

PL-2J55

PULSED-TYPE MAGNETRON OSCILLATOR



The Penta PL-2J55 is a pulsed-type super-high frequency magnetron oscillator with internal magnets. Containing its own internal resonance circuits, the PL-2J55 is designed to operate in the 3 centimeter band, and under pulsed conditions, is capable of delivering 70 kilowatts of peak power.

ELECTRICAL CHARACTERISTICS

Maximum Ratings

Heater Voltage	7.0 V
Peak Anode Voltage	16 kv
Peak Anode Current	16 a
Maximum Duty Cycle Product	.001
Maximum Pulse Duration	2.5 μ s
Average Input Power	180 W
Frequency Pulling @ standing wave ratio of 1.5 in voltage	15 Mc
Anode Temperature	100° C.
Maximum recommended period of operation per 100 microsecond interval	5 μ s
Minimum pressure at which output circuit will pass 50 kw. without breakdown	.5 Atmosphere

Heater

Heater Voltage	6.3 V
Heater Current	1.0 A
Minimum Heating Period	1 min.
Heater Type	Oxide coated unipotential cathode, heated indirectly

Typical Operation

Heater Voltage	See oper. notes
Pulse Duration	1 μ s
Recurrence Frequency	1000 pulses/sec.
Peak Anode Voltage	12.8 kv
Peak Anode Current	12.0 a
Peak Power Output	50 kw
Frequency	9345-9405 Mc.
Maximum Frequency Change Resulting From Temperature Change	.25 Mc./°C.



PENTA LABORATORIES, INC.

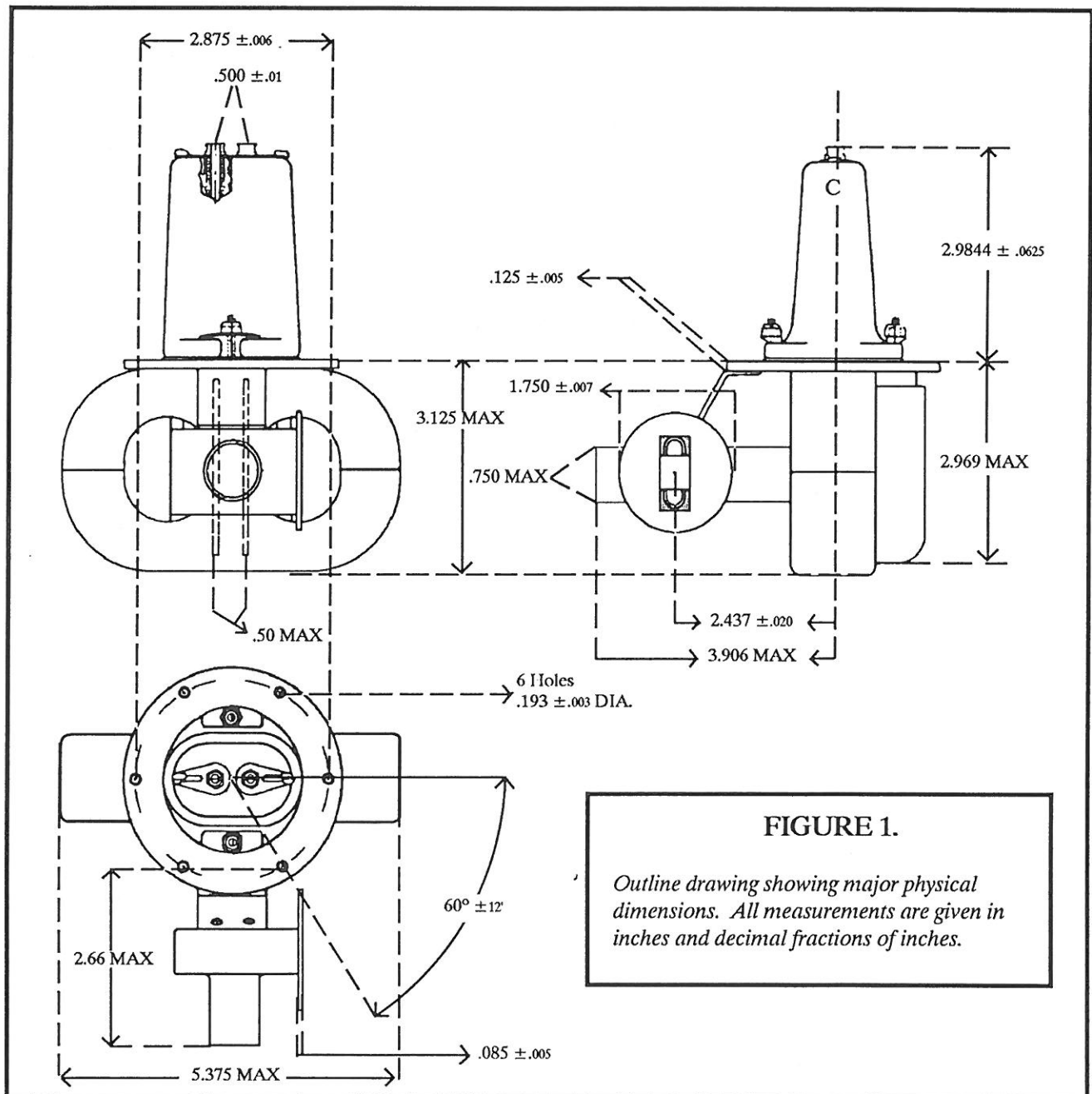


MECHANICAL CHARACTERISTICS

The output coupling flange, heater-cathode terminals, cooling fins, heater, magnet position, and main external dimensions can be seen in *Figure 1*. Pulsating high voltage is connected to the common heater-cathode terminal, which is marked with a letter "C". No direct connection is made to the output circuit of the tube.

The tube is mounted using the circular flange and is indifferent to orientation. The output circuit of the tube is preplumbed to a certain frequency pulling figure for operation into a waveguide load. It is designed for optimum frequency insensitivity and minimum breakdown. The design of the coaxial waveguide flange is such that little or no electrical reflection can be expected to be present in any part of the output circuit.

Both the mounting and radio frequency output flanges are designed to work well in conjunction with pressure seals.





OPERATING CHARACTERISTICS

The Rieke Diagram in *Figure 2* shows power and frequency curves for a typical curve operating into a waveguide of dimensions of .5 in. by 1.125 in with standing wave ratio and phase angle varied. The pulling figure at 1.5 ratio in voltage is 11.5 megacycles.

Figure 3. gives the recommended heater voltage to input power schedule.

Figure 4. shows peak power output, frequency, efficiency, radio frequency bandwidth at 1/4 power, and peak anode potential contours, as a function of peak current.

The change in frequency, or effective spectrum width, as a function of sinusoidal acceleration, in G's is given in *Figure 5.*

NOTE: THE DATA IN THE FOLLOWING GRAPHS IS INTENDED AS REPRESENTATIVE OF AN AVERAGE TUBE OPERATING UNDER AVERAGE CONDITIONS ONLY! Data can be expected to vary slightly with the individual tube and its specific operating environment.

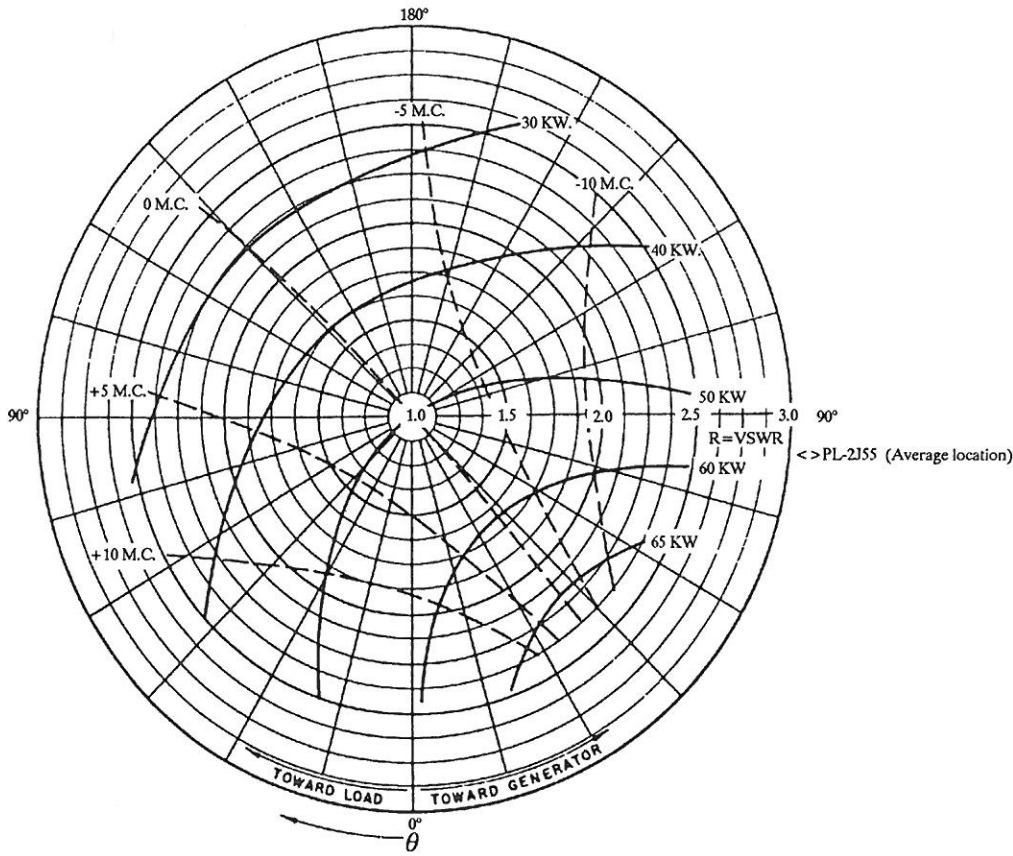


FIGURE 2. Frequency-Power Contour Diagram

Recurrence Rate	= 1000 cps.	R	= Standing wave ratio in voltage
Pulse Duration	= 1 μ s	θ	= Distance of standing wave min. from face of output flange
Peak Current	= 12.0 a	—	= Peak kw power contours
Recommended Load	= Center of Graph	- - -	= Frequency contours in megacycles



NOTES ON OPERATION

The waveform characteristics of the input voltage pulse are crucial to achieve satisfactory operation of the tube. For proper operation the following guidelines should be adhered to:

Current Variation	less than ±10% of average pulse current
Voltage Time of Rise	0.1 to 0.2 microsecond
Voltage Time of Fall	less than 0.4 microsecond

Pulse shape not conforming to these recommendations may result in excessive frequency modulation and general instability.

The PL-2J55 is designed for forced air cooling; sufficient air flow should be provide to keep the temperature of the anode below 100° C.

As a general rule, a magnatron's useful life varies inversely with pulse width and duty cycle. Therefore, where high peak power is desired, it is recommened that the tube be operated at a relatively low recurrence rate. The useful life of the tube will also be greatly reduced when it operates into an improperly matched transmission line.

The maximum ratings specified within this data sheet are intended to represent limiting values for each variable independently, and do not define an overall set of values at which the tube may be satisfactorily operated.

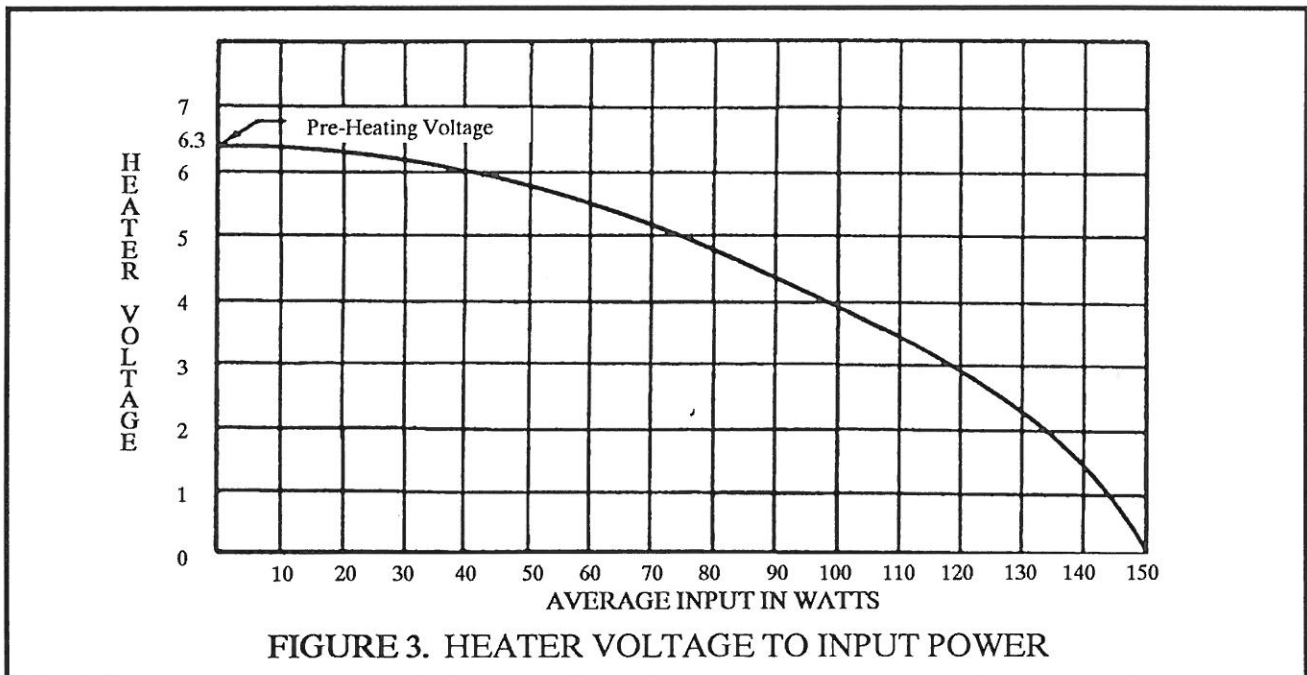
For power output of equal to or in excess of 150 kw, the duty cycle product must not exceed 0.0007, and under no circumstances should it exceed 0.001.

As is the case with any magnatron, the PL-2J55 is extremely sensitive to external magnetic fields. A minimum of 2 inches should be maintained at all times between the tube and any other magnetic material.

Upon initial instalation of the PL-2J55, a temporary unsteadiness in operation may be noticed. It is recommended that the tube be operated under normal or expected conditions (seasoned) until normally stable operating values are obtained.

A heater voltage of 6.3 volts should always be applied at least one minute prior to the application of high voltage pulsations. During high voltage operation with recurrence rates equal to or below 500 pulses per second, a heater voltage of 3.0 volts MUST be maintained. At recurrence rates above 500 pulses per secnd, the heater voltage should be reduced in accordance with the table given.

NOTE: FAILURE TO COMPLY WITH THESE RECOMMENDATIONS MAY SERIOUSLY REDUCE TUBE LIFE!!



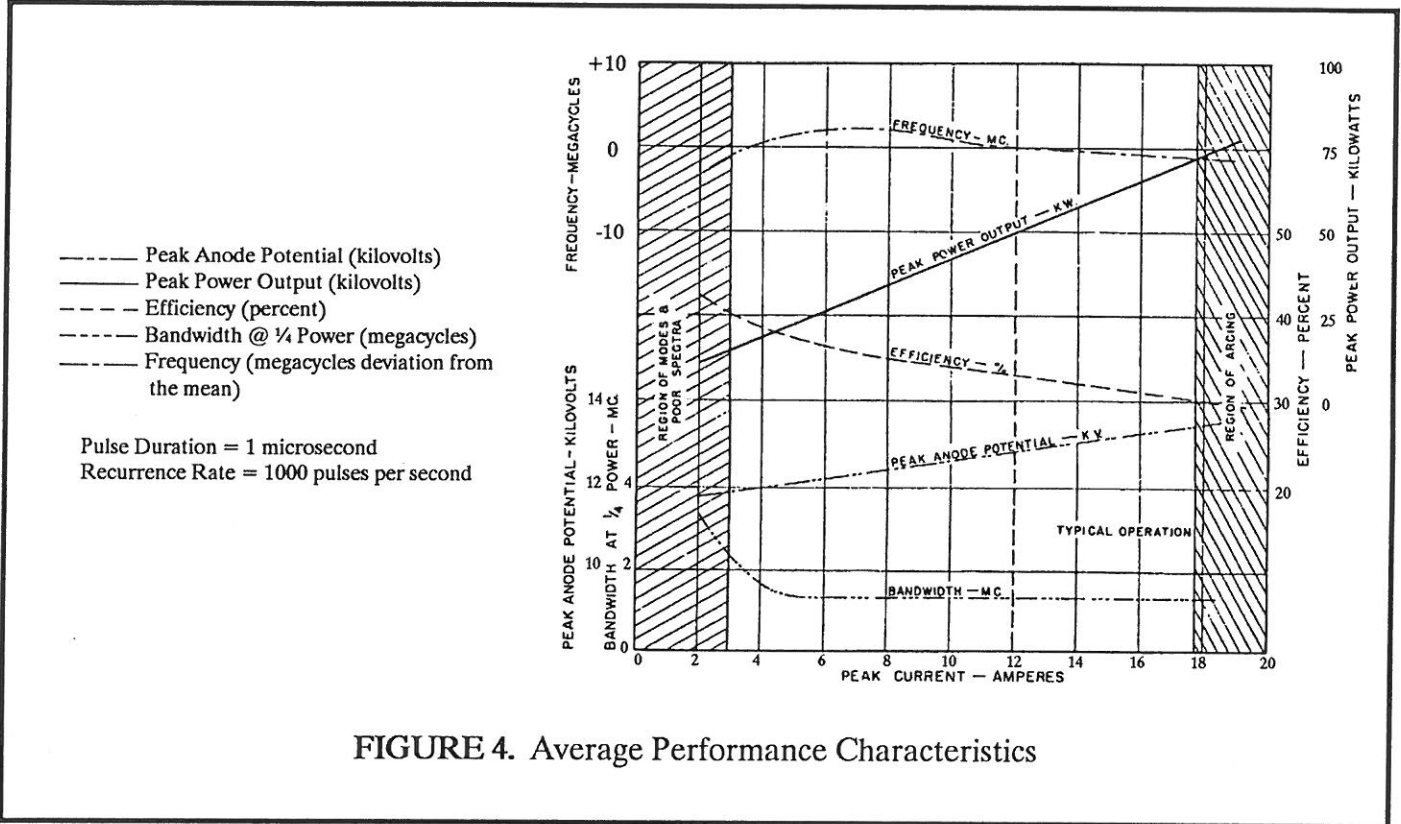


FIGURE 4. Average Performance Characteristics

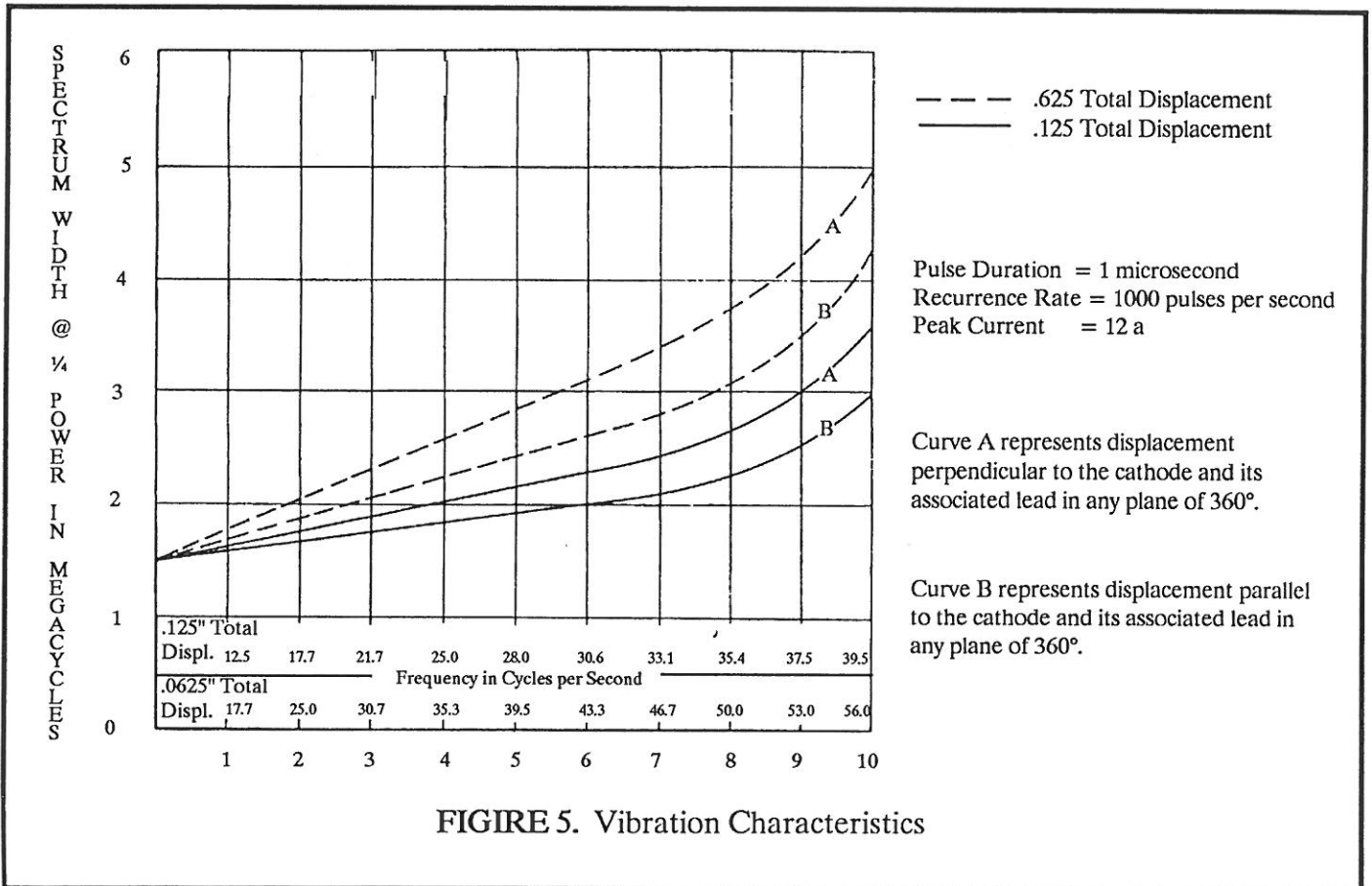


FIGURE 5. Vibration Characteristics