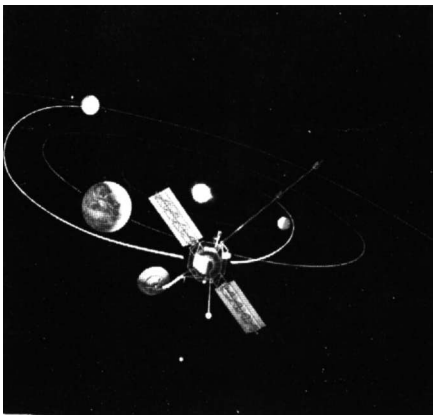

MARINER VENUS / MERCURY 1973

STATUS BULLETIN

Scientists Study Wealth of Venus Encounter Data - While Mariner 10 Streaks Toward Mercury.

An 85 per cent illuminated Venus was photographed by Mariner 10 on 9 February, four days after the spacecraft swung past the planet enroute to Mercury. The morning terminator is at the right Taken from a distance of 1,725,000 miles, the picture shows a large, dark belt near the equator, suggestive of the classical "Y" feature often photographed from Earth through ultraviolet light, which appear to originate in the equatorial regions and spiral toward the pole. Periodic observation of Venus by Mariner 10 cameras as the planet recedes may answer questions concerning the nature of rapidly rotating ultraviolet clouds seen at much poorer resolution through Earth telescopes. The pattern of black dots is used for geometric calibration of the TV cameras. This photo has been computer enhanced by the Imaging Processing Laboratory at JPL.

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

19 February 1974

BULLETIN NO. 20

Mariner 10 is speeding along today in solar orbit between Venus and Mercury at a speed of 80,330 mph. Earth is over 37.5 million miles away and Mercury is less than 41 million miles to encounter.

On 8 February the Mariner 10 television cameras continued taking pictures of Venus so scientists can study the excellent weather patterns and the movement of ultraviolet cloud markings that were obtained. Picture resolution is far superior than those obtained from Earth.

On 9 February the picture taking sequence was slowed to one every eight hours and the 86-picture sequences were cut to one every 12 hours—with the cameras turned off between sequences.

This plan was designed to preserve the cameras operating lifetime but still obtain enough Venus pictures to observe cloud movements.

On 12 February one of Mariner's last two photo sequences included pictures of the planet taken through orange and blue and ultraviolet filters which will later be reconstructed into color composites.

On 13 February the final Venus picture session was concluded. A total of 4,165 pictures were taken, of these 2,700 will be computer enhanced.

Minutes before gyro turn-on for critical tests necessary prior to the TCM-3 on 14 February, the Deep Space Station 12 command transmitter at Goldstone lost contact with the spacecraft for a few moments, causing a delay in the operational sequences. Because a smooth restart wasn't possible for these tests, they were rescheduled to 14 February, using Station 14 at Goldstone.

To provide sufficient time to evaluate the tests of Mariner's gyro and to reload commands in the spacecraft's computer memory, the trajectory correction maneuver was delayed.

On 14 February the Mariner 10 gyro's were tested. The gyros did not oscillate during the first two tests, however, oscillations were seen during the initial (capacitor reforming) period of the third test and also during the commanded turn (by CC&S—7 M4) test. A special fifth test was performed (2 deg turn by DC-18's), in which the gyros also oscillated. About 0.4 Ibm of N2 attitude control stabilization gas was used.

The planned trajectory correction maneuver (TCM-3) has therefore been cancelled. Instead, a sun-line maneuver is now planned for mid-March when Mariner's celestial attitude is such that its rocket motor is pointed in the proper direction to be fired without a pitch or roll maneuver. This sun-line course change will bring Mariner to the correct point on Mercury' dark side on 29 March, but approximately 37 minutes later than desired. Project Scientist Dr. James Dunne has stated nearly all science data can be obtained at Mercury as originally planned.

Shortly after midnight, in the early morning of 18 February, the Mariner 10 start tracker was attracted to a stray bright particle (≈ 2.5 times Canopus intensity) causing the spacecraft to lose celestial orientation with the star Canopus. Motion of this particle was such that the Roll Search Inhibit (30 second) flip-flop was set, resulting in an inability to perform a normal roll search and Canopus acquistion. During the course of the next three hours, Canopus "drifted" through the star trackers field-of-view twice, as the "slow drift motion" was reversed twice, and each time a short "Gyro OFF → ON" cycle was produced. These gyrations produced some data losses, since Mariner 10 was over a 26-m DSN station. Data was also lost due to interferometry effects between the high-gain antenna and the low-gain antenna. When data was restored, a DC-21 was sent to initiate a normal roll search, which resulted in a Canopus acquisition approximately 1.3 minutes later (as predicted by star map observations). The gyro's were on for 1 hr 48 min for the three turn-on's. No oscillation's were observed until after the final Canopus acquisition (while the 3 minute timer was running down). Gyro power turned off in a normal manner after the Canopus roll error was nulled out. Approximatley 70 millipounds of attitude control gas was lost while the roll gyro was on.

On 19 February the Navigation Team is preparing data for the sun-line course change which will put Mariner 10 in its small target zone near the dark side of Mercury on 29 March. All is well aboard the spacecraft.