

12GeV Trigger meeting notes:

19 March 2010: C. Cuevas, H. Dong, J. Gu, B. Raydo, E. Jastrzembki, J. Wilson, A. Somov

11 March 2010: C. Cuevas, H. Dong, J. Gu, B. Raydo, E. Jastrzembki, J. Wilson

4 March 2010: C. Cuevas, H. Dong, J. Gu, B. Raydo, E. Jastrzembki, A. Somov, J. Wilson

19 Feb 2010: C. Cuevas, H. Dong, J. Gu, E. Jastrzembki, B. Raydo, J. Wilson, A. Somov

5 Feb 2010: C. Cuevas, H. Dong, J. Gu, J. Wilson, E. Jastrzembki, B. Raydo, A. Somov

Updated prototype board status table:--19 February 2010

Quantity	Description	Location	STATUS/Contact
8	<u>10 bit FADC250</u> <u>SN001 -----</u> <u>SN002 -----</u> <u>SN003 -----</u> <u>SN004 -----</u> <u>SN005 -----</u> <u>SN006 -----</u> <u>SN007 -----</u> <u>SN008 -----</u>	<u>Daq Lab F110</u> <u>Daq LabF110</u> <u>Daq Lab F110</u> <u>EEL – 126</u> <u>EEL109</u> <u>F-Wing Lab</u> <u>Hall A</u> <u>EEL – 126</u>	<u>Test Board</u> <u>OK Hall A Student</u> <u>Moller Spare</u> <u>FDC test setup</u> <u>Needs repair</u> <u>F117 (A. Somov)</u> <u>Moller setup</u> <u>FDC test setup</u>
1	<u>12bit FADC250</u>	<u>Indiana Univ</u>	<u>New timing algorithm firmware loaded</u> <u>Sent to IU for FCAL testing</u> <u>12Oct2009</u> <u>'64x crate and LinuX Cpu sent 24Jan10</u>
4	<u>Trigger Interface</u> <u>Trigger</u> <u>Distribution</u>	<u>EEL109/DAQ</u> <u>Lab</u>	<u>Modules used for system testing</u>
5	<u>VME -- FP-SD</u> <u>Front Panel – Signal</u> <u>Distribution</u>	<u>EEL109/DAQ</u> <u>Lab</u>	<u>Complete</u> <u>Use in test crates</u>
1	<u>Crate Trigger</u> <u>Processor</u>	<u>EEL 109</u>	<u>Successful testing with multiple</u> <u>FADC250!!</u>
1	<u>Crate Trigger</u> <u>Processor</u>	<u>EEL 109</u>	<u>Successful testing with multiple</u> <u>FADC250 and in SSP mode!!</u>
2	<u>Signal</u> <u>Distribution</u>	<u>EEL109</u>	<u>Testing complete</u>

0. Trigger/Clock/Sync – TI/TD

19March 2010

William has provided updates to the schedule for three board projects. The TI/TD module design is progressing nicely and schematics are ready for a check.

The 2.7Gbps transceivers were received and were tested in the lab by Ben and William. Results were not remarkable compared to the 3.125Gbps transceivers, but a few plots of the results would be useful. These components would save some costs for the TI-TD fiber links.

As soon as a BOM is created for the prototype TI/TD, any long lead items should be ordered.

4 March 2010

The TI/TD and two other board designs for the distribution of global trigger signals are on schedule and William has updated his schedule progress.

The 2.7Gbps transceivers were delivered and should be tested soon to see if the intrinsic jitter performance of the clock distribution is significantly different than the 3.125Gbps components.

The cost savings to use these transceivers was shown at the last meeting; however, we should plan to use the higher speed grade parts for the CTP to SSP link because these links can be driven to their full bandwidth by the FPGA on the CTP. The quantity needed for the TI-TD links may be able to use the 2.7Gbps part, but the intrinsic jitter spec is the main concern, and needs to be tested thoroughly.

19 February 2010

No schedule updates and the topic of discussion were focused on the fiber optic transceivers. William pointed out about a month ago that the Avago makes another transceiver rated at 2.7Gbps that is about \$100 less than the 3.25Gbps version that we are planning to use.

In the production quantities for both Halls B & D the \$100 savings per part could save \$34K
See table below

Board Quantity	Board	Per board multiplier	Total		
12	SSP	8	96		
60	CTP	1	60		
84	TI	1	84		
12	TD	8	96		
			336	@\$500	\$168K
			336	@\$400	\$134K
				Saving	\$34K

The vendor should be able to provide a few samples of the 2.7Gbps units for testing. One of the arguments is that the savings does not account for extra engineering time needed for thorough test evaluation of jitter and other performance requirements. If the vendor has trouble delivering the 2.7Gbps parts soon, it may be moot.

5 February 2010

No updates to the schedule and William continues to make progress on the TI design activities.

A brief discussion about the assignment of the extra transmit and receive fibers from the TI to the TDs was started by Chris and the consensus was to connect these unused Tx and Rx pairs from the fiber transceivers to pairs on the FPGA. These signals will not require Gigabit resources from the FPGA, but by using the Select I/O features, these unused transceivers could be used as an additional data path between the front end crates and the trigger supervisor crate.

1. FIRMWARE TESTING

19 March 2010

→Hai has completed the "Playback" mode for the FADC250 that will create a waveform in local memory and continuously run these waveforms from the front end FPGA so that the triggering functions upstream can be tested deterministically. The firmware can be tested as soon as reasonable and will be loaded onto the board that Alex is using. The firmware documentation has been updated to include the playback mode.

→Ed reports that the VHDL firmware is complete and will need to be tested on a module for full verification. Ed reports that there is some discussion of adding a big endian-little endian control to the readout word so that the new Intel based CPU does not have to swap the bytes. This issue was raised by Gerard and will implemented on the FADC125.

4 March 2010

Ed reports that the converted AHDL firmware is virtually complete and is in the final stages of testing. As mentioned at previous meetings, the new firmware can be loaded and tested on different boards to measure performance.

No new updates to the FADC250 code lately, and the PREX folks will be running soon and experiment data will be collected from the flash board in Hall A. The Moller firmware was completed many months ago.

19 February 2010

Ed reports significant progress and plan to test on an existing FADC soon. Ben could also use the new VHDL code to on the new VME 16channel discriminator/scaler module. At some point in the not too distant future, Girard may be able to use the latest source code to implement the readout into the FADC125.

5 February 2010

Ed reports that the firmware development to transfer AHDL to a full VHDL source is progressing. The new firmware will need simulation verification and then there are a number of modules that can use the new firmware for field testing.

There was some discussion about the 12bit FADC250 board testing and that the FCAL group has achieved and presented results at the latest GlueX collaboration meeting. The plot that Matt Sheppard presented is included at the end of these notes. The algorithm that was implemented appears to work nicely and achieves the desired timing resolution. (See the plot) The tests were performed using the local on board clock including the jitter from the clock distribution circuits.

2. SUB-SYSTEM PROCESSOR (SSP)

19 March 2010

Ben is preparing to route the SSP with the Specctra router and will configure a quad core machine in the lab for this purpose. The new computer center rules for putting machines to sleep can be bypassed, and if a machine is busy, then the computer center sleep routine will wait until the machine has completed a routing job.

The BOM should be available and long lead items identified!! Consolidate where appropriate and prepare an order before the end of the March!!! Chris will locate appropriate cost accounts for these prototype quantity purchases.

4 March 2010

Ben updated the latest status with the SSP design, and the global trigger crate pair mapping was updated to reflect the latest SSP design. There will be a significant level of work required for the board routing process and hopefully we do not run into any contentions for the Specctra router key.

Parts is parts, and I will say it again that I think the long lead items need to be ordered by the end of March! Even though it is not a large order, I think consolidating the order for long lead parts for the FADC250, SSP, and TI/TD makes sense. These parts will be funded by 12GeV.

19 February 2010

Ben reported that other activities are taking a higher priority than the final routing of the SSP module. Ben has received the quotation for the two fiber optic transceiver models and we are waiting to see if the vendor can deliver two units for evaluation purposes.

Ben reviewed and requested that the pair mapping for the global trigger crate be changed to support the existing SSP design. The new pair mapping for the global trigger crate is on the M:drive.

5 February 2010

The SSP board is ready to begin the routing phase and Ben will be optimizing the DO files and other necessary parameters for the Specctra router. Starting soon after the routing phase, we should process an order for the components and take any advantage of lowering cost by consolidating common components orders for the TI-TD boards as well. The tentative plan is to order one fully assembled SSP.

3. CUSTOMERS

19 March 2010

→Sasha will implement and test the new “Playback Mode” with the FADC250 in the F117 lab. This will be an opportunity to verify the triggering functions of a module and also lead the way for system level commissioning of each crate and associated global trigger modules.

→No recent news from the PREx folks in Hall A and this week they will receive beam and proceed with the commissioning phase of the experiment. It will be interesting to see their results.

→The 12bit FADC250 that is in IU with the FCAL folks may be able to be used by the TOF folks in Florida. The decision to send a flash board to Florida has not been made yet, but I anticipate that they will need a module after they record measurements of their phototubes and scintillation counters.

4 March 2010

→Sasha described his recent success and setup with the FADC250 board he has configured in F117. The plan is keep this board for continued testing and development of the front end “data playback” mode that will be used to commission the trigger system. Hai has started a specification document that describes the ‘data playback’ mode that includes an implementation plan.

→No news from the IU FCAL group regarding the latest measurements using the 12bit board.

→Request from the Florida State TOF group was answered, but it is not clear what they will need for their test setup. It is clear that they will need a VXS backplane, but the overall goals of what their priority measurements need to be has not been described.

19February2010

→Sasha has started using one of the FADC250 boards and has set up a test crate in the Fwing 1st floor lab. Dave Abbott has located a spare FADC250 unit which can be sent to Paul Eugenio in Florida. (GlueX TOF testing) Paul has modified a ‘64x crate so that the P0 connector on the flash board will not get damaged. Chris will check with Paul to see what other peripheral boards Paul may need to get going. The firmware will need to be updated and verified before sending the board. (Hai)

→Dave Abbott exchanged a GE Fanuc CPU with another model for the FCAL folks at IU. The new unit will be used by Girard Visser for continued testing with the new FADC125.

5 February 2010

→No new issues with the 12bit FADC @ IU. The number of working channels is fine for their testing purposes and I believe they have the new crate and Cpu working.

→Alex will receive a single FADC250 along with a small test crate, Cpu and VME-TI so that he can become familiar with the hardware and prepare a ‘framework’ that will interface simulation data(signals) to the front end FPGA. The data(signals) will be loaded into the front end modules and the trigger system can be tested using the simulated data(signals). Using this method, individual detector systems could be tested and verified using data that is effectively generated from each input channel.

→A single crate and FADC250 has been reserved for the injector group and they have submitted a letter of intent(LOI) for a new Compton Polarimeter system. The LOI lists the goals of the new apparatus and they are projecting a very high trigger rate and understand the triggering features and data acquisition modes of the FADC250. The request is not presently a high priority, but we should be able to set them up with the hardware when they are ready.

4 "B" Switch - Signal Distribution Module (SD)

5 February 2010

No new activities planned and modifications to the existing modules will have to take place before testing begins with the latest version of the FADC250 boards and the SSP.

8 January 2010

The SD module will need to be revised to reflect the changes to the signal pair mapping for the front end crates. We have two modules in the lab and I believe we can modify these units to work for testing the SSP prototype and revision 1 of the FADC250 that will be ready before the end of FY10. The SD module revisions are effectively only signal pair changes and there are a few other circuit changes that will also need to be included for the final production lot.

5. System Diagrams & Test Stand Activities

19 March 2010

A brief discussion of the test stand configuration for testing the TI/TD, SSP and version 2 of the FADC250 was started and it makes sense to dedicate a meeting to the activities that will be needed for testing these modules as a system.

4 March 2010

Nothing new to report. Fiber optic layout and details will become a significant project for FY11.

19 February 2010

See notes in the SSP section, and to repeat, the updated global trigger crate pair mapping has been updated per Ben's request. Sooner than later, this crate pair mapping will be cast in stone and there are ongoing discussions regarding the GTP that may impact the final configuration.

5 February 2010

The Trigger Supervisor crate pair map has been completed and will need to be checked. I believe Ben volunteered to check the diagram. Several other groups have been instructed to use the pair mapping definitions for their front end payload designs, and the pair mapping for the global trigger crate takes into account the signaling required for the SSP-GTP-SD crate scheme.

Crate Trigger Processor (CTP)

CTP activities are complete.

6. Projects for FY10

19 March 2010

The projects outlined for FY10 are progressing nicely with the exception of the GTP. The specifications for the GTP have not changed, but a new solution for implementation of the design has been determined. Schematics for the GTP must start soon.

Prototypes of the SSP, and version two of the TI/TD will be completed before the end of this fiscal year and these modules can be tested in concert with the FADC250 version two boards that will be ready also.

4 March 2010

→The GTP update was presented and a single chip solution exists for the GTP prototype. Altium Summer09 has the part in the library so at some point in the very near future a schematic will be conceived. A very big start to this is the fact that the CTP can be copied and many of the same parts re-used. The switch board format is also complete!

→We discussed the use of two GTP for CLAS12 and it is clear that an updated requirement from the CLAS12 folks is in order for the global trigger hardware. GlueX has not requested any new global trigger requirements, so in principle a single GTP should be able to manage the experiment trigger equations. The SD functions for each GTP will remain, and we also discussed that it may be a very good idea to implement at least 4 of the inter-switch pairs for future use.

19 February 2010

→The original GTP specification was written in April 2008 and discussions have started to at least review the requirement specification and begin an update. We will have to keep this activity moving at the specification stage, because we simply do not have a full time person dedicated solely to this design project. The complexity of the GTP design is an extreme challenge, and we can take advantage of the latest FPGA technology to solve these challenges.

22 January 2010

The GTP specification exists and has not been updated for several months. The activities for the schematic and detailed design issues have not been started and this may slip because the plan was to have a new hire in place by now. Starting the schematic and other activities *could* start soon, but it will impact other project assignments and I do not want to have that happen at this point.

ACTION ITEMS: Next meeting → Friday 2 APRIL 2010 at 10:00am in F227