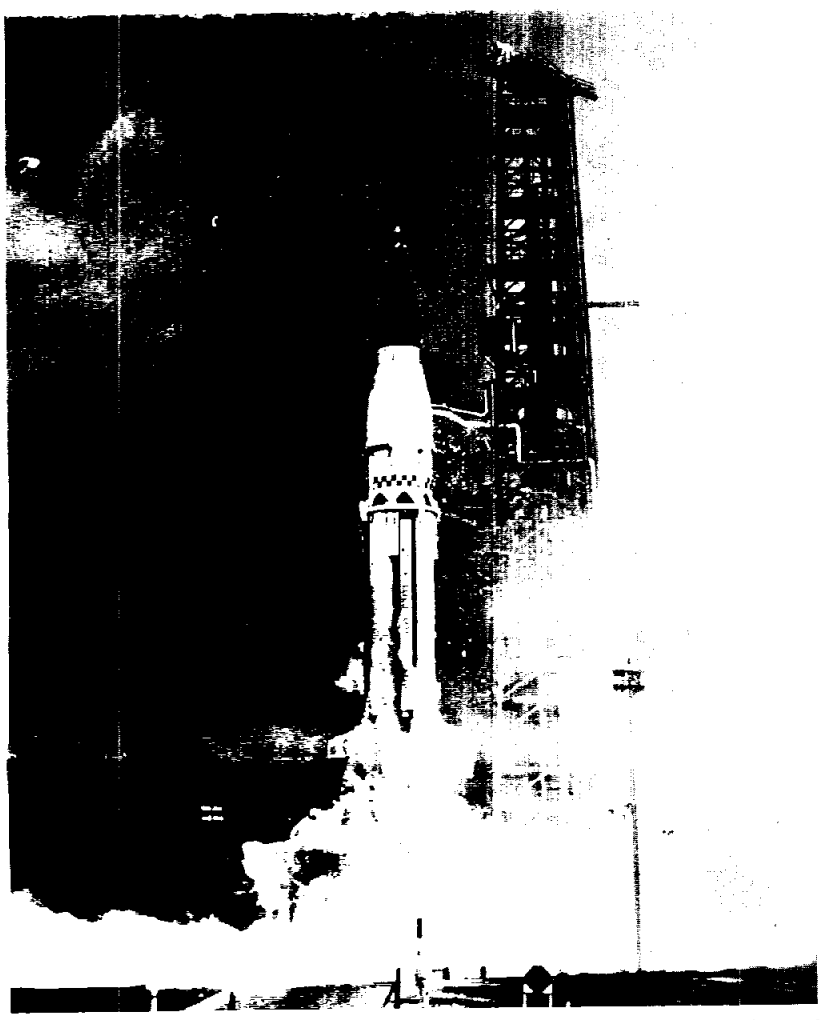
Space News ROUNDUP!

VOL. 3, NO. 8 MANNED SPACECRAFT CENTER, HOUSTON, TEXAS FEBRUARY 5, 1964

$5.3 Billion Requested For NASA For FY 1965



THE SA-5 is shown as it lifted off Pad 37 at Cape Kennedy and started its successful flight.

Two Stage SA-5 Test Is Fired Successfully

NASA launched SA-5 successfully last Wednesday at Cape Kennedy in a spectacular shot which provided three milestones for the Saturn program - (1) the first stage, a cluster of eight H-1 engines, generated full thrust of 1.5 million pounds for the first time. The four earlier Saturn tests built up 1.3 million pounds of thrust; (2) the high energy liquid hydrogen second stage was ignited for the first time with 90,000 pounds of thrust generated by the six RL-10 engines; and (3) it was the first Saturn to carry a satellite.

The weight of the satellite, 37,700 pounds, far exceeds the heaviest previous U. S. payload, 10,200 pounds launched atop a Centaur last November.

The payload on the SA-5 consisted of the spent S-IV stage of the vehicle, an instrument unit, payload adapter, Jupiter nose cone and ballast.

Five more tests are planned for the Saturn I model. All will carry useful payloads, including several unmanned models of the Apollo spacecraft.

When operational, the Saturn I will be able to place about 10 tons of useful payload into earth orbit. The extra weight achieved by last week's launch was due to the fact that the second stage remained attached.

NASA officials were extremely pleased with the success of the flight and received congratulations from many, including President Lyndon B. Johnson who called Dr. Wehrner von Braun minutes later to offer his best wishes to all members of the space team for their achievement.

Shortly after the orbit was announced, Dr. Joseph Shea, manager of the Apollo Spacecraft Program Office, was interviewed by Houston television stations. In response to a question as to what the successful launch meant to the Apollo

(Continued on page 2)

Manned Space Flight Would Receive $3 Billion

President Lyndon B. Johnson, on January 21, requested Congress to appropriate $5.3 Billion for the National Aeronautics and Space Administration for fiscal year 1965 and also recommended a supplemental appropriation of $141 Million for 1964.

The original budget estimate was $5.97 Billion plus the supplemental figure. The final hard figure was worked out by NASA, jointly with the Bureau of the Budget and the President.

The breakdown of the fiscal '65 budget that directly affects the Manned Spacecraft Center, is $3,011,900,000 for manned space flight research and development, $25,166,000 for MSC construction and $98,104,000 for administrative operation. Included in the construction for MSC is work on the environmental testing laboratory and for an electronics systems compatibility laboratory.

In addition to the 995 positions authorized for MSC in 1964, another 471 are provided for in the 1965 budget. This will bring the MSC personnel strength to 4,811.

Only two other places within NASA were included in the fiscal '65 budget for a personnel buildup: 429 at John F. Kennedy Space Center and 200 for an electronics research center.

In his message to Congress, the President said, "Appropriations enacted for NASA in 1964 were $600 Million below the amount requested. As a result major development programs leading to the manned lunar landing have fallen behind schedule. Careful replanning of the entire program, including a reduction in the number of test flights, will offset some of this delay. Even so, more funds are needed in 1964, and I am therefore recommending a supplemental appropriation of $141 Million for this year."

The President continued, ".... The 1964 and 1965 recommendations represent the minimum amount

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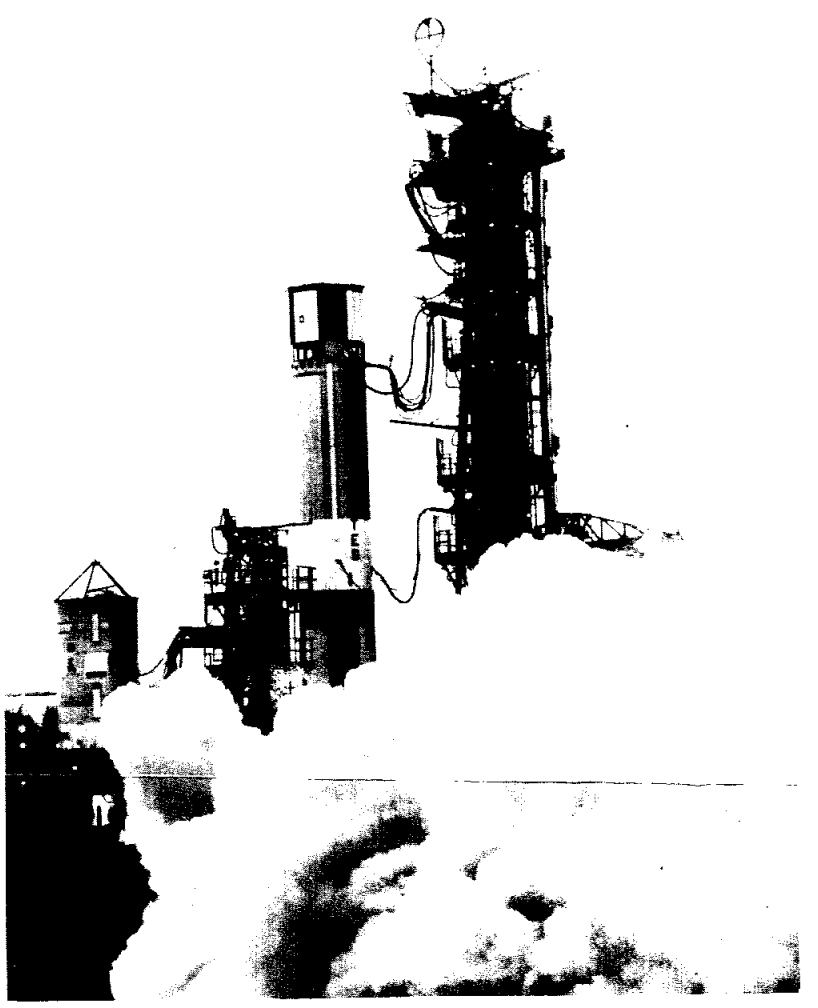

STATIC FIRING of the GT-1 launch vehicle first and second stages.

Gemini Launch Vehicle Test Firing Successful

Both stages of the first Gemini Titan II Launch Vehicle were static-fired on Gemini Launch Complex No. 19 at Cape Kennedy, Florida, January 21. They produced a combined total thrust of more than half a million pounds, marking an important milestone in the NASA Manned Spacecraft Center's schedule to launch the first unmanned Gemini spacecraft into orbit.

Charles W. Matthews, the Manned Spacecraft Center's Gemini Program Manager, said, "Early indications show the static firing as a success; however, the final report will not be available until after a complete study of the collected data."

The purpose of the test was to evaluate the over-all Gemini Launch Vehicle system performance -- fueling, countdown, engine start and shutdown commands, guidance control, and telemetry; and to verify engine performance via thrust generation, and engine gimbaling (directional thrust control to steer the Gemini Launch Vehicle).

Each stage was static-fired for 30 seconds. The engines, manufactured by the Aerojet General Corporation, developed the same amount of thrust expected during actual flight -- 430,000 pounds by first stage engines, and 100,000 pounds by the second stage engine.

For this test firing, both Gemini Launch Vehicle stages were mounted side-by-side on separate mounts. Both stages were held to their mounts by four one and one-half-inch bolts; for actual flight, these bolts will be blown apart by small explosive charges to effect lift-off of the entire vehicle and for first and second stage separation.

The countdown extended to 300 minutes -- just as it will during an actual launch.

At T minus Zero, the first stage propellant line valves opened. The Gemini Launch Vehicle fuel and oxidizer

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NASA Budget For FY' 1965

(Continued from page 1)

needed to achieve our goals in space. The estimated increase of $590 Million in expenditures in 1965 is due principally to payments required by commitments made in 1964 and earlier years. With the leveling off of appropriations, annual outlays should remain relatively stable in subsequent years..."

A budget briefing was held for the press prior to the President's message to Congress and among those representing NASA were Dr. Robert C. Seamans, associate administrator and Dr. George E. Mueller, associate administrator for Manned Space Flight.

Seamans explained that the $141 Million supplemental request was split into two items..."Approximately $31 Million for Apollo, and the remainder for the Saturn V."

For fiscal '64, $5.71 billion were requested, $5.35 were authorized, and $5.1 were appropriated.

Due to the 1964 budget appropriation Seamans said, "We found it necessary to freeze the buildup of the contractors responsible for the Apollo and the large launch vehicle at the level that they were last December.

"It is conceivable, "Seamans said," that if the supplemental were not forthcoming, that we might want to make some readjustment and actually cut back one contractor in order to increase another. That is the kind of thing that we don't want to do. It is a very poor way of getting on with a development program, to start cutting it back instead of pushing it forward."

In reference to manned flight Seamans said, "The Gemini program shows a level in 1964 of $383 Million. Here is one item in the budget that actually shows an increase over the authorization.

"The Gemini program is moving into the final development phases prior to flight. In order to hold our schedule we found it necessary to increase the funding levels....The reduction in '65 ($308 Million) is as a result of a tapering off of the requirements.

"Now is the time that we have to procure large amounts of hardware for subsystem testing, as well as the lead procurements, if you will, for the follow-on of flight equipment."

The budget figures for fiscal 1965 for Apollo are $2.6 Billion as compared to $2.2 Billion for 1964 and $1.1 Billion for fiscal 1963.

In reference to Apollo, Seamans said, "I will certainly say that all our experience in programs of this sort is that the heaviest obligational requirements come several years before the actual flights. We could show you, for example, the history of Mercury, where the monthly rates were decreasing at the time that we had the first Mercury-Redstone.

"This is because there is a very great requirement for a lot of hardware for testing early, prior to the time that the various elements come together, for systems testing, which also takes more hardware, and also there are a lot of items, long-lead items, required for the flight hardware."

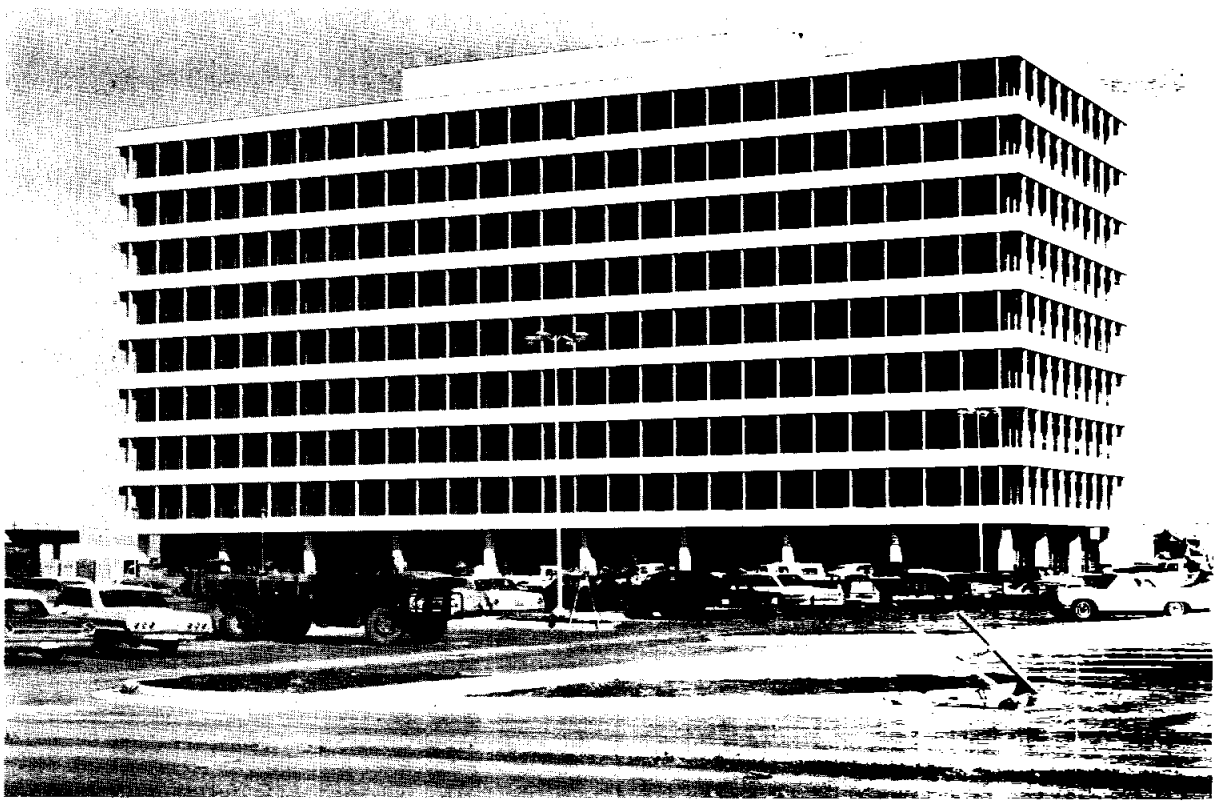
Seamans also said that, "As far as the manned lunar landing program, we are now cut back to the point where we will have to admit that we cannot carry out the programs in this decade unless we get the full support from the Congress in the form of this supplemental bill, ($141 Million), and in terms of the 1965 bill,...and even then we have no margin, we have no fall-back position in the program.

"It is a very tight schedule for the funds that are now available to us."

Seamans said that a year had already been lost in the scheduled lunar landing because of the cut in funds for the project.

As to the possible slip of the lunar landing out of this decade because of budget cuts, Dr. George E. Mueller, associate administrator for Manned Space Flight said, "You can never precisely estimate the effects of any such cuts in the budget. Our present estimate is, that there is associated with the $141 Million something like a six months's slip in the lunar landing itself. Obviously, no one knows quite when the lunar landing might take place."

Seamans said that even with the $141 Million supplemental, "Our best judgement, of the people in charge of the program, is that we are really crowding the end of 1969."



THE PROJECT MANAGEMENT BUILDING, pictured above is now in the final stages of completion, and it is anticipated that it will be ready for occupancy by the latter part of the month.

Seven Floors of Project Management Building Accepted; To Be Completed by February 20

Seven floors of the nine-story Project Management building at the NASA Manned Spacecraft Center, Clear Lake, Texas have been accepted for occupancy with minor construction remaining on the other floors before the building is ready.

The headquarters, in which will be offices of MSC Director Dr. Robert R. Gilruth, the spacecraft program managers and assistant directors, contains 194,191 square feet of space. Solar gray window panels are a predominate feature of the 254-foot long building.

In addition to the Apollo and Gemini program offices, personnel assigned to the Director's staff, Procurement and Contracts Division, and administrative offices will occupy the building. If no significant delays occur, the $4,466,579 structure will be ready for tenancy on February 20.

Leavell, Morrison-Knudson and Hardeman Company of El Paso, Texas is the prime contractor.

Nearly a half dozen buildings included in a contract for Phase 3 of the MSC construction will be completed about the same time. These are the Auditorium, Cafeteria, Flight Crew Operations Office, Technical Services Office and Life Systems Laboratory.

To date 13 facilities at MSC's Clear Lake site have been certified as operational or ready for occupancy and nearly 270 employees are working in new offices. The major move is scheduled to take place in March when more than 2,000 persons will be relocated.

In addition to the construction of the administrative buildings, the space agency is building flight test facilities, a thermochemical test complex and space environmental chambers.

Total value of construction and equipment at Clear Lake stands at $147,452,700 and the National Aeronautics and Space Administration has requested an additional $25,166,000 from Congress for construction at MSC during fiscal year 1965.

The funding request and estimated dollar value would cover: a Lunar Mission and Space Exploration Facility, $2,647,000; Flight Crew Operations Facility, $1,764,000; Electronic Systems Components Facilities, $4,110,000; Technical Services Facility, $2,240,000; Cafeteria, $706,000; and modifications to Environmental Test Laboratory, $9,416,000; Central Data Office extension, $2,658,000, and extensions to the Heating plant and warehouse, $1,625,000.

Out of the 147 millions obligated, MSC has paid contractors $62,561,488 as of January 31, 1964.

Gemini

(Continued from page 1)

rushed together and ignited upon mixing in the thrust chambers. These storable hypergolic propellants (a blend of hydrazine and unsymmetrical dimethyl hydrazine as fuel, and nitrogen tetroxide, N_2O_4, as oxidizer) ignite when mixed.

An electrical signal stopped the first stage engine after 30 seconds, then started the second stage engine. The second stage, in turn, was shut down by radio signal from a ground computer just as in actual flight.

Officials of the United States Air Force and the Martin Company, builders of the Gemini Launch Vehicle systems, are now continuing with plans for the next step in the checkout schedule of the Gemini Launch Vehicle, its new launch complex and blockhouse equipment.

Supporting NASA in the Gemini Program, the Air Force Space Systems Division (AFSSD) is responsible for development, test, and launch of the Gemini Launch Vehicle. The Martin Company's Baltimore Division is performing the research and development, manufacturing, assembly, and ground testing under contract to AFSSD. The Martin Company's Cape Kennedy Division is responsible for launch complex preparation, checkout and launch preparation of the Gemini Launch Vehicle.

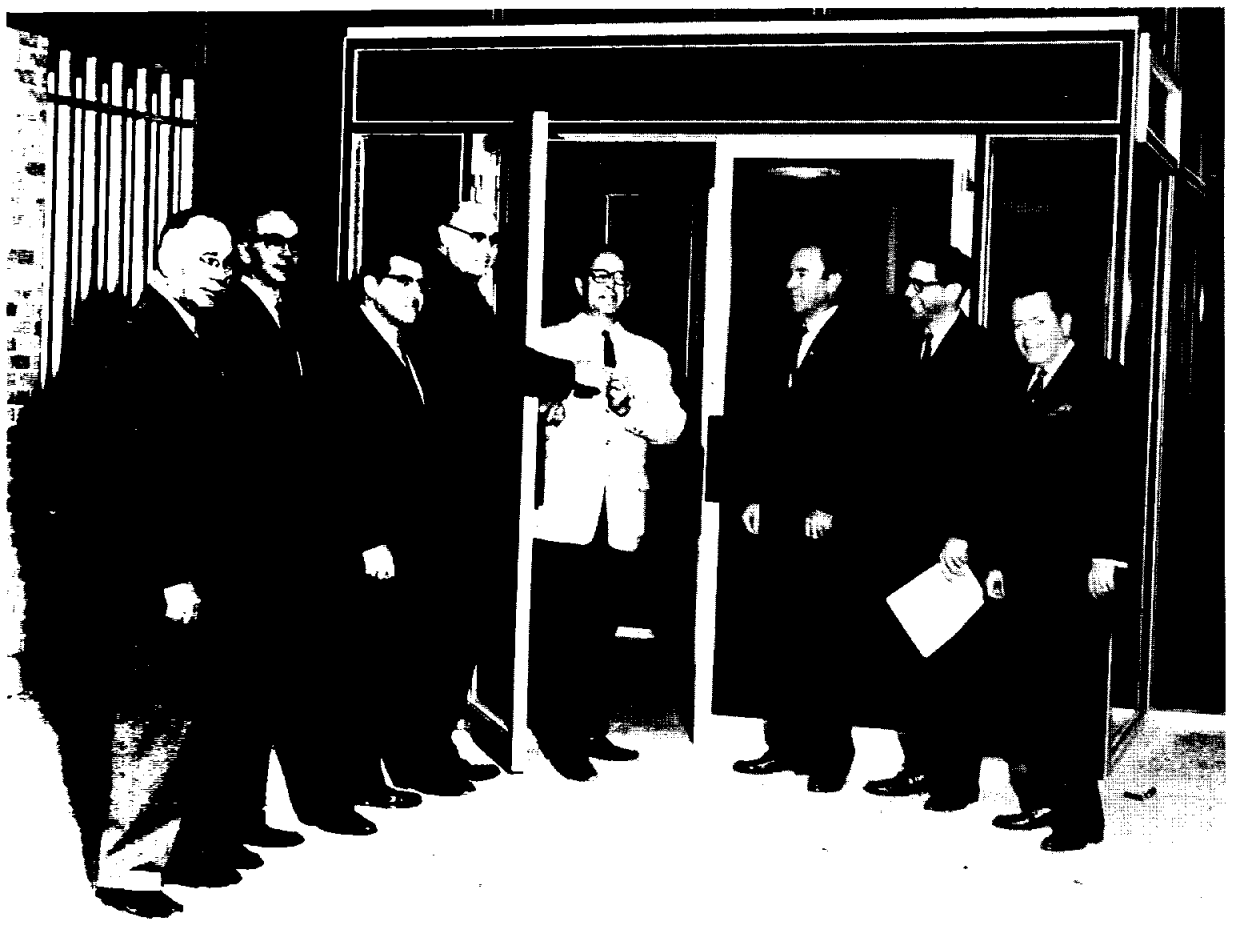
SA-5 Test

(Continued from page 1)

program, Dr. Shea replied:

"It is a tremendous step forward in our overall program because it certifies again that the development of hydrogen stages is a technology which we are going to contain very well in this country. As you know, all of our large launch vehicles depend on hydrogen for the propulsion in upper stages."

"The second thing that is tremendously significant is the fact that here in the first launch of a two-stage vehicle, we have what appears to be a completely successful experiment. And it certifies again, our belief that space is moving out of the age of experimentation, where we expect to fail occasionally in flight, into the point where we can expect even the first flights of these vehicles to be essentially completely successful. It therefore means that we will require many fewer shots to manrate the vehicles before putting a manned spacecraft on board."



Astronauts

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Donn Fulton Eisele, Capt. Theodore Cordy Freeman, and Capt. David Randolph Scott; Navy Lt. Cmdr. Richard Francis Gordon, Lt. Alan LaVern Bean, Lt. Eugene Andrew Cernan and Lt. Roger Bruce Chaffee; and Marine Corps Capt. Clifton Curtis Williams.

Initial training phase for the new astronauts will be similar to that of the previous groups, basic science and technology courses related to space flight development.

These will include geology, flight mechanics, rocket propulsion, aerodynamics of space flight, digital computers, astronomy, communications, physics of the upper atmosphere and space, medical aspects of space flight and space-related meterology.

There will be, during this phase also, field trips associated with various aspects of the training, as well as operational orientation trips to various government, institutional and industrial installations involved in space flight development in MSC programs.

The first phase of training will continue until about mid-June, after which the new astronauts will begin concentrated activity in relation to the specific missions of Manned Spacecraft Center, the Apollo lunar landing mission and the Gemini Earth-orbital long duration and rendezvous flights.

Each of the new astronauts will be assigned following their basic training courses to specific areas of responsibility and will be required, in addition to the special responsibilities, to maintain over-all proficiency as astronauts.

All of the new men will undergo the standard survival courses designed for astronauts, tropical, desert and water survival.

In addition, like the previous groups, the 14 will be required to maintain space flight readiness in high-performance airplanes.

Over-all direction of the astronaut training will be by Donald K. Slayton, one of the original Mercury astronauts and now Assistant Director of MSC for Flight Crew Operations. Astronaut Walter M. Schirra, chief of operations and training, will supervise the new group's training, assisted by Astronauts Elliot See, Neil Armstrong and Thomas P. Stafford.

Egress Training

(Continued from page 8)

another training version of the Gemini spacecraft. The complete training course will be conducted over a period of several weeks to permit all astronauts to participate.

Paul T. Chaput is the project engineer and James Lovell is monitoring the program for the astronauts.

Ultra High Vacuum Chamber Planned

Radio Corporation of America, Camden, N. J. has been selected by the NASA Manned Spacecraft Center to build and install an ultra high vacuum chamber and associated equipment. The fixed price type contract for the work is $245,000.

The system is being built for the Manned Spacecraft Center at Clear Lake. The chamber, which is 13 feet long and seven feet in diameter will be installed horizontally and stand on steel support columns more than 16 feet above the floor.

The system will be capable of producing vacuum conditions equivalent to approximately 400 miles in space. It is being built for MSC's Structures & Mechancs Division and will be installed temporarily at Ellington Air Force Base.

The Clear Lake site cafeteria was turned over to NASA Exchange Council by personnel of the facilities division in a formal ceremony January 28. The Cafeteria will be operated by the Council and will open for business next Monday. Operating hours will be from 7 a.m. until 2 p.m.

Keys to the building were turned over to C. L. Spillers, who will manage the facility by Leo Zbanek. In the picture at the upper left are, from left to right, James Creel, John Ross, Ed Campagna and Zbanek, all of facilities division; Spillers; Hazen Walker, Chairman of the NASA Exchange Council; Don Gregory, Exchange Council member; and Bill Bower, Exchange Council supervisor.

At upper right, Spillers shows the serving line to Gregory, Walker and Bower. At lower left is a view of the executive dining room and, at lower right is a view of the main dining room.

Bower said that food will be reasonably priced with breakfasts ranging from 15 to 65 cents and luncheons from 55 cents to a dollar, depending on individual choices.

Avco Corporation/RAD Division, Designing Ablating

Avco Corporation's Research and Advanced Development Division, prime contractor responsible for designing an ablating material for Apollo re-entry, started working on the atmospheric re-entry problem in 1955.

This was, in 1955, a totally new scientific problem on which virtually no work had been done, and for which, in the opinion of many distinguished scientists, there was no solution.

No data was available for hypersonic ICBM re-entry velocities, let alone design information. Yet the nation's highest priority program, creating an operational ICBM system, could not succeed without a workable re-entry vehicle. From collection of basic heat transfer and aerodynamic data with shock tube and other experiments, on through development of ablation theory, vehicle design fabrication and flight testing, the re-entry problem was solved. Full-scale vehicle flight tests began in 1959 and re-entry vehicle systems became operational with Atlas, Titan and Minuteman ICBMs in 1962.

AVCO SCIENTISTS examine the first man-made object in history to arch into space, travel the full ICBM distance of 5000 miles, and be recovered after plunging back into the earth's atmosphere at 15,000 miles per hour.

AVCO–DESIGNED data cassette being examined in a laboratory of RAD Division after flight one-third of the way around the world aboard an Atlas booster launched from Cape Kennedy on Oct. 5, 1961.

On January 24 of this year Avco/RAD observed its 100th re-entry vehicle flight from Cape Kennedy, when an advanced re-entry vehicle, the Mark II, was flown aboard a Minuteman booster. One week earlier the division observed another significant event, when three Avco vehicles were test flown the same day, one from each of the three national missile ranges--Atlantic Missile Range, Pacific Missile Range and White Sands Missile Range.

From the nucleus of a few scientists and engineers that began probing re-entry problems in 1955, Avco/RAD has grown to an organization of 5,200 people, of whom 1,500 hold technical degrees. They comprise a systems development organization with strong emphasis on re-entry technology, high-temperature materials development and hyperthermal gas dynamics. It has more than one million square feet of offices, laboratories and other facilities in Wilmington, Lowell and Lawrence, Mass., and New London, Conn., plus field operations at the national missile ranges.

The division is currently bringing its re-entry experience to bear on the thermal protection system that will protect America's first lunar travelers when they return to earth in the NASA Apollo command module. Under contract to the Space and Information Systems Division of North American Aviation in Downey, Calif., the RAD Division is responsible for the design of an ablating material that will give the required protection, for developing and fabricating this material and applying it to the Apollo structure.

K. R. WILSON JR.
Chairman of the Board Avco Corporation.

Re-entry conditions from a lunar flight will be considerably more severe than for any other previous mission, especially since the interior of the module must remain habitable at all times. When the vehicle re-enters, and the familiar shock wave of compressed air builds up in front of the heat shield, it is calculated that temperatures will rise to 19,000°F at the stagnation point (point of most severe compression). The body temperature on the outside surface of the vehicle will rise to about 6,000°F, yet, just a few inches away, inside the module, there must be a shirtsleeve environment, i.e., scarcely more than 100 F. This condition must be achieved with a material that is extremely light in weight and which can withstand long periods at a temperature of 300° below zero F.

The latter situation posed one of the most severe problems of all for the men and women concerned with materials development at Avco. The Apollo vehicle will go from an ambient temperature of about 90°F into a long "soaking" period of deep cold space temperatures down to minus 300°F and then suddenly be heated to 6,000°F during earth re-entry. This poses an enormous problem of achieving a material that will expand and contract at exactly the same rate and amount as the vehicle structure to which it will be bonded. Otherwise, it would crack and be completely useless. The final material will also incorporate other methods of

J. R. KERR
President Avco Corporation.

reducing the low temperature and high temperature stresses acting upon the heat shield.

Avco has developed a material based upon epoxy resin, with a lightweight reinforcing structure. In use, it will form a charring layer on the surface of the heat shield, reducing heat transfer to the interior and carrying away part of the heat through an actual loss of mass.

Special fabrication facilities have been established at one of RAD's Lowell plants, including a pilot

Aerial view of Avco Corporation's Research and Advanced Development Division main facility at Wilmington, Mass. This research and development complex of more than 600,000 square feet on 70 acres of ground is the division's headquarters and principal research facility.

TEST MODEL–Professional watchmaker, with Avco's Research and Advanced Development Division, applies traditional hand skills to microscopic precision work in the Apollo lunar landing program. This tiny model is a perfect miniature of the three-man command module and is used for re-entry testing.

The Spotlight On MSC Secretaries....

In this issue we feature secretaries from the western outpost of the Manned Spacecraft Center, MSC/White Sands Missile Range Operations in New Mexico.

MARGARET I. MORGAN (Upper Left) is secretary to Wesley E. Messing, manager, MSC/WSMR Operations. She joined NASA in August, 1962 in her present position. Her home town is Wilson, N. C., where she completed high school. Margaret's husband, Shepard A. Morgan is in service with the U. S. Army Air Defense Command and assigned to the MacGregor Range. She previously worked for the U. S. Army Transportation Research Command, Ft. Eustis, Va. Margaret resides in El Paso, Tex., and her hobbies include bowling and ceramics and caring for a six months old puppy named Tina.

MARY J. TILL (Lower Left) secretary to Henry Van Goey, assistant to manager, MSC/WSMR is a native of Detroit, Mich., where she also attended high school. She joined NASA in June, 1963 as a clerk-stenographer. Mary's previous job was as secretary to the manager of the West Printing Company in Detroit. Her husband, Harry K. Till is in service and assigned to the Ordnance Command, WSMR, N. M. They live on board the White Sands Missile Range. Her outside interests include swimming, water skiing, ice skating and tobogganning.

BETTY L. WALLACE (Upper Right), is secretary to D. G. Kanoff, chief, Administrative Office at MSC/WSMR. She was born in Johnstown, Penn. and attended Nanty-Glo, Penn. High School and Cambria-Rowe Business College in Johnstown. Betty joined NASA in her present position in September, 1962. Prior to this she was at Fort Meade, Md., also in civil service there. Her husband William Wallace is in service and with the U. S. Army Garrison attached to Nike-Zeus. They have a son Billy Joe, eight years, and reside at WSMR.

RITA F. ROUCH (Center Right) secretary to Gerald Ard, chief, Facilities Office, MSC/WSMR, joined NASA in her present position in March of 1963. Rita was born in Shelbyville, Tenn., and completed her high schooling there. Her previous jobs have been at the Post Exchange, WSMR and the Office of the Entertainment Center of the Post at WSMR. Her husband Anthony J. Rouch Jr. is in the U. S. Army with the Provost Marshall's Office. They reside on board WSMR. She includes horseback riding in her outside interests.

BERTHA C. GUTIERREZ (Lower Right) is secretary to Billy R. Gantz, chief, Engineering Division, MSC/WSMR. She joined NASA in December 1962 in her present postion. Bertha was born in Tortugas, N. M. and attended high school in Las Cruces, N. M. Her previous jobs were with the Post Engineer, WSMR and Electronic Research and Development Agency, WSMR. She resides in Tortugas and counts singing and bowling among her outside interests.

Folk Music Group Planned for MSC

Folk music has become a very popular thing in recent months and Johnny Lee Ferry (who plays the guitar), Flight Operations Division, is interested in organizing a small group of musicians for playing folk songs.

Interested MSC musicians that would like to participate in a folk music band for fun (not for profit) should contact Ferry at Ext. 3334.

The instruments best suited for this type music are bass, banjo, drums and guitar.

INDIAN VISITORS RECENTLY VISITED THE IBM site in Houston. James E. Hamlin, left, explains the IBM 716 printer to them, above. Left to right are: Hamlin; Kishan Chand Jaitly, Principal, Central Training Institute, Directorate General of Employment and Training, Minstry of Labor and Employment, Government of India, New Delhi; Vardarevu Pandu Ranga Rao, Inspector of Training, Directorate of Technical Education, Hyderabad, Andhra, Paradesh; Ralph K. Everett, Chief, MSC Real Time Computing office; Balram Singh Randhava, Additional Director of Training, Ministry of Labor and Employment, Government of India; New Delhi; Gopinath Mahapatra, Special Officer (Technical Training) Directorate of Industries, Cuttack, State of Orissa: and Suraj Prakash Datta, Deputy Director of Technical Education, State of Rajasthan.

MSC BOWLING ROUNDUP

MSC MEN'S LEAGUE
(Final First Half Standings)
Standings as of Jan. 16

Team	Won	Lost
Tecnics	46	26
Lunar Lights	45	27
Turkeys	43	29
Whirlwinds	41½	30½
Asteroids	34½	37½
Pseudonauts	34	38
Spastics	33	39
Cosmonuts	31	41
Fizzlers	30	42
Overshoots	22	50

High Game: J. Garino 266, B. Harris 263.
High Series: J. Strickland 621, J. Garino 616.
High Team Game: Lunar Lights 916, Cosmonuts 883.
High Team Series: Lunar Lights 2570, Whirlwinds 2562.

MSC COUPLES LEAGUE
(Final First Half Standings)
Standings as of Jan. 21

Team	Won	Lost
Goofballs	47	25
Lame Ducks	44	28
Schplitz	42	30
Ridgerunners	41	31
Bowlernauts	37½	34½
Spare-O's	33	39
Four Aces	32½	39½
Hackers	30	42
Shucks	28	44
Piddlers	27	45

High Game Women: C. Clyatt 198, M. Jordan 191.
High Game Men: G. Sanders 223, F. Gentile 218.
High Series Women: C. Clyatt 515, V. Lantz 500.
High Series Men: H. Brasseaux 564, P. Thomas 559.

MSC MIXED LEAGUE

Team	Won	Lost
Alley Oops	55	21
Eight Balls	47½	28½
Celestials	46	30
Five Flushers	42½	33½
Snap Shots	41½	34½
Little Splits	40½	35½
Pricers	38½	37½
Space Mates	38	38
Virginians	38	38
Hardly Ables	35½	40½
Aborts	33	43
Core Dumps	30	46
Gabs	24	52
Decigones	24	52

High Game, Women: C. Barnes, 213; M. Lewis, 211; C. Barnes, 207.
High Game, Men: J. Pavlosky, 236; J. Lewis, 234; A. Chop, 227.
High Series, Women: C. Barnes - 545, 543, 543.
High Series, Men: P. Petersen, 640; A. Chop, 632; E. Shumilak, 600.
High Team Game: Alley Oops - 984, 930, 900.
High Team Series: Alley Oops - 2658, 2598, 2593.
(On January 29, "Petc" Petersen rolled a 224, 213, 203 - 640 series.)

RECENT VISITORS TO MSC included a Danish gymnastic team. One of the team members, Vibeke Rysz, is shown above, trying on a space helmet and glove with an assist from Walter D. Salyer, Crew Systems Equipment Division.

Singleton Party

The Singleton Club will have a Valentine Day party Friday, Feb. 14, starting at 8 p.m. The affair will be held in the Conference Room of the Skylane Inn Motel, 6747 Telephone Rd.

Music and setups will be provided. For further information call Ivan Nachman, extension 7418 or Rita Sommer, extension 7761.

Credit Union Holds Meeting, Elects Officers, Gets Reports

The MSC Credit Union held its second annual meeting January 28. Officers and board of director members were elected and the annual reports rendered. About 50 persons attended.

The incumbent officers - Roy C. Aldridge, president; Robert J. Bailey, vice president; William Kincaide, secretary; and Alfred J. Ligrani, treasurer - were all re-elected for another year. Also re-elected were board members Burney Goodwin, George MacDougall and Jack Kinzler. T. J. Cassias was elected to replace William Bland and James A. Stephens to replace Art Hinners. Aldridge reported that the board had 11 regular and two special meetings during 1963.

At the December meeting the board voted a 5.04 per cent dividend on all shares outstanding as of December 31. This dividend has been paid and credited to share accounts of members on that date.

The treasurer reported that during the year 313 deposits were made at the bank, totaling $583,803 and that 1,486 checks were issued in the amount of $583,803. On December 31 there were 1,161 active members in the Credit Union. Interest on loans during the year was more than $26,000 and the net gain for the organization was more than $12,000.

The credit committee, composed of chairman Abner Askew, James Moody, Harold Ferrese, Robert Stubblefield and Troy Williams held 10 regular and 21 special meetings during the year and acted on a total of 446 loan applications.

Employees Ass'n Elects Officers

The MSC Employees Activities Association elected officers to fill vacancies on the Second General Assembly Executive Board at a meeting on January 7. The officers were elected from District Representatives.

New district representatives and alternates are: District 1, Phoncille De Vore; Marilyn Bockting; District 10, Flossie Leggett, Joyce Priode; District 11, James Blumentritt, Leon Ballinger; District 12, Fred Richmond, Robert Fricke; District 26, Leroy Proctor, James Axley.

NAA Gets Money For Construction At Downey, Cal.

A contract amendment in the amount of $9,200,000 has been issued by the Manned Spacecraft Center to the Space and Information Systems Division of North American Aviation, Inc., for construction and modification of buildings at Downey, Calif.

MSC is supervising research and development work on two major NASA contracts held by NAA. These cover the Apollo command and service modules and the paraglider system for Gemini. The contract amendment calls for the construction of seven new buildings and modifications to existing structures to permit expansion of the research and development effort.

North American is the prime contractor for the Apollo Command and Service module program, holding a $934,400,000 definitive contract which was signed with MSC August 14, 1963.

The company also has a $20,015,000 research and development contract for the paraglider, one of the landing systems being developed for the Gemini spacecraft.

SERVICE AWARD—John Brinkman, (right) chief, Photo Division, presents a 20-year award for government service to Ludy T. Benjamin of General Photo Laboratory and Processing Section.

Material For Application To Command Module

plant setup to turn the laboratory-developed Apollo material into an item suitable for production. The command module will be shipped from Downey, Calif., to Lowell, where the heat shielding will be applied and the entire surface ground to fine tolerances on a huge vertical-turning lathe.

Dr. C. F. Berninger, director of space systems for the RAD Division, has been in charge of the Apollo program at Avco since it began.

Immediate responsibility for Apollo at Avco is held by E. W. Offenhartz, Apollo project director.

All space programs at Avco/RAD are under the leadership of Dr. Mac C. Adams, a vice president. He is a member of the NASA Research Advisory Committee for Missile and Spacecraft Technology.

Typical of the extensive research and re-entry simulation facilities backing up the Apollo program at Avco are the OVERS (orbital velocity re-entry simulator) wind tunnel. This is an electric-arc-powered device which can simulate the heating profile of a profile of a complete lunar re-entry, from the low pressure-high velocity of the first portion of the re-entry trajectory on through the relatively low velocity, higher density of the final portion.

E. W. OFFENHARTZ
Apollo Project Director, Avco RAD Division.

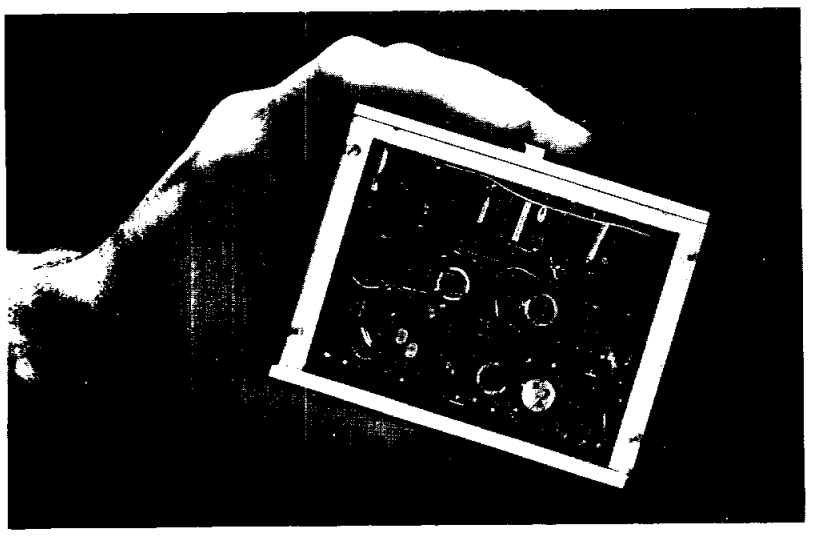
The division is also doing work on thrust chambers for the Apollo lunar excursion module lift off engines under contract to its sister organization, the Avco Aerospace Structures Division in Nashville, Tenn.

A program to develop electric space propulsion, including arc jet and resisto jet engines for NASA's Lewis Laboratory has been under way for several years, and nose caps have been developed and built for the Scout research vehicle.

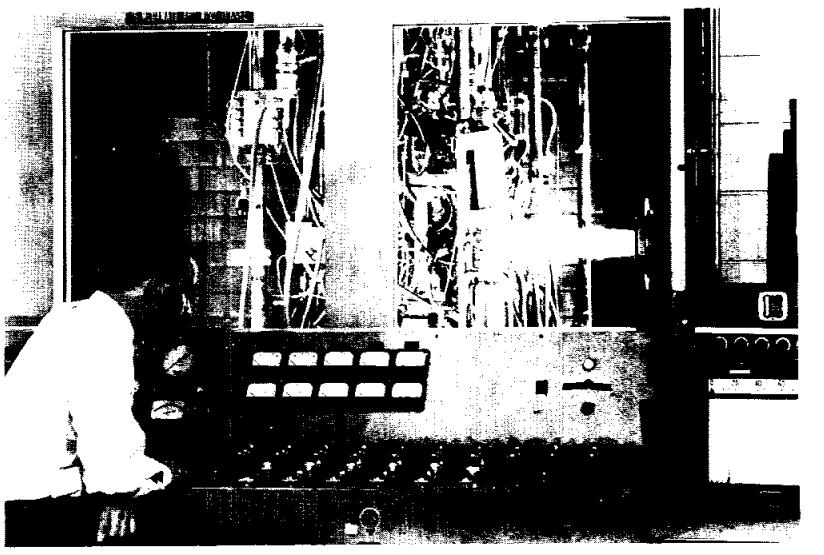
The division also holds contracts for NASA studies of spectral emissivity of materials and Astrovoice re-entry communication system. The latter is exploring the possible attainment of voice communication with a manned vehicle during re-entry by using existing C-band radar and NASA's tracking network.

The division's medical science department is developing a biological experiment for the biosatellite program.

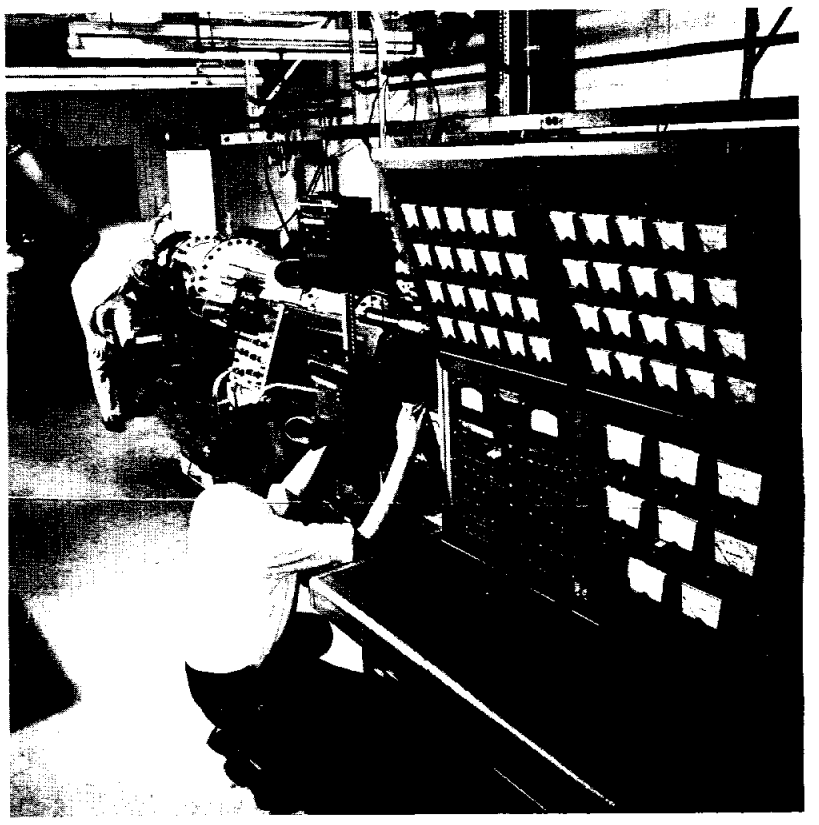
Current RAD space research sponsored by Avco Corporation includes studies and experiments relating to planetary entry, a vehicle design for a probe to approach within three solar radii of the sun, a study of nuclear-propelled space vehicles, an emergency orbital escape system and laboratory experiments related to advanced entry vehicle technology and space vehicle technology.



ASTROVOICE—This lightweight encoder is being designed to permit astronauts to talk to ground stations during the peak heating period of re-entry into the earth's atmosphere, when communications normally black out due to the sheath of ionized plasma--air at several thousand degrees Fahrenheit--surrounding the capsule.

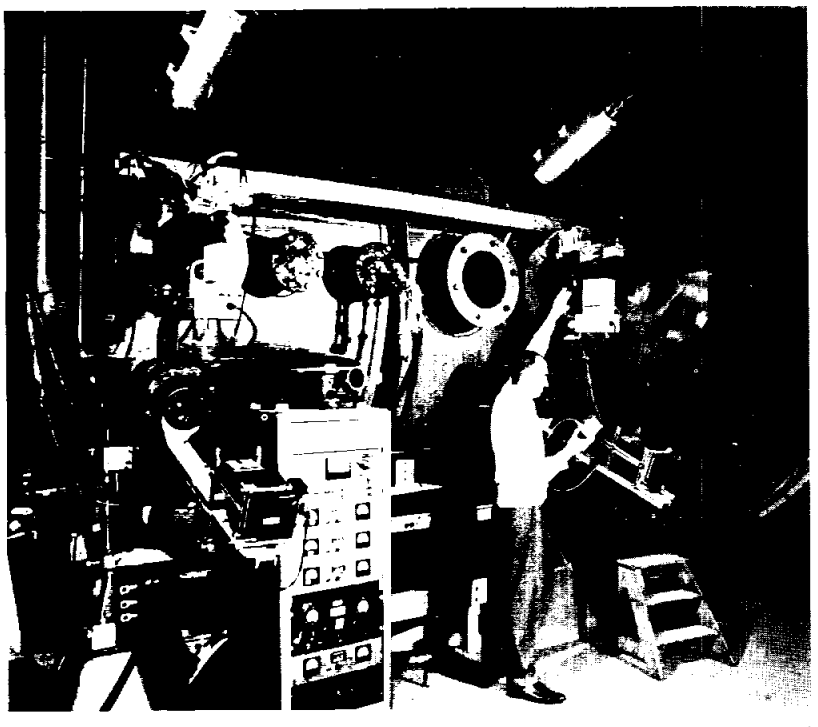


THIS ARC WIND TUNNEL draws 15 million watts of electrical power and uses five electric arcs to heat air and other gases to 20,000 temperatures for re-entry simulation studies. This "work horse" has been in operation since 1959 for materials testing and other re-entry simulation tasks.

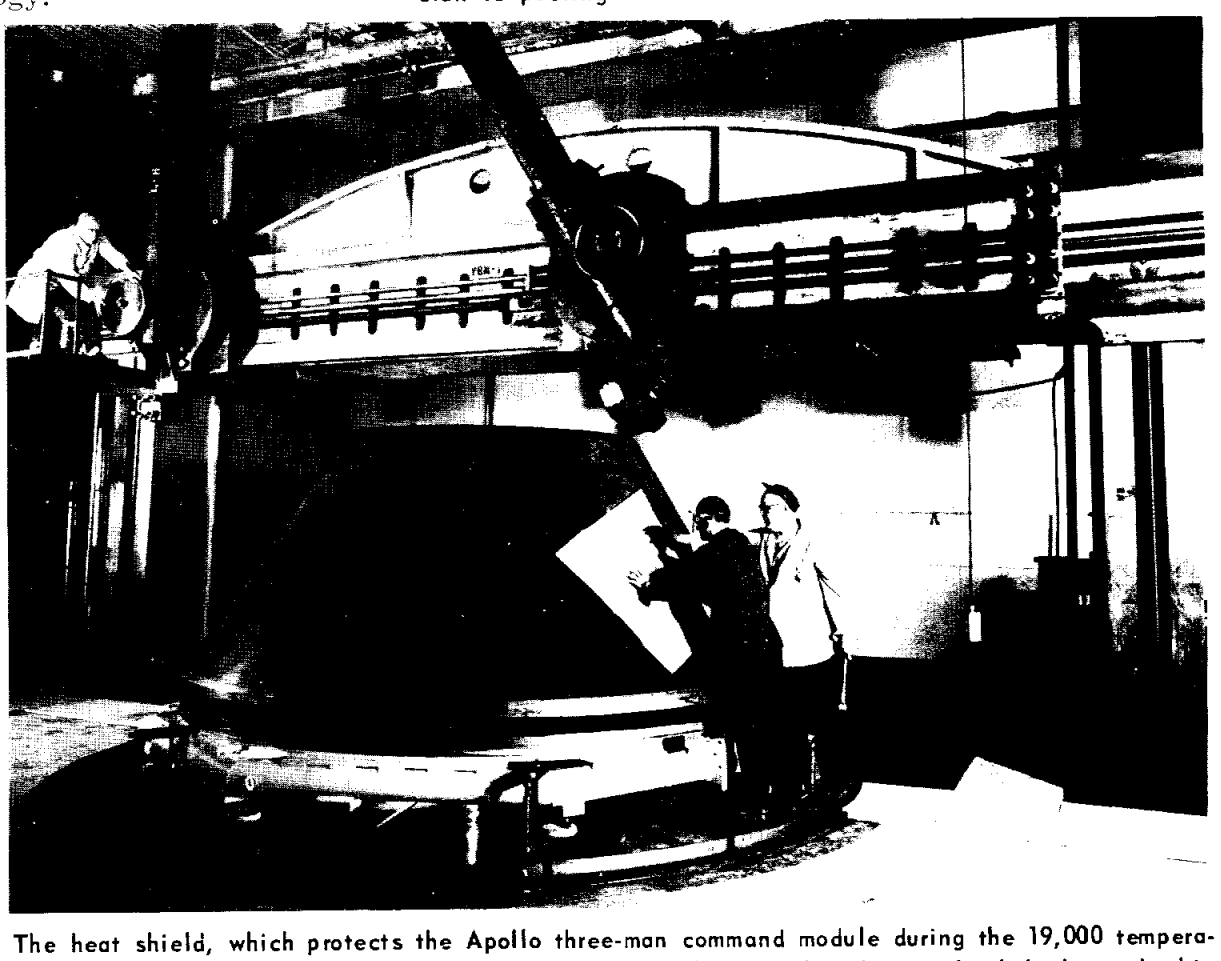


SHOCK TUNNEL—This aerodynamic testing facility at Avco Corporation's Research and Advanced Development Division, Wilmington, Mass., uses high-pressure hydrogen to achieve velocities above Mach 15 and temperatures of 5,000 C. In the background a technician is peering into the window where test models are mounted.

EDITOR'S NOTE: This is the twenty-first 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, AVCO Corporation.



A HIGH-ALTITUDE ballistics range at Avco/RAD is used for studies of the ionized wakes of hypervelocity vehicles at the edge of the earth's atmosphere, and for ballistic studies. The latter are valuable in predicting effects of micro-meteorite impact upon space vehicles. The facility consists of a light-gas gun (not visible in photo) firing into a near vacuum at hypersonic speeds.



The heat shield, which protects the Apollo three-man command module during the 19,000 temperature generated by earth reenty after its lunar mission, will be machined to its final thickness by this giant boring mill at Avco Corporation's Research and Advanced Development Division.

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

On The Lighter Side

AST Proves To Be An Asset

Having the letters AST (Aero-Space Technology) after your title seems to carry a little weight outside the confines of the Manned Spacecraft Center.

An employee of MSC recently applied for a home loan at a local savings and loan association and the processing of the application was going a little slow. Then one of the officials at the savings and loan asked the MSC employee if he by chance had AST after his title. When the employee replied yes, the official said, "Oh, that's different...." and thereupon the loan went through immediately.

Now this leaves us to wonder just what the loan official thinks the letters AST stand for (according to the MSC employee, he did not seem to know). Do you suppose he thinks it could mean "A Sure Thing" or some title that indicates that the person is qualified for a loan beyond question? Anyway it's nice to know that it helps. Maybe MSC employees with that title ought to think seriously about putting the letters AST on their next loan application, just to see if it really works.

Gemini Test Vehicle Arrives MSC; To Be Used In Astronaut Training

A Gemini test vehicle built to familiarize and train astronauts in recovery procedures to be employed after water or land landings of the two-man spacecraft arrived recently at the NASA Manned Spacecraft Center.

The full scale vehicle comprises the re-entry portion of the spacecraft including the crew compartment. It is a replica of all that portion of the Gemini vehicle that will re-enter earth's atmosphere and return to earth.

The test vehicle has aboard all systems needed for recovery including communications; environmental control; radio beacons and flashing lights. The test vehicle is configured to resemble the operational model.

With the vehicle, astronauts will practice methods of entering the capsule and departing from it after landing. Water tests will take place in Galveston Bay. Recovery teams also will use the vehicle to develop techniques for post-landing recovery of the spacecraft as well as astronauts.

THE EXECUTIVE SECRETARY of the National Aeronautics and Space Council, Dr. Edward C. Welsh, right, is shown above with MSC Deputy Director James C. Elms during his visit to the center last week.

WELCOME ABOARD

Thirty-five recent arrivals to Manned Spacecraft Center have been announced by Personnel Division.

MSC-FLORIDA OPERATIONS: Emmett Shepard, Christopher T. Widder, Joan D. Hudson, Carl L. Ellerd Jr., William B. Allen, Samuel B. Baker, Harold G. Koger.

COMPUTATION AND DATA REDUCTION DIVISION: Bruce B. Johnson.

PERSONNEL DIVISION: Glenda L. Malone, Sarah K. Duncan, Mary E. Wilson, Kay C. Duncan.

PROPULSION AND ENERGY SYSTEMS DIVISION: Joseph G. Thibodaux Jr., Edith L. Todd.

STRUCTURES AND MECHANICS DIVISION: Randall E. Sellers.

MISSION ANALYSIS DIVISION: James R. Roundtree, Samuel B. Crossland.

FLIGHT CONTROL DIVISION: Benjamin F. McGhee II, Kenneth W. Russell, Phillip N. Barnes.

FLIGHT CREW SUPPORT DIVISION: William S. Curran, Peggy J. Sanders.

GEMINI PROGRAM OFFICE: John E. Williams.

FACILITIES DIVISION: Henry G. Goodwyn.

WHITE SANDS MISSILE RANGE OPERATIONS: Donald R. Glebe.

ADVANCED SPACECRAFT TECHNOLOGY DIVISION: Joe G. Garcia, Nancy E. Davis, William W. Wais.

APOLLO SPACECRAFT PROJECT OFFICE: Mary M. Jones, Judith J. Liles.

ASSISTANT DIRECTOR FOR FLIGHT CREW OPERATIONS: Ronnie W. Cunningham.

OFFICE OF ASSISTANT DIRECTOR FOR ENGINEERING AND DEVELOPMENT: Harm Buning.

OFFICE OF TECHNICAL AND ENGINEERING SERVICES: William B. Hagan.

CREW SYSTEMS DIVISION: Clyde W. Teague.

Clean Shaven Moonmen?

There'll be no five-o-clock shadow for the man on the moon.

Engineers at the NASA Manned Spacecraft Center here are evaluating a combination razor and vacuum cleaner which will not only shave the astronauts, but capture weightless whiskers and prevent them from floating freely inside the spacecraft.

The device, patented by Shav-Air International of Charlotte, North Carolina, is being studied to see if it can be adapted to space use.

It's turbine motor is driven by vacuum.

Where does this vacuum come from?

From Space. It's all vacuum.

MSC PERSONALITY

D. R. Hendrickson Directs MSC Administrative Services

A former administrator of the Japanese Yen budget during the U. S. occupation of Japan, Douglas R. Hendrickson, chief, Office of Administrative Services, joined the Space Task Group at Langley in March 1961, as budget and fiscal officer.

Hendrickson assumed his present duties in June 1963, with his office having the responsibility to furnish administrative services support to all elements of the Manned Spacecraft Center.

His office directs the planning, coordination, and implementation of support in the areas of transportation, property and supply, office services, printing, graphics, telecommunications, mail and records, technical editing and writing, and technical library services.

In addition his office provides staff guidance and assistance to the Director, Deputy Director and Assistant Director for Administration, as well as other MSC organizational elements on matters involving administrative service.

Born in Cumberland, Wis., Hendrickson, grew up and completed his early schooling in St. Louis Park, Minn.

Just prior to entering the military service in 1942, he was a personnel assistant with North American Aviation Co. in Inglewood, Calif.

While in the Army he held various administrative jobs and saw service in the European Theatre of Operations. Upon being discharged from the service in March, 1946, he returned to a job with North American Aviation for a few months before joining Civil Service in August, 1946, in Tokyo, Japan.

While in Japan he held various positions from statistical clerk to budget administrator and budget specialist. In the latter two positions he was concerned with the preparation and administration of the Japanese Yen budget used for support of American occupation and security forces in Japan.

DOUGLAS R. HENDRICKSON

In June, 1956, Hendrickson became supervisory budget administrator chief of the Budget Division at the USAF Missile Test Center, Patrick AFB, Fla. and was with the Air Force until he joined the Budget and Finance Office, Space Task Group, at Langley in March 1963.

Prior to his present position as chief of the Office of Administrative services, Hendrickson was deputy chief of the Financial Management Division.

While in Japan, Hendrickson was married to the former Charlotte Stella of Kankakee, Ill. They have a son Robert who is five years old and the family resides in Houston.

Hendrickson's hobbies include golf, bowling, fishing and painting.

MSC DIRECTOR Dr. Robert R. Gilruth shows a model of Project Apollo hardware to former Ambassador to Italy Mrs. Clare Booth Luce as Paul E. Purser and Mrs. Oveta Culp Hobby, President and Editor of the Houston Post, look on.

Racing, Athletics, More Strenuous Than Space Flight, Tests Show

Athletes undergo more physical stress during competition than astronauts do during space flight. That's how it appears to scientists at the NASA Manned Spacecraft Center here. Experiments conducted with sports car drivers at nearby tracks indicate that the drivers work more strenuously during a race than any of the Project Mercury astronauts did during orbital flight.

But the key here is physical activity. An astronaut, in top physical shape and well conditioned to the rigors of high-performance flight, is physically restricted in his spacecraft. The bulk of his activity is in concentration and timing. An athlete's heart rate increases with muscular activity -- and with the heat of intense competition.

Studies conducted for the Manned Spacecraft Center by Bio-Dynamics, Inc., of Cambridge, Mass., seem to bear out that sky divers, hockey players, skiiers, polo players and track athletes also experience more physical stress than spacemen.

And a report published recently in "The Journal of Sports Medicine and Physical Fitness" by two University of Michigan investigators emphasizes that athletic competition is extremely demanding in the cardio-vascular system.

Handball, the report says, is more strenuous than paddleball, but paddleball is more demanding than badminton; tennis, though less strenuous than badminton, is more exerting than volleyball; bowling is less demanding than the other sports studied, but still seemingly more physically exerting than orbital flight.

Bowlers, according to the University of Michigan report, were found to range between 82 and 132 heartbeats per minute during competition, with a mean heart rate of 99.

Astronaut L. Gordon Cooper, during his 34-hour orbital flight, ranged from 55 to 180 beats per minute, but his mean heart rate was only 89 beats per minute.

And during an hour-long, 60-lap sports car race, one of the drivers monitored by Bio-Dynamics, Inc., experienced a mean heart rate of 200 beats per minute during segments of the race.

None of the Project Mercury astronauts during orbital flight reflected a heart rate higher than 184 beats per minute, and then only for a few seconds during re-entry -- the most rigorous part of the space ride.

Normally, a well conditioned athlete's heart rate -- and that of an astronaut -- is between 50 and 60 beats per minute. And for the sake of perspective, one NASA scientist explained that a perfectly normal, healthy individual -- neither athlete nor astronaut -- sometimes experiences heart rates of 180 beats a minute and higher while getting his teeth drilled at the dentist's office.

To get this comparative information members of the Space Medicine Branch at the NASA center, under the direction of Dr. Lawrence F. Dietlein, and scientists at Bio-Dynamics in Cambridge, taped electrodes to the chests of performing athletes. These sensors monitored heart and respiration rates and radioed them through small transmitters to receivers which converted them into readable physiological data.

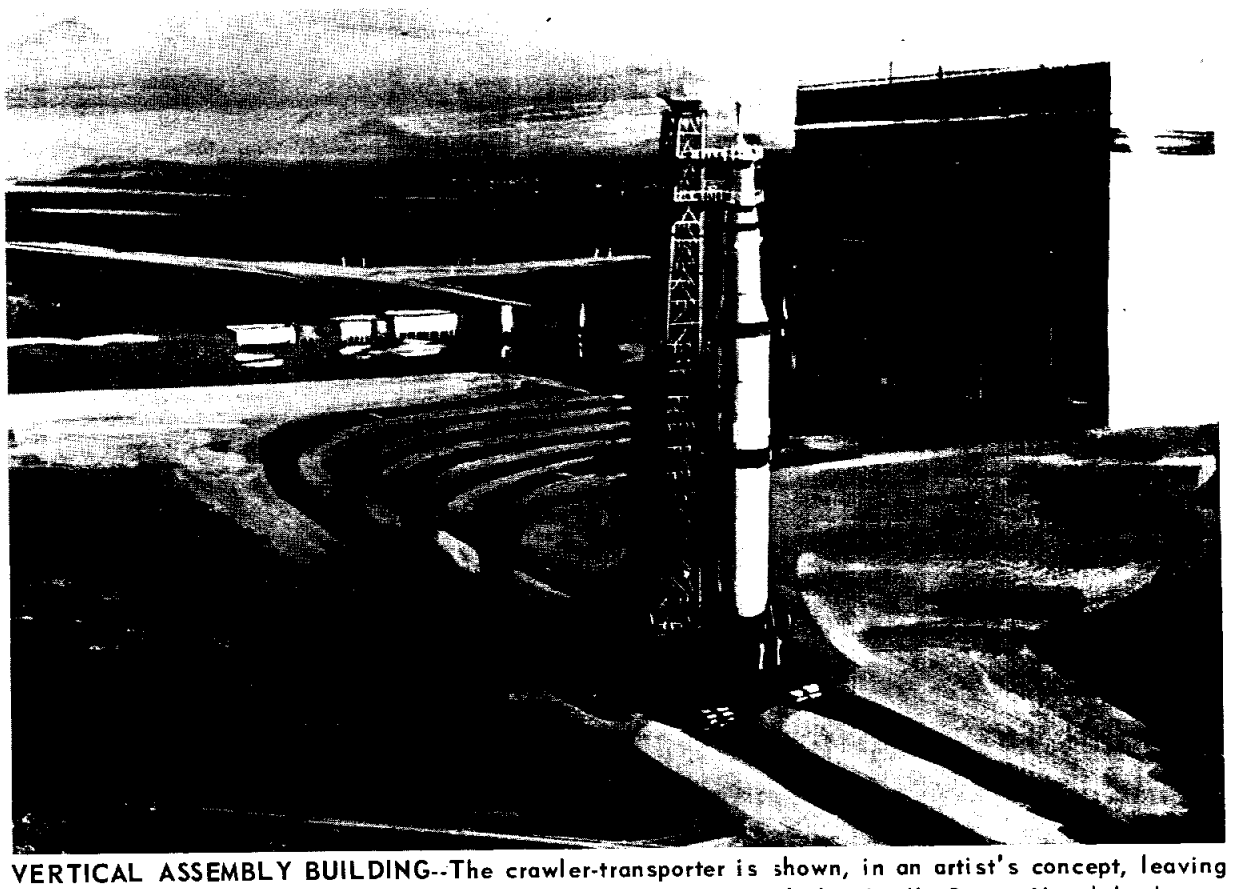
During space flight, astronauts are similarly monitored to keep NASA physicians constantly aware of a pilot's physical condition during flight.

Miss Rita Rapp of Dr. Dietlein's Experimental Medicine Branch has been gathering physiological data from sports car drivers with the assistance of two Baylor College of Medicine doctors, Dr. V. P. Collins, head of the Radiology Department, and his assistant, Dr. Zoltan Petrany. Dr. Collins and Dr. Petrany are sports car drivers and perform as subjects while collecting information on physiological stress. Later this month longer duration tests will be conducted at the Daytona Beach International Sports Car Association's big race in Florida where subjects will perform for as long as 12 hours at a stretch under severe stress.

Not only are telemetered heart and respiratory information gathered, but athletes provide blood and urine specimens before and after competing to give NASA a broader picture of their physical conditions.

When completed these studies will help NASA determine the degree of physical stress individuals can accept, and its effect upon their performance.

Miss Rita Rapp of the MSC Experimental Medicine Section attaches sensors to Dr. Vincent P. Collins, Chairman of the Radiology Department at Baylor College of Medicine, during sports car trials at Meyers Raceway, Houston.



VERTICAL ASSEMBLY BUILDING--The crawler-transporter is shown, in an artist's concept, leaving the Vertical Assembly Building on its way to the launch pad with the Apollo-Saturn V and the launcher umbilical tower.

Vertical Assembly Building on Merritt Island Will Have 125 Million Cubic Feet of Space

The Vertical Assembly Building on Merritt Island with its over 125-million cubic feet of space will be used to prepare the 7.5-million pound thrust Saturn V rocket and the three-man Apollo spacecraft for lunar flight.

Essentially a large steel-framed building with a metal skin, the VAB will be 524 feet tall, 674 feet long and 513 feet wide. It will contain more than one and a half times the volume of the Pentagon, the world's largest office building.

The 280-foot rocket and the Apollo spacecraft will be assembled in an upright position inside the VAB within a controlled environment.

After preparation, the Apollo-Saturn V will be transferred to the launch pad by the world's largest land vehicle, a crawler transporter. The Apollo-Saturn V will be vertically assembled in the VAB on its own launcher umbilical tower (LUT) and the entire package--rocket, spacecraft, and LUT--will be moved in an upright position to the launch pad some 3.5 miles away. There the crawler-transporter will place its 11.5 million-pound cargo on the pad where final launch preparations will be completed.

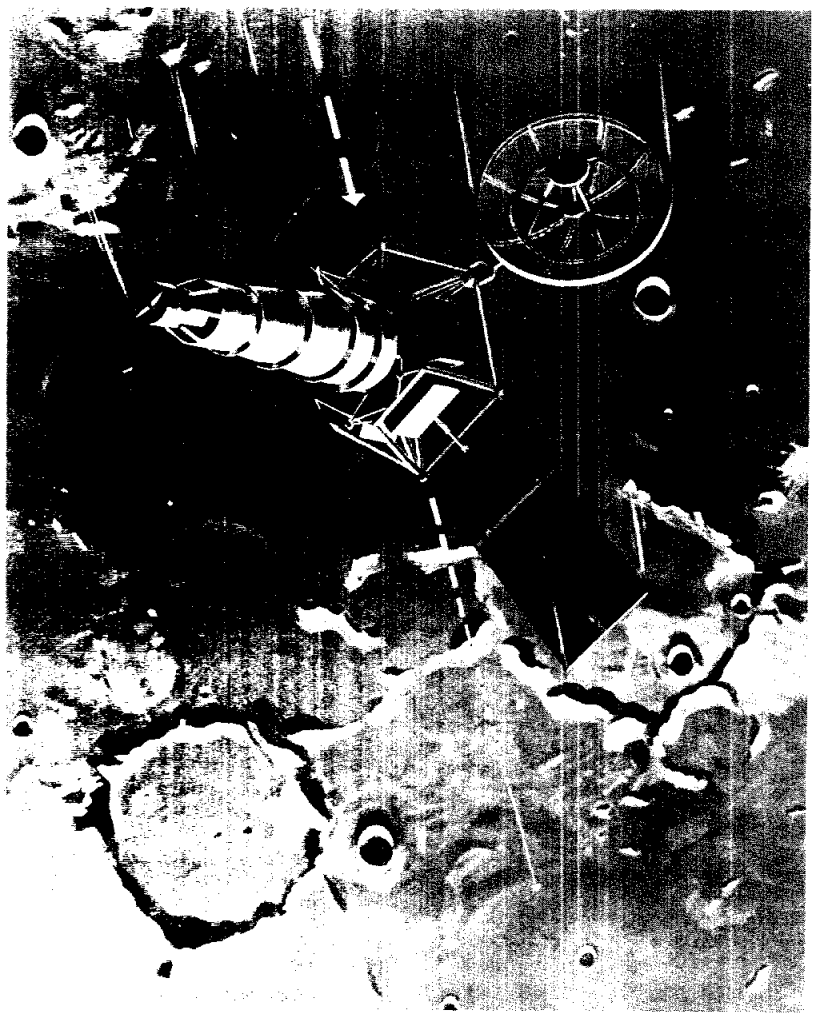
The first and second stages of the rocket are scheduled to be brought to Complex 39 by barge, the third stage by airplane.

After initial checkout, the stages then go into the high bay area for assembly. There will be four high bays, two back-to-back, each with its own 460-foot-high door opening onto the special roadway over which the crawler-transporter will move the vertically-assembled rocket.

Design of the building is such that it will withstand winds of hurricane force. Doors in the high bay area are being designed not only to protect the rocket and spacecraft from the weather but also to dampen sound shock waves created when the Apollo-Saturn V lifts off the launch pad.

Space News NASA ROUNDUP!

SECOND FRONT PAGE



THE SKETCH ABOVE depicts the attitude of Ranger VI as it was designed to approach the lunar surface. The spacecraft is tilted to allow cameras to look down the flight path.

Ranger VI Flight Hits Moon, Fails To Send Back Pictures

Ranger VI, a camera laden spacecraft, was launched from Cape Kennedy on an Atlas-Agena launch vehicle at 9:49 a.m., EST, Thursday, January 20, and completed its trip to the surface of the moon at 4:24 a.m., EST, Sunday morning.

Six television cameras were housed in the 804-pound spacecraft. During the last 10 minutes of the flight the cameras were to have gone into action, relaying as many as 3,000 pictures by radio signal to receiving equipment at the Jet Propulsion Laboratory at Goldstone, Calif.

Some of the objectives of the flight were to provide closeup photos of the moon's surface - photos needed in the development of vehicles for lunar landing. It was estimated that pictures taken seconds before the impact would allow scientists to distinguish objects as small as a card table on the lunar surface.

At 12:30 a.m. Friday, almost 17 hours after its launch, Ranger VI received mid-course correction signals designed to put it back on target. The signals caused a 50-pound thrust booster rocket to ignite and increase the spacecraft's 1,343-mile-per-hour speed by 92 m.p.h., and thus pull the trajectory toward the center of the moon. Prior to the maneuver, Ranger VI was on a course that would have missed the moon by about 600 miles.

14 Astronauts Report And Start Training

Fourteen new members of the Gemini and Apollo space flight crew pool reported to Manned Spacecraft Center Monday to begin their training as astronauts. The new men, selected from among about 270 volunteers last October, bring the total of astronauts in training for the MSC manned space flight programs to 29.

Reporting for duty as astronauts were Civilians Russell Louis Schweickart and Ronnie Walter Cunningham; Air Force Major Edwin Eugene Aldrin Jr., Capt. William Alison Anders Jr., Capt. Charles Arthur Bassett II, Capt. Michael Collins, Capt.

(Continued on page 3)

Motion Device Being Studied

A new concept in motion simulation, the first to produce unlimited angular motion for a large heavy vehicle is being studied for the NASA Manned Spacecraft Center by the Aerospace Division of Westinghouse Electric Corporation, Pittsburgh, Pennsylvania.

Developed under a contract with MSC, the study also calls for a 34-inch diameter working model of the full scale device which will be used to prove the feasibility of the simulation concept.

The simulator has six sets of steerable dual aircraft wheels which are driven and steered by hydraulic motors. The wheels are affixed to the outside of the superstructure within which a spacecraft is mounted. The entire assembly rotates within a cup-like open hemispherical base to give the spacecraft unlimited angular motion about any axis.

A computer would accept inputs from the spacecraft control systems and, in turn, control hydraulic motors that drive and steer the simulator's wheels. A hydraulic pump driven by a 65 horsepower gas turbine supplies power to the motors.

After intensive testing, the space agency will determine if procurement of a full scale assembly is necessary. If the final full scale assembly is ordered, it will be 23 feet in diameter, large enough to accept spacecraft the size of the Apollo Command Module.

Free Fall Platform Contract Award

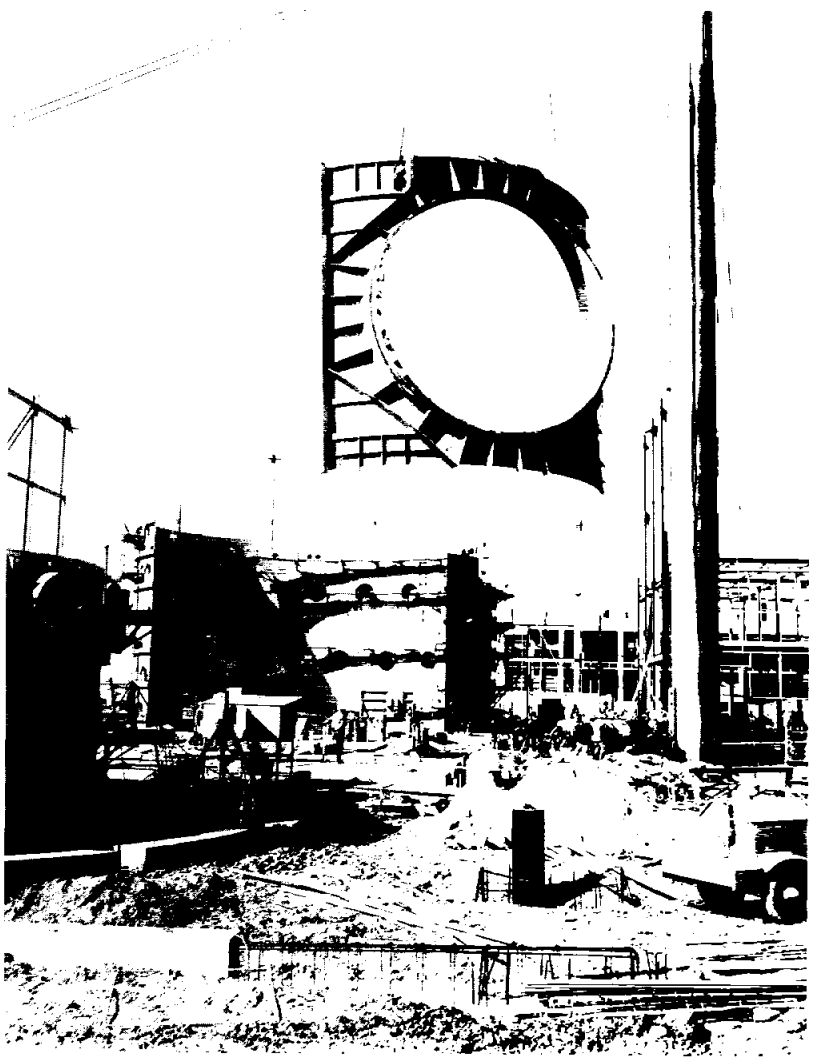
The American Machine and Foundry Company, Santa Barbara, Calif., was selected by the Manned Spacecraft Center to build a guided free fall platform to investigate effects of impact on space pilot's equipment.

The fixed price research and development contract is for $185,800.

The free fall platform is capable of containing up to 2,000 pounds of equipment. It is four feet wide by seven long, large enough to hold a couch, harness and test manikin. The platform can be hoisted 26 feet above floor level and then dropped, impacting on a piston located in a fluid-filled cylinder.

American Machine will install the device in MSC's Life Systems Laboratory at Clear Lake. The contract calls for completion of the work by Dec. 21, 1964.

It is being built for the Crew Systems Division.



THIRTY-EIGHT FOOT DOOR—The 97 ton stainless steel frame for the entrance door to the Space Environment Chamber at Clear Lake is lowered into place. The diameter of the door opening is 38 feet.

Vacuum A Chamber Doorway Is Installed

The huge stainless steel frame for the entrance door to Chamber A in the Space Environment Simulation Laboratory was lowered into place at the NASA Manned Spacecraft Center's Clear Lake site, on January 17, by Chicago Bridge and Iron Company of Oak Brook, Ill., contractor for chamber construction in the environmental building.

The frame weighed approximately 97 tons. It had to be raised more than 150 feet above the ground, moved over guy lines before being mounted.

Chamber A is the larger of two vacuum chambers under construction. A full size spacecraft of the Apollo class can be tested in it. The chamber is tubular in shape, 172 feet long and 65 feet in diameter with approximately 82 feet of the facility below ground. The diameter of the door opening is 38 feet.

Within this chamber, solar simulation units will achieve the effect of the sun on the lunar surface. Other simulated effects will be the extreme cold and airlessness of outer space. These extremes range from a minus 253 degrees to 121 degrees centigrade--a variation of 374 degrees. The vacuum will be equivalent to approximately 75 miles out from earth's surface.

A smaller chamber also is under construction. Identified as Chamber B, it is nearly 42 feet long and has a 35-foot diameter. Entrance into Chamber B, will be from the top.

Total value of construction and equipment for the simulation laboratory is $3,423,397.

Gemini Egress Tests Underway

The development of training techniques to teach astronauts egress from a Gemini spacecraft got underway here at the Manned Spacecraft Center the last week in January.

In the program, engineers from MSC's Landing and Recovery Division are seeking optimum methods for leaving a space craft that is in the water. They use a tethered boiler plate version of the Gemini spacecraft.

The boiler plate has the same configuration and mass as a production model. Only the weight differs. It has been modified for egress and includes mock-up seats and an instrument panel.

In the test the spacecraft floats in a 24-foot diameter tank. At a given moment, the two subjects who are in the closed vehicle are ordered to egress and the manner, procedure and time it takes to get out is recorded for study.

Development of egress training techniques will lead to tests later this year involving astronauts and

(Continued on page 3)