GLAST Large Area Telescope:

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

Monthly Status 01-05-05

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Test-Stand Summary

• 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

- 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. 15th and completed the 168 hr room temperature test on Dec. 22nd. This test will be complete on Jan. 26th 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

- 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

- 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)

- **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 3rd TEM/TPS is available
TEM/TPS Schedule

- 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

• 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
  – 2nd PDU lags first by about 5 weeks (after 1st 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

• 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

• 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

- 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

- 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

- 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