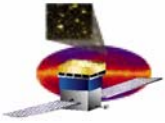


## **GLAST Large Area Telescope:**

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

**Monthly Status 01-05-05**

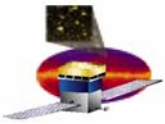
**Gunther Haller  
haller@slac.stanford.edu  
(650) 926-4257**



# Test-Stand Summary

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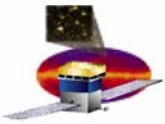
- **ACD test-stands:**
  - **G3 GASU which had been returned to SLAC for repair was repaired and sent back to GSFC.**
    - **Cold solder joint on added wired-on circuit for FREE I/V monitoring**
  - **Added by Mike...**
    - **I & T GASU upgraded to “full boat”**
    - **Passed ELX tests, waiting formal acceptance**



# ASIC

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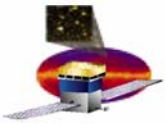
- All GTCC1, GCCC1 TEM ASIC's screened
  - Qualification testing at GSFC:
    - The parts have passed all of the tests to date.
    - The GTCC and GCCC began the 1000 hr life cycle test on Dec. 15<sup>th</sup> and completed the 168 hr room temperature test on Dec. 22<sup>nd</sup>. This test will be complete on Jan. 26<sup>th</sup> and will then require 3-temperature testing.
- GLTC ASIC's (for GASU)
  - New test-boards were fabricated/loaded/tested
  - About 20 GLTC3's were burned in/tested/no failures
  - 10 were sent to Italy for TID
  - New batch of about 32 are in burn-in
  - Need about 35 for one complete GASU box (in baseline two enclosures are to be assembled)
  - Additional ~50 for GSFC qual testing to follow



# ACTEL

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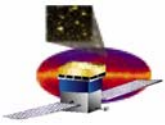
- UMC line FPGA's
- 3 sets (one 32-1, one 72-series) were put on TEM flight boards
  - **Flight TEM passed function/performance tests over temperature**
- 8 more sets were programmed (for 8 more TEM's) and are being lead-formed at Fancort for TEM assembler
- 2 72-series were programmed for PDU, will be lead-formed at PDU assembler



## TEM/TPS Schedule Qual, TWR-A, TWR-B

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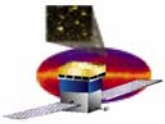
- 3 TEM/TPS were integrated in their respective enclosures & tested, passed function/performance tests, about 3.5 weeks ago
- 3 TPS's were mounted onto TEM's & tested, passed, about 3 weeks ago
- Attempted vibration at GT for about 9 days, but system at GT was not operating satisfactorily to use on flight assemblies
  - Table only vibrates in one dimension
  - Required mounting fixture to get 3 dimension
    - GT designed it and it was available, but
    - System had issues with stabilization, looked like mounting fixture needed to be redesigned
  - Number of sensors not sufficient
  - Had 3 SLAC engineers helping in New-Mexico, but after a few days we gave up and decided to change plan
  - Vibration test TEM/TPS at Wyle instead (close to SLAC, previous vib tests on EM TEM/TPS were performed there without issues)
- Changed original production plan and shipped the 3 TEM/TPS assemblies to SLAC
- All 3 passed incoming electrical tests at SLAC
- Meanwhile: Re-run vib test with EM TEM/TPS at Wyle: M. Opie (mechanical), D. Tarkington (DAQ),
- Wrote/reviewed/released test procedure for test now at Wyle
  - No stand-offs, directly mounted via mounting plate to vib table



## TEM/TPS Schedule Qual, TWR-A, TWR-B (con't)

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- Qual
  - Jan 24/25: Vib-tested qualification TEM/TPS at Wyle
    - Jan 26 Ran test successfully
  - Jan 28: thermal-cycle qual (together with TwrA and TwrB below) & test
  - Jan 30: mass/ CG measurement
  - Feb 12: start TV (12 cycles, start after TV of TwrA/TwrB for schedule reasons)
  - Feb 28: EMI tests starting at CKC lab (EMI procedure is being drafted at CKC Lab in Fremont)
  - Mar 16: review
  - Performance over Temperature with CAL AFEE and TKR MCM as soon as AFEE/MCM/flex-cables are available
- TwrA/Twr B
  - Jan 25: Vib-test
    - Jan 27 Run test (1 day delay to re-measure mass)
  - Jan 27: mass measurement (no CG required)
  - Jan 28: Thermal cycle together with qual
- TwrA
  - Jan 29: Start TV
  - Feb 4: EMI test
  - Feb 6: review
  - Feb 7: Deliver to I&T
- TwrB
  - Lags Twr A by one week due only to TV bottle-neck
    - Can one TV two TEM/TPS simultaneously?
    - In principle yes but it requires more TV IO connections, additional connector plate
    - About \$12k to upgrade, suggest to do it if \$ are available to accelerate future production schedule
    - Second test-stand is not an issue on the time-scale the 3<sup>rd</sup> TEM/TPS is available



## TEM/TPS Schedule

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- **According to last slide, first FLT TEM available Feb 7, but:**
  - **Strongly Recommended:**
    - Performance test over Temperature of each FLT TEM/TSP with CAL AFEE and TKR MCM (no vacuum required)
    - As soon as AFEE/MCM/flex-cables are available, but that test needs to be inserted in flow above
    - 1 day for test, but required working 4 AFEE, 36? MCM's, 8 flex-cables! When??
    - Flex-cables/MCM's need to be bowed/curved since oven is not large enough for straight flex-cables (is doable)
- **Flight production for balance of 19:**
  - Was released first week of January
  - Production not started
  - Jan 25, had telecon with GT to make sure all lessons learned are in production documents
  - Jan 28: all production documents are updated and released
  - Jan 31: production should start at GT
  - Still waiting for GT's schedule



# PDU

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- **PDU**
  - Assembly contract awarded (Aeroflex)
  - QA and Technical Interface Meeting meetings 1/26 and 1/27 at Aeroflex
  - Feb 7: deliver part kits to Aeroflex (being kitted at SLAC), subsequent discrepancy resolution assembly of CCA's
  - Schedule to be provided by Aeroflex at TIM: our estimate
    - March 14: deliver first pre-coat PDU to SLAC for testing, return 1 week later
    - April 11: deliver coated, fully assembled first PDU to SLAC
    - May 2: Done with Vib/TC/TV/EMI
  - 2<sup>nd</sup> PDU lags first by about 5 weeks (after 1<sup>st</sup> PDU passes pre-coat tests)
  - Old Issue: OMNIREL linear-regulator. Recalled lot which was received by SLAC. (Tantalum cap used has end-termination with pure Sn as opposed to Sn/Pb. Can't use in space.) New delivery maybe late Feb 05. Issue with DX-priorities
- **Testers**
  - PDU tester is assembled, code still in progress
- **TV testing plan**
  - See GASU

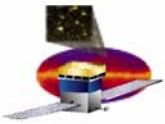




# GASU & GASU-PS & PDU

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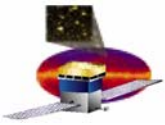
- **GASU**
  - Same state as PDU
  - Schedule lags PDU by 2-3 weeks
  - Issue: Trigger-related FPGA's were modified to achieve timing margins for flight-FPGA (additional pipe-line registers were added to meet (slower) flight FPGA margins)
- **Testers**
  - GASU tester being designed/assembled
- **TV testing plan**
  - Currently building 33 TV chamber can only be penetrated with small percentage of signals (~100)
    - Upgrade to 600 pins: \$21k
    - Upgrade to 450 pins: \$12k
  - If one wants to exercise each I/O from GASU to 24 FREE interfaces, 16 TEM's, 5 crates, monitoring
    - Need to design/build analog multiplexer boards to switch 1 TEM to 16 GASU TEM IO's
    - Plus relays to switch power to 12x2x (3.3V + 28V)= 48 FREE power connections
  - Engineer is currently designing system and calculating number of TV IO pins are required
  - Need to design/fabricate thermal construction to mount GASU/TEM/FREE in thermal chamber



# SIU

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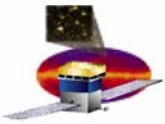
- **SIU**
  - Enclosure in fabrication, plating is imminent
  - Test with RAD750 flight board revealed that two mounting holes are off
  - Mounting brackets will be modified next week, then crate will go to plating
  - CPS board in and coupons passed
  - LCB and CPB coupons failed, boards are being refabricated, due back end of this week
  - SIB board going to fab next week
  - Decided to only load one type of SIB's (SIU SIB's)
    - EPU SIB's did not have any MIL1553 components
    - Load all SIB's the same, overall more cost-effective
  - Testers and documentation for board and crate tests to be done
- **Issue**
  - Austin EEPROM lot acceptance was put on hold by GSFC (used on SIB)
    - DPA issues
  - GSFC sent pictures to Austin
    - Austin responded, discussion on-going



## Harness/RAD750/ISIS

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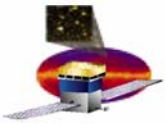
- **LAT Harness**
  - Awarded, parts need to be kitted, priority list was created
- **RAD750**
  - Need to resolve heat-sink issue, will have to send boards back to BAE for rework
  - Issues with Omnirel regulator (need to be replaced on RAD750)
    - Had telecon with BAE/General Dynamics/GSFC
    - 12-14 weeks delivery quoted from Omnirel to BAE
- **ISIS acceptance test successful**



# RAD750 Test

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- Took RAD750 flight board and ran tests in an engineering SIU crate with
  - EM Crate Backplane (CBP)
  - EM Storage Interface Board (SIB)
  - EM LAT Communication Board (LCB)
  - EM Crate Power Supply (CPS)
- Main goal was LCB firm-ware/software validation (EM BAE750 has differences to RAD750, e.g. boot code is different)
  - Power-up/down and power-on reset ok (POR to RAD750 needs to be asserted while powering on/off, mainly because of SU-EEPROM)
  - Crate power-supply works with RAD750
  - Power Consumption of crate @RT, @28V: 23.5W
    - In budget: 28W (23.5W will increase a bit due to 2 LCB/1SIB flight FPGA differences)
  - Programming of SU boot-code into RAD750 EEPROM successful
  - Primary and secondary boot of RAD750 successful
  - Communication with SIB successful
  - Communication with LCB including DMA successful
  - Discrete IO tests successful
- Remaining risk is timing over temperature with flight FPGA's in SIB and LCB
  - Can only be done once qual models of those boards are available



## Schedule/Budget

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- Total budget: \$22,238
- Work Scheduled up to date: \$21,406
- Work Performed: \$18,865
- Actuals: \$22,364
- Schedule Variance \$-2,541k (change from last month: -2k)
  - Qual/Flight work should have been started, reflects current status
- Cost Variance: \$-3,500k (change from last month: -\$100k)
  - Detailed list was provided last year, needs CCB action