

To: Messrs. Ginzton, Jasberg, Sonkin, Soderstrom, Neal  
 From: J. Lebacqz  
 Subject: M Klystron Specifications

The Klystron Committee met on November 4 to discuss specifications. Enclosed find proposed tentative specifications for project M klystrons. Many of these are still tbs (to be supplied). Particular attention is called to the following numbers tbs:

1) Drive power - We feel that overall consideration of the klystron and drive system has to be undertaken before the drive power can be specified.

2) Focusing - It is estimated that electromagnets for the klystron under consideration will require about 2 to 3 kw of power each. For 1000 tubes at 3000 hours per year, this is about  $20 \times 10^6$  kw hours/year; or an expenditure of \$200,000/year approximately.

It appears at present that permanent magnet focusing could be provided for these tubes, at an initial cost no higher than the cost of focusing coils and rectifiers. The main disadvantage is the probable lack of flexibility in power output adjustment; for instance, if the magnets are adjusted for optimum performance at 265 kv, the output at 195 kv might be 1 or 2 db lower than could be obtained by refocusing with electromagnets. An opinion on the desirability of permanent magnets will be appreciated by the Klystron Committee.

3) Knowledge of available water flow and pressure is necessary to design the klystron cooling system.

JVL/ann

November 6, 1953.

PROJECT "M" KLYSTRON  
TENTATIVE SPECIFICATIONS

Description:

Pulsed amplifier klystron tube, 22 megawatt, S-band, single frequency, magnetically focused, waveguide output, coax input, liquid cooled, sealed-off.

	Units	Absolute Ratings			Typical Operating Conditions							
		Max.	Min.	Notes	Operation A			Operation B				
					Max.	Min.	Notes	Max.	Min.	Notes		
$E_f$	volts	tbs	tbs									
$I_f$	amps	tbs	tbs									
$e_{py}$	kV	265	-	1	184	-	1	265	-	1		
$e_{pz}$	kV	60	-	-	40	-	-	55	-	-		
$i_f$	amps	231	180	2	120	98	2	208	170	2		
$P_d$	Mw	66	54	-	32	18	-	55	45	-		
$P_A$	kw	50	24.3	-	19.8	16.2	-	24.9	20.3	-		
F	Mc	2856	2856	-	2856	2856	-	2856	2856	-		
$t_p(e_{py})$	μsec	2.5	-	3	2.5	-	3	2.5	-	3		
$P_{drive}$	watts	tbs	tbs	-	tbs	tbs	-	tbs	tbs	-		
$P_{out}$	Mw	-	25	-	-	6	-	-	22	-		
$t_{rf}$	μsec	-	2	-	-	2	-	-	2	-		
$P_{out}$	kw	-	9	-	-	4.3	-	-	7.9	-		
Load	VSWR	1.5:1	-	-	1.5:1	-	-	1.5:1	-	-		
Window pressure	mm Hg	$10^{-3}$	-	-	$10^{-6}$	-	-	$10^{-8}$	-	-		
Life	hours					2000			200			

Cooling: Water flow                      tbs at tbs psig  
 Water temp. inlet                    tbs

Drift:  $P_{out}$  to change not more than tbs percent per °F in inlet water temp.

Base: Special plug-in socket

Input: Female coaxial connector, type C -- (mates with UG-573/U male connector)

Output: Waveguide RG-48/U

Cooling Connections: two quick-disconnect type tbs

Phase Modulation: phase modulation produced by stray heater magnetic field to be less than tbs<sup>3</sup>

Focusing: Permanent magnet focusing to be considered

Radiation: Shielding may be provided on collector

Note 1 - Any short transient spikes on the voltage pulse shall not exceed 10% in magnitude and 0.25  $\mu$ s in duration.

Note 2 - The tube is designed to operate with a gun of perveance  $\approx 1.4 \times 10^{-6}$ ; the limits of acceptable current at operating voltage correspond to variation of  $\pm 10$  percent in perveance.

Note 3 - Pulse length measured at 70 percent of maximum voltage; and minimum of 2  $\mu$ sec flat top is required.

Corrected: November 10, 1958.