

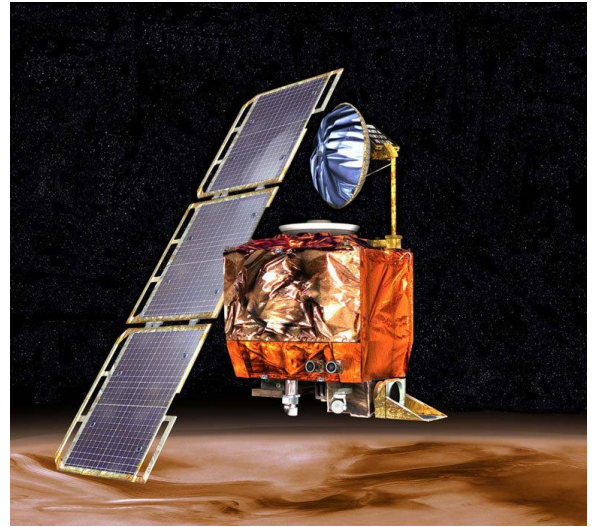
Mars Climate Orbiter

An artist's concept of NASA Mars Climate Orbiter.
Credit: NASA/JPL-Caltech

OUTCOME: UNSUCCESSFUL

Mission Elapsed Time

Dec. 11, 1998 — Sep. 23, 1999



00^{YRS} 09^{MOS} 11^{DAYS} 05^{HRS} 14^{MINS} 09^{SECS}

What was Mars Climate Orbiter?

NASA's Mars Climate Orbiter was designed to study Mars from orbit and to serve as a communications relay for the Mars Polar Lander and Deep Space probes. The mission was unsuccessful due to a navigation error caused by a failure to translate English units to metric.

Nation	United States of America (USA)
Objective(s)	Mars Orbit
Spacecraft	MCO
Spacecraft Mass	1,407 pounds (638 Kilograms)
Mission Design and Management	NASA / Jet Propulsion Laboratory
Launch Vehicle	Delta 7427-9.5 (no. D264)
Launch Date and Time	Dec. 11, 1998 / 18:45:51 UT
Launch Site	Cape Canaveral, Fla. / Launch Complex 17A
Scientific Instruments	1. Pressure Modulated Infrared Radiometer (PMIRR) 2. Mars Color Imaging System (Two Cameras) (MARCI)

Key Dates

Dec. 11, 1998: Launch

Sept. 23, 1999: Spacecraft lost

In Depth: Mars Climate Orbiter

Mars Climate Orbiter (MCO) was the second probe in NASA's Mars Surveyor program, which also included the Mars Global Surveyor (launched in November 1996) and Mars Polar Lander (launched in January 1999).

Mars Climate Orbiter was designed to arrive at roughly the same time as Mars Polar Lander and to conduct simultaneous investigations of Mars' atmosphere, climate and surface. Arrival in orbit was dated for Sept. 23, 1999. MCO would then reach its operational near-circular Sun-synchronous orbit at about 260 miles (421 kilometers) by Dec. 1, 1999.

The satellite was also designed to serve as a communications relay for the Mars Polar Lander. After the lander's mission (lasting three months), MCO would have performed a two-year independent mission to monitor atmospheric dust and water vapor and take daily pictures of the planet's surface to construct an evolutionary map of climatic changes.

Scientists hoped that such information would aid in reconstructing Mars' climatic history and provide evidence of buried water reserves. After the end of its main mapping mission Jan. 15, 2001, Mars Climate Orbiter would have acted as a communications relay for future NASA missions to Mars.

After launch, the spacecraft was put into a Hohmann transfer orbit to intersect with Mars. It performed four course corrections: Dec. 21, 1998, and March 4, July 25 and Sept. 15, 1999.

At 09:00:46 UT Sept. 23, 1999, the orbiter began its Mars orbit insertion burn as planned. The spacecraft was scheduled to re-establish contact after passing behind Mars, but, unfortunately, no signals were received from the spacecraft.

An investigation indicated that the failure resulted from a navigational error due to commands from Earth being sent in English units (in this case, pound-seconds) without being converted into the metric standard (Newton-seconds).

The error caused the orbiter to miss its intended orbit (87 to 93 miles or 140 to 50 kilometers) and to fall into the Martian atmosphere at approximately 35 miles (57 kilometers) in altitude and to disintegrate due to atmospheric stresses.

Key Source

Siddiqi, Asif A. [Beyond Earth: A Chronicle of Deep Space Exploration, 1958-2016](#). NASA History Program Office, 2018.