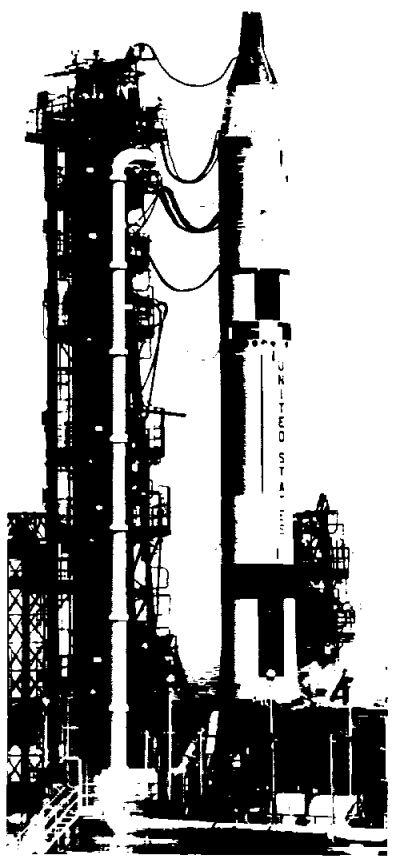
Space News ROUNDUP!

VOL. 4 NO. 7 MANNED SPACECRAFT CENTER, HOUSTON, TEXAS JANUARY 20, 1965



GT-2 ON PAD 19—The Titan II launch vehicle topped by Gemini spacecraft 2 stands ready for launch on a downrange suborbital flight from Pad 19 at Cape Kennedy, Fla.

GT-2 Launch Scheduled This Week

The launch of the unmanned Gemini spacecraft 2 (GT-2), which was postponed December 9, was scheduled to have been launched no earlier than yesterday from Complex 19 at Cape Kennedy, Fla.

The servo valve flange that cracked, causing a delay in the flight, along with other servo valves on the Titan II, were replaced with heavier and stronger forgings and certain modifications were made in the hydraulic system.

The modified Titan II booster was scheduled to lift the Gemini spacecraft on a suborbital flight downrange and ram it back through the atmosphere at 16,600 miles per hour to test the craft under maximum reentry heating conditions.

Flight time was to be about 20 minutes with the spacecraft reaching an altitude of about 106 miles and traveling about 2,150 miles downrange from Cape Kennedy.

Designed to flight-qualify the total spacecraft as an integrated system prior to the first manned flight by GT-3 crew, Virgil I. Grissom and John W. Young, the major item of this test is to verify the afterbody heat protection. Flow patterns over the spacecraft during reentry cannot be fully simulated in ground testing.

Launching of the unmanned GT-2 spacecraft was to be on an azimuth of 105 degrees. Spacecraft separation was to be followed by a turn-around and maneuver to retroattitude. The retrorockets, though not needed to perform this mission, were to be sequence fired 62 seconds after spacecraft separation.

The panel instruments were to be monitored during the GT-2 mission by three 16mm black and white motion picture cameras mounted on the crew simulator pallets, with another camera recording the command pilot's view out the left window, starting after retrofire.

Two crewman simulators have been mounted in the reworked ejection seat assemblies. Operating elements of the ejection system were to be flown but the seats were not armed for ejection. Both seats were clamped to the seat rails to minimize vibration damage to the crew simulators.

Prime recovery ship for the mission is the USS Lake Champlain, the aircraft carrier that recovered Astronaut Alan Shepard's Freedom 7 spacecraft, May 5, 1961.

U. S. Naval forces were to be deployed along the flight path with recovery of the spacecraft programmed to take place about 800 miles east of San Juan, Puerto Rico.

Navy swimmers were to be taken to the spacecraft area by helicopters from the Lake Champlain to install a flotation collar around the spacecraft to provide additional buoyancy until the spacecraft could be lifted aboard the aircraft carrier by a crane.

The main parachute for landing the GT-2 spacecraft is an 84-foot-diameter ringsail chute designed to provide stable descent at a vertical velocity of 30 feet per second at sea level.

The parachute deploys and supports the spacecraft vertically for 22 seconds, then the single point suspension is released permitting the spacecraft to reposition to a two-point bridle suspension. This orients the spacecraft in the proper attitude for landing with the nose 35 degrees above the horizon.

Christopher C. Kraft Jr., MSC assistant director for Flight

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NASA To Host Vacuum Seminar Here March 18

The Midwest Section of the American Vacuum Society's 1965 Seminar on Vacuum Science and Technology will be hosted by NASA and held here at the Manned Spacecraft Center on March 18.

On the program will be descriptions of current projects in vacuum technology with open discussion following the presentation of each paper. The papers presented at the seminar will not be published.

All interested MSC people working in the field of vacuum technology are encouraged to attend these sessions. MSC people interested in submitting an abstract for presentation on the program should contact Frank Knox, code ES6, or call Ext. 3618.

The sessions will be held in the morning and afternoon in the auditorium of Building 1. No registration fee will be required to attend.

Aleck C. Bond, head, Systems Test and Evaluation for Engineering and Development, will present the welcoming address to the group.

For additional information on the seminar, call Howard Kimzey, chairman of the meeting, at Ext. 4247.

Seven-Story Office Building Slated Here, Occupants To Include Gemini And Apollo

Bids are to be opened February 24 by the Corps of Engineers on a seven-story steel frame office building with a one-story library wing that is to be constructed here at the Manned Spacecraft Center beginning this year.

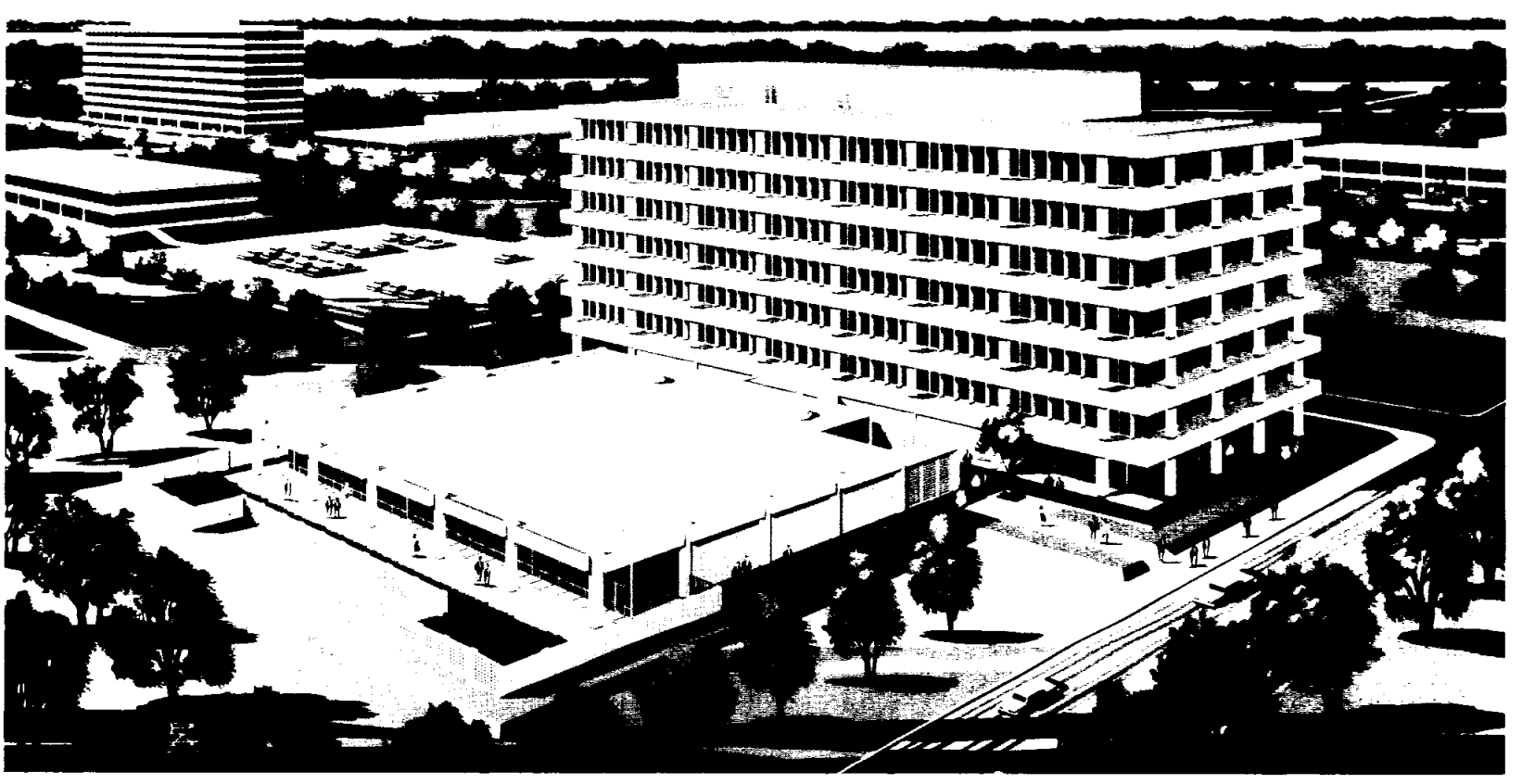
The building (No. 45) will be located in the area between Second Street and Building 12 and will be constructed with precast concrete wall panels to make the building compatable with the rest of the Center buildings.

Occupancy of the seven-story portion of building will be by the Gemini Program Office, Apollo Spacecraft Program Office, Central Data Branch (offices only), and Propulsion and Energy Systems Division.

The single-story wing of the new structure will be occupied by the Technical Information Division and Library.

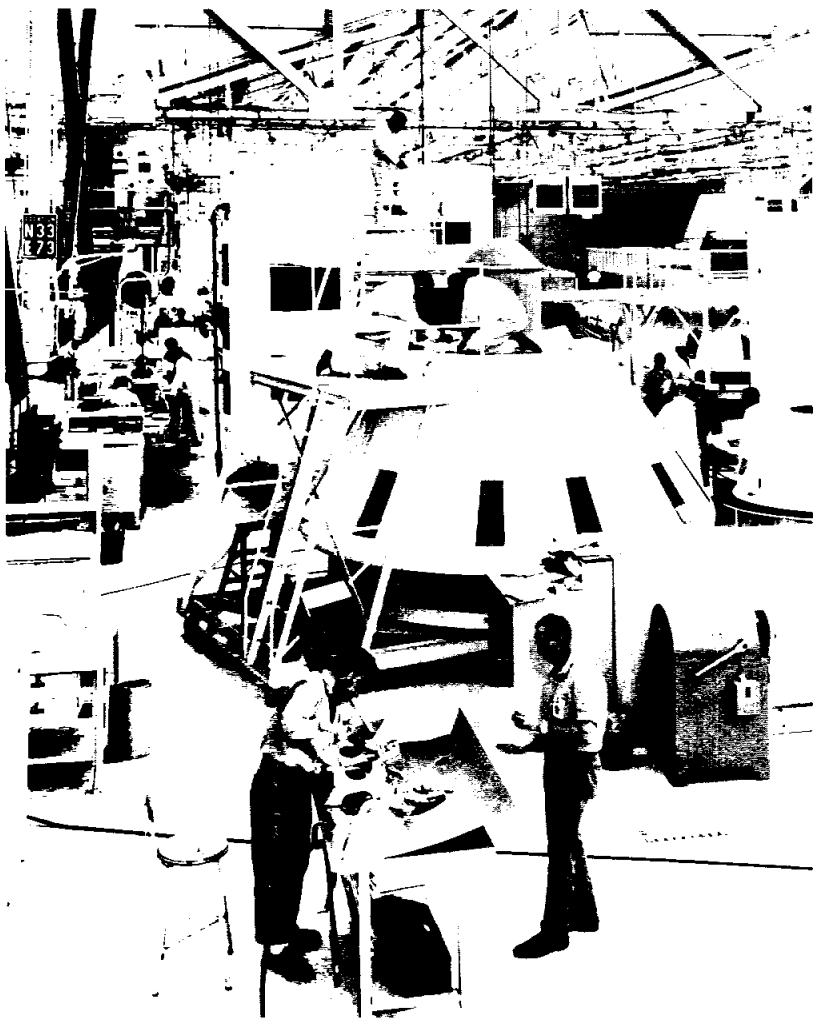
Approximately 850 people will occupy the offices in the Project Engineering Facility, which it is estimated will cost $3.5-million.

The seven story portion of the building will cover an area 92 by 218 feet and the one story wing will be 117 by 140 feet. Construction is scheduled to be completed 14 months after the work is begun.



PROJECT ENGINEERING FACILITY (BUILDING 45)—This artist's concept of the new seven-story office building that is to be constructed here at the Center, is shown in relation to the nine-story Project Management Building (Building 2), and the Central Data Office (Building 12) in the far left portion of the drawing. The view is looking south with Clear Lake in the background, and Second Street in the right foreground.

Boilerplate Spacecraft, Workhorses Of Space Program



WORKHORSES—Employees at North American Aviation's Space and Information Systems Division assemble engineering test models of Apollo spacecraft command and service modules in early stages of program. Test models, or boilerplates, duplicate external size, shape, structural soundness, and center of gravity of flight spacecraft that will carry first astronauts to the moon.

Dress rehearsals for the Apollo program launch to the moon are being conducted daily by NASA and North American Aviation's Space and Information Systems Division with simulated spacecraft bearing the unglamorous title of boilerplates.

The test models simulate the weight, shape, and center of gravity of the actual spacecraft. Termed boilerplates because of their rugged construction, they are the workhorses of the space program.

Success of the boilerplate program was dramatically highlighted by the test of Boilerplate 23 in December of last year at White Sands Missile Range, which marked the fifth consecutive successful flight test of boilerplate spacecraft. BP-23 is to be reworked and will become BP-23A for use in a pad abort test scheduled later this year at White Sands.

Under its contract with NASA's Manned Spacecraft Center, the Space Division has built 16 boilerplate spacecraft, and two more are nearing completion.

The test models have been dropped out of airplanes, impacted into earth and water, used in flotation and recovery experiments, put through high-speed, high-stress tests, and even rocketed into orbit in various tests aimed at proving out the basic spacecraft design, the operation of vital subsystems, and the compatibility of the spacecraft and launch vehicles.

Of equal importance to North American, said Dale Myers, Space Division vice-president and Apollo program manager, the test model program has been instrumental in the development of the production team concept and in the establishment of key manufacturing methods and approaches. Both concepts are bearing fruit in the building of flight hardware.

Initially, the test models were of simple construction. Their systems and instrumentation

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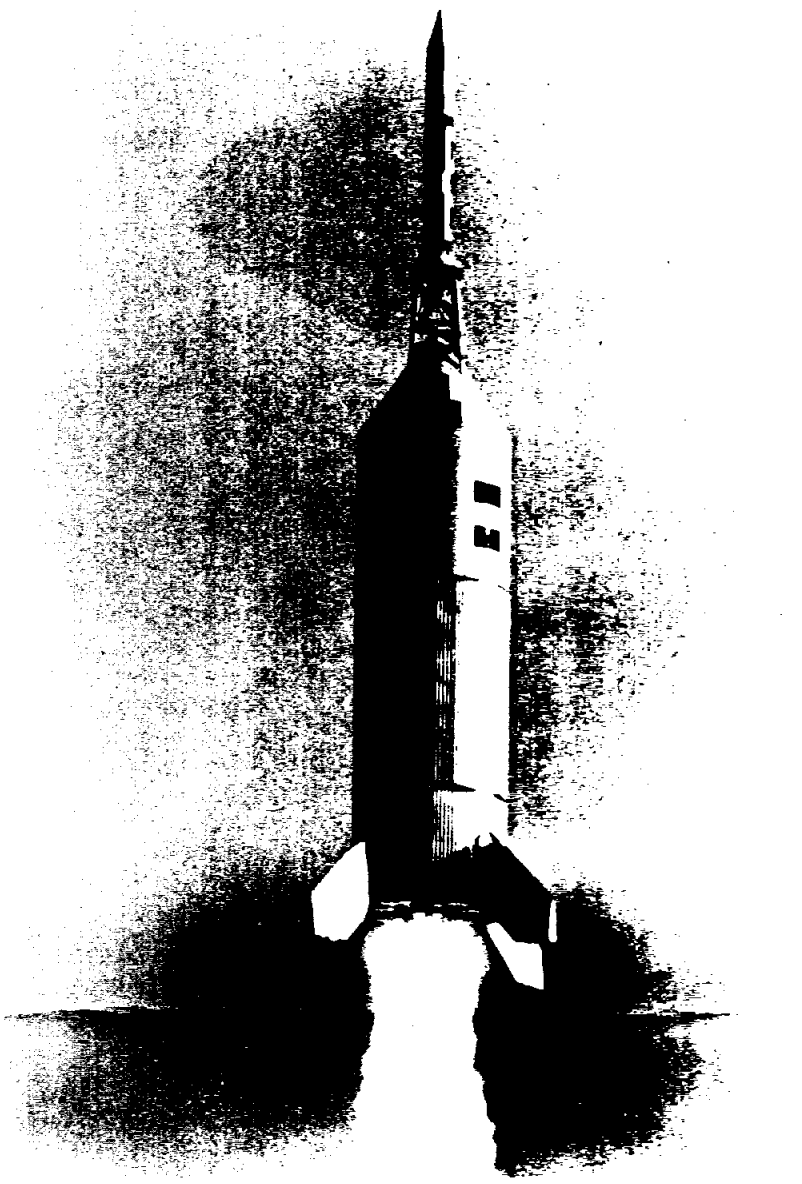
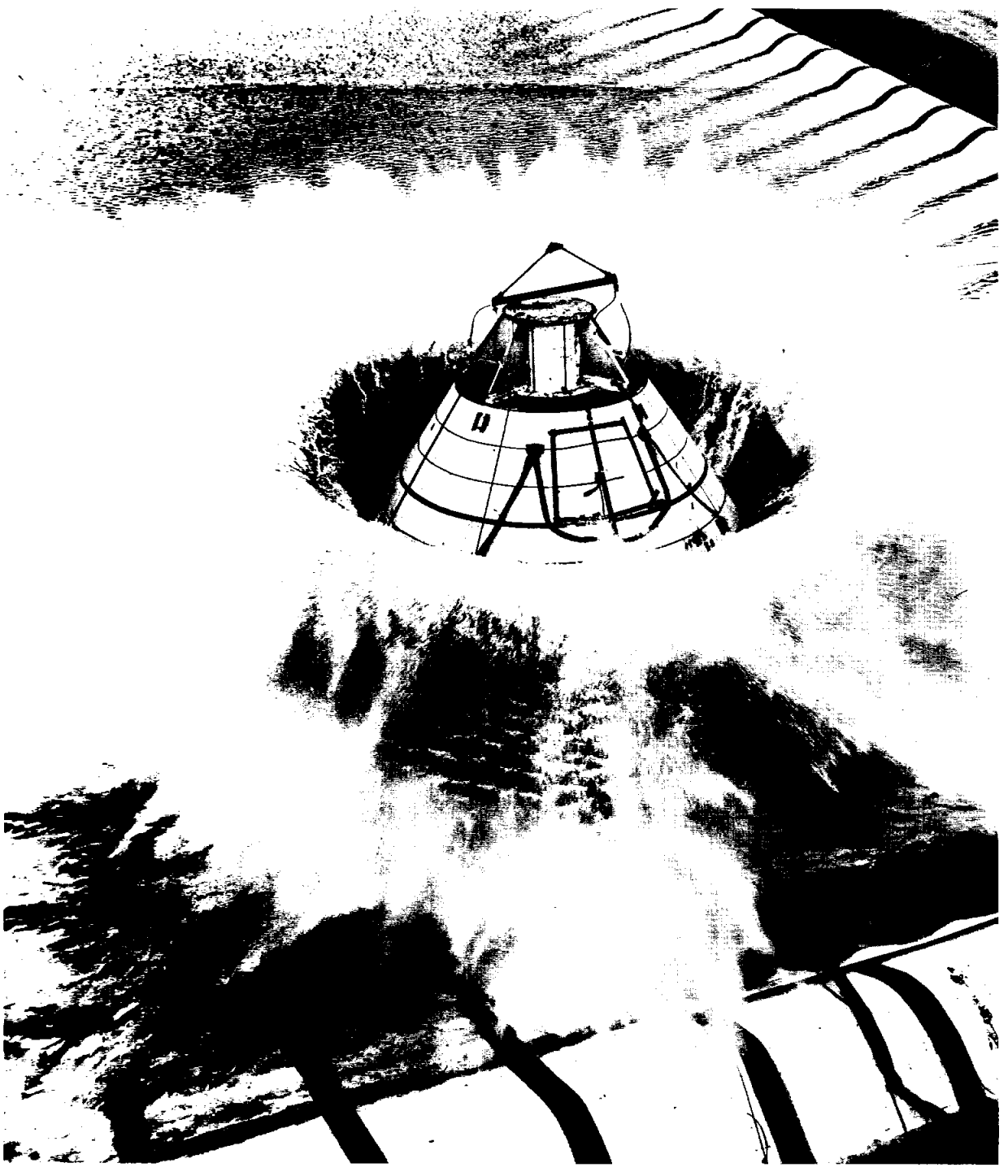
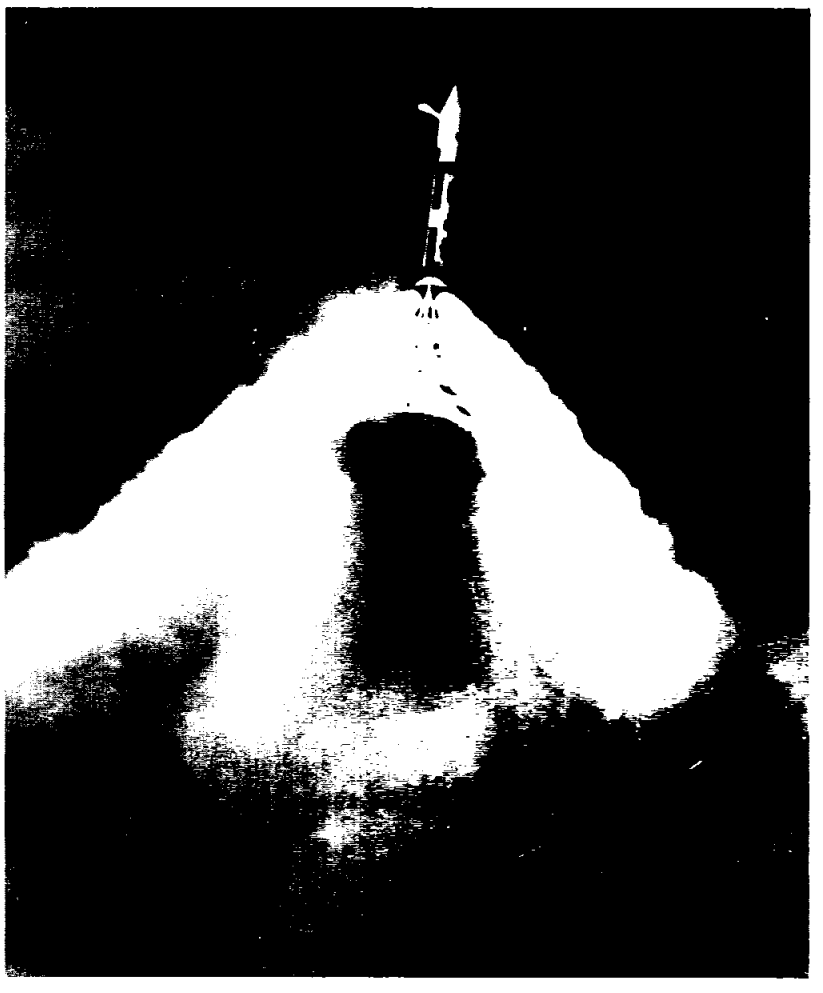


IN FLIGHT—Rising on tail of flame, Apollo spacecraft Boilerplate 12 roars skyward aboard Little Joe II to examine spacecraft's launch escape system in test conducted at White Sands Missile Range, N.M.



SPLASH POOL—Instrumented test command module splashes into Apollo Impact Test Facility pool in checkout of cabin crew equipment. Other models were impacted in earth.



PAD ABORT—Boilerplate 6 command module blasts skyward in pad abort test that checked escape propulsion system, parachute deployment, and impact condition of vehicle. Following successful test, vehicle was reworked in preparation for another mission in program.

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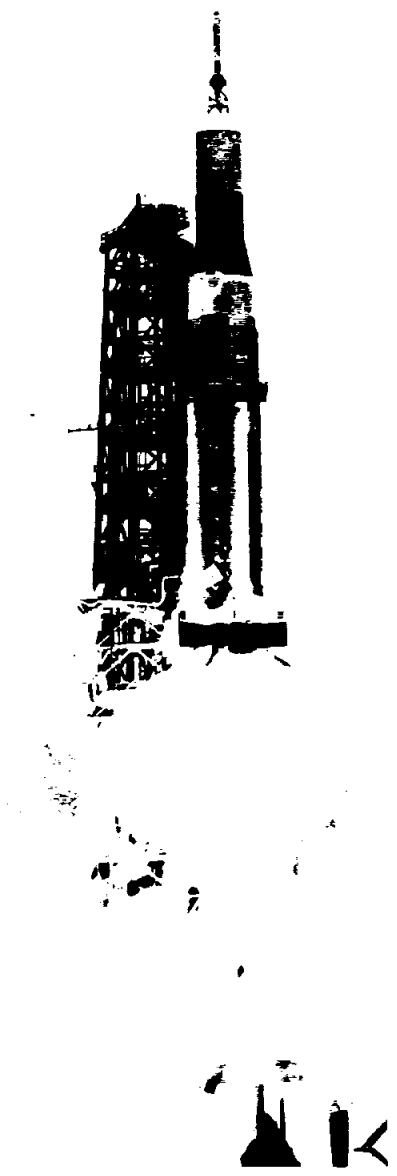
have become more sophisticated as the test program has progressed and more detailed data has been acquired.

The test models have enabled engineers to obtain basic data early in relation to the evolution of the spacecraft program, Myers said.



LIFT OFF—Instrumented Apollo spacecraft engineering test model is lofted into space aboard Saturn SA-7 flight at Cape Kennedy. Apollo payload weighed 17,200 pounds.

"The program has been planned so that each test vehicle has accomplished a number of important objectives," he pointed out.

As an example, Boilerplate 6 in addition to checking the command module pad abort capability also tested the launch escape propulsion system, parachute deployment, and the actual impact condition of the vehicle, among other objectives. Following its successful test, it has been reworked in preparation for another mission in the space program.

Flights using the Little Joe II launch vehicle and Boilerplates 12 and 23 examined the spacecraft's launch escape system and its aerodynamic stability under high-stress, high-speed conditions: demonstrated the command module to service module separation subsystem, and the timing sequence of the Earth landing system.

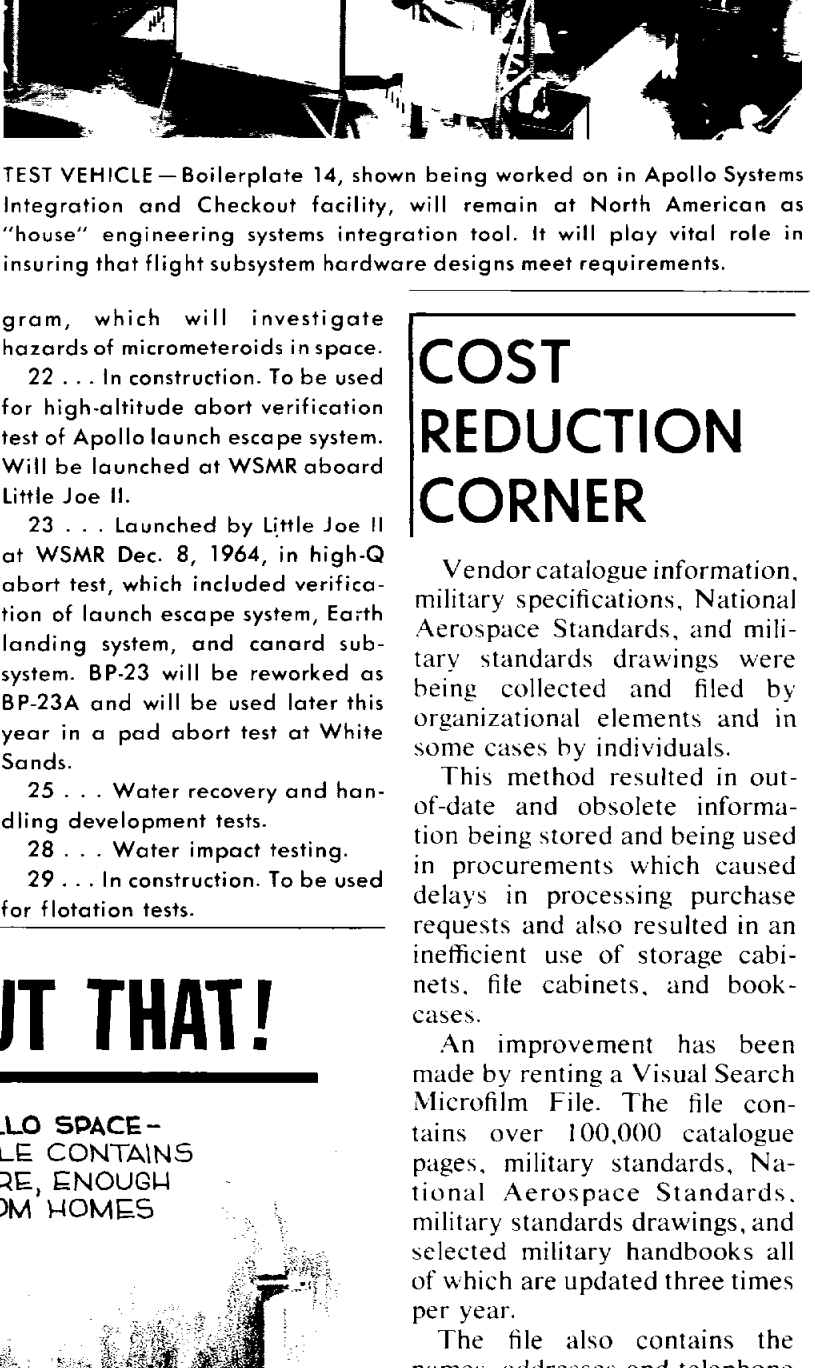
The recent Saturn I launches with Boilerplates 13 and 15 tested spacecraft and launch vehicle compatibility under preflight conditions. As well as checking the launch escape system jettison tower, these flights also verified design criteria under launch and exit environmental conditions, and the spacecraft radio frequency and instrumentation system with the launch vehicle systems.

Another test model, number 14, will remain in Downey as a "house" engineering systems integration tool. Ahead of schedule in the Apollo Systems Integration and Checkout building, it is playing a vital role in insuring that flight subsystem hardware designs meet all requirements.

Two more boilerplates, 16 and 26, have been shipped to Cape Kennedy and will be used by NASA in the "Pegasus" program which will investigate the hazards of meteoroids in space. The test vehicles will be launched aboard Saturn I rockets.

Wing-like aluminum-coated mylar panels 96 feet long and 14 feet wide will unfold from the service module in space to record meteoroid penetration data and transmit it back to Earth. With its spread panels, the Pegasus vehicle will be among the largest objects in orbit.

With the curtain ringing down on the manufacturing phase of the boilerplate program, the spotlight is shifting to the flight spacecraft now in production. However, the "dress rehearsals" of the test program will continue to be vital factors in insuring the success of the main attraction—the landing of Americans on the moon.



TEST VEHICLE—Boilerplate 14, shown being worked on in Apollo Systems Integration and Checkout facility, will remain at North American as "house" engineering systems integration tool. It will play vital role in insuring that flight subsystem hardware designs meet requirements.

Apollo Boilerplates Mission Or Purpose

The Apollo Boilerplate spacecraft numbers along with the mission or purpose of the spacecraft:

1-2 . . . Command module shells for land and water impact testing.

3-19 . . . Command module shells for parachute recovery tests.

6 . . . Used in pad abort test Nov. 7, 1963, at White Sands Missile Range, N.M. Being reworked as number 6A for parachute recovery tests.

9-27 . . . Used in tests to determine dynamic structural compatibility of Apollo spacecraft with Saturn launch vehicle.

12 . . . Used in transonic abort test utilizing Little Joe II launch vehicle at WSMR, May 13, 1964.

13 . . . Demonstrate compatibility of Apollo Spacecraft and Saturn I launch vehicle in launch from Cape Kennedy, Fla., May 28, 1964. Went into Earth orbit.

14 . . . "House" engineering systems integration tool being used at Downey by S&ID to verify flight subsystem hardware design.

15 . . . Second vehicle to fly aboard Saturn I. Launched from Cape Kennedy into Earth orbit on Sept. 18, 1964.

16-26 . . . Will be launched aboard Saturn I vehicle from Cape Kennedy in NASA's Pegasus program, which will investigate hazards of micrometeroids in space.

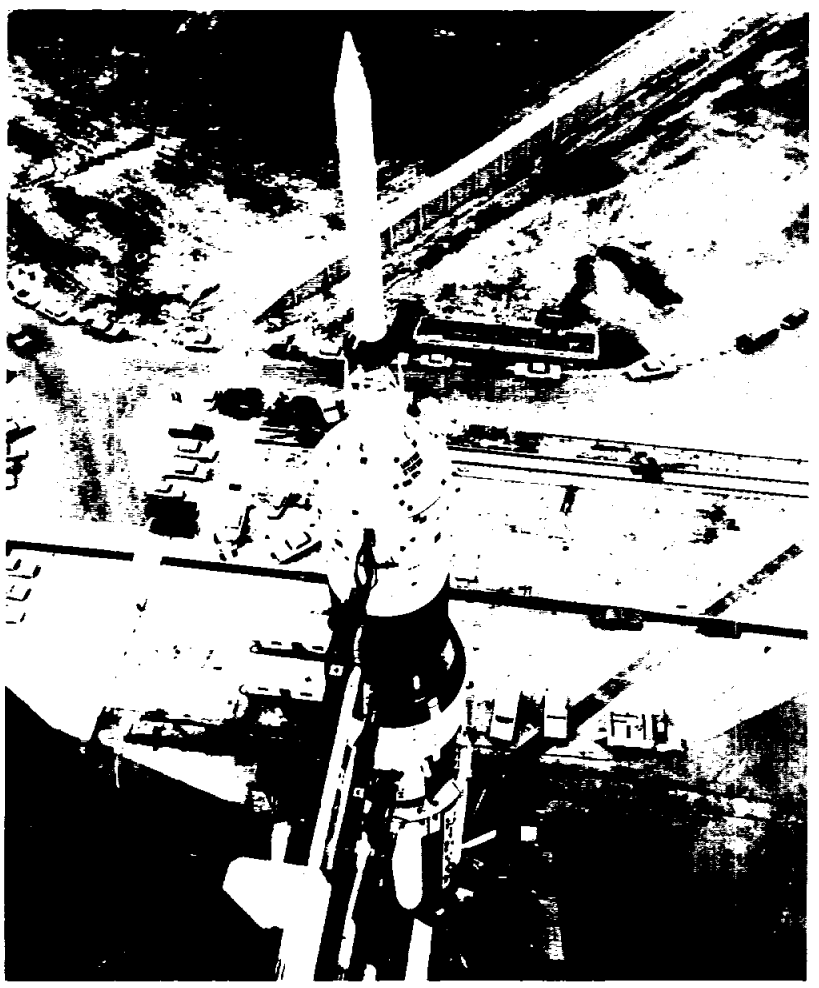
22 . . . In construction. To be used for high-altitude abort verification test of Apollo launch escape system. Will be launched at WSMR aboard Little Joe II.

23 . . . Launched by Little Joe II at WSMR Dec. 8, 1964, in high-Q abort test, which included verification of launch escape system, Earth landing system, and canard subsystem. BP-23 will be reworked as BP-23A and will be used later this year in a pad abort test at White Sands.

25 . . . Water recovery and handling development tests.

28 . . . Water impact testing.

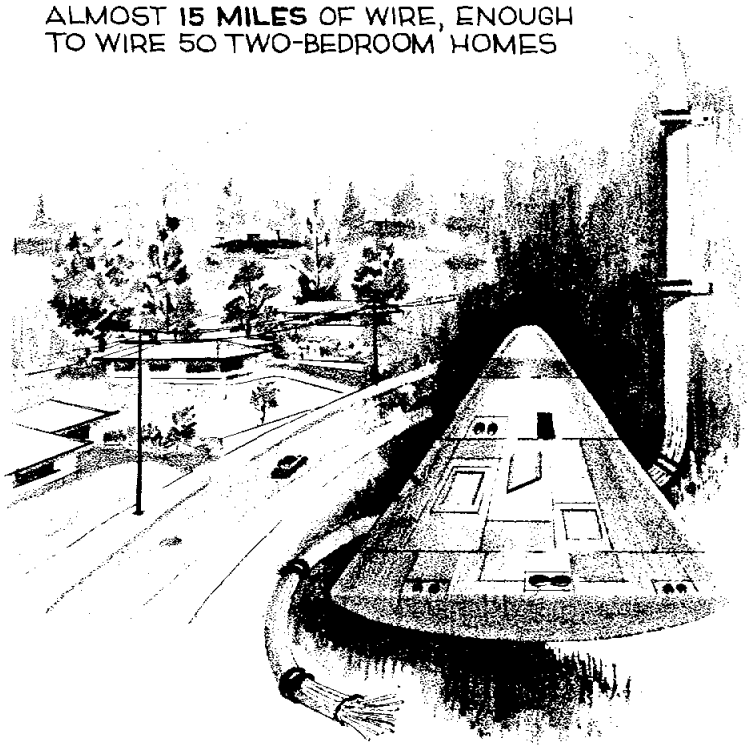
29 . . . In construction. To be used for flotation tests.



READY TO GO—Apollo Boilerplate 13, atop Saturn SA-6 launch vehicle, is poised on pad at Cape Kennedy awaiting test firing in which it was used to demonstrate spacecraft and Saturn launch vehicle compatibility.

HOW ABOUT THAT!

THE 13-FOOT-HIGH **APOLLO SPACECRAFT** COMMAND MODULE CONTAINS ALMOST **15 MILES** OF WIRE, ENOUGH TO WIRE 50 TWO-BEDROOM HOMES



COST REDUCTION CORNER

Vendor catalogue information, military specifications, National Aerospace Standards, and military standards drawings were being collected and filed by organizational elements and in some cases by individuals.

This method resulted in out-of-date and obsolete information being stored and being used in procurements which caused delays in processing purchase requests and also resulted in an inefficient use of storage cabinets, file cabinets, and bookcases.

An improvement has been made by renting a Visual Search Microfilm File. The file contains over 100,000 catalogue pages, military standards, National Aerospace Standards, military standards drawings, and selected military handbooks all of which are updated three times per year.

The file also contains the names, addresses and telephone numbers of local vendors or representatives. This will reduce long distance telephone charges because most of the addresses listed are in the Houston area or a city served by the Federal Telecommunications System.

Search time to locate catalogue information is reduced through use of a subject index to the file: a vendor index is also provided plus a cross index system between the military standards items.

This new method is saving $18,853 per year and is credited to the Instrumentation and Electronic Systems Division.

Sperry Rand Contributing Guidance, Control And Comput

On a bright, sunlit morning in 1912, a Curtiss flying boat with its single engine clattering, lifted from the waters off Hammondsport, N.Y. At the controls was a young man named Lawrence Sperry, son of the renowned inventor, Dr. Elmer A. Sperry. It was to be a historic flight—the *first* automatic flight, demonstrating Sperry's new aircraft stabilizer, forerunner of today's automatic pilot.

Just three years later, the same principles were applied by Dr. Sperry's fledgling company in developing the first U. S. "guided missile," a project then described as " . . . an automatic aerial torpedo, a passengerless aeroplane, capable of flying a desired distance on a course, true and predetermined, except for deviations due to direction by the wind, and of descending to earth and exploding a heavy explosive charge upon impact . . ."

These early milestones in technology, coupled with Sperry's successful development of the first naval gyro-compass, marked successful launching of Sperry Gyroscope Company—today one of the major divisions of the Sperry Rand Corporation.

Another important chapter in technological history associated with Sperry Rand began shortly after World War II: development of the electronic computer. In 1947, two scientists at the University of Pennsylvania developed for the U. S. Army the first all-electric computer. It was called *ENIAC*. They formed a company and in 1949 produced *BINAC*, the second computer system. Remington Rand, Inc., later merged with the Sperry Corporation to form Sperry Rand, acquired the computer company and before long a new computer series was taking shape—*UNIVAC*®.

Today, both the Sperry and UNIVAC divisions play important roles in our nation's defense and space programs. Combining over 70 years of accomplishments in electronics and aeronautics, their work now ranges from laser gyros and precision inertial navigation systems to microelectronic computers capable of repeating sets of operatings in billionths of a second.

Among the current efforts for the National Aeronautics and Space Administration are such programs as—16 PIP (pulsed integrating pendulum) accelerometers for both the Apollo and LEM navigation and guidance system; survival beacons for Project Gemini astronauts; thin-film computers for NASA's Mission Control Center and tracking sites: Inertial Reference Unit (IRU) for the Boeing-built Lunar Orbiter spacecraft; control and stabilization studies for cable-connected manned orbiting space stations: management support of the Astrionics Laboratory; real-time systems for tracking; a small ring laser gyro for ground-based tracking of launch vehicles and boosters; microcircuit Loran-C receivers for Project Apollo recovery aircraft; studies for displays to aid in orbital rendezvous and lunar landing, and highly precise Inertial Navigation Systems (INS) for Apollo tracking ships.

Although 16 PIPs might sound like a bachelor's code for a bevy of beautiful girls, in reality they are small, ultra-precise elements in the inertial guidance systems of both Apollo and LEM. The devices—pulsed integrating pendulums—are accelerometers which measure both the amount and direction of any change in a vehicle's acceleration. Based on a M.I.T. design, they are being produced under prime contract to MSC by Sperry's Inertial Division.

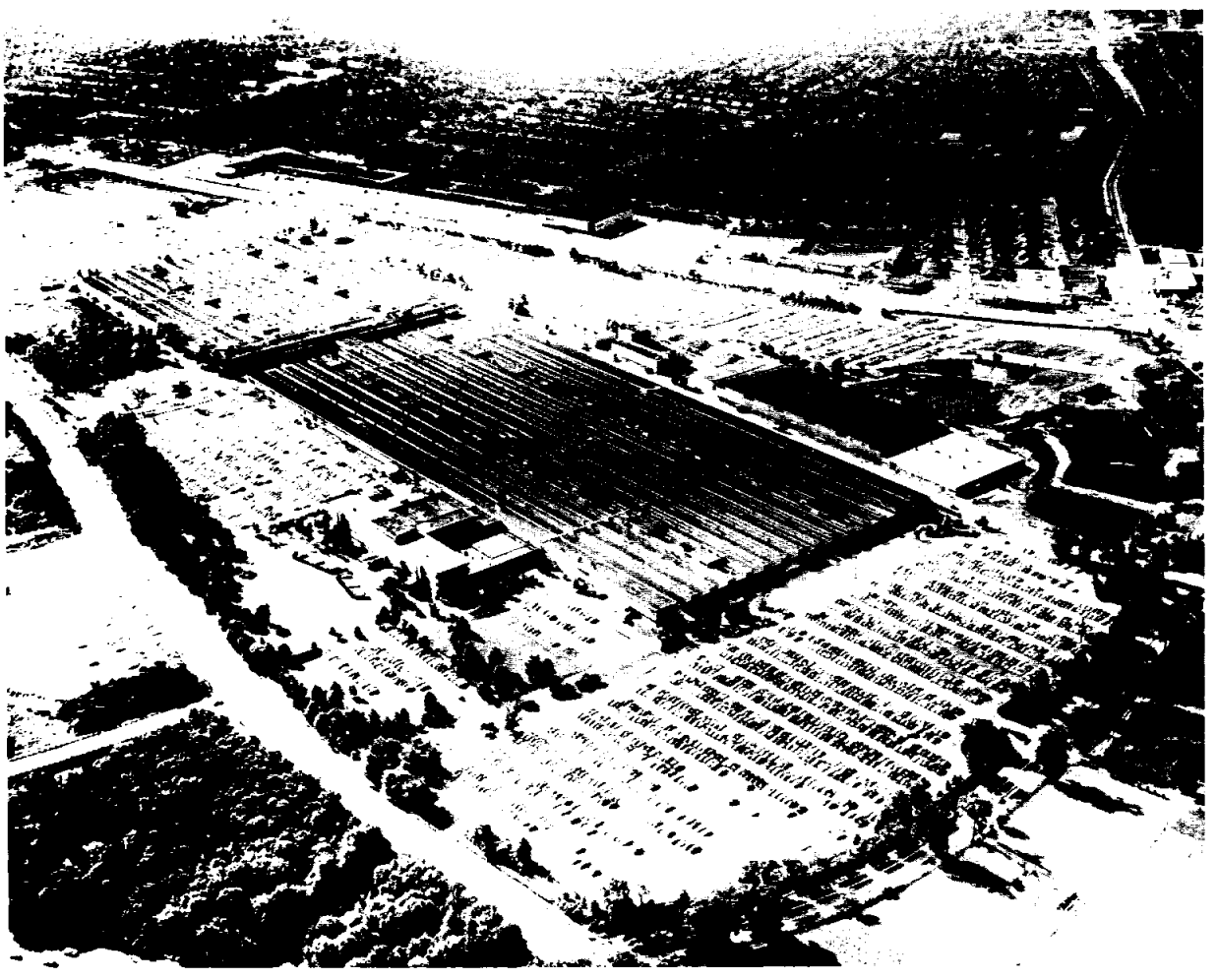
The two-inch-long PIP cylinder contains a floated element which is pushed or pulled by an accelerating or decelerating force. This element is permitted to rotate no further than 30,000,000ths of an inch before an artificial twisting force—torque—pushes it back toward null. The electrical signal from the torquers is proportional to the force being exerted on the floated element and on the vehicle itself.

As in all critical Apollo systems, success hinges on the reliability of each component to perform its mission. Sperry has taken great care to insure this reliability and assembly in super "clean" rooms. Nearly every tiny part of the 16 PIP must be precise to 50,000,000ths of an inch. These extremely accurate devices are also employed in a special program for the U. S. Navy, and it is expected that they will also find application in extended Apollo missions and beyond.

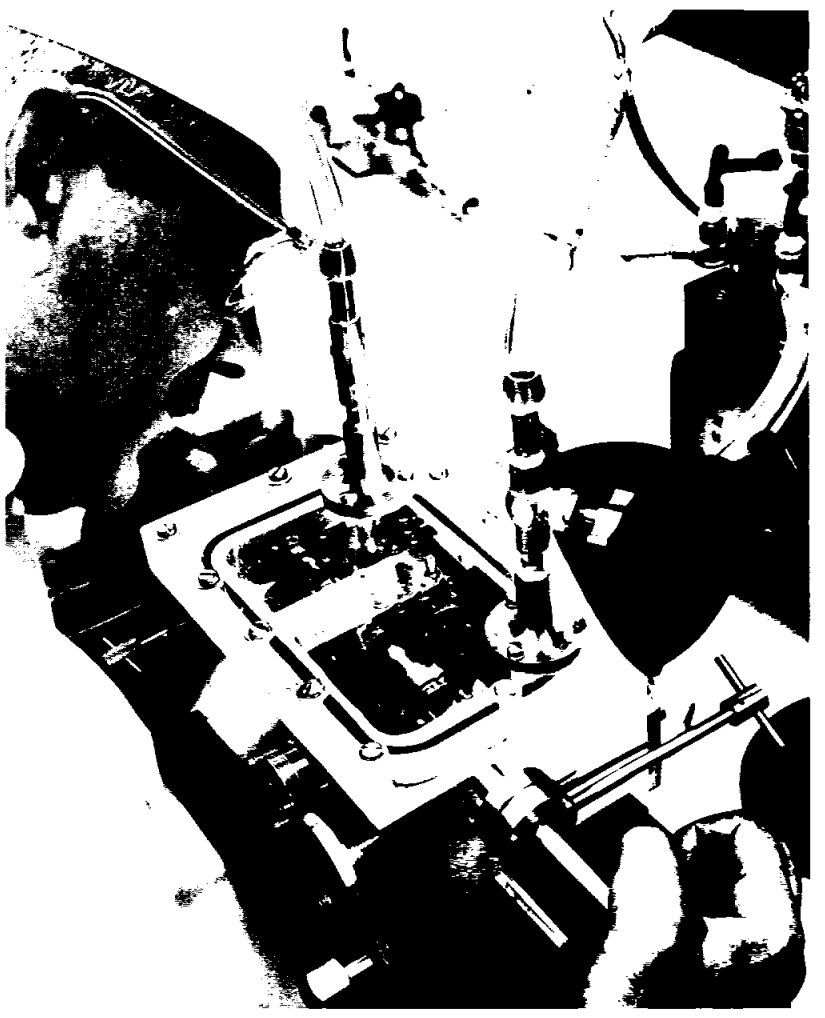
HARRY F. VICKERS, president & chief executive officer SPERRY RAND CORPORATION.

Another prime program at Sperry is the Inertial Reference Unit for the Lunar Orbiter spacecraft. As part of NASA's pre-lunar landing investigations, the Lunar Orbiter will be launched into moon orbit sometime in 1966 to obtain photo-

SPOTLESS FOR SPACE—A miniature vacuum cleaner hose sucks microscopic specks of dust from precision parts of a tiny instrument that will help guide U. S. astronauts to the moon and back. Sperry Gyroscope Company is manufacturing the devices—called accelerometers—that will sense changes in speed and direction of the huge Saturn rocket space vehicle.



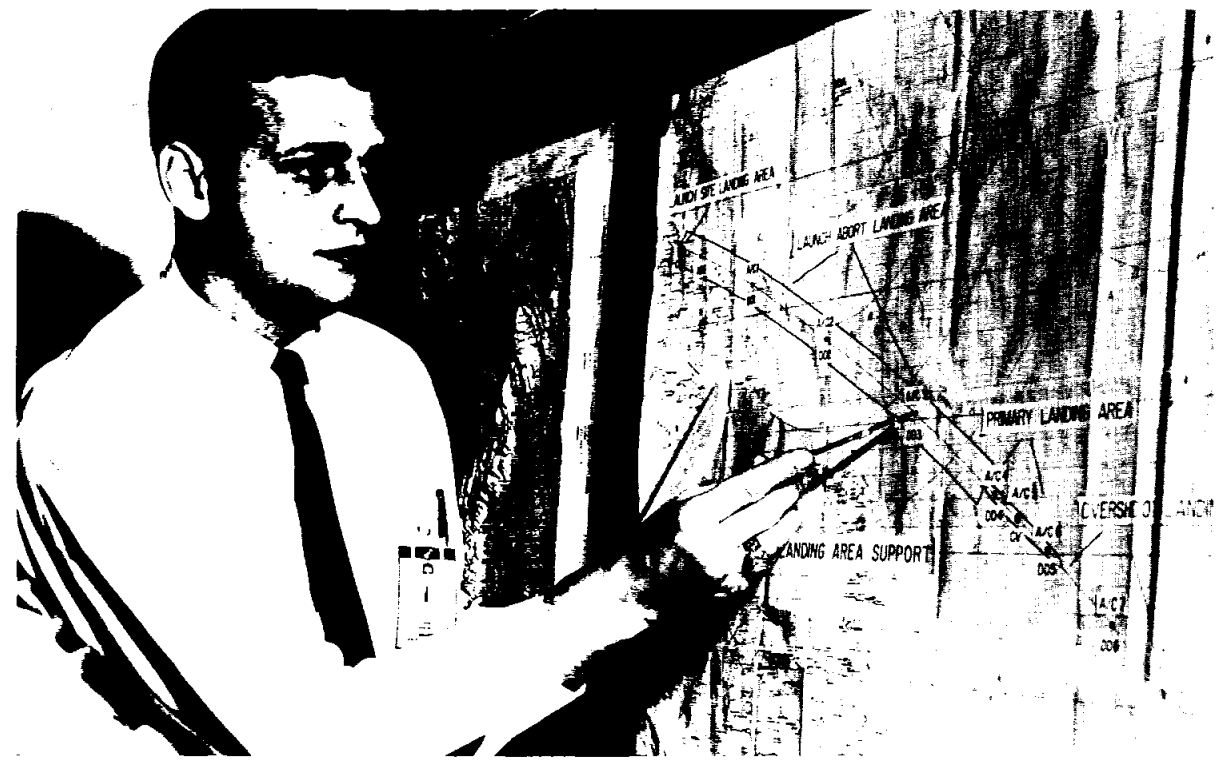
AERIAL VIEW—The Nassau Plant, Sperry Gyroscope Company, Division of Sperry Rand Corporation.



GUIDANCE UNDER GLASS—Unusual "no hands" assembly of a precision space guidance instrument at the Sperry Gyroscope Company has a technician manipulating metal rods through the air-tight walls of a pressurized, fluid-filled fixture. Parts of an accelerometer—a device that will sense changes in the speed and direction of the Apollo space vehicle designed to put U. S. astronauts on the moon—are lined up in "exploded" sequence inside the box-like fixture.

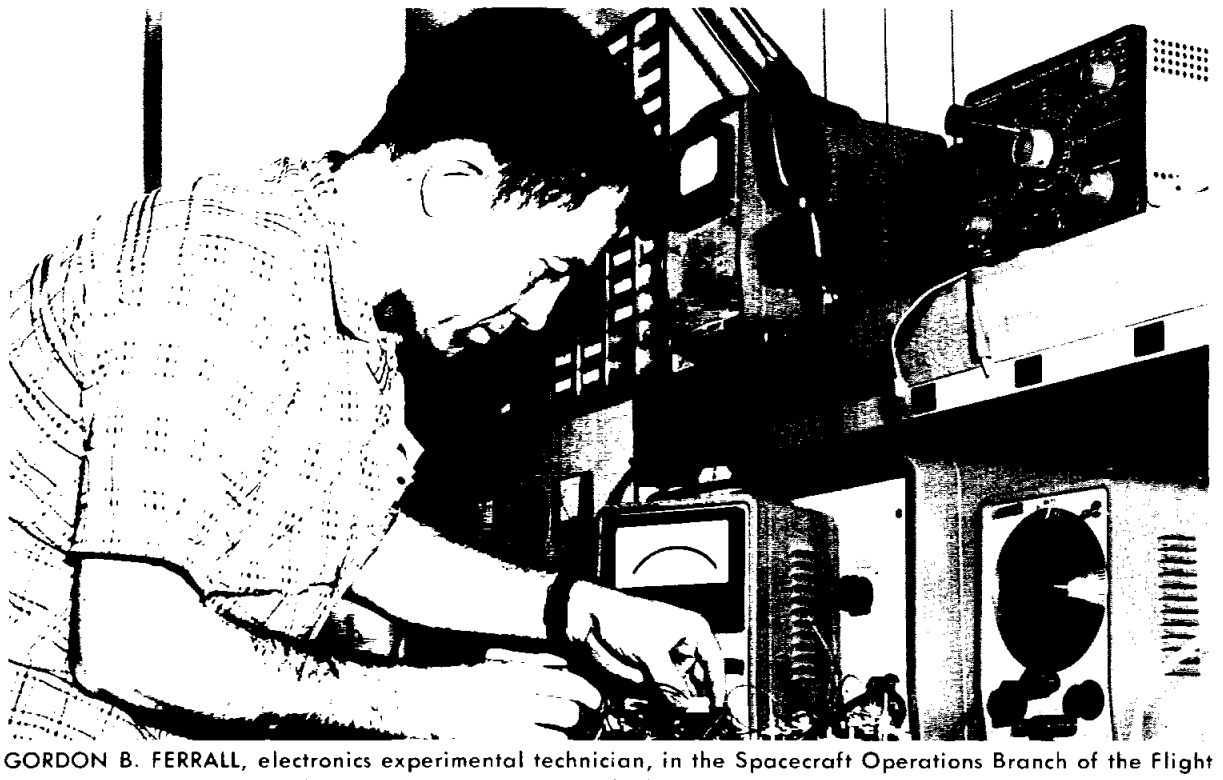
EDITOR'S NOTE: This is the thirty-ninth in a series of articles designed to acquaint MSC personnel with the Center's industrial family, the contractors who make MSC spacecraft, their launch vehicles and associated equipment. The material on these two pages was furnished by the Sperry Rand Corporation.

MSC at work...



EDWARD C. BULLUCK, AST, Recovery Operations Branch of the Landing and Recovery Division, checks a charted recovery plan for a Gemini flight. He also worked on the Mercury flights.

CAPT. ROBERT B. SHERIDAN, network controller of the Flight Support Division's Network Operations Branch (world-wide system), is seated at the Charatron Unit panel, a device that converts real-time data from the world-wide manned space flight network into projected television displays in the Manned Spaceflight Control Center here at MSC.



GORDON B. FERRALL, electronics experimental technician, in the Spacecraft Operations Branch of the Flight Crew Support Division, works on a camera time control which is being constructed and tested for use in the Gemini spacecraft.

NEW OFFICERS—At a recent election of officers by the Ellington Toastmistress Club, Betty Rogers (left), of the Program Budget Branch, Resources Management Division was elected president, and Bobbie Wright, secretary to the commander of the Air Force Systems Command Field Office, was elected vice president.

Ellington Toastmistress' Elect Officers, Extend Invitation For New Members

An invitation to all women at the Manned Spacecraft Center to join the Ellington Toastmistress Club has been extended by Virginia Thompson of the Management Analysis Division, who is publicity chairman of the group.

The club meets at 5:30 p.m., the first and third Tuesdays of each month in the Ellington AFB Officers Open Mess. The next meeting is scheduled for February 2.

At a recent election of officers, Betty Rogers was elected president and Bobbie Wright was elected vice president.

Those interested in attending a Toastmistress meeting are invited to call Virginia Thompson at Ext. 5461, or Silvie Kelarek at Ext. 3961.

Award For Government Service

20-YEAR AWARD—Walter D. Wolhart (right), chief, Cost Engineering Office, Office of Gemini Program Control, was recently presented a service award for 20-years of government service, by Charles W. Mathews, manager, Gemini Program Office.

Aero Club Schedules Pilot's Course, Secures Special Aircraft Rental Rates

Plans for the next Private Pilot Ground School course will be discussed at the meeting of the Aero Club at 5 p.m., January 25 in the auditorium of Building 30.

This audio-visual course will begin in February and is open to Aero Club members for a $10 tuition fee. Manuals, flight computers, plotters and other materials may be obtained through the club at reduced prices. Members who paid the $10 fee for the Ground School last fall will be admitted to the course in February, free of charge.

The Aero Club has obtained a reduction from the normal aircraft rental rates with the Whirly Bees at Clover Field, Friendswood, and at Cliff Hyde Aviation in LaPorte. Licensed instructors may be obtained at either field at reasonable rates.

Types of planes that may be rented at these special club rates include: Cessna 150, 172, 182; Piper PA-18; Tri-Pacer; Cherokee; and Beech Bonanza. These planes vary in speed, equipment, and hourly rate price but the rates are below nominal rental prices. These planes are periodically inspected by FAA licensed mechanics according to FAA regulations.

All persons interested in the flying club are invited to attend the meeting in order to ask questions concerning the club and flying in general.

Members are again urged to attend the next meeting and to pay their quarterly dues of one dollar. Also all members who have soloed or obtained a rating during their membership in the Aero Club are asked to notify Bill Kuykendall, Ext. 3101, or Dick Sutton, Ext. 4302.

Partner Assured Newcomers To Bridge Club

The MSC Duplicate Bridge Club is introducing a plan to assure partners for all who wish to play each Tuesday night at the Ellington NCO Club.

Each game night one of the regular members will volunteer to come without a partner and be available to play with any newcomer, visiting MSC or contractor "fireman" or a club member who happens to find himself without a partner.

Wayne Brewer has been elected to serve as President of the Club, with Jim Raney continuing to serve as tournament director. Other officers are: James O'Neill, first vice president; Art Manson, second vice president; Gil Conforti, treasurer; Evelyn Huvar, secretary; Leona Kempainen, publicity chairman; and Muncy McKinney, membership chairman.

The Club Directors have approved a schedule of events for 1965, including several special games at which trophies will be awarded to the winners. The first of these special events will be the Mixed Pair Championship on February 16.

Winners at the January 5, Master Point game were Max Cone and John Stanfield, first North-South, and Bob and Terry Hodgson, first East-West. Charles and Dolores Sheridan were second North-South, and C. E. Bailey and Charlie Brown, second East-West.

At the rating point game on December 29, the North-South winners were Wayne and Elizabeth Brewer, first; Art and Skip Manson, second. East-West winners were Tom Holt and Frank Herbert, first; Tom Moore and Harold Granger, second.

Coming EAA Employee Events Announced

Some of the events being planned for MSC employees by the Employees Activities Association were announced this week by Mary Sylvia, chairman, Center Social Activities.

In March a trip is being planned to Las Vegas, Nev. The trip will be made by jet aircraft. More details will be announced on this event soon.

A picnic style bar-b-que is planned for April in the Harris County Domed Stadium, followed by a baseball game.

June 26 is the date that has been set for the MSC Summer dance at the Sylvan Beach Pavilion in LaPorte.

In September the MSC/EAA annual picnic will be held with Tony Yeater serving as general chairman.

The MSC Christmas Dance will be held again this year at the Sylvan Beach Pavilion in LaPorte, the date, December 10.

Tentative plans have also been made to hold an ice skating party and a theatre party sometime during the year.

Anyone having suggestions for employee participation activities may submit them in writing to any EAA representative for consideration by the proper EAA chairman.

New Executive Board MSC Employees Activities Association

RECENTLY ELECTED BOARD MEMBERS—At elections held recently by representatives of the MSC Employees Activities Association, four new board members were elected for two year terms to fill existing vacancies. The vacancies were president; competitive sports; children's committee; and building, grounds and safety. The board members are (seated l. to r.) Joyce Lowe, children's committee; Phoncille DeVore, publicity chairman; Phil Hamburger, president; Mary Sylvia, social activities; and Rita Sommer, corresponding secretary, (standing l. to r.) William Creasy, buildings, grounds and safety; Claude Ingels, treasurer; John Miles, competitive sports; and Mervin Hughes, arts, crafts and clubs. (Abner Askew, vice president, not pictured.)

MSC BOWLING ROUNDUP

MSC MIXED LEAGUE
Standings as of Jan. 11

TEAM	WON	LOST
Celestials	45½	18½
Virginians	40	24
Alley Cats	38	26
Eight Balls	32	32
Dusters	32	32
Falcons	32	32
Shakers	30	34
Gutter Nuts	30	34
Play Mates	30	34
Hawks	28½	35½
Chugg-a-Luggs	28	36
Goofballs	22	42

High Game Women: Barnes 225, Taylor, Morris 174, Gassett 165.

High Game Men: McDonald 245, Morris 230, Schmidt, Zwolinski, Sargent, Morgan 221.

High Series Women: Barnes 541, Morris 452, Gassett 450.

High Series Men: Sargent 580, Spivey 574, Morris 570.

High Team Game: Celestials 854, Virginians 840, Eight Balls, Shakers 823.

High Team Series: Celestials 2399, Eight Balls 2321, Chugg-a-Luggs 2286.

NASA 5 O'CLOCK MON.
Standings as of Jan. 11

TEAM	WON	LOST
Suppliers	38	22
Foul Five	34	26
Computers	32	28
Sombreros	28	32
Hot Shots	27	33
Alley Gators	21	39

High Game: W. Kutalek 244, M. Cohn 230, H. Erickson 224.

High Series: E. R. Walker 591, H. Walker 569, B. Calhoun 567.

High Team Game: Computers 880, Foul Five 862, Suppliers 845.

High Team Series: Hot Shots 2326, Computers 2321, Foul Five 2306.

MIMOSA MEN'S LEAGUE
Standings as of Jan. 7

TEAM	WON	LOST
Fabricators	39	25
Whirlwinds	38	26
Pseudonauts	36	28
Green Giants	33	31
Alley Oops	32	32
Turkeys	32	32
Roadrunners	31	33
Sizzlers	28	36
Spastics	28	36
Technics	23	41

High Game: Hecht 244, Schwartz 242, Amason 233.

High Series: Lee 643, Morgan 629, Whipkey 603.

High Team Game: Fabricators 990, Pseudonauts 971, Green Giants 928.

High Team Series: Fabricators 2641, Pseudonauts 2631, Whirlwinds 2620.

MSC COUPLES LEAGUE
Final Standings First Half
As of Jan. 12

TEAM	WON	LOST
Wha' Hoppen?	52	16
Hi-Ho's	42	26
Schplitz	38	30
Pin Splitters	35	33
Ez-Go	33½	34½
Crickets	33	35
Goofballs	32½	35½
Alley Cats	32	36
Bowlernauts	31½	36½
Sandbaggers	28½	39½
Thinkers	26	42
BLTZF	24	44

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

High Game Men: L. Townsend, D. Kennedy 236, J. Garino 235.

High Series Women: J. Foster 564, W. Townsend 510.

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

Employee Health Benefits Plans May Be Changed February 1-15

All employees enrolled in plans under the Federal Employees Health Benefits Program will have an opportunity to change their enrollments during the open season scheduled for Feb. 1-15, 1965.

Eligible employees who are not enrolled will be able to enroll during this open season.

Enrolled employees will be able to make the following changes in their enrollments: from one plan to another; from one option to another in the same or a different plan; from self only to self and family, or the reverse.

Last October, all enrolled employees were given an up-to-date copy of Standard Form 2809A (The Federal Employees Health Benefits Program), dated November 1964, and a copy of pamphlet BRI 41-117 (Information About Plan Changes Effective November 1964). New brochures for each plan will not be distributed for this open season. However, each employee will be given a leaflet informing him of the open season and telling how to change health benefits registration if he wishes to do so.

All plans which participate in this program will be listed in the leaflet and any employee who is considering a change and is interested in seeing the brochure of a plan other than the one in which he is enrolled should contact the administrative officer of his organization.

Any employee who does not want to change his registration need take no action; his present registration will remain in effect.

Any employee who is not now enrolled and wishes to enroll, or who is enrolled and wishes to change his enrollment, must complete a new Standard Form 2809. These forms are available in the Administrative Branch of the Personnel Division, Room 146, Building 2.

Completed forms must be returned to that office no later than Feb. 15, 1965.

Special Golf Lessons Set For The Ladies

The MSC Golf Association has made arrangements for interested MSC female employees or the wives of male employees here at the Center to take golf lessons at the Ellington AFB Golf Course.

Lessons will cost only twenty-five cents each and will be given by Jim "Red" Owens, the golf pro at the Ellington course. The lessons will be offered at 10 a.m. and 5 p.m. each Tuesday and Thursday at Ellington.

Paul J. McGarrigle, president of the MSC Golf Association said, "This is a wonderful opportunity for the ladies to learn the game of golf at a fraction of the normal charge for golf lessons."

For additional information on these lessons, call McGarrigle at Ext. 4313.

ers To NASA Space Programs

graphs of the lunar surface. These observations will aid in selecting the LEM landing site.

Sperry's IRU will weigh 9.5 pounds and is composed of space-proven SYG-1000 miniature gyros and a 16 PIP accelerometer, plus solid state electronics. The IRU will perform three prime functions: attitude rate measurement, displacement from prime attitude, and mid-course velocity changes. The IRU is designed to measure the drift of the spacecraft to within .0001-degrees per second; inertial attitude to within .03-degrees for one-hour increments, and lunar orbit injection velocity increments to within .05 per cent accuracy. High reliability is of prime concern in the design.

Sperry Rand's wide experience in electronics and management of large scale defense programs will be brought to bear in support of NASA's Astrionics Laboratory at Huntsville, Ala. Under a recent contract award, Sperry will provide 1,000 engineers and support personnel for the NASA laboratory which develops electronic equipment for multi-stage launch vehicles like Saturn.

Sperry's sensor skill has been applied to a new system called READI (Rocket Engine Analyzer and Decision Instrumentation), which is under evaluation by the Marshall Space Flight Center. This system monitors rocket engine performance, and is designed to detect and counter dangerous malfunctions either on the launch pad or in flight. READI would alert a spacecraft astronaut to trouble if there were time, or decide on and take corrective action itself if instantaneous action were required.

An important element to success of Project Apollo will be split-second communications between NASA spacecraft control centers and world-wide tracking sites. The NASA Communications Network (NASCOM) circles the globe with high speed ground communications support for space flight missions, linking 89 stations, including 34 overseas points, with message, voice and data communication.

The primary switching center is located at Goddard Space Flight Center, Greenbelt, Md., where communications are received, stored, examined, cued, routed and transmitted at high speed. So efficient is the system that average processing time is only 6.6 seconds. The NASCOM system also includes sub-switching centers in London, Honolulu, and Adelaide, Australia, plus sea-going tracking ships and aircraft.

At MSC, Houston, a UNIVAC 490, part of the NASCOM system, handles a switching load equivalent to 10,000 teletype lines. Unlike other networks which adhere to preplanned formats, message lengths, and acceptance times, the 490 system accepts all inputs without restrictions, and in real-time. Once entered into the system, 490 programs automatically notify the network intercept position of errors.

In the NASA system, there are two status levels for network lines: mission and non-mission. This means that any given station in the network can monitor an orbiting mission, or can send non-mission traffic. Prior to use of the 490, network circuits were either put into mission mode, stations closed for non-mission use, or traffic held until mission completion. With the UNIVAC 490, individual circuits are "mission" or "non-mission" as required. In addition, the 490 can "talk" to a variety of different computers by use of a special interface configuration.

Last month, NASA selected Univac to provide ten digital data processing systems for Project Apollo. They will be utilized for selected ground sites and three ships, with Univac providing training for station personnel and documentation services.

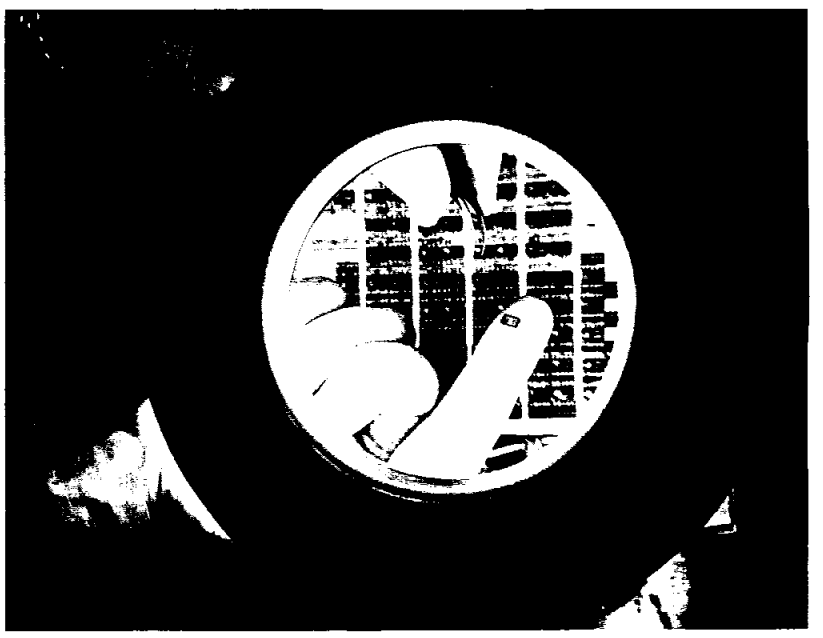
The data processors will examine, evaluate and organize the digital data to provide visual displays at each site and feed the information to computers at the Mission Control Center at Houston by way of high speed transmission lines. Here data will be evaluated and decisions made concerning the flight.

Among other Univac installations within NASA is the 1107 Thin-Film Memory System for the Goddard Flight Center. It is used to process telemetered data from satellites at millions-of-a-second speed.

Today, one of the 500 largest U. S. industrial corporations, Sperry Rand ranks among the top 50 in sales and assets, and among the top 10 defense contractors. It employs over 90,000 people in domestic and overseas operations. In the U. S., Sperry Rand operates 50 plants in 22 states. Forty-six manufacturing plants are operated in 18 other countries. Heading this organization is Harry F. Vickers, President and Chief Executive Officer.

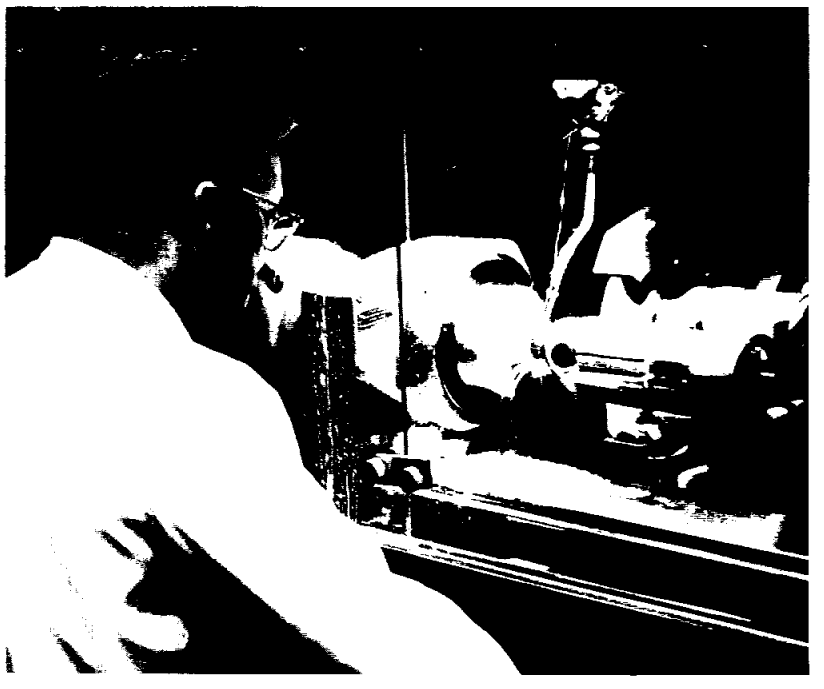
Products produced serve many different fields. In general, however, they extend man's abilities to perform his tasks more quickly, more accurately, and with smaller expenditure of human energy—whether his work be in the factory or office, on a farm, at the controls of an airplane or spacecraft, on the bridge of a ship, under the sea, or intercepting missiles or aircraft.

MOON GUIDANCE—An acceleration-sensing space speedometer is mounted in a test model of the ball-shaped inertial navigation system "platform" that will help guide U. S. astronauts to the moon and back. These units being manufactured by the Sperry Gyroscope Company under contract to NASA for the Apollo project, will sense changes in speed and direction of a vehicle.



MICROCIRCUITS—Tiny silicon wafer is one of more than 800 microcircuits integrated into Sperry's AN/ARN-78 airborne Loran-C receiver. Wafers have up to 40 components invisible to the eye. Receivers will be employed by Project Apollo recovery aircraft to provide precise navigation.

CONTROL CENTER SYSTEM—This UNIVAC 490, as part of the NASA Communications Network (NASCOM) at the Manned Spacecraft Center, can handle a switching load equivalent to 10,000 teletype lines.



NO SQUARES HERE—Roundness to within 50 millionths of an inch for parts of the Apollo moon mission navigation instruments calls for special machining operations. The grinder helps turn out miniature inertial devices called accelerometers that will aid in charting a precise course to the moon and back. The grinder's special hydrostatic head can be set up to assure roundness to within ten millionths of an inch.

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
Editor . . . . . Milton E. Reim
Staff Photographer . . . . . A. "Pat" Patnesky

On The Lighter Side

WHAT PARKING PROBLEM??

Space News Of Five Years Ago

JAN. 21, 1960—At a meeting to draft fiscal year 1962 funding estimates, the total purchase of Atlas launch vehicles was listed as 15, and the total purchase of Mercury spacecraft was listed as 26.

—Little Joe 1-B was launched from Wallops Island with a rhesus monkey, "Miss Sam," aboard. During the mission, all sequences operated as planned; the spacecraft attained a peak altitude of 9.3 statute miles, a range of 11.7 statute miles, and a maximum speed of 2,021.6 miles per hour. Thirty minutes from launch time, a Marine recovery helicopter deposited the spacecraft and its occupant at Wallops Station. "Miss Sam" was in good condition, and all test objectives were successfully fulfilled.

— McDonnell delivered the first production-type Mercury spacecraft to the Space Task Group at Langley in less than one year from the signing of the formal contract. This spacecraft was a structural shell and did not contain most of the internal systems that would be required for manned space flight. After receipt, the Space Task Group instrumented the spacecraft and designated it for Mercury-Atlas 1 (MA-1) flight.

JAN. 31, 1960—Six chimpanzees were rated as being trained and ready to support Mercury-Redstone or Mercury-Atlas missions. Other chimpanzees were being shipped from Africa to enter the animal training program.

During January 1960 — NASA presented its basic communications requirements for Project Mercury to Western Electric, and the Company's interim proposal to satisfy these requirements was accepted in February 1960.

— Qualification tests were completed on the Mercury spacecraft pilot cameras and instrument viewing cameras.

FEB. 1. 1960—Qualification tests of the Mercury spacecraft periscope were completed.

—The NASA administrator requested another $113-million for fiscal year 1961 to increase the large launch vehicle program based on a study directed by the President on January 14.

—A study was completed on the "External and Internal Noise of Space Capsules." NASA officials were still of the opinion that the internal noise level was too high for pilot comfort. Space Task Group felt that data were needed on noise transmission through an actual production-model spacecraft structure.

Rocket Tanks Of Fiberglass?

The possibility of building space-vehicle fuel tanks out of fiberglass is being studied by the National Aeronautics and Space Administration's Lewis Research Center.

The tanks would hold liquid fuels at temperatures below —250 degrees F.

Fiberglass is light in weight and shows promise of retaining its strength at sub-zero temperatures. The study is being made for NASA by Douglas Missiles & Space Systems Division, Santa Monica, Calif.

Welcome Aboard

During the last reporting period, a total of 33 persons joined the Manned Spacecraft Center. Of these, seven were assigned to MSC-Florida Operations, Merritt Island, Fla.; one to Downey, Calif.; one to Bethpage, N. Y.; three to White Sands Operations, Las Cruces, N.M.; and the remaining 21 in Houston.

Procurement and Contracts Division: John J. Cunningham, Donald E. Jackson, Farris R. Tabor, and Stuart L. Vanderoef.

Engineering Division: Homer J. Leonard.

Flight Crew Support Division: William M. Coons, and Benjamin C. Locher.

Information Systems Division: James A. Porter.

Instrumentation and Electronic Systems Division: William T. Murphree.

Advanced Spacecraft Technology Division: Robert H. Manka, and Steven R. Mansur.

Flight Control Division: R. Lee Hysom, Jerry W. Moser, J. Gary Renick, Homer H. Schwartz, and Joseph P. Vick.

Mission Planning and Analysis Division: Harold W. Kinamon, Donald P. Schneider, and Theodore P. Volin.

Flight Support Division: Fred A. Patterson.

MSC-Florida Operations (Merritt Island, Fla.): Roland M. Brunelle, Walter K. A. Gallant, Warren E. Horne, Russell D. Newlin, Robert J. Reed, Cornelius R. Roerdomp, and Thomas A. Zemo.

Apollo Spacecraft Program Office: Cecilia Alvarado, (Downey, Calif.), and Robert S. Zuckerman, (Bethpage, N. Y.)

White Sands Operations, (Las Cruces, N.M.): Leonard D. Bronkema, Mauhillau M. McKenzie, and Leonard F. Pickens.

Resources Management Division: Charles M. Hoskins.

SPACE QUOTES

USAF-NASA EXCHANGE IS INTEGRAL PART OF SPACE PROGRAM. James E. Webb, Young Presidents' Orangization, White Sulphur Springs, West Virginia, October 3, 1964.

"NASA works very closely with the Air Force in manned space flight. The Gemini two-man spacecraft will serve the Air Force as a key element in the Manned Orbiting Laboratory Program whose purpose is to help determine what military missions in space should be assigned to piloted craft. Our program contributes research and development aid throughout the appropriate spectrum of defense projects. The Department of Defense, in turn, shares applicable knowledge from its military projects with NASA. This exchange is an integral part of the concept of a national space program."

MSC PERSONALITY

Dr. Catterson Directs Residency Program For Doctors At MSC

Directing a program that will provide the Manned Spacecraft Center and other government agencies with a source of well-trained medical doctors who have a specialization in aerospace medicine is the primary duty assigned to Dr. Duane Catterson, here at the Center.

The Aerospace Medical Residency Program which was inaugurated here at MSC on July 1, 1964, now has two doctors in the program with another scheduled to enter this month.

Dr. Catterson is the assistant for Program Development to the chief of Center Medical Programs, in which he is responsible for the development of medical research, as the need arises, to support Center programs.

As preceptor of the Aerospace Medical Residency Program, Dr. Catterson counsels the doctors in residence at the Center and supervises their specific assignments into various areas during their residency. He also furnishes reports and evaluations of their training to their respective educational institutions.

To perform the above duty for Ohio State University, Dr. Catterson was appointed an associate professor by Ohio State (without remuneration). The above university is presently the only fully accredited civilian flight surgeon training school in the U. S.—two other flight surgeon schools are military. They are USAF School of Aerospace Medicine, Brooks AFB, Tex.; and the U. S. Naval School of Aviation Medicine, Pensacola, Fla.

He is also a medical representative on the Center's Experiments Review Panel. (an advisory panel to the MSC Director, reviewing proposed in-flight experiments for operational feasibility). He coordinates and provides medical input into the proposed experiments from medical areas within the Center.

He also serves as staff advisor on the size and configuration of the medical research establishment required to do the proper job here at MSC.

Another duty of Dr. Catterson is to provide medical advice in the area of advanced manned mission studies to NASA Headquarters and to the Advanced Spacecraft Technology Division here at the Center.

Dr. Catterson was born in Denver, Colo., where he attended Colorado Military School. In 1951 he was graduated from the University of Colorado with a BA degree, and in 1955 was awarded his doctor of medicine degree. His internship was with the USAF at Madigan Army Hospital, Tacoma, Wash., followed by service with the Air Force at March AFB, Calif., and the School of Aviation Medicine, Randolph AFB, Tex. He was also in private practice in Wheatridge, Colo., for a year in 1958-59.

He was a senior resident in aviation medicine at Ohio State University in 1959-61 and was awarded a MS degree in preventive medicine. From 1961-62 he was chief resident at the Lovelace Foundation for Medical Education and Research, Albuquerque, N. M., where he gained experience in application of the aerospace medical specialities of exercise physiology and identifying and evaluating selection criteria for pilots of high performance aircraft. The original seven astronauts were given their qualifying physical examinations at the Lovelace Foundation.

DR. A. D. CATTERSON

In July of 1962, Dr. Catterson joined MSC as head of the Operational Support Branch in the Aerospace Medical Operations Office, and later became associate chief for Requirements Advanced Planning.

He assumed his present duties in March, 1964, when the Center Medical Programs office was formed.

His published technical papers include "Human Psychomotor Performance During Prolonged Vertical Vibration" in *Aerospace Medicine*, 1962.

He is a member of the American Medical Association, Aerospace Medical Association, Phi Rho Sigma (medical fraternity), and the Harris County Medical Society.

Married to the former Charlene Willis of Denver, Colo., he and his wife, and children Donald 13, Mary 11, and Allen 2, live in El Lago, Seabrook, Tex.

Dr. Catterson, like many others here at the Center, is only able to sporadically pursue his hobby. He builds household furniture in his woodworking shop in his garage. He said it is sometimes so long between work sessions in his shop that he has been known to make the same mistake twice while working on a piece of furniture.

Heavy Roadwork

The roadway for the Crawler-Transporter which will carry the Saturn V and Apollo spacecraft at NASA's Merritt Island Launch Area in Florida will be almost seven feet thick.

GT-2

(Continued from Page 1)

Operations, is operations director and has overall responsibility for conducting the GT-2 mission.

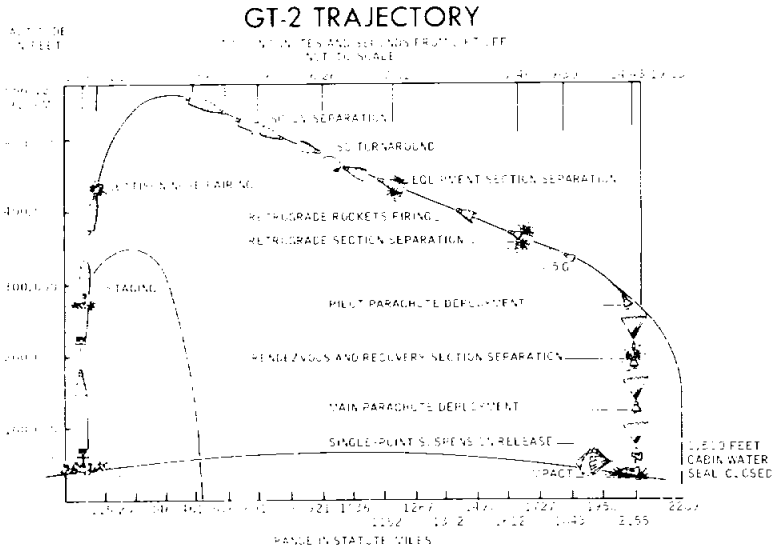
The Manned Spacecraft Center's Gemini Program Office headed by Charles W. Mathews is managing the Gemini program. Dr. George E. Mueller, NASA associate administrator for Manned Space Flight, is acting Gemini program director.

USAF Space Systems Division and the 6555th Aerospace Test Wing, Patrick Air Force Base, Fla., are responsible for the development and launch, respectively, of the Gemini launch vehicle (GLV), a modified Titan II rocket.

Department of Defense support for this mission includes tracking, recovery ships and launch services.

McDonnell Aircraft Corp. is prime contractor for the Gemini spacecraft and the Martin Company manufactures the Gemini launch vehicle.

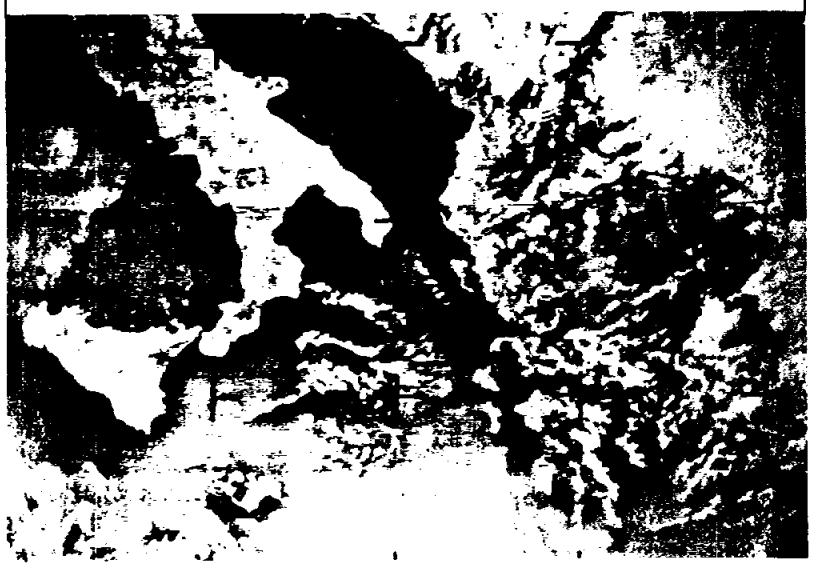
GT-2 TRAJECTORY



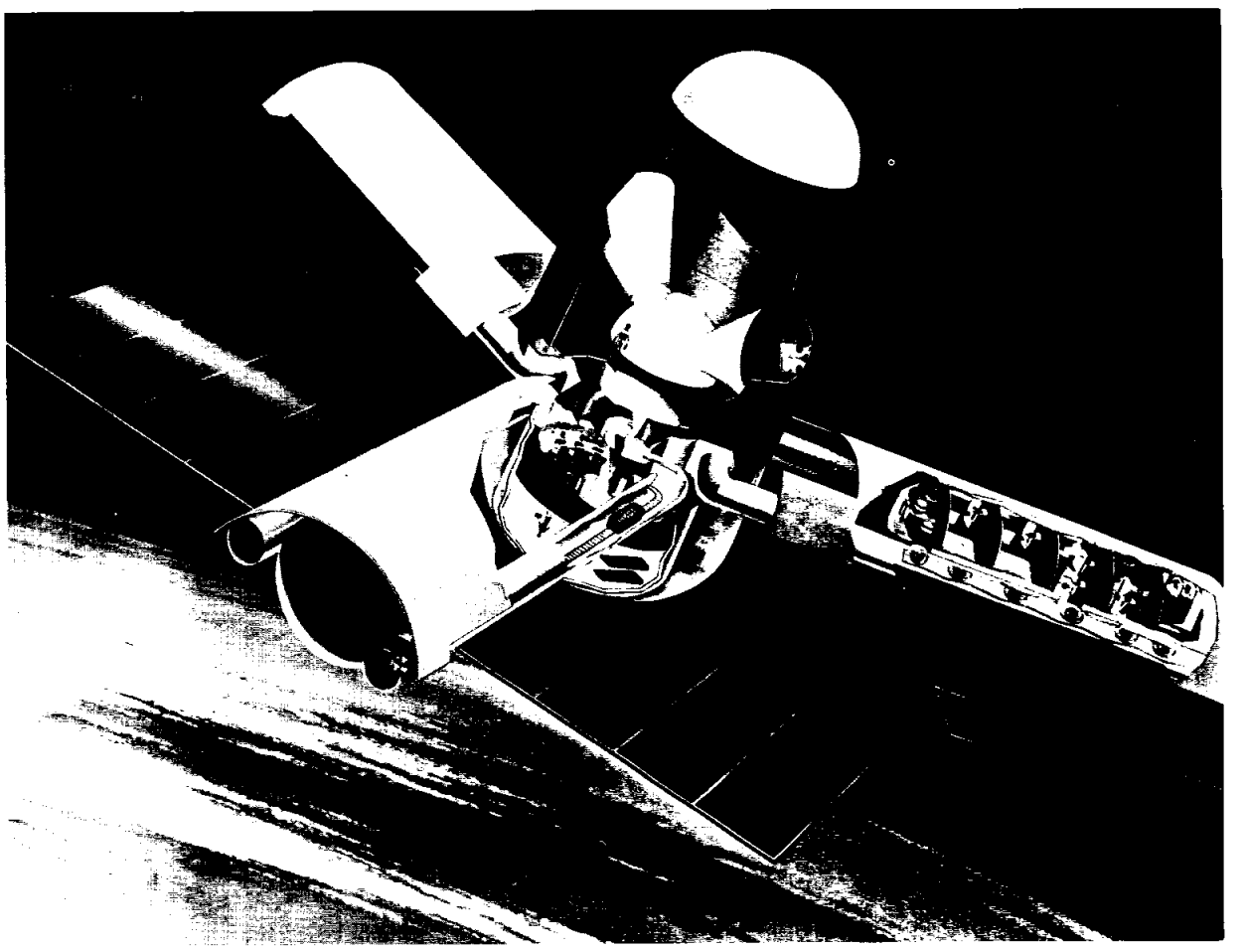
Recent Visitors To Center

KIWANIS HEAD—Edward B. Moylan Jr., president of Kiwanis International, of Miami, Fla. was a recent visitor to the Manned Spacecraft Center. Shown above (l. to r.) are: Knox E. Wright, president, Houston Kiwanis Club; Robert E. Finch, district governor, Kiwanis International, of Corpus Christi; and Moylan, as they take a close look at the Sigma 7 spacecraft of Walter M. Schirra in the Building 1 Auditorium.

A Geography Lesson Verified



JUST LIKE THE GEOGRAPHY BOOKS—What looks like a photo copy out of a geography book is an actual photo taken from NASA's Nimbus I meteorological satellite. Italy and Sicily show clearly while the coasts of Yugoslavia, Albania, and Greece are easily recognized through the cloud cover in this automatic picture transmission that was received by the French Meteorological Service's APT ground station near Lannion, France on September 9, last year. Nimbus ceased taking pictures on September 22, but on December 8, the 830-pound weather satellite began to transmit again, sending back engineering information useful for future Nimbus flights.



'RECOMMENDED' 24-MAN SPACE STATION—America's first 24-man space station with artificial gravity may resemble this rotating three-radial module and hub design. This configuration is recommended by Lockheed-California Company Spacecraft Organization engineers in a study for the Manned Spacecraft Center. The 124-ton orbiting laboratory, would have a one- to five-year mission life and would be about 260 nautical miles from earth. Total cost was estimated at $2.85 billion.

Lockheed Study Favors 'Three-Radial' Hub Design For 24-Man Gravity Space Station

A spoke-like "three radial module" design is recommended for America's first 24-man artificial gravity space station by Lockheed-California Company engineers announced in a December 28, 1964 report to the National Aeronautics and Space Administration.

In a study sponsored by NASA's Manned Spacecraft Center, Lockheed favored an orbiting laboratory design with manned compartments cradled in the three 79-foot-long arms extending from a hub 75 feet high. Reaching out from the arms would be rectangular panels containing solar cells designed to absorb sunlight and produce electricity.

The 246,000-pound station would rotate at a rate of four revolutions per minute to provide simulated gravity from one-fifth to four-tenths of earth gravity. However, a weightlessness chamber—controlled by a despin motor—would be available in the two-level hub for zero gravity scientific experiments.

A tracked elevator carrier could move men and supplies throughout the station.

Lockheed engineers estimated it would cost $2.85 billion to build the space station and operate it for five years.

This amount would include research, development, test, and evaluation; production, ground support, and launch; and passenger-cargo logistics spacecraft to travel between earth and orbit every 90 days.

The Lockheed engineering project was a conceptual design study sponsored by NASA for the purpose of long-range planning. This is one of several approaches under consideration. Development of a 24-man space station has not yet been authorized.

The three-radial module configuration won the nod over a similar three-axial module design and six-side wheelshape also considered in the study by Lockheed-California Spacecraft Organization engineers. Deciding factors were minimum weight, cost and complexity, design feasibility, and greater operational flexibility.

The Lockheed-recommended design makes maximum use of the technology available from current programs.

The study indicated that the space station system could be operational within five years after a program go-ahead signal was given.

The unoccupied space station, folded into a compact 120-foot long and 33-foot diameter cylinder shape and mounted atop a two-stage Saturn V rocket booster, would be launched from Cape Kennedy. An orbit altitude of 260 nautical miles is recommended.

It would be followed into orbit by a manned spacecraft that would dock at the station's hub. An activation crew would enter, point the station's spin axis at the sun, "stretch out" the station's arms by firing explosive charges, deploy the solar arrays from the modules for generating electricity, and spin up the station to produce artificial gravity.

The 24-man crew would be distributed six to each module and six in the hub. Each module would have six compartments. Two 12-man or four six-man logistic spacecraft would be stowed in the hub hangar.

During a three-month period, the 24-man crew would require an estimated ten tons of supplies—food, air, fuels, spare parts, scientific experimental program items.

Resupply of water would not be necessary. Sufficient quantities could be reclaimed from the space station atmosphere and waste liquids.

Station balance would be controlled by pumping water from module to module into ballast tanks.

A two-year training program for space station crew candidates is suggested. During a five-year period, an estimated 430 trainees could be enrolled. These would include flight engineers, communication engineers, activation engineers, biomedical specialists, engineering scientists, physicists, phychologists, and biological specialists.

The space station would be built mainly of aluminum.

Lockheed project manager for the space station study was Charles Tonkin.

Instant Foam Floats Space Pack In Sea

Now, a new invention right out of the space age—instant plastic foam.

With it NASA hopes to recover more of its scientific instruments which parachute into the sea from the earth's atmosphere.

Developed by Langley Research Center and tested at Wallops Island, Va., the device was rocketed to about 9,000 feet and during parachute descent, a delayed action blasting cap exploded, breaking a wall between a resin and catalyst producing a foam that provided the instrument package with its own built-in float.

Space News ROUNDUP!

SECOND FRONT PAGE

Rocket History Book Contributors

CONTRIBUTE ARTICLES—Kenneth S. Kleinknecht (left), deputy manager, Gemini Program Office, and William S. Bland Jr., chief, Test Division, Apollo Spacecraft Program Office, were among the contributors to a recently published book *The History of Rocket Technology*, which was edited by Eugene M. Emmee, NASA historian. Kleinknecht contributed a chapter entitled "The Rocket Research Airplanes," and Bland contributed a chapter entitled "Project Mercury." The book was published by the Wayne State University Press, in cooperation with the Society for the History of Technology, with profits from the sale of the book going to the society.

MSC Monthly Symposium To Be Held Next Monday

The monthly Manned Spacecraft Center Technical Symposium will meet at 6:15 p.m., Monday, January 25, in the auditorium of Building 1.

Subjects to be presented on the program include:

"Saturn V Development Program," presented by Lucian G. Bell Jr., from the George C. Marshall Space Flight Center.

"Results of Radio Tracking of Ranger and Its Implications to Apollo," presented by T. W. Hamilton, Jet Propulsion Laboratory.

And "LEM Landing Dynamic Studies," presented by Harold Doiron, MSC Advanced Spacecraft Technology Division.

Admission to these monthly meetings requires a security clearance at the confidential level.

For additional information on the symposiums, call Warren Gillespie Jr., meeting manager, Ext. 3711.

Langley Senior Staff Members Briefed Here

Members of the Langley Research Center senior staff were here at the Manned Spacecraft Center January 12-13 for briefings on the various areas at the Center.

Dr. Robert R. Gilruth, director, MSC, welcomed the senior management group and accompanied them on a tour of the Center facilities.

Briefings were presented in the various areas by the directorate and division heads.

Included in the group from Langley were: Charles J. Donlan, associate director; Francis B. Smith, Dr. John E. Duberg, and Eugene C. Draley, all assistant directors; and other Langley management heads.

Contract Awarded To Study Minerals From 'Lunar Surface'

A one-year contract for approximately $80,000 to study the structural and chemical changes that occur in specified earth minerals when they are subjected to a simulated lunar environment has been awarded to the Bendix Systems division by the NASA Manned Spacecraft Center.

The study will include a number of different earth minerals, plus basalt glass, tektite, and several other synthesized minerals, which are thought to have counterparts on the moon's surface.

Spacecraft Land Landing System To Be Tested In Ft. Hood Drop

A major milestone in the parasail land landing tests is scheduled to take place next month at Fort Hood, Tex., when a full scale Gemini boilerplate is to be dropped with a complete land landing system.

Recent tests have been conducted in Trinity Bay drops by Manned Spacecraft Center engineers and technicians. These drops were made from a C-119 aircraft at 11,200 feet using 80-foot and 69.7 foot diameter parasails.

In previous tests, an 80-foot parasail was used. The smaller version was used in the most recent test, with project engineers re-evaluating the turn motor rigging lines on the chute and gaining more experience in remote control guidance of the smaller parasail.

The boilerplate spacecraft was radio-controlled by a project engineer aboard the NASA motor vessel Retriever, which also was used for recovery of the spacecraft from the Bay.

In another phase of preparation for the land test, landing gear deployment is being qualified on Gemini boilerplate 206 in a test rig at Ellington AFB. The first test in a series of three was successfully conducted January 5, using the boilerplate that will also be used in the land landing test at Ft. Hood.

The landing gear will be identical to that originally proposed for use with the paraglider on Gemini. Both the parasail and the paraglider are developmental programs and are not scheduled for use as landing equipment for any Gemini flights. A standard 84-foot ringsail parachute will be used for all Gemini recoveries.

Configuration of the parasail landing gear consists of tricycle, skid-type landing struts. The nose gear is a telescoping type and is deployed by the thrust of compressed nitrogen gas.

The two main gear are positioned beneath the cabin of the spacecraft and are deployed by small solid propellant actuators, with the gear locking in place by means of angle braces.

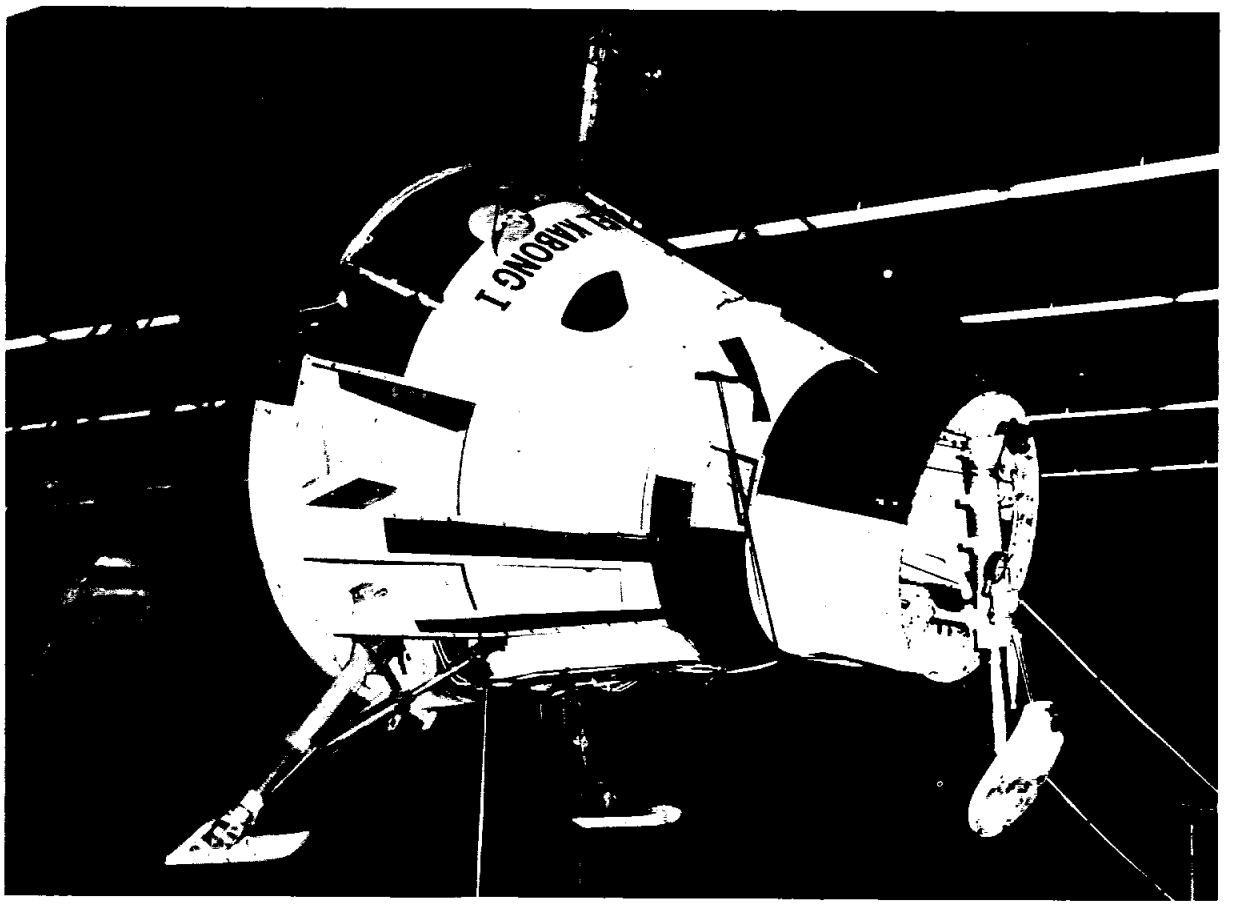
Skids, the metal shoes on the end of the gear, are automatically trimmed by cable mechanism at full gear extension.

The pyrotechnic actuators which deploy the gear have been tested with simulated loads by McDonnell Aircraft Corp. The MSC tests combine the actuators and the landing gear for the first time.

Tests here at MSC are being conducted by the Landing Technology Branch of the Structures and Mechanics Division, with the Technical Services Division supplying support services for the tests.

The test drop at Ft. Hood will combine the parasail landing system with the impact attenuation rockets and the landing gear.

Propulsion and Power Division is supplying the design and qualification of the rocket motors being used in the Gemini test drops.



LANDING GEAR TESTS—Full deployment of the landing gear on Gemini boilerplate 206 is shown during recent deployment tests at Ellington AFB. Nicknamed El Kabong I, the boilerplate spacecraft will be used next month in a drop test at Ft. Hood, Tex., using the complete land landing system, consisting of the parasail, landing gear and impact attenuation rocket. Upper photo shows spacecraft with landing gear in a stowed position.