

Minutes of ATLAS Level-1 Calorimeter Trigger Phone Conference – 16th June 2005

Birmingham: Richard Booth*, Gilles Mahout, Richard Staley, Peter Watkins

Heidelberg: Ralf Achenbach, Victor Andrei, Florian Föhlisch, Paul Hanke, Kambiz Mahboubi, Karlheinz Meier, Frederik Rühr, Klaus Schmitt, Pavel Weber

Mainz: Uli Schäfer

QMUL: Eric Eisenhandler*

RAL: Ian Brawn, Norman Gee, Tony Gillman, Weiming Qian

Stockholm: Sam Silverstein

**at RAL*

1. Birmingham

- The Production Readiness Review for the CPM was held in Birmingham on 7th June, and concluded with approval for module production to go ahead.

During the Review, the results of further tests and measurements requested by the Final Design Review were presented:

- With modified LSM firmware, the LVDS links were shown to operate up to 42.7 MHz with no increase in BER.
 - Data integrity of the links was shown to be insensitive to variations in the Deserialiser 3.3V power supply voltage over the range 2.8V to 3.6V.
 - The latency of the CP FPGA was measured to be 7.0 BC, rather than the expected 6.4 BC – *i.e.* compared to the original figure, the improvement is 1.4 BC rather than 2.0 BC.
Eric suggested that the overall CPM latency should also be measured as soon as possible.
 - Uli's suggestions for managing FPGA global clock resources has been applied to the CP FPGA, and now permits a total of four global clocks to be distributed, thereby allowing provision for one spare global clock to be distributed if needed.
 - The FIO data timing windows have been measured on the second CPM1.9 to be 2.4 nsec, slightly worse than the 2.5-2.6 nsec measured on the first module, although this may possibly be due to the use of the modified CP FPGA firmware as noted above.
- The 14 new LSMs have been assembled and will be delivered to RAL for JTAG testing. Subsequent testing and fitting of front-panels will be carried out at Birmingham.

2. Heidelberg

Paul reported three pieces of very good progress:

- All 18 of the new AnIn daughter-cards have been assembled and fully tested. They all perform correctly, with no measurable cross-talk. 16 of them (plus two spares) are needed to populate the first four prototype PPMs.
- The first batch of 415 assembled MCMs has been delivered to KIP. Of these, 350 devices were thoroughly evaluated, with extended ASIC tests, and the yield of accepted MCMs is 91% (318 good devices), which is very impressive and implies that there will be a more than adequate number of good MCMs available finally.

32 MCMs show some problems, and will be studied further to see if re-work is possible. One important and encouraging observation is that there is no correlation between the ASICs on these failed MCMs and the known poor-yield wafers.

- The first re-designed LCD card has been delivered, assembled and tested at KIP. All output channels have been checked by scope observation, both directly on the socket and also at the end of a 15m LVDS cable, and the eye patterns look very good. Quantitative BER measurements must still be made, but this is already extremely encouraging.
- PPM readout tests at RAL were successful at low trigger rates, and high-rate testing so far is promising. The PPM design itself is in the process of being updated to reflect known changes. LVDS cable grounding is being discussed between the PPr, CP and JEP engineers.
- Multi-step timing calibration runs with a PPM have been successfully carried out at KIP, and a note describing them will be issued soon.
- Frederik has drawn and distributed some clear diagrams of the inter-crate/rack analogue cabling in USA15, which will be helpful during the three-day “cable-fest” in CERN next week.

3. *Mainz*

- Uli has been studying the FIO data cross-talk problem on the JEMs, which is believed to be caused (at least, in part) by the trace separation of 120 μm being too small. In order to confirm this, a stand-alone test board is being designed to measure the cross-talk magnitudes for different trace separations. This will be available in about two weeks, after which a further layout iteration of the JEM will be needed.
- The JEM1.1 manufactured at Rhode & Schwarz will need to be re-made with the appropriate Gerber file translation.

4. *RAL*

- The modified TileCal Patch-Panel (TCPP) schematics will be submitted to the RAL Drawing Office tomorrow for layout. The first few pre-production modules should be available in late July, with the full production batch ready by late August.
- There are problems with some of the components for CPM production, which have very long lead-times of up to 14 weeks. For the first few modules, Viraj is trying to find if sufficient parts are still in stock at RAL from earlier CPM versions.
- The RAL Drawing Office has all the information required to produce updated CPM schematics, and this work, followed by the pcb layout changes, will start as soon as the draughtsman becomes available.
- The 9U ROD firmware has been updated to reflect several new requested features, and at present a few bugs have still to be fixed in the new code. It should be ready for Bruce to test when he returns next week.
- The RAL Drawing Office will start to work on the schematics and pcb layout changes for the production CMM tomorrow, and these are expected to take about one month to complete.
- There are also changes needed to the generic CMM firmware, to provide a second clock timing domain for the revised asynchronous G-link readout scheme.
- The CP variant of the CMM firmware works correctly.
- The Energy variant of the CMM firmware will not yet run at 40 MHz; to achieve this may require an increase of 1 BC in the latency of the Energy algorithm path.
- Weiming has another six of the new TTCdec cards available for testing, for which he will need his TTC Test Module returned from Birmingham.
- Richard (Booth) and Norman have been working to get CMM timing measurements done using multi-step runs. Richard and Florian should clearly keep in contact regarding multi-step running.

5. *Stockholm*

- The bids for the Processor Backplane (PB) were all received by the closing date of 10th June, and Sam is currently evaluating them. Some further discussions with manufacturers may need to take place over the next few days, but he hopes to reach a decision by the end of next week. Production should then start four weeks after a contract has been placed.

(There then followed some discussion about the nature and extent of the pre-production and production PB testing, which will be pursued in a smaller group.)

- Sam will visit RAL for the week beginning 27th June for tests of the Jet variant of CMM firmware.
- Two students will be working in Stockholm throughout the summer to prepare the mechanics for the production crate and PB assemblies.

Next Phone Conference – Thursday 30th June 2005 at 10:00 (UK), 11:00 (Germany, Sweden)

Tony Gillman