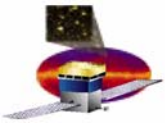


# GLAST Large Area Telescope: Performance & Safety Assurance

Darren Marsh  
SLAC  
Performance & Safety Assurance Manager

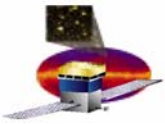
Marsh@SLAC.Stanford.Edu  
650-926-4577



# Outline

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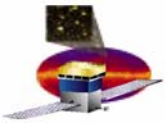
- Tracker MCM Issues**
- Tracker Bias Circuit Issue**
- Tracker Mid-Tray Issue**
- DAQ TEM EEE Parts Status**
- DAQ TEM-PS EEE Parts & TEM Enclosure Status**
- TEM &TEM-PS Assembly Vendor Activities**
- DAQ ASICs Inspection & Test Status**
- Mechanical Subsystem QA Activities**
- LAT QA Audit Activities**
- Cost Variance Analysis**



# Tracker MCM Issues

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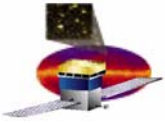
- **Issues associated with Tracker MCMs that are aggressively being addressed**
  - **Pitch adaptor cracked traces**
    - Qualification plan for redesigned pitch adaptor developed
    - Process validation will be performed with 25 pitch adaptors
    - An order for 50 “revised” pitch adaptors (no nickel or gold plating in bond area) has been placed with Parlex
    - Pitch adaptors will be shipped to Teledyne for process validation
  - **Readout errors of mask register contents at -30C (limited to reading to the right; the DAC and Mode registers were not affected)**
    - **Fix is to change two 100 ohm terminations resistors to 75 ohms**
    - **Zentec will perform the rework on existing MCMs manufactured that exhibit this discrepancy**
      - » **LAT QA to perform source inspections at supplier**
    - **Teledyne will introduce the 75 ohm resistor into the production line as soon as possible**
  - **Charge injection read-back errors at +60C**
    - **MRB held on May 28<sup>th</sup> – Additional tests and analysis required<sub>3</sub>**



# Tracker Bias Circuit Issue

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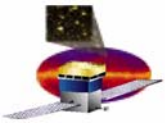
- **Tracker Bias Circuits**
  - **Test coupons for 104 out of 267 bias circuits did not meet IPC 6013, Class 3 requirements**
    - **Not all test coupon holes were plated through with gold. In the case where the test coupon is not plated with gold, the copper gets etched away in the next step**
    - **Prior to gold plating, the edges of the bias circuits were masked with tape; in some cases, the tape covered all or parts of the test coupons**
    - **The technical integrity of the flight bias circuits is not compromised by this personnel oversight at Parlex**
    - **Additional coupons will be submitted from the affected bias circuits to GSFC for evaluation**
    - **Parlex management met with LAT personnel at SLAC for discussion related to this issue**
    - **LAT Quality Engineering visited Parlex to verify corrective action and review process controls**



## Tracker Mid-Tray Issue

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- **Bias circuit delamination found on 7 mid-trays after the thermal vacuum test**
  - Testing was performed at 85C which is incompatible with the specified epoxy characteristics
  - A parametric test was performed on 5 samples each at 35C, 55C, 70C and 85C
  - Delaminations were observed on selected trays at 55C
    - Cause is due to poor adhesion of the epoxy to the tungsten plates
    - Surface preparation process of tungsten plates is under investigation with process validation to follow

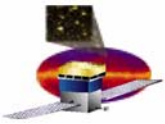


## DAQ TEM EEE Parts Status

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- **Tower Electronics Module (TEM) EEE parts inspection and acceptance**
  - **31 of 40 part types received to date \***
    - 26 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete
    - ADC and DAC ICs just completed testing at GSFC and are acceptable. Waiting for the parts to be received at SLAC.
    - DPA samples from 2 part types submitted to GSFC for evaluation are passed (6 TEM part types require DPA)
    - 2 part types sent to GSFC for screening (fuses)
      - GSFC understands the priority for these parts
    - 18 part types approved for "flight use"

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

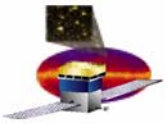


## DAQ TEM-PS EEE Parts & TEM Enclosure Status

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- **Tower Electronics Module Power Supply (TEM-PS) parts inspection and acceptance**
  - 71 of 83 part types received to date \*
    - 59 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete
    - DPA samples from 4 part types submitted to GSFC for evaluation passed (14 TEM-PS part types require DPA)
    - 2 part types sent to GSFC for screening (fuse, IC)
    - 52 part types approved for "flight use"
- **TEM Enclosures**
  - Source inspection performed June 18 at vendor facility
    - Reviewed plating operations at plating vendor
    - All enclosures being shipped to SLAC this week
      - 21 lids and 16 bases are acceptable based on the source inspection
      - 5 of the enclosures bases are being evaluated for plating irregularities

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

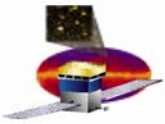


## TEM & TEM-PS Assembly Vendor Activities

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- **TEM assembly vendor qualification**
  - A quality survey was performed June 15-16 at General Technology Corp. in Albuquerque, New Mexico
    - Survey team included LAT QA and GSFC QE
    - No issues were identified
      - Excerpt from Survey Report
        - » “General Technology Corporation (GTC) has demonstrated their ability to fabricate a flight worthy product through their process and quality controls.”
- **Technical Exchange Meeting is taking place at General Technologies on June 30<sup>th</sup>**
  - LAT QA, Electronics Engineering, and Manufacturing Engineering will meet with General Technologies technical staff to review and discuss technical requirements
- **On-site source inspection**
  - LAT Quality Assurance secured the services of Quality Engineer for on-site source inspection and oversight at General Technologies
    - Individual will participate in Technical Exchange Meeting
    - Full time throughout all phases of hardware assembly and test

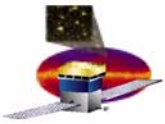




# DAQ ASICs Inspection & Test Status

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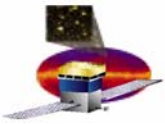
- **GLTC3 – 645 each (GASU); GTCC1 – 881 each (TEM); GCCC1 – 824 each (TEM)**
  - **Screening and Qualification Plan, LAT-TD-02656, released and approved**
    - **Visual inspection completed**
    - **Serialization by outside vendor completed**
    - **Thermal cycling completed**
      - **GTCC1 And GCCC1 have completed thermal cycling 4/2/04**
      - **GLTC3 requires thermal cycling**
  - **Electrical testing and burn-in to be performed at SLAC in Building 33 (LAT I&T Facility)**
    - **Initial Electrical Test at 25C**
      - » **GTCC1 – 16 of 19 accepted**
      - » **GCCC1 – 8 of 10 accepted**
    - **Dynamic Burn in for 168 hrs. at 85C**
      - » **GTCC1 – 16 of 16 accepted**
      - » **GCCC1 – 8 of 8 accepted**
    - **Electrical Test post burn in at 25C**
    - **GTCC1 – 16 of 16 accepted (Enough GTCC1s for two TEM first articles)**
    - **GCCC1 – 8 of 8 accepted (Enough GCCC1s for two TEM first article)**
  - **Radiation testing (TID) to be performed in Italy**
  - **Qualification testing, DPA to be performed at GSFC**



# Mechanical Subsystem QA Activities

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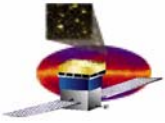
- **Mechanical Subsystem Support**
  - **LM re-tested constant conductance heat pipes (CCHPs). LAT and GSFC approved LM retest plan - CCHPs were originally proof tested at pressure below requirement of 1.5X MEOP (max expected operating pressure)**
    - **LAT and GSFC QA witnessed reproof pressure testing**
    - **All CCHPs passed re-test**
  - **Address machining anomaly on grid (NCR #101 - Bay #5 sidewall was gouged with 1/4" ball mill during machining of cable chase)**
    - **Stress analysis needs to be completed by LAT Structural Analyst to support final MRB disposition**
      - **GSFC has performed their analysis and has approved the disposition**
  - **ACD BFA match drilling to LAT Grid was successfully completed at Tapemation.**



# LAT QA Audit Activities

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- **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 15 observations were identified and documented**
    - **Responses to the findings and observations are required 7/7**
      - **One finding and eight observation 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**



# Cost Variance Analysis

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- **Cumulative CV = \$285K (Last month - \$301K)**
  - **Management = \$51K**
  - **Quality Assurance = \$232K**
    - **Majority of variance due to delayed processing of subcontractor invoices. Actual expenditures in line with planning.**
  - **Records Management = \$-3K**
  - **Training = \$4K**
  - **Systems Safety = \$0K**