

**GUVI ELECTRONICS CONTROL UNIT (ECU)
SUBSYSTEM DESIGN**

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ECU OVERVIEW

Function:

- Interface with S/C C&DH via 1553
- Condition primary power for GUVI subsystems
- Control operation of SIS and Detector subsystems
- Format GUVI science and housekeeping data
- Process detector events

Components:

- Motherboard (backplane)
- Powerconverter/switching boards (2)
- Telemetry processor
- S/C / instrument I/O board
- Detector processor board

GUVI Preliminary Design Review

ECU OVERVIEW

Heritage:

- DMSP SSUSI Instrument
- NEAR NIS Instrument

Changes:

- | | |
|-----------------------|---------------------------------|
| • Chassis - | Card slots, Connector top panel |
| • Motherboard - | Backplane, Top panel, Wirelist |
| • Power Converter - | New design |
| • Power Switch Bd - | New design |
| • Telemetry Proc Bd - | New design |
| • S/C Interface Bd - | New design |
| • I/O Bd - | New design |
| • Detector Proc Bd - | None |

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ECU

Chassis is SSUSI Support Module Chassis with minor mods:

- Slots for 4 plug-in boards on both halves of chassis
- Power Converter Unit and Power Switching Board replaced with 2 power converter/switching boards on one half of chassis

Motherboard consists of side board for backplane connectors and top board for external connectors:

- Flex printed wiring board connects top and side boards
- Side board design is simplified - no additional flex required
- 3(1) backplane connectors added to side board
- 1 additional external connector added to top board

ECU ACCOUNTABILITY

APL is responsible for:

- ECU chassis design and fab
- Motherboard design and fab
- Power converter boards design and fab
- Detector processor board design and fab
- Detector processor flight software
- Integration and test of ECU subsystem (func. & environ.)

Aerospace Corp. responsible for:

- Telemetry processor board design and fab
- Telemetry processor flight software
- Interface board design and fab (S/C 1553 interface and instrument I/O)

POWER CONVERTER BOARDS

Two new boards replace SSUSI power converter unit (PCU) design:

- Eliminates PCU chassis – less weight
- Increases power conversion efficiency -- less power
- Adopts NEAR approach for converter design:
 - Interpoint converters
 - Extensive testing, characterization, & design experience
 - Availability
- Eliminates separate power switching board

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POWER CONVERTER BOARDS

- Input voltage = +28 +/-6 VDC
- Outputs Total of 15 (5 - board 1 and 10 - board 2)
 - SIS = +5V, +20V
 - FPE1 = +5V, ±6V
 - FPE2 = +5V, ±6V
 - HVPS1 = ±15V
 - HVPS2 = ±15V
 - ECU = +5V, ±15V
- Secondary power returns isolated from primary return.
- Isolation provided between sources powering different box destinations.
- Inrush current limiting (controls turn on time at 2.5A for 500 us w/4 bricks).
- Undervoltage inhibit for S/C power input (18V shutdown, 20.5V turn on).
- Input & output voltage limiting (zener in inrush for spikes, zeners on outputs).

POWER SWITCHING

- Switches power to primary & secondary FPE and HVPS units
- Incorporated on new power converter boards
- Both detectors may be powered simultaneously
- Switches are SSRs controlling converter inhibits (used on NEAR)
- Switches are controlled by Telemetry Processor via Interface Board
- Switches $\pm 15\text{V}$ to HVPS#1 and/or HVPS#2
- Switches $+5\text{V}$ and $\pm 6\text{V}$ to FPE#1 and/or FPE#2
- Switches scan mirror heater on or off

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SSUSI / GUVI ECU DIFFERENCES

- Chassis modified to add card slots on power side
- Motherboard simplified in design by eliminating multi-flex segments
- One additional external connector, 3(1) internal connectors added to motherboard
- Power converter unit & power switching board replaced with 2 power converter/switching boards
- New Telemetry Processor Board
- New combined S/C Interface and Instrument Interface Board