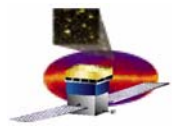


GLAST Large Area Telescope: Performance & Safety Assurance

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Performance & Safety Assurance Manager**

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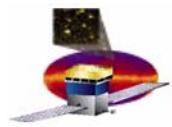
Outline

- Mechanical Subsystem – Grid Status**
- Tracker Subsystem QA Activities**
- Tracker Subsystem QA Issues**
- Tracker Subsystem QA Concerns**
- DAQ Subsystem – Part Status**
- DAQ Subsystem – Enclosure Status**
- Flight Software QA Activities**
- LAT QA Audit Activities**
- Issues and Concerns**
- Cost Variance Analysis**



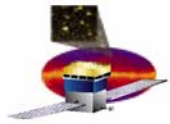
Mechanical Subsystem – Grid Status

- Final machining operations on Grid prior to plating and alodining have been completed
- MRB was held 8/16 with Mechanical Subsystems, System Engineering, I&T and QA to review Grid dimensional nonconformances found during final dimensional inspection (NCR #147)
 - Discrepancies on Tracker, Calorimeter, and ACD interfaces were dispositioned “conditional” use as is. Additional inspection and analysis will be performed.
 - Spacecraft interface dimensions will be verified using LAT/Spacecraft interface tool after spacecraft mount bushings are installed in Grid following plating
 - EMI interfaces will be fit checked after plating, and EMI mounting holes can be enlarged as required
 - Radiator mount bracket interfaces will be shimmed to accommodate Grid squareness discrepancy
- MRB concurred to proceed with Grid alodining and plating
- Alodining completed 8/23 at Sanford Metal Processing (Menlo Park, CA)
- Grid shipped to Platron (Hayward, CA) for selective Ni plating per AMS 2451/1
- Grid will return to Tapemation after plating for helicoil and bushing installation, EMI shield fit checks, RMB shimming, Spacecraft interface dimension verification and closure of NCR #147



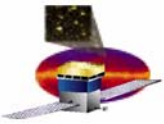
Mechanical Subsystem – Grid Status (Con't.)





Tracker Subsystem QA Activities

- **Completed tasks**
 - **Inspections of MGSE and flight hardware for tower assembly activities**
 - Interface hardware
 - Lifting fixture
 - Vibration fixture
 - Inner shipping container
 - Cable-holding frame
 - Cable-fixation corner brackets
 - **Pre-Production Readiness Review performed for tower assembly**
- **Issues**
 - **Bias Circuit Bonding Failure**
 - **Kapton bias circuits bonded to the tracker trays fail under T/V testing at 55C**
 - **Tiger Team currently in Italy to propose plan of action**



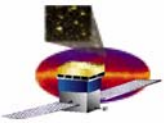
Tracker Subsystem QA Issues

- **Flex cable coupon failures**
 - Coupon evaluation results received from GSFC show failures on 5 Parlex flight flex cables
 - 1 coupon had internal annular rings missing and separations between barrel plating and internal layers
 - 4 other coupons had separations between barrel plating and internal layers
 - LAT Team visited Parlex last Friday to discuss failures
 - Parlex and LAT personnel were at GSFC today to review sample preparation procedures and coupon results
- **Novacap HV capacitors on MCMs fail the mil-spec leakage current requirement**
 - Lifetime testing at GSFC and MCM experience indicate minimal risk
 - Plan is to use existing capacitors on boards and cut in new production of capacitors when available
 - Documentation of test results, conclusions and disposition required to close issue
- **MCM Workmanship issues (peeling of conformal coating, bubbles, and solder and solder on connector leads)**
 - Additional investigation, inspections and analysis required



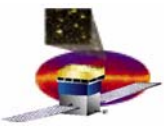
Tracker Subsystem QA Issues (Con't.)

- **Charge injection read-back errors at +60C**
 - **MRB held on May 28th – Additional tests and analysis performed by Tracker team that isolate the error to be internal to the GTRC chip**
 - Traced to GTRC timing margins, which were found to be sensitive to clock duty factor
 - Follow-up MRB required to address analysis
- **Pitch adaptor trace cracking**
 - Traces on the MCM pitch adaptor show cracking in the nickel at the bend region; some cracks results in open traces
 - Qualification of “revised” pitch adaptors design (no nickel or gold plating in bond area) not successful; second design iteration complete
 - Design review to take place prior to moving to production
- **MCM board shorts**
 - 6 MCMs have developed internal board shorts
 - Investigation and analysis is underway



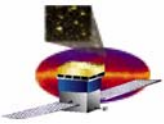
Tracker QA Concerns

- **LAT Tracker and QA resources are focused on addressing “problems of the moment”**
 - **Delays in addressing open Tracker NCRs**
 - **A total of 35 INFN & SLAC Tracker NCRs are open**
 - **17 NCRs have been opened within the past 30 days**
 - **8 NCRs have been open over 30 days**
 - **6 NCRs have been open over 60 days**
 - **4 NCRs have been open over 90 days**
- **LAT SLAC Tracker Quality Engineer is retiring requiring reassignment of responsibilities**



DAQ Subsystem - Part Status

- **Tower Electronics Module (TEM) EEE parts inspection and acceptance**
 - 36 of 39 part types received to date
 - DPA samples from 3 part types submitted to GSFC for evaluation passed (7 TEM part types require DPA)
 - 28 part types approved for “flight use”
- **Tower Electronics Module Power Supply (TEM-PS) parts inspection and acceptance**
 - 73 of 76 part types received to date
 - DPA samples from 8 part types submitted to GSFC for evaluation passed (13 TEM-PS part types require DPA)
 - 66 part types approved for “flight use”
- **TEM & TEM-PS part issues and concerns:**
 - Replacement Novacap capacitors have not been received
 - Two capacitor types were not surge tested by supplier. Parts sent to GSFC for surge testing
 - Bake-out of Cristek connectors required (interface seals were not pre-baked prior to connector assembly)
 - FPGA reliability issue outstanding
 - Determination of parts (mechanical) on hand is still in progress by DAQ Production; status of part inspections are reviewed regularly
 - Number of recent design iterations on PWBs. Subsequent testing of CCA resulted in BOM revisions.



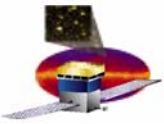
TEM Enclosure Status

- **TEM Enclosures**
 - **Source inspection performed June 18 at vendor facility**
 - **Reviewed plating operations at plating vendor**
 - **21 lids and bases received at SLAC**
 - **5 of the enclosure bases returned to vendor for replacement due to plating irregularities**
 - **5 replacement bases to be delivered from vendor this week**
 - **100% dimensional inspection on 2 bases and 2 lids**
 - **Fit check on one base and lid by QA revealed slight “oil canning” distortion of base**
 - » **Additional evaluation revealed out of tolerance flatness condition on bases and lids**
 - » **Flatness profiles were measured on bases to determine how much distortion circuit boards will experience when installed into bases**
 - » **Measured base distortion is within the allowed 0.5% bow and twist requirement for TEM PWB**



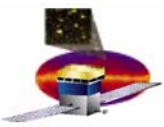
DAQ ASICs Inspection & Test Status

- **GLTC3 – 645 each (GASU); GTCC1 – 881 each (TEM); GCCC1 – 824 each (TEM)**
 - **Screening and Qualification Plan, LAT-TD-02656, released and approved**
 - **Visual inspection and serialization completed**
 - **Thermal cycling completed**
 - **GTCC1 and GCCC1 have completed thermal cycling 4/2/04**
 - **GLTC3 requires thermal cycling**
 - **Electrical testing and burn-in performed at SLAC in Building 33 (LAT I&T Facility)**
 - **Initial Electrical Test at 25C**
 - » **GTCC1 – 224 of 231 accepted**
 - » **GCCC1 – 112 of 139 accepted**
 - **Dynamic Burn in for 168 hrs. at 85C**
 - » **GTCC1 – 224 of 244 accepted**
 - » **GCCC1 – 112 of 112 accepted**
 - **Electrical Test post burn in at 25C**
 - **GTCC1 – 224 of 224 accepted (Enough GTCC1s for 28 TEMs)**
 - **GCCC1 – 112 of 112 accepted (Enough GCCC1s for 28 TEMs)**
 - **Radiation testing (TID) to be performed in Italy**
 - **9 ASICs from each ASICs type to be sent to Italy**
 - **Qualification testing will be performed at GSFC**
 - **52 ASICs from each ASICs type need to be provided to GSFC**
 - **DPA evaluation performed on all three ASICs and passed**



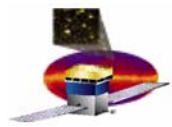
Flight Software QA Activities

- **Software Quality Engineering oversight necessary at this stage of flight software life-cycle**
 - **LAT Performance Assurance provided recommendation to LAT Project Management to supplement flight software activities with Software Quality Engineer**
 - **LAT Performance Assurance identified individual to support this function and in-process of establishing contract**
- **EEPROM reliability issue on the RAD750 and SIB**
 - **EEPROM can experience a failure mode that affects all the bits in the 128 bytes of a page of memory**
 - **NCR No. 149 was generated to capture this issue**
 - **Mitigation strategies are presently being formulated**



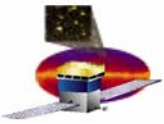
LAT QA Audit Activities

- **Facility Readiness Review (SLAC I&T Facility – Building 33) was performed by LAT QA on May 19th & 24th**
 - **Facility Readiness Review performed to evaluate readiness of facility to receive, store, assemble and test flight hardware**
 - **4 findings and 22 observations were identified and documented**
 - **4 findings and 14 observations have been closed to date**
- **Status of LAT responses to GSFC Audit recommendations**
 - **Responses to all 26 observations were provided to Lead Auditor March 4th**
 - **25 of the responses have been closed by the Audit Team**
 - **One response required additional information be submitted related to MAR deliverables**
 - **LAT Project Controls and Performance Assurance updated the MAR Deliverables Matrix in April and it is currently with LAT Project Management for review**



Issues and Concerns

- **Incoming inspection & documentation backlog has accumulated**
 - **QA inspector has been on long-term medical leave**
 - **QA has lost two excellent short-term replacements due to Purchasing cycle time to execute contract**
 - **Presently QA is not a bottleneck but inspections performed on “just-in-time” basis based on priorities**
 - **QA does not have visibility into part application for those parts in bonded stores**
 - **No Mechanical Subsystem TCS parts have gone through incoming inspection**
 - **Plan to meet with subsystem to determine priorities and work with Production Group to get parts identified**
 - **Few DAQ SIB, GASU, Harness and PDU part inspections have been performed**
 - **Still struggling with getting “critical path” parts to QA in timely manner**
 - **Resources required to address documentation and quality problems of components/parts exasperates issue**
 - **QA has over 70 documents in the queue to review**



Cost Variance Analysis

- **Cumulative CV = \$139K (Last month \$149K)**
 - **Management = \$48K**
 - **Quality Assurance = \$89K**
 - **Majority of variance due to delayed processing of subcontractor invoices. Actual expenditures in line with planning.**
 - **Records Management = \$-3K**
 - **Training = \$5K**
 - **Systems Safety = \$0K**