4J50

MAGNETRON

FORCED-AIR COOLED

Fixed Frequency: 9375 ± 30 Mc

GENERAL DATA

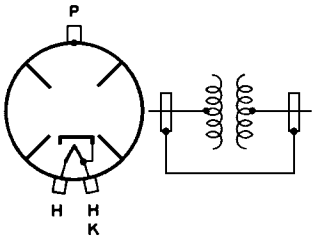
Electrical:

Heater, for Unipotential Cathode:

Voltage	13.75 ± 10%	ac or dc volts
Current	3.15	amp
Starting Current: The maximum instantaneous starting current must never exceed 12 amperes, even momentarily		
Minimum Cathode Heating Time	4	minutes
Frequency	9375 ± 30	Mc
Maximum Frequency Pulling at VSWR of 1.5/1	15	Mc
Maximum Frequency Change with Anode Temperature Change	0.25	Mc/°C

Mechanical:

Dimensions and Terminal Connections: See *Dimensional Outline*



H – Heater
K – Cathode
P – Anode

Connector (For heater terminal and heater-cathode terminal) . . . Ucinite* No. 115364 with built-in capacitor, or equivalent

Mounting Position . . . . . Any

Air Flow:

To Fins -- An air stream should be directed along the cooling fins toward the body of the tube. The stream may be obtained from a rectangular nozzle about 3-1/4" by 3/4" located so that the plane through the 3-1/4" side is parallel with the plane of a cooling fin and so that the nozzle is centered on the body of the tube. Adequate flow should be provided so that the temperature of the anode block does not exceed 150°C.

To Heater-Cathode Terminal -- Adequate flow should be provided to maintain the temperature of the heater-cathode terminal below 165°C.

Weight (Approx.) . . . . . 9-1/2 lbs

PULSED OSCILLATOR SERVICE

Maximum and Minimum Ratings, *Absolute Values:*

For Duty Cycle of 0.001 max.

PEAK ANODE VOLTAGE	21 max.	23 max.	kv
PEAK ANODE CURRENT	18 max.	27.5 max.	amp
PEAK POWER INPUT●	380 max.	635 max.	kw
AVERAGE POWER INPUT	0.38 max.	0.635 max.	kw
PULSE DURATION	6.0 max.	1.2 max.	μsec

* Ucinite Div. of United-Carr Fastener Corp., Newtonville 60, Mass.

● For atmospheric pressures greater than 60 centimeters of mercury, operation at pressures lower than 60 centimeters of mercury may result in arc-over with consequent damage to the tube.

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OPERATION TIME IN ANY 100-MICROSECOND INTERVAL . .	6.0 max.	6.0 max.	μsec
RATE OF RISE OF VOLT. PULSE .	110 max.	110 max.	kv/μsec
	70 min.	70 min.	kv/μsec
ANODE-BLOCK TEMPERATURE . . .	150 max.	150 max.	°C
HEATER-CATHODE TERMINAL TEMPERATURE	165 max.	165 max.	°C

Typical Operation▲ with Load-Voltage Standing-Wave Ratio Equal to or Less than 1.05

With Duty Cycle of	*0.001*	*0.001*	*0.001*	
Heater Voltage	See Operating Considerations			
Magnetic Field	Supplied by permanent magnet integral with tube			
Peak Anode Voltage	20	21.0	21.5	kv
Peak Anode Current	18	23.5	27.5	amp
Pulse Repetition Rate	200	333	1000	cps
Pulse Duration	1	3	5	μsec
Maximum RF Bandwidth	1.0	1.0	3.0	Mc
Peak Power Output	140	185	240	kw

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	3.0	3.75	amp
Peak Anode Voltage	–	20	23	kv
Peak Power Output	2	225	–	kw

Note 1: With 13.75 volts ac or dc on heater.

Note 2: With peak anode current = 27.5 amperes corresponding to a peak anode voltage in the order of 21500 volts, anode-block temperature (approx.) = 100°C, pulse duration = 1 microsecond, and maximum load-voltage standing-wave ratio equal to or less than 1.05.

▲ It is essential that the input circuit be designed so that if arcing occurs the energy per pulse delivered to the tube cannot greatly exceed the normal energy per pulse. To satisfy this requirement, it is recommended that pulsers of the discharging-network type be used.

OPERATING CONSIDERATIONS

Rated voltage (13.75 volts) should be applied to the heater for at least 4 minutes to allow the cathode to reach normal operating temperature. When the cathode has reached normal operating temperature, high-voltage pulses, negative with respect to the anode (ground), may be applied to the heater-cathode terminal. As soon as the 4J50 starts to oscillate, the heater voltage (E_f) must be reduced approximately in accordance with the following formula depending on the value of average power input (P_i) to the tube:

P_i up to 100 watts: $E_f = 13.75$ volts

P_i greater than 100 watts: $E_f = 14\ (1-0.000895P_i)$ volts

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This formula applies to the conditions involving the pulse durations and pulse repetition rates under Typical Operation. If the 4J50 is to be operated with pulse durations and repetition rates different from those shown, write for recommendations as to required reduction in heater voltage to *Commercial Engineering, RCA, Harrison, New Jersey*, giving complete details as to the proposed service. When the tube is oscillating, the cathode is subjected to considerable electron bombardment which raises the temperature of the cathode. The magnitude of such heating is a function of the total dissipation and must be compensated by reduction of the heater voltage in order to prevent overheating of the cathode. Failure to start the tube at rated heater voltage and to reduce the heater voltage as soon as oscillation starts may seriously affect tube life. The heater should be protected against input pulse power by a suitable capacitor connected in shunt with the heater leads as near the input stem as possible in order to limit high transient voltages from developing across the heater.

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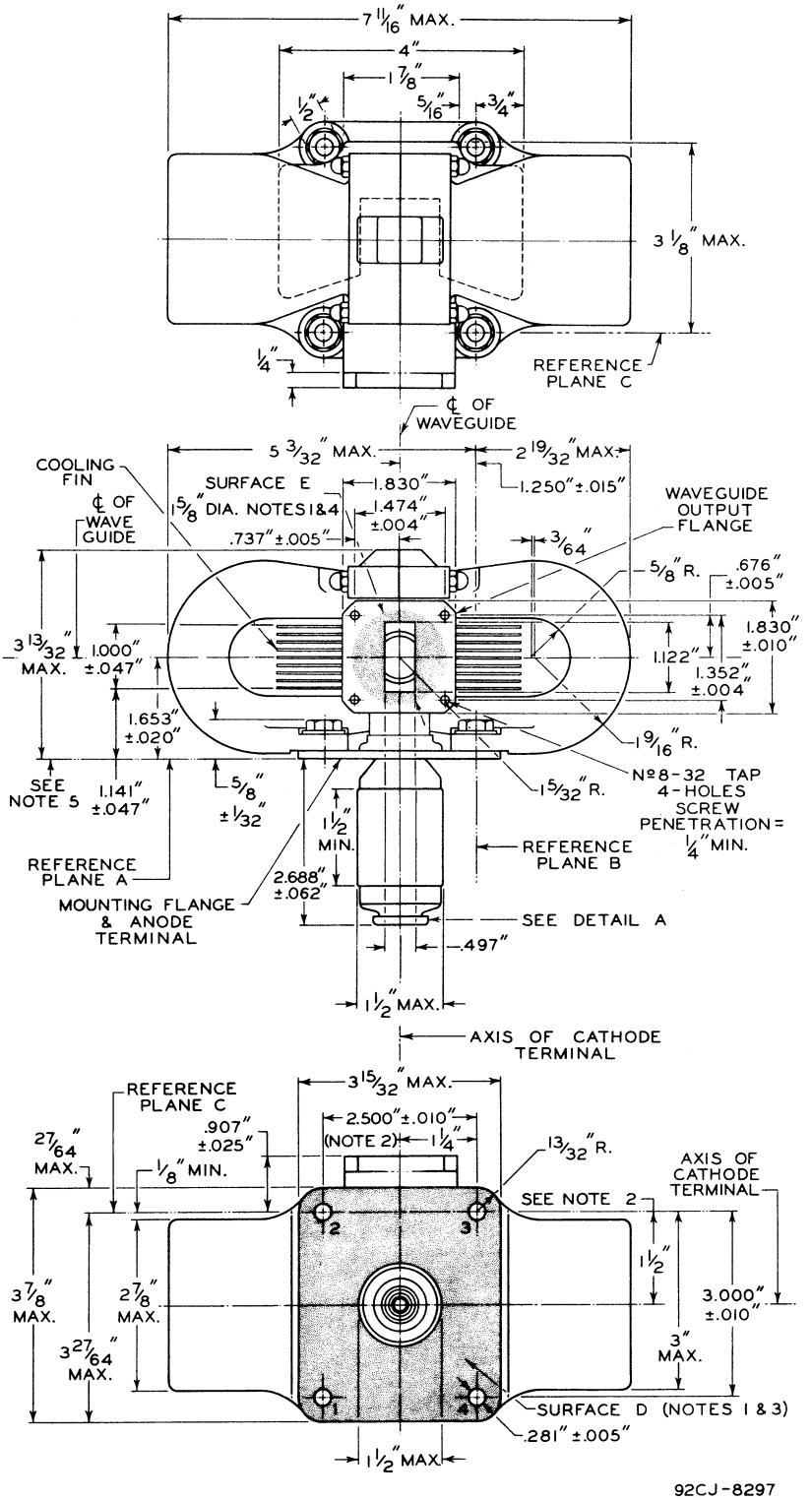

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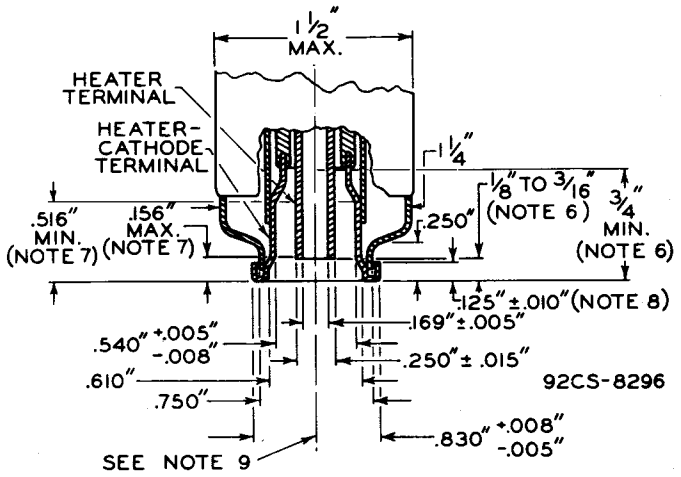
DETAIL A



Reference plane A is defined as the plane through a plane surface on which the mounting flange rests.

Reference plane B is defined as the plane which is perpendicular to plane A and plane C and passes through the exact center of mounting flange holes No.3 and No.4.

Reference plane C is defined as the plane which is perpendicular to plane A and passes through the exact centers of mounting flange holes No.2 and No.3.

NOTE 1: THE WAVEGUIDE OUTPUT FLANGE AND THE MOUNTING FLANGE ARE MADE SO THAT THEY MAY BE USED TO PROVIDE A HERMETIC SEAL AT SURFACE D AND SURFACE E.

NOTE 2: THE AXIS OF THE HEATER-CATHODE TERMINAL WILL BE WITHIN THE CONFINES OF A CYLINDER WHOSE RADIUS IS 3/64" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AND LOCATED AS DIMENSIONED FROM PLANES B AND C.

NOTE 3: ALL POINTS ON MOUNTING SURFACE D WILL BE WITHIN 0.005" OF MOUNTING PLANE A.

NOTE 4: WHEN RESTING ON A PLANE SURFACE, SURFACE E OF THE WAVEGUIDE OUTPUT FLANGE HAS A FLATNESS SUCH THAT A 0.005" THICKNESS GAUGE 1/8" WIDE WILL NOT ENTER BETWEEN SURFACE E AND THE PLANE SURFACE.

NOTE 5: NO PART OF THE TUBE SUPPORT FASTENED TO THE MOUNTING FLANGE SHOULD EXTEND BEYOND THE SURFACE OF A CYLINDER WHOSE RADIUS IS 3/4" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AND LOCATED AS DIMENSIONED FROM PLANES B AND C.

NOTE 6: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.169" INTERNAL DIAMETER OF THE CYLINDRICAL HEATER TERMINAL.

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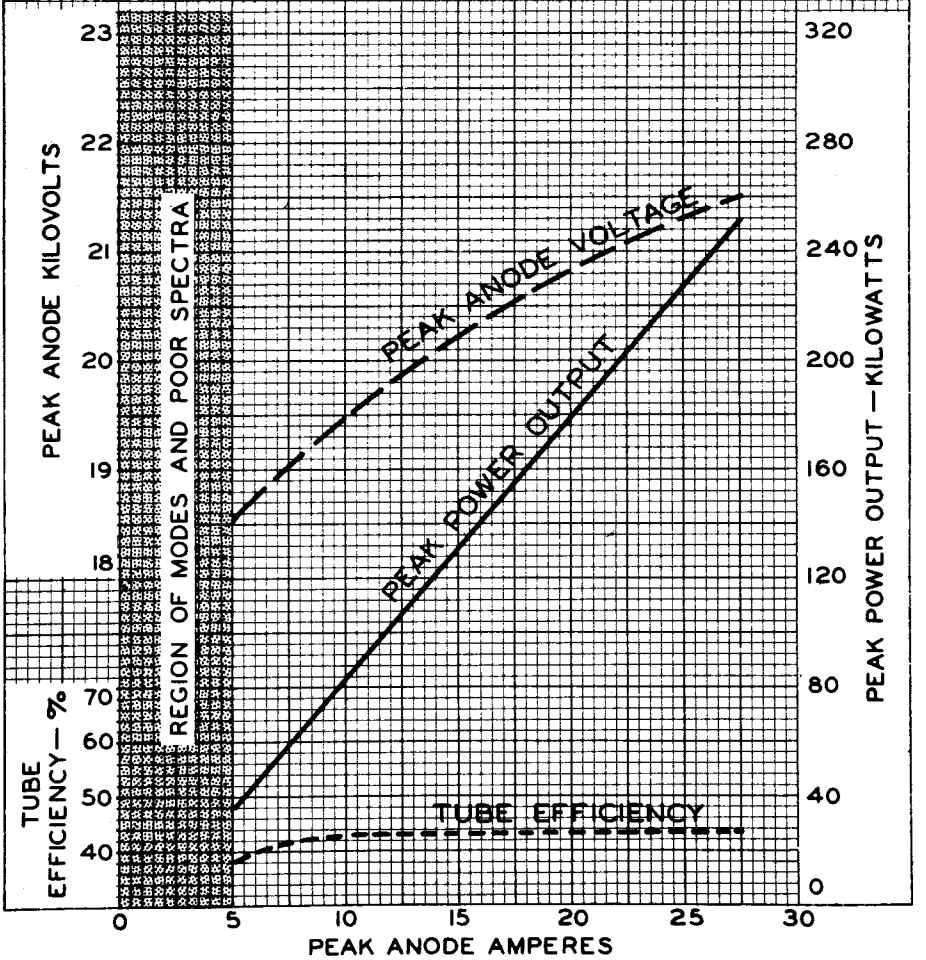
NOTE 7: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.540" INTERNAL DIAMETER OF THE CYLINDRICAL HEATER-CATHODE TERMINAL.

NOTE 8: NO PART OF THE CONNECTOR DEVICE FOR THE HEATER AND HEATER-CATHODE TERMINALS SHOULD BEAR AGAINST THE UNDERSIDE OF THIS LIP.

NOTE 9: THE HEATER TERMINAL AND THE HEATER-CATHODE TERMINAL ARE CONCENTRIC WITHIN 0.010".

PERFORMANCE CHART

OPERATING FREQUENCY: 9375 ± 30 Mc
PULSE DURATION: 1 MICROSECOND
PULSE REPETITION RATE: 1000 PPS
PULLING FIGURE: 9.5 Mc
TUBE OPERATING INTO MATCHED LOAD



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