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McCANDLESS LUNAR LANDER SCIENCE MISSION CAPABILITIES

Murrow, David (1), Beau Bierhaus (2), Josh Hopkins (3) Josh Wood (4) John Ricks (5) , and Stuart Wiens (6)

(1) Lockheed Martin Space, PO Box 179, Denver CO, USA, 80201, David.1.murrow@lmco.com

(2) Lockheed Martin Space, PO Box 179, Denver CO, USA, 80201, edward.b.bierhaus@lmco.com

(3) Lockheed Martin Space, PO Box 179, Denver CO, USA, 80201, josh.b.hopkins@lmco.com

(4) Lockheed Martin Space, PO Box 179, Denver CO, USA, 80201, joshua.l.wood@lmco.com

(5) Lockheed Martin Space, PO Box 179, Denver CO, USA, 80201, john.m.ricks@lmco.com

(6) Lockheed Martin Space, PO Box 179, Denver CO, USA, 80201, stuart.wiens@lmco.com

Abstract

Lockheed Martin has designed the McCandless lunar lander to carry a variety of small to medium-class payloads to the surface of the Moon. The spacecraft, named for astronaut Bruce McCandless, was selected by NASA as a candidate in the Commercial Lunar Payload Services (CLPS) catalog in late 2018 and is available to other commercial and international users. This paper describes the McCandless design, payload capabilities, and payload interfaces.

The design, flight software, and operations concept of the McCandless Lunar Lander are based on Lockheed Martin's history of developing, building, and operating numerous planetary spacecraft in partnership with NASA and JPL, from Viking to OSIRIS-REx. It draws on aspects of the Phoenix and InSight Mars landers, and the GRAIL A & B lunar orbiters. Like McCandless, these missions involved integrating multiple payloads with differing requirements. Lockheed Martin planetary missions have a strong track record of meeting unforgiving planetary launch schedules.

The lander offers a large payload deck about 1 m above the lunar surface for easy integration of multiple payloads or large single payloads such as rovers which need access to the lunar surface. Smaller payload volumes are available suspended underneath the top deck for payloads need a more isolated thermal environment inside the lander thermal blankets. The lander can deliver at least 250 kg of payload mass to locations on the lunar surface and is adaptable to larger payload masses if required. A large solar array provides 400 W of payload power at ~28 VDC during lunar surface operations. To maximize the useful mission duration, the array is mounted on a Sun-tracking gimbal, enabling landing shortly after lunar dawn and full-power operations throughout one lunar day, for a total landed mission duration of more than 300 hrs depending on latitude and local terrain at the selected landing site.

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