GLAST Large Area Telescope: Quality Assurance

Darren S. Marsh, LAT Performance & Safety Assurance Manager

PDU & GASU MRR

(650) 926-4577


Applicable 2\textsuperscript{nd} tier documents include:
- 49208, Electrostatic Discharge
- 65001, Workmanship Standards
- 65002, Nonconforming Material
- 65030, Production Test Document
- 65032, Corrective/Preventive Action
- 65053, First Article Inspection
- 69818, Receiving Inspection
- 69801, Calibration
- 65151, Standard Repair Procedure
PDU & GASU Assembly QA Activities

- PDU & GASU assembly vendor qualification
  - A quality survey was performed January 26\textsuperscript{th} at Aeroflex in Colorado Springs, Colorado
    - Survey team included LAT QA and GSFC QE
      - Excerpt from Survey Report
        - “Aeroflex has demonstrated their ability to fabricate a flight worthy product through their process and quality controls.”
      - Areas of concern included:
        - Use of Silicone Based Kapton Tape
        - Wiring Workmanship Standard

- Technical Exchange Meeting took place at Aeroflex on January 27\textsuperscript{th}
  - LAT QA, Electronics Engineering, and Manufacturing Engineering met with Aeroflex technical staff to review and discuss technical requirements

- On-site Quality Assurance and source inspection
  - LAT Quality Assurance Engineer will be on site, full time for source inspection and oversight at Aeroflex
    - Individual will participate in Technical Exchange Meetings
    - Full time throughout all phases of hardware assembly and test
Workmanship Standards

- **ESD**
  - 49208, Electrostatic Discharge Procedure for Protection of Electronic Parts and Assemblies
    - Class 1 compliant
    - MIL-STD-1686 Electrostatic Discharge Control Program
    - MIL-HDBK-263 Electrostatic Discharge Control Handbook
  - **Training**
    - All personnel who handle ESDS components are required to complete an intensive ESD training course
    - Annual training is provided and documented
  - **Facilities**
    - Work Stations equipped with means for operator to connect with ground
    - Work Stations equipped with static dissipative work surface and ionizers and inspected on monthly basis
Workmanship Standards

- IPC/EIA J-STD-001C Requirements for Soldered Electrical and Electronic Assemblies.
  - Personnel trained and certified by in-house instructor.
- IPC J-STD-001CS Space Applications Electronic Hardware Addendum to Requirements for Soldered and Electrical and Electronic Assemblies.
  - Personnel trained and certified by in-house instructor.
- NASA STD 8739.4 Crimping, Interconnecting Cables, Harnesses and Wiring.
  - Individual operator certification to NASA STD is not required. Aeroflex has personnel who have been trained but certification is inactive.
    - Excerpt from NASA QE Survey Report
      - “The criteria for implementing NASA 8739.4 can be included in the internal assembly instructions and would require no further action.”
Inspection Requirements

- Aeroflex will perform Receiving Inspection, In-Process Inspections and Final Inspections per their internal inspection plan and procedures.
  - SLAC Quality Assurance Engineer will approve plan prior to any assembly activities
- Mandatory Inspection Points (MIP’s) to be performed by SLAC Source Inspector. MIP’s will be documented on Aeroflex’s traveler and stamped by the SLAC Source Inspector after the inspection/witness activity.
  - 100% Prior to conformal coat
  - 100% Post conformal coat
  - Flying Probe test
  - Final Inspection and End Item Data Package review
Oversight and Surveillance Activities

- Surveillance
  - **SLAC Source Inspector on-site full time with full access to all production activities associated with GLAST**
    - Conformance to drawing specifications, SOW, Aeroflex procedures and workmanship standards
    - Polymeric material shelf life dates
    - Adhesive mix records
    - Mate/Demate logs
    - Calibration records
    - Torque Logs
    - ESD
Oversight and Surveillance Activities

- Audits
  - SLAC Source Inspector has the right to conduct audits with prior coordination with Aeroflex
MRB Process

- **Documents**
  - 65002, Nonconforming Material
  - 65032, Corrective/Preventive Action
  - 65095, Stock Screeners
  - NCR, Corrective Action Forms

- **Procedure**
  - Aeroflex will identify, segregate, document and report all parts, materials, CCA’s and electronic assemblies/units which do not meet drawing or specification requirements.
    - Defects that can not be reworked using approved procedures
    - Receipt of SLAC supplied material
    - Failures or anomalies
    - Nonconformances found at final Inspection
MRB Procedure

- **Aeroflex will provide immediate notification to SLAC source inspector of NCR initiated**
  - Description of nonconformance
    - Violation of drawing or specification
    - IS and S/B conditions
  - Location by drawing reference zones
  - Part number
  - Serial number
  - Quantity
  - Corrective/Preventive Action as available

- **SLAC Source Inspector will convene a MRB with SLAC promptly**
  - Darren Marsh, LAT Performance Assurance
  - Gunther Haller, LAT DAQ Subsystem Manager (or designee)
  - LAT Manufacturing Engineering (as applicable)
MRB Procedure

- **Disposition**
  - Quality Engineering from Aeroflex receives disposition instructions from SLAC Source Inspector
    - Use-as-Is
    - Rework
    - Repair
    - Scrap
End Item Data Package

- Certifications of Compliance for each assembly
- Copies of travelers/shop orders
- Nonconformance Reports
- As-Built drawing and parts list
- As-Built configuration record
- In process and final test reports
- End Item acceptance test data including environmental test
- Inspection reports as applicable
- Mate/Demate log for flight connectors
- Digital Photos