

The spacecraft is currently in a 35-hour elliptical orbit which brings it 107 miles (172 kilometers) above the surface of Mars at its closest approach to the planet. The operations team at JPL and Lockheed Martin Astronautics, Denver, CO, will begin to reduce that orbit using a more moderate level of aerobraking that will slowly bring the spacecraft into the desired nearly circular mapping orbit. Aerobraking, a technique first demonstrated in the summer of 1993 during the final months of the Magellan mission to Venus, allows a spacecraft to lower its orbit without relying on propellant, by using the drag produced by a planet's atmosphere.

"There are several types of desirable orbits for us to consider in the next several weeks that will give us global coverage of the planet and yield all of the science data we expected to return," Cunningham said. "In the meantime, the instruments are performing marvelously, and we will continue gathering new science data as we begin to reduce the spacecraft's altitude and bring it down into the upper Martian atmosphere. Even if we wind up in an elliptical orbit, we will have an opportunity to study Mars at closer range than we originally planned because the spacecraft's periapsis -- or closest passage over Mars -- will be closer than the 234-mile (378-kilometer) circular orbit that was to be its original mapping distance."

The spacecraft's current orbit was raised Oct. 12 after the flight operations team observed that the unlatched solar panel had moved more than 20 degrees and beyond what should have been its fully deployed and latched position. Significant movement was observed on periapsis 15 -- or the 15th closest pass over Mars, which occurred on Oct. 6 -- when the Martian atmosphere had become twice as dense as it had been during previous passes. The thickness of the atmosphere amounted to a 50 percent increase in pressure over what was expected on the spacecraft's solar array.

Although atmospheric variations like these were anticipated as the seasons change on Mars, the spacecraft's orbit was raised by about seven miles (11 kilometers) to adjust the pressure level. Subsequent motion of the panel at periapsis 16 through 18 caused the flight team to raise the orbit further on Oct. 12, taking the spacecraft out of the atmosphere altogether.

"The investigation of the unexpected motion of the unlatched panel led us to identify a secondary source of damage in the yoke, a piece of structure that connects the solar panel to the spacecraft," Cunningham said. "This secondary source of damage was a result of the failure of the damper arm that jammed in the panel's hinge joint shortly after launch, when the solar panels were initially deployed."

Mechanical stress analysis tests suggest that the yoke -- a triangular, aluminum honeycomb material sandwiched between two sheets of graphite epoxy -- probably fractured on one surface. The analysis further suggests that the fractured surface, with increased pressure on the panel during aerobraking, began to pull away from the aluminum honeycomb beneath it.

"Aerobraking will be reinitiated at 0.2 newtons per square meter (0.00003 pounds per square inch), which is about one-third of the original aerobraking level," Cunningham said. "This is a pressure that we currently believe is safe but we will continue to work with ground tests, analysis and close monitoring of in-flight spacecraft data to assure that it is safe."

"Aerobraking will take much longer, perhaps eight to 12 months, at this more gradual rate. In the meantime, we will continue collecting science data and work in the next several weeks toward selection of the best possible orbit to fulfill the science objectives of the mapping mission," Cunningham said.

A new color image from the MGS Mars Orbiter Camera of the giant volcano Olympus Mons is available on the Internet at the following URL:

http://barsoom.msss.com/mars/global_surveyor/camera/images/index.html

Additional information about the Mars Global Surveyor mission is available on the World Wide Web by accessing JPL's

Mars news site at URL:

<http://www.jpl.nasa.gov/marsnews>

or the Global Surveyor project home page at URL:

<http://mars.jpl.nasa.gov>.

Mars Global Surveyor is part of a sustained program of Mars exploration, known as the Mars Surveyor Program. The mission is managed by the Jet Propulsion Laboratory for NASA's Office of Space Science, Washington, DC. JPL's industrial partner is Lockheed Martin Astronautics, Denver, CO, which developed and operates the spacecraft. JPL is a division of the California Institute of Technology, Pasadena, CA.

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