A FERRITE LOADED TUNING SYSTEM FOR SYNCHROCYCLOTRONS

K. VAN DUUREN
Philips Research Laboratories, Eindhoven

In our laboratory experiments are being carried out for a frequency-modulation system with ferrites.

A 1 : 40 scale model has been constructed and some measurements have been done with it. From the results of these experiments the preliminary data for the full-size oscillator were calculated.

The design parameters for our cyclotron are—
Energy : 28 Mev neutrons
Dee voltage : 30 kV peak
Repetition frequency : 3000/sec.
Modulation depth $\Delta f/f$ : 5%

Under these conditions the total magnetic losses in the ferrite will amount to about 40 kW (partly high frequency losses, partly polarisation losses due to hysteresis). Our experiments were done for the ferrite type : Ferroxcube IV D. The cooling medium was air.

For the proton resonance frequency (20 Mc) also some experiments were done. In this case the losses are expected to be of the same order of magnitude.

The data for the full-scale oscillator are rather preliminary. Due to the non-linear characteristics of the ferrites measurements on a full-scale model will be necessary to determine the final design parameters. Such a model, containing about 0.1 m$^3$ ferrite, is now under construction.

The improvements we hope to achieve in this way are:

1. higher repetition frequency
2. more favourable duty cycle
3. higher reliability.

I should like to mention the contribution of M. Morpurgo from CERN to the preparation of this project.