

Space News **ROUNDUP!**

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

OCTOBER 16, 1963

First Of 13 Gemini Spacecraft Delivered To MSC Cape Facility

R&D Contract For Paraglider Landing System Is Awarded

A definitive research and development contract for the paraglider, one of two landing systems being developed for the Gemini spacecraft, has been awarded to the Space and Information Systems Division of North American Aviation, Inc., by NASA's Manned Spacecraft Center.

The contract sets the cost of the research and development at \$20,015,100, of which 10.8 million dollars has been expended under a letter contract issued about a year ago. The definitive contract runs through April 1964.

This landing system is being developed to provide capability for the Gemini pilots to land a spacecraft at a pre-selected site.

Under a parallel development program, a parachute system is being developed similar to the Mercury landing system, which will provide water landing capability. Both systems have capability beyond their basic designs for either water or land landings.

The main parachute system, already in test phase, is being developed by Northrop-Ventura under a \$2,000,000 subcontract to McDonnell Aircraft Corporation, prime contractor for the Gemini spacecraft.

Logistics Personnel Move Into New Clear Lake Offices

Approximately 80 persons assigned to the NASA Manned Spacecraft Center's Logistics Division moved into new offices last week at the Clear Lake Site.

The group is the first large complement of MSC employees to occupy the new quarters. They are housed in the Center Support Office building and the Warehouse and Shops building.

The division includes transportation and supply personnel which formerly occupied office space at Ellington Air Force Base.

Next move will be made by some 100 persons assigned to the Computation and Data Reduction Division

(Continued on page 3)



FIRST GEMINI - The first flight-rated Gemini spacecraft was delivered to MSC's Cape Canaveral operations recently by an Air Force C-133 cargo plane. Spacecraft No. 1 is the first of 13 to be built under contract by McDonnell Aircraft Corporation of St. Louis, Mo.

Dr. Joseph F. Shea Named Manager MSC Apollo Spacecraft Project Office

Dr. Joseph F. Shea, the deputy director for systems at the Office of Manned Space Flight at NASA's Washington headquarters, has been named manager of the Apollo Spacecraft Project Office here at MSC, it was announced last week.

Robert O. Piland who has been serving as acting manager of Apollo, as well as deputy manager, will continue as deputy manager, Spacecraft.

Dr. Robert R. Gilruth, director of MSC, said, "I am delighted to have a man of Dr. Shea's outstanding background and high caliber performance join us here in Houston." James C. Elms, MSC's deputy director for Development and Programs, who had previously been associated with Shea on a ballistic missile program, said, "The development of the Apollo spacecraft is the most challenging task facing this center. I am most happy that Joe Shea is joining our organization to take over this assignment."

As deputy director of OMSF, Shea was responsible for the overall system engineering of NASA manned space flight pro-

gram development and implementation of the program that insured over-all integration, reliability assessment and checkout of all elements essential to manned space flight.

In his new position, he will be in charge of the development of the command and service module of the



DR. JOSEPH F. SHEA
Apollo Manager

Apollo, which will carry the first Americans to the vicinity of the moon, and the lunar excursion module (LEM), which will land the first two Americans on the surface of the moon.

Shea, born Sept. 5, 1926, in New York City, has a bachelor of mathematics degree, and master's and doctor's degrees in engineering mechanics, all from the University of Michigan.

In addition to Dr. Shea's appointment, Dr. Homer Newell and Dr. Raymond Bisplinghoff were stepped up to the level of Dr. George E. Mueller. Newell and Bisplinghoff will be deputies to associate administrator Robert C. Seamans Jr.

Dr. Bisplinghoff will be deputy associate administrator for advanced research. He will be directly responsible for the Lewis Research Center at Cleveland, Ohio, Edwards Flight Test Center in California, Ames Research Center at Moffett Field, Calif., and Langley Research Center in Hampton, Va.

Dr. Newell will be deputy associate administrator for space services. He will be in charge of work at the Jet Propulsion Laboratory in Pasadena, Calif., the NASA launching station at Wallops Island, Va., and the Goddard Space Flight Center in Greenbelt, Md.

Functions of some of the other agency offices have been re-aligned. Julian Scheer will become assistant administrator for public affairs, re-

(Continued on page 3)

The first of the spacecraft for Project Gemini was delivered recently by McDonnell Aircraft Corporation to NASA Manned Spacecraft Center officials at Cape Canaveral, Fla., for preflight checkout procedures leading to the first Gemini mission.

Spacecraft No. 1 will be used in an unmanned orbital flight from the Cape, tentatively scheduled for early next year. The production model, for unmanned testing of the spacecraft and the Titan II launch vehicle, was transported from St. Louis by an Air Force C-133 cargo plane.

The spacecraft will structurally simulate weight, center of gravity and aerodynamic form of the final Gemini craft which will carry two men into space for practice maneuvers leading eventually to Project Apollo lunar landing. It will be instrumented for telemetering data of structural integrity, temperature, pressure and vibration back to ground control stations.

Representative of the simulated equipment are mock-ups of Gemini's compact, new on-board computer which will be used by astronauts in their projected space rendezvous with an orbiting target vehicle. This computer weighs 65 pounds and requires only a cubic foot of space.

Also in the spacecraft will be a mock-up of the special inertial guidance platform which will conserve fuel on future manned Gemini flights by allowing the spacecraft to "tumble" while in coasting flight, as well as mock-ups of the re-entry control system's thrusters to be used for de-orbiting the spacecraft.

While Spacecraft No. 1 will not be recovered, results of this data-gathering and performance testing will verify flight-worthiness of later Gemini space vehicles for future missions leading up to two-man orbital flights, rendezvous and docking in space with another orbiting vehicle, and re-entry and recovery of both spacecraft and astronauts.

The spacecraft is the first of 13 flight-rated Gemini vehicles to be delivered

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Field Test Branch Helps Get The 'Bugs' Out Of Space Hardware

That new innovation in space technology may work on paper, but whether it really works under actual or simulated conditions will be determined by the Field Test Branch of Technical Services Division of Manned Spacecraft Center, before it is introduced into the actual space program.

This branch has the responsibility of carrying out the test programs of the various divisions of MSC and is headed up by Edward A. "Bud" Carpenter.

The Field Test Branch is comprised of four sections which include: the Installation Section, Rigging Section, Parachute Section and the Hazardous Materials Section.

The Installation Section, with Charlie Rogers in charge, performs the mechanical installation of hardware and the building up of test vehicles. The men in this section go along physically with the test and participate as part of the program, and often find themselves in a helicopter or plane for test drops of spacecraft or in a boat during water recovery tests or on the scene for a

test launch of a spacecraft.

Handling and setting up all types of equipment for tests and other purposes is the job of the Rigging Section with Lymon O. Lee in charge. Using trucks, cranes and other equipment, they assist in tests being performed by the other sections. A recent performance by this group was the erection of the Mercury-Redstone and the Little Joe I outside the coliseum in downtown Houston for the Mercury Summary Conference.

Using a table 160 feet long, Bill Drummond and his crew in the Parachute Section pack chutes for test drops of the Gemini. Solid canopy chute drops are now being performed at Ft. Hood, Texas by this section.

The section includes facilities for repair and

actual construction of test chutes. The chutes for the Mercury test missions were packed in this section using the in-house developed pressure pack for compressing the chutes into a cannister. This same method, only using a larger packer will be used for the Gemini and Apollo test chutes.

Assisting in parasail training of the astronauts is part of the duties of this section.

In charge of the Hazardous Materials Section is Roger Messier with pyro technicians, explosives, rockets, ignition and cryogenics in his field. Some of this section's duties include loading explosives for chute disconnects in high altitude tests, ignition and arming of test rockets such as the Little Joe I and II, and they are now setting up a test stand study of rocket fuels in weightless condition and conducting tests under engineers from Systems Evaluation and Development Division.

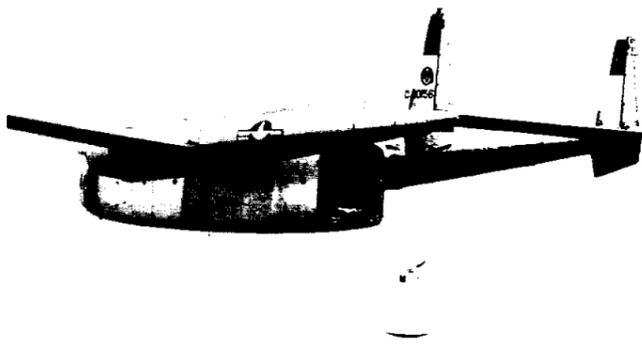
The section is also involved in a feasibility study of the rocket soft landing program with the Landing and Impact Systems Section of SEDD.

Members of the entire branch work as a team and although one section may be in charge of a particular phase of testing, all participate in the program with their peculiar skills.

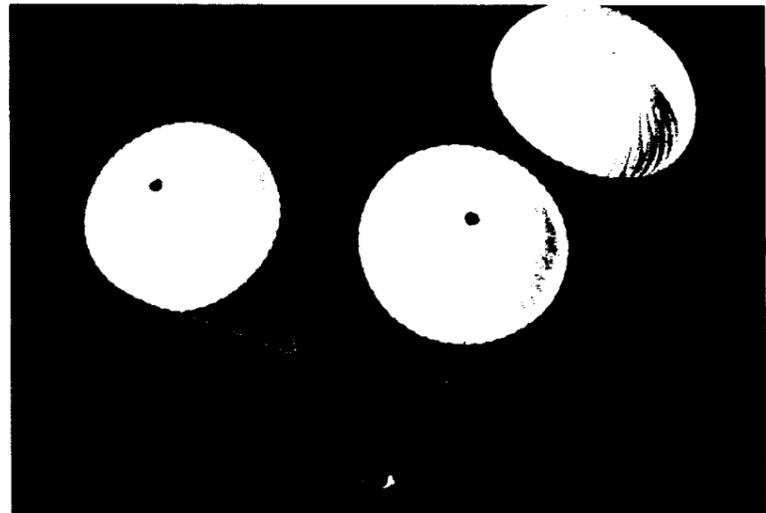
Personnel in the branch that participate in high altitude drops are required to go through the high altitude test chamber at Brooks AFB to qualify for the flights.

The branch has its own SCUBA team which is composed of Lamar Beatty, Charlie Rogers, Lyman Lee and Bill Drummond. They have been aiding in training the astronauts for Gemini water landings, using Galveston Bay for the

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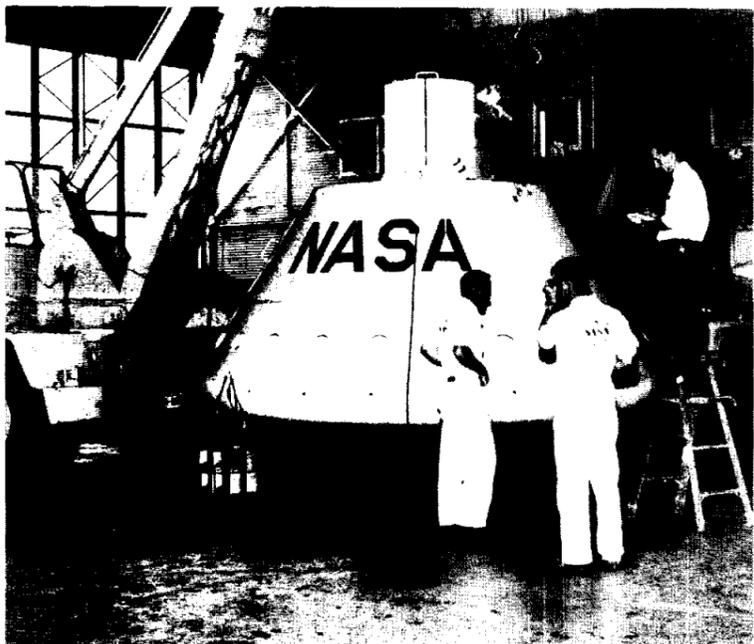
TEST DROP—A boilerplate of a spacecraft is dropped from an Air Force C-119 in Galveston Bay to check the parachute and systems sequence prior to a soft landing. Field Test Branch members accompany the flight for the drop.



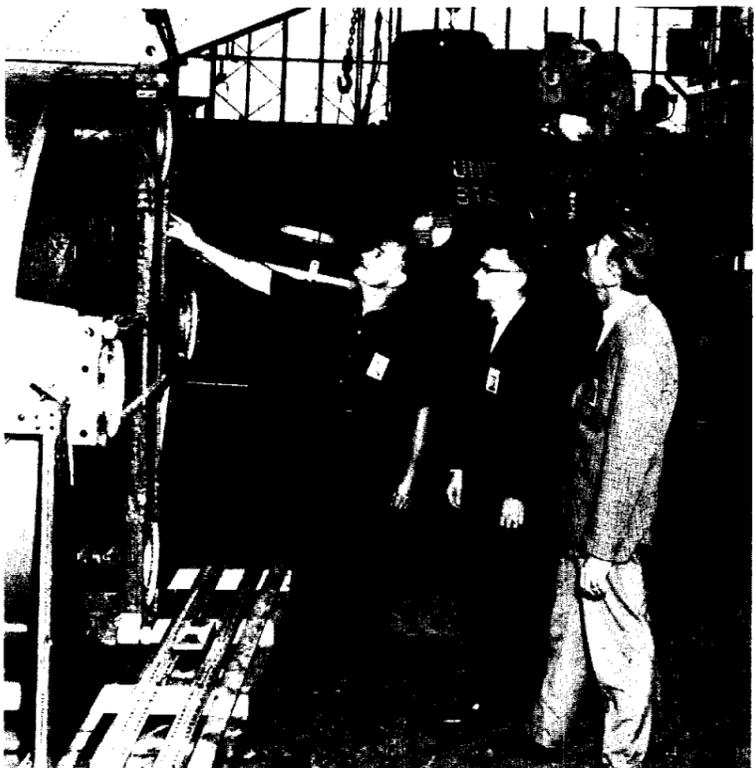
CLUSTER DROP—A boilerplate spacecraft is used in a cluster parachute drop to check the chutes for loads and opening shocks. The tests are being performed by the Field Test Branch of the Technical Services Division.



FISHED FROM BAY—Field Test Branch members fish a spacecraft boilerplate from Galveston bay after a soft landing study.



GRAVITY CHECK—Field Test Branch personnel run center-of-gravity checks on a boilerplate of the Apollo spacecraft.



LITTLE JOE I—Jack A. Kinzler (right), chief, Technical Services Division and David L. McCraw (center), assistant chief, look on as Edward A. (Bud) Carpenter, head of the Field Test Branch checks the business end of the Little Joe I rocket that is being assembled for a static display.



NASA NAVY—The Landing Ship Utility (LSU) "Retriever," operates out of Seabrook and is used in the Bay area for recovery of spacecraft used in water tests.

Gemini

(Continued from page 1)

under a \$456 million NASA contract with McDonnell. Twelve are to be used for space flight and one will initially be used for ground testing.

The Gemini spacecraft is similar in shape to Mercury, but in order to accommodate two astronauts, it is about 20 per cent larger in linear dimension, weighs approximately twice as much and has 50 per cent more cabin volume. In addition, Gemini has an attached equipment section in which will be carried the additional oxygen, electrical power and fuel required for long duration flights. This easily accessible equipment section, which is separate from the reentry body, provides great flexibility for alternate missions.

Gemini, which is described as having the potential to become "the workhorse in space", is designed to be more operational than the Mercury spacecraft, which was a research and development vehicle. Most of the flight systems and major components will be readily

Manager

(Continued from page 1)

responsible directly to the administrator for the duties he now performs as deputy to Dr. George Simpson.

In addition to retaining his present responsibilities as assistant administrator for Technology Utilization and Policy Planning, Simpson will assume a second title as associate deputy administrator of the agency. In the latter capacity, Dr. Simpson will coordinate work of staff members re-

accessible in compact modules from the outside, an arrangement which should reduce maintenance and drastically cut checkout time immediately prior to launch. During the later phase of the NASA program, the spacecraft will make controlled landings on earth by means of a paraglider which will be operated by the astronauts.

Delivery of the spacecraft was accomplished 23 months after NASA announced that McDonnell had been selected to negotiate on the two-man spacecraft. The overall Gemini program is under the technical direction of MSC, here in Houston.

porting directly to the administrator and Dr. Hugh L. Dryden, deputy administrator.

Richard Callaghan, a special assistant to the administrator will become assistant administrator for legislative affairs. Earl D. Hilburn, now deputy associate administrator for other than manned space flight centers, will assume responsibilities as deputy associate administrator for industry affairs.

Prior to joining NASA in 1962, Shea was program director of the Space Technology Laboratory, Inc., at Los Angeles.

Before this Shea was director of advance systems and development division of the Titan inertial guidance program for the AC Sparkplug Division of General Motors in Milwaukee, Wis. He was also one of the principal contributors to the Titan I guidance systems at the Bell Telephone Laboratories, Whippany, N. J.

He served in the U. S. Navy from 1944-47 as an ensign and during this period attended the Massachusetts Institute of Technology and was a member of the track team at MIT.

Shea is a member of the

American Institute of Aeronautics and Astronautics, and the Institute of Electronics and Electrical En-

gineering.

He is married to the former Beverly Rice and the couple has five daughters.

Geological Fault On Moon Forms 800-Ft. 60-Mile Wall

One of the most fascinating surface features on the Moon is the Straight Wall, described as a geological fault. It is the largest and best known of several Moon faults. Faults are linear fractures of the surface.

As with faults on the earth, bedrock sometimes will rise more on one side of the crack than on the other, producing cliffs, or walls.

Dr. John A. O'Keefe, assistant chief of the Theoretical Division at the NASA Goddard Space Flight Center in Greenbelt, reports the height of the Moon's Straight Wall is "approximately 800 feet" and the wall is about 60 miles in length.

Studies of shadows of the slope, he said, show that the wall is not vertical but has a slope of not over 40 degrees. He attributed this to the formation of a "rubble slope" on what had been the lower side.

"Here and there along the Straight Wall modern observers have noticed evidence of landslides," Dr. O'Keefe explained.

"We notice that the Straight Wall is almost completely a vertical feature. There is no evidence of sidewise movement along this fault such as often exists along terrestrial faults."



MOON WALL—Photo shows the Straight Wall on the Moon. It is a geological surface fault that extends 60 miles and is about 800 feet high, a NASA scientist reports.

Studies Indicate Ordinary Tools Could Repair Space Equipment

Studies by engineers and scientists of Textron's Bell Aerosystem Company of Buffalo, N. Y., have indicated that astronauts could repair their own space vehicles with a "do-it-yourself space maintenance kit" consisting of ordinary earthly tools.

"We believe that an astronaut with a relatively small kit of tools such as screwdrivers, wrenches and pliers could repair a wide variety of equipment ranging from rocket engines to guidance systems," William E. Powe, chief of Human Factors at Bell Aerosystems, reported in a technical paper.

Powe's paper, presented at the American Astronautical Society's three-day "Space Rendezvous, Rescue and Recovery Symposium" Sept. 10-12, described the work of Bell engineers and scientists on an extensive study under contract for the Air Force's Aeronautical Systems Division.

Objective of the study was to determine the kinds of failures that might occur in future manned space systems and ascertain what repairs the astronaut might be expected to make and the type of tools required for the job.

Most significant conclu-

sion of the study was that the weightlessness of space may not present problems of the magnitude once expected.

"With the use of a restraining device, similar to the safety belts worn by electrical and telephone linemen, man would be able to exert substantial forces without using specially-designed 'torqueless' tools," Powe observed.

Move

(Continued from page 1)

currently occupying offices at the University of Houston. They are expected to move into the Central Data Office in December.

The major move from the temporary offices in Houston will take place between Feb. 28 and March 23, 1964. At that time, over 2,000 employees, equipment, furniture and office supplies will be relocated. MSC will completely occupy the Clear Lake Facility by July 1, 1964.

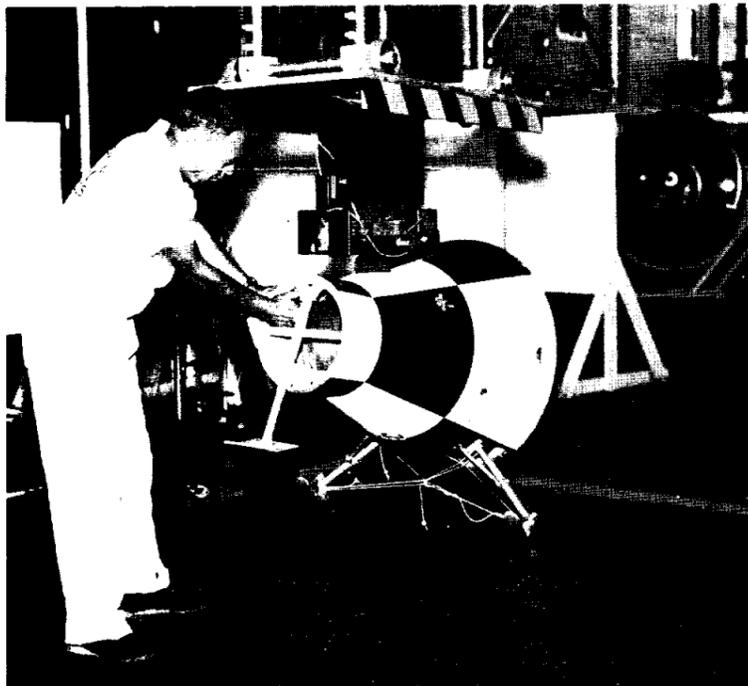
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training area.

Tests in the near future include drops of a one-eighth scale Apollo with the Paraglider and the modifying of a Gemini boilerplate to make it into an a-gress trainer. The Gemini trainer will include hardware and will simulate as close as possible the actual craft.

As one of the men in the branch put it, "we are real fortunate to have such an interesting job.... everything new and different and being involved in it first hand."

The branch members often find themselves putting in long hours and plenty of hard work on tests but as "Bud" Carpenter said, "everyone is enthusiastic about his job and doesn't mind the long and sometime odd hours that are required to complete a test."



TEST LANDING SIMULATOR—A one-third scale model of the Gemini is used for simulated test landings in the Field Test Branch Hanger. The tests are being performed with Systems Evaluation and Development Division engineers.



TOWER SEPARATION—A feasibility study with Systems Evaluation and Development Division in the checkout and arming of the Apollo tower release mockup is conducted by the Field Test Branch. Checking the mockup are l. to r. Jim Bailey, Roger Messier, and Gene Waldron.



CONTRACT SIGNING—Oscar T. Simpson, general manager, Western Development Laboratories, Philco Corporation, affixes his signature to the contract for equipping the Mission Control Center at MSC. Looking on is James Stroup, MSC Contracting Officer.



MCC CONSOLE—Tom Fisher right and Grier Oberholtzer, Philco Houston Human Factors Department, discuss early conceptual design changes for the Flight Dynamics Officer's console. This and sixteen other consoles are planned for the Mission Operations Control Room of MSC's Mission Control Center.



"HEARTBEAT" of the Ranger 5 lunar capsule is checked by an engineer at Aeronutronic Division with an electronic "stethoscope." The console gives an accurate reading of signals from the capsule as they are received by the electronic probe. The lunar capsule was built by Aeronutronic for Jet Propulsion Laboratory and the National Aeronautics and Space Administration.

Electronics Equipment For MSC's

Philco Corporation, which has supported the government of the United States through its research and development in electronics and communications for more than half a century, assumed a major role in the manned space flight effort this year with receipt of a \$33.8 million contract from the National Aeronautics and Space Administration to implement the Mission Control Center at the Manned Spacecraft Center.

A subsidiary of Ford Motor Company, Philco will provide the Mission Control Center (MCC) the complicated electronics equip-

ment necessary to support communications, simulation, checkout and training, and control and display. (The Real Time Computer Complex used to support these systems is being built and will be maintained by IBM).

When completed in 1964, the MCC will serve as a centralized control center for the direct support of manned space flight. The first operational missions to be supported by the center will be Gemini rendezvous flights. Integrated in concept and design, the MCC will be capable of complete support of the Apollo earth-orbital and lunar missions.

Philco's work in the design, development and integration of systems in the Mission Control Center is under the direction of its Western Development Laboratories Division at Palo Alto, Calif., headed by Oscar T. Simpson, Philco vice president and WDL general manager. Dr. Walter B. LaBerge is General Operations Manager, heading Philco Houston Operations headquartered in the Main Building in downtown Houston. The company has about 250 employees in Houston.

Four other Philco organizations are providing manpower and other support on the MCC contract. They include the Communications and Electronics Division, the TechRep Division and the Philco Scientific Laboratory, all in the Philadelphia area; and Aeronutronic Division at Newport Beach, Calif.

Work on the Project is being done at those locations as well as in Houston.

Philco previously had been awarded the NASA contract for a design and development study of manned space flight operations and control and support. As a supplement to the MCC contract, the Philco Houston Operations, headed by T. L. Kraft, is engaged in a continuing study of support concepts and requirements for manned space flight beyond Gemini and Apollo.

Both Philco and its parent firm, Ford Motor Company, were prominent in developments forerunning the space age—Philco in communications and electronics; Ford as a pioneer in aviation. Both have been active in space since the early days of the U.S. aerospace program. Philco's WDL developed Courier, this nation's first active

communications satellite. Aeronutronic, then a division of Ford, worked with NASA on the Ranger program. (Aeronutronic became a Philco division last July 1).

Philco Corporation was founded in Philadelphia in 1892 as the Helios Electric Company and was known for a number of years as Philadelphia Storage Battery Company. "Philco," first a trademark, became a part of the corporate title in 1940.

The company first contributed to the U. S. defense effort in World War I by supplying batteries for portable field radio sets used



CHARLES E. BECK
President
Philco Corporation

by the U. S. Army. In the 1920s the firm turned from the development and manufacture of batteries and battery chargers for home radios to the production of radios.

Philco also operated an experimental television station in Philadelphia beginning in 1932, inaugurated regular service in 1939 and later operated television station WPTZ, Philadelphia, on a commercial basis.

With so much experience in providing goods and services in civilian communications, it was natural for Philco to expand its production into the more sophisticated electronics area demanded by our World War II effort, later by government and industry, and now by the aerospace program.

During the war the company produced artillery shells and fuses, Bazooka rockets and fuses, radio and electronic communications equipment, ground and airborne radar equipment. Through what later be-

Editor's Note: This is the fifteenth in a series of articles designed to acquaint MSC personnel with the Center's industrial family, the contractors who make MSC spacecraft, their launch vehicles and associated equipment. The material on these two pages was furnished by the Public Relations Office, Philco Corporation.

The Spotlight On MSC Secretaries....

MSC secretaries featured in this issue of the Space News Roundup represent the offices of Program Analysis and Evaluation, and Astronaut Activities.

Inez B. Reynolds top left, has held the position of secretary to the Chief, Program Analysis and Evaluation Office, William J. Wagoner since her transfer in July from the Control Room. Her first assignment with MSC came in October 1962 when she was secretary to the deputy director at NASA's Michoud Plant, New Orleans. Born in Memphis, Tenn., Inez at-

tended business college in Hattiesburg, Miss. and the Fisher Institute in Gulfport, Miss.

Prior to joining civil service in 1957, Inez worked as assistant manager for an insurance company in Mississippi.

She and her husband Frank Reynolds reside in Houston. The couple has two married daughters.

Carolyn Hogg top right, one of the secretaries to the astronauts has been with NASA since 1961 and is a transfer from Langley Flight Control.

Before coming to work for MSC,

she was employed as a secretary by an aircraft company at the Bomarc Missile Base in Virginia.

Carolyn was born in Gloucester Point, Va. and received her secondary education there before attending the Pan American Business School in Richmond, Va.

She is single and enjoys reading, playing golf, and right now her main "hobby" is "saving money for a visit home."

Ruby Spence lower left, secretary to the astronauts for one year, came to MSC from Bryan, Tex. She had been employed for two years in the note department of a bank in that city and had previously worked for the Air Force.

A native Houstonian, Ruby attended a local high school and the Rhoades Business College.

She and her husband, Bill Spence, who is employed by an oil tool specialty company, live in Houston with their two children, James and Judith, both of whom are students at the University of Texas.

Ruby is an avid camera "bug" in her spare time and develops many of her own pictures. She also enjoys ice skating and water skiing.

Millie Guice (lower right), secretary to the astronauts is a recent transfer from Cape Canaveral where she had been employed by MSC for two years.

A graduate of Mississippi State University, Millie received her bachelor of science degree in commercial education.

Millie was born in Oldenburg, Miss. a small town which was founded by her great-grandfather. She considers Starkville, Miss., where she attended elementary and high school as her home town.

She is single and lives in Houston. Her hobbies include sewing and cooking.



374 At MSC Are Eligible To Receive Service Awards

Honorary service awards were presented to 374 MSC employees who became eligible during the months of April through June of 1963 it was announced this past week by the Personnel Division.

Congratulatory letters from Dr. Robert R. Gilruth, director, MSC, were delivered to 22 employees who became eligible for 20-year awards and they will be presented emblems and certificates later at an annual awards ceremony.

The remaining 352 employees were presented their awards by division and office chiefs.

Awards for 15-years service went to 34 MSC employees, 40 received 10-year awards and 278 received the 1-year service emblem.

NASA Singleton Club Plans Party For Members Friday

The NASA Singleton Club is throwing its October Party at the Skylane Inn Conference Room of the Skylane Inn motel on Telephone Road, Friday, October 18.

Festivities will get underway at 8:00 PM, music and set-ups will be provided at the reasonable cost of \$1.50 per person. Stags are preferred.

Tickets may be purchased ahead of time from: Steve Jacobs and Bob Harris at Ext. 5440, Bill Rogers at Ext. 5437 or Rita Sommer at Ext. 7709.

The Singleton Club was formed about one year

ago -- its purpose -- to provide for the social needs of the Manned Spacecraft Center single employees. The Club has given eight successful parties over the past year and plans to hold one function per month in the future. Persons interested in having their names added to the Club's mailing list, please contact Steve Jacobs at Ext. 5440.

Tiros VI Operates Full Year Acclaimed Major Achievement

A milestone in the United States space program was reached recently when the TIROS VI weather satellite attained a full year of successful operation on September 18.

Commenting on this achievement in a congratulatory letter to Robert Rados, TIROS project manager for Goddard Space Flight Center, (which has direct management responsibility) the director of NASA Headquarters' Office of Applications, Robert F. Garbarini said:

"A major goal in our meteorological satellite program--durable, yet complex equipment capable of continuous operation in the space environment--is no longer merely a goal, but an achievement on which to base further improvements."

The spacecraft was built by Radio Corporation of America's Astro-Electronics Division, Princeton, N. J.

Original life expectancy of TIROS satellites was expected to be about three to four months. However, all but the first TIROS have exceeded this life span, providing research and development knowledge for NASA and cloud-cover photos for use by the U.S. Weather Bureau in daily operations. TIROS I operated 2-1/2 months, TIROS II 10 months, TIROS III and IV, 4-1/2 months and TIROS V, 10-1/2 months.

TIROS VII, launched June 19, 1963, also continues to provide cloud-cover photos in a different part of the world from VI.

The two tracking beacons on TIROS VI were shut off September 14 by an automatic beacon killer installed in the spacecraft prior to launch. Although this eliminates use of the tracking beacon transmission it does not eliminate the useful TV transmissions.

TIROS' II, III, IV and V, although silent photographically, are still transmitting beacon signals and cannot be silenced on ground command. It was to preclude this continued transmission--after what was thought to be the outside limit of TIROS spacecraft operational lifetimes--that the beacon killer was installed on VI and VII. Subsequent TIROS satellites will have this device but its activation time will be set for more than a year.

In its year of successful space operation TIROS VI has a long record of accomplishments. Along with TIROS V it supported the flights of Astronauts Walter Schirra and Gordon Cooper. It detected sand storms in Saudi Arabia; ice conditions in southern and northern hemispheres; 12 hurricanes, typhoons and tropical storms; and about 300 weather advisories to countries all over the world were issued based on some of the 63,000 cloud-cover pictures sent back to earth from the satellite.

Picture Life As These Eyes See It.....



Spacecraft Design Proposed For Mars And Venus Manned Flyby Missions

Concept of a three-man interplanetary spacecraft for flyby missions to Mars and Venus by Ben P. Martin, senior advanced systems engineer, Research and Development Division, Lockheed Missiles and Space Company, was presented at a recent meeting on Engineering Problems of Manned Interplanetary Exploration, Palo Alto, Calif.

This design was conceived for the National Aeronautics and Space Administration. It is one of several concepts submitted to the Future Projects Office of NASA's Marshall Space Flight Center revealing the feasibility of multi-manned flybys of Mars and Venus by the 1970's. The spacecraft could be available for 365 to 600-day missions within a decade.

The Apollo-type command module houses the crew during the launch phase, serves as command and control center for the spacecraft during its long flight, and acts as the Earth re-entry body.

The service module, 12 feet in diameter and 40 feet in length, serves as the crew's living and recreation center, and contains the primary life support equipment. These modules are connected to the central hub section by an extended rigid spoke structure 70 feet in length and five feet in diameter.

The command module is equipped with either a retro-propulsion or drag brake system to provide initial deceleration during Earth re-entry. The weight of the command module and its braking system are equal to that of the service module.

The central hub section of the spacecraft has the mid-course propulsion unit attached at one side, the power supply unit at the other side, and a solar flare shelter mounted inside.

The 180-foot spacecraft is folded into a compact as-

sembly atop the launch booster with the spokes retracted to fit within the height of the payload shroud. The service and command module walls act as their own launch support structure, requiring no additional external support.

MSC Employees Activity Association Presented Check By Mercury Office

The treasury of the MSC Employees Activities Association is richer by \$216.81 as the result of a recent donation from the Mercury Project Office.

Originally this money had been donated by MSC employees for the Project Mercury party and was left over after the party expenses were paid.

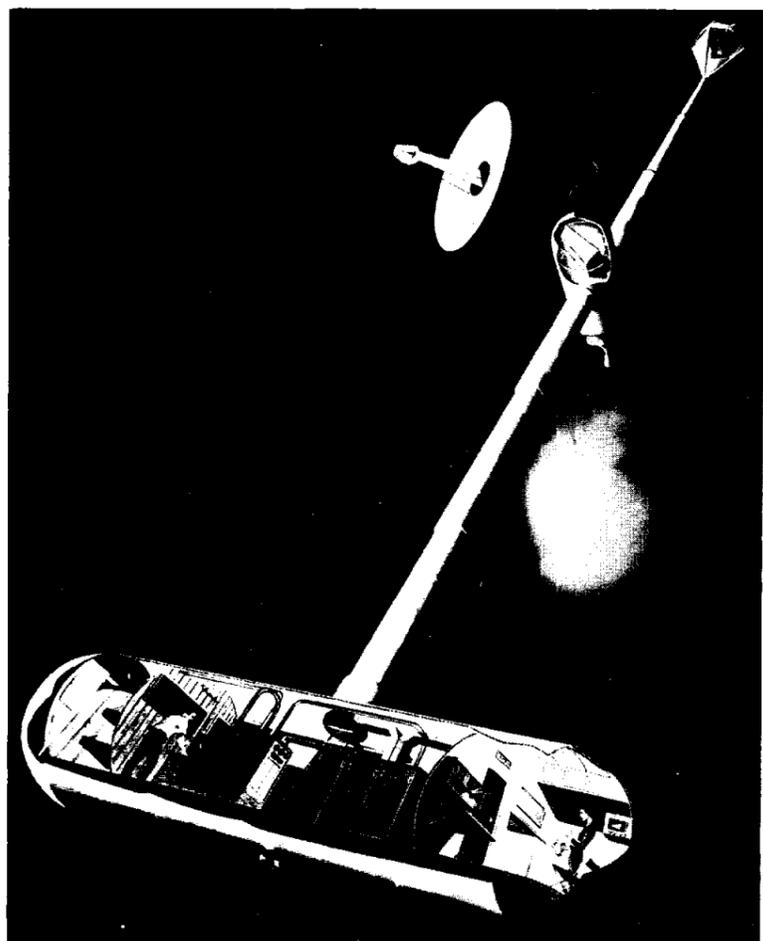
Kenneth Kleinknecht, manager, Project Mercury Office, presented the money in check form to Alfred Li-

grani, president of the Employees Activities Association.

Kleinknecht suggested that the money could possibly be used for some permanent type item that would benefit or apply to all MSC employees.

MSC BOWLING ROUNDUP

MSC MEN'S LEAGUE		Overshoots	7	13
		Spasties	6	14
Standings as of Oct. 3:				
Team	Won	Lost	High Indiv. Game: Joe Garino 266, Lewis Lee, Paul Horsman, and William Chase 233.	
Technics	14	6	High Indiv. Series: Joe Garino 646, Jim Koplin 576.	
Lunar Lights	14	6	High Team Game: Lunar Lights 902, 897.	
Whirlwinds	13	7	High Team Series: Lunar Lights 2573, 2554.	
Cosmonauts	12	8		
Turkeys	10	10		
Asteroids	9	11		
Pseudonauts	8	12		
Fizzlers	7	13		



MARS AND VENUS SPACECRAFT-- Concept of a three-man interplanetary spacecraft that could be available for 365 to 600-day missions within a decade is shown above in this artists drawing.

Mission Control Center To Be Provided By Philco

came the TechRep Division, the company contributed to the war manpower effort through the training of radio and radar technicians and service by its own personnel in the field. These civilian technicians installed and maintained complex radar and communications equipment for the Armed Forces in the U.S. and in combat zones in both World War II and the Korean conflict.

Approximately 3,000 Philco TechRep engineers and technicians—now are providing technical assistance to military, industrial, governmental and educational agencies about the globe, and to such Philco projects as implementation of the MCC. A TechRep served as a monitor at each tracking station on every flight of Project Mercury.

The wartime production performance which brought Philco 21 "E" awards also gave it a commanding post-war position in electronics and led eventually to the founding of the Communications and Electronics Division and Western Development Laboratories.

The Communications and Electronics Division, with research, advanced development and engineering facilities in Philadelphia and Blue Bell, Pa., developed and produces the Sidewinder missile; makes fuses for other missiles; develops, builds, installs and maintains worldwide radar detection and communications systems; and display and data processing systems and sub-systems.

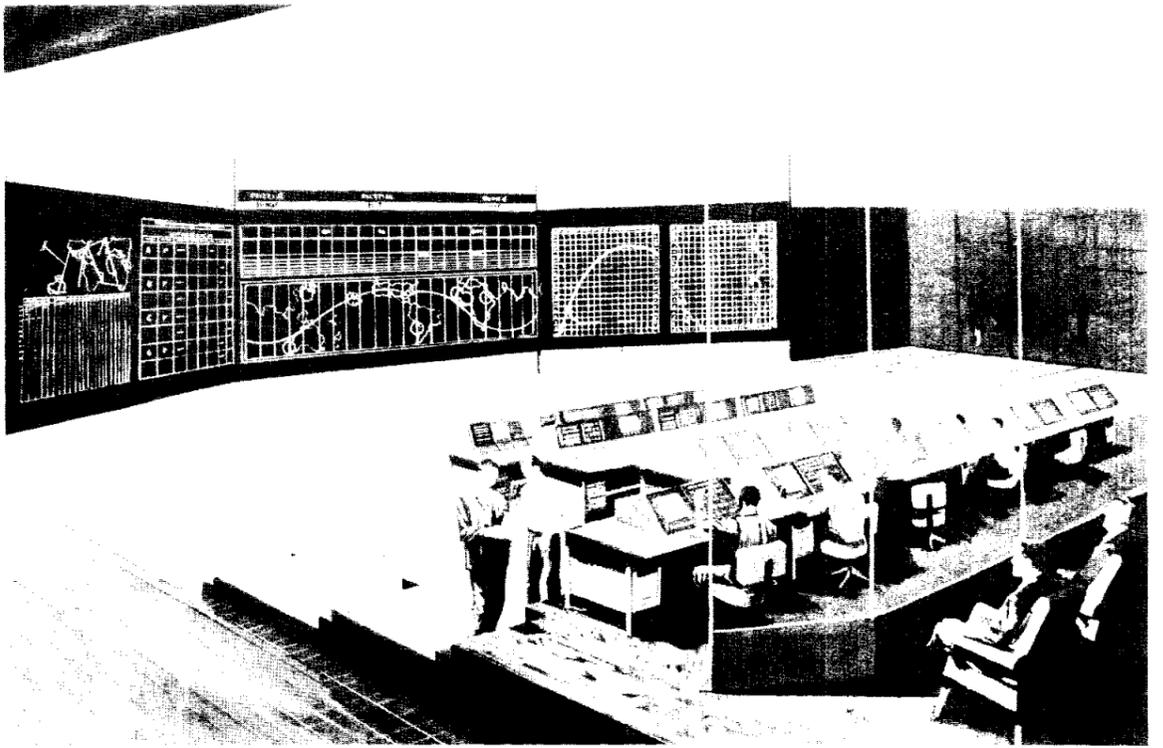
Philco's WDL Division, established just a little over

six years ago, now has some 2500 employees who work in a complex of modern buildings on a 24-acre site in Palo Alto. The division serves as systems manager for space programs, and designs, engineers and develops both earthbound and planetary unmanned spacecraft vehicles and systems, and communications and instrumentation sub-systems for manned spacecraft. It also serves as systems manager for large command and control systems for mission control of space operations (as in MCC); designs, engineers, builds and installs radio astronomy telescopes and antennas used in the aerospace program.

The division holds a current contract from NASA for a design study of an Advanced Solar Probe. The study could result in the most sophisticated unmanned spacecraft yet developed. It not only requires precise scientific instrumentation with stringent requirements for accuracy, but it has to operate under extreme environmental conditions (within 28 million miles of the sun) to which no previous spacecraft has been subjected.

Under an Air Force contract, the division will design, fabricate and test two solid-state space radiation monitoring systems capable of detecting and analyzing the various types of radiations in space.

In a NASA-sponsored program this year WDL delivered to the University of Texas a 16-foot, millimeter radio telescope which will be used in the aerospace



SPACEFLIGHT CONTROL CENTER—Artist's conception shows one of the two mission control rooms of the Mission Control Center MCC, which Philco Corporation is developing and equipping for the National Aeronautics and Space Administration Manned Spacecraft Center at Houston, Tex. Major display elements of the MCC are being developed by Philco's Aeronutronic Division in Newport Beach, Calif.

program.

With the transfer of Aeronutronic to Philco this year, Philco gained greater depth in engineering, development, manufacture and management of space, missile and weapon systems, electronics, display and storage equipment.

Aeronutronic has an important role in the MCC project—providing the display system section including a group display system, keyboards for use in selecting displays and interface equipment to connect the various display systems to the center's computers.

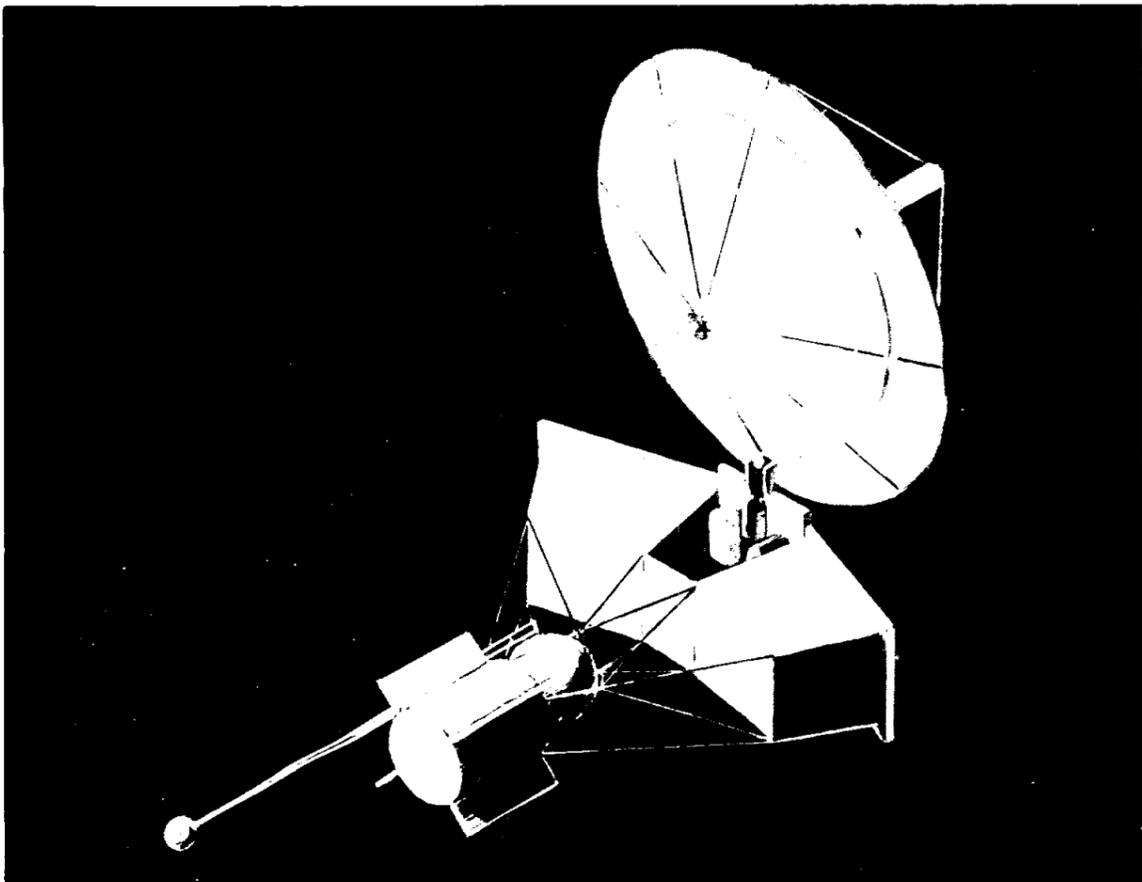
As an extension of its earlier lunar capsule work, Aeronutronic has been

awarded a development contract for a space capsule camera scanning system that would provide photographs showing fine detail of the moon's surface.

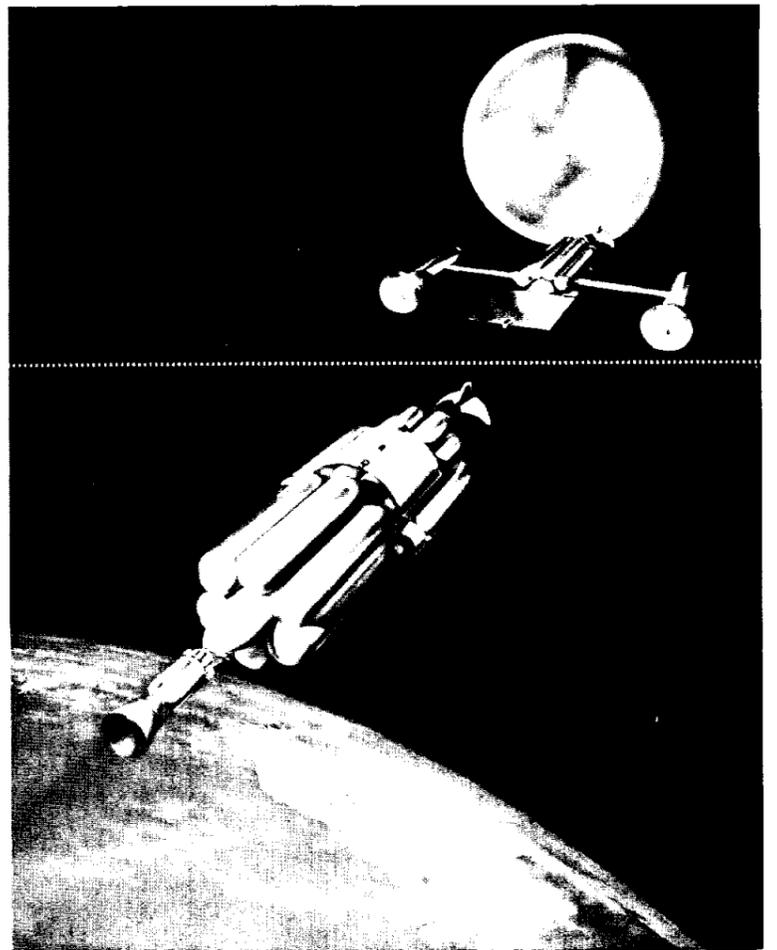
The division also is doing a study for NASA on requirements for a Martian "taxi," the Mars Excursion Module (MEM). Carried by a larger spacecraft, MEM

would be designed to taxi astronauts between the spacecraft and the planet Mars, around which the spacecraft would be orbiting.

Earlier, Aeronutronic was one of three U.S. aerospace firms that carried out a study for NASA on early manned planetary exploration.



PROPOSED SPACECRAFT—This is an artist's conception of the Advance Solar Probe vehicle on which Philco's Western Development Laboratories, Palo Alto, Calif., has a design study contract with NASA. The unmanned spacecraft would measure magnetic fields, corpuscular particles and radiation and other solar phenomena in the solar system between the orbit of the earth and within 28 million miles of the sun.



400,000-LBS. OF SPACESHIP—Huge manned interplanetary spaceship departs from earth (lower portion of photo) for planets Venus and Mars, taking U.S. astronauts on an 18-month reconnaissance fly-by in preparation for later interplanetary spaceflights to land men on the planets. Artist's rendering is of spacecraft described by Philco Corporation scientist, Dr. Franklin P. Dixon, in a Palo Alto, Calif., meeting on the Engineering Problems of Manned Interplanetary Spaceflight, sponsored by the American Institute of Aeronautics and Astronautics. In upper portion of photo, spacecraft is shown nearing the planet Mars. The mission would take the spacecraft and its six-man crew to within 600 miles of both Venus and Mars.

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

On The Lighter Side

Standard Progress Report

For Those With No Progress To Report

During the period which ends _____ (fill in the appropriate date) considerable progress has been made in the preliminary work directed toward the establishment of the initial activities. (We are getting ready to start, but we haven't done anything yet.) The background information has been surveyed and the functional structure of the component parts of the cognizant organization has been clarified. (We looked at the assignment and decided that George would do it.)

Considerable difficulty has been encountered in the selection of optimum materials and experimental methods, but the problem is being attacked vigorously and we expect that the development phase will proceed at a satisfactory rate. (George is looking at the handbook.) In order to prevent unnecessary duplication of previous efforts in the same field, it was necessary to establish a survey team which has conducted a rather extensive tour of the various facilities in the immediate vicinity of manufacturers. (George and Harry had a nice time in New York.)

The Steering Committee held its regular meeting and considered rather important policy matters pertaining to the over-all organizational levels of the line and staff responsibilities that devolve on the personnel associated with the specific assignments resulting from the broad functional specifications. (Untranslatable---sorry!) It is believed that the rate of progress will continue to accelerate as necessary personnel are recruited to fill billets now vacant. (We'll get some work done as soon as we find someone who knows something.)

Contracts

(Continued from page 8)

will receive and assimilate information from control centers on earth has been ordered for NASA's moon-bound Apollo spacecraft.

Motorola Military Electronics Division, Scottsdale, Ariz., has been selected to develop and produce spaceborne data link equipment by North American's Space and Information Systems Division, principal contractor on the Apollo command and service modules. Amount of the contract is approximately \$2-million.

An ability featured in the unit will be data decoding and the introduction of the results into a spaceborne computer on-board the Apollo for the performance of several guidance and navigational functions.

Beckman Instruments, Inc., Systems Division, Fullerton, Calif. was awarded a \$1-million con-

tract by North American's SISD, for data acquisition equipment to be used in the development of NASA's Apollo spacecraft.

The equipment which includes two data acquisition systems and a recorder unit will be built for use in the development and test of the three-man vehicle designed for the moon expedition.

The purpose of the equipment will be to monitor and record test data to determine the reaction of the Apollo vehicle to such conditions of flight as thrust, temperature and vibration. The equipment will collect and record engineering test data at the rate of some 40,000 samples per second for study and evaluation.

An environmental chamber for testing non-metallic materials for use in space will be built for the Life Systems Laboratory, Crew Systems Division for installation at the Clear Lake site, by the Avco Corporation Spaceflight Programs Office, Tulsa, Okla.

Zero-Gravity Tower Will Test Space Vehicle Separations

Construction of a zero-gravity tower designed to test space vehicle stage separation systems at upper stratospheric conditions is nearing completion at the Douglas Aircraft Company's Tulsa Division.

The six-story steel tower, one of the largest and most versatile of its kind in the nation, will complement the Douglas-Tulsa facility's existing space environmental chambers, said J. P. Rogan, the division's vice president - general manager.

The "Zero-G" tower, which virtually eliminates atmospheric interference during drop tests, will accept space systems up to 7-1/2 feet in diameter. It is equipped with a photographic instrumentation system to determine angular displacement of test specimens during free fall.

A specimen dropped from the top of the tower would experience zero gravity for 1-1/2 seconds in a simulated altitude of from 100,000 to 180,000 feet. Cata-pulted from the bottom, the observation time could be extended to 3 seconds.

WELCOME ABOARD

Seventeen new employees joined MSC during the period September 22 through September 25. All but two were assigned in Houston.

FLIGHT OPERATIONS DIVISION: William B. Wood and Ivan L. Johnson.

LEGAL OFFICE: Bernard A. Reiter.

FINANCIAL MANAGEMENT DIVISION: Joan D. Landon, Sarah E. Elkins, and Jack T. Atkins.

CENTER MEDICAL OPERATIONS OFFICE: Raynell Brooks.

SYSTEMS EVALUATION AND DEVELOPMENT DIVISION: Emmett F. Jones, and Ronald S. Stevens.

APOLLO SPACECRAFT PROJECT OFFICE (Bethpage, N. Y.): Sharon K. Bridges.

PERSONNEL DIVISION: Dianne P. Ryan.

CREW SYSTEMS DIVISION: Earl V. La Fevers.

GROUND SYSTEMS PROJECT OFFICE: Robert D. Shelton.

PRE FLIGHT OPERATIONS DIVISION (Cape Ca-

The chamber and associated equipment will cost \$72,970. Outside dimensions of the chamber are 14 by 24 by 14 inches. Temperatures in the chamber will range from minus 300 degrees to plus 600 degrees Fahrenheit. Liquid nitrogen will be used for cooling and tungsten elements will be

MSC PERSONALITY

Early Job Ambitions Attained By Apollo's David W. Gilbert

"I decided at junior high school age that I was going to work in the aircraft industry somewhere," said David W. Gilbert, chief of the Guidance and Control Division of Project Apollo.

With that decision behind him, Gilbert became a "fanatical" model airplane enthusiast, entering every contest he could figure a way to get to, and as a result holds several national records in various free flight categories.

Gilbert was appointed to his present position on March 5, 1962, coming to



DAVID W. GILBERT

MSC from General Dynamics/Convair, where he specialized in control systems dynamics.

Born in Berkeley, Calif., Gilbert was graduated from Fremont High School in Oakland, Calif. and entered the U. S. Army to serve in the Ardennes and Rhineland campaigns during World War II. After the Army he attended and was graduated in 1948 from the University of California with a B. S. degree in aeronautical engineering.

He joined Convair in San Diego as an aerodynamicist in 1948 (then Consolidated Vultee Aircraft Corporation). Soon thereafter he transferred to the missile flight test group and was actively engaged in flight test operations at the Naval Ordnance Test Station, Inyokern, Calif., for two and one-half years on the LARK and early TERRIER missile programs.

"Most people started in naverall, Fla.): Joel H. Lect. SPACECRAFT TECHNOLOGY DIVISION: Joyce E. Dalley.

FLIGHT CREW OPERATIONS: Jeffrey M. Bremer. ASTRONAUT ACTIVITIES OFFICE: Sherry Y. Green.

applied for heating.

It will be used in connection with a tensile testing machine for evaluation of physical properties of textiles, plastics and elastomeric materials (synthetic rubber). Avco Corporation will also supply vacuum pumping, cooling and control systems.

the aircraft business first and then became involved with missiles, but I had the opposite experience," Gilbert said.

After the missile test period at NOTS, he transferred to the dynamics group of Convair and became involved in guidance and control systems studies for the production versions of the TERRIER missile and from there to a string of aircraft systems including the F-102, F-106 interceptors and the 880 and 990 jet transports.

As chief of the guidance and control systems at Convair, Gilbert was concerned with the development of yaw dampers, engine inlet controls, autopilots and fire control systems for these aircraft.

He is a member of the American Rocket Society and authored numerous technical reports while with Convair.

Of his work, Gilbert said, "There is a great satisfaction in seeing the results of engineering activities in which one participates transformed into useful hardware. It provides an opportunity to contribute as well as to learn first hand."

Of his present job, he said, "I am looking forward to Apollo as the best opportunity that exists to continue this activity in a space oriented project. In Project Apollo, MSC is exerting the greatest amount of detail technical management I have ever seen practiced directly by the procuring agency."

As one of his hobbies, Gilbert "plays the accordion to let off steam." He professes to not being very good, "but very loud."

He also confessed to having a hidden urge to build brick or block walls. "This comes out once in a while," he said. "I think it is because the work is so different from the daily job. One can determine exactly how much has been accomplished, and once finished, the job stays that way."

In San Diego, Gilbert was a scout cubmaster and active in the Little League but due to frequent travel required in his job in Houston he doesn't have the time he would like to devote to this type activity.

Married to the former Jeanne Gillette, of Hollywood, Calif., the couple live in Houston with their four children, Laurence 12, Lee Ann 11, Dean 10 and Barbara 3.

Mercury Conference Marks Formal Ending Of Five-Year Space Program

A two-day summary conference, held here in Houston October 3 and 4, marked the formal end of the five-year pioneering manned space flight program, Project Mercury.

Over 2,000 scientists and representatives attended the sessions to hear the 17 reports summarizing the results of the Mercury program.

The conferrees were welcomed by Dr. Robert R. Gilruth, director, Manned Spacecraft Center, followed by an opening statement by Dr. Hugh L. Dryden, NASA's Deputy Administrator.

A review of the manned space program was presented to the Conference by Dr. Walter C. Williams, deputy director for Mission Requirements, in which he pointed out the various phases of the program along with the skills, initiative experience and knowledge required to successfully initiate the Mercury Project.

The accomplished objectives, to place a manned spacecraft in orbital flight around the earth, investigate man's performance capabilities and his ability to function in the environment of space, and to recover the man and the spacecraft safely, were stated by Williams.

He also outlined the guidelines which were followed to accomplish the Mercury Project objectives.

Williams gave a brief resume of each of the 25 actual flight tests in the program and what was learned from each flight to improve the reliability of future missions.

Other areas presented included the development of the management structure and operating mode re-

quired to direct this complex and rapidly moving project.

Also covered in the talk by Williams were the major results obtained and the significant philosophies and techniques developed during the course of the project.

A paper on the results of physiologic measurements and medical studies of Astronaut L. Gordon Cooper made prior to, during, and following his flight of 22 orbits in the MA-9 Spacecraft, was presented to the Mercury Summary Conference by A. D. Catterson M. D., of Manned Spacecraft Center.

The data presented revealed that Cooper's physiologic measurements in flight remained within the normal variability established under dynamic circumstances during his participation in training activities as a Mercury astronaut.

In flight there was no degradation of his functional integrity as a pilot and his sleeping in flight was reported as normal, the paper revealed.

Postflight examination of Astronaut Cooper revealed that he had developed dehydration, and low blood pressure accompanied by an accelerated pulse response. The pulse and blood pressure returned to normal after sleeping. Other changes in the blood were noted but these returned to normal in two weeks.

The paper also stated that with respect to all other studies, the medical status of the pilot was found essentially unchanged between the preflight and postflight examinations.

The principal scientific observations of space phe-

nomena by the Mercury astronauts were presented to the Mercury Summary Conference by John A. O'Keefe, NASA Goddard Space Flight Center.

Observations reported were that major color variations can be distinguished, clouds are extremely bright and easily visible, a spectacular view of a hurricane a thousand miles in diameter, and the banding of light in the horizon layer of the earth's atmosphere.

Described in the paper was the visibility of the earth in daylight from space. Visibility was hindered by atmospheric haze, and up to 50 per cent cloud cover over the surface of the earth. Viewing of small features on earth was dependent also on the contrast of the object and the illumination.

The appearance of the earth at sunset and twilight was described in the paper. The sun appeared to have the color of an arc light and only changed color when viewed through the earth's atmosphere. Sunset occurred in seven and one-half seconds as viewed from the spacecraft.

Other phenomena such as the twilight bands, luminous particles in space, and the dim-light observations of the astronauts were presented.

The zodiacal light, a faint pyramid-shaped illumination of the night sky on moonless nights was viewed by Cooper in a part of the night sky where it has never been seen before, the paper stated.

Descriptions of the appearance of the earth and sky at night by the astronauts were included in the paper.

The earth appears darker than the sky on moonless



SPACE FLAGS—Dr. David P. Morris left, chief of Medical Operations, MSC, Cape Canaveral, recently presented a plaque containing the United States and the Christian flags carried aboard Faith 7 spacecraft, to Dr. Alva Sizemore, minister of the First Christian Church, Cocoa Beach, Fla. The flags were carried by Astronaut L. Gordon Cooper on his 22 orbital flight. Dr. Morris conveyed Astronaut Cooper's disappointment in not being available to make the presentation.

nights but clouds and coastlines are just visible to the dark-adapted eye, it was reported by Cooper. He also reported that from the spacecraft the stars do not twinkle but that the lights on earth do.

The appearance of night glow slightly above the visible horizon was seen by all the astronauts and one described it as comparable to a bank of clouds near the horizon illuminated by the quarter moon.

These were only three of the informative reports

presented to the group attending the conference. Others included Spacecraft Development, Mercury-Atlas Launch Vehicle Development, Reliability and Flight Safety, Trajectory Analysis, Worldwide Network Support, Operational Support from DOD, Astronaut Training, Aeromedical Preparations, Spacecraft Preflight Preparations, Flight Control Operations, Recovery Operations, Astronaut Performance, and Astronauts' Summary period.

Mercury Astronauts Receive Iven C. Kincheloe Award

The Iven C. Kincheloe Award was presented September 28 to the seven Mercury astronauts as the highlight of the Seventh Annual Awards Banquet of The Society of Experimental Test Pilots held at Lancaster, Calif.

The award is presented annually for the recognition of outstanding professional accomplishment in the conduct of flight testing.

Receiving the award were M. Scott Carpenter, L. Gordon Cooper Jr., John H. Glenn Jr., Virgil I. Grissom, Walter M. Schirra Jr., Alan B. Shepard Jr., and Donald K. Slayton.

Accompanying the award from the SETP was a citation which stated in part... "for their many contributions to the nation's space objective in the planning, design, and development aspects of Project Mercury as well as for their more publicized accomplishments as pilots of the nation's first spacecraft." Presenting the award to the astronauts was Mrs. Dorothy Kincheloe, widow of the Air Force experimental test pilot for whom the award was named.

Rendezvous In Space May Be Most Hazardous Phase Of Lunar Trip

Making contact in space with orbiting vehicles is perhaps the most dangerous part of the planned manned landing on the Moon, Russel G. Brooks, a coordinator of Project Gemini at the Atlantic Missile Range, believes.

"First, there is the hazard of impact while traveling at excessive speeds during complicated rendezvous maneuvers in space," he warns.

For example in the so called "orbital catch-up maneuver" during rendezvous, when the pilot increases speed to catch up he also changes orbit and appears to change altitude with respect to the target spacecraft.

"Second, there is the peril of an electrical discharge from one vehicle to the

other, possibly damaging or destroying one or both vehicles." Says Brooks.

It has been established that while traveling through space, vehicles buildup an electrical charge. Studies are being made to measure and equalize the electrical charges of approaching space vehicles to prevent a hazardous electric charge.



AEROSPACE PARK OPENS—Hampton, Va.'s aerospace park opening and the fifth anniversary of NASA coincided on October 1 as a Mercury spacecraft, a gift from NASA Langley Research Center, was unveiled at "Space Day" ceremonies. Langley Research Center Director Floyd L. Thompson presented the Mercury spacecraft. A sign near by inset gives the legend of the spacecraft.

Space News **ROUNDUP!**

SECOND FRONT PAGE

Cooper's Spacecraft Faith 7 To Tour U.S. State Capitals

Faith 7, the spacecraft of Astronaut L. Gordon Cooper Jr., left the Manned Spacecraft Center this past week for a tour of the state capitals of the United States, with the first stop in Little Rock, Ark.

The spacecraft was returned here from Oklahoma City for the Mercury Summary Conference exhibit. It had been on public display for the first time in the home state of Cooper.

The spacecraft - inside and out - is as it was when it splashed down into the Pacific near Midway Island on May 16, 1963, except

for a viewing window and cutaways of the heat shield and outer skin for viewing the inner structure. The spacecraft shingles--its outer skin made of a new metal rene' 41-- shows the effects of the 1,000 degree heat which blanketed the spacecraft during re-entry into earth's atmosphere. The heat shield--a mixture of glass fibers and resin--at the base of the spacecraft withstood maximum temperatures of 3,000 degrees Fahrenheit when Cooper directed Faith 7 on its return to earth.

Also on display with the spacecraft will be the cam-



READY FOR TOUR—Faith 7, the spacecraft of Astronaut L. Gordon Cooper, is made secure on the trailer that will transport it on a tour of the state capitals of the 50 states. The first scheduled stop was Little Rock, Ark. this past weekend.

eras Cooper carried and the astronaut Survival Kit which rode on Faith 7's 546,185 mile earth-circling flight. Samples of the types of food Cooper ate during his day and a half in space will also be on display.

The 13 month tour, ending in the nation's capital on November 1, 1964, will

cover approximately 20,000 miles, a distance Faith 7 covered in space in approximately 80 minutes.

Scheduled appearances for the spacecraft during the remainder of 1963 are as follows: Little Rock, Ark., Oct. 10-13; Jefferson City, Mo., Oct. 17-20; Springfield, Ill., Oct. 24-27; Indianapolis, Ind.,

Oct. 31-Nov. 3; Columbus, Ohio, Nov. 7-10; Frankfort, Ky., Nov. 14-17; Charleston, W. Va., Nov. 21-24; Richmond, Va., Nov. 28-Dec. 1; Raleigh, N. C., Dec. 5-8; and Columbia, S. C., Dec. 12-15.

Appearances at other state capitals will be announced as soon as a schedule is available.

Apollo And Testing Equipment Contracts Awarded Four Firms

Contracts were awarded recently by NASA to the following firms, Beckman Instruments, Inc., Motorola Military Electronics Division, Avco Corporation Spaceflight Programs Office, and RADCOM division of Litton Industries.

Tracking beacon antennas encapsulated in fused quartz to withstand the heat of re-entry will be designed, fabricated and tested for NASA's Apollo Spacecraft by the RADCOM division of Litton Industries, Silver Springs, Md.

Four of the antennas will be mounted around the circumference of the outer skin of the vehicle to make

sure that one will always be directed toward earth. The antennas will transmit signals making it possible for ground-based radar to track the vehicle before and after re-entry. A total of 31 antennas will be supplied, including quality test units.

A miniaturized spaceborne electronics unit that

(Continued on page 6)

MSC Officials Attend Apollo Design Engineering Inspection And Review

A recent three-day design engineering inspection and Apollo program design review held by North American Aviation, Space and Information Division at El Segundo, Calif. was attended by top officials from NASA centers across the country.

Heading the Manned Spacecraft Center group

were Dr. Robert R. Gilruth, director MSC; James C. Elms, deputy director of Development and Programs; Robert O. Piland, acting manager of the Apollo Project Office; Maxime Faget, assistant director for Engineering and Development; C. C. Johnson, acting assistant chief, Spacecraft Technology Division; Rene A. Berglund, chief of the Space Vehicle Design Branch, and D. M. Hammock, acting deputy manager, Spacecraft.

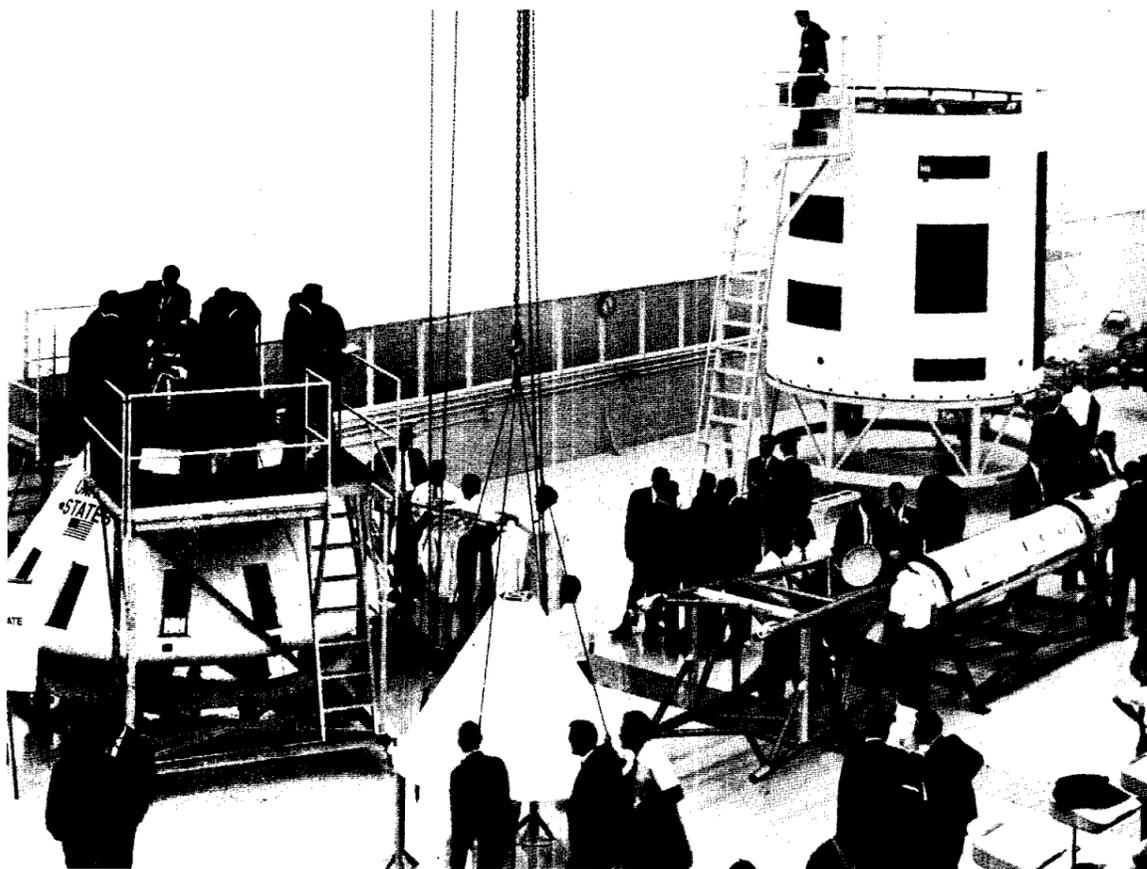
Also on hand from MSC were nine of the 16 astronauts. In the group were M. Scott Carpenter, Walter M. Schirra Jr., Alan B. Shepard Jr., Donald K. Slayton, Elliot M. See, Charles Conrad Jr., Thomas P. Staf-

ford, James A. Lovell, and John W. Young.

Other NASA representatives were present from Washington D. C., MSC of Cape Canaveral, the Ames and Langley Research Centers, and the Goddard Space Flight Center.

The agenda for the design engineering specification included objectives and schedules, flight technology the launch escape system, test and operations, and vehicle inspection.

Among the topics for the design review were structural design, the propulsion, power and electronic systems, guidance and navigation, simulation and trainers, ground support equipment, and a program hardware summary.



INSPECTION PERIOD—Leading officials from NASA centers attended a three-day Apollo design engineering inspection along with a program design review, recently at North American Aviation, Space and Information Division. The agenda included an inspection of spacecraft and mockups.



APOLLO MOCKUP—Dr. Robert R. Gilruth, (right), director, MSC, and Maxime Faget, assistant director for Engineering and Development, check a mockup of the Apollo spacecraft.