P R E S S   K I T

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546
TELS. WO 2-4155
WO 3-6925

FOR RELEASE: IMMEDIATE
July 9, 1965

RELEASE NO: 65-227

PROJECT: MARINER MARS ENCOUNTER

CONTENTS

NEWS NASA

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MARINER TO CLIMAX UNPRECEDENTED MARS MISSION JULY 14

Close inspection of the planet Mars by the United States Mariner IV spacecraft July 14 will bring to a climax an exploratory mission of unprecedented distance and complexity.

Delicate, but rugged, instruments which will have endured 228 days in space will act as the eyes of mankind. They will observe and measure interesting aspects of the red planet from a distance of within 5700 miles.

The closest that Mars and Earth ever come in their separate orbits around the Sun and the narrowest distance possible, once every 15 years, for ground-based telescopic observations is 35 million miles.

By the time of encounter, the National Aeronautics and Space Administration's spacecraft will have traveled 325 million miles along a wide-swinging path designed to intersect the orbit of Mars.

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7/8/65

CONTINUOUS REPORTS

Mile-by-mile along that 325-million-mile stretch, Mariner IV has reported back to Earth how it was functioning and what it was encountering in space. Since its launch from Cape Kennedy, Fla., Nov. 28, 1964 Mariner IV has supplied scientists with millions of bits of information on such interplanetary phenomena as solar wind, cosmic dust, magnetic fields and radiation.

The straight-line distance of Mariner from Earth will be 134 million miles when the spacecraft passes near Mars.

Useful information from the historic mission was quick in coming. On the first day of flight, Mariner IV detected the shock wave produced by the solar wind on the Earth's magnetic field at a greater altitude than this phenomena had ever been observed before.

Soon afterward the trapped radiation detector on this spacecraft recorded the bext measurement yet made on the outer regions of the Van Allen radiation belts.

The Mariner IV mission was undertaken because of the great physical and geological interest in Mars because it offers what is believed to be the best opportunity within our solar system of shedding light on the possibility of life in some form, plant or animal, existing beyond the Earth. The search for extraterrestrial life will be conducted in future NASA missions to Mars.

The Mariner IV mission also serves to spotlight United States'committment to expand human knowledge of space. The National Space Act of 1958 created NASA and called on the civilian agency to plan and conduct those activities in space "devoted to peaceful purposes for the benefit of all mankind."

MANDATE FOR EXPLORATION

The lunar and planetary exploration program was one of the first programs to be started by NASA. Selected as the most reasonable goals for initial exploration were the Moon and Venus and Mars, the closest planets to Earth.

Design of the Mariner series of spacecraft began in 1961. Mariner II completed the world's first successful trip to the vicinity of Venus Dec. 14, 1962. Its data determined the planet's surface temperature to be about 800 degrees Fahrenheit with a temperature range of minus 30 to 70 degrees at the tops of the clouds that surround and shroud the planet. It also gathered much significant information on interplanetary space.

Mariner IV weighs 575 pounds, about 125 more than Mariner II and has some 138,000 individual parts. It has a design lifetime of 6,500 hours compared with Mariner II's 54,000 parts and 2,600-hour design lifetime. Mariner IV exceeded 5,000 hours in space June 24.

PRECEDENTS, RECORDS SET

Since April 29, Mariner IV has set new communications distance records every day. By the time it has finished transmitting all desired data the communications distance will be about 150 million miles.

This initial attempt of the United States to explore Mars with an unmanned spacecraft also is the first flight outside of the Earth's orbit away from the Sun. Another first is the use of the star Canopus for a spacecraft attitude reference.

Attesting to the accuracy and reliability of many vital components, such as the Atlas-Agena launch vehicle, the midcourse motor, attitude controls and the like, is the fact that with a flight path of about 325 million miles the miss from the aiming point will be only about 1,000 miles.

WHAT'S HAPPENED SO FAR

At 9:22 a.m. EST, Nov. 28, 1964, Mariner IV lifted from the pad at Cape Kennedy and began its 228-day flight to the planet Mars.

The launch vehicle was an Atlas-Agena. Earth and the spacecraft at the time of launch were than 129 million miles from Mars.

The Earth was travelling about 66,000 miles per hour in a near-circular solar orbit averaging about 93 million miles out from the Sun. Mars was moving about 54,000 miles per hour in an orbit averaging 140 million miles from the Sun.

OBJECTIVES OF MISSION

Objective of Mariner IV was to perform scientific measurements in interplanetary space between the orbits of Earth and Mars and in the vicinity of Mars and to gain engineering experience in operating spacecraft during long-duration missions aimed away from the Sun.

Six of the eight Mariner IV scientific investigations (experiments) were designed to measure radiation, magnetic fields, and meteoroids in interplanetary space and near Mars. The other two depended on everything going well right up to the closest approach to Mars. One was a single television camera to take about 21 pictures of the planet and the other was an occultation experiment designed to shed light on the Martian atmosphere.

The Mariner trajectory was carefully planned to avoid impact with Mars.

Forty-two minutes after liftoff the spacecraft separated from the Agena D second stage. In the next half hour the four big solar panels had deployed and two sensors on the spacecraft had locked on the Sun, cancelling out all tumbling motion and maneuvering the craft so that all solar panels were correctly pointed.

With this accomplished, the Mariner IV began a search for the star Canopus about 2 a.m. EST Nov. 29. The lock on Canopus was completed about 7 a.m. the next day. This lock on Canopus was required to properly position the spacecraft. Canopus was selected because of its brightness and its specific location.

With one portion of the spacecraft facing the Sun and another portion always facing Canopus, Mariner IV was fixed in position for cruise.

ATTITUDE HELD FIRM

The position was held by a combination of attitude control systems that functioned to counter any tendency of the spacecraft to pitch, roll, or yaw. Gas jets, gyros, solar pressure vanes, jet vanes in the midcourse motor exhaust, solar and Canopus sensors, and associated electronics have all helped to keep Mariner in a stabilized attitude.

On Dec. 4, 1964 a midcourse maneuver was attempted, but was cancelled after the Canopus lock was lost. Canopus was reacquired by the star sensor after seven ground commands. The midcourse maneuver was successfully completed the next day. Purpose of the maneuver was to slightly alter the trajectory so that Mariner IV would pass closer to Mars.

On Dec. 6, 1964 telemetry data from the plasma probe, an instrument designed to measure solar wind, became unintelligible. The problem was traced to a resistor which opened. Later in the mission, after the spacecraft transmissions switched to a lower data rate, a large portion of the data from the plasma probe again became useful.

FIRM LOCK ON CANOPUS

Between Dec. 6 and 17, the Canopus lock was lost and reacquired several times apparently due to dust particles drifting in front of Canopus and reflecting flashes of sunlight back into the star sensor. A ground command sent Dec. 17 desensitized the sensor and has prevented this loss of lock from happening again.

A ground command sent Dec. 13 increased radio transmitter power from $6\frac{1}{2}$ to $10\frac{1}{2}$ watts by switching from one amplifier to another of a different type. The rate at which data was transmitted from the spacecraft was reduced automatically from 33 1/3 to 8 1/3 bits per second Jan. 3, 1965, because of the increasing distance between Mariner IV and Earth. At this time the plasma probe data became mostly recoverable.

LENS COVER REMOVED

On Feb. 11 and 12 a series of 12 commands were sent to Mariner IV to check out equipment to be used at encounter with Mars. A lens cover was dropped from the television camera and the scanning platform, carrying the camera and two Mars sensors, was preset in a position to be pointing at Mars during the fly-by.

The lens cover was removed at that time rather than near encounter to assure that the removal would not shake loose any dust particles that could distract the Canopus sensor at a crucial time.

ION CHAMBER EXPERIMENT FAILS

An unexpected event was announced March 3. The Geiger-Mueller tube portion of the ion chamber experiment failed. The tube counts the number of charged particles (radiation) encountered in a certain energy range. The chamber itself continued to function normally, measuring the total effect of radiation in the region of energy of electrons greater than a half-million electron volts and protons of greater than 10 million electron volts. However, on March 17 the ion chamber also ceased to return useful data.

This left five of the six interplanetary experiments functioning as Mariner IV passed the half-way point in its mission. By the 114th day of flight, March 21, Mariner IV had transmitted to Earth more than 160 million bits of engineering and scientific data from interplanetary space.

COMMUNICATIONS RECORD

On April 29 Mariner IV set a world space communications distance record as it reached a straight-line distance from Earth of 66 million miles.

In the course of its flight Mariner IV has detected 10 solar flares, eight of which were confirmed by ground observation posts. Total hits of cosmic dust micrometeoroids have topped 190.

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MARS ENCOUNTER

During the last hours before Mariner IV sweeps up to within 5700 miles of Mars, preparations will begin for the climatic phase of the spacecraft's mission. A series of events is scheduled to start about 10 hours before the spacecraft passes the planet. This 10-hour ground-to-space, space-to-ground checkout of instruments will be the project engineer's final stamp of approval on the instrument-laden package they have closely watched through the 228-day flight.

This will set the stage for photographing the planet and gathering other scientific information on the nature of Mars.

At 11:41 a.m. EDT, July 14, the Central Computer and Sequencer aboard Mariner IV will turn on the encounter science equipment and start the scan platform (with TV camera and two Mars sensors) searching for the planet. The television tape recorders will be warmed up, ready to turn on and record the pictures.

These commands to the spacecraft were engineered into the spacecraft before launch, and if their automatic proper execution cannot be verified on the ground a backup signal can be transmitted from the tracking station at Johannesburg, South Africa.

Throughout the day, the spacecraft will continue feeding back scientific and engineering information via the telemetry system.

The instruments on the spacecraft will scan the Martian skies, sweeping through 180 degrees nearly vertical to the direction of the spacecraft's motion. Sensitive sensors on the spacecraft will search for the target. Engineers at ground stations will stand by ready to send signals. They will watch their instruments for a verification that the search has been successful.

FIRST CONTACT WITH MARS

By 7:50 p.m. EDT, scientists will expect the spacecraft to make its first "sighting" contact with the planet. The telemetry system should then shift and begin sending only information from the scientific experiments. After a wait of 12 minutes, the time it takes for radio signals to reach Earth from 134 million miles away, these events should be verified at 8:02 at a ground station.

Aided and guided by the wide angle sensor, the narrow angle sensor on the spacecraft then takes over in the final minutes of the planet encounter, and at 8:20 p.m. EDT, the planet should be in full view and the 25-minute picture taking sequence will begin.

Immediately, the tape recorders begin collecting the detailed bits of information for the long process of composing 21 pictures of Mars.

Meanwhile, other experiments aboard Mariner IV will seek to detect and measure the planet's magnetic field, any trapped radiation belts such as Earth's Van Allen belts, the extent of cosmic dust (micrometeors) in the near-Mars region and solar wind around the planet.

If all goes well, the first two pictures will cover a part of the brightest of Martian deserts, Elysium, and an unusual maria region, Trivium Charontis. This region is of interest because it was only recently discovered to be a strong radar backscatterer -- a region that reflects radar waves as a mirror reflects light.

The television camera will then sweep southward across the desert Zephyria and into Mare Cimmerium. Farther south, over the desert Electis, an atmospheric haze which surrounds the polar cap at this time of the Martian year should be encountered.

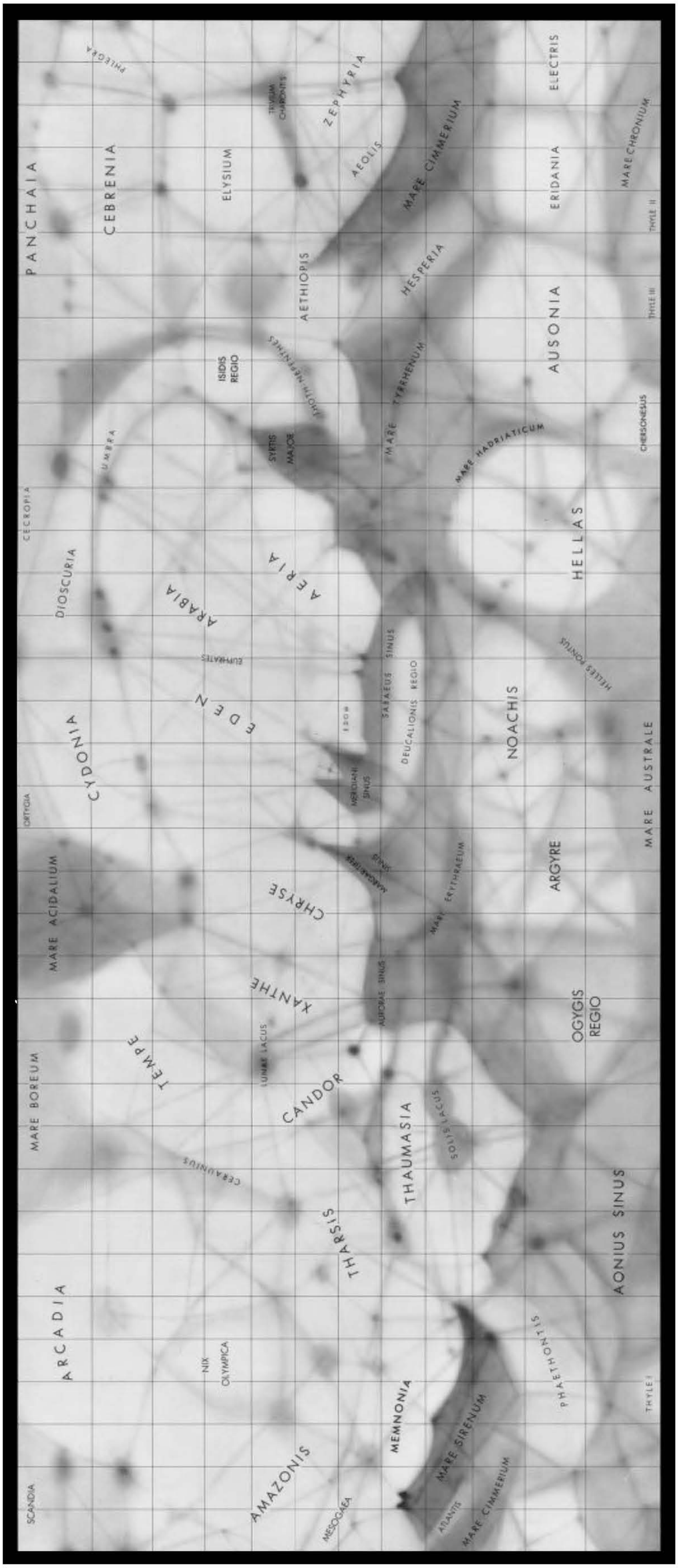

Chart of Mars

It is hoped that the camera will cut through this haze sufficiently to allow observation of the edge of the polar cap at 55 degrees south latitude. The TV scan will continue, now in a southeasterly direction, across the sunset terminator line south of Aonius Sinus in the polar cap.

The spacecraft will be at an altitude of about 7000 miles for the first pictures. The ground resolution will be best near the middle of the television pass when the camera will be pointed almost straight down at the planet. In this region, each picture will cover a surface area 120 by 120 miles, and it should be possible to resolve prominent surface markings as small as two miles across.

The picture taking sequence is scheduled to end at 8:45 p.m. EDT. Shortly after 9 p.m., Mariner will be at its closest distance to the planet.

OCCULTATION EXPERIMENT

While scientists are eagerly studying the early indications of the planetary scientific experiments and the photographic mission, others will be absorbed with the occultation experiment, the receiving of Mariner radio signals that travel through the Martian atmosphere. Changes in frequency and strength of signal may help determine the density and depth of the Martian atmosphere.

About one hour after passing Mars, the spacecraft will fly behind Mars and remain obscured for about one hour. Just prior to entering this occultation region, and immediately after emerging, the spacecraft's radio signals will travel through the atmosphere and ionosphere, if any, of Mars of their way back to earth.

This will be the first time that a coherent radio transmission from an object in space will reach Earth after having traveled through the atmosphere of another planet.

The Martian atmosphere is thought to be much thinner than that of the Earth.

Knowledge of physical characteristics of Mars is essential for the design of capsules to land on the planet. Design of an entry capsule requires knowing the rate it will be slowed by atmospheric drag and whether or not a parachute system is sufficient or if some other means of slowing the capsule is required.

Detection of changes in the radio signal will provide a severe test of the Deep Space Network for the tracking of future spacecraft in the planetary regions.

Loss of radio signal is expected to occur at 10:12 pm EDT when the spacecraft enters the region behind Mars. Because of the 12 minutes required for the signal to reach Earth, this will be observed at the ground stations at 10:24. Resumption of radio signal reception is expected at 11:17, allowing for 53 minutes behind the planet and the 12-minute delay in receiving the signal.

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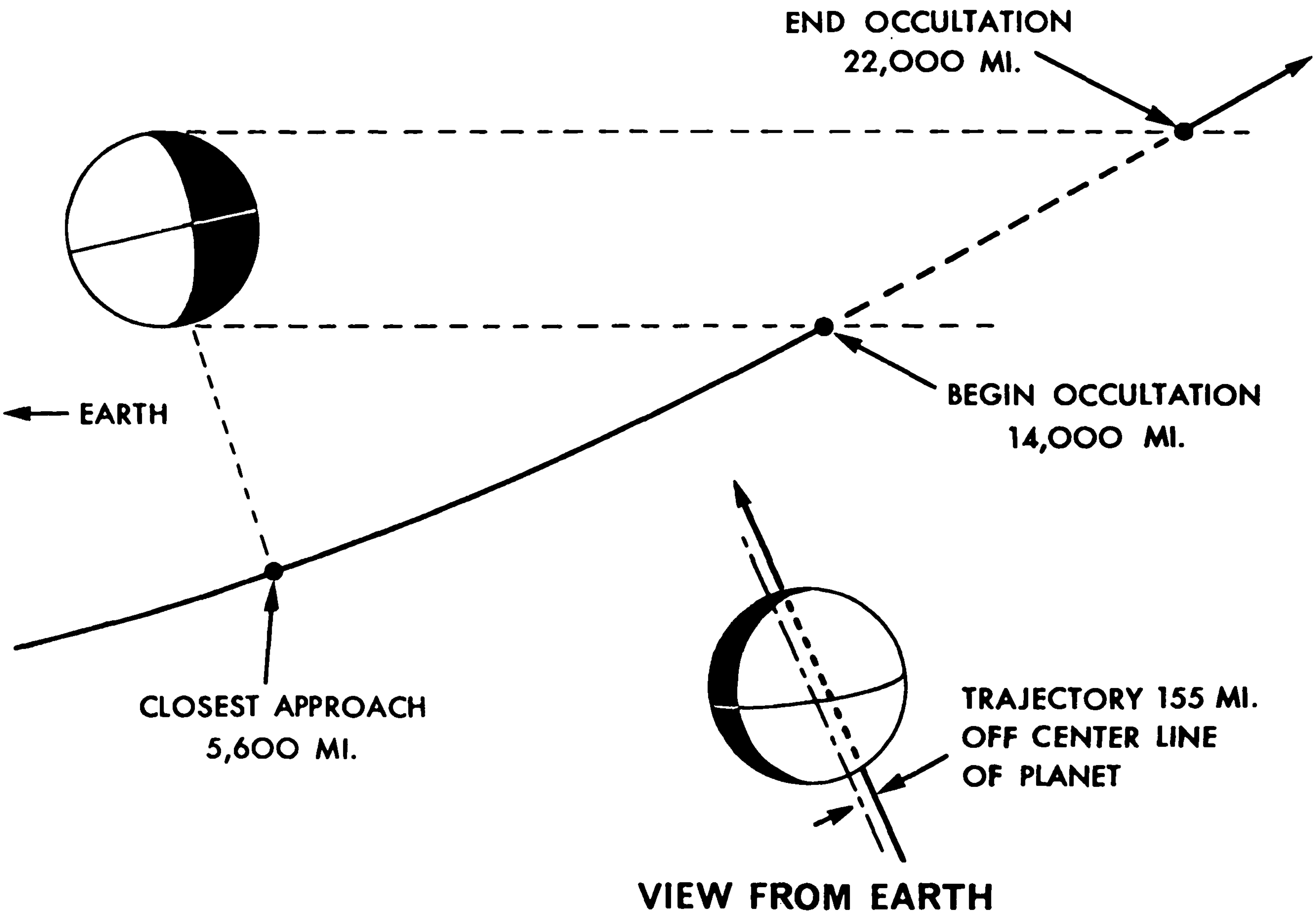
GEOMETRY OF MARINER IV OCCULTATION BY MARS



PLAYBACK OF PICTURES

With its tape recorder loaded with thousands of coded bits of Martian photographic details, Mariner will continue to probe deeper into space. NASA scientists will follow the voyage of the spacecraft for twelve hours before they call upon it to send back the pictures. Playback of the first picture is scheduled to begin at 8:41 a.m. EDT, July 15, and eight and one-half hours later the tape recorder should complete the transmission of the first television picture of Mars. Allowing 12 minutes for transmission over the 134 million miles, the first complete picture is expected at 5:28 p.m. EDT.

Between each picture transmission, the spacecraft will return 90 minutes of details on scientific experiments and engineering data. Thus, it will be 10 days before a full playback of all 21 pictures can be completed.

The Mariner spacecraft will continue to cruise through space sending back scientific and engineering data until it exceeds the communication range. Then, the mission will end but Mariner will continue in perpetual orbit around the Sun.

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MARINER PROJECT TEAM

The National Aeronautics and Space Administration's programs for unmanned investigation of space are directed by Dr. Homer E. Newell, Associate Administrator for Space Science and Applications. Oran W. Nicks is the Director of OSSA's Lunar and Planetary Programs and Glenn A. Reiff is the Mariner Program Manager. Andrew Edwards is NASA's Mariner program engineer and Dr. Edward A. Gaugler is program scientist. Joseph B. Mahon is Agena Program Manager for OSSA's Launch Vehicle and Propulsion Programs.

NASA has assigned Mariner project management to its Jet Propulsion Laboratory, Pasadena, Calif., which is operated by the California Institute of Technology. Dr. William H. Pickering is the Director of JPL and Assistant Director Jack N. James heads JPL's lunar and planetary projects.

Dan Schneiderman is Mariner Project Manager. His two assistant project managers are Wilbur A. Collier and Theodore H. Parker. In a staff capacity, Norman R. Haynes is in charge of mission analysis and planning, and John S. Reuyl, launch constraints.

Richard K. Sloan is the Mariner Project Scientist.

The project is divided into four systems:

Spacecraft

Spaceflight Operations

Deep Space Network

Launch Vehicle

The first three systems are assigned to the Jet Propulsion Laboratory. The fourth is assigned to NASA's Lewis Research Center, Cleveland, for the Atlas-Agena launch vehicle. Dr. Abe Silverstein is the Director of Lewis Research Center. Launch operations for Lewis are directed by Goddard Space Flight Center Launch Operations at Cape Kennedy.

A few of the many key personnel in each of the systems are listed.

John R. Casani - Spacecraft System Manager

Allan Conrad - Spacecraft Project Engineer

Milton T. Goldfine - Spacecraft Operations Manager

James Maclay - Environmental Requirements Engineer

Richard A. Welnick - Quality Assurance Engineer

David E. Shaw - Spacecraft Program Engineer

A. Nash Williams - Spacecraft Launch Vehicle Integration

Herbert G. Trostle - Space Science

James N. Bryden - Spacecraft Telecommunications

James D. Acord - Spacecraft Guidance and Control

James H. Wilson - Spacecraft Engineering Mechanical

Douglas S. Hess - Spacecraft Test Facilities

Bruce Schmitz - Post-injection propulsion and pyrotechnics

Wade G. Earle - Test Conductor, First flight spacecraft

Max E. Goble - Test Conductor, Second flight spacecraft

H. Holmes Weaver - Test Conductor, Test model spacecraft

Thomas S. Bilbo — Spaceflight Operations Systems Manager

David W. Douglas - Spaceflight Operation Director

Don B. Sparks - Facility Operations Manager

Frank G. Curl - Data Processing Project Engineer

Jay F. Helms - Communications

Dr. Nichola A. Renzetti — Deep Space Network System Manager

Arthur T. Burke - Project Engineer

Clarence A. Holritz - DSN Operations Manager

Dr. S. Himmel — Launch Vehicle System Manager

C. Conger - Assistant Launch Vehicle System Manager

R. Gedney - Project Engineer

D. E. Forney - Chief of Agena Field Engineering Branch

Robert H. Gray - Chief of Goddard Launch Operations

Harold Zweigbaum - Manager of Atlas-Agena Launch Operations

MARINER SCIENTIFIC EXPERIMENTS

INSTRUMENT	INVESTIGATORS
Television subsystem -- obtain close-up pictures of planet surface	R. Leighton, B. Murray, R. Sharp, CIT; R. Sloan, J. Allen, JPL
Radio subsystem -- determine atmospheric properties of Mars on an occulation trajector	A. Kliore, D. Cain, G. Levy, JPL; F. Drake, Cornell Univ; V. Eshleman, G. Fjeldbo, Stanford Univ.
Magnetometer -- measure magnitude and other characteristics of planetary and interplanetary magnetic fields	E. Smith, D. Jones, JPL; P. Coleman, UCLA; L. Davis, CIT
Cosmic dust detector -- measure momentum, distribution, density, and direction of cosmic dust	W. Alexander, C. McCracken, L. Secretan, O. Berg, GSFC; J. Boh, Temple Univ.
Ion chamber -- measure charged particle intensity and distribution of interplanetary space and in vicinity of Mars	H. Neher, CIT; H. Anderson, JPL
Trapped radiation detector -- measure intensity and direction of low energy particles	J. Van Allen, L. Frank S. Krimiges State University of Iowa
Cosmic Ray telescope -- measure direction and energy spectrum of protons and alpha particles	J. Simpson, J. O'Gallagher Univ. of Chicago
Plasma probe -- measure very low energy charged particle flux from the Sun	H. Bridge, A. Lazarus, MIT; C. Snyder, JPL

JPL -- Jet Propulsion Laboratory
CIT -- California Institute of Technology
GSFC -- Goddard Space Flight Center
MIT -- Massachusetts of Technology

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MARINER IV LOG

EVENT	DATE & TIME (PST)		REMARKS
	November 28, 1964		
Liftoff	6:22:01	AM	
Atlas/Agena Separation	6:27:20	AM	
Shroud Ejection	6:27:23	AM	
1st Agena Ignition	6:28	AM	
1st Agena Cutoff	6:30	AM	
2nd Agena Ignition	7:02	AM	
2nd Agena Cutoff	7:04:27	AM	Injection velocity: 25,598 MPH Desired velocity: 25,591 MPH Injection altitude: 122.8 MI Earth-Mars distance: 127.7 Million MI
Enter Earth's Shadow	7:05:51	AM	
Mariner/Agena Separation	7:07:10	AM	
Solar Panels Deployed	7:15:05	AM	Start Sun acquisition
Exit Earth's Shadow	7:17:35	AM	
Sun Acquisition Complete	7:31	AM	
Start Canopus Search	10:59	PM	Automatic command from CC&S
Alderamin Acquired	11:07	PM	Momentary stop at Markab (51°)
	November 29, 1964		
Lost Lock on Alderamin	5:13	AM	Automatic search
Lock on Regulus	5:29	AM	107° Roll
	November 30, 1964		
DC-21	1:14	AM	Command roll search (from Goldstone)
Lock on Naos	1:21	AM	60° Roll
DC-21	2:45	AM	Search command (from Goldstone)
Lock on 3-star cluster	2:46	AM	7° Roll

Mariner IV Log (Cont'd)

EVENT	DATE & TIME (PST)		REMARKS
	November 30, (Cont'd)		
DC-21	2:58	AM	Search command (from Goldstone)
Canopus Acquisition	3:00	AM	15° Roll (293° total roll from start)
Midcourse Commands	December 4, 1964		
QC1-1	5:05	AM	Stored pitch command (-43.94°)
QC1-2	5:10	AM	Stored roll command (+156.24°)
QC1-3	5:15	AM	Stored motorburn command (20.18 sec)
DC-29	5:45	AM	Arm propulsion pyros
DC-14	6:05	AM	Remove maneuver inhibit
DC-27	6:35	AM	Initiate maneuver sequence
Roll Condition Observed	6:36	AM	
DC-13	6:47:13	AM	Inhibit maneuver sequence
Lock on Unknown Object	6:51:53	AM	Approximate 90° Roll
DC-21	7:22	AM	Search command
Lock on Unknown Object	7:26	AM	
DC-21	7:32	AM	Search command
Lock on Unknown Object	7:36:12	AM	
DC-21	8:02	AM	Search command
Lock on Unknown Object	8:06:39	AM	
Midcourse Maneuver Attempt Scrubbed	8:25	AM	
DC-21	2:40	PM	Search command
Lock on Unknown Object	2:44	PM	
DC-21	3:04	PM	Search command sent in order to pass star cluster
DC-21	3:05:01	PM	Search command sent in order to pass star cluster
DC-21	3:05:59	PM	Search command sent in order to pass star cluster
Lock on Star Regulus	3:25:08	PM	
DC-21	3:40	PM	Search command

Mariner IV Log (Cont'd)

EVENT	DATE & TIME (PST)	REMARKS
	December 4, (Cont'd)	
Lock on Star Naos	3:48:52 PM	
DC-21	3:57 PM	Search command sent in order to pass G-VEL
DC-21	3:58 PM	Search command sent in order to pass G-VEL
Canopus Acquisition	3:59:22 PM	
2nd Midcourse Attempt	December 5, 1964	
QC1-1	5:05 AM	Stored pitch command (-39.2°)
QC1-2	5:10 AM	Stored roll command (+156.08°)
QC1-3	5:15 AM	Stored motor burn command (20.06 sec)
DC-29	5:45 AM	Arm propulsion pyros
DC-14	6:05 AM	Remove maneuver inhibit
DC-27	6:25 AM	Initiate maneuver
Start Pitch	7:25:08 AM	
Stop Pitch	7:28:54 AM	
Start Roll	7:47:10 AM	
Stop Roll	8:01:19 AM	
Motor Ignition	8:09:09 AM	
Motor cutoff	8:09:29.06 AM	Burn time nominal
Start Sun Acquisition	8:15:11 AM	Automatic from CC&S
Complete Sun Acquisition	8:21:07 AM	
Start Canopus Search	8:21:07 AM	Automatic from CC&S
Lock on Star G-VEL	8:44:39 AM	Rolled passed Regulus & Naos
DC-21	8:52:00 AM	Search command
Acquired Canopus	8:54:57 AM	
	December 7, 1964	
Lost Canopus Lock	4:30 AM	
Plasma Probe Failure	4:30 AM	Time approximate - not connected with loss of Canopus lock
Acquired G-VEL	5:15 AM	

EVENT	DATE & TIME (PST)	REMARKS
	December 13, 1964	
DC-7	6:09 AM	Switch from cavity amplifier to traveling wave amplifier - changed transmitter output from 6 1/2 watts to 10 1/2 watts
	December 17, 1964	
DC-21	8:00 AM	Canopus search command
Canopus Acquisition	8:03:02 AM	
DC-15	9:30:00 AM	Inhibits Canopus sensor gates preventing gyro turn-on when dust particle passes in sensor view
	January 3, 1965	
Bit Rate Change (33 1/3 Bits/Sec to 8 1/3 Bits/Sec)	8:59:56 AM	Automatic from CC&S
	February 11, 1965	
Direct Commands		
DC-3	7:29:29 PM	Switches data encoder to all science telemetry (Mode III)
DC-2	7:36:13 PM	Switches data encoder back to cruise engineering and science telemetry
DC-26	7:53:15 PM	Turns off all science and battery charger, power boost mode on.
DC-2	8:15:51 PM	Turn on cruise science
DC-28	8:32:39 PM	Turn battery charger on -- Normal cruise condition again
DC-25	10:54:43 PM	Turn on encounter science, warm up tape recorder (no pictures recorded) start scan motor, remove scan cover
	February 12, 1965	
DC-24	12:59:23 AM	Stop scan platform
DC-28	1:30:56 AM	Turn off tape recorder

EVENT	DATE & TIME (PST)		REMARKS
	February 12, 1965 (cont'd)		
DC-3	1:30:56	AM	Switch encoder to all science telemetry (Mode III)
DC-2	2:21:20	AM	Switch encoder to cruise engineering and science telemetry (Mode II)
DC-26	2:27:08	AM	Turn off all science and battery charger, power boost mode on
DC-2	2:49:35	AM	Turn on cruise science

The spacecraft mode of operation is now: Cruise science and engineering telemetry on; power boost mode on; scan cover removed; scan platform in nominal position for encounter; Canopus sensor gates off. Total of 42 ground commands to spacecraft so far.

EVENT	DATE & TIME (PST)		REMARKS
	February 27, 1965		
MT-1	9:02	AM	Command from CC&S to change Canopus sensor cone angle
	March 3, 1965		
70% data recovery from plasma probe	announced		Resistor failure compensated for in calibrations
Failure of Geiger Mueller tube associated with ion chamber	announced		Data received but not understood
	March 5, 1965		
MT-5	5:02:40	AM	CC&S command to switch transmitter from Omni to high-gain antenna
Signal level rise from -164 DBM to -148.5 DBM	5:04:20	AM	Signal strength increased 40 times
	March 17, 1965		
Failure of Ion Chamber			Reason for failure unknown - occurred during Jo'burg view period. Jo'burg not tracking because of planned RA-9 launch 3/21.

EVENT	DATE & TIME (PST)	REMARKS
	April 2, 1965	
MT-2	6:24 AM	Command from CC&S to change Canopus sensor cone angle.
	May 7, 1965	
MT-3	7:27 AM (PDT)	Command from CC&S to change Canopus sensor cone angle.
	June 14, 1965	
MT-4	8:40 AM (PDT)	Command from CC&S to change Canopus sensor cone angle.