GLAST Large Area Telescope:

Cost and Schedule Rebaseline

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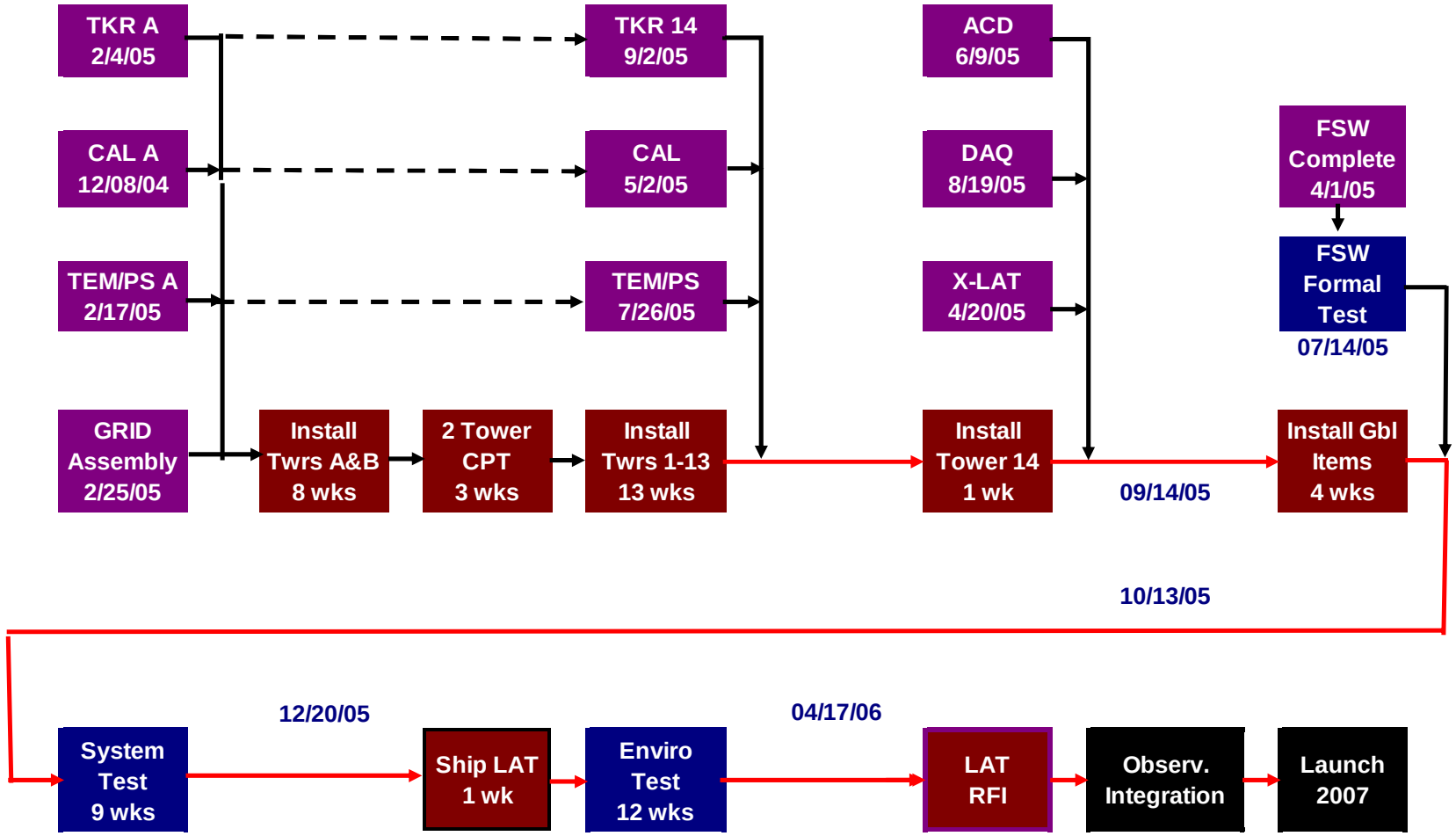
Master Schedule

- LAT complete and tested December 2005
  - To NRL for environmental testing
- Delivery to Observatory Integration April 2006
  - Mate with spacecraft and GBM and test
- Launch May 2007 TBR
  - Kennedy Space Flight Center

SIRTF Launch on a Delta II Heavy

LAT Schedule



Module Schedule

	Forecast Dates and Float (working days) to "Ship LAT"									
	Mech/ACD		TKR		CAL		ELEC		I&T	
Grid	11/08/04A	-								
Module A			2/04/05A	-	12/08/04A	-	2/17/05A	-	21-Mar-05	39
Module B			2/24/05A	-	01/14/05A	-	3/09/05A	-	20-Apr-05	37
Module 1			22-Mar-05	57	01/14/05A	-	22-Apr-05	34	2-May-05	34
Module 2			20-Apr-05	41	01/14/05A	-	29-Apr-05	34	9-May-05	34
Module 3			3-May-05	37	01/14/05A	-	6-May-05	34	16-May-05	34
Module 4			16-May-05	33	2/22/05A	-	13-May-05	34	24-May-05	33
Module 5			3-Jun-05	25	2/22/05A	-	20-May-05	34	13-Jun-05	25
Module 6			16-Jun-05	21	18-Apr-05	55	27-May-05	34	24-Jun-05	21
Module 7			27-Jun-05	19	21-Apr-05	52	6-Jun-05	34	6-Jul-05	19
Module 8			6-Jul-05	18	25-Apr-05	50	13-Jun-05	34	14-Jul-05	18
Module 9			15-Jul-05	16	2-May-05	45	20-Jun-05	34	25-Jul-05	16
Module 10			26-Jul-05	14	10-May-05	39	27-Jun-05	34	3-Aug-05	14
Module 11			4-Aug-05	12	13-May-05	36	5-Jul-05	34	12-Aug-05	12
Module 12			15-Aug-05	10	18-May-05	33	12-Jul-05	34	23-Aug-05	10
Module 13			24-Aug-05	8	23-May-05	30	19-Jul-05	34	1-Sep-05	8
Module 14			2-Sep-05	6	25-May-05	28	26-Jul-05	34	13-Sep-05	6
ACD	9-Jun-05	87								
X-LAT	20-Apr-05	125								
SIU							2-Sep-05	11		
PDU							1-Jul-05	55		
Harness							1-Jun-05	77		
GASU							14-Jul-05	47		
EPU							19-Aug-05	21		
FSW							1-Apr-05	77		
Inst Global Items									13-Oct-05	6
System Test									20-Dec-05	6
LAT Arrives at NRL									26-Dec-05	6
EMI/EMC Test									1-Feb-06	6
Sine Vibe									14-Feb-06	6
Acoustic Test									26-Feb-06	6
TVAC									15-Apr-06	6
Weight & CG									17-Apr-06	6
Preship Review									18-Apr-06	6
Ship LAT									23-Apr-06	6

Mission office schedule options

- **NASA management investigated an option to preserve schedule**
  - **The configuration investigated was:**
    - **16 Calorimeters**
    - **12 Tracker towers**
    - **Remaining instrument per the current baseline**
  - **Saves approximately 1 month of schedule**
  - **Steve Ritz and Peter Michelson presented the scientific implications of exercising this option to Anne Kinney, Director, Universe Division, on February 24**
    - **Peter will discuss this further next**
  - **Decision to adopt this option was postponed to give the LAT the opportunity to demonstrate execution to the proposed schedule**

Rebaseline Background

- **Pathfinder project**
  - First flight instrument integrated at SLAC
  - Most of the staff at SLAC were unfamiliar with the effort required to meet space instrumentation requirements – valuable" Lessons Learned" that benefit project
- **Challenging project**
  - Largest silicon detector, 800K channels
  - Limited bandwidth to ground
    - Event processing on board
  - Space qualifying state of the art instrumentation
  - Rigorous requirements of space instrumentation
    - Low power
    - Withstand launch loads
    - Vacuum
    - Challenging thermal environment
    - Reliability – no opportunity to repair the hardware

Need to rebaseline

- Underestimated the engineering required early in the project
  - Particularly, to adapt ground based instrumentation to the space environment
- Resulted in more anomalies in engineering model and flight model testing than expected
- The redesign and retest required to resolve these anomalies was greater than planned
- The project had higher expectations of the vendors chosen than was experienced once flight production was started
  - Assigned senior staff at SLAC to work with each vendor
  - Placed product assurance persons on-site
  - Direct communications with vendor management to keep the LAT work at high priority

Rebaseline Timeline

- October 2, 2004 International Finance Committee meeting
  - "Cost and schedule will be reviewed after installation of the first tower
    - Review early in 2005"
- October 12, 2004 DOE/NASA Biannual Review
  - "The project does not have adequate funding or schedule contingency
    - Manage aggressively to mitigate any further schedule slips
    - Work descope options that have minimum impact on the science objectives – accept higher risk in selected areas
    - Work with the sponsoring agencies for additional funding"
- November 24, 2004 Submitted LAT Rebaseline Plan to NASA and DOE
  - Cost variance analysis
  - Contingency variance analysis

Rebaseline Timeline

- **January 2005 Mission Project Office reviews each item with the Instrument and subsystem management.**
- **February 18, 2005 DOE Review of rebaseline proposal**
  - **Identified a specific scope of work to close out the DOE commitment to the fabrication of the Instrument**
- **February 24, 2005 Presentation to Anne Kinney, Director, Universe Division at NASA on science and programmatic impacts of descope of instrument**
- **February 28, 2005 DOE ESAAB meeting**
  - **Approved the additional $3M for the project.**
- **March 7, 2005 Kickoff meeting in Italy for the Tracker fabrication work funded by ASI**
- **March 2005 Mission office establishes rebaseline cost and schedule**

US Rebaseline Plan

- **LAT project management identified the need for $24.6M more in funding required for fabrication of the instrument**
  - **$21.3M of the increase in the current fiscal year**
- **DOE contribution to fabrication is capped at $45M**
  - **On-going operating funds are limited to $5M per year**
  - **Previously $6.3M for CY06**
  - **OK in the following years**
- **The planning value from NASA is a $17M increase this fiscal year**
- **The DOE $3M plus the $17M from NASA gives an additional $20M in funding for the LAT for FY05**
  - **The work in the rebaseline plan has been descoped to match available funding**

FY05 Rebaseline

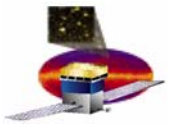
			Plan thru FY05		
		Oct-04	Planned		
WBS	Item	Baseline	Baseline	Difference	Reduction Description
4.1.1	Instrument Management	16,911	17,647	736	Reduce staff by 3 people
4.1.2	System Engineering	7,047	7,647	600	Reduce staff by 1 person
4.1.4	Tracker	16,573	21,316	4,743	Last 2 towers non-flight
					Stop 2nd cable vendor
					Tile etching a GSFC cost
4.1.5	Calorimeter	22,022	22,593	571	No environ test for 15,16
4.1.6	Anticoincidence Detector	15,595	17,240	1,645	Reduced testing, T/V and EMI
4.1.7	Electronics, Data Acquisition, Flight Software	22,055	28,894	6,839	Eliminate GASU, SIU PDU, EPU spares
4.1.8	Mechanical Systems	14,179	15,998	1,819	Reduce staff
4.1.9	Integration & Test	7,764	9,451	1,687	Reduce staff
					Reduce VdG testing
4.1.A	Performance & Safety Assurance	2,935	3,846	911	Staff roll off
4.1.B	Instrument Science Operations Center	328	334	6	
4.1.C	Education & Public Outreach	2,448	2,684	236	
4.1.D	Science Analysis Software	3,019	3,069	50	
4.1.E	Suborbital Flight Test	1,325	1,325	0	
4.1	**Budget at Completion**	**$132,202**	**$152,044**	**$19,842**	
4.1	**Contingency**	**$3,783**	**$3,941**	**$158**	
4.1	**Total Estimated Cost**	**$135,985**	**$155,985**	**$20,000**	

Status as of January 31, 2005

- Cost and Commitments through January 31, 2005 $129M
- Planned Budget at Completion of fabrication $156M
- Cost to go for fabrication $ 27M
- Cost and Commitments as percent of planned budget 83%

International Funding

Calendar Year	2001 [a]	2002	2003	2004	2005	2006	2007	2008	Total
Funding for the GLAST-LAT Project (in thousands, USD)									
France - IN2P3	2,520	1,450	1,725	830	350	380	460	380	8,095
France - CEA [b]	927	423	148						1,498
Italy - ASI		800	2,230	2,604	354	440	922	930	8,280
Italy - INFN	2,100	4,319	1,801	1,333	1,150				10,703
Japan	1,140	1,040	880	730	150	100	100	100	4,240
Sweden	300	900	1,000	300					2,500
US - DOE Project	10,709	8,288	8,658	8,780	8,566				45,000
US - DOE Ops & Science	4,224	3,385	4,142	5,104	6,572	7,683	7,590	7,135	45,835
US - NASA (Fab Phase)	10,994	16,481	27,051	25,899	13,211				93,636
US - NASA (Comm Phase)					2,900	8,800	6,853	6,734	25,287
Scientific and Technical FTE's supporting the GLAST-LAT Project (Not included in the funding above)									
France - IN2P3	10.4	3.4	3.8	6.4	7.8	10.1	10.1	10.1	
France - CEA [b]									
Italy			6.0	6.0	4.0	4.0	4.0	4.0	
Japan	4.0	4.5	3.5	3.5	3.5	3.5	4.5	5.0	
Sweden	6.3	7.5	5.6	5.0					
US DOE & NASA	FTEs included in the funding above.								
*Shading indicates revisions since Oct 04 IFC.									
(a) The 2001 column includes funds from prior years.									
(b) CEA: Numbers require updating.									



Summary

- The project has moved into the instrument integration and test phase
- Both cost and schedule have been replanned
- The sponsors continue to support the project and are taking steps to provide the needed funding
- The project has been challenged to complete the remaining work in a timely manner