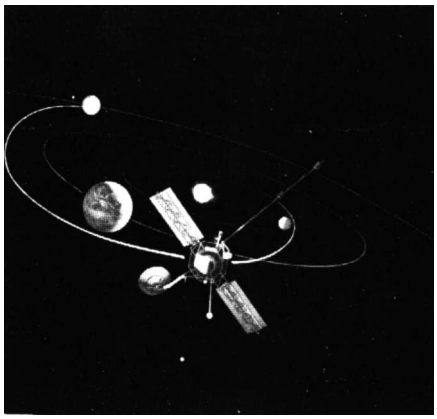
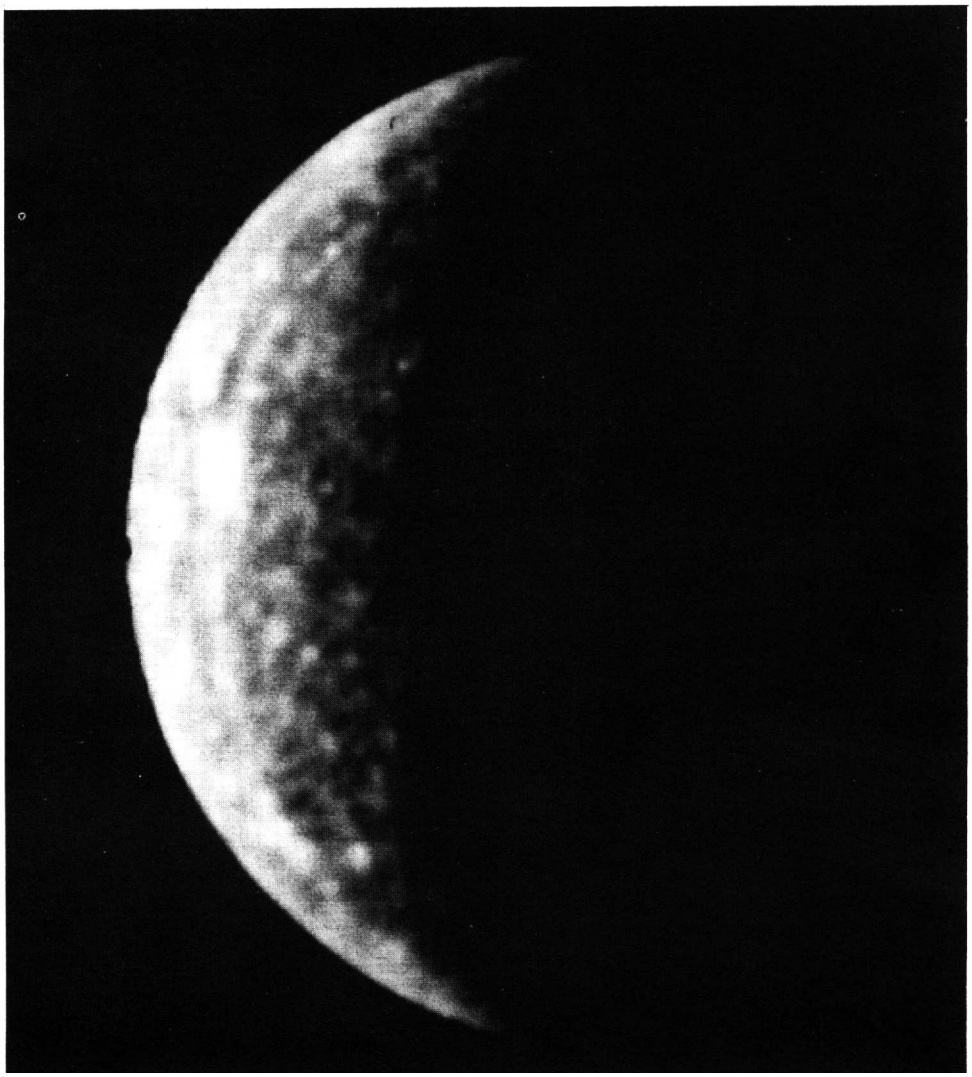


MARINER VENUS / MERCURY 1973
STATUS BULLETIN

MERCURY ENCOUNTER SEQUENCES



This computer-enhanced and enlarged picture of Mercury was taken by Mariner 10 on March 25 at a distance of 3.5 million kilometers (2,190,000 miles). At this resolution, the surface shows a mottled texture suggestive of a heavily cratered surface similar to the lunar highlands. The large bright area near the left edge of the planet is about 480 kilometers (300 miles) in diameter. It is undetermined as yet whether the feature is a protrusion or a depression. Higher resolution pictures will be taken during the next few days enroute to Mariner 10's close encounter with Mercury on March 29. The notch in the limb of planet is not a physical feature, but is one dark dot in a pattern of dots on face of camera's vidicon tube. The dots are used for geometric calibration. North is at top and the illuminated side of Mercury is to the left.

MARINER VENUS/MERCURY 1973 PROJECT OFFICE
Jet Propulsion Labratory California Institute of Technology
National Areonautics and Space Administration
Pasadena, California

26 MARCH 1974
BULLETIN NO. 24

MARINER 10 TV EXPERIMENT SEQUENCES

DAY	DATE	TIME (PDT) EARTH RECEIVE	# OF PICS	RATE PER PIC	TYPE OF TRANSMISSION	APPROX. RANGE TO MERCURY	AVERAGE PICTURE RESOLUTION	STATION TRACKING	REMARKS
Sa	3/23	4:08 - 6:38am	216	42 sec	Real Time Low Res.	5,690,000 km 3,536,000 mi		Madrid	Preliminary albedo and phase function experiment.
		12:18 -12:45pm	36	42 sec	Real Time Low Res.	5,400,000 km 3,348,000 mi		Goldstone	Start incoming far-encounter sequence. Record 36 pictures and simultaneously transmit real time sample. Playback full tape.
		12:45 - 3:08pm	36	3m,44s	Tape Playback High Res.		120 km 75 miles	Goldstone	
Su	3/24	12:18 -12:45pm	36	42 sec	Real Time Low Res.	4,525,000 km 2,805,000 mi		Goldstone	
		12:45 - 3:08pm	36	3m,44s	Tape Playback High Res.		100 km 62 miles	Goldstone	
M	3/25	12:18 -12:45pm	36	42 sec	Real Time Low Res.	3,635,000 km 2,254,000 mi		Goldstone	
		12:45 - 3:08pm	36	3m,44s	Tape Playback High Res.		80 km 49 miles	Goldstone	
Tu	3/26	12:18 -12:45pm	36	42 sec	Real Time Low Res.	2,750,000 km 1,705,000 mi		Goldstone	
		12:45 - 3:08pm	36	3m,44s	Tape Playback High Res.		60 km 37 miles	Goldstone	
W	3/27	12:18 -12:45pm	36	42 sec	Real Time Low Res.	1,840,000 km 1,141,000 mi		Goldstone	
		12:45 - 3:08pm	36	3m,44s	Tape Playback High Res.		40 km 24 miles	Goldstone	
Th	3/28	12:18 -12:45pm	36	42 sec	Real Time Low Res.	952,600 km 590,240 mi		Goldstone	
		12:45 - 3:08pm	36	3m,44s	Tape Playback High Res.		20 km 12 miles	Goldstone	
		4:13 - 5:08pm	36		Real Time Low Res.	801,800 km 496,620 mi		Goldstone Canberra	Dark current buildup for Mercury Diameter Experiment.
		5:08 - 7:28pm	36		Tape Playback High Res.			Goldstone Canberra	
		9:43 - 9:57pm	18	42 sec	Real Time Low Res.	595,000 km 368,900 mi		Canberra	Start incoming near-encounter sequence. Record half-tape (18 frames) and transmit real time low resolution sample. Play back half tape.
		9:57 -11:08pm	18	3m,44s	Tape Playback High Res.		12 km 7.4 miles	Canberra Madrid	
		11:08 -11:21pm	18	42 sec	Real Time	555,000 km		Canberra	

			•	Low Res.	344,100 mi		Madrid	
	11:21pm-12:31am (3/29)	18	3m,44s	Tape Playback High Res.		11 km 6.8 miles	Madrid	
F 3/29	12:31 -12:44am	18	42 sec	Real Time Low Res.	500,000 km 310,000 mi		Madrid	
	12:44 - 1:55am	18	3m,44s	Tape Playback High Res.		9.9 km 6.14 mi	Madrid	
	1:55 - 2:08am	18	42 sec	Real Time Low Res.	443,400 km 274,900 mi		Madrid	
	2:08 - 3:19am	18	3m,44s	Tape Playback High Res.		8.8 km 5.46 mi	Madrid	
	3:19 - 3:32am	18	42 sec	Real Time Low Res.	386,800 km 239,800 mi		Madrid	
	3:32 - 4:43am	18	3m,44s	Tape Playback High Res.		7.8 km 4.84 mi	Madrid	
	4:43 - 4:56am	18	42 sec	Real Time Low Res.	335,000 km 207,700 mi		Madrid	
	4:56 - 6:07am	18	3m,44s	Tape Playback High Res.		6.7 km 4.15 mi	Madrid	
	6:07 - 6:20am	18	42 sec	Real Time Low Res.	290,000 km 179,800 mi		Madrid Goldstone	
	6:20 - 7:31am	18	3m,44s	Tape Playback High Res.		5.7 km 3.53 mi	Madrid Goldstone	
	7:31 - 7:44am	18	42 sec	Real Time Low Res.	230,000 km 142,600 mi		Goldstone	
	7:44 - 8:55am	18	3m,44s	Tape Playback High Res.		4.7 km 2.91 mi	Goldstone	
	8:55 - 9:08am	18	42 sec	Real Time Low Res.	179,100 km 111,050 mi		Goldstone	Record final incoming near-encounter sequence.
	9:08 -10:20am	18	3m,44s	Tape Playback High Res.		3.7 km 2.3 mi	Goldstone	
	10:20am- 1:37pm	282	42 sec	Real Time High Res.**	125,000-7,000 km 77,500-4,340 mi	2.3-0.3 km 7500-900 ft	Goldstone Canberra	Real Time incoming encounter TV. Only 18 pictures recorded simultaneously on spacecraft (1:18 to 1:31 pm) on 2nd half of tape.
	• 1:46 PM	MERCURY ENCOUNTER		RANGE TO MERCURY: 650 to 700 km. (400 to 435 mi). RANGE TO EARTH: 148,620,000 km. (92,144,400 mi.)				
	2:05 - 6:09pm	351	42 sec	Real Time High Res.**	6,000-157,000 km 3,720-97,340 mi	0.1-3.5 km 300-12500ft	Goldstone Canberra	Real Time outgoing encounter TV. First 17 frames are recorded on 1st half of tape. **Note: Pictures will be partial frame high res. if necessary to use lower data rate.
	6:09 - 7:19pm	18	3m,44s	Tape Playback High Res.	9,500 km 5,890 mi		Canberra	Play back 2nd half of encounter tape (recorded from 1:18 to 1:31 pm)
	7:19 - 7:33pm	18	42 sec	Real Time Low Res.		4.5 km 2.79 mi	Canberra	Start outgoing near-encounter TV. Record 18 pics on 2nd half tape; transmit real time.

INCOMING FAR-ENCOUNTER SEQUENCE

The first of the three Mercury Encounter (E) sequences covers a period of E minus 6.5 days to E-17 hours (23 March to 28 March). In this period, 6 full magnetic tapes of TV pictures (36 frames each) will be recorded aboard the spacecraft and played back to the Goldstone DSS-14 (64 meter) station. In Status Bulletin 17, the TV cameras and their filters were described. Specific sequences of the filters will be used throughout the encounter sequences; e.g., orange (yellow), ultraviolet, clear, minus ultraviolet, ultraviolet polarized, blue, etc.

A Mercury diameter experiment will be performed by the television experiment during the far-encounter period to refine this value. The profile or contour of Mercury and its departures from a true spherical shape can also be determined in this experiment.

In addition to the taped photographs obtained in this far-encounter period, there will be additional frames transmitted in real-time without first being recorded. The photographs that are taped aboard the spacecraft are also transmitted to Earth in near real-time. Real-time photographs transmitted to Earth will be in a reduced resolution format, leaving out some picture elements. Taped photographs will be transmitted at full resolution.

The limitation in transmitting only reduced resolution photographs in real-time is a 22050 bit-per-second transmission rate versus a camera capability of taking a photograph, containing more than 5 million bits, every 42 seconds. The interval between photographs is not sufficient time to transmit an entire picture. When transmitting a taped picture, however, the entire full resolution frame can be sent.

The real-time transmissions in this period will be used for the Preliminary Albedo and Phase Function Experiment to analyze the reflective properties of Mercury at different lighting angles.

The full resolution frames will be used to construct photographic mosaics of the Mercury surface. The cameras will view about one-half of the sunlit face of Mercury (one-fourth of the entire planetary surface) during approach to the planet and another half in the outgoing sequence.

INCOMING NEAR-ENCOUNTER SEQUENCE

The second sequence begins at E-17 hours to E-3.5 hours. Eight half-tape loads (18 frames) will be recorded and transmitted in this sequence. An ultraviolet airglow spectrometer experiment will be done at the end of each half tape consisting of eight 10-degree slews back and forth across the planet.

A mosaic is programmed for E-13.3 hours and another at E-4.9 hours. The latter will be important as a basis for locating later pictures covering smaller areas at a higher resolution. The resolution of this mosaic will be about 2.5 miles (4 km).

MERCURY ENCOUNTER SEQUENCE

The next sequence is from E-3.5 hours to E+4.45 hours. During that time, 612 full resolution partial frames will be transmitted in real-time and 35 full frames will be taped (18 incoming and 17 outgoing) to be transmitted later.

During this period, the Ultraviolet Airglow Experiment will perform three experiments; at E-2, a helium search; at E-1 hour, oxygen search, and at E, an argon search.

This is also the period in which Earth and Sun occultations occur and the Radio Science Experiment and the Ultraviolet Occultation Spectrometer will make atmospheric measurements, if an atmosphere exists at Mercury. The Plasma Science Magnetometer, and Charged-Particle Telescope experiments will observe the interaction of Mercury with the solar wind which emanates continuously from the sun.

OUTGOING NEAR-ENCOUNTER SEQUENCE

This sequence is nearly the reverse of the Incoming Sequence. There will be 144 taped full frames and 144 real-time quarter frames. The Ultraviolet Experiment will repeat the searches for oxygen and helium. Photography will again provide mosaics, of the visible, sunlit disc.

OUTGOING FAR-ENCOUNTER SEQUENCE

This sequence will continue until E+13 days. The UVS will scan Mercury daily until E+7 days when the instrument will be turned off. Photography in this sequence will total more than 500 taped and real-time frames and will include a second satellite search and a second Mercury diameter experiment.