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MOONLANDING, MARS FLIGHTS' HIGHLIGHT THE YEAR IN SPACE

1969 was the year of the Apollo moon landings, the year of close-up studies of Mars and, closer to home, a year when communications satellites, space weather observations, and scientific examination of the Earth's environment from orbit continued with increasing sophistication.

Following the Apollo 9 and 10 readiness missions, the first lunar landing mission was launched July 16, and man set foot on the moon for the first time four days later.

"That's one small step for a man, one giant leap for mankind" were the words of Apollo 11 Commander Neil A. Armstrong as he swung down from the Lunar Module to the dusty Sea of Tranquility at 10:56 p.m. EDT July 20.

Exactly four months later Apollo 12 Commander Charles "Pete" Conrad led

a second two-man exploration team to the Moon, this time in the Ocean of Storms.

Two unmanned spacecraft, Mariners 6 and 7, flew by Mars in July and August, revealing it to be different than - rather than resembling - either the moon or earth.

Results of the flyby in which 200 photos of Mars were taken confirmed earlier data received from Mariner 4 in 1964 that there are numerous craters and the atmosphere is roughly equivalent to that of earth at about 100,000 feet altitude.

But the unprecedented clarity of the new pictures showed numerous craters including one about 300 miles in diameter as well as one vast stretch of over 1,200 miles with almost no craters. The only

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MAJOR NASA LAUNCHES--1969

Date	Name	Launch Vehicle	Launch Site	Mission
1/22	OSO 5	Delta	KSC	Solar Observation
1/30	ISIS 1	Delta	WTR	Ionosphere Sounding
*2/5	Intelsat III F-3	Delta	KSC	Communications
2/24	Mariner 6	Atlas-Centaur	KSC	Mars Fly-by
*2/26	ESSA 9	Delta	KSC	Weather
3/3	Apollo 9	Saturn V	KSC	LM Checkout
3/27	Mariner 7	Atlas-Centaur	KSC	Mars Fly-by
4/14	Nimbus 3	Thor-Agena	WTR	Weather R & D
5/18	Apollo 10	Saturn V	KSC	LM Lunar Orbit
*5/21	Intelsat III F-4	Delta	KSC	Communications
6/5	OGO 6	Thor-Agena	WTR	Geophysical Studies
6/21	Explorer 41	Delta	WTR	Interplanetary Studies
6/28	Biosatellite 3	Delta	KSC	Biological Studies
7/16	Apollo 11	Saturn V	KSC	First Manned Lunar Landing
*7/25	Intelsat III F-5	Delta	KSC	Communications
8/9	OSO 6	Delta	KSC	Solar Physics
8/12	ATS 5	Atlas-Centaur	KSC	Communications & Technology
8/27	Pioneer 5	Delta	KSC	Solar Studies
*10/1	ESRO 1-B	Scout	WTR	Polar Ionosphere
*11/7	GRS 1	Scout	WTR	Energetic Particles
11/14	Apollo 12	Saturn V	KSC	Manned Lunar Exploration
*11/21	Skynet	Delta	KSC	Communications

*Non-NASA Mission

HAWAII--OVER A DECADE IN MSFN

The Hawaii station has successfully supported Projects Mercury, Gemini and Apollo.

On November 29, 1959, a siting team visited the Hawaiian Islands to select an area for the station and decided upon one on the island of Kauai, in Kokee Park, state-owned land in the northwest section of the island.

For support of the Mercury Project, the station had constructed and installed a telemetry and control building, a power building, two receiving antennas with a boresight tower, a ground-to-air transmitter, a Verlor (Very Long Range Tracking) S-band antenna and boresight tower.

Construction began in May, 1960, and the station was operational by June, 1961. Hawaii supported MA4, the first unmanned orbital Mercury mission on September 13, 1961. The Kauai station successfully supported the remainder of the manned and unmanned Mercury missions.

From May, 1963, when the Mercury program ended until the Gemini program began, Kauai was being implemented for Gemini support.

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Changes Announced For Apollo Program

NASA announced that the Apollo 13 manned lunar landing mission scheduled for launch on March 12, has been rescheduled for April 11.

The Fra Mauro highland area located at 17 degrees 36 minutes West longitude and 3 degrees 48 minutes South latitude remains as the primary landing site.

The landing sites and mission objectives of the Apollo program are interrelated, with each mission playing a vital role in the accomplishment of the overall goal of lunar exploration.

With the prospect of reducing the frequency rate of Apollo flights, the movement of Apollo 13 to April allows additional time for more detailed analysis of specific mission plans. Launches to follow Apollo 13 are being studied to determine the best interval between them to obtain the maximum operational and scientific returns.

The Apollo 14 manned lunar landing mission scheduled for July, 1970, will be rescheduled for the Fall of 1970.

Apollo 13 crew members are Navy Cdr. James A. Lovell, Commander; Navy Lt. Cdr. Thomas K. Mattingly, Command Module Pilot; and Fred W. Haise, Jr., a civilian, Lunar Module Pilot.

MOON LANDING, MARS FLIGHTS' HIGHLIGHT THE YEAR IN SPACE

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identifiable cloud was a very thin streak hanging 20 to 30 miles off the edge of the planet.

Ice cap temperatures were measured to be very similar to that of dry ice, although one experimenter believes there may be water ice at the edge of the cap.

In the meteorological satellite area, Nimbus 3 was placed in polar orbit. Shortly after launch, it was apparent that not only the cloud cover photos being returned were of excellent quality, but a new step forward in meteorology had been taken.

NASA also launched a regular meteorological operational satellite for ESSA, ESSA 9, in February, and four communications satellites were launched for Communications Satellite Corp. One of the four, INTELSAT III F-5, failed to achieve orbit because of a launch vehicle malfunction.

Two more Orbiting Solar Observatories, OSO's 5 and 6, were launched during the year to continue the study of the Sun and another Interplanetary Monitoring Platform, IMP-G, and an Orbiting Geophysical Observatory, OGO-6, were launched to study the medium near earth and out to more than 100,000 miles in space.

Other launches for outside organizations included an ionospheric sounding satellite, ISIS 1; ESRO I-B and German Research Satellite-A, both scientific satellites, and a communications satellite, Skynet-A, for the British Ministry of Defense.

Another important flight during the year was Biosatellite 3. This was the first mission involving a primate, and though it was aborted far short of its scheduled flight of one month, results from the flight were important.

Double success twice rewarded NASA's efforts in tracking and data acquisition in 1969, with the successful lunar landing flights of Apollo 11 and 12, and the two Mariners flying close to Mars.

The Manned Space Flight Network performed virtually without flaw in

maintaining contact on two flights, with two Apollo spacecraft at once -- the lunar module stationed on the moon, the command module continuing in lunar orbit. The 85-foot stations at Goldstone, Calif.; Canberra, Australia; and Madrid, Spain; used main and wing, or backup, antennas to carry out this long-range double-track task. In addition, with 210-foot antennas at Goldstone and Parkes, Australia, they provided live television direct from the moon to an audience estimated, for Apollo 11, in the hundreds of millions of persons over many nations.

The Mars feat attracted the interest of astronomers because the cameras of Mariners 6 and 7 returned 200 high quality photos of the planet in a period of some 12 hours -- a gross gain from the technology possible with Mariner 4, in 1965, when 22 Mars pictures were transmitted in 175 hours. Last July 31 and Aug. 5 Mariner 6 and 7 passed within 2,000 miles of Mars to scan two different faces of the planet, and transmitted photo and other data to Earth over a distance of 60 million miles.

HAWAII-- OVER A DECADE IN MSFN

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The same general area on Kauai was used for Gemini, but it was implemented with new equipment designed to increase the capability of the station to support the new project.

Kauai was ready to support the first Gemini flight in April, 1964, and successfully supported the entire Gemini program.

In April, 1964, a siting team visited the Hawaiian Islands for the primary purpose of selecting a station location for an Apollo unified S-band facility. It was decided to expand the existing Gemini station for the Apollo program rather than to seek a new location.

Construction for Apollo had to be done while the station actively supported Gemini missions. Started in 1965, the station was ready for Apollo by the end of 1966.

Hawaii also is a vitally important station for the support of major NASA scientific satellite programs including BIOS, TIROS, Pioneer, and GEOS spacecraft.

The Hawaii Station Director is Virgil True and the M&O Supervisor is H. Armstrong.

LUNAR ROVING VEHICLE

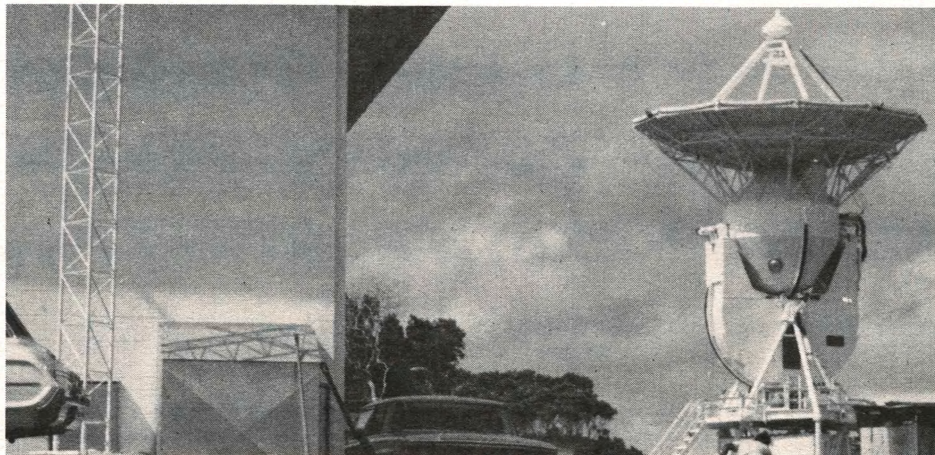
Marshall Space Flight Center has released a request for proposal for the development of a small, manned lunar roving vehicle. The request for proposal includes design, development, test, and delivery of four flight models.

The lunar rover is to be ready for flight to the moon in 1971. It will be delivered to the lunar surface by a manned Apollo lunar module.

The vehicle will have four wheels and will weigh about 400 pounds. It will pro-

vide lunar surface transportation for two astronauts and their hand tools, collected lunar samples, and other equipment and experiments.

The 1971 delivery data is compatible with planned improvements to the Apollo lunar module, command module and astronaut life support equipment. The vehicle will increase the scope of lunar exploration by conserving time of the astronauts, thus providing a greater scientific return for each mission.



The Hawaii MSFN station began its service in November, 1959 when a siting team first selected the station location. Hawaii supported the Mercury 4 mission on September 13, 1961.

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