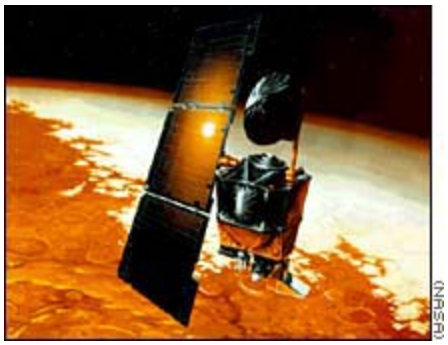
Metric mishap caused loss of NASA orbiter



By Robin Lloyd
CNN Interactive Senior Writer

(CNN) -- NASA lost a $125 million Mars orbiter because a Lockheed Martin engineering team used English units of measurement while the agency's team used the more conventional metric system for a key spacecraft operation, according to a review finding released Thursday.

The units mismatch prevented navigation information from transferring between the Mars Climate Orbiter spacecraft team in at Lockheed Martin in Denver and the flight team at NASA's Jet Propulsion Laboratory in Pasadena, California.

Lockheed Martin helped build, develop and operate the spacecraft for NASA. Its engineers provided navigation commands for Climate Orbiter's thrusters in English units although NASA has been using the metric system predominantly since at least 1990.

No one is pointing fingers at Lockheed Martin, said Tom Gavin, the JPL administrator to whom all project managers report.

"This is an end-to-end process problem," he said. "A single error like this should not have caused the loss of Climate Orbiter. Something went wrong in our system processes in checks and balances that we have that should have caught this and fixed it."

After a 286-day journey, the probe fired its engine on September 23 to push itself into orbit.

The engine fired but the spacecraft came within 60 km (36 miles) of the planet -- about 100 km closer than planned and about 25 km (15 miles) beneath the level at which it could function properly, mission members said.

The latest findings show that the spacecraft's propulsion system overheated and was disabled as Climate Orbiter dipped deeply into the atmosphere, JPL spokesman Frank O'Donnell said.

That probably stopped the engine from completing its burn, so Climate Orbiter likely plowed through the atmosphere, continued out beyond Mars and now could be orbiting the sun, he said.

Metric system used by NASA for many years

A NASA document came out several years ago, when the Cassini mission to Saturn was under development, establishing the metric system for all units of measurement, Gavin said.

The metric system is used for the Polar Lander mission, as well as upcoming missions to Mars, he said.

That review panel's findings now are being studied by a second group -- a special review board headed up by John Casani, which will search for the processes that failed to find the metric to English mismatch. Casani retired from JPL two months ago from the position of chief engineer for the Lab.

"We're going to look at how was the data transferred," Gavin said. "How did it originally get into system in English units? How was it transferred? When we were doing navigation and Doppler (distance and speed) checks, how come we didn't find it?"

"People make errors," Gavin said. "The problem here was not the error. It was the failure of us to look at it end-to-end and find it. It's unfair to rely on any one person."

Error points to nation's conversion lag

Lorelle Young, president of the U.S. Metric Association, said the loss of Climate Orbiter brings up the "untenable" position of the United States in relation to most other countries, which rely on the metric system for measurement. She was not surprised at the error that arose.

"In this day and age when the metric system is the measurement language of all sophisticated science, two measurements systems should not be used," Young said.

"Only the metric system should be used because that is the system science uses," she said.

She put blame at the feet of Congress that she said has squeezed NASA's budget to the point that it has no funds to completely convert its operations to metric.

"This should be a loud wake-up call to Congress that being first in technology requires funding," she said, "and it's a very important area for the country."