Minutes of ATLAS Level-1 Calorimeter Trigger Phone Conference – 14th December 2006

Birmingham:	**Dave Charlton, Chris Curtis, Gilles Mahout, Simon Pyatt**
Heidelberg:	**Paul Hanke, Karlheinz Meier, Rainer Stamen**
Mainz:	**Markus Bendel, Andrea Neusiedl, Uli Schäfer**
QMUL:	**Eric Eisenhandler**, Murrough Landon***
RAL:	**Norman Gee, Tony Gillman, Viraj Perera, Damien Prieur, Dave Sankey**
Stockholm:	**Sten Hellman**

** at CERN ** at RAL*

1. Birmingham

- The recent batch of six CPMs sent from RAL have now been tested, and two have been returned to RAL for minor repairs (connector re-fitting, *etc*).

  A further two modules had already been returned to RAL for even more minor repairs (incorrect LED colour, wrong CAN connector).

  Viraj gave the following summary of the current CPM production status:

  53 modules were ordered.

  31 modules have successfully passed their JTAG tests.

  15 modules require some level of re-work.

  7 modules are still to be tested.

  The assembly company are currently re-working some of the large BGAs on some boards.

  An investigation was carried out to try and understand the reason for connectivity failure with some BGAs, by removing one faulty device and inspecting the underlying PCB surface. In this particular case the cause was found to be a broken trace near a BGA pad, which has been repaired.

  Boards with re-worked BGAs, both large and small packages, will be sent to Birmingham for thermal stress tests.

- Gilles has already tested one CPM at an elevated temperature, by stopping the crate cooling fans. The temperature monitor on one of the FPGAs showed a rise to 70°C, at which temperature the module was operated for 20 minutes (with real-time data patterns running) before returning the temperature to ambient for a further 20 minutes. This cycle was repeated four times, with no measured change in the module performance.

- Simon is drawing up the pieces of mechanics which will be fitted to the CP/JEP crates to provide the framework for the LVDS cable strain relief system. This structure may also act as a support structure for a perspex insulating sheet to isolate the power bus-bar system, which will be extended slightly to better accommodate the multiple power leads.

  The Birmingham workshops will produce one set of these parts during the first week of January, which can first be evaluated in the Birmingham CP/JEP crate and then taken at CERN for the cabling week starting on January 15th. If successful, a further six sets of these parts will be produced for retro-fitting to the remaining crates at CERN.

  The order for manufacturing the LVDS cable strain relief system for the CP/JEP crates will be sent out from RAL early next week, with the first ten 4-slot blocks requested by 11th January, so that they can be at CERN for the cabling week.

2. Heidelberg

- A start has been made on repairing some of the faulty MCMs. Ralf has been working with *Hasec* and 70 devices have so far been successfully restored to life.

- Klaus has fixed the problem of minor mask misalignment on the LCD PCBs by filling each of the three affected vias on all 160 PCBs. The assembly company, *Ludtke*, will now start to assemble a sample of ten LCDs, which will be X-rayed to assess the viability of the repair.

  If satisfactory, the company will continue to assemble the remaining boards, with X-ray sampling to maintain QA.

  If problems are seen with this initial test batch, then all of the PCBs will have to be re-manufactured.

- The 160 PCBs for the CAN control daughter-cards have all been delivered, and are now at *Ludtke* for assembly next week.

- The first batch of 80 PPM motherboard PCBs were delivered to KIP on 8th December. Each board had a minor manufacturing error, where seven mounting holes for connectors had not been drilled, so they were returned to the PCB manufacturers for this to be done.

  Surface-mount component assembly of all 160 PPMs will take place at *Ludtke* next week.

  The remaining (non-SMD) assembly work on the modules will begin at *Ludtke* after Christmas, as defined in the advertised production schedule.

- The LVDS Multiplexing Test-Rig, for checking the real-time signals from the production LCDs, is largely ready, with only the VME readout section remaining to be completed.

- Viraj reported that 23 J0 Auxiliary Backplanes of the modified design have been ordered. The PCB manufacturers will ship the 15 boards for the PPr crates directly to Heidelberg on 21st December, and the remaining eight boards for the ROD crates will be fitted with connectors *etc* at the assembly company in the UK.

- The remaining six PPr crates at KIP need further electrical and mechanical work before they are ready to be shipped to CERN. All of the LVDS cable strain relief system is ready to be installed in the crates.

  The aim is to take to CERN by road between two and four PPr crates in time for the proposed LVDS cabling week, beginning on 15th January. It would be very useful to have all four of the PPr crates installed on the A-side.

3. Mainz

- Tests of 45 G-link daughter-cards and 41 Control Modules for the JEMs have been completed. One G-link daughter-card and three Control Modules required re-work. The full system tests await the assembled JEM mother-boards.

- The JEM Input Modules have all been assembled, but an unexpected seasonal shortage of packing material has delayed their shipping to Mainz. They are expected next week.

- The assembled JEM motherboards are scheduled for delivery to Mainz just after Christmas.

4. RAL

- 300 PCBs for the TTCdecs have been manufactured. An initial batch of 50 assembled boards will be shipped to CERN today for Weiming to test as soon as possible.

- 142 RGTM-O modules are currently being assembled, and the first batch of ten which have just been delivered will be shipped to KIP today. The remainder are scheduled to be delivered to RAL next week and once they have been inspected will be shipped to KIP (probably after Christmas).

- Only three of the four CMM PCBs have been delivered so far. If the fourth board does not appear by the end of this week, then assembly of the first three will be started to avoid further delay. The expected date for the completed modules is 15th January.

- The CANbus interface does not work on the TCM-64 module at CERN. Someone (Weiming?) should check that the changes made to the TCM-CP/JEP design have all been carried over correctly to the TCM-64 design.

- The S-Link RTM design is still in the RAL Drawing Office. Some mechanical changes and some test-points have to be added to the PCB.
- It is important to check that the CMM RTMs mount correctly in the brackets that have been added to the CP/JEP crate sides.
- The production VMMs are scheduled for delivery to RAL on 20th December.
- All ROD schematics changes have been made to the PCB layout and checked. The design files are therefore ready to be sent out to have another four modules manufactured. However, some problems have been observed recently with operation of the first ROD to be tested in USA15:

  i) VME WRITE operations are flaky, at least when the modules are in Slots 17 or 18

  ii) Playback memories cannot be written correctly; odd-address locations respond with valid data, but even-address locations always read back zeroes. (The second ROD should also be checked for this problem)

  These two effects may be different symptoms of the same problem.

  If these problems are hardware-related, then the design must be fixed before the next batch of four modules is ordered, so further investigation must be carried out as soon as possible.

  Ian is looking into the problem, and there are some minor hardware (solder link) changes that can be made on the CERN module which may fix the problems.

  Norman and Ian will visit Birmingham next Tuesday so that Ian can make some tests on the ROD there, using *ChipScope*.
- A very comprehensive series of tests have been carried out on the ROD in USA15; one possible remaining test would be to try thermal cycling of the module.

5. Stockholm

- The fourth CP/JEP crate shipped from Stockholm has arrived at CERN. All four crates now at CERN will need to have the LVDS cable strain relief system and the power bus-bar extension pieces added before they can be installed in USA15. (Note that the first crate will have to be temporarily removed from its rack on the C-side for this work to be done.)

6. CERN

- Last week was a cabling week at CERN, and a start was made on labelling the LVDS cables and grouping them in suitable bundles ready for installation. This process proved extremely time-consuming.

  Nick Ellis is arranging for a Romanian technician to help with this work for at least one month, starting on 8th January.
- Preparations are being made for signal testing of the TileCal trigger signals.

Next Phone Conference – Thursday 11th January 2007 at 11:00 *(10:00 in UK)*

Tony Gillman