

AntiCoincidence Detector

**GLAST Large Area Telescope:
Cost/Schedule Review
January 27, 2005
AntiCoincidence Detector (ACD)
Subsystem
WBS: 4.1.6**

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Significant Accomplishments

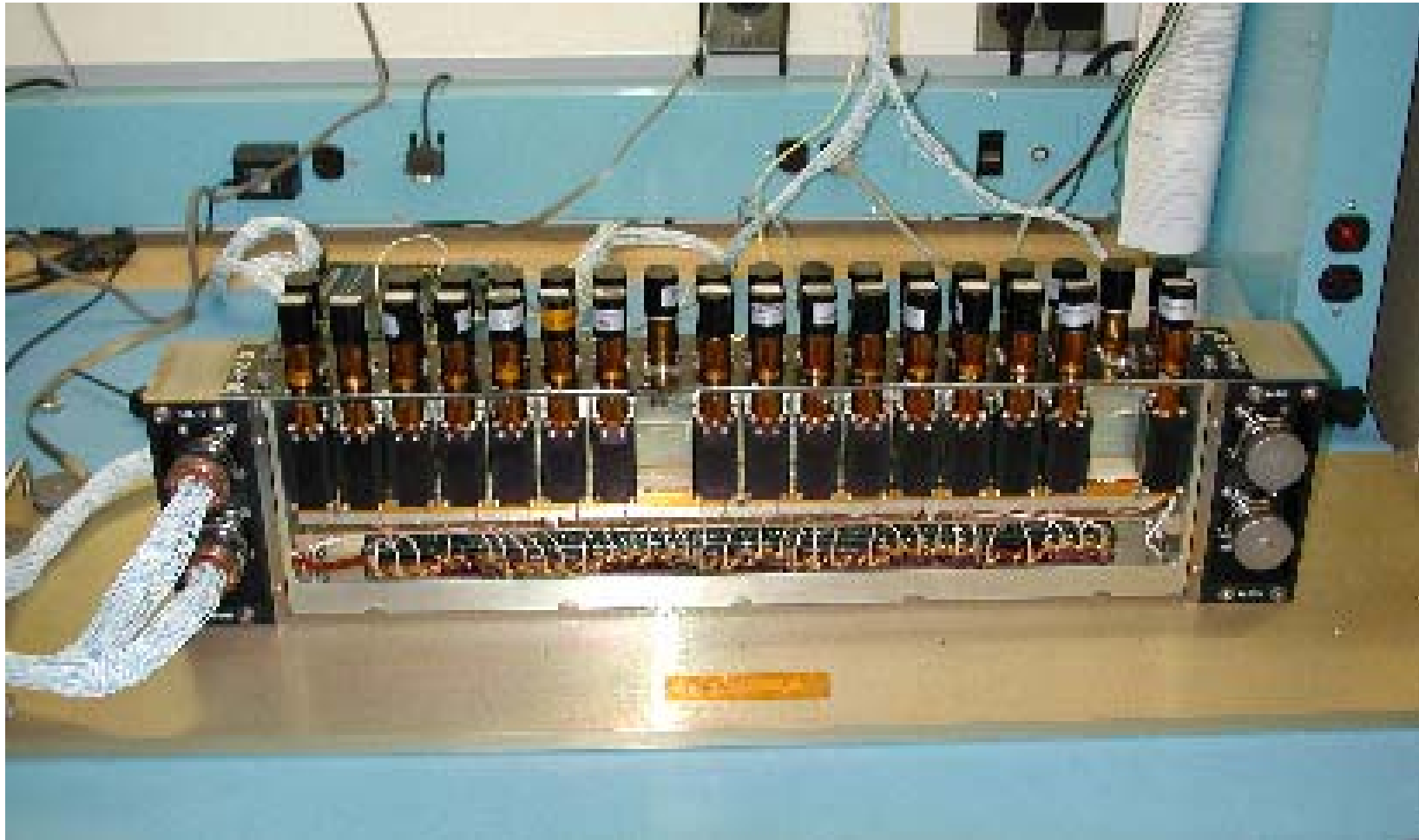
- **Completed installation of 2nd side row TDAs. This brings the total number of installed TDAs to 65. Remaining 24 TDAs are installed after integration of the Electronics Chassis.**
- **Completed a performance simulation using “as built” gaps between detectors and “as measured” performance data for the flight detector chain (TDA and fiber cables). The ACD efficiency requirement of 0.9997 was met!**
- **PMT assembly progressing well. Continue to experience issues with quality and delivery rate of mechanical housings. This has not impacted planned production rate, but has not allowed us to accelerate production to catch up from last months issues with the mechanical housings.**
- **Started Thermal Vacuum testing of the Qual/Spare Electronics Chassis.**
- **Completed assembly of the first Electronics Chassis.**

TSA Integration



Top and 2 top side row TDAs completed!

Flight Electronics Chassis Assembly



First Electronics Chassis (dual row) completed!

Electronics Chassis Testing



Qualification Electronics Chassis in Thermal Vacuum Chamber

Near Term Milestones

Milestone Description	Date	New Date	Status/Notes
Complete PMT Assembly	January, 2004	<u>2/11/05</u> <u>2/21/05</u>	Mechanical parts availability and quality has impacted completion.
Complete Flight Mechanical Drawings	September	<u>12/23/04</u> <u>2/18/05</u>	One assembly drawings remains. Designer has been focused on problem resolution, revisions, and EOs.
Complete installation of 25 top TDAs	10/15/04	<u>Actual</u> <u>11/10/04</u>	<u>COMPLETE</u>
EMI Testing of Qual/Flight Spare Electronics Chassis	11/29/04	<u>Actual</u> <u>12/06/04</u>	<u>COMPLETE</u>
Complete environmental and functional testing of first 10 flight PMTs	11/10/04	<u>Actual</u> <u>11/19/04</u>	<u>COMPLETED. All 10 PMTs successfully passed testing!</u>
Complete 34 PMTs for first dual row Electronic Chassis	11/19/04	<u>12/14/04</u> <u>1/8/04</u>	<u>COMPLETE</u>
Thermal vacuum test Qual/Flight Spare Electronic Chassis using fully functional EGSE	12/15/04	<u>TBD</u> <u>1/24/05</u>	<u>EGSE software issues delayed the start of this test.</u>
Complete 1 st Electronic Chassis Assembly and Functional Test	1/26/05	<u>2/3/05</u>	<u>Assembly complete, functional testing underway</u>

ACD Milestones

DATE	MILESTONE
2/4/05	30 PMT subassemblies complete
1/28/05	Flight TSA integration complete (except 2 bottom rows)
2/11/05	30 PMT subassemblies complete
2/4/05	All flight PMTs installed in housings
2/18/05	30 PMT subassemblies complete
2/25/05	30 PMT subassemblies complete
3/5/05	(4) electronic chassis vib/ tvac tested and RFI
3/28/05	(4) electronic chassis vib/tvac tested and RFI
3/31/05	Flight BEA integration complete
4/6/05	ACD Integration (TSA to BEA) complete
3/13/05	ACD Functional Test
4/23/05	Performance Efficiency Verification Test
5/2/05	ACD PER
4/26/05	Flight shield/thermal blanket assy aval for I&T
5/13/05	EMI/EMC test
4/15/05	shipping container completed
5/9/05	ACD vib test
5/13/05	ACD acoustics test
6/2/05	ACD thermal vacuum test
6/4/05	ACD Mass prop test
6/6/05	ACD PSR
6/12/05	Ship ACD to SLAC
6/18/05	ACD post ship functional testing
6/18/05	ACD RFI

PMT Assembly - Schedule of Events

PMT QTY.	Cleaning (Materials)	Mechanical Assembly	Electrical Asm. & Test	Thermal Cycle	Coating & Enclosures	Connector Installation	Light Tight Testing
	IN / OUT	IN / OUT	IN / OUT	IN / OUT	IN / OUT	IN / OUT	IN / OUT
1 - 10	Done	Done	Done	Done	Done	Done	Done
11 - 17	Done	Done	Done	12/3 / 12/6	12/6 / 12/10	12/10 / 12/13	12/13 / 12/13
18 - 33	Done	Done	11/30 / 12/3	12/3 / 12/6	12/6 / 12/10	12/10 / 12/13	12/14 / 12/15
34 - 64	12/1 / 12/2	12/6 / 12/10	12/8 / 12/15	12/15 / 12/16	12/16 / 12/30	1/3 / 1/5	1/6 / 1/8
65 - 95	12/2 / 12/3	12/13 / 12/17	12/15 / 12/21	12/22 / 12/23	12/27 / 1/5	1/5 / 1/6	1/7 / 1/10
96 - 126	12/6 / 12/7	12/20 / 12/30	12/22 / 12/28	12/29 / 12/30	1/3 / 1/10	1/11 / 1/13	1/13 / 1/15
127 - 157	12/6 / 12/7	1/3 / 1/7	1/5 / 1/11	1/12 / 1/13	1/13 / 1/1/21	1/24 / 1/25	1/26 / 1/28
158 - 188	12/7 / 12/8	1/10 / 1/14	1/12 / 1/19	1/20 / 1/21	1/21 / 1/28	1/28 / 1/31	2/1 / 2/4
189 - 209	12/7 / 12/8	1/18 / 1/21	1/20 / 1/26	1/27 / 1/28	1/31 / 2/4	2/7 / 2/8	2/9 / 2/11

Completion status as of 1/26

- 131 mechanical
- 112 electrical
- 90 coated
- 69 light tight
- 47 in rail

EGSE – Test Stands

ACD software developers have been working hard to adapt and complete test scripts

- **More bugs found in system; another release of LATTE delivered.**
- **Test scripts are now in use for chassis thermal vacuum testing.**
- **Continued serious concern: counts seem to be showing up in channels that do not exist – channels with no cables connected to GASU.**

Test Script Status: 31 scripts needed. 28 working, 3 in development.

- **Plan: make needed improvements in some working scripts, based on experience with thermal vacuum tests; then work on three scripts needed for full ACD operation (by February).**

ACD Problem /Failure Report Status

A total of 141 (21 opened since last months Review) PR's have been generated as of 1/26/05.

- ▶ 122 PR's have been closed (19 closed this month)
- ▶ 19 PR's open

A total of 12 PFR's have been generated.

- ▶ 5 PFR's are open.
 - ▶ 1 Red
 - ▶ 2 Yellow
 - ▶ 2 Black

▶ 7 PFR's closed

AntiCoincidence Detector

ACD Schedule Variances

- 4.1.6 – ACD Subsystem (-\$462K cum, +\$76K current)
- 4.1.6.4 BEA Schedule Variances (-\$128K cum, +\$61K current)
 - All variance is due to the PMTs and EGSE
- 4.1.6.7 ACD I&T (-\$300K cum, +\$18K current)
 - Technical issues (PMTs and EGSE) have delayed progress. This will begin to improve when PMT and EGSE completion allows the ACD to be integrated and tested.
- 4.1.6.B GSE (-\$22K cum, \$0K current)
 - (\$22K) – Shipping container work being pushed out to reduce manpower.

ACD Cost Variances

- 4.1.6 ACD (-\$649K cum, -\$289K current period)
- 4.1.6.1 ACD Project Management/Sys Eng/Science (+\$167K cum, -\$47K current period)
 - Science support lower than planned and a lag in accruals. This is one area that has been identified as needing additional support in the form of a Grad student. (+\$138K)
 - Systems Engineering Support running lower than planned (+\$16K)
 - MPS/Lab Tax (+\$38K)
 - Materials, software maintenance and fabrication support (-\$33K)
- 4.1.6.2 Safety and Mission Assurance (-\$115K cum, -\$92K current period)
 - Increased level of QA support (1 FTE) not in the baseline plan, but covered in rebaseline. Substantial increase (~2x) in rates not planned.
- 4.1.6.3 Tile Shell Assembly (-\$177K cum, -\$3K current period)
 - (-\$91K) - Design and analysis manpower
 - (-\$80K) - Fabrication charge backs higher than planned and increased fabrication and material costs required to resolve light leak issues.

ACD Cost Variances

- **4.1.6.4 Base Electronics Assembly (-\$453K cum, -\$138K current month)**
 - (-\$173K) – Labor for PMTs and chassis testing
 - (-\$235K) – Materials, no earned value, but incurring costs on PMT tasks that are in progress, but not completed. Fabrication overrun on PMT housings and rails (\$50K).
 - (-\$44K) - SLAC ASIC charges.
- **4.1.6.5 MS/TB (+\$21 cum, -\$13K current month)**
- **4.1.6.6 ACD Mech Qual and Cal Unit (-\$66K cum, \$0K current month)**
 - (-\$15K) – Tracker costs erroneously charged to the ACD
- **4.1.6.7 I&T (-\$129K cum, +\$20K current month)**
 - Have not received credit for the amount of work done.
 - TSA Integration manpower overrunning.
 - Unplanned work on EGSE issues.
- **4.1.6.B Ground Support Equipment (+\$57K cum, -\$17K current month)**
 - (-\$20K) – Schedule variance
 - (-\$40K) – Labor for EGSE software support.
 - (+\$117K) – Materials. Not billed for work completed

Threats to Schedule and Cost

- 1. GASU/G3 EGSE**
- 2. PMT Assembly**
- 3. Electronics assembly and test**
- 4. Minor Technical Issues that require manpower and time to resolve.**