

## RF Cavities and Amplifiers

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RF Cavities and Amplifiers

*(Mini-Workshop on RHIC RF Systems)*

*July 11-15, 1988  
Collider Center*

J. G. Cottingham  
BNL

## RHIC ACCELERATING SYSTEMS

Frequency	26.74	160.4 MHz
Harmonic No.	342	2052
Accelerator Voltage/Ring	0.3-0.4	11.0 MV
Frequency Change	-1%	-0.12%
Number of Cavities/ring	2	11
Voltage/cavity	0.15-0.2	1.0 MV
Cavity Power	20-25	75-90 KW
Amplifier Power Rating	45	100 KW
"ON" time	C.W.	C.W.
Sin $\phi_s$	.04	0
No. of Bunches	57	57

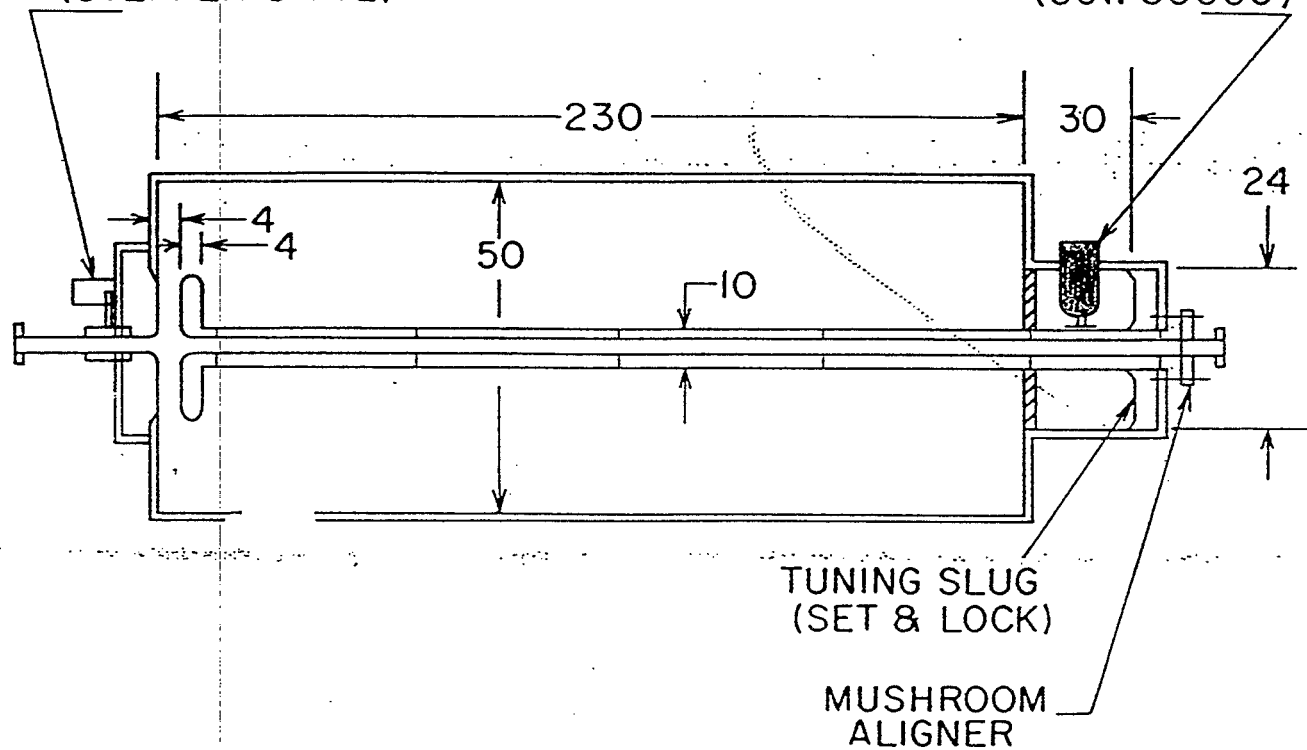
*E. C. K. K. K. K. K.*

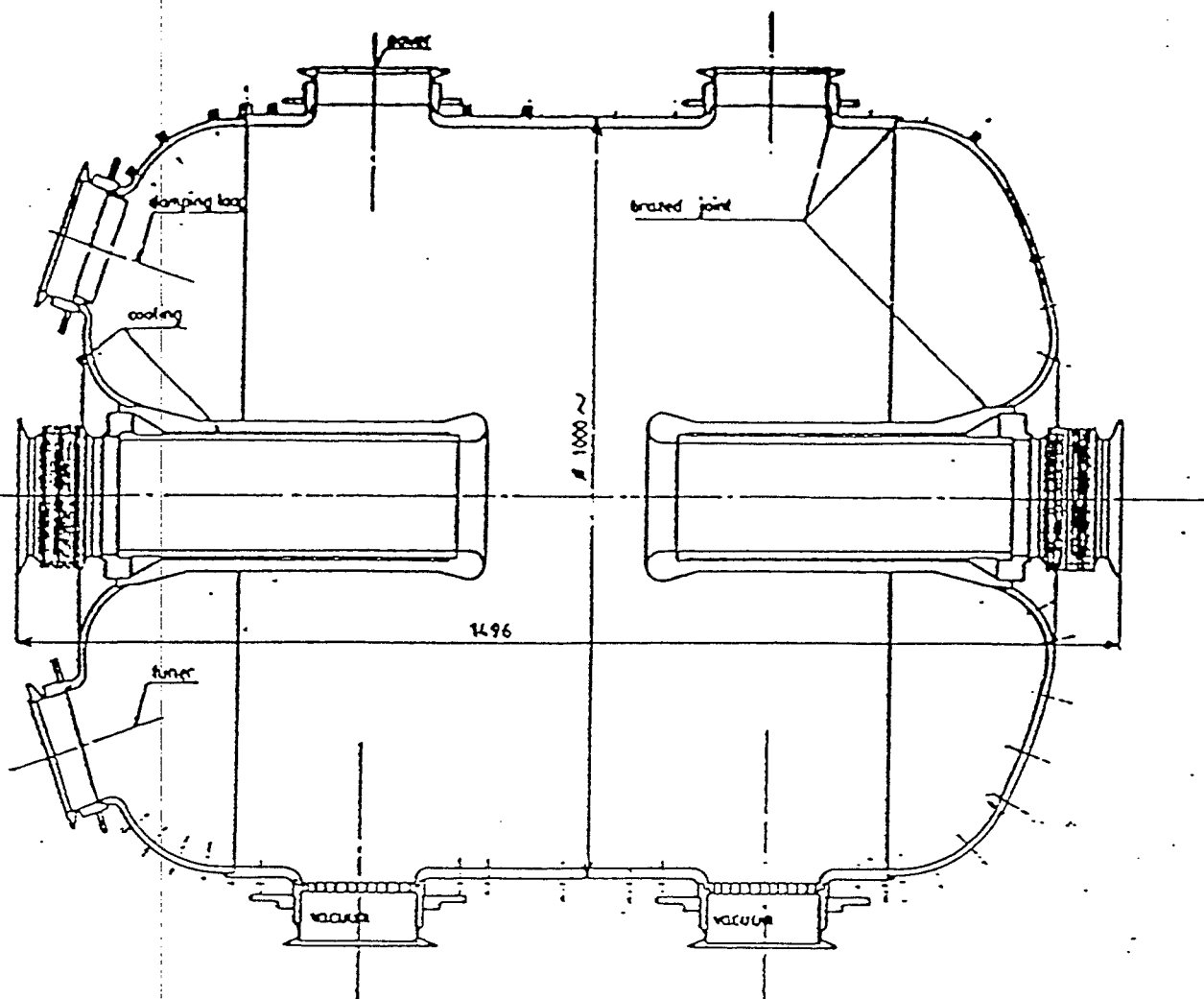
## **RHIC ACCELERATING SYSTEM (continued)**

<b><u>Frequency</u></b>	<b><u>26.74</u></b>	<b><u>160.4 MHz</u></b>
<b>Shunt Z/cavity, Tuned</b>	<b><math>800 \times 10^3</math></b>	<b><math>6.7 \times 10^6</math></b>
<b>Shunt Z, Total Tuned</b>	<b><math>1.6 \times 10^6</math></b>	<b><math>73.3 \times 10^6</math></b>
<b>Shunt Z/cavity Detuned</b>	<b><math>-j 8.9 \times 10^3</math></b>	<b><math>-j 47 \times 10^3</math> ohms</b>
<b>Shunt Z, Total Detuned</b>	<b><math>-j 17.8 \times 10^3</math></b>	<b><math>-j 520 \times 10^3</math> ohm</b>
<b>Cavity Q, Unloaded</b>	<b>9000</b>	<b>45000</b>
<b>Cavity Q, Loaded</b>	<b>4500</b>	<b>22500</b>

OPERATING TUNER  
(STEPPER DRIVE)

EIMAC TRIODE  
(3CW 30000)





Cross-section of a 100 MHz cavity (SPS)

0 100 200 mm

Design study of a 100 MHz single-cell cavity  
for application in the SPS p/pbar collider

G. Rogner

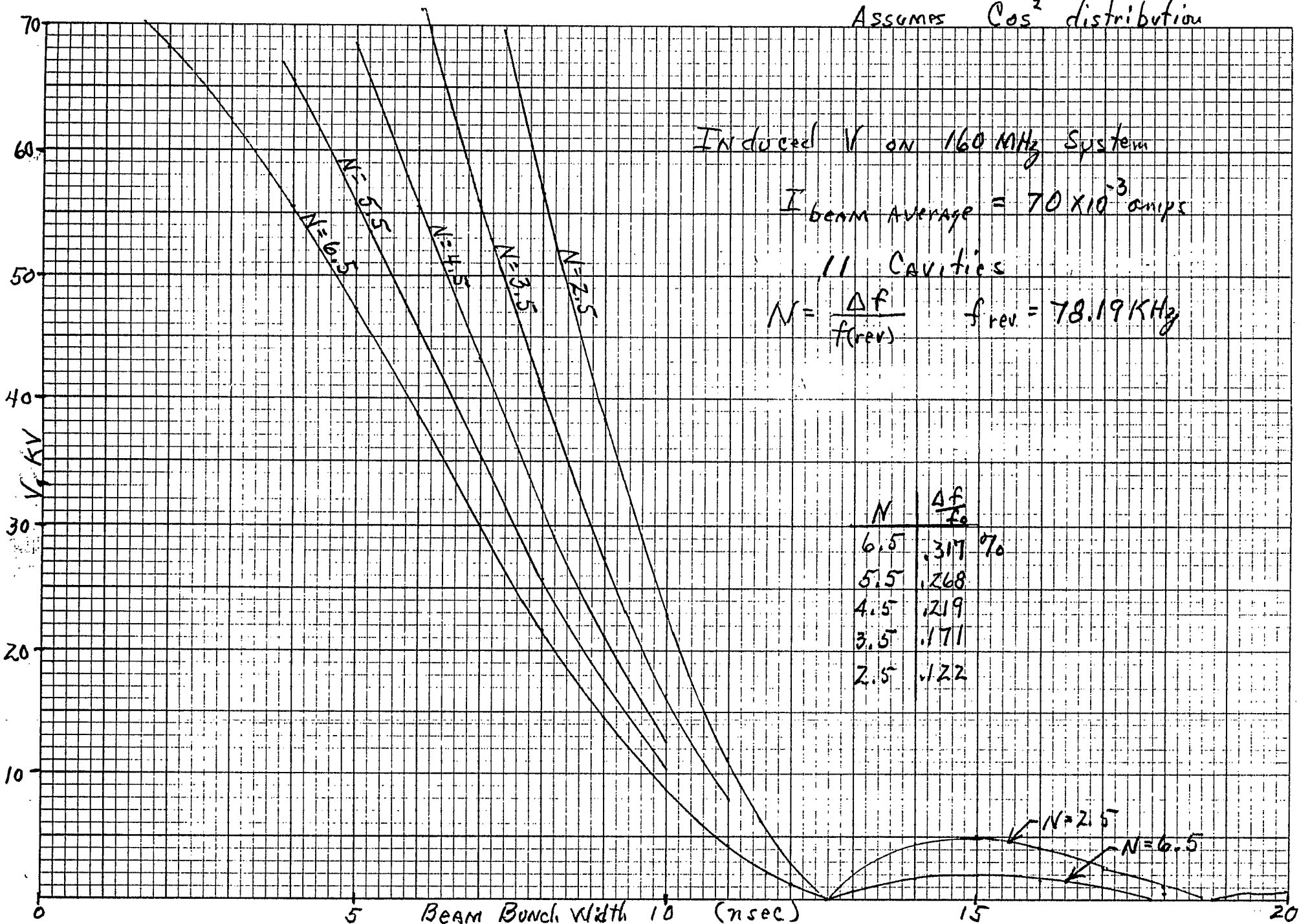
Assumes  $\cos^2$  distribution

Induced V on 160 MHz System

$I_{\text{beam Average}} = 70 \times 10^{-3}$  amps

11 Cavities

$$N = \frac{\Delta f}{f(\text{rev})} \quad f_{\text{rev}} = 78.19 \text{ KHz}$$





Normalized Induced Voltage

$\Delta f / f_0 - \%$

Induced Voltage vs.  $\Delta f$

( $\Delta f$  measured in units of  
 the Revolution freq., 78.19 KHz)

1.1 Cavities - 1.1 Megavolts

Choose (.122%)

$\Delta f$  (Harmonic of  $f_{rev}$ )

