

Minutes of ATLAS Level-1 Calorimeter Trigger Phone Conference – 7th September 2006

Birmingham: Steve Hillier*, Gilles Mahout, Simon Pyatt, Xen Serghi, Richard Staley

Heidelberg: Paul Hanke, Karlheinz Meier, Hans-Christian Schultz-Coulon

Mainz: Uli Schäfer**

RAL: Bruce Barnett*, Ian Brawn, Tony Gillman, Viraj Perera, Dave Sankey

Stockholm: Christian Bohm

*at home **at Birmingham

1. Birmingham

- There have been further problems seen with PSU oscillations at ~1kHz, this time on the 3.3V rail, when operating multiple CPMs and JEMs in the CP/JEP crate. There is an intensive discussion continuing between a few people and measurements of the effect are continuing. The cause of the oscillation is believed to stem from the resonant circuit formed by the high capacitance presented by the modules and the loop inductance of the PSU leads. Reducing this inductance by running the leads close together increases the frequency and reduces the amplitude, sometimes to zero, but the suspicion is that the system is close to some threshold for oscillation and remains potentially unstable.
- The CP/JEP crate PSU cabling will be changed to use the thicker (95mm²) flexible Silistrom cable which has just been delivered. The length of the cabling will emulate that needed for the water-cooled crates in order to check that the increased length does not exacerbate the oscillation problems. For example, Wiener state that the lead lengths should not exceed ~1m, whereas we need >1.5m. Paul noted that Wiener had suggested lengths under 0.5m to the Heidelberg group.
- Reducing the capacitance on the 3.3V rail on the JEMs may be a solution, so a test has been carried out in Birmingham to check that the LVDS links remained stable when this was done for one JEM. By clipping the PSU power and ground return leads together very carefully to reduce the loop inductance it was possible to stop the oscillations, and under these condition all links on the modified JEM operated stably with no parity errors seen in long test runs. This implies that a similar reduction (by 75%) of the 3.3V decoupling capacitance on all JEMs should allow a full crate of 16 JEMs to operate oscillation-free.
- No similar problems have been seen to recur on the 5V PSU once the power-ground return pairs are appropriately tightly coupled.

2. Heidelberg

- Manufacture of the 20 pre-production PPMs is complete, the modules have been delivered from Lutke to KIP and tests have begun with checks on the integrity of the 3.3V, 5V and 12V power distribution.

17 of the 20 modules are OK, three have some minor problems with shorts on some of the MCM connector pins, which will be easy to repair.

All of the PCB stabiliser bars have been fitted, the LCD cards installed and all necessary firmware loaded.

VME operation (on the 17 modules) performs correctly.

Nine PPMs have been operated together in the crate, but so far only with their LCD cards mounted.

No AnIn cards or MCMs have yet been mounted on the PPMs.

Hot-swap operation works correctly.

The goal is to operate all 16 PPMs in the crate very soon, adding AnIn cards and MCMs gradually.

The cable strain relief mechanics has been tried and works well.

A complete list of the known modifications (small in number) is being compiled as an aid to full production of PPM v1.1.

The CAN daughter-card is still missing. Of the existing 30 PCBs the first two daughter-cards will be assembled by hand, with subsequent assembly of the remainder being carried out at Lutke.

- Kambiz is bringing the TCM-64 to KIP, where it will be needed for module clocking tests.
- The combined FDR/PRR for the PPM will be scheduled for early-mid October 2006.

3. *Mainz*

- Uli stressed again that production of the JEMs is becoming very urgent, for reasons of funding. It is hoped that authorisation will be given before the end of this week, assuming that no further problems are seen with the module tests.

4. *RAL*

- The latest batch of TTCdecs are all missing the 40MHz crystal modules, due to a manufacturing error. They will be returned directly to the assembly company to be retro-fitted.
- The faulty ROD has had the central Input FPGA removed for inspection, and ~60 pads were found to have become detached from the PCB. The board is therefore unusable. There is still a suspicion that the damage may have been caused by mechanical stresses during transit.
- A second ROD has a fault whereby one of the Link Ready lights (and its corresponding Status Register bit) is permanently illuminated.
- The temperature profiling needed for the assembly process will be carried out once more, on another board, in order to check that there is no problem in this area.
- It was suggested that frequent power cycling could exacerbate the effect of thermal stress on the PCB-BGA interface, possibly leading to failure.
- Front-panels for the pre-production VMM and TCM-CP modules are not yet available, due to reduced effort in the RAL Drawing Office during last month, but the necessary design and layout work has now started.
- Dave Sankey reported that he has built a System ACE file for the ROD compression firmware, which he will ask Bruce to test on the ROD at CERN. It is very important to confirm that the firmware matches the FPGA resources comfortably so that the appropriate size of device can be ordered. Dave has managed to make significant reductions in resource utilisation since the recent ROD review, but although error treatment is implemented the results are not yet output. The question as to whether the current utilisation factor allows sufficient headroom in the smaller devices must be decided by the reviewers.
- FPGA delivery for the production RODs is either ex-stock (for the larger version) or 17 weeks (for the current smaller version). Five of the smaller devices will be recovered from the damaged ROD and re-balled. A further nine devices are already in hand, so there would be enough available to assemble another two modules.

5. *Stockholm*

- The next two CP/JEP crates (air-cooled) are being prepared now. The first one could possibly be delivered next week, and the most likely destination is the Mainz group. The second crate is destined for CERN, but is missing its PSU, which is currently at CERN for repair.
- The replacement Silistrom flexible power cable will be shipped from RAL to Stockholm in the next few days.

6. *CERN*

- Steve reported that ~50% of the short analogue cables had been installed in their final positions, and about 60% of the remaining cables had now been measured and delivered to Cegelec.

- We should approach Cegelec to extend the contract with them, to allow spare cables to be fabricated according to the recently agreed plan. An extra ~5% of cables of specific length, and an extra ~5% of cables of double length (for subsequent cutting into two new cables) would be provided.
- For the calorimeter analogue trigger cabling, 25 Extended Barrel cables have been already laid this week on the A-side (but not yet with connectors), producing plenty of off-cut lengths which will be very useful for us.
- The next major cabling task in USA15 will be to plan for the LVDS cable installation, which may be interleaved with the last stages of the analogue cable installation. The production LVDS cables are currently being shipped from Stockholm to CERN, where suitable storage must be found for them. A modified version of Paul's design for the PPM LVDS cable strain relief mechanics would be very desirable for the CP/JEP crates, and we should start to think how this work (design iteration and manufacture) might best get carried out.
- The fibre plant (G-links and S-links) must also be carefully planned to provide proper handling of these delicate cables.
- Almost all of the production TCPPs have been finally installed, and the remainder are awaiting replacement connectors to be fitted as soon as they are delivered to Birmingham.
- Bruce reported that the CMM clocking problem, where the TTC lost lock occasionally, was caused by a glitch on the encoded TTC signal into the CMM when a Single-Mode fibre instead of the correct Multi-Mode fibre had been used by mistake, producing severe attenuation of the optical signal.
- Errors are still seen in the ROD under tests at CERN, at a level of in 10^4 events, when one extra word appears in the output. It is believed to be a firmware rather than a hardware problem.
- Tests of Dave Sankey's compression firmware will be carried out next week, in order to establish the correct Input FPGA device size to order.
- During recent CMM-CTP interfacing tests, the CMM-CTP cables were found to have a large number of faults. They must be removed, repaired and re-tested. It is possible that the analogue cable tester designed by Xen might be modified as an in-situ test system for these cables, providing continuity and shorting tests.

Next Phone Conference – Thursday 21st September 2006 at 11:00 (10:00 in UK)

Tony Gillman