LHC RF Meeting
1st April 2005

Present: Luca Arnaudon, Philippe Baudrenghien, Andy Butterworth, Edmond Ciapala, Wolfgang Höfle, Pierre Maesen, Eric Montesinos, Joachim Tückmantel, Frode Weierud.

1. Corrections to write-up of meeting 18th March 2005.

ADT: the second batch of amplifiers is now to be accepted, the first has already been delivered.

2. ACS Couplers and SA2 conditioning (Eric).

- **SA2 Conditioning:** Conditioning of couplers MC120 and 121 has reached 200 kW pulsed 1 ms/20 ms. 300 kW should be reached next week.

3. ACS Modules, SM18 and conditioning (Pierre/Eric)

- **Module 3 conditioning:** Thanks to good progress with a new combined modulation conditioning procedure and to sustained running over the Easter weekend (Eric), the couplers have been fully conditioned to 300 kW and 8 mV/m has been reached in all four cavities, ahead of schedule. HOM coupler fundamental power has been checked at 5 MV/m. One HOM on cavity D was suspected to have a problem but turned out to have better rejection than the others (< -20dBm measured). Static losses of the module were measured at 7.3 g/s. (However this may be conservative since the measurement sensor saturates at 7.8 g/s!). The module will be warmed up and taken out next week.
- **Module 2:** Couplers have been mounted and leak test is in progress. A leaking Pirani gauge on the pump connecting piece will be changed. More leak tests then bake-out will be done next week.
- **Module 5:** Will go into the bunker next week.

4. ADT (Wolfgang)

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- **Anode Supplies:** The manufacturer was visited on 24th March. Assembly of the converter is well advanced. The manufacturer will provide a removable hoisting frame compatible allowing lifting from above. Special beams will need to be added in the SR4 floor to accommodate these supplies. This is being looked after by J-C Perrier. Power tests will be done in B867, the manufacturer facilities can only allow short periods of power testing. Testing of the control interface will be done using a simple test unit. This will also be looked at on the next visit, planned for the end of April. The supply should be installed in B867, ready for testing, by the end of May.
- **Power Amplifiers:** The two amplifiers are nearly ready. We still have to send some parts; a single shipment will be arranged. Special treatment of the wooden packing cases is needed to meet EU regulations. A firm in Moscow is qualified to do this - this has also been needed for Atlas material. Dubna will arrange it.
- **Kicker Production:** Dubna have confirmed this is going according to plan.

5. B867 Test Area (Eric)

- **Preparation:** Water is installed and electrical installation will start in one week. HV and signal cables can be pulled. HV divider and signal conditioning electronics are being built. Two controls interface chassis are being built by the Meyrin site FSU.
- **Tests:** First tests for ADT will be on the Imtech supply, using an existing Dubna amplifier and a load. (8 kV, 16 A)

6. Flexwell Cables (Wolfgang)

We have not had an official date for delivery of compensated cables but believe hat it should be in June or July. Additional cables for the reflectometer will be added to the present DiC.

7. Klystron Ripple (Philippe)

- Additional measurements have been made in SM18 by Olivier and Philippe, mainly to compare with RF phase and amplitude noise measurements made last June-August. Amplitude noise is a factor 2 better (5kW pp at 300 kW). The peak to peak phase noise is the same (4 °). The 100 Hz component has been reduced by a factor two, however the 50 Hz ripple has increased by a factor 2. This is most likely due to the installation of a different modulator, but if the necessary adjustments were to be made on this modulator we should be back to a factor 2 better in phase noise also.

8. LLRF (Philippe)

- **Modules:** Design of the phase loop module is in progress and the radial loop started.
- **Component procurement:** It is generally agreed that we must order series production components as soon as possible, especially long-lead time items, however there is concern over the amount of time that technical personnel have to spend on this.
- **Faraday Cages:** Tender opening in 4 weeks. Two low turnover firms have not been added to the list.
- **Timing for experiments:** We are responsible for transmission of RF and revolution frequency signals from SR4 to CCC. Revolution frequency also has to be sent to the experiments and while it was originally understood this was the responsibility of AB-CO this is not now clear. The best technical solution is that we would be responsible, using the same standard equipment etc. but this is some additional work and means working in other locations.
- **Instruments:** Many of our instruments are out of date or faulty; now is a god time to procure instruments needed in SM18 and for the machine.

9. Diagnostics and Signal Acquisition (Andy et al.)

- **RF diagnostics in SR4:** Thomas and Urs are preparing the design of the RF pick-up signal monitoring system in SR4. The overall situation for RF signals including those coming from the ACS LLRF system should be checked at the same time and we should ensure that we get the best overall layout. Andy is responsible for overall remote diagnostics.
- **Acquisition boards:** We are grouping our requirements with AB-BT and AB-CO (Oasis). There are three types of module: 50 MHz 12-bit for kicker pulse monitoring, 50 MHz 8-bit for RF and ADT monitoring and 8-bit 2-4 Gs/s for OASIS and RF monitoring. A market survey has been prepared and presented to the specification committee. An IT should go out soon.
- **RF signal multiplexing:** AB-BDI have a design for a multiplexing crate which connects to Ethernet using a simple standard commercial interface board providing parallel outputs. We can probably adapt the design to allow use of the coaxial switches we already have.

10. RUX45/UX45 Integration

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- **Drawing LHCLJ4GA0007** (RF layout and naming) is now in the CDD approval process.
- **Cryo WRL**: Still being followed up with L. Serio. The warm recovery line is needed to evacuate helium when the D-line is closed. No provision has been made, either in the QRL or in the service module for its connection. There is probably no space in the tunnel for an additional interconnection box (as in SM18), nor would not it be compatible with the planned QRL connecting rigid line. The existing cryo dome design is considered unsuitable either for WRL connection or even the for quench valves with the slow He discharge we might encounter in LHC, due to the risk of damage to connections from icing up under slow continuous flow of helium. Solutions are being discussed. For integration we should route the warm recovery line and the safety outlets as decided already, however the exact connections on the module need to be defined and some re-design may be needed. **(Action: Ed. Pierre with L. Serio)**

11. EVM and Budget Estimates

We have to present our expenditure budget to the end of the year to project and departmental management at the end of the month. For most systems this means making sure EVM is up to date and well defined to the end of the year. The biggest task this year is the installation, where the existing WUs can be redefined in more detail and according to the planning. This is being done by Olivier with Volker. ADT and ACS couplers will be re-checked. Some areas probably needing special checking: SC cavities, diagnostics, controls for ADT.

(Actions: Wolfgang, Eric, Pierre, Ed, Andy, Luca)

12. Beam Permit and machine protection (Andy)

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Machine Protection Review: The machine protection review will be held on 11-13 April. There is a talk by Wolfgang on effects of the damper and abort gap cleaning. While there is no specific treatment of issues relating to accelerating RF, subjects such as abort gap monitoring, ADT/ACS inputs to the BIC and possible synchro diagnostics do remain to be followed up.

Next Meeting: Friday 9th April at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 4th April 2005.