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MAIN RING EXTRACTION AND DOUBLER INJECTION KICKER

Two modes of operation of the Doubler are contemplated. The first mode is meant for normal external beam line high energy physics operation. This mode involves 13 batch transfer from the main ring to the Doubler with a 395 ns gap between the first and the 13th batch.

The second mode is for colliding beams in the Doubler. In this scheme \bar{p} 's will be transferred first into the Doubler. One bunch at a time will be accelerated in the main ring and transferred into the Doubler until 12 bunches equally spaced around 2/3 of the ring are injected.

The main ring will be filled with p's and rebunched to form 21 equally spaced bunches. These will be extracted one at a time and loaded in between the \bar{p} 's.

Table 1

Kicker Requirements

<u>Parameter</u>	<u>Normal p Ext.</u>	<u>Normal p Inj.</u>	<u>\bar{p} p Ext.</u>	<u>\bar{p} p Inj.</u>	<u>p Ext.</u>	<u>p Inj.</u>
B · l	1800-m	1230g-m	1800g-m	1230g-m	750g-m	2680g-m
Rise Time	395 ns	---	950 ns	400 ns	20 μ sec	1 μ sec
Fall Time	---	395 ns	950 ns	400 ns	20 μ sec	1 μ sec
Pulse Length	20.56 μ sec	20.56 μ sec	10 ns	10 ns		10 ns
Useable Length	6 m	2 m	6 m	2 m	1.5 m	4 m

The p extraction kickers and injection kickers are to be used for both modes. Thus there is a total of four magnet systems. Three of the systems will require matched lumped element transmission line magnets as beam will circulate through their apertures after the kicker is fired. The only system exempt is the \bar{p} extraction kicker which can be a simple 40 μsec 1/2 sine wave device until it is converted at a later date to accommodate 1/3 of the ring extraction for pre cooler use.

Kicker Proposal

	p		p		\bar{p}	\bar{p}
	Extraction p mode	\bar{p} mode	Injection p mode	\bar{p} mode		
Pulse Length	20.56 μsec	10ns	20.56 μsec	10 ns	40 μsec	10 ns
Rise Time	395ns	395ns	---	300ns	20 μsec	435 ns
Fall Time	---	500ns	350ns	350ns	20 μsec	550 ns
Magnet Impedance	25 Ω	25 Ω	12.5 Ω	12.5 Ω	5.625 μH	12.5 Ω
# Modules	5	5	1	1	1	1
P.F.N. Impedance	8.3 Ω &12.5 Ω	8.3 Ω &12.5 Ω	12.5 Ω	12.5 Ω	90.54 μF	12.5 Ω
Magnet Module Length	1.0 m	1.0 m	2m	2m	1.5m	3.5m
Field	360g	360g	750g	750g	500g	766g
Gap	2x6"	2x6"	2x2"	2x2"	2x6"	2x2"
Charging Voltage	72KV	72KV	75KV	75KV	500V	76.6KV

In order to produce the fast fall time for the p injection kicker, two additional thyratrons are needed. One to act as a clipper to generate the fast fall time and one as a dump to terminate reflections from the clipper (see Figure 1). This system can be used also to produce the short pulse for p injection for colliding beams by appropriately timing the clipper and dump switches relative to the main switch.

Figure 2 shows a scheme to produce a short or long pulse for the main ring p extraction kicker. In the case of the long pulse, both P.F.N.'s are charged and both thyratrons are fired sequentially. For the short pulse only the front end P.F.N. need be charged and only thyatron 1 need be fired.

The \bar{p} extraction kicker is a simple SCR device similar to the main ring pingers.

Figure 3 shows the proposed \bar{p} injection kicker.



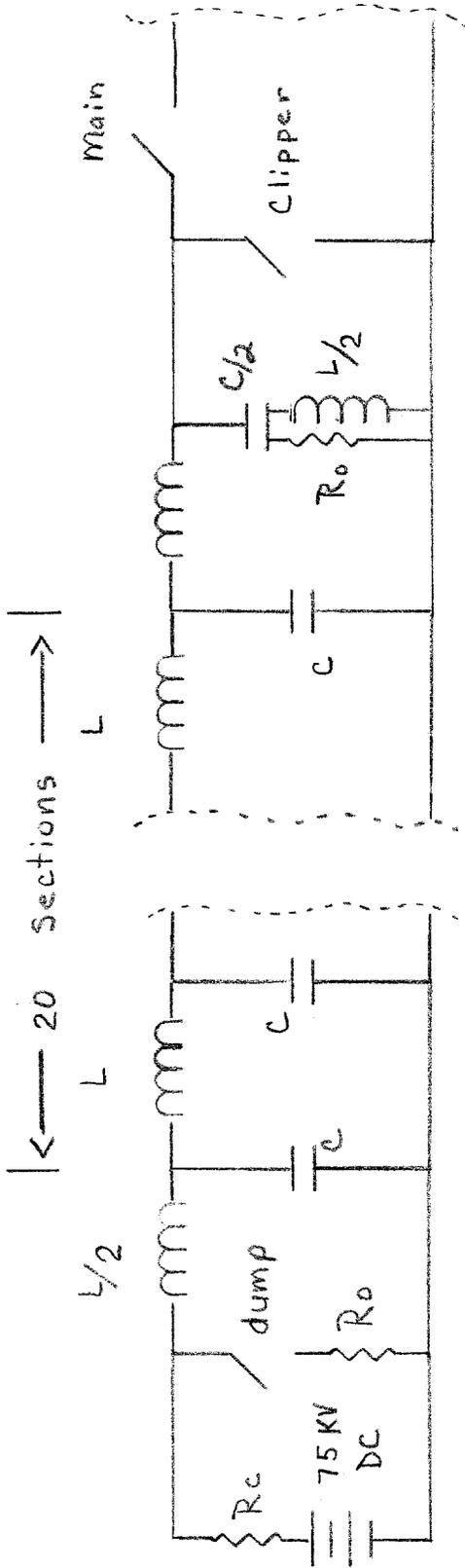
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P INJECTION KICKER Figure 1

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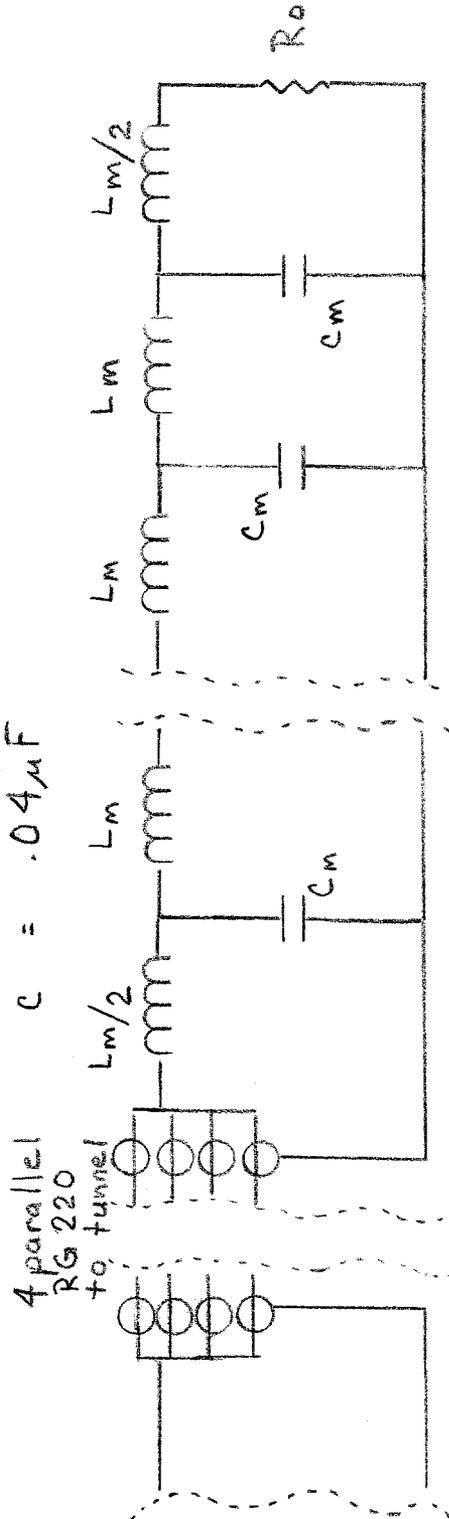


$R_c = 1 M\Omega$

$R_o = Z_o = 12.5 \Omega$

$L = 6.25 \mu H$

$C = .04 \mu F$



← 10 Sections →

$L_m = .227 \mu H$

$C_m = .00145 \mu F$



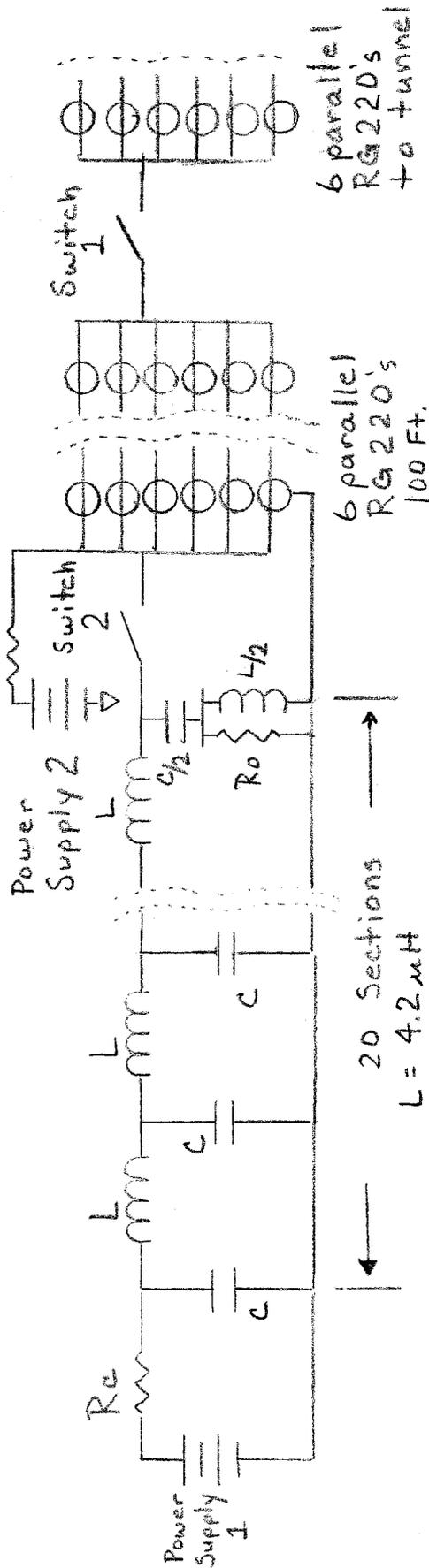
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P Extraction Kicker Figure 2

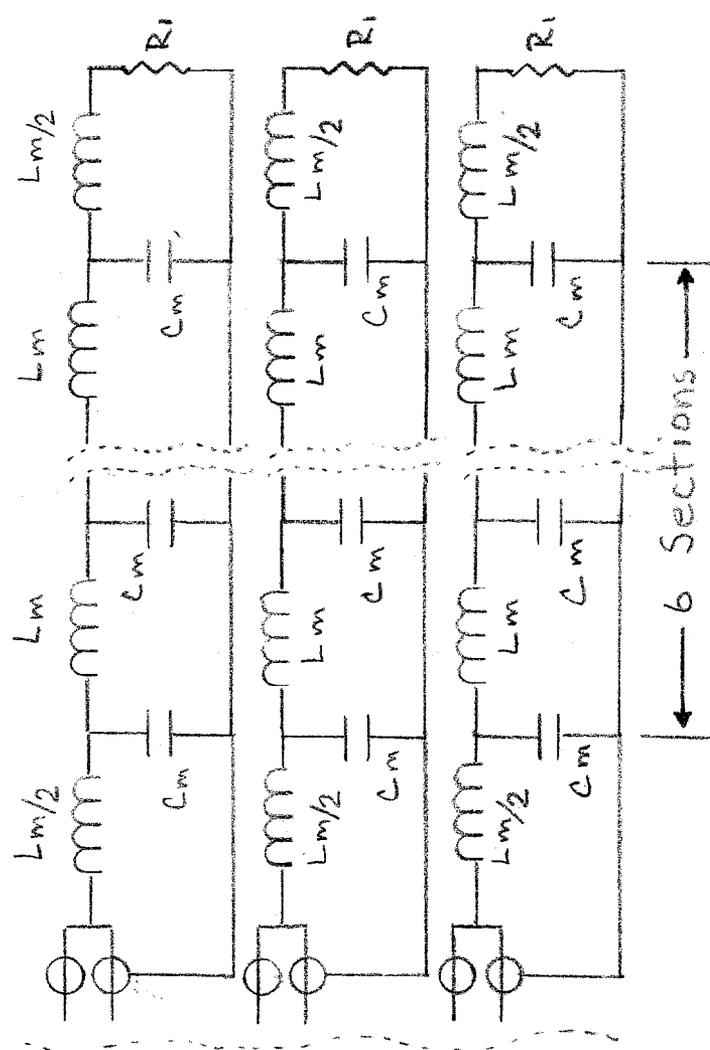
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$L_m = .536 \mu H$
 $C_m = .0086 \mu F$
 $R_1 = 25 \Omega$





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P Injection Figure 3

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