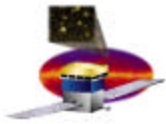


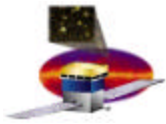
Schedule & Budget

Gunther Haller
Stanford Linear Accelerator Center



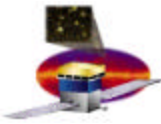
Organization (1)

- **Includes T&DF, Power System, Flight Software**
- **Overall Organization for Modules**
 - **System Architecture**
 - **Boards**
 - **Enclosures**
 - **Assembly & Qualification**
 - **Install & Test**
- **Components organized in**
 - **Pre-Engineering Model**
 - **Engineering Model 1**
 - **Engineering Model 2**
 - **Qualification Model**
 - **Flight Model**



Organization (2)

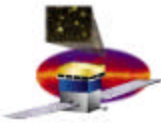
- Each of the engineering modules scheduled as
 - Requirements
 - Conceptual Design
 - Preliminary Design
 - Layout
 - Fabrication
 - Assembly
 - Standalone Test
 - System Test
- Entire Schedule on PDR web page



TEM Example (1)

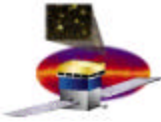
Activity ID	Activity Description	Orig Dur	EFFD	PMT	% Comp	Early Start	Early Finish	Budgeted Cost	FY01	FY02	FY03	FY04	FY05	FY06
4 GLAST INSTRUMENTS														
4.1 GLAST LAT PROJECT (DRAFT)														
Subtotal		660	486		1	17APR01A	11DEC03	1,221,948.54						
4.1.7 ELECTRONICS														
Subtotal		660	486		1	17APR01A	11DEC03	1,221,948.54						
4.1.7.4 DATAFLOW ELECTRONICS (TEMs + PROCESSOR FARM)														
Subtotal		660	486		1	17APR01A	11DEC03	1,221,948.54						
4.1.7.4.3 TKRICAL TEM ELECTRONICS														
Subtotal		660	486		1	17APR01A	11DEC03	1,221,948.54						
4.1.7.4.3.1 PRE ENGINEERING MODEL														
Subtotal		253	75		19	17APR01A	24APR02	52,273.01						
4.1.7.4.3.1.1 DESIGN														
7E4310000	ND: Front End System Interface Defined	0	0		100		16APR01A	0.00						
7E4310000	Produce Preliminary Interface Document	3	3	E	100	17APR01A	19APR01A	1,676.64						
7E43100020	Produce Conceptual Design	10	5	E	100	20APR01A	05JUL01	2,794.40						
7E43100040	Produce Preliminary Design	70	15	E	50	11MAY01A	30AUG01	8,363.20						
7E43100030	Produce Conceptual Design Document	5	2	E	100	06JUL01	12JUL01	1,117.76						
7E43100060	Simulate Board	10	5	E	0	31AUG01	14SEP01	2,794.40						
4.1.7.4.3.1.2 FAB, ASSEMBLY & TEST														
7E43100100	Assemble Test-setup	5	5	E	0	17SEP01	21SEP01	2,130.40						
7E43120010	Procure Test Equipment	5	0	E	0	17SEP01	21SEP01	10,370.08						
7E43100070	Layout	10	10	E	0	17SEP01	28SEP01	4,260.80						
7E43100090	Procure Parts	15	0	E	0	17SEP01	05OCT01	2,253.33						
7E43120020	Assemble PCB	10	5	E	0	01OCT01	12OCT01	1,758.00						
7E43100080	Fabricate PCB	15	0	E	0	01OCT01	19OCT01	2,280.00						
7E43120030	ND: Test Software	0	0		0		12OCT01	0.00						
7E43100110	Test	20	10	E	0	22OCT01	16NOV01	4,981.60						
7E43100120	Test Sub-Systems	20	15	E	0	28MAR02	24APR02	7,472.40						
7E43120000	AV: Deliver Pre Engr Model to Front End Sys	0	0		0		24APR02	0.00						
7E43120100	ND: CAL Elex	0	0		0		24APR02	0.00						
7E43120110	ND: TKR Elex	0	0		0		24APR02	0.00						

<p>© Primavera Systems, Inc.</p>	Early Bar Progress Bar Critical Activity	LT-60 CAR WMF WBS 07AUG01 16:37	<table border="1"> <tr> <th>Date</th> <th>Revision</th> <th>Checked</th> <th>Approved</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	Date	Revision	Checked	Approved																
	Date	Revision	Checked	Approved																			



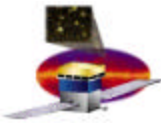
TEM Example (2)

Activity ID	Activity Description	Orig Dur	EFFD	PMT	% Comp	Early Start	Early Finish	Budgeted Cost	Fiscal Year					
									FY01	FY02	FY03	FY04	FY05	FY06
4.1.7.4.3.2 ENGINEERING MODEL 1														
Subtotal		105	104		0	25APR02	23SEP02	95,461.12						
4.1.7.4.3.2.1 CONCEPTUAL DESIGN														
7E74311000	ND: Front End System Interface Defined	0	0		0		24APR02	0.00						
7E20000480	Update Preliminary Interface Document	1	1	E	0	25APR02	25APR02	592.40						
7E20000500	Design blocks	5	5	E	0	26APR02	02MAY02	2,962.00						
7E20000510	Produce Conceptual Design Document	2	2	E	0	03MAY02	06MAY02	1,184.80						
7E20000620	Interim Parts Evaluation and Selection	3	3	E	0	07MAY02	09MAY02	1,777.20						
7E20000530	Complete Conceptual Design	0	0		0		09MAY02	0.00						
4.1.7.4.3.2.2 PRELIMINARY DESIGN														
7E20000540	Design Board Schematics	5	5	E	0	10MAY02	16MAY02	2,962.00						
7E20000550	Design/Simulate blocks VHDL	5	5	E	0	10MAY02	16MAY02	2,962.00						
7E20000585	Engineer Thermal & Mechanical	5	5	E	0	10MAY02	16MAY02	2,962.00						
7E20000590	Produce Preliminary Design Documents	8	4	E	0	10MAY02	21MAY02	2,369.60						
7E20000570	Synthesis FPGA's	3	3	E	0	17MAY02	21MAY02	1,777.20						
7E20000680	Simulate Board	5	5	E	0	22MAY02	29MAY02	2,962.00						
7E20000610	Review EM1 preliminary design	1	1	E	0	30MAY02	30MAY02	592.40						
4.1.7.4.3.2.3 FAB/ASSEMBLYTEST														
7E20000660	PR for Procure Parts	1	0	E	0	31MAY02	31MAY02	13,680.00						
7E43230000	Procure Equipment	1	0	E	0	31MAY02	31MAY02	17,100.00						
7E20000680	Assemble Test-setup	3	1	E	0	31MAY02	04JUN02	451.68						
7E20000690	Software for Test-Setup	5	5	E	0	31MAY02	06JUN02	2,387.60						
7E20000630	Layout Board	10	10	E	0	31MAY02	13JUN02	4,516.80						
7E20000780	Thermal & Mechanical Engineering	20	8	E	0	31MAY02	27JUN02	5,018.24						
7E20000650	Fabricate PCB	10	0	E	0	14JUN02	27JUN02	5,700.00						
7E43230000	Receive Procure Parts	1	0	E	0	12JUL02	12JUL02	0.00						
7E43230010	Assemble PCB	5	5	E	0	15JUL02	19JUL02	1,758.00						
7E43230020	ND: Test Software	0	0		0		19JUL02	0.00						
7E20000710	Test w Simulator/Electrical/Mechanical/Thermal	10	10	E	0	22JUL02	02AUG02	5,924.00						
7E20000740	Test with DAQ Electronics	10	10	E	0	05AUG02	16AUG02	5,924.00						
7E20000760	Test with Subsystem Electronics	15	15	E	0	19AUG02	09SEP02	9,304.80						
7E20000790	Review Eng. Model 1	1	1	E	0	10SEP02	10SEP02	592.40						
7E43300000	AV: EM1 Available to Subsystems	0	0		0		10SEP02	0.00						
7E43230100	ND: CAL EM1 Elex	0	0		0		23SEP02	0.00						
7E43230110	ND: TKR EM1 Elex	0	0		0		23SEP02	0.00						
4.1.7.4.3.3 ENGINEERING MODEL 2														
Subtotal		157	126		0	11SEP02	02MAY03	136,338.77						
4.1.7.4.3.3.1 PRELIMINARY DESIGN														
7E43310000	Update Part Selection	1	1	E	0	11SEP02	11SEP02	592.40						



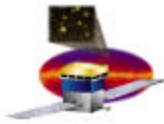
TEM Example (3)

Activity ID	Activity Description	Orig Dur	EFFD	PMT	% Comp	Early Start	Early Finish	Budgeted Cost	FY01	FY02	FY03	FY04	FY05	FY06
7E2000820	Modify blocks	5	5	E	0	11SEP02	17SEP02	2,962.00						
7E2000830	Synthesis into ASICs/FPGA	10	10	E	0	11SEP02	24SEP02	5,924.00						
7E2000870	Check Thermal & Mechanical	5	1	E	0	12SEP02	18SEP02	592.40						
7E2000880	Review EM2 preliminary design	1	1	E	0	19SEP02	19SEP02	592.40						
7E2000890	Design ASIC Test Board (if need ASIC)	14	5	E	0	25SEP02	14OCT02	3,067.71						
7E2000840	Place&Route ASICs/FPGA	15	15	E	0	25SEP02	15OCT02	9,211.60						
7E2000850	Simulate ASICs/FPGA	15	15	E	0	25SEP02	15OCT02	9,211.60						
7E2000855	Simulate Board	5	5	E	0	16OCT02	22OCT02	3,110.00						
4.1.7.4.3.2 FAB, ASSEMBLY & TEST														
7E2000970	PR for Procure Parts (8)	1	0	E	0	11SEP02	11SEP02	18,560.00						
7E20001060	Thermal & Mechanical Engineering	20	2	E	0	20SEP02	17OCT02	1,295.33						
7E2000910	Fabricate ASIC Run 1 (if need ASIC)	60	0	E	0	20SEP02	18DEC02	9,261.33						
7E2000980	Layout/Fab/Assemble ASIC Test Board (need ASIC?)	10	0	E	0	15OCT02	28OCT02	10,741.60						
7E2000950	Layout Modification	10	10	E	0	23OCT02	05NOV02	4,742.40						
7E2000960	Fabricate PCB	15	0	E	0	06NOV02	28NOV02	11,600.00						
7E43220000	Receive Procure Parts (8)	1	0	E	0	06DEC02	06DEC02	0.00						
7E43320000	Assemble PCB	5	5	E	0	06DEC02	12DEC02	2,371.20						
7E2000920	Test Run 1 (if need ASIC)	15	10	E	0	17DEC02	15JAN03	6,220.00						
7E2000990	Test w Simulator	10	15	E	0	16JAN03	30JAN03	9,330.00						
7E2000930	Fabricate ASIC Run 2 (if need ASIC)	60	0	E	0	16JAN03	11APR03	11,600.00						
7E20001000	ND: Flight Software	1	0	E	0	31JAN03	31JAN03	0.00						
7E20001020	Test with DAQ Electronics	10	10	E	0	03FEB03	14FEB03	5,176.00						
7E20001040	Test with Subsystem Electronics	10	10	E	0	18FEB03	03MAR03	6,444.80						
7E20001070	Review Eng. Model 2	1	1	E	0	04MAR03	04MAR03	622.00						
7E43320120	AV: EM2 Available to Subsystem	0	0		0		04MAR03	0.00						
7E43320100	ND: CAL EM2	0	0		0		10MAR03	0.00						
7E43320110	ND: TKR EM2	0	0		0		10MAR03	0.00						
7E2000940	Test Run 2 (if need ASIC)	15	5	E	0	14APR03	02MAY03	3,110.00						
4.1.7.4.3.4 FLIGHT UNITS														
Subtotal		304	181		0	20SEP02	11DEC03	937,875.64						
4.1.7.4.3.1 QUALIFICATION UNIT DESIGN														
7E20001030	Review parts selection and availability	10	10	E	0	20SEP02	03OCT02	6,012.80						
7E20001100	Complete mechanical and thermal analysis	5	5	E	0	05MAR03	11MAR03	3,293.20						
7E20001110	Review and update req and design documents	5	5	E	0	05MAR03	11MAR03	3,110.00						
7E20001140	Modify Design and Simulate	15	15	E	0	05MAR03	25MAR03	9,330.00						
7E20001200	Complete Qualification Unit Design	0	0		0		25MAR03	0.00						
4.1.7.4.3.2 QUALIFICATION UNIT FAB, ASSEMBLY & TEST														
7E20001180	PR Procure Parts	1	0	E	0	11OCT02	11OCT02	50,000.00						
7E20001160	Modify Layout	10	10	E	0	28MAR03	08APR03	4,742.40						



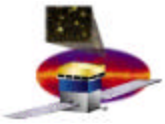
TEM Example (4)

Activity ID	Activity Description	Orig Dur	EFFD	PMT	% Comp	Early Start	Early Finish	Budgeted Cost	FY01 FY02 FY03 FY04 FY05 FY06							
7E20001230	Develop Test Plan	10	10	E	0	26MAR03	08APR03	6,444.80							⊗ Develop Test Plan	
7E20001170	Fabricate PCB	15	0	E	0	09APR03	29APR03	15,000.02							⊗ Fabricate PCB	
7E4342C000	Receive Procure Parts	1	0	E	0	11APR03	11APR03	-52							⊗ Receive Procure Parts	
7E20001190	Assemble/Inspect/Coat	10	0	E	0	06MAY03	16MAY03	15,000.08							⊗ Assemble/Inspect/Coat	
7E20001220	ND: Qual Unit Software	0	0		0		16MAY03	0.00							◆ ND: Qual Unit Software	
7E20001240	Functional Test	10	10	E	0	19MAY03	02JUN03	6,444.80							⊗ Functional Test	
7E20001250	Interface test	5	5	E	0	03JUN03	09JUN03	3,222.40							⊗ Interface test	
7E20001260	Performance Test	20	20	E	0	10JUN03	08JUL03	12,889.60							⊗ Performance Test	
7E20001270	Ambient pressure thermal cycle test	5	5	E	0	09JUL03	15JUL03	3,110.00							⊗ Ambient pressure thermal cycle	
7E43420000	Procure Equipment for Thermal Test	5	0	E	0	09JUL03	15JUL03	10,740.44							⊗ Procure Equipment for Thermal	
7E20001280	Functional Test	5	5	E	0	16JUL03	22JUL03	3,222.40							⊗ Functional Test	
7E20001210	AV: Deliver Qual Unit	0	0		0		22JUL03	0.00							◆ AV: Deliver Qual Unit	
4.1.7.4.3.4.3 FLIGHT UNIT FAB, ASSEMBLY & TEST																
7E43430020	PR Procure Parts	1	0	E	0	26MAR03	26MAR03	540,000.00							⊗ PR Procure Parts	
7E20001360	Update Test Plan	2	2	E	0	23JUL03	24JUL03	1,288.96							⊗ Update Test Plan	
7E20001300	Fabrication PWB	15	0	E	0	23JUL03	12AUG03	75,000.03							⊗ Fabrication PWB	
7E4343C000	Receive Procure Parts	1	0	E	0	12SEP03	12SEP03	0.30							⊗ Receive Procure Parts	
7E20001310	Assemble/Inspect/Coat	15	0	E	0	15SEP03	03OCT03	93,320.73							⊗ Assemble/Inspect/Coat	
7E20001320	ND: Flight Unit Software	1	0		0	06OCT03	06OCT03	0.00							⊗ ND: Flight Unit Software	
7E20001340	Preliminary Test	20	20	E	0	07OCT03	03NOV03	13,392.00							⊗ Preliminary Test	
7E20001370	Functional Test	20	20	E	0	14OCT03	10NOV03	13,392.00							⊗ Functional Test	
7E20001380	Interface test	4	4	E	0	21OCT03	24OCT03	2,678.40							⊗ Interface test	
7E20001390	Performance Test	20	20	E	0	22OCT03	18NOV03	12,937.60							⊗ Performance Test	
7E20001400	Ambient pressure thermal cycle test	5	5	E	0	23OCT03	29OCT03	3,234.40							⊗ Ambient pressure thermal cyc	
7E43430010	Procure Equipment for Thermal Test	5	0	E	0	19NOV03	25NOV03	23,600.00							⊗ Procure Equipment for Ther	
7E20001410	Functional Test	10	10	E	0	26NOV03	11DEC03	6,468.80							⊗ Functional Test	
7E20001420	AV: 1st Flight Unit Available for Integration	0	0		0		01DEC03	0.00							◆ AV: 1st Flight Unit Availabl	
7E43430000	AV: Last Flight Unit Available for Integration	0	0		0		11DEC03	0.00							◆ AV: Last Flight Unit Availat	

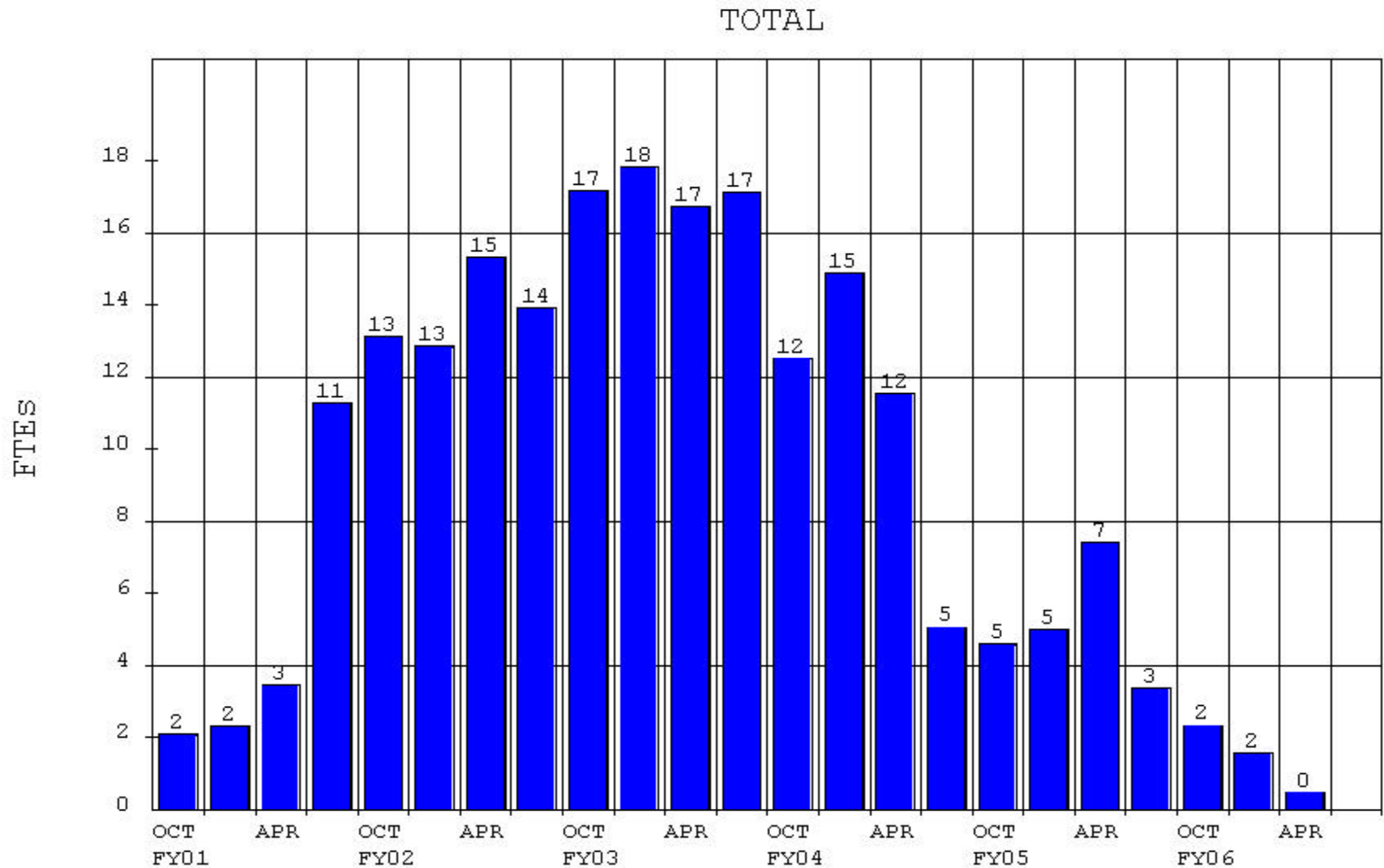


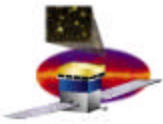
Milestones

- Trigger & Dataflow Requirements Review 03/27/01
- T & DF PDR 08/16/01
- Flight Software PDR 08/16/01
- **LAT Instrument PDR** 09/25/01
- Engineering Model 1 (EM1) System Test Complete 03/15/02
- T&DF CDR 06/19/02
- Flight Software CDR 06/12/02
- **LAT Instrument CDR** 08/05/02
- Engineering Model 2 (EM2; flight software & DAQ) System Test Complete 05/10/03
- **Deliver Electronics Units for Calibration Unit** 05/10/03
- Assemble/Test Qual Unit 07/15/03
- Assemble/Test last Flight Unit 12/01/03

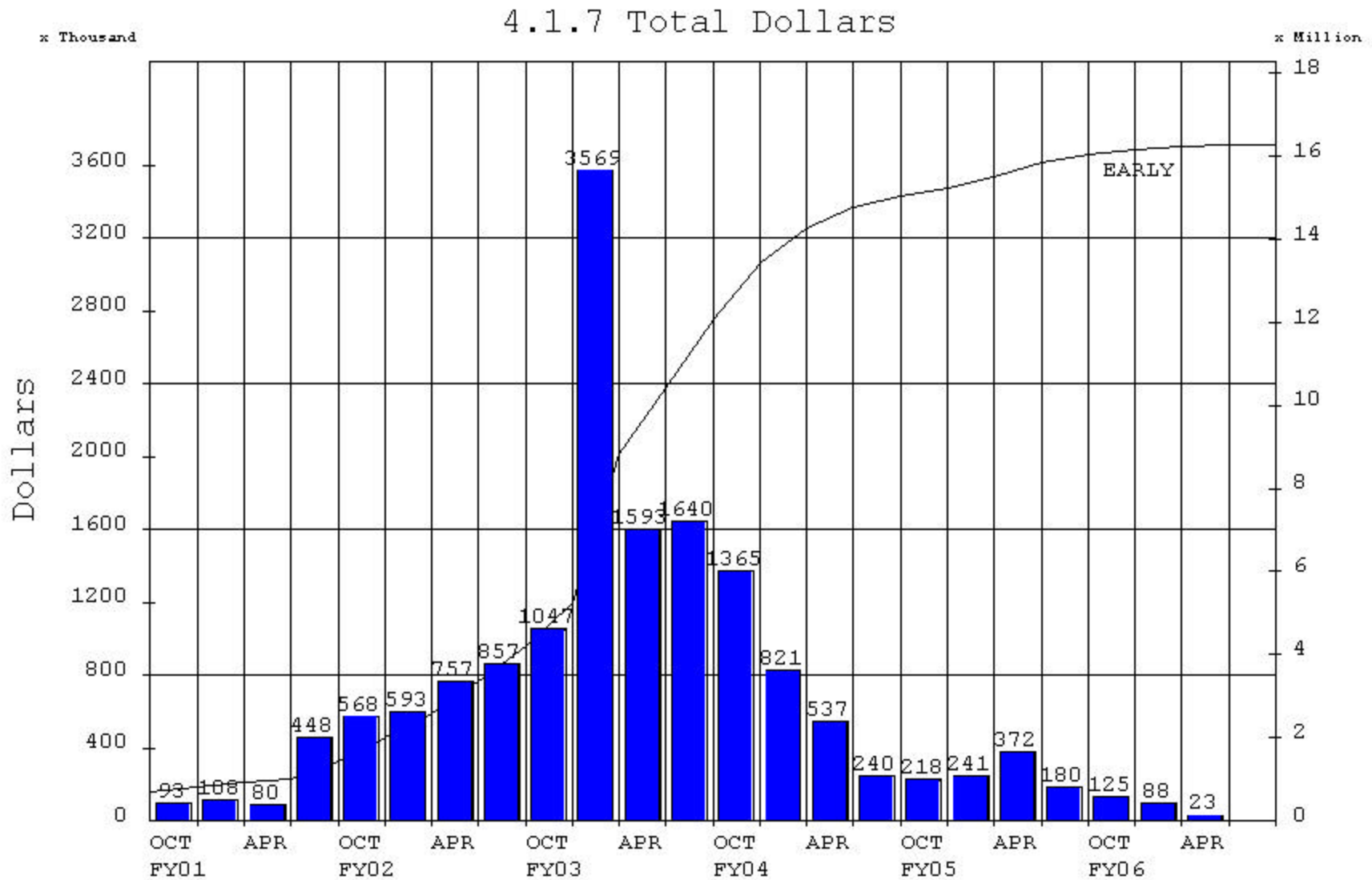


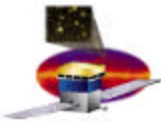
Manpower (preliminary)





Cost Profile (before Contingency)





Level 4 Budget by FY

CAR: FY\$ x 1000

TOTAL USAGE FOR YEAR

ACT CODE	DESCRIPTION	TOTAL	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
7	4.1.7 ELECTRONIC									
71	4.1.7.1 ELECTRONICS	1323		148	255	327	329	258	5	
72	4.1.7.2 RELIABILITY	292		32	71	71	71	47		
73	4.1.7.3 ELECTRONICS	980	709	194	77					
74	4.1.7.4 DATAFLOW ELE	5658		124	789	3986	754	6		
75	4.1.7.5 SPACECRAFT I	812		52	298	352	110			
76	4.1.7.6 POWER CONDIT	1394		24	210	1097	63			
77	4.1.7.7 ENCLOSURES	646			168	368	110			
78	4.1.7.8 CABLE HARNES	520			43	125	352			
79	4.1.7.9 FLIGHT SOFTW	2586		105	590	816	401	497	175	
7A	4.1.7.A EGSE & OPERA	831		48	275	508				
7C	4.1.7.C INSTRUMENT I	973				198	774			
7D	4.1.7.D MISSION SYST	258						203	55	
	REPORT TOTAL	16272	709	728	2776	7849	2964	1011	236	

* Above numbers are before contingency. To include contingency add ~ 27%.