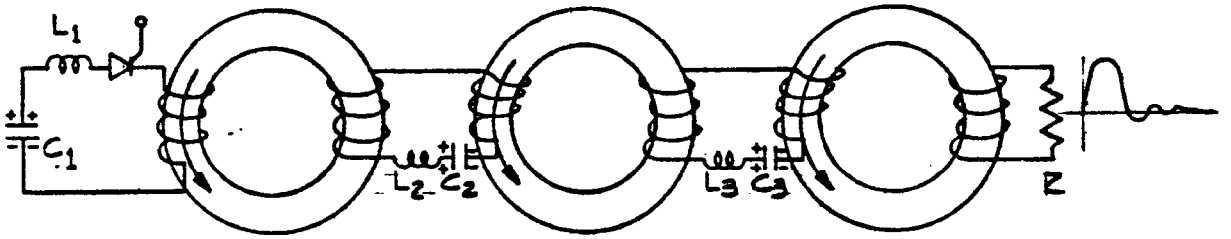
What is unique about Laser thyratrons? They have larger cathodes, a gradient grid, are compact for low inductance, much beefier, have low jitter but are more difficult to trigger (it takes at least 500 V). The major differences are the large reservoir and cathode.

What is the deflection uniformity across the beam transversely? About 10%, but again the plan is to put tips on the plates or to use curved plates. The ratio of the plate-width to the usable-region-width is ~ 3:1. We can show the computer field calculations if desired.

B. Magnetic Modulator, R. K. Cooper, LASL

The magnetic modulator is a series of saturable transformers with an initial condition in which all cores are saturated in the same direction. When the capacitor discharges, the core looks like a free-space inductor. The transfer of energy from the primary to the secondary depends only on the capacity in the secondary (see the sketch below):



DISCHARGE OF C_1 DRIVES FIRST OUT OF NEGATIVE SATURATION, TRANSFERS ENERGY TO C_2

CHARGING OF C_2 HOLDS CORE 2 IN NEGATIVE SATURATION. DISCHARGE OF C_2 FIRST DRIVES CORE 1 INTO POSITIVE SATURATION, THEN DRIVES CORE 2 OUT OF NEGATIVE SATURATION.

CHARGING OF C_3 HOLDS CORE 3 IN NEGATIVE SATURATION, etc. DISCHARGE OF C_3 DRIVES CORE 2 INTO SATURATION, BUT SOME ENERGY COULD BE COUPLED BACK TO C_2 IF SATURATION NOT SOON ENOUGH

This then becomes the primary and the next one is the secondary. A pulse forming network is used after the second core. We have to time the second core properly as energy is transferred since there is no diode on this stage.

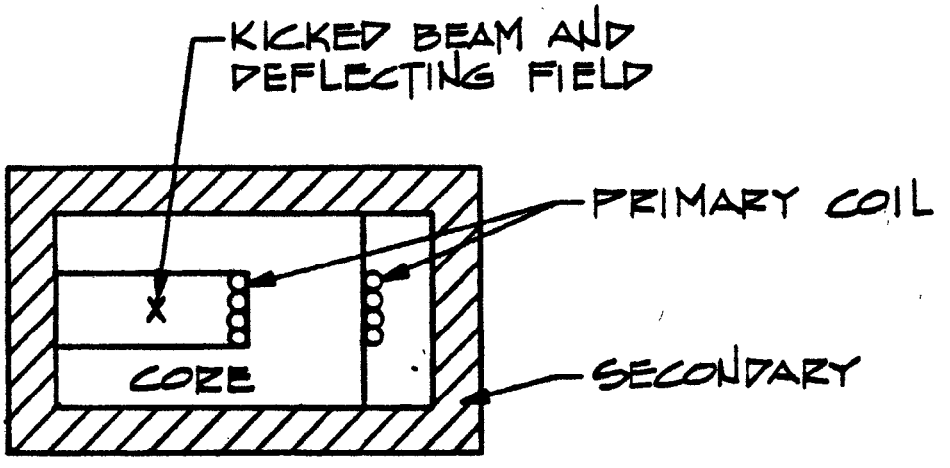
The plan is to use a five stage device and the delivery time is about six to nine months for a system to do what we want.

1. Questions

Isn't it hard to believe you can get ns accuracy? We expect typically 5 ns with overall jitter of 10 ns. The material is called Deltamax and is made by Arnold. They have been used for radar modulators. The cores for this design are about 9-inches diam by 3-inches wide.

C. Pulsed-Septum Magnet, M. H. Foss, ANL

A thin (¼-inch) pulsed (1 Tesla) septum magnet is used at the Argonne Rapid Cycling Synchrotron, but this magnet fails too soon. A good magnet should last 10^9 to 10^{10} pulses. We have tried to develop a better device which consists of a primary coil wound on a "C" core (as shown below).



If this structure were surrounded by a superconducting box then the desired deflecting field would be produced in the gap when the primary is pulsed. This suggests that a grounded conducting box will contain the stray field for a limited time. This box is the secondary. Electrical considerations are