GLAST Large Area Telescope:
Performance & Safety Assurance

Darren Marsh
SLAC
Performance & Safety Assurance Manager

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

- Manpower Update
- Significant Accomplishments
- Nonconformance Report Summary
- Issues and Concerns
- Three Month Milestones
- Cost Variance Analysis
Manpower Update

- **Quality Engineering**
  - Three senior level Quality Engineers on board

- **Source Inspection Support**
  - Contract in place for source inspection support for Tracker MCM production activities at Teledyne Electronic Technologies in Los Angeles
    - Planned start date of 1/26/04 slipped to 2/4/04
      - Pre-production contract needs to be modified to account for on-site QA oversight at Teledyne
      - Flight MCM SOW covers requirement for full-time QA oversight at Teledyne

- **EEE Parts Assurance Support at SLAC**
  - Individual secured for two months beginning 2/4/04

- **Quality Inspection Support**
  - Purchase requisition submitted for acquisition of two quality inspectors
    - Start date anticipated to be last week of February
Significant Accomplishments

- Grid manufacturing support
  - Supported Grid Manufacturing Readiness Review (MRR) 12/18/03
    - Presented QA efforts to date and defined quality plan for final grid manufacturing
      - Addressed plan for quality surveys and process approval of plating vendors, witnessing/documenting special processes, etc.
  - Created first draft of LAT MRB Procedure
    - Establishes procedures, organization and responsibilities of the LAT MRB
  - Supported GSFC Quality Audit performed at SLAC Jan. 19-23
    - No findings were identified
    - Significant progress in QA System development noted in close-out meeting
    - 26 recommendations provided in draft report
      - 6 recommendations immediately implemented
Significant Accomplishments (Con’t.)

- Quality System Development
  - LAT QA defining and assigning Supplier Quality Assurance Requirements (SQAR) to purchase orders, as flow down QA requirements for LAT flight hardware suppliers
  - Flight hardware procurement process now ensures all flight hardware is delivered to Building 33 (LAT Receiving) for proper control and incoming inspection
  - Established Bonded Stores processes for receipt, storage and inventory control of flight hardware
  - Established QA inspection stations in cleanroom and bonded stores in Building 33
  - Provided critical QA requirements to INFN at Pisa workshop (Jan. 13-14) for documentation/configuration control, materials/parts traceability, nonconformance reporting/MRB, EIDP, supplier control, inspections and readiness reviews
# Closed Nonconformance Reports
(Since last Monthly Status Meeting)

<table>
<thead>
<tr>
<th>NCR No.</th>
<th>Open Date</th>
<th>Description of Non-Conformance</th>
<th>Summary of Disposition</th>
<th>Close Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>32</td>
<td>10/23/03 Tracker Honeycomb material has various visual imperfections</td>
<td>Affected material was scrapped and new material ordered. Source inspection being performed prior to next shipment</td>
<td>1/3/04</td>
</tr>
<tr>
<td>2.</td>
<td>38</td>
<td>11/26/03 dc/dc regulators were inadvertently opened without using ESD precautions and in an uncontrolled environment</td>
<td>Parts evaluated by LAT Parts Control Board. Non-effected parts accepted for “use-as-is”.</td>
<td>1/2/04</td>
</tr>
<tr>
<td>3.</td>
<td>48</td>
<td>1/13/04 PWB coupon failed annular ring requirement</td>
<td>Affected PWB’s scrapped</td>
<td>1/23/04</td>
</tr>
</tbody>
</table>
## Open Nonconformance Reports

<table>
<thead>
<tr>
<th>NCR No.</th>
<th>Open Date</th>
<th>Description of Non-Conformance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>29</td>
<td>Tracker MCMs using nano-connectors with qualification testing not complete</td>
<td>Parts have passed visual. Contact resistance, thermal cycling. Shock/vibration testing starting 12/12.</td>
</tr>
<tr>
<td>2.</td>
<td>39</td>
<td>DAQ PDU PMOS FET – SEM Inspection of wafer lot revealed worst case metallization of oxide step not meeting requirement</td>
<td>Waiver request submitted to LAT PCB for review.</td>
</tr>
<tr>
<td>3.</td>
<td>41</td>
<td>PWB width and Step down dimensional discrepancies</td>
<td>Parts were manufactured to correct requirements. Drawing utilized for manufacturing not formally released. QA requires acceptable corrective action of configuration management issue.</td>
</tr>
<tr>
<td>4.</td>
<td>42</td>
<td>1 PWB has exposed copper; 1 PWB is stain/foreign material; 5 PWBs with illegible serial number</td>
<td>5 PWBs with illegible serial number will be remarked, others are scrapped.</td>
</tr>
<tr>
<td>5.</td>
<td>43</td>
<td>Omnetic connector issues. Jack screws too long and bond line between metal shell and connector body had inadequate peel strength</td>
<td>Tiger Team formed to resolve issues with supplier. Initial process changes appear acceptable.</td>
</tr>
<tr>
<td>6.</td>
<td>44</td>
<td>Failed dielectric thickness from coupon testing</td>
<td>Parts are acceptable per previous design reviews. Drawing issue. LAT QA requires acceptable corrective action of configuration management problem.</td>
</tr>
<tr>
<td>8.</td>
<td>47</td>
<td>Bias circuits not serialized per drawing.</td>
<td>Bias circuits require serial number. Supplier was contact and issue resolved.</td>
</tr>
</tbody>
</table>
Issues/Concerns

- Open RFA on inertia welding process for heat pipes at Lockheed Martin
  - Submitted details of weld process qualification testing and in-process acceptance testing on all flight welds to GSFC to address this RFA

- QA requirements flowed down at Pisa workshop need to be implemented at INFN and INFN suppliers

- Backlog of flight EEE parts that require incoming inspection
  - Some components utilized for MCM fabrication were dropped shipped to Teledyne
    - Need to ensure incoming inspection of parts will be performed prior to start of flight production
    - Parts requiring DPA have been identified and samples will be pulled and sent to GSFC for DPA
  - Several shipments of EEE flight parts received in Building 33 have yet to be accepted by LAT QA
Three-Month Milestones

• Complete in-process and final inspection of Lockheed Martin heat pipe – April 2004
• Formalize MRB procedure – January 2004
• Release Work Order requirements document and brief affected LAT personnel – February 2004
• Initiate Change Request for additional Quality Assurance Manpower – Completed
• Source inspector on board at Teledyne – February 4, 2004
• Close out GSFC RFA on LM inertial weld process control issue – January 2004
• Provide QA support for final grid machining and plating – Through April 2004
• Review quality system and production activities and perform source inspections related to the fabrication of Tracker bottom tray close-outs at Composites Optics – Through February 2004
Three Month Milestones (Con’t)

- Develop records retention and traceability process for supplier quality documentation – February 2004
- Perform vendor surveys of Electronic Subsystem assembly houses – March 2004
Cost Variance Analysis

- Cumulative CV = $93K
  - Management (CV = $42K)  Labor & travel costs lower than plan
  - Quality Assurance (CV = $52K)
    - $35K of variance due to delayed Stanford processing of subcontractor invoices. Actual expenditures in line with planning
  - Training (CV = $2K)
  - Systems Safety (CV = $0K)
  - EEE Parts Control Program (CV = $0K)