Calorimeter Electronics

- System Overview
  - Quantities
- Present Status
- Schedule
  - New Milestones
  - A contingency analysis example - PERT Analysis
  - Critical Paths
- Summary

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System Overview

- **Goals**
  - Comparable noise performance at high luminosity, small bunch spacing, as for Run I
- **Replace**
  - Preamps, cables, shapers, power supplies, controllers, calibration system
- **Retain**
  - Infrastructure: crates, most backplanes, cooling, most cabling

Parts Counts & Status

- ~14 systems/cards types; ~170,000 boards

System	*Part*	*Quantity*	*In hand*
Preamp	Cables	2,400	2,400
	Hybrid	60,000	5,000
	Motherboard	1,250	100
	Power supply	24	3
Shapers (BLS)	SCA	25,000	19,000
	Shaper Hybrid	60,000	50
	Daughtercard	*5,000*	*10**
	Trigger sum	10,000	1*
	Trig driver	2,500	1*
	Backplane	80	80
	Motherboard	*1,250*	*10*
	Power supply	36	-
Calibration Syst.	Passive fanout	72	1
	Plug ins	1150	16
	Cables	144	96
Timing & Fanouts		20	1*

*= prototype; *red italics indicates critical path*

•*Green = production, yellow=pre-production, red=prototypes*

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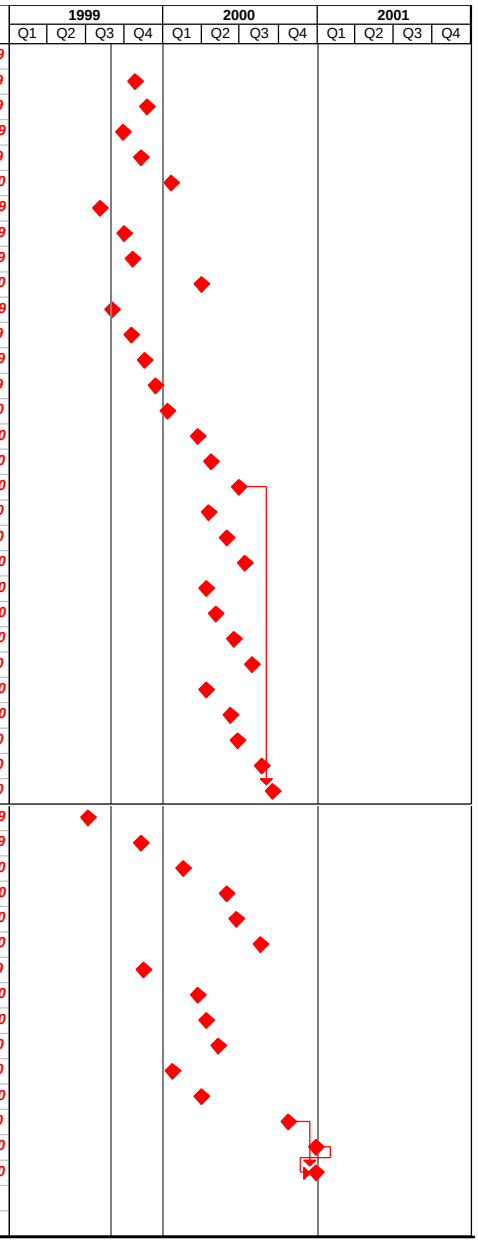
Schedule

- As requested by the DOE, we have added more “tracking” milestones
  - Track start/finish of vendor board production
  - Track board assembly
  - Track in-house partial production (e.g. power supplies)
  - Track installation & commissioning milestones
- 31 new milestones added

Milestones (>1/1/1999)

ID	Description	Current Date
23	M3-Calorimeter Preamp Production Begun	Mon 1/4/99
26	Preamp 1st production lot shipped from vendor	Wed 10/27/99
28	Preamp production complete at vendor	Wed 11/24/99
43	Preamp Motherboard Production Begun	Thu 9/30/99
45	Preamp Motherboardfabrication complete	Wed 11/10/99
47	Preamp Motherboard assembly complete	Fri 1/21/00
58	Preamp Power Supply assembly started	Fri 8/6/99
60	Preamp Power Supplies 50% complete	Fri 10/1/99
61	Preamp Power Supply fabrication complete	Fri 10/22/99
65	M2-Calorimeter Preamp System Test Complete	Fri 3/31/00
86	Final SCA fabrication complete	Fri 9/3/99
88	Start Fnal SCA testing	Mon 10/18/99
90	SCA testing 50% complete	Fri 11/19/99
91	SCA testing complete	Wed 12/15/99
101	Shaper Hybrid Design and Test Complete	Wed 1/12/00
103	Shaper Hybrid production started	Thu 3/23/00
105	Shaper Hybrid 50% complete	Tue 4/25/00
107	Shaper Hybrid Construction Complete	Thu 6/29/00
119	Trigger Sum prodruction started	Wed 4/19/00
121	Trigger Sum production complete	Wed 5/31/00
123	Trigger Sum assembly complete	Thu 7/13/00
151	BLS Motherboard Design and Test Complete	Thu 4/13/00
153	BLS Motherboard production starts	Fri 5/5/00
155	BLS Motherboard production complete	Fri 6/16/00
157	BLS Motherboard assembly complete	Mon 7/31/00
134	Daughterboard vendor production begins	Thu 4/13/00
136	Daughterboard vendor production complete	Fri 6/9/00
138	Daughterboard testing starts	Mon 6/26/00
140	Daughterboard testing complete	Mon 8/21/00
160	M2-Calorimeter BLS Assembly Complete	Mon 9/18/00
184	Calibration System Design Complete	Tue 7/6/99
188	Start Installation of calibration system	Thu 11/11/99
190	Calibration system installed & debugged	Fri 2/18/00
196	Timing & Control System Design Complete	Thu 6/1/00
202	Start production of timing system	Fri 6/23/00
205	Timing system installed	Fri 8/18/00
166	M3-Calorimeter BLS PS Prototype Built/Tested	Mon 11/15/99
171	Start assembly of BLS power supplies	Thu 3/23/00
174	Start installation of BLS power supplies	Thu 4/13/00
176	BLS power supplies installed	Wed 5/10/00
215	Begin Preamp Installation	Mon 1/24/00
217	M3-Calorimeter CC,ECN Preamp Installation Complete	Fri 3/31/00
221	M3-CC, ECN Calorimeter System Checked Out	Mon 10/23/00
226	Ready to Roll in	Thu 12/28/00
227	Checkout of Calorimeter Electronics Complete	Thu 12/28/00



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PERT Analysis

- Try PERT Analysis functions in MS Project on this simpler system as possible way to explore schedule contingency
- Supply 3 durations by task for:
  - Optimistic (O) assumptions
    - On-time vendor deliveries
    - No difficulties in pre-production evaluation
    - All shifts manned for installation where needed
    - Additional manpower (add 1-2 tech, .5EE)
  - Expected (E) assumptions (used in master schedule)
    - Modest vendor delays
    - Realistic evaluation times
    - Existing manpower (maybe +1 tech)
    - One shift installation
  - Pessimistic (P) assumptions
    - Unanticipated vendor delays
    - Unexpected problems in pre-production evaluation & BLS power supply re-do
    - Installation problems, single shift
    - Present manpower
  - Weighted (~"best guess"?)
    - Use (1/6)*O+(3/6)*E+(2/6)*P

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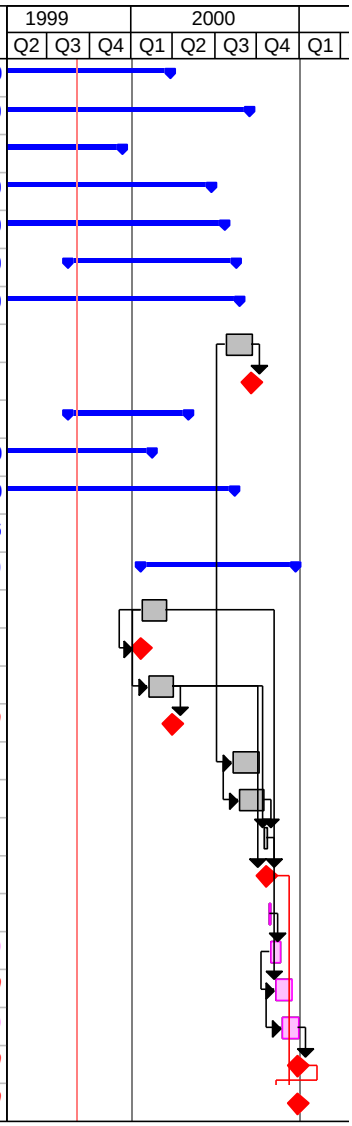
Expected Schedule

- **Key dates**
  - **11/99 – Calibration hardware fabricated**
  - **2/00 – Preamp hardware fabricated**
  - **9/00 – BLS, T&C hardware fabricated**
  - **1/00 – Start preamp install on CC, ECN**
  - **8/00 – Start BLS install on CC, ECN**
  - **11/00 – Start ECS install of BLS & Preamps**
  - **12/00 – Calorimeter electronics installed & tested**

Set by silicon install

Could be in Collision Hall

ID	Task Name	Duration	Start	Finish
5	Preamp Construction	335.2 w	Thu 8/5/93	Fri 3/31/00
67	BLS Construction	306.2 w	Wed 8/10/94	Mon 9/18/00
69	SCA construction	269 w	Wed 8/10/94	Wed 12/15/99
93	Shaper Hybrid construction	266 w	Wed 3/1/95	Thu 6/29/00
109	Trigger Sum, Backplane Construction	159.8 w	Fri 5/2/97	Thu 7/27/00
126	Daughterboard Construction	50 w	Tue 8/17/99	Mon 8/21/00
142	BLS Motherboard construction	140.2 w	Wed 10/22/97	Mon 8/28/00
159	BLS Assembly/Test	8 w	Tue 7/25/00	Mon 9/18/00
160	*M2-Calorimeter BLS Assembly Complete*	*0 w*	*Mon 9/18/00*	*Mon 9/18/00*
162	BLS Power Supply Construction	36 w	Mon 8/16/99	Wed 5/10/00
178	Calibration system construction	142 w	Tue 4/1/97	Fri 2/18/00
192	Timing & Control System construction	96.2 w	Fri 9/4/98	Fri 8/18/00
207	Install Feedthrough Cables	18 w	Wed 5/29/96	Thu 10/3/96
213	Installation	48.3 w	Mon 1/24/00	Thu 12/28/00
214	Install CC, ECN Preamps	8 w	Mon 1/24/00	Fri 3/17/00
215	*Begin Preamp Installation*	*0 w*	*Mon 1/24/00*	*Mon 1/24/00*
216	Checkout CC, ECN Preamp system	8 w	Mon 2/7/00	Fri 3/31/00
217	*M3-Calorimeter CC,ECN Preamp Installation Compl*	*0 w*	*Fri 3/31/00*	*Fri 3/31/00*
218	Install BLS system	8 w	Tue 8/8/00	Mon 10/2/00
219	Checkout BLS system	8 w	Tue 8/22/00	Mon 10/16/00
220	Final checkout	1 w	Tue 10/17/00	Mon 10/23/00
221	*M3-CC, ECN Calorimeter System Checked Out*	*0 w*	*Mon 10/23/00*	*Mon 10/23/00*
222	Move ECS Calorimeter onto Platform	0.6 w	Thu 10/26/00	Mon 10/30/00
223	Recable ECS Calorimeter	3 w	Tue 10/31/00	Mon 11/20/00
224	*Install ECS Preamps*	*5 w*	*Thu 11/9/00*	*Thu 12/14/00*
225	Checkout ECS Preamp system	5 w	Thu 11/23/00	Thu 12/28/00
226	*Ready to Roll in*	*0 w*	*Thu 12/28/00*	*Thu 12/28/00*
227	*Checkout of Calorimeter Electronics Complete*	*0 w*	*Thu 12/28/00*	*Thu 12/28/00*



PERT Analysis Comparison

Task	Optimistic	*Expected*	Pessimistic	Weighted (1O+3E+2P)
Calibration hardware done	11/10/99	*11/10/99*	12/10/99	11/19/99
Preamp hardware done	1/14/00	*1/21/00*	3/3/00	2/4/00
BLS hardware done	7/17/00	*8/28/00*	12/11/00	9/19/00
Start preamp install	1/17/00	*1/24/00*	2/21/00	1/31/00
Start BLS install	7/7/00	*8/8/00*	11/7/00	8/28/00
Start ECS install	10/31/00	*10/31/00*	10/31/00	10/31/00
Done & Tested	12/4/00	*12/28/00*	2/5/01	12/28/00

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Critical Paths

- **Three areas that are relevant to critical paths based on expected schedule**
  - **BLS daughtercard (houses SCA's)**
    - Try and reduce the prototype and pre-production evaluation time
    - Actually ~8 wks of float behind ECS move
  - **BLS Motherboard**
    - Try and reduce the prototype and pre-production evaluation time
    - Actually ~8 wks of float behind ECS move
  - **ECS moving onto platform**
    - Cannot cable/install preamps on ECS until it moves onto platform
    - "Real" critical path
    - Try and reduce cabling & installation time

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Summary

- Preamp system delayed (~vendor problems) but far from critical path for experiment
- BLS system delayed (~manpower problems) but ~8wks from critical path due to ECS move
- Could instrument CC ~8/00 for detector commissioning
- Need some additional manpower later in 1999 (1 tech, .5EE)
- Fully ready ~12/00 (with ECS move)
- Try to determine “error” ~ +/- 1month based on PERT analysis