

# U.H.F. POWER TETRODE

# QVI-150A

Forced air-cooled power tetrode rated for a maximum anode dissipation of 150W and suitable for use at frequencies up to 500 Mc/s.

## PRELIMINARY DATA

This data should be read in conjunction with "Operating Notes, Part 1—Power Valves" included in this volume of the Handbook.

### HEATER Indirectly heated.

|                      |     |      |
|----------------------|-----|------|
| $V_h$                | 6.0 | V    |
| $I_h$                | 2.6 | A    |
| Minimum heating time | 30  | secs |

### MOUNTING POSITION

Any

### CAPACITANCES (Measured without external shield)

|            |       |                  |
|------------|-------|------------------|
| $C_{a-g1}$ | <0.06 | $\mu\mu\text{F}$ |
| $C_{jn}$   | 15.5  | $\mu\mu\text{F}$ |
| $C_{out}$  | 4.5   | $\mu\mu\text{F}$ |

### CHARACTERISTICS (Measured at $V_a=500$ V, $V_{g2}=250$ V, $I_a=200$ mA)

|               |         |
|---------------|---------|
| $\mu_{g1-g2}$ | 5.0     |
| $g_m$         | 12 mA/V |

### COOLING

Max. temperature of base and envelope seals 150 °C

Air cooling must start simultaneously with the application of heater voltage. A base must be used which directs air on to the base seals, past the screen-grid seal and glass envelope, and through the radiator. A typical value of air flow for maximum anode dissipation is given in the following table.

| Anode dissipation | Height above sea-level | Input temperature | Rate of flow of air         | Pressure difference between inlet and outlet |
|-------------------|------------------------|-------------------|-----------------------------|----------------------------------------------|
| $P_a$<br>(W)      | $h$<br>(m)             | $T_{in}$<br>°C    | ( $\text{m}^3/\text{min}$ ) | (mm of $\text{H}_2\text{O}$ )                |
| 150               | 0                      | 20                | 0.22                        | 15                                           |

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### OPERATING CONDITIONS AS SINGLE VALVE R.F. POWER AMPLIFIER (CLASS "C" TELEPHONY, ANODE AND SCREEN-GRID MODULATION)

#### Limiting Values

|                         |     |      |
|-------------------------|-----|------|
| f max.                  | 500 | Mc/s |
| V <sub>a</sub> max.     | 1.0 | kV   |
| p <sub>a</sub> max.     | 100 | W    |
| V <sub>g2</sub> max.    | 300 | V    |
| p <sub>g2</sub> max.    | 12  | W    |
| I <sub>k</sub> max.     | 250 | mA   |
| i <sub>k(pk)</sub> max. | 2.1 | A    |
| -V <sub>g1</sub> max.   | 250 | V    |
| p <sub>g1</sub> max.    | 2.0 | W    |
| R <sub>g1-k</sub> max.  | 25  | k Ω  |

#### Typical Operating Conditions at f ≤ 165 Mc/s.

|                            |     |     |      |      |    |
|----------------------------|-----|-----|------|------|----|
| V <sub>a</sub>             | 400 | 600 | 800  | 1000 | V  |
| V <sub>g2</sub>            | 250 | 250 | 250  | 250  | V  |
| V <sub>g1</sub>            | -90 | -95 | -100 | -105 | V  |
| I <sub>a</sub>             | 200 | 200 | 200  | 200  | mA |
| I <sub>g2</sub>            | 40  | 35  | 25   | 20   | mA |
| I <sub>g1</sub> (approx.)  | 7.0 | 8.0 | 10   | 15   | mA |
| v <sub>in(pk)</sub>        | 110 | 120 | 120  | 125  | V  |
| p <sub>a</sub>             | 25  | 40  | 60   | 60   | W  |
| P <sub>drive</sub>         | 1.0 | 1.0 | 1.5  | 2.0  | W  |
| P <sub>out</sub>           | 55  | 80  | 100  | 140  | W  |
| *P <sub>load</sub>         | 44  | 64  | 80   | 112  | W  |
| η                          | 69  | 66  | 63   | 70   | %  |
| <i>For 100% modulation</i> |     |     |      |      |    |
| v <sub>g2(pk) mod.</sub>   | 140 | 150 | 160  | 170  | V  |
| P <sub>mod.</sub>          | 40  | 60  | 80   | 100  | W  |

\*With a circuit transfer efficiency of 80%.

### OPERATING CONDITIONS AS SINGLE VALVE R.F. POWER AMPLIFIER OR OSCILLATOR (CLASS "C" TELEGRAPHY OR F.M. TELEPHONY)

#### Limiting Values

|                         |      |      |
|-------------------------|------|------|
| f max.                  | 500  | Mc/s |
| V <sub>a</sub> max.     | 1.25 | kV   |
| p <sub>a</sub> max.     | 150  | W    |
| V <sub>g2</sub> max.    | 300  | V    |
| p <sub>g2</sub> max.    | 12   | W    |
| I <sub>k</sub> max.     | 250  | mA   |
| i <sub>k(pk)</sub> max. | 1.25 | A    |
| -V <sub>g1</sub> max.   | 250  | V    |
| p <sub>g1</sub> max.    | 2.0  | W    |
| R <sub>g1-k</sub> max.  | 25   | k Ω  |

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## Typical Operating Conditions at $f \leq 165$ Mc/s.

|                    |     |     |      |      |    |
|--------------------|-----|-----|------|------|----|
| $V_a$              | 600 | 750 | 1000 | 1250 | V  |
| $V_{g2}$           | 250 | 250 | 250  | 250  | V  |
| $V_{g1}$           | -75 | -80 | -80  | -90  | V  |
| $I_a$              | 200 | 200 | 200  | 200  | mA |
| $I_{g2}$           | 37  | 37  | 30   | 20   | mA |
| $I_{g1}$ (approx.) | 10  | 10  | 10   | 10   | mA |
| $v_{in(pk)}$       | 90  | 95  | 95   | 105  | V  |
| * $P_{drive}$      | 1.0 | 1.0 | 1.0  | 1.2  | W  |
| $p_a$              | 35  | 40  | 50   | 55   | W  |
| $P_{out}$          | 85  | 110 | 150  | 195  | W  |
| † $P_{load}$       | 68  | 88  | 120  | 156  | W  |
| $\eta$             | 71  | 73  | 75   | 78   | %  |

\*Circuit losses not included.

†With a circuit transfer efficiency of 80%.

## Typical Operating Conditions with Coaxial Cavity at $f \leq 500$ Mc/s.

|                    |      |      |      |      |    |
|--------------------|------|------|------|------|----|
| $V_a$              | 600  | 800  | 1000 | 1250 | V  |
| $V_{g2}$           | 250  | 250  | 250  | 280  | V  |
| $V_{g1}$           | -110 | -110 | -110 | -115 | V  |
| $I_a$              | 170  | 200  | 200  | 200  | mA |
| $I_{g2}$           | 6.0  | 7.0  | 7.0  | 5.0  | mA |
| $I_{g1}$ (approx.) | 6.0  | 10   | 10   | 10   | mA |
| $p_a$              | 52   | 65   | 80   | 110  | W  |
| * $P_{drive}$      | 15   | 20   | 25   | 30   | W  |
| $P_{out}$          | 50   | 95   | 120  | 140  | W  |
| † $P_{load}$       | 40   | 76   | 96   | 112  | W  |
| $\eta$             | 49   | 60   | 60   | 56   | %  |

\*Output of driver stage.

†With a circuit transfer efficiency of 80%.

**OPERATING CONDITIONS AS R.F. POWER AMPLIFIER CLASS "B" FOR TELEVISION SERVICE** (Negative modulation and positive synchronisation).

### Limiting Values

|                    |      |      |
|--------------------|------|------|
| $f$ max.           | 220  | Mc/s |
| $V_a$ max.         | 1.25 | kV   |
| $p_a$ max.         | 150  | W    |
| $I_{a(sync)}$ max. | 335  | mA   |
| $I_a$ max.         | 250  | mA   |
| $V_{g2}$ max.      | 400  | V    |
| $p_{g2}$ max.      | 12   | W    |
| $-V_{g1}$ max.     | 250  | V    |
| $p_{g1}$ max.      | 2.0  | W    |

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### Typical Operating Conditions

|                      | 170-220 | 170-220 | 170-220 | Mc/s |
|----------------------|---------|---------|---------|------|
| f                    | 170-220 | 170-220 | 170-220 | Mc/s |
| Bandwidth            | 5.0     | 5.0     | 5.0     | Mc/s |
| $V_a$                | 750     | 1000    | 1250    | V    |
| $V_{g2}$             | 300     | 300     | 300     | V    |
| $V_{g1}$             | -60     | -65     | -70     | V    |
| $I_a$ (sync)         | 335     | 330     | 305     | mA   |
| $I_a$ (black)        | 245     | 240     | 230     | mA   |
| $I_{g2}$ (sync)      | 50      | 45      | 45      | mA   |
| $I_{g2}$ (black)     | 20      | 15      | 10      | mA   |
| $I_{g1}$ (sync)      | 15      | 20      | 25      | mA   |
| $I_{g1}$ (black)     | 4.0     | 4.0     | 4.0     | mA   |
| $V_{In(pk)}$ (sync)  | 85      | 95      | 100     | V    |
| $V_{In(pk)}$ (black) | 65      | 70      | 75      | V    |
| $P_{drive}$ (sync)   | 7.0     | 8.0     | 9.0     | W    |
| $P_{drive}$ (black)  | 4.25    | 4.7     | 5.5     | W    |
| $P_{out}$ (sync)     | 135     | 200     | 250     | W    |
| $P_{out}$ (black)    | 75      | 110     | 140     | W    |

### CIRCUIT NOTES

1. All four cathode connections must be used.
2. For low frequency operation the screen-grid connection is made to Pin 1. At higher frequencies the contact ring must be used for connecting the screen-grid.

### WEIGHT

Valve only

{ 5.5 ozs  
150 g

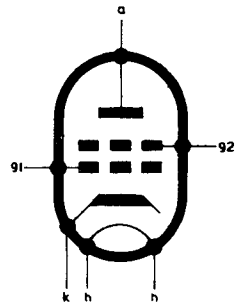
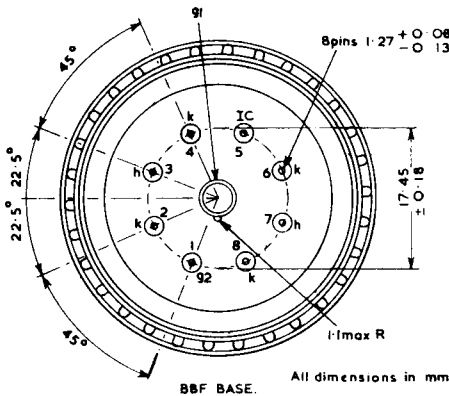
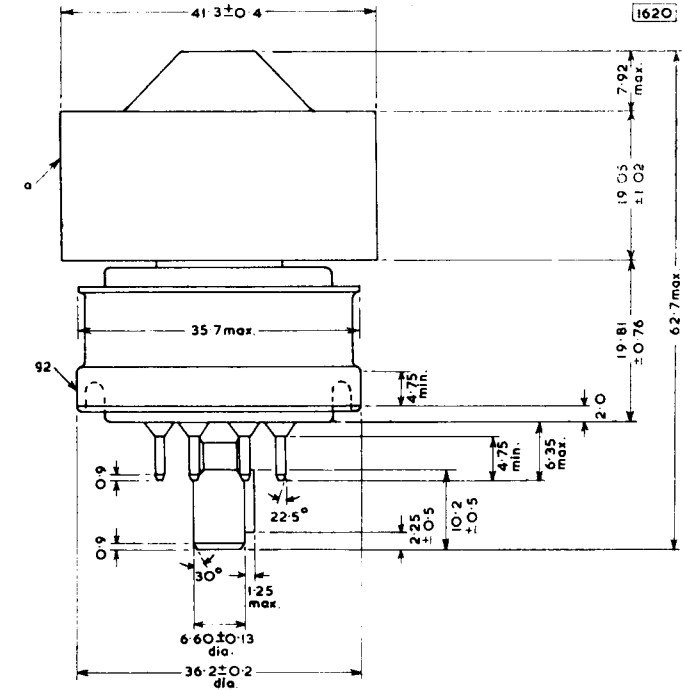
### ACCESSORIES

Information on these items can be obtained from the Industrial Technical Service Department, Mullard Ltd.

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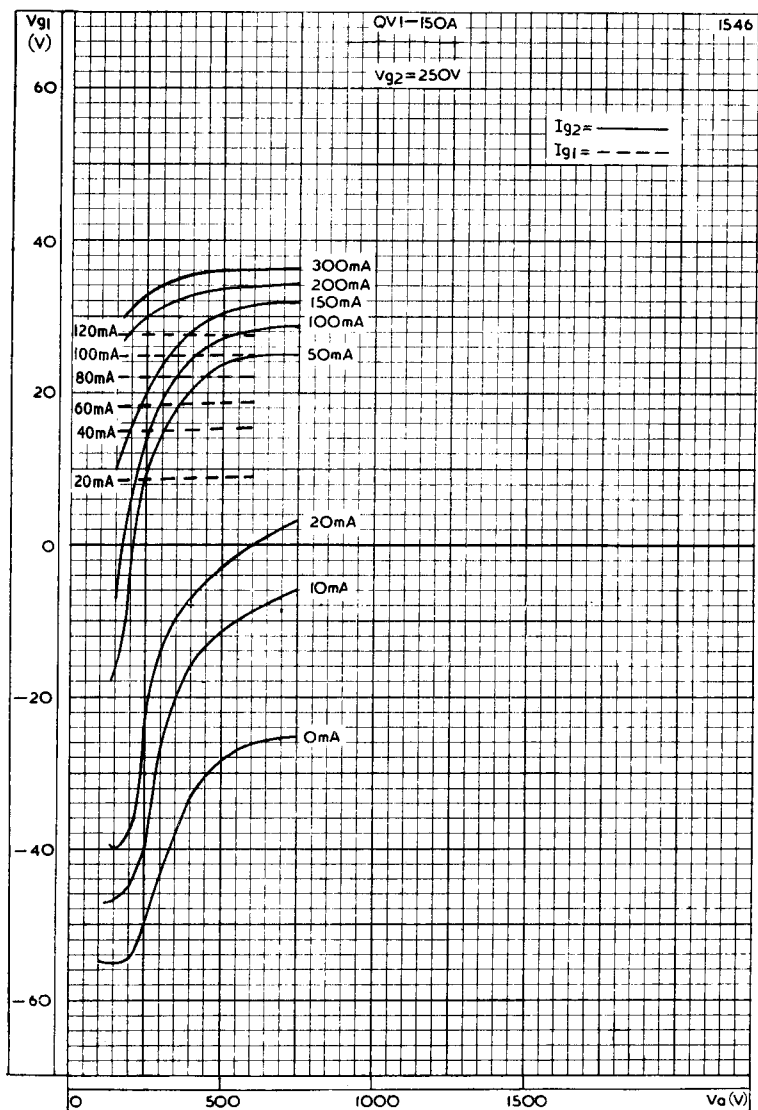
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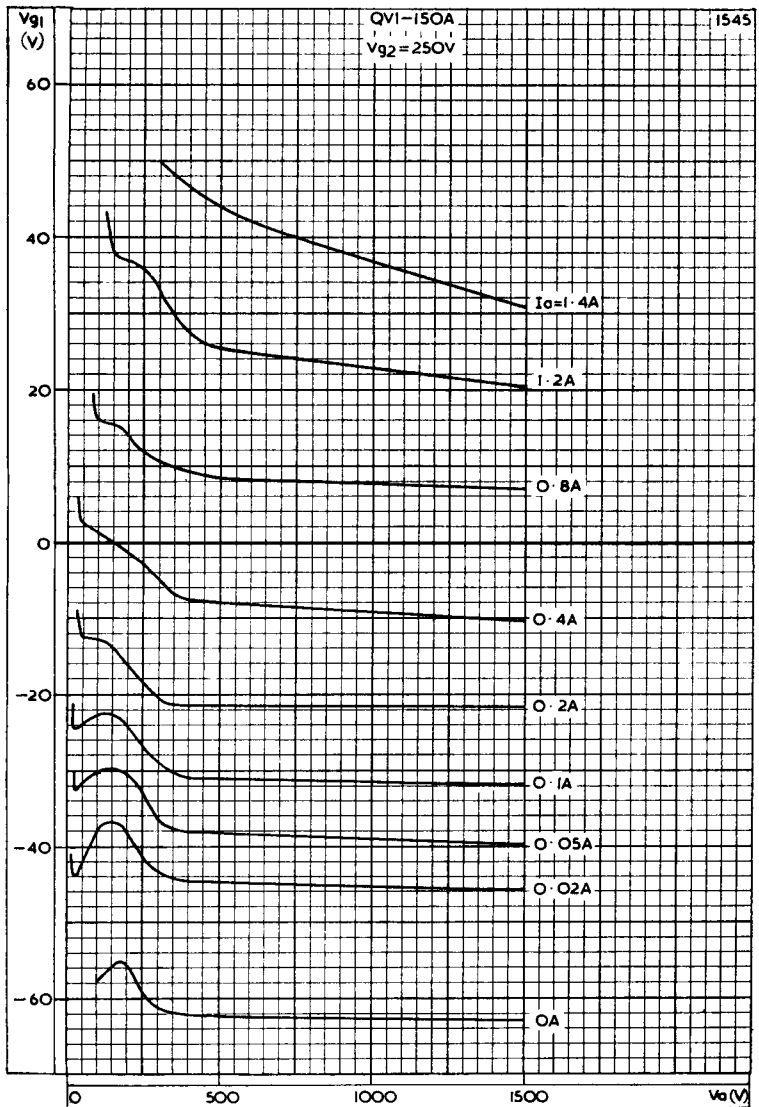
SCREEN-GRID AND CONTROL-GRID CONSTANT CURRENT CURVES



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CONSTANT ANODE CURRENT CURVES