LHC RF Meeting
20th January 2006

Participants: Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Olivier Brunner, Andy Butterworth, Edmond Ciapala, Wolfgang Höfle, Trevor Linnecar, Pierre Maesen, Eric Montesinos, Volker Rödel, Elena Shaposhnikova.

1. ACS Couplers (Eric)

- **Couplers 126 and 126:** SA2 conditioning is progressing normally and is now at 500us pulsing with 225 kW.
- **Couplers 128 and 128:** Slight contamination (possibly from finger marks?) and oxidisation resulting from the cleaning process were seen on assembling these. These do not warrant re-cleaning but the conditioning process may take longer. A simple method of selectively identifying good sealing rings for the second ceramics has been used. (6-7 out of a batch of 30 seals were good). This allowed these couplers to be baked and successfully leak tested at the first attempt.

2. ACS Modules (Pierre)

- **New tuning bellows:** Cycling tests are now at 55000 cycles.
- **Tuner mechanics:** A test of the torsion bar in 2000 resulted in failure at 17000 full tuning sweep cycles. We have to find out how this scales for the much smaller sweep ranges that will continuously occur in normal operation and if there is any degradation for operation at low temperatures. The problem of wear on the drive screw also needs to be followed up - at the least we should obtain a few spares.
- **Module 5:** Will be fitted with couplers next week
- **Alignment of cavities and second beam tube:** Checking of the alignment of these with respect to the cryostat has been taken up with the survey specialists. We assume that the horizontal and vertical tolerance for both is 1 mm,
- **Cryo safety valves.** This has been discussed with L. Serio. The cryo lines will be kept filled with helium throughout the year hence two way valves will have to be fitted to the modules so that they can be taken out one at a time for safety inspections. G. Mouron (AT-CR) will help us with the design.
- **Cryo planning:** It is planned to close the He circuits by the end of August 2006, the modules need to be in place by then.

3. ACS Power (Olivier)

- **SM18:** The klystron recently installed will be measured next week (Philippe)
- **HV boxes for klystrons.** We are still following up the re-design of the HV box to avoid the problems of ionisation in the top part – Olivier will visit Thales next week.
- **LEP circulators:** These are rated for 1 MW. We still have most of them in storage. They can be modified for 400 MHz; however they are 3-4 times larger. We should nevertheless keep them in case we do have any difficulties later with the present circulators at high intensity.

4. ADT Equipment (Eric)

- **Kickers:** Bakeout of the first kicker in B113 will be done in the next two weeks, before a three week absence of the vacuum specialist. This kicker will be dismantled after bake-out, with our Russian colleagues, to check that there has been no deformation of the electrodes. After bake-out of the series they will either be kept under vacuum or let up to ap with nitrogen and stored in B113 till tunnel installation. It may be decided not to do further bake-out after installation in the tunnel.

(NOTE: We in fact have 19 kickers, not 20 as recorded last meeting, one still remains in Dubna.)

- **Amplifiers:** A minor control problem has to be fixed (cable inversion). The supplier will bring a modified resistor to test this week.
- **Drivers:** Thales have explained that an internal grounding problem may be the cause of the re-programming difficulties.
- **Ig2 supplies:** A problem with unreliable readback of the status being discussed with the manufacturer.

5. APW Equipment (Eric/Thomas)

- **PU 01 Bakeout:** Bakeout of APW 01 will be done next week.

6. LLRF (Philippe/Wolfgang)

- **Planning for LLRF and beam control:** We are about 2 man-years short with respect to the present planning and deadlines. Every effort is being made to get the most part-time help from staff committed to other machines. In any case we need to move on as quickly and effectively as possible.

  At the moment some of the ongoing and soon to be undertaken developments are:
  - Conditioning DDS
  - Switch and Protection Module
  - Set point module
  - RF feedback V2
  - Tuner RF V2
  - Clock generator
  - Injection pulse generator
  - Fibre transmitter/receiver
- **Sector test:** We will aim - as far as possible - to use the LHC fast timing and synchronisation systems for the sector test. While this is not essential for the sector test as such it would avoid investing time in temporary additions to the SPS timing and also allow a good pre-test not only of the timing but also of other systems such as controls and slow timing.

  (Note that a NIM module in SPS for re-phasing will also be needed)

7. Controls (Luca/Andy)

- **Hardware:** The new klystron modulator control prototype transmitter and receiver are now with the design office. Expected advantages compared to the existing system are better reliability and reduced ripple. It will be tested in A5 then in SM18.
- **ACS equipment and system development:** Hardware and final PLC software testing for ACS equipment is in progress in the Lab test set up. The IEPLC configuration is ongoing and specifications for the front end (FE) software are in preparation. This will allow FESA configuration and writing of specific C++ code, together with AB-CO. This will prepare us for configuration of alarm, logging systems and basic switch on applications. RF specific tools will be developed in LabView or JAVA.
- **ADT hardware:** We have roughly completed 1/3 of the production of the ADT controls hardware.
- **Fast digitizers:** A suitable supplier has been selected and delivery should be for March 2006. Drivers under Linux are available for the selected modules.

8. UX45/RUX45 Installation (Olivier)

- **General planning:** there will be a revision in the coming weeks.
- **QRL work:** is still going on in both sectors. Sector 4-5 is still being leak tested as there are still a number of problems. Pressure test in 3-4 is planned for 3-4th February.

- **Cooling water:** After QRL tests the connections for ADT in the RBs will be done and other connections completed by the end of February. There will be a meeting next week on the klystron zone in UX45, concerning the pressure regulating valves and minor modifications. The work on the water cooling system in UX45, including connection to the US, will go on until May.
- **HV bunker ventilation:** The layout has been decided.
- **Faraday cages:** The insides have been painted and the false floor is being put in place.
- **Cabling:** General services cabling should be finished by mid-February. HV bunker cabling is progressing well. External cables to the ACS racks are also progressing well. Rack interconnecting cables are also now being installed. A DiC for cables inside the Faraday cage has been prepared by J-C Perrier. Pulling of RF 7/8 inch cables is nearly finished. 3/8 inch cables for ADT are in progress. HOM cables will now be routed under the quay to avoid overcrowding in the waveguide holes. Improved routing for ADT control cables has also been found.
- **Waveguide installation:** This has now started with the installation of supports. The work is done by an outside company, with our close supervision.
- **Tunnel roof:** Some of the roof blocks will need to be in place to allow installation of the ventilation units.
- **Upper UX45 Access:** Doors to restrict access to the upper part of the UX45 cavern have been put in place. These are ex LEP access doors and the LEP key can be used

Next Meeting: **Exceptional place and time:**
Tuesday 7th February at 09:00 in Room 865-1-D17.

Agenda:
1) The results of Matlab simulations on the ACS feedback system, by J.K Holma
2) Equipment status and installation review (from ~10:00)

E. Ciapala, 1st February 2006.