LESSH
Lunar Experiment Support System and Handling
Battery Charger Module

Fact Sheet:

About LESSH

Battery Charger Module

Beginning with Artemis III, NASA plans to deploy science instruments on the moon near a South Pole landing site.

To extend lunar science operations, an EVA compatible LESSH Battery Charger Module (BCM) enables recharging and hard-line data transfer at the modular GFP Interface Bank on the Human Landing System (HLS) or other Artemis vehicles.

The LESSH BCM provides an ergonomic interface for astronauts to connect instruments to HLS power and data interfaces. The BCM provides battery charge monitoring and enables data transfer via a flexible harness.

LESSH-Placed is an instrument package that can be deployed by astronauts and re-charged via an Artemis vehicle, enabling extended science operations.
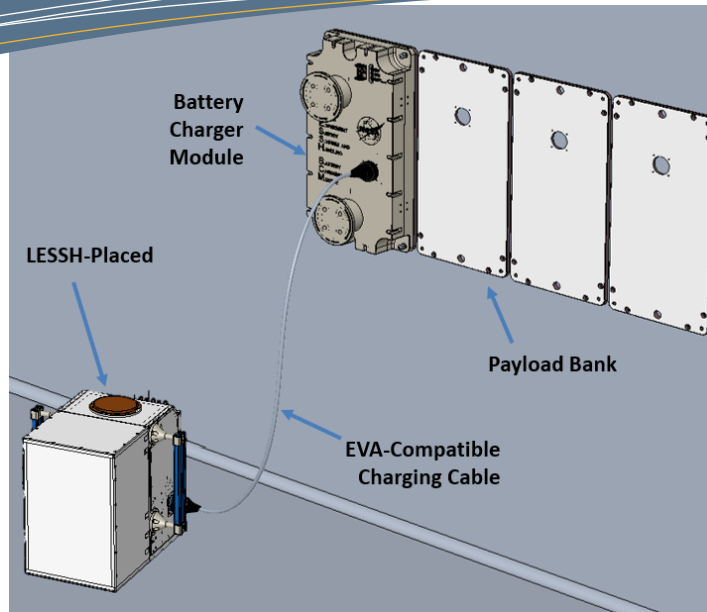
For more information contact:

Michael Amato
Michael.J.Amato@nasa.gov

Russ Snyder
Russell.M.Snyder@nasa.gov

Mark Neuman
mark.a.neuman@nasa.gov
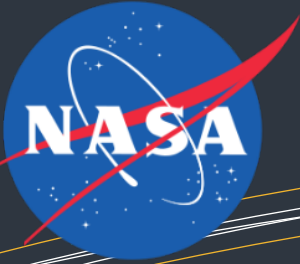
Ryan Flora
ryan.m.flora@nasa.gov

LESSH Battery Charger Module (BCM) Features

Physical

- Mass — 9.4 kg
- Volume — 50 x 25 x 10 cm
- Location — Mounted to the HLS Government Furnished Property (GFP) Interface Bank per HLS-IRD-007-01 and Payload Bank M2M-50038. Compatible with the following Lunar exploration systems:
    - Human Landing System Sustaining (HLS)
    - Orion
    - Gateway Logistics Module (LM)
    - Gateway
    - Surface Hab (SH)
    - Transit Hab (TH)
    - Pressurized Rover (PR)
    - Lunar Terrain Vehicle (LTV)
    - Cargo Lander
- Interface — Flexible harness (1.5m long) with EVA compatible connector and removeable dust cover
- Controls — 1 astronaut-operated power switch *(with switch guards).* LED indicators for charging status.

Power Services

- LESSH-Placed Charging — Accommodates 28V astronaut-rated batteries in LESSH instrument modules. System design to be certified to JSC-20793 Crewed Space Vehicle Battery Safety Requirements.
- Charging Power — Rated 215W power output (9.4A Output)
- Battery Pre-heater — Utilizes M2M-50038 28V bus. Rated for 10A.

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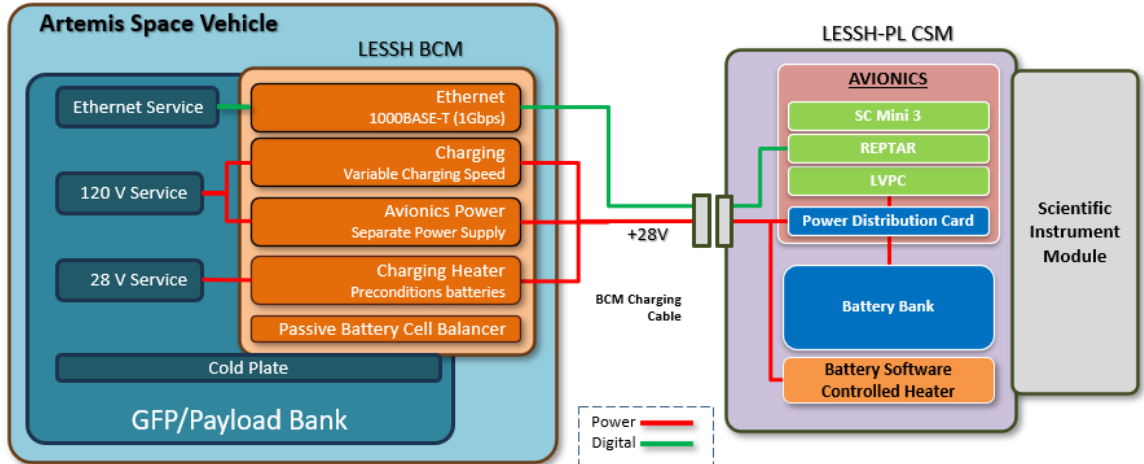
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Block Diagram of LESSH-Placed Charging through BCM

Battery Charger Module (BCM) Operations

Charging

- Charge Time — 4 hours from 0%-100% state of charge
- Charging Method — Constant current 0A-9.4A and constant voltage 24V-33.6V (Cannot exceed 300W input power limit)
- Software Adjustability — Charging Battery Current, Voltage, Overvoltage, Undervoltage setpoints nominally set prelaunch but can be changed during mission.
- Passive Battery Rebalancing — Ability to passively balance the top and bottom half cell voltages of each battery pack

Communications

- Hardline Interface — 1000BASE-T (1Gbps) Ethernet pass through from the GFP bank for science data transfer.
- Charger CMD/TLM — Differential SPI Bus, 2 Chip Selects

Charging Safety

- Inhibits — Input Power, Output Power, Output Return
- Over/Under Voltage Protection — 2-fault tolerant hardware monitors battery voltage with adjustable setpoint to prevent hazards per JSC-20793
- Battery Midpoint Deviation — 8 channel battery midpoint voltage monitor to detect pack imbalances