime C



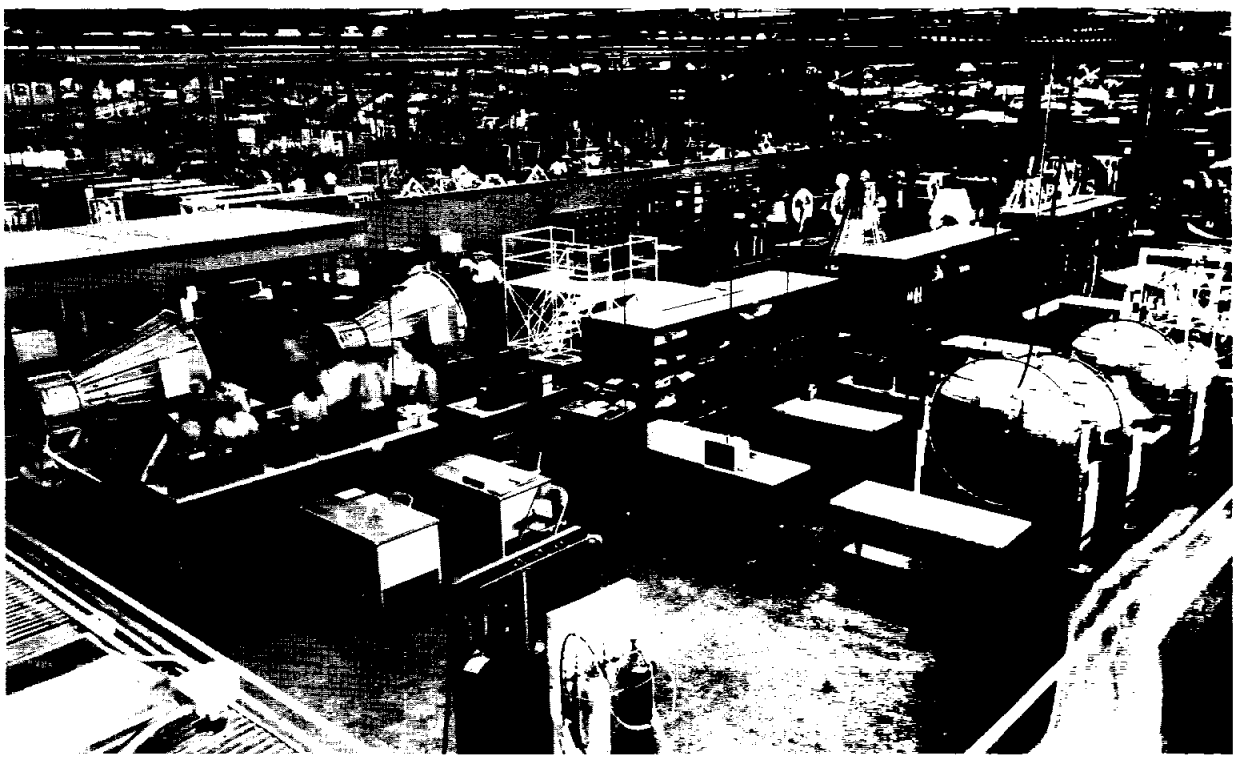
MERCURY SPACECRAFT "Friendship 7" is hoisted to the top of the gantry in preparation for mating with launch vehicle before the America's first orbital flight by Astronaut John Glenn, as three members of McDonnell's Cape Canaveral staff assist.



McDONNELL AUTOMATION CENTER is the working room for data reduction during the engineering and design program which is constantly going on at the McDonnell plant.



FIRST PRODUCTION SPACECRAFT for Project Mercury was used in an off-the-beach abort test at Wallops Island May 9, 1960. Here a McDonnell crew at Wallops prepares it for the test.



MERCURY PRODUCTION LINE at the McDonnell plant in St. Louis, where work is done on the spacecraft prior to moving them into the white room for the component installation.

On Monday, January 12, 1959, the wires to the nation's press became hot with the news that the United States was taking its most important step to put a man into space. The National Aeronautics and Space Administration announced in Washington that McDonnell Aircraft had been selected to design, develop and produce a spacecraft in which the first American would go into orbit.

NASA's decision to contract for the hardware was hardly unexpected in the light of world conditions. But, compared to most of the other firms eagerly vying for the contract, the St. Louis concern was little known to the general public.

It undoubtedly was a surprise to most people that McDonnell was one of the largest defense suppliers in the country; that it had built the world's first carrier-based jet fighter and currently is the leading fighter-plane producer in the free world; that it is the largest employer in Missouri with over 26,000 people sharing in its more than $3½ million weekly payroll.

McDonnell work on a spacecraft concept actually began a year before the company's selection as prime contractor. The original design work was carried out with company funds by a group of 12 engineers. This group grew to approximately 40 people by the time the company submitted its proposal to NASA in December, 1958. In the four years since that time, McDonnell personnel working on Project Mercury reached a peak total of 1800, including 400 at Cape Canaveral assigned to final testing of the spacecraft, as well as launch operations.

McDonnell's original contract with NASA called for the delivery of 12 spacecraft, with a minimum of support functions. As the program grew, the company became responsible for the development of two procedural trainers, an environmental trainer, seven check-out trailers, and for much of the prelaunch operation at Cape Canaveral, including the mating of the spacecraft to the booster, check-out, and count-down.

McDonnell's responsibility included the design concept for each of the spacecraft com-

J. S. McDonnell
Chairman of the Board
McDonnell Aircraft Corp.

ponents as well as the production of certain major components such as the astronaut couches.

Design Factors

The original contract called for spacecraft of identical design and envisioned the use of "off-the-shelf" equipment to a large extent. As the program grew, each spacecraft was individually designed for a specific mission and the need for newly designed equipment became necessary. Thus, the program called for the design and production of hardware that pushed the state of the art.

The principal design requirement was the safety of the astronaut, and probably no manned vehicle has ever been designed with so many redundant features. Each component on which the astronaut depends has at least one backup system and, in some systems such as stabilization control, there are three complete backups. To add to the engineering challenge, it was necessary that the spacecraft be designed to operate automatically, manually, or by ground control.

Two other design considerations of major import are worthy of note. First, because of stringent time limitations, there was the need for designing the spacecraft concurrently with the research and testing conducted by both NASA and McDonnell, thus preventing a normal step-by-step development of the spacecraft. Secondly, the basic spacecraft could weigh only a little more than a ton, which necessitated the use of miniaturized instruments and specially-designed space-saving components as well as the use of strong, lightweight metals which could withstand far higher temperatures than most metals.

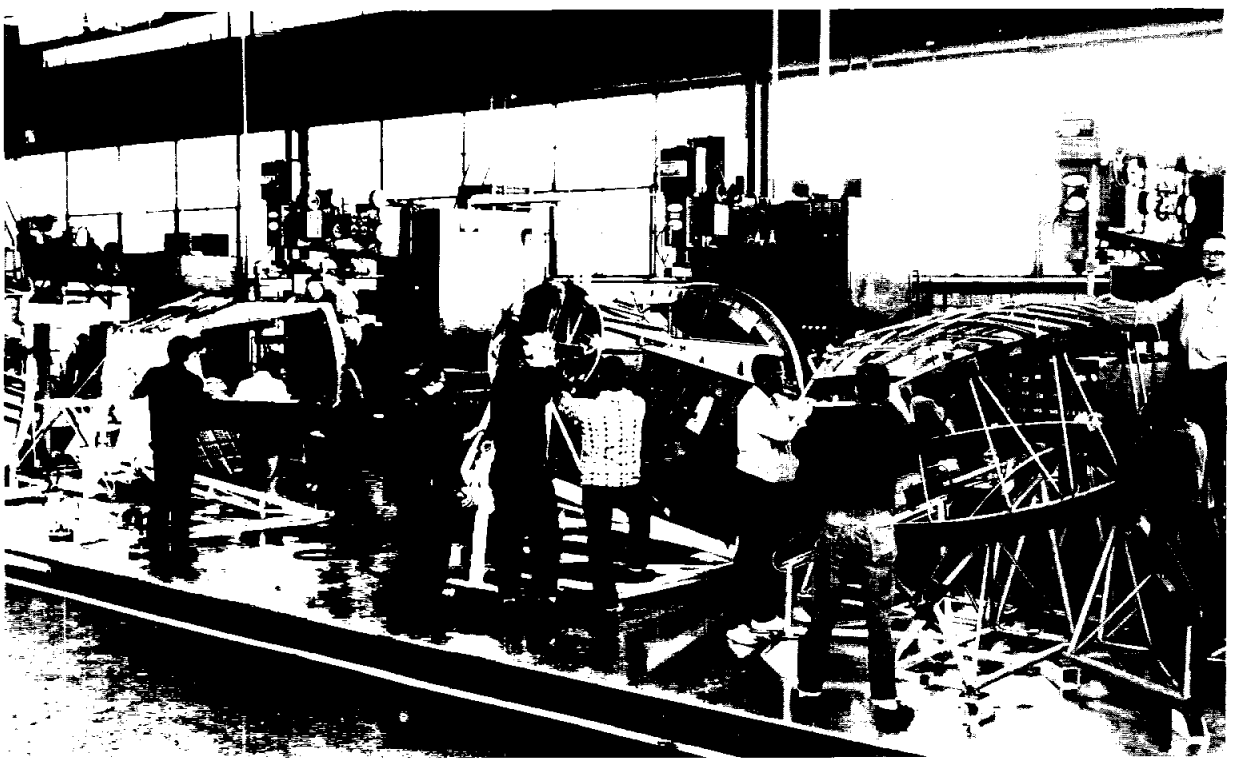
Production

The production job also was a particularly tough one in that new manufacturing techniques had to be devised to achieve the desired results.

An example was the development of a technique for the automatic fusion-welding of titanium capsule skins only .010 inches in thickness and nearly six feet long. At the outset there was considerable doubt as to whether successful welds could be achieved with such thin sheets. McDonnell manufacturing people finally designed fixtures that permitted the welding to be done in room air rather than in a gas chamber, in which all previous fusion-welding of titanium had taken place. The weld realized by this new technique is believed to be the highest quality yet achieved in the industry.

Another example is the "superclean white room" developed for the assembling of the environmental and reaction control systems. Spacecraft controls can tolerate neither dust particles to inter-

ntract For MSC's Mercury And Gemini Spacecraft



BEGINNING OF GEMINI production line shows workmen welding structural members of the first Gemini spacecraft into place, as the two-man spacecraft begins to take shape.

PRESIDENT KENNEDY and NASA Administrator James E. Webb (on platform) visited the McDonnell plant in St. Louis last September and were briefed on the Gemini spacecraft by W. F. Burke (back to camera), Vice President and Manager, Spacecraft. Behind Kennedy is McDonnell Board Chairman, "Mr. Mac."

fere with operating mechanisms, nor rust which might originate from human contact during assembly.

McDonnell designed and built a 9,000 square foot white room with an air conditioning filtration system that removes dust particles down to .3 micron in size, maintains a temperature of 74°F, and a relative humidity of not over 50% to provide for worker comfort and perspiration control. The room is pressurized at all times and anyone entering must wear white uniforms of dust-free nylon, nylon caps, and plastic shoes.

Quality Control

About 125 McDonnell people were assigned to quality control work. This means that there has been an average of one quality control man for every six production workers.

McDonnell took a step beyond the normal quality control practices by establishing a team of experienced engineering and production personnel to conduct a continuing quality audit. Going far beyond ordinary product inspection, the quality audit evaluates design; production planning; manufacturing methods; tools, aids and skills; inspection systems and procedures.

Testing

The Mercury spacecraft is probably the most thoroughly tested manned vehicle ever built. At both NASA and McDonnell facilities, the spacecraft underwent literally thousands of tests of various types.

Two of the most important test areas were the system tests, conducted on every spacecraft delivered by McDonnell to NASA, and the Project Orbit test series, designed to gather information on the spacecraft program in general. A series of full-scale simulated mission tests at altitudes approaching 300,000 feet were conducted in a large altitude test chamber where the effects of low pressure on the spacecraft structure and systems were evaluated.

Subcontractors

McDonnell Aircraft as prime contractor was assisted in the spacecraft program by an estimated 4000 suppliers and subcontractors throughout the country. Direct subcontractors numbered 596 from 25 states,

Walter F. Burke
Vice President General Manager, Spacecraft
McDonnell Aircraft Corp.

while 1500 were "second" tier subcontractors.

Gemini

On December 22, 1961, McDonnell received a go-ahead from NASA to develop the two-man Gemini spacecraft. This program is planned to be substantially larger than Mercury.

Gemini is being developed as an intermediate step between the single-seat Mercury and the Apollo manned lunar landing spacecraft.

McDonnell currently has over 2500 people working on the NASA order for 12 Gemini spacecraft.

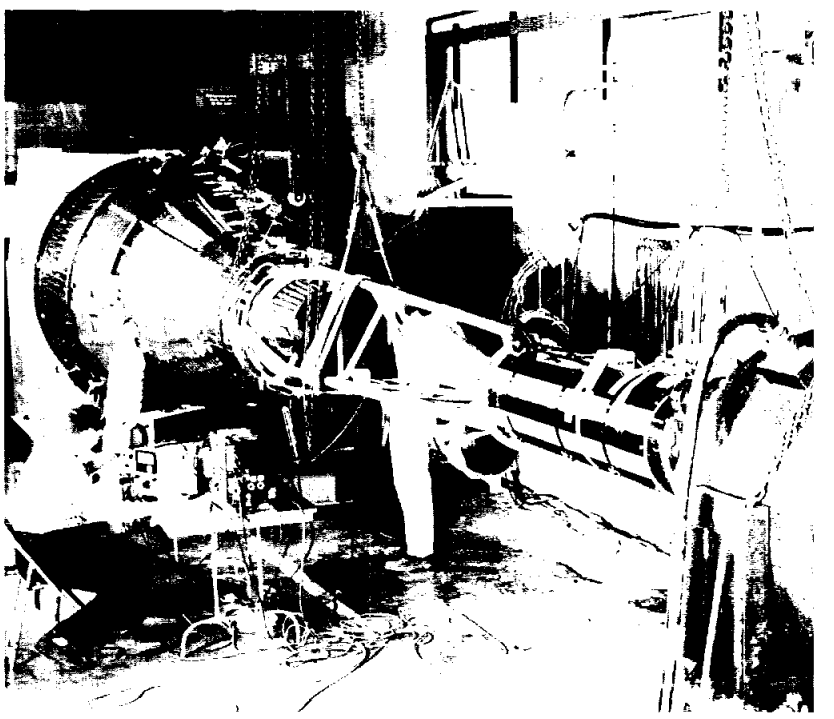
McDonnell has retained more than $80 million in earnings to implement a program of facilities expansion and is currently spending an additional $21 million on a new facilities program which will include a new space center to be integrated into its existing plant. These additions will add 708,000 square feet to the 3,684,197 square feet currently occupied.

Mr. J. S. McDonnell, President of McDonnell Aircraft, said "We must progressively provide facilities to carry out advanced research and development, conduct the exacting reliability testing required, and meet the urgent delivery schedules usually associated with space work".

Included in the new equipment to be installed in the space center will be nine space environmental simulation chambers, the largest of which will be a cylinder 30 feet in diameter and 35 feet long. This will permit the simulation of environments in space up to 219 miles high and is large enough to test the entire Gemini spacecraft complete with its equipment module. It also will provide cold wall temperatures as low as minus 280°F and air temperatures as high as 200°F. The smaller space chambers will be used to test spacecraft components under similar conditions.

Whatever the challenge of the space age might be, McDonnell looks forward eagerly to the continuance of its mission of service to the community and the nation. It will pursue the development of modern and futuristic missiles and spacecraft. It will also continue to design, develop and manufacture the finest manned aircraft for the preservation of peace in the world.

SUPERCLEAN WHITE ROOM was designed and built at McDonnell to insure that even tiny particles of dust and debris would be kept out of the precision control systems. Mercury spacecraft are undergoing final assembly and checkout.



VIBRATION TESTING of the complete Mercury spacecraft is just one of the long series of tests conducted at McDonnell to insure that each separate system, then all the systems together, will function with perfect reliability.

Editor's Note: With this issue, the Roundup begins a new series designed to acquaint MSC personnel with the Center's industrial family, the contractors and subcontractors who make Mercury, Gemini and Apollo spacecraft and related equipment. The material on these two pages was furnished by McDonnell public relations personnel. This series will run interspersed with the series on the activities of other NASA Centers, until the latter is concluded.

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

People who talk about "the good old days" may learn something from the century-old quotation below, sent in by Personnel Chief Stu Clarke.

This is the statement of personnel policy issued in 1861 by the well-known John Wanamaker Department Store to its employees. We hope it will furnish some solace the next time you have to burn a little midnight oil.

"Stores must be opened at 6 a.m. and remain open until 9 p.m. the year around. The store must be swept; counters, base shelves and showcases dusted; lamps trimmed, filled, and chimneys cleaned; pens made, doors and windows opened. A pail of water and a scuttle of coal must be brought in by each clerk before breakfast, if there is time to do and still attend to customers who call. The store must not be open on the Sabbath day unless absolutely necessary, and then only for a few minutes.

Any employee who is in the habit of smoking Spanish cigars, getting shaved at a barbershop, or going to dances and other places of amusement—will most surely give the employer reason to be suspicious of his integrity and all-around honesty.

Each employee must pay not less than $5.00 per year to the church and must attend Sunday School each Sunday. Men employees are given one evening a week for courting purposes, and two if they go to prayer meeting regularly. After 14 hours of work in the store, the leisure time must be spent in reading good literature."

* * *

There's something startlingly new in "music" this year—melodies played by an electronic brain computer.

Technicians in the Computer Sciences Division at Aerojet-General Corporation have harnessed the electronic noises made by the computer, all the little blips and pings it makes as it does its calculations.

They then tell the machine, by punched cards, to make the noises in the proper sequence (or musical arrangement, actually) to play various tunes.

The result is a repertoire of old favorites, only they are played by a brand new "instrument," an electronic music machine which sounds roughly like a combination of Scottish bagpipes and Chinese music.

The range of the electrical impulses which cause the melodious little pinging noises is such that any tune can be extracted from the computer.

And these same machines are the ones that have been taught to write free verse, even plots for television shows.

Which leads, of course, to the potential of eventually pairing them up—one to do music and the other the lyrics, as a mechanical musical comedy team.

"So look, kid," says Machine No. 7090 to No. 1107, "stick with me and someday you'll see your number up in lights."

—Copy by Don Bailer. Reprinted courtesy of Aerojet-General.

WELCOME ABOARD

MSC welcomed 108 new personnel aboard between Jan. 20 and Feb. 12.

Mercury Project Office: Nancy C. White.

Gemini Project Office: Cordella Richardson, Jolene P. Bowman, and Albert B. Triche (Sunnyvale, Calif.)

Apollo Project Office: William B. Goeckler, Roy F. Thompson, Clinton L. Smith, Harry W. Byington and Glenda Pickens (White Sands, N. M.)

Bus. Mgr. Resident Office, White Sands: Barbara J. Grimm.

Bus. Liaison Rep., Downey, Calif.: Robert J. Sar[illegible]non.

Business Mgr. Resident Office, Bethpage, N. Y.: Frank X. Battersby.

Spacecraft Technology Division: Frank A. Bryant, William C. Farries, Joseph C. Gausepohl, Victoria C. West, Charles E. Manry, Oscar Cabra, Jr., Rayfield K. Wert, Kenneth J. Wilcox, Forrest G. Hall, Wesley M. Sokolosky.

Space Environment Division: Robert G. Musgrove, Wiley F. Rich, James T. Pickering, and Josephine A. Grant.

Crew Systems Division: Earl J. Peterson, Robert W. Horstmann, William D. Womack, Joseph R. Trombley, Robert L. Spann, John Billingham, Richard Willadson, Donna S. Aiken, Richard H. Peetz, and James R. Marbach.

Systems Eval. and Devel. Division: Jack E. Capps, and H. J. Lowery.

Preflight Operations, Cape Canaveral: William D. Graham, Charles H. Capps, Luther L. Crane, Lorenz Simpkins, Howard E. Comer, Charles F. Warnock, Henri J. Kent, Richard B. Battin, and Charles W. Patterson.

Flight Operations Division: James D. Alexander, Roger H. Sanders, Bebe B. Ballas, Steven M. Martinez, James L. Hall, Robert P. Kehl, and Janet S. Campbell.

Flight Crew Operations: Tommy W. Holloway, and Clair D. Nelson.

AMR Operations: Dennis T. Penland, Ollie E. McCurry, and Laura Nonamaker.

Ground Systems Project Office: Armistead Dennett, Estelle T. Herbert, Alice M. Davis, and Benjamin H. Hood.

Computation and Data Reduction Division: Wesley W. Griffin, Gary H. Knippelmier, William C. Rozelle, Arnold B. Jackson, Halley O. Bradford, and Marcia McCollum.

Instrumentation and Electronic Systems Division: Marvin H. Perry, Laurence S. Washco, Guss E. Wenzel, Max Engert, Dallas V. Johnson, III, Robert R. Hilderback, and William C. Fulton.

Personnel Division: Henrietta L. Tudge, William B. Karpf, and Carolyn J. Holcomb.

Financial Management Division: Robert T. Rodriguez.

Procurement and Contracts Division: Charles W. Jones, Jean R. Cleapor, William T. Hanor, Modena B. Reed, and Mary J. Marks.

Facilities Division: James L. Goshorn, Gaynell C. Alford, Gary L. Rasco, and Edward W. Boddeker, III.

Photographic Services: James D. Moncrief.

Technical Services Division: Julian D. Rumby, Jesse W. Hogan, William A. Laycock, and Leon Cryar.

Technical Information Division: Grace M. Malicote, and Frances R. Parker.

Logistics Division: James D. Jenkins, Helen M. Newton, Mary H. McQuillan, Mary L. Humes, Walter S. Fruland, Stanley LaPine, and Edward E. Jaramillo.

MSC PERSONALITY

Logistics Chief Hazen Walker Claims Texas and Virginia

The chief of MSC's Logistics Division describes himself as a "native Virginian"—in spite of the fact that he was born in Austin, Texas.

Having married a girl from Lynchburg, Va (Kay Walker is in MSC's Procurement Division) Hazen L. Walker might just qualify, at that. He finished high school in Hampton, Va. and shortly thereafter began a 24-year career in Civil Service.

Walker started in a clerical capacity in the Quartermaster Corps at Ft. Monroe, Va. in 1939. He was moving up the ladder by the time the war broke out, and served three years from 1942 to '45 in the Air Corps. Returning to civilian life, he became a public relations counselor at Camp Swift, Texas and a year later

Hazen L. Walker

transferred to Langley Field, Va., as property and supply supervisor and property disposal officer.

In 1948, he transferred to the Transportation Corps at Ft. Eustis, Va. as supply officer for the Post Engineers. Four years later he joined the Transportation Research and Engineering Command as a supply officer.

In 1954 he was promoted to deputy chief of the Supply and Facilities Division, and in 1957 to chief of the Logistics Division.

Walker graduated from the Army Logistics Management Center at Ft. Lee, Va. in 1957, and has since taught more than a dozen classes in supply management and property accounting, and written and delivered a number of lectures on the same subject.

In October of 1961, Walker joined NASA's Space Task Group, now MSC, at Langley as supply officer. He was promoted to his present position June 1 of last year.

The Logistics Division has responsibility for all transportation and supply functions at the Center.

Transportation includes passenger travel, vehicular transportation, motor pool operation; transfer of household goods and heavy equipment and all freight traffic by air, rail, highway or water.

"We moved about one and a half million dollars worth of administrative and technical equipment to Houston from Langley," Walker said, "and since then have increased the inventory to over $7 million in supplies and equipment."

The division handles an average of 890 passenger trips a month and moves some 344 tons of freight in the same period; handles about 300 bills of lading a month; is in charge of the fleet of Government cars and rental vehicles used by the Center; and acquires visas and passports for MSC personnel traveling out of the country.

The Supply Branch has 56,000 square feet of warehouse storage space at Ellington, and is accountable for 30,000 different items ranging from the common pencil to high tollerance milling machines and oscilloscopes. "Average monthly sales from the store stock run about $73,000," Walker said. "We handle about $525,000 in administrations items and about $418,000 per month in technical items, an annual volume of over $5 million."

The division also conducts studies on the most efficient and economical methods of "phasing in" equipment at various temporary sites to the permanent site at Clear Lake next year, in cooperation with various technical divisions.

All of this leaves Walker little time to indulge in his one-time hobbies—golfing and dancing.

The Houston Jaycees extend a cordial invitation to all MSC men between the ages of 21 and 35 to attend a meeting in the Farnsworth and Chambers building cafeteria at 7:30 tomorrow night. Free refreshments will be served.

Motorola To Build Apollo Spacecraft's Transponder

Motorola Military Electronics Division, Scottsdale, Ariz., has been selected to develop and produce the Apollo spacecraft transponder, the main communication link between the three-man apollo capsule and Earth.

The award was made by Collins Radio Company, Cedar Rapids, Iowa, principal subcontractor to North American Aviation, Inc. for a portion of the Apollo communications and data subsystem.

The transponder to be furnished by Motorola is an extremely precise transmitter-receiver assembly. Aboard the Spacecraft it will function as the main communications link between the spacecraft and earth from distances of about 4,000 miles out to the moon. This link will carry PSK telemetry, FM voice, and television transmission.

Motorola's participation in this most challenging of all U.S. space ventures overlaps its role in the Mercury manned spacecraft missions and in the forthcoming Gemini two-man flights. It also reflects the company's demonstrated capability for the design and development of highly reliable space instrumentation.

Named as program manager for the Apollo program at Motorola is Richard Y. Hoffman. All development and production efforts will be under his direction. Terry Nelson will be the project engineer, assisted by Donald Hockum.

The program will be conducted in the Missile and Space Instrumentation Laboratory of the Military Electronics Division's western center at Scottsdale.

Tape Recorders

(Continued from Page 8)

Collins is providing a portion of the telecommunications system for the Apollo command module.

The Apollo recorders will have half the weight and twice the capacity of the most sophisticated recorders now available, and will operate on about one-third the power.

The recorders will have a five-hour capacity for collection and storage of data which can then be played back to the earth over telemetry links when they are available. There is a unique provision in the design of the equipment to enable astronauts to change tape reels easily in flight.

The recorders will draw less than 20 watts of power from the command module's power system.

HARM BUNNING, left, associate professor in aeronautical engineering at the University of Michigan, conducted a three-day seminar in orbital flight mechanics for the MSC flight crew personnel recently, part of a continuing program of astronaut training. Here he discusses his subject with Astronaut Walter M. Schirra, Jr. and Astronaut Trainee Edward White II, right.

Apollo Project Office Reorganizes

(Continued from Page 1)

acting manager, and William F. Rector III, assistant manager. A Spacecraft Systems Office for Guidance and Control, headed by Dave W. Gilbert with Paul Ebersole as assistant manager, was also established.

J. Thomas Markley has been designated special assistant to the manager with full responsibility to negotiate with North American Aviation, Inc., now under letter contract for the Apollo command and service modules.

William J. Rhine will fill the Resident Apollo Spacecraft Office in Boston, Mass., reporting to Gilbert. The Massachusetts Institute of Technology has been contracted by MSC for the Apollo's guidance and control system.

John W. Small, Jr. will be located at the Resident Apollo Spacecraft Project Office in Bethpage, Long Island, New York, home of Grumman Aircraft Engineering Corp., which has been negotiating with MSC for the LEM contract.

A Resident Apollo Spacecraft Project Office had previously been established at North American Aviation, Inc. at Downey, California, with George Lemke as resident manager.

Decker, 39, served as manager of Martin Company's Advance Design Engineering Department, and as technical director of the Gemini Launch vehicle program. Prior to this, he served as a Martin staff engineer for the Dyna-Soar launch vehicle program, and as chief of Engineering Systems Requirements for Titan I and Titan II missiles during the time the Titan II design was being established.

Decker did extensive aerodynamic, stability and control work in the development of the U. S. Navy's P4M, P5M, and the first multijet seaplane—the XP6M1.

In 1957, Decker became the Martin representative on the Aircraft Industries Association Airworthiness Requirements Commission and served in this capacity for two years. He was graduated from Rennselaer Polytechnic Institute in 1944 with a bechelor in aeronautical engineering (BAE).

Schirra Was Efficient Engineer As Well As Pilot Says Crew Ops.

"The results of the MA-8 orbital flight . . . further verify that man can function effectively in a spece invironment, in this instance for a period of up to nine hours," report Richard E. Day, assistant chief for training, and John J. Van Bockel, both of Flight Crew Operations Division, in "Pilot Performance."

"The pilot was able to position the spacecraft to a given altitude and to complete attitude maneuvers with a high degree of accuracy and a minimum amount of control-system fuel by using only visual references as seen through the spacecraft window.

"This flight provided additional evidence that man can perform primary control tasks and serve as an effective back-up to the automatic control modes provided.

"During the MA-8 mission, the pilot also demonstrated that he can efficiently perform the role of an engineering test pilot while orbiting in a space environment if the pilot devotes his primary attention to the management of spacecraft systems and the operational aspects of the mission."

Since MA-8 was primarily an "engineering flight," with particular emphasis on systems management and control-fuel conservation, several in-flight maneuvers and control tasks were programed in order to obtain more information on possible orientation problems in space and the ability of the pilot to perform attitude control tasks accurately with low fuel expenditure.

Schirra performed a turnaround maneuver smoothly using the fly-by-wire mode, low thrusters only, and in doing so consumed only about 10 percent of the total fuel typically needed by the automatic control system for the same maneuver.

A series of yaw maneuvers, using the window and the periscope independently as references for determining the proper altitude about the yaw axis, was accomplished on both the daylight and night sides.

Results indicated that for yaw misalignments of the order obtained during this flight, the spacecraft can be realigned during the day or during moonlit night conditions by using the window as the only visual reference. Schirra reported that yaw determination on the nightside was more difficult, since the he found the periscope to be ineffective and the field of view available through the window for the acquisition of star patterns was small.

"Drifting flight was not disturbing to the pilot, and results verify that this technique provides an excellent means of conserving fuel and electrical power," the report states. Schirra spent a total of almost two and a half hours in either drifting completely free or "limited drifting flight," in which the spacecraft attitudes were maintained within the limits of the horizon scanners with a minimum of control.

The gyros were realigned to earth reference through the window using fly-by-wire on two different occasions.

On four occasions during the flight, Schirra maneuvered from retroattitude to reentry-attitude in pitch using only about .2 pound of automatic fuel supply each time. As planned, he used the rate stabilization and control system mode for controlling the reentry phase of the flight, consuming, as was expected, large quantities of control system fuel.

The fuel reserve at retrofire was about 80 percent of initial levels for both the manual and automatic supplies, the report said, "which represented a total fuel consumption of only 12 pounds for almost nine hours of flight."

Congressmen Visit

(Continued from Page 1)

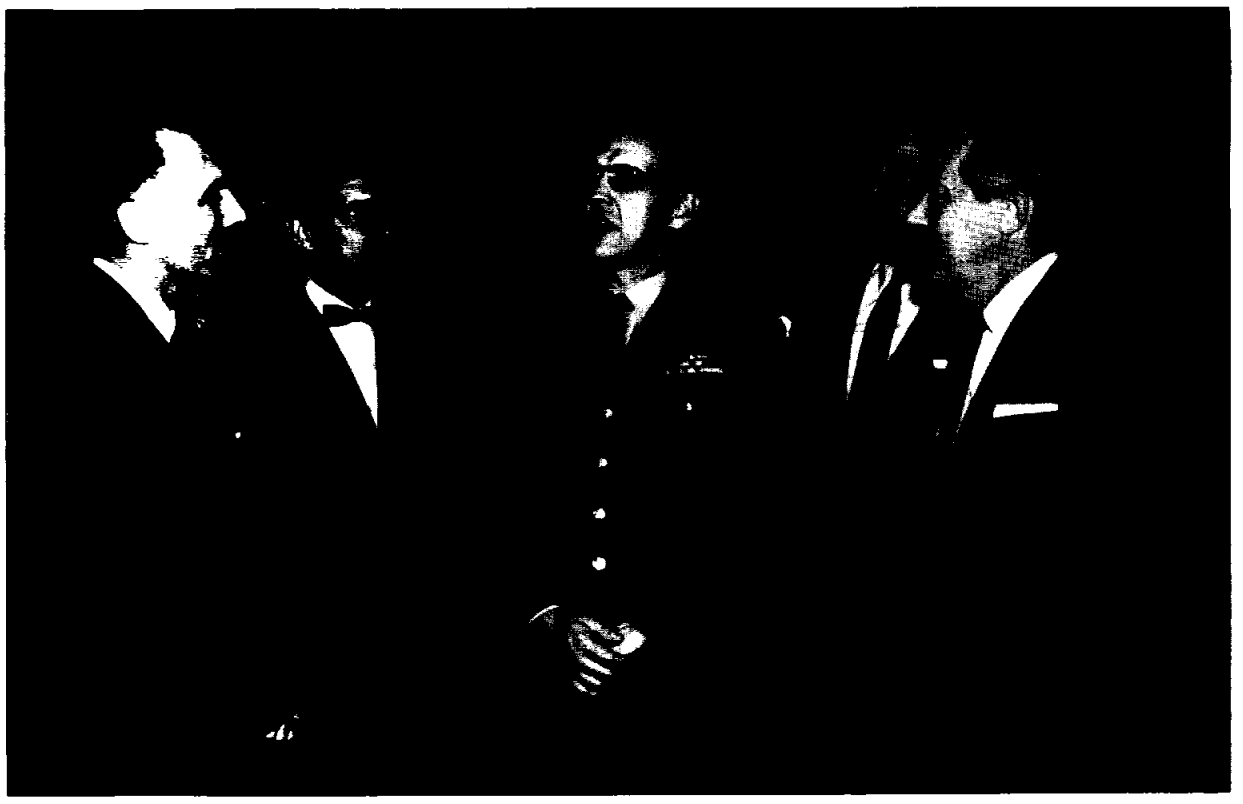
government and non-government industrial elements involved in high priority national space research efforts in order to better equip committee members to render knowledgeable judgments on budget and program proposals.

He indicated that the Committee on Space and Astronautics intended to scrutinize space research budget proposals very closely to assure that full dollar value is being received for each dollar invested and, at the same time, that we are investing sufficient funds to assure the accomplishment of national goals.

In opening comments, MSC Director Robert R. Gilruth told the Committee members he felt that good progress had been made during the past year. He forecasted that with the forthcoming flight of Astronaut Gordon Cooper on a day-long mission, the U. S. Manned Flight Program will have turned a pivotal corner and will be ready to move forward to much more ambitious and complicated flights.

Dr. Gilruth indicated that Project Gemini flights are programmed to begin in early 1964, with hopes that a two-man flight may be accomplished during the fiscal year for which funds are currently being sought.

During the afternoon, Committee members were given an escorted tour of construction now underway at the Manned Spacecraft Center's permanent home at Clear Lake. Ranking Republican member present, Rep. James G. Fulton, expressed satisfaction with the obvious progress that has been made in such a short time but indicated continued concern over the very high costs involved in the manned lunar landing program.



WHITE SANDS MISSILE RANGE facilities and plans for the Apollo test program to be held there were discussed recently in a conference at WSMR. Left to right are John Paup, division vice-president and Apollo program manager, North American Aviation; James L. Pearce, manager of Apollo test and operations for NAA; Col. John C. Bane, deputy chief of WSMR; Wesley Messing, manager of MSC facilities at WSMR; and John Proctor, NAA's White Sands Manager.

Design Contract For White Sands Facility Goes To Ralph Parsons

An architect engineering design contract for an Apollo engine test facility at White Sands, N. M. has been awarded to the Ralph M. Parsons company of Los Angeles, Calif. by North American Aviation's Space and Information Systems Division, located in Downey, Calif.

Construction is scheduled to begin this spring and to be completed early in 1964.

This facility, to be used to test the propulsion systems of the Apollo command and service modules, is to be a part of an 87-square-mile NASA test area located on the west side of the White Sands Missile Range near Las Cruces, New Mexico, under a use agreement with the Department of Defense.

The facility will include two

(Continued on Page 2)

Elgin Will Build Timekeeping Device For Apollo Module

The Elgin National Watch Company's Research and Development Division, Rolling Meadows, Ill., was selected by North American's Space and Information Systems Division to develop and build the unique timekeeping device for the Apollo command module. Amount of the contract is being negotiated.

The electronic timekeeper will be to moon-bound astronauts what the automatic clock radio and electric timer are to the contemporary housewife.

It will receive synchronization its from the onboard guidance and navigation computer. The computer solves a problem, then synchornizes the timekeeper to count cadence and send the signal to start or stop an operation.

With a required flight and ground check operating life of about 2,000 hours, the space-age timepiece will be called upon to keep the spacecraft television, telemetry, and onboard test equipment synchronized.

Gemini Chute Test Series Is Completed Successfully

The first series of tests on the Gemini back-up parachute recovery system have been successfully completed at El Centro, Calif., Gemini Project Office announced last week. "We achieved every aim we were after," said Ken F. Hecht of Gemini Project Office, "with only minor difficulties in early tests."

Hecht said the chute at first had a tendency to tuck under, hindering full inflation. Once this problem was solved "we had complete success."

The 'chute system is planned for early unmanned and manned flights pending completion of the Gemini paraglider system.

The 20-test series checked out the deployment characteristics of the system and the structural integrity of the individual chutes.

Phase II tests, scheduled to begin soon, will check out the Gemini boilerplate spacecraft harnessed to the chute at a 55-degree angle from the horizontal, the descent position of the spacecraft.

The 55-degree impact angle eliminates the need of the "impact bag" used on the Mercury spacecraft and lowers the shock of landing by impacting on the corner of the heat shield.

Test drops using "bombs" duplicating the spacecraft's weight were made from a USAF C-130 cargo transport from 10,000 to 15,000 feet altitude.

The first four tests used only the drogue chute to determine ascent rate. Two simple weight drops followed to check strength characteristics of the main chute, and the entire sequencing was studied beginning with the seventh drop.

After configuration was finalized, MSC personnel established "reefing times." "Reefing," or restricting the skirt from opening until it has slowed down to a safe speed, prevents excessive loading on the canopy. At a safe speed, "disreefing" releases the band and allows the canopy to blossom.

Loads in pounds per square foot (psf) were increased steadily from test drop 14, from opening design load of 120 psf to ultimate design load of 180

(Continued on Page 2)

Radiation, Inc. Gets $4 Million System Contract

Homer R. Denius, President of Radiation Incorporated, has announced the receipt from Collins Radio Company of a contract in excess of $4 million for pulse code modulation (PCM) telemetry systems and ground support equipment for the Apollo Manned Spacecraft.

The telemetry system to be supplied by Radiation is one of the primary communications links for spacecraft functions. The contract calls for twenty-eight development models, followed by production units not included in this contract. The unusual feature of the system is that it permits in-flight analysis and maintainability by the astonauts.

Space News ROUNDUP! NASA

SECOND FRONT PAGE

Ohio Firm Will Build Cape Crawler Vehicle

The Marion Power Shovel Company in Marion, Ohio will design and build a gigantic crawler-transport vehicle which is to: pick up a fully assembled Apollo lunar spacecraft mated to a three-stage Saturn V launch vehicle plus necessary launch equipment, weighing a total of 12 million pounds; haul the 400-foot high assembly a little over two miles, all the while keeping it within about one-tenth of a degree of true level; and deposit it gently on a Merritt Island, Florida, launch pad.

What's more, the crawler must be able to perform this feat in winds of at least 45 knots.

The crawler itself will weigh some 5.5 million pounds but it will be able to lift and carry more than twice its weight. The squat 130 foot long, 115 foot wide behemoth, only 20 feet tall, would cover the infield of a major league baseball diamond.

The crawler is one of the key elements of planning for NASA Launch Operation Center's Complex 39 from which manned lunar Apollo missions will be launched. Plans call for Apollo-Saturn V to be assembled in a 520 foot tall vertical assembly building and transported via crawler to a launch pad for fueling, final tuning up and boarding by astronaut.

Apollo-Saturn V, which must reach the velocity of some 24,000 miles an hour to achieve a lunar mission, will travel its first few miles to the pad at a velocity of not more than one mile an hour. Top speed of the crawler will be two miles an hour.

NASA plans to buy two crawlers to serve the three or more pads that will be built at Complex 39. The vehicles will cost between four and five million dollars each. The first should be undergoing test runs at the new NASA Merritt Island launch area by late 1964.

Each of its four crawler trucks, measuring about 24 by 40 feet, will feature a pair of steel link belts. There will be a total of 16 electric driving motors, two driving each of the eight link belts. The motors in turn will be powered by two 2800 horsepower diesel generators.

The crawler will shoulder its load at each corner on a unique system of four hydraulic cylinders grouped around a rigid 48 inch diameter guide tube. The leveling system is to maintain the chassis within one-tenth of one degree of level at all times even while climbing a five per cent grade.

It will be able to turn at the rate of ten degrees a minute and be operated from identical control cabs at either end by two men.

The company plans to build a major crawler component at its plant in Marion and transport it by rail to Merritt Island for final assembly.

Raytheon Gets Contract For Apollo Computor

MSC announced the award of a $15,029,420 contract to Raytheon Company's Space and Information Systems Division of Lexington, Mass., February 11 for an important phase of the Apollo lunar Mission.

Raytheon, under the contract terms, will provide industrial support to the Massachusetts Institute of Technology, which is developing the guidance and navigation systems for Apollo, in the design and development of the on-board digital computer for the lunar command module.

In addition, the electronics firm will be responsible for production of the computer and its associated ground support equipment.

The Apollo on-board computer will process data for the automatic operation of certain flight functions and present essential information to the crew for navigation and control of the command module during the lunar mission.

The associated ground support equipment to be produced by Raytheon under the contract will include the computer test set, computer simulator and computer calibration equipment.

Work will be performed at Raytheon's Sudbury, Mass. facilities.

Contract For Apollo Tape Recorder Goes To Leach Corporation

Lunar flight tape recorders that will enable Project Apollo astronauts to record vital research data will be developed by Leach Corporation of Compton, Calif.

Announcement of a contract for the production of extremely light weight units of great tape capacity and low power requirement was made by Robert L. Jannen, Leach Vice President.

The Leach contract consideration is approximately $2 million.

Jannen said the recorders will be used aboard the three-man Apollo command module which will orbit the moon.

(Continued on Page 7)