LHC RF Meeting
11th November 2005

Present: Luca Arnaudon, Olivier Brunner, Thomas Bohl, Philippe Baudrenghien, Andy Butterworth, Edmond Ciapala, Trevor Linnecar, Wolfgang Höfle, Pierre Maesen, Joachim Tückmantel, Volker Rödel, Elena Shaposhnikova, Daniel Valuch.

1. ACS Couplers Modules and SM18 (Pierre + info from Eric)

- **SA2:** Conditioning is now going better, still with short pulses but with the power significantly increased to between 120 and 200 kW, depending on the phase. A vacuum gauge has however been confirmed faulty. The gauge will be changed on Monday afternoon, using a mobile laminar flow set up and pressurizing the cavity. We may also put in new arc detectors next week.
- **Couplers 126 and 127:** These both showed small vacuum leaks around the polarization ceramic after final assembly. The ceramic itself and the seals had been inspected before the mounting and found OK. The seals came from the last delivered batch. Reassembling one coupler with seals from the previous batch made it leak free. The other coupler will be done next week. From now on final assembly will be done using the 'good' batch and pre-assembly using the later batch. There are sufficient numbers in the good batch to cover the remaining couplers.
- **Modules 4 and 5:** Module 5 has been taken out of the bunker and module 4 put in for cycling as planned. The operation was done under difficult conditions, due to the magnet activities in the area we need to use for transport. Cryo will not be available till Monday due to holiday absences.
- **Tuner bellows:** An outside company will make a new prototype bellows. The construction follows a design used successfully in AT division.

2. ACS Power (Olivier)

- **Klystrons:** All have been tested in H112. A klystron with 'ideal' characteristics (see last week's meeting) will be installed. Tests with cavities will have to wait till bunker tests are resumed next year. Decisions on the best klystron tuning can only be made after this. Note that bringing the original SM18 klystron K01 to the ideal response will require deformation of its cavity 1 since the tuning mechanism is at end of range. Undoing any deformation will probably not be possible.
- **HV Equipment:** Improved 'mandolines' (modulator control interfaces in oil the tanks) are being made, as well as new crowbar detection units.

3. ADT (Wolfgang)

- **Kicker tanks:** The 15 kicker tanks will be cleaned on the Meyrin site where chemical treatment facilities are available. Internal components (electrodes) will need to be removed, after being numbered to allow replacement in the original tanks. (not necessary for the ceramics - they are interchangeable). Rather than doing destructive heating of a real electrode to establish the safe bakeout temperature we will do oven tests on samples of the high purity OFE copper they are made of. This temperature is expected to be around 150 °C compared to the typical bakeout temperature of 200 °C.
- **Controls issues – Interlocks:** Responsibility for the reliability of the ADT interlock structure lies within CS section. Hardware interlocks are used where the action has to be rapid and also in certain cases (e.g. personnel safety) for redundancy where this is not provided inside the PLC or by other systems. Concerning PLC reliability, all outputs are fail-safe (interlock active for power down) and there is a watchdog which, if not continuously triggered by the PLC, also causes fault output state, switching off all equipment. This is standard practice. In the case of the ADT additional redundancy is proved by all power supplies having their own current overload protection. (NOTE: We still have to agree on the configuration of the Power Interlock Controller module: either as an input in the normal fast chain or as the final interlock, with the fast chain as a separate input.
- **Amplifier design:** The design has been finalized with the Dubna team, and they will start to make the rest of the amplifiers in Russia as soon as possible.

- **Drive amplifier firmware:** Six amplifiers will be returned to Thales for them to resolve the firmware downloading problem.
- **Water cooling:** The cooling system layout has now been approved by the integration team (Yvon Muttoni). Construction and installation will be through TS-CV.

4. APW (Info from Thomas/Eric)

- **Production:** The mechanical parts for the APWs are now being made and will be ready in two weeks. Time has been set aside in the central workshop for the construction n of 6 PUs (4 RF and 2 for BDI). Eric intends to have the work finished for the end of the year. The supports design has been finalized and it is hoped to have these also completed in the workshop by the end of the year.
- **Testing:** We are waiting on the help of the vacuum group to prepare for the heating tests. In the meantime the response of the prototype is being up is being worked on and the optimum ferrite layout is being determined.

5. Low Level RF

- **Cables:** Most of the flexwell cables from SR4 to the tunnel and UX45 have been pulled – i.e. 33 out of 38.
- **Faraday Cages:** The cages are complete, we have 10 dB better isolation than specified. There is however a problem to be resolved with leakage on the top patch panel (cable feedthroughs). The interiors are finished. Offers have been requested for the false floors.
- **Design and series production of electronics modules (Philippe/Wolfgang):** A list of the modules needed for cavity/klystron control, RF synchro and beam control was presented by Philippe. The situation is extremely tight considering the respective deadlines for hardware commissioning, sector test and first beam. About 50 % (?) of the prototyping has been done and series production has only just started. A preliminary planning has been given to TS-DEM. The deadlines are also difficult for TS-DEM.
- **Crates and backplane:** A prototype production VME crate, according to our specification, has been received from ATOS. The prototype of the printed circuit RF backplane designed by John has been manufactured by the design office. These will be assembled and tested.

6. Diagnostics (Andy)

- **Acquisition boards:** Input from the specification meeting, together with our own additions, has been added to the tender documents. FI department should send them out next week.

7. UX45 installation (Olivier)

- **General progress and planning:** QRL installation is progressing well in sectors 3-4 and 4-5. Cavity installation is planned for May/June 2006, with vacuum work in RUX45 starting in May. (See preliminary vacuum planning). The details will be discussed next week. The floor drilling plan is being prepared. (K. Foraz)
- **Platform and shielding wall:** For both of these the design studies were never properly completed (no record of them having been done) and are only now being taken up again. We will get final information on the technical solutions from TS-CE next week.
- **Cabling:** Controls cable installation has started and is progressing well.
- **Klystron zone:** The earth bar installation is almost finished. Positions of klystrons and racks are being marked on the UX45 floor. Access to the Faraday cage roof patch panels have been made in the passerelles above.
- **Waveguide installation.** An invitation to tender is needed (<50 kCHF). FI department will make this procedure as short and simple as possible.

- **SR4 floor reinforcement:** The additional work has been done. We are waiting on written approval from D. Parchet.
- **Flow meters for ADT:** These ex-LEP parts have been taken from storage in the tent.(B956). The value is 80 kCHF. They are used extensively in other LHC installations and are considered fully reliable.

(Post meeting – Olivier: They are stored in PS and we can take what is needed.)

- **HV Junction boxes:** These are based on standard tanks used in the HV bunkers. They will be situated on the second floor of the US, surrounded by a safety grill. The tanks and the planned installation arrangement have been approved by SC.
- **UPS:** Platforms are being built for the UPS supplies in UX45.
- **Drawings:** LHCEBF__4022 showing the electrical layout is now in the approval list. There are many elements on this to be verified. Note that drawings LHCLJ4GA0007 (RF layout Point 4) has been inadvertently put back into the approval list. LHCLJ4GA0002 has also been re-circulated. The latter is not up to date, e.g. cable trays wrongly shown. It will be rejected and must not be used.

8. AB Review (Trevor)

- **Cost-to-Completion:** Additional costs: UX45 cooling system, TDR system and extra coupler costs have been included in a PLOA (Volker). The corresponding 900 kCHF has not been added to our CtC and we are therefore heading towards overspend by that amount. We may now have to cut some planned items out. Taking on any additional commitments or buying additional equipment is out of the question.

Next Meeting: Friday 18th November at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 17th November 2005.