



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

- Receiving inspection of Grid
 - Grid received and visual inspection completed
- Grid assembly parts 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
 - 47 mechanical parts are required for grid assembly activities
 - LAT QA has inspected and accepted 41
- Grid assembly activities
 - Heat pipe and thermal control hardware bonding procedures reviewed and released
 - Grid handling procedure for MGSE support table reviewed and released
 - Grid Assembly Work Order developed and approved
- Lockheed-Martin source inspection activities
 - Inspection performed after radiator panel fabrication



Mechanical Subsystem – Issues

- **Grid assembly issues**
 - **Grid MGSE support table not certified for use**
 - **Proof load procedure in release cycle**
 - **LAT QA to witness and approve proof load test and certify support table**
 - **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**



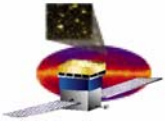
Tracker Subsystem - QA Completed Tasks

- **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



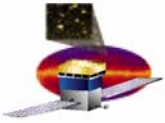
Tracker Subsystem QA Activities

- 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



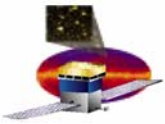
Tracker Subsystem QA Activities

- **MCMs Issues**
 - **Pitch adaptor trace cracking**
 - **Electrical test implemented to detect cracked traces**
 - **Workmanship issues (peeling of conformal coating, bubbles, and solder and solder on connector leads)**
 - **Reinspection of MCMs delivered to SLAC completed**
 - **Corrective action associated with workmanship issues discussed at Teledyne on 9/27, 10/8 and 11/8**
 - **Follow-up visit to Teledyne required**
 - **Rework plan developed and completed and rework being performed**
 - **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**
 - **Plan for closure converging for final MRB**



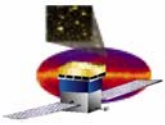
Tracker Subsystem QA Issues

- **New MCM issues**
 - Pitch adaptor debonding
 - Copious disconnected channels on MCMs
- **Flex cable installation on towers**
 - Lien will be carried on those towers that utilize cables with unacceptable coupon results
- **Review of Tower A assembly and test activities**
 - Need to ensure plan is place to ensure the design has been validated through the environmental qualification and/or acceptance test program, and that open items are satisfactorily being addressed



DAQ Part Activities

- **EEE Parts 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 PWB coupons failed .002” internal annular ring requirement and showed laminate cracks and delaminations**
 - **Austin Semi EEPROM PIND testing failure**
 - **Lot date code 0302 – 21 of 66 parts failed**
 - **Lot date code 0336 – 16 of 58 part failed**



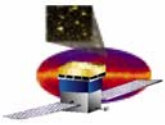
DAQ ASICs Inspection & Test Status

- 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

- **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)**
 - **Daily meetings are held between LAT and General Technology Corp. personnel to discuss issues**
 - **On-site Quality Engineer is witnessing all steps associated with assembly activities and working with DAQ/GT personnel on resolution of issues**



DAQ Harness QA Activities

- **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 19th**
 - **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 Meeting is planned to review harness requirements, status of survey corrective actions and preliminary assembly documentation**



LAT I&T QA Activities

- **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**
- **I&T is actively working to replace MGSE that currently does not meet requirements**