

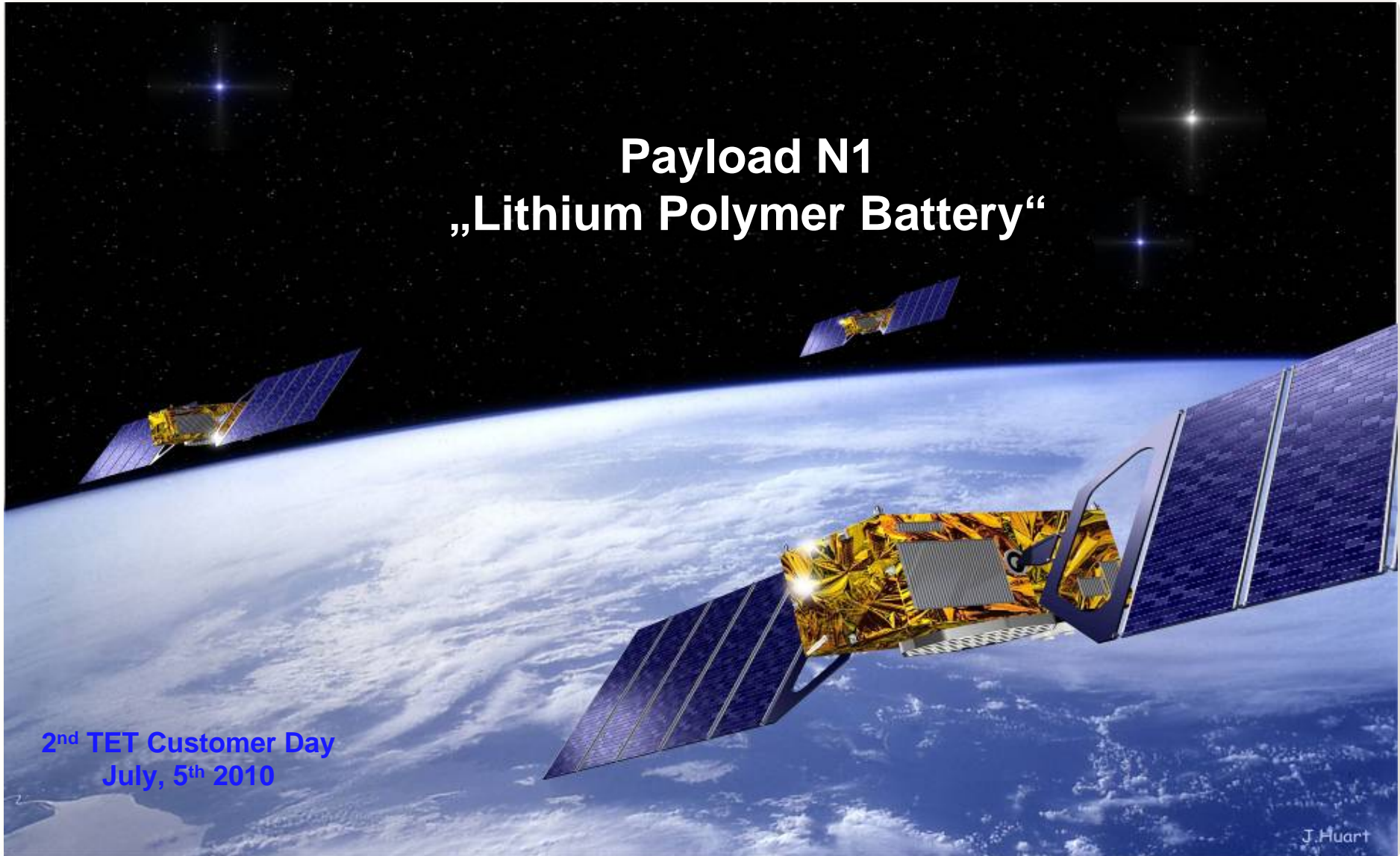


Advanced Space Power Equipment GmbH

Payload N1 „Lithium Polymer Battery“

2nd TET Customer Day
July, 5th 2010

J. Huart



Intension of the Experiment (1)

Lithium Batteries are the future Technology for Energy Storage in Satellites.

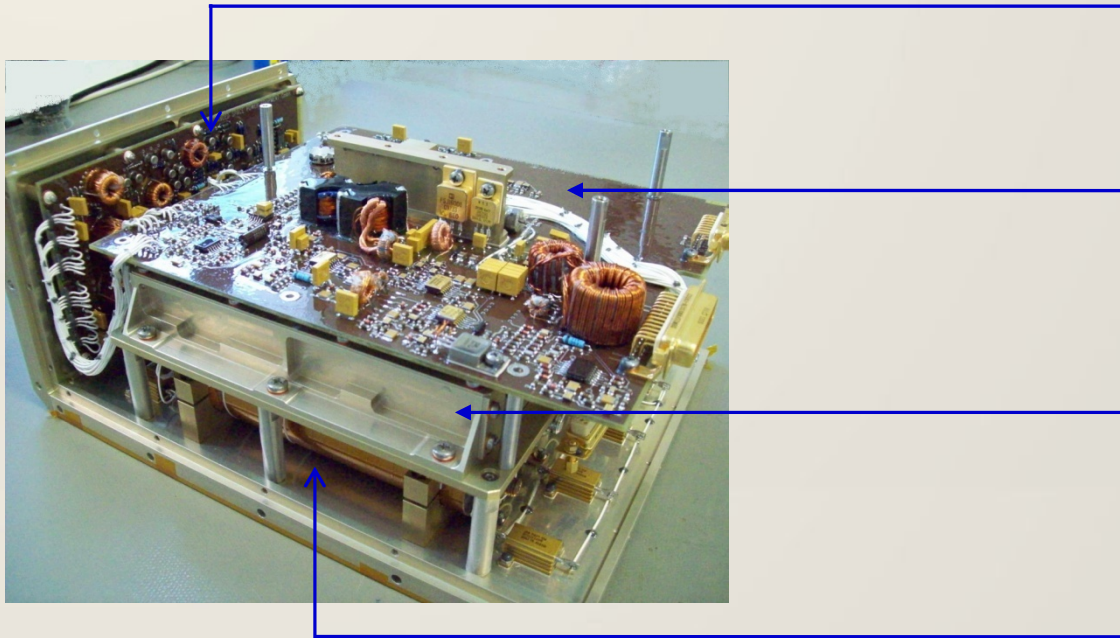
But:

- Qualified Lithium Batteries are expensive
- Only a few Manufactures for qualified Batteries in Europe
- Lithium Batteries require a special treatment
 - Battery Management System is needed

Intension of the Experiment (2)

- Space qualification of German Lithium Polymer Cells
 - Cycle Stability of the Cells
 - Operation under Vacuum Conditions for 1Year
- Space qualification of ASP Battery Management System
 - Balancing of the Lithium Cells
 - Monitoring of relevant Battery Data

Experiment Design

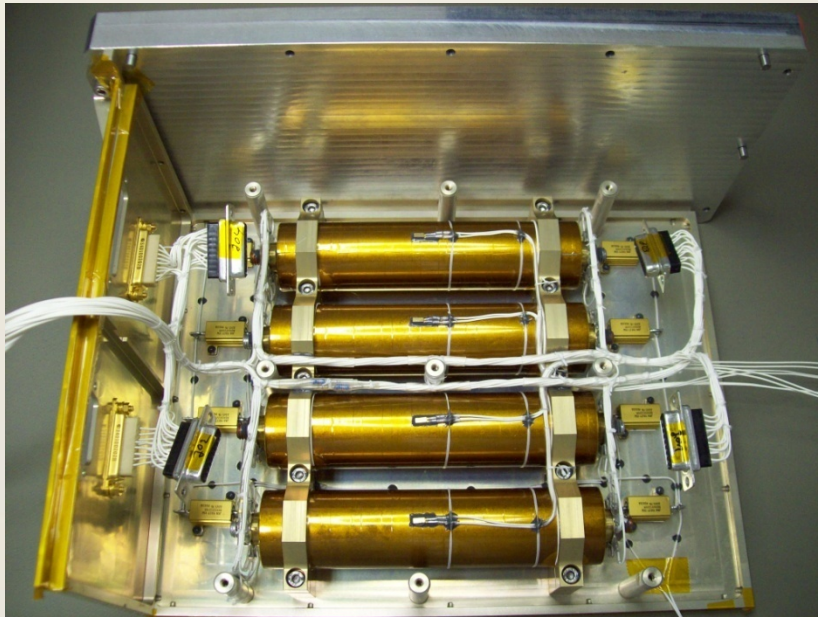


PFM during Integration

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The Battery

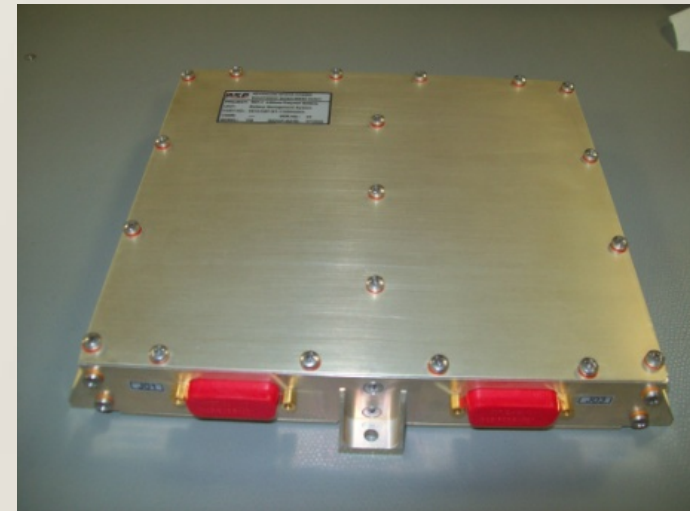


PFM Battery during Integration

- Manufacturer of Cells: GAIA, Germany
- Model Number of Cells: DD UHP-341440
- Nominal Voltage: 14,4V
- End of Charge Voltage: 16,0V
- Rated Capacity: 7,5Ah
- Rated Energy Density: 85Wh/kg

Redundant Battery Management System

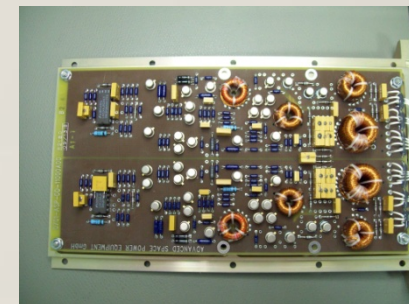
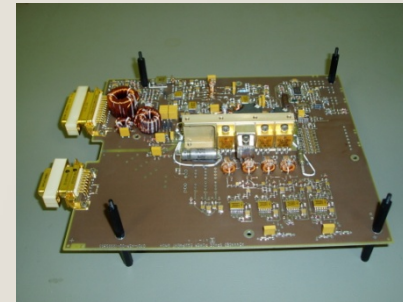
- Balancing of the Cells
 - Prevents Single Cells from overcharging
 - Guarantees maximum Battery Capacity
- Monitoring of Cell Voltages
 - Provides analog HK Data for each Cell of the Battery
- Over-/Under Voltage Detection
 - Provides actual Status of the Battery



Additional Electronics

- Charge Regulator
 - Charge current up to 5A
 - Constant Current/Constant Voltage(CC/CV)

- Auxiliary Converter
 - V_{out} nominal: +12V, -12V
 - V_{out} redundant: +12V, -12V



Mission Profile

- In Orbit
 - Continuous Charging and Discharging of the Battery during the complete TET01 mission
 - Periodical Capacity Tests
 - Recording of Cell Voltages, Charge- and Discharge Current and Temperatures
- On Ground
 - Monitoring of the Status of the Battery
 - Analysis of the received Data

Future Outlook

- Market:
 - Batteries for national missions
 - Batteries for small satellites
 - Batteries for university satellites
- Management Systems for all kinds of Lithium Batteries



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Thank You for your attention!