Apollo mans moon

The Apollo program has been described at various times by astronauts, engineers, space agency officials and newspaper columnists as a magnificent "team effort." Indeed, the team which is accomplishing this complex project as it explores the Moon comprises hundreds of thousands of government and contractor employees throughout the nation.

Among the shapers of history in the early years of the space program was Lewis' Director, Dr. Abe Silverstein. In 1958, when he was Associate Director of Lewis, Dr. Silverstein was called to Washington to help organize NASA, which was, at the successor of National Advisory Committee for Aeronautics (NACA), to be the nation's civil agency for meeting the challenge of space. Among the many missions conceived at that time was a manned journey to the Moon and back. Dr. Silverstein himself named it "Apollo" after one of the most versatile of the Greek gods. Dr. Silverstein realized the name after perusing a book of mythology at home one evening early in 1960. He thought that the image of "Apollo riding his chariot across the Sun was appropriate to the grand scale of the proposed program."

In the late 1940's Lewis used very small thrust chambers in the range of 100 to 1,000 lb. thrust. Over the course of the next decade, rocket engineers and scientists experimented with a variety of thrust chamber designs to achieve high combustion efficiency and smooth burning, and they measured heat transfer rates within the thrust chamber and demonstrated how to cool the chamber and nozzle with liquid hydrogen. Since hydrogen, the lightest of the elements, in its liquid state boils at -423°F., and the oxidizer, liquid oxygen, is stored at -297°F., another major concern was how to handle the cryogenic propellants themselves.

By 1954, as the United States entered the space business, the Lewis Center had tested only liquid hydrogen, liquid oxygen engines power the upper stages of the Atlas-Centaur launcher vehicle that has been under Lewis management since 1952. At Lewis-Centaur launched the Surveyor spacecraft which landed on the moon, and the Mariner spacecraft that will fly by Mars on July 31 and Aug. 5.

The experience Lewis engineers and scientists gained in the field of high energy propellants later led to the development of the 15,000 lb. thrust liquid hydrogen-liquid oxygen engine designated RL-10. Two of these engines power the upper stage of the Atlas-Centaur launch vehicle which has been under Lewis management since 1962. "At Lewis-Centaur launched the Surveyor spacecraft that landed on the moon, and the Mariner spacecraft that will fly by Mars on July 31 and Aug. 5."

Much of the same technology developed by Lewis for Centaur was particularly applicable to the J-2 liquid hydrogen-oxygen engines of the Saturn second stage (S-IVB).

Consequently a number of Lewis staff members — men by then well experienced in high energy propulsion systems — were called upon by NASA Headquarters to serve on the technical assessment team which recommended the contractor to build the F-1 and J-2 engines. Dr. Silverstein chaired the Source Board which made the final selection of the general contractor. Work began on the F-1 engine, the nation's largest, in 1958 and on the J-2 in 1960.

During the course of development of these engines, Lewis continued its technical support in the form of consultation with NASA's Marshall Space Flight Center, Huntsville, Ala. Melvin Hartmann and Ambrose Ginsburg, Lewis fluid systems engineers, served on a Marshall committee to review problems being experienced by the F-1 turbopump.

These and other specialists served as consultants on a J-2 review committee. Among the topics discussed and of particular interest to the Lewis men was the inducer, that component which recommended the name artech for the J-2 engine.

An excellent opportunity to earn while learning is available to college students through the Lewis co-op program. Four recent graduates of the program are beginning full-time careers at Lewis and Plum Brook.

Once on-board, students usually work one quarter and study one quarter, although this may be altered according to an individual's scholastic schedule. During the five-year program, the Lewis Training Office maintains records of work performance, grades, and areas of interest of each co-op, and recommends work assignments which complement the student's formal training.

The four recent graduates who have joined the staff are:

Joseph Hemminger, graduated in May from the University of Detroit with B.S. and M.S. degrees in mechanical engineering. He is now assigned to the Test Operations Section, Facility Operating Branch of the Space Power Facility Division at Plum Brook.

Robert Ziemke, also in Plum Brook's SPF Division, Engineering Test Branch, Installation Branch. Ziemke graduated last month from Cleveland State University with a bachelor's degree in electrical engineering.

Gregory Rock, a recent graduate from the University of Cincinnati with a B.S. degree in aerospace engineering. Rock is assigned to the Combustion Branch, Airbreathing Engines Division.

James Triener, who received his bachelor's degree in electrical engineering from Cleveland State College, is now assigned to the Test and Evaluation Section of the Spacecraft Technology Division.

Recently graduated engineers Robert Ziemke (left) and Joseph Hemminger apply their talents to tasks with the Space Power Facility at Plum Brook.

Gregory Rock is investigating improved performance of advanced afterburner designs for the Airbreathing Engines Division.

James Triener is studying corona detection and degradation on flight hardware for the Spacecraft Technology Division.

Four co-ops join staff

The pick of the Center's beauties are looking to the employees at the Annual Employee Picnic tonight to complete the choice of one of them as Miss NASA-Lewis. Contestants from front to rear, left to right are: Nancy Corr, recently graduated in Sonny Escobar; Joan Barfield, Chris Schneider and Linda Garlitz; Sherrell White and Eleanor Hart. Not pictured was Maryann Vini. (John Marton photo)
Morthland is retiring

Joining Lewis upon his graduation from Carnegie Tech in 1948, Useller assisted in experimental development of jet and turbojet engines. He continued his involvement with jet propulsion devices including high temperature afterburners. He was involved in the Center's research of unconventional fuels for turbojets including metallic slurries, boron compounds and the use of hydrogen to increase operating altitudes and extend aircraft ranges. Useller trained the original astronauts in the use of the manual attitude controller for the Mercury space vehicle and contributed to the knowledge of ocellar nystagmus, an involuntary eye oscillation that occurs during aircraft maneuvering. While associated with the Flight Operations Branch, Useller supervised the design, development and testing of recovery systems for retrieval of data nose cones fired from Aerobee rockets at Wallops Island. Since 1966 he had been associated with the Zero Gravity Research Facility.

The author of several technical papers, Useller was a full fellow in the Royal Aeronautical Society. He was secretary of the Lewis Sportmen's Club.

Survivors include his father, Walter J., a brother Walter F., and a sister, Mrs. Teresa Trisch all of Pennsylvania. Useller was buried at Gettysburg National Cemetery.

Two appointed to FEB

New appointments to the Cleveland Federal Executive Board for 1969-70 include the appointment of Richard Tilton of the Personnel Division as FEB Program Chairman and Dr. Betty Del Duca of the Direct Energy Conversion Division as Chairman of the Federal Women's Program.

Dr. Charles D. Ferraro of the Personnel Division has completed a year as Chairman of the Equal Employment Opportunity Committee. Mr. George T. Hoy, FEB Director, Dr. Abe Silverstein, and Mr. Useller have been approved, and we talked of the possibility that he might find an opening at Edwards Flight Research Center for test pilot training.

Armstrong's interest in flying was very great, and he said he would be willing to hire on in any capacity that might lead him to test pilot training. NACA salary offers in 1955 were not too competitive, and we were emphasizing the fringe benefits and advanced education assistance for applicants. Yet not once in this interview did Armstrong mention salary. His career flying interest seemed to overshadow all other considerations.

In encouraging Armstrong to join the NACA ranks, I talked to him about the prospects in high-speed sub-orbital flight which was currently under study. Also, just a year before, the X-15 program had been approved, and we talked of the possibility that he might find an opening at Edwards Flight Research Center for test pilot training.

Morthland is retiring

John E. Morthland, a painter in the Building and Maintenance Section of the Plant Services Division, retired July 17, Morthland joined Lewis in July 1961 and had worked for the Center as a steam-plant operator before becoming a research assistant. He is survived by him and his wife, Ellen, a happy and active retiree.

Coapman merits DFC

Just prior to being transferred to Wright-Patterson Air Force Base in Dayton, Col. A. Lincoln Coapman was awarded the Distinguished Flying Cross for meritorious service during a combat mission in Vietnam.

Mariner twins perform after six-month journey

After traveling over 225 million miles in little more than six months, the Mariner '69 twins will soon meet the challenge of helping determine whether or not the environment on the planet Mars is suitable for life.

The project responsibility for the Mariner '69 mission is assigned to the Jet Propulsion Laboratory, managed for NASA by the California Institute of Technology, Pasadena, Calif. The launch vehicle responsibility rests with the Lewis Launch Vehicles Division, which managed the dual launches on Atlas-Centaur vehicles.

Mariner VI, launched last Feb. 24, will fly past the equator of the red planet July 31, with its sister, Mariner VII, following five days later on a polar pass. In this way the twin spacecraft can furnish data as different as possible from the standpoint of Martian geography and climate.

Each of the 900-pound Mariners is equipped with two television cameras to photograph the disc of Mars during the approach to the planet and the surface during fly-by. The resolution of the surface pictures is expected to be about 900 feet, compared with two miles in resolution which the Mariner IV took in its 1965 flight.

Two instruments, an infrared spectrometer and an ultraviolet spectrometer, will probe the atmosphere of Mars. An occultation experiment, passing radio signals through the Mars atmosphere while the spacecraft swings behind the planet, will yield data on atmospheric pressures and densities.

The Mariner '69 flights are a second step in the Mars investigation series. The first, Mariner 2, was in 1964-65. In 1971 two Mariner-type vehicles will orbit Mars for three months, performing experiments similar to the Moon's Lunar Orbiters series. The 1973 proposed mission, Project Viking, involves two spacecraft orbiting Mars and detaching soft landers to descend to the surface.

Tracking and communications for the '69 mission is handled by the Deep Space Network, operated for NASA by JPL.

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Recruiter reminisces

Moonman started at Lewis

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I was so impressed by the qualifications and determination of this young man that at the close of the interview I assured him that he would receive an offer from Lewis or Edwards. Lewis did accept Armstrong as a member of its flight crew in February, 1965 and a few months later he transferred to Edwards Flight Research Center in California.

Typical Mariner TV Coverage of Mars

Mariner II will probe the atmosphere of Mars. An occultation experiment, passing radio signals through the Mars atmosphere while the spacecraft swings behind the planet, will yield data about atmospheric pressures and densities.

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Lewis shares pride in Apollo program

(Begin Page One)

A 1/20th scale model of the Saturn 1-B launch vehicle was finally checked before and its launch escape system were conducted in the Lewis 10 x 10-foot supersonic wind tunnel. Scale models were used in the tests.

In the bottom of the fuel tank the propellants are maintained at the stage of the Saturn V for the engines of 250 lbs. thrust each. Data were taken over a range of pressures from the Ares Stage I of altitudes from sea level to 150,000 feet. This simulation from Lewis too. Fuel cells are carried aboard the Service Module to provide electric power to spacecraft systems. Consequently, Lewis researchers investigated this area and made known to the manned spacecraft Center that the condition of the fuel cell did not depend on gravity to operate properly. Lewis also provided MEC in determining the best transfer characteristics of the condenser; this information was used in a computer simulation of the spacecraft's electrical power subsystem.

During 1962 Lewis engineers were consulting on the overall combustion and system stability of the Lunar Module ascent engine, the critical propulsion system for the ascent stage which returns the astronauts from the moon to lunar orbit. Dr. Richard Priem, a chemical engineer, was part of a group working to overcome the high frequency combustion instability noted in the engine. Two other engineers, Robert Dorsch and Leon Wenzel, ran analog computer analyses of low frequency combustion instability characteristics. The Center's 8x6-foot transonic and 18x10-foot supersonic wind tunnels were used in extensive tests on models of Saturn booster stages. The first such tests were made in the late 1950's when engineers studied boost flow and heating tests on the SIB booster, the eight-engine first stage of the Saturn V. The 1/45th scale model had real, working rocket engines of 253 lbs. thrust each. Data were taken over a range of speeds from takeoff to Mach 3.5 and of altitudes from sea level to 150,000 feet. This simulation from Lewis too. Fuel cells are carried aboard the Service Module to provide electric power to spacecraft systems. Consequently, Lewis researchers investigated this area and made known to the manned spacecraft Center that the condition of the fuel cell did not depend on gravity to operate properly. Lewis also provided MEC in determining the best transfer characteristics of the condenser; this information was used in a computer simulation of the spacecraft's electrical power subsystem.

On July 21 astronaut Neil Armstrong is scheduled to plant the American flag on the lunar soil, in view of millions the world over via direct TV broadcast.

Lewis technicians checked out a model of the one and a half million pound thrust Saturn booster which was being readied for base heating problem studies in the Center's supersonic wind tunnel.

Dynamic stability tests of the Apollo command module and its launch escape system were performed in the Lewis 8x6-foot transonic wind tunnel. Scale models were used in the tests.
'We came in peace for all mankind'