Minutes of ATLAS Level-1 Calorimeter Trigger Phone Conference – 5th October 2006

Birmingham:	**Richard Booth, Dave Charlton, Chris Curtis, Gilles Mahout, Richard Staley**
Heidelberg:	**Eike-Erik Kluge*, Paul Hanke, Kambiz Mahboubi*, Karlheinz Meier, Hans-Christian Schultz-Coulon, Rainer Stamen**
Mainz:	**Markus Bendel, Uli Schäfer**
QMUL:	**Eric Eisenhandler*, Murrough Landon***
RAL:	**Bruce Barnett*, Ian Brawn, Norman Gee, Tony Gillman*, Viraj Perera, Damien Prieur, Weiming Qian*, Dave Sankey**
Stockholm:	**Sten Hellman, Sam Silverstein***
	** at CERN*

1. Birmingham

- The new mechanical stiffening bars have been fitted to the pre-production CPMs, with no detectable temperature changes across the modules, showing that the flow of cooling-air is not significantly disturbed.
- Four of the Type 5 RPPPs are now ready to be sent to CERN. Four Type 4 RPPPs will be prepared next.

2. Heidelberg

- Preparations have been continuing for next week's PPM review (combined FDR and PRR), and Paul has just released the updated documentation which Tony will circulate – primarily for the reviewers, but also for others to read.
- The PPr full-crate now operates completely stably, for periods exceeding an hour. Operating with "stress" patterns from playback memories, the PSU currents are 170A (3.3V) and 150A (5V). The temperature profiles of the MCMs range from 30-60 degrees Celsius.
- One of the most serious problems that has been solved with the PPMs relates to the PHOS4 chips. Solution have had to be found to fix many "features" of the device. For example, it was discovered that the reference clock must have a mark/space ratio very close to unity, requiring modifications to the clock distribution trees.
- A cold-start configuration of the full crate of 16 PPMs boots from Flash memory takes only ~5 seconds.
- Some minor hardware changes to the PPM motherboard design have been identified and will need to be carried out on the full set of 20 modules. A revised PCB layout has already been prepared for the production boards.
- The LVDS output cables have not yet been connected to other modules, and the eye patterns have been observed just by resistively terminating the cables.
- Tests of the links to the CP and JEP sub-systems and to a ROD will be carried out at CERN next week.
- The Auxiliary Backplane is available, with a custom tool to insert and remove it from a VME64xP crate.
- The PSU oscillations observed recently in the PPr crate occurred only with the original Wiener-supplied power cable wiring, although they are only ~0.5m in length. After re-arranging power and ground leads in closely-couple pairs, the PSUs are now completely stable with several different types of data pattern.
- The complete set of MCMs is now complete, with ~3,000 devices tested and working. Of these, only 1984 are needed at any one time in ATLAS.

The yield from the final batch was much lower than on earlier batches.

Some of the faulty MCMs are due to bad PHOS4 chips.

Some MCM repairs will be attempted, with perhaps ~100 or more devices possibly recoverable.

3. Mainz

- As soon as the new air-cooled CP/JEP test crate arrives from Stockholm in the next few days, it will be set up for commissioning the forthcoming production JEMs.
- A full test-rig for the JEMs has been assembled by Bruno. Boundary scan files are being prepared and will first be tried on some of the old JEMs.
- A single LSM will be used in the test-rig to generate real-time LVDS signals.
- A DSS with associated GIO card is being shipped from RAL for use in this test-rig.
- The JEMs currently in Birmingham should be sent to CERN for integration tests, although one or two could usefully be returned to Mainz.
- There is no recent news on JEM production from Rohde & Schwarz. The current expectation is that all modules (including daughter-cards) will be delivered by the end of October.

4. RAL

- The latest news on CPM production is that delivery of the first five modules is scheduled for 9th October, with delivery of five modules per day to follow. This implies that we should receive all of the CPMs before the end of October.
- Richard Matson has made the necessary preparations for JTAG tests of the CPMs at a rate of at least five modules per day.
- Once it has been confirmed that the missing parity bit on the CMMs is not caused by a hardware fault, the module design is ready for production.
- All production CMMs should be tested in the Birmingham full-crate system before they are shipped to CERN.
- Bruce is concerned that the mechanical stiffening bars on the CMMs and RODs may obstruct the flow of cooling air to regions of the modules, but Ian does not believe that it will be a problem. Viraj suggests that the FPGA temperatures be measured, both with and without the bars to check for any differences.
- The mechanical accessories for the pre-production VMMs and TCMs (front-panels, etc) are due for delivery to RAL by 19th October.
- Full VMM production is awaiting a quotation.
- The pre-production batch of TTCdecs has been tested in Heidelberg to work correctly, except for the operation of TTC Broadcasts, which could be tested at CERN next week. Viraj would like to get production authorised as soon as possible as there is believed to be long lead-time.
- There has been a recent concern about possible voltage drop on the 5V line across the VMM. It is noted that the three VPC pins are not tracked on the VMM 6U connector, so there are a total of only six pins carrying 7A to the Concurrent SBC. It was decided to track these three VPC pins on the production PCBs in order to improve the current capacity.
- Weiming will test the TTCdecs returned after repair from *Cemgraft* (addition of crystal oscillator chip).
- Work is continuing to check several features of the ROD design and implementation – in particular, interfacing – that were recommended by the recent PRR.
- Dave Sankey reported that the compression firmware has now been further compressed to use only 73% of the FPGA resources. Although it does not yet incorporate the necessary error-handling code, this should not significantly increase the occupancy.

5. Stockholm

- Sam was at CERN during part of this week, looking into the CP/JEP crate power cable routing, and other mechanical issues. It has been decided to re-route the cables to the lower half of the crates, thereby saving a considerable length of cable, and hence inductance and IR drop.
- Two more water-cooled crates are ready in Stockholm, except for new power cable looms. Perspex insulating plates are also available for fitting to protect any exposed parts of bus-bars and wiring. These crates could be shipped to CERN within a couple of days of receiving the replacement 50mm^2 *Silistrom* cable which will be ordered from the UK distributors. Credit will be given for the unused drum of 95mm^2 *Silistrom* cable currently at Stockholm when it is returned.
- *In situ* retro-fitting of the crate currently in USA15 with the new power cabling will be difficult.

6. CERN

- The continuing testing of the ROD during the last two weeks has been very successful, thanks to efforts from Ian, Weiming and Bruce in particular. Bugs have been identified in the Input FPGAs and the Switch FPGA. Weiming has identified and fixed the 10^{-4} error rate bug, and ~20M error-free events have now been processed. There is now considerable evidence to show that the hardware integrity of the ROD design and implementation is sound.
- The full set of 64 TCPPs are now labelled and installed in USA15.
- The TileCal cosmic trigger will require even more signals, for which the existing TCPPs will be used with temporary re-cabling.
- The DCS PC has been equipped with a keyboard and screen, ready for the imminent CAN tests in USA15.
- Murrough has ordered cable and connectors to make up the necessary CANbus cable assemblies. However, the CERN-recommended cable appears to be much too thick to allow for realistic connector assembly for daisy-chained cables (two cables into each connector). It was suggested that for short in-rack runs twist-and-flat cable might be possible.
- It may be possible this week to install the ROD-ROS fibres, which are already labelled. This would then allow ROS commissioning to begin.
- The CMM-CTP cables have been removed and returned to Philippe Farthouat for repair.
- Most of the necessary rack blanking panels and module dummy front-panels have been shipped from the UK to CERN, and the remainder are already on order.
- The Muon Trigger termination boards (for the currently-unused TCPP muon trigger outputs) have been delivered from Philippe Farthouat.
- The final RPPP analogue cable measurements have begun in USA15.
- All of the direct-run Receiver-PPM cables have been installed – a significant milestone.

Next Phone Conference – Thursday 19th October 2006 at 12:00 *(11:00 in UK)*

Tony Gillman