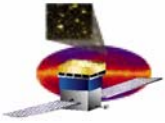


# GLAST Large Area Telescope: Performance & Safety Assurance

Joseph Cullinan  
SLAC  
Performance & Safety Assurance Manager

[cullinan@slac.stanford.edu](mailto:cullinan@slac.stanford.edu)  
(650) 926-5034



## 4.1.A P&SA – Status October 2005

---

- DAQ/Electronics

PDU:

- Completed handoff of 1<sup>st</sup> PDU (GLAT1898) to I&T
- 2<sup>nd</sup> PDU scheduled for delivery from Aeroflex in December

GASU:

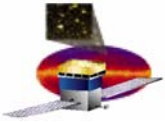
- 1<sup>st</sup> GASU completed vibration testing
- CCAs for 2<sup>nd</sup> GASU still in assembly at Aeroflex

SIU:

- Completed environmental testing on proto-flight and first two flight boxes

New vibration testing facility used for GASU and 2 SIUs

- Primary vendor (Wyle Labs) had equipment problems
- Quanta Labs (Santa Clara) was used to maintain test schedule
- QA survey was conducted prior to hardware testing; no QA issues
- Quanta Labs engineering support and test equipment capabilities is superior to that of Wyle



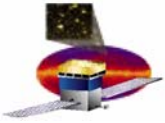
## 4.1.A P&SA – Status October 2005

---

- DAQ/Electronics

QA issues with hardware built at Aeroflex:

- Returned backplane (GLAT 2418) after observing flux residue on cPCI connector pins and discoloration/contamination in areas of conformal coat
  - Aeroflex received board yesterday and will evaluate for cleaning/rework
  - Expect rework to complete by next week
- cPCI X-ray evaluation
  - NCRs have been generated when solder touch up is required
  - GSFC also reviewing X-rays of soldered connectors for solder void/fill evaluation
  - Will schedule MRB to discuss any differences between GSFC and SLAC evaluations
- Continue to receive timely in-process and pre-ship inspection reports for each board from SLAC source QA at Aeroflex, so workmanship issues and rework are clearly tracked
  - LAT QA also supporting twice weekly status telecons with Aeroflex
  - Workmanship issues with Aeroflex boards have not been completely eliminated, but have been greatly reduced and have not resulted in scrapping of CCAs



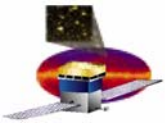
## 4.1.A P&SA – Status October 2005

---

- DAQ/Electronics

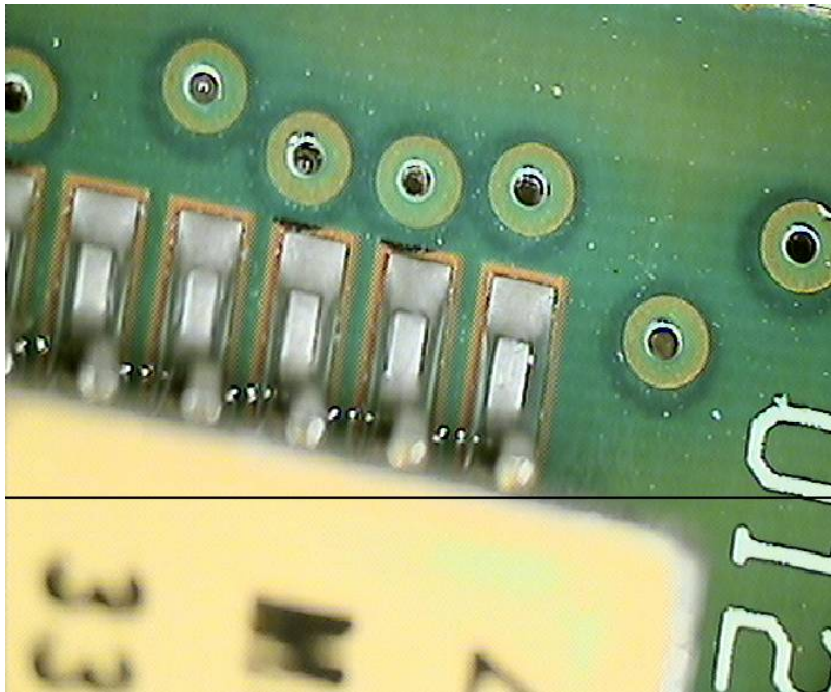
RAD750 boards

- Spectrum/Astro reported particulate contamination (electrically conductive epoxy) on their two RAD750 boards (S/N 16 and 24) following rework at BAE
- SLAC RAD750 boards were also reworked; five flight boards (S/N 12, 14, 15, 17, 18) in-house at SLAC were inspected and did not show contamination levels observed on S/A boards; no additional cleaning was required
- SLAC received sixth flight board (S/N 13) yesterday; will inspect for contamination
- S/A to investigate cause of contamination on their boards and possibilities for cleaning



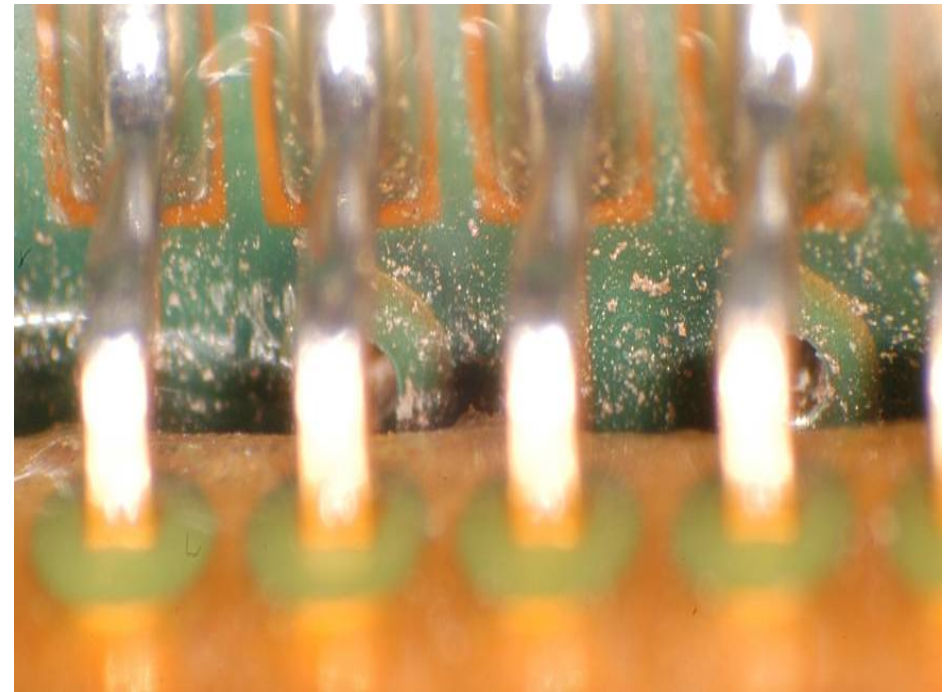
## RAD750 board contamination SLAC and Spectrum Astro observations

---



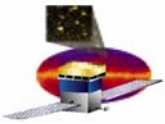
**S/N 018 (SLAC Board)**

Fine particulates observed  
lightly dispersed in localized  
regions (magnification 20X)



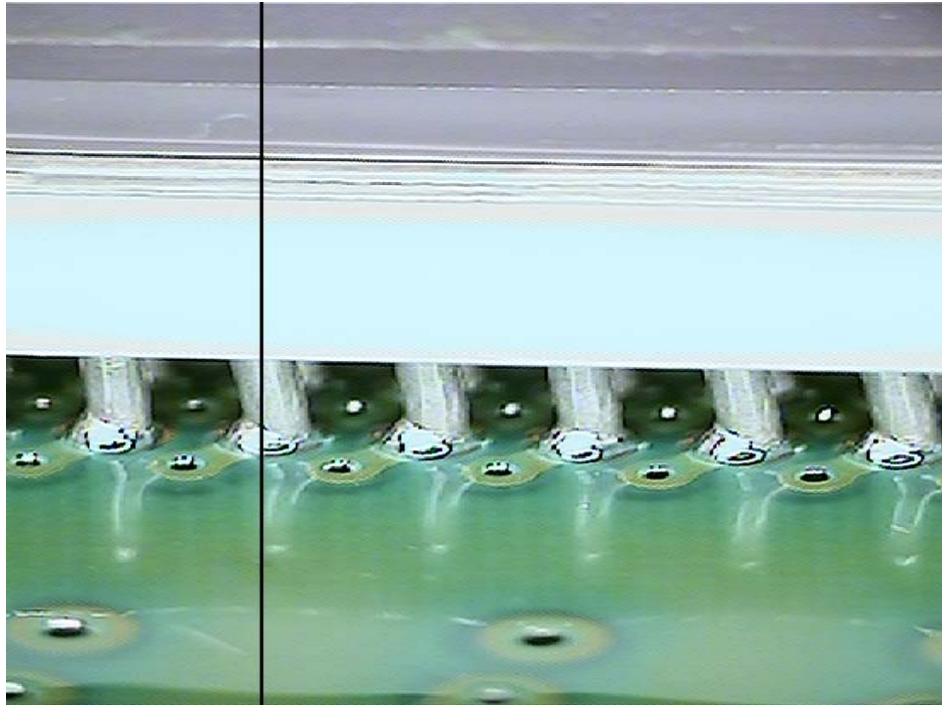
**S/N 024 (S/A Board)**

High density of particulate  
contamination. (magnification  
30-40X)



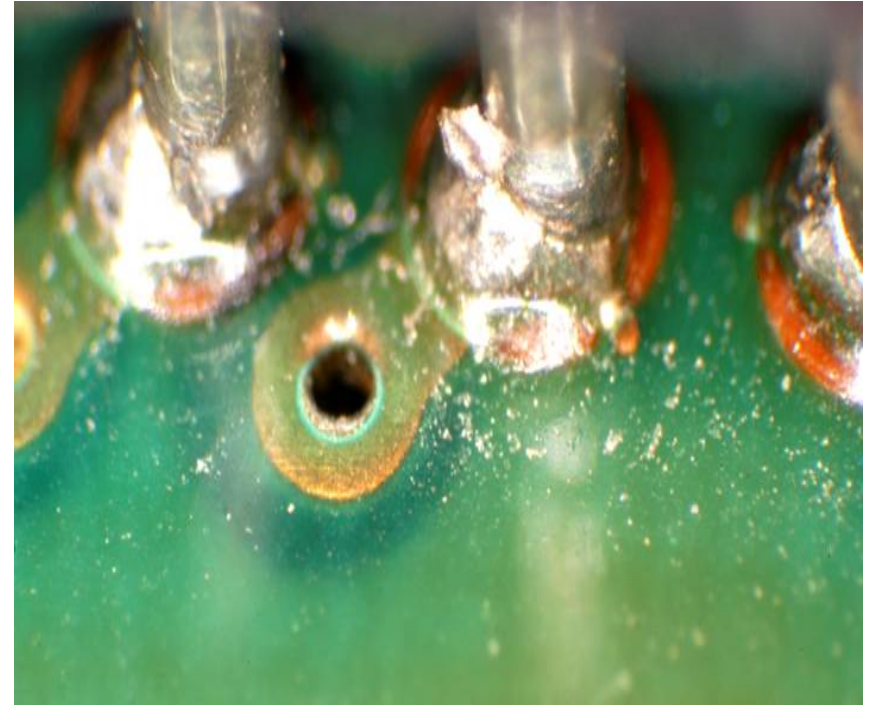
## RAD750 board contamination SLAC and Spectrum Astro observations

---



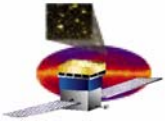
**S/N 018 (SLAC Board)**

Area around processor leads is visibly clean. Typical of majority of S/N 018 surface (magnification 25-30X)



**S/N 024 (S/A Board)**

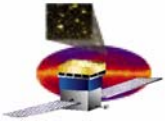
Area around processor shows heavy particulate contamination (magnification 30-40x)



## 4.1.A P&SA – Status October 2005

---

- Integration and Test
  - Supported completion of 16 Tower integration and 16 Tower testing
  - Supporting inspection of parts and hardware still being received
  - Continue to lead weekly MRBs to work through I&T NCRs for closure

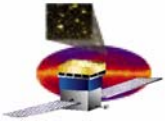


## 4.1.A P&SA – Status October 2005

---

- Tracker
  - Supported successful preship review of final Towers delivered
  - Supported Tracker team in addressing some specific INFN NCRs as requested by GSFC Product Assurance:
    - Identify Tower locations of TMCMs that incorporated silicone masking tape during assembly
    - Identify Tower locations of trays that incorporated epoxy encapsulant on MCM to SSD wire bonds
    - Cause of observed wire bond breakage on Tower A heavy trays
    - Cause of noisy channels observed in some trays
    - Cause of wire bonds shorting to SSDs in Tower 1 trays
  - Response to these questions has been completed by Tracker team; plan on reviewing these issues with GSFC this week or next
  - Finalized qualification test plan for Parlex and Pioneer flex cables
    - Plan has been approved by SLAC, GSFC and cable vendors
    - Will use qty = 10 bare flex cables from each vendor for qualification
    - Trace Labs (Hunt Valley, MD) will conduct the same qualification testing on Parlex and Pioneer cables
    - Goal is to successfully complete qualification testing before LAT ships to NRL





## 4.1.A P&SA – Status October 2005

---

- Mechanical Systems

- X-LAT Plate

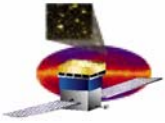
- Delivered to SLAC in July; reviewed acceptance data package from Lockheed Martin. Still have not received final data package
    - Need to repeat proof load test on lift fixture
      - Cracked welds observed after first proof load test
      - Fixture was reworked; needs to be retested/inspected

- Radiators

- Received 9/30/05
    - Identified open items in acceptance data package
      - LM has not yet completed data package

- Static Load test (Grid #2)

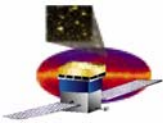
- Supported Test readiness review with vendor (NTS)
    - Delta TRR scheduled for tomorrow to close remaining issues
    - LAT QA plans to witness and support static load test



## 4.1.A P&SA – Status October 2005

---

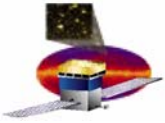
- FSW QA
  - Completed first successful formal dry run of test scrip and procedure
  - Completed audit of Build B0-5-1 (one finding, two observations)
  - Supported V&V of LATTE Release R4.10.2
  - Continued support of FSW Test Script development, dry runs and LICOS development
  - Participated in Quality Requirements Management Process assessment with GSFC SW QE (R. Worden).
    - No findings were noted by GSFC during the assessment



# LAT NCR Metrics 11/3/05

Subsystem	Open NCRs	Closed NCRs last 30 days	NCRs Open 30 days or more	NCRs open 90 days or more	NCRs ready to close (disposition complete; need final QA review to close)
DAQ	69	14	57	22	30
Tracker	33	27	32	25	17
Mechanical	2	1	1	1	1
CAL	0	0	0	0	0
ACD*	10*	0	7	0	0
I&T	36	6	22	16	7

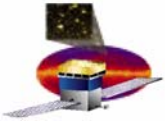
\* includes 5 open ACD PRs and PFRs from GSFC



# Issues and Concerns

---

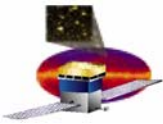
- Flex Cable Qual Testing
  - Need to complete qual testing of Parlex and Pioneer flex cables. Goal is to complete before LAT ships to NRL
- Final data packages and lift fixture from Lockheed Martin
  - Open items in data package are identified; need LM support to close
  - X-LAT Lift fixture needs to successfully pass second proof load test and inspection
- Continued focus on addressing and closing NCRs



## 4.1.A P&SA – Planned Accomplishments November 2005

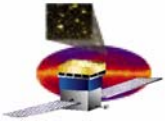
---

- Support testing of electronics CCAs and boxes
- Support formal dry runs of FSW test scripts/procedures
- Continue to work closely with Aeroflex to minimize workmanship issues
- Support and monitor results of flex cable qual testing
- Support Grid static load testing
- Work with Lockheed Martin to complete documentation packages and have remaining hardware delivered



# Cost Report

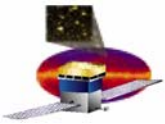
	During Month		Cum. to Date		Detail		Balance of	Contractor	Contract	Outstanding
	Actual	Planned	Actual	Planned	OCT05		Contract	Estimate	Value	
<b>4.1.A PERFORMANCE AND SAFETY ASSURANCE</b>										
4.1.A.1 PERFORMANCE ASSURANCE MGMT	5	70	790	936			146	936	936	0
4.1.A.2 QUALITY ASSURANCE	146	66	2,971	2,696			-275	2,696	2,696	0
4.1.A.3 TRAINING	0	0	14	14			0	14	14	0
4.1.A.4 RECORDS MANAGEMENT	0	0	42	42			0	42	42	0
4.1.A.5 SYSTEMS SAFETY	0	0	0	0			0	0	0	0
4.1.A.6 EEE PARTS CONTROL PROGRAM	0	0	214	210			-4	210	210	0
<b>CAPW[3]Totals:</b>	<b>150</b>	<b>136</b>	<b>4,031</b>	<b>3,897</b>			<b>-134</b>	<b>3,897</b>	<b>3,897</b>	<b>0</b>
<b>4.1.B LAT INSTRUMENT SCIENCE OPERATIONS CENTER</b>										
4.1.B.1 PROJECT MANAGEMENT	2	2	176	188			12	188	188	0



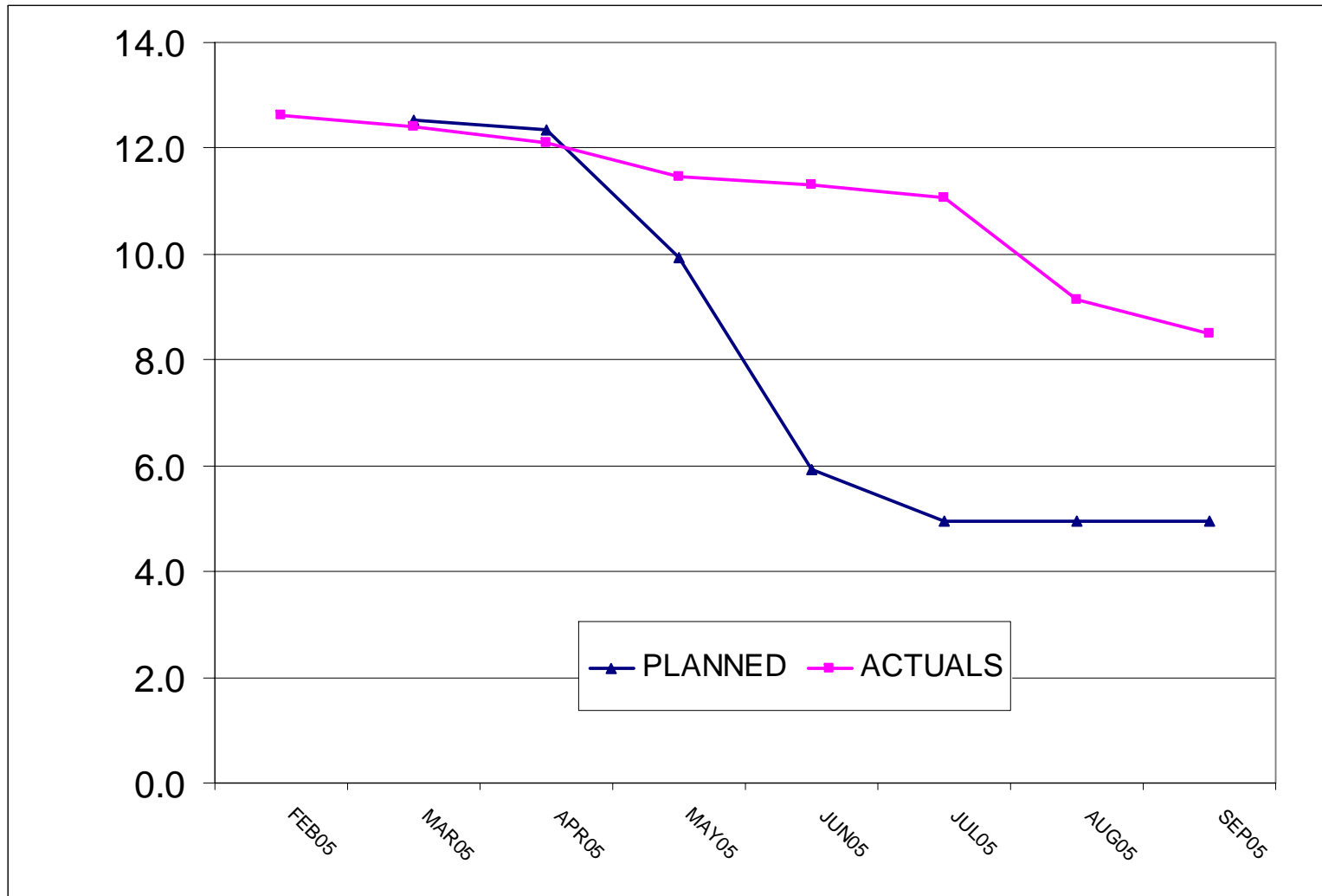
# Cost Variance Explanation

---

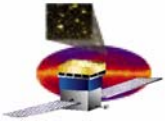
- **Why overrun/underrun?**
  - **Overrun due to higher FTE required for support than budgeted. Continue to show lower overall FTE.**
- **What will be done to correct?**
  - **FTE will continue to decrease. One SLAC QE (Richard Gobin) left program in October. Can reduce FTE as final subsystem hardware production is completed**



# FTE Report (DOE/NASA-funded only)







# FTE Variance Explanation

---

- **Why overrun/underrun?**
  - **Needed to continue higher than budgeted level of QE support at SLAC.**
- **What is the impact?**
  - **FTE continues to decrease. Will see decrease of approx 1 FTE in October (SLAC QE left project)**
- **What will be done to correct?**
  - **Further reduction of FTE at SLAC expected in December as hardware production ends**