

# C Band Klystron

- Gang Tuned Cavities
- Air Cooled
- High Efficiency
- High Power Gain
- Compact
- Sturdy

Frequency . . . . . 4.4 to 5.0 GHz

## Electrical:

Cathode . . . . . Indirectly-heated Tungsten  
Dispenser Cathode

## Filament:

|                              |           |   |
|------------------------------|-----------|---|
| Voltage . . . . .            | 6.5 ± 0.5 | V |
| Current at 6.5 V . . . . .   | 7.6       | A |
| Maximum current . . . . .    | 8.2       | A |
| Warmup time (min.) . . . . . | 180       | s |

## Mechanical:

|                              |           |      |    |
|------------------------------|-----------|------|----|
| Mounting Position . . . . .  | Any       |      |    |
| Length (max.) . . . . .      | (393 mm)  | 15.5 | in |
| Width (max.) . . . . .       | (267 mm)  | 10.5 | in |
| Weight (approx.) . . . . .   | (17.2 kg) | 38   | lb |
| In commercial pack . . . . . | (18.1 kg) | 40   | lb |
| In military pack . . . . .   | (22.5 kg) | 50   | lb |

## Thermal:

|                                        |     |    |
|----------------------------------------|-----|----|
| Collector Temperature (max.) . . . . . | 260 | °C |
| Body Temperature (max.) . . . . .      | 150 | °C |
| Tuner Fin Temperature (max.) . . . . . | 150 | °C |

## Electron Gun Potting

|                                         |     |    |
|-----------------------------------------|-----|----|
| Insulation temperature (max.) . . . . . | 250 | °C |
| Storage temperature (min.) . . . . .    | -65 | °C |

## Cooling

Forced air flow across the collector, body, and tuner, is required.

Typical air requirements for operation with 20° C ambient air temperature at sea level are:

|                         | Min Reg<br>Air Flow |        | Max<br>Press-Drop   |                     |
|-------------------------|---------------------|--------|---------------------|---------------------|
|                         | lb/min              | kg/min | in H <sub>2</sub> O | cm H <sub>2</sub> O |
| Collector . . . . .     | 7.5                 | 3.4    | 2.0                 | 5.1                 |
| Body & Tuners . . . . . | 0.85                | 0.38   | 0.75                | 1.9                 |

**Performance****Maximum CW Ratings, Absolute-Maximum Values:**

|                 |       |    |
|-----------------|-------|----|
| DC Beam Voltage | 8.5   | kV |
| DC Beam Current | 600   | mA |
| DC Body Current | 60    | mA |
| Surge Current   | 25    | A  |
| Load VSWR       | 2.0:1 |    |
| Input VSWR      | 2.0:1 |    |

**Typical CW Operation:****High Efficiency Tuned**

| Frequency       | 4.4 GHz | 5.0 GHz |    |
|-----------------|---------|---------|----|
| DC Beam Voltage | 8.0     | 8.0     | kV |
| DC Beam Current | 520.0   | 520.0   | mA |

**Typical CW Operation (cont'd.)****High Efficiency Tuned**

| Frequency        | 4.4 GHz | 5.0 GHz |     |
|------------------|---------|---------|-----|
| DC Body Current  | 10.0    | 10.0    | mA  |
| RF Power Output  | 1.60    | 1.45    | kW  |
| Bandwidth (3 dB) | 8.0     | 10.0    | MHz |
| Efficiency       | 39.0    | 35.0    | %   |
| Gain             | 45.0    | 45.0    | dB  |
| Drive            | 50.0    | 50.0    | mW  |
| Load VSWR        | 1.05:1  | 1.05:1  |     |
| Input VSWR       | 1.3:1   | 1.3:1   |     |

**High Gain Tuned**

| Frequency        | 4.4 GHz | 5.0 GHz |     |
|------------------|---------|---------|-----|
| DC Beam Voltage  | 8.0     | 8.0     | kV  |
| DC Beam Current  | 520.0   | 520.0   | mA  |
| DC Body Current  | 10.0    | 10.0    | mA  |
| RF Power Output  | 1.45    | 1.30    | kW  |
| Bandwidth (3 dB) | 6.0     | 8.0     | MHz |
| Efficiency       | 35.0    | 31.0    | %   |
| Gain             | 52.0    | 52.0    | dB  |
| Drive            | 10.0    | 10.0    | mW  |
| Load VSWR        | 1.05:1  | 1.05:1  | --  |
| Input VSWR       | 1.3:1   | 1.3:1   | --  |

**Broadband Tuned**

| <b>Frequency</b>           | <b>4.4 GHz</b> | <b>5.0 GHz</b> |     |
|----------------------------|----------------|----------------|-----|
| DC Beam Voltage . . . . .  | 8.0            | 8.0            | kV  |
| DC Beam Current . . . . .  | 520.0          | 520.0          | mA  |
| DC Body Current . . . . .  | 10.0           | 10.0           | mA  |
| RF Power Output . . . . .  | 1.5            | 1.4            | kW  |
| Bandwidth (3 dB) . . . . . | 13.0           | 19.0           | MHz |
| Efficiency . . . . .       | 36.0           | 33.0           | %   |
| Gain . . . . .             | 42.0           | 42.0           | dB  |
| Drive . . . . .            | 100.0          | 100.0          | mW  |
| Load VSWR . . . . .        | 1.05:1         | 1.05:1         | —   |
| Input VSWR . . . . .       | 1.3:1          | 1.3:1          | —   |

**General Information****Installation and Operation**

No installation or operation should be attempted without first consulting the Installation and Operating Instructions shipped with each tube or available on request from Super Power Marketing, RCA, Lancaster, PA.

RCA reference publications required for the installation and operation of this device include the following:

Data Sheet — RCA-8811

Application Note AN 4213

Application Guide 1CE-279A

These publications are available as a complete packet — request PWR 542 "Applications Information for the RCA-8811 klystron."

**Personnel Safety**

The high voltages and microwave radiations from this device can be dangerous to life. High voltage shielding and interlock precautions must be taken and all rf connections must be tightly closed and rf terminals shielded.

**Packaging**

Two types of packaging are available with these tubes; Commercial Pack and Military Pack. The customer specifies the desired type.

The Commercial Pack is made of nesting cardboard cartons with the inner carton shock-mounted. The Military Pack complies with MIL-S-4473C for air shipment. It uses a hermetically-sealed metal container which protects the tube and serves to shield the area surrounding the pack from stray magnetic fields set up by the klystron focusing magnet.

In shipment, the tube is enclosed in a polyethylene bag to prevent dust and other particles from collecting in the waveguide or tuning system. It is recommended that the tube be stored in the bag and in the shipping container when not in use. Dust or other unwanted particles in the waveguide can cause arcing during operation and subsequent tube destruction.

## **Cooling**

Air ducts must be provided to connect to the top of the collector and the tuner cooling duct. See Outline Drawing.

## **Mounting**

Four holes are provided in the gun-end of the focusing magnet for mounting purposes. Only non-magnetic studs should be used.

## **Thermocouple**

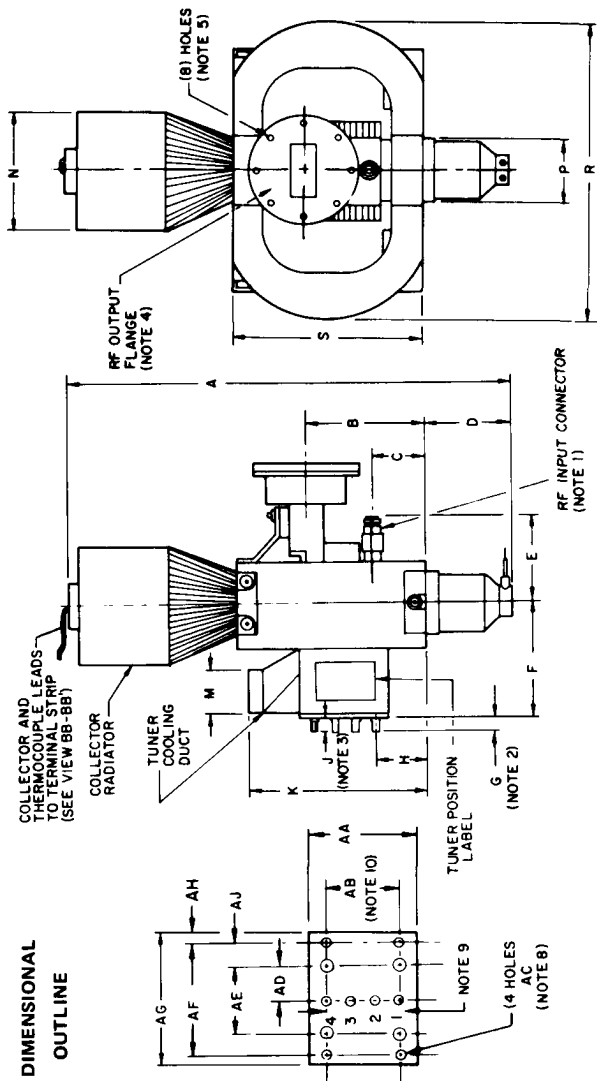
A thermocouple mounted on the collector provides a signal output for excessive collector temperature. This output is used to operate protective circuitry.

## **Tuning**

Tuning is accomplished by a single knob which "gang-tunes" all four cavities simultaneously. The second, third and output cavities may be individually trimmed for optimizing the tube performance at any frequency within the tube operating band. See Outline Drawing.

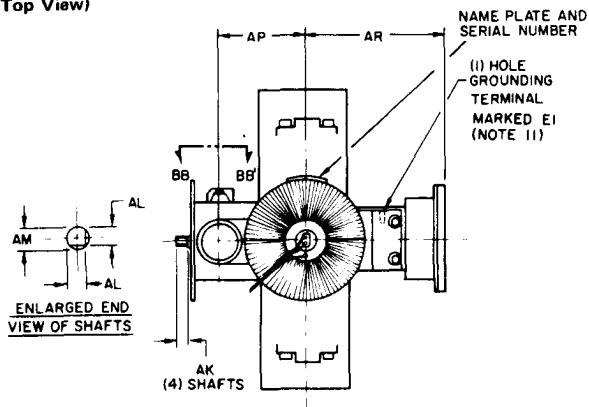
## **Protection Circuits**

Protection circuits serve a threefold purpose: safety of personnel, protection of the tube and protection of tube circuits. Consult Application Guide 1CE-279A for complete information on protection circuits.



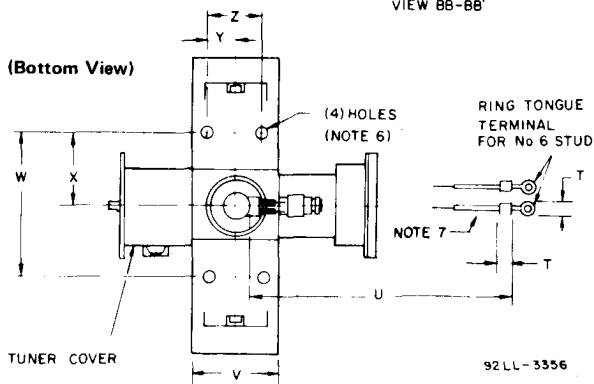
## DIMENSIONAL OUTLINE

(Top View)

COLLECTOR  
GROUND CONNECTIONTHERMOSTAT  
CONNECTION

VIEW BB-BB'

(Bottom View)



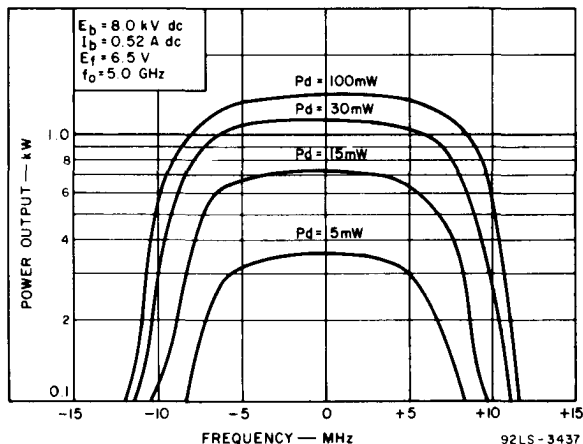
## Tabulated Dimensions for the Dimensional Outline

| Dimension<br>Reference | Specified Values                                  |                                                  |
|------------------------|---------------------------------------------------|--------------------------------------------------|
|                        | Inches                                            | Millimeters                                      |
| A                      | 15.5 max.                                         | 393.7 max.                                       |
| B                      | 4.06 $\pm .12$                                    | 103.1 $\pm 3.0$                                  |
| C                      | 1.80 $\pm .12$                                    | 45.7 $\pm 3.0$                                   |
| D                      | 3.5 max.                                          | 88.9 max.                                        |
| E                      | 3.00 $\pm .06$                                    | 76.2 $\pm 1.5$                                   |
| F                      | 3.80 $\pm .12$                                    | 96.5 $\pm 3.0$                                   |
| G                      | 0.68 $\pm .05$                                    | 17.3 $\pm 1.3$                                   |
| H                      | 1.80 $\pm .09$                                    | 45.7 $\pm 2.3$                                   |
| J                      | 0.68 $\begin{matrix} + .15 \\ - .10 \end{matrix}$ | 17.3 $\begin{matrix} +3.8 \\ - 2.5 \end{matrix}$ |
| K                      | 6.25 max.                                         | 158.8 max.                                       |
| M                      | 1.50 $\pm .03$                                    | 38.1 $\pm .8$                                    |
| N Dia.                 | 4.12 $\pm .03$                                    | 101.6 $\pm .8$                                   |
| P Dia.                 | 2.130 $\pm .015$                                  | 54.10 $\pm .38$                                  |
| R                      | 10.5 max.                                         | 266.7 max.                                       |
| S                      | 6.5 $\pm .5$                                      | 165.0 $\pm 13.0$                                 |
| T Dia.                 | 0.250 $\pm .015$                                  | 6.35 $\pm .38$                                   |
| U                      | 13.50 $\pm .25$                                   | 343.0 $\pm 6.0$                                  |
| V                      | 3.25 max.                                         | 82.55 max.                                       |
| W                      | 5.00 $\pm .06$                                    | 127.0 $\pm 1.5$                                  |
| X                      | 2.50 $\pm .06$                                    | 63.5 $\pm 1.5$                                   |
| Y                      | 1.00 $\pm .06$                                    | 25.4 $\pm 1.5$                                   |
| Z                      | 2.00 $\pm .06$                                    | 50.8 $\pm 1.5$                                   |
| AA                     | 3.00 $\pm .06$                                    | 76.2 $\pm 1.5$                                   |
| AB                     | 2.10 $\pm .02$                                    | 53.34 $\pm .51$                                  |
| AC                     | 0.201 $\pm .010$                                  | 5.11 $\pm .25$                                   |
| AD                     | 1.00 $\pm .03$                                    | 25.4 $\pm .8$                                    |
| AE                     | 2.00 $\pm .03$                                    | 50.8 $\pm .8$                                    |
| AF                     | 3.25 $\pm .02$                                    | 82.55 $\pm .51$                                  |
| AG                     | 3.75 $\pm .03$                                    | 95.3 $\pm .8$                                    |
| AH                     | 0.25 $\pm .03$                                    | 6.4 $\pm .8$                                     |
| AJ                     | 0.62 $\pm .03$                                    | 15.8 $\pm .8$                                    |
| AK                     | 0.440 $\pm .010$                                  | 11.18 $\pm .25$                                  |
| AL                     | 0.230 $\pm .005$                                  | 5.84 $\pm .13$                                   |
| AM Dia.                | 0.249 $\pm .002$                                  | 6.325 $\pm .051$                                 |
| AN                     | 0.125 $\pm .030$                                  | 3.2 $\pm .8$                                     |
| AP                     | 3.00 $\pm .06$                                    | 76.2 $\pm 1.5$                                   |
| AR                     | 4.75 $\pm .12$                                    | 120.6 $\pm 3.0$                                  |

## Notes for Dimensional Outline

1. Mates with Type "N" Connector UG-21 B/U or equivalent.
2. Dimension applies to Shaft No.1 only.
3. Dimension applies to Shafts No.'s 2, 3, and 4 only.
4. Mates with UG-149 A/U or equivalent.
5. Holes 10-32 UNF-2B equally spaced on  $3.250 \pm .032$  (82.6  $\pm$  .8 mm) dia. circle.
6. Holes  $0.437 \pm .062$  (11.1  $\pm$  1.6 mm) thru (One side only).
7. High-Voltage Lead Designation : Heater Lead — Yellow  
Heater-Cathode Lead — White
8. Thru-holes checked with gauge.
9. Three spaces between shafts are  $0.70 \pm .03$  (17.8  $\pm$  .8 mm) and add to 2.100 (53.34 mm). Shafts are numbered as shown. (1) Gang tuner, (2) Cavity two, (3) Cavity three, (4) Output cavity.
10. Tolerance for this dimension applies to location of four 0.201 (5.11 mm) holes.
11. Hole No.6-32 UNC-2B, 0.25 (6.35 mm) minimum depth.

## BANDWIDTH CHARACTERISTIC CURVE



The *Beam Current Characteristic*, *Gain Characteristic*, and *Output Characteristic* curves shown under Type 4658 also apply to Type 8811.