

GLAST Calorimeter

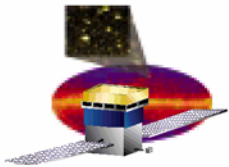
*Monthly Cost /
Schedule / Mission
May 2004*

Monthly Cost/Schedule/Mission Review

GLAST LAT Calorimeter June 2, 2004

**W. Neil Johnson
Naval Research Lab
neil.johnson@nrl.navy.mil**





GLAST Calorimeter

Outline

*Monthly Cost /
Schedule / Mission
May 2004*

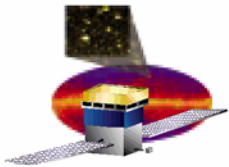
□ **Technical Status:**

- **Last Month's Accomplishments**
- **Near-term Milestones & Status towards them for next 3 months (from F2F)**
- **Drawing Release Plan & Status required to achieve production milestones**
- **Summary of issues & concerns**
- **Status of Subsystem's Documentation & qualification program**

□ **Cost & Schedule**

- **Variances**
- **Actions required to retain zero schedule variance**





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Significant Accomplishments May 2004

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□ CDEs

■ Csl Crystals

- To date Kalmar has delivered ~1443 tested crystals to NRL. They have received ~1800 (out of 1950) from Amcrys-H. Approximately 100 crystals have been returned to Amcrys for non-compliance.
- NRL has corrected light taper on ~150 crystals that did not meet spec.

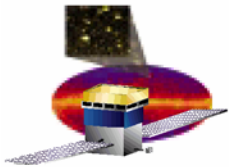
■ PIN Photodiode Assembly (PDA)

- ~ 3300 (out of 4800) flight PDAs have been manufactured, tested and delivered to Swales.

■ CDE Assembly Process

- 864 CDEs have been bonded at Swales
- Wrapping, capping and acceptance testing is recovering from an early delay in availability of end caps.
- 804 have been wrapped and capped
- 680 have been tested and delivered to NRL
- The planned production 60 CDE per week is well within capabilities





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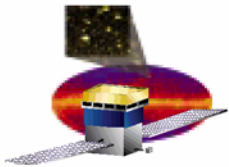
Significant Accomplishments

May 2004 (2)

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- ❑ **Composite Structure Manufacture – LLR Ecole Polytechnique**
 - **Ten flight structures have been manufactured (#3 - #12).**
 - Expect to complete 2 more before June 9 when prepreg expires.
 - New prepreg, cut and kitted, will be available end of June.
 - **Seven of these have successfully completed strength verification vibration test.**
 - **Six of these are at NRL.**
- ❑ **Structure Assembly – NRL**
 - **Titanium stand off for TEM/TPS have been manufactured and plated.**
- ❑ **PEM Assembly**
 - **Four PEMs have been completely assembled.**
 - **All four have completed cosmic muon verification testing with the EGSE checkout electronics.**





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Significant Accomplishments

May 2004 (3)

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□ AFEE Electronics

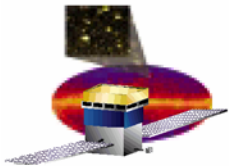
▪ ASICs

- Post burn-in testing complete. No issues. Report in progress.
- 85 GCFE and GCRC with GSE have been delivered to GSFC for qualification.
- All radiation testing complete, no issues. Draft report on TID has been circulated to GLAST radiation test team.

▪ AFEE-TEM interface cable.

- 16 copies of the AFEE-TEM cable have been received.
- Minor design mod's have been made (and verified) to avoid potential stay clear violation
- 1st production deliveries early in July.
- Mechanical support and shield for AFEE cable have been released for fabrication.





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Significant Accomplishments May (4)

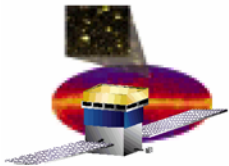
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□ AFEE Electronics (cont)

▪ Flight AFEE (X & Y) have been manufactured.

- Six of each PCB fab'ed at two vendors. Coupons have been delivered to GSFC.
 - Neither vendor's product is perfect. Nick is investigating quality control issues with both vendors and will select one for production run.
- All flight parts have been delivered to assembly vendor.
- Virmani and Raynor have visited assembly house for process inspection and witness of 1st article board assembly.
- 10 boards have been SMT assembled; two of these should arrive at NRL today.
- Release of remaining boards awaits 1st article test completion.





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CAL Near Term Milestones

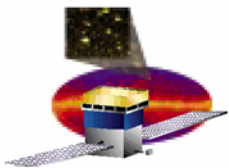
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Activity ID	Activity description	Total float	Early finish	Comment
5C62300290	IA: FM1 PEM Ready	48	6/1/2004	
5C62300620	IN: FM5 CDE	58	6/4/2004	
5C62300390	IA: FM2 PEM Ready	51	6/8/2004	
5C62300700	IN: Receive FM6 Mechanical Struct	64	6/8/2004	
5C52000441	IA: FM15 CsI Crystals	88	6/9/2004	
5C62300490	IA: FM3 PEM Ready	57	6/14/2004	
5C1140A	ND: EM2 TEM/PS/CTS FMA	13	6/15/2004	This is the big one
5C62300720	IN: FM6 CDE	55	6/16/2004	
5C76001120	FMA AFEE Ready	18	6/17/2004	This is the big one
5C62300800	IN: Receive FM7 Mechanical Struct	67	6/18/2004	
5C76001140	FMB AFEE Ready	33	6/18/2004	
5C52000461	IA: FM16 CsI Crystals	254	6/23/2004	
5C62300690	IA: FM5 PEM Ready	58	6/25/2004	
5C76001180	FM1 AFEE Ready	31	6/25/2004	
5C1161A	ND: EM2 TEM/PS/CTS FMB	35	6/25/2004	
5C57000111	IA: PDA Lot 7 (600)	243	6/28/2004	
5C62300820	IN: FM7 CDE	58	6/28/2004	
5C76001200	FM2 AFEE Ready	38	6/28/2004	
5C62300900	IN: Receive FM8 Mechanical Struct	63	7/2/2004	
5C1183A	ND: EM2 TEM/PS/CTS FM1	38	7/2/2004	
5C76001240	FM3 AFEE Ready	44	7/6/2004	
5C76001260	FM4 AFEE Ready	49	7/7/2004	
5C62300790	IA: FM6 PEM Ready	55	7/8/2004	
5C62300920	IN: FM8 CDE	56	7/9/2004	
5C1203A	ND: EM2 TEM/PS/CTS FM2	37	7/12/2004	
5C76001300	FM5 AFEE Ready	52	7/13/2004	
5C76001320	FM6 AFEE Ready	57	7/14/2004	
5C62301000	IN: Receive FM9 Mechanical Struct	60	7/15/2004	
5C62300890	IA: FM7 PEM Ready	58	7/20/2004	
5C62301020	IN: FM9 CDE	53	7/21/2004	
5C76001360	FM7 AFEE Ready	58	7/21/2004	
5C76001380	FM8 AFEE Ready	63	7/22/2004	
5C1223A	ND: EM2 TEM/PS/CTS FM3	40	7/26/2004	
5C62301100	IN: Receive FM10 Mechanical Struct	60	7/29/2004	
5C1153	AV: Calorimeter Module A RFI	13	9/7/2004	

Production
Pipeline in
progress

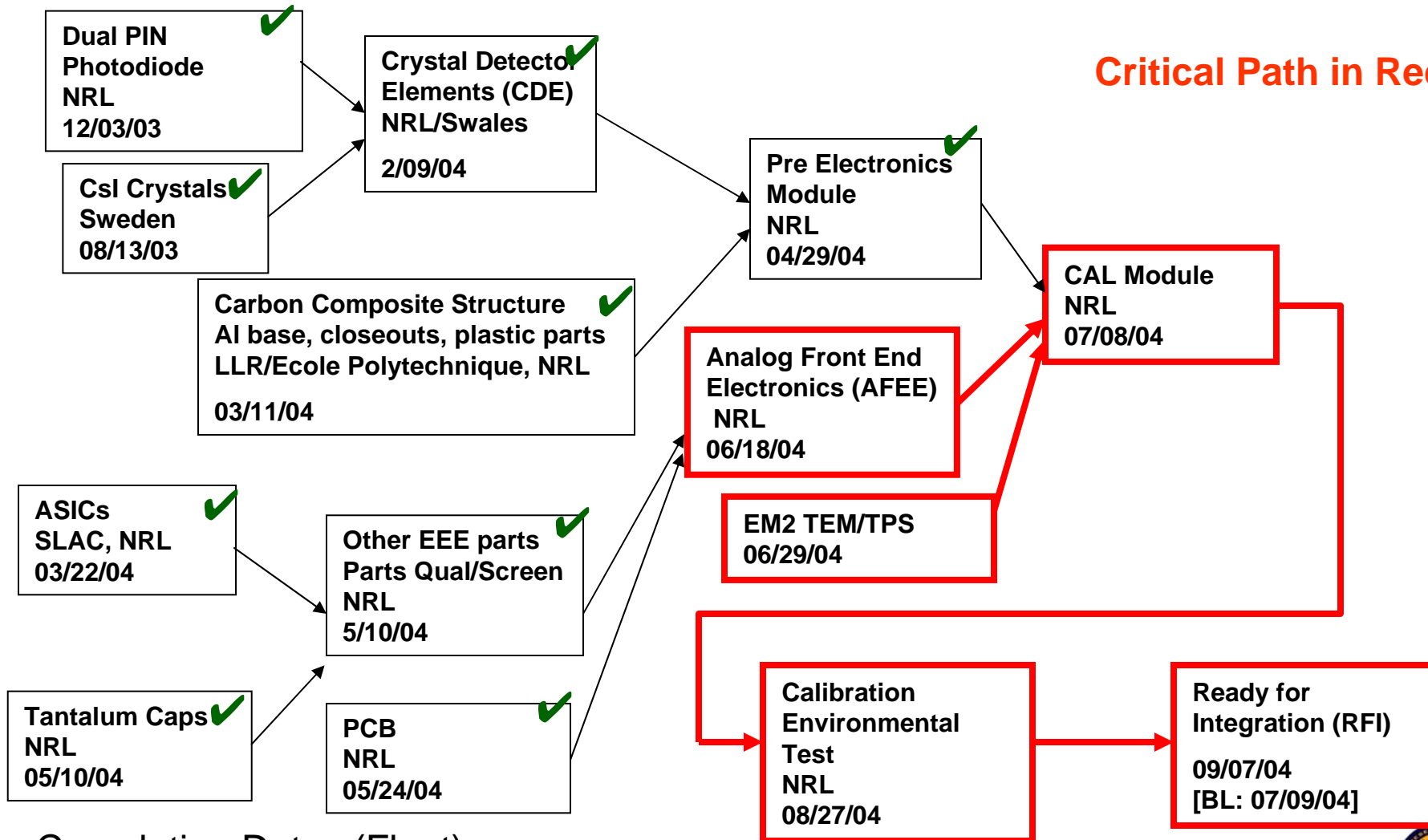
NAVAL RESEARCH LAB
WASHINGTON DC





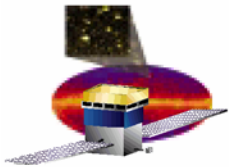
Path to first flight CAL Module (FMA)

Critical Path in Red



Completion Dates (Float)





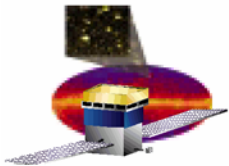
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New Impact on FM A Delivery

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- ❑ **TVAC**
 - This schedule includes TVAC of FMA alone
 - unplanned cost, but improves delivery by about 2 weeks.
- ❑ **AFEE Boards**
 - Boards from both vendors showed quality flaws that are being reviewed with vendors. Incoming inspection selected best boards for assembly.
 - Non-uniform solder flow, under-etch of copper and other visual inspection issues.
 - Coupons are at GSFC for evaluation.
 - Production run – 108 boards – on hold until electrical test of 1st articles
 - 1st article AFEE boards are being assembled in parallel with coupon inspection.
 - 4 of 1st articles assumed usable for FMA module. Potential for another 3 – 4 week schedule impact, if they can't be used.
- ❑ **EM2 TEM/TPS – apparent critical path**
 - Prior to TEM/TPS use with CAL Flight Hardware
 - Perform workmanship vibration test on each TEM/TPS
 - Burn in each TEM/TPS with load for at least 48 hours at maximum permissible temperature.
 - TEM/TPS functional test procedure
 - CAL – TEM safe to mate procedure.





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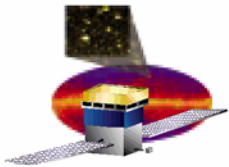
Drawing Release Summary

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Flight Hardware Drawings

Element	Total Dwgs	Completed Dwgs	Comments
Module Assy	11	11	AFEE Cable support & shield – 3 parts.
PEM Assy	6	6	
Structure	12	12	Includes CAL-TEM stand off
CDE	5	5	
AFEE	8	8	
TOTAL	42	42	100% Complete





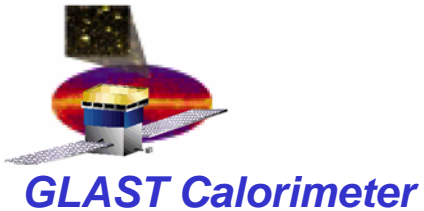
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Issues and Concerns

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- ❑ **AFEE Assembly**
 - Verify design and manufacturing process with 1st article tests.
 - Release production build
- ❑ **Current TVAC cycle time breaks budget (schedule/cost by ~40%)**
 - TVAC test plans are being reviewed.
 - Likely cost increase of \$130K (\$50K in FY04) required to cover additional duration of 8 TVACs.



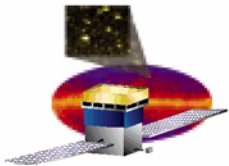


Documentation and Qualification Program

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- ❑ CDE manufacture and test procedures – 100% complete
- ❑ Composite Structure manufacture and test procedures – 100% complete
- ❑ PEM Assembly and Test – 100% complete
- ❑ EEE qualification and screening procedures – 100% complete
- ❑ AFEE PCB manufacture and assembly
 - Procurement specifications – 100% complete
 - Parts lists and assembly drawings – 100% complete
 - AFEE functional test procedure – 90% complete.
- ❑ Module Assembly and Qualification/Acceptance
 - EM versions of procedures exist from EM qualification program. Need modifications for flight protoflight/acceptance testing.
 - Working on new EMI/EMC test procedure to meet recent direction





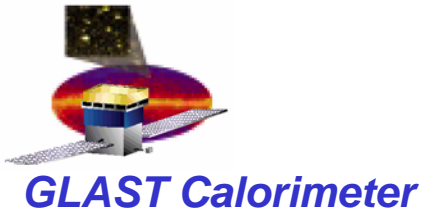
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PMCS - Jan '04 Cost Variances

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- **Cost Variance: + \$594 cum (-\$157 for April)**
 - **+270: Mgmt, Eng, R&QA, ~ 1 FTE labor, rest travel**
 - **+290: CDE Manuf.**
 - PDA manufacturing - materials cost underrun.
 - CDE manufacturing - labor underrun (+230)
 - **+29: PEM**
 - Invoicing delay in facilities preparation
 - **-82: AFEE**
 - Much higher labor costs balanced by savings in GSE materials
 - **+5: Module Ass'y & Test**
 - **+61: GSFC allocated funds**





PMCS – Jan '04 Schedule Variances

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- **Schedule Variance: - \$767 cum (-284 for March)**
 - **- 104: CDE Manuf.**
 - Stopped bonding CDE for about 1 month due to lack of end caps to complete CDEs. Material storage problem. (No issue: CDE manufacturing is weeks off of the CAL critical path)
 - **- 167: PEM**
 - Delay in delivery of 1st composite structures.
 - **- 340: AFEE**
 - Delay in delivery of ASICs causing delay in screening and qualification work
 - Problems in manufacture of AFEE PCB.
 - **- 137: Module Assy & Test**
 - Delay in electronics delivery for module A&T

