

Minutes of the meeting held on 23rd May 1996 concerning Gun5 RF power requirements and implementation in the CTF2 scheme

People present:	H. Braun	J.M.B Madsen	Copy to:	J-P Potier
	R. Bossart	P. Pearce		L. Rinolfi
	M. Dehler	I. Wilson		J-C Godot
	J.P Delahaye			

The meeting started with some mechanical drawings being shown of the cold model gun assembly and also of the final gun assembly. The cold model is actually being constructed and should be completed by the end of June. After this the measurements will be made during July, and a conclusion will be drawn about its RF performance. If these results are good then the final manufacturing drawings can be completed for possibly the end of August and the manufacture of Gun 5 could start in September.

The RF power required for Gun 5, in order to obtain a beam energy of 8MeV at its output, needs to be increased by 20% above the 25MW previously given to compensate for the RF losses caused by dark current and surface rugosity. In addition, to overcome losses in the network components an additional 10% in power is also required, bringing the total peak output from the klystron to 33MW.

The initial RF gun scheme proposed by R. Bossart used a 45MW klystron with a LIPS that was driving Gun 5 for the Drive beam, and also the Probe beam gun and the standard accelerating section for the probe beam. This scheme was seen as a bad marriage between the travelling wave LIPS cavities and the slow filling time (2 μ s) standing wave Gun 5, which would require a high peak power at the Gun 5 circulators. In addition, the Gun 5 may possibly need to be driven with a slightly different frequency to help compensate for beam loading, so that the proposed scheme would not be the ideal one to use in these circumstances.

A variant of this scheme by R. Bossart for powering the drive beam Gun 5, the probe beam gun and the accelerating section of the probe beam was looked at by P. Pearce for using one modulator operating at 10Hz and driving two 45MW klystrons was reviewed in the meeting. This scheme however would require a certain amount of modification of the PFN and high voltage sections of the modulator as well as a modification to the interlocks. In addition it also needs extra floor space for a second klystron assembly and its support frame, which is very difficult to find in the gallery. Consequently this scheme was also abandoned, although it would provide RF power at two different frequencies.

More detailed calculations concerning the effect of frequency changes and phase slip at the gun and the effect on the beam dynamics are to be made by M. Dehler and R. Bossart.

A new scenario for CTF2 is envisaged to ensure that sufficient RF power was available for the Gun 5 and other accelerator components without compromising the RF and beam requirements. This new scheme entails using the test modulator MDK29 (closest to CTF), which is about halfway down the LIL machine, and connecting it up to the CTF2 RF network. The test modulator would in this case become the MDK35, currently used on the LIL machine.

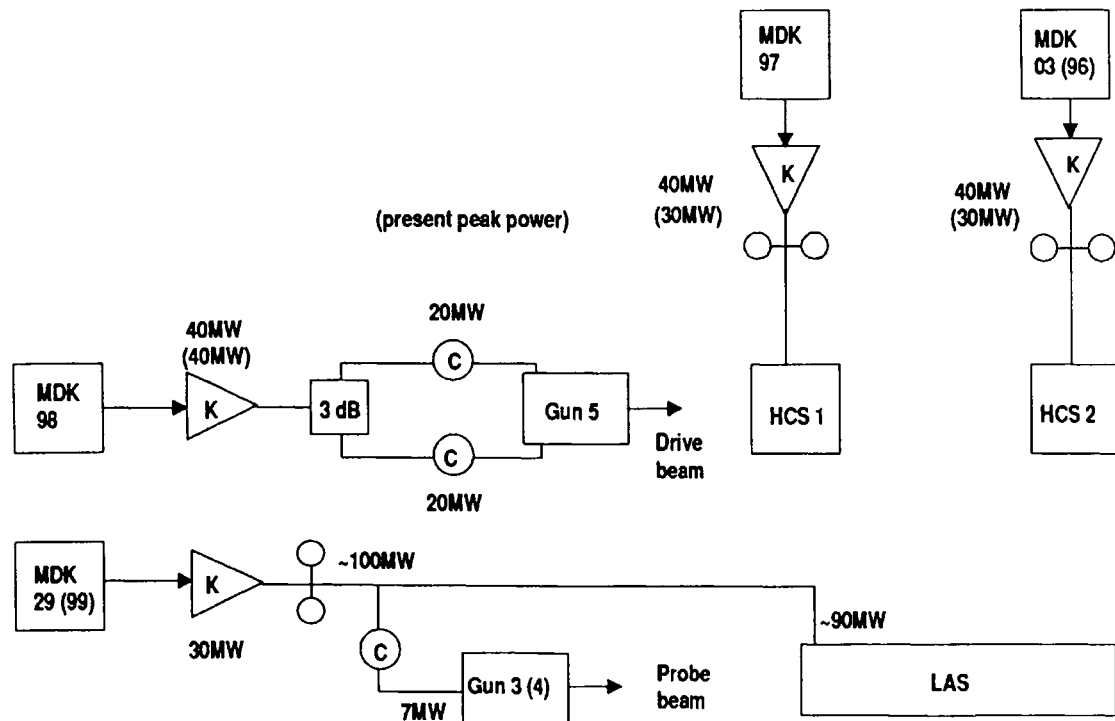
This new scheme means that there will be eventually four high power klystron-modulators connected to the CTF2 facility and four connected to LIL. In order for this to happen, it has first to be shown that the LIL machine can operate correctly without MDK35, since it is not feasible to give up the test modulator facility without replacing it with an equivalent system. Machine development tests on LIL will be organised by J-P Potier and L. Rinolfi to verify that operation without MDK35 is reasonable.

The new proposed CTF2 RF high power scheme is shown below. The RF drive to the new Gun 5 will also be connected as shown in the diagram. A 3dB power splitter will feed the two 20MW circulators and drive the two inputs to Gun 5. The mechanical arrangement has to be studied by the team of J-C Godot.

The situation concerning the circulators in manufacture and repair at EEV Lincoln, UK is advancing to schedule. The new 20MW circulator which previously had problems with the ferrite has been redesigned to use much smaller sections of ferrite. This will avoid the cracking that appeared during SF6 pressure tests, and subsequent breakdowns when RF was applied. The circulator under repair will be rebuilt exactly as the new 20MW model, and we have asked that it be conditioned up to 20MW RF operation as well. This means that when these two return from EEV in week 27 they both should in principle be usable in the Gun 5 connection at 20MW each.

The overall schedule concerning klystron-modulators for CTF2 is as follows:

1. MDK98 is now prepared for operation at 45MW, 4.5 μ s pulse width (10 to 50Hz rate)
2. MDK03 to be upgraded to 45MW operation in 1996 (2nd klystron needs to be obtained)
3. MDK97 upgrading preparations to be done in 1996 (3rd 45MW klystron requirement to be reviewed at beginning of 1997)
4. MDK97 to be upgraded during Jan/Feb shutdown in 1997
5. MDK29 with LIP's connected to RF Gun 3 (possibly changed to Gun 4 later) and LAS section of Probe beam (if decided) during Jan/Feb shutdown in 1997
6. Installation of the spare LIP's on MDK35 for tests



The RF power flow of the above scheme and the corresponding beam energies in the Probe and Drive beams will be updated by R. Bossart. Klystron power shown in brackets above are the present operating peak power levels. The numbering of the klystron-modulators could also be revised (see above diagram) once they are established in their new roles within CTF2.

A meeting will be called in a few weeks time to review this scheme and possibly take the decision on its installation at the beginning of 1997.