



GLAST Large Area Telescope:

Joint Oversight Group

February 27, 2004

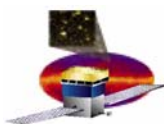
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650-926-2726



Instrument Status

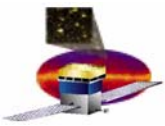
- All subsystems have begun flight production
- Flight Grid and First Flight Calorimeter & Tracker modules in Integration and Test by the end of July
- All known technical issues have an identified closure path
- The staff has been strengthened in key positions
- The schedule is very tight with all subsystems near the critical path
- Budget in FY04 is very tight
 - The project will need to draw on the Stanford University backstop funding
- The over all contingency for the fabrication phase is an acceptable 28 % of the cost to go
- The project has 9 weeks of schedule float to ready to integrate with the spacecraft (December 1, 2005)



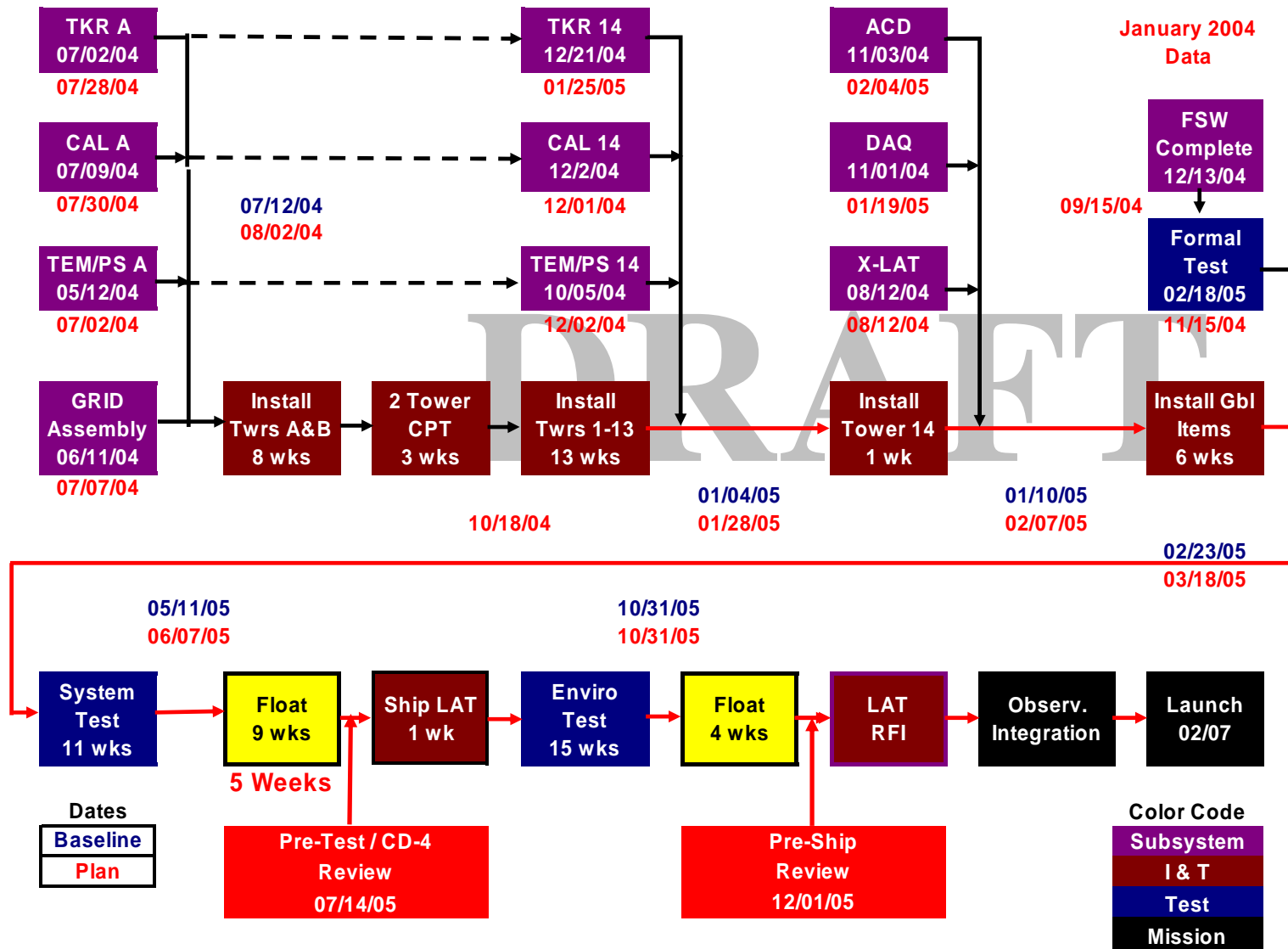
Level 1 and Level 2 Milestones

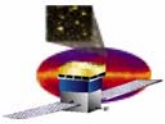
	Milestone	Plan	Float
Level 1 Milestones – DOE/NASA Joint Oversight Group			
DOE Critical Decision (CD) 0 Approval	June 25, 2001	June 25, 2001	Actual
CD-1 Approval	July 23, 2002	July 23, 2002	Actual
CD-2 Approval	November 8, 2002	November 8, 2002	Actual
CD-3 Approval	August 31, 2003	August 31, 2003	Actual
Flight Grid Complete	September 15, 2004	July 22, 2004	8 weeks
CD-4 Approval	March 15, 2006	June 7, 2005*	40 weeks
Level 2 Milestones – Federal Project Managers			
Launch Balloon Flight	August 1, 2001	August 1, 2001	Actual
Instrument Preliminary Design Review	January 8, 2002	January 8, 2002	Actual
Instrument Critical Design Review	May 16, 2003	May 16, 2003	Actual
Start LAT Integration	August 24, 2004	August 2, 2004	3 weeks
Pre Environmental Test Review	July 14, 2005	June 7, 2005	5 weeks
Instrument Pre-Ship Review	December 1, 2005	October 1, 2005	9 weeks

* The CD-4 Review is planned for June 7, 2005 and the CD-4 Approval will occur after validation by DOE.



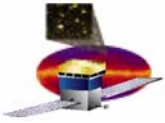
LAT Schedule





Subsystem Status

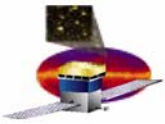
- **Calorimeter**
 - Thorough testing of Engineering Model
 - Flight CDEs, composite structure, aluminum parts, and electronics being fabricated
- **Tracker**
 - Mid-tray structures started
 - Titanium parts for bottom tray on critical path
 - Design complete
 - MCMs approved for production at Teledyne
 - ASICs tested and ready for MCMs
 - Silicon ladder production 75% complete
- **Mechanical**
 - GRID being machined
 - Thermal components in manufacture



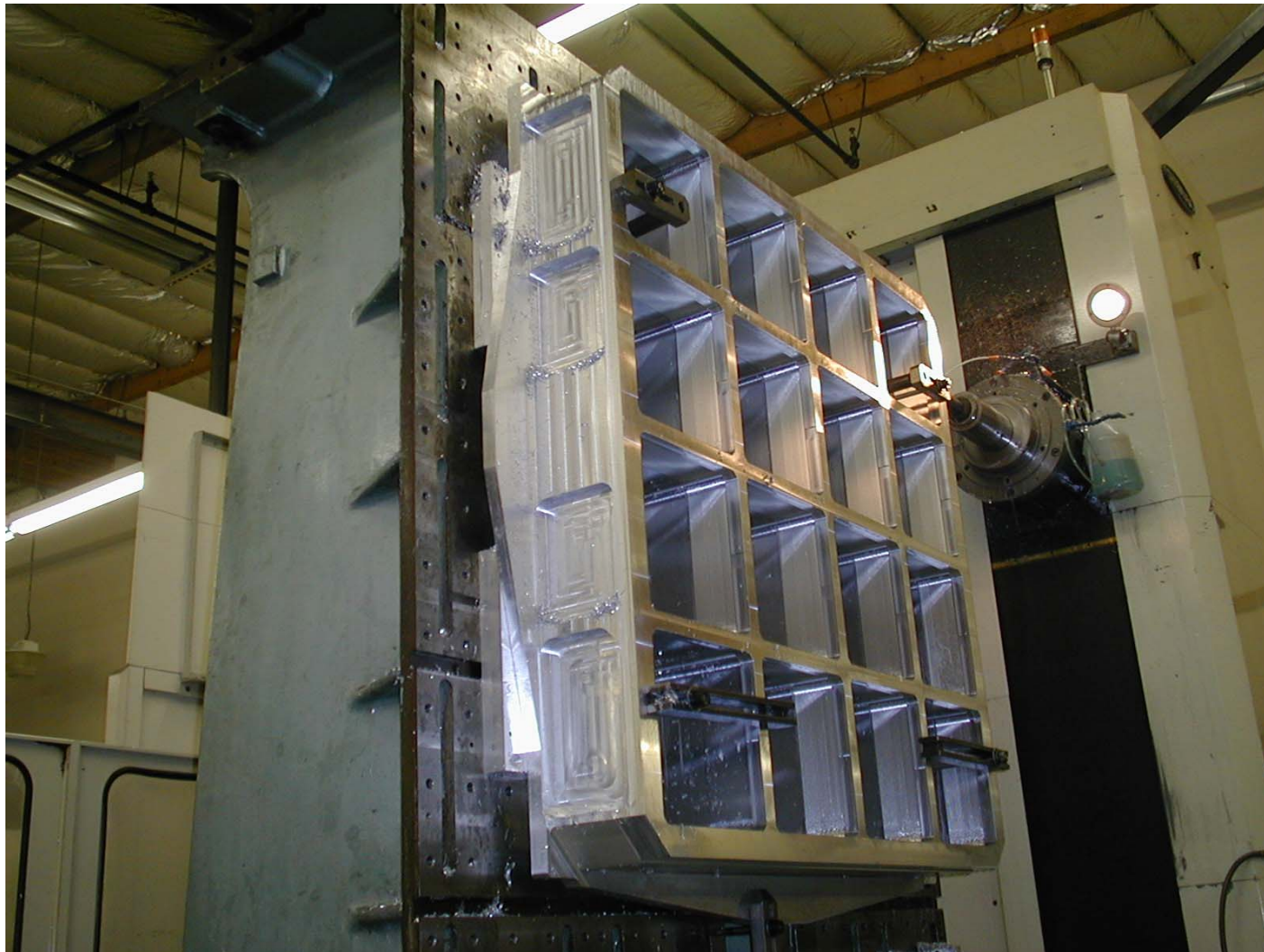
Subsystem Status (2)

- **Anticoincidence Detector**
- **Data Acquisition System**
- **Instrument Science Operations Center**
- **Science Analysis Software**

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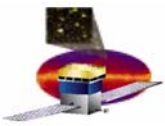
GRID in machining



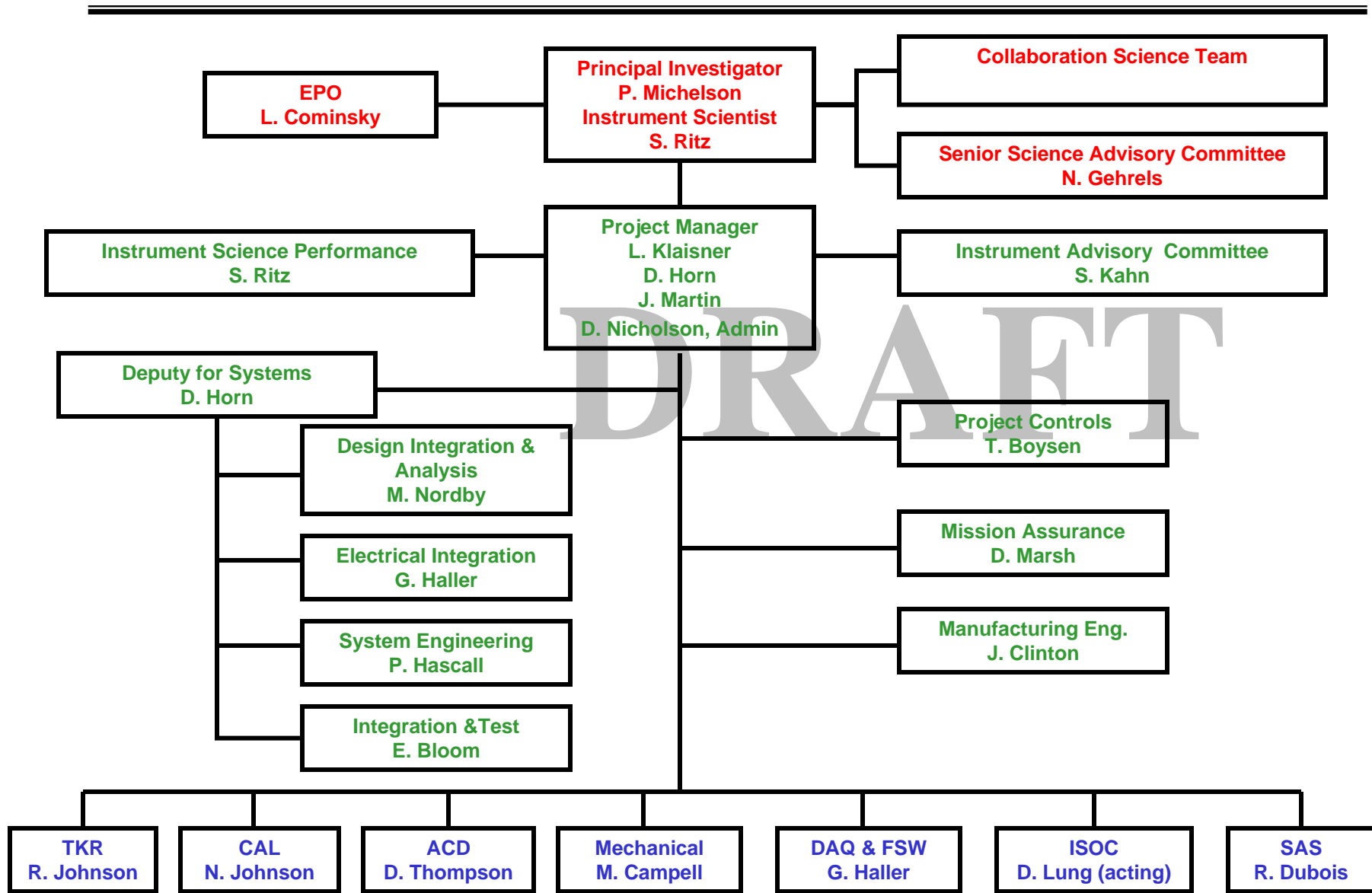


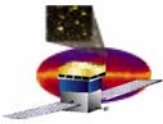
Issues

- **Technical issues**
 - **Tracker interface to GRID – EM Vibration Test Anomaly**
 - Drawings complete
 - Validation plan in development
 - **ACD Photomultiplier Tube Breakage**
 - Replace Mumetal with nickel plating
 - Change potting material from urethane to silicon rubber
 - Design in test
- **Programmatic issues**
 - **Start fabrication and qualify first articles**
 - Schedule is tight
 - **Uncertainty in Japanese funding in FY04**
 - Plan has \$1M funding



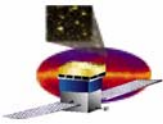
LAT Organization Chart





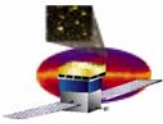
CPR Level 3

Cost Performance Report - Work Breakdown Structure													
Contractor: Location:						Contract Type/No:			Project Name/No: LAT Project		Report Period: 12/31/2003 1/31/2004		
CAPW[3] Item (1)	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost Work Performed (4)	Variance		Budgeted Cost		Actual Cost Work Performed (9)	Variance		Budgeted (12)	Latest Revised Estimate (13)	Variance (14)
	Work Scheduled (2)	Work Performed (3)		Schedule (5)	Cost (6)	Work Scheduled (7)	Work Performed (8)		Schedule (10)	Cost (11)			
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4.1.1 INSTRUMENT MANAGEMENT	347	347	278	0	68	10,578	10,578	10,526	0	53	15,617	15,617	0
4.1.2 SYSTEM ENGINEERING	25	25	85	0	-60	4,393	4,393	4,248	0	145	6,588	6,588	0
4.1.4 TRACKER	391	94	388	-297	-294	10,870	10,548	10,865	-322	-317	14,333	14,333	0
4.1.5 CALORIMETER	685	504	837	-181	-334	14,537	14,040	12,778	-497	1,262	22,648	22,648	0
4.1.6 ANTICOINCIDENCE DETECTOR	663	542	952	-122	-410	11,403	11,026	10,477	-376	549	14,020	14,020	0
4.1.7 ELECTRONICS	982	887	670	-94	218	9,399	9,997	10,595	598	-598	20,195	20,195	0
4.1.8 MECHANICAL SYSTEMS	384	400	281	16	118	7,229	7,014	7,045	-215	-31	13,362	13,362	0
4.1.9 INTEGRATION & TEST	130	129	151	-1	-21	2,885	2,876	2,827	-9	50	6,907	6,907	0
4.1.A PERFORMANCE AND SAFETY ASSURANCE	209	209	55	0	153	1,314	1,314	1,068	0	246	2,459	2,459	0
4.1.B LAT INSTRUMENT OPERATIONS CENTER	3	3	0	0	3	269	269	278	0	-10	326	326	0
4.1.C EDUCATION AND PUBLIC OUTREACH	70	10	98	-61	-88	1,374	1,377	1,199	3	178	2,448	2,448	0
4.1.D SCIENCE ANALYSIS SOFTWARE	73	73	113	0	-39	1,821	1,821	1,760	0	61	3,220	3,220	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	3,961	3,222	3,908	-740	-686	77,394	76,574	74,989	-820	1,585	123,444	123,444	0
Contingency											13,386	13,386	0
Total	3,961	3,222	3,908	-740	-686	77,394	76,574	74,989	-820	1,585	136,830	136,830	0



History of Cost Estimate

WBS	Item	LAT Project Baseline			Baseline Change	
		May-02	Mar-03	Jan-04	May-02 to Jan-04	
	4.1 LAT Budget at Completion	\$99,973	\$107,462	\$123,444	\$23,471	23.5%
4.1.1	Instrument Management	11,602	15,357	15,617	4,015	34.6%
4.1.2	System Engineering	4,647	6,453	6,588	1,941	41.8%
4.1.4	Tracker	9,877	10,915	14,333	4,456	45.1%
4.1.5	Calorimeter	17,348	17,830	22,648	5,300	30.6%
4.1.6	Anticoincidence Detector	10,280	11,557	14,020	3,740	36.4%
4.1.7	Electronics, Data Acquisition, Flight Software	15,738	16,672	20,195	4,457	28.3%
4.1.8	Mechanical Systems	11,850	10,373	13,362	1,512	12.8%
4.1.9	Integration & Test	6,654	6,588	6,907	254	3.8%
4.1.A	Performance & Safety Assurance	2,180	1,607	2,459	279	12.8%
4.1.B	Instrument Science Operations Center	2,552	2,512	326	(2,226)	-87.2%
4.1.C	Education & Public Outreach	2,598	2,684	2,448	(150)	-5.8%
4.1.D	Science Analysis Software	3,328	3,595	3,220	(108)	-3.3%
4.1.E	Suborbital Flight Test	1,321	1,321	1,321	0	0.0%
	4.1 Budget at Completion	\$99,973	\$107,462	\$123,444	\$23,470	23.5%
	NASA	67,818	72,577	84,037	16,219	23.9%
	DOE	31,156	33,499	38,213	7,057	22.7%
	Japan	1,000	1,387	1,194	194	19.4%
	4.1 Contingency	\$21,266	\$14,251	\$13,386	(\$7,880)	-37.1%
	NASA	15,422	10,749	9,599	(5,823)	-37.8%
	DOE	5,844	3,501	3,787	(2,057)	-35.2%
	Japan	0	0	0	0	0.0%
	Contingency as % of Cost to Go	29%	24%	29%		
	4.1 Total Estimated Cost	\$121,240	\$121,713	\$136,830	\$15,590	12.9%
	NASA	83,240	83,326	93,636	10,396	12.5%
	DOE	37,000	37,000	42,000	5,000	13.5%
	Japan	1,000	1,387	1,194	194	19.4%

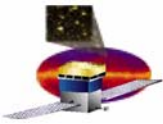


GLAST Mission Office Support

- **GLAST Mission Contingency was applied to the LAT budget in the following areas**

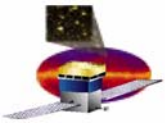
– Additional Integration and Test Manpower	\$ 523K
– Strengthen staff in Italy supporting INFN	\$ 738K
– Additional Quality Assurance Manpower	\$ 973K
– Additional Flight Software Manpower	\$ 747K
Total	\$2,981K

- **Also, the Mission Office has provided technical support**
 - Thermal Engineering
 - EMI/EMC Engineering
 - Tracker and ACD Management
 - Mechanical Analysis



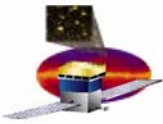
LAT Funding (K\$)

AS OF 5/30/02	FY00	FY01	FY02	FY03	FY04	FY05	FAB TOTAL	COMMENTS
D DOE	3,000	5,689	8,080	8,910	7,900	3,421	37,000	
J Japan Funding	0	0	0	0	1,000	0	1,000	Funding available 3/04
N NASA	3,863	3,847	13,137	20,917	25,803	15,673	83,240	
Grand Totals:	6,863	9,536	21,217	29,827	34,703	19,094	121,240	
DOE ADJUSTMENTS								
				-120		120	0	General Reduction 3/03
				120		-120	0	Funding restored 8/03
						5,000	5,000	Funding increase 8/03 per Valle ESAAB presentation - rebaseline
							0	
							0	
total	0	0	0	0	0	5,000	5,000	
JAPAN ADJUSTMENTS								
						387	387	Add'l US-purchased SSD's; funding available 3/05
						-193	-193	SSDs to be paid for by Japan 7/30/03
							0	
total	0	0	0	0	0	194	194	
NASA ADJUSTMENTS								
				36	25	25	86	EPO increase - Telescope Network & EIT req'ts
				3,761	-3,761		0	Radiators, SSDs, CPUs & EM2 parts procurement move forward (CRs 1159 & 1319).
				1,800			1,800	Funding increase 8/03 - rebaseline
					3,000	1,900	4,900	Funding increase 8/03 per Valle ESAAB presentation - rebaseline
					612	17	629	Flight Software Budget Increase 11/03
					2,981			PSA/FSW/I&T/Tracker
total	0	0	0	5,597	2,857	1,942	7,415	
CURRENT FUNDING								
D DOE	3,000	5,689	8,080	8,910	7,900	8,421	42,000	
J Japan Funding	0	0	0	0	1,000	194	1,194	
N NASA	3,863	3,847	13,137	26,514	28,660	17,615	93,636	
total	6,863	9,536	21,217	35,424	37,560	26,230	136,830	



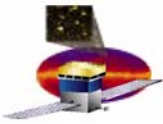
Lien List -- February

	FY04	FY05	Total Fab
Proposed in February	454	583	1,037
Contingency	454	583	1,037
<i>4.1.1 Management</i>	29		29
HEPL Subaward Indirect Cost	29		29
<i>4.1.4 Tracker</i>	297	19	316
Tracker-Grid Interface Redesign	297	19	316
<i>4.1.5 Calorimeter</i>	-546		-546
CDE Cost Reduction	-546		-546
<i>4.1.8 Mech Sys</i>	-74	128	54
Grid Assy/TCS Replan	-74	128	54
<i>4.1.9 I&T</i>	152	132	284
IFCT Engineering/Design	152	132	284
<i>4.1.E</i>	4		4
Close out Balloon Flight WBS	4		4
<i>Several</i>	592	304	896
SLAC Security Charge	108	42	150
Stanford Benefits Rate Increase	484	262	746



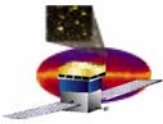
Lien List – Near Term

	FY04	FY05	Total Fab
Pending - Near Term	1,842	-148	1,694
Contingency	1,171	180	1,351
4.1.4 Tracker	504		504
MCM Production	200		200
Tracker QA @Teledyne	135		135
Parts for TCMs & Flex Cables	48		48
Parts for Bias Circuits	121		121
4.1.7 Electronics	1,245		1,245
Additional ACTEL parts	70		70
Front-End Simulator	330		330
TEM EM	400		400
LCB EM	185		185
GASU Board EM	260		260
4.1.8 Mech Sys	-800		-800
Lockheed Martin Phase II	-800		-800
4.1.9 I&T	132		132
Add'l Items for MGSE	132		132
4.1.A PSA	90	180	270
Extend INFN Support thru Last Delivery	90	180	270
NASA Funding Change	671	-328	343
4.1.6 ACD	1,193		1,193
PMT Anomaly	377		377
ASIC Delay	400		400
TSA repair/analysis	195		195
HVBS capacitor failure/analysis/recovery	221		221
4.1.7 Electronics	94		94
ISIS	94		94
4.1.C E/PO	29		29
Add'l Flashlights, Stickers, etc.	29		29
Several	-645	-328	-973
Discontinue GSFC MPS Budget	-645	-328	-973



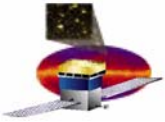
Lien List -- Future

	FY04	FY05	Total Fab
Pending - Future	500	2,323	2,823
Contingency	500	2,323	2,823
4.1.4 Tracker		360	360
Continued Support at INFN		360	360
4.1.5 Calorimeter	-100		-100
Thermal Vac Cycle Reduction	-100		-100
4.1.7 Electronics		685	685
Continued FSW Manpower Increase		685	685
4.1.9 I&T		408	408
Continued I&T Manpower Increase		408	408
4.1.A PSA		870	870
Continued QA Support		870	870
Several	600		600
Japanese Funding Shortfall	600		600



Contingency Analysis

	Current Baseline	CCBs in	With CCBs
	January 04 Costs	progress	March Projections
Fabrication Project			
Funding	\$136,830	\$343	\$137,173
Estimate at complete	\$123,444	\$2,651	\$126,095
Work Performed	\$76,574	\$6,744	\$83,318
Cost to Go	\$46,870		\$42,777
Percent complete	62%		66%
Contingency	\$13,386		\$11,078
Contingency/ Cost to Go	29%		26%
Available Funds at the End of FY04			
Funding	\$110,600	\$671	\$111,271
Estimated Cost	\$110,637	\$1,073	\$111,710
Difference	-\$37		-\$439



Summary

- Project is fabricating flight hardware
 - Currently in the startup phase for flight hardware
- GLAST Mission office has applied mission contingency
- FY04 budget is very tight
 - More room in FY05
- Schedule is tight
 - 9 weeks contingency to LAT RFI (on 22 months)
- Adequate float to Level 1 and Level 2 milestones

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