LHC RF Meeting
1st September 2006

Participants: Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Olivier Brunner, Andy Butterworth, Edmond Ciapala, Wolfgang Höfle, Trevor Linnecar, Pierre Maesen, Eric Montesinos, Joachim Tückmantel, Daniel Valuch, Frode Weierud.

1. UX45/RUX45 installation (Olivier et al)

Olivier gave an account of recent significant progress and presented some photographs: \\cern.ch\dfs\Departments\AB\Groups\RF\Sections\MK\pictures\HRF Meeting 1.9.06

- **ACS Module Installation:** The past two weeks have seen the successful completion of transport to SX4 at P4, descent into the cavern via PX46 and the putting in place in RUX45 of all four modules. No major problems were encountered and the operation went smoothly, under the guidance of Gaby Pechaud and Max Gourragne, with excellent work done by the TS-IC transport team. The last module still has to be put onto its supports (planned next week). The overall success of this operation is the result of long and careful preparation on our side and invaluable help from the TS installation and installation coordination teams.

Modules and positions, from left to right at IP4:

ACSGA 1.B1 Module 1 Africa
ACSGA 2.B2 Module 5 Oceania
ACSGA 1.B2 Module 2 Americas
ACSGA 2.B1 Module 3 Asia

The potential risk of damage to the MC vacuum coupler connections with persons walking on the module platform has been raised. However waveguide parts will be put in place early next week and these will provide the necessary protection.

The insulation vacuum pumps, normally fitted on the '3rd beam' stub at the cavity A (beam out) end of the module may need to be shifted to the other end on some modules, to allow better access for the vacuum group. This can be done quite easily in-situ, but needs breaking the insulation vacuum and re-pumping.

- **ACS coax cables:**

We plan to have no patch panel connection for the antenna cables near the modules. Some means of supporting the heavy flexwell cables needs to be found.

The HOM cables should be positioned, cut and the connectors mounted as soon as possible, to avoid risk of damage.

Two flexwell antenna cables have been bent too tightly around a corner of the tunnel wall. They should be measured to see the effect on the response. If necessary the cables can be repaired by reforming and re-bending. **(Actions: J-C Perrier)**

- **Crash barriers:** The protective 'crash barriers' are in now place near the modules, the supports are presently being put in place for the APW and ADT sections in the RUX and RBs.

- **APW installation:** The welding of the QRL eXtensions has not yet been completed. We will wait till this is done before putting the APWs in place. Patch panels will be put on the upper horizontal cable trays for the flexwell cables.

- **ADT installation:** The ADT kickers will also be taken to P4 surface (SX4) and then into the tunnel early in week 37.

The ADT water connections are in place, (see photos above) but some rubber absorbers will be put on supporting brackets to avoid vibration and noise. (F. Moro, TS-CV)

- **Survey activities**: to be done as soon as all equipment is in place (Week 37 planned)

- **Tunnel Earthing:** There will be a meeting on tunnel earthing layout next week, with TS-EL. We should make use of and update existing UX45 earthing drawing "UX45 - EARTH CIRCUIT EQUIPMENTS" - CDD drawing **LHCEIE__4012**
- **Klystrons and Circulators in UX45:** Two klystrons and two circulators are already in place. Transport to Point 4 will beat the rate of one klystron or one circulator per day.
- **Controls equipment (Luca):** We are waiting on completion of fitting some connectors on cables to wall conditioner modules.

2. RUX45/UX45 Equipment testing:

- **ACS Waveguide measurements:** Reflected signals to the klystron, with a terminated transition at the cavity end of the waveguide chain have been measured. One slightly deformed bellows was found and repaired.
- **ACS power converter tests:** The interfaces to the power converter in SR4 will be tested later this month. Some first klystron power tests with the waveguide shorts in front of the cavities could start in October, but this depends on the availability of services – water and electricity.

3. ACS cavities and couplers:

- **SA2 coupler conditioning:** MC125-130 are effectively completed, the motor drive for the short circuit movement has been repaired. The couplers will be dismounted in week 37. One will be fitted to the 'spare' cavity – cavity 19.
- **Polarization seals:** Vacuum tests will be done shortly on the ceramic and its niobium coating.

4. LLRF

- **Set Point Module: (Philippe)** is now in the hands of the design office.
- **DDS / Conditioning module: (Info from John)** The CPLD conditioning loop, DAC and ADC have been tested successfully, as well as the VME access to the loop parameters. Good progress is also being made with the RF part of the module; the DDS can be controlled and locked.
- **Switch and Protection module: (Philippe)** The design is nearly completed. This module is the most critical, in terms of delay, for UX45 first tests.
- **Fibre Optics transmitter/receivers: (Philippe)** Prototype (breadboard) versions have been made and first tests done successfully. There are four different versions, with different fibre optics transmitters/receivers depending on the application: 3 GHz wideband for fast analog signals, 1 GHz digital for 400 MHz RF signals and 200 MHz digital for 40 MHz to physicists and a DC coupled version for revolution frequency and kicker pulses. There are two printed circuit versions, one for the analog and one common configurable design for for the three digital applications. A series of the latter is being made for forthcoming P4/CCC timing tests
- **Beam Phase Modules: (Daniel)** A prototype of the analog part of the system (BP filters, IQ demodulators for beam and cavity signals) has been successfully tested during an SPS MD with LHC beam. The system and the tests done will be a topic for a future LHC RF meeting (and/or RF Monday afternoon seminar)

5. AoB

- **DG's visit to P4**. The DG and LHC project leader visited the RF at point 4 last week. The short visit of ~ ½ hour went well.
- **Budgets:** We must re-estimate expenditure on operation / spares budgets till the end of the year - (95541 *LHC RF operation* or 95550 *LHC spares AB-RF*). Note that there should be covering work units in EVM. An email should also be set to Trevor outlining major items to be put on these codes. **(Action – all)**

Hardware Commissioning Meeting: Luca attended a meeting on hardware commissioning in LSS P4 on 31st August. Some points noted :

- R. Saban would like to have a V2 of our hardware commissioning document with more details on what can really be done in parallel and an updated time estimation **(Action: Ed / Olivier)**
- We have to look in details at the interaction with BDI (special meeting in 15 days at 15h30) and try to agree with them on access in our zone. BDI will have to organize installation and test and commissioning planning, J-J Gras will try to do this for this special meeting
- Very important is the interaction with the Cryo sector operation (return valve can close >2bars any time if a quench during their tests) to be analyzed in detail with L Serio.
- If we do not agree with the present plans we should warn the coordination and refuse the present planning.
- APW were not in the R Saban list (now corrected)
- PO can be ready for software test with Power Converters for RF from mid-September.

Next Meeting: Friday **15th September** at 08:45 in the JBA room.

E. Ciapala, 11th September 2006.