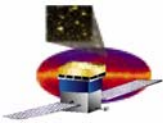


## GLAST Large Area Telescope:

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

September Status 09-01-04

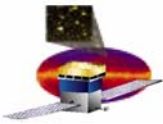
Gunther Haller  
haller@slac.stanford.edu  
(650) 926-4257



# Test-Stand Summary

Client	Shipped	Assemble/Test	Total
Calorimeter (conformal)	8	3	11
Calorimeter	5	0	5
Tracker (conformal)	2	0	2
Tracker	9	0	9
ACD	4	0	4
I & T* (next slide)	5	0	5
DAQ/FSW	12	0	12
Electronics Support	11	0	11
<b>Total</b>	<b>56</b>	<b>3</b>	<b>59</b>

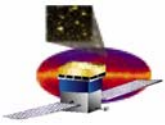
- **Finished TKR test-stands**
- **ACD was already finished**
- **Produced 3 more CAL FM TEM/TPS including conformal coating/stacking**
  - **Were 2 short, made one additional spare, in testing**
- **Added one complete test-stand for trigger (Su Dong/Martin)**
  - **Delivered**
- **GASU's were delivered to I&T, only PDU remains to be provided (in test)**



# Test-Stand Maintenance

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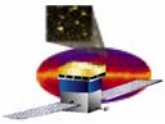
- **TKR Returns**
  - One TEM came back for repair, output signal was shorted to VCC, possible from safe-to-mate probing and shorting out two neighbor pins (saw that before)
- **CAL Returns**
  - One CAL TEM Bit was stuck in GCCC ASIC. Original TEM test did use unscreened ASICs. ASIC screening test does test all FIFO bits. Suck bit was shown in ASIC test. ASIC replaced, tested, returned to NRL.
  - CAL FM TPS passed initial vibration test, but failed in vibration test end of last week when connected to flight CAL
    - Being sent back to SLAC for investigation
    - Need to find out why, TEM was stacked per flight instructions, but by commercial vendor (no flight controls). To be continued.
- **ACD Returns**
  - One VME crate failed (power switch). Being replaced.



# ACD Teststand

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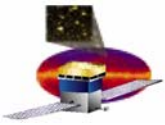
- Last ACD test-stand was already delivered last month
- Issue with high-rate testing -> CPU crashes -> GASU needs to be power-cycled (since high-rate trigger is still present and will crash CPU as soon as it is up)
  - Cause: CPU fills up 100% and, due to CPU/LCB bug, CPU crashes
  - Happens at about 300 Hz (note that TKR, CAL run several KHz, DAQ up to 5 KHz without problems). Difference is how events are processed by sub-system software.
- Mitigation: Short Term:
  - DAQ/I&T to send ACD instruction on how to reset GASU after CPU crash so that GASU does not need to be power-cycled. (Done as of yesterday)
  - ACD to either
    - Change code to process all events off-line (transmit from CPU to PC instead of process them in the CPU), or
    - Change code to process only fraction of events real-time in CPU (prescaling)
  - Testing can continue by
    - First look at rate-counters to confirm that rates are not high
    - If rates are low, one can take data, if rates are high, there is a problem anyways
- Mitigation: Longer Term (couple of weeks)
  - DAQ/I&T to send ACD
    - 4 each LCB's with updated FPGA code
    - New revision I&T release (back-ward compatible, transparent)
  - This will fix crashes, but in order to do high rate processing, ACD code still needs to change code as described above



## TEM/TPS Production Status

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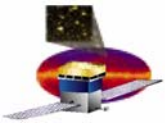
- Received Novacaps, another cap which was surge-tested, parts from lead-forming
- Parts kit shipped to General Technology, being audited
- Interim Milestones
  - TEM/TPS Qual + 2 ship to I&T 12/1/04
  - TEM/TPS Production units to I&T 3/7/05
- Tasks left to be completed
  - Release of some modified test procedures
  - Delivery/review of detailed vibration/TC procedure from GT
  - Delivery of test-stands including engineers to GT (in two weeks)
- Schedule risk mitigation efforts in process
  - 3x weekly production meetings to assign and status action item matrix (Brigitte Estey)
  - 1x weekly meeting with assembly house to prepare for production and work documentation/process issues prior to receipt of kits



# ASIC

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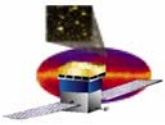
- **All GTCC1, GCCC1 TEM ASIC's screened**
  - **Function/Performance test: 95% yield**
  - **Burn in**
  - **No failures after burn in**
- **Radiation testing**
  - **7 burned-in samples TID tested, up to 10 krad, no failures**
  - **1 non-burned in sample tested, no failures**
  - **Original plan was for 8 burned-in chips**
    - **NCR to be created**
- **GLTC ASIC's (for GASU)**
  - **Test documents to be released before testing can commence**



## **GASU & GASU-PS & PDU & SIU**

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- **Brigitte is working on getting very detailed production schedule entered (like for TEM/TPS)**
- **Driver is getting all fabrication documentation approved and contract put in place**
  - **SIU/EPU mechanical drawings released**
    - **Requisition written for flight fabrication**
  - **PDU mechanical drawings in review**
    - **Requisition written for flight fabrication**
  - **GASU mechanical drawings in review**
    - **Requisition written for flight fabrication**
- **Drivers**
  - **Getting parts audited to check whether there are problems (not on reel, correct parts, not sure-tested, late parts, etc)**
  - **Getting SIU/PDU/GASU internal harness components ordered**
    - **Have draft SOW, need vendor to quote on**
  - **Getting Assembly SOW written and PO placed**
  - **Getting electronics drawings released**

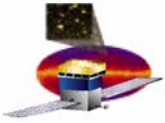


# GASU & PDU & SIU Electrical

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- **GASU:**
  - Power switching sections: Some concerns about rating of transistors when ACD FREE has failure (short)
  - Requested in-rush current profile for ACD FREE 28V for HV
    - When 28V is applied
    - When HV supply is enabled
      - For e.g. 100V at turn-on, and 1000V at turn-on
  - Flight layout will be finished end of this week, Art just emailed some data.
- **PDU:**
  - Flight layout finished, in review
  - BOM, layout, schematic
- **SIU**
  - Found that on SIB and LCB, when input 28V power comes on slow, 3.3V to ACTEL is applied before 2.5V (and that is not right since ACTEL has then in-rush current problem, see GIDEP alert: they need first 2.5V and then 3.3V)
    - Problem: 3.3V Actel is delayed from 3.3V to board by power-switch circuit. However we see that 3.3V ACTEL comes up before 3.3V to board
    - Cause: 28V/5V converter operates from 7V on, and 28V/3.3V converter only starts working at about 16V: We see leakage from 5V to 3.3V Actel supply. ACTEL gets partially powered via 5V path before 3.3V is applied to board
    - Solution: in work for SIB pull down resistor and modification to POR reset circuit fixes it. LCB is in progress.

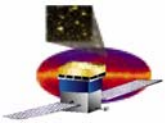




# Heater Control Box & Harness

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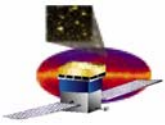
- **Heater Control Box drawings sent for release**
- **Harness drawings submitted for review/release**
- **SOW for harness in progress.**



## FES/Testbed Status

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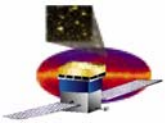
- **Hardware *Complete*:**
  - All 16 TEMs, GASU, PDU upgraded
  - ACD-FES Cabling Complete
  - System connectivity verified using FES
- **FES input datasets have been generated from GLEAM MC**
  - Mostly muons in tower centers
  - With this MC, the FES has been used to self trigger the LAT
    - Resulting in the readout of all 16 Towers
    - Rates up to 10 KHz w/o deadtime
    - Rate of 20 KHz results in well understood deadtime.
    - Run durations of ~minutes
    - Data integrity checked by eye
  - Collaborators from The OSU have been integral in the process
- ***The FES/Testbed is now being used to test T&DF design!***



# FES/Testbed Plans

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- **Immediate Goals**
  - **Begin using “new LCB” and associated FSW when available**
  - **Begin systematic tests of all aspects of T&DF**
    - **Data integrity**
    - **Timing and edge effects**
  - **Take data for extended periods (hours-days?) without error**
  - **FES/TB will be used for SIIS Acceptance**
- **Longer Term**
  - **Testing the Event Filter**
    - **(recall, this is the original purpose of the FES/TB)**
- **FSW & SW Testing driven by requests**
- **FES/TB Group**
  - **Weekly meetings**
  - **OSU group instrumental in the development of tools to verify T&DF**



## Schedule/Budget

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- Total budget: \$22,055
- Work Scheduled up to date: \$20,048
- Work Performed: \$17.936
- Actuals: \$19,295
- Schedule Variance \$-2,112k (-10.9%)
  - Qual/Flight work should have been started, reflects current status
- Cost Variance: \$-1,360k (-7%)
  - EGSE is over budget (26-00068)