

# BRIMAR

## VALVES

TYPE **19AQ5**

R.M.A. REGISTRATION DATA

DATE  
ISSUED **24.7.50**

### 19AQ5 BEAM PENTODE

The 19AQ5 is a miniature type beam power amplifier pentode similar to the type 6AQ5. It is designed for use in A.C./D.C. medium power audio-frequency applications.

#### MECHANICAL DATA

Coated unipotential cathode.

Outline drawing ..... 5-3      Bulb ..... T-5 $\frac{1}{2}$   
Base ..... E7-1 miniature button 7 - pin  
Maximum diameter .....  $\frac{3}{4}$ "  
Maximum overall length ..... 2.5/8"  
Maximum seated height ..... 2.3/8"  
Pin connections ..... Basing No. 7BZ

|                             |                    |
|-----------------------------|--------------------|
| Pin 1 - Grid No. 1          | Pin 5 - Plate      |
| Pin 2 - Cathode, Grid No. 3 | Pin 6 - Grid No. 2 |
| Pin 3 - Heater              | Pin 7 - Grid No. 1 |
| Pin 4 - Heater              |                    |

Mounting position ..... any

#### ELECTRICAL DATA

##### Ratings

|                                                                |            |
|----------------------------------------------------------------|------------|
| Heater voltage, (ac or dc) .....                               | 18.9 volts |
| Maximum heater-cathode voltage .....                           | 90 volts   |
| Maximum plate voltage .....                                    | 250 volts  |
| Maximum grid No. 2 voltage .....                               | 250 volts  |
| Maximum plate dissipation .....                                | 12 watts   |
| Maximum grid No. 2 dissipation .....                           | 2 watts    |
| Maximum external grid No. 1 circuit resistance - self bias ... | 0.5 megohm |
| Maximum external grid No. 1 circuit resistance - fixed bias .. | 0.1 megohm |
| Maximum bulb temperature at any point .....                    | 250°C      |

from RTMA release #899, Sept. 5, 1950

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Typical operating conditions and characteristics class A-1 amplifier

|                                           |       |             |
|-------------------------------------------|-------|-------------|
| Heater voltage (ac or dc) .....           | 18.9  | 18.9 volts  |
| Heater current .....                      | 150   | 150 mA      |
| Plate voltage .....                       | 180   | 250 volts   |
| Grid No. 2 voltage .....                  | 180   | 250 volts   |
| Grid No. 1 voltage .....                  | -8.5  | -12.5 volts |
| Plate resistance (approx.) .....          | 58000 | 52000 ohms  |
| Transconductance .....                    | 3700  | 4100 umhos  |
| Peak a-f signal voltage .....             | 8.5   | 12.5 volts  |
| Zero signal plate current .....           | 29    | 45 mA       |
| Zero signal grid No. 2 current .....      | 3     | 4.5 mA      |
| Maximum signal plate current .....        | 30    | 47 mA       |
| Maximum signal grid No. 2 current .....   | 4     | 7 mA        |
| Load resistance .....                     | 5500  | 5000 ohms   |
| Total harmonic distortion (approx.) ..... | 8     | 8 %         |
| Power output .....                        | 2.0   | 4.5 watts   |

# BRIMAR

## VALVES

TYPE **1T2**DATE  
ISSUED **3.1.51**

## R.M.A. REGISTRATION DATA

1T2  
DIODE

The 1T2 is a high voltage vacuum rectifier with a directly heated cathode. It is especially designed for providing high tension power for cathode ray tubes from a radio-frequency source or by rectification of the fly-back voltage

MECHANICAL DATA

Coated filament.

Outline drawing ..... None at present. Bulb ..... No number at present.  
 Base ..... No number at present.  
 Maximum diameter ..... 17/32"  
 Maximum overall length, including leads ..... 4.1/2"  
 Maximum length, excluding leads ..... 1.29/32"  
 Pin connections ..... No basing number at present.

Base lead 1 - Filament      Top lead - Plate  
 Base lead 2 - Filament

Mounting position ..... any

ELECTRICAL DATADirect Inter-electrode capacitancesPlate to filament (p to f) ..... 0.65  $\mu$ fRatings

Filament voltage (ac or dc) ..... 1.4 volts  
 Filament current ..... 140 mA  
 Maximum peak inverse voltage \* ..... 15,000 volts  
 Maximum steady state peak plate current ..... 12 mA  
 Maximum dc output current ..... 2 mA  
 Tube voltage drop (measured with tube conducting 4 mA) ..... 46 volts

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Typical operating conditions and characteristics (fly-back pulse rectifier)

|                      |    |               |
|----------------------|----|---------------|
| Filament current     | ** | 140 mA        |
| Peak inverse voltage |    | 7,500 volts   |
| Input condenser      |    | 0.001 $\mu$ F |
| D-C output potential |    | 7,000 volts   |
| D-C output current   |    | 100 $\mu$ A   |

- \* For circuits where the anode voltage rises at approximately the same rate as the filament voltage (e.g. in fly-back and radio frequency oscillator circuits).

Where used on power input circuits with full A.C. anode volts applied on switching, the maximum peak inverse voltage is 10,000 volts.

- \*\* The filament should be run at the same temperature as it would attain if operated at 1.4 Vdc.

Refer to "Interpretation of Receiving Tube Ratings"

# BRIMAR

## VALVES

TYPE **25U4GT**DATE  
ISSUED **9.7.51.**

### R.M.A. REGISTRATION DATA

#### 25U4GT DAMPER DIODE

The 25U4GT is a half wave rectifier especially designed for use as a damper diode in AC/DC television circuits. The electrical characteristics, except for the heater rating are similar to the 6U4GT.

#### MECHANICAL DATA.

Coated unipotential cathode  
Outline drawing ..... 9-13      Bulb ..... T-9  
Base ..... B.6.8  
Maximum Diameter ..... 1.9/32"  
Maximum Overall Length ..... 3.3/8"  
Maximum Seated Height ..... 2.13/16"  
Pin Connections ..... Basing Number 4GG

|                       |                |
|-----------------------|----------------|
| Pin 1 - No connection | Pin 5 - Anode  |
| Pin 2 - No connection | Pin 6 - -      |
| Pin 3 - Cathode       | Pin 7 - Heater |
| Pin 4 - -             | Pin 8 - Heater |

Mounting Position..... any

#### ELECTRICAL DATA.

##### Direct Inter-electrode Capacitance.

Cap. heater-cathode ..... 8.5  $\mu$ f

#### RATINGS. (absolute maximum values)

Heater Voltage (ac or dc) ..... 25 volts

Maximum heater-cathode voltage.

##### (a) Mains Rectifier

Heater positive with respect to cathode ..... 385 volts  
Heater negative with respect to cathode ..... 550 volts

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## (b) Damper Diode

Heater positive with respect to cathode ..... 385 volts  
 \* Heater negative with respect to cathode ..... 3850 volts

## Maximum Peak Inverse Voltage

(a) Mains Rectifier ..... 1375 volts  
 \* (b) Damper Diode ..... 3850 volts

Maximum A.C. plate voltage (RMS) ..... 375 volts

Maximum steady state peak plate current ..... 660 mA

Maximum transient peak plate current ..... 3.85 amps  
 (duration not exceeding 0.2 sec.)

Tube voltage drop (measured with tube conducting 250 mA) ..... 21 volts

Maximum D.C. output current ..... 138 mA

Minimum total effective plate supply impedance ..... 145 ohms

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS.

Heater voltage ..... 25 volts

Heater current ..... .3 amps

A.C. Plate voltage (RMS) ..... 350 volts

Filter Input capacitor ..... 20  $\mu$ f

Total effective plate supply impedance ..... 145 ohms

D.C. output current ..... 125 mA

D.C. output potential ..... 335 volts

- \* This rating is applicable when the duty cycle of the voltage pulse does not exceed 15% of one scanning cycle and its duration is limited to 10 microseconds.

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**R. E. T. M. A.  
REGISTRATION DATA**

TYPE 4EN4  
DATE 10th March '58  
ISSUED .....

TYPE 4EN4

The 4EN4 is a miniature medium-mu triode intended primarily for use as a radio frequency amplifier in VHF television tuners. The electrical characteristics are similar to those of each section of the 6BZ7.

MECHANICAL DATA.

Coated unipotential cathode.  
Outline drawing..... 5-2 Bulb..... T-5 $\frac{1}{2}$   
Base..... E7-1 Miniature Button 7-pin  
Maximum diameter.....  $\frac{3}{4}$ "  
Maximum overall length..... 2 $\frac{1}{8}$ "  
Maximum seated height..... 1 $\frac{7}{8}$ "  
Pin Connections..... Basing 7EG  
Pin 1 - Cathode. Pin 5 - Plate.  
Pin 2 - Grid. Pin 6 - Cathode.  
Pin 3 - Heater. Pin 7 - Grid.  
Pin 4 - Heater.  
Mounting position..... Any

ELECTRICAL DATA.Direct Inter-electrode Capacitances ~ with external shield.

Grid to plate: (g1 to p)..... 1.244F  
Input: g1 to (h+k)..... 3.244F  
Output: p to (h+k)..... 1.444F  
Heater to cathode: (h to k)..... 2.844F

Ratings Design Centre Values.

Heater voltage (A.C. or D.C.)..... 4.2 volts  
Maximum heater-cathode voltage.....  
Heater positive with respect to cathode..... 100 volts  
Heater negative with respect to cathode..... 100 volts  
Maximum plate voltage..... 250 volts  
Maximum positive D.C. grid voltage..... 0 volts  
Maximum plate dissipation..... 2.0 watts  
Maximum D.C. cathode current..... 20milli  
amperes  
Maximum grid circuit resistance..... 0.5Megohms

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R.E.T.M.A. REGISTRATION DATA (CONTINUED)

TYPE.....4BN4

Typical Operating Conditions and Characteristics, class A1  
Amplifier.

|                                      |                     |
|--------------------------------------|---------------------|
| Heater voltage (A.C. or D.C.).....   | 4.2 volts           |
| Heater current.....                  | 0.3 amperes         |
| Plate voltage.....                   | 150 volts           |
| Cathode-bias resistor.....           | 220 ohms            |
| Plate resistance(approximately)..... | 6300 ohms           |
| Transconductance.....                | 6800microhms        |
| Plate current.....                   | 9.0milli<br>amperes |
| Grid voltage, approximate.....       |                     |
| Ib = 100 Microamperes.....           | -6 volts            |
| Amplification factor.....            | 43                  |

# BRIMAR

## VALVES

TYPE **50CD6G**DATE  
ISSUED **9. 7. 51.**

### R.M.A. REGISTRATION DATA

#### 50CD6G BEAM POWER AMPLIFIER

The 50CD6G is an indirectly-heated line output tube, designed for AC/DC television service. The electrical characteristics, except for the heater rating, are similar to the 6CD6G.

#### MECHANICAL DATA.

Coated unipotential cathode  
 Outline drawing ..... 16-4      Bulb ..... ST-16  
 Base ..... B6-13  
 Maximum diameter ..... 2.1/16"  
 Maximum overall length ..... 5.11/16"  
 Maximum Seated height ..... 5.1/8 "  
 Pin connections ..... Basing Number    5BT

|                               |                     |
|-------------------------------|---------------------|
| Pin 1 - No connection         | Pin 5 - Grid No.1   |
| Pin 2 - Heater                | Pin 6 - -           |
| Pin 3 - Cathode and Grid No.3 | Pin 7 - Heater      |
| Pin 4 - -                     | Pin 8 - Screen Grid |

Top Cap - Anode

Mounting Position ..... Vertical, base up or down;  
 Horizontal, with pins 2  
 and 7 in a vertical plane.

#### ELECTRICAL DATA.

Direct Inter-electrode Capacitances (with no external shield).

Grid-Plate (max) ..... 1  $\mu$ f  
 Input ..... 26  $\mu$ f  
 Output ..... 10  $\mu$ f

#### RATINGS (Design Centre Values)

Heater Voltage (ac or dc) ..... 50 volts  
 Heater current ..... 0.3 amps

Sheet 1 of 2

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## Peak heater-cathode voltage.

- (a) Heater negative with respect to cathode ..... 350 volts
- (b) Heater positive with respect to cathode ..... 350 volts

Maximum D.C. Plate Voltage ..... 700 volts

- \* Peak positive - pulse plate voltage ..... 6000 volts
- \* Peak negative - pulse plate voltage ..... -1500 volts

Maximum Grid No.2 voltage ..... 175 volts

Maximum negative Grid No.1 voltage ..... -50 volts

Peak negative-pulse Grid No.1 voltage ..... -150 volts

Maximum plate dissipation ..... 15 watts

Maximum Grid No.2 dissipation ..... 3 watts

Maximum D.C. Plate current ..... 170 mA

Maximum Bulb temperature at any point ..... 210°C

Maximum Grid No.1 circuit resistance ..... 1.0 megohm

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS.

Heater voltage ..... 50 volts

Heater current ..... 0.3 amps

Plate voltage ..... 175 volts

Grid No.2 voltage ..... 175 volts

Grid No.1 voltage ..... -30 volts

Transconductance ..... 7500 micromhos

Plate current ..... 90 mA

Grid No.2 current ..... 5 mA

- \* The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle, with a maximum duration of 10 microseconds.

# BRIMAR

## VALVES

TYPE **6042**DATE  
ISSUED **16.3.51.**

## R.M.A. REGISTRATION DATA

6042TRUSTWORTHY DOUBLE TRIODE

The 6042 is a double triode designed for trustworthy operation under conditions of vibration and mechanical shock. The heaters of the two triode units are connected in series, so that failure of either heater renders both units inoperative. The electrical characteristics, except for the heater rating are similar to the 6SN7GT, but the maximum ratings have been reduced.

MECHANICAL DATA.

Coated unipotential cathode.

Outline drawing..... 9-3      Bulb..... T-9

Base.....B.8.6

Maximum Diameter..... 1.9/22"

Maximum overall length..... 2.7/8"

Maximum seated height..... 2.5/16"

Pin connections..... Basing Number 8BD

Pin 1 - Grid of triode 2.      Pin 5 - Plate of triode 1.

Pin 2 - Plate of triode 2.      Pin 6 - Cathode of triode 1.

Pin 3 - Cathode of triode 2. Pin 7 - Heater

Pin 4 - Grid of triode 1.      Pin 8 - Heater

Mounting position..... any

Maximum shock (in intermittent service)..... 500 g

Vibration (continuous service)..... 2½ g

Mechanical resonance.....None below 100 c/s

ELECTRICAL DATA.Direct inter-electrode Capacitances.Triode 1.

Grid to Plate..... 3.5 µµf

Grid to Cathode..... 2.3 µµf

Plate to Cathode..... 2.5 µµf

Triode 2.

|                       |             |
|-----------------------|-------------|
| Grid to Plate.....    | 3.3 $\mu$ f |
| Grid to Cathode.....  | 2.6 $\mu$ f |
| Plate to Cathode..... | 2.7 $\mu$ f |
| Plate to Plate.....   | 0.4 $\mu$ f |

RATINGS.

|                                |          |
|--------------------------------|----------|
| Heater Voltage (ac or dc)..... | 25 volts |
|--------------------------------|----------|

VALUES FOR EACH SECTION.

|                                       |             |
|---------------------------------------|-------------|
| Maximum Heater - Cathode Voltage..... | 90 volts    |
| Maximum Plate Voltage.....            | 250 volts   |
| Maximum Negative Grid Voltage.....    | 100 volts   |
| Maximum Positive Grid Voltage.....    | 0 volts     |
| Maximum Plate Dissipation.....        | 2.25 watts  |
| Maximum Grid circuit resistance.....  | 1.0 megohms |

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS.

|                     |           |
|---------------------|-----------|
| Heater Voltage..... | 25 volts  |
| Heater Current..... | 0.15 amp. |

VALUES FOR EACH SECTION.

|                                             |       |                  |
|---------------------------------------------|-------|------------------|
| Plate Voltage.....                          | 100   | 250 volts        |
| Grid Voltage.....                           | 0     | -9 volts         |
| Plate Current.....                          | 10.6  | 6.5 mA           |
| Plate Current for Grid Voltage of -24 volts |       | 15 $\mu$ A MAX   |
| Plate Resistance.....                       | 8,000 | 9,100 ohms       |
| Transconductance.....                       | 2,500 | 2,200 $\mu$ mhos |
| Amplification Factor.....                   | 20    | 20               |

# BRIMAR

## VALVES

TYPE **6057**DATE ISSUED **2.3.51.**

## R.M.A. REGISTRATION DATA

### 6057

#### TWIN TRIODE

The 6057 is a twin triode with the same characteristics as type 12AX7. It is suitable for applications where important considerations are high voltage gain at low heater power, such as voltage amplifiers, phase inverters and multivibrators. It is designed for trustworthy operation under adverse conditions of vibration and mechanical shock.

MECHANICAL DATA

Coated unipotential cathode.

Outline drawing ..... 6-2      Bulb ..... T-6 $\frac{1}{2}$ 

Base ..... E9-1      Small glass button      9-pin

Maximum diameter ..... 7/8"

Maximum overall length ..... 2.3/16"

Maximum seated height ..... 1.15/16"

Pin connections ..... Basing Number 9A

Pin 1 - Plate (No. 2)

Pin 6 - Plate (No. 1)

Pin 2 - Grid (No. 2)

Pin 7 - Grid (No. 1)

Pin 3 - Cathode (No. 2)

Pin 8 - Cathode (No. 1)

Pin 4 - Heater

Pin 9 - Heater centre tap

Pin 5 - Heater

Mounting position ..... any

Maximum shock (in intermittent operation) ..... 550 g

Vibration (continuous service) ..... 2 $\frac{1}{2}$  g

Mechanical resonance ..... None below 100 c/s

ELECTRICAL DATADirect interelectrode capacitances  $\mu$ 

|                              | Triode No. 1 | Triode No. 2 |
|------------------------------|--------------|--------------|
| Grid to plate (g to p) ..... | 1.7          | 1.7 $\mu$ F  |
| Input (g to k+h) .....       | 1.6          | 1.6 $\mu$ F  |
| Output (p to k+h) .....      | 0.46         | 0.34 $\mu$ F |

 $\mu$  Without external shield.

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Ratings (each unit)

Heater voltage (ac or dc) ..... 12.6 volts (series); 6.3 volts (parallel)  
Maximum heater-cathode voltage ..... 90 volts  
Maximum plate voltage ..... 300 volts  
Maximum negative dc grid voltage ..... -50 volts  
Maximum positive dc grid voltage ..... 0 volts  
Maximum plate dissipation ..... 1.0 watt

Typical operating conditions and characteristics; class A<sub>1</sub> amplifier  
(each triode)

|                            |        |     |        |           |
|----------------------------|--------|-----|--------|-----------|
| Heater voltage .....       | 12.6   | 6.3 | 12.6   | 6.3 volts |
| Heater current .....       | 150    | 300 | 150    | 300 mA    |
| Plate voltage .....        | 100    |     | 250    | volts     |
| Grid voltage .....         | -1     |     | -2     | volts     |
| Plate current .....        | 0.5    |     | 1.2    | mA        |
| Plate resistance .....     | 80,000 |     | 62,500 | ohms      |
| Transconductance .....     | 1,250  |     | 1,600  | μmhos     |
| Amplification factor ..... | 100    |     | 100    |           |

# BRIMAR

## VALVES

TYPE **6058**DATE **2.3.51.**  
ISSUED

## R.M.A. REGISTRATION DATA

### 6058

#### TWIN DIODE

The 6058 is a miniature type twin diode with separate cathodes, with the same general characteristics as type 6AL5. It is designed for trustworthy operation under adverse conditions of vibration and mechanical shock.

MECHANICAL DATA

Coated unipotential cathodes.

Outline drawing ..... 5-2 Bulb ..... T-5 $\frac{1}{2}$ 

Base ..... E7-1 miniature button 7-pin

Maximum diameter .....  $\frac{3}{4}$ "Maximum overall length ..... 2.1 $\frac{1}{8}$ "Maximum seated height ..... 1.7 $\frac{1}{8}$ "

Pin connections ..... Basing number 6BT

Pin 1 - Cathode (No. 1) Pin 5 - Cathode (No. 2)

Pin 2 - Plate (No. 2) Pin 6 - Internal shield

Pin 3 - Heater Pin 7 - Plate (No. 1)

Pin 4 - Heater

Mounting position ..... any

Maximum shock (in intermittent service) ..... 500 g

Vibration (continuous service) ..... 2 $\frac{1}{2}$  g

Mechanical resonance ..... None below 100 c/s

ELECTRICAL DATADirect interelectrode capacitances  $\mu$ Plate input: p to (k+h+i.s.) each unit ..... 3.2  $\mu$ FCathode input: k to (p+h+i.s.) each unit ..... 3.6  $\mu$ FPlate No. 1 to Plate No. 2 ..... 0.026  $\mu$ F Max. $\mu$  With external shield connected to Pin 6.

Ratings

|                                              |           |
|----------------------------------------------|-----------|
| Heater voltage (ac or dc) .....              | 6.3 volts |
| Maximum heater-cathode voltage .....         | 330 volts |
| Maximum peak inverse plate voltage .....     | 420 volts |
| Maximum peak plate current (per plate) ..... | 54 mA     |
| Maximum dc output current (per plate) .....  | 9 mA      |

Typical operating conditions and characteristics (half-wave rectifier)

|                                                               |                       |
|---------------------------------------------------------------|-----------------------|
| Heater voltage .....                                          | 6.3 volts             |
| Heater current .....                                          | 300 mA                |
| A.C. plate voltage (per plate) .....                          | 150 volts R.M.S. Max. |
| Minimum total effective plate supply impedance (per plate)... | 300 ohms              |
| D.C. output current (per plate) .....                         | 9 mA                  |

The resonant frequency of each unit of the 6058 is 700 Mc.approx.

6059

# BRIMAR

## VALVES

TYPE

23.8.51.

DATE  
ISSUED

### R.M.A. REGISTRATION DATA

6059

#### H.F. LOW NOISE AMPLIFIER PENTODE.

The 6059 is a sharp cut-off H.F. pentode of the 9-pin miniature type with general characteristics similar to type 6J7 designed for trustworthy operation under conditions of vibration and mechanical shock. It is primarily intended for use in applications where low microphonic, leakage and hum noise are required.

#### MECHANICAL DATA.

Coated unipotential cathode

|                             |        |                        |          |
|-----------------------------|--------|------------------------|----------|
| Outline drawing.....        | 6-2    | Bulb.....              | T 6½     |
| Base.....                   | ES-1   | Miniature glass button | 9-pin    |
| Maximum diameter.....       | 0..... |                        | 7/8"     |
| Maximum overall length..... |        |                        | 2.3/16"  |
| Maximum seated height.....  |        |                        | 1.15/16" |
| Pin connections.....        |        | Basing Number          | 9BC      |

Pin 1 - I.C.

Pin 6 - Shield

Pin 2 - Grid No.1.

Pin 7 - Plate

Pin 3 - Cathode

Pin 8 - Grid No.2.

Pin 4 - Heater

Pin 9 - Grid No.3.

Pin 5 - Heater

|                                              |                    |
|----------------------------------------------|--------------------|
| Mounting Position.....                       | any                |
| Maximum shock (in intermittent service)..... | 500 g.             |
| Vibration (continuous service).....          | 2.5 g.             |
| Mechanical resonance.....                    | None below 100 c/s |

#### ELECTRICAL DATA.

##### Direct Inter-electrode Capacitances. (without external shield)

##### Pentode Connection.

|                           |         |
|---------------------------|---------|
| Grid No.1. to Plate (Max) | 0.01 µf |
| Input                     | 4.25 µf |
| Output                    | 4.0 µf  |

##### Triode Connection.

|                     |        |
|---------------------|--------|
| Grid No.1. to Plate | 1.2 µf |
| Input               | 3.1 µf |
| Output              | 6.7 µf |

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RATINGS - Pentode Connection.

|                                     |            |
|-------------------------------------|------------|
| Heater voltage (ac or dc).....      | 6.3 volts  |
| Maximum heater-cathode voltage..... | 100 volts  |
| Maximum plate voltage.....          | 300 volts  |
| Maximum screen voltage.....         | 125 volts  |
| Maximum Grid No.1. voltage          |            |
| Negative Bias Value.....            | 50 volts   |
| Positive Bias Value.....            | 0 volts    |
| Maximum plate dissipation.....      | 1.75 watts |
| Maximum screen dissipation.....     | 0.30 watts |

CHARACTERISTICS - Pentode Connection.

|                                               |                |
|-----------------------------------------------|----------------|
| Heater current.....                           | 0.15 amp       |
| Plate voltage..... 100                        | 250 volts      |
| Grid No.3. - connected to cathode at socket.  |                |
| Grid No.2. voltage..... 100                   | 100 volts      |
| Grid No.1. voltage..... - 3                   | - 3 volts      |
| Plate resistance..... 0.9                     | 2.5 megohm     |
| Transconductance..... 900                     | 1250 $\mu$ hos |
| Grid No.1. Bias (approx) for plate current of |                |
| 10 $\mu$ amp. - 8                             | - 8 volts      |
| Plate current..... 2.0                        | 2.1 mA         |
| Screen current..... 0.65                      | 0.6 mA         |

Maximum Circuit Values.

|                                          |            |
|------------------------------------------|------------|
| Maximum Grid No.1. circuit Resistor..... | 1.0 megohm |
|------------------------------------------|------------|

RATINGS - Triode Connection (Grids No.2. & No.3. connected to Plate.

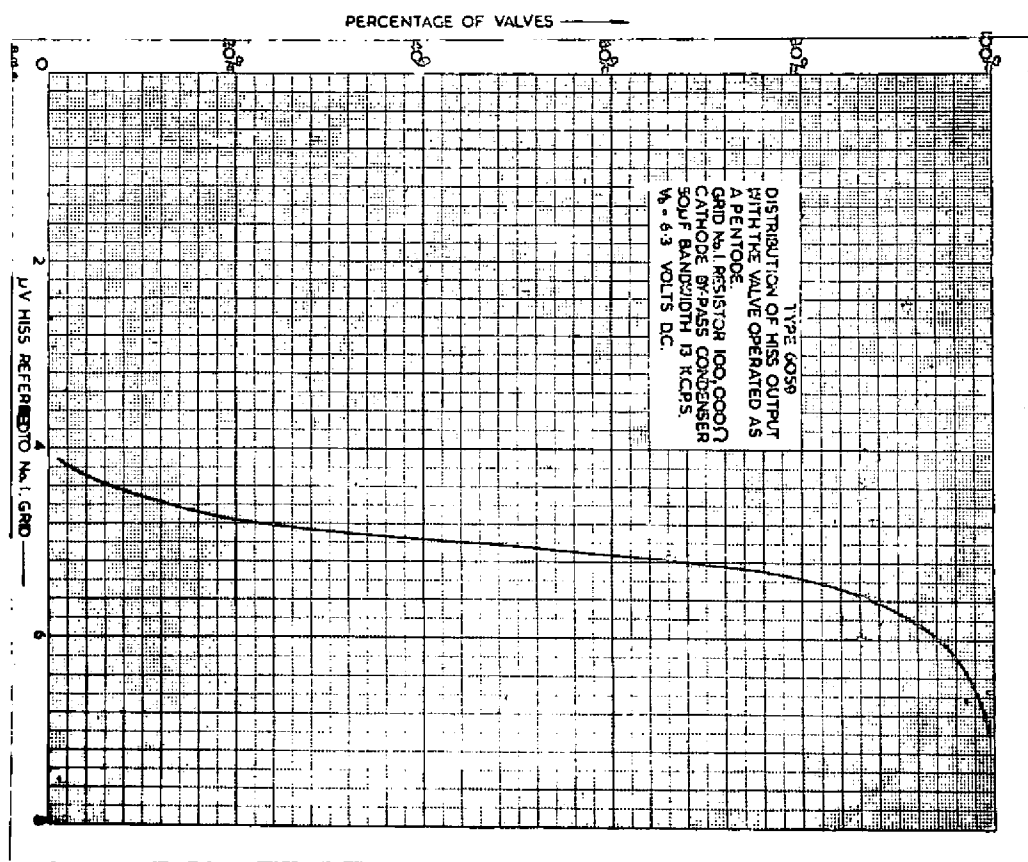
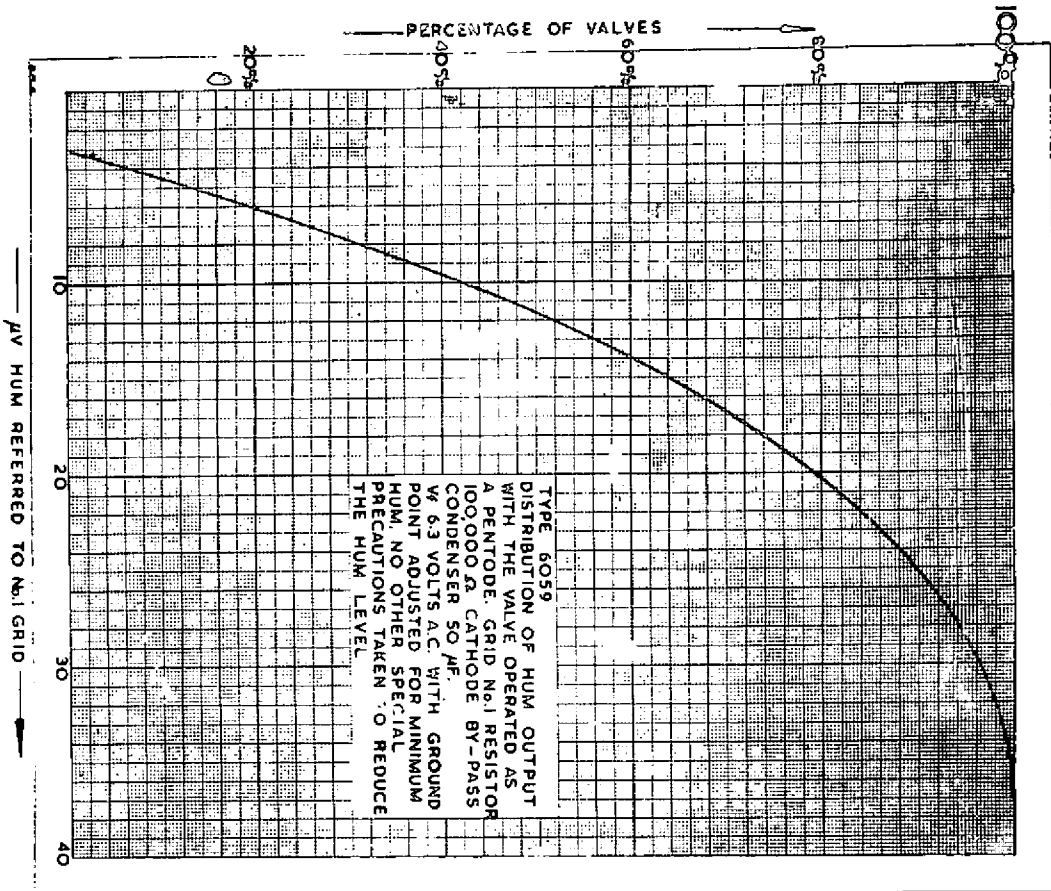
|                                     |            |
|-------------------------------------|------------|
| Heater voltage (ac or dc).....      | 6.3 volts  |
| Maximum heater-cathode voltage..... | 100 volts  |
| Maximum plate voltage.....          | 250 volts  |
| Maximum Grid No.1. voltage          |            |
| Negative Bias Value.....            | 50 volts   |
| Positive Bias Value.....            | 0 volts    |
| Maximum plate dissipation.....      | 2.05 watts |

CHARACTERISTICS - Triode Connection.

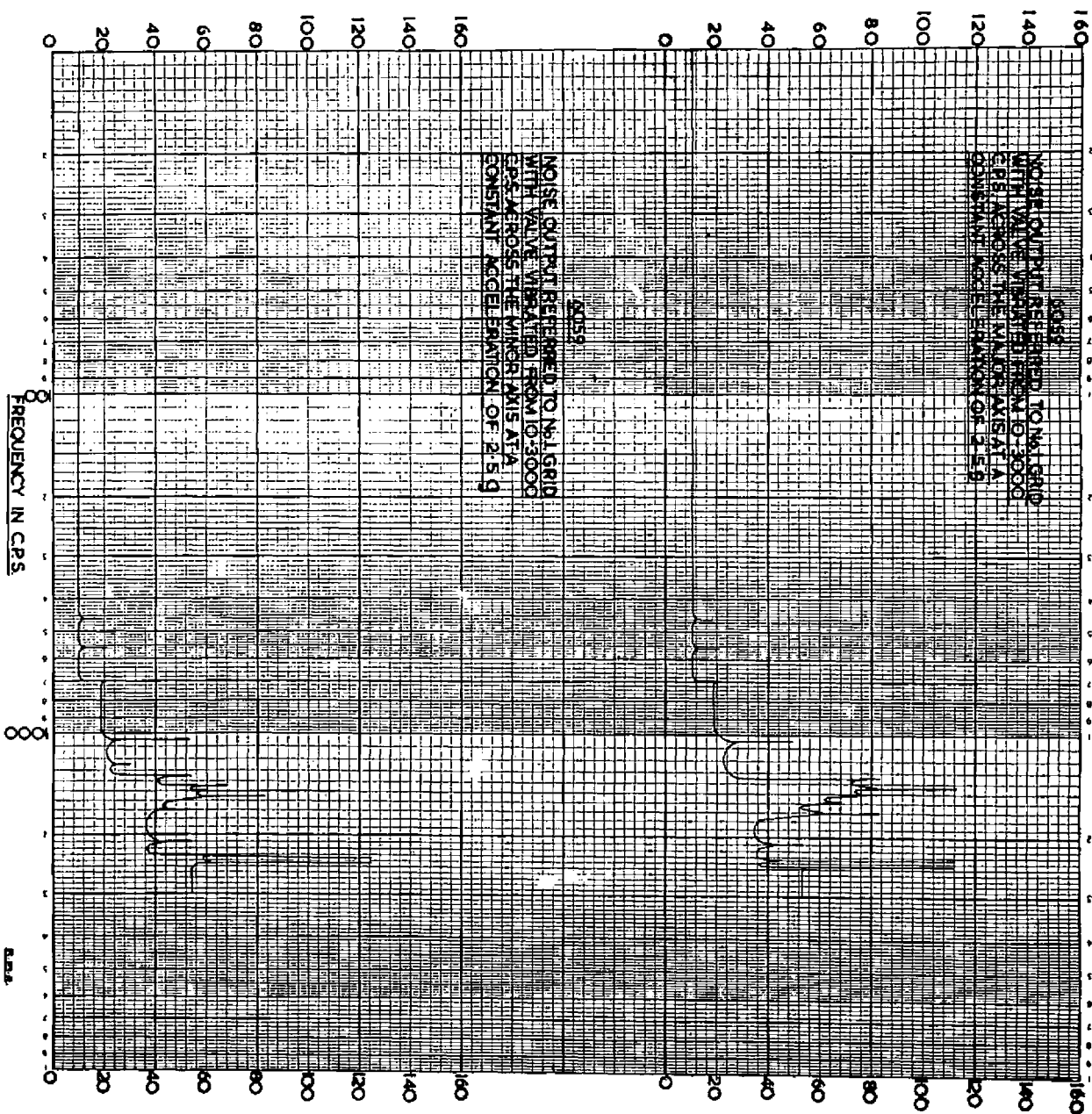
|                              |                |
|------------------------------|----------------|
| Heater current.....          | 0.15 amp       |
| Plate voltage..... 100       | 250 volts      |
| Grid No.1. voltage..... - 3  | - 8 volts      |
| Plate resistance..... 12660  | 10250 ohms     |
| Transconductance..... 1580   | 1950 $\mu$ hos |
| Amplification factor..... 20 | 20             |
| Plate current..... 2.7       | 7.0 mA         |

Maximum Circuit Values.

|                                          |             |
|------------------------------------------|-------------|
| Maximum Grid No.1. circuit Resistor..... | 1.0 megohm. |
|------------------------------------------|-------------|



# EQUIVALENT $\mu$ V ON CONTROL GRID.



# BRIMAR

## VALVES

TYPE **6060**DATE **2.3.51.**  
ISSUED

## R.M.A. REGISTRATION DATA

### 6060 DOUBLE TRIODE

The 6060 is a miniature type double triode employing the 9 pin glass button base, having the same general characteristics as the 12AT7, and as a frequency changer, operating at frequencies up to 500 Mc/s. Type 6060 is designed for trustworthy operation under adverse conditions of vibration and mechanical shock.

MECHANICAL DATA

Coated unipotential cathode.

|                              |      |                    |                   |
|------------------------------|------|--------------------|-------------------|
| Outline drawing .....        | 6-2  | Bulb .....         | T-6 $\frac{1}{2}$ |
| Base .....                   | E9-1 | Small glass button | 9-pin.            |
| Maximum diameter .....       |      |                    | 7/8"              |
| Maximum overall length ..... |      |                    | 2.3/16"           |
| Maximum seated height .....  |      |                    | 1.15/16"          |
| Pin connections .....        |      | Basing number      | 9A                |

|                         |                           |
|-------------------------|---------------------------|
| Pin 1 - Anode (No. 2)   | Pin 6 - Anode (No. 1)     |
| Pin 2 - Grid (No. 2)    | Pin 7 - Grid (No. 1)      |
| Pin 3 - Cathode (No. 2) | Pin 8 - Cathode (No. 1)   |
| Pin 4 - Heater          | Pin 9 - Heater centre tap |
| Pin 5 - Heater          |                           |

|                                               |                    |
|-----------------------------------------------|--------------------|
| Mounting position .....                       | any                |
| Maximum shock (in intermittent service) ..... | 500 g              |
| Vibration (continuous service) .....          | 2 $\frac{1}{2}$ g  |
| Mechanical resonance .....                    | None below 100 c/s |

ELECTRICAL DATADirect interelectrode capacitances

|                          |         |
|--------------------------|---------|
| Anode 1 to Grid 1 .....  | 1.6 pF  |
| Anode 2 to Grid 2 .....  | 1.6 pF  |
| Input 1 .....            | 2.25 pF |
| Input 2 .....            | 2.25 pF |
| Output 1 .....           | 0.4 pF  |
| Output 2 .....           | 0.4 pF  |
| Anode 1 to Anode 2 ..... | 0.2 pF  |

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Ratings

|                                        |                |
|----------------------------------------|----------------|
| Heater voltage (ac or dc) .....        | 12.6/6.3 volts |
| Maximum negative dc grid voltage ..... | -50 volts      |
| Maximum heater-cathode voltage .....   | 90 volts       |
| Maximum anode voltage .....            | 350 volts      |
| Maximum anode dissipation .....        | 2.5 watts      |

Typical operating conditions and characteristics, class A<sub>1</sub> amplifier  
(each section)

|                                           |          |          |                |
|-------------------------------------------|----------|----------|----------------|
| Heater voltage (both sections) (ac or dc) | 12.6/6.3 | 12.6/6.3 | 12.6/6.3 volts |
| Heater current .....                      | 0.15/0.3 | 0.15/0.3 | 0.15/0.3 amp   |
| Anode voltage .....                       | 100      | 180      | 250 volts      |
| Anode current .....                       | 3.7      | 11.0     | 10.0 mA        |
| Grid voltage .....                        | -1       | -1       | -2 volts       |
| Anode impedance .....                     | 13,500   | 9,400    | 10,000 ohms    |
| Mutual conductance .....                  | 4.0      | 6.6      | 5.5 mA/V       |
| Amplification factor .....                | 54       | 62       | 55             |
| Grid voltage .....                        | -6       | -8       | -12 volts      |
| (for anode current cut-off)               |          |          |                |

Operation as a frequency changerOscillator section

|                                  |             |
|----------------------------------|-------------|
| Anode supply voltage .....       | 250 volts   |
| Anode de-coupling resistor ..... | 1,000 ohms  |
| Grid resistor .....              | 10,000 ohms |

Mixer section

|                                           |            |
|-------------------------------------------|------------|
| Anode supply voltage .....                | 250 volts  |
| Anode de-coupling resistor .....          | 1,000 ohms |
| Cathode bias resistor .....               | 2,000 ohms |
| Conversion conductance <sup>‡</sup> ..... | 2.0 mA/V   |
| Heterodyne voltage <sup>‡‡</sup> .....    | (See note) |

<sup>‡</sup> Exact value depends on circuit constants and input impedance considerations.

<sup>‡‡</sup> Heterodyne voltage should be sufficient to just cause grid current in the mixer section.



Typical operating conditions and characteristics class A<sub>1</sub> amplifier

|                                          |       |       |                |
|------------------------------------------|-------|-------|----------------|
| Heater voltage (ac or dc) .....          | 6.3   | 6.3   | 6.3 volts      |
| Heater current .....                     | 450   | 450   | 450 mA         |
| Plate voltage .....                      | 180   | 250   | 315 volts      |
| Grid No. 3 voltage .....                 | 0     | 0     | 0 volts        |
| Grid No. 2 voltage .....                 | 180   | 250   | 225 volts      |
| Grid No. 1 voltage .....                 | -8.5  | -12.5 | -13 volts      |
| Plate resistance (approx.) .....         | 58000 | 52000 | 77000 ohms     |
| Transconductance .....                   | 3700  | 4100  | 3750 $\mu$ hos |
| Peak a-f signal voltage .....            | 8.5   | 12.5  | 13 volts       |
| Zero signal plate current .....          | 29    | 45    | 34 mA          |
| Zero signal Grid No. 2 current .....     | 3     | 4.5   | 2.2 mA         |
| Maximum signal plate current .....       | 30    | 47    | 35 mA          |
| Maximum signal Grid No. 2 current .....  | 4     | 7     | 6 mA           |
| Load resistance .....                    | 5500  | 5000  | 8500 ohms      |
| Total harmonic distortion (approx.) .... | 8     | 8     | 12%            |
| Power output .....                       | 2.0   | 4.5   | 5.5 watts      |

# BRIMAR

## VALVES

TYPE **6062**DATE **2.3.51.**  
ISSUED

## R.M.A. REGISTRATION DATA

DATA SHEETElectron Tube Type 6062

These data are a part of JETEC General Data J4

The 6062 is a five-electrode tube designed for use as an amplifier, and as a frequency doubler and tripler in compact, low-power mobile transmitters. The anode is capable of dissipating 12 watts and cooling is accomplished by radiation. The cathode is a coated unipotential cathode. Maximum ratings apply up to 175 megacycles. The 6062 is designed for trustworthy operation under conditions of vibration and shock. It has electrical characteristics which are identical to those of the 5763.

GENERAL:Electrical Data

|                                                                                | Min. | Bogey | Max.        |
|--------------------------------------------------------------------------------|------|-------|-------------|
| Heater voltage .....                                                           | 5.4  | 6.0   | 6.6 volts   |
| Heater current at bogey voltage .....                                          | 0.69 | 0.75  | 0.81 ampere |
| Amplification factor, = $G_1-G_2$ $\mu_p$ , = at<br>Eb=Ec2=250, Ec1=-7.5 ..... |      | 16.0  |             |

Direct interelectrode capacitances  
(No external shield)

|                  |     |     |             |
|------------------|-----|-----|-------------|
| Grid-plate ..... |     |     | 0.3 $\mu F$ |
| Input .....      | 8   | 9.5 | 11 $\mu F$  |
| Output .....     | 3.8 | 4.5 | 5.2 $\mu F$ |

Mechanical Data

|                              |      |                        |                   |
|------------------------------|------|------------------------|-------------------|
| Outline drawing .....        | 6-3  | Bulb .....             | T-6 $\frac{1}{2}$ |
| Base .....                   | E9-1 | Miniature glass button | 9-pin             |
| Maximum diameter .....       |      |                        | 7/8"              |
| Maximum overall length ..... |      |                        | 2.5/8"            |
| Maximum seated height .....  |      |                        | 2.3/8"            |
| Pin connections .....        |      | Basing No...           | 9K                |

|                               |                    |
|-------------------------------|--------------------|
| Pin 1 - Plate                 | Pin 6 - Grid No. 2 |
| Pin 2 - Internally connected. | Pin 7 - Cathode    |
| Pin 3 - Grid No. 3            | Pin 8 - Grid No. 1 |
| Pin 4 - Heater                | Pin 9 - Grid No. 1 |
| Pin 5 - Heater                |                    |

|                                                 |                    |
|-------------------------------------------------|--------------------|
| Mounting position .....                         | any                |
| Maximum shock (in intermittent operation) ..... | 500 g              |
| Vibration .....                                 | 2 $\frac{1}{2}$ g  |
| Mechanical resonance .....                      | None below 100 c/s |
| Maximum glass temperature .....                 | 250°C              |
| Net weight, approximate .....                   | 0.46 ounces        |

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MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS:Radio-Frequency Power Amplifier and Oscillator - Class C Telegraphy<sup>\*</sup> and  
Radio-Frequency Power Amplifier - Class C Frequency Modulation Telephony

Key down conditions per tube without amplitude modulation.

Maximum continuous commercial service ratings, absolute values.

|                                               |                |
|-----------------------------------------------|----------------|
| D.C. plate voltage .....                      | 300 max.volts  |
| D.C. Grid No. 3 voltage .....                 | 0 max.volts    |
| D.C. Grid No. 2 voltage .....                 | 250 max.volts  |
| D.C. Grid No. 1 voltage .....                 | -125 max.volts |
| D.C. plate current .....                      | 50 max.mA      |
| D.C. Grid No. 2 current .....                 | 15 max.mA      |
| D.C. Grid No. 1 current .....                 | 5 max. mA      |
| Plate input .....                             | 15 max.watts   |
| Grid No. 2 input .....                        | 2 max.watts    |
| Plate dissipation .....                       | 12 max.watts   |
| Peak heater-cathode voltage                   |                |
| Heater negative with respect to cathode ..... | 100 max.volts  |
| Heater positive with respect to cathode ..... | 100 max.volts  |

Typical OperationAt 50 megacycles

|                                            |                           |
|--------------------------------------------|---------------------------|
| D.C. plate voltage .....                   | 300 volts                 |
| Grid No. 3 .....                           | Tied to cathode at socket |
| D.C. Grid No. 2 voltage .....              | 250 volts                 |
| D.C. Grid No. 1 voltage .....              | -60 volts                 |
| From a resistor of .....                   | 22000 ohms                |
| Peak R.F. Grid No. 1 voltage .....         | 80 volts                  |
| D.C. plate current .....                   | 50 mA                     |
| D.C. Grid No. 2 current .....              | 5 mA                      |
| D.C. Grid No. 1 current (approx.) .....    | 3 mA                      |
| Driving power (approx.) .....              | 0.35 watts                |
| Power output (approx.) <sup>**</sup> ..... | 8 watts                   |

<sup>\*</sup> Modulation essentially negative may be used if the positive peak of the audio frequency envelope does not exceed 115 per cent of the carrier conditions.

<sup>\*\*</sup> The useful power output is approximately 7 watts.

Frequency Multiplier

Maximum continuous commercial service, absolute values.

|                                               |                |
|-----------------------------------------------|----------------|
| D.C. Plate voltage .....                      | 300 max.volts  |
| D.C. Grid No. 3 voltage .....                 | 0 max.volts    |
| D.C. Grid No. 2 voltage .....                 | 250 max.volts  |
| D.C. Grid No. 1 voltage .....                 | -125 max.volts |
| D.C. plate current .....                      | 50 max.mA      |
| D.C. Grid No. 2 current .....                 | 15 max.mA      |
| D.C. Grid No. 1 current .....                 | 5 max.mA       |
| Plate input .....                             | 15 max.watts   |
| Grid No. 2 input .....                        | 2 max.watts    |
| Plate dissipation .....                       | 12 max.watts   |
| Peak heater-cathode voltage                   |                |
| Heater negative with respect to cathode ..... | 100 max.volts  |
| Heater positive with respect to cathode ..... | 100 max.volts  |

Typical Operation

|                                           | <u>Doubler to</u><br><u>175 megacycles</u> | <u>Tripler to</u><br><u>175 megacycles</u> |
|-------------------------------------------|--------------------------------------------|--------------------------------------------|
| D.C. plate voltage .....                  | 300                                        | 300 volts                                  |
| Grid No. 3 .....                          | Tied to cathode at socket                  |                                            |
| D.C. Grid No. 2 voltage .....             | ⌘                                          | ⌘ volts                                    |
| D.C. Grid No. 1 voltage .....             | -75                                        | -100 volts                                 |
| From a Grid No. 1 resistor of .....       | 75,000                                     | 100,000 ohms                               |
| Peak R.F. Grid No. 1 voltage .....        | 95                                         | 120 volts                                  |
| D.C. plate current .....                  | 40                                         | 35 mA                                      |
| D.C. Grid No. 2 current .....             | 4.0                                        | 5.0 mA                                     |
| D.C. Grid No. 1 current (approx.) .....   | 1.0                                        | 1.0 mA                                     |
| Driving power (approx.) .....             | 0.6                                        | 0.6 watts                                  |
| Power output (approx.) <del>⌘</del> ..... | 3.6                                        | 2.8 watts                                  |

⌘ Obtained from plate supply voltage of 300 volts through a series resistor of 12,500 ohms.

⌘⌘ Useful power output is approximately 2.1 watts for doubler service and 1.3 watts for tripler service.

# BRIMAR

## VALVES

TYPE **6063**DATE  
ISSUED **22.2.51.**

## R.M.A. REGISTRATION DATA

6063FULL WAVE RECTIFIER

This valve is designed for trustworthy operation under conditions of vibration and mechanical shock. It is designed for use in equipment where the current drain does not exceed 70 mA. The general characteristics and performance are as Type 6X4.

MECHANICAL DATA:

Coated unipotential cathode.

Outline drawing ..... 5-3 Bulb ..... T-5½

Base ..... E7-1 Miniature Button 7-pin.

Maximum diameter ..... 3/4"

Maximum overall length ..... 2.5/8"

Maximum seated height ..... 2.3/8"

Pin connections ..... Basing No. BS

Pin 1 - Plate No. 2

Pin 5 - Internally connected

Pin 2 - Internally connected

Pin 6 - Plate No. 1

Pin 3 - Heater

Pin 7 - Cathode

Pin 4 - Heater

Mounting position ..... any

Maximum shock (in intermittent service) ..... 720 g.

Vibration (continuous service) ..... 2.5 g.

Mechanical resonance ..... None below 100 c/s.

ELECTRICAL DATA:Ratings

Heater voltage (ac or dc) ..... 6.3 volts

Heater current ..... 0.6 amp

D.C. heater-cathode voltage ..... 450 volts

Peak plate current (per plate) ..... 210 mA

D.C. output current ..... 70 mA

Peak inverse plate voltage ..... 1250 volts

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Typical operating conditionsCondenser Input Filter

|                                            |            |
|--------------------------------------------|------------|
| Maximum R.M.S. voltage(per plate) .....    | 325 volts  |
| Minimum supply impedance (per plate) ..... | 150 ohms   |
| Maximum direct current output .....        | 70 mA      |
| Maximum reservoir condenser .....          | 32 $\mu$ F |

Choke Input Filter

|                                          |           |
|------------------------------------------|-----------|
| Maximum R.M.S. voltage (per plate) ..... | 450 volts |
| Maximum direct current output .....      | 70 mA     |
| Maximum choke inductance .....           | 8 Henries |

# BRIMAR

## VALVES

TYPE **6064**

GAKS

DATE  
ISSUED **9.2.51.**

## R.M.A. REGISTRATION DATA

6064HIGH SLOPE R.F. PENTODE

This valve is designed for trustworthy operation under conditions of vibration and mechanical shock. It is particularly suitable for use in wide band amplifiers and will function (in conjunction with a suitable oscillator) as a frequency changer at frequencies up to 100 m/cs.

MECHANICAL DATA:

Coated unipotential cathode.

Outline drawing ..... 5-2

Bulb ..... T-5 $\frac{1}{2}$ 

Base ..... E7-1 Miniature button 7-pin

Maximum diameter ..... 3/4"

Maximum overall length ..... 2.1/8"

Maximum seated height ..... 1.7/8"

Pin connections ..... Basing No. ~~7BD~~

Pin 1 - Grid No. 1

Pin 5 - Plate

Pin 2 - Cathode

Pin 6 - Grid No. 3 and

Pin 3 - Heater

internal shield

Pin 4 - Heater

Pin 7 - Grid No. 2

Mounting position ..... any

Maximum shock (in intermittent service) ..... 500 g

Vibration (continuous service) ..... 2 $\frac{1}{2}$  g

Mechanical resonance ..... None below 100 c/s

ELECTRICAL DATA:Direct inter-electrode capacitances:

Grid to plate ..... 0.01 pF max.

Input ..... 7.8 pF

Output ..... 3.9 pF

\* With shield No. 316 connected to cathode.

Sheet 1 of 2

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Ratings:

|                                      |           |
|--------------------------------------|-----------|
| Heater voltage (ac or dc) .....      | 6.3 volts |
| Heater current .....                 | 0.3 amp   |
| Maximum heater-cathode voltage ..... | 90 volts  |
| Maximum plate voltage .....          | 250 volts |
| Maximum plate dissipation .....      | 2.5 watts |
| Maximum Grid No. 2 voltage .....     | 250 volts |
| Maximum Grid No. 2 dissipation ..... | 0.8 watts |

Typical operating characteristics:

Suppressor grid (Grid No. 3) connected to cathode

|                                                    |      |             |
|----------------------------------------------------|------|-------------|
| Anode voltage .....                                | 200  | 250 volts   |
| Anode current .....                                | 9.0  | 10.0 mA     |
| Screen voltage .....                               | 200  | 250 volts   |
| Control grid (Grid No. 1) voltage .....            | -1.5 | -2.0 volts  |
| Cathode bias resistor .....                        | 135  | 160 ohms    |
| Plate impedance (approx.) .....                    | 0.8  | 1.0 megohms |
| Mutual conductance .....                           | 7.5  | 7.5 mA/V    |
| Inner amplification factor ( $\mu_{g1-g2}$ ) ..... | 70   | 70          |

# BRIMAR

## VALVES

TYPE **6065**DATE  
ISSUED **2.3.51.**

## R.M.A. REGISTRATION DATA

6065  
PENTODE:

The 6065 is an indirectly heated variable-mu R.F. pentode on a 7-pin miniature base and is suitable for use in the R.F. and I.F. stages of compact radio equipment. It is designed for trustworthy operation under adverse conditions of vibration and mechanical shock.

MECHANICAL DATA

Coated unipotential cathode.

Outline drawing ..... 5-2      Bulb ..... T-5½  
 Base ..... E7-1      Miniature glass button 7-pin  
 Maximum diameter ..... 3/4"  
 Maximum overall length ..... 2.1/8"  
 Maximum seated height ..... 1.7/8"  
 Pin connections ..... Basing number 7DB

Pin 1 - Grid No. 1  
 Pin 2 - Cathode  
 Pin 3 - Heater  
 Pin 4 - Heater

Pin 5 - Plate  
 Pin 6 - Grid No. 3 and  
                     internal shield.  
 Pin 7 - Grid No. 2

Mounting position ..... any  
 Maximum shock (in intermittent operation) ..... 500 g  
 Vibration (continuous service) ..... 2½ g  
 Mechanical resonance ..... None below 100 c/s

ELECTRICAL DATADirect interelectrode capacitances <sup>Ⓜ</sup>

Grid to plate: g1 to p (max.) ..... 0.007 μμF  
 Input: g1 to (h+k+g2+g3+i.s.) ..... 4.5 μμF  
 Output: p to (h+k+g2+g3+i.s.) ..... 7.0 μμF

Ⓜ External shield connected to Pin 2

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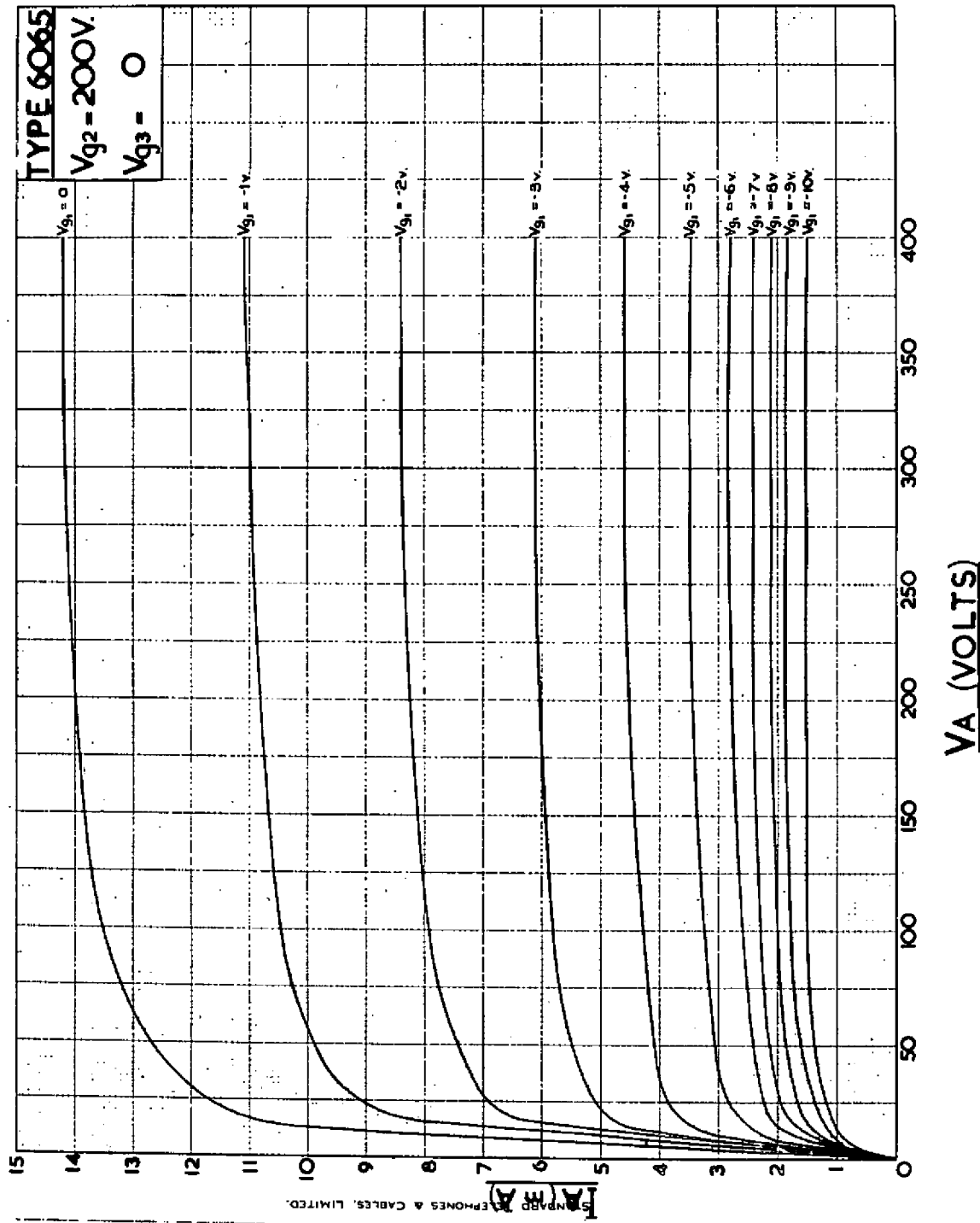
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Ratings

|                                      |           |
|--------------------------------------|-----------|
| Heater voltage (ac or dc) .....      | 6.3 volts |
| Maximum heater-cathode voltage ..... | 90 volts  |
| Maximum plate voltage .....          | 250 volts |
| Maximum grid No. 2 voltage .....     | 250 volts |
| Maximum plate dissipation .....      | 2.5 watts |
| Maximum grid No. 2 dissipation ..... | 0.6 watt  |

Typical operating conditions and characteristics, class A<sub>1</sub> amplifier.

|                                  |       |                  |
|----------------------------------|-------|------------------|
| Heater voltage .....             | 6.3   | 6.3 volts        |
| Heater current .....             | 200   | 200 mA           |
| Plate voltage .....              | 250   | 250 volts        |
| Grid No. 3 voltage .....         | 0     | 0 volts          |
| Grid No. 2 voltage .....         | 150   | 200 volts        |
| Grid No. 1 voltage .....         | -0.65 | -2.5 volts       |
| Plate resistance (approx.) ..... | 1.0   | 1.0 megohm       |
| Transconductance .....           | 2,500 | 2,500 $\mu$ mhos |
| Plate current .....              | 8.0   | 8.0 mA           |
| Grid No. 2 current .....         | 2.0   | 2.1 mA           |



# BRIMAR

## VALVES

TYPE **6066**DATE  
ISSUED **2.3.51.**

## R.M.A. REGISTRATION DATA

### 6066

#### DOUBLE DIODE TRIODE

The 6066 is a miniature type, double diode triode, designed for trustworthy operation under conditions of vibration and mechanical shock. Characteristics are similar to the 6AT6.

MECHANICAL DATA

Coated unipotential cathode.  
 Outline drawing ..... 5-2                      Bulb ..... T-5 $\frac{1}{2}$   
 Base ..... E7-1      Miniature button 7-pin  
 Maximum diameter .....  $\frac{3}{4}$ "  
 Maximum overall length ..... 2.1/8"  
 Maximum seated height ..... 1.7/8"  
 Pin connections ..... Basing No. 7BT

|                    |                     |
|--------------------|---------------------|
| Pin 1 - Grid No. 1 | Pin 5 - Diode No. 2 |
| Pin 2 - Cathode    | Pin 6 - Diode No. 1 |
| Pin 3 - Heater     | Pin 7 - Plate       |
| Pin 4 - Heater     |                     |

|                                               |                    |
|-----------------------------------------------|--------------------|
| Mounting position .....                       | any                |
| Maximum shock (in intermittent service) ..... | 500 g              |
| Vibration (continuous service) .....          | 2 $\frac{1}{2}$ g  |
| Mechanical resonance .....                    | None below 100 c/s |

ELECTRICAL DATAInterelectrode capacitances  $\ddagger$ 

|                          |               |
|--------------------------|---------------|
| Grid to cathode .....    | 2.3 pF        |
| Anode to cathode .....   | 1.1 pF        |
| Grid to anode .....      | 2.1 pF        |
| Diode (D2) to grid ..... | 0.025 pF max. |

$\ddagger$  With no external shield.

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Ratings

|                                                               |           |
|---------------------------------------------------------------|-----------|
| Heater voltage (ac or dc) .....                               | 6.3 volts |
| Maximum heater-cathode voltage .....                          | 90 volts  |
| Maximum plate voltage .....                                   | 300 volts |
| Maximum external Grid No. 1 circuit resistance - self bias... | 1 megohm  |

Typical operating characteristics

|                            |        |             |
|----------------------------|--------|-------------|
| Anode voltage .....        | 100    | 250 volts   |
| Anode current .....        | 0.8    | 1.0 mA      |
| Grid voltage .....         | -1     | -3 volts    |
| Anode impedance .....      | 54,000 | 58,000 ohms |
| Mutual conductance .....   | 1.3    | 1.2 mA/V    |
| Amplification factor ..... | 70     | 70          |

Operation as a resistance coupled amplifier

|                             |       |       |             |
|-----------------------------|-------|-------|-------------|
| Anode supply voltage .....  | 100   | 250   | 250 volts   |
| Anode load resistor .....   | 0.5   | 0.25  | 0.25 megohm |
| Grid resistor .....         | 1.0   | 1.0   | 10 megohm   |
| Cathode bias resistor ..... | 9,000 | 3,000 | 0 ohms      |
| Peak output .....           | 16    | 43    | 40 volts    |
| * Stage gain .....          | 33    | 42    | 42          |
| * Harmonic distortion ..... | 2     | 1     | 5 %         |

\* Figures are for 12 volts peak output.

# BRIMAR

## VALVES

TYPE **6067**DATE ISSUED **2.3.51.**

## R.M.A. REGISTRATION DATA

### 6067

#### TWIN TRIODE

The 6067 is a twin triode with the same characteristics as type 12AU7. It can be used as an audio-frequency amplifier or as a combined oscillator and mixer. It is designed for trustworthy operation under adverse conditions of vibration and mechanical shock.

MECHANICAL DATA

Coated unipotential cathodes.

Outline drawing ..... 6-2      Bulb ..... T-6 $\frac{1}{2}$   
 Base ..... E9-1      Small glass button 9-pin  
 Maximum diameter ..... 7/8"  
 Maximum overall length ..... 2.3/16"  
 Maximum seated height ..... 1.15/16"  
 Pin connections ..... Basing number 9A

|                         |                            |
|-------------------------|----------------------------|
| Pin 1 - Plate (No. 2)   | Pin 6 - Plate (No. 1)      |
| Pin 2 - Grid (No. 2)    | Pin 7 - Grid (No. 1)       |
| Pin 3 - Cathode (No. 2) | Pin 8 - Cathode (No. 1)    |
| Pin 4 - Heater          | Pin 9 - Heater centre tap. |
| Pin 5 - Heater          |                            |

Mounting position ..... any  
 Maximum shock (in intermittent operation) ..... 550 g  
 Vibration (continuous service) ..... 2 $\frac{1}{2}$  g  
 Mechanical resonance ..... None below 100 c/s

ELECTRICAL DATADirect interelectrode capacitances <sup>■</sup>

|                               | <u>Triode No. 1</u> | <u>Triode No. 2</u> |
|-------------------------------|---------------------|---------------------|
| Grid to plate: (g to p) ..... | 1.5                 | 1.5 $\mu$ F         |
| Input: (g to k+h) .....       | 1.6                 | 1.6 $\mu$ F         |
| Output: (p to k+h) .....      | 0.5                 | 0.35 $\mu$ F        |

■ Without external shield.

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Ratings (each unit)

|                                                    |                                          |
|----------------------------------------------------|------------------------------------------|
| Heater voltage (ac or dc)                          | 12.6 volts (series):6.3 volts (parallel) |
| Maximum heater-cathode voltage .....               | 90 volts                                 |
| Maximum plate voltage .....                        | 300 volts                                |
| Maximum negative dc grid voltage .....             | -50 volts                                |
| Maximum positive dc grid voltage .....             | 0 volts                                  |
| Maximum plate dissipation .....                    | 2.75 watts                               |
| Maximum cathode current .....                      | 20 mA                                    |
| Maximum grid circuit resistance (fixed bias) ..... | 0.25 megohm                              |
| Maximum grid circuit resistance (self bias) .....  | 1.0 megohm                               |

Typical operating conditions and characteristics, class A<sub>1</sub> amplifier  
(each unit)

|                           |       |     |       |           |
|---------------------------|-------|-----|-------|-----------|
| Heater voltage.....       | 12.6  | 6.3 | 12.6  | 6.3 volts |
| Heater current .....      | 150   | 300 | 150   | 300 mA    |
| Plate voltage .....       | 100   |     | 250   | volts     |
| Grid voltage .....        | 0     |     | -8.5  | volts     |
| Plate current .....       | 11.8  |     | 10.5  | mA        |
| Plate resistance .....    | 6,500 |     | 7,700 | ohms      |
| Transconductance .....    | 3,100 |     | 2,200 | μmhos     |
| Amplification factor .... | 20    |     | 17    |           |

DATE  
ISSUED 15.11.51.

BRIMAR VALVE WORKS, FOOTSCRAY, KENT, ENGLAND.

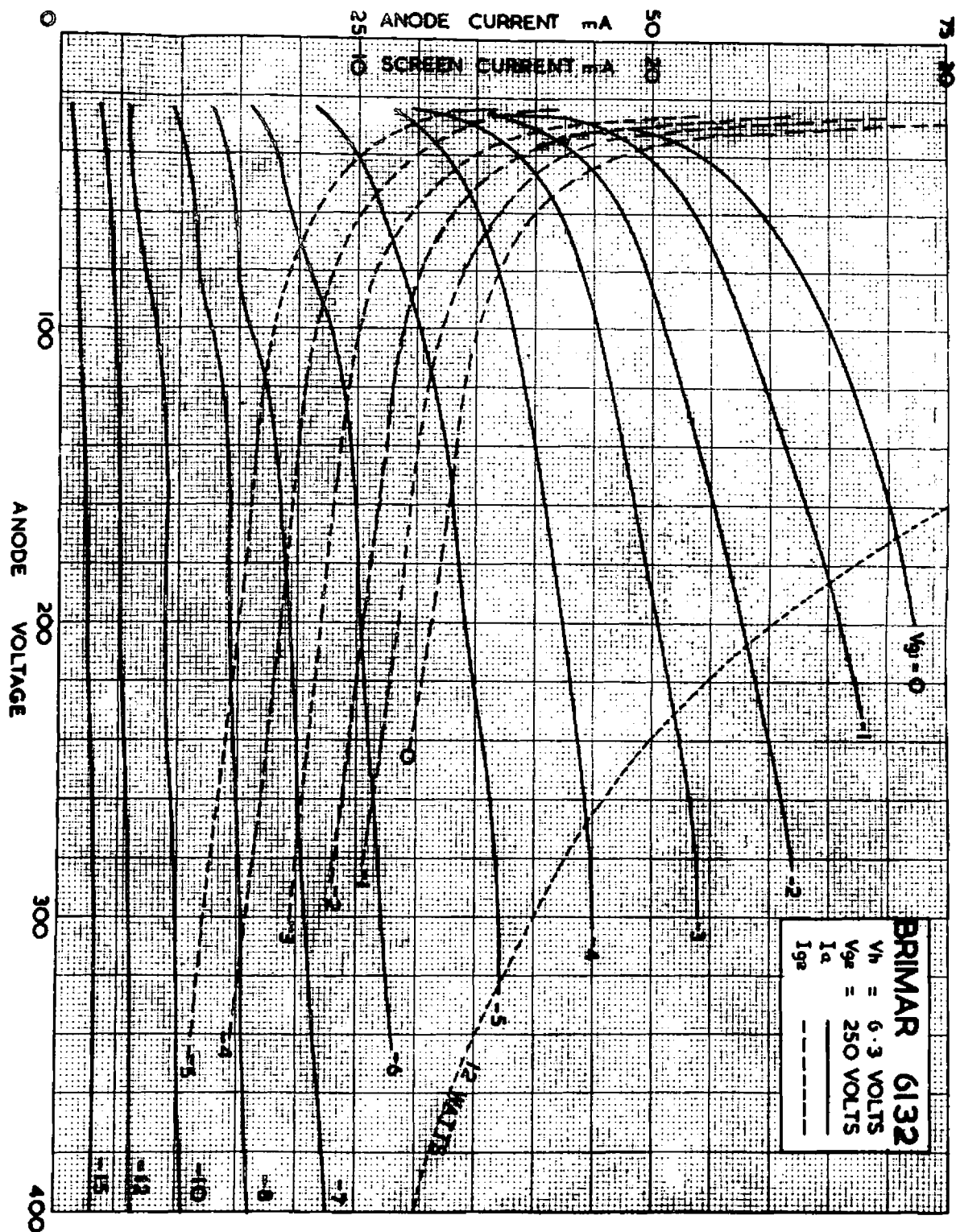
Ratings:

|                                          |           |
|------------------------------------------|-----------|
| Heater voltage nominal (ac or dc) .....  | 6.3 volts |
| Maximum heater-cathode voltage .....     | 90 volts  |
| Maximum anode voltage .....              | 275 volts |
| Maximum Grid No.2 voltage .....          | 275 volts |
| Maximum anode dissipation .....          | 12 watts  |
| Maximum Grid No.2 dissipation .....      | 2.5 watts |
| Maximum bulb temperature .....           | 250°C     |
| Peak instantaneous cathode current ..... | 1.5 amps. |

Typical operating conditions and characteristics:

|                                    |             |
|------------------------------------|-------------|
| Heater voltage .....               | 6.3 volts   |
| Heater current .....               | 0.75 amp    |
| Anode voltage .....                | 250 volts   |
| Grid No.2 voltage .....            | 250 volts   |
| Grid No.1 voltage .....            | -4.5 volts  |
| Grid No.3 voltage .....            | 0 volts     |
| Anode impedance .....              | 50,000 ohms |
| Transconductance .....             | 11,000μmhos |
| Anode current .....                | 40.0 mA     |
| Grid No.2 current .....            | 6.0 mA      |
| Amplification factor (g2-g1) ..... | 26          |

STANDARD TELEPHONES & CABLES, LIMITED.



# BRIMAR

## VALVES

TYPE **6157**DATE  
ISSUED **20.12.51.**

## R.M.A. REGISTRATION DATA

6157

HALF WAVE VACUUM RECTIFIER.

This tube is an indirectly heated half-wave vacuum rectifier. Its small physical size renders it useful for compact mobile and airborne equipment. The use of a top cap reduces the possibility of electrolysis of the glass and the likelihood of arc-over at high altitudes. It is designed for Trustworthy operation under adverse conditions of vibration and mechanical shock.

MECHANICAL DATA.

Coated unipotential cathode.

Outline drawing ..... No number allocated Bulb ..... T-6 $\frac{1}{2}$   
 Base ..... E9-1 miniature glass button 9-pin.  
 Top Cap ..... JETEC C1-3  
 Maximum diameter ..... 7/8"  
 Maximum overall length ..... 2.13/16"  
 Maximum seated height ..... 2.9/16"  
 Pin connection ..... Basing No. No number allocated.

Pin 1 - Internally connected.  
 Pin 2 - Internally connected.  
 Pin 3 - Cathode  
 Pin 4 - Heater  
 Pin 5 - Heater

Pin 6 - Internally connected.  
 Pin 7 - Internally connected.  
 Pin 8 - Internally connected.  
 Pin 9 - Internally connected.  
 Top Cap - Plate.

Mounting position ..... any  
 Maximum shock (in intermittent operation ..... 500g  
 Vibration (continuous service) ..... 2 $\frac{1}{2}$ g  
 Mechanical resonance ..... None below 100 c/s

ELECTRICAL DATA.Ratings.

|                                   |      |             |
|-----------------------------------|------|-------------|
| Heater voltage (ac or dc) .....   | 6.3  | 6.3 volts   |
| Heater current (ac or dc) .....   | 0.8  | 0.8 amps    |
| D.C. heater cathode voltage ..... | 700  | 700 volts   |
| Peak plate current .....          | 450  | 450 mA      |
| D.C. output current .....         | 75   | 125 mA      |
| Peak plate inverse voltage .....  | 1450 | 1000 volts. |

Sheet 1 of 2

*Standard Telephones and Cables Limited*

BRIMAR VALVE WORKS, FOOTSCRAY, KENT, ENGLAND.

Typical operating conditions.Condenser input Filter (half wave rectifier).

|                                     |     |            |
|-------------------------------------|-----|------------|
| Maximum R.M.S. voltage .....        | 500 | 350 volts  |
| Minimum supply impedance .....      | 50  | 50 ohms    |
| Maximum direct output current ..... | 75  | 125 mA     |
| Maximum reservoir condenser .....   | 32  | 32 $\mu$ F |

Condenser input Filter (Two valves as full wave rectifier).

|                                            |     |            |
|--------------------------------------------|-----|------------|
| Maximum R.M.S. voltage (per plate) .....   | 500 | 350 volts  |
| Minimum supply impedance (per plate) ..... | 50  | 50 ohms    |
| Maximum direct output current .....        | 150 | 250 mA     |
| Maximum reservoir condenser .....          | 16  | 16 $\mu$ F |

# BRIMAR

## VALVES

TYPE **6180**DATE **21.1.52.**  
ISSUED

## R.M.A. REGISTRATION DATA

6180TRUSTWORTHY DOUBLE TRIODE

The 6180 is a double triode designed for trustworthy operation under conditions of vibration and mechanical shock. The heaters of the two triode units are connected in series, so that failure of either heater renders both units inoperative. The electrical characteristics are similar to the 6SN7GT, but the maximum ratings have been reduced.

MECHANICAL DATA

Coated unipotential cathode.

Outline drawing ..... 9-3      Bulb ..... T-9

Base ..... B.8.6

Maximum diameter ..... 1.9/32"

Maximum overall length ..... 2.7/8"

Maximum seated height ..... 2.5/16"

Pin Connections ..... Basing Number 8BD

Pin 1 - Grid of Triode 2

Pin 5 - Plate of Triode 1

Pin 2 - Plate of Triode 2

Pin 6 - Cathode of Triode 1

Pin 3 - Cathode of Triode 2

Pin 7 - Heater

Pin 4 - Grid of Triode 1

Pin 8 - Heater

Mounting position ..... any

Maximum shock (in intermittent service) ..... 500g

Vibration (continuous service) ..... 2½g

Mechanical resonance ..... None below 1000/s

ELECTRICAL DATADirect inter-electrode capacitances.Triode 1

Grid to Plate ..... 3.5 µf

Grid to Cathode ..... 2.3 µf

Plate to Cathode ..... 2.5 µf

Sheet 1 of 2

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Triode 2

Grid to plate ..... 3.3  $\mu\text{f}$   
Grid to Cathode ..... 2.6  $\mu\text{f}$   
Plate to Cathode ..... 2.7  $\mu\text{f}$

Plate to Plate ..... 0.4  $\mu\text{f}$

RATINGS

Heater voltage (ac or dc) ..... 6.3 volts

VALUES FOR EACH SECTION

Maximum heater-cathode voltage ..... 90 volts  
Maximum plate voltage ..... 300 volts  
Maximum negative grid voltage ..... 100 volts  
Maximum positive grid voltage ..... 0 volt  
Maximum plate dissipation ..... 2.25 watts

Maximum grid circuit resistance ..... 1.0 megohms

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

Heater voltage ..... 6.3 volts  
Heater current ..... 0.6 amp

VALUES FOR EACH SECTION

|                                             |      |                        |
|---------------------------------------------|------|------------------------|
| Plate voltage                               | 100  | 250 volts              |
| Grid voltage                                | 0    | -9 volts               |
| Plate current                               | 10.6 | 6.5 mA                 |
| Plate current for grid voltage of -24 volts |      | 15 $\mu\text{A}$ Max.  |
| Plate resistance                            | 8000 | 9,100 ohms             |
| Transconductance                            | 2500 | 2,200 $\mu\text{mhos}$ |
| Amplification factor                        | 20   | 20                     |

# BRIMAR

## VALVES

TYPE **6443**DATE  
ISSUE **1.54.**

### R.M.A. REGISTRATION DATA

6443  
DIODE

This tube is an indirectly heated half wave vacuum rectifier. Its small physical size compared with its high output current capabilities renders it useful for compact mobile and airborne equipment. The use of a top cap reduces the possibility of electrolysis of the glass and the likelihood of arc-over at high altitudes. The heater-cathode voltage rating is sufficient to allow the operation of the heater from a supply common to the other valves in the equipment, except when two or more valves are used for voltage multiplication. It is designed for Trustworthy operation under adverse conditions of vibration and mechanical shock.

#### MECHANICAL DATA

Coated Unipotential cathode.

Outline drawing .... BVA B9A valve outline with top cap No. 4. Bulb T-6 $\frac{1}{2}$   
 Top Cap ..... C1-2 or C1-33  
 Maximum diameter .....  $\frac{7}{8}$   
 Maximum overall length ..... 3.9/32"  
 Maximum seated height ..... 3"

Pin Connections ..... Basing 9BW.

|                               |                               |
|-------------------------------|-------------------------------|
| Pin 1 - Internally connected. | Pin 6 - Internally connected. |
| Pin 2 - Internally connected. | Pin 7 - Internally connected. |
| Pin 3 - Cathode.              | Pin 8 - Internally connected. |
| Pin 4 - Heater.               | Pin 9 - Internally connected. |
| Pin 5 - Heater.               |                               |

Top Cap-Plate.

|                                      |                    |
|--------------------------------------|--------------------|
| Mounting position .....              | any                |
| Maximum shock .....                  | 500 g              |
| Vibration (continuous service) ..... | 2 $\frac{1}{2}$ g  |
| Mechanical resonances .....          | None below 100 c/s |

#### ELECTRICAL DATA

##### Ratings

|                                         |            |
|-----------------------------------------|------------|
| Heater voltage (nominal ac or dc) ..... | 6.3 volts  |
| Maximum heater-cathode voltage .....    | 900 volts  |
| Maximum peak inverse voltage .....      | 1800 volts |
| Maximum ac plate voltage (rms) .....    | 625 volts  |

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BRIMAR VALVE WORKS, FOOTSCRAY, KENT, ENGLAND.

|                                                     |             |
|-----------------------------------------------------|-------------|
| Maximum steady state peak plate current .....       | 900 mA      |
| Maximum transient peak plate current .....          | 3.0 amperes |
| Tube voltage drop (with 150 mA plate current) ..... | 25 volts    |
| Maximum steady-state DC output current .....        | 150 mA      |

Typical operating conditions in half-wave circuit with capacitor input to filter.

|                                        |     |           |
|----------------------------------------|-----|-----------|
| Heater voltage .....                   | 6.3 | 6.3 volts |
| Heater current .....                   | 1.1 | 1.1 amps. |
| AC plate supply voltage (rms) .....    | 625 | 500 volts |
| DC output current .....                | 125 | 150 mA    |
| Effective plate supply impedance ..... | 160 | 200 ohms. |
| Input condenser .....                  | 8   | 8 $\mu$ F |
| DC output voltage .....                | 680 | 460 volts |

**BRIMAR**

**R. E. T. M. A.  
REGISTRATION DATA**

TYPE 6516 H.F. Pentode

DATE  
ISSUED 24. 10. 1956.

This tube is a seven pin miniature indirectly heated R.F. power pentode designed for reliable operation under adverse conditions of shock and vibration. It is suitable for use as an A.F. power amplifier or a driven R.F. power amplifier up to 100 Mc/s. where a low heater dissipation is required. Electrically it is similar to the 6AM5.

Mechanical Data

|                                         |                                          |
|-----------------------------------------|------------------------------------------|
| Coated unipotential cathode             |                                          |
| Outline drawing.....                    | 5 - 2      Bulb..... T - 5 $\frac{1}{2}$ |
| Base.....                               | E7 - 1      Miniature Button 7 - pin     |
| Maximum diameter.....                   | 3/4"                                     |
| Maximum overall length.....             | 2.1/8"                                   |
| Maximum seated height.....              | 1.7/8"                                   |
| Pin connections                         | Basing..... 6CH                          |
| Pin 1 Grid No.1                         | Pin 5 Plate                              |
| Pin 2 Cathode, grid No.3                | Pin 6 No connection                      |
| Pin 3 Heater                            | Pin 7 Grid No.2                          |
| Pin 4 Heater                            |                                          |
| Mounting position                       | any                                      |
| Maximum shock (in intermittent service) | 500g                                     |
| Maximum vibration (continuous service)  | 2 $\frac{1}{2}$ g                        |
| Minimum mechanical resonance            | 100c/s                                   |

Electrical DataDirect Inter-electrode Capacitances - with a close fitting external shield

|                                   |          |
|-----------------------------------|----------|
| Grid to plate ( $g_1$ to p) max.  | 0.344pF  |
| Input: $g_1$ to ( $h+k+g_2+g_3$ ) | 4.2544pF |
| Output: p to ( $h+k+g_2+g_3$ )    | 6.544pF  |

Ratings Design Centre Values except where indicated.

|                                                           |              |
|-----------------------------------------------------------|--------------|
| Heater voltage (AC or DC)                                 | 6.3 volts    |
| Maximum heater cathode voltage <sup>32</sup>              | +150 volts   |
| Maximum plate voltage <sup>32</sup>                       | 300 volts    |
| Maximum plate voltage ( $I_p = 0$ ) <sup>32</sup>         | 550 volts    |
| Maximum plate dissipation <sup>32</sup>                   | 4.75watts    |
| Maximum grid No.2 voltage <sup>32</sup>                   | 275 volts    |
| Maximum grid No.2 voltage ( $I_{g_2} = 0$ ) <sup>32</sup> | 550 volts    |
| Maximum grid No.2 dissipation <sup>32</sup>               | 0.80watts    |
| Maximum grid No.1 - grid No.2 voltage                     | 300 volts DC |
| Maximum grid No.1 - cathode voltage                       | 100 volts DC |
| Maximum mean grid No.1 current                            | 3.3 mA       |
| Maximum cathode current                                   | 23 mA        |

**BRIMAR**

R.E.T.M.A. REGISTRATION DATA (CONTINUED)

TYPE... 6516.....

|                                                          |                  |
|----------------------------------------------------------|------------------|
| Maximum grid No.1 - cathode resistance with cathode bias | 680 K $\Omega$ . |
| Maximum grid No.1 - cathode resistance with fixed bias   | 220 K $\Omega$ . |
| Maximum operating frequency                              | 100 Mc/s.        |
| Maximum bulb temperature                                 | 180°C            |

(R = absolute ratings).

Typical Operating Conditions and Characteristics. Class A Amplifier

|                                                    |                |
|----------------------------------------------------|----------------|
| Heater Voltage.....                                | 6.3 volts      |
| Heater Current.....                                | 0.2 amps       |
| Plate Voltage .....                                | 250 volts      |
| Grid No.2 voltage.....                             | 250 volts      |
| Grid No.1 voltage.....                             | -13.5volts     |
| Plate current.....                                 | 16 mA          |
| Grid No.2 current.....                             | 2.25mA         |
| Plate resistance (approx.).....                    | 0.15 Megohms   |
| Transconductance.....                              | 2550 $\mu$ hos |
| Optimum plate load.....                            | 16,000 ohms    |
| Power output.....                                  | 1.4 watts      |
| Amplification factor (grid No.1 to grid No.2)..... | 12             |

**BRIMAR**

**R. E. T. M. A.  
REGISTRATION DATA**

6870  
TYPE.....

DATE 6. 11. 1956.  
ISSUED.....

TYPE 6870  
V.H.F. POWER PENTODE

This tube is an indirectly heated fully screened V.H.F. power pentode for operation up to 150 mc. It is intended for use as a class C amplifier or as a frequency multiplier. It may also be used as a video amplifier where the supply voltage is low and a large output voltage is required with a low value plate resistor. The tube features a centre-tapped heater for both AC and AC/DC applications.

The 6870 is designed for trustworthy operation under conditions of shock and vibration usually found in aircraft and mobile equipment.

MECHANICAL DATA.

Coated unipotential cathode.  
Outline drawing..... 6-3      Bulb..... T-6 $\frac{1}{2}$   
Base..... E9-4 Miniature Button 9-pin  
Maximum diameter.....  $\frac{7}{8}$ "  
Maximum overall length..... 2.5/8"  
Maximum seated height..... 2.3/8"  
Pin Connections..... Basing JETEC 9BF  
Pin 1 - Cathode.                      Pin 6 - Heater centre tap.  
Pin 2 - Grid No.1.                      Pin 7 - Plate.  
Pin 3 - Grid No.3, internal shield.      Pin 8 - Grid No.2.  
Pin 4 - Heater.                      Pin 9 - Grid No.3, internal shield.  
Pin 5 - Heater.

Mounting position..... Any

Maximum shock (intermittent service)..... 550" g"  
Maximum vibration (continuous service)..... 2 $\frac{1}{2}$  " g"  
Minimum mechanical resonance..... 100c/s

ELECTRICAL DATA.

Direct Inter-electrode Capacitances - without external shield

Grid to plate: (g1 to p) max..... 0.025  $\mu$ F  
Input: g1 to (h+k+g2+g3 and I.S.)..... 8.5  $\mu$ F  
Output: p to (h+k+g2+g3 and I.S.)..... 7.0  $\mu$ F

**BRIMAR**

R.E.T.M.A. REGISTRATION DATA (CONTINUED)

TYPE 6870.

Ratings Design Centre Values

|                                                        |               |
|--------------------------------------------------------|---------------|
| Heater voltage (A.C. or D.C.).....                     | 12.6/6.3volts |
| Maximum heater-cathode voltage.....                    | -90volts      |
| Maximum plate voltage.....                             | 300DCvolts    |
| Maximum grid No.2 voltage.....                         | 250DCvolts    |
| Maximum plate supply voltage ( $I_b = 0$ mA).....      | 500DCvolts    |
| Maximum grid No.2 supply voltage ( $I_{g2} = 0$ )..... | 500DCvolts    |
| Maximum plate dissipation.....                         | 6.3watts      |
| Maximum grid No.2 dissipation.....                     | 2.0watts      |
| Maximum grid No.1 current.....                         | 3.0mA         |
| Maximum cathode current.....                           | 50 mA         |
| Maximum grid No.1 circuit resistance.....              |               |
| Fixed bias.....                                        | 0.1meg        |
| Self bias.....                                         | 0.5meg        |
| Maximum bulb temperature.....                          | 190°C         |

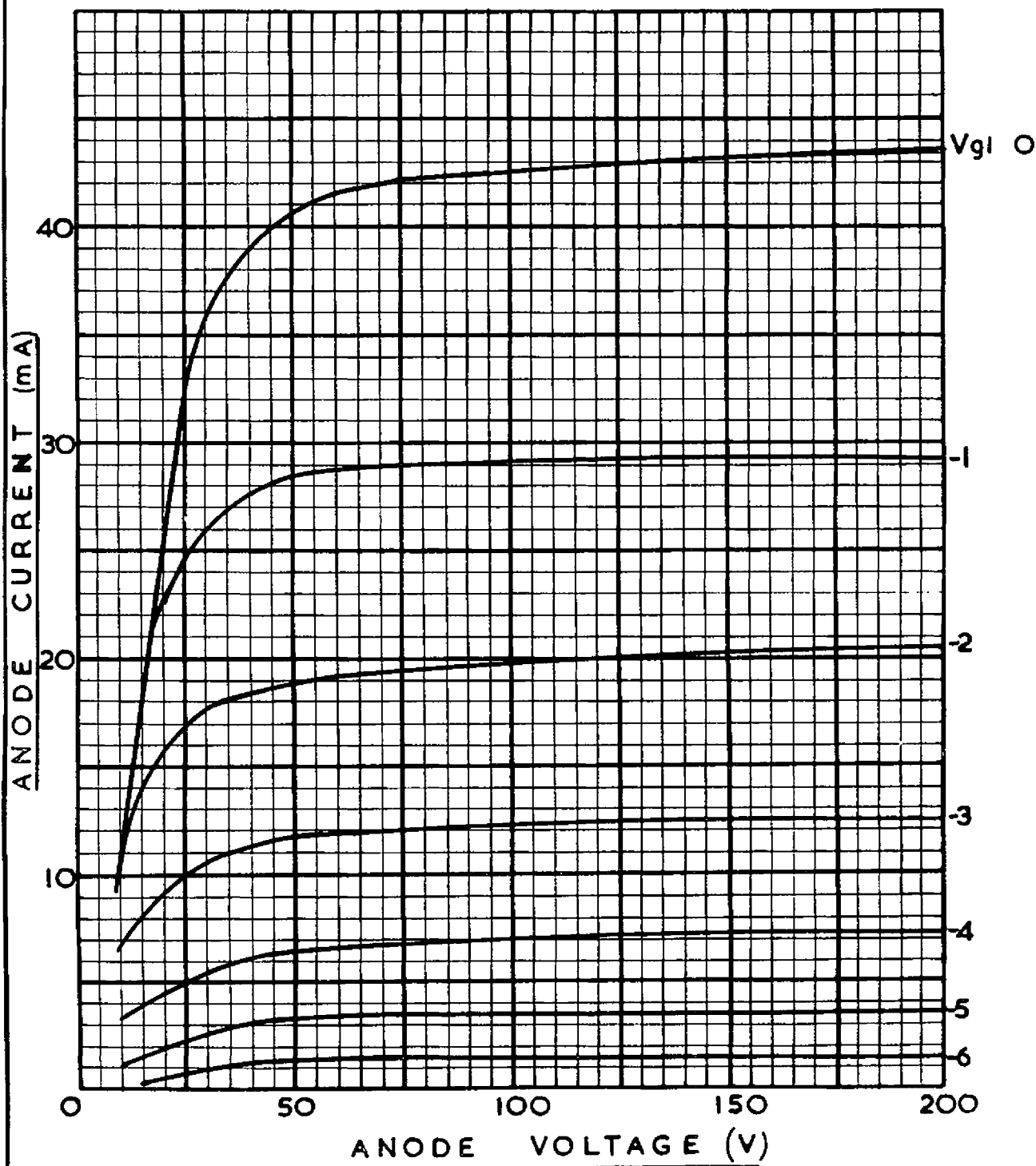
Typical Operating Conditions and Characteristics, class A1 Amplifier.

|                                                                 |          |          |             |
|-----------------------------------------------------------------|----------|----------|-------------|
| Heater voltage (A.C. or D.C.).....                              | 6.3/12.6 | 6.3/12.6 | volts       |
| Heater current.....                                             | 0.6/0.3  | 0.6/0.3  | amps        |
| Plate voltage.....                                              | 250      | 180      | DCvolts     |
| Grid No.3 voltage - pins 3 and 9 connected to pin 1 at socket.  |          |          |             |
| Grid No.2 voltage.....                                          | 250      | 180      | DCvolts     |
| Cathode bias resistor.....                                      | 120      | 56       | ohms        |
| Plate resistance (approximately)....                            | 230      | 170      | k-ohms      |
| Transconductance.....                                           | 8,500    | 9000     | $\mu$ -mhos |
| Plate current.....                                              | 25       | 25       | mA          |
| Grid No.2 current.....                                          | 3.5      | 3.5      | mA          |
| Grid No.1 voltage (approximately)<br>for $I_b = 100\mu A$ ..... | -13.5    | -9       | volts       |
| Amplification factor ( $g_2$ - $g_1$ ).....                     | 35       | 35       |             |

# BRIMAR

VALVE TYPE 6870

$V_{g2} = 180V$ ;  $V_{g3} = 0$

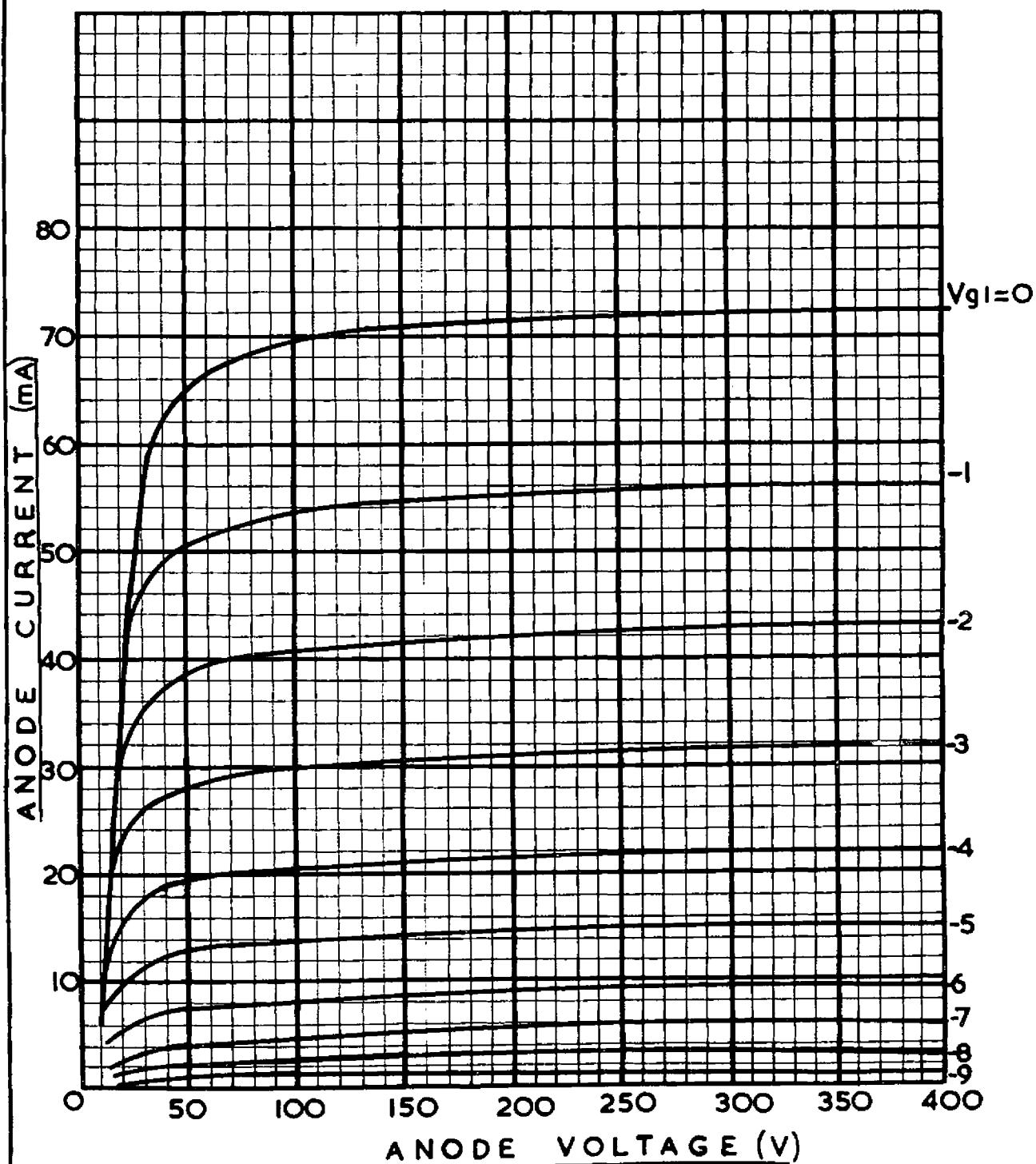


# BRIMAR

VALVE TYPE 6 8 7 0

$V_{g2} = 250 \text{ V}$

$V_{g3} = 0$



# RADIO MANUFACTURERS ASSOCIATION



SUITE 701-4 AMERICAN BUILDING  
1317 F STREET, N.W.  
WASHINGTON, D. C.

R.M.A. DATA BUREAU  
90 West Street  
New York, N. Y.

RMA Release # 147

November 10, 1938

On application of the

Standard Telephone and Cables Co.  
London, England

the type of vacuum tube defined by the ratings and characteristics given below has been registered under the tube type designation,

6AG6G

Power Amplifier Pentode  
(For A.C. Receivers)

|                     |               |
|---------------------|---------------|
| Heater Voltage (AC) | 6.3 volts.    |
| " Current           | 1.25 amperes. |

Direct Interelectrode Capacitances (Approx.)

|                       |             |
|-----------------------|-------------|
| Grid - Anode Capacity | - 1.6 mmfd. |
| Input Capacity        | - 17.5 "    |
| Output Capacity       | - 10.3 "    |

Bulb - S.T.16  
Base - Medium Shell Octal 7-pin.

## OPERATING CONDITIONS AND CHARACTERISTICS

### (SINGLE VALVE AMPLIFIER)

|                           |                       |
|---------------------------|-----------------------|
| Heater                    | 6.3 volts.            |
| Plate                     | 250 " (max.)          |
| Screen                    | 250 "                 |
| Grid                      | -6.0 "                |
| Cathode Resistor          | 150 ohms.             |
| Amplification Factor      | 600 (approx.)         |
| Plate Resistance          | 60,000 ohms (approx.) |
| Transconductance          | 10,000 micromhos.     |
| Plate Current             | 32 milliamps.         |
| Screen Current            | 6.0 "                 |
| Load Resistance           | 8,500 ohms.           |
| Power Output              | 3.75 watts.           |
| Total Harmonic Distortion | 7%                    |

### Base Connections

#### Basing Designation 7-S

|       |        |       |         |
|-------|--------|-------|---------|
| Pin 1 | N.C.   | Pin 5 | Grid    |
| Pin 2 | Heater | Pin 7 | Heater  |
| Pin 3 | Plate  | Pin 8 | Cathode |
| Pin 4 | Screen |       |         |

# BRIMAR

## VALVES

TYPE **6CH6**DATE  
ISSUED **9.2.51.**

## R.M.A. REGISTRATION DATA

6CH6VIDEO AMPLIFIER PENTODE

The 6CH6 is a miniature type amplifier pentode employing the 9-pin glass button base. Its low anode to grid capacitance and high slope make it particularly useful for high frequency and broad band application as may be met in television video output stages.

It has a high peak cathode current which makes it eminently suitable for pulse applications. A separate grid 3 connection is provided so that this electrode may be operated at other than cathode potential.

MECHANICAL DATA:

Coated unipotential cathode.

Outline drawing ..... 6-3                      Bulb ..... T-6 $\frac{1}{2}$ 

Base ..... E9-1 Small glass button 9-pin.

Maximum diameter ..... 7/8"

Maximum overall length ..... 2.5/8"

Maximum seated height ..... 2.3/8"

Pin connections ..... Basing No. ~~9BA~~

Pin 1 - I.C.

Pin 6 - I.C.

Pin 2 - Grid No. 1

Pin 7 - Anode

Pin 3 - Cathode

Pin 8 - Grid No. 2

Pin 4 - Heater

Pin 9 - Grid No. 3

Pin 5 - Heater

9AU

Mounting position ..... any

ELECTRICAL DATA:Direct Inter-electrode capacitances:

Grid to anode ..... .25 pF max.

Input ..... 14 pF

Output ..... 5.0 pF

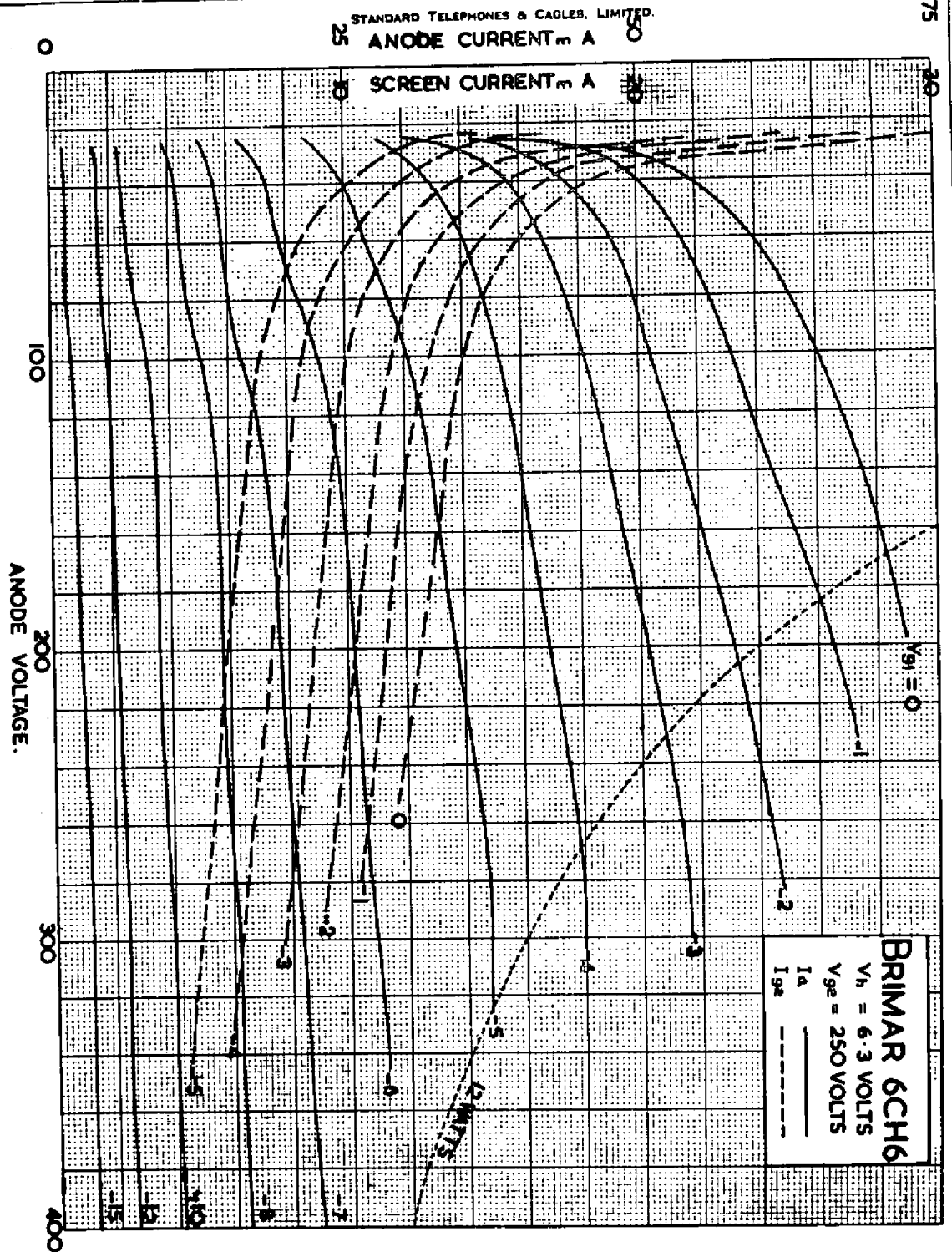
(External shield not used)

Ratings:

|                                          |           |
|------------------------------------------|-----------|
| Heater voltage nominal (ac or dc) .....  | 6.3 volts |
| Maximum heater-cathode voltage .....     | 90 volts  |
| Maximum anode voltage .....              | 275 volts |
| Maximum Grid No. 2 voltage .....         | 275 volts |
| Maximum anode dissipation .....          | 12 watts  |
| Maximum Grid No. 2 dissipation .....     | 2.5 watts |
| Maximum bulb temperature .....           | 250°C     |
| Peak instantaneous cathode current ..... | 1.5 amp   |

Typical operating conditions and characteristics:

|                                                              |                  |
|--------------------------------------------------------------|------------------|
| Heater voltage .....                                         | 6.3 volts        |
| Heater current .....                                         | 0.75 amp         |
| Anode voltage .....                                          | 250 volts        |
| Grid No. 2 voltage .....                                     | 250 volts        |
| Grid No. 1 voltage .....                                     | -4.5 volts       |
| Grid No. 3 voltage .....                                     | 0 volts          |
| Anode impedance .....                                        | 50,000 ohms      |
| Transconductance .....                                       | 11,000 $\mu$ hos |
| Anode current .....                                          | 40.0 mA          |
| Grid No. 2 current .....                                     | 6.0 mA           |
| Amplification factor (g <sub>2</sub> -g <sub>1</sub> ) ..... | 26               |



# RADIO MANUFACTURERS ASSOCIATION



SUITE 701-4 AMERICAN BUILDING  
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90 West Street  
New York, N. Y.

RMA Release # 147

November 10, 1938

On application of the

Standard Telephone and Cables Co.  
London, England

the type of vacuum tube defined by the ratings and characteristics given below has been registered under the tube type designation,

6P8G  
Triode Hexode  
(For A.C. Receivers)

The design of this tube incorporates in a single envelope a hexode unit and a triode unit with the latter located at the bottom end of a common cathode.

Heater Voltage (AC) 6.3 volts.  
" Current 0.8 amperes.

Direct Interelectrode Capacitances (Approx.)

|                                             |            |
|---------------------------------------------|------------|
| Hexode Control Grid to Hexode Plate         | 0.04 mmfd. |
| Triode Grid to Hexode Plate                 | 0.03 "     |
| Triode Grid to Triode Plate                 | 3.0 "      |
| Hexode Control Grid to all other electrodes | 6.5 "      |
| Hexode Control Grid to Triode Grid          | 0.25 "     |
| Hexode Plate to all other electrodes        | 20.0 "     |
| Triode Plate to all other electrodes        | 8.0 "      |

Bulb - S.T.14.  
Base - Medium Shell Octal 8-pin.

## OPERATING CONDITIONS AND CHARACTERISTICS (CONVERTER SERVICE)

|                                                                                     |                  |
|-------------------------------------------------------------------------------------|------------------|
| Hexode Plate Voltage                                                                | 250 volts (max.) |
| Hexode Screen Voltage                                                               | 80 " ( " )       |
| Hexode Control Grid Voltage                                                         | -2 to -30 volts  |
| Triode Plate Voltage                                                                | 150 volts (max.) |
| Typical Operation:                                                                  |                  |
| Heater Voltage                                                                      | 6.3 volts        |
| Hexode Plate Voltage                                                                | 250 "            |
| Hexode Screen Voltage                                                               | 75 "             |
| Hexode Control Grid Voltage                                                         | -2.0 "           |
| Triode Plate Voltage                                                                | 100 "            |
| Triode Grid Resistor                                                                | 50,000 ohms.     |
| Hexode Plate Resistance (approx.)                                                   | 0.75 megohms.    |
| Conversion Transconductance                                                         | 650 micromhos.   |
| Hexode Control Grid Bias (approx.) for<br>Conversion Transconductance = 2 micromhos | -30 volts.       |
| Hexode Plate Current                                                                | 1.5 mA.          |
| Hexode Screen Current                                                               | 1.4 mA.          |
| Triode Plate Current                                                                | 2.2 mA.          |
| Oscillator Grid Voltage Peak Swing                                                  | 12 volts peak.   |

## PIN CONNECTIONS

Basing Designation 8-0

|                     |                                |
|---------------------|--------------------------------|
| Pin 1. N.C.         | Pin 5. Triode & Injector Grids |
| Pin 2. Heater       | Pin 6. Triode Plate            |
| Pin 3. Hexode Plate | Pin 7. Heater                  |
| Pin 4. Screen       | Pin 8. Cathode                 |

## CAP.

Hexode Control Grid

**Standard Telephones and Cables Limited**  
BRIMAR VALVE WORKS, FOOTSCRAY, SIDCUP, KENT, ENGLAND

# BRIMAR

## R. E. T. M. A. REGISTRATION DATA

TYPE..... 7227.  
DATE ISSUED..... 2.10.58.

### TYPE 7227: LOW VOLTAGE OUTPUT PENTODE.

The 7227 is an indirectly heated pentode for power output operation. It is designed for reliable service in mobile or fixed equipment where adverse conditions of mechanical vibration and shock are present. The tube will operate in applications where the heater, plate and screen voltages are derived from a battery of approximately 24V. These features make the tube particularly suitable for use in the instrumentation, control and radio equipment of aircraft.

### MECHANICAL DATA

|                                              |                                |
|----------------------------------------------|--------------------------------|
| Coated unipotential cathode                  |                                |
| Outline drawing .... 6-3                     | Bulb ..... T - 6 $\frac{1}{2}$ |
| Base ..... E9-1                              | Miniature Glass Button 9 pin.  |
| Maximum diameter .....                       | $\frac{7}{8}$ "                |
| Maximum overall length .....                 | 2 $\frac{9}{16}$ "             |
| Maximum seated height .....                  | 2 $\frac{3}{8}$ "              |
| Pin connections .....                        | Basing 9BA                     |
| Pin 1 - Internal connection                  | Pin 6 - Internal connection    |
| Pin 2 - Grid No.1                            | Pin 7 - Plate                  |
| Pin 3 - Cathode                              | Pin 8 - Grid No.2              |
| Pin 4 - Heater                               | Pin 9 - Grid No.3              |
| Pin 5 - Heater                               |                                |
| Mounting position .....                      | Any                            |
| Maximum shock (intermittent service) .....   | 500g                           |
| Maximum vibration (continuous service) ..... | 2 $\frac{1}{2}$ g              |

### ELECTRICAL DATA

#### Direct Interelectrode capacitances - without external shield

|                                     |        |
|-------------------------------------|--------|
| Grid to plate: (g1-p) maximum ..... | 0.35pF |
| Input (g1-h+k+g2+g3).....           | 12.5pF |
| Output (a-h+k+g2+g3).....           | 7.5pF  |

#### Ratings Design Centre Values.

|                                            |             |
|--------------------------------------------|-------------|
| Maximum heater voltage.....                | 29volts     |
| Minimum heater voltage.....                | 22volts     |
| Maximum heater-cathode voltage.....        | +50volts    |
| Maximum plate voltage .....                | 50D.C.volts |
| Maximum grid No.2 voltage .....            | 50D.C.volts |
| Maximum plate supply voltage (Ib = 0)..... | 50D.C.volts |

**BRIMAR**

R.E.T.M.A. REGISTRATION DATA (CONTINUED)

TYPE...7227.....

|                                                         |             |
|---------------------------------------------------------|-------------|
| Maximum grid No.2 supply voltage ( $I_{g2} = 0$ ) ..... | 50D.C.volts |
| Maximum plate dissipation .....                         | 2 watts     |
| Maximum grid No.2 dissipation .....                     | 0.5 watts   |
| Maximum grid No.1 current .....                         | 5 mA        |
| Maximum cathode current .....                           | 4.0 mA      |
| Maximum grid No.1 circuit resistance                    |             |
| Fixed bias .....                                        | 0.5megohm   |
| Self bias .....                                         | 1.0megohm   |

### Typical Operating Conditions and Characteristics, Class A1 Amplifier

|                                                      |                                          |
|------------------------------------------------------|------------------------------------------|
| Heater voltage (A.C. or D.C.) .....                  | 27.5 volts                               |
| Heater current .....                                 | 175 mA                                   |
| Plate voltage .....                                  | 27.5D.C.volts                            |
| Grid No.3 voltage .....                              | Pin No.9 connected to pin No.3 at socket |
| Grid No.2 voltage .....                              | 27.5D.C.volts                            |
| Grid No.1 voltage .....                              | -2.5D.C.volts                            |
| Plate resistance (Approx.) .....                     | 8.0 kilohms                              |
| Transconductance.....                                | 5500 $\mu$ mhos.                         |
| Plate current.....                                   | 11.0 mA                                  |
| Grid No.2 current .....                              | 1.1mA                                    |
| Grid No.1 voltage (approx.) for $I_b=10\mu A$ ,..... | -7.5 volts                               |
| Amplification factor ( $g_1-g_2$ ) .....             | 4.0                                      |
| Power output.....                                    | 70mW                                     |

**Standard Telephones and Cables Limited**  
BRIMAR VALVE WORKS, FOOTSCRAY, SIDCUP, KENT, ENGLAND

**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

**TYPE** 7489

**DATE** 19.1.61.  
**ISSUED**

**TYPE 7489 - LOW-MU DOUBLE TRIODE**

The 7489 is a nine pin all glass construction double triode with independent sections for use in A.F. and control applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition, the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater cathode voltage 240V r.m.s.: applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

**MECHANICAL DATA**

Coated unipotential cathode.

|                              |      |                    |                   |
|------------------------------|------|--------------------|-------------------|
| Outline drawing .....        | 6-2  | Bulb .....         | T-6 $\frac{1}{2}$ |
| Base .....                   | E9-1 | Small button ..... | 9 pin             |
| Maximum diameter .....       |      |                    | $\frac{7}{8}$ "   |
| Maximum overall length ..... |      |                    | 2.3/16"           |
| Maximum seated height .....  |      |                    | 1.15/16"          |
| Pin connections .....        |      | Basing .....       | 9A                |

|                             |                             |
|-----------------------------|-----------------------------|
| Pin 1 - Anode (Section 2)   | Pin 6 - Anode (Section 1)   |
| Pin 2 - Grid (Section 2)    | Pin 7 - Grid (Section 1)    |
| Pin 3 - Cathode (Section 2) | Pin 8 - Cathode (Section 1) |
| Pin 4 - Heater              | Pin 9 - Heater centre tap   |
| Pin 5 - Heater              |                             |

|                                            |      |
|--------------------------------------------|------|
| Mounting position .....                    | any  |
| Maximum shock (intermittent service) ..... | 500g |

ELECTRICAL DATAInterelectrode capacitances. (Measured without external shield)

$C_{a'g'}$  ..... 1.5 pF  
 $C_{in'}$  ..... 1.6 pF  
 $C_{out'}$  ..... 0.5 pF  
 $C_{a''g''}$  ..... 1.5 pF  
 $C_{in''}$  ..... 1.6 pF  
 $C_{out''}$  ..... 0.45 pF

Heater:

|         |            | <u>Series</u> | <u>Parallel</u> |
|---------|------------|---------------|-----------------|
| Voltage | (ac or dc) | 12.6          | 6.3 volts       |
| Current |            | 0.15          | 0.3 amps.       |

Ratings - Absolute maximum values.

Maximum heater voltage variation .....  $\pm 5\%$  of nominal value.  
 Maximum heater-cathode voltage:  
   Heater negative with respect to cathode ..... 200 Volts  
   Heater positive with respect to cathode ..... 200 volts  
 Maximum cathode current (Each section) ..... 20 mA  
 Maximum anode voltage ..... 330 volts  
 Maximum anode dissipation (Each section) ..... 3.0 watts  
 Maximum bulb temperature (at hottest spot on bulb surface) 200°C

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN. (At Zero hours)

Test conditions .....  $V_a = 250V$ ,  $V_g = -8.5V$

Each Section

|                               | <u>Min.</u> | <u>Bogey.</u> | <u>Max.</u> |
|-------------------------------|-------------|---------------|-------------|
| Anode current                 | 6.5         | 10.5          | 14.5 mA     |
| Mutual conductance            | 1.75        | 2.2           | 2.65 mA/V   |
| Anode current at $V_g = -25V$ |             |               | 20 $\mu A$  |
| Amplification factor          | 15.5        | 17.0          | 18.5        |
| Anode impedance               |             | 7.7           | k $\Omega$  |

Maximum value of cathode interface resistance throughout life under cut-off conditions ..... 10 $\Omega$

|               |                                       |                      |
|---------------|---------------------------------------|----------------------|
| <b>BRIMAR</b> | <b>E. I. A.<br/>REGISTRATION DATA</b> | TYPE 7490            |
|               |                                       | DATE ISSUED 10.2.61. |

from JEDEC release #3211, April 3, 1961

TYPE 7490: MEDIUM-MU DOUBLE TRIODE.

The 7490 is a nine pin all glass construction double triode for use in A.F. control and D.C. amplifier applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater-cathode voltage of 240V r.m.s: applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

|                              |      |                    |                   |
|------------------------------|------|--------------------|-------------------|
| Outline drawing .....        | 6-2  | Bulb .....         | T-6 $\frac{1}{2}$ |
| Base .....                   | E9-1 | Small button ..... | 9 pin             |
| Maximum diameter .....       |      |                    | $\frac{7}{8}$ "   |
| Maximum overall length ..... |      |                    | 2.3/16"           |
| Maximum seated height .....  |      |                    | 1.15/16"          |
| Pin connections .....        |      | Basing .....       | 9A                |

|                 |             |                           |             |
|-----------------|-------------|---------------------------|-------------|
| Pin 1 - Anode   | (section 2) | Pin 6 - Anode             | (section 1) |
| Pin 2 - Grid    | (section 2) | Pin 7 - Grid              | (section 1) |
| Pin 3 - Cathode | (section 2) | Pin 8 - Cathode           | (section 1) |
| Pin 4 - Heater  |             | Pin 9 - Heater centre tap |             |
| Pin 5 - Heater  |             |                           |             |

|                         |      |
|-------------------------|------|
| Mounting position ..... | any  |
| Maximum shock .....     | 500g |

ELECTRICAL DATAInterelectrode capacitances. (Measured with external shield)

|                     |        |
|---------------------|--------|
| $C_{a'-g'}$ .....   | 1.9 pF |
| $C_{in'}$ .....     | 2.2 pF |
| $C_{out'}$ .....    | 2.0 pF |
| $C_{a''-g''}$ ..... | 1.9 pF |
| $C_{in''}$ .....    | 2.2 pF |
| $C_{out''}$ .....   | 2.0 pF |

Heater:

|         |            | <u>Series</u> | <u>Parallel</u> |
|---------|------------|---------------|-----------------|
| Voltage | (ac or dc) | 12.6          | 6.3 volts       |
| Current |            | 0.3           | 0.6 amps.       |

Ratings - Absolute Maximum values.

|                                                                  |                             |
|------------------------------------------------------------------|-----------------------------|
| Maximum heater voltage variation .....                           | $\pm 5\%$ of nominal value. |
| Maximum heater cathode voltage:                                  |                             |
| Heater negative with respect to cathode .....                    | 200 volts                   |
| Heater positive with respect to cathode .....                    | 200 volts                   |
| Maximum anode voltage ( $I_a=0$ ) .....                          | 550 volts                   |
| Maximum anode voltage .....                                      | 300 volts                   |
| Maximum anode dissipation (Each section) .....                   | 5.0 watts                   |
| Maximum bulb temperature (at hottest spot on bulb surface) ..... | 250°C                       |

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN. (At Zero hours).

Test conditions .....  $V_a = 250V$ ,  $V_g = -4.6V$ .

Each Section

|                               | <u>Min.</u> | <u>Bogey</u> | <u>Max.</u> |
|-------------------------------|-------------|--------------|-------------|
| Anode current                 | 3.5         | 6.0          | 8.5 mA      |
| Mutual conductance            | 1.7         | 2.35         | 3.0 mA/V    |
| Anode current at $V_g = -10V$ |             |              | 500 $\mu A$ |
| Amplification factor          | 27          | 32           | 37          |

Maximum value of cathode interface resistance throughout life under cut-off conditions ..... 10 $\Omega$ .

**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

TYPE 7492

DATE ISSUED 19.1.1961

TYPE 7492: HIGH SLOPE DOUBLE TRIODE

The 7492 is a nine pin, all glass construction double triode with independent sections for use in both R.F and computer applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater-cathode voltage 240V r.m.s: applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

|                              |      |                    |                   |
|------------------------------|------|--------------------|-------------------|
| Outline drawing .....        | 6-2  | Bulb .....         | T-6 $\frac{1}{2}$ |
| Base .....                   | E9-1 | Small button ..... | 9 pin             |
| Maximum diameter .....       |      |                    | $\frac{7}{8}$ "   |
| Maximum overall length ..... |      |                    | 2.3/16"           |
| Maximum seated height .....  |      |                    | 1.15/16"          |
| Pin connections .....        |      | Basing .....       | 9A                |

|                 |               |                           |               |
|-----------------|---------------|---------------------------|---------------|
| Pin 1 - Anode   | { section 2 } | Pin 6 - Anode             | { section 1 } |
| Pin 2 - Grid    |               | Pin 7 - Grid              |               |
| Pin 3 - Cathode |               | Pin 8 - Cathode           |               |
| Pin 4 - Heater  |               | Pin 9 - Heater centre tap |               |
| Pin 5 - Heater  |               |                           |               |

Mounting position ..... any  
Maximum shock (intermittent service) ..... 500g

ELECTRICAL DATAInterelectrode capacitances. (Without external shield)

|                                |         |
|--------------------------------|---------|
| $C_{a-g}$ (Each section) ..... | 1.6 pF  |
| $C_{in}$ (Each section) .....  | 2.5 pF  |
| $C_{out'}$ .....               | 0.45 pF |
| $C_{out''}$ .....              | 0.38 pF |
| $C_{a'-a''}$ .....             | 0.24 pF |
| $C_{h-k' + k''}$ .....         | 4.1 pF  |

Heater:

|         |            | Series | Parallel  |
|---------|------------|--------|-----------|
| Voltage | (ac or dc) | 12.6   | 6.3 volts |
| Current |            | 0.15   | 0.3 amps. |

Ratings - Absolute Maximum values.

|                                                               |                             |
|---------------------------------------------------------------|-----------------------------|
| Maximum heater voltage variation .....                        | $\pm 5\%$ of nominal value. |
| Maximum heater-cathode voltage:                               |                             |
| Heater negative with respect to cathode .....                 | 100 volts                   |
| Heater positive with respect to cathode .....                 | 100 volts                   |
| Maximum cathode current (Each section) .....                  | 22 mA                       |
| Maximum average grid current .....                            | 1.1 mA                      |
| Maximum anode voltage ( $I_a = 0$ ) .....                     | 550 volts                   |
| Maximum anode voltage .....                                   | 380 volts                   |
| Maximum anode dissipation (Each section) .....                | 2.8 watts                   |
| Maximum bulb temperature (at hottest spot on bulb surface) .. | 200°C                       |

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN (At Zero hours)

Test conditions .....  $V_a = 250V$ ,  $V_g = 0$ ,  $R_k = 200\Omega$

Each Section

|                                                                  | <u>Min.</u> | <u>Bogey</u> | <u>Max.</u> |          |
|------------------------------------------------------------------|-------------|--------------|-------------|----------|
| Anode current                                                    | 7           | 10           | 14          | mA       |
| Mutual conductance                                               | 4.5         | 5.5          | 6.5         | mA/V     |
| Amplification factor                                             | 50          | 60           | 70          |          |
| Unbalance between anode current of sections                      |             | -            | 3.2         | mA       |
| Anode current at $V_g = -20V$                                    |             |              | 10          | $\mu A$  |
| Maximum value of cathode interface resistance throughout life... |             |              | 10          | $\Omega$ |

**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

TYPE 7494

DATE  
ISSUED 4.1.1961

TYPE 7494: HIGH MU DOUBLE TRIODE.

The 7494 is a nine pin all glass construction double triode with independent sections for use in A.F. and control applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition, the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater cathode voltage 240V r.m.s: applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

Outline drawing .....6-2 Bulb .....T-6 $\frac{1}{2}$   
Base .....E9-1 Small button ..... 9 pin  
Maximum diameter .....  $\frac{7}{8}$ "  
Maximum overall length ..... 2.3/16"  
Maximum seated height ..... 1.15/16"  
Pin connections ..... Basing ..... 9A

|                             |                             |
|-----------------------------|-----------------------------|
| Pin 1 - Anode (Section 2)   | Pin 6 - Anode (Section 1)   |
| Pin 2 - Grid (Section 2)    | Pin 7 - Grid (Section 1)    |
| Pin 3 - Cathode (Section 2) | Pin 8 - Cathode (Section 1) |
| Pin 4 - Heater              | Pin 9 - Heater centre-tap   |
| Pin 5 - Heater              |                             |

Mounting position..... any  
Maximum shock (intermittent service) ..... 500g

ELECTRICAL DATAInterelectrode capacitances. (Without external shield)

|                    |         |
|--------------------|---------|
| $C_{a'g'}$ .....   | 1.7 pF  |
| $C_{in'}$ .....    | 1.6 pF  |
| $C_{out'}$ .....   | 0.46 pF |
| $C_{a''g''}$ ..... | 1.7 pF  |
| $C_{in''}$ .....   | 1.6 pF  |
| $C_{out''}$ .....  | 0.34 pF |

Heater

|                    | <u>Series</u> | <u>Parallel</u> |
|--------------------|---------------|-----------------|
| Voltage (ac or dc) | 12.6          | 6.3 volts       |
| Current            | 0.15          | 0.3 amps.       |

Ratings - Absolute maximum values.

|                                                            |                             |
|------------------------------------------------------------|-----------------------------|
| Maximum heater voltage variation .....                     | $\pm 5\%$ of nominal value. |
| Maximum heater-cathode voltage:                            |                             |
| Heater negative with respect to cathode .....              | 200 volts                   |
| Heater positive with respect to cathode .....              | 200 volts                   |
| Maximum cathode current (Each section) .....               | 20 mA                       |
| Maximum anode voltage ( $I_a=0$ ) .....                    | 550 volts                   |
| Maximum anode voltage .....                                | 330 volts                   |
| Maximum anode dissipation (Each section) .....             | 1.1 watts                   |
| Maximum bulb temperature (at hottest spot on bulb surface) | 200°C                       |

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN (At Zero hours)

Test conditions:-  $V_a = 250V$ ,  $V_g = -2V$ .

Each Section

|                                | <u>Min.</u> | <u>Bogey.</u> | <u>Max.</u> |
|--------------------------------|-------------|---------------|-------------|
| Anode current                  | 0.75        | 1.25          | 1.75 mA     |
| Mutual conductance             | 1.25        | 1.60          | 2.05 mA/V   |
| Anode current at $V_g = -5V$ . |             |               | 35 $\mu A$  |
| Amplification factor           | 75          | 95            | 115         |
| Anode impedance                |             | 59            | k $\Omega$  |

Maximum value of cathode interface resistance throughout life  
under cut-off conditions.... 10 $\Omega$

**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

TYPE 7495

DATE ISSUED 4.1.1961

TYPE 7495: R.F. POWER TETRODE

The 7495 is a nine pin all glass construction beam tetrode for use in V.H.F. amplifier and driver applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition, the heater cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater-cathode voltage 240V r.m.s: applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

|                              |      |                    |                   |
|------------------------------|------|--------------------|-------------------|
| Outline drawing .....        | 6-3  | Bulb .....         | T-6 $\frac{1}{2}$ |
| Base .....                   | E9-1 | Snail button ..... | 9 pin             |
| Maximum diameter .....       |      |                    | $\frac{7}{8}$ "   |
| Maximum overall length ..... |      |                    | 2 $\frac{5}{8}$ " |
| Maximum seated height .....  |      |                    | 2 $\frac{3}{8}$ " |
| Pin connections .....        |      | Basing .....       | 9K                |

|                             |                    |
|-----------------------------|--------------------|
| Pin 1 - Anode               | Pin 6 - Grid No. 2 |
| Pin 2 - Internal connection | Pin 7 - Cathode    |
| Pin 3 - Grid No. 3          | Pin 8 - Grid No. 1 |
| Pin 4 - Heater              | Pin 9 - Grid No. 1 |
| Pin 5 - Heater              |                    |

Mounting position ..... any  
Maximum shock (intermittent service) ..... 500g.

ELECTRICAL DATAInterelectrode capacitances. (Measured without external shield)

$C_{ag1}$  ..... 0.3 pF (Max)  
 $C_{in}$  ..... 9.5 pF  
 $C_{out}$  ..... 4.5 pF

Heater:

Voltage (ac or dc) ..... 6.0 volts  
 Current ..... 0.75 amps

Ratings - Absolute maximum values.

Maximum heater voltage variation .....  $\pm 5\%$  of nominal value.  
 Maximum heater-cathode voltage:  
     Heater negative with respect to cathode ..... 100 volts  
     Heater positive with respect to cathode ..... 100 volts  
 Maximum anode voltage ( $I_a=0$ ) ..... 500 volts  
 Maximum anode voltage ..... 300 volts  
 Maximum anode dissipation ..... 12 watts  
 Maximum screen voltage ( $I_{g2}=0$ ) ..... 500 volts  
 Maximum screen voltage ..... 250 volts  
 Maximum screen dissipation ..... 2 watts  
 Maximum bulb temperature (at hottest spot on bulb surface)  $250^{\circ}\text{C}$

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN. (At Zero hours)

Test conditions .....  $V_a = 250\text{V}$ ,  $V_{g3}=0$ ,  $V_{g2} = 250\text{V}$ ,  $V_{g1} = -7.5\text{V}$ .

|                                         | <u>Min.</u> | <u>Bogey.</u> | <u>Max.</u> |      |
|-----------------------------------------|-------------|---------------|-------------|------|
| Anode current                           | 33          | 45            | 57          | mA   |
| Screen current                          | -           | -             | 7.0         | mA   |
| Mutual conductance                      | 5.6         | 7.0           | 9.0         | mA/V |
| Anode current at $V_{g1} = -15\text{V}$ |             |               | 15          | mA   |
| Amplification factor                    | 13          | 16            | 20          |      |

Maximum value of cathode interface resistance throughout life  
 under cut-off conditions..... 10 $\Omega$ .

**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

TYPE 7496  
DATE ISSUED 10.2.61

TYPE 7496: VARI-MU R.F. PENTODE.

The 7496 is a seven pin all glass construction vari-mu pentode for use in R.F. and I.F. applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition, the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater-cathode voltage 240V r.m.s; applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

|                              |      |                    |                   |
|------------------------------|------|--------------------|-------------------|
| Outline drawing .....        | 5-2  | Bulb .....         | T-5 $\frac{1}{2}$ |
| Base .....                   | E7-1 | Small button ..... | 7 pin             |
| Maximum diameter .....       |      |                    | $\frac{3}{4}$ "   |
| Maximum overall length ..... |      |                    | 1 $\frac{1}{8}$ " |
| Maximum seated height .....  |      |                    | 2 $\frac{1}{8}$ " |
| Pin connections .....        |      | Basing .....       | 7BK               |

|                    |                    |
|--------------------|--------------------|
| Pin 1 - Grid No. 1 | Pin 5 - Anode      |
| Pin 2 - Grid No. 3 | Pin 6 - Grid No. 2 |
| Pin 3 - Heater     | Pin 7 - Cathode    |
| Pin 4 - Heater     |                    |

Mounting position ..... any  
Maximum shock (intermittent service) ..... 500g

ELECTRICAL DATAInterelectrode capacitances. (Without external shield)

Ca-g1 ..... .0035 pF (max)  
 C in ..... .5.5 pF  
 C out ..... .5.0 pF

Heater:

Voltage (ac or dc) 6.3 volts  
 Current 0.3 amps

Ratings - Absolute maximum values.

Maximum heater voltage variation .....  $\pm 5\%$  of nominal value.  
 Maximum heater-cathode voltage.  
   Heater negative with respect to cathode ..... 150 volts  
   Heater positive with respect to cathode ..... 150 volts  
 Maximum anode voltage ( $I_a = 0$ ) ..... 500 volts  
 Maximum anode voltage ..... 330 volts  
 Maximum anode dissipation ..... 3.3 watts  
 Maximum screen voltage ( $I_{g2} = 0$ ) ..... 330 volts  
 Maximum screen voltage ..... 135 volts  
 Maximum screen dissipation ..... 0.7 watts  
 Maximum bulb temperature (at hottest spot on bulb surface)..... 165°C.

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN (At Zero hours)

Test conditions :- .....  $V_a = 250V$ ,  $V_{g3} = 0$ ,  $V_{g2} = 100V$ .  
 $V_{g1} = 0$ ,  $R_k = 68\Omega$

|                            | <u>Min.</u> | <u>Bogey.</u> | <u>Max.</u> |            |
|----------------------------|-------------|---------------|-------------|------------|
| Anode current              | 8.5         | 11.0          | 13.5        | mA         |
| Screen current             | 2.8         | 4.2           | 5.6         | mA         |
| Mutual conductance         | 3.6         | 4.4           | 5.2         | mA/V       |
| Inner amplification factor | 16          | 24            | 32          | -          |
| Anode impedance            |             | 1.0           |             | M $\Omega$ |

Maximum value of cathode interface resistance throughout life under cut-off conditions ..... 10 $\Omega$ .

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**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

TYPE 7498

DATE 19.1.61  
ISSUEDTYPE 7498: HIGH SLOPE R.F. PENTODE.

The 7498 is a seven pin all glass construction pentode for use in R.F. and I.F. applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

NOTE: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater-cathode voltage 240V r.m.s: applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

|                              |                         |                       |
|------------------------------|-------------------------|-----------------------|
| Outline drawing .....        | 5-2 Bulb .....          | T-5 $\frac{1}{2}$     |
| Base .....                   | E7-1 Small button ..... | 7 pin                 |
| Maximum diameter .....       |                         | $\frac{3}{4}$ "       |
| Maximum overall length ..... |                         | 2 $\frac{1}{8}$ "     |
| Maximum seated height .....  |                         | 1 $\frac{1}{8}$ "     |
| Pin connections .....        | Basing .....            | <del>7ED</del><br>7DB |

Pin 1 - Grid No. 1

Pin 5 - Anode

Pin 2 - Cathode

Pin 6 - Grid No. 3 and shield

Pin 3 - Heater

Pin 7 - Grid No. 2

Pin 4 - Heater

Mounting position ..... any

Maximum shock (intermittent service) ..... 500g

ELECTRICAL DATAInterelectrode capacitances. (Measured with external shield)

$C_{a-g1}$  ..... .01 pF (max)  
 $C_{in}$  ..... 7.6 pF  
 $C_{out}$  ..... 3.25 pF

Heater:

Voltage (ac or dc) ..... 6.3 volts  
 Current ..... 0.3 amps.

Ratings - Absolute Maximum values.

Maximum heater voltage variation .....  $\pm 5\%$  of nominal value.  
 Heater negative with respect to cathode ..... 150 volts  
 Heater positive with respect to cathode ..... 150 volts  
 Maximum anode voltage ( $I_a=0$ ) ..... 550 volts  
 Maximum anode voltage ..... 300 volts  
 Maximum anode dissipation ..... 3.0 watts  
 Maximum screen voltage ( $I_{g2}=0$ ) ..... 450 volts  
 Maximum screen voltage ..... 300 volts  
 Maximum screen dissipation ..... 0.9 watts  
 Maximum bulb temperature (at hottest spot on bulb surface) 200 °C

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN (At Zero hours)

Test conditions ....  $V_a = 250V$ ,  $V_{g3} = 0$ ,  $V_{g2} = 250V$ ,  $V_{g1} = 0$   
 $R_{hk} = 160\Omega$ .

|                                 | <u>Min.</u> | <u>Bogev</u> | <u>Max.</u> |         |
|---------------------------------|-------------|--------------|-------------|---------|
| Anode current                   | 7.5         | 9.85         | 12.2        | mA      |
| Screen current                  | 1.8         | 2.6          | 3.4         | mA      |
| Mutual conductance              | 6.0         | 7.62         | 9.25        | mA/V    |
| Anode current at $V_{g1} = -8V$ |             |              | 100         | $\mu A$ |
| Inner amplification factor      | 60          | 75           | 89          |         |

Maximum value of cathode interface resistance throughout life  
 under cut-off conditions ..... 10 $\Omega$

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|               |                                             |                             |
|---------------|---------------------------------------------|-----------------------------|
| <b>BRIMAR</b> | <b>E. I. A.</b><br><b>REGISTRATION DATA</b> | <b>TYPE</b> 7499            |
|               |                                             | <b>DATE ISSUED</b> 19.1.61. |

**TYPE 7499: HIGH SLOPE VIDEO PENTODE**

The 7499 is a nine pin all glass construction pentode for use in video amplifier applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition, the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

**Note:** A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value; heater-cathode voltage 240V r.m.s; applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

**MECHANICAL DATA**

Coated unipotential cathode.

|                              |                         |                   |
|------------------------------|-------------------------|-------------------|
| Outline drawing .....        | 6 - 3 Bulb .....        | T-6 $\frac{1}{2}$ |
| Base .....                   | E9-1 Small button ..... | 9-pin             |
| Maximum diameter .....       |                         | $\frac{7}{8}$ "   |
| Maximum overall length ..... |                         | 2 $\frac{5}{8}$ " |
| Maximum seated height .....  |                         | 2 $\frac{3}{8}$ " |
| Pin connections .....        | Basing .....            | 9DA<br>9BA        |

|                             |                             |
|-----------------------------|-----------------------------|
| Pin 1 - Internal connection | Pin 6 - Internal connection |
| Pin 2 - Grid No.1           | Pin 7 - Anode               |
| Pin 3 - Cathode             | Pin 8 - Grid No. 2          |
| Pin 4 - Heater              | Pin 9 - Grid No. 3          |
| Pin 5 - Heater              |                             |

|                                            |      |
|--------------------------------------------|------|
| Mounting position .....                    | any  |
| Maximum shock (intermittent service) ..... | 500g |

ELECTRICAL DATAInterelectrode capacitances. (Measured without external shield)

$C_{a-g1}$  ..... 0.18 pF  
 $C_{in}$  ..... 12.5 pF  
 $C_{out}$  ..... 5.0 pF

Heater:

Voltage (ac or dc) 6.3 volts  
 Current 0.75 amps.

Ratings - Absolute maximum values.

Maximum heater voltage variation .....  $\pm 5\%$  of nominal value.  
 Maximum cathode current ..... 65 mA  
 Maximum anode voltage ( $I_a=0$ ) ..... 500 volts  
 Maximum anode voltage ..... 300 volts  
 Maximum anode dissipation ..... 12 watts  
 Maximum screen voltage ( $I_{g2}=0$ ) ..... 500 volts  
 Maximum screen voltage ..... 300 volts  
 Maximum screen dissipation ..... 2.5 watts  
 Maximum bulb temperature (at hottest spot on bulb surface) 250°C

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN (At Zero hours)

Test conditions ....  $V_a = 250V$ ,  $V_{g3} = 0$ ,  $V_{g2} = 250V$ ,  $V_{g1} = -4.5V$

|                                  | <u>Min.</u> | <u>Bogey</u> | <u>Max.</u> |      |
|----------------------------------|-------------|--------------|-------------|------|
| Anode current                    | 30          | 40           | 50          | mA   |
| Screen current                   | -           | 6.0          | 7.5         | mA   |
| Mutual conductance               | 9.0         | 11.0         | 13.5        | mA/V |
| Anode current at $V_{g1} = -25V$ |             |              | 10          | μA   |
| Inner amplification factor       | 20          | 26           | 32          |      |

Maximum value of cathode interface resistance throughout life 10Ω.

**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

|             |          |
|-------------|----------|
| TYPE        | 7500     |
| DATE ISSUED | 4.1.1961 |

TYPE 7500 : POWER OUTPUT BEAM TETRODE.

The 7500 is a nine pin all glass construction beam tetrode for A.F. power applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality: heater voltage 120% of nominal value: heater-cathode voltage 240V r.m.s: applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

|                                            |                             |
|--------------------------------------------|-----------------------------|
| Coated unipotential cathode.               |                             |
| Outline drawing .....                      | 6 -3                        |
| Base .....                                 | E9-1                        |
| Maximum diameter .....                     | $\frac{7}{8}$ "             |
| Maximum overall length .....               | $2\frac{5}{8}$ "            |
| Maximum seated height .....                | $2\frac{3}{8}$ "            |
| Pin connections .....                      | Basing .....                |
| Pin 1 - Internal connection                | Pin 6 - Internal connection |
| Pin 2 - Grid No. 1                         | Pin 7 - Anode               |
| Pin 3 - Cathode                            | Pin 8 - Grid No. 2          |
| Pin 4 - Heater                             | Pin 9 - Grid No. 3          |
| Pin 5 - Heater                             |                             |
| Mounting position .....                    | any                         |
| Maximum shock (intermittent service) ..... | 500g                        |

ELECTRICAL DATAInter-electrode capacitances. (Without external shield)

|            |       |        |
|------------|-------|--------|
| $C_{a-g1}$ | ..... | 0.5 pF |
| $C_{in}$   | ..... | 8.3 pF |
| $C_{out}$  | ..... | 7.0 pF |

Heater:

|         |            |            |
|---------|------------|------------|
| Voltage | (ac or dc) | 6.3 volts  |
| Current |            | 0.45 amps. |

Ratings - Absolute maximum values:Maximum heater voltage variation ....  $\pm 5\%$  of nominal value.

Maximum heater-cathode voltage:

Heater negative with respect to cathode ..... 90 volts

Heater positive with respect to cathode ..... 90 volts

Maximum anode voltage ..... 350 volts

Maximum anode dissipation ..... 13.2 watts

Maximum screen voltage ..... 310 volts

Maximum screen dissipation ..... 2.1 watts

Maximum bulb temperature (at hottest spot on bulb surface) 250°C

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN. (At Zero hours)Test conditions .....  $V_a = 250V$ ,  $V_{g3} = 0$ ,  $V_{g2} = 250V$ ,  $V_{g1} = -12.5V$ .

|                    | <u>Min.</u> | <u>Borey</u> | <u>Max.</u> |
|--------------------|-------------|--------------|-------------|
| Anode current      | 33          | 45           | 57 nA       |
| Screen current     | 3.5         | -            | 7.5 nA      |
| Mutual conductance | 3.0         | 4.1          | 5.2 nA/V.   |
| Anode impedance    |             | 50           | k $\Omega$  |

Maximum value of cathode interface resistance throughout life  
under cut-off conditions..... 10 $\Omega$

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|               |                                             |                      |
|---------------|---------------------------------------------|----------------------|
| <b>BRIMAR</b> | <b>E. I. A.</b><br><b>REGISTRATION DATA</b> | TYPE 7502            |
|               |                                             | DATE ISSUED 4.1.1961 |

TYPE 7502: HEPTODE FREQUENCY CHANGER.

The 7502 is a seven pin all glass construction heptode for use as a frequency changer up to 60 Mc/s.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note) In addition the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater-cathode voltage 240V r.m.s; applied voltages cycled 1 minute on, 3 minutes off for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

|                              |                        |                   |
|------------------------------|------------------------|-------------------|
| Outline drawing .....        | 5-2 Bulb .....         | T-5 $\frac{1}{2}$ |
| Base .....                   | E7-1 Small button..... | 7 pin             |
| Maximum diameter .....       |                        | $\frac{3}{4}$ "   |
| Maximum overall length ..... |                        | 1 $\frac{7}{8}$ " |
| Maximum seated height .....  |                        | 2 $\frac{3}{8}$ " |
| Pin connections .....        | Basing .....           | 7CH               |

|                              |                            |
|------------------------------|----------------------------|
| Pin 1 - Grid No. 1 (Osc.)    | Pin 5 - Anode              |
| Pin 2 - Cathode & Grid No. 5 | Pin 6 - Grids No.2 & No. 4 |
| Pin 3 - Heater               | Pin 7 - Grid No. 3 (sig.)  |
| Pin 4 - Heater               |                            |

|                                            |      |
|--------------------------------------------|------|
| Mounting position .....                    | any  |
| Maximum shock (intermittent service) ..... | 500g |

**BRIMAR**

E.I.A. REGISTRATION DATA (Continued)

TYPE 7502

ELECTRICAL DATAInterelectrode capacitances (Measured with external shield)

C in ..... 7.5 pF  
 C out..... 13.5 pF  
 Ca-g<sub>3</sub>..... 0.35 pF max.

Heater:

Voltage (ac or dc) 6.3 volts  
 Current 0.3 amps

Ratings - Absolute maximum values.Maximum heater voltage variation .....  $\pm 5\%$  of nominal value.

Maximum heater-cathode voltage

Heater negative with respect to cathode ..... 100 volts

Heater positive with respect to cathode ..... 100 volts

Maximum cathode current ..... 15.5 mA

Maximum anode voltage ..... 330 volts

Maximum anode dissipation ..... 1.1 watts

Maximum screen voltage ..... 110 volts

Maximum screen dissipation ..... 1.1 watts

Maximum bulb temperature (hottest spot on bulb surface).. 165°C

RANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN. (At Zero hours)Test conditions:-  $V_a = 250V$ ,  $V_{g3} = -1.5V$ ,  $V_{g2+4} = 100V$ , $I_{g1} = 0.5$  mA r.m.s.  $R_{g1} = 20K\Omega$ 

|                                 | <u>Min.</u> | <u>Bogey</u> | <u>Max.</u> |
|---------------------------------|-------------|--------------|-------------|
| Anode current                   | 1.9         | 3.0          | 4.1 mA      |
| Screen current                  | 5.2         | 7.5          | 9.8 mA      |
| Mutual conductance $g_m$ (osc.) | 5.5         | 7.25         | 9.0 mA/V    |
| Inner amplification factor      | 17          | 21           | 25          |
| Anode impedance                 |             | 1.0          | M $\Omega$  |

Maximum value of cathode interface resistance throughout life  
 under cut-off conditions ..... 10 $\Omega$

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**BRIMAR**

**E. I. A.  
REGISTRATION DATA**

TYPE 7631

DATE 10.2.61  
ISSUEDTYPE 7631: DOUBLE DIODE.

The 7631 is a seven pin all glass construction double diode suitable for clamping and pulse shaping applications.

The use of a special rugged electrode construction manufactured by means of semi-automatic assembly techniques contributes to a low catastrophic failure rate.

The cathode sleeve is made of a special alloy to inhibit the growth of cathode interface resistance during long periods of operation under cut-off conditions and the pure tungsten heater has been designed to withstand frequent heater switching (see note). In addition the heater-cathode construction and materials ensure very low levels of leakage throughout life.

The glass base and envelope strain patterns are tightly controlled during manufacture to prevent glass failures during life. Special attention is also given to the control of materials and processes to minimise variation of characteristics during life. A particular feature is the very low change in inter-electrode capacitances during life.

Note: A sample from each production lot is tested under the following elevated conditions to assess heater quality:- heater voltage 120% of nominal value: heater-cathode voltage 240V r.m.s: applied voltages cycled 1 minute on, 3 minutes off. for 100 hours.

MECHANICAL DATA

Coated unipotential cathode.

|                              |              |                    |
|------------------------------|--------------|--------------------|
|                              | Bulb .....   | T-5 $\frac{1}{2}$  |
| Base .....                   | E7-1         | Small button ..... |
| Maximum diameter .....       |              | 7 pin              |
| Maximum overall length ..... |              | $\frac{3}{4}$ "    |
| Maximum seated height .....  |              | 1 $\frac{3}{4}$ "  |
| Pin connections .....        | Basing ..... | 1 $\frac{1}{2}$ "  |
|                              |              | 6BT                |

|                 |             |                 |                 |
|-----------------|-------------|-----------------|-----------------|
| Pin 1 - Cathode | (section 1) | Pin 5 - Cathode | (section 2)     |
| Pin 2 - Anode   | (section 2) | Pin 6 -         | Internal Shield |
| Pin 3 - Heater  |             | Pin 7 - Anode   | (section 1)     |
| Pin 4 - Heater  |             |                 |                 |

Mounting position ..... any  
Maximum shock (intermittent service) ..... 500g

**BRIMAR**

E.I.A. REGISTRATION DATA (Continued)

TYPE 7631

ELECTRICAL DATAInterelectrode capacitances. Measured with external shield)

Ca-h+k+s (each section) ..... 3.2 pF

Ck-h+a+s (each section) ..... 3.2 pF

Ca' -a" ..... 0.026 pF(max)

Heater:

Voltage (ac or dc) 6.3 volts

Current 0.3 amps.

Ratings - Absolute Maximum values.Maximum heater voltage variation .....  $\pm 5\%$  of nominal value.Maximum heater cathode voltage ..... 360 volts  
(cathode positive with respect to heater)

Maximum peak inverse anode voltage ..... 360 volts

Maximum peak anode current ..... 10 mA

Maximum surge anode current ..... 350 mA

Maximum bulb temperature (at hottest spot on  
bulb surface) ..... 165°CRANGE OF CHARACTERISTIC VALUES FOR EQUIPMENT DESIGN.

(At Zero hours).

Test conditions .....  $V_a = 10V$ .Each Section.

|                                                                                           | <u>Min.</u> | <u>Bogey.</u> | <u>Max.</u> |
|-------------------------------------------------------------------------------------------|-------------|---------------|-------------|
| Anode current                                                                             | 40          | 60            | - mA        |
| Diode short circuit current<br>( $R_L = 40k\Omega$ )                                      | 2.0         | -             | 20 $\mu A$  |
| Maximum value of cathode interface resistance throughout<br>life under cut-off conditions | 10 $\Omega$ |               |             |

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**BRIMAR**

**R. E. T. M. A.  
REGISTRATION DATA**

TYPE 9BR8.DATE  
ISSUED 10th March '58.

from JETEC release #2226, June 23, 1958

TYPE 9BR8

The 9BR8 comprises two electrically independent sections - a triode and a pentode - in the 9 pin miniature construction. Both units are capable of good performance at the higher frequencies. The tube may be used as a local oscillator-pentode mixer for FM or television receivers or in the many combined functions in such receivers. The electrical characteristics are similar to those of the 9U8.

MECHANICAL DATA.

Coated unipotential cathodes - 2.

Outline drawing..... 6-2 Bulb..... T-6 $\frac{1}{2}$ 

Base..... E9-1 Miniature Button 9-pin

Maximum diameter.....  $\frac{7}{8}$ "

Maximum overall length..... 2.3/16"

Maximum seated height..... 1.15/16"

Pin Connections..... Basing

Pin 1 - Triode Grid      Pin 6 - Pentode Plate

Pin 2 - Triode Plate      Pin 7 - Pentode Grid No.2

Pin 3 - Triode Cathode      Pin 8 - Pentode Cathode, Grid No.3, Shield

Pin 4 - Heater      Pin 9 - Pentode Grid No.1

Pin 5 - Heater

Mounting position..... Any

ELECTRICAL DATA.Direct Inter-electrode Capacitances.

|                                            | With<br>Shield | Without<br>Shield |                  |
|--------------------------------------------|----------------|-------------------|------------------|
| Pentode Grid No.1 to pentode plate         | .008           | 0.015max          | $\mu\mu\text{F}$ |
| Pentode input                              | 5.0            | 5.0               | $\mu\mu\text{F}$ |
| Pentode output                             | 3.5            | 2.6               | $\mu\mu\text{F}$ |
| Triode grid to triode plate                | 1.8            | 1.8               | $\mu\mu\text{F}$ |
| Triode grid to cathode                     | 2.5            | 2.5               | $\mu\mu\text{F}$ |
| Triode plate to cathode                    | 1.0            | 0.4               | $\mu\mu\text{F}$ |
| Cathode to heater (either section) approx. | 3.0            | 3.0               | $\mu\mu\text{F}$ |

Ratings - Interpreted according to design centre system

|                                         | Triode<br>Unit | Pentode<br>Unit |       |
|-----------------------------------------|----------------|-----------------|-------|
| Heater voltage                          |                | 9.45            | volts |
| Maximum heater-cathode voltage:         |                |                 |       |
| Heater negative with respect to cathode |                |                 |       |
| Total DC and peak                       | 250            | 250             | volts |

**BRIMAR**

R.E.T.M.A. REGISTRATION DATA (CONTINUED)

TYPE 9BR8.....

|                                         | Triode<br>Unit | Pentode<br>Unit |       |
|-----------------------------------------|----------------|-----------------|-------|
| Heater positive with respect to cathode | 100            | 100             | volts |
| D.C. Total D.C. and Peak                | 200            | 200             | volts |
| Maximum plate voltage                   | 300            | 300             | volts |
| Maximum Grid No.2 voltage               |                | 300             | volts |
| Maximum plate dissipation               | 2.7            | 2.8             | watts |
| Maximum Grid No.2 dissipation           |                | 0.5             | watts |
| Maximum positive D.C. Grid No.1 voltage |                | 0               | volts |
| Maximum positive D.C. grid voltage      | 0              |                 | volts |

Typical operating conditions and characteristics.

|                                                   | Triode | Pentode |           |
|---------------------------------------------------|--------|---------|-----------|
| Heater voltage                                    | 9.45   |         | volts     |
| Heater current                                    | 300    |         | mA        |
| Plate voltage                                     | 150    | 250     | volts     |
| Grid No.2 voltage                                 |        | 110     | volts     |
| Cathode resistor                                  | 56     | 68      | ohms      |
| Transconductance                                  | 8,500  | 5,200   | $\mu$ mos |
| Grid No.1 voltage (approx.) for $I_b = 10\mu A$ . | -12    | -10     | volts     |
| Plate current                                     | 18     | 10      | mA        |
| Grid No.2 current                                 |        | 3.5     | mA        |
| Plate resistance (approx.)                        | .005   | 0.40    | megohm    |
| Amplification factor                              | 40     |         |           |

# BRIMAR

## VALVES

TYPE **9BW6**DATE  
ISSUED **9.8.50**

### R.M.A. REGISTRATION DATA

#### 9BW6

#### BEAM PENTODE

The 9BW6 is a miniature type beam power amplifier pentode similar to the type 6BW6. It is designed for use in A.C./D.C. medium power audio amplifier applications with particular reference to A.C./D.C. television receivers using a series heater chain of 0.3 amps. The use of the T-6 $\frac{1}{2}$  bulb enables the valve to meet the full rating of the 6V6C/GT.

#### MECHANICAL DATA

Coated unipotential cathode.

Outline drawing .....6-3                      Bulb .....T-6 $\frac{1}{2}$

Base .....E9-4 Miniature glass button 9-pin.

Maximum diameter ..... 7/8"

Maximum overall length ..... 2.5/8"

Maximum seated height ..... 2.3/8"

Pin connections ..... Basing No. 9AM

Pin 1 - Grid No. 1

Pin 6 - IC

Pin 2 - Grid No. 1

Pin 7 - Plate

Pin 3 - Cathode

Pin 8 - Grid No. 2

Pin 4 - Heater

Pin 9 - Grid No. 3

Pin 5 - Heater

Mounting position ..... any

#### ELECTRICAL DATA

##### Ratings

Heater voltage (ac or dc) ..... 9.45 volts

Maximum heater-cathode voltage ..... 100 volts

Maximum plate voltage ..... 315 volts

Maximum Grid No. 2 voltage ..... 285 volts

Maximum plate dissipation ..... 12 watts

Maximum Grid No. 2 dissipation ..... 2 watts

Maximum external Grid No. 1 circuit resistance-self bias ..... 0.5 megohm

Maximum external Grid No. 1 circuit resistance-fixed bias ..... 0.1 megohm

Maximum bulb temperature at any point ..... 250°C

Typical operating conditions and characteristics class A<sub>1</sub> amplifier

|                                           |       |       |                 |
|-------------------------------------------|-------|-------|-----------------|
| Heater voltage (ac or dc) .....           | 9.45  | 9.45  | 9.45 volts      |
| Heater Current .....                      | 300   | 300   | 300 mA          |
| Plate voltage .....                       | 180   | 250   | 315 volts       |
| Grid No. 3 voltage .....                  | 0     | 0     | 0 volts         |
| Grid No. 2 voltage .....                  | 180   | 250   | 225 volts       |
| Grid No. 1 voltage .....                  | -8.5  | -12.5 | -13 volts       |
| Plate resistance (approx.) .....          | 58000 | 52000 | 77000 ohms      |
| Transconductance .....                    | 3700  | 4100  | 3750 $\mu$ mhos |
| Peak a-f signal voltage .....             | 8.5   | 12.5  | 13 volts        |
| Zero signal plate current .....           | 29    | 45    | 34 mA           |
| Zero signal Grid No. 2 current .....      | 3     | 4.5   | 2.2 mA          |
| Maximum signal plate current .....        | 30    | 47    | 35 mA           |
| Maximum signal Grid No. 2 current .....   | 4     | 7     | 6 mA            |
| Load resistance .....                     | 5500  | 5000  | 8500 ohms       |
| Total harmonic distortion (approx.) ..... | 8     | 8     | 12 %            |
| Power output .....                        | 2.0   | 4.5   | 5.5 watts       |

# BRIMAR VALVES

Standard Telephones & Cables Ltd. Footscray, Sidcup, Kent, England

## JETEC TYPE 9 U 8

### TRIODE-PENTODE

The type 9U8 is identical to the type 6U8 except for heater ratings.

#### MECHANICAL DATA

Coated unipotential cathode  
Outline drawing ..... 6 - 2 Bulb ..... T - 6 $\frac{1}{2}$   
Base ..... E9 - 1 miniature glass button 9 - pin  
Maximum diameter .....  $\frac{7}{8}$ "  
Maximum overall length .....  $2\frac{3}{16}$ "  
Maximum seated height .....  $1\frac{15}{16}$ "  
Pin connections ..... 9AE  
Pin 1 - Triode Plate                      Pin 6 - Pentode Plate  
Pin 2 - Pentode Grid No. 1              Pin 7 - Pentode Cathode, Pentode  
Pin 3 - Pentode Grid No. 2              Grid No. 3, Internal Shield  
Pin 4 - Heater                              Pin 8 - Triode Cathode  
Pin 5 - Heater                              Pin 9 - Triode Grid  
Mounting position ..... Any

#### ELECTRICAL DATA

##### Direct interelectrode capacitances.

| <u>Pentode unit.</u>                       | With<br>Shield | Without<br>Shield |               |
|--------------------------------------------|----------------|-------------------|---------------|
| Grid No. 1 to plate: (g1 to p).....        | 0.006 (Max.)   | 0.01 (Max.)       | $\mu\text{F}$ |
| Input: g1 to (h + k & g3 & i.s. + g2)..... | 5              | 5                 | $\mu\text{F}$ |
| Output: p to (h + k & g3 & i.s. + g2)..... | 3.5            | 2.6               | $\mu\text{F}$ |

##### Triode Unit

|                              |     |     |               |
|------------------------------|-----|-----|---------------|
| Grid to plate: (g to p)..... | 1.8 | 1.8 | $\mu\text{F}$ |
| Input: g to (h + k) .....    | 2.5 | 2.5 | $\mu\text{F}$ |
| Output: p to (h + k) .....   | 1.0 | 0.4 | $\mu\text{F}$ |

|                                                      |   |   |               |
|------------------------------------------------------|---|---|---------------|
| Cathode to heater: (k to h) each section<br>(approx) | 3 | 3 | $\mu\text{F}$ |
|------------------------------------------------------|---|---|---------------|

##### Ratings

|                                          | Triode<br>Unit     | Pentode<br>Unit |       |
|------------------------------------------|--------------------|-----------------|-------|
| Heater voltage (ac or dc) .....          | 9.45               |                 | volts |
| Maximum heater-cathode voltage .....     | 90 (dc or peak ac) |                 | volts |
| Maximum plate voltage .....              | 300                | 300             | volts |
| Maximum grid no. 2 voltage .....         |                    | 300             | volts |
| Maximum grid no. 2 supply voltage .....  |                    | 300             | volts |
| Maximum positive dc control-grid voltage | 0                  | 0               | volts |
| Maximum plate dissipation .....          | 2.7                | 2.8             | watts |
| Maximum grid no. 2 dissipation .....     |                    | 0.5             | watt  |

Typical operating conditions and characteristics.

|                                                             | Triode<br>Unit | Pentode<br>Unit |            |
|-------------------------------------------------------------|----------------|-----------------|------------|
| Heater voltage .....                                        | 9.45           |                 | volts      |
| Heater current .....                                        | 300            |                 | mA         |
| Plate voltage .....                                         | 150            | 250             | volts      |
| Grid no. 2 voltage .....                                    | -              | 110             | volts      |
| Cathode resistor.....                                       | 56             | 68              | ohms       |
| Amplification factor.....                                   | 40             | -               |            |
| Plate resistance (approx.).....                             | 0.005          | 0.4             | megohm     |
| Transconductance .....                                      | 8500           | 5200            | $\mu$ mhos |
| Plate current .....                                         | 18             | 10              | mA         |
| Grid no. 2 current.....                                     | -              | 3.5             | mA         |
| Control-grid voltage (approx)<br>for $I_b = 10 \mu A$ ..... | -12            | -10             | volts      |