

## INTERNATIONAL TESTING OF A MARS ROVER PROTOTYPE;

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Tests on a prototype engineering model of the Russian Mars 96 Rover were conducted by an international team in and near Death Valley in the United States in late May, 1992. These tests were part of a comprehensive design and testing program initiated by the three Russian groups responsible for the rover development. The specific objectives of the May tests were:

- (1) Evaluate rover performance over different Mars-like terrains, specifically a Viking 1-site-like boulder field, and sand dunes;
- (2) Evaluate state-of-the-art teleoperation and autonomy development for Mars rover command, control and navigation;
- (3) Organize an international team to contribute expertise and capability on the rover development for the flight project.

The test team included representatives from the three Russian space organizations: Space Research Institute, Babakin Center, Mobile Vehicle Engineering Institute; France; Hungary; and The Planetary Society, Ball Aerospace and ISX in the United States. Each of the test objectives were met through a series of tests at two sites: Dumont Dunes, and "Mars Hill."

The range and performance that can be planned for the Mars mission is dependent on the degree of autonomy that will be possible to implement on the mission. Current plans are for limited autonomy, with Earth-based teleoperation for the nominal navigation system. Several types of television systems are being investigated for inclusion in the navigation system including panoramic camera, stereo, and framing cameras. The tests used each of these in teleoperation experiments. Experiments were included to consider use of such TV data in autonomy algorithms. Image processing and some aspects of closed-loop control software were also tested.

A micro-rover was tested to help consider the value of such a device as a payload supplement to the main rover. The concept is for the micro-rover to serve like a mobile hand, with its own sensors including a television camera.