

SECOND-HARMONIC COLLABORATION MINI-MEETING/DISCUSSIONS

Minutes of mini-meeting held on March 24-26, 2004 at ISIS

Itinerary

1. General Meeting

March 24, 2004, 15:15~17:15 @ Conference Room, R3

Present: Adrian Morris, Clive Appelbee, Ian Gardner, John Hoxton, John Thomason, Mike Glover, Neil Kelly, Robin Bendall, Steve Stoneham, Steve Warner, Yoshiro Irie

2. Discussions (March 25, 2004)

- Water requirements in the categories (S Stoneham).
- Water in the MICE Hall (D Couchman (Duncan)).
- MICE power (~500KW) and water requirements with respect to time, and the time schedule for MICE installation (P Drum).
- RF signals, ISIS status display at the MICE Hall, interlocks (M Glover, R Bendall).
- LOI on the rail (T Western).
- Visit R40 (store) to see the arrival of the sea freight from KEK.

3. Discussions (March 26, 2004)

- Power distributions at the MICE Hall, interlocks (S Stoneham).
- Floor arrangement in the MICE Hall (A Morris, S Stoneham, S Warner).
- Budget, visas, accommodations, car rental, etc (A Morris, J Thomason).
- Distance between buck regulator and the LOI chassis (G Pile by phone).

Discussion details

1. Phasing of LOI (Low-Output Impedance system) preparations

Phase I: April 20 ~ September 30, 2004.

Preparations are made in the MICE Hall: Use a liquid resistor first, and then the ISIS 2nd harmonic cavity which can be available in the MICE Hall. The ferrite bias power supply is moved to MICE Hall from Hall 2.

De-crating/moving/setting of LOI modules from the store (R40) will be performed before the long shutdown (April-September, 2004). Adrian will discuss on the layout plan with a heavy gang personnel on April 2. As for the buck regulator, it is not necessarily located as close as

possible to the LOI chassis.

Work plan in this period is shown in fig.1.

Phase II: period (TBD)

Installation of LOI into SP8 and the beam test are performed.

4-week shutdown to replace the target moderator is foreseen near Christmas. The MICE solenoid will arrive in October, but the date of installation is yet to be determined, possibly in Christmas or in June/July, 2005.

2. Power and Water requirements

Phase I) In the MICE Hall,

Power: 573KW(average) and 733KW(peak),

Water: 750 liter/minute. D Couchman(Duncan) are investigating the water capacity in the MICE Hall whether it is feasible.

Phase II)

	MICE Hall (power supplies)	Hall 2 (bias supply)	SP8 (LOI+cavity)
Power [KW]	473. (average), 633. (peak)	100.	
Water [liter/minute]			
Hi purity+Demin.		40.(SUS)	458.*(LOI)
Demin.		80.(Cu)	
Process (tapped)	38.(BR)		130.(cavity)

*) only 270 l/min is available at SP8 (mini-meeting in May 1, 2003 at ISIS). When the grid switching of the driver tetrode is introduced, this requirement is reduced to 388 l/m. Is it possible that the water from the MICE Hall supplements the shortage?

MICE requires about 500KW, but the water requirements are to be estimated (P Drum).

3. Present status

Cables: almost all cables except for the AC primary-line cables are ready to ship at KEK. The cable lengths were determined by the Steve's note (February 24, 2004). The primary power-distribution-units in the MICE Hall will be distributed along the wall at the trench side (see present distribution units in fig.2). Regarding the output cables of the plate supply of the final triode and the grid switcher will be shipped from ANL to ISIS.

Water: Water-supply lines are running at the opposite side of the trench (fig.3). Water capacity and the output flange sizes are under investigation by D Couchman.

4. Cost/labor sharing between ANL/ISIS/KEK.

- Cost:
- ¶ power distribution units in the MICE Hall,
 - ¶ water distribution units in the MICE Hall,
 - ¶ interface control modules to LOI,
 - ¶ AC primary lines,
 - ¶ insulating oils for T/R set, buck regulator and driver anode supply (5,700 liters in total) (ANL?),
 - ¶ ancillaries(?),
 - ¶ etc.
- Labor:
- ¶ de-crating/moving/setting of LOI modules from the store(R40),
 - ¶ cabling from the MICE Hall to SP8, Hall 2 and MCR,
 - ¶ boring new cable/water-hose holes from MICE Hall thru Synchrotron Hall?
 - ¶ etc.

Comments: safety check is required whether the insulating oils can be used indoors

5. Specifications

Cavity tuning: The cavity has two accelerating gaps, each of which is provided with a gap monitor. One of the output is sent to the MCR, and the other can be used at the MICE Hall. For the grid monitor of the final triode, two fanouts with 50ohms are prepared by KEK: one is for the MCR and the other for the MICE Hall.

RF law: This signal is sent from the MCR to the LOI after correcting the propagation difference between LOI and HPD.

RF cables: Six LMR600 coaxial cables are available between MCR and MICE Hall, and another six LMR600 coaxial cables between MICE Hall and SP8.

50Hz-clock: This signal is used for switching the grid bias levels of the driver and final tubes. The signal type is 5volts with 5μsec duration, but 50ohms?

Bias current monitor: In Phase II, this signal is sent from the MCR to the MICE Hall for monitoring.

ISIS status display and control: The Ethernet cable will be laid between the MCR and the MICE Hall so that the ISIS status can be monitored and the ON/OFF control of the bias supply can be performed at the MICE Hall. The monitor is prepared by ISIS.

LOI status display and interlocks: The LOI status is displayed at the MCR on the screen which KEK prepares. More than display, 6-core cable will be laid between the MCR and the MICE Hall: one pair is for the LOI ON/OFF status by the volt-free-contact.

Voltage limit of the buck regulator input capacitor: 3phase-400Vac in RAL means the range

of 415~427Vac. Is this safe for the voltage limit(35KV) of the input capacitor of the buck regulator?

Max./min. voltage range for 1phase-200Vac requirement?

Screen grid supply: The ISIS screen supply can also be usable which is capable of 1.4KV, 2Amps.

6. LOI on the rail

Modifications of the LOI chassis to fit in the cavity base is in progress (fig. 4).

7. Toward the beam test

What kind of parameters are to be measured for the LOI in the beam test although the contributions to the whole second harmonic cavity system is only one-fourth? It is, however, clear that the first thing we should prove is that the LOI itself is stable under the heavy beam loading at the ISIS synchrotron. Next, measure the voltage modulations by the beam in order to identify the low-impedance characteristics.

In the test the HPD is replaced by the LOI. It is another issue how to allocate the replacements and the following study-time during the limited accelerator physics run

Conclusions

The water capacities in the MICE Hall and at the SP8 are under investigations. However, it is very likely that the water is short. In the Phase I (all the LOI system is tested in the MICE Hall), low-duty operation and/or operation at class ~B, not at class A, will be essential. In the Phase II (LOI is located at SP8 and the beam test is performed), the same measures above may be required. The grid switching of the driver anode supply can alleviate the shortage by 70 l/min. Is it possible as another measure that the water from the MICE Hall supplements the shortage?

Regarding the electric power in the MICE Hall, the existing 1.25MVA is capable of feeding the LOI peak of 633KW and the 500KW of MICE, simultaneously.

Preliminary: LOI PREPARATION PLAN at the MICE HALL

March 18, 2004

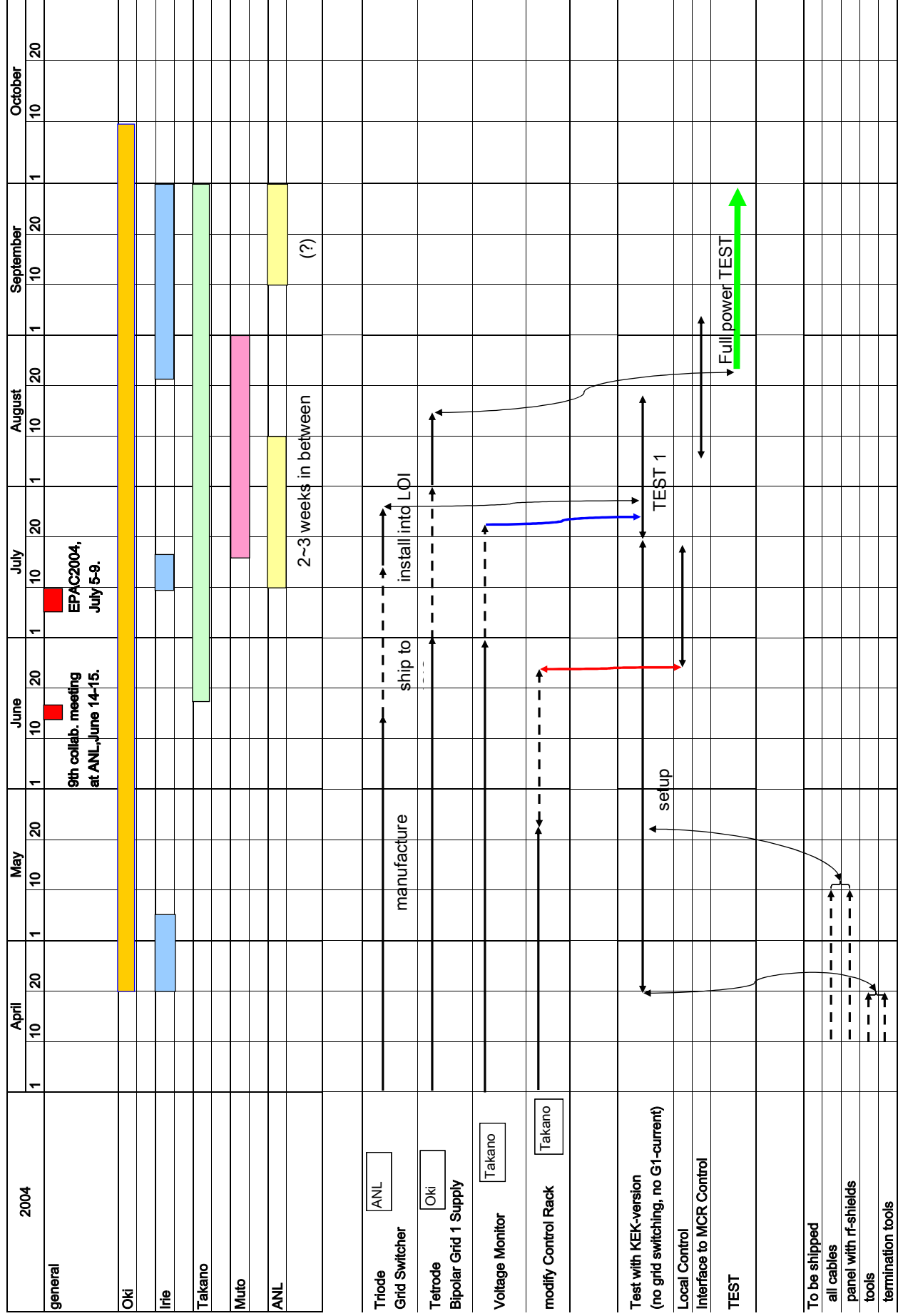


Figure 1. Time schedule at Phase I



Figure 2. Present power-distribution-unit along the wall at the trench side.



Figure 3. Water connections in the MICE Hall in the opposite side of the trench.



Figure 4. LOI on the rail