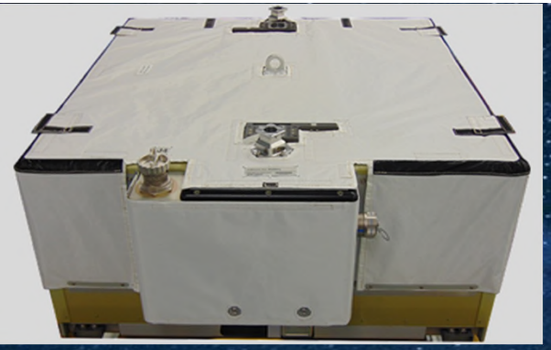
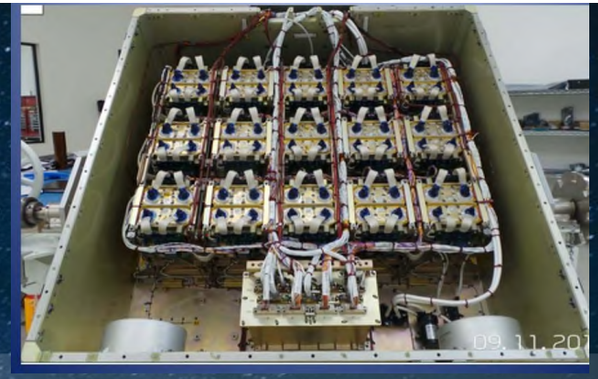


AEROJET ROCKETDYNE



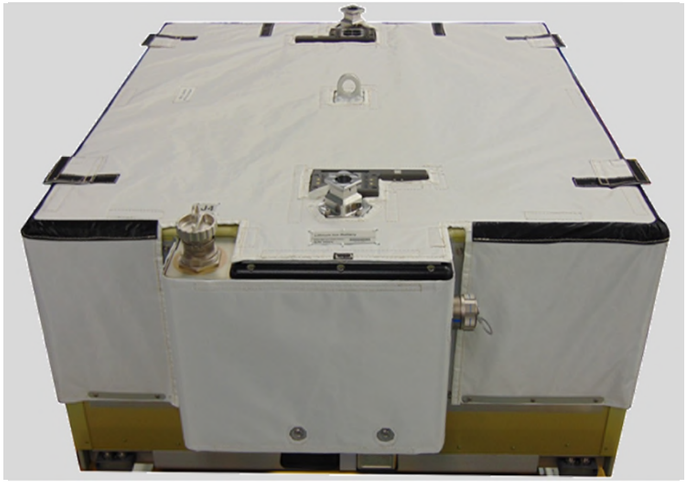
ISS Lithium Ion Battery Development

2022 Space Power Workshop

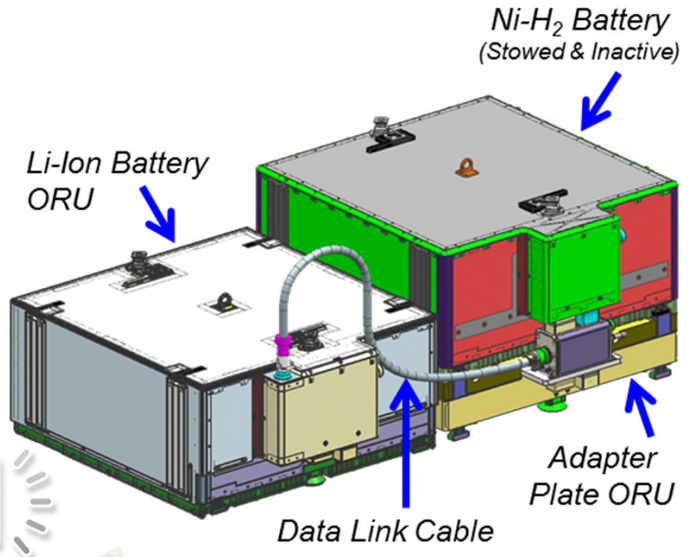
Date:4/26/2022

Erich Soendker

PLUG AND PLAY OBJECTIVE



428 lbs Li-Ion ORU
Replace Two
350 lbs Ni-H2 ORUs



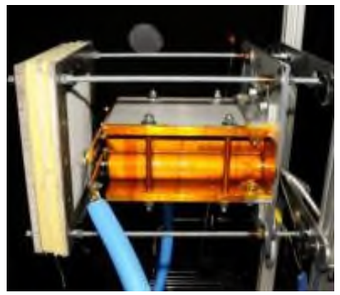
System Approach
1 Li-Ion with adapter plate with data link to 2nd NiH2 ORU. Ability to store old NiH2 on top of adapter

<u>ISS NiH Nominal</u>
5C +/- 1C ISS NiH----------
1.5V/Cell----------
Very tolerant to overcharge-
Non-Flammable Material----

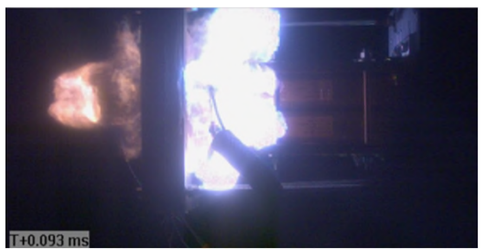
<u>ISS Li-Ion Nominal</u>
22C +/- 7C *
4.1V/Cell
Thermal Runaway if overcharged
Flammable Material

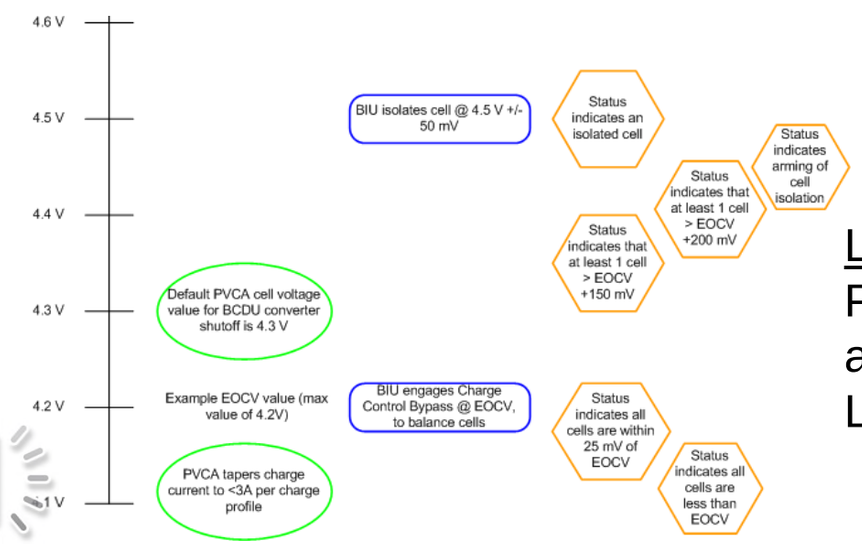
Charging a Li-Ion Bat with NiH2 charger is like
Charging an iPhone with a 1998 Ericsson Cell phone Charge

CHALLENGING REQUIREMENTS FOR ADAPTATION



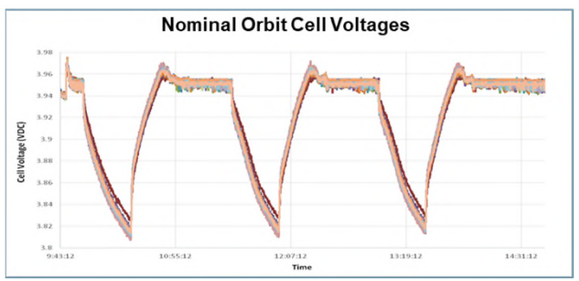
MMOD Testing Define Extreme Condition of Thermal Runaway

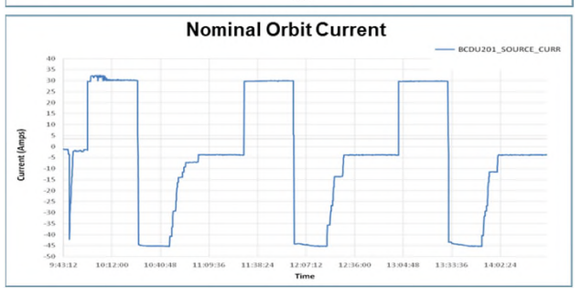




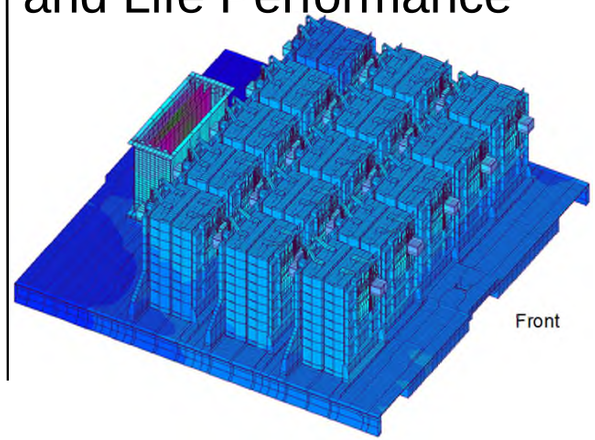
<u>Layered Hazard</u>
Protection provide adaption ensuring Li-Ion operation

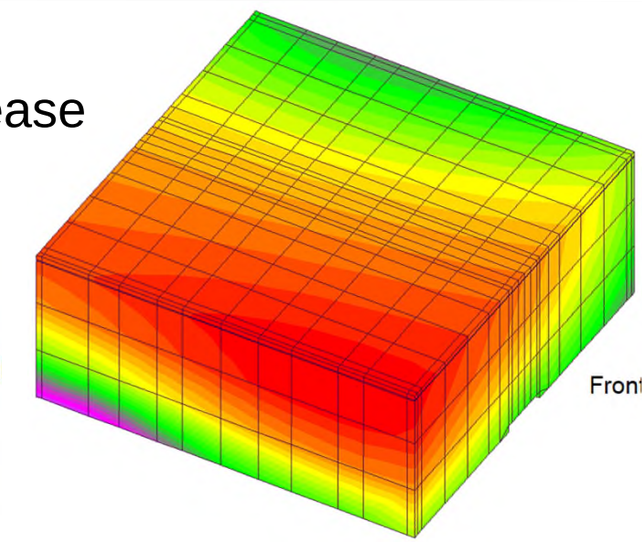
<u>On Orbit</u>
Charge/Discharge Cycle validate Charge Control Algorithm





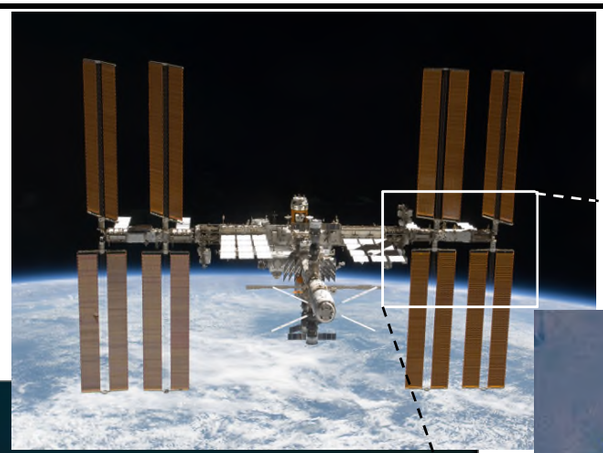
Thermal Analysis
Validate impedance increase and Life Performance

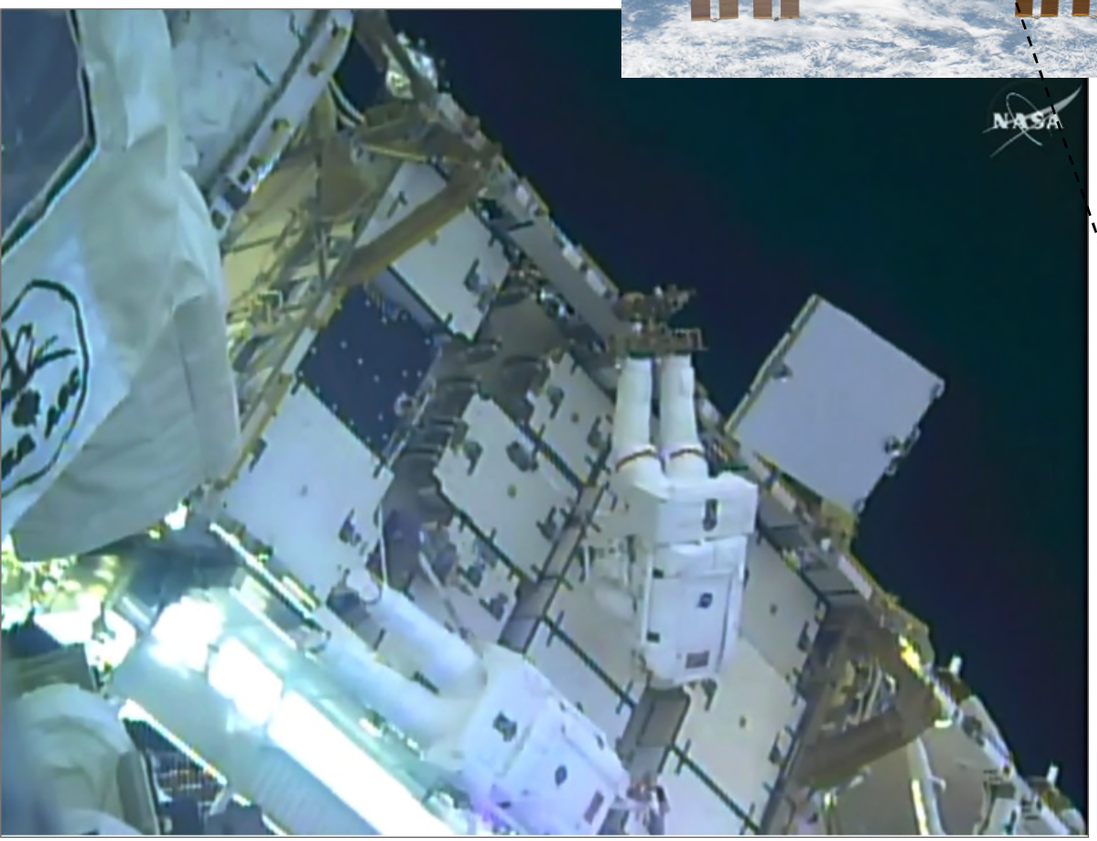


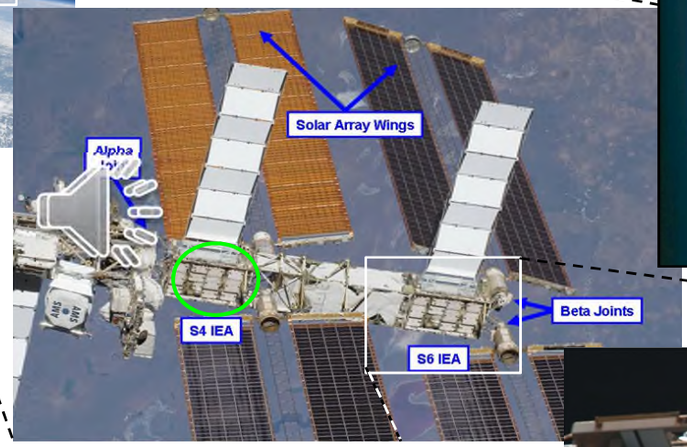


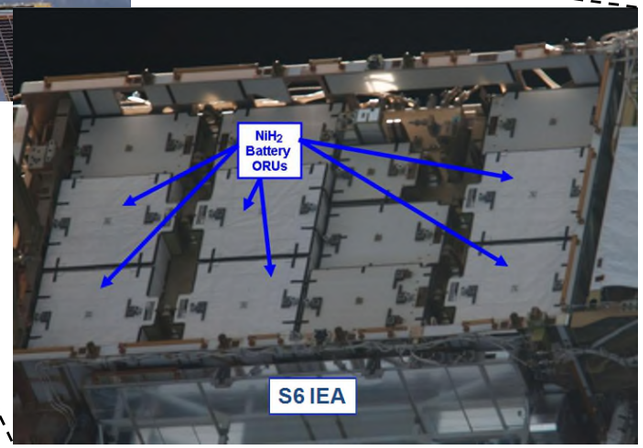
ISS NOW HAS OVER 360KWHRS OF ENERGY STORAGE

8 Power Channels
24 Li-Ion Batteries
15kW-Hrs each









60,000 Cycle
10 Years

24 Li-Ion Batteries replace 48 Ni-H_2

Questions?

WARNING: **THIS SHEET MAY CONTAIN TECHNICAL INFORMATION SUBJECT TO THE EXPORT RESTRICTIONS ON SHEET 1.**

AEROJET ROCKETDYNE