# LHC RF Meeting 2nd October 2008

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### 1. Commissioning Note

It is proposed to write an LHC Commissioning Note covering the period between installation in the LHC to the beam commissioning (cavity conditioning, low-level setting up...). It will cover both ADT and the RF.

## 2. Machine status & planning

- Sector 4-5 will be emptied for work on the interconnects in 3-4, since the connection between 3-4 and 4-5 is only separated by a single valve, and so we cannot have liquid in one while the other is not safe. Cooling of sector 4-5 will be after the new year.
- Warm up of 3-4 with warm air (blowing from Pt4 to Pt3) starts today.
- ♣ Access will be possible from this week.
- Broken tuner in UX45: The plan is still to intervene on this tuner. Tests in SM18 seem to indicate that symptoms correspond to 1 broken cable. Does not seem to be systematic, so no need to open all modules.

## 3. Software

- ♣ At the end of the LHC run the Beam Control software was stable with crate startup correctly handled in all cases.
- Observation buffer access was not available for certain modules; this has now been added. A generic persistence mechanism has been developed by Frederic which allows setting of registers with values saved for reload at crate startup. A corresponding LabView interface has been implemented by David and tested in the lab.
- We need to define fully the list of setup tasks which the LHC sequencer needs to perform at the right moments in the LHC cycle, so that this can be implemented by OP. This is currently only partly implemented.
- There is still a considerable amount of work to do on controls for the damper where very little software exists at the moment.

# 4. LLRF

- **Radial Loop:** Useful setting up done on 18th with small amounts of beam. Band pass filter No control.
- **Frequency programme:** This was tested in a simulated ramp on 19th September with the function from LSA. Measurements showed both outputs to be glitch-free.
- Phasing: One cavity in ring 2 was adjusted by 8 degrees: a corresponding phase shift should be put in at the summing point. This requires access in the tunnel.

#### **Frequency protection:**

- John has implemented a frequency surveillance of the 40MHz clock in the Crate Management Module: absence of the clock is detected in 100us, and a frequency deviation is detected in 1ms. Both situations result in a veto being generated in the Switch/Protection module.
- $\circ~$  The granularity of the frequency measurement is 1kHz at 40MHz. The limits currently set limit  $f_{RF}$  to between 400.78 and 400.9 MHz.
- The updated firmware is ready to be flashed in all CMMs.
- Although this new system will protect the hardware, the functioning of the cavity controller is interrupted, and it is necessary to re-initialize many boards after a restart of the clocks.
- Disappearance of clocks does not risk to damage ADT DSPU modules as they will simply freeze.

# 5. ADT

- 4 Tetrodes: Since the start of HW commissioning, a total of 3 tetrodes with open filaments have been sent back to Thales. Some are out of guarantee and will need negotiation over the repair charges.
- Temperature probes: The Pt100 temperature probes inside amplifiers read too high (40 degrees cf. tunnel air temperature 20 degrees).
- **DSPU boards:** All 4 work perfectly, communication with Beam Pos module works correctly.
- Commissioning with beam: The initial setup of one damper module has been done: polarity check, measured delays, synchronisation with the bunch clock and revolution frequency marker. Gerd has made a script to measure the cable delays with a network analyser and Matlab.
- **Faults detected:** Measurements have revealed a number of broken Spinner loads. Daniel has ordered new material for replacing them. A polarity error was found in one amplifier. 2 faults were detected in the connections with the kicker plates.

## 6. Crate power supply issue

- The LL crates 3.3V and -6V switched-mode supplies show erratic behaviour giving a large overshoot at power-on, which can destroy components on boards. In addition the power supplies do not start at the same instant. New power supplies are already used in all SR4 crates. We should avoid the manufacturer CMB in future and also specify the switch-on behaviour when ordering power supplies.
- CMB power supplies used in UX45. No apparent problems but stressing equipment with over voltages. Already 3 iterations of design change. Samples ordered from another manufacturer, after measurements we decide whether to replace all UX45 supplies.
- The series of new ADT DSPU cards have been sent back to TS-DEM for modification to protect against power-on damage. They are expected in a few weeks.

# 7. SM18

Cryo availability: In the magnet test stand they are currently testing a SSS and cooling a dipole. The strategy for the shutdown is under discussion: 4 lines are to be kept on line for magnet testing, which will occupy the whole SM18 cryo capacity. We could have 1-2 weeks in November, but this is not enough time to do anything useful with the module. The possibility of using the 18kW cryoplant in Point 1 to supply SM18 is under discussion.

#### **8.** APW

- ↓ A detector problem was quickly solved.
- **4** OASIS:
  - Software/configuration problems related to the triggering of multi-segment acquisitions have now been solved with S. Deghaye.
  - A jitter of >1 sample, has been observed and is being investigated.
  - We will also need the trigger interpolator to be implemented in OASIS to remove intrasample jitter.
  - The low frequency (National Instruments digitizers) OASIS software is still missing (Andy)
- **4** There is some noise observed at 150Hz, this is being investigated.
- Fibre link: Measurements are needed to characterize the bandwidth and sign inversion.
- **BBQ** commissioning has started (mainly BI).
- 4 The 2nd set of Acqiris digitizers are still in the process of being ordered for delivery in Jan 2009.
- 4 Continue with replacement of feedthroughs (not before startup 2009).
- Peak detector module: This design is still to do. Do we now have time to develop it? (Reinier, Jose).
- A. Butterworth, 2nd October 2008