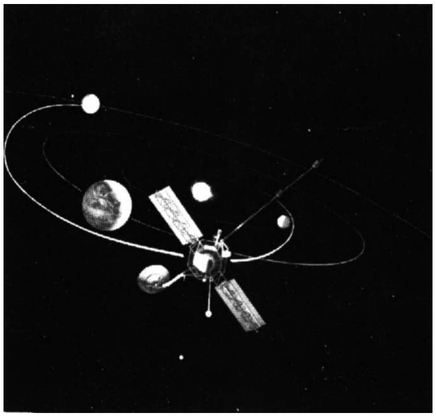
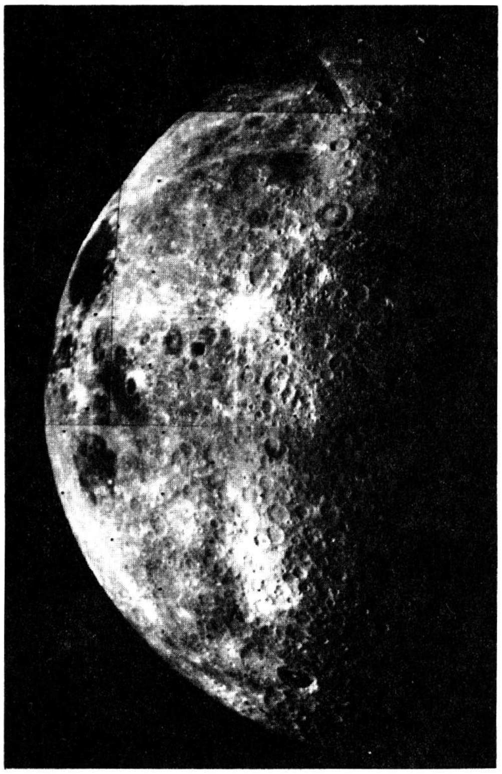
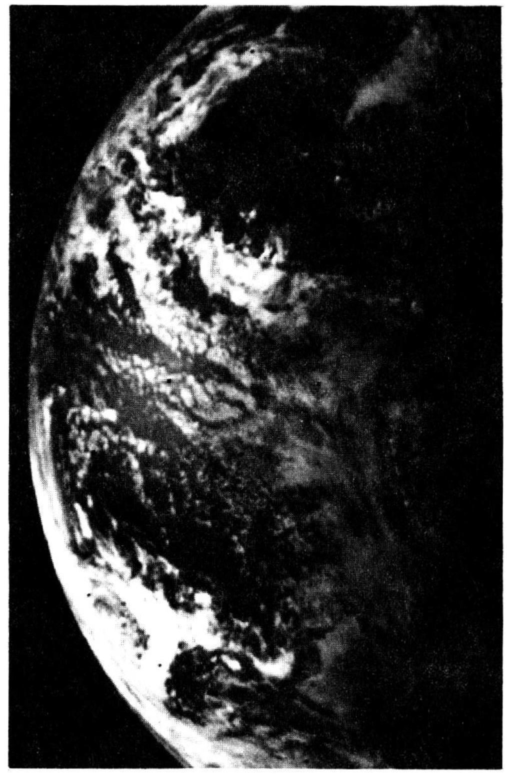


MARINER VENUS / MERCURY 1973
STATUS BULLETIN

Mariner 10 views Earth and Moon from a Million Miles





Right

The planet Earth from one million miles is portrayed by one of Mariner 10's two television cameras as the spacecraft heads for Venus and Mercury. This is the first time our planet has been photographed from farther than the Moon distance (about 250,000 miles). Taken at 2:05 p.m. Pacific Standard Time, November 6, the picture shows Earth more than filling the TV camera frame. Both cameras are equipped with 1500 mm telescopes. Most of North America is out of frame at top. The west coast of South America — Columbia, Ecuador, Peru and Chile—can be seen in late afternoon sunlight from center right to lower right. Some 90% of the area seen is the eastern Pacific.

Left

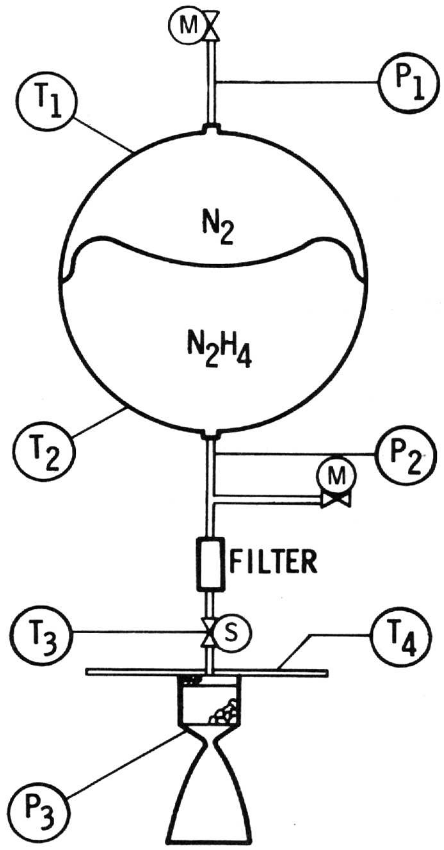
The heavily-cratered back side of the Moon was photographed by the Venus and Mercury-bound Mariner 10 spacecraft on November 4. The lunar mosaic was constructed of narrow-angle frames taken at 42-second intervals. The three dark areas at left are lunar seas (from top) Mare Crisium, Mare Marginus and Mare Smythii. Mare Crisium can be seen from Earth at the right edge of the full Moon. Marginus and Smythii wrap around that edge. The large, dark crater near the bottom of the picture is Tsiolkovsky, named for the Rutsian rocket pioneer. Next February and March, Mariner 10 will take thousands of pictures of Venus and Mercury.

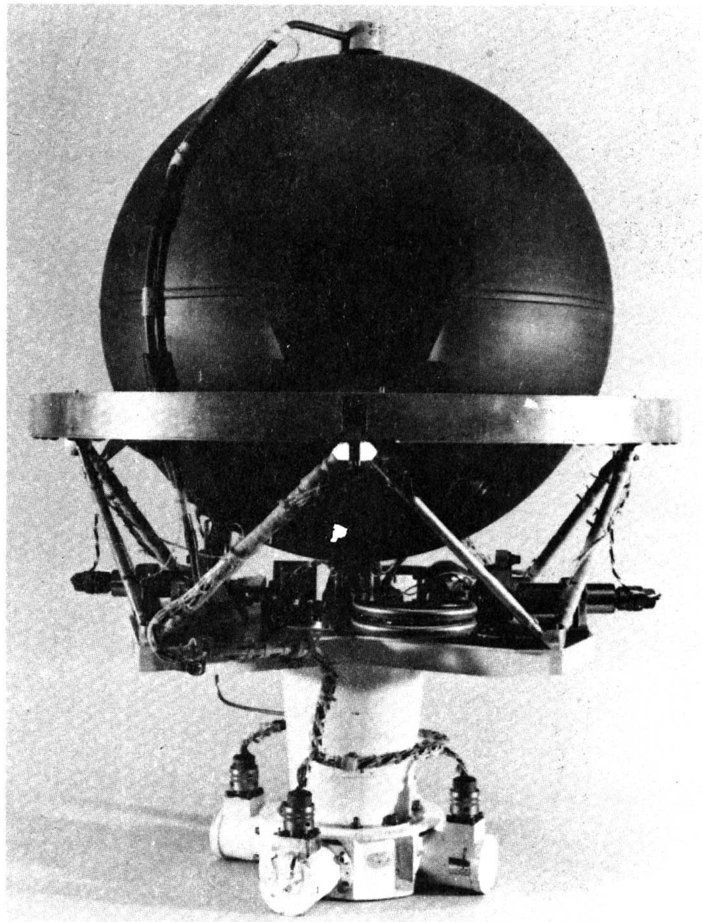
MARINER VENUS/MERCURY 1973 PROJECT OFFICE
Jet Propulsion Labratory California Institute of Technology
National Areonautics and Space Administration
Pasadena, California

13 November 1973

BULLETIN NO. 6

MVM '73 PROPULSION SUBSYSTEM





The Mariner 10 spacecraft uses a self-contained monopropellant hydrazine propulsion subsystem to provide the velocity changes necessary to remove launch vehicle errors and for the in-transit trajectory correction maneuvers (TCM) required to achieve the desired flybys of the planets Venus and Mercury.

Mariner 10 is the first to use a blowdown propulsion subsystem. This system design is simple and reliable, but it means that the rocket engine thrust and propellant tank pressure vary with the amount of propellant used for each TCM. The spacecraft velocity change is determined by programming an on-board timer which controls duration of propellant flow to the rocket engine. Each TCM burn time is determined by a computer program which takes into account the propellant pressure at the start of each TCM and the amount of propellant remaining in the tank following each maneuver.

The blowdown pressurization starts at a pressure of about 370 psia and decays to approximately 95 psia at propellant depletion. Resultant thrust levels are approximately 46 Ib and 18 Ib, respectively, over the 550 sec total burn capability. Thrust vector control during engine firing is accomplished by jet vanes located in the engine exhaust.

The propulsion subsystem contains about 60 Ib of useable propellant to provide about 122 m/sec to a 1,100-pound spacecraft. The subsystem consists of a 16-1/2-inch-diameter tank, which contains both the nitrogen pressurant and propellant, connected to an in-line filter and solenoid-operated propellant flow control valve. The use of a solenoid valve permits a multi-start capability since the hydrazine is spontaneously decomposed in the rocket engine by Shell 405 catalyst. Propellant orientation and expulsion in zero-g is accomplished by a flexible rubber diaphragm located within the tank.