Solar Probe Plus

A NASA Mission to Touch the Sun Integrated Science Investigation of the Sun Energetic Particles



Preliminary Design Review 05 – 06 NOV 2013 Ground Support Equipment

Reid Gurnee

Outline



EGSE

- Board Level
- S/C Emulators
- Safe/Arm Plugs
- EGSE software should be described including requirements, design and verification of EGSE software
- MGSE
 - Aperture covers
 - Handling fixtures
 - Transport cases
- Instrument purge equipment
- Alignment requirements and features
- << Reid, the MGSE isn't very complex and are things you are very used to. The ME's will supply the details, but I thought you would be a good person to make the overall pitch since you have some of the best knowledge of the latest versions of the EGSE from your RBSP experience >>

Board-Level GSE

- Solar Probe Plus A NASA Mission to Touch the Sun
- Each lead engineer is responsible for developing their own board-level GSE.
 - Power Board: Load board, active load, HV load, breakout box, breakout board, I2C stimulus
 - <u>Event Board</u>: energy and TOF preamp boards, event board, test port box, breakout box, I2C slave, commercial pulsers
 - <u>Anode Board</u>: Commercial pulsers, scope, HV power supply
- All GSE is peer reviews and XXX (talk to Jim Burgum)

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Spacecraft Emulator

- Mini emulator
 - Provides Instrument Data Interfaces only, No Power Interfaces, No Temperature Interfaces
 - Also provides 1PPS and Gated_PPS Interfaces for Instrument EGSE
 - GSEOS Interface is fully compliant
 - Non-flight use only
- Full emulator
 - Provides Instrument Data, Power and Temperature Interfaces
 - Also provides 1PPS and Gated_PPS Interfaces for Instrument EGSE
 - Designed for use with Flight hardware
- GSE verification performed by project
- QTY provided to ISIS?





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GSEOS



- Common GSE software for all instruments
- Display screens and instrument customizations can be used through all development cycles from bench testing, I&T deployment, to flight operations
- Same platform used for EM, Flight, and Spacecraft operations
 - Test scripts can be developed by individual teams, tested on EMs, and then executed at the S/C level
- Software verification performed by project



Safe / Arm plugs

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- EPI-Lo has a HV air-safe plug
 - When installed HV is limited to air safe levels
 - Plug will be removed for S/C TV testing
 - Plug will be permanently removed during final closeout
- EPI-Hi???
- Instrument covers
 - ISIS instruments will have red-tag covers to protect the apertures
 - Covers will be temporarily removed for S/C TV testing
 - Covers will be permanently removed during final closeout

Calibration GSE for Instrument Articulation

- Requirements
 - Use in APL accelerator facility
 - Vacuum compatible (low outgassing)
 - Accommodate vertical and horizontal-mount instrument with open doors
 - Cover full FOV
- Status
 - Specified and purchased custom system in the cate Photo Newmark Systems **Newmark Systems**
 - Received January '09
 - Fit tested with instrument
 - Remote software interface under development
- Future Work
 - Make small modifications for mounting
 - Test with mass prototype and EM instrument



Articulation stage

RBSPICE CDR August 3 & 4 2009

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Instrument

Calibration GSE for Beam Generation



- Requirements
 - Use in APL calibration facility with particle accelerator
 - Vacuum compatible (low outgassing)
 - Allow user to select ion or electron calibration source and intensity
 - No stray light from optical switches
- Status
 - Designed and built custom system
 - Three-wheel implementation
 - Optical switches off when not homing
 - Installed and in use in APL facility



Mechanical GSE

- Shipping Container
 - Requirements
 - N2 purged, humidity controlled and monitored
 - Low outgassing
 - Shock mounted and monitored
 - Hermetically sealed with pressure relief valve
 - Status: Under design
- Environmental Test Fixtures
 - Thermal Vacuum Fixture
 - Vibration Plate Fixture
 - To be based on JEDI fixtures
- Purge Suitcase





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Update Photo

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Alignment Requirements

- EPI-Lo
- EPI-Hi

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Component-Level Electrical GSE

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- Component-Level GSE designed and reviewed for supporting flight build
- Requirements
 - Functionality to test component requirements
 - Fail-safe flight component interface
- Status
 - Energy board test board

 - Board is designed, uilt a propate Photo
 Used to test EM and tight in the cate Photo
 - Energy board burn in boar
 - Schematic is complete

