Space News ROUNDUP!

VOL. 3, NO. 17 MANNED SPACECRAFT CENTER, HOUSTON, TEXAS JUNE 10, 1964

Incentive Awards Program Implemented At MSC

The red, white, and blue wall-hanging containers located throughout Manned Spacecraft Center facilities hold an invitation to Center employees to join management in improving the efficiency and economy in local and Government-wide operations.

Suggestion forms and envelopes in these containers offer each employee an opportunity to participate in the Incentive Awards Program which was implemented by Dr. Robert R. Gilruth, MSC director, on May 6.

The program is designed to meet the needs of this Center, and a top-level committee, chaired by Paul E. Purser, special assistant to the director, has been appointed to promote the activities of the program and to act upon performance and suggestion award nominations.

In a special announcement, Dr. Gilruth followed President Lyndon B. Johnson's request to "challenge the ingenuity of the people in (the) workforce--and reward them for it." In his personal endorsement of the program, Dr. Gilruth said, "I whole-heartedly endorse this effort and consider the Incentive Awards Program an excellent system through which every employee can respond to the President's challenge."

All MSC employees are extremely busy because of the high volume of activity taking place in present programs and it may be difficult for some to generate suggestions which are beyond the expectations of their jobs.

However, those who are able to do so will receive the appreciation of Management and can receive a cash award.

The newly organized Incentive Awards Office of the Personnel Division is located in Bldg. 2, room 121. More information may be obtained by calling HU 3-3761 or by contacting H. Mervin Hughes, executive secretary of the Incentive Awards Committee.

INCENTIVE AWARDS COMMITTEE---The first meeting of the Manned Spacecraft Center Incentive Awards Committee was held May 26. Stuart H. Clarke (right center), special advisor for program implementation, shows the suggestion form package to be used in the Center program to Paul E. Purser, (left) chairman of the MSC Incentive Awards Committee.

Apollo BP-15 Shipped To Cape For SA-7

The Apollo boilerplate spacecraft BP-15 and related ground service equipment was shipped from North American Aviation, Downey, Calif., by air to Cape Kennedy this week for the SA-7 flight which is scheduled late this summer from Complex 37B.

BP-15 will be basically the same as BP-13 which was launched from Cape Kennedy atop a Saturn I on May 28.

On the SA-7 orbital test flight of BP-15, the reaction control system will be more fully instrumented and the escape tower will be jettisoned by using the launch escape and pitch control motors instead of the jettison rockets as on BP-13.

Other tests will remain the same and will include determining the launch and exit environment parameters; demonstrating the physical compatability of the Saturn I launch vehicle and the Apollo spacecraft under pre-flight and flight conditions and to further qualify the Saturn I launch vehicle.

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

Astronauts Windup Geology Field Trips With Exercise At Philmont Scout Ranch

Twenty astronauts from the Manned Spacecraft Center were at Philmont Boy Scout Ranch near Cimarron, N.M., last week for four days of geology training.

This field trip which consisted of mapping, studying geological formations of the area and seismic studies using geophysics instruments is the last in the current series.

Geologists here at MSC said this last trip was to serve as a final exam, with classroom study ending sometime this month.

Previous field trips have been with the astronauts going in two groups.

Center Work Hours Changed This Week

Working hours for Manned Spacecraft Center employees were changed beginning Monday morning, with the purpose to alleviate the existing and anticipated traffic problems.

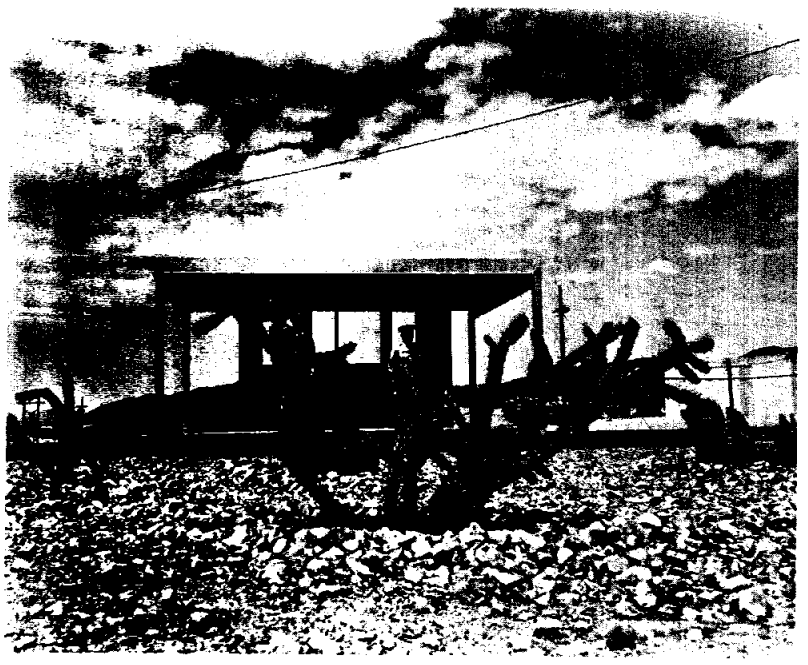
The working hours, staggered 30 minutes apart, are 8:30 to 5 p.m. with 30 minutes for lunch for employees working in Buildings 1, 2, 13 and 15 at the Center.

Employees working in all other buildings, whether or not they are located at the Clear Lake Site, are 8 a.m. to 4:30 p.m. with 30 minutes for lunch.

It is realized that problems will arise concerning car pools, but management feels that this schedule will prove more effective and convenient than those previously established.

IN THE BLOCKHOUSE instants after lift-off of SA-6 from Cape Kennedy on May 28.....tension is mirrored in the sea of anxious faces. (SEE STORY ON PAGE 8)

MSC-White Sands Operations Employees Move Into New Home



ENTRANCE to MSC–White Sands Operations in New Mexico.

A barren patch of desert at the southern end of the legendary Jornada del Muerto--the Journey of Death --is home, as of mid May, to personnel of Manned Spacecraft Center-White Sands Operations and two prime contractors for Project Apollo.

The south-central New Mexico badlands still are devoid of vegetation other than Yucca cactus and scrub brush, but a straight black ribbon of asphalt slices six miles into the desert from the nearest civilization. At the end of the road is the complex of static test stands and administrative facilities that is White Sands Operations.

Moving day in May brought some 80 Operations personnel from the White Sands Missile Range headquarters area to the 87 square mile NASA site across the San Andres Mountains. This 10-mile-long chunk of the missile range had been inhabited by pre-Columbian Indians whose artifacts still lay beneath the sand; it was marched across by Coronado's Conquistadors on their way to the ancient capital Santa Fe, and it was the scene of ranching and mining activity less than a century ago.

But only the construction of facilities to test the Apollo spacecraft power plants bear the mark of permanence.

The first building inside the entrance gate is the Administration Center into which most of the Operations people, including Manager Wes Messing and his staff, have just moved. They joined about 20 employees of the Propulsion Test Branch who already were located at the site in temporary accommodations. Several hundred North American Aviation, Inc. and Grumman Aircraft Engineering Corporation personnel also are located at the new Operations area.

An identical administration building of 32,400 square feet is under construction just north of the first. It is intended primarily to house Grumman and will be completed this fall. A cafeteria attached to the east end of the present Administration Center will serve the entire area.

Beyond this point, north of the maintenance-motor pool-fire station section, begins the test complex.

The first static test of the Apollo service module engine at White Sands Operations will start like all the rest, in the Preparation Building. This combined high-bay prep area and bench checkout workspace structure of steel and masonry is the largest building, in overall bulk, in the Propulsion Systems Development Facilities. A twin structure for preparation of the lunar excursion module is rising just south of the present building, and the two will form the most visible landmark at White Sands Operations.

Further north, past the winking warning lights that define the safety perimeter for static firing operations, are Test Stand One and Test Stand Two. Forming the bottom corner of a right triangle, with the test stands on each leg, is the blockhouse or Control Center. Its banks of computers are linked by miles of wiring to the two engine test stands.

Plumbing for the service module engine already is in place in the 33-feet-square Test Stand One. The first engine delivered to White Sands is in the Preparation Building and will be mated to the fuel system for the initial static test tentatively scheduled for July.

Halfway up the San Andres Mountains east of the test stands, a million-gallon storage tank will feed cooling water into the massive flame deflector buckets beneath the test stands. This supply also serves the fire

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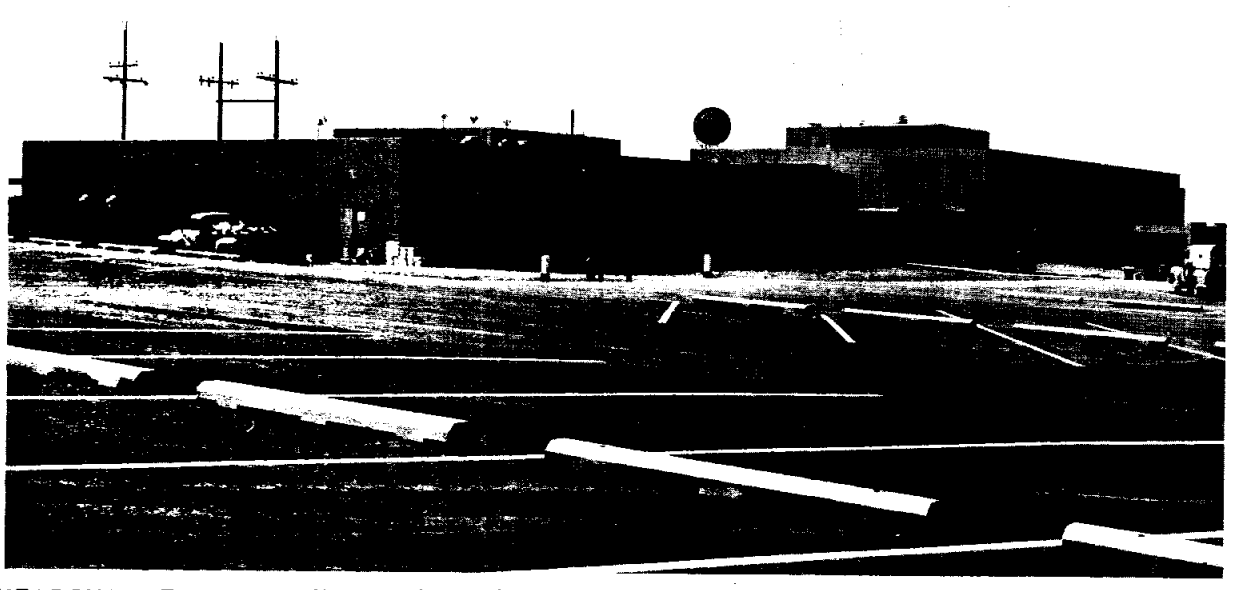
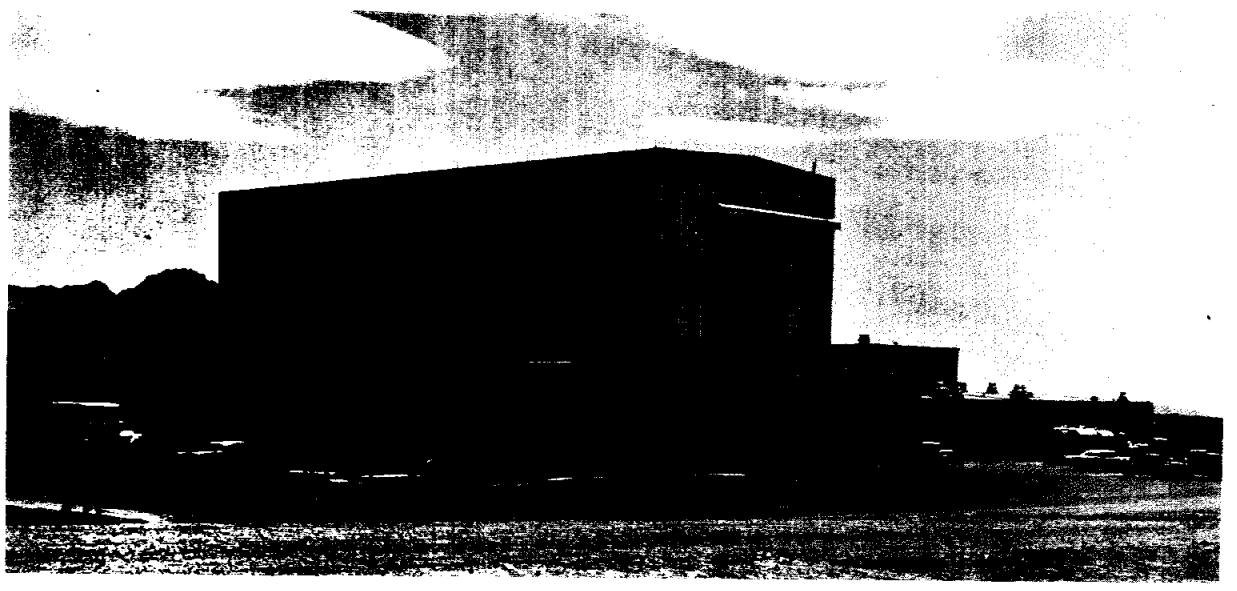
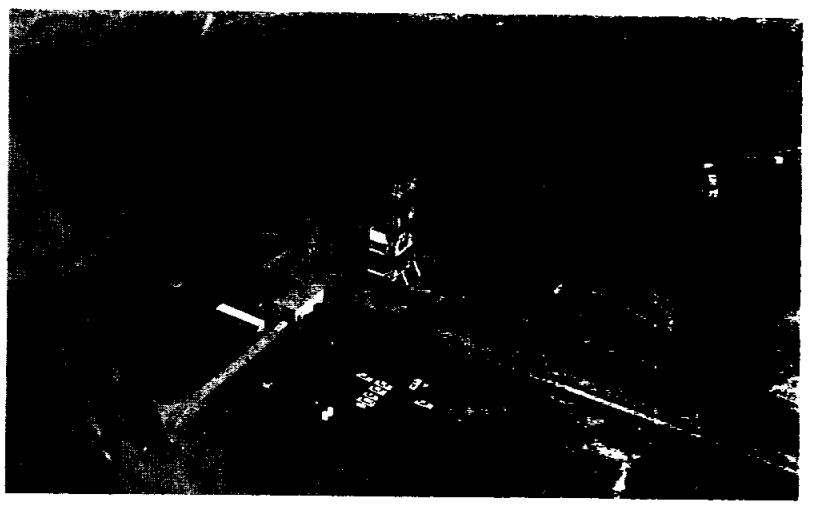


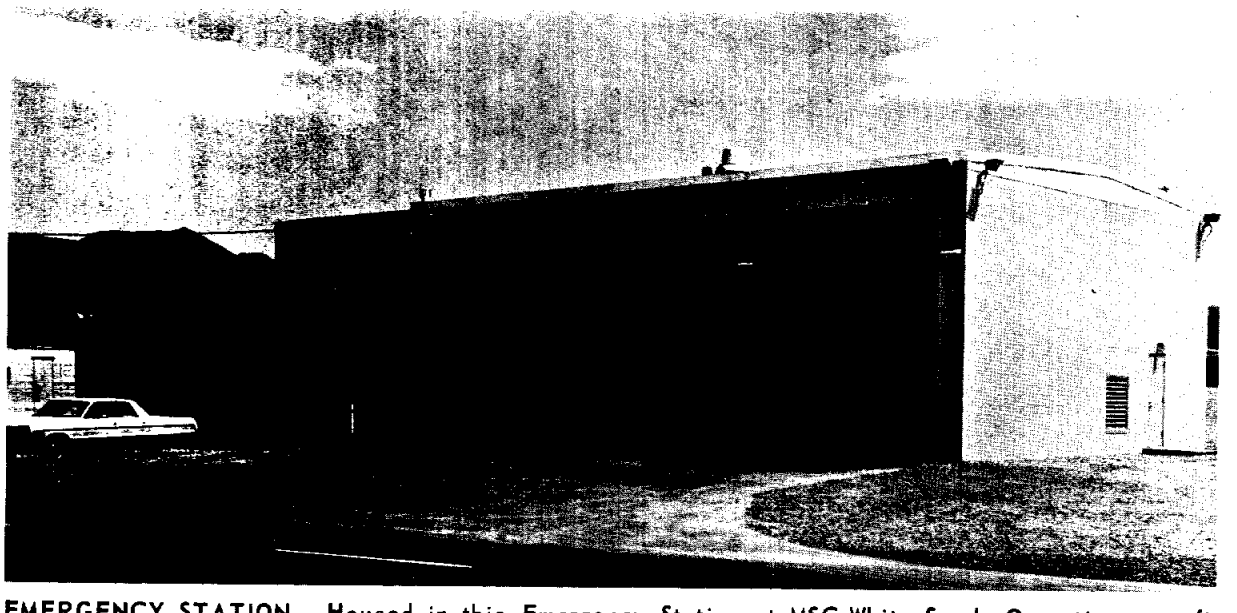
HEADQUARTERS--Overall view shows the Cafeteria on the left, and the Project Control Building on the right, at the MSC-White Sands Operations.



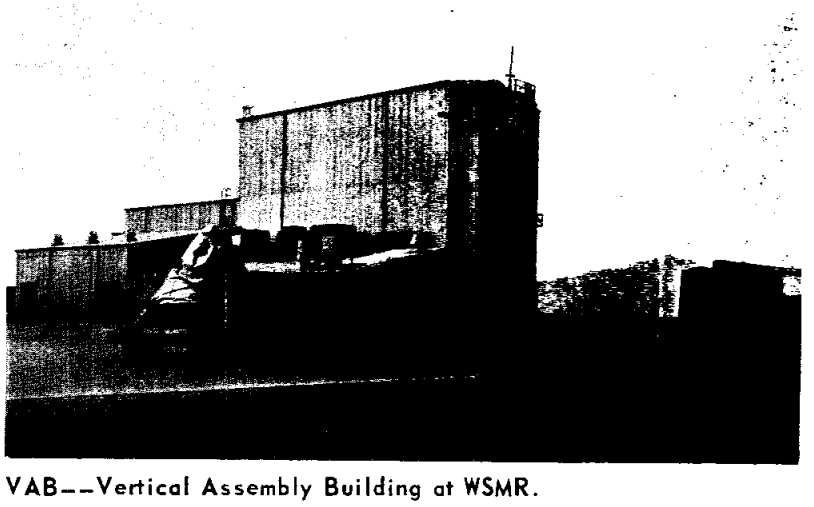
PREPARATION Building at the Propulsion Systems Development Facilities, White Sands Operations.



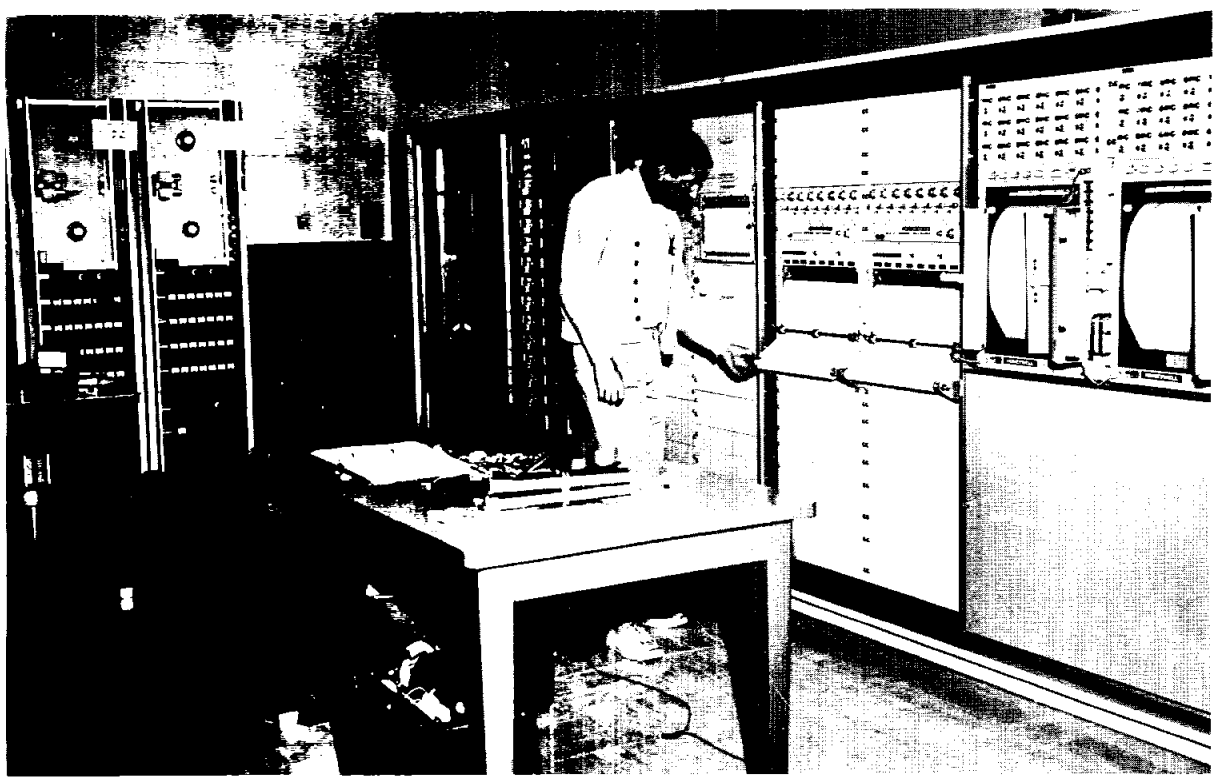
GANTRY at WSMR used in launchings of Little Joe II/Apollo tests.



EMERGENCY STATION--Housed in this Emergency Station at MSC-White Sands Operations are fire fighting equipment and first aid facilities.



VAB--Vertical Assembly Building at WSMR.



COMPUTER ROOM in the Control Center at the White Sands Operations test area.

(Continued from page 2)

control system mounted along the 45-feet height of the test stand.

In this land of sand and sagebrush, water is at a premium; the cooling and cleaning water used during each test will be routed down concrete-lined flumes into holding ponds, then to a decontamination pond where all residue of the toxic propellant is removed. Finally the water will be released into the desert to sink into the blotter-like sand, returning to the pumping level more than 400 feet beneath the desert floor.

Bridging the arroyos that scar the area are more miles of pipe that link the test stands with the propellant storage tanks situated west of the stands. The toxicity of the propellant used in the Apollo service module engine makes the storage area, and the test stands when they are propellant-loaded, off limits to personnel who have not been medically certified. Although the danger of contamination is no greater to personnel than at other test sites across the country, the isolation of the PSDF is ideal for stricter control over any potential incidents involving the fuel.

In yet another area, to the southwest of the service module stands, three more static test structures and a mission control center are rising. These are designed for tests of the lunar excursion module's ascent, descent and attitude control engines. Stands Three and Five will be capable of simulating a rarified atmosphere similar to that expected on the moon, while Stand Four will be an ambient--open to the local atmospheric pressure--stand.

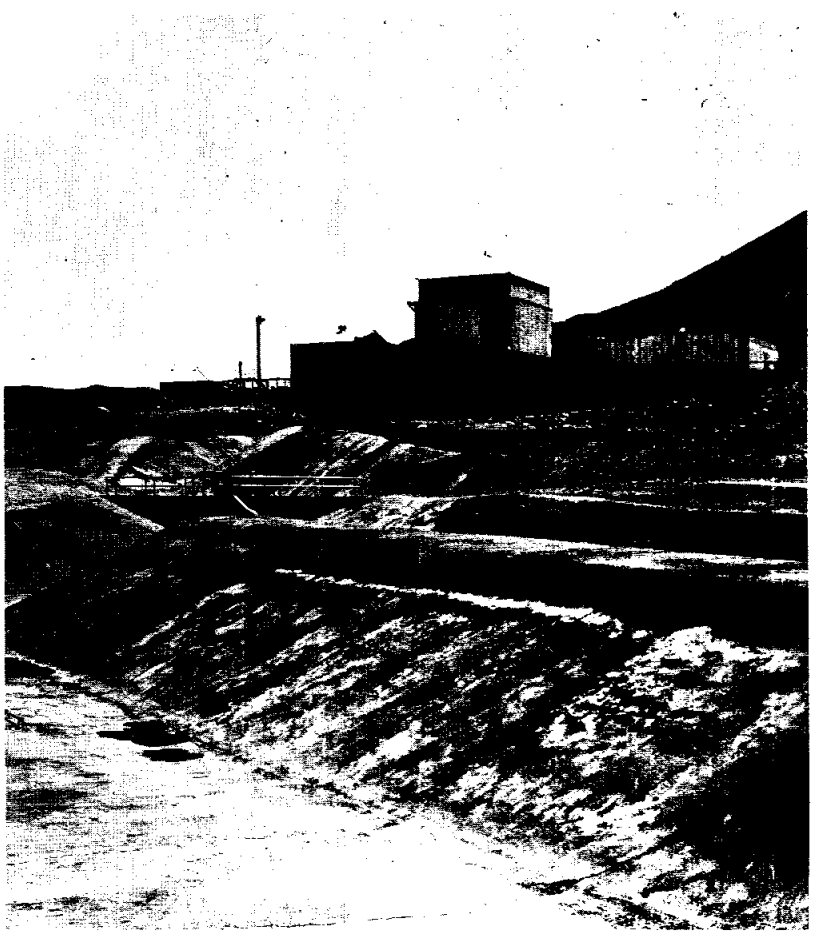
The total complex represents more than $20 million already committed. This is brick-and-mortar money and does not include the various data-gathering and analysis equipment.

In terms of personnel, the area is designed for about 1,000. This strength will be reached by mid-1965, about one fourth the total to be NASA employees, the rest half-and-half North American and Grumman. Also represented in the total in smaller numbers are the Zia Corporation, which will perform housekeeping functions for White Sands Operations, and other support contractors.

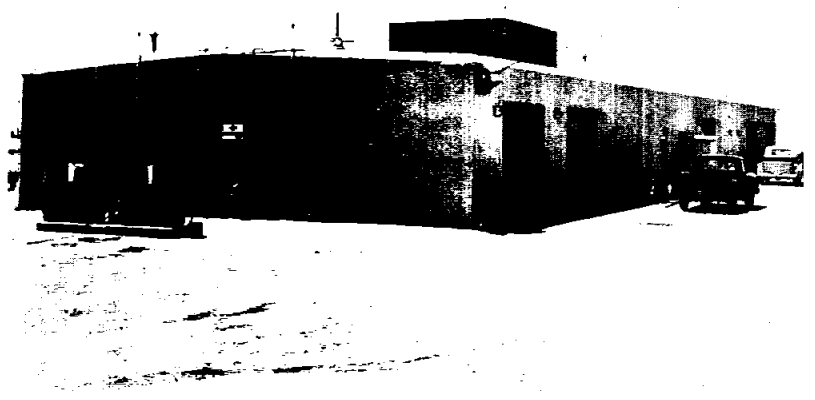
The May move centralized for the first time the entire White Sands Operation, although some 20 to 25 personnel of the Resident Apollo Spacecraft Program Office will remain at the White Sands Missile Range headquarters area near their Launch Complex 36 activity.

What do the old-timers think about the new activity in the desert? They love it. Las Cruces, already oriented to missilery through White Sands tests beginning in 1945 with the explosion of the first Atomic Bomb and the launching of captured German V-2 rockets, is home to most White Sands Operations people. The city's civic and service organizations have thrown their doors open to NASA speakers and films, and the local motels and restaurants display a friendliness that transcends the usual economic reasons.

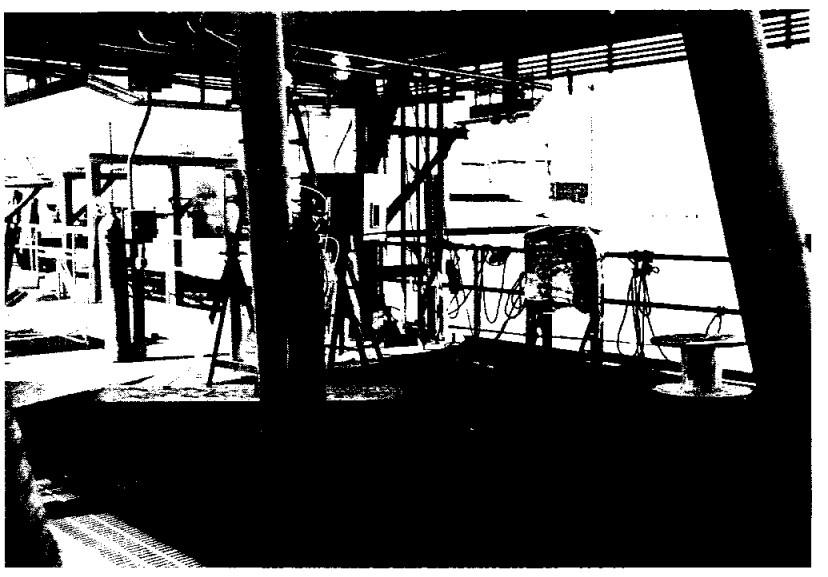
Only the coyotes and jackrabbits appear upset by the presence of the space program--and even they will eventually adapt to this newest invasion of civilization.



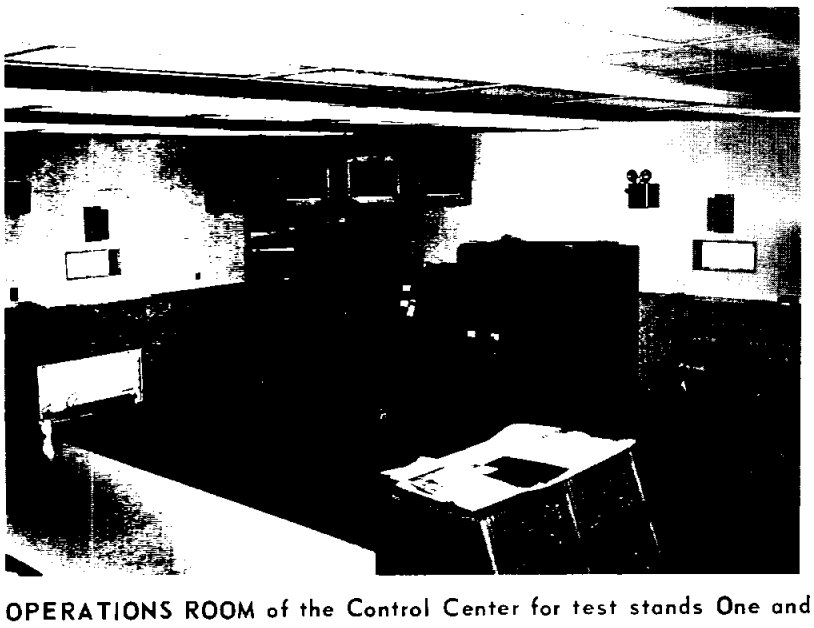
FLUME AREA to carry off cooling and cleaning water from the test stands. Test Stand Two is shown in the background.



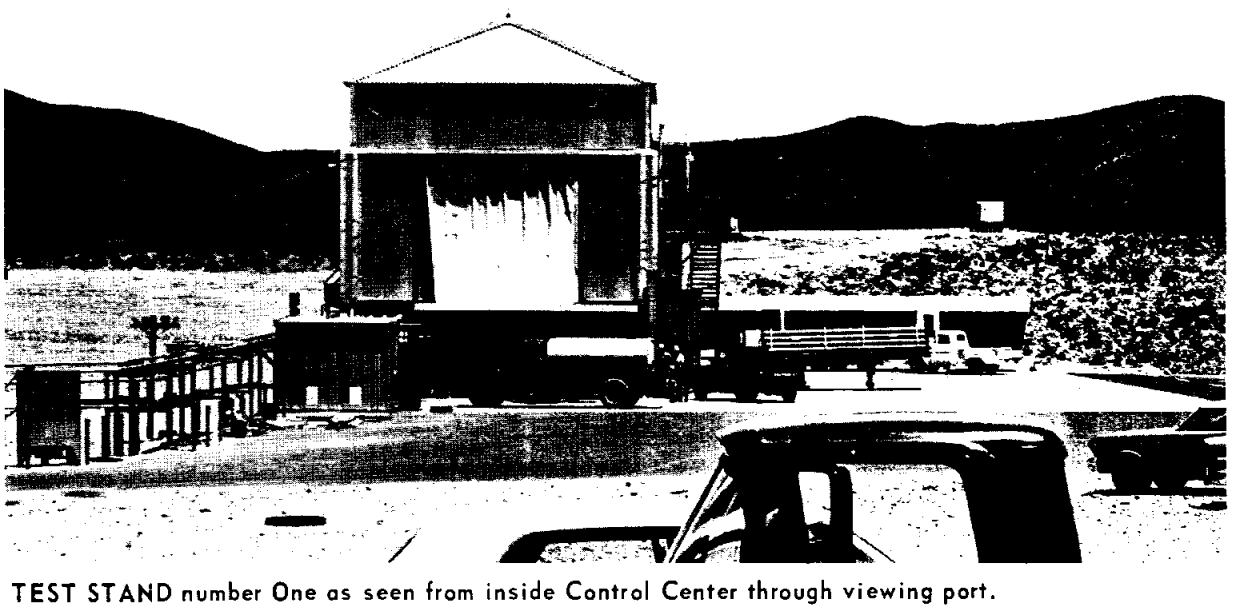
GARAGE and Maintenance Shops at MSC–White Sands Operations.



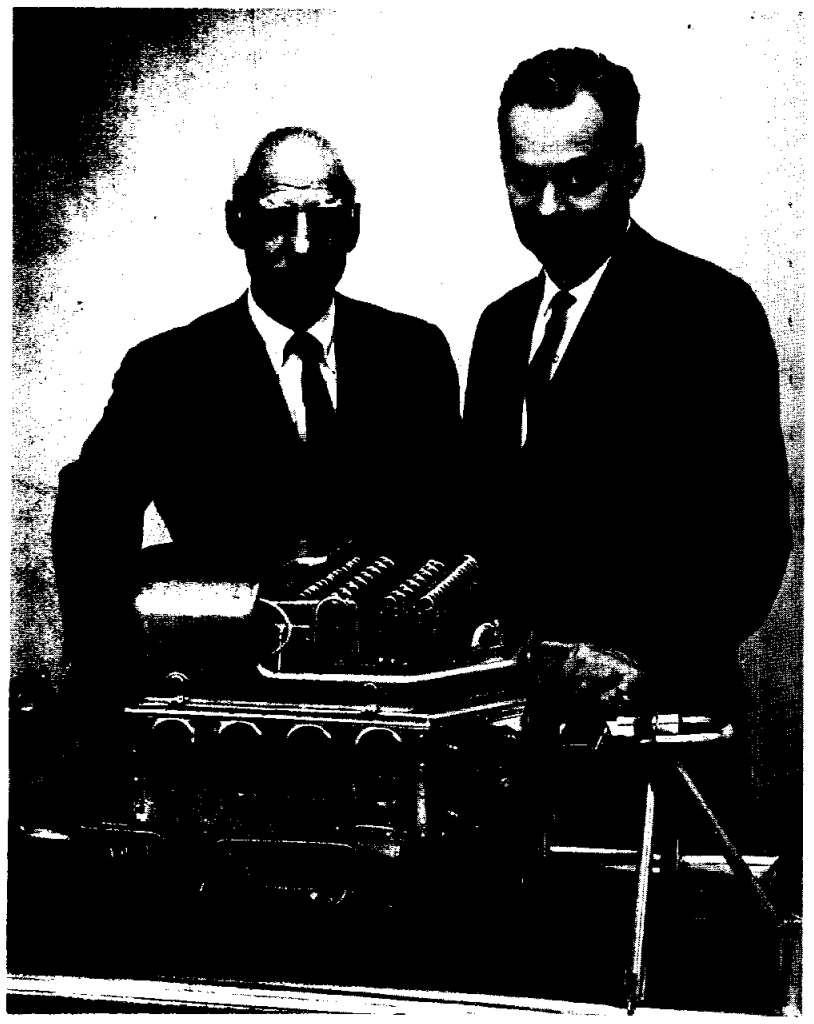
WORKING LEVEL on Test Stand One at the White Sands Operations Propulsion Systems Development Facilities.



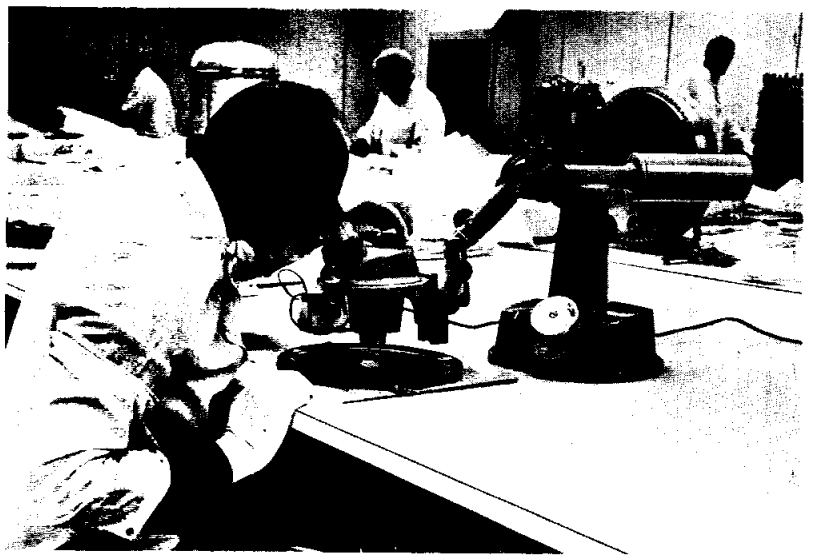
OPERATIONS ROOM of the Control Center for test stands One and and Two at White Sands Operations.



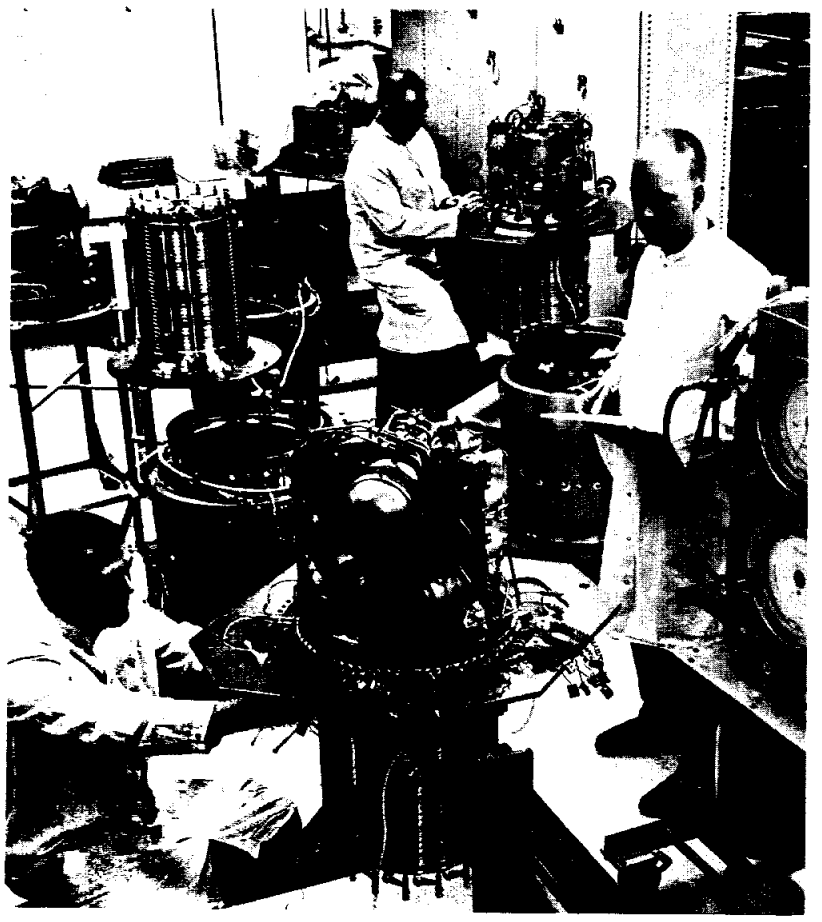
TEST STAND number One as seen from inside Control Center through viewing port.



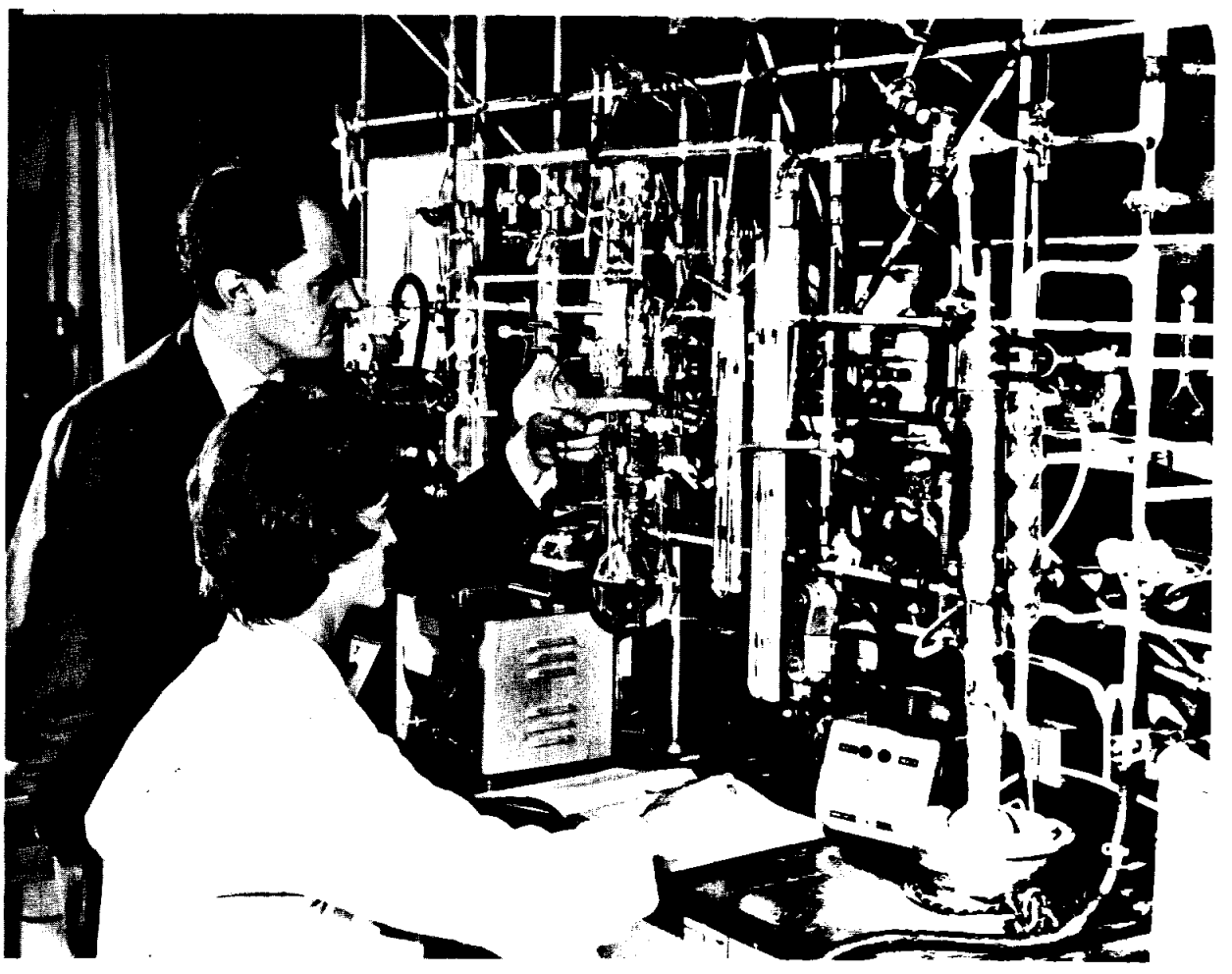
L. C. MALLET, (left) president of Pratt & Whitney Aircraft division and A. E. Smith, executive vice president, are photographed with engineering mockup of fuel cell powerplant for lunar excursion module.



ELECTRODE INSPECTION – In the "clean room" at one of Pratt & Whitney Aircraft's fuel cell facilities, the surface of an electrode undergoes inspection with a binocular microscope.



FUEL CELL POWERPLANTS being developed for the Apollo lunar mission are shown in various stages of assembly at one of Pratt & Whitney Aircraft's East Hartford, Conn., facilities.



APOLLO FUEL CELL programs at Pratt & Whitney Aircraft are supported by a large physical chemistry laboratory. Electrochemists and other scientists use equipment such as this for basic fuel cell research.

Apollo's Fuel Cells Being Develo

A new kind of power will provide on-board electricity for the astronauts on the Apollo lunar exploration mission.

This electricity will be produced directly from hydrogen and oxygen by a fuel cell powerplant designed and developed by Pratt & Whitney Aircraft division of United Aircraft Corporation.

The fuel cell system utilizes an electrochemical reaction which produces electrical energy without noise, vibration or fumes. The efficiency of these devices is greater than any other type of powerplant.

Potable, or drinkable, water is a by-product. It will be used to supply crew needs and to cool spacecraft components. The high efficiency, plus the water production, results in great weight savings over conventional electrical systems such as batteries.

Pratt & Whitney Aircraft is developing two fuel cell systems for NASA's lunar exploration program. One is being produced for the command and service modules under contract to North American Aviation's Space and Information Systems Division. The other will supply electrical needs for the lunar excursion module and is being developed for Grumman Aircraft Engineering Corporation.

While the first major use of fuel cell powerplants will be in the space program, the concept of the fuel cell dates back to 1801 when the English chemist Sir Humphrey Davy built a cell using zinc and oxygen and obtained electrical energy. Sir William Grove, another English investigator generally regarded as the father of the fuel cell, demonstrated in 1839 a chemical battery in which the water-forming reaction of hydrogen produced an electrical current. He used platinum catalyst-electrodes in his experiment.

A half-century later, German-born Ludwig Mond and Carl Langer, also in England, developed another device called a fuel cell. Technical limitations, plus the excitement stirred by the steam engine, discouraged the scientists from any extensive development of the cell at that time.

Following World War II, Francis T. Bacon of the University of Cambridge, who had begun his experiments in 1932, produced a hydrogen-oxygen fuel cell with enough power to operate a fork lift truck with a two-ton load, cut a chunk of mahogany with a circular saw, and operate a welding assembly.

Dr. H. H. Chambers, also of England, experimented with a fuel cell using low-cost petroleum base fuels instead of hydrogen, and air instead of pure oxygen.

After making an intensive study, Pratt & Whitney Aircraft felt the fuel cell had a good potential. In 1959 the division obtained the patent rights to Bacon-Chambers preliminary work, which appeared to be the most productive of post-war experiments.

Then it set its own extensive research, development and manufacturing facilities to work toward producing a practical fuel cell system with the reliability and efficiency to make it attractive for space applications.

To obtain such reliability for fuel cells involved the creation of an entirely new technology. But by the time the lunar mission was established as a national goal the division was prepared to undertake the task of developing specific fuel cell powerplants for the mission. Pratt & Whitney Aircraft had already assembled and tested a complete fuel cell system.

The division received the go-ahead from North American and NASA in March, 1962, to develop and produce fuel cell powerplants for the command and service modules. The initial design of the system was completed three months later.

In September, 1962, testing of the first experimental unit began. In September, 1963, the first test of one of the units in a simulated space environment was completed. Op-

EDITOR'S NOTE: This is the twenty-ninth 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 Department, Pratt & Whitney Aircraft.

Coming Employee Functions Discussed By EAA Board

Excerpts from the minutes of the EAA Executive Board meeting May 5, 1964.

Jim McBride is still working to coordinate bowling leagues for this fall.

Leroy Ruetz talked to Ragan Edmiston about handball. There's a quite enthused group of about 15 MSC persons interested in playing. They do, however, need a facility.

The tennis club still needs a subchairman to handle arrangements. They also need a place to play that is a little more convenient than Houston.

Softball is well on the way. There are 24 teams-about 8 of these are EAFB teams. EAFB is being very cooperative with their softball fields. They are working on them now, and they should be available for use soon.

The Folk Songs Club has some enthusiastic members, but would like more. Ken Cashion would like for those who are interested to contact him. The club has tapes and records for those who like to just listen. For those who like to join in the fun and play an instrument, please contact Ken and join in the fun.

The Scuba club is doing great. Lots of interest and action.

The Archery club is coming along in fine shape, but need some targets.

The Duplicate Bridge Club has moved to the NCO club. The meetings are held at 7:15 p. m. on fourth Tuesdays.

Jack Joerns says the flying club is well on the way.

All the other clubs are doing fine except the barbershop quartets (they need more members), and the Great Books club has disbanded until later in the year.

The skating party for the MSC teenagers was a great success. In fact, there were so many adults interested that Mary Sylvia was asked to look into a possible skating party for the adults in the near future.

In the Miss Transportation contest, Ann Spencer, ASTD, was runner-up for Miss Transportation and was chosen Miss Sea.

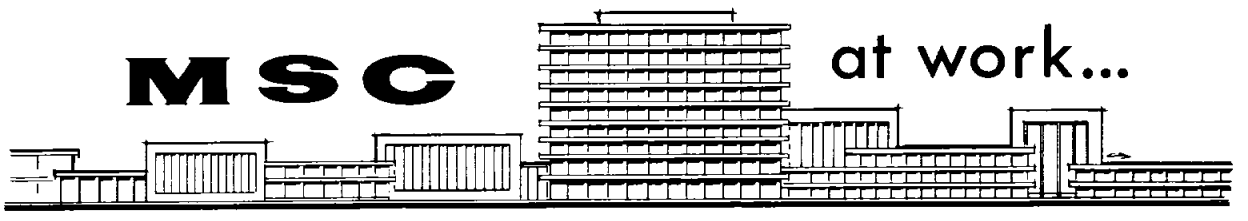
There has been discussion on a summer style show, but there are a lot of details to work out before this can be presented.

The fall MSC picnic was discussed and a tentative date set for September 12. There have been some tentative committee assignments.

Spotlight On Secretaries...

JUDY P. ERNULL, (lower left) secretary to Maj. Henry E. Clements, manager of the Mission Control Center Program Office, joined NASA and the Space Task Group at Langley AFB, Va. in 1960 as a secretary in the Operations Division. She was born in Albemarle, N. C., and was graduated from high school in that city. In 1960 she completed a Commercial Course at Woman's College, University of North Carolina in Greensboro. She is married to Robert E. Ernull of the Mission Planning and Analysis Division here at MSC and the couple resides in Houston. Judy includes in her outside interests water skiing, horseback riding and sewing. And she is one of those girls that met their husbands while working for NASA.

JEANNETTE LIGHT (lower right) is secretary to Col. T.A. Hargis, USAF/ATC resident representative and Lt. Col. F. E. Eckenroth, AFSC/STLO representative. She joined the Air Force Liaison Office in March of this year. Born in Texarkana, Tex., Jeannette attended Texarkana High School and Texarkana Junior College. Previous jobs include Secretary to the surgeon general of 8th Air Force, Carswell AFB, Tex.; secretary to commander SAC Wing, Tinker AFB, Okla.; and secretary to director of engineering, Hq. 15th Air Force, March AFB, Calif. She and her daughter Lida 19 who is a sophmore at the University of Houston, live in Houston. Jeannette includes in her interests; cooking, music, dancing, reading, golf, boating and homemaking.



JESSE WILDER, warehouseman with the Logistics Division, Storage and Distribution branch, selects the proper pipe fitting to fill a request.

WALLACE ROGERS, warehouseman of the Logistics Division, Storage and Distribution Branch, fills a request for supplies.

MSC Diving Club Elects Officers, Schedules Dive

On May 10, 1964, the MSC Diving Club held its first meeting and elected Wally Graves, president; Ralph Paine, vice president; Hugh Scott as diving officer; Loyce Holt, secretary; Roderick Bass, treasurer; Dick Holt and Luther Swift III, club advisors; and Jim Peacock, training officer.

The club held its first dive Memorial Day weekend at Possum Kingdom Lake, west of Fort Worth. A fine time was had by the ten club members who attended, in spite of the rainy weather.

Plans are now made to hold a beach dive June 13 and 14 at Corpus Christi.

Several club members have brought back from that area tales of clear, warm weather, sandy bottom, and large fish. Even ignoring the fish stories, the weekend promises to be one of fun and excitement.

All persons interested in joining the club, participating in the Corpus Christi dive, or receiving instruction in skin and scuba diving should attend the club's second meeting on June 10, 7:30 p. m., Building 323, Ellington, or contact one of the club officers.

MSC-EAFB Softball League Begins Play With 24 Teams

The MSC-EAFB Softball League began play on May 25 with 24 teams with eight slow pitch teams and 16 fast pitch teams.

The league is composed of eight Ellington AFB teams, one IBM team, and 15 MSC teams.

Ten games are scheduled for each team during the season with the championship play-off beginning the first week in August.

Games are played Monday, Tuesday and Wednesday of each week from 6:30 to 10 p. m. at two fields on Ellington AFB. MSC employees and families are invited to come out and watch their fellow workers play an exciting game of softball.

More information may be obtained on teams by calling Ragan Edmiston at Ext. 32191.

Pay Checks, Savings Bonds To Be Mailed To Employees

Effective with the pay period ending June 20, 1964, all pay checks and United States Savings Bonds will be mailed for each employee by the U.S. Treasury's Kansas City Regional Disbursing Office.

The first pay checks and bonds will be mailed from Kansas City, dated June 26, 1964, the day following receipt of the payroll data from this Center.

The employee may request his pay checks and bonds be mailed to his residence, bank, post office box, or any other place he desires.

Center Management decided to mail pay checks and bonds for several reasons. First, is that employees' pay checks and bonds will be placed in distribution six days earlier than they are delivered under the present system. Second, is the dollar savings to the Center.

A survey conducted by the Center indicates that a minimum annual savings of $20,000 will be realized by the Manned Spacecraft Center as the result of the direct mailing. Thus, the principle of efficiency and economy, as outlined in President Johnson's Cost Reduction Program, is being observed.

The question of mailing pay checks and bonds was presented to the employees in the form of a straw-vote some months ago. The result of this straw-vote was that a majority of employees favored the mailing program.

However, it was decided not to implement the proposal at that time due to the wide dispersal of employees at various sites in Houston and the fact that numerous residence and banking changes would be made as employees were transferred to the permanent location at Clear Lake. Since that time, most employees have been transferred to the permanent site, thus making the program more feasible.

It is most important for each employee to keep the Payroll Unit (AR 23) of the Resources Management Divison informed of any change of mailing address.

This will be accomplished by submitting mailing address for pay checks, MSC Form 239 (Rev. June 64) and/or Request for Change in Payroll Savings allotment (TD 2254 22663) (white copy).

Change of addresses received in the Payroll Unit by 10:00 a.m. of the Monday following the end of a pay period will be reflected on pay checks and bonds for that and subsequent pay periods.

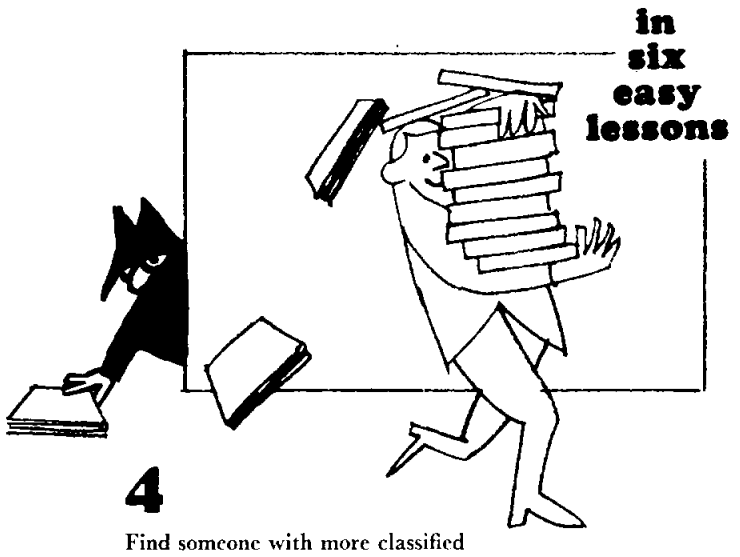
Singleton Club Plans House Party And Ranch Trip

A house party has been scheduled for 8:30 p.m., June 26 by the Singleton Club.

There will be music and dancing with dress to be casual. Tickets may be purchased in advance or at the door for one dollar per person. Location of the party will be announced later. For further information, call Wendell Mendell, Ext. 7695.

In the planning stage is a weekend trip for Singleton Club members to a ranch in Bandera, Tex., late in July. For information on this event, call Jim McBarron, Ext. 34351.

how to be a spy



Find someone with more classified material in his possession than he really needs. This is the pack rat type. He has only a general idea of what he has, so if some of it disappears. . .

—Reprinted Courtesy General Dynamics News

SAFEGUARD CLASSIFIED MATERIAL!

MSC MEN'S LEAGUE CHAMPS---In a roll-off between the first half winner, Tecnics, and the second half winner, Lunar Lights, of the MSC Men's League, the Tecnics came out on top as league champions. They are (l. to r.) Leon Galler, Fred Rowell, Westley Brenton, Jimmy Warren, Gail Blalock and Bill Whipkey.

MSC Photo Club To Hold Color Slide Competition June 18

The next meeting of the MSC Photographic Club will feature a club competition and discussion on color slides.

Members and others interested in joining the club are requested to bring four of their better color slides for the competition.

A 45-minute slide program will also be on the program with the showing of "Our Colorful Capital", a series of 150 slides with recorded commentary.

The meeting will be held in Bldg. 2, room 657, at 7:30 p.m., June 18. All interested in photography are invited to attend. For additional information, contact the club coordinator, Robert L. Jones at Ext. 7695.

EAA Boat Trip On Sam Houston Set For June 20

The EAA sponsored boat trip on the Sam Houston will depart from the pier near the Turning Basin on the Houston Ship Channel at 2 p.m. on June 20 with a maximum load capacity of 100 persons.

Reservations are necessary for the trip and may be made by calling Flossie Leggett at 32438. She will also be at the pier to check your name off as you board the boat.

There is no charge for the trip and all taking the trip are asked to bring a sack lunch, if they desire food, and also wear clothing which will protect from the sun if they do not have a good suntan.

Directions to the pier are shown by the map on this page.

MSC BOWLING ROUNDUP

MSC COUPLES LEAGUE

Final Standings
Second Half

Team	Won	Lost
Ridgerunners	49	23
Lame Ducks	44	28
Four Aces	38	34
Spare-O's	36	36
Hackers	35½	36½
Schplitz	35	37
Bowlernauts	32½	39½
Goofballs	31	41
Shucks	31	41
Piddlers	28	44

High Average: woman, Carolyn Clyatt 144; man, Hal Bishop 162.

High Scratch Game: woman, Carolyn Clyatt 215; man, Hoyt Maples 245.

High Scratch Series: woman, Carolyn Clyatt 515; man, Hubert Brasseaux 564.

Most Improved Bowler: woman, Shirley Brasseaux from 121 to 130 average; man, Hoyt Maples from 143 to 153 average.

MSC MEN'S LEAGUE

Final Standings
Second Half

Team	Won	Lost
Lunar Lights	48	24
Turkeys	42	30
Whirlwinds	42	30
Tecnics	38	34
Spastics	38	34
Fizzlers	36	36
Pseudonauts	36	36
Overshoots	33	39
Asteroids	26	46
Cosmonuts	21	51

High Average: Jack Keggins 175.

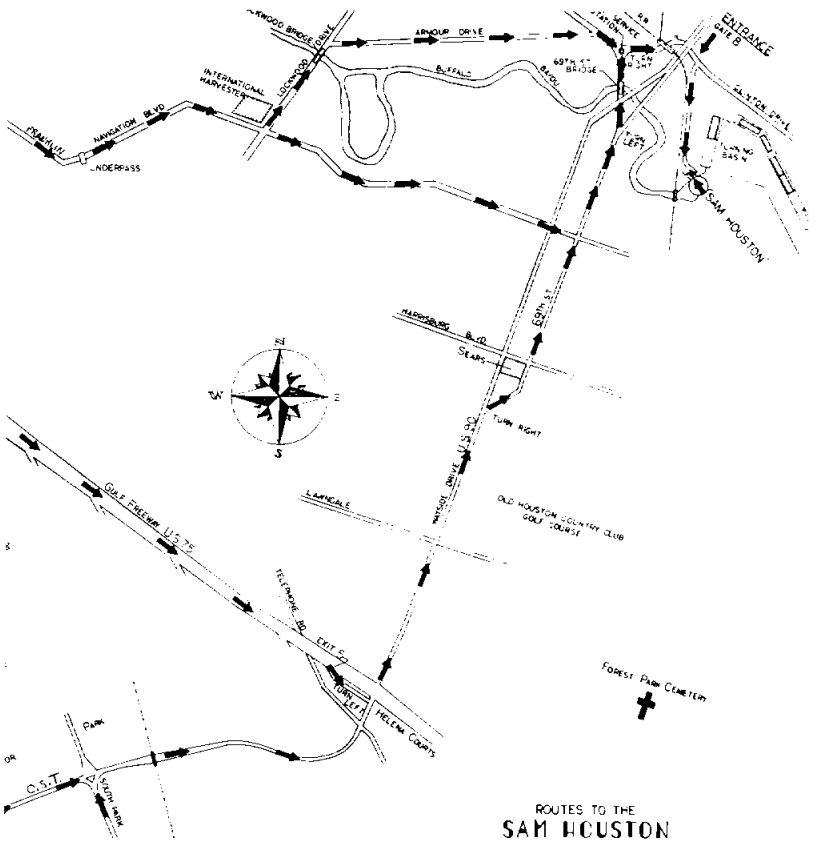
High Scratch Series: Jack Keggins 650.

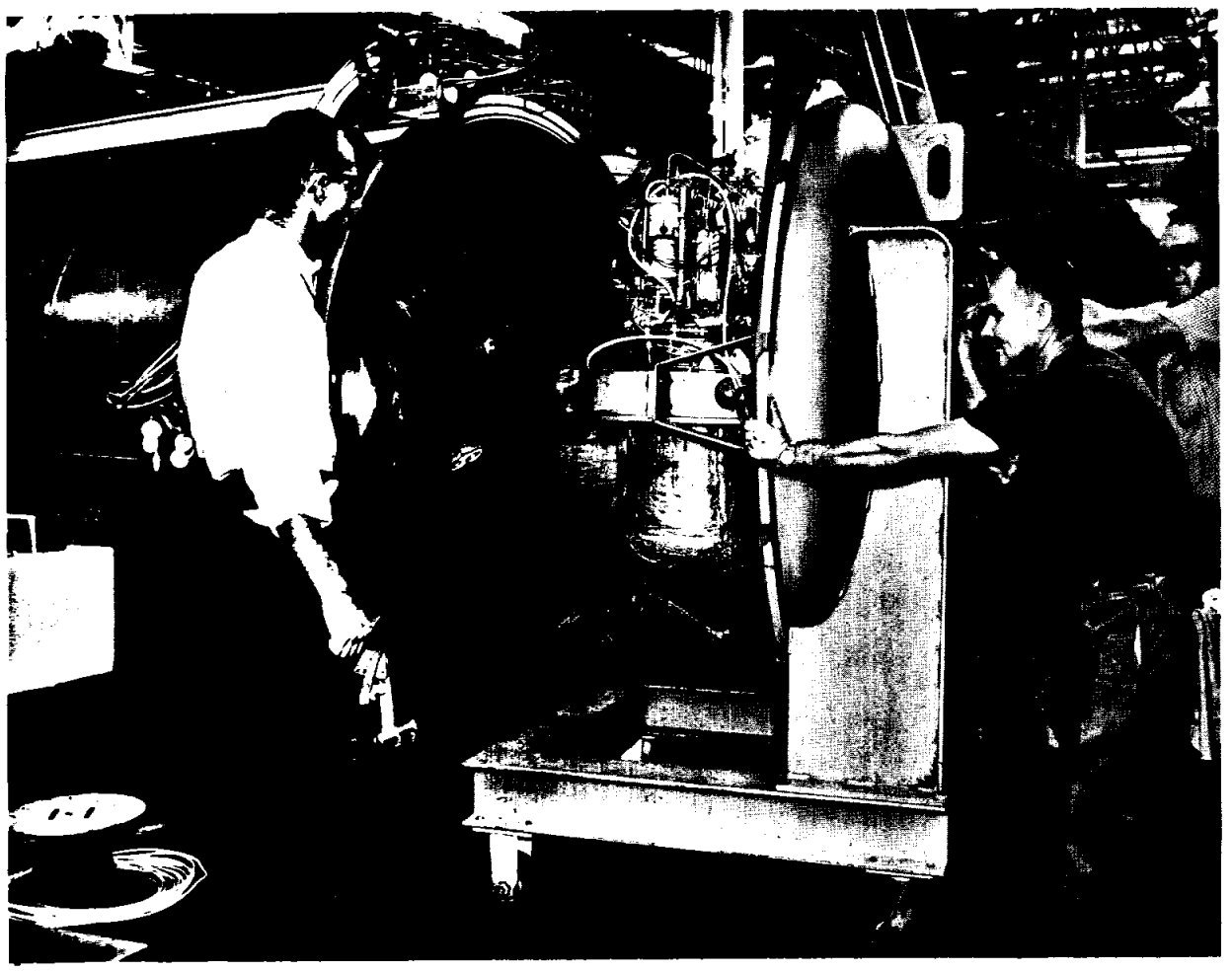
High Scratch Game: Joe Garino 266.

High Team Game: Tecnics 965.

High Team Series: Fizzlers 2673.

Most Improved Bowler: Nick Jevas from 155 to 168 average.





VACUUM TESTING – A fuel cell powerplant for the Command and Service modules is being placed in a vacuum chamber for testing under space conditions.

...oped By Pratt & Whitney Aircraft

eration of the unit was satisfactory.

Less than two months later, a powerplant was successfully operated while being subjected to vibration levels greater than those expected during launch of the Saturn V rocket.

Delivery to North American of the first flight-weight prototype fuel cell powerplants began in December, 1963.

Early in 1964, Pratt & Whitney Aircraft conducted an endurance run exceeding 400 hours with one of the powerplants. It produced electrical power well beyond the normal total energy demand foreseen for any one unit used on the lunar mission.

In September, 1963, the division received a contract from Grumman to develop a fuel cell system for the lunar excursion module. Initial design of the system has been completed, component testing is under way, and the first experimental LEM fuel cell powerplant is now being assembled.

In addition to the space program, Pratt & Whitney has an extensive company-financed program aimed at developing fuel cell powerplants which will utilize commercially practical fuels such as hydrocarbons and will use air as the oxidizer. The division believes that fuel cells have an extensive future for industrial applications

Some of the applications foreseen for fuel cells in the future include land vehicles such as taxis, buses, and delivery trucks. Such vehicles, electrically driven by fuel cells, would operate quietly and without exhaust fumes.

Also envisioned for the future are submarines powered by fuel cells and stationary and portable electrical generating units. Fuel cells of the future can be used for almost any purpose where a highly-efficient electrical power source is needed.

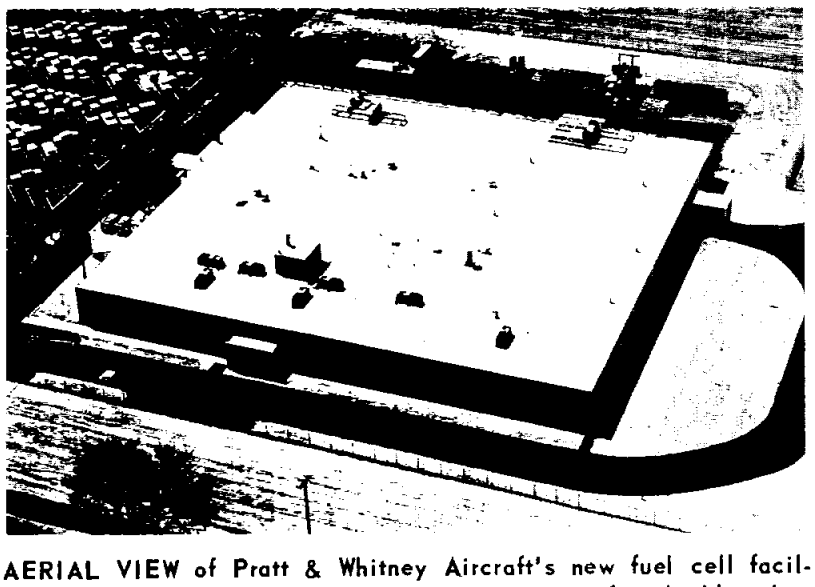
The space program has given impetus and developmental boost to many innovations. Fuel cells certainly will rank among those which ultimately will be most useful to mankind.

Because of Pratt & Whitney Aircraft's interest in efficient and reliable powerplants, the development of fuel cells was a natural step. The company was founded in 1925 and its first engine was the 400 horsepower air-cooled Wasp, a revolutionary engine in that day. For many years, the division has been a world leader in design and manufacture of aircraft engines.

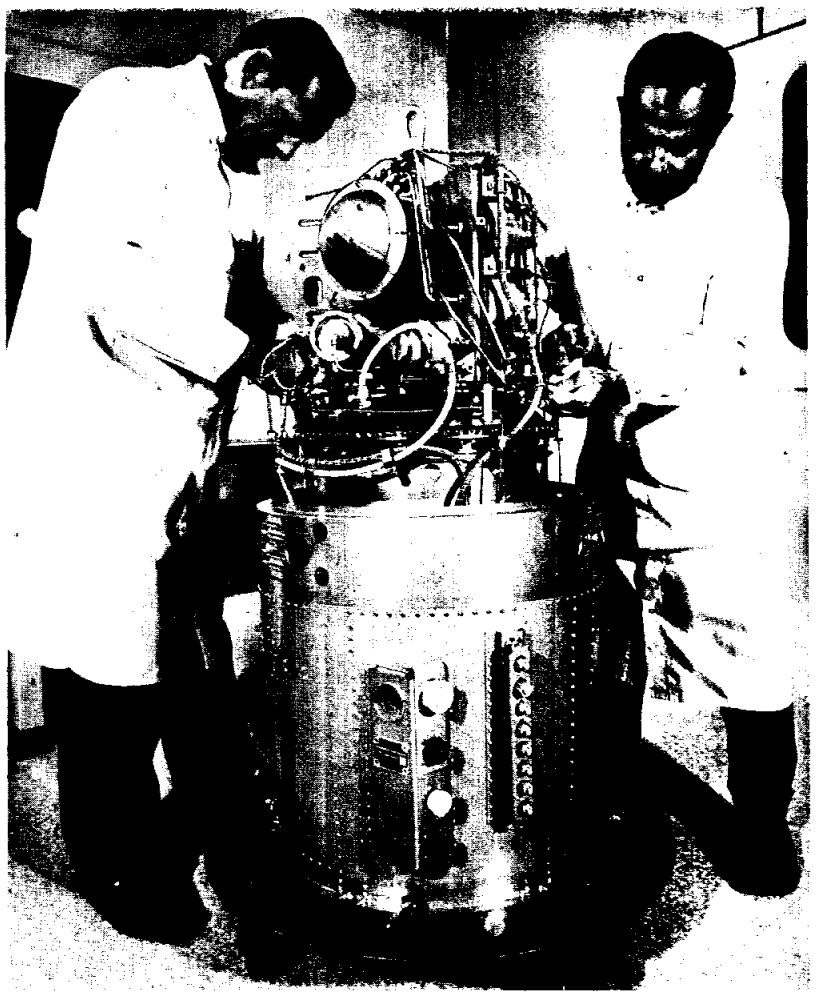
The division designed and developed the J58 engine used by the YF-12A (formerly known as the A-11) experimental interceptor which flies at speeds in excess of 2,000 miles per hour and is also developing the TF30 engine for the F-111 (TFX) fighter-bomber.

Pratt & Whitney Aircraft developed the world's first liquid hydrogen rocket engine, the RL-10, which is sponsored by NASA and has been successfully flown in Centaur and the S-IV stage of Saturn I.

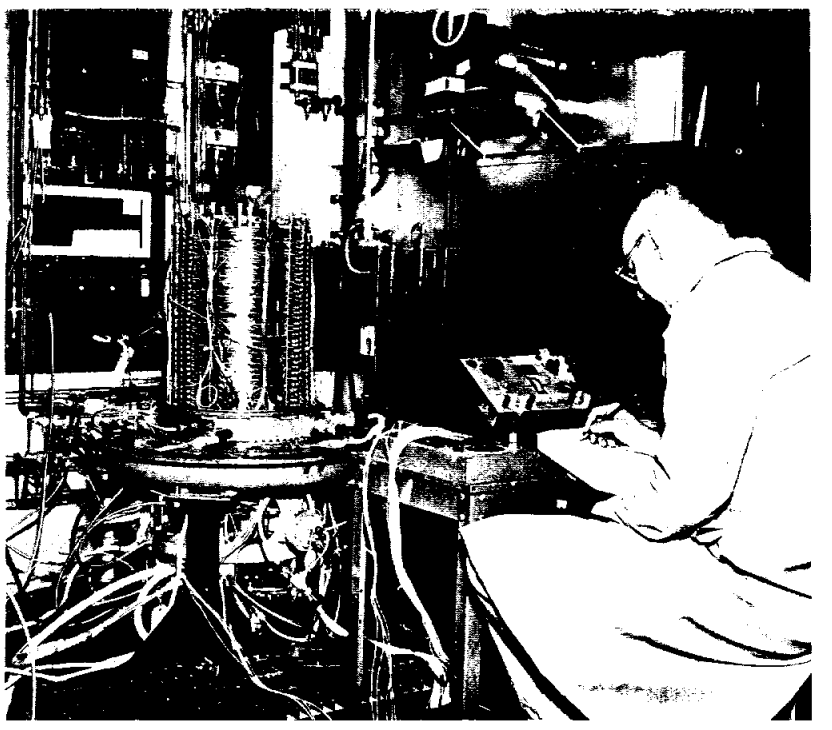
In other space activity, the division is developing SNAP-50/SPUR, a lightweight nuclear reactor which will provide electrical power for future space ships with long duration missions.



AERIAL VIEW of Pratt & Whitney Aircraft's new fuel cell facility in South Windsor, Conn. This 60,000 square-foot building has just been occupied by the division. Fuel cell work is also done in two locations in East Hartford. Altogether, P & WA has about three acres of floor space for fuel cell development and manufacture.



TECHNICIANS at Pratt and Whitney complete assembly of prototype fuel cell powerplant for command and service modules. Three of these will be located in service module to provide electricity and drinking water for the command module.



FUEL CELL SECTION TEST – A complete power section of a fuel cell powerplant is undergoing test operation.

LOOKING AT REPORTS on Apollo fuel cell powerplant development, are (left to right): Donald H. Brendal, program manager, Apollo (command and service modules) fuel cell systems; H. Clay Osborn, program manager, LEM fuel cell system; and J. Stuart Conley, program manager, space fuel cell systems.

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

Director ..... Robert R. Gilruth
Public Affairs Officer ..... Paul Haney
Chief, News Bureau ..... Ben Gillespie
Editor ..... Milton E. Reim

Center Beautification Progresses

The Manned Spacecraft Center is beginning to shape-up as far as landscaping of the areas surrounding the completed buildings is concerned. The grass, shrubbery, and trees are showing signs of growing and becoming a part of the Center.

In addition to beautifying the Center, landscaping serves another purpose..... it is better than having dust blow in your eyes, or having a sea of mud during rainy periods. And actually the cost of providing all this is very moderate in terms of the total cost of the Center.

The average residence requires as much as five per cent or more of the total construction cost for landscaping, while the Manned Spacecraft Center's landscaping bill is only one-third of one per cent of the Center's construction cost through 1964.

This is not to say that the cost is trivial, but the Center planners did want to provide pleasant surroundings for the employees and they have.

Visitors to the Center have been favorably impressed with the beauty of the setting for the buildings provided by the landscaping efforts thus far completed here at MSC.

Additional Parking Being Provided

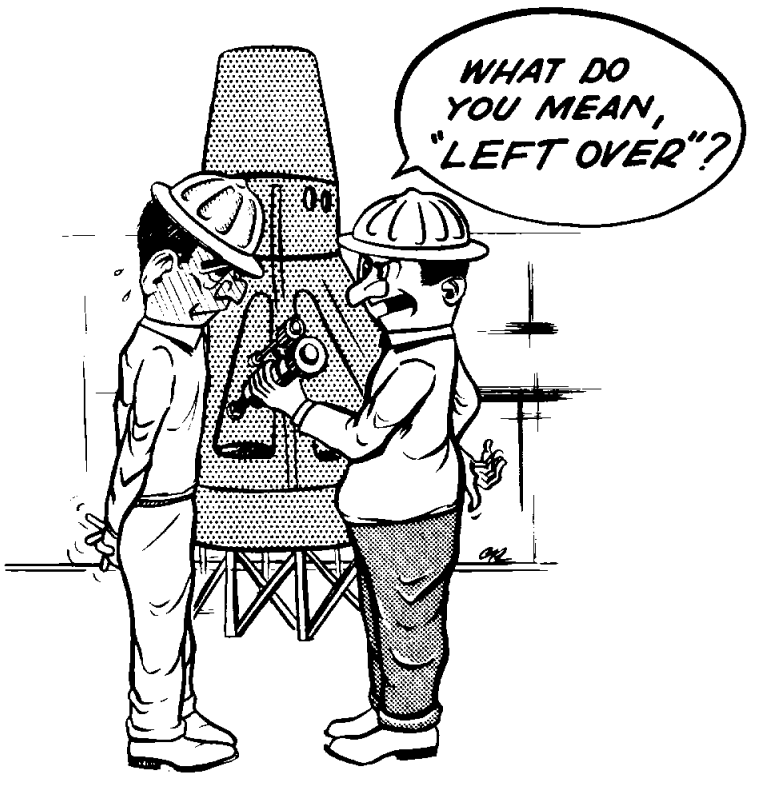
In some areas of the Manned Spacecraft Center there is a noticeable shortage of parking space but action to alleviate this situation is being implemented.

Five temporary parking lots are being provided around the center. There locations are: east of the Flight Acceleration Facility (Bldg. 29); north of Bldg. 10; south of the sub station on Avenue B; west of Bldg. 12 on the west side of Second Street; and opposite the Bell Telephone building on the west side of Second Street.

Certain parking lots as well as a second cafeteria were eliminated from the 1964 budget.

No immediate solution to solve all the parking problems is possible at this time, but additional parking lots that were in the original plans for the Center are being proposed by Center management for inclusion in the next budget's construction monies.

On The Lighter Side



WELCOME ABOARD

A total of 91 new employees joined the Manned Spacecraft Center during the past two weeks.

AUDIT OFFICE: Armando G. Sepulveda.

PUBLIC AFFAIRS OFFICE: Louis M. Kidd, and Zell Skillern.

CENTER MEDICAL OFFICE: Phyllis A. Norstrom.

PERSONNEL DIVISION: Elizabeth E. Foster, Jeanne M. Hulo, Carolyn K. Slavik, Teresa M. Stinson, Ana M. Valadez, and Barbara J. Walston.

PROCUREMENT AND CONTRACTS DIVISION: Mack D. Cantrell, Stephen J. Geng, Janice C. Hays, Merle S. Hess, and Thomas E. McHugh.

RESOURCES MANAGEMENT DIVISION: Donna K. Robbins, Dailey E. Rowe, and Nina S. Gunter.

WHITE SANDS MISSILE RANGE (White Sands, N. M.): Robert E. Covington, and Harold E. White.

ENGINEERING DIVISION: Richard T. Hall.

TECHNICAL SERVICES DIVISION: Leon F. Atkins, Eugene C. Faires, Elwood C. Hicks, Harold D. Siegfried, Leo Silveri, Paul A. Turgeon, and N. A. Virden.

PLANS AND PROGRAMS OFFICE: Sharon A. Swain.

OFFICE SERVICES DIVISION: Walter E. Duke, Kenneth W. McCaghren, Edward R. Rhem, Tommy J. Taylor, and Chales T. Townsend.

LOGISTICS DIVISION: Joan C. Gansky, and Albert Jackson.

TECHNICAL INFORMATION DIVISION: Albert R. Smith, and Dorothy C. Whitley.

GEMINI PROGRAM OFFICE: Ernest E. Kennedy, Olav Smistad, Jo Jane Sparkman, and Judy G. Wheeler.

APOLLO SPACECRAFT PROGRAM OFFICE: Louis J. Lewandowski (Milwaukee, Wisc.), James W. Rayl, Lyle D. White, Lorene S. Fairbank, Agnes Y. Frye, Dorothy C. Hagler, and Shirley P. Hale.

ADVANCED SPACECRAFT TECHNOLOGY DIVISION: Gil Chisholm Jr., Alden C. Mackey, and Brian J. O'Brein.

GUIDANCE AND CONTROL DIVISION: Robert D. Vaughn, Virgil L. Vice, Frank M. Elam, and Edward H. Simon Jr.

INSTRUMENTATION AND ELECTRONIC SYSTEMS DIVISION: Mary A. Brovey, and Catherine S. Watkins.

COMPUTATION AND ANALYSIS DIVISION: David E. Harris Jr.

PROPULSION AND POWER DIVISION: Archie R. Beckett, George P. Demchok, Bobby R. Lowrance, John C. Stowers, Noel E. Woodwell (all to WSMR), J. C. Gillis, and Phyllis L. Hutson.

MSC-FLORIDA OPERATIONS (Cape Kennedy, Fla.): Jimmy D. Allison, John D. Beeson, Albert B. Cannon, Sylvester A. DeMars, Roger B. Caskins, Frank M. Harsche, Katherine B. MacLean, Patsy W. Moore, Ralph B. Powell, Rebecca L. Purvis, James M. Ragusa, Leonard W. Scholl, Joseph B. Smith, and Myrtice P. White.

FLIGHT CREW SUPPORT DIVISION: Louis E. Hackney, and James H. Hoskins.

FLIGHT CONTROL DIVISION: Elena M. Cardenas, Angeline S. Duke, Merril A. Lowe, and James E. Saultz Sr.

RECOVERY OPERATIONS DIVISION: Hardie R. Barr, and Anna K. Cornish.

MISSION PLANNING AND ANALYSIS DIVISION: George H. Calohan, Michael A. Collins Jr., and Paul T. Pixley.

MSC PERSONALITY

X-15 Pilots And Astronauts Trained By Richard E. Day

With a background of training pilots for the X-15 flights into the lower regions of space over southern California, the next natural step for Richard E. Day was to train astronauts who will one day travel to the moon and beyond.

Day is the assistant chief for Spacecraft Training, Flight Crew Support Division and conducts the astronaut training program in the engineering and operational areas of the program.

His job includes specifying and providing training equipment as well as scheduling various training programs. Most of the training is in the systems areas.

Each astronaut is given engineering assignments and Day coordinates these with simulations performed on various trainers.

Day joined NASA (then NACA) in 1951 at the Flight Research Center at Edwards AFB, Calif. He participated in the early X-1 aircraft program and was project engineer on the X-2 and X-3 aircraft.

He was flight planning project engineer on the X-15 aircraft and supplied

RICHARD E. DAY

flight controllers for the flights. He conducted tests for analysis for stability and control, performance and energy management in the X-15 flights.

Day was also in charge of the simulation facility at Edwards that conducted engineering simulations in addition to pilot training for the X-15, and from these simulations all flight planning and research analysis were obtained.

From the position as head of the Mission Planning and Pilot Training Office for the X-15, Day transferred from Edwards to the MSC staff in his present position in February 1962.

Day was born in Windfall, Ind. and attended high school in that city. He entered Indiana University but his education was interrupted by military service in World War II. After the war he reentered Indiana University and was graduated in 1951 with a BA degree in physics.

During WWII he was a pilot in both the Canadian Air Force and the U.S. Eighth Air Force.

Day is author or co-author of some 10 technical papers for NASA.

He is married to the former Dorothy Hungate of Fountaintown, Ind. The couple has two children: David, 21, who recently entered the armed services, and Dean, 15. The family resides in Houston.

Day's hobby is photography which he has had very little time to pursue lately. He said he also enjoys fishing and hunting when the opportunity arises and time permits.

MSC MOONPORT--Dr. Ted Foss, NASA geophysicist, points to moon crater that will resemble the lunar topographic area to be constructed here at the Manned Spacecraft Center.

MSC To Have Lunar Training Area Will Have Craters 50-Feet Across

A tiny piece of the moon will soon be created at the Manned Spacecraft Center.

Geologists, using slag and big chunks of lava rock, are planning to turn an area not much bigger than a football field into what they believe the moon looks like.

The U.S. Corps of Engineers have asked for contractor bids on the $42,000 moon-building job.

Dr. Ted Foss, National Aeronautics and Space Administration geophysicist who is teaching the astronauts geology, said the area would be 328 feet in diameter.

"It will have several large craters about 50 feet in diameter, and about 15 feet deep," Foss said.

This little bit of the moon is being modeled after the Kepler Crater in the Oceanus Procellarum on the lunar surface.

"It isn't going to be an accurate reproduction," Foss said, "because we simply don't know what makes up the surface of the moon. We are making it to conform to what we believe the moon looks like from the information we have now."

The surface of the space agency moon will be covered with slag, which resembles small, rough, lava flow rock and the large lava boulders.

"Once the moon is finished this summer," Foss said, "we hope to have a mock-up of the LEM (lunar excursion module) set up and have the astronauts practice getting in and out of the spaceship."

Foss explained there would be an area suitable for landing a spaceship and the rest of the surface would be unsuitable for landing.

"Primary purpose for constructing the moon," Foss said, "is to have a simulated lunar surface so we can conduct time and motion studies with astronauts in their spacesuits."

"For instance, we want to know how long it will take the astronaut to get certain instruments out of the spaceship and set up for observation."

The rocks and slag will be distributed in a geological relation to the moon's surface as it is known, with some slag covering other areas and ash and slag covering still other parts of the surface.

"It also will be helpful for the astronaut in his geology training," Foss said.

The Kepler Crater on the moon is about 10 degrees above the lunar equator and to the left. It is not an area being considered for a landing.

The Kepler Crater is large enough to put Los Angeles in the bottom with room to spare, Foss said, so re-creation in Houston would, of course, be on a much smaller scale.

"We also have planned to make the simulation flexible," Foss said, "so we can change the surface as we get more information before we make the actual trip."

First Relaxation In Months Earned By BP-13 Test Crew

When the SA-6 Apollo space vehicle successfully lifted off from NASA launch Complex 37 at Cape Kennedy May 28, there were many men who paused, took a deep breath, and momentarily relaxed for the first time in months.

One such man is Ted Sasseen, test conductor for the first Apollo spacecraft to be launched from the Cape.

Sasseen is assigned to the Manned Spacecraft Center-Florida Operations (MSC-FO).

He was charged with factory and launch site preflight acceptance testing for the SA-6 Apollo Spacecraft, Boiler Plate 13, which consisted of a boilerplate command module, service module, adapter, and partial launch escape system.

In two months of factory testing at Downey, Calif., Sasseen and the test group, comprised of NASA and North American Aviation (NAA) personnel, acceptance tested all the individual and combined spacecraft systems, conducted hours of trouble shooting, and recommended corrective action preparatory to the final spacecraft system integrated tests at the factory.

The first test at the factory was the Test Equipment Integrated Test used to check out the spacecraft. This verified operation of the test complex prior to connecting the complex to the spacecraft, and entailed six to seven days of vigorous work. The spacecraft power distribution test was then conducted to prove the spacecraft power control system prior to activating other on-board spacecraft systems. Next, the spacecraft environment control system was tested to confirm operation of the spacecraft's cooling systems.

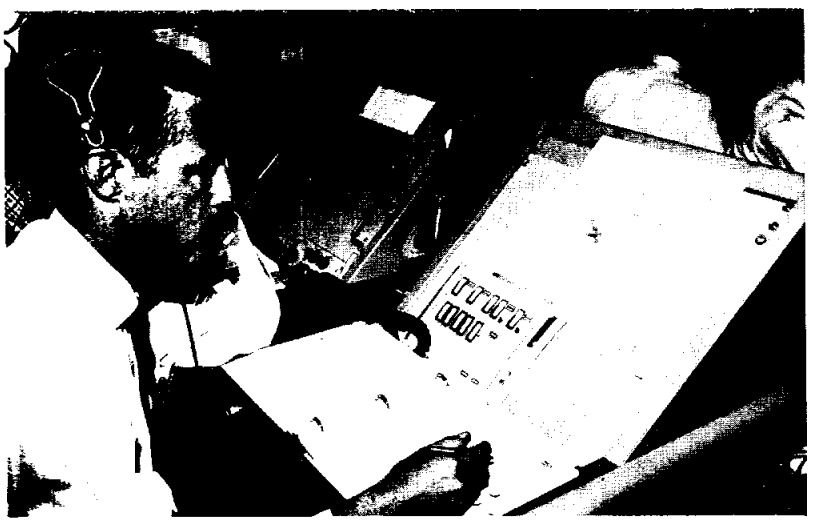
Following a tight sequential testing pattern, the engineers next ran the C-band System Test to corroborate correct operation of both spacecraft beacons and their associated antenna systems. Telemetry system tests followed to check all spacecraft instrumentation and radio frequency systems.

Sasseen, and his crew of 40 NASA/NAA systems engineers and technicians, spent a total of 68 days at the NAA plant in Downey. With the exception of a "breather" for Christmas vacation, this crew worked a "normal 14-hour test day" including some Saturdays and Sundays.

Following the strenuous factory acceptance testing, Sasseen and his MSC-FO test personnel travelled back to Cape Kennedy.

Another 84 days stretched out before them at the Cape before the actual launch. Hangar and Launch Complex 37 testing of the spacecraft had to be conducted to insure flight readiness.

After 5 months and more than 55,000 man-hours of factory and Cape prelaunch tests and preparations, it becomes readily apparent why Sasseen and his dedicated test crew earned the right to momentarily relax.



BP-13 ACCEPTANCE TESTS---Ted Sasseen, MSC-Florida Operations test conductor concentrates on the control panel during integrated tests of Apollo BP-13 in Hangar AF at Cape Kennedy.

BUREAU APPRENTICE MEETING---Paul E. Purser, special assistant to the Director of MSC (second from left), meets with officials of the Bureau Apprentice Program at MSC on May 21. The MSC training program will start in September with 20 apprentices. From left to right are Hugh C. Murphy, administrator for the program here from Washington; Purser; Ralph H. Settlers, apprentice representative of Houston; and Fred W. Erhard, regional director for Bureau Apprentice Training, Dallas.

Gemini

(Continued from page 8)

approximately 50 mm. of mercury for about five minutes every one-half hour the crew is awake. (Flights 5 through 8)

(2) Crew members will be placed on a tilt table before and after flight to record pulse rate and results will be compared to study the effects of weightlessness on the blood system. (Flights 3 through 9)

(3) A microphone will record heart sounds which will be compared with electrocardiogram readings to determine the time interval between electrical and mechanical contraction of the heart muscle. This will give an indication of possible deterioration of the heart muscle during weightlessness. (Flights 4 through 9)

(4) Hormone analyses will be made from urine specimens collected before, during and after the mission. Results will be compared from pre-flight and post-flight specimens to determine reaction to requirements and cardiovascular response mechanisms during space flight. (Flights 6 through 9)

(5) Occurrence and degrees of bone demineralization from prolonged weightlessness will be studied by comparing pre-flight and post-flight X-rays of the heel bone and little finger of the right hand. (Flights 4 through 9)

(6) For two weeks before flight, during flight and two weeks after flight, astronauts will maintain a controlled calcium diet. All body wastes will be analyzed for calcium content establish rate and amount of calcium lost during weightlessness. (Flight 7, the long duration mission, and (Flight 9)

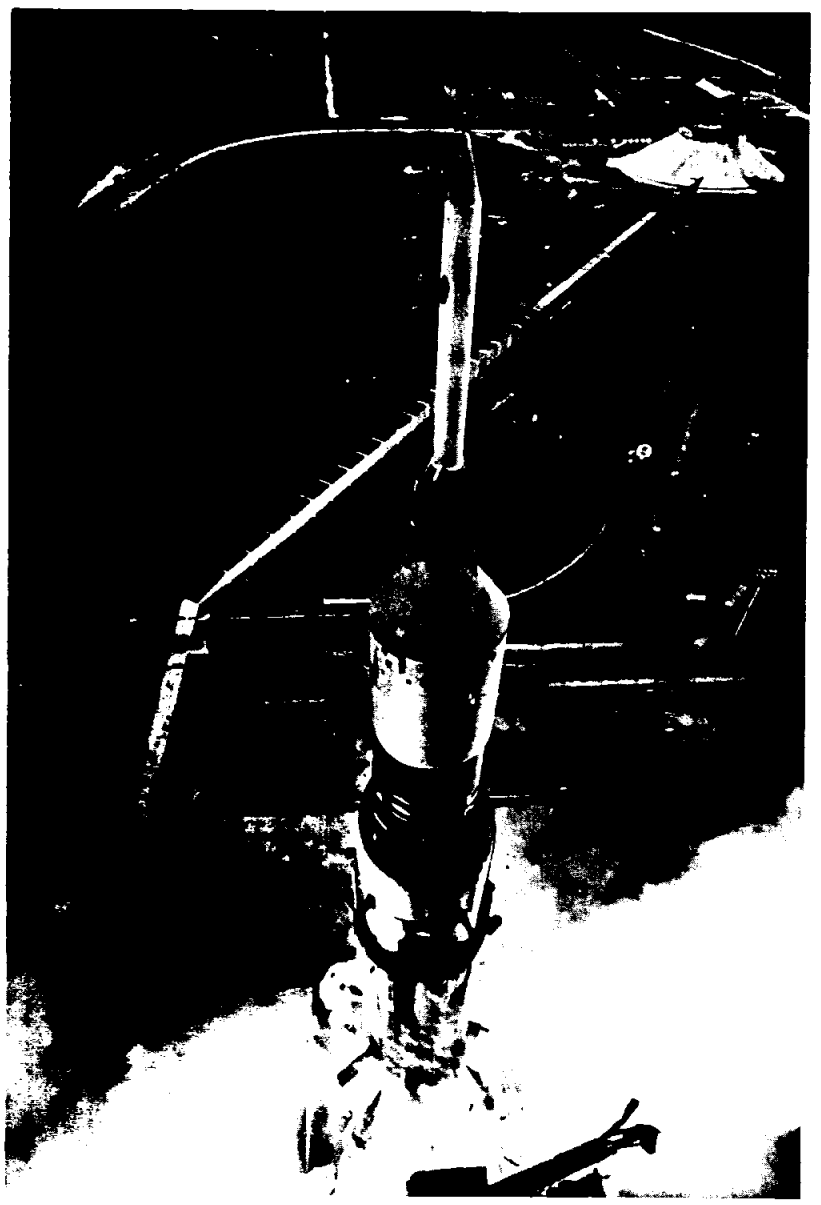
(7) Electroencephalograph readings on a miniature biomedical tape recorder will note levels of consciousness and depth of sleep during flight. (Flight 5, 7 and 9)

(8) Before, during and after the mission measurements will be taken as astronauts wear special light-proof goggles, one eye piece of which contains a self-powered light source in the form of a movable white line. With head fixed, the white line is positioned by the astronaut to what he judges to be the pitch axis of the spacecraft. The second astronaut reads and records the numbers on a calibrated screw. The vestibular effects experiment will determine orientation capability in the dark during long periods of weightlessness. (Flight 7)

(9) Astronauts will exercise by pulling a bungee cord with foot crossbar prior to and during space flight. Blood pressure measurement will be taken before and after excercise, and pulse rate will be monitored during exercise periods to determine the astronauts capability to perform physical work during weightlessness. (Flights 4 through 7)

Space News NASA ROUNDUP!

SECOND FRONT PAGE



ON ITS WAY---The umbilical lines swing away, lower left, as the SA-6 gets on its way to a successful flight from Cape Kennedy at 12:08 p.m., May 28. The blockhouse from which the launch was controlled is shown in the upper right corner. The photo was taken by a remote controlled camera atop the umbilical tower.

SA-6 Launch Is A Roaring Success, Makes 50 Orbits Before Reentering

With a deep-throated rumble the world's most powerful rocket, the Saturn 1, pushed an Apollo boilerplate spacecraft into earth orbit from Cape Kennedy on May 28.

At 12:08 p.m. lift-off from Launch Complex 37 was accomplished after a week's delay, then a two day postponement and three hours of holding, the latter two due to difficulty with ground support equipment, and a locked valve in the first stage liquid hydrogen replenishing system.

Jettisoning of the launch escape tower, using the tower jettison motor, was accomplished successfully during the flight along with determining the launch and exit environmental parameters and demonstrating the physical compatibility of the Saturn I and the Apollo spacecraft.

The eighteen and one-half ton spacecraft and S-IV stage of the Saturn went into orbit about 10 minutes after liftoff ranging from 123 to 140 miles above the earth.

During the flight, data indicated that one of the eight H-1 engines in the first stage shut down 24 seconds early. The deviation from the planned trajectory was corrected by the guidance system.

The Saturn I booster is designed to operate successfully with one engine out. Cause of the premature shutdown is still being investigated.

All eight of the cameras mounted on the launch vehicle to photograph propulsion and fuel operations were ejected and recovered.

The 80-foot satellite was inserted into orbit 1,300 miles down the Atlantic range, sweeping around the globe every 88 minutes.

At 6:30 p.m. CST, May 31, during the 50th orbit of the earth, the 37,300 pound SA-6 satellite reentered the atmosphere and disintegrated over the western Pacific Ocean.

Dr. George Mueller, NASA's associate administrator for manned space flight, said, "the success adds to our confidence in meeting our goal of landing men on the moon in this decade."

Congressman Olin Teague, chairman of the House Subcommittee on Manned Space Flight, who was present for the flight, said, "This is another step for a very successful space team. They are all to be complimented."

Gemini Medical Tests Named For Two-Man Orbital Flights

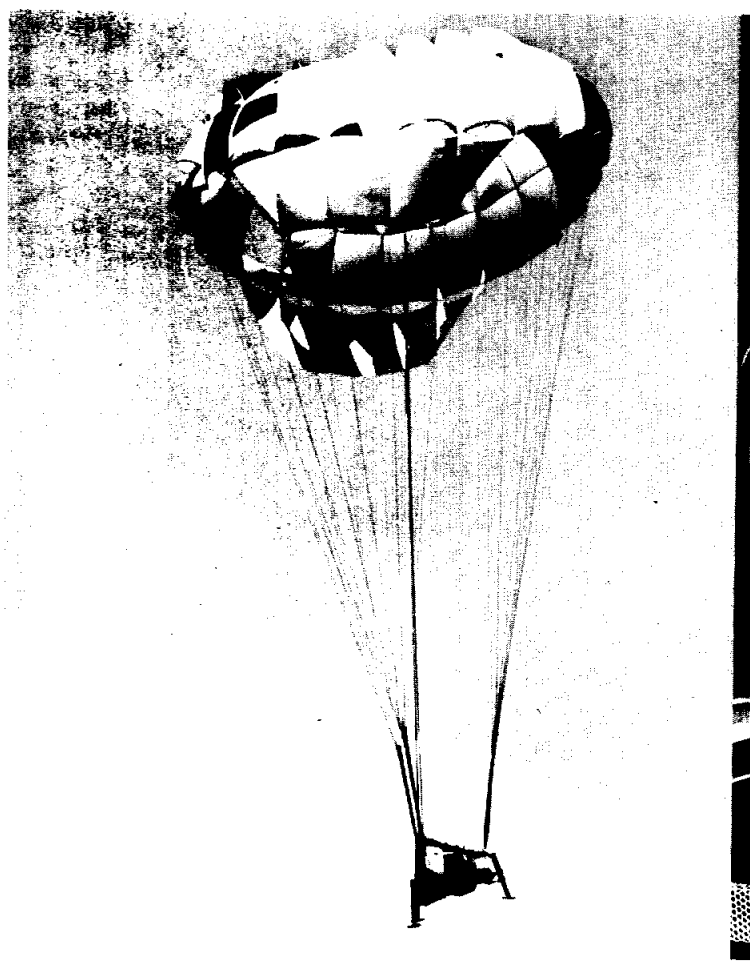
The head of the United States manned space flight program recently listed nine medical experiments to be carried out during two-man orbital flights in the National Aeronautics and Space Administration's Gemini program.

Dr. George E. Mueller, NASA associate administrator for Manned Space Flight, pointed out that "since crew safety is the first consideration in the U. S. manned space flight program, the buildup in flight duration in the Gemini program will be gradual--from the three-orbit manned flight late this year to a flight of up to two weeks duration on the seventh mission."

During the gradual buildup in duration of the flights, NASA will conduct a series of extensive medical tests to determine the actual effects of increased flight time on Gemini crews. Mueller described nine medical experiments to be carried out on Gemini flights three through nine. These are:

(1) A Cardiovascular reflex experiment to attempt to develop countermeasures for deterioration of blood distribution in the body caused by prolonged weightlessness. Pneumatic cuffs on the astronauts' upper arms and thighs will be inflated to a pressure of

(Continued on page 7)



LAND LANDING BY PARASAIL--Astronaut James Lovell Jr., right, operates the radio controlled descent of the parasail by observing a video image of the ground as seen from the one-third scale Gemini spacecraft in the second series of tests conducted, May 27, at Ft. Hood, Tex. By using the remote control unit, Lovell was able to guide the craft to a successful landing. Emmett Jeffery, electronic technician adjust the video view of the ground that is being transmitted from the Gemini model. The parasail with the scale model Gemini is shown at left as it made the approach for a landing. All previous manned space flight landings have been made in water and the parasail is being considered for possible use in later missions of the Gemini program for land landings as well as water landings.