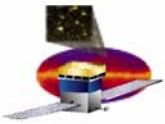


# GLAST Large Area Telescope: Performance & Safety Assurance

Joseph Cullinan  
SLAC  
Performance & Safety Assurance Manager

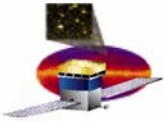
[cullinan@slac.stanford.edu](mailto:cullinan@slac.stanford.edu)  
(650) 926-5034



## 4.1.A P&SA – Accomplishments June 2005

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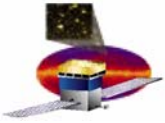
- DAQ/Electronics –
  - Transition of QE personnel to support electronics hardware testing has been effective to support inspection, data review, documentation review/management and NCR documentation of TEM/TPS and PDU testing
  - Continued to support TEM, TPS, PDU board and module testing
  - TEM/TPS environmental testing running smoothly
    - No significant issues with T/V chamber operation or vibration testing of two TEM/TPS modules simultaneously
  - Supporting resolution of assembly problems with PDU and GASU at Aeroflex
    - 6 nonconformances have been written by Aeroflex on the PDU and GASU to date to document PWB assembly issues and minor mechanical hardware modifications
    - All have been closed and assembly is proceeding
  - Closed 17 NCRs related to Electronics – making progress



## 4.1.A P&SA – Accomplishments June 2005

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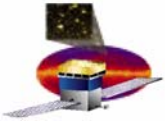
- Integration and Test
  - Continued support of 4- and 6-tower testing
    - Supporting resolution of open NCRs related to testing
    - Closed 8 NCRs related to I&T



## 4.1.A P&SA – Accomplishments June 2005

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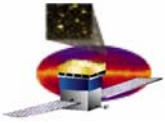
- Cables
  - Conducted on-site final inspections and assembly process auditing at cable vendor (Cicon)
  - Auditing has improved workmanship and reduced rejection rate; on-site final inspection has decreased turnaround time to rework rejected cables.
  - Approximately 110 cables left for Cicon to build, should complete in July.



## 4.1.A P&SA – Accomplishments June 2005

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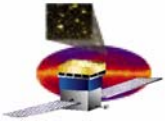
- TMCM
  - Supporting final TMCM production, inspection/shipment of parts to Teledyne and finished TMCMs to INFN
  - Teledyne is performing board conformal coating in house and will not use outside vendor for coating any flight TMCMs
  - TMCM production expected to finish at Teledyne in July
  - LAT QA is performing final review to ensure acceptance data packages for production run is complete and all NCRs are closed



## 4.1.A P&SA – Accomplishments June 2005

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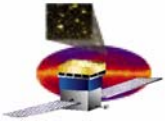
- Software QA
  - Completed review of baseline FSW Candidate Release and closed out findings with software group
  - Reviewed FSW test procedures and provided comments
  - Supported recent I&T releases for LATTE and ELogbook
  - Currently tracking Test scrip V&V (pre-FQT), build process dry runs, test procedure development status



# Issues and Concerns

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- Pioneer Flex Cables
  - Pioneer reported problems in meeting the 0.002" minimum annular ring requirement for first panels built
    - This has caused a delay in delivery of first bare boards to mid-July. Concern is that this will be a continuing problem affecting Pioneer's yield and delivery schedule
  - Three test samples of Omnetics connectors bonded to flex cables using Pioneer's autoclave process have been received at SLAC. Visual inspection shows very good epoxy bonding and no connector cracking; bond shear strength will be tested at GSFC to qualify the connector bonding process.
    - Bond shear strength expected to be acceptable, but if not, a second process will have to be quickly developed and qualified.
  - LAT QA and TKR team will coordinate with Pioneer and GSFC to determine when panel test coupons will be ready for evaluation and their priority in GSFC's test lab. First coupons should be available second week of July. Parlex test coupons will need priority evaluation also.

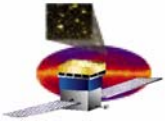


# Issues and Concerns

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- Parlex Flex Cables
  - Held two MRBs with GSFC to discuss cracks observed in Omnetics connectors on Parlex flex cables.
    - SLAC analysis of voltage breakdown and Omnetics' testing of current leakage of cracked connectors indicate presence of cracks would not create significant changes to electrical performance of connectors
    - GSFC currently underway with their proposed test plan to evaluate effects of thermal cycling and mate/demate on connector crack propagation.
    - Even though Parlex modified their process to greatly reduce compressive load on connectors during cable assembly, cracks were still observed in connectors on one cable. Root cause of cracking is still not completely known.
    - Follow up MRB to finalize acceptance criteria of cracked connectors is planned once GSFC test results are complete

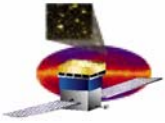




# Issues and Concerns

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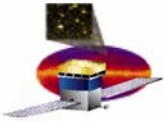
- Cable retesting following rework
  - Recent MRB with GSFC reviewed three PDU cables reworked in-house that did not repeat full electrical acceptance testing per NASA cable assy standard 8739.4 prior to shipment to Aeroflex
    - Cables were only tested for continuity after rework and sent to Aeroflex for PDU assembly.
    - Cables were returned to SLAC from Aeroflex, then sent to vendor and passed full electrical acceptance testing. Cables meet NASA requirements and have been returned to Aeroflex for PDU assembly
    - All cables reworked at vendor are fully retested, so this issue was isolated to cables reworked in-house.



# Issues and Concerns

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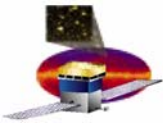
- Shielded cables
  - MRB with GSFC reviewed LAT cables with metallic braid shielding that do not include a kapton tape wrap around the wires to provide additional layer of protection between wires and external braid
    - LAT cables have been built and tested to existing NASA requirements
    - Practice is recommended by NASA-STD-8739 but not required
    - Risk is cold flow of teflon wire insulation under stress, resulting in separation of the insulation and possible shorting of exposed wire to the metallic braid. Cold flow will occur under these conditions within a day or two, so any resulting cable problems would be readily observed during I&T.
    - Evaluation of cable tray layout shows no expected bending over sharp edges or tight radii (less than 3X O.D. per NASA-STD-8739). Tie wrap installation and compression will be controlled with industry proven, calibrated installation tool.
    - I&T has been sensitized to the cold flow concerns and new practices and process are in place for cable handling and care
    - Discussions with cable vendor showed significant cost and schedule impact to rework/rebuild braided cables to add layer of insulation
    - Recommendation is to proceed with current cable design; awaiting final concurrence from GSFC



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

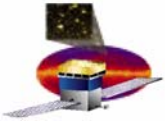
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- Support TEM/TPS, PDU, GASU assembly and testing
- Support expected completion of production runs at Teledyne and Cicon
- Work with GSFC to finalize the issues with braided cable design and cracked flex cable connectors.
- Work with TKR team on flex cable delivery concerns with Pioneer and Parlex
- Work to close NCRs



# Cost Report

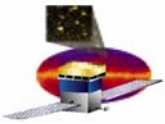
Reporting Category	Cost Incurred				Estimated Cost			Estimated Final Cost		Unfilled Orders Outstanding
	During Month		Cum. to Date		Detail		Balance of Contract	Contractor Estimate	Contract Value	
	Actual	Planned	Actual	Planned	JUN05	JUL05				
<b>4.1.A PERFORMANCE AND SAFETY ASSURANCE</b>										
4.1.A.1 PERFORMANCE ASSURANCE MANAGEMENT	12	19	772	807	20	18	75	885	885	0
4.1.A.2 QUALITY ASSURANCE	169	84	2,463	2,404	91	63	78	2,696	2,696	1
4.1.A.3 TRAINING	0	0	14	14	0	0	0	14	14	0
4.1.A.4 RECORDS MANAGEMENT	0	0	42	42	0	0	0	42	42	0
4.1.A.5 SYSTEMS SAFETY	0	0	0	0	0	0	0	0	0	0
4.1.A.6 EEE PARTS CONTROL PROGRAM	0	0	210	210	0	0	0	210	210	0
<b>CAPW[3]Totals:</b>	<b>182</b>	<b>103</b>	<b>3,502</b>	<b>3,477</b>	<b>111</b>	<b>81</b>	<b>152</b>	<b>3,846</b>	<b>3,846</b>	<b>1</b>



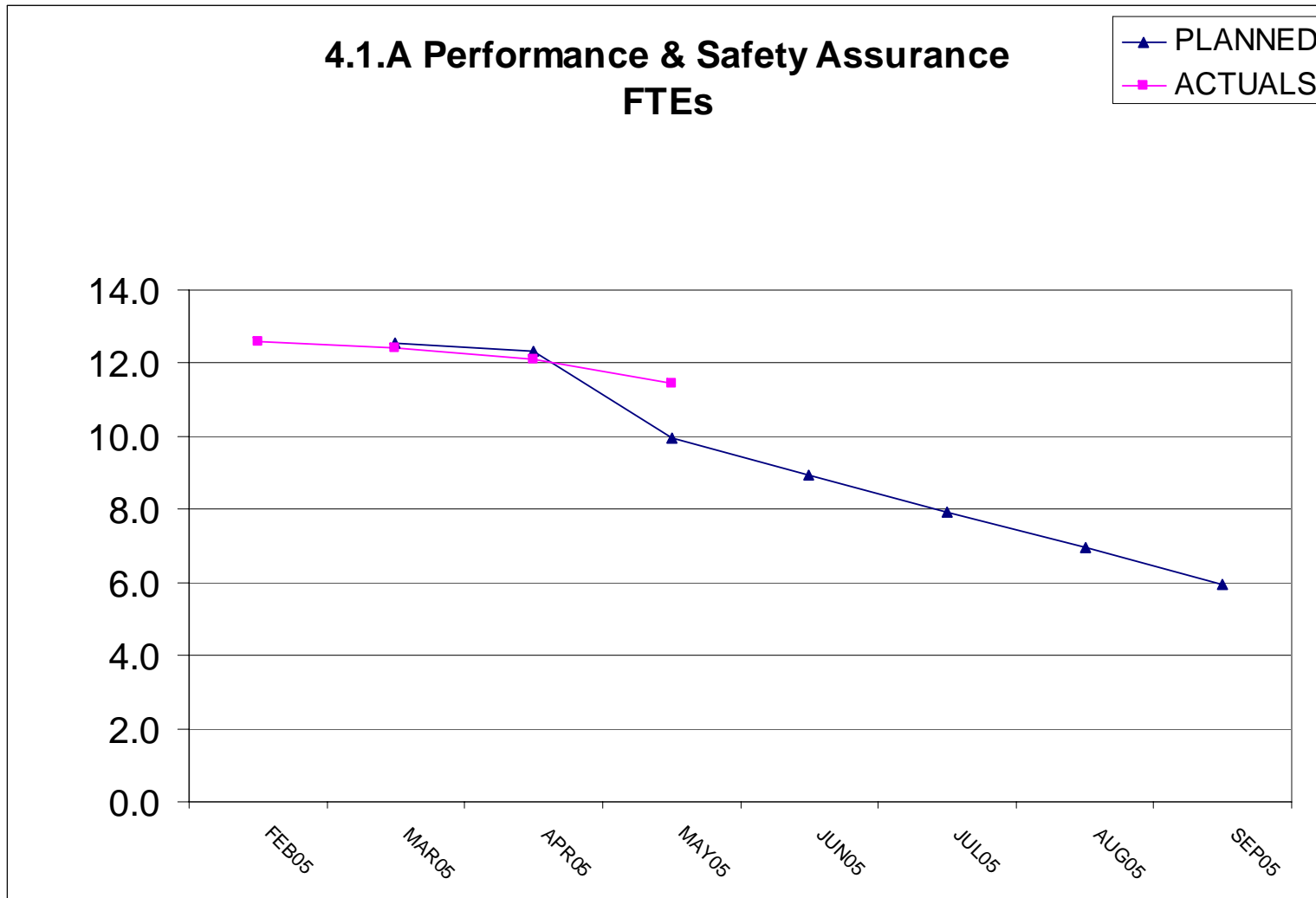
# Cost Variance Explanation

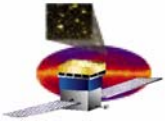
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- **Why overrun/underrun?**
  - **Did not reduce headcount to follow planned FTE dropoff due to extended production runs at vendors with full time source quality engineers. Also required same headcount as last month to support subsystem production and testing.**
- **What will be done to correct?**
  - **Source quality engineers at Teledyne and General Technology will not be needed once production ends**
  - **Look to consolidate QA headcount at SLAC in July as subsystem production (cables, TEM/TPS) ramps down**



# FTE Report





# FTE Variance Explanation

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- **Why overrun/underrun?**
  - **Source QA support was needed longer than expected at Teledyne and General Technology to support production**
- **What is the impact?**
  - **Need for source QA support ( 2 FTEs) should end in July**
- **What will be done to correct?**
  - **Look to consolidate QA headcount at SLAC in July as subsystem production needs (cables, TEM/TPS) ramps down**