

US Lander for the Intermarsnet Mission

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The 2003 Intermarsnet/Mars Surveyor lander will evolve from the 1998 Mars Surveyor lander through a pre-planned product improvement program of technology development and investment. This paper discusses the status of the 1998 Mars Surveyor lander and the preliminary plan being developed to evolve to the 2003 lander.

The 1998 Mars Surveyor lander is being designed and built by Lockheed-Martin Astronautics, Denver, CO. The lander is enclosed in a 2.4 m diameter aeroshell of Pathfinder/Viking heritage, using S1 A-561 as the ablator material. The lander has a minimal cruise stage (solar array power, sun/star sensors, antennas, and solid state power amplifier) that is ejected nominal 1 y 10 days before entry. The aeroshell/lander uses a direct-entry landing approach with the aeroshell/ablator providing the majority of velocity reduction, a Viking-heritage parachute, with the lander separating (based on the landing radar/altimeter) and using an active powered descent to the surface. The lander uses 3.5 m silicon solar arrays with a nickel hydride battery for energy storage. The thermal control is entirely passive, achieving a full Martian year operation up to approximately $\pm 20^\circ$ latitude. The lander uses redundant electronics. Communication to/from Earth is via a primary UHF link to an orbiter (MGS or the '98 Orbiter) or a backup X-band two-way link direct to Earth. The lander can carry approximately 20 kg and 160 liters of science payload. The current launch mass estimate is approximately 450 kg.

The evolution from the 450 kg 1998 Mars Surveyor lander to the 415 kg 2003 Intermarsnet/Mars Surveyor lander is through a pre-planned product improvement program of technology development and investment. The preliminary plan is to develop 1) high density electronics using multi-chip module technology to integrate the electronics design into a smaller volume, more efficient package, and 2) qualify higher energy density Lithium ion batteries which will provide the same energy in a smaller volume package. In addition, if not already a part of the 1998 lander, the small deep space transponder will be incorporated. Miniaturization of these subsystems will result in the desired 415 kg lander mass. Another area of emphasis for technological development is extended survivability at higher latitudes.

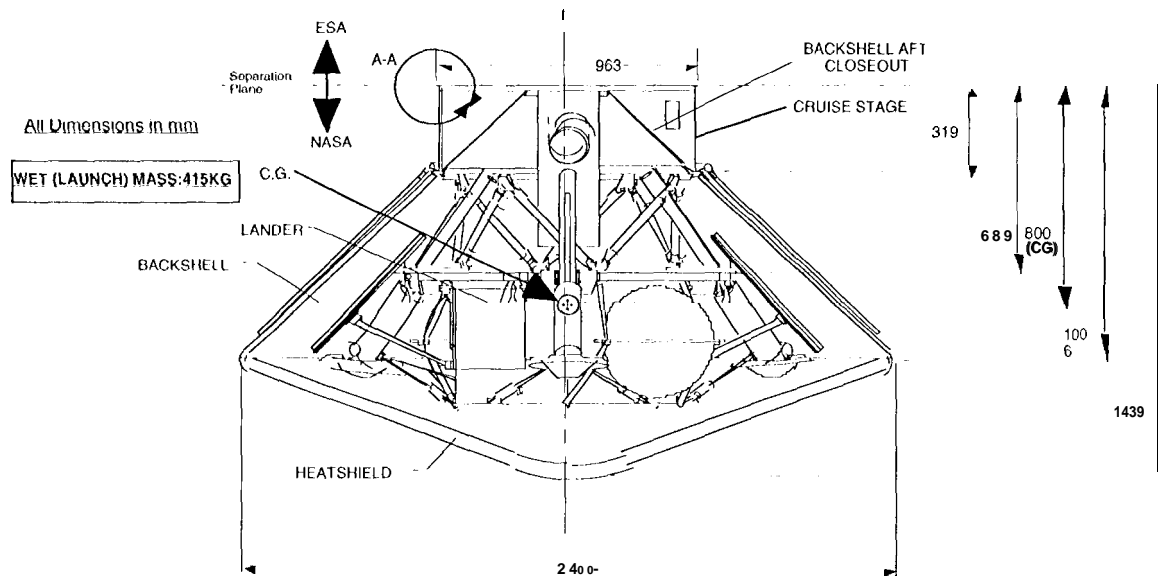


Figure 1-1. NASA Mars Surveyor Free Flyer (2003)