

GLAST Large Area Telescope: Performance & Safety Assurance

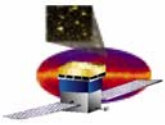
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Outline

- Quality Assurance Activities**
- Nonconformance Report Summary**
- Near-Term Milestones**
- Cost Variance Analysis**



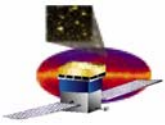
Quality Assurance Activities

- **Tracker MCM EEE parts inspection**
 - **Omnetics connectors**
 - **950 male connectors (A8485-001) received**
 - Inspection performed on 750 connectors to date at 10X – no issues,
 - » 5 connectors sent to GSFC for additional qualification testing
 - Source inspection and process surveillance performed at Supplier's facility prior to two male connector shipments
 - **150 female connectors (A8486-001) received to date**
 - Inspection performed on 150 female connectors – no issues
 - » 2 connectors sent to GSFC for additional qualification testing
 - **275 connector savers (A8597-001) received to date**
 - Incoming inspection currently being performed



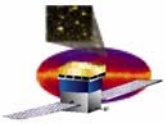
Quality Assurance Activities (Con't.)

- **MCM Printed Wiring Boards (PWBs)**
 - **Flight PWB coupon testing**
 - **238 panel coupons submitted to GSFC for testing**
 - **193 coupons have been tested to date**
 - **14 coupons have failed minimum annular ring requirement of 0.0020 inches**
 - » **PWB Tall (LAT-DS-00368) – 1 out of 11 coupons failed**
 - » **PWB Short (LAT-DS-00077) – 13 of 182 coupons failed**
 - **40 total flight PWBs affected by these failures**
 - **A series of face-to-face meetings and telecons have taken place with the supplier (DDI) to discuss the annular ring 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**



Quality Assurance Activities (Con't.)

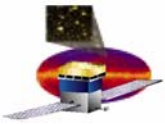
- **Tracker MCM Production Activities**
 - **Six flight MCMs were delivered to SLAC 3/23/04**
 - **Thermal-cycling will commence 3/24/04 followed by burn-in and final electrical test**
 - **Work Orders are in place for all activities performed at SLAC with QA oversight and acceptance tasks incorporated**
 - **MCM Production Metrics at Teledyne**
 - **MIP-1 (verifies integrity of the joining of the pitch adapter)**
 - **30 of 43 MCMs accepted (70% yield)**
 - » **Variation in pitch adapters, process validation attrition, damaged as received pitch adapters**
 - » **Pitch adapter inspection plan/alignment requirement discussed and agreed upon**
 - **MIP-2 (inspection prior to encapsulation of the ASICs with all components assembled)**
 - **6 of 19 MCMs accepted (32% yield on first submittal)**
 - » **Isolated die failures (There are 26 die per MCM)**
 - » **Bad die are reworked in accordance with approved procedure by replacing one or more defective die**
 - **MIP-3 (inspection following encapsulation and conformal coating followed by electrical test)**
 - **6 of 6 MCMs accepted (100% yield)**
 - **MIP-4 (Review, verification and acceptance of EIDP)**
 - **Six flight MCMs accepted by LAT QA**



Quality Assurance Activities (Con't.)

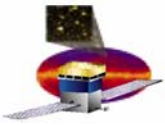
- DAQ EEE parts inspection and acceptance
 - Tower Electronics Module (TEM) parts
 - 23 of 41 part types received to date *
 - 18 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete
 - DPA samples from 4 part types submitted to GSFC for evaluation (8 TEM part types require DPA)
 - 2 part types sent to GSFC for screening (fuses)
 - Tower Electronics Module (TEM) Power Supply parts
 - 42 of 85 part types received to date *
 - 38 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete
 - DPA samples from 7 part types submitted to GSFC for evaluation (21 TEM-PS part types require DPA)
 - 2 part types sent to GSFC for screening (fuse, IC)

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



Quality Assurance Activities (Con't.)

- **DAQ EEE parts inspection activities (Con't.)**
 - **ASICs**
 - **GLTC2 – 762 each; GTCC1 – 881 each; GCCC1 – 824 each**
 - **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**



Quality Assurance Activities (Con't.)

- **Status of LAT responses to GSFC Audit recommendations**
 - Responses to all 26 observations were provided to Lead Auditor March 4th
 - 23 of the responses have been closed by the Audit Team
 - Of the three open observations, two will be closed upon release of revised procedures, one requires additional information be submitted related to MAR deliverables
- **Mechanical Subsystem Support**
 - Completed hardware handling plan for the ACD base frame assembly at Tapemation



Closed Nonconformance Reports

(April 2004)

	NCR No.	Open Date	Description of Non-Conformance	Summary of Disposition	Close Date
1.	55	2/16/04	ACD GARC ASIC has reset problem. A mode has been found where the GARC does not initialize properly.	Cross-strapping resistors on the FREE card were added and a modification to the GASU implemented (FREE clock frequency change from nominal 20-MHz to 1.25 MHz for about 1 second).	4/21/04



Open Nonconformance Reports

	NCR No.	Open Date	Description of Nonconformance	Comments	Close Date
2.	43	12/12/03	Omnetic connector issues. Jack screws too long and bond line between metal shell and connector body had inadequate peel strength	Tiger Team formed to resolve issues with supplier. See previous slide for details. NCR will be closed upon completion of connector saver inspection.	
3.	49	1/28/04	Five PWBs do not have panel number identifiers for traceability.	A series of meetings and telecons was held with the PWB supplier on this issue. Cause and corrective was determined and agreed upon. MRB will be convened upon completion of PWB coupon testing.	
4.	51, 53, 63, 64, 68, 72, 73, 75, 76, 77, 80, 83, 84	Various	PWB test coupons failed annular ring requirement.	A series of meetings and telecons was held with the PWB supplier on this issue. Cause and corrective was determined and agreed upon. MRB will be convened upon completion of PWB coupon testing.	
5.	60	4/5/04	Mid tray closeout walls fabricated with 7075-T76 Al inserts. 7075-T6 was specified on the drawings.	MRB held and 7075-T76 material was determined to be acceptable (Fred Gross, GSFC was included in the MRB). Discrepancy was identified by INFN during audit of hardware compliance activities. MUA will be formally submitted to GSFC for approval.	



Near-Term Milestones

- **Witness proof pressure, leak and functional testing of VCHP heat pipe – June 04**
- **Accept tracker bottom tray closeouts and corner/side flexures – Through May 2004**
- **Provide QA support for final grid machining, dimensional inspection and plating – Through June 2004**
- **I&T Facility Readiness Review – May 2004**
- **Complete incoming inspection of DAQ TEM and TEM-PS EEE parts – May 2004**
- **Support Tracker “just-in-time” material/part inspections**
- **Perform vendor surveys of Electronic Subsystem assembly houses – May-June 04**
- **Close all observations from GSFC Mission Assurance Audit – May 2004**
- **Conduct Production Readiness Review for TEM – May 2004**



Cost Variance Analysis

- **Cumulative CV = \$374K**
 - **Management = \$51K**
 - **Quality Assurance = \$322K**
 - **Majority of variance due to delayed processing of subcontractor invoices. Actual expenditures in line with planning.**
 - **Records Management = \$-3K**
 - **Training = \$3K**
 - **Systems Safety = \$0K**