

AntiCoincidence Detector

**GLAST Large Area Telescope:  
Cost/Schedule Review  
January 5, 2005  
AntiCoincidence Detector (ACD)  
Subsystem  
WBS: 4.1.6**

**David J. Thompson  
Thomas E. Johnson  
NASA Goddard Space Flight Center  
Subsystem Manager/Instrument Manager**

**David.J.Thompson@nasa.gov  
Thomas.E.Johnson@nasa.gov**

# Significant Accomplishments

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- **Completed installation of “Crown” TDAs and started installation of 2<sup>nd</sup> side row**
- **PMT assembly progressing well – Rapidly addressed issues with mechanical housings**
- **Completed EMI testing of Qual/Spare Electronics Chassis**
- **Completed preparing hardware for Thermal Vacuum testing of the Qual/Spare Electronics Chassis. Final software preparations are in progress.**

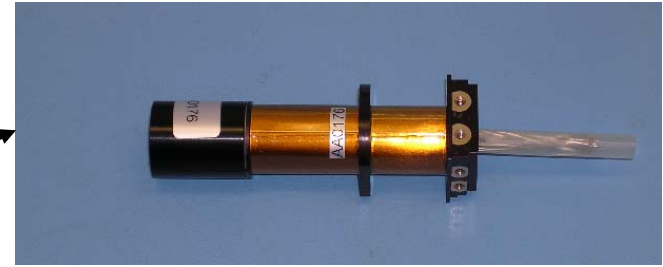
# Near Term Milestones

Milestone Description	Date	New Date	Status/Notes
Complete PMT Assembly	January, 2004	<u>1/25/04</u> <u>2/11/05</u>	More detailed information to follow
Complete Flight Mechanical Drawings	September	<u>12/23/04</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>	COMPLETE
EMI Testing of Qual/Flight Spare Electronics Chassis	11/29/04	<u>Actual</u> <u>12/06/04</u>	COMPLETE
Complete environmental and functional testing of first 10 flight PMTs	11/10/04	<u>Actual</u> <u>11/19/04</u>	COMPLETED. All 10 PMTs successfully passed testing!
Complete 34 PMTs for first dual row Electronic Chassis	11/19/04	<u>12/14/04</u> <u>1/8/04</u>	<u>65 PMTs have completed assembly, however 3 PMTs assigned to the first dual row Electronics Chassis had to be replaced by spares due to mechanical housing issues.</u>
Thermal vacuum test Qual/Flight Spare Electronic Chassis using fully functional EGSE	12/15/04	<u>TBD</u>	<u>EGSE software issues have delayed the start of this test.</u>
Complete 1 <sup>st</sup> Electronic Chassis Assembly and Functional Test	1/26/05		<u>Assembly will begin next week following completion of PMTs. Light pulser testing and GASU testing to follow.</u>

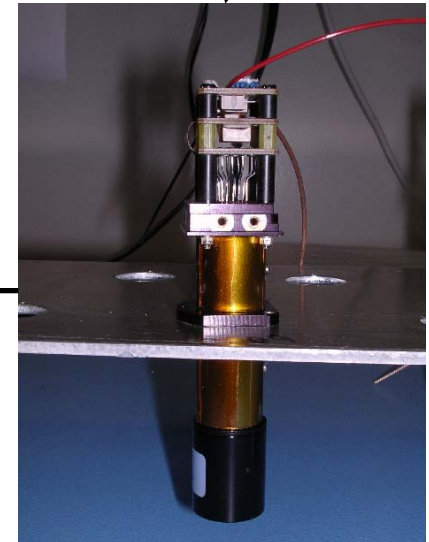
# PhotoMultiplier Tube Assembly



PhotoMultiplier Tube and Mechanical Mounting Hardware



PhotoMultiplier Tube in  
Mechanical Housing



Installation of Resistor  
Network 4



Completed PMT Assembly –  
Functionally and light tight tested  
AntiCoincidence Detector (194 required)

# PMT - Status

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- **Assembly Team meeting or exceeding production rate goals\***
- **Mechanical housing availability and quality have been issues.**
- **Issue #1: Thread non-conformance. Limited number of PMT caps did not thread onto “old” housings properly. Fit check of PMTs to their specific PMT caps (already integrated to the mechanical structure) found several that did not mate properly. Code 547 did an excellent job reworking threads. “New” housings have smaller threads. STATUS - RESOLVED**
- **Issue #2: Outside fabrication shops are delivering new housings late and delivered parts do not meet specification. Late delivery has been resolved by negotiating partial shipments. Can use discrepant parts (mostly coating problems) “as is” with slight rework, but it is taking time to resolve issues. STATUS – RESOLVED**
- **Issue #3: Minor light leaks around resistor network cover. Caused by coatings and issues with the cover. One cover was cracked at a counter-sunk hole. Causes a light leak, but is not a structural problem. Will tape seam at edge of cover. STATUS - RESOLVED**

\*when all hardware is available

# 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

- Dates highlighted in green have been completed.
- Mechanical housing issues described on previous slide have delayed progress beginning at PMTs 65-95. Issues have been resolved, all parts are in and production has resumed. We will be working hard to maintain final completion date of 2/11.

# EGSE – Test Stands

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

- **Additional upgrades required this month to LATTE to make ACD software function properly.**
- **Test scripts successfully used for electronics chassis EMI/EMC testing.**
- **Test scripts required for TVac testing of the electronics chassis need to be completed.**

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

- **Plan: Get TVac test scripts operating properly and then work on three scripts needed for full ACD operation.**

# Issue – EGSE/Test Stands

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**ISSUE: EGSE/G3 Test Stand #7 had a hardware failure during EMI testing.**

- **House keeping circuit failed. Sent Test Stand #7 back to SLAC for repair since this circuit is required for next test (TVac)**
- **The other “mini” test stands not suitable for TVac testing either.**

## **Mitigation:**

- **Use “full” GASU for TVac test of qual chassis. Need Test Stand #7 back in ~2 weeks. Gunther is planning on returning GASU #7 back to us this week.**



# Status - TSA Integration



Top and Crown TDAs completed, working on 2<sup>nd</sup> side row

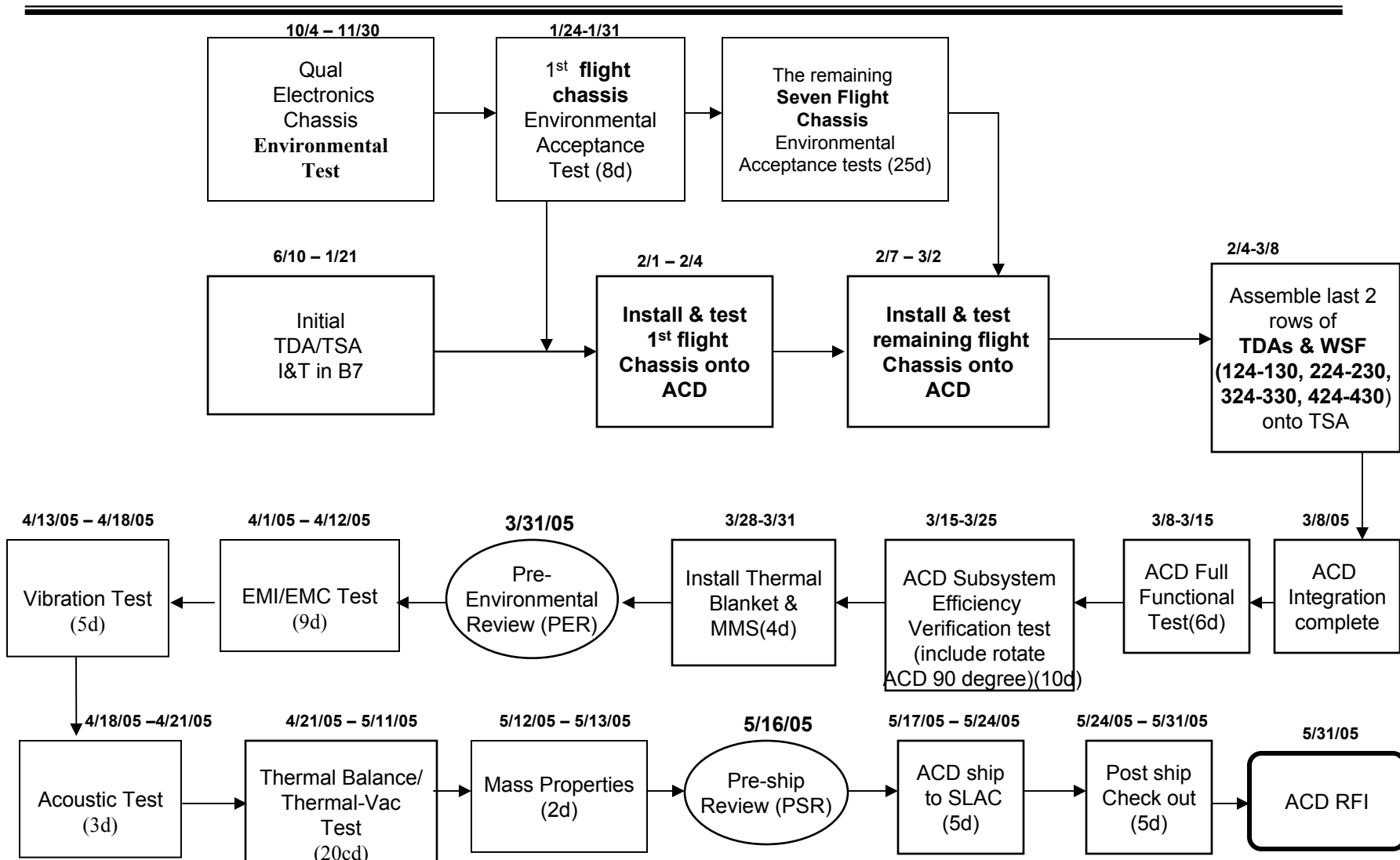
# Status - TSA Integration



Fiber cable routing on the +Y side



# Schedule Flow (as of 12/15/04)



# ACD Problem /Failure Report Status

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A total of 120 (11 opened since last Champion Team Review) PR's have been generated as of 12/31/04.

- ▶ 103 PR's have been closed.
- ▶ 17 PR's open

A total of 12 PFR's have been generated.

- ▶ 8 PFR's are open.
  - ▶ 2 Red
  - ▶ 4 Yellow
  - ▶ 2 Black

▶ 4 PFR's closed

# ACD Schedule Variances

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- **4.1.6 – ACD Subsystem (-\$537K cum, -\$15 current)**
- **4.1.6.4 BEA Schedule Variances (-\$190K cum, +\$32K current)**
  - **All variance is due to the PMTs.**
- **4.1.6.7 ACD I&T (-\$318K cum, -\$45K 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

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- **4.1.6 ACD (-\$405K cum, -\$145K current period)**
- **4.1.6.1 ACD Project Management/Sys Eng/Science (+\$215K cum, -\$3K 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. (+\$167K)**
  - **Systems Engineering Support running lower than planned (+\$32K)**
  - **CM and Scheduling support lag in accruals (+\$10K)**
  - **MPS/Lab Tax (+\$38K)**
  - **Materials, software maintenance and fabrication support (-\$33K)**
- **4.1.6.2 Safety and Mission Assurance (-\$23K cum, -\$13K current period)**
  - **Increased level of QA support (1 FTE) not in the baseline plan.**
- **4.1.6.3 Tile Shell Assembly (-\$174K cum, -\$26K 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

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- **4.1.6.4 Base Electronics Assembly (-\$315K cum, -\$71K current month)**
  - (-\$77K) – Labor for PMTs and chassis testing
  - (-\$194K) – Materials, no earned value, but incurring costs on PMT tasks that are in progress, but not completed
  - (-\$44K) - SLAC ASIC charges.
- **4.1.6.5 MS/TB (+\$33 cum, \$0K current month)**
- **4.1.6.6 ACD Mech Qual and Cal Unit (-\$66K cum, -\$14K current month)**
  - (-\$15K) – Tracker costs erroneously charged to the ACD
- **4.1.6.7 I&T (-\$149K cum, -\$45K current month)**
  - Have not received credit for the amount of work done.
  - TSA Integration manpower overrunning
- **4.1.6.B Ground Support Equipment (+\$74K cum, -\$1K current month)**
  - (+\$43K) – Labor. Costs lagging on mechanical design and EGSE support.
  - (-\$40K) – Labor for EGSE software support.
  - (+\$72K) – Materials. Not billed for work completed

# Threats to Schedule and Cost

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