From the detector review:

3.12 DAQ and Electronics

Although not requested to review DAQ and electronics, we note that design developments since the July 2004 electronics review have ameliorated or eclipsed some of the issues pointed out in that review. Notably, the vertex detector has vanished, removing all concerns about VLPCs; and the original plan to seek single TDC and FADC designs to serve all detector systems no longer appears optimal. With the addition of the Alberta group available manpower has grown, but still needs to grow more. Detector subsystems need to specify front-end electronics prior to the "Lehman Review".

From the electronics review:

Are there any special areas of concern that deserve special study?

More manpower will be needed in order to fully realize the GlueX electronics system. Considerable special (technical) expertise will also be required.

The requirements and specifications of the analog front-end electronics are not yet adequately defined. This is coupled to the tentative status of some detector designs. The lack of full definition of detector designs may soon limit progress on electronics design,

Summary of GlueX Detector Subsystems

2 March 2005 P. Smith

Detector	Photon tagger	Pair polarimeter	Upstream Photon veto	Start counter	Central drift	Forward drifts	DIRC	Time-of-flight	Barrel calorimeter	Forward calorimeter
Type	Scintillator	Si microstrip	Scintillator	Scintillator	Straw tube	Planar chamber	Quartz	Scintillator	Sci fibers	Lead glass
Channel count	140 fixed 120 movable	2048	24	40	3240	2900 anode 11,400 cathode	2000 TDC 32 FADC	168	960	2500
Signal source	PMT fixed SiPMT movable	Silicon microstrip	PMT	PMT	Straw tube	anode wires cathode strips	Multi-anode PMT	PMT	SiPMT	PMT
Physics signal	100 pe	22000 e	100 pe	100 pe	25 e	25 e	25 pe	500 pe	100 pe/GeV	250 pe/GeV.
Energy resolution	0.1% (segmentation)	N/A	10%/√E	N/A	20%	N/A	N/A.	N/A	2% + 5%/√E	3.6% + 7.3%/√E
Time resolution	100 ps	25 ns	1 ns	350 ps	1 ns	1 ns	200 ps	80 ps	200 ps	400 ps
Maximum single channel rate	5 MHz	1 MHz	1 MHz	10 MHz	1 MHz	1 MHz	250 KHz	1 MHz	10 KHz	1 MHz
Gain in detector	10^6	1	10^6	10^5	10^4	10^4	10^6	10^6	10^6	10^6
Typical charge	16 pC	3.5 fC	16 pC	16 pC	40 fC	40 fC anodes 4 fC cathodes	4 pC	80 pC	16 pC/GeV	40 pC/GeV
Preamp gain	no	10^4	no	no	10^3	10^3 anodes 10^4 cathodes	10	no	no	no
Discrimination	constant fraction	no	no	constant fraction	no	yes (anode) no (cathode)	constant fraction	constant fraction	constant fraction	no
Dynamic range	5	10	100	100	1000	100 anodes 1000 cathodes	10	10	500	500
FADC	8 bits 250 Msps	8 - 12 bits 62.5 Msps	8 bits 250 Msps	8 bits 250 Msps	10 - 12 bits 125 Msps	Cathodes: 8 - 12 bits 62.5 Msps	8 bits 250 Msps	8 bits 250 MSPS	8 bits 250 Msps	8 bits 250 Msps
TDC	62 ps	no	no	62 ps	no	Anodes: 125 ps	125 ps	62 ps	62 ps	no
Level 1 trigger	yes (low rate runs)	no	no	track count	no	no	no	track count	track count energy sum	energy sum

Types of FADCs?

Hall A	Hall B	Hall C
500 channels	2500 channels	64 channels
250 Msps	250 Msps	250 Msps

Other PMT/ SiPMT	FCal Bcal	CDC (anodes)	FDC anodes	FDC cathodes
500 channels	3500 channels	3240 channels	2900 channels	11,400 channels
8 bits 250 Msps	8 bits 250 Msps	10-12 bits 125 Msps	8-12 bits 125 Msps	8-12 bits 62.5 Msps
gain monitor	energy sum FCAL time	dE/dX drift time	dE/dX drift time	charge division

Flash ADC data processing

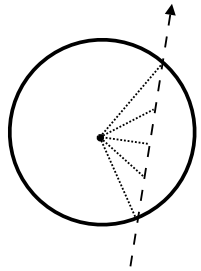
Calorimeter PMT processing:

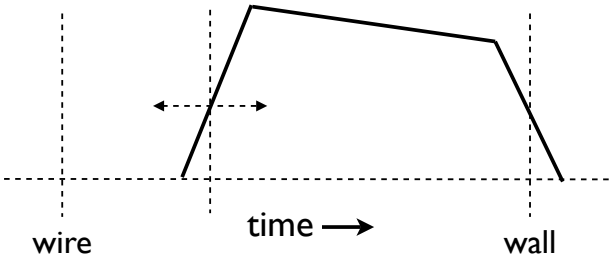
charge
time
energy sum

CDC anode processing:

dE/dX ∝ charge

leading edge time
trailing edge time!
track count for L1?





FDC cathode processing:

charge only?
position algorithm?

FDC anodes:

fADCs for dE/dX?!
track count for L1?

non-calorimeter PMT processing:

charge only?
timing?

Need:
Data from prototypes
Simulations
Algorithms

From the electronics review:

Do they have a realistic milestones as we prepare for the Lehmann review and beyond to construction?

The Committee estimates that a project of the overall scale of GlueX will require about 6 years to complete after CD-3 is achieved. Approximately two years are available between obtaining CD-0 and CD-3, during which the CDR must be developed and all groups involved in the construction of GlueX be put in place. This requires that by FY2006, all major R&D issues should have been addressed.

Does the collaboration have a sensible plan for management?

Rudiments of a plan for management of the electronics system exist, although the plan needs further development. The Committee suggests creating a single organization covering front-end electronics of all detector subsystems, trigger, data acquisition, and online software. The electronics organization should be put in place during the development of the CDR, and the electronics management plan included in that document

Discussion points:

- Detector
  - PID: dE/dX, DIRC, BCal TOF
  - Trigger: Start, BCal track count
- Commonality with other halls...
- Risk management / Innovation
- Management
  - JLab FE & DAQ groups / University groups
    - R&D priorities / funding
    - Responsibilities / Division of tasks
    - Commercial partner?
  - Technical Review Committee
    - There is often more than one “right” answer
    - How will decisions be made?
    - What is time scale for decisions?