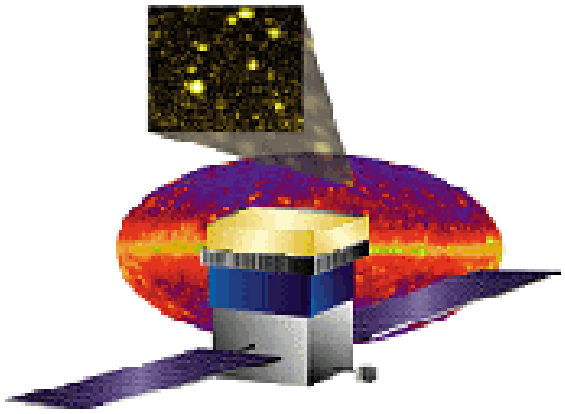
# Monthly Progress Report

**(Month Ending June 2003)**

## GLAST Large Area Telescope (LAT)



LAT-MR-02362-01

July 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 June, 2003.

# 2.0 Recent Progress and Status

4.1.4 Tracker

Fifty percent of the silicon strip detectors have been inspected. The bottom trays were assembled, and the initial bottom tray static test plan has been completed. Bias circuit prototypes with a solid shield plane were fabricated and tested. The mini-tower Van de Graaff testing was completed and the tower sent back to Italy, along with new microchip modules and flex-circuit cables for the mini-tower. Nine multichip modules were tested, together with two flex cables and a tower electronics module. Flight ASIC testing is 50% complete. Hardware was ordered for the completion of the burn-in system.

4.1.5 Calorimeter

Qualification testing of the flight prototype dual pin photodiodes has commenced at GSFC. The first 172 flight CsI crystals have been delivered to Sweden (250 expected in July). Manufacturing of the crystal detector elements at Swales Aerospace is making excellent progress; 14 test crystals have been bonded as training exercise. Machining of the tooling for fabrication of flight carbon composite structures is completed; the autoclave for curing the structures has been received and installed at Ecole Polytechnique. Machined part drawings for the structure are being translated to English for fabrication in the US. Testing of the front-end ASICs (GCRC5 and GCFE9) has been completed; GCRC5 is ready for flight, unfavorable results from GCFE9 suggest an additional fabrication run. Thermal vacuum testing of the engineering model has been successfully completed. An additional thermal vacuum cycle was conducted to modify the mechanical ground support equipment for faster cool-down, and it was found that a failure of the electrical ground support equipment (EGSE) tower electronics module power supply unit at hot temperature occurred. No damage occurred to the Calorimeter Engineering Model. The EGSE failure will be investigated.

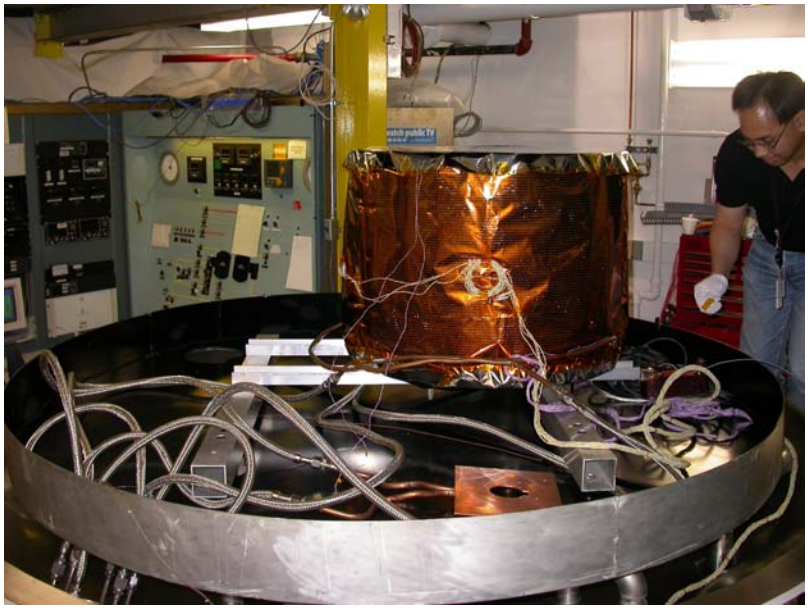


Figure 1: Calorimeter Engineering Model is enclosed in a thermal shroud and mounted on the thermal vacuum chamber base plate.

4.1.6 Anticoincidence Detector

Component fabrication of a set of base electronics assembly parts was completed and a fit check was performed. Electrical system end-to-end testing commenced, using a scintillator, phototubes, high voltage bias supply, and front-end electronics card with front end and readout controller ASICs. Tile detector and composite shell fabrication efforts are in progress. An estimate to complete was performed.

Figure 2: Engineering Model ACD electronics chassis being used for fit testing of the phototubes, high voltage bias supplies, and FREE cards.

4.1.7 Electronics

The layout of the LAT communications board cPCI board was completed. Tests of the GASU started. An alternative tower supply solution was designed. The second RAD750 board was received, and will be used for direct memory access tests with the LAT communications board. The tower electronics module and LAT communications board were redesigned to incorporate a solution to the ACTEL power-sequencing feature. The radiation test boards for the Maxim DC/DC converters and the data acquisition ASICs were designed, fabricated, and tested. The first boot code was committed to the startup ROM on the RAD750 CPU board. Software (Monte Carlo to event-builder format) was released to Integration & Test.

4.1.8 Mechanical Systems

The Calorimeter-grid interface has been defined and is being validated. The request for quotations has been issued for the flight grid and the grid box assembly machining. Definitions for the cross-LAT thermal interface design, cross-LAT plate, and radiator are in progress.

4.1.9 Integration & Test

The Integration and Test (I&T) plan document is in progress. Procedures for testing with a single bay have been drafted. The I&T engineering model procedures document for single bay is in the LAT document system in draft form, LAT-PS-00856. Muon rates for thermal vacuum tests have been calculated. The dead and noisy channel list utility is complete. The BGO data acquisition system has been calibrated with a Co source and Van de Graaff accelerator. The Tracker mini-tower data analysis chain was validated, using muon and Van de Graaff data from the Tracker mini-tower.

## 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: 08/08/03 Variance: -168 days

Lack of sufficent 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).

Tracker Engineering Model (1M1001430)
Baseline/Target Finish: 12/09/02 Projected Finish: 08/11/03 Variance: -164 days
The delivery of the full Tracker EM has been delayed by the redesign of the bottom tray. In the meantime, the upgraded EM minitower will be 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: 07/31/03 Variance: -143 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 accomodated 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 accomodated in the Integration & Test schedule with no further impact.

Calorimeter Engineering Model (1M59000000)
Baseline/Target Finish: 07/07/03 Projected Finish: 07/23/03 Variance: -12 days
The delivery of this item has been delayed to accommodate EMI/EMC testing. This delay can be accomodated in the Integration & Test schedule with no further impact.

Calorimeter Engineering Model Returned to NRL (1M1001520)
Baseline/Target Finish: 09/08/03 Projected Finish: 11/03/03 Variance: -40 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). This delay will be reduced, and the milestone is expected to be completed by mid-October.

## 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.

4.1.6 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.

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, and the baseline schedule is expected to be restored by the end of the fiscal year.

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. This underrun will be applied towards additional 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. While an additional engineer has been hired recently, 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

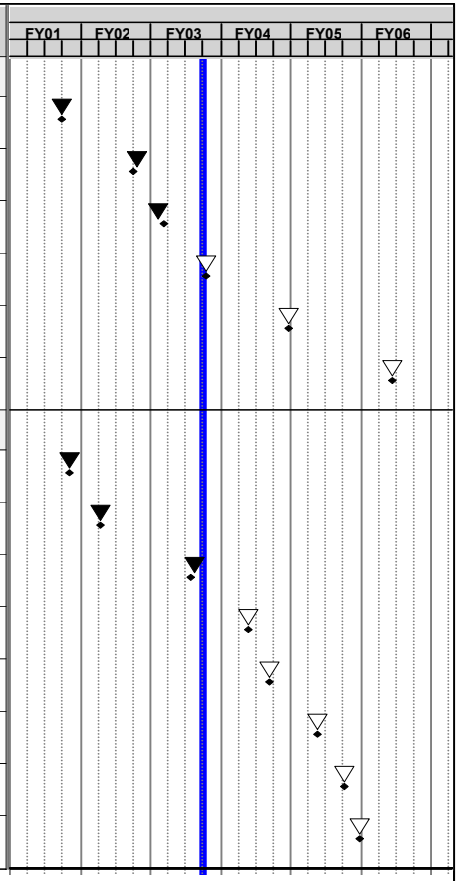
No change requests were approved by the LAT Configuration Control Board during this period. The fabrication phase cost baseline remains at $107.9M. Funding applicable to that baseline is $121.7M; the resulting contingency is $13.8M.

## 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.

## Attachment 1
## Milestones, Levels 1-2

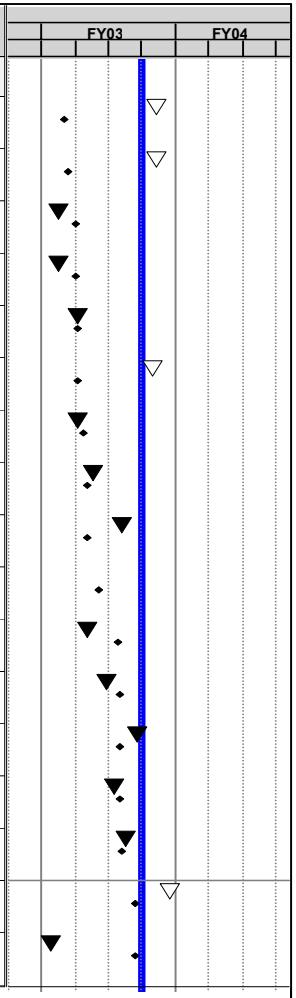
| Activity ID | Activity Description | Target Finish Date | Variance | Scheduled Finish Date |
|---|---|---|---|---|
| **DOE/NASA Joint Oversight Group (Level** | | | | |
| 1M1P000000 | DOE Critical Decision (CD) 0 Approval | 06/25/01A | 0 | 06/25/01A |
| 1M1P000010 | CD-1 Approval | 07/01/02* | -15 | 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* |
| **DOE/NASA Federal Project Managers (Level** | | | | |
| 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* |
| 1M1000140 | LAT Ready for Integration ( RFI ) to Spacecraft | 09/22/05* | 0 | 09/22/05* |




| | | |
|---|---|---|
| Run Date 07/24/03 18:33 | **GLAST LAT PROJECT** | 0717 Sheet 1 of 1 |
| | **Project Milestones (Level 1 and 2)** | LT_MS1-2 |
|  | | |

## Attachment 2 (Page 1 of 2)
## Level 3 Milestones (One-Year View)

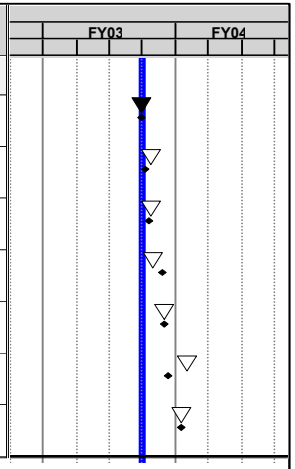
| Activity ID | Activity Description | Target Finish Date | Variance | Scheduled Finish Date | AV | ND |
|---|---|---|---|---|---|---|
| **Instrument Project Office (Level 3** | | | | | | |
| 1M1001380 | Delivery of EM (1X4) Grid to I&T/MSGE | 12/02/02* | -168 | 08/08/03* | 8 | 9 |
| 1M1001430 | Delv of TKR EM to SLAC I&T/MGSE | 12/09/02* | -164 | 08/11/03* | 4 | 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 | -143 | 07/31/03 | 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 toElec | 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 ACD) | 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 FSW | 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 - EM2 | 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/SVAC | 06/13/03* | 156 | 10/22/02A | D | 9 |




| | | |
|---|---|---|
| Run Date 07/24/03 18:34 | **GLAST LAT PROJECT** | 0717 Sheet 1 of 2 |
| | **Project Milestones (Level 3)** | LTX1 - MS (L3) |
| | **1 Year View (+/- 6mo)** | FLX1- MS (L3) |
|  | | |

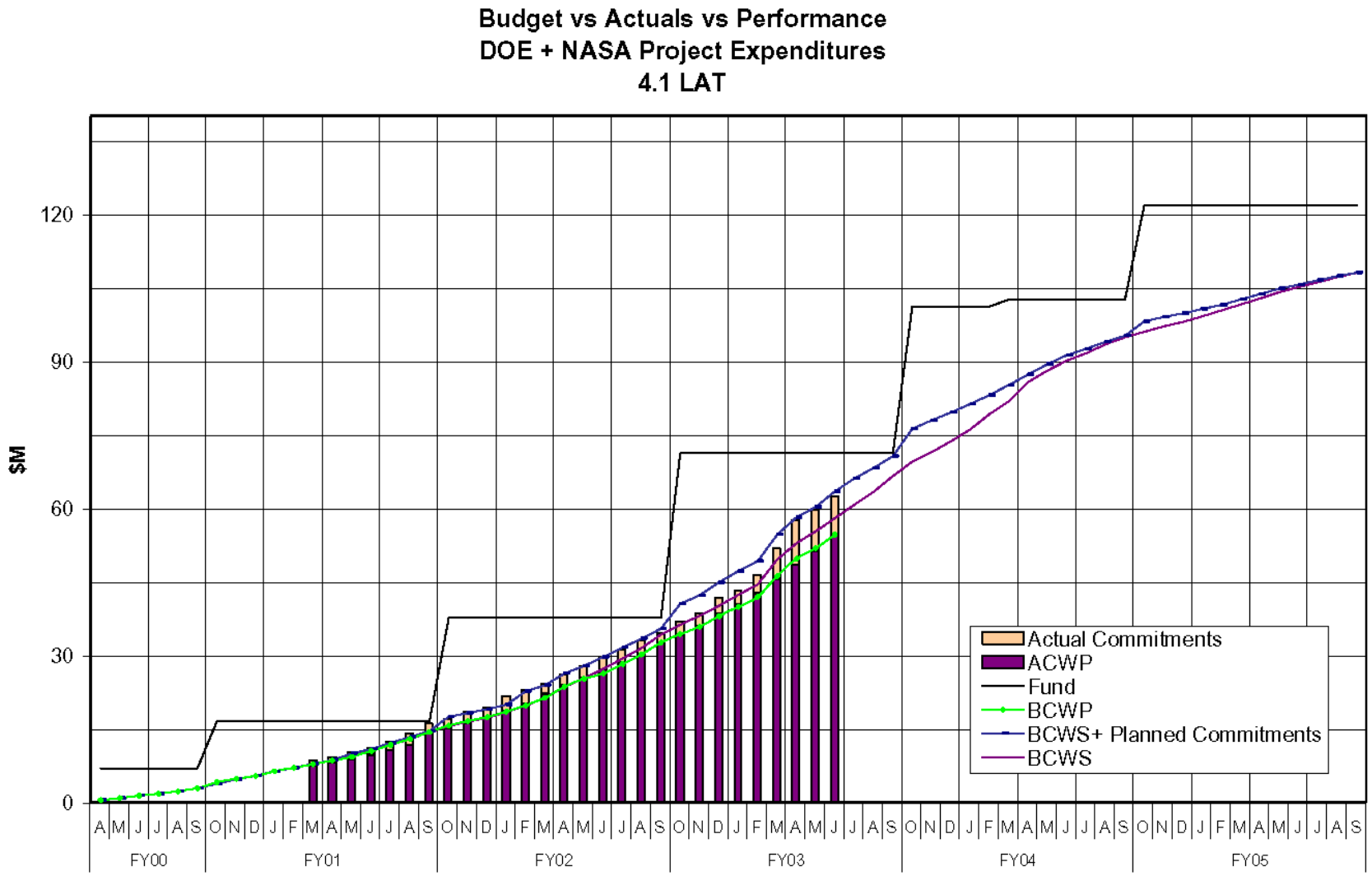
## Attachment 2, Continued (Page 2 of 2)
## Level 3 Milestones (One-Year View)

| Activity ID | Activity Description | Target Finish Date | Variance | Scheduled Finish Date | AV | ND |
|---|---|---|---|---|---|---|
| **Instrument Project Office (Level 3** | | | | | | |
| 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* | -12 | 07/23/03 | 5 | 9 |
| 1M1000910 | (36) MCM's for EM2 from Tracker to Elec | 07/18/03 | -3 | 07/23/03 | 4 | 7 |
| 1M75000000 | (6) EM2 TEM-from Elec to CAL | 08/25/03 | 20 | 07/28/03 | 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 dock) | 09/08/03* | -40 | 11/03/03 | 9 | 5 |
| 1M1000920 | EM2 TEM for Qual Towers A,B from Elec to Tracker | 10/16/03* | 0 | 10/16/03* | 7 | 4 |




| | | |
|---|---|---|
| Run Date 07/24/03 18:34 | **GLAST LAT PROJECT** | 0717 Sheet 2 of 2 |
| | **Project Milestones (Level 3)** | LTX1 - MS (L3) |
| | **1 Year View (+/- 6mo)** | FLX1- MS (L3) |
| © Primavera Systems, Inc. | | |

**Attachment 3**



# Attachment 4
# LAT Costs, through June 2003, by WBS

| Monthly Contractor Financial Management Report | | | | | | | | Report for Month Ending: 6/30/03 | |
|---|---|---|---|---|---|---|---|---|---|
| To: Kevin Grady, GLAST Project Manager (NASA)<br>Ev Valle, LAT Project Manager (DOE) | | | From: Tanya Boysen, LAT Project Controls Manager | | | | | Budget Value<br>Cost: 0 | Fee: 0 |
| LAT3<br><br>GLAST LAT Project | Type: | | | | | | | Fund Limitation:<br><br>0 | |
| Reporting Category | Cost Incurred | | | | Estimated Cost | | | 4/3/00 Estimated Final Cost | Billing Unfilled Orders Outstanding |
| | During Month | | Cum. to Date | | Detail | | Balance of Budget | Project Estimate | Budget Value | |
| | Actual | Planned | Actual | Planned | JUL03 | AUG03 | | | | |
| 4.1.1 INSTRUMENT MANAGEMENT | 382 | 326 | 8,227 | 8,197 | 357 | 341 | 6,431 | 15,357 | 15,357 | |
| 4.1.2 SYSTEM ENGINEERING | 100 | 169 | 3,501 | 3,599 | 174 | 166 | 2,612 | 6,453 | 6,453 | |
| 4.1.4 TRACKER | 1,145 | 163 | 8,460 | 8,946 | 227 | 197 | 2,032 | 10,915 | 10,915 | |
| 4.1.5 CALORIMETER | 416 | 576 | 8,684 | 9,742 | 536 | 345 | 8,264 | 17,830 | 17,830 | |
| 4.1.6 ANTICOINCIDENCE DETECTOR | 224 | 450 | 8,036 | 8,252 | 244 | 400 | 3,344 | 12,025 | 12,025 | |
| 4.1.7 ELECTRONICS | 919 | 323 | 6,469 | 5,956 | 296 | 379 | 9,527 | 16,672 | 16,672 | |
| 4.1.8 MECHANICAL SYSTEMS | -93 | 384 | 4,564 | 5,620 | 486 | 355 | 4,967 | 10,373 | 10,373 | |
| 4.1.9 INTEGRATION & TEST | 99 | 78 | 1,950 | 2,002 | 180 | 278 | 4,179 | 6,588 | 6,588 | |
| 4.1.A PERFORMANCE AND SAFETY ASSURANCE | 23 | 29 | 784 | 1,149 | 30 | 29 | 764 | 1,607 | 1,607 | |
| 4.1.B LAT INSTRUMENT OPERATIONS CENTER | 0 | 33 | 263 | 639 | 32 | 31 | 2,186 | 2,512 | 2,512 | |
| 4.1.C EDUCATION AND PUBLIC OUTREACH | 11 | 45 | 862 | 971 | 48 | 45 | 1,729 | 2,684 | 2,684 | |
| 4.1.D SCIENCE ANALYSIS SOFTWARE | 52 | 70 | 1,276 | 1,502 | 74 | 70 | 2,175 | 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 | |
| Total | 3,277 | 2,646 | 54,402 | 57,895 | 2,685 | 2,636 | 48,207 | 107,930 | 107,930 | |

# Attachment 5
# LAT Costs, through June 2003, by Organization and Cost Code

| Monthly Contractor Financial Management Report | | | | | | | | Report for Month Ending: 6/30/03 | |
|---|---|---|---|---|---|---|---|---|---|
| To: Kevin Grady, GLAST Project Manager (NASA)<br>Ev Valle, LAT Project Manager (DOE) | | | From: Tanya Boysen, LAT Project Controls Manager | | | | | Budget Value<br>Cost: 0 | Fee: 0 |
| LAT3<br>GLAST LAT Project | Type: | | | | | | | Fund Limitation: 0 | |
| Reporting Category | Cost Incurred | | | | Estimated Cost | | | 4/3/00 Billing<br>Estimated Final Cost | Unfilled Orders Outstanding |
| | During Month | | Cum. to Date | | Detail | | Balance of Contract | Project Estimate | Budget Value | |
| | Actual | Planned | Actual | Planned | JUL03 | AUG03 | | | | |
| DG *** GSFC | 267 | 478 | 9,051 | 9,593 | 274 | 428 | 4,820 | 14,573 | 14,573 | |
| DH *** HEPL | 62 | 149 | 3,509 | 4,147 | 184 | 168 | 5,072 | 8,934 | 8,934 | |
| DL *** SLAC | 2,341 | 1,182 | 28,415 | 28,540 | 1,465 | 1,470 | 23,167 | 54,517 | 54,517 | |
| DN *** NRL | 522 | 741 | 10,826 | 12,808 | 668 | 480 | 12,326 | 24,300 | 24,300 | |
| DO *** Financial Plan Transfer/Sub Ou | 0 | 0 | 32 | 32 | 0 | 0 | 0 | 32 | 32 | |
| DS *** SSU | 11 | 45 | 862 | 967 | 47 | 45 | 1,655 | 2,609 | 2,609 | |
| DT *** Texas A&M | 0 | 0 | 15 | 16 | 0 | 0 | 0 | 16 | 16 | |
| DU *** UCSC | 63 | 43 | 1,650 | 1,743 | 38 | 37 | 941 | 2,666 | 2,666 | |
| DW *** UW | 11 | 8 | 40 | 50 | 9 | 8 | 226 | 283 | 283 | |
| Total | 3,277 | 2,646 | 54,402 | 57,895 | 2,685 | 2,636 | 48,207 | 107,930 | 107,930 | |

| 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 | JUL03 | AUG03 | | | | |
| RL LABOR | 1,264 | 1,186 | 30,774 | 31,226 | 1,333 | 1,179 | 25,056 | 58,342 | 58,342 | |
| *FTE (DOE/NASA)* | *100.8* | *100.4* | *2,663.6* | *2,745.7* | *105.0* | *101.0* | *2,159.3* | *5,028.9* | *5,028.9* | |
| *HOURS (DOE/NASA)* | *16,938* | *16,868* | *446,284* | *452,269* | *18,453* | *16,892* | *348,713* | *830,342* | *830,342* | |
| RT TRAVEL | 39 | 64 | 773 | 1,500 | 72 | 67 | 2,455 | 3,367 | 3,367 | |
| RM MATERIAL & SERVICES | 1,906 | 1,302 | 20,936 | 23,033 | 1,265 | 1,285 | 18,944 | 42,430 | 42,430 | |
| RX MPS & LAB TAX | 68 | 94 | 1,920 | 2,136 | 15 | 105 | 1,751 | 3,791 | 3,791 | |
| Total (not incl FTE/Hours) | 3,277 | 2,646 | 54,402 | 57,895 | 2,685 | 2,636 | 48,207 | 107,930 | 107,930 | |

# Attachment 6
# LAT Performance, through June 2003, by WBS

| Cost Performance Report - Work Breakdown Structure | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor:<br>Location: | | | | | Contract Type/No: | | | Project Name/No:<br>GLAST LAT Project | | Report Period:<br>5/31/03 6/30/03 | | | |
| Quantity<br>1 | Negotiated Cost<br>0 | | Est. Cost Authorized Unpriced Work<br>0 | | Tgt. Profit/ Fee %<br>0 | 0 | Tgt. Price<br>0 | Est Price<br>0 | Share Ratio | Contract Ceiling<br>0 | Estimated Contract Ceiling<br>0 | | |
| CAPW[3] | Current Period | | | | | Cumulative to Date | | | | | At Completion | | |
| | Budgeted Cost | | Actual Cost | Variance | | Budgeted Cost | | Actual Cost | Variance | | | Latest | |
| Item | Work Scheduled | Work Performed | Work Performed | Schedule | Cost | Work Scheduled | Work Performed | Work Performed | Schedule | Cost | Budgeted | Revised Estimate | Variance |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| 4.1.1 INSTRUMENT MANAGEMENT | 326 | 326 | 382 | 0 | -56 | 8,197 | 8,197 | 8,227 | 0 | -30 | 15,357 | 15,357 | 0 |
| 4.1.2 SYSTEM ENGINEERING | 169 | 169 | 100 | 0 | 69 | 3,599 | 3,599 | 3,501 | 0 | 98 | 6,453 | 6,453 | 0 |
| 4.1.4 TRACKER | 163 | 270 | 1,145 | 107 | -875 | 8,946 | 8,381 | 8,460 | -565 | -78 | 10,915 | 10,915 | 0 |
| 4.1.5 CALORIMETER | 576 | 395 | 416 | -181 | -21 | 9,742 | 8,965 | 8,684 | -776 | 281 | 17,830 | 17,830 | 0 |
| 4.1.6 ANTICOINCIDENCE DETECTOR | 450 | 276 | 224 | -174 | 52 | 8,252 | 7,090 | 8,036 | -1,162 | -947 | 12,025 | 12,025 | 0 |
| 4.1.7 ELECTRONICS | 323 | 584 | 919 | 262 | -334 | 5,956 | 5,967 | 6,469 | 11 | -502 | 16,672 | 16,672 | 0 |
| 4.1.8 MECHANICAL SYSTEMS | 384 | 344 | -93 | -40 | 437 | 5,620 | 4,961 | 4,564 | -658 | 397 | 10,373 | 10,373 | 0 |
| 4.1.9 INTEGRATION & TEST | 78 | 164 | 99 | 85 | 65 | 2,002 | 1,972 | 1,950 | -29 | 22 | 6,588 | 6,588 | 0 |
| 4.1.A PERFORMANCE AND SAFETY ASSURA | 29 | 29 | 23 | 0 | 6 | 1,149 | 1,149 | 784 | 0 | 365 | 1,607 | 1,607 | 0 |
| 4.1.B LAT INSTRUMENT OPERATIONS CENTI | 33 | 30 | 0 | -2 | 30 | 639 | 549 | 263 | -90 | 286 | 2,512 | 2,512 | 0 |
| 4.1.C EDUCATION AND PUBLIC OUTREACH | 45 | 34 | 11 | -11 | 23 | 971 | 934 | 862 | -36 | 72 | 2,684 | 2,684 | 0 |
| 4.1.D SCIENCE ANALYSIS SOFTWARE | 70 | 107 | 52 | 37 | 55 | 1,502 | 1,478 | 1,276 | -24 | 201 | 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 | 2,646 | 2,729 | 3,277 | 83 | -548 | 57,895 | 54,564 | 54,402 | -3,331 | 162 | 107,930 | 107,930 | 0 |
| Contingency | | | | | | | | | | | 13,783 | 13,783 | |
| Total | 2,646 | 2,729 | 3,277 | 83 | -548 | 57,895 | 54,564 | 54,402 | -3,331 | 162 | 121,713 | 121,713 | |

## Attachment 7
## LAT Performance, through June 2003, by Organization

| Cost Performance Report - Organization | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contractor:<br>Location: | | | | | Contract Type/No: | | | Project Name/No:<br>GLAST LAT Project | | Report Period:<br>5/31/03 6/30/03 | | | |
| 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 | 0 | | |
| OBS | Current Period | | | | | Cumulative to Date | | | | | At Completion | | |
| | Budgeted Cost | | Actual Cost | Variance | | Budgeted Cost | | Actual Cost | Variance | | | Latest | |
| Item | Work Scheduled | Work Performed | Work Performed | Schedule | Cost | Work Scheduled | Work Performed | Work Performed | Schedule | Cost | Budgeted | Revised Estimate | Variance |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| DG *** GSFC | 478 | 304 | 267 | -174 | 37 | 9,593 | 8,431 | 9,051 | -1,162 | -621 | 14,573 | 14,573 | 0 |
| DH *** HEPL | 149 | 178 | 62 | 28 | 115 | 4,147 | 3,995 | 3,509 | -152 | 486 | 8,934 | 8,934 | 0 |
| DL *** SLAC | 1,182 | 1,524 | 2,341 | 342 | -817 | 28,540 | 27,384 | 28,415 | -1,156 | -1,031 | 54,517 | 54,517 | 0 |
| DN *** NRL | 741 | 638 | 522 | -103 | 116 | 12,808 | 12,004 | 10,826 | -804 | 1,178 | 24,300 | 24,300 | 0 |
| DO *** Financial Plan | 0 | 0 | 0 | 0 | 0 | 32 | 32 | 32 | 0 | 0 | 32 | 32 | |
| DS *** SSU | 45 | 34 | 11 | -11 | 23 | 967 | 932 | 862 | -35 | 70 | 2,609 | 2,609 | 0 |
| DT *** Texas A&M | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 15 | 0 | 0 | 16 | 16 | 0 |
| DU *** UCSC | 43 | 42 | 63 | -1 | -21 | 1,743 | 1,721 | 1,650 | -22 | 70 | 2,666 | 2,666 | 0 |
| DW *** UW | 8 | 8 | 11 | 0 | -3 | 50 | 50 | 40 | 0 | 10 | 283 | 283 | |
| Gen. and Admin. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Undist. Budget | | | | | | | | | | | 0 | 0 | 0 |
| Sub Total | 2,646 | 2,729 | 3,277 | 83 | -548 | 57,895 | 54,564 | 54,402 | -3,331 | 162 | 107,930 | 107,930 | 0 |
| Contingency | | | | | | | | | | | 13,783 | 13,783 | |
| Total | 2,646 | 2,729 | 3,277 | 83 | -548 | 57,895 | 54,564 | 54,402 | -3,331 | 162 | 121,713 | 121,713 | |

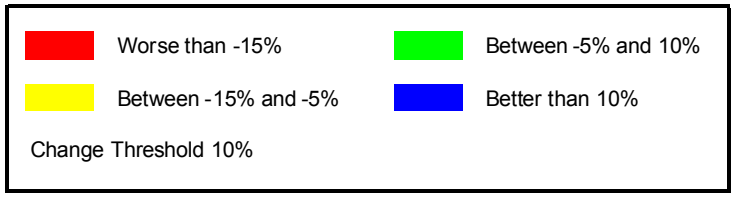
**Attachment 8**
**LAT Performance Analysis, June 2003**

| | WBS | BAC | BCWS | BCWP | ACWP | SV $ | CV $ | % BCWS | % BCWP | % ACWP | SV Trend | CV Trend | SPI | CPI | Cpi_Fcst | CpiSpi_Fcst |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.1 | 107,930 | 57,895 | 54,564 | 54,402 | -3,331 | 162 | 53.64 | 50.55 | 50.40 | ↔ | ↓ | 0.942 | 1.003 | 107,610 | 110,858 |
| 2 | 4.1.1 | 15,357 | 8,197 | 8,197 | 8,227 | 0 | -30 | 53.38 | 53.38 | 53.57 | ↔ | ↓ | 1.000 | 0.996 | 15,414 | 15,414 |
| 3 | 4.1.2 | 6,453 | 3,599 | 3,599 | 3,501 | 0 | 98 | 55.77 | 55.77 | 54.25 | ↔ | ↑ | 1.000 | 1.028 | 6,277 | 6,277 |
| 4 | 4.1.4 | 10,915 | 8,946 | 8,381 | 8,460 | -565 | -78 | 81.96 | 76.79 | 77.50 | ↑ | ↓ | 0.937 | 0.991 | 11,017 | 11,190 |
| 5 | 4.1.5 | 17,830 | 9,742 | 8,965 | 8,684 | -776 | 281 | 54.64 | 50.28 | 48.71 | ↓ | ↓ | 0.920 | 1.032 | 17,271 | 18,014 |
| 6 | 4.1.6 | 12,025 | 8,252 | 7,090 | 8,036 | -1,162 | -947 | 68.63 | 58.96 | 66.83 | ↓ | ↔ | 0.859 | 0.882 | 13,630 | 14,548 |
| 7 | 4.1.7 | 16,672 | 5,956 | 5,967 | 6,469 | 11 | -502 | 35.72 | 35.79 | 38.80 | ↑ | ↓ | 1.002 | 0.922 | 18,075 | 18,054 |
| 8 | 4.1.8 | 10,373 | 5,620 | 4,961 | 4,564 | -658 | 397 | 54.18 | 47.83 | 44.00 | ↔ | ↑ | 0.883 | 1.087 | 9,543 | 10,203 |
| 9 | 4.1.9 | 6,588 | 2,002 | 1,972 | 1,950 | -29 | 22 | 30.39 | 29.94 | 29.61 | ↑ | ↑ | 0.985 | 1.011 | 6,514 | 6,583 |
| 10 | 4.1.A | 1,607 | 1,149 | 1,149 | 784 | 0 | 365 | 71.52 | 71.52 | 48.78 | ↔ | ↔ | 1.000 | 1.466 | 1,096 | 1,096 |
| 11 | 4.1.B | 2,512 | 639 | 549 | 263 | -90 | 286 | 25.45 | 21.87 | 10.48 | ↔ | ↔ | 0.859 | 2.086 | 1,204 | 1,358 |
| 12 | 4.1.C | 2,684 | 971 | 934 | 862 | -36 | 72 | 36.16 | 34.81 | 32.12 | ↓ | ↑ | 0.963 | 1.084 | 2,476 | 2,539 |
| 13 | 4.1.D | 3,595 | 1,502 | 1,478 | 1,276 | -24 | 201 | 41.78 | 41.10 | 35.50 | ↑ | ↑ | 0.984 | 1.158 | 3,106 | 3,136 |
| 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 |

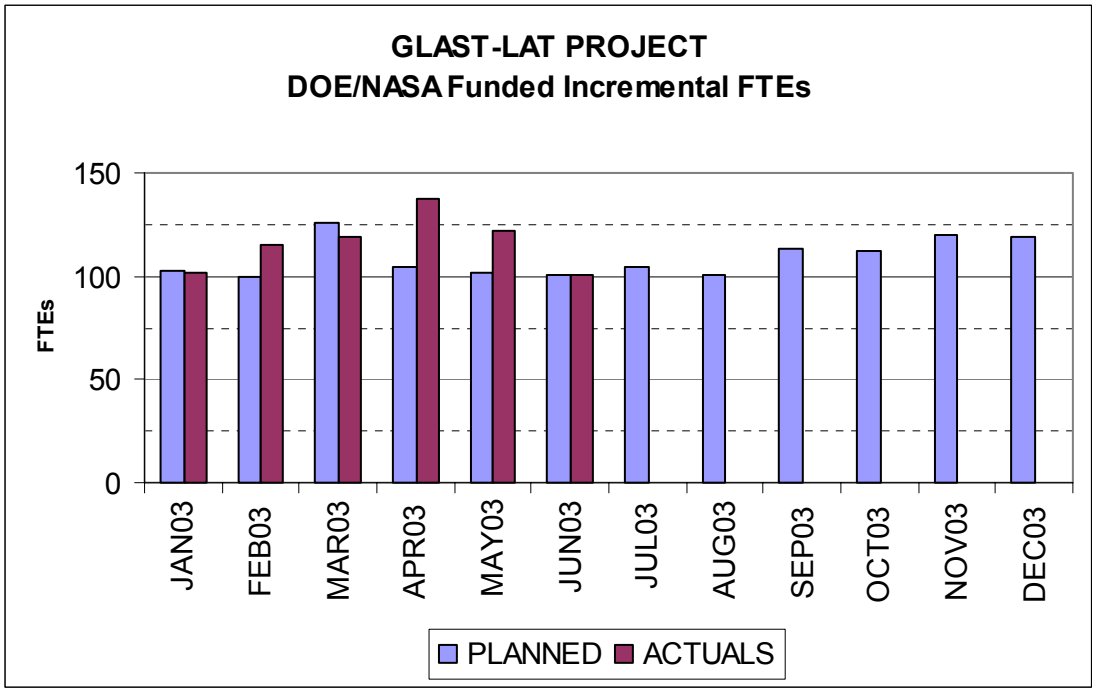
## LEGEND

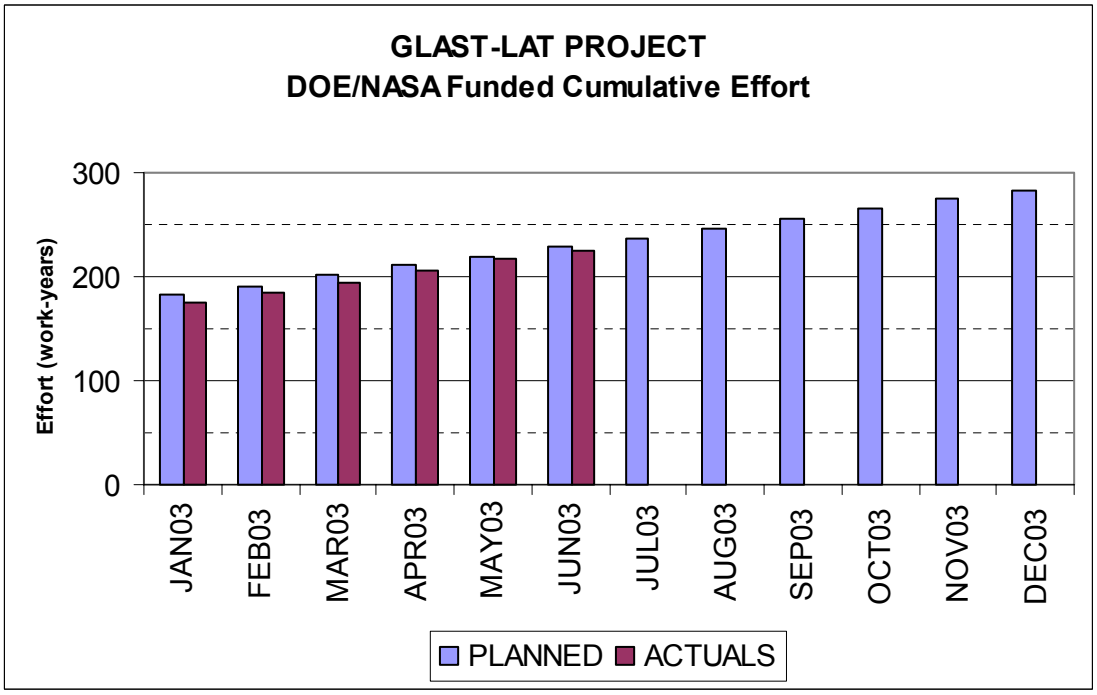
BAC: Budget At CompleteSV $: Schedule Variance = BCWP - BCWS% BCWS: Percent Scheduled = BCWS/BAC
BCWS: Budgeted Cost of Work Scheduled (to date)CV $: Cost Variance = BCWP - ACWP% BCWP: Percent Complete = BCWP/BAC
BCWP: Budgeted Cost of Work Performed (to date)SPI: Schedule Performance Index = BCWP/BCWS% 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)



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



# Attachment 10
# LAT Manpower Data, through June 2003, by Organization

| Program: | Description: | Approval: |
|---|---|---|
| LAT3 | GLAST LAT Project | Program Manager |
| Run Date: | Status Date: | Functional Manager |
| 7/24/03 | 6/30/03 | Cost Account Manager |

| CAPW[3] | | PRIOR | JAN03 | FEB03 | MAR03 | APR03 | MAY03 | JUN03 | **Cum-to Date** | JUL03 | AUG03 | SEP03 | OCT03 | NOV03 | DEC03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.1.1 INSTRUMENT MANAGEMENT | | | | | | | | | | | | | | | |
| FTE | PLANNED | 239.9 | 11.1 | 4.8 | 47.5 | 18.1 | 18.0 | 16.7 | **356.1** | 16.8 | 16.8 | 16.8 | 15.0 | 15.0 | 15.0 |
| | ACTUALS | 236.6 | 11.8 | 13.9 | 36.7 | 15.5 | 15.4 | 13.5 | **343.3** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.2 SYSTEM ENGINEERING | | | | | | | | | | | | | | | |
| FTE | PLANNED | 43.3 | 1.8 | 1.9 | -6.1 | 1.6 | 1.6 | 1.6 | **45.6** | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.8 |
| | ACTUALS | 30.1 | 1.2 | 1.4 | 2.0 | 1.7 | 1.2 | 1.1 | **38.7** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.4 TRACKER | | | | | | | | | | | | | | | |
| FTE | PLANNED | 584.0 | 26.1 | 26.6 | 15.3 | 28.3 | 28.1 | 19.9 | **728.2** | 17.6 | 18.5 | 20.5 | 21.2 | 20.7 | 20.5 |
| | ACTUALS | 546.6 | 21.4 | 22.9 | 18.9 | 24.1 | 25.6 | 23.9 | **683.4** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.5 CALORIMETER | | | | | | | | | | | | | | | |
| FTE | PLANNED | 1135.7 | 48.5 | 49.2 | 45.0 | 43.3 | 44.0 | 51.8 | **1417.5** | 52.4 | 48.7 | 50.7 | 55.5 | 67.3 | 57.0 |
| | ACTUALS | 367.7 | 16.0 | 16.5 | 18.1 | 17.2 | 21.4 | 24.6 | **481.4** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.6 ANTICOINCIDENCE DETECTOR | | | | | | | | | | | | | | | |
| FTE | PLANNED | 371.6 | 19.5 | 18.3 | 53.2 | 23.3 | 20.6 | 20.3 | **526.7** | 15.5 | 16.4 | 19.8 | 19.0 | 16.7 | 17.6 |
| | ACTUALS | 372.3 | 30.3 | 27.2 | 29.4 | 42.3 | 29.0 | 12.6 | **543.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.7 ELECTRONICS | | | | | | | | | | | | | | | |
| FTE | PLANNED | 282.7 | 19.1 | 21.1 | 16.1 | 18.6 | 18.5 | 17.9 | **394.1** | 17.9 | 13.7 | 21.6 | 21.3 | 20.8 | 18.4 |
| | ACTUALS | 291.4 | 13.6 | 18.6 | 22.2 | 25.1 | 20.0 | 19.2 | **410.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.8 MECHANICAL SYSTEMS | | | | | | | | | | | | | | | |
| FTE | PLANNED | 162.7 | 8.4 | 7.8 | -4.9 | 8.1 | 6.5 | 4.0 | **192.7** | 4.6 | 5.3 | 6.9 | 6.2 | 4.6 | 5.6 |
| | ACTUALS | 118.1 | 9.5 | 10.6 | -7.3 | 7.8 | 8.5 | 6.9 | **154.1** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.9 INSTRUMENT INTEGRATION AND TESTING | | | | | | | | | | | | | | | |
| FTE | PLANNED | 120.3 | 10.2 | 7.5 | 8.3 | 9.8 | 9.5 | 7.0 | **172.6** | 13.8 | 16.2 | 13.8 | 12.7 | 14.0 | 13.3 |
| | ACTUALS | 108.4 | 8.2 | 11.4 | 10.3 | 9.8 | 9.8 | 8.0 | **165.9** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.A PERFORMANCE AND SAFETY ASSURANCE | | | | | | | | | | | | | | | |
| FTE | PLANNED | 59.8 | 2.6 | 2.6 | -7.0 | 0.9 | 0.9 | 0.9 | **60.6** | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| | ACTUALS | 47.7 | 2.0 | 2.1 | -4.0 | 1.0 | 0.7 | 1.1 | **50.6** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.B LAT INSTRUMENT OPERATIONS CENTER | | | | | | | | | | | | | | | |
| FTE | PLANNED | 29.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | **43.1** | 2.2 | 2.2 | 1.9 | 1.8 | 1.8 | 2.2 |
| | ACTUALS | 24.5 | -1.8 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | **22.8** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.C EDUCATION AND PUBLIC OUTREACH | | | | | | | | | | | | | | | |
| FTE | PLANNED | 49.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.9 | 2.9 | **63.2** | 2.9 | 2.9 | 2.9 | 2.3 | 2.4 | 2.4 |
| | ACTUALS | 55.9 | 1.7 | 2.3 | 4.5 | 4.3 | 3.3 | 1.3 | **73.3** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1.D SCIENCE ANALYSIS SOFTWARE | | | | | | | | | | | | | | | |
| FTE | PLANNED | 378.0 | 20.2 | 25.0 | 24.7 | 24.7 | 24.7 | 24.5 | **521.8** | 24.1 | 23.0 | 22.6 | 26.7 | 26.8 | 24.5 |
| | ACTUALS | 216.4 | 11.5 | 11.6 | 12.1 | 11.5 | 10.7 | 11.5 | **285.4** | 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 | **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 | 0.0 | **75.3** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Grand Totals: | | | | | | | | | | | | | | | |
| | PLANNED | 3568.7 | 171.9 | 168.8 | 196.4 | 180.7 | 177.7 | 169.7 | **4634.0** | 170.2 | 166.2 | 180.1 | 184.1 | 192.4 | 179.1 |
| | ACTUALS | 2490.8 | 125.6 | 138.6 | 142.8 | 160.2 | 145.6 | 123.6 | **3327.1** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |