# 4J52■
# MAGNETRON

FORCED-AIR COOLED

*Fixed Frequency: 9375 ± 30 Mc*

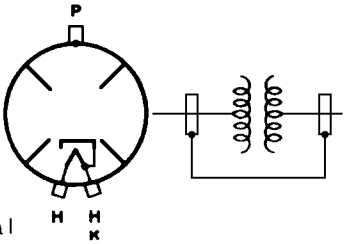
## GENERAL DATA

### Electrical:

| | | |
|---|---|---|
| Heater, for Unipotential Cathode: | | |
| Voltage | 12.6 ± 10% | ac or dc volts |
| Current | 2.1 | amp |
| Starting Current: The maximum instantaneous starting current must never exceed 8 amperes, even momentarily | | |
| Minimum Cathode Heating Time | 4 | minutes |
| Frequency | 9375 ± 30 | Mc |
| Maximum Frequency Pulling | 15 | Mc |
| Maximum Frequency Change with Anode Temperature Change | 0.25 | Mc/°C |

### Mechanical:

Dimensions and Terminal Connections: See Outline Drawing




Connector (For heater terminal and heater-cathode terminal) . . . Ucinite* No. 115316 or No. 115402 with built-in capacitor, or equivalent.

Mounting Position . . . . . Any

Dimensions . . . . . See Outline Drawing

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 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.

Weight (Approx.) . . . . . 5-1/2 lbs

## PULSED OSCILLATOR SERVICE

**Maximum Ratings,** *Absolute Values:*

| | *For Duty Cycle of 0.002 max.* | | |
|---|---|---|---|
| PEAK ANODE VOLTAGE | 16 max. | 16 max. | kv |
| PEAK ANODE CURRENT | 20 max. | 30 max. | amp |
| PEAK POWER INPUT● | 300 max. | 450 max. | kw |
| AVERAGE POWER INPUT | 0.3 max. | 0.45 max. | kw |
| PULSE DURATION | 5.0 max. | 1.2 max. | μsec |
| OPERATION TIME IN ANY 100-MICROSECOND INTERVAL | 6.0 max. | 6.0 max. | μsec |
| ANODE-BLOCK TEMPERATURE | 150 max. | 150 max. | °C |

■ Data shown for this type are in accord with JAN-1A Specification 4J52, 30 January 1952.

* 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 arcover with consequent damage to the tube.

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**Typical Operation with Load-Voltage Standing-Wave Ratio Equal to or Less Than 1.05▲:**

| *With Duty Cycle of* | *0.0006* | *0.001* | *0.001* | |
|---|---|---|---|---|
| Heater Voltage | See Operating Considerations | | | |
| Magnetic Field | Supplied by permanent magnet integral with tube | | | |
| Peak Anode Voltage | 15 | 15 | 15 | kv |
| Peak Anode Current | 15 | 15 | 15 | amp |
| Pulse Repetition Rate | 2000 | 1000 | 200 | cps |
| Pulse Duration | 0.3 | 1 | 5 | μsec |
| Maximum RF Bandwidth | 9 | 3 | 1 | Mc |
| Maximum Rate of Rise of Voltage Pulse | 130 | 130 | 100 | kv/μsec |
| Peak Power Output | 80 | 80 | 80 | kw |

## CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

| | *Note* | *Min.* | *Max.* | |
|---|---|---|---|---|
| Heater Current | 1 | 1.8 | 2.4 | amp |
| Peak Anode Voltage | — | 14 | 16 | kv |
| Peak Power Output | 2 | 65 | — | kw |

Note 1: With 12.6 volts ac or dc on heater.

Note 2: With peak anode current = 15 amperes corresponding to a peak anode voltage in the order of 15000 volts, anode-block temperature (approx.) = 100°C, 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 (12.6 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 4J52 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 130 watts:* $E_f = 12.6 \text{ volts} - 0.04P_i$
*$P_i$ from 130 to 450 watts:* $E_f = 10.5 \text{ volts} - 0.02P_i$

where $P_i$ is the average power input to the tube. This formula applies to conditions for pulse durations of 1 microsecond or less and for pulse repetition rates of 1000 pps or more. Normal pulse shape and regulation are assumed; the effect of power supply regulation is not considered. For longer pulse durations and lower pulse

repetition rates, the heater voltage must be increased. The increase in heater voltage is often between 1 and 2 volts depending on the particular application. Rates of rise of the voltage pulse faster than those indicated under Typical Operation are not recommended because they tend to cause unstable operation. A very poor regulation characteristic during the first part of the pulse may indicate, if unstable operation occurs, that an increase in heater voltage is desirable. Increasing the heater voltage under these conditions may, however, decrease the life of the tube. When the tube is oscillating, the cathode is subjected to considerable electron bombardment which raises the temperature of the cathode. The magnitube of the 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 placing a suitable capacitor in shunt with the heater leads as near the input stem as possible in order to limit high transient currents from developing across the heater.

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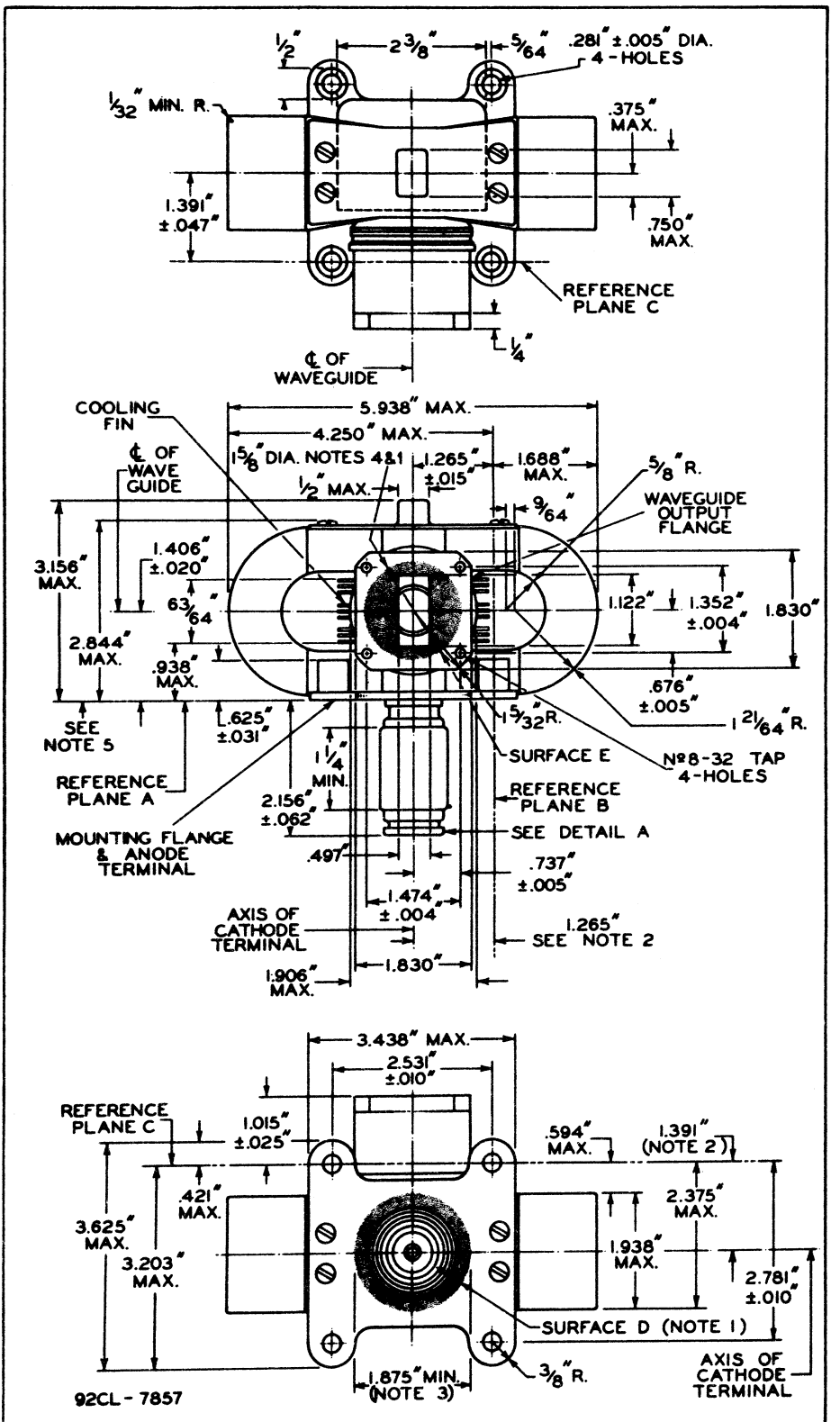





TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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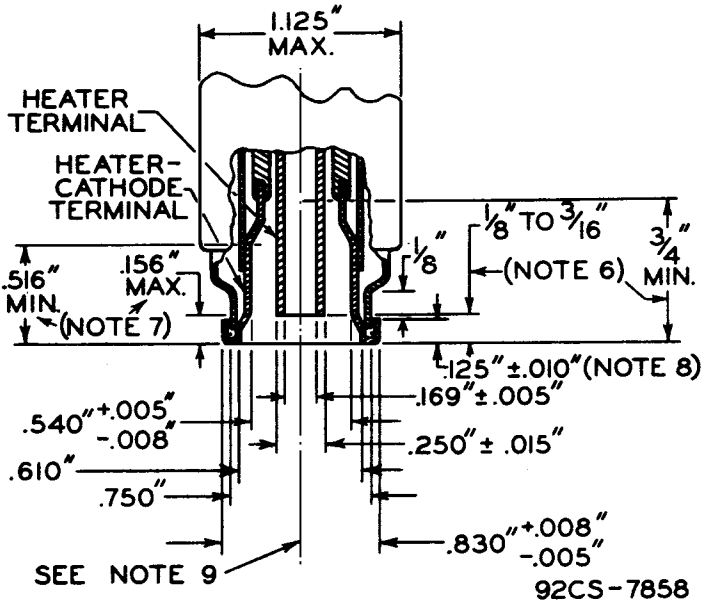
## DETAIL A




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 ON THE TRUE CENTER OF THE MOUNTING FLANGE.

**NOTE 3:** WHEN RESTING ON A PLANE SURFACE (REFERENCE PLANE A), THE SURFACE D HAS A FLATNESS SUCH THAT A 0.010" THICKNESS GAUGE 1/8" WIDE WILL NOT ENTER BETWEEN SURFACE D AND THE PLANE SURFACE. ALSO, THE MOUNTING-FLANGE SURFACE OUTSIDE OF SURFACE D WILL BE WITHIN 0.010" OF THE PLANE SURFACE.

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**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 5/8" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AND LOCATED AT THE TRUE CENTER OF THE MOUNTING FLANGE.

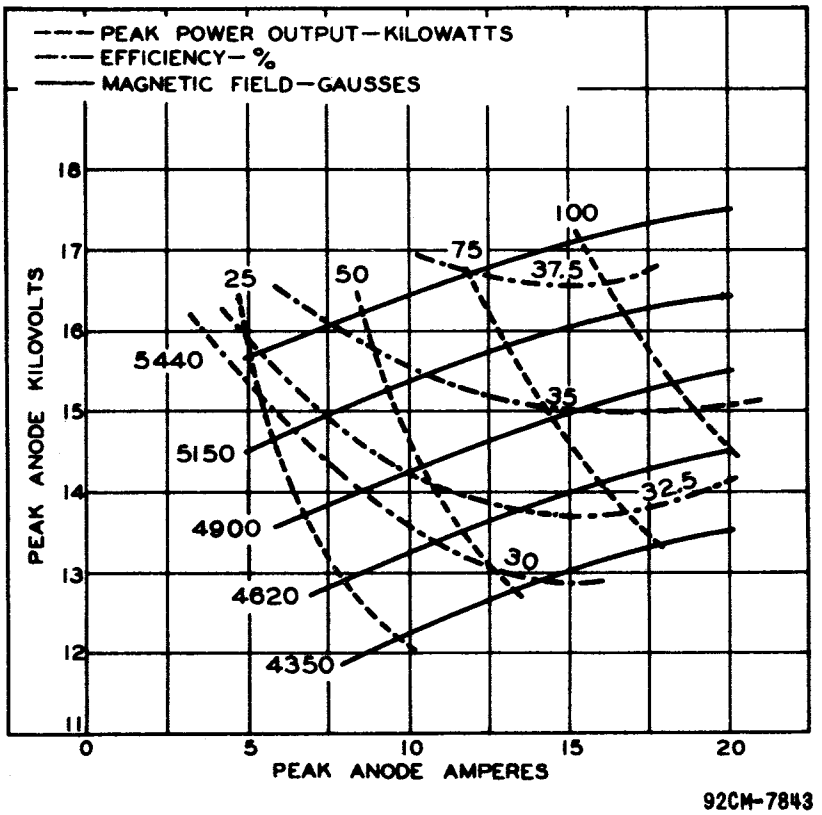
**NOTE 6:** THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.169" INTERNAL DIAMETER OF THE CYLINDRICAL HEATER TERMINAL.

**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

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