

GLAST Large Area Telescope: Performance & Safety Assurance

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Outline

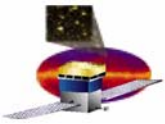
- Tracker MCM EEE Parts Inspection
- Tracker MCM QA Activities
- DAQ TEM QA Activities
- DAQ TEM-PS and EGSE QA Activities
- DAQ ASICs Inspection and Test Status
- Mechanical Subsystem QA Activities
- LAT QA Audit Activities
- Near-Term Milestones
- Cost Variance Analysis



Tracker MCM EEE Parts Inspection

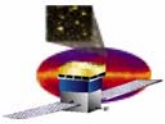
– Omnetics connectors

- **Male connectors (A8485-001) and connector savers (A8597-001)**
 - **Source inspection and process surveillance at Omnetics on May 11-12 surfaced a design change to the connector**
 - » **An arbitrary decision was made by Omnetics to drill all the way through the jack screw blind threaded hole**
 - » **Male connectors were determined to be unacceptable per the LAT Material Review Board (MRB)**
 - » **The connector savers could be “used-as-is”**
 - » **99 male connectors received by SLAC (2 date lot codes) were affected and returned for replacement (no affected male connectors were shipped to Teledyne)**
 - » **The vendor has revised the drawing with min.-max. blind hole tolerances, and has resumed production**
- **Female connectors (A8486-001) were unaffected by this issue**



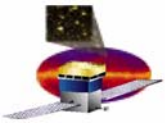
Tracker MCM EEE Parts Inspection (Con't.)

- **MCM Printed Wiring Boards (PWBs)**
 - **Flight PWB coupon testing**
 - **266 panel coupons submitted to GSFC for testing**
 - **260 coupons have been tested to date**
 - **31 coupons have failed for delamination, minimum annular ring and dielectric spacing**
 - » **PWB Tall (LAT-DS-00368) – 5 out of 20 coupons failed**
 - » **PWB Short (LAT-DS-00077) – 26 of 240 coupons failed**
 - **90 total flight PWBs affected by these failures (90 of 927)**
 - **A series of face-to-face meetings and telecons have taken place with the supplier (DDI) to discuss the failures and other quality issues**
 - **Cause and corrective action has been determined and approved**
 - **Final MRB to take place upon completion of coupon testing**
 - **DDI will replace 40 of the short PWBs and 15 of the tall PWBs**



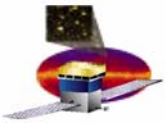
Tracker MCM QA Activities

- **A MRB Meeting was held May 18th to address the following MCM issues:**
 - **Unprobed GTFE ASICs – NCR #97**
 - **Verified no suspect ASICs were utilized in flight MCMs**
 - **Pitch adaptor cracked traces – NCR #100**
 - **Qualification plan for redesigned pitch adaptor developed**
 - **Process validation will be performed with 25 pitch adaptors**
 - **TMCM failed post burn-in functional test – NCR#96 (closed)**
 - **Contamination was removed from the traces and retested**
 - **NCR #97 and #100 will remain open until completion of action items**
- **GSFC Resident Quality Engineer performed a quality survey at Teledyne May 20-21**
 - **No issues relating to Teledyne process controls or workmanship identified**



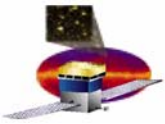
Tracker MCM QA Activities (Con't.)

- **Six flight MCMs were delivered to SLAC 4/23/04**
 - **NCR #98 - Current values exceeded allowable requirements**
 - EGSE not designed for measure the current values referred to in the procedure
 - Current values were captured during pre-production and thought to be of value as reference information
 - Procedure and work order were revised eliminating this requirement – NCR closed
 - **NCR #99 - TEM-1 (EGSE) was not certified for use on flight hardware by means of an Acceptance Test Procedure as required by LAT-MD-00408**
 - EGSE Acceptance Test Procedure Released on 5/12
 - Completed the acceptance test of the burn-in EGSE 5/13
 - Restarted burn-in with EGSE EM-2 utilizing updated LAT-TD-02367 document
 - **These six MCMs segregated in LAT QA Bonded Stores**
 - Disposition of six MCMs needs to be addressed
- **Three MCMs delivered to SLAC 5/3/04**
 - **Accepted by LAT QA and shipped to INFN 5/24/04**



Tracker MCM QA Activities (Con't.)

- **Twelve MCMs delivered to SLAC 5/10/04**
 - Six MCMs accepted by LAT QA and shipped to INFN 5/24/04
 - NCR #104 - GTFE register read-back failures at -30C (Four MCMs)
 - MRB held on May 28th – Additional tests and analysis required
- **Twenty eight MCMs delivered to SLAC between 5/17 and 5/21**
 - NCR #106 - GTFE register read-back failures at -30C (Nine MCMs)
 - Same issue noted on NCR #104
 - NCR #107 – Charge injection read-back errors at +60C (Two MCMs)
 - MRB held on May 28th – Additional tests and analysis required
- **Twenty four MCMs received 6/1/04 by LAT QA for review**
 - Temperature cycling, electrical test and burn-in to commence this week



DAQ TEM QA Activities

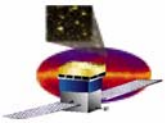
- **Tower Electronics Module (TEM) EEE parts inspection and acceptance**
 - **28 of 39 part types received to date ***
 - **20 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete**
 - **ADC and DAC ICs just completed testing at GSFC and are acceptable**
 - **DPA samples from 4 part types submitted to GSFC for evaluation (7 TEM part types require DPA)**
 - **2 part types sent to GSFC for screening (fuses)**
 - **GSFC understands the priority for these parts**
 - **19 part types approved for "flight use"**
- **TEM assembly vendor qualification**
 - **A quality survey is schedule for June 15-16 at General Technology Corp. in Albuquerque, New Mexico**
 - **Survey team to include LAT QA and GSFC QE**



DAQ TEM-PS and EGSE QA Activities

- **Tower Electronics Module Power Supply (TEM-PS) parts inspection and acceptance**
 - **55 of 75 part types received to date ***
 - **55 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete**
 - **DPA samples from 9 part types submitted to GSFC for evaluation (13 TEM-PS part types require DPA)**
 - **Four part types passed DPA to date**
 - **2 part types sent to GSFC for screening (fuse, IC)**
 - **49 part types approved for "flight use"**
- **TEM-PS assembly vendor qualification**
 - **A quality survey is schedule for June 15-16 at General Technology Corp. in Albuquerque, New Mexico**
- **ESGE QA Activities**
 - **ACD G3 Test Stand #2 hardware and documentation was reviewed and approved**

* *Total number of part types as delineated on the applicable LAT EEE Parts List*



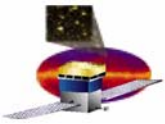
DAQ ASICs Inspection & Test Status

- **GLTC2 – 762 each (GASU); GTCC1 – 881 each (TEM); GCCC1 – 824 each (TEM)**
 - **Screening and Qualification Plan, LAT-TD-02656, released and approved**
 - **Visual inspection completed 2/24/04**
 - **Serialization by outside vendor completed 3/10/04**
 - **Thermal cycling completed 4/2/04**
 - **Electrical testing and burn-in to be performed at SLAC in Building 33 (LAT I&T Facility)**
 - **Radiation testing (TID) to be performed in Italy**
 - **Qualification testing, DPA to be performed at GSFC**
 - **Informed by DAQ Subsystem GLTC3 – 645 each, will replace GLTC2**
 - **Visual inspection and serialization of GLTC3 completed last week**
 - **Thermal cycling, electrical testing and burn-in need to be performed**



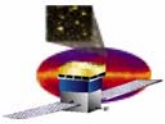
Mechanical Subsystem QA Activities

- **Mechanical Subsystem Support**
 - **Supported LM Production Readiness Review (PRR) for X-LAT Assembly**
 - **Two RFAs were generated from the PRR**
 - **LAT and GSFC QA to review work orders and procedures prior to start of manufacturing**
 - **Held MRB to approve re-test of LM constant conductance heat pipes (CCHPs). CCHPs were proof tested at pressure below requirement of 1.5X MEOP (max expected operating pressure)**
 - **LAT and GSFC approved LM retest plan**
 - **LAT and GSFC QA to witness reproof pressure testing**
 - **Held MRB to address machining anomaly on grid (NCR #101 - Bay #5 sidewall was gouged with 1/4" ball mill during machining of cable chase)**
 - **Stress analysis in process to support final MRB disposition**



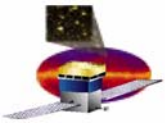
LAT QA Audit Activities

- **Facility Readiness Review (SLAC I&T Facility – Building 33) was performed by LAT QA**
 - **Facility Readiness Review performed to evaluate readiness of facility to receive, store, assemble and test flight hardware**
 - **4 findings and 16 observations were identified and documented**
 - **Responses to the findings and observations are required 7/7**
- **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**



Near-Term Milestones

- **Witness proof pressure, leak and functional testing of VCHP heat pipe – June 04**
- **Provide QA support for final grid machining, dimensional inspection and plating – Through July 2004**
- **Complete incoming inspection of DAQ TEM and TEM-PS EEE parts – July 2004**
- **Support Tracker “just-in-time” material/part inspections**
- **Perform vendor survey of Electronic Subsystem assembly house – June 04**
- **Close all observations from GSFC Mission Assurance Audit – June 2004**



Cost Variance Analysis

- **Cumulative CV = \$301K (Last month - \$374K)**
 - **Management = \$51K**
 - **Quality Assurance = \$251K**
 - **Majority of variance due to delayed processing of subcontractor invoices. Actual expenditures in line with planning.**
 - **Records Management = \$-3K**
 - **Training = \$4K**
 - **Systems Safety = \$0K**