National Aeronautics and Space Administration

BATTERY AND POWER SYSTEMS DESIGNED BY NASA

LYNDON B. JOHNSON SPACE CENTER • HOUSTON, TEXAS

OVERVIEW

The engineering team in the Propulsion and Power Division designs, develops, tests and evaluates electric power and safe battery system solutions.

EXAMPLES

Battery Solutions

- Modular Intravehicular Activity/Extravehicular Activity Batteries
  - Provides modular, safe storage and delivery of 95Wh electrical power at 28V
  - Safe for use at all planned spacecraft environments with smaller compartments
  - Uses a passive propagation resistant design
- Lithium-ion Battery Fire Containment System
  - Fire bags with thermal runaway shields inside a secondary container, e.g., cargo transfer bag, can contain a propagating battery fire's flames, sparks, heat, and particulate

Battery Chargers

- Exploration Battery Management System (xBMS) provides safe charging and management of modular 28V batteries
- EVA Battery Operations Terminal (EBOT) provides safe charging, management, and stowage of International Space Station (ISS) EVA lithium-ion batteries

Power Solutions

- USB-C Power Delivery
  - USB power delivery standard enables a common interface and minimal unique cables
  - USB-C interface enables maximum power from 100W – 240W
- DC to AC Power Inverter
  - Enables the use of terrestrial/commercial off-the-shelf equipment which interfaces with standard US AC power outlet
  - Size and mass improvements over base design are achievable with newer power semiconductor technology
  - Input Voltage: Per vehicle 120 VDC or 28 VDC. Output Voltage: Up to four outlets at 120 VAC
- Power Supply Assembly-2
  - Provides electrical power to multiple loads simultaneously on the ISS
  - Provides power for the Extravehicular Mobility Unit (EMU) and the Exploration Extravehicular Activity Service (xEVAS) space suits during extravehicular activity missions

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These battery and power system solutions are used in several spaceflight applications.

Volatiles Investigating Polar Exploration Rover (VIPER) battery



EVA Battery Operations Terminal



Extravehicular Mobility Unit (EMU) spacesuit battery



Modular Battery Charger/ Management System

