

# **Monthly Progress Report**

**(Month Ending February 2003)**

## **GLAST Large Area Telescope (LAT)**

LAT-MR-01860-01

April 7, 2003

## 1.0 Introduction

This monthly progress report is submitted to the GLAST Project Office at the Goddard Space Flight Center and the Department of Energy SLAC Site Office. The report summarizes LAT project status as of the end of February, 2003.

## 2.0 Recent Progress and Status

### 4.1.4 Tracker

Multichip modules for the mini-tower were shipped to Italy, successfully tested there, and mounted onto trays with wire bonds to working silicon strip detector (SSD) ladders. The completed trays are currently under test at INFN, Pisa. Production was completed for the first lot of 300 flight ladders, including encapsulation and final electrical testing. Flight procurements for hex-cell cores, thick tungsten, and high voltage capacitors were placed. All tray panels for the engineering model were completed, excepting the top and bottom trays.

### 4.1.5 Calorimeter

The production readiness review was conducted on the Dual PIN Photodiode (DPD), and procurement authorized for 4,800 DPDs (3,000 US and 1,800 France). The CsI crystals were deemed ready for production and manufacturing of the first flight crystals has commenced. Insertion of the crystal detector elements (CDEs) into the engineering model mechanical structure was completed. The pre-electronics module (PEM) assembly was completed with the installation of the closeout plates. PEM checkout electronics were connected to the 384 photodiodes of the PEM and cosmic muon performance verification has commenced. A second full-scale composite mechanical structure was fabricated; flaws noted on the previous prototype have been corrected. The engineering model AFEE-X and -Y printed wire boards have been assembled; functional and environmental testing has begun.

### 4.1.6 Anticoincidence Detector

Drawings for the development unit base electronics assembly have been completed and are in review or being submitted for fabrication. Fabrication of flight tile detector assemblies (TDAs) and the shell has been initiated. An end-to-end test of two electronic channels on the front-end readout electronics board was performed. Testing of the commercial off-the-shelf phototubes was completed, with excellent performance results. Responses were provided to all the action items identified in January's peer review of the ACD.

### 4.1.7 Electronics

The Global Trigger, ACD, Data Acquisition, and Signal Distribution Unit (GASU) enclosure was designed. PCI transfers with the engineering model communication board commenced. The spacecraft interface was finalized, with respect to monitoring and discretes. A workshop on flight software was held during the last week of February.

#### 4.1.8 Mechanical Systems

Friction tests with alodine interfaces were completed. Engineering model heat pipe data reduction was completed. Machining of the 1 x 4 grid is progressing well. The Mechanical Systems CAD files were migrated to a common server, so that all subsystems can access the most current designs.

#### 4.1.9 Integration & Test

The Van de Graaf simulator is making gamma rays; the first spectrum is roughly as expected. The functional test suite for the Tracker minitower is ready. The engineering model Calorimeter rotation stand is being fabricated. The single bay grid has been designed; the unit is expected to be fabricated early in March. The x-y rotation table for the calibration unit beam test concept has been completed. The LAT assembly plan has been drafted.

### **3.0 Schedule Status**

The status of significant milestones identified in the Project Management Plan (LAT-MD-00054-08) for the LAT project is summarized in Attachments 1 and 2. Attachment 1 presents the status of the Level 1 and Level 2 milestones. Attachment 2 shows the status of the Level 3 milestones planned to occur during the six months preceding and following the current month. Unfavorable variance projections greater than one week to the future milestones are discussed below.

#### Engineering Model (1x4) Grid (1M1001380)

Baseline/Target Finish: 12/02/02    Projected Finish: 03/03/03    Variance: -56 days  
Lack of sufficient manpower has resulted in the delay of this milestone. While the staffing levels have been increased, the completion of this milestone will still be delayed. The procurement has been made for the 1x4 EM grid, machining has begun, and receipt is expected in mid April. After inspection and testing, the grid will be ready for integration with the EM modules in mid May. This delay can be accommodated in the I&T schedule with no further impact.

#### Tracker Engineering Model (1M1001430)

Baseline/Target Finish: 12/09/02    Projected Finish: 03/03/03    Variance: -51 days  
This milestone has been delayed by the ASIC design issues, startup issues with the tray fabrication, and the ladder production being slower than planned. The expected completion of this milestone is early April. This delay can be accommodated in the I&T schedule with no further impact.

#### GEM H/W Driver, Final Version, Elex to I&T/Online (1M1001390)

Baseline/Target Finish: 01/07/03    Projected Finish: 04/16/03    Variance: -69 days  
The subsystem managers for Electronics and Integration & Test have agreed on a completion date for this milestone in April. This will not adversely affect any other activities or level 3 milestones.

High Voltage Power Supply Board & Parts, ACD to Electronics (1M7941350)

Baseline/Target Finish: 02/03/03      Projected Finish: 03/03/03      Variance: -19 days

Resources have been diverted from the completion of this milestone to other ACD tasks with higher priority. This milestone is expected to be completed in early April, with no impact to 4.1.7 Electronics (the subsystem receiving the high voltage power supply board and parts).

Online EM2 Release #1 to Flight Software (1M1001500)

Baseline/Target Finish: 04/30/03      Projected Finish: 06/02/03      Variance: -22 days

This milestone was delayed due to a delay in providing multitower support for the second engineering model. A workaround plan is in progress and the milestone is expected to be completed on schedule.

## **4.0 Financial Status**

Attachment 3 depicts the costs and commitments through the end of the current reporting period. Commitments for level-of-effort subcontracts have been phased in response to the continuing resolution situation. This is being managed so that there is no cost impact, and the level of effort is not affected.

Attachments 4 and 5 summarize the actual costs through the current period, by WBS level 3 and institution, respectively. The hours worked/FTE lines include only DOE/NASA-funded labor.

## **5.0 Performance Status (Comparison to Project Baseline)**

Attachment 6 is a Cost Performance Report (CPR) for the end of the current reporting period, by WBS level 3. The CPR shows the time-phased budget to date (BCWS), the earned value (BCWP), and the actual costs through the end of the month (ACWP). Attachment 7 shows the same information for each participating DOE- and/or NASA-funded institution. The schedule variance is equal to the difference between the budget-to-date and the earned value and represents a measure of the ahead (positive) or behind (negative) schedule position. The cost variance is equal to the difference between the earned value and the actual costs.

Attachment 8 shows performance analysis (by WBS level 3), including trends in the schedule and cost variances from the previous period. Cumulative cost variances exceeding 10% of the BCWP and cumulative schedule variances exceeding 10% of BCWS (favorable and unfavorable) are discussed below.

#### 4.1.2 System Engineering

The cost variance is due to the addition of a full-time subsystem manager, the manufacturing engineer, and increased manpower to support test planning, audits, subsystem integration, spacecraft integration and test discrepancy resolution. (The scope increase, and associated cost increase, was approved by the LAT Configuration Control Board in March.)

#### 4.1.5 Calorimeter

Delays in the AFEE flight part procurements (to ensure design maturity) and development and delays in the ground support equipment are not currently critical, but the unfavorable trend is of concern. The engineering model assembly and test started late due to component availability; however, the workaround plan has been approved by the LAT CCB and is underway.

#### 4.1.6 Anticoincidence Detector

The tile shell assembly design has taken longer than planned due to inadequate manpower. Manpower was diverted from the MGSE design work to support this effort. A recovery plan has been developed which preserves the MGSE delivery date, does not impact significant milestones, and removes the unfavorable schedule variance by the end of the fiscal year. A plan has been developed and is being implemented to minimize the impact of delays in the analog ASICs, by moving the ASIC design work to SLAC (a change request was approved by the LAT Configuration Control Board in March), and adding civil servant manpower to this activity. The unfavorable schedule variance is expected to be removed before the end of the fiscal year.

The unfavorable cost variance is due to higher labor costs than planned for the tile shell assembly work, as well as the base electronics assembly (BEA). Cost savings in other areas, are anticipated to decrease the tile shell assembly variance. (A change request was approved by the LAT CCB in March to address the BEA variance.)

#### 4.1.8 Mechanical Systems

The unfavorable schedule variance is due to filling key engineering and design positions slower than planned. These positions have been filled, and the schedule variance has stabilized this period. The baseline schedule is expected to be restored by the end of the fiscal year.

During January, \$170K of subcontractor costs were incorrectly charged to 4.1.1 Management, resulting in an overstated favorable cost variance for 4.1.8 Mechanical Systems and an overstated unfavorable cost variance for 4.1.1 Management. This is expected to be corrected in the March accounting period.

#### 4.1.A Performance & Safety Assurance

The favorable cost variance is due to the delay in the hire of a part-time parts engineer at NRL (now on board), specific mission-assurance-related activities being covered by other LAT subsystems, and less travel taken than planned.

#### 4.1.B Instrument Operations Center

The schedule variance results from a delay in hiring additional planned resources. The LAT management is working with SLAC management to address the long-term management and staffing of the subsystem.

A change in the subsystem management has resulted in a temporary favorable cost variance. The budget will be adjusted once longer-term plans have been made for management of this subsystem.

#### 4.1.D Science Analysis Software

Hiring delays at Stanford/HEPL and GSFC have resulted in a favorable cost variance. These hires have now been completed.

## **6.0 Change Control and Contingency Analysis**

Three change requests were submitted to and approved by the LAT Configuration Control Board during February. A summary, including the impacts on the LAT fabrication phase cost, is below.

Change Request No.	Description	Submitted By	CCB Meeting	Current Status
LAT-XR-01195-01	Calorimeter EM/QM Thermal Vac Testing	N. Johnson	2/7/03	Approved \$256K
LAT-XR-01242-01	Flight Software Manpower	G. Haller	2/7/03	Approved \$739K
LAT-XR-01314-01	PMCS Consultant Support	T. Boysen	2/7/03	Approved \$143K

The fabrication phase cost baseline is now \$102.6M. Funding applicable to that baseline is \$121.7M; the resulting contingency is \$19.1M.

## **7.0 Staffing**

Attachments 9-10 demonstrate the staffing plan, and reports of actual manpower received. Note from Attachment 10 that not all participating organizations are providing manpower data.

## Attachment 1 Milestones, Levels 1-2

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY01	FY02	FY03	FY04	FY05	FY06
<b>DOE/NASA Joint Oversight Group (Level</b>										
1M1P000000	DOE Critical Decision (CD) 0 Approval	06/25/01A	0	06/25/01A	▼					
1M1P000010	CD-1 Approval	07/01/02*	-15	07/23/02A		▼				
1M1P000020	CD-2 Approval	12/13/02*	23	11/08/02A			▼			
1M1P000030	CD-3 Approval	07/15/03*	0	07/15/03*				▼		
1M1P000060	Flight GRID Complete	09/15/04*	0	09/15/04*					▼	
1M1P000040	CD-4 Approval	03/15/06*	0	03/15/06*						▼
<b>DOE/NASA Federal Project Managers (Level</b>										
1M1BF00000	Launch Balloon Flight	08/01/01A	0	08/01/01A	▼					
1M1000100	Instrument Preliminary Design Review	01/08/02A	0	01/08/02A		▼				
1M1000110	I-CDR (Critical Design Review)	04/30/03*	0	04/30/03*			▼			
1M1000730	TKR, CAL FM A, B Available for Calibration Unit	02/17/04*	0	02/17/04*				▼		
1M1000740	Start LAT Integration	06/15/04*	0	06/15/04*					▼	
1M1000700	Pre Environmental Testing Review	02/15/05*	0	02/15/05*						▼
1M1000120	PSR-(Instrument Pre-Ship Review)	07/07/05*	0	07/07/05*						▼
1M1000140	LAT Ready for Integration ( RFI ) to Spacecraft	09/22/05*	0	09/22/05*						▼
Run Date	03/27/03 10:38	<b>GLAST LAT PROJECT Project Milestones (Level 1 and 2)</b>			0319 LT_MS1-2	Sheet 1 of 1				
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**Attachment 2 (Page 1 of 3)  
Level 3 Milestones (One-Year View)**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	AV	ND	Fiscal Year			
							FY02	FY03	FY04	
<b>Instrument Project Office (Level 3)</b>										
1M1001120	Tracker Dead/Noisy Strips (SAS to I & T)	06/21/02*	-79	10/14/02A	D	9	▼			
1M1001110	Calorimeter Calibration Prototype Coding SAS-I&T	07/08/02	-69	10/14/02A	D	9	▼			
1M1000550	(9) MCM's from Tracker to Elec	09/20/02	-29	10/31/02A	4	7	▼			
1M1001420	AEM H/W driver final ver-ELX to I&T/Online	09/20/02	-40	11/15/02A	7	9	▼			
1M7941310	ACD Electronics Module - EM1 (Elec to ACD)	09/20/02	-40	11/15/02A	7	6	▼			
1M7941330	Test/Screening Board w/ASIC for EM1 -ACD to Elec	09/20/02	12	09/04/02A	6	7	▼			
1M1001340	GEM H/W driver, init ver-ELX to I&T/Online	11/12/02	37	09/20/02A	7	9	▼			
1M1001410	TEM H/W driver, final ver-ELX to I&T/Online	11/19/02	36	09/30/02A	7	9	▼			
1M1001380	Delivery of EM (1X4) Grid to I&T/MSGE	12/02/02*	-56	03/03/03*	8	9	▼			
1M1001280	As-Built dwgs for EM TKR-TKR to I&T	12/05/02	-1	12/06/02A	4	9	▼			
1M1001510	EM1 EGSE WS-S/W R2 I&T to ACD	12/05/02	-6	12/13/02A	9	6	▼			
1M1001511	EM1 EGSE WS-S/W R2 I&T to CAL	12/05/02	-6	12/13/02A	9	5	▼			
1M1001512	EM1 EGSE WS-S/W R2 I&T to ELX	12/05/02	-6	12/13/02A	9	7	▼			
1M1001513	EM1 EGSE WS-S/W R2 I&T to IOC	12/05/02	-6	12/13/02A	9	B	▼			
1M1001514	EM1 EGSE WS-S/W R2 I&T to TKR	12/05/02	-6	12/13/02A	9	4	▼			
1M1001430	Delv of TKR EM to SLAC I&T/MSGE	12/09/02*	-51	03/03/03*	4	9	▼			
1M1001360	FSW system spec-ELX/FSW to I&T/Online	12/20/02	4	12/16/02A	7	9	▼			
Run Date: 03/27/03 10:39							GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)		0319 LT - MS (L3)	Sheet 1 of 3
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**Attachment 2, Continued (Page 2 of 3)  
Level 3 Milestones (One-Year View)**

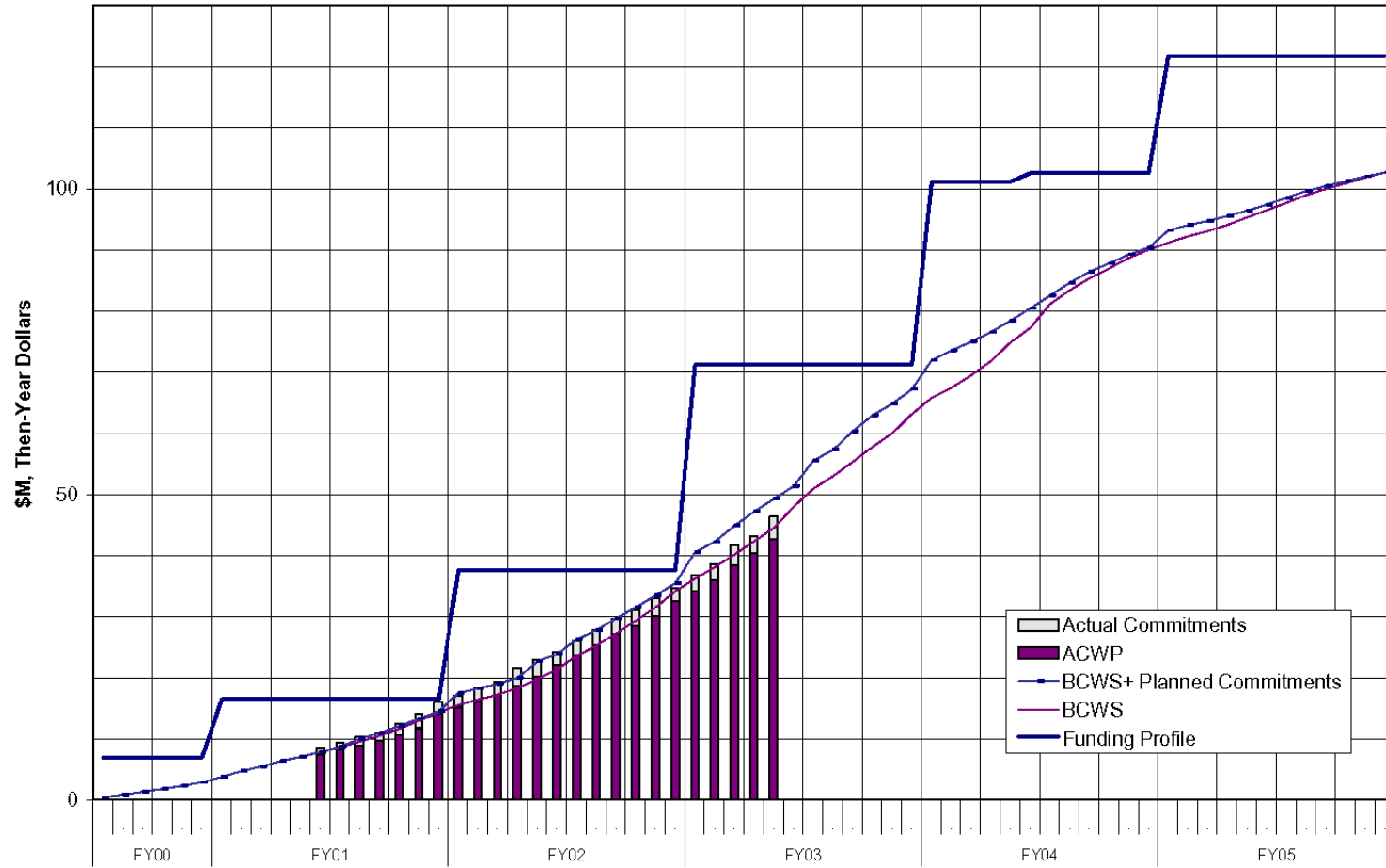
Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	AV	ND	Fiscal Year		
							FY02	FY03	FY04
<b>Instrument Project Office (Level 3)</b>									
1M1001460	IPS description-ELX to I&T/Online	12/23/02	5	12/16/02A	7	9			
1M1001210	AEM H/W driver, init ver-ELX to I&T/Online	01/02/03*	25	11/15/02A	7	9			
1M1001310	AEM data taking desc-ELX to I&T/Online	01/02/03*	25	11/15/02A	7	9			
1M1000980	Doc defining Backsplash Test Model (ACD to I&T)	01/03/03*	0	01/03/03A	6	9			
1M1001390	GEM h/w driver, final ver-ELX to I&T/Online	01/07/03	-69	04/16/03	7	9			
1M1001130	Tracker Tower & Tray Alignment (SAS to I&T)	01/22/03*	11	01/06/03A	D	9			
1M57000020	CAL AFFE Engr Model-CAL to Elec	02/03/03*	-11	02/19/03A	5	7			
1M7941350	High Voltage Power Supply (Bd & Prts)-ACD to Elec	02/03/03*	-19	03/03/03*	6	7			
1M7941380	EGSE Workstation / Software #3 (I&T to ACD)	03/03/03*	216	04/15/02A	9	6			
1M7941320	(2) ACD Electronics Modules - EM2 (Elec to ACD)	04/24/03	59	01/30/03A	7	6			
1M1001490	SIS description-ELX to I&T	04/30/03*	0	04/30/03*	7	9			
1M1001500	Online EM2 release #1 to FSW	04/30/03	-22	06/02/03	9	7			
1M19500500	CU IPS - ELX to I&T/Online	04/30/03*	0	04/30/03*	7	9			
1M7941340	(11) FREE Bds & ASICS, (1) Fully Tested Bd - EM2	05/07/03*	0	05/07/03*	6	7			
1M7941150	EGSE EM2 Release-Elec to I&T	06/12/03*	0	06/12/03*	7	9			
1M1001570	CU Monte Carlo sim from SAS to I&T/SVAC	06/13/03*	156	10/22/02A	D	9			
1M1001550	Online EM2 release #2 to ELX	06/26/03	0	06/26/03	9	7			
Run Date	03/27/03 10:39	<b>GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)</b>			0319 LT - MS (L3)	Sheet 2 of 3			
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**Attachment 2, Continued (Page 3 of 3)  
Level 3 Milestones (One-Year View)**

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	AV	ND	Fiscal Year				
							FY02	FY03	FY04		
<b>Instrument Project Office (Level 3)</b>											
1M59000000	EM from CAL to I&T	06/30/03	-1	07/01/03	5	9			▼		
1M1000910	(36) MCM's for EM2 from Tracker to Elec	07/18/03	-5	07/25/03	4	7			▼		
1M75000000	(6) EM2 TEM-from Elec to CAL	08/25/03	0	08/25/03	7	5			▼		
1M1001520	EM CAL Returned to NRL (arrives on dock)	08/29/03*	34	07/14/03	9	5			▼		
1M19500400	CU S/C Simulator - ELX to I&T Online	08/29/03*	0	08/29/03*	7	9			▼		
Run Date							03/27/03 10:39	GLAST LAT PROJECT Project Milestones (Level 3) 1 Year View (+/- 6mo)		0319 LT - MS (L3)	Sheet 3 of 3
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### Attachment 3

Budget vs Actuals vs Funding  
DOE + NASA Project Expenditures



**Attachment 4  
LAT Costs, through February 2003, by WBS**

Monthly Contractor Financial Management Report								Report for Month Ending: 2/28/03		
To: Kevin Grady, GLAST Project Manager (NASA) Ev Valle, LAT Project Manager (DOE)					From: Tanya Boysen, LAT Project Controls Manager			Budget Value		
								Cost: 0	Fee: 0	
LAT3 GLAST LAT Project		Type:						Fund Limitation: 0		
Reporting Category	Cost Incurred				Estimated Cost			4/3/00	Billing	
	During Month		Cum. to Date		Detail		Balance of Budget	Estimated Final Cost		Unfiled Orders Outstanding
	Actual	Planned	Actual	Planned	MAR03	APR03		Project Estimate	Budget Value	
4.1.1 INSTRUMENT MANAGEMENT	280	262	6,564	6,148	201	210	4,770	11,745	11,745	
4.1.2 SYSTEM ENGINEERING	195	89	2,880	2,583	85	90	1,592	4,647	4,647	
4.1.4 TRACKER	177	8	6,090	5,807	1,227	1,053	1,934	10,303	10,303	
4.1.5 CALORIMETER	242	505	6,945	8,295	336	309	10,240	17,830	17,830	
4.1.6 ANTICOINCIDENCE DETECTOR	512	317	6,497	5,914	683	201	3,391	10,772	10,772	
4.1.7 ELECTRONICS	245	374	4,483	4,580	318	358	11,317	16,476	16,476	
4.1.8 MECHANICAL SYSTEMS	388	319	3,543	4,603	327	367	7,556	11,794	11,794	
4.1.9 INTEGRATION & TEST	123	101	1,458	1,562	78	152	4,985	6,673	6,673	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	37	49	807	1,151	55	57	1,255	2,174	2,174	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	0	28	262	510	32	32	2,225	2,552	2,552	
4.1.C EDUCATION AND PUBLIC OUTREACH	42	36	730	809	32	38	1,884	2,684	2,684	
4.1.D SCIENCE ANALYSIS SOFTWARE	52	84	1,031	1,170	88	90	2,402	3,611	3,611	
4.1.E SUBORBITAL FLIGHT TEST	0	0	1,325	1,321	0	0	-4	1,321	1,321	
Gen. and Admin.	0	0	0	0	0	0	0	0	0	
<b>Total</b>	<b>2,292</b>	<b>2,172</b>	<b>42,615</b>	<b>44,453</b>	<b>3,462</b>	<b>2,958</b>	<b>53,548</b>	<b>102,581</b>	<b>102,581</b>	

**Attachment 5**  
**LAT Costs, through February 2003, by Organization and Cost Code**

Monthly Contractor Financial Management Report								Report for Month Ending: 2/28/03		
To: Kevin Grady, GLAST Project Manager (NASA) Ev Valle, LAT Project Manager (DOE)				From: Tanya Boysen, LAT Project Controls Manager				Budget Value		
								Cost: 0	Fee: 0	
LAT3	Type:							Fund Limitation:		
GLAST LAT Project								0		
Reporting Category	Cost Incurred				Estimated Cost			4/3/00	Billing	
	During Month		Cum. to Date		Detail		Balance of Budget	Project Estimate	Budget Value	Unfilled Orders Outstanding
	Actual	Planned	Actual	Planned	MAR03	APR03				
DG *** GSFC	527	358	7,531	7,431	729	248	5,225	13,733	13,733	
DH *** HEPL	117	86	3,091	3,409	89	104	4,309	7,593	7,593	
DL *** SLAC	1,249	998	21,030	20,417	2,067	2,048	26,343	51,487	51,487	
DN *** NRL	306	642	8,733	10,705	478	458	14,417	24,086	24,086	
DO *** Financial Plan Transfer/Sub Out	0	0	32	32	0	0	0	32	32	
DS *** SSU	42	36	730	808	32	37	1,810	2,609	2,609	
DT *** Texas A&M	0	0	15	16	0	0	0	16	16	
DU *** UCSC	45	44	1,437	1,620	58	54	1,193	2,741	2,741	
DW *** UW	6	8	16	16	8	9	250	283	283	
<b>Total</b>	<b>2,292</b>	<b>2,172</b>	<b>42,615</b>	<b>44,453</b>	<b>3,461</b>	<b>2,958</b>	<b>53,548</b>	<b>102,581</b>	<b>102,581</b>	

Reporting Category	Cost Incurred/Hours Worked				Estimated Cost/Hours to Complete			Estimated Final Cost/Hours		Unfilled Orders Outstanding
	During Month		Cum. to Date		Detail		Balance of Budget	Project Estimate	Budget Value	
	Actual	Planned	Actual	Planned	MAR03	APR03				
RL LABOR	1,278	1,058	25,337	25,969	1,038	1,103	28,828	56,306	56,306	
<i>FTE (DOE/NASA)</i>	<i>114.9</i>	<i>99.6</i>	<i>2,184.8</i>	<i>2,311.1</i>	<i>92.0</i>	<i>96.0</i>	<i>2,514.4</i>	<i>4,887.2</i>	<i>4,887.2</i>	
<i>HOURS (DOE/NASA)</i>	<i>17,470</i>	<i>15,143</i>	<i>364,738</i>	<i>378,421</i>	<i>15,517</i>	<i>16,960</i>	<i>409,695</i>	<i>806,910</i>	<i>806,910</i>	
RT TRAVEL	24	53	677	1,215	59	63	2,468	3,267	3,267	
RM MATERIAL & SERVICES	872	964	14,871	15,471	2,251	1,778	20,326	39,226	39,226	
RX MPS & LAB TAX	119	96	1,730	1,798	113	15	1,924	3,783	3,783	
<b>Total (not incl FTE/Hours)</b>	<b>2,292</b>	<b>2,172</b>	<b>42,615</b>	<b>44,453</b>	<b>3,461</b>	<b>2,958</b>	<b>53,548</b>	<b>102,581</b>	<b>102,581</b>	

**Attachment 6**  
**LAT Performance, through February 2003, by WBS**

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 1/31/03                      2/28/03			
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %	Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling			
1	0		0		0	0	0		0	0			
CAPW[3]	Current Period					Cumulative to Date					At Completion		
Item	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance		Budgeted	Latest Revised Estimate	Variance
	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4.1.1 INSTRUMENT MANAGEMENT	262	262	280	0	-18	6,148	6,148	6,564	0	-416	11,745	11,745	0
4.1.2 SYSTEM ENGINEERING	89	85	195	-3	-110	2,583	2,577	2,880	-6	-302	4,647	4,647	0
4.1.4 TRACKER	8	76	177	68	-101	5,807	5,720	6,090	-87	-370	10,303	10,303	0
4.1.5 CALORIMETER	505	310	242	-196	68	8,295	7,307	6,945	-988	362	17,830	17,830	0
4.1.6 ANTICOINCIDENCE DETECTOR	317	262	512	-55	-249	5,914	5,313	6,497	-601	-1,184	10,772	10,772	0
4.1.7 ELECTRONICS	374	337	245	-36	93	4,580	4,486	4,483	-94	3	16,476	16,476	0
4.1.8 MECHANICAL SYSTEMS	319	400	388	81	12	4,603	3,939	3,543	-664	395	11,794	11,794	0
4.1.9 INTEGRATION & TEST	101	117	123	16	-7	1,562	1,527	1,458	-35	69	6,673	6,673	0
4.1.A PERFORMANCE AND SAFETY ASSURA	49	49	37	0	12	1,151	1,151	807	0	344	2,174	2,174	0
4.1.B LAT INSTRUMENT OPERATIONS CENT	28	16	0	-12	16	510	441	262	-69	179	2,552	2,552	0
4.1.C EDUCATION AND PUBLIC OUTREACH	36	30	42	-6	-12	809	810	730	0	80	2,684	2,684	0
4.1.D SCIENCE ANALYSIS SOFTWARE	84	63	52	-20	12	1,170	1,160	1,031	-9	129	3,611	3,611	0
4.1.E SUBORBITAL FLIGHT TEST	0	0	0	0	0	1,321	1,321	1,325	0	-4	1,321	1,321	0
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0	0	0
Sub Total	2,172	2,008	2,292	-163	-284	44,453	41,901	42,615	-2,553	-714	102,581	102,581	0
Contingency											19,132	19,132	
Total	2,172	2,008	2,292	-163	-284	44,453	41,901	42,615	-2,553	-714	121,713	121,713	

**Attachment 7  
LAT Performance, through February 2003, by Organization**

Cost Performance Report - Organization													
Contractor: Location:				Contract Type/No:				Project Name/No: GLAST LAT Project		Report Period: 1/31/03                      2/28/03			
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	0		0		0		0	0		0	0		
OBS	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost Work	Variance		Budgeted Cost		Actual Cost Work	Variance		Budgeted	Latest Revised Estimate	Variance
	Work Scheduled	Work Performed		Schedule	Cost	Work Scheduled	Work Performed		Schedule	Cost			
Item	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
DG *** GSFC	358	304	527	-55	-223	7,431	6,830	7,531	-601	-701	13,733	13,733	0
DH *** HEPL	86	67	117	-19	-49	3,409	3,319	3,091	-89	228	7,593	7,593	0
DL *** SLAC	998	1,095	1,249	97	-154	20,417	19,565	21,030	-852	-1,465	51,487	51,487	0
DN *** NRL	642	459	306	-183	153	10,705	9,701	8,733	-1,004	968	24,086	24,086	0
DO *** Financial Plan	0	0	0	0	0	32	32	32	0	0	32	32	0
DS *** SSU	36	30	42	-6	-12	808	807	730	-1	77	2,609	2,609	0
DT *** Texas A&M	0	0	0	0	0	16	16	15	0	0	16	16	0
DU *** UCSC	44	46	45	2	0	1,620	1,615	1,437	-5	178	2,741	2,741	0
DW *** UW	8	8	6	0	1	16	16	16	0	0	283	283	0
Gen. and Admin.	0	0	0	0	0	0	0	0	0	0	0	0	0
Undist. Budget											0	0	0
Sub Total	2,172	2,008	2,292	-163	-284	44,453	41,901	42,615	-2,552	-714	102,581	102,581	0
Contingency											19,132	19,132	
Total	2,172	2,008	2,292	-163	-284	44,453	41,901	42,615	-2,552	-714	121,713	121,713	

## Attachment 8 LAT Performance Analysis, February 2003

	WBS	BAC	BCWS	BCWP	ACWP	SV \$	CV \$	% BCWS	% BCWP	% ACWP	SV Trend	CV Trend	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
2	4.1	102,581	44,453	41,901	42,615	-2,552	-714	43.33	40.85	41.54	↔	↓	0.943	0.983	104,330	108,089
3	4.1.1	11,745	6,148	6,148	6,564	0	-416	52.34	52.34	55.89	↔	↔	1.000	0.937	12,541	12,541
4	4.1.2	4,647	2,583	2,577	2,880	-6	-302	55.59	55.47	61.98	↓	↓	0.998	0.895	5,192	5,197
5	4.1.4	10,303	5,807	5,720	6,090	-87	-370	56.36	55.52	59.11	↑	↓	0.985	0.939	10,969	11,043
6	4.1.5	17,830	8,295	7,307	6,945	-988	362	46.52	40.98	38.95	↓	↑	0.881	1.052	16,946	18,298
7	4.1.6	10,772	5,914	5,313	6,497	-601	-1,184	54.91	49.33	60.32	↔	↓	0.898	0.818	13,171	13,926
8	4.1.7	16,476	4,580	4,486	4,483	-94	3	27.80	27.23	27.21	↓	↑	0.979	1.001	16,466	16,717
9	4.1.8	11,794	4,603	3,939	3,543	-664	395	39.03	33.40	30.04	↑	↔	0.856	1.112	10,610	11,802
10	4.1.9	6,673	1,562	1,527	1,458	-35	69	23.41	22.89	21.85	↑	↓	0.978	1.047	6,373	6,484
11	4.1.A	2,174	1,151	1,151	807	0	344	52.95	52.95	37.11	↔	↔	1.000	1.427	1,524	1,524
12	4.1.B	2,552	510	441	262	-69	179	20.00	17.30	10.28	↓	↔	0.865	1.682	1,517	1,714
13	4.1.C	2,684	809	810	730	0	80	30.16	30.16	27.18	↓	↓	1.000	1.110	2,419	2,418
14	4.1.D	3,611	1,170	1,160	1,031	-9	129	32.39	32.14	28.56	↓	↔	0.992	1.125	3,209	3,226
15	4.1.E	1,321	1,321	1,321	1,325	0	-4	100.00	100.00	100.29	↔	↔	1.000	0.997	1,325	1,325

### LEGEND

BAC: Budget At Complete

BCWS: Budgeted Cost of Work Scheduled (to date)

BCWP: Budgeted Cost of Work Performed (to date)

ACWP: Actual Cost of Work Performed (to date)

SV \$: Schedule Variance = BCWP - BCWS

CV \$: Cost Variance = BCWP - ACWP

SPI: Schedule Performance Index = BCWP/BCWS

CPI: Cost Performance Index = BCWP/ACWP

% BCWS: Percent Scheduled = BCWS/BAC

% BCWP: Percent Complete = BCWP/BAC

% ACWP: Percent Spent = ACWP/BAC

SV Trend: Schedule Variance Trend = SV\$ / BCWS

CV Trend: Cost Variance Trend = CV\$ / BCWP

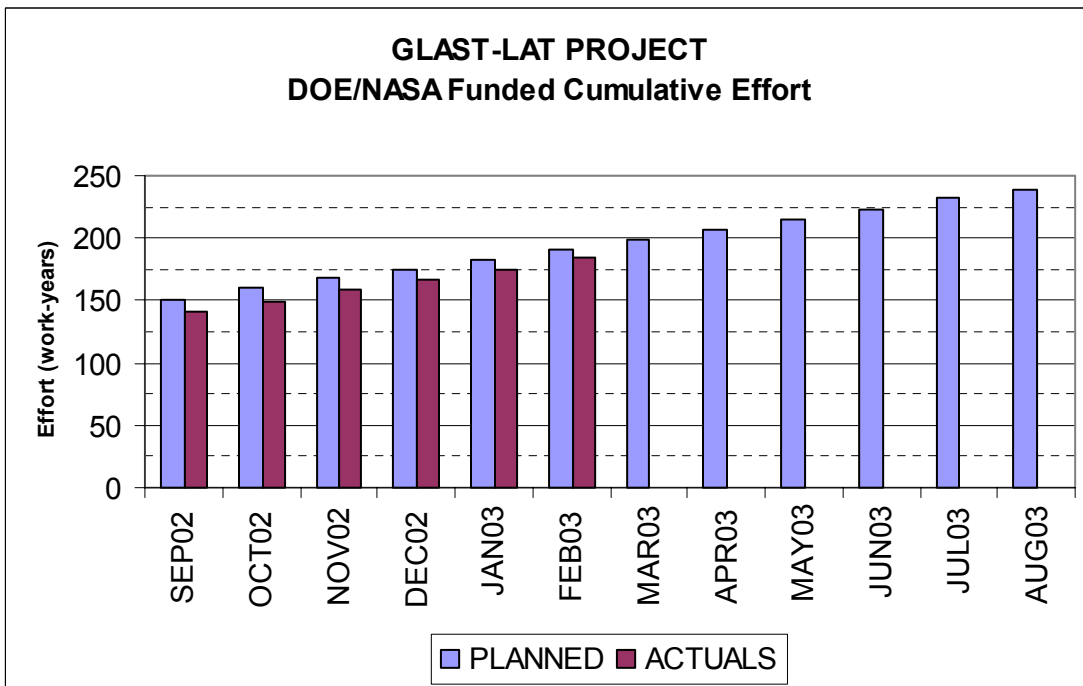
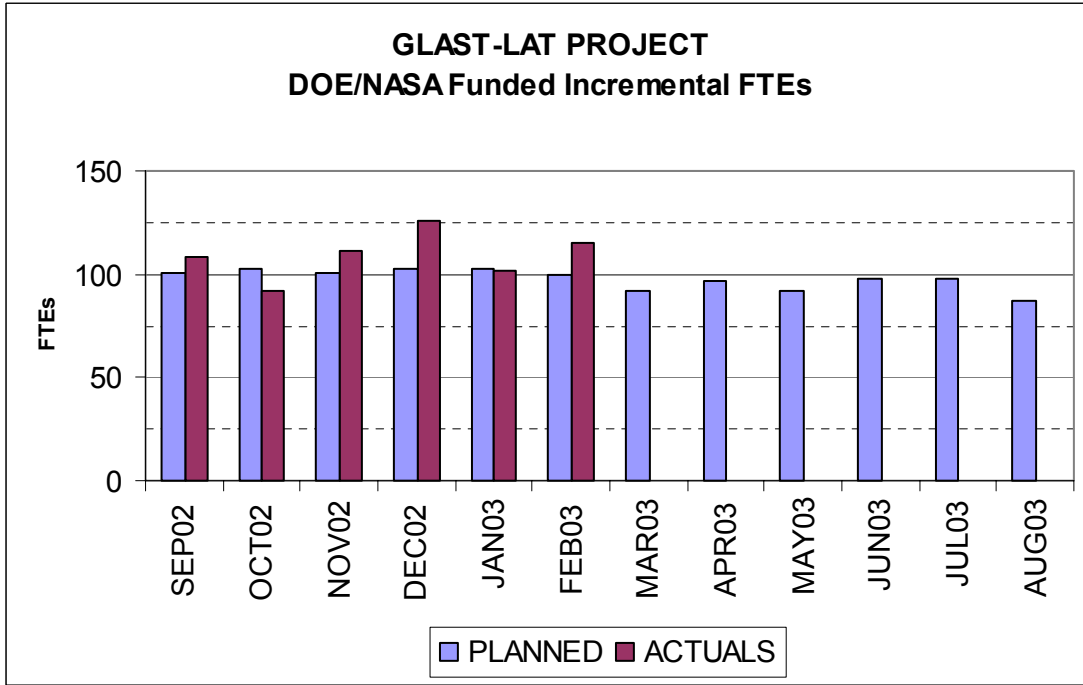
Cpi\_Fcst: CPI (to date) EAC Forecast = BAC / CPI

CpiSpi\_Fcst: Combination CPI and SPI EAC Forecast = ACWP + (BAC - BCWP) / (CPI \* SPI)

	Worse than -15%		Between -5% and 10%
	Between -15% and -5%		Better than 10%
Change Threshold 10%			



**Attachment 9  
LAT Manpower (DOE/NASA-Funded)**



**Attachment 10**  
**LAT Manpower Data, through February 2003, by Organization**

Program: LAT3		Description: GLAST LAT Project		Approval: Program Manager Functional Manager Cost Account Manager												
Run Date: 3/27/03		Status Date: 2/28/03														
		PRIOR	SEP02	OCT02	NOV02	DEC02	JAN03	FEB03	Cum-to Date	MAR03	APR03	MAY03	JUN03	JUL03	AUG03	
CAPW[3]																
4.1.1 INSTRUMENT MANAGEMENT	FTE	PLANNED	195.7	11.0	11.1	11.1	11.1	4.8	255.8	11.1	11.1	11.1	11.1	11.2	11.2	
		ACTUALS	187.5	11.0	15.0	10.7	12.5	13.9	262.3	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.2 SYSTEM ENGINEERING	FTE	PLANNED	35.0	2.0	2.1	2.1	2.0	1.8	47.0	1.9	1.9	1.7	1.6	1.6	1.6	
		ACTUALS	24.2	1.9	1.7	1.1	1.2	1.4	32.7	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.4 TRACKER	FTE	PLANNED	486.3	23.0	21.6	25.8	27.3	26.1	636.7	24.6	28.3	28.1	19.9	17.6	18.5	
		ACTUALS	464.7	15.2	16.9	24.5	25.3	21.4	590.9	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.5 CALORIMETER	FTE	PLANNED	908.8	61.9	63.4	57.4	44.2	48.5	1233.5	45.0	43.3	44.0	51.8	52.4	48.7	
		ACTUALS	277.4	22.1	20.4	22.9	24.9	16.0	400.2	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.6 ANTICOINCIDENCE DETECTOR	FTE	PLANNED	269.9	36.6	23.2	22.9	19.0	19.5	409.4	18.1	21.2	16.9	16.5	11.7	12.7	
		ACTUALS	250.4	25.5	25.8	31.5	39.1	30.3	429.7	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.7 ELECTRONICS	FTE	PLANNED	239.3	15.3	7.1	7.7	13.3	19.1	322.9	16.1	17.4	17.3	16.6	16.7	12.4	
		ACTUALS	234.6	29.3	8.1	8.6	10.8	13.6	323.6	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.8 MECHANICAL SYSTEMS	FTE	PLANNED	116.0	14.5	10.9	13.8	7.5	8.4	178.9	6.8	8.6	7.6	5.1	5.7	6.2	
		ACTUALS	85.7	7.4	7.4	8.5	9.2	10.6	138.3	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.9 INSTRUMENT INTEGRATION AND TESTING	FTE	PLANNED	79.0	12.5	8.9	6.8	13.2	10.2	138.1	8.3	9.8	9.5	12.8	11.6	16.9	
		ACTUALS	73.9	8.2	8.4	9.7	8.3	11.4	128.0	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	FTE	PLANNED	49.4	2.6	2.6	2.6	2.6	2.6	64.9	2.6	2.6	2.6	2.6	2.6	2.6	
		ACTUALS	38.7	2.9	2.2	1.8	2.1	2.0	51.8	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	FTE	PLANNED	22.3	0.5	2.2	2.2	2.2	2.2	33.7	2.3	2.3	2.4	2.4	2.2	2.2	
		ACTUALS	22.7	0.0	0.0	0.0	1.7	-1.8	22.7	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.C EDUCATION AND PUBLIC OUTREACH	FTE	PLANNED	43.1	1.5	1.7	1.7	1.6	2.0	53.4	2.0	2.0	2.0	2.0	6.4	2.0	
		ACTUALS	47.0	0.4	0.0	5.5	3.0	1.7	59.9	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.D SCIENCE ANALYSIS SOFTWARE	FTE	PLANNED	300.1	18.1	18.5	18.2	23.1	20.2	423.2	24.7	24.7	24.7	24.5	24.1	23.0	
		ACTUALS	176.6	9.6	9.6	10.2	10.5	11.5	239.6	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.E SUBORBITAL FLIGHT TEST	FTE	PLANNED	111.9	0.0	0.0	0.0	0.0	0.0	111.9	0.0	0.0	0.0	0.0	0.0	0.0	
		ACTUALS	75.3	0.0	0.0	0.0	0.0	0.0	75.3	0.0	0.0	0.0	0.0	0.0	0.0	
Grand Totals:		PLANNED	2856.7	199.4	173.3	172.2	167.1	171.9	3909.4	163.3	172.8	167.8	166.9	163.7	158.0	
		ACTUALS	1958.4	133.5	115.3	134.9	148.6	125.6	2754.9	0.0	0.0	0.0	0.0	0.0	0.0	