

## Mars Surveyor Program and UHF Telemetry Communications

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Beginning in November 1996 with the launch of the Mars Global Surveyor (MGS), NASA will embark on a decade-long exploration of the planet Mars using a series of robotic spacecrafts. Launched approximately every 26 months, these probes will carry Orbiters, Landers, and Rovers with the intent of mapping the planet while characterizing its climate, along with a search for water and possible life, past or present. Severe budgetary constraints on these missions and their highly focused scientific objectives will require leading-edge technologies to achieve their aggressive goals. The MGS, along with the Pathfinder mission (a Lander with a small Rover), will be the first tests of this new direction in the NASA vision.

The Mars Surveyor Program (MSP) consists of two small spacecraft (an Orbiter and Lander) that will be launched separately during 20 day windows in December 1998 and January 1999, respectively. Lockheed Martin Astronautics (Denver, CO) is teamed with NASA's JPL to build, test, launch, and fly both spacecraft for the duration of the mission.

The Mars Surveyor Program will follow these probes and be the subject of this paper, along with the UHF telemetry communications concept between the Mars Orbiters and Mars Landers. Also contained in the discussion will be the X-Band telecommunications concept for RF linkage between Earth and the spacecraft.

With the advent of interplanetary missions involving multiple spacecraft scenarios such as the MSP, a need for reliable data rate inter-spacecraft communications has emerged for these type of missions. A full-duplex UHF transceiver and transfer system, termed the CE Telemetry Broadcast Protocol (CETBP), has been developed by Cincinnati electronics to address this need. This transceiver system has been designed to be a versatile, off-the-shelf solution for many types of spacecraft telemetry and command requirements.

Specifically, this transceiver will fly on both the upcoming Mars Orbiter and Mars Lander missions. The transceiver meets the requirements of small spacecraft missions by providing low weight (1.68 lbs.), small size (56 cubic inches), and radiation hardness (50 krads, latchup immune).

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