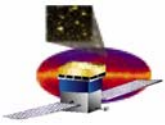


## **GLAST Large Area Telescope:**

**Electronics, Data Acquisition &  
Flight Software W.B.S 4.1.7**

**November Status 12-17-03**

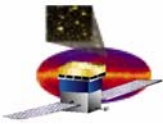
**Mike Huffer  
mehsys@slac.stanford.edu  
(650) 926-4269**



# Last Month's Accomplishment, PDU

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- **Power Distribution Unit**
  - **Function**
    - Switches power to TEM's, GASU, EPU crates
    - Digitizes temperatures to be used for thermal control
  - **Last Month**
    - PDU DAQ engineering module board was interfaced via FSW to LATTE
    - Most interface functions were exercised successfully
    - Started building a second box for testbed, includes prim and redundant DAQ board
    - Completed conceptual design of test-box to be used to test qual and flight version of PDU box
      - Started design of schematics for PC boards
    - Started working on schematic for flight board
      - some small fixes
      - replace Thermistor input sense circuits with RTD's where needed, waiting for final decisions by Lockheed
      - replace 28V to 3.3V/2.5V converter for ACTEL with circuit used on Tower Power Supply (does power-sequencing as required, see GIDEP Alert by ACTEL)
      - replace on-board connectors used for engineering modules with flight connectors
    - Need more documentation

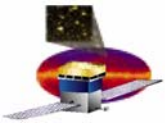


# Last Month's Accomplishment, GASU

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- **GASU**

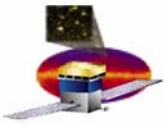
- **Function: global trigger, event builder, command-response unit, ACD control/monitoring/data-readout (all on one GASU DAQ PC board)**
- **Serious Concern:**
  - **Main GASU engineer J Ludvig is leaving SLAC**
    - DAQ group is working on finding solution
    - Definite schedule impact, being assessed
- **Status:**
  - **GEM (Global Trigger Module): (transferred to Jeff Olsen)**
    - Code was loaded on board, interfaced via FSW to LATTE
    - Main part of global trigger was exercised successfully
  - **EBM (Event Builder Module): (transferred to Erik Siskin)**
    - Continue writing code for FPGA implementing event builder
  - **CRU (Command-Response Unit): (J Ludvig, plan to transfer to E. Siskin)**
    - Interfaced via FSW to LATTE
    - Needs some modification/completion of remaining sections
  - **ACD Electronics Module (AEM) (M. Freytag)**
    - Started debugging of code on module, first write-reads to FSW/LATTE
  - **Integration of modules (are all on one PCB, just logical integration of FPGA's) (J Ludvig, plan to transfer to Jeff Olsen)**
  - **Modifications to schematic to complete flight design (J Ludvig, plan to transfer to J. Olsen)**
    - Difference to flight:
      - » need to incorporate fixes
      - » replace 8 programmable ACTEL FPGA's with 8 flight one-time programmable (different pin-out)
      - » replace commercial SRAM with flight SRAM (different pin-out)
      - » Move some board connectors once internal cabling is finalized
      - » Replace non-flight connectors with flight connectors
  - **Documentation (J Ludvig, tbd)**
  - **Assembled full primary and redundant GASU including all wiring for test-bed**
    - Started to debug the complete unit



# Last Month's Accomplishment, GASU Power Supply

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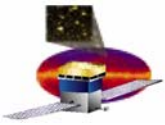
- **GASU Power Supply**
  - **Function: Generate power for GASU DAQ board and ACD front-end electronics from 28V**
  - **Last month**
    - **Finished schematic (modified original supply to use circuit from Tower Power Supply (MAX724))**
    - **Started/finished layout of board (flight layout)**
    - **Fabricated PC boards**
    - **Started/finished assembly of PC board**
    - **Tested board**
    - **Being incorporated in GASU**



## Last Month's Accomplishment, TEM & TEM-PS

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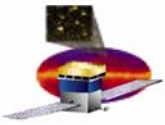
- **Tower Electronics Module**
  - **Function: control/readout/monitoring of TKR and CAL sub-system**
  - **Status:**
    - **Continue testing, still works including ASIC's**
    - **Flight fabrication package final, is in signature cycle**
    - **Fabricated 60 PC boards for EGSE and test-bed (see EGSE)**
- **Tower Power Supply**
  - **Function: supply voltages to TKR, CAL sub-system and to TEM from 28V**
  - **Status:**
    - **Fabricated 60 boards for testing, EGSE test-stands, and test-bed**



## Last Month's Accomplishment, DAQ ASICs

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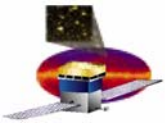
- **TEM Tracker Cable Controller ASIC (GTCC1)**
- **TEM Calorimeter Cable Controller ASIC (GCCC1)**
- **GLAST LVDS Translator Chip ASIC (GLTC2)**
  - **Submitted ASIC qualification and screening document to Parts Control Board for approval**
  - **Finished schematics of burn-in board**
  - **Received packaged flight lot from ASAT**
  - **Continue to write test-scripts for screening**



## Last Month's Accomplishment, SIU/EPU (1)

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- **EPU and SIU cCPI crate the same except**
  - **RAD750 boot code different**
  - **Storage Interface Card loaded different (no MIL1553 components loaded on board)**
  - **Thus, status is combined...**
- **cPCI crate comprises:**
  - **Enclosure**
  - **Backplane**
  - **LAT Communication Board (LCB)**
  - **Storage Interface Board (SIB)**
  - **Crate Power Supply Board (CPS)**
  - **Wiring**

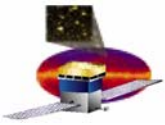


## Last Month's Accomplishment, SIU/EPU (2)

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- **Enclosure (cPCI crate)**
  - Received one, looks ok (fit-checked backplane, boards)
  - Additional ones for test-bed in fabrication
- **Custom Backplane**
  - Backplane received/loaded, is in testing with LCB, awaits software, SIB card, BAE750
  - Integrated in crate enclosure, power applied with CPS and looks ok
  - Layout was modified to use large holes due to project requirement to use solder connections instead of press-fit
- **SIB (MIL1553 interface to Spacecraft, EEPROM storage for code, control circuit for VCHP heaters) (Done at Silver Engineering via NRL)**
  - Finished layout of board
  - Fabricated board
  - Assembled one board
  - Started testing
- **CPS (Generate crate supplies (5V/3.3V) from 28V) (same status as last month)**
  - Debugged module, tested with backplane and LCB, all ok
  - Waiting until all boards including BAE750, SIB are integrated before flight fabrication

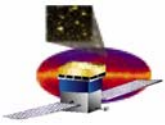




## Last Month's Accomplishment, SIU/EPU (2)

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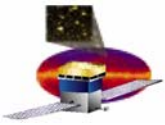
- **LCB (Control/event interface from processor to LAT)**
  - **PMC card code was debugged further**
    - **EM1 version without command slave function (that part is needed when EPU's are added: not EM1, not EM2, but FU model)**
  - **Discovered issue with handling of STOP signal from processor when interrupting DMA**
    - **RAD750 will issue STOP signals, possibly frequently**
    - **Non-trivial, working with ACTEL to see how their PCI core can be used when using pipeline structure (flight system requires use of discrete FIFO's on LCB and thus pipelining)**
    - **Looks like we have solution, but does not fit anymore in SX32 series FPGA**
      - **Requires SX72-1 series, need to order them (\$50k additional cost)**
      - **Requires modified ACTEL PCI Core which meets timing in bigger SX72-1 series**
        - » **Will be released January 04**
  - **cPCI version was put on hold until above is solved**



## Last Month's Accomplishment, Misc

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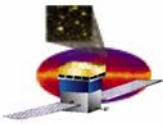
- **LAT Point-to-point cables (“Harness”)**
  - Worked on cable assembly drawings
  - Started to add cable-ways on test-bed so one can fit cables
    - Need to make sure that it is ok with installation sequence during I&T
    - Need to finalize fly-away sensors and cabling since they live in same space
  - Got quotes for test-bed harness, wrote requisition
- **Heater Control Box**
  - Continued to work on schematic of Heater Control Box circuit



# Last Month's Accomplishment, Simulator

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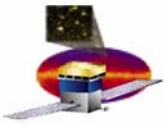
- **Function:**
  - Simulates TKR and/or Calorimeter front-end electronics on test-bed, connects to TEM like subsystem and to PC (latter for downloading data-patterns)
- **Last month:**
  - Modified simulator PC board schematic and layout to incorporate changes from testing of first version PCB
  - Being checked before fabricating 45 boards for test-bed
  - Started ordering of components for 45 boards
  - Started ordering of computer parts for simulator host system



# Last Month's Accomplishment, EGSE

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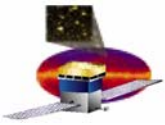
- **Function:**
  - Provides test-setups for CAL, TKR, ACD, DAQ HW & SW effort
  - Contains 60 sets of
    - VME crates
    - VME single-board computers
    - VME SLAC custom transition board (boards and components)
    - Custom PCI Mezzanine Card (PMC) LCB's (boards and components)
    - Connectors for cables
    - TEM enclosures
    - Tower Power Supply enclosures
    - TEM printer-circuit boards
    - TEM components
    - 28V-power supplies
- **Status:**
  - Ordered all parts
  - Received 60 LCB PCB's, loaded 20, tested 20, remaining 40 waiting on connectors
  - Received 60 transition cards, being tested
  - Received VME crates
  - Received CPU boards (firmware being upgraded)
  - Received 28V supplies
  - Setting up area to test/assemble test-stands (R. Rodriguez)
- **Issue:**
  - 42 TEM PC boards are waiting to be loaded but
    - CRISTEK connectors (for TKR and CAL interface) is already 3 weeks late
      - » Problems with delivery of some parts by sub-contractor of CRISTEK
      - » Hope to know more next week



# Manpower

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- **Loosing one key engineer for GASU**
  - **In process of writing requisition but adding new manpower at the stage the GASU is really difficult**
    - **Redistributing effort to other engineers and adding new engineer for additional tasks**
- **Writing requisitions for additional man-power for testing**
- **We've been interviewing...**



# Schedule/Budget

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- Work Scheduled up to date: **7.945 M\$**
- Work Performed: **7.917 M\$**
- Schedule Variance **-28 K\$**