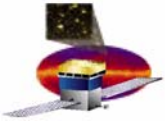




# GLAST Large Area Telescope: Performance & Safety Assurance

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650-926-4577



# Outline

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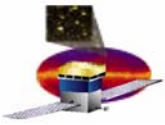
- Quality Assurance Activities**
- Nonconformance Report Summary**
- GSFC Safety & Mission Assurance Audit**
- Three Month Milestones**
- Cost Variance Analysis**



# Quality Assurance Activities

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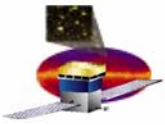
- **Mechanical Subsystem support**
  - **Response to RFA on inertia welding process for heat pipes at Lockheed Martin approved by GSFC**
    - **Submitted details of weld process qualification testing and in-process acceptance testing on all heat pipe flight welds to GSFC System Safety**
      - **Preliminary feedback from GSFC System Safety personnel indicate RFA response satisfies their concerns**
- **Quality Engineering Support installed at Tracker MCM Supplier**
  - **Senior Level Quality Engineer started 2/7/04 at Teledyne Electronic Technologies**
    - **LAT Performance Assurance and Manufacturing Engineering provided project orientation and MCM technical overview to individual**
    - **Individual participated in MCM Production Readiness Review**
    - **Weekly Reports are submitted to LAT Performance Assurance**



## Quality Assurance Activities (Con't.)

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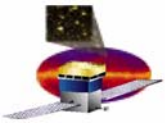
- **Tracker MCM parts inspection**
  - **Omnetics connectors**
    - **70 male connectors (A8485-001) received and 100% inspection performed at 10X – no issues, 5 connectors sent to GSFC for additional qualification testing**
      - **Source inspection to be performed at Supplier's facility on next scheduled (March 8) shipment of 100**
    - **100 female connectors (A8486-001) are scheduled to be delivered March 24**
      - **Source inspection planned on first shipment of these connectors**
  - **DPA samples from Polyswitches and Novacap capacitor pulled and sent to GSFC**



## Quality Assurance Activities (Con't.)

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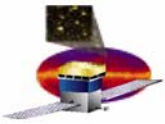
- **MCM Printed Wiring Boards (PWBs)**
  - **PWB coupon testing**
    - **238 panel coupons submitted to GSFC for testing**
    - **73 coupons have been tested to date**
      - **7 coupons have failed minimum annular ring requirement of 0.0020 inches**
        - » **PWB Tall (LAT-DS-00368) – 3 out of 6 coupons failed**
        - » **PWB Short (LAT-DS-00077) – 4 of 67 coupons failed**
      - **All failed coupon results have been reported on NCR**
        - » **15 flight PWBs are affected by these 7 coupon failures**
  - **LAT QA has visited the supplier (DDI) and discussed the annular ring failures and other quality issues**
    - **Another meeting has been set-up for Feb. 27 with DDI to discuss the coupon failures in more detail**



## Quality Assurance Activities (Con't.)

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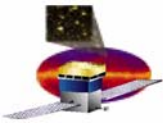
- **DAQ parts inspection**
  - **Tower Electronics Module (TEM) parts**
    - **15 of 37 part types received to date**
      - 13 data packages/Certificate of Conformance's reviewed and accepted
      - Will begin pulling DPA samples (8 part types) upon completion of visual inspection
  - **Tower Electronics Module (TEM) Power Supply parts**
    - **23 of 91 part types received to date**
      - 21 data packages/Certificate of Conformance's reviewed and accepted
      - Will begin pulling DPA samples (21 part types) upon completion of visual inspection



## Quality Assurance Activities (Con't.)

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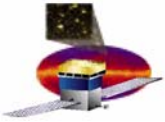
- **DAQ parts inspection activities (Con't.)**
  - **ASICs**
    - **GLTC2 – 762 each; GTCC1 – 881 each; GCCC1 – 824 each**
      - Visual inspection complete
    - **Meeting held 2/23 with DAQ personnel on ASICs screening and qualification activities**
      - LAT QA responsible for serialization by outside vendor
      - Thermal cycling and electrical testing 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
      - Screening and Qualification Plan, LAT-TD-02656 to be modified and released through LAT CM



## Closed Nonconformance Reports (Since last Monthly Status Meeting)

	NCR No.	Open Date	Description of Non-Conformance	Summary of Disposition	Close Date
1.	29	10/2/03	Tracker MCMs using nano-connectors with qualification testing not complete.	The qualification testing for the A8485 and A8486 parts was completed. Additional qualification samples from first flight production run will be submitted to GSFC.	2/6/04
2.	39	12/1/03	DAQ PDU PMOS FET – SEM inspection of wafer lot revealed worst case metallization of oxide step not meeting requirement.	Parts accepted for “use-as-is” by LAT Parts Control Board. A step coverage of 20% does not present a reliability risk.	2/13/04
3.	41	12/9/03	PWB width and step down dimensional discrepancies.	PWB’s accepted per the revised drawing requirements.	2/13/04
4.	44	12/15/03	Failed dielectric thickness from PWB coupon testing.	PWBs accepted per drawing requirement. PWBs were built to unreleased drawing. Tracker configuration management issue addressed.	2/12/04
5.	45	12/19/03	Drawing utilized for manufacturing and inspection of bias circuits not formally released.	Revised drawing formally released. Tracker configuration management issue addressed.	2/6/04
6.	47	1/5/04	Bias circuits not serialized per drawing.	Supplier contacted during production and corrective action implemented.	2/19/04
7.	50	1/30/04	PWB test coupon failed annular ring requirement.	PWBs affected by failed coupon scrapped.	2/3/04





## Closed Nonconformance Reports (Con't.) (Since last Monthly Status Meeting)

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	<b>NCR No.</b>	<b>Open Date</b>	<b>Description of Non-Conformance</b>	<b>Comments</b>	<b>Close Date</b>
8.	54	2/12/04	The artwork on the bias circuit, including in particular the wire bonding pads, is shifted by 0.25mm with respect to the holes used to align the circuit to the tray.	All bias circuits affected by this NCR were scrapped. Gerber file was modified and reviewed against 3-D model.	2/23/04
9.	57	2/18/04	Parallelism measurement did not meet .05 mm maximum requirement on six PWBs.	Sufficient design margin exists. Parts are acceptable to "use-as-is". New supplier is being qualified for machining of PWBs.	2/23/04



## Open Nonconformance Reports

	NCR No.	Open Date	Description of Nonconformance	Comments	Close Date
1.	42	12/10/03	1 PWB has exposed copper; 1 PWB is stain/foreign material; 5 PWBs with illegible serial number	5 PWBs with illegible serial number will be remarked, others are scrapped.	
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. First shipment of 70 male (A8485-001) connectors 100% inspected and accepted. Samples for additional qualification testing sent to GSFC.	
3.	49	1/28/04	Five PWBs do not have panel number identifiers for traceability.	Currently reviewing issue with supplier.	
4.	51	2/9/04	PWB test coupon failed annular ring requirement.	A meeting was held with the PWB supplier on this issue. A follow-up meeting is tentatively planned for week of 2/23 for further analysis.	
5.	53	2/12/04	Three PWB test coupons failed annular ring requirement.	A meeting was held with the PWB supplier on this issue. A follow-up meeting is tentatively planned for week of 2/23 for further analysis.	
6.	55	2/16/04	ACD GARC ASIC has reset problem. A mode has been found where the GARC does not initialize properly.	Two options are being pursued. – Doing a revised FREE card with additional components, and testing fixes that can be made on the existing flight FREE card.	

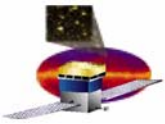


# Open Nonconformance Reports

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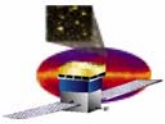
	NCR No.	Open Date	Description of Nonconformance	Comments	Close Date
7.	58	2/18/04	Parallelism measurement did not meet 0.05 mm maximum requirement on 18 PWBs.	Sufficient design margin exists for 11 of the PWBs and can be "used-as-is". The remaining 7 PWBs may be reworked to bring PWBs into tolerance.	
8.	60	2/23/04	ACD Base Frame Assembly hole position anomaly. 6 of 12 holes in the BFA corners used to interface the BFA to Grid are out of tolerance in the -Y direction.	Material Review Board (MRB) held and ACD and Mechanical personnel agreed on approach using 'keenserts' and changes to the ACD IDD (LAT-DS-00039).	



## GSFC Audit Closure

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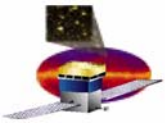
- **GSFC Safety & Mission Assurance Quality Audit performed at SLAC Jan. 19-23**
  - **26 observations documented in final report**
  - **General status of responses to recommendations**
    - **4 recommendations immediately implemented during audit**
    - **10 recommendations accepted**
      - **3 completed and implemented**
      - **2 of the recommendations planned for prior to audit**
    - **12 recommendations reviewed for applicability**
  - **Report issued 1/30 and response requested by Lead Auditor within 30 days**
    - **Other priorities are driving LAT response to Observations**



## Three-Month Milestones

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- **Witness proof pressure, leak and functional testing of VCHP heat pipe – March 04**
- **Coordinate installation of NVR/particle fallout samples in LAT I&T Facility – February 04**
- **Develop hardware handling plan for the ACD base frame assembly at Tapemation and conduct review – March 04**
- **Provide QA support for final grid machining and plating – Through April 2004**
- **Complete incoming inspection of DAQ TEM and TEM-PS EEE parts – April 04**
- **Perform source inspections of Tracker bottom tray close-outs, connectors and flexures – March-May 04**
- **Support Tracker MCM “just-in-time” part inspections**
- **Perform vendor surveys of Electronic Subsystem assembly houses – April - June 04**
- **Close all observation from GSFC Mission Assurance Audit – March?**



# Cost Variance Analysis

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- **Cumulative CV = \$246K (\$93K last month)**
  - **Management = \$44K (\$42K last month)**
  - **Quality Assurance = \$204K (\$52K last month)**
    - **Majority of variance due to delayed processing of subcontractor invoices. Actual expenditures in line with planning.**
  - **Records Management = \$-3K**
  - **Training = \$3K**
  - **Systems Safety = \$0K**
  - **EEE Parts Control Program = \$0K**