

LHC RF Meeting 27th August 2004

Present: Luca Arnaudon, Olivier Brunner, Philippe Baudrenghien, Andy Butterworth, Edmond Ciapala, Trevor Linnecar, Pierre Maesen, Eric Montesinos, Joachim Tückmantel, Daniel Valuch.

1. SM18 – Module 3 incident week 34 & follow up

- **Events:** *Correction to last week's minutes (Eric).* On 12th August power was taken to 240 kW, when arc detector and Wattcher tripped. Power was only re-applied the following day, when it was found that only 100 kW could be reached.

- **Follow up actions:**

- **1) Inspection of coupler A: (Eric)** This was done immediately after the module was removed from the bunker. A large number of metal filings and other small fragments of material were found, some having found their way onto the upper part of the capacitor and some onto the window. Eric presented a number of photos. This is therefore the most likely cause of the arcing. (A similar experience had already occurred during coupler development - info from H-P. Kindermann) This material could have been present during the mounting of the transition and waveguides or have been introduced via the cooling tubes. (if, for example, they had been left open and lying on the ground). An abnormally large amount of dust was also present on the outside of the module. Cleanliness during installation and mounting procedures needs to be improved (see procedures below) and a general clean-up of the bunker area will be organized before the installation of module 1. **(Action: Pierre)**

- **2) 'Repair' of coupler A: (Eric)** When removed, the coupler will be cleaned up then tested with power in SA2, to give information on what might be the likelihood of success if such a cleaning operation ever had to be attempted in the machine. **(Actions: Eric)**

- **3) Inspection of other couplers (B and C):** This will be done as soon as possible.

- **4) Arc detectors:** A series of 10 prototypes has been made but for the moment we do not have enough to allow fitting one per coupler. A single one will be rotated, depending on the coupler being powered. For the longer term the plan is to use the fibres from the LEP arc detectors, cut to shorter lengths. An improved solution for the electronics design has been found. On the subject of radiation it was pointed out that damaging radiation levels for the fibres will be less in LHC than LEP. In any case the fibres can easily be changed periodically.

- **5) Review of interlocks:** While the cause of the incident now seems less likely to have been humidity related, the checking of window heater and blower 'delay' times will be introduced into the PLC software. Also the proposed complete review and final specification of the interlock and protection system will be completed and documented **(Action: Luca, Olivier, Pierre, Eric, Ed)**

- **4. Review of installation and operational procedures:** Pierre and Eric have started to compile the lists of all procedures and details are being added. These will be collated and circulated for additions and comments.

2. Couplers (Eric)

- **Conditioning in SA2:** Conditioning of couplers MC111 and 112 has now reached 300 kW continuous. (Higher power, up to 330 kW, is systematically applied for short periods at the end of conditioning).

- **Production:** Supply of both ceramics is now well on schedule, polarization ceramics are being produced at the rate of two per week. All parts are ready for the next four couplers (MC113 to 116).

3. ACS Power (Olivier)

- **Klystrons, loads & circulators:** Circulator 15 has been tested successfully. The final batch will be delivered at the end of the month. Klystron 10 will arrive next week. Klystron 9 (repaired after a blocked cooling channel) and klystron 11 are due for the end of September.

- **Klystron Ripple:** 50 Hz on the klystron modulator can be reduced by modifications in the tank and different power supplies. 100 Hz ripple on the power converter can be reduced by improvements to the converter (PO group). We should pursue both actions. The results of the tests recently done should be made available (A brief summary is included in the minutes of LHC RF Meetings [30th July](#) and [6th August](#)). Any further tests needed should be planned for the period before installation of module 1. **(Action: Ed, Philippe, Daniel)**

4. ADT Status (Trevor)

- **Dubna activities:** Progress on kickers and amplifiers is being discussed with staff from Dubna who are visiting at the moment. This, together with news on the anode supplies will be presented by Wolfgang at the next meeting.

5. Planning and installation: (Olivier)

- **General planning:** The H. Gaillard planning will be circulated by Olivier. A number of important details remain to be resolved: e.g. when water can be installed, before/after HV bunkers. Some key dates however are:

- installation of ACS modules RUX45 - February 2006, (waveguides in tunnel by January 2006)
- Finishing of QRL installation in P4 - end of September 2005
- Start of shielding wall and platform construction in UX45 - September 2005
- Faraday Cages in UX45 - October/November 2005.
- Installation of equipment in HV bunkers - beginning 2006
- RF equipment in UX45 - summer 2006
- Cabling – 3 phases:
 - Cable trays – spring 2005; then, after shielding wall =>
 - Cabling of general services, including platform
 - Remaining RF cabling

Philippe raised the problem of installing the Faraday cages after cable trays just above them, which would complicate installation for the contractor and create extra expense. A possible fourth phase could be considered for cables in that area, or some other solution found. Solving these and similar problems which will no doubt arise awaits a more detailed version of the planning.

- **The revised RF commissioning note:** Andy has made the requested additions on software and requirements and has forwarded it to R. Saban.

6. EVM:

- The update (re-baselining, removal of CERN staff and LS) has been done for all systems. Discrepancies between PV and EV exist mainly for:

- ACS Power (klystron delivery dates to be properly updated) **(Action: Olivier)**
- Cabling – The situation concerning an externally introduced Work Unit needs to be clarified. **(Action: Volker/Ed.)**

Next Meeting: Friday 3rd September at 08:45 in the JBA Room 864-2-B14

E. Ciapala, 31st August 2004