

CANADIAN **Marconi** COMPANY

TUBE DATA SHEET

TENTATIVE

DESCRIPTION

Magnetrons 7138 to 7143 are a series of fixed frequency, pulsed oscillator tubes which cover the frequency range of 9050 to 9550 Mc in steps of 100 Mc.

Integral magnet construction is used and the waveguide output and anode support bracket act as cooling fins.

These tubes are generally similar to the 6027 magnetron but may be used at full rated output (18 KW peak) at altitudes up to 50,000 feet without pressurization.

High altitude operation is attained by means of a potted cathode stem and pressure sealed output.

The output is designed to fit a UG40A/U coupler and the input is provided with plastic insulated flying leads.

These tubes are capable of delivering an RF peak power output of 18 kilowatts at a peak anode voltage of 7.4 kilovolts with pulse durations up to 2.0 microseconds.

MECHANICAL DATA

Mounting Position Any
Mounting Support Base Plate
Weight 5.5 lbs.
Coupling between Tube and Load UG-40A/U
Load Transmission Line RG-52/U
Cooling Note 4 & 5
Dimension See Outline Drawing

ELECTRICAL DATA

General

Pre-heat Heater Voltage 6.3 $\pm$ 10%
Pre-heat Heater Current at 6.3 Volts 515 amps. $\pm$.085 amps.
Minimum Pre-heat Time See Note 1.
Heater Cold Resistance Approx. 2.9 ohms.
Anode-Cathode Capacitance Approx. 7.0 uuf.

Please send technical inquiries to: Electronic Tube Plant, 90 Trenton Ave., Montreal 16, Quebec.

CANADIAN MARCONI COMPANY
Electronic Tube And Components Division,
830 Bayview Avenue,
Toronto 17, Ontario.

Sales branches at: 3594 Main St., 168 Market Ave. E., 6035 Cote de Liesse Rd., 572-574 Barrington St.,
Vancouver, B.C. Winnipeg, Manitoba. Montreal, Quebec. Halifax, N.S.

7138

7139

7140

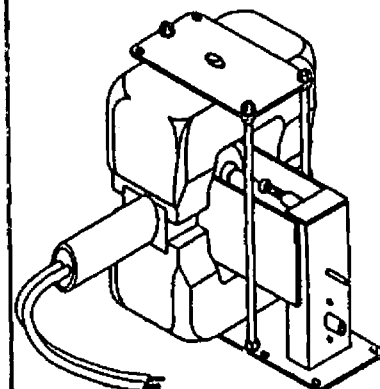
7141

7142

7143

MAGNETRON

Fixed Frequency
9000-9600 Mc
18 Kw Peak Power Output
Integral Magnet
Forced Air Cooled
High Altitude Operation





ABSOLUTE MAXIMUM RATINGS

(Non-Simultaneous Values)

Heater Voltage	6.93 Volts.
Heater Current	0.60 amps.
Heater Surge Current	2.5 amps.
Peak Anode Voltage (Note 6)	7.8 KV.
Peak Anode Current (Note 6)	8.0 amps.
Average Power Input	80 watts.
Duty Cycle	.0025
Pulse Duration	Max. 2.5 μ secs.
(Note 7)	Min. 0.2 μ secs.
Rate of Rise of Anode Voltage	
(Note 2)	110 KV/ μ s max.
.....	80 KV/ μ s min.
Output Circuit Pressurization	15 psi abs.
Maximum Altitude without Pressurization	
Output Circuit	50,000 ft.
Input Terminals	50,000 ft.
Anode Temperature	
(See Outline Drawing)	120°C.
Cathode Stem Temperature	
(See Outline Drawing)	60°C.
VSWR (Magnetron Load)	1.5/1

TYPICAL OPERATION

Frequency (with Anode Temperature = $40 \pm 10^\circ\text{C}$).

7138	9000 to 9100 Mc.
7139	9101 to 9200 Mc.
7140	9201 to 9300 Mc.
7141	9301 to 9400 Mc.
7142	9401 to 9500 Mc.
7143	9501 to 9600 Mc.

Heater Voltage (Note 1)	4.5 volts
Peak Anode Voltage (Note 6)	$7.4 \pm .04$ KV
Peak Anode Current (Note 6)	7.5 amp.
Duty Cycle	.001
Current Pulse Duration	$2.0 \pm .2$ usec.
VSWR	1.15/1
RF Bandwidth (Note 8)	1.25 Mc max.
Peak Power Output	18 KW Minimum
Pulling Figure (VSWR 1.5/1)	15 Mc.
Pushing Factor ($I_b = 7.0$ ma to $I_b = 8.0$ ma)	3 Mc/ma.
Thermal Factor	0.25 Mc/°C Max.

Equipment Design Values.

	Min.	Max.
Heater Current at 6.3 volts	.43	.60 amp.
Peak Anode Voltage (Note 6)	7.0	7.8 KV
Peak Power Output	18	25 KW
Stability (Note 3)	0.5 %	

APPLICATION

The ABSOLUTE MAXIMUM RATINGS shown are the limiting values which if exceeded may impair the useful life and performance of these tubes. The designer is therefore cautioned to choose circuits and ratings such that the absolute values will not be exceeded under the usual variations of load or line supply. It is customary to design the pulse input circuit so that in the event of an arc, in the magnetron or load the normal input pulse energy is not greatly exceeded.

TEMPERATURE STABILIZATION. Upon application of the high-voltage pulses after heater warm up the temperature of the anode rises until a condition of thermal equilibrium is reached. During this period the dimensions of the resonant cavities change causing a corresponding drift in frequency. A typical curve showing time to stabilization and total frequency drift are plotted in Fig. 1.

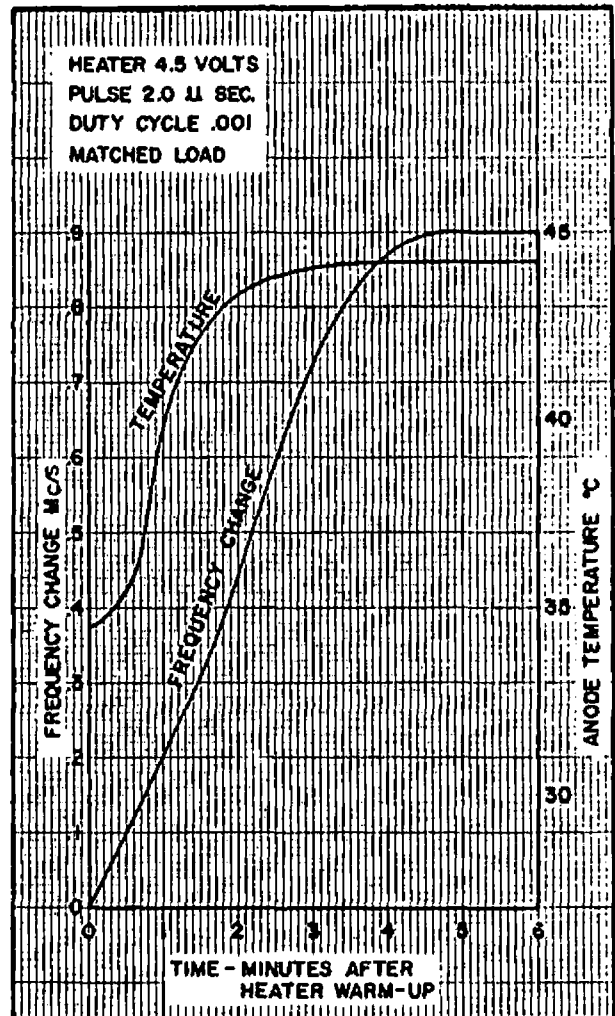


FIG. 1 TYPICAL TEMPERATURE AND FREQUENCY STABILIZATION CHART FOR TYPE 7138-43



CATHODE CONNECTION. The cathode connection should be made to the yellow lead. The heater connection is made between the green and yellow lead. If the anode current is allowed to flow through the heater it may cause burn out.

TRANSMISSION LINE LENGTH. In general long transmission lines require that the VSWR presented to the magnetron be kept close to unity.

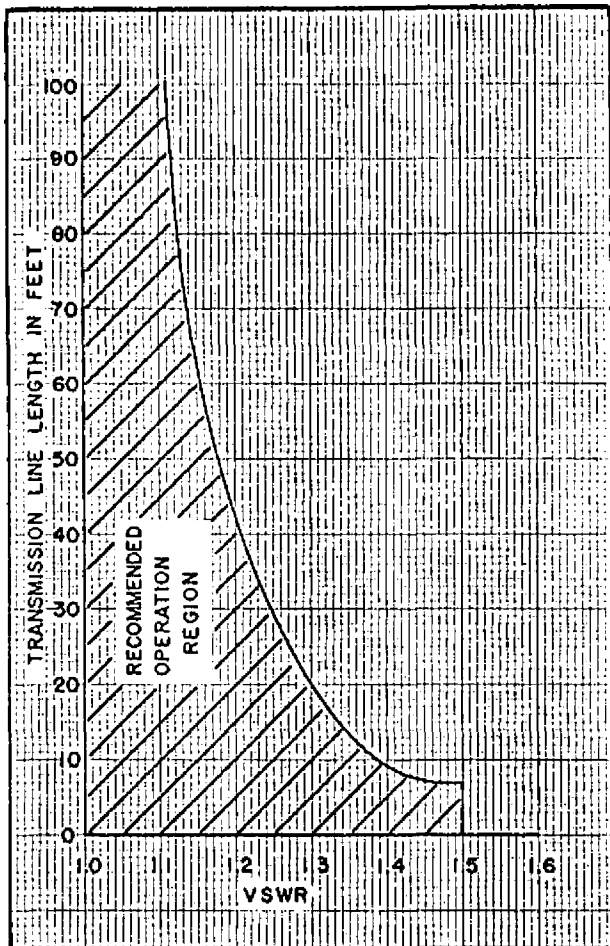


FIG. 2 RECOMMENDED OPERATION REGION FOR TYPE 7138-43

Fig. 2 shows the recommended operating region for the 7138-43. Under no circumstances should a VSWR of 1.5 be exceeded.

PERFORMANCE. Fig. 3 is a typical performance chart. Peak power output, tube efficiency and peak anode voltage are plotted as functions of peak anode current with the tube operating under typical conditions into a well matched load.

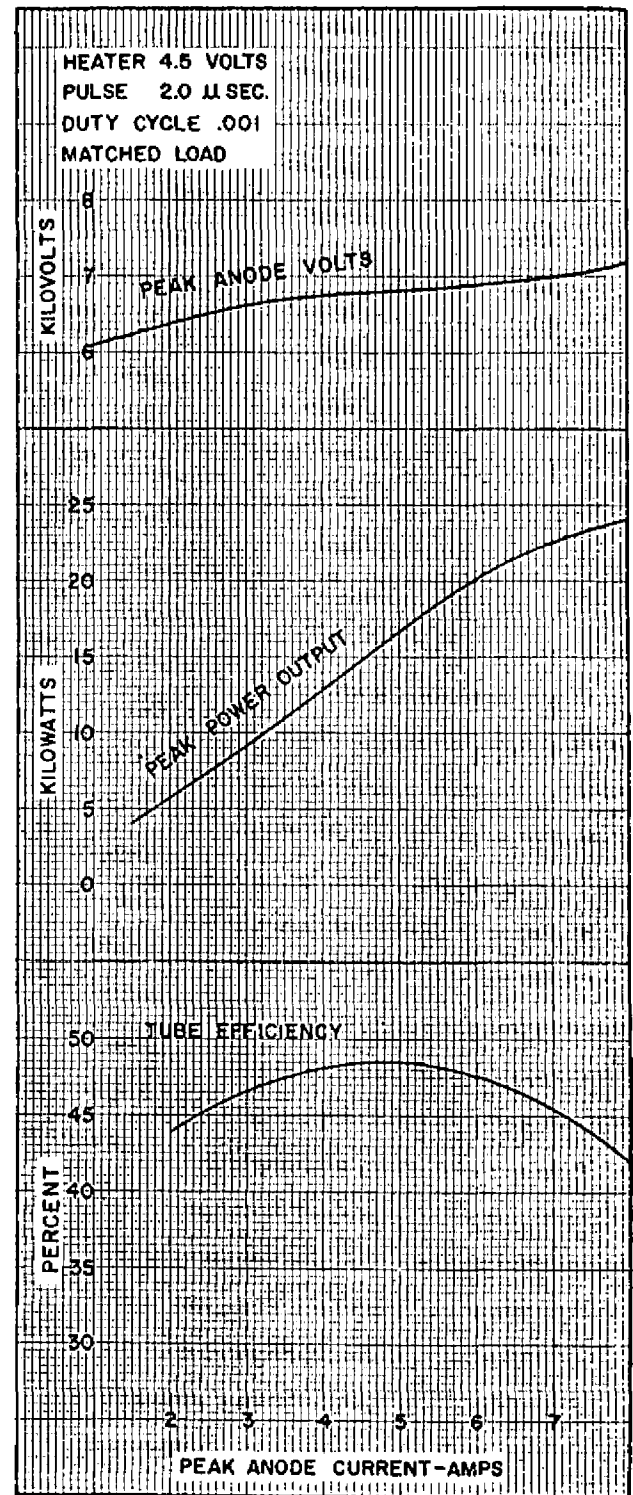


FIG. 3 TYPICAL PERFORMANCE CHART FOR TYPE 7138-43

NOTES

1. The cathode heating time shall be a minimum of 120 seconds at temperatures greater than 0°C and a minimum of 180 seconds at temperatures between 0°C and -55°C. For average pulse power inputs in excess of 25 watts, the heater voltage shall be reduced within 3 seconds after applying high voltage according to the following schedule:

$$E_f = 6.3 \left(1 - \frac{P_i}{180} \right) \text{ volts, where}$$

P_i = Average pulse power input in watts.

2. The rate of rise of the applied voltage pulse shall be defined by the steepest tangent to the leading edge of the voltage pulse above 80 per cent amplitude. Any capacitance used in the viewing system shall not exceed 6.0 uuf.
3. Stability shall be measured in terms of the average number of output pulses missing, expressed as a per cent of the number of input pulses applied during the period of observation. Pulses, due to any causes, are considered to be "missing" if the R.F. energy is less than 70 per cent of the energy level in the frequency range of each member of the series. The number of missing pulses shall not exceed $\frac{1}{2}$ per cent of the applied pulses during any consecutive 3 minute interval of a 10 minute test period.
4. The anode shall be cooled to the temperature specified by a suitable flow of air over the anode body and wave guide attachment brackets which serve as cooling fins.
5. The anode temperature shall be measured at the point indicated on the outline drawing.
6. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuation over the top portion of the pulse as shown in Fig. 4.
7. The pulse duration shall be the time interval between the two points on the current pulse at which the instantaneous current is 50 percent of the smooth-peak current.
8. The R.F. bandwidth is measured between $\frac{1}{4}$ P_o points with the VSWR = 1.5/1 and the phase adjusted for the broadest spectrum.

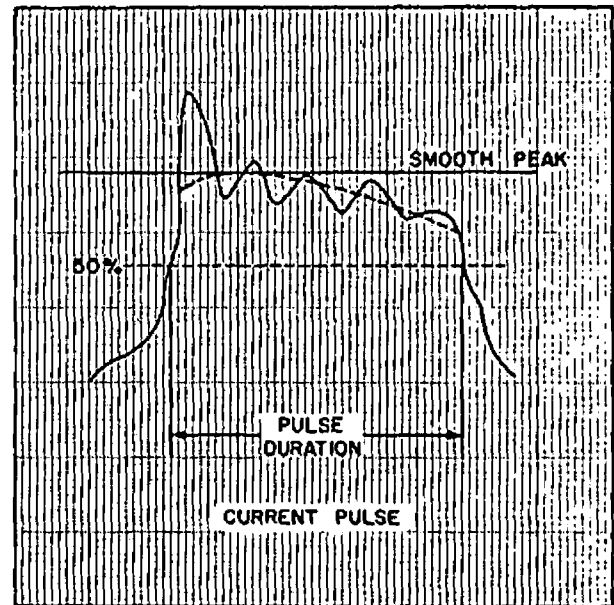
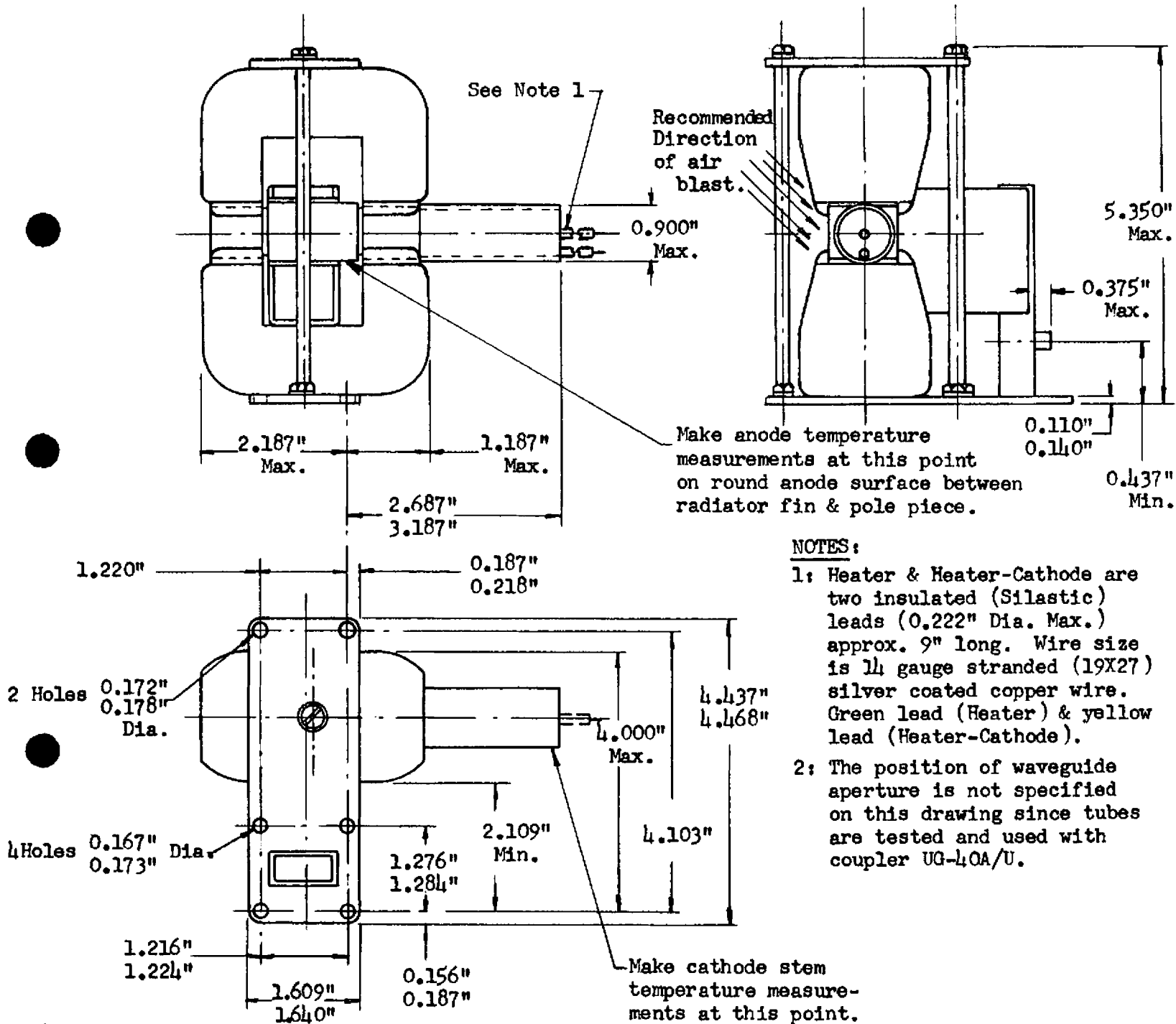


FIG. 4 PULSE CHARACTERISTIC



NOTES:

- 1: Heater & Heater-Cathode are two insulated (Silastic) leads (0.222" Dia. Max.) approx. 9" long. Wire size is 14 gauge stranded (19X27) silver coated copper wire. Green lead (Heater) & yellow lead (Heater-Cathode).
- 2: The position of waveguide aperture is not specified on this drawing since tubes are tested and used with coupler UG-40A/U.

7138 - 7143 OUTLINE