

Robotic Precursors to Human Exploration (03)
Lunar Robotic Precursor Missions (1)

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ROBOTIC LUNAR LANDER DEVELOPMENT STATUS

Abstract

NASA Marshall Space Flight Center and John Hopkins University Applied Physics Laboratory have developed several mission concepts to place scientific and exploration payloads ranging from 10 kg to more than 200 kg on the surface of the moon. The mission concepts all use a small versatile lander that is capable of precision landing. The results to date of the lunar lander development risk reduction activities including high pressure propulsion system testing, structure and mechanism development and testing, long cycle time battery testing, and thermal protection system testing will be addressed. The most visible elements of the risk reduction program are two fully autonomous lander flight test vehicles. The first utilized a high pressure cold gas system with limited flight durations while the subsequent test vehicle, known as the Warm Gas Test Article, utilizes hydrogen peroxide propellant resulting in significantly longer flight times and the ability to more fully exercise flight sensors and algorithms. The development of the Warm Gas Test Article is a system demonstration and was designed with similarity to an actual lunar lander including energy absorbing landing legs, pulsing thrusters, and flight-like software implementation. The flight testing of the hydrogen peroxide test vehicle was completed in November 2011 and will be discussed.