

AntiCoincidence Detector

GLAST Large Area Telescope: Cost/Schedule Review July 26, 2005 AntiCoincidence Detector (ACD) Subsystem WBS: 4.1.6

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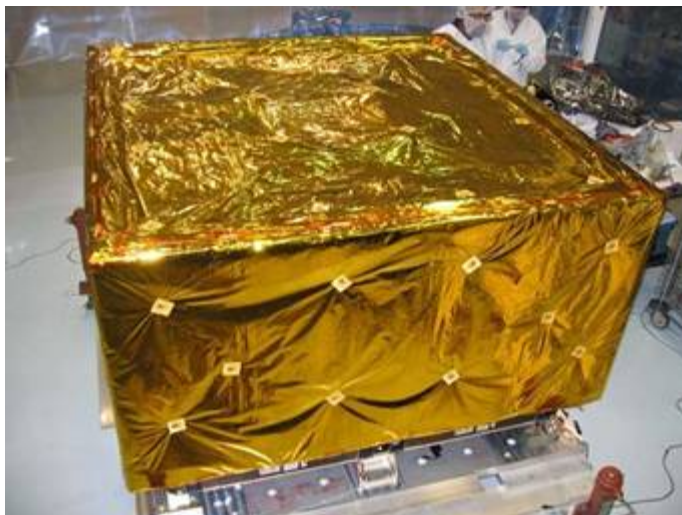
SIGNIFICANT ACCOMPLISHMENTS



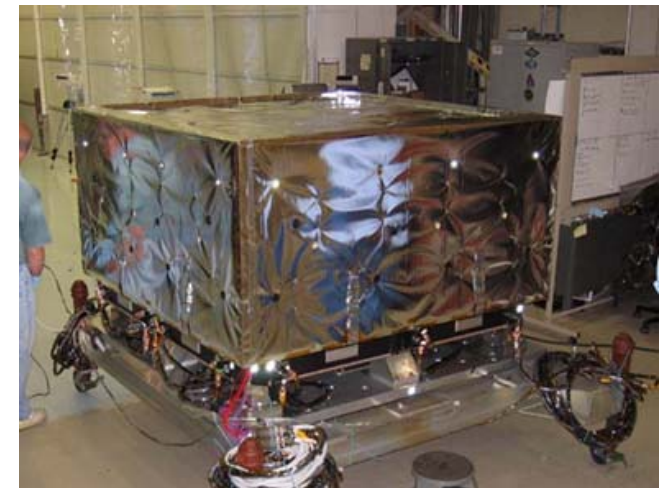
Final ACD Integration

Clockwise from left:

- All detectors and electronics
- Installation of Micrometeoroid Shield (MMS)
- MMS in place
- Multi-Layer Insulation (MLI) attached, except for Germanium Kapton outer layer



AntiCoincidence Detector



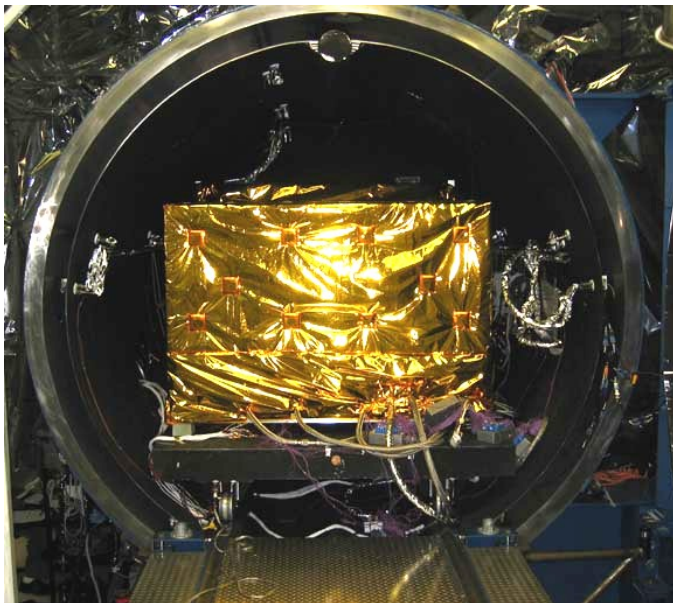
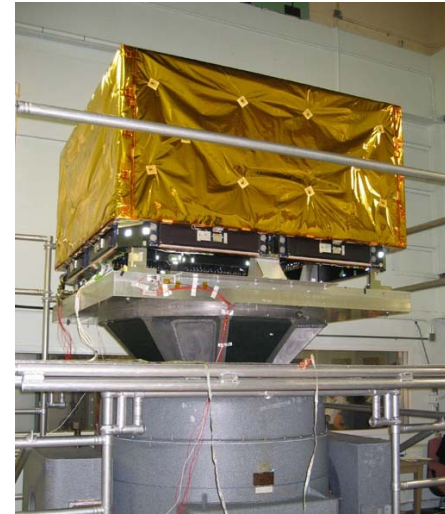
SIGNIFICANT ACCOMPLISHMENTS



ACD Testing

Clockwise from left:

- Performance testing
- ACD on vibration table
- ACD in acoustics chamber
- ACD in thermal vacuum chamber



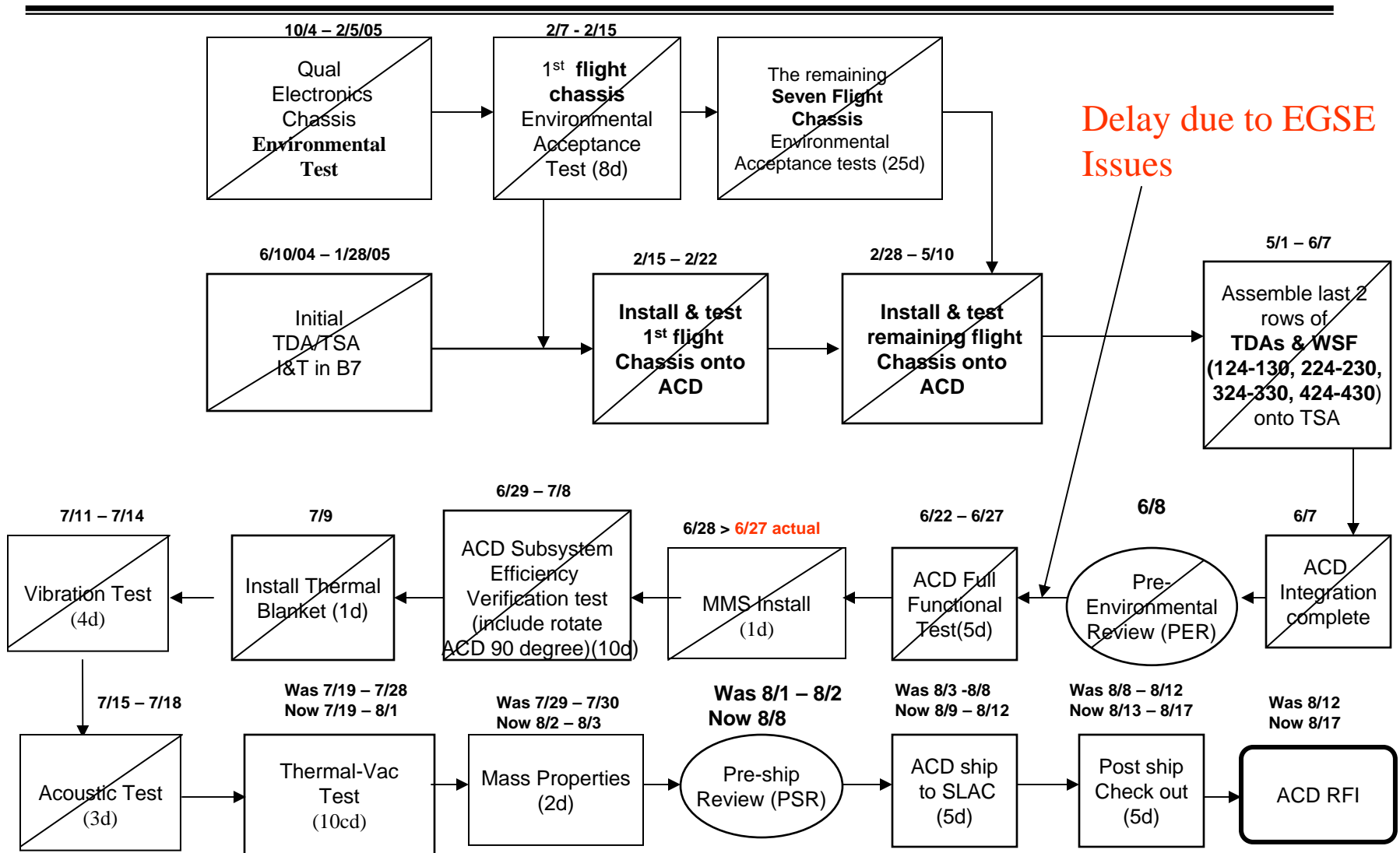
AntiCoincidence Detector



Near Term Milestones

Milestone Description	Date	New Date	Status/Notes
ACD PER	5/24/05	<u>6/8/05 (Act)</u>	<u>COMPLETED</u>
Efficiency Verification Test	6/3/05	6/16/05 <u>7/8/05</u>	<u>COMPLETE. This milestone slipped due to EGSE issues.</u>
MMS/TB Installation	6/17/05	<u>6/29/05</u>	<u>COMPLETE</u>
Vibration	6/23/05	<u>7/11-14/05</u>	<u>COMPLETE</u>
Acoustics	7/15-18/05	<u>7/18/05</u>	<u>COMPLETE</u>
Thermal Vacuum	6/15/05	6/27/05 7/19-28/05 <u>7/19-8/1</u>	<u>Additional testing and longer thermal transitions will add a few days to this test. Expect to complete no earlier than 8/1. This test is underway now.</u>
Mass Properties	8/2-3		<u>May request additional margin on Z-axis CG. Analysis shows we meet requirement, but may be difficult to prove by test (i.e. ACD would need to be turned on side). Can be done, it would just take time/money (approx 1-2 days)</u>
PSR	8/8		<u>On the schedule</u>
Shipping	8/9-12		<u>Talked to Jim Ryan, he agrees that escort is not required.</u>

ACD - Schedule Flow (as of 7/25)

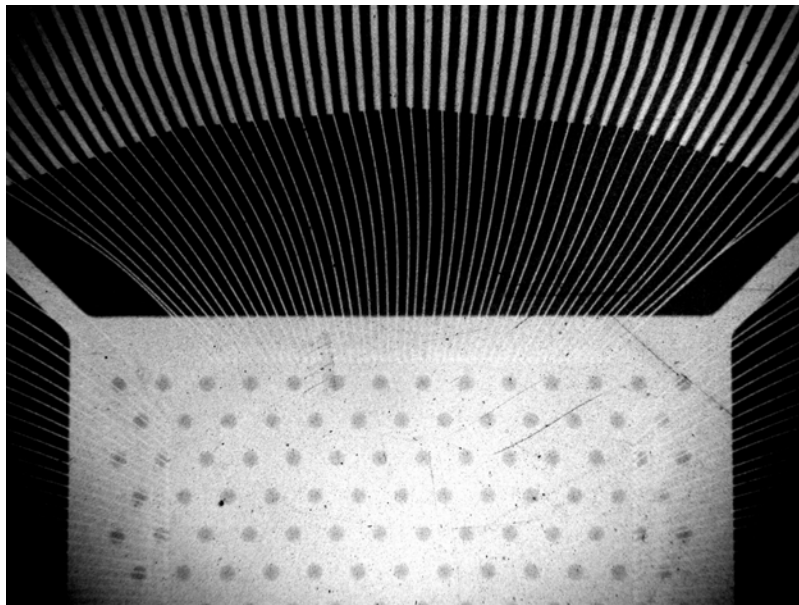


EGSE/Test Stand Issue – Largely Resolved

Recent Activities

- We have a system that works and a full set of test scripts, thanks to lots of hard work by the software developers.
- The Level 3 milestone of delivering a set of test scripts has been completed.
- We had hoped to improve the system to allow automatic comparisons of runs made under different conditions, but this effort had to be abandoned due to limitations of the LATTE system. Comparisons will be done manually.
- We have a few known anomalies that are probably software-related. Those are still being worked.

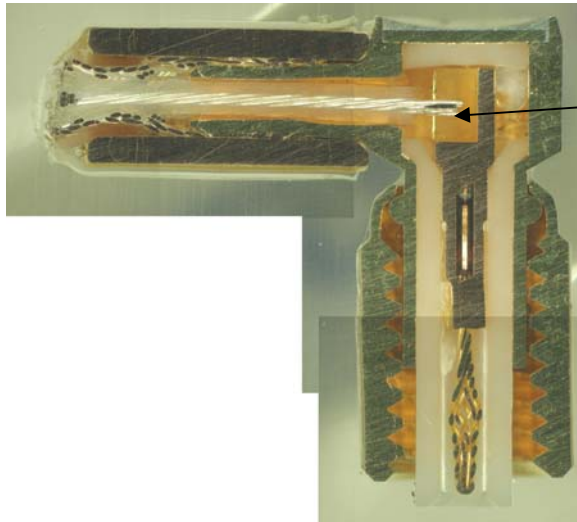
GARC Issue - Resolved



Wire overlap

- **GARC wire bond overlap**
 - **Issue: Flight GARCs (digital ASIC) passed through the screening process with an abnormal x-ray. The cause of this issue is that the radiographic results were not reviewed. The 2D image clearly shows that two bond wires cross, however the vertical separation between the wires can not be seen. The good news is that the GARC has been tested without anomaly at the part, FREE board, chassis, and ACD level. A review of all available data indicates no concern and no further action needed.**

Lepra/Con Issue – Resolved?



Empty solder cup

Lepra/Con Failure

- Issue: One (of 194) flight PMT signal connectors failed vibration testing.
- Cause: Workmanship. No solder at connector junction.
- Resolution: Repaired in place.
- X-ray of 9 other flight connectors showed good workmanship.
- All flight connectors have passed vibration and acoustics testing.
- Still need formal closure on this issue.

Nut Plate Issue – New

Following acoustics testing of the ACD, a nut plate was found under the ACD. It is the same type used to attach the ACD Tile Detector Assemblies to the flexures. The concern is that one of the tiles has lost a fastener.

- We believe this nut plate did not come from the ACD.
- The location would have required a tortuous path, since it was found under the part of the ACD that was sealed off by plywood and sandbags.
- The locking feature of the nut plate should have made it extremely difficult to loosen.
- We know that some of these nut plates were removed during assembly and may have been trapped in parts of the ACD dolly.
- Most of the flexures are sealed with tape for light tightness, so that a loosened nut plate would have been trapped.
- We are documenting this as a problem, but not a major concern.

ACD Problem /Failure Report Status

As of July 25, 2005, a total of 353 Problem Reports (PR's) and 22 Problem Failure Reports (PFR's) have been opened

▶14 PR's open

▶13 for EGSE related problems

▶1 for the nut plate found following acoustics testing

▶4 PFR's are open

▶PMT signal wire connector (Lepra/Con) - Green

▶TDA gaps – Yellow

▶One broken fiber on tile 230 – Yellow

▶One thermistor wire violates interior stay-clear - Yellow

Lien List

LIEN #	Description	LAT Cost
2	MMS/TB Bakeout. Seven day B/O followed by chamber certification. Since the MMS and Thermal Blanket material contain many polymeric materials (i.e. foam, fabrics, netting, fims, etc) that can not be cleaned other than by a thermal vacuum bakeout, it is required to bakeout these materials prior to ACD thermal vacuum testing to eliminate the risk of contaminating the full ACD subsystem. (WD#6431 Estimate). This cost is under WBS 4.1.6.5	41.4
4	Per day cost. = \$4.9K. \$15K of the total amount is for CM and scheduling support under WBS 4.1.6.1 and the remainder is under WBS 4.1.6.7.	151.9
6	Additional stress analysis on MMS/TB attachment points to incorporate thermal loads imparted by MMS/TB. This is required to close an action item assigned to the ACD by the Goddard Mechanical Engineering Division. The concern being that temperature induced shrinkage of the MMS/TB could casue a failure to the MMS/TB attachment points. This cost is covered under WBS 4.1.6.5.	8.5
7	Increase manpower support on MMS to pull in delivery date. The MMS was on the critical path for completing the ACD, therefore additional support was required to accelerate the completion of the MMS. This additional support allowed the MMS to be completed on schedule and removed it from the critical path. This cost fall under WBS 4.1.6.5	35
8	Additional S&MA support to prepare for PER, close out PRs, and monitor floor activities. Additionally, this covers QA support for the schedule delay identified in lien #4 at a cost of \$1.7K per day. This cost is covered under WBS 4.1.6.2.	51
9	Three additional vibration tests on Electronic Chassis and final resolution and closeout of vibration frequency shift. This cost is covered under WBS 4.1.6.4.	29
10	Alignment hardware for the Optical fiber to PMT connection. The fiber cables at the PMT optical interface had a tilt relative to the optical window of the PMT. This tilt caused a degradatdion of light yield and therefore had to be minimized. Therefore additional hardware is required to reduce the tilt of the fiber cables. This cost is covered under WBS 4.1.6.4.	8
12	Tracker simulator. In order to drive the temperature of the ACD during thermal vacuum testing, a temperature controlled tracker simulator is required. This cost covers the design and fabrication of a box to simulate the Trackers. A 4' x 4' temperature controlled plate and a Thermal Conditioning Unit (TCU) will be used to drive the temperature of the Tracker simulator. Both of these items are provided by the thermal testing group. This cost is under WBS 4.1.6.7	6
13	Facility costs. Due to the schedule delay and a rate increase, additional funding is required to cover integration and test support in the Building 7,10,15, and 29 complex. This cost is under WBS 4.1.6.7.	30
	TOTAL	360.8

Change from last month: LAT Cost FY05, was \$326K now \$361K, delta of \$35K. Variance explanation: \$6K for MMS/TB bakeout, \$29K for labor due to additional schedule delay (5 days). Note: Some labor dollars have moved from lien #4 to lien #8 for accounting purposes.

Level 3 Milestone List

Activity Description	Baseline Finish	-2m Var	-1m Var	Bsln Var	Early Finish	2005												2006				
						F	M	A	M	J	J	A	S	O	N	D	D	E	J	A	F	M
4.1.6 ACD																						
ACD Test Scripts (from ACD to I&T)	03/15/05*	-54	-76	-91	07/22/05	▼																
ACD Flight Unit at SLAC,	07/15/05	0	-10	-20	08/12/05																	

Run Date 07/20/05 13:25
 Data Date 07/01/05
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GLAST LAT PROJECT
Level 3 Milestones
Baseline Variance (Organized by Subsystem)

LT-DZ: Baseline Variance
 FL-D4: AV: Level 3 Milestones
 Report #10
 Sheet 5

Milestone Variance Explanation

- **Explanation**
 - **Software Scripts – Delivered to LAT I&T**
 - **RFI date - Slipped 5 days from last month due to delay in completion of EGSE, PSR date change, and longer than planned thermal vacuum test. Several days have been recovered by working 24 hour days, reducing duration of performance testing, and reducing shipping by one day. This can be done because we will have more time to pack up due to PSR date being moved out.**
- **Schedule Impact – 5 days from last month**
- **Cost Impact – Detailed in lien list**
- **Corrective Action – Explanation provided above**

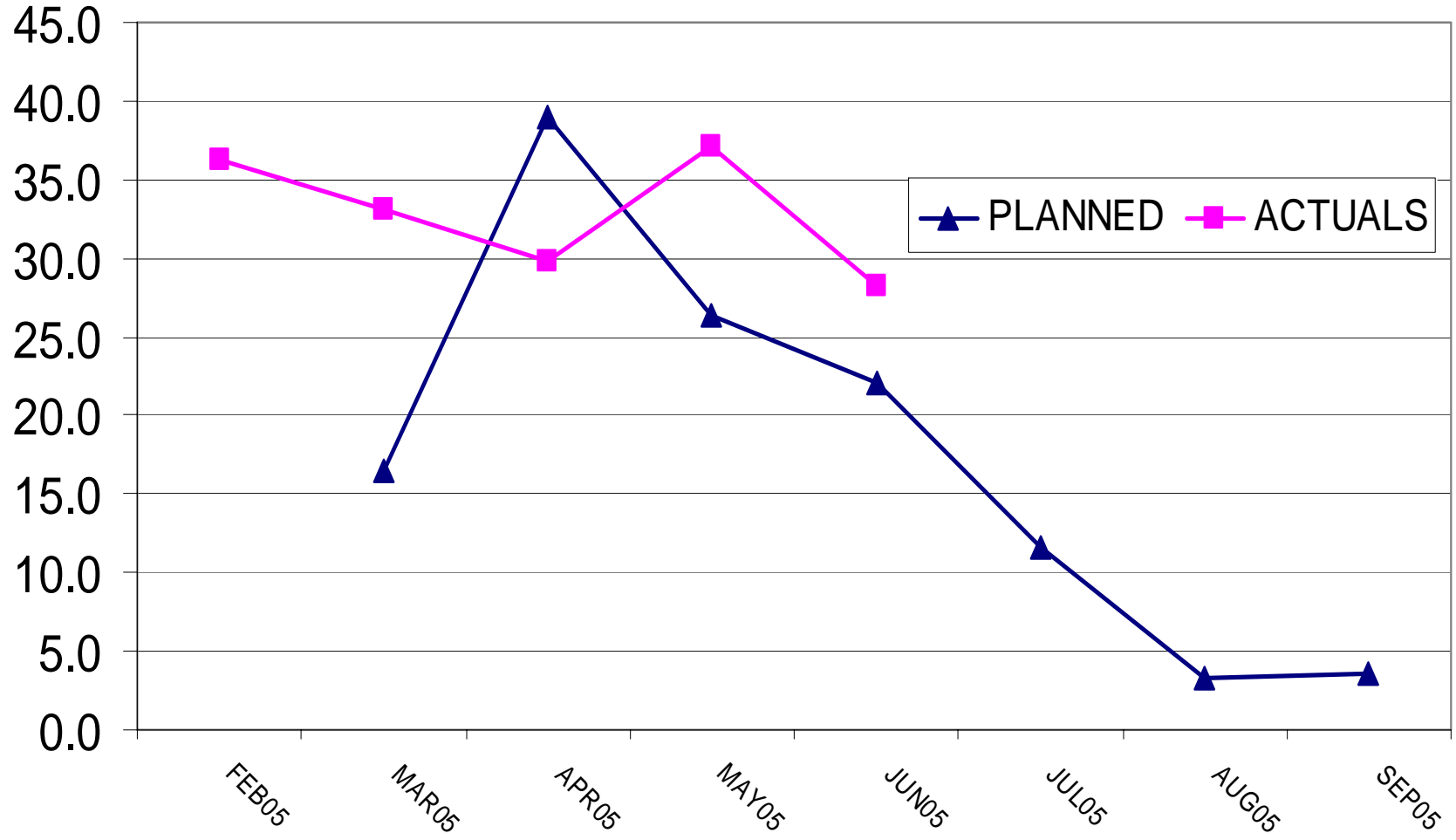
Cost Report

Reporting Category	Cost Incurred				Estimated Cost			4/3/2000	Unfilled Orders	
								Estimated Final Cost		
	During Month		Cum. to Date		Detail		Balance Contract	Contractor Estimate	Contract Value	Outstanding
Actual	Planned	Actual	Planned	JUL05	AUG05					
4.1.6 ANTICOINCIDENCE DETECTOR										
4.1.6.1 ACD PROJECT MANAGEMENT/SYS ENGRG	3	43	3,844	3,938	38	42	188	4,113	4,113	22
4.1.6.2 SAFETY & MISSION ASSURANCE	36	26	864	869	0	0	5	869	869	0
4.1.6.3 TILE SHELL ASSEMBLY (TSA)	0	0	3,770	3,792	0	0	22	3,792	3,792	17
4.1.6.4 BASE ELECTRONICS ASSEMBLY (BEA)	42	0	6,586	6,639	0	0	53	6,639	6,639	16
4.1.6.5 MICROMETEOROID SHIELD/THERMAL BLAN	16	38	551	694	0	0	142	694	694	0
4.1.6.6 ACD MECHANICAL QUALIFICATION & CALIB	0	0	177	177	0	0	0	177	177	0
4.1.6.7 ACD INTEGRATION & TEST	51	108	635	702	16	0	67	718	718	0
4.1.6.8 LAT INTEGRATION & TEST SUPPORT	0	0	0	0	3	7	7	17	17	0
4.1.6.B GROUND SUPPORT EQUIPMENT (GSE) & FA	74	0	929	951	0	0	21	951	951	39
CAPW[3]Totals:	221	216	17,355	17,761	56	50	506	17,968	17,968	94

Cost Variance Explanation

- **Why overrun/underrun? Lag in invoicing on several mechanical support tasks and the MMS/TB task. Additional cost underrun due to schedule variance.**
- **What will be done to correct? Submitted a CR for \$361K to cover costs identified in the ACD lien list.**

FTE Report (DOE/NASA-funded only)



FTE Variance Explanation

- **Why overrun/underrun? Additional work. Closing out paperwork and issues (and non-issues!)**
- **What is the impact? Cost.**
- **What will be done to correct? Moving people off of project. Get ACD delivered!**