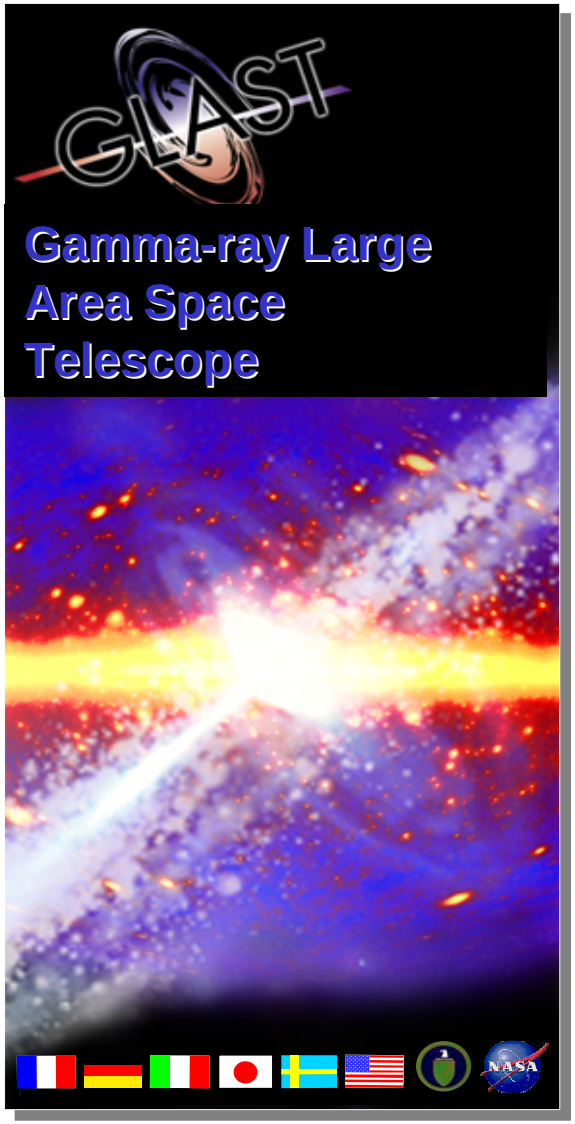

GLAST Large Area Telescope:

Performance & Safety Assurance

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Outline

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

Tracker MCM Issues

- **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**
    - **50 "revised" pitch adaptors (no nickel or gold plating in bond area) were received and sent to Teledyne**
    - **Qualification of pitch adaptors will commence this week**
  - **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 performing the rework on existing MCMs manufactured**
      - » **GSFC QA performing source inspections at supplier**
      - » **Plan is to rework all MCMs received from Teledyne with 100 ohm resistors (except 4 installed on trays)**
    - **Teledyne introduced the 75 ohm resistor into the production line August 2nd – 32 MCMs to date**

Tracker MCM Issues (Con't.)

- Issues associated with Tracker MCMs that are aggressively being addressed
  - Charge injection read-back errors at +60C
    - MRB held on May 28th – Additional tests and analysis performed by Tracker team that isolate the error to be internal to the GTRC chip
      - Follow-up MRB required to address analysis
- Novacap HV capacitors fail the mil-spec leakage current requirement
  - Testing in process at GSFC
  - MRB will be held prior to Tower B integration
  - Requested one MCM board not encapsulated from Tracker team for additional evaluation
- GSFC Resident Quality Engineer identified three workmanship concerns on completed MCMs
  - Two of the observations addressed and closed
  - Additional evaluation required to determine effects of conformal coating on specific component of concern

Tracker Bias Circuit Issue

- **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/bias circuits will be submitted from the affected lots for evaluation
    - LAT Quality Engineering visited Parlex to verify corrective action and review process controls
  - Test coupons representing 3 bias circuits failed average barrel plating thickness
    - Vias in the circuit serve only to connect a shield plane, which was put into the design as a precaution against possible noise pickup from the structure
      - All evidence indicates this precaution was not necessary
    - A Change Request has been generated and a drawing change will be forthcoming that will revise the average barrel plating thickness requirement

Tracker Mid-Tray Issue

- **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 improved**
      - **Bead blasting performed on all the foils**
      - **Bubble is cut to prevent air pressure from increasing the delamination**
    - **Process validation to be reviewed prior to Tower B tray fabrication**

DAQ TEM EEE Parts Status

- **Tower Electronics Module (TEM) EEE parts inspection and acceptance**
  - **37 of 39 part types received to date ***
    - **31 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete**
    - **ADC and DAC ICs completed testing at GSFC and are acceptable.**
    - **DPA samples from 3 part types submitted to GSFC for evaluation passed (6 TEM part types require DPA)**
    - **27 part types approved for "flight use"**

- **Tower Electronics Module Power Supply (TEM-PS) parts inspection and acceptance**
  - **72 of 87 part types received to date ***
    - **69 data packages/Certificate of Conformance's reviewed and accepted, incoming inspection complete**
    - **DPA samples from 6 part types submitted to GSFC for evaluation passed (17 TEM-PS part types require DPA)**
    - **Part types sent to GSFC for screening received and are acceptable (fuse, IC)**
    - **66 part types approved for "flight use"**

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

TEM Enclosure Status

- TEM Enclosures
  - Source inspection performed June 18 at vendor facility
    - Reviewed plating operations at plating vendor
  - 21 lids and bases received at SLAC
    - 21 lids and 16 bases are acceptable based on the source inspection
    - 5 of the enclosure bases returned to vendor for replacement due to plating irregularities
    - 100% dimensional inspection on 2 bases and 2 lids
      - Bases were acceptable
      - Minor radius out-of-tolerance condition on lids
        - » Use-as-is disposition
      - Critical dimensions will be inspected for balance of bases and lids
      - Fit check on one base and lid by QA revealed slight “oil canning” distortion of base
        - » Additional evaluation in-process

TEM & TEM-PS Assembly Vendor Activities

- 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 took place at General Technologies on June 30th
  - LAT QA, Electronics Engineering, and Manufacturing Engineering met 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 participated in Technical Exchange Meeting
    - Full time throughout all phases of hardware assembly and test

DAQ ASICs Inspection & Test Status

- 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 performed at SLAC in Building 33 (LAT I&T Facility)
      - Initial Electrical Test at 25C
        - » GTCC1 – 144 of 150 accepted
        - » GCCC1 – 72 of 79 accepted
      - Dynamic Burn in for 168 hrs. at 85C
        - » GTCC1 – 144 of 144 accepted
        - » GCCC1 – 72 of 72 accepted
      - Electrical Test post burn in at 25C
      - GTCC1 – 144 of 144 accepted (Enough GTCC1s for 18 TEMs)
      - GCCC1 – 72 of 72 accepted (Enough GCCC1s for 18 TEMs)
    - Radiation testing (TID) to be performed in Italy
    - Qualification testing will be performed at GSFC
    - DPA evaluation performed on all three ASICs and passed

Mechanical Subsystem QA Activities

- **Mechanical Subsystem Support**
  - **Reviewed and approved LM Final Acceptance Data Package for Top Flange and Downspout Heat Pipes**
    - **Heat Pipes are being held at LM**
  - **Final machining operations on Grid prior to plating and alodining have been completed**
    - **Supported finalizing inspection plan and participating in inspection oversight activities at Tapemation**
    - **Completed quality survey of grid plating vendors**
    - **Addressed all dimensional anomalies on grid and closed affected NCRs**
      - **Stress analysis performed by LAT Structural Analyst to support final MRB dispositions**

LAT QA Audit Activities

- **Facility Readiness Review (SLAC I&T Facility – Building 33) was performed by LAT QA on May 19th & 24th**
  - **Facility Readiness Review performed to evaluate readiness of facility to receive, store, assemble and test flight hardware**
    - **4 findings and 22 observations were identified and documented**
    - **Responses to the findings and observations are required 7/7**
      - **Three findings and sixteen observations 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**

Additional LAT QA Activities

- A telecon was held on July 9th between LAT Performance Assurance, INFN Quality Assurance and Production Personnel and the GSFC GLAST Mission Assurance Office
  - The purpose of the meeting was to review flight hardware QA activities
    - Where flight hardware is fabricated and tested in Italy
    - What quality assurance is in place for each facility
    - INFN QA oversight
    - Documentation and NCR reporting
  - A good exchange of information was communicated

Issues and Concerns

- **Incoming inspection backlog has accumulated**
  - **QA inspector on medical leave until mid-September**
  - **Inspections of pitch adaptors, bias circuits, Omnetic connectors and reworked MCMs ongoing**
  - **Resources required to address documentation and quality problems exasperates issue**
    - **Presently QA is not a bottleneck but is inspecting on "just-in-time" basis**
- **Performance Assurance FY05 resource planning will have to account for QA inspection support for Tracker parts, MCM deliveries until 12/04 and DAQ Source Inspection**

Cost Variance Analysis

- **Cumulative CV = $149K (Last month $285K)**
  - **Management = $46K**
  - **Quality Assurance = $102K**
    - **Majority of variance due to delayed processing of subcontractor invoices. Actual expenditures in line with planning.**
  - **Records Management = $-3K**
  - **Training = $5K**
  - **Systems Safety = $0K**