

NASA Investigates Problems With Spirit

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Engineers on [NASA's Mars](#) Exploration Rover team are investigating possible causes and remedies for a problem affecting the steering on Spirit.

The relay for steering actuators on [Spirit's](#) right-front and left-rear wheels did not operate as commanded on Oct. 1. Each of the front and rear wheels on the rover has a steering actuator, or motor, that adjusts the direction in which the wheels are headed independently from the motor that makes the wheels roll. When the actuators are not in use, electric relays are closed and the motor acts as a brake to prevent unintended changes in direction.

Engineers received results from Spirit today from a first set of diagnostic tests on the relay. "We are interpreting the data and planning additional tests," said Rick Welch, rover mission manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "We hope to determine the best

work-around if the problem does persist."

Spirit and its twin, Opportunity, successfully completed their three-month primary missions in April and five-month mission extensions in September. They began second extensions of their missions on Oct. 1. Spirit has driven more than 3.6 kilometers (2.2 miles), six times the distance set as a goal for mission success. It is climbing into uplands called the "Columbia Hills."

JPL's Jim Erickson, rover project manager, said, "If we do not identify other remedies, the brakes could be released by a command to blow the fuse controlling the relay, though that would make those two brakes unavailable for the rest of the mission." Without the steering-actuator brakes, small bumps or dips that a wheel hits during a drive might twist the wheel away from the intended drive direction.

"If we do need to disable the brakes, errors in drive direction could increase. However, the errors might be minimized by continuing to use the brakes on the left-front and right-rear wheels, by driving in smaller segments, and by adding a software patch to reset the direction periodically during a drive," Erickson said. Engineers believe the steering-brake issue is not related to excessive friction detected during the summer in the drive motor for Spirit's right-front wheel, because the steering actuator is a different motor.

Meanwhile, the team continues to use Spirit's robotic arm and camera mast to study rocks and soils around the rover, without moving the vehicle until the cause of the anomaly is understood and corrective measures can be implemented.

Source: NASA

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