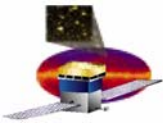


# GLAST Large Area Telescope: Performance & Safety Assurance

Darren Marsh  
SLAC  
Performance & Safety Assurance Manager

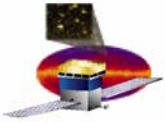
Marsh@SLAC.Stanford.Edu  
650-926-4577



## Mechanical Subsystem – QA Completed Tasks

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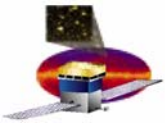
- **Grid assembly part inspection and acceptance status**
  - **TCS EEE parts**
    - 4 part types received and have gone through incoming inspection to date (4 total parts required)
    - 3 part types approved for “flight use”
      - Qual testing of thermostats submitted to LAT PCB
  - **Mechanical parts**
    - 57 mechanical parts are required for grid assembly activities
      - LAT QA has inspected and accepted 41
      - Total number of mechanical parts has increased by 10 since last month
- **Grid assembly activities**
  - Heat pipe and thermal control hardware bonding procedures reviewed and released
    - 4 out of 5 top flange heat pipes installed
  - Grid handling procedure for MGSE support table reviewed and released
  - Grid Assembly Work Order developed and approved
  - Grid MGSE support table and calorimeter lift fixture certified for use



# Mechanical Subsystem – Issues

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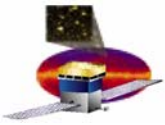
- **Grid assembly issues**
  - **Grid NCR No. 147 has two remaining open issues from dimensional inspection**
    - **Perform final measurement of Tracker bushing locations during alignment operation**
    - **Verify spacecraft attach holes true positions on +X/-X sides are acceptable**
  - **Radiator mount brackets require modification to fix interference with MGSE**
  - **Rework of grid required to add purge way not designed into grid**



# Tracker Subsystem - QA Completed Tasks

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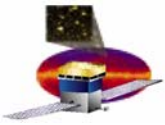
- **MCM Charge injection read-back errors at +60C**
  - Traced to GTRC timing margins, which were found to be sensitive to clock duty factor
    - Changing termination resistor (instead of 100 ohm to 75 ohm) on flex cables to resolve problem
    - NCR's No. 107, 114, 118 and 139 to be closed
- **MCM workmanship issues**
  - Dedicated Senior LAT Quality Engineer to aggressively work MCM workmanship issues with Teledyne and direct rework effort at SLAC
    - Developed MCM specific inspection criteria and rework documentation
  - Deploying inspector from LAT QA staff to Teledyne as source inspector
- **Flex cable quality issues**
  - Assigned LAT Quality Engineer solely to flex cable activities
    - Performing inspections on all fabricated flex cables
    - Visited Parlex 4 times in last 5 weeks
    - Maintaining flex cable corrective plan



# Tracker Subsystem QA Activities

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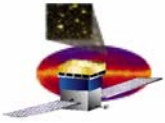
- Tracker issues being addressed
  - Flex cables
    - Coupon failures
      - Coupon evaluation results received from GSFC on initial flex cable revealed internal annular rings missing and separations between barrel plating and internal layers
        - » Process changes were initiated at Parlex (drill speed and feed modifications and circuit X-ray incorporated)
        - » Post-process change flex cable coupons indicate corrective actions were not adequate
    - Workmanship issues
      - Source inspection on 8 post-process change flex cables was performed at Parlex week of 10/25
      - Several workmanship issues were identified
        - » Excessive bubble in adhesive between Omnetic connectors, foreign material on cables, voids in epoxy, damaged connectors, etc.
        - » Flex cable assembly activity stopped, corrective action requested from Parlex
  - LAT Quality Engineering and Tracker Engineering maintaining on-site presence at Parlex
    - Daily meetings are being held with Parlex
  - Working to develop second source for flex cables
    - Surveys are being schedule for viable candidates



# Tracker Subsystem QA Activities

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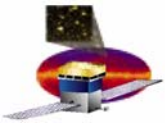
- **MCMs Issues**
  - **Pitch adaptor trace cracking**
    - **Electrical test implemented to detect cracked traces**
  - **MCM board shorts**
    - **8 MCMs have developed internal board shorts (3 more MCMs may be suspect)**
      - **Leakage current between layers 7 and 8 PWB**
    - **GSFC performed DPA on MCMs submitted**
    - **Additional MCM to be submitted to U of Maryland for evaluation**
    - **Analysis and evaluations nearing completion**
      - **Final MRB planned for next week**



# Tracker Subsystem QA Issues

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- **MCM issues being addressed**
  - **Pitch adaptor debonding**
  - **Copious disconnected channels on MCMs**
- **Flex cable installation on towers**
  - **MRB held 1/4/05 on those towers that utilize cables with unacceptable coupon results**

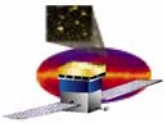


# DAQ Part Activities

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- **EEE Part inspection and acceptance**
  - **DAQ EEE Parts are inspected as they are received**
    - **No backlog exists**
    - **Part acceptance status maintained**
  - **All required DPA samples have been submitted to GSFC**
- **Part Issues**
  - **“UMC line” FPGA’s received – DPA failure on one sample**
    - **RTSX32SU-1CQ208B – 50 ea. (TEM) – DPA passed**
    - **RTSX72SU-CQ208B – 75 ea. (TEM) – One bond lifted at 0.6 grams**
    - **RTSX72SU-1CQ208B – 11 ea. (LCB) – DPA to be performed**
  - **cPCI connector qualification plan requires finalization**
    - **Potential solderability problem due to less than desirable nickel plated surface on pins**
      - **Samples from each lot sent to GSFC for additional evaluation**
  - **PDU and SIB PWB coupons failed .002” internal annular ring requirement and showed laminate cracks and delaminations**
    - **PWBs are being replaced**
  - **Austin Semi EEPROM PIND testing failure**
    - **Lot date code 0302 – 21 of 66 parts failed**
    - **Lot date code 0336 – 16 of 58 part failed**

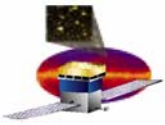




# DAQ ASICs Inspection & Test Status

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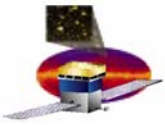
- GLTC3 – 645 each (GASU); GTCC1 – 881 each (TEM); GCCC1 – 824 each (TEM)
  - Screening and Qualification Plan, LAT-TD-02656, released and approved
    - Visual inspection and serialization completed
    - Thermal cycling completed
      - GTCC1 and GCCC1 have completed thermal cycling 4/2/04
      - GLTC3 completed thermal cycling 10/11
  - Electrical testing and burn-in performed at SLAC in Building 33 (LAT I&T Facility)
    - Initial Electrical Test at 25C
      - » GTCC1 – 384 of 405 accepted
      - » GCCC1 – 192 of 221 accepted
      - » **GLTC3 – To be performed**
    - Dynamic Burn in for 168 hrs. at 85C
      - » GTCC1 – 384 of 384 accepted
      - » GCCC1 – 192 of 192 accepted
      - » **GLTC3 – To be performed**
    - Electrical Test post burn in at 25C
      - » GTCC1 – 384 of 384 accepted
      - » GCCC1 – 192 of 192 accepted
      - » **GLTC3 – To be performed**
  - DPA evaluation performed on all three ASICs and passed



## TEM & TEM-PS Assembly QA Activities

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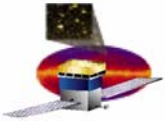
- **Production activities commenced week of 9/27 on Qual + 2 units**
  - **Several technical/quality issues have surfaced on TEM-PS assembly activities requiring evaluation and corrective action**
    - **Thermally conductive adhesive .010 max. bond line requirement could not be met (closed)**
    - **FPGA's received at GTC with leads not meeting coplanarity requirements (closed)**
    - **Dropped TEM boards by General Technology**
    - **Incorrect lead configuration on MAX724 IC (TPS assembly)**
  - **NCRs related to quality issues have been addressed and approved**



## DAQ Harness QA Activities

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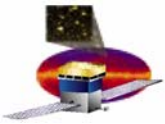
- **PDU internal harnesses**
  - **LAT-DS-04710 – 28 Pair Pigtail with Micro D – 8 total**
  - **LAT-DS-04711 – 38 Pair Pigtail with Micro D – 8 total**
  - **LAT-DS-04712 – 16 Pair Pigtail with Micro D – 12 total**
    - **Perform quality survey at Glenair on November 19<sup>th</sup>**
      - **Survey performed in conjunction with NASA QE**
        - » **Identified quality system deficiencies required corrective action**
        - » **LAT harness specific workmanship and inspection requirements must be implemented**
    - **Technical Exchange Meetings have been going to review status of survey corrective actions and finalize assembly documentation**
      - **Production start anticipated for 1/10**



## DAQ Tasks to be Performed

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- **GASU and PDU Assembly**
  - Responses of RFP have been received from potential assembly houses
    - Quality Survey of selected vendor required
    - Technical Exchange Meeting will be set-up
    - Source inspection plan being developed
- Dimensional inspection of metal fab items received last week required to support PDU, GASU, and EPU/SIU assembly activities



# LAT I&T QA Activities

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- **I&T Cleanroom Facilities**
  - **Weekly surveillance of I&T facility is performed by LAT QA to verify compliance to cleanroom facility requirements**
    - **Performed with participation of I&T personnel**
    - **3 observations are open**
  - **ESD controls reviewed and ionizers procured and installed**
  - **Nonvolatile residue (NVR) sampling results (quarterly)**
    - **No measurable NVR accumulation on witness plates**
  - **Particle fallout sampling results (quarterly)**
    - **No excessive heavy particulate accumulation observed**
- **Working in concert with I&T personnel on the review of I&T procedures and documentation and integration process development**
- **I&T replaced MGSE that did not meet requirements**