



Brookhaven
National Laboratory

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RHIC RF Systems

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RHIC RF SYSTEMS

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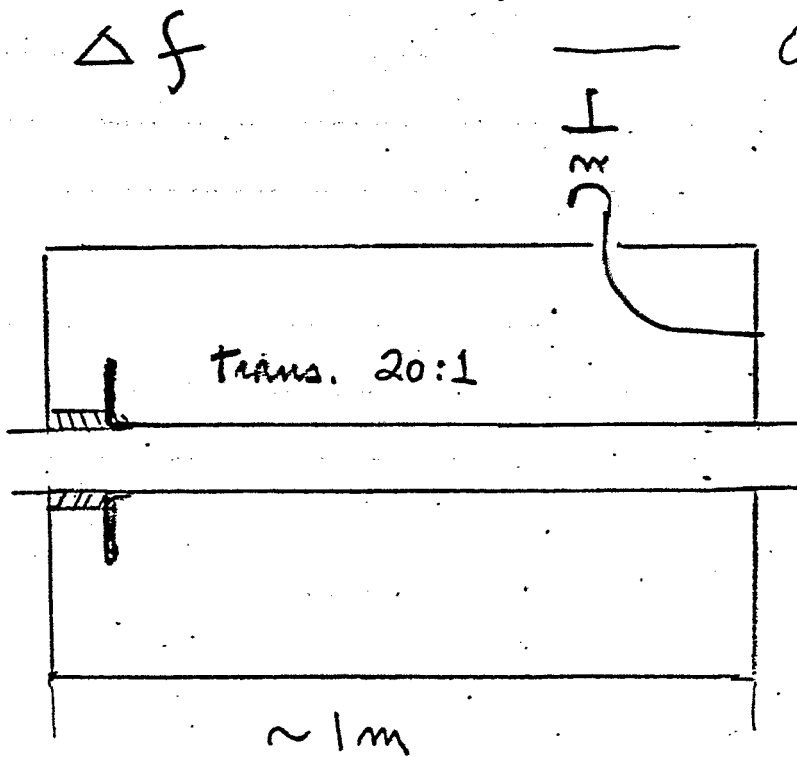
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RHIC RF System

1 MV/turn

	Option 1	2	3
V gap (kV)	200	200	20
frequency (Mc)	54	27	54
length (m)	1.3	2.5	0.75
R M-Ω	1.06	0.83	
Cavities/ring	5	5	50
Dissipation kW	19	24	0.5
Total R M-Ω	< 5	< 4	< 0.5
Δf		0.4%	(Aw B = .9968)



Option 3

Small 1.5 kW

Triode

Air core cavity

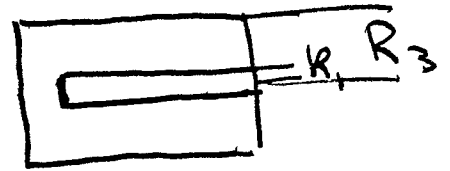
Lower Impedance

Needs more study

Power Losses

$$W = \frac{1}{2} R_s \left(\frac{V}{Z_0} \right)^2 \frac{1}{16\pi} \left(\frac{1}{R_1} + \frac{1}{R_3} \right)$$

$$W \propto \sqrt{\lambda}$$



f (length)

$\lambda/4$

W

1

$\lambda/8$

1.6

$\lambda/16$

3.3

f $\left(\frac{R_3}{R_1} \right)$

min

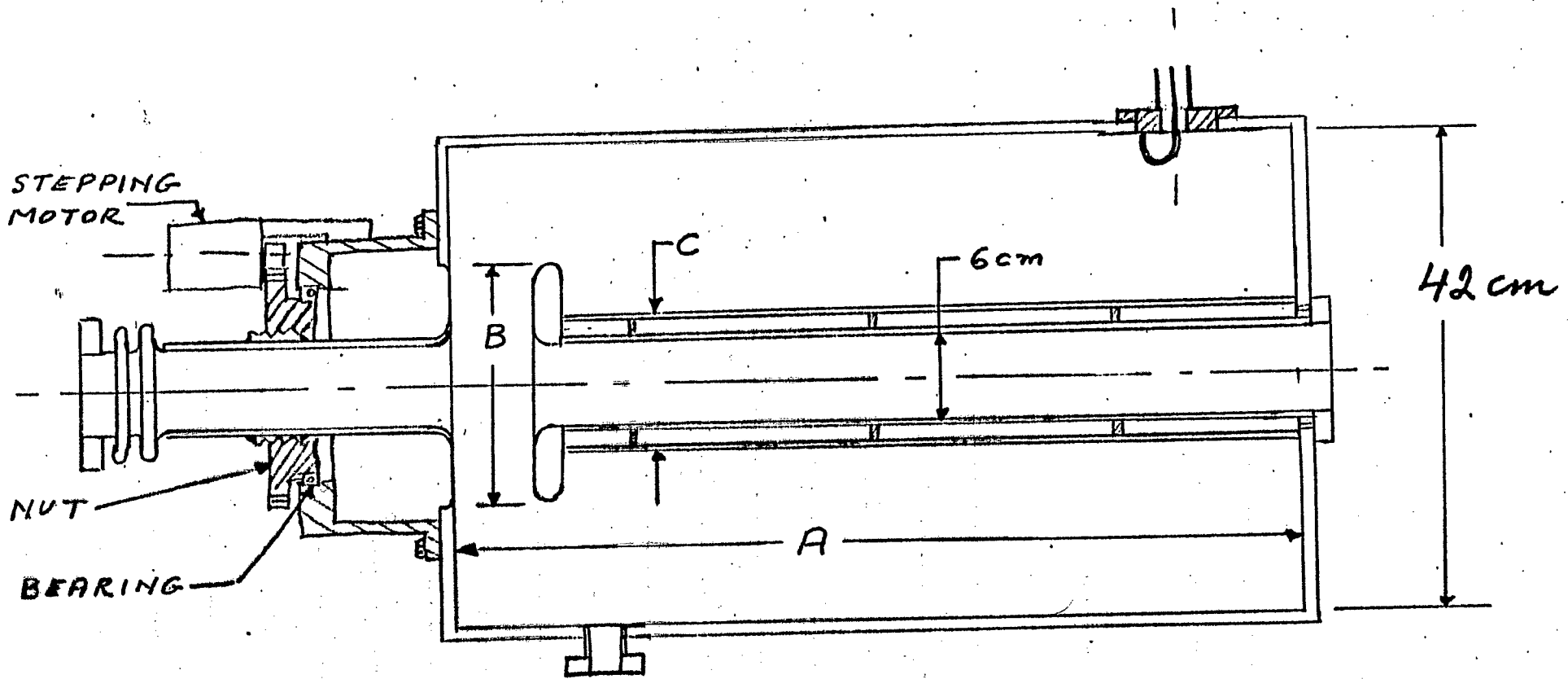
$$\frac{R_3}{R_1} = 9$$

W

1

$$\frac{R_3}{R_1} = 3$$

1.65



	DIM.	A	B	C
CAVITY 1		1.3 m	16 cm	8 cm
2		2.5 m	20 cm	10 cm

SKETCH of HRIC RF CAVITY