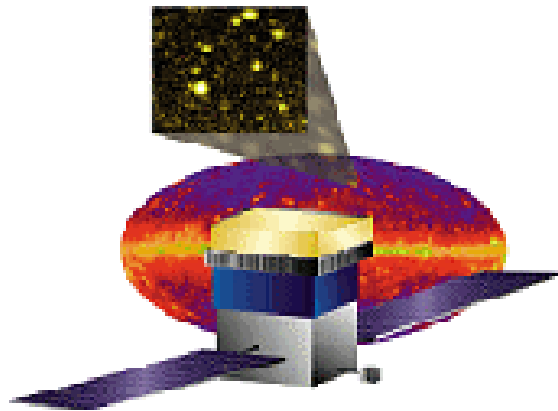


# **Monthly Progress Report**

**(Month Ending July 2003)**

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



LAT-MR-02407-01

August 29, 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 July, 2003.

## 2.0 Recent Progress and Status

The case for LAT rebaselining was presented on July 31, 2003 to a mini-review committee at DOE headquarters. Both DOE and NASA management participated in the review. Both the DOE and NASA indicated their support for this proposal, and the formal approval process is underway.

### 4.1.4 Tracker

Receiving inspection of flight silicon strip detectors, ladder fabrication, and ASIC wafer testing is well underway. Multichip modules (MCMs) were assembled onto the minitower trays and tested. The top and bottom trays of the engineering model were completed, including the flexure attachment with new fixtures; ladders and MCMs were mounted to the trays. A test of the bottom tray to 100% of the axial random-vibe static equivalent was performed. Fifty preproduction printed wiring boards for the MCMs were manufactured; connectors and many other parts have been received. Preproduction of MCMs awaits resolution of several issues involving pitch adaptor alignment and gluing, staking of the large tantalum capacitors, encapsulation procedures, and the protection of wire bonds during electrical test.

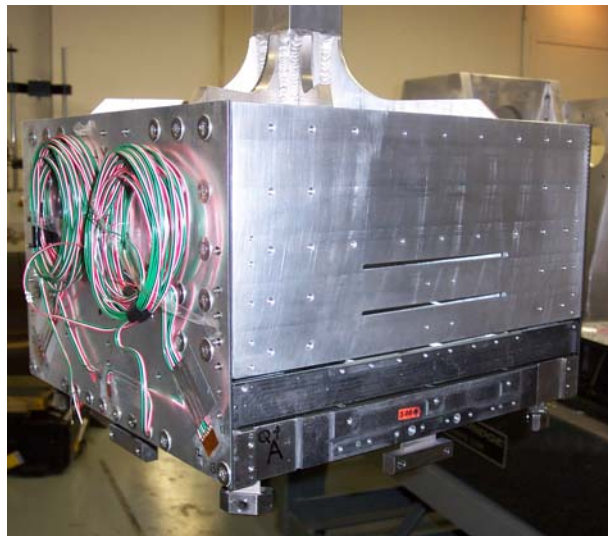


Figure 1: Test article, Tracker bottom tray.

#### 4.1.5 Calorimeter

Excellent progress is being made in the manufacture of crystal detector elements (CDEs) at Swales Aerospace. Twenty-eight CDEs have been bonded; 10 have been wrapped and capped using the new tooling. Test bonds with new molds/masks were successful. Fabrication of twelve copies of tooling for qualification units has begun. Dual pin photodiode flight samples underwent neutron irradiation testing. 370 CsI crystals have been delivered to Kalmar; 117 have been shipped to NRL after acceptance testing at Kalmar. Stress analyses of the proposed Calorimeter-Grid interface were performed. Tooling and materials were prepared for manufacture of the carbon composite structural model (first flight article to be used for strength verification in France). Version 5 of the readout controller ASIC was installed on the engineering model and reliable communications were achieved at 20 MHz at room temperature. Full communications performance is expected with version 9 of the front end ASIC. Electromagnetic interference/compatibility testing of the Calorimeter Engineering Model (EM) has been completed. The EM data package is in review, and the Calorimeter EM will be shipped to SLAC in early August.

#### 4.1.6 Anticoincidence Detector

All components for the engineering unit base electronics assembly were fabricated, and a fit check was performed. End-to-end testing of the electrical system was performed. System tests with the front-end electronics board, high voltage bias supply, photomultiplier tubes, and tile detector assemblies are in progress. Tile detector assembly fabrication continues; drawings have been completed and the first set of connectors have been received. The facility for photomultiplier tube assembly was prepared.

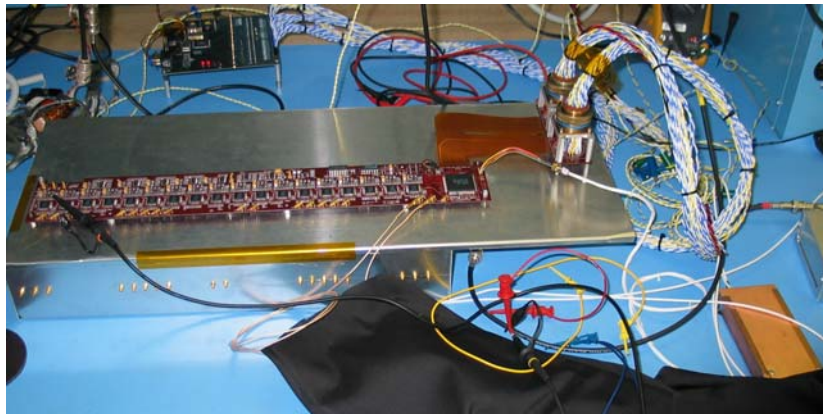


Figure 2: End-to-end testing of ACD front-end electronics

#### 4.1.7 Electronics

The power distribution unit has been fabricated and is being tested. An alternative tower supply has been designed, and is being simulated. A flight model tower electronics module with ASICs has been fabricated. Several data acquisition ASICs were radiation tested. The first boot code committed to the startup ROM on the RAD750 CPU board

was tested. The spacecraft interface simulator was received from the spacecraft vendor and successfully operated.

#### 4.1.8 Mechanical Systems

The engineering model grid (1x4) was fabricated. The technical proposal evaluation was completed and a vendor, Tapemation, was selected for the flight grid. The Calorimeter-grid interface was defined and validated. A design approach for the cross-LAT thermal interface was selected and is being analyzed. The manufacturing readiness review for the heat pipes was conducted. The interface definition document for the radiators was completed. The specification control drawings for the downspout and top flange heat pipes were released. A technician was hired for EM testing.

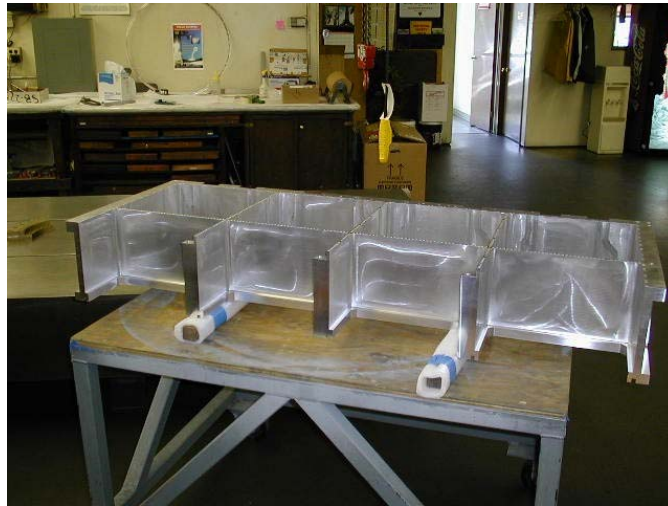


Figure 3: Engineering Model Grid (1x4)

#### 4.1.9 Integration & Test

The engineering model and Calorimeter rotation stand was proof-tested for the 1x4 grid configuration. The single bay grid was refurbished and reassembled, and integration procedures for single bay integration were completed. A facility readiness review was held prior to engineering model deliveries. Photon angular distribution was measured from the Van de Graaff target, using the BGO array.

### **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.

CD-3 Approval (1M1P000030)

Baseline/Target Finish: 07/15/03      Projected Finish: 08/31/03      Variance: -47 days  
CD-3 approval is contingent upon resolution of the CNES French funding situation and the cost and schedule recovery plan. This is expected to occur as the formal approval of the rebaseline plan progresses.

Engineering Model (1x4) Grid (1M1001380)

Baseline/Target Finish: 12/02/02      Projected Finish: 10/01/03      Variance: -205 days  
Lack of sufficient manpower, vendor machine failure, and design maturity of the Calorimeter-grid interface definition have impacted the delivery of this milestone. Additional delay has been incurred due to machining difficulties, which have resulted in improved methods to increase machining speed. An existing 1x1 grid bay mockup will be used to develop test procedures and electrical ground support equipment (EGSE). (Note: as of the publication of this report, the 1x4 grid has been received at SLAC, and is being tested prior to delivery to I&T.)

Tracker Engineering Model (1M1001430)

Baseline/Target Finish: 12/09/02      Projected Finish: 08/22/03      Variance: -173 days  
The delivery of the full Tracker EM has been delayed until mid-November by the redesign of the bottom tray. In the meantime, the upgraded EM minitower has been delivered to I&T, and will be used with the aforementioned 1x1 grid bay mockup to develop test procedures and EGSE. The delay of the full tower 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: 09/02/03      Variance: -165 days  
Resources have been diverted from the completion of this milestone to other tasks with higher priority. The need for additional hardware testing is also a factor in the delay. This delay can be accommodated in the Integration & Test schedule with no further impact.

EGSE EM2 Release, Electronics to I&T (1M7941150)

Baseline/Target Finish: 06/12/03      Projected Finish: 09/15/03      Variance: -65 days  
Resources have been diverted from the completion of this milestone to other tasks with higher priority, most notably the power supply design. This delay can be accommodated in the Integration & Test schedule with no further impact.

Calorimeter Engineering Model (1M59000000)

Baseline/Target Finish: 07/07/03      Projected Finish: 08/07/03      Variance: -23 days  
The Calorimeter EM was delivered to SLAC on August 5. This delay can be accommodated in the Integration & Test schedule with no further impact.

MCMs for EM2 from Tracker to Electronics (1M1000910)

Baseline/Target Finish: 07/18/03      Projected Finish: 09/15/03      Variance: -40 days  
The multichip module (MCM) procurement has been delayed by subcontract negotiations and availability of parts. The Electronics subsystem will accommodate this delay by manufacturing 36 MCMs without pitch adaptors.

EM2 Tower Engineering Model from Electronics to Calorimeter (1M75000000)

Baseline/Target Finish: 08/25/03    Projected Finish: 10/15/03    Variance: -36 days

This item is needed for the calibration unit; which will be rescheduled in accordance with the approved change in the beam test schedule.

Calorimeter Engineering Model Returned to NRL (1M1001520)

Baseline/Target Finish: 09/08/03    Projected Finish: 10/17/03    Variance: -29 days

The return of the Calorimeter EM to NRL has been delayed, in accordance with the delivery of the Calorimeter EM to I&T (above).

EGSE Calibration Unit Release – Electronics to I&T (1M7941160)

Baseline/Target Finish: 01/14/04    Projected Finish: 03/03/04    Variance: -33 days

This item is needed for the calibration unit; which will be rescheduled in accordance with the approved change in the beam test schedule.

#### **4.0 Financial Status**

Attachment 3 depicts the costs, commitments, and performance through the end of the current reporting period.

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.

#### 4.1.5 Calorimeter

The schedule variance is largely due to a delay in the flight analog front-end electronics boards; the ASICs are not expected to be received until October or November, so this variance will persist until the project plan is reprogrammed.

#### 4.1.6 Anticoincidence Detector

The flight shell and tile detector assembly procurements were not received on schedule. This is not considered critical path, and the schedule is expected to recover by the end of the fiscal year. Manpower was diverted from the MGSE design work to support the tile shell assembly design. A recovery plan is underway which preserves the MGSE design work, but it is expected that MGSE hardware procurements will be deferred until next fiscal year.

The unfavorable cost variance is due to higher labor costs than planned for the tile shell assembly and base electronics assembly (BEA) work. Contract labor support is being reduced in favor of NASA/Goddard civil servant labor, where appropriate. The large cost variance in the current period is due to costs accumulated during the three-month GSFC financial system shutdown now being reported.

#### 4.1.7 Electronics

The unfavorable cost variance is due to an advance payment required by British Aerospace for the flight processors. This advance payment was not in the baseline schedule, rather, payment was planned to occur when the items were received.

#### 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, however, additional personnel may be required to recover schedule. There has also been a delay in placement of the Lockheed Martin Phase II subcontract (now placed).

#### 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. The underrun has been significantly decreased in the current period, by adding performance assurance support for Tracker/INFN activities in Italy.

#### 4.1.B Instrument Operations Center

The schedule variance results from a delay in hiring additional planned resources. Recruitment for a regular subsystem manager (non-acting) is underway at SLAC, which is the first step towards increasing the staffing. The pending replan of the LAT project includes incorporating much of the IOC into the SLAC operating budget; this will alleviate the positive cost variance.

#### 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**

Two change requests were submitted to and approved by the LAT Configuration Control Board during July. 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-02178-01	SSD Procurement Reduction	T. Borden	N/A	Approved -\$193K*
LAT-XR-02369-01	PSA Support for Tracker/INFN	D. Marsh	N/A	Approved \$0K

The fabrication phase cost baseline is now \$107.7M. Funding applicable to that baseline is \$121.5M; the resulting contingency is \$13.8M.

### **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.

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\* Cost decrease of \$193K is directly offset by corresponding funding decrease from Japan.



## Attachment 1 Milestones, Levels 1-2

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	FY01		FY02				FY03				FY04				FY05				FY06		
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
<b>DOE/NASA Joint Oversight Group (Level 1)</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*	-47	08/31/03*							▼														
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 1)</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*	-12	05/16/03A							▼														
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*																				▼	
91023350	AV: LAT Ready to Ship to SCO	07/22/05	-27	08/30/05																				▼	
1M1000140	LAT Ready for Integration (RFI) to Spacecraft	09/22/05*	0	09/22/05*																				▼	
Run Date					08/22/03 16:20					<b>GLAST LAT PROJECT</b>										0819			Sheet 1 of 1		
										Project Milestones (Level 1 and 2)										LT_MS1-2					
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## Attachment 2 Level 3 Milestones (One-Year View)

Activity ID	Activity Description	Target Finish Date	Variance	Scheduled Finish Date	AV	ND	Timeline																	
							FY02 Q4	Q1	Q2	FY03 Q3		Q4	Q1	FY04 Q2		Q3	Q4							
<b>Instrument Project Office (Level 3)</b>																								
1M1001380	Delivery of EM (1X4) Grid to I&T/MSGSE	12/02/02*	-205	10/01/03*	8	9																		
1M1001430	Delv of TKR EM to SLAC I&T/MGSE	12/09/02*	-173	08/22/03*	4	9																		
1M1001390	GEM h/w driver, final ver-ELX to I&T/Onlir	01/07/03	-165	09/02/03	7	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 toElc	02/03/03*	-66	05/07/03A	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 ACI	04/24/03	59	01/30/03A	7	6																		
1M1001490	SIS description-ELX to I&T	04/30/03*	23	03/28/03A	7	9																		
1M1001500	Online EM2 release #1 to FSV	04/30/03	-32	06/16/03A	9	7																		
1M19500500	CU IPS - ELX to I&T/Online	04/30/03*	11	04/15/03A	7	9																		
1M7941340	(11) FREE Bds & ASICS, (1) Fully Tested Bd - EM	05/07/03*	-8	05/19/03A	6	7																		
1M7941150	EGSE EM2 Release-Elec to I&T	06/12/03*	-65	09/15/03*	7	9																		
1M1001570	CU Monte Carlo sim from SAS to I&T/SVA	06/13/03*	156	10/22/02A	D	9																		
1M1001550	Online EM2 release #2 to ELX	06/26/03	0	06/26/03A	9	7																		
1M59000000	EM from CAL to I&T	07/07/03*	-23	08/07/03	5	9																		
1M1000910	(36) MCM's for EM2 from Tracker to Elec	07/18/03	-40	09/15/03	4	7																		
1M75000000	(6) EM2 TEM-from Elec to CAI	08/25/03	-36	10/15/03	7	5																		
1M19500400	CU S/C Simulator - ELX to I&T Online	08/29/03*	0	08/29/03*	7	9																		
1M1001520	EM CAL Returned to NRL (arrives on doc)	09/08/03*	-29	10/17/03	9	5																		
1M1000920	EM2 TEM for Qual Towers A,B from Elec to Tracker	10/16/03*	0	10/16/03*	7	4																		
1M7941160	EGSE Calibration Unit Release-Elec to I&T	01/14/04	-33	03/03/04	7	9																		

Run Date 08/22/03 16:22

**GLAST LAT PROJECT  
Project Milestones (Level 3)  
1 Year View (+/- 6mo)**

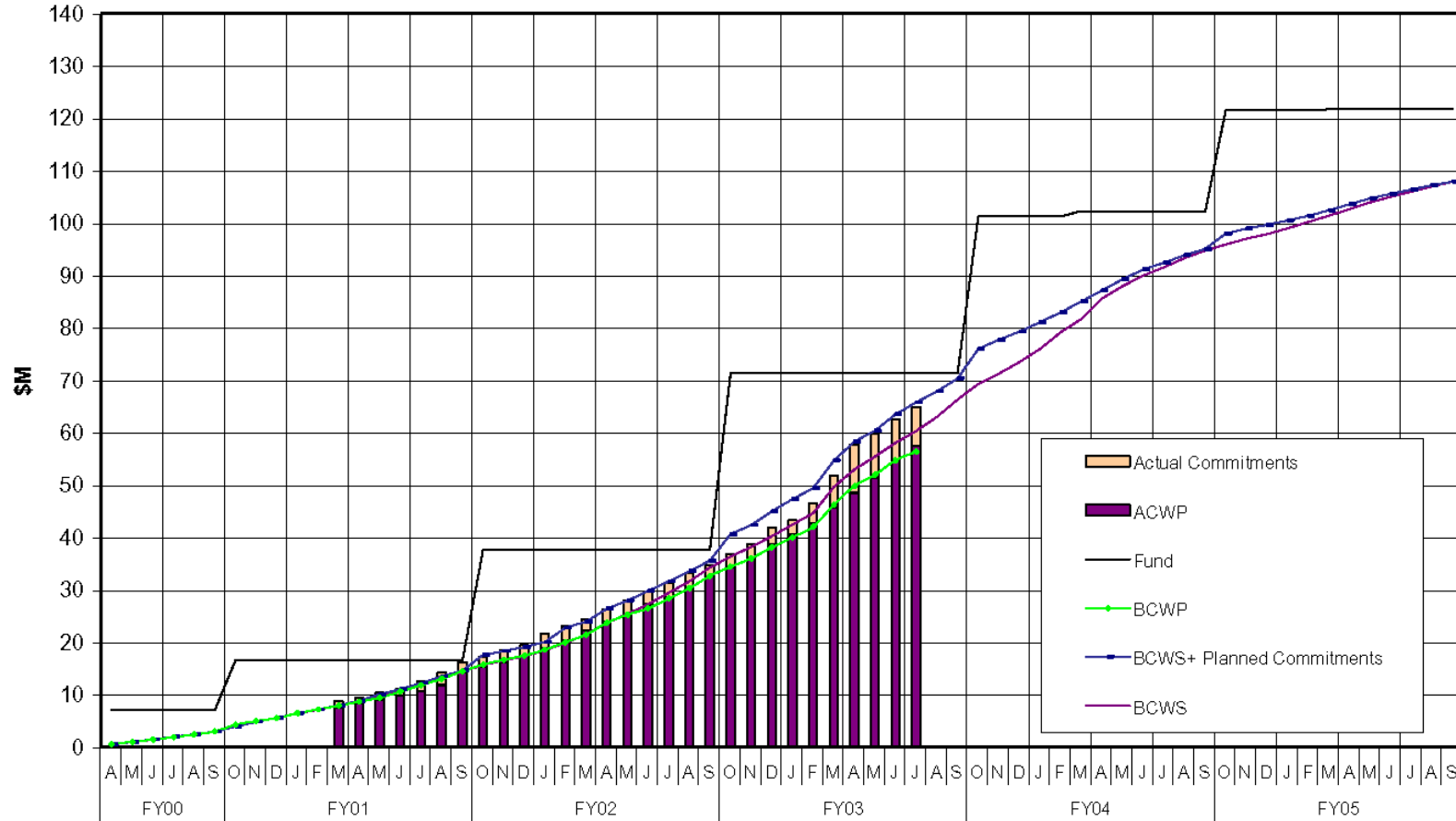
0819  
LTX1 - MS (L3)  
FLX1- MS (L3)

Sheet 1 of 1

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### Attachment 3

#### Budget vs Actuals vs Performance DOE + NASA Project Expenditures 4.1 LAT



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

Monthly Contractor Financial Management Report								Report for Month Ending: 7/31/03		
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		Unfilled Orders Outstanding
	Actual	Planned	Actual	Planned	AUG03	SEP03		Project Estimate	Budget Value	
4.1.1 INSTRUMENT MANAGEMENT	426	357	8,654	8,554	341	341	6,021	15,357	15,357	
4.1.2 SYSTEM ENGINEERING	55	174	3,555	3,773	166	166	2,565	6,453	6,453	
4.1.4 TRACKER	241	34	8,701	8,981	197	298	1,527	10,722	10,722	
4.1.5 CALORIMETER	543	536	9,227	10,278	345	381	7,876	17,830	17,830	
4.1.6 ANTICOINCIDENCE DETECTOR	542	244	8,578	8,496	400	244	2,803	12,025	12,025	
4.1.7 ELECTRONICS	390	296	6,860	6,251	379	950	8,483	16,672	16,672	
4.1.8 MECHANICAL SYSTEMS	460	486	5,024	6,106	355	462	4,531	10,373	10,373	
4.1.9 INTEGRATION & TEST	116	180	2,067	2,181	278	263	3,980	6,588	6,588	
4.1.A PERFORMANCE AND SAFETY ASSURANCE	16	-201	800	949	55	55	697	1,607	1,607	
4.1.B LAT INSTRUMENT OPERATIONS CENTER	0	32	263	671	31	28	2,190	2,512	2,512	
4.1.C EDUCATION AND PUBLIC OUTREACH	25	48	887	1,018	45	45	1,707	2,684	2,684	
4.1.D SCIENCE ANALYSIS SOFTWARE	47	74	1,323	1,576	70	71	2,131	3,595	3,595	
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>2,862</b>	<b>2,260</b>	<b>57,264</b>	<b>60,155</b>	<b>2,685</b>	<b>2,636</b>	<b>45,152</b>	<b>107,737</b>	<b>107,737</b>	

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

Monthly Contractor Financial Management Report								Report for Month Ending: 7/31/03		
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 Contract	Project Estimate	Budget Value	Unfilled Orders Outstanding
	Actual	Planned	Actual	Planned	AUG03	SEP03				
DG *** GSFC	504	274	9,555	9,867	428	272	4,318	14,573	14,573	
DH *** HEPL	170	217	3,679	4,364	200	230	5,087	9,197	9,197	
DL *** SLAC	1,546	1,007	29,960	29,547	1,464	2,155	20,482	54,061	54,061	
DN *** NRL	558	668	11,384	13,476	480	558	11,879	24,300	24,300	
DO *** Financial Plan Transfer/Sub Out	0	0	32	32	0	0	0	32	32	
DS *** SSU	25	47	887	1,014	45	45	1,632	2,609	2,609	
DT *** Texas A&M	0	0	15	16	0	0	0	16	16	
DU *** UCSC	51	38	1,702	1,781	37	37	891	2,666	2,666	
DW *** UW	9	9	49	59	8	8	218	283	283	
Total	2,862	2,260	57,264	60,155	2,685	2,636	45,152	107,737	107,737	

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	AUG03	SEP03				
RL LABOR	1,374	1,333	32,148	32,560	1,179	1,318	23,859	58,503	58,503	
<i>FTE (DOE/NASA)</i>	<i>138.0</i>	<i>104.7</i>	<i>2,801.6</i>	<i>2,847.6</i>	<i>100.0</i>	<i>113.0</i>	<i>2,030.6</i>	<i>5,045.2</i>	<i>5,045.2</i>	
<i>HOURS (DOE/NASA)</i>	<i>24,284</i>	<i>18,432</i>	<i>470,568</i>	<i>470,228</i>	<i>16,825</i>	<i>19,004</i>	<i>326,431</i>	<i>832,828</i>	<i>832,828</i>	
RT TRAVEL	19	11	791	1,511	67	67	2,381	3,306	3,306	
RM MATERIAL & SERVICES	1,443	901	22,378	23,934	1,311	1,814	16,633	42,137	42,137	
RX MPS & LAB TAX	27	15	1,947	2,151	105	105	1,635	3,791	3,791	
Total (not incl FTE/Hours)	2,862	2,260	57,264	60,155	2,685	2,636	45,152	107,737	107,737	

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

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:					Contract Type/No:			Project Name/No: GLAST LAT Project		Report Period: 6/30/03 7/31/03			
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		
	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			
Item	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4.1.1 INSTRUMENT MANAGEMENT	357	357	426	0	-69	8,554	8,554	8,654	0	-100	15,357	15,357	0
4.1.2 SYSTEM ENGINEERING	174	174	55	0	119	3,773	3,773	3,555	0	217	6,453	6,453	0
4.1.4 TRACKER	34	66	241	32	-175	8,981	8,448	8,701	-533	-253	10,722	10,722	0
4.1.5 CALORIMETER	536	201	543	-335	-342	10,278	9,166	9,227	-1,112	-61	17,830	17,830	0
4.1.6 ANTICOINCIDENCE DETECTOR	244	128	542	-116	-414	8,496	7,218	8,578	-1,279	-1,360	12,025	12,025	0
4.1.7 ELECTRONICS	296	348	390	52	-42	6,251	6,315	6,860	64	-545	16,672	16,672	0
4.1.8 MECHANICAL SYSTEMS	486	339	460	-147	-121	6,106	5,300	5,024	-806	276	10,373	10,373	0
4.1.9 INTEGRATION & TEST	180	133	116	-46	17	2,181	2,105	2,067	-76	39	6,588	6,588	0
4.1.A PERFORMANCE AND SAFETY ASSURA	-201	-201	16	0	-217	949	949	800	0	149	1,607	1,607	0
4.1.B LAT INSTRUMENT OPERATIONS CENT	32	27	0	-5	27	671	576	263	-95	313	2,512	2,512	0
4.1.C EDUCATION AND PUBLIC OUTREACH	48	35	25	-12	11	1,018	970	887	-48	83	2,684	2,684	0
4.1.D SCIENCE ANALYSIS SOFTWARE	74	57	47	-17	10	1,576	1,534	1,323	-41	211	3,595	3,595	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	2,260	1,665	2,862	-595	-1,197	60,155	56,229	57,264	-3,926	-1,035	107,737	107,737	0
Contingency											13,783	13,783	
Total	2,260	1,665	2,862	-595	-1,197	60,155	56,229	57,264	-3,926	-1,035	121,520	121,520	

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

Cost Performance Report - Organization													
Contractor: Location:				Contract Type/No:				Project Name/No: GLAST LAT Project		Report Period: 6/30/03                      7/31/03			
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 Performed	Variance		Budgeted Cost		Actual Cost Work Performed	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	274	158	504	-116	-346	9,867	8,588	9,555	-1,279	-967	14,573	14,573	0
DH *** HEPL	217	219	170	2	49	4,364	4,214	3,679	-149	535	9,197	9,197	0
DL *** SLAC	1,007	853	1,546	-154	-692	29,547	28,237	29,960	-1,310	-1,723	54,061	54,061	0
DN *** NRL	668	353	558	-316	-205	13,476	12,356	11,384	-1,119	973	24,300	24,300	0
DO *** Financial Plan	0	0	0	0	0	32	32	32	0	0	32	32	0
DS *** SSU	47	35	25	-11	11	1,014	967	887	-47	81	2,609	2,609	0
DT *** Texas A&M	0	0	0	0	0	16	16	15	0	0	16	16	0
DU *** UCSC	38	38	51	-1	-14	1,781	1,759	1,702	-23	57	2,666	2,666	0
DW *** UW	9	9	9	0	0	59	59	49	0	10	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	2,260	1,665	2,862	-595	-1,197	60,155	56,229	57,264	-3,926	-1,035	107,737	107,737	0
Contingency											13,783	13,783	
Total	2,260	1,665	2,862	-595	-1,197	60,155	56,229	57,264	-3,926	-1,035	121,520	121,520	

## Attachment 8 LAT Performance Analysis, July 2003

	WBS	BAC	BCWS	BCWP	ACWP	SV \$	CV \$	% BCWS	% BCWP	% ACWP	SV Trend	CV Trend	SPI	CPI	Cpi_Fcst	CpiSpi_Fcst
1	4.1	107,737	60,155	56,229	57,264	-3,926	-1,035	55.83	52.19	53.15	↓	↓	0.935	0.982	109,720	113,383
2	4.1.1	15,357	8,554	8,554	8,653	0	-100	55.70	55.70	56.35	↔	↓	1.000	0.988	15,536	15,536
3	4.1.2	6,453	3,773	3,773	3,555	0	217	58.47	58.47	55.10	↔	↑	1.000	1.061	6,081	6,081
4	4.1.4	10,722	8,981	8,448	8,701	-533	-253	83.76	78.79	81.15	↔	↓	0.941	0.971	11,044	11,191
5	4.1.5	17,830	10,278	9,166	9,227	-1,112	-61	57.65	51.41	51.75	↓	↓	0.892	0.993	17,948	19,006
6	4.1.6	12,025	8,496	7,218	8,578	-1,279	-1,360	70.66	60.02	71.34	↔	↓	0.850	0.841	14,291	15,303
7	4.1.7	16,672	6,251	6,315	6,860	64	-545	37.50	37.88	41.14	↑	↔	1.010	0.921	18,109	17,996
8	4.1.8	10,373	6,106	5,300	5,024	-806	276	58.87	51.10	48.44	↓	↓	0.868	1.055	9,833	10,564
9	4.1.9	6,588	2,181	2,105	2,067	-76	39	33.11	31.96	31.37	↓	↑	0.965	1.019	6,466	6,625
10	4.1.A	1,607	949	949	800	0	149	59.01	59.01	49.77	↔	↓	1.000	1.186	1,356	1,356
11	4.1.B	2,512	671	576	263	-95	313	26.73	22.94	10.48	↔	↔	0.858	2.188	1,148	1,294
12	4.1.C	2,684	1,018	970	887	-48	83	37.94	36.14	33.04	↓	↑	0.953	1.094	2,454	2,532
13	4.1.D	3,595	1,576	1,534	1,323	-41	211	43.83	42.67	36.81	↓	↔	0.974	1.159	3,101	3,149
14	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  
SV \$: Schedule Variance = BCWP - BCWS  
% BCWS: Percent Scheduled = BCWS/BAC

BCWS: Budgeted Cost of Work Scheduled (to date)  
CV \$: Cost Variance = BCWP - ACWP  
% BCWP: Percent Complete = BCWP/BAC

BCWP: Budgeted Cost of Work Performed (to date)  
SPI: Schedule Performance Index = BCWP/BCWS  
% ACWP: Percent Spent = ACWP/BAC

ACWP: Actual Cost of Work Performed (to date)  
CPI: Cost Performance Index = BCWP/ACWP

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

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

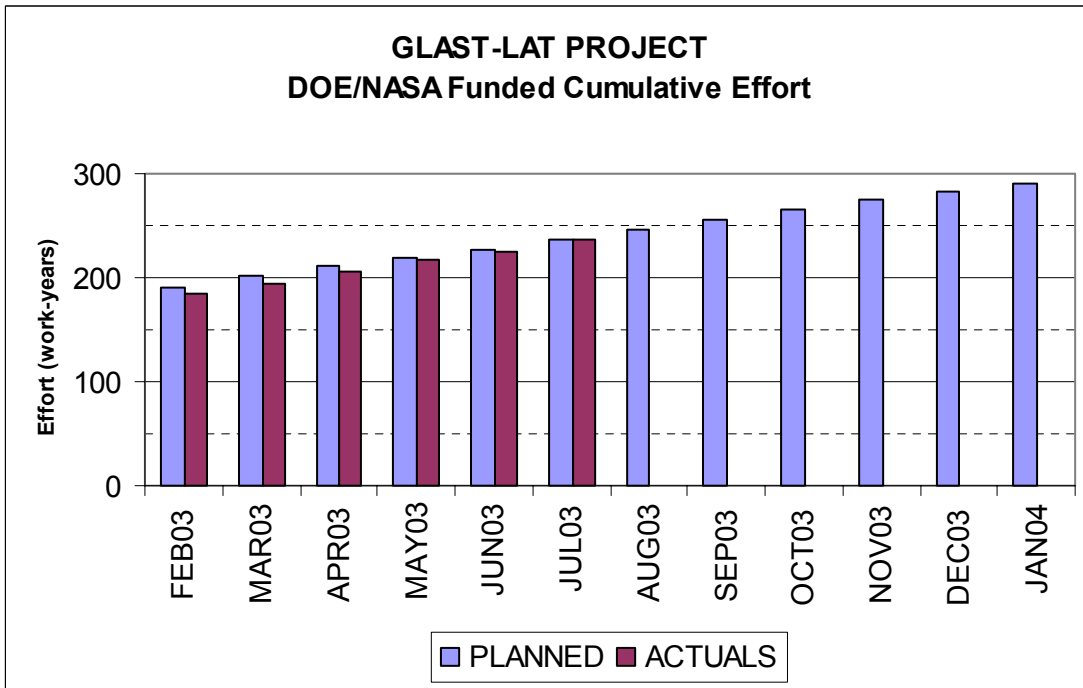
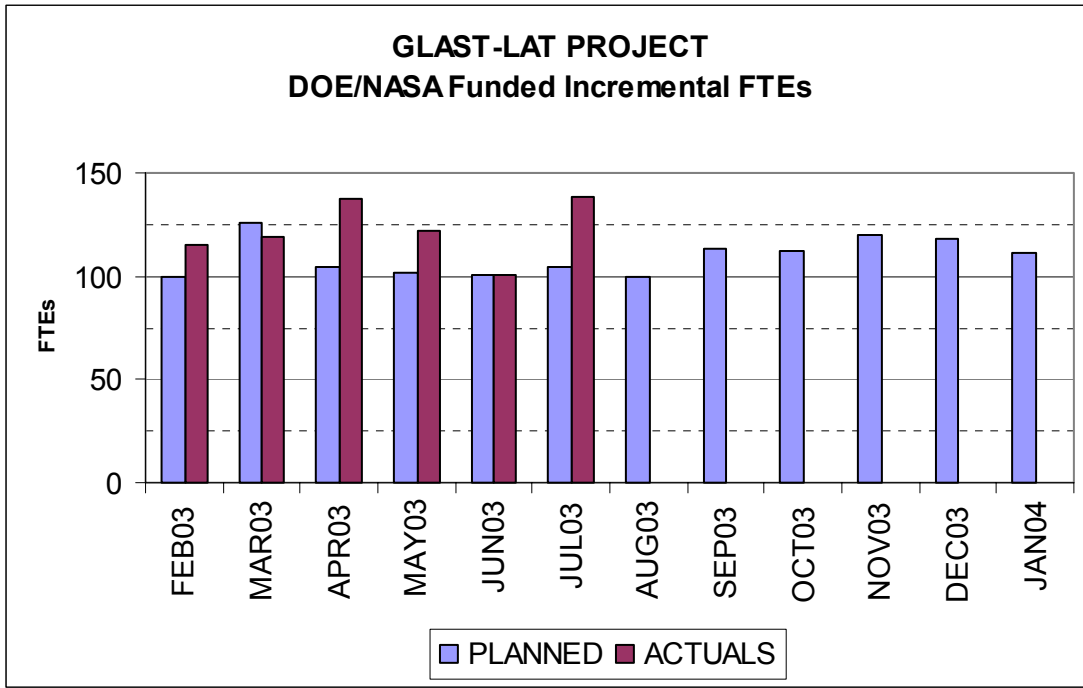
Cpi\_Fcst: CPI (to date) EAC Forecast = BAC / CPI

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 July 2003, by Organization**

Program: LAT3		Description: GLAST LAT Project		Approval: Program Manager												
Run Date: 8/22/03		Status Date: 7/31/03		Functional Manager												
		Cost Account Manager														
										Cum-to Date						
CAPW[3]		PRIOR	FEB03	MAR03	APR03	MAY03	JUN03	JUL03		AUG03	SEP03	OCT03	NOV03	DEC03	JAN04	
4.1.1 INSTRUMENT MANAGEMENT																
FTE	PLANNED	251.0	4.8	47.5	18.1	18.0	16.7	16.8	<b>372.9</b>	16.8	16.8	15.0	15.0	15.0	15.0	
	ACTUALS	248.4	13.9	36.7	15.5	15.4	13.5	22.6	<b>365.9</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.2 SYSTEM ENGINEERING																
FTE	PLANNED	45.1	1.9	-6.1	1.6	1.6	1.6	1.6	<b>47.2</b>	1.6	1.6	1.5	1.5	1.8	1.5	
	ACTUALS	31.3	1.4	2.0	1.7	1.2	1.1	0.9	<b>39.6</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.4 TRACKER																
FTE	PLANNED	610.1	26.6	15.3	28.3	28.1	19.9	17.6	<b>745.8</b>	18.5	20.5	21.2	20.7	20.5	18.8	
	ACTUALS	568.0	22.9	18.9	24.1	25.6	23.9	23.7	<b>707.1</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.5 CALORIMETER																
FTE	PLANNED	1184.3	49.2	45.0	43.3	44.0	51.8	52.4	<b>1469.9</b>	48.7	50.7	55.5	67.3	57.0	42.0	
	ACTUALS	383.7	16.5	18.1	17.2	21.4	24.6	21.7	<b>503.1</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.6 ANTICOINCIDENCE DETECTOR																
FTE	PLANNED	391.1	18.3	53.2	23.3	20.6	20.3	15.5	<b>542.2</b>	16.4	19.8	19.0	16.7	17.6	19.5	
	ACTUALS	402.5	27.2	29.4	42.3	29.0	12.6	51.8	<b>594.8</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.7 ELECTRONICS																
FTE	PLANNED	301.9	21.1	16.1	18.6	18.5	17.9	17.9	<b>411.9</b>	13.7	21.6	21.3	20.8	18.4	15.0	
	ACTUALS	305.0	18.6	22.2	25.1	20.0	19.2	16.7	<b>426.8</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.8 MECHANICAL SYSTEMS																
FTE	PLANNED	171.2	7.8	-4.9	8.1	6.5	4.0	4.6	<b>197.3</b>	5.3	6.9	6.2	4.6	5.6	6.8	
	ACTUALS	127.6	10.6	-7.3	7.8	8.5	6.9	0.2	<b>154.3</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.9 INSTRUMENT INTEGRATION AND TESTING																
FTE	PLANNED	130.5	7.5	8.3	9.8	9.5	7.0	13.8	<b>186.5</b>	16.2	13.8	12.7	14.0	13.3	10.9	
	ACTUALS	116.6	11.4	10.3	9.8	9.8	8.0	8.8	<b>174.7</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.A PERFORMANCE AND SAFETY ASSURANCE																
FTE	PLANNED	62.4	2.6	-7.0	0.9	0.9	0.9	0.9	<b>61.5</b>	0.9	0.9	0.9	0.9	0.9	0.9	
	ACTUALS	49.7	2.1	-4.0	1.0	0.7	1.1	0.9	<b>51.4</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.B LAT INSTRUMENT OPERATIONS CENTER																
FTE	PLANNED	31.5	2.2	2.3	2.3	2.4	2.4	2.2	<b>45.2</b>	2.2	1.9	1.8	1.8	2.2	2.5	
	ACTUALS	22.7	0.0	0.0	0.0	0.1	0.0	0.0	<b>22.8</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.C EDUCATION AND PUBLIC OUTREACH																
FTE	PLANNED	51.5	2.0	2.0	2.0	2.9	2.9	2.9	<b>66.1</b>	2.9	2.9	2.3	2.4	2.4	2.3	
	ACTUALS	57.6	2.3	4.5	4.3	3.3	1.3	2.5	<b>75.7</b>	0.0	0.0	0.0	0.0	0.0	0.0	
4.1.D SCIENCE ANALYSIS SOFTWARE																
FTE	PLANNED	398.2	25.0	24.7	24.7	24.7	24.5	24.1	<b>545.8</b>	23.0	22.6	26.7	26.8	24.5	21.6	
	ACTUALS	227.9	11.6	12.1	11.5	10.7	11.5	8.9	<b>294.3</b>	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	0.0	<b>111.9</b>	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	0.0	<b>75.3</b>	0.0	0.0	0.0	0.0	0.0	0.0	
Grand Totals:																
	PLANNED	3740.6	168.8	196.4	180.7	177.7	169.7	170.2	<b>4804.2</b>	166.2	180.1	184.1	192.4	179.1	156.9	
	ACTUALS	2616.3	138.6	142.8	160.2	145.6	123.6	158.6	<b>3485.6</b>	0.0	0.0	0.0	0.0	0.0	0.0	