

## Minutes of ATLAS Level-1 Calorimeter Trigger Phone Conference – 4<sup>th</sup> May 2006

**Birmingham:** Richard Booth\*, Chris Curtis\*, Gilles Mahout\*, Simon Pyatt, Xen Serghi, Richard Staley, Peter Watkins

**Heidelberg:** Björn Gosdzik\*\*, Paul Hanke, Eike-Erik Kluge, Kambiz Mahboubi\*\*, Klaus Schmitt

**Mainz:** Uli Schäfer

**QMUL:** Eric Eisenhandler, Murrough Landon\*\*

**RAL:** Bruce Barnett\*\*, Ian Brawn, Norman Gee, Tony Gillman, Weiming Qian\*\*, David Sankey

**Stockholm:** Sten Hellman, Sam Silverstein

\*at RAL      \*\*at CERN

### 1. Birmingham

- The JTAG tester software is ready for the 9U RPPPs *i.e.* those with three connectors.  
All 36 Type 1 modules have been delivered.  
The 20 Type 2 modules still need to be modified to correct a schematic error, which should only take about 20 minutes per module.  
The six Type 5 modules will need all nine 37-way connectors replaced as the original ones are too flimsy for our use.  
The Types 3 and 6 RPPPs are expected this week.  
The Type 4 PCBs were ordered this week, but will be delivered without connectors, since they have the same problem with poor connectors as the Type 5 modules. Replacement connectors will be added at Birmingham with additional mounting bars to hold the screwlock threads. A mock-up appears very sturdy, and the school workshop will be asked to machine the bars.
- To complete the “full-crate” CPM tests, a 5V 300A PSU was ordered from PowerSolve on 28<sup>th</sup> March who claimed that unit was in stock, but then subsequently discovered it was not. The unit is shipping from Japan but the delivery date keeps changing. An alternative supplier is quoting on delivery as their 300A unit is also not a stock item.
- Gilles has confirmed that the problem of Des1 clock phase shifts seen when issuing Broadcast Start-Stop commands is present in both the CPM and TTC Fan-Out modules. It does not appear to be systematic, and only two phase states are ever observed.
- It was confirmed that the Bytestream Converter must have the capability to read all of the time slices from the CPMs and JEMs.

### 2. Heidelberg

- 2800 “naked” MCMs are now available, with a further 500 to be collected next week, out of a total requirement of 4000. Yields have remained fairly constant.
- There are now 1100 “lidded” MCMs, and the target is to complete the entire production/assembly by June. Re-work issues are currently under discussion.
- Production of the AnIn daughter-cards will start 10<sup>th</sup>-12<sup>th</sup> May.
- The LCD daughter-cards are now at the assembly company.

- The PPM layout and routing has undergone many iterations. Routing around the ReM-FPGA is particularly difficult, and hand-routing has been found essential. It is expected that the manufacture of the first 16 PCBs can be started in about one or two weeks.
- A prototype of the LVDS cable strain relief system proposed by Paul is being made, and if successful all of the PPr crates will be so fitted.
- An LVDS Multiplexer Receiver module is being assembled for testing all LVDS outputs from each PPM.
- There was some discussion about temporarily lending a PPr crate from Heidelberg for use for ROD testing in Bat 3150. It would be best if it were fitted with the LVDS cable strain relief mechanics before shipping from Heidelberg, and would also require the temporary addition of a 48V PSU.

### 3. *Mainz*

- Four pre-production Control Modules have been assembled, and the first one is now being tested. The other three modules still require some re-work.
- Rohde & Schwarz have apparently resolved the problems of wrong connectors, and delivery of four assembled JEMs and 16 assembled Input Modules is expected within a few days.

### 4. *RAL*

- Testing of both of the latest two RODs and both of the pre-production CMMs has been completed satisfactorily, and they now only await checks with a TTC system.
- The design of the RTM for the production CMM has been completed and a request for quotation submitted, for either four pre-production followed by 17 production modules or for the entire batch of 21 modules immediately.
- The assembly of the pre-production TCM-VME64x modules has been delayed because of delivery problems with a memory device. These are now expected on 5<sup>th</sup> May, but if they do not arrive then assembly will go ahead and the part added later.
- The TCM-CP/JEP schematics have been completed, with Richard's requested changes incorporated, and they will be available on the web soon. The aim is to submit the design for manufacture by 12<sup>th</sup> May.
- The first pre-production VMM was sent to Birmingham for "full-crate" tests, which it passed successfully. Minor modifications can now be incorporated in the design and the final production started.
- Four new PCBs for the VME64x ALC are being manufactured, and should be delivered to RAL on 12<sup>th</sup> May. Except the PECL driver chips, all components are now available to assemble them by hand.
- An order has been placed for the components for 350 production TTCdecs, as some had a long lead-time. Once Kambiz has confirmed that the latest design is satisfactory an initial pre-production batch of 50 TTCdecs will be produced. Norman suggested that the Broadcast Start-Stop clock phase-shift problem should be properly understood before full-scale TTCdec production takes place, although it is strongly believed that the problem lies in the TTCrx chip itself, rather than on the TTCdec. Kambiz suggested reading the timing register both before and after the phase-change to see if it changes. It was felt that Philippe should be consulted about similar known problems with the TTCrx chip.
- A request for quotation has been submitted for the new GIO cards – seven back-end cards, two LVDS front-end cards and three ECL front-end cards.
- The design and layout of the VME64x(P) Auxiliary Backplane will be started by 5<sup>th</sup> May.
- Ian believes that the problem seen in the pre-production CMMs of register bits gradually being cleared during a run may be caused by re-configuration of the FPGA.

- Dave Sankey has a version of the ROD firmware to handle PPM data in compressed format. He is confident that it will run at full speed and (just) fit into the existing FPGA, but consideration should be given about using the next larger device (if affordable). The “non-functional” version has been tested to work, and he is now evaluating the fully-functional version.

## 5. *Stockholm*

- The first assembled Processor Backplane has been delivered to Stockholm from Erni in Germany, and everything looks fine except for the known PCB problem of the D-sub and J2 connectors, where the hole diameters are slightly over-size to ensure reliable contact. Since of course the J2 connectors are fine for through-connections, it was decided that there was little to gain by risking soldering the pins to the PCB, so this will not be attempted (although if later found to be essential it could still be done *in situ*). However, the D-sub connector pins will be soldered to the PCB, as this is a much simpler operation.
- The tolerances on the measured Processor Backplane trace impedances are much better than specified – the first four PCBs are within 3% and the next two within 5% of the nominal 60 ohm value. Production of the last PCB has therefore been authorised, and in 3-4 weeks assembly of all eleven production Processor Backplanes should be complete.
- Sam has successfully soldered some ground probe points to one of the PCBs, and estimates a complete set can be added in about one hour per PCB.
- A CMM RTM is needed to fit the LVDS cable strain relief mechanics. Ian will arrange for one to be sent from RAL.
- The power pins have only just been sent to Stockholm, so until they arrive the first full crate assembly (Test CP/JEP crate, with air-cooled PSU) cannot be completed. The LVDS cable strain relief mechanics also have to be added, but once this is ready (hopefully in about one week) it will be shipped to Birmingham to complete the full-crate CPM tests (assuming that its PSU has sufficient current capacity – to be checked).
- Sam commented that the connector shrouds used on the production Processor Backplanes are more robust than those on the prototype crates, and the connector pins are longer, making for more reliable contacts.

## 6. *CERN*

- The analogue cabling continued steadily last week with A-side TCPP → TileCal Receiver cable measuring, but progress is rather slow. About 400 cables have now been delivered to Cegelec since February, to which they have assembled only about 160 connectors, which is too slow a rate.
- The clearance height above the under-floor upper cable tray has been measured to be only ~10cm, rather than the 30cm estimated some months ago. This may present a problem for accommodating the large bulk of LVDS cables.
- Weiming has ordered from Mr Scalisi the full set of 20 water hoses for the water-cooled crate PSUs, all of 2.5m length, and they should be delivered in under two weeks.
- The CERN workshops have modified the first of the rear-mounted cable stock frames to match the new TileCal Receiver cable routing scheme.
- The first signals have been observed from the LAr calorimeter. Four cables were made available to the level-1 trigger, with 60 active trigger towers. The trigger rate was >30Hz, and there were some database configuration problems, but progress was made. Chaouki is busy checking the LAr Receiver system, so the level-1 trigger work must be interleaved with his studies, and there are still some problems with the LAr electronics power supplies. More opportunities should be present today and tomorrow, but next week no signals will be available, although it is possible that there TileCal signals may be available if the final electronics cooling system is working by then.

- The TCPP screwlock problem can be briefly summarised as follows. Each TCPP has nine D-sub connectors, each with a pair of screwlock (hexagonal studs), into which the cable connector retaining screws locate. These screwlocks were screwed into the TCPP connectors, which were subsequently found to be weak, and many of the screwlocks could not be tightened into the connectors because the captive nuts in the connector bodies became loose. Unfortunately, neither could they be removed, for the same reason!

Simon found a neat solution to their removal, involving a custom tool made in Birmingham, and a threadlock adhesive to secure the captive nuts. The full job involves removing, gluing and replacing a total of 1260 screwlocks, which will take some significant time and effort (probably outside CERN), but is absolutely essential.

**Next Phone Conference – Thursday 18<sup>th</sup> May 2006 at 12:00 (11:00 in UK)**

*Tony Gillman*