

Mars Reconnaissance Orbiter Team Plans Uplink of Protective Files

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Artist concept of Mars Reconnaissance Orbiter. Image credit: NASA/JPL

(PhysOrg.com) -- The team operating NASA's Mars Reconnaissance Orbiter plans to uplink protective files to the spacecraft next week as one step toward resuming the orbiter's research and relay activities.

Since the orbiter spontaneously rebooted its computer on Aug. 26, flight team engineers have been examining possible root causes and repercussions of that incident and three similar events this year on Feb. 23, June 3 and Aug. 6. Meanwhile, the team has kept the spacecraft in a precautionary, minimally active status called "[safe mode](#)."

The four reboots involved a device, called the "computer module interface controller," that controls which of two redundant main computers on the spacecraft is active. Still undetermined is whether trouble lies with that controller itself or with a voltage [glitch](#) elsewhere

on the spacecraft. The Aug. 6 reboot, though not the other three, prompted a switch from one computer to its backup twin. More than 100 factors are under consideration as possible root causes.

Engineers' analysis of the reboots has identified a possible, though unlikely, scenario that, should it occur, could jeopardize the spacecraft. This scenario would require two computer reboots, each worse than any so far, occurring within about a minute of each other in a certain pattern. The effect would be that neither of the redundant computers would remember that the spacecraft is in orbit around Mars instead of awaiting launch. The team has developed and tested a preventive-care measure to eliminate this possibility.

The preventive care requires amending some data files in the computers' non-volatile, or "flash" memories where the computers check for default settings when they reboot. However, overwriting information in those files can entail risk, especially if the spacecraft were to experience another reboot with the process only partially completed. A process developed and tested in recent weeks to minimize that risk will take several days to implement. The team will uplink, install and verify the changes in a careful sequence.

"We plan to begin uplinking protective files next week," said [Mars Reconnaissance Orbiter](#) Project Manager Jim Erickson of NASA's Jet Propulsion Laboratory, Pasadena, Calif. "This process is to bulletproof the spacecraft against a remote vulnerability that our team identified. Meanwhile, analysis of possible root causes for the four reboots this year continues as another important part of our path toward resuming science operations."

The Mars Reconnaissance Orbiter uses six instruments to examine Mars in detail, from subsurface layers to the top of the atmosphere. It began its investigations in 2006, has provided more data about Mars than all

other missions combined, and last year completed its primary science phase. Continuing science observations are planned when the [spacecraft](#) is brought out of safe mode, but no specific date for that has been set.

"The precautionary steps we are taking are not driven by the calendar, but by our commitment to care for this valuable national resource," Erickson said. "We are all eager to have science observations resume as soon as a properly cautious process allows."

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