

MARINER VENUS / MERCURY 1973 STATUS BULLETIN

Mariner 10 Status -

The Mariner 10 mission status as of 16:00 PST, 13 December 1973 is normal with the exception of the camera optics heaters and the presently non-functioning Planetary Scanning Electrostatic Analyzer (PSEA).

On Friday, 7 December, the Mariner 10 performed a successful roll calibration maneuver and high-gain antenna calibration. During the turn-on of the gyros for the maneuver, the Flight Data System (FDS) again automatically reset to 0 as it did previously during the maneuver two weeks ago. It is not known at this time if the power on reset is a problem in the spacecraft power or grounding system, or a sensing error in the FDS.

In a press conference held at JPL on Monday, 10 December 1973, Dr. James Dunne, Project Scientist, said rising temperatures may activate the PSEA.

Dr. Bruce Murray reported that about 1,000 TV pictures from Mariner so far showed that the cameras are working very well in spite of sub-normal operating temperatures.

Mariner's several mosaics of the Earth show that layering and structures in the Venus clouds should be very clear in Mariner's pictures of the planet next February. Photo mosaics of the Moon taken by Mariner show that the very first pictures of Mercury, 6 days out, will have more detail in them than any taken from Earth—a very exciting prospect to TV scientists who are anxious to know what crater densities are on Mercury. Those densities will have a profound effect on theories of the evolution of the solar system.

Mariner's pictures of the Moon's north pole are better than any taken so far and will be used to construct improved maps of the Moon.

Dr. Lyle Broadfoot, Principal Investigator of the Ultraviolet Experiment, reported that the airglow instrument has made important measurements of the Gum Nebulae, an ancient extra-galactic relic, which may show the interstellar hydrogen densities are less than they are now believed to be.

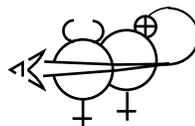
The only spacecraft activity scheduled for 13 December 1973 will be the calibration of the Charged-Particle Telescope's complex internal logic circuitry—one of many calibrations of the instrument during Mariner's interplanetary cruise.

The navigation team has refined the parameters of Mariner's next course change scheduled for January 18. Team members are also hard at work on the details of the February 5th Venus flyby—instrument pointing angles, occultation times, etc.

Mariner is now 8.7 million miles from Earth and $33\frac{3}{4}$ million miles from Venus.

1. SIGNIFICANT MISSION EVENTS / TIMES

Roll Calibration Maneuver (RCM 3)	10:30 PST (D341) Friday	7 December 1973
UVSAG Celestial Point Source Interrogation	10:00 PST (D344) Monday	10 December 1973



2. NAVIGATION

Orbit solutions based upon a tracking data arc from TCM 1 to TCM 1 + 27 days remains stable. Using these solutions the preliminary estimates for TCM 2 are as follows:

Roll turn	48.6 degrees
Pitch Turn	28.7 degrees
DV	1.2 m/sec

A maneuver of this magnitude is only slightly larger than the a-priori mean value predicted for TCM 2. TCM 2 is presently scheduled for 18 January 1974.

The reconnaissance group continues to design Earth-Venus cruise, Venus encounter, and Mercury encounter sequences. POGASIS simulation of the U 10.X update will be completed during the week of 10 December 1973. A first version of the 117.6/22.05 hybrid sequence for Mercury encounter has been completed and is being reviewed.

3. SPACECRAFT

The spacecraft subsystems as of 13 December 1973 (Day 347) are normal with the exception of the two previously mentioned spacecraft problems (TV optics heaters and PSE) and the Power On Reset (POR) reoccurrence after gyro turn-on.

The spacecraft power is 455 watts due to an increase in PS&L voltage (to 47.5 volts) due to temperature increase of the zeners. When the gyros are on the spacecraft power is 477 watts. The attitude control gas weight is 6.645 lb. Indicated gas usage over the past 48 hours is 8 millipounds—which suggests a continuing low daily usage rate. Both tank pressure measurements toggled one DN in the last reporting period which indicates the current usage is 9 millipounds per day. The total ground commands to the Mariner 10 are 2843. The total on-board commands are 945. The total spacecraft time = 81,678 TV (42 sec) frames. Total gyro on-time = 42.6 hr from 8 turn-ons. Total passes on the tape recorder are 396.

4. SCIENCE

The 7 December 1973 RCM-3 was successfully conducted despite the reoccurrence of the FDS Power On Reset (POR) following gyro turn on. Adequate time was allowed between gyro turn on and the start of the roll maneuver to allow resetting of all affected subsystems to their correct states. Of the science instruments, only the IRR and TV required such reset commands, indicating proper response to a POR event.

UVSA ultraviolet object scan was conducted on 10 December 1973. Definite indications of extreme ultraviolet emissions were observed and quick-look data tapes were generated for detailed analysis by KPNO.

Because of the POR recurrence, the TV calibration PRM scheduled for 12 December 1973 was cancelled. Engineering diagnostic commands were however sent to the TV subsystem to evaluate camera electronic performance, which continues to be good.

A CPT calibration was conducted on 6 December 1973 as scheduled with good results. An engineering test was conducted to determine the effect of PSE scanning on A/C gas consumption over the period of 7-10 December 1973. The effect of the one degree/sec scan appears to be small but measurable. Detailed analysis is not complete.

5. DSN

Continuous cruise support was provided during the period 6-12 December 1973.

Initial recovery of RCM 3 playback data on 8 December over DSS 14 was unsatisfactory. After the station switched telemetry processing strings the data were processed satisfactorily.

The DSN has transmitted a total of 2854 commands as of 12 December 1973. No commands were aborted and 402 commands were transmitted during this reporting period.

Regarding implementation, debugging of S/X-band equipment continues at DSS 14 to determine and eliminate the cause of X-band cycle slips. Recent test results are promising; the problem has been isolated to the Block IV receiver. The 1 January '74 operable date is expected to be met. Installation of the planetary ranging assemblies at DSS 93/63 will resume following end of the Pioneer freeze on 14 December 1973 to meet the 1 January 1974 committed date.

6. MCCC

MCCC status continues to be normal with routine operational problems. MTC has experienced a reoccurrence of memory parity checks in the prime computer. Operations were conducted from the backup machine during diagnostic and repair activities. The prime machine is again supporting the mission.

New high speed character printers have been brought into the mission support area to be tested in parallel with the old, less reliable printers. The new devices have been most satisfactory thus far, so the real time output will be shifted entirely over to them next week.

Development and test of the MTC systematic video and data records software continues to be a high priority item. Master data records have been generated and are now in validation; however, the total capability is not completed yet. Buy-off tests of the video processing are underway this week.

New project software deliveries for the 1108 and 360 computers are on schedule for delivery on 17 December.

Planning for extended mission operations is another major MCCC activity now underway.