GLAST Large Area Telescope:

4.1.7 Engineering Models

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The principle was written up and released/distributed by Mike Huffer

LAT-TD-00861-01 (July 2002), Test-Stand Architecture Redux

Following are some slides to summarize (and update) the plan
What will be supplied for engineering tower test:

- Tower Electronics Module
- Tower Power-Supply Module
- VME crate with
  - PPC604 EGSE CPU
  - LAT Communication Board
  - VME Transition Board
- 28-V spacecraft (bench) supply, 110V input
- Cables between TEM and rest of DAQ (not from TEM to front-end electronics, responsibility of sub-system)
- Software
- No monitoring beyond what is digitized on tower: CAL/TKR/TEM temperatures, voltages, currents
Tower Electronics Module EM1

- Final interfaces to tracker and calorimeter including power (when Tower Power Supply Board is attached, see next slide)
- Flight-like functionality (control, trigger and event data taking)
- Includes digitization of sub-system temperatures
- Have 18 TEM boards in hand, being tested
- Have software drivers
- Aluminum enclosure for TEM in fabrication
For CAL-TKR Engineering Tower Test (4)

- Tower Power Supply Module (EM1)
  - Final interfaces to TEM and LAT Power-Distribution Unit (which supplies 28-V). Power Distribution Unit is prototyped on VME Transition Board
  - Contains DC/DC converters to provide
    - 1.5V TKR
    - 2.5 V analog and digital TKR
    - 0-150V Bias to TKR. The set point is programmed via a register on the TEM (already in software which was distributed)
    - 3.3V analog and digital CAL
    - 0-100V Bias to CAL. The set point is programmed via a register on the TEM (already in software which was distributed)
    - 3.3V DAQ (TEM)
  - Transition Board has additional capability (does not need to be used): it enables changing of all normally fixed supply voltages to TEM, CAL, TKR (1.5V, 2.5V, 3.3V, all +/- 10%) under program control
  - Prototype Power Supply Module in integration at SLAC
  - Aluminum enclosure in fabrication
- 28-V Master Power Supply already at SLAC
- LAT Communication Board (LCB)
  - VME LCB/COM Board is used in present EGSE stations
  - Will be replaced with PCI-Interface LCB EM1 (PMC plug-in card on VME PPC604 EGSE CPU)
    - Closer to final LCB (interface and full flight-like functionality)
    - Transparent to EGSE user (no change in user software), just replace VME card with PMC (PCI Mezzanine Card) plug-in card on existing CPU
  - In design, scheduled to have prototype late December
- Takes care of communication using LAT protocol to TEM (via Transition Card)
  - Commanding and read-back
  - Event data acquisition
VME Transition Board

- EM1 Functionality of
  - LAT Fan-Out/Fan-In unit
  - Global Trigger
  - Power-Distribution Unit

- Command from LCB is fanned-out on this board to TEM
- Hosts 20-MHz system clock, also fanned-out to TEM and LCB
- Receives command response from TEM and forwards to LCB
- Receives trigger inputs from TEM and generates trigger messages (back to TEM)

- Prototype in hand, being integrated
Software (on PPC604 CPU)

- Drivers for
  - LCB (includes front-end drivers)
  - Transition board
  - TEM
  - Interface to I&T software
Other DAQ EM’s (not used for tower EM test)

- **Spacecraft Interface Board (SIB)**
  - Prototype board with cPCI interface (in ACTEL) and MIL1553 interface in test at NRL
  - Next prototype will include LVDS (event-data) interface to spacecraft (when interface is defined, in development with SC vendor)
- **CPU**
  - BAE RAD750 cPCI Engineering module already in test at NRL since Spring 02
  - PPC603e back-up cPCI board in debugging stage at NRL
- **Event-Builder**
  - EM1 in design, prototype in early Spring 03
- **ACD Electronics Module**
  - Version to support one full ACD FREE already in use at GSFC
  - Version with full functionality and interface to 12 ACD FREE’s in design, prototype in December 02