LHC RF Meeting
11th February 2005

Present: Luca Arnaudon, Thomas Böhl, Philippe Baudrenghien, Andy Butterworth, Edmond Ciapala, Wolfgang Höfle, Trevor Linnecar, Pierre Maesen, Eric Montesinos, Volker Rödel, Elena Shaposhnikova, Daniel Valuch.

1. ACS Couplers, SA2 and conditioning (Eric)

- **SA2 Conditioning:** Couplers MC118 and 119 are at 200 kW continuous and will now be pulsed to 300 kW. The klystron change planned for week 8 may not be needed if the tuning system adjustments can be done in-situ.
- **Couplers MC120 and 121** will be assembled next week.

2. ACS Modules and SM18 (Pierre)

- **Module 3:** is now in the bunker and will be cooled down next week.
- **Cavity Tuning:** The problems with module 5 have been discussed with AB-ATB. The overall situation is:

Module	Lower detuning limit [400790 – fmin] (kHz)				Remarks
	Cavity A	B	C	D	
1	66	73	50	60	'OK' but cavity C 'near limit'
2	102	94	85	68	'Good' (second attempt)
3	86	77	60	67	OK, Cavity D brought down
4	36	88	59	43	Not good, A and C, C got worse!
5	102	15	65	175	Bad, B got worse. D very low?

- **Module 5 cavity B is unacceptable.** The high value of **cavity 5D** can probably be corrected by changing thickness of spacers on the torsion bar mounting support. Several other cavities do not have much margin; any further change in the long term would be serious.

Actions:

- **1) Verify frequency of cavity 5B**: i.e. check that it is not affected by any residual force in the torsion bars. An error in the thickness of spacing pieces introduced after the tuning operation could cause this. The module will be re-opened next week to check the minimum resonant frequency before and after removal of all spacers. Opening has to be done in any case. **(Pierre with G. Pechaud)**
- **2) Check the history of all cavities** - as far back as possible. Add the data to the existing Excel file and try to understand the results of the tuning manipulations, in particular why has cavity 5D been well decreased and 5B has increased ? **(Pierre)**
- **3) Re-check Module 1** later in the year to see if there is a drift.
- **4) Study 'repair' options** for out of limit cavities. Options are:
  - ***Replace cavity and He tank*** (Drastic! and can only be done for one cavity !)
  - ***Compression of cavity*** (0.5 mm for 100 kHz). Simple calculations show that pre-tensioned cables (around 3-5 mm in diameter), four around the circumference, pulling the ends of the cavity together, could be a simple and viable solution, with correct choice of material. Introducing springs to push the cavity away from the opposite end of the supporting frame is also a possibility, but it may be more difficult mechanically.

We should make proposals for discussion with AB-ATB group (O. Aberle) to find a reliable technical solution. Any solution needs to be fully approved by them as the mechanical system is officially their responsibility.

3. B867 Test Stand (Eric)

- **Water installation:** Should be done by end of February
- **Electricity:** Waiting on completion by TS-EL

4. ADT (Wolfgang)

- **Tetrode Power Amplifiers:** Construction of two more amplifiers has started in Dubna. Parts have to be sent.
- **Kickers:** We understand that production of the tanks has started, after our acceptance of the two test tanks. However we do not yet know the expected delivery dates and we are not in a position to contact the factory directly. There will be a visit to Dubna 8th to 10th March to absolutely ensure that delivery dates are well within our planning constraints. (Test of equipment by AT-VA group in November). The kicker tanks, once made, have to be fitted with electrodes, supports & feedthroughs. This work will be done here, after the initial high-temperature bakeout that will probably be done on the empty tanks.

5. Low Level RF (Philippe)

- **Faraday Cages:** The specification meeting will be held on Monday 14th February. About 5 firms are expected to make an offer.
- **RF Feedback modules:** Two Version 2 prototype modules have been received; John and Donat will each test RF and digital parts.
- **Tuner Control Module:** A version 2 prototype has also just been received for test by John and Ragnar.

6. APW (Thomas)

Four APWL will be installed. They will be 17 m from the IR. The beam width is 2 mm. The aperture will be 80 mm, the same as adjacent beam pipes. A prototype is already installed in the SPS. The ferrites inside are baked to 300 °C. The small degradation in the ferrite due to bake-out at this temperature has no effect on the performance. Vacuum is not expected to be a problem (for radiation SEU considerations) but an extra pumping port is fitted incase local pumping is needed. The pick-ups will be made in the central workshops, aiming for November completion. Final drawings are being prepared. All necessary information on dimensions and position has now been given to the installation group.

7. Coaxial Cables (Wolfgang)

We are still waiting on delivery dates for temperature compensated cable from the supplier, needed before the order can be sent out. One problem is our requirement for blue colouring of compensated cables; this requires the introduction of a new item in the manufacturer's range. To make some progress we may split the order in two parts – compensated and uncompensated cables. In the meantime BDI have requested an additional 1 km of cable.

8. UX45 Installation and planning (Volker/Trevor)

- **New Official Schedule**: Trevor presented the latest draft outline of the installation planning. Installation in LSS 3-4 and 4-5 runs for 6 months from end January 2006, finishing in June 2006. The RF part of the tunnel is planned for the beginning of this period. It means that the November 2005 deadline for equipment is maintained. We must aim to have ADT and APW equipment ready for that date. From our SM18 planning it should be just possible to complete four SC modules. However, if it is decided that other equipment is to be transported through the RUX45 roof, the SC modules would not be installed until June.
- **Cryo connections in UX45:** Follow-up on this is needed after the Chamonix presentation by S. Claudet on the "Cryogenic System in Point 4" at the 2005 LHC Performance workshop. The issue was recently raised in the TCC. **(Action: Ed)**

- **TCC Presentation:** We have been asked to make a TCC presentation on the installation of the RF system in RUX45, covering the present status of the equipment, planning and resources.

9. Interlocks and connection to Beam Permit system (Luca)

For the ACS system there are three categories of interlocks:

1) He pressure, level and temperature interlocks to protect the cavities from beam heating if they are not cold.

2) Max. cavity field, reflected power ('Wattcher Hi') and coupler arc detector to protect cavities, couplers, circulators and loads from high beam induced power.

3) RF and HV OFF interlocks to be supplied to dump the beam if we are sure that the beam will not survive a trip. ('Pre-emptive')

The Beam Permit system allows for 'maskable' and 'unmaskable' inputs. A first proposal is to connect category 1) to unmaskable and 2) to maskable. For category 1 this may be over-restrictive. It was agreed that we should check the definition of 'safe' and 'unsafe' and their relation to maskable and unmaskable. Connection of category 3), valid for above half-nominal where we expect a single RF line trip to lose the beam, still has to be decided. These points should be followed up for next week.

(Action Ed, Andy, Luca)

10. AoB

- **Equipment naming (Volker/Ed):** ACN cavities, ADT kickers on LH side of IR4 and APW have now been correctly named and this has been agreed with R. Laukner and S. Chemli. The official database naming list and the list of Layout and functional names have been updated and are on the LHC RF web under naming.
- **Drawing support:** With the loss of S. Girod we are in need of support for mechanical and layout drawings. In addition many of the diagrams relation to the SC cavity assemblies are not properly finalized in CDD. We need to get drawing support and finalize drawings. **(Action Ed/Volker)**

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

E. Ciapala, 17th February 2005.