

AntiCoincidence Detector

# **GLAST Large Area Telescope: Cost/Schedule Review June 2, 2004 AntiCoincidence Detector (ACD) Subsystem WBS: 4.1.6**

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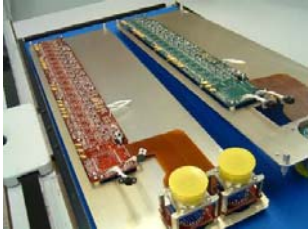


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## Recent Accomplishments

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- **Tile Detector Assembly**
  - Final parts delivered to Fermi last Friday.
  - 96 TDAs received. 80 TDAs tested; all meet our performance requirements.
  - First Flight Ribbon Detector formed. Meets dimensional requirements. Working out mounting issues.
- **PMTs**
  - Lost only 3 days due to hazardous material issues. This is a big accomplishment as all activities involving hazardous materials at Goddard have been officially suspended.
- **Mechanical Structure**
  - Completed qualification testing! Structure officially being delivered to I&T on Thursday, June 3.

## Recent Accomplishments - Electronic Component Status

ITEM	Quantity Required Flight (Spare)	Assembly Complete	Functional Testing	Conformal Coating	Thermal Testing	Ready for next assembly
<b>Front End Electronics Boards</b> 	<b>12 (4)</b>	<b>14</b>	<b>8</b>	<b>5</b>	<b>7</b>	<b>5</b>
<b>High Voltage Bias Supply</b> 	<b>24 (6)</b>	<b>30</b>	<b>30</b>	<b>12</b>	<b>8</b>	<b>4</b>
<b>Photomultiplier Tube Assembly</b> 	<b>196 (40)</b>	<b>29</b>	<b>29</b>	<b>29</b>	<b>0</b>	<b>0</b>

## Near Term Milestones

Milestone Description	Date	New Date	Status/Notes
Complete Flight HVBS	<u>6/30/04</u>		<u>All 30 are assembled. On hold to resolve voltage change.</u>
Complete Flight FREE Boards	<u>6/30/04</u>		<u>First 14 are assembled. 5 ready for assembly into flight electronics chassis.</u>
Complete PMT Assembly	January, 2004	<u>6/30/04</u>	<u>39 assembled. Issues with plastic screws and glass flaws being worked.</u>
Complete Qualification Unit Electronics Chassis Assembly	<u>5/20/04</u>	<u>?</u>	<u>Mechanical parts, FREE Boards, and HVBS are ready. 29 PMTs ready this week. Need to finish up EGSE testing and software so that the chassis can be tested.</u>
Mechanical Subsystem delivered to I&T	<u>5/17/04</u>	<u>6/1/04</u>	<u>Complete!</u>
Complete Flight Mechanical Drawings	September	<u>5/30/04</u>	All part drawings complete. <u>Two assembly drawings remain.</u>
Complete Fab of Clear Fiber Cables	August	<u>6/25/04</u>	<u>All parts have been received and tooling is set up. Will complete first cable this week.</u>
Complete Fab of Flight TDAs	November	<u>6/20/04</u>	<u>96 TDAs received. Remainder to be completed by 6/20/04.</u>

# Interdependencies

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1. EGSE/G3 – Ongoing development with I&T and Electronics groups.
  - Second EGSE/G3 was received on 5/27. Testing ongoing.
2. Grid to Base Frame match drilling – Outline drawing and available date for work? Need to finalize date. Currently estimate that we need the base frame back by 6/21/04.
3. Delivery of ACD Calibration Unit or subset to LAT I&T –**The same electronics chassis being used for G3 commissioning will be used for the calibration unit. Delivery of calibration unit will occur some time after this testing.**
4. ICD – Rich Bielawski is helping track a set of needed changes.
5. Finalize voltage change.

# Open Design Issues

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- **OPEN:** Outline drawing that defines some interfaces with LAT is still not complete (blanket attachment, grounding, cable tie-downs, optical survey mounts). Action Plan: Work with LAT mechanical design team to resolve open issues. **Status: Unchanged from last month**

# Issues

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- **PMT Anomaly (glass breaking)**
  - Closed out anomaly and began flight production
  - Two issues with plastic screws came up (poor quality and torque issue) and have been resolved.
  - Visual inspection of PMTs has identified that 43 PMTs fall into the “worst of the worst” category regarding flaws in the glass. This leaves us with ~24 spare PMTs when the new order for 30 arrives in July. This is not enough spares, at least 20 more PMTs are required.
- **HV Capacitor life testing failure**
  - HALT testing looks great so far
- **G3/EGSE**
  - Testing of recently received EGSE is ongoing
  - Working on software.
  - Schedule driver.

# Concerns

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- **Our schedule for assembly of the ACD is tight (or aggressive, or challenging, or whatever word you choose to indicate that we have a lot of hard work over the next few months).**



## ACD Schedule Variances

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- **4.1.6.3 - TSA Schedule Variances (-\$22K cum, +\$48K current)**
  - Procedures
  - TDA Assembly and Test
- **4.1.6.4 BEA Schedule Variances (-\$394K cum, +\$54K current)**
  - (\$81K) – HVBS (HV Capacitor & voltage change)
  - (\$298K) – PMTs (PMT Anomaly)
  - (\$5K) – FREE Board (ASIC Delay)
- **4.1.6.6 Mech Qual and Cal Unit (-\$104K cum, -\$54K current)**
  - (\$104K) – Late start on mechanical qualification testing. Has been completed! SV will be gone next month
- **4.1.6.7 ACD I&T (-\$94K cum, +\$6K current)**
  - (\$94K) – Getting started late, but we have begun!

## ACD Cost Variances

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- **4.1.6.1 ACD Project Management/Sys Eng/Science (+\$376K cum, +\$24K current period)**
  - (+\$221K) - Labor support lower than planned due to lower than planned science simulations and test support (\$148K), systems engineering being covered by GLAST Project (\$54K), Science Support lag in accruals (\$41K)
  - (+\$118K) MPS lower than planned
- **4.1.6.2 Safety and Mission Assurance (+\$66K cum, +\$56K current period)**
  - Cross utilizing support with the GLAST project. Staffing was not sufficient in this area. We have added a QA person.
- **4.1.6.3 Tile Shell Assembly (-\$152K cum, -\$249K current period)**
  - (-\$135K) - Labor higher than planned to complete drawings, schedule variance, and labor charged to .3 instead of .6 (\$34K)
  - Materials – \$160K payment to Fermi lab this month. Shell panels not invoiced yet.

## ACD Cost Variances

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- **4.1.6.4 Base Electronics Assembly (-\$636K cum, +\$271K current month)**
  - (-\$208K) Labor
  - (-\$382K) M&S – Parts screening, parts purchases, FREE, HVBS, PMT, and Resistor Network work performed, but have not received credit for work done.
  - (-\$46K) SLAC ASIC charges.
- **4.1.6.5 MS/TB (+\$16K cum, -\$24K current month)**
  - (+\$27K) – JSC cost reporting behind actual work performed.
- **4.1.6.6 ACD Mech Qual and Cal Unit (+\$92K cum, +\$7K current month)**
  - Some charges billed to .3 instead of .6
- **4.1.6.B Ground Support Equipment (+\$270K cum, -\$75K current month)**
  - (+\$188K) – Labor
  - (+\$80K) - Materials

# Threats to Schedule and Cost

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- 1. GASU/G3 EGSE**
- 2. PMT Assembly**
- 3. Electronics assembly and test**

## Zero Schedule Variance Actions

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- **Total ACD SV = \$619K**
- **Approximately 1/2 (\$300K) of ACD schedule variance is due to PMTs, so we need to get this work completed. Making good progress, have run into several issues, but we are getting close to reaching full production.**
- **Another \$100K is for electronics assembly. Need to resolve voltage change and get EGSE operating to eliminate this variance.**
- **Another \$100K is for mechanical qualification. This work is done so it will go away next month.**
- **Another \$100K is for I&T. Due to schedule delays this one would be difficult to zero out. It would require a CCB action to change our scheduled delivery date.**