

APG
Space
News

INDEXING DATA
DATE 5-14-65 OPR MSC # 4-15 T 2 PGM IWS SUBJECT ★ SIGNATOR Roundup LOC GR1102

ROUNDDUP!

VOL. 4, NO. 15

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

MAY 14, 1965

At WSMR Next Week

Apollo Launch Escape System Test Scheduled



APOLLO HIGH ALTITUDE TEST—Emergency launch escape and earth landing systems for Apollo spacecraft are shown in this drawing of scheduled high altitude abort sequence test at White Sands Missile Range, N.M. A Little Joe II rocket (General Dynamics/Convair) plays role of Saturn rocket in trouble and lifts Apollo command to high altitude region where abort sequence is initiated. Launch escape rocket motor (Lockheed Propulsion Co.) pulls command module from booster to safety area and Apollo coasts to about 33 miles altitude. Wing-like canards stabilize tumbling command module to blunt end forward position. Tower jettison motor (Thiokol Chemical Corp.) fires pulling tower clear of command module. Forward cover is jettisoned exposing parachute recovery subsystem (Northrop Ventura Division) which lowers five-ton command module to safe landing speed of about 25 feet per second (17 miles an hour). Apollo spacecraft (North American Aviation's Space and Information Systems Division) is produced for NASA's Manned Spacecraft Center.

NASA—Wide Contest

Cash Prizes Offered For Best Cost-Reduction Symbol And Slogan

A NASA-wide contest to provide a Cost Reduction Symbol and Slogan was announced early this month with cash prizes to be offered at the NASA Center level and also for the finalists by NASA Headquarters.

The contest was announced here by Dr. Robert R. Gilruth, director, Manned Spacecraft Center, who said that "This contest is the first step in the enlarged and continuing program involving recognition and reward for individual achievement."

Two separate contests are being conducted: one for the purpose of selecting the slogan and the other for selection of a cost reduction symbol. The monetary and other awards will be identical for both contests.

All MSC employees are encouraged to participate and help make the contest a success. Cash awards to be presented to local winners at the Center will be: 1st prize—\$150, 2d prize—\$75,

3d prize—\$25, with the winning entry being submitted to NASA Hq and entered in NASA-wide competition for additional monetary rewards.

Dr. Gilruth said, "President Johnson directed on Dec. 4, 1964, that increased recognition be given to those organizational elements and individuals making notable advances in conducting efficient operations at lower cost. I agree with the President and feel that this type of activity stimulates the ingenuity and imaginations of our employees."

The rules state that contestants may participate in one or both contests or submit a combined entry containing both a slogan and a symbol. Entries should be marked on the trans-

mittal envelope to indicate whether they are to be considered for the symbol contest, the slogan contest, or both.

Contestants may submit as many entries as they wish, however, not more than one award will be given to an individual in the same category.

Deadline for entries in the contest is 5:30 p.m., May 28, with entries to be submitted to the MSC Cost Reduction Officer, Rm. 167, Building 2.

Slogans will be judged for originality and for appeal, and should not exceed 15 words.

Symbols should attempt to strikingly depict the idea of cost reduction and/or the benefits associated with it in a manner
(Continued on Page 7)

The fourth in a series of Apollo spacecraft launch escape system tests is scheduled to be conducted at White Sands Missile Range, N.M., no earlier than next Wednesday (May 19).

Called Apollo Boilerplate-22, the spacecraft will be launched by a Little Joe II rocket to an altitude of 112,000 feet above the ground where the Apollo launch escape subsystem will be fired. The escape motor will carry the spacecraft to a peak altitude of about 175,000 feet.

The spacecraft is expected to land about 110 miles up-range near Williams Ranch, private property leased by the government to extend the White Sands Range.

Two main objectives of this test flight are:

1.—To determine performance of the launch escape vehicle at an altitude approximating the upper limit of the canard subsystem. Canards are small wings on the forward section of the escape rocket to orient the Apollo command module aerodynamically in an escape situation in the atmosphere.

2.—To demonstrate orienta-

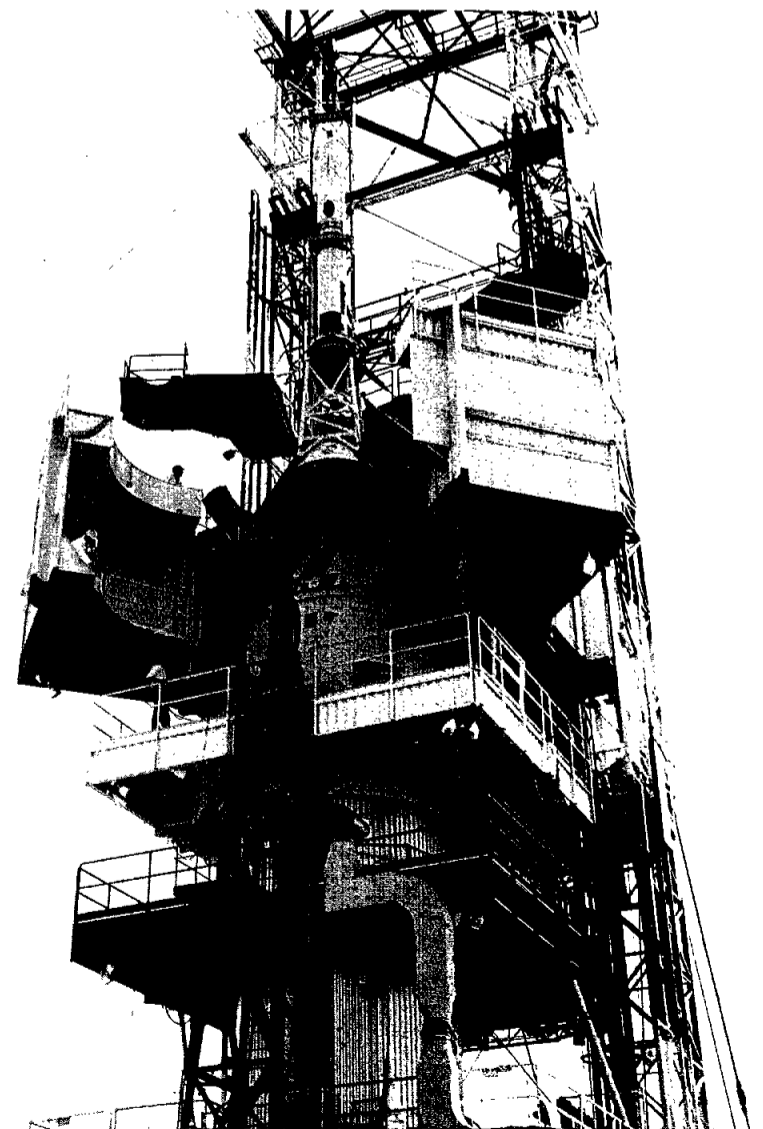
tion of the launch escape vehicle to a relatively stable position with the main heat shield forward, using the canards, for proper deployment of dual drogue parachutes.

During a launch of the three-man Apollo spacecraft, the launch escape subsystem would be used to propel the spacecraft and its crew to safety in the event of a Saturn launch vehicle failure either on the pad or during powered flight.

The Apollo Boilerplate spacecraft will incorporate for the first time a jettisonable forward heat shield which will be separated from the command module by thrusters prior to parachute deployment. A new pilot and main parachute design also will be used for the first time.

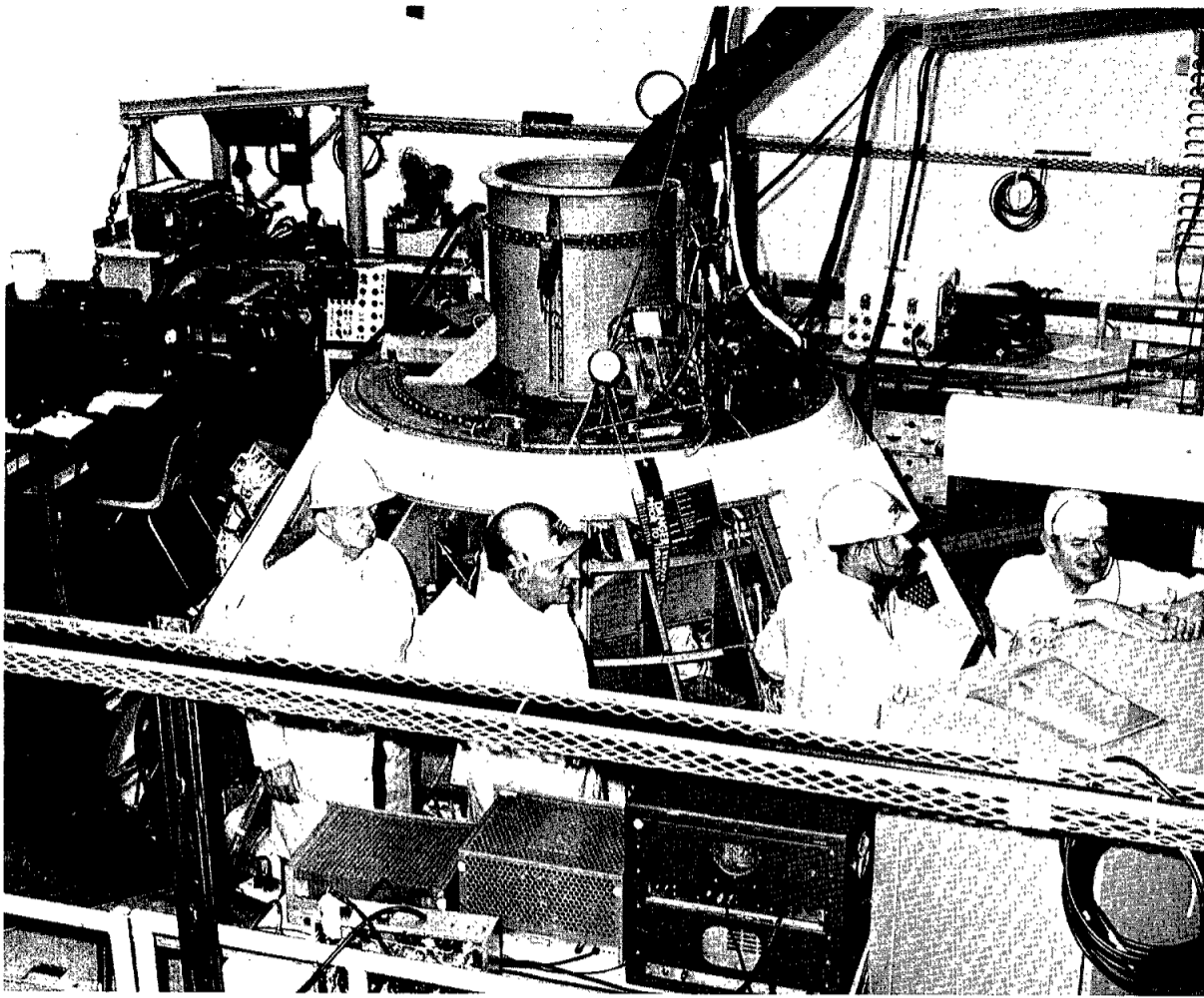
Previous tests of Apollo spacecraft launch escape vehi-

(Continued on Page 3)



LIFTED INTO PLACE—The Launch Escape Vehicle is lifted into place at Launch Complex 36, White Sands Missile Range, N.M., in preparation for the Apollo Boilerplate-22 flight. The LEV is lowered, with the booster protective cover, for mating with the Apollo command module, atop the Little Joe II launch vehicle.

Apollo Boilerplate -14 Checks, Perfects Systems For Flight To Moon



ON THE SPOT—Test team members check vehicle operations on special test equipment located in huge clean room of Apollo Systems Integration and Checkout facility at Space Division's Downey facility.



IN PROGRESS—Comprehensive checkout equipment used in Boilerplate 14 program is identical to that which will be used at Cape Kennedy. Vehicle includes both command and service modules and will contain actual flight hardware. Current test program is simulating mission of Apollo spacecraft 009.

Apollo Tracking Station Contracted For Bermuda

A real time (no delay) deep space tracking and data acquisition system for support of Apollo Moon missions is to be built by Radio Corporation of America under a \$4.6 million contract by NASA's Goddard Space Flight Center.

The contract calls for the installation, checkout, and documentation of RCA's most sophisticated long range (32,000

miles) radar, called the FPQ-6, at NASA's Bermuda site on Cooper's Island.

The Manned Space Flight Tracking Network's first "Q-6" was previously installed by RCA at NASA's Carnarvon, Australia, station and has performed creditably throughout earlier Gemini and Saturn booster test missions.

Since the giant Saturn booster

will insert the three man Apollo spacecraft into earth orbit at a more eastward point than either Mercury-Atlas or Gemini-Titan boosters, the Bermuda facility will be a key station throughout the critical launch period of the flight. First to electronically "see" the initial powered flight stages of the giant rocket, Bermuda will provide the much needed "go-no-go" data to mission directors for decision making purposes.

Operating at "C-Band" frequencies the highly precise system has a power capability of 2.8 million watts and employs a 29-foot, dish-like antenna that yields a pin-point beam width of one-half degree accurate to 30,000 miles within six feet. By comparison, Bermuda's present tracking radar, the RCA FPS-16, tracks to 500 miles with an accuracy of 15 feet.

MSC To Lease News Center For Flights

A building in the Nassau Bay office center across the street from the Manned Spacecraft Center will be leased for use by NASA and news media representatives during the upcoming Gemini flights, it was announced this week by Wesley L. Hjernevik, assistant director for Administration.

The lease of the building will

cost \$92,165.70 per year with certain modifications being made to the building by the landlord. Other modifications and equipment will be installed by NASA at a cost of about \$126,000. Most of this cost will be for equipment and furnishings which will belong to NASA.

The building is expected to be ready for occupancy May 24.

A spacecraft that will never leave the ground is being used to check and perfect the systems that one day will insure the astronauts' safety on the historic Apollo flight to the moon.

The test model, Boilerplate 14, is an engineering development tool that will never leave North American Aviation's Space and Information Systems Division at Downey.

Consisting of both command and service modules, the "house" spacecraft contains actual flight hardware that can be operated and monitored through a comprehensive checkout system identical to that which will be used at Cape Kennedy.

Boilerplate 14 is a veritable jack-of-all-trades. In it, flight systems can be put through an extensive test program under simulated operational conditions, and it can be used for advanced compatibility checks between the spacecraft systems and ground support equipment.

It also will help prove out engineering modifications prior to their being incorporated into flight spacecraft, and will be used as a training vehicle to better qualify test engineers for their jobs.

Built with an aluminum structure, Boilerplate 14 has removable skins which provide easy access to its wiring and internal systems. It is undergoing testing in the huge clean room area of the Apollo Systems Integration and Checkout facility (Bldg. 290) at Downey.

Paul Koenig of the Space Division's Apollo Test and Operations, test project engineer for Boilerplate 14, said the test program is being conducted in phases and will check the major-

ity of the major systems for flight spacecraft, including the fuel cell, communication, instrumentation, guidance and navigation, and stabilization and control systems.

The command and service module reaction control motors and the service module propulsion motor systems will be checked electrically to the point of ignition, said Koenig.

"Currently," Koenig said, "the test program is supporting the unmanned flight of Spacecraft 009, which is scheduled for the first Saturn 1B launch."

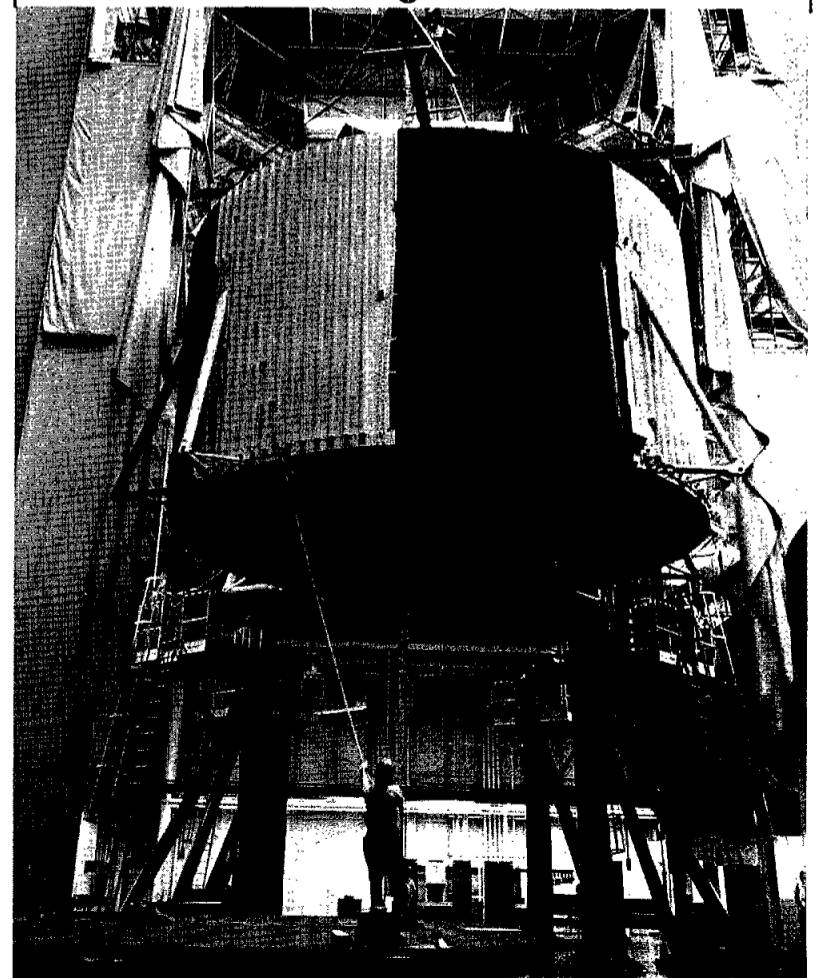
The current testing program will simulate the entire mission of Spacecraft 009 from launch to water landing, using systems which are functionally the same as those for the launch vehicle. Two integrated systems checks already have been conducted, in which all the major flight systems have been tested.

Started in 1964, the initial portion of the test program was a fit-check of the systems to insure that they actually could be installed in the spacecraft.

The Boilerplate 14 program is but one phase of the intensive ground test program which is serving as a dress rehearsal for the first manned lunar landing.

By the time Spacecraft 009 is launched, the reliability of its systems will have been thoroughly proved out in hundreds of hours of testing in Boilerplate 14—more than enough time for several trips to the moon and back.

First S-IC Stage Assembled



SATURN V FIRST STAGE—A 33-foot-diameter thrust structure for the Saturn V moon rocket first stage (S-IC) is lowered into its vertical assembly position, as assembly of the first S-IC stage began recently at the National Aeronautics and Space Administration's Michoud Operations in New Orleans. The 90,000-pound corrugated tail section, built by The Boeing Company's Launch Systems Branch, will support the booster's five, 1.5-million-pound-thrust engines.

Apollo

(Continued from Page 1)

cles conducted from White Sands were:

—Boilerplate 6—Nov. 7, 1963
—Successful abort from the launch pad.

—Boilerplate 12 — May 13, 1964—Successful high dynamic pressure tests despite failure of one of the three main spacecraft parachutes to deploy fully.

—Boilerplate 23 — Dec. 8,

1964—Successful abort at maximum dynamic pressure region. (This abort was at about 31,000 feet.)

Last December's test was the first using canard subsystem, dual drogue parachutes, a command module boost protective cover and a Little Joe II with control fins for guided flight during the boost phase, all of which will be used for this test.

Two more abort tests are planned this year at White Sands, including an off-the-pad abort using Boilerplate 23 again (redes-

igned BP-23A), and a fourth Little Joe II abort test using a flight production Apollo spacecraft (Spacecraft 002) instead of an engineering test "boilerplate." Spacecraft 002 will be the first actual Apollo spacecraft to be launched.

The flight plan for the test vehicle calls for it to be launched from Complex 36 at White Sands Missile Range in a northerly direction at an angle of about 84 degrees to the horizontal. A launch signal, via electrical cables from the blockhouse, will ignite three first stage Alcol solid propellant rocket motors in the Little Joe II launch vehicle.

Three second-stage Alcol motors will be ignited about 40 seconds after liftoff by an on-board timer ignition circuit as the first stage burns out. The second-stage Alcols will propel the test vehicle to the test point, about 112,000 ft.

Flight trajectory will be programmed by an autopilot aboard the Little Joe II, "steering" the launch vehicle by actuating aerodynamic control surfaces on the launch vehicle's fins.

Abort will take place about 89 seconds after liftoff, commanded by radio from the ground. The abort signal will begin separation of the Apollo command module from the service module, ignition of the pitch control and launch escape rocket motors, and (11 seconds later) deployment of the canard surfaces.

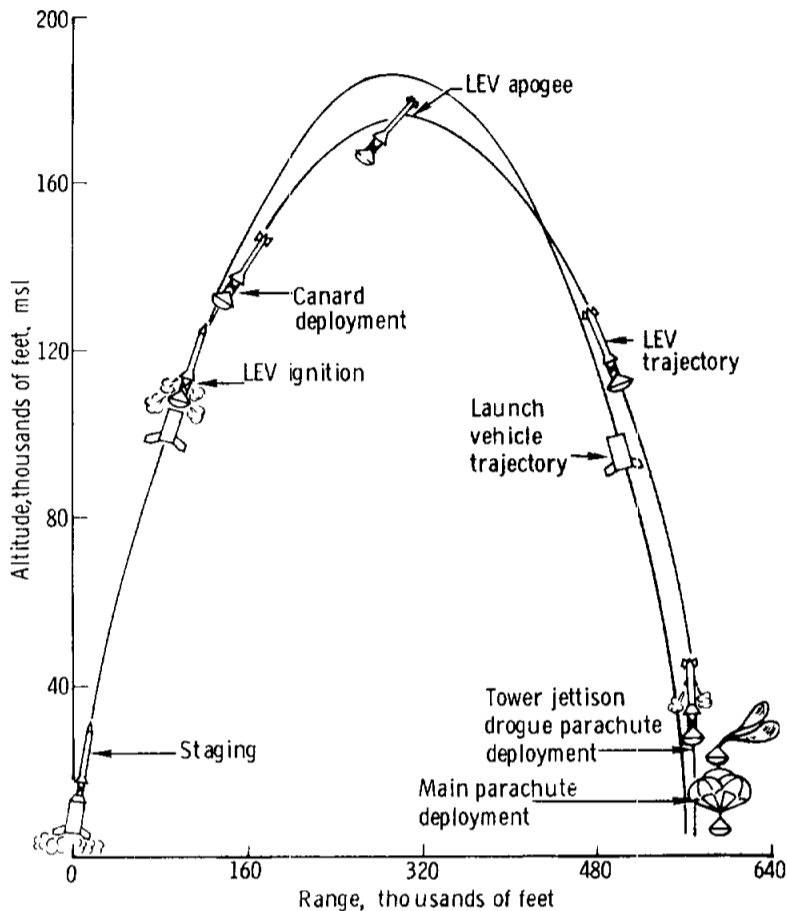
The Apollo launch escape vehicle will coast in tumbling flight to an altitude of about 175,000 feet, then begin its tumbling descent. Canards and the launch escape subsystem will stabilize the spacecraft with its aft heat shield forward and downward.

At an altitude of about 21,000 feet above the range the tower

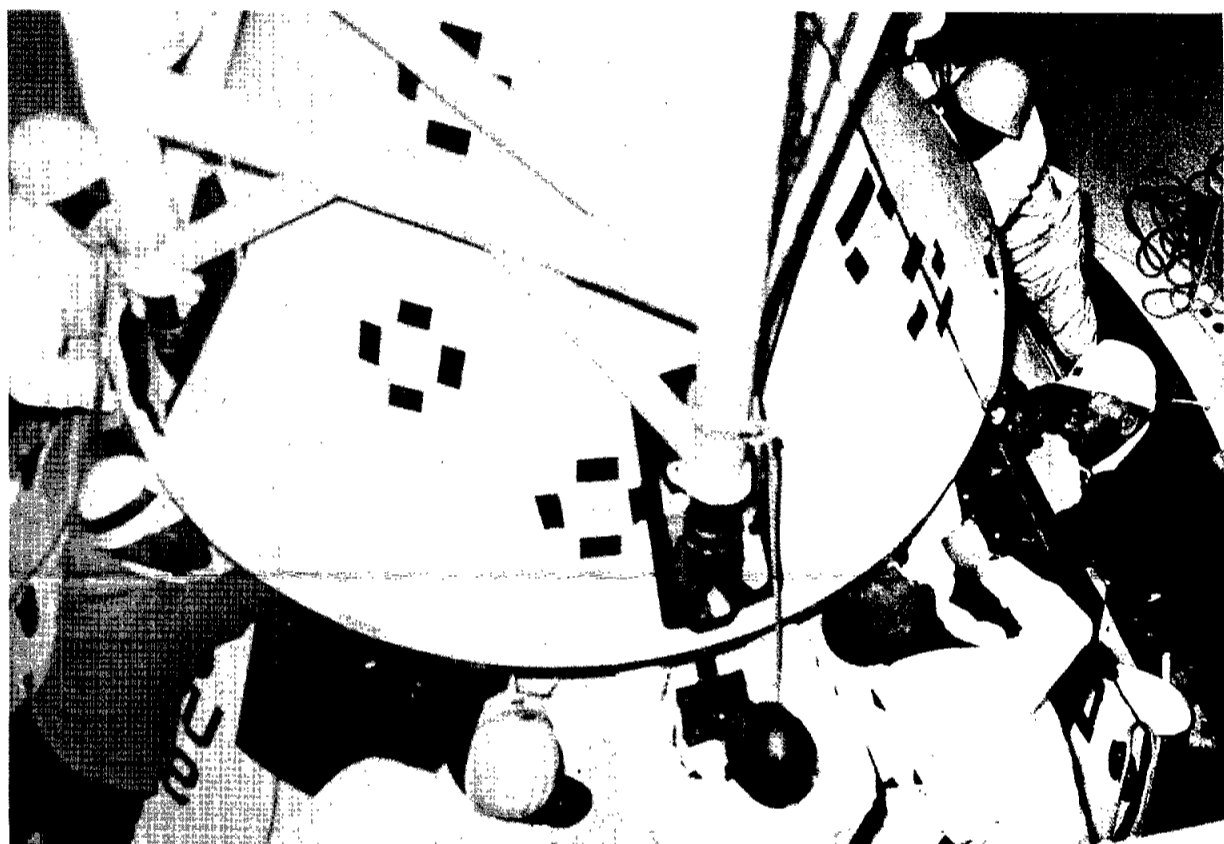
jettison rocket motor will carry away the launch escape subsystem and boost protective cover. The forward heat shield will be jettisoned 0.4 seconds later, exposing the compartment which contains parachutes, the egress hatch and other equipment.

Dual-drogue parachutes will be deployed in reefed condition two seconds after jettison of the launch escape subsystem. The drogues will be reefed for eight seconds.

At an altitude of about 6,000 feet above the range, the dual-drogue parachutes will be jettisoned and three main parachutes will be deployed in reefed condition by mortar-actuated pilot chutes. Eight seconds later the main parachutes will be disreefed and inflated fully, lowering the spacecraft to a landing approximately 110 miles from the launch point.



Mission A-003 nominal mission profile



LEV MATING—The Launch Escape Vehicle tower and legs and the booster protective cover is mated to the Apollo command module Boilerplate-22 at Launch Complex 36, White Sands Missile Range, N.M.

Giant 'Eye Charts' To Check Visual Perception In Space

How well astronauts can see the Earth and objects on the Earth from an orbiting spacecraft will be determined scientifically in a project that will use areas in Australia and the southern part of Texas for the tests.

The scientific program of some future Gemini flight will include an experiment to shed light on this subject, which has been of interest to scientists since several astronauts in orbit reported seeing surprising detail on the Earth.

Main objective of the experiment will be to measure the cut-off point in recognizing objects on the ground as they are displayed in progressively smaller fashion, much as an ordinary eye chart uses lettering of decreasing sizes.

Australia has agreed to provide a site in Western Australia which is well suited to Gemini flightpaths in the Southern Hemisphere, providing a sufficient number of sightings for the results to be statistically significant. A similar Northern Hemisphere area is being prepared 40 miles north of Laredo, Tex.

Flat plots of land in a semi-arid region are required for such an experiment so that cloud-cover interference is less likely. The terrain needs to be either barren of vegetation or easily cleared. The plots will range in size from a mile or more wide to several miles long.

Each plot, or strip of land, will

be divided into a number of squares with some of the squares containing markings for use in the sighting experiments.

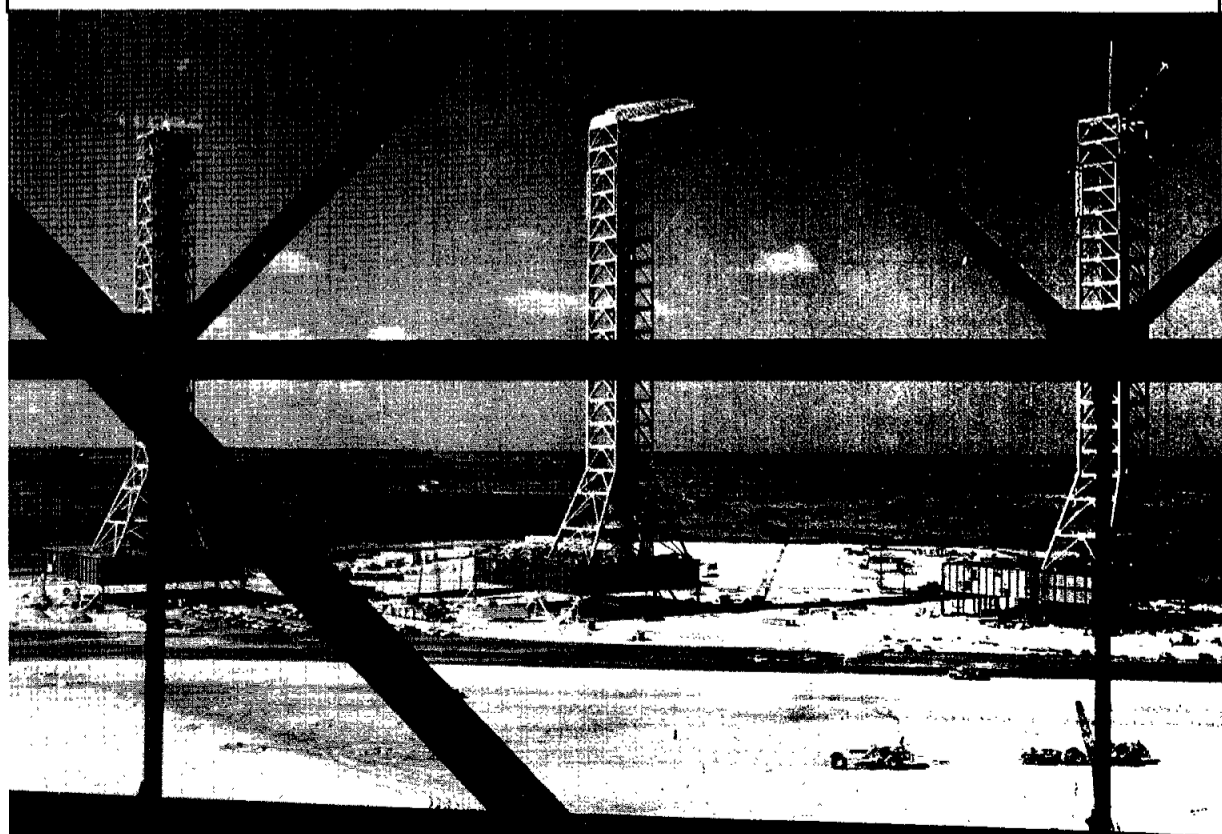
The shapes, or markings, presented for viewing by the astronauts will be of white material, such as sea shells, spread on the ground. The markings will have varying sizes and orientations.

The astronauts will be asked to report the number and orientation of the markings they can observe. The astronauts also will be repeatedly checked in flight with an on-board device to test their brightness discrimination, contrast threshold and visual acuity, or sharpness.

As the flight continues, the several tests will help determine how the visual capability of the astronauts is affected by prolonged weightlessness, breathing pure oxygen, breathing under a pressure of five pounds per square inch, and other in-flight stresses.

The experiment for testing visual perception in space will have as its principal investigator on behalf of NASA, S.Q. Duntley, director of the Visibility Laboratory of the Scripps Institute of Oceanography, University of California, LaJolla.

Portable Launching Pads For Apollo



LUNAR LAUNCH TOWERS—Artistically framed, through the structural steel work of the Vehicle Assembly Building on Merritt Island, Fla., are three mobile launchers that will help send National Aeronautics and Space Administration Apollo-Saturn V moon rockets on their way. The tower at right is being topped out as huge hammerhead crane is lifted to its crown. The structures are 445 feet high. With each launcher topped off, ground support equipment and electrical apparatus are now being installed, to be completed by December, 1966.

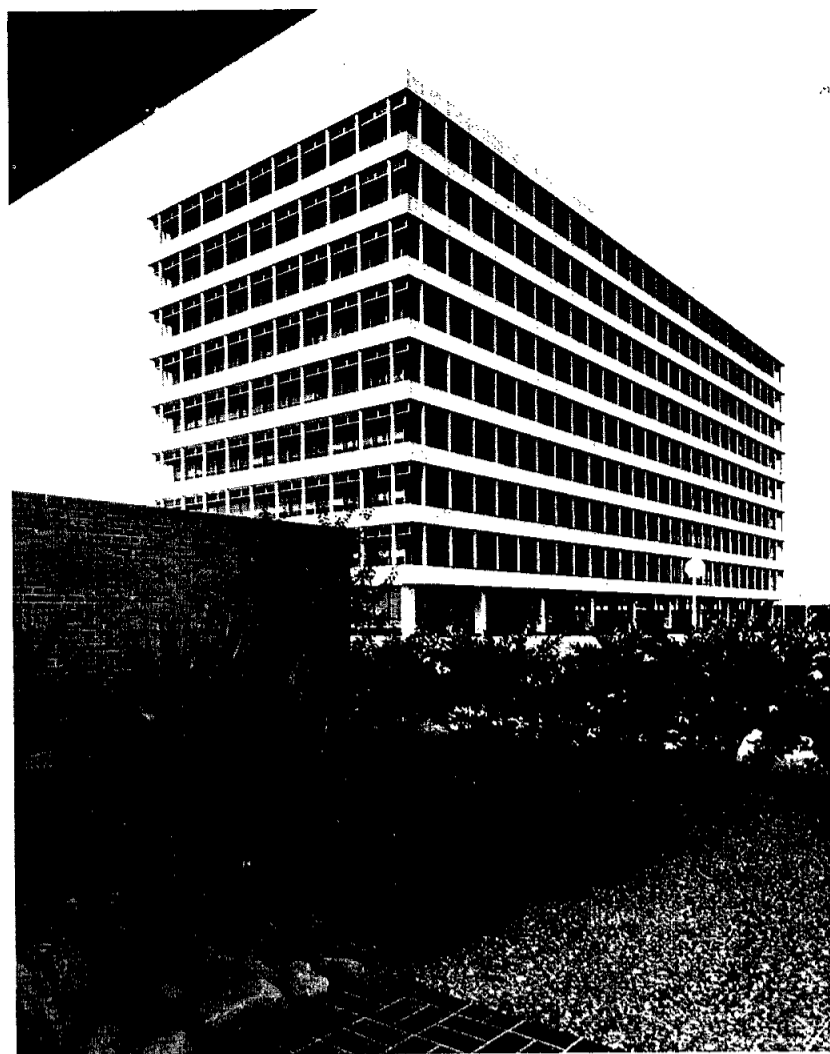
AUTICS AND SPACE ADMINISTRATION FT CENTER ORGANIZATION CHART



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George M. Low



SPECIAL ASSISTANT
Paul E. Purser



PROJECT MANAGEMENT BUILDING



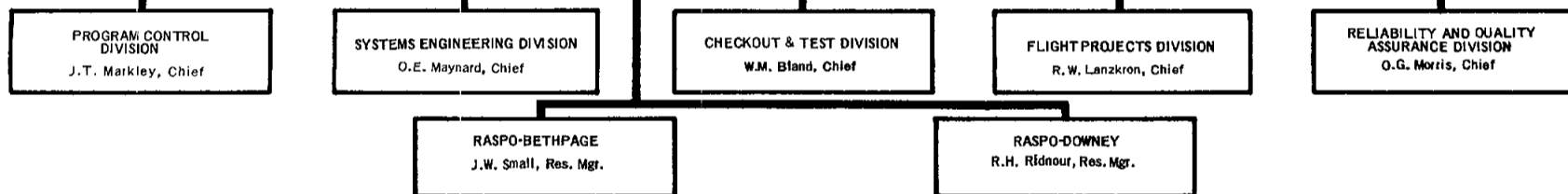
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D.O. Coons, M.D., Chief



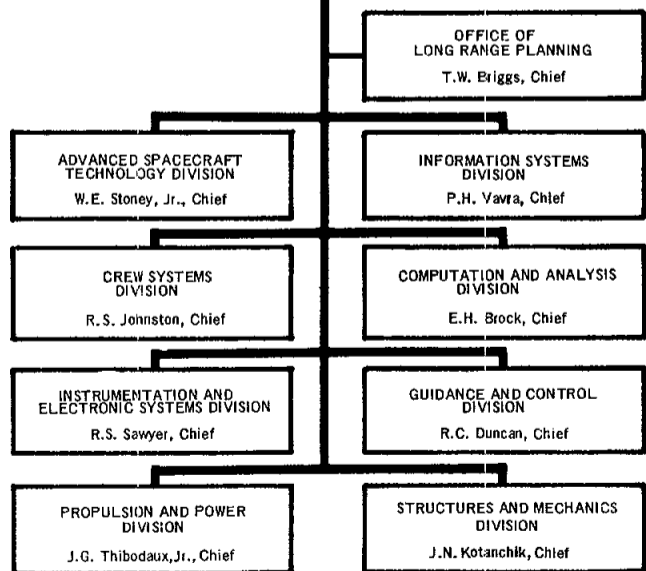
LEGAL OFFICE
J.W. Ould, Chief Counsel



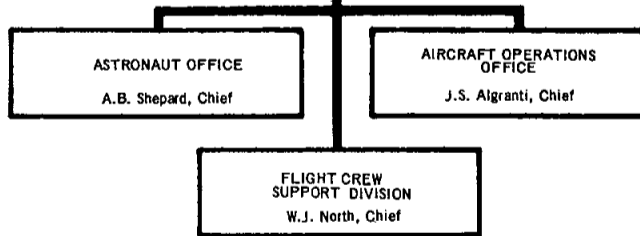
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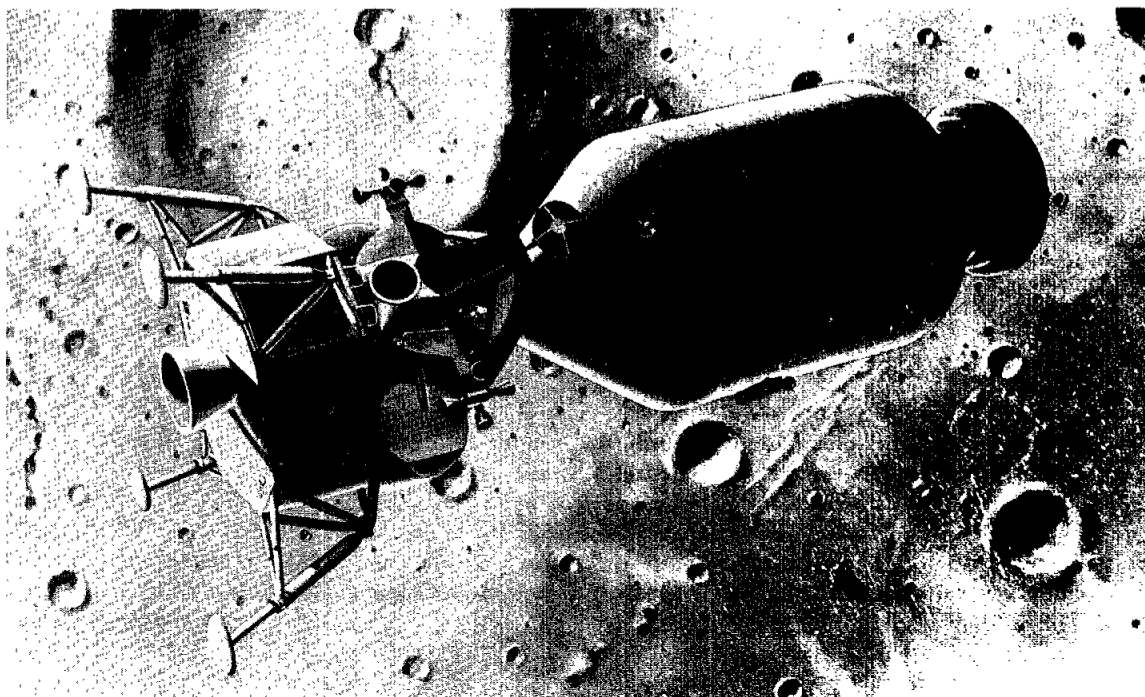


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The SPACE NEWS ROUNDUP, an official publication of the Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Texas, is published for MSC personnel by the Public Affairs Office.

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 Public Affairs Officer Paul Haney
 Editor Milton E. Reim
 Staff Photographer A. "Pat" Patnesky

Seven MSC Employees Named To AIAA Technical Committees

Seven members of the Manned Spacecraft Center team were named recently to serve on key technical committees of the American Institute of Aeronautics and Astronautics (AIAA) for 1965.

These committees are comprised of persons considered to represent the best technical leadership in the aerospace disciplines.

The committees and the MSC people named to serve are: **Aerodynamic Deceleration Systems**, John W. Kiker, chief, Landing and Technology, Branch, Structures and Mechanics Division; **Astrodynamic**s, John P. Mayer, chief, Mission Planning and Analysis Division; **Atmospheric Flight Mechanics**, William E. Stoney Jr., chief, Advanced Spacecraft Technology Division; **Entry Vehicles**, Maxime A. Faget, assistant director for Engineer-

ing and Development; **Ground Testing and Simulation**, Aleck C. Bond, manager, Systems Test and Evaluation, Gemini; **Guidance and Control**, Dr. Robert C. Duncan, chief, Guidance and Control Division; and **Life Sciences and Systems**, Rufus R. Hessburg, M.D., assistant chief for Medical Support, Crew Systems Division, who was named chairman of that committee.

Purpose of the Technical Committees is to insure a high quality in meeting programs and AIAA programs. The committees are the technical backbone of the organization, AIAA officials stated.

Space News Of Five Years Ago

MAY 14, 1960—The first production Mercury spacecraft, used in the beach abort test, was returned to the McDonnell plant for an integrity test.

MAY 15, 1960 — SPACECRAFT I weighing 10,000 pounds was launched into orbit by the U.S.S.R., the first successful effort to orbit a vehicle large enough to contain a human passenger, although efforts to recover the space capsule failed.

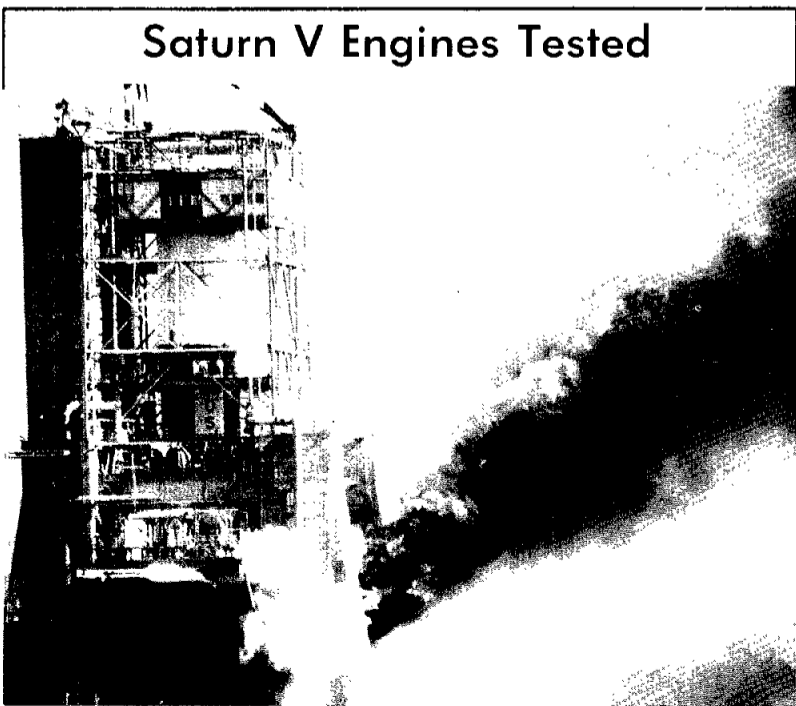
MAY 15, 1960 — Qualification tests for the Mercury spacecraft explosive egress hatch were completed.

MAY 21, 1960 — The first

public showing of the F-1 engine mockup for the Saturn V launch vehicle was held.

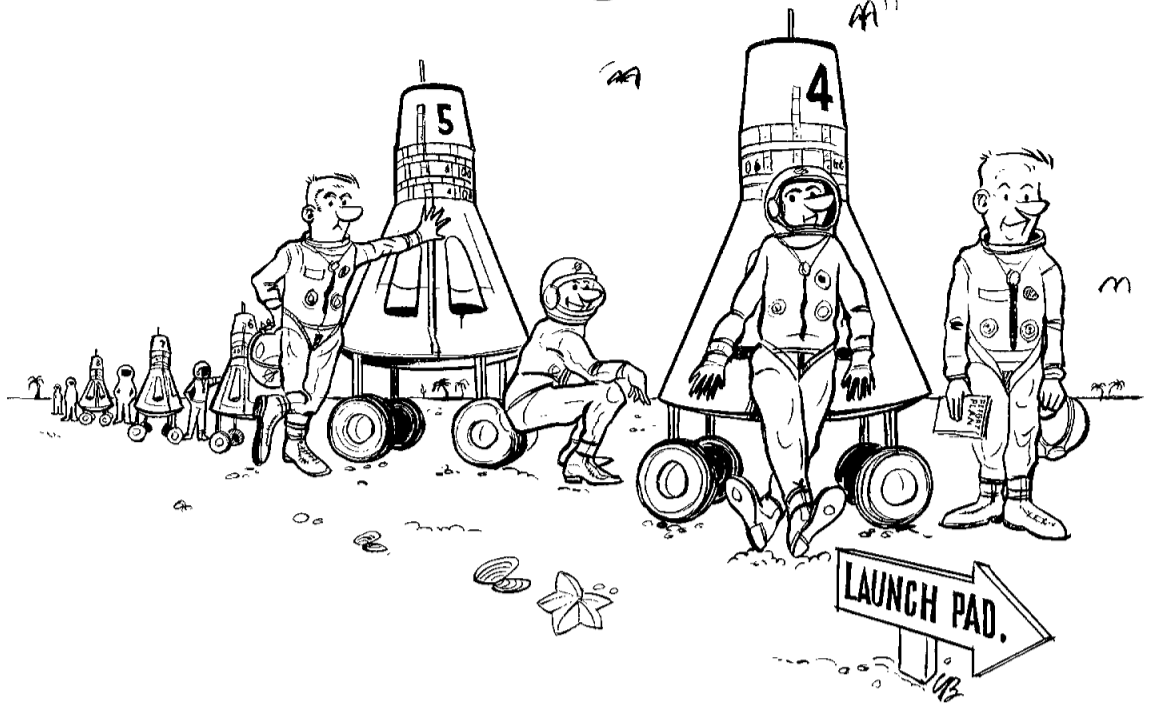
MAY 23, 1960 — Spacecraft No. 4 (production model), after being instrumented and prepared by the Space Task Group and the Langley Research Center for flight tests, was delivered to Cape Canaveral for the first Mercury-Atlas mission (MA-1).

During **MAY 1960**—Training classes were started for 30 physicians who had been selected by the Department of Defense to serve as medical monitors in support of Project Mercury operations.



LUNAR ROCKET TEST—The NASA Marshall Space Flight Center conducted a static test of all five engines of the Saturn V booster (S-1C stage) April 16. The brief test ran for the intended six and one-half seconds, during which time the five Rocketdyne F-1 engines developed 7.5-million pounds thrust. More than 500 measurements of the booster's performance were made and recorded in a blockhouse some 800 feet from the test stand, which was built especially for this stage. The S-1C is 138 feet long and 33 feet in diameter.

On The Lighter Side



“. 7, 6, 5, 4, 3, 2, 1 LIFTOFF!!! NEXT!!”

SPACE QUOTES

VICE PRESIDENT ADVOCATE OF DYNAMIC SPACE PROGRAM. Vice President Hubert H. Humphrey, Robert H. Goddard Memorial Dinner, Washington, D.C., March 19, 1965.

“I am an advocate of a dynamic space program—a program which will succeed in reaching the goals we have set—and one which will set new goals—one that can see beyond the moon and into fields where we can only speculate about the knowledge awaiting us.

“And I can promise you this will not be an advocacy simply of formal duty and responsibility. What I have learned of our space and aeronautics programs has made me an enthusiastic advocate . . .

“This strong and prosperous economy permits us to do many things and to do them well. We can put a man on the moon at the same time as we help to put a man on his feet. We conquer outer space even as we conquer poverty . . .

“Our space dollars need not—and will not—deprive, starve or decimate any other useful programs . . .”

Sighting Of Familiar Looking Object Makes MSC Employee Nostalgic

A bit of nostalgia gripped MSC's William M. Bland Jr. early last month when he sighted a bright orange familiar looking shape mounted on wheels and being towed behind a truck in a local subdivision.

Bland, one of the original members of the Space Task Group and former deputy manager of the Project Mercury program, thought he had discovered what happens to “old spacecraft” when he saw the vaguely familiar shape moving through the neighborhood.

While working at Langley, Bland was one of the earliest contributors to the concept that was to become the Mercury spacecraft, and this “thing” on wheels gave him quite a start.

Upon closer examination of the bright orange object, Bland discovered that, while the exterior shape of the “thing” on wheels looked somewhat like an old Mercury spacecraft, there the resemblance ended. On the side of the “thing” in bold letters were the words “Flexible Pipe

Cleaning Co.”—a firm from Houston devoted to cleaning pipes. At least one consoling thought was forthcoming, old spacecraft are not being used to clean out stopped-up drains.

Photographic proof of the sighting was furnished by Bland who just happened to have his camera handy.

Bland is now heading up the Checkout and Test Division in the Apollo Spacecraft Program Office, and whether he has ideas about going into the pipe cleaning business as a sideline, has not yet been determined.



JUST A THOUGHT—“Is this what happens to ‘Old Spacecraft’?”

Welcome Aboard

Twenty-one new employees joined the Manned Spacecraft Center during the last reporting period.

NASA Regional Audit Office: Wilma A. Schneider.

Reliability and Quality Assurance Office: Edward C. Canull.

Procurement and Contracts Division: Andrew J. Walls.

Personnel Division: Patricia J. Kreske.

Resources Management Division: Julia M. Gray.

Facilities Division: Roberta A. Reeves.

Flight Crew Support Division: Judy A. Wilson.

Information Systems Division: Stephen J. Foster.

Crew Systems Division:

Mariner IV Still On Course Going A Million Miles Daily

Distance between the Mars-bound Mariner IV spacecraft

Darryl L. Getman and Charles E. Phillips.

Instrumentation and Electronic Systems Division: James V. Goins and Jack G. Sheppard.

Propulsion and Power Division: Bobby F. Bundy (Tullahoma, Tenn.).

Flight Control Division: Alfred P. Sanders.

Landing and Recovery Division: Leslie A. Mann.

Mission Planning and Analysis Division: Kayleen B. Behring and Garner R. Kimball.

Apollo Spacecraft Program Office: Barbara J. Harper, Lorene C. Clinton (Downey, Calif.), Maile H. Oshita (Downey, Calif.), and Ella N. Pellerin (Downey, Calif.)

and the Earth is increasing by about one million miles a day, the National Aeronautics and Space Administration announced recently.

May 14, after 167 days in space, Mariner IV is 80 million miles from Earth and has travelled 253 million miles in its separate orbit. Its velocity relative to the Earth is 46,500 miles per hour, and 51,000 miles per hour relative to the Sun.

Straight-line distance between Earth and the spacecraft will be 134 million miles when Mariner IV makes its closest approach to Mars July 14.

The spacecraft continues to return scientific and engineering data to ground stations daily while continuing to set new records for distance of communications.

Space News ROUNDUP!

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

EMPLOYEE NEWS

Style Show Scheduled May 18 By Ellington Toastmistress Club

The Ellington Toastmistress Club will hold a style show with "Summertime in Houston" as its theme, at the clubs May 18 meeting at the Nassau Inn.

Tickets will be \$1.25 per person and may be obtained from any club member. The meeting will begin at 6:45 p.m. Refreshments will be served, and door prizes will be awarded.

Featured on the program will be fashions by Foley's, and a wig demonstration by the Pink Lady Wig Salon.

Models for the style show will

EAA Cancels Picnic In Domed Stadium, Plans Other Events

Tentative plans by the Executive Board of the Employees Activities Association to hold a picnic in the Harris County Domed Stadium have been cancelled.

It was decided by the board to be too expensive to pay \$3.50 per plate plus the cost of a ticket to the baseball game. In the early fall we will have our Annual Picnic for all employees of the Center.

Plans are underway for the "Vaudeville Revisited '65" array of talent to raise money to purchase books for the Theodore Freeman Libraries. If you wish to perform or have any suggestions, please contact Juanita Bower, Ext. 4951.

Be sure to mark June 26 on your calendar. This is the date for the Summer Dance at Sylvan Beach Pavilion. Music will be furnished by Nick Navarro and his orchestra with dancing from 9 p.m. until 1 a.m.

be Ellington Toastmistress Club members Connie Bohl, Phylas Lawther, Marilyn Morehouse, Imogene Pulleine, Mabel Thompson, and Virginia Thompson. Other program participants are Millie Rogers, Inspiration; Mel Schmerler and Bobbie Wright, Moderators; Juanita Blackman, Timekeeper; Juanita Kilgarlin, General Evaluator; and Carrie Ables, Closing Thought. Betty Rogers will preside, and Silvie Kelarek will serve as Toastmistress.

Cookie Underwood is in charge of this fund-raising project; proceeds of which will be used to help defray expenses to send the club's delegate to the International Toastmistress Clubs Convention to be held in New Orleans in July.

Singletons Plan Beach Party

The Singleton Club planning committee has announced plans for another "swinging beach party" in Freeport, Tex. on June 5.

There will be food, drinks, and lots of fun. Look for posters displayed on bulletin boards, etc., and more detailed information (time, transportation, tickets) in the next Roundup.

If you're not yet a member of the Singleton Club, join now. No dues, no applications, the only requirement is to be single. Just call and give your name, phone number, and office symbol to Mary Lopez, Ext. 2761 or Dan Christenberry, Ext. 3091. Contractor workers at the Center are also invited to join.

MSC, Marshall Employees Exchange Ideas



MARSHALL VISITORS—Representatives of the Manned Spacecraft Center Employees Activities Association are shown at a meeting with representatives of the Marshall Space Flight Center Athletic and Recreation Society at a recent meeting to exchange ideas and information. The two Marshall representatives took annual leave to pay a visit here. Shown standing (l. to r.) are Mervin Hughes, Abner Askew, Phoncille De Vore, and Rita Sommer (all EAA). Seated (l. to r.) are John Welzyn (MSFC), Philip Hamburger (EAA), and Wendell McKinney (MSFC).

Rod-Gun Club Sets Varmint Hunters Shooting Contest

The MSC Rod and Gun Club will sponsor a varmint hunters type shooting contest beginning at 10 a.m. May 31, at the Bayou Rifle Club range at Juliff.

The event will be open to all and awards will be given. All shooting members of the club are encouraged to participate.

Matches are designed to appeal to a wide range of shooting interests, and offer the opportunity of winning an award in particular classes by somewhat equalizing differences in shooting skills and types of rifles.

Two rifle classes are specified for this event: Class A—.22 to .25 caliber, centerfire; Class B—above .25 caliber; maximum rifle weight—12 lbs. (including scope and equipment); maximum scope power—10X.

Three matches are specified for this event as follows: (1.)—five shots—bench rest—100 yards—MOA scoring, five shots—bench rest—200 yards—MOA scoring, winners are determined by the smallest average MOA (minute of angle) group. Applicable rifle—class A; (2.)—same as 1, except applicable rifle—class B; (3.)—five shots—prone—crow target—numerical scoring—five shots—bipod rest—rabbit target—numerical scoring, winners are determined by total score. Applicable rifle—class A or B.

One award will be presented for each three shooters participating in a given match. A shooter can enter any or all matches. Entry fee will be \$1.75 for the first match and \$1.25 for each additional match.

Complete rules governing the match will be available before May 31. An early indication of your interest or intentions of participating will be appreciated for planning purposes. Please contact Hoyt McBryar, Ext. 4771.

EAA Emblem Contest Winner



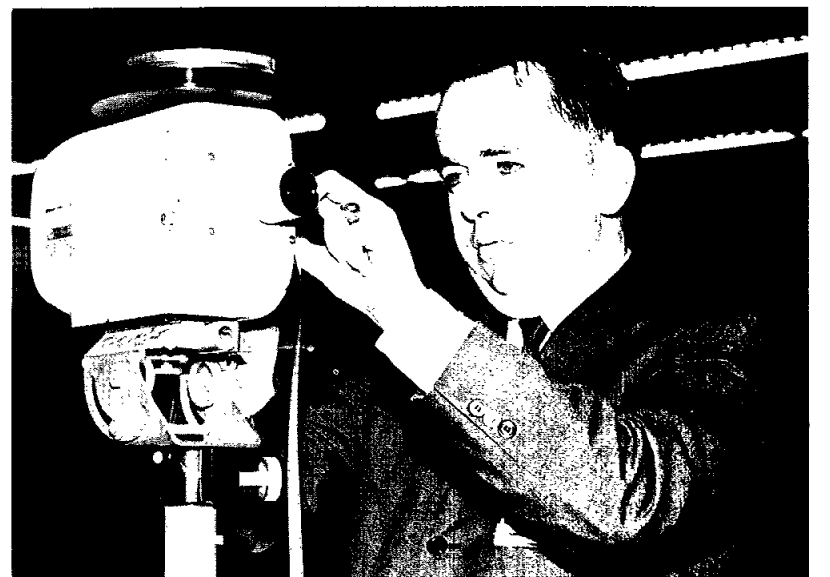
NEW EAA EMBLEM—Philip T. Hamburger (l.) presents Colin Kennedy a \$25 U.S. Savings bond which he won for designing an emblem for the Employee's Activities Association. Kennedy is holding a drawing of the emblem which won him the prize.

20-Year's Service Acknowledged



TWENTY-YEAR AWARD—A certificate and pin for 20-years of government service were presented recently to Herman H. Lauterbach, Quality Assurance and Inspection Office at White Sands Operations. The award was presented by M. L. Raines, manager, WSO.

MSC at work...



BOBBY V. GRAY, Photographic Instrumentation Section, Photographic Division, loads film in a Milliken high speed movie camera in preparation for photographing tests in the Systems Evaluation Laboratory, Bldg. 13.

Trophies Presented Duplicate Bridge Champions



BRIDGE CHAMPIONS—J. L. Raney (seated center), tournament director of the Duplicate Bridge Club, presents trophies to the winners of the recent bridge tournament. Shown are: (standing, l. to r.) Lee Pearson and Bob Hodgson, winners of the Men's Pair Championship, and Charlie Brown, winner of first series awards; (seated l.) Betty Herman, winner of Women's Pair Championship, (Dolores Sheridan, not shown, shares Mrs. Herman's title); (seated r.) Joe Duke, winner of Mixed Pair Championship, (his wife, Phyllis, shares the title).

Duplicate Bridge Winners Announced

Winners of recent Duplicate Bridge Club play were announced by the club secretary Leona Kempainen.

April 6: Section A: North-South, Floyd Bennett and Clarke Hackler, first; Betty and John Herrmann, second; East-West, Max Cone and John Stanfield, first; Bob and Terry Hodgson, second. Section B: North-South, C. J. Bates and Charles Shoemaker, first; Bill De George and J. T. Marco, second; East-West, Gary Hunt and Stephen Lowe, first; Charlie and Eugenia Brown, second. The April 6 game was the regular monthly Club Master Point.

April 13: North-South, C. J. Bates and Charles Shoemaker, first; Otto Kuhlmann and Art

Manson, second; East-West, W. H. Hamby and Floyd Bennett, first; Tom Moore and Gay Walker, second.

The Men's Pair Championship was won by Bob Hodgson and Lee Pearson, with Betty Herrmann and Dolores Sheridan capturing the Women's Pairs. These events were held on April 20. The winners received handsome trophies.

At the fractional rating point game on April 27, the winners were: North-South, C. J. Bates and Charles Shoemaker, first; Marilyn and Larry Gallagher, second; East-West, Bob and Terry Hodgson, first; Sue Shrader and Leona Kempainen, second.

Winners at the regular Club

Master Point on May 4 were: North-South; Mr. and Mrs. William Puderbaugh, first; C. J. Bates and Charles Shoemaker, second; East-West, Sue Shrader and Leona Kempainen, first; Mr. and Mrs. Paul Swanzy, second.

Games are held at 7:15 p.m. each Tuesday at the Noncommissioned Officers Club at Ellington AFB. MSC and contractor employees and members of their immediate families are welcome.

The Club wishes to emphasize the fact that they are assuring partners for all by having one regular member scheduled to come without a partner each Tuesday and thus be available to play with anyone showing up without a partner.

Safety Office Recommends TV Drivers Program

"The National Drivers Test" a special CBS television network program on KHOU-TV Ch. 11 in Houston, 9 p.m., May 24, has been recommended for viewing by MSC employees by

John Kanak, assistant chief for Safety, Center Medical Office.

This program should be of special interest to Center employees because all must commute in an automobile to and

from work and knowledge of good driving judgement could very well save lives of MSC employees, Kanak stated.

The broadcast, first of its kind, uses spectacular photography to test the viewing audiences' driving judgement. Also high-speed head-on collisions staged by experienced stunt drivers will be shown as they develop and occur.

In another part of the program the viewing audience will be in the driver's seat and be faced with a number of potentially serious driving hazards and asked: "How many did you spot?"

During the broadcast questions will be asked to test the viewers' driving ability and correct answers will be shown to give the viewer an opportunity to compare his score with that of typical drivers in other parts of the country.

The test program printed on this page will be the form used in marking answers during the TV program.

MSC BOWLING ROUNDUP

MSC MIXED LEAGUE
Final Standings as of May 3

TEAM	WON	LOST
Celestials	85½	34½
Virginians	74	46
Alley Cats	72	48
Play Mates	63	57
Dusters	59	61
Falcons	58½	61½
Chugg-a-Luggs	58	62
Shakers	58	62
Gutter Nuts	57½	62½
Hawks	51½	68½
Eight Balls	50	70
Goofballs	37	83

High Game Women: Barnes 225, Morris 217, Smith 192.

High Game Men: Bundas 250, McDonald 245, Morris 230.

High Series Women: Barnes 575, Morris 494, Dahn 474.

High Series Men: Keeley 588, Sargent 580, Spivey 574.

High Team Game: Shakers 919, Celestials 854, Virginians 840.

High Team Series: Shakers 2424, Celestials 2399, Virginians 2342.

Alley Oops	27½	28½
Sizzlers	25	31
Fireballs	22	34
Pseudonauts	15	41

High Game: Blair 254, Greenwood 244, Amason 233.

High Series: Morgan 629, Gordon 623, Gaffney 613.

High Team Game: Fabricators 990, Alley Oops 975, Pseudonauts 973.

High Team Series: Alley Oops 2730, Roadrunners 2681, Fabricators 2641.

MSC COUPLES LEAGUE
Standings as of May 4

TEAM	WON	LOST
Wha' Hoppen?	44	20
EZ-GO	43	21
Bowlernauts	37	27
Schplitz	36	28
Bltzf	35	29
Crickets	33	31
Alley Cats	31½	32½
Pin Splitters	28	36
Goof Balls	27	37
Sandbaggers	26	38
Hi-Ho's	24½	39½
Thinkers	19	45

High Game Women: J. Foster 228, K. Gentile 224.

High Game Men: D. Benne 250, J. Garino 246.

High Series Women: J. Foster 564, J. Sands 538.

High Series Men: J. Garino 642, B. Jones 628.

NASA 5 O'CLOCK MON.
Final Standings as of May 3

TEAM	WON	LOST
Suppliers	70	50
Foul Five	70	50
Computers	68	52
Sombreros	56	64
Hot Shots	52	68
Alley Gators	46	74

High Game: W. Kutalek 244, T. Hutchens 232, J. McDowell 230.

High Series: H. Erickson 595, E. R. Walker 591, T. Hutchens 590.

High Team Game: Computers 880, Suppliers 865, Foul Five 862.

High Team Series: Suppliers 2473, Foul Five 2341, Computers 2321.

MIMOSA MEN'S LEAGUE
Standings as of April 29

TEAM	WON	LOST
Whirlwinds	36	20
Roadrunners	35	21
Green Giants	33	23
Fabricators	29½	26½
Technics	29	27
Spastics	28	28

MSC Charm Club Schedules Course

The MSC Charm Club is currently forming a new class for MSC and contractor girls interested in self-improvement.

The class will be instructed by Marilyn Flowers of the Marilyn Flowers Dance Studio and will last for 15 weeks. Meeting nights will be determined by the girls.

At the end of the 15-week class, the ladies will continue as members of the present MSC Charm Club. An organizational meeting for the class was held at the Crest Hotel May 12. Anyone else interested in joining the group may contact Judy Levaser, Ext. 4696.

AFGE Granted Recognition



RECOGNITION—W. H. Gray, NASA resident manager, St. Louis, recently presented Elmer Hardaway, NASA inspector, a letter from Dr. Robert R. Gilruth, director, MSC, which granted informal recognition of the American Federation of Government employees, Lodge 2425, representing NASA employees at McDonnell. Hardaway is a union representative. Shown (l. to r.) are: Gray, Hardaway, and R. A. Dittman, administrative assistant, Gemini Program Office, Houston.

OFFICIAL TEST FORM

A. JUDGMENT

Defensive Driving Techniques

circle correct letter

1. a. b. c. d. . . . SCORE
2. a. b. c. d. . . .
3. a. b. c. d. . . .

B. KNOWLEDGE

Rules of the Road:

circle T [true] or F [false]

- | | | |
|---|--|--|
| 1. T. F. . . . <input type="checkbox"/> | 6. T. F. . . . <input type="checkbox"/> | 11. T. F. . . . <input type="checkbox"/> |
| 2. T. F. . . . <input type="checkbox"/> | 7. T. F. . . . <input type="checkbox"/> | 12. T. F. . . . <input type="checkbox"/> |
| 3. T. F. . . . <input type="checkbox"/> | 8. T. F. . . . <input type="checkbox"/> | 13. T. F. . . . <input type="checkbox"/> |
| 4. T. F. . . . <input type="checkbox"/> | 9. T. F. . . . <input type="checkbox"/> | 14. T. F. . . . <input type="checkbox"/> |
| 5. T. F. . . . <input type="checkbox"/> | 10. T. F. . . . <input type="checkbox"/> | 15. T. F. . . . <input type="checkbox"/> |

C. PERCEPTION

Hazards Alertness

1. List the number of driving hazards you have seen

NUMBER () SCORE

D. SPECIAL

circle correct letter

1. a. b. c. d. . . .
2. a. b. c. d. . . .

TOTAL SCORE

HOW ABOUT THAT!



IF YOUR CAR GETS 15 MILES TO A GALLON, YOU COULD DRIVE 18 MILLION MILES OR AROUND THE **WORLD ABOUT 700 TIMES ON THE FUEL REQUIRED FOR THE APOLLO/SATURN LUNAR LANDING MISSION**

Contest

(Continued from Page 1)

which clearly identifies the effort as a NASA effort or associated with the NASA mission. Neatness is requested, but entries will be judged by concept, rather than graphic or artistic skill.

Symbol concepts should be described in concise language and although it is desirable that a rough sketch be submitted, the absence of an accompanying sketch will not effect favorable consideration of the entry.

All entries must be submitted on letter-size bond-type white paper and should contain the contestant's name, name of in-

stallation, organizational element and date of submission, along with indication of the portion of the contest being entered.

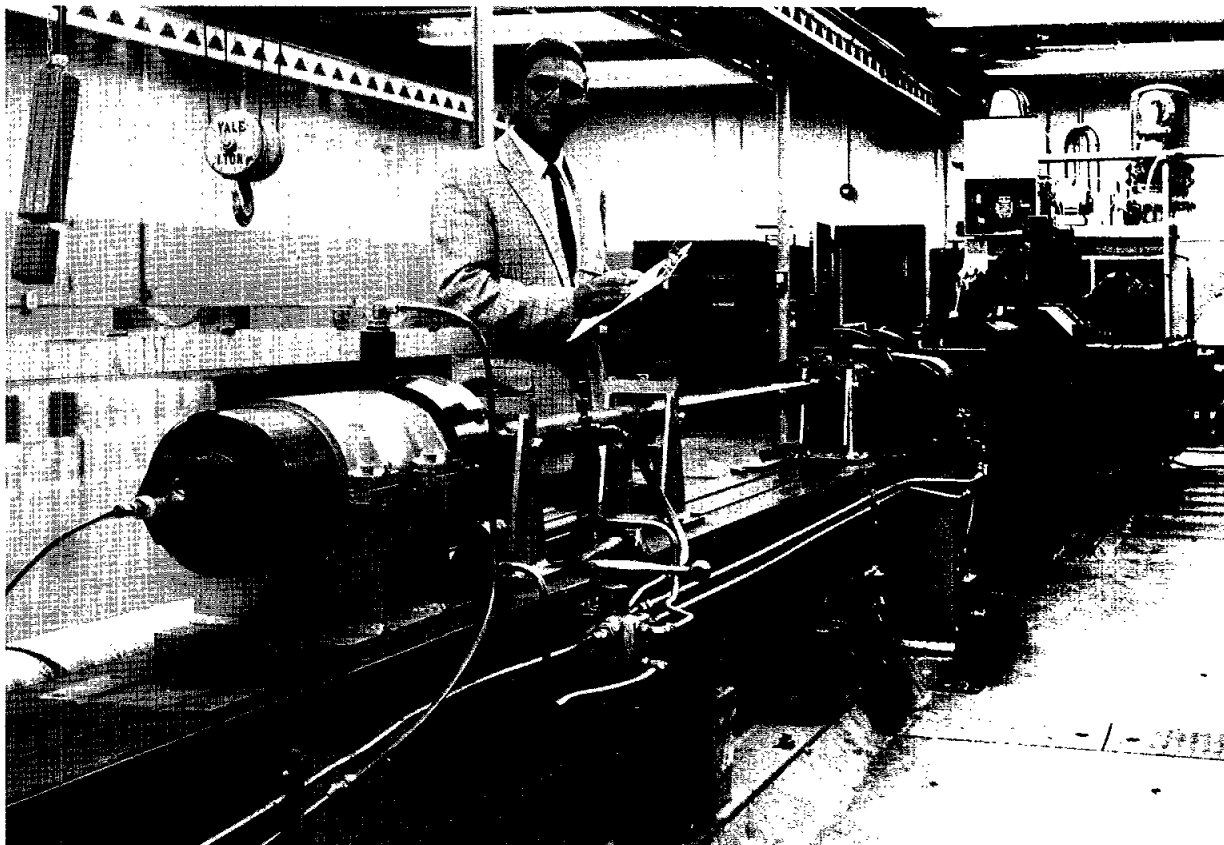
All NASA employees are eligible except those working directly in the areas of Cost Reduction and Incentive Awards and those individuals selected to act as contest judges.

The MSC winners in the contest will be announced July 2. A ceremony and presentation of awards for the winners in the NASA Hq contest will be held in Washington, D. C., July 29. This will mean an expense paid trip for the NASA-wide winners to Washington to receive a cash prize of \$500 and a certificate for each the symbol and slogan.

In NASA Space Park At Fair



FEELING 100 MILES TALL—Two happy youngsters are playing astronaut in a cutaway model of the National Aeronautics and Space Administration's Mercury Spacecraft. The vehicle, like that in which six Project Mercury astronauts rode into space, is in the Space Park at the New York World's Fair which opened April 21. While the nose of the Mercury model rocks up and down, its young passengers hear a countdown and then see, on a screen before them, a film of the earth 100 miles below.



FASTEST GUN IN THE WORLD—The 20-foot light-gas gun at NASA's Ames Research Center that fired the fastest shot ever recorded. B. Pat Denardo, Ames research scientist in charge of the shot, checks the gun. The gun "fired" a polyethylene cylinder at 25,300 mph, 700 mph faster than Earth escape speed and 3,200 mph faster than the previous record shot. The research "guns" are used to study entry into Earth's atmosphere from space, properties of gas flow, and hypervelocity impacts of meteorites on spacecraft and space suits.

In Meteorite Impact Study

World's Fastest Gun Shoots Plastic Projectile 25,300 Miles Per Hour On Controlled Flight

The fastest shot ever fired has been rammed out of a 20-foot-long, light-gas gun at NASA's Ames Research Center near Mountain View, Calif.

The shot set a world speed record of 25,300 miles per hour for controlled flight of a visible object, of known mass and shape, and over a known distance in a ground facility.

The ability to move objects this fast applies directly to space flight problems because it gets into the range of extremely high speeds at which small meteorites hit spacecraft hulls, the space suits of astronauts, and the walls of space stations.

The record shot is also a "hardware triumph" in advancing the development of hypervelocity guns. These devices are used for research in entry into the atmospheres of the Earth and planets, in properties of gas flow around solid objects, to study materials under super speed conditions, and to check theories of high speed impact.

The .05 gram, .22 caliber polyethylene cylinder (about one-third the size of a shirt button) made its flight down a horizontal 20-foot-long vacuum flight range. Its 25,300 mph speed was about 700 mph faster than the speed needed by a spacecraft to escape from the Earth's gravity into the solar system.

The plastic projectile blasted out a crater in its target (a block of hard aluminum) about three-quarters-of-an-inch across and three-tenths-of-an-inch deep.

The shot was about 3,200 mph faster than the previous record for ground-based controlled projectile flight.

The light gas gun used in the shot works something like a child's pop gun. An explosive charge is set off in a cylinder behind a plastic piston. The ex-

plosion pushes the piston into a chamber of hydrogen gas, compressing it, and the gas in turn pushes the spacecraft model or projectile out of the firing tube. A light gas (hydrogen is the lightest) must be used because it has a low mass and will expand at the highest speed after compression.

In the cylinder behind the model, the gas pressure is about a half million pounds per square inch, and forces on the rapidly accelerating model are several million times the force of gravity.

The model was photographed vertically and horizontally from five camera stations. Time of travel between stations was measured to within one one-hundred-millionth (1/100,000,000th) of a second.

The model was .22 inches in diameter and .07 inches thick. It hit the target with zero angle of attack, "right square on." This indicated virtually perfect firing technique, he says.

Super speed runs of this type depend on skills built up with a great deal of practice. The present model of the gun was developed at Ames about four years ago.

The launch tube must be honed "like glass" to absolute smoothness. There is a difficult sealing problem because of the half million pounds of pressure in the gun. Sometimes the polyethylene piston breaks a solid steel cylinder because of its great striking force.

Many members of the Hypersonic Free Flight Branch at Ames have contributed techniques and ideas for improvements since the Center began building high speed guns in 1949. In those days 4,000 miles per hour was considered really top speed.

For the record-setting shot, the vacuum flight chamber was pumped down to 1/700th of normal atmospheric pressure.

NASA's Newest Center To Explore Possible Space Guidance Techniques

Possibilities of new space guidance techniques will be explored in programs directed by NASA's new Electronics Research Center at Cambridge, Mass., Dr. Winston E. Kock, its director, reported in a speech in Houston, April 29.

In his address at the annual banquet of the Institute of Navigation at the Rice Hotel, Dr. Kock mentioned particularly the use of Mossbauer radiation which he termed "the most precise electromagnetic frequency yet known" in guidance applications.

The new Electronics Research Center, he said, is considering a program to investigate the feasibility of employing Mossbauer radiation as an accelerometer for use as a systems performance monitor on future ion propelled

or other low thrust spacecraft.

Dr. Kock said the Center, which moved into its temporary quarters five months ago, already is engaged in a wide area of research and is issuing grants and contracts to universities and firms throughout the nation.

The Center currently has 170 of its planned total of 2100 personnel. Dr. Kock was the guest of Dr. Robert R. Gilruth, director of the NASA Manned Spacecraft Center on a tour of its facilities while here in Houston.

Space News **ROUNDUP!**
 SECOND FRONT PAGE

Structural And Vacuum Integrity Tests Passed By Chamber 'A' Here At MSC

Chamber "A", the 120 foot high by 65 foot diameter vacuum chamber under construction here at the Manned Spacecraft Center, successfully passed structural and vacuum integrity tests on April 14 and May 3 respectively.

The chamber, located in Building 32, was "pumped down" to an altitude of approximately 130,000 feet and a battery of 225 instruments placed on its steel skin measured the stress as the air on the outside pushed against the chamber during the struc-

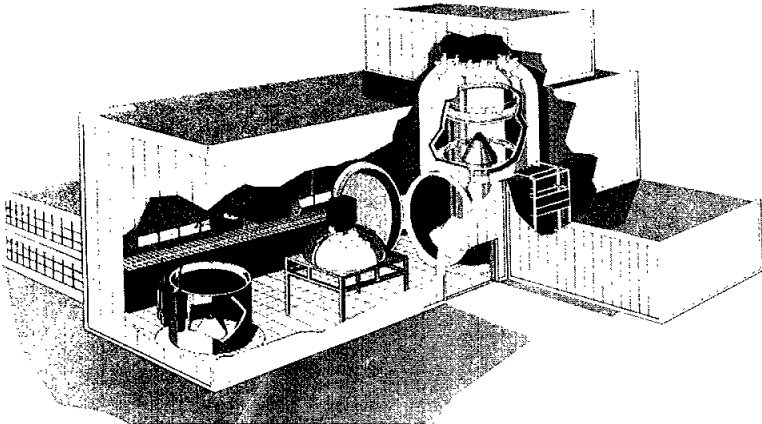
tural integrity tests.

The pumpdown of the chamber began at 9 a.m. April 13 and terminated at 6:30 p.m. April 14. Normal pumpdown time would be less, but frequent holds were called to check data obtained.

The vacuum integrity test, requiring about one and one-half weeks, was successfully completed May 3. During this test, the chamber was pumped down to an equivalent of 70 miles in altitude and the leak rate of air into the chamber was checked.

Engineers from Manned Spacecraft Center, the Army Corps of Engineers, and the prime construction contractor for the chamber, Chicago Bridge and Iron, conducted the test. Test conductors were Tom Milton, Lou Vosteen and Phil Glynn, all MSC engineers.

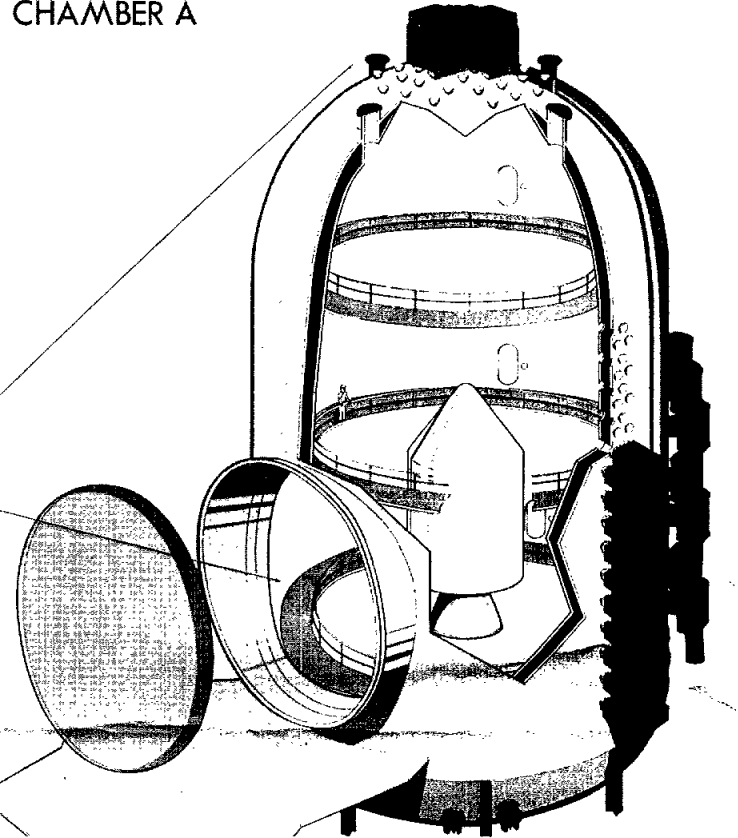
Chamber "A" will be used by the MSC for checking full Apollo lunar spacecraft under vacuum and thermal conditions. The tests are part of a series designed to qualify the large chamber for operational use.



SPACE ENVIRONMENT SIMULATION LABORATORY—Chamber "A", the vacuum chamber that just passed structural and vacuum integrity tests is shown in the high bay portion of the cutaway drawing of Building 32 here at the Center. Chamber "B" at the left, is now undergoing acceptance testing.

SPACE ENVIRONMENT SIMULATION LABORATORY CHAMBER A

CAPABILITY & DESCRIPTION	
OUTSIDE DIMENSIONS	65 FT DIA X 120 FT HIGH
INSIDE CLEAR DIMENSIONS	55 FT DIA X 90 FT HIGH
MAXIMUM VEHICLE SIZE	25 FT DIA X 65 FT HIGH
MAXIMUM VEHICLE WEIGHT	150,000 POUNDS
PRESSURE LEVEL	1 x 10 ⁻⁵ TORR (80 MILES ALTITUDE)
SOLAR SIMULATION SOURCE	CARBON ARC UNITS
TEMPERATURE INTERIOR	-280°F
CHAMBER WALLS	
LUNAR PLANE	ROTATES ± 180°



CHAMBER "A" CUTAWAY DRAWING—Structural details of the recently accepted vacuum Chamber "A" are shown in this cutaway drawing with an Apollo command and service module in the chamber.

KSC Cease And Desist Order Bans Collecting Of 'Federal Rattlesnakes'

The civilization of some of Florida's swampland is progressing fast enough to suit the Industrial Safety Committee of the Kennedy Space Center in Florida.

The committee has ruled against collecting rattlesnakes as long as they don't disrupt construction activities at the National Aeronautics and Space Administration's Merritt Island moonport.

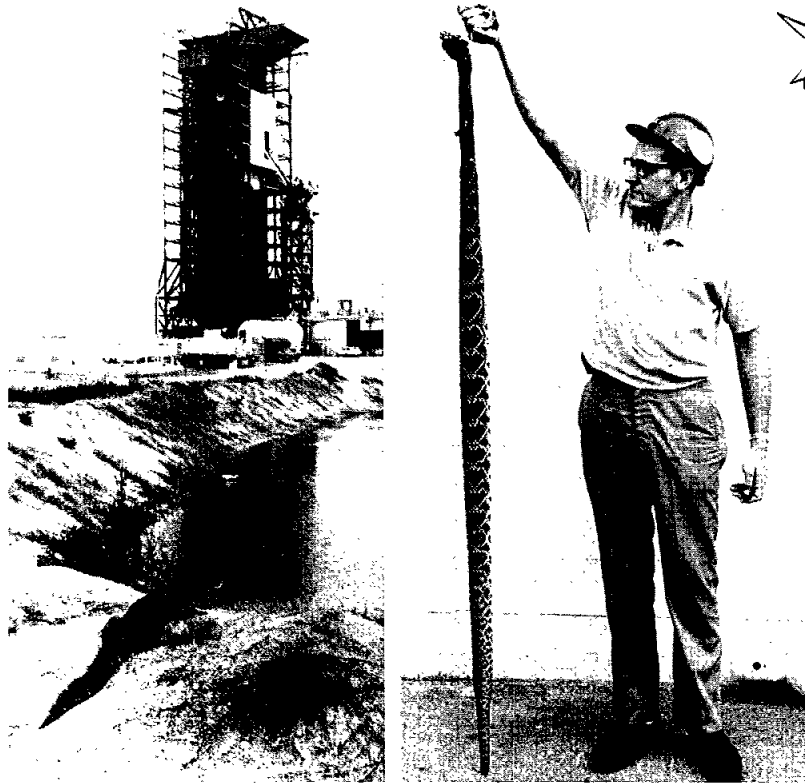
It seems that one contractor on the island made a habit of catching rattlers and putting them in boxes on the job site.

The committee acted to pre-

vent possible injuries. It gave the order to "cease and desist collecting Federal rattlesnakes due to hazards to personnel as well as snakes."

So the snakes are free to crawl around freely—well, as freely as the alligators which also roam the area, until the NASA spaceport gradually pushes both snakes and alligators back into the receding swamplands.

The snake amnesty does not apply, however, where the reptiles actually menace construction workers. A road building crew recently killed 24 rattlers in one desolate mile-long stretch.



SPACE BASE DENIZENS—Things you're liable to meet as a space base is hewed out of the Florida swamps are shown above. A diamondback rattlesnake killed by a construction worker and an alligator sunning itself on a launch complex. The scene is the Merritt Island moonport being built by NASA near Cape Kennedy.

Apprentice Week Proclaimed Here

Proclamations naming May 23-29 as Apprentice Week were signed recently by Mayor Louie Welch of Houston and Judge Bill Elliott of Harris County and presented to officials here at the

Manned Spacecraft Center. MSC has 19 apprentices learning trades in the Technical Services Division and also taking courses in related fields at the University of Houston.

To Support Manned Exploration

Potential Use Of Lunar Materials Studied

Potential use of lunar materials to support manned exploration of the Moon is the aim of a three-year \$300,000 research program awarded recently by NASA to the Department of Interior's Bureau of Mines.

The long-range goal of the Bureau's Minneapolis Mining Research Center is to develop a technology for the most efficient use of extraterrestrial materials by lunar explorers.

The research team will study the possible production, processing and uses of materials on the Moon for the construction, supply and operation of manned lunar bases. Scientific findings from NASA's unmanned lunar programs will be used in their studies.

The studies will seek to learn how lunar resources could be used by manned exploration missions for shelter from solar heat and radiation and as a source for fuels for vehicle propulsion. The team will seek to learn how these resources could be mined and transported from one location to another on the Moon and how the material reacts to the changing lunar environment.

The program will be carried out under the direction of Thomas C. Atchison, assistant

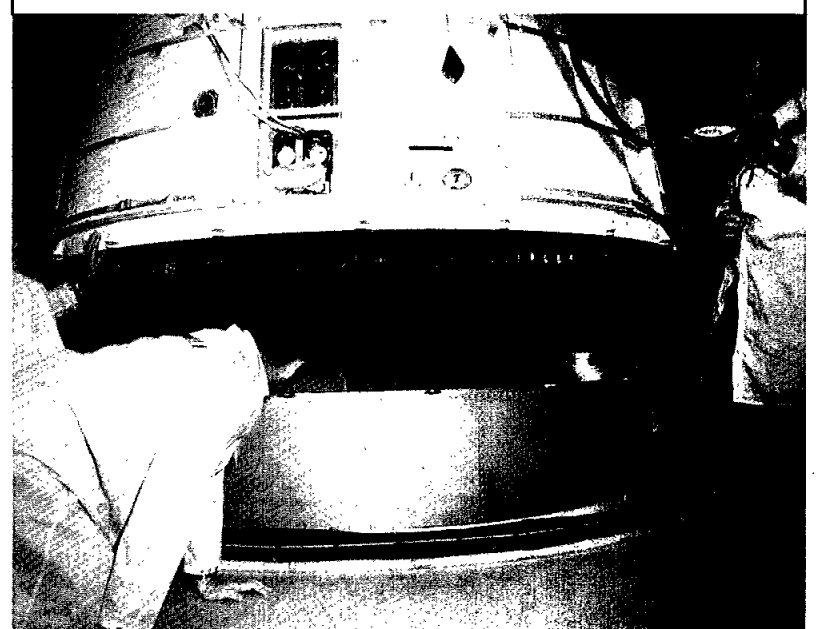
director of the Bureau's Minneapolis Mining Research Center.

The research team will include engineering experts in mining, geology, chemistry, physics and materials. Faculty consultants and graduate students from the University of Minnesota will aid the team as part of the Bureau's

program to develop future capabilities at educational institutions.

The Minneapolis Center was selected from among seven institutions which submitted proposals. Selection was made by a panel representing NASA, the U.S. Geological Survey and the Office of the Chief of Engineers.

Gemini-4 Readied For Flight



SPACECRAFT MATING—Workmen check alignment and clearance as Gemini Spacecraft-4 is lowered for mating with the Gemini Launch Vehicle on Pad 19 at Cape Kennedy, April 23.